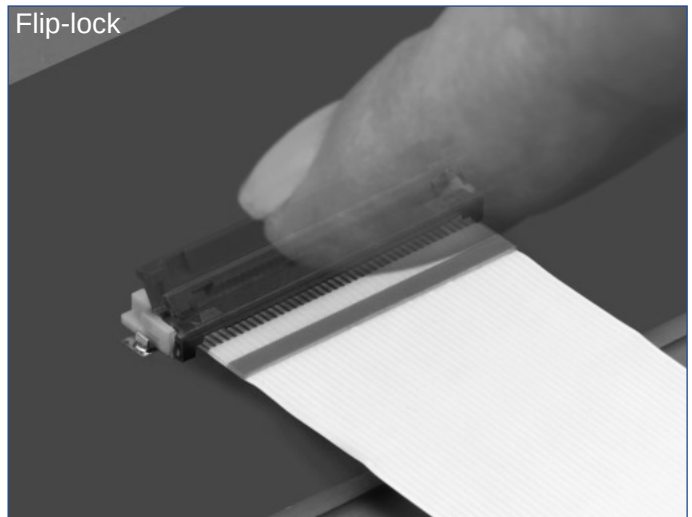
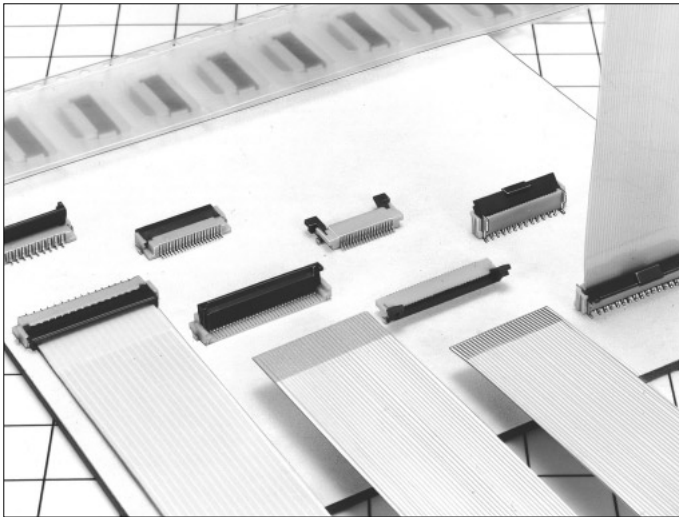


# 0.5mm and 1mm Pitch Connectors For FPC/FFC

## FH12 Series



### ■ Features

#### 1. Ease of Use and Space Savings

Only one finger or 6.9N (Newtons) of force is required to lock Hirose's rotational actuator (flip-lock) as compared to using 2 fingers and 39.2N to close a FFC/FPC connector from our competition.

The Flip-Lock design also allows customers to place 2 or more connectors side by side as there is no need to waste additional board space for a side latch.

#### 2. Strengthened Flip-lock Actuator

The standard Flip-Lock requires only 2.0mm height above the board. A strengthened lock lever is available which only requires an additional 0.4mm.

#### 3. Supports Thin FPC (0.18mm)

Hirose does not require double-sided FPC to have any additional strengthening plate or stiffener and can therefore support a thickness of as little as 0.18mm +/- 0.05.

#### 4. Hirose Ensures Reliability

Hirose's patented half tuning fork contacts maintain the required normal force without relying on the connector housing. With our competitor's conventional products the housing walls support the contact force, which does not provide for long-term reliability.

#### 5. Prevention of Solder Bridge

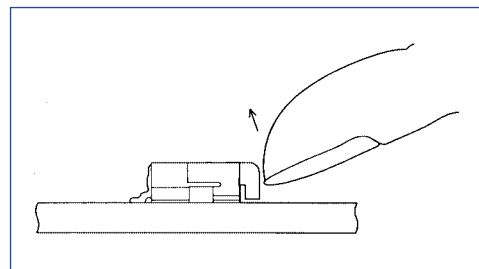
Excess solder cavity absorbs excessive solder and avoids solder bridging.

#### 6. Three different assembly types

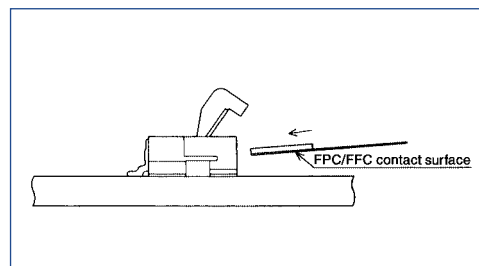
FH12 is offered in Top & Bottom Contact and Vertical Mount and offered in both a 0.5mm contact pitch as well as a 1.0mm contact pitch (bottom contact only).

### Rotating One-touch Mechanism

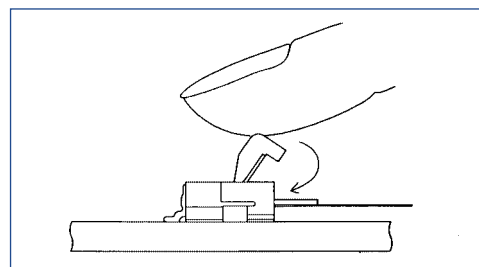
①



②



③



### ■ Applications

Notebook computers, printers, PDAs, digital cameras and other compact devices for interconnecting the main circuit board with the LCD, HDD or other device.

Product Specifications

|        |                                                   |                                                                                                                         |                                                                                                                     |
|--------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Rating | Current rating: 0.4A DC<br>Voltage rating: 50V AC | Operating Temperature Range:−40 to +70℃ (Note 1)<br>Operating Humidity Range:Relative humidity, 90% max.<br>(Not dewed) | Storage Temperature Range:−10 to +50℃ (Note 2)<br>Storage Humidity Range:Relative humidity, 90% max.<br>(Not dewed) |
|--------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|

|                |                                    |                                  |
|----------------|------------------------------------|----------------------------------|
| Applicable FPC | t=0.3±0.05 Tin-lead plated(Note 3) | t=0.18 ± 0.05 for FH12F-*S-0.5SH |
|----------------|------------------------------------|----------------------------------|

| Item                                 | Specification                                                                                                                   | Conditions                                                                                                                            |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 1. Insulation resistance             | 500M ohms minimum                                                                                                               | 100V DC                                                                                                                               |
| 2. Withstanding voltage              | No flashover or insulation breakdown.                                                                                           | 150V AC/1 minute                                                                                                                      |
| 3. Contact resistance                | 50m ohms maximum                                                                                                                | 1mA                                                                                                                                   |
| 4. Durability (Insertion/withdrawal) | Contact resistance: 50m ohms maximum<br>No damage, cracks, or parts dislocation.                                                | 20 cycles                                                                                                                             |
| 5. Vibration                         | No electrical discontinuity of 1μs or more<br>Contact resistance: 50m ohms maximum.<br>No damage, cracks, or parts dislocation. | Frequency: 10 to 55 Hz, single amplitude of 0.75 mm,<br>2 hours in each of the 3 directions.                                          |
| 6. Shock                             | No electrical discontinuity of 1μs or more<br>Contact resistance: 50m ohms maximum.<br>No damage, cracks, or parts dislocation. | Acceleration of 490 m/s², 11 ms duration,<br>sine half-wave waveform, 3 cycles in each of the 3 axis.                                 |
| 7. Humidity(Steady state)            | Contact resistance: 50m ohms maximum.<br>Insulation resistance: 50M ohms minimum.<br>No damage, cracks, or parts dislocation.   | 96 hours at temperature of 40℃ and humidity of 90% to 95%                                                                             |
| 8. Temperature Cycle                 | Contact resistance: 50m ohms maximum.<br>Insulation resistance: 50M ohms minimum.<br>No damage, cracks, or parts dislocation.   | 5 cycles under conditions as follows;<br>Temperature: −40℃ → 15 to 35℃ → 85℃ → 15 to 35℃,<br>Time: 30 → 5 max. → 30 → 5 max.(minutes) |
| 9.Resistance to Soldering heat       | No deformation of<br>components affecting performance.                                                                          | Reflow: At the recommended temperature profile<br>Manual soldering: 350±5℃ for 3 seconds                                              |

Note 1: Includes temperature rise caused by current flow.

Note 2: The term "storage" refers to products stored for long period of time prior to mounting and use. Operating Temperature Range and Humidity range covers nonconducting condition of installed connectors in storage, shipment or during transportation.

Note 3: When FPC is gold plated, the connector contacts should be also gold plated: Select the (55) specification.

Material

| Part           | Material                | Finish             | Remarks |
|----------------|-------------------------|--------------------|---------|
| Insulator      | Polyamide, LCP(60 pos.) | Color : Beige      | UL94V-0 |
|                | PPS                     | Color : Dark brown |         |
| Contact        | Phosphor bronze         | Tin-lead plated    | _____   |
| Metal Fittings | Brass                   | Tin-lead plated    |         |

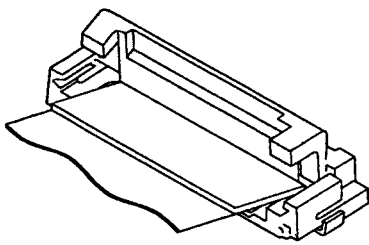
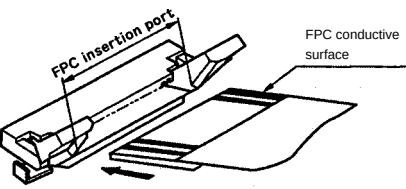
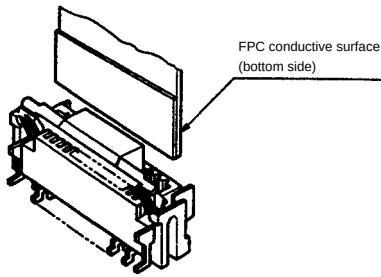
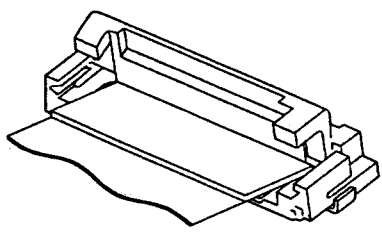
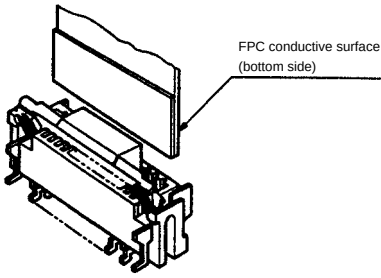
Ordering Information

FH12    A   -   10   (4)   -   S   A   -   0.5   SH   (55)

1        2        3        4        5        6        7        8        9

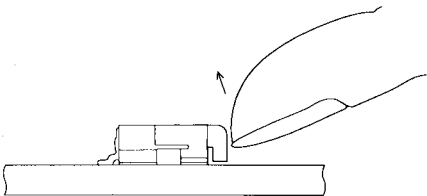
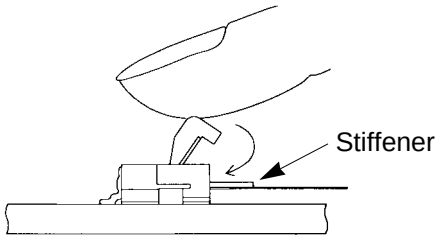
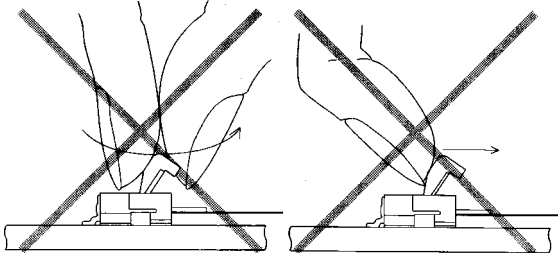
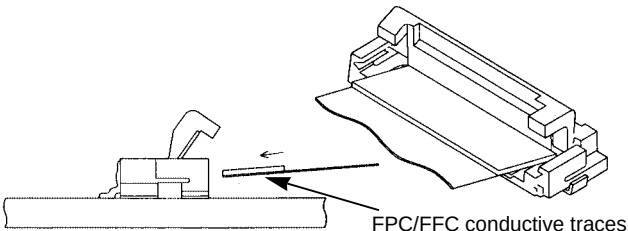
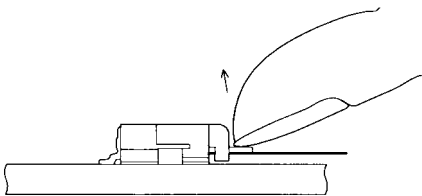
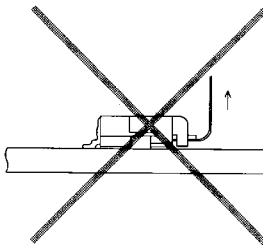
|                                                                                                                                          |                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 1 Series Name : FH12                                                                                                                     | 5 Contact alignment: Single                                                            |
| 2 Blank : standard type<br>A : Top contact type<br>S : Type with strenghted flip-lock actuator<br>F : Type with 0.18mm FPC End Thickness | 6 Eccentric direction:<br>Blank : standard type<br>A : Eccentric type                  |
| 3 Standard type : Number of contacts<br>Eccentric type : Number of contacts in 0.5mm housing                                             | 7 Contacts Pitch : 0.5mm, 1mm                                                          |
| 4 Standard type : Blank<br>Eccentric type : Number of contacts                                                                           | 8 Contact type<br>SH : SMT horizontal mounting type<br>SV : SMT vertical mounting type |
|                                                                                                                                          | 9 Plating specification<br>Blank : Tin-lead plated<br>(55) : Gold plated               |

## ◆Series Configuration

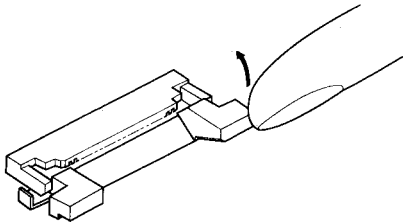
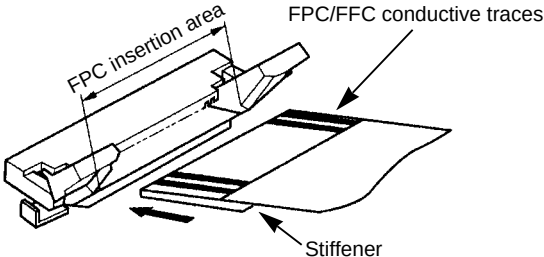
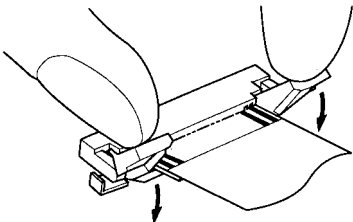
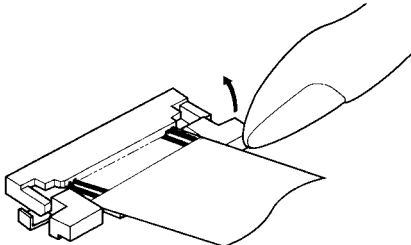
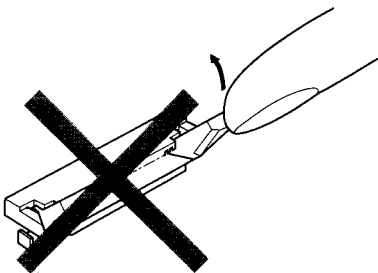
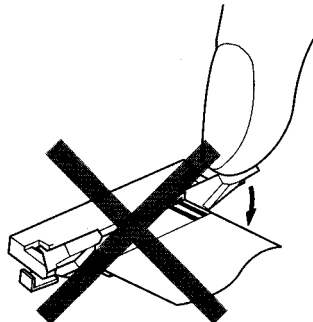
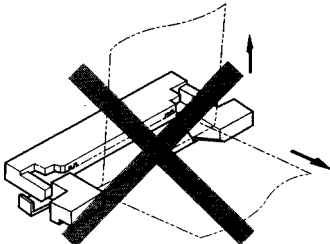
| Pitch | Bottom Contact Type                                                                                                                                                                                                                                                                                                              | Top Contact Type                                                                                                                                     | Vertical mounting Type                                                                                                                                                           |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.5mm |  <p><b>FH12- ** S-0.5SH</b> <b>P.12</b></p> <p>Number of contacts 6, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 24, 25, 26, 28, 30, 32, 33, 34, 36, 40, 45, 50, 53</p>                                                                     |                                                                    |                                                                                               |
|       | Type with Strengthened Lock Lever                                                                                                                                                                                                                                                                                                |                                                                                                                                                      |                                                                                                                                                                                  |
|       | <p><b>FH12S- ** S-0.5SH</b> <b>P.13</b></p> <p>Number of contacts 30, 40, 45, 50, 53</p>                                                                                                                                                                                                                                         |                                                                                                                                                      |                                                                                                                                                                                  |
|       | Type with 0.18mm FPC End Thickness                                                                                                                                                                                                                                                                                               |                                                                                                                                                      |                                                                                                                                                                                  |
| 1mm   | <p><b>FH12F- ** S-0.5SH</b> <b>P.14</b></p> <p>Number of contacts 6, 10, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 28, 30, 32, (33), 34, 36, 40</p>                                                                                                                                                                                | <p><b>FH12A- ** S-0.5SH</b> <b>P.15</b></p> <p>Number of contacts 10, 12, 15, 16, 18, 20, 22, 24, 26, 28, 29, 30, 32, 33, 34, 36, 40, 42, 45, 50</p> | <p><b>FH12- ** S-0.5SV</b> <b>P.16</b></p> <p>Number of contacts 10, 12, 13, 15, 16, 17, 18, 20, 22, 24, 26, 30, 32, 33, 34, 36, 40, 45, 49, 50, 60</p>                          |
|       |  <p>Standard <b>FH12- ** S-1SH</b> <b>P.18</b></p> <p>Eccentric <b>FH12- ** (**) S-1SH</b></p> <p>Standard</p> <p>Number of contacts 5, 6, 7, 8, 9, 11, 16, 22, 26</p> <p>Eccentric</p> <p>Number of contacts 4, 6, 8, 10, 11, 14, 19, 24</p> |                                                                                                                                                      |  <p><b>FH12- ** S-1SV</b> <b>P.19</b></p> <p>Number of contacts 6, 7, 8, 16, 20, 22, 24</p> |

## ◆Connector Operating Instructions, precautions and recommendations

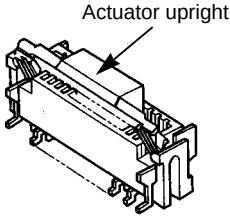
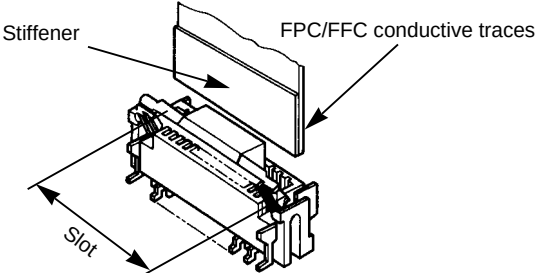
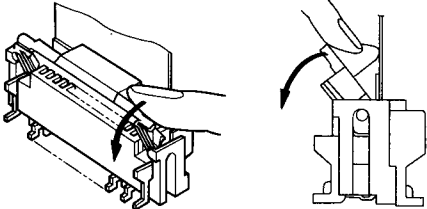
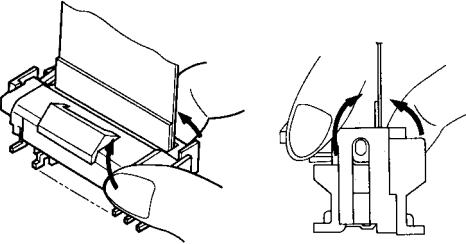
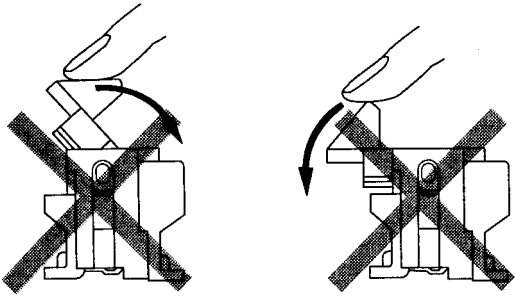
### ●Bottom Contact Type (common for 0.5mm/1mm)

| Operation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Precautions                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>1. FPC/FFC Termination procedure.</b><br/> <b>Connector installed on the board.</b></p> <p>1) Lift up the actuator. Use thumb or index finger.</p>  <p>2) Rotate down the actuator until firmly closed.<br/> It is critical that the inserted FPC/FFC is not moved and remains fully inserted. Should the FPC/FFC be moved, open the actuator and repeat the process, starting with Step 1 above.</p>  | <p>1) Avoid grasping the actuator with two fingers or lifting the actuator with fingernail.</p>  <p>2) Fully insert the FPC/FFC parallel to mounting surface, with the exposed conductive traces facing down.</p>  |
| <p><b>2. FPC/FFC Removal</b></p> <p>1) Lift up the actuator.<br/> 2) Carefully remove the FPC/FFC.</p>                                                                                                                                                                                                                                                                                                                                                                                        | <p>3) Due to the structure of the connectors, they do not have strong resistance to upward pulling; therefore, support the FPC/FFC when a pulling force is applied to it.</p>                                                                                                                       |

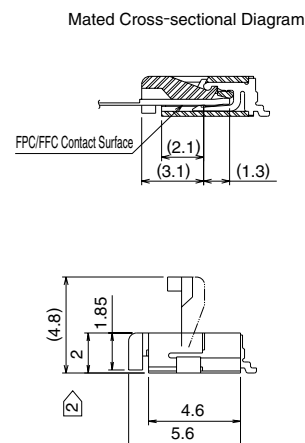
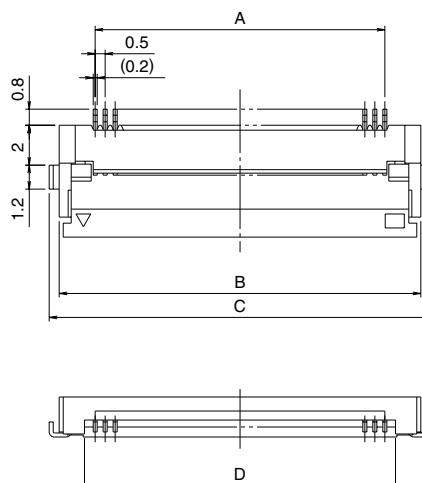
## ●Top Contact Type

| Operation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Precautions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>1. FPC/FFC Termination procedure.</b><br/> <b>Connector installed on the board.</b></p> <p>1) Lift up the actuator. Use thumb or index finger.</p>  <p>2) Fully insert the FPC/FFC parallel to mounting surface, with the exposed conductive traces facing UP.</p>  <p>3) Rotate down the actuator until firmly closed. It is critical that the inserted FPC/FFC is not moved and remains fully inserted. Should the FPC/FFC be moved, open the actuator and repeat the process, starting with Step 1 above.</p>  <p><b>2. FPC/FFC Removal</b></p> <p>1) Lift up the actuator.</p> <p>2) Carefully remove the FPC/FFC.</p>  | <p>1) Avoid forcing the actuator up or down without the FPC/FFC inserted.</p>  <p>2) When closing down the actuator apply equal pressure to both sides of the actuator.</p>  <p>3) Avoid forced pulling of the FPC. Forced pulling will cause the FPC to become disconnected or damaged.</p>  |

## ●Vertical Mounting Type

| Operation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Precautions                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>1. FPC/FFC Termination procedure. Connector installed on the board.</b></p> <p>1) Verify that the actuator is positioned upright. If the actuator has rotated to the side, carefully rotate it upright.</p>  <p>2) Insert the FPC/FFC vertically in the connector slot assuring that the conductive traces of the FPC/FFC are facing away from the actuator.</p>  <p>3) Press down the actuator in the direction shown.</p>  <p><b>2. FPC/FFC Removal</b></p> <p>Rotate the actuator upward and withdraw the FPC/FFC.</p>  | <p>1) Avoid forcing the actuator up or down without the FPC/FFC inserted.</p>  |

## ■0.5mm Pitch Bottom Contact Type



Unit:mm

| Part Number           | CL No.     | Number of Contacts | A    | B    | C    | D     |
|-----------------------|------------|--------------------|------|------|------|-------|
| FH12- 6S-0.5SH        | 586-0582-5 | 6                  | 2.5  | 6.1  | 7.1  | 3.57  |
| FH12-10S-0.5SH        | 586-0522-3 | 10                 | 4.5  | 8.1  | 9.1  | 5.57  |
| FH12-11S-0.5SH        | 586-0600-5 | 11                 | 5    | 8.6  | 9.6  | 6.07  |
| FH12-12S-0.5SH        | 586-0704-0 | 12                 | 5.5  | 9.1  | 10.1 | 6.57  |
| FH12-13S-0.5SH        | 586-0549-0 | 13                 | 6    | 9.6  | 10.6 | 7.07  |
| FH12-14S-0.5SH        | 586-0533-0 | 14                 | 6.5  | 10.1 | 11.1 | 7.57  |
| FH12-15S-0.5SH        | 586-0523-6 | 15                 | 7    | 10.6 | 11.6 | 8.07  |
| FH12-16S-0.5SH        | 586-0531-4 | 16                 | 7.5  | 11.1 | 12.1 | 8.57  |
| FH12-17S-0.5SH        | 586-0606-1 | 17                 | 8    | 11.6 | 12.6 | 9.07  |
| FH12-18S-0.5SH        | 586-0530-1 | 18                 | 8.5  | 12.1 | 13.1 | 9.57  |
| FH12-19S-0.5SH        | 586-0534-2 | 19                 | 9    | 12.6 | 13.6 | 10.07 |
| FH12-20S-0.5SH        | 586-0524-9 | 20                 | 9.5  | 13.1 | 14.1 | 10.57 |
| FH12-22S-0.5SH        | 586-0532-7 | 22                 | 10.5 | 14.1 | 15.1 | 11.57 |
| FH12-24S-0.5SH        | 586-0521-0 | 24                 | 11.5 | 15.1 | 16.1 | 12.57 |
| FH12-25S-0.5SH        | 586-0692-3 | 25                 | 12   | 15.6 | 16.6 | 13.07 |
| FH12-26S-0.5SH        | 586-0576-2 | 26                 | 12.5 | 16.1 | 17.1 | 13.57 |
| FH12-28S-0.5SH        | 586-0612-4 | 28                 | 13.5 | 17.1 | 18.1 | 14.57 |
| Note ② FH12-30S-0.5SH | 586-0525-1 | 30                 | 14.5 | 18.1 | 19.1 | 15.57 |
| FH12-32S-0.5SH        | 586-0681-7 | 32                 | 15.5 | 19.1 | 20.1 | 16.57 |
| FH12-33S-0.5SH        | 586-0520-8 | 33                 | 16   | 19.6 | 20.6 | 17.07 |
| FH12-34S-0.5SH        | 586-0617-8 | 34                 | 16.5 | 20.1 | 21.1 | 17.57 |
| FH12-36S-0.5SH        | 586-0526-4 | 36                 | 17.5 | 21.1 | 22.1 | 18.57 |
| Note ② FH12-40S-0.5SH | 586-0527-7 | 40                 | 19.5 | 23.1 | 24.1 | 20.57 |
| Note ② FH12-45S-0.5SH | 586-0528-0 | 45                 | 22   | 25.6 | 26.6 | 23.07 |
| Note ② FH12-50S-0.5SH | 586-0529-2 | 50                 | 24.5 | 28.1 | 29.1 | 25.57 |
| Note ② FH12-53S-0.5SH | 586-0595-7 | 53                 | 26   | 29.6 | 30.6 | 27.07 |

Note 1 : Embossed tape reel packaging (2,000 pieces/reel).

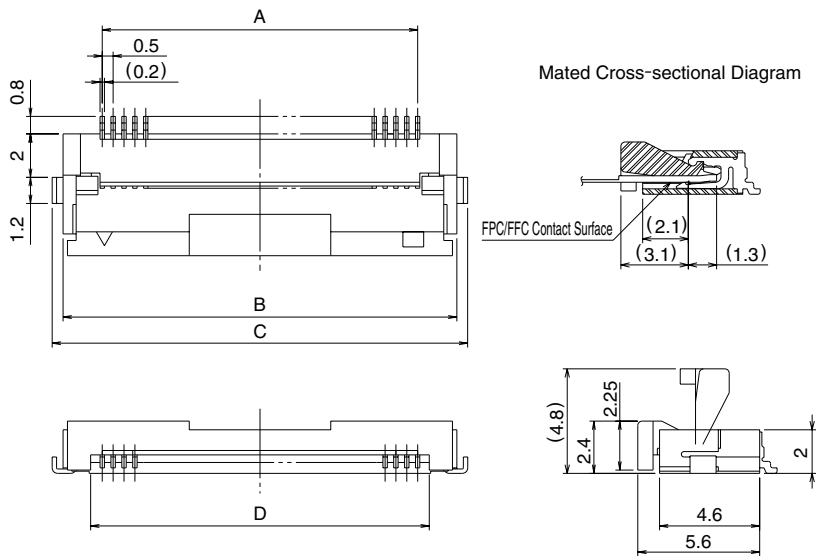
Order by number of reels.

Note ② : If there is no problem with the connector height, we recommend the type with the strengthened Flip-lock actuator (FH12S-\*S-0.5SH).

Standard type connector height: 2 mm

Connector height of type with strengthened Flip-lock actuator: 2.4 mm

# 0.5mm Pitch Bottom Contact Type with Strengthened Flip-lock Actuator



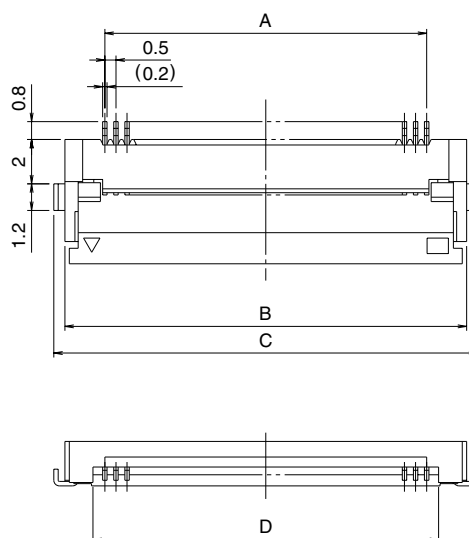
Unit:mm

| Part Number     | CL No.     | Number of Contacts | A    | B    | C    | D     |
|-----------------|------------|--------------------|------|------|------|-------|
| FH12S-30S-0.5SH | 586-0667-6 | 30                 | 14.5 | 18.1 | 19.1 | 15.57 |
| FH12S-40S-0.5SH | 586-0640-0 | 40                 | 19.5 | 23.1 | 24.1 | 20.57 |
| FH12S-45S-0.5SH | 586-0665-0 | 45                 | 22.0 | 25.6 | 26.6 | 23.07 |
| FH12S-50S-0.5SH | 586-0642-5 | 50                 | 24.5 | 28.1 | 29.1 | 25.57 |
| FH12S-53S-0.5SH | 586-0691-0 | 53                 | 26.0 | 29.6 | 30.6 | 27.07 |

Note: Embossed tape reel packaging (2,000 pieces/reel).  
Order by number of reels.

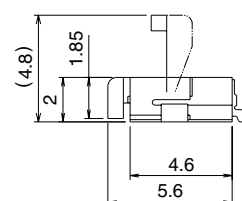
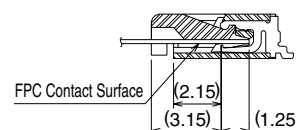


## ■0.5mm Pitch Bottom Contact Type with 0.18mm FPC End Thickness



Applicable FPC end thickness :  $0.18 \pm 0.05$

Mated Cross-sectional Diagram



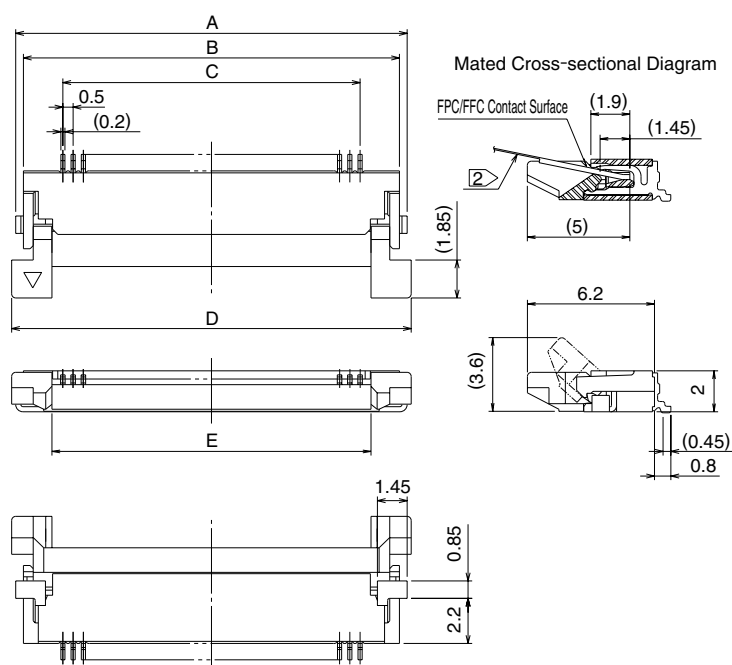
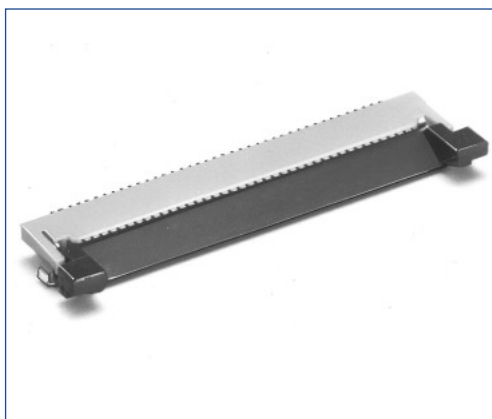
Unit:mm

| Part Number     | CL No.     | Number of Contacts | A    | B    | C    | D     |
|-----------------|------------|--------------------|------|------|------|-------|
| FH12F- 6S-0.5SH | 586-0672-6 | 6                  | 2.5  | 6.1  | 7.1  | 3.57  |
| FH12F-10S-0.5SH | 586-0709-4 | 10                 | 4.5  | 8.1  | 9.1  | 5.57  |
| FH12F-12S-0.5SH | 586-0653-1 | 12                 | 5.5  | 9.1  | 10.1 | 6.57  |
| FH12F-13S-0.5SH | 586-0629-7 | 13                 | 6.0  | 9.6  | 10.6 | 7.07  |
| FH12F-14S-0.5SH | 586-0655-7 | 14                 | 6.5  | 10.1 | 11.1 | 7.57  |
| FH12F-15S-0.5SH | 586-0680-4 | 15                 | 7.0  | 10.6 | 11.6 | 8.07  |
| FH12F-16S-0.5SH | 586-0673-9 | 16                 | 7.5  | 11.1 | 12.1 | 8.57  |
| FH12F-18S-0.5SH | 586-0626-9 | 18                 | 8.5  | 12.1 | 13.1 | 9.57  |
| FH12F-20S-0.5SH | 586-0636-2 | 20                 | 9.5  | 13.1 | 14.1 | 10.57 |
| FH12F-22S-0.5SH | 586-0630-6 | 22                 | 10.5 | 14.1 | 15.1 | 11.57 |
| FH12F-24S-0.5SH | 586-0632-1 | 24                 | 11.5 | 15.1 | 16.1 | 12.57 |
| FH12F-26S-0.5SH | 586-0627-1 | 26                 | 12.5 | 16.1 | 17.1 | 13.57 |
| FH12F-28S-0.5SH | 586-0643-8 | 28                 | 13.5 | 17.1 | 18.1 | 14.57 |
| FH12F-30S-0.5SH | 586-0628-4 | 30                 | 14.5 | 18.1 | 19.1 | 15.57 |
| FH12F-32S-0.5SH | 586-0705-3 | 32                 | 15.5 | 19.1 | 20.1 | 16.57 |
| FH12F-33S-0.5SH | —          | 33                 | 16.0 | 19.6 | 20.6 | 17.07 |
| FH12F-34S-0.5SH | 586-0677-0 | 34                 | 16.5 | 20.1 | 21.1 | 17.57 |
| FH12F-36S-0.5SH | 586-0656-0 | 36                 | 17.5 | 21.1 | 22.1 | 18.57 |
| FH12F-40S-0.5SH | 586-0635-0 | 40                 | 19.5 | 23.1 | 24.1 | 20.57 |

Note: Embossed tape reel packaging (2,000 pieces/reel).

Order by number of reels.

## ■0.5mm Pitch Top Contact Type



Unit:mm

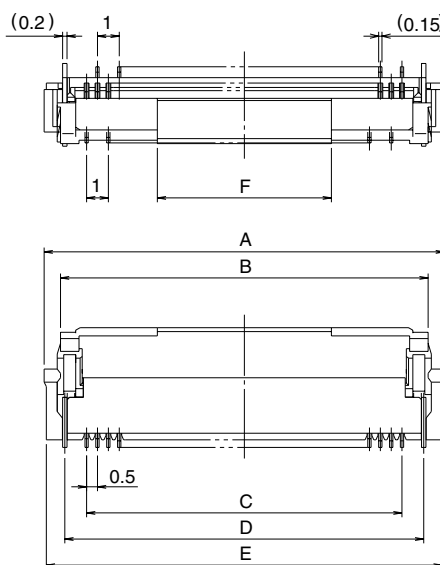
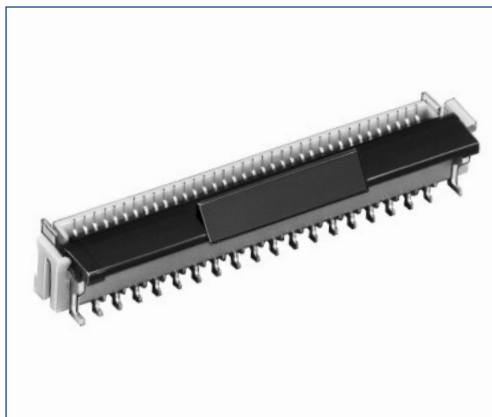
| Part Number     | CL No.     | Number of Contacts | A    | B     | C    | D    | E     |
|-----------------|------------|--------------------|------|-------|------|------|-------|
| FH12A-10S-0.5SH | 586-0550-9 | 10                 | 9.1  | 8.35  | 4.5  | 9.5  | 5.57  |
| FH12A-12S-0.5SH | 586-0696-4 | 12                 | 10.1 | 9.35  | 5.5  | 10.5 | 6.57  |
| FH12A-15S-0.5SH | 586-0551-1 | 15                 | 11.6 | 10.85 | 7.0  | 12.0 | 8.07  |
| FH12A-16S-0.5SH | 586-0552-4 | 16                 | 12.1 | 11.35 | 7.5  | 12.5 | 8.57  |
| FH12A-18S-0.5SH | 586-0553-7 | 18                 | 13.1 | 12.35 | 8.5  | 13.5 | 9.57  |
| FH12A-20S-0.5SH | 586-0554-0 | 20                 | 14.1 | 13.35 | 9.5  | 14.5 | 10.57 |
| FH12A-22S-0.5SH | 586-0686-0 | 22                 | 15.1 | 14.35 | 10.5 | 15.5 | 11.57 |
| FH12A-24S-0.5SH | 586-0555-2 | 24                 | 16.1 | 15.35 | 11.5 | 16.5 | 12.57 |
| FH12A-26S-0.5SH | 586-0663-5 | 26                 | 17.1 | 16.35 | 12.5 | 17.5 | 13.57 |
| FH12A-28S-0.5SH | 586-0725-0 | 28                 | 18.1 | 17.35 | 13.5 | 18.5 | 14.57 |
| FH12A-29S-0.5SH | 586-0585-3 | 29                 | 18.6 | 17.85 | 14.0 | 19.0 | 15.07 |
| FH12A-30S-0.5SH | 586-0556-5 | 30                 | 19.1 | 18.35 | 14.5 | 19.5 | 15.57 |
| FH12A-32S-0.5SH | 586-0687-3 | 32                 | 20.1 | 19.35 | 15.5 | 20.5 | 16.57 |
| FH12A-33S-0.5SH | 586-0570-6 | 33                 | 20.6 | 19.85 | 16.0 | 21.0 | 17.07 |
| FH12A-34S-0.5SH | 586-0670-0 | 34                 | 21.1 | 20.35 | 16.5 | 21.5 | 17.57 |
| FH12A-36S-0.5SH | 586-0662-2 | 36                 | 22.1 | 21.35 | 17.5 | 22.5 | 18.57 |
| FH12A-40S-0.5SH | 586-0557-8 | 40                 | 24.1 | 23.35 | 19.5 | 24.5 | 20.57 |
| FH12A-42S-0.5SH | 586-0698-0 | 42                 | 25.1 | 24.35 | 20.5 | 25.5 | 21.57 |
| FH12A-45S-0.5SH | 586-0558-0 | 45                 | 26.6 | 25.85 | 22.0 | 27.0 | 23.07 |
| FH12A-50S-0.5SH | 586-0559-3 | 50                 | 29.1 | 28.35 | 24.5 | 29.5 | 25.57 |

Note 1 : Embossed tape reel packaging (2,000 pieces/reel).

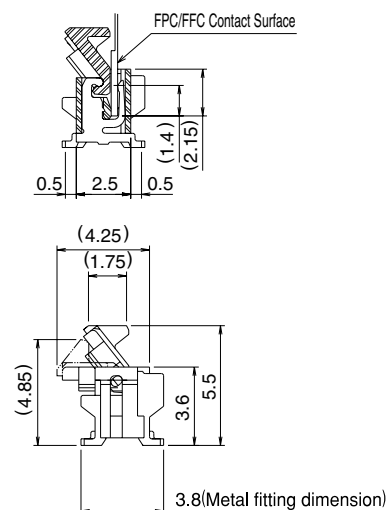
Order by number of reels.

Note②: The design is such that the FPC/FFC protrudes on an upward angle so that other parts can be mounted beneath the PFC/FFC. In view of this, please take note of the gap at the top surface of the connector.

## ■0.5mm Pitch Vertical mounting Type



Mated Cross-sectional Diagram



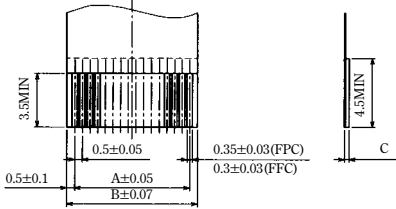
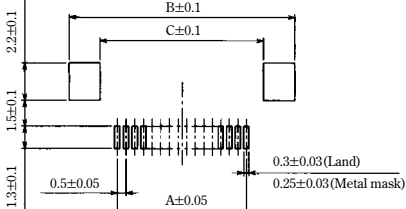
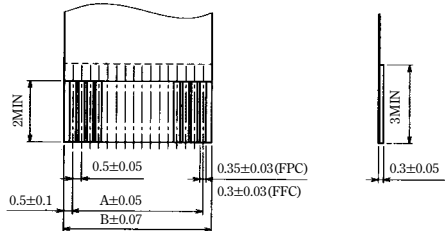
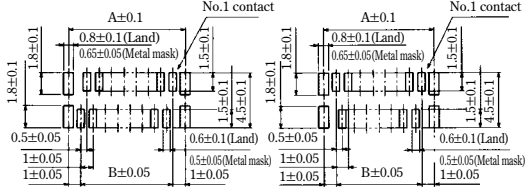
Unit:mm

| Part Number    | CL No.     | Number of Contacts | A    | B    | C    | D    | E    | F |
|----------------|------------|--------------------|------|------|------|------|------|---|
| FH12-10S-0.5SV | 586-0560-2 | 10                 | 8.4  | 6.9  | 4.5  | 6.5  | 8.2  | 4 |
| FH12-12S-0.5SV | 586-0615-2 | 12                 | 9.4  | 7.9  | 5.5  | 7.5  | 9.2  | 4 |
| FH12-13S-0.5SV | 586-0575-0 | 13                 | 9.9  | 8.4  | 6.0  | 8.0  | 9.7  | 4 |
| FH12-15S-0.5SV | 586-0561-5 | 15                 | 10.9 | 9.4  | 7.0  | 9.0  | 10.7 | 4 |
| FH12-16S-0.5SV | 586-0572-1 | 16                 | 11.4 | 9.9  | 7.5  | 9.5  | 11.2 | 4 |
| FH12-17S-0.5SV | 586-0601-8 | 17                 | 11.9 | 10.4 | 8.0  | 10.0 | 11.7 | 4 |
| FH12-18S-0.5SV | 586-0573-4 | 18                 | 12.4 | 10.9 | 8.5  | 10.5 | 12.2 | 4 |
| FH12-20S-0.5SV | 586-0562-8 | 20                 | 13.4 | 11.9 | 9.5  | 11.5 | 13.2 | 4 |
| FH12-22S-0.5SV | 586-0589-4 | 22                 | 14.4 | 12.9 | 10.5 | 12.5 | 14.2 | 8 |
| FH12-24S-0.5SV | 586-0563-0 | 24                 | 15.4 | 13.9 | 11.5 | 13.5 | 15.2 | 8 |
| FH12-26S-0.5SV | 586-0664-8 | 26                 | 16.4 | 14.9 | 12.5 | 14.5 | 16.2 | 8 |
| FH12-30S-0.5SV | 586-0564-3 | 30                 | 18.4 | 16.9 | 14.5 | 16.5 | 18.2 | 8 |
| FH12-32S-0.5SV | 586-0699-2 | 32                 | 19.4 | 17.9 | 15.5 | 17.5 | 19.2 | 8 |
| FH12-33S-0.5SV | 586-0565-6 | 33                 | 19.9 | 18.4 | 16.0 | 18.0 | 19.7 | 8 |
| FH12-34S-0.5SV | 586-0706-6 | 34                 | 20.4 | 18.9 | 16.5 | 18.5 | 20.2 | 8 |
| FH12-36S-0.5SV | 586-0641-2 | 36                 | 21.4 | 19.9 | 17.5 | 19.5 | 21.2 | 8 |
| FH12-40S-0.5SV | 586-0566-9 | 40                 | 23.4 | 21.9 | 19.5 | 21.5 | 23.2 | 8 |
| FH12-45S-0.5SV | 586-0567-1 | 45                 | 25.9 | 24.4 | 22.0 | 24.0 | 25.7 | 8 |
| FH12-49S-0.5SV | 586-0602-0 | 49                 | 27.9 | 26.4 | 24.0 | 26.0 | 27.7 | 8 |
| FH12-50S-0.5SV | 586-0568-4 | 50                 | 28.4 | 26.9 | 24.5 | 26.5 | 28.2 | 8 |
| FH12-60S-0.5SV | 586-0735-4 | 60                 | 33.4 | 31.9 | 29.5 | 31.5 | 33.2 | 8 |

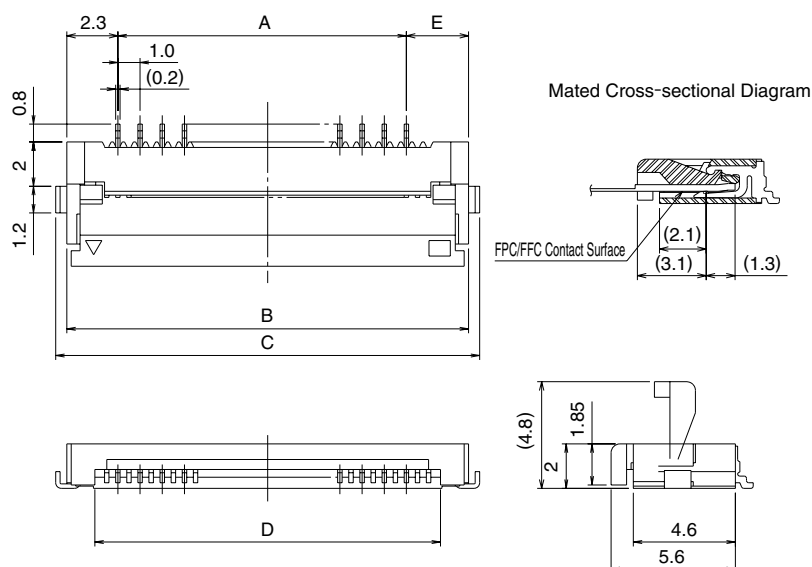
Note 1 : Embossed tape reel packaging (1,000 pieces/reel).  
Order by number of reels.

## ◆Recommended FPC/FFC dimensions and Land/Metal Mask dimensions

### ●0.5mm Pitch Product

|                                                                                    | <div>FPC/FFC dimensions</div> <div><table><tr><th>Product Type</th><th>C Dimension</th></tr><tr><td>Types other than those below</td><td>0.3±0.05min<br/>Stiffener thickness should be 0.188 mm (7.5 mil) min</td></tr><tr><td>Types with an FPC end thickness of 0.18 mm</td><td>0.18±0.05</td></tr></table></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Product Type                    | C Dimension                     | Types other than those below    | 0.3±0.05min<br>Stiffener thickness should be 0.188 mm (7.5 mil) min | Types with an FPC end thickness of 0.18 mm | 0.18±0.05 | <div>Land / Metal Mask dimensions</div> <div><p>Recommended metal mask thickness : 0.15mm</p></div> |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------------------------------------------|--------------------------------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|------|------|----|-----|-----|----|------|------|----|-----|-----|----|------|------|----|-----|-----|----|------|------|----|-----|-----|----|------|------|----|-----|-----|----|------|------|----|-----|-----|----|------|------|----|-----|------|----|------|------|----|------|------|----|------|------|----|------|------|----|------|------|----|-----|------|----|------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------|----|---------------------------------|------|----|------|------|-----|------|------|------|------|------|-----|------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-----|-----|----|---------------------------------|------|----|-----|-----|-----|------|------|----|------|------|------|------|------|------|------|-----|------|------|------|----|------|------|-----|------|------|------|------|-----|-----|------|------|----|------|------|------|------|------|------|------|------|------|------|------|----|-----|------|-----|------|------|------|------|----|-----|------|-----|----|------|------|------|----|-----|------|-----|----|------|------|------|----|-----|------|------|----|------|------|------|----|-----|------|------|----|------|------|------|----|-----|------|------|----|------|------|------|----|-----|------|------|----|------|------|------|----|------|------|------|----|------|------|------|----|------|------|------|----|------|------|------|
| Product Type                                                                       | C Dimension                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                 |                                 |                                 |                                                                     |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| Types other than those below                                                       | 0.3±0.05min<br>Stiffener thickness should be 0.188 mm (7.5 mil) min                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                 |                                 |                                 |                                                                     |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| Types with an FPC end thickness of 0.18 mm                                         | 0.18±0.05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                 |                                 |                                 |                                                                     |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| <div>0.5mm Pitch Bottom Contact Type</div> <div>0.5mm Pitch Top Contact Type</div> | <div>Unit: mm</div> <table><tr><th>Dimension<br/>Number of Contacts</th><th>A</th><th>B</th><th>Dimension<br/>Number of Contacts</th><th>A</th><th>B</th></tr><tr><td>6</td><td>2.5</td><td>3.5</td><td>25</td><td>12.0</td><td>13.0</td></tr><tr><td>10</td><td>4.5</td><td>5.5</td><td>26</td><td>12.5</td><td>13.5</td></tr><tr><td>11</td><td>5.0</td><td>6.0</td><td>28</td><td>13.5</td><td>14.5</td></tr><tr><td>12</td><td>5.5</td><td>6.5</td><td>29</td><td>14.0</td><td>15.0</td></tr><tr><td>13</td><td>6.0</td><td>7.0</td><td>30</td><td>14.5</td><td>15.5</td></tr><tr><td>14</td><td>6.5</td><td>7.5</td><td>32</td><td>15.5</td><td>16.5</td></tr><tr><td>15</td><td>7.0</td><td>8.0</td><td>33</td><td>16.0</td><td>17.0</td></tr><tr><td>16</td><td>7.5</td><td>8.5</td><td>34</td><td>16.5</td><td>17.5</td></tr><tr><td>17</td><td>8.0</td><td>9.0</td><td>36</td><td>17.5</td><td>18.5</td></tr><tr><td>18</td><td>8.5</td><td>9.5</td><td>40</td><td>19.5</td><td>20.5</td></tr><tr><td>19</td><td>9.0</td><td>10.0</td><td>42</td><td>20.5</td><td>21.5</td></tr><tr><td>20</td><td>9.5</td><td>10.5</td><td>45</td><td>22.0</td><td>23.0</td></tr><tr><td>22</td><td>10.5</td><td>11.5</td><td>50</td><td>24.5</td><td>25.5</td></tr><tr><td>24</td><td>11.5</td><td>12.5</td><td>53</td><td>26.0</td><td>27.0</td></tr></table> | Dimension<br>Number of Contacts | A                               | B                               | Dimension<br>Number of Contacts                                     | A                                          | B         | 6                                                                                                                                                                                      | 2.5 | 3.5 | 25 | 12.0 | 13.0 | 10 | 4.5 | 5.5 | 26 | 12.5 | 13.5 | 11 | 5.0 | 6.0 | 28 | 13.5 | 14.5 | 12 | 5.5 | 6.5 | 29 | 14.0 | 15.0 | 13 | 6.0 | 7.0 | 30 | 14.5 | 15.5 | 14 | 6.5 | 7.5 | 32 | 15.5 | 16.5 | 15 | 7.0 | 8.0 | 33 | 16.0 | 17.0 | 16 | 7.5 | 8.5  | 34 | 16.5 | 17.5 | 17 | 8.0  | 9.0  | 36 | 17.5 | 18.5 | 18 | 8.5  | 9.5  | 40 | 19.5 | 20.5 | 19 | 9.0 | 10.0 | 42 | 20.5 | 21.5 | 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 9.5                             | 10.5 | 45 | 22.0                            | 23.0 | 22 | 10.5 | 11.5 | 50  | 24.5 | 25.5 | 24   | 11.5 | 12.5 | 53  | 26.0 | 27.0 | <div>Unit: mm</div> <table><tr><th>Dimension<br/>Number of Contacts</th><th>A</th><th>B</th><th>C</th><th>Dimension<br/>Number of Contacts</th><th>A</th><th>B</th><th>C</th></tr><tr><td>6</td><td>2.5</td><td>8.1</td><td>4.5</td><td>25</td><td>12.0</td><td>17.6</td><td>14.0</td></tr><tr><td>10</td><td>4.5</td><td>10.1</td><td>6.5</td><td>26</td><td>12.5</td><td>18.1</td><td>14.5</td></tr><tr><td>11</td><td>5.0</td><td>10.6</td><td>7.0</td><td>28</td><td>13.5</td><td>19.1</td><td>15.5</td></tr><tr><td>12</td><td>5.5</td><td>11.1</td><td>7.5</td><td>29</td><td>14.0</td><td>19.6</td><td>16.0</td></tr><tr><td>13</td><td>6.0</td><td>11.6</td><td>8.0</td><td>30</td><td>14.5</td><td>20.1</td><td>16.5</td></tr><tr><td>14</td><td>6.5</td><td>12.1</td><td>8.5</td><td>32</td><td>15.5</td><td>21.1</td><td>17.5</td></tr><tr><td>15</td><td>7.0</td><td>12.6</td><td>9.0</td><td>33</td><td>16.0</td><td>21.6</td><td>18.0</td></tr><tr><td>16</td><td>7.5</td><td>13.1</td><td>9.5</td><td>34</td><td>16.5</td><td>22.1</td><td>18.5</td></tr><tr><td>17</td><td>8.0</td><td>13.6</td><td>10.0</td><td>36</td><td>17.5</td><td>23.1</td><td>19.5</td></tr><tr><td>18</td><td>8.5</td><td>14.1</td><td>10.5</td><td>40</td><td>19.5</td><td>25.1</td><td>21.5</td></tr><tr><td>19</td><td>9.0</td><td>14.6</td><td>11.0</td><td>42</td><td>20.5</td><td>26.1</td><td>22.5</td></tr><tr><td>20</td><td>9.5</td><td>15.1</td><td>11.5</td><td>45</td><td>22.0</td><td>27.6</td><td>24.0</td></tr><tr><td>22</td><td>10.5</td><td>16.1</td><td>12.5</td><td>50</td><td>24.5</td><td>30.1</td><td>26.5</td></tr><tr><td>24</td><td>11.5</td><td>17.1</td><td>13.5</td><td>53</td><td>26.0</td><td>31.6</td><td>28.0</td></tr></table> | Dimension<br>Number of Contacts | A   | B   | C  | Dimension<br>Number of Contacts | A    | B  | C   | 6   | 2.5 | 8.1  | 4.5  | 25 | 12.0 | 17.6 | 14.0 | 10   | 4.5  | 10.1 | 6.5  | 26  | 12.5 | 18.1 | 14.5 | 11 | 5.0  | 10.6 | 7.0 | 28   | 13.5 | 19.1 | 15.5 | 12  | 5.5 | 11.1 | 7.5  | 29 | 14.0 | 19.6 | 16.0 | 13   | 6.0  | 11.6 | 8.0  | 30   | 14.5 | 20.1 | 16.5 | 14 | 6.5 | 12.1 | 8.5 | 32   | 15.5 | 21.1 | 17.5 | 15 | 7.0 | 12.6 | 9.0 | 33 | 16.0 | 21.6 | 18.0 | 16 | 7.5 | 13.1 | 9.5 | 34 | 16.5 | 22.1 | 18.5 | 17 | 8.0 | 13.6 | 10.0 | 36 | 17.5 | 23.1 | 19.5 | 18 | 8.5 | 14.1 | 10.5 | 40 | 19.5 | 25.1 | 21.5 | 19 | 9.0 | 14.6 | 11.0 | 42 | 20.5 | 26.1 | 22.5 | 20 | 9.5 | 15.1 | 11.5 | 45 | 22.0 | 27.6 | 24.0 | 22 | 10.5 | 16.1 | 12.5 | 50 | 24.5 | 30.1 | 26.5 | 24 | 11.5 | 17.1 | 13.5 | 53 | 26.0 | 31.6 | 28.0 |
| Dimension<br>Number of Contacts                                                    | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | B                               | Dimension<br>Number of Contacts | A                               | B                                                                   |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 6                                                                                  | 2.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 3.5                             | 25                              | 12.0                            | 13.0                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 10                                                                                 | 4.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 5.5                             | 26                              | 12.5                            | 13.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 11                                                                                 | 5.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 6.0                             | 28                              | 13.5                            | 14.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 12                                                                                 | 5.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 6.5                             | 29                              | 14.0                            | 15.0                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 13                                                                                 | 6.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 7.0                             | 30                              | 14.5                            | 15.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 14                                                                                 | 6.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 7.5                             | 32                              | 15.5                            | 16.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 15                                                                                 | 7.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 8.0                             | 33                              | 16.0                            | 17.0                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 16                                                                                 | 7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 8.5                             | 34                              | 16.5                            | 17.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 17                                                                                 | 8.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 9.0                             | 36                              | 17.5                            | 18.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 18                                                                                 | 8.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 9.5                             | 40                              | 19.5                            | 20.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 19                                                                                 | 9.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 10.0                            | 42                              | 20.5                            | 21.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 20                                                                                 | 9.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 10.5                            | 45                              | 22.0                            | 23.0                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 22                                                                                 | 10.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 11.5                            | 50                              | 24.5                            | 25.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 24                                                                                 | 11.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 12.5                            | 53                              | 26.0                            | 27.0                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| Dimension<br>Number of Contacts                                                    | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | B                               | C                               | Dimension<br>Number of Contacts | A                                                                   | B                                          | C         |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 6                                                                                  | 2.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 8.1                             | 4.5                             | 25                              | 12.0                                                                | 17.6                                       | 14.0      |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 10                                                                                 | 4.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 10.1                            | 6.5                             | 26                              | 12.5                                                                | 18.1                                       | 14.5      |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 11                                                                                 | 5.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 10.6                            | 7.0                             | 28                              | 13.5                                                                | 19.1                                       | 15.5      |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 12                                                                                 | 5.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 11.1                            | 7.5                             | 29                              | 14.0                                                                | 19.6                                       | 16.0      |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 13                                                                                 | 6.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 11.6                            | 8.0                             | 30                              | 14.5                                                                | 20.1                                       | 16.5      |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 14                                                                                 | 6.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 12.1                            | 8.5                             | 32                              | 15.5                                                                | 21.1                                       | 17.5      |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 15                                                                                 | 7.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 12.6                            | 9.0                             | 33                              | 16.0                                                                | 21.6                                       | 18.0      |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 16                                                                                 | 7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 13.1                            | 9.5                             | 34                              | 16.5                                                                | 22.1                                       | 18.5      |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 17                                                                                 | 8.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 13.6                            | 10.0                            | 36                              | 17.5                                                                | 23.1                                       | 19.5      |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 18                                                                                 | 8.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 14.1                            | 10.5                            | 40                              | 19.5                                                                | 25.1                                       | 21.5      |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 19                                                                                 | 9.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 14.6                            | 11.0                            | 42                              | 20.5                                                                | 26.1                                       | 22.5      |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 20                                                                                 | 9.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 15.1                            | 11.5                            | 45                              | 22.0                                                                | 27.6                                       | 24.0      |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 22                                                                                 | 10.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 16.1                            | 12.5                            | 50                              | 24.5                                                                | 30.1                                       | 26.5      |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 24                                                                                 | 11.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 17.1                            | 13.5                            | 53                              | 26.0                                                                | 31.6                                       | 28.0      |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| <div>0.5mm Pitch Vertical Mounting Type</div>                                      | <div><p>*Set the stiffener thickness to 0.188 (7.5mil) min.</p></div> <div>Unit: mm</div> <table><tr><th>Dimension<br/>Number of Contacts</th><th>A</th><th>B</th><th>Dimension<br/>Number of Contacts</th><th>A</th><th>B</th></tr><tr><td>10</td><td>4.5</td><td>5.5</td><td>26</td><td>12.5</td><td>13.5</td></tr><tr><td>12</td><td>5.5</td><td>6.5</td><td>30</td><td>14.5</td><td>15.5</td></tr><tr><td>13</td><td>6.0</td><td>7.0</td><td>32</td><td>15.5</td><td>16.5</td></tr><tr><td>15</td><td>7.0</td><td>8.0</td><td>33</td><td>16.0</td><td>17.0</td></tr><tr><td>16</td><td>7.5</td><td>8.5</td><td>34</td><td>16.5</td><td>17.5</td></tr><tr><td>17</td><td>8.0</td><td>9.0</td><td>36</td><td>17.5</td><td>18.5</td></tr><tr><td>18</td><td>8.5</td><td>9.5</td><td>40</td><td>19.5</td><td>20.5</td></tr><tr><td>20</td><td>9.5</td><td>10.5</td><td>45</td><td>22.0</td><td>23.0</td></tr><tr><td>22</td><td>10.5</td><td>11.5</td><td>49</td><td>24.0</td><td>25.0</td></tr><tr><td>24</td><td>11.5</td><td>12.5</td><td>50</td><td>24.5</td><td>25.5</td></tr><tr><td></td><td></td><td></td><td>60</td><td>29.5</td><td>30.5</td></tr></table>                                                                                                   | Dimension<br>Number of Contacts | A                               | B                               | Dimension<br>Number of Contacts                                     | A                                          | B         | 10                                                                                                                                                                                     | 4.5 | 5.5 | 26 | 12.5 | 13.5 | 12 | 5.5 | 6.5 | 30 | 14.5 | 15.5 | 13 | 6.0 | 7.0 | 32 | 15.5 | 16.5 | 15 | 7.0 | 8.0 | 33 | 16.0 | 17.0 | 16 | 7.5 | 8.5 | 34 | 16.5 | 17.5 | 17 | 8.0 | 9.0 | 36 | 17.5 | 18.5 | 18 | 8.5 | 9.5 | 40 | 19.5 | 20.5 | 20 | 9.5 | 10.5 | 45 | 22.0 | 23.0 | 22 | 10.5 | 11.5 | 49 | 24.0 | 25.0 | 24 | 11.5 | 12.5 | 50 | 24.5 | 25.5 |    |     |      | 60 | 29.5 | 30.5 | <div><p>Even contact number      Odd contact number</p><p>Recommended metal mask thickness : 0.15mm</p></div> <div>Unit: mm</div> <table><tr><th>Dimension<br/>Number of Contacts</th><th>A</th><th>B</th><th>Dimension<br/>Number of Contacts</th><th>A</th><th>B</th></tr><tr><td>10</td><td>6.5</td><td>4.5</td><td>26</td><td>14.5</td><td>12.5</td></tr><tr><td>12</td><td>7.5</td><td>5.5</td><td>30</td><td>16.5</td><td>14.5</td></tr><tr><td>13</td><td>8.0</td><td>6.0</td><td>32</td><td>17.5</td><td>15.5</td></tr><tr><td>15</td><td>9.0</td><td>7.0</td><td>33</td><td>18.0</td><td>16.0</td></tr><tr><td>16</td><td>9.5</td><td>7.5</td><td>34</td><td>18.5</td><td>16.5</td></tr><tr><td>17</td><td>10.0</td><td>8.0</td><td>36</td><td>19.5</td><td>17.5</td></tr><tr><td>18</td><td>10.5</td><td>8.5</td><td>40</td><td>21.5</td><td>19.5</td></tr><tr><td>20</td><td>11.5</td><td>9.5</td><td>45</td><td>24.0</td><td>22.0</td></tr><tr><td>22</td><td>12.5</td><td>10.5</td><td>49</td><td>26.0</td><td>24.0</td></tr><tr><td>24</td><td>13.5</td><td>11.5</td><td>50</td><td>26.5</td><td>24.5</td></tr><tr><td></td><td></td><td></td><td>60</td><td>31.5</td><td>29.5</td></tr></table> | Dimension<br>Number of Contacts | A    | B  | Dimension<br>Number of Contacts | A    | B  | 10   | 6.5  | 4.5 | 26   | 14.5 | 12.5 | 12   | 7.5  | 5.5 | 30   | 16.5 | 14.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 13                              | 8.0 | 6.0 | 32 | 17.5                            | 15.5 | 15 | 9.0 | 7.0 | 33  | 18.0 | 16.0 | 16 | 9.5  | 7.5  | 34   | 18.5 | 16.5 | 17   | 10.0 | 8.0 | 36   | 19.5 | 17.5 | 18 | 10.5 | 8.5  | 40  | 21.5 | 19.5 | 20   | 11.5 | 9.5 | 45  | 24.0 | 22.0 | 22 | 12.5 | 10.5 | 49   | 26.0 | 24.0 | 24   | 13.5 | 11.5 | 50   | 26.5 | 24.5 |    |     |      | 60  | 31.5 | 29.5 |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| Dimension<br>Number of Contacts                                                    | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | B                               | Dimension<br>Number of Contacts | A                               | B                                                                   |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 10                                                                                 | 4.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 5.5                             | 26                              | 12.5                            | 13.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 12                                                                                 | 5.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 6.5                             | 30                              | 14.5                            | 15.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 13                                                                                 | 6.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 7.0                             | 32                              | 15.5                            | 16.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 15                                                                                 | 7.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 8.0                             | 33                              | 16.0                            | 17.0                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 16                                                                                 | 7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 8.5                             | 34                              | 16.5                            | 17.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 17                                                                                 | 8.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 9.0                             | 36                              | 17.5                            | 18.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 18                                                                                 | 8.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 9.5                             | 40                              | 19.5                            | 20.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 20                                                                                 | 9.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 10.5                            | 45                              | 22.0                            | 23.0                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 22                                                                                 | 10.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 11.5                            | 49                              | 24.0                            | 25.0                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 24                                                                                 | 11.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 12.5                            | 50                              | 24.5                            | 25.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                 | 60                              | 29.5                            | 30.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| Dimension<br>Number of Contacts                                                    | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | B                               | Dimension<br>Number of Contacts | A                               | B                                                                   |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 10                                                                                 | 6.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 4.5                             | 26                              | 14.5                            | 12.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 12                                                                                 | 7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 5.5                             | 30                              | 16.5                            | 14.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 13                                                                                 | 8.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 6.0                             | 32                              | 17.5                            | 15.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 15                                                                                 | 9.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 7.0                             | 33                              | 18.0                            | 16.0                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 16                                                                                 | 9.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 7.5                             | 34                              | 18.5                            | 16.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 17                                                                                 | 10.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 8.0                             | 36                              | 19.5                            | 17.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 18                                                                                 | 10.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 8.5                             | 40                              | 21.5                            | 19.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 20                                                                                 | 11.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 9.5                             | 45                              | 24.0                            | 22.0                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 22                                                                                 | 12.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 10.5                            | 49                              | 26.0                            | 24.0                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
| 24                                                                                 | 13.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 11.5                            | 50                              | 26.5                            | 24.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |
|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                 | 60                              | 31.5                            | 29.5                                                                |                                            |           |                                                                                                                                                                                        |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |     |    |      |      |    |     |      |    |      |      |    |      |      |    |      |      |    |      |      |    |      |      |    |     |      |    |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |      |    |                                 |      |    |      |      |     |      |      |      |      |      |     |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |     |     |    |                                 |      |    |     |     |     |      |      |    |      |      |      |      |      |      |      |     |      |      |      |    |      |      |     |      |      |      |      |     |     |      |      |    |      |      |      |      |      |      |      |      |      |      |      |    |     |      |     |      |      |      |      |    |     |      |     |    |      |      |      |    |     |      |     |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |     |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |    |      |      |      |

## ■1mm Pitch Type Bottom Contact Type



|                | Part Number       | CL No.     | Number of Contacts | A  | B    | C    | D     | E   |
|----------------|-------------------|------------|--------------------|----|------|------|-------|-----|
| Standard type  | FH12- 5S-1SH      | 586-0591-6 | 5                  | 4  | 8.6  | 9.6  | 6.07  | 2.3 |
|                | FH12- 6S-1SH      | 586-0607-4 | 6                  | 5  | 9.6  | 10.6 | 7.07  | 2.3 |
|                | FH12- 7S-1SH      | 586-0535-5 | 7                  | 6  | 10.6 | 11.6 | 8.07  | 2.3 |
|                | FH12- 8S-1SH      | 586-0579-0 | 8                  | 7  | 11.6 | 12.6 | 9.07  | 2.3 |
|                | FH12- 9S-1SH      | 586-0540-5 | 9                  | 8  | 12.6 | 13.6 | 10.07 | 2.3 |
|                | FH12-11S-1SH      | 586-0668-9 | 11                 | 10 | 14.6 | 15.6 | 12.07 | 2.3 |
|                | FH12-16S-1SH      | 586-0536-8 | 16                 | 15 | 19.6 | 20.6 | 17.07 | 2.3 |
|                | FH12-22S-1SH      | 586-0547-4 | 22                 | 21 | 25.6 | 26.6 | 23.07 | 2.3 |
|                | FH12-26S-1SH      | 586-0592-9 | 26                 | 25 | 29.6 | 30.6 | 27.07 | 2.3 |
| Eccentric type | FH12-10(4)SA-1SH  | 586-0537-0 | 4                  | 3  | 8.1  | 9.1  | 5.57  | 2.8 |
|                | FH12-14(6)SA-1SH  | 586-0538-3 | 6                  | 5  | 10.1 | 11.1 | 7.57  | 2.8 |
|                | FH12-18(8)SA-1SH  | 586-0539-6 | 8                  | 7  | 12.1 | 13.1 | 9.57  | 2.8 |
|                | FH12-22(10)SA-1SH | 586-0541-8 | 10                 | 9  | 14.1 | 15.1 | 11.57 | 2.8 |
|                | FH12-24(11)SA-1SH | 586-0542-0 | 11                 | 10 | 15.1 | 16.1 | 12.57 | 2.8 |
|                | FH12-30(14)SA-1SH | 586-0543-3 | 14                 | 13 | 18.1 | 19.1 | 15.57 | 2.8 |
|                | FH12-40(19)SA-1SH | 586-0546-1 | 19                 | 18 | 23.1 | 24.1 | 20.57 | 2.8 |
|                | FH12-50(24)SA-1SH | 586-0548-7 | 24                 | 23 | 28.1 | 29.1 | 25.57 | 2.8 |

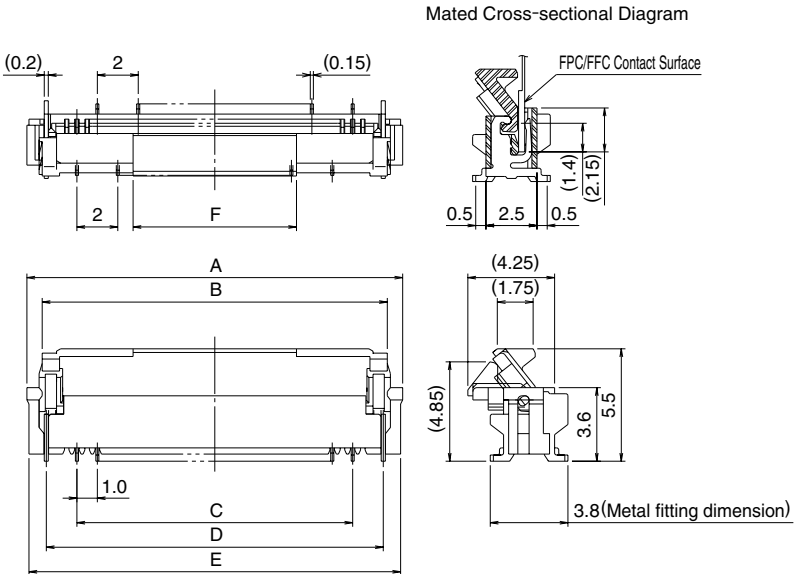
Note 1: Embossed tape reel packaging (2,000 pieces/reel).

Order by number of reels.

Note 2: The 1mm version of FH12 is constructed by loading every other contact into the 0.5mm housing. When a housing designed for an odd number of 0.5mm pitch contacts is used; the spacing from the edge to the first contact on either side is the same as the distance between each contact, 1.0mm. Hirose considers this design to be a **standard-type 1.0mm** connector.

An **eccentric-type** connector using a housing designed for an even number of 0.5mm pitch contacts and consequently one side has 1.5mm distance from the edge to the first contact. (See FPC/FFC dimensional drawing on page 19) The part number for the eccentric type describes the size of the 0.5mm housing used and lists the number of 1.0mm pitch contacts in parentheses ( ) as shown in the above table.

# 1mm Pitch Vertical Mounting Type



Unit:mm

| Part Number  | CL No.     | Number of Contacts | A    | B    | C  | D  | E    | F |
|--------------|------------|--------------------|------|------|----|----|------|---|
| FH12- 6S-1SV | 586-0605-9 | 6                  | 9.9  | 8.4  | 5  | 8  | 9.7  | 4 |
| FH12- 7S-1SV | 586-0610-9 | 7                  | 10.9 | 9.4  | 6  | 9  | 10.7 | 4 |
| FH12- 8S-1SV | 586-0593-1 | 8                  | 11.9 | 10.4 | 7  | 10 | 11.7 | 4 |
| FH12-16S-1SV | 586-0574-7 | 16                 | 19.9 | 18.4 | 15 | 18 | 19.7 | 8 |
| FH12-20S-1SV | 586-0634-7 | 20                 | 23.9 | 22.4 | 19 | 22 | 23.7 | 8 |
| FH12-22S-1SV | 586-0584-0 | 22                 | 25.9 | 24.4 | 21 | 24 | 25.7 | 8 |
| FH12-24S-1SV | 586-0594-4 | 24                 | 27.9 | 26.4 | 23 | 26 | 27.7 | 8 |

Note: Embossed tape reel packaging (1,000 pieces/reel).  
Order by number of reels.

## ●1mm Pitch Product

1mm Pitch  
Bottom Contact  
Type

FPC/FFC dimensions

※Set the stiffener thickness to 0.188 (7.5mil) min.

Unit: mm

| Dimension<br>Number of Contacts | A  | B  | C |
|---------------------------------|----|----|---|
| 5                               | 4  | 6  | 1 |
| 6                               | 5  | 7  | 1 |
| 7                               | 6  | 8  | 1 |
| 8                               | 7  | 9  | 1 |
| 9                               | 8  | 10 | 1 |
| 11                              | 10 | 12 | 1 |
| 16                              | 15 | 17 | 1 |
| 22                              | 21 | 23 | 1 |
| 26                              | 25 | 27 | 1 |

| Dimension<br>Number of Contacts | A  | B    | C   |
|---------------------------------|----|------|-----|
| 4                               | 3  | 5.5  | 1.5 |
| 6                               | 5  | 7.5  | 1.5 |
| 8                               | 7  | 9.5  | 1.5 |
| 10                              | 9  | 11.5 | 1.5 |
| 11                              | 10 | 12.5 | 1.5 |
| 14                              | 13 | 15.5 | 1.5 |
| 19                              | 18 | 20.5 | 1.5 |
| 24                              | 23 | 25.5 | 1.5 |

Land / Metal Mask dimensions

Recommended metal mask thickness : 0.15mm

Unit: mm

| Dimension<br>Number of Contacts | A  | B    | C  | D   |
|---------------------------------|----|------|----|-----|
| 5                               | 4  | 10.6 | 7  | 1.5 |
| 6                               | 5  | 11.6 | 8  | 1.5 |
| 7                               | 6  | 12.6 | 9  | 1.5 |
| 8                               | 7  | 13.6 | 10 | 1.5 |
| 9                               | 8  | 14.6 | 11 | 1.5 |
| 11                              | 10 | 16.6 | 13 | 1.5 |
| 16                              | 15 | 21.6 | 18 | 1.5 |
| 22                              | 21 | 27.6 | 24 | 1.5 |
| 26                              | 25 | 31.6 | 28 | 1.5 |

| Dimension<br>Number of Contacts | A  | B    | C    | D |
|---------------------------------|----|------|------|---|
| 4                               | 3  | 10.1 | 6.5  | 2 |
| 6                               | 5  | 12.1 | 8.5  | 2 |
| 8                               | 7  | 14.1 | 10.5 | 2 |
| 10                              | 9  | 16.1 | 12.5 | 2 |
| 11                              | 10 | 17.1 | 13.5 | 2 |
| 14                              | 13 | 20.1 | 16.5 | 2 |
| 19                              | 18 | 25.1 | 21.5 | 2 |
| 24                              | 23 | 30.1 | 26.5 | 2 |

1mm Pitch  
Vertical  
Mounting Type

※Set the stiffener thickness to 0.188 (7.5mil) min.

Unit: mm

| Dimension<br>Number of Contacts | A  | B  |
|---------------------------------|----|----|
| 6                               | 5  | 7  |
| 7                               | 6  | 8  |
| 8                               | 7  | 9  |
| 16                              | 15 | 17 |
| 20                              | 19 | 21 |
| 22                              | 21 | 23 |
| 24                              | 23 | 25 |

Recommended metal mask thickness : 0.15mm

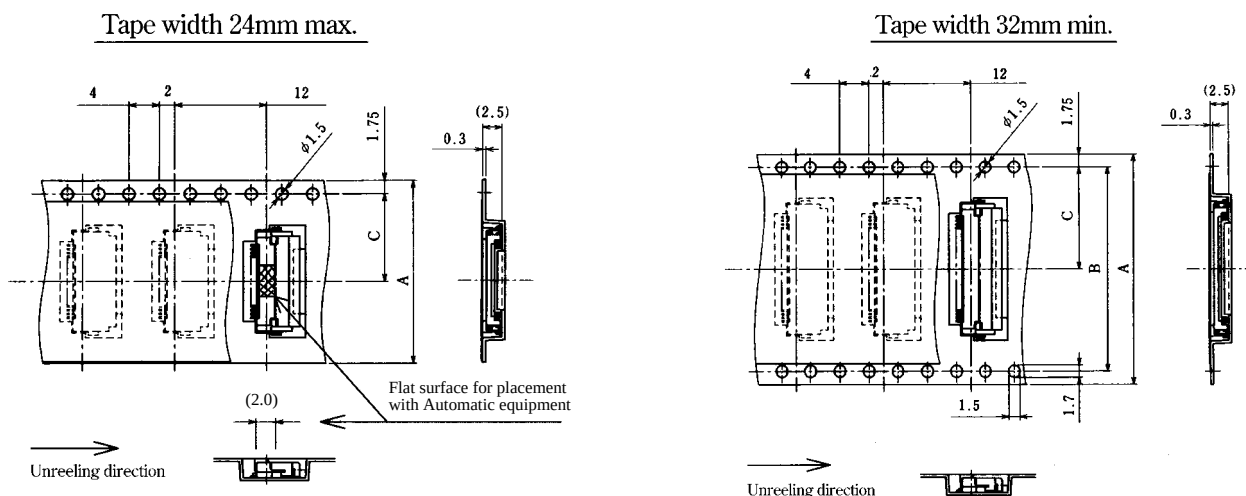
Unit: mm

| Dimension<br>Number of Contacts | A  | B  |
|---------------------------------|----|----|
| 6                               | 8  | 5  |
| 7                               | 9  | 6  |
| 8                               | 10 | 7  |
| 16                              | 18 | 15 |
| 20                              | 22 | 19 |
| 22                              | 24 | 21 |
| 24                              | 26 | 23 |

## ◆ Packaging Specification

### Embossed Carrier Tape Dimensions

#### Horizontal Type (Common to Bottom/Top Contact, 0.5mm/1mm Pitch)



#### ● 0.5mm Pitch Bottom/Top Contact Type

Unit:mm

| Dimension<br>Number of Contacts | A  | B | C    | D    |
|---------------------------------|----|---|------|------|
| 6                               | 16 | — | 7.5  | 16.5 |
| 10                              | 16 | — | 7.5  | 16.5 |
| 11                              | 16 | — | 7.5  | 16.5 |
| 12                              | 24 | — | 11.5 | 24.5 |
| 13                              | 24 | — | 11.5 | 24.5 |
| 14                              | 24 | — | 11.5 | 24.5 |
| 15                              | 24 | — | 11.5 | 24.5 |
| 16                              | 24 | — | 11.5 | 24.5 |
| 17                              | 24 | — | 11.5 | 24.5 |
| 18                              | 24 | — | 11.5 | 24.5 |
| 19                              | 24 | — | 11.5 | 24.5 |
| 20                              | 24 | — | 11.5 | 24.5 |
| 22                              | 24 | — | 11.5 | 24.5 |
| 24                              | 24 | — | 11.5 | 24.5 |

| Dimension<br>Number of Contacts | A  | B    | C    | D    |
|---------------------------------|----|------|------|------|
| 25                              | 24 | —    | 11.5 | 24.5 |
| 26                              | 24 | —    | 11.5 | 24.5 |
| 28                              | 32 | 28.4 | 14.2 | 32.5 |
| 29                              | 32 | 28.4 | 14.2 | 32.5 |
| 30                              | 32 | 28.4 | 14.2 | 32.5 |
| 32                              | 32 | 28.4 | 14.2 | 32.5 |
| 33                              | 32 | 28.4 | 14.2 | 32.5 |
| 34                              | 32 | 28.4 | 14.2 | 32.5 |
| 36                              | 44 | 40.4 | 20.2 | 44.5 |
| 40                              | 44 | 40.4 | 20.2 | 44.5 |
| 42                              | 44 | 40.4 | 20.2 | 44.5 |
| 45                              | 44 | 40.4 | 20.2 | 44.5 |
| 50                              | 44 | 40.4 | 20.2 | 44.5 |
| 53                              | 44 | 40.4 | 20.2 | 44.5 |

Note: 2,000 pieces per reel.

#### ● 1mm Pitch Bottom Contact Type

Unit:mm

| Dimension<br>Number of Contacts | A  | B    | C    | D    |
|---------------------------------|----|------|------|------|
| 5                               | 16 | —    | 7.5  | 16.5 |
| 6                               | 24 | —    | 11.5 | 24.5 |
| 7                               | 24 | —    | 11.5 | 24.5 |
| 8                               | 24 | —    | 11.5 | 24.5 |
| 9                               | 24 | —    | 11.5 | 24.5 |
| 11                              | 24 | —    | 11.5 | 24.5 |
| 16                              | 32 | 28.4 | 14.2 | 32.5 |
| 22                              | 44 | 40.4 | 20.2 | 44.5 |
| 26                              | 44 | 40.4 | 20.2 | 44.5 |

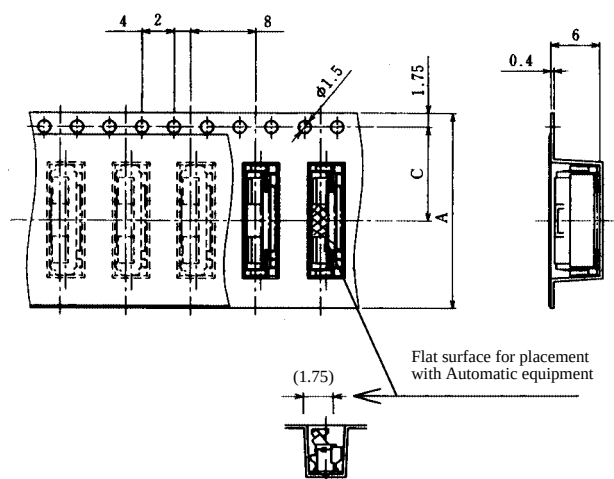
| Dimension<br>Number of Contacts | A  | B    | C    | D    |
|---------------------------------|----|------|------|------|
| 4                               | 16 | —    | 7.5  | 16.5 |
| 6                               | 24 | —    | 11.5 | 24.5 |
| 8                               | 24 | —    | 11.5 | 24.5 |
| 10                              | 24 | —    | 11.5 | 24.5 |
| 11                              | 24 | —    | 11.5 | 24.5 |
| 14                              | 32 | 28.4 | 14.2 | 32.5 |
| 19                              | 44 | 40.4 | 20.2 | 44.5 |
| 24                              | 44 | 40.4 | 20.2 | 44.5 |

Note: 2,000 pieces per reel.

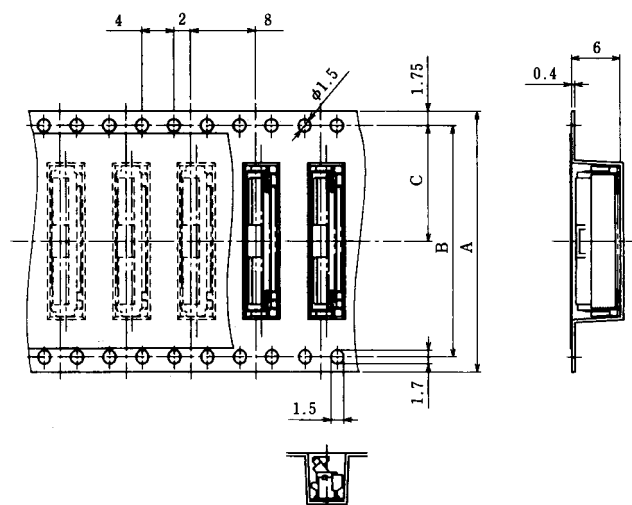


## Vertical Mounting Type (Common to 0.5mm/1mm Pitch)

Tape width 24mm max.



Tape width 32mm min.



### ●0.5mm Pitch Vertical mounting Type

Unit:mm

| Dimension<br>Number of Contacts | A  | B | C    | D    |
|---------------------------------|----|---|------|------|
| 10                              | 16 | — | 7.5  | 16.5 |
| 12                              | 16 | — | 7.5  | 16.5 |
| 13                              | 24 | — | 11.5 | 24.5 |
| 15                              | 24 | — | 11.5 | 24.5 |
| 16                              | 24 | — | 11.5 | 24.5 |
| 17                              | 24 | — | 11.5 | 24.5 |
| 18                              | 24 | — | 11.5 | 24.5 |
| 20                              | 24 | — | 11.5 | 24.5 |
| 22                              | 24 | — | 11.5 | 24.5 |
| 24                              | 24 | — | 11.5 | 24.5 |

Note: 1,000 pieces per reel.

| Dimension<br>Number of Contacts | A  | B    | C    | D    |
|---------------------------------|----|------|------|------|
| 26                              | 24 | —    | 11.5 | 24.5 |
| 30                              | 32 | 28.4 | 14.2 | 32.5 |
| 32                              | 32 | 28.4 | 14.2 | 32.5 |
| 33                              | 32 | 28.4 | 14.2 | 32.5 |
| 34                              | 44 | 40.4 | 20.2 | 44.5 |
| 36                              | 44 | 40.4 | 20.2 | 44.5 |
| 40                              | 44 | 40.4 | 20.2 | 44.5 |
| 45                              | 44 | 40.4 | 20.2 | 44.5 |
| 49                              | 44 | 40.4 | 20.2 | 44.5 |
| 50                              | 44 | 40.4 | 20.2 | 44.5 |
| 60                              | 56 | 52.4 | 26.2 | 56.5 |

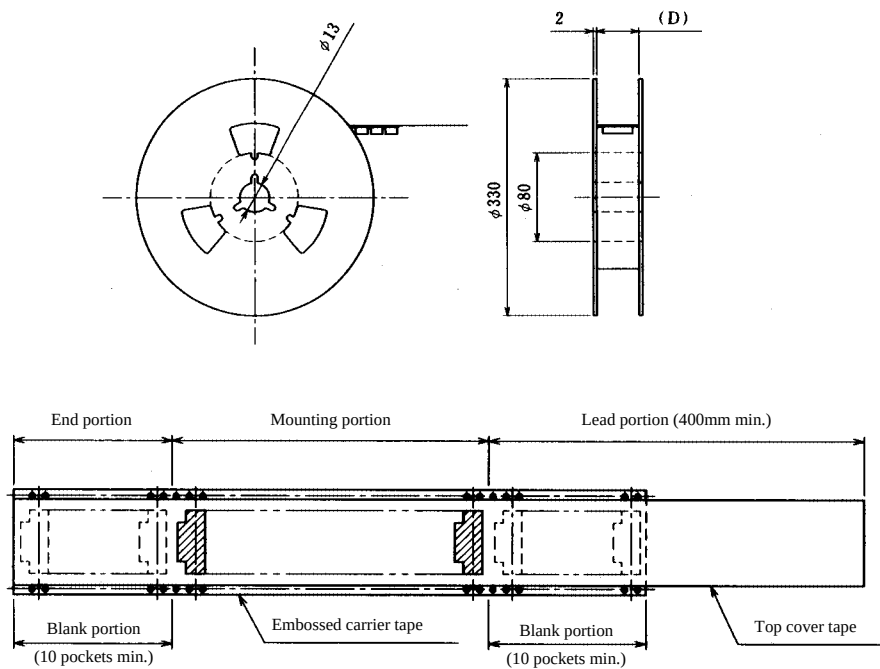
### ●1mm Pitch Vertical mounting Type

Unit:mm

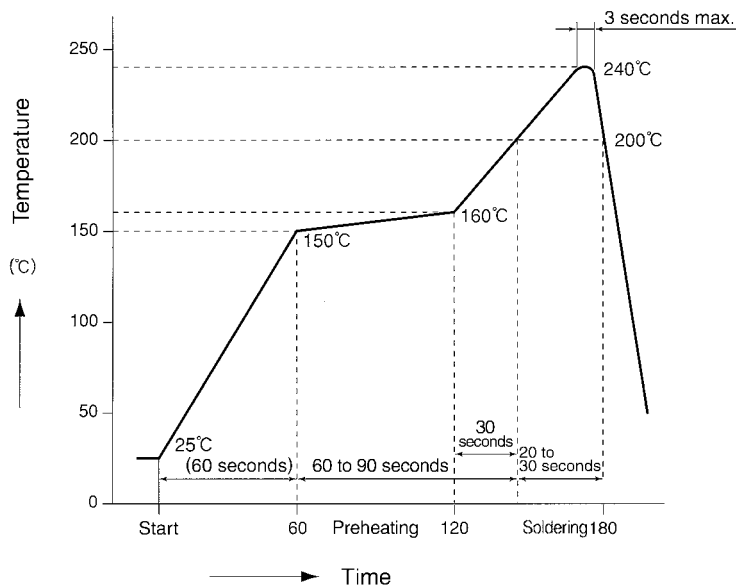
| Dimension<br>Number of Contacts | A  | B    | C    | D    |
|---------------------------------|----|------|------|------|
| 6                               | 24 | —    | 11.5 | 24.5 |
| 7                               | 24 | —    | 11.5 | 24.5 |
| 8                               | 24 | —    | 11.5 | 24.5 |
| 16                              | 32 | 28.4 | 14.2 | 32.5 |
| 20                              | 44 | 40.4 | 20.2 | 44.5 |
| 22                              | 44 | 40.4 | 20.2 | 44.5 |
| 24                              | 44 | 40.4 | 20.2 | 44.5 |

Note: 1,000 pieces per reel.

# Reel Dimensions (Common to All Types)



## Recommended Temperature Profile



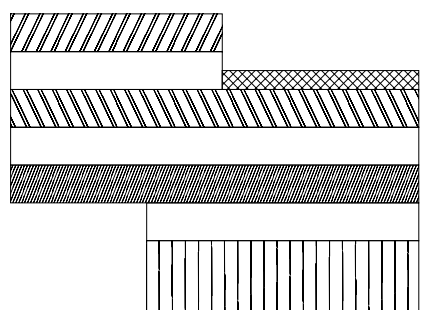
| HRS test conditions |                                                                                                                 |
|---------------------|-----------------------------------------------------------------------------------------------------------------|
| Solder method       | :Reflow, IR/hot air<br>(Nihon Den-netsu Co., Ltd.'s<br>Part Number: SENSBY NR- II )                             |
| Environment:        | :Room air                                                                                                       |
| Solder composition  | :Paste, 63%Sn/37%Pb<br>(Senju Metal Industry, Co., Ltd.'s<br>Part Number: OZ63-201C-50-9)                       |
| Test board          | :Glass epoxy 40mm×80mm×1.6mm thick                                                                              |
| Land dimensions     | :Top and bottom<br>contact type 0.3mm×1.3mm<br>Vertical mounting type 0.6mm×1.5mm                               |
| Metal mask          | :Top and bottom contact type<br>0.25mm×1.3mm×0.15mm thick<br>Vertical mounting type<br>0.5mm×1.5mm×0.15mm thick |

This temperature profile is based on the above conditions. In individual applications the actual temperature may vary, depending on solder paste type, volume/thickness and board size/thickness. Consult your solder paste and equipment manufacturer for specific recommendations.

## ◆FH12 Series FPC/FFC Construction (Recommended Specifications)

### 1. FFC

#### FFC : Flexible Flat Cable

|                                                                                   | Material Name                     | Material       | Thickness (μm) |
|-----------------------------------------------------------------------------------|-----------------------------------|----------------|----------------|
|  | Hard copper foil with tin plating |                | 35             |
|                                                                                   | Adhesive                          | Polyester type | 30             |
|                                                                                   | Polyester                         |                | 12             |
|                                                                                   | Adhesive                          | Polyester type | 30             |
|                                                                                   | Stiffener                         | Polyester type | 188 (Note)     |
|                                                                                   | Total                             |                | 295            |

\*Real tolerance of thickness dimension is on the order of  $\pm 20 \mu\text{m}$  (275 to 315  $\mu\text{m}$ )

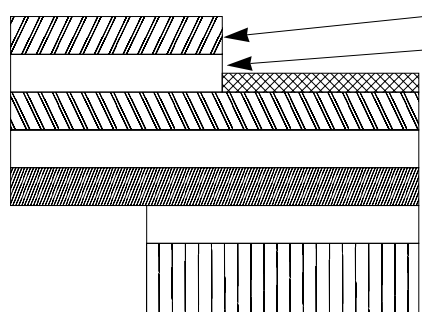
Note: Use of a thicker FFC results in a stiffer lock action and the lock is more easily released.

A factor that contributes to thicker FFC is the use of 250  $\mu\text{m}$  stiffener which is thicker than the standard (188  $\mu\text{m}$ ) product. This results in a total thickness of 357  $\mu\text{m}$ .

When using FFC, control of FFC thickness becomes easy if you indicate to us the thickness of the stiffener.

### 2. FPC

#### FPC : Flexible Printed Circuit

|                                                                                     | Material Name                   | Material               | Thickness (μm) |
|-------------------------------------------------------------------------------------|---------------------------------|------------------------|----------------|
|  | Covering layer film             | Polyamide 1 mil        | 25             |
|                                                                                     | Cover adhesive                  |                        | 25             |
|                                                                                     | Surface treatment               | Tin-lead               | 5              |
|                                                                                     | Copper foil                     | Cu 1oz                 | 35             |
|                                                                                     | Base adhesive                   |                        | 25             |
|                                                                                     | Base film                       | Polyamide 1 mil        | 25             |
|                                                                                     | Reinforcement material adhesive | Heat-hardened adhesive | 30             |
|                                                                                     | Stiffener                       | Polyamide 7 mil        | 175            |
|                                                                                     | Total                           |                        | 295            |

### 3. Precautions

1. This specification is a recommendation for the construction of the FH12 Series FPC and FFC ( $t=0.3 \pm 0.05$ ).
2. For details about the construction, please contact the FPC/FFC manufacturers.