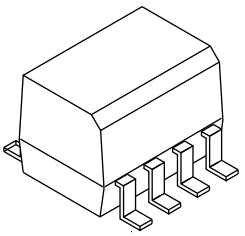
FAIRCHILD
SEMICONDUCTOR®

# DUAL CHANNEL PHOTOTRANSISTOR SMALL OUTLINE SURFACE MOUNT OPTOCOUPLERS

# MOCD213-M

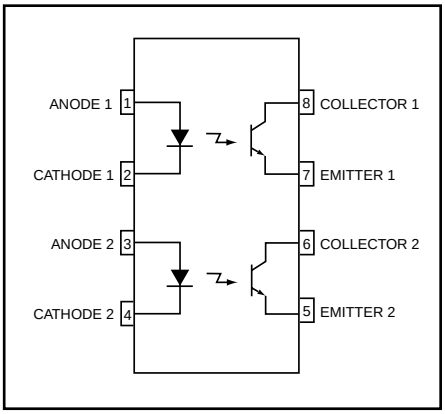
## DESCRIPTION

The MOCD213-M consist of two gallium arsenide infrared emitting diodes optically coupled to two monolithic silicon phototransistor detectors, in a surface mountable, small outline plastic package. It is ideally suited for high density applications and eliminates the need for through-the-board mounting.



## FEATURES

- U.L. Recognized (File #E90700, Volume 2)
- VDE Recognized (File #136616) (add option “V” for VDE approval, i.e, MOCD213V-M)
- Dual Channel Coupler
- Convenient Plastic SOIC-8 Surface Mountable Package Style
- Minimum Current Transfer Ratio 100% with Input Current of 10 mA
- Minimum $V_{(BR)CEO}$ of 70 Volts Guaranteed
- Standard SOIC-8 Footprint, with 0.050” Lead Spacing
- Compatible with Dual Wave, Vapor Phase and IR Reflow Soldering
- High Input-Output Isolation of 2500 $V_{AC(rms)}$ Guaranteed




## APPLICATIONS

- Feedback control circuits
- Interfacing and coupling systems of different potentials and impedances
- General purpose switching circuits
- Monitor and detection circuits

## ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C Unless otherwise specified)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| **EMITTER** | | | |
| Forward Current - Continuous | $I_F$ | 60 | mA |
| Forward Current - Peak (PW = 100 µs, 120 pps) | $I_F$ (pk) | 1.0 | A |
| Reverse Voltage | $V_R$ | 6.0 | V |
| LED Power Dissipation @ $T_A$ = 25°C | $P_D$ | 90 | mW |
| Derate above 25°C | | 0.8 | mW/°C |
| **DETECTOR** | | | |
| Collector-Emitter Voltage | $V_{CEO}$ | 70 | V |
| Collector-Base Voltage | $V_{CBO}$ | 70 | V |
| Emitter-Collector Voltage | $V_{ECO}$ | 7.0 | V |
| Collector Current-Continuous | $I_C$ | 150 | mA |
| Detector Power Dissipation @ $T_A$ = 25°C | $P_D$ | 150 | mW |
| Derate above 25°C | | 1.76 | mW/°C |
| **TOTAL DEVICE** | | | |
| Input-Output Isolation Voltage (1,2,3) (f = 60 Hz, 1 min. Duration) | $V_{ISO}$ | 2500 | Vac(rms) |
| Total Device Power Dissipation @ $T_A$ = 25°C | $P_D$ | 250 | mW |
| Derate above 25°C | | 2.94 | mW/°C |
| Ambient Operating Temperature Range | $T_A$ | -40 to +100 | °C |
| Storage Temperature Range | $T_{stg}$ | -40 to +150 | °C |
| Lead Soldering Temperature (1/16” from case, 10 sec. duration) | $T_L$ | 260 | °C |

## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise specified)

| Parameter | Test Conditions | Symbol | Min | Typ** | Max | Unit |
|---|---|---|---|---|---|---|
| **EMITTER** | | | | | | |
| Input Forward Voltage | $I_F$ = 30 mA | $V_F$ | — | 1.25 | 1.55 | V |
| Reverse Leakage Current | $V_R$ = 6.0 V | $I_R$ | — | 0.001 | 100 | µA |
| Capacitance | | C | — | 18 | — | pF |
| **DETECTOR** | | | | | | |
| Collector-Emitter Dark Current | $V_{CE}$ = 10 V, $T_A$ = 25°C | $I_{CEO1}$ | — | 1.0 | 50 | nA |
| | $V_{CE}$ = 10 V, $T_A$ = 100°C | $I_{CEO2}$ | — | 1.0 | — | µA |
| Collector-Emitter Breakdown Voltage | $I_C$ = 100 µA | $BV_{CEO}$ | 70 | 120 | — | V |
| Emitter-Collector Breakdown Voltage | $I_E$ = 100 µA | $BV_{ECO}$ | 7.0 | 7.8 | — | V |
| Collector-Emitter Capacitance | f = 1.0 MHz, $V_{CE}$ = 0 V | $C_{CE}$ | — | 7.0 | — | pF |
| **COUPLED** | | | | | | |
| Output Collector Current (4) | $I_F$ = 10 mA, $V_{CE}$ = 5 V | CTR | 100 | — | — | % |
| Collector-Emitter Saturation Voltage | $I_C$ = 2.0 mA, $I_F$ = 10 mA | $V_{CE\ (sat)}$ | — | 0.15 | 0.4 | V |
| Turn-On Time | $I_C$ = 2.0 mA, $V_{CC}$ = 10 V, $R_L$ = 100 Ω (Fig.6) | $t_{on}$ | — | 3.0 | — | µs |
| Turn-Off Time | $I_C$ = 2.0 mA, $V_{CC}$ = 10 V, $R_L$ = 100 Ω (Fig.6) | $t_{off}$ | — | 2.8 | — | µs |
| Rise Time | $I_C$ = 2.0 mA, $V_{CC}$ = 10 V, $R_L$ = 100 Ω (Fig.6) | $t_r$ | — | 1.6 | — | µs |
| Fall Time | $I_C$ = 2.0 mA, $V_{CC}$ = 10 V, $R_L$ = 100 Ω (Fig.6) | $t_f$ | — | 2.2 | — | µs |
| Isolation Surge Voltage (1,2,3) | f = 60 Hz, t = 1 min. | $V_{ISO}$ | 2500 | — | — | Vac(rms) |
| Isolation Resistance (2) | $V_{I-O}$ = 500 V | $R_{ISO}$ | $10^{11}$ | — | — | Ω |
| Isolation Capacitance (2) | $V_{I-O}$ = 0 V, f = 1 MHz | $C_{ISO}$ | — | 0.2 | — | pF |

** Typical values at $T_A$ = 25°C

**NOTE:**

1. Input-Output Isolation Voltage, $V_{ISO}$, is an internal device dielectric breakdown rating.
2. For this test, Pins 1, 2, 3 and 4 are common and Pins 5, 6, 7 and 8 are common.
3. $V_{ISO}$ rating of 2500 $V_{AC(rms)}$ for t = 1 min. is equivalent to a rating of 3,000 $V_{AC(rms)}$ for t = 1 sec.
4. Current Transfer Ratio (CTR) = $I_C/I_F$ x 100%.

**Fig. 1 LED Forward Voltage vs. Forward Current**

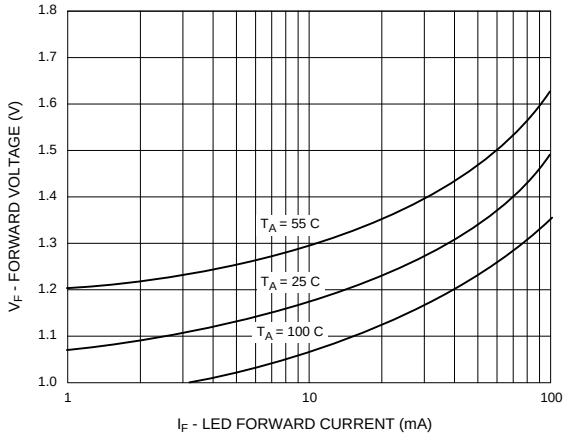



**Fig. 2 Output Curent vs. Input Current**

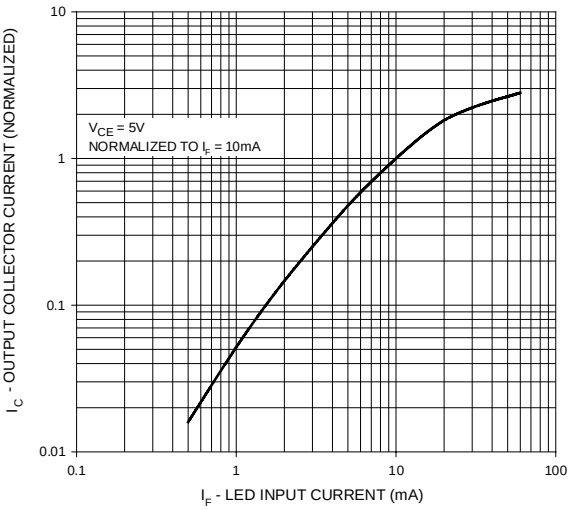



**Fig. 3 Output Current vs. Ambient Temperature**

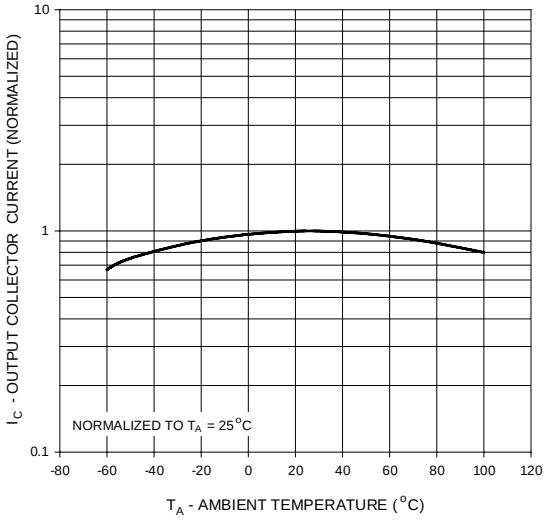



**Fig. 4 Output Current vs. Collector - Emitter Voltage**

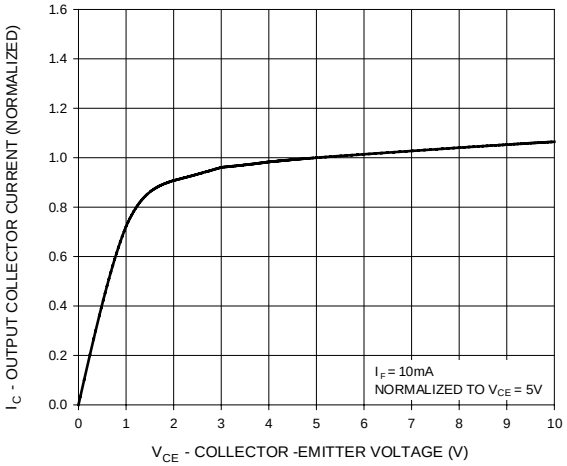
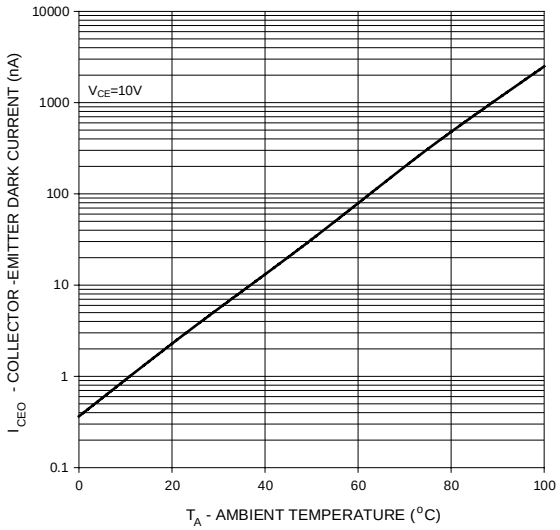



**Fig. 5 Dark Current vs. Ambient Temperature**



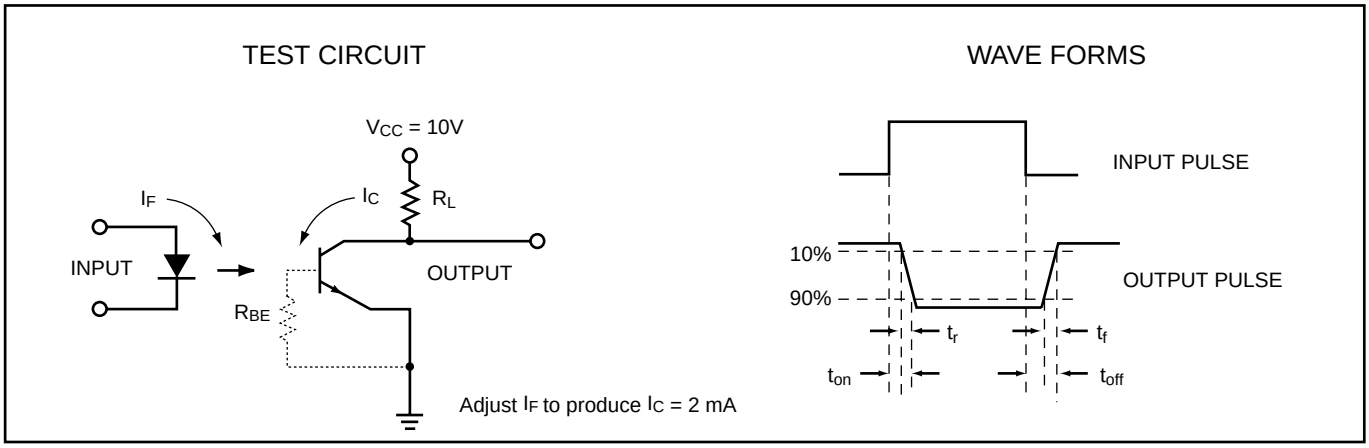
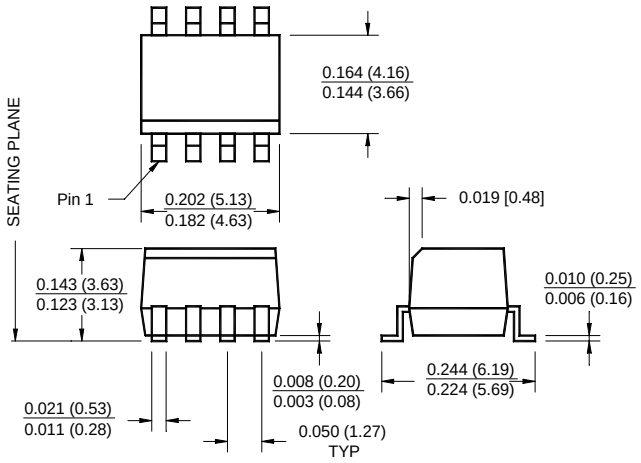


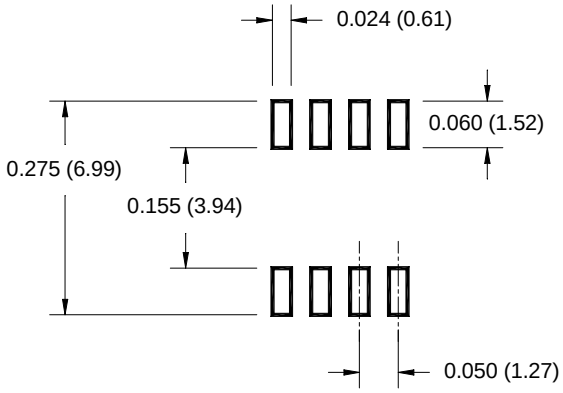

**Figure 6. Switching Time Test Circuit and Waveforms**

## Package Dimensions (Surface Mount)




Lead Coplanarity : 0.004 (0.10) MAX

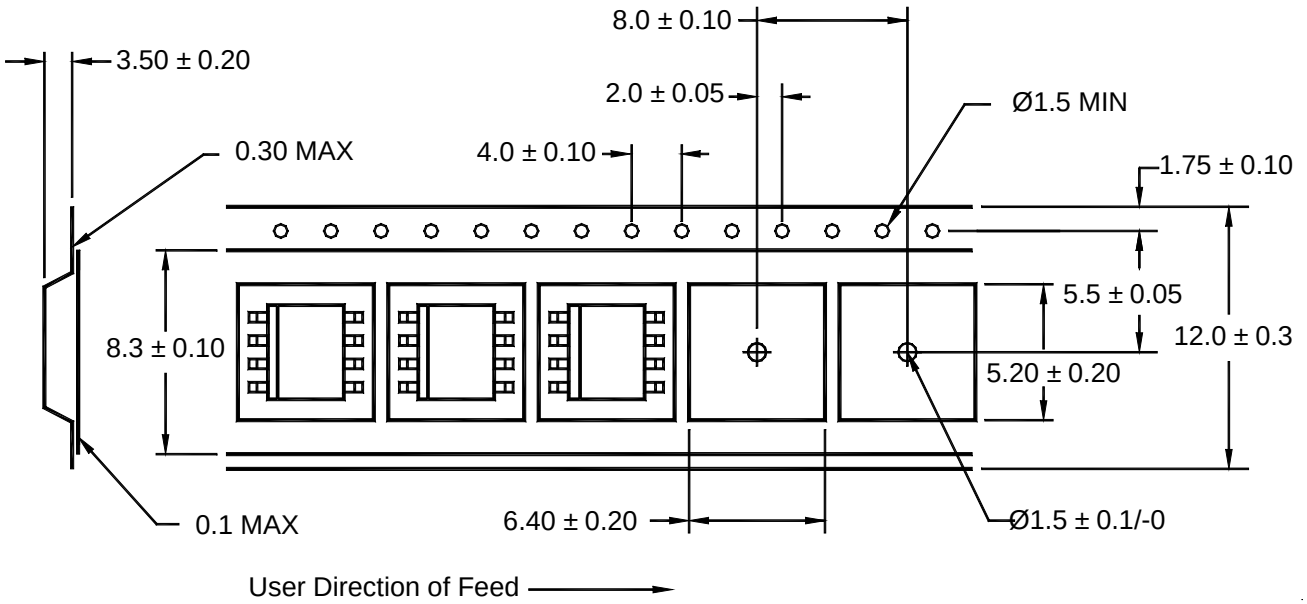
## 8 - Pin Small Outline



## ORDERING INFORMATION

| Option | Order Entry Identifier | Description |
|---|---|---|
| V | V | VDE 0884 |
| R1 | R1 | Tape and reel (500 units per reel) |
| R1V | R1V | VDE 0884, Tape and reel (500 units per reel) |
| R2 | R2 | Tape and reel (2500 units per reel) |
| R2V | R2V | VDE 0884, Tape and reel (2500 units per reel) |

### QT Carrier Tape Specifications (“D” Taping Orientation)



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