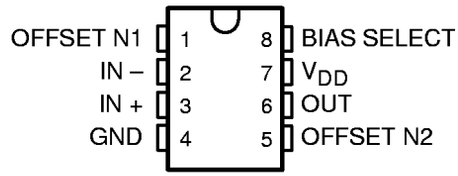
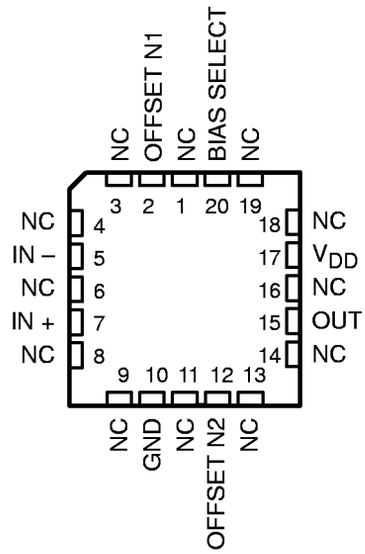
- **Input Offset Voltage Drift . . . Typically 0.1 μV/Month, Including the First 30 Days**
- **Wide Range of Supply Voltages Over Specified Temperature Range:**
  0°C to 70°C . . . 3 V to 16 V
  −40°C to 85°C . . . 4 V to 16 V
  −55°C to 125°C . . . 5 V to 16 V
- **Single-Supply Operation**
- **Common-Mode Input Voltage Range Extends Below the Negative Rail (C-Suffix and I-Suffix Types)**
- **Low Noise . . . 25 nV/$\sqrt{\text{Hz}}$ Typically at f = 1 kHz (High-Bias Mode)**
- **Output Voltage Range includes Negative Rail**
- **High Input Impedance . . . 10^{12} Ω Typ**
- **ESD-Protection Circuitry**
- **Small-Outline Package Option Also Available in Tape and Reel**
- **Designed-In Latch-Up Immunity**

D, JG, OR P PACKAGE
(TOP VIEW)



FK PACKAGE
(TOP VIEW)



NC – No internal connection

description

The TLC271 operational amplifier combines a wide range of input offset voltage grades with low offset voltage drift and high input impedance. In addition, the TLC271 offers a bias-select mode that allows the user to select the best combination of power dissipation and ac performance for a particular application. These devices use Texas Instruments silicon-gate LinCMOS™ technology, which provides offset voltage stability far exceeding the stability available with conventional metal-gate processes.

AVAILABLE OPTIONS

T_A	V_{IO}max AT 25°C	PACKAGE			
		SMALL OUTLINE (D)	CHIP CARRIER (FK)	CERAMIC DIP (JG)	PLASTIC DIP (P)
0°C to 70°C	2 mV 5 mV 10 mV	TLC271BCD TLC271ACD TLC271CD	—	—	TLC271BCP TLC271ACP TLC271CP
−40°C to 85°C	2 mV 5 mV 10 mV	TLC271BID TLC271AID TLC271ID	—	—	TLC271BIP TLC271AIP TLC271IP
−55°C to 125°C	10 mV	TLC271MD	TLC271MFK	TLC271MJG	TLC271MP

The D package is available taped and reeled. Add R suffix to the device type (e.g., TLC271BCDR).

Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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8DEVICE FEATURES

PARAMETER†	BIAS-SELECT MODE			UNIT
	HIGH	MEDIUM	LOW	
P_D	3375	525	50	μW
SR	3.6	0.4	0.03	V/μs
V_n	25	32	68	nV/√Hz
B_1	1.7	0.5	0.09	MHz
A_{VD}	23	170	480	V/mV

† Typical at V_{DD} = 5 V, T_A = 25°C

description (continued)

Using the bias-select option, these cost-effective devices can be programmed to span a wide range of applications that previously required BiFET, NFET or bipolar technology. Three offset voltage grades are available (C-suffix and I-suffix types), ranging from the low-cost TLC271 (10 mV) to the TLC271B (2 mV) low-offset version. The extremely high input impedance and low bias currents, in conjunction with good common-mode rejection and supply voltage rejection, make these devices a good choice for new state-of-the-art designs as well as for upgrading existing designs.

In general, many features associated with bipolar technology are available in LinCMOS™ operational amplifiers, without the power penalties of bipolar technology. General applications such as transducer interfacing, analog calculations, amplifier blocks, active filters, and signal buffering are all easily designed with the TLC271. The devices also exhibit low-voltage single-supply operation, making them ideally suited for remote and inaccessible battery-powered applications. The common-mode input voltage range includes the negative rail.

A wide range of packaging options is available, including small-outline and chip-carrier versions for high-density system applications.

The device inputs and output are designed to withstand −100-mA surge currents without sustaining latch-up.

The TLC271 incorporates internal ESD-protection circuits that prevent functional failures at voltages up to 2000 V as tested under MIL-STD-883C, Method 3015.2; however, care should be exercised in handling these devices as exposure to ESD may result in the degradation of the device parametric performance.

The C-suffix devices are characterized for operation from 0°C to 70°C. The I-suffix devices are characterized for operation from −40°C to 85°C. The M-suffix devices are characterized for operation over the full military temperature range of −55°C to 125°C.

bias-select feature

The TLC271 offers a bias-select feature that allows the user to select any one of three bias levels depending on the level of performance desired. The tradeoffs between bias levels involve ac performance and power dissipation (see Table 1).

bias-select feature (continued)

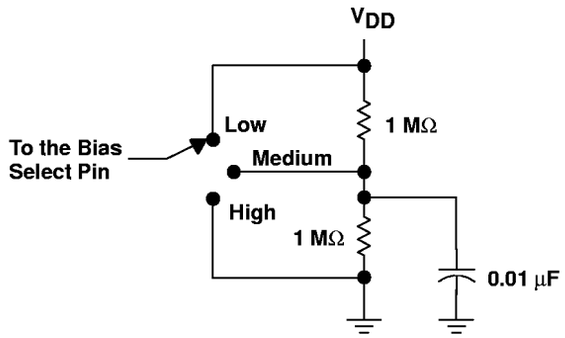
Table 1. Effect of Bias Selection on Performance

TYPICAL PARAMETER VALUES T_A = 25°C, V_{DD} = 5 V		MODE			UNIT
		HIGH BIAS R_L = 10 kΩ	MEDIUM BIAS R_L = 100 kΩ	LOW BIAS R_L = 1 MΩ	
P_D	Power dissipation	3.4	0.5	0.05	mW
SR	Slew rate	3.6	0.4	0.03	V/μs
V_n	Equivalent input noise voltage at f = 1 kHz	25	32	68	nV/√Hz
B_1	Unity-gain bandwidth	1.7	0.5	0.09	MHz
ϕ_m	Phase margin	46°	40°	34°	
A_{VD}	Large-signal differential voltage amplification	23	170	480	V/mV

bias selection

Bias selection is achieved by connecting the bias select pin to one of three voltage levels (see Figure 1). For medium-bias applications, it is recommended that the bias select pin be connected to the midpoint between the supply rails. This procedure is simple in split-supply applications, since this point is ground. In single-supply applications, the medium-bias mode necessitates using a voltage divider as indicated in Figure 1. The use of large-value resistors in the voltage divider reduces the current drain of the divider from the supply line. However, large-value resistors used in conjunction with a large-value capacitor require significant time to charge up to the supply midpoint after the supply is switched on. A voltage other than the midpoint can be used if it is within the voltages specified in Figure 1.

bias selection (continued)



BIAS MODE	BIAS-SELECT VOLTAGE (single supply)
Low	V_{DD}
Medium	1 V to V_{DD} – 1 V
High	GND

Figure 1. Bias Selection for Single-Supply Applications

high-bias mode

In the high-bias mode, the TLC271 series features low offset voltage drift, high input impedance, and low noise. Speed in this mode approaches that of BiFET devices but at only a fraction of the power dissipation. Unity-gain bandwidth is typically greater than 1 MHz.

medium-bias mode

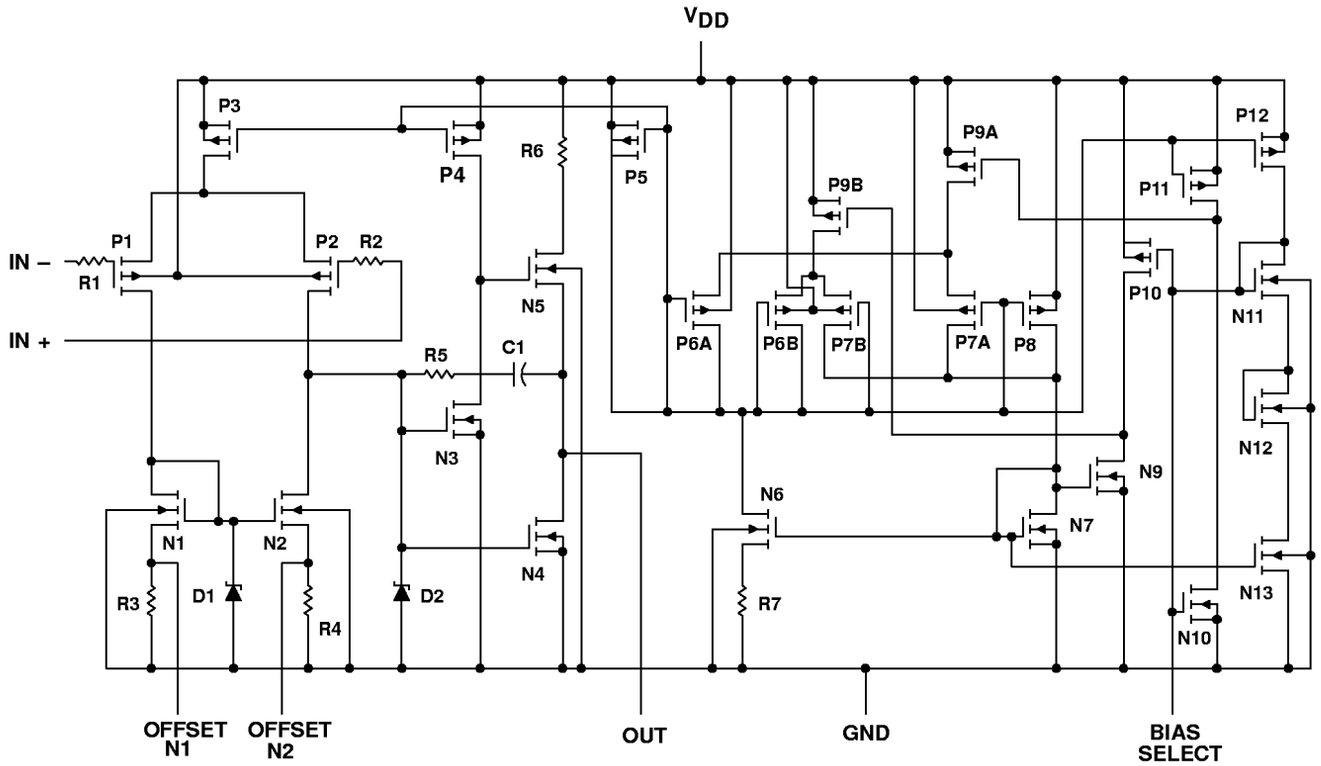
The TLC271 in the medium-bias mode features low offset voltage drift, high input impedance, and low noise. Speed in this mode is similar to general-purpose bipolar devices but power dissipation is only a fraction of that consumed by bipolar devices.

low-bias mode

In the low-bias mode, the TLC271 features low offset voltage drift, high input impedance, extremely low power consumption, and high differential voltage gain.

ORDER OF CONTENTS

equivalent schematic



absolute maximum ratings over operating free-air temperature (unless otherwise noted)†

Supply voltage, V_{DD} (see Note 1) . . . . . 18 V
Differential input voltage, V_{ID} (see Note 2) . . . . . $\pm V_{DD}$
Input voltage range, V_I (any input) . . . . . -0.3 V to V_{DD}
Input current, I_I . . . . . ± 5 mA
Output current, I_O . . . . . ± 30 mA
Duration of short-circuit current at (or below) 25°C (see Note 3) . . . . . Unlimited
Continuous total dissipation . . . . . See Dissipation Rating Table
Operating free-air temperature, T_A: C suffix . . . . . 0°C to 70°C
I suffix . . . . . -40°C to 85°C
M suffix . . . . . -55°C to 125°C
Storage temperature range . . . . . -65°C to 150°C
Case temperature for 60 seconds: FK package . . . . . 260°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: D or P package . . . . . 260°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: JG package . . . . . 300°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. All voltage values, except differential voltages, are with respect to network ground.
2. Differential voltages are at IN+ with respect to IN–.
3. The output may be shorted to either supply. Temperature and/or supply voltages must be limited to ensure that the maximum dissipation rating is not exceeded (see application section).

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25$°C POWER RATING	DERATING FACTOR ABOVE $T_A = 25$°C	$T_A = 70$°C POWER RATING	$T_A = 85$°C POWER RATING	$T_A = 125$°C POWER RATING
D	725 mW	5.8 mW/°C	464 mW	377 mW	145 mW
FK	1375 mW	11.0 mW/°C	880 mW	715 mW	275 mW
JG	1050 mW	8.4 mW/°C	672 mW	546 mW	210 mW
P	1000 mW	8.0 mW/°C	640 mW	520 mW	200 mW

recommended operating conditions

		C SUFFIX		I SUFFIX		M SUFFIX		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
Supply voltage, V_{DD}		3	16	4	16	5	16	V
Common-mode input voltage, V_{IC}	$V_{DD} = 5$ V	−0.2	3.5	−0.2	3.5	0	3.5	V
	$V_{DD} = 10$ V	−0.2	8.5	−0.2	8.5	0	8.5	
Operating free-air temperature, T_A		0	70	−40	85	−55	125	°C

HIGH-BIAS MODE

electrical characteristics at specified free-air temperature (unless otherwise noted)

PARAMETER			TEST CONDITIONS	T_A†	TLC271C, TLC271AC, TLC271BC						UNIT
					V_{DD} = 5 V			V_{DD} = 10 V			
					MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO}	Input offset voltage	TLC271C	V_O = 1.4 V, V_{IC} = 0 V, R_S = 50 Ω, R_L = 10 kΩ	25°C		1.1	10		1.1	10	mV
				Full range			12			12	
		TLC271AC		25°C		0.9	5		0.9	5	
				Full range			6.5			6.5	
		TLC271BC		25°C		0.34	2		0.39	2	
				Full range			3			3	
α_{VIO}	Average temperature coefficient of input offset voltage			25°C to 70°C		1.8			2		μV/°C
I_{IO}	Input offset current (see Note 4)		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.1			0.1		pA
				70°C		7	300		7	300	
I_{IB}	Input bias current (see Note 4)		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.6			0.7		pA
				70°C		40	600		50	600	
V_{ICR}	Common-mode input voltage range (see Note 5)			25°C	−0.2 to 4	−0.3 to 4.2		−0.2 to 9	−0.3 to 9.2		V
				Full range	−0.2 to 3.5			−0.2 to 8.5			V
V_{OH}	High-level output voltage		V_{ID} = 100 mV, R_L = 10 kΩ	25°C	3.2	3.8		8	8.5		V
				0°C	3	3.8		7.8	8.5		
				70°C	3	3.8		7.8	8.4		
V_{OL}	Low-level output voltage		V_{ID} = −100 mV, I_{OL} = 0	25°C		0	50		0	50	mV
				0°C		0	50		0	50	
				70°C		0	50		0	50	
A_{VD}	Large-signal differential voltage amplification		R_L = 10 kΩ, See Note 6	25°C	5	23		10	36		V/mV
				0°C	4	27		7.5	42		
				70°C	4	20		7.5	32		
CMRR	Common-mode rejection ratio		$V_{IC} = V_{ICR}$min	25°C	65	80		65	85		dB
				0°C	60	84		60	88		
				70°C	60	85		60	88		
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)		V_{DD} = 5 V to 10 V, V_O = 1.4 V	25°C	65	95		65	95		dB
				0°C	60	94		60	94		
				70°C	60	96		60	96		
$I_{I(SEL)}$	Input current (BIAS SELECT)		$V_{I(SEL)}$ = 0	25°C		−1.4			−1.9		μA
I_{DD}	Supply current		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$, No load	25°C		675	1600		950	2000	μA
				0°C		775	1800		1125	2200	
				70°C		575	1300		750	1700	

† Full range is 0°C to 70°C.

NOTES: 4. The typical values of input bias current and input offset current below 5 pA were determined mathematically.
5. This range also applies to each input individually.
6. At V_{DD} = 5 V, V_O = 0.25 V to 2 V; at V_{DD} = 10 V, V_O = 1 V to 6 V.

HIGH-BIAS MODE

electrical characteristics at specified free-air temperature (unless otherwise noted)

PARAMETER			TEST CONDITIONS	T_A†	TLC271I, TLC271AI, TLC271BI						UNIT
					V_{DD} = 5 V			V_{DD} = 10 V			
					MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO}	Input offset voltage	TLC271I	V_O = 1.4 V, V_{IC} = 0 V, R_S = 50 Ω, R_L = 10 kΩ	25°C		1.1	10		1.1	10	mV
				Full range			13			13	
		TLC271AI		25°C		0.9	5		0.9	5	
				Full range			7			7	
		TLC271BI		25°C		0.34	2		0.39	2	
				Full range			3.5			3.5	
α_{VIO}	Average temperature coefficient of input offset voltage			25°C to 85°C		1.8			2		μV/°C
I_{IO}	Input offset current (see Note 4)		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.1			0.1		pA
				85°C		24	1000		26	1000	
I_{IB}	Input bias current (see Note 4)		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.6			0.7		pA
				85°C		200	2000		220	2000	
V_{ICR}	Common-mode input voltage range (see Note 5)			25°C	−0.2 to 4	−0.3 to 4.2		−0.2 to 9	−0.3 to 9.2		V
				Full range	−0.2 to 3.5			−0.2 to 8.5			V
V_{OH}	High-level output voltage		V_{ID} = 100 mV, R_L = 10 kΩ	25°C	3.2	3.8		8	8.5		V
				−40°C	3	3.8		7.8	8.5		
				85°C	3	3.8		7.8	8.5		
V_{OL}	Low-level output voltage		V_{ID} = −100 mV, I_{OL} = 0	25°C		0	50		0	50	mV
				−40°C		0	50		0	50	
				85°C		0	50		0	50	
A_{VD}	Large-signal differential voltage amplification		R_L = 10 kΩ, See Note 6	25°C	5	23		10	36		V/mV
				−40°C	3.5	32		7	46		
				85°C	3.5	19		7	31		
CMRR	Common-mode rejection ratio		$V_{IC} = V_{ICR}$min	25°C	65	80		65	85		dB
				−40°C	60	81		60	87		
				85°C	60	86		60	88		
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)		V_{DD} = 5 V to 10 V, V_O = 1.4 V	25°C	65	95		65	95		dB
				−40°C	60	92		60	92		
				85°C	60	96		60	96		
$I_{I(SEL)}$	Input current (BIAS SELECT)		$V_{I(SEL)}$ = 0	25°C		−1.4			−1.9		μA
I_{DD}	Supply current		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$, No load	25°C		675	1600		950	2000	μA
				−40°C		950	2200		1375	2500	
				85°C		525	1200		725	1600	

† Full range is −40°C to 85°C.

NOTES: 4. The typical values of input bias current and input offset current below 5 pA were determined mathematically.
5. This range also applies to each input individually.
6. At V_{DD} = 5 V, V_O = 0.25 V to 2 V; at V_{DD} = 10 V, V_O = 1 V to 6 V.

HIGH-BIAS MODE

electrical characteristics at specified free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A†	TLC271M						UNIT
				V_{DD} = 5 V			V_{DD} = 10 V			
				MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO}	Input offset voltage	V_O = 1.4 V, V_{IC} = 0 V, R_S = 50 Ω, R_L = 10 kΩ	25°C		1.1	10		1.1	10	mV
			Full range			12			12	
α_{VIO}	Average temperature coefficient of input offset voltage		25°C to 125°C		2.1			2.2		μV/°C
I_{IO}	Input offset current (see Note 4)	$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.1			0.1		pA
			125°C		1.4	15		1.8	15	nA
I_{IB}	Input bias current (see Note 4)	$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.6			0.7		pA
			125°C		9	35		10	35	nA
V_{ICR}	Common-mode input voltage range (see Note 5)		25°C	0 to 4	−0.3 to 4.2		0 to 9	−0.3 to 9.2		V
			Full range	0 to 3.5			0 to 8.5			V
V_{OH}	High-level output voltage	V_{ID} = 100 mV, R_L = 10 kΩ	25°C	3.2	3.8		8	8.5		V
			−55°C	3	3.8		7.8	8.5		
			125°C	3	3.8		7.8	8.4		
V_{OL}	Low-level output voltage	V_{ID} = −100 mV, I_{OL} = 0	25°C		0	50		0	50	mV
			−55°C		0	50		0	50	
			125°C		0	50		0	50	
A_{VD}	Large-signal differential voltage amplification	R_L = 10 kΩ, See Note 6	25°C	5	23		10	36		V/mV
			−55°C	3.5	35		7	50		
			125°C	3.5	16		7	27		
CMRR	Common-mode rejection ratio	$V_{IC} = V_{ICR}$min	25°C	65	80		65	85		dB
			−55°C	60	81		60	87		
			125°C	60	84		60	86		
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)	V_{DD} = 5 V to 10 V, V_O = 1.4 V	25°C	65	95		65	95		dB
			−55°C	60	90		60	90		
			125°C	60	97		60	97		
$I_{I(SEL)}$	Input current (BIAS SELECT)	$V_{I(SEL)}$ = 0	25°C		−1.4			−1.9		μA
I_{DD}	Supply current	$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$, No load	25°C		675	1600		950	2000	μA
			−55°C		1000	2500		1475	3000	
			125°C		475	1100		625	1400	

† Full range is −55°C to 125°C.

NOTES: 4. The typical values of input bias current and input offset current below 5 pA were determined mathematically.
5. This range also applies to each input individually.
6. At V_{DD} = 5 V, V_O = 0.25 V to 2 V; at V_{DD} = 10 V, V_O = 1 V to 6 V.

HIGH-BIAS MODE

operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A	TLC271C, TLC271AC, TLC271BC			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 10 kΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		3.6		V/μs
				0°C		4		
				70°C		3		
			$V_{I(PP)}$ = 2.5 V	25°C		2.9		
				0°C		3.1		
				70°C		2.5		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		25		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	$V_O = V_{OH}$, R_L = 10 kΩ,	C_L = 20 pF, See Figure 98	25°C		320		kHz
				0°C		340		
				70°C		260		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		1.7		MHz
				0°C		2		
				70°C		1.3		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f = B_1, See Figure 100	25°C		46°		
				0°C		47°		
				70°C		44°		

operating characteristics at specified free-air temperature, V_{DD} = 10 V

PARAMETER		TEST CONDITIONS		T_A	TLC271C, TLC271AC, TLC271BC			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 10 kΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		5.3		V/μs
				0°C		5.9		
				70°C		4.3		
			$V_{I(PP)}$ = 5.5 V	25°C		4.6		
				0°C		5.1		
				70°C		3.8		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		25		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	$V_O = V_{OH}$, R_L = 10 kΩ,	C_L = 20 pF, See Figure 98	25°C		200		kHz
				0°C		220		
				70°C		140		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		2.2		MHz
				0°C		2.5		
				70°C		1.8		
ϕ_m	Phase margin	f = B_1, C_L = 20 pF,	V_I = 10 mV, See Figure 100	25°C		49°		
				0°C		50°		
				70°C		46°		

HIGH-BIAS MODE

operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A	TLC271I, TLC271AI, TLC271BI			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 10 kΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		3.6		V/μs
				−40°C		4.5		
				85°C		2.8		
			$V_{I(PP)}$ = 2.5 V	25°C		2.9		
				−40°C		3.5		
				85°C		2.3		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		25		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	$V_O = V_{OH}$, R_L = 10 kΩ,	C_L = 20 pF, See Figure 98	25°C		320		kHz
				−40°C		380		
				85°C		250		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		1.7		MHz
				−40°C		2.6		
				85°C		1.2		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f = B_1, See Figure 100	25°C		46°		
				−40°C		49°		
				85°C		43°		

operating characteristics at specified free-air temperature, V_{DD} = 10 V

PARAMETER		TEST CONDITIONS		T_A	TLC271I, TLC271AI, TLC271BI			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 10 kΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		5.3		V/μs
				−40°C		6.8		
				85°C		4		
			$V_{I(PP)}$ = 5.5 V	25°C		4.6		
				−40°C		5.8		
				85°C		3.5		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		25		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	$V_O = V_{OH}$, R_L = 10 kΩ,	C_L = 20 pF, See Figure 98	25°C		200		kHz
				−40°C		260		
				85°C		130		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		2.2		MHz
				−40°C		3.1		
				85°C		1.7		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f= B_1, See Figure 100	25°C		49°		
				−40°C		52°		
				85°C		46°		

HIGH-BIAS MODE

operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A	TLC271M			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 10 kΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		3.6		V/μs
				−55°C		4.7		
				125°C		2.3		
			$V_{I(PP)}$ = 2.5 V	25°C		2.9		
				−55°C		3.7		
				125°C		2		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		25		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	V_O = V_{OH}, R_L = 10 kΩ,	C_L = 20 pF, See Figure 98	25°C		320		kHz
				−55°C		400		
				125°C		230		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		1.7		MHz
				−55°C		2.9		
				125°C		1.1		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f = B_1, See Figure 100	25°C		46°		
				−55°C		49°		
				125°C		41°		

operating characteristics at specified free-air temperature, V_{DD} = 10 V

PARAMETER		TEST CONDITIONS		T_A	TLC271M			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 10 kΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		5.3		V/μs
				−55°C		7.1		
				125°C		3.1		
			$V_{I(PP)}$ = 5.5 V	25°C		4.6		
				−55°C		6.1		
				125°C		2.7		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		25		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	V_O = V_{OH}, R_L = 10 kΩ,	C_L = 20 pF, See Figure 98	25°C		200		kHz
				−55°C		280		
				125°C		110		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		2.2		MHz
				−55°C		3.4		
				125°C		1.6		
ϕ_m	Phase margin	f = B_1, C_L = 20 pF,	V_I = 10 mV, See Figure 100	25°C		49°		
				−55°C		52°		
				125°C		44°		

TYPICAL CHARACTERISTICS (HIGH-BIAS MODE)

Table of Graphs

			FIGURE
V_{IO}	Input offset voltage	Distribution	2, 3
α_{VIO}	Temperature coefficient	Distribution	4, 5
V_{OH}	High-level output voltage	vs High-level output current vs Supply voltage vs Free-air temperature	6, 7 8 9
V_{OL}	Low-level output voltage	vs Common-mode input voltage vs Differential input voltage vs Free-air temperature vs Low-level output current	10, 11 12 13 14, 15
A_{VD}	Large-signal differential voltage amplification	vs Supply voltage vs Free-air temperature vs Frequency	16 17 28, 29
I_{IB}	Input bias current	vs Free-air temperature	18
I_{IO}	Input offset current	vs Free-air temperature	18
V_{IC}	Common-mode input voltage	vs Supply voltage	19
I_{DD}	Supply current	vs Supply voltage vs Free-air temperature	20 21
SR	Slew rate	vs Supply voltage vs Free-air temperature	22 23
	Bias-select current	vs Supply voltage	24
$V_{O(PP)}$	Maximum peak-to-peak output voltage	vs Frequency	25
B_1	Unity-gain bandwidth	vs Free-air temperature vs Supply voltage	26 27
A_{VD}	Large-signal differential voltage amplification	vs Frequency	28, 29
ϕ_m	Phase margin	vs Supply voltage vs Free-air temperature vs Capacitive load	30 31 32
V_n	Equivalent input noise voltage	vs Frequency	33
	Phase shift	vs Frequency	28, 29

TYPICAL CHARACTERISTICS (HIGH-BIAS MODE)†

**DISTRIBUTION OF TLC271
INPUT OFFSET VOLTAGE**

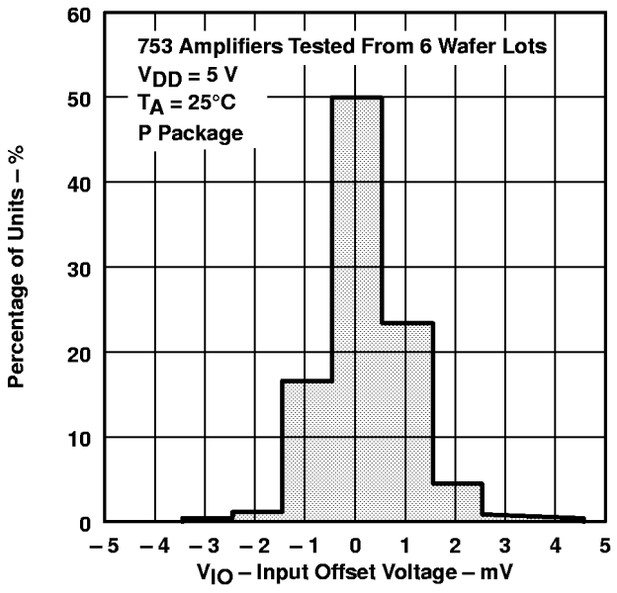


Figure 2

**DISTRIBUTION OF TLC271
INPUT OFFSET VOLTAGE**

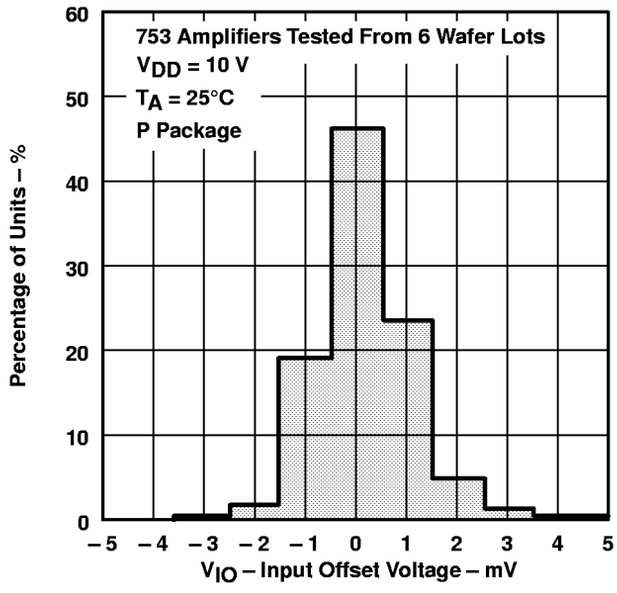


Figure 3

**DISTRIBUTION OF TLC271
INPUT OFFSET VOLTAGE
TEMPERATURE COEFFICIENT**

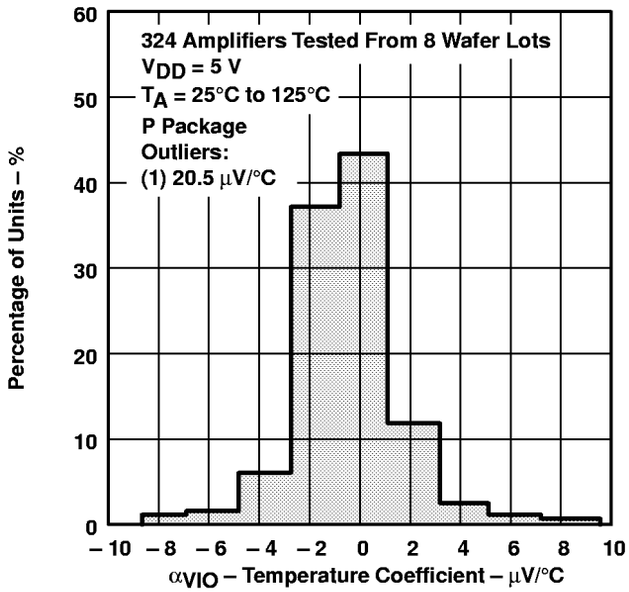


Figure 4

**DISTRIBUTION OF TLC271
INPUT OFFSET VOLTAGE
TEMPERATURE COEFFICIENT**

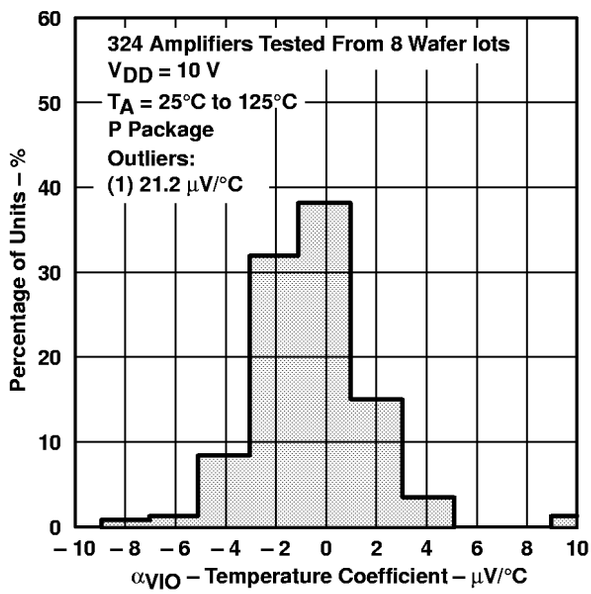


Figure 5

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (HIGH-BIAS MODE)†

HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

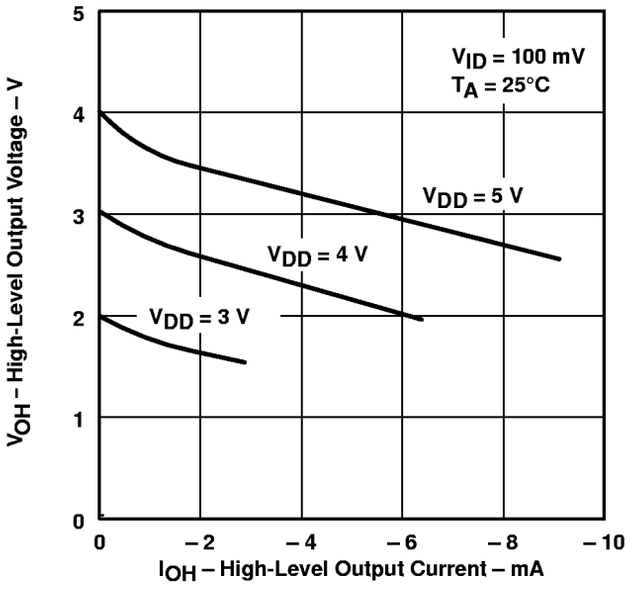


Figure 6

HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

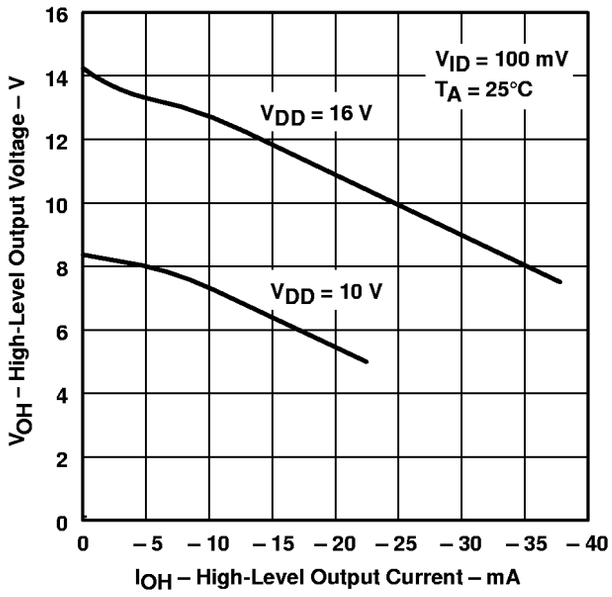


Figure 7

HIGH-LEVEL OUTPUT VOLTAGE
vs
SUPPLY VOLTAGE

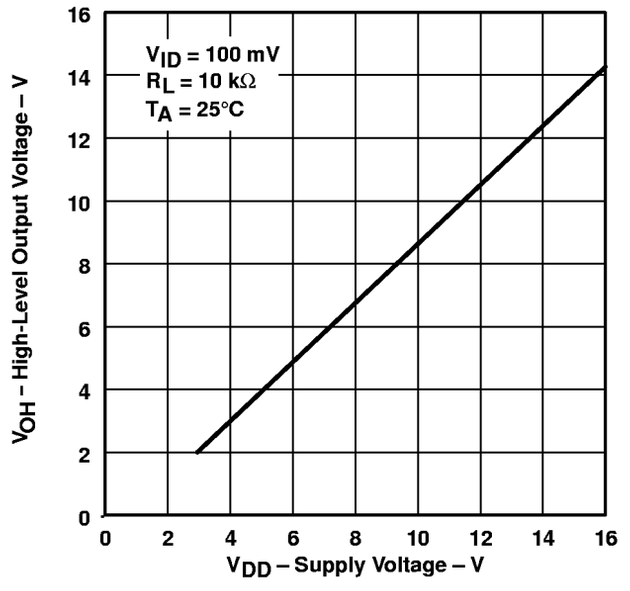


Figure 8

HIGH-LEVEL OUTPUT VOLTAGE
vs
FREE-AIR TEMPERATURE

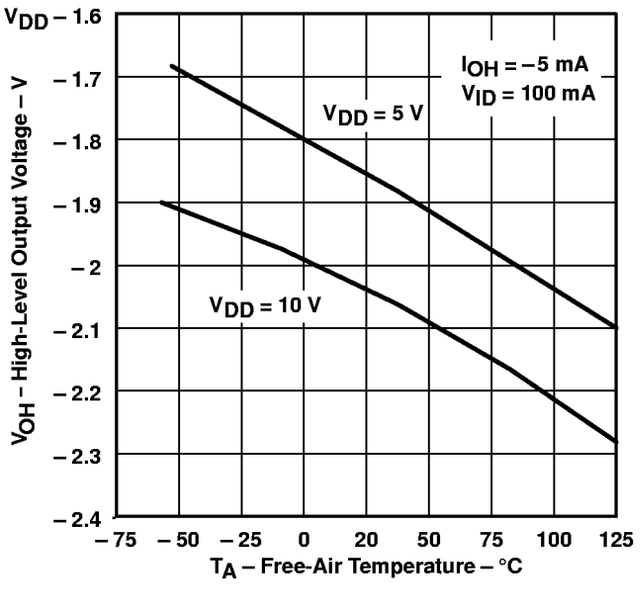


Figure 9

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (HIGH-BIAS MODE)†

LOW-LEVEL OUTPUT VOLTAGE vs COMMON-MODE INPUT VOLTAGE

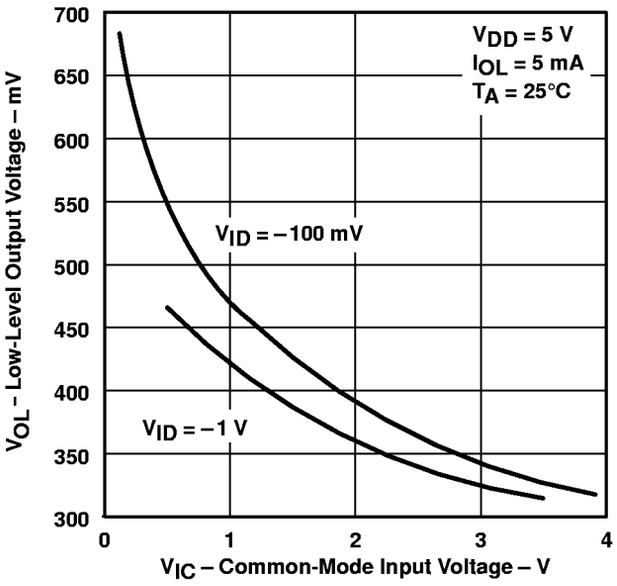


Figure 10

LOW-LEVEL OUTPUT VOLTAGE vs COMMON-MODE INPUT VOLTAGE

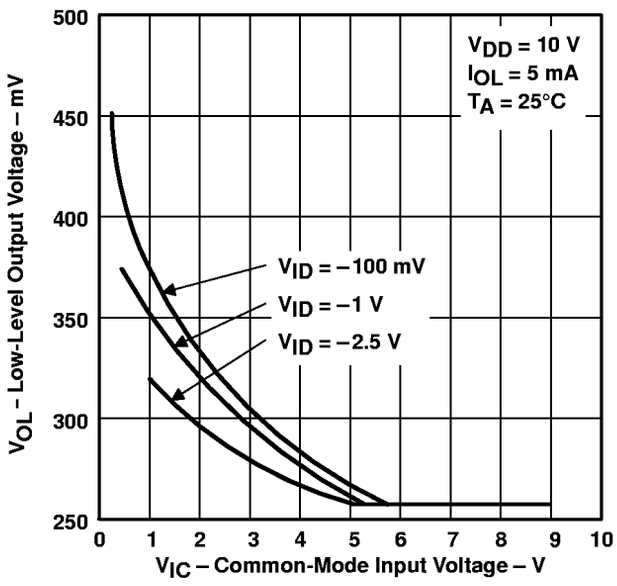


Figure 11

LOW-LEVEL OUTPUT VOLTAGE vs DIFFERENTIAL INPUT VOLTAGE

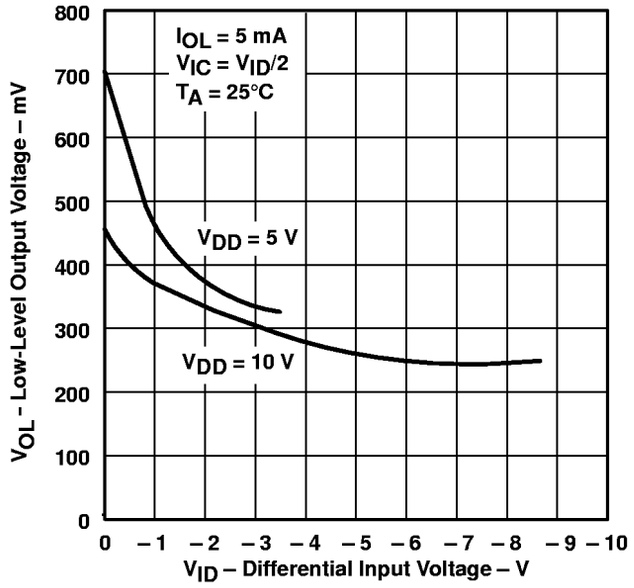


Figure 12

LOW-LEVEL OUTPUT VOLTAGE vs FREE-AIR TEMPERATURE

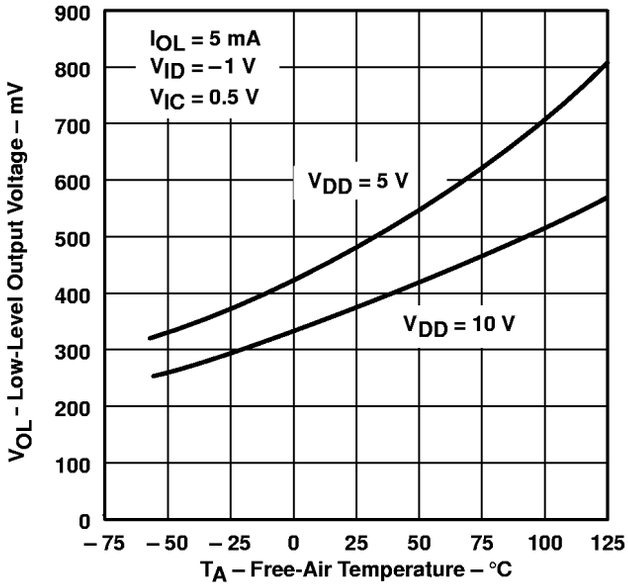


Figure 13

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (HIGH-BIAS MODE)†

LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT

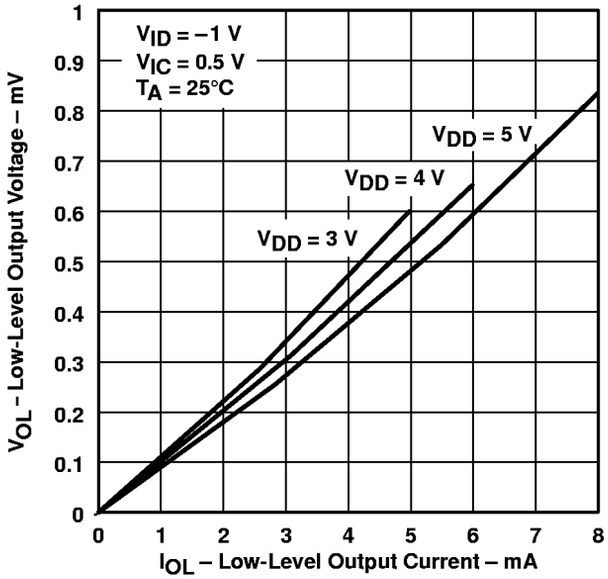


Figure 14

LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT

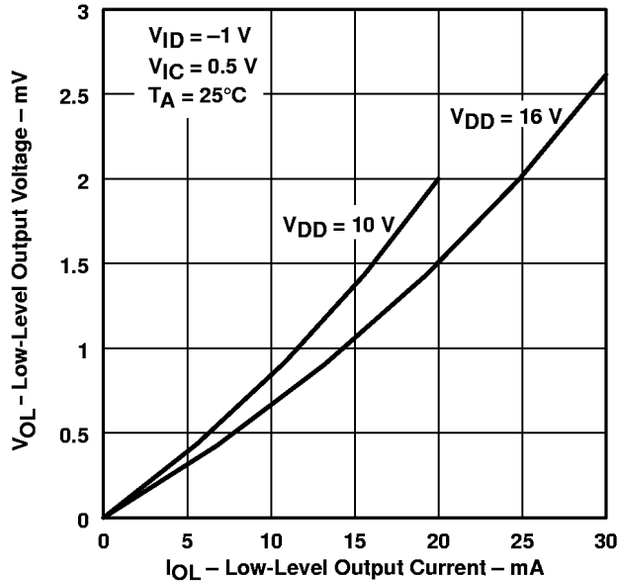


Figure 15

LARGE-SIGNAL
DIFFERENTIAL VOLTAGE AMPLIFICATION
vs
SUPPLY VOLTAGE

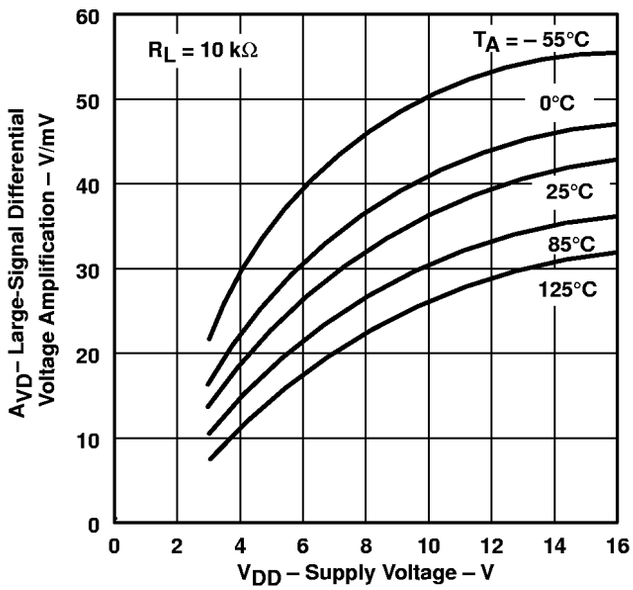


Figure 16

LARGE-SIGNAL
DIFFERENTIAL VOLTAGE AMPLIFICATION
vs
FREE-AIR TEMPERATURE

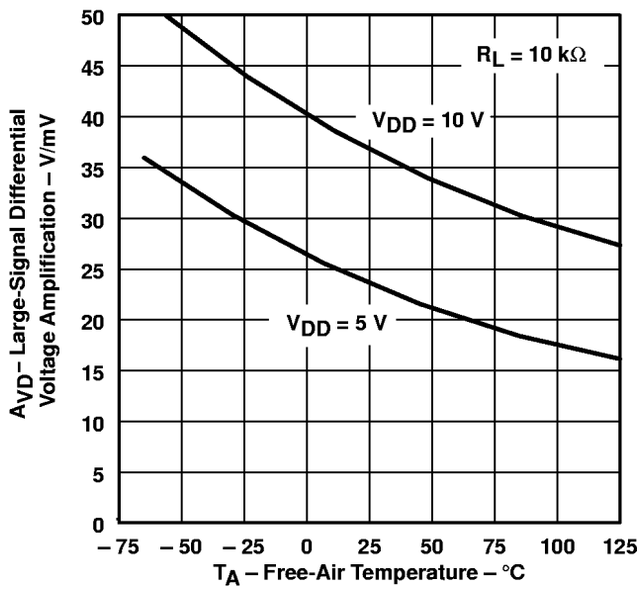
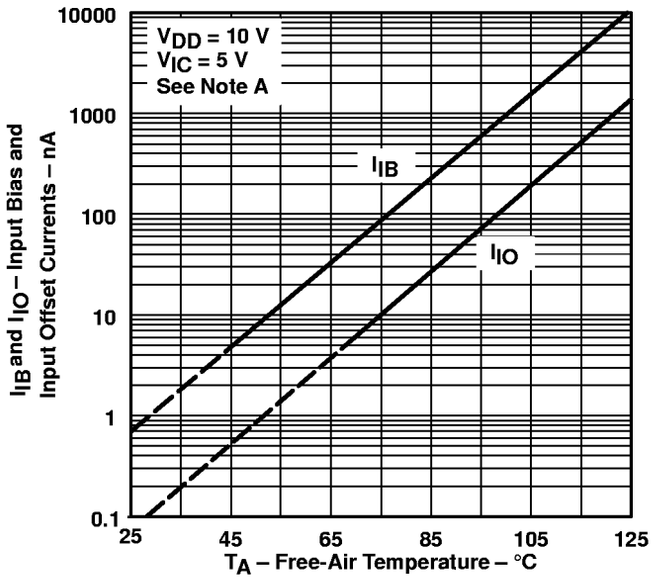


Figure 17

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (HIGH-BIAS MODE)†

INPUT BIAS CURRENT AND INPUT OFFSET CURRENT vs FREE-AIR TEMPERATURE



NOTE A: The typical values of input bias current and input offset current below 5 pA were determined mathematically.

Figure 18

COMMON-MODE INPUT VOLTAGE (POSITIVE LIMIT) vs SUPPLY VOLTAGE

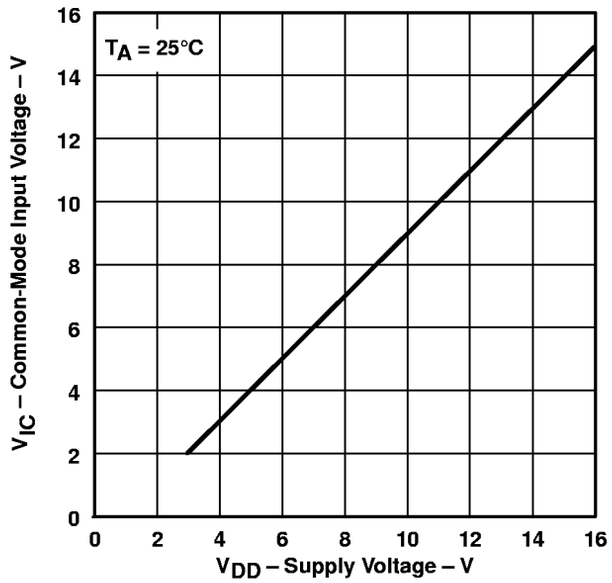


Figure 19

SUPPLY CURRENT vs SUPPLY VOLTAGE

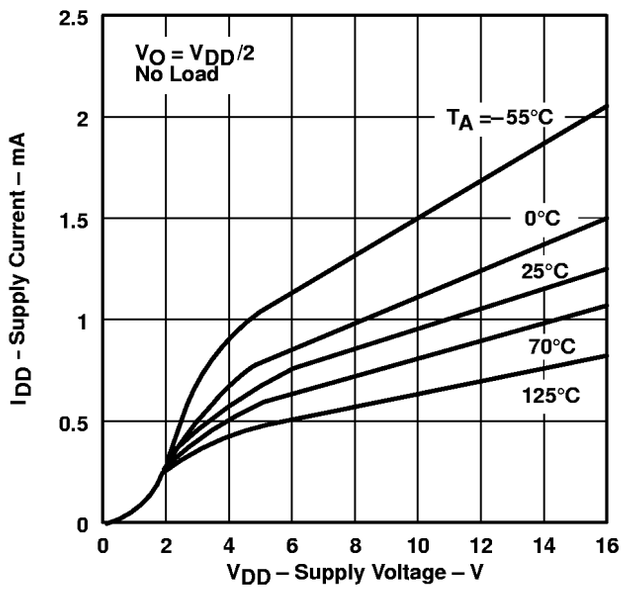


Figure 20

SUPPLY CURRENT vs FREE-AIR TEMPERATURE

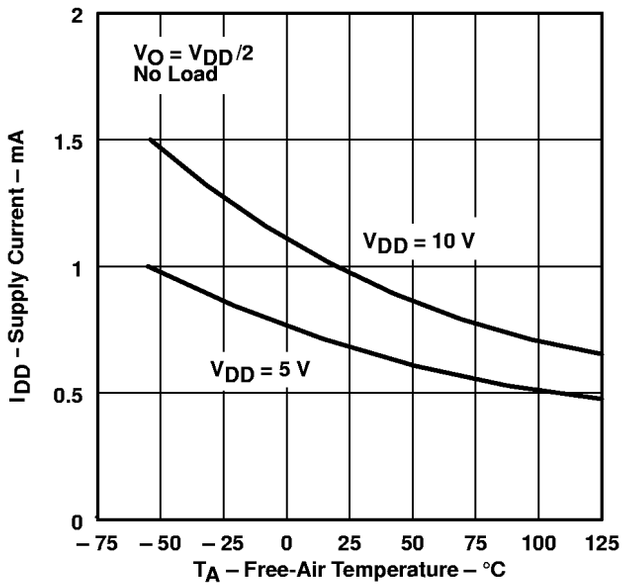


Figure 21

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (HIGH-BIAS MODE)†

SLEW RATE vs SUPPLY VOLTAGE

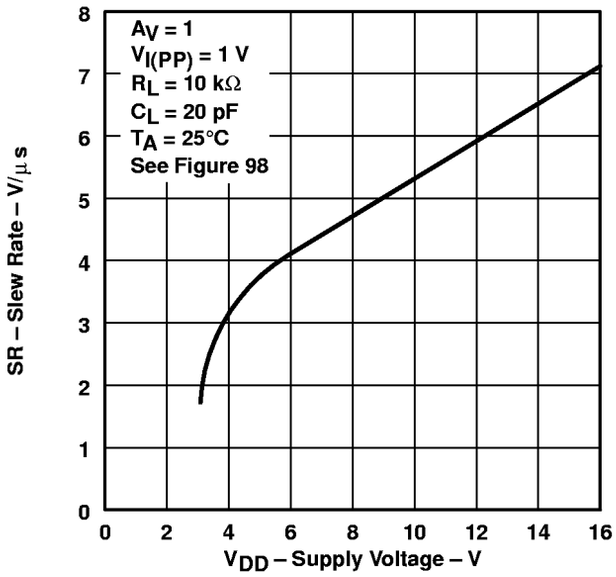


Figure 22

SLEW RATE vs FREE-AIR TEMPERATURE

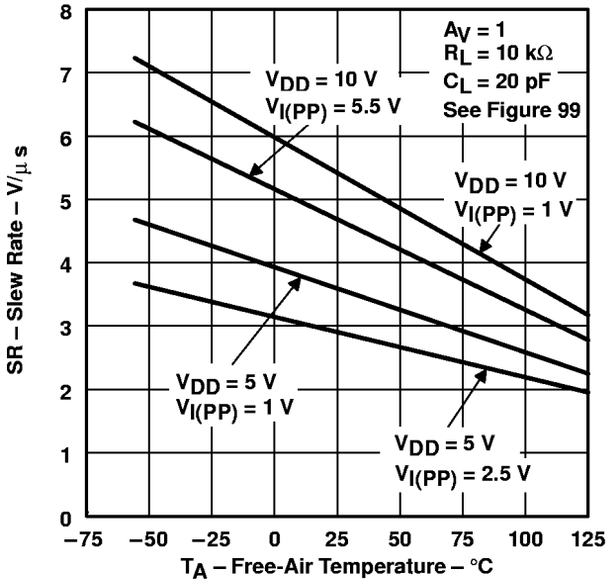


Figure 23

BIAS-SELECT CURRENT vs SUPPLY VOLTAGE

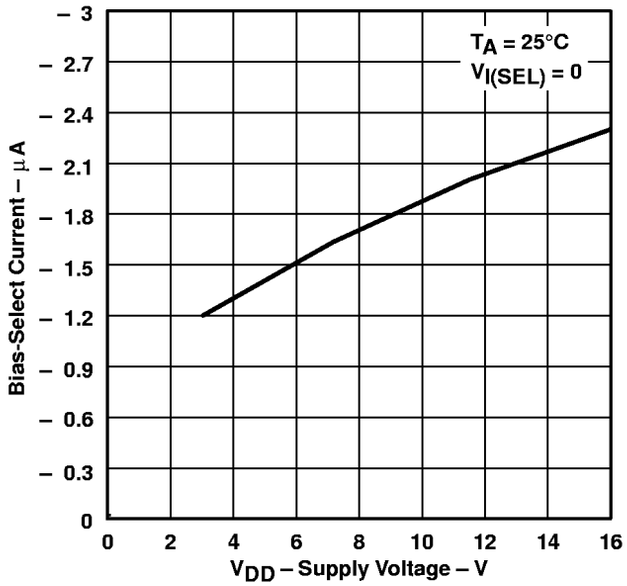


Figure 24

MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE vs FREQUENCY

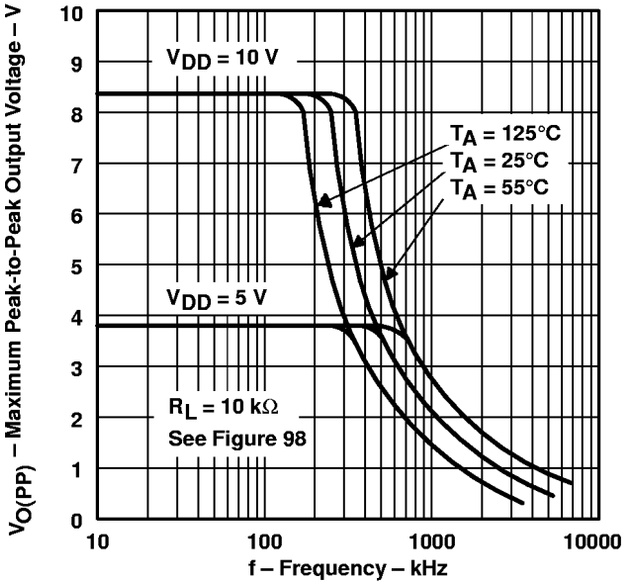


Figure 25

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (HIGH-BIAS MODE)†

UNITY-GAIN BANDWIDTH vs FREE-AIR TEMPERATURE

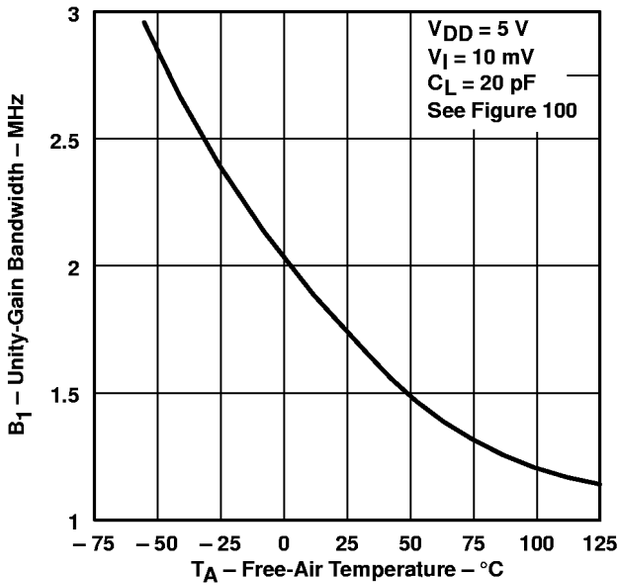


Figure 26

UNITY-GAIN BANDWIDTH vs SUPPLY VOLTAGE

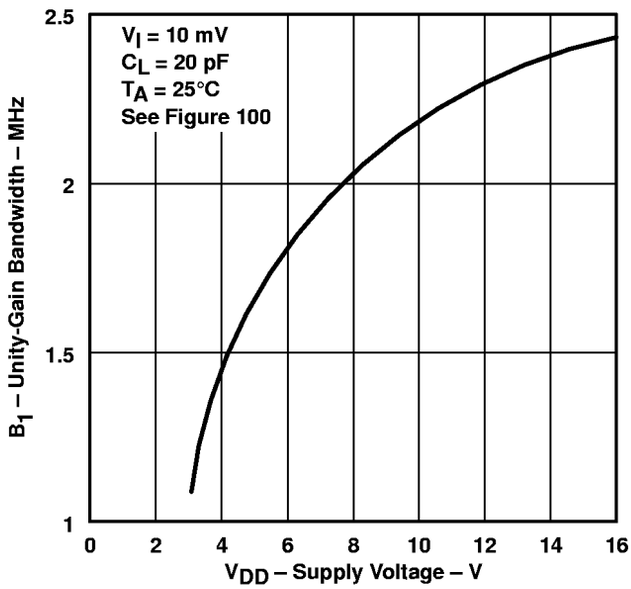


Figure 27

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE SHIFT vs FREQUENCY

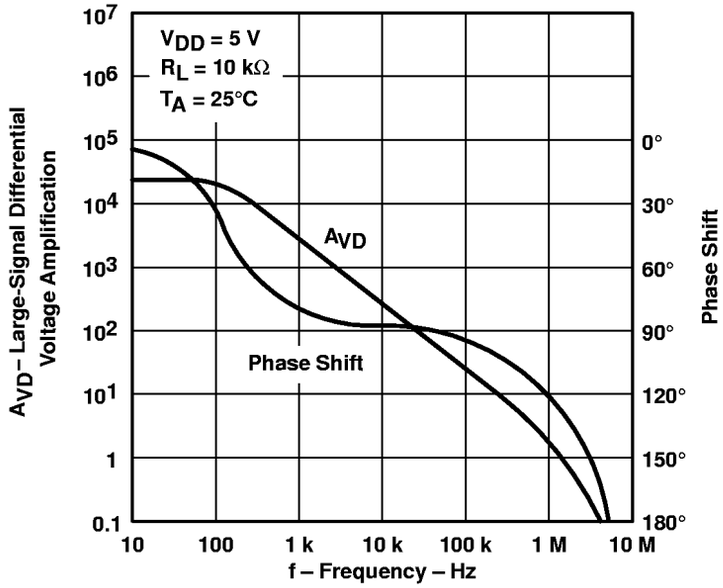


Figure 28

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (HIGH-BIAS MODE)†

LARGE-SCALE DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE SHIFT vs FREQUENCY

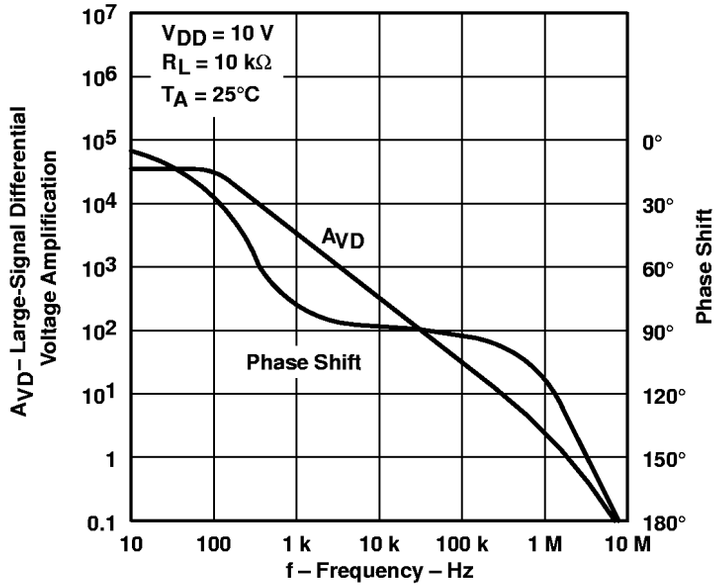


Figure 29

PHASE MARGIN vs SUPPLY VOLTAGE

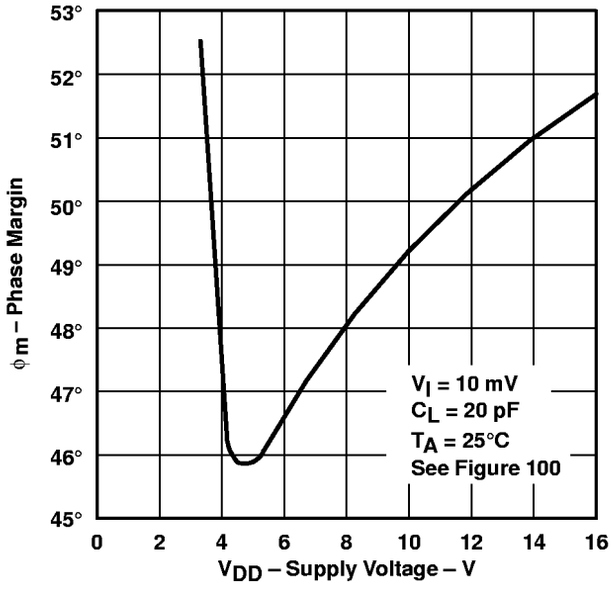


Figure 30

PHASE MARGIN vs FREE-AIR TEMPERATURE

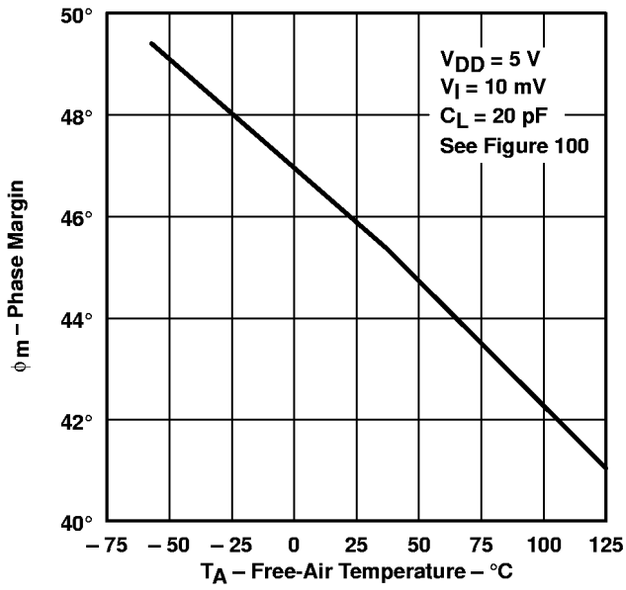


Figure 31

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (HIGH-BIAS MODE)†

PHASE MARGIN vs CAPACITIVE LOAD

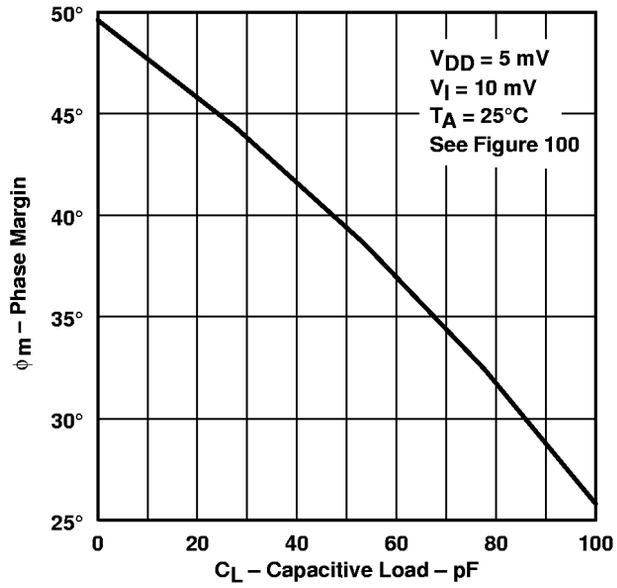


Figure 32

EQUIVALENT NOISE VOLTAGE vs FREQUENCY

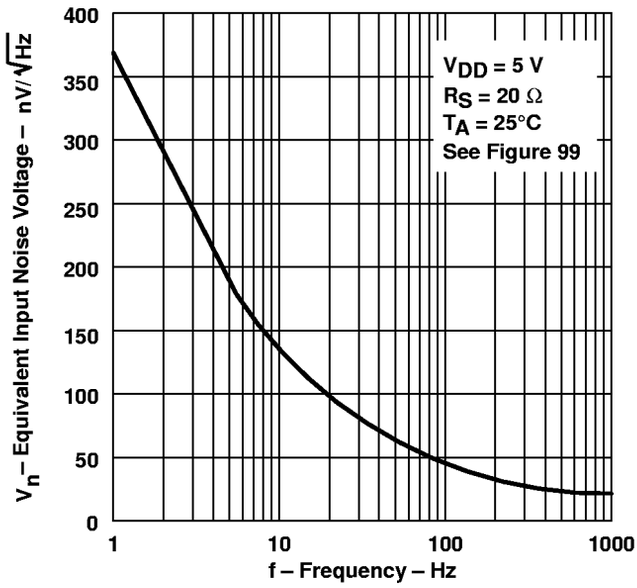


Figure 33

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

MEDIUM-BIAS MODE

electrical characteristics at specified free-air temperature (unless otherwise noted)

PARAMETER			TEST CONDITIONS	T_A†	TLC271C, TLC271AC, TLC271BC						UNIT
					V_{DD} = 5 V			V_{DD} = 10 V			
					MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO}	Input offset voltage	TLC271C	V_O = 1.4 V, V_{IC} = 0, R_S = 50 Ω, R_l = 100 kΩ	25°C		1.1	10		1.1	10	mV
				Full range			12			12	
		TLC271AC		25°C		0.9	5		0.9	5	
				Full range			6.5			6.5	
		TLC271BC		25°C		0.25	2		0.26	2	
				Full range			3			3	
α_{VIO}	Average temperature coefficient of input offset voltage			25°C to 70°C		1.7			2.1		μV/°C
I_{IO}	Input offset current (see Note 4)		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.1			0.1		pA
				70°C		7	300		7	300	
I_{IB}	Input bias current (see Note 4)		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.6			0.7		pA
				70°C		40	600		50	600	
V_{ICR}	Common-mode input voltage range (see Note 5)			25°C	−0.2 to 4	−0.3 to 4.2		−0.2 to 9	−0.3 to 9.2		V
				Full range	−0.2 to 3.5			−0.2 to 8.5			V
V_{OH}	High-level output voltage		V_{ID} = 100 mV, R_L = 100 kΩ	25°C	3.2	3.9		8	8.7		V
				0°C	3	3.9		7.8	8.7		
				70°C	3	4		7.8	8.7		
V_{OL}	Low-level output voltage		V_{ID} = −100 mV, I_{OL} = 0	25°C		0	50		0	50	mV
				0°C		0	50		0	50	
				70°C		0	50		0	50	
A_{VD}	Large-signal differential voltage amplification		R_L = 100 kΩ, See Note 6	25°C	25	170		25	275		V/mV
				0°C	15	200		15	320		
				70°C	15	140		15	230		
CMRR	Common-mode rejection ratio		$V_{IC} = V_{ICR}$min	25°C	65	91		65	94		dB
				0°C	60	91		60	94		
				70°C	60	92		60	94		
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)		V_{DD} = 5 V to 10 V, V_O = 1.4 V	25°C	70	93		70	93		dB
				0°C	60	92		60	92		
				70°C	60	94		60	94		
$I_{I(SEL)}$	Input current (BIAS SELECT)		$V_{I(SEL)} = V_{DD}/2$	25°C		−130			−160		nA
I_{DD}	Supply current		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$, No load	25°C		105	280		143	300	μA
				0°C		125	320		173	400	
				70°C		85	220		110	280	

† Full range is 0°C to 70°C.

NOTES: 4. The typical values of input bias current and input offset current below 5 pA were determined mathematically.
5. This range also applies to each input individually.
6. At V_{DD} = 5 V, V_O = 0.25 V to 2 V; at V_{DD} = 10 V, V_O = 1 V to 6 V.

MEDIUM-BIAS MODE

electrical characteristics at specified free-air temperature (unless otherwise noted)

PARAMETER			TEST CONDITIONS	T_A†	TLC271I, TLC271AI, TLC271BI						UNIT
					V_{DD} = 5 V			V_{DD} = 10 V			
					MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO}	Input offset voltage	TLC271I	V_O = 1.4 V, V_{IC} = 0 V, R_S = 50 Ω, R_L = 100 kΩ	25°C		1.1	10		1.1	10	mV
				Full range			13			13	
		TLC271AI		25°C		0.9	5		0.9	5	
				Full range			7			7	
		TLC271BI		25°C		0.25	2		0.26	2	
				Full range			3.5			3.5	
α_{VIO}	Average temperature coefficient of input offset voltage			25°C to 85°C		1.7			2.1		μV/°C
I_{IO}	Input offset current (see Note 4)		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.1			0.1		pA
				85°C		24	1000		26	1000	
I_{IB}	Input bias current (see Note 4)		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.6			0.7		pA
				85°C		200	2000		220	2000	
V_{ICR}	Common-mode input voltage range (see Note 5)			25°C	−0.2 to 4	−0.3 to 4.2		−0.2 to 9	−0.3 to 9.2		V
				Full range	−0.2 to 3.5			−0.2 to 8.5			V
V_{OH}	High-level output voltage		V_{ID} = 100 mV, R_L = 100 kΩ	25°C	3.2	3.9		8	8.7		V
				−40°C	3	3.9		7.8	8.7		
				85°C	3	4		7.8	8.7		
V_{OL}	Low-level output voltage		V_{ID} = −100 mV, I_{OL} = 0	25°C		0	50		0	50	mV
				−40°C		0	50		0	50	
				85°C		0	50		0	50	
A_{VD}	Large-signal differential voltage amplification		R_L = 100 kΩ, See Note 6	25°C	25	170		25	275		V/mV
				−40°C	15	270		15	390		
				85°C	15	130		15	220		
CMRR	Common-mode rejection ratio		$V_{IC} = V_{ICR}$min	25°C	65	91		65	94		dB
				−40°C	60	90		60	93		
				85°C	60	90		60	94		
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)		V_{DD} = 5 V to 10 V, V_O = 1.4 V	25°C	70	93		70	93		dB
				−40°C	60	91		60	91		
				85°C	60	94		60	94		
$I_{I(SEL)}$	Input current (BIAS SELECT)		$V_{I(SEL)} = V_{DD}/2$	25°C		−130			−160		nA
I_{DD}	Supply current		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$, No load	25°C		105	280		143	300	μA
				−40°C		158	400		225	450	
				85°C		80	200		103	260	

† Full range is −40°C to 85°C.

NOTES: 4. The typical values of input bias current and input offset current below 5 pA were determined mathematically.
5. This range also applies to each input individually.
6. At V_{DD} = 5 V, V_O = 0.25 V to 2 V; at V_{DD} = 10 V, V_O = 1 V to 6 V.

MEDIUM-BIAS MODE

electrical characteristics at specified free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A†	TLC271M						UNIT
				V_{DD} = 5 V			V_{DD} = 10 V			
				MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO}	Input offset voltage	V_O = 1.4 V, V_{IC} = 0 V, R_S = 50 Ω, R_L = 100 kΩ	25°C		1.1	10		1.1	10	mV
			Full range			12			12	
α_{VIO}	Average temperature coefficient of input offset voltage		25°C to 125°C		1.7			2.1		μV/°C
I_{IO}	Input offset current (see Note 4)	$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.1			0.1		pA
			125°C		1.4	15		1.8	15	nA
I_{IB}	Input bias current (see Note 4)	$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.6			0.7		pA
			125°C		9	35		10	35	nA
V_{ICR}	Common-mode input voltage range (see Note 5)		25°C	0 to 4	−0.3 to 4.2		0 to 9	−0.3 to 9.2		V
			Full range	0 to 3.5			0 to 8.5			V
V_{OH}	High-level output voltage	V_{ID} = 100 mV, R_L = 100 kΩ	25°C	3.2	3.9		8	8.7		V
			−55°C	3	3.9		7.8	8.6		
			125°C	3	4		7.8	8.6		
V_{OL}	Low-level output voltage	V_{ID} = −100 mV, I_{OL} = 0	25°C		0	50		0	50	mV
			−55°C		0	50		0	50	
			125°C		0	50		0	50	
A_{VD}	Large-signal differential voltage amplification	R_L = 10 kΩ See Note 6	25°C	25	170		25	275		V/mV
			−55°C	15	290		15	420		
			125°C	15	120		15	190		
CMRR	Common-mode rejection ratio	$V_{IC} = V_{ICR}$min	25°C	65	91		65	94		dB
			−55°C	60	89		60	93		
			125°C	60	91		60	93		
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)	V_{DD} = 5 V to 10 V, V_O = 1.4 V	25°C	70	93		70	93		dB
			−55°C	60	91		60	91		
			125°C	60	94		60	94		
$I_{I(SEL)}$	Input current (BIAS SELECT)	$V_{I(SEL)} = V_{DD}/2$	25°C		−130			−160		nA
I_{DD}	Supply current	$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$, No load	25°C		105	280		143	300	μA
			−55°C		170	440		245	500	
			125°C		70	180		90	240	

† Full range is −55°C to 125°C.

NOTES: 4. The typical values of input bias current and input offset current below 5 pA were determined mathematically.
5. This range also applies to each input individually.
6. At V_{DD} = 5 V, V_O = 0.25 V to 2 V; at V_{DD} = 10 V, V_O = 1 V to 6 V.

MEDIUM-BIAS MODE

operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A	TLC271C, TLC271AC, TLC271BC			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 100 kΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		0.43		V/μs
				0°C		0.46		
				70°C		0.36		
			$V_{I(PP)}$ = 2.5 V	25°C		0.40		
				0°C		0.43		
				70°C		0.34		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		32		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	$V_O = V_{OH}$, R_L = 100 kΩ,	C_L = 20 pF, See Figure 98	25°C		55		kHz
				0°C		60		
				70°C		50		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		525		kHz
				0°C		600		
				70°C		400		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f = B_1, See Figure 100	25°C		40°		
				0°C		41°		
				70°C		39°		

operating characteristics at specified free-air temperature, V_{DD} = 10 V

PARAMETER		TEST CONDITIONS		T_A	TLC271C, TLC271AC, TLC271BC			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 100 kΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		0.62		V/μs
				0°C		0.67		
				70°C		0.51		
			$V_{I(PP)}$ = 5.5 V	25°C		0.56		
				0°C		0.61		
				70°C		0.46		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		32		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	$V_O = V_{OH}$, R_L = 100 kΩ,	C_L = 20 pF, See Figure 98	25°C		35		kHz
				0°C		40		
				70°C		30		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		635		kHz
				0°C		710		
				70°C		510		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f = B_1, See Figure 100	25°C		43°		
				0°C		44°		
				70°C		42°		

MEDIUM-BIAS MODE

operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A	TLC271I, TLC271AI, TLC271BI			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 100 kΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		0.43		V/μs
				−40°C		0.51		
				85°C		0.35		
			$V_{I(PP)}$ = 2.5 V	25°C		0.40		
				−40°C		0.48		
				85°C		0.32		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		32		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	$V_O = V_{OH}$, R_L = 100 kΩ,	C_L = 20 pF, See Figure 98	25°C		55		kHz
				−40°C		75		
				85°C		45		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		525		MHz
				−40°C		770		
				85°C		370		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f = B_1, See Figure 100	25°C		40°		
				−40°C		43°		
				85°C		38°		

operating characteristics at specified free-air temperature, V_{DD} = 10 V

PARAMETER		TEST CONDITIONS		T_A	TLC271I, TLC271AI, TLC271BI			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 100 kΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		0.62		V/μs
				−40°C		0.77		
				85°C		0.47		
			$V_{I(PP)}$ = 5.5 V	25°C		0.56		
				−40°C		0.70		
				85°C		0.44		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		32		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	$V_O = V_{OH}$,3 R_L = 100 kΩ,	C_L = 20 pF, See Figure 98	25°C		35		kHz
				−40°C		45		
				85°C		25		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		635		kHz
				−40°C		880		
				85°C		480		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f = B_1, See Figure 100	25°C		43°		
				−40°C		46°		
				85°C		41°		

MEDIUM-BIAS MODE

operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A	TLC271M			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 100 kΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		0.43		V/μs
				–55°C		0.54		
				125°C		0.29		
			$V_{I(PP)}$ = 2.5 V	25°C		0.40		
				–55°C		0.50		
				125°C		0.28		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		32		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	$V_O = V_{OH}$, R_L = 100 kΩ,	C_L = 20 pF, See Figure 98	25°C		55		kHz
				–55°C		80		
				125°C		40		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		525		kHz
				–55°C		850		
				125°C		330		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f = B_1, See Figure 100	25°C		40°		
				–55°C		43°		
				125°C		36°		

operating characteristics at specified free-air temperature, V_{DD} = 10 V

PARAMETER		TEST CONDITIONS		T_A	TLC271M			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 100 kΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		0.62		V/μs
				–55°C		0.81		
				125°C		0.38		
			$V_{I(PP)}$ = 5.5 V	25°C		0.56		
				–55°C		0.73		
				125°C		0.35		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		32		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	$V_O = V_{OH}$, R_L = 100 kΩ,	C_L = 20 pF, See Figure 98	25°C		35		kHz
				–55°C		50		
				125°C		20		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		635		kHz
				–55°C		960		
				125°C		440		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f = B_1, See Figure 100	25°C		43°		
				–55°C		47°		
				125°C		39°		

TYPICAL CHARACTERISTICS (MEDIUM-BIAS MODE)

Table of Graphs

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TYPICAL CHARACTERISTICS (MEDIUM-BIAS MODE)†

**DISTRIBUTION OF TLC271
INPUT OFFSET VOLTAGE**

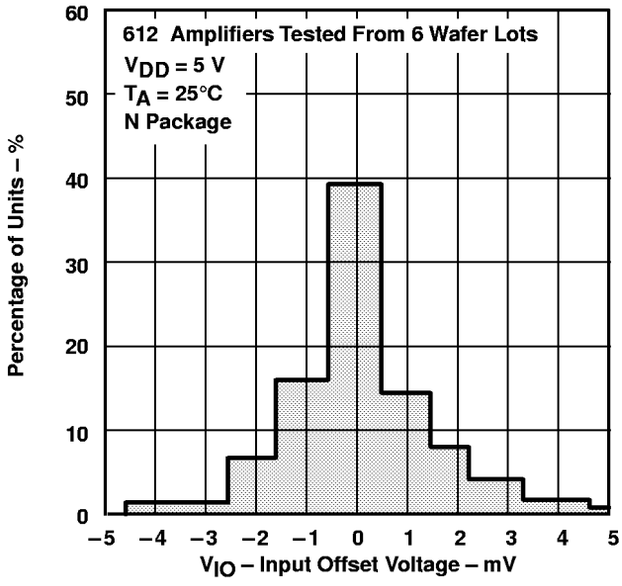


Figure 34

**DISTRIBUTION OF TLC271
INPUT OFFSET VOLTAGE**

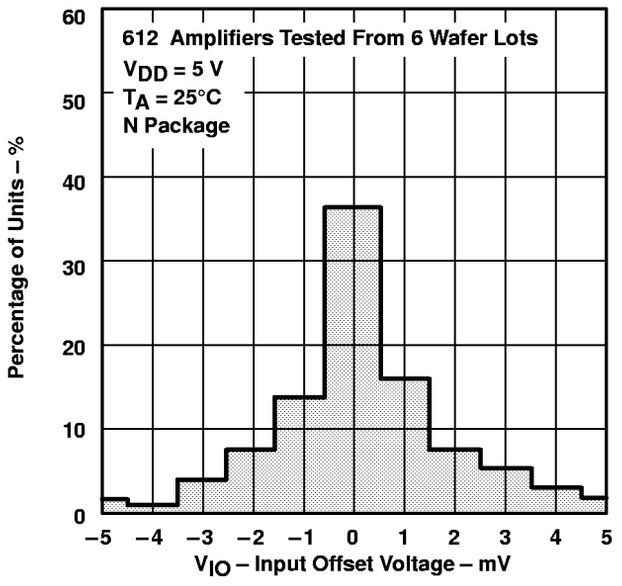


Figure 35

**DISTRIBUTION OF TLC271
INPUT OFFSET VOLTAGE
TEMPERATURE COEFFICIENT**

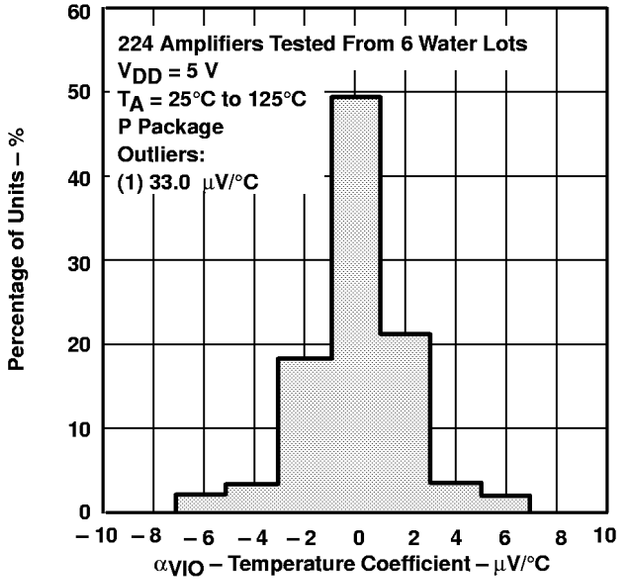


Figure 36

**DISTRIBUTION OF TLC271
INPUT OFFSET VOLTAGE
TEMPERATURE COEFFICIENT**

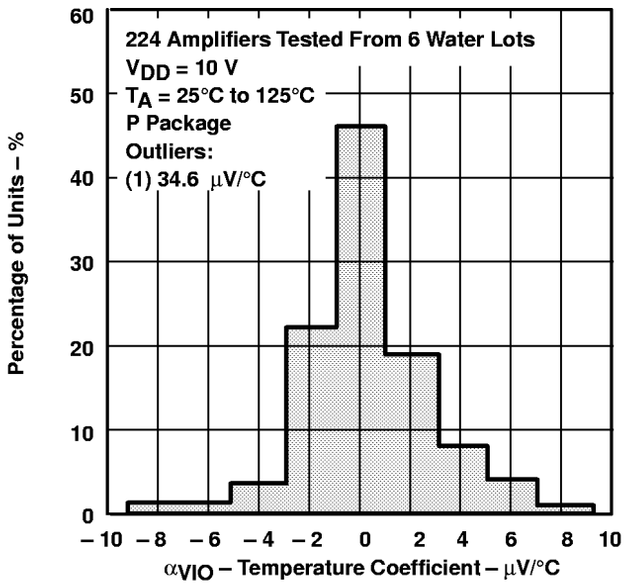


Figure 37

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (MEDIUM-BIAS MODE)†

HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

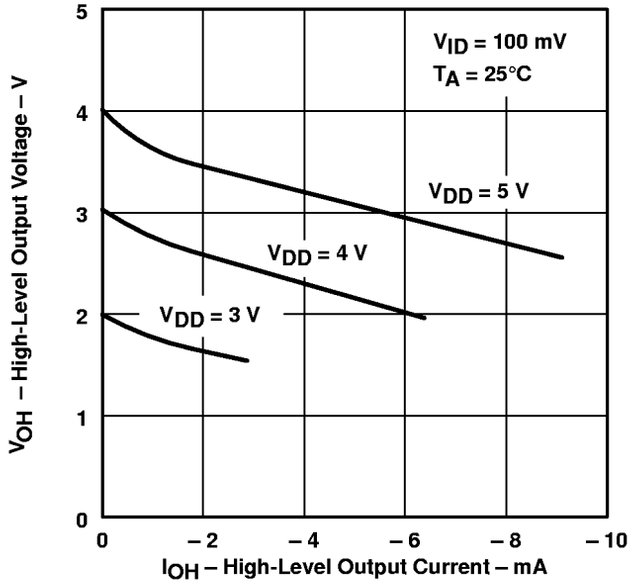


Figure 38

HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

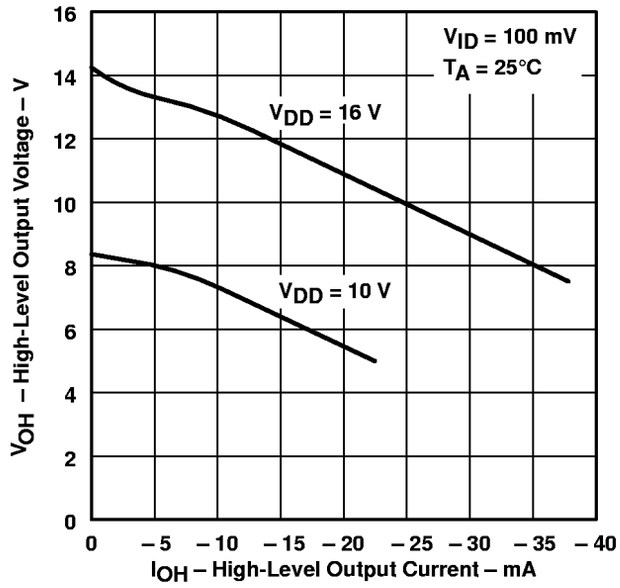


Figure 39

HIGH-LEVEL OUTPUT VOLTAGE
vs
SUPPLY VOLTAGE

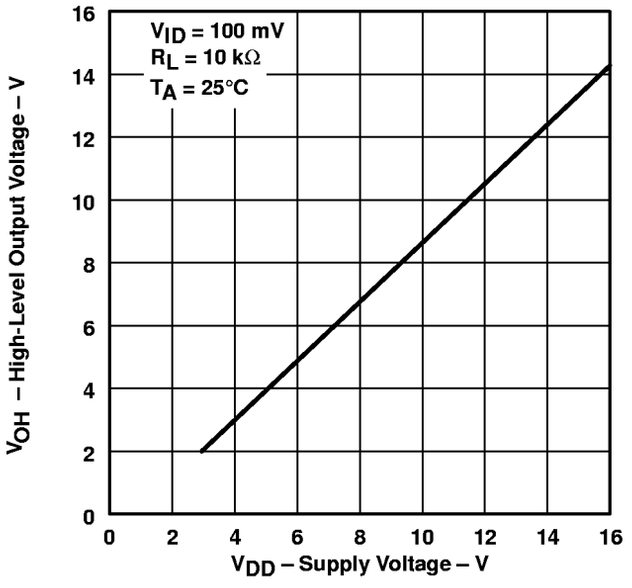


Figure 40

HIGH-LEVEL OUTPUT VOLTAGE
vs
FREE-AIR TEMPERATURE

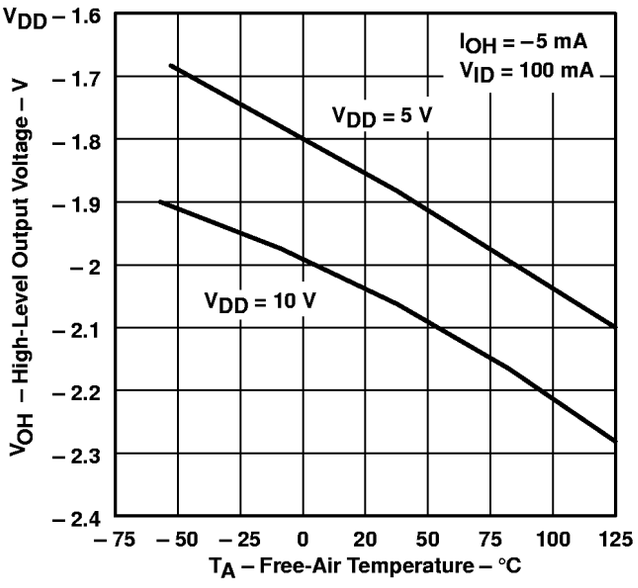


Figure 41

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (MEDIUM-BIAS MODE)†

LOW-LEVEL OUTPUT VOLTAGE
vs
COMMON-MODE INPUT VOLTAGE

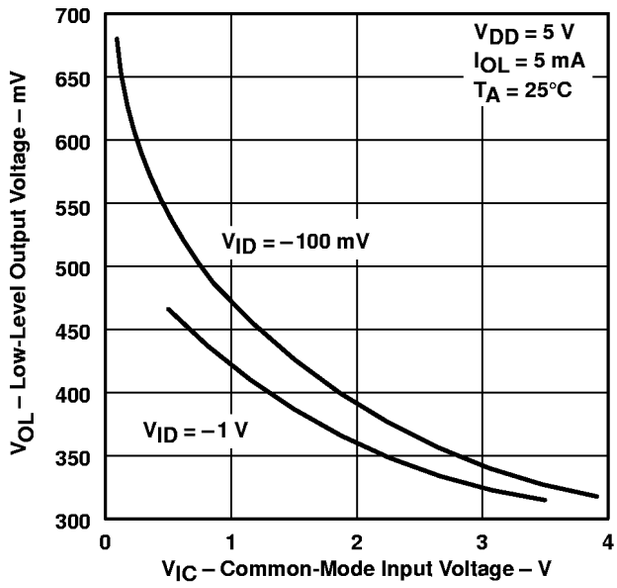


Figure 42

LOW-LEVEL OUTPUT VOLTAGE
vs
COMMON-MODE INPUT VOLTAGE

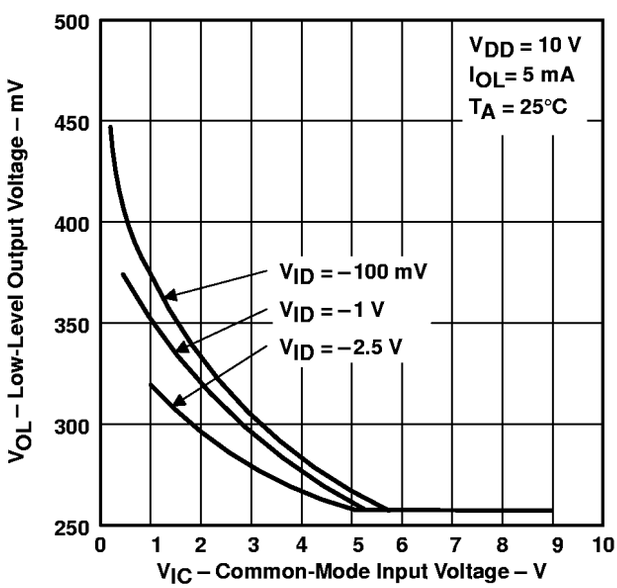


Figure 43

LOW-LEVEL OUTPUT VOLTAGE
vs
DIFFERENTIAL INPUT VOLTAGE

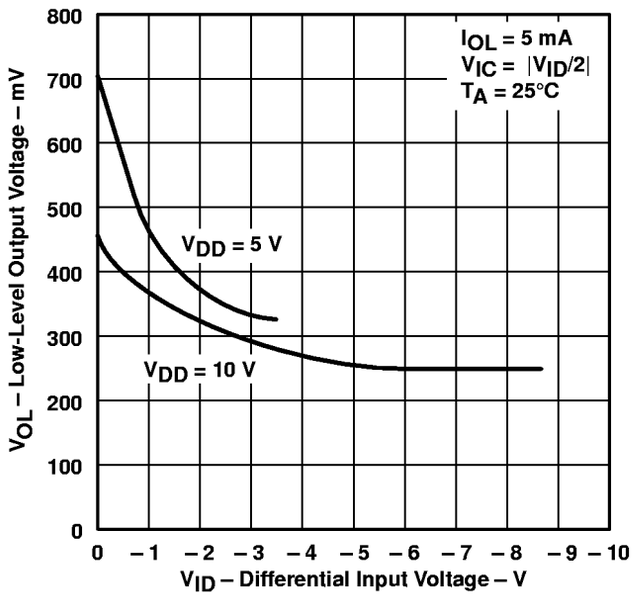


Figure 44

LOW-LEVEL OUTPUT VOLTAGE
vs
FREE-AIR TEMPERATURE

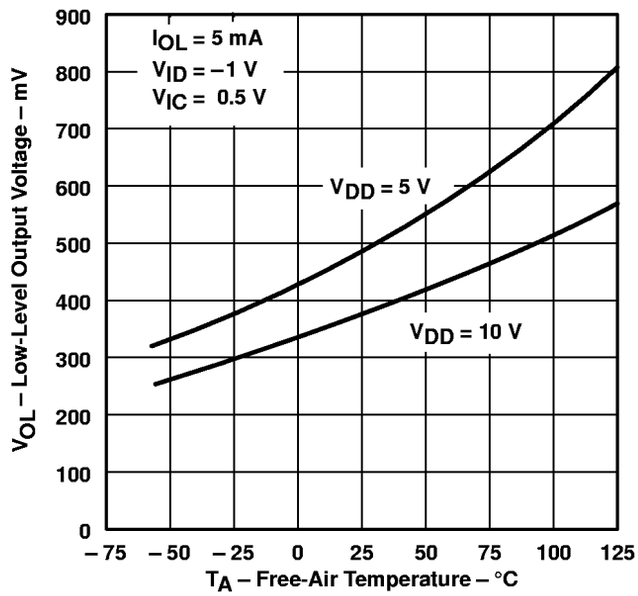


Figure 45

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (MEDIUM-BIAS MODE)†

LOW-LEVEL OUTPUT VOLTAGE vs LOW-LEVEL OUTPUT CURRENT

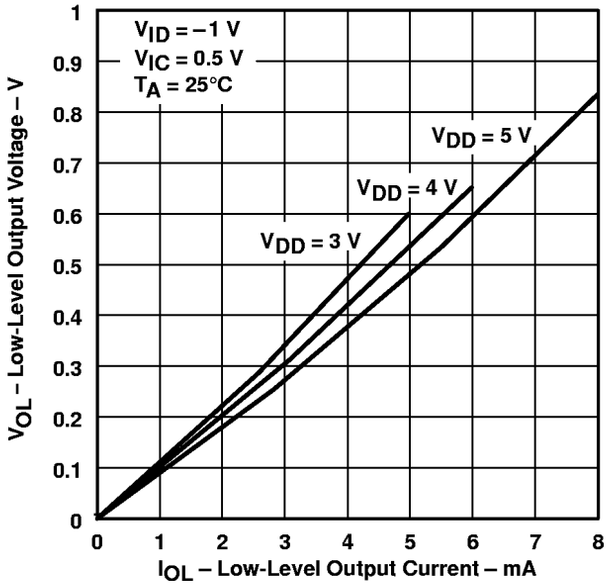


Figure 46

LOW-LEVEL OUTPUT VOLTAGE vs LOW-LEVEL OUTPUT CURRENT

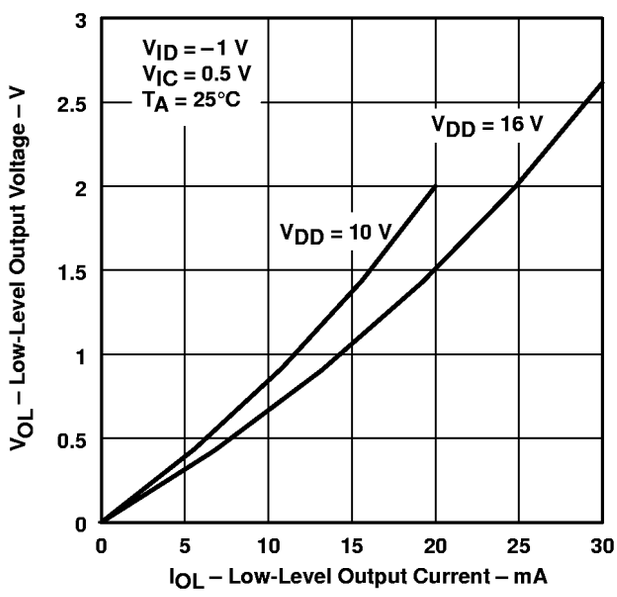


Figure 47

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION vs SUPPLY VOLTAGE

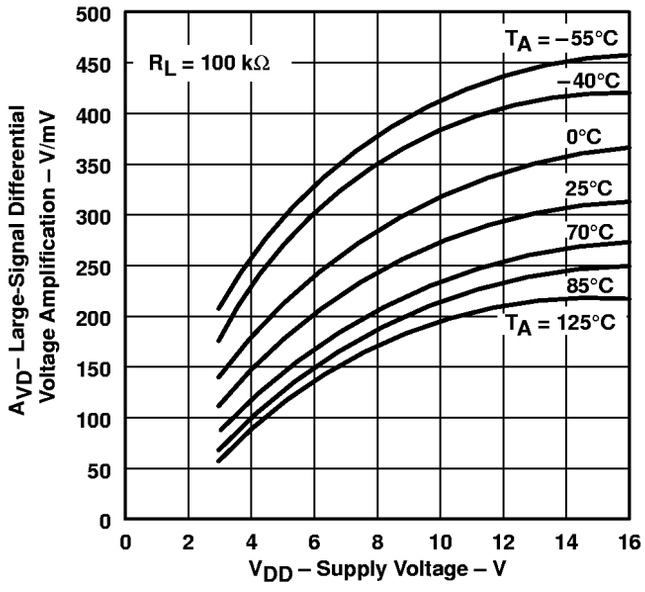


Figure 48

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION vs FREE-AIR TEMPERATURE

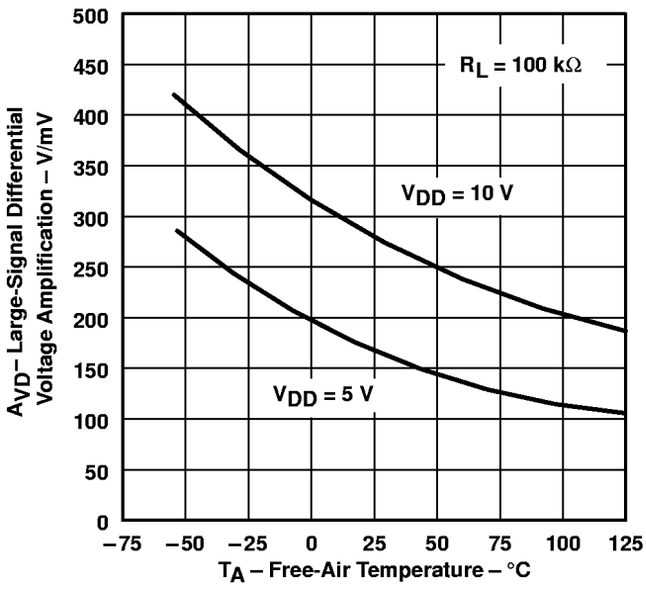
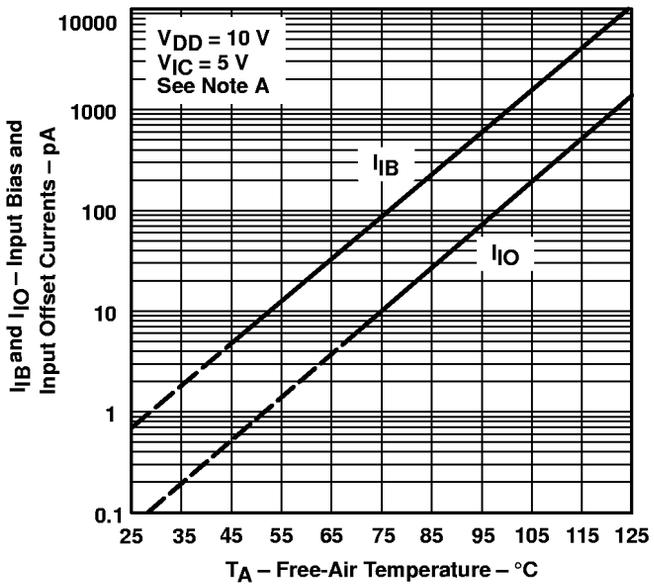


Figure 49

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (MEDIUM-BIAS MODE)†

INPUT BIAS CURRENT AND INPUT OFFSET CURRENT vs FREE-AIR TEMPERATURE



NOTE A: The typical values of input bias current and input offset current below 5 pA were determined mathematically.

Figure 50

MAXIMUM INPUT VOLTAGE vs SUPPLY VOLTAGE

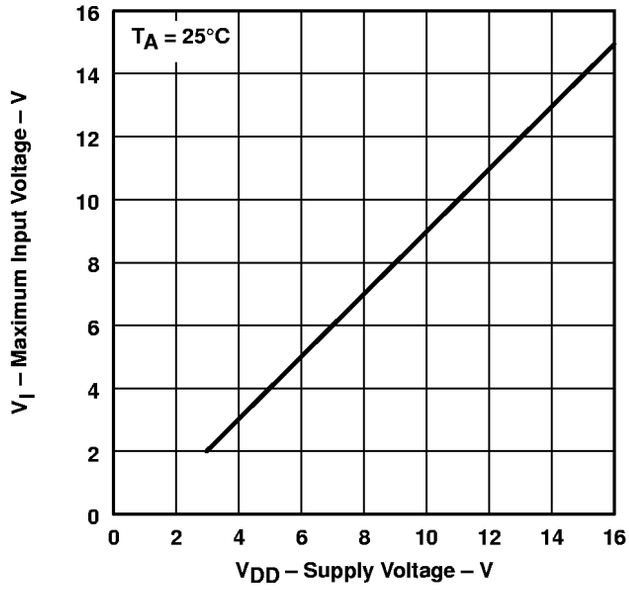


Figure 51

SUPPLY CURRENT vs SUPPLY VOLTAGE

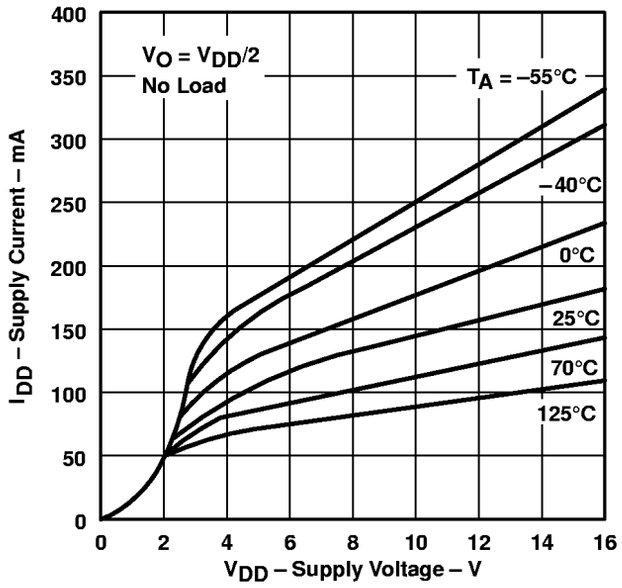


Figure 52

SUPPLY CURRENT vs FREE-AIR TEMPERATURE

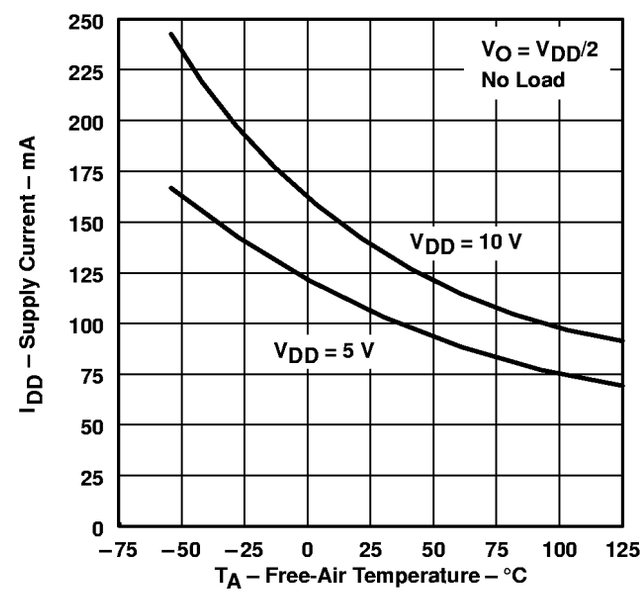


Figure 53

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (MEDIUM-BIAS MODE)†

SLEW RATE
vs
SUPPLY VOLTAGE

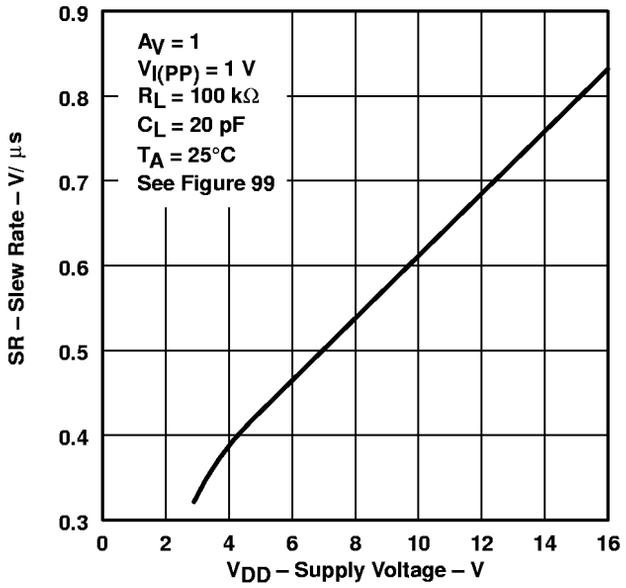


Figure 54

SLEW RATE
vs
FREE-AIR TEMPERATURE

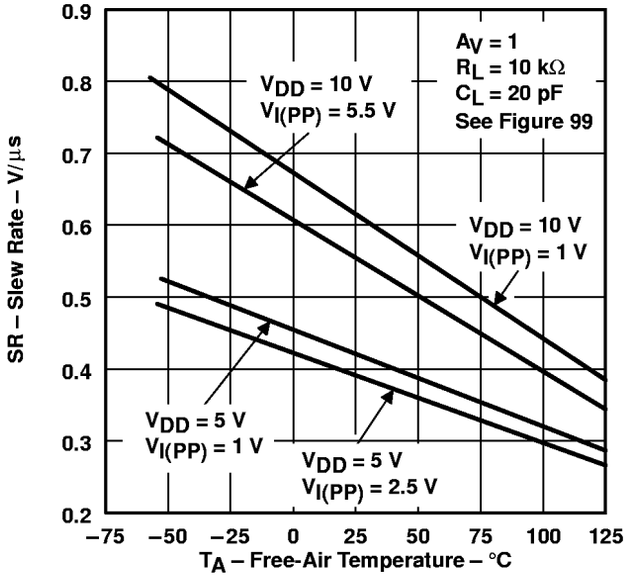


Figure 55

BIAS-SELECT CURRENT
vs
SUPPLY VOLTAGE

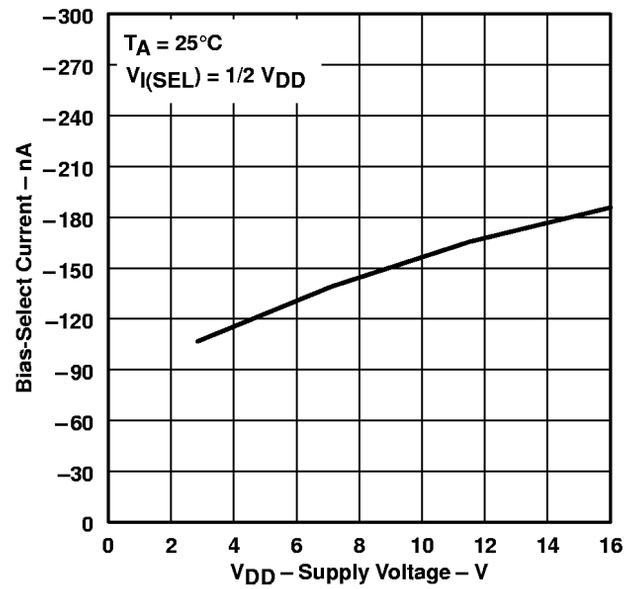


Figure 56

MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE
vs
FREQUENCY

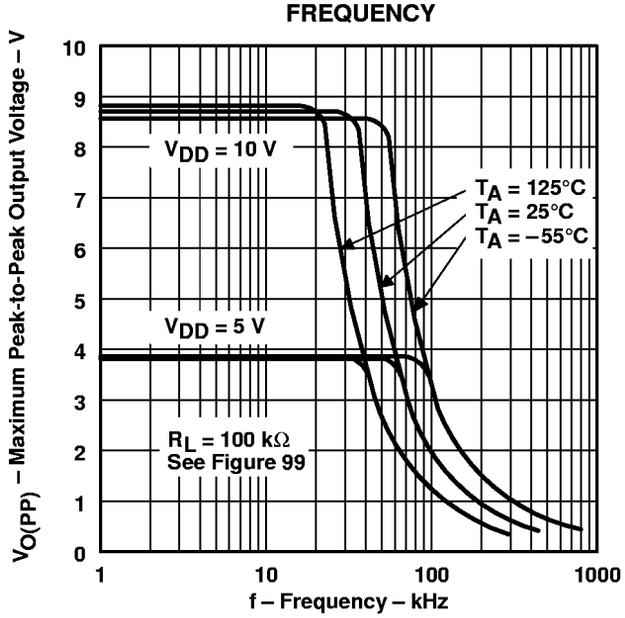


Figure 57

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (MEDIUM-BIAS MODE)†

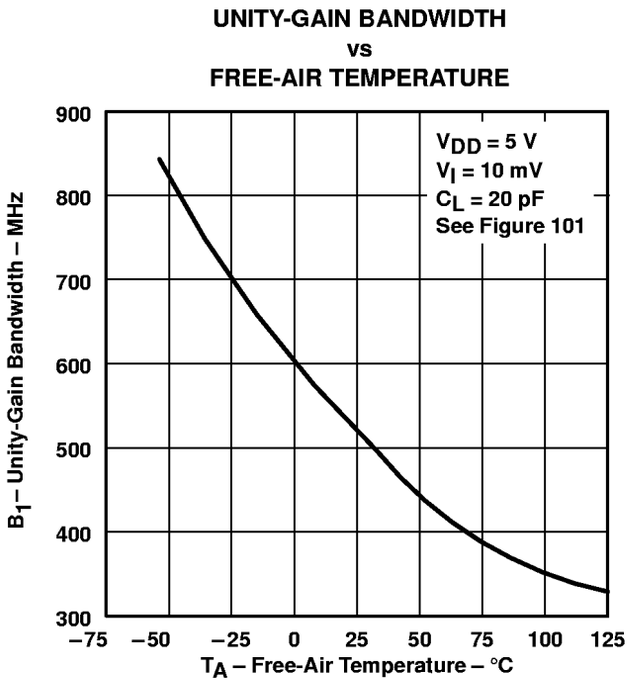


Figure 58

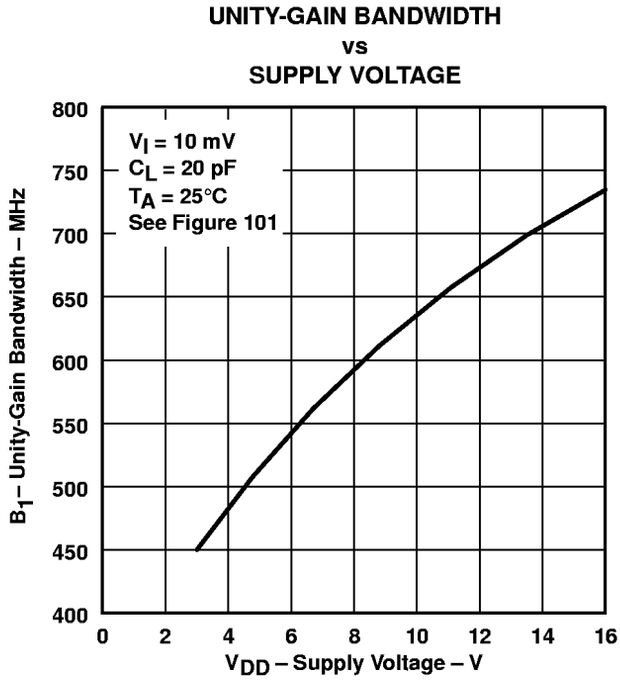


Figure 59

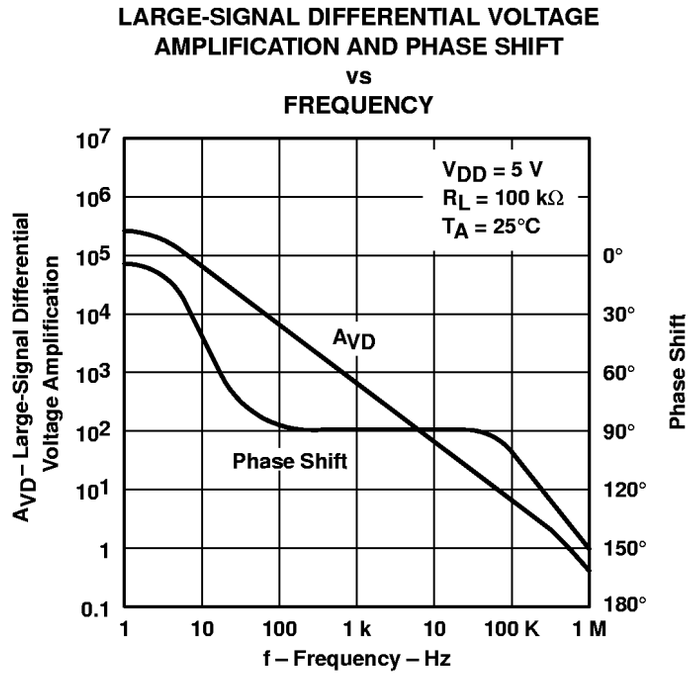


Figure 60

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (MEDIUM-BIAS MODE)†

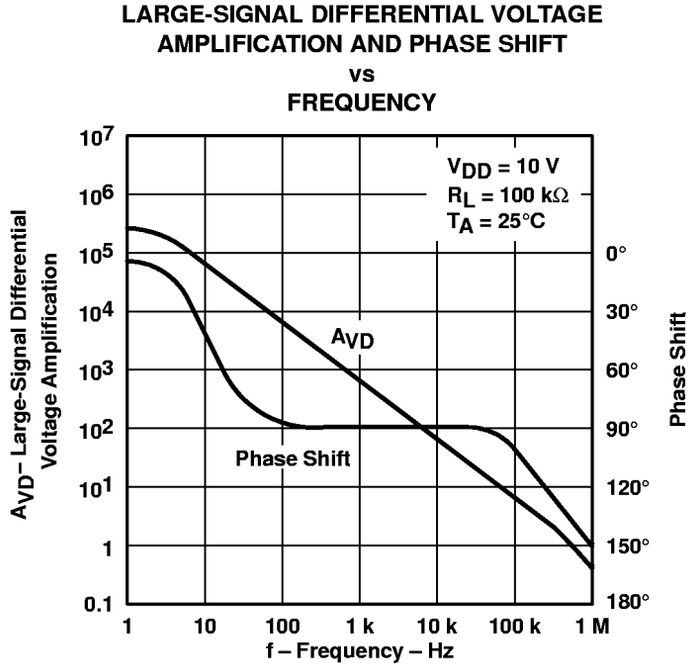


Figure 61

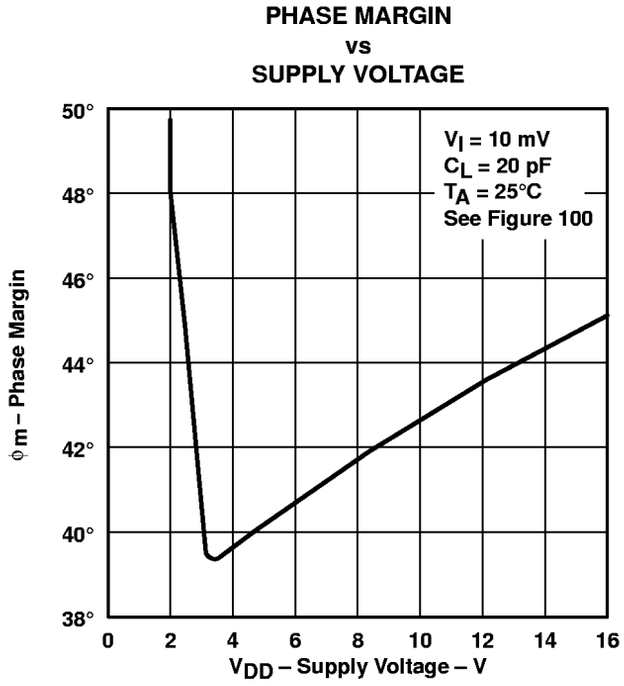


Figure 62

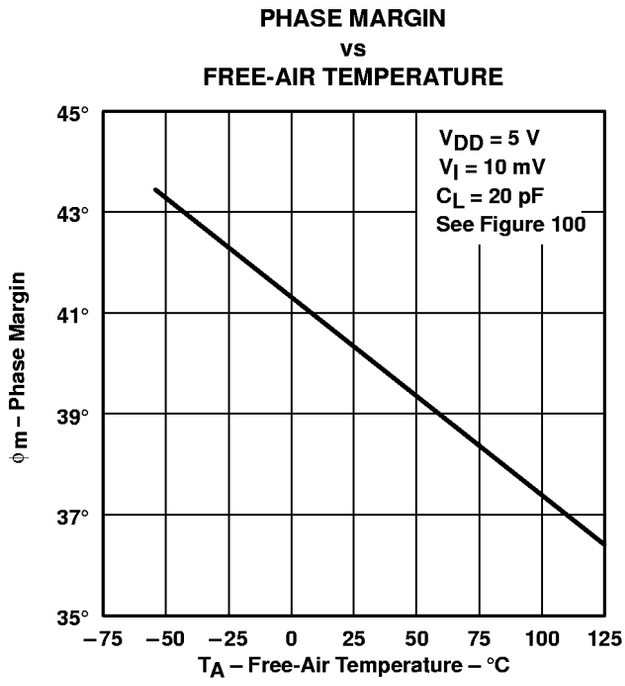


Figure 63

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (MEDIUM-BIAS MODE)†

PHASE MARGIN vs CAPACITIVE LOAD

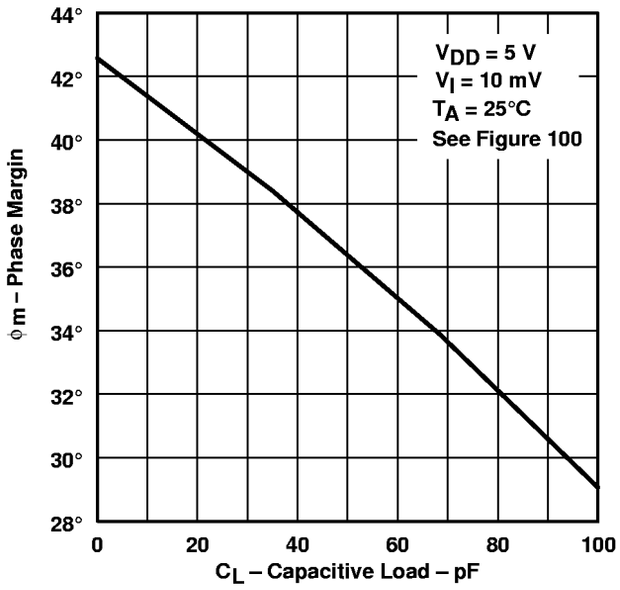


Figure 64

EQUIVALENT INPUT NOISE VOLTAGE vs FREQUENCY

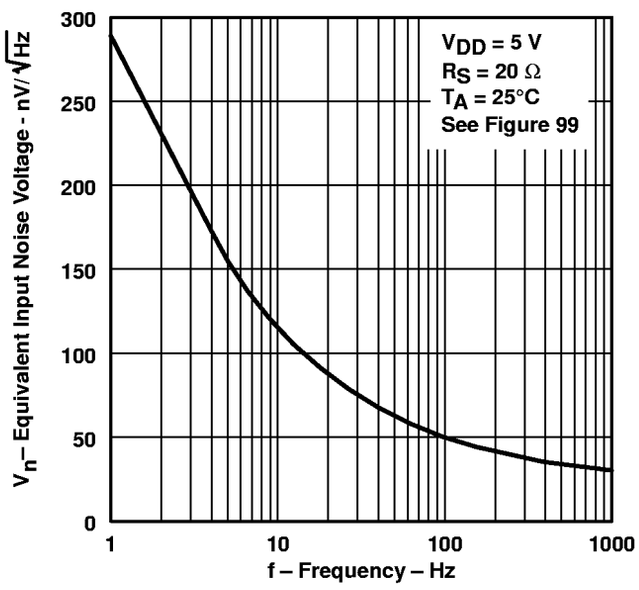


Figure 65

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

LOW-BIAS MODE

electrical characteristics at specified free-air temperature (unless otherwise noted)

PARAMETER			TEST CONDITIONS	T_A†	TLC271C, TLC271AC, TLC271BC						UNIT
					V_{DD} = 5 V			V_{DD} = 10 V			
					MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO}	Input offset voltage	TLC271C	V_O = 1.4 V, V_{IC} = 0 V, R_S = 50 Ω, R_I = 1 MΩ	25°C		1.1	10		1.1	10	mV
				Full range			12			12	
		TLC271AC		25°C		0.9	5		0.9	5	
				Full range			6.5			6.5	
		TLC271BC		25°C		0.24	2		0.26	2	
				Full range			3			3	
α_{VIO}	Average temperature coefficient of input offset voltage			25°C to 70°C		1.1			1		μV/°C
I_{IO}	Input offset current (see Note 4)		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.1			0.1		pA
				70°C		7	300		8	300	
I_{IB}	Input bias current (see Note 4)		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.6			0.7		pA
				70°C		40	600		50	600	
V_{ICR}	Common-mode input voltage range (see Note 5)			25°C	−0.2 to 4	−0.3 to 4.2		−0.2 to 9	−0.3 to 9.2		V
				Full range	−0.2 to 3.5			−0.2 to 8.5			V
V_{OH}	High-level output voltage		V_{ID} = 100 mV, R_L = 1 MΩ	25°C	3.2	4.1		8	8.9		V
				0°C	3	4.1		7.8	8.9		
				70°C	3	4.2		7.8	8.9		
V_{OL}	Low-level output voltage		V_{ID} = −100 mV, I_{OL} = 0	25°C		0	50		0	50	mV
				0°C		0	50		0	50	
				70°C		0	50		0	50	
A_{VD}	Large-signal differential voltage amplification		R_L = 1 MΩ, See Note 6	25°C	50	520		50	870		V/mV
				0°C	50	700		50	1030		
				70°C	50	380		50	660		
CMRR	Common-mode rejection ratio		$V_{IC} = V_{ICR}$min	25°C	65	94		65	97		dB
				0°C	60	95		60	97		
				70°C	60	95		60	97		
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)		V_{DD} = 5 V to 10 V, V_O = 1.4 V	25°C	70	97		70	97		dB
				0°C	60	97		60	97		
				70°C	60	98		60	98		
$I_{I(SEL)}$	Input current (BIAS SELECT)		$V_{I(SEL)} = V_{DD}$	25°C		65			95		nA
I_{DD}	Supply current		$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$, No load	25°C		10	17		14	23	μA
				0°C		12	21		18	33	
				70°C		8	14		11	20	

† Full range is 0°C to 70°C.

NOTES: 4. The typical values of input bias current and input offset current below 5 pA were determined mathematically.
5. This range also applies to each input individually.
6. At V_{DD} = 5 V, V_O = 0.25 V to 2 V; at V_{DD} = 10 V, V_O = 1 V to 6 V.

LOW-BIAS MODE

electrical characteristics at specified free-air temperature (unless otherwise noted)

PARAMETER			TEST CONDITIONS	T_A†	TLC271I, TLC271AI, TLC271BI						UNIT
					V_{DD} = 5 V			V_{DD} = 10 V			
					MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO}	Input offset voltage	TLC271I	V_O = 1.4 V, V_{IC} = 0 V, R_S = 50 Ω, R_L = 1 MΩ	25°C		1.1	10		1.1	10	mV
				Full range			13			13	
		TLC271AI		25°C		0.9	5		0.9	5	
				Full range			7			7	
		TLC271BI		25°C		0.24	2		0.26	2	
				Full range			3.5			3.5	
α_{VIO}	Average temperature coefficient of input offset voltage			25°C to 85°C		1.1			1		μV/°C
I_{IO}	Input offset current (see Note 4)		V_O = V_{DD}/2, V_{IC} = V_{DD}/2	25°C		0.1			0.1		pA
				85°C		24	1000		26	1000	
I_{IB}	Input bias current (see Note 4)		V_O = V_{DD}/2, V_{IC} = V_{DD}/2	25°C		0.6			0.7		pA
				85°C		200	2000		220	2000	
V_{ICR}	Common-mode input voltage range (see Note 5)			25°C	−0.2 to 4	−0.3 to 4.2		−0.2 to 9	−0.3 to 9.2		V
				Full range	−0.2 to 3.5			−0.2 to 8.5			V
V_{OH}	High-level output voltage		V_{ID} = 100 mV, R_L = 1 MΩ	25°C	3	4.1		8	8.9		V
				−40°C	3	4.1		7.8	8.9		
				85°C	3	4.2		7.8	8.9		
V_{OL}	Low-level output voltage		V_{ID} = −100 mV, I_{OL} = 0	25°C		0	50		0	50	mV
				−40°C		0	50		0	50	
				85°C		0	50		0	50	
A_{VD}	Large-signal differential voltage amplification		R_L = 1 MΩ See Note 6	25°C	50	520		50	870		V/mV
				−40°C	50	900		50	1550		
				85°C	50	330		50	585		
CMRR	Common-mode rejection ratio		V_{IC} = V_{ICR}min	25°C	65	94		65	97		dB
				−40°C	60	95		60	97		
				85°C	60	95		60	98		
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)		V_{DD} = 5 V to 10 V V_O = 1.4 V	25°C	70	97		70	97		dB
				−40°C	60	97		60	97		
				85°C	60	98		60	98		
$I_{I(SEL)}$	Input current (BIAS SELECT)		$V_{I(SEL)}$ = V_{DD}	25°C		65			95		nA
I_{DD}	Supply current		V_O = V_{DD}/2, V_{IC} = V_{DD}/2, No load	25°C		10	17		14	23	μA
				−40°C		16	27		25	43	
				85°C		17	13		10	18	

† Full range is −40 to 85°C.

NOTES: 4. The typical values of input bias current and input offset current below 5 pA were determined mathematically.
5. This range also applies to each input individually.
6. At V_{DD} = 5 V, V_O = 0.25 V to 2 V; at V_{DD} = 10 V, V_O = 1 V to 6 V.

LOW-BIAS MODE

electrical characteristics at specified free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A†	TLC271M						UNIT
				V_{DD} = 5 V			V_{DD} = 10 V			
				MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO}	Input offset voltage	V_O = 1.4 V, V_{IC} = 0 V, R_S = 50 Ω, R_L = 1 MΩ	25°C		1.1	10		1.1	10	mV
			Full range			12			12	
α_{VIO}	Average temperature coefficient of input offset voltage		25°C to 125°C		1.4			1.4		μV/°C
I_{IO}	Input offset current (see Note 4)	$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.1			0.1		pA
			125°C		1.4	15		1.8	15	nA
I_{IB}	Input bias current (see Note 4)	$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$	25°C		0.6			0.7		pA
			125°C		9	35		10	35	nA
V_{ICR}	Common-mode input voltage range (see Note 5)		25°C	0 to 4	−0.3 to 4.2		0 to 9	−0.3 to 9.2		V
			Full range	0 to 3.5			0 to 8.5			V
V_{OH}	High-level output voltage	V_{ID} = 100 mV, R_L = 1 MΩ	25°C	3.2	4.1		8	8.9		V
			−55°C	3	4.1		7.8	8.8		
			125°C	3	4.2		7.8	9		
V_{OL}	Low-level output voltage	V_{ID} = −100 mV, I_{OL} = 0	25°C		0	50		0	50	mV
			−55°C		0	50		0	50	
			125°C		0	50		0	50	
A_{VD}	Large-signal differential voltage amplification	R_L = 1 MΩ, See Note 6	25°C	50	520		50	870		V/mV
			−55°C	25	1000		25	1775		
			125°C	25	200		25	380		
CMRR	Common-mode rejection ratio	$V_{IC} = V_{ICR}$min	25°C	65	94		65	97		dB
			−55°C	60	95		60	97		
			125°C	60	85		60	91		
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)	V_{DD} = 5 V to 10 V, V_O = 1.4 V	25°C	70	97		70	97		dB
			−55°C	60	97		60	97		
			125°C	60	98		60	98		
$I_{I(SEL)}$	Input current (BIAS SELECT)	$V_{I(SEL)} = V_{DD}$	25°C		65			95		nA
I_{DD}	Supply current	$V_O = V_{DD}/2$, $V_{IC} = V_{DD}/2$, No load	25°C		10	17		14	23	μA
			−55°C		17	30		28	48	
			125°C		7	12		9	15	

† Full range is −55°C to 125°C.

NOTES: 4. The typical values of input bias current and input offset current below 5 pA were determined mathematically.
5. This range also applies to each input individually.
6. At V_{DD} = 5 V, V_O = 0.25 V to 2 V; at V_{DD} = 10 V, V_O = 1 V to 6 V.

LOW-BIAS MODE

operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A	TLC271C, TLC271AC, TLC271BC			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 1 MΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		0.03		V/μs
				0°C		0.04		
				70°C		0.03		
			$V_{I(PP)}$ = 2.5 V	25°C		0.03		
				0°C		0.03		
				70°C		0.02		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		68		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	$V_O = V_{OH}$, R_L = 1 MΩ,	C_L = 20 pF, See Figure 98	25°C		5		kHz
				0°C		6		
				70°C		4.5		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		85		kHz
				0°C		100		
				70°C		65		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f = B_1, See Figure 100	25°C		34°		
				0°C		36°		
				70°C		30°		

operating characteristics at specified free-air temperature, V_{DD} = 10 V

PARAMETER		TEST CONDITIONS		T_A	TLC271C, TLC271AC, TLC271BC			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 1 MΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		0.05		V/μs
				0°C		0.05		
				70°C		0.04		
			$V_{I(PP)}$ = 5.5 V	25°C		0.04		
				0°C		0.05		
				70°C		0.04		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		68		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	$V_O = V_{OH}$, R_L = 1 MΩ,	C_L = 20 pF, See Figure 98	25°C		1		kHz
				0°C		1.3		
				70°C		0.9		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		110		kHz
				0°C		125		
				70°C		90		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f = B_1, See Figure 100	25°C		38°		
				0°C		40°		
				70°C		34°		

LOW-BIAS MODE

operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A	TLC271I, TLC271AI, TLC271BI			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 1 MΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		0.03		V/μs
				−40°C		0.04		
				85°C		0.03		
			$V_{I(PP)}$ = 2.5 V	25°C		0.03		
				−40°C		0.04		
				85°C		0.02		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		68		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	$V_O = V_{OH}$, R_L = 1 MΩ,	C_L = 20 pF, See Figure 98	25°C		5		kHz
				−40°C		7		
				85°C		4		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		85		MHz
				−40°C		130		
				85°C		55		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f = B_1, See Figure 100	25°C		34°		
				−40°C		38°		
				85°C		28°		

operating characteristics at specified free-air temperature, V_{DD} = 10 V

PARAMETER		TEST CONDITIONS		T_A	TLC271C, TLC271AC, TLC271BC			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 1 MΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		0.05		V/μs
				−40°C		0.06		
				85°C		0.03		
			$V_{I(PP)}$ = 5.5 V	25°C		0.04		
				−40°C		0.05		
				85°C		0.03		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		68		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	$V_O = V_{OH}$, R_L = 1 MΩ,	C_L = 20 pF, See Figure 98	25°C		1		kHz
				−40°C		1.4		
				85°C		0.8		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		110		MHz
				−40°C		155		
				85°C		80		
ϕ_m	Phase margin	V_I = 10 mV,I C_L = 20 pF,	f = B_1, See Figure 100	25°C		38°		
				−40°C		42°		
				85°C		32°		

LOW-BIAS MODE

operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A	TLC271M			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 1 MΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		0.03		V/μs
				−55°C		0.04		
				125°C		0.02		
			$V_{I(PP)}$ = 2.5 V	25°C		0.03		
				−55°C		0.04		
				125°C		0.02		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		68		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	V_O = V_{OH}, R_L = 1 MΩ,	C_L = 20 pF, See Figure 98	25°C		5		kHz
				−55°C		8		
				125°C		3		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		85		kHz
				−55°C		140		
				125°C		45		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f = B_1, See Figure 100	25°C		34°		
				−55°C		39°		
				125°C		25°		

operating characteristics at specified free-air temperature, V_{DD} = 10 V

PARAMETER		TEST CONDITIONS		T_A	TLC271M			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	R_L = 1 MΩ, C_L = 20 pF, See Figure 98	$V_{I(PP)}$ = 1 V	25°C		0.05		V/μs
				−55°C		0.06		
				125°C		0.03		
			$V_{I(PP)}$ = 5.5 V	25°C		0.04		
				−55°C		0.06		
				125°C		0.03		
V_n	Equivalent input noise voltage	f = 1 kHz, See Figure 99	R_S = 20 Ω,	25°C		68		nV/√Hz
B_{OM}	Maximum output-swing bandwidth	V_O = V_{OH}, R_L = 1 MΩ,	C_L = 20 pF, See Figure 98	25°C		1		kHz
				−55°C		1.5		
				125°C		0.7		
B_1	Unity-gain bandwidth	V_I = 10 mV, See Figure 100	C_L = 20 pF,	25°C		110		kHz
				−55°C		165		
				125°C		70		
ϕ_m	Phase margin	V_I = 10 mV, C_L = 20 pF,	f = B_1, See Figure 100	25°C		38°		
				−55°C		43°		
				125°C		29°		

TYPICAL CHARACTERISTICS (LOW-BIAS MODE)

Table of Graphs

			FIGURE
V_{IO}	Input offset voltage	Distribution	66, 67
α_{VIO}	Temperature coefficient	Distribution	68, 69
V_{OH}	High-level output voltage	vs High-level output current vs Supply voltage vs Free-air temperature	70, 71 72 73
V_{OL}	Low-level output voltage	vs Common-mode input voltage vs Differential input voltage vs Free-air temperature vs Low-level output current	74, 75 76 77 78, 79
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I_{IB}	Input bias current	vs Free-air temperature	82
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V_I	Maximum input voltage	vs Supply voltage	83
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SR	Slew rate	vs Supply voltage vs Free-air temperature	86 87
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$V_{O(PP)}$	Maximum peak-to-peak output voltage	vs Frequency	89
B_1	Unity-gain bandwidth	vs Free-air temperature vs Supply voltage	90 91
ϕ_m	Phase margin	vs Supply voltage vs Free-air temperature vs Capacitive load	94 95 96
V_n	Equivalent input noise voltage	vs Frequency	97
	Phase shift	vs Frequency	92, 93

TYPICAL CHARACTERISTICS (LOW-BIAS MODE)†

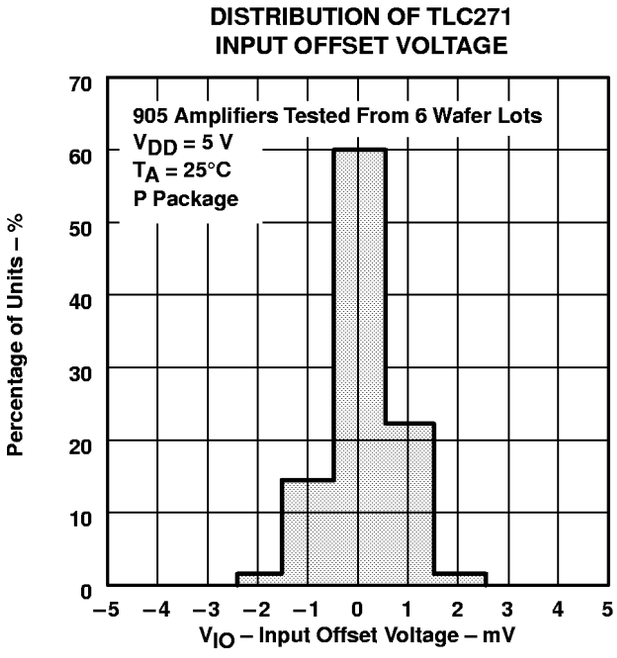


Figure 66

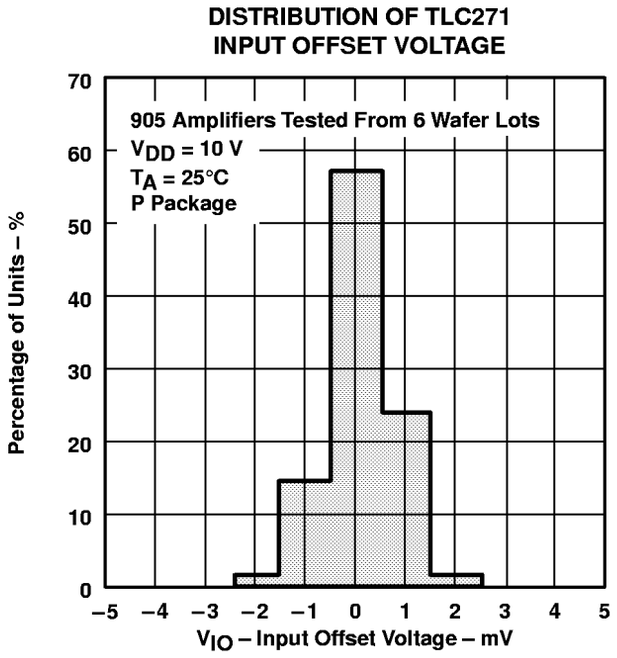


Figure 67

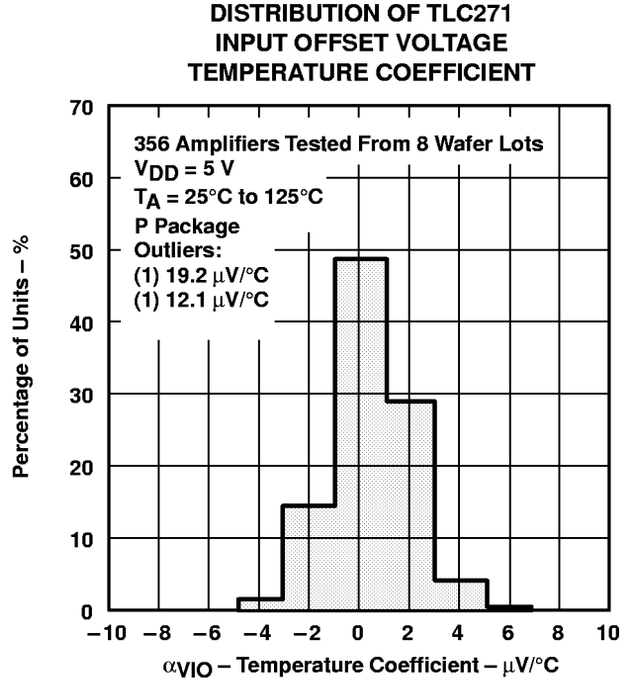


Figure 68

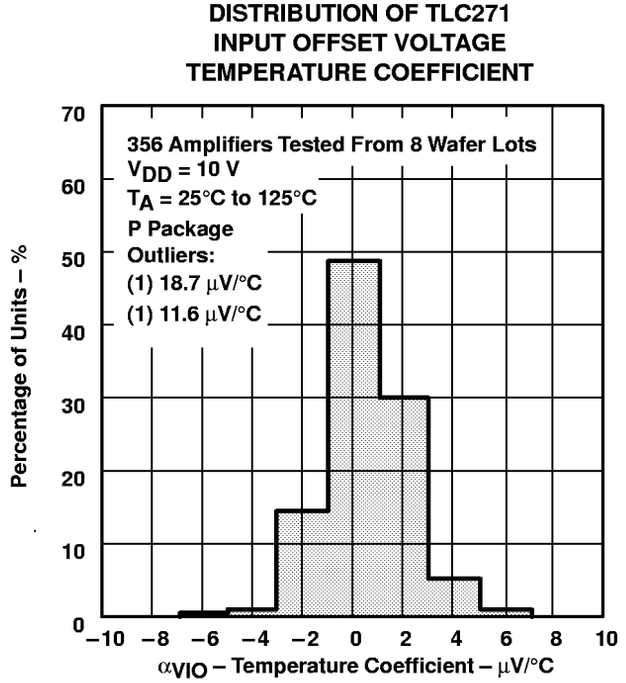


Figure 69

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (LOW-BIAS MODE)†

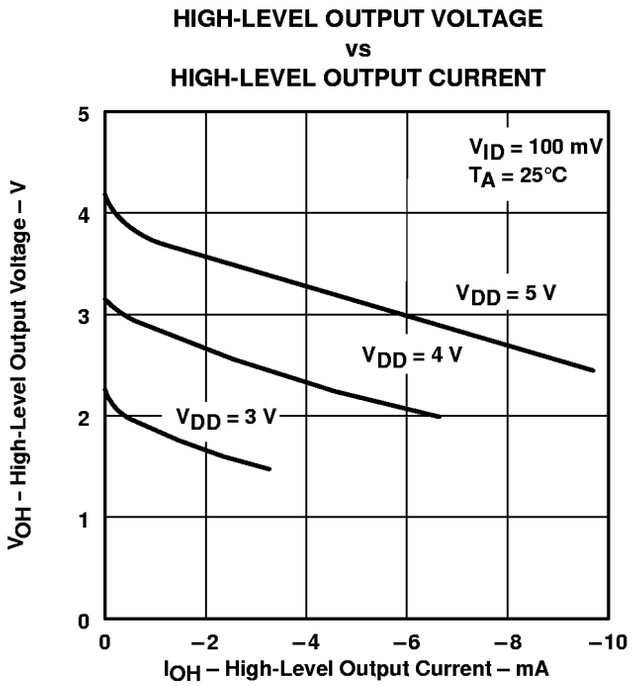


Figure 70

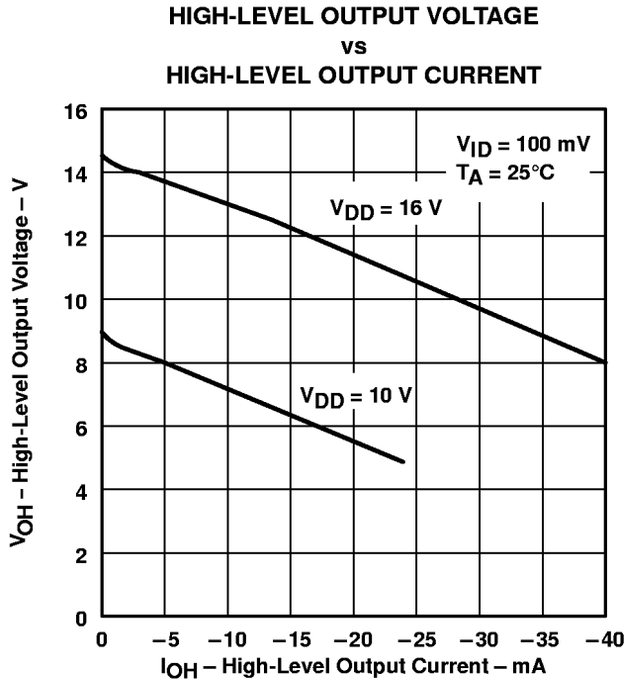


Figure 71

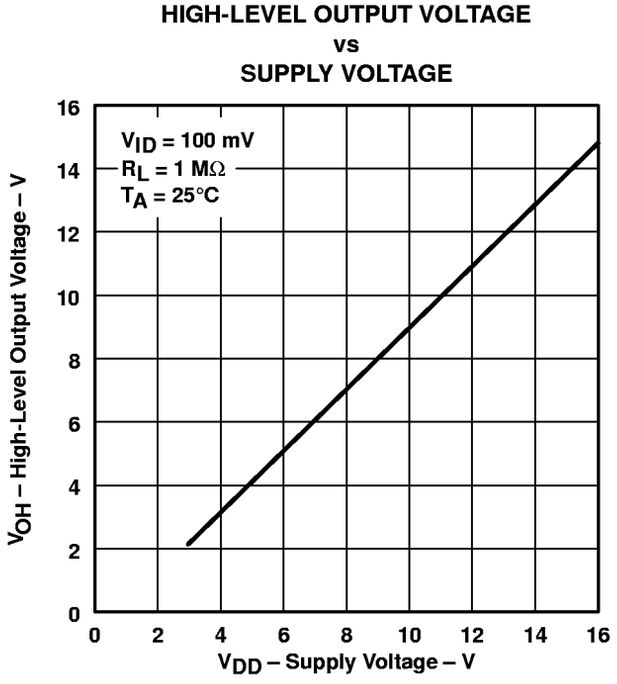


Figure 72

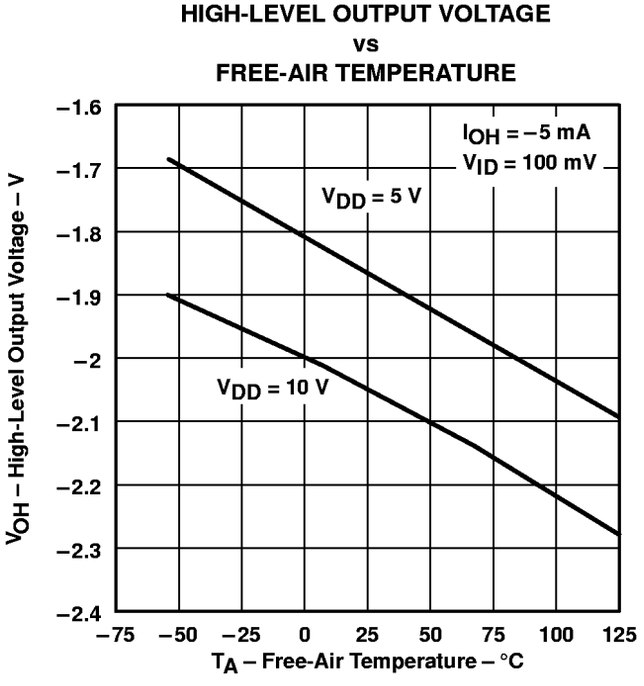


Figure 73

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (LOW-BIAS MODE)†

LOW-LEVEL OUTPUT VOLTAGE vs COMMON-MODE INPUT VOLTAGE

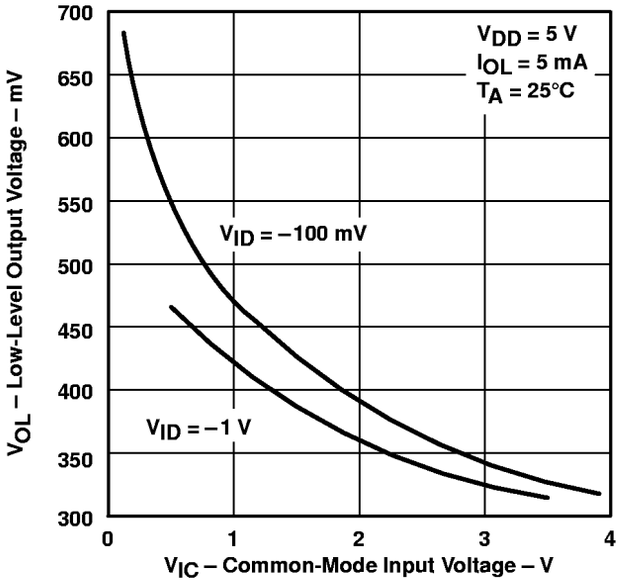


Figure 74

LOW-LEVEL OUTPUT VOLTAGE vs COMMON-MODE INPUT VOLTAGE

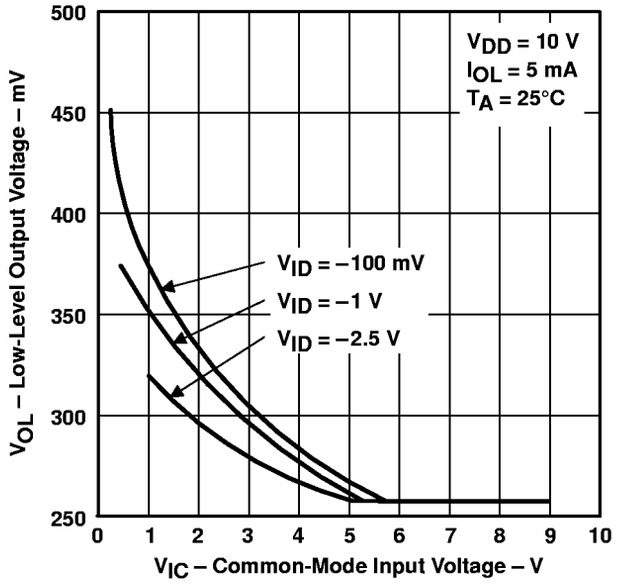


Figure 75

LOW-LEVEL OUTPUT VOLTAGE vs DIFFERENTIAL INPUT VOLTAGE

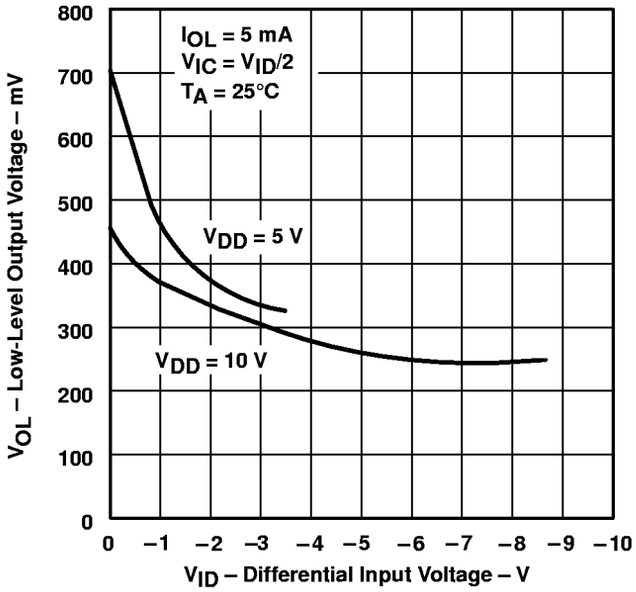


Figure 76

LOW-LEVEL OUTPUT VOLTAGE vs FREE-AIR TEMPERATURE

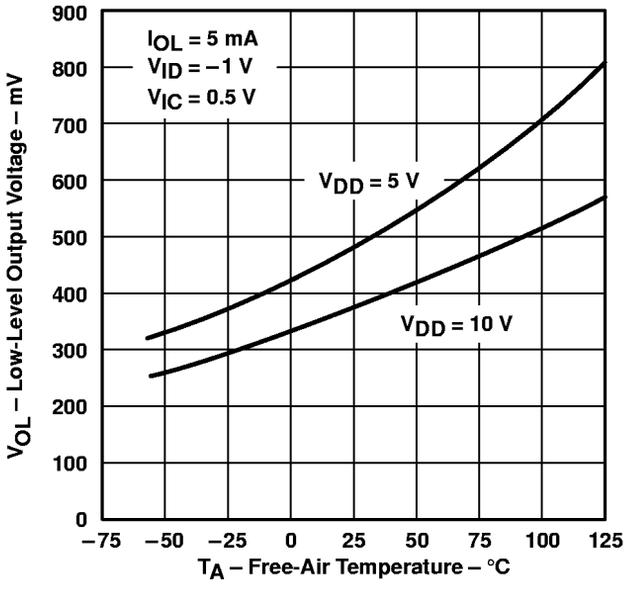


Figure 77

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (LOW-BIAS MODE)†

LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT

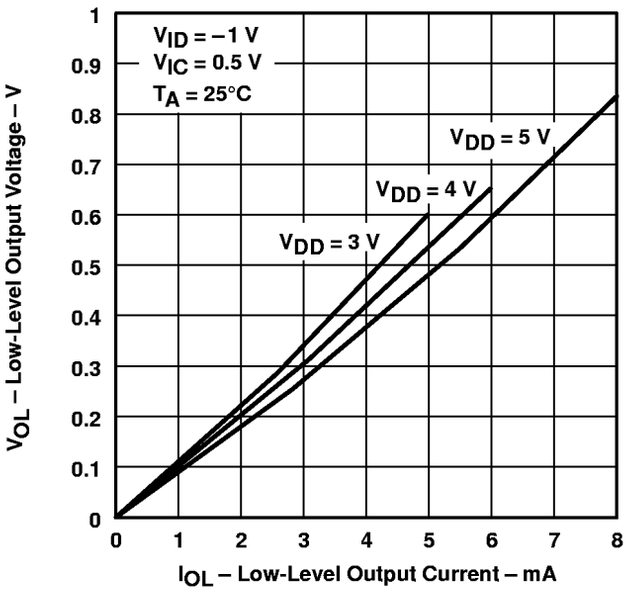


Figure 78

LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT

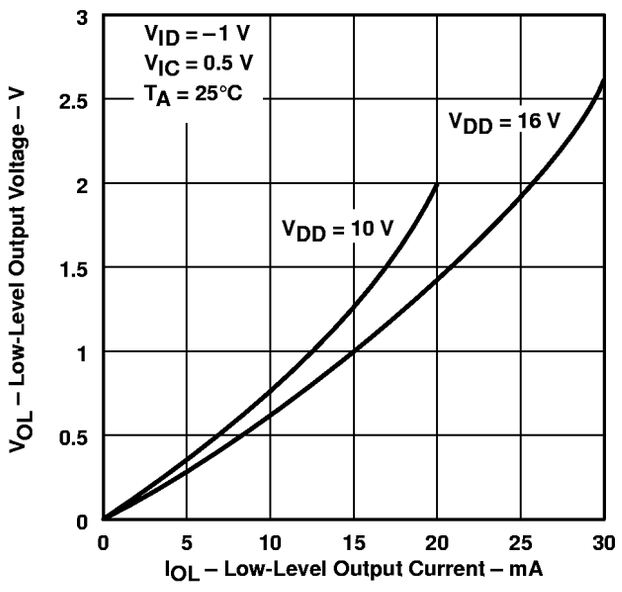


Figure 79

LARGE-SIGNAL
DIFFERENTIAL VOLTAGE AMPLIFICATION
vs
SUPPLY VOLTAGE

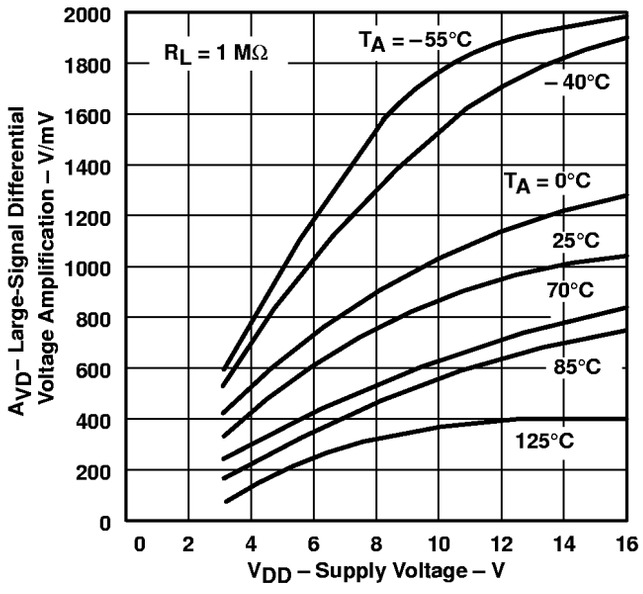


Figure 80

LARGE-SIGNAL
DIFFERENTIAL VOLTAGE AMPLIFICATION
vs
FREE-AIR TEMPERATURE

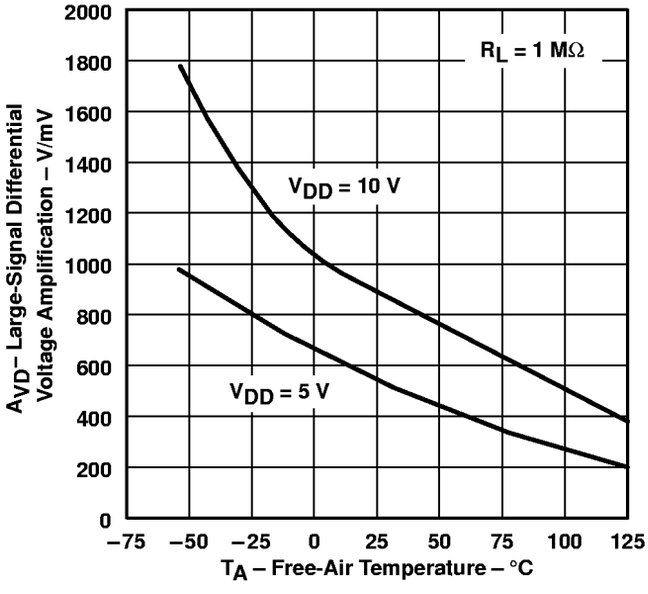
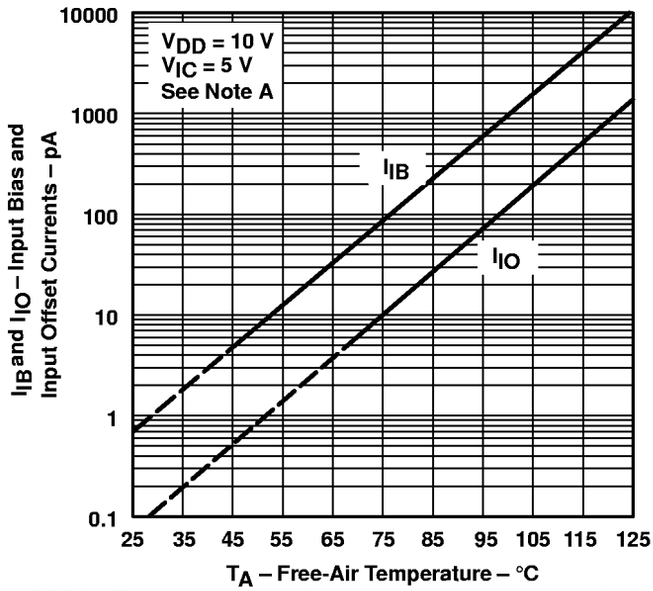


Figure 81

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (LOW-BIAS MODE)†

INPUT BIAS CURRENT AND INPUT OFFSET CURRENT vs FREE-AIR TEMPERATURE



NOTE A: The typical values of input bias current and input offset current below 5 pA were determined mathematically.

Figure 82

MAXIMUM INPUT VOLTAGE vs SUPPLY VOLTAGE

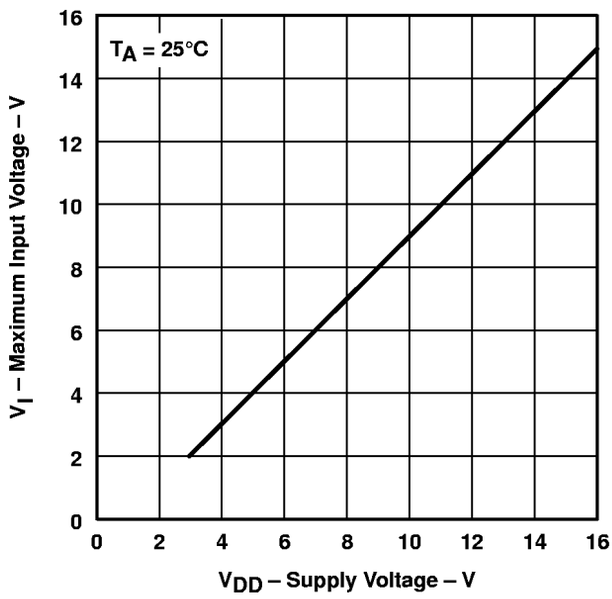


Figure 83

SUPPLY CURRENT vs SUPPLY VOLTAGE

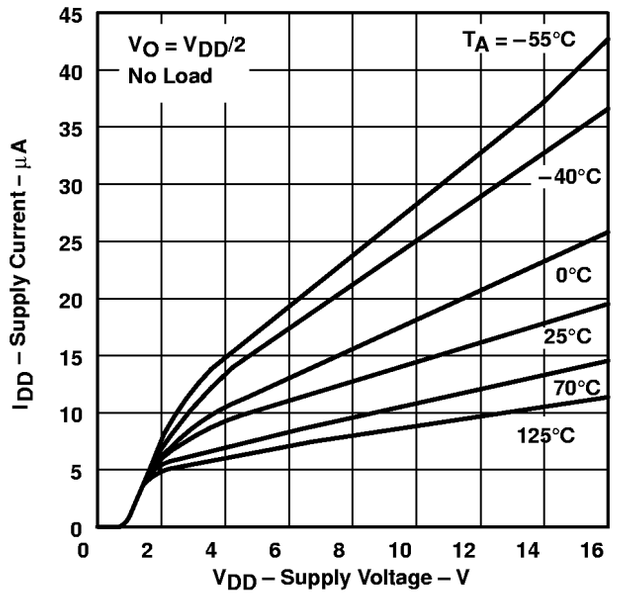


Figure 84

SUPPLY CURRENT vs FREE-AIR TEMPERATURE

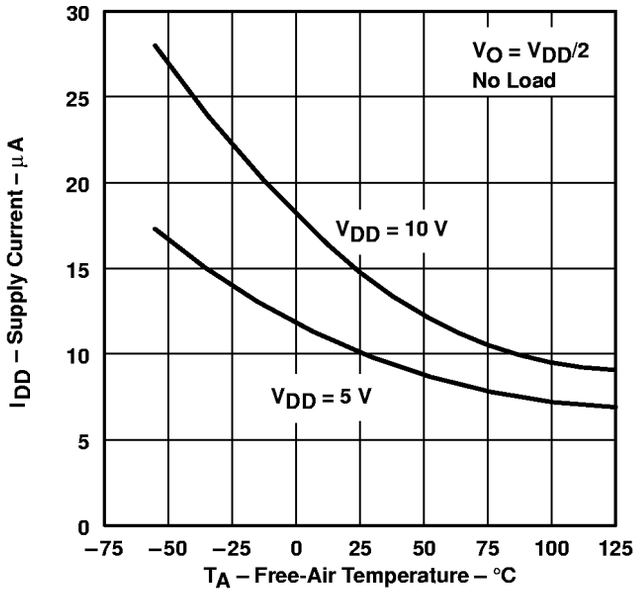


Figure 85

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS (LOW-BIAS MODE)†

SLEW RATE vs SUPPLY VOLTAGE

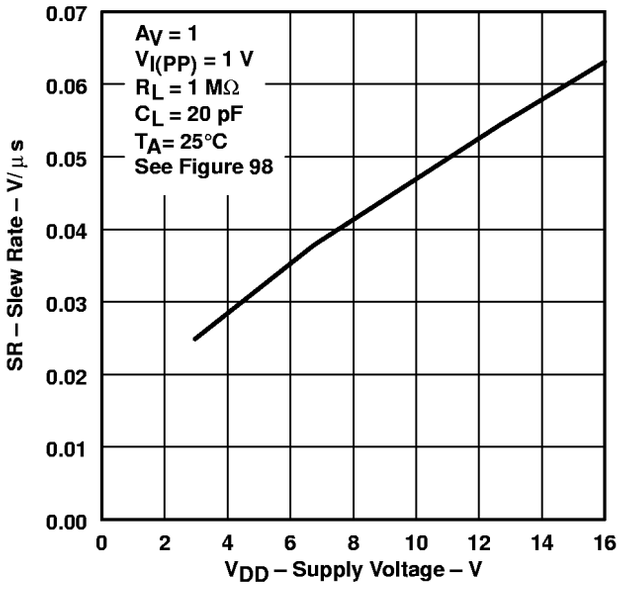


Figure 86

SLEW RATE vs FREE-AIR TEMPERATURE

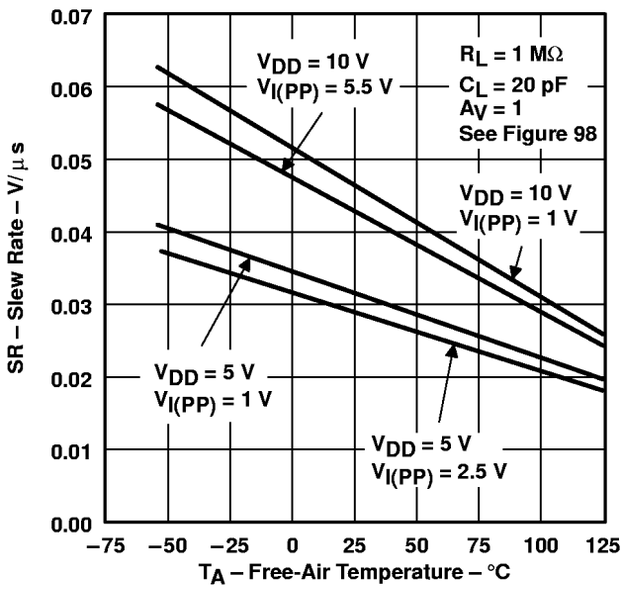


Figure 87

BIAS-SELECT CURRENT vs SUPPLY VOLTAGE

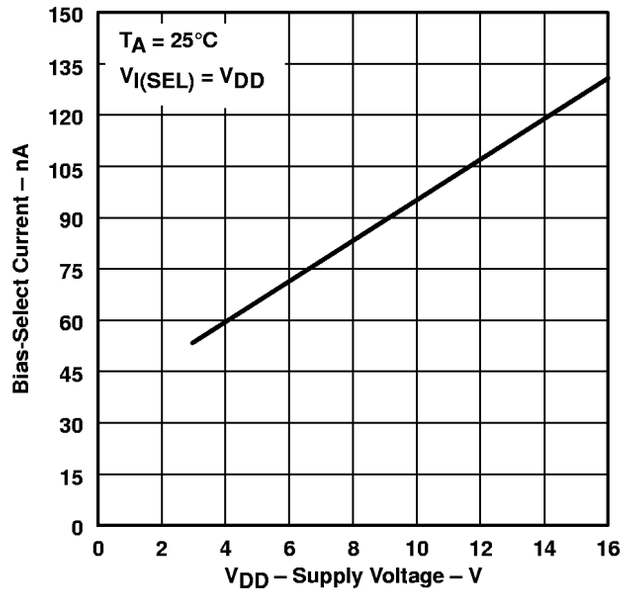


Figure 88

MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE vs FREQUENCY

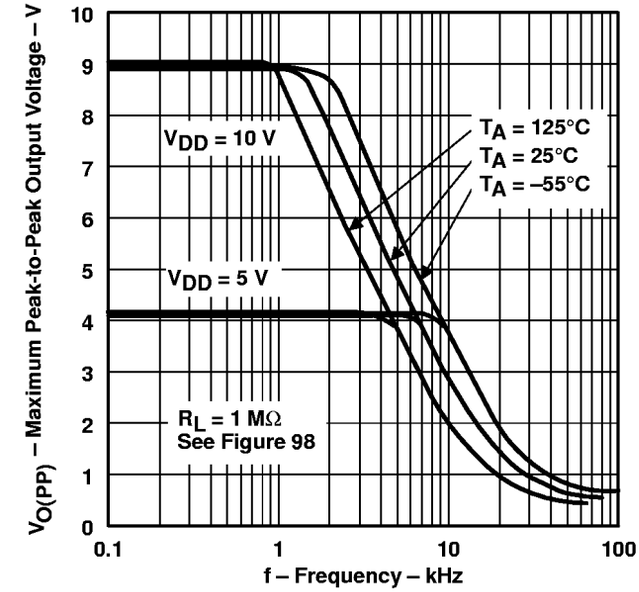


Figure 89

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.