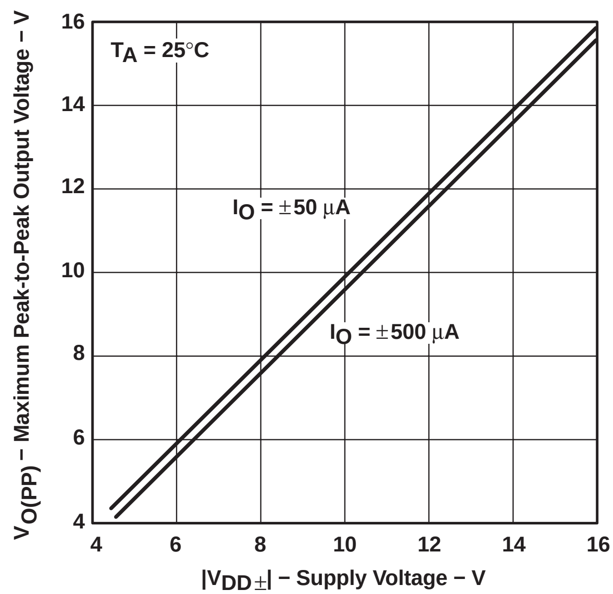
- **Output Swing Includes Both Supply Rails**
- **Low Noise . . . 9 nV/√Hz Typ at f = 1 kHz**
- **Low Input Bias Current . . . 1 pA Typ**
- **Fully Specified for Both Single-Supply and Split-Supply Operation**
- **Common-Mode Input Voltage Range Includes Negative Rail**
- **High-Gain Bandwidth . . . 2.2 MHz Typ**
- **High Slew Rate . . . 3.6 V/μs Typ**
- **Low Input Offset Voltage**
  950 μV Max at T_A = 25°C
- **Macromodel Included**
- **Performance Upgrades for the TS272, TS274, TLC272, and TLC274**
- **Available in Q-Temp Automotive**
  HighRel Automotive Applications
  Configuration Control / Print Support
  Qualification to Automotive Standards

description

The TLC2272 and TLC2274 are dual and quadruple operational amplifiers from Texas Instruments. Both devices exhibit rail-to-rail output performance for increased dynamic range in single- or split-supply applications. The TLC227x family offers 2 MHz of bandwidth and 3 V/μs of slew rate for higher speed applications. These devices offer comparable ac performance while having better noise, input offset voltage, and power dissipation than existing CMOS operational amplifiers. The TLC227x has a noise voltage of 9 nV/√Hz, two times lower than competitive solutions.

MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE vs SUPPLY VOLTAGE



The TLC227x, exhibiting high input impedance and low noise, is excellent for small-signal conditioning for high-impedance sources, such as piezoelectric transducers. Because of the micro-power dissipation levels, these devices work well in hand-held monitoring and remote-sensing applications. In addition, the rail-to-rail output feature, with single- or split-supplies, makes this family a great choice when interfacing with analog-to-digital converters (ADCs). For precision applications, the TLC227xA family is available with a maximum input offset voltage of 950 μV. This family is fully characterized at 5 V and ±5 V.

The TLC2272/4 also makes great upgrades to the TLC272/4 or TS272/4 in standard designs. They offer increased output dynamic range, lower noise voltage, and lower input offset voltage. This enhanced feature set allows them to be used in a wider range of applications. For applications that require higher output drive and wider input voltage range, see the TLV2432 and TLV2442 devices.

If the design requires single amplifiers, see the TLV2211/21/31 family. These devices are single rail-to-rail operational amplifiers in the SOT-23 package. Their small size and low power consumption, make them ideal for high density, battery-powered equipment.

TLC2272 AVAILABLE OPTIONS

T_A	V_{IO}max At 25°C	PACKAGED DEVICES					
		SMALL OUTLINE† (D)	CERAMIC LCC (FK)	CERAMIC DIP (JG)	PLASTIC DIP (P)	TSSOP‡ (PW)	CERAMIC FLAT PACK (U)
0°C to 70°C	950 µV 2.5 mV	TLC2272ACD TLC2272CD	— —	— —	TLC2272ACP TLC2272CP	TLC2272ACPW TLC2272CPW	— —
−40°C to 125°C	950 µV 2.5 mV	TLC2272AID TLC2272ID	— —	— —	TLC2272AIP TLC2272IP	— TLC2272IPW	— —
	950 µV 2.5 mV	TLC2272AQD TLC2272QD	— —	— —	—	TLC2272AQPW TLC2272QPW	— —
−55°C to 125°C	950 µV 2.5 mV	TLC2272AMD TLC2272MD	TLC2272AMFK TLC2272MFK	TLC2272AMJG TLC2272MJG	TLC2272AMP TLC2272MP	—	TLC2272AMU TLC2272MU

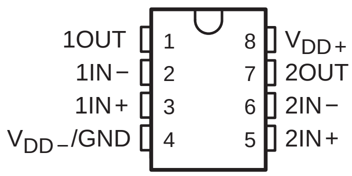
† The D packages are available taped and reeled. Add R suffix to the device type (e.g., TLC2272CDR).
‡ The PW package is available taped and reeled. Add R suffix to the device type (e.g., TLC2272PWR).
§ Chips are tested at 25°C.

TLC2274 AVAILABLE OPTIONS

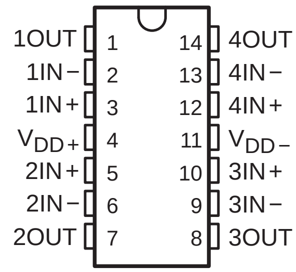
T_A	V_{IO}max AT 25°C	PACKAGED DEVICES					
		SMALL OUTLINE† (D)	CERAMIC LCC (FK)	CERAMIC DIP (J)	PLASTIC DIP (N)	TSSOP‡ (PW)	CERAMIC FLAT PACK (W)
0°C to 70°C	950 µV 2.5 mV	TLC2274ACD TLC2274CD	—	—	TLC2274ACN TLC2274CN	TLC2274ACPW TLC2274CPW	—
−40°C to 125°C	950 µV 2.5 mV	TLC2274AID TLC2274ID	—	—	TLC2274AIN TLC2274IN	TLC2274AIPW TLC2274IPW	—
	950 µV 2.5 mV	TLC2274AQD TLC2274QD	—	—	—	—	—
−55°C to 125°C	950 µV 2.5 mV	TLC2274AMD TLC2274MD	TLC2274AMFK TLC2274MFK	TLC2274AMJ TLC2274MJ	TLC2274AMN TLC2274MN	—	TLC2274AMW TLC2274MW

† The D packages are available taped and reeled. Add R suffix to device type (e.g., TLC2274CDR).
‡ The PW package is available taped and reeled.
§ Chips are tested at 25°C.

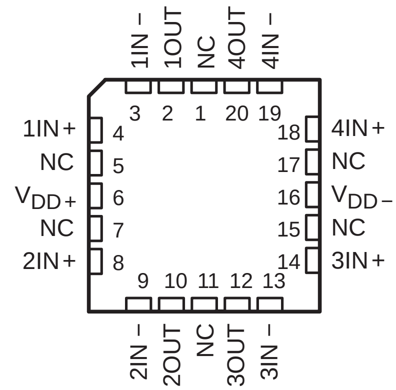
TLC2272
D, JG, P, OR PW PACKAGE
(TOP VIEW)



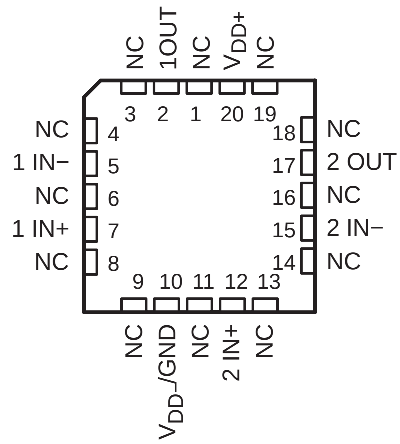
TLC2274
D, J, N, PW, OR W PACKAGE
(TOP VIEW)



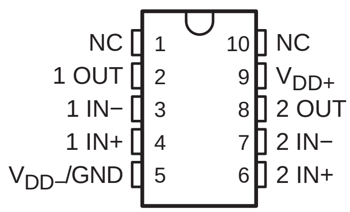
TLC2274
FK PACKAGE
(TOP VIEW)



TLC2272
FK PACKAGE
(TOP VIEW)

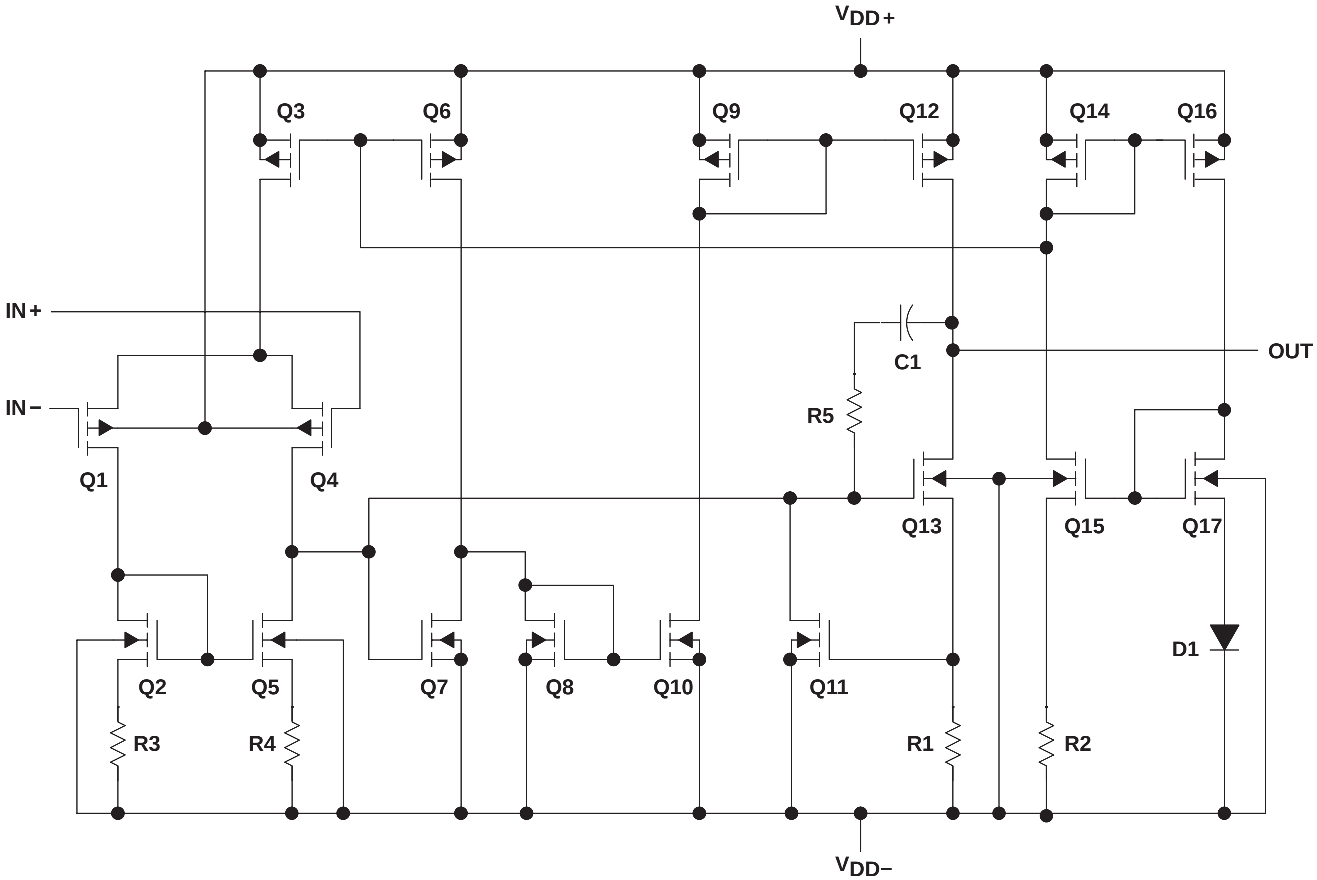


TLC2272
U PACKAGE
(TOP VIEW)



NC − No internal connection

equivalent schematic (each amplifier)



ACTUAL DEVICE COMPONENT COUNT†		
COMPONENT	TLC2272	TLC2274
Transistors	38	76
Resistors	26	52
Diodes	9	18
Capacitors	3	6

† Includes both amplifiers and all ESD, bias, and trim circuitry

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

Supply voltage, V_{DD+} (see Note 1) . . . . . 8 V
Supply voltage, V_{DD-} (see Note 1) . . . . . −8 V
Differential input voltage, V_{ID} (see Note 2) . . . . . ±16 V
Input voltage range, V_I (any input, see Note 1) . . . . . V_{DD-} − 0.3 V to V_{DD+}
Input current, I_I (any input) . . . . . ±5 mA
Output current, I_O . . . . . ±50 mA
Total current into V_{DD+} . . . . . ±50 mA
Total current out of V_{DD-} . . . . . ±50 mA
Duration of short-circuit current at (or below) 25°C (see Note 3) . . . . . unlimited
Package thermal impedance, θ_{JA} (see Notes 4 and 5): D package (8 pin) . . . . . 97.1°C/W
D package (14 pin) . . . . . 86.2°C/W
N package . . . . . 79.7°C/W
P package . . . . . 84.6°C/W
PW package (8 pin) . . . . . 149°C/W
PW package (14 pin) . . . . . 113°C/W
Package thermal impedance, θ_{JC} (see Notes 4 and 5): FK package . . . . . 5.6°C/W
J package . . . . . 15.1°C/W
U package . . . . . 14.7°C/W
Operating free-air temperature range, T_A: C suffix . . . . . 0°C to 70°C
I, Q suffix . . . . . −40°C to 125°C
M suffix . . . . . −55°C to 125°C
Storage temperature range . . . . . −65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: D, N, P or PW package . . . . . 260°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: J or U 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 the midpoint between V_{DD+} and V_{DD-}.
2. Differential voltages are at IN+ with respect to IN−. Excessive current will flow if input is brought below V_{DD-} − 0.3 V.
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.
4. Maximum power dissipation is a function of T_J(max), θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
5. The package thermal impedance is calculated in accordance with JESD 51-7 (plastic) or MIL-STD-883 Method 1012 (ceramic).

recommended operating conditions

	C SUFFIX		I SUFFIX		Q SUFFIX		M SUFFIX		UNIT
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
Supply voltage, $V_{DD\pm}$	±2.2	±8	±2.2	±8	±2.2	±8	±2.2	±8	V
Input voltage, V_I	V_{DD-}	V_{DD+} −1.5	V_{DD-}	V_{DD+} −1.5	V_{DD-}	V_{DD+} −1.5	V_{DD-}	V_{DD+} −1.5	V
Common-mode input voltage, V_{IC}	V_{DD-}	V_{DD+} −1.5	V_{DD-}	V_{DD+} −1.5	V_{DD-}	V_{DD+} −1.5	V_{DD-}	V_{DD+} −1.5	V
Operating free-air temperature, T_A	0	70	−40	125	−40	125	−55	125	°C

TLC2272C electrical characteristics at specified free-air temperature, V_{DD} = 5 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A†	TLC2272C MIN	TLC2272C TYP	TLC2272C MAX	TLC2272AC MIN	TLC2272AC TYP	TLC2272AC MAX	UNIT
V_{IO}	Input offset voltage	V_{IC} = 0 V, $V_{DD}\pm$ = ±2.5 V, V_O = 0 V, R_S = 50 Ω		25°C		300	2500		300	950	μV
				Full range			3000			1500	
α_{VIO}	Temperature coefficient of input offset voltage			25°C to 70°C		2			2		μV/°C
	Input offset voltage long-term drift (see Note 4)			25°C		0.002			0.002		μV/mo
I_{IO}	Input offset current			25°C		0.5	60		0.5	60	pA
				Full range			100			100	
I_{IB}	Input bias current			25°C		1	60		1	60	pA
				Full range			100			100	
V_{ICR}	Common-mode input voltage	R_S = 50 Ω,	$\|V_{IO}\|$ ≤ 5 mV	25°C	0 to 4	−0.3 to 4.2		0 to 4	−0.3 to 4.2		V
				Full range	0 to 3.5			0 to 3.5			
V_{OH}	High-level output voltage	I_{OH} = −20 μA		25°C		4.99			4.99		V
		I_{OH} = −200 μA		25°C	4.85	4.93		4.85	4.93		
				Full range	4.85			4.85			
		I_{OH} = −1 mA		25°C	4.25	4.65		4.25	4.65		
				Full range	4.25			4.25			
V_{OL}	Low-level output voltage	V_{IC} = 2.5 V,	I_{OL} = 50 μA	25°C		0.01			0.01		V
		V_{IC} = 2.5 V,	I_{OL} = 500 μA	25°C		0.09	0.15		0.09	0.15	
				Full range			0.15			0.15	
		V_{IC} = 2.5 V,	I_{OL} = 5 mA	25°C		0.9	1.5		0.9	1.5	
				Full range			1.5			1.5	
A_{VD}	Large-signal differential voltage amplification	V_{IC} = 2.5 V, V_O = 1 V to 4 V	R_L = 10 kΩ‡	25°C	15	35		15	35		V/mV
				Full range	15			15			
			R_L = 1 mΩ‡	25°C		175			175		
r_{id}	Differential input resistance			25°C		10^{12}			10^{12}		Ω
r_i	Common-mode input resistance			25°C		10^{12}			10^{12}		Ω
c_i	Common-mode input capacitance	f = 10 kHz,	P package	25°C		8			8		pF
z_o	Closed-loop output impedance	f = 1 MHz,	A_V = 10	25°C		140			140		Ω
CMRR	Common-mode rejection ratio	V_{IC} = 0 V to 2.7 V, V_O = 2.5 V,	R_S = 50 Ω	25°C	70	75		70	75		dB
				Full range	70			70			
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)	V_{DD} = 4.4 V to 16 V, V_{IC} = V_{DD}/2, No load		25°C	80	95		80	95		dB
				Full range	80			80			
I_{DD}	Supply current	V_O = 2.5 V,	No load	25°C		2.2	3		2.2	3	mA
				Full range			3			3	

† Full range is 0°C to 70°C.
‡ Referenced to 0 V

NOTE 6: Typical values are based on the input offset voltage shift observed through 168 hours of operating life test at T_A = 150°C extrapolated to T_A = 25°C using the Arrhenius equation and assuming an activation energy of 0.96 eV.

TLC2272C operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A†	TLC2272C MIN	TLC2272C TYP	TLC2272C MAX	TLC2272AC MIN	TLC2272AC TYP	TLC2272AC MAX	UNIT
SR	Slew rate at unity gain	V_O = 0.5 V to 2.5 V, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C	2.3	3.6		2.3	3.6		V/µs
				Full range	1.7			1.7			
V_n	Equivalent input noise voltage	f = 10 Hz		25°C		50			50		nV/√Hz
		f = 1 kHz		25°C		9			9		
V_{NPP}	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 1 Hz		25°C		1			1		µV
		f = 0.1 Hz to 10 Hz		25°C		1.4			1.4		
I_n	Equivalent input noise current			25°C		0.6			0.6		fA/√Hz
THD + N	Total harmonic distortion plus noise	V_O = 0.5 V to 2.5 V, f = 20 kHz, R_L = 10 kΩ‡,	A_V = 1	25°C		0.0013%			0.0013%		
			A_V = 10			0.004%			0.004%		
			A_V = 100			0.03%			0.03%		
	Gain-bandwidth product	f = 10 kHz, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		2.18			2.18		MHz
B_{OM}	Maximum output-swing bandwidth	$V_{O(PP)}$ = 2 V, A_V = 1, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		1			1		MHz
t_s	Settling time	A_V = −1, Step = 0.5 V to 2.5 V, R_L = 10 kΩ‡, C_L = 100 pF‡	To 0.1%	25°C		1.5			1.5		µs
			To 0.01%			2.6			2.6		
ϕ_m	Phase margin at unity gain	R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		50°			50°		
	Gain margin			25°C		10			10		dB

† Full range is 0°C to 70°C.
‡ Referenced to 0 V

TLC2272C electrical characteristics at specified free-air temperature, $V_{DD\pm} = \pm5$ V (unless otherwise specified)

PARAMETER		TEST CONDITIONS	T_A†	TLC2272C MIN	TLC2272C TYP	TLC2272C MAX	TLC2272AC MIN	TLC2272AC TYP	TLC2272AC MAX	UNIT
V_{IO}	Input offset voltage	V_{IC} = 0 V, V_O = 0 V, R_S = 50 Ω	25°C		300	2500		300	950	µV
			Full range			3000			1500	
α_{VIO}	Temperature coefficient of input offset voltage		25°C to 70°C		2			2		µV/°C
	Input offset voltage long-term drift (see Note 4)		25°C		0.002			0.002		µV/mo
I_{IO}	Input offset current		25°C		0.5	60		0.5	60	pA
			Full range			100			100	
I_{IB}	Input bias current		25°C		1	60		1	60	pA
			Full range			100			100	
V_{ICR}	Common-mode input voltage	R_S = 50 Ω, $\lvert V_{IO} \rvert \le 5$ mV	25°C	−5 to 4	−5.3 to 4.2		−5 to 4	−5.3 to 4.2		V
			Full range	−5 to 3.5			−5 to 3.5			
V_{OM+}	Maximum positive peak output voltage	I_O = −20 µA	25°C		4.99			4.99		V
		I_O = −200 µA	25°C	4.85	4.93		4.85	4.93		
			Full range	4.85			4.85			
		I_O = −1 mA	25°C	4.25	4.65		4.25	4.65		
			Full range	4.25			4.25			
V_{OM-}	Maximum negative peak output voltage	V_{IC} = 0 V, I_O = 50 µA	25°C		−4.99			−4.99		V
		V_{IC} = 0 V, I_O = 500 µA	25°C	−4.85	−4.91		−4.85	−4.91		
			Full range	−4.85			−4.85			
		V_{IC} = 0 V, I_O = 5 mA	25°C	−3.5	−4.1		−3.5	−4.1		
			Full range	−3.5			−3.5			
A_{VD}	Large-signal differential voltage amplification	V_O = ±4 V, R_L = 10 kΩ	25°C	25	50		25	50		V/mV
			Full range	25			25			
		V_O = ±4 V, R_L = 1 mΩ	25°C		300			300		
r_{id}	Differential input resistance		25°C		10^{12}			10^{12}		Ω
r_i	Common-mode input resistance		25°C		10^{12}			10^{12}		Ω
c_i	Common-mode input capacitance	f = 10 kHz, P package	25°C		8			8		pF
z_o	Closed-loop output impedance	f = 1 MHz, A_V = 10	25°C		130			130		Ω
CMRR	Common-mode rejection ratio	V_{IC} = −5 V to 2.7 V, V_O = 0 V, R_S = 50 Ω	25°C	75	80		75	80		dB
			Full range	75			75			
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD\pm}/\Delta V_{IO}$)	$V_{DD\pm}$ = 2.2 V to ±8 V, V_{IC} = 0 V, No load	25°C	80	95		80	95		dB
			Full range	80			80			
I_{DD}	Supply current	V_O = 0 V, No load	25°C		2.4	3		2.4	3	mA
			Full range			3			3	

† Full range is 0°C to 70°C.

NOTE 4: Typical values are based on the input offset voltage shift observed through 168 hours of operating life test at T_A = 150°C extrapolated to T_A = 25°C using the Arrhenius equation and assuming an activation energy of 0.96 eV.

TLC2272C operating characteristics at specified free-air temperature, $V_{DD\pm} = \pm5$ V

PARAMETER		TEST CONDITIONS		T_A†	TLC2272C MIN	TLC2272C TYP	TLC2272C MAX	TLC2272AC MIN	TLC2272AC TYP	TLC2272AC MAX	UNIT
SR	Slew rate at unity gain	$V_O = \pm2.3$ V, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C	2.3	3.6		2.3	3.6		V/μs
				Full range	1.7			1.7			
V_n	Equivalent input noise voltage	f = 10 Hz		25°C		50			50		nV/√Hz
		f = 1 kHz		25°C		9			9		
V_{NPP}	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 1 Hz		25°C		1			1		μV
		f = 0.1 Hz to 10 Hz		25°C		1.4			1.4		
I_n	Equivalent input noise current			25°C		0.6			0.6		fA/√Hz
THD + N	Total harmonic distortion pulse duration	$V_O = \pm2.3$ V, f = 20 kHz, $R_L = 10$ kΩ	$A_V = 1$	25°C		0.0011%			0.0011%		
			$A_V = 10$			0.004%			0.004%		
			$A_V = 100$			0.03%			0.03%		
	Gain-bandwidth product	f = 10 kHz, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C		2.25			2.25		MHz
B_{OM}	Maximum output-swing bandwidth	$V_{O(PP)} = 4.6$ V, $A_V = 1$, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C		0.54			0.54		MHz
t_s	Settling time	$A_V = -1$, Step = −2.3 V to 2.3 V, $R_L = 10$ kΩ, $C_L = 100$ pF	To 0.1%	25°C		1.5			1.5		μs
			To 0.01%			3.2			3.2		
ϕ_m	Phase margin at unity gain	$R_L = 10$ kΩ, $C_L = 100$ pF		25°C		52°			52°		
	Gain margin			25°C		10			10		dB

† Full range is 0°C to 70°C.

TLC2274C electrical characteristics at specified free-air temperature, V_{DD} = 5 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A†	TLC2274C MIN	TLC2274C TYP	TLC2274C MAX	TLC2274AC MIN	TLC2274AC TYP	TLC2274AC MAX	UNIT
V_{IO}	Input offset voltage	$V_{DD\pm} = \pm2.5$ V, $V_{IC} = 0$ V, $V_O = 0$ V, $R_S = 50\ \Omega$	25°C		300	2500		300	950	μV
			Full range			3000			1500	
α_{VIO}	Temperature coefficient of input offset voltage		25°C to 70°C		2			2		μV/°C
	Input offset voltage long-term drift (see Note 4)		25°C		0.002			0.002		μV/mo
I_{IO}	Input offset current		25°C		0.5	60		0.5	60	pA
			Full range			100			100	
I_{IB}	Input bias current		25°C		1	60		1	60	pA
			Full range			100			100	
V_{ICR}	Common-mode input voltage	$R_S = 50\ \Omega$, $\lvert V_{IO} \rvert \le 5$ mV,	25°C	0 to 4	−0.3 to 4.2		0 to 4	−0.3 to 4.2		V
			Full range	0 to 3.5			0 to 3.5			
V_{OH}	High-level output voltage	$I_{OH} = -20\ \mu A$	25°C		4.99			4.99		V
		$I_{OH} = -200\ \mu A$	25°C	4.85	4.93		4.85	4.93		
			Full range	4.85			4.85			
		$I_{OH} = -1$ mA	25°C	4.25	4.65		4.25	4.65		
			Full range	4.25			4.25			
V_{OL}	Low-level output voltage	$V_{IC} = 2.5$ V, $I_{OL} = 50\ \mu A$	25°C		0.01			0.01		V
		$V_{IC} = 2.5$ V, $I_{OL} = 500\ \mu A$	25°C		0.09	0.15		0.09	0.15	
			Full range			0.15			0.15	
		$V_{IC} = 2.5$ V, $I_{OL} = 5$ mA	25°C		0.9	1.5		0.9	1.5	
			Full range			1.5			1.5	
A_{VD}	Large-signal differential voltage amplification	$V_{IC} = 2.5$ V, $V_O = 1$ V to 4 V, $R_L = 10\ k\Omega$‡	25°C	15	35		15	35		V/mV
			Full range	15			15			
		$R_L = 1\ m\Omega$‡	25°C		175			175		
r_{id}	Differential input resistance		25°C		10^{12}			10^{12}		Ω
r_i	Common-mode input resistance		25°C		10^{12}			10^{12}		Ω
c_i	Common-mode input capacitance	f = 10 kHz, N package	25°C		8			8		pF
z_o	Closed-loop output impedance	f = 1 MHz, $A_V = 10$	25°C		140			140		Ω
CMRR	Common-mode rejection ratio	$V_{IC} = 0$ V to 2.7 V, $V_O = 2.5$ V, $R_S = 50\ \Omega$	25°C	70	75		70	75		dB
			Full range	70			70			
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)	$V_{DD} = 4.4$ V to 16 V, $V_{IC} = V_{DD}/2$, No load	25°C	80	95		80	95		dB
			Full range	80			80			
I_{DD}	Supply current	$V_O = 2.5$ V, No load	25°C		4.4	6		4.4	6	mA
			Full range			6			6	

† Full range is 0°C to 70°C.
‡ Referenced to 0 V

NOTE 4: Typical values are based on the input offset voltage shift observed through 168 hours of operating life test at T_A = 150°C extrapolated to T_A = 25°C using the Arrhenius equation and assuming an activation energy of 0.96 eV.

TLC2274C operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A†	TLC2274C MIN	TLC2274C TYP	TLC2274C MAX	TLC2274AC MIN	TLC2274AC TYP	TLC2274AC MAX	UNIT
SR	Slew rate at unity gain	V_O = 0.5 V to 2.5 V, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C	2.3	3.6		2.3	3.6		V/μs
				Full range	1.7			1.7			
V_n	Equivalent input noise voltage	f = 10 Hz		25°C		50			50		nV/√Hz
		f = 1 kHz		25°C		9			9		
$V_{N(PP)}$	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 1 Hz		25°C		1			1		μV
		f = 0.1 Hz to 10 Hz		25°C		1.4			1.4		
I_n	Equivalent input noise current			25°C		0.6			0.6		fA/√Hz
THD + N	Total harmonic distortion plus noise	V_O = 0.5 V to 2.5 V, f = 20 kHz, R_L = 10 kΩ‡	A_V = 1	25°C		0.0013%			0.0013%		
			A_V = 10			0.004%			0.004%		
			A_V = 100			0.03%			0.03%		
	Gain-bandwidth product	f = 10 kHz, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		2.18			2.18		MHz
B_{OM}	Maximum output-swing bandwidth	$V_{O(PP)}$ = 2 V, A_V = 1, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		1			1		MHz
t_s	Settling time	A_V = −1, Step = 0.5 V to 2.5 V, R_L = 10 kΩ‡, C_L = 100 pF‡	To 0.1%	25°C		1.5			1.5		μs
			To 0.01%			2.6			2.6		
ϕ_m	Phase margin at unity gain	R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		50°			50°		
	Gain margin			25°C		10			10		dB

† Full range is 0°C to 70°C.
‡ Referenced to 0 V

TLC2274C electrical characteristics at specified free-air temperature, $V_{DD\pm} = \pm 5$ V (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A†	TLC2274C MIN	TLC2274C TYP	TLC2274C MAX	TLC2274AC MIN	TLC2274AC TYP	TLC2274AC MAX	UNIT
V_{IO}	Input offset voltage	V_{IC} = 0 V, V_O = 0 V, R_S = 50 Ω	25°C		300	2500		300	950	μV
			Full range			3000			1500	
α_{VIO}	Temperature coefficient of input offset voltage	V_{IC} = 0 V, V_O = 0 V, R_S = 50 Ω	25°C to 70°C		2			2		μV/°C
	Input offset voltage long-term drift (see Note 4)	V_{IC} = 0 V, V_O = 0 V, R_S = 50 Ω	25°C		0.002			0.002		μV/mo
I_{IO}	Input offset current	V_{IC} = 0 V, V_O = 0 V, R_S = 50 Ω	25°C		0.5	60		0.5	60	pA
			Full range			100			100	
I_{IB}	Input bias current	V_{IC} = 0 V, V_O = 0 V, R_S = 50 Ω	25°C		1	60		1	60	pA
			Full range			100			100	
V_{ICR}	Common-mode input voltage	R_S = 50 Ω, $\lvert V_{IO} \rvert \leq$ 5 mV	25°C	−5 to 4	−5.3 to 4.2		−5 to 4	−5.3 to 4.2		V
			Full range	−5 to 3.5			−5 to 3.5			
V_{OM+}	Maximum positive peak output voltage	I_O = −20 μA	25°C		4.99			4.99		V
		I_O = −200 μA	25°C	4.85	4.93		4.85	4.93		
			Full range	4.85			4.85			
		I_O = −1 mA	25°C	4.25	4.65		4.25	4.65		
			Full range	4.25			4.25			
V_{OM-}	Maximum negative peak output voltage	V_{IC} = 0 V, I_O = 50 μA	25°C		−4.99			−4.99		V
		V_{IC} = 0 V, I_O = 500 μA	25°C	−4.85	−4.91		−4.85	−4.91		
			Full range	−4.85			−4.85			
		V_{IC} = 0 V, I_O = −5 mA	25°C	−3.5	−4.1		−3.5	−4.1		
			Full range	−3.5			−3.5			
A_{VD}	Large-signal differential voltage amplification	V_O = ±4 V, R_L = 10 kΩ	25°C	25	50		25	50		V/mV
			Full range	25			25			
		V_O = ±4 V, R_L = 1 MΩ	25°C		300			300		
r_{id}	Differential input resistance		25°C		10^{12}			10^{12}		Ω
r_i	Common-mode input resistance		25°C		10^{12}			10^{12}		Ω
c_i	Common-mode input capacitance	f = 10 kHz, N package	25°C		8			8		pF
z_o	Closed-loop output impedance	f = 1 MHz, A_V = 10	25°C		130			130		Ω
CMRR	Common-mode rejection ratio	V_{IC} = −5 V to 2.7 V, V_O = 0 V, R_S = 50 Ω	25°C	75	80		75	80		dB
			Full range	75			75			
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD\pm}/\Delta V_{IO}$)	$V_{DD\pm}$ = ±2.2 V to ±8 V, V_{IC} = 0 V, No load	25°C	80	95		80	95		dB
			Full range	80			80			
I_{DD}	Supply current	V_O = 0 V, No load	25°C		4.8	6		4.8	6	mA
			Full range			6			6	

† Full range is 0°C to 70°C.

NOTE 4: Typical values are based on the input offset voltage shift observed through 168 hours of operating life test at T_A = 150°C extrapolated to T_A = 25°C using the Arrhenius equation and assuming an activation energy of 0.96 eV.

TLC2274C operating characteristics at specified free-air temperature, $V_{DD\pm} = \pm 5$ V

PARAMETER		TEST CONDITIONS		T_A†	TLC2274C MIN	TLC2274C TYP	TLC2274C MAX	TLC2274AC MIN	TLC2274AC TYP	TLC2274AC MAX	UNIT
SR	Slew rate at unity gain	$V_O = \pm 2.3$ V, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C	2.3	3.6		2.3	3.6		V/µs
				Full range	1.7			1.7			
V_n	Equivalent input noise voltage	f = 10 Hz		25°C		50			50		nV/√Hz
		f = 1 Hz		25°C		9			9		
$V_{N(PP)}$	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 1 Hz		25°C		1			1		µV
		f = 0.1 Hz to 10 Hz		25°C		1.4			1.4		
I_n	Equivalent input noise current			25°C		0.6			0.6		fA/√Hz
THD + N	Total harmonic distortion plus noise	$V_O = \pm 2.3$ V, f = 20 kHz, $R_L = 10$ kΩ	$A_V = 1$	25°C		0.0011%			0.0011%		
			$A_V = 10$			0.004%			0.004%		
			$A_V = 100$			0.03%			0.03%		
	Gain-bandwidth product	f = 10 kHz, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C		2.25			2.25		MHz
B_{OM}	Maximum output-swing bandwidth	$V_{O(PP)} = 4.6$ V, $A_V = 1$, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C		0.54			0.54		MHz
t_s	Settling time	$A_V = -1$, Step = −2.3 V to 2.3 V, $R_L = 10$ kΩ, $C_L = 100$ pF	To 0.1%	25°C		1.5			1.5		µs
			To 0.01%			3.2			3.2		
ϕ_m	Phase margin at unity gain	$R_L = 10$ kΩ, $C_L = 100$ pF		25°C		52°			52°		
	Gain margin			25°C		10			10		dB

† Full range is 0°C to 70°C.

TLC2272I electrical characteristics at specified free-air temperature, V_{DD} = 5 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A†	TLC2272I			TLC2272AI			UNIT
					MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO}	Input offset voltage	V_{IC} = 0 V, V_O = 0 V,	$V_{DD\pm} = \pm 2.5$ V, R_S = 50 Ω	25°C		300	2500		300	950	µV
				Full range			3000			1500	
α_{VIO}	Temperature coefficient of input offset voltage			25°C to 85°C		2			2		µV/°C
	Input offset voltage long-term drift (see Note 4)			25°C		0.002			0.002		µV/mo
I_{IO}	Input offset current			25°C		0.5	60		0.5	60	pA
				−40°C to 85°C			150			150	
				Full range			800			800	
I_{IB}	Input bias current			25°C		1	60		1	60	pA
				−40°C to 85°C			150			150	
				Full range			800			800	
V_{ICR}	Common-mode input voltage	R_S = 50 Ω,	$\lvert V_{IO} \rvert \le$ 5 mV	25°C	0 to 4	−0.3 to 4.2		0 to 4	−0.3 to 4.2		V
				Full range	0 to 3.5			0 to 3.5			
V_{OH}	High-level output voltage	I_{OH} = −20 µA		25°C		4.99			4.99		V
		I_{OH} = −200 µA		25°C	4.85	4.93		4.85	4.93		
				Full range	4.85			4.85			
		I_{OH} = −1 mA		25°C	4.25	4.65		4.25	4.65		
				Full range	4.25			4.25			
V_{OL}	Low-level output voltage	V_{IC} = 2.5 V,	I_{OL} = 50 µA	25°C		0.01			0.01		V
		V_{IC} = 2.5 V,	I_{OL} = 500 µA	25°C		0.09	0.15		0.09	0.15	
				Full range			0.15			0.15	
		V_{IC} = 2.5 V,	I_{OL} = 5 mA	25°C		0.9	1.5		0.9	1.5	
				Full range			1.5			1.5	
A_{VD}	Large-signal differential voltage amplification	V_{IC} = 2.5 V, V_O = 1 V to 4 V	R_L = 10 kΩ‡	25°C	15	35		15	35		V/mV
				Full range	15			15			
			R_L = 1 mΩ‡	25°C		175			175		
r_{id}	Differential input resistance			25°C		10^{12}			10^{12}		Ω
r_i	Common-mode input resistance			25°C		10^{12}			10^{12}		Ω
c_i	Common-mode input capacitance	f = 10 kHz,	P package	25°C		8			8		pF
z_o	Closed-loop output impedance	f = 1 MHz,	A_V = 10	25°C		140			140		Ω
CMRR	Common-mode rejection ratio	V_{IC} = 0 V to 2.7 V, V_O = 2.5 V,	R_S = 50 Ω	25°C	70	75		70	75		dB
				Full range	70			70			
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)	V_{DD} = 4.4 V to 16 V, $V_{IC} = V_{DD}/2$,	No load	25°C	80	95		80	95		dB
				Full range	80			80			
I_{DD}	Supply current	V_O = 2.5 V,	No load	25°C		2.2	3		2.2	3	mA
				Full range			3			3	

† Full range is − 40°C to 125°C.
‡ Referenced to 0 V
NOTE 4: Typical values are based on the input offset voltage shift observed through 168 hours of operating life test at T_A = 150°C extrapolated to T_A = 25°C using the Arrhenius equation and assuming an activation energy of 0.96 eV.

TLC2272I operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A†	TLC2272I MIN	TLC2272I TYP	TLC2272I MAX	TLC2272AI MIN	TLC2272AI TYP	TLC2272AI MAX	UNIT
SR	Slew rate at unity gain	V_O = 0.5 V to 2.5 V, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C	2.3	3.6		2.3	3.6		V/μs
				Full range	1.7			1.7			
V_n	Equivalent input noise voltage	f = 10 Hz		25°C		50			50		nV/√Hz
		f = 1 kHz		25°C		9			9		
V_{NPP}	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 1 Hz		25°C		1			1		μV
		f = 0.1 Hz to 10 Hz		25°C		1.4			1.4		
I_n	Equivalent input noise current			25°C		0.6			0.6		fA/√Hz
THD + N	Total harmonic distortion plus noise	V_O = 0.5 V to 2.5 V, f = 20 kHz, R_L = 10 kΩ‡	A_V = 1	25°C		0.0013%			0.0013%		
			A_V = 10			0.004%			0.004%		
			A_V = 100			0.03%			0.03%		
	Gain-bandwidth product	f = 10 kHz, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		2.18			2.18		MHz
B_{OM}	Maximum output-swing bandwidth	$V_{O(PP)}$ = 2 V, A_V = 1, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		1			1		MHz
t_s	Settling time	A_V = −1, Step = 0.5 V to 2.5 V, R_L = 10 kΩ‡, C_L = 100 pF‡	To 0.1%	25°C		1.5			1.5		μs
			To 0.01%			2.6			2.6		
ϕ_m	Phase margin at unity gain	R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		50°			50°		
	Gain margin			25°C		10			10		dB

† Full range is − 40°C to 125°C.
‡ Referenced to 0 V

TLC2272I electrical characteristics at specified free-air temperature, $V_{DD\pm} = \pm 5$ V (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A†	TLC2272I MIN	TLC2272I TYP	TLC2272I MAX	TLC2272AI MIN	TLC2272AI TYP	TLC2272AI MAX	UNIT
V_{IO}	Input offset voltage	V_{IC} = 0 V, V_O = 0 V, R_S = 50 Ω	25°C		300	2500		300	950	µV
			Full range			3000			1500	
α_{VIO}	Temperature coefficient of input offset voltage		25°C to 85°C		2			2		µV/°C
	Input offset voltage long-term drift (see Note 4)		25°C		0.002			0.002		µV/mo
I_{IO}	Input offset current		25°C		0.5	60		0.5	60	pA
			−40°C to 85°C			150			150	
			Full range			800			800	
I_{IB}	Input bias current		25°C		1	60		1	60	pA
			−40°C to 85°C			150			150	
			Full range			800			800	
V_{ICR}	Common-mode input voltage	R_S = 50 Ω, $\lvert V_{IO} \rvert \le 5$ mV	25°C	−5 to 4	−5.3 to 4.2		−5 to 4	−5.3 to 4.2		V
			Full range	−5 to 3.5			−5 to 3.5			
V_{OM+}	Maximum positive peak output voltage	I_O = −20 µA	25°C		4.99			4.99		V
		I_O = −200 µA	25°C	4.85	4.93		4.85	4.93		
			Full range	4.85			4.85			
		I_O = −1 mA	25°C	4.25	4.65		4.25	4.65		
			Full range	4.25			4.25			
V_{OM-}	Maximum negative peak output voltage	V_{IC} = 0 V, I_O = 50 µA	25°C		−4.99			−4.99		V
		V_{IC} = 0 V, I_O = 500 µA	25°C	−4.85	−4.91		−4.85	−4.91		
			Full range	−4.85			−4.85			
		V_{IC} = 0 V, I_O = 5 mA	25°C	−3.5	−4.1		−3.5	−4.1		
			Full range	−3.5			−3.5			
A_{VD}	Large-signal differential voltage amplification	V_O = ±4 V, R_L = 10 kΩ	25°C	25	50		25	50		V/mV
			Full range	25			25			
		V_O = ±4 V, R_L = 1 mΩ	25°C		300			300		
r_{id}	Differential input resistance		25°C		10^{12}			10^{12}		Ω
r_i	Common-mode input resistance		25°C		10^{12}			10^{12}		Ω
c_i	Common-mode input capacitance	f = 10 kHz, P package	25°C		8			8		pF
z_o	Closed-loop output impedance	f = 1 MHz, A_V = 10	25°C		130			130		Ω
CMRR	Common-mode rejection ratio	V_{IC} = −5 V to 2.7 V, V_O = 0 V, R_S = 50 Ω	25°C	75	80		75	80		dB
			Full range	75			75			
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD\pm}/\Delta V_{IO}$)	V_{DD} = 4.4 V to 16 V, $V_{IC} = V_{DD}/2$, No load	25°C	80	95		80	95		dB
			Full range	80			80			
I_{DD}	Supply current	V_O = 0 V, No load	25°C		2.4	3		2.4	3	mA
			Full range			3			3	

† Full range is − 40°C to 125°C.

NOTE 4: Typical values are based on the input offset voltage shift observed through 168 hours of operating life test at T_A = 150°C extrapolated to T_A = 25°C using the Arrhenius equation and assuming an activation energy of 0.96 eV.

TLC2272I operating characteristics at specified free-air temperature, $V_{DD\pm} = \pm5$ V

PARAMETER		TEST CONDITIONS		T_A†	TLC2272I			TLC2272AI			UNIT
					MIN	TYP	MAX	MIN	TYP	MAX	
SR	Slew rate at unity gain	$V_O = \pm2.3$ V, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C	2.3	3.6		2.3	3.6		V/μs
				Full range	1.7			1.7			
V_n	Equivalent input noise voltage	f = 10 Hz		25°C		50			50		$nV/\sqrt{Hz}$
		f = 1 kHz		25°C		9			9		
V_{NPP}	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 1 Hz		25°C		1			1		μV
		f = 0.1 Hz to 10 Hz		25°C		1.4			1.4		
I_n	Equivalent input noise current			25°C		0.6			0.6		$fA/\sqrt{Hz}$
THD + N	Total harmonic distortion plus noise	$V_O = \pm2.3$ V, $R_L = 10$ kΩ, f = 20 kHz	$A_V = 1$	25°C		0.0011%			0.0011%		
			$A_V = 10$			0.004%			0.004%		
			$A_V = 100$			0.03%			0.03%		
	Gain-bandwidth product	f = 10 kHz, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C		2.25			2.25		MHz
B_{OM}	Maximum output-swing bandwidth	$V_{O(PP)} = 4.6$ V, $A_V = 1$, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C		0.54			0.54		MHz
t_s	Settling time	$A_V = -1$, Step = −2.3 V to 2.3 V, $R_L = 10$ kΩ, $C_L = 100$ pF	To 0.1%	25°C		1.5			1.5		μs
			To 0.01%			3.2			3.2		
ϕ_m	Phase margin at unity gain	$R_L = 10$ kΩ, $C_L = 100$ pF		25°C		52°			52°		
	Gain margin			25°C		10			10		dB

† Full range is −40°C to 125°C.

TLC2274I electrical characteristics at specified free-air temperature, V_{DD} = 5 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A†	TLC2274I MIN	TLC2274I TYP	TLC2274I MAX	TLC2274AI MIN	TLC2274AI TYP	TLC2274AI MAX	UNIT
V_{IO}	Input offset voltage	$V_{DD\pm} = \pm2.5$ V, V_{IC} = 0 V, V_O = 0 V, R_S = 50 Ω	25°C		300	2500		300	950	μV
			Full range			3000			1500	
α_{VIO}	Temperature coefficient of input offset voltage		25°C to 85°C		2			2		μV/°C
	Input offset voltage long-term drift (see Note 4)		25°C		0.002			0.002		μV/mo
I_{IO}	Input offset current		25°C		0.5	60		0.5	60	pA
			−40°C to 85°C			150			150	
			Full range			800			800	
I_{IB}	Input bias current		25°C		1	60		1	60	pA
			−40°C to 85°C			150			150	
			Full range			800			800	
V_{ICR}	Common-mode input voltage	R_S = 50 Ω, $\|V_{IO}\| \le 5$ mV	25°C	0 to 4	−0.3 to 4.2		0 to 4	−0.3 to 4.2		V
			Full range	0 to 3.5			0 to 3.5			
V_{OH}	High-level output voltage	$I_{OH} = -20$ μA	25°C		4.99			4.99		V
		$I_{OH} = -200$ μA	25°C	4.85	4.93		4.85	4.93		
			Full range	4.85			4.85			
		$I_{OH} = -1$ mA	25°C	4.25	4.65		4.25	4.65		
			Full range	4.25			4.25			
V_{OL}	Low-level output voltage	V_{IC} = 2.5 V, I_{OL} = 50 μA	25°C		0.01			0.01		V
		V_{IC} = 2.5 V, I_{OL} = 500 μA	25°C		0.09	0.15		0.09	0.15	
			Full range			0.15			0.15	
		V_{IC} = 2.5 V, I_{OL} = 5 mA	25°C		0.9	1.5		0.9	1.5	
			Full range			1.5			1.5	
A_{VD}	Large-signal differential voltage amplification	V_{IC} = 2.5 V, V_O = 1 V to 4 V, R_L = 10 kΩ‡	25°C	15	35		15	35		V/mV
			Full range	15			15			
		V_{IC} = 2.5 V, V_O = 1 V to 4 V, R_L = 1 MΩ‡	25°C		175			175		
r_{id}	Differential input resistance		25°C		10^{12}			10^{12}		Ω
r_i	Common-mode input resistance		25°C		10^{12}			10^{12}		Ω
c_i	Common-mode input capacitance	f = 10 kHz, N package	25°C		8			8		pF
z_o	Closed-loop output impedance	f = 1 MHz, A_V = 10	25°C		140			140		Ω
CMRR	Common-mode rejection ratio	V_{IC} = 0 V to 2.7 V, V_O = 2.5 V, R_S = 50 Ω	25°C	70	75		70	75		dB
			Full range	70			70			
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)	V_{DD} = 4.4 V to 16 V, $V_{IC} = V_{DD}/2$, No load	25°C	80	95		80	95		dB
			Full range	80			80			
I_{DD}	Supply current	V_O = 2.5 V, No load	25°C		4.4	6		4.4	6	mA
			Full range			6			6	

† Full range is − 40°C to 125°C.
‡ Referenced to 0 V

NOTE 4: Typical values are based on the input offset voltage shift observed through 168 hours of operating life test at T_A = 150°C extrapolated to T_A = 25°C using the Arrhenius equation and assuming an activation energy of 0.96 eV.

TLC2274I operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A†	TLC2274I MIN	TLC2274I TYP	TLC2274I MAX	TLC2274AI MIN	TLC2274AI TYP	TLC2274AI MAX	UNIT
SR	Slew rate at unity gain	V_O = 0.5 V to 2.5 V, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C	2.3	3.6		2.3	3.6		V/µs
				Full range	1.7			1.7			
V_n	Equivalent input noise voltage	f = 10 Hz		25°C		50			50		nV/√Hz
		f = 1 kHz		25°C		9			9		
$V_{N(PP)}$	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 1 Hz		25°C		1			1		µV
		f = 0.1 Hz to 10 Hz		25°C		1.4			1.4		
I_n	Equivalent input noise current			25°C		0.6			0.6		fA/√Hz
THD + N	Total harmonic distortion plus noise	V_O = 0.5 V to 2.5 V, f = 20 kHz, R_L = 10 kΩ‡	A_V = 1	25°C		0.0013%			0.0013%		
			A_V = 10			0.004%			0.004%		
			A_V = 100			0.03%			0.03%		
	Gain-bandwidth product	f = 10 kHz, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		2.18			2.18		MHz
B_{OM}	Maximum output-swing bandwidth	$V_{O(PP)}$ = 2 V, A_V = 1, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		1			1		MHz
t_s	Settling time	A_V = −1, Step = 0.5 V to 2.5 V, R_L = 10 kΩ‡, C_L = 100 pF‡	To 0.1%	25°C		1.5			1.5		µs
			To 0.01%			2.6			2.6		
ϕ_m	Phase margin at unity gain	R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		50°			50°		
	Gain margin			25°C		10			10		dB

† Full range is − 40°C to 125°C.
‡ Referenced to 0 V

TLC2274I electrical characteristics at specified free-air temperature, $V_{DD\pm} = \pm 5$ V (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A†	TLC2274I MIN	TLC2274I TYP	TLC2274I MAX	TLC2274AI MIN	TLC2274AI TYP	TLC2274AI MAX	UNIT
V_{IO}	Input offset voltage	$V_{IC} = 0$ V, $V_O = 0$ V, $R_S = 50\ \Omega$		25°C		300	2500		300	950	µV
				Full range			3000			1500	
α_{VIO}	Temperature coefficient of input offset voltage			25°C to 85°C		2			2		µV/°C
	Input offset voltage long-term drift (see Note 4)			25°C		0.002			0.002		µV/mo
I_{IO}	Input offset current			25°C		0.5	60		0.5	60	pA
				−40°C to 85°C			150			150	
				Full range			800			800	
I_{IB}	Input bias current			25°C		1	60		1	60	pA
				−40°C to 85°C			150			150	
				Full range			800			800	
V_{ICR}	Common-mode input voltage	$R_S = 50\ \Omega$, $\|V_{IO}\| \le 5$ mV		25°C	−5 to 4	−5.3 to 4.2		−5 to 4	−5.3 to 4.2		V
				Full range	−5 to 3.5			−5 to 3.5			
V_{OM+}	Maximum positive peak output voltage	$I_O = -20\ \mu A$		25°C		4.99			4.99		V
		$I_O = -200\ \mu A$		25°C	4.85	4.93		4.85	4.93		
				Full range	4.85			4.85			
		$I_O = -1$ mA		25°C	4.25	4.65		4.25	4.65		
				Full range	4.25			4.25			
V_{OM-}	Maximum negative peak output voltage	$V_{IC} = 0$ V, $I_O = 50\ \mu A$		25°C		−4.99			−4.99		V
		$V_{IC} = 0$ V, $I_O = 500\ \mu A$		25°C	−4.85	−4.91		−4.85	−4.91		
				Full range	−4.85			−4.85			
		$V_{IC} = 0$ V, $I_O = 5$ mA		25°C	−3.5	−4.1		−3.5	−4.1		
				Full range	−3.5			−3.5			
A_{VD}	Large-signal differential voltage amplification	$V_O = \pm 4$ V	$R_L = 10\ k\Omega$	25°C	25	50		25	50		V/mV
				Full range	25			25			
			$R_L = 1\ M\Omega$	25°C		300			300		
r_{id}	Differential input resistance			25°C		10^{12}			10^{12}		Ω
r_i	Common-mode input resistance			25°C		10^{12}			10^{12}		Ω
c_i	Common-mode input capacitance	f = 10 kHz, N package		25°C		8			8		pF
z_o	Closed-loop output impedance	f = 1 MHz, $A_V = 10$		25°C		130			130		Ω
CMRR	Common-mode rejection ratio	$V_{IC} = -5$ V to 2.7 V, $V_O = 0$ V, $R_S = 50\ \Omega$		25°C	75	80		75	80		dB
				Full range	75			75			
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD\pm}/\Delta V_{IO}$)	$V_{DD\pm} = \pm 2.2$ V to ± 8 V, $V_{IC} = 0$ V, No load		25°C	80	95		80	95		dB
				Full range	80			80			
I_{DD}	Supply current	$V_O = 0$ V, No load		25°C		4.8	6		4.8	6	mA
				Full range			6			6	

† Full range is − 40°C to 125°C.

NOTE 4: Typical values are based on the input offset voltage shift observed through 168 hours of operating life test at $T_A = 150°C$ extrapolated to $T_A = 25°C$ using the Arrhenius equation and assuming an activation energy of 0.96 eV.

TLC2274I operating characteristics at specified free-air temperature, $V_{DD\pm} = \pm 5$ V

PARAMETER		TEST CONDITIONS		T_A†	TLC2274I			TLC2274AI			UNIT
					MIN	TYP	MAX	MIN	TYP	MAX	
SR	Slew rate at unity gain	$V_O = \pm 2.3$ V, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C	2.3	3.6		2.3	3.6		V/μs
				Full range	1.7			1.7			
V_n	Equivalent input noise voltage	f = 10 Hz		25°C		50			50		nV/√Hz
		f = 1 kHz		25°C		9			9		
$V_{N(PP)}$	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 1 Hz		25°C		1			1		μV
		f = 0.1 Hz to 10 Hz		25°C		1.4			1.4		
I_n	Equivalent input noise current			25°C		0.6			0.6		fA/√Hz
THD + N	Total harmonic distortion plus noise	$V_O = \pm 2.3$ V, $R_L = 10$ kΩ, f = 20 kHz	$A_V = 1$	25°C		0.0011%			0.0011%		
			$A_V = 10$			0.004%			0.004%		
			$A_V = 100$			0.03%			0.03%		
	Gain-bandwidth product	f = 10 kHz, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C		2.25			2.25		MHz
B_{OM}	Maximum output-swing bandwidth	$V_{O(PP)} = 4.6$ V, $A_V = 1$, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C		0.54			0.54		MHz
t_s	Settling time	$A_V = -1$, Step = −2.3 V to 2.3 V, $R_L = 10$ kΩ, $C_L = 100$ pF	To 0.1%	25°C		1.5			1.5		μs
			To 0.01%			3.2			3.2		
ϕ_m	Phase margin at unity gain	$R_L = 10$ kΩ, $C_L = 100$ pF		25°C		52°			52°		
	Gain margin			25°C		10			10		dB

† Full range is −40°C to 125°C.

TLC2272Q and TLC2272M electrical characteristics at specified free-air temperature, V_{DD} = 5 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A†	TLC2272Q, TLC2272M MIN	TLC2272Q, TLC2272M TYP	TLC2272Q, TLC2272M MAX	TLC2272AQ, TLC2272AM MIN	TLC2272AQ, TLC2272AM TYP	TLC2272AQ, TLC2272AM MAX	UNIT
V_{IO}	Input offset voltage	V_{IC} = 0 V, $V_{DD\pm}$ = ±2.5 V, V_O = 0 V, R_S = 50 Ω	25°C		300	2500		300	950	µV
			Full range			3000			1500	
α_{VIO}	Temperature coefficient of input offset voltage		25°C to 125°C		2			2		µV/°C
	Input offset voltage long-term drift (see Note 4)		25°C		0.002			0.002		µV/mo
I_{IO}	Input offset current		25°C		0.5	60		0.5	60	pA
			Full range			800			800	
I_{IB}	Input bias current		25°C		1	60		1	60	pA
			Full range			800			800	
V_{ICR}	Common-mode input voltage	R_S = 50 Ω, $\lvert V_{IO} \rvert \le$ 5 mV	25°C	0 to 4	−0.3 to 4.2		0 to 4	−0.3 to 4.2		V
			Full range	0 to 3.5			0 to 3.5			
V_{OH}	High-level output voltage	I_{OH} = −20 µA	25°C		4.99			4.99		V
		I_{OH} = −200 µA	25°C	4.85	4.93		4.85	4.93		
			Full range	4.85			4.85			
		I_{OH} = −1 mA	25°C	4.25	4.65		4.25	4.65		
			Full range	4.25			4.25			
V_{OL}	Low-level output voltage	V_{IC} = 2.5 V, I_{OL} = 50 µA	25°C		0.01			0.01		V
		V_{IC} = 2.5 V, I_{OL} = 500 µA	25°C		0.09	0.15		0.09	0.15	
			Full range			0.15			0.15	
		V_{IC} = 2.5 V, I_{OL} = 5 mA	25°C		0.9	1.5		0.9	1.5	
			Full range			1.5			1.5	
A_{VD}	Large-signal differential voltage amplification	V_{IC} = 2.5 V, V_O = 1 V to 4 V, R_L = 10 kΩ‡	25°C	10	35		10	35		V/mV
			Full range	10			10			
		V_{IC} = 2.5 V, V_O = 1 V to 4 V, R_L = 1 mΩ‡	25°C		175			175		
r_{id}	Differential input resistance		25°C		10^{12}			10^{12}		Ω
r_i	Common-mode input resistance		25°C		10^{12}			10^{12}		Ω
c_i	Common-mode input capacitance	f = 10 kHz, P package	25°C		8			8		pF
z_o	Closed-loop output impedance	f = 1 MHz, A_V = 10	25°C		140			140		Ω
CMRR	Common-mode rejection ratio	V_{IC} = 0 V to 2.7 V, V_O = 2.5 V, R_S = 50 Ω	25°C	70	75		70	75		dB
			Full range	70			70			
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)	V_{DD} = 4.4 V to 16 V, V_{IC} = V_{DD}/2, No load	25°C	80	95		80	95		dB
			Full range	80			80			
I_{DD}	Supply current	V_O = 2.5 V, No load	25°C		2.2	3		2.2	3	mA
			Full range			3			3	

† Full range is −40°C to 125°C for Q level part, −55°C to 125°C for M level part.
‡ Referenced to 2.5 V

NOTE 4: Typical values are based on the input offset voltage shift observed through 168 hours of operating life test at T_A = 150°C extrapolated to T_A = 25°C using the Arrhenius equation and assuming an activation energy of 0.96 eV.

TLC2272Q and TLC2272M operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A†	TLC2272Q, TLC2272M MIN	TLC2272Q, TLC2272M TYP	TLC2272Q, TLC2272M MAX	TLC2272AQ, TLC2272AM MIN	TLC2272AQ, TLC2272AM TYP	TLC2272AQ, TLC2272AM MAX	UNIT
SR	Slew rate at unity gain	V_O = 1.25 V to 2.75 V, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C	2.3	3.6		2.3	3.6		V/μs
				Full range	1.7			1.7			
V_n	Equivalent input noise voltage	f = 10 Hz		25°C		50			50		nV/√Hz
		f = 1 kHz		25°C		9			9		
V_{NPP}	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 1 Hz		25°C		1			1		μV
		f = 0.1 Hz to 10 Hz		25°C		1.4			1.4		
I_n	Equivalent input noise current			25°C		0.6			0.6		fA/√Hz
THD + N	Total harmonic distortion plus noise	V_O = 0.5 V to 2.5 V, f = 20 kHz, R_L = 10 kΩ‡,	A_V = 1	25°C		0.0013%			0.0013%		
			A_V = 10			0.004%			0.004%		
			A_V = 100			0.03%			0.03%		
	Gain-bandwidth product	f = 10 kHz, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		2.18			2.18		MHz
B_{OM}	Maximum output-swing bandwidth	$V_{O(PP)}$ = 2 V, A_V = 1, R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		1			1		MHz
t_s	Settling time	A_V = −1, Step = 0.5 V to 2.5 V, R_L = 10 kΩ‡, C_L = 100 pF‡	To 0.1%	25°C		1.5			1.5		μs
			To 0.01%			2.6			2.6		
ϕ_m	Phase margin at unity gain	R_L = 10 kΩ‡, C_L = 100 pF‡		25°C		50°			50°		
	Gain margin			25°C		10			10		dB

† Full range is −40°C to 125°C for Q level part, −55°C to 125°C for M level part.
‡ Referenced to 2.5 V

TLC2272Q and TLC2272M electrical characteristics at specified free-air temperature, $V_{DD\pm} = \pm5$ V (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A†	TLC2272Q, TLC2272M MIN	TYP	MAX	TLC2272AQ, TLC2272AM MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage	$V_{IC} = 0$ V, $V_O = 0$ V, $R_S = 50\ \Omega$		25°C		300	2500		300	950	µV
				Full range			3000			1500	
α_{VIO}	Temperature coefficient of input offset voltage			25°C to 125°C		2			2		µV/°C
	Input offset voltage long-term drift (see Note 4)			25°C		0.002			0.002		µV/mo
I_{IO}	Input offset current			25°C		0.5	60		0.5	60	pA
				Full range			800			800	
I_{IB}	Input bias current			25°C		1	60		1	60	pA
				Full range			800			800	
V_{ICR}	Common-mode input voltage	$R_S = 50\ \Omega$, $\lvert V_{IO} \rvert \le 5$ mV		25°C	−5 to 4	−5.3 to 4.2		−5 to 4	−5.3 to 4.2		V
				Full range	−5 to 3.5			−5 to 3.5			
V_{OM+}	Maximum positive peak output voltage	$I_O = -20\ \mu A$		25°C		4.99			4.99		V
		$I_O = -200\ \mu A$		25°C	4.85	4.93		4.85	4.93		
				Full range	4.85			4.85			
		$I_O = -1$ mA		25°C	4.25	4.65		4.25	4.65		
				Full range	4.25			4.25			
V_{OM-}	Maximum negative peak output voltage	$V_{IC} = 0$ V, $I_O = 50\ \mu A$		25°C		−4.99			−4.99		V
		$V_{IC} = 0$ V, $I_O = 500\ \mu A$		25°C	−4.85	−4.91		−4.85	−4.91		
				Full range	−4.85			−4.85			
		$V_{IC} = 0$ V, $I_O = 5$ mA		25°C	−3.5	−4.1		−3.5	−4.1		
				Full range	−3.5			−3.5			
A_{VD}	Large-signal differential voltage amplification	$V_O = \pm4$ V	$R_L = 10\ k\Omega$	25°C	20	50		20	50		V/mV
				Full range	20			20			
			$R_L = 1\ m\Omega$	25°C		300			300		
r_{id}	Differential input resistance			25°C		10^{12}			10^{12}		Ω
r_i	Common-mode input resistance			25°C		10^{12}			10^{12}		Ω
c_i	Common-mode input capacitance	f = 10 kHz, P package		25°C		8			8		pF
z_o	Closed-loop output impedance	f = 1 MHz, $A_V = 10$		25°C		130			130		Ω
CMRR	Common-mode rejection ratio	$V_{IC} = -5$ V to 2.7 V, $V_O = 0$ V, $R_S = 50\ \Omega$		25°C	75	80		75	80		dB
				Full range	75			75			
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD\pm}/\Delta V_{IO}$)	$V_{DD} = \pm2.2$ V to ±8 V, $V_{IC} = 0$ V, No load		25°C	80	95		80	95		dB
				Full range	80			80			
I_{DD}	Supply current	$V_O = 2.5$ V, No load		25°C		2.4	3		2.4	3	mA
				Full range			3			3	

† Full range is −40°C to 125°C for Q level part, −55°C to 125°C for M level part.

NOTE 4: Typical values are based on the input offset voltage shift observed through 168 hours of operating life test at $T_A = 150°C$ extrapolated to $T_A = 25°C$ using the Arrhenius equation and assuming an activation energy of 0.96 eV.

TLC2272Q and TLC2272M operating characteristics at specified free-air temperature, $V_{DD\pm} = \pm5$ V

PARAMETER		TEST CONDITIONS		T_A†	TLC2272Q, TLC2272M MIN	TLC2272Q, TLC2272M TYP	TLC2272Q, TLC2272M MAX	TLC2272AQ, TLC2272AM MIN	TLC2272AQ, TLC2272AM TYP	TLC2272AQ, TLC2272AM MAX	UNIT
SR	Slew rate at unity gain	$V_O = \pm1$ V, C_L = 100 pF	R_L = 10 kΩ,	25°C	2.3	3.6		2.3	3.6		V/µs
				Full range	1.7			1.7			
V_n	Equivalent input noise voltage	f = 10 Hz		25°C		50			50		nV/√Hz
		f = 1 kHz		25°C		9			9		
V_{NPP}	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 1 Hz		25°C		1			1		µV
		f = 0.1 Hz to 10 Hz		25°C		1.4			1.4		
I_n	Equivalent input noise current			25°C		0.6			0.6		fA/√Hz
THD + N	Total harmonic distortion plus noise	$V_O = \pm2.3$ V, R_L = 10 kΩ, f = 20 kHz	A_V = 1	25°C		0.0011%			0.0011%		
			A_V = 10			0.004%			0.004%		
			A_V = 100			0.03%			0.03%		
	Gain-bandwidth product	f = 10 kHz, C_L = 100 pF	R_L = 10 kΩ,	25°C		2.25			2.25		MHz
B_{OM}	Maximum output-swing bandwidth	$V_{O(PP)}$ = 4.6 V, R_L = 10 kΩ,	A_V = 1, C_L = 100 pF	25°C		0.54			0.54		MHz
t_s	Settling time	$A_V = -1$, Step = −2.3 V to 2.3 V, R_L = 10 kΩ, C_L = 100 pF	To 0.1%	25°C		1.5			1.5		µs
			To 0.01%			3.2			3.2		
ϕ_m	Phase margin at unity gain	R_L = 10 kΩ,	C_L = 100 pF	25°C		52°			52°		
	Gain margin			25°C		10			10		dB

† Full range is −40°C to 125°C for Q level part, −55°C to 125°C for M level part.

TLC2274Q and TLC2274M electrical characteristics at specified free-air temperature, V_{DD} = 5 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A†	TLC2274Q, TLC2274M			TLC2274AQ, TLC2274AM			UNIT
					MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO}	Input offset voltage	$V_{DD\pm} = \pm2.5$ V, V_O = 0 V,	V_{IC} = 0 V, R_S = 50 Ω	25°C		300	2500		300	950	μV
				Full range			3000			1500	
α_{VIO}	Temperature coefficient of input offset voltage			25°C to 125°C		2			2		μV/°C
	Input offset voltage long-term drift (see Note 4)			25°C		0.002			0.002		μV/mo
I_{IO}	Input offset current			25°C		0.5	60		0.5	60	pA
				Full range			800			800	
I_{IB}	Input bias current			25°C		1	60		1	60	pA
				Full range			800			800	
V_{ICR}	Common-mode input voltage	R_S = 50 Ω,	$\lvert V_{IO} \rvert \le$ 5 mV	25°C	0 to 4	−0.3 to 4.2		0 to 4	−0.3 to 4.2		V
				Full range	0 to 3.5			0 to 3.5			
V_{OH}	High-level output voltage	I_{OH} = −20 μA		25°C		4.99			4.99		V
		I_{OH} = −200 μA		25°C	4.85	4.93		4.85	4.93		
				Full range	4.85			4.85			
		I_{OH} = −1 mA		25°C	4.25	4.65		4.25	4.65		
				Full range	4.25			4.25			
V_{OL}	Low-level output voltage	V_{IC} = 2.5 V,	I_{OL} = 50 μA	25°C		0.01			0.01		V
		V_{IC} = 2.5 V, I_{OL} = 500 μA		25°C		0.09	0.15		0.09	0.15	
				Full range			0.15			0.15	
		V_{IC} = 2.5 V,	I_{OL} = 5 mA	25°C		0.9	1.5		0.9	1.5	
				Full range			1.5			1.5	
A_{VD}	Large-signal differential voltage amplification	V_{IC} = 2.5 V, V_O = 1 V to 4 V	R_L = 10 kΩ‡	25°C	10	35		10	35		V/mV
				Full range	10			10			
			R_L = 1 MΩ‡	25°C		175			175		
r_{id}	Differential input resistance			25°C		10^{12}			10^{12}		Ω
r_i	Common-mode input resistance			25°C		10^{12}			10^{12}		Ω
c_i	Common-mode input capacitance	f = 10 kHz,	N package	25°C		8			8		pF
z_o	Closed-loop output impedance	f = 1 MHz,	A_V = 10	25°C		140			140		Ω
CMRR	Common-mode rejection ratio	V_{IC} = 0 V to 2.7 V, V_O = 2.5 V,	R_S = 50 Ω	25°C	70	75		70	75		dB
				Full range	70			70			
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)	V_{DD} = 4.4 V to 16 V, $V_{IC} = V_{DD}/2$,	No load	25°C	80	95		80	95		dB
				Full range	80			80			
I_{DD}	Supply current	V_O = 2.5 V,	No load	25°C		4.4	6		4.4	6	mA
				Full range			6			6	

† Full range is −40°C to 125°C for Q level part, −55°C to 125°C for M level part.
‡ Referenced to 2.5 V
NOTE 4: Typical values are based on the input offset voltage shift observed through 168 hours of operating life test at T_A = 150°C extrapolated to T_A = 25°C using the Arrhenius equation and assuming an activation energy of 0.96 eV.

TLC2274Q and TLC2274M operating characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER		TEST CONDITIONS		T_A†	TLC2274Q, TLC2274M MIN	TLC2274Q, TLC2274M TYP	TLC2274Q, TLC2274M MAX	TLC2274AQ, TLC2274AM MIN	TLC2274AQ, TLC2274AM TYP	TLC2274AQ, TLC2274AM MAX	UNIT
SR	Slew rate at unity gain	V_O = 0.5 V to 2.5 V, R_L = 10 kΩ‡,	C_L = 100 pF‡	25°C	2.3	3.6		2.3	3.6		V/µs
				Full range	1.7			1.7			
V_n	Equivalent input noise voltage	f = 10 Hz		25°C		50			50		nV/√Hz
		f = 1 kHz		25°C		9			9		
$V_{N(PP)}$	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 1 Hz		25°C		1			1		µV
		f = 0.1 Hz to 10 Hz		25°C		1.4			1.4		
I_n	Equivalent input noise current			25°C		0.6			0.6		fA/√Hz
THD + N	Total harmonic distortion plus noise	V_O = 0.5 V to 2.5 V, f = 20 kHz, R_L = 10 kΩ‡	A_V = 1	25°C		0.0013%			0.0013%		
			A_V = 10			0.004%			0.004%		
			A_V = 100			0.03%			0.03%		
	Gain-bandwidth product	f = 10 kHz, C_L = 100 pF‡	R_L = 10 kΩ‡,	25°C		2.18			2.18		MHz
B_{OM}	Maximum output-swing bandwidth	$V_{O(PP)}$ = 2 V, R_L = 10 kΩ‡,	A_V = 1, C_L = 100 pF‡	25°C		1			1		MHz
t_s	Settling time	A_V = −1, Step = 0.5 V to 2.5 V, R_L = 10 kΩ‡, C_L = 100 pF‡	To 0.1%	25°C		1.5			1.5		µs
			To 0.01%			2.6			2.6		
ϕ_m	Phase margin at unity gain	R_L = 10 kΩ‡,	C_L = 100 pF‡	25°C		50°			50°		
	Gain margin			25°C		10			10		dB

† Full range is −40°C to 125°C for Q level part, −55°C to 125°C for M level part.
‡ Referenced to 2.5 V

TLC2274Q and TLC2274M electrical characteristics at specified free-air temperature, $V_{DD\pm} = \pm5$ V (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A†	TLC2274Q, TLC2274M MIN	TLC2274Q, TLC2274M TYP	TLC2274Q, TLC2274M MAX	TLC2274AQ, TLC2274AM MIN	TLC2274AQ, TLC2274AM TYP	TLC2274AQ, TLC2274AM MAX	UNIT
V_{IO}	Input offset voltage	V_{IC} = 0 V, V_O = 0 V, R_S = 50 Ω		25°C		300	2500		300	950	μV
				Full range			3000			1500	
α_{VIO}	Temperature coefficient of input offset voltage			25°C to 125°C		2			2		μV/°C
	Input offset voltage long-term drift (see Note 4)			25°C		0.002			0.002		μV/mo
I_{IO}	Input offset current			25°C		0.5	60		0.5	60	pA
				Full range			800			800	
I_{IB}	Input bias current			25°C		1	60		1	60	pA
				Full range			800			800	
V_{ICR}	Common-mode input voltage	R_S = 50 Ω, $\|V_{IO}\| \le 5$ mV		25°C	−5 to 4	−5.3 to 4.2		−5 to 4	−5.3 to 4.2		V
				Full range	−5 to 3.5			−5 to 3.5			
V_{OM+}	Maximum positive peak output voltage	I_O = −20 μA		25°C		4.99			4.99		V
		I_O = −200 μA		25°C	4.85	4.93		4.85	4.93		
				Full range	4.85			4.85			
		I_O = −1 mA		25°C	4.25	4.65		4.25	4.65		
				Full range	4.25			4.25			
V_{OM-}	Maximum negative peak output voltage	V_{IC} = 0 V, I_O = 50 μA		25°C		−4.99			−4.99		V
		V_{IC} = 0 V, I_O = 500 μA		25°C	−4.85	−4.91		−4.85	−4.91		
				Full range	−4.85			−4.85			
		V_{IC} = 0 V, I_O = 5 mA		25°C	−3.5	−4.1		−3.5	−4.1		
				Full range	−3.5			−3.5			
A_{VD}	Large-signal differential voltage amplification	V_O = ±4 V	R_L = 10 kΩ	25°C	20	50		20	50		V/mV
				Full range	20			20			
			R_L = 1 MΩ	25°C		300			300		
r_{id}	Differential input resistance			25°C		10^{12}			10^{12}		Ω
r_i	Common-mode input resistance			25°C		10^{12}			10^{12}		Ω
c_i	Common-mode input capacitance	f = 10 kHz, N package		25°C		8			8		pF
z_o	Closed-loop output impedance	f = 1 MHz, A_V = 10		25°C		130			130		Ω
CMRR	Common-mode rejection ratio	V_{IC} = −5 V to 2.7 V, V_O = 0 V, R_S = 50 Ω		25°C	75	80		75	80		dB
				Full range	75			75			
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD\pm}/\Delta V_{IO}$)	$V_{DD\pm}$ = ± 2.2 V to ±8 V, V_{IC} = 0 V, No load		25°C	80	95		80	95		dB
				Full range	80			80			
I_{DD}	Supply current	V_O = 0 V, No load		25°C		4.8	6		4.8	6	mA
				Full range			6			6	

† Full range is −40°C to 125°C for Q level part, −55°C to 125°C for M level part.

NOTE 4: Typical values are based on the input offset voltage shift observed through 168 hours of operating life test at T_A = 150°C extrapolated to T_A = 25°C using the Arrhenius equation and assuming an activation energy of 0.96 eV.

TLC2274Q and TLC2274M operating characteristics at specified free-air temperature, $V_{DD\pm} = \pm5$ V

PARAMETER		TEST CONDITIONS		T_A†	TLC2274Q, TLC2274M MIN	TYP	MAX	TLC2274AQ, TLC2274AM MIN	TYP	MAX	UNIT
SR	Slew rate at unity gain	$V_O = \pm2.3$ V, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C	2.3	3.6		2.3	3.6		V/μs
				Full range	1.7			1.7			
V_n	Equivalent input noise voltage	f = 10 Hz		25°C		50			50		nV/√Hz
		f = 1 kHz		25°C		9			9		
$V_{N(PP)}$	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 1 Hz		25°C		1			1		μV
		f = 0.1 Hz to 10 Hz		25°C		1.4			1.4		
I_n	Equivalent input noise current			25°C		0.6			0.6		fA/√Hz
THD + N	Total harmonic distortion plus noise	$V_O = \pm2.3$ V, $R_L = 10$ kΩ, f = 20 kHz	$A_V = 1$	25°C		0.0011%			0.0011%		
			$A_V = 10$			0.004%			0.004%		
			$A_V = 100$			0.03%			0.03%		
	Gain-bandwidth product	f = 10 kHz, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C		2.25			2.25		MHz
B_{OM}	Maximum output-swing bandwidth	$V_{O(PP)} = 4.6$ V, $A_V = 1$, $R_L = 10$ kΩ, $C_L = 100$ pF		25°C		0.54			0.54		MHz
t_s	Settling time	$A_V = -1$, Step = −2.3 V to 2.3 V, $R_L = 10$ kΩ, $C_L = 100$ pF	To 0.1%	25°C		1.5			1.5		μs
			To 0.01%			3.2			3.2		
ϕ_m	Phase margin at unit gain	$R_L = 10$ kΩ, $C_L = 100$ pF		25°C		52°			52°		
	Gain margin			25°C		10			10		dB

† Full range is −40°C to 125°C for Q level part, −55°C to 125°C for M level part.

TYPICAL CHARACTERISTICS

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ϕ_m	Phase margin	vs Load capacitance	57
	Gain margin	vs Load capacitance	58

NOTE: For all graphs where V_{DD} = 5 V, all loads are referenced to 2.5 V.

TYPICAL CHARACTERISTICS

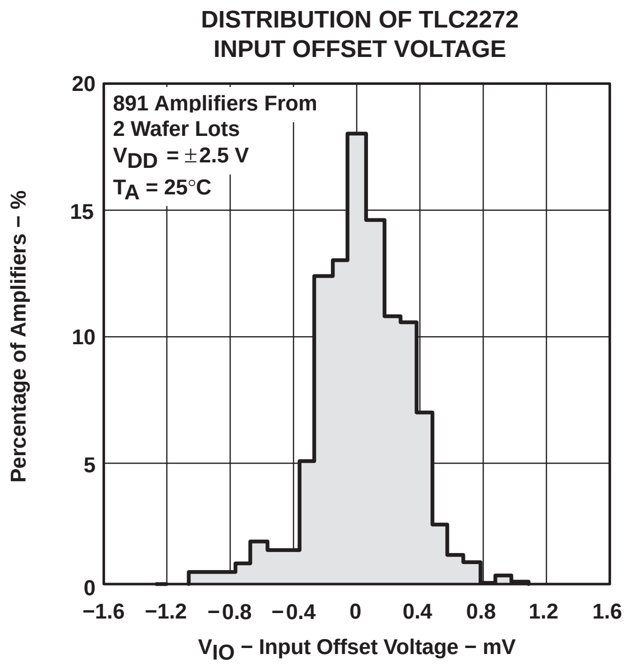


Figure 1

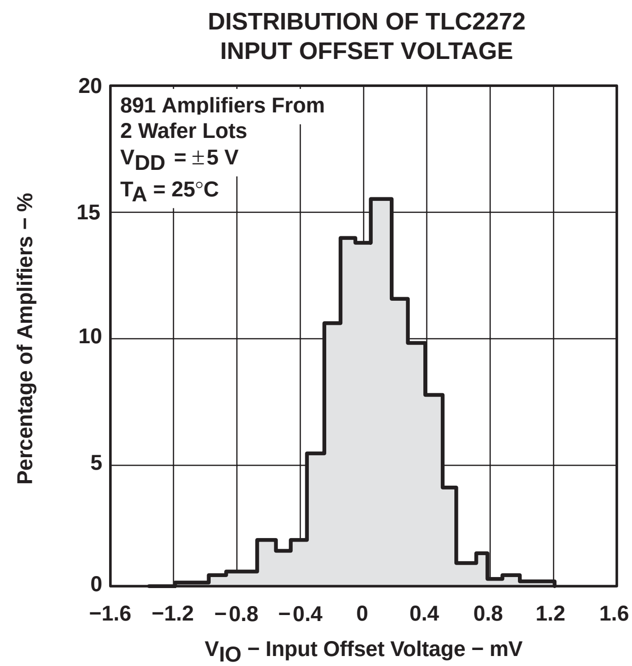


Figure 2

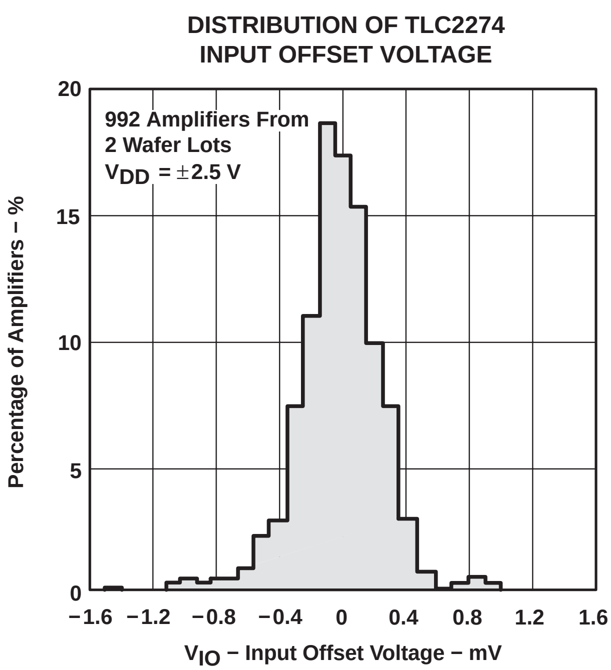


Figure 3

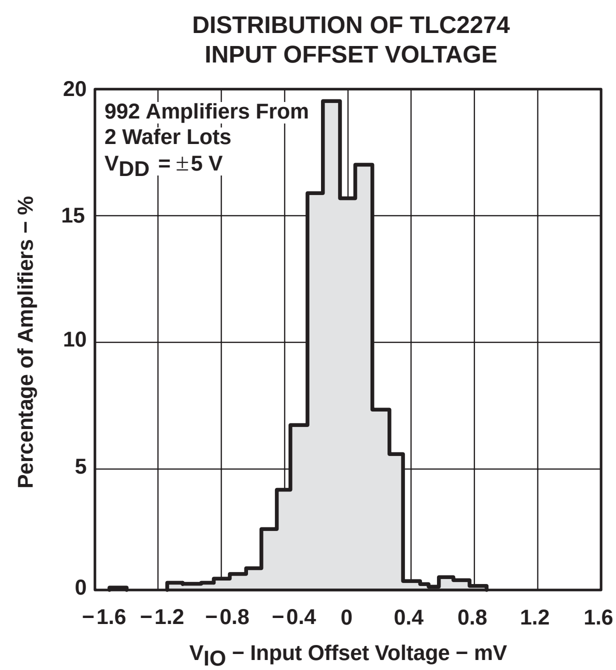


Figure 4

TYPICAL CHARACTERISTICS

INPUT OFFSET VOLTAGE
vs
COMMON-MODE VOLTAGE

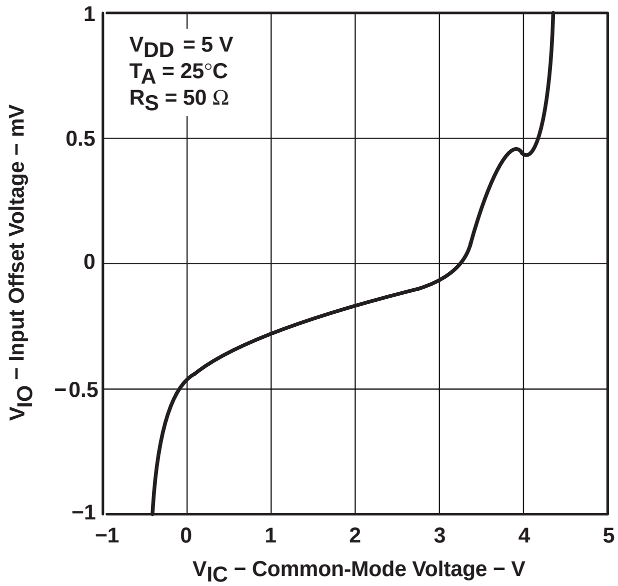


Figure 5

INPUT OFFSET VOLTAGE
vs
COMMON-MODE VOLTAGE

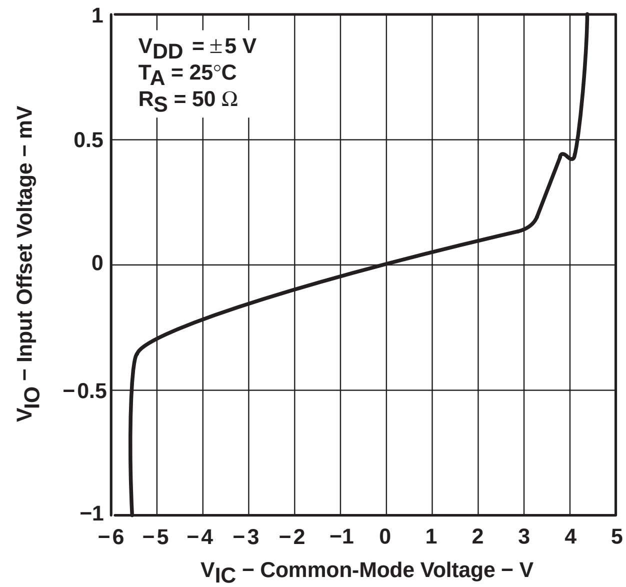


Figure 6

DISTRIBUTION OF TLC2272
vs
INPUT OFFSET VOLTAGE TEMPERATURE COEFFICIENT†

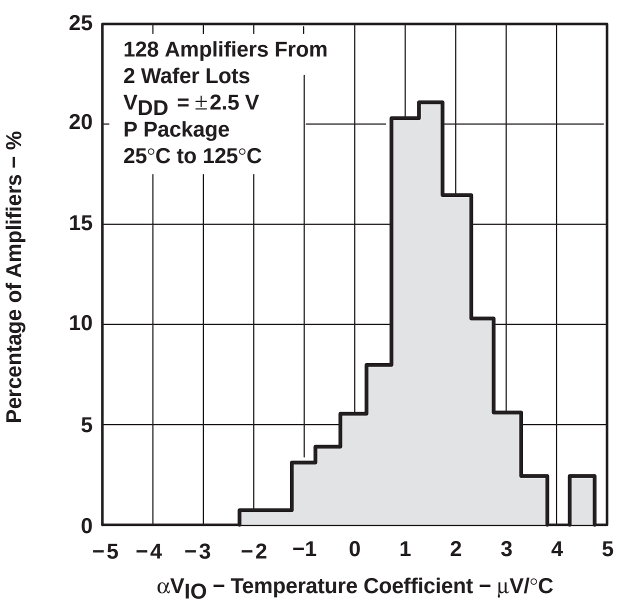


Figure 7

DISTRIBUTION OF TLC2272
vs
INPUT OFFSET VOLTAGE TEMPERATURE COEFFICIENT†

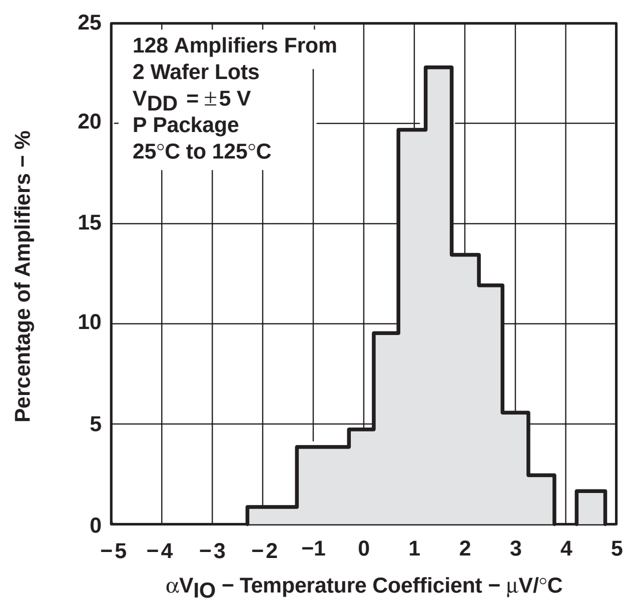


Figure 8

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

TYPICAL CHARACTERISTICS

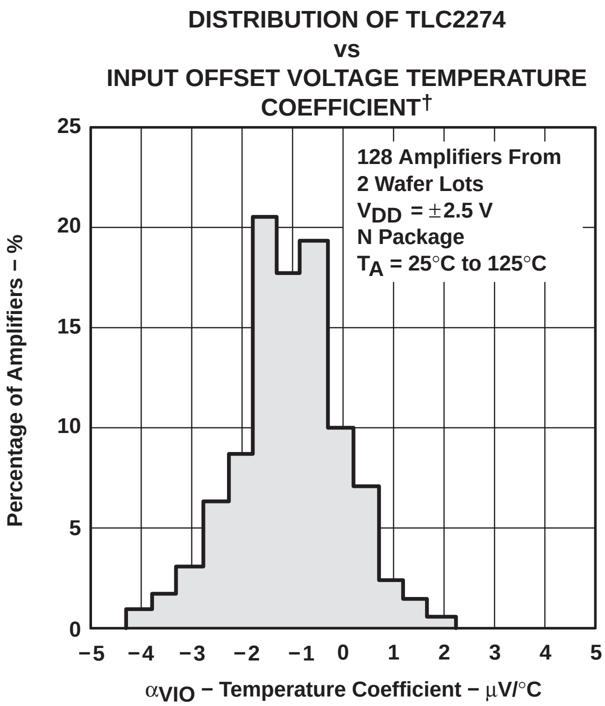


Figure 9

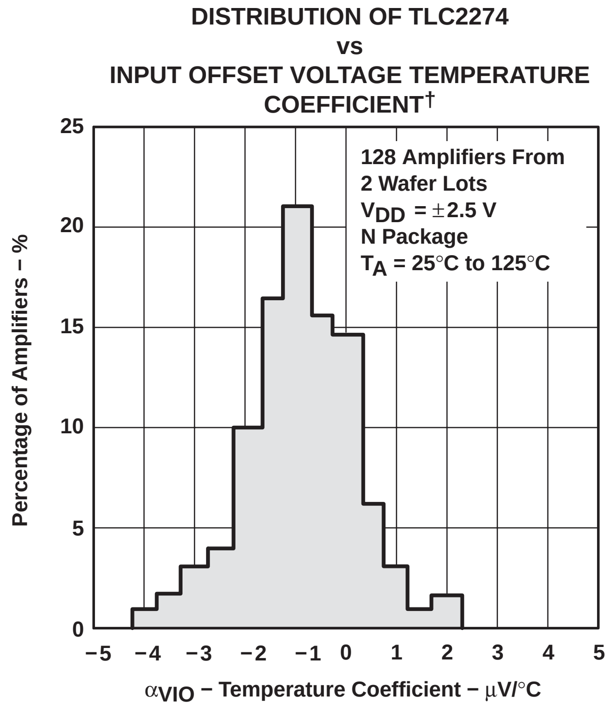


Figure 10

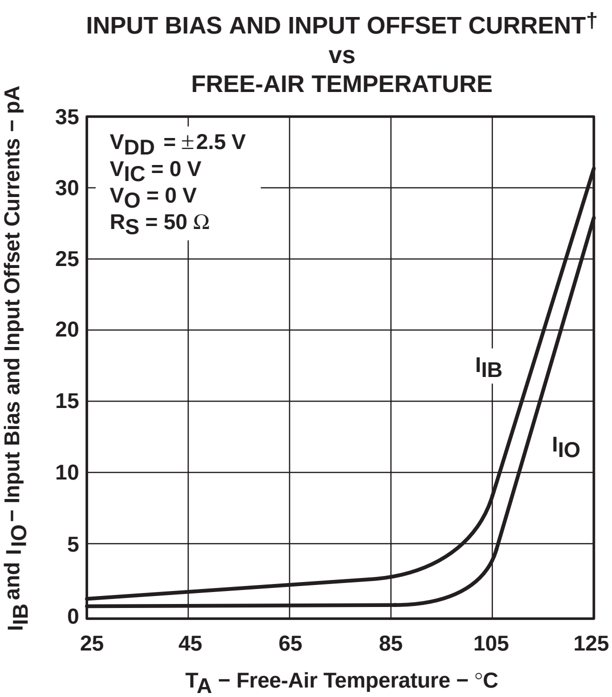


Figure 11

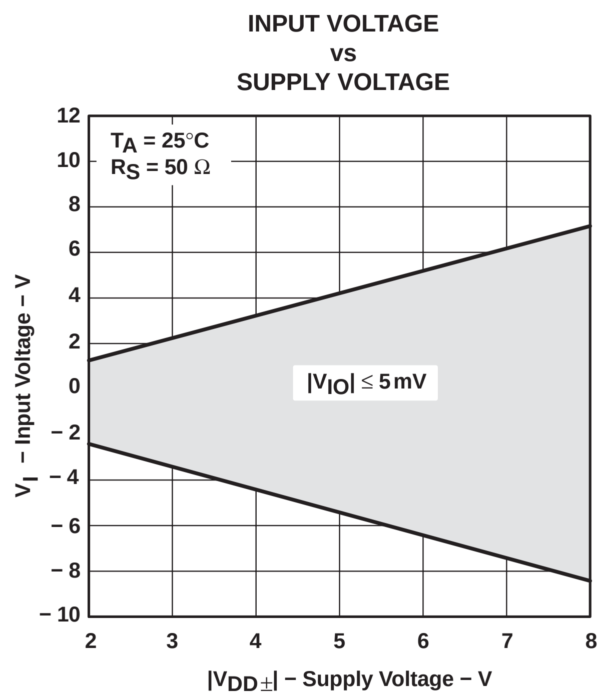


Figure 12

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

TYPICAL CHARACTERISTICS

INPUT VOLTAGE† vs FREE-AIR TEMPERATURE

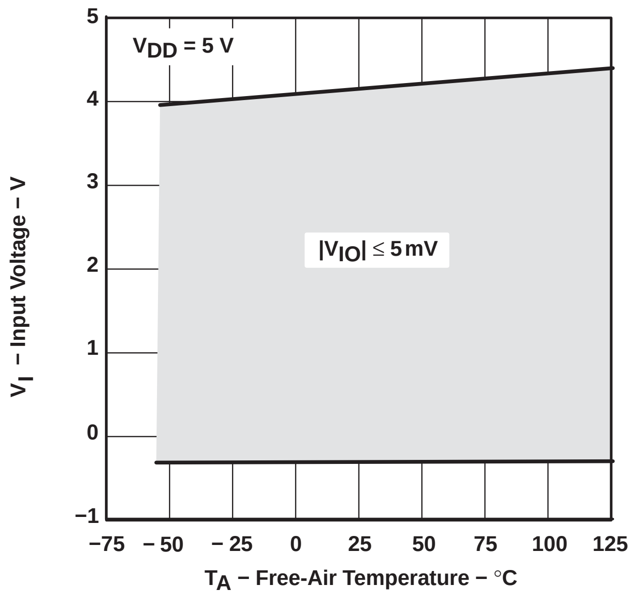


Figure 13

HIGH-LEVEL OUTPUT VOLTAGE† vs HIGH-LEVEL OUTPUT CURRENT

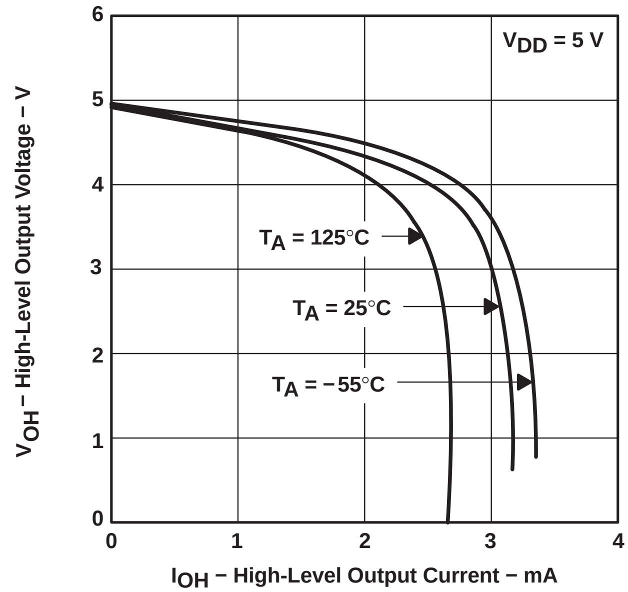


Figure 14

LOW-LEVEL OUTPUT VOLTAGE vs LOW-LEVEL OUTPUT CURRENT

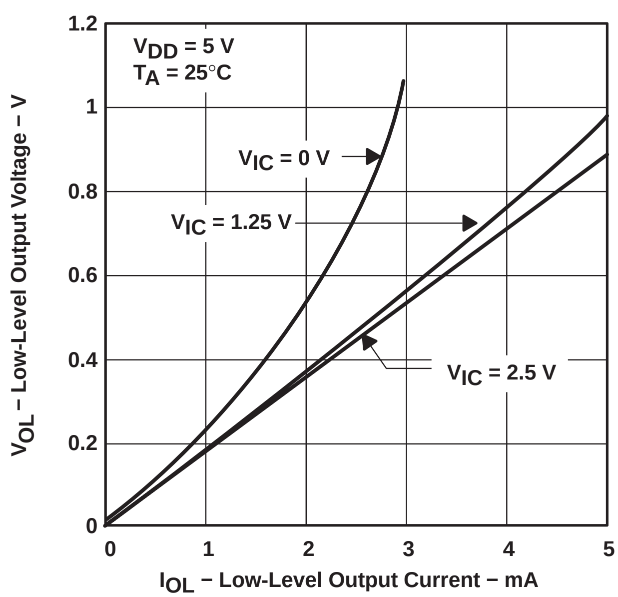


Figure 15

LOW-LEVEL OUTPUT VOLTAGE† vs LOW-LEVEL OUTPUT CURRENT

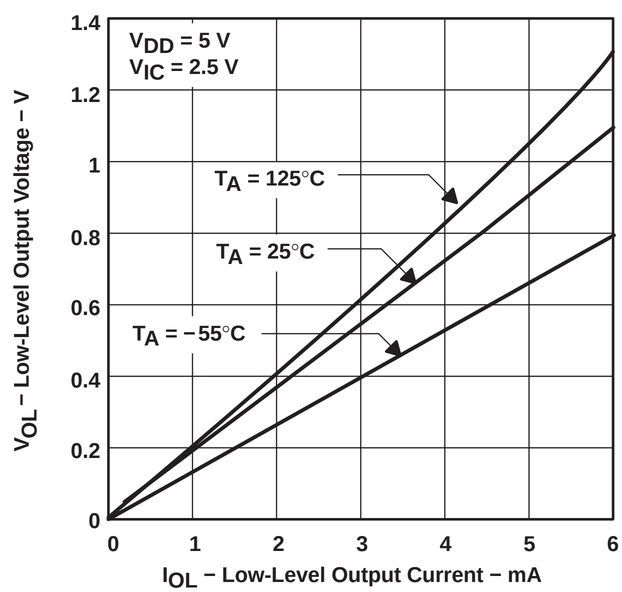


Figure 16

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

TYPICAL CHARACTERISTICS

MAXIMUM POSITIVE PEAK OUTPUT VOLTAGE† vs OUTPUT CURRENT

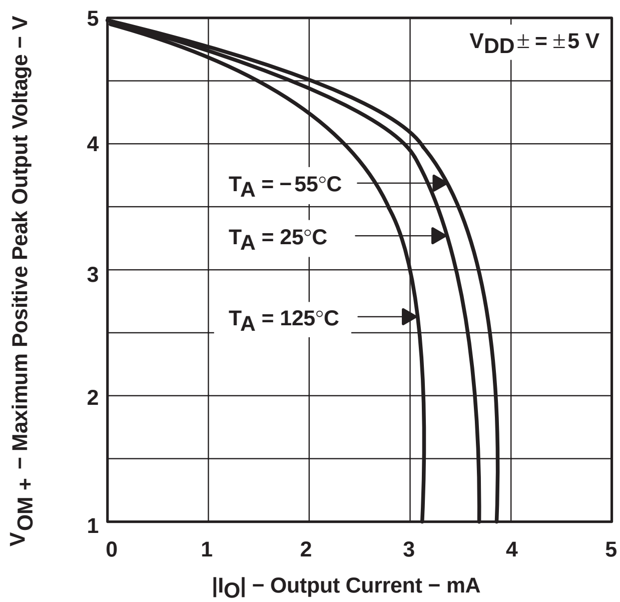


Figure 17

MAXIMUM NEGATIVE PEAK OUTPUT VOLTAGE† vs OUTPUT CURRENT

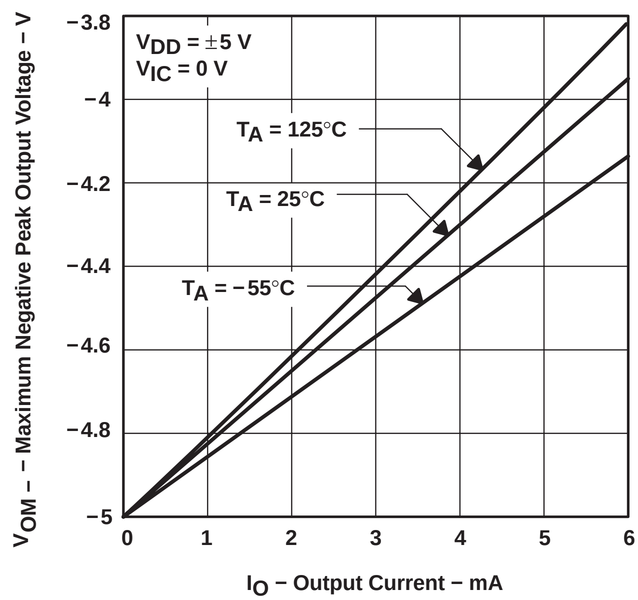


Figure 18

MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE vs FREQUENCY

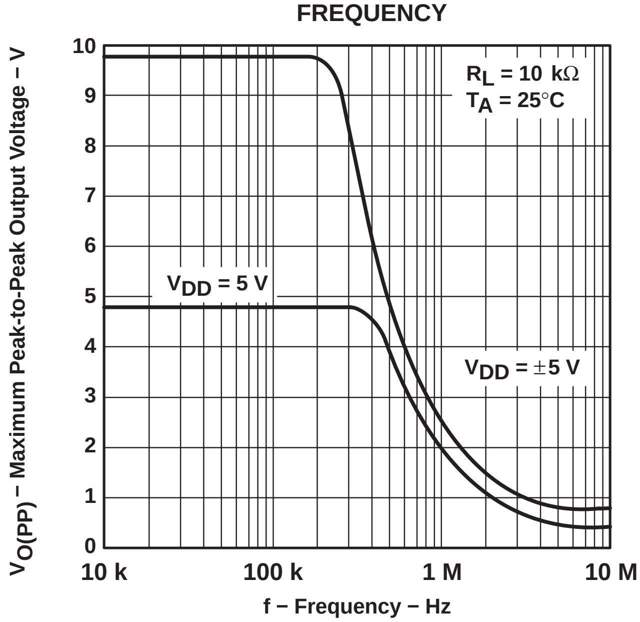


Figure 19

SHORT-CIRCUIT OUTPUT CURRENT vs SUPPLY VOLTAGE

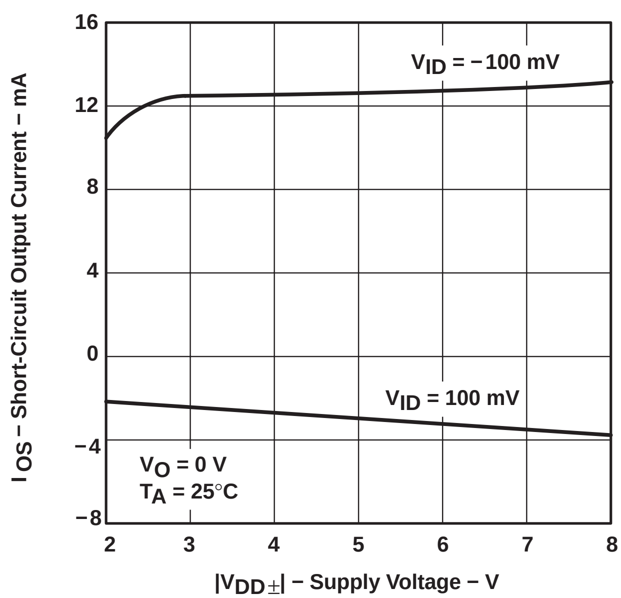


Figure 20

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

TYPICAL CHARACTERISTICS

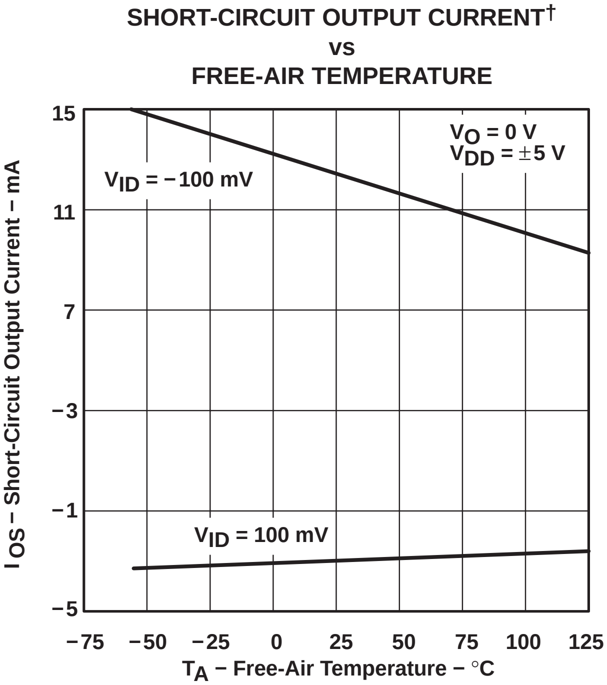


Figure 21

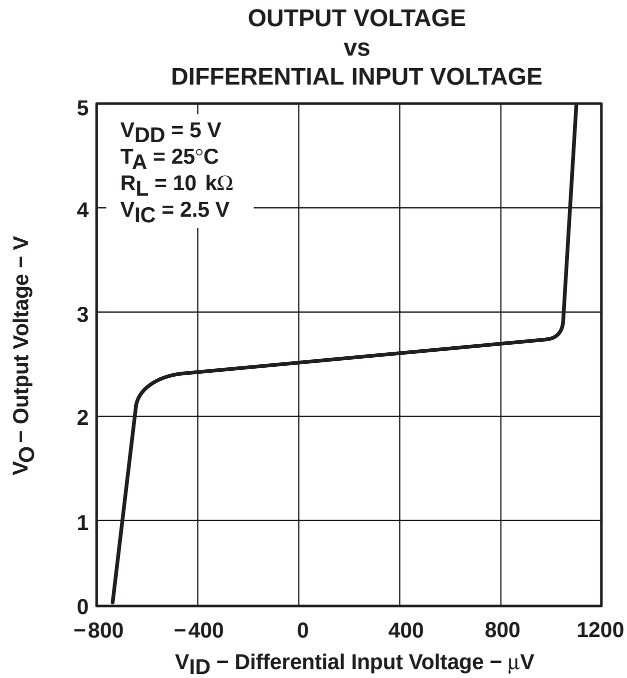


Figure 22

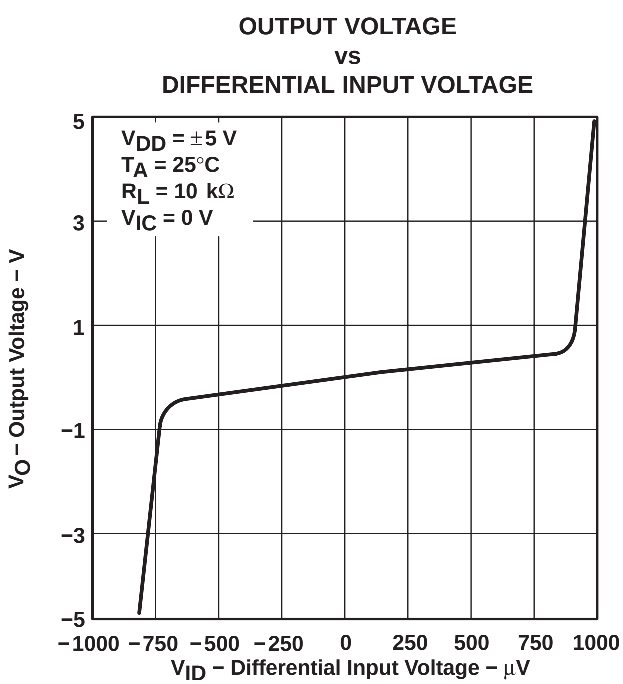


Figure 23

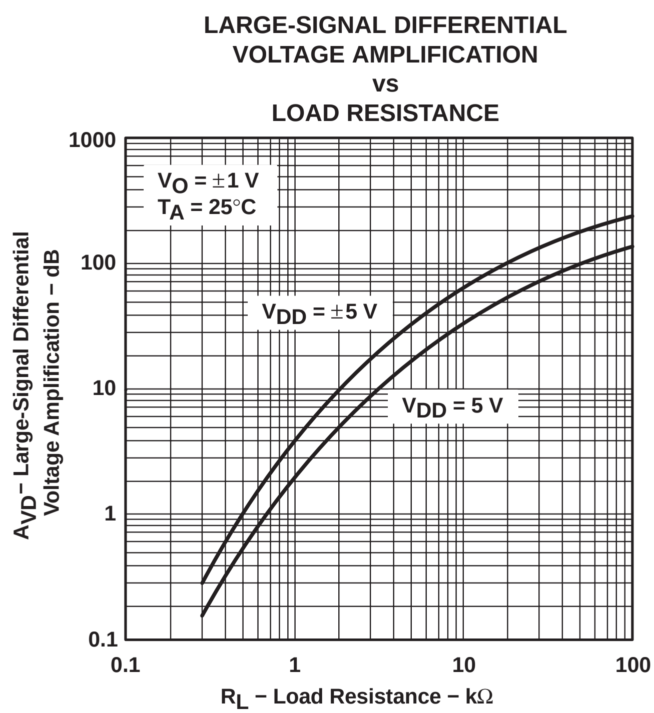


Figure 24

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

TYPICAL CHARACTERISTICS

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE MARGIN vs FREQUENCY

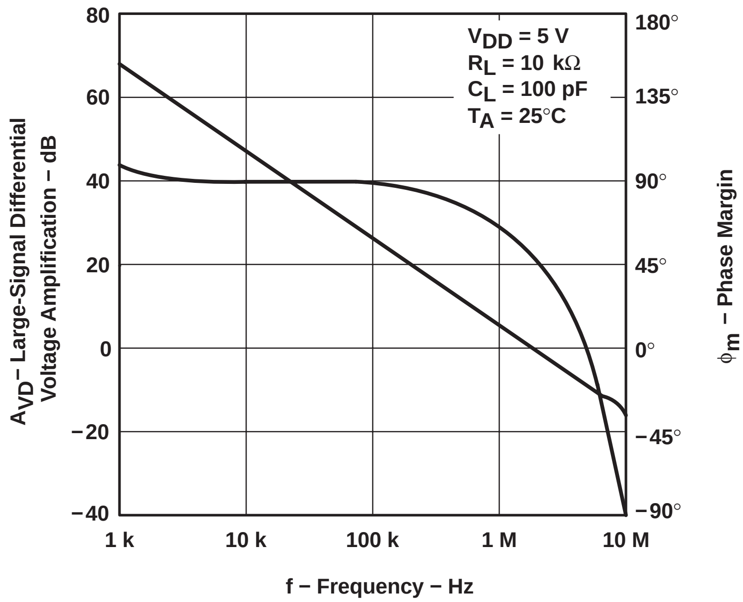


Figure 25

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE MARGIN vs FREQUENCY

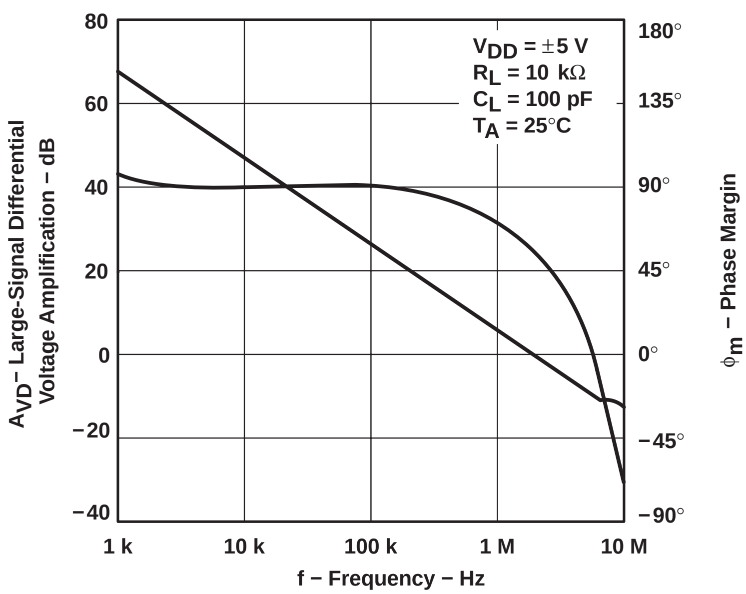


Figure 26

TYPICAL CHARACTERISTICS

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION† vs FREE-AIR TEMPERATURE

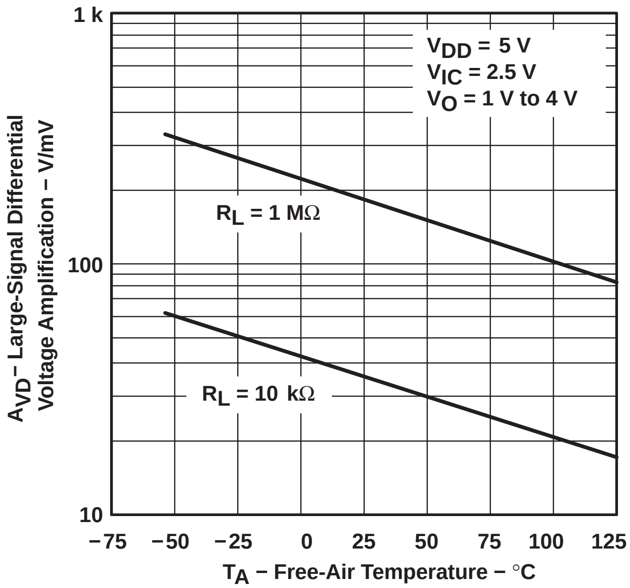


Figure 27

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION† vs FREE-AIR TEMPERATURE

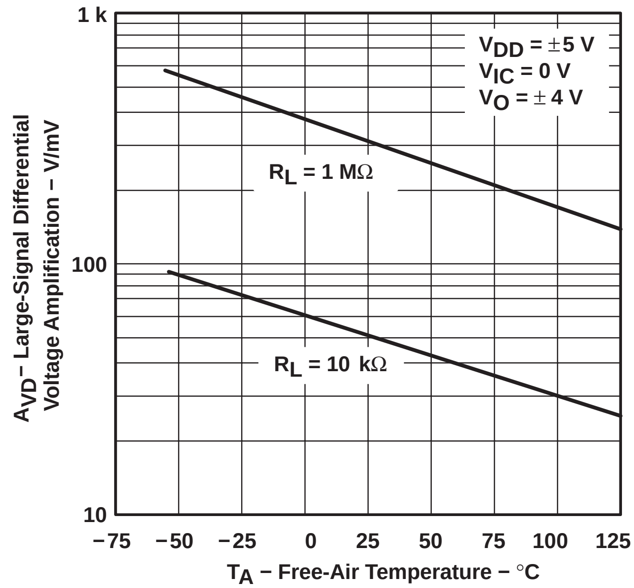


Figure 28

OUTPUT IMPEDANCE vs FREQUENCY

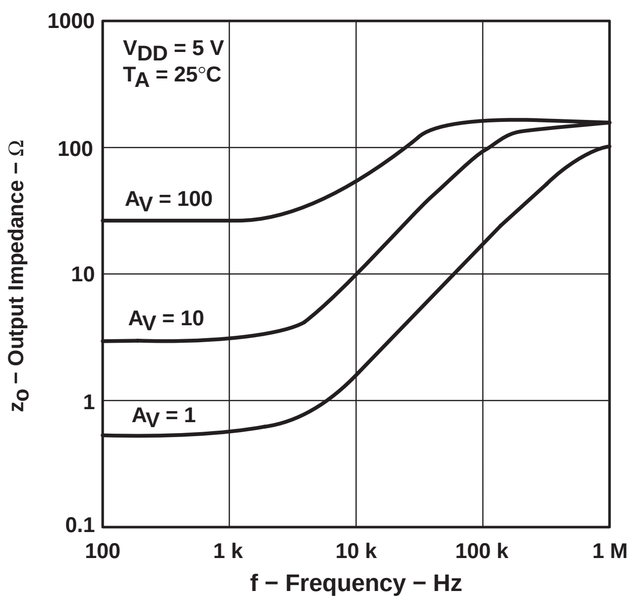


Figure 29

OUTPUT IMPEDANCE vs FREQUENCY

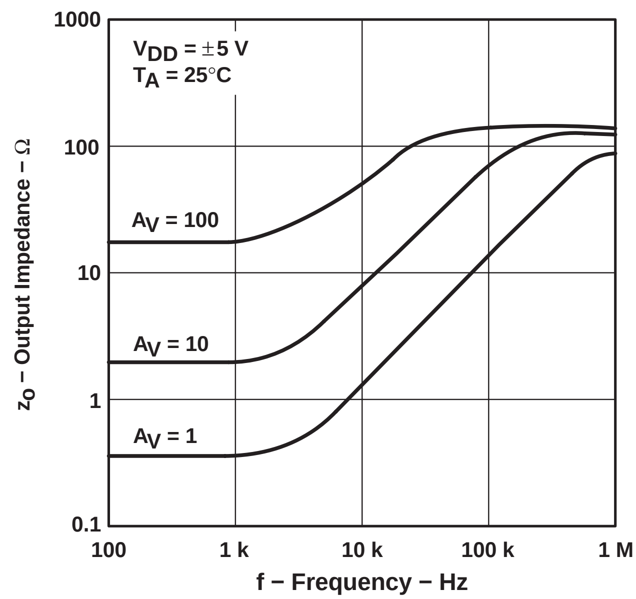


Figure 30

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

TYPICAL CHARACTERISTICS

COMMON-MODE REJECTION RATIO vs FREQUENCY

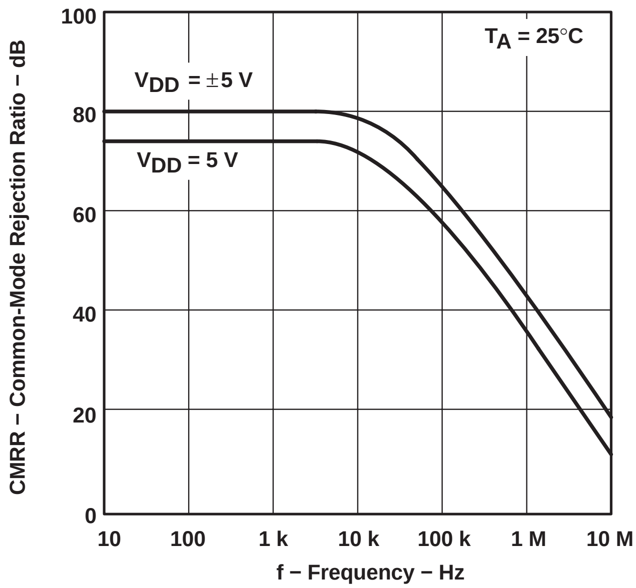


Figure 31

COMMON-MODE REJECTION RATIO vs FREE-AIR TEMPERATURE

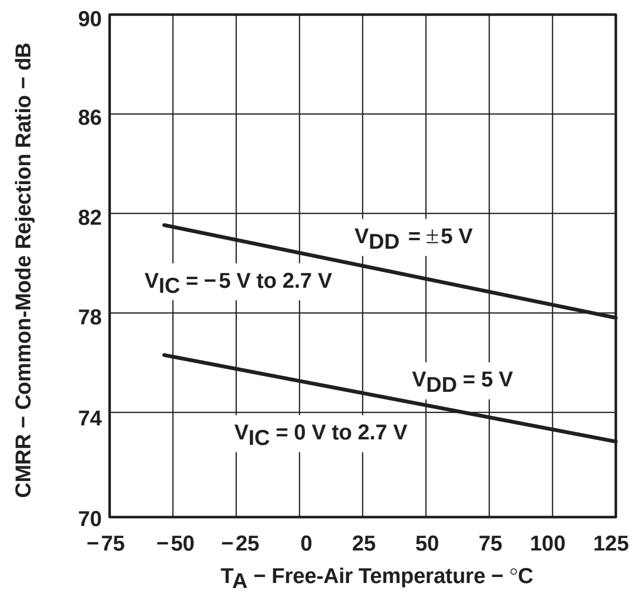


Figure 32

SUPPLY-VOLTAGE REJECTION RATIO vs FREQUENCY

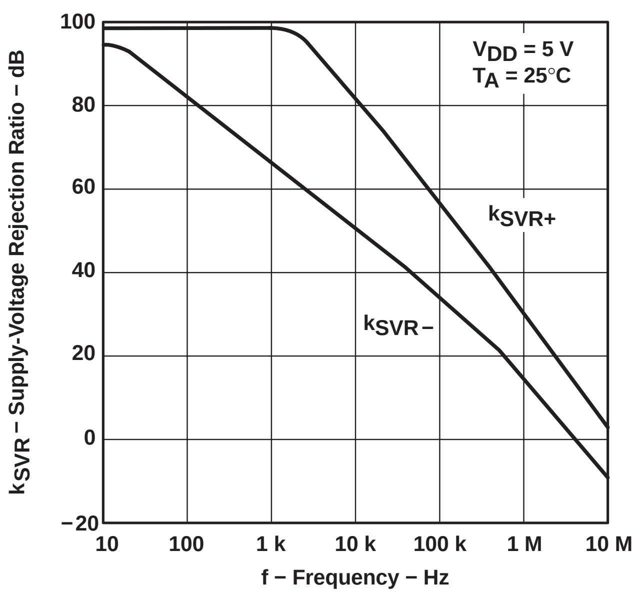


Figure 33

SUPPLY-VOLTAGE REJECTION RATIO vs FREQUENCY

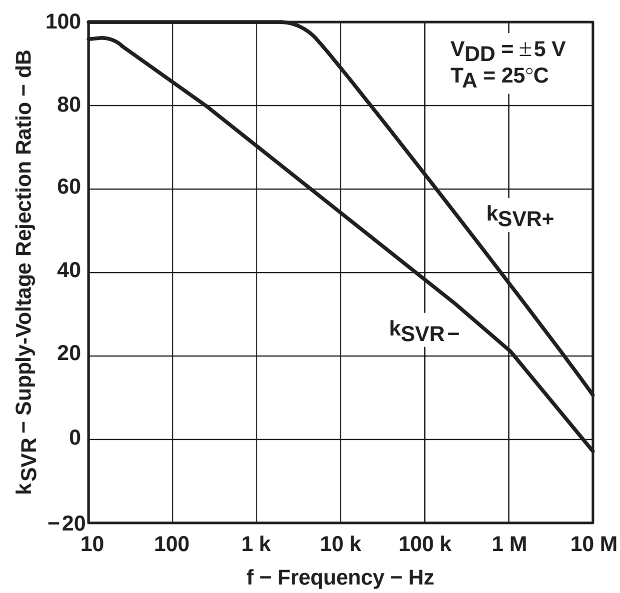


Figure 34

TYPICAL CHARACTERISTICS

SUPPLY VOLTAGE REJECTION RATIO†
vs
FREE-AIR TEMPERATURE

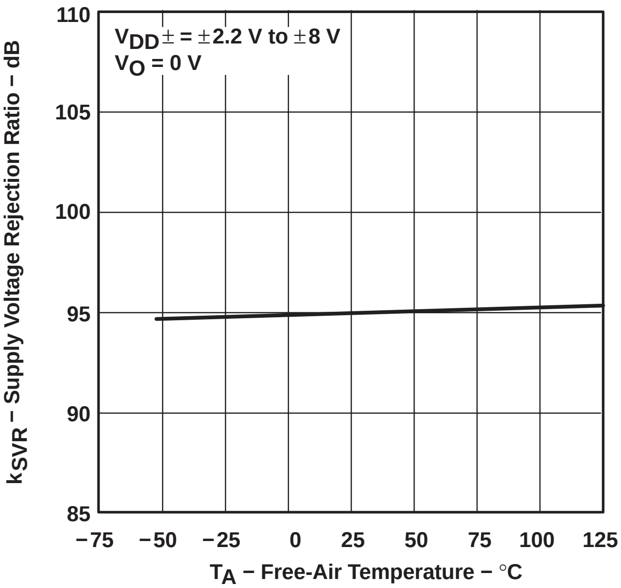


Figure 35

TLC2272
SUPPLY CURRENT†
vs
SUPPLY VOLTAGE

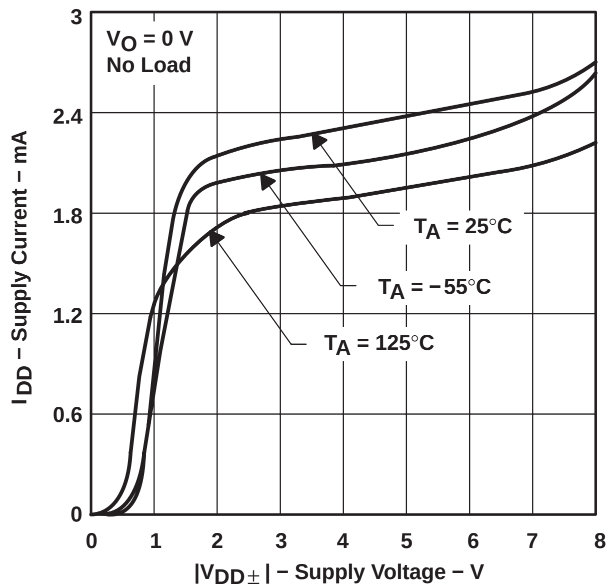


Figure 36

TLC2274
SUPPLY CURRENT†
vs
SUPPLY VOLTAGE

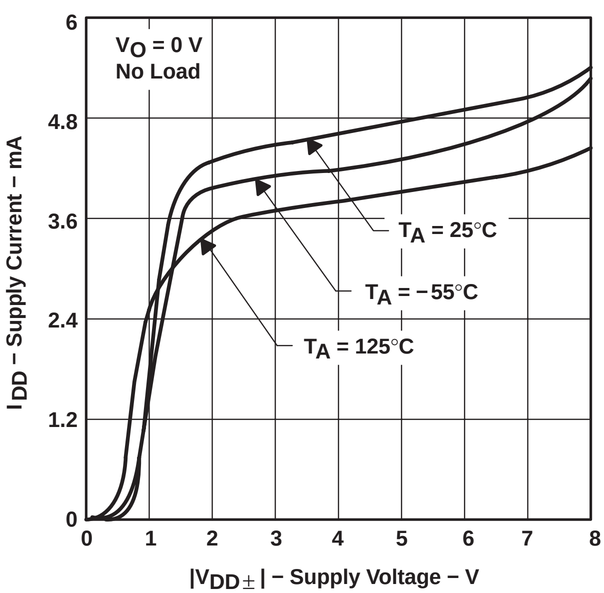


Figure 37

TLC2272
SUPPLY CURRENT†
vs
FREE-AIR TEMPERATURE

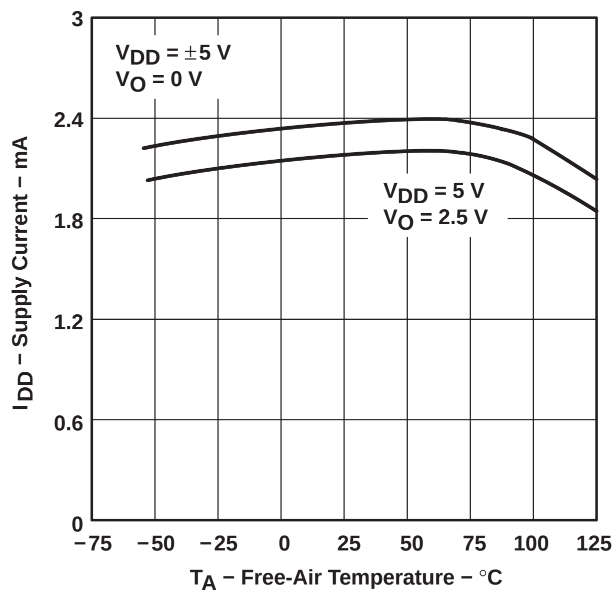


Figure 38

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

TYPICAL CHARACTERISTICS

**TLC2274
SUPPLY CURRENT†
vs
FREE-AIR TEMPERATURE**

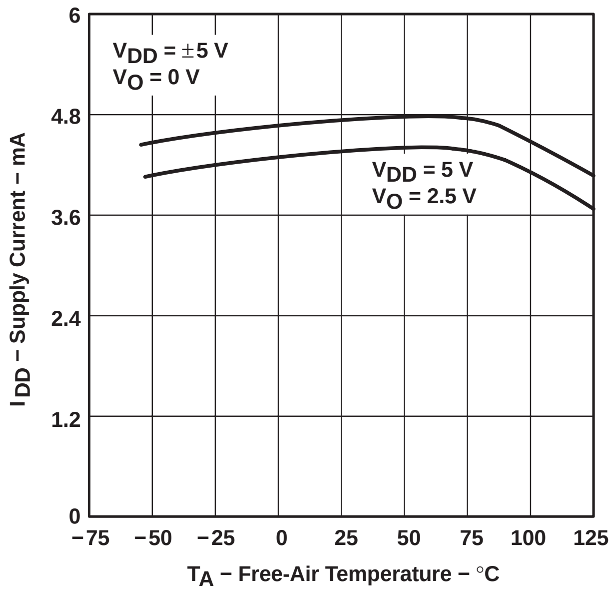


Figure 39

**SLEW RATE
vs
LOAD CAPACITANCE**

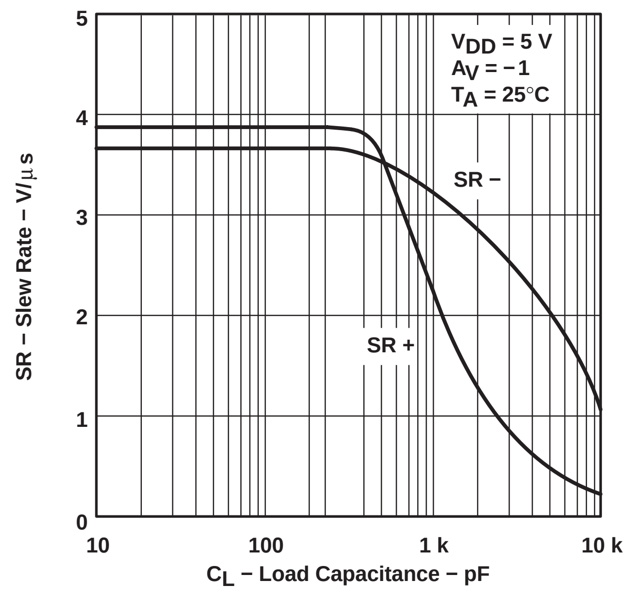


Figure 40

**SLEW RATE†
vs
FREE-AIR TEMPERATURE**

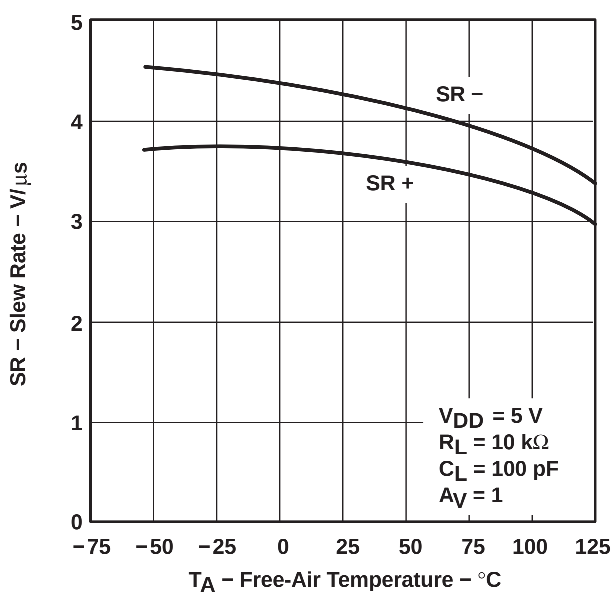


Figure 41

INVERTING LARGE-SIGNAL PULSE RESPONSE

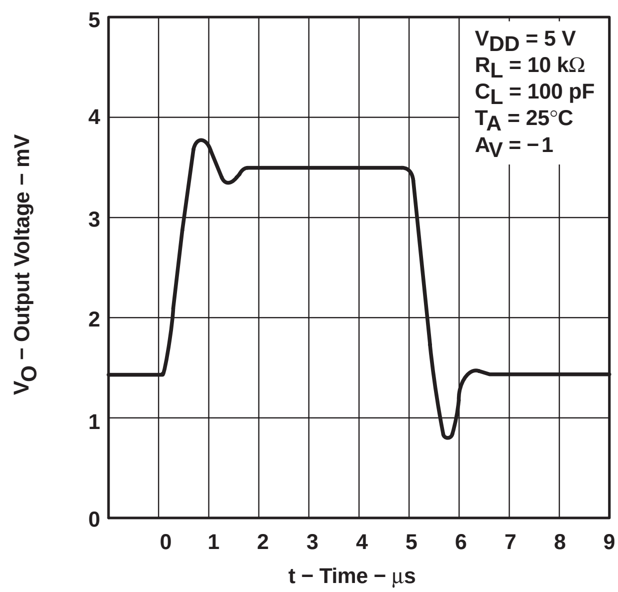


Figure 42

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

TYPICAL CHARACTERISTICS

INVERTING LARGE-SIGNAL PULSE RESPONSE

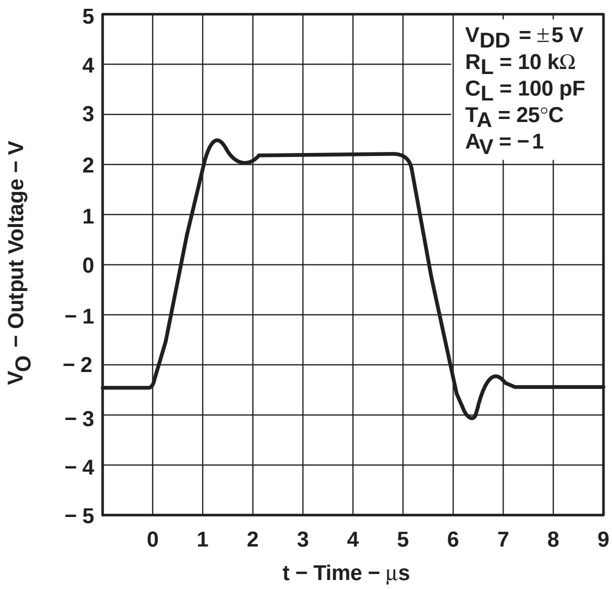


Figure 43

VOLTAGE-FOLLOWER LARGE-SIGNAL PULSE RESPONSE

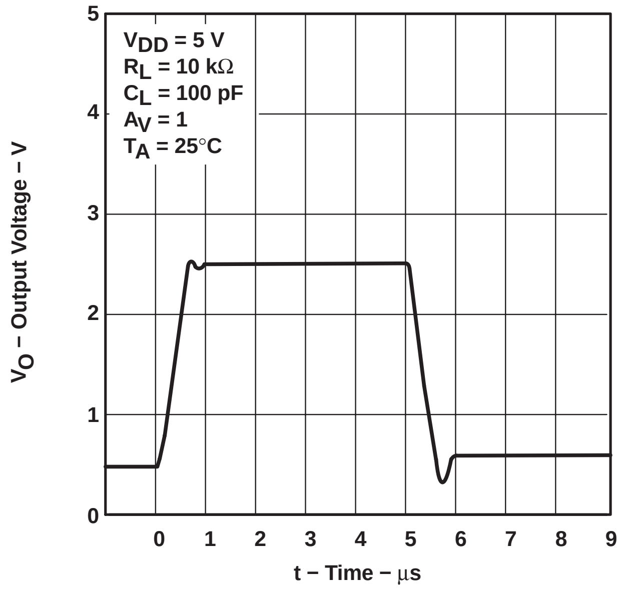


Figure 44

VOLTAGE-FOLLOWER LARGE-SIGNAL PULSE RESPONSE

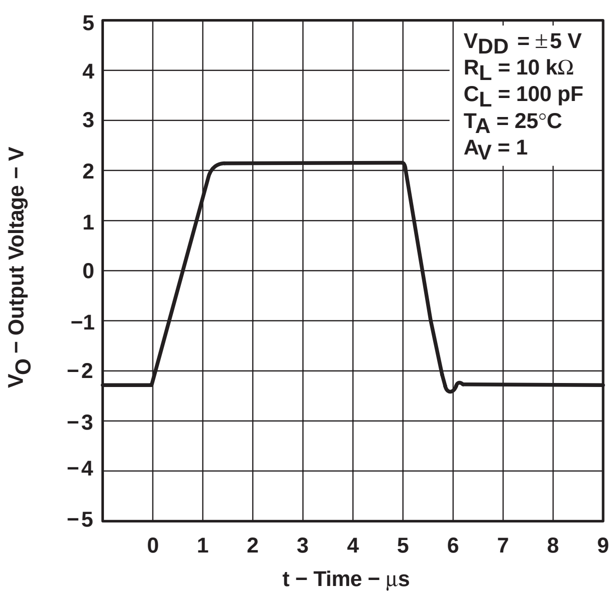


Figure 45

INVERTING SMALL-SIGNAL PULSE RESPONSE

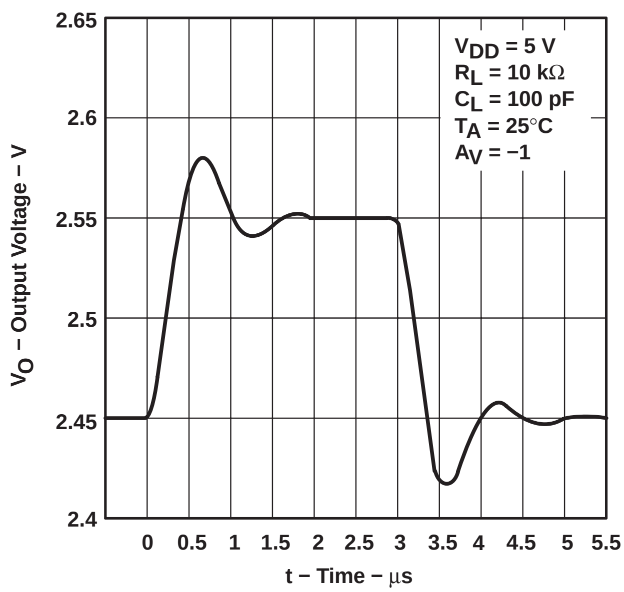


Figure 46

TYPICAL CHARACTERISTICS

INVERTING SMALL-SIGNAL PULSE RESPONSE

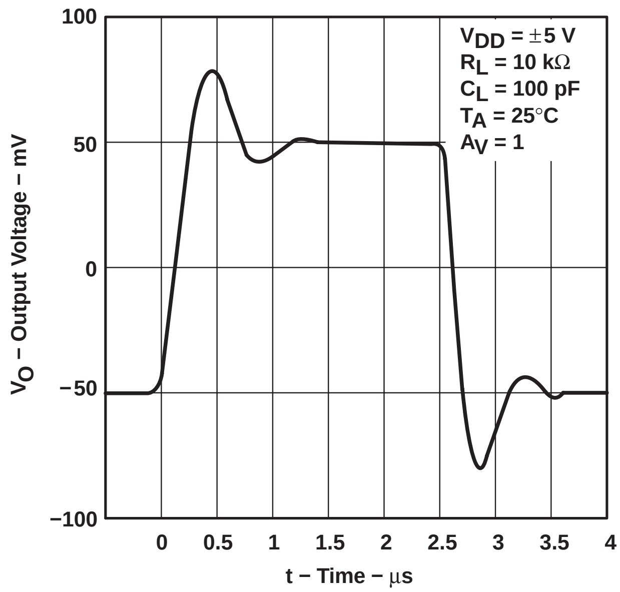


Figure 47

VOLTAGE-FOLLOWER SMALL-SIGNAL PULSE RESPONSE

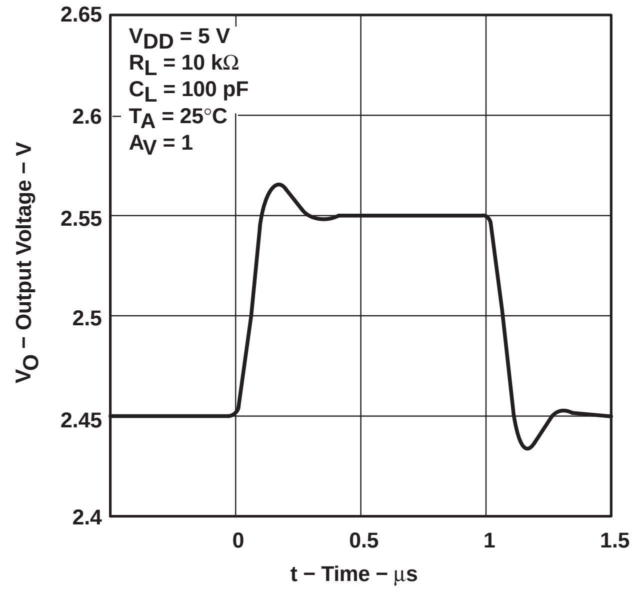


Figure 48

VOLTAGE-FOLLOWER SMALL-SIGNAL PULSE RESPONSE

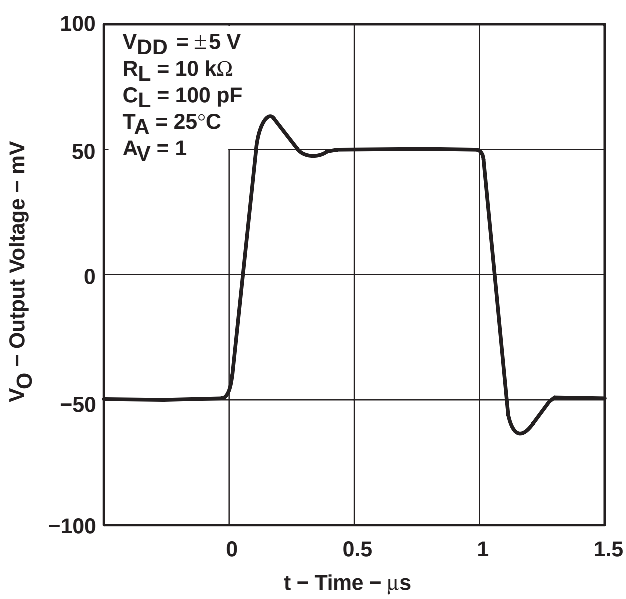


Figure 49

EQUIVALENT INPUT NOISE VOLTAGE vs FREQUENCY

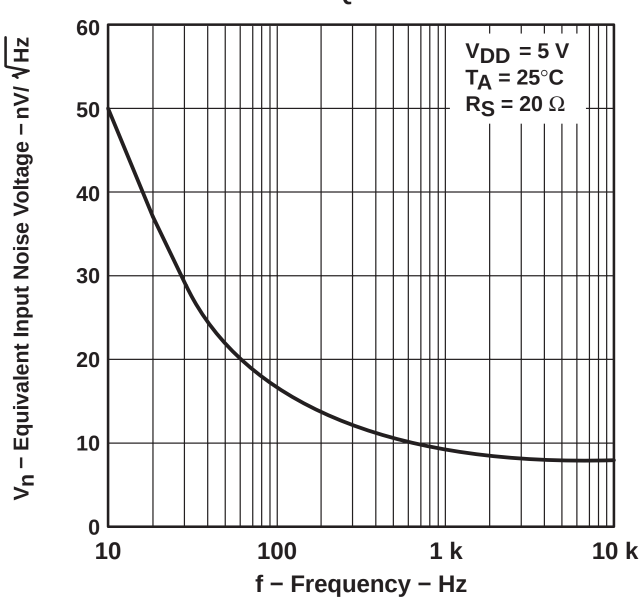


Figure 50

TYPICAL CHARACTERISTICS

EQUIVALENT INPUT NOISE VOLTAGE
vs
FREQUENCY

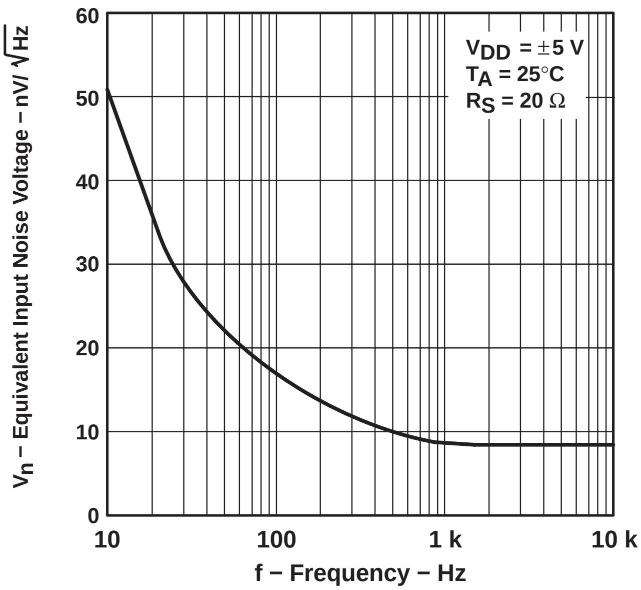


Figure 51

NOISE VOLTAGE
OVER A 10 SECOND PERIOD

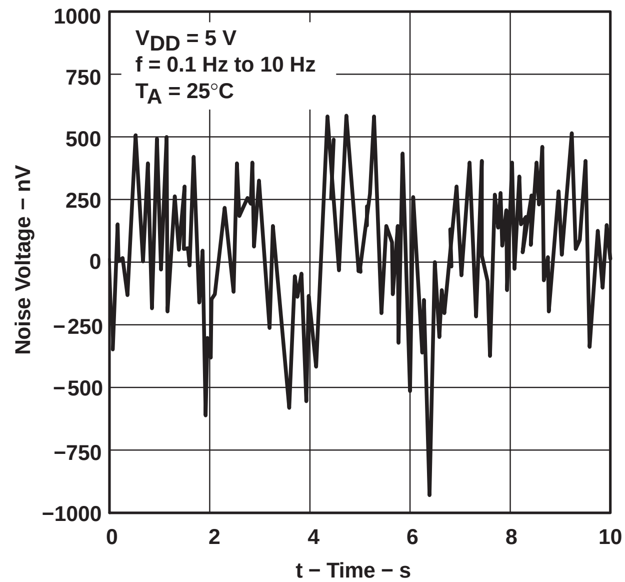


Figure 52

INTEGRATED NOISE VOLTAGE
vs
FREQUENCY

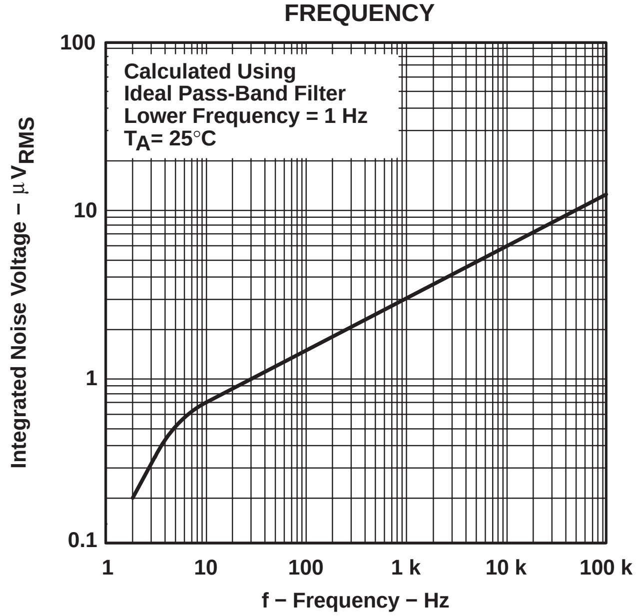


Figure 53

TOTAL HARMONIC DISTORTION PLUS NOISE
vs
FREQUENCY

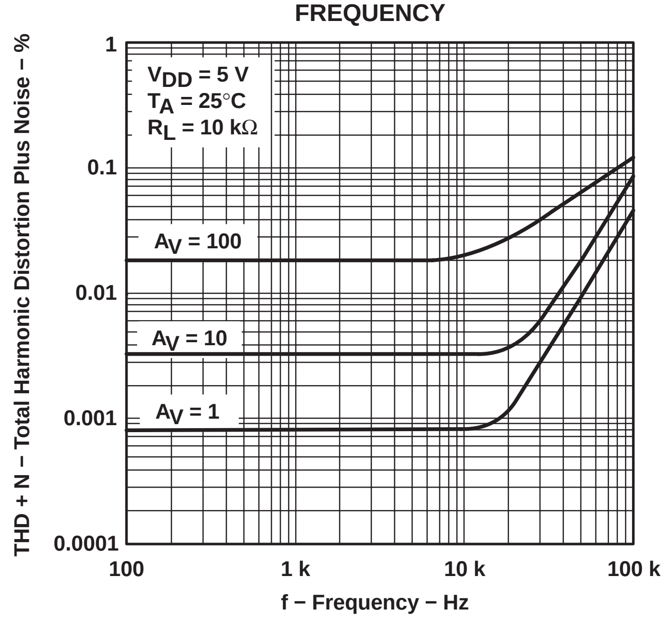


Figure 54

TYPICAL CHARACTERISTICS

GAIN-BANDWIDTH PRODUCT vs SUPPLY VOLTAGE

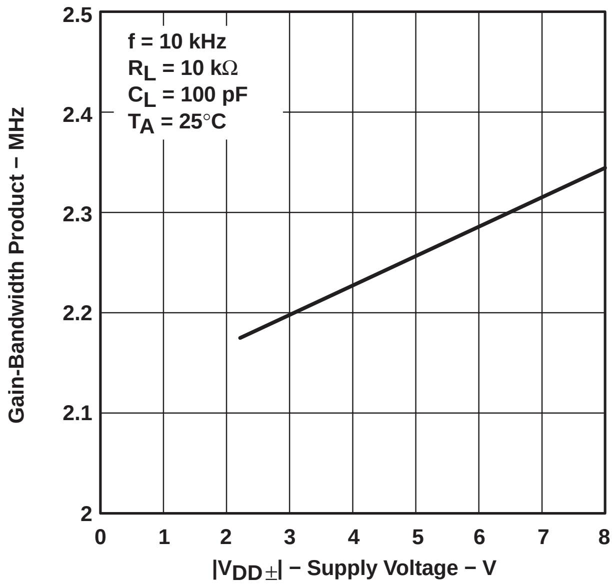


Figure 55

GAIN-BANDWIDTH PRODUCT† vs FREE-AIR TEMPERATURE

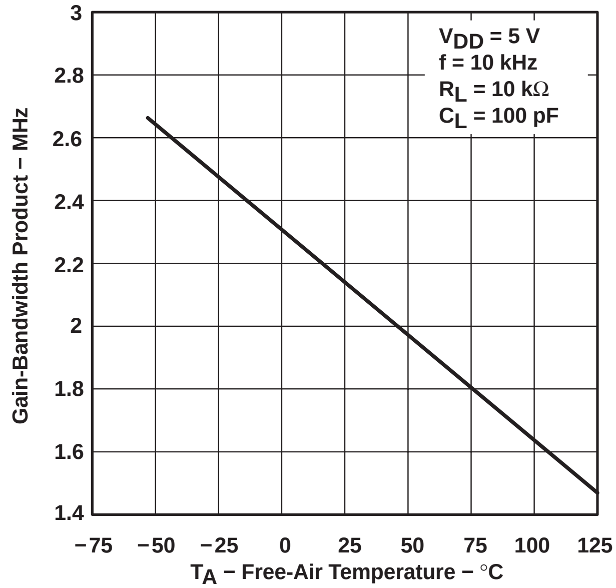


Figure 56

PHASE MARGIN vs LOAD CAPACITANCE

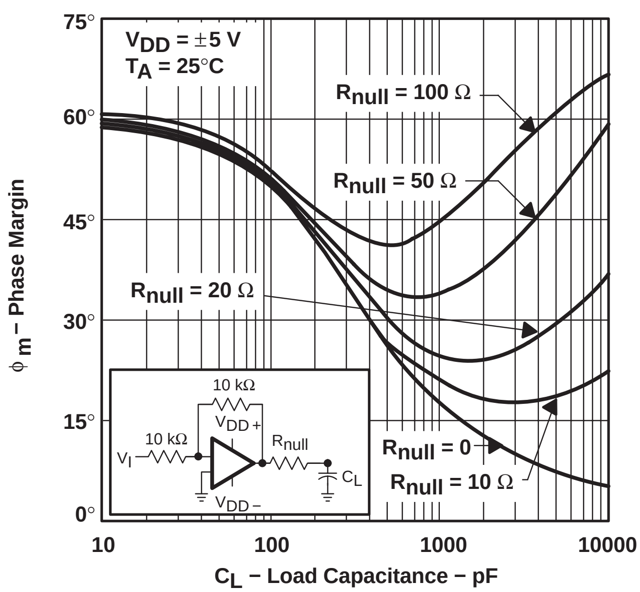


Figure 57

GAIN MARGIN vs LOAD CAPACITANCE

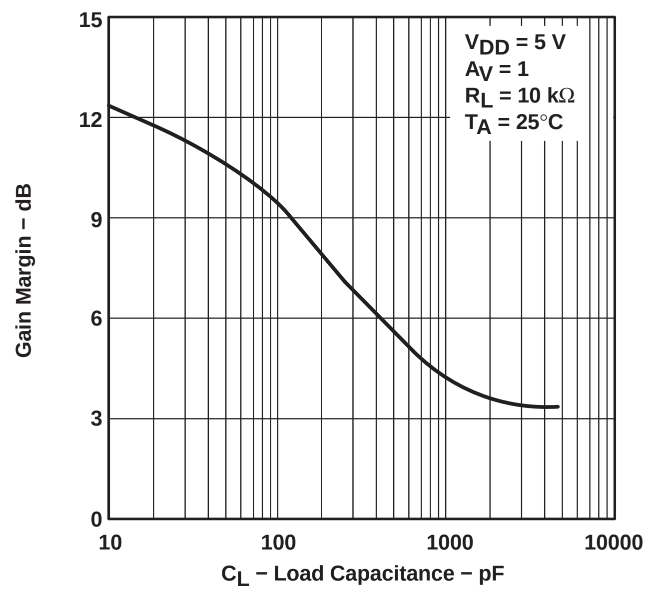


Figure 58

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

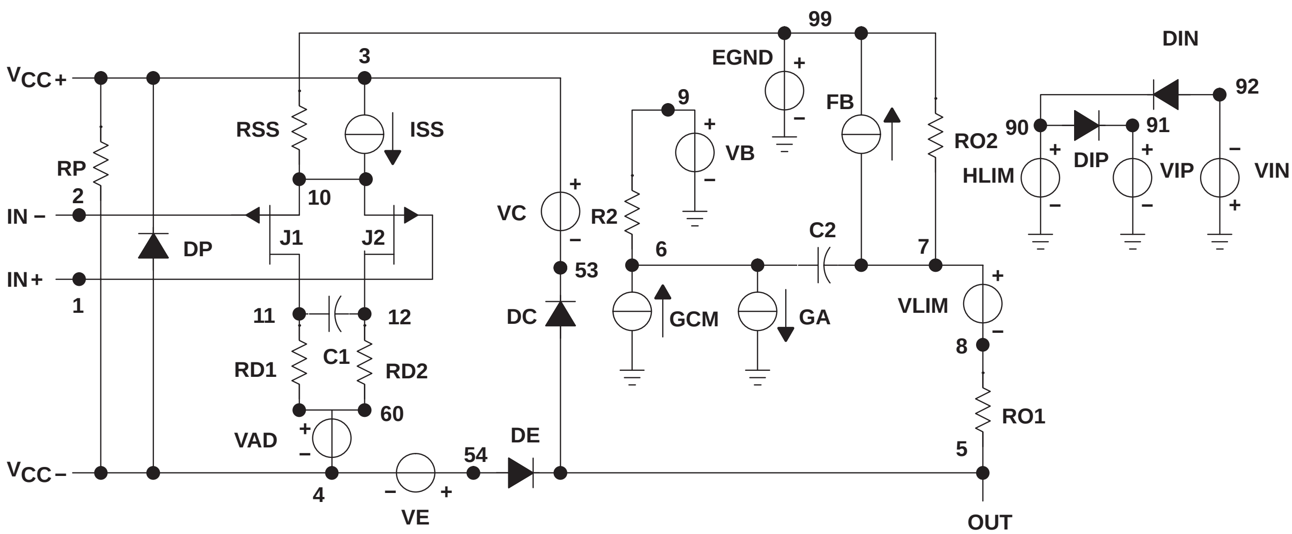
APPLICATION INFORMATION

macromodel information

Macromodel information provided was derived using Microsim *Parts*™, the model generation software used with Microsim *PSpice*™. The Boyle macromodel (see Note 5) and subcircuit in Figure 59 were generated using the TLC227x typical electrical and operating characteristics at T_A = 25°C. Using this information, output simulations of the following key parameters can be generated to a tolerance of 20% (in most cases):

- Maximum positive output voltage swing
- Maximum negative output voltage swing
- Slew rate
- Quiescent power dissipation
- Input bias current
- Open-loop voltage amplification
- Unity gain frequency
- Common-mode rejection ratio
- Phase margin
- DC output resistance
- AC output resistance
- Short-circuit output current limit

NOTE 5: G. R. Boyle, B. M. Cohn, D. O. Pederson, and J. E. Solomon, “Macromodeling of Integrated Circuit Operational Amplifiers”, *IEEE Journal of Solid-State Circuits,* SC-9, 353 (1974).




```
.SUBCKT TLC227x 1 2 3 4 5
        C1      11      1214E−12
        C2      6       760.00E−12
        DC      5       53DX
        DE      54      5DX
        DLP     90      91DX
        DLN     92      90DX
        DP      4       3DX
        EGND    99      0POLY (2) (3,0) (4,) 0 .5 .5
        FB      99      0POLY (5) VB VC VE VLP VLN 0
        + 984.9E3 −1E6 1E6 1E6 −1E6
        GA      6       011 12 377.0E−6
        GCM 0 6 10 99 134E−9
        ISS     3       10DC 216.OE−6
        HLIM    90      0VLIM 1K
        J1      11      210 JX
        J2      12      110 JX
        R2      6       9100.OE3

RD1     60      112.653E3
RD2     60      122.653E3
R01     8       550
R02     7       9950
RP      3       44.310E3
RSS     10      99925.9E3
VAD     60      4−.5
VB      9       0DC 0
VC 3 53 DC .78
VE      54      4DC .78
VLIM    7       8DC 0
VLP     91      0DC 1.9
VLN     0       92DC 9.4
.MODEL DX D (IS=800.0E−18)
.MODEL JX PJF (IS=1.500E−12BETA=1.316E-3
+ VTO=−.270)
.ENDS
```

Figure 59. Boyle Macromodel and Subcircuit

PSpice and *Parts* are trademarks of MicroSim Corporation.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
5962-9318201M2A	ACTIVE	LCCC	FK	20	1	None	POST-PLATE	Level-NC-NC-NC
5962-9318201MCA	ACTIVE	CDIP	J	14	1	None	A42 SNPB	Level-NC-NC-NC
5962-9318201QDA	ACTIVE	CFP	W	14	1	None	A42 SNPB	Level-NC-NC-NC
5962-9318202Q2A	ACTIVE	LCCC	FK	20	1	None	POST-PLATE	Level-NC-NC-NC
5962-9318202QCA	ACTIVE	CDIP	J	14	1	None	A42 SNPB	Level-NC-NC-NC
5962-9318202QDA	ACTIVE	CFP	W	14	1	None	A42 SNPB	Level-NC-NC-NC
5962-9555201NXDR	ACTIVE	SOIC	D	8	2500	None	CU NIPDAU	Level-1-220C-UNLIM
5962-9555201Q2A	ACTIVE	LCCC	FK	20	1	None	POST-PLATE	Level-NC-NC-NC
5962-9555201QHA	ACTIVE	CFP	U	10	1	None	A42 SNPB	Level-NC-NC-NC
5962-9555201QPA	ACTIVE	CDIP	JG	8	1	None	A42 SNPB	Level-NC-NC-NC
5962-9555202Q2A	ACTIVE	LCCC	FK	20	1	None	POST-PLATE	Level-NC-NC-NC
5962-9555202QHA	ACTIVE	CFP	U	10	1	None	A42 SNPB	Level-NC-NC-NC
5962-9555202QPA	ACTIVE	CDIP	JG	8	1	None	A42 SNPB	Level-NC-NC-NC
TLC2272ACD	ACTIVE	SOIC	D	8	75	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2272ACDR	ACTIVE	SOIC	D	8	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2272ACP	ACTIVE	PDIP	P	8	50	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
TLC2272ACPW	ACTIVE	TSSOP	PW	8	150	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2272ACPWLE	OBSOLETE	TSSOP	PW	8		None	Call TI	Call TI
TLC2272ACPWR	ACTIVE	TSSOP	PW	8	2000	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2272AID	ACTIVE	SOIC	D	8	75	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2272AIDR	ACTIVE	SOIC	D	8	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2272AIP	ACTIVE	PDIP	P	8	50	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
TLC2272AMD	ACTIVE	SOIC	D	8	75	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2272AMDR	ACTIVE	SOIC	D	8	2500	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2272AMFKB	ACTIVE	LCCC	FK	20	1	None	POST-PLATE	Level-NC-NC-NC
TLC2272AMJGB	ACTIVE	CDIP	JG	8	1	None	A42 SNPB	Level-NC-NC-NC
TLC2272AMP	OBSOLETE	PDIP	P	8		None	Call TI	Call TI
TLC2272AMUB	ACTIVE	CFP	U	10	1	None	A42 SNPB	Level-NC-NC-NC
TLC2272AQD	ACTIVE	SOIC	D	8	75	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2272AQDR	ACTIVE	SOIC	D	8	2500	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2272CD	ACTIVE	SOIC	D	8	75	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2272CDR	ACTIVE	SOIC	D	8	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2272CP	ACTIVE	PDIP	P	8	50	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
TLC2272CPSR	ACTIVE	SO	PS	8	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2272CPW	ACTIVE	TSSOP	PW	8	150	None	CU NIPDAU	Level-1-220C-UNLIM

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
TLC2272CPWLE	OBSOLETE	TSSOP	PW	8		None	Call TI	Call TI
TLC2272CPWR	ACTIVE	TSSOP	PW	8	2000	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2272ID	ACTIVE	SOIC	D	8	75	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2272IDR	ACTIVE	SOIC	D	8	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2272IP	ACTIVE	PDIP	P	8	50	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
TLC2272IPW	ACTIVE	TSSOP	PW	8	150	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2272IPWLE	OBSOLETE	TSSOP	PW	8		None	Call TI	Call TI
TLC2272IPWR	ACTIVE	TSSOP	PW	8	2000	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2272MD	ACTIVE	SOIC	D	8	75	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2272MDR	ACTIVE	SOIC	D	8	2500	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2272MFKB	ACTIVE	LCCC	FK	20	1	None	POST-PLATE	Level-NC-NC-NC
TLC2272MJG	ACTIVE	CDIP	JG	8	1	None	A42 SNPB	Level-NC-NC-NC
TLC2272MJGB	ACTIVE	CDIP	JG	8	1	None	A42 SNPB	Level-NC-NC-NC
TLC2272MP	OBSOLETE	PDIP	P	8		None	Call TI	Call TI
TLC2272MUB	ACTIVE	CFP	U	10	1	None	A42 SNPB	Level-NC-NC-NC
TLC2272QD	ACTIVE	SOIC	D	8	75	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2272QDR	ACTIVE	SOIC	D	8	2500	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2272QPWR	ACTIVE	TSSOP	PW	8	2000	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274ACD	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2274ACDR	ACTIVE	SOIC	D	14	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2274ACN	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPD	Level-NC-NC-NC
TLC2274ACPW	ACTIVE	TSSOP	PW	14	90	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274ACPWR	ACTIVE	TSSOP	PW	14	2000	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274AID	ACTIVE	SOIC	D	14	50	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274AIDR	ACTIVE	SOIC	D	14	2500	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274AIN	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPD	Level-NC-NC-NC
TLC2274AIPW	ACTIVE	TSSOP	PW	14	90	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274AIPWLE	OBSOLETE	TSSOP	PW	14		None	Call TI	Call TI
TLC2274AIPWR	ACTIVE	TSSOP	PW	14	2000	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274AIPWRG4	PREVIEW	TSSOP	PW	14	2000	None	Call TI	Call TI
TLC2274AMD	ACTIVE	SOIC	D	14	50	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274AMDR	ACTIVE	SOIC	D	14	2500	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274AMFKB	ACTIVE	LCCC	FK	20	1	None	POST-PLATE	Level-NC-NC-NC
TLC2274AMJB	ACTIVE	CDIP	J	14	1	None	A42 SNPB	Level-NC-NC-NC
TLC2274AMWB	ACTIVE	CFP	W	14	1	None	A42 SNPB	Level-NC-NC-NC
TLC2274AQD	ACTIVE	SOIC	D	14	50	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274AQDR	ACTIVE	SOIC	D	14	2500	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274CD	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
TLC2274CDB	ACTIVE	SSOP	DB	14	80	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2274CDR	ACTIVE	SOIC	D	14	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2274CN	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPD	Level-NC-NC-NC
TLC2274CNS-A	ACTIVE	SO	NS	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2274CNSR	ACTIVE	SO	NS	14	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2274CNSR-A	ACTIVE	SO	NS	14	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2274CPW	ACTIVE	TSSOP	PW	14	90	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274CPWLE	OBSOLETE	TSSOP	PW	14		None	Call TI	Call TI
TLC2274CPWR	ACTIVE	TSSOP	PW	14	2000	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274CPWRG4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TLC2274ID	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2274IDR	ACTIVE	SOIC	D	14	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1YEAR/ Level-1-220C-UNLIM
TLC2274IN	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPD	Level-NC-NC-NC
TLC2274IPW	ACTIVE	TSSOP	PW	14	90	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274IPWLE	OBSOLETE	TSSOP	PW	14		None	Call TI	Call TI
TLC2274IPWR	ACTIVE	TSSOP	PW	14	2000	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274MD	ACTIVE	SOIC	D	14	50	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274MDR	ACTIVE	SOIC	D	14	2500	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274MFKB	ACTIVE	LCCC	FK	20	1	None	POST-PLATE	Level-NC-NC-NC
TLC2274MJ	ACTIVE	CDIP	J	14	1	None	A42 SNPB	Level-NC-NC-NC
TLC2274MJB	ACTIVE	CDIP	J	14	1	None	A42 SNPB	Level-NC-NC-NC
TLC2274MN	ACTIVE	PDIP	N	14	25	None	Call TI	Level-NC-NC-NC
TLC2274MWB	ACTIVE	CFP	W	14	1	None	A42 SNPB	Level-NC-NC-NC
TLC2274QD	ACTIVE	SOIC	D	14	50	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274QDR	ACTIVE	SOIC	D	14	2500	None	CU NIPDAU	Level-1-220C-UNLIM
TLC2274Y	PREVIEW	XCEPT	Y	0		None	Call TI	Call TI

[1] The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

[2] Eco Plan - May not be currently available - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
None: Not yet available Lead (Pb-Free).
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Green (RoHS & no Sb/Br): TI defines "Green" to mean "Pb-Free" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDECindustry standard classifications, and peak solder temperature.

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