1.Description

The TLC2272 and TLC2274 are dual and quadruple operational amplifiers . Both devices exhibit rail-to-rail output performance for increased dynamic range in single- or split-supply applications. The TLC2272 and TLC2274 family offers 2 MHz of bandwidth and 3V/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. TheTLC2272 and TLC2274 has a noise voltage of 9nV/√Hz, two times lower than competitive solutions.

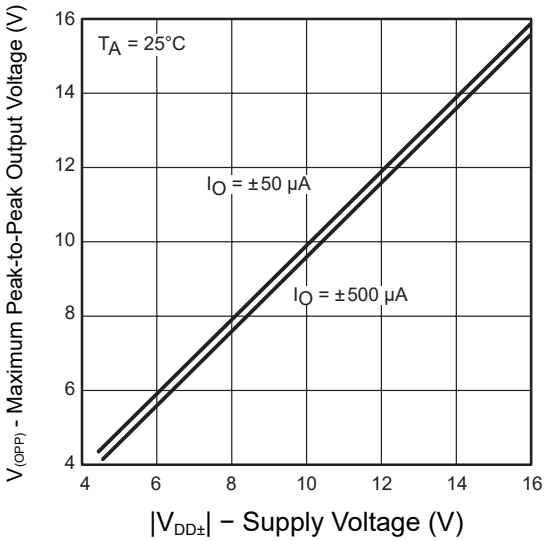
2.Features

- Output Swing Includes Both Supply Rails
- Low Noise: 9 nV/√Hz Typical at f=1kHz
- Low-Input Bias Current: 1-pA Typical
- Fully-Specified for Both Single-Supply and Split-Supply Operation
- Common-Mode Input Voltage Range Includes Negative Rail
- High-Gain Bandwidth: 2.2-MHz Typical
- High Slew Rate: 3.6-V/μs Typical
- Low Input Offset Voltage: 950 μV Maximum at T_A=25°C

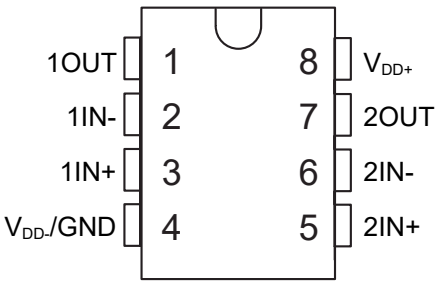
3.Applications

- White Goods (Refrigerators, Washing Machines)
- Hand-held Monitoring Systems
- Configuration Control and Print Support
- Transducer Interfaces
- Battery-Powered Applications

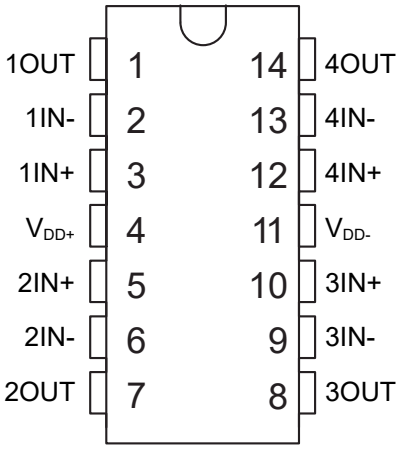
Maximum Peak-to-Peak Output Voltage vs Supply Voltage



4.Pinning information



TLC2272
SOP-8



TLC2274
SOP-14

Pin Functions

Pin		Name	I/O	Description
TLC2272 (SOP8)	TLC2274 (SOP14)			
3	3	1IN+	I	Non-inverting input, Channel 1
2	2	1IN-	I	Inverting input, Channel 1
1	1	1OUT	O	Output, Channel 1
5	5	2IN+	I	Non-inverting input, Channel 2
6	6	2IN-	I	Inverting input, Channel 2
7	7	2OUT	O	Output, Channel 2
-	10	3IN+	I	Non-inverting input, Channel 3
-	9	3IN-	I	Inverting input, Channel 3
-	8	3OUT	O	Output, Channel 3
-	12	4IN+	I	Non-inverting input, Channel 4
-	13	4IN-	I	Inverting input, Channel 4
-	14	4OUT	O	Output, Channel 4
-	4	V_{DD+}	-	Positive (highest) supply
8	11	V_{DD-}	-	Negative (lowest) supply
-	-	V_{DD}/GND	-	Negative (lowest) supply
4	-	NC	-	No Connection

5.Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted) (1)

Condition		Min	Max	Unit
Supply voltage, V_{DD+} (2)			8	V
V_{DD-} (2)		-8		V
Differential input voltage, V_{ID} (3)			±16	V
Input voltage, V_I (any input) (2)		V_{DD-} - 0.3	V_{DD+}	mA
Input current, I_I (any input)			±5	mA
Output current, I_O			±50	mA
Total current into V_{OD+}			±50	mA
Total current out of V_{DD-}			±50	mA
Duration of short-circuit current at (or below) 25°C (4)		Continuous		
Operating free-air temperature range, T_A	C level parts	0	70	°C
	I, level parts	-40	125	°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	D Package		260	°C
Storage temperature, T_{STG}		-65	150	°C

Notes:

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) All voltage values, except differential voltages, are with respect to the midpoint between V_{DD+} and V_{DD-}.

(3) Differential voltages are at IN+ with respect to IN–. Excessive current will flow if input is brought below V_{DD-} − 0.3 V.

(4) The output may be shorted to either supply. Temperature or supply voltages must be limited to ensure that the maximum dissipation rating is not exceeded.

6.ESD Ratings

Parameter			Symbol	Value	Units
Electrostatic discharge	Human-body model (HBM) per AEC Q100-002 (1)	Q-grade and M-grade devices in D and PW packages	$V_{(ESD)}$	±2000	V
	Charged-device model (CDM) per AEC Q100-011	Q-grade and M-grade devices in D and PW packages		±1000	V

7.Thermal Information

Parameter	Symbol	TLC2272 D (SOP) 8-PIN	TLC2274 D (SOP) 14-PIN	Units
Junction-to-ambient thermal resistance (2)(3)	$R_{\theta JA}$	115.6	83.8	°C/W
Junction-to-case (top) thermal resistance (2)(3)	$R_{\theta JC(top)}$	61.8	43.2	°C/W
Junction-to-board thermal resistance	$R_{\theta JB}$	55.9	38.4	°C/W
Junction-to-top characterization parameter	Ψ_{JT}	14.3	9.4	°C/W
Junction-to-board characterization parameter	Ψ_{JB}	55.4	38.1	°C/W
Junction-to-case (bottom) thermal resistance	$R_{\theta JC\ (bot)}$	-	-	°C/W

Notes:

(1) 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

8.1 Electrical characteristics (TLC2272, TLC2272A)

at specified free-air temperature, V_{DD}=5V; T_A=25°C, unless otherwise noted.

Parameter	Symbol	Conditions			Min	Typ	Max	Units
Input offset voltage	V_{IO}	V_{IC}=0V, $V_{DD±}$=±2.5V V_O=0V, R_S=50Ω	TLC2272	T_A=25°C		300	2500	μV
			TLC2272A			300	950	μV
			TLC2272	Full Range(1)			3000	μV
			TLC2272A				1500	μV
Temperature coefficient of input offset voltage	α_{VIO}	V_{IC}=0V, $V_{DD±}$=±2.5 V V_O=0V, R_S=50Ω				1		μV/°C
Input offset voltage long-term drift (2)		V_{IC}=0V, $V_{DD±}$=±2.5V V_O=0V, R_S=50Ω				0.002		μV/mo
Input offset current	I_{IO}	V_{IC}=0V, $V_{DD±}$=±2.5V, V_O=0V, R_S=50Ω		T_A=25°C		0.5	60	pA
Input bias current	I_{IB}	V_{IC}=0V, $V_{DD±}$=±2.5V, V_O=0V, R_S=50Ω		T_A=25°C		1	60	pA
Common-mode input voltage	V_{ICR}	R_S=50Ω; $\|V_{IO}\|$ ≤ 5mV		T_A=25°C	-0.3	2.5	4	V
				Full Range(1)	0	2.5	3.5	V
High-level output voltage	V_{OH}	I_{OH}=-20μA				4.99		V
		I_{OH}=-200μA		T_A=25°C	4.85	4.93		V
				Full Range(1)	4.85			V
		I_{OH}=-1mA		T_A=25°C	4.25	4.65		V
				Full Range(1)	4.25			V
Low-level output voltage	V_{OL}	V_{IC}=2.5V	I_{OL}=50μA			0.01		V
			I_{OL}=500μA	T_A=25°C		0.09	0.15	V
				Full Range(1)			0.15	V
			I_{OL}=5mA	T_A=25°C		0.9	1.5	V
				Full Range(1)			1.5	V
Large-signal differential voltage amplification	A_{VD}	V_{IC}=2.5V, V_O=1V to 4V; R_L=10kΩ (3)		T_A=25°C	15	35		V/mV
				T_A=0°C to 80°C	15			V/mV
		V_{IC}=2.5V, V_O=1V to 4V; R_L=1MΩ (3)				175		V/mV

Parameter	Symbol	Conditions		Min	Typ	Max	Units
Differential input resistance	r_{id}				10^{12}		Ω
Common-mode input resistance	r_i				10^{12}		Ω
Common-mode input capacitance	C_i	f=10kHz, P package			8		pF
Closed-loop output impedance	Z_O	f=1MHz, A_V=10			140		Ω
Common-mode rejection ratio	CMRR	V_{IC}=0V to 2.7V,	T_A=25°C	70	75		dB
		V_O=2.5V, R_S=50Ω	Full Range(1)	70			dB
Supply-voltage rejection ratio (ΔV_{DD} / ΔV_{IO})	k_{SVR}	V_{DD}=4.4V to 16V,	T_A=25°C	80	95		dB
		V_{IC}=V_{DD}/2, no load	Full Range(1)	80			dB
Supply currrent	I_{DD}	V_O=2.5V, no load	T_A=25°C		2.2	3	mA
			Full Range(1)			3	mA
Slew rate at unity gain	SR	V_O=0.5V to 2.5V, R_L=10kΩ (3)	T_A=25°C	2.3	3.6		V/μs
		C_L=100pF (3)	Full Range(1)	1.7			V/μs
Equivalent input noise voltage	V_n	f=10Hz			50		nV/√Hz
		f=1kHz			9		nV/√Hz
Peak-to-peak equivalent input noise voltage	V_{NPP}	f=0.1Hz to 1Hz			1		μV
		f=0.1Hz to 10Hz			1.4		μV
Equivalent input noise current	I_n				0.6		fA/√Hz
Total harmonic distortion+ noise	THD+N	V_O=0.5V to 2.5V, f=20kHz, R_L=10kΩ (3)	A_V=1		0.0013		%
			A_V=10		0.004		%
			A_V=100		0.03		%
Gain-bandwidth product		f=10kHz, R_L=10kΩ (3), C_L=100pF (3)			2.18		MHz
Maximum output-swing bandwidth	B_{OM}	$V_{O(PP)}$=2V, A_V=1, R_L=10kΩ (3), C_L=100pF (3)			1		MHz
Settling time	t_s	A_V=-1, R_L=10kΩ (3)	To 0.1%		1.5		μs
		Step=0.5V to 2.5V, C_L=100pF (3)	To 0.01%		2.6		μs
Phase margin at unity gain	φ_m	R_L=10kΩ (3), C_L=100pF (3)			50		°
Gain margin		R_L=10kΩ (3), C_L=100pF (3)			10		dB

9.2 Electrical characteristics (TLC2272, TLC2272A)

at specified free-air temperature, V_{DD}=±5V; T_A=25°C, unless otherwise noted.

Parameter	Symbol	Conditions			Min	Typ	Max	Units
Input offset voltage	V_{IO}	V_{IC}=0V, V_O=0V, R_S=50Ω	TLC2272	T_A=25°C		300	2500	μV
			TLC2272A			300	950	μV
			TLC2272	Full Range(1)			3000	μV
			TLC2272A				1500	μV
Temperature coefficient of input offset voltage	α_{VIO}	V_{IC}=0V, V_O=0V, R_S=50Ω				2		μV/°C
Input offset voltage long-term drift (2)		V_{IC}=0V, V_O=0V, R_S=50Ω				0.002		μV/mo
Input offset current	I_{IO}	V_{IC}=0V, V_O=0V, R_S=50Ω		T_A=25°C		0.5	60	pA
Input bias current	I_{IB}	V_{IC}=0V, V_O=0V, R_S=50Ω		T_A=25°C		1	60	pA
Common-mode input voltage	V_{ICR}	R_S=50Ω; $\|V_{IO}\| \le$ 5mV		T_A=25°C	-5.3	0	4	V
				Full Range(1)	-5	0	3.5	V
Maximum positive peak output voltage	V_{OM+}	I_{OH}=-20μA				4.99		V
		I_{OH}=-200μA		T_A=25°C	4.85	4.93		V
				Full Range(1)	4.85			V
		I_{OH}=-1mA		T_A=25°C	4.25	4.65		V
				Full Range(1)	4.25			V
Maximum negative peak output voltage	V_{OM-}	V_{IC}=0V	I_{OL}=50μA			-4.99		V
			I_{OL}=500μA	T_A=25°C	4.85	-4.91		V
				Full Range(1)	-4.85			V
			I_{OL}=5mA	T_A=25°C	-3.5	-4.1		V
				Full Range(1)	-3.5			V
Large-signal differential voltage amplification	A_{VD}	V_O=±4V, R_L=10kΩ		T_A=25°C	25	50		V/mV
		V_{IC}=±4V, R_L=1MΩ				300		V/mV

Parameter	Symbol	Conditions			Min	Typ	Max	Units
Maximum negative peak output voltage	V_{OM-}	V_{IC}=0V	I_{OL}=50μA			-4.99		V
			I_{OL}=500μA	T_A=25°C	-4.85	-4.91		V
				Full Range(1)	-4.85			V
			I_{OL}=5mA	T_A=25°C	-3.5	-4.1		V
				Full Range(1)	-3.5			V
Large-signal differential voltage amplification	A_{VD}	V_O=±4V, R_L=10kΩ		T_A=25°C	25	50		V/mV
		V_{IC}=±4V, R_L=1MΩ				300		V/mV
Differential input resistance	r_{id}					10^{12}		Ω
Common-mode input resistance	r_i					10^{12}		Ω
Common-mode input capacitance	C_i	f=10kHz, P package				8		pF
Closed-loop output impedance	Z_O	f=1MHz, A_V=10				130		Ω
Common-mode rejection ratio	CMRR	V_{IC}=-5V to 2.7V, V_O=0V, R_S=50Ω		T_A=25°C	75	80		dB
				Full Range(1)	75			dB
Supply-voltage rejection ratio (ΔV_{DD} / ΔV_{IO})	k_{SVR}	V_{DD+}=2.2V to ±8V, V_{IC}=0V, no load		T_A=25°C	80	95		dB
				Full Range(1)	80			dB
Supply currrent	I_{DD}	V_O=0V, no load		T_A=25°C		2.4	3	mA
				Full Range(1)			3	mA
Slew rate at unity gain	SR	V_O=±2.3V, R_L=10kΩ C_L=100pF		T_A=25°C	2.3	3.6		V/μs
				Full Range(1)	1.7			V/μs
Equivalent input noise voltage	V_n	f=10Hz				50		nV/√Hz
		f=1kHz				9		nV/√Hz

Parameter	Symbol	Conditions		Min	Typ	Max	Units
Peak-to-peak equivalent input noise voltage	V_{NPP}	f=0.1Hz to 1Hz			1		μV
		f=0.1Hz to 10Hz			1.4		μV
Equivalent input noise current	I_n				0.6		fA/√Hz
Total harmonic distortion+ noise	THD+N	V_O=±2.3 f=20kHz, R_L=10kΩ	A_V=1		0.0011		%
			A_V=10		0.004		%
			A_V=100		0.03		%
Gain-bandwidth product		f=10kHz, R_L=10kΩ, C_L=100pF			2.25		MHz
Maximum output-swing bandwidth	B_{OM}	$V_{O(PP)}$=4.6V, A_V=1, R_L=10kΩ, C_L=100pF			0.54		MHz
Settling time	t_s	A_V=-1, R_L=10kΩ	To 0.1%		1.5		μs
		Step=-2.3 to 2.3V, C_L=100pF	To 0.01%		3.2		μs
Phase margin at unity gain	φ_m	R_L=10kΩ, C_L=100pF			52		°
Gain margin		R_L=10kΩ, C_L=100pF			10		dB

9.3 Electrical characteristics (TLC2274, TLC2274A)

at specified free-air temperature, V_{DD}=5V; T_A=25°C, unless otherwise noted.

Parameter	Symbol	Conditions			Min	Typ	Max	Units
Input offset voltage	V_{IO}	V_{IC}=0V, $V_{DD±}$=±2.5V V_O=0V, R_S=50Ω	TLC2274	T_A=25°C		300	2500	μV
			TLC2274A			300	950	μV
			TLC2274	Full Range(1)			3000	μV
			TLC2274A				1500	μV
Temperature coefficient of input offset voltage	α_{VIO}	V_{IC}=0V, $V_{DD±}$=±2.5 V V_O=0V, R_S=50Ω				2		μV/°C
Input offset voltage long-term drift (2)		V_{IC}=0V, $V_{DD±}$=±2.5V V_O=0V, R_S=50Ω				0.002		μV/mo
Input offset current	I_{IO}	V_{IC}=0V, $V_{DD±}$=±2.5V V_O=0V, R_S=50Ω	All level parts	T_A=25°C		0.5	60	pA
			C level part	T_A=0°C to 80°C			100	pA
			I level part	T_A=-40°C to 85°C			150	pA
Input bias current	I_{IB}	V_{IC}=0V, $V_{DD±}$=±2.5V V_O=0V, R_S=50Ω	All level parts	T_A=25°C		1	60	pA
			C level part	T_A=0°C to 80°C			100	pA
			I level part	T_A=-40°C to 85°C			150	pA
Common-mode input voltage	V_{ICR}	R_S=50Ω; $\|V_{IO}\|$ ≤ 5mV		T_A=25°C	-0.3	2.5	4	V
				Full Range(1)	0	2.5	3.5	V
High-level output voltage	V_{OH}	I_{OH}=-20μA				4.99		V
		I_{OH}=-200μA		T_A=25°C	4.85	4.93		V
				Full Range(1)	4.85			V
		I_{OH}=-1mA		T_A=25°C	4.25	4.65		V
				Full Range(1)	4.25			V

Parameter	Symbol	Conditions			Min	Typ	Max	Units
Low-level output voltage	V_{OL}	V_{IC}=2.5V	I_{OL}=50μA			0.01		V
			I_{OL}=500μA	T_A=25°C		0.09	0.15	V
				Full Range(1)			0.15	V
			I_{OL}=5mA	T_A=25°C		0.9	1.5	V
				Full Range(1)			1.5	V
Large-signal differential voltage amplification	A_{VD}	V_{IC}=2.5V, V_O=1V to 4V; R_L=10kΩ (3)	C level part	T_A=25°C	15	35		V/mV
				T_A=0°C to 80°C	15			V/mV
			I level part	T_A=25°C	15	35		V/mV
				T_A=-40°C to 85°C	15			V/mV
		V_{IC}=2.5V, V_O=1V to 4V; R_L=1MΩ (3)				175		V/mV
Differential input resistance	r_{id}					10^{12}		Ω
Common-mode input resistance	r_i					10^{12}		Ω
Common-mode input capacitance	C_i	f=10kHz, P package				8		pF
Closed-loop output impedance	Z_O	f=1MHz, A_V=10				140		Ω
Common-mode rejection ratio	CMRR	V_{IC}=0V to 2.7V, V_O=2.5V, R_S=50Ω		T_A=25°C	70	75		dB
				Full Range(1)	70			dB
Supply-voltage rejection ratio (ΔV_{DD} / ΔV_{IO})	k_{SVR}	V_{DD}=4.4V to 16V, V_{IC}=V_{DD}/2, no load		T_A=25°C	80	95		dB
				Full Range(1)	80			dB
Supply currrent	I_{DD}	V_O=2.5V, no load		T_A=25°C		4.4	6	mA
				Full Range(1)			6	mA
Slew rate at unity gain	SR	V_O=0.5V to 2.5V, R_L=10kΩ (3) C_L=100pF (3)		T_A=25°C	2.3	3.6		V/μs
				Full Range(1)	1.7			V/μs
Equivalent input noise voltage	V_n	f=10Hz				50		nV/√Hz
		f=1kHz				9		nV/√Hz

Parameter	Symbol	Conditions		Min	Typ	Max	Units
Peak-to-peak equivalent input noise voltage	V_{NPP}	f=0.1Hz to 1Hz			1		μV
		f=0.1Hz to 10Hz			1.4		μV
Equivalent input noise current	I_n				0.6		fA/√Hz
Total harmonic distortion+ noise	THD+N	V_O=0.5V to 2.5V, f=20kHz, R_L=10kΩ (3)	A_V=1		0.0013		%
			A_V=10		0.004		%
			A_V=100		0.03		%
Gain-bandwidth product		f=10kHz, R_L=10kΩ (3), C_L=100pF (3)			2.18		MHz
Maximum output-swing bandwidth	B_{OM}	$V_{O(PP)}$=2V, A_V=1, R_L=10kΩ (3), C_L=100pF (3)			1		MHz
Settling time	t_s	A_V=-1, R_L=10kΩ (3)	To 0.1%		1.5		μs
		Step=0.5V to 2.5V, C_L=100pF (3)	To 0.01%		2.6		μs
Phase margin at unity gain	φ_m	R_L=10kΩ (3), C_L=100pF (3)			50		°
Gain margin		R_L=10kΩ (3), C_L=100pF (3)			10		dB

9.4 Electrical characteristics (TLC2274, TLC2274A)

at specified free-air temperature, V_{DD}=±5V; T_A=25°C, unless otherwise noted.

Parameter	Symbol	Conditions			Min	Typ	Max	Units
Input offset voltage	V_{IO}	V_{IC}=0V, V_O=0V, R_S=50Ω	TLC2274	T_A=25°C		300	2500	μV
			TLC2274A			300	950	μV
			TLC2242	Full Range(1)			3000	μV
			TLC2274A				1500	μV
Temperature coefficient of input offset voltage	α_{VIO}	V_{IC}=0V, V_O=0V, R_S=50Ω				2		μV/°C
Input offset voltage long-term drift (2)		V_{IC}=0V, V_O=0V, R_S=50Ω				0.002		μV/mo
Input offset current	I_{IO}	V_{IC}=0V, V_O=0V, R_S=50Ω		T_A=25°C		0.5	60	pA
Input bias current	I_{IB}	V_{IC}=0V, V_O=0V, R_S=50Ω		T_A=25°C		1	60	pA
Common-mode input voltage	V_{ICR}	R_S=50Ω; $\|V_{IO}\| \le$ 5mV		T_A=25°C	-5.3	0	4	V
				Full Range(1)	-5	0	3.5	V
Maximum positive peak output voltage	V_{OM+}	I_{OH}=-20μA				4.99		V
		I_{OH}=-200μA		T_A=25°C	4.85	4.93		V
				Full Range(1)	4.85			V
		I_{OH}=-1mA		T_A=25°C	4.25	4.65		V
				Full Range(1)	4.25			V
Maximum negative peak output voltage	V_{OM-}	V_{IC}=0V	I_{OL}=50μA			-4.99		V
			I_{OL}=500μA	T_A=25°C	-4.85	-4.91		V
				Full Range(1)	-4.85			V
			I_{OL}=5mA	T_A=25°C	-3.5	-4.1		V
				Full Range(1)	-3.5			V
Large-signal differential voltage amplification	A_{VD}	V_O=±4V, R_L=10kΩ		T_A=25°C	25	50		V/mV
		V_{IC}=±4V, R_L=1MΩ				300		V/mV

Parameter	Symbol	Conditions			Min	Typ	Max	Units
Maximum negative peak output voltage	V_{OM-}	V_{IC}=0V	I_{OL}=50μA			-4.99		V
			I_{OL}=500μA	T_A=25°C	-4.85	-4.91		V
				Full Range(1)	-4.85			V
			I_{OL}=5mA	T_A=25°C	-3.5	-4.1		V
				Full Range(1)	-3.5			V
Large-signal differential voltage amplification	A_{VD}	V_O=±4V, R_L=10kΩ	C level part	T_A=25°C	25	50		V/mV
				T_A=0°C to 80°C	25			V/mV
			I level part	T_A=25°C	25	50		V/mV
				T_A=-40°C to 85°C	25			V/mV
			Q level part	T_A=25°C	20	50		V/mV
				T_A=-40°C to 125°C	20			V/mV
			M level part	T_A=25°C	20	50		V/mV
				T_A=-55°C to 125°C	20			V/mV
		V_{IC}=±4V, R_L=1MΩ				300		V/mV
Differential input resistance	r_{id}					10^{12}		Ω
Common-mode input resistance	r_i					10^{12}		Ω
Common-mode input capacitance	C_i	f=10kHz, P package				8		pF
Closed-loop output impedance	Z_O	f=1MHz, A_V=10				130		Ω
Common-mode rejection ratio	CMRR	V_{IC}=-5V to 2.7V, V_O=0V, R_S=50Ω		T_A=25°C	75	80		dB
				Full Range(1)	75			dB
Supply-voltage rejection ratio (ΔV_{DD} / ΔV_{IO})	k_{SVR}	V_{DD+}=2.2V to ±8V, V_{IC}=0V, no load		T_A=25°C	80	95		dB
				Full Range(1)	80			dB
Supply currrent	I_{DD}	V_O=0V, no load		T_A=25°C		4.8	6	mA
				Full Range(1)			6	mA
Slew rate at unity gain	SR	V_O=±2.3V, R_L=10kΩ C_L=100pF		T_A=25°C	2.3	3.6		V/μs
				Full Range(1)	1.7			V/μs
Equivalent input noise voltage	V_n	f=10Hz				50		nV/√Hz
		f=1kHz				9		nV/√Hz

Parameter	Symbol	Conditions		Min	Typ	Max	Units
Peak-to-peak equivalent input noise voltage	V_{NPP}	f=0.1Hz to 1Hz			1		μV
		f=0.1Hz to 10Hz			1.4		μV
Equivalent input noise current	I_n				0.6		fA/√Hz
Total harmonic distortion+ noise	THD+N	V_O=±2.3 f=20kHz, R_L=10kΩ	A_V=1		0.0011		%
			A_V=10		0.004		%
			A_V=100		0.03		%
Gain-bandwidth product		f=10kHz, R_L=10kΩ, C_L=100pF			2.25		MHz
Maximum output-swing bandwidth	B_{OM}	$V_{O(PP)}$=4.6V, A_V=1, R_L=10kΩ, C_L=100pF			0.54		MHz
Settling time	t_s	A_V=-1, R_L=10kΩ	To 0.1%		1.5		μs
		Step=-2.3 to 2.3V, C_L=100pF	To 0.01%		3.2		μs
Phase margin at unity gain	φ_m	R_L=10kΩ, C_L=100pF			52		°
Gain margin		R_L=10kΩ, C_L=100pF			10		dB

11.1 Typical Characteristic

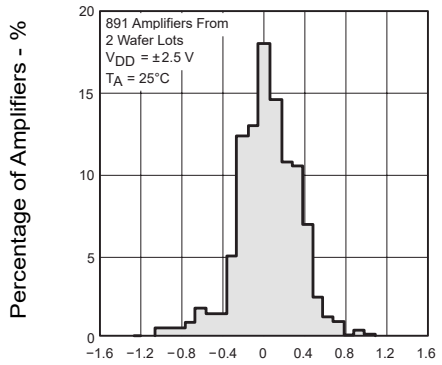


Figure 1: Distribution of TLC2272 Input Offset Voltage

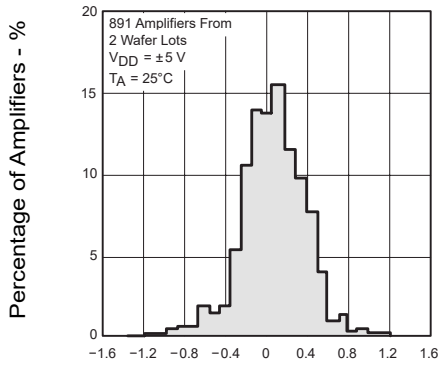


Figure 2: Distribution of TLC2272 Input Offset Voltage

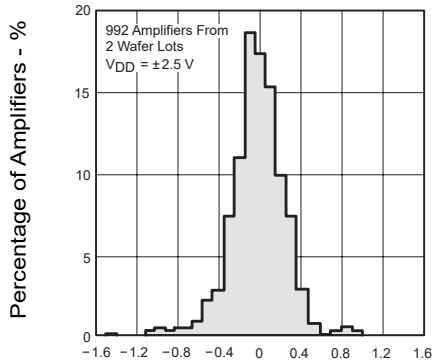


Figure 3: Distribution of TLC2274 Input Offset Voltage

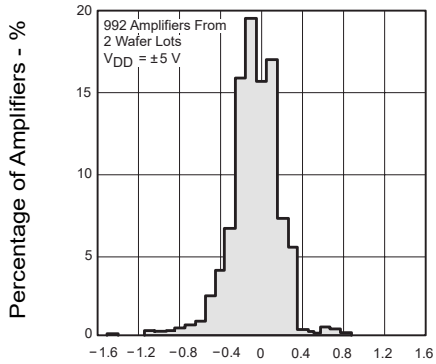


Figure 4: Distribution of TLC2274 Input Offset Voltage

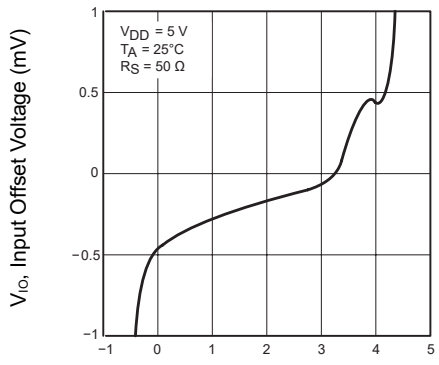


Figure 5: Input Offset Voltage vs Common-Mode Voltage

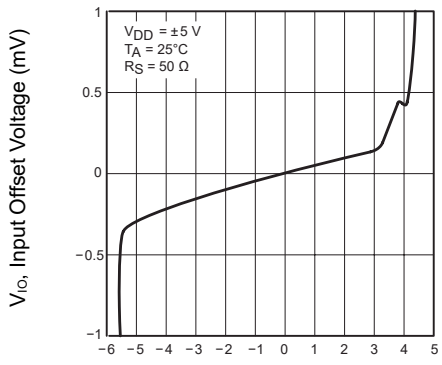


Figure 6: Input Offset Voltage vs Common-Mode Voltage

11.2 Typical Characteristic

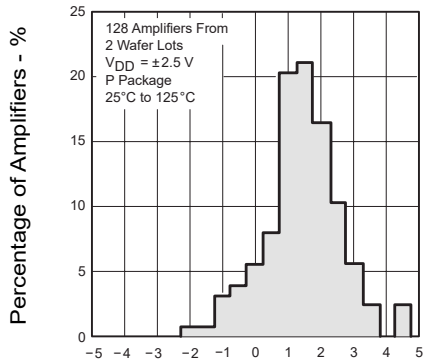


Figure 7: Distribution of TLC2272 vs Input Offset Voltage Temperature Coefficient

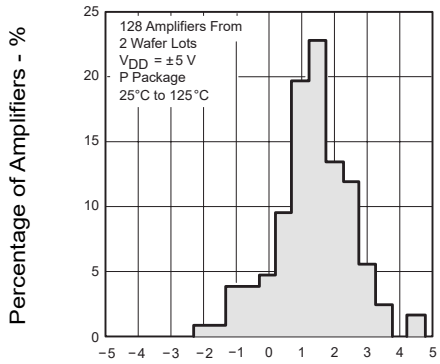


Figure 8: Distribution of TLC2272 vs Input Offset Voltage Temperature Coefficient

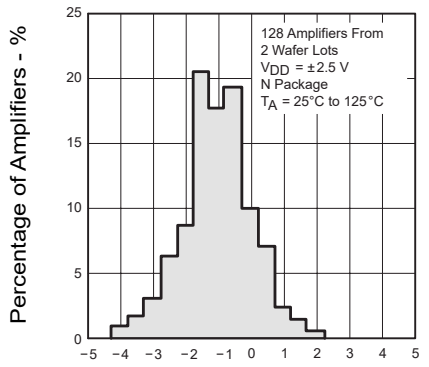


Figure 9: Distribution of TLC2274 vs Input Offset Voltage Temperature Coefficient

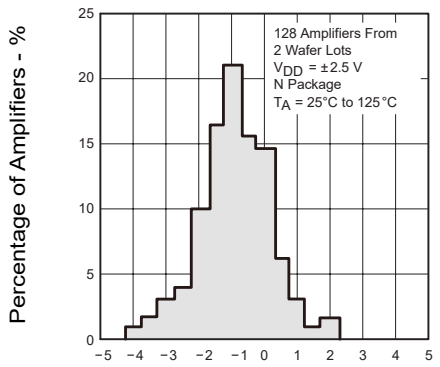


Figure 10: Distribution of TLC2274 vs Input Offset Voltage Temperature Coefficient

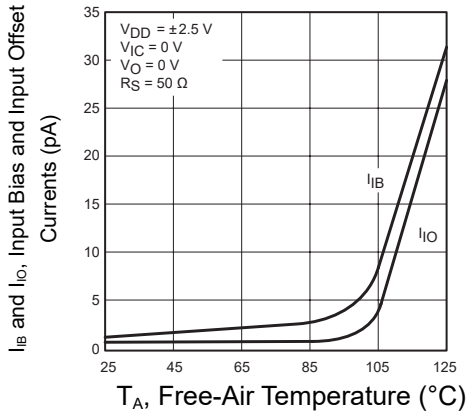


Figure 11: Input Bias and Input Offset Current vs Free-Air Temperature

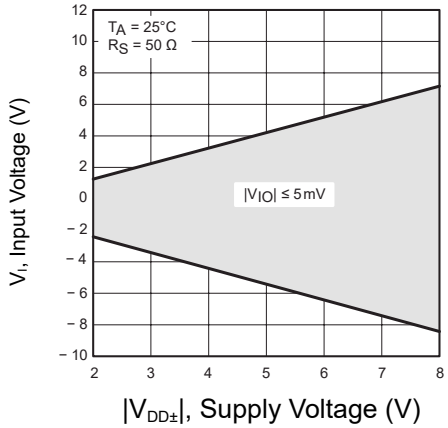


Figure 12: Input Voltage vs Supply Voltage

11.3 Typical Characteristic

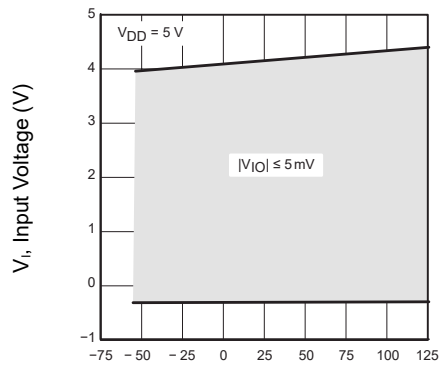


Figure 13: Input Voltage vs Free-Air Temperature

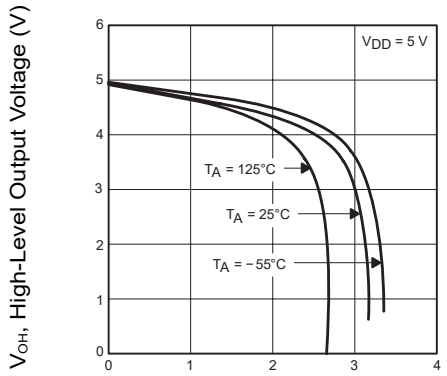


Figure 14: High-Level Output Voltage vs High-Level Output Current

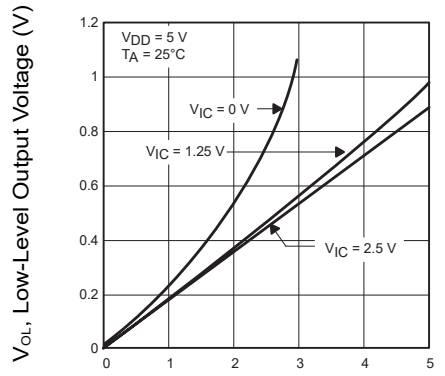


Figure 15: Low-Level Output Voltage vs Low-Level Output Current

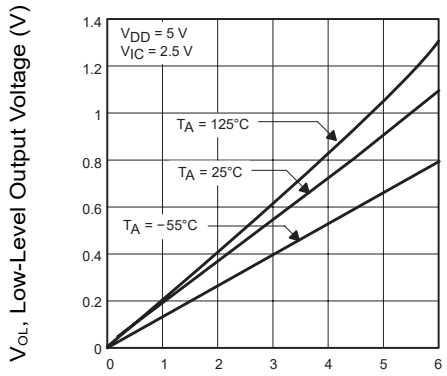


Figure 16: Low-Level Output Voltage vs Low-Level Output Current

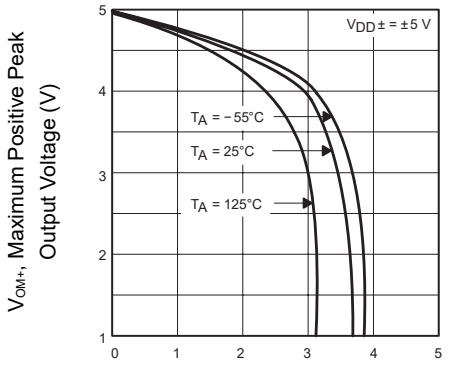


Figure 17: Maximum Positive Peak Output Voltage vs Output Current

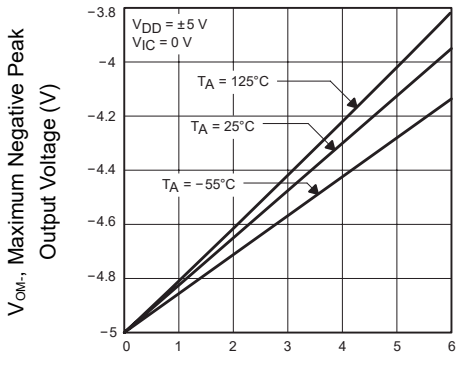


Figure 18: Maximum Positive Peak Output Voltage vs Output Current

11.4 Typical Characteristic

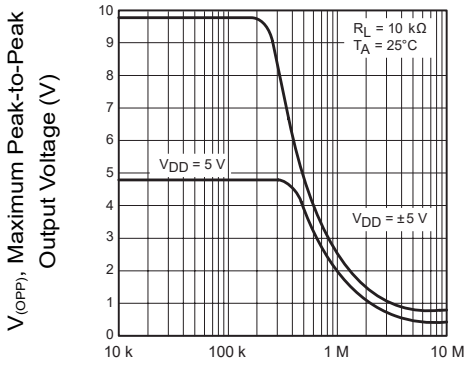


Figure 19: Maximum Peak-to-Peak Output Voltage vs Frequency

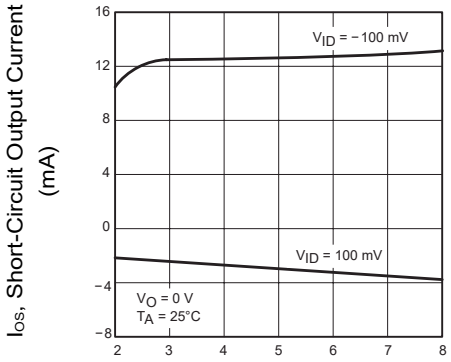


Figure 20: Short-Circuit Output Current vs Supply Voltage

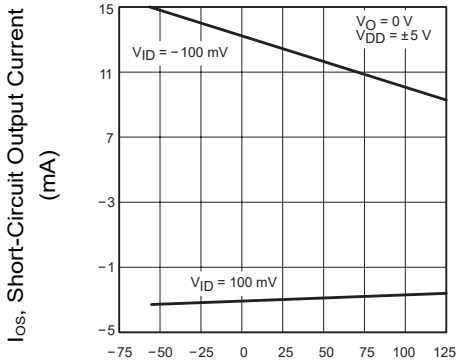


Figure 21: Short-Circuit Output Current vs Free-Air Temperature

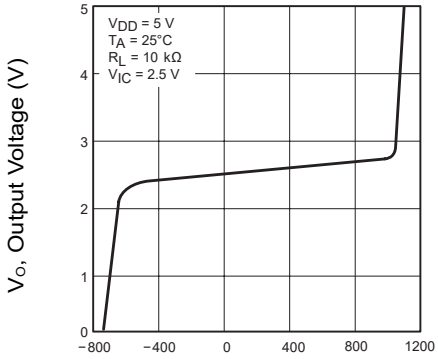


Figure 22: Output Voltage vs Differential Input Voltage

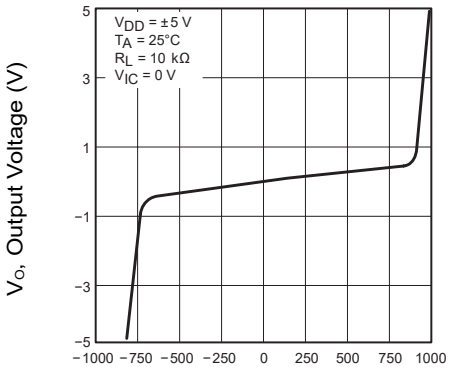


Figure 23: Output Voltage vs Differential Input Voltage

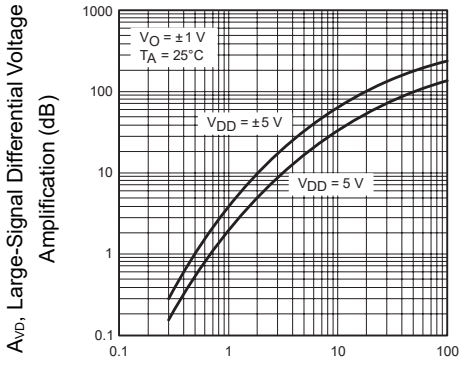


Figure 24: Large-Signal Differential Voltage Amplification vs Load Resistance

11.5 Typical Characteristic

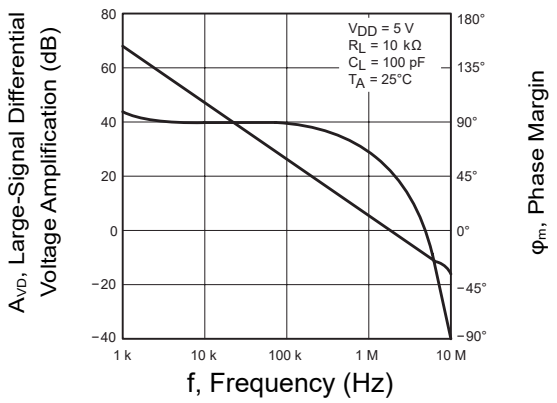


Figure 25: Large-Signal Differential Voltage Amplification and Phase Margin vs Frequency

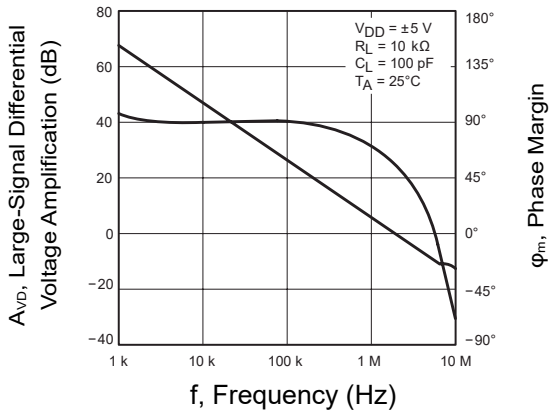


Figure 26: Large-Signal Differential Voltage Amplification and Phase Margin vs Frequency

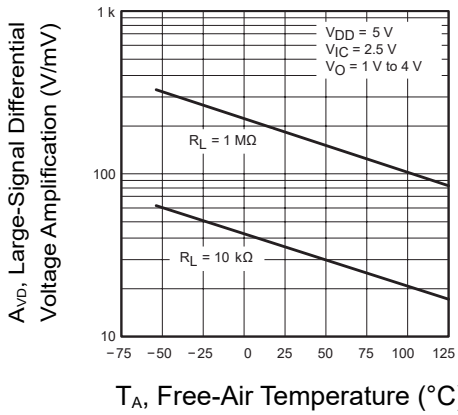


Figure 27: Large-Signal Differential Voltage Amplification vs Free-Air Temperature

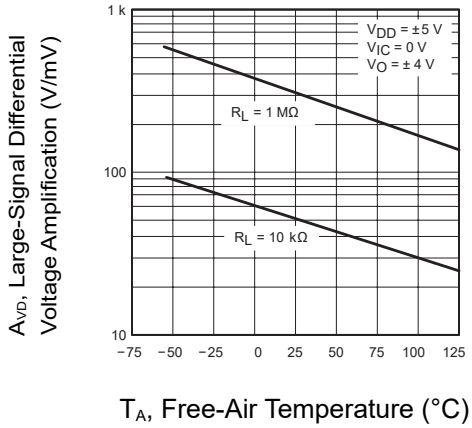


Figure 28: Large-Signal Differential Voltage Amplification vs Free-Air Temperature

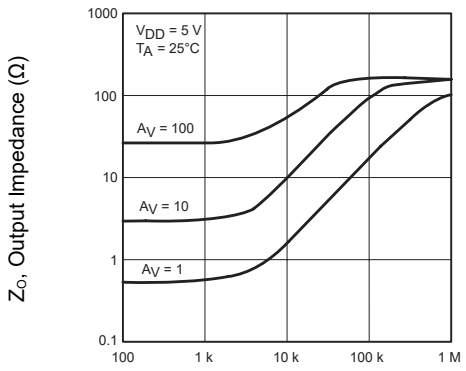


Figure 29: Output Impedance vs Frequency

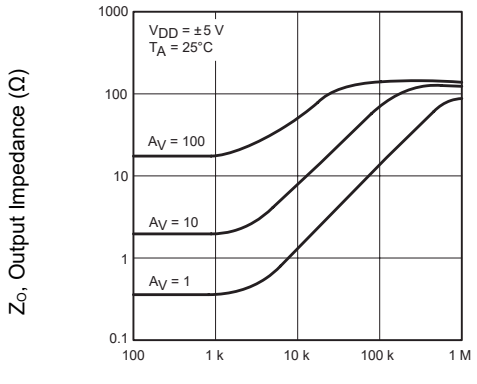


Figure 30: Output Impedance vs Frequency

11.6 Typical Characteristic

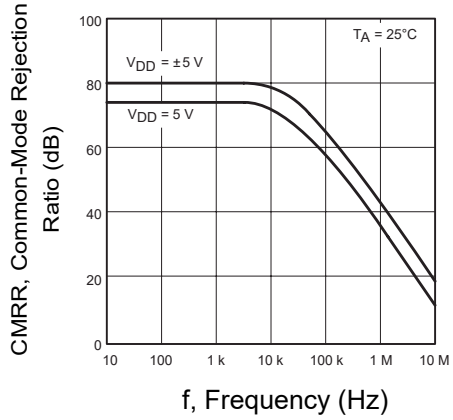


Figure 31: Common-Mode Rejection Ratio vs Frequency

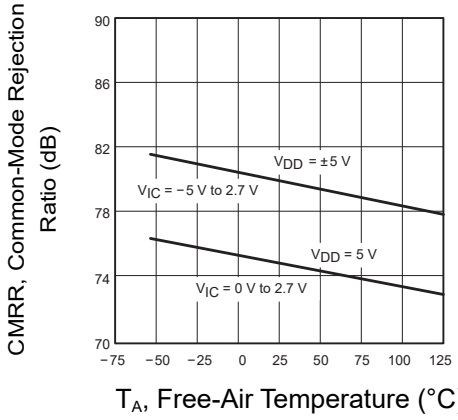


Figure 32: Common-Mode Rejection Ratio vs Free-Air Temperature

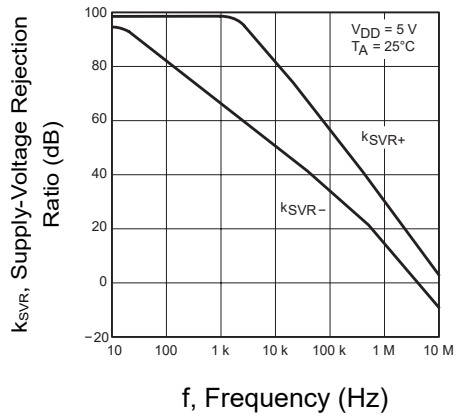


Figure 33: Supply-Voltage Rejection Ratio vs Frequency

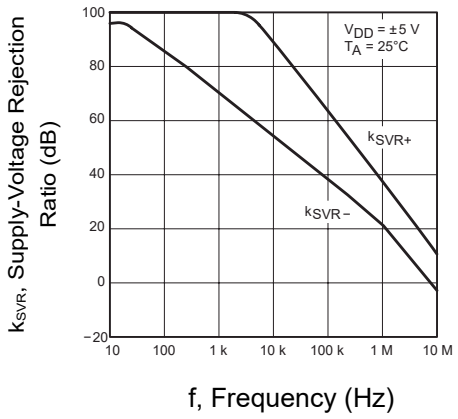


Figure 34: Supply-Voltage Rejection Ratio vs Frequency

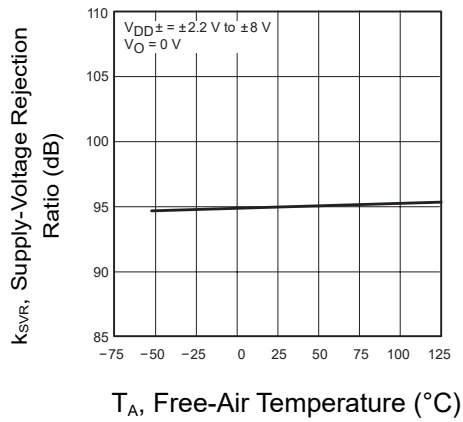


Figure 35: Supply-Voltage Rejection Ratio vs Free-Air Temperature

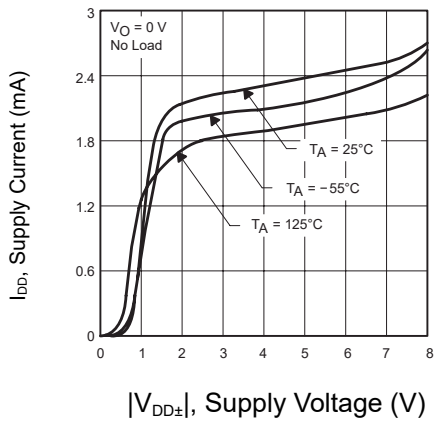


Figure 36: TLC2272 Supply Current vs Supply Voltage

11.7 Typical Characteristic

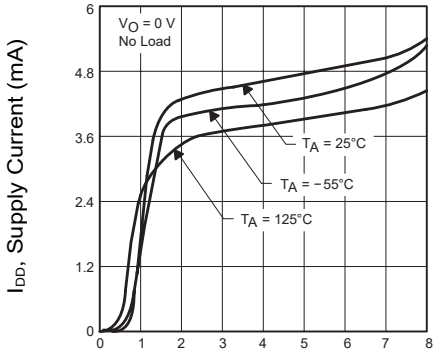


Figure 37: TLC2274 Supply Current vs Supply Voltage

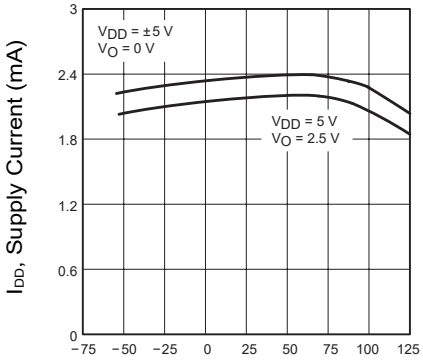


Figure 38: TLC2272 Supply Current vs Free-Air Temperature

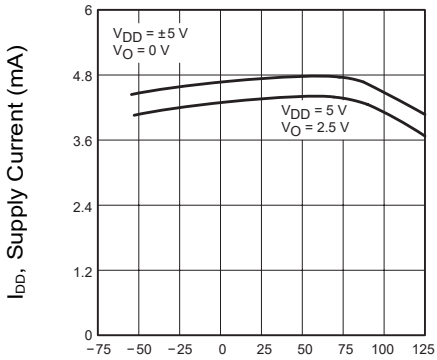


Figure 39: TLC2274 Supply Current vs Free-Air Temperature

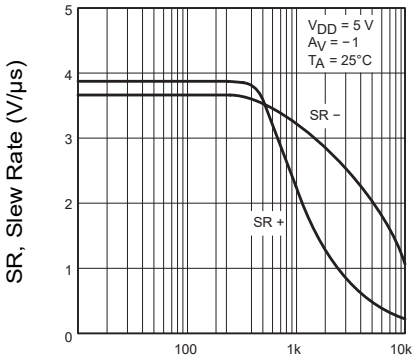


Figure 40: Slew Rate vs Load Capacitance

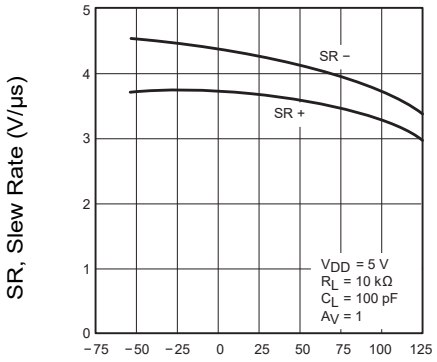


Figure 41: Slew Rate vs Free-Air Temperature

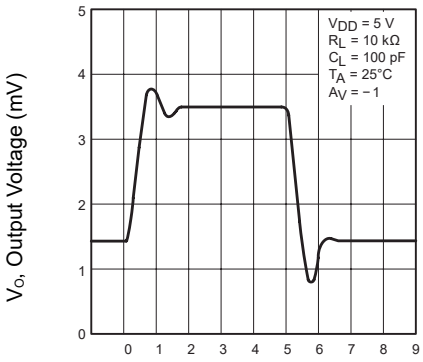


Figure 42: Inverting Large-Signal Pulse Response

11.8 Typical Characteristic

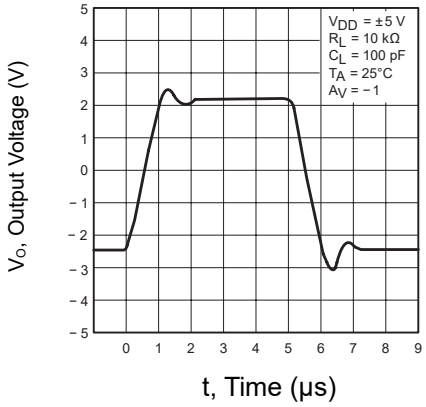


Figure 43: Inverting Large-Signal Pulse Response

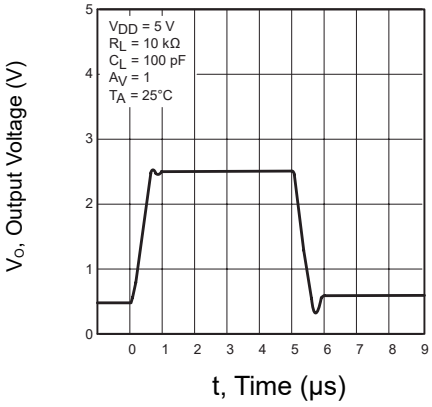


Figure 44: Voltage-Follower Large-Signal Pulse Response

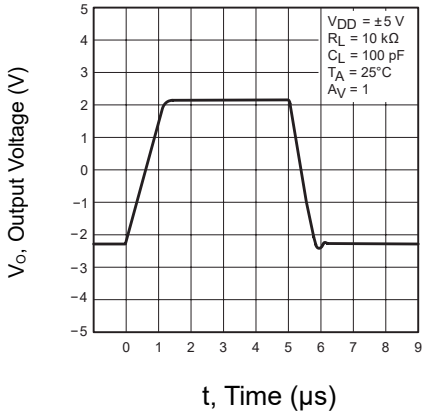


Figure 45: Voltage-Follower Large-Signal Pulse Response

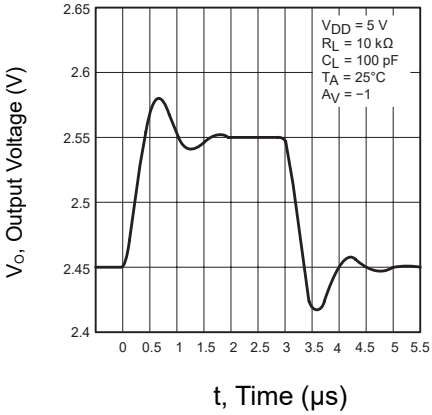


Figure 46: Inverting Small-Signal Pulse Response

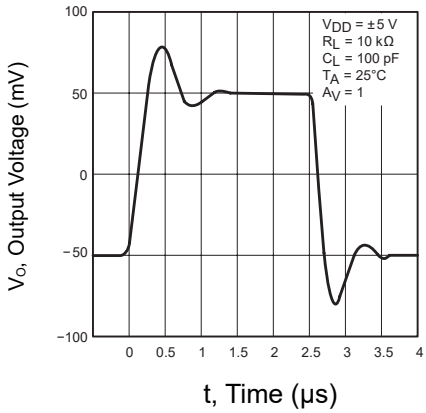


Figure 47: Inverting Small-Signal Pulse Response

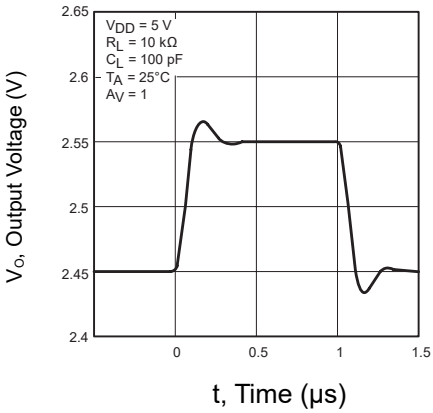


Figure 48: Voltage-Follower Small-Signal Pulse Response

11.9 Typical Characteristic

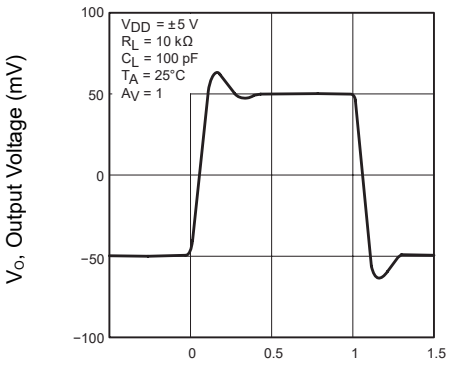


Figure 49: Voltage-Follower Small-Signal Pulse Response

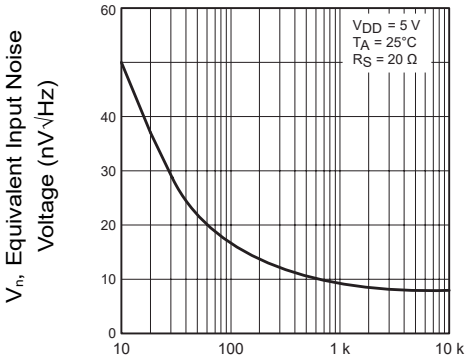


Figure 50: Equivalent Input Noise Voltage vs Frequency

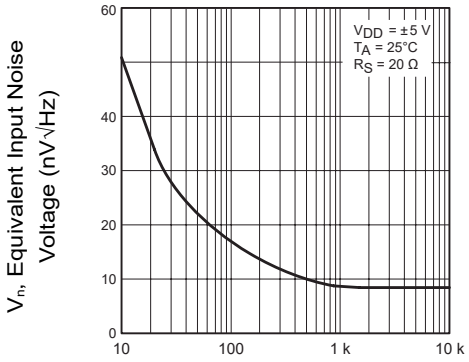


Figure 51: Equivalent Input Noise Voltage vs Frequency

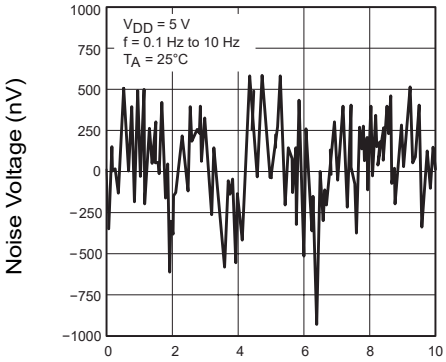


Figure 52: Noise Voltage Over a 10 Second Period

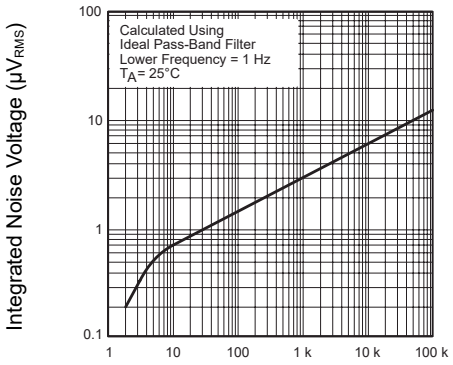


Figure 53: Integrated Noise Voltage vs Frequency

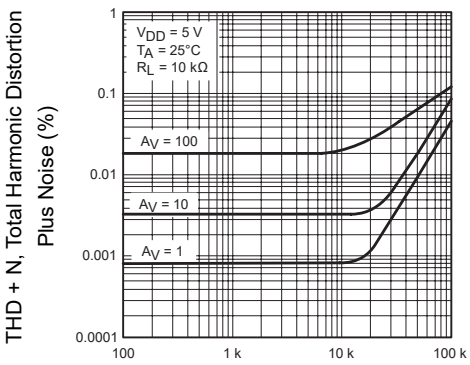


Figure 54: Total Harmonic Distortion + Noise vs Frequency

11.10 Typical Characteristic

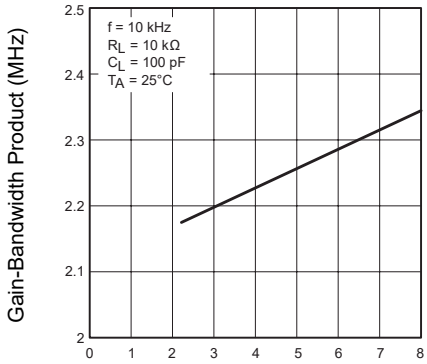


Figure 55: Gain-Bandwidth Product vs Supply Voltage

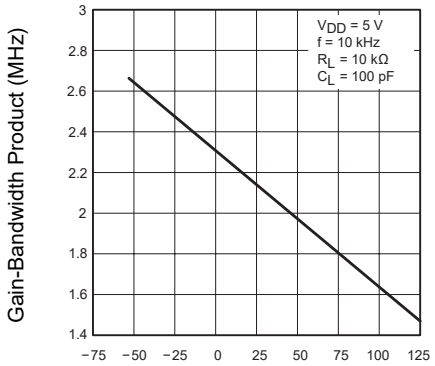


Figure 56: Gain-Bandwidth Product vs Free-Air Temperature

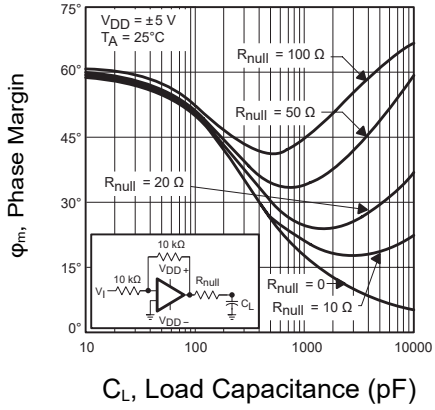


Figure 57: Phase Margin vs Load Capacitance

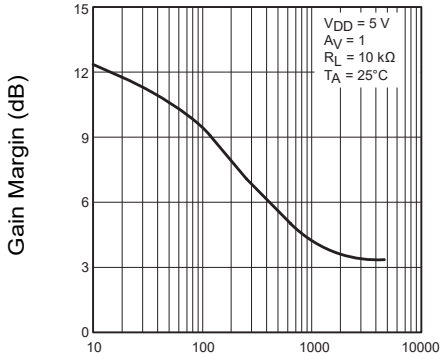
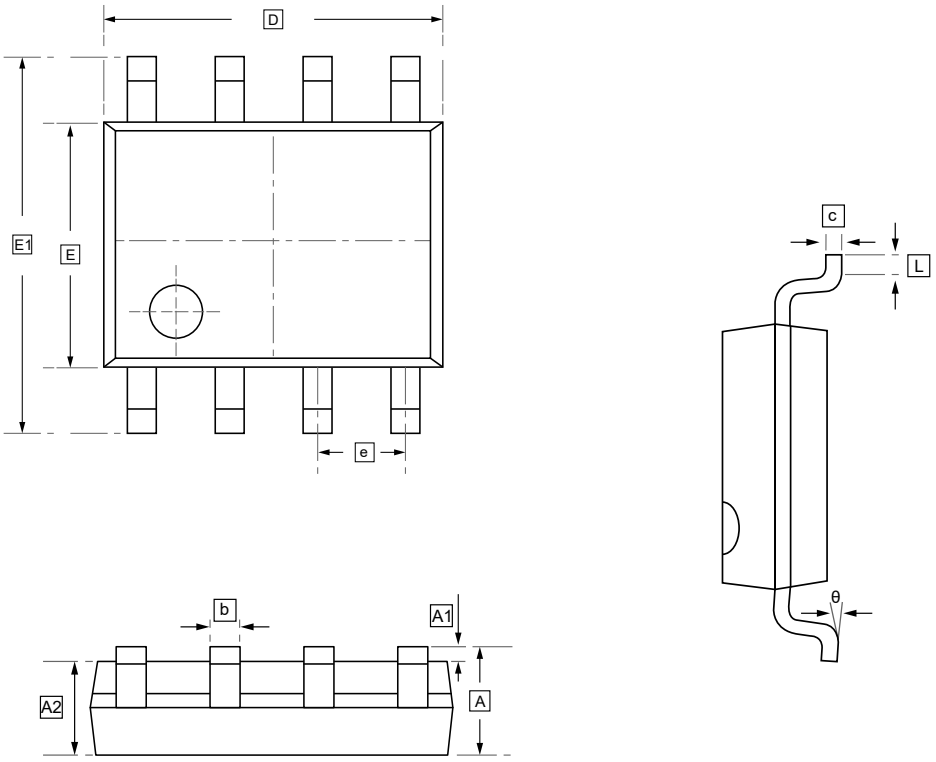


Figure 58: Gain Margin vs Load Capacitance

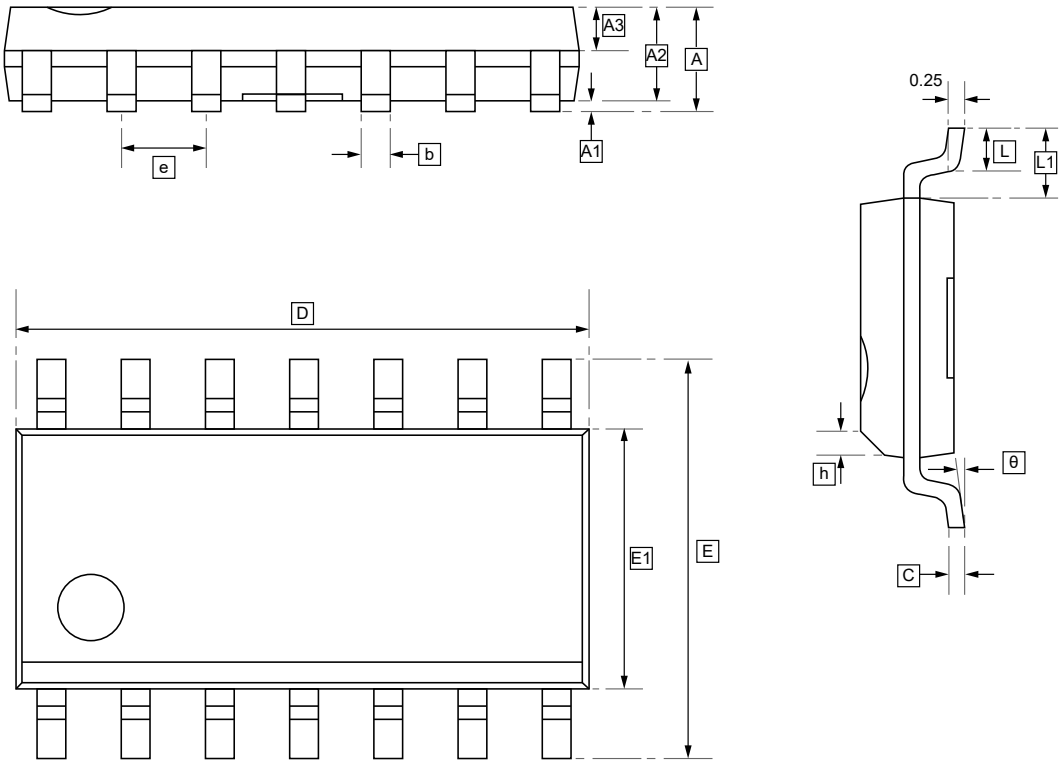
12.1 SOP-8 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	c	D	E	E1	e	L	θ
Min	1.350	0.000	1.350	0.330	0.170	4.700	3.800	5.800	1.270	0.400	0°
Max	1.750	0.100	1.550	0.510	0.250	5.100	4.000	6.200	BSC	1.270	8°

12.2 SOP-14 Package Outline Dimensions

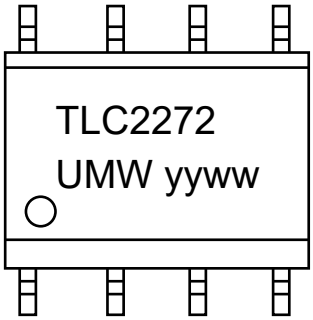


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	C	D	E	E1	e	h	L
Min	-	0.05	1.35	0.65	0.203	0.17	8.45	5.80	3.80	1.24	0.25	0.40
Max	1.75	0.25	1.55	0.75	0.305	0.25	8.85	6.20	4.00	1.30	0.50	0.80

Symbol	L1	θ
Min	1.00	0°
Max	1.10	8°

13.Ordering Information



yy: Year Code
ww: Week Code

Order Code	Marking	Package	Base QTY	Delivery Mode
UMW TLC2272ACDR	TLC2272	SOP-8	2500	Tape and reel
UMW TLC2272AIDR	TLC2272	SOP-8	2500	Tape and reel
UMW TLC2272CDR	TLC2272	SOP-8	2500	Tape and reel
UMW TLC2272IDR	TLC2272	SOP-8	2500	Tape and reel
UMW TLC2274ACDR	TLC2274	SOP-14	2500	Tape and reel
UMW TLC2274AIDR	TLC2274	SOP-14	2500	Tape and reel
UMW TLC2274CDR	TLC2274	SOP-14	2500	Tape and reel
UMW TLC2274IDR	TLC2274	SOP-14	2500	Tape and reel

14.Disclaimer

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