The Future of Analog IC Technology®

MP8102

Ultra Low Power 1.8V, 600kHz Op Amp

DESCRIPTION

The MP8102 is a rail-to-rail output, operational amplifier in a TSOT-23 package. This amplifier provides 600KHz bandwidth while consuming an incredibly low 7.5µA of supply current. The MP8102 can operate with a single supply voltage as low as 1.8V.

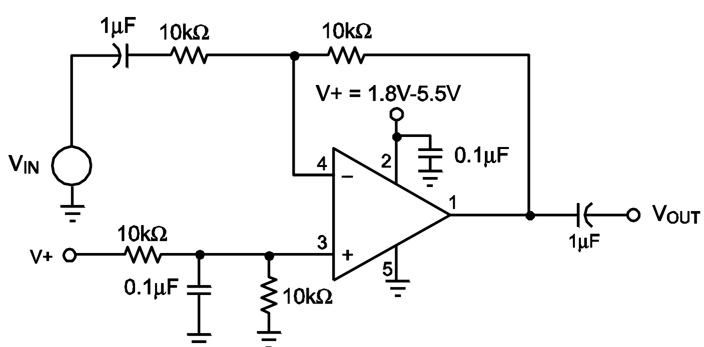
FEATURES

- Single Supply Operation: 1.8V to 5.5V
- TSOT23-5 Package
- 600KHz –3dB Bandwidth
- 7.5µA Supply Current
- Rail-to-Rail Output
- Unity-Gain Stable
- Input Common Mode to Ground
- Drives Up to 1000pF of Capacitive Loads

APPLICATIONS

- Portable Equipment
- PDAs
- Pagers
- Cordless Phones
- Handheld GPS
- Consumer Electronics

TYPICAL APPLICATION



ORDERING INFORMATION

Part Number*	Package	Top Marking
MP8102DJ	TSOT23-5	*See Below*

* For Tape & Reel, add suffix –Z (e.g. MP8102DJ–Z);

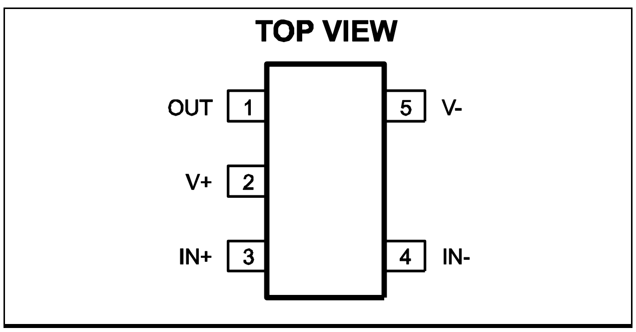
For RoHS, compliant packaging, add suffix –LF (e.g. MP8102DJ–LF–Z).

TOP MARKING

|H6YW

H6: product code of MP8102DJ;
Y: year code;
W: week code:

PACKAGE REFERENCE



ABSOLUTE MAXIMUM RATINGS (1)

Supply Voltage (V+ to V-) ....+6.0V
Differential Input Voltage (V_{IN+} – $V_{IN–}$)........+6.0V
Input Voltage (V_{IN+} – $V_{IN–}$).. V_{IN+} + 0.3V, $V_{IN–}$ – 0.3V
Junction Temperature..............................150°C

Recommended Operating Conditions (2)

Supply Voltage .... +1.8V to +5.5V
Operating Temperature............. –40°C to +85°C

Thermal Resistance (3)

	θ_{JA}	θ_{JC}	
TSOT23-5	220	110	°C/W

Notes:
1) Exceeding these ratings may damage the device.
2) The device is not guaranteed to function outside of its operating conditions.
3) Measured on approximately 1" square of 1 oz copper.

ELECTRICAL CHARACTERISTICS

V_+ = +5V, V_- = 0V, V_{CM} = V+/2, R_L = 10kΩ, T_A = +25°C, unless otherwise noted.

Parameter	Symbol	Condition	Min	Typ	Max	Units
Input Offset Voltage	V_{OS}		–5	1	+5	mV
Input Offset Voltage Temp Coefficient				15		μV/°C
Input Bias Current (4)	I_B			2		pA
Input Offset Current (4)	I_{OS}			0.2		pA
Input Voltage Range	V_{CM}	CMRR > 60dB	0		3.8	V
Common-Mode Rejection Ratio	CMRR	0 < V_{CM} < 3.5V		82		dB
Power Supply Rejection Ratio	PSRR	Supply Voltage change of 1.0V		80		dB
Large Signal Voltage Gain	A_{VOL}	R_L = 100kΩ, V_{OUT} = 5.0 Peak to Peak	60	88		dB
Maximum Output Voltage Swing	V_{OUT}	R_L = 10kΩ		V+ – 23mV		V
Minimum Output Voltage Swing	V_{OUT}	R_L = 10kΩ		V– + 19mV		V
Gain-Bandwidth Product (4)	GBW	R_L = 200kΩ,C_L = 2pF, V_{OUT} = 0		200		KHz
–3dB Bandwidth (4)	BW	A_V = 1, C_L = 2pF, R_L = 1MΩ		600		KHz
Slew Rate (4)	SR	A_V = 1, C_L = 2pF, R_L = 1MΩ		0.1		V/μs
Short Circuit Current	I_{SC}	Source		–20		mA
		Sink		20		mA
Supply Current		No Load		7.5	10	μA

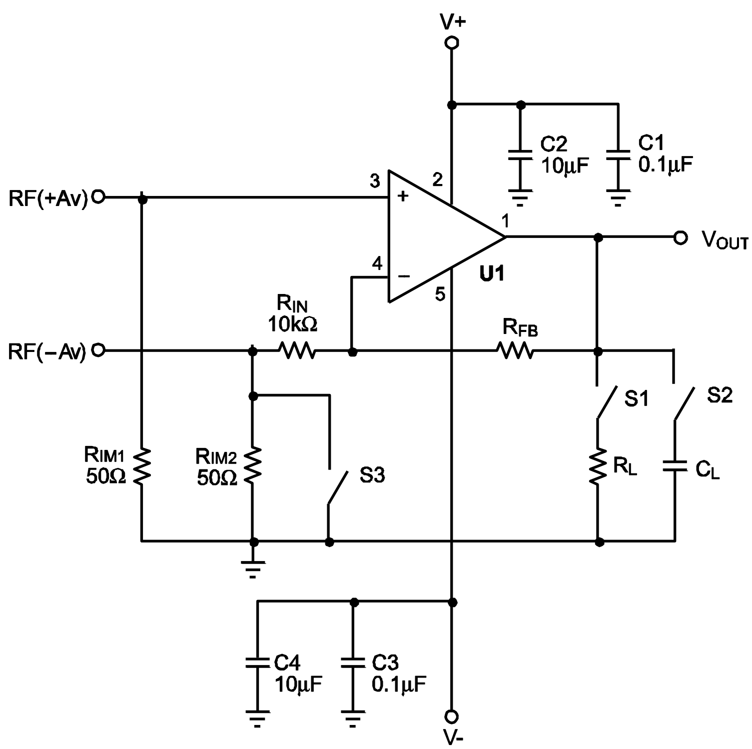
Note:

4) Guaranteed by design.

PIN FUNCTIONS

Pin #	Name	Description
1	OUT	Output.
2	V+	Supply Voltage.
3	IN+	Non-Inverting Input.
4	IN-	Inverting Input.
5	V-	Ground or Supply Return Pin.

TEST CIRCUITS



Notes: Close S3 for positive gain. Input signal to RF(+Av) connector.
The gain Av = 1 + R_{FB}/R_{IN}.
For unity gain, remove R_{IN} and short R_{FB}.
Open S3 for negative gain. Input signal to RF(-Av) connector.
The gain Av = -R_{FB}/R_{IN}.
S1 and S2 are switches for possible resistor and capacitor load connections.

Figure 1—AC Test Circuit

TEST CIRCUITS (continued)

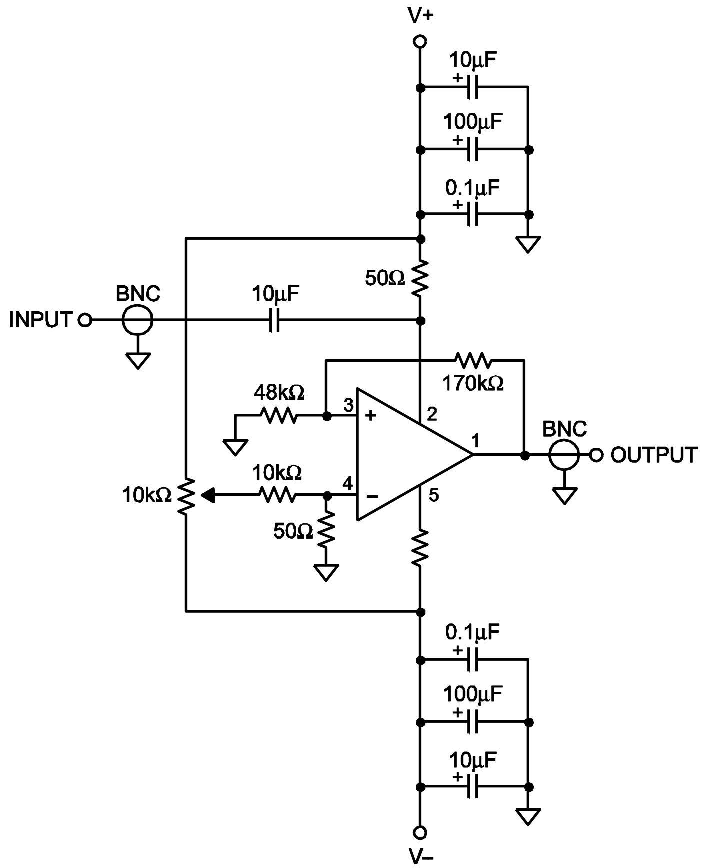
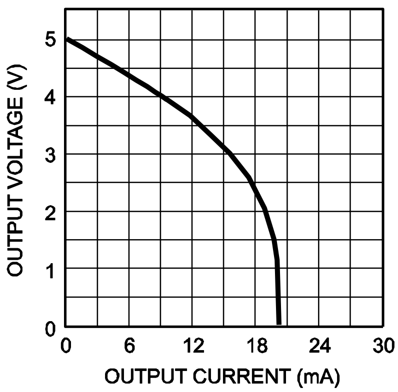


Figure 2—Positive Power Supply Rejection Ratio Measurement

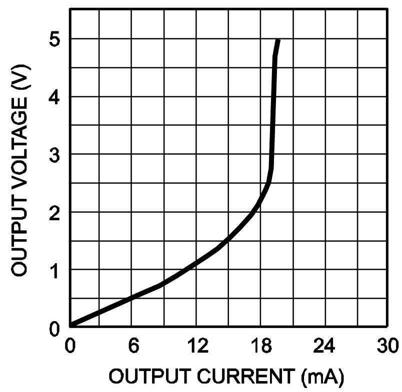
TYPICAL PERFORMANCE CHARACTERISTICS

T_A = +25°C, unless otherwise noted.

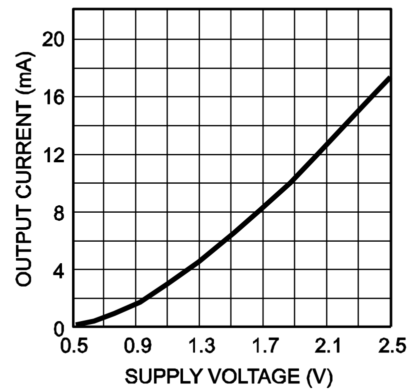
Output Voltage vs. Output Current
Sourcing



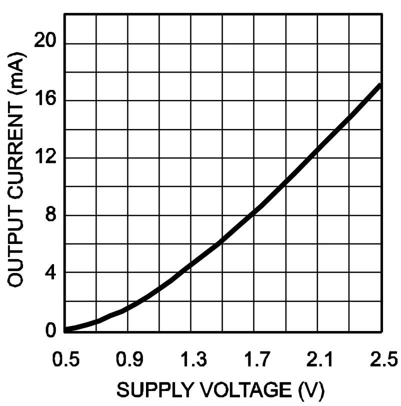
Output Voltage vs Output Current
Sinking



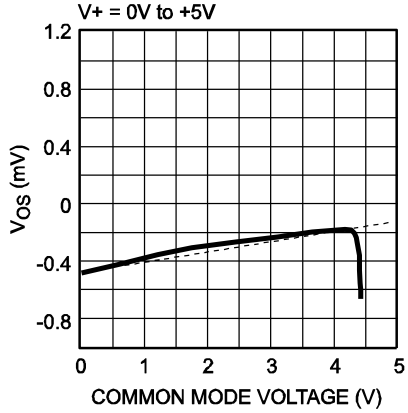
Short Circuit Current vs Supply Voltage
Sourcing



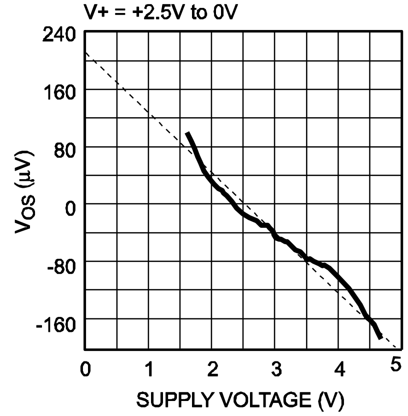
Short Circuit Current vs Supply Voltage
Sinking



Offset Voltage vs. Common Mode Voltage
R_{FB} = 50kΩ, V- = -5V to 0V,
V+ = 0V to +5V



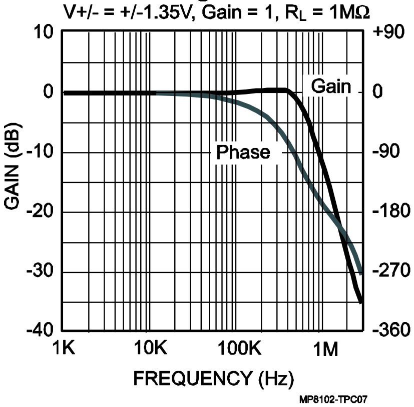
Offset Voltage vs. Supply Voltage
R_{FB} = 50kΩ, V- = -2.5V to 0V,
V+ = +2.5V to 0V



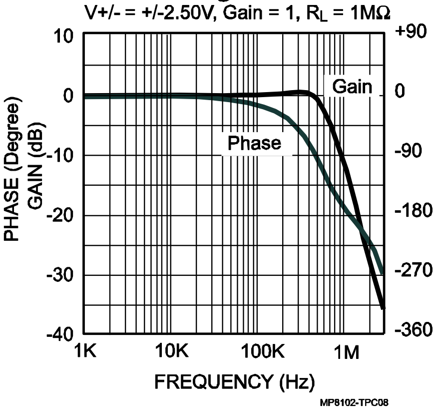
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_A = +25°C, unless otherwise noted.

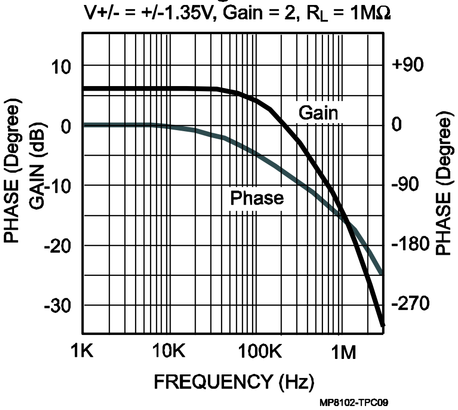
Gain Bandwidth and Phase Margin
V+/- = +/-1.35V, Gain = 1, R_L = 1MΩ



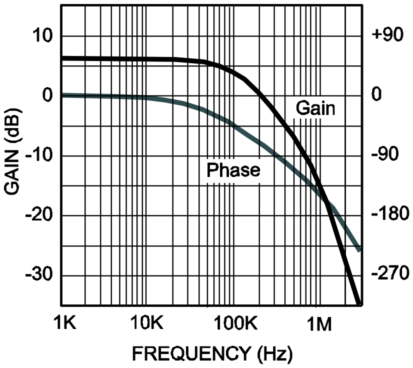
Gain Bandwidth and Phase Margin
V+/- = +/-2.50V, Gain = 1, R_L = 1MΩ



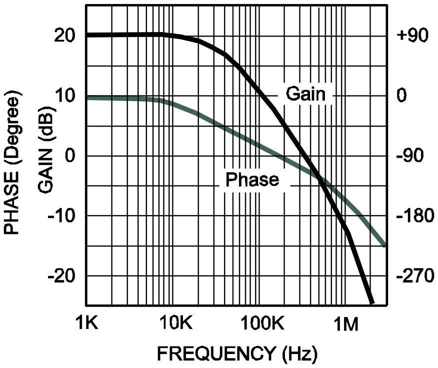
Gain Bandwidth and Phase Margin
V+/- = +/-1.35V, Gain = 2, R_L = 1MΩ



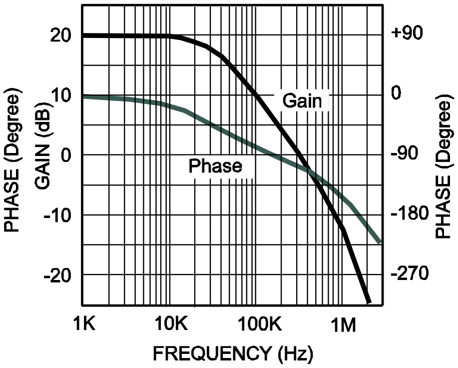
Gain Bandwidth and Phase Margin
V+/- = +/-2.50V, Gain = 2, R_L = 1MΩ



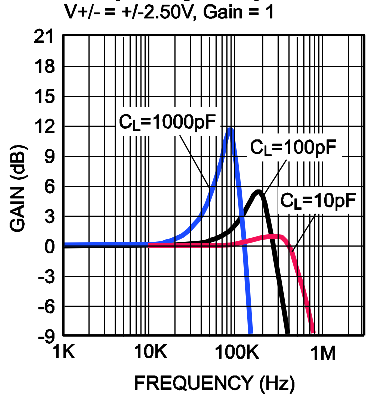
Gain Bandwidth and Phase Margin
V+/- = +/-1.35V, Gain = 10, R_L = 1MΩ



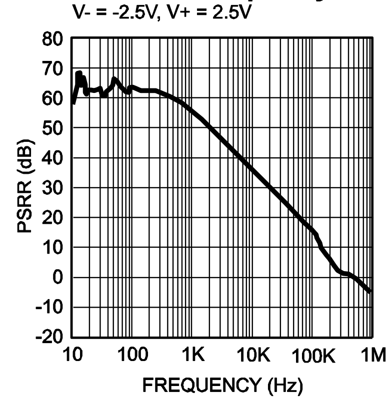
Gain Bandwidth and Phase Margin
V+/- = +/-2.50V, Gain = 10, R_L = 1MΩ



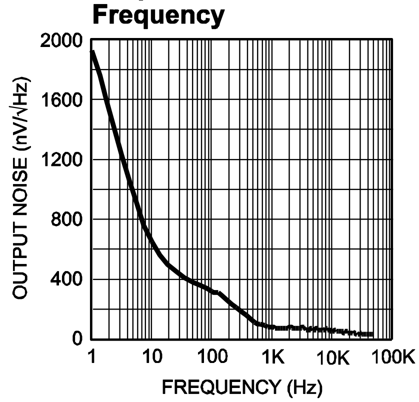
Close-Loop Unity Gain Frequency Response
V+/- = +/-2.50V, Gain = 1



PSRR vs. Frequency
V- = -2.5V, V+ = 2.5V



Output Noise vs. Frequency

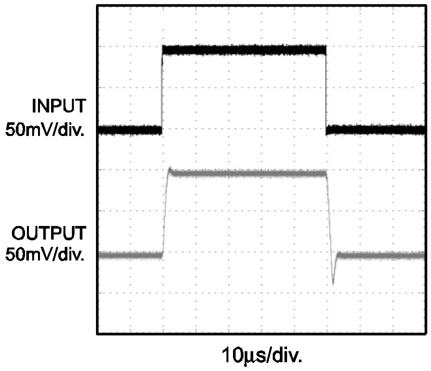


TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_A = +25°C, unless otherwise noted.

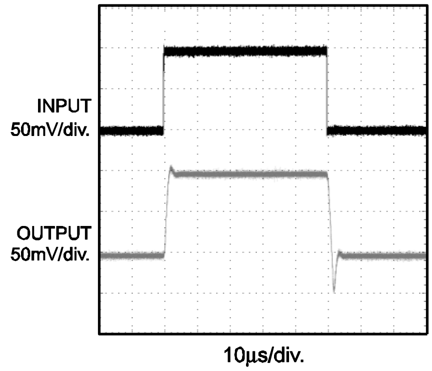
Small Signal Pulse Response

A_V = 1, V+ = 2.5V, V- = -2.5V
R_L = 1MΩ, C_L = 8pF



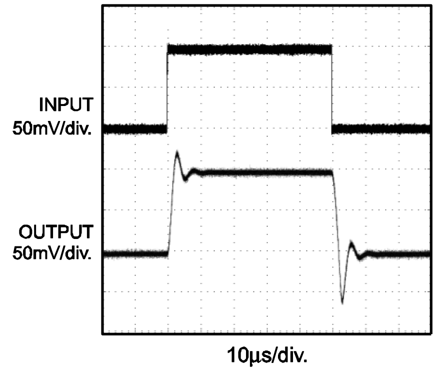
Small Signal Pulse Response

A_V = 1, V+ = 1.25V, V- = -1.25V
R_L = 1MΩ, C_L = 8pF



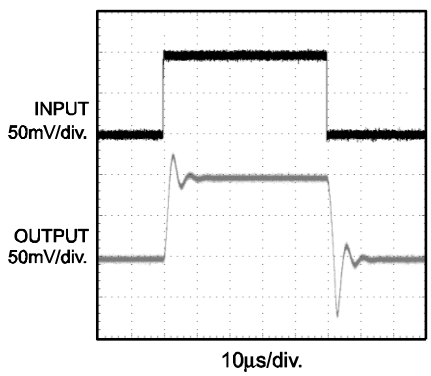
Small Signal Pulse Response

A_V = 1, V+ = 2.5V, V- = -2.5V
R_L = 1MΩ, C_L = 50pF



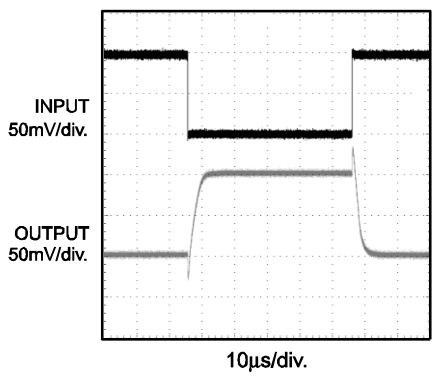
Small Signal Pulse Response

A_V = 1, V+ = 1.25V, V- = -1.25V
R_L = 1MΩ, C_L = 50pF



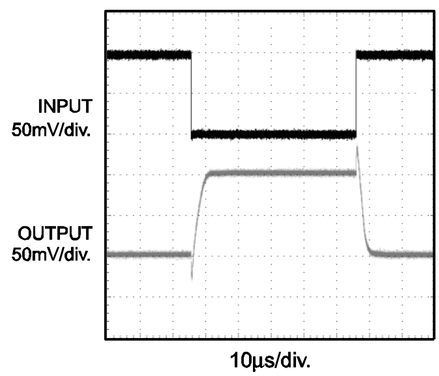
Small Signal Pulse Response

A_V = -1, V+ = 2.5V, V- = -2.5V
R_L = 1MΩ, C_L = 8pF



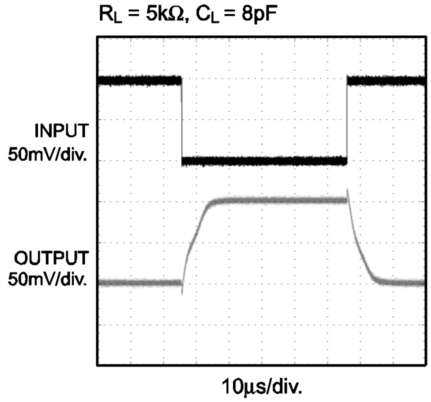
Small Signal Pulse Response

A_V = -1, V+ = 1.25V, V- = -1.25V
R_L = 1MΩ, C_L = 8pF



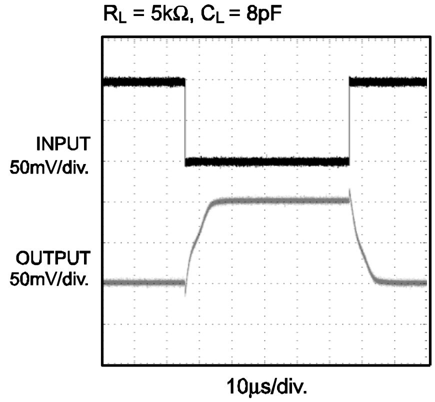
Small Signal Pulse Response

A_V = -1, V+ = 2.5V, V- = -2.5V
R_L = 5kΩ, C_L = 8pF



Small Signal Pulse Response

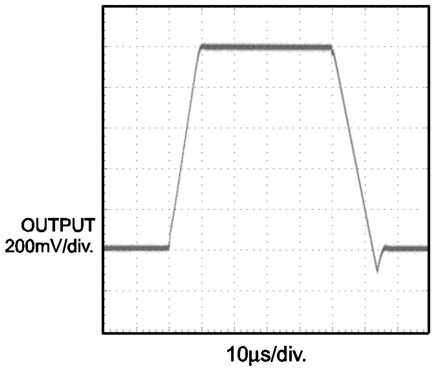
A_V = -1, V+ = 1.25V, V- = -1.25V
R_L = 5kΩ, C_L = 8pF



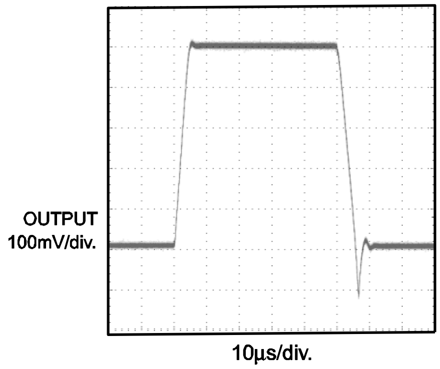
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_A = +25°C, unless otherwise noted.

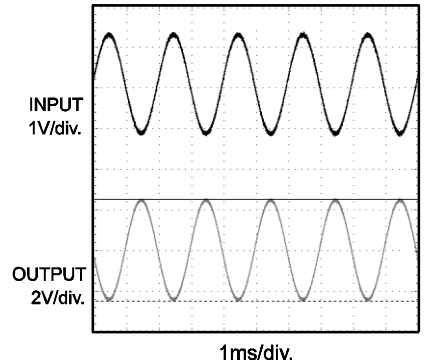
Large Signal Pulse Response
A_V = 1, V+ = 2.5V, V- = -2.5V
R_L = 1MΩ, C_L = 8pF



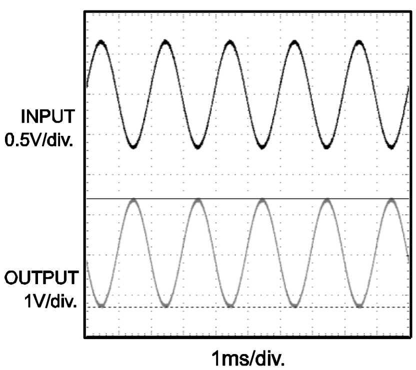
Large Signal Pulse Response
A_V = 1, V+ = 1.25V, V- = -1.25V
R_L = 1MΩ, C_L = 8pF



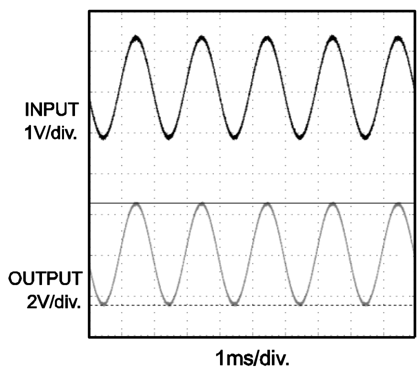
Rail to Rail Output Operation
A_V = -2, V+ = 2.5V, V- = -2.5V
R_L = 1MΩ, C_L = 8pF



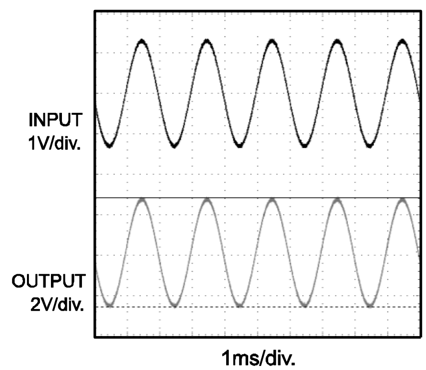
Rail to Rail Output Operation
A_V = -2, V+ = 1.25V, V- = -1.25V
R_L = 1MΩ, C_L = 8pF



Rail to Rail Output Operation
A_V = 2, V+ = 2.5V, V- = -2.5V
R_L = 1MΩ, C_L = 8pF



Rail to Rail Output Operation
A_V = 2, V+ = 1.25V, V- = -1.25V
R_L = 1MΩ, C_L = 8pF



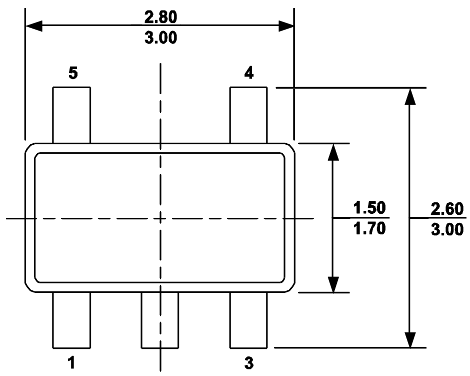
APPLICATION INFORMATION

Power Supply Bypassing

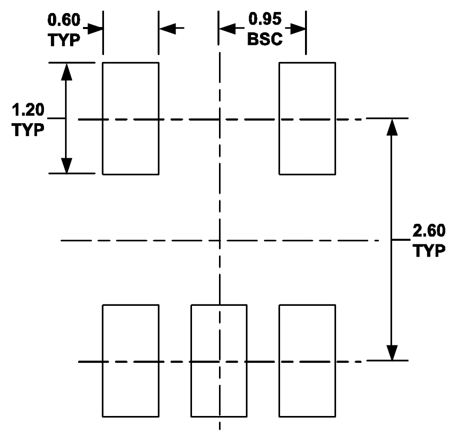
Regular supply bypassing techniques are recommended. A 10µF capacitor in parallel with a 0.1µF capacitor on both the positive and negative supplies is ideal. For the best performance, all bypassing capacitors should be located as close to the op amp as possible and all capacitors should be low ESL (Equivalent Series Inductance) and low ESR (Equivalent Series Resistance). Surface mount ceramic capacitors are ideal.

PACKAGE INFORMATION

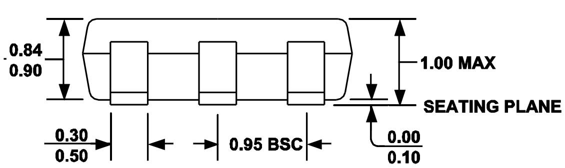
TSOT23-5



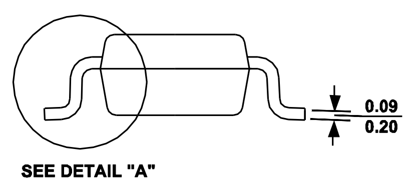
TOP VIEW



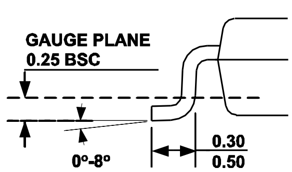
RECOMMENDED LAND PATTERN



FRONT VIEW



SIDE VIEW



DETAIL "A"

NOTE:

1) ALL DIMENSIONS ARE IN MILLIMETERS.
2) PACKAGE LENGTH DOES NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURR.
3) PACKAGE WIDTH DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION.
4) LEAD COPLANARITY (BOTTOM OF LEADS AFTER FORMING) SHALL BE 0.10 MILLIMETERS MAX.
5) DRAWING CONFORMS TO JEDEC MO-193, VARIATION AA.
6) DRAWING IS NOT TO SCALE.