MSKSEMI SEMICONDUCTOR 美森科

ESD TVS TSS MOV GDT PLED

OPA2348AIDR-MS/OPA2348AIDGKR-MS

Product specification

GENERAL DESCRIPTION

The OPA2348AIDR-MS/OPA2348AIDGKR-MS is dual CMOS operational amplifier that uses the propriet ary auto-calibration technique to simultaneously provides very low offset voltage near-zero drift over ti me and temperature.These miniature,high-precision,low quiescent current amplifiers offer high-impedan ce inputs that have a common-mode range 200mV beyond the rails,and rail-to-rail output that swings within 50mV of the rails single or dual supplies as low as 2.1V(±1.35V)and up to 5.5V(±2.75V)can be used.These devices are optimized for low voltage,single supply operation.
The OPA2348AIDR-MS/OPA2348AIDGKR-MS offers excellent CMRR without the crossover associated with traditional complementary input stages.This design results in superior performance for driving anal og-to-digital converters (ADC)without degradation of diferential linearity.
The OPA2348AIDR-MS/OPA2348AIDGKR-MS is available in the 8-pin and VSSOP packages.

FEATURES

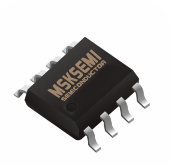
- VDD range:2.1Vto5.5V
- Low Offset Voltage:0.5mV (Typical)
- Low Drit:0.65μV/°C(Typical)
- Low Noise
- Quiescent Current:50μA(Total)
- Rail to Rail Input/Output
- MicroSize Packages:SOP8 and VSSOP8

APPLICATIONS

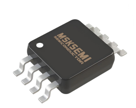
- Transducers
- Temperature Measurement
- Electronic Scales
- Medical instrumentation
- Handheld Test Equipment

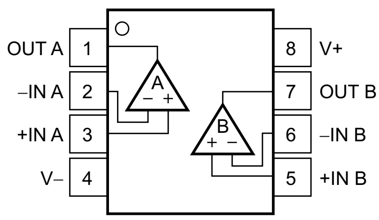
Pin Description and Marking

SOP-8



VSSOP-8





PIN			I/O	DESCRIPTION
NAME	SOP-8	VSSOP-8		
–IN A	2	2	I	Inverting input, channel A
–IN B	6	6	I	Inverting input, channel B
+IN A	3	3	I	Noninverting input, channel A
+IN B	5	5	I	Noninverting input, channel B
OUT A	1	1	O	Output, channel A
OUT B	7	7	O	Output, channel B
V–	4	4	—	Negative (lowest) power supply
V+	8	8	—	Positive (highest) power supply

SIMPLIFIED SCHEMATIC

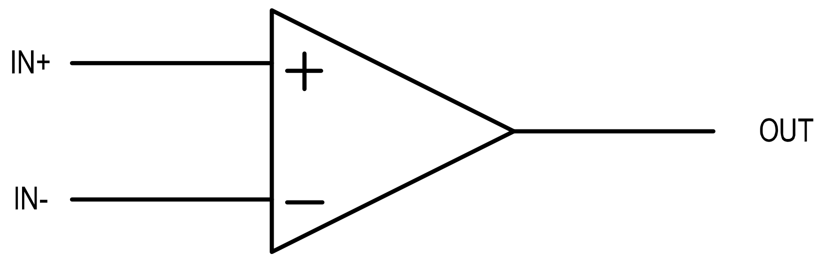


Figure 1. Simplified Schematic

ABSOLUTE MAXIMUM RATINGS

Thermal Resistance θ_{JC}....................... 130°C/W
Supply Voltage....................................2.1to 5.5V
Signal Input Terminals Voltage...... -0.1 to (V+)+0.1V
Operating Junction Temperature................. 150°C
Operating Temperature Range............-40°Cto125°C
Storage Temperature .... -65°C to 150°C

ordering information

P/N	PKG	QTY
OPA2348AIDR-MS	SOP-8	2500
OPA2348AIDGKR-MS	VSSOP-8	3000

ELECTRICAL CHARACTERISTICS

(At T_A = 25°C, R_L=10k connected to V_S/2, and V_{OUT}=V_S/2, unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	V_S=±2.5V	-2	0.5	2	mV
Input Offset Voltage Drift	T_A = -55°C to 125°C		0.65		μV/°C
Power Supply Rejection Ratio	V_S =2.1V to 5.5V T_A = -55°C to 125°C	80	90		dB
Input Bias Current	T_A = 25°C		2		pA
Input Offset Current			1		pA
Common-mode Voltage Range		(V-)-0.1		(V+)+0.1	V
Common-mode Rejection Ratio	(V-)-0.1<V_{CM}<(V+)+0.1 T_A = -55°C to 125°C	80	95		dB
Open Loop Voltage Gain	(V-)+100mV<V_O<(V+)-100mV, R_L=10k T_A = -55°C to 125°C	80	100		dB
Gain-bandwidth product	C_L=120pF		1.5		MHz
Slew Rate	G=+1		1.2		V/μs
Specified Voltage Range		2.1		5.5	V
Quiescent Current (Total)	I_O=0A		50		μA
Operating Temperature Range		-55		125	°C
Storage Temperature Range		-65		150	°C

TYPICAL PERFORMANCE CHARACTERISTICS

(At T_A = 25°C,V_S=5V, C_L=20pF, unless otherwise noted.)

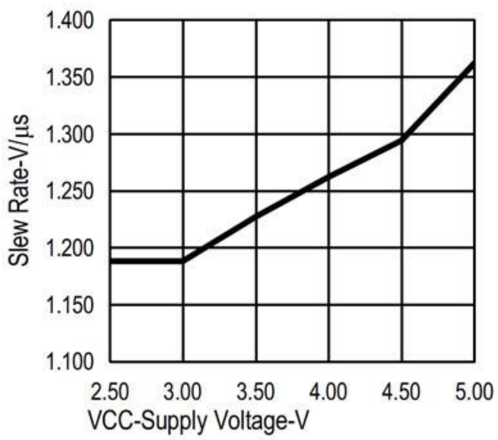


Figure 2. Slew Rate vs Supply Voltage

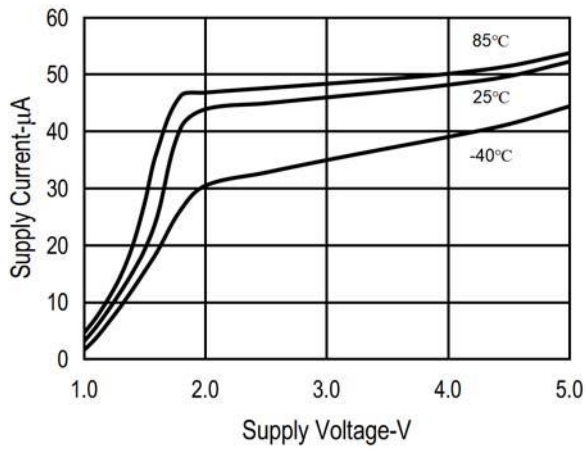


Figure 3. Supply Current vs Supply Voltage

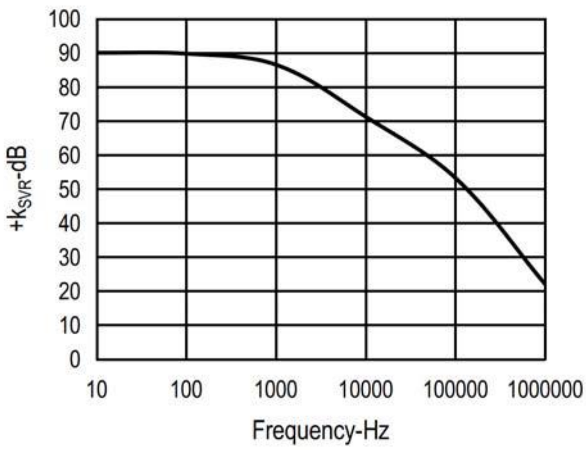


Figure 4. +k_{SVR} vs Frequency

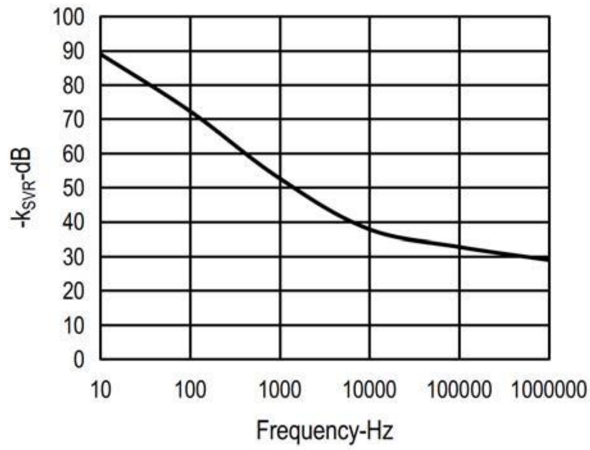


Figure 5. -k_{SVR} vs Frequency

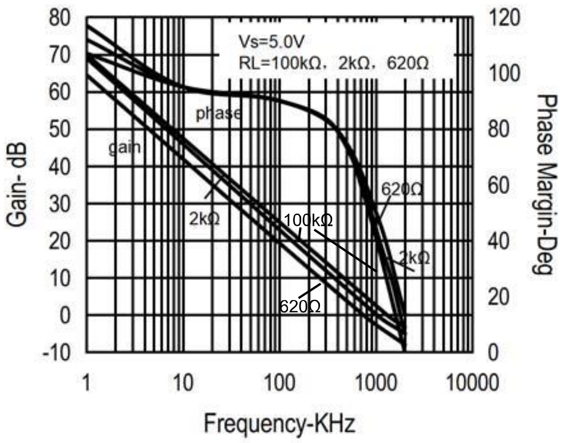


Figure 6. Frequency Response vs Resistive Load

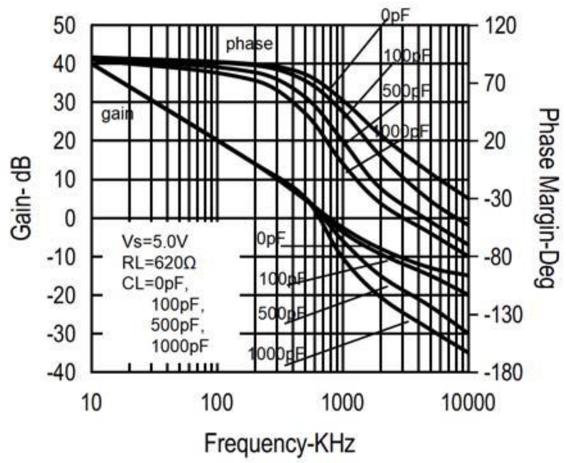


Figure 7. Frequency Response vs Capacitive Load

TYPICAL PERFORMANCE CHARACTERISTICS

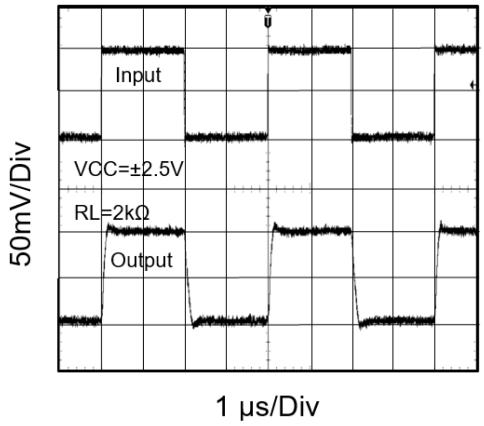


Figure 8. Noninverting Small-Signal Pulse Response

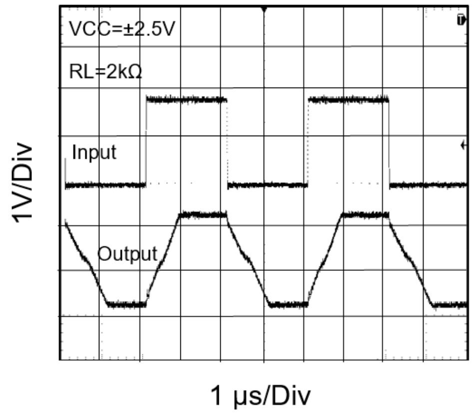


Figure 9. Noninverting Large-Signal Pulse Response

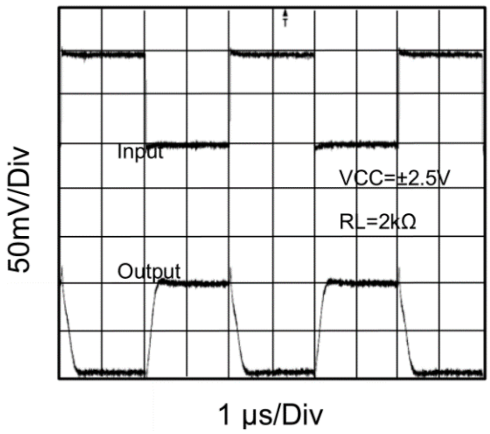


Figure 10. Inverting Small-Signal Pulse Response

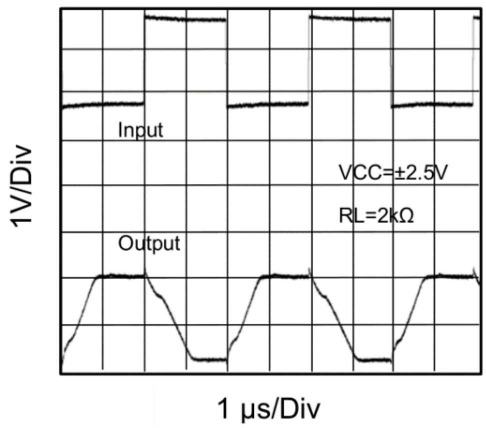


Figure 11. Inverting Large-Signal Pulse Response

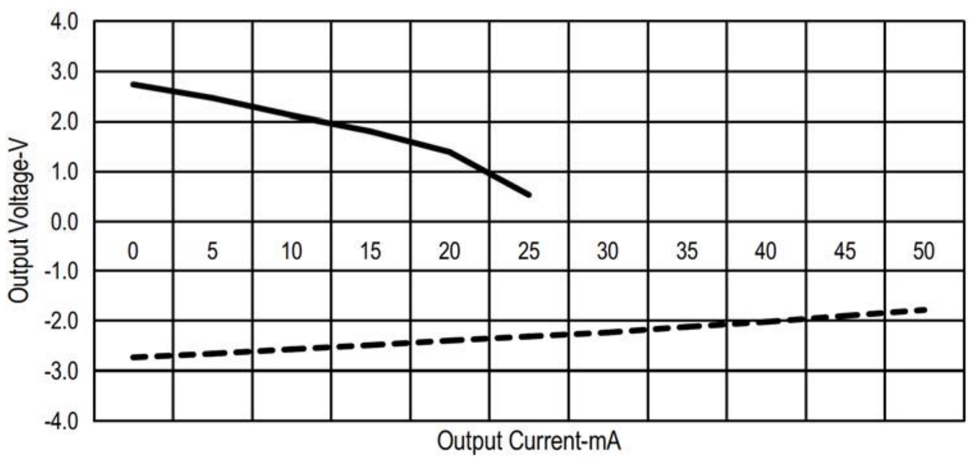


Figure 12. Output Voltage vs Output Current

FUNCTIONAL DESCRIPTION

Operating Voltage

The OPA2348AIDR-MS/OPA2348AIDGKR-MS device is fully specified and ensured for operation from 2.1V to 5.5V.In addition,many specifications apply from -55°C to 125℃. Parameters that vary significantly with operating voltages or temperature are shown in the Typical Characteristics graphs

Unity-Gain Bandwidth

The unity-gain bandwidth is the frequency up to which an amplifier with a unity gain may be operated without greatly distorting the signal.The OPA2348AIDR-MS/OPA2348AIDGKR-MSdevice has a 1.5-MHz unity-gain bandwidth.

Slew Rate

The slew rate is the rate at which an operational amplifier can change its output when there is a change on the input.The OPA2348AIDR-MS/OPA2348AIDGKR-MS deviceshave a 1.2-V/μ s slew rate.The LMV358-MS is characterized to perform with this technique;the recommended resistor value is approximately 20 k.

Device Functional Modes

The OPA2348AIDR-MS/OPA2348AIDGKR-MS device has a single functional mode. The device is powered on as long as the power supply voltage is between 2.1V(±1.35V)and 5.5V(±2.75V).

APPLICATIONS INFORMATION

The OPA2348AIDR-MS/OPA2348AIDGKR-MS is a unity-gain stable,precision operational amplifier with very low offset voltage drift; these devices are also free from output phase reversal.Applications with noisy or high-impedance power supplies require decoupling capacitors close to the device power-supply pins.In most cases, 0.1μF capacitors are adequate.

Typical Application

Figure 13 shows a simple circuit to convert a single-ended input into differential output.The OPA2348AIDR-MS/OPA2348AIDGKR-MS could be used to build this circuit.The circuit is composed of two amplifiers.One amplifier acts as a buffer and creates a voltage,Vour+.The second amplifier inverts the input and adds a reference voltage to generate Vour-.Both Vour+ and Vour-range from 0.5 to 2V.The diference, VDIFF,is the difference between VouT+and VouT-.

Detailed Design Procedure

Linearity over the input range is key for good dc accuracy.The common mode input range and the output swing limitations determine the linearity.In general,an amplifier with rail-to-rail input and output swing is required.Bandwidth is a key concern for this design.Because OPA2348AIDR-MS/OPA2348AIDGKR-MS has a bandwidth of 1 MHz,this circuit will only be able to process signals with frequencies of less than 1 MHz.

Because the transfer function of Vour-is heavily reliant on resistors(R1,R2,R3,and R4),use resistors with low tolerances to maximize performance and minimize error.This design used resistors with resistance values of 36 k with tolerances measured to be within 2%.If the noise of the system is a key parameter,the user can select smaller resistance values (6 k or lower)to keep the overall system noise low.This ensures that the noise from the resistors is lower than the amplifier noise.

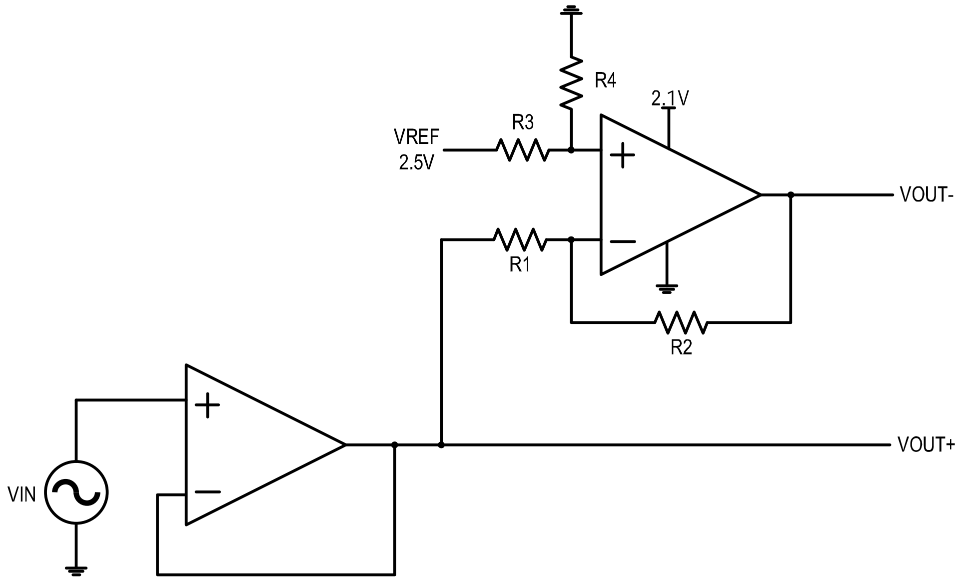
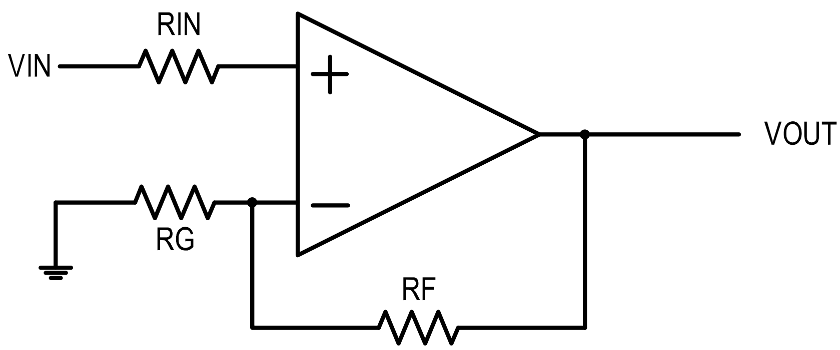


Figure 13. Schematic for Single-Ended Input to Differential Output Conversion

LAYOUT

Use good PCB layout practices for best operational performance of the device, including:

- Keep the length of input traces as short as possible.
- Run the input traces as far away from the supply lines as possible to reduce parasitic coupling.
- Place components close to device and to each other to reduce parasitic capacitance and parasitic errors.
- Use low-ESR, ceramic bypass capacitors to reduce the coupled noise by providing low impedance power sources local to the analog circuitry.
- Grounding for analog and digital portions of circuitry separately to suppresse the noise.



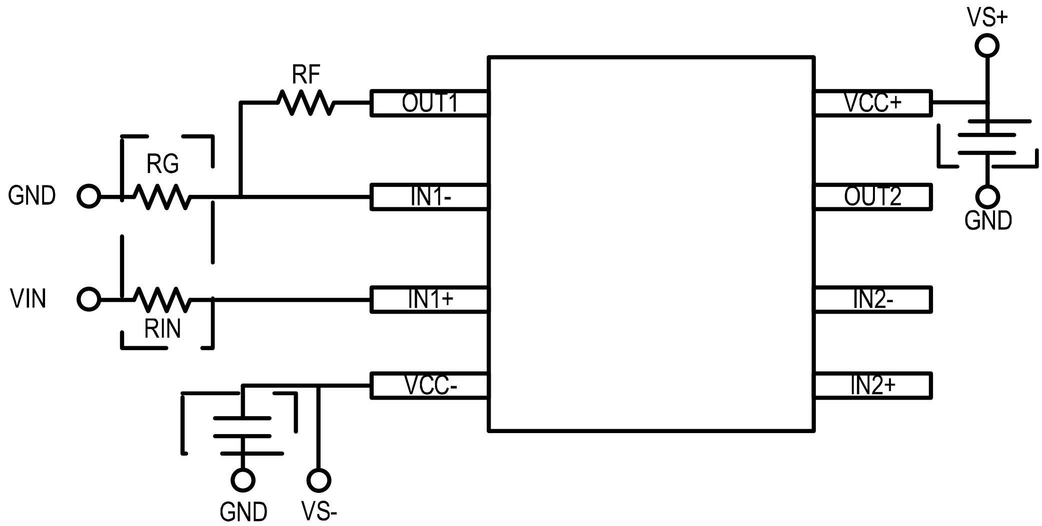
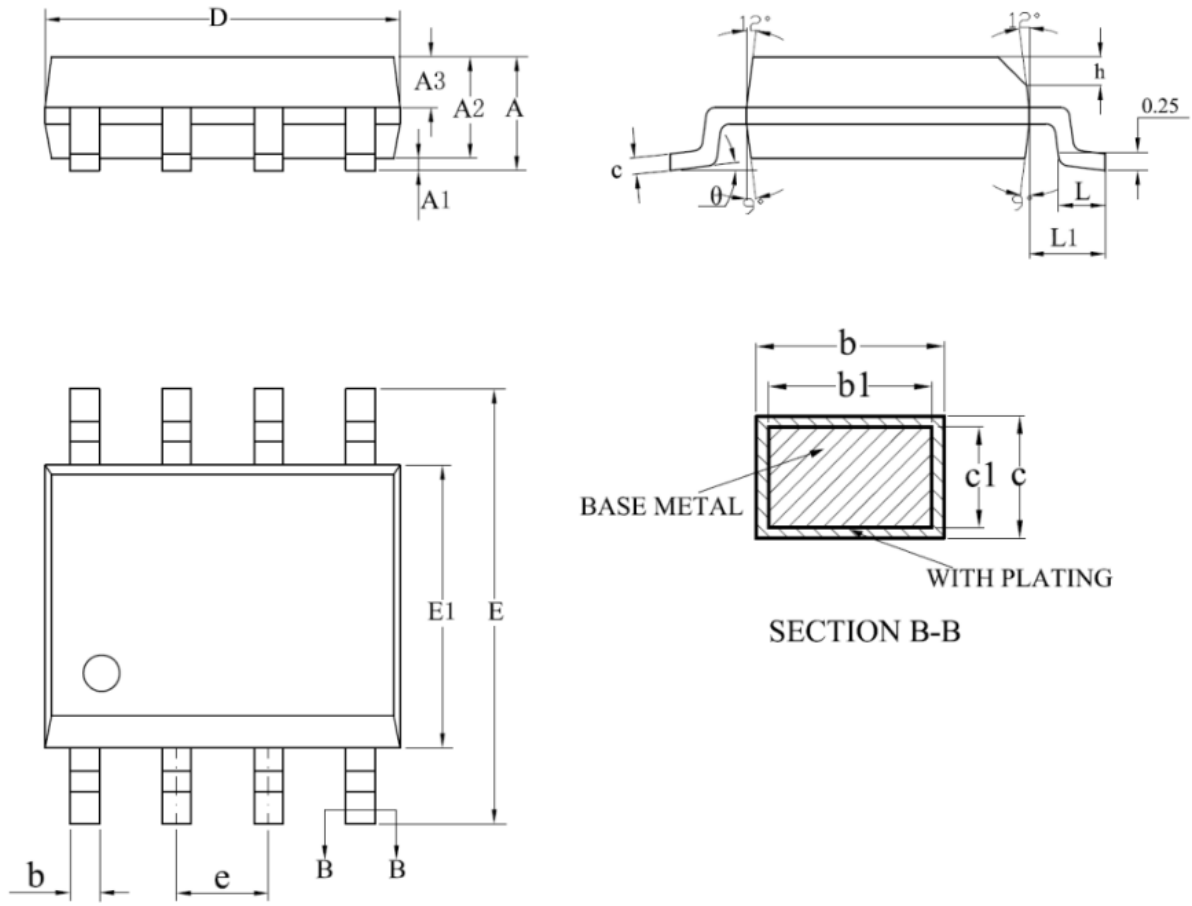


Figure 14. Operational Amplifier Schematic and Board Layout for Noninverting Configuration

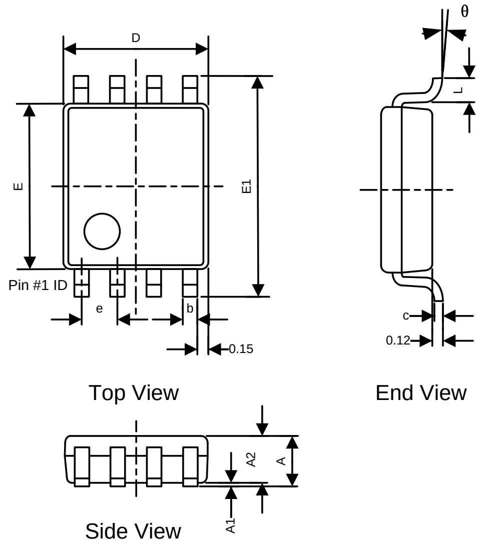
PACKAGE DESCRIPTION

SOP-8



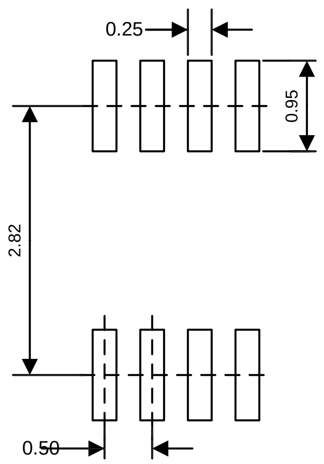
SYMBOL	millimeter		
	min	nom	max
A	-	-	1.75
A1	0.10	-	0.23
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	-	0.47
b1	0.38	0.41	0.44
c	0.20	-	0.24
c1	0.19	0.20	0.21
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
h	0.25	-	0.50
L	0.50	-	0.80
L1	1.05REF		
θ	0	-	8°

PACKAGE DESCRIPTION



DIMENSIONS						
Symbol	**MILLIMETERS**			**INCHES**		
	Min	**Typ**	**Max**	**Min**	**Typ**	**Max**
A	0.60	0.75	0.90	0.023	0.029	0.035
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.60	0.70	0.80	0.023	0.027	0.031
b	0.17	-	0.27	0.007	-	0.011
c	0.08	-	0.23	0.003	-	0.009
D	1.90	2.00	2.10	0.075	0.079	0.083
E	2.20	2.30	2.40	0.086	0.090	0.094
E1	3.00	3.10	3.20	0.118	0.122	0.126
e	0.50BSC			0.020BSC		
L	0.20	0.28	0.35	0.008	0.011	0.014
θ	0°	3°	6°	0°	3°	6°

Land Pattern



NOTES:
1. Compound dimension: 2.00×2.30;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

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