



FEATURES

- Slew rate: 0.93V/ μ s
- Bandwidth: 1.6MHz
- Input/Output full swing
- Low supply current: 83 μ A
- Offset Voltage: 0.8mV (Typical)
- Supply Voltage: 2.1V to 6.0V
- Operation Temperature Range: -40°C to 125°C
- Micro Size Packages: SOT23 and SC70

APPLICATIONS

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

- Consumer electronics

GENERAL DESCRIPTION

The MT060X series are single, dual, and quad rail-to-rail CMOS operational amplifiers. These amplifiers have the characteristics of input/output full swing, low offset, low power and stable high frequency response. They achieve very good AC performance with 1.6MHz bandwidth, 0.93V/ μ s slew rate and low distortion while drawing only 83 μ A of quiescent current per amplifier. MT060X has wide temperature range from -40°C to +125°C.

Single or dual supplies as low as 2.1V(\pm 1.05V) and up to 6.0V(\pm 3.0V) can be used.

The MT0601 is available in the 5-Pin SOT23 and SC70 packages.

SIMPLIFIED SCHEMATIC

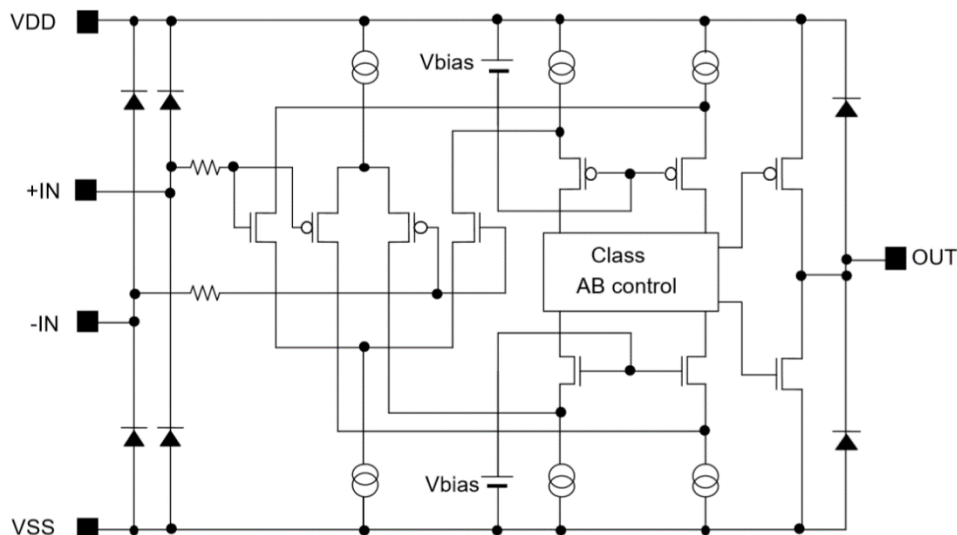


Figure 1. Simplified schematic

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply Voltage.....+2.1V to +6.0V
 Input Offset Voltage.....0.8mV(typical)
 Input Offset Current.....1.9pA(typical)
 Maximum Operating Junction Temperature.....150°C
 Operating Temperature Range.....-40°C to 125°C
 Storage Temperature-65°C to 150°C

PACKAGE/ORDER INFORMATION

TOP VIEW	Order Part Number	Package	Top Marking
<p>Not to scale</p>	MT0601	5-Pin SOT23 5-Pin SC70	MT0601 <u>AC</u> MT0601 <u>CD</u>
<p>Not to scale</p>		5-Pin SOT23R	MT0601 <u>RAC</u>
<p>Not to scale</p>		5-Pin SOT23U	MT0601 <u>UAC</u>

DEVICE INFORMATION

Order Part Number	Top Marking	Package
MT0601	MT0601 <u>AC</u>	SOT23-5
	MT0601 <u>RAC</u>	SOT23-5

	MT0601 <u>UAC</u>	SOT23-5
	MT0601 <u>CD</u>	SC70-5 (SOT353)

PIN DESCRIPTION

Pin Name	Pin Number	Description
OUT	-	Output
-IN	-	Inverting input
+IN	-	Noninverting input
-V	-	Positive (highest) power supply
+V	-	Negative(lowest) power supply

ELECTRICAL CHARACTERISTICS (Note 3)

(At $T_A = 25^\circ\text{C}$, $+V_S = +2.5\text{V}$, $-V_S = -2.5\text{V}$, $R_L = 2\text{K}\Omega$, $C_L = 100\text{pF}$, unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	$V_S = 5.0\text{V}$	-3	0.8	3	mV
Input Offset Voltage Drift	$T_A = -40^\circ\text{C}$ to 125°C		2		$\mu\text{V}/^\circ\text{C}$
Input Bias Current	$T_A = 25^\circ\text{C}$		1.7		pA
Input Offset Current			1.9		pA
Power Supply Rejection Ratio		80	91		dB
Common-mode Rejection Ratio		70	95		dB
Open Loop Voltage Gain	$R_L = 2\text{K}\Omega$, $C_L = 100\text{pF}$	85	119		dB
Gain-bandwidth product	$R_L = 2\text{K}\Omega$, $C_L = 100\text{pF}$		1.6		MHz
Slew Rate	$G = +1$, $R_L = 1\text{K}\Omega$, $C_L = 56\text{pF}$		0.93		$\text{V}/\mu\text{s}$
Input Voltage Noise	$f = 0.1\text{Hz}$ to 10Hz		8		μV_{PP}
Input Voltage Noise Density	$f = 1\text{kHz}$		27		$\text{nV}/\sqrt{\text{Hz}}$

Supply Current (per amplifier)			83		μA
Operating Temperature Range		-40		125	$^{\circ}\text{C}$
Storage Temperature Range		-65		150	$^{\circ}\text{C}$

Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

Note 2: T_J is calculated from the ambient temperature T_A and power dissipation P_D according to the following formula: $T_J = T_A + (P_D) \times (170^{\circ}\text{C}/\text{W})$.

Note 3: 100% production test at $+25^{\circ}\text{C}$. Specifications over the temperature range are guaranteed by design and characterization.

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TYPICAL PERFORMANCE CHARACTERISTICS

(At $T_A = 25^\circ\text{C}$, $+V_S = +2.5\text{V}$, $-V_S = -2.5\text{V}$, $R_L = 2\text{K}\Omega$, $C_L = 100\text{pF}$, unless otherwise noted.)

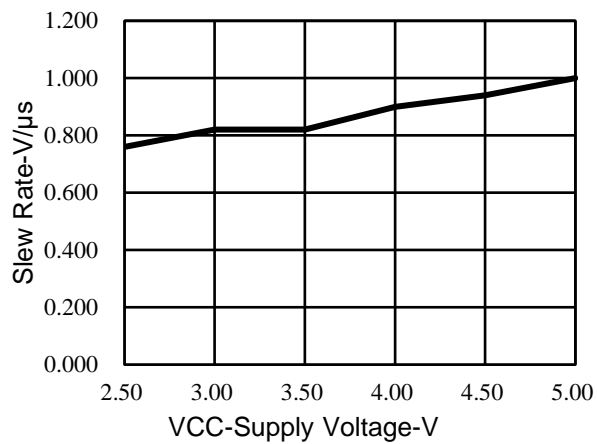


Figure 2. Slew Rate vs Supply Voltage

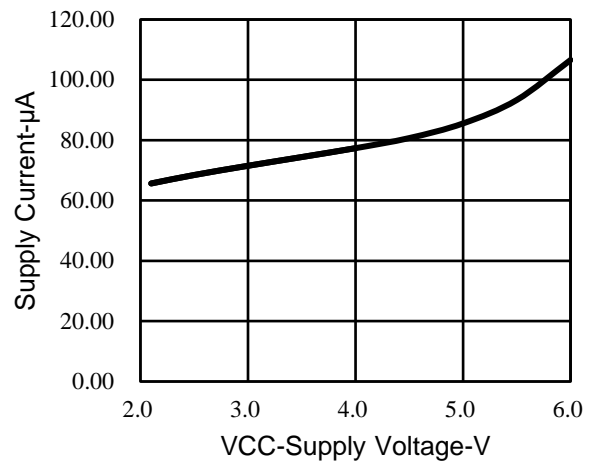


Figure 3. Supply Current vs Supply Voltage

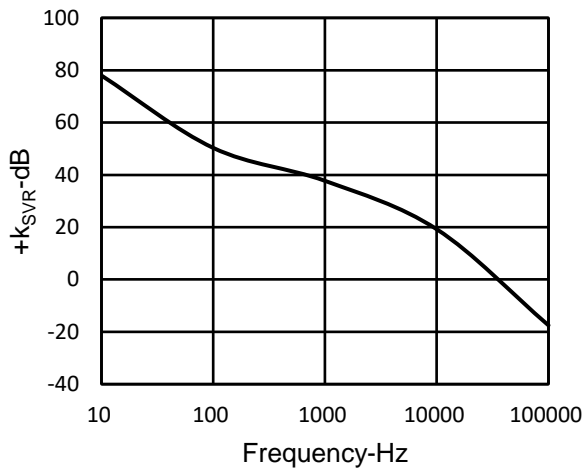


Figure 4. +k_{SVR} vs Frequency

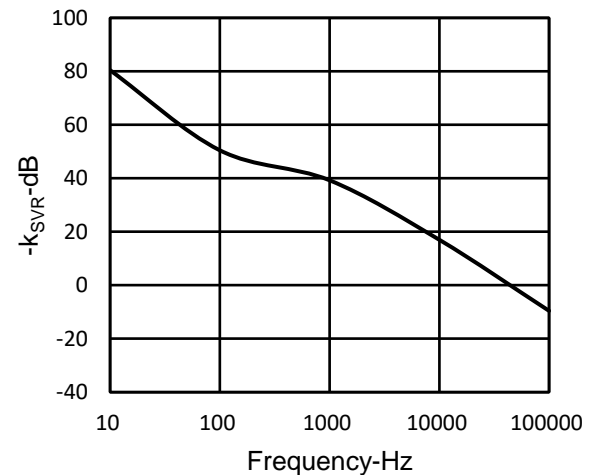


Figure 5. -k_{SVR} vs Frequency

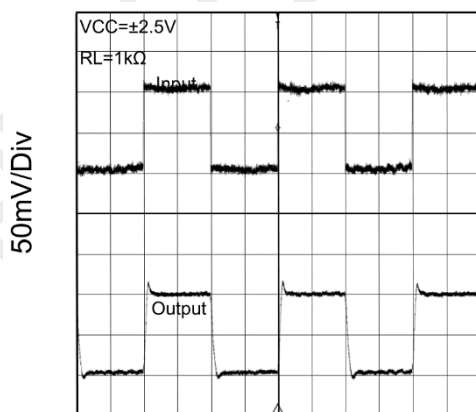


Figure 6. Noninverting Small-Signal Pulse Response

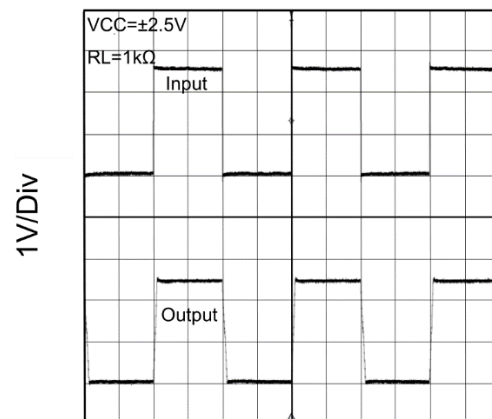
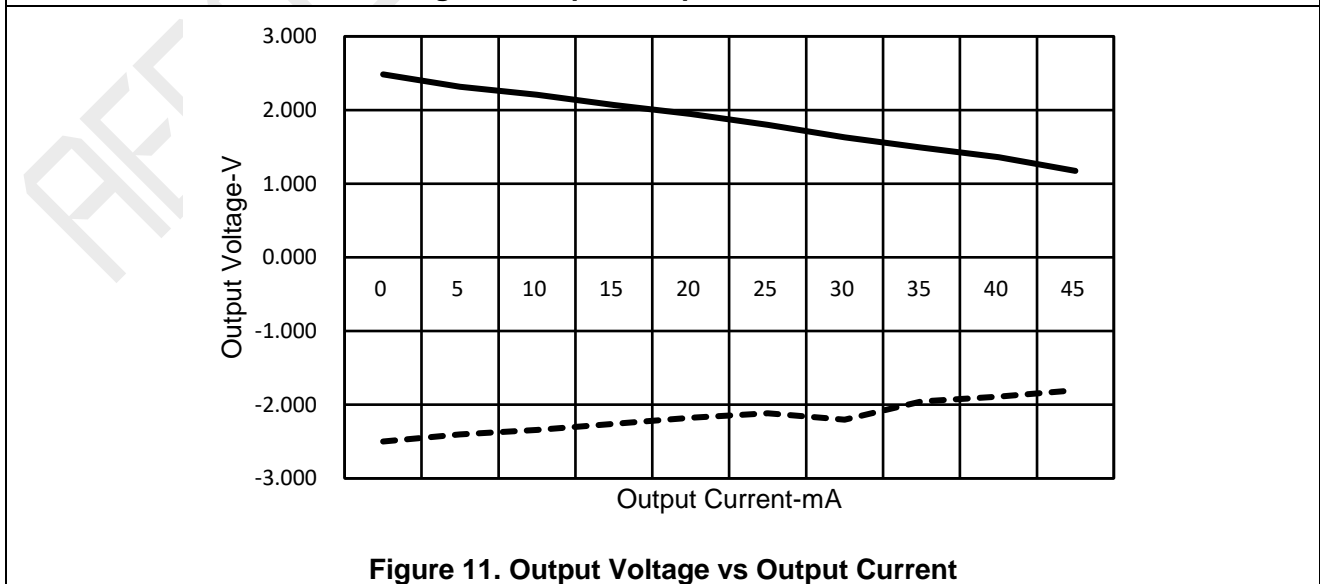
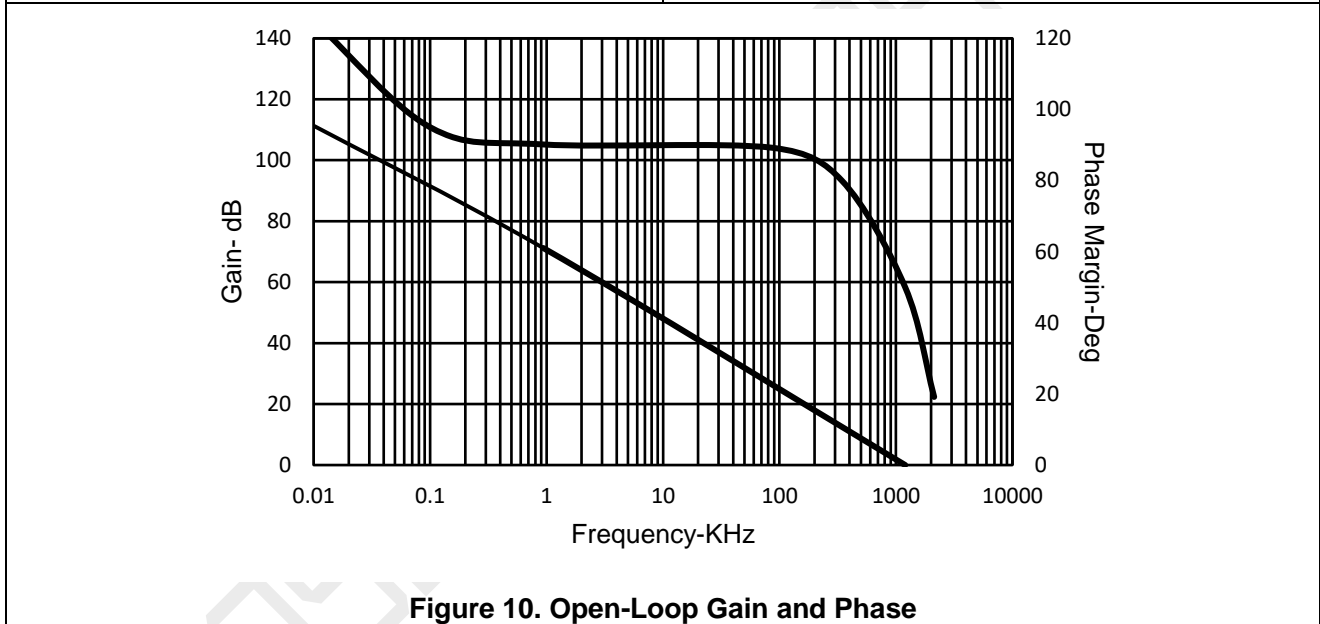
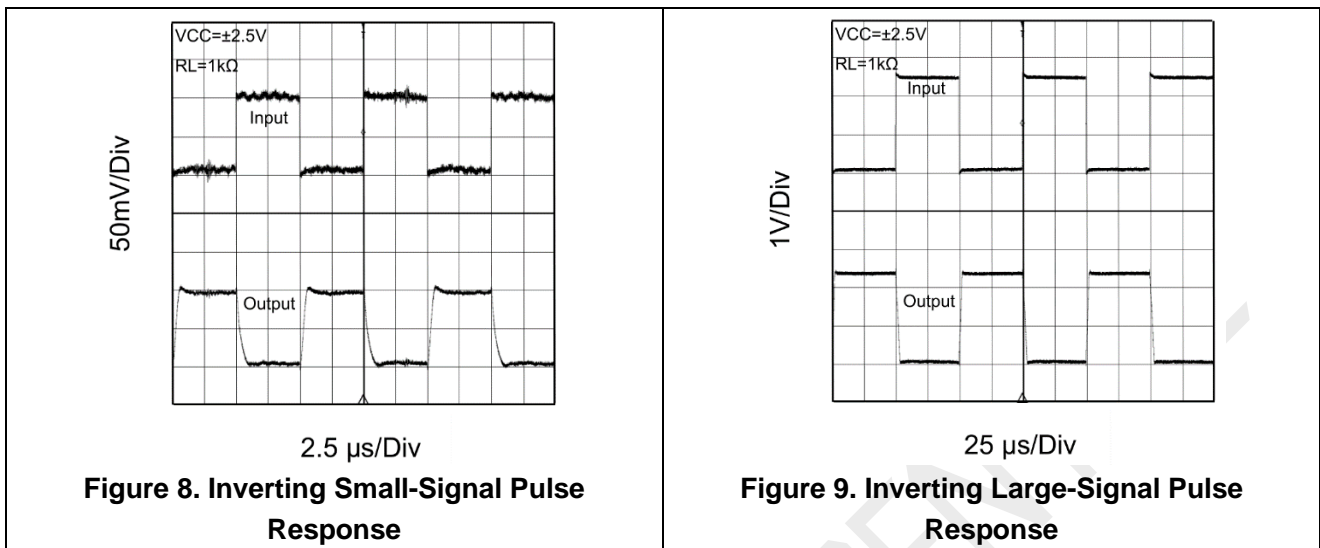


Figure 7. Noninverting Large-Signal Pulse Response

TYPICAL PERFORMANCE CHARACTERISTICS



APPLICATIONS INFORMATION

MT060X are low supply voltage CMOS operational Amplifiers. This amplifier has the characteristics of Input/Output full swing, high slew rate, low supply current and high speed operation. Input bias current is very low at 1pA (Typ) .MT060X has wide temperature range from -40°C to +85°C. Single or dual supplies as low as 2.1V(±1.05V) and up to 6.0V(±3.0V) can be used.

Voltage follower

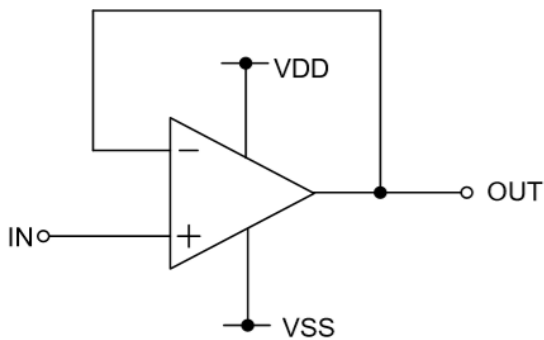


Figure 12. Voltage follower

Voltage gain is 0dB. Using this circuit, the output voltage (OUT) is configured to be equal to the input voltage (IN). This circuit also stabilizes the output voltage (OUT) due to high input impedance and low output impedance. Computation for output voltage (OUT) is shown below. $OUT=IN$.

Inverting amplifier

For inverting amplifier, input voltage (IN) is amplified by a voltage gain and depends on the ratio of R1 and R2. The out-of-phase output voltage is shown in the next expression

$$OUT = -(R2/R1) \cdot IN$$

This circuit has input impedance equal to R1.

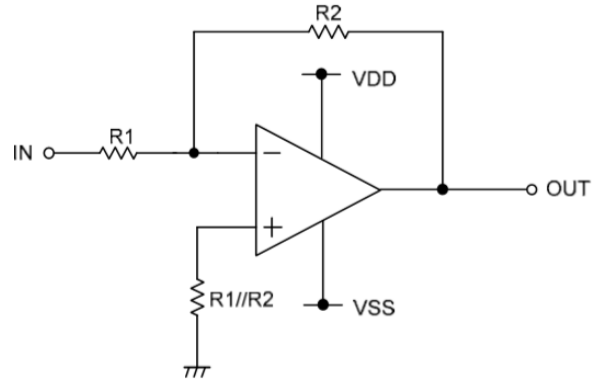


Figure 13. Inverting amplifier circuit

Non-inverting amplifier

For non-inverting amplifier, input voltage (IN) is amplified by a voltage gain, which depends on the ratio of R1 and R2. The output voltage (OUT) is in-phase with the input voltage (IN) and is shown in the next expression.

$$OUT = (1 + R2/R1) \cdot IN$$

Effectively, this circuit has high input impedance since its input side is the same as that of the operational amplifier.

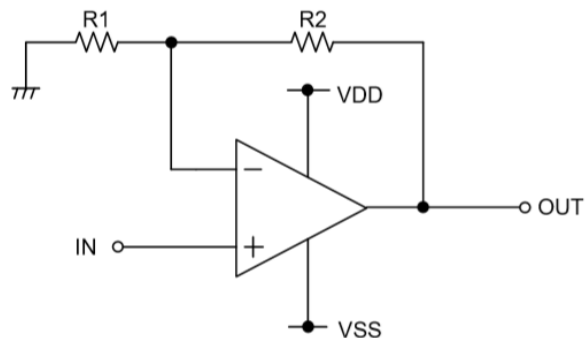
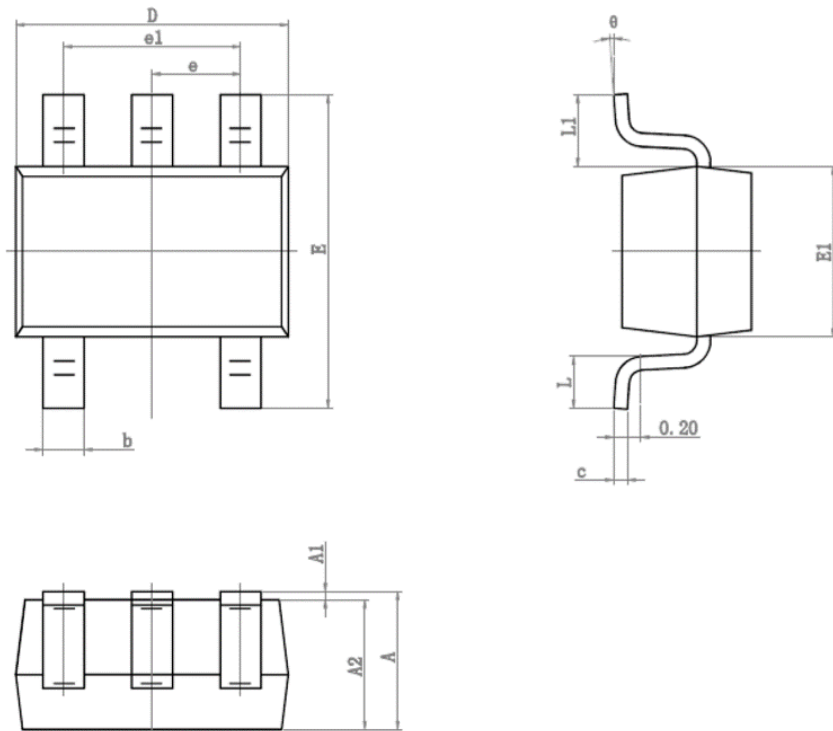


Figure 14. Non-inverting amplifier circuit

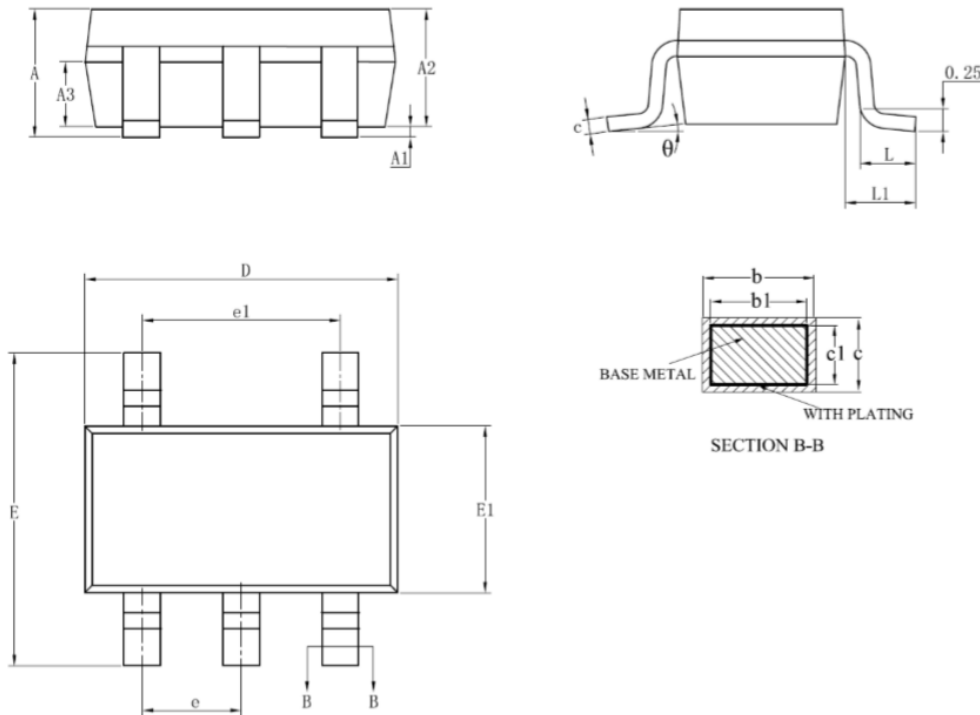
PACKAGE DESCRIPTION

SC70-5



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.110	0.175	0.004	0.007
D	2.000	2.200	0.079	0.087
E	2.150	2.450	0.085	0.096
E1	1.150	1.350	0.045	0.053
e	0.650 TYP.		0.026 TYP.	
e1	1.200	1.400	0.047	0.055
L	0.260	0.460	0.010	0.018
L1	0.525 REF.		0.021 REF.	
θ	0°	8°	0°	8°

SOT23-5



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	-	-	1.25
A1	0.04	-	0.10
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.33	-	0.41
b1	0.32	0.35	0.38
c	0.15	-	0.19
c1	0.14	0.15	0.16
D	2.82	2.92	3.02
E	2.60	2.80	3.00
E1	1.50	1.60	1.70
e	0.95BSC		
e1	1.90BSC		
L	0.30	-	0.60
L1	0.6REF		
θ	0	-	8°

NOTE:

- 1.All linear dimensions are in inches (millimeters).
- 2.This drawing is subject to change without notice.
- 3.Body length does not include mold flash,protrusions,or gate burrs.mold flash,protrusions,or gate burrs shall not exceed 0.006 (0.15) each side.
- 4.Body width does not include interlead flash.interlead flash shall not exceed 0.017 (0.43)each side.

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