

6.5MHz, Rail-to-Rail I/O CMOS Operational Amplifier

FEATURES

- HIGH GAIN BANDWIDTH:6.5MHz
- RAIL-TO-RAIL INPUT AND OUTPUT
0.8mV Typical Vos
- INPUT VOLTAGE RANGE: -0.1V to +5.6V
with Vs = 5.5V
- SUPPLY RANGE: +2.5V to +5.5V
- SPECIFIED UP TO +125°C

APPLICATIONS

- SENSORS
- PHOTODIODE AMPLIFICATION
- ACTIVE FILTERS
- TEST EQUIPMENT
- DRIVING A/D CONVERTERS

DESCRIPTION

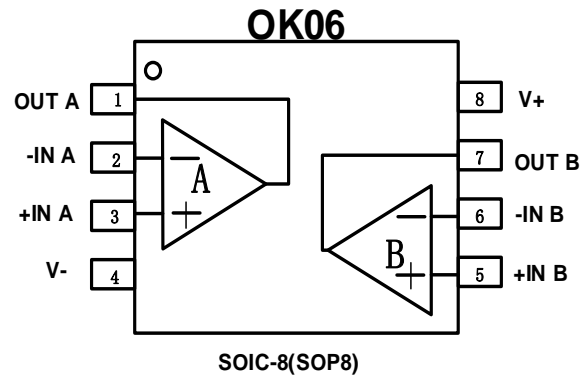
The OK06 offer low voltage operation and rail-to-rail input and output, as well as excellent speed/power consumption ratio, providing an excellent bandwidth (6.5MHz) and slew rate of 3.7V/us. The op-amps are unity gain stable and feature an ultra-low input bias current.

The devices are ideal for sensor interfaces, active filters and portable applications. The OK06 operational amplifier are specified at the full temperature range of -40°C to +125°C under single or dual power supplies of 2.5V to 5.5V.

Device Information ⁽¹⁾

PART NUMBER	PACKAGE	BODY SIZE(NOM)
OK06	SOIC-8(SOP8)	4.90mm×3.90mm

Pin Configuration and Functions (Top View)



Pin Description

NAME	PIN		I/O	DESCRIPTION
	OK06			
	SOIC-8(SOP8)			
-INA	2	I	Inverting input, channel A	
+INA	3	I	Noninverting input, channel A	
-INB	6	I	Inverting input, channel B	
+INB	5	I	Noninverting input, channel B	
OUTA	1	O	Output, channel A	
OUTB	7	O	Output, channel B	
V-	4	-	Negative (lowest) power supply	
V+	8	-	Positive (highest) power supply	

SPECIFICATIONS

Absolute Maximum Ratings

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

		MIN	MAX	UNIT
Voltage	Supply, $V_s=(V+) - (V-)$		7	V
	Signal input pin ⁽²⁾	(V-)-0.5	(V+) +0.5	
	Signal output pin ⁽³⁾	(V-)-0.5	(V+) +0.5	
Current	Signal input pin ⁽²⁾	-10	10	mA
	Signal output pin ⁽³⁾	-55	55	mA
	Output short-circuit ⁽⁴⁾	Continuous		
Temperature	Operating range, T_A	-40	125	°C
	Junction, T_J		150	
	Storage, T_{stg}	-65	150	

(1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.

(2) Input terminals are diode-clamped to the power-supply rails. Input signals that can swing more than 0.5V beyond the supply rails should be current-limited to 10mA or less.

(3) Output terminals are diode-clamped to the power-supply rails. Output signals that can swing more than 0.5V beyond the supply rails should be current-limited to ± 55 mA or less.

(4) Short-circuit to ground, one amplifier per package.

ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM)	± 5000	V
		Machine Model (MM)	± 400	

Recommended Operating Conditions

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

		MIN	NOM	MAX	UNIT
Supply voltage , $V_s= (V+) - (V-)$	Single-supply	2.5		5.5	V
	Dual-supply	± 1.25		± 2.75	

Thermal Information: OK06

THERMAL METRIC ⁽¹⁾		OK06	UNIT
		8PINS	
		SOIC-8(SOP8)	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	116	°C/W
$R_{\theta JC(top)}$	Junction-to-case(top) thermal resistance	60	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	56	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	12.8	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	98.3	°C/W
$R_{\theta JC(bot)}$	Junction-to-case(bottom) thermal resistance	N/A	°C/W

PACKAGE/ORDERING INFORMATION

Orderable Device	Package Type	Pin	Channel	Op Temp(°C)	Device Marking ⁽¹⁾	Package Qty
OK06XK	SOIC-8(SOP8)	8	2	-40°C~125°C	OK06	Tape and Reel,4000

NOTE:

- (1) There may be additional marking, which relates to the lot trace code information(data code and vendor code), the logo or the environmental category on the device.

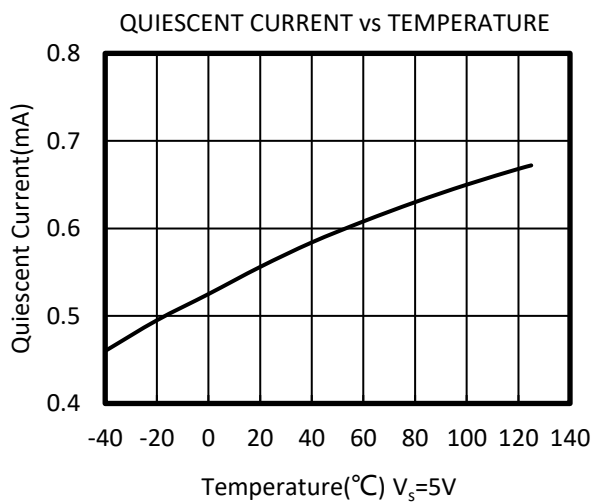
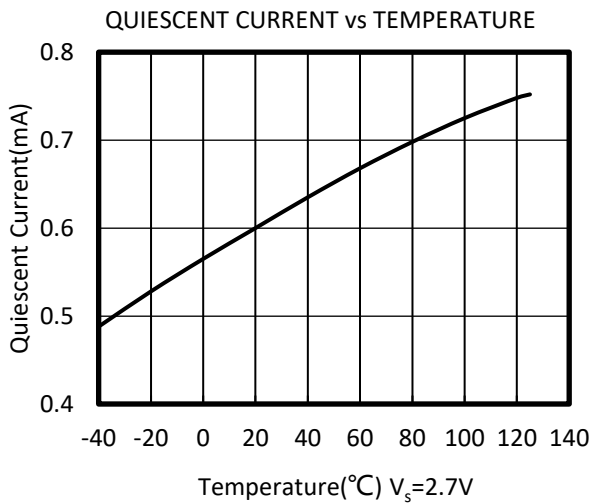
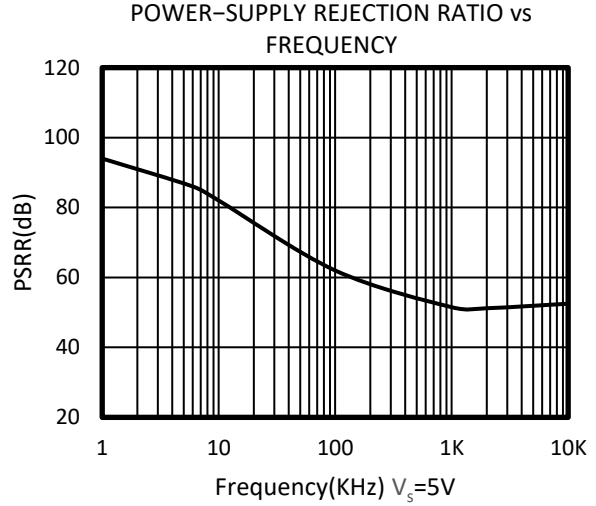
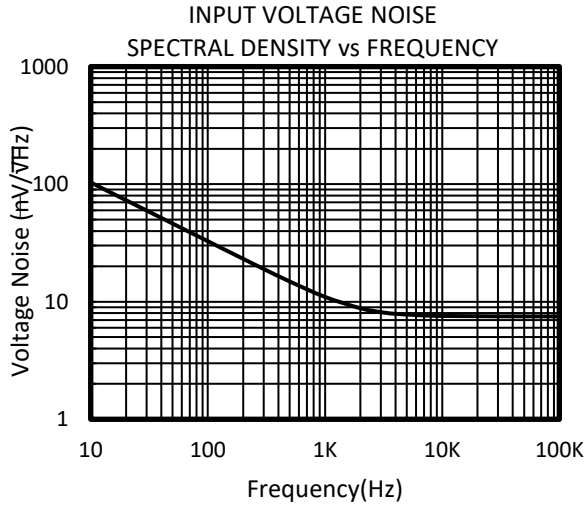
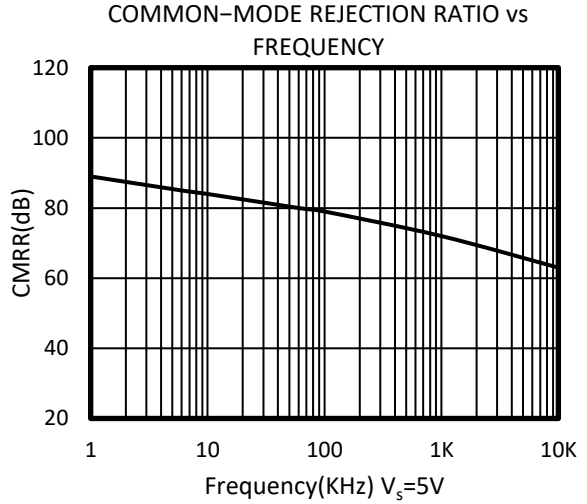
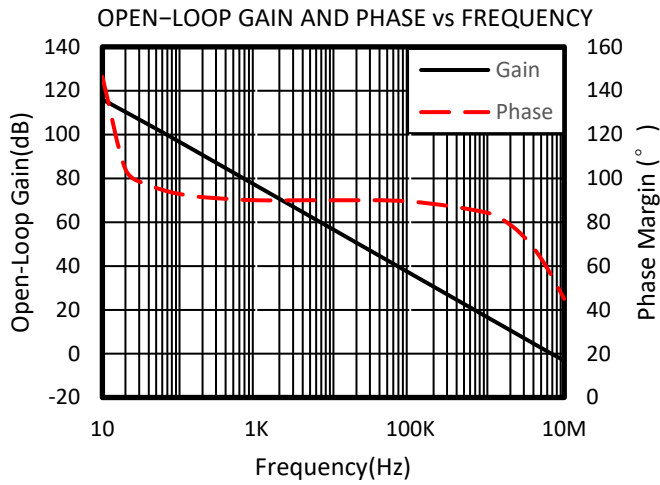
ELECTRICAL CHARACTERISTICS

(At $T_A = +25^\circ\text{C}$, $V_S = 5\text{V}$, $R_L = 10\text{k}\Omega$ connected to $V_S/2$, and $V_{OUT} = V_S/2$, unless otherwise noted.)

PARAMETER	CONDITIONS	T_J	OK06			UNITS	
			MIN	TYP	MAX		
POWER SUPPLY							
V_S	Operating Voltage Range		25°C	2.5		5.5	V
I_Q	Quiescent Current/Amplifier		25°C		590	820	μA
PSRR	Power-Supply Rejection Ratio	$V_S = 2.5\text{V to } 5.5\text{V}$, $V_{CM} = (V_-) + 0.5\text{V}$	25°C	75	94		dB
			$-40^\circ\text{C to } 125^\circ\text{C}$	72			
INPUT							
V_{OS}	Input Offset Voltage	$V_{CM} = V_S/2$	25°C	-3	± 0.8	3	mV
$V_{OS} T_C$	Input Offset Voltage Average Drift		$-40^\circ\text{C to } 125^\circ\text{C}$		2		$\mu\text{V}/^\circ\text{C}$
I_B	Input Bias Current		25°C		1	10	pA
I_{OS}	Input Offset Current		25°C		1	10	pA
V_{CM}	Common-Mode Voltage Range	$V_S = 5.5\text{V}$	25°C	-0.1		5.6	V
CMRR	Common-Mode Rejection Ratio	$V_S = 5.5\text{V}$, $V_{CM} = -0.1\text{V to } 4\text{V}$	25°C	74	92		dB
			$-40^\circ\text{C to } 125^\circ\text{C}$	68			
			25°C	62	83		
			$-40^\circ\text{C to } 125^\circ\text{C}$	60			
OUTPUT							
AOL	Open-Loop Voltage Gain	$R_L = 2\text{k}\Omega$, $V_O = 0.15\text{V to } 4.85\text{V}$	25°C	95	100		dB
			$-40^\circ\text{C to } 125^\circ\text{C}$	83			
			25°C	98	106		
			$-40^\circ\text{C to } 125^\circ\text{C}$	85			
	Output Swing From Rail	$R_L = 2\text{k}\Omega$	25°C		40		mV
		$R_L = 10\text{k}\Omega$			7		
I_{out}	Output Current Source		25°C		50		mA
FREQUENCY RESPONSE							
SR	Slew Rate		25°C		3.7		V/ μs
GBP	Gain-Bandwidth Product		25°C		6.5		MHz
PM	Phase Margin		25°C		63		$^\circ$
t_s	Setting Time, 0.1%		25°C		0.5		μs
	Overload Recovery Time	$V_{IN} \cdot \text{Gain} \geq V_S$	25°C		0.5		μs
NOISE							
en	Input Voltage Noise Density	$f = 1\text{KHz}$	25°C		12		nV/ $\sqrt{\text{Hz}}$
		$f = 10\text{KHz}$	25°C		8		nV/ $\sqrt{\text{Hz}}$

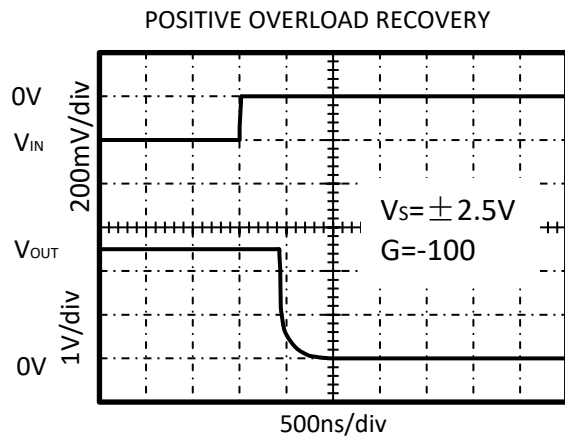
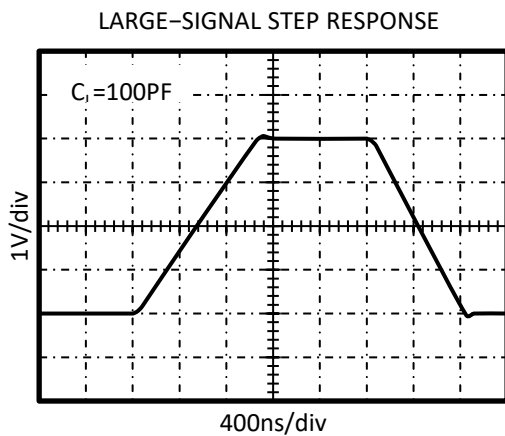
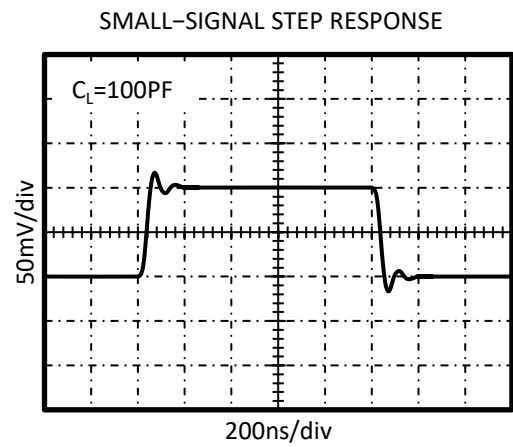
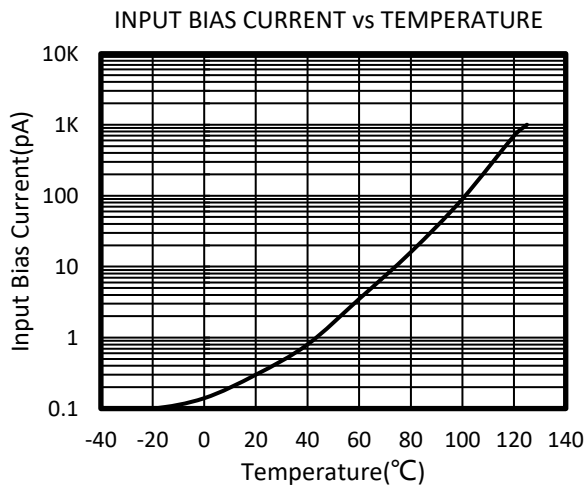
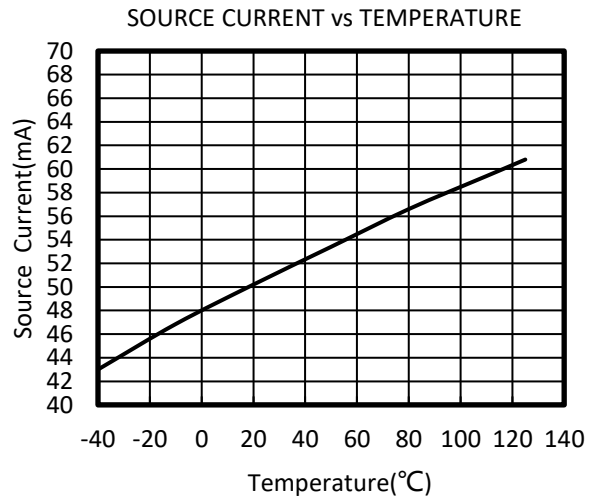
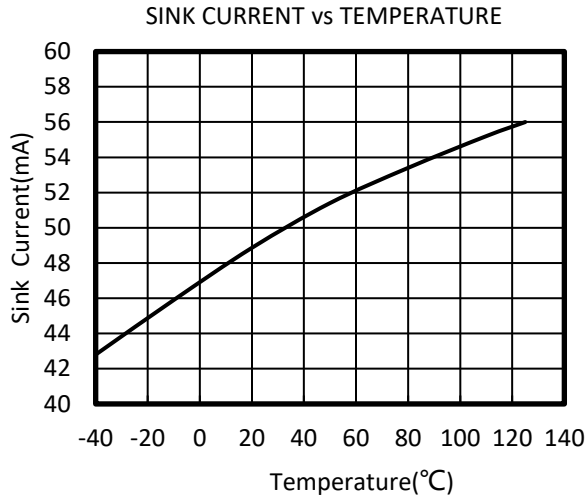
TYPICAL CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, $V_S=5\text{V}$, $R_L = 10\text{k}\Omega$ connected to $V_S/2$, $V_{OUT} = V_S/2$, unless otherwise noted.



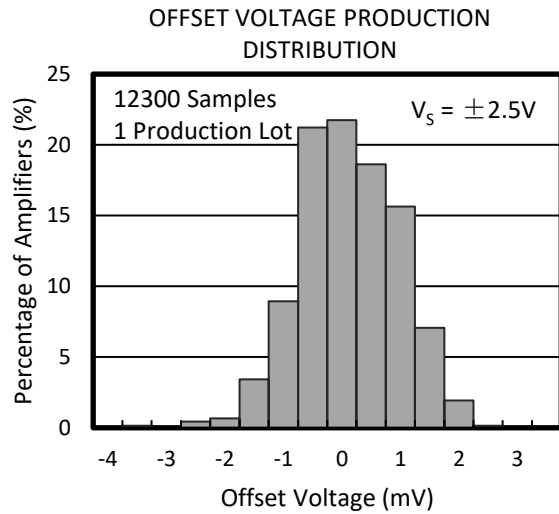
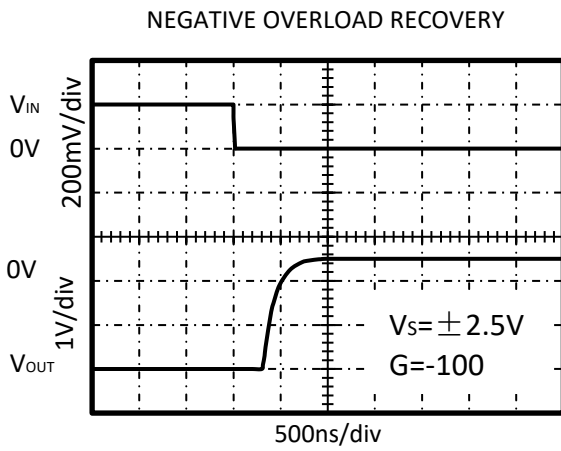
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APPLICATION NOTES

The OK06 is high precision, rail-to-rail operational amplifiers that can be run from a single-supply voltage 2.5V to 5.5V ($\pm 1.25V$ to $\pm 2.75V$). Supply voltages higher than 7V (absolute maximum) can permanently damage the amplifier.

Rail-to-rail input and output swing significantly increases dynamic range, especially in low-supply applications.

Good layout practice mandates use of a 0.1uF capacitor place closely across the supply pins.

LAYOUT GUIDELINS

Attention to good layout practices is always recommended. Keep traces short. When possible, use a PCB ground plane with surface-mount components placed as close to the device pins as possible. Place a 0.1uF capacitor closely across the supply pins.

These guidelines should be applied throughout the analog circuit to improve performance and provide benefits such as reducing the EMI susceptibility.

INSTRUMENTATION AMPLIFIER

In the three-op amp, instrumentation amplifier configuration shown in Figure2,

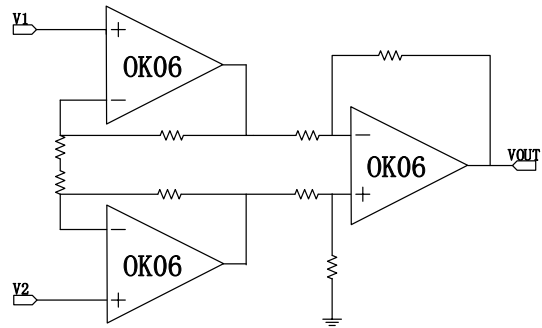


Figure2. Amplifier instrumentation amplifier

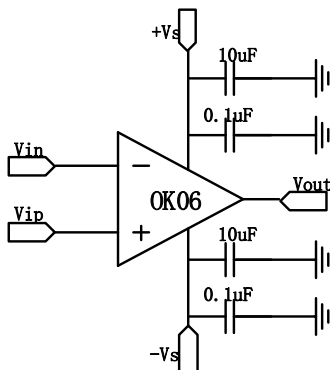
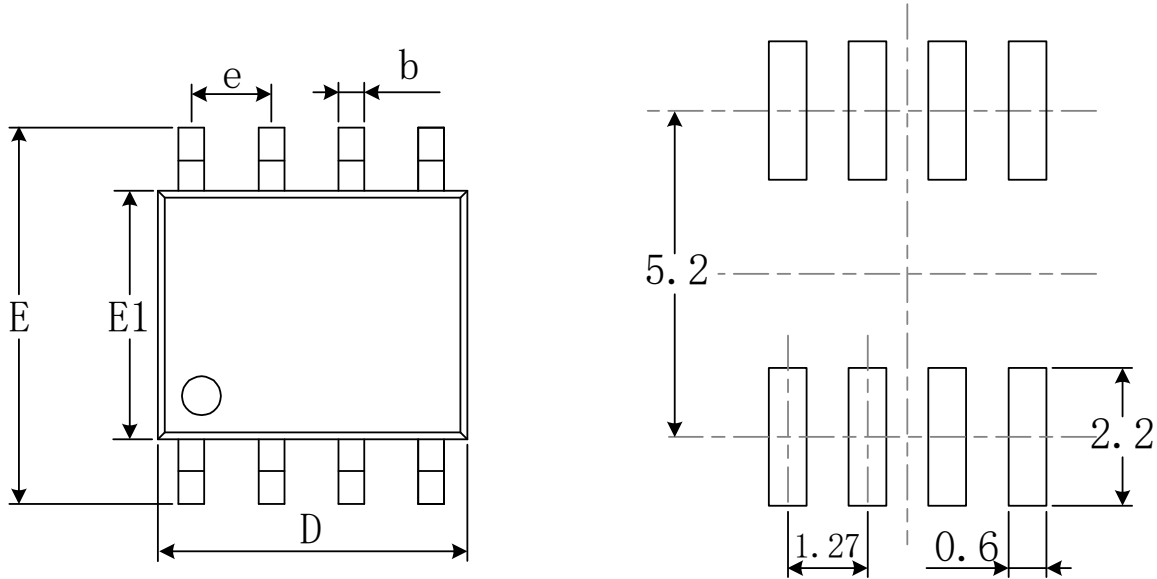
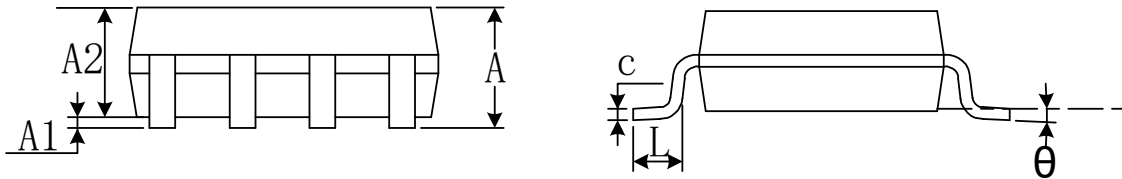


Figure1. Amplifier with Bypass Capacitors

PACKAGE OUTLINE DIMENSIONS

SOIC-8(SOP8)


RECOMMENDED LAND PATTERN (Unit: mm)


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270(BSC)		0.050(BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°