AOS SEMICONDUCTOR

产品规格说明书

Product Data Sheet

AOS324AXx

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1.1MHz, Precision, Rail-to-Rail I/O CMOS Operational Amplifier

DESCRIPTIONS

The AOS324A products offer low voltage operation and rail-to-rail input and output, as well as excellent speed/power consumption ratio, providing an excellent bandwidth (1.1MHz) and slew rate of 0.5V/us. The op-amps are unity gain stable and feature an ultra-low input bias current.

The AOS324A has lower offset, which is guaranteed not upper than ±4.5mV at 25℃ with Vs = 5V, V_{CM} = Vs/2.

The devices are ideal for sensor interfaces, active filters and portable applications.

The AOS324A families of operational amplifiers are specified at the full temperature range of −40℃ to +125℃ under single or dual power supplies of 2.5V to 5.5V.

FEATURES

★ HIGH GAIN BANDWIDTH:1.1MHz
★ RAIL-TO-RAIL INPUT AND OUTPUT ±4.5mV 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℃
★ Micro SIZE PACKAGES: SOIC-14、TSSOP-14

APPLICATIONS

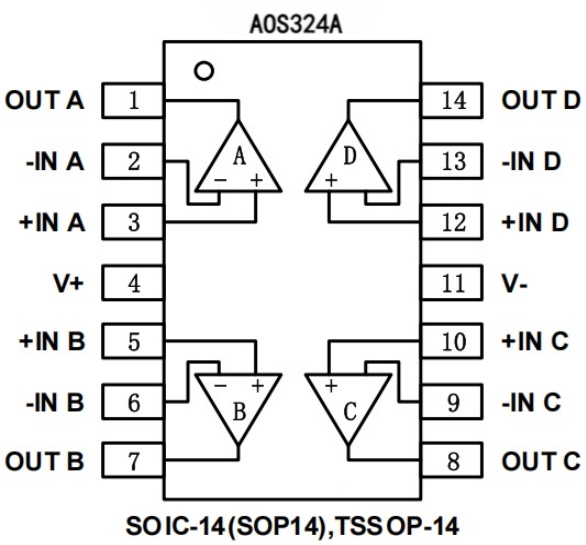
★ SENSORS
★ PHOTODIODE AMPLIFICATION
★ ACTIVE FILTERS
★ TEST EQUIPMENT
★ DRIVING A/D CONVERTERS

Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE(NOM)
AOS324A	SOIC-14(SOP14)	8.65mm×3.90mm
	TSSOP-14	5.00mm×4.40mm

(1)For all available packages, see the orderable addendum at the end of the data sheet.

PIN CONFIGURATION AND FUNCTIONS (Top View)



PIN DESCRIPTION

NAME	PIN	I/O	DESCRIPTION
	SOIC-14(SOP14)/TSSOP-14		
-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
-INC	9	I	Inverting input, channel C
+INC	10	I	Noninverting input, channel C
-IND	13	I	Inverting input, channel D
+IND	12	I	Noninverting input, channel D
OUTA	1	O	Output, channel A
OUTB	7	O	Output, channel B
OUTC	8	O	Output, channel C
OUTD	14	O	Output, channel D
V-	11	-	Negative (lowest) power supply
V+	4	-	Positive (highest) power supply

Specifications

Absolute Maximum Ratings

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

		MIN	MAX	UNIT
Voltage	Supply, Vs=(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)	-140	140	mA
	Output short-circuit (4)	Continuous		
Temperature	Operating range, T_A	-40	125	℃
	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 ±140mA or less.

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

ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM)	3000	V
		Machine Model (MM)	200	

Recommended Operating Conditions

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

		MIN	NOM	MAX	UNIT
Supply voltage, Vs=(V+) -(V-)	Single-supply	2.5		5.5	V
	Dual-supply	±1.25		±2.75	
Specified temperature		-40		125	℃

Thermal Information:

THERMAL METRIC (1)		AOS324A 14PINS		UNIT
		SOIC-14(SOP14)	TSSOP-14	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	83.8	205.8	℃/W
$R_{\theta JC(top)}$	Junction-to-case(top) thermal resistance	70.7	106.7	℃/W
$R_{\theta JB}$	Junction-to-board thermal resistance	59.5	133.9	℃/W
ψ_{JT}	Junction-to-top characterization parameter	11.6	34.4	℃/W
ψ_{JB}	Junction-to-board characterization parameter	37.7	132.6	℃/W
$R_{\theta JC(bot)}$	Junction-to-case(bottom) thermal resistance	N/A	N/A	℃/W

PACKAGE/ORDERING INFORMATION(1)

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING	PACKAGEOPTION
AOS324A	AOS324AXP	-40℃ ~125℃	SOIC-14(SOP14)	AOS324A	Tape and Reel,2500
	AOS324AXQ	-40℃ ~125℃	TSSOP-14	AOS324A	Tape and Reel,3000

ELECTRICAL CHARACTERISTICS

(At T_A= +25℃, V_S=5V, R_L= 10kΩ connected to V_S/2, and V_{OUT}= V_S/2, unless otherwise noted.)

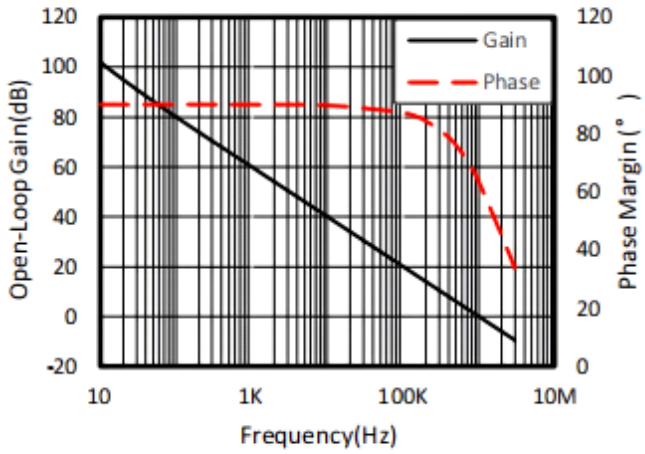
PARAMETER		CONDITIONS	T_J	AOS324A			UINTS
				MIN	TYP	MAX	
POWER SUPPLY							
Vs	Operating Voltage Range		25°C	2.5		5.5	V
IQ	Quiescent Current/ Amplifier		25°C		60	110	uA
PSRR	Power-SupplyRejection Ratio	Vs=2.5V to 5.5V, V_{CM}=(V-)+0.5V	25°C	74	90		dB
			-40°C to 125°C	65			
INPUT							
Vos	Input Offset Voltage	V_{CM}=0V to 3.5V	25°C	-4.5	±0.8	4.5	mV
Vos TC	Input Offset VoltageAverage Drift	-40°C to 125°C			2		uV/°C
IB	Input Bias Current		25°C		10	100	pA
Ios	Input Offset Current		25°C		1	10	pA
VCM	Common-Mode Voltage Range	Vs= 5.5V	25°C	-0.1		5.6	V
CMRR	Common-ModeRejection Ratio	Vs= 5.5V, V_{CM}=-0.1V to 4V	25°C	74	90		dB
			-40°C to 125°C	68			
		Vs= 5.5V, V_{CM}=-0.1V to 5.6V	25°C	63	80		
			-40°C to 125°C	57			
OUTPUT							
AOL	Open-Loop Voltage Gain	R_L=2KΩ, Vo=0.15V to 4.85V	25°C	85	105		dB
			-40°C to 125°C	80			
		R_L=10KΩ, Vo=0.05V to 4.95V	25°C	88	110		
			-40°C to 125°C	83			
	Output Swing From Rail	R_L=2KΩ	25°C		25		mV
		R_L=10KΩ			8		
Iout	Output Short-Circuit Current		25°C		130		mA

FREQUENCY RESPONSE							
SR	Slew Rate		25°C		0.5		V/us
GBP	Gain-Bandwidth Product		25°C		1.1		MHz
PM	Phase Margin		25°C		64		°
ts	Setting Time,0.1%				1.3		us
	Overload Recovery Time	V_{IN} · Gain≥V_S			2.3		us
NOISE							
en	Input Voltage Noise Density	f = 1KHz	25°C		22		nV/√Hz
		f = 10KHz	25°C		20		nV/√Hz

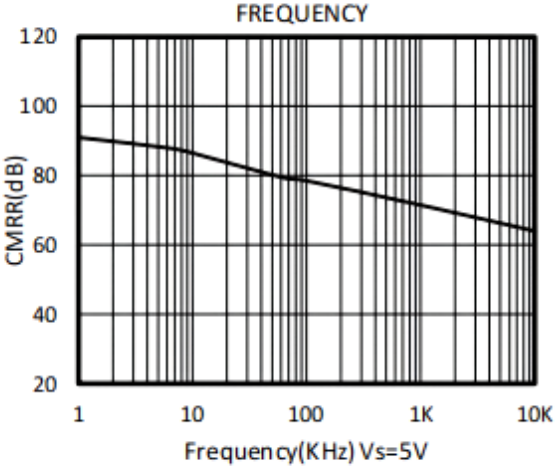
TYPICAL CHARACTERISTICS

At T_A= +25℃, Vs=5V, R_L= 10kΩ connected to V_S/2, V_{OUT}= V_S/2, unless otherwise noted.

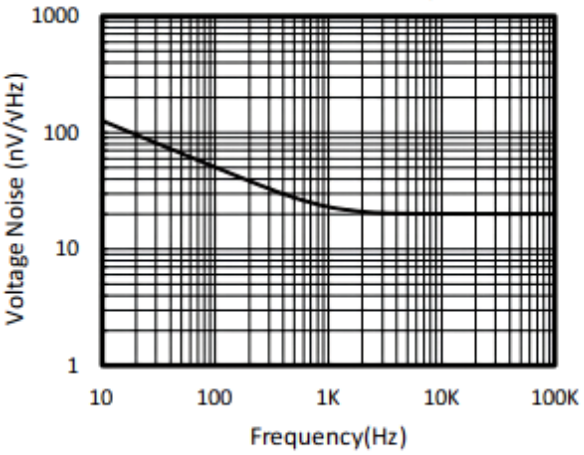
OPEN-LOOP GAIN AND PHASE vs FREQUENCY



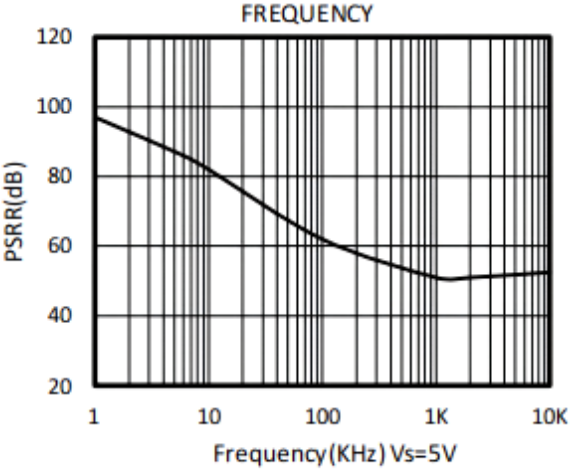
COMMON-MODE REJECTION RATIO vs FREQUENCY



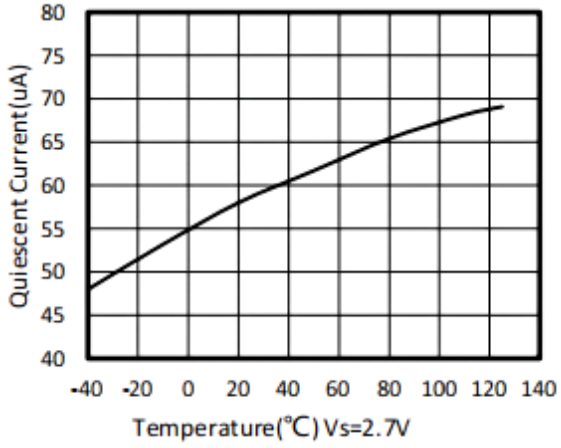
INPUT VOLTAGE NOISE SPECTRAL DENSITY vs FREQUENCY



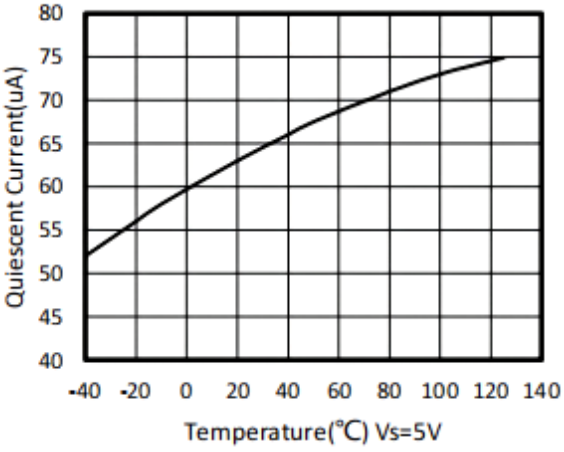
POWER-SUPPLY REJECTION RATIO vs FREQUENCY



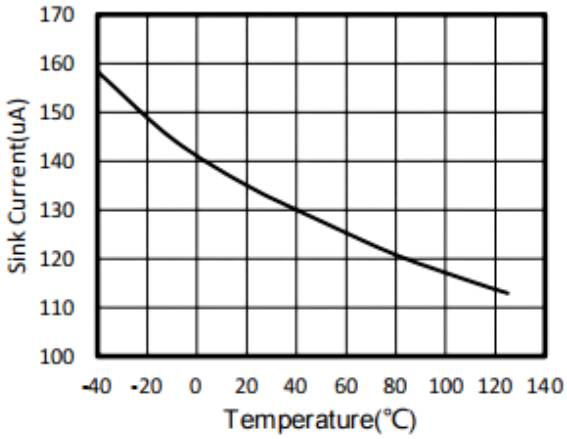
QUIESCENT CURRENT vs TEMPERATURE



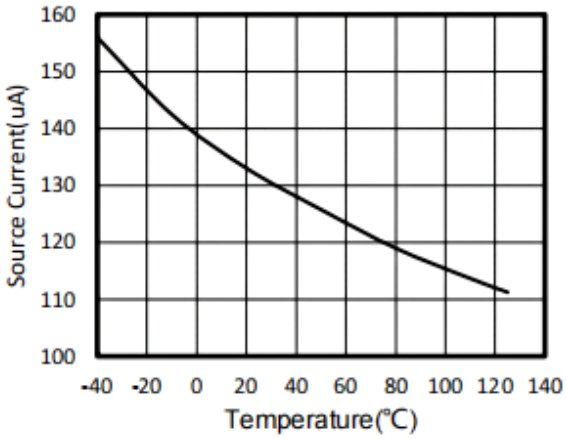
QUIESCENT CURRENT vs TEMPERATURE



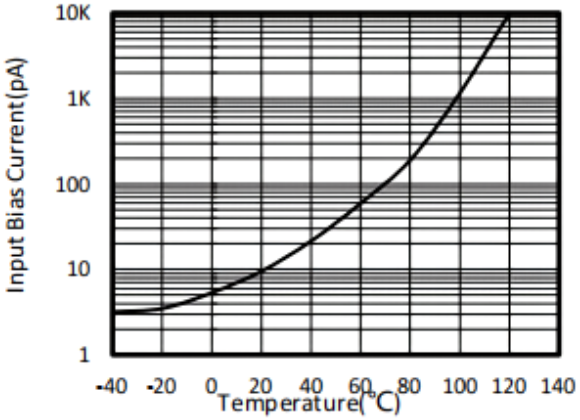
SINK CURRENT vs TEMPERATURE



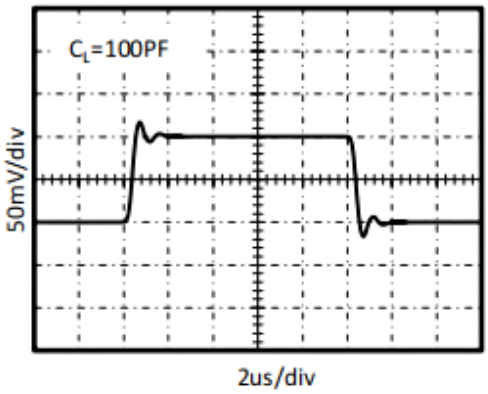
SOURCE CURRENT vs TEMPERATURE



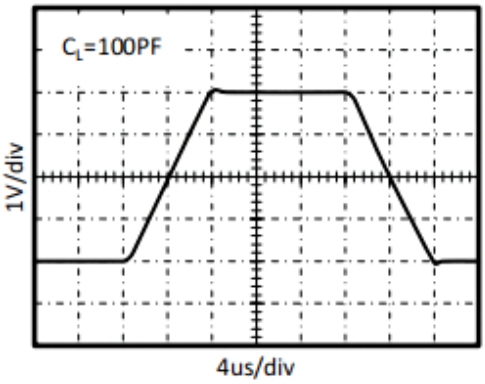
INPUT BIAS CURRENT vs TEMPERATURE



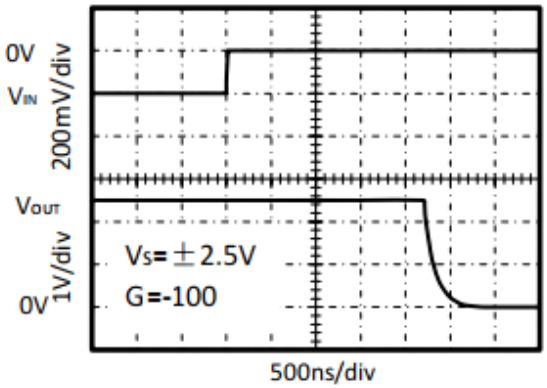
SMALL-SIGNAL STEP RESPONSE

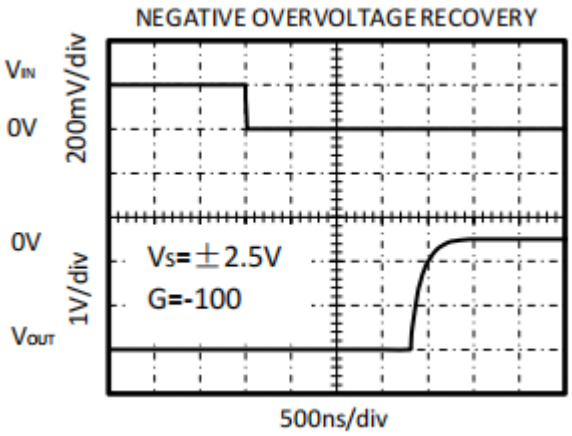


LARGE-SIGNAL STEP RESPONSE



POSITIVE OVERVOLTAGE RECOVERY




NEGATIVE OVERVOLTAGE RECOVERY
VIN
0V
200mV/div
0V
1V/div
VOUT
VS=±2.5V
G=-100
500ns/div

APPLICATION NOTES

The AOS324A are high precision, rail-to-rail operational amplifiers that can be run froma singlesupply voltage 2.5V to 5.5V(±1.25V to ±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 Figure 2

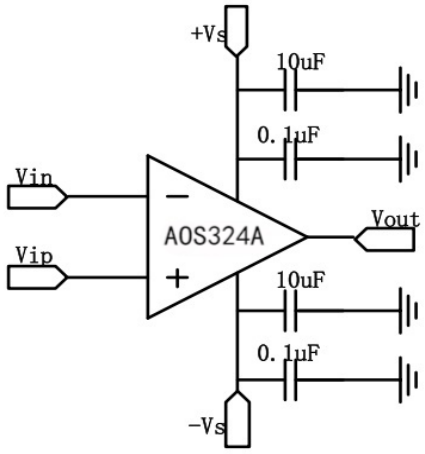


Figure1. Amplifier with Bypass Capacitors

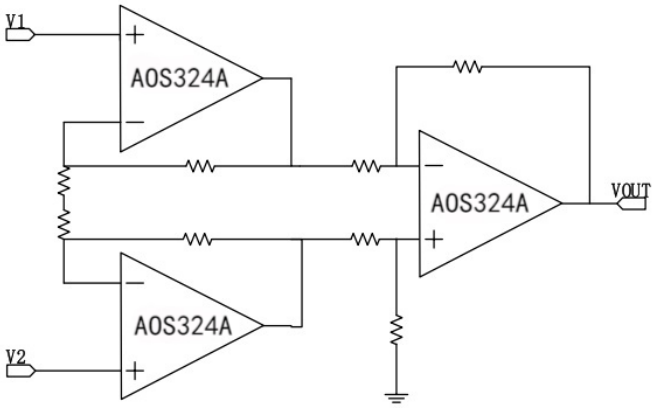
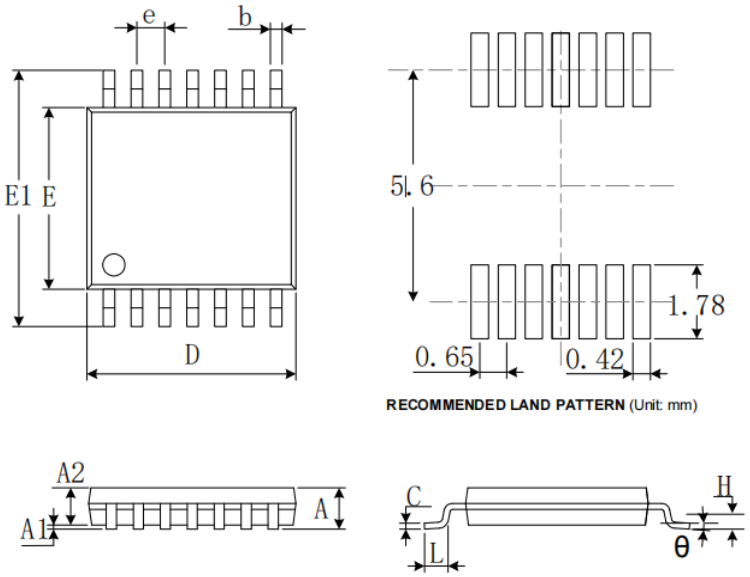


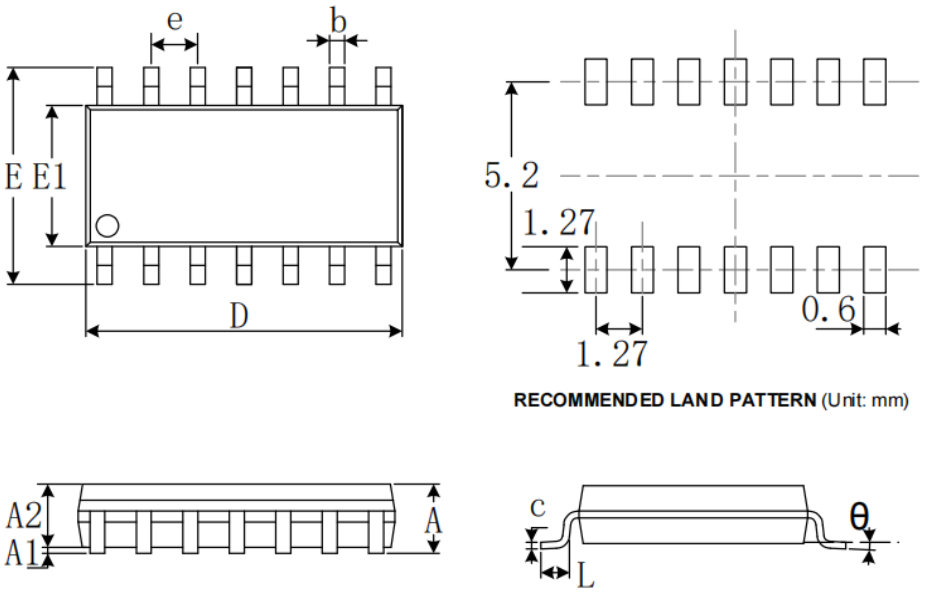
Figure2. Amplifier instrumentation amplifier

PACKAGE OUTLINE DIMENSIONS
TSSOP-14



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A		1.200		0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.860	5.100	0.191	0.201
E	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
e	0.650(BSC)		0.026(BSC)	
L	0.500	0.700	0.020	0.028
H	0.25(TYP)		0.01(TYP)	
θ	1°	7°	1°	7°

SOIC-14(SOP14)



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	0.310	0.510	0.012	0.020
c	0.100	0.250	0.004	0.010
D	8.450	8.850	0.333	0.348
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°