

FEATURES

- HIGH GAIN BANDWIDTH:7MHz
- RAIL-TO-RAIL INPUT AND OUTPUT
0.7mV Typical Vos
- INPUT VOLTAGE RANGE: -0.1V to +5.6V
with Vs = 5.5V
- SUPPLY RANGE: +2.5V to +5.5V
- SHUTDOWN: CBM8621S/CBM8622S
- SPECIFIED UP TO +125°C
- Micro SIZE PACKAGES: SOT23-5, SOT23-6

APPLICATIONS

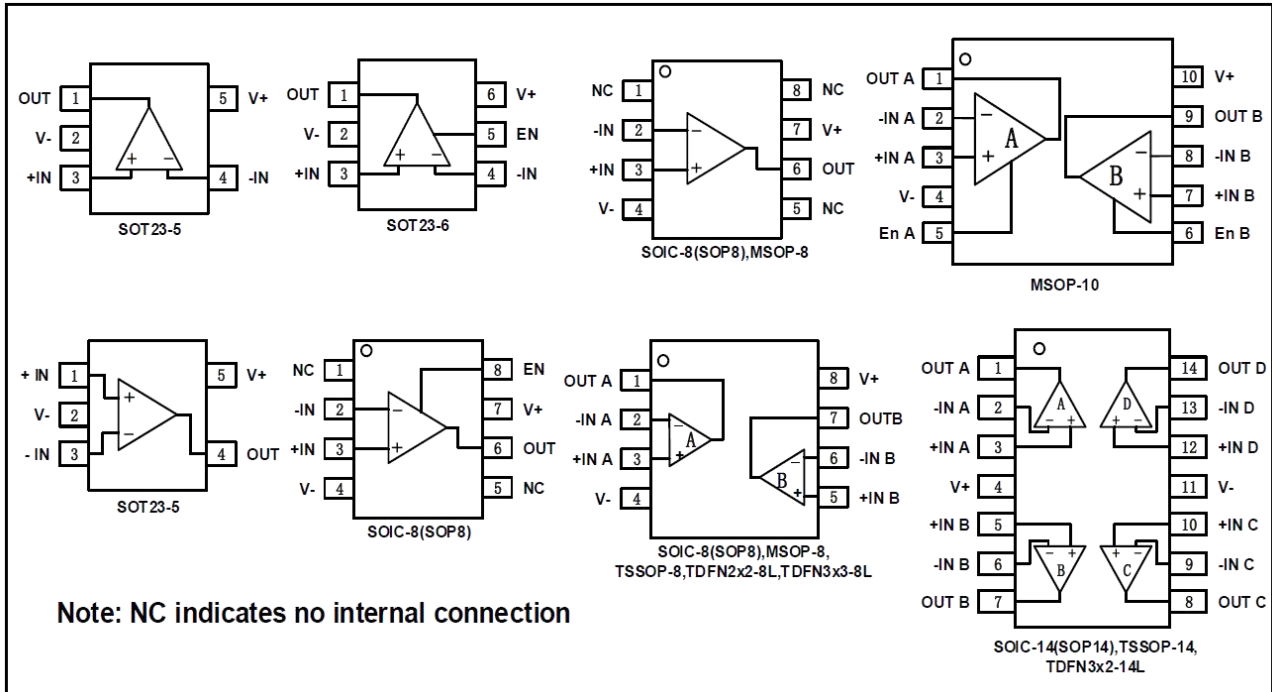
- SENSORS
- PHOTODIODE AMPLIFICATION
- ACTIVE FILTERS
- TEST EQUIPMENT
- DRIVING A/D CONVERTERS

DESCRIPTION

The CBM862X families of products offer low voltage operation and rail-to-rail input and output, as well as excellent speed/power consumption ratio, providing an excellent bandwidth (7MHz) 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 CBM8621S, CBM8622S include a shutdown mode. Under logic control, the amplifiers can be switched from normal operation to a standby current that is less than 1uA. The CBM862X families of operational amplifiers 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.

PIN CONFIGURATIONS



ABSOLUTE MAXIMUM RATINGS (1)

Supply Voltage, V+ to V-.....	7.0V
Input Terminals, Voltage (2)	- 0.5 to (V+) + 0.5V
Current (2).....	±10mA
Storage Temperature	-65°C to +150°C
Operating Temperature	-40°C to +125°C
Junction Temperature.....	150°C
Package Thermal Resistance @ T _A = +25°C	
SOT23-5, SOT23-6.....	200°C/W
MSOP-10, SOIC-8	150°C/W
SOIC-14, TSSOP-14.....	100°C/W
Lead Temperature (Soldering, 10s)	260°C
ESD Susceptibility	
HBM	5000V
MM	400V

(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.



ESD SENSITIVITY CAUTION

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

ELECTRICAL CHARACTERISTICS

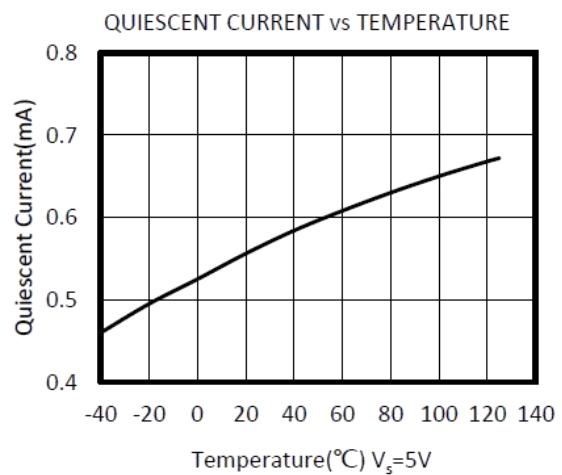
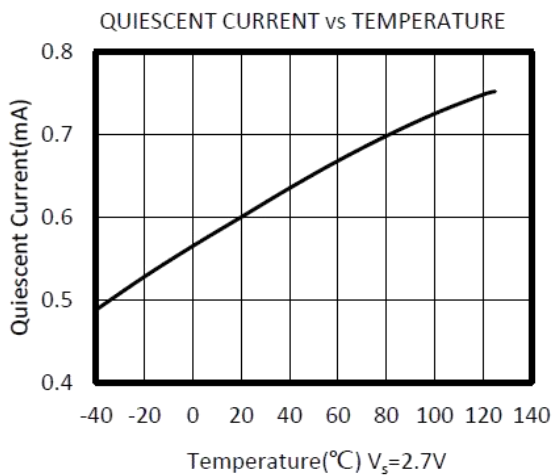
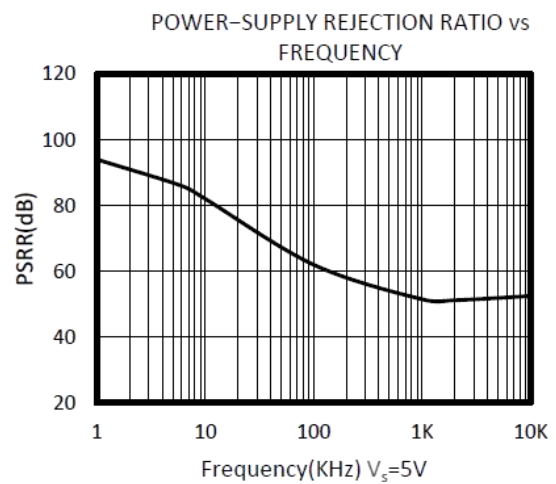
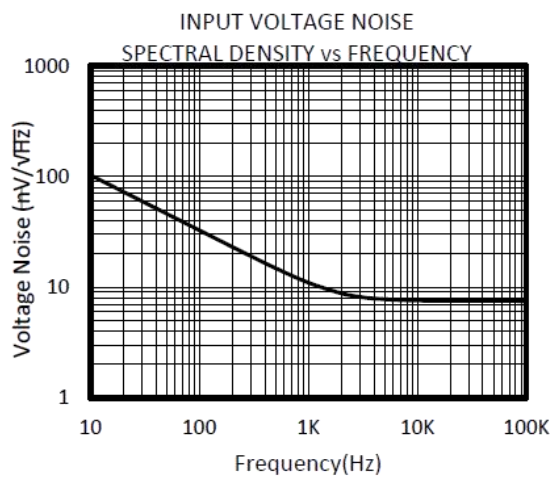
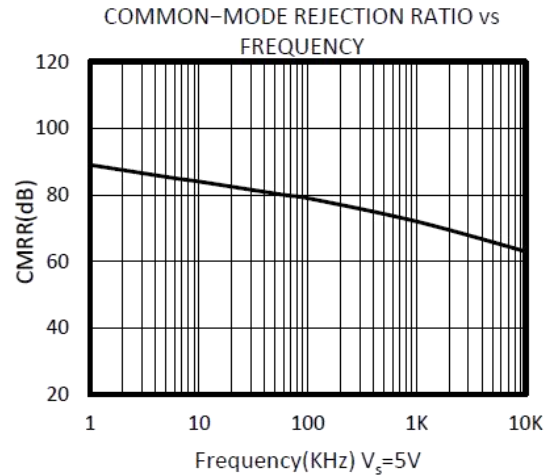
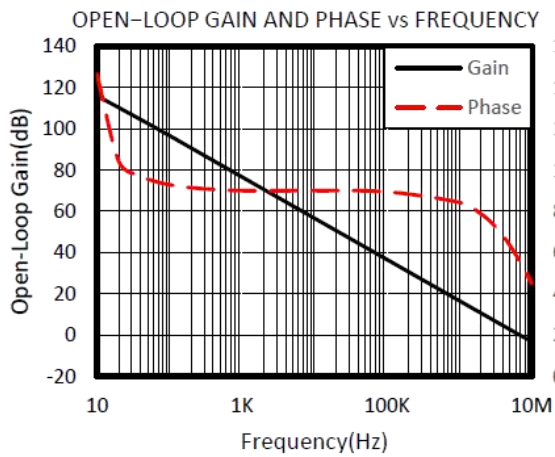
(At $T_A = +25^\circ\text{C}$, $V_S = 5\text{V}$, $R_L = 200\text{k}\Omega$ connected to $V_S/2$, and $V_{OUT} = V_S/2$, unless otherwise noted.)

PARAMETER	CONDITIONS	T_J	CBM8621S, CBM8622S, CBM8621, CBM8622, CBM8624			UNIT
			MIN	TYP	MAX	
POWER SUPPLY						
V_S	Operating Voltage Range	25°C	2.5		5.5	V
I_Q	Quiescent Current/Amplifier	25°C		600	800	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	78	93	dB
			$-40^\circ\text{C to } 125^\circ\text{C}$	72		
INPUT						
V_{OS}	Input Offset Voltage	25°C		0.7	3	mV
$V_{OS\ TC}$	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	Vs= 5.5V, Vcm=-0.1V to 4V	25°C	74	92	dB
			-40°C to 125°C	68		
		Vs= 5.5V, Vcm=-0.1V to 5.6V	25°C	62	83	
			-40°C to 125°C	60		
OUTPUT						
AOL	Open-Loop Voltage Gain	RL=2KΩ, Vo=0.15V to 4.85V	25°C	96	102	dB
			-40°C to 125°C	83		
		RL=10KΩ,Vo=0.05V to 4.95V	25°C	98	106	
			-40°C to 125°C	85		
	Output Swing From Rail	RL=2KΩ	25°C	40		mV
		RL=10KΩ		7		
Iout	Output Short-Circuit Current		25°C		50	mA
FREQUENCY RESPONSE						
SR	Slew Rate		25°C		3.7	V/us
GBP	Gain-Bandwidth Product		25°C		7	MHz
PM	Phase Margin		25°C		64	°
ts	Setting Time,0.1%				0.5	us
	Overload Recovery Time	VIN·Gain≥VS			0.5	us
NOISE						
en	Input Voltage Noise Density	f=1 KHz	25°C		11	nV/√Hz
		f=10KHz	25°C		7.5	nV/√Hz
ENABLE/SHUTDOWN(CBM8621SS,CBM8622S)						
I _{Q(OFF)}	Supply Current in Shutdown		25°C		<1	uA
t _{OFF}			25°C		3	us
t _{ON}			25°C		20	us
V _L	Shut Down		25°C	V-		(V-)+0.8 V
V _H	Amplifier Is Active		25°C	(V-)+2		V+ V

TYPICAL CHARACTERISTICS

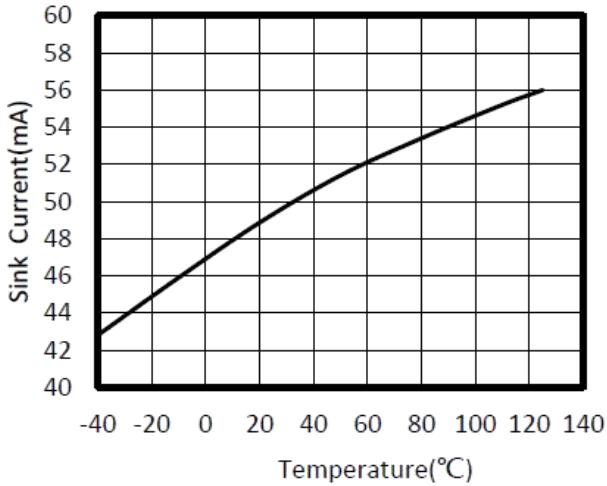
At $T_A = +25^\circ\text{C}$, $V_S = 5\text{V}$, $R_L = 10\text{k}\Omega$ connected to $V_S/2$, $V_{OUT} = V_S/2$, unless otherwise noted.



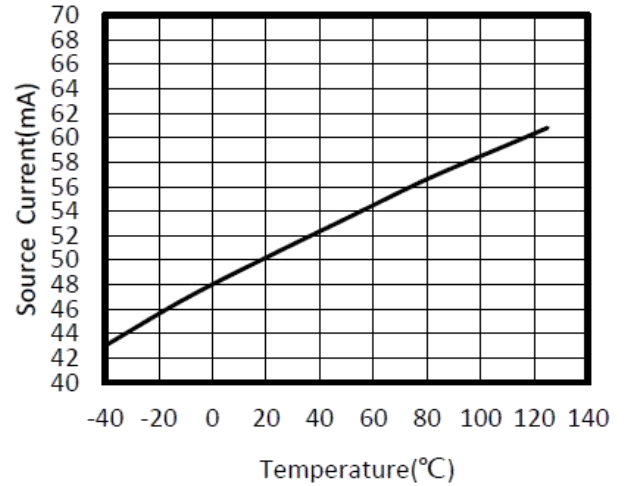
TYPICAL CHARACTERISTICS

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.

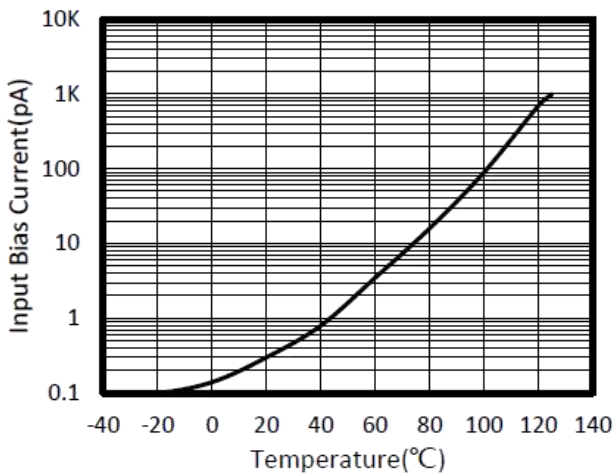
SINK CURRENT vs TEMPERATURE



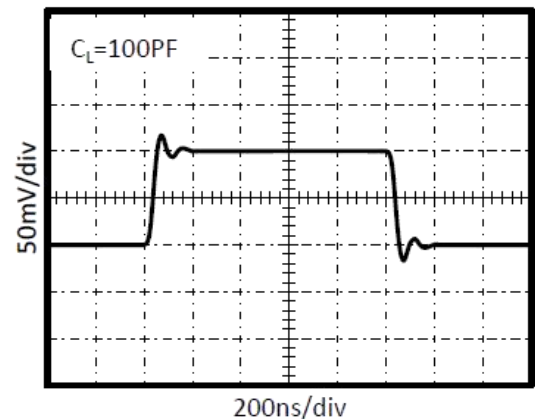
SOURCE CURRENT vs TEMPERATURE



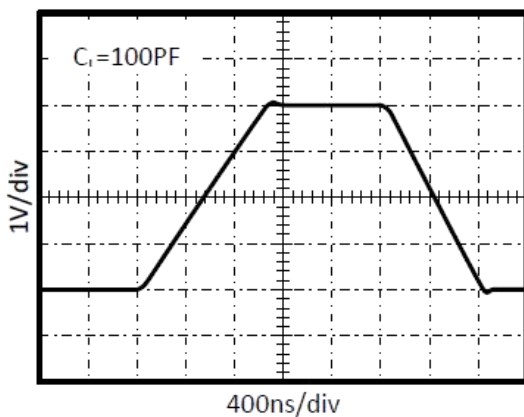
INPUT BIAS CURRENT vs TEMPERATURE



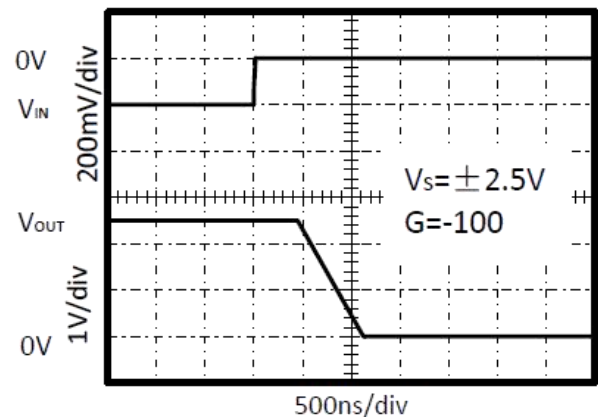
SMALL-SIGNAL STEP RESPONSE



LARGE-SIGNAL STEP RESPONSE

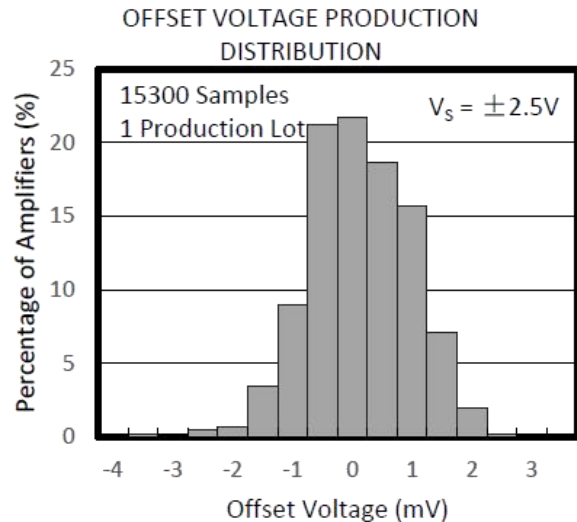
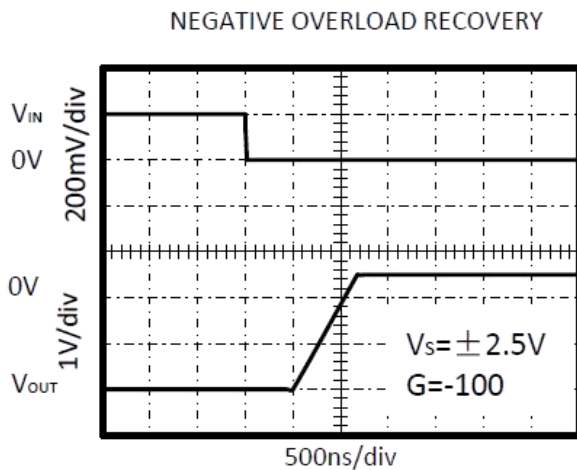


POSITIVE OVERLOAD RECOVERY



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.



APPLICATION NOTES

The CBM8621, CBM8622, CBM8624, CBM8621S, CBM8622S are high precision, rail-to-rail operational amplifiers that can be run from a single-supply voltage 2.5V to 5.5V ($\pm 1.25\text{V}$ to $\pm 2.75\text{V}$). 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 0.1 μF capacitor place closely across the supply pins.

CBM8621S/CBM8622S ENABLE FUNCTION

The CBM8621S/CBM8622S includes a shutdown mode. Under logic control, the amplifiers can be switched from normal mode to a standby current of 1 μA . When the Enable pin is connected to high, the amplifier is active. Connecting Enable low disables the amplifier, and places the amplifier, and place the output in a high-impedance state.

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,

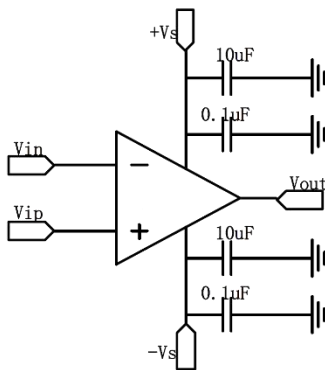


Figure1. Amplifier with Bypass Capacitors

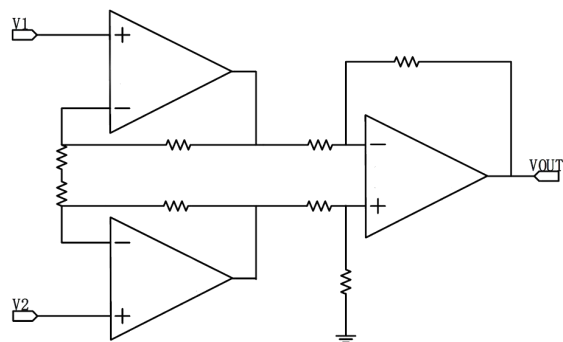
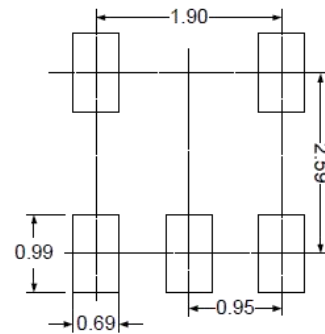
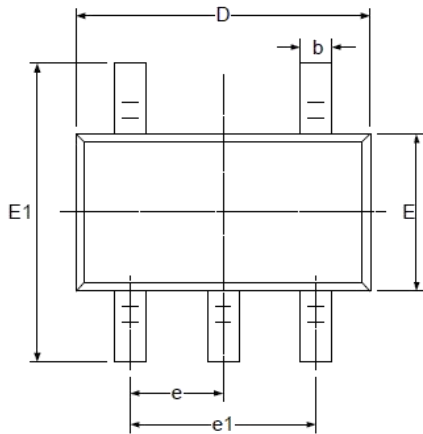


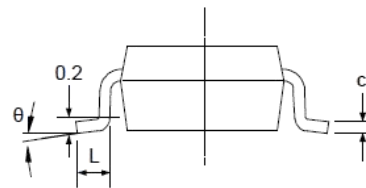
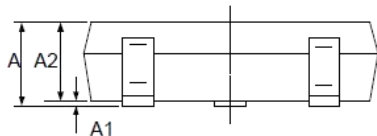
Figure2. Amplifier instrumentation amplifier

PACKAGE OUTLINE DIMENSIONS

SOT23-5

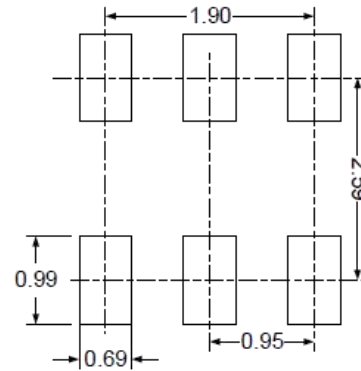
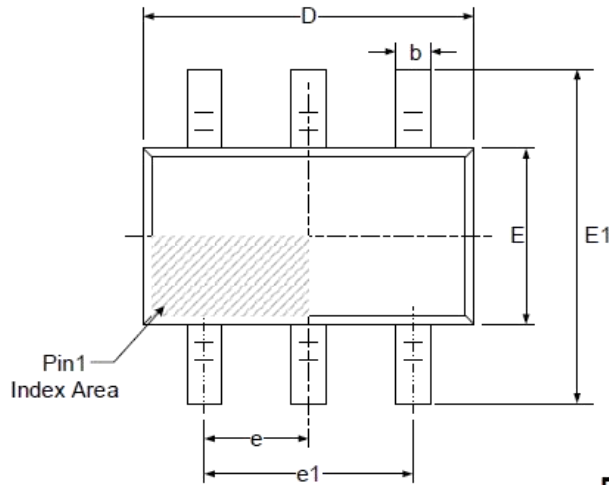


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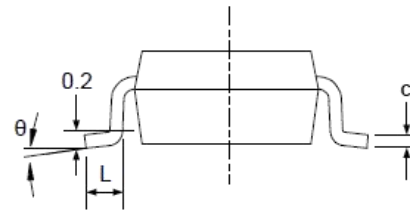
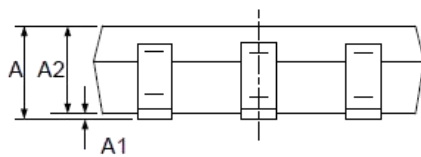


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOT23-6

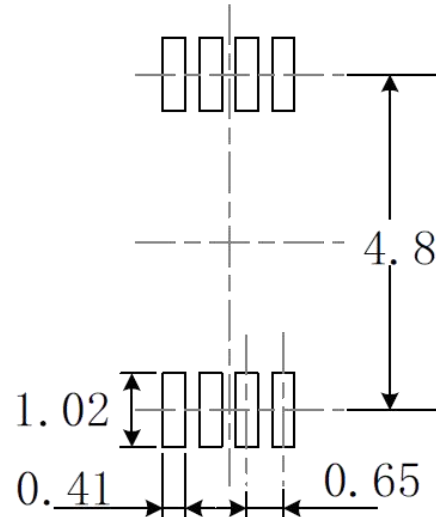
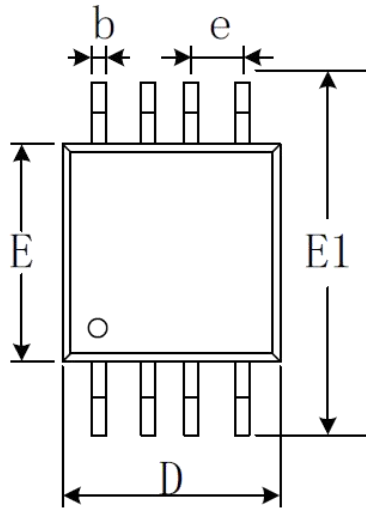


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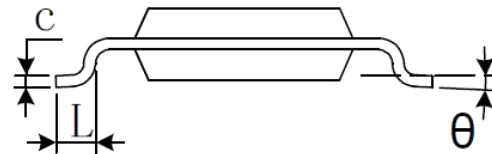
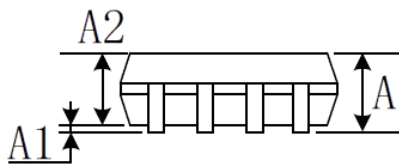


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

MSOP-8

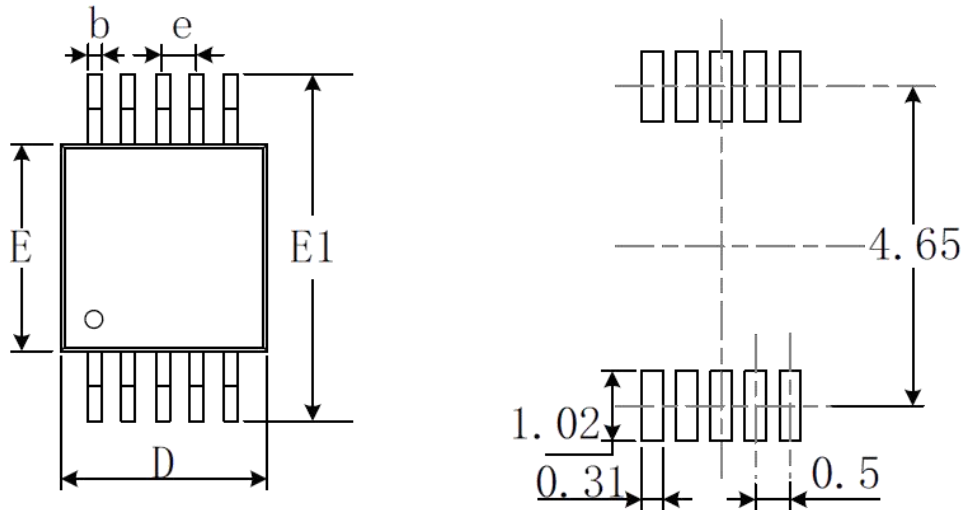


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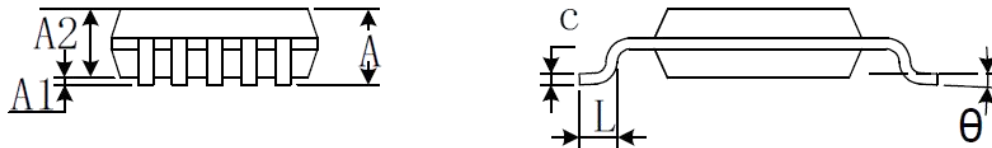


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.650 BSC		0.026 BSC	
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

MSOP-10

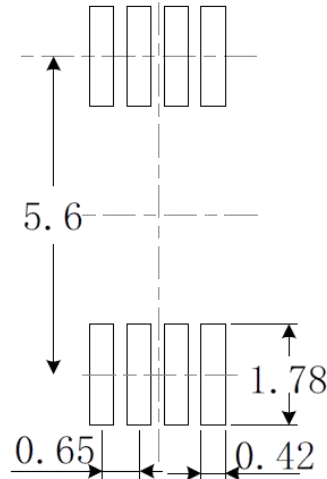
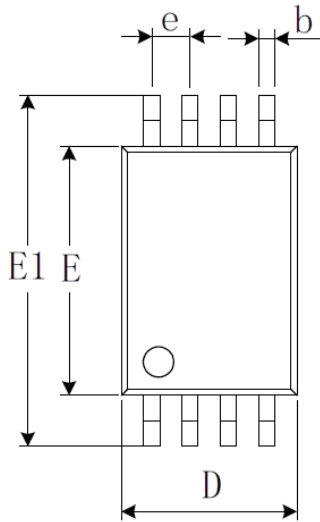


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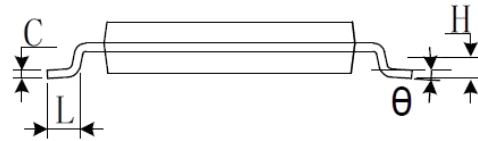
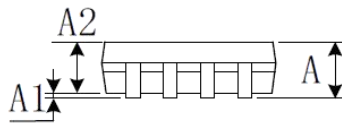


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.180	0.280	0.007	0.011
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.50 BSC		0.020 BSC	
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

TSSOP-8

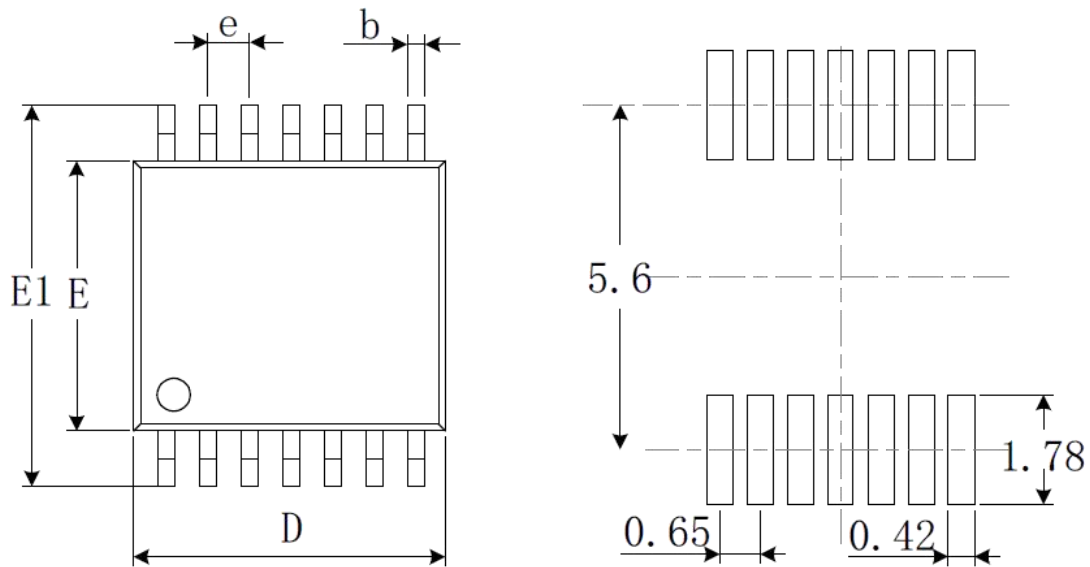


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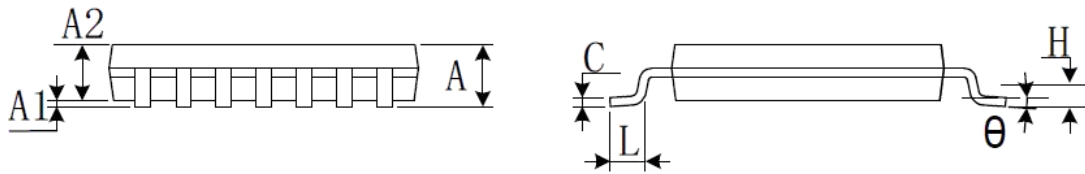


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	Max	Min	Max
A		1.200		0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	2.900	3.100	0.114	0.122
E	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
e	0.650 BSC		0.026 BSC	
L	0.500	0.700	0.020	0.028
H	0.25 TYP		0.01 TYP	
θ	1°	7°	1°	7°

TSSOP-14

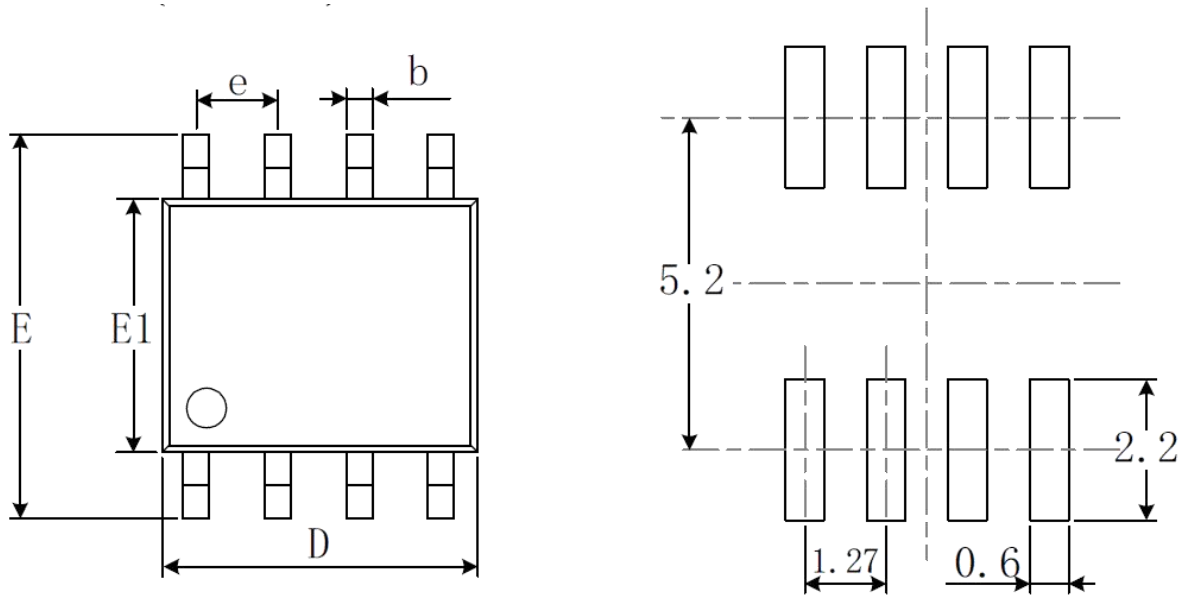


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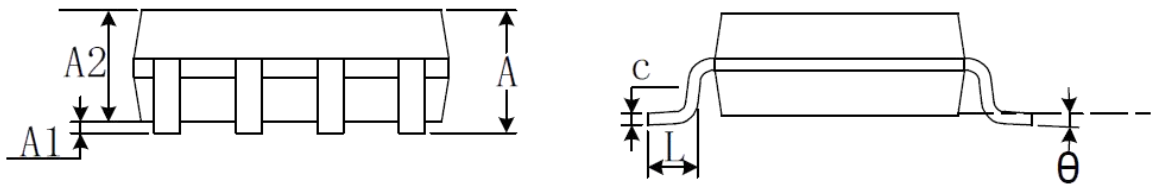


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	Max	Min	Max
A		1.200		0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.860	5.100	0.191	0.201
E	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
e	0.650 BSC		0.026 BSC	
L	0.500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

SOIC-8(SOP8)

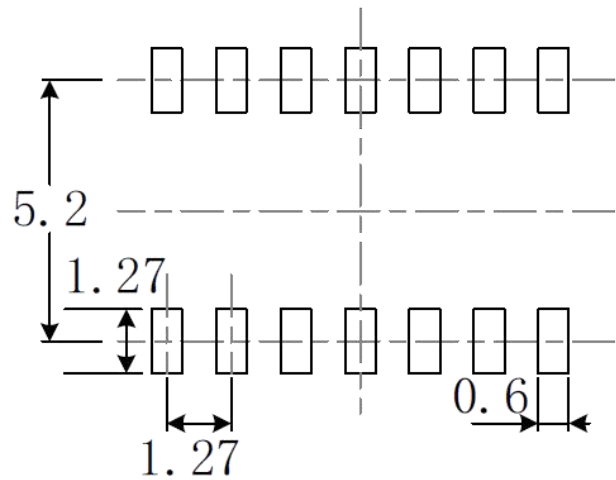
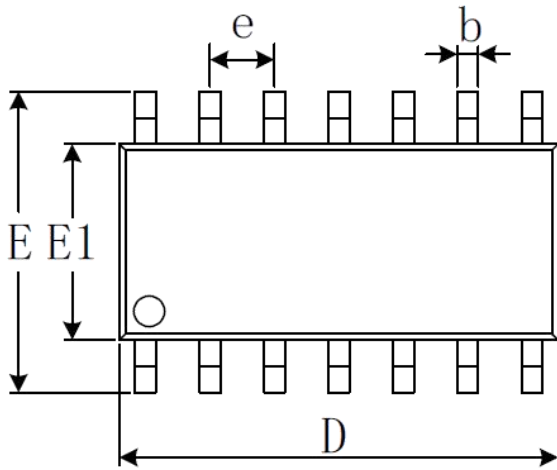


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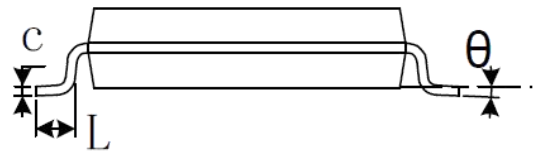
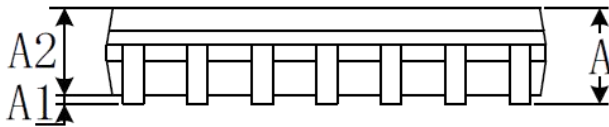


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
e	1.270 BSC		0.050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

SOIC-14(SOP14)

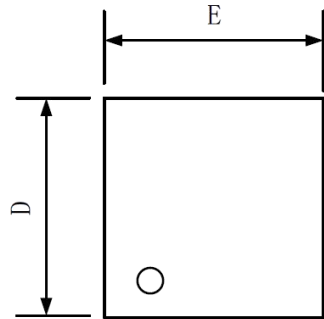


RECOMMENDED LAND PATTERN (Unit: mm)

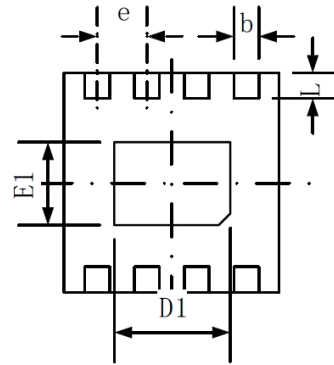


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.310	0.510	0.012	0.020
c	0.100	0.250	0.004	0.010
D	8.450	8.850	0.333	0.348
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
e	1.270 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

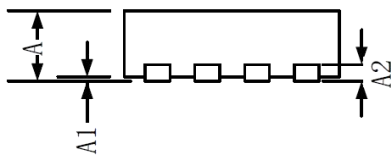
TDFN-2x2-8L



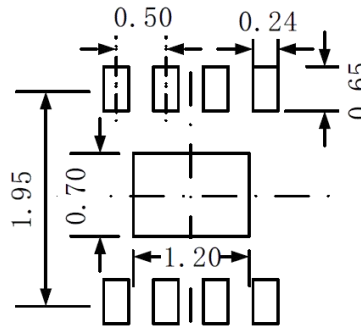
TOP VIEW



BOTTOM VIEW



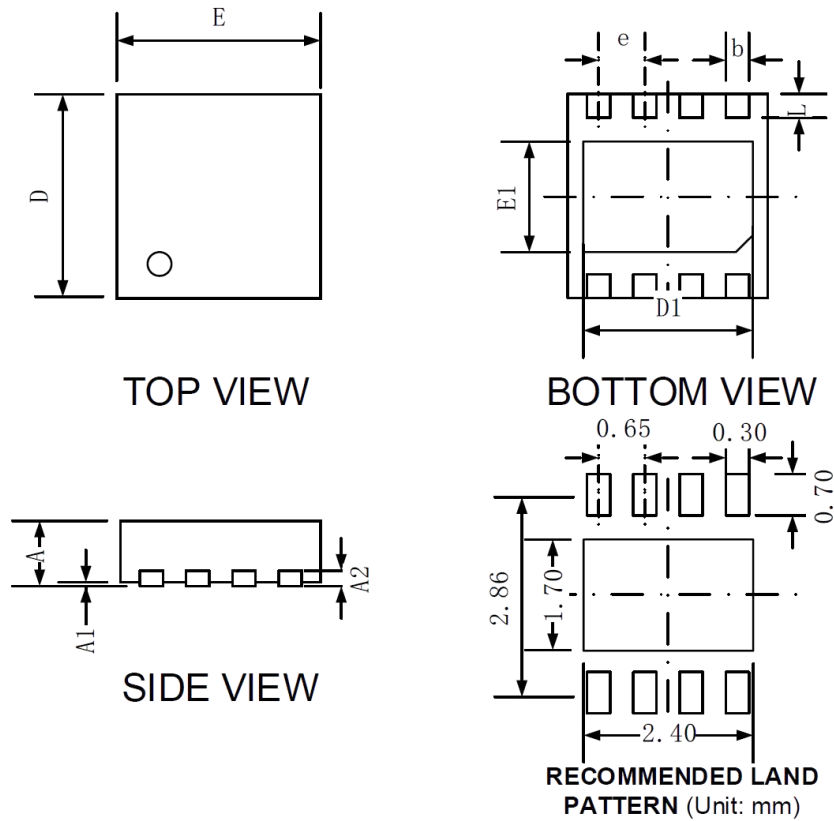
SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)

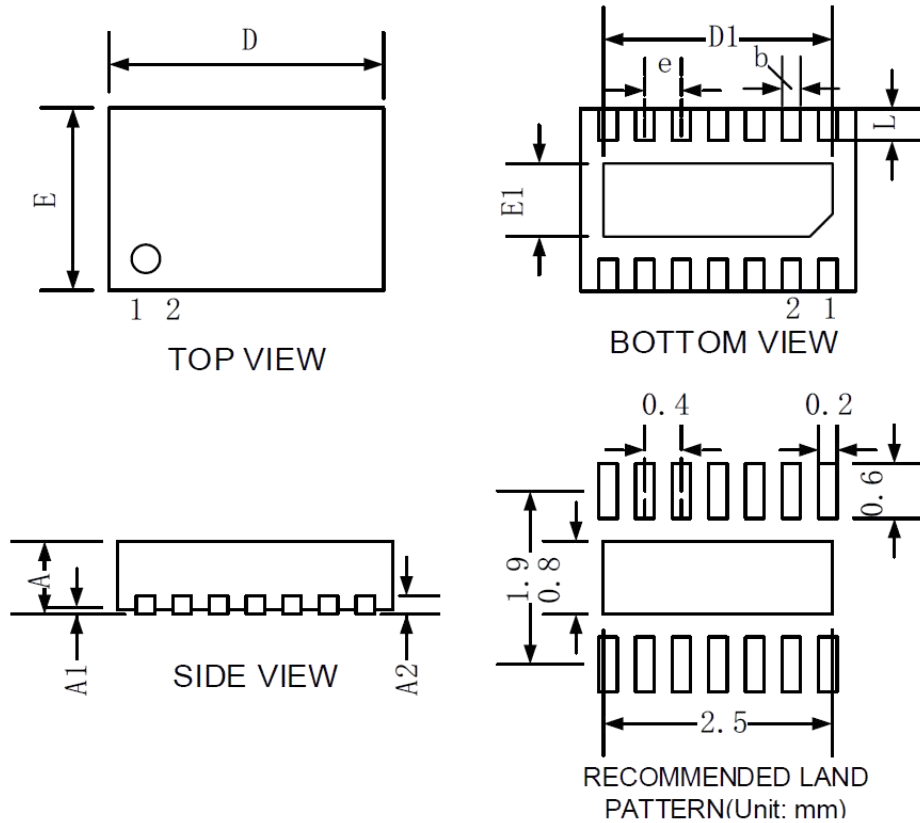
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	Max	Min	Max
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 TYP		0.008 TYP	
b	0.180	0.300	0.007	0.012
D	1.900	2.100	0.075	0.083
D1	1.100	1.300	0.043	0.051
E	1.900	2.100	0.075	0.083
E1	0.600	0.800	0.024	0.031
e	0.500 TYP		0.020 TYP	
L	0.250	0.450	0.010	0.018

TDFN-3x3-8L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	Max	Min	Max
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 TYP		0.008 TYP	
b	0.250	0.350	0.010	0.014
D	2.900	3.100	0.114	0.122
D1	2.350	2.450	0.093	0.096
E	2.900	3.100	0.114	0.122
E1	1.650	1.750	0.065	0.069
e	0.650 TYP		0.026 TYP	
L	0.370	0.470	0.15	0.019

TQFN-3x3-16L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	Max	Min	Max
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.200		0.008	
b	0.150	0.250	0.006	0.010
D	2.900	3.100	0.114	0.122
D1	2.400	2.600	0.094	0.102
E	1.900	2.100	0.075	0.083
E1	0.700	0.900	0.028	0.035
e	0.400 TYP		0.016 TYP	
L	0.300	0.400	0.012	0.016

PACKAGE/ORDERING INFORMATION

PRODUCT	ORDERING NUMBER	TEMPRANGE	PACKAGE	PAKEAGE MARKING	TRANSPOT MEDIA,QUANTILY
CBM8621	CBM8621AS8	-40°C~125°C	SOIC-8(SOP8)	CBM8621	Tape and Reel,2500
	CBM8621AST5	-40°C~125°C	SOT23-5	621	Tape and Reel,3000
	CBM8621BST5	-40°C~125°C	SOT23-5	621B	Tape and Reel,3000
	CBM8621AMS8	-40°C~125°C	MSOP-8	CBM8621	Tape and Reel,3000
CBM8621S	CBM8621SA8	-40°C~125°C	SOIC-8(SOP8)	CBM8621S	Tape and Reel,2500
	CBM8621SAT5	-40°C~125°C	SOT23-6	621S	Tape and Reel,3000
CBM8622	CBM8622AS8	-40°C~125°C	SOIC-8(SOP8)	CBM8622	Tape and Reel,2500
	CBM8622AMS8	-40°C~125°C	MSOP-8	CBM8622	Tape and Reel,3000
	CBM8622ATDE8	-40°C~125°C	TDFN2x2-8L	CBM8622	Tape and Reel,3000
	CBM8622ATDC8	-40°C~125°C	TDFN3x3-8L	CBM8622	Tape and Reel,3000
	CBM8622AST8	-40°C~125°C	TSSOP-8	CBM8622	Tape and Reel,3000
CBM8622S	CBM8622AMS10	-40°C~125°C	MSOP-10	CBM8622S	Tape and Reel,3000
CBM8624	CBM8624AS14	-40°C~125°C	SOIC-14(SOP14)	CBM8624	Tape and Reel,2500
	CBM8624AST14	-40°C~125°C	TSSOP-14	CBM8624	Tape and Reel,3000
	CBM8624ATDB14	-40°C~125°C	TQFN-3x2-14L	CBM8624	Tape and Reel,3000