

## Feature

- **Stable 6MHz GBWP with Low  $I_Q$  of Only 480 $\mu$ A Typical per Amplifier**
- **Offset Voltage: +/-3mV Maximum**
- **High Slew Rate: 3.7V/ $\mu$ s**
- **Input Bias Current: 1pA Typical**
- **CMRR/PSRR:100dB/100dB**
- **Settling time to 0.1% with 2V Step: 0.46us**
- **Beyond the Rails Input Common-Mode Range**
- **Output Swing to within 10mV Typical of each Rail**
- **No Phase Reversal for Overdriven Inputs**
- **Supply Voltage Range: 2.5V to 5.5V**
- **-40 $^{\circ}$ C to 125 $^{\circ}$ C Operation Range**
- **Green, Popular Type Package**

## Applications

- **Active Filters, ASIC Input or Output Amplifier**
- **Sensor Interface**
- **Smoke/Gas/Environment Sensors**
- **Portable Instruments and Mobile Device**
- **Audio Output**
- **PCMCIA Cards**
- **Battery or Solar Power Systems**
- **Medical Equipment**
- **Piezo Electrical Transducer Amplifier**

## General Description

The SC8631/1A/2 are CMOS op-amps with low offset, stable high frequency response, low power, low supply voltage, and rail-to-rail inputs and outputs.

SC8631/1A/2 have a high gain-bandwidth product of 6MHz, 3.7V/ $\mu$ s slew rate while consuming only 480 $\mu$ A of supply current per amplifier. The maximum input offset voltage is 3mV for SC8631/1A/2. Beyond the rail input and rail-to-rail output characteristics allow the full power-supply voltage to be used for signal range. The operating range is from 2.5V to 5.5V.

This combination of features makes the SC8631/1A/2 superior among rail-to-rail input/output CMOS op amps in its power class. It is specified over the extended industrial temperature rang -40 $^{\circ}$ C to +125 $^{\circ}$ C.

The SC8631/1A/2 can be used as cost-effective plug-in replacements for many commercially available op amps to reduce power and improve input/output range and performance.

## Ordering Information

Model Name	Package	Marking	Packing
SC8631A	SOT23-5	8631A	Tape and Rape, 3000
SC8631	SOT23-5	SC8631	Tape and Rape, 3000
SC8632	SOIC-8	SC8632 XXXX	Tape and Rape, 4000
	MSOP-8	SC8632 XXXX	Tape and Rape, 4000
	DFN-8L	BXX	Tape and Rape, 3000

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**Absolute Maximum Ratings**

(If out of these ratings, the filter may be fail or damaged)

Table 1

<b>Symbol</b>	<b>parameter</b>	<b>rating</b>	<b>units</b>
VDD	Power supply	6	V
T <sub>A</sub>	Operating ambient Temperature Range	-40~+125	°C
T <sub>STG</sub>	Storage Temperature	-65~+150	°C

**Recommended Operating Conditions**

Table 2

<b>Symbol</b>	<b>parameter</b>	<b>rating</b>	<b>units</b>
VDD	Power supply	2.5~5.5	V
T <sub>A</sub>	Operating ambient Temperature Range	-40~+125	°C

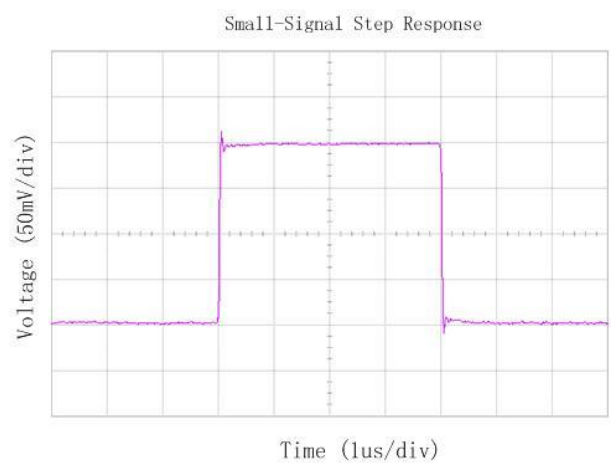
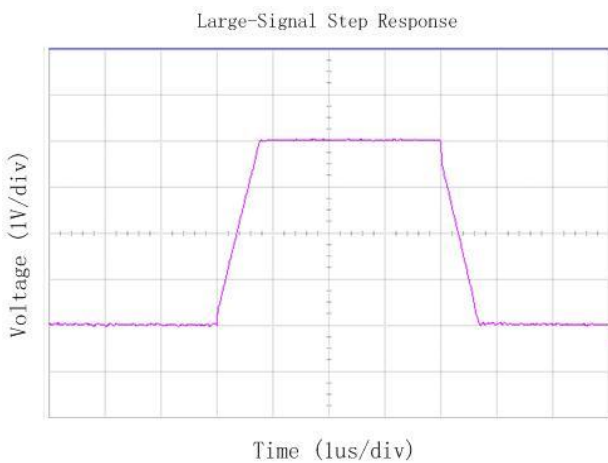
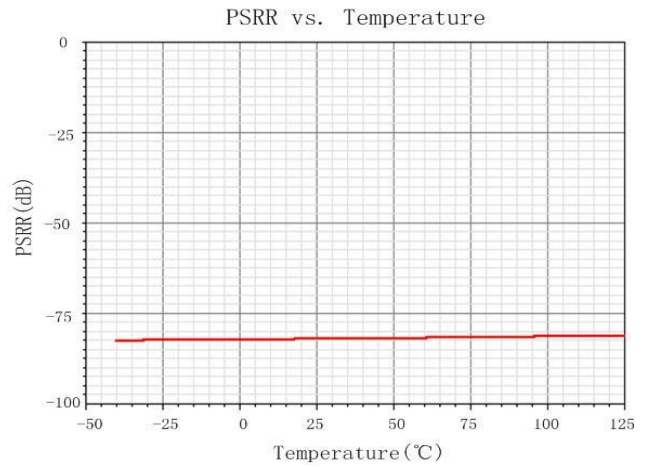
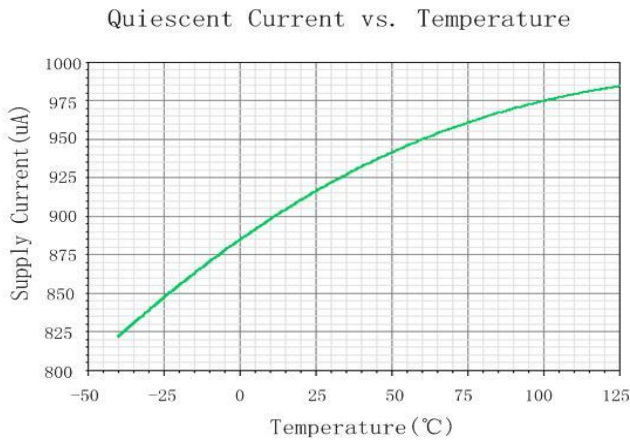
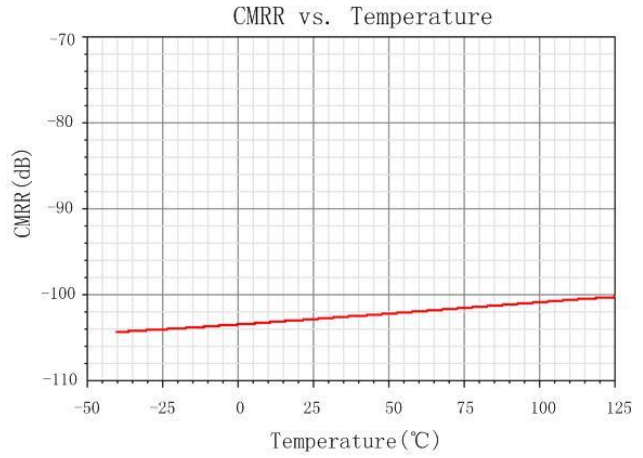
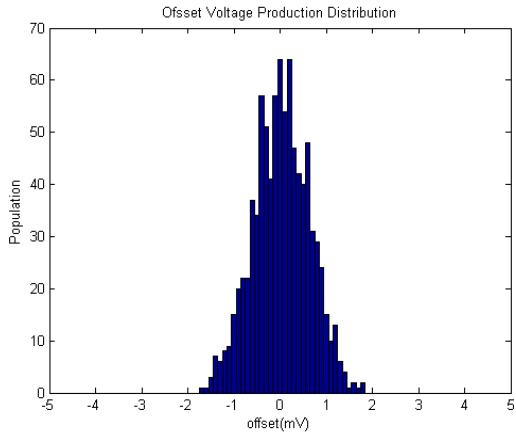
**Electrical Characteristics**

 Specifications are at  $T_A=+27^{\circ}\text{C}$ ,  $V_{DD}=5\text{V}$ ,  $V_{CM}=V_{OUT}=V_{DD}/2$ ,  $R_L=10\text{Kohm}$ ,  $C_L=100\text{pF}$ 

Symbol	Parameter	Spec			Units
		Min	Typ	Max	
VCC	Operating Supply Voltage	2.5	5	5.5	V
V <sub>OS</sub>	Input Offset Voltage	-3	+/-0.6	+3	mV
V <sub>OS_TC</sub>	Input Offset voltage Temp Drift		4		$\mu\text{V}/^{\circ}\text{C}$
e <sub>n</sub>	Input Voltage Noise Density: f=1KHz		25		nV/ $\sqrt{\text{Hz}}$
C <sub>IN</sub>	Input Capacitance	Differential	1.5		pF
		Common Mode	3.0		
R <sub>IN</sub>	Input Resistance	>100			G $\Omega$
I <sub>Q</sub>	Quiescent Current per Amplifier		480	790	$\mu\text{A}$
I <sub>out</sub>	Output Current		50		mA
V <sub>in_cm</sub>	Common mode Input voltage	0		VDD-0.1	V
V <sub>OL</sub>	Output Voltage from supply Swing		10		mV
CMRR	Common Mode Rejection Ratio		100		dB
I <sub>sc</sub>	Output short-circuit current		80		mA
PM	Phase Margin		65		$^{\circ}$
GM	Gain Margin		-10		dB
GBWP	Gain-Bandwidth Product		6		MHz
PSRR	Power supply rejection ratio: 1Hz 1KHz		100		dB
			72		
t <sub>s</sub>	Settling time, 1.5V to 3.5V, Unity Gain: 0.1%		0.46		$\mu\text{s}$
SR	Slew Rate		3.7		V/ $\mu\text{s}$
THD+Noise	Total Harmonic Distortion and Noise: f=1KHz		0.0007		%

### Typical performance characteristics

At  $T_A=+27^\circ\text{C}$ ,  $V_{DD}=5\text{V}$ ,  $V_{CM}=V_{OUT}=V_{DD}/2$ ,  $R_L=10\text{Kohm}$ ,  $C_L=100\text{pF}$



**PAD Definition**

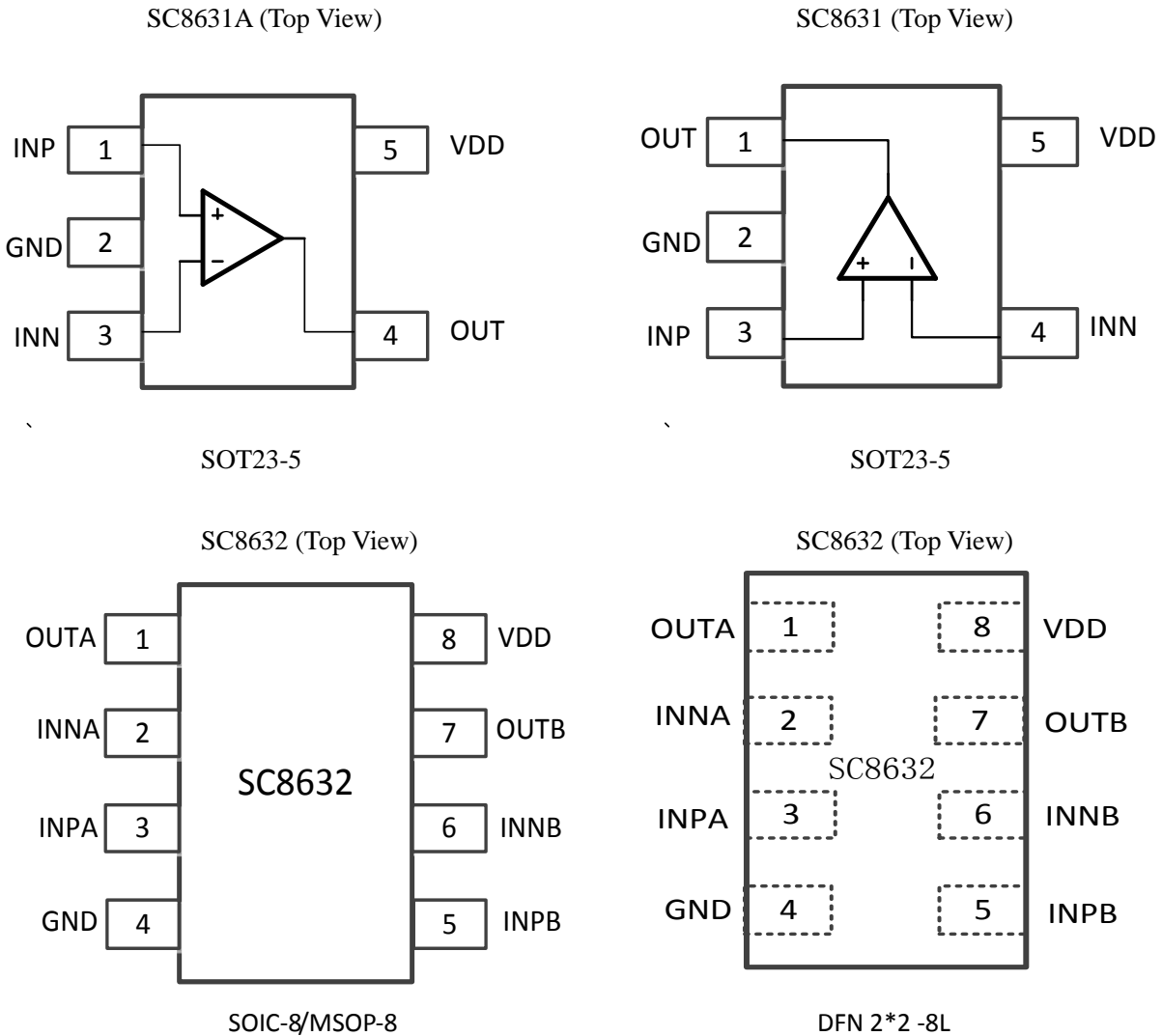


Fig 2. Pad definition of SC8632

Table 7. Pad definition

Name	I/O	Analog/Digital	Description
INP	I	A	Non-Inverting Input of Amplifier. Voltage range of this pin can go from 0 to VDD.
GND	GROUND	GROUND	Ground pin. Connect to the most negative supply, ALL GND pads are connected on die.
INN	I	A	Inverting Input of Amplifier. This pin has same voltage range as INP.
OUT	O	A	Amplifier Output. The voltage range extends to within millivolts of each supply rail.
VDD	POWER	POWER	Power supply (5V), connect to positive voltage supply

## Application Circuits

The SC8632 of operational amplifier can operate with power supply voltages from 2.5V to 5.5V. Each amplifier draws only 480uA quiescent current. The SC8632 can driver larger capacitive loads in unity-gain without oscillation. The unity-gain follower (buffer) is the most sensitive configuration to capacitive loading.

When driving large capacitive loads with the SC8632 OPA, a small series resistor at the output improves the feedback loop's phase margin and stability by making the output load resistive at higher frequencies.

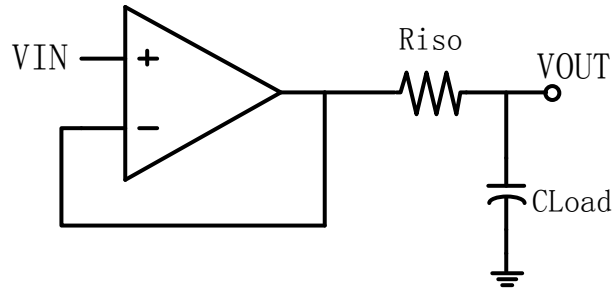
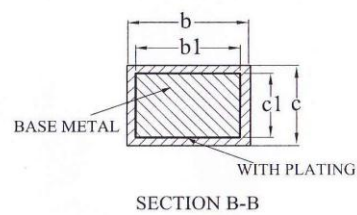
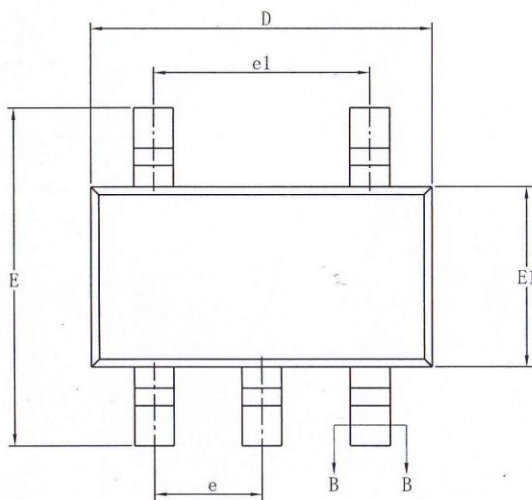
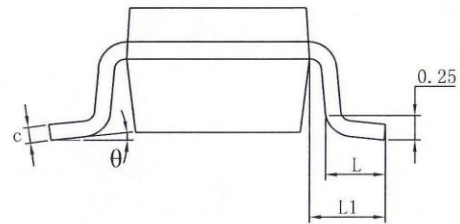
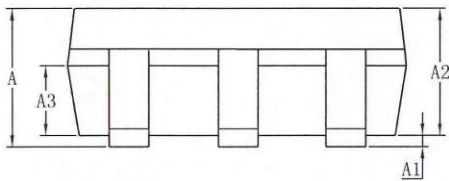


Fig.3 Applications Circuits of SC8632

## Package

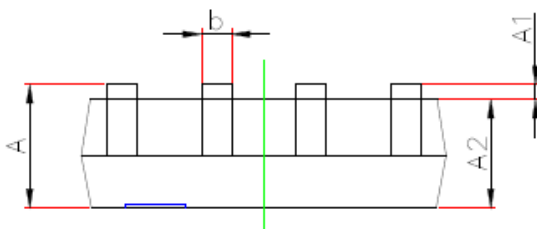
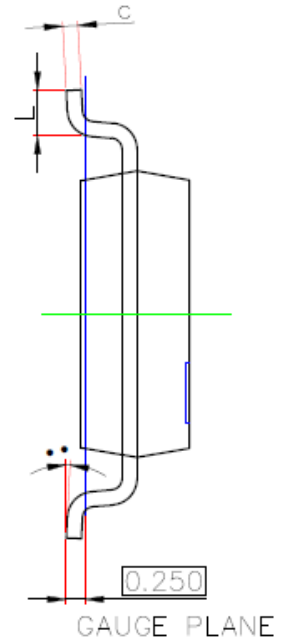
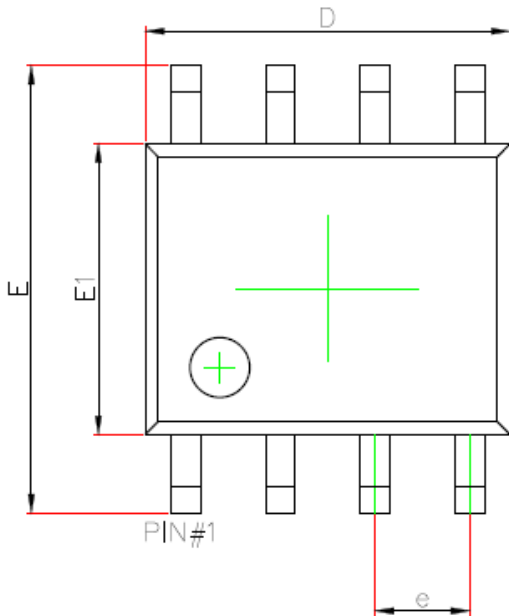
### SOT23-5

Symbol	Unit(mm)		
	Min	Typ	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	0.60REF		
$\theta$	0°	-	8°



SOIC-8

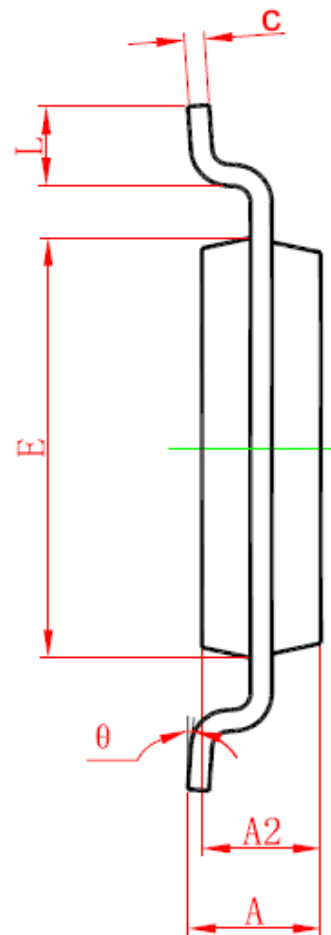
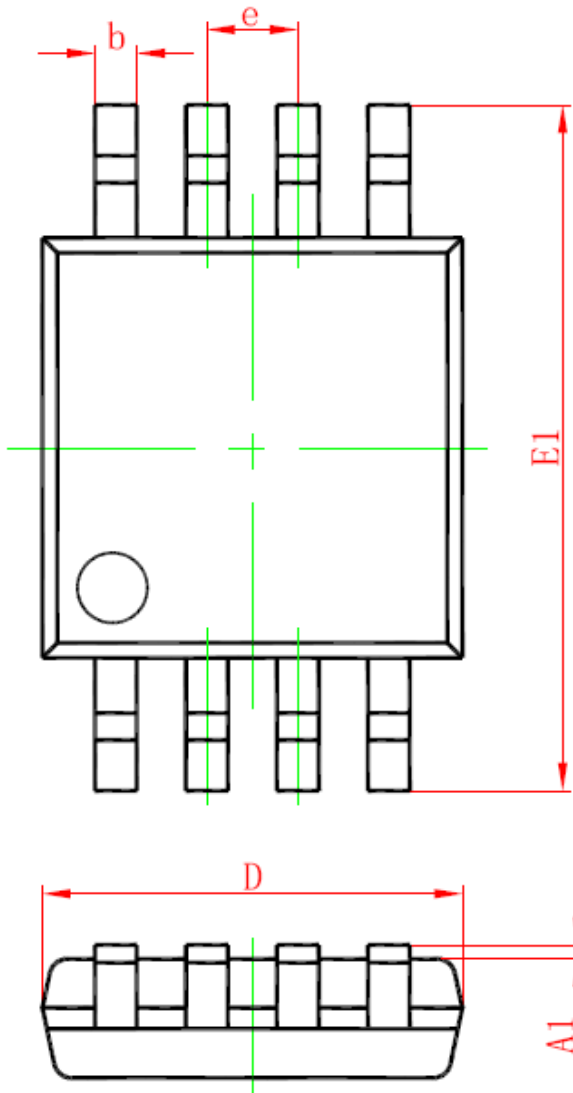
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
$\theta$	0°	0°	0°	0°



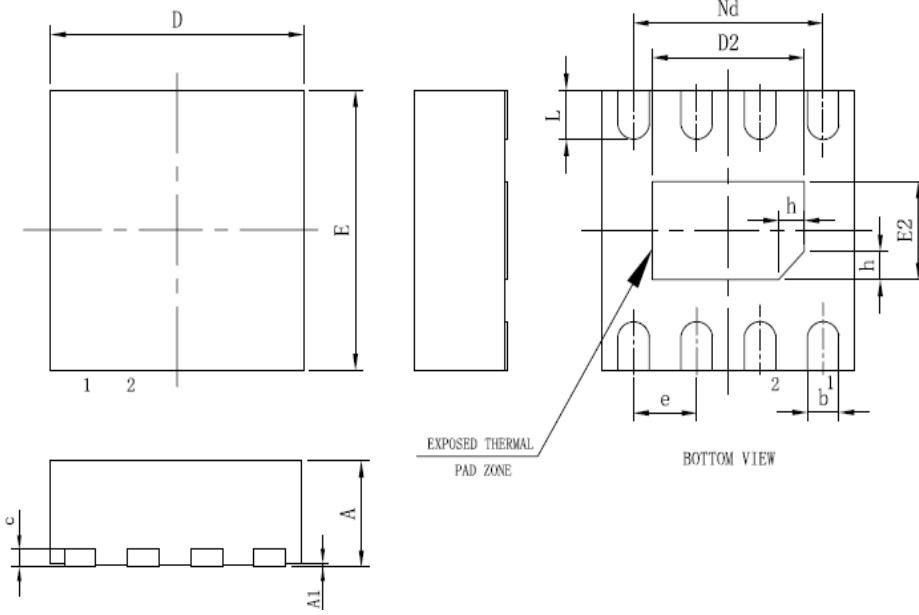


MSOP-8

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.200	0.031	0.047
A1	0.000	0.200	0.000	0.008
A2	0.760	0.970	0.030	0.038
b	0.30TYP		0.012TYP	
C	0.15TYP		0.006TYP	
D	2.900	3.100	0.114	0.122
e	0.65TYP		0.026	
E	2.900	3.100	0.114	0.122
E1	4.700	5.100	0.185	0.201
L1	0.410	0.650	0.016	0.026
$\theta$	0°	0°	0°	0°



DFN-8L



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	—	0.02	0.05
b	0.18	0.25	0.30
c	0.18	0.20	0.25
D	1.90	2.00	2.10
D2	1.10	1.20	1.30
e	0.50BSC		
Nd	1.50BSC		
E	1.90	2.00	2.10
E2	0.60	0.70	0.80
L	0.30	0.35	0.40
h	0.15	0.20	0.25
载体尺寸 (mil)	63X39		