Dual Rail-to-Rail I/O, High-Slew-Rate OP Amp

Features

- **+3V to +5.5V Single-Supply Operation**
- **Input / Output Rail-to-Rail**
- **Low Input Current**
- **High Output Driving Capacity**
- **Low Quiescent Current: 1mA @ 5V**
- **High Slew Rate 6V/μs**
- **High Gain-Bandwidth Product 2.5MHz**
- **High Open Loop Gain 95dB**
- **High PSRR 70dB**

Applications

- **Headphone Driver**
- **Portable Equipment**
- **Battery-Powered Equipment**
- **Multimedia Audio**
- **ASIC Input or Output Amplifier**
- **Sensor Amplifier**
- **Low Power/Low Voltage Applications**

General Description

G1224 is a input/output rail-to-rail Operational Amplifier. It can be operated from +3V to +5.5V single supply or from ±1.5V to ±2.75 dual supply. G1224 can drive 66mA into resistor loads to within 10% power rail each amplifier. AC performance is very excellent with 2.5MHz bandwidth, 6V/μs Slew Rate, 95dB open loop gain, 60 degree phase margin and low distortion.

Supply current of G1224 is only 500μA per Amplifier. It is very suitable for low current consumption applications to control high current loads. Applications include audio amplification for computers, sound ports, sound cards and set-top boxes.

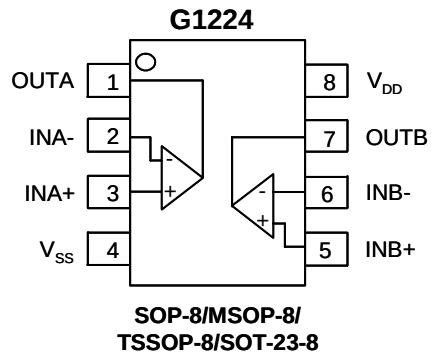
G1224 is available in 8pins SOP-8, MSOP-8, TSSOP-8 and SOT-23-8 package.

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Pb free)
G1224P1U	G1224	0°C to 85°C	SOP-8
G1224P8U	G1224	0°C to 85°C	MSOP-8
G1224D1U	G1224	0°C to 85°C	TSSOP-8
G1224TMU	1224x	0°C to 85°C	SOT-23-8

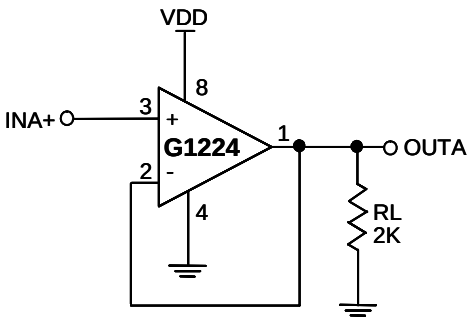
Note: P1:SOP-8 P8: MSOP-8
D1:TSSOP-8 TM: SOT-23-8
U: Tape & Reel

Pin Configuration



SOP-8/MSOP-8/ TSSOP-8/SOT-23-8

Typical Application Circuit



Absolute Maximum Ratings

Supply Voltage (V_{DD} to V_{SS}) 6.5V
All Other Pins. . . . . (Vss-0.3V) to (V_{DD}+0.3V)
Continuous Power Dissipation (T_A=25°C)
SOP-8. . . . . 520mW
MSOP-8. . . . . 520mW
TSSOP-8. . . . . 520mW

θ_{JA}. . . . . .240°C/Watt
Junction Temperature. . . . . .150°C
Operating Temperature Range. . . . . 0°C to 85°C
Storage Temperature Range. . . . . -65°C to 160°C
Reflow Temperature (Soldering, 10 sec) . . . . . .260°C

Electrical Characteristics

V_{DD} = 5V; V_{SS} = 0V; T_{amb} = 25°C; C_L=10pF, R_L=1kΩ to V_{DD}/2; unless otherwise specified.

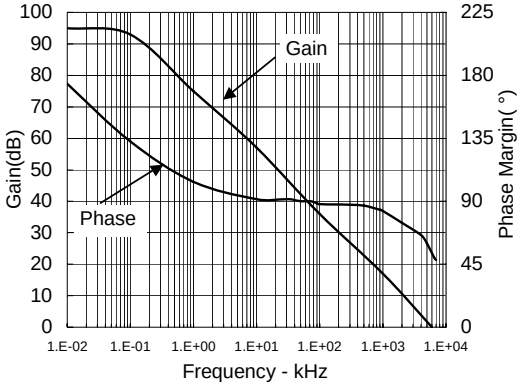
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supplies						
Supply Voltage Range	V_{DD}	Note1	3	---	5.5	V
Supply Current	I_{DD}	No load	---	1	1.4	mA
Total Power Dissipation	P_{tot}	No load	---	5	7	mW
DC Characteristics						
Input Offset Voltage	$V_{I\ (OS)}$		---	±5	±20	mV
Common Mode Voltage	V_{CM}	Inferred from CMRR test	0	-	5	V
Input Bias Current	I_B		---	±1.5	±20	nA
Input Bias Current Offset	I_{OS}		---	±1.5	±20	nA
Input Resistance	R_{IN}		---	1000	---	MΩ
Open Loop Gain	A_V		85	95	---	dB
Maximum Output Current	I_O	V_{OUT} = ±V_{IN} x 90%	55	±66	---	mA
Output Voltage Swing High	V_{OH}	R_L = 2kΩ	4.96	4.99	---	V
Output Voltage Swing Low	V_{OL}	R_L = 2kΩ	---	0.012	0.04	V
Power Supply Rejection Ratio	PSRR	3V≦V_{DD}≦5.5V	45	70	---	dB
Common-Mode Rejection Ratio	CMRR	V_{SS}≦V_{CM}≦V_{DD}	42	65	---	dB
AC Characteristics						
Gain-Bandwidth Product	GBWP	Open-loop; No Load	---	2.5	---	MHz
Slew-Rate	SR	Measured from 10% to 90% of $4V_{P-P}$ step, R_L = 1kΩ, C_L = 10pF	---	6	---	V/µs
Phase Margin	PM		---	60	---	deg
Maximum Output Current with THD	I_O	THD< 0.1%, R_L = 16Ω	---	100	---	mA
Channel Separation	CS	f = 1KHz R_L = 32Ω	---	85	---	dB

Note1: Guaranteed by the Power-Supply Rejection Ratio (PSRR) test

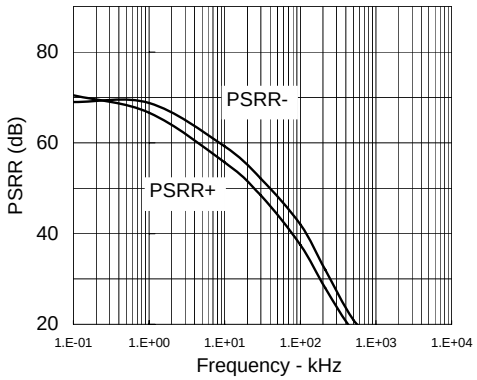
Typical Performance Characteristics

V_{DD} = 5V; V_{SS} = 0V; T_{amb} = 25°C; C_L=10pF, R_L=1kΩ to V_{DD}/2; unless otherwise specified.

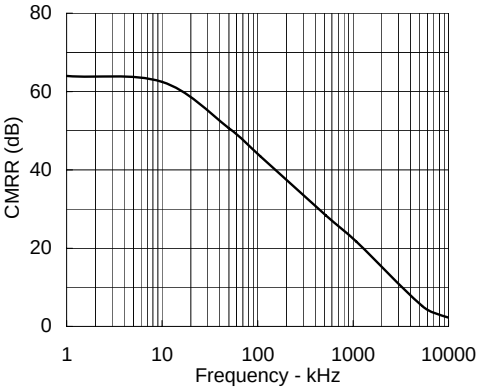
Open Loop Gain & Phase Margin vs. Frequency



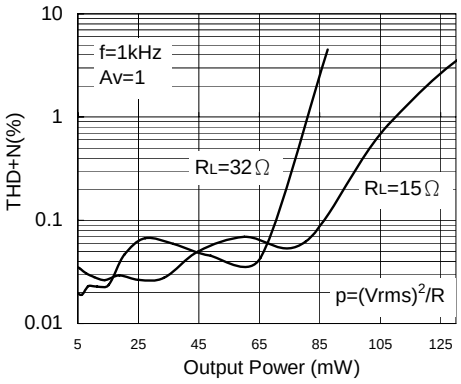
PSRR vs. Frequency



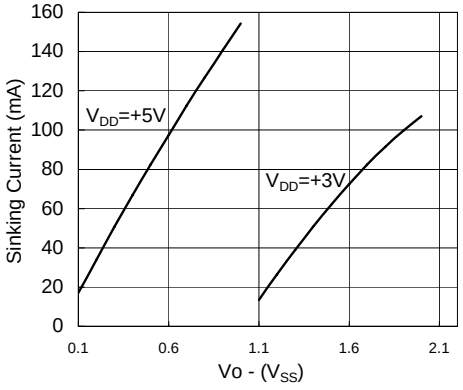
CMRR vs. Frequency



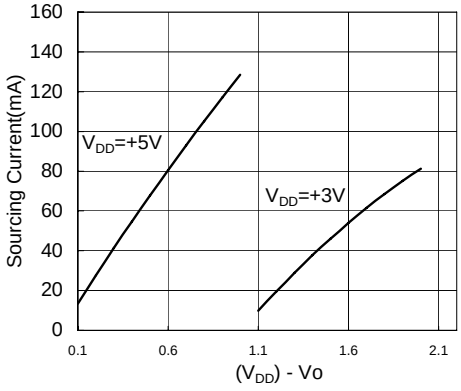
Total Harmonic Distortion Plus Noise vs.Output Power



Sinking Current vs. Vo - (V_{SS})

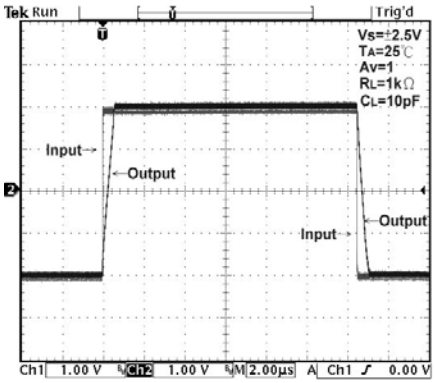


Sourcing Current vs. (V_{DD}) - Vo

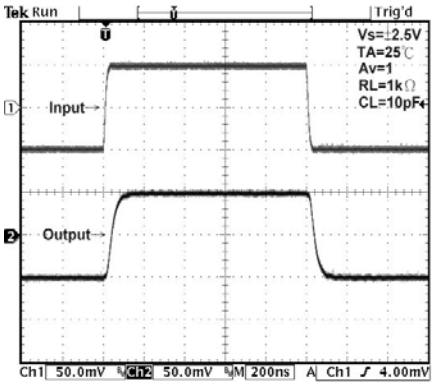


Typical Performance Characteristics (Continued)

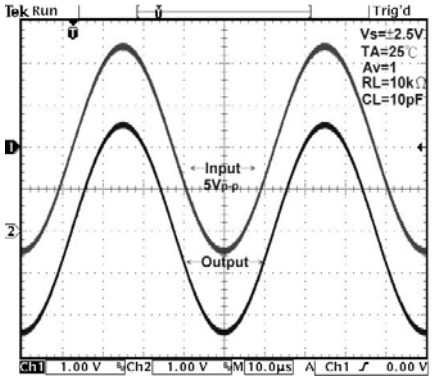
Large Signal Transient Response



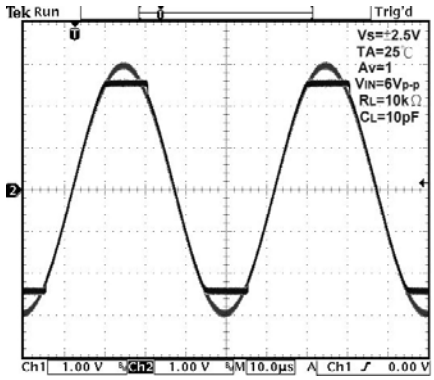
Small Signal Transient Response



Operation with Rail-to-Rail Input and Output

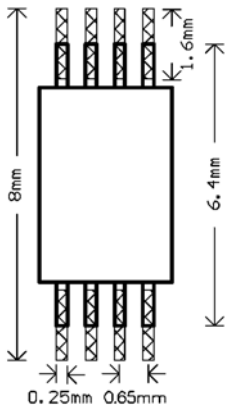


Operation with Beyond-the Rail Input

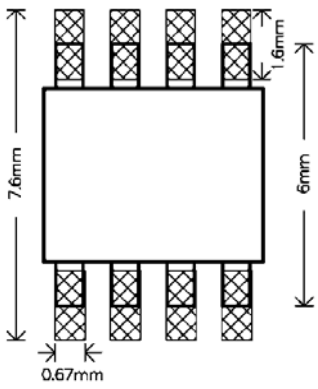


Recommended Minimum Footprint

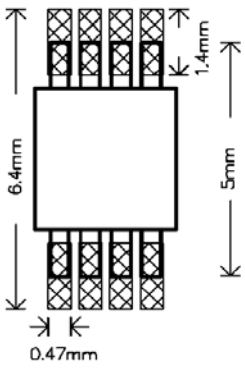
TSSOP-8



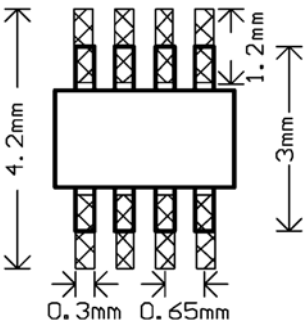
SOP-8



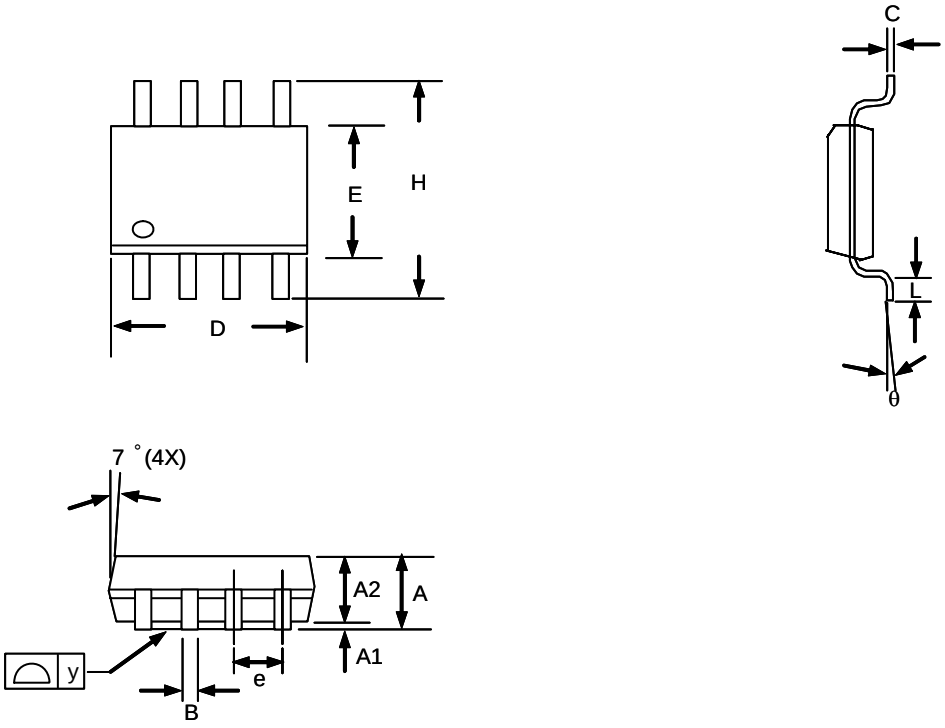
MSOP-8



SOT-23-8



Package Information

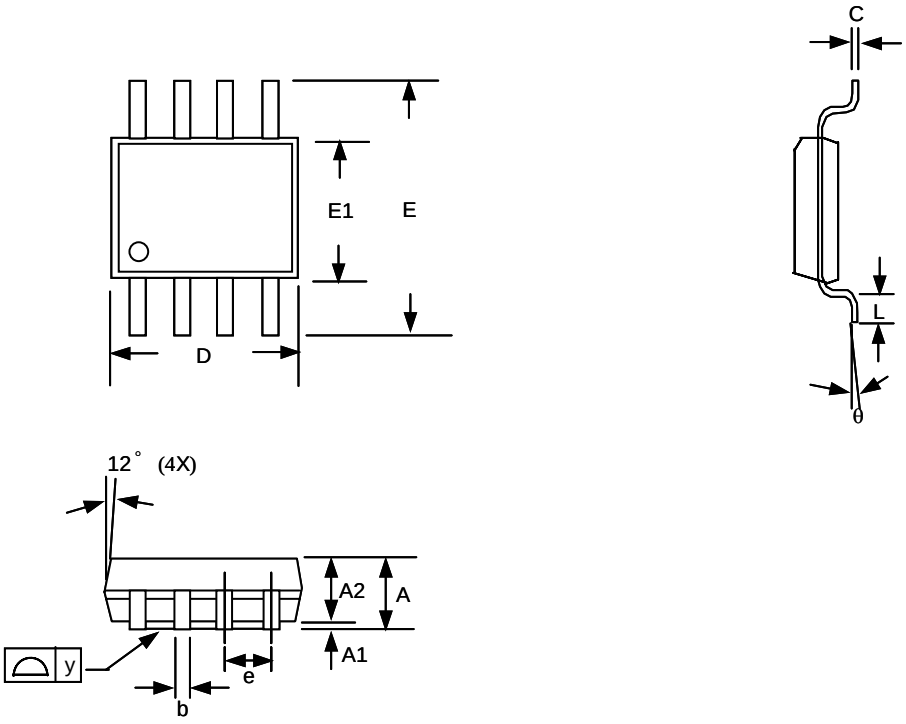


SOP- 8 (P1) Package

Note:

1. Package body sizes exclude mold flash and gate burrs
2. Dimension L is measured in gage plane
3. Tolerance 0.10mm unless otherwise specified
4. Controlling dimension is millimeter converted inch dimensions are not necessarily exact.
5. Followed from JEDEC MS-012

SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.35	1.60	1.75	0.053	0.063	0.069
A1	0.10	-----	0.25	0.004	-----	0.010
A2	-----	1.45	-----	-----	0.057	-----
B	0.33	-----	0.51	0.013	-----	0.020
C	0.19	-----	0.25	0.007	-----	0.010
D	4.80	-----	5.00	0.189	-----	0.197
E	3.80	-----	4.00	0.150	-----	0.157
e	-----	1.27	-----	-----	0.050	-----
H	5.80	-----	6.20	0.228	-----	0.244
L	0.40	-----	1.27	0.016	-----	0.050
y	-----	-----	0.10	-----	-----	0.004
θ	0°	-----	8°	0°	-----	8°

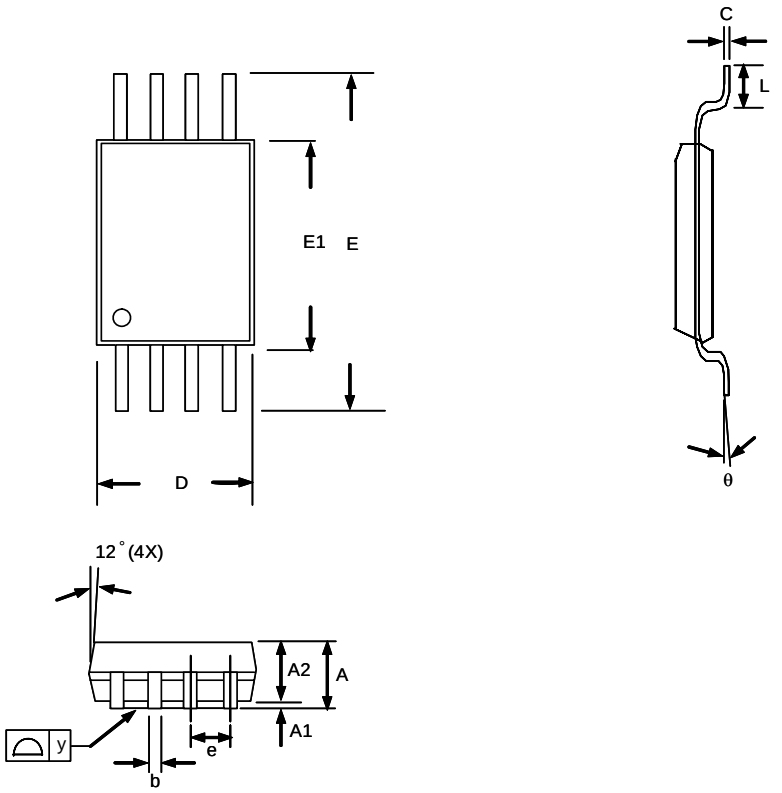


MSOP-8 (P8) Package

Note:

1. Package body sizes exclude mold flash and gate burrs
2. Dimension L is measured in gage plane
3. Tolerance 0.10mm unless otherwise specified
4. Controlling dimension is millimeter converted inch dimensions are not necessarily exact.
5. Followed from JEDEC MO-137

SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.81	1.02	1.22	0.032	0.040	0.048
A1	0.00	-----	0.20	0.000	-----	0.008
A2	0.76	0.86	0.97	0.030	0.034	0.038
b	0.28	0.30	0.38	0.011	0.012	0.015
C	0.13	0.15	0.23	0.005	0.006	0.009
D	2.90	3.00	3.10	0.114	0.118	0.122
E	4.80	4.90	5.00	0.189	0.193	0.197
E1	2.90	3.00	3.10	0.114	0.118	0.122
e	-----	0.65	-----	-----	0.026	-----
L	0.40	0.53	0.66	0.016	0.021	0.026
y	-----	-----	0.10	-----	-----	0.004
θ	0°	-----	6°	0°	-----	6°

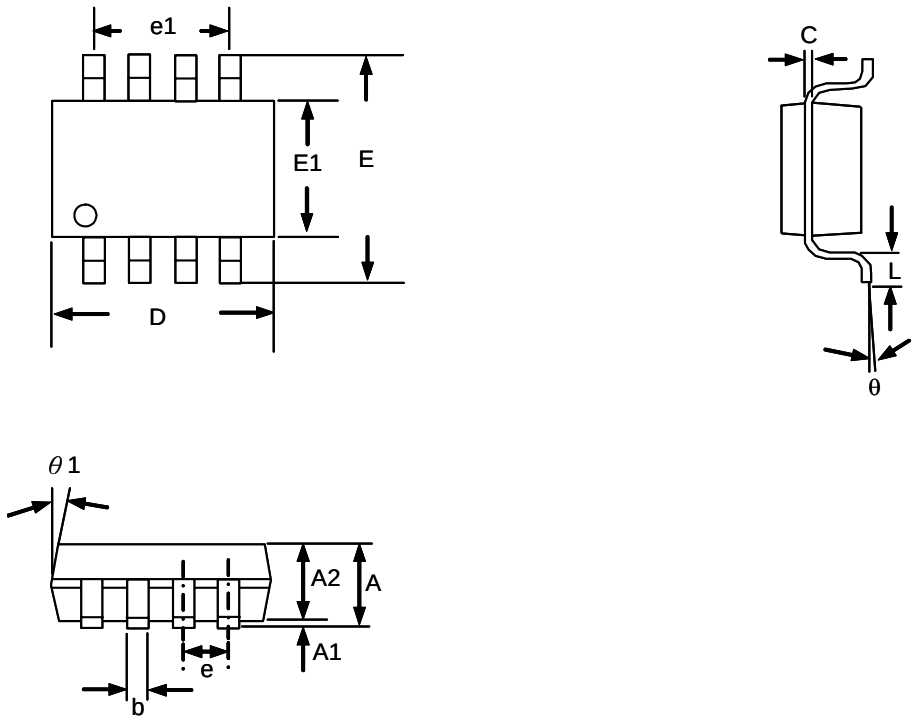


TSSOP-8 (D1) Package

Note:

1. Package body sizes exclude mold flash protrusions or gate burrs
2. Tolerance ±0.10mm unless otherwise specified
3. Coplanarity: 0.10mm
4. Controlling dimension is millimeter converted inch dimensions are not necessarily exact.
6. Followed from JEDEC MO-153

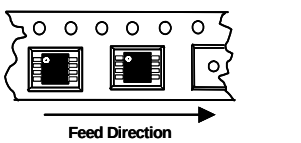
SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	-----	-----	1.20	-----	-----	0.048
A1	0.05	-----	0.15	0.002	-----	0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
b	0.19	-----	0.30	0.007	-----	0.012
C	0.09	-----	0.20	0.004	-----	0.008
D	2.90	3.00	3.10	0.114	0.118	0.122
E	-----	6.40	-----	-----	0.252	-----
E1	4.30	4.40	4.50	0.169	0.173	0.177
e	-----	0.65	-----	-----	0.026	-----
L	0.45	0.60	0.75	0.018	0.024	0.030
y	-----	-----	0.10	-----	-----	0.004
θ	0°	-----	8°	0°	-----	8°



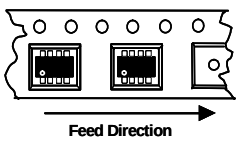
SOT-23-8 (TM) Package

SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	-----	-----	1.45	-----	-----	0.057
A1	0.00	-----	0.15	0.000	-----	0.006
A2	0.90	1.15	1.30	0.035		0.051
b	0.22	-----	0.38	0.009	-----	0.015
C	0.08	-----	0.22	0.003	-----	0.009
D	2.90 BSC			0.114 BSC		
E	2.80 BSC			0.110 BSC		
E1	1.60 BSC			0.063 BSC		
e	0.65 BSC			0.026 BSC		
e1	1.95 BSC			0.077 BSC		
L	0.30	0.45	0.60	0.012	0.018	0.024
θ	0°	4°	8°	0°	4°	8°
θ1	5°	10°	15°	5°	10°	15°

Taping Specification



Typical SOP/MSOP/TSSOP Package Orientation



Typical SOT-23-8 Package Orientation

PACKAGE	Q'TY/REEL
SOP-8	2,500 ea
MSOP-8	2,500 ea
TSSOP-8	2,500 ea
SOT-23-8	3,000 ea