



SGM8922

12.7MHz, Dual Rail-to-Rail Output Operational Amplifier

PRODUCT DESCRIPTION

The SGM8922 is a dual, rail-to-rail output operational amplifier that is optimized and fully specified for 5V operation. High output current allows low load impedances to be driven.

The SGM8922 has a wide input common mode voltage range and output voltage swing, running at single supply voltage from 3V to 5.5V.

The SGM8922 provides excellent overall performance. It exhibits low noise, distortion, low offset and high output current capability, making this device an excellent choice for high quality, low voltage or battery operated audio systems.

The SGM8922 is offered in Green MSOP-8, TSSOP-8 and SOIC-8 packages and ESD (HBM) reaches 8kV. It is specified over the extended -40°C to +125°C temperature range.

FEATURES

- **Rail-to-Rail Output**
- **Low Noise: 6nV/√Hz**
- **Low Distortion**
- **High Output Voltage Swing: 4.73V (with 100mA Output Current)**
- **Low Output Voltage Swing: 0.24V (with 100mA Output Current)**
- **Supply Voltage Range: 3V to 5.5V**
- **Low Input Offset Voltage: 0.9mV (MAX, SGM8922A)**
- **Gain-Bandwidth Product: 12.7MHz**
- **Slew Rate: 6.8V/μs**
- **Low Supply Current 3mA/Amplifier (TYP)**
- **Small Packaging: Available in Green MSOP-8, TSSOP-8 and SOIC-8 Packages**

APPLICATIONS

Data Acquisition
Process Control
Active Filters
Test Equipment
Mobile Phone
Audio Processing
Video Processing
Headphone Amplifier
Portable Equipment
Broadband Communications
A-to-D Driver
D-to-A Driver

PACKAGE/ORDERING INFORMATION

MODEL	PIN-PACKAGE	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKAGE OPTION
SGM8922	MSOP-8	-40°C to +85°C	SGM8922YMS8/TR	SGM8922YMS8	Tape and Reel, 3000
	SOIC-8	-40°C to +85°C	SGM8922YS8/TR	SGM8922YS8	Tape and Reel, 2500
	TSSOP-8	-40°C to +85°C	SGM8922YTS8/TR	SGM8922YTS8	Tape and Reel, 3000
	SOIC-8	-40°C to +125°C	SGM8922XS8/TR	SGM8922XS8	Tape and Reel, 2500
SGM8922A	MSOP-8	-40°C to +85°C	SGM8922AYMS8/TR	SGM8922YMS8	Tape and Reel, 3000
	SOIC-8	-40°C to +85°C	SGM8922AYS8/TR	SGM8922YS8	Tape and Reel, 2500
	SOIC-8	-40°C to +125°C	SGM8922AXS8/TR	SGM8922XS8	Tape and Reel, 2500

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, +V_S to -V_S6V
 Common Mode Input Voltage..... -0.1V to 3.8V
 Storage Temperature Range.....-65°C to +150°C
 Junction Temperature150°C
 Operating Temperature Range.....-40°C to +125°C
 Package Thermal Resistance @ T_A = +25°C
 SOIC-8, θ_{JA}.....82°C/W
 MSOP-8, θ_{JA}..... 105°C/W
 TSSOP-8, θ_{JA}.....108°C/W
 Lead Temperature (Soldering 10sec)
260°C
 ESD Susceptibility
 HBM.....8000V
 MM.....400V

NOTE:

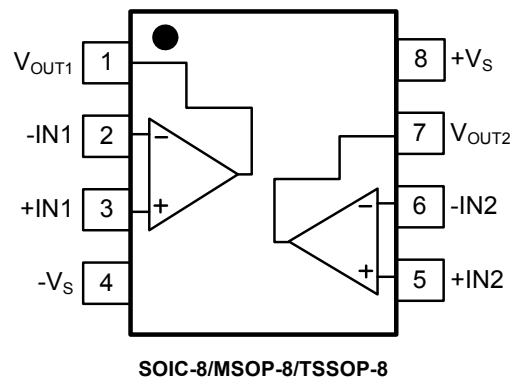
Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

CAUTION

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. 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.

SGMICRO reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact SGMICRO sales office to get the latest datasheet.

PIN CONFIGURATIONS (TOP VIEW)



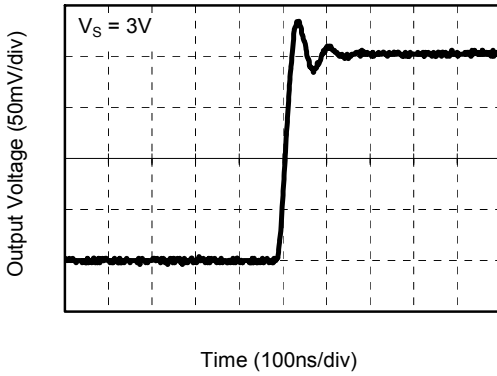
ELECTRICAL CHARACTERISTICS: $V_S = +5V$ (At $T_A = +25^\circ\text{C}$, $R_L = 600\Omega$ connected to $V_S/2$, unless otherwise noted.)

PARAMETER	CONDITIONS	SGM8922						
		TYP	MIN/MAX OVER TEMPERATURE				UNITS	MIN /MAX
		+25°C	+25°C	-40°C to +85°C	-40°C to +125°C			
DYNAMIC PERFORMANCE								
Gain-Bandwidth Product (GBP)	$R_L = 600\Omega$	12.7				MHz	TYP	
Slew Rate	$2V_{PP}$ step, $A_V = 1$	6.8				V/ μs	TYP	
Crosstalk	$f = 1\text{kHz}$	-120				dB	TYP	
NOISE/DISTORTION PERFORMANCE								
Total Harmonic Distortion + Noise (THD+N)	$V_{OUT} = 2V_{PP}$, $f = 1\text{kHz}$, $A_V = 1$, $R_L = 600\Omega$	0.003				%	TYP	
Input Voltage Noise (e_n)	$f = 1\text{kHz}$	6				nV/ $\sqrt{\text{Hz}}$	TYP	
Phase Margin	$R_L = 600\Omega$, $C_L = 100\text{pF}$	45				degree	TYP	
DC PERFORMANCE								
Input Offset Voltage (V_{OS})								
SGM8922			3	4.2	5	mV	MAX	
SGM8922A			0.9	1.8	2.6	mV	MAX	
Input Offset Voltage Drift		1.6				$\mu\text{V}/^\circ\text{C}$	TYP	
Open-Loop Gain (A_{OL})	$R_L = 600\Omega$, $V_{OUT} = 0.15\text{V}$ to 4.85V	109	86	80	75	dB	MIN	
	$R_L = 10\text{k}\Omega$, $V_{OUT} = 0.05\text{V}$ to 4.95V	104	84	75	70	dB	MIN	
INPUT CHARACTERISTICS								
Input Common Mode Voltage Range (V_{CM})	$V_S = 5\text{V}$	-0.1 to 3.8				V	TYP	
Common Mode Rejection Ratio (CMRR)	$V_S = 5.5\text{V}$, $V_{CM} = -0.1\text{V}$ to 3.8V	108	60	56	51	dB	MIN	
OUTPUT CHARACTERISTICS								
Output Voltage Swing from Rails								
High Output Voltage Swing (V_{OH})	$I_{OUT} = 100\text{mA}$	4.73	4.20	4.10	4	V	MIN	
Low Output Voltage Swing (V_{OL})	$I_{OUT} = -100\text{mA}$	0.24	0.45	0.56	0.68	V	MAX	
Output Short Circuit Current			300			mA	MAX	
POWER SUPPLY								
Operating Voltage Range			3	3	3	V	MIN	
			5.5	5.5	5.5	V	MAX	
Quiescent Current (per Amplifier)	$I_{OUT} = 0\text{mA}$	3	3.9			mA	MAX	
Power Supply Rejection Ratio (PSRR)	$V_S = +2.5\text{V}$ to $+5.5\text{V}$, $V_{CM} = (-V_S) + 0.5\text{V}$	80	60	56	51	dB	MIN	

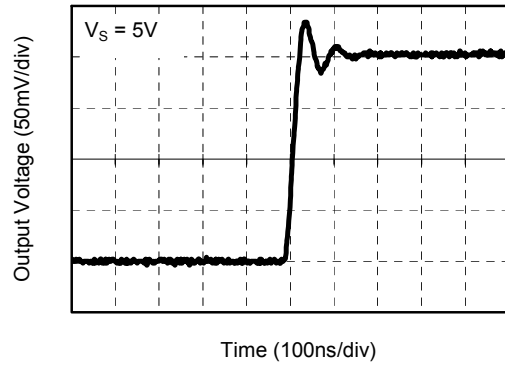
TYPICAL PERFORMANCE CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, $A_v = +1$, $C_L = 100\text{pF}$ and $R_L = 600\Omega$, unless otherwise noted.

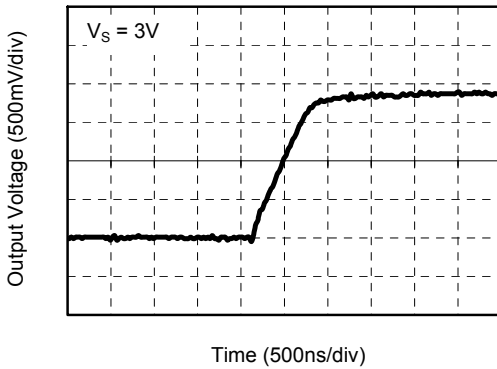
Small Signal Step Response



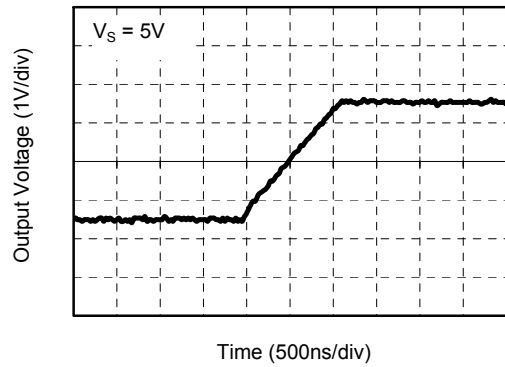
Small Signal Step Response



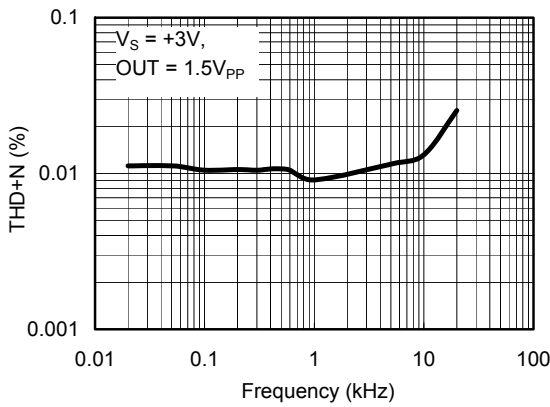
Large Signal Step Response



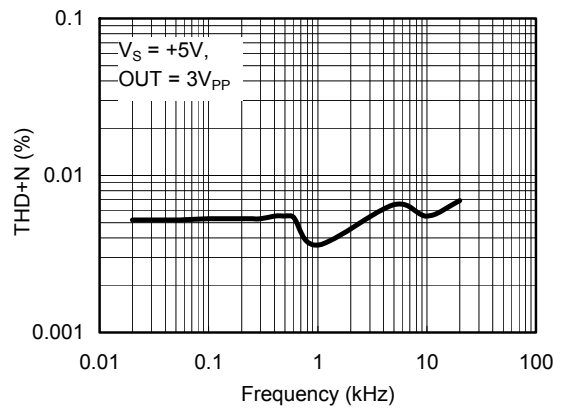
Large Signal Step Response



THD+N vs. Frequency

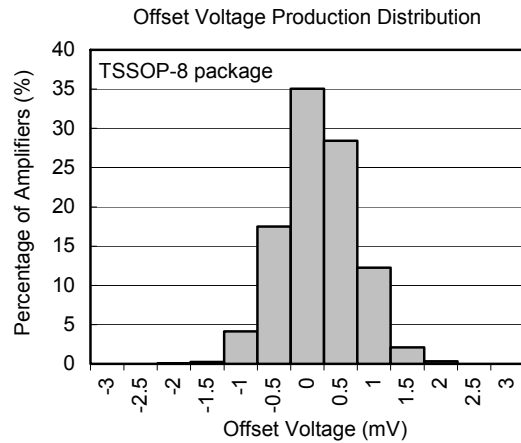
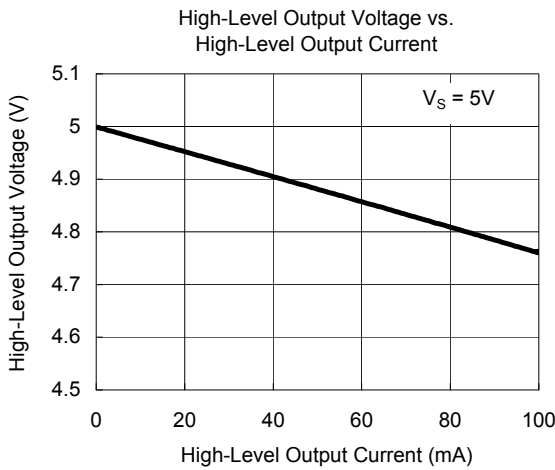
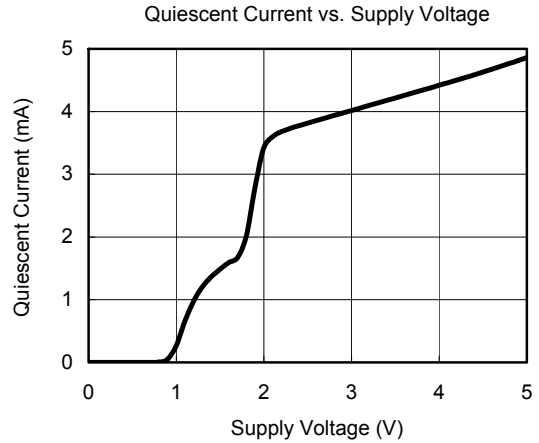
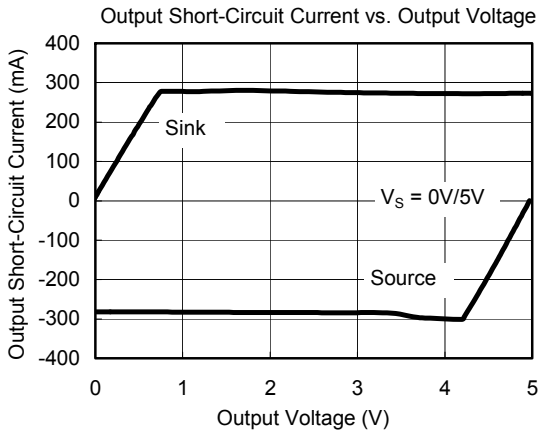


THD+N vs. Frequency



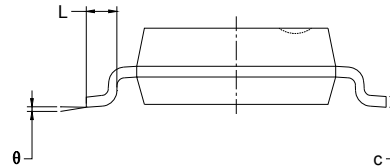
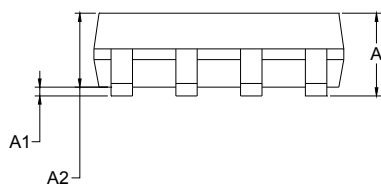
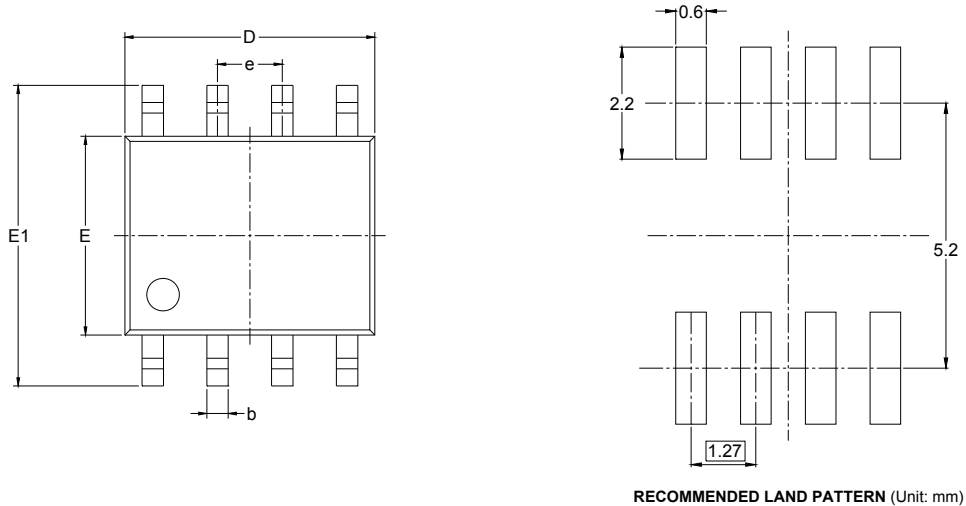
TYPICAL PERFORMANCE CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, $A_v = +1$, $C_L = 100\text{pF}$ and $R_L = 600\Omega$, unless otherwise noted.



PACKAGE OUTLINE DIMENSIONS

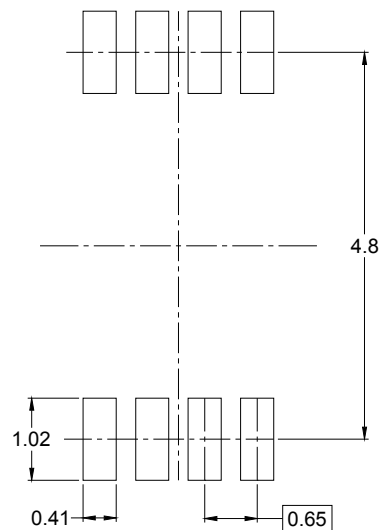
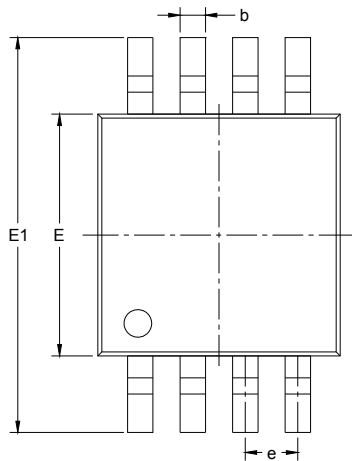
SOIC-8



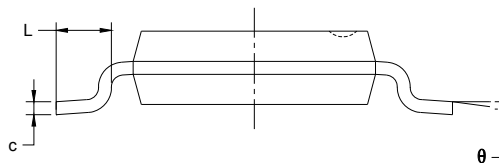
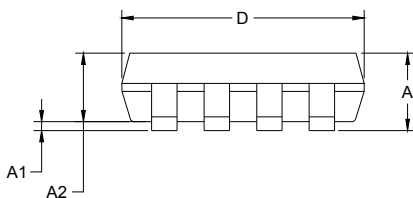
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

MSOP-8



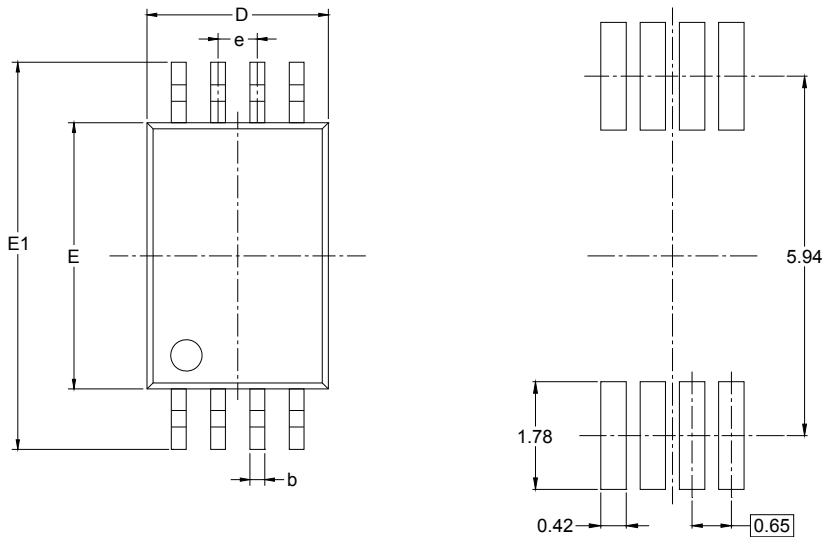
RECOMMENDED LAND PATTERN (Unit: mm)



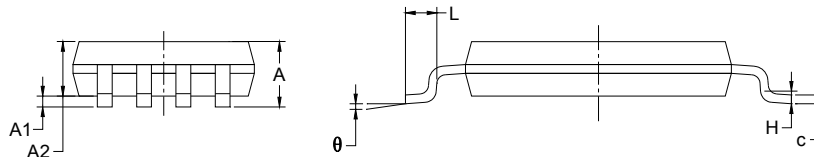
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.650 BSC		0.026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

PACKAGE OUTLINE DIMENSIONS

TSSOP-8



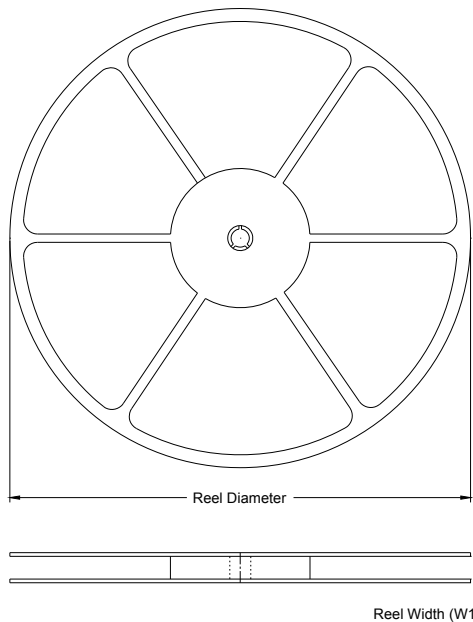
RECOMMENDED LAND PATTERN (Unit: mm)



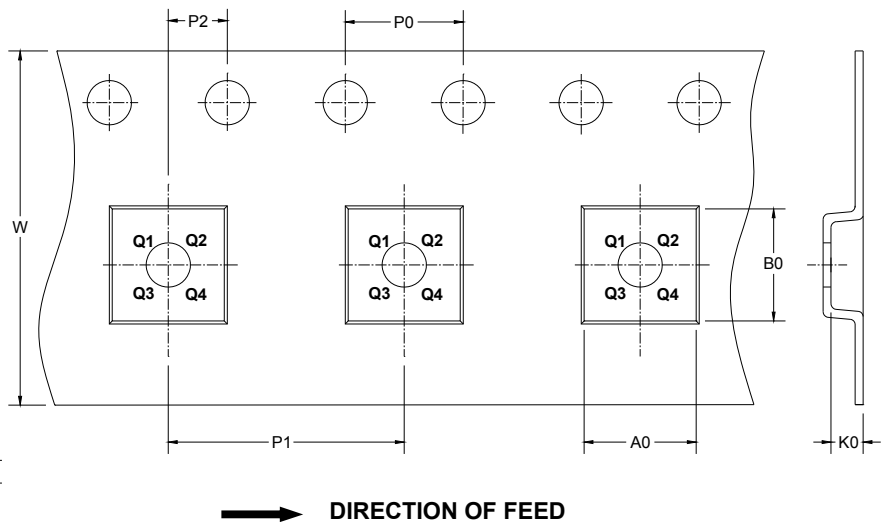
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A		1.100		0.043
A1	0.050	0.150	0.002	0.006
A2	0.800	1.000	0.031	0.039
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	2.900	3.100	0.114	0.122
E	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
e	0.650 BSC		0.026 BSC	
L	0.500	0.700	0.02	0.028
H	0.25 TYP		0.01 TYP	
theta	1°	7°	1°	7°

TAPE AND REEL INFORMATION

REEL DIMENSIONS



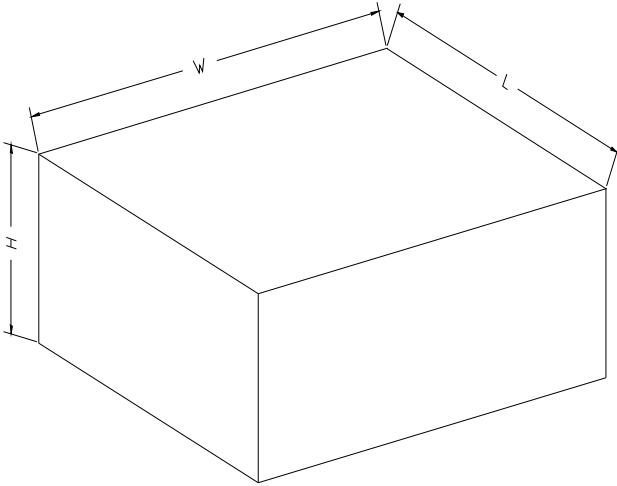
TAPE DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOIC-8	13"	12.4	6.4	5.4	2.1	4.0	8.0	2.0	12.0	Q1
MSOP-8	13"	12.4	5.2	3.3	1.5	4.0	8.0	2.0	12.0	Q1
TSSOP-8	13"	12.4	6.76	3.3	1.8	4.0	8.0	2.0	12.0	Q1

CARTON BOX DIMENSIONS

NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
13"	386	280	370	5