

## PACKAGE/ORDERING INFORMATION

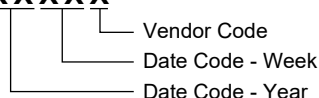
| MODEL   | PACKAGE DESCRIPTION | SPECIFIED TEMPERATURE RANGE | ORDERING NUMBER | PACKAGE MARKING          | PACKING OPTION      |
|---------|---------------------|-----------------------------|-----------------|--------------------------|---------------------|
| SGM8142 | SOIC-8              | -40°C to +85°C              | SGM8142YS8G/TR  | SGM8142YS8<br>XXXXX      | Tape and Reel, 2500 |
|         | MSOP-8              | -40°C to +85°C              | SGM8142YMS8G/TR | SGM8142<br>YMS8<br>XXXXX | Tape and Reel, 3000 |

## MARKING INFORMATION

NOTE: XXXXX = Date Code and Vendor Code.

## SOIC-8/MSOP-8

XXXXX



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

## ABSOLUTE MAXIMUM RATINGS

|                                        |                                                        |
|----------------------------------------|--------------------------------------------------------|
| Supply Voltage.....                    | 6V                                                     |
| Analog Inputs (+IN, -IN).....          | (-V <sub>S</sub> ) - 0.1V to (+V <sub>S</sub> ) + 0.1V |
| Differential Input Voltage.....        | (-V <sub>S</sub> ) - (+V <sub>S</sub> )                |
| Junction Temperature.....              | +150°C                                                 |
| Storage Temperature Range.....         | -65°C to +150°C                                        |
| Lead Temperature (Soldering, 10s)..... | +260°C                                                 |
| ESD Susceptibility                     |                                                        |
| HBM.....                               | 3000V                                                  |
| MM.....                                | 400V                                                   |

## RECOMMENDED OPERATING CONDITIONS

|                                   |                |
|-----------------------------------|----------------|
| Operating Temperature Range ..... | -40°C to +85°C |
|-----------------------------------|----------------|

## OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods

may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

## ESD SENSITIVITY 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.

## DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

## ELECTRICAL CHARACTERISTICS

(At  $T_A = +25^\circ\text{C}$ ,  $+V_S = 1.4\text{V}$  to  $5.0\text{V}$ ,  $-V_S = \text{GND}$ ,  $V_{CM} = +V_S/2$ ,  $V_{OUT} \approx +V_S/2$  and  $R_L = 1\text{M}\Omega$  to  $+V_S/2$  <sup>(1)</sup>, unless otherwise noted.)

| PARAMETER                            | SYMBOL                   | CONDITIONS                                                                         | MIN            | TYP   | MAX            | UNITS                        |
|--------------------------------------|--------------------------|------------------------------------------------------------------------------------|----------------|-------|----------------|------------------------------|
| <b>DC Electrical Characteristics</b> |                          |                                                                                    |                |       |                |                              |
| Input Offset Voltage                 | $V_{OS}$                 | $V_{CM} = +V_S/2$                                                                  |                | 0.4   | 2.5            | mV                           |
| Input Offset Voltage Drift           | $\Delta V_{OS}/\Delta T$ | $V_{CM} = +V_S/2$ , $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$            |                | 2     |                | $\mu\text{V}/^\circ\text{C}$ |
| Power Supply Rejection Ratio         | PSRR                     | $+V_S = 1.4\text{V}$ to $5.5\text{V}$                                              | 69             | 80    |                | dB                           |
| Input Common Mode Voltage Range      | $V_{CMR}$                |                                                                                    | $(-V_S) - 0.1$ |       | $(+V_S) + 0.1$ | V                            |
| Common Mode Rejection Ratio          | CMRR                     | $+V_S = 5.0\text{V}$ , $V_{CM} = -0.1\text{V}$ to $5.1\text{V}$                    | 69             | 83    |                | dB                           |
|                                      |                          | $+V_S = 5.0\text{V}$ , $V_{CM} = 2.5\text{V}$ to $5.1\text{V}$                     | 67             | 82    |                |                              |
|                                      |                          | $+V_S = 5.0\text{V}$ , $V_{CM} = -0.1\text{V}$ to $2.5\text{V}$                    | 63             | 77    |                |                              |
| Large-Signal Voltage Gain            | $A_{VO}$                 | $+V_S = 1.4\text{V}$ , $R_L = 50\text{k}\Omega$ , $V_{OUT} = (+V_S) - 0.1\text{V}$ | 75             | 80    |                | dB                           |
|                                      |                          | $+V_S = 2.5\text{V}$ , $R_L = 50\text{k}\Omega$ , $V_{OUT} = (+V_S) - 0.1\text{V}$ |                | 87    |                |                              |
|                                      |                          | $+V_S = 5.0\text{V}$ , $R_L = 50\text{k}\Omega$ , $V_{OUT} = (+V_S) - 0.1\text{V}$ | 87             | 93    |                |                              |
| Input Bias Current                   | $I_B$                    |                                                                                    |                | 1     |                | pA                           |
| Input Offset Current                 | $I_{OS}$                 |                                                                                    |                | 1     |                | pA                           |
| Maximum Output Voltage Swing         | $V_{OH}$                 | $+V_S = 1.4\text{V}$ , $R_L = 50\text{k}\Omega$                                    | 1.39           | 1.395 |                | V                            |
|                                      |                          | $+V_S = 2.5\text{V}$ , $R_L = 50\text{k}\Omega$                                    |                | 2.497 |                |                              |
|                                      |                          | $+V_S = 5.0\text{V}$ , $R_L = 50\text{k}\Omega$                                    | 4.99           | 4.996 |                |                              |
|                                      | $V_{OL}$                 | $+V_S = 1.4\text{V}$ , $R_L = 50\text{k}\Omega$                                    |                | 4.6   | 10             | mV                           |
|                                      |                          | $+V_S = 2.5\text{V}$ , $R_L = 50\text{k}\Omega$                                    |                | 3.1   |                |                              |
|                                      |                          | $+V_S = 5.0\text{V}$ , $R_L = 50\text{k}\Omega$                                    |                | 3.6   | 10             |                              |
| Output Short-Circuit Current         | $I_{SC}$                 | $+V_S = 2.5\text{V}$                                                               |                | 5.6   |                | mA                           |
|                                      |                          | $+V_S = 5.0\text{V}$                                                               | 22             | 24    |                |                              |
| Supply Voltage                       | $V_{CC}$                 |                                                                                    | 1.4            |       | 5.5            | V                            |
| Quiescent Current/Amplifier          | $I_Q$                    | $+V_S = 1.4\text{V}$                                                               |                | 300   |                | nA                           |
|                                      |                          | $+V_S = 2.5\text{V}$                                                               |                | 320   |                |                              |
|                                      |                          | $+V_S = 5.0\text{V}$                                                               |                | 350   | 800            |                              |

**ELECTRICAL CHARACTERISTICS (continued)**

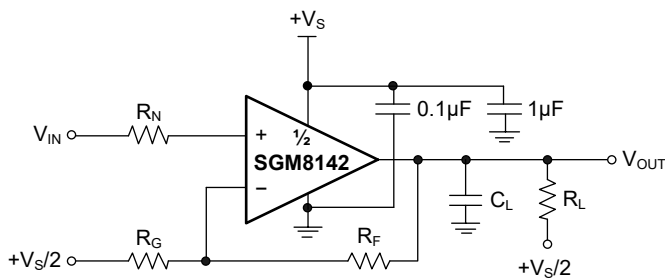
(At  $T_A = +25^\circ\text{C}$ ,  $+V_S = 1.4\text{V}$  to  $5.0\text{V}$ ,  $-V_S = \text{GND}$ ,  $V_{CM} = +V_S/2$ ,  $V_{OUT} \approx +V_S/2$  and  $R_L = 1\text{M}\Omega$  to  $+V_S/2$ ,  $C_L = 60\text{pF}$  <sup>(1)</sup>, unless otherwise noted.)

| PARAMETER                            | SYMBOL             | CONDITIONS                                                 | MIN | TYP | MAX | UNITS                        |
|--------------------------------------|--------------------|------------------------------------------------------------|-----|-----|-----|------------------------------|
| <b>AC Electrical Characteristics</b> |                    |                                                            |     |     |     |                              |
| Gain-Bandwidth Product               | GBP                | $+V_S = 1.4\text{V}$                                       |     | 4.3 |     | kHz                          |
|                                      |                    | $+V_S = 2.5\text{V}$                                       |     | 4.7 |     |                              |
|                                      |                    | $+V_S = 5.0\text{V}$                                       |     | 5   |     |                              |
| Slew Rate                            | SR                 | $+V_S = 1.4\text{V}$ , $V_{OUT} = 1\text{V}$ Step          |     | 1.3 |     | V/ms                         |
|                                      |                    | $+V_S = 2.5\text{V}$ , $V_{OUT} = 1\text{V}$ Step          |     | 1.5 |     |                              |
|                                      |                    | $+V_S = 5.0\text{V}$ , $V_{OUT} = 2\text{V}$ Step          |     | 1.6 |     |                              |
| Phase Margin                         | PM                 | $+V_S = 1.4\text{V}$ to $5.5\text{V}$                      |     | 60  |     | °                            |
| Input Voltage Noise                  | $e_{n\text{ p-p}}$ | $+V_S = 1.4\text{V}$ , $f = 0.1\text{Hz}$ to $10\text{Hz}$ |     | 4.4 |     | $\mu\text{V}_{\text{P-P}}$   |
|                                      |                    | $+V_S = 2.5\text{V}$ , $f = 0.1\text{Hz}$ to $10\text{Hz}$ |     | 3.9 |     |                              |
|                                      |                    | $+V_S = 5.0\text{V}$ , $f = 0.1\text{Hz}$ to $10\text{Hz}$ |     | 4.0 |     |                              |
| Input Voltage Noise Density          | $e_n$              | $+V_S = 1.4\text{V}$ , $f = 1\text{kHz}$                   |     | 135 |     | $\text{nV}/\sqrt{\text{Hz}}$ |
|                                      |                    | $+V_S = 2.5\text{V}$ , $f = 1\text{kHz}$                   |     | 140 |     |                              |
|                                      |                    | $+V_S = 5.0\text{V}$ , $f = 1\text{kHz}$                   |     | 130 |     |                              |

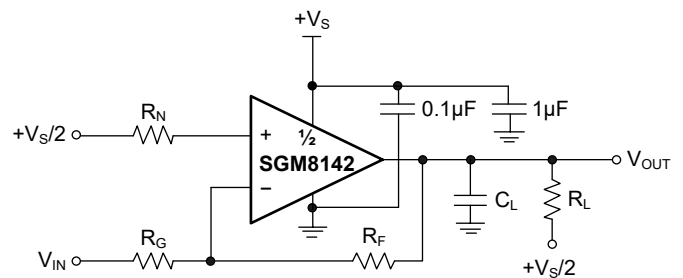
NOTE: 1. Refer to Figure 1 and Figure 2.

**TEST CIRCUITS**

The test circuits used for the DC and AC tests are shown in Figure 1 and Figure 2. The bypass capacitors are laid out according to the rules discussed in "Supply Bypass".



**Figure 1. AC and DC Test Circuit for Most Non-Inverting Gain Conditions**

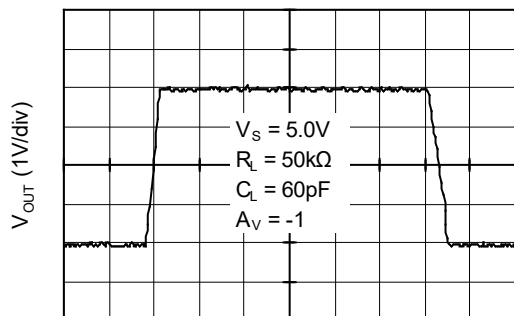


**Figure 2. AC and DC Test Circuit for Most Inverting Gain Conditions**

## TYPICAL PERFORMANCE CHARACTERISTICS

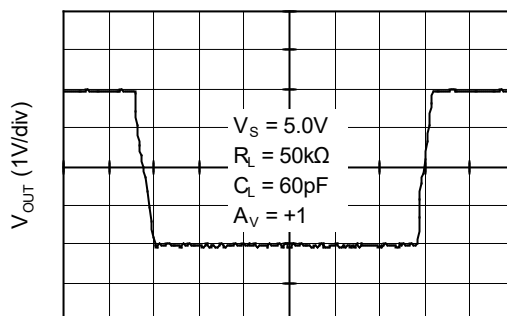
At  $T_A = +25^\circ\text{C}$ ,  $+V_S = 1.4\text{V}$  to  $5.0\text{V}$ ,  $-V_S = \text{GND}$ ,  $V_{CM} = +V_S/2$ ,  $V_{OUT} \approx +V_S/2$  and  $R_L = 1\text{M}\Omega$  to  $+V_S/2$ ,  $C_L = 60\text{pF}$ , unless otherwise noted.

Large Signal Inverting Pulse Response



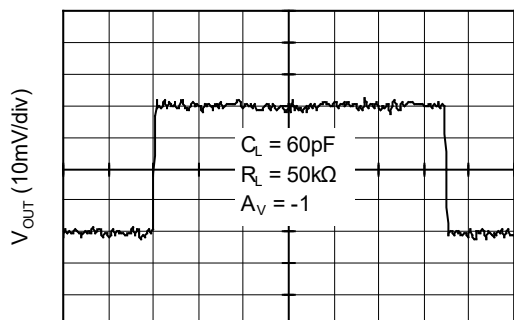
Time (5ms/div)

Large Signal Non-Inverting Pulse Response



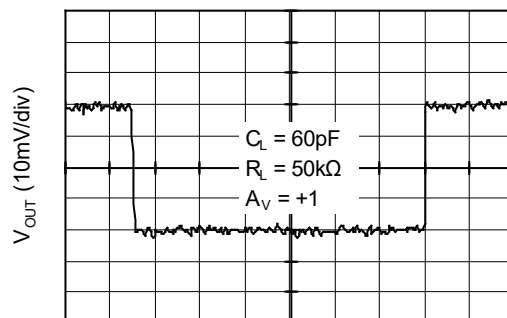
Time (5ms/div)

Small Signal Inverting Pulse Response



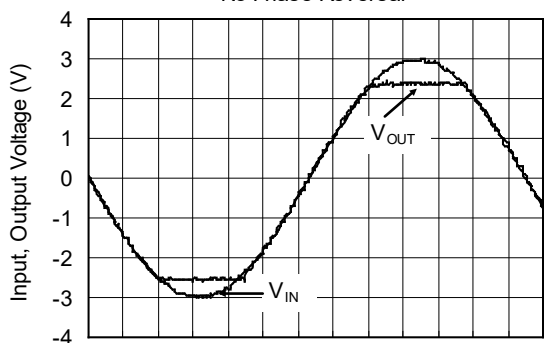
Time (5ms/div)

Small Signal Non-Inverting Pulse Response



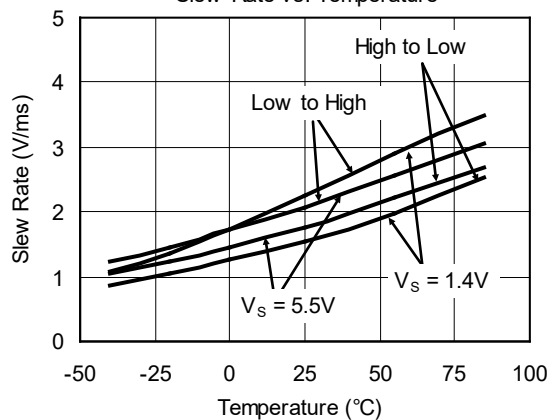
Time (5ms/div)

No Phase Reversal



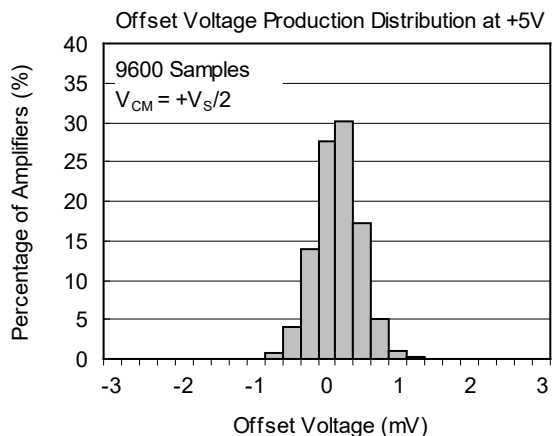
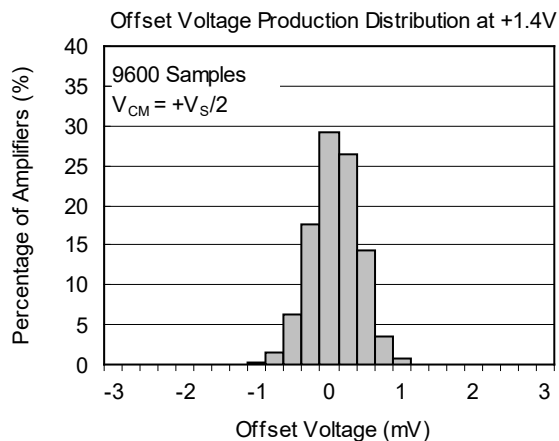
Time (5ms/div)

Slew Rate vs. Temperature



**TYPICAL PERFORMANCE CHARACTERISTICS (continued)**

At  $T_A = +25^\circ\text{C}$ ,  $+V_S = 1.4\text{V}$  to  $5.0\text{V}$ ,  $-V_S = \text{GND}$ ,  $V_{CM} = +V_S/2$ ,  $V_{OUT} \approx +V_S/2$  and  $R_L = 1\text{M}\Omega$  to  $+V_S/2$ ,  $C_L = 60\text{pF}$ , unless otherwise noted.

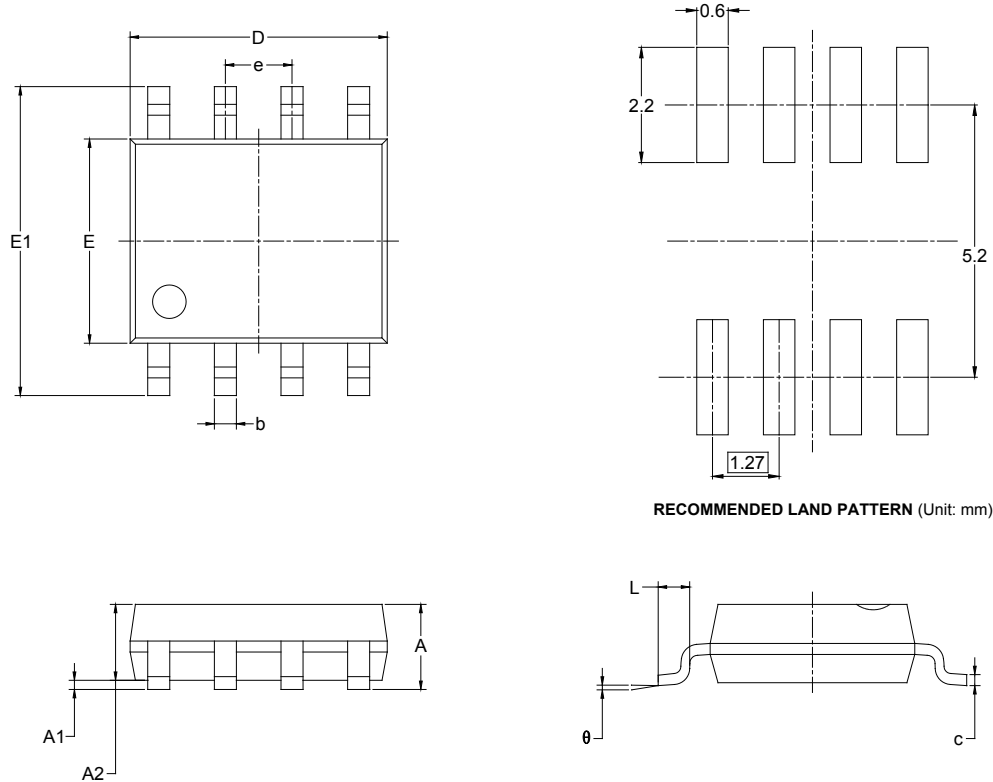
**REVISION HISTORY**

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

| JANUARY 2013 – REV.A.1 to REV.A.2                    |  | Page |
|------------------------------------------------------|--|------|
| Added Tape and Reel Information section .....        |  | 9~10 |
| MAY 2011 – REV.A to REV.A.1                          |  | Page |
| Updated Package Description .....                    |  | All  |
| Changes from Original (APRIL 2010) to REV.A          |  | Page |
| Changed from product preview to production data..... |  | All  |

## PACKAGE OUTLINE DIMENSIONS

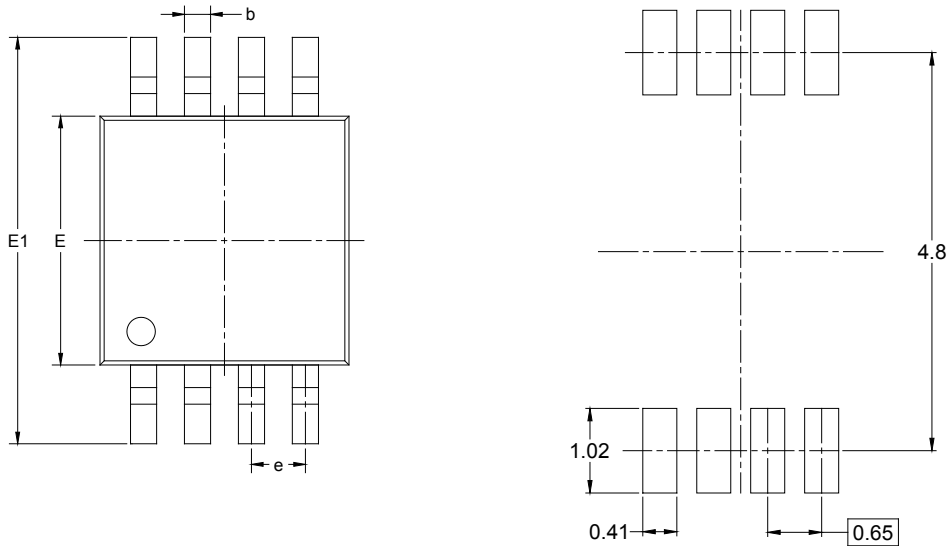
### SOIC-8



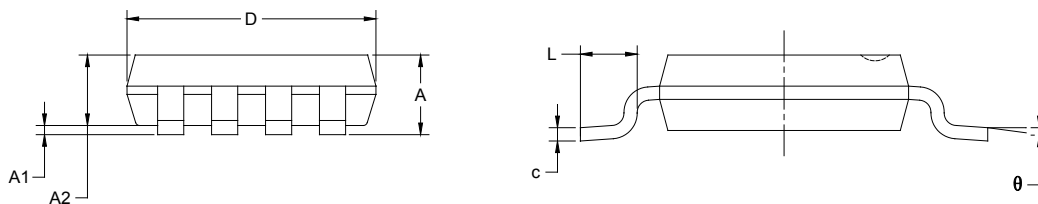
| Symbol   | Dimensions<br>In Millimeters |       | Dimensions<br>In Inches |       |
|----------|------------------------------|-------|-------------------------|-------|
|          | MIN                          | MAX   | MIN                     | MAX   |
| A        | 1.350                        | 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 |
| $\theta$ | 0°                           | 8°    | 0°                      | 8°    |

## PACKAGE OUTLINE DIMENSIONS

### MSOP-8



RECOMMENDED LAND PATTERN (Unit: mm)

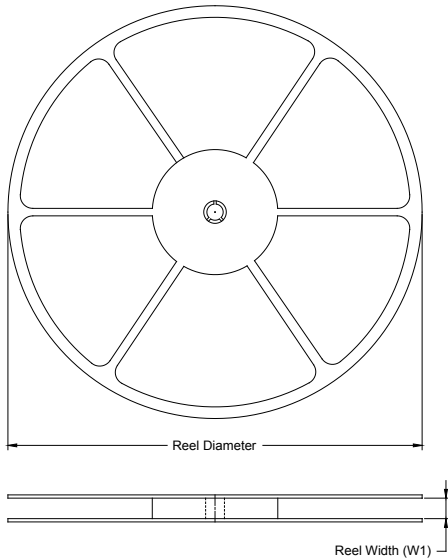


| Symbol | Dimensions<br>In Millimeters |       | Dimensions<br>In Inches |       |
|--------|------------------------------|-------|-------------------------|-------|
|        | MIN                          | MAX   | MIN                     | MAX   |
| A      | 0.820                        | 1.100 | 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°    |

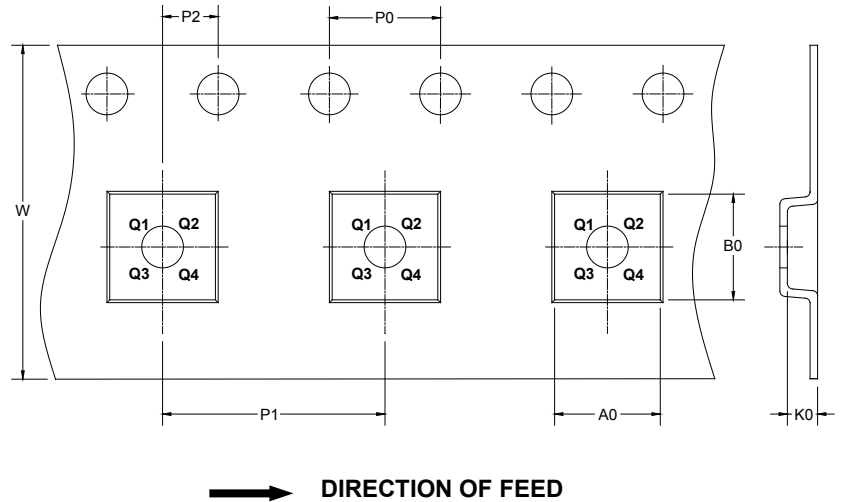
# PACKAGE INFORMATION

## TAPE AND REEL INFORMATION

### REEL DIMENSIONS



### TAPE DIMENSIONS



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

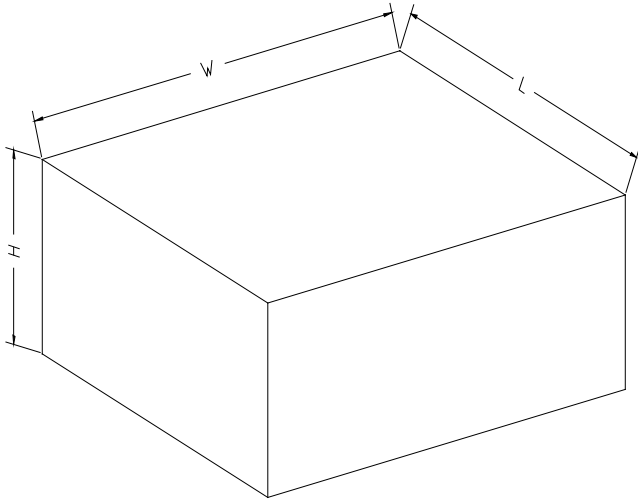
### KEY PARAMETER LIST OF TAPE AND REEL

| 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               | 6.40    | 5.40    | 2.10    | 4.0     | 8.0     | 2.0     | 12.0   | Q1            |
| MSOP-8       | 13"           | 12.4               | 5.20    | 3.30    | 1.50    | 4.0     | 8.0     | 2.0     | 12.0   | Q1            |

DD0001

## PACKAGE INFORMATION

### 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            |

DD0002