



# SGM8270-2

## Low Noise, Precision, High Voltage, Rail-to-Rail I/O Operational Amplifier

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### GENERAL DESCRIPTION

The SGM8270-2 is a dual, low noise, precision, high voltage operational amplifier, which can operate from 3.3V to 36V single supply or from  $\pm 1.65\text{V}$  to  $\pm 18\text{V}$  dual power supplies. It provides rail-to-rail input with a wide input common mode voltage range and rail-to-rail output voltage swing.

The SGM8270-2 provides high slew rate, low noise, bias current and offset.

The SGM8270-2 is available in Green SOIC-8 and MSOP-8 packages. It is specified over the extended  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  temperature range.

### FEATURES

- Rail-to-Rail Input and Output
- Wide Input Common Mode and Differential Voltage Ranges
- Low Offset Voltage: 2.8mV (MAX)
- Low Input Bias Current
- Low Input Offset Current
- Output Short-Circuit Protection
- High Input Impedance
- Low Noise:  $15\text{nV}/\sqrt{\text{Hz}}$  at 1kHz
- Gain-Bandwidth Product: 2.5MHz
- High Slew Rate:  $8\text{V}/\mu\text{s}$
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  Operating Temperature Range
- Available in Green SOIC-8 and MSOP-8 Packages

### APPLICATIONS

High Impedance Sensor  
Photodiode Amplifier  
High End, Professional Audio  
DAC Output Amplifier  
Medical

**PACKAGE/ORDERING INFORMATION**

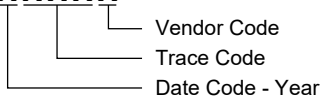
| MODEL     | PACKAGE DESCRIPTION | SPECIFIED TEMPERATURE RANGE | ORDERING NUMBER   | PACKAGE MARKING           | PACKING OPTION      |
|-----------|---------------------|-----------------------------|-------------------|---------------------------|---------------------|
| SGM8270-2 | SOIC-8              | -40°C to +125°C             | SGM8270-2XS8G/TR  | SGM<br>82702XS8<br>XXXXX  | Tape and Reel, 4000 |
|           | MSOP-8              | -40°C to +125°C             | SGM8270-2XMS8G/TR | SGM82702<br>XMS8<br>XXXXX | Tape and Reel, 4000 |

**MARKING INFORMATION**

**SOIC-8**

(1) XXXXX = Date Code, Trace Code and Vendor Code.

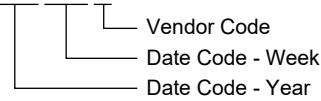
**XXXXX**



**MSOP-8**

(2) XXXXX = Date Code and Vendor Code.

**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, +V <sub>S</sub> to -V <sub>S</sub> .....                              | 40V             |
| Input/Output Voltage Range.....(-V <sub>S</sub> ) - 0.3V to (+V <sub>S</sub> ) + 0.3V |                 |
| Junction Temperature.....   | +150°C          |
| Storage Temperature Range.....  | -65°C to +150°C |
| Lead Temperature (Soldering, 10s).....  | +260°C          |
| ESD Susceptibility  |                 |
| HBM.....  | 6000V           |
| MM.....   | 400V            |
| CDM .....   | 2000V           |

**RECOMMENDED OPERATING CONDITIONS**

|                                  |                 |
|----------------------------------|-----------------|
| Operating Temperature Range..... | -40°C to +125°C |
|----------------------------------|-----------------|

**NOTE:**

1. Proper power supply sequencing is recommended for the CMOS device. Always sequence V<sub>S</sub> on first, followed by the inputs and outputs.

**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.

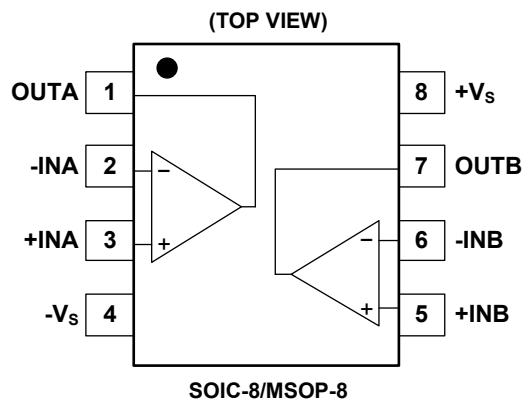
**ESD SENSITIVITY CAUTION**

This integrated circuit can be damaged if ESD protections are not considered carefully. 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 even small parametric changes could cause the device not to meet the published specifications.

**DISCLAIMER**

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

**PIN CONFIGURATIONS**

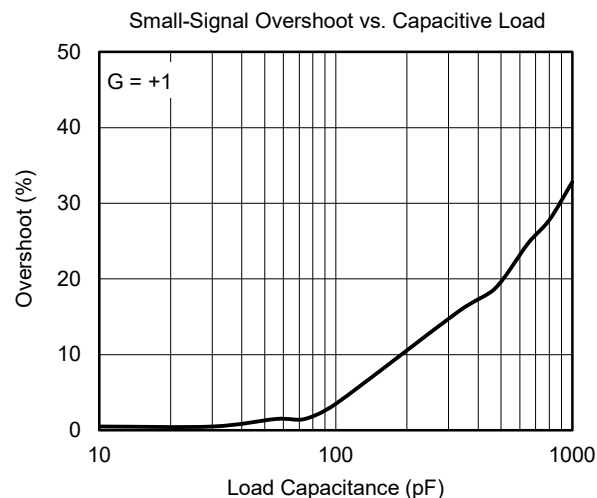
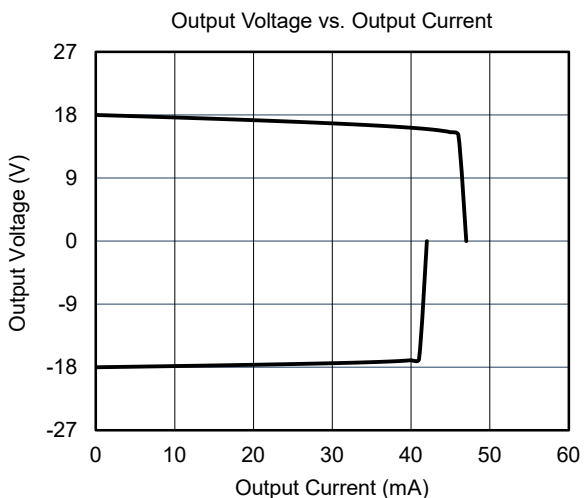
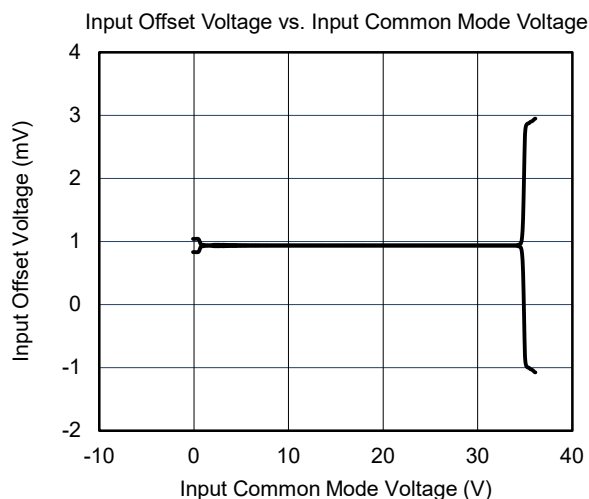
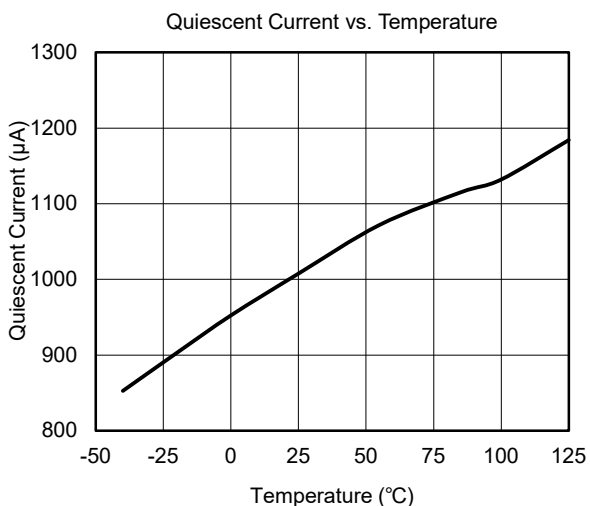
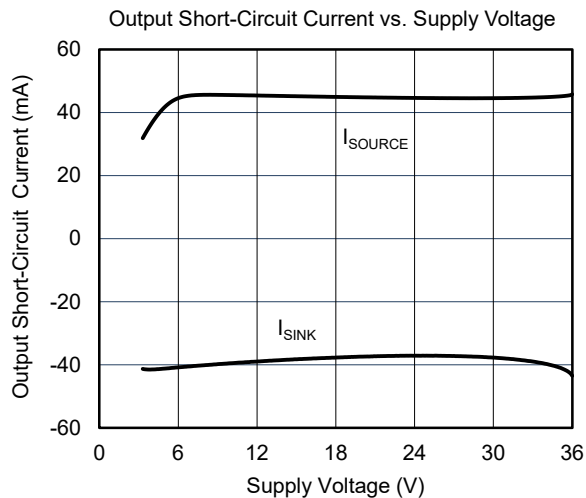
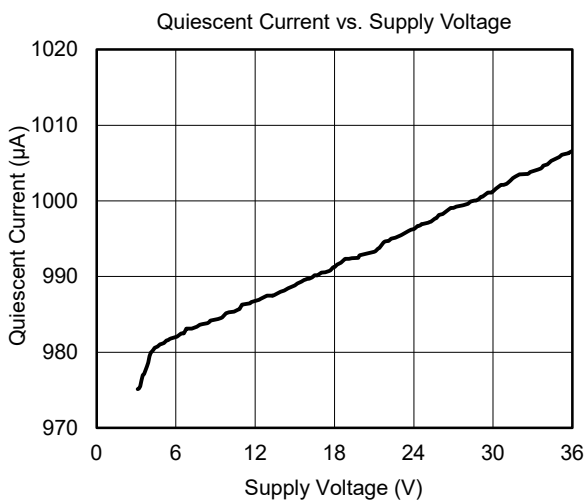


**ELECTRICAL CHARACTERISTICS**(At  $T_A = +25^\circ\text{C}$ ,  $V_S = \pm 1.65\text{V}$  to  $\pm 18\text{V}$  and  $R_L = 2\text{k}\Omega$  connected to  $0\text{V}$ , Full =  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$ , unless otherwise noted.)

| PARAMETER                             | SYMBOL                   | CONDITIONS   | TEMP                | MIN            | TYP      | MAX            | UNITS                        |
|---------------------------------------|--------------------------|--|---------------------|----------------|----------|----------------|------------------------------|
| <b>Input Characteristics</b>          |                          |  |                     |                |          |                |                              |
| Input Offset Voltage                  | $V_{OS}$                 | $V_{CM} = 0\text{V}$   | $+25^\circ\text{C}$ |                | 1.2      | 2.8            | mV                           |
|                                       |                          |  | Full                |                |          | 3              |                              |
| Input Offset Voltage Drift            | $\Delta V_{OS}/\Delta T$ |  | Full                |                | 0.8      |                | $\mu\text{V}/^\circ\text{C}$ |
| Input Bias Current                    | $I_B$                    | $V_{CM} = 0\text{V}$   | $+25^\circ\text{C}$ |                | $\pm 10$ | $\pm 300$      | pA                           |
| Input Offset Current                  | $I_{OS}$                 | $V_{CM} = 0\text{V}$   | $+25^\circ\text{C}$ |                | $\pm 10$ | $\pm 300$      | pA                           |
| Maximum Differential Input Voltage    | $ V_{ID} $               |  | Full                |                |          | $V_S$          | V                            |
| Maximum Input Difference Bias Current | $ I_{ID} $               | $V_S = \pm 18\text{V}$ , $V_{ID} = \pm 18\text{V}$   | $+25^\circ\text{C}$ |                | 2        | 3              | $\mu\text{A}$                |
|                                       |                          |  | Full                |                |          | 4              |                              |
| Input Common Mode Voltage Range       | $V_{CM}$                 |  | Full                | $(-V_S) - 0.1$ |          | $(+V_S) + 0.1$ | V                            |
| Common Mode Rejection Ratio           | CMRR                     | $V_S = \pm 18\text{V}$ ,<br>$(-V_S) - 0.1\text{V} < V_{CM} < (+V_S) - 1.5\text{V}$                                       | $+25^\circ\text{C}$ | 96             | 105      |                | dB                           |
|                                       |                          |  | Full                | 93             |          |                |                              |
|                                       |                          | $V_S = \pm 18\text{V}$ ,<br>$(-V_S) - 0.1\text{V} < V_{CM} < (+V_S) + 0.1\text{V}$                                       | $+25^\circ\text{C}$ | 76             | 85       |                |                              |
|                                       |                          |  | Full                | 73             |          |                |                              |
| Open-Loop Voltage Gain                | $A_{OL}$                 | $(-V_S) + 0.2\text{V} < V_{OUT} < (+V_S) - 0.2\text{V}$ ,<br>$R_L = 10\text{k}\Omega$                                    | $+25^\circ\text{C}$ | 103            | 120      |                | dB                           |
|                                       |                          |  | Full                | 100            |          |                |                              |
|                                       |                          | $(-V_S) + 0.5\text{V} < V_{OUT} < (+V_S) - 0.5\text{V}$ ,<br>$R_L = 2\text{k}\Omega$                                     | $+25^\circ\text{C}$ | 100            | 120      |                |                              |
|                                       |                          |  | Full                | 87             |          |                |                              |
| <b>Output Characteristics</b>         |                          |  |                     |                |          |                |                              |
| Output Voltage Swing from Rail        | $V_{OUT}$                | $V_S = \pm 18\text{V}$ , $R_L = 10\text{k}\Omega$  | $+25^\circ\text{C}$ |                | 60       | 80             | mV                           |
|                                       |                          |  | Full                |                |          | 110            |                              |
|                                       |                          | $V_S = \pm 18\text{V}$ , $R_L = 2\text{k}\Omega$   | $+25^\circ\text{C}$ |                | 300      | 400            |                              |
|                                       |                          |  | Full                |                |          | 540            |                              |
| Output Short-Circuit Current          | $I_{SC}$                 | $V_S = \pm 18\text{V}$   | $+25^\circ\text{C}$ | $\pm 28$       | $\pm 40$ |                | mA                           |
| <b>Power Supply</b>                   |                          |  |                     |                |          |                |                              |
| Operating Voltage Range               | $V_S$                    |  | Full                | 3.3            |          | 36             | V                            |
| Quiescent Current                     | $I_Q$                    | $I_{OUT} = 0$  | $+25^\circ\text{C}$ |                | 1        | 1.24           | mA                           |
|                                       |                          |  | Full                |                |          | 1.5            |                              |
| Power Supply Rejection Ratio          | PSRR                     | $V_S = 3.3\text{V}$ to $36\text{V}$  | $+25^\circ\text{C}$ | 106            | 120      |                | dB                           |
|                                       |                          |  | Full                | 103            |          |                |                              |
| <b>Dynamic Performance</b>            |                          |  |                     |                |          |                |                              |
| Gain-Bandwidth Product                | GBP                      | $C_L = 50\text{pF}$  | $+25^\circ\text{C}$ |                | 2.5      |                | MHz                          |
| Phase Margin                          | $\phi_O$                 | $C_L = 50\text{pF}$  | $+25^\circ\text{C}$ |                | 60       |                | $^\circ$                     |
| Slew Rate                             | SR                       | $V_S = \pm 2.5\text{V}$ to $\pm 18\text{V}$ , $G = +1$   | $+25^\circ\text{C}$ |                | 8        |                | $\text{V}/\mu\text{s}$       |
| Overload Recovery Time                | ORT                      | $V_{IN} \times G > V_S$  | $+25^\circ\text{C}$ |                | 1        |                | $\mu\text{s}$                |
| Total Harmonic Distortion + Noise     | THD+N                    | $V_S = \pm 2.5\text{V}$ to $\pm 18\text{V}$ , $V_{OUT} = 2V_{P-P}$ ,<br>$f = 1\text{kHz}$ , $G = +1$ , $R_L = 600\Omega$ | $+25^\circ\text{C}$ |                | 0.005    |                | %                            |
|                                       |                          |  | $+25^\circ\text{C}$ |                | 0.0005   |                | %                            |
| <b>Noise</b>                          |                          |  |                     |                |          |                |                              |
| Input Voltage Noise                   |                          | $f = 0.1\text{Hz}$ to $10\text{Hz}$  | $+25^\circ\text{C}$ |                | 3        |                | $\mu\text{V}_{P-P}$          |
| Input Voltage Noise Density           | $e_n$                    | $f = 10\text{Hz}$  | $+25^\circ\text{C}$ |                | 100      |                | $\text{nV}/\sqrt{\text{Hz}}$ |
|                                       |                          | $f = 1\text{kHz}$  | $+25^\circ\text{C}$ |                | 15       |                |                              |
| Input Current Noise Density           | $i_n$                    | $f = 1\text{kHz}$  | $+25^\circ\text{C}$ |                | 300      |                | $\text{fA}/\sqrt{\text{Hz}}$ |

TYPICAL PERFORMANCE CHARACTERISTICS

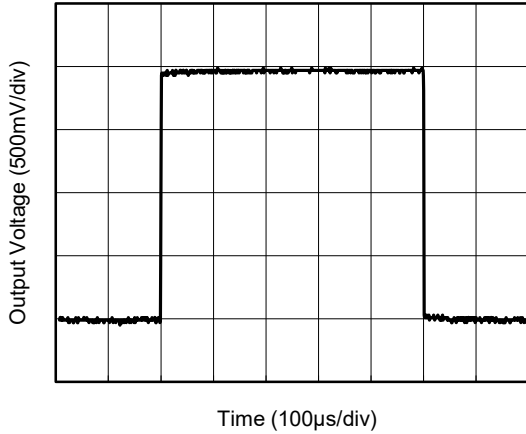
At  $T_A = +25^\circ\text{C}$ ,  $V_S = 36\text{V}$  and  $R_L = 2\text{k}\Omega$ , unless otherwise noted.



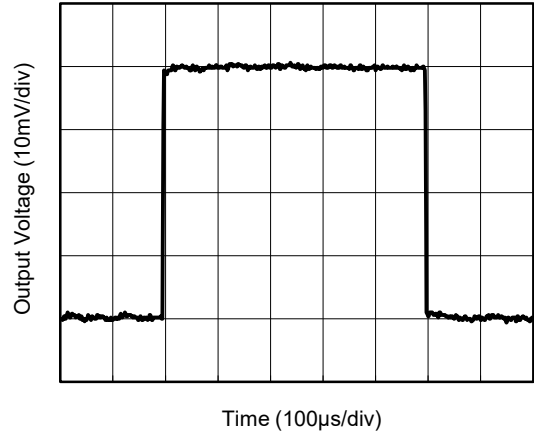
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

At  $T_A = +25^\circ\text{C}$ ,  $V_S = 36\text{V}$  and  $R_L = 2\text{k}\Omega$ , unless otherwise noted.

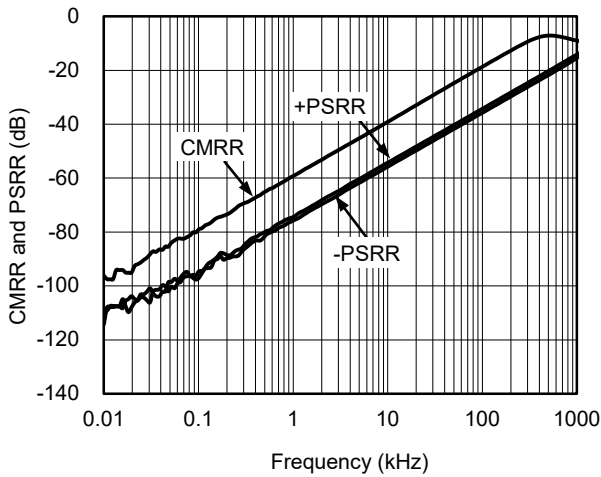
Large-Signal Step Response



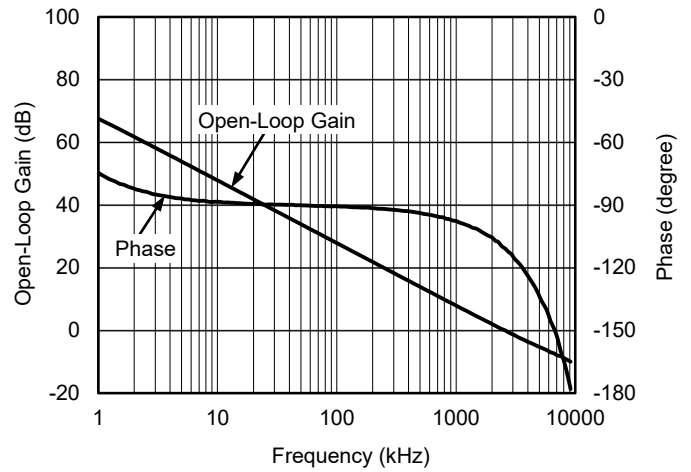
Small-Signal Step Response



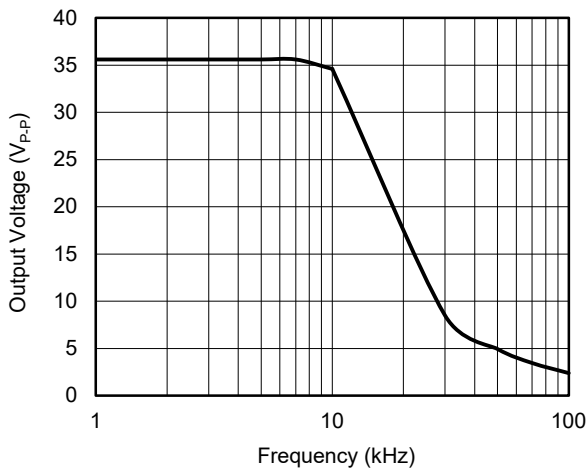
CMRR and PSRR vs. Frequency



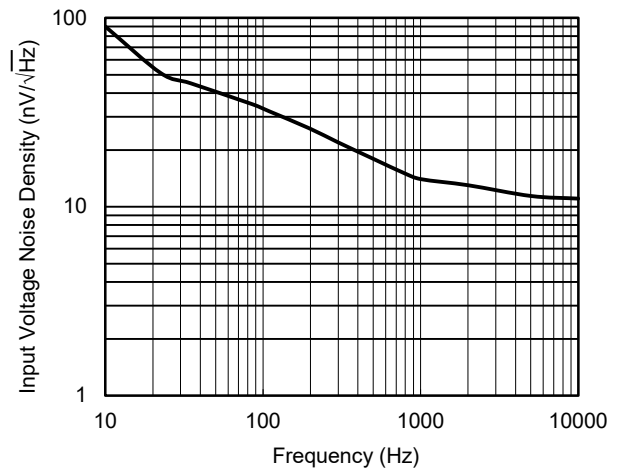
Open-Loop Gain and Phase vs. Frequency



Maximum Output Voltage vs. Frequency

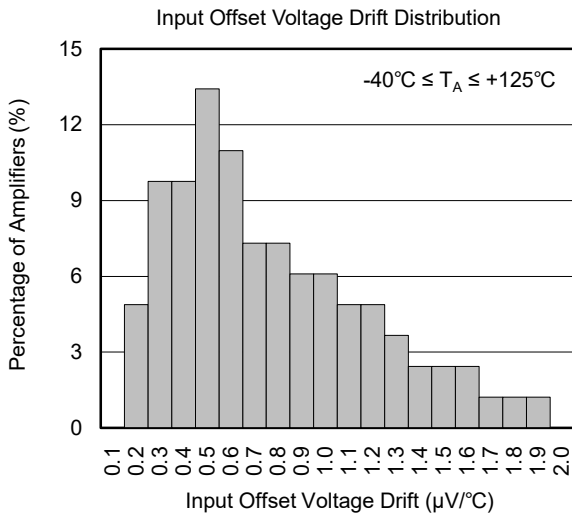
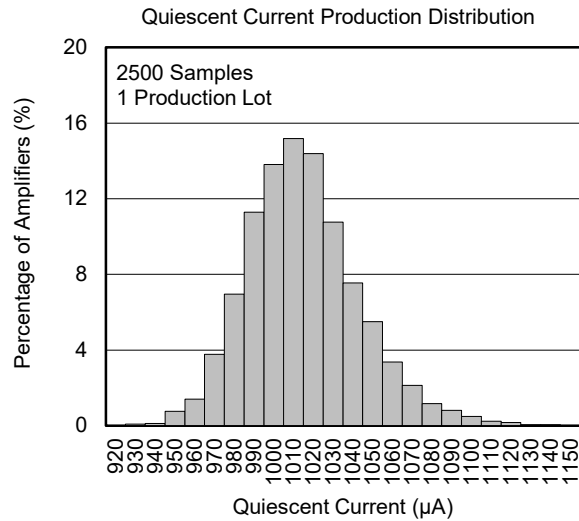
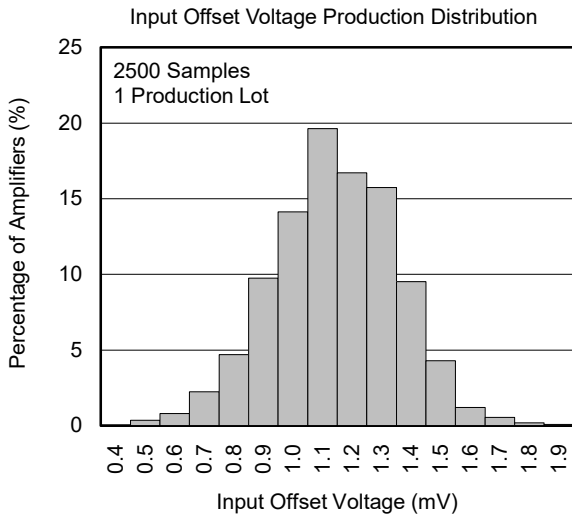
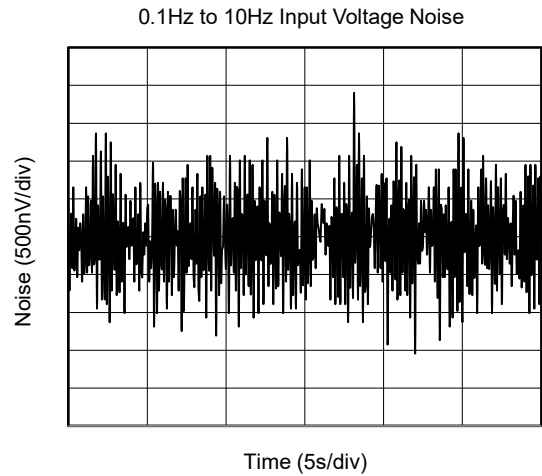
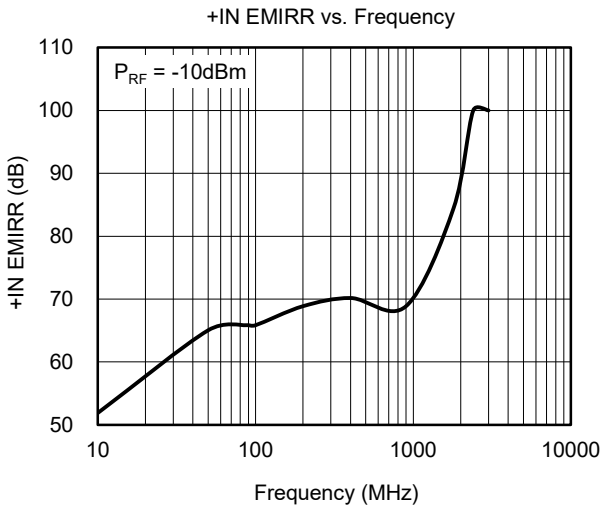


Input Voltage Noise Density vs. Frequency



**TYPICAL PERFORMANCE CHARACTERISTICS (continued)**

At  $T_A = +25^\circ\text{C}$ ,  $V_S = 36\text{V}$  and  $R_L = 2\text{k}\Omega$ , unless otherwise noted.



**REVISION HISTORY**

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

| <b>NOVEMBER 2020 – REV.A.1 to REV.A.2</b> | <b>Page</b> |
|---|-------------|
| Updated Marking Information section.....  | 2           |

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| <b>JUNE 2018 – REV.A to REV.A.1</b> | <b>Page</b> |
|-------------------------------------|-------------|
| Added MSOP-8 Package.....           | All         |

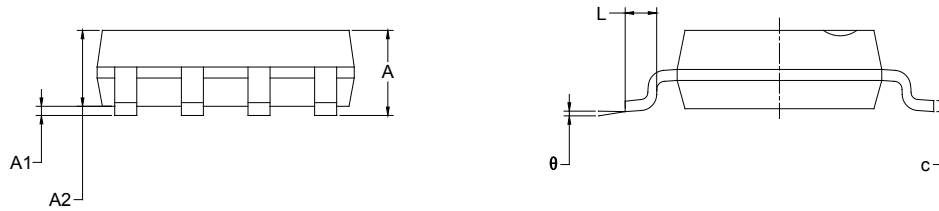
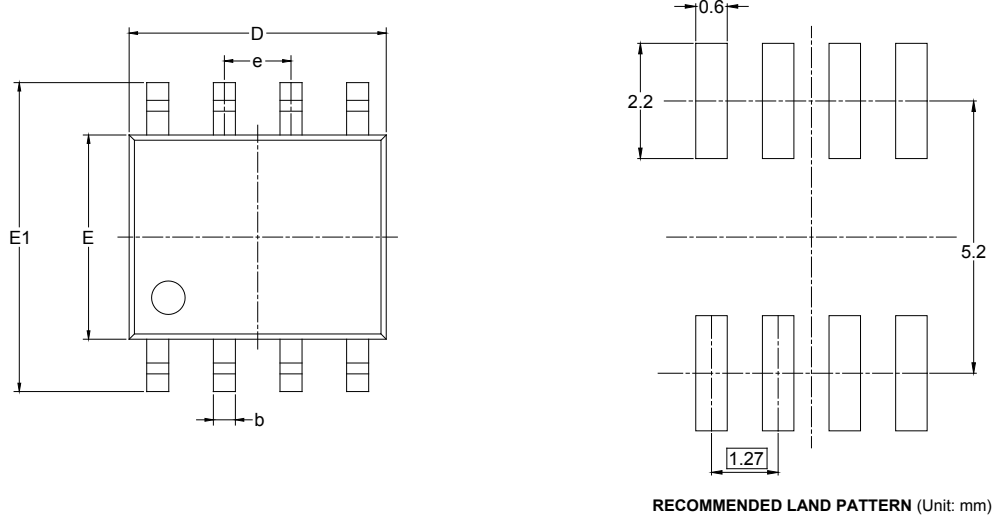
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| <b>Changes from Original (DECEMBER 2017) to REV.A</b> | <b>Page</b> |
|---|-------------|
| Changed from product preview to production data.....  | All         |

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PACKAGE OUTLINE DIMENSIONS

SOIC-8

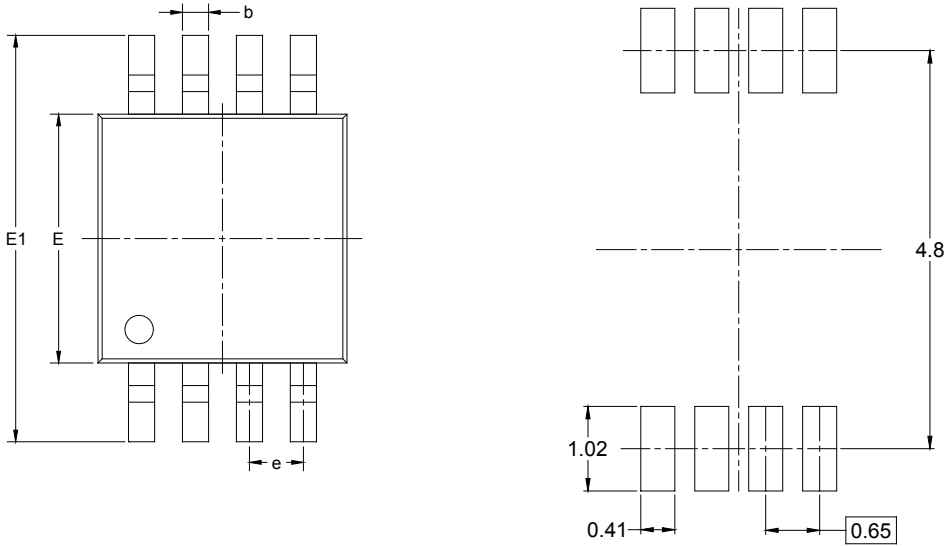


| Symbol | Dimensions<br>In Millimeters |       | Dimensions<br>In Inches |       |
|--------|------------------------------|-------|-------------------------|-------|
|        | MIN                          | MAX   | MIN                     | MAX   |
| A      | 1.350                        | 1.750 | 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 |
| θ      | 0°                           | 8°    | 0°                      | 8°    |

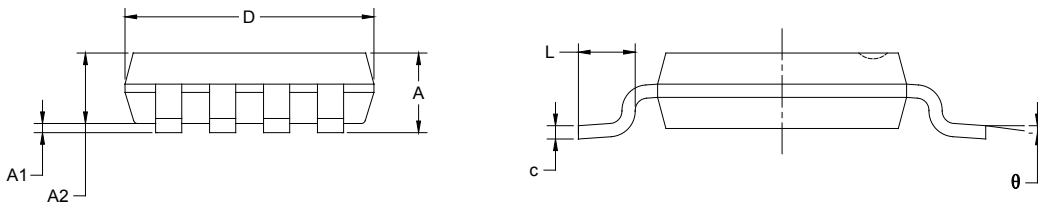


PACKAGE OUTLINE DIMENSIONS

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

单击下面可查看定价，库存，交付和生命周期等信息

[>>SGMICRO\(圣邦微电子\)](#)