



SGMOP07C

600kHz, Low Noise, High Voltage, Precision Operational Amplifier

GENERAL DESCRIPTION

The SGMOP07C is a low noise, low offset voltage and high voltage operational amplifier, which can operate from 3.6V to 36V single supply or from $\pm 1.8V$ to $\pm 18V$ dual supplies, while consuming only 0.75mA quiescent current.

The SGMOP07C exhibits a high gain-bandwidth product of 600kHz and a slew rate of $3V/\mu s$. The output swing is rail-to-rail with heavy loads. These specifications make the operational amplifier appropriate for various applications.

The single SGMOP07C is available in a Green SOIC-8 package. It is specified over the extended $-40^{\circ}C$ to $+125^{\circ}C$ temperature range.

FEATURES

- Rail-to-Rail Output
- Low Bias Current: $\pm 1nA$ (TYP)
- High Open-Loop Gain: 130dB at $V_s = \pm 15V$
- High PSRR: 135dB
- Gain-Bandwidth Product: 600kHz
- Low Noise: $8.5nV/\sqrt{Hz}$ at 1kHz
- Supply Voltage Range:
3.6V to 36V or $\pm 1.8V$ to $\pm 18V$
- Input Common Mode Voltage Range:
 $(-V_s) + 1.5V$ to $(+V_s) - 2V$
- Low Quiescent Current: 0.75mA (TYP)
- $-40^{\circ}C$ to $+125^{\circ}C$ Operating Temperature Range
- Available in a Green SOIC-8 Package

APPLICATIONS

Sensors
Audio
Active Filters
A/D Converters
Communications
Test Equipment
Cellular and Cordless Phones
Laptops and PDAs
Photodiode Amplification

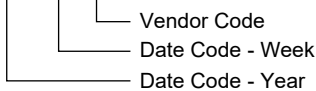
PACKAGE/ORDERING INFORMATION

| MODEL | PACKAGE DESCRIPTION | SPECIFIED TEMPERATURE RANGE | ORDERING NUMBER | PACKAGE MARKING | PACKING OPTION |
|----------|---------------------|-----------------------------|-----------------|--------------------------|---------------------|
| SGMOP07C | SOIC-8 | -40°C to +125°C | SGMOP07CXS8G/TR | SGM OP07CXS8 XXXXX | Tape and Reel, 2500 |

MARKING INFORMATION

NOTE: 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 _S to -V _S | 40V |
| Input Common Mode Voltage Range | (-V _S) - 0.3V to (+V _S) + 0.3V |
| Junction Temperature | +150°C |
| Storage Temperature Range | -65°C to +150°C |
| Lead Temperature (Soldering, 10s) | +260°C |
| ESD Susceptibility | |
| HBM | 2000V |
| MM | 250V |
| CDM | 1000V |

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.

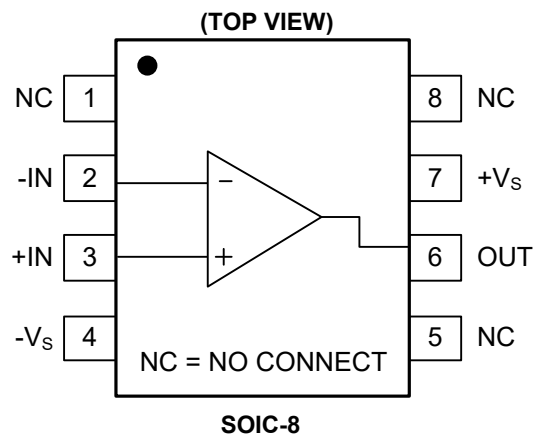
DISCLAIMER

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

RECOMMENDED OPERATING CONDITIONS

| | |
|-----------------------------------|-----------------|
| Supply Voltage Range | 3.6V to 36V |
| Operating Temperature Range | -40°C to +125°C |

PIN CONFIGURATION



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.

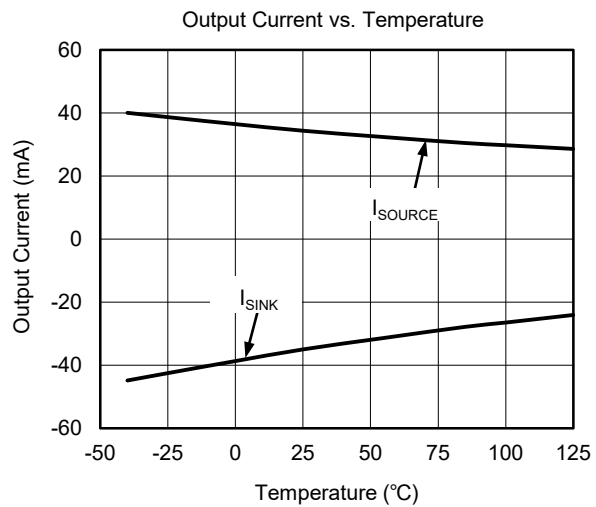
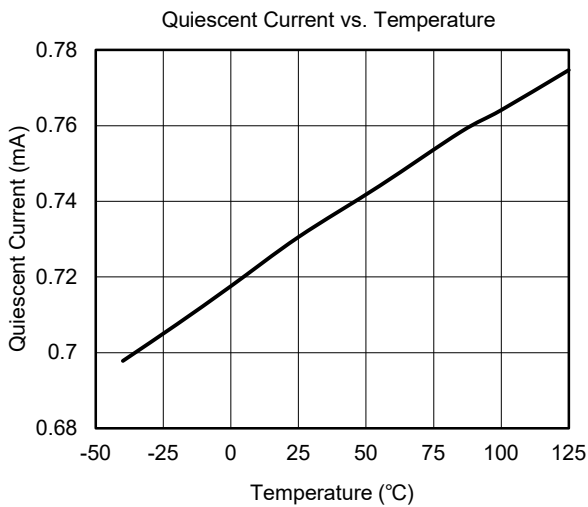
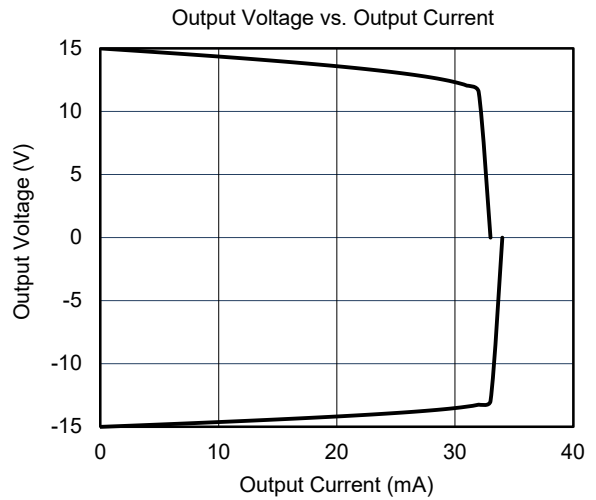
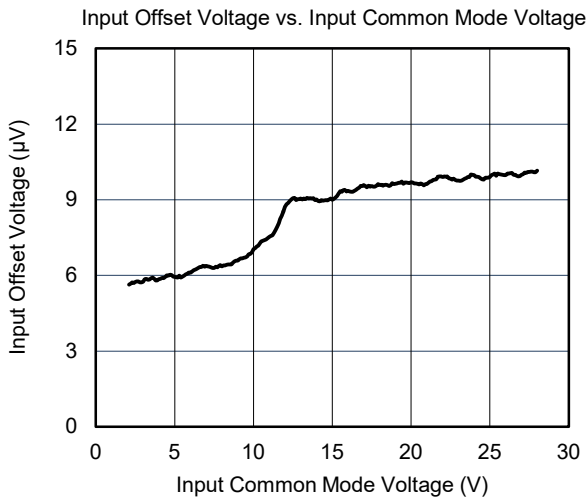
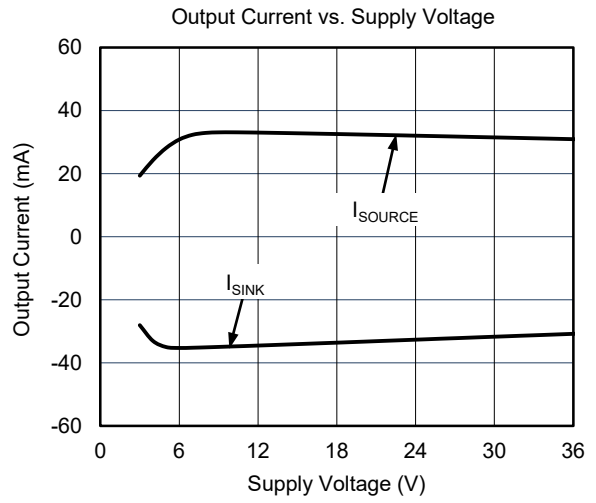
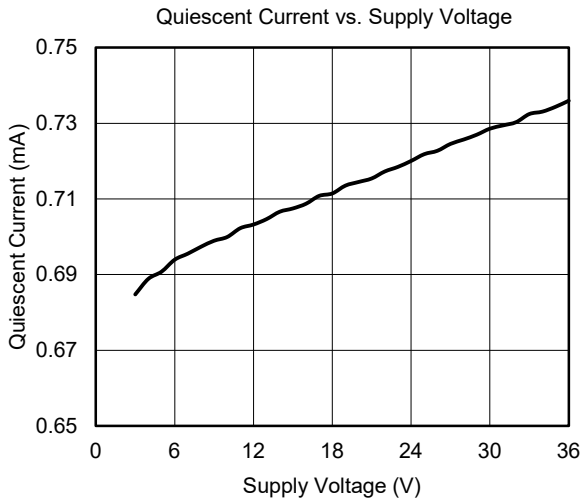
ELECTRICAL CHARACTERISTICS

(At T_A = +25°C, V_S = ±5V to ±15V, V_{CM} = 0V, V_{OUT} = 0V and R_L = 2kΩ connected to 0V, Full = -40°C to +125°C, unless otherwise noted.)

| PARAMETER | SYMBOL | CONDITIONS | TEMP | MIN | TYP | MAX | UNITS |
|-----------------------------------|----------------------|---|-------|--------------------------|--------|------------------------|-------------------|
| Input Characteristics | | | | | | | |
| Input Offset Voltage | V _{OS} | | +25°C | | 35 | 150 | μV |
| | | | Full | | | 220 | |
| Input Bias Current | I _B | | +25°C | | ±1 | ±12 | nA |
| | | | Full | | | ±45 | |
| Input Offset Current | I _{OS} | | +25°C | | ±1 | ±12 | nA |
| | | | Full | | | ±35 | |
| Input Common Mode Voltage Range | V _{CM} | | Full | (-V _S) + 1.5 | | (+V _S) - 2 | V |
| Common Mode Rejection Ratio | CMRR | (-V _S) + 1.5V ≤ V _{CM} ≤ (+V _S) - 2V | +25°C | 120 | 140 | | dB |
| | | | Full | 115 | | | |
| Open-Loop Voltage Gain | A _{OL} | V _S = ±5V, V _{OUT} = ±2.5V, R _L = 10kΩ | +25°C | 115 | 135 | | dB |
| | | | Full | 112 | | | |
| | | V _S = ±15V, V _{OUT} = ±10V, R _L = 10kΩ | +25°C | 120 | 135 | | |
| | | | Full | 117 | | | |
| | | V _S = ±5V, V _{OUT} = ±2.5V, R _L = 2kΩ | +25°C | 110 | 124 | | |
| | | | Full | 106 | | | |
| | | V _S = ±15V, V _{OUT} = ±10V, R _L = 2kΩ | +25°C | 120 | 130 | | |
| | | | Full | 112 | | | |
| Input Offset Voltage Drift | ΔV _{OS} /ΔT | | Full | | 0.3 | | μV/°C |
| Output Characteristics | | | | | | | |
| Output Voltage Swing from Rail | V _{OUT} | V _S = ±15V, R _L = 10kΩ | +25°C | | 90 | 120 | mV |
| | | | Full | | | 165 | |
| | | V _S = ±15V, R _L = 2kΩ | +25°C | | 450 | 600 | |
| | | | Full | | | 820 | |
| Output Short-Circuit Current | I _{SC} | V _S = ±15V | +25°C | ±21 | ±34 | | mA |
| Power Supply | | | | | | | |
| Operating Voltage Range | V _S | | Full | 3.6 | | 36 | V |
| Quiescent Current | I _Q | I _{OUT} = 0mA | +25°C | | 0.75 | 0.9 | mA |
| | | | Full | | | 1 | |
| Power Supply Rejection Ratio | PSRR | V _S = 3V to 38V | +25°C | 123 | 135 | | dB |
| | | | Full | 120 | | | |
| Dynamic Performance | | | | | | | |
| Gain-Bandwidth Product | GBP | V _{OUT} = 100mV _{P-P} , C _L = 10pF | +25°C | | 600 | | kHz |
| Slew Rate | SR | | +25°C | | 3 | | V/μs |
| Settling Time to 0.1% | t _S | V _{IN} = 1V Step, G = +1 | +25°C | | 3.5 | | μs |
| Overload Recovery Time | | V _{IN} × G = V _S | +25°C | | 1.5 | | μs |
| Phase Margin | φ _O | V _{OUT} = 100mV _{P-P} , C _L = 10pF | +25°C | | 60 | | ° |
| Total Harmonic Distortion + Noise | THD+N | V _{IN} = 1V _{RMS} , G = +1, f = 1kHz | +25°C | | 0.0008 | | % |
| Noise | | | | | | | |
| Input Voltage Noise | | f = 0.1Hz to 10Hz | +25°C | | 300 | | nV _{P-P} |
| Input Voltage Noise Density | e _n | f = 1kHz | +25°C | | 8.5 | | nV/√Hz |
| Input Current Noise Density | i _n | f = 1kHz | +25°C | | 1.5 | | pA/√Hz |

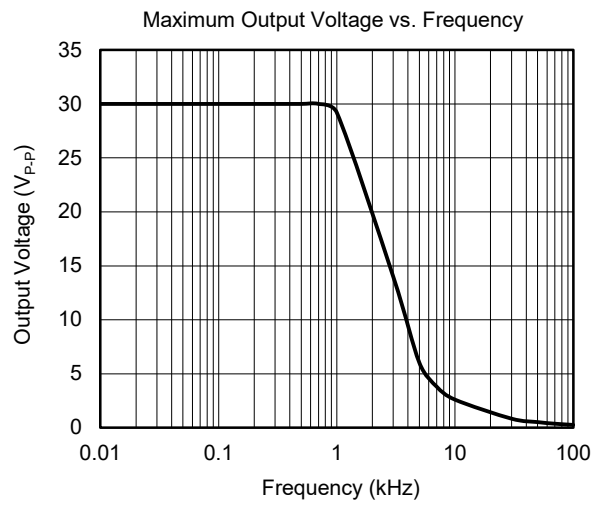
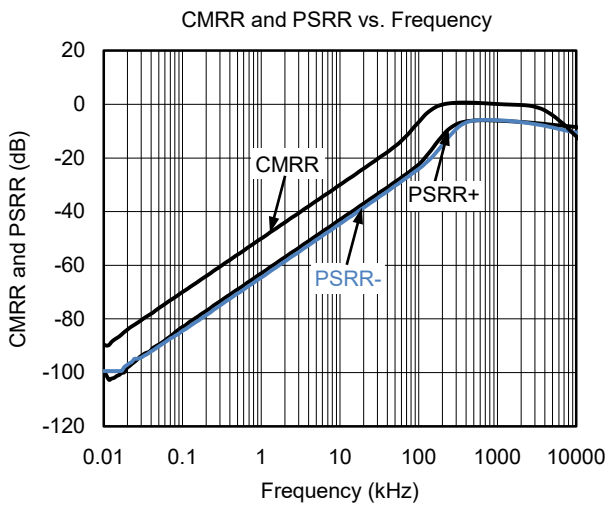
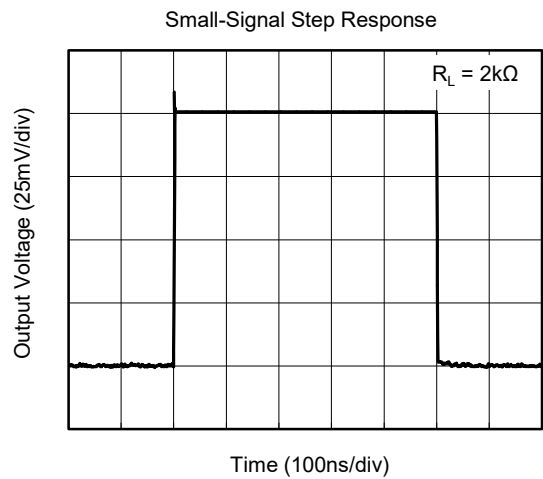
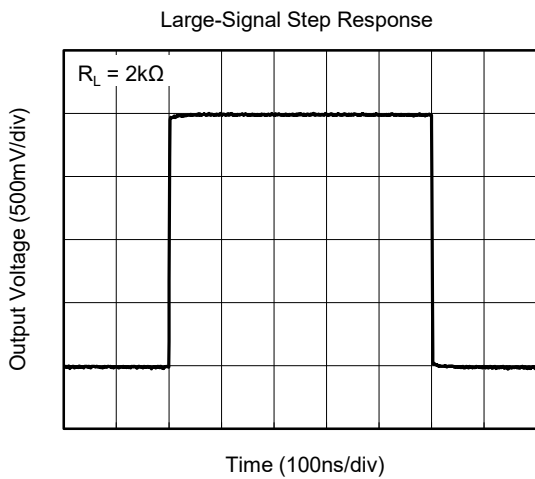
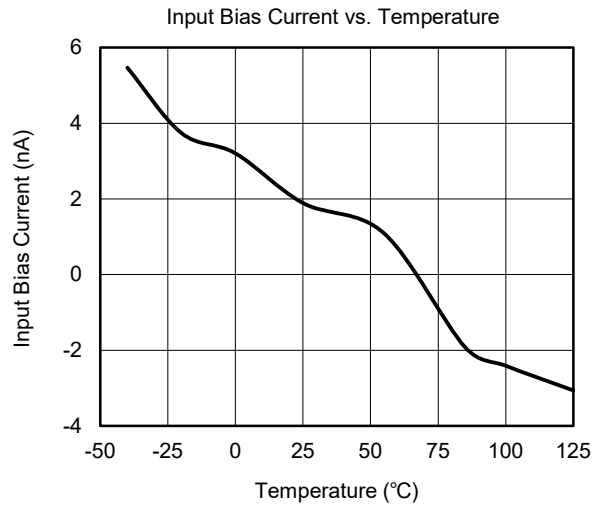
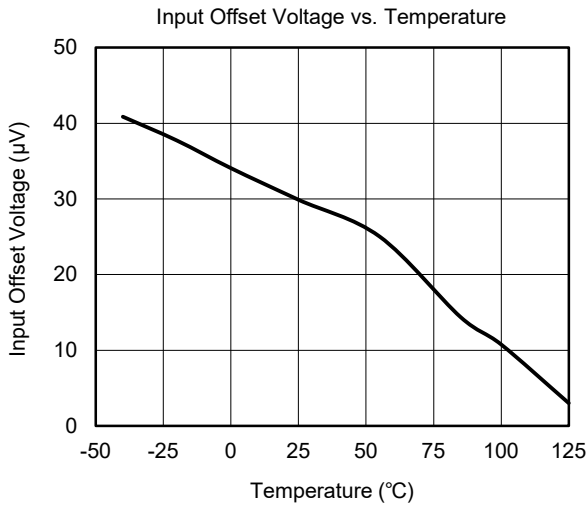
TYPICAL PERFORMANCE CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, $V_S = \pm 15\text{V}$ and $R_L = 2\text{k}\Omega$, unless otherwise noted.



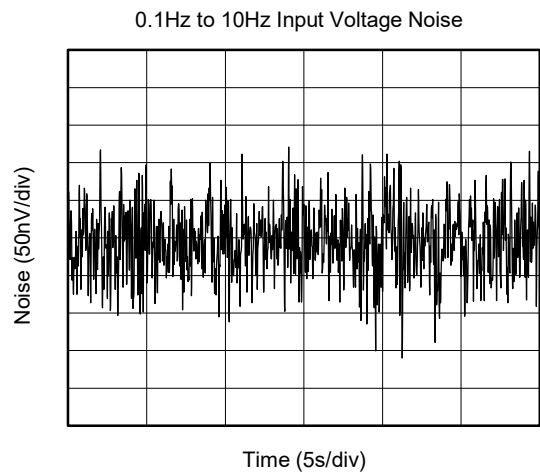
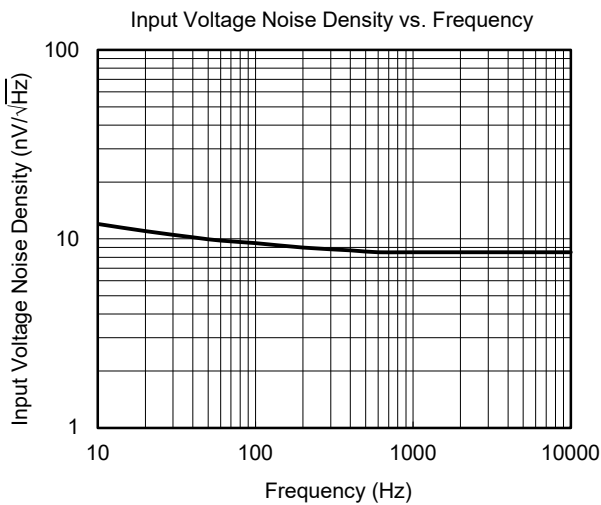
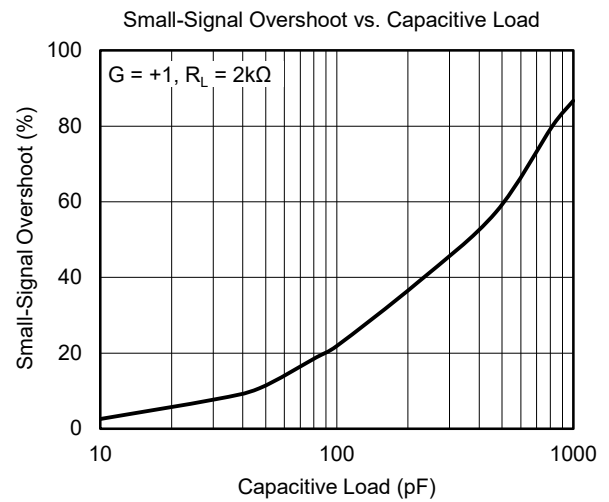
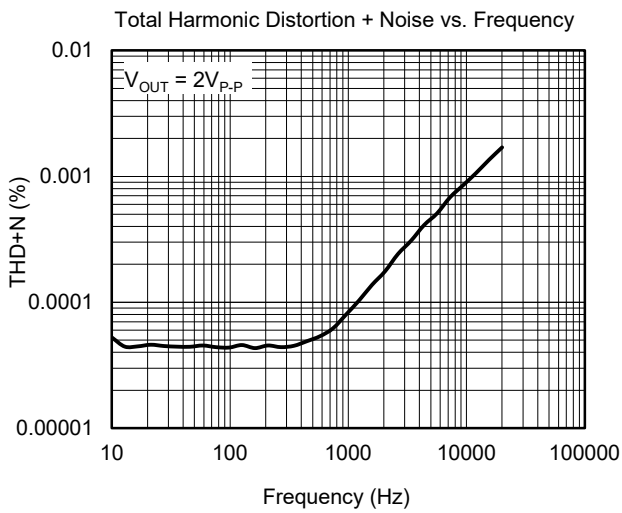
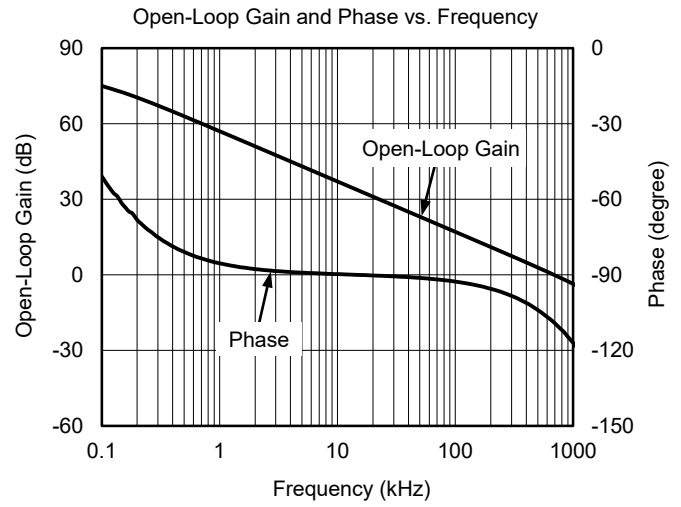
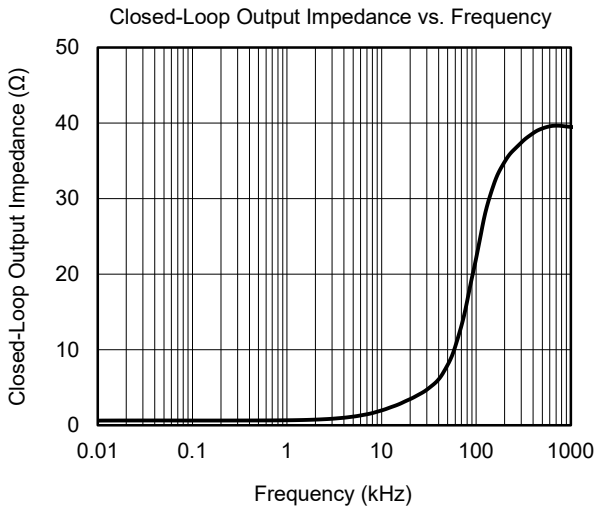
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

At $T_A = +25^\circ\text{C}$, $V_S = \pm 15\text{V}$ and $R_L = 2\text{k}\Omega$, unless otherwise noted.



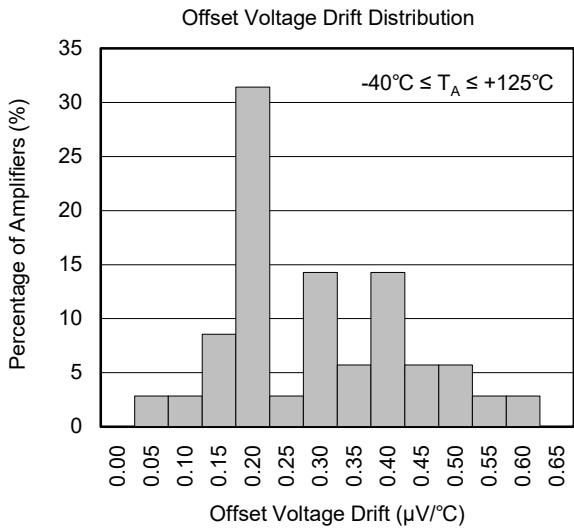
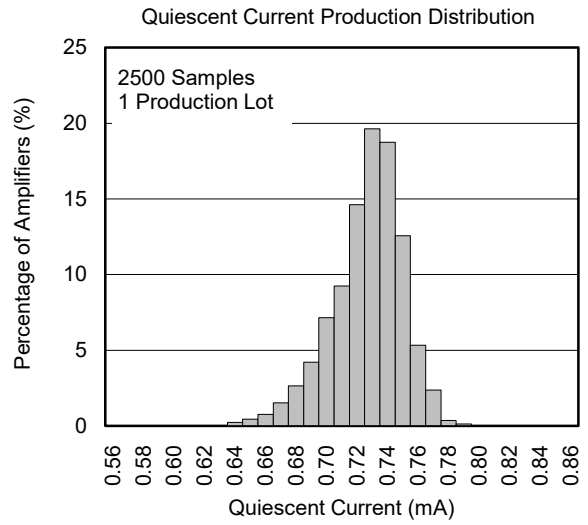
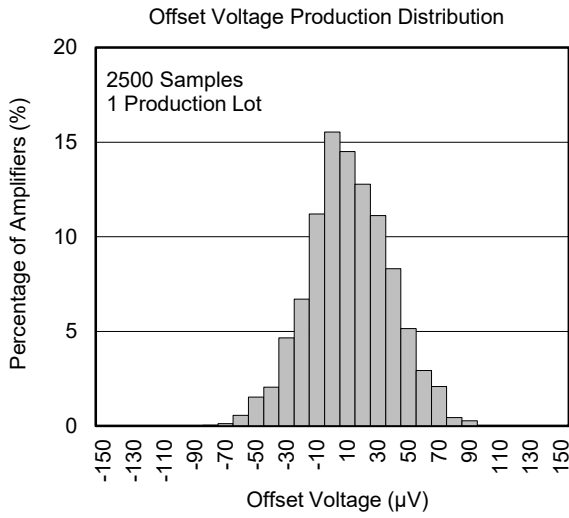
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

At $T_A = +25^\circ\text{C}$, $V_S = \pm 15\text{V}$ and $R_L = 2\text{k}\Omega$, unless otherwise noted.



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

At $T_A = +25^\circ\text{C}$, $V_S = \pm 15\text{V}$ 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.

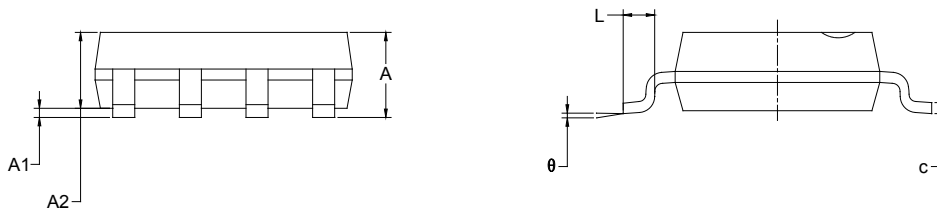
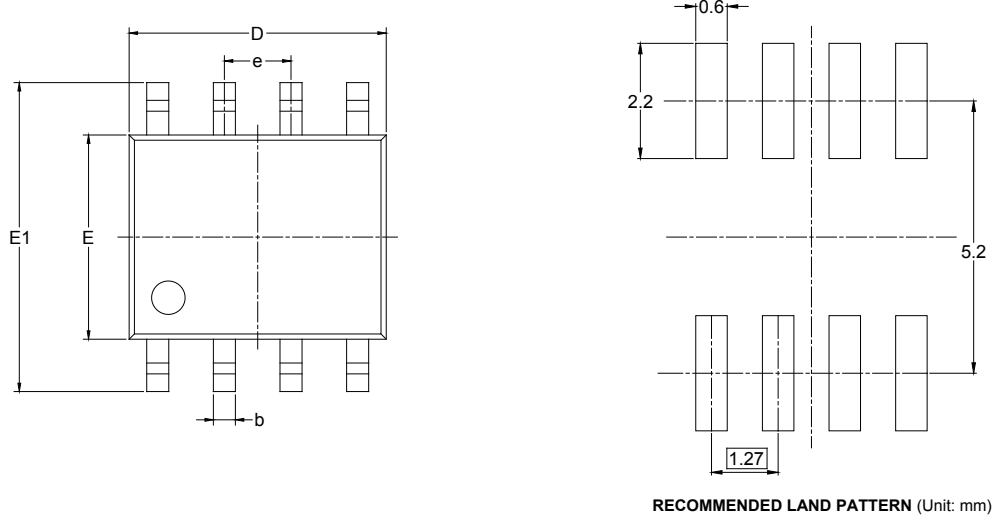
| MAY 2018 – REV. A.1 to REV.B | Page |
|-------------------------------------|-------------|
| Updated version | All |

| AUGUST 2017 – REV.A to REV.A.1 | Page |
|--|-------------|
| Updated open-loop gain and phase vs. frequency | 6 |

| Changes from Original (AUGUST 2017) to REV.A | Page |
|--|-------------|
| Changed from product preview to production data..... | All |

PACKAGE OUTLINE DIMENSIONS

SOIC-8

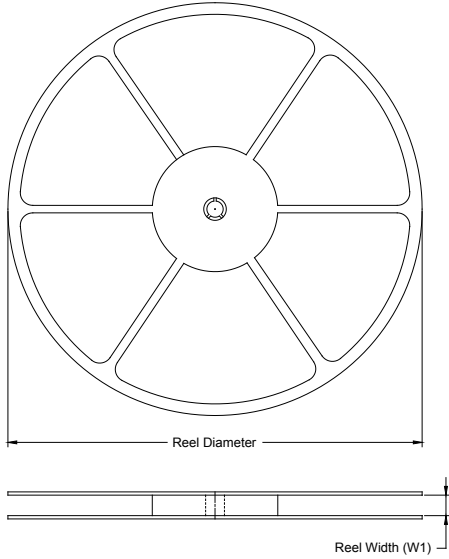


| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|------------------------------|-------|-------------------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 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° |

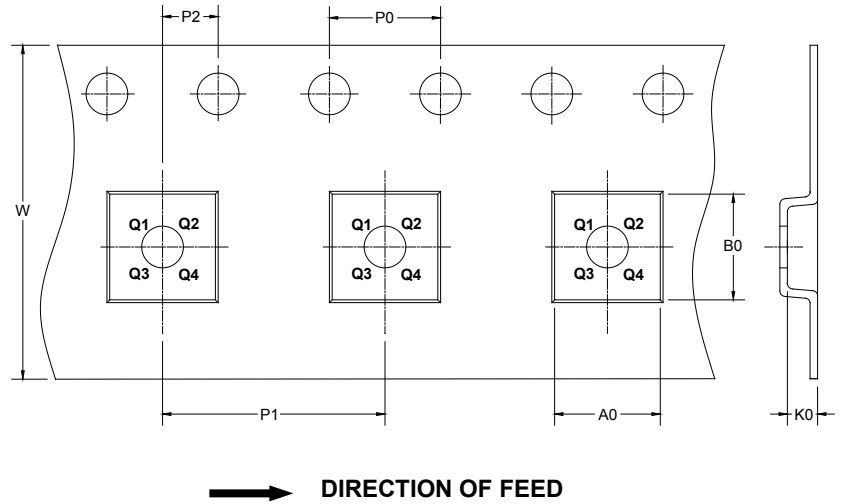
PACKAGE INFORMATION

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 |

000001

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