



SGMOP07

3MHz, Low Noise, High Voltage, Precision Operational Amplifier

GENERAL DESCRIPTION

The SGMOP07 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 0.9mA quiescent current.

The SGMOP07 exhibits a high gain-bandwidth product of 3MHz and a slew rate of $4V/\mu s$. The output swing is rail-to-rail with heavy loads. These specifications make the operational amplifier appropriate for various applications.

The single SGMOP07 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: 120dB at $V_s = \pm 15V$
- High PSRR: 146dB
- High Gain-Bandwidth Product: 3MHz
- Settling Time to 0.1% with 1V Step: $0.5\mu s$
- Overload Recovery Time: $10\mu s$
- 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: 0.9mA (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

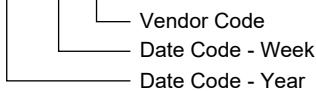
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGMOP07	SOIC-8	-40°C to +125°C	SGMOP07XS8G/TR	SGM OP07XS8 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, +Vs to -Vs	40V
Input Common Mode Voltage Range	(-Vs) - 0.3V to (+Vs) + 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	200V
CDM	1000V

RECOMMENDED OPERATING CONDITIONS

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

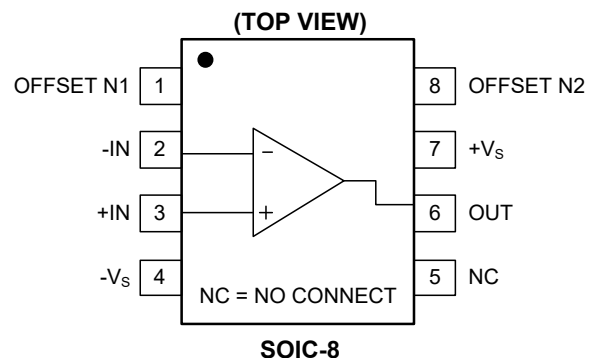
ESD SENSITIVITY CAUTION

This integrated circuit can be damaged 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 CONFIGURATION



ELECTRICAL CHARACTERISTICS

(At $T_A = +25^\circ\text{C}$, $V_S = \pm 5\text{V}$ to $V_S = \pm 15\text{V}$, $V_{CM} = 0\text{V}$, $V_{OUT} = 0\text{V}$ and R_L connected to 0V , Full = -40°C to $+125^\circ\text{C}$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Input Characteristics							
Input Offset Voltage	V_{OS}		+25°C		100	170	μV
			Full			290	
Input Bias Current	I_B	$V_{CM} = V_S/2$	+25°C		±1	±16	nA
			Full			±55	
Input Offset Current	I_{OS}	$V_{CM} = V_S/2$	+25°C		±1	±18	nA
			Full			±28	
Input Common Mode Voltage Range	V_{CM}		Full	$(-V_S) + 1.5$		$(+V_S) - 2$	V
Common Mode Rejection Ratio	CMRR	$(-V_S) + 1.5\text{V} \leq V_{CM} \leq (+V_S) - 2\text{V}$	+25°C	115	140		dB
			Full	113			
Open-Loop Voltage Gain	A_{OL}	$V_S = \pm 5\text{V}$, $V_{OUT} = \pm 2.5\text{V}$, $R_L = 10\text{k}\Omega$	+25°C	112	135		dB
			Full	110			
		$V_S = \pm 15\text{V}$, $V_{OUT} = \pm 10\text{V}$, $R_L = 10\text{k}\Omega$	+25°C	115	126		
			Full	109			
		$V_S = \pm 5\text{V}$, $V_{OUT} = \pm 2.5\text{V}$, $R_L = 2\text{k}\Omega$	+25°C	105	112		
			Full	94			
		$V_S = \pm 15\text{V}$, $V_{OUT} = \pm 10\text{V}$, $R_L = 2\text{k}\Omega$	+25°C	112	120		
			Full	102			
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta T$		Full		0.5		μV/°C
Offset Adjustment							
Offset Adjustment Range		$R_S = 50\text{k}\Omega$, See Figure 1	+25°C		±20		mV
External Resistance between OFFSET N1 and +V _S			+25°C	15			kΩ
External Resistance between OFFSET N2 and +V _S			+25°C	15			kΩ
Output Characteristics							
Output Voltage Swing from Rail	V_{OUT}	$V_S = \pm 15\text{V}$, $R_L = 10\text{k}\Omega$	+25°C		90	175	mV
			Full			220	
		$V_S = \pm 15\text{V}$, $R_L = 2\text{k}\Omega$	+25°C		450	850	
			Full			1060	
Output Short-Circuit Current	I_{SC}		+25°C	±13	±32		mA
Power Supply							
Operating Voltage Range	V_S		Full	3.6		36	V
Quiescent Current/Amplifier	I_Q	$I_{OUT} = 0\text{mA}$	+25°C		0.9	1.2	mA
			Full			1.3	
Power Supply Rejection Ratio	PSRR	$V_S = 3\text{V}$ to 38V	+25°C	121	146		dB
			Full	118			

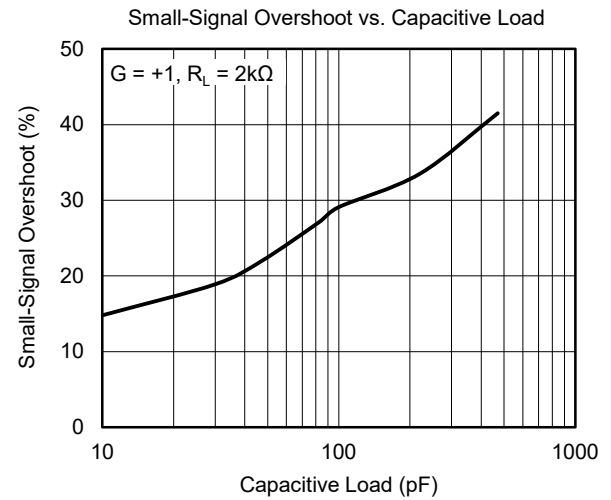
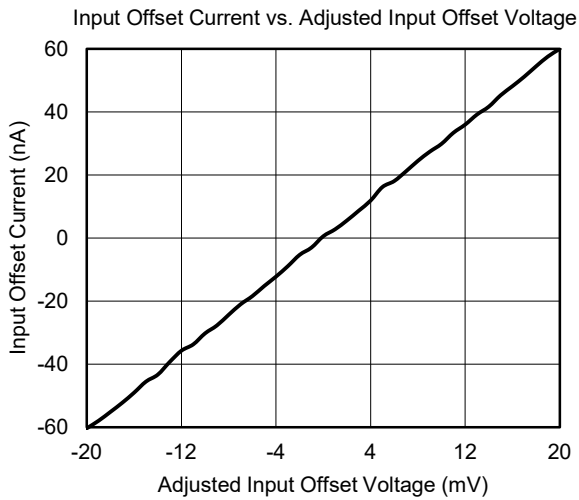
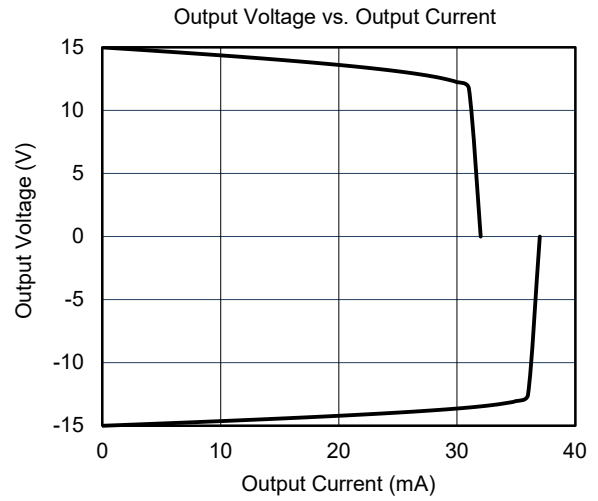
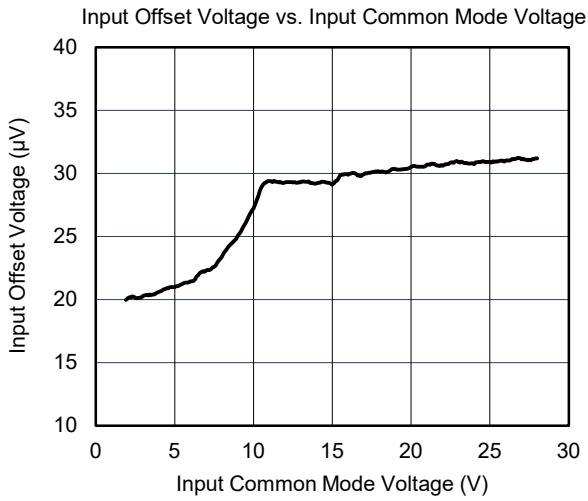
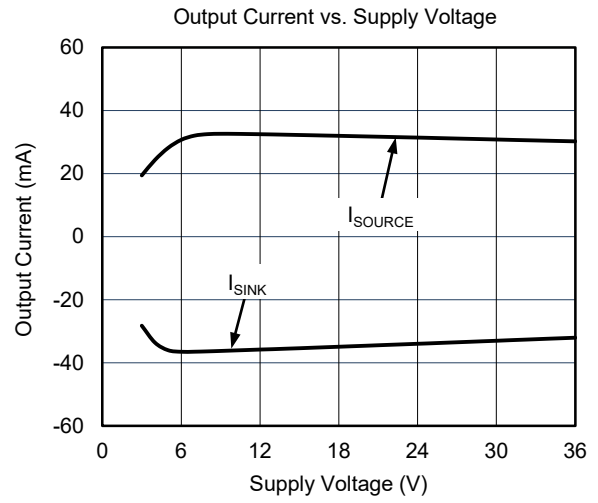
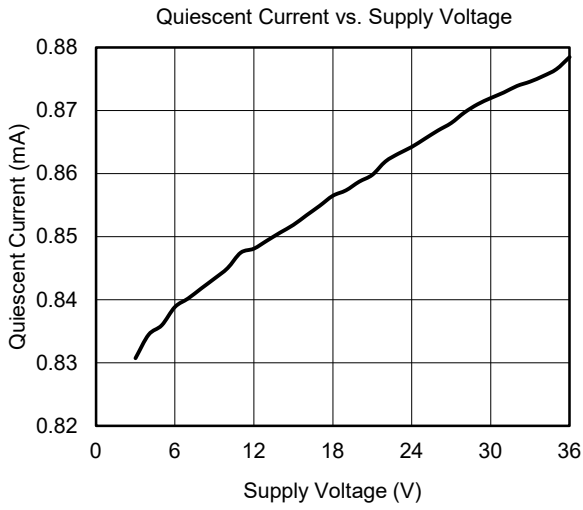
ELECTRICAL CHARACTERISTICS (continued)

(At $T_A = +25^\circ\text{C}$, $V_S = \pm 5\text{V}$ to $V_S = \pm 15\text{V}$, $V_{CM} = 0\text{V}$, $V_{OUT} = 0\text{V}$ and R_L connected to 0V , Full = -40°C to $+125^\circ\text{C}$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Dynamic Performance							
Gain-Bandwidth Product	GBP	$V_{OUT} = 100\text{mV}_{P-P}$, $R_L = 2\text{k}\Omega$, $C_L = 10\text{pF}$	$+25^\circ\text{C}$		3		MHz
Slew Rate	SR	$R_L = 2\text{k}\Omega$	$+25^\circ\text{C}$		4		$\text{V}/\mu\text{s}$
Settling Time to 0.1%	t_S	$V_{IN} = 1\text{V Step}$, $R_L = 2\text{k}\Omega$, $G = +1$	$+25^\circ\text{C}$		0.5		μs
Overload Recovery Time		$R_L = 2\text{k}\Omega$, $V_{IN} \times G = V_S$	$+25^\circ\text{C}$		10		μs
Phase Margin	ϕ_O	$V_{OUT} = 100\text{mV}_{P-P}$, $R_L = 2\text{k}\Omega$, $C_L = 10\text{pF}$	$+25^\circ\text{C}$		55		$^\circ$
Total Harmonic Distortion + Noise	THD+N	$V_{IN} = 1\text{V}_{RMS}$, $G = +1$, $R_L = 2\text{k}\Omega$, $f = 1\text{kHz}$	$+25^\circ\text{C}$		0.0008		%
Noise							
Input Voltage Noise		$f = 0.1\text{Hz to } 10\text{Hz}$	$+25^\circ\text{C}$		300		nV_{P-P}
Input Voltage Noise Density	e_n	$f = 1\text{kHz}$	$+25^\circ\text{C}$		8.5		$\text{nV}/\sqrt{\text{Hz}}$
Input Current Noise Density	i_n	$f = 1\text{kHz}$	$+25^\circ\text{C}$		1.5		$\text{pA}/\sqrt{\text{Hz}}$

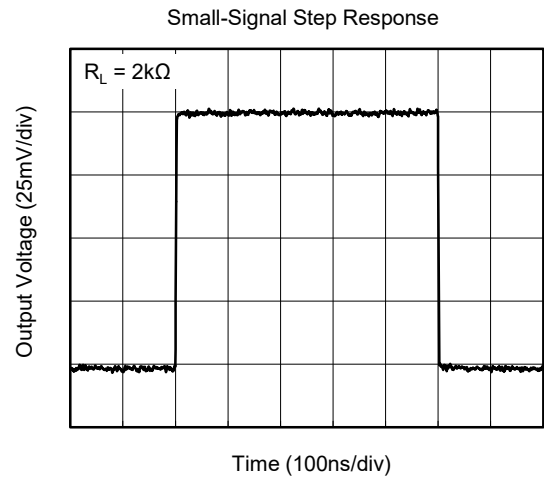
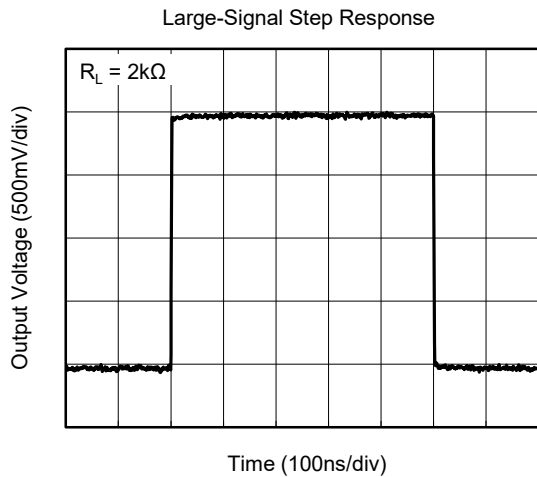
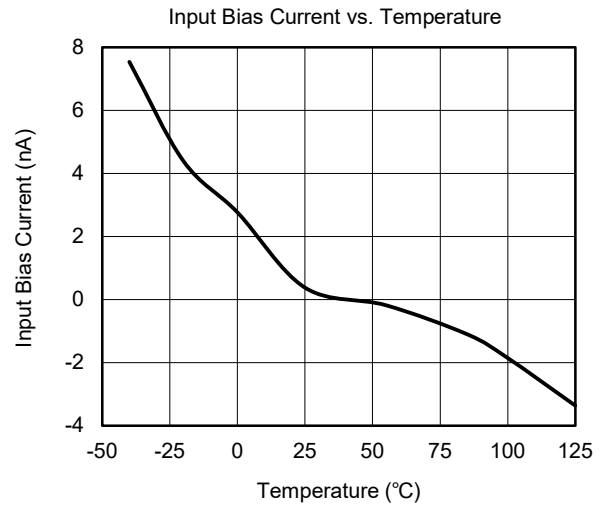
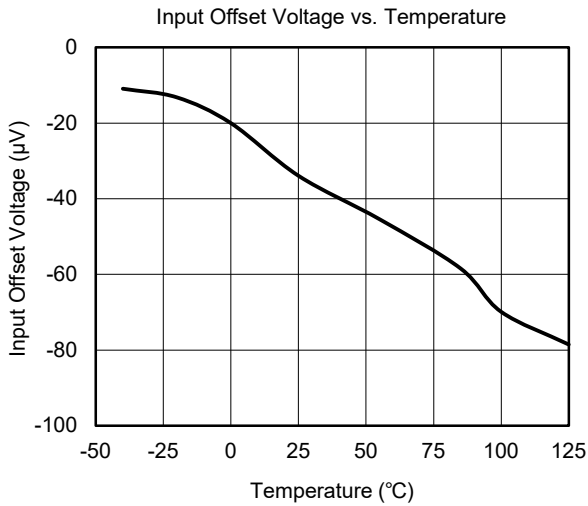
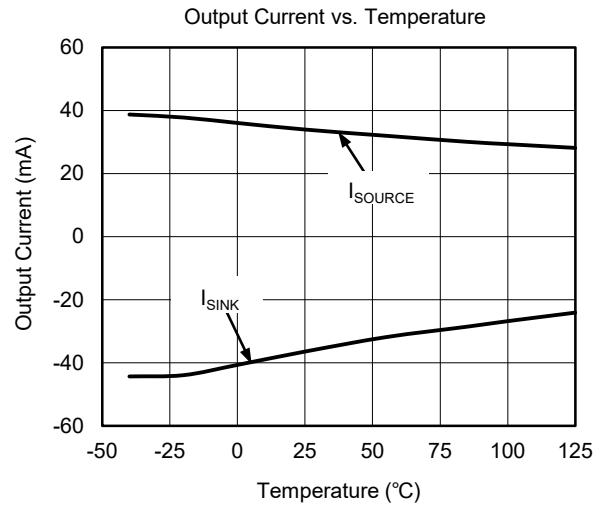
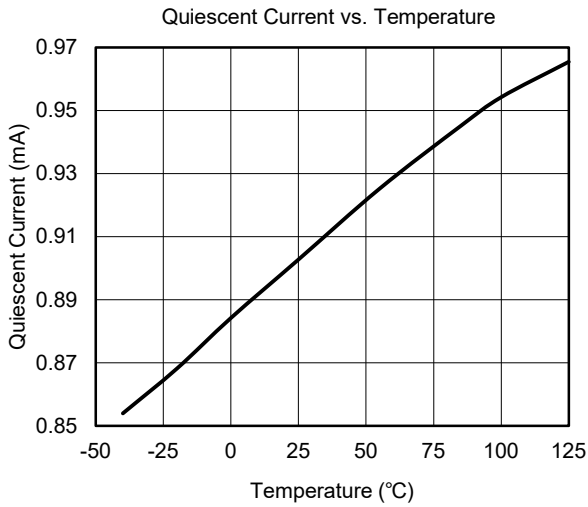
TYPICAL PERFORMANCE CHARACTERISTICS

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



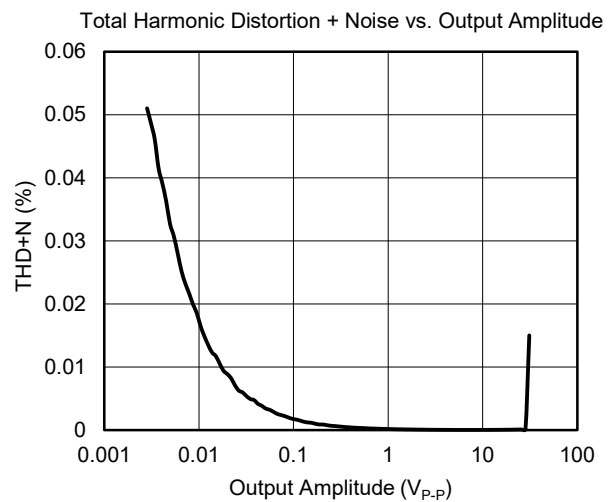
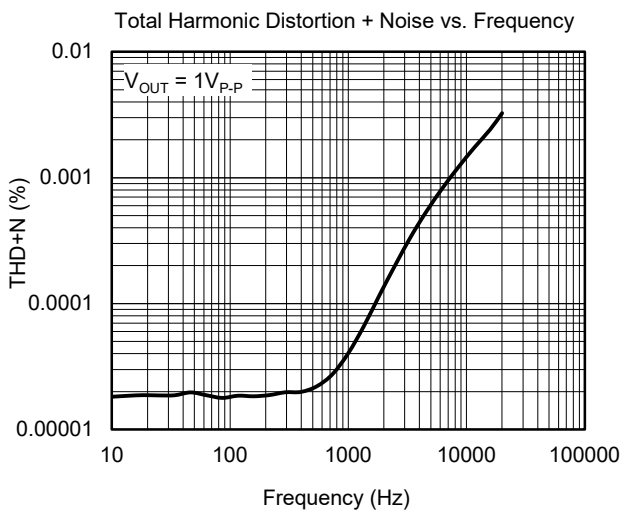
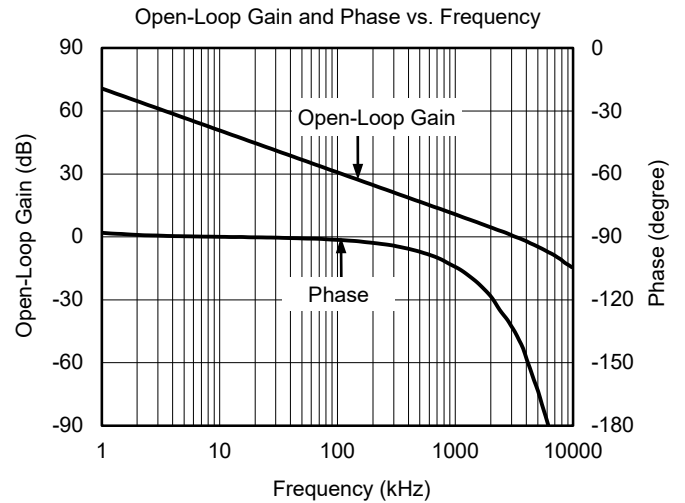
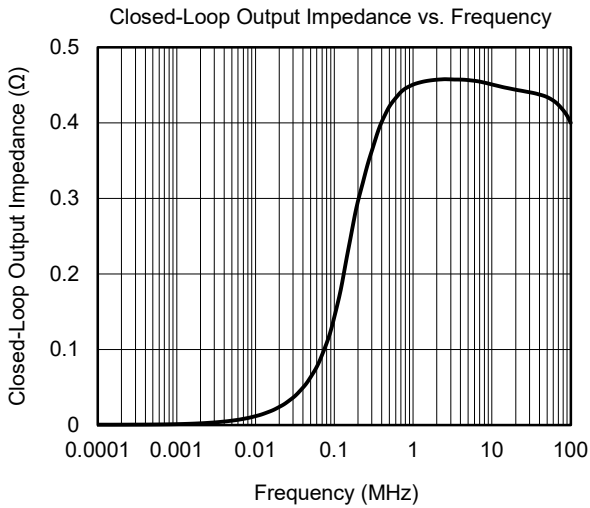
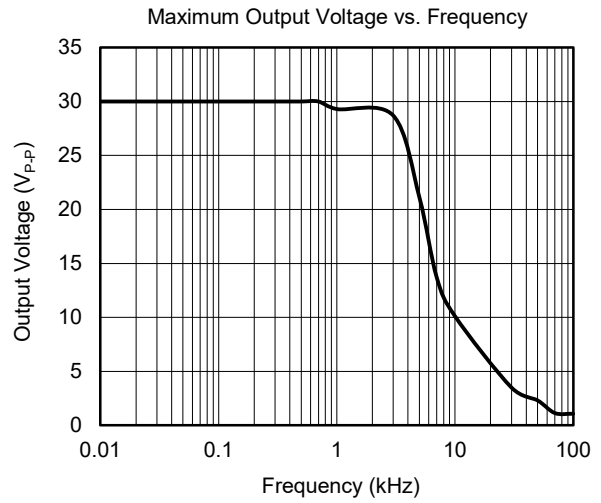
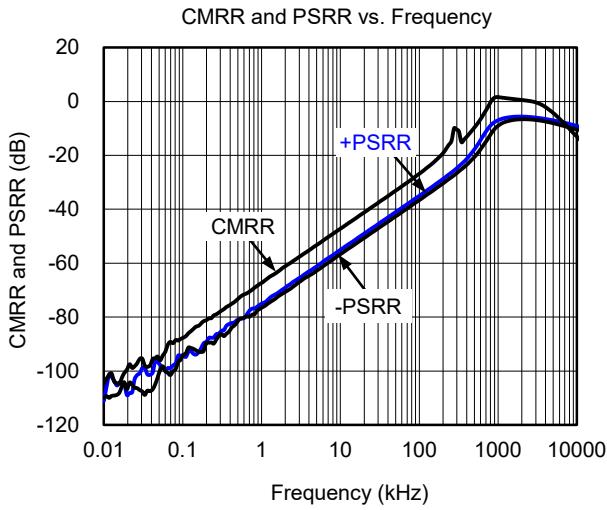
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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



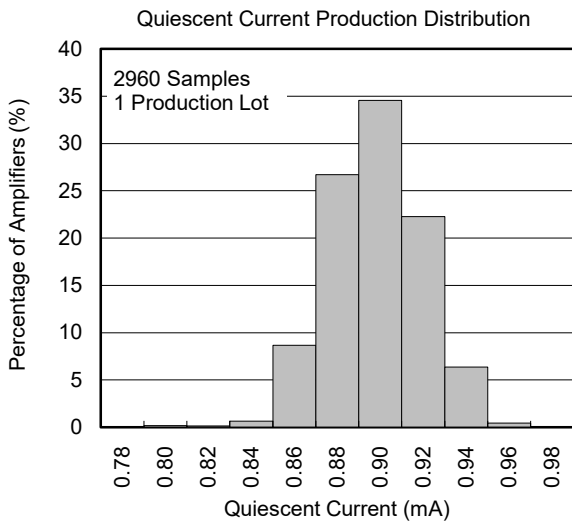
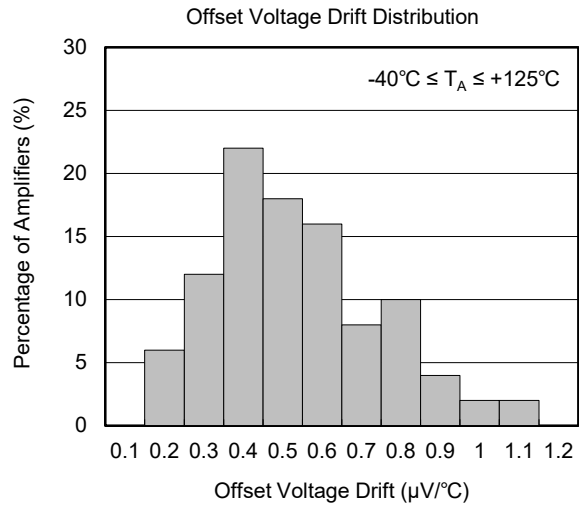
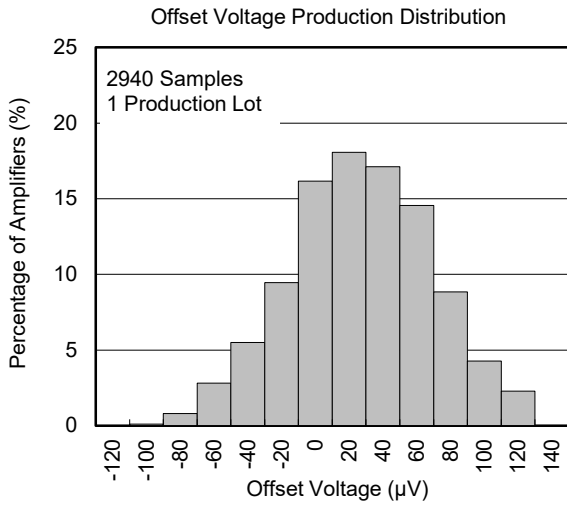
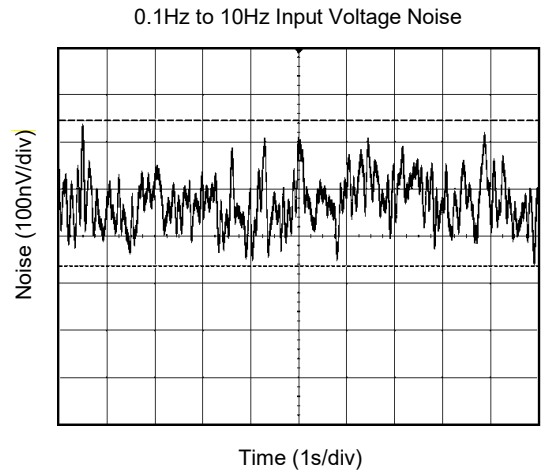
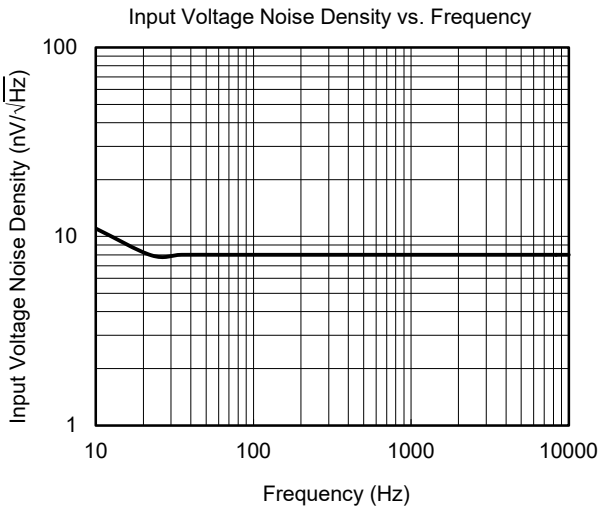
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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



REVISION HISTORY

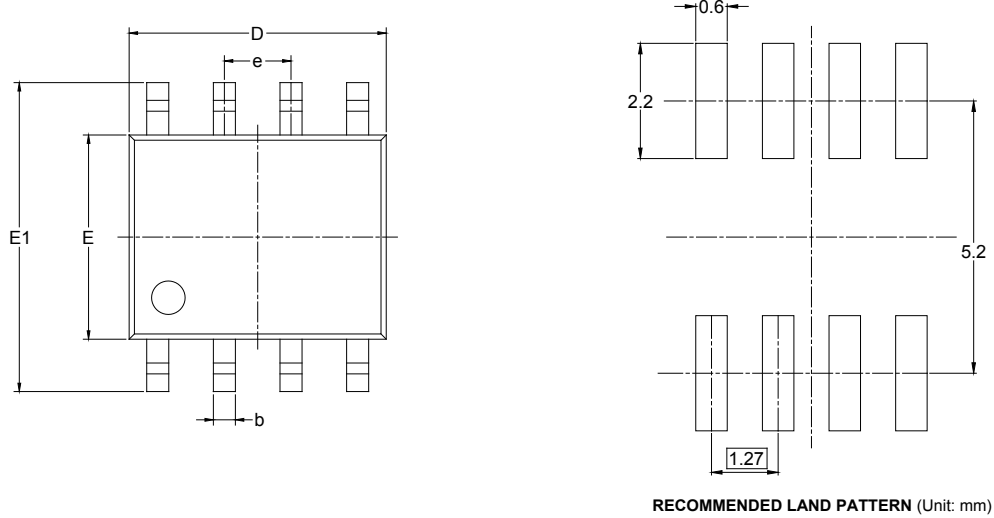
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

AUGUST 2017 – REV.A to REV.A.1	Page
Added external resistance parameter	3
Updated open-loop gain and phase vs. frequency	7

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

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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