SGM8307-2 Dual, Low Noise, High-Speed Operational Amplifier

GENERAL DESCRIPTION

The SGM8307-2 is a dual, low power, low noise, high-speed, voltage feedback amplifier. The device can operate from 2.8V to 12V single supply or ±1.4V to ±6V dual power supplies. It provides an input range including ground. It also offers an output voltage swing within 250mV of the rails with a 150Ω load by utilizing complementary common-source outputs and offers a high output current of 110mA. The SGM8307-2 features low differential gain and differential phase errors. It is suitable for single-supply consumer video applications.

The SGM8307-2 features high gain-bandwidth product of 75MHz and high slew rate of 150V/μs. So it supports low distortion operation. In contrast to previous low power single-supply amplifiers, decreasing the signal swing enhances the distortion performance of SGM8307-2. The combination of these characteristics makes the device a good choice as ideal input buffer stage of ADC. The SGM8307-2 has a wide dynamic range due to its low noise of 14nV/√Hz.

The SGM8307-2 is available in a Green SOIC-8 package. It is specified over the extended -40℃ to +125℃ temperature range.

FEATURES

- **High Bandwidth:**
  - **135MHz (G = +1)**
  - **70MHz (G = +2)**
- **High Slew Rate: 150V/μs**
- **Low Noise: 14nV/√Hz (f > 1MHz)**
- **Support Input Voltage below 0V on Single Supply**
- **Output Voltage Swing: ±4.75V (V_S = ±5V)**
- **Wide Supply Range:**
  - **Single Supply: 2.8V to 12V**
  - **Dual Supplies: ±1.4V to ±6V**
- **Quiescent Current: 8.5mA (V_S = +5V)**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in a Green SOIC-8 Package**

APPLICATIONS

ADC Input Driver
DAC Output Driver
Video Equipment
PLL Filter
Industrial Equipment

TYPICAL APPLICATION

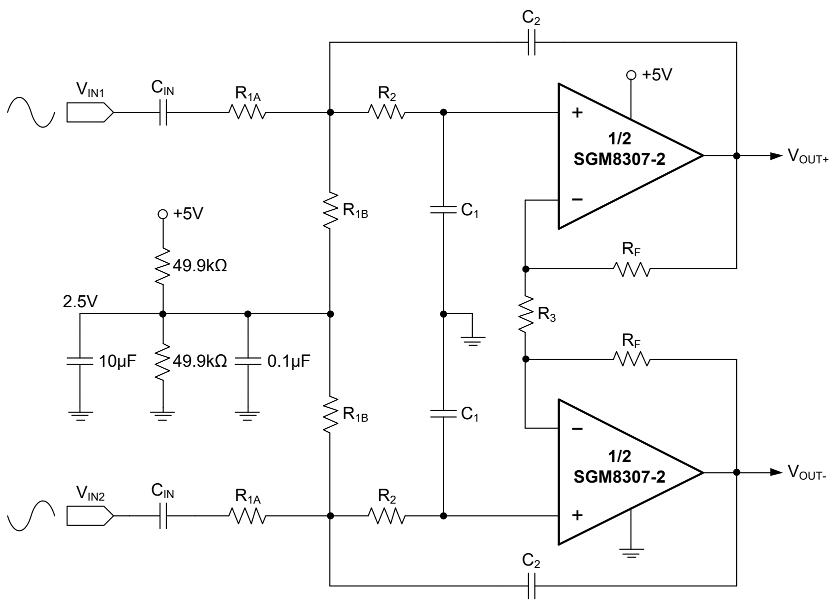


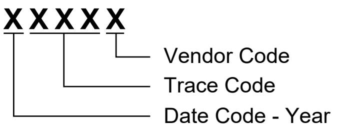
Figure 1. 5MHz, Sallen-Key Low-Pass Filter with 2nd-Order Differential Design on Single-Supply Operation

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM8307-2	SOIC-8	-40℃ to +125℃	SGM8307-2XS8G/TR	0BOXS8 XXXXX	Tape and Reel, 4000

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code.



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 $-V_S$ 12V
Differential Input Voltage, V_{ID} .... ±2.5V
Input Voltage Range, V_{IN} .... -0.5V to ($+V_S$) + 0.5V
Junction Temperature .... +150℃
Storage Temperature Range .... -65℃ to +150℃
Lead Temperature (Soldering, 10s) .... +260℃
ESD Susceptibility [(1) (2)]
HBM .... ±8000V
CDM .... ±1000V

NOTES:
1. For human body model (HBM), all pins comply with ANSI/ESDA/JEDEC JS-001 specifications.
2. For charged device model (CDM), all pins comply with ANSI/ESDA/JEDEC JS-002 specifications.

RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range .... -40℃ to +125℃

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

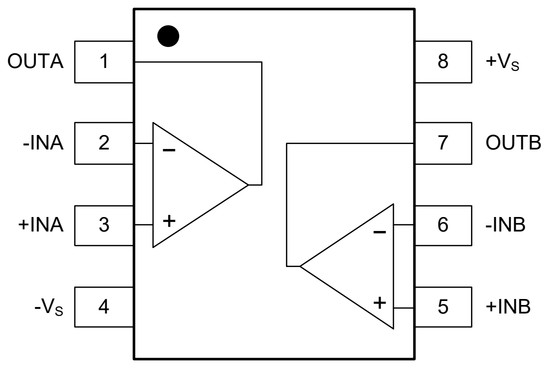
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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

(TOP VIEW)



SOIC-8

ELECTRICAL CHARACTERISTICS

(V_S = ±5V, G = +2, R_F = 750Ω, R_L = 150Ω to GND, Full = -40℃ to +125℃, typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER		SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Input Characteristics								
Input Offset Voltage		V_{OS}	V_{CM} = 0V	+25℃		±1.2	±6	mV
				Full			±6.5	
Average Offset Voltage Drift		$ΔV_{OS}/ΔT$	V_{CM} = 0V	Full		20		μV/℃
Input Bias Current		I_B	V_{CM} = 0V	+25℃		±0.1	±0.5	nA
				-40℃ to +85℃			±2	
				Full			±20	
Input Bias Current Drift		$ΔI_B/ΔT$	V_{CM} = 0V	Full		1		nA/℃
Input Offset Current		I_{OS}	V_{CM} = 0V	+25℃		±0.1	±0.5	nA
				-40℃ to +85℃			±1	
				Full			±10	
Input Offset Current Drift		$ΔI_{OS}/ΔT$	V_{CM} = 0V	Full		0.5		nA/℃
Negative Input Voltage				Full		-5.2		V
Positive Input Voltage				Full		2.9		V
Common Mode Rejection Ratio, RTI (1)		CMRR		+25℃	68	80		dB
				Full	65			
Input Capacitance	Differential			+25℃		5.0		pF
	Common Mode			+25℃		3.5		
Open-Loop Voltage Gain		A_{OL}		+25℃	100	110		dB
				Full	97			
Output Characteristics								
Output Voltage Swing		V_{OUT}	R_L = 1kΩ to GND	+25℃	±4.925	±4.95		V
				Full	±4.9			
			R_L = 150Ω to GND	+25℃	±4.7	±4.75		
				Full	±4.6			
Output Current, Sinking and Sourcing		I_{OUT}	R_L = 10Ω to GND	+25℃	75	110		mA
				Full	65			
Closed-Loop Output Impedance			f ≤ 100kHz	+25℃		0.15		Ω
Power Supply								
Operating Voltage Range		V_S		+25℃	2.8		12	V
Quiescent Current		I_Q		+25℃		8.5	11	mA
				Full			12	
Power Supply Rejection Ratio, RTI (1)		PSRR		+25℃	72	86		dB
				Full	69			

NOTE: 1. RTI = Referred-to-input.

ELECTRICAL CHARACTERISTICS (continued)

(V_S = ±5V, G = +2, R_F = 750Ω, R_L = 150Ω to GND, Full = -40℃ to +125℃, typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER		SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
Dynamic Performance									
Small-Signal Bandwidth		BW	G = +1, V_{OUT} ≤ 0.2V_{P-P}		+25℃		135		MHz
			G = +2, V_{OUT} ≤ 0.2V_{P-P}		+25℃		70		
			G = +5, V_{OUT} ≤ 0.2V_{P-P}		+25℃		18		
			G = +10, V_{OUT} ≤ 0.2V_{P-P}		+25℃		7.5		
Gain-Bandwidth Product		GBP	G ≥ +10		+25℃		75		MHz
Peaking at a Gain of +1			V_{OUT} ≤ 0.2V_{P-P}		+25℃		4		dB
Slew Rate		SR	V_{OUT} = 2V_{P-P}		+25℃		150		V/μs
Rise Time		t_R	V_{OUT} = 0.5V_{P-P}		+25℃		6.5		ns
Fall Time		t_F	V_{OUT} = 0.5V_{P-P}		+25℃		7		ns
Settling Time to 0.1%		t_S	V_{OUT} = 1V_{P-P}		+25℃		180		ns
Harmonic Distortion	2nd-Harmonic	HD2	V_{OUT} = 2V_{P-P}, f = 5MHz	R_L = 150Ω	+25℃		-50		dBc
				R_L = 500Ω	+25℃		-52		
	3rd-Harmonic	HD3		R_L = 150Ω	+25℃		-36		
				R_L = 500Ω	+25℃		-50		
Noise									
Input Voltage Noise Density		e_n	f > 1MHz		+25℃		14		nV/$\sqrt{Hz}$
Input Current Noise Density		i_n	f > 1MHz		+25℃		1.8		pA/$\sqrt{Hz}$

ELECTRICAL CHARACTERISTICS (continued)

(V_S = +5V, G = +2, R_F = 750Ω, R_L = 150Ω to V_S/2, Full = -40℃ to +125℃, typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER		SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Input Characteristics								
Input Offset Voltage		V_{OS}	V_{CM} = 2.5V	+25℃		±1.2	±6	mV
				Full			±6.5	
Average Offset Voltage Drift		$\Delta V_{OS}/\Delta T$	V_{CM} = 2.5V	Full		20		μV/℃
Input Bias Current		I_B	V_{CM} = 2.5V	+25℃		±0.1	±0.5	nA
				-40℃ to +85℃			±2	
				Full			±20	
Input Bias Current Drift		$\Delta I_B/\Delta T$	V_{CM} = 2.5V	Full		1		nA/℃
Input Offset Current		I_{OS}	V_{CM} = 2.5V	+25℃		±0.1	±0.5	nA
				-40℃ to +85℃			±1	
				Full			±10	
Input Offset Current Drift		$\Delta I_{OS}/\Delta T$	V_{CM} = 2.5V	Full		0.5		nA/℃
Least Positive Input Voltage				Full		-0.2		V
Most Positive Input Voltage				Full		2.9		V
Common Mode Rejection Ratio, RTI (1)		CMRR		+25℃	60	70		dB
				Full	57			
Input Capacitance	Differential			+25℃		4		pF
	Common Mode			+25℃		4		
Open-Loop Voltage Gain		A_{OL}		+25℃	90	110		dB
				Full	87			
Output Characteristics								
Output Voltage Swing		V_{OL}	R_L = 1kΩ to 2.5V	+25℃		0.03	0.06	V
				Full			0.075	
			R_L = 150Ω to 2.5V	+25℃		0.12	0.2	
				Full			0.25	
		V_{OH}	R_L = 1kΩ to 2.5V	+25℃	4.94	4.97		V
				Full	4.925			
			R_L = 150Ω to 2.5V	+25℃	4.8	4.88		
				Full	4.75			
Output Current, Sinking and Sourcing		I_{OUT}	R_L = 10Ω to 2.5V	+25℃	60	105		mA
				Full	40			
Closed-Loop Output Impedance			f ≤ 100kHz	+25℃		0.15		Ω
Power Supply								
Operating Voltage Range		V_S		+25℃	2.8		12	V
Quiescent Current		I_Q		+25℃		8.2	11	mA
				Full			12	
Power Supply Rejection Ratio, RTI (1)		PSRR		+25℃	72	86		dB
				Full	69			

NOTE: 1. RTI = Referred-to-input.

ELECTRICAL CHARACTERISTICS (continued)

(V_S = +5V, G = +2, R_F = 750Ω, R_L = 150Ω to V_S/2, Full = -40℃ to +125℃, typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Dynamic Performance							
Small-Signal Bandwidth	BW	G = +1, V_{OUT} ≤ 0.2V_{P-P}	+25℃		125		MHz
		G = +2, V_{OUT} ≤ 0.2V_{P-P}	+25℃		68		MHz
		G = +5, V_{OUT} ≤ 0.2V_{P-P}	+25℃		17		MHz
		G = +10, V V_{OUT} ≤ 0.2V_{P-P}	+25℃		7		MHz
Gain-Bandwidth Product	GBP	G ≥ +10	+25℃		70		MHz
Peaking at a Gain of +1		V_{OUT} ≤ 0.2V_{P-P}	+25℃		4		dB
Slew Rate	SR	V_{OUT} = 2V_{P-P}	+25℃		140		V/μs
Rise Time	t_R	V_{OUT} = 0.5V_{P-P}	+25℃		7		ns
Fall Time	t_F	V_{OUT} = 0.5V_{P-P}	+25℃		7.5		ns
Settling Time to 0.1%	t_S	V_{OUT} = 1V_{P-P}	+25℃		180		ns
Harmonic Distortion, 2nd-Harmonic	HD2	V_{OUT} = 2V_{P-P}, f = 5MHz, R_L = 150Ω	+25℃		-53		dBc
		V_{OUT} = 2V_{P-P}, f = 5MHz, R_L = 500Ω	+25℃		-52		dBc
Harmonic Distortion, 3rd-Harmonic	HD3	V_{OUT} = 2V_{P-P}, f = 5MHz, R_L = 150Ω	+25℃		-36		dBc
		V_{OUT} = 2V_{P-P}, f = 5MHz, R_L = 500Ω	+25℃		-50		dBc
Noise							
Input Voltage Noise Density	e_n	f > 1MHz	+25℃		14		nV/√Hz
Input Current Noise Density	i_n	f > 1MHz	+25℃		1.8		pA/√Hz

ELECTRICAL CHARACTERISTICS (continued)

(V_S = +3V, G = +2, R_F = 750Ω, R_L = 150Ω to V_S/2, Full = -40℃ to +125℃, typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER		SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Input Characteristics								
Input Offset Voltage		V_{OS}	V_{CM} = 1.5V	+25℃		±1.2	±6	mV
				Full			±6.5	
Average Offset Voltage Drift		$\Delta V_{OS}/\Delta T$	V_{CM} = 1.5V	Full		20		μV/℃
Input Bias Current		I_B	V_{CM} = 1.5V	+25℃		±0.1	±0.5	nA
				Full			±20	
Input Offset Current		I_{OS}	V_{CM} = 1.5V	+25℃		±0.1	±0.5	nA
				Full			±10	
Least Positive Input Voltage				Full		-0.2		V
Most Positive Input Voltage				Full		0.8		V
Common Mode Rejection Ratio, RTI (1)		CMRR		+25℃	51	60		dB
				Full	48			
Input Capacitance	Differential			+25℃		2.4		pF
Input Capacitance	Common Mode			+25℃		4.4		pF
Open-Loop Voltage Gain		A_{OL}		+25℃	90	110		dB
				Full	87			
Output Characteristics								
Output Voltage Swing		V_{OL}	R_L = 1kΩ to 1.5V	+25℃		0.02	0.05	V
				Full			0.06	
			R_L = 150Ω to 1.5V	+25℃		0.1	0.15	
				Full			0.2	
		V_{OH}	R_L = 1kΩ to 1.5V	+25℃	2.95	2.98		V
				Full	2.94			
			R_L = 150Ω to 1.5V	+25℃	2.85	2.9		
				Full	2.8			
Output Current, Sinking and Sourcing		I_{OUT}	R_L = 10Ω to 1.5V	+25℃	45	60		mA
Closed-Loop Output Impedance			f ≤ 100kHz	+25℃		0.15		Ω
Power Supply								
Operating Voltage Range		V_S		+25℃	2.8		12	V
Quiescent Current		I_Q		+25℃		8	10	mA
				Full			11	
Power Supply Rejection Ratio, RTI (1)		PSRR		+25℃	72	86		dB
				Full	69			

NOTE: 1. RTI = Referred-to-input.

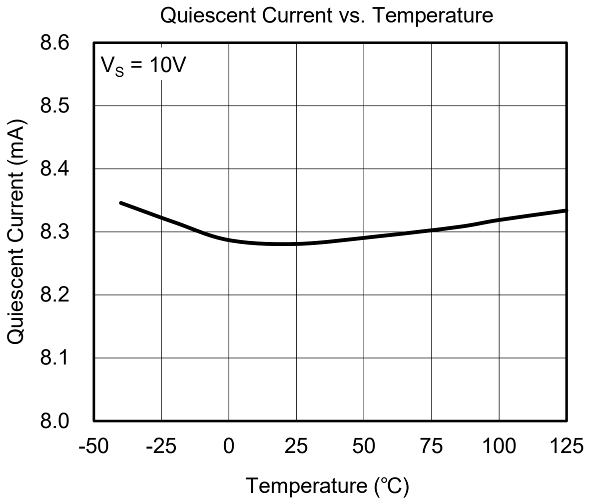
ELECTRICAL CHARACTERISTICS (continued)

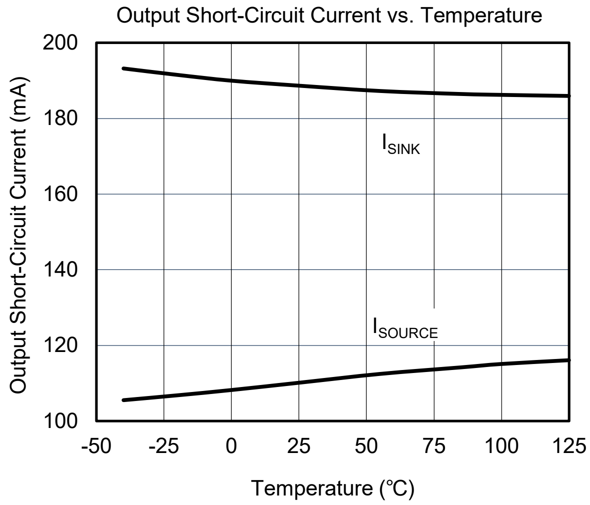
(V_S = +3V, G = +2, R_F = 750Ω, R_L = 150Ω to V_S/2, Full = -40℃ to +125℃, typical values are at T_A = +25℃, unless otherwise noted.)

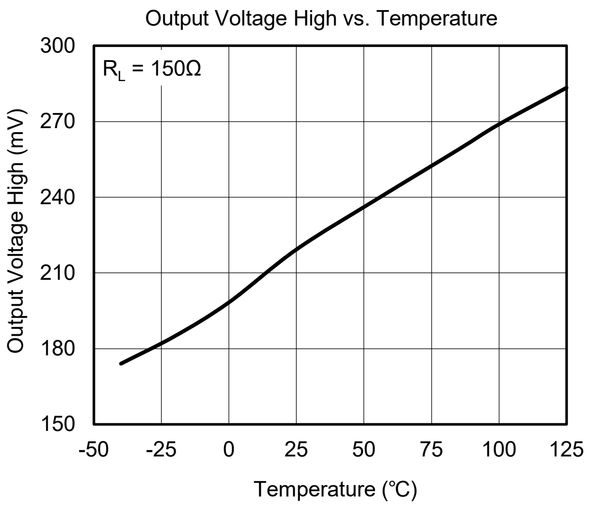
PARAMETER		SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
Dynamic Performance									
Small-Signal Bandwidth		BW	G = +2, V_{OUT} ≤ 0.2V_{P-P}		+25℃		62		MHz
			G = +5, V_{OUT} ≤ 0.2V_{P-P}		+25℃		16		
			G = +10, V_{OUT} ≤ 0.2V_{P-P}		+25℃		6.5		
Gain-Bandwidth Product		GBP	G ≥ +10		+25℃		65		MHz
Slew Rate		SR	V_{OUT} = 2V_{P-P}		+25℃		120		V/μs
Rise Time		t_R	V_{OUT} = 0.5V_{P-P}		+25℃		8		ns
Fall Time		t_F	V_{OUT} = 0.5V_{P-P}		+25℃		8.5		ns
Settling Time to 0.1%		t_S	V_{OUT} = 1V_{P-P}		+25℃		185		ns
Harmonic Distortion	2nd-Harmonic	HD2	V_{OUT} = 2V_{P-P}, f = 5MHz	R_L = 150Ω	+25℃		-53		dBc
				R_L = 500Ω	+25℃		-54		
	3rd-Harmonic	HD3		R_L = 150Ω	+25℃		-39		
				R_L = 500Ω	+25℃		-55		
Noise									
Input Voltage Noise Density		e_n	f > 1MHz		+25℃		14		nV/$\sqrt{Hz}$
Input Current Noise Density		i_n	f > 1MHz		+25℃		1.8		pA/$\sqrt{Hz}$

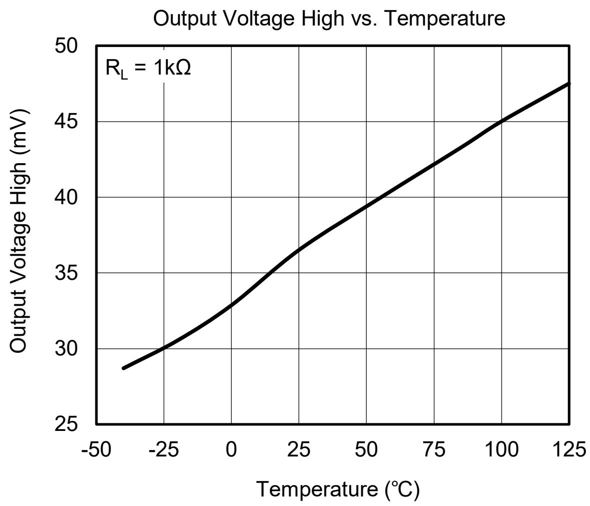
TYPICAL PERFORMANCE CHARACTERISTICS

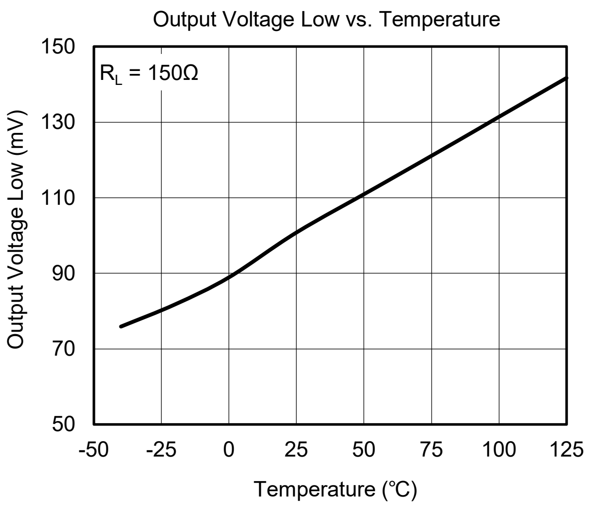
At T_A = +25℃, V_S = 12V, unless otherwise noted.

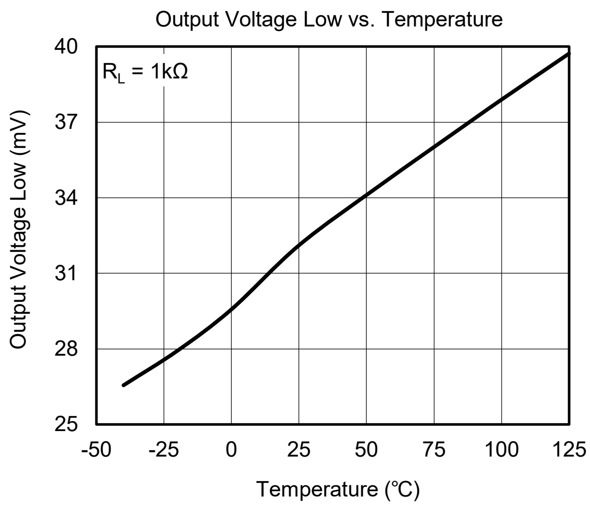






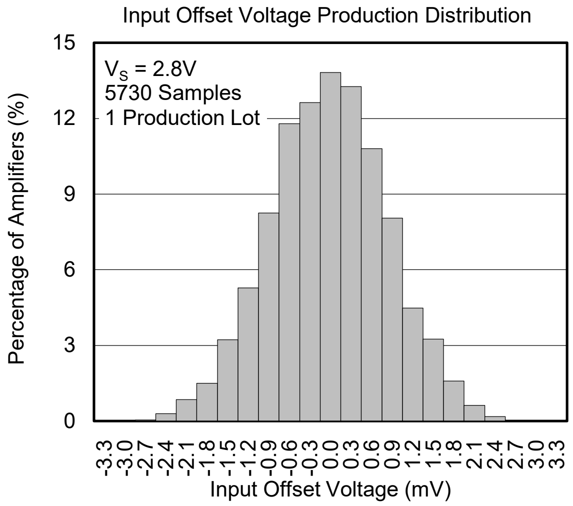


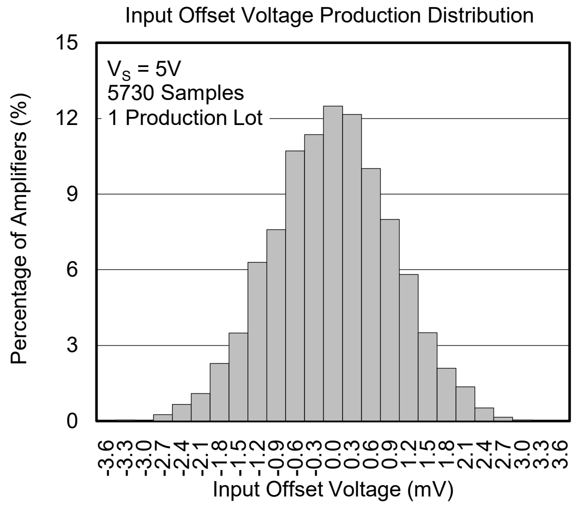


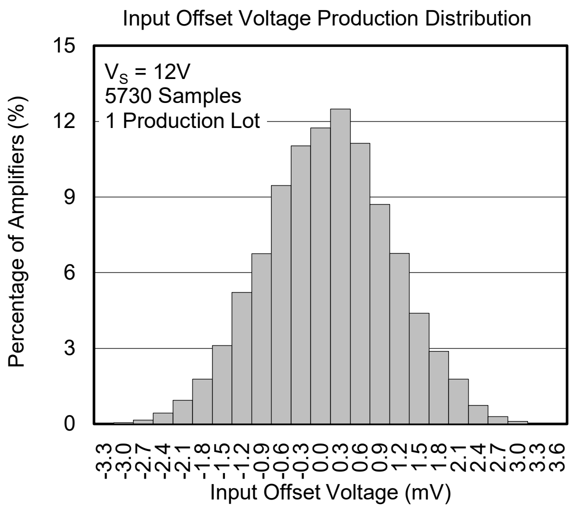


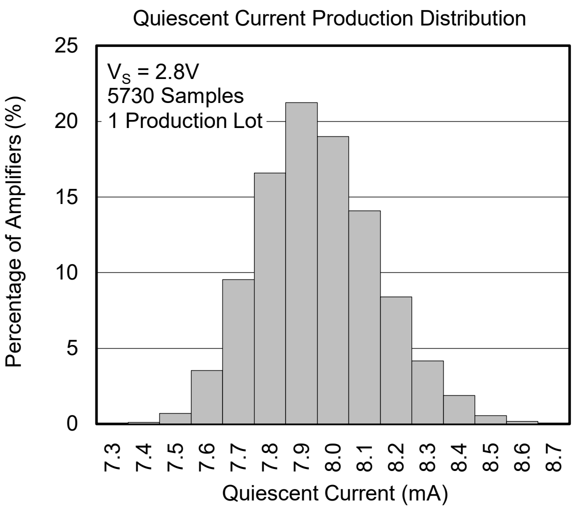
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

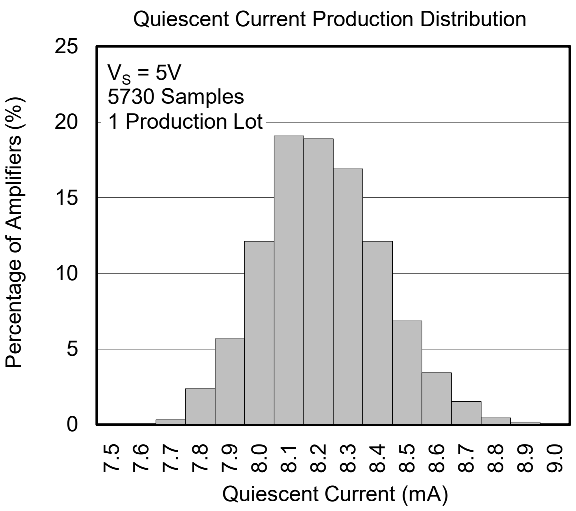
At T_A = +25℃, unless otherwise noted.

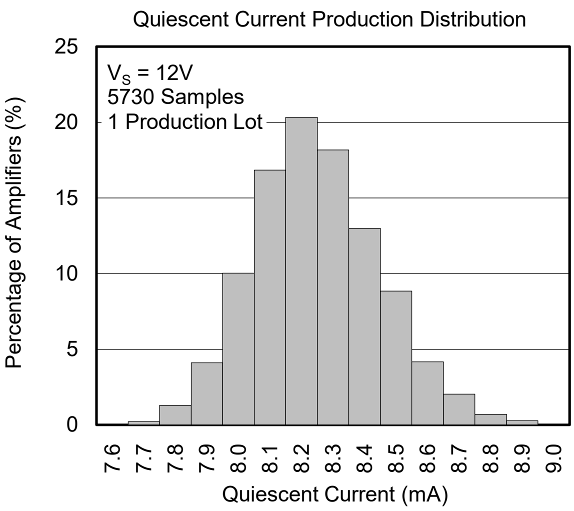








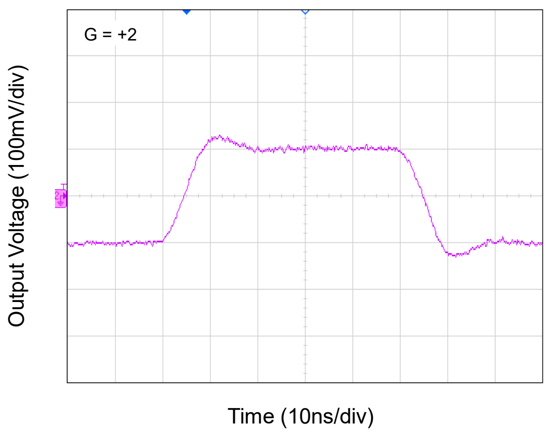




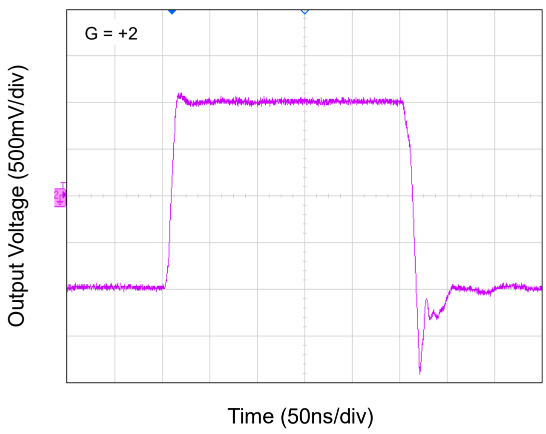
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

At T_A = +25℃, V_S = ±5V, G = +2, R_F = 750Ω, and R_L = 150Ω to GND, unless otherwise noted.

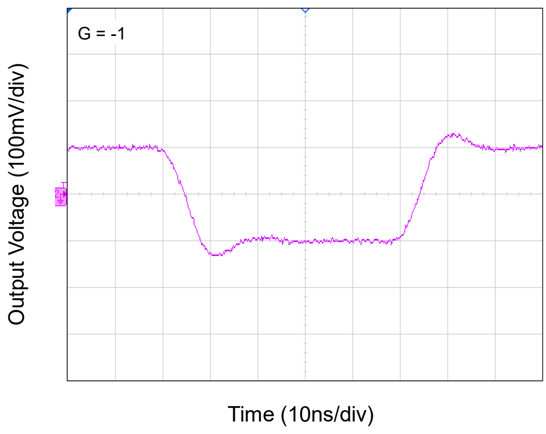
Non-Inverting Small-Signal Step Response



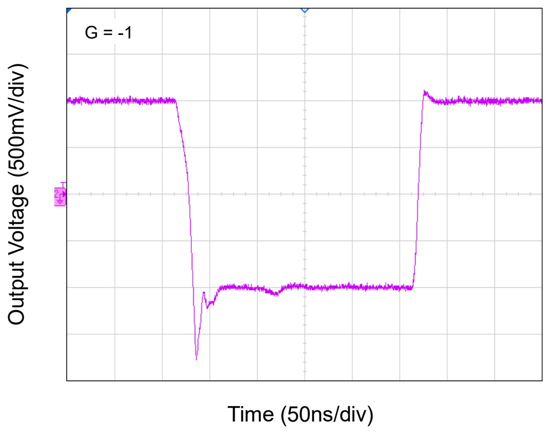
Non-Inverting Large-Signal Step Response



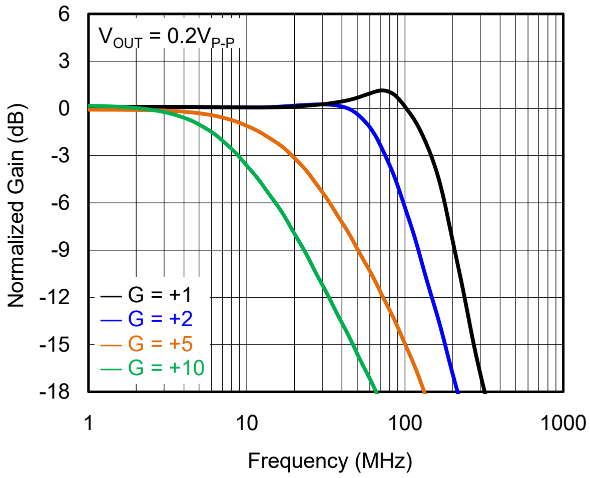
Inverting Small-Signal Step Response



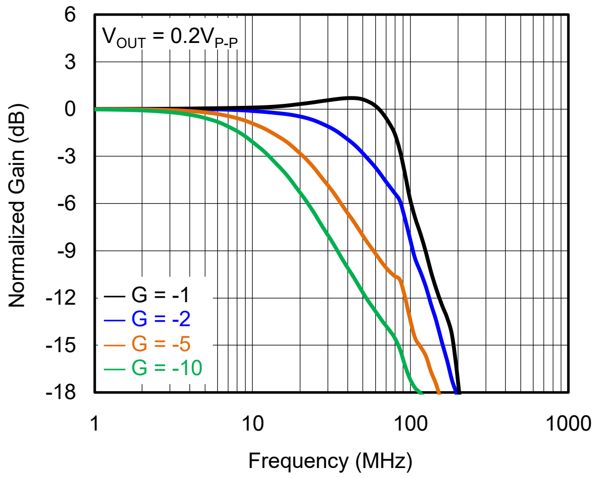
Inverting Large-Signal Step Response



Non-Inverting Small-Signal Frequency Response

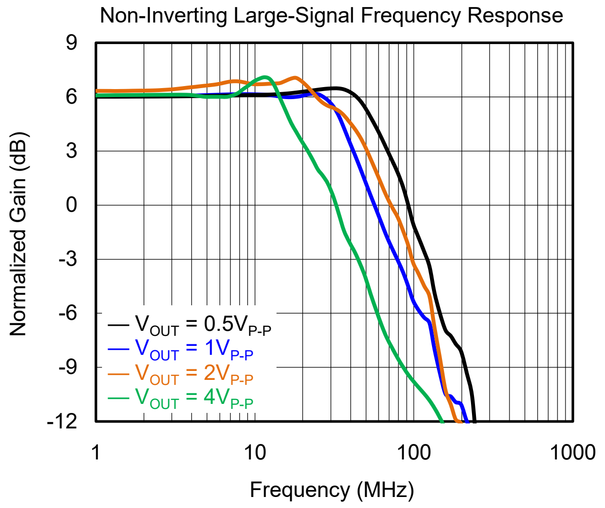


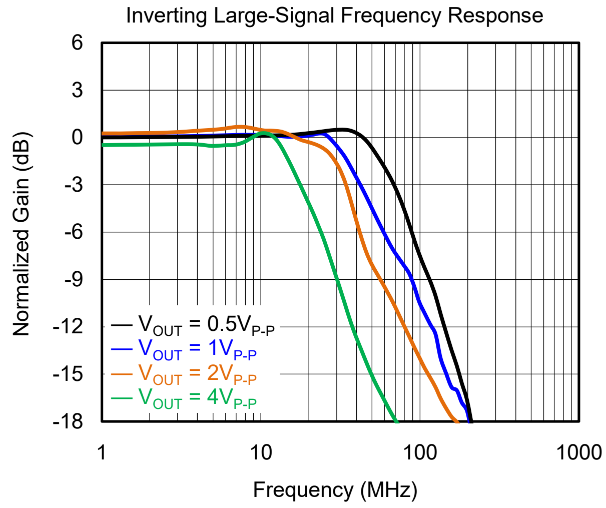
Inverting Small-Signal Frequency Response

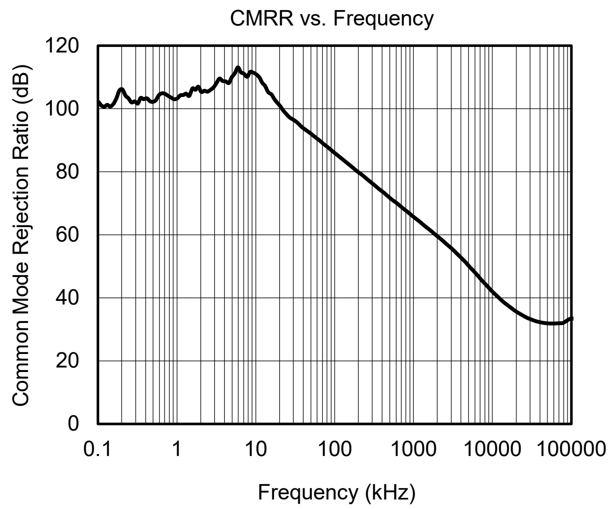


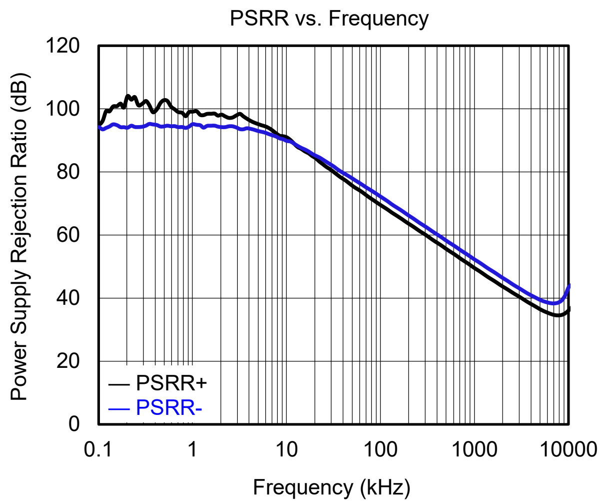
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

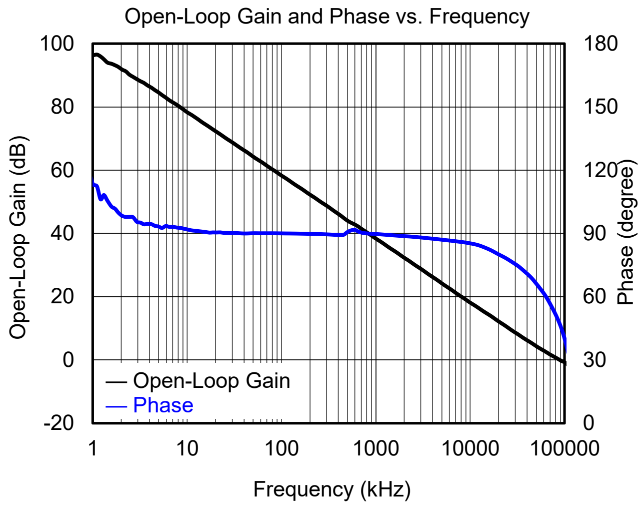
At T_A = +25℃, V_S = ±5V, G = +2, R_F = 750Ω, and R_L = 150Ω to GND, unless otherwise noted.

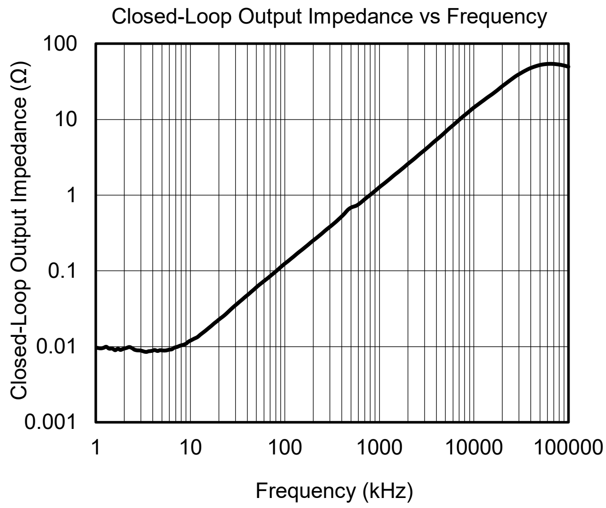






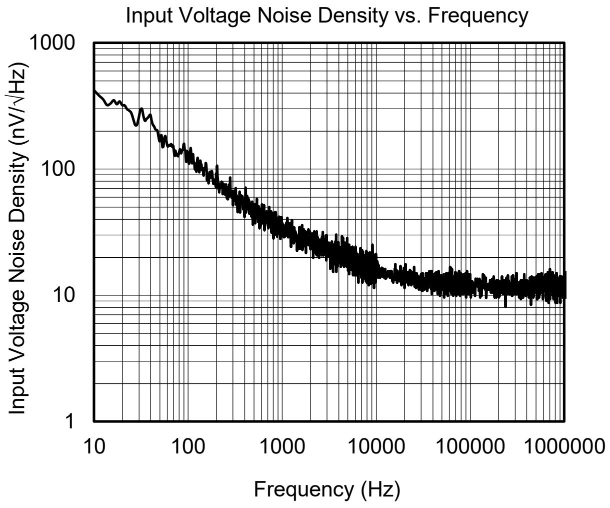


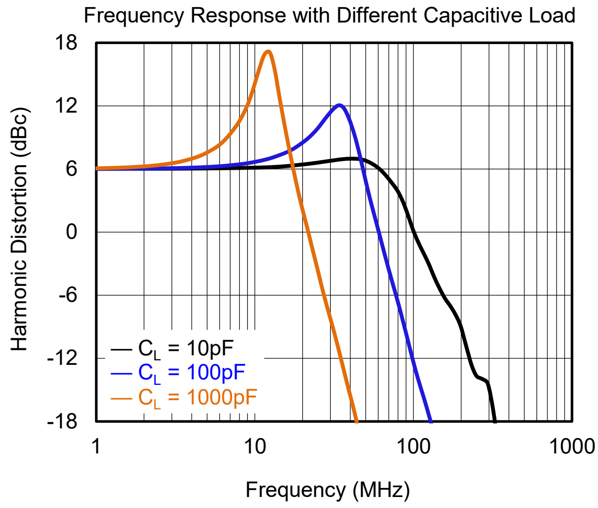


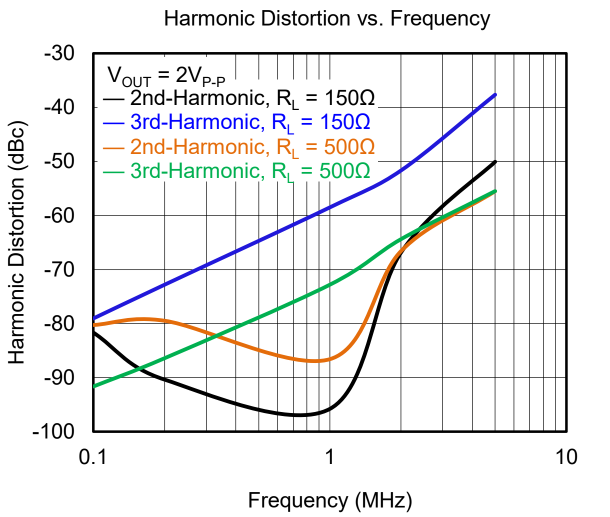


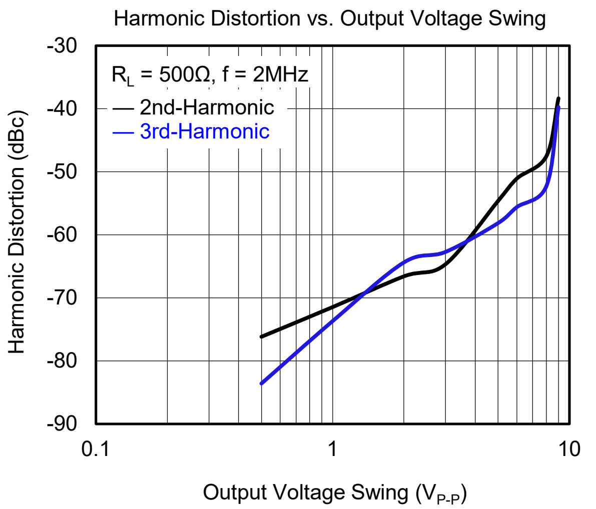
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

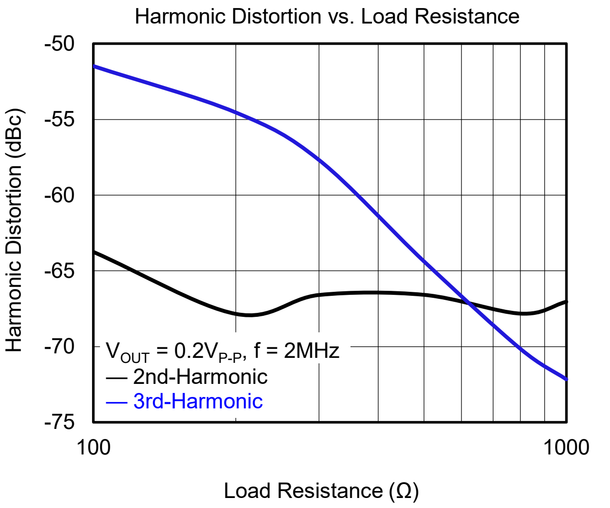
At T_A = +25℃, V_S = ±5V, G = +2, R_F = 750Ω, and R_L = 150Ω to GND, unless otherwise noted.

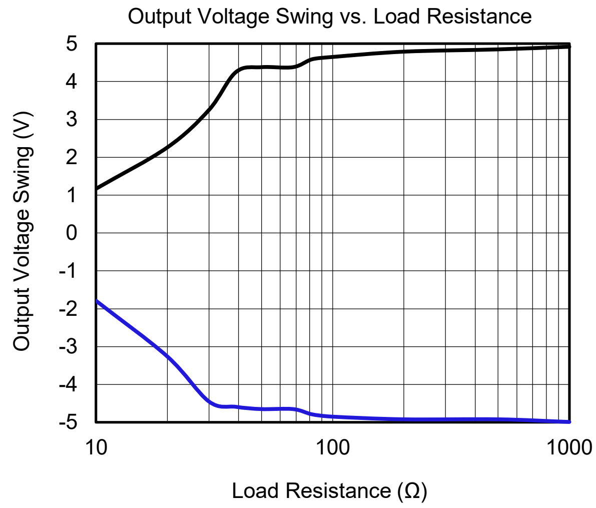






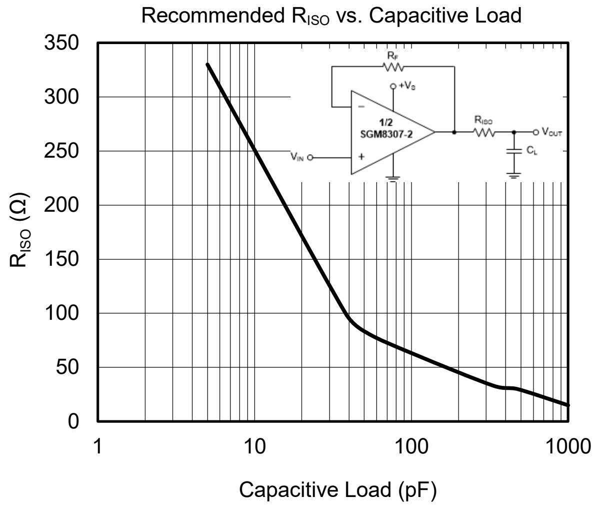






TYPICAL PERFORMANCE CHARACTERISTICS (continued)

At T_A = +25℃, V_S = ±5V, G = +2, R_F = 750Ω, and R_L = 150Ω to GND, unless otherwise noted.



APPLICATION INFORMATION

Single-Supply Non-Inverting Amplifier

The SGM8307-2 is a high-speed voltage feedback operational amplifier that exhibits unity-gain stability, accommodating both single power supply (2.8V to 12V) and dual power supply (±1.4V to ±6V). The input voltages range from below the ground to 2.1V lower than the positive supply. The SGM8307-2 also provides an output voltage swing within 250mV of the rails with a 150Ω load by employing complementary common-source outputs.

Figure 2 and Figure 3 illustrate the test circuits for electrical characteristics and typical performance characteristics for +5V and +3V single power supply, respectively. The input and output voltages are directly measured from the input and output terminals. The resistors between the non-inverting input and the V_S are utilized for generating a common mode bias voltage.

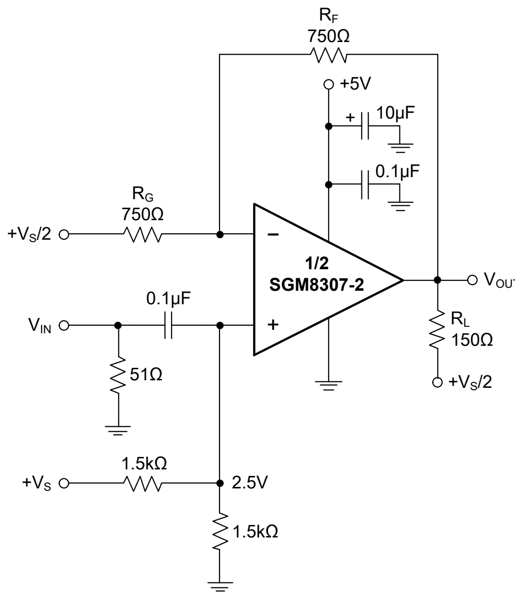


Figure 2. G = +2, +5V Single-Supply Non-Inverting Amplifier

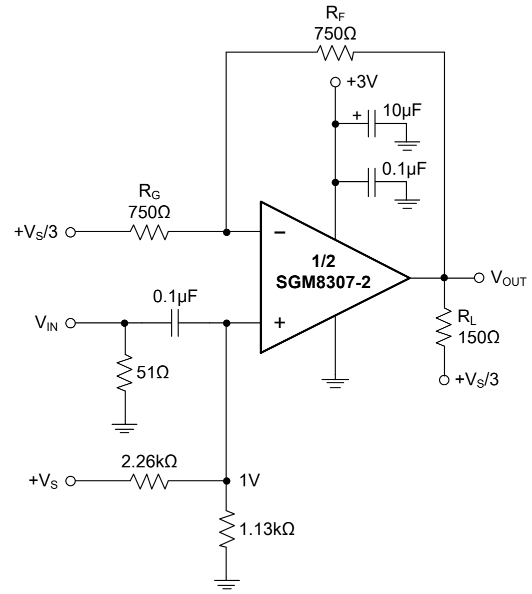


Figure 3. G = +2, +3V Single-Supply Non-Inverting Amplifier

Dual-Supply Non-Inverting Amplifier

Figure 4 depicts the circuit configuration for the electrical characteristics of a dual power supply. The optional capacitor between the positive and negative power supply pins can generally enhance the performance of the 2nd-harmonic distortion.

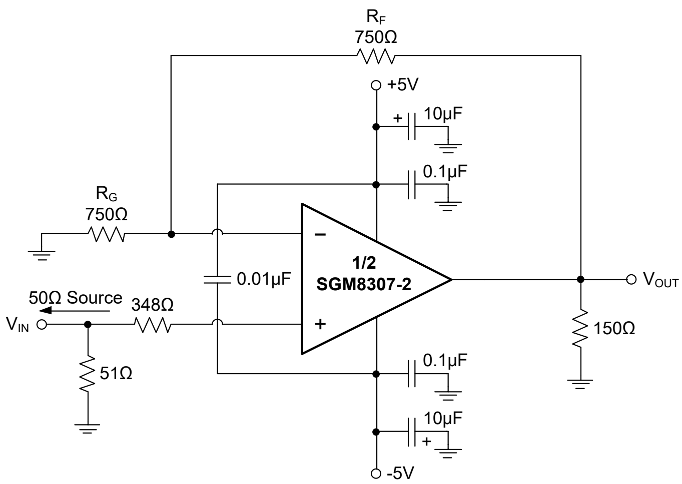


Figure 4. G = +2, Dual-Supply Non-Inverting Amplifier

APPLICATION INFORMATION (continued)

Driving Capacitive Loads

When the output pin of the SGM8307-2 is directly connected to a capacitive load, it is recommended to add an isolation resistor between the output pin of the operational amplifier and the load capacitor to ensure stability or reduce the AC response peaking, as illustrated in Figure 5.

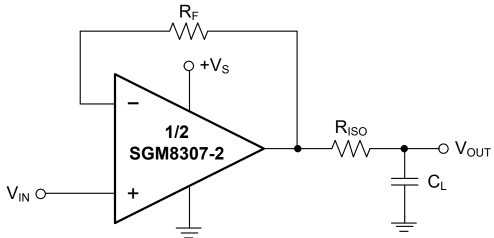


Figure 5. Unity-Gain Buffer with R_{ISO} Stability Compensation

ADC Input Driver

The SGM8307-2 is well-suited as a single-supply ADC driver due to its wide input/output voltage ranges, excellent distortion performance, and support for single power supply ranging from 2.8V to 12V. Figure 6 shows a typical circuit used by the SGM8307-2 as an ADC driver, capable of elevating the input level. To achieve the specified signal gain (G) and the required upward shift in V_{OUT} (ΔV_{OUT}) when V_{IN} is at its midpoint, the following equations determine the resistor values needed for the optimal performance.

$$NG = G + V_{OUT}/V_S$$

$$R_T = R_F/G$$

$$R_P = R_F/(NG - G)$$

$$R_G = R_F/(NG - 1)$$

where:

$$NG = 1 + R_F/R_G$$

$$V_{OUT} = (G)V_{IN} + (NG - G)V_S$$

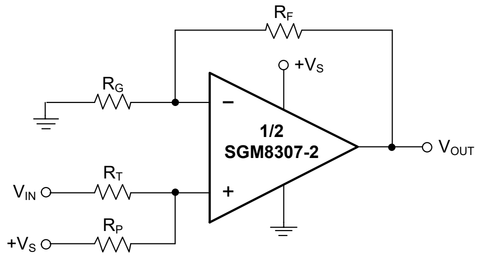


Figure 6. DC Level-Shifting Circuit

Non-Inverting Amplifier with Reduced Peaking

To mitigate the peaking of the AC response at low gain, a compensation resistor can be inserted between the input pins of the non-inverting amplifier to augment the noise gain, as illustrated in Figure 7. The equations for noise gain are as follows:

$$G_1 = 1 + R_F/R_G$$

$$G_2 = 1 + \frac{R_T + R_F/G_1}{R_C}$$

$$NG = G_1 \times G_2$$

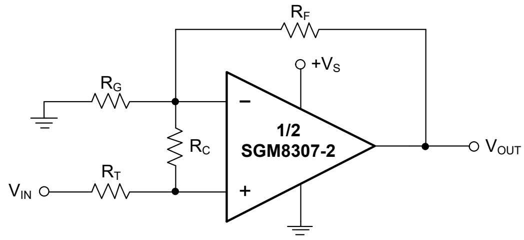


Figure 7. AC Response Peaking Compensation Circuit

APPLICATION INFORMATION (continued)

DAC Output Driver

Utilizing SGM8307-2 as the output driver for high frequency DACs can effectively guarantee their SFDR performance. Figure 8 depicts a typical circuit in which SGM8307-2 is configured as a transimpedance amplifier to convert the DAC's differential output current into differential voltage. Due to the presence of the output capacitors, it is essential to add a feedback capacitor in parallel with the feedback resistor for compensation in order to achieve a flat frequency response. The value of the feedback capacitor can be determined using the following equations:

$$\frac{1}{2\pi R_F C_F} = \sqrt{\frac{GBP}{4\pi R_F C_D}}$$

$$f_{-3dB} = \sqrt{\frac{GBP}{2\pi R_F C_D}}$$

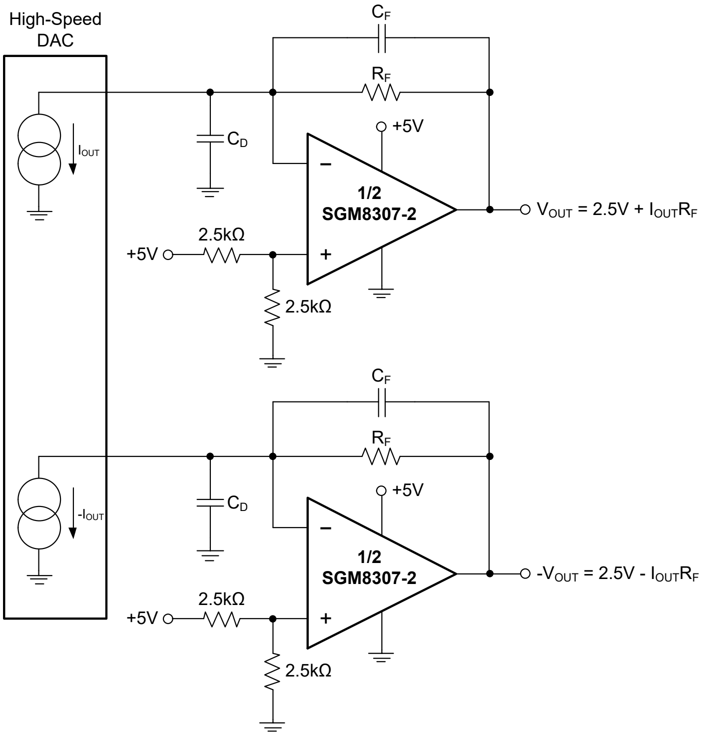


Figure 8. Differential Transimpedance Amplifier

APPLICATION INFORMATION (continued)

Active Filter

The SGM8307-2 is highly suitable for use in single-supply active filter designs, showcasing its exceptional compatibility and proficiency in this application. Figure 9 illustrates a typical single-supply 2nd-order Sallen-Key (SK) low-pass filter. The cutoff frequency of this filter is $1/2\pi\sqrt{(R_{1A}||R_{1B})R_2C_1C_2}$. Furthermore, the incorporation of two SGM8307-2 channels can be used to configure a differential active filter. An exemplary single-supply 2nd-order differential low-pass SK filter is depicted in Figure 10.

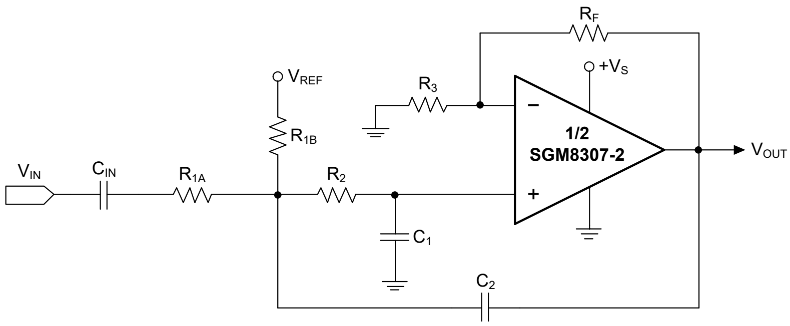


Figure 9. Single-Supply SK Low-Pass Filter

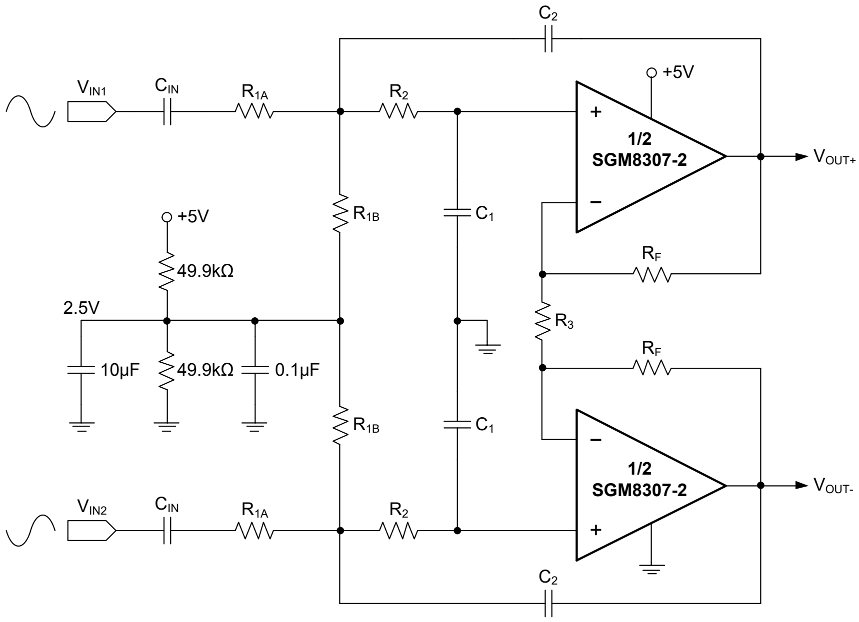


Figure 10. Differential Active Low-Pass Filter

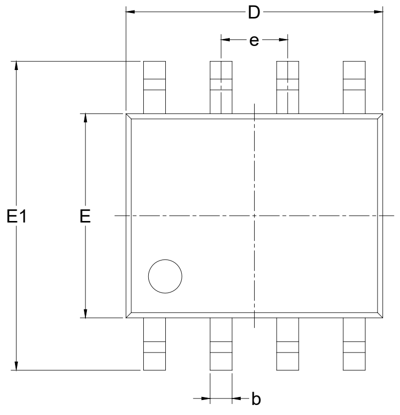
REVISION HISTORY

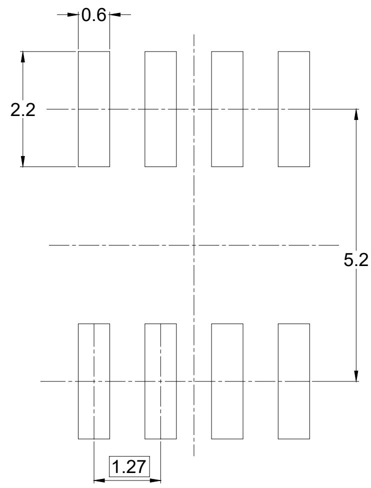
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (NOVEMBER 2024) to REV.A	Page
Changed from product preview to production data	All

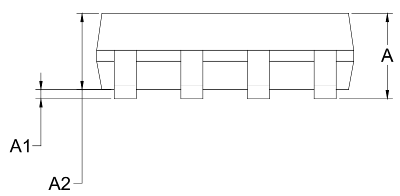
PACKAGE OUTLINE DIMENSIONS

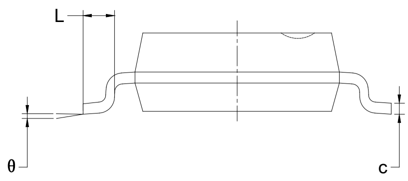
SOIC-8





RECOMMENDED LAND PATTERN (Unit: mm)



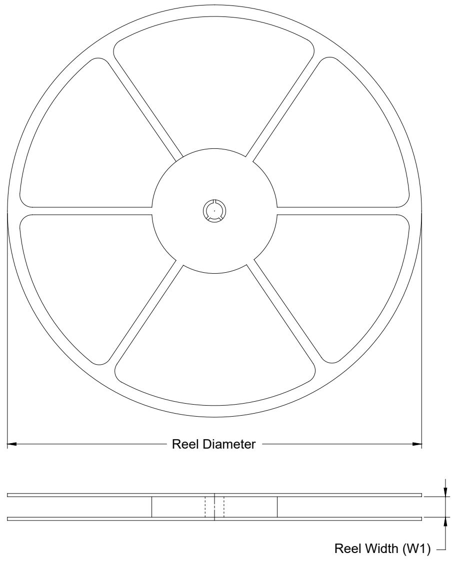


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050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

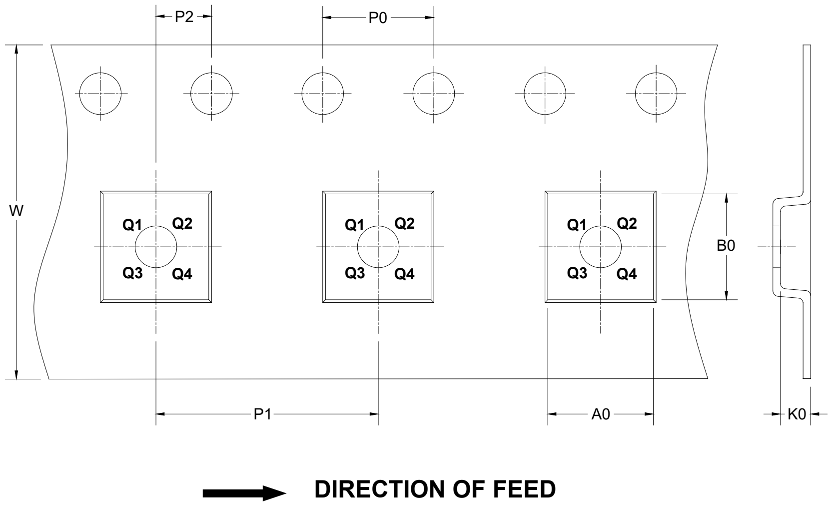
NOTES:
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



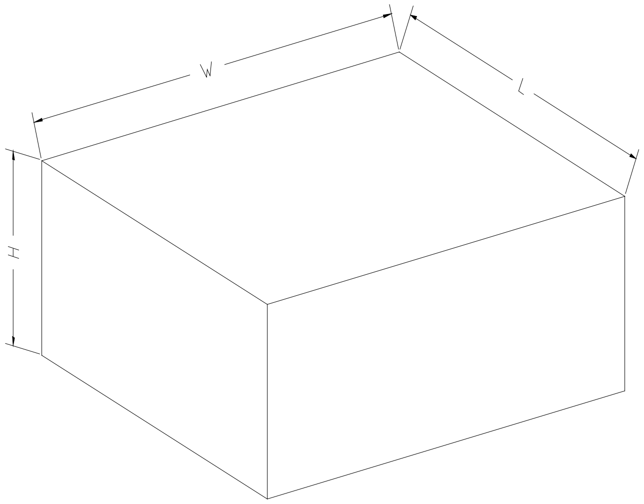
NOTE: The picture is only for reference. Please make the object as the standard.

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

DD0001

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