

SGM8922

12.7MHz, Dual Rail-to-Rail Output Operational Amplifier

PRODUCT DESCRIPTION

The SGM8922 is a dual, rail-to-rail output operational amplifier that is optimized and fully specified for 5V operation. High output current allows low load impedances to be driven.

The SGM8922 has a wide input common-mode voltage range and output voltage swing, running at single supply voltage from 3V to 5.5V.

The SGM8922 provides excellent overall performance. It exhibits low noise and distortion, low offset and high output current capability, making this device an excellent choice for high quality, low voltage or battery operated audio systems.

The SGM8922 is offered in (Pb)-free MSOP-8 and SO-8 packages and ESD (HBM) reaches 8KV. It is specified over the extended -40°C to $+85^{\circ}\text{C}$ temperature range.

FEATURES

- Rail-to-Rail Output
- Low Noise: $6\text{nV}/\sqrt{\text{Hz}}$
- Low Distortion
- High Output Voltage Swing: 4.73V (with 100mA Output Current)
- Low Output Voltage Swing: 0.24V (with 100mA Output Current)
- Supply Voltage Range: 3V to 5.5V
- Low Input Offset Voltage: 0.9mV MAX (SGM8922A)
- Gain Bandwidth Product: 12.7MHz
- Slew Rate: $6.8\text{V}/\mu\text{s}$
- Low Power
3mA/Amplifier Typical Supply Current
- Small Packaging:
Available in Lead (Pb)-Free MSOP-8 and SO-8

APPLICATIONS

Data Acquisition
Process Control
Active Filters
Test Equipment
Mobile Phone
Audio Processing
Video Processing
Headphone Amplifier
Portable Equipment
Broadband Communications
A-to-D Driver
D-to-A Driver



PACKAGE/ORDERING INFORMATION

MODEL	PIN-PACKAGE	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKAGE OPTION
SGM8922	MSOP-8	-40°C to +85°C	SGM8922YMS8/TR	SGM8922YMS8	Tape and Reel, 3000
	SO-8	-40°C to +85°C	SGM8922YS8/TR	SGM8922YS8	Tape and Reel, 2500
SGM8922A	MSOP-8	-40°C to +85°C	SGM8922AYMS8/TR	SGM8922YMS8	Tape and Reel, 3000
	SO-8	-40°C to +85°C	SGM8922AYS8/TR	SGM8922YS8	Tape and Reel, 2500

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V+ to V-	6V
Common-Mode Input Voltage	-0.1V to 3.8V
Storage Temperature Range	-65°C to +150°C
Junction Temperature	160°C
Operating Temperature Range	-40°C to +85°C
Package Thermal Resistance @ T _A = 25°C	
SO-8, θ _{JA}	82°C/W
MSOP-8, θ _{JA}	105°C/W
Lead Temperature Range (Soldering 10 sec)	
	260°C
ESD Susceptibility	
HBM	8000V
MM	400V

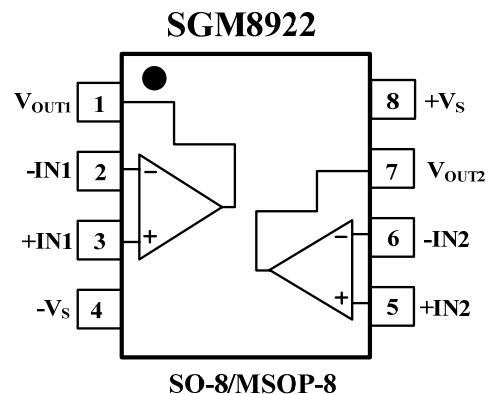
NOTES

1. Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

CAUTION

This integrated circuit can be damaged by ESD. SG Micro-electronics 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.

PIN CONFIGURATIONS (Top View)



ELECTRICAL CHARACTERISTICS: $V_S = +5V$

(At $T_A = +25^\circ\text{C}$, $R_L = 600\Omega$ connected to $V_S/2$, unless otherwise noted)

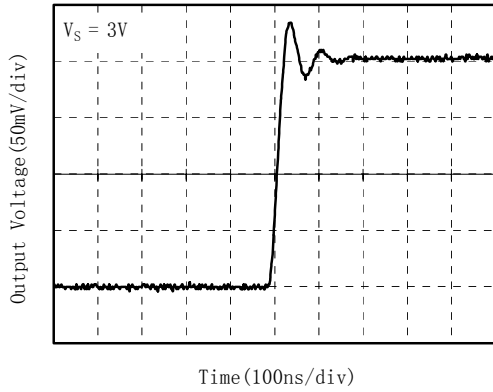
PARAMETER	CONDITIONS	SGM8922						
		TYP	MIN/MAX OVER TEMPERATURE				UNITS	MIN/MAX
		+25°C	+25°C	0°C To +70°C	-40°C To +85°C			
DYNAMIC PERFORMANCE								
Gain-Bandwidth Product (GBP)	$R_L = 600\Omega$	12.7				MHz	TYP	
Slew Rate	2Vpp Step, $A_V = 1$	6.8				V/ μs	TYP	
Crosstalk	$f = 1\text{kHz}$	-120				dB	TYP	
NOISE/DISTORTION PERFORMANCE								
Total Harmonic Distortion + Noise (THD)	$V_{OUT} = 2V_{pp}$, $f = 1\text{kHz}$, $A_V = 1$, $R_L = 600\Omega$	0.003				%	TYP	
Input Voltage Noise (e_n)	$f = 1\text{kHz}$	6				nV/ $\sqrt{\text{Hz}}$	TYP	
Gain Margin	$R_L = 600\Omega$, $C_L = 100\text{pF}$	18.5				dB	TYP	
Phase Margin	$R_L = 600\Omega$, $C_L = 100\text{pF}$	60				degree	TYP	
DC PERFORMANCE								
Input Offset Voltage (V_{OS})								
SGM8922			3			mV	MAX	
SGM8922A			0.9			mV	MAX	
Input Offset Voltage Drift		1.6				$\mu\text{V}/^\circ\text{C}$	TYP	
Open-Loop Gain (A_{OL})	$R_L = 600\Omega$, $V_{OUT} = 0.15V$ to $4.85V$	109				dB	MIN	
	$R_L = 10k\Omega$, $V_{OUT} = 0.05V$ to $4.95V$	104				dB	MIN	
INPUT CHARACTERISTICS								
Input Common Mode Voltage Range (V_{CM})	$V_S = 5V$	-0.1 to 3.8				V	TYP	
Common Mode Rejection Ratio (CMRR)	$V_S = 5.5V$, $V_{CM} = -0.1V$ to $3.8V$	108				dB	MIN	
OUTPUT CHARACTERISTICS								
Output Voltage Swing from Rails								
High Output Voltage Swing (V_{OH})	$I_{OUT} = 100\text{mA}$	4.73				V	TYP	
Low Output Voltage Swing (V_{OL})	$I_{OUT} = -100\text{mA}$	0.24				V	TYP	
Output Short Circuit Current			300			mA	MAX	
POWER SUPPLY								
Operating Voltage Range			3	3	3	V	MIN	
			5.5	5.5	5.5	V	MAX	
Quiescent Current (per Amplifier)	$I_{OUT} = 0\text{mA}$	3				mA	MAX	
Power Supply Rejection Ratio (PSRR)	$V_S = +2.5V$ to $+5.5V$, $V_{CM} = (-V_S)+0.5V$	80				dB	MIN	

Specifications subject to changes without notice.

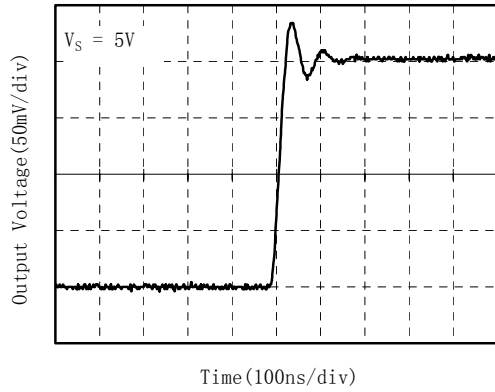
TYPICAL PERFORMANCE CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, $A_V = +1$, $C_L = 100\text{pF}$ and $R_L = 600\Omega$, unless otherwise noted.

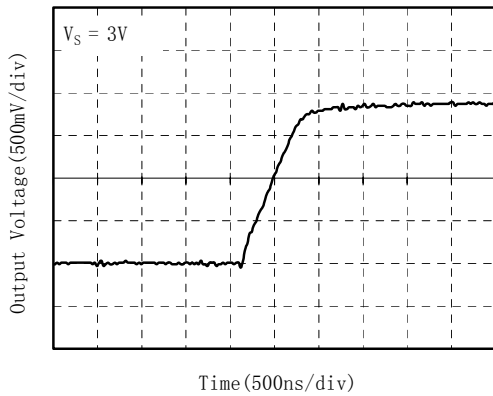
Small Signal Step Response



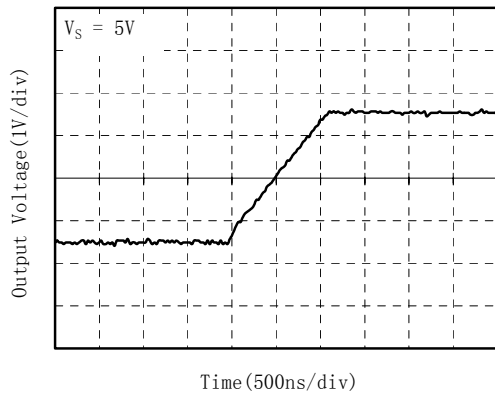
Small Signal Step Response



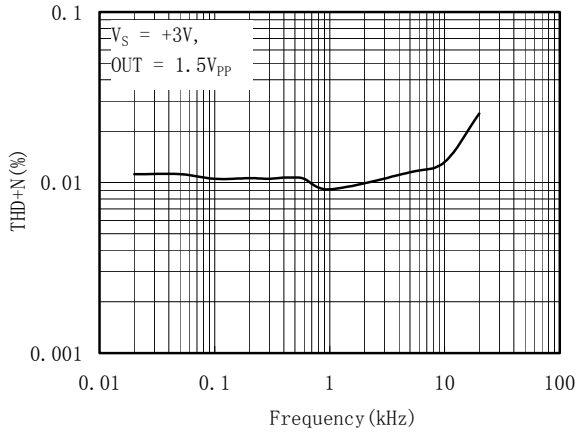
Large Signal Step Response



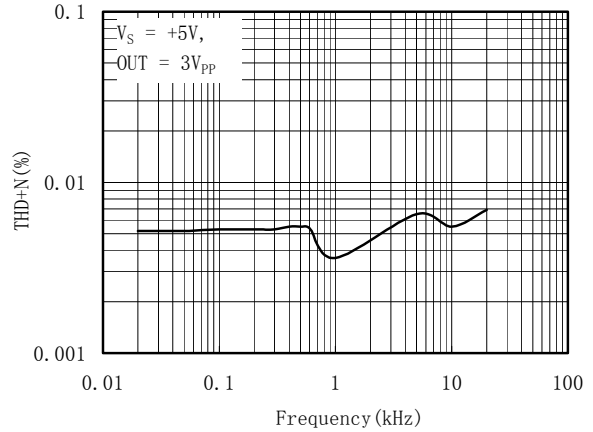
Large Signal Step Response



THD+N vs. Frequency

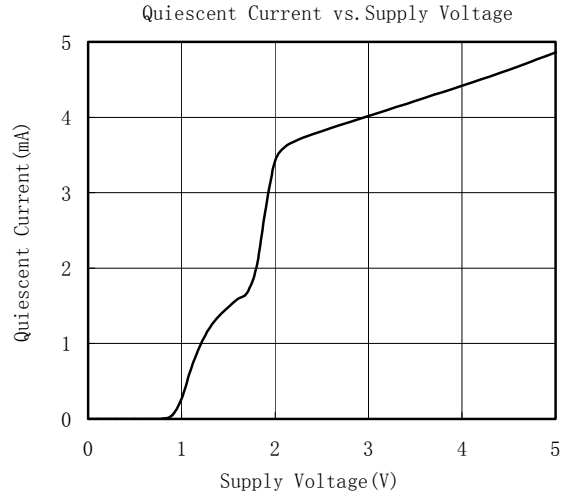
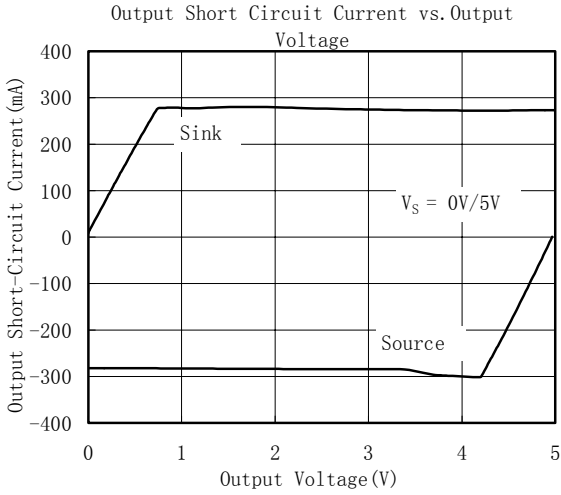


THD+N vs. Frequency



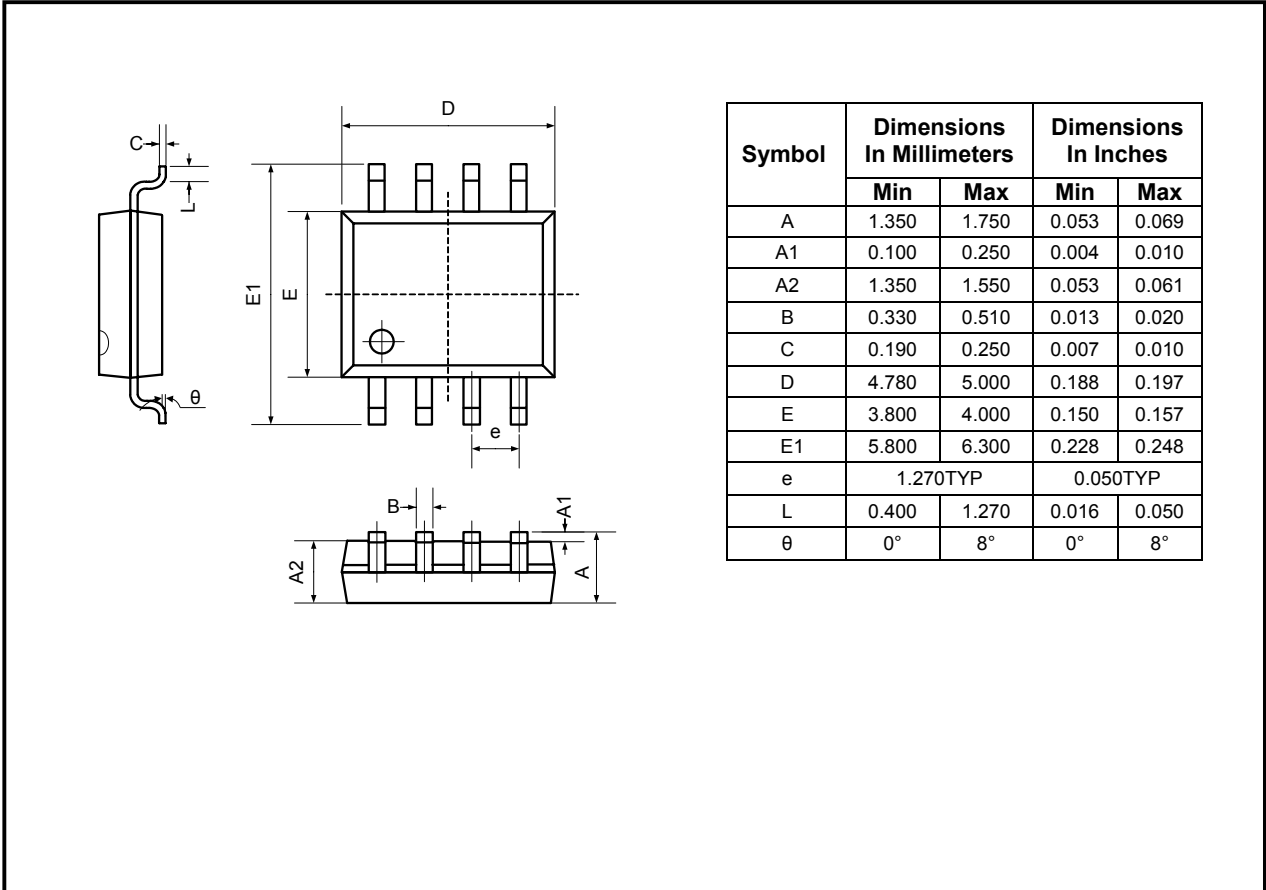
TYPICAL PERFORMANCE CHARACTERISTICS

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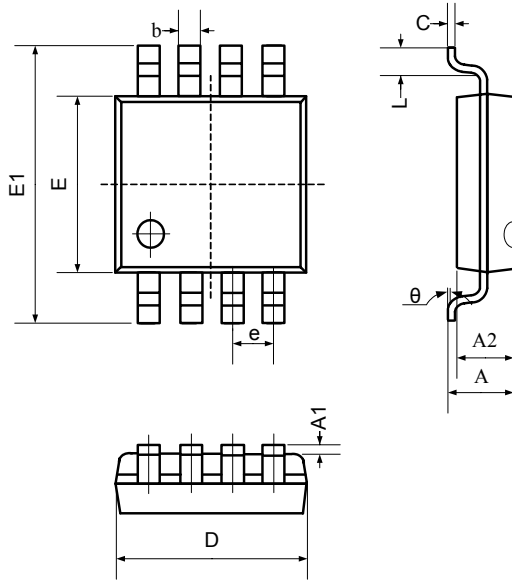
PACKAGE OUTLINE DIMENSIONS

SO-8



PACKAGE OUTLINE DIMENSIONS

MSOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.200	0.031	0.047
A1	0.000	0.200	0.000	0.008
A2	0.760	0.970	0.030	0.038
b	0.30 TYP		0.012 TYP	
c	0.15 TYP		0.006 TYP	
D	2.900	3.100	0.114	0.122
e	0.65 TYP		0.026 TYP	
E	2.900	3.100	0.114	0.122
E1	4.700	5.100	0.185	0.201
L	0.410	0.650	0.016	0.026
theta	0°	6°	0°	6°

REVISION HISTORY

Location

Page

03/2008—Preliminary Datasheet

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