SGM8924
9MHz, Dual Rail-to-Rail Output Operational Amplifier with Shutdown

PRODUCT DESCRIPTION

The SGM8924 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 SGM8924 has a wide input common-mode voltage range and output voltage swing, running at single supply voltage from 3V to 5.5V.

The SGM8924 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 SGM8924 is offered in Green MSOP10 package. It is specified over the extended -40℃ to +85℃ temperature range.

FEATURES

- **Rail-to-Rail Output**
- **Low Noise: 6nV/$\sqrt{Hz}$**
- **Low Distortion**
- **High Output Voltage Swing: 4.75V (with 150mA Output Current)**
- **Low Output Voltage Swing: 0.25V (with 150mA Output Current)**
- **Supply Voltage Range: 3V to 5.5V**
- **Thermal Shutdown Protection Circuitry**
- **Low Input Offset Voltage**
  0.9mV MAX (SGM8924A)
- **Gain Bandwidth Product: 9MHz**
- **Slew Rate: 6.2V/μs**
- **Low Power**
  5.5mA/Amplifier Typical Supply Current
- **Small Packaging:**
  Available in Green MSOP10 Package

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
SGM8924A	MSOP10	-40℃ to +85℃	SGM8924AYMS10G/TR	SGM8924YMS10	Tape and Reel, 3000
SGM8924	MSOP10	-40℃ to +85℃	SGM8924YMS10G/TR	SGM8924YMS10	Tape and Reel, 3000

ABSOLUTE MAXIMUM RATINGS

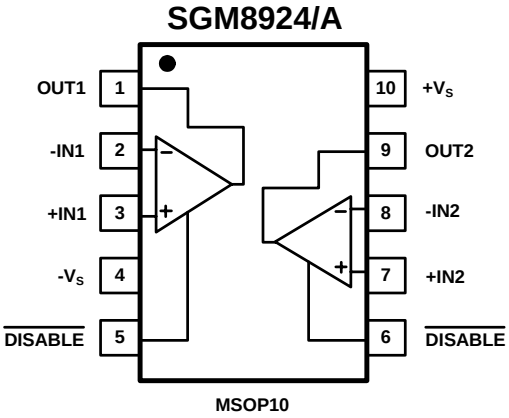
Supply Voltage, $+V_S$ to $-V_S$ 6V
Common-Mode Input Voltage..... -0.1V to 3.8V
Storage Temperature Range.....-65℃ to 150℃
Junction Temperature .....160℃
Operating Temperature Range..... -40℃ to 85℃
Lead Temperature Range (Soldering 10 sec)
.....260℃

NOTE:
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 if you don't pay attention to ESD protection. 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 very small parametric changes could cause the device not to meet its published specifications.

PIN CONFIGURATION (Top View)



ELECTRICAL CHARACTERISTICS: V_S = +5V

(At T_A = -40℃ to +85℃, R_L = 600Ω connected to V_S/2, unless otherwise noted)

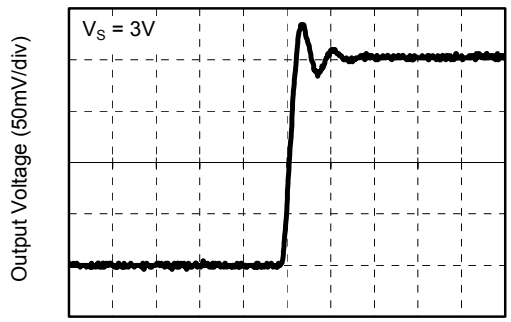
PARAMETER	CONDITIONS	SGM8924				
		TYP	MIN/MAX OVER TEMPERATURE			
		+25℃	+25℃	-40℃ to +85℃	UNITS	MIN /MAX
DYNAMIC PERFORMANCE						
Gain-Bandwidth Product (GBP)	R_L = 600Ω	9			MHz	TYP
Slew Rate	2Vpp Step, A_V = 1	6.2			V/μs	TYP
Crosstalk	f = 1kHz	-120			dB	TYP
NOISE/DISTORTION PERFORMANCE						
Total Harmonic Distortion + Noise (THD)	V_{OUT} = 2Vpp, f = 1kHz,					
	A_V = 1, R_L=600Ω	0.003			%	TYP
Input Voltage Noise (e_n)	f = 1kHz	6			nV/$\sqrt{Hz}$	TYP
Gain Margin	R_L = 600Ω, C_L = 100pF	18.5			dB	TYP
Phase Margin	R_L = 600Ω, C_L = 100pF	60			degree	TYP
DC PERFORMANCE						
Input Offset Voltage (V_{OS})						
SGM8924			3	4.2	mV	MAX
SGM8924A			0.9		mV	MAX
Input Offset Voltage Drift		1.6			μV/℃	TYP
Open-Loop Gain (A_{OL})	R_L = 600Ω, V_{OUT} = 0.15V to 4.85V	109	91	85	dB	MIN
	R_L = 10kΩ, V_{OUT} = 0.05V to 4.95V	104	89	80	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	60	56	dB	MIN
OUTPUT CHARACTERISTICS						
Output Voltage Swing from Rails						
High Output Voltage Swing (V_{OH})	I_{OUT} = 150mA	4.75			V	TYP
Low Output Voltage Swing (V_{OL})	I_{OUT} = -150mA	0.25			V	TYP
Output Short Circuit Current			300		mA	MAX
POWER-DOWN DISABLE						
$\overline{\text{DISABLE}}$ High			2.2		V	MIN
$\overline{\text{DISABLE}}$ Low			0.8		V	MAX
POWER SUPPLY						
Operating Voltage Range			3	3	V	MIN
			5.5	5.5	V	MAX
Quiescent Current (per Amplifier)	I_{OUT} = 0mA	5.5			mA	TYP
Shutdown Supply Current		4			μA	TYP
Power Supply Rejection Ratio (PSRR)	V_S = +2.5V to + 5.5V,					
	V_{CM} = (-V_S) + 0.5V	80	60	56	dB	MIN

Specifications subject to changes without notice.

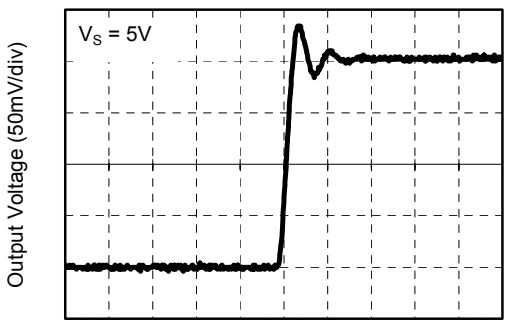
TYPICAL PERFORMANCE CHARACTERISTICS

At T_A= +25℃, A_V = +1, C_L = 100pF and R_L= 600Ω, unless otherwise noted.

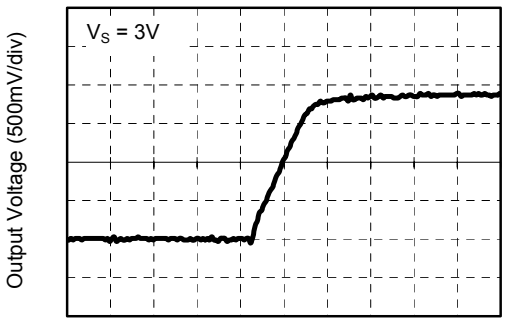
Small Signal Step Response



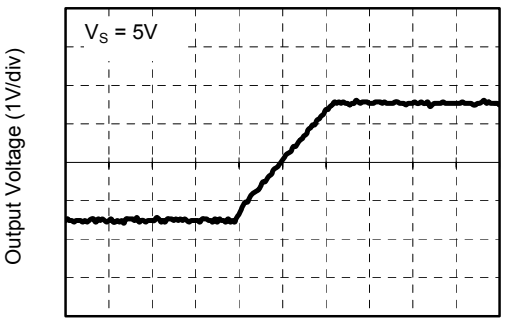
Small Signal Step Response



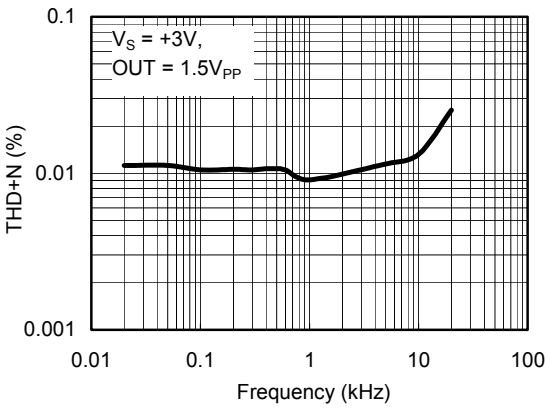
Large Signal Step Response



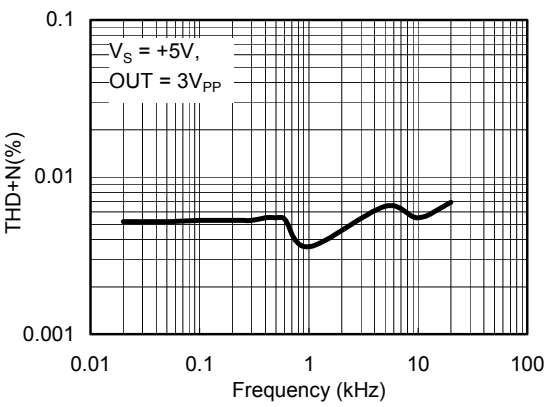
Large Signal Step Response



THD+N vs. Frequency

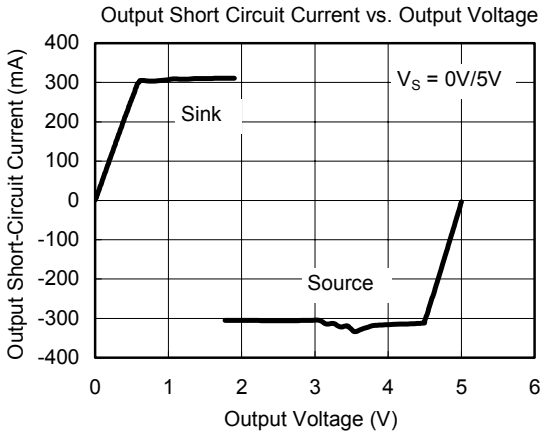


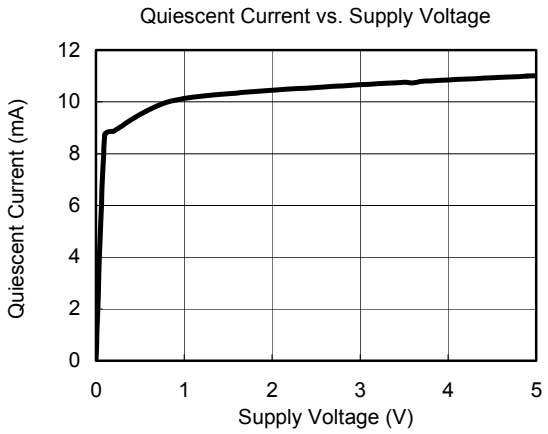
THD+N vs. Frequency



TYPICAL PERFORMANCE CHARACTERISTICS

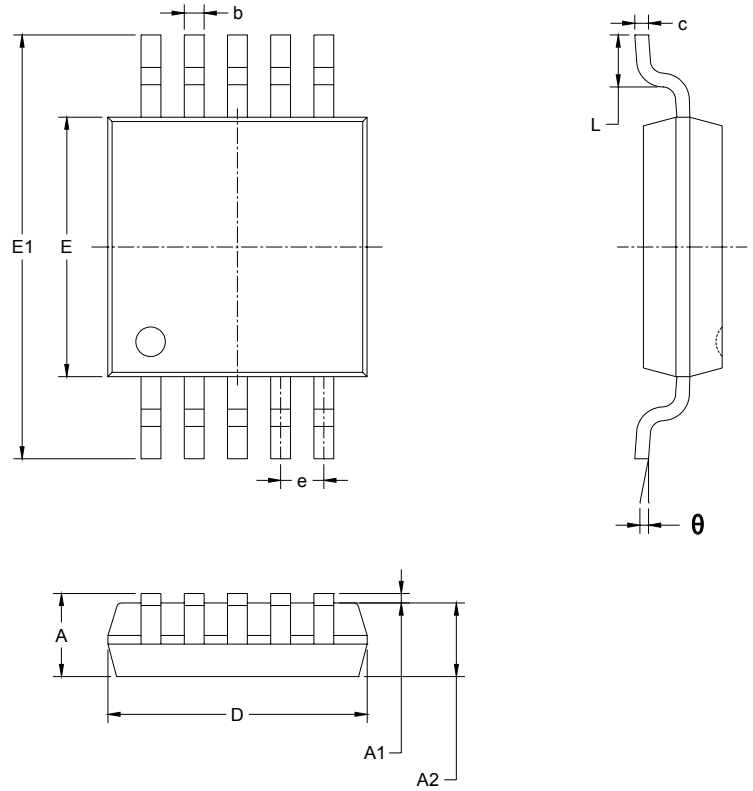
At T_A= +25℃, A_V = +1, C_L = 100pF and R_L= 600Ω, unless otherwise noted.





PACKAGE OUTLINE DIMENSIONS

MSOP10



Symbol	Dimensions In Millimeters		Dimensions 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	0.180	0.280	0.007	0.011
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	0.500 BSC		0.020 BSC	
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

SGMICRO is dedicated to provide high quality and high performance analog IC products to customers. All SGMICRO products meet the highest industry standards with strict and comprehensive test and quality control systems to achieve world-class consistency and reliability.

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