SGM4895
1.3W Fully Differential Audio Power Amplifier

GENERAL DESCRIPTION

The SGM4895 is a fully differential audio power amplifier that is designed for portable communication device applications and demanding applications in mobile phones. It is capable of delivering 1.3W of continuous average power to an 8Ω load with less than 1% distortion (THD+N) from a 5V battery voltage. It operates from 2.5V to 5.5V power supply.

The SGM4895 features a low-power consumption shutdown mode. To facilitate this, Shutdown may be enabled by logic low. Additionally, the SGM4895 features an internal thermal shutdown protection mechanism.

The SGM4895 contains advanced pop & click circuitry, a minimal count of external components and low-power shutdown mode. All these features make SGM4895 ideal for wireless handsets and other low voltage applications where minimal power consumption is a primary requirement.

The SGM4895 is available in Pb-Free DFN3×3-8L, MSOP8 and MSOP8/PP packages. It operates over an ambient temperature range of -40℃ to +85℃.

FEATURES

- **Fully Differential Amplifier**
- **Excellent PSRR: Direct Connection to the Battery**
- **1.3W to 8Ω Load from 5V Supply at THD+N = 1% (TYP)**
- **1.6W to 4Ω Load from 5V Supply at THD+N = 1% (TYP) SGM4895YDB8 only**
- **2.5V to 5.5V Operation**
- **Low Shutdown Current**
- **Improved Pop & Click Circuitry**
- **Support Single- Ended or Differential input**
- **Thermal Overload Protection Circuitry**
- **No Output Coupling Capacitors, Bootstrap Capacitors Required**
- **External Gain Configuration Capability**
- **-40℃ to +85℃ Operating Temperature Range**
- **Pb-Free DFN3×3-8L, MSOP8 and MSOP8/PP Packages**

APPLICATIONS

Portable Systems
Wireless Handsets
Mobile Phone
Handheld Computers
PDAs
GPS

PACKAGE/ORDERING INFORMATION

ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION	MARKING INFORMATION
SGM4895YDB8/TR	DFN3×3-8L	Tape and Reel, 3000	SGM4895DB
SGM4895YMS8/TR	MSOP8	Tape and Reel, 3000	SGM4895YMS8
SGM4895YPMS8/TR	MSOP8/PP	Tape and Reel, 3000	SGM4895YPMS8

ABSOLUTE MAXIMUM RATINGS

Supply Voltage……6V
Input Voltage ..…… –0.3V to (V_+) + 0.3V
Storage Temperature Range ……..…… –65℃ to +150℃
Junction Temperature……..150℃
Operating Temperature Range……..–40℃ to +85℃
Lead Temperature Range (Soldering 10 sec)
…….260℃
ESD Susceptibility
HBM……..……2000V
MM……400V

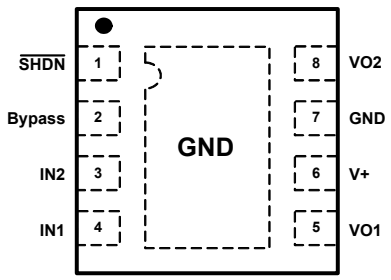
Note: Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure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

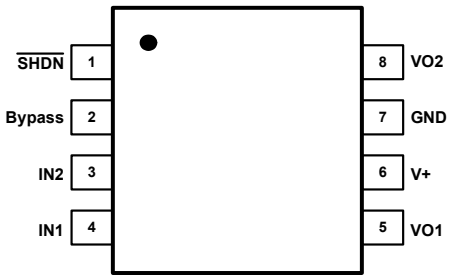
PIN CONFIGURATIONS (Top View)

SGM4895YDB8



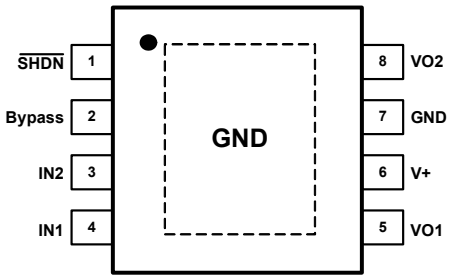
DFN3×3-8L

SGM4895YMS8



MSOP8

SGM4895YPMS8



MSOP8/PP

TYPICAL APPLICATION

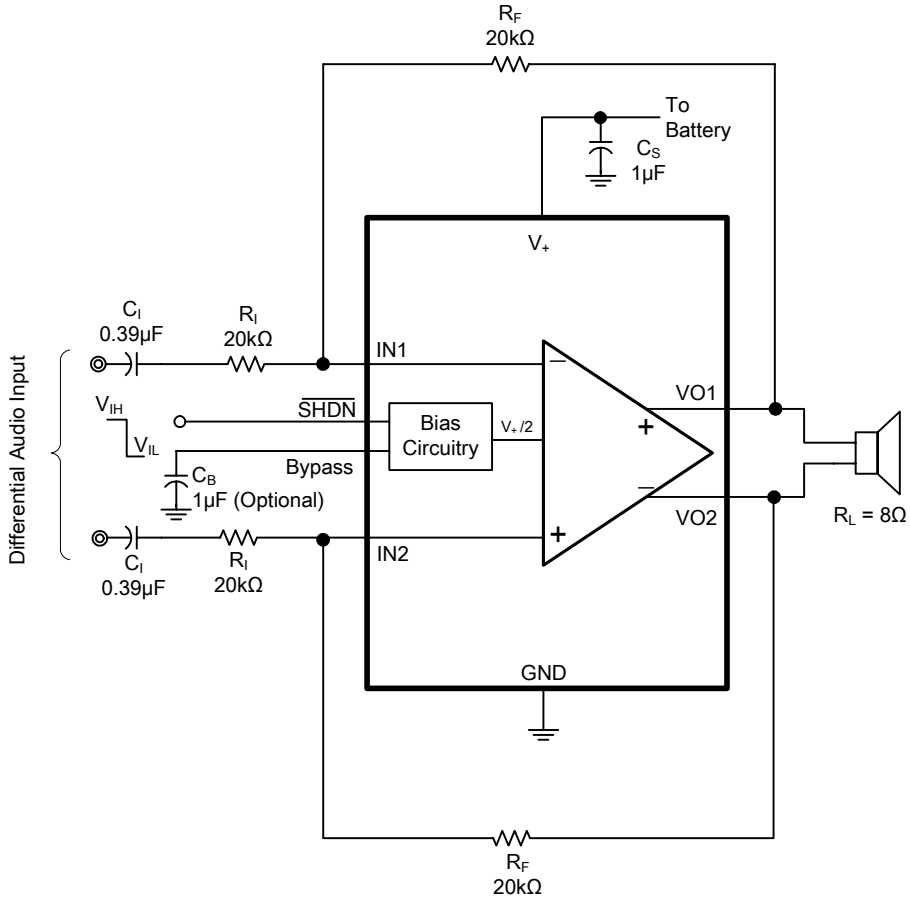


Figure1. Typical Differential Input Application Schematic

APPLICATION CIRCUIT(Cont.)

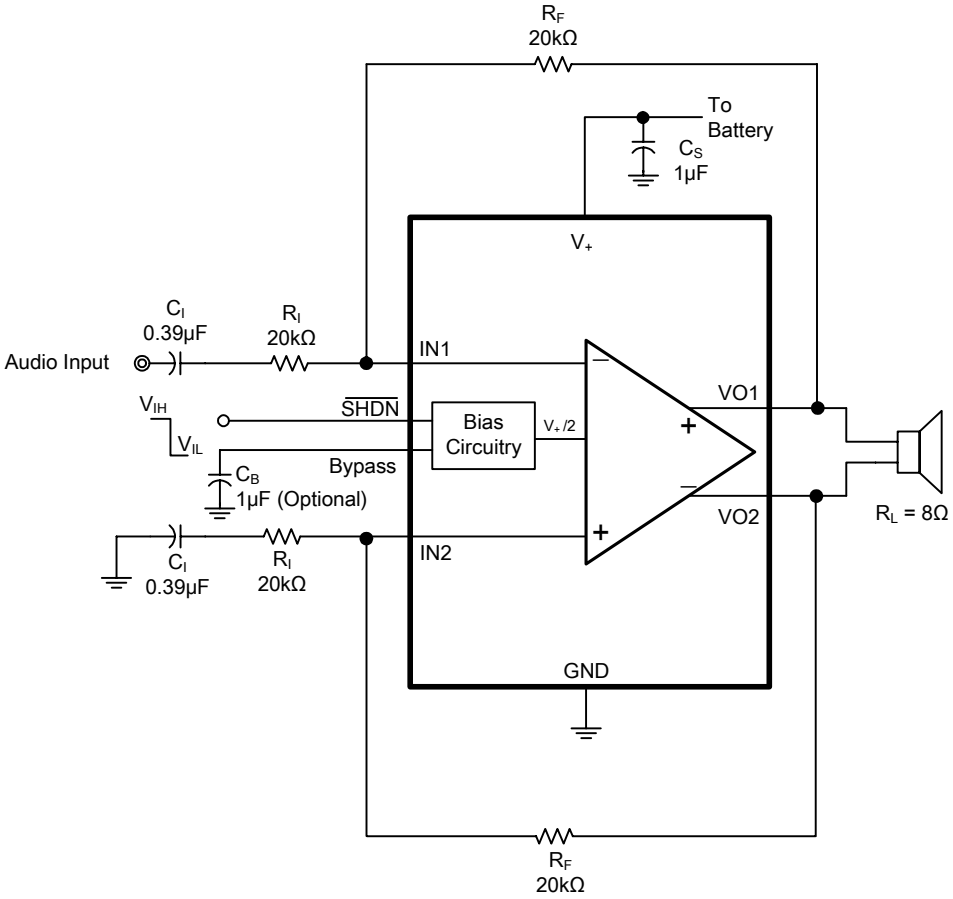


Figure2. Single- Ended Input Application Schematic

ELECTRICAL CHARACTERISTICS

(The following AC specifications apply for 8Ω load, A_V = 1V/V, T_A = 25℃, unless otherwise specified.)

PARAMETER	SYMBOL	CONDITIONS		SGM4895			UNITS
				MIN	TYP	MAX	
Supply Voltage	V_+			2.5		5.5	V
Shutdown Current	I_{SD}	V_{IN} = 0V, V_{SHDN} = GND			0.01	1	μA
Output Offset Voltage	V_{OS}	V_{IN} = 0V, V_{SHDN} = V_+ = 5.0V		-10	2.5	10	mV
		V_{IN} = 0V, V_{SHDN} = V_+ = 3.3V		-10	2.0	10	
		V_{IN} = 0V, V_{SHDN} = V_+ = 2.6V			2.0		
Quiescent Power Supply Current	I_Q	V_{IN} = 0V, I_O = 0A, V_{SHDN} = V_+	V_+ = 5.0V, No Load		4.70	7.50	mA
			V_+ = 5.0V, 8 Ω Load		4.75	8.00	
			V_+ = 3.3V, No Load		3.87	5.80	
			V_+ = 3.3V, 8 Ω Load		3.90	6.00	
			V_+ = 2.6V, No Load		3.20		
			V_+ = 2.6V, 8 Ω Load		3.22		
Shutdown Voltage Input High	V_{SDIH}			1.2			V
Shutdown Voltage Input Low	V_{SDIL}					0.4	
Output Power (8Ω)	P_O	f = 1kHz THD+N = 1%	V_+ = 5.0V		1.30		W
			V_+ = 3.6V		0.65		
			V_+ = 3.0V		0.45		
			V_+ = 2.6V		0.34		
		f = 1kHz THD+N = 10%	V_+ = 5.0V		1.60		
			V_+ = 3.6V		0.82		
			V_+ = 3.0V		0.55		
			V_+ = 2.6V		0.42		
Output Power (4Ω)	P_O	f = 1kHz THD+N = 1% SGM4895YDB8 only	V_+ = 5.0V		1.60		W
			V_+ = 3.6V		1.00		
			V_+ = 3.0V		0.65		
			V_+ = 2.6V		0.50		
		f = 1kHz THD+N = 10% SGM4895YDB8 only	V_+ = 5.0V		2.20		
			V_+ = 3.6V		1.25		
			V_+ = 3.0V		0.85		
			V_+ = 2.6V		0.60		
Total Harmonic Distortion + Noise	THD+N	P_O = 0.6Wrms, f = 1kHz, V_+ = 5.0V			0.015		%
Power Supply Rejection Ratio	PSRR	f = 217Hz (Note 1, 2)	V_+ = 5.0V		-83		dB
			V_+ = 3.6V		-80		
			V_+ = 3.0V		-73		
			V_+ = 2.6V		-65		
		f = 1kHz (Note 1, 2)	V_+ = 5.0V		-83		
			V_+ = 3.6V		-80		
			V_+ = 3.0V		-73		
			V_+ = 2.6V		-65		
Common Mode Rejection Ratio	CMRR	f = 217Hz, V_{CM} = 200mV_{PP}, V_+ = 5.0V (Note 2)			-76		dB
Wake–Up Time	T_{WU}	C_B = 1μF	V_+ = 5.0V		50		ms
			V_+ = 3.6V		42		
			V_+ = 3.0V		37		
			V_+ = 2.6V		32		

Specifications subject to changes without notice.

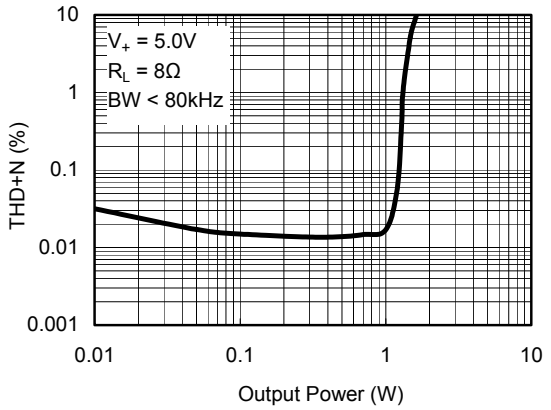
Note 1: 10Ω terminated input.

Note 2: PSRR and CMRR are affected by the matching between external gain-setting resistor ratios.

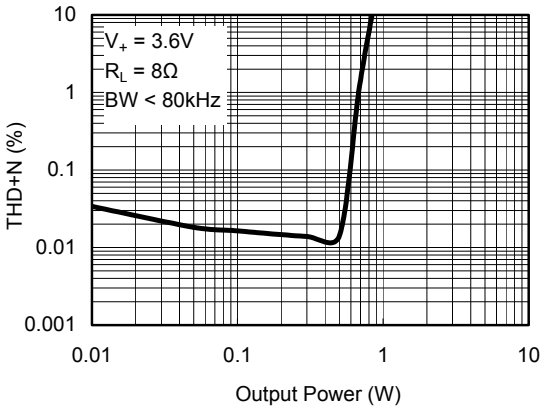
TYPICAL PERFORMANCE CHARACTERISTICS

At T_A= +25℃, A_V = 1, f = 1kHz, C_B = 1μF, unless otherwise noted.

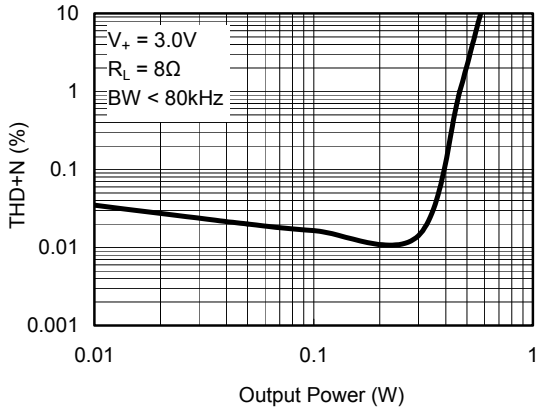
THD+N vs. Output Power



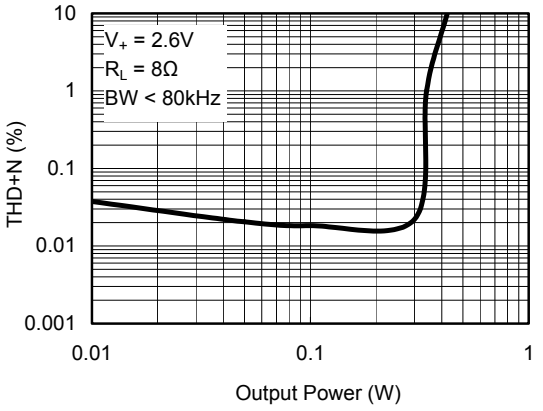
THD+N vs. Output Power



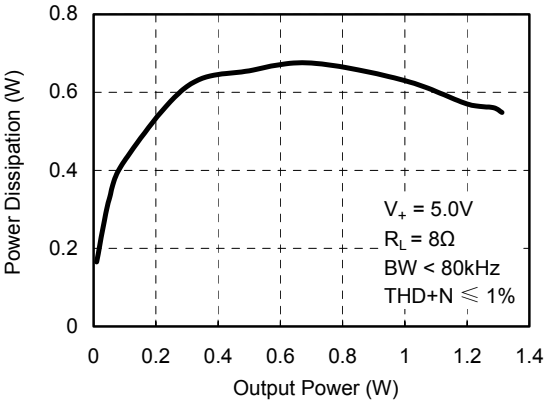
THD+N vs. Output Power



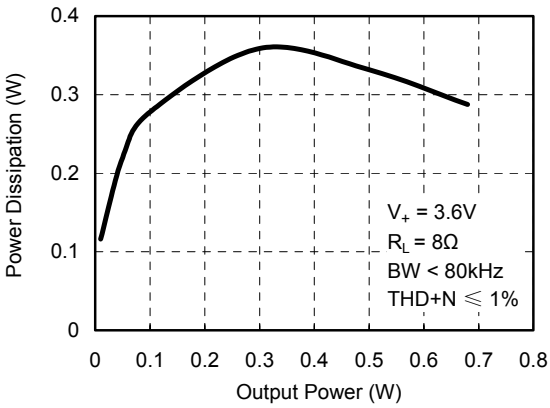
THD+N vs. Output Power



Power Dissipation vs. Output Power



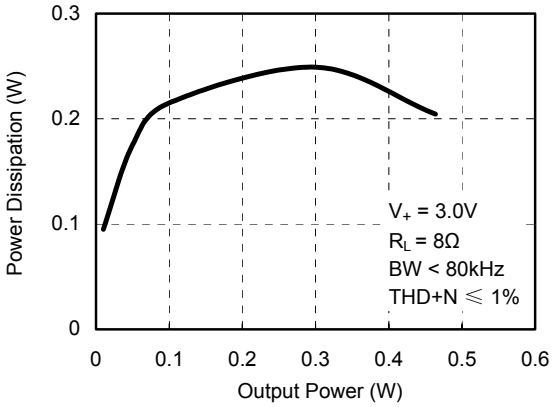
Power Dissipation vs. Output Power



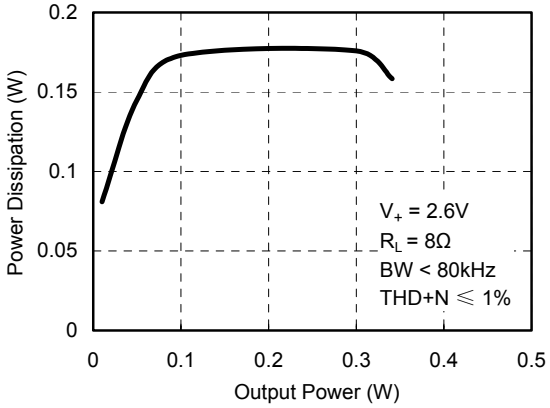
TYPICAL PERFORMANCE CHARACTERISTICS

At T_A= +25℃, A_V = 1, f = 1kHz, C_B = 1μF, unless otherwise noted.

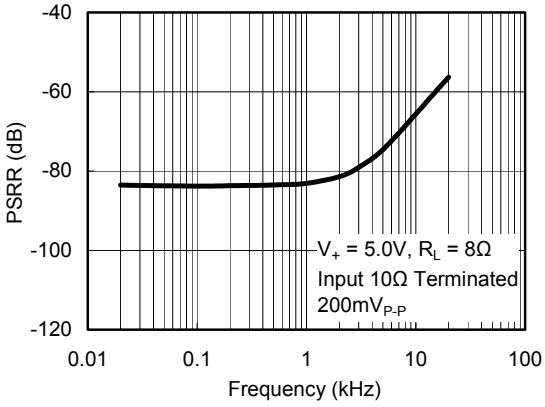
Power Dissipation vs. Output Power



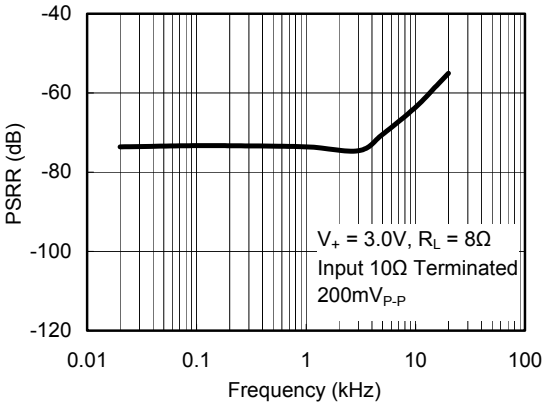
Power Dissipation vs. Output Power



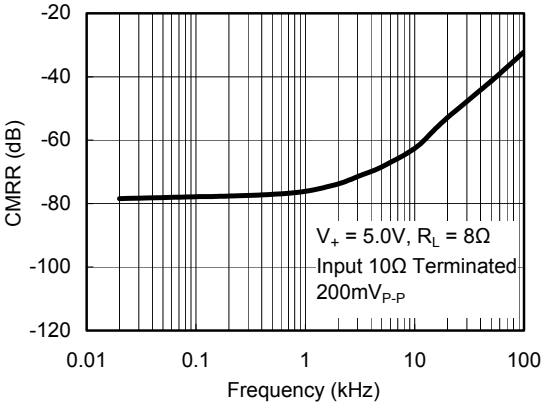
Power-Supply Rejection Ratio vs. Frequency



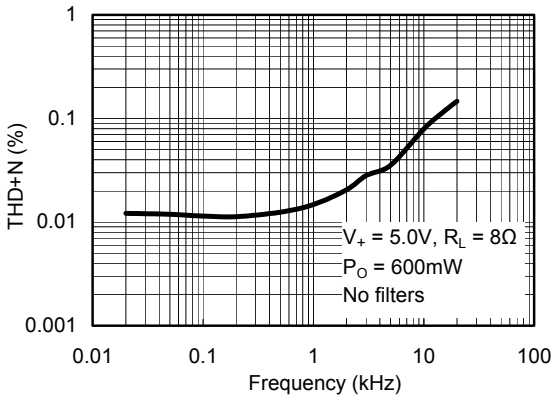
Power-Supply Rejection Ratio vs. Frequency



Common Mode Rejection Ratio vs. Frequency



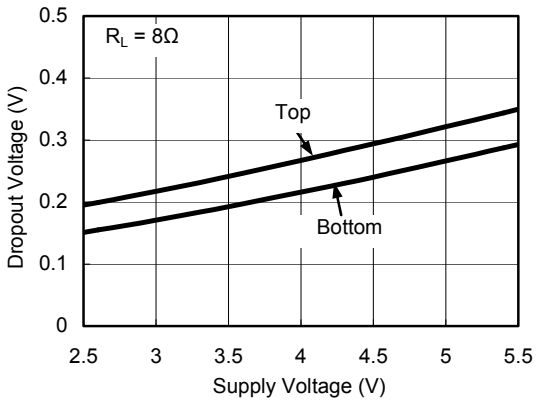
THD+N vs. Frequency



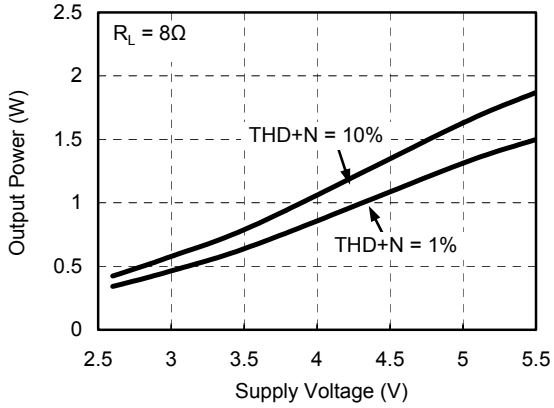
TYPICAL PERFORMANCE CHARACTERISTICS

At T_A= +25℃, A_V = 1, f = 1kHz, C_B = 1μF, unless otherwise noted.

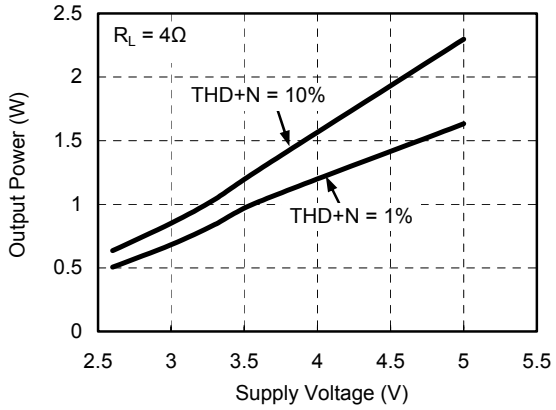
Clipping(Dropout) Voltage vs. Supply Voltage



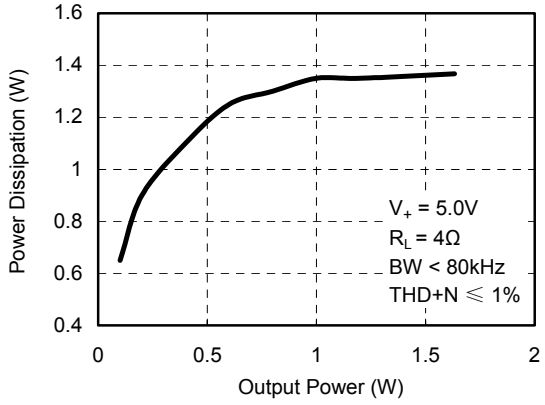
Output Power vs. Supply Voltage



Output Power vs. Supply Voltage



Power Dissipation vs. Output Power



APPLICATION NOTES

PCB Design Recommendations (Thermal Design Considerations)

SGM4895YDB8 is capable of delivering 1.6W of continuous average power to an 4Ω load at 5V voltage when provide a thermal design considerations

Thermal Land

The DFN3×3-8L thermal land is a metal (normally copper) region centrally located under the package and on top of the PCB. It has a rectangular or square shape and should match the dimensions of the exposed pad on the bottom of the package (1:1 ratio).

For certain high power applications, the PCB land may be modified to a "dog bone" shape that enhances thermal performance. The packages used with the "dog bone" lands will be a dual inline configuration. (See Figure 1).

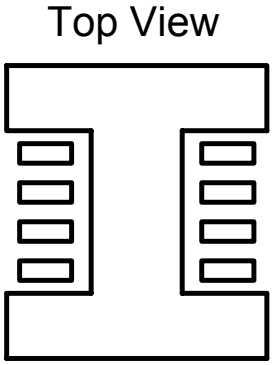


Figure1. Dog Bone

Thermal Vias

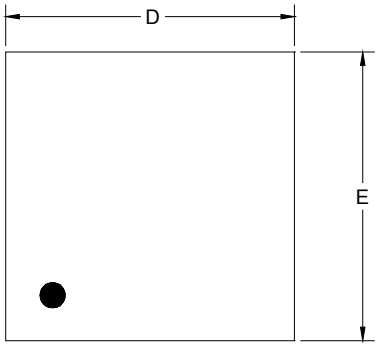
Thermal vias are necessary. They conduct heat from the exposed pad of the package to the ground plane. The number of vias is application specific and is dependent upon electrical requirements and power dissipation.

The via diameter should be 0.2 mm to 0.33 mm with 1oz. copper via barrel plating. It is important to plug the via to avoid any solder wicking inside the via during the soldering process. The thermal vias can be tented with solder mask on the top surface of the PCB. The solder mask diameter should be at least 75 microns (or 3 mils) larger than the via diameter. The solder mask thickness should be the same across the entire PCB.

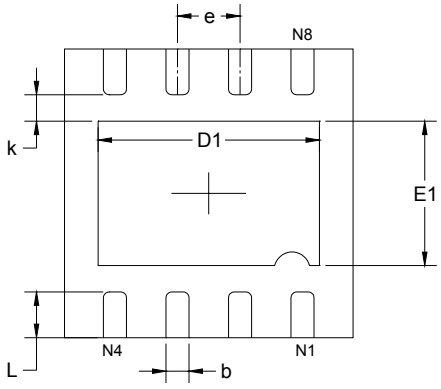
A package thermal performance may be improved by increasing the number of vias.

PACKAGE OUTLINE DIMENSIONS

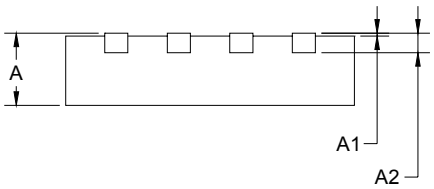
DFN3×3-8L



TOP VIEW



BOTTOM VIEW

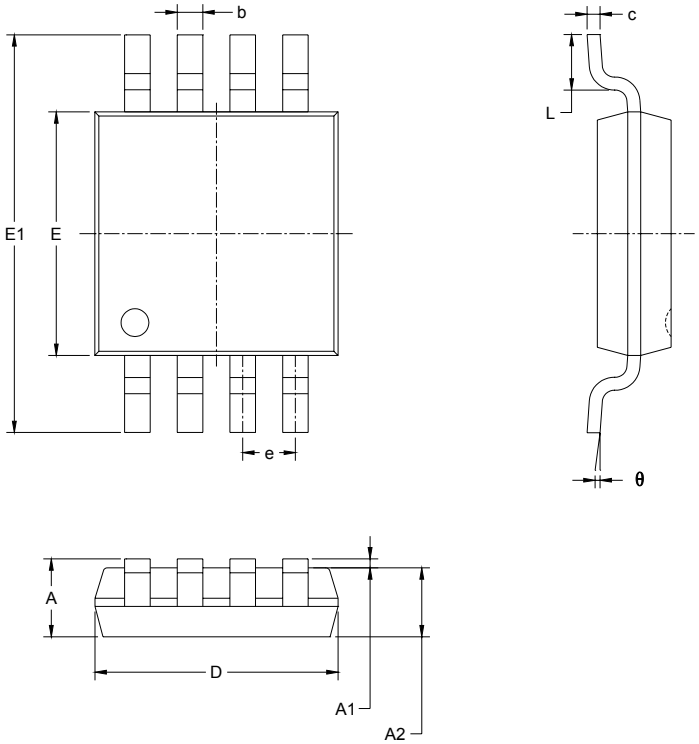


SIDE VIEW

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	2.900	3.100	0.114	0.122
D1	2.200	2.400	0.087	0.094
E	2.900	3.100	0.114	0.122
E1	1.400	1.600	0.055	0.063
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.650 TYP		0.026 TYP	
L	0.375	0.575	0.015	0.023

PACKAGE OUTLINE DIMENSIONS

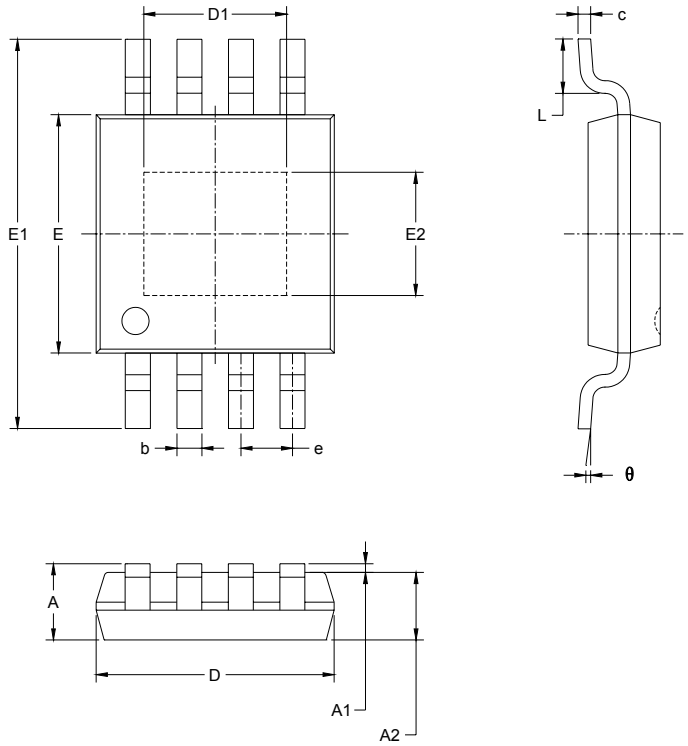
MSOP8



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	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
e	0.650 BSC		0.026 BSC	
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

PACKAGE OUTLINE DIMENSIONS

MSOP8/PP



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	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
D1	1.700	1.900	0.067	0.075
e	0.65 BSC		0.026 BSC	
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
E2	1.450	1.650	0.057	0.065
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

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