# SGM4871
# 2.4W Audio Power Amplifier with Shutdown Mode

## GENERAL DESCRIPTION

The SGM4871 is a mono bridged audio power amplifier that is designed for portable communication device applications and demanding applications in mobile phones. SGM4871YPS8 is capable of delivering 2.4W of continuous average power to a 4Ω load with less than 10% distortion (THD) from a 5V battery voltage. It operates from 2.5V to 5.5V power supply.

The SGM4871's micro-power shutdown mode ($I_{SD}$ = 0.07μA TYP) is activated when $V_+$ is applied to the SHDN pin. Since the SGM4871 does not require output coupling capacitors, bootstrap capacitors, or snubber networks, it is ideally suited for low-power portable systems that require minimum volume and weight.

The SGM4871 is unity-gain stable and can be configured by external gain-setting resistors. Additionally, the SGM4871 features an internal thermal shutdown protection mechanism.

The SGM4871 is available in Green SOIC-8 and SOIC-8 (Exposed Pad) packages. It operates over an ambient temperature range of -40℃ to +85℃.

## FEATURES

- **PO at 10% THD+N, 1kHz**
  **SGM4871YPS8: 2.4W (TYP) to 4Ω Load**
  **All other SGM4871 Packages: 1.5W (TYP) to 8Ω Load**
- **Unity Gain Stable**
- **2.5V to 5.5V Operation**
- **Shutdown Current: 0.07μA (TYP)**
- **Thermal Overload Protection Circuitry**
- **No Output Coupling Capacitors, Bootstrap Capacitors or Snubber Networks Required**
- **External Gain Configuration Capability**
- **-40℃ to +85℃ Operating Temperature Range**
- **Small SOIC-8 and SOIC-8 (Exposed Pad) Packages**

## APPLICATIONS

Portable System
Wireless Handset
Mobile Phone
PDAs

## PACKAGE/ORDERING INFORMATION

| MODEL | ORDER NUMBER | PACKAGE DESCRIPTION | PACKAGE OPTION | MARKING INFORMATION |
|---|---|---|---|---|
| SGM4871 | SGM4871YPS8/TR | SOIC-8 (Exposed Pad) | Tape and Reel, 2500 | SGM4871YPS8 |
| | SGM4871YS8/TR | SOIC-8 | Tape and Reel, 2500 | SGM4871YS8 |

## ABSOLUTE MAXIMUM RATINGS

Supply Voltage ……5.5V
Input Voltage…… -0.1V to ($V_+$) + 0.1V
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……200V

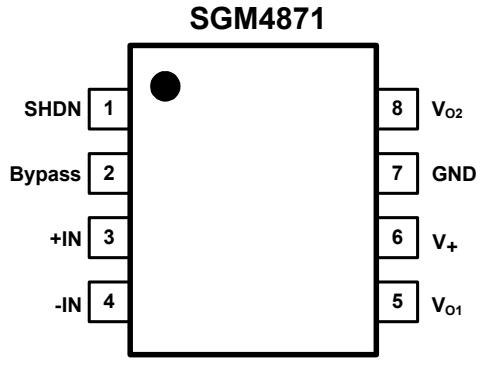
NOTE
Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to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

SGMICRO reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact SGMICRO sales office to get the last datasheet.

## PIN CONFIGURATIONS (Top View)



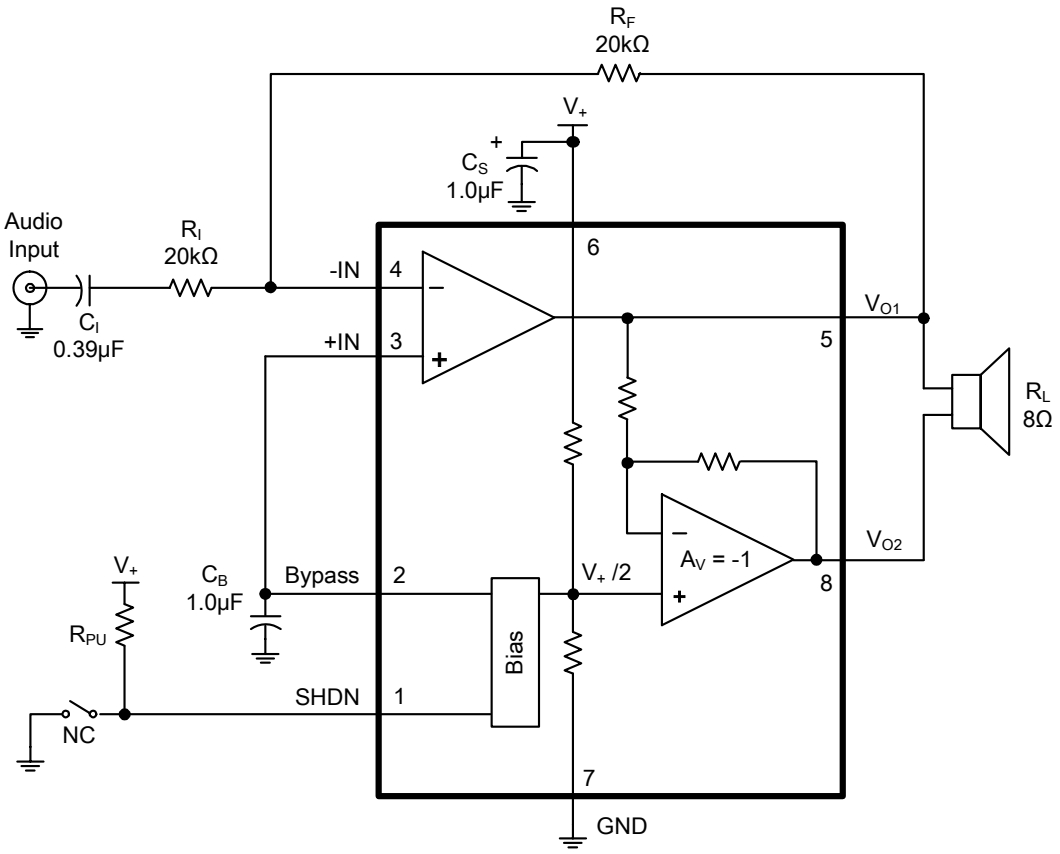

SOIC-8 / SOIC-8 (Exposed Pad)

## ELECTRICAL CHARACTERISTICS

The following specifications apply for $T_A$ = +25℃, $V_+$ = 5V and $R_L$ = 8Ω, unless otherwise specified.

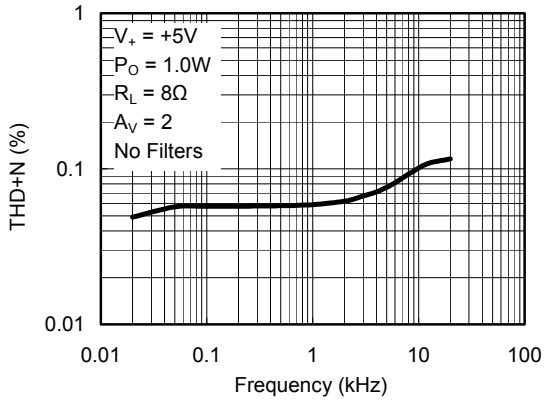
| PARAMETER | SYMBOL | CONDITIONS | | SGM4871 | | | UNITS |
|---|---|---|---|---|---|---|---|
| | | | | MIN | TYP | MAX | |
| Supply Voltage | $V_+$ | | | 2.5 | | 5.5 | V |
| Output Offset Voltage | $V_{OS}$ | | | | 5.5 | 65 | mV |
| Quiescent Power Supply Current | $I_Q$ | $V_{SHDN}$ = GND | No Load | | 5.2 | 9 | mA |
| | | | $R_L$ = 8Ω | | 5.3 | | |
| Shutdown Current | $I_{SD}$ | $V_+$ = 5.0V, $V_{SHDN}$ = 5.0V, $I_O$ = 0mA | | | 0.07 | 2 | μA |
| Shutdown Voltage Input High | $V_{SDIH}$ | | | 1.2 | | | V |
| Shutdown Voltage Input Low | $V_{SDIL}$ | | | | | 0.4 | |
| Output Power (4Ω) | $P_O$ | f = 1kHz, THD+N = 1% | | | 1.9 | | W |
| | | f = 1kHz, THD+N = 10% | | | 2.4 | | W |
| Output Power (8Ω) | $P_O$ | f = 1kHz, THD+N = 1% | | | 1.2 | | W |
| | | f = 1kHz, THD+N = 10% | | | 1.5 | | W |
| Total Harmonic Distortion + Noise | THD+N | 20Hz < f < 20kHz, $R_L$ = 8 Ω, $P_O$ = 1W | | | 0.2 | | % |
| Power Supply Rejection Ratio | PSRR | $V_{SHDN}$ = GND, $V_+$ = 4.9V to 5.1V | | | 70 | | dB |

## TYPICAL APPLICATION

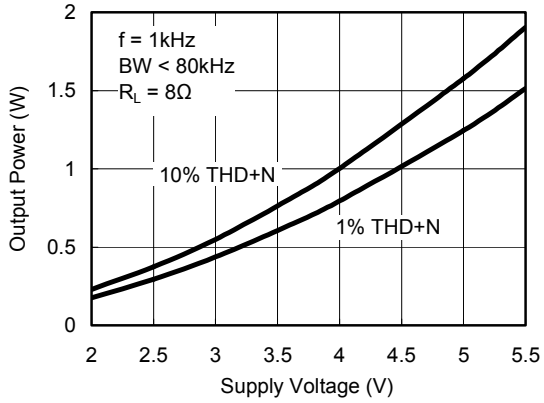


## TYPICAL PERFORMANCE CHARACTERISTICS (SGM4871YS8)

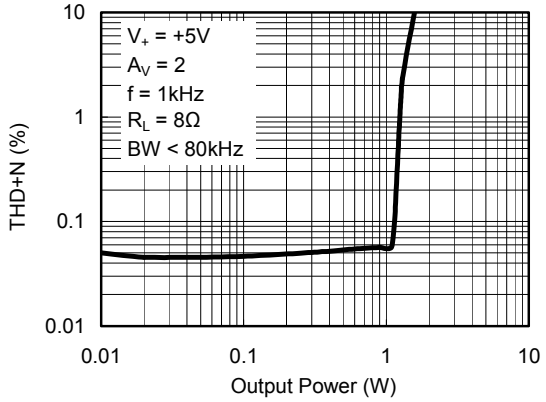
THD+N vs. Frequency



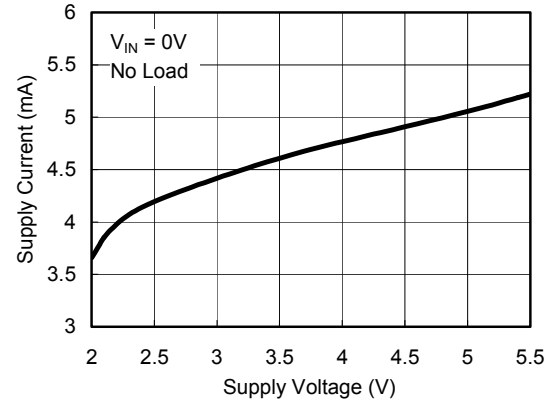

Output Power vs. Supply Voltage



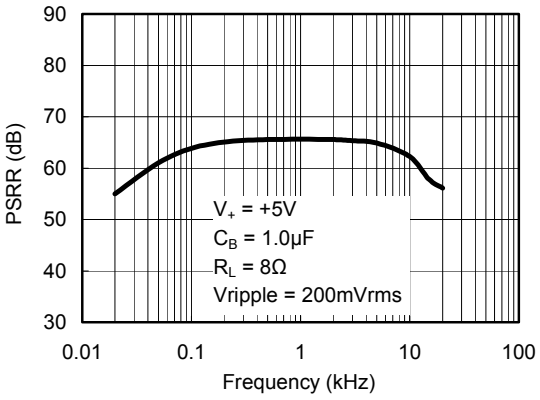

THD+N vs. Output Power



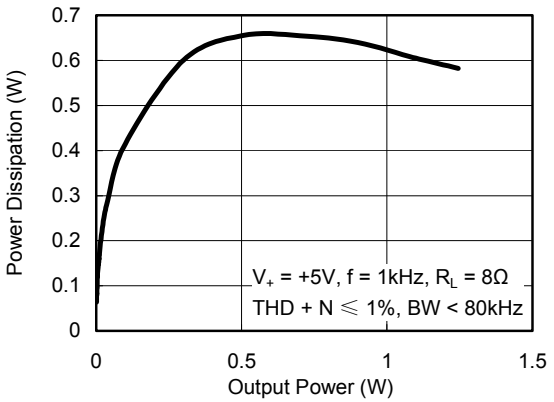

Supply Current vs. Supply Voltage




PSRR vs. Frequency

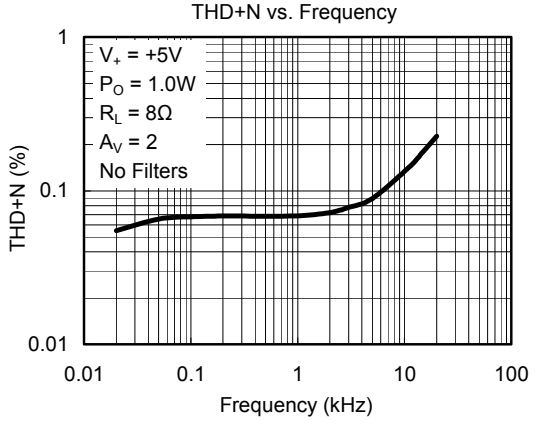



Power Dissipation vs. Output Power

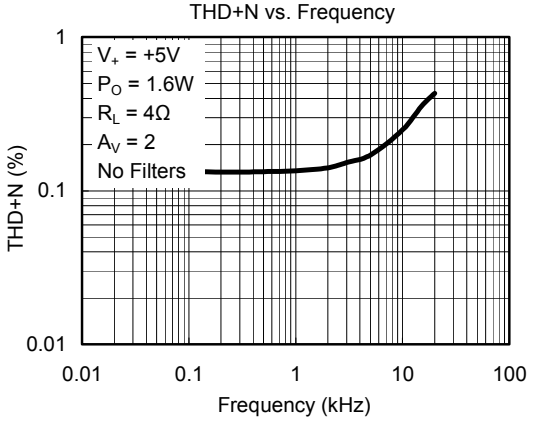


## TYPICAL PERFORMANCE CHARACTERISTICS (SGM4871YPS8)

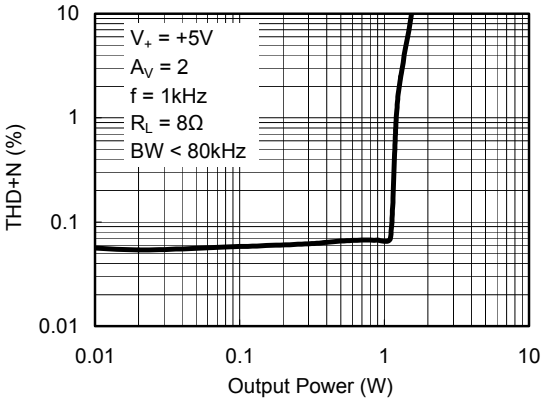
THD+N vs. Frequency



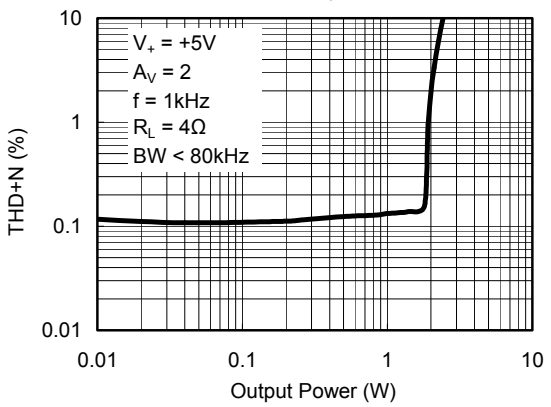

THD+N vs. Frequency



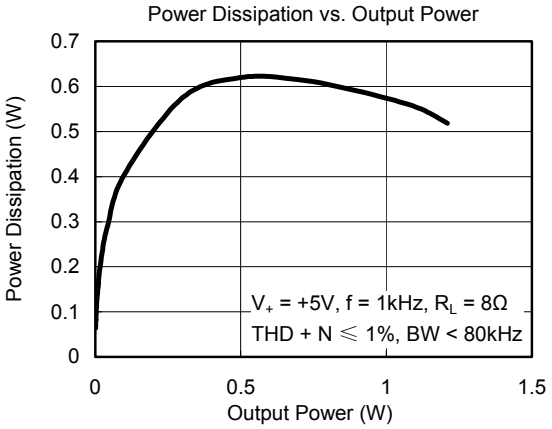

THD+N vs. Output Power



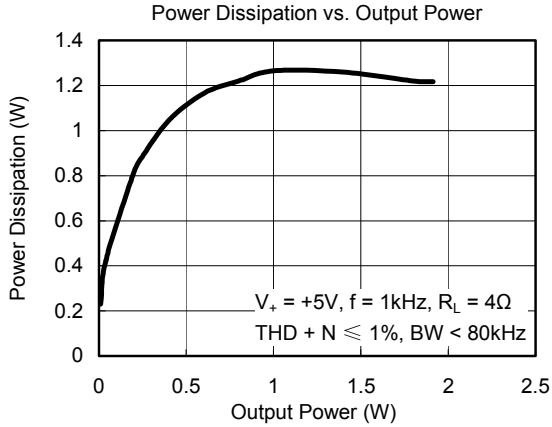

THD+N vs. Output Power




Power Dissipation vs. Output Power

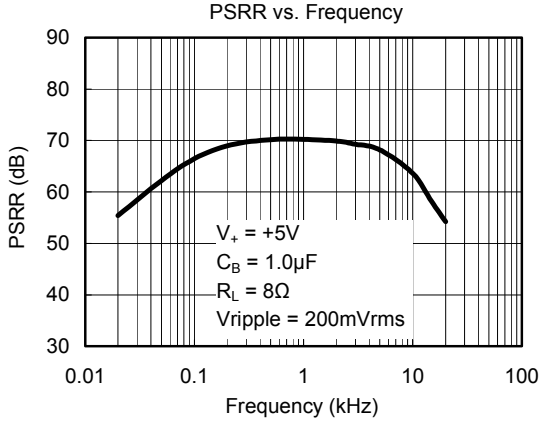



Power Dissipation vs. Output Power

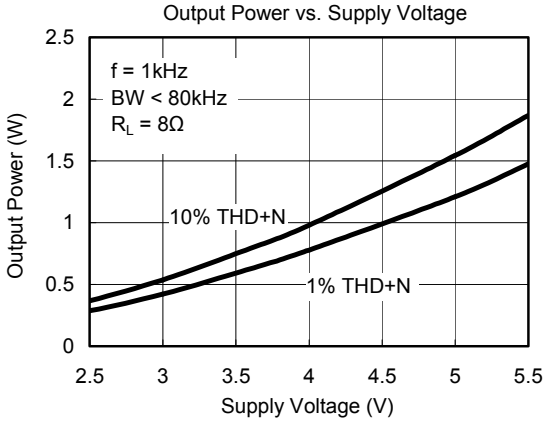


## TYPICAL PERFORMANCE CHARACTERISTICS (SGM4871YPS8) Cont.

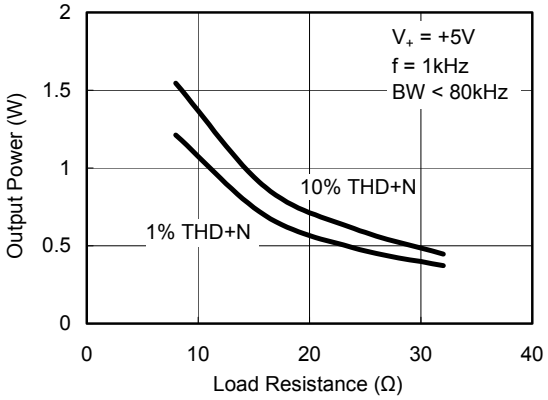
PSRR vs. Frequency



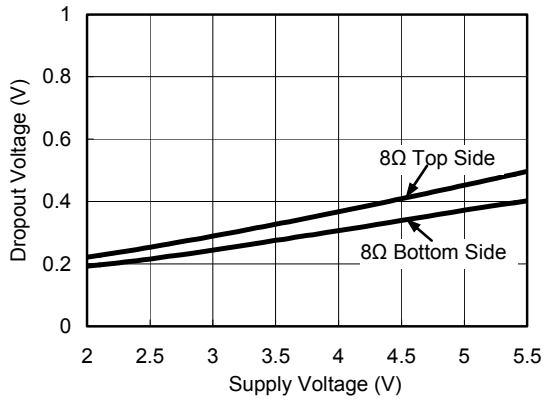

Output Power vs. Supply Voltage



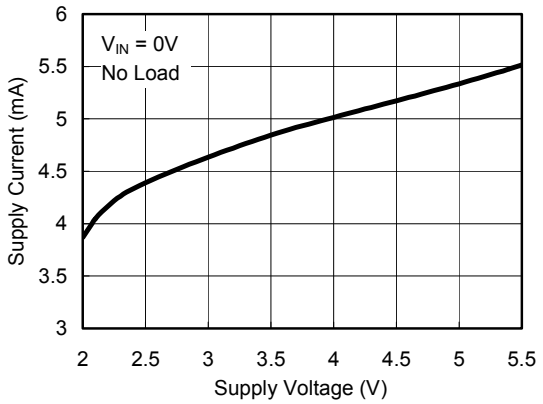

Output Power vs. Load Resistance




Clipping Voltage vs. Supply Voltage




Supply Current vs. Supply Voltage



# APPLICATION NOTES

### PCB Design Recommendations (Thermal Design Considerations)

SGM4871YPS8 is capable of delivering 2.4W of continuous average power to an 4Ω load when provide a thermal design considerations

#### Thermal Land

The SOIC-8 (Exposed Pad) 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).

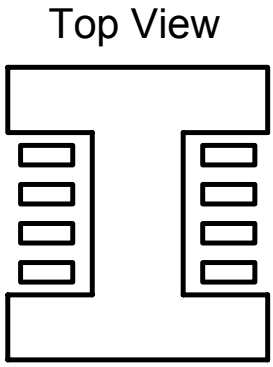



**Figure1. Dog Bone**

#### Thermal Vias

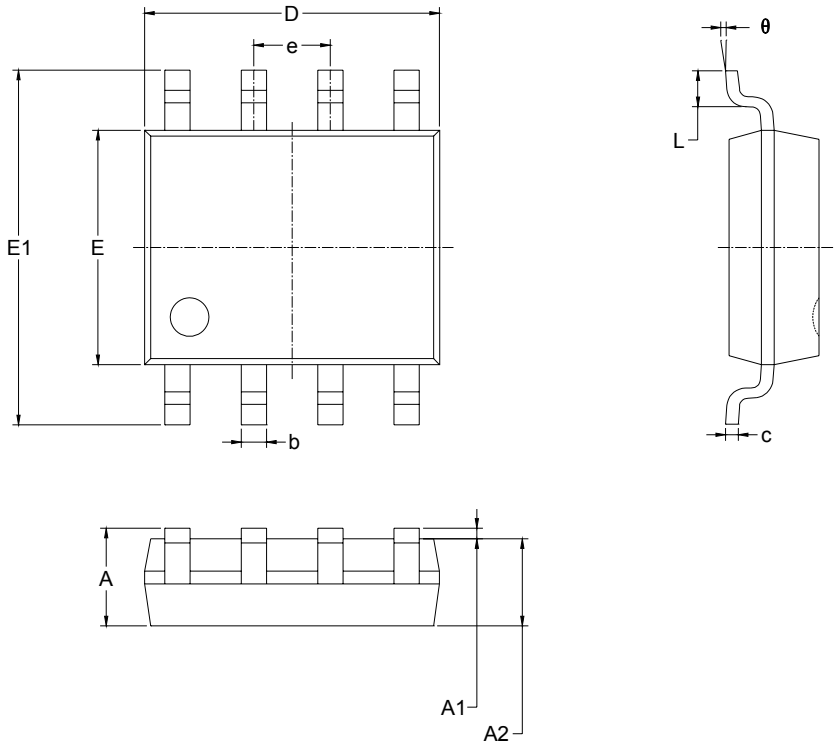
Thermal vias are necessary. They conduct heat from the exposed pad of the package to the ground plane. The number of vias is application specific and is dependent upon electrical requirements and power dissipation.

The via diameter should be 0.2mm to 0.33mm 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

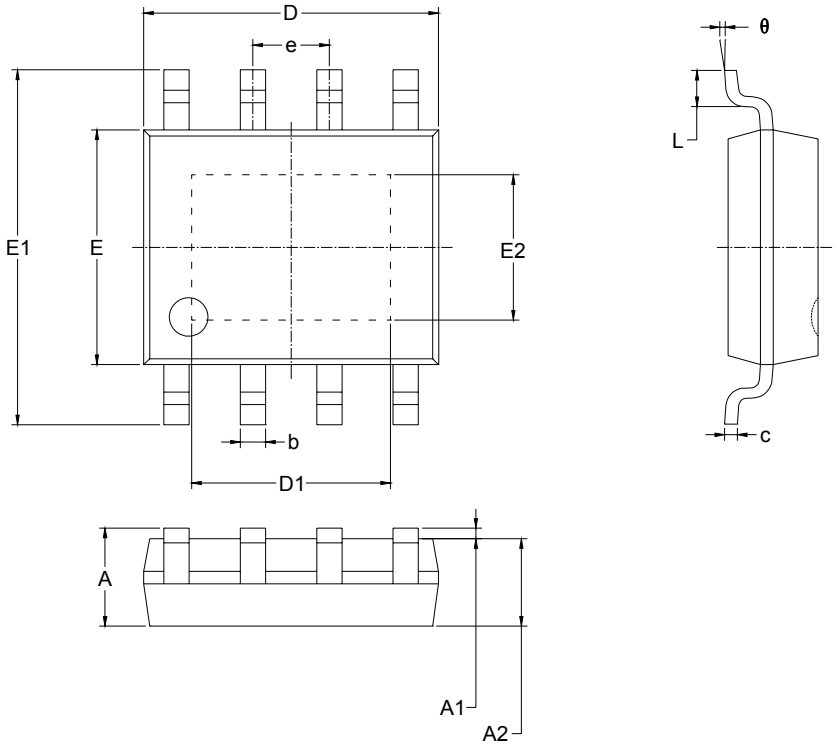
## SOIC-8




| 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 OUTLINE DIMENSIONS

## SOIC-8 (Exposed Pad)




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | | 1.700 | | 0.067 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.007 | 0.010 |
| D | 4.700 | 5.100 | 0.185 | 0.201 |
| D1 | 3.202 | 3.402 | 0.126 | 0.134 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| E2 | 2.313 | 2.513 | 0.091 | 0.099 |
| e | 1.27 BSC | | 0.050 BSC | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |