



# SGM4915

## Dual 145mW Headphone Amplifier with Active Low Shutdown Mode

### GENERAL DESCRIPTION

The SGM4915 is a dual audio power amplifier capable of delivering 145mW per channel of continuous average power with less than 0.1% distortion ( THD ) when it drives a 16Ω speaker from a 5.0V power supply. It is designed to maximize audio performance in portable applications such as mobile phone. The portable application requires audio power amplifier has minimum of external components and can operate from a single 2.5V to 5.5V power supply.

SGM4915 features an externally controlled, active-low, micropower consumption shutdown mode, as well as an internal thermal shutdown protection mechanism.

SGM4915 does not require bootstrap capacitors or snubber networks. It is optimally suited for low-power portable systems.

For maximum flexibility, the SGM4915 provides an externally controlled gain (with resistors), as well as an externally controlled turn-on time (with the bypass capacitor).

The SGM4915 is available in Green TDFN-2×2-8L package. It operates over an ambient temperature range of -40°C to +85°C.

### FEATURES

- **Active-Low Shutdown Mode**
- **145mW into 16Ω Load from 5V Power Supply at THD+N = 0.1% Typical (per Channel)**
- **85mW into 32Ω Load from 5V Power Supply at THD+N = 0.1% Typical (per Channel)**
- **Unity Gain Stable**
- **Shutdown Current: 0.02μA (TYP)**
- **2.5V to 5.5V Operation**
- **Shutdown Pin is Compatible with 1.8V Logic**
- **Click and Pop Reduction Circuitry**
- **-40°C to +85°C Operating Temperature Range**
- **Green TDFN-2×2-8L Package**

### APPLICATIONS

Portable Systems  
Headphone Amplifier  
Microphone Preamplifier  
Notebook Computers  
Mobile Phone  
PDAs  
GPS

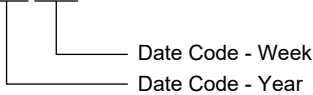
**PACKAGE/ORDERING INFORMATION**

| MODEL   | PACKAGE DESCRIPTION | SPECIFIED TEMPERATURE RANGE | ORDERING NUMBER | PACKAGE MARKING | PACKING OPTION      |
|---------|---------------------|-----------------------------|-----------------|-----------------|---------------------|
| SGM4915 | TDFN-2x2-8L         | -40°C to +85°C              | SGM4915YDE8G/TR | 4915<br>XXXX    | Tape and Reel, 3000 |

**MARKING INFORMATION**

NOTE: XXXX = Date Code.

**XXXX**



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.....6V
- Input Voltage..... -0.3V to (V<sub>CC</sub>) + 0.3V
- Junction Temperature.....+150°C
- Storage Temperature Range .....-65°C to +150°C
- Lead Temperature (Soldering, 10s).....+260°C
- ESD Susceptibility
- HBM.....2000V
- MM.....200V

**RECOMMENDED OPERATING CONDITIONS**

- Supply Voltage Range .....2.5V to 5.5V
- Operating Temperature Range .....-40°C to +85°C

**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.

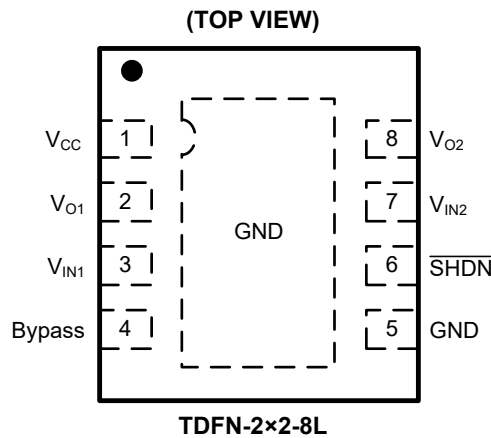
**ESD SENSITIVITY CAUTION**

This integrated circuit can be damaged 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.

**DISCLAIMER**

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATION



PIN DESCRIPTIONS

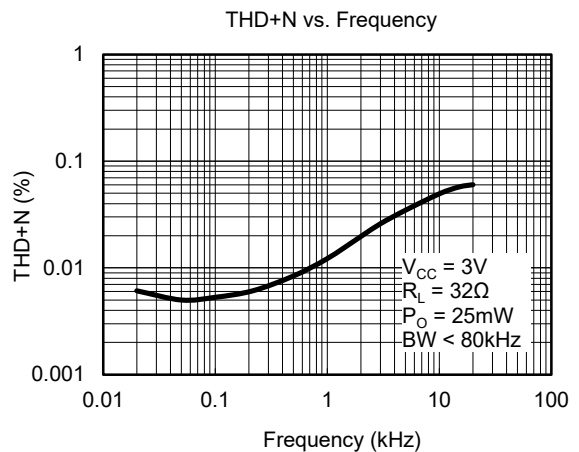
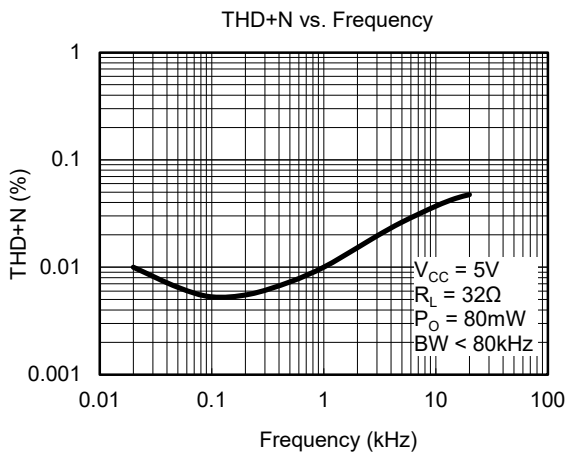
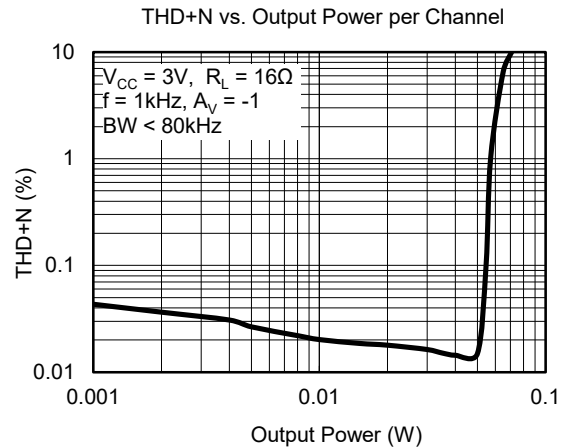
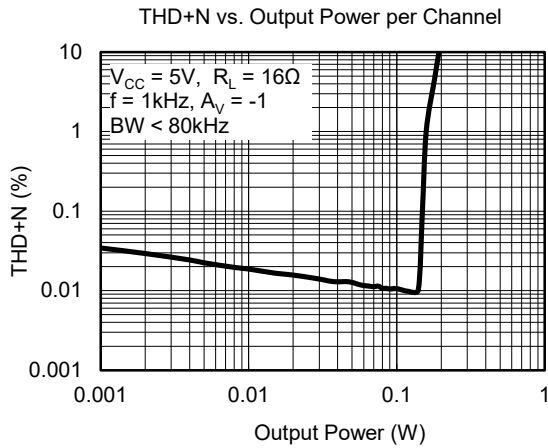
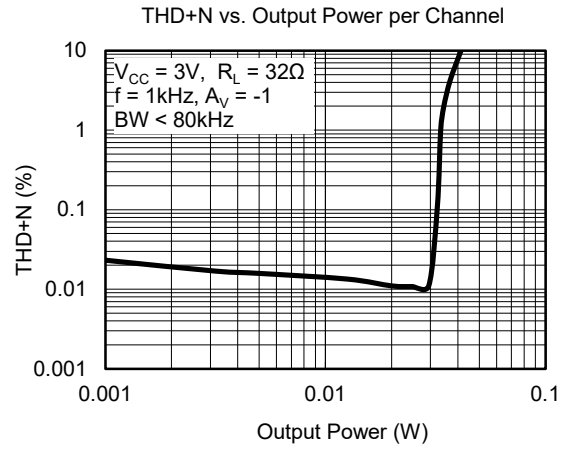
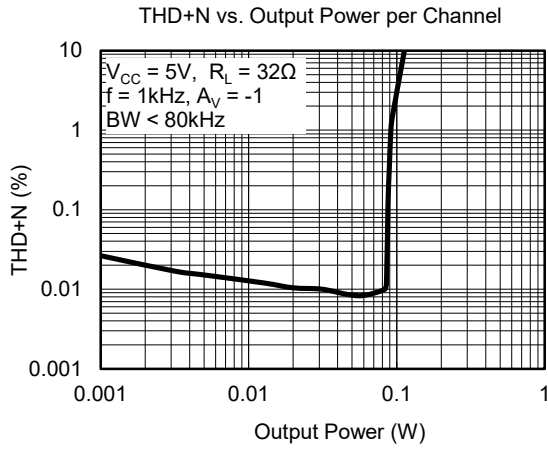
| PIN            | NAME | DESCRIPTION  |
|----------------|------|--|
| 1              | C1P  | Flying Capacitor Positive Terminal. Connect a 1μF ceramic capacitor from C1P to C1N. |
| 2              | PGND | Power Ground. Connect to SGND.   |
| 3              | C1N  | Flying Capacitor Negative Terminal. Connect a 1μF ceramic capacitor from C1P to C1N. |
| 4              | PVSS | Charge-Pump Output. Connect to SVSS and bypass with a 1μF ceramic capacitor to PGND. |
| 5              | SHDN | Active-Low Shutdown Input.   |
| 6              | INL  | Left-Channel Input.  |
| 7              | SGND | Signal Ground. Connect to PGND.  |
| 8              | INR  | Right-Channel Input.   |
| 9              | SVSS | Amplifier Negative Supply. Connect to PVSS.  |
| 10             | OUTR | Right-Channel Output.  |
| 11             | OUTL | Left-Channel Output.   |
| 12             | VDD  | Positive Power-Supply Input. Bypass with a 1μF capacitor to SGND.                    |
| Exposed Paddle | —    | Exposed Paddle. Can be connected to GND or left floating.                            |

## ELECTRICAL CHARACTERISTICS

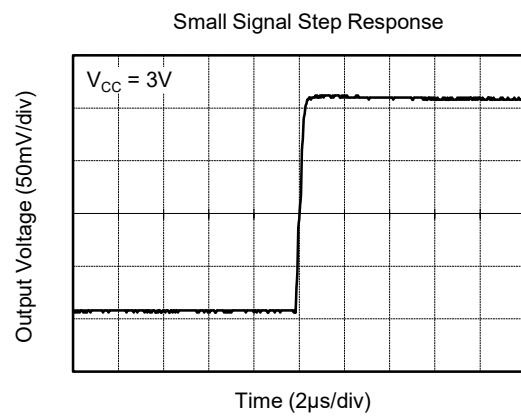
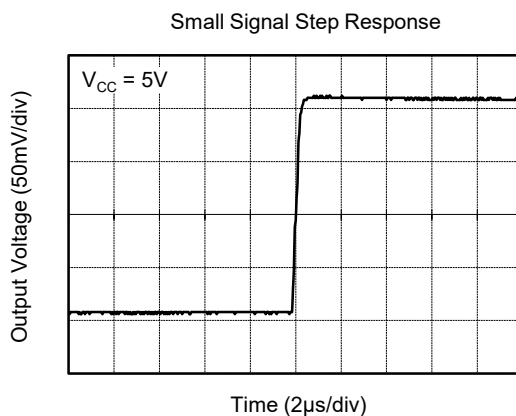
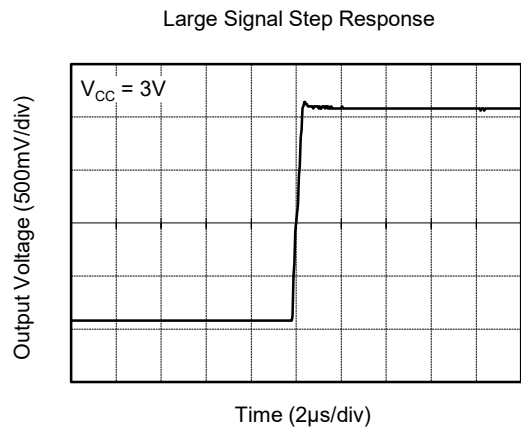
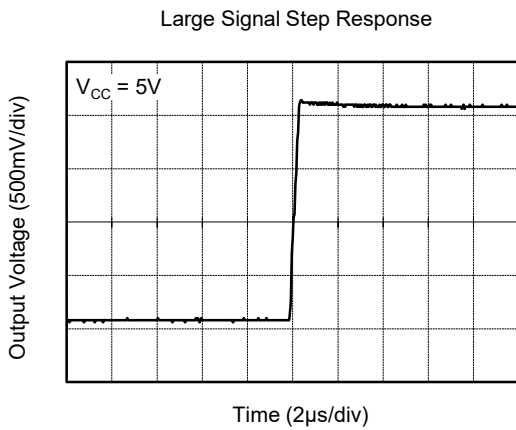
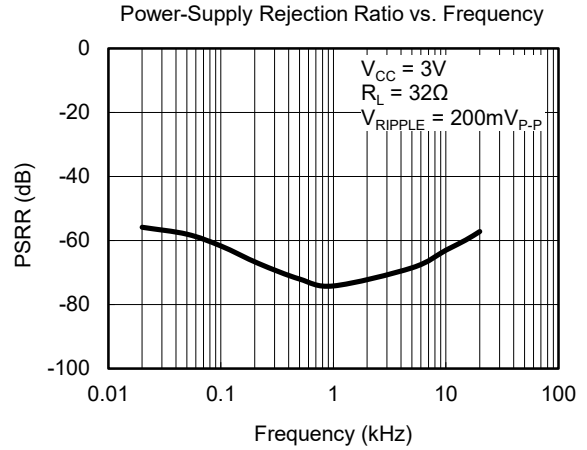
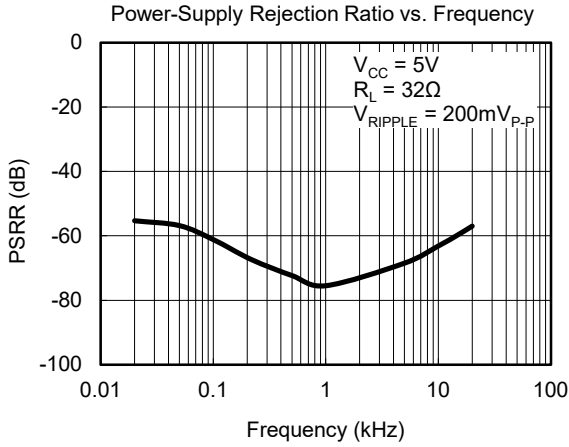
(T<sub>A</sub> = +25°C, unless otherwise noted.)

| PARAMETER                         | SYMBOL            | CONDITIONS  |                                 | MIN                  | TYP  | MAX | UNITS |
|-----------------------------------|-------------------|---|---------------------------------|----------------------|------|-----|-------|
|                                   |                   |   |                                 | 2.5                  |      | 5.5 | V     |
| Shutdown Current                  | I <sub>SD</sub>   | V <sub>IN</sub> = 0V, V <sub>SHDN</sub> = GND, V <sub>CC</sub> = 5.0V   |                                 |                      | 0.02 | 4   | μA    |
|                                   |                   | V <sub>IN</sub> = 0V, V <sub>SHDN</sub> = GND, V <sub>CC</sub> = 3.3V   |                                 |                      | 0.02 |     |       |
|                                   |                   | V <sub>IN</sub> = 0V, V <sub>SHDN</sub> = GND, V <sub>CC</sub> = 2.6V   |                                 |                      | 0.02 |     |       |
| Output Offset Voltage             | V <sub>OS</sub>   | V <sub>IN</sub> = 0V, V <sub>SHDN</sub> = V <sub>CC</sub> = 5.0V  |                                 | -50                  | 2.5  | 50  | mV    |
|                                   |                   | V <sub>IN</sub> = 0V, V <sub>SHDN</sub> = V <sub>CC</sub> = 3.3V  |                                 |                      | 2.5  |     |       |
|                                   |                   | V <sub>IN</sub> = 0V, V <sub>SHDN</sub> = V <sub>CC</sub> = 2.6V  |                                 |                      | 2.5  |     |       |
| Quiescent Power Supply Current    | I <sub>Q</sub>    | V <sub>IN</sub> = 0V,<br>V <sub>SHDN</sub> = V <sub>CC</sub>  | V <sub>CC</sub> = 5.0V, No Load |                      | 1.65 | 2.8 | mA    |
|                                   |                   |   | V <sub>CC</sub> = 3.3V, No Load |                      | 1.50 |     |       |
|                                   |                   |   | V <sub>CC</sub> = 2.6V, No Load |                      | 1.40 |     |       |
| Shutdown Voltage Input High       | V <sub>SDIH</sub> |   |                                 | 1.2                  |      |     | V     |
| Shutdown Voltage Input Low        | V <sub>SDIL</sub> |   |                                 |                      |      | 0.4 | V     |
| Output Power (per Channel)        | P <sub>O</sub>    | f = 1kHz<br>THD+N = 0.1%  | V <sub>CC</sub> = 5.0V          | R <sub>L</sub> = 16Ω |      | 145 | mW    |
|                                   |                   |   |                                 | R <sub>L</sub> = 32Ω |      | 85  |       |
|                                   |                   |   | V <sub>CC</sub> = 3.6V          | R <sub>L</sub> = 16Ω |      | 78  |       |
|                                   |                   |   |                                 | R <sub>L</sub> = 32Ω |      | 44  |       |
|                                   |                   |   | V <sub>CC</sub> = 3.0V          | R <sub>L</sub> = 16Ω |      | 54  |       |
|                                   |                   |   |                                 | R <sub>L</sub> = 32Ω |      | 31  |       |
|                                   |                   |   | V <sub>CC</sub> = 2.6V          | R <sub>L</sub> = 16Ω |      | 40  |       |
|                                   |                   |   |                                 | R <sub>L</sub> = 32Ω |      | 23  |       |
| Total Harmonic Distortion + Noise | THD+N             | P <sub>O</sub> = 78mW, V <sub>CC</sub> = 5.0V, R <sub>L</sub> = 32Ω,<br>f = 20Hz to 20kHz                           |                                 |                      | 0.1  |     | %     |
| Crosstalk                         | X <sub>talk</sub> | R <sub>L</sub> = 32Ω, P <sub>O</sub> = 70mW, V <sub>CC</sub> = 5V, f = 1kHz   |                                 |                      | -85  |     | dB    |
| Power Supply Rejection Ratio      | PSRR              | f = 217Hz, C <sub>B</sub> = 1μF, R <sub>L</sub> = 32Ω<br>V <sub>RIPPLE</sub> = 200mVp-p,<br>Input Grounded with 10Ω | V <sub>CC</sub> = 5.0V          |                      | -67  | dB  |       |
|                                   |                   |   | V <sub>CC</sub> = 3.6V          |                      | -67  |     |       |
|                                   |                   |   | V <sub>CC</sub> = 3.0V          |                      | -65  |     |       |
|                                   |                   |   | V <sub>CC</sub> = 2.6V          |                      | -64  |     |       |
|                                   |                   | f = 1kHz, C <sub>B</sub> = 1μF, R <sub>L</sub> = 32Ω<br>V <sub>RIPPLE</sub> = 200mVp-p,<br>Input Grounded with 10Ω  | V <sub>CC</sub> = 5.0V          |                      | -75  |     |       |
|                                   |                   |   | V <sub>CC</sub> = 3.6V          |                      | -75  |     |       |
|                                   |                   |   | V <sub>CC</sub> = 3.0V          |                      | -74  |     |       |
|                                   |                   |   | V <sub>CC</sub> = 2.6V          |                      | -65  |     |       |

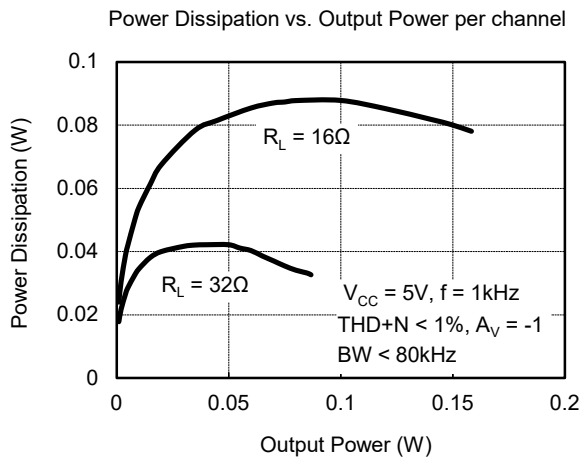
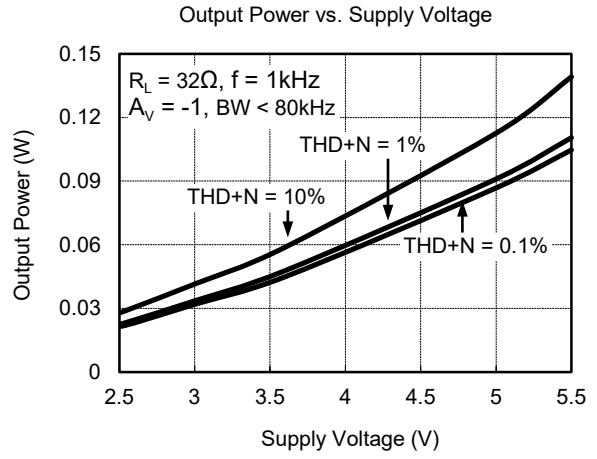
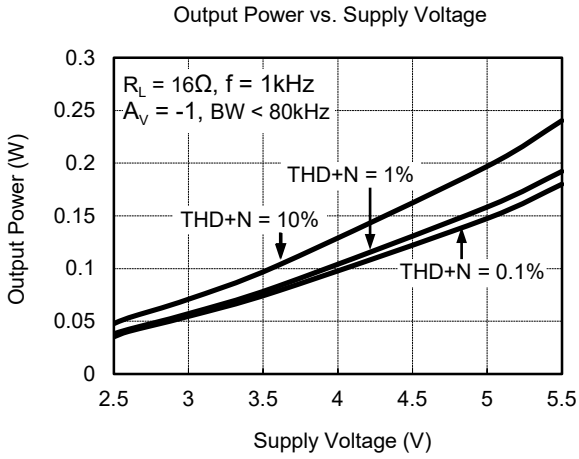
TYPICAL PERFORMANCE CHARACTERISTICS



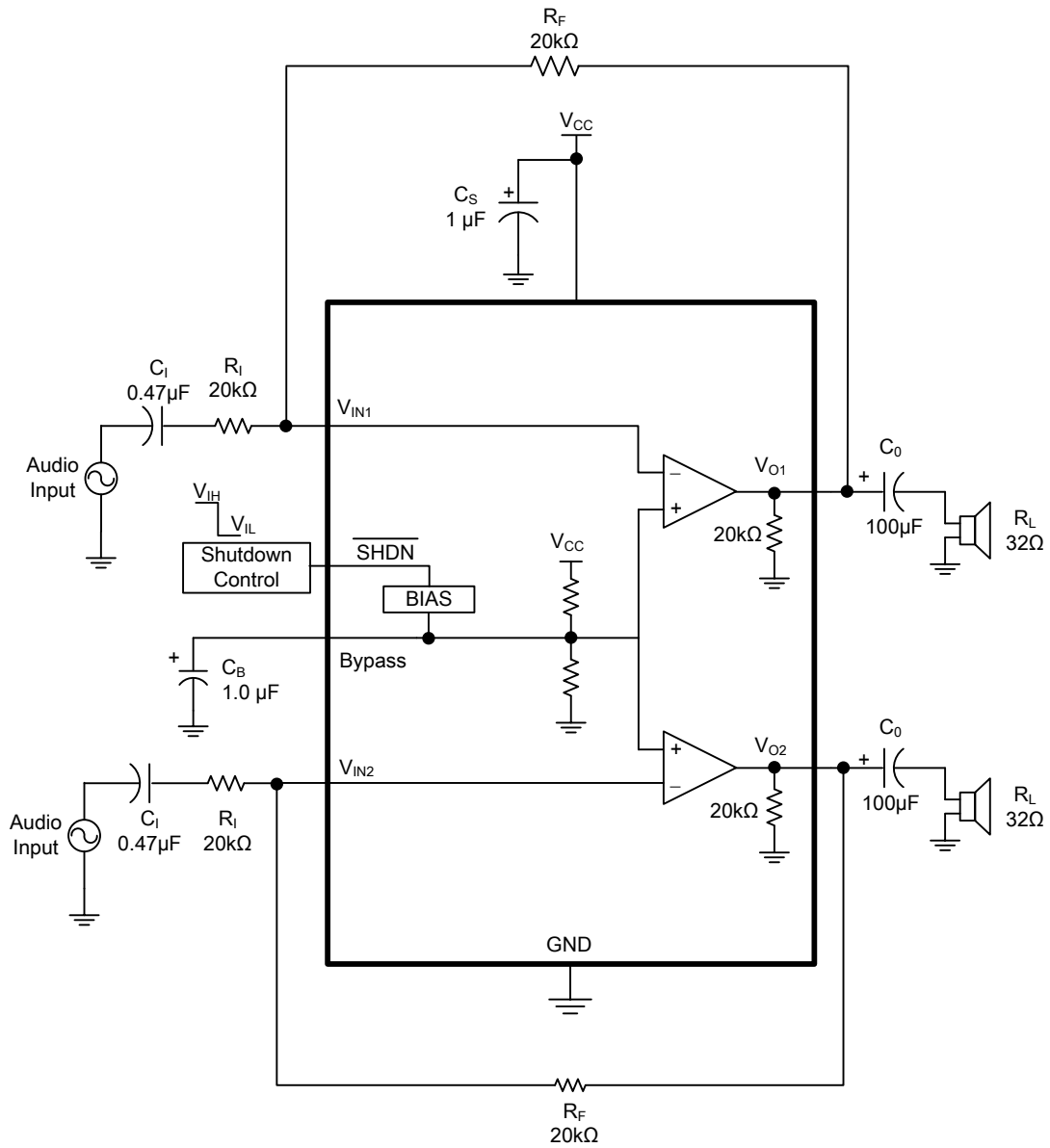
TYPICAL PERFORMANCE CHARACTERISTICS (continued)



TYPICAL PERFORMANCE CHARACTERISTICS (continued)



FUNCTIONAL DIAGRAM/TYPICAL APPLICATION CIRCUIT





**REVISION HISTORY**

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

**MAY 2011 – REV.A to REV.A.1**

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Updated package name.....All

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**Changes from Original (MARCH 2010) to REV.A**

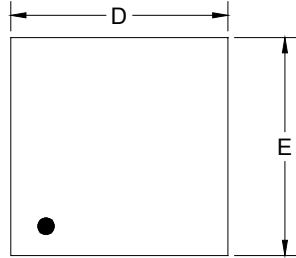
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Changed from product preview to production data.....All

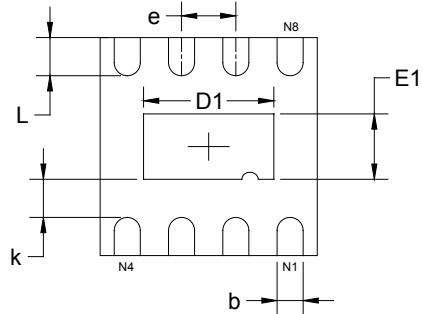
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PACKAGE OUTLINE DIMENSIONS

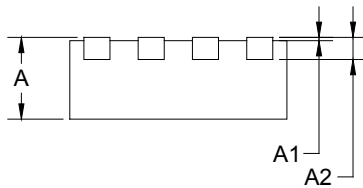
TDFN-2x2-8L



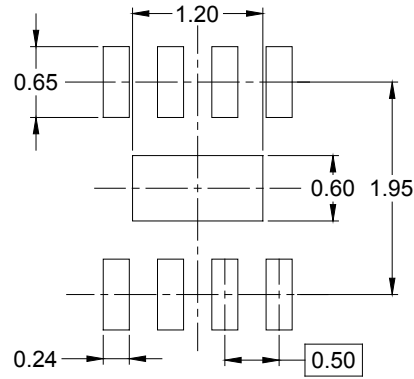
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)

| Symbol | Dimensions<br>In Millimeters |       | Dimensions<br>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      | 1.900                        | 2.100 | 0.075                   | 0.083 |
| D1     | 1.100                        | 1.300 | 0.043                   | 0.051 |
| E      | 1.900                        | 2.100 | 0.075                   | 0.083 |
| E1     | 0.500                        | 0.700 | 0.020                   | 0.028 |
| k      | 0.200 MIN                    |       | 0.008 MIN               |       |
| b      | 0.180                        | 0.300 | 0.007                   | 0.012 |
| e      | 0.500 TYP                    |       | 0.020 TYP               |       |
| L      | 0.250                        | 0.450 | 0.010                   | 0.018 |

# PACKAGE INFORMATION

## 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 |
|--------------|---------------|--------------------|---------|---------|---------|---------|---------|---------|--------|---------------|
| TDFN-2×2-8L  | 7"            | 9.5                | 2.30    | 2.30    | 1.10    | 4.0     | 4.0     | 2.0     | 8.0    | Q1            |

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# PACKAGE INFORMATION

## 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 |
|-------------|-------------|------------|-------------|--------------|
| 7" (Option) | 368         | 227        | 224         | 8            |
| 7"          | 442         | 410        | 224         | 18           |

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