



SGM4888

Dual 2.1W Audio Power Amplifier Plus Stereo Headphone & 3D Enhancement

GENERAL DESCRIPTION

The SGM4888 is a dual bridge-connected audio power amplifier which, when connected to a 5V supply, will deliver 2.1W into a 4Ω load or 2.5W into a 3Ω load with typically 1% THD+N.

The SGM4888 has two separate HP (headphone) enable inputs, each having different logic level thresholds. Either HP enable input activates the single-ended headphone mode and disables the BTL output mode. The HP Sense input is for use with a normal stereo headphone jack. The remaining input, HP Logic, accepts standard logic level thresholds.

To simplify audio system design, the SGM4888 combines dual bridge speaker amplifiers and stereo headphone amplifiers on one chip.

The SGM4888 features a low power consumption shutdown mode and thermal shutdown protection. It also utilizes circuitry to reduce “pop/click” during device turn-on.

The SGM4888 is available in Green TQFN-4×4-24L package. It operates over an ambient temperature range of -40°C to +85°C.

FEATURES

- **P_O at 1% THD+N, V_{CC} = 5V**

R_L = 3Ω	2.5W (TYP)
R_L = 4Ω	2.1W (TYP)
R_L = 8Ω	1.3W (TYP)
- **Low Shutdown Current** 0.02μA
- **Operation Supply Voltage** 2.8V to 5.5V
- **PSRR at 217Hz** 80dB (TYP)
- **3D Enhancement**
- **Selectable Headphone Enable Modes**
- **Stereo Headphone Amplifier Mode**
- **Improved “Pop/Click” Suppression Circuitry**
- **Thermal Shutdown Protection Circuitry**
- **-40°C to +85°C Operating Temperature Range**
- **Available in Green TQFN-4×4-24L Package**

APPLICATIONS

Cell Phones, PDAs, MP4s, PMPs
Portable and Desktop Computers
Desktops Audio System
Multimedia Monitors



SGM4888

Dual 2.1W Audio Power Amplifier Plus Stereo Headphone & 3D Enhancement

PACKAGE/ORDERING INFORMATION

MODEL	ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION	MARKING INFORMATION
SGM4888	SGM4888YTQF24G/TR	TQFN-4×4-24L	Tape and Reel, 3000	SGM4888YTQF24

ABSOLUTE MAXIMUM RATINGS

Supply Voltage.....6V
 Input Voltage.....-0.3V to (V_{CC}) + 0.3V
 Storage Temperature Range.....-65°C to +150°C
 Junction Temperature.....150°C
 Operating Temperature Range.....-40°C to +85°C
 Lead Temperature Range (Soldering 10sec)
260°C
 ESD Susceptibility
 HBM.....4000V
 MM.....400V

NOTE:

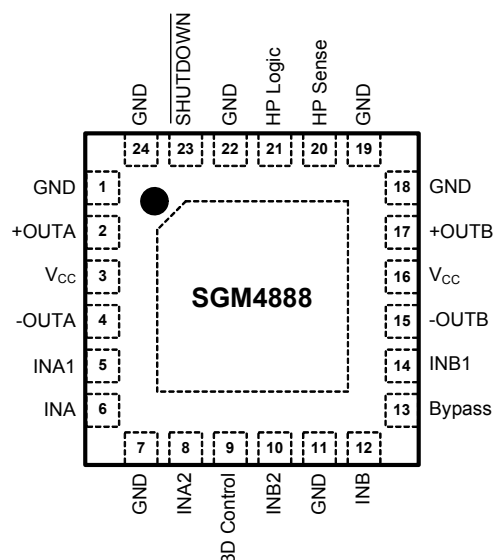
Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure 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 latest datasheet.

PIN CONFIGURATION (TOP VIEW)



PIN DESCRIPTION

PIN	NAME	FUNCTION
6	INA	Left channel input.
5	INA1	Left channel non 3D-mode feedback input.
8	INA2	Left channel 3D-mode feedback input.
12	INB	Right channel input.
14	INB1	Right channel non 3D-mode feedback input.
10	INB2	Right channel 3D-mode feedback input.
4	-OUTA	Left channel -output in BTL mode.
2	+OUTA	Left channel +output in BTL mode.
15	-OUTB	Right channel -output in BTL mode.
17	+OUTB	Right channel +output in BTL mode.
9	3D Control	Hold high for 3D mode; hold low for general stereo mode.
21	HP Logic	Headphone logic control.
20	HP Sense	Headphone sense control.
3,16	V _{CC}	Supply voltage.
23	SHUTDOWN	Shutdown control: hold low for shutdown mode.
13	Bypass	Bypass capacitor which provides the common mode voltage.
1, 7, 11, 18, 19, 22, 24	GND	Ground.
Exposed Pad	GND	Exposed pad should be soldered to PCB board and connected to GND.

LOGIC LEVEL TRUTH TABLE

SHUTDOWN PIN	HEADPHONE LOGIC PIN	HEADPHONE JACK SENSE PIN	OPERATIONAL OUTPUT MODE
Logic High	High	Don't Care	Single-Ended (SE)
Logic High	Low	Low (HP not plugged in)	Bridged (BTL)
Logic High	Don't Care	High (HP plugged in)	Single-Ended (SE)
Logic Low	Don't Care	Don't Care	Micro-Power Shutdown

ELECTRICAL CHARACTERISTICS (5V)(The following specifications apply for $V_{CC} = 5V$, limits apply for $T_A = +25^\circ C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage	V_{CC}		2.8		5.5	V
Quiescent Power Supply Current ⁽¹⁾	I_Q	$V_{IN} = 0V, I_O = 0A$, BTL mode		6.7	10	mA
		$V_{IN} = 0V, I_O = 0A$, SE mode		3.5	5	
Shutdown Current	I_{SD}	GND applied to the SHUTDOWN pin		0.02	2	μA
Headphone Sense High Input Voltage	V_{IH}		4			V
Headphone Sense Low Input Voltage	V_{IL}				3.2	V
Shutdown, Headphone Logic, 3D Control High Input Voltage	V_{SDIH}		1			V
Shutdown, Headphone Logic, 3D control Low Input Voltage	V_{SDIL}				0.8	V
Turn-On Time	T_{ON}	1 μF Bypass Cap (C_6)		210		ms

ELECTRICAL CHARACTERISTICS FOR BRIDGED-MODE OPERATION (5V)(The following specifications apply for $V_{CC} = 5V$, limits apply for $T_A = +25^\circ C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Offset Voltage	V_{OS}	$V_{IN} = 0V$		5	30	mV
Output Power ⁽²⁾	P_O	THD+N = 1%, $f = 1kHz$	$R_L = 3\Omega$	2.5		W
			$R_L = 4\Omega$	2.1		
			$R_L = 8\Omega$	1.3		
		THD+N = 10%, $f = 1kHz$	$R_L = 3\Omega$	3.2		
			$R_L = 4\Omega$	2.6		
			$R_L = 8\Omega$	1.6		
Total Harmonic Distortion + Noise	THD+N	$f = 1kHz, A_{VD} = 2$	$R_L = 4\Omega, P_O = 1W$	0.07		%
			$R_L = 8\Omega, P_O = 0.4W$	0.04		
Power Supply Rejection Ratio	PSRR	Input unterminated, 217Hz $V_{RIPPLE} = 200mV_{P-P}, C_6 = 1\mu F, R_L = 8\Omega$		-80		dB
		Input unterminated, 1kHz $V_{RIPPLE} = 200mV_{P-P}, C_6 = 1\mu F, R_L = 8\Omega$		-69		
		Input grounded with 10 Ω , 217Hz $V_{RIPPLE} = 200mV_{P-P}, C_6 = 1\mu F, R_L = 8\Omega$		-68		
		Input grounded with 10 Ω , 1kHz $V_{RIPPLE} = 200mV_{P-P}, C_6 = 1\mu F, R_L = 8\Omega$		-70		
Crosstalk	X_{TALK}	$f = 1kHz, C_6 = 1.0\mu F$, 3D Control = Low		-90		dB

ELECTRICAL CHARACTERISTICS FOR SINGLE-MODE OPERATION (5V)(The following specifications apply for $V_{CC} = 5V$, limits apply for $T_A = +25^\circ C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Power	P_O	THD+N = 0.5%, $f = 1kHz$, $R_L = 32\Omega$		95		mW
Total Harmonic Distortion + Noise	THD+N	$P_O = 20mW$, $1kHz$, $R_L = 32\Omega$		0.01		%
Power Supply Rejection Ratio	PSRR	Input unterminated, 217Hz $V_{RIPPLE} = 200mV_{P-P}$, $C_6 = 1\mu F$, $R_L = 32\Omega$		-74		dB
		Input unterminated, 1kHz $V_{RIPPLE} = 200mV_{P-P}$, $C_6 = 1\mu F$, $R_L = 32\Omega$		-75		
		Input grounded with 10 Ω , 217Hz $V_{RIPPLE} = 200mV_{P-P}$, $C_6 = 1\mu F$, $R_L = 32\Omega$		-69		
		Input grounded with 10 Ω , 1kHz $V_{RIPPLE} = 200mV_{P-P}$, $C_6 = 1\mu F$, $R_L = 32\Omega$		-74		
Crosstalk	X_{TALK}	$f = 1kHz$, $C_6 = 1.0\mu F$, 3D Control = Low		-84		dB

ELECTRICAL CHARACTERISTICS (3V)(The following specifications apply for $V_{CC} = 3V$, limits apply for $T_A = +25^\circ C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Quiescent Power Supply Current ⁽¹⁾	I_Q	$V_{IN} = 0V$, $I_O = 0A$, BTL mode		5.7		mA
		$V_{IN} = 0V$, $I_O = 0A$, SE mode		3		
Shutdown Current	I_{SD}	GND applied to the $\overline{SHUTDOWN}$ pin		0.02		μA
Headphone Sense High Input Voltage	V_{IH}		2.4			V
Headphone Sense Low Input Voltage	V_{IL}				1.9	V
Shutdown, Headphone Logic, 3D Control High Input Voltage	V_{SDIH}		1			V
Shutdown, Headphone Logic, 3D Control Low Input Voltage	V_{SDIL}				0.6	V
Turn-On Time	T_{ON}	1 μF Bypass Cap (C_6)		150		ms

ELECTRICAL CHARACTERISTICS FOR BRIDGED-MODE OPERATION (3V)(The following specifications apply for $V_{CC} = 3V$, limits apply for $T_A = +25^\circ C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Offset Voltage	V_{OS}	$V_{IN} = 0V$		5		mV
Output Power ⁽²⁾	P_O	THD+N = 1%, $f = 1kHz$	$R_L = 3\Omega$	0.85		W
			$R_L = 4\Omega$	0.7		
			$R_L = 8\Omega$	0.45		
		THD+N = 10%, $f = 1kHz$	$R_L = 3\Omega$	1		
			$R_L = 4\Omega$	0.85		
			$R_L = 8\Omega$	0.55		
Total Harmonic Distortion + Noise	THD+N	$f = 1kHz$	$R_L = 4\Omega$, $P_O = 280mW$	0.06		%
			$R_L = 8\Omega$, $P_O = 200mW$	0.04		
Power Supply Rejection Ratio	PSRR	Input unterminated, 217Hz $V_{RIPPLE} = 200mV_{P-P}$, $C_6 = 1\mu F$, $R_L = 8\Omega$		-73		dB
		Input unterminated, 1kHz $V_{RIPPLE} = 200mV_{P-P}$, $C_6 = 1\mu F$, $R_L = 8\Omega$		-67		
		Input grounded with 10 Ω , 217Hz $V_{RIPPLE} = 200mV_{P-P}$, $C_6 = 1\mu F$, $R_L = 8\Omega$		-66		
		Input grounded with 10 Ω , 1kHz $V_{RIPPLE} = 200mV_{P-P}$, $C_6 = 1\mu F$, $R_L = 8\Omega$		-67		
Crosstalk	X_{TALK}	$f = 1kHz$, $C_6 = 1.0\mu F$, 3D Control = Low		-92		dB

ELECTRICAL CHARACTERISTICS FOR SINGLE-MODE OPERATION (3V)(The following specifications apply for $V_{CC} = 3V$, limits apply for $T_A = +25^\circ C$, unless otherwise noted.)

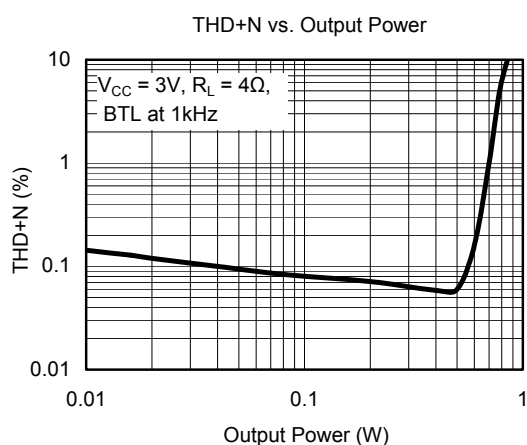
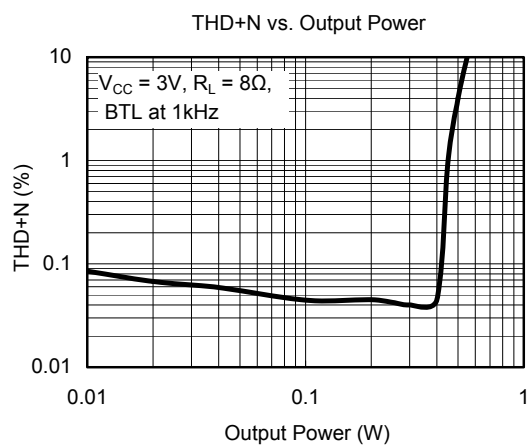
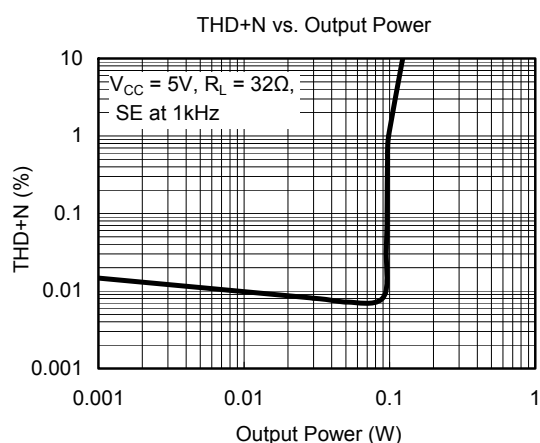
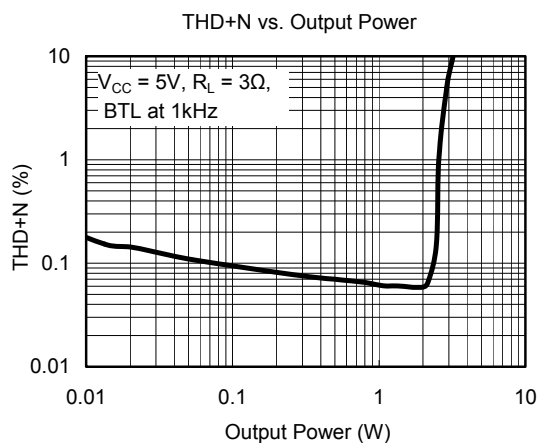
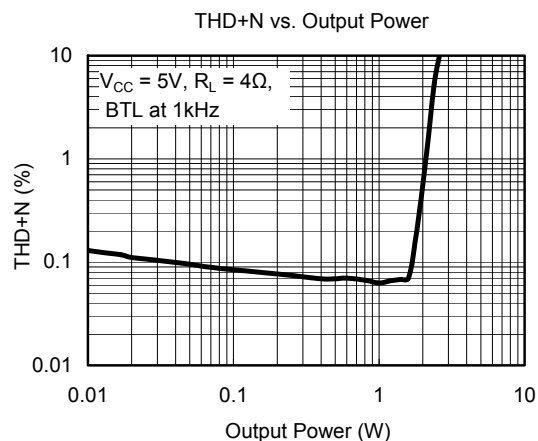
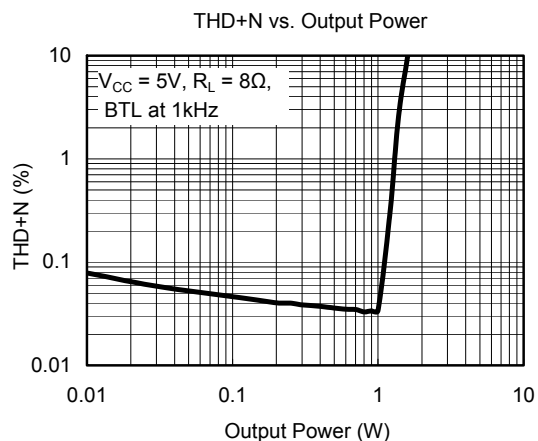
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Power	P_O	THD+N = 0.5%, $f = 1\text{ kHz}$, $R_L = 32\Omega$		33		mW
Total Harmonic Distortion + Noise	THD+N	$P_O = 25\text{mW}$, 1kHz , $R_L = 32\Omega$		0.01		%
Power Supply Rejection Ratio	PSRR	Input unterminated, 217Hz $V_{\text{RIPPLE}} = 200\text{mV}_{P-P}$, $C_6 = 1\mu F$, $R_L = 32\Omega$		-74		dB
		Input unterminated, 1kHz $V_{\text{RIPPLE}} = 200\text{mV}_{P-P}$, $C_6 = 1\mu F$, $R_L = 32\Omega$		-75		
		Input grounded with 10 Ω , 217Hz $V_{\text{RIPPLE}} = 200\text{mV}_{P-P}$, $C_6 = 1\mu F$, $R_L = 32\Omega$		-69		
		Input grounded with 10 Ω , 1kHz $V_{\text{RIPPLE}} = 200\text{mV}_{P-P}$, $C_6 = 1\mu F$, $R_L = 32\Omega$		-74		
Crosstalk	X_{TALK}	$f = 1\text{ kHz}$, $C_6 = 1.0\mu F$, 3D Control = Low		-84		dB

NOTES:

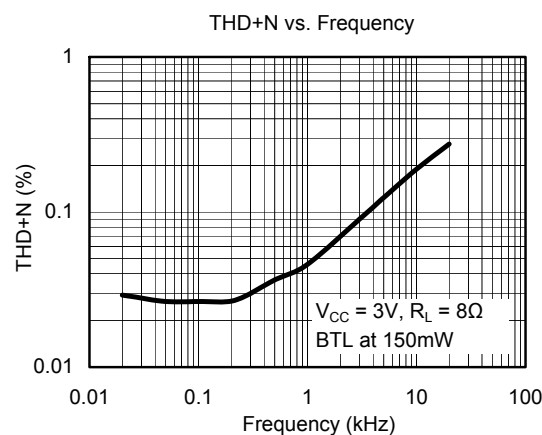
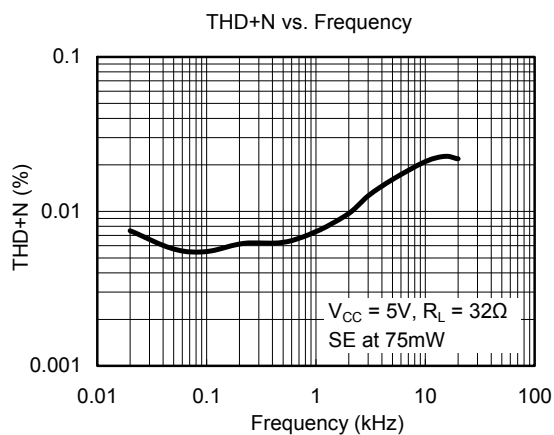
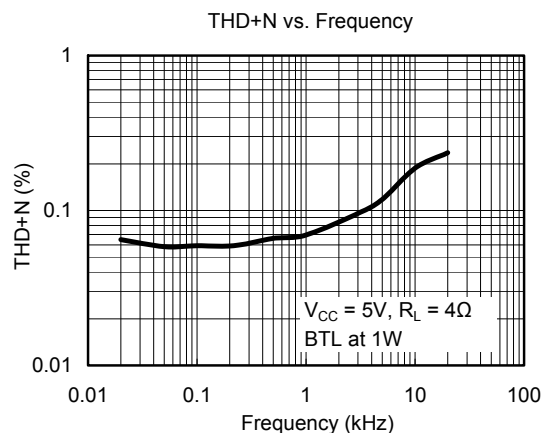
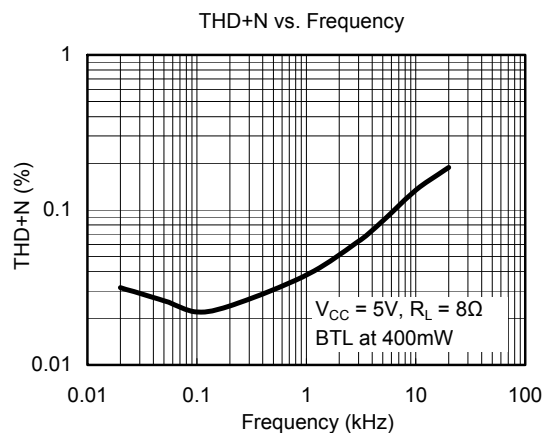
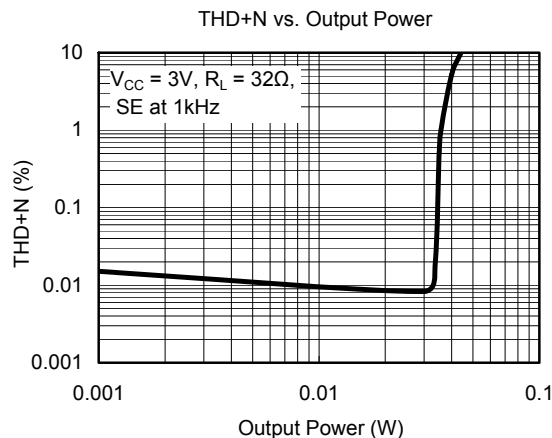
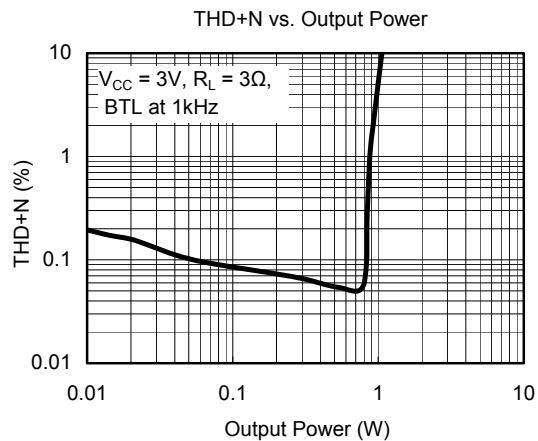
1. The quiescent power supply current depends on the offset voltage when a practical load is connected to the amplifier.
2. When driving 3 Ω or 4 Ω loads, the SGM4888 must be mounted to a circuit board that has a minimum of 2.5in² of exposed, uninterrupted copper area connected to the TQFN-4×4-24L package's exposed DAP.

TYPICAL PERFORMANCE CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, $C_6 = 1\mu\text{F}$, $\text{BW} < 80\text{kHz}$, unless otherwise noted.

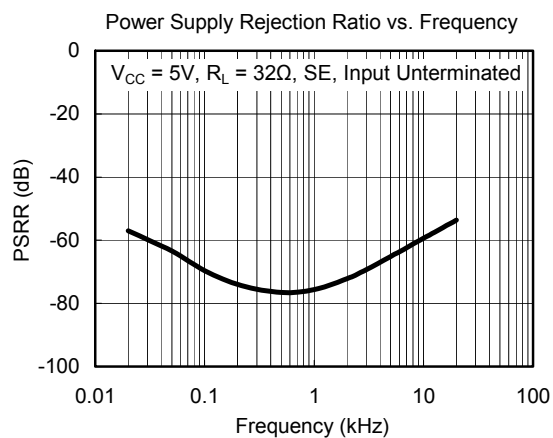
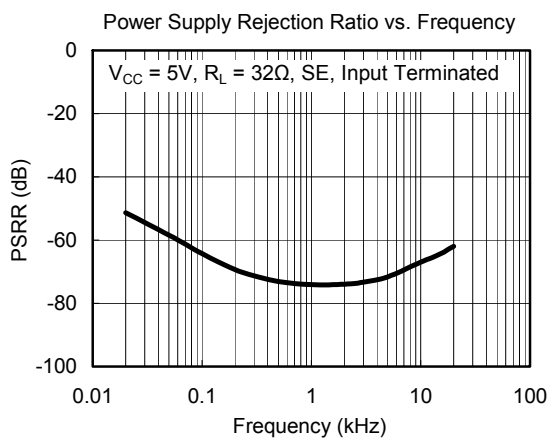
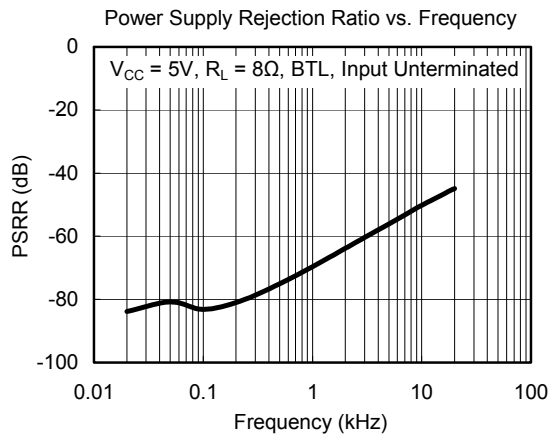
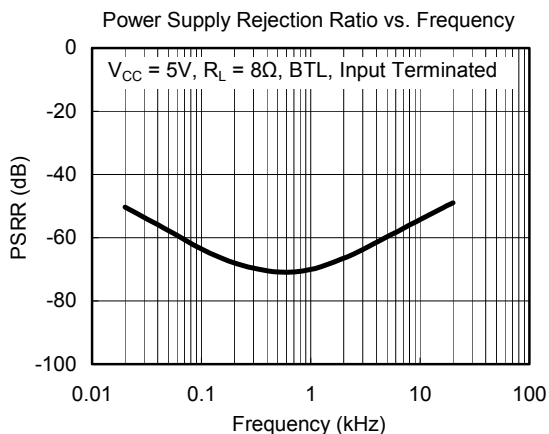
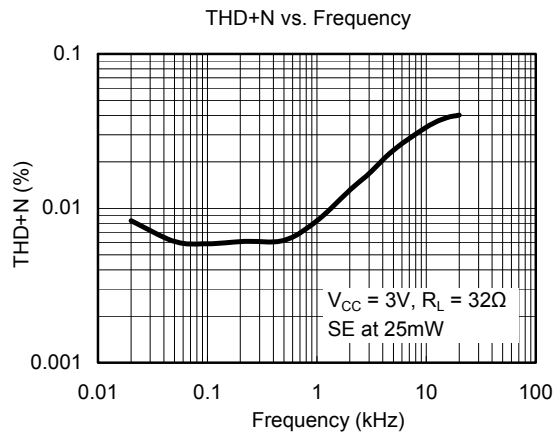
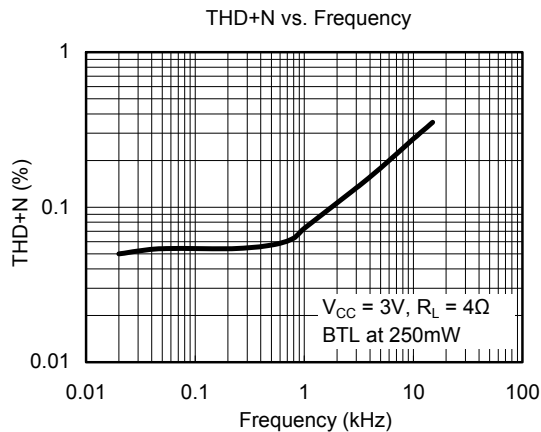


TYPICAL PERFORMANCE CHARACTERISTICS

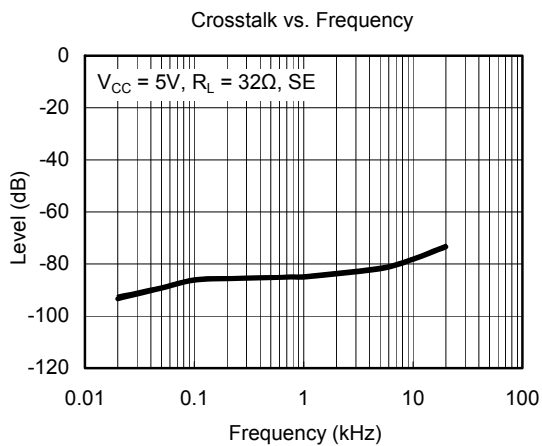
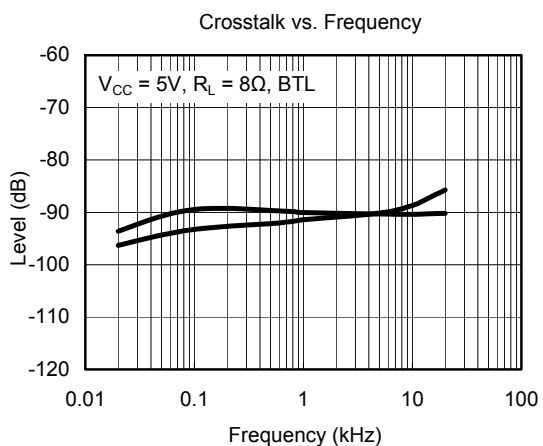
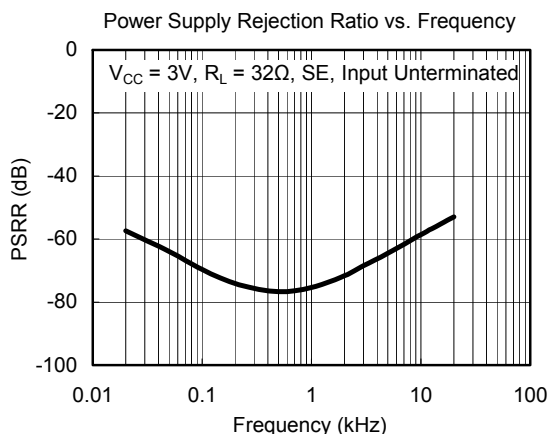
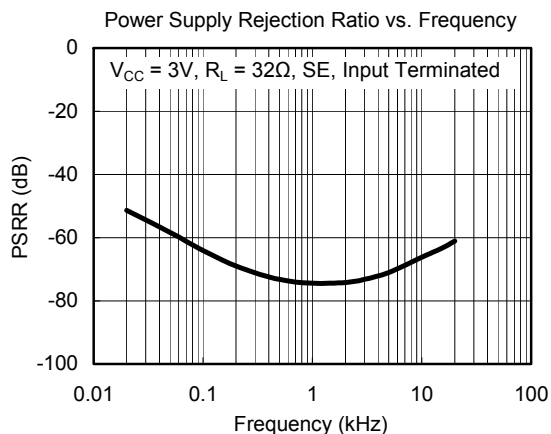
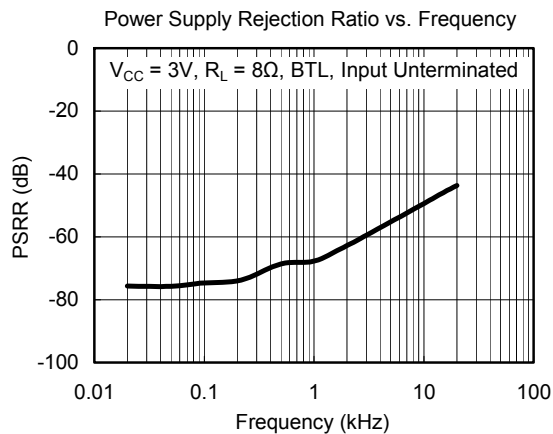
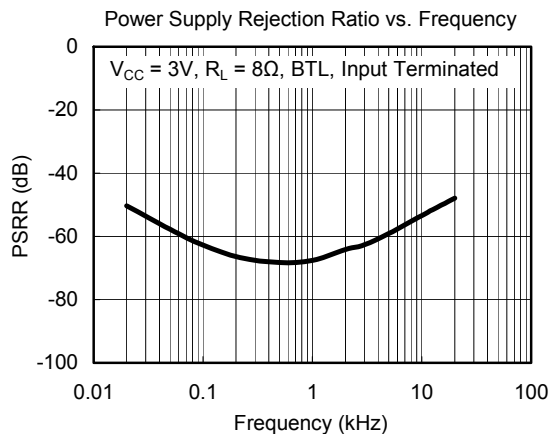
At $T_A = +25^\circ\text{C}$, $C_6 = 1\mu\text{F}$, $\text{BW} < 80\text{kHz}$, unless otherwise noted.

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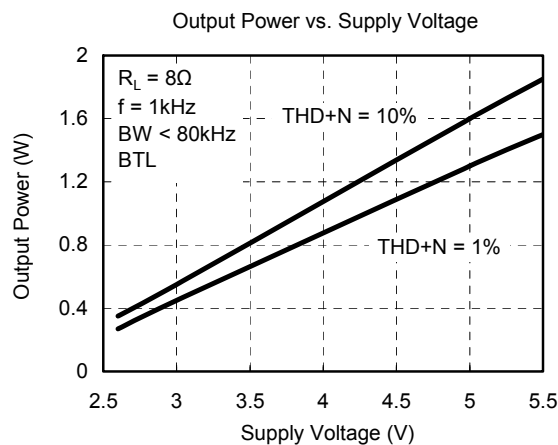
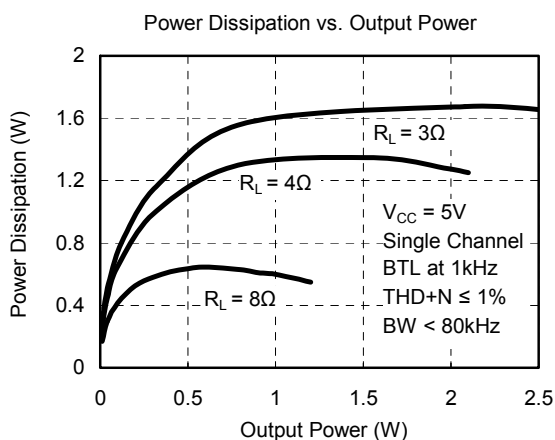
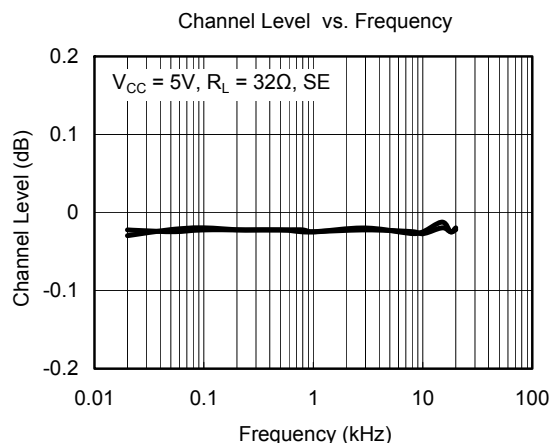
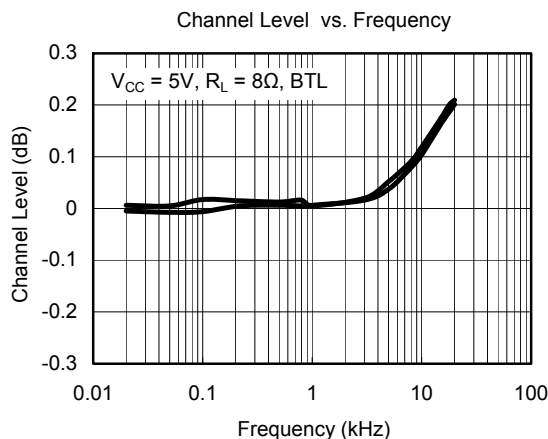
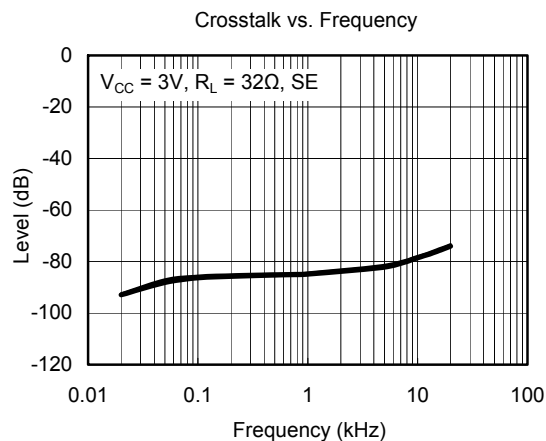
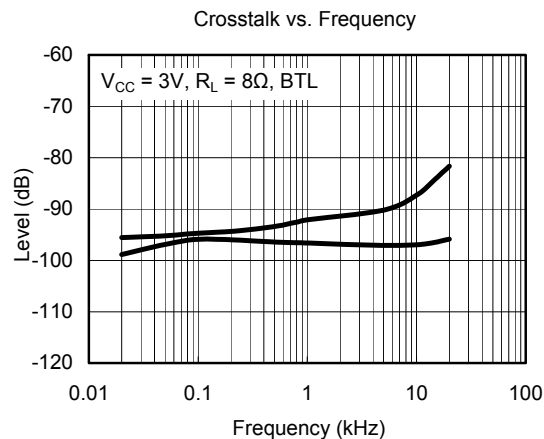


TYPICAL PERFORMANCE CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, $C_6 = 1\mu\text{F}$, BW < 80kHz, unless otherwise noted.

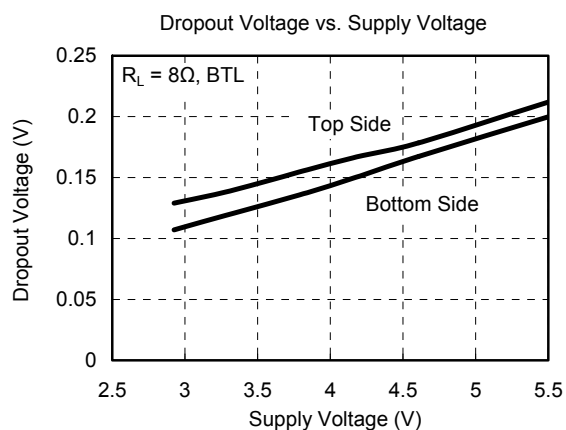
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TYPICAL PERFORMANCE CHARACTERISTICS

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TYPICAL APPLICATION

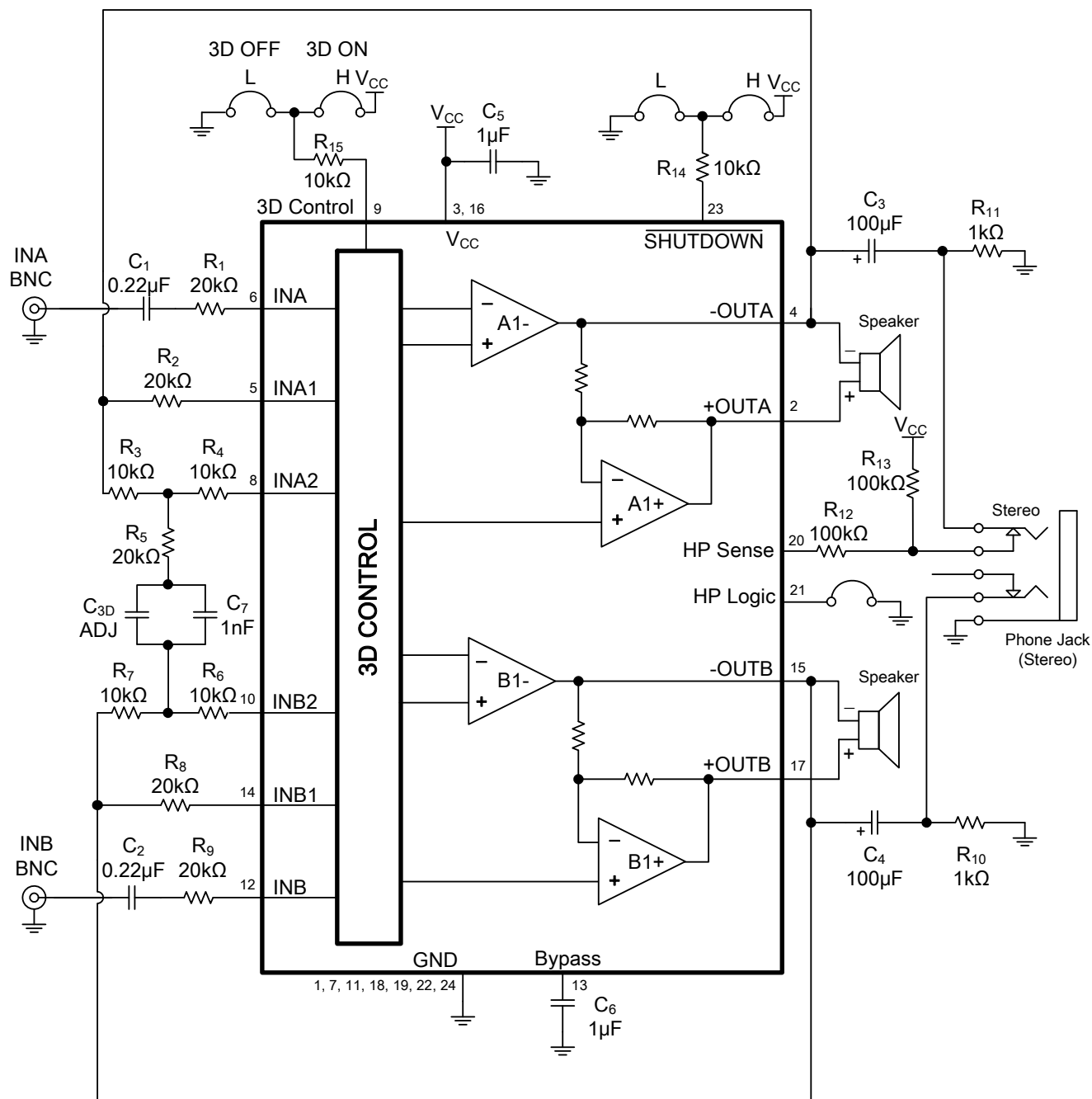


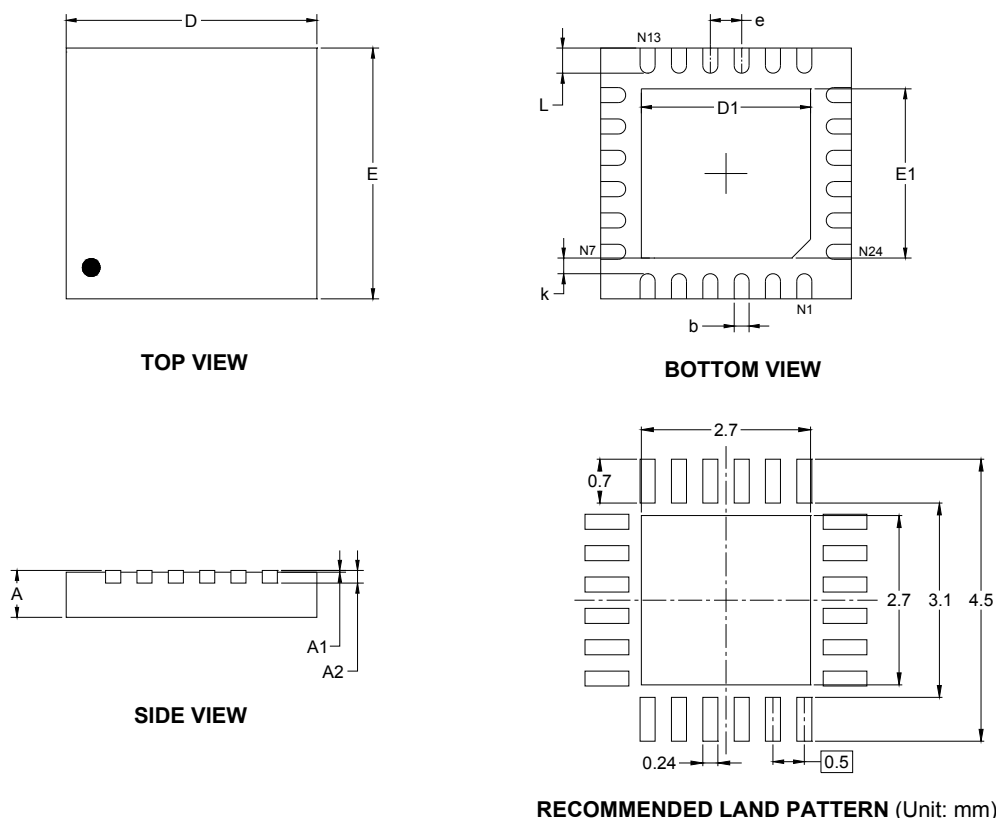
Figure 1. Typical Audio Amplifier Application Circuit

NOTES:

1. It is necessary to connect the schottky barrier diode with the power supply to prevent IC destruction during power supply surge.
2. A 10kΩ resistor must be serially connected to $\overline{\text{SHUTDOWN}}$ or 3D control pin.

PACKAGE OUTLINE DIMENSIONS

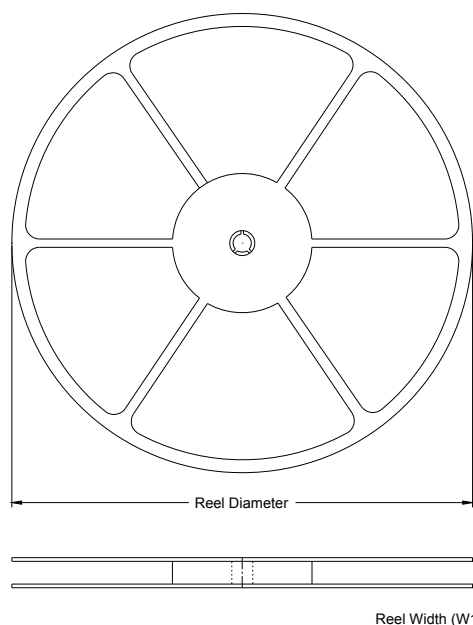
TQFN-4×4-24L



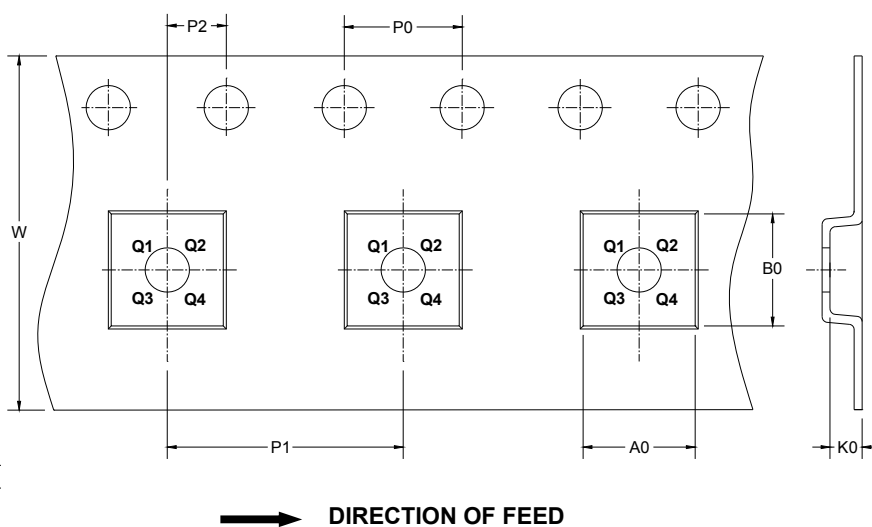
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	3.900	4.100	0.154	0.161
D1	2.600	2.800	0.102	0.110
E	3.900	4.100	0.154	0.161
E1	2.600	2.800	0.102	0.110
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.500 TYP		0.020 TYP	
L	0.300	0.500	0.012	0.020

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

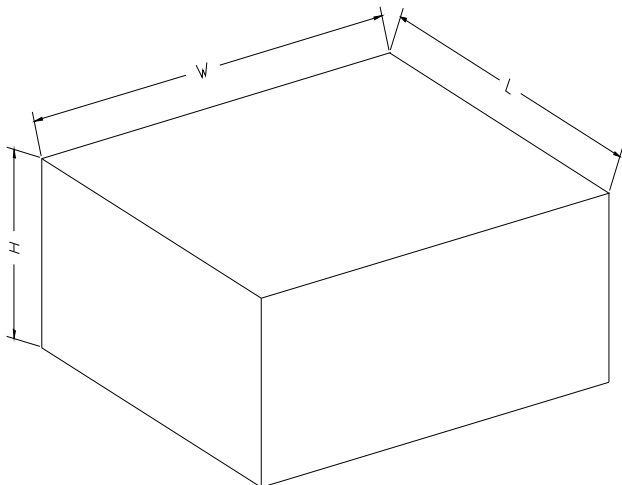
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TQFN-4×4-24L	13"	12.4	4.3	4.3	1.1	4.0	8.0	2.0	12.0	Q1

SGM4888

Dual 2.1W Audio Power Amplifier Plus Stereo Headphone & 3D Enhancement

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
13"	386	280	370	5