



# SGM4917

## 80mW, Capless, Stereo Headphone Amplifier with Shutdown

### GENERAL DESCRIPTION

The SGM4917 is stereo headphone amplifier which is designed for portable applications and can operate from a 2.7V to 5.5V single supply. Capless design can produce a ground-referenced output from a single power supply, and can eliminate output DC-blocking capacitors for less-component height and low-cost. For SGM4917B, the internal gain setting (-2V/V) is to further reduce component count. For SGM4917A, the gain can be adjusted by external feedback resistors.

The SGM4917 has low quiescent current 2.7mA at 5V supply, low 0.02% THD+N, 80mW per channel into 32Ω load from 5V power supply at THD+N = 0.1%. The high supply rejection ratio (PSRR) of -78dB at 217Hz allows the device to operate from noisy digital supplies without an additional linear regulator. The device provides short-circuit and thermal-overload protections. Build-in shutdown control also helps for pop/click-free on/off control.

The SGM4917 is available in a Green TQFN-3×3-16L package. It operates over an ambient temperature range of -40°C to +85°C.

### FEATURES

- **Supply Voltage Range: 2.7V to 5.5V**
- **SGM4917A: External Feedback Gain Network**  
**SGM4917B: Fixed -2V/V Gain**
- **Capless Structure**
  - ◆ **Eliminates Ground-Referenced Outputs**
  - ◆ **Eliminates Output DC-Blocking Capacitors**
  - ◆ **Provides Flat Frequency Response**
- **80mW into 32Ω Load from 5V Power Supply at THD+N = 0.1% (Typical, per Channel)**
- **THD+N = 0.02% (f = 1kHz)**
- **High PSRR: -78dB (at 217Hz)**
- **Quiescent Current: 2.7mA (TYP)**
- **Shutdown Control**
- **Short-Circuit and Thermal-Overload Protections**
- **Under-Voltage Lockout Function**
- **Enhanced Noise Cancellation by Differential Inputs**
- **-40°C to +85°C Operating Temperature Range**
- **Available in a Green TQFN-3×3-16L Package**

### APPLICATIONS

Smart Phones  
Portable Audio Equipment  
Notebook PCs  
PDAs

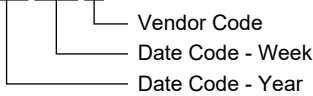
**PACKAGE/ORDERING INFORMATION**

MODEL	GAIN (V/V)	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM4917A	ADJ	TQFN-3x3-16L	-40°C to +85°C	SGM4917AYTQ16G/TR	4917AQ XXXXXX	Tape and Reel, 3000
SGM4917B	-2	TQFN-3x3-16L	-40°C to +85°C	SGM4917BYTQ16G/TR	4917BQ XXXXXX	Tape and Reel, 3000

**MARKING INFORMATION**

NOTE: XXXXXX = Date Code and Vendor Code.

**XXXXXX**



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**

- PV<sub>SS</sub> to SV<sub>SS</sub>.....-0.3V to +0.3V
- PGND to SGND .....-0.3V to +0.3V
- PV<sub>DD</sub> to SV<sub>DD</sub> .....-0.3V to +0.3V
- PV<sub>DD</sub> and SV<sub>DD</sub> to PGND or SGND .....-0.3V to +6V
- PV<sub>SS</sub> and SV<sub>SS</sub> to PGND or SGND .....-6V to +0.3V
- IN to SGND.....(SV<sub>SS</sub> - 0.3V) to (SV<sub>DD</sub> + 0.3V)
- SHDN to SGND.....-0.3V to (SV<sub>DD</sub> + 0.3V)
- OUT to SGND.....(SV<sub>SS</sub> - 0.3V) to (SV<sub>DD</sub> + 0.3V)
- C1P to PGND .....-0.3V to (PV<sub>DD</sub> + 0.3V)
- C1N to PGND ..... (PV<sub>SS</sub> - 0.3V) to + 0.3V
- Output Short Circuit to GND or V<sub>DD</sub> .....Continuous
- Junction Temperature..... +150°C
- Storage Temperature Range ..... -65°C to +150°C
- Lead Temperature (Soldering, 10s)..... +260°C
- ESD Susceptibility
- HBM..... 2000V
- HBM (Output pins to Supply and Ground pins)..... 4000V
- MM..... 150V

**RECOMMENDED OPERATING CONDITIONS**

- Supply Voltage Range ..... 2.7V 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.

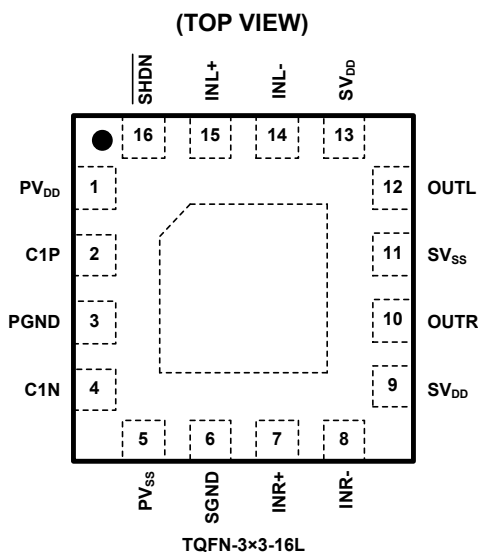
**ESD SENSITIVITY CAUTION**

This integrated circuit can be damaged if ESD protections are not considered carefully. 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 even small parametric changes could cause the device not to meet the published specifications.

**DISCLAIMER**

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

## PIN CONFIGURATION



## PIN DESCRIPTION

PIN	NAME	DESCRIPTION
1	PV <sub>DD</sub>	Charge-Pump Power Supply. Powers charge-pump inverter, charge-pump logic, and oscillator. Connect to positive supply (2.7V to 5.5V). Bypass with a 1μF capacitor to PGND as close to the pin as possible.
2	C1P	Positive Terminal for Flying Capacitor. Connect a 1μF capacitor to C1N.
3	PGND	Power Ground. Connect to ground.
4	C1N	Negative Terminal for Flying Capacitor. Connect a 1μF capacitor to C1P.
5	PV <sub>SS</sub>	Charge-Pump Output. Connect to SV <sub>SS</sub> .
6	SGND	Signal Ground. Connect to ground.
7	INR+	Noninverting Right-Channel Audio Input.
8	INR-	Inverting Right-Channel Audio Input.
9,13	SV <sub>DD</sub>	Amplifier Positive Power Supply. Connect to positive supply (2.7V to 5.5V). Bypass with a 1μF capacitor to SGND as close to the pin as possible.
10	OUTR	Output for Right-Channel.
11	SV <sub>SS</sub>	Amplifier Negative Power Supply. Connect to PV <sub>SS</sub> .
12	OUTL	Output for Left-Channel.
14	INL-	Inverting Left-Channel Audio Input.
15	INL+	Noninverting Left-Channel Audio Input.
16	SHDN	Active-Low Shutdown Input.
Exposed Pad	—	Exposed Pad. Can be connected to GND or left floating.

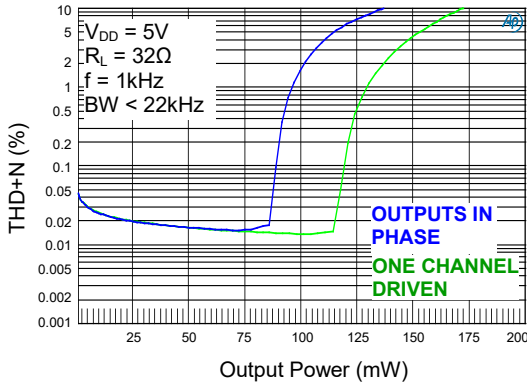
**ELECTRICAL CHARACTERISTICS**

( $P_{V_{DD}} = S_{V_{DD}} = 5V$ ,  $P_{GND} = S_{GND} = 0V$ ,  $\overline{SHDN} = S_{V_{DD}}$ ,  $C1 = C2 = 1\mu F$ ,  $R_L = \infty$ , resistive load referenced to ground; for SGM4917A, gain =  $-1V/V$  ( $R_{IN} = R_F = 10k\Omega$ ); for SGM4917B, gain =  $-2V/V$  (internally set).  $T_A = +25^\circ C$ , unless otherwise noted.)

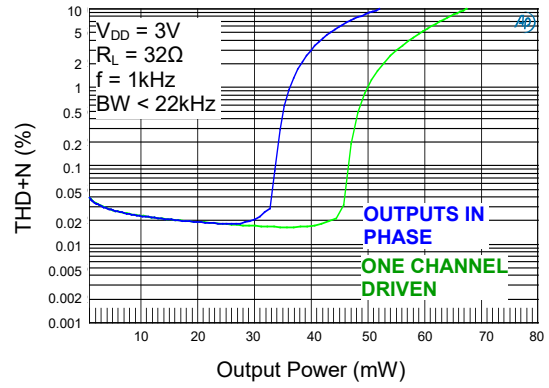
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
<b>General</b>						
Supply Voltage Range	$V_{DD}$		2.7		5.5	V
Quiescent Supply Current	$I_{DD}$			2.7	3.7	mA
Shutdown Supply Current	$I_{SHDN}$	$\overline{SHDN} = S_{GND} = P_{GND}$		0.01	8	$\mu A$
$\overline{SHDN}$ Input Logic High	$V_{IH}$		1.2			V
$\overline{SHDN}$ Input Logic Low	$V_{IL}$				0.4	V
$\overline{SHDN}$ to Full Operation Time	$t_{SON}$			3.2		ms
<b>Amplifiers</b>						
Voltage Gain	$A_V$	SGM4917B	-2.12	-2	-1.88	V/V
Gain Matching	$\Delta A_V$	SGM4917B, between the right and left channels		0.2		%
Output Offset Voltage	$V_{OS}$	Between IN+ and IN-, input AC-coupled to ground (SGM4917A)	-5.5	1.1	5.5	mV
Input Impedance	$R_{IN}$	SGM4917B, measured at INL and INR	12.5	14.6	17	k $\Omega$
Common Mode Rejection Ratio	CMRR	Input referred, SGM4917A		-70		dB
Power Supply Rejection Ratio	PSRR	$f = 217Hz$ , $V_{RIPPLE} = 200mV_{P-P}$		-78		dB
		$f = 10kHz$ , $V_{RIPPLE} = 200mV_{P-P}$		-70		
Output Power	$P_{OUT}$	$R_L = 32\Omega$ , THD+N = 0.1%		80		mW
Output Impedance in Shutdown				2		k $\Omega$
Total Harmonic Distortion Plus Noise	THD+N	$R_L = 32\Omega$ , $P_{OUT} = 55mW$ , $f = 1kHz$		0.02		%
Signal-to-Noise Ratio	SNR	$R_L = 32\Omega$ , $P_{OUT} = 20mW$ , BW < 20kHz		100		dB
Capacitive Drive	$C_L$	No sustained oscillation		200		pF
Charge-Pump Oscillator Frequency	$f_{OSC}$		200	350	500	kHz
Crosstalk		$R_L = 32\Omega$ , $V_{IN} = 200mV_{P-P}$ , $f = 10kHz$ $A_V = -1V/V$		90		dB
Thermal Shutdown Threshold				137		$^\circ C$
Thermal Shutdown Hysteresis				11		$^\circ C$

TYPICAL PERFORMANCE CHARACTERISTICS

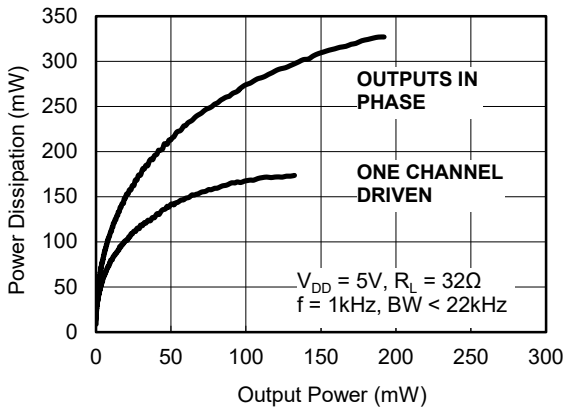
THD+N vs. Output Power



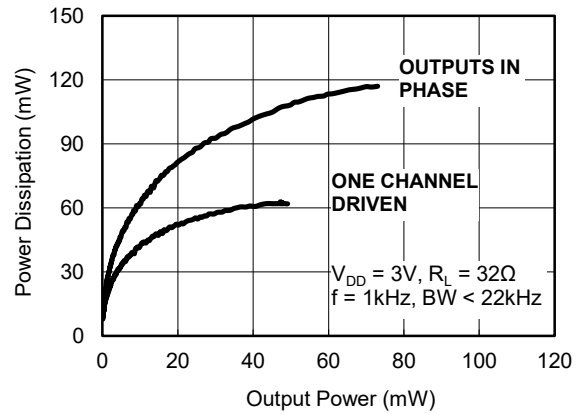
THD+N vs. Output Power



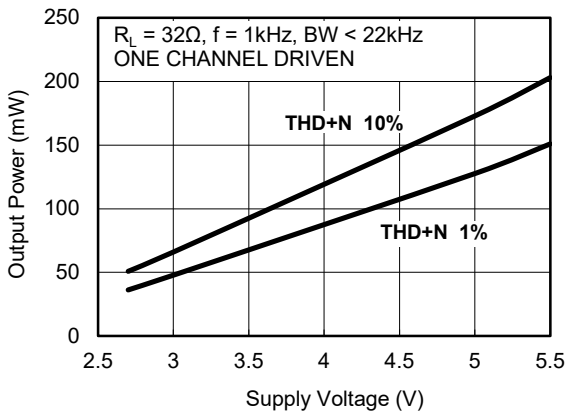
Power Dissipation vs. Output Power



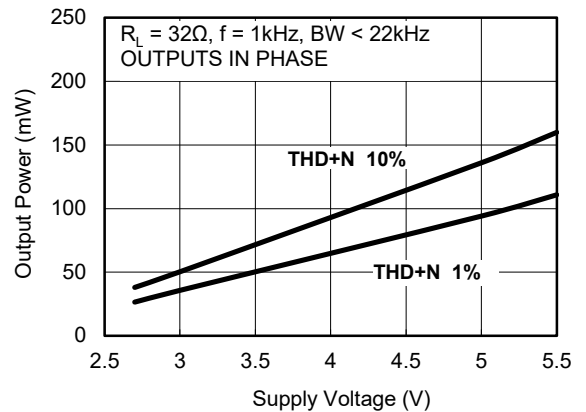
Power Dissipation vs. Output Power



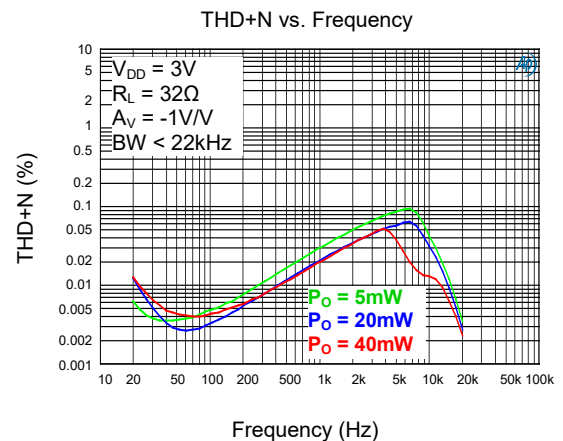
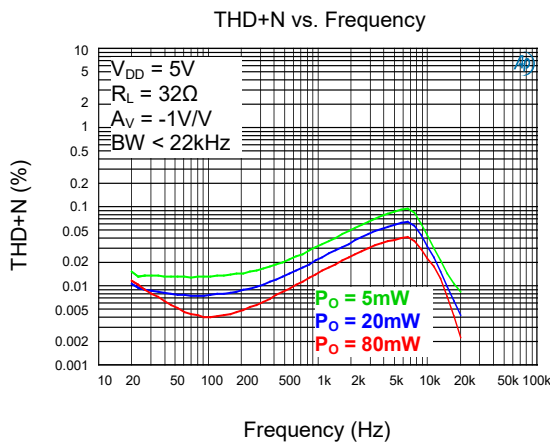
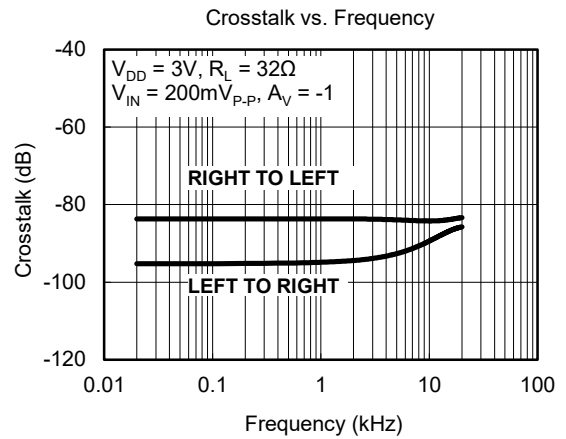
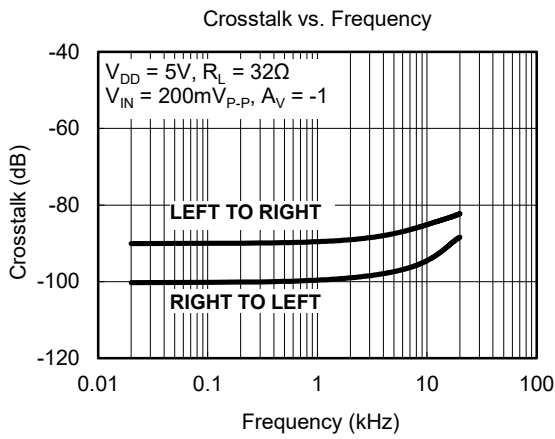
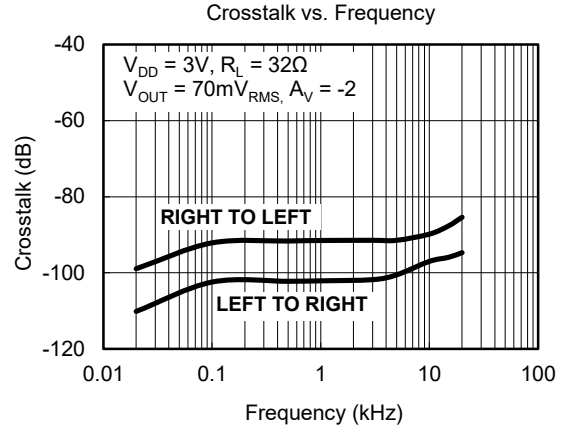
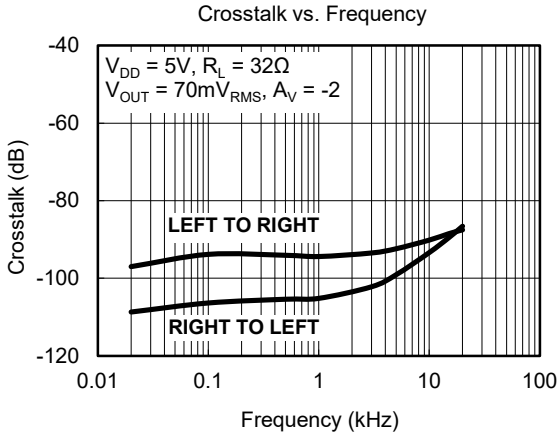
Output Power vs. Supply Voltage



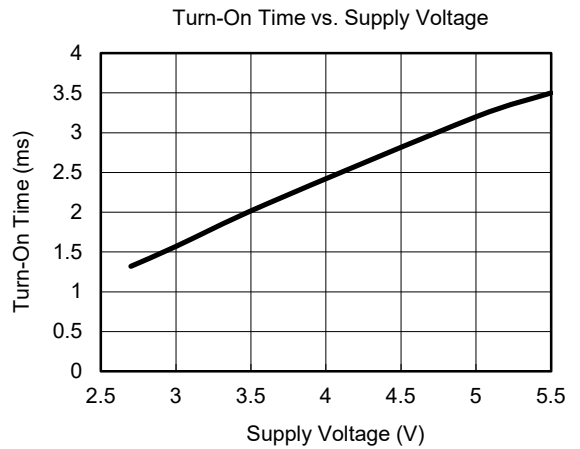
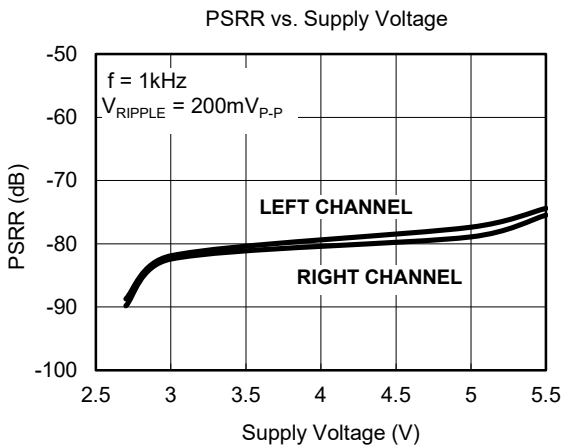
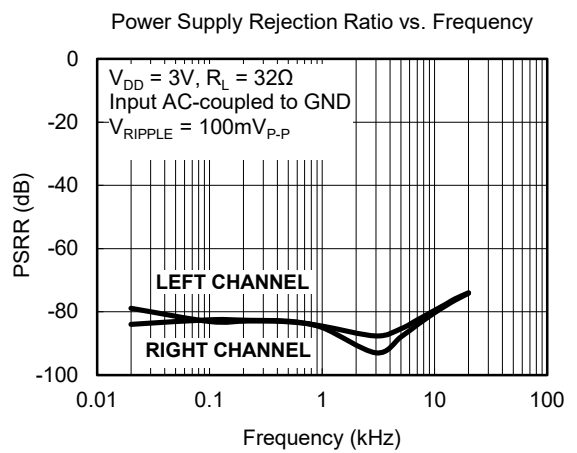
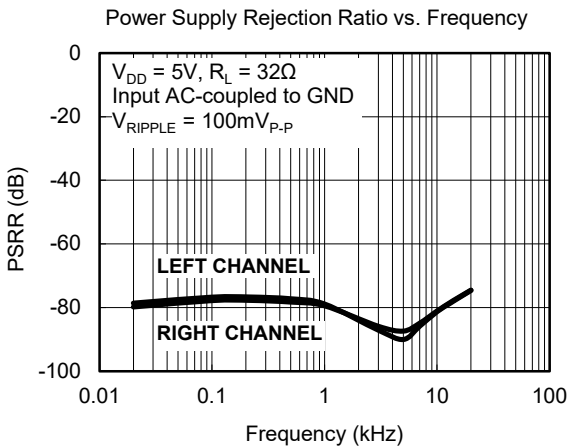
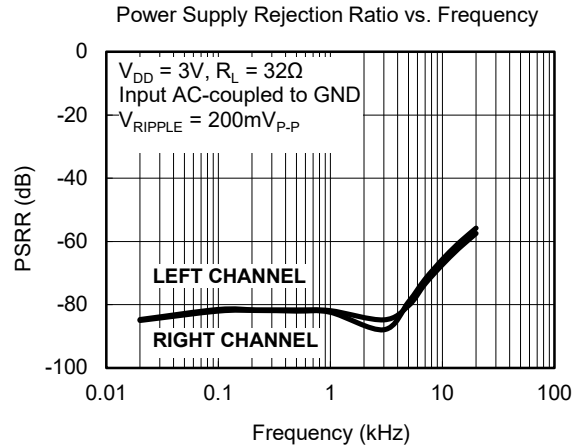
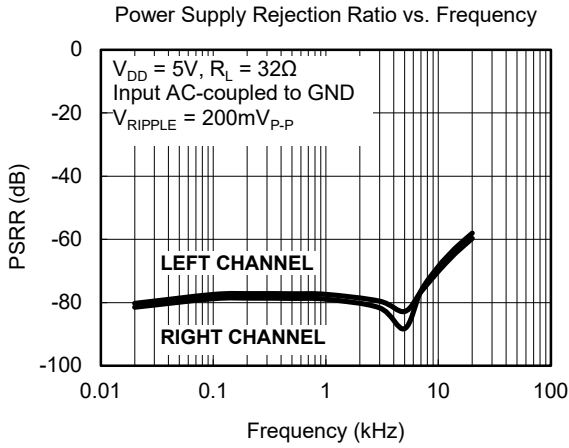
Output Power vs. Supply Voltage



TYPICAL PERFORMANCE CHARACTERISTICS (continued)



TYPICAL PERFORMANCE CHARACTERISTICS (continued)



**REVISION HISTORY**

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

**JULY 2017 – REV.A.2 to REV.A.3**

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Updated Typical Application Circuit ..... 8-9

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**DECEMBER 2012 – REV.A.1 to REV.A.2**

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Added note for Typical Application Circuit..... 8-9

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**SEPTEMBER 2012 – REV.A to REV.A.1**

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Added Tape and Reel Information ..... 11-12

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**Changes from Original (FEBRUARY 2012) to REV.A**

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

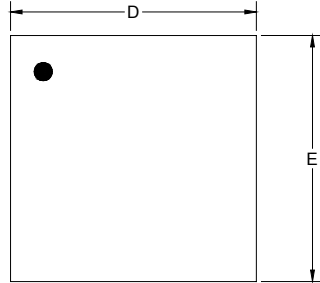
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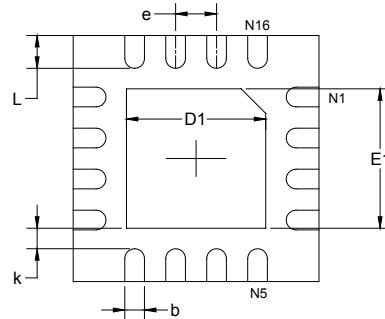
# PACKAGE INFORMATION

## PACKAGE OUTLINE DIMENSIONS

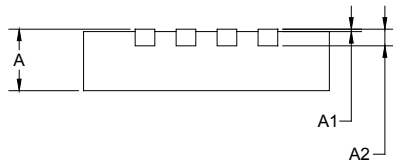
### TQFN-3×3-16L



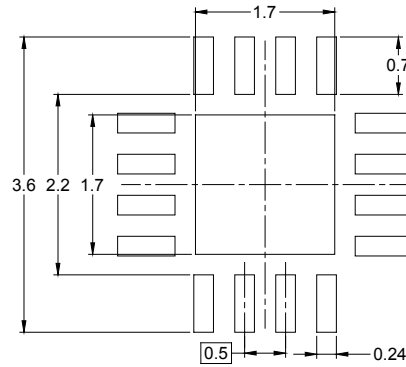
TOP VIEW



BOTTOM VIEW



SIDE VIEW



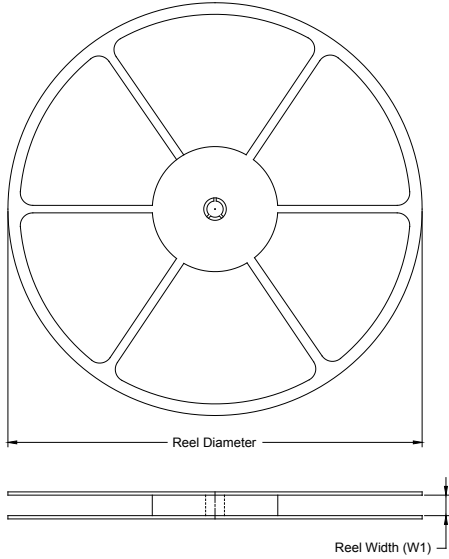
RECOMMENDED LAND PATTERN (Unit: mm)

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	1.600	1.800	0.063	0.071
E	2.900	3.100	0.114	0.122
E1	1.600	1.800	0.063	0.071
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

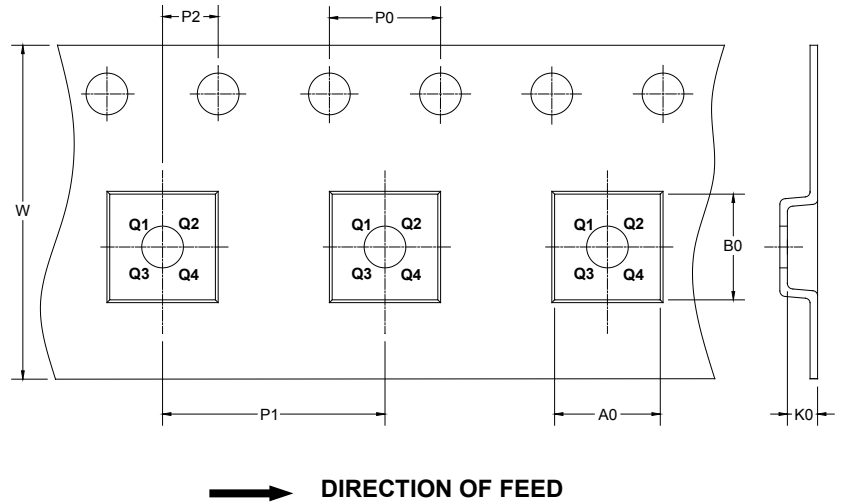
# PACKAGE INFORMATION

## 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
TQFN-3×3-16L	13"	12.4	3.35	3.35	1.13	4.0	8.0	2.0	12.0	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
13"	386	280	370	5

DD0002