



SGM4918

80mW, Capless, Stereo Headphone Amplifier with Shutdown

GENERAL DESCRIPTION

The SGM4918 is stereo headphone amplifier which is designed for portable applications and can operate from a 2.7V to 5.1V 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 SGM4918B, the internal gain setting (-2V/V) is to further reduce component count. For SGM4918A, the gain can be adjusted by external feedback resistors.

The SGM4918 has low quiescent current 5.8mA at 5V supply, low 0.03% 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 SGM4918 is available in a Green TQFN-3×3-10L package. It operates over an ambient temperature range of -40°C to +85°C.

FEATURES

- **Supply Voltage Range: 2.7V to 5.1V**
- **SGM4918A: External Feedback Gain Network**
SGM4918B: 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 = 0.03% (f = 1kHz)**
- **High PSRR: -78dB (at 217Hz)**
- **Quiescent Current: 5.8mA (TYP)**
- **Shutdown Control**
- **Short-Circuit and Thermal-Overload Protections**
- **Under-Voltage Lockout Function**
- **-40°C to +85°C Operating Temperature Range**
- **Available in a Green TQFN-3×3-10L Package**

APPLICATIONS

Smart Phones
Portable Audio Equipment
Notebook PCs
PDAs

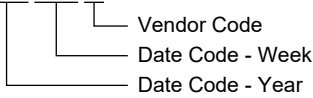
PACKAGE/ORDERING INFORMATION

MODEL	GAIN (V/V)	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM4918A	ADJ	TDFN-3x3-10L	-40°C to +85°C	SGM4918AYD10G/TR	SGM 4918AD XXXXX	Tape and Reel, 3000
SGM4918B	-2	TDFN-3x3-10L	-40°C to +85°C	SGM4918BYD10G/TR	SGM 4918BD XXXXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XXXXX = Date Code and Vendor Code.

XXXXX



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

- V_{DD} to GND -0.3V to +6V
- C1P to GND -0.3V to (V_{DD} + 0.3V)
- C1N to GND (V_{SS} - 0.3V) to + 0.3V
- V_{SS} to GND -6V to +0.3V
- OUTR, OUTL to GND (V_{SS} - 0.3V) to (V_{DD} + 0.3V)
- SHDN to GND -0.3V to +6V
- INR, INL to GND (V_{SS} - 0.3V) to (V_{DD} + 0.3V)
- Output Short Circuit to GND or VDD Continuous
- Junction Temperature +150°C
- Storage Temperature Range -65°C to +150°C
- Lead Temperature (Soldering, 10s) +260°C
- ESD Susceptibility
- HBM 3000V
- HBM (Output pins to Supply and Ground pins) 4000V
- MM 200V

RECOMMENDED OPERATING CONDITIONS

- Supply Voltage Range 2.7V to 5.1V
- 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.

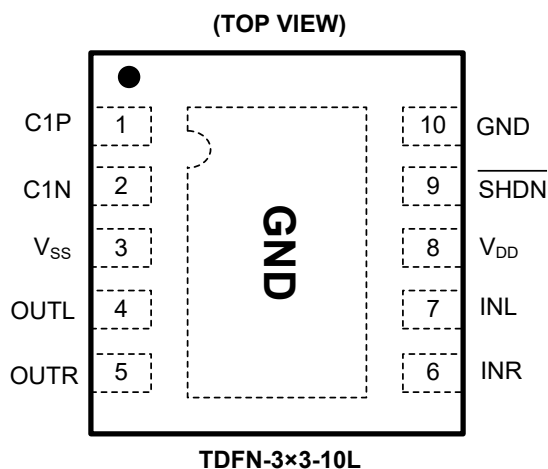
ESD SENSITIVITY CAUTION

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 DESCRIPTIONS

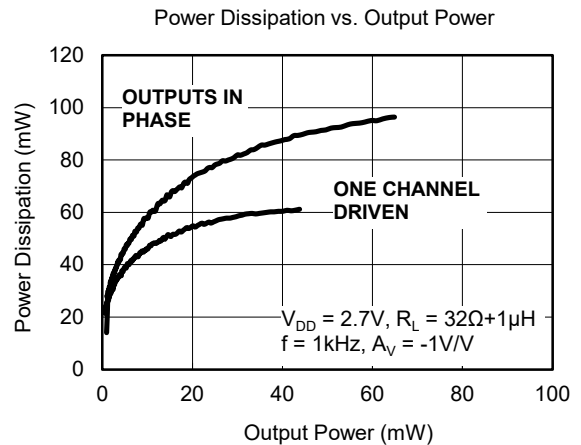
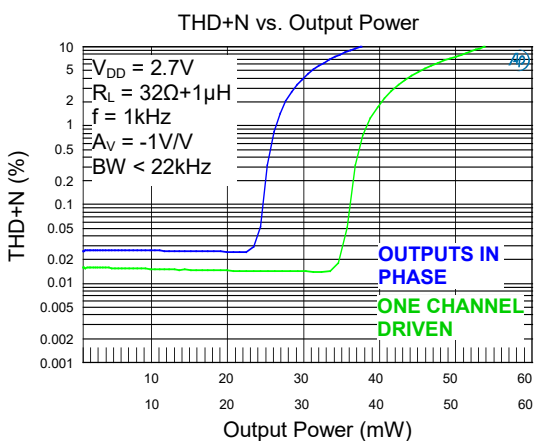
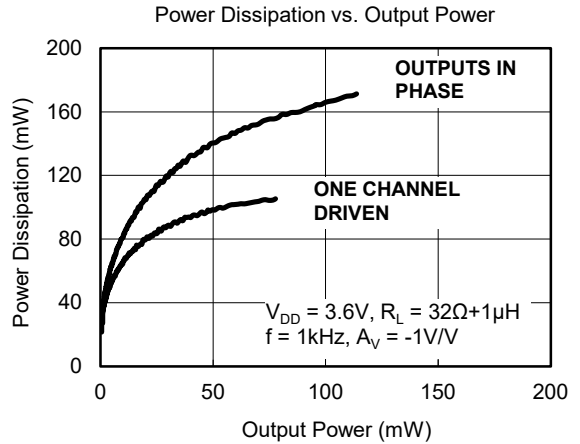
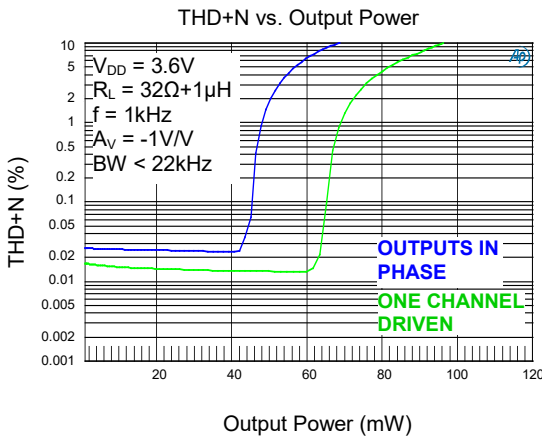
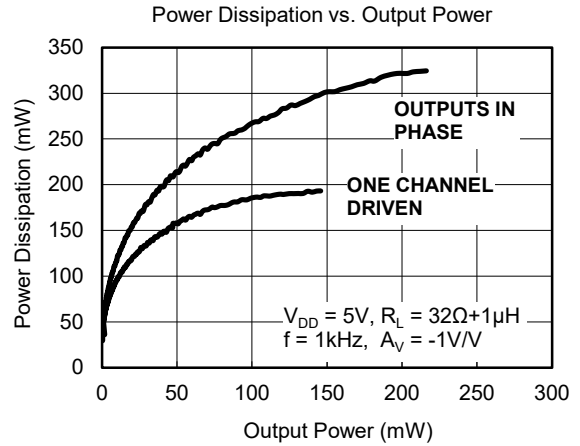
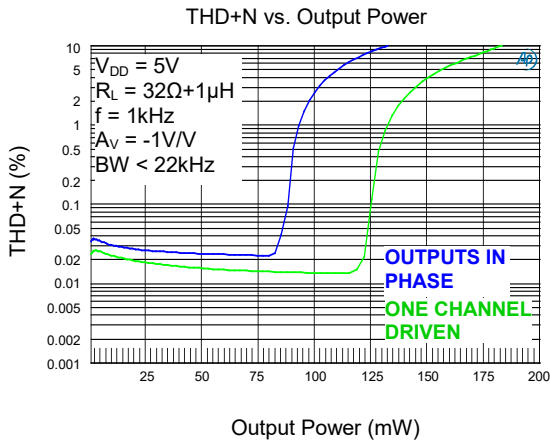
PIN	NAME	DESCRIPTION
1	C1P	Positive Terminal for Flying Capacitor. Connect a 1 μ F capacitor to C1N.
2	C1N	Negative Terminal for Flying Capacitor. Connect a 1 μ F capacitor to C1P.
3	VSS	Charge-Pump Output. Bypass with a 1 μ F capacitor to GND.
4	OUTL	Output for Left-Channel.
5	OUTR	Output for Right-Channel.
6	INR	Input for Right-Channel.
7	INL	Input for Left-Channel.
8	VDD	Positive Power-Supply Input. Bypass with 4.7 μ F and 0.1 μ F capacitor to GND.
9	$\overline{\text{SHDN}}$	Active-Low Shutdown Input.
10	GND	Signal Ground.
Exposed Pad	GND	Exposed Pad. Can be connected to GND or left floating.

ELECTRICAL CHARACTERISTICS

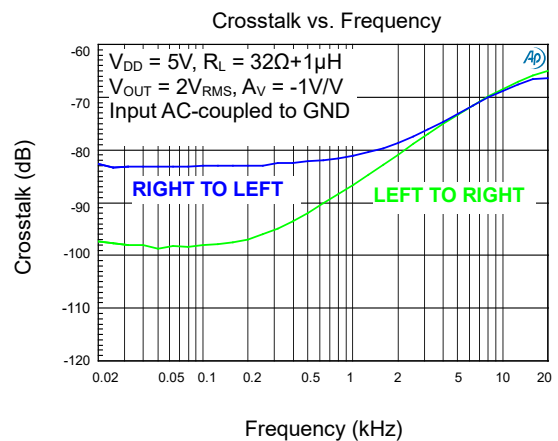
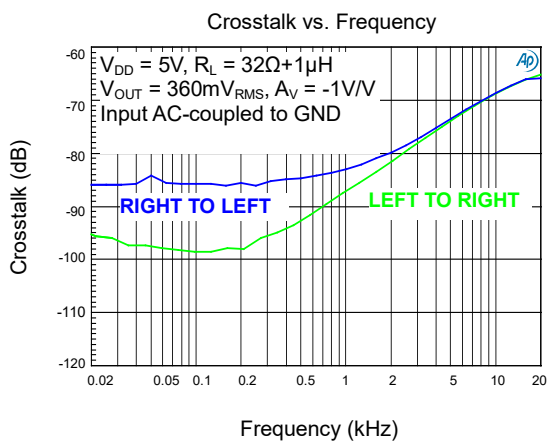
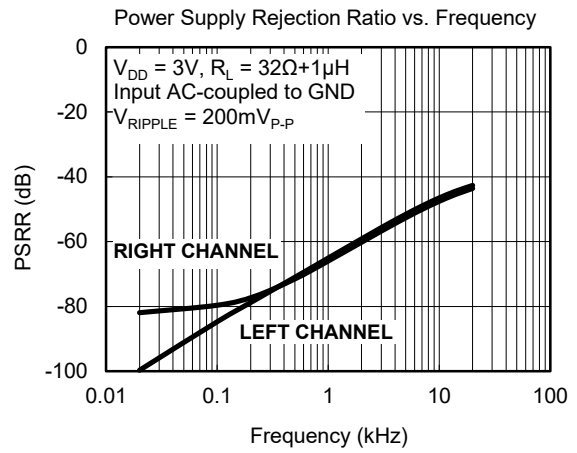
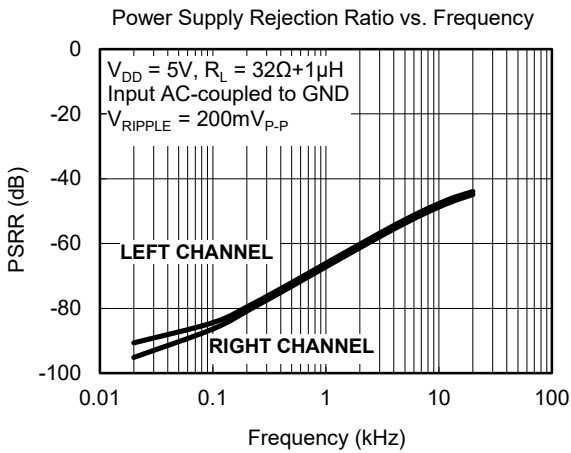
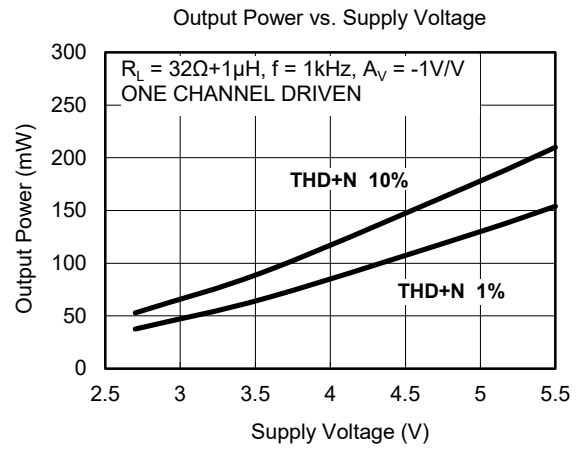
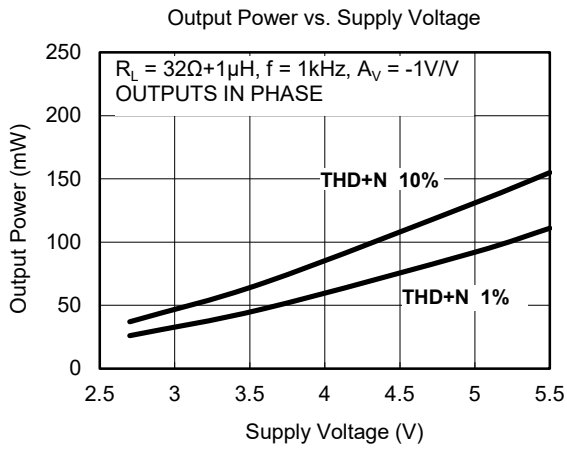
($T_A = +25^\circ\text{C}$, $V_{DD} = \overline{\text{SHDN}} = 5\text{V}$, $V_{GND} = 0\text{V}$, $R_{IN} = R_F = 40\text{k}\Omega$ (gain = -1V/V), $C_1 = C_2 = 1\mu\text{F}$, $C_3 = 4.7\mu\text{F}$, $C_4 = 0.1\mu\text{F}$, $R_L = \infty$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
General							
Supply Voltage Range	V_{DD}			2.7		5.1	V
Under-Voltage Lockout	UVLO				2.2		V
Quiescent Supply Current	I_{DD}	$\overline{\text{SHDN}} = V_{DD}$	$V_{DD} = 3.3\text{V}$		5.5		mA
			$V_{DD} = 5\text{V}$		5.8	8.2	
Shutdown Supply Current	I_{SHDN}	$\overline{\text{SHDN}} = 0\text{V}$			0.01	3	μA
$\overline{\text{SHDN}}$ Input Logic High	V_{IH}			1.2			V
$\overline{\text{SHDN}}$ Input Logic Low	V_{IL}					0.4	V
Turn-On Time	t_{ON}	$V_{DD} = 5\text{V}$			2.8		ms
Amplifiers							
Output Offset Voltage	V_{OS}	Input AC-coupled to ground	$V_{DD} = 3.3\text{V}$		1.0		mV
			$V_{DD} = 5\text{V}$	-5.5	1.2	5.5	
Power Supply Rejection Ratio	PSRR	$V_{DD} = 5\text{V}$	$f = 217\text{Hz}$, $V_{RIPPLE} = 200\text{mV}_{P-P}$		-78		dB
			$f = 1\text{kHz}$, $V_{RIPPLE} = 200\text{mV}_{P-P}$		-68		
			$f = 20\text{kHz}$, $V_{RIPPLE} = 200\text{mV}_{P-P}$		-63		
Output Power	P_{OUT}	$R_L = 32\Omega + 1\mu\text{H}$, $f = 1\text{kHz}$, $\text{THD+N} = 0.1\%$	$V_{DD} = 3.6\text{V}$		40		mW
			$V_{DD} = 5\text{V}$		80		
Output Impedance in Shutdown		$\overline{\text{SHDN}} = 0\text{V}$			2		k Ω
Total Harmonic Distortion Plus Noise	THD+N	$V_{DD} = 3.6\text{V}$	$R_L = 32\Omega + 1\mu\text{H}$, $f = 1\text{kHz}$ $P_{OUT} = 10\text{mW}$		0.02		%
		$V_{DD} = 5\text{V}$	$R_L = 32\Omega + 1\mu\text{H}$, $f = 1\text{kHz}$ $P_{OUT} = 20\text{mW}$		0.03		
Signal-to-Noise Ratio	SNR	$V_{DD} = 5\text{V}$, $R_L = 32\Omega + 1\mu\text{H}$, $P_{OUT} = 25\text{mW}$, $\text{BW} < 22\text{kHz}$			100		dB
Crosstalk		L to R, R to L, $f = 10\text{kHz}$	$R_L = 32\Omega + 1\mu\text{H}$, $V_{OUT} = 360\text{mV}_{RMS}$		68		dB
			$R_L = 32\Omega + 1\mu\text{H}$, $V_{OUT} = 2\text{V}_{RMS}$		68		
Capacitive Drive	C_L	No sustained oscillations			200		pF
Charge-Pump Oscillator Frequency	f_{OSC}			200	345	515	kHz
Thermal Shutdown Threshold					140		$^\circ\text{C}$
Thermal Shutdown Hysteresis					15		$^\circ\text{C}$

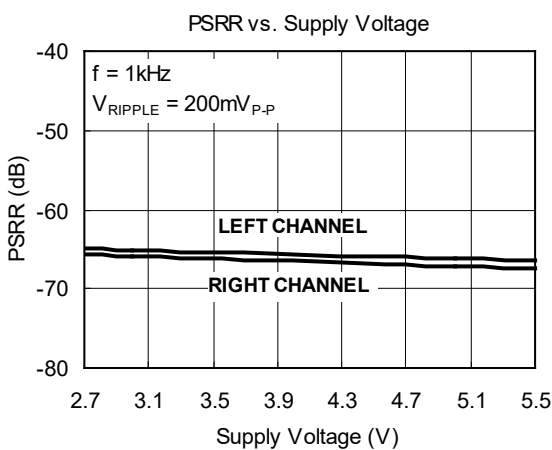
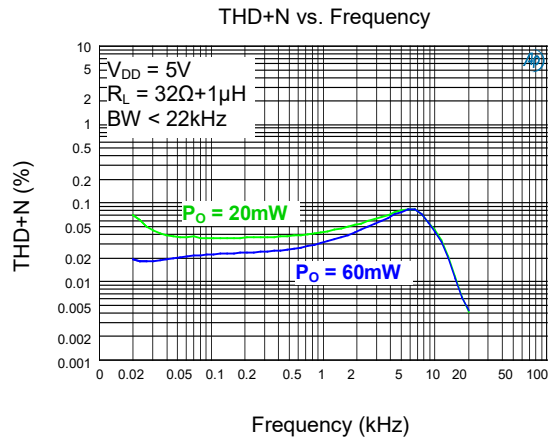
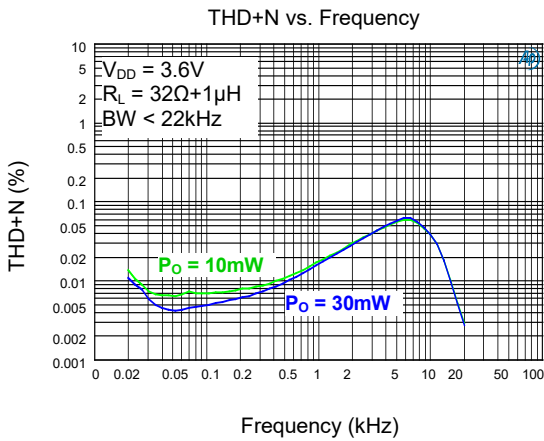
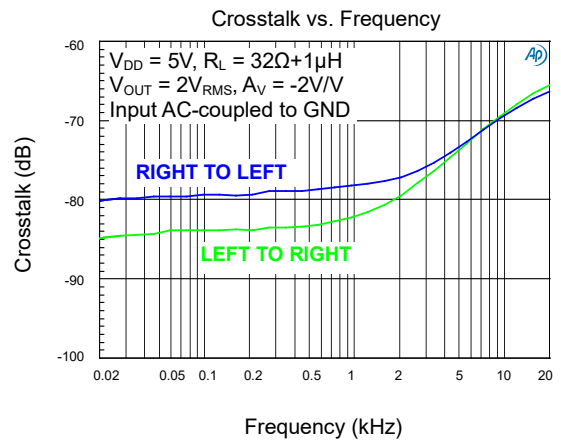
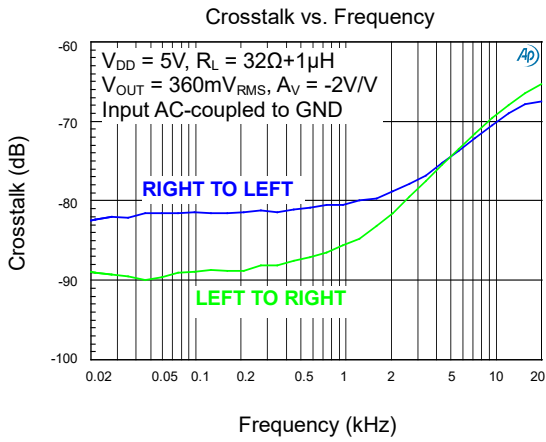
TYPICAL PERFORMANCE CHARACTERISTICS



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.

MARCH 2014 – REV.A.3 to REV.A.4

Changed V_{CC} All

AUGUST 2013 – REV.A.2 to REV.A.3

Updated ELECTRICAL CHARACTERISTICS and TYPICAL PERFORMANCE CHARACTERISTICS 4, 6, 7

NOVEMBER 2012 – REV.A.1 to REV.A.2

Added note for Typical Application Circuit 8

SEPTEMBER 2012 – REV.A to REV.A.1

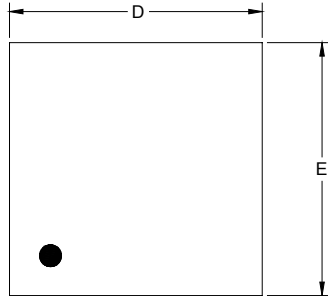
Added Tape and Reel Information 11, 12

Changes from Original (FEBRUARY 2012) to REV.A

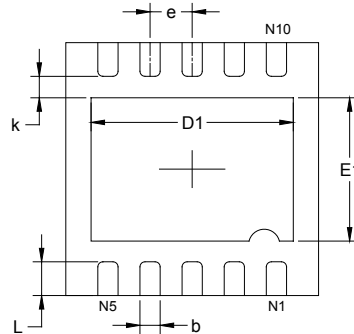
Changed from product preview to production data All

PACKAGE OUTLINE DIMENSIONS

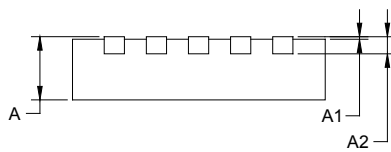
TDFN-3x3-10L



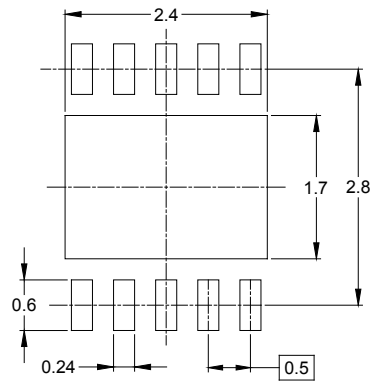
TOP VIEW



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	2.300	2.600	0.091	0.103
E	2.900	3.100	0.114	0.122
E1	1.500	1.800	0.059	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
TDFN-3×3-10L	13"	12.4	3.35	3.35	1.13	4.0	8.0	2.0	12.0	Q1

000001

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