SGM4808B
Wide Power Supply Range Audio Click-Pop Noise Eliminator

GENERAL DESCRIPTION

The SGM4808B is an audio click-pop eliminator which can operate from a 2.7V to 12V single power supply. It is designed for HiFi audio system or portable devices.

The SGM4808B allows $-V_{CC}$ to $+V_{CC}$ wide range audio signals passing with low distortion. An external processor can eliminate the click-pop noise.

The SGM4808B is available in a Green TQFN-2.6×1.8-16L package. It operates over an ambient temperature range of -40℃ to +85℃.

FEATURES

- **Supply Voltage Range: 2.7V to 12V**
- **Low On-Resistance: 1Ω (TYP)**
- **$-V_{CC}$ to $+V_{CC}$ Rail-to-Rail Low Distortion Audio Signals Passing**
- **Fast Switching Times**
- **High Off-Isolation**
- **Low Crosstalk**
- **1.8V Logic Control**
- **-40℃ to +85℃ Operating Temperature Range**
- **Available in a Green TQFN-2.6×1.8-16L Package**

APPLICATIONS

HiFi Audio System

Portable Equipment

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM4808B	TQFN-2.6×1.8-16L	-40℃ to +85℃	SGM4808BYTQA16G/TR	4808B XXXXX	Tape and Reel, 3000

NOTE: XXXXX = Date Code and Vendor Code.

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_{CC} to GND ..... 0V to 13.2V
$\overline{MUTER}$, $\overline{MUTEL}$, EN to GND ..... 0V to 6V
Passing Audio Signals Range (1)
..... ($-V_{CC}$ - 0.3V) to (V_{CC} + 0.3V)
Continuous Current ..... ±200mA
Peak Current ..... ±250mA
I/O Clamp Current (V_I < 0) ..... -30mA
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM 7000V
MM 300V
CDM 1000V

NOTE:
1. Signals on RIN, LIN, ROUT, LOUT, exceeding V_{CC} will be clamped by internal diodes. Limit forward diode current to maximum current ratings.

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range ..... 2.7V to 12V
Operating Temperature Range ..... -40℃ to +85℃

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

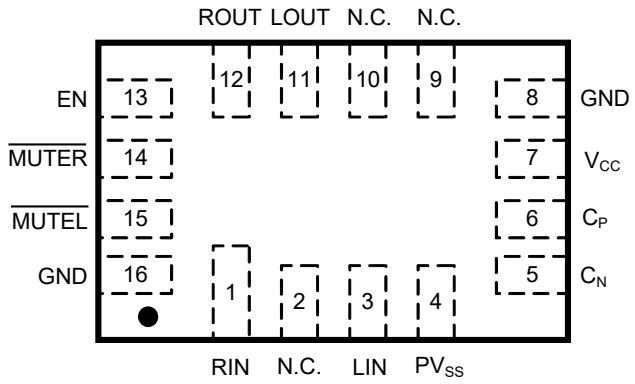
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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

(TOP VIEW)



TQFN-2.6×1.8-16L

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	RIN	Right Channel Audio Signals Input.
2, 9, 10	N.C.	No Connection.
3	LIN	Left Channel Audio Signals Input.
4	PV_{SS}	Negative Supply Voltage Output. Connect one 0.1μF ceramic capacitor from PV_{SS} to GND.
5	C_N	Negative Terminal for Charge Pump Flying Capacitor.
6	C_P	Positive Terminal for Charge Pump Flying Capacitor.
7	V_{CC}	Power Supply.
8, 16	GND	Ground.
11	LOUT	Left Channel Audio Signals Output.
12	ROUT	Right Channel Audio Signals Output.
13	EN	Enable Control. When EN = “Low”, both RIN to ROUT and LIN to LOUT channels will be disconnected, negative charge pump doesn’t work, the SGM4808B will be in shutdown state. When EN = “High”, negative charge pump will work, the SGM4808B will be in working state, whether the audio signals channel works depends on the logical state of $\overline{\text{MUTER}}$ or $\overline{\text{MUTEL}}$.
14	$\overline{\text{MUTER}}$	Digital Control Pin to Mute Right Audio Signals Channel.
15	$\overline{\text{MUTEL}}$	Digital Control Pin to Mute Left Audio Signals Channel.

FUNCTION TABLE

Table 1. Function Table:

EN	$\overline{\text{MUTER}}$	RIGHT CHANNEL WORKING STATE	NEGATIVE CHARGE PUMP
0	X	Shutdown	Turn off
1	0	Mute	Turn on
1	1	Active	Turn on

Table 2. Function Table:

EN	$\overline{\text{MUTEL}}$	LEFT CHANNEL WORKING STATE	NEGATIVE CHARGE PUMP
0	X	Shutdown	Turn off
1	0	Mute	Turn on
1	1	Active	Turn on

ELECTRICAL CHARACTERISTICS

(V_{CC} = 3.3V, Full = -40℃ to +85℃. Typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Analog Switch							
Analog Signal Range	V_{RIN}, V_{LIN}, V_{ROUT}, V_{LOUT}		Full	$-V_{CC}$		$+V_{CC}$	V
On-Resistance	R_{ON}	$-V_{CC} \le V_{RIN}$ or $V_{LIN} \le V_{CC}$ - 3V, I_{ROUT} or I_{LOUT} = -50mA, Test Circuit 1	+25℃		1	1.25	Ω
			Full			1.7	
On-Resistance Match between Channels	ΔR_{ON}	$-V_{CC} \le V_{RIN}$ or $V_{LIN} \le V_{CC}$ - 3V, I_{ROUT} or I_{LOUT} = -50mA, Test Circuit 1	+25℃		0.03	0.09	Ω
			Full			0.12	
On-Resistance Flatness	$R_{FLAT(ON)}$	$-V_{CC} \le V_{RIN}$ or $V_{LIN} \le V_{CC}$ - 3V, I_{ROUT} or I_{LOUT} = -50mA, Test Circuit 1	+25℃		0.05	0.1	Ω
			Full			0.13	
Digital Inputs							
Input High Voltage	V_{INH}	V_{CC} = 2.7V to 12V	Full	1.4		5.5	V
Input Low Voltage	V_{INL}	V_{CC} = 2.7V to 12V	Full			0.4	V
Pull-Down Resistor	$R_{PULL\ DOWN}$		+25℃		600		kΩ
Dynamic Characteristics							
Turn-On Time	t_{ON}	V_{RIN} or V_{LIN} = 1.0V, R_L = 50Ω, C_L = 35pF, Test Circuit 2	+25℃		200		ns
Turn-Off Time	t_{OFF}	V_{RIN} or V_{LIN} = 1.0V, R_L = 50Ω, C_L = 35pF, Test Circuit 2	+25℃		60		ns
Off Isolation	O_{ISO}	f = 1kHz, R_L = 32Ω, Signal = 0dBm, Test Circuit 3	+25℃		-120		dB
		f = 1MHz, R_L = 50Ω, Signal = 0dBm, C_L = 5pF, Test Circuit 3			-80		
Channel-to-Channel Crosstalk	X_{TALK}	f = 1kHz, R_L = 32Ω, Signal = 0dBm, Test Circuit 4	+25℃		-110		dB
		f = 1MHz, R_L = 50Ω, Signal = 0dBm, C_L = 5pF, Test Circuit 4			-75		
-3dB Bandwidth	BW	Signal = 0dBm, R_L = 50Ω, C_L = 5pF, Test Circuit 5	+25℃		160		MHz
Channel ON Capacitance	C_{ON}		+25℃		30		pF
Charge Injection	Q	V_G = GND, R_G = 0Ω, C_L = 1.0nF, Test Circuit 6	+25℃		500		pC
Total Harmonic Distortion + Noise	THD+N	A-Weighting, Test Circuit 7	+25℃				dB
		V_{RIN} or V_{LIN} = $2V_{PP}$, R_L = 600Ω			-80		
		V_{RIN} or V_{LIN} = $2V_{PP}$, R_L = 32Ω			-67		
		V_{RIN} or V_{LIN} = $1V_{PP}$, R_L = 600Ω			-90		
		V_{RIN} or V_{LIN} = $1V_{PP}$, R_L = 32Ω			-78		
		V_{RIN} or V_{LIN} = $0.5V_{PP}$, R_L = 600Ω			-98		
		V_{RIN} or V_{LIN} = $0.5V_{PP}$, R_L = 32Ω			-85		
Start-Up Time	t_{START}	Switch V_{EN} = 0V to V_{EN} = 1.4V	+25℃		0.2		ms

ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = 5V, Full = -40℃ to +85℃. Typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Analog Switch							
Analog Signal Range	V_{RIN}, V_{LIN}, V_{ROUT}, V_{LOUT}		Full	$-V_{CC}$		$+V_{CC}$	V
On-Resistance	R_{ON}	$-V_{CC} \le V_{RIN}$ or $V_{LIN} \le V_{CC}$ - 3V, I_{ROUT} or I_{LOUT} = -50mA, Test Circuit 1	+25℃		1	1.25	Ω
			Full			1.7	
On-Resistance Match between Channels	ΔR_{ON}	$-V_{CC} \le V_{RIN}$ or $V_{LIN} \le V_{CC}$ - 3V, I_{ROUT} or I_{LOUT} = -50mA, Test Circuit 1	+25℃		0.03	0.09	Ω
			Full			0.12	
On-Resistance Flatness	$R_{FLAT(ON)}$	$-V_{CC} \le V_{RIN}$ or $V_{LIN} \le V_{CC}$ - 3V, I_{ROUT} or I_{LOUT} = -50mA, Test Circuit 1	+25℃		0.05	0.1	Ω
			Full			0.13	
Channel ON Leakage Current	$I_{RIN(ON)}$, $I_{LIN(ON)}$, $I_{ROUT(ON)}$, $I_{LOUT(ON)}$	V_{RIN} or V_{LIN} = -4.5V, 4.5V, V_{ROUT} or V_{LOUT} = floating, or V_{RIN} or V_{LIN} = floating, V_{ROUT} or V_{LOUT} = -4.5V, 4.5V	+25℃		0.01	0.4	μA
			Full			1	
Digital Inputs							
Input High Voltage	V_{INH}	V_{CC} = 2.7V to 12V	Full	1.4		5.5	V
Input Low Voltage	V_{INL}	V_{CC} = 2.7V to 12V	Full			0.4	V
Pull-Down Resistor	$R_{PULL\ DOWN}$		+25℃		600		kΩ
Dynamic Characteristics							
Turn-On Time	t_{ON}	V_{RIN} or V_{LIN} = 1.0V, R_L = 50Ω, C_L = 35pF, Test Circuit 2	+25℃		200		ns
Turn-Off Time	t_{OFF}	V_{RIN} or V_{LIN} = 1.0V, R_L = 50Ω, C_L = 35pF, Test Circuit 2	+25℃		60		ns
Off Isolation	O_{ISO}	f = 1kHz, R_L = 32Ω, Signal = 0dBm, Test Circuit 3	+25℃		-120		dB
		f = 1MHz, R_L = 50Ω, Signal = 0dBm, C_L = 5pF, Test Circuit 3			-80		
Channel-to-Channel Crosstalk	X_{TALK}	f = 1kHz, R_L = 32Ω, Signal = 0dBm, Test Circuit 4	+25℃		-110		dB
		f = 1MHz, R_L = 50Ω, Signal = 0dBm, C_L = 5pF, Test Circuit 4			-75		
-3dB Bandwidth	BW	Signal = 0dBm, R_L = 50Ω, C_L = 5pF, Test Circuit 5	+25℃		160		MHz
Channel ON Capacitance	C_{ON}		+25℃		30		pF
Charge Injection	Q	V_G = GND, R_G = 0Ω, C_L = 1.0nF, Test Circuit 6	+25℃		600		pC
Total Harmonic Distortion + Noise	THD+N	A-Weighting, Test Circuit 7; V_{RIN} or V_{LIN} = $2V_{PP}$, R_L = 600Ω	+25℃		-115		dB
		A-Weighting, Test Circuit 7; V_{RIN} or V_{LIN} = $2V_{PP}$, R_L = 32Ω			-113		
		A-Weighting, Test Circuit 7; V_{RIN} or V_{LIN} = $1V_{PP}$, R_L = 600Ω			-110		
		A-Weighting, Test Circuit 7; V_{RIN} or V_{LIN} = $1V_{PP}$, R_L = 32Ω			-110		
		A-Weighting, Test Circuit 7; V_{RIN} or V_{LIN} = $0.5V_{PP}$, R_L = 600Ω			-107		
		A-Weighting, Test Circuit 7; V_{RIN} or V_{LIN} = $0.5V_{PP}$, R_L = 32Ω			-105		
Start-Up Time	t_{START}	Switch V_{EN} = 0V to V_{EN} = 1.4V	+25℃		0.2		ms
Power Requirements							
Power Supply Current	I_{CC}	V_{EN} = 1.4V	+25℃		300	415	μA
			Full			420	
Power Supply Current in Shutdown State	I_{CC}	V_{EN} = 0V	+25℃		0.3	0.8	μA
			Full			1.2	

ELECTRICAL CHARACTERISTICS (continued)

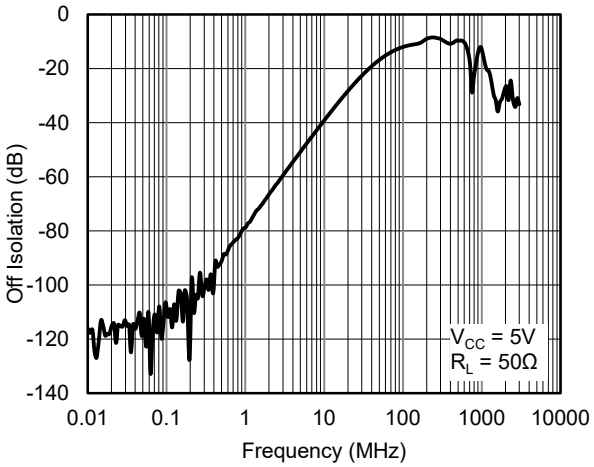
(V_{CC} = 12V, Full = -40℃ to +85℃. Typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Analog Switch							
Analog Signal Range	V_{RIN}, V_{LIN}, V_{ROUT}, V_{LOUT}		Full	$-V_{CC}$		$+V_{CC}$	V
On-Resistance	R_{ON}	$-V_{CC} \le V_{RIN}$ or $V_{LIN} \le V_{CC}$ - 3V, I_{ROUT} or I_{LOUT} = -50mA, Test Circuit 1	+25℃		1	1.25	Ω
			Full			1.7	
On-Resistance Match between Channels	ΔR_{ON}	$-V_{CC} \le V_{RIN}$ or $V_{LIN} \le V_{CC}$ - 3V, I_{ROUT} or I_{LOUT} = -50mA, Test Circuit 1	+25℃		0.03	0.09	Ω
			Full			0.13	
On-Resistance Flatness	$R_{FLAT(ON)}$	$-V_{CC} \le V_{RIN}$ or $V_{LIN} \le V_{CC}$ - 3V, I_{ROUT} or I_{LOUT} = -50mA, Test Circuit 1	+25℃		0.05	0.1	Ω
			Full			0.12	
Channel ON Leakage Current	$I_{RIN(ON)}$, $I_{LIN(ON)}$, $I_{ROUT(ON)}$, $I_{LOUT(ON)}$	V_{RIN} or V_{LIN} = -11.5V, 11.5V, V_{ROUT} or V_{LOUT} = floating, or V_{RIN} or V_{LIN} = floating, V_{ROUT} or V_{LOUT} = -11.5V, 11.5V	+25℃		0.05	1	μA
			Full			3	
Digital Inputs							
Input High Voltage	V_{INH}	V_{CC} = 2.7V to 12V	Full	1.4		5.5	V
Input Low Voltage	V_{INL}	V_{CC} = 2.7V to 12V	Full			0.4	V
Pull-Down Resistor	$R_{PULL\ DOWN}$		+25℃		600		kΩ
Dynamic Characteristics							
Turn-On Time	t_{ON}	V_{RIN} or V_{LIN} = 1.0V, R_L = 50Ω, C_L = 35pF, Test Circuit 2	+25℃		200		ns
Turn-Off Time	t_{OFF}	V_{RIN} or V_{LIN} = 1.0V, R_L = 50Ω, C_L = 35pF, Test Circuit 2	+25℃		60		ns
Off Isolation	O_{ISO}	f = 1kHz, R_L = 32Ω, Signal = 0dBm, Test Circuit 3	+25℃		-120		dB
		f = 1MHz, R_L = 50Ω, Signal = 0dBm, C_L = 5pF, Test Circuit 3			-80		
Channel-to-Channel Crosstalk	X_{TALK}	f = 1kHz, R_L = 32Ω, Signal = 0dBm, Test Circuit 4	+25℃		-110		dB
		f = 1MHz, R_L = 50Ω, Signal = 0dBm, C_L = 5pF, Test Circuit 4			-75		
-3dB Bandwidth	BW	Signal = 0dBm, R_L = 50Ω, C_L = 5pF, Test Circuit 5	+25℃		160		MHz
Channel ON Capacitance	C_{ON}		+25℃		30		pF
Charge Injection	Q	V_G = GND, R_G = 0Ω, C_L = 1.0nF, Test Circuit 6	+25℃		800		pC
Total Harmonic Distortion + Noise	THD+N	A-Weighting, Test Circuit 7; V_{RIN} or V_{LIN} = $2V_{PP}$, R_L = 600Ω	+25℃		-115		dB
		A-Weighting, Test Circuit 7; V_{RIN} or V_{LIN} = $2V_{PP}$, R_L = 32Ω			-113		
		A-Weighting, Test Circuit 7; V_{RIN} or V_{LIN} = $1V_{PP}$, R_L = 600Ω			-110		
		A-Weighting, Test Circuit 7; V_{RIN} or V_{LIN} = $1V_{PP}$, R_L = 32Ω			-110		
		A-Weighting, Test Circuit 7; V_{RIN} or V_{LIN} = $0.5V_{PP}$, R_L = 600Ω			-107		
		A-Weighting, Test Circuit 7; V_{RIN} or V_{LIN} = $0.5V_{PP}$, R_L = 32Ω			-105		
Start-Up Time	t_{START}	Switch V_{EN} = 0V to V_{EN} = 1.4V	+25℃		0.2		ms
Power Requirements							
Power Supply Current	I_{CC}	V_{EN} = 1.4V	+25℃		400	540	μA
			Full			550	
Power Supply Current in Shutdown State	I_{CC}	V_{EN} = 0V	+25℃		0.5	1.2	μA
			Full			1.5	

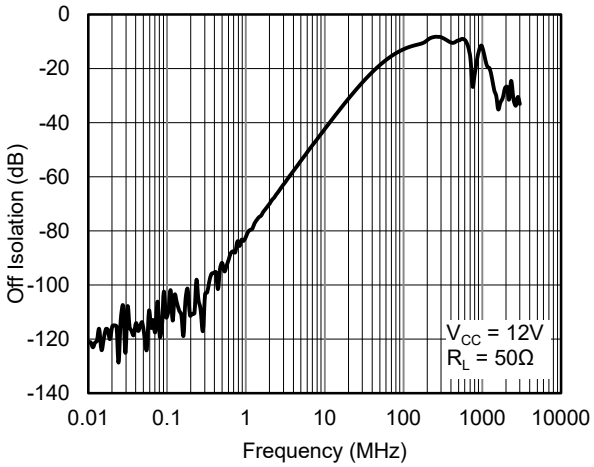
TYPICAL PERFORMANCE CHARACTERISTICS

T_A = +25℃, unless otherwise noted.

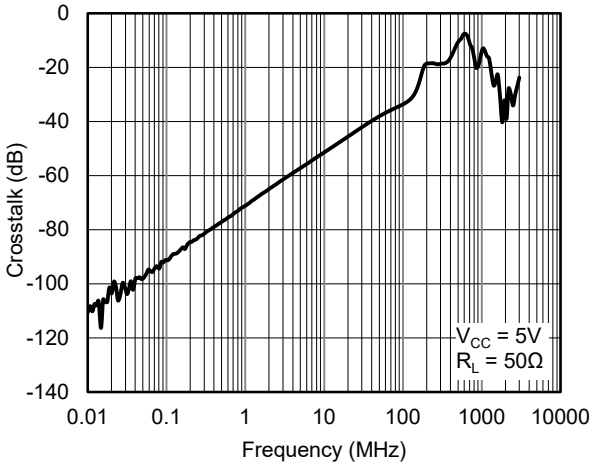
Off Isolation vs. Frequency



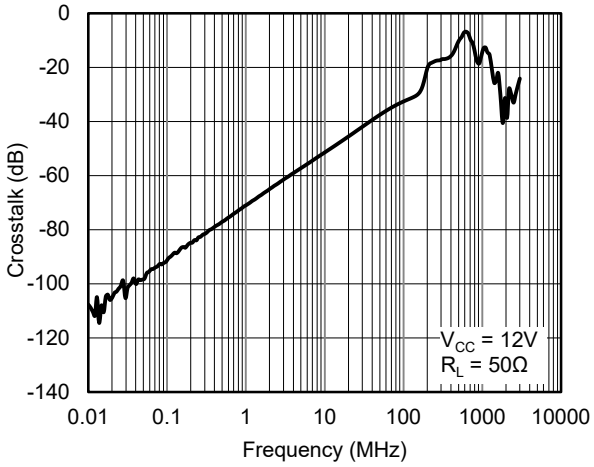
Off Isolation vs. Frequency



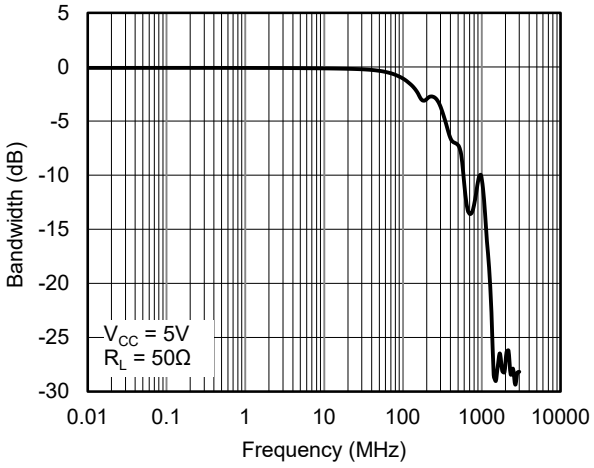
Crosstalk vs. Frequency



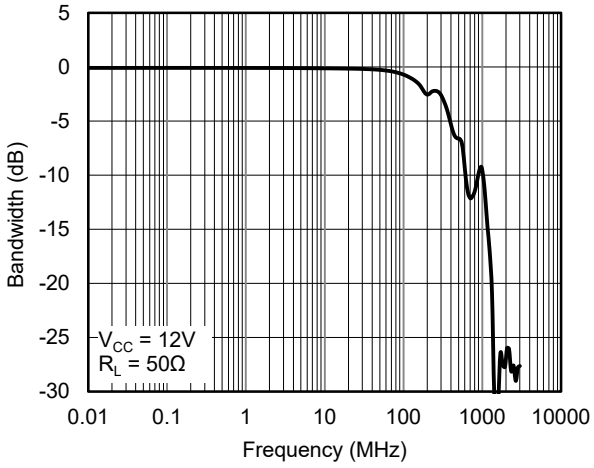
Crosstalk vs. Frequency



Bandwidth vs. Frequency



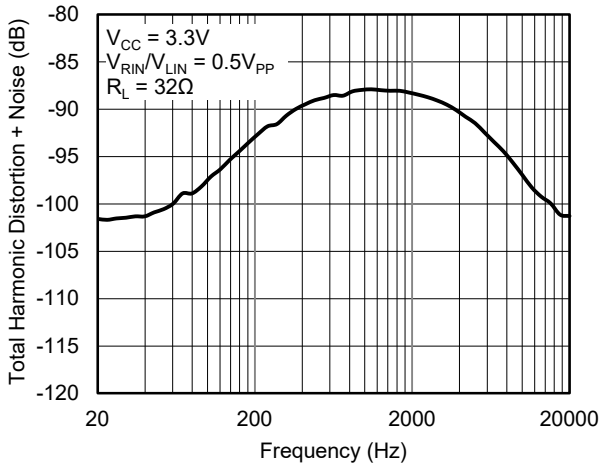
Bandwidth vs. Frequency



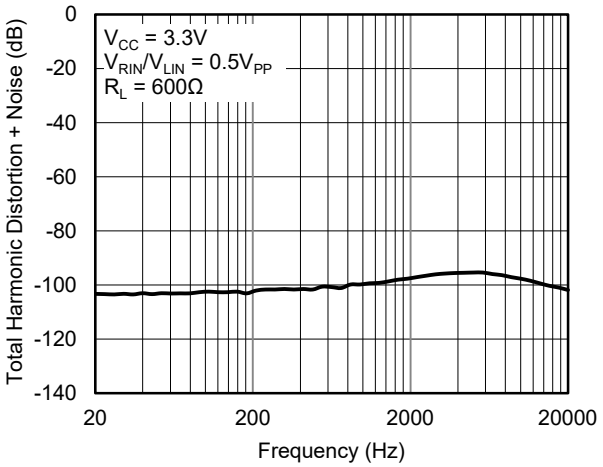
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_A = +25℃, unless otherwise noted.

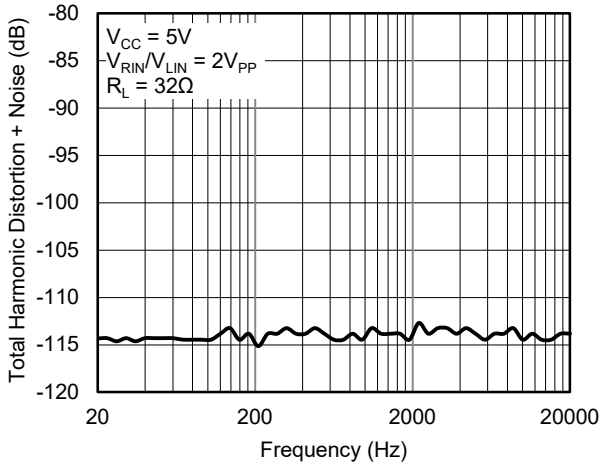
Total Harmonic Distortion + Noise vs. Frequency



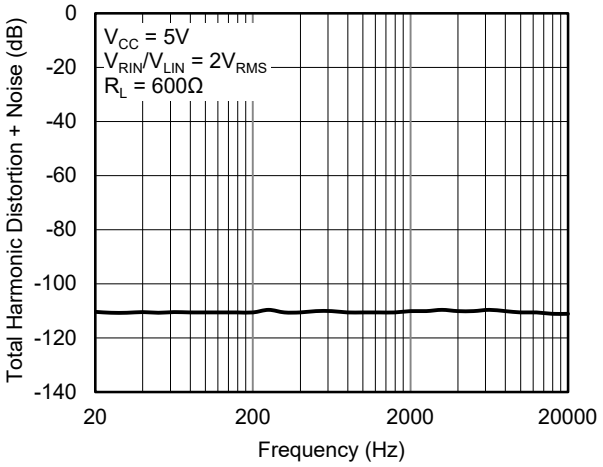
Total Harmonic Distortion + Noise vs. Frequency



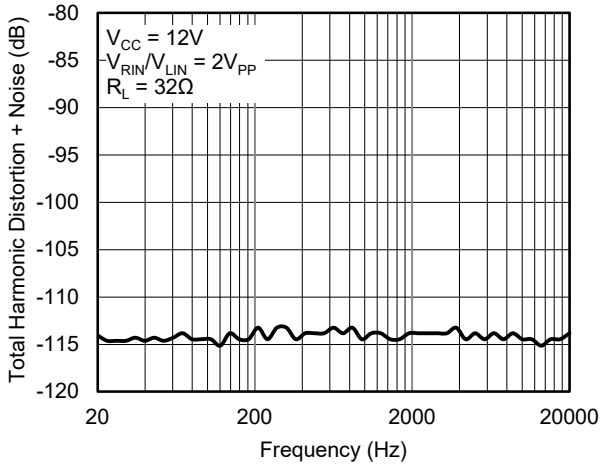
Total Harmonic Distortion + Noise vs. Frequency



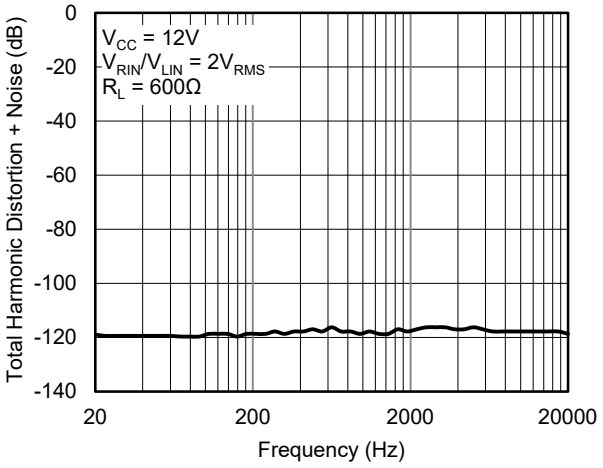
Total Harmonic Distortion + Noise vs. Frequency



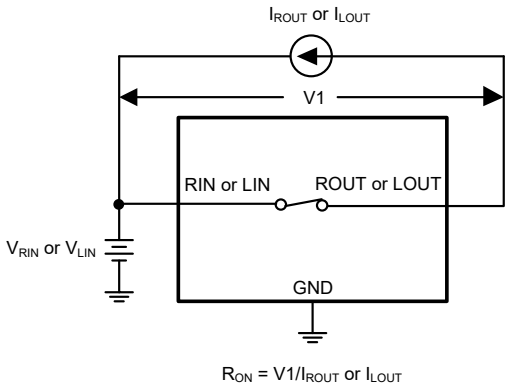
Total Harmonic Distortion + Noise vs. Frequency



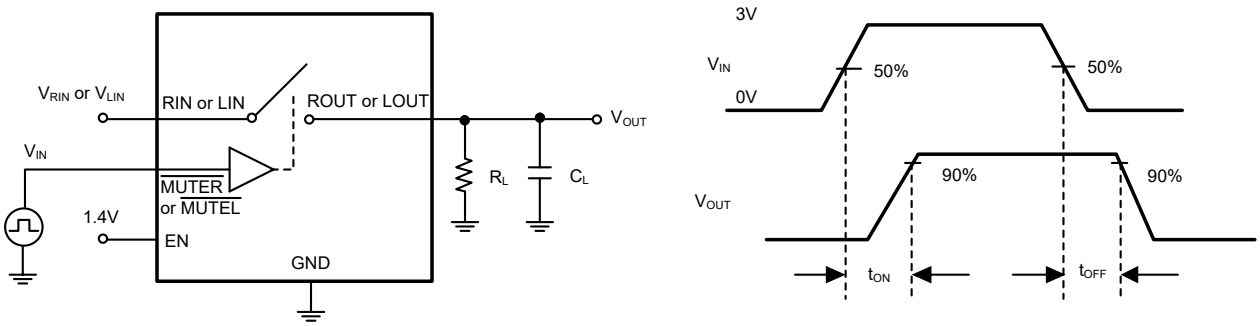
Total Harmonic Distortion + Noise vs. Frequency



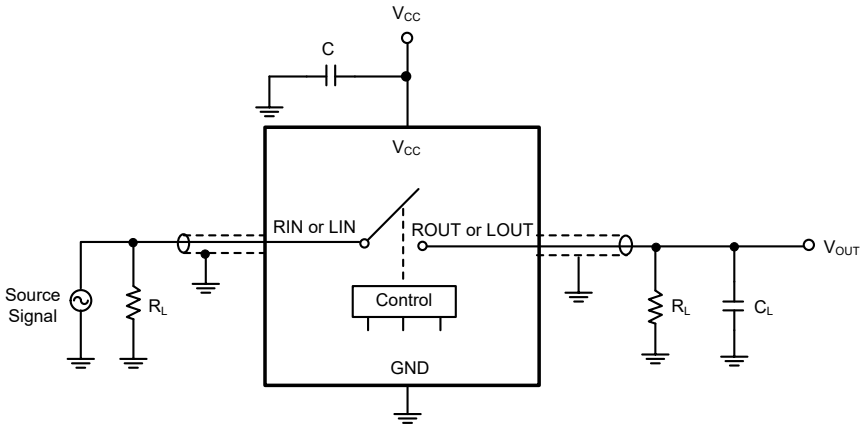
TEST CIRCUITS



Test Circuit 1. On Resistance

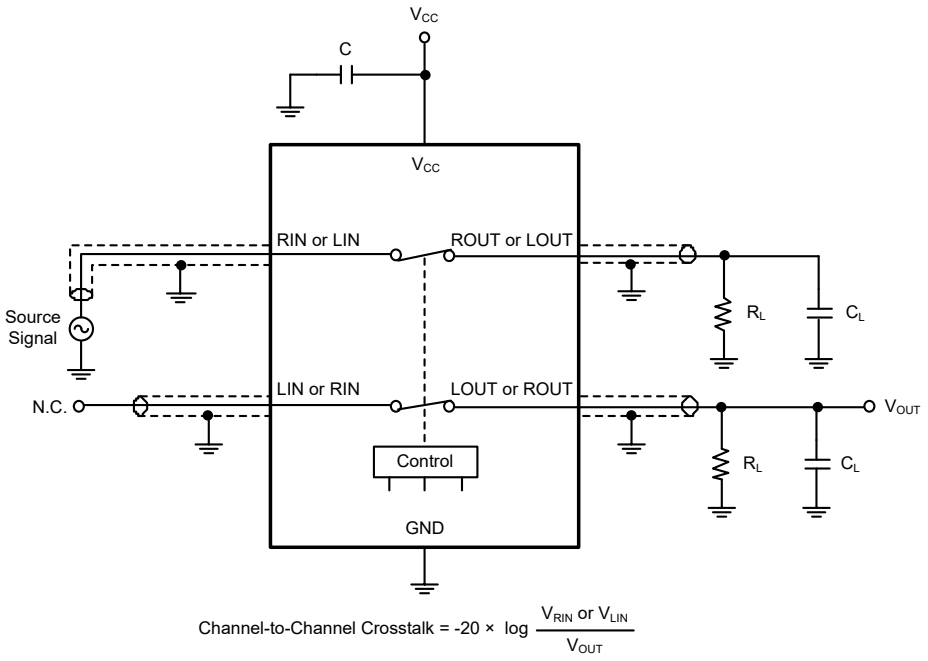


Test Circuit 2. Switching Times (t_{ON}, t_{OFF})

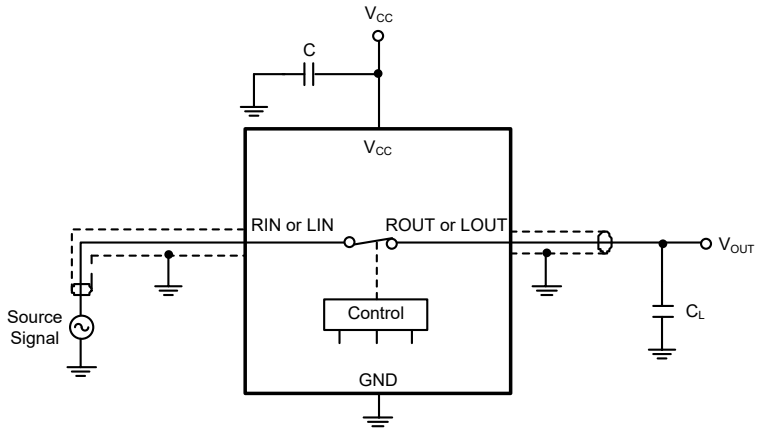


Test Circuit 3. Off Isolation

TEST CIRCUITS (continued)

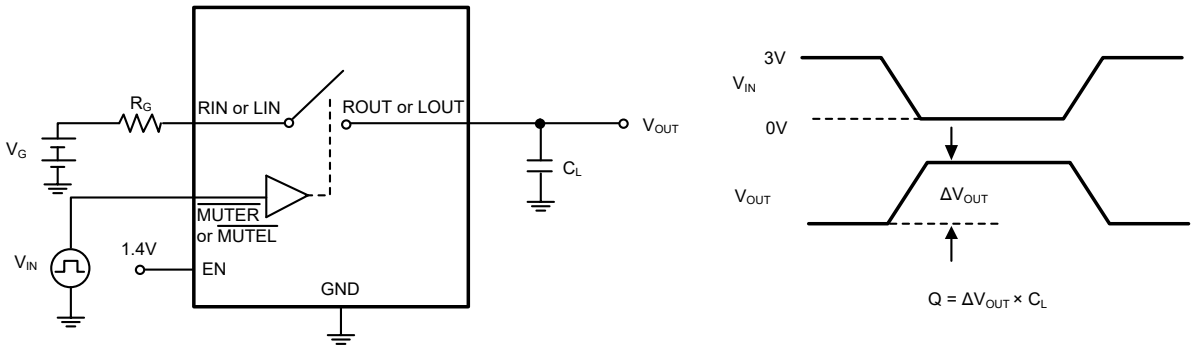


Test Circuit 4. Channel-to-Channel Crosstalk

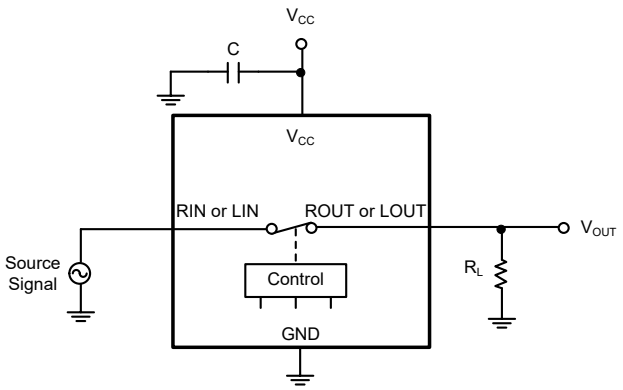


Test Circuit 5. -3dB Bandwidth

TEST CIRCUITS (continued)



Test Circuit 6. Charge Injection (Q)



Test Circuit 7. Total Harmonic Distortion + Noise (THD+N)

APPLICATION INFORMATION

The SGM4808B can be used at the input or output of audio system to eliminate the click-pop noise. The circuit is shown in Figure 1.

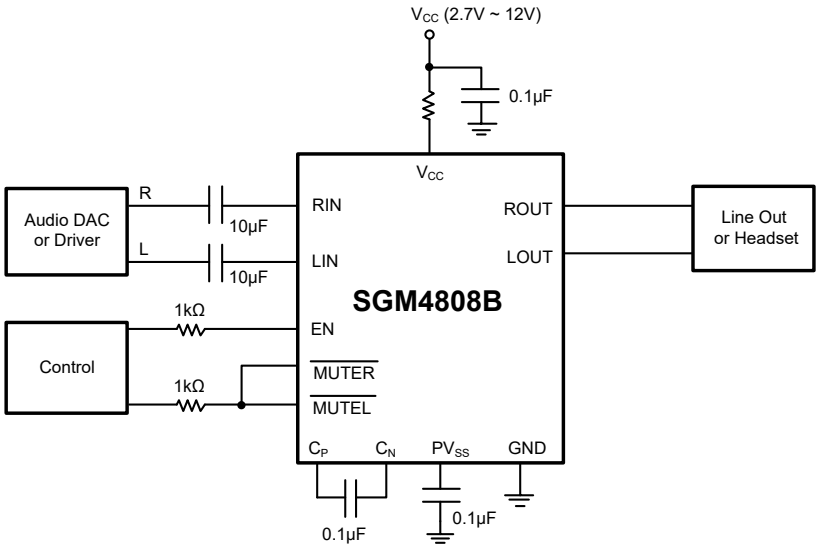


Figure 1. Typical Application Circuit

REVISION HISTORY

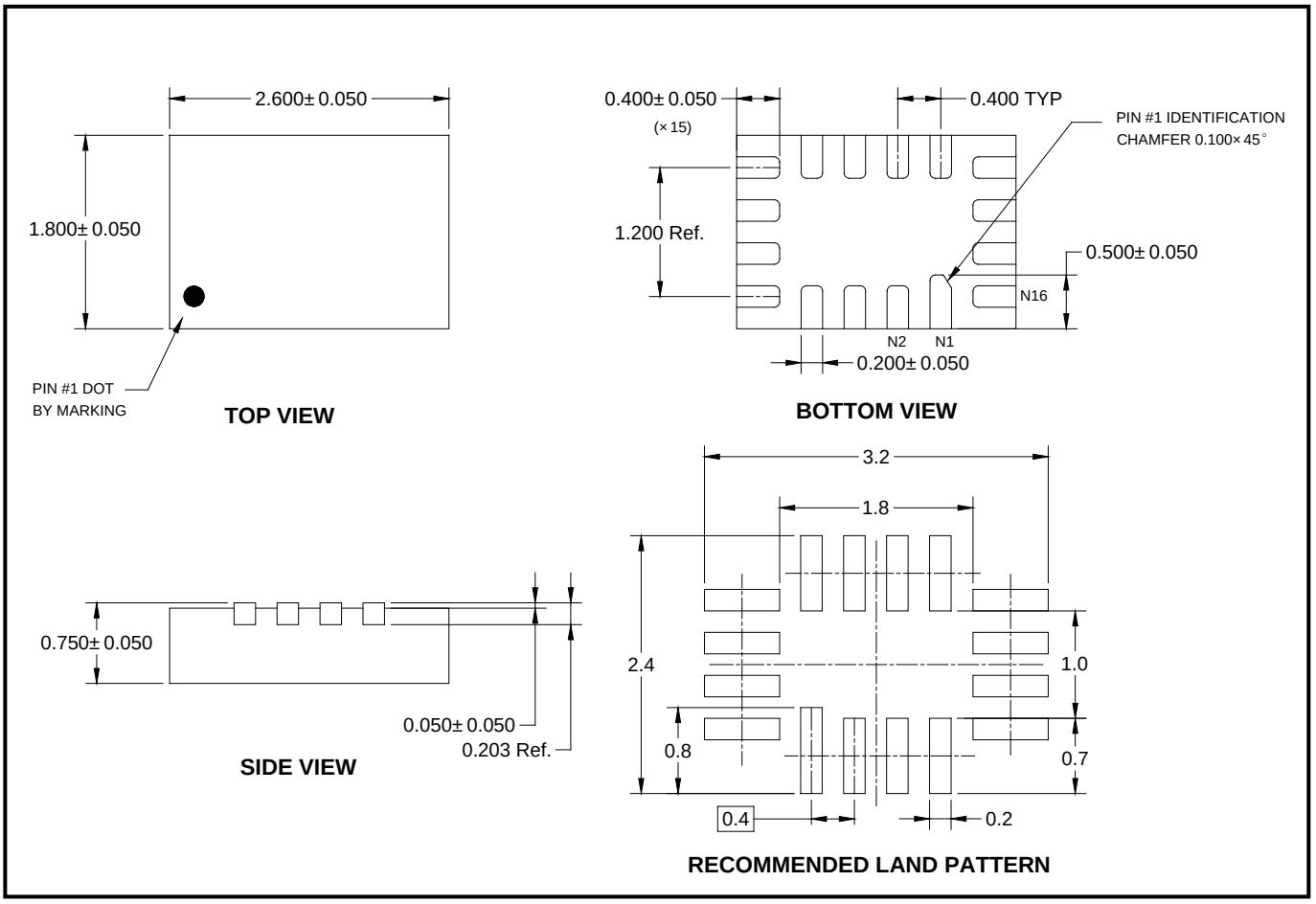
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (NOVEMBER 2016) to REV.A

Changed from product preview to production data	All

PACKAGE OUTLINE DIMENSIONS

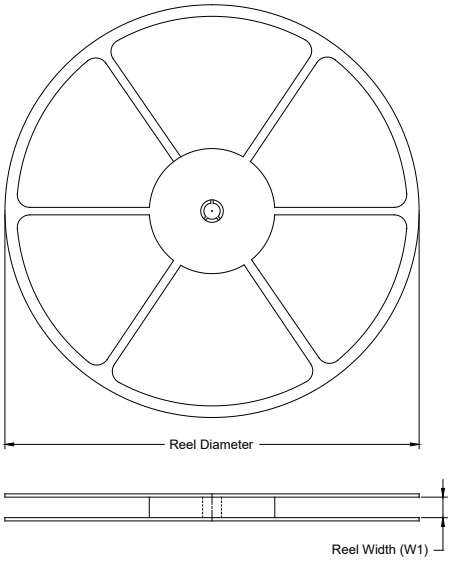
TQFN-2.6×1.8-16L



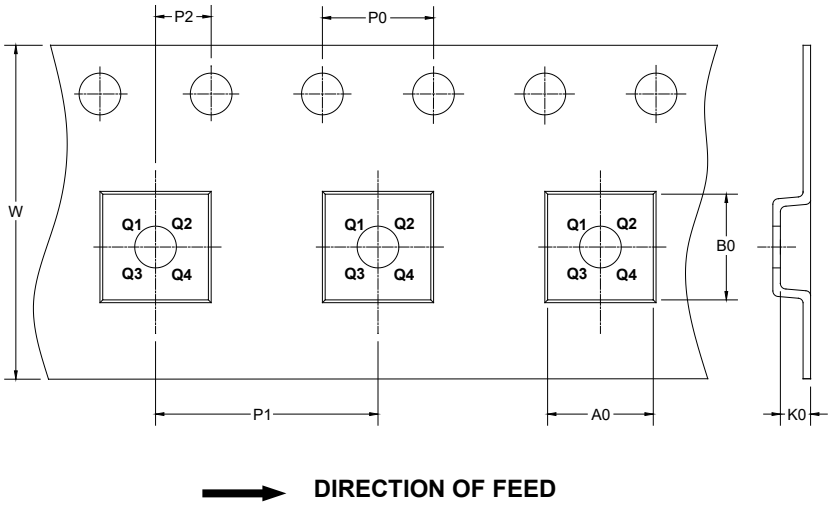
NOTES:
1. All linear dimensions are in millimeters.
2. This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



DIRECTION OF FEED

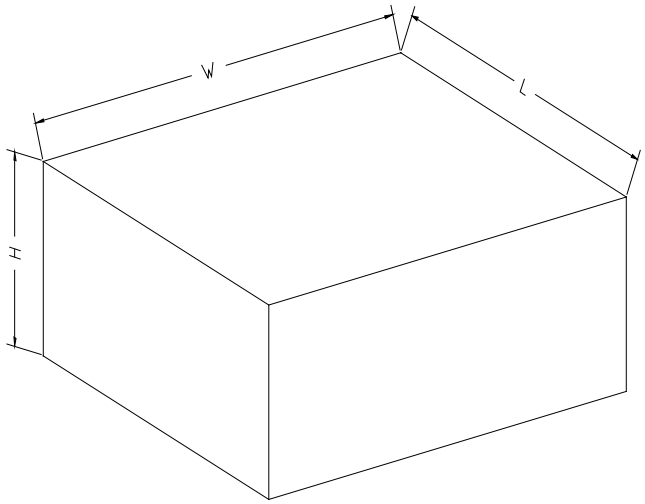
NOTE: The picture is only for reference. Please make the object as the standard.

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-2.6×1.8-16L	7″	9.0	2.01	2.81	0.93	4.0	4.0	2.0	8.0	Q1

DD0001

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

DD0002