



SGM2267

0.4Ω, Ultra Low On-Resistance, Dual, SPDT Analog Switch

GENERAL DESCRIPTION

The SGM2267 is a dual single-pole/double-throw (SPDT) analog switch that is designed to operate from a single 1.8V to 4.2V power supply. Targeted applications include battery powered equipment that benefit from ultra low on-resistance (0.4Ω) and fast switching speeds.

The SGM2267 features guaranteed on-resistance matching (0.04Ω TYP) between switches and guaranteed on-resistance flatness over the signal range (0.08Ω TYP), as well as high off-isolation and low crosstalk. This ensures excellent linearity and low distortion when switching audio signals.

The SGM2267 is a committed dual single-pole/double-throw (SPDT) that consist of two normally open (NO) and two normally close (NC) switches. This configuration can be used as a dual 2-to-1 multiplexer.

The SGM2267 is available in a Green TQFN-2.1×1.6-10L package.

FEATURES

- **Supply Voltage Range:** 1.8V to 4.2V
- **Ultra Low On-Resistance:** 0.4Ω (TYP) at 4.2V
- **On-Resistance Matching:** 0.04Ω (TYP)
- **On-Resistance Flatness:** 0.08Ω (TYP)
- **-3dB Bandwidth:** 40MHz
- **High Off-Isolation:** -78dB at 100kHz
- **Low Crosstalk:** -103dB at 100kHz
- **Rail-to-Rail Input and Output Operation**
- **TTL/CMOS Compatible**
- **Break-Before-Make Switching**
- **Extended Industrial Temperature Range:**
-40°C to +85°C
- **Available in a Green TQFN-2.1×1.6-10L Package**

APPLICATIONS

Portable Instrumentation
Battery-Operated Equipment
Computer Peripherals
Speaker and Earphone Switching
Medical Equipment
Audio and Video Switching

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2267	TQFN-2.1×1.6-10L	-40°C to +85°C	SGM2267YTQD10/TR	2267 XXXX	Tape and Reel, 3000

NOTE: XXXX = Date 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 ₊ , IN to GND.....	0V to 4.6V
Analog, Digital Voltage Range ⁽¹⁾	-0.3V to (V ₊) + 0.3V
Continuous Current NO, NC, or COM.....	±250mA
Peak Current NO, NC, or COM.....	±350mA
Junction Temperature.....	+150°C
Storage Temperature Range.....	-65°C to +150°C
Lead Temperature (Soldering, 10s).....	+260°C
ESD Susceptibility	
HBM.....	4000V
MM.....	400V

NOTE:

1. Signals on NC, NO, or COM or IN exceeding V₊ will be clamped by internal diodes. Limit forward diode current to maximum current ratings.

RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range.....	-40°C to +85°C
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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.

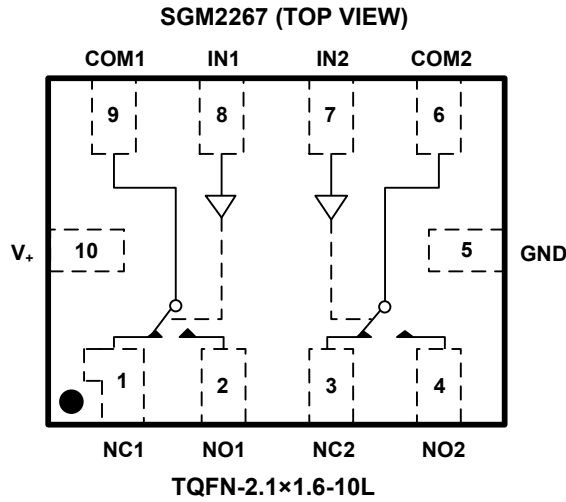
ESD SENSITIVITY CAUTION

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 DESCRIPTION

PIN	NAME	FUNCTION
1, 3	NC1, NC2	Normally-Closed Terminal.
2, 4	NO1, NO2	Normally-Open Terminal.
5	GND	Ground.
8, 7	IN1, IN2	Digital Control Pin to Connect the COM Terminal to the NO or NC Terminals.
9, 6	COM1, COM2	Common Terminal.
10	V+	Power Supply.

NOTE: NO, NC and COM terminals may be an input or output.

FUNCTION TABLE

LOGIC	NO	NC
0	OFF	ON
1	ON	OFF

NOTE: Switches shown for logic "0" input.

ELECTRICAL CHARACTERISTICS

($V_+ = 4.2V$, $GND = 0V$, $V_{IH} = 1.6V$, $V_{IL} = 0.6V$, Full = $-40^\circ C$ to $+85^\circ C$. Typical values are at $V_+ = 4.2V$, $T_A = +25^\circ C$, unless otherwise noted.)

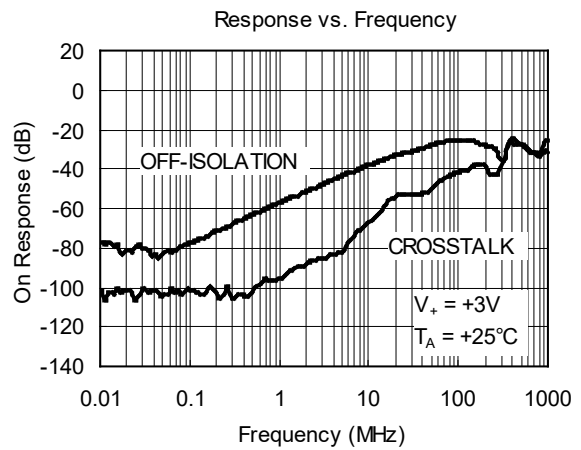
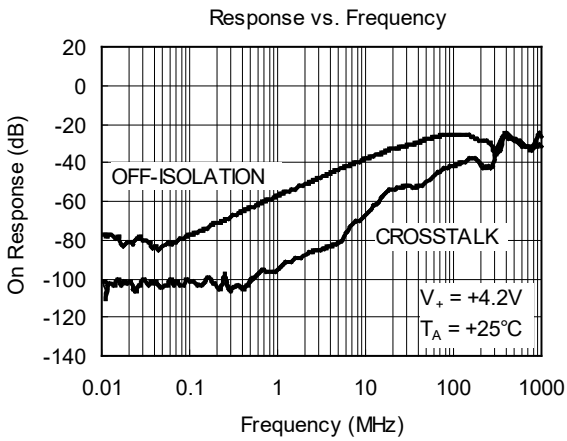
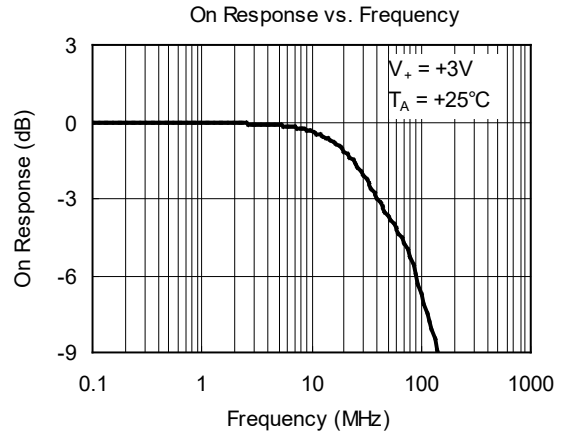
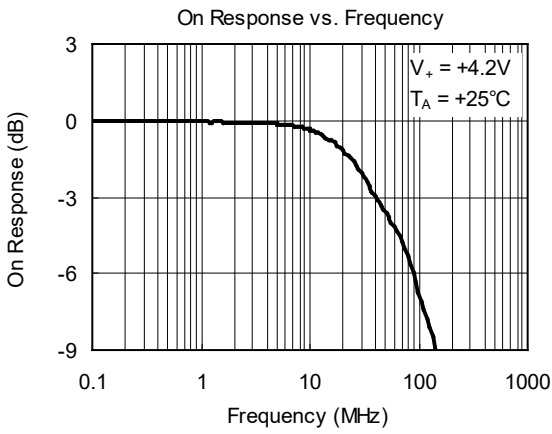
PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Analog Switch							
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}		Full	0		V_+	V
On-Resistance	R_{ON}	$V_+ = 4.2V, 0V \leq V_{NO} \text{ or } V_{NC} \leq V_+, I_{COM} = -100mA, \text{ Test Circuit 1}$	$+25^\circ C$		0.4	0.65	Ω
			Full			0.75	Ω
On-Resistance Match Between Channels	ΔR_{ON}	$V_+ = 4.2V, 0V \leq V_{NO} \text{ or } V_{NC} \leq V_+, I_{COM} = -100mA, \text{ Test Circuit 1}$	$+25^\circ C$		0.04	0.15	Ω
			Full			0.2	Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	$V_+ = 4.2V, 0V \leq V_{NO} \text{ or } V_{NC} \leq V_+, I_{COM} = -100mA, \text{ Test Circuit 1}$	$+25^\circ C$		0.08	0.12	Ω
			Full			0.2	Ω
Source Off Leakage Current	$I_{NC(OFF)}, I_{NO(OFF)}$	$V_+ = 4.2V, V_{NO} \text{ or } V_{NC} = 3.3V/0.3V, V_{COM} = 0.3V/3.3V$	Full			1	μA
Channel On Leakage Current	$I_{NC(ON)}, I_{NO(ON)}, I_{COM(ON)}$	$V_+ = 4.2V, V_{COM} = 0.3V/3.3V, V_{NO} \text{ or } V_{NC} = 0.3V/3.3V \text{ or floating}$	Full			1	μA
Digital Inputs							
Input High Voltage	V_{INH}		Full	1.6			V
Input Low Voltage	V_{INL}		Full			0.5	V
Input Leakage Current	I_{IN}	$V_+ = 4.2V, V_{IN} = 0V \text{ or } 4.2V$	Full			1	μA
Dynamic Characteristics							
Turn-On Time	t_{ON}	$V_{IN} = 2.1V \text{ to } 0V, R_L = 50\Omega, C_L = 35pF, V_{NO1} \text{ or } V_{NC1} = V_{NO2} \text{ or } V_{NC2} = 2.1V, \text{ Test Circuit 2}$	$+25^\circ C$		96		ns
Turn-Off Time	t_{OFF}	$V_{IN} = 2.1V \text{ to } 0V, R_L = 50\Omega, C_L = 35pF, V_{NO1} \text{ or } V_{NC1} = V_{NO2} \text{ or } V_{NC2} = 2.1V, \text{ Test Circuit 2}$	$+25^\circ C$		16		ns
Break-Before-Make Time Delay	t_D	$V_{IN} = 2.1V \text{ to } 0V, R_L = 50\Omega, C_L = 35pF, V_{NO1} \text{ or } V_{NC1} = V_{NO2} \text{ or } V_{NC2} = 2.1V, \text{ Test Circuit 3}$	$+25^\circ C$		25		ns
Off Isolation	O_{ISO}	$R_L = 50\Omega, \text{ Signal} = 0dBm, \text{ Test Circuit 4}$	100kHz	$+25^\circ C$		-78	dB
			1MHz	$+25^\circ C$		-58	dB
Channel-to-Channel Crosstalk	X_{TALK}	$R_L = 50\Omega, \text{ Signal} = 0dBm, \text{ Test Circuit 5}$	100kHz	$+25^\circ C$		-103	dB
			1MHz	$+25^\circ C$		-90	dB
-3dB Bandwidth	BW	$R_L = 50\Omega, \text{ Signal} = 0dBm, \text{ Test Circuit 6}$	$+25^\circ C$		40.0		MHz
Charge Injection Select Input to Common I/O	Q	$V_{NO1} \text{ or } V_{NC1} = V_{NO2} \text{ or } V_{NC2} = 0V, C_L = 1.0nF, R_s = 0\Omega, \text{ Test Circuit 7}$	$+25^\circ C$		4.0		pC
Total Harmonic Distortion + Noise	THD+N	$V_{COM} = 2V_{P-P}, f = 20Hz \text{ to } 20kHz, \text{ Test Circuit 8}$	$+25^\circ C$		0.011		%
Channel On Capacitance	C_{ON}		$+25^\circ C$		106		pF
Power Requirements							
Power Supply Range	V_+		Full	1.8		4.2	V
Power Supply Current	I_+	$V_+ = 4.2V, V_{IN} = 0V \text{ or } V_+$	Full			1	μA

ELECTRICAL CHARACTERISTICS (continued)

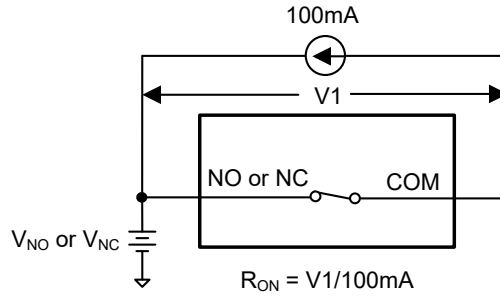
($V_+ = 2.7V$ to $3.6V$, $GND = 0V$, $V_{IH} = 1.6V$, $V_{IL} = 0.4V$, Full = $-40^\circ C$ to $+85^\circ C$. Typical values are at $V_+ = 3V$, $T_A = +25^\circ C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Analog Switch							
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}		Full	0		V_+	V
On-Resistance	R_{ON}	$V_+ = 2.7V, 0V \leq V_{NO} \text{ or } V_{NC} \leq V_+, I_{COM} = -100mA$, Test Circuit 1	+25°C		0.5	0.7	Ω
			Full			0.8	Ω
On-Resistance Match Between Channels	ΔR_{ON}	$V_+ = 2.7V, 0V \leq V_{NO} \text{ or } V_{NC} \leq V_+, I_{COM} = -100mA$, Test Circuit 1	+25°C		0.03	0.15	Ω
			Full			0.2	Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	$V_+ = 2.7V, 0V \leq V_{NO} \text{ or } V_{NC} \leq V_+, I_{COM} = -100mA$, Test Circuit 1	+25°C		0.1	0.18	Ω
			Full			0.2	Ω
Source Off Leakage Current	$I_{NC(OFF)}, I_{NO(OFF)}$	$V_+ = 3.6V, V_{NO} \text{ or } V_{NC} = 3.3V/0.3V, V_{COM} = 0.3V/3.3V$	Full			1	μA
Channel On Leakage Current	$I_{NC(ON)}, I_{NO(ON)}, I_{COM(ON)}$	$V_+ = 3.6V, V_{COM} = 0.3V/3.3V, V_{NO} \text{ or } V_{NC} = 0.3V/3.3V$ or floating	Full			1	μA
Digital Inputs							
Input High Voltage	V_{INH}		Full	1.5			V
Input Low Voltage	V_{INL}		Full			0.4	V
Input Leakage Current	I_{IN}	$V_+ = 2.7V, V_{IN} = 0V$ or $2.7V$	Full			1	μA
Dynamic Characteristics							
Turn-On Time	t_{ON}	$V_{IN} = 1.5V$ to $0V, R_L = 50\Omega, C_L = 35pF, V_{NO1} \text{ or } V_{NC1} = V_{NO2} \text{ or } V_{NC2} = 1.5V$, Test Circuit 2	+25°C		100		ns
Turn-Off Time	t_{OFF}	$V_{IN} = 1.5V$ to $0V, R_L = 50\Omega, C_L = 35pF, V_{NO1} \text{ or } V_{NC1} = V_{NO2} \text{ or } V_{NC2} = 1.5V$, Test Circuit 2	+25°C		25		ns
Break-Before-Make Time Delay	t_D	$V_{IN} = 1.5V$ to $0V, R_L = 50\Omega, C_L = 35pF, V_{NO1} \text{ or } V_{NC1} = V_{NO2} \text{ or } V_{NC2} = 1.5V$, Test Circuit 3	+25°C		28		ns
Off Isolation	O_{ISO}	$R_L = 50\Omega, \text{Signal} = 0dBm$, Test Circuit 4	100kHz	+25°C		-78	dB
			1MHz	+25°C		-58	dB
Channel-to-Channel Crosstalk	X_{TALK}	$R_L = 50\Omega, \text{Signal} = 0dBm$, Test Circuit 5	100kHz	+25°C		-103	dB
			1MHz	+25°C		-90	dB
-3dB Bandwidth	BW	$R_L = 50\Omega, \text{Signal} = 0dBm$, Test Circuit 6	+25°C		40		MHz
Charge Injection Select Input to Common I/O	Q	$V_{NO1} \text{ or } V_{NC1} = V_{NO2} \text{ or } V_{NC2} = 0V, C_L = 1.0nF, R_S = 0\Omega$, Test Circuit 7	+25°C		4.0		pC
Total Harmonic Distortion + Noise	THD+N	$V_{COM} = 1.5V_{P-P}, f = 20Hz$ to $20kHz$, Test Circuit 8	+25°C		0.015		%
Channel On Capacitance	C_{ON}		+25°C		106		pF

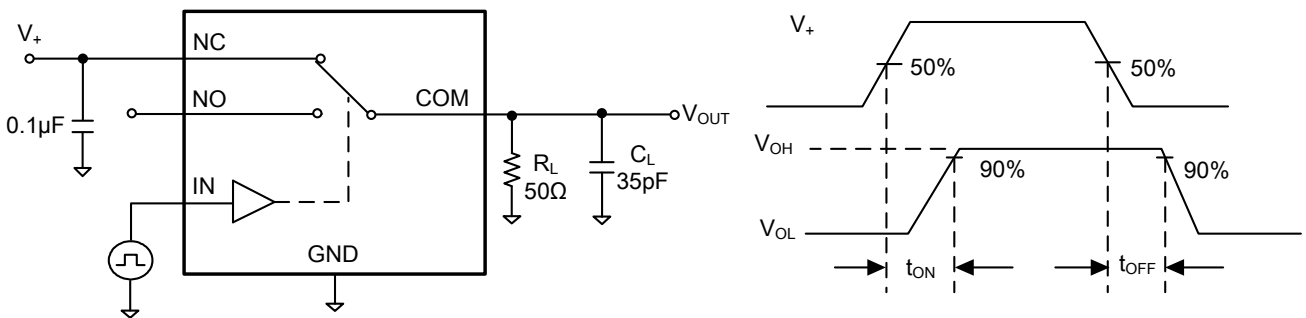
TYPICAL PERFORMANCE CHARACTERISTICS



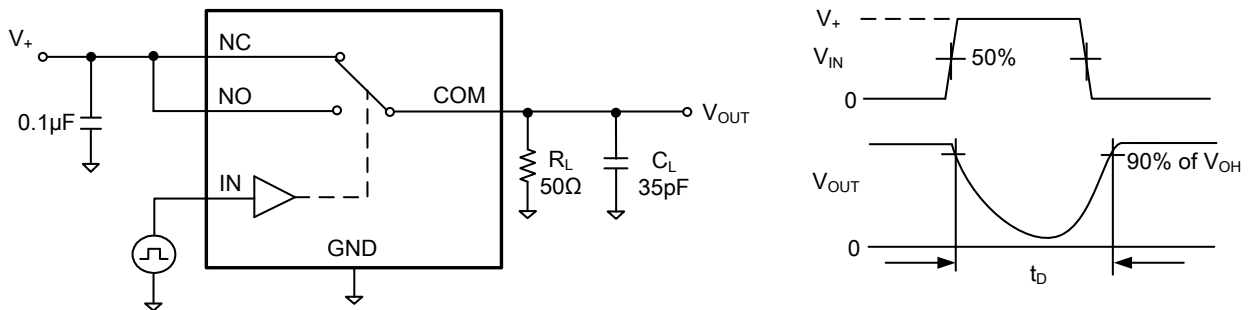
TEST CIRCUITS



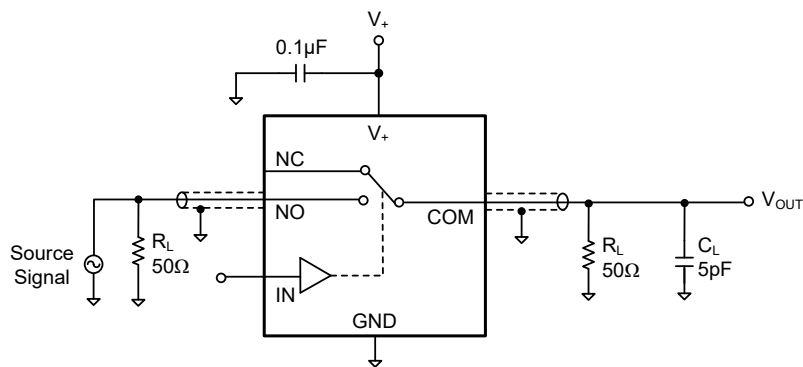
Test Circuit 1. On-Resistance



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

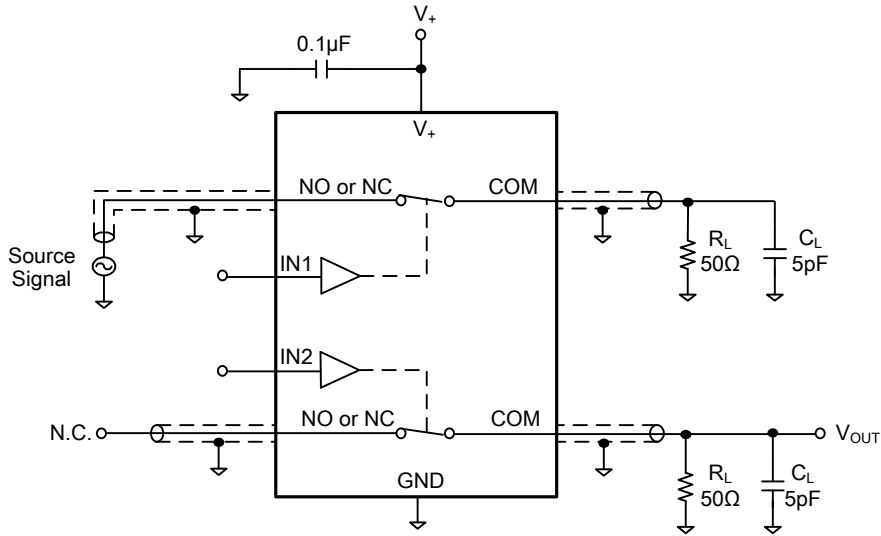


Test Circuit 3. Break-Before-Make Time (t_d)



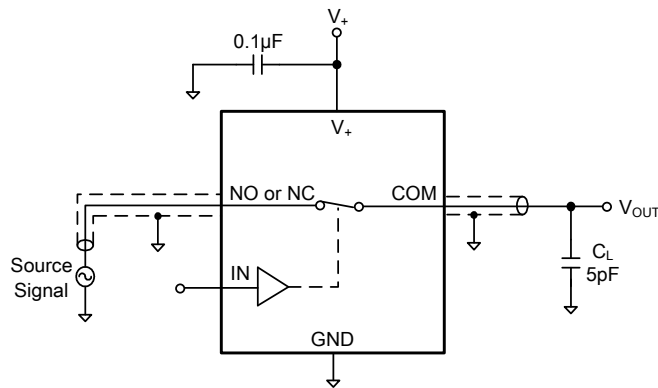
Test Circuit 4. Off Isolation

TEST CIRCUITS (continued)

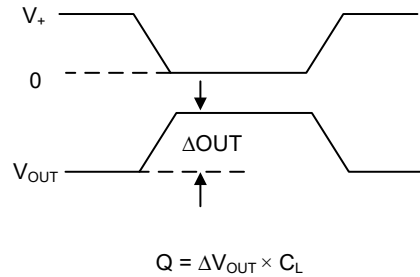
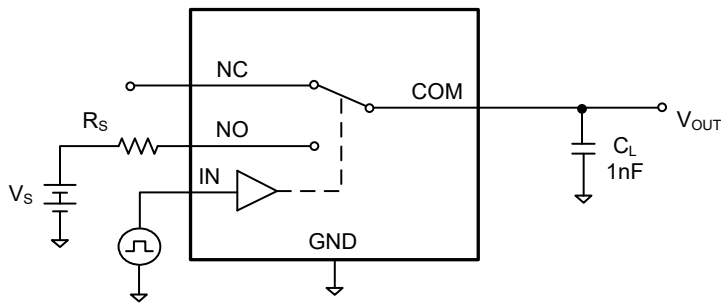


$$\text{Channel To Channel Crosstalk} = -20 \times \log \frac{V_{\text{NO or VNC}}}{V_{\text{OUT}}}$$

Test Circuit 5. Channel-to-Channel Crosstalk

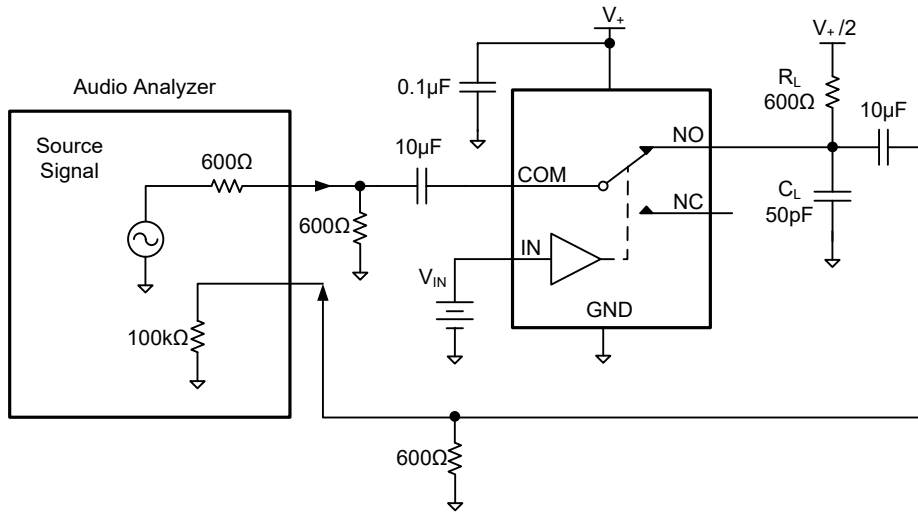


Test Circuit 6. -3dB Bandwidth



Test Circuit 7. Charge Injection (Q)

TEST CIRCUITS (continued)



Test Circuit 8. Total Harmonic Distortion

REVISION HISTORY

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

JANUARY 2013 – REV.A.1 to REV.A.2

Added Recommended Land Pattern Information	10
Added Tape and Reel Information.....	11, 12

MAY 2011 – REV.A to REV.A.1

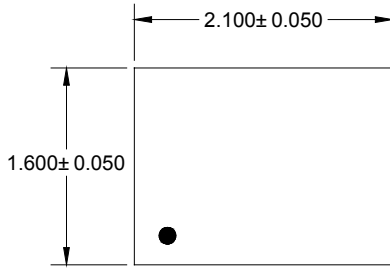
Updated Package Description	All
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Changes from Original (MAY 2008) to REV.A

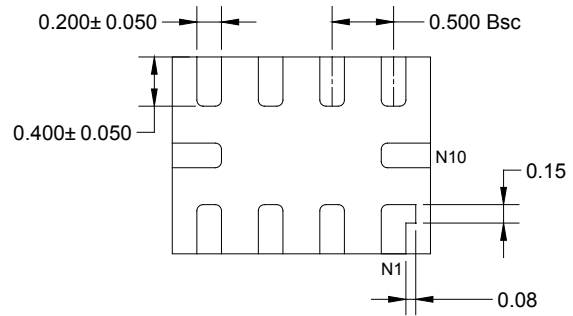
Changed from product preview to production data.....	All
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PACKAGE OUTLINE DIMENSIONS

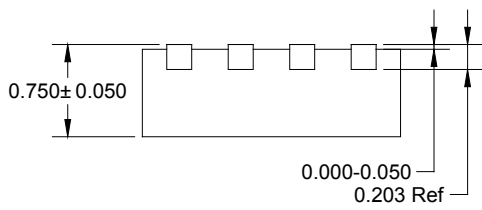
TQFN-2.1×1.6-10L



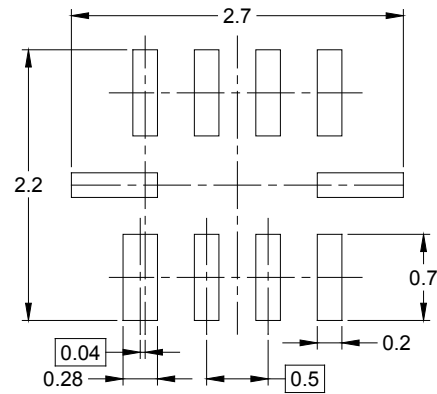
TOP VIEW



BOTTOM VIEW



SIDE VIEW



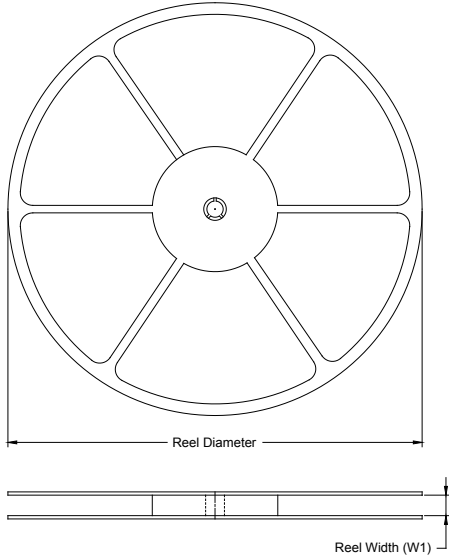
RECOMMENDED LAND PATTERN

NOTE: All linear dimensions are in millimeters.

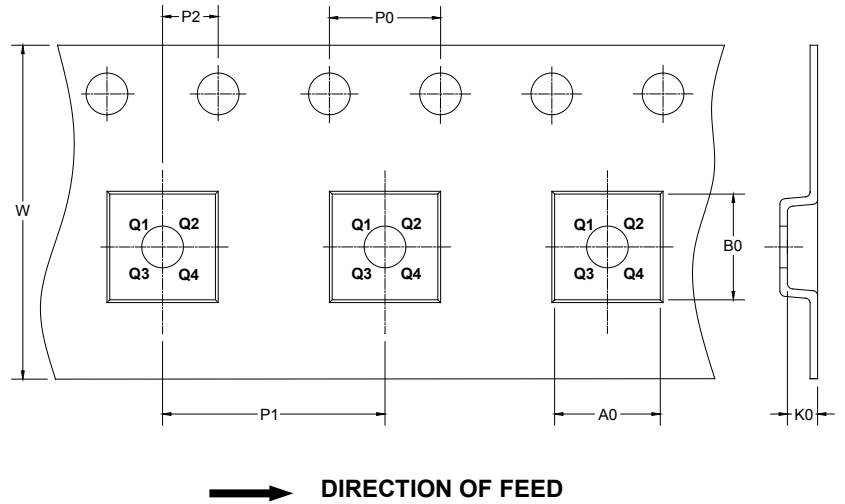
PACKAGE INFORMATION

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-2.1×1.6-10L	7"	9.0	1.90	2.30	0.90	4.0	4.0	2.0	8.0	Q1

DD0001

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

DD0002