

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.

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.

SGM2267 is available in Pb-free TQFN-10 (2.1mm ×1.6mm) package.

APPLICATIONS

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

FEATURES

- Voltage Operation: +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
- Lead (Pb) Free TQFN-10 (2.1mm×1.6mm) Package



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REV. A

ORDERING INFORMATION

MODEL	PIN-PACKAGE	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKAGE OPTION
SGM2267	TQFN-10 (2.1mm×1.6mm)	-40°C to +85°C	SGM2267YTQD10/TR	2267	Tape and Reel, 3000

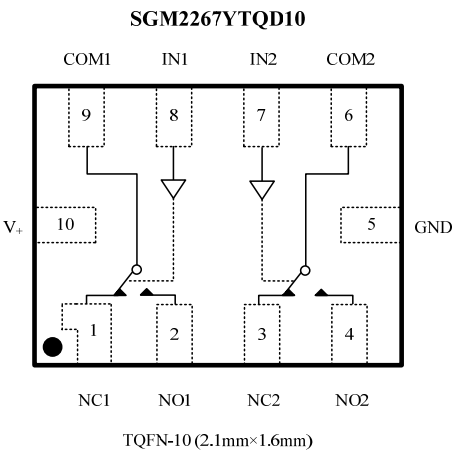
ABSOLUTE MAXIMUM RATINGS

V+, IN to GND.....	0V to +4.6V	Storage Temperature.....	- 65°C to +150°C
Analog, Digital voltage range(1).....	- 0.3V to (V+ + 0.3V)	Lead Temperature (soldering, 10s).....	+260°C
Continuous Current NO, NC, or COM.....	±250mA	ESD Susceptibility	
Peak Current NO, NC, or COM.....	±350mA	HBM.....	4000V
Operating Temperature Range.....	- 40°C to +85°C	MM.....	400V
Junction Temperature.....	+150°C		

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.

(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.

PIN CONFIGURATION (TOP VIEW)



PIN DESCRIPTION

PIN	NAME	FUNCTION
10	V+	Power supply
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
2,4	NO1, NO2	Normally-open terminal
1,3	NC1, NC2	Normally-closed terminal

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

FUNCTION TABLE

LOGIC	NO	NC
0	OFF	ON
1	ON	OFF

Switches Shown For Logic “0” Input

ELECTRICAL CHARACTERISTICS

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

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TPY	MAX	UNITS
ANALOG SWITCH							
Analog Signal Range	V _{NO} , V _{NC} , V _{COM}		-40°C to +85°C	0		V ₊	V
On-Resistance	R _{ON}	V ₊ = 4.2V, 0V ≤ V _{NO} or V _{NC} ≤ V ₊ , I _{COM} = -100mA, Test Circuit 1	+25°C		0.4	0.65	Ω
			-40°C to +85°C			0.75	Ω
On-Resistance Match Between Channels	ΔR _{ON}	V ₊ = 4.2V, 0V ≤ V _{NO} or V _{NC} ≤ V ₊ , I _{COM} = -100mA, Test Circuit 1	+25°C		0.04	0.15	Ω
			-40°C to +85°C			0.2	Ω
On-Resistance Flatness	R _{FLAT(ON)}	V ₊ = 4.2V, 0V ≤ V _{NO} or V _{NC} ≤ V ₊ , I _{COM} = -100mA, Test Circuit 1	+25°C		0.08	0.12	Ω
			-40°C to +85°C			0.2	Ω
Source OFF Leakage Current	I _{NC(OFF)} , I _{NO(OFF)}	V ₊ = 4.2V, V _{NO} or V _{NC} = 3.3 V/0.3V, V _{COM} = 0.3V/ 3.3V	-40°C to +85°C			1	μA
Channel ON Leakage Current	I _{NC(ON)} , I _{NO(ON)} , I _{COM(ON)}	V ₊ = 4.2 V, V _{COM} = 0.3V/ 3.3V, V _{NO} or V _{NC} = 0.3V/ 3.3V, or floating	-40°C to +85°C			1	μA
DIGITAL INPUTS							
Input High Voltage	V _{IHH}		-40°C to +85°C	1.6			V
Input Low Voltage	V _{IL}		-40°C to +85°C			0.5	V
Input Leakage Current	I _{IN}	V ₊ = 4.2V, V _{IN} = 0V or 4.2V	-40°C to +85°C			1	μA
DYNAMIC CHARACTERISTICS							
Turn-On Time	t _{ON}	V _{IN} = 2.1V to 0V, R _L = 50Ω, C _L = 35pF, V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 2.1V, Test Circuit2	+25°C		96		ns
Turn-Off Time	t _{OFF}	V _{IN} = 2.1V to 0V, R _L = 50Ω, C _L = 35pF, V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 2.1V, Test Circuit2	+25°C		16		ns
Break-Before-Make Time Delay	t _D	V _{IN} = 2.1V to 0V, R _L = 50Ω, C _L = 35pF, V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 2.1V, Test Circuit3	+25°C		25		ns
Off Isolation	O _{ISO}	R _L = 50Ω, Signal = 0dBm, Test Circuit4	100kHz	+25°C		-78	dB
			1MHz	+25°C		-58	dB
Channel-to-Channel Crosstalk	X _{TALK}	R _L = 50Ω, Signal = 0dBm, Test Circuit5	100kHz	+25°C		-103	dB
			1MHz	+25°C		-90	dB
-3dB Bandwidth	BW	R _L = 50Ω, Signal = 0dBm, Test Circuit6	+25°C		40.0		MHz
Charge Injection Select Input to Common I/O	Q	V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 0V, C _L = 1.0nF, R _s = 0Ω, Test Circuit7	+25°C		4.0		pC
Total Harmonic Distortion + Noise	THD+N	V _{COM} = 2V _{P-P} , f = 20Hz to 20kHz, Test Circuit8	+25°C		0.011		%
Channel ON Capacitance	C _{ON}		+25°C		106		pF
POWER REQUIREMENTS							
Power Supply Range	V ₊		-40°C to +85°C	1.8		4.2	V
Power Supply Current	I ₊	V ₊ = 4.2V, V _{IN} = 0V or V ₊	-40°C to +85°C			1	μA

Specifications subject to changes without notice.

ELECTRICAL CHARACTERISTICS

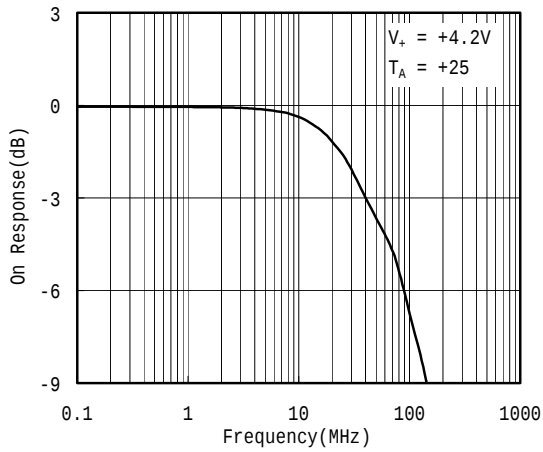
(V₊ = +2.7V to +3.6V, GND = 0V, V_{IH} = +1.6V, V_{IL} = +0.4V, T_A = -40°C to +85°C. Typical values are at V₊ = +3.0V, T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TPY	MAX	UNITS
ANALOG SWITCH							
Analog Signal Range	V _{NO} , V _{NC} , V _{COM}		-40°C to +85°C	0		V ₊	V
On-Resistance	R _{ON}	V ₊ = 2.7V, 0V ≤ V _{NO} or V _{NC} ≤ V ₊ , I _{COM} = -100mA, Test Circuit 1	+25°C		0.5	0.7	Ω
			-40°C to +85°C			0.8	Ω
On-Resistance Match Between Channels	ΔR _{ON}	V ₊ = 2.7V, 0V ≤ V _{NO} or V _{NC} ≤ V ₊ , I _{COM} = -100mA, Test Circuit 1	+25°C		0.03	0.15	Ω
			-40°C to +85°C			0.2	Ω
On-Resistance Flatness	R _{FLAT(ON)}	V ₊ = 2.7V, 0V ≤ V _{NO} or V _{NC} ≤ V ₊ , I _{COM} = -100mA, Test Circuit 1	+25°C		0.1	0.18	Ω
			-40°C to +85°C			0.2	Ω
Source OFF Leakage Current	I _{NC(OFF)} , I _{NO(OFF)}	V ₊ = 3.6V, V _{NO} or V _{NC} = 3.3V/ 0.3V, V _{COM} = 0.3V/ 3.3V	-40°C to +85°C			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} or V _{NC} = 0.3V/ 3.3V, or floating	-40°C to +85°C			1	μA
DIGITAL INPUTS							
Input High Voltage	V _{IH}		-40°C to +85°C	1.5			V
Input Low Voltage	V _{IL}		-40°C to +85°C			0.4	V
Input Leakage Current	I _{IN}	V ₊ = 2.7V, V _{IN} = 0V or 2.7V	-40°C to +85°C			1	μA
DYNAMIC CHARACTERISTICS							
Turn-On Time	t _{ON}	V _{IN} = 1.5V to 0V, R _L = 50Ω, C _L = 35pF, V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 1.5V, Test Circuit2	+25°C		100		ns
Turn-Off Time	t _{OFF}	V _{IN} = 1.5V to 0V, R _L = 50Ω, C _L = 35pF, V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 1.5V, Test Circuit2	+25°C		25		ns
Break-Before-Make Time Delay	t _D	V _{IN} = 1.5V to 0V, R _L = 50Ω, C _L = 35pF, V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 1.5V, Test Circuit3	+25°C		28		ns
Off Isolation	O _{ISO}	R _L = 50Ω, Signal = 0dBm, Test Circuit4	100kHz +25°C		-78		dB
			1MHz +25°C		-58		dB
Channel-to-Channel Crosstalk	X _{TALK}	R _L = 50Ω, Signal = 0dBm, Test Circuit5	100kHz +25°C		-103		dB
			1MHz +25°C		-90		dB
-3dB Bandwidth	BW	R _L = 50Ω, Signal = 0dBm, Test Circuit6	+25°C		40		MHz
Charge Injection Select Input to Common I/O	Q	V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 0V, C _L = 1.0nF, R _S = 0Ω, Test Circuit7	+25°C		4.0		pC
Total Harmonic Distortion + Noise	THD+N	V _{COM} = 1.5V _{P-P} , f = 20Hz to 20kHz, Test Circuit8	+25°C		0.015		%
Channel ON Capacitance	C _{ON}		+25°C		106		pF

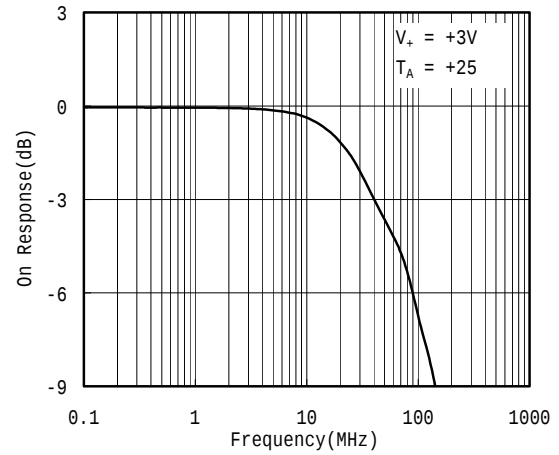
Specifications subject to changes without notice.

TYPICAL PERFORMANCE CHARACTERISTICS

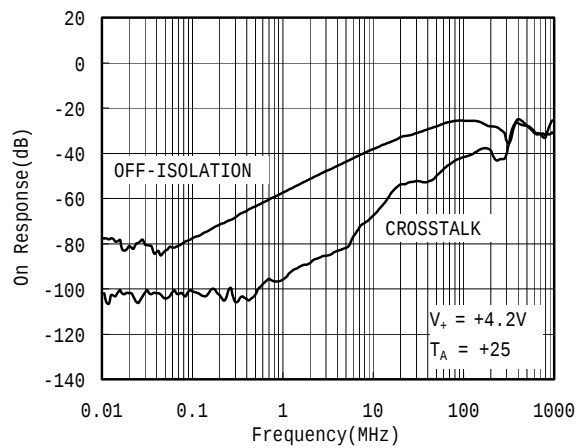
On Response vs.Frequency



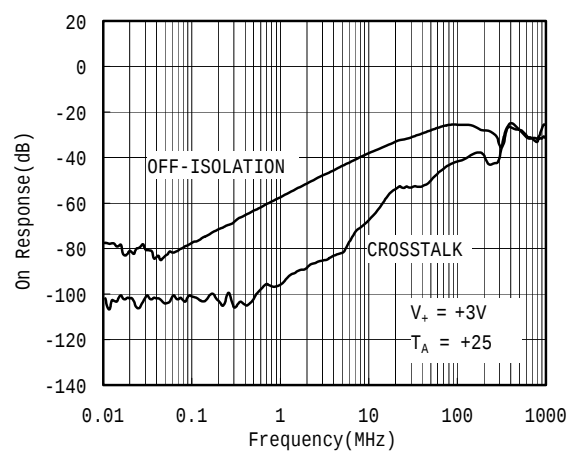
On Response vs.Frequency



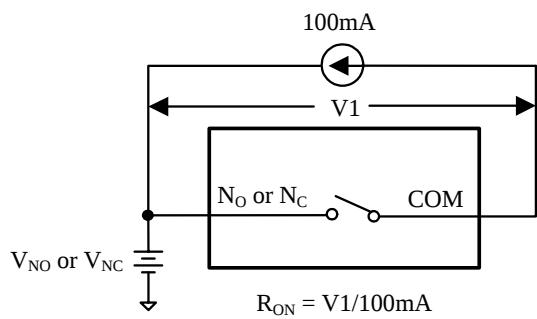
Response vs.Frequency



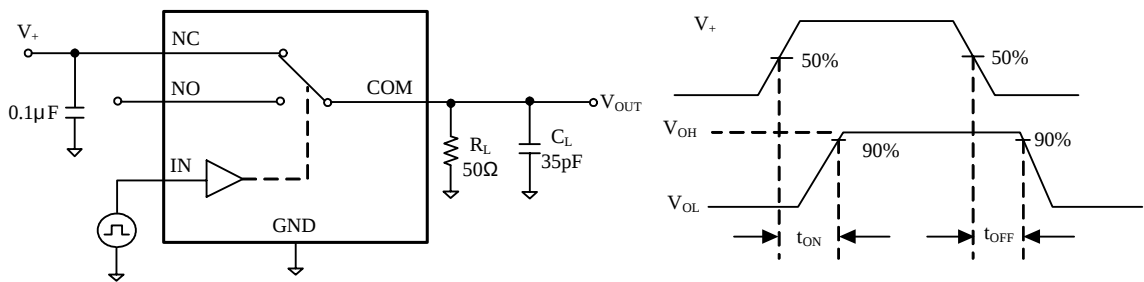
Response vs.Frequency



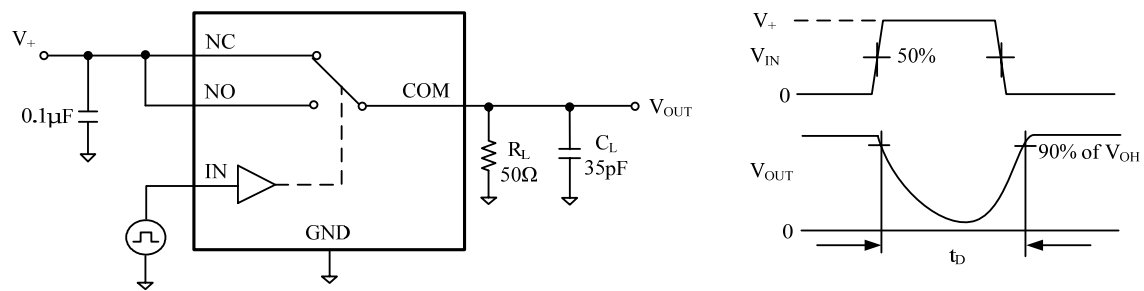
TEST CIRCUITS



Test Circuit 1. On Resistance

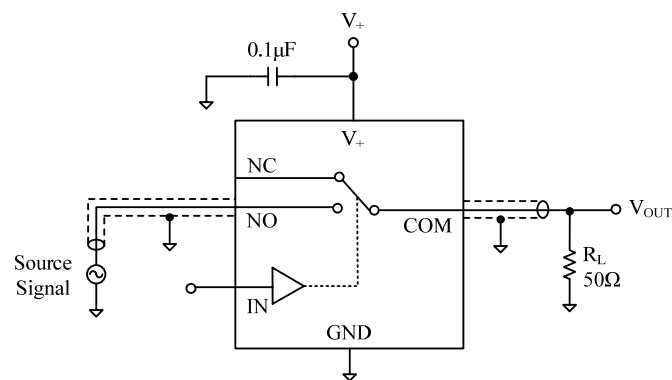


Test Circuit 2. Switching Times (t_{ON} , t_{OFF})

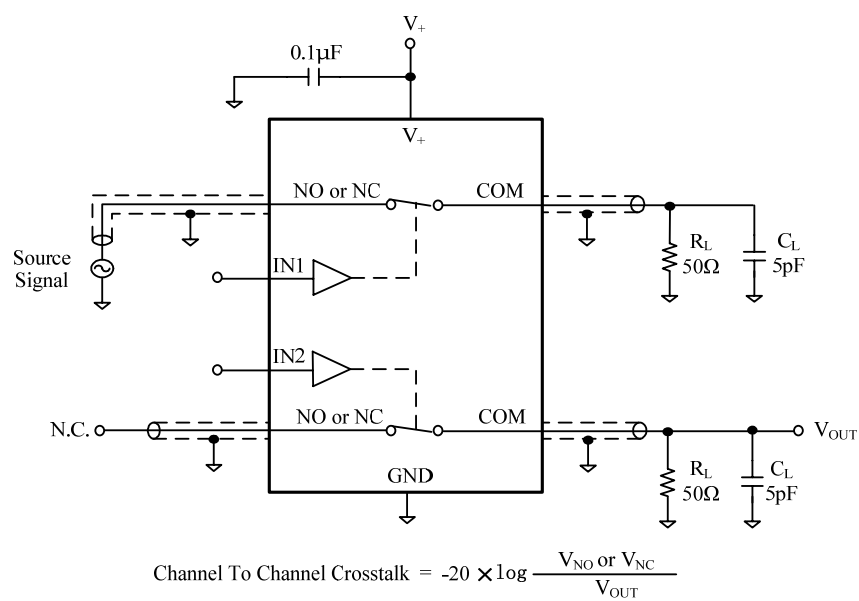


Test Circuit 3. Break-Before-Make Time (t_D)

TEST CIRCUITS (Cont.)

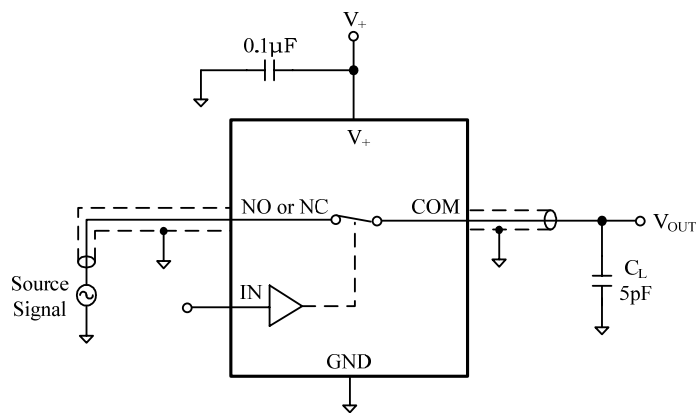


Test Circuit 4. Off Isolation

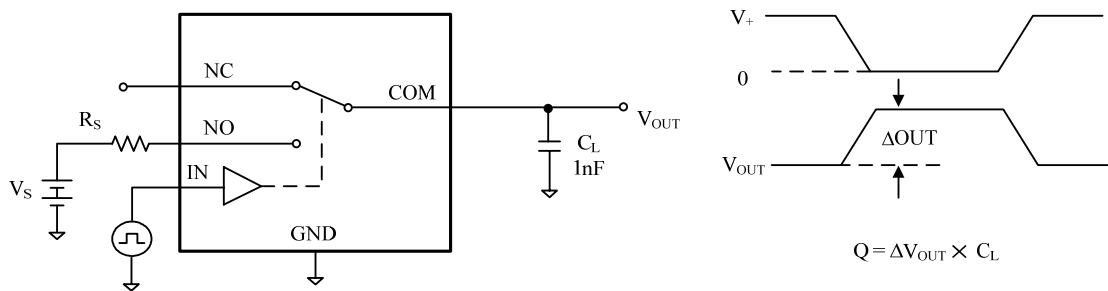


Test Circuit 5. Channel-to-Channel Crosstalk

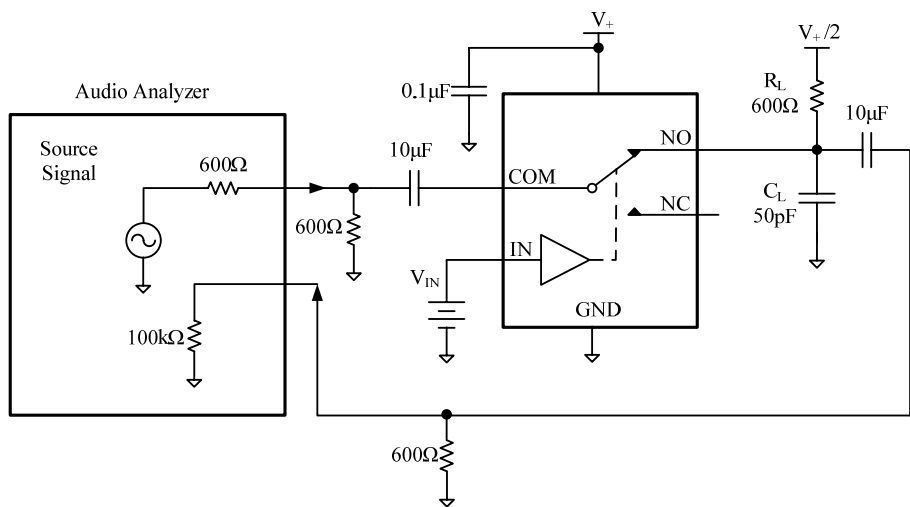
TEST CIRCUITS (Cont.)



Test Circuit 6. -3dB Bandwidth



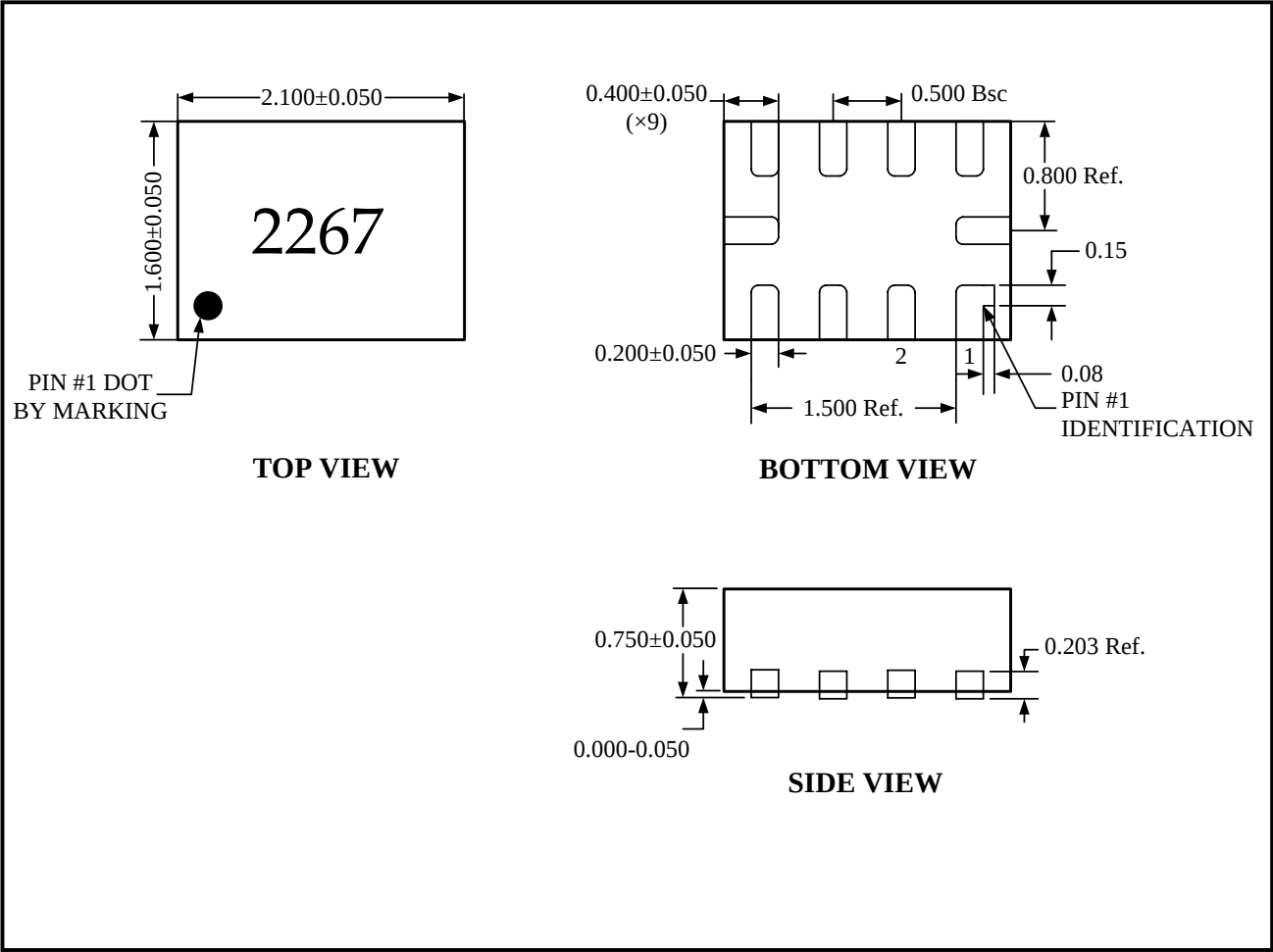
Test Circuit 7. Charge Injection (Q)



Test Circuit 8. Total Harmonic Distortion

PACKAGE OUTLINE DIMENSIONS

TQFN-10 (2.1mm × 1.6mm)



Note: All linear dimensions are in millimeters.

REVISION HISTORY

Location

Page

01/2008—Preliminary Datasheet

02/2008—Data Sheet REV.A

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