

SGM2268

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

GENERAL DESCRIPTION

The SGM2268 is a dual single-pole/double-throw (SPDT) analog switch that 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.

SGM2268 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 SGM2268 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.

SGM2268 is available in Pb-free WQFN-10 package.

APPLICATIONS

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

FUNCTION TABLE

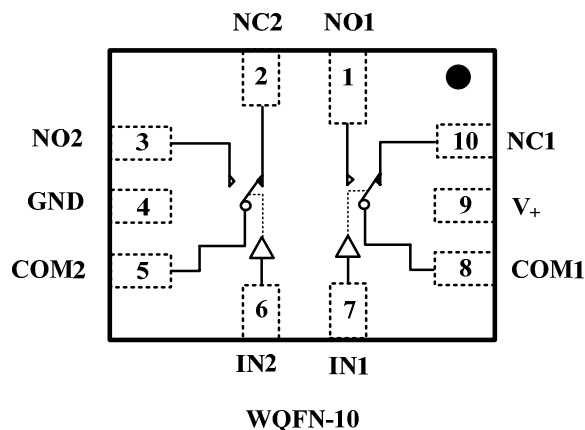
LOGIC	NO	NC
0	OFF	ON
1	ON	OFF

Switches Shown For Logic "0" Input

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)
- -3 dB 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 WQFN-10 Package

PIN CONFIGURATION (TOP VIEW)



SG Microelectronics Co., Ltd
Tel: 86/10/51798160/80
www.sg-micro.com

REV. A

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 ₊ = 4.2 V, V _{NO} , V _{NC} or V _{COM} = 1 V, I _{COM} = -100 mA, 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 ₊ = 4.2 V, V _{NO} , V _{NC} or V _{COM} = 1 V, I _{COM} = -100 mA, 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 ₊ = 4.2 V, V _{NO} , V _{NC} or V _{COM} = 1 V, I _{COM} = -100 mA, 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 ₊ = 4.2 V, V _{NO} or V _{NC} = 3.3 V/ 0.3 V, V _{COM} = 0.3 V/ 3.3 V	- 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} = 0.3 V/ 3.3 V, V _{NO} or V _{NC} = 0.3 V/ 3.3 V, or floating	- 40°C to +85°C			1	μA
DIGITAL INPUTS							
Input High Voltage	V _{IH}		- 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 ₊ = 4.2 V, V _{IN} = 0 V or 4.2 V	- 40°C to +85°C			1	μA
DYNAMIC CHARACTERISTICS							
Turn-On Time	t _{ON}	V _{IN} = 2.1 V to 0 V, R _L = 50 Ω, C _L = 35 pF, V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 2.1 V, Test Circuit2	+25°C		88		ns
Turn-Off Time	t _{OFF}	V _{IN} = 2.1 V to 0 V, R _L = 50 Ω, C _L = 35 pF, V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 2.1 V, Test Circuit2	+25°C		16		ns
Break-Before-Make Time Delay	t _D	V _{IN} = 2.1 V to 0 V, R _L = 50 Ω, C _L = 35 pF, V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 2.1 V, Test Circuit3	+25°C		6.0		ns
Off Isolation	O _{ISO}	V _{BIAS} = 2.1 V, V _{IN} = 0 dBm, Test Circuit4	100KHz	+25°C		-78	dB
			1MHz	+25°C		-58	dB
Channel-to-Channel Crosstalk	X _{TALK}	V _{BIAS} = 2.1 V, V _{IN} = 0 dBm, Test Circuit5	100KHz	+25°C		-103	dB
			1MHz	+25°C		-90	dB
Bandwidth -3 dB	BW	V _{BIAS} = 2.1 V, V _{IN} = 0 dBm, 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} = 0 V, C _L = 1.0 nF, Test Circuit7	+25°C		4.0		pC
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 ₊ = 4.2 V, V _{IN} = 0 V or V ₊	- 40°C to +85°C			1	μA

Specifications subject to change 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 ₊ = 2.7 V, V _{NO} , V _{NC} or V _{COM} = 1 V, I _{COM} = -100 mA, 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 ₊ = 2.7 V, V _{NO} , V _{NC} or V _{COM} = 1 V, I _{COM} = -100 mA, 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 ₊ = 2.7 V, V _{NO} , V _{NC} or V _{COM} = 1 V, I _{COM} = -100 mA, 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 ₊ = 3.6 V, V _{NO} or V _{NC} = 3.3 V / 0.3 V, V _{COM} = 0.3 V / 3.3 V	- 40°C to +85°C			1	μA
Channel ON Leakage current	I _{NC(ON)} , I _{NO(ON)} , I _{COM(ON)}	V ₊ = 3.6 V, V _{COM} = 0.3 V / 3.3 V, V _{NO} or V _{NC} = 0.3 V / 3.3 V, or floating	- 40°C to +85°C			1	μA
DIGITAL INPUTS							
Input High Voltage	V _{INH}		- 40°C to +85°C	1.5			V
Input Low Voltage	V _{INL}		- 40°C to +85°C			0.4	V
Input Leakage Current	I _{IN}	V ₊ = 2.7 V, V _{IN} = 0 V or 2.7 V	- 40°C to +85°C			1	μA
DYNAMIC CHARACTERISTICS							
Turn-On Time	t _{ON}	V _{IN} = 1.5 V to 0 V, R _L = 50 Ω, C _L = 35 pF, V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 1.5 V, Test Circuit2	+25°C		100		ns
Turn-Off Time	t _{OFF}	V _{IN} = 1.5 V to 0 V, R _L = 50 Ω, C _L = 35 pF, V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 1.5 V, Test Circuit2	+25°C		20		ns
Break-Before-Make Time Delay	t _D	V _{IN} = 1.5 V to 0 V, R _L = 50 Ω, C _L = 35 pF, V _{NO1} or V _{NC1} = V _{NO2} or V _{NC2} = 1.5 V, Test Circuit3	+25°C		9.2		ns
Off Isolation	O _{ISO}	V _{BIAS} = 2.1 V, V _{IN} = 0 dBm, Test Circuit4	100KHz	+25°C		-78	dB
			1MHz	+25°C		-58	dB
Channel-to-Channel Crosstalk	X _{TALK}	V _{BIAS} = 2.1 V, V _{IN} = 0 dBm, Test Circuit5	100KHz	+25°C		-103	dB
			1MHz	+25°C		-90	dB
Bandwidth -3 dB	BW	V _{BIAS} = 2.1 V, V _{IN} = 0 dBm, 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} = 0 V, C _L = 1.0nF Test Circuit7	+25°C		3.0		pC
Channel ON Capacitance	C _{ON}		+25°C		106		pF

Specifications subject to change without notice.

ORDERING INFORMATION

MODEL	PIN-PACKAGE	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKAGE OPTION
SGM2268	WQFN-10	- 40°C to +85°C	SGM2268YWQ10/TR	2268	Tape and Reel, 3000

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
 Operating Temperature Range.....- 40°C to +85°C
 Junction Temperature.....+150°C

Storage Temperature.....- 65°C to +150°C
 Lead Temperature (soldering, 10s)..... +260°C
 ESD Susceptibility
 HBM.....4000V
 MM.....400V

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.

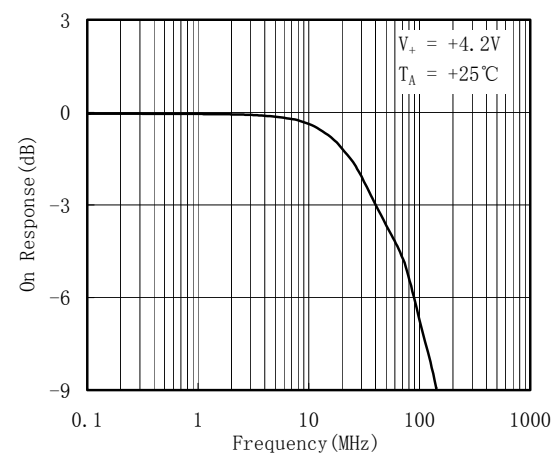
PIN DESCRIPTION

WQFN-10	NAME	FUNCTION
9	V ₊	Power supply
4	GND	Ground
7,6	IN1, IN2	Digital control pin to connect the COM terminal to the NO or NC terminals
8,5	COM1, COM2	Common terminal
1,3	NO1, NO2	Normally-open terminal
10,2	NC1, NC2	Normally-closed terminal

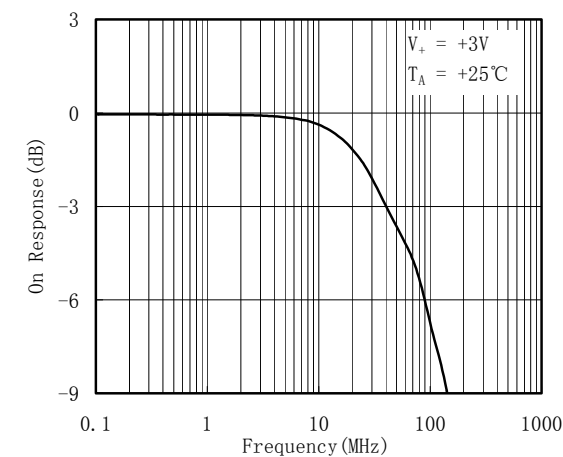
Note: NO, NC and COM terminal may be an input or output.

TYPICAL PERFORMANCE CHARACTERISTICS

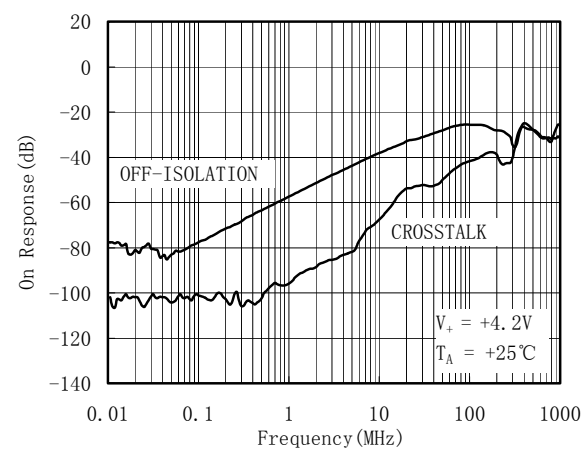
On Response vs. Frequency



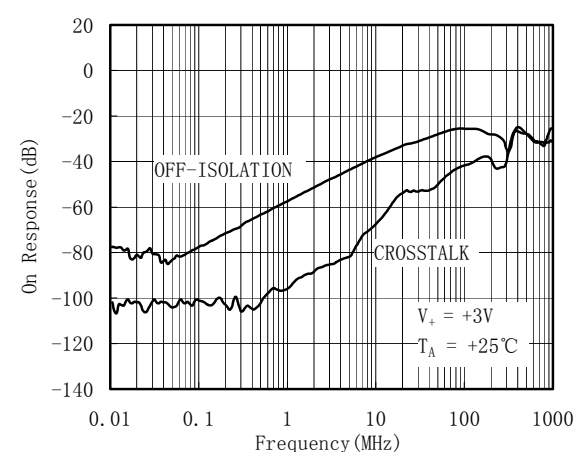
On Response vs. Frequency



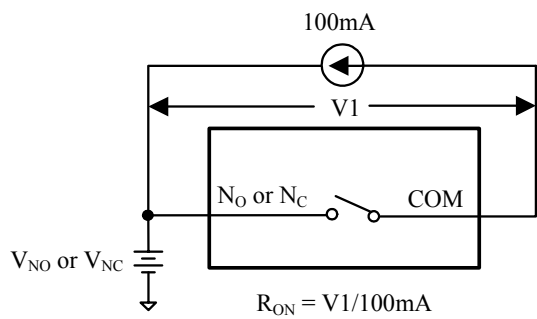
Response vs. Frequency



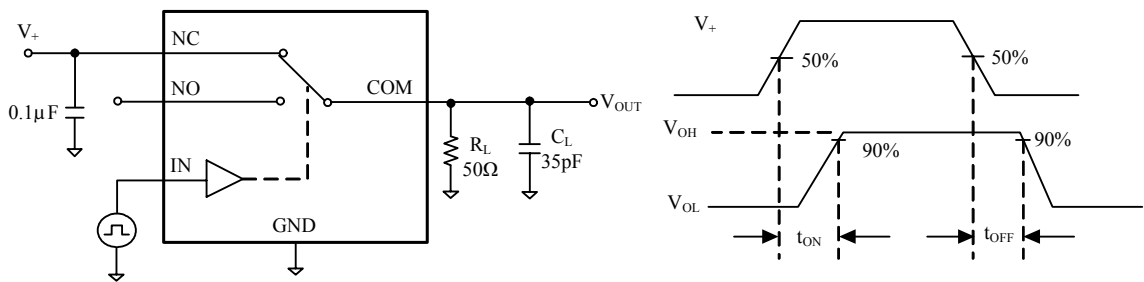
Response vs. Frequency



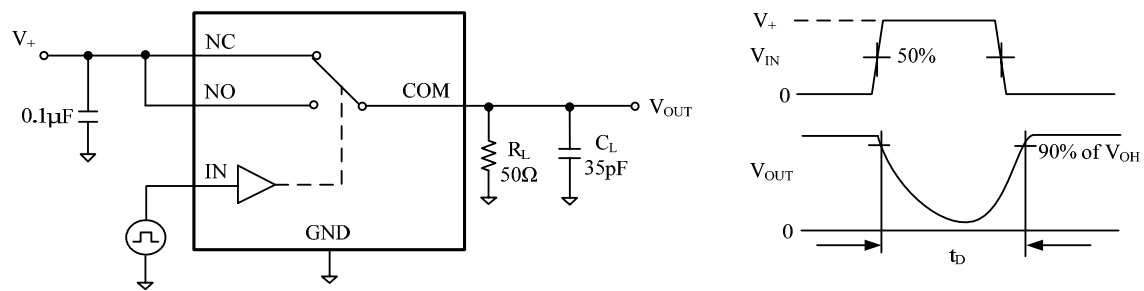
TEST CIRCUITS



Test Circuit 1. On Resistance

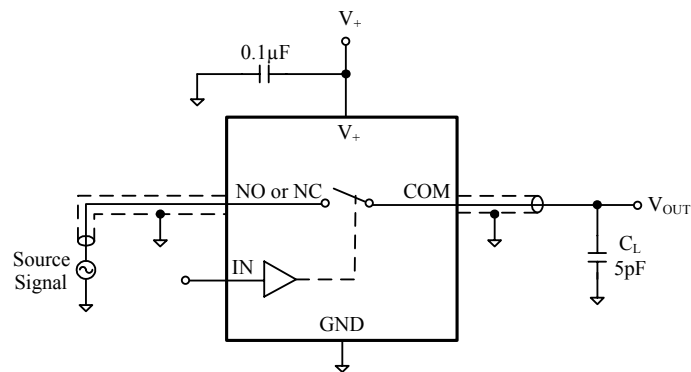


Test Circuit 2. Switching Times (t_{ON} , t_{OFF})

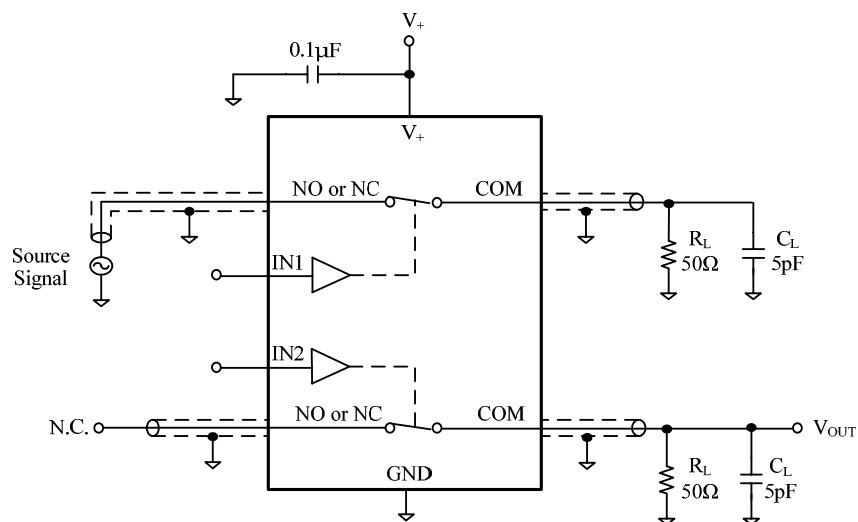


Test Circuit 3. Break-Before-Make Time (t_D)

TEST CIRCUITS (Cont.)



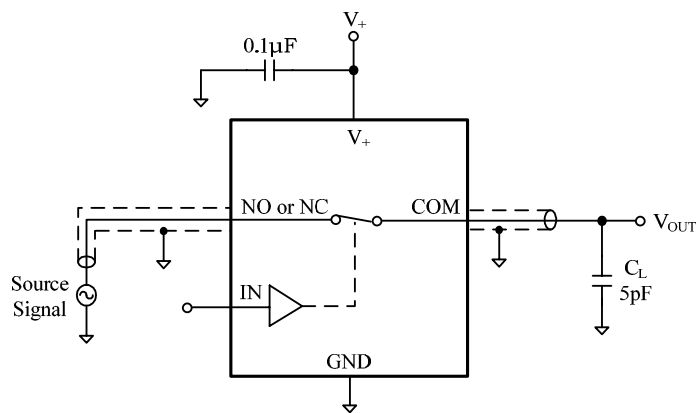
Test Circuit 4. Off Isolation



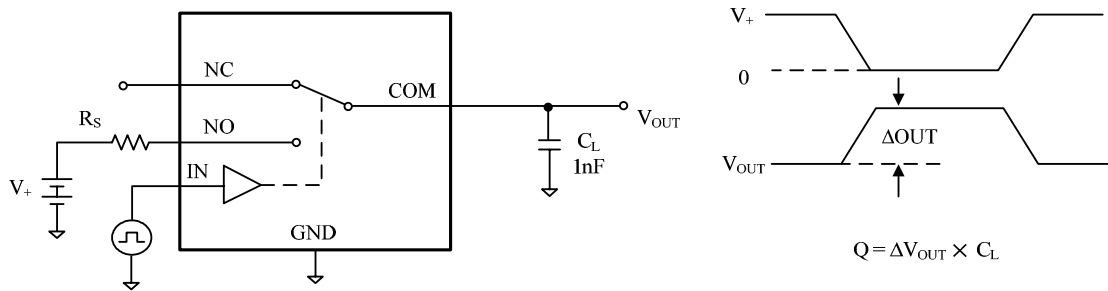
$$\text{Channel To Channel Crosstalk} = -20 \times \log \frac{V_{\text{NO or V}_{\text{NC}}}}{V_{\text{OUT}}}$$

Test Circuit 5. Channel-to-Channel Crosstalk

TEST CIRCUITS (Cont.)



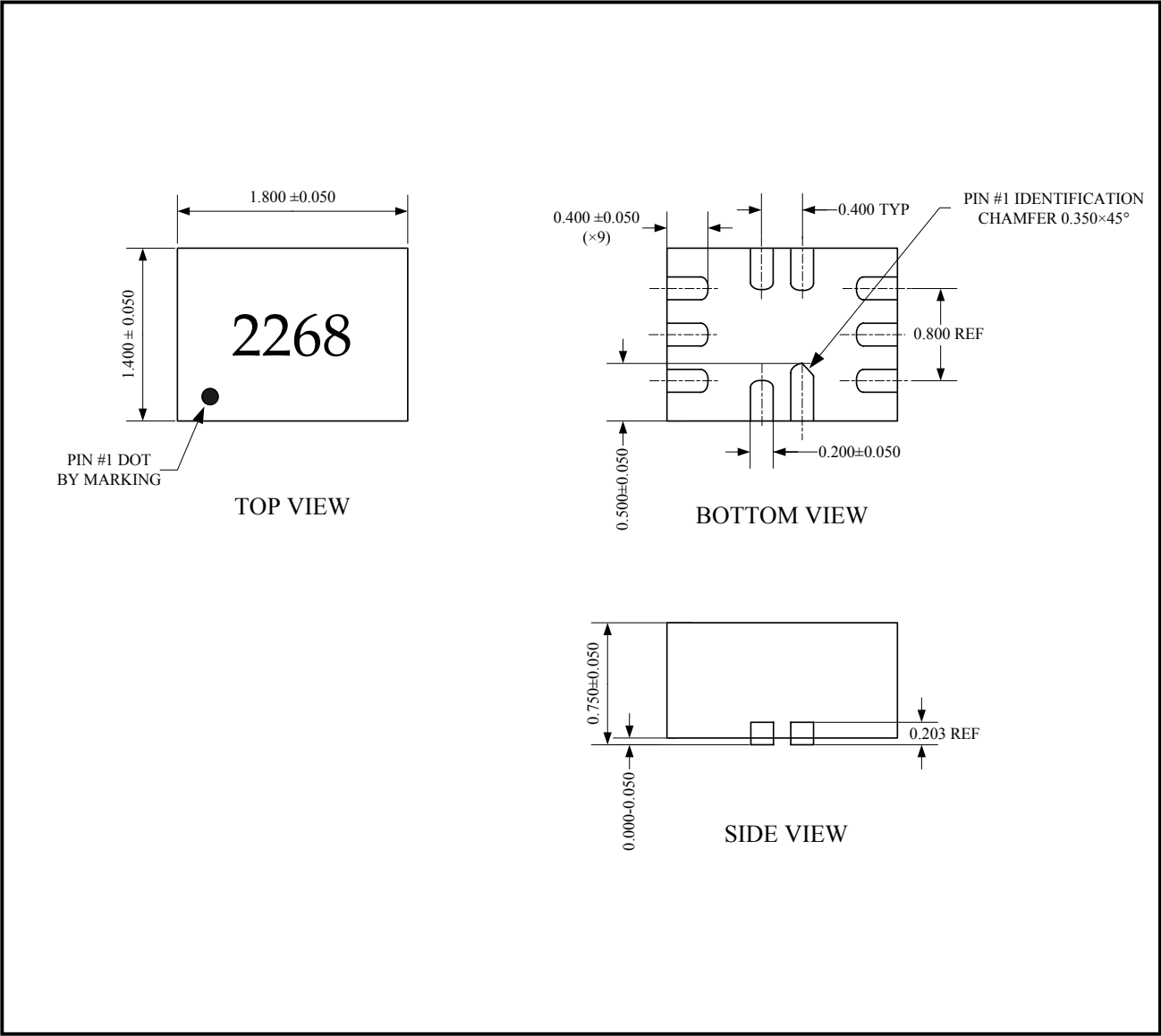
Test Circuit 6. Bandwidth -3dB



Test Circuit 7. Charge Injection (Q)

PACKAGE OUTLINE DIMENSIONS

WQFN-10



Note: All linear dimensions are in millimeters.

REVISION HISTORY

Location	Page
10/2007—Preliminary Datasheet	
01/2008—Data Sheet REV.A	

SG Microelectronics Co., Ltd

A2608, NO.72 North Road
Xisanhuan, Haidian District,
Beijing, China 100037
Tel: 86-10-51798160/80
Fax: 86-10-51798180-803
www.sg-micro.com