



# SGM2267

## 0.45Ω, Ultra Low On-Resistance, Dual, SPDT Analog Switch

### GENERAL DESCRIPTION

The SGM2267 is a dual SPDT (single-pole/double-throw) analog switch. It operates from a 1.8V to 4.2V single power supply.

The SGM2267 features ultra low on-resistance, low voltage and fast switching times. The high performances make it very suitable for multiple applications, such as portable equipment, audio and video signal routing, etc. In addition, the SGM2267 can be used as a dual 2-to-1 multiplexer because it has two normally open and two normally close switches. Low power consumption is also one of the important reasons that make it a good choice.

The SGM2267 is available in a Green TQFN-2.1×1.6-10L package. It operates over an ambient temperature range of -40°C to +85°C.

### FEATURES

- **Single Supply Voltage Range: 1.8V to 4.2V**
- **Ultra Low On-Resistance: 0.45Ω (TYP) at 4.2V**
- **Low On-Resistance Flatness: 0.1Ω (TYP)**
- **Low On-Resistance Matching: 0.04Ω (TYP)**
- **-3dB Bandwidth: 40MHz**
- **Fast Switching Times at  $V_+ = 4.2V$ :**
  - $t_{ON}$ : 96ns (TYP)
  - $t_{OFF}$ : 16ns (TYP)
- **High Off-Isolation: -78dB at 100kHz**
- **Low Crosstalk: -103dB at 100kHz**
- **Break-Before-Make Switching**
- **TTL/CMOS Compatible**
- **Rail-to-Rail Input and Output Operation**
- **-40°C to +85°C Operating Temperature Range**
- **Available in a Green TQFN-2.1×1.6-10L Package**

### APPLICATIONS

Cellular Phones  
Medical Equipment  
Computer Peripherals  
Portable Equipment  
Sample-and-Hold Circuits  
Battery-Powered Systems  
Audio and Video Signal Routing

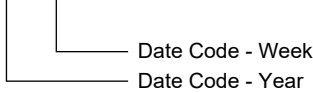
**PACKAGE/ORDERING INFORMATION**

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2267	TQFN-2.1x1.6-10L	-40°C to +85°C	SGM2267YTQD10/TR	2267 XXXX	Tape and Reel, 3000

**MARKING INFORMATION**

NOTE: XXXX = Date Code.

**XXXX**



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 <sup>(1)</sup> ..... -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

**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.

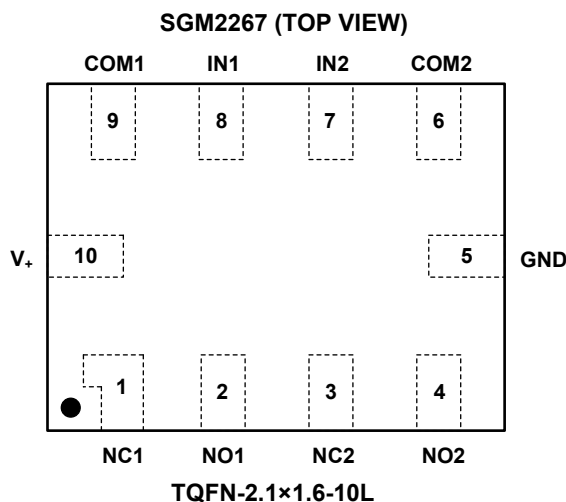
**ESD SENSITIVITY CAUTION**

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

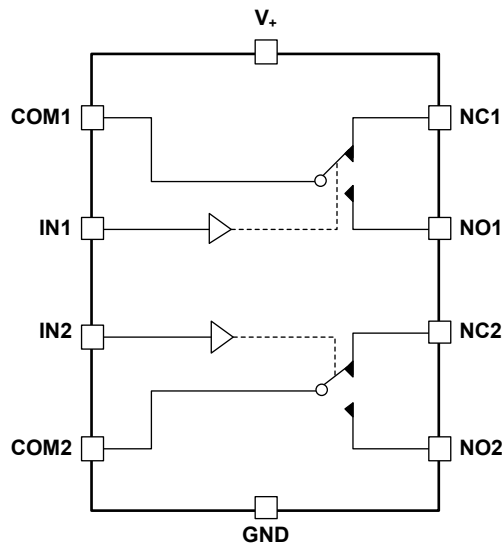


## PIN DESCRIPTION

PIN	NAME	FUNCTION
1, 3	NC1, NC2	Normally Closed Pins.
2, 4	NO1, NO2	Normally Open Pins.
5	GND	Ground.
8, 7	IN1, IN2	Digital Control Input Pins to Connect the COM Pins to the NO or NC Pins.
9, 6	COM1, COM2	Common Pins.
10	V <sub>+</sub>	Positive Power Supply.

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

LOGIC DIAGRAM



FUNCTION TABLE

LOGIC	NO	NC
0	OFF	ON
1	ON	OFF

NOTE: Switches shown for logic "0" input.

## ELECTRICAL CHARACTERISTICS

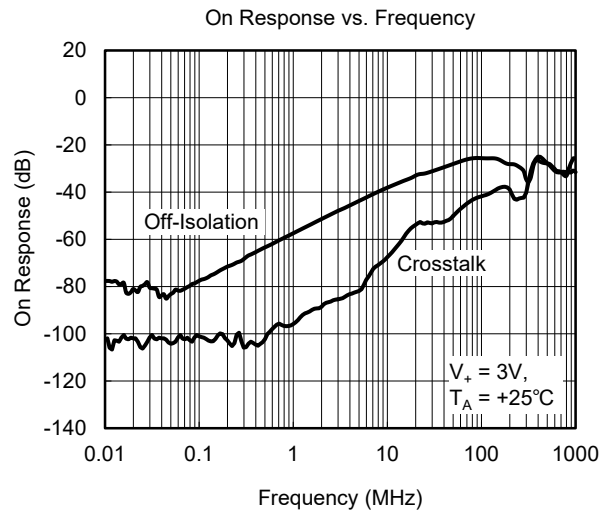
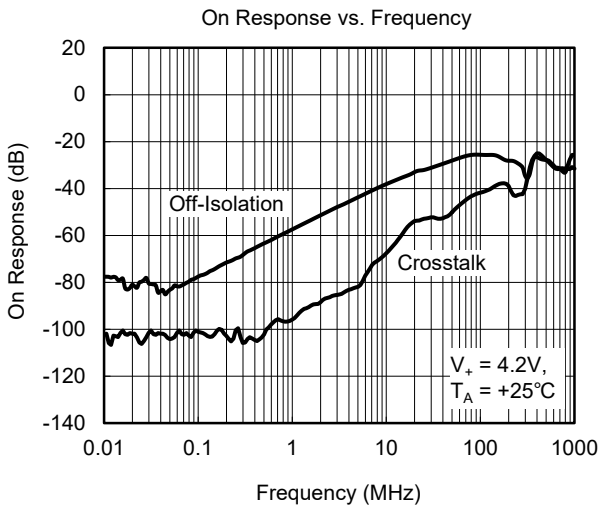
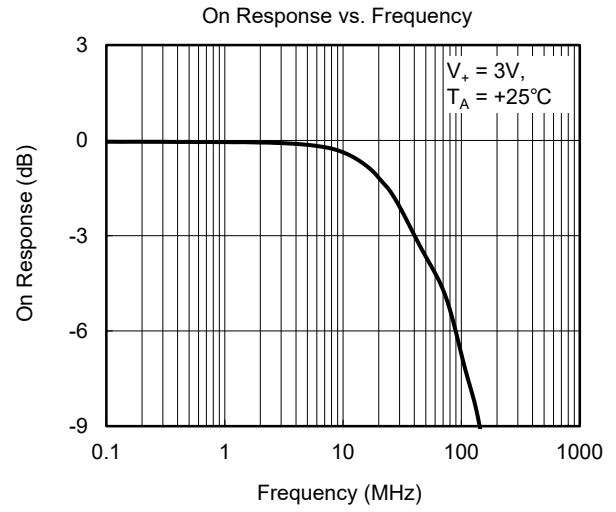
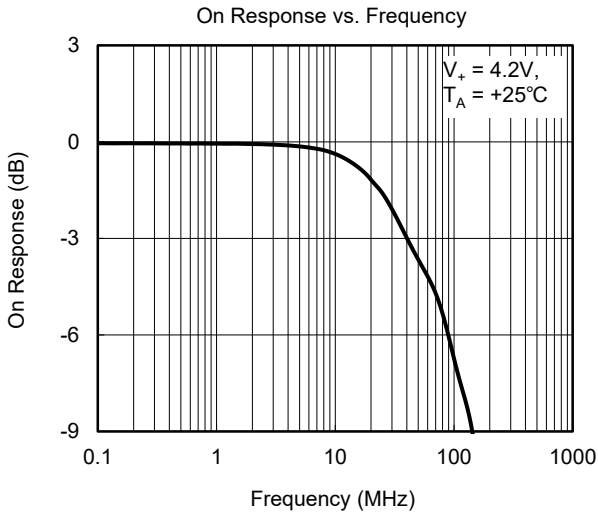
(V<sub>+</sub> = 4.2V, GND = 0V, Full = -40°C to +85°C. Typical values are at V<sub>+</sub> = 4.2V, T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
<b>Analog Switch</b>							
Analog Signal Range	V <sub>NO</sub> , V <sub>NC</sub> , V <sub>COM</sub>		Full	0		V <sub>+</sub>	V
On-Resistance	R <sub>ON</sub>	V <sub>+</sub> = 4.2V, 0V ≤ V <sub>NO</sub> or V <sub>NC</sub> ≤ V <sub>+</sub> , I <sub>COM</sub> = -100mA, Test Circuit 1	+25°C		0.45	0.65	Ω
			Full			0.75	
On-Resistance Match Between Channels	ΔR <sub>ON</sub>	V <sub>+</sub> = 4.2V, 0V ≤ V <sub>NO</sub> or V <sub>NC</sub> ≤ V <sub>+</sub> , I <sub>COM</sub> = -100mA, Test Circuit 1	+25°C		0.04	0.1	Ω
			Full			0.12	
On-Resistance Flatness	R <sub>FLAT(ON)</sub>	V <sub>+</sub> = 4.2V, 0V ≤ V <sub>NO</sub> or V <sub>NC</sub> ≤ V <sub>+</sub> , I <sub>COM</sub> = -100mA, Test Circuit 1	+25°C		0.1	0.18	Ω
			Full			0.2	
Source Off Leakage Current	I <sub>NC(OFF)</sub> , I <sub>NO(OFF)</sub>	V <sub>+</sub> = 4.2V, V <sub>NO</sub> or V <sub>NC</sub> = 3.3V/0.3V, V <sub>COM</sub> = 0.3V/3.3V	Full			1	μA
Channel On Leakage Current	I <sub>NC(ON)</sub> , I <sub>NO(ON)</sub> , I <sub>COM(ON)</sub>	V <sub>+</sub> = 4.2V, V <sub>COM</sub> = 0.3V/3.3V, V <sub>NO</sub> or V <sub>NC</sub> = 0.3V/3.3V or floating	Full			1	μA
<b>Digital Inputs</b>							
Input High Voltage	V <sub>INH</sub>		Full	1.6			V
Input Low Voltage	V <sub>INL</sub>		Full			0.4	V
Input Leakage Current	I <sub>IN</sub>	V <sub>+</sub> = 4.2V, V <sub>IN</sub> = 0V or 4.2V	Full			1	μA
<b>Dynamic Characteristics</b>							
Turn-On Time	t <sub>ON</sub>	V <sub>IN</sub> = 2.1V to 0V, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35pF, V <sub>NO1</sub> or V <sub>NC1</sub> = V <sub>NO2</sub> or V <sub>NC2</sub> = 2.1V, Test Circuit 2	+25°C		96		ns
Turn-Off Time	t <sub>OFF</sub>	V <sub>IN</sub> = 2.1V to 0V, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35pF, V <sub>NO1</sub> or V <sub>NC1</sub> = V <sub>NO2</sub> or V <sub>NC2</sub> = 2.1V, Test Circuit 2	+25°C		16		ns
Break-Before-Make Time Delay	t <sub>D</sub>	V <sub>IN</sub> = 2.1V to 0V, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35pF, V <sub>NO1</sub> or V <sub>NC1</sub> = V <sub>NO2</sub> or V <sub>NC2</sub> = 2.1V, Test Circuit 3	+25°C		25		ns
Off Isolation	O <sub>ISO</sub>	R <sub>L</sub> = 50Ω, Signal = 0dBm, Test Circuit 4	100kHz	+25°C		-78	dB
			1MHz	+25°C		-58	
Channel-to-Channel Crosstalk	X <sub>TALK</sub>	R <sub>L</sub> = 50Ω, Signal = 0dBm, Test Circuit 5	100kHz	+25°C		-103	dB
			1MHz	+25°C		-90	
-3dB Bandwidth	BW	R <sub>L</sub> = 50Ω, Signal = 0dBm, Test Circuit 6	+25°C		40		MHz
Charge Injection Select Input to Common I/O	Q	V <sub>NO1</sub> or V <sub>NC1</sub> = V <sub>NO2</sub> or V <sub>NC2</sub> = 0V, C <sub>L</sub> = 1.0nF, R <sub>s</sub> = 0Ω, Test Circuit 7	+25°C		4		pC
Total Harmonic Distortion + Noise	THD+N	V <sub>COM</sub> = 2V <sub>P-P</sub> , f = 20Hz to 20kHz, Test Circuit 8	+25°C		0.011		%
Channel On Capacitance	C <sub>ON</sub>		+25°C		106		pF
<b>Power Requirements</b>							
Power Supply Range	V <sub>+</sub>		Full	1.8		4.2	V
Power Supply Current	I <sub>+</sub>	V <sub>+</sub> = 4.2V, V <sub>IN</sub> = 0V or V <sub>+</sub>	Full			1	μA

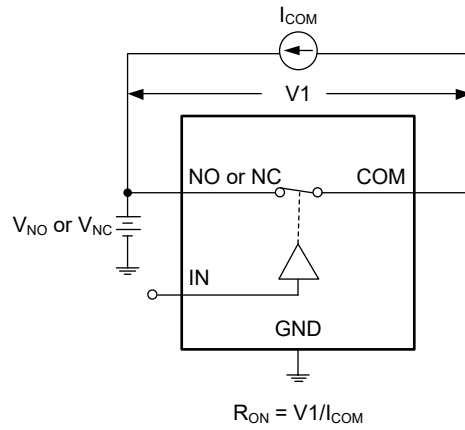
**ELECTRICAL CHARACTERISTICS (continued)**(V<sub>+</sub> = 2.7V to 3.6V, GND = 0V, Full = -40°C to +85°C. Typical values are at V<sub>+</sub> = 3V, T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
<b>Analog Switch</b>							
Analog Signal Range	V <sub>NO</sub> , V <sub>NC</sub> , V <sub>COM</sub>		Full	0		V <sub>+</sub>	V
On-Resistance	R <sub>ON</sub>	V <sub>+</sub> = 2.7V, 0V ≤ V <sub>NO</sub> or V <sub>NC</sub> ≤ V <sub>+</sub> , I <sub>COM</sub> = -100mA, Test Circuit 1	+25°C		0.6	0.8	Ω
			Full			0.85	
On-Resistance Match Between Channels	ΔR <sub>ON</sub>	V <sub>+</sub> = 2.7V, 0V ≤ V <sub>NO</sub> or V <sub>NC</sub> ≤ V <sub>+</sub> , I <sub>COM</sub> = -100mA, Test Circuit 1	+25°C		0.03	0.1	Ω
			Full			0.12	
On-Resistance Flatness	R <sub>FLAT(ON)</sub>	V <sub>+</sub> = 2.7V, 0V ≤ V <sub>NO</sub> or V <sub>NC</sub> ≤ V <sub>+</sub> , I <sub>COM</sub> = -100mA, Test Circuit 1	+25°C		0.2	0.3	Ω
			Full			0.35	
Source Off Leakage Current	I <sub>NC(OFF)</sub> , I <sub>NO(OFF)</sub>	V <sub>+</sub> = 3.6V, V <sub>NO</sub> or V <sub>NC</sub> = 3.3V/0.3V, V <sub>COM</sub> = 0.3V/3.3V	Full			1	μA
Channel On Leakage Current	I <sub>NC(ON)</sub> , I <sub>NO(ON)</sub> , I <sub>COM(ON)</sub>	V <sub>+</sub> = 3.6V, V <sub>COM</sub> = 0.3V/3.3V, V <sub>NO</sub> or V <sub>NC</sub> = 0.3V/3.3V or floating	Full			1	μA
<b>Digital Inputs</b>							
Input High Voltage	V <sub>INH</sub>		Full	1.5			V
Input Low Voltage	V <sub>INL</sub>		Full			0.35	V
Input Leakage Current	I <sub>IN</sub>	V <sub>+</sub> = 2.7V, V <sub>IN</sub> = 0V or 2.7V	Full			1	μA
<b>Dynamic Characteristics</b>							
Turn-On Time	t <sub>ON</sub>	V <sub>IN</sub> = 1.5V to 0V, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35pF, V <sub>NO1</sub> or V <sub>NC1</sub> = V <sub>NO2</sub> or V <sub>NC2</sub> = 1.5V, Test Circuit 2	+25°C		100		ns
Turn-Off Time	t <sub>OFF</sub>	V <sub>IN</sub> = 1.5V to 0V, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35pF, V <sub>NO1</sub> or V <sub>NC1</sub> = V <sub>NO2</sub> or V <sub>NC2</sub> = 1.5V, Test Circuit 2	+25°C		25		ns
Break-Before-Make Time Delay	t <sub>D</sub>	V <sub>IN</sub> = 1.5V to 0V, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35pF, V <sub>NO1</sub> or V <sub>NC1</sub> = V <sub>NO2</sub> or V <sub>NC2</sub> = 1.5V, Test Circuit 3	+25°C		28		ns
Off Isolation	O <sub>ISO</sub>	R <sub>L</sub> = 50Ω, Signal = 0dBm, Test Circuit 4	100kHz	+25°C		-78	dB
			1MHz	+25°C		-58	dB
Channel-to-Channel Crosstalk	X <sub>TALK</sub>	R <sub>L</sub> = 50Ω, Signal = 0dBm, Test Circuit 5	100kHz	+25°C		-103	dB
			1MHz	+25°C		-90	dB
-3dB Bandwidth	BW	R <sub>L</sub> = 50Ω, Signal = 0dBm, Test Circuit 6	+25°C		40		MHz
Charge Injection Select Input to Common I/O	Q	V <sub>NO1</sub> or V <sub>NC1</sub> = V <sub>NO2</sub> or V <sub>NC2</sub> = 0V, C <sub>L</sub> = 1.0nF, R <sub>S</sub> = 0Ω, Test Circuit 7	+25°C		4		pC
Total Harmonic Distortion + Noise	THD+N	V <sub>COM</sub> = 1.5V <sub>P-P</sub> , f = 20Hz to 20kHz, Test Circuit 8	+25°C		0.015		%
Channel On Capacitance	C <sub>ON</sub>		+25°C		106		pF

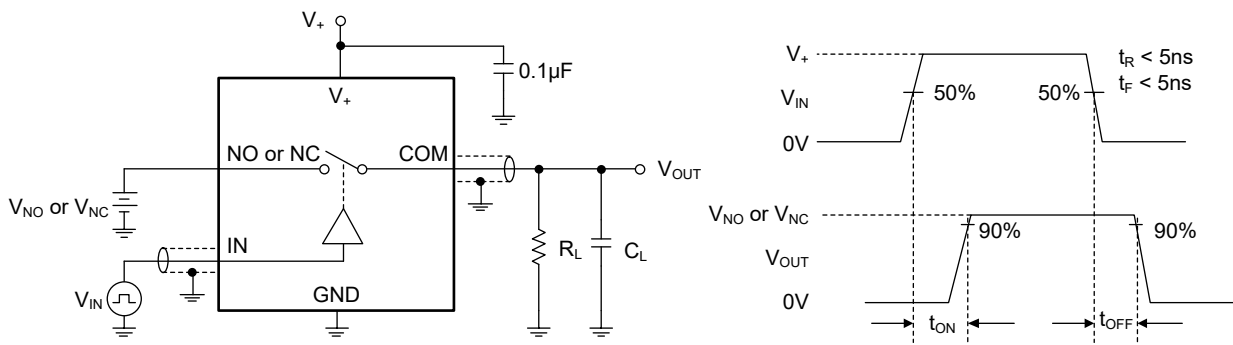
TYPICAL PERFORMANCE CHARACTERISTICS



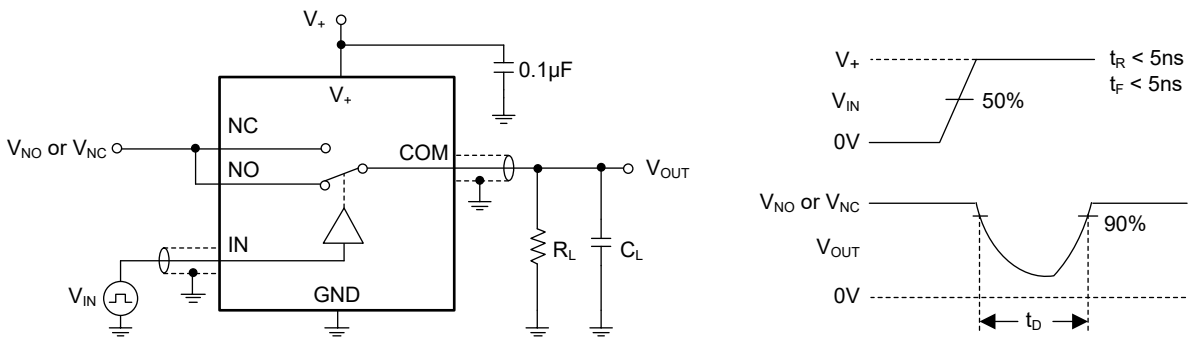
TEST CIRCUITS



Test Circuit 1. On-Resistance



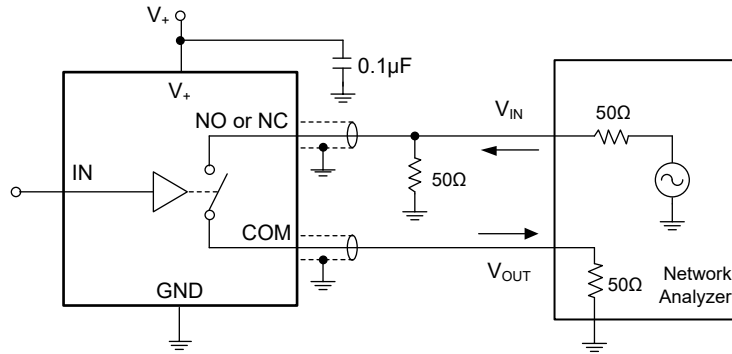
Test Circuit 2. Switching Times ( $t_{ON}$ ,  $t_{OFF}$ )



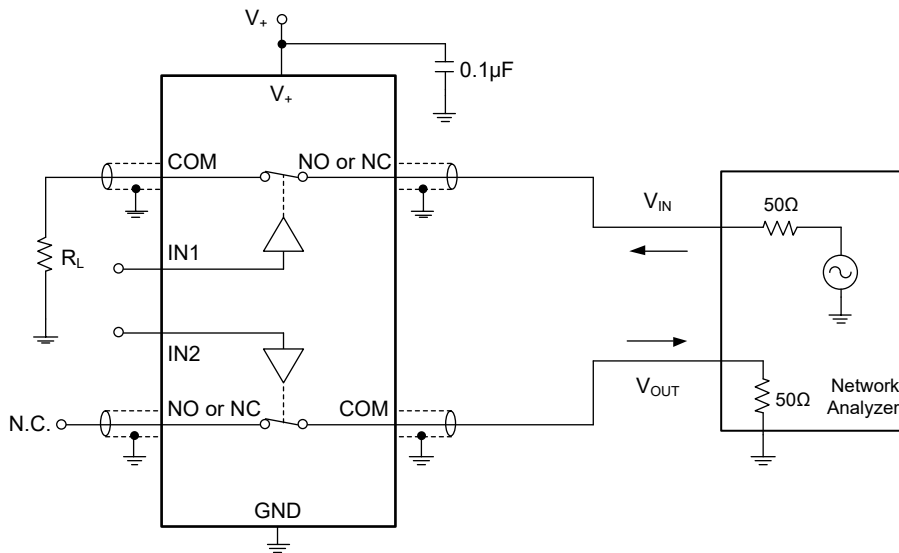
Test Circuit 3. Break-Before-Make Time ( $t_D$ )



TEST CIRCUITS (continued)

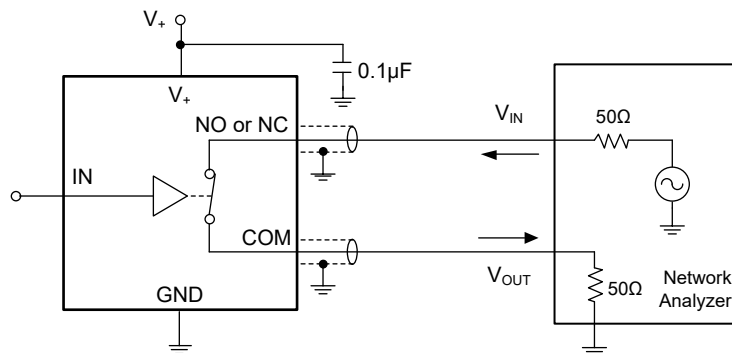


Test Circuit 4. Off Isolation



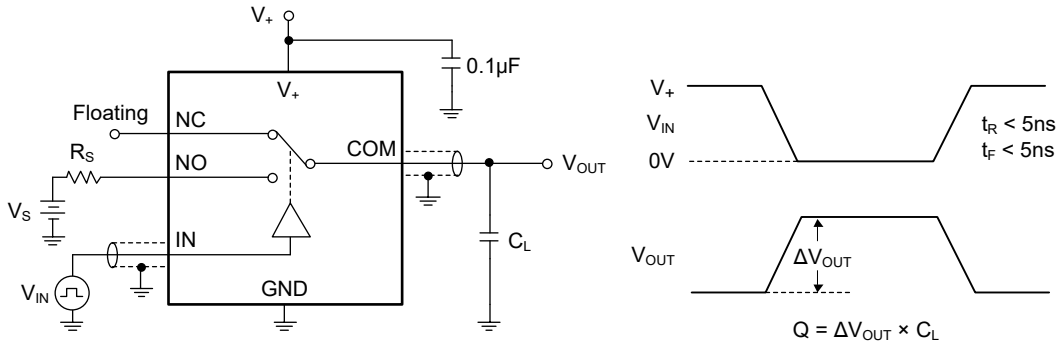
$$\text{Channel-to-Channel Crosstalk} = -20 \log (V_{NO} \text{ or } V_{NC}/V_{OUT})$$

Test Circuit 5. Channel-to-Channel Crosstalk

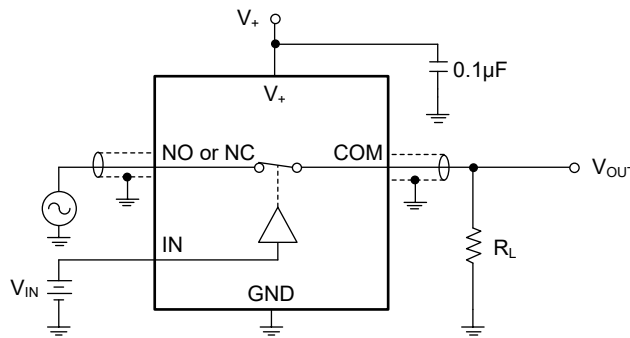


Test Circuit 6. -3dB Bandwidth

TEST CIRCUITS (continued)



Test Circuit 7. Charge Injection (Q)



Test Circuit 8. Total Harmonic Distortion

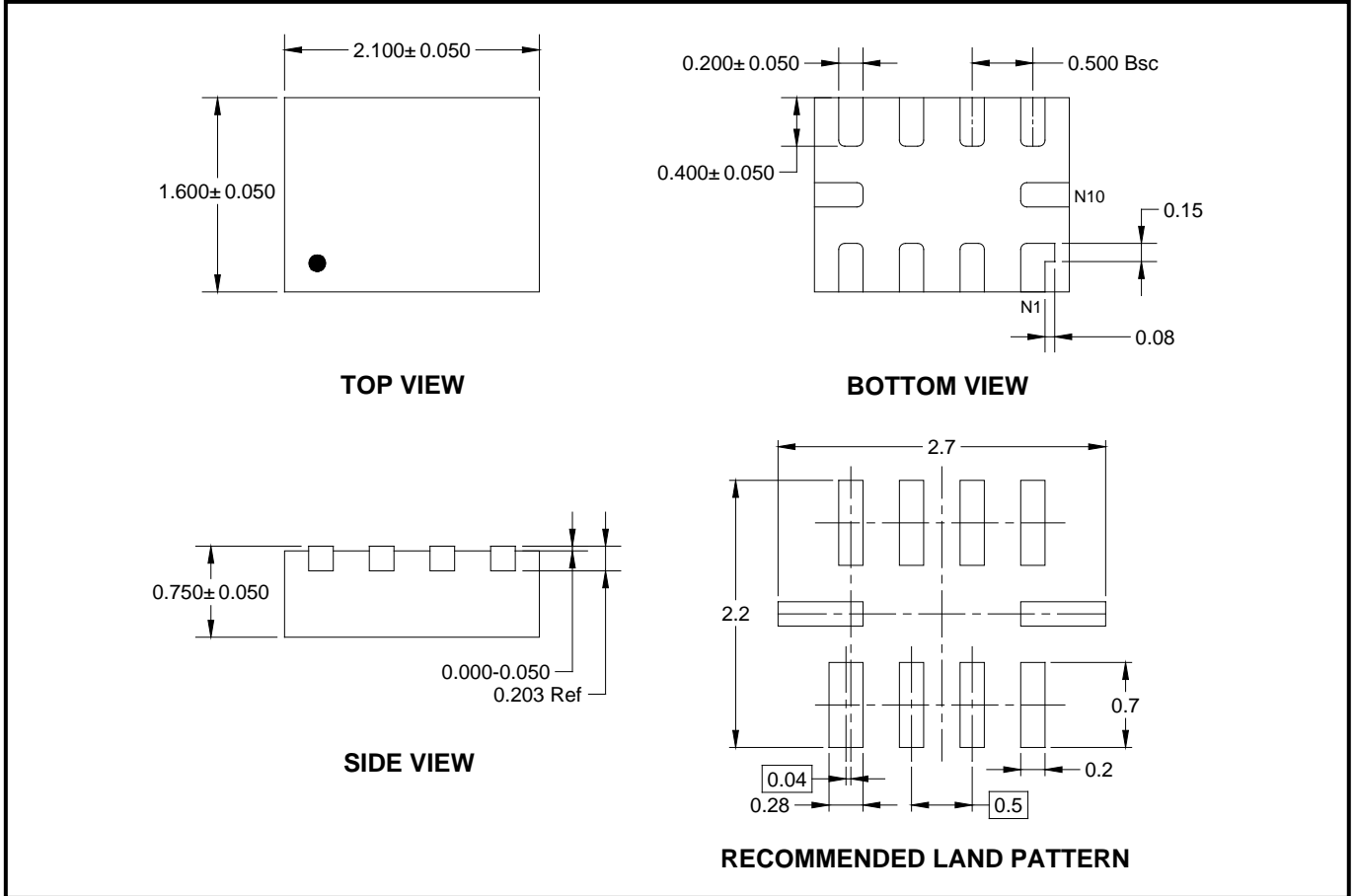
REVISION HISTORY

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

	Page
<b>APRIL 2022 – REV.A.2 to REV.A.3</b>	
Updated Electrical Characteristic .....	4, 5
<b>JANUARY 2013 – REV.A.1 to REV.A.2</b>	
Added Recommended Land Pattern Information .....	10
Added Tape and Reel Information .....	11, 12
<b>MAY 2011 – REV.A to REV.A.1</b>	
Updated Package Description .....	All
<b>Changes from Original (MAY 2008) to REV.A</b>	
Changed from product preview to production data .....	All

PACKAGE OUTLINE DIMENSIONS

TQFN-2.1x1.6-10L

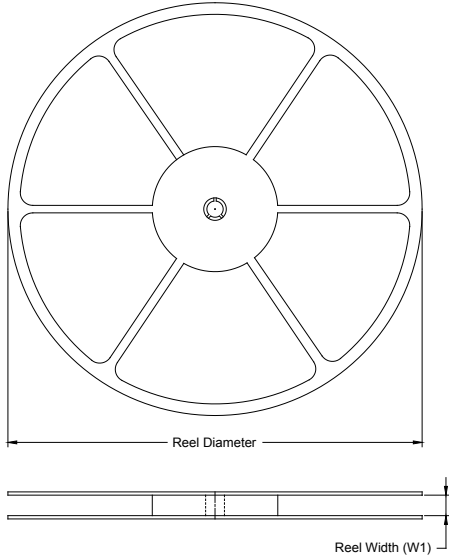


- NOTES:
1. All linear dimensions are in millimeters.
  2. This drawing is subject to change without notice.

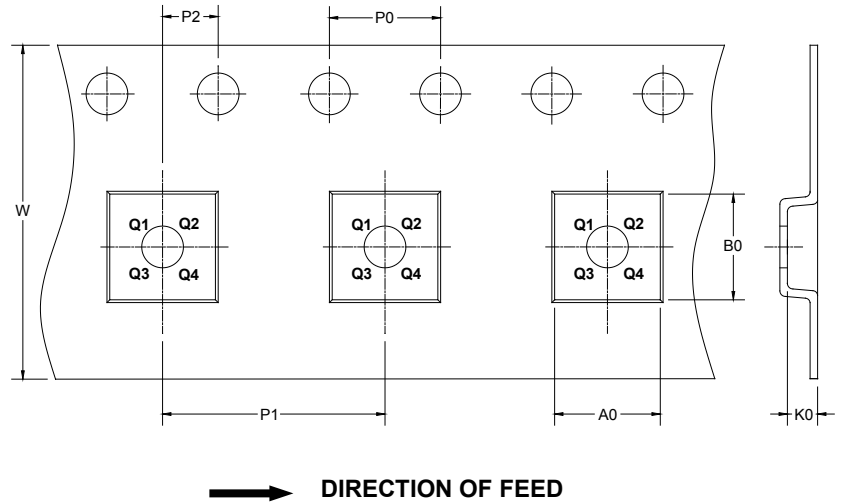
# PACKAGE INFORMATION

## 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