



SGM44602

4Ω, High Speed, Low Voltage Dual, DPDT Analog Switch

GENERAL DESCRIPTION

The SGM44602 is a dual, high-speed, low-voltage, double-pole/double-throw (DPDT) CMOS analog switch that is designed to operate from a single 1.8V to 5.5V power supply. It features high-bandwidth (300MHz) and low on-resistance (4Ω TYP), targeted applications for audio switching.

The SGM44602 consists of four SPDT switches. The configuration can be used as a bidirectional quad 2-channel multiplexer/demultiplexer with a single switch-enable (IN_{1-4}) input.

The SGM44602 can handle rail-to-rail analog signals and it is available in a Green TQFN-2.6×1.8-16L package.

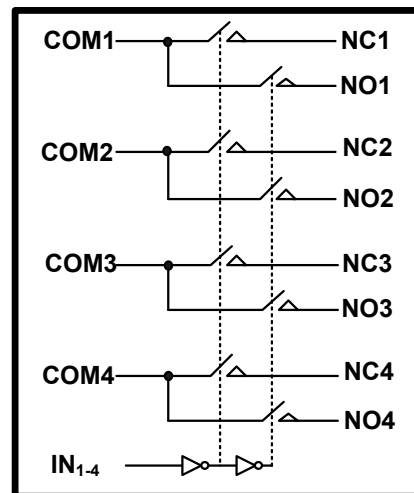
APPLICATIONS

- Communication Systems
- Cell Phones
- Portable Instrumentation
- Audio Signal Routing
- Audio and Video Switching
- PCMCIA Cards
- Computer Peripherals
- Modems
- PDA's

FEATURES

- **Low Voltage Operation: 1.8V to 5.5V**
- **Low On-Resistance: 4Ω (TYP)**
- **Low On-Resistance Flatness**
- **-3dB Bandwidth: 300MHz**
- **High Off-Isolation: -75dB at 1MHz**
- **Low Crosstalk: -100dB at 1MHz**
- **Rail-to-Rail Input and Output Operation**
- **Typical Power Consumption (< 0.01μW)**
- **TTL/CMOS Compatible**
- **-40°C to +85°C Operating Temperature Range**
- **Available in a Green TQFN-2.6×1.8-16L Package**

BLOCK DIAGRAM



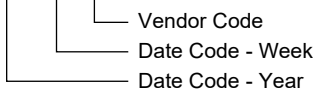
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM44602	TQFN-2.6×1.8-16L	-40°C to +85°C	SGM44602YTQA16/TR	44602 XXXXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XXXXX = Date Code and Vendor Code.

XXXXX



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₊ to GND0V to 6V
- Analog, Digital Voltage Range-0.3V to (V₊) + 0.3V
- Continuous Current NO, NC, or COM..... ±100mA
- Junction Temperature+150°C
- Storage Temperature Range-65°C to +150°C
- Lead Temperature (Soldering, 10s).....+260°C

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.

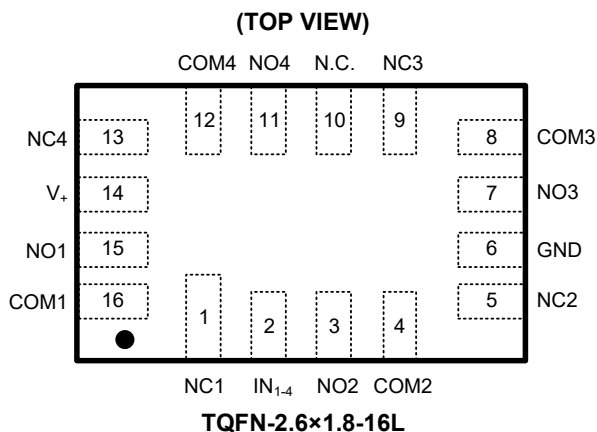
ESD SENSITIVITY CAUTION

This integrated circuit can be damaged 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, 5, 9, 13	NC _x	Normally-Closed Terminal.
2	IN ₁₋₄	Digital Control Pin to Connect the COM Terminal to the NO or NC Terminals.
6	GND	Ground.
10	N.C.	Not Internally Connected.
14	V ₊	Power Supply.
15, 3, 7, 11	NO _x	Normally-Open Terminal.
16, 4, 8, 12	COM _x	Common Terminal.

FUNCTION TABLE

IN ₁₋₄	FUNCTION	
	NC1, 2, 3 and 4	NO1, 2, 3 and 4
0	ON	OFF
1	OFF	ON

ELECTRICAL CHARACTERISTICS

($V_+ = 4.5V$ to $5.5V$, $GND = 0V$, $V_{IH} = 1.6V$, $V_{IL} = 0.5V$, Full = $-40^\circ C$ to $+85^\circ C$. Typical values are at $V_+ = 5V$, $T_A = +25^\circ C$, unless otherwise noted.)

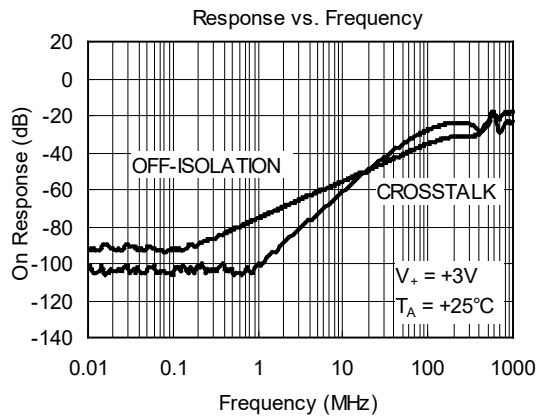
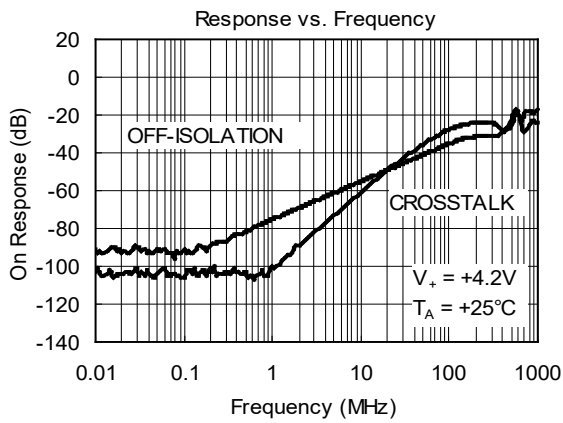
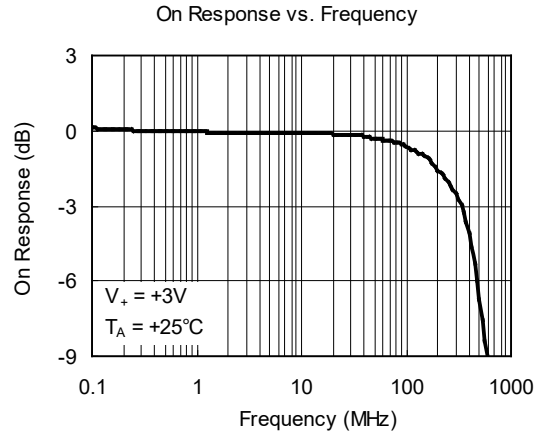
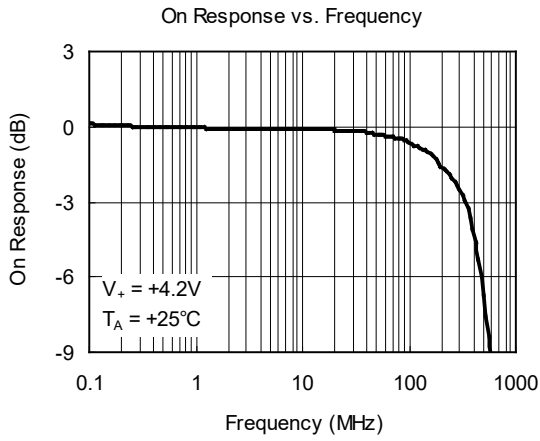
PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Analog Switch							
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}		Full	0		V_+	V
On-Resistance	R_{ON}	$V_+ = 4.5V, 0V \leq V_{NO} \text{ or } V_{NC} \leq V_+, I_{COM} = -100mA$, Test Circuit 1	$+25^\circ C$		4	6	Ω
			Full			7	
On-Resistance Match between Channels	ΔR_{ON}	$V_+ = 4.5V, 0V \leq V_{NO} \text{ or } V_{NC} \leq V_+, I_{COM} = -100mA$, Test Circuit 1	$+25^\circ C$		0.4	2.5	Ω
			Full			3	
On-Resistance Flatness	$R_{FLAT(ON)}$	$V_+ = 4.5V, 0V \leq V_{NO} \text{ or } V_{NC} \leq V_+, I_{COM} = -100mA$, Test Circuit 1	$+25^\circ C$		2	3	Ω
			Full			3.5	
Source Off Leakage Current	$I_{NC(OFF)}, I_{NO(OFF)}$	$V_+ = 5.5V, V_{NO} \text{ or } V_{NC} = 3.3V/0.3V, V_{COM} = 0.3V/3.3V$	Full			1	μA
Channel On Leakage Current	$I_{NC(ON)}, I_{NO(ON)}, I_{COM(ON)}$	$V_+ = 5.5V, V_{COM} = 0.3V/3.3V, V_{NO} \text{ or } V_{NC} = 0.3V/3.3V$ or floating	Full			1	μA
Digital Inputs							
Input High Voltage	V_{INH}		Full	1.6			V
Input Low Voltage	V_{INL}		Full			0.5	V
Input Leakage Current	I_{IN}	$V_+ = 5.5V, V_{IN} = 0V$ or $5.5V$	Full			1	μA
Dynamic Characteristics							
Turn-On Time	t_{ON}	$V_{NC} \text{ or } V_{NO} = 3V, R_L = 300\Omega, C_L = 35pF$, Test Circuit 2	$+25^\circ C$		32		ns
Turn-Off Time	t_{OFF}		$+25^\circ C$		26		ns
Break-Before-Make Time Delay	t_D	$V_{NC} \text{ or } V_{NO} = 3V, R_L = 300\Omega, C_L = 35pF$, Test Circuit 4	$+25^\circ C$		15.5		ns
Charge Injection	Q	$V_G = GND, R_G = 0\Omega, C_L = 1nF, Q = C_L \times V_{OUT}$, Test Circuit 3	$+25^\circ C$		4.8		pC
Off Isolation	O_{ISO}	Signal = 0dBm, $R_L = 50\Omega$, Test Circuit 5	1MHz	$+25^\circ C$		-75	dB
			10MHz	$+25^\circ C$		-55	
Channel-to-Channel Crosstalk	X_{TALK}	Signal = 0dBm, $R_L = 50\Omega$, Test Circuit 6	1MHz	$+25^\circ C$		-100	dB
			10MHz	$+25^\circ C$		-60	
-3dB Bandwidth	BW	Signal = 0dBm, $R_L = 50\Omega$, Test Circuit 7	$+25^\circ C$		300		MHz
Channel On Capacitance	$C_{NC(ON)}, C_{NO(ON)}, C_{COM(ON)}$		$+25^\circ C$		45		pF
Power Requirements							
Power Supply Range	V_+		Full	1.8		5.5	V
Power Supply Current	I_+	$V_+ = 5.5V, V_{IN} = 0V$ or V_+	Full			1	μA

ELECTRICAL CHARACTERISTICS (continued)

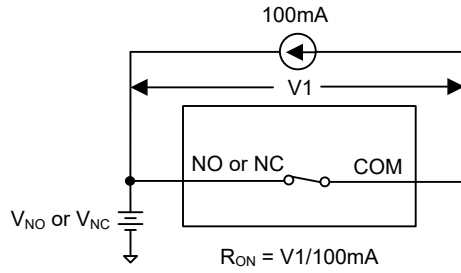
($V_+ = 2.7V$ to $3.6V$, $V_{IH} = 1.6V$, $V_{IL} = 0.4V$, Full = $-40^\circ C$ to $+85^\circ C$. Typical values are at $V_+ = 3V$, $T_A = +25^\circ C$, unless otherwise noted.)

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}	$V_+ = 2.7V, 0V \leq V_{NO} \text{ or } V_{NC} \leq V_+, I_{COM} = -10mA, \text{ Test Circuit 1}$	$+25^\circ C$		10	15	Ω
			Full			18	
On-Resistance Match between Channels	ΔR_{ON}	$V_+ = 2.7V, 0V \leq V_{NO} \text{ or } V_{NC} \leq V_+, I_{COM} = -100mA, \text{ Test Circuit 1}$	$+25^\circ C$		1	3	Ω
			Full			4	
On-Resistance Flatness	$R_{FLAT(ON)}$	$V_+ = 2.7V, 0V \leq V_{NO} \text{ or } V_{NC} \leq V_+, I_{COM} = -100mA, \text{ Test Circuit 1}$	$+25^\circ C$		6	9	Ω
			Full			12	
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	$I_{NC(ON)}, I_{NO(ON)}, I_{COM(ON)}$	$V_+ = 3.6V, V_{COM} = 0.3V/3.3V, V_{NO} \text{ or } V_{NC} = 0.3V/3.3V \text{ or floating}$	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}	$V_+ = 2.7V, V_{IN} = 0V \text{ or } 2.7V$	Full			1	μA
Dynamic Characteristics							
Turn-On Time	t_{ON}	$V_{NC} \text{ or } V_{NO} = 1.5V, R_L = 300\Omega, C_L = 35pF, \text{ Test Circuit 2}$	$+25^\circ C$		34		Ns
Turn-Off Time	t_{OFF}		$+25^\circ C$		40		Ns
Break-Before-Make Time Delay	t_D	$V_{NC} \text{ or } V_{NO} = 1.5V, R_L = 300\Omega, C_L = 35pF, \text{ Test Circuit 4}$	$+25^\circ C$		20		Ns
Charge Injection	Q	$V_G = GND, R_G = 0\Omega, C_L = 1.0nF, Q = C_L \times V_{OUT}, \text{ Test Circuit 3}$	$+25^\circ C$		3.4		pC
Off Isolation	O_{ISO}	Signal = 0dBm, $R_L = 50\Omega$, Test Circuit 5	1MHz	$+25^\circ C$		-75	dB
			10MHz	$+25^\circ C$		-55	
Channel-to-Channel Crosstalk	X_{TALK}	Signal = 0dBm, $R_L = 50\Omega$, Test Circuit 6	1MHz	$+25^\circ C$		-100	dB
			10MHz	$+25^\circ C$		-60	
-3dB Bandwidth	BW	Signal = 0dBm, $R_L = 50\Omega$, Test Circuit 7	$+25^\circ C$		300		MHz
Channel On Capacitance	$C_{NC(ON)}, C_{NO(ON)}, C_{COM(ON)}$		$+25^\circ C$		45		pF

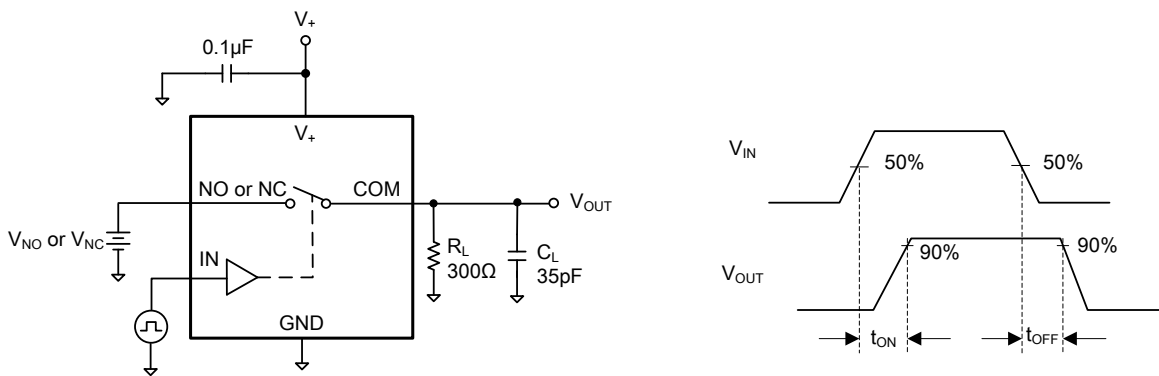
TYPICAL PERFORMANCE CHARACTERISTICS



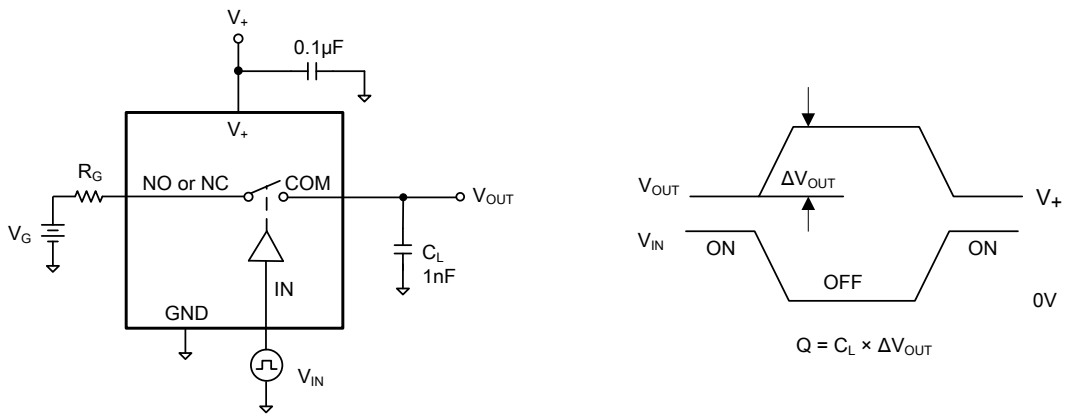
TEST CIRCUITS



Test Circuit 1. On Resistance

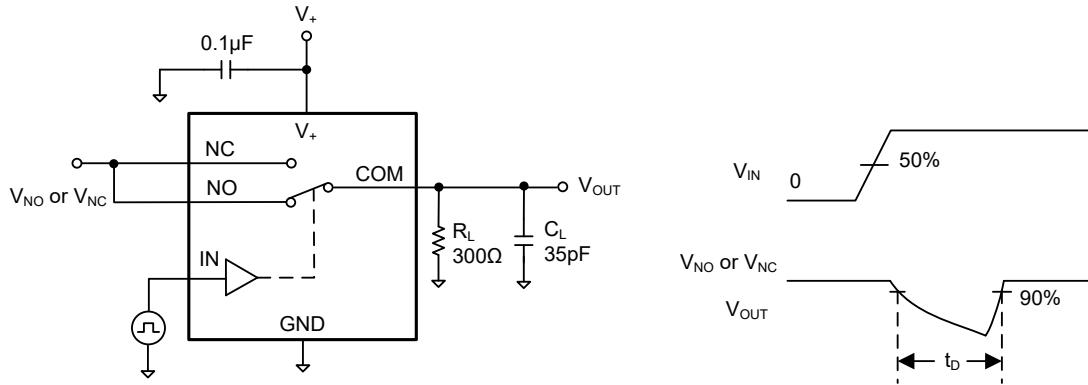


Test Circuit 2. Switching Times (t_{ON} , t_{OFF})

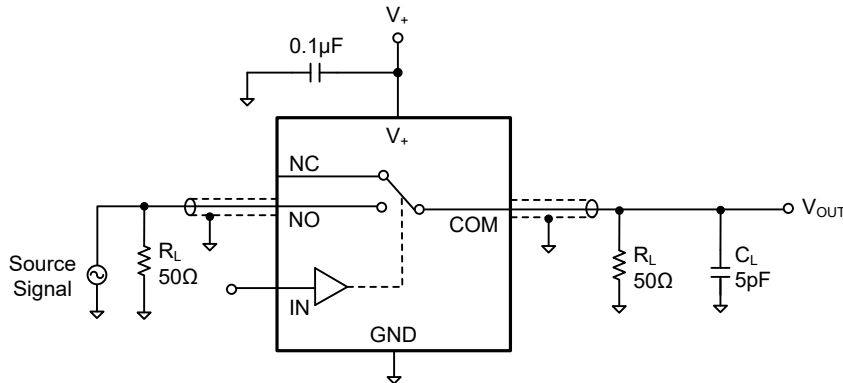


Test Circuit 3. Charge Injection

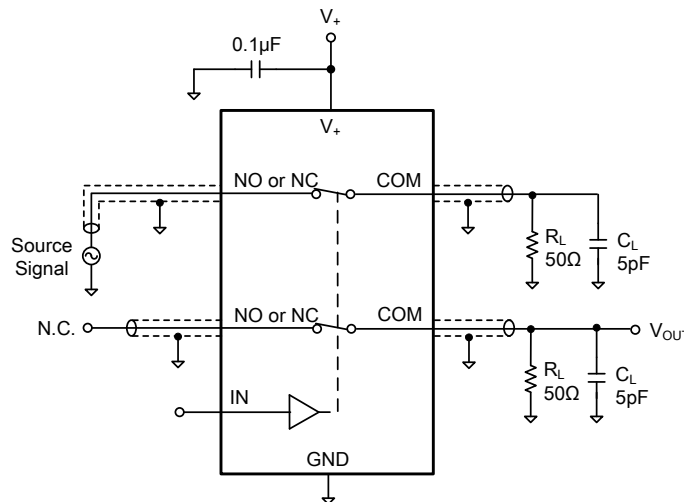
TEST CIRCUITS (continued)



Test Circuit 4. Break-Before-Make Time Delay (t_d)



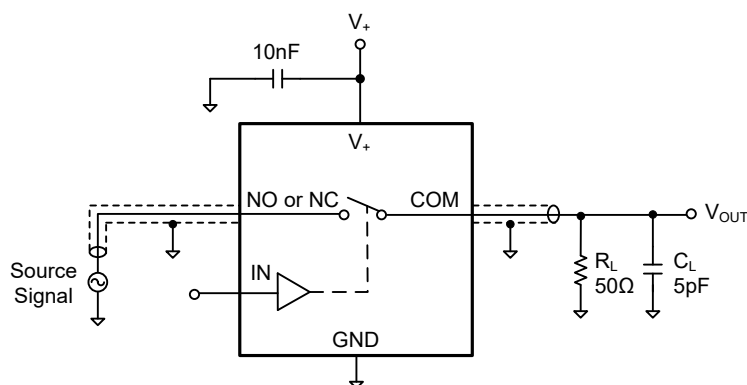
Test Circuit 5. Off Isolation



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

Test Circuit 6. Channel-to-Channel Crosstalk

TEST CIRCUITS (continued)



Test Circuit 7. -3dB Bandwidth

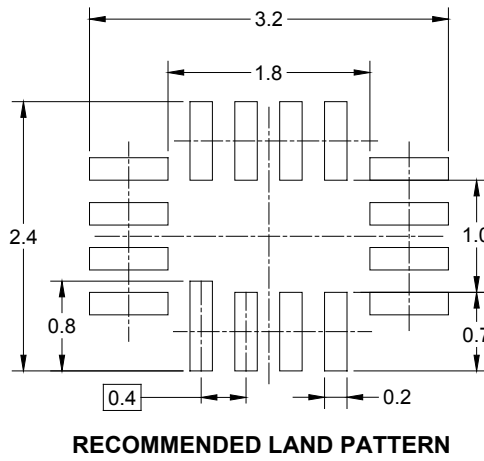
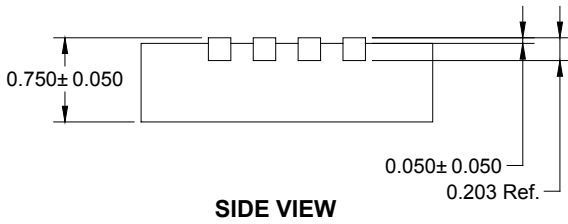
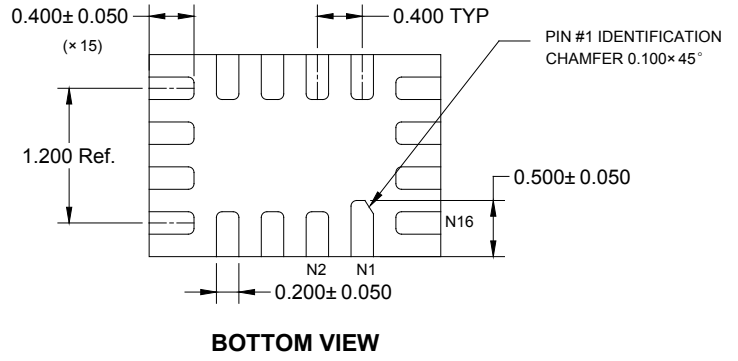
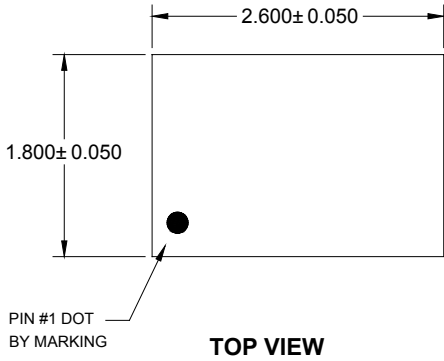
REVISION HISTORY

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

	Page
MAY 2016 – REV.A.3 to REV.A.4	
Updated Tape and Reel Information section	11
JANUARY 2013 – REV.A.2 to REV.A.3	
Added Recommended Land Pattern Information	10
Added Tape and Reel Information.....	11, 12
MAY 2011 – REV.A.1 to REV.A.2	
Updated Package Description	All
DECEMBER 2008 – REV.A to REV.A.1	
Changed Absolute Maximum Ratings section.....	2
Changes from Original (MAY 2008) to REV.A	
Changed from product preview to production data.....	All

PACKAGE OUTLINE DIMENSIONS

TQFN-2.6×1.8-16L



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-2.6×1.8-16L	7"	9.0	2.01	2.81	0.93	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