



SGM3799

0.5Ω, Low Voltage Dual, DPDT Analog Switch

GENERAL DESCRIPTION

The SGM3799 is a dual, ultra low on-resistance, low voltage, double-pole/double-throw (DPDT) CMOS analog switch. This device is designed for low operating voltage, high current switching of speaker output and earpiece for cellphone applications. It can switch a balanced stereo output.

The SGM3799 can handle a balanced microphone/speaker/ring-tone generator in a monophone mode. It contains a break-before-make (BBM) feature.

The SGM3799 is configured as a dual double-pole/double-throw (DPDT) analog switch with two logic control inputs that control two SPDT switches each. The configuration can be used as a dual differential 2-to-1 multiplexer/demultiplexer.

The SGM3799 is available in Green TQFN-2.6×1.8-16L package.

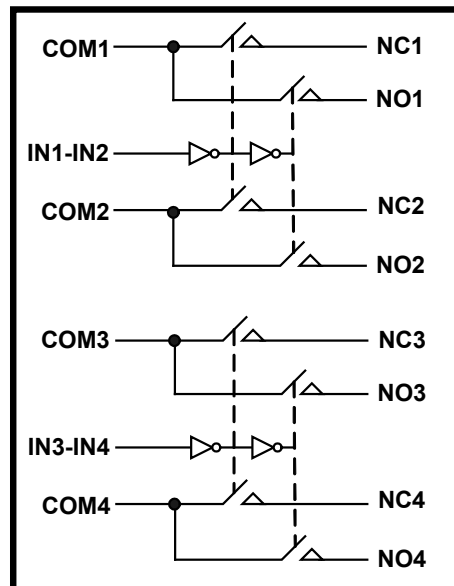
APPLICATIONS

- 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 4.35V**
- **Ultra Low On-Resistance: 0.5Ω (TYP)**
- **Low On-Resistance Flatness**
- **-3dB Bandwidth: 70MHz**
- **Fast Switching Times (4.2V)**
 - $t_{ON} = 52ns$
 - $t_{OFF} = 25ns$
- **Rail-to-Rail Input and Output Operation**
- **Low Power Consumption**
- **TTL/CMOS Compatible Logic Control**
- **-40°C to +85°C Operating Temperature Range**
- **Available in 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
SGM3799	TQFN-2.6×1.8-16L	-40°C to +85°C	SGM3799YTQA16/TR	GC XXXXX	Tape and Reel, 3000

NOTE: XXXXX = Date Code and Vendor 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₊ to GND0V to 4.6V
 Analog, Digital Voltage Range ⁽¹⁾ -0.3V to (V₊) + 0.3V
 Continuous Current NO, NC, or COM..... ±200mA
 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_x 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 may cause permanent damage to the device. Functional operation of the device at these or any other conditions beyond those indicated in the operational section of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

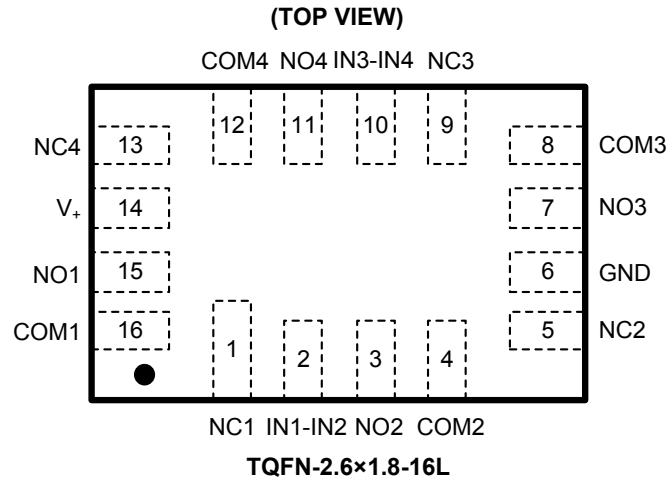
ESD SENSITIVITY CAUTION

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, specification or other related things if necessary without notice at any time.

PIN CONFIGURATION



PIN DESCRIPTION

PIN	NAME	FUNCTION
14	V ₊	Power Supply.
6	GND	Ground.
2, 10	IN _x	Digital Control Pin to Connect the COM Terminal to the NO or NC Terminals.
16, 4, 8, 12	COM _x	Common Terminal.
15, 3, 7, 11	NO _x	Normally-Open Terminal.
1, 5, 9, 13	NC _x	Normally-Closed Terminal.

NOTE: NO_x, NC_x and COM_x terminals may be an input or output.

FUNCTION TABLE

IN1-IN2	FUNCTION	
	NC1 and NC2	NO1 and NO2
0	ON	OFF
1	OFF	ON

IN3-IN4	FUNCTION	
	NC3 and NC4	NO3 and NO4
0	ON	OFF
1	OFF	ON

ELECTRICAL CHARACTERISTICS

(V₊ = 4.2V, GND = 0V, V_{IH} = 1.6V, V_{IL} = 0.5V, Full = -40°C to +85°C. Typical values are at T_A = +25°C, unless otherwise noted.)

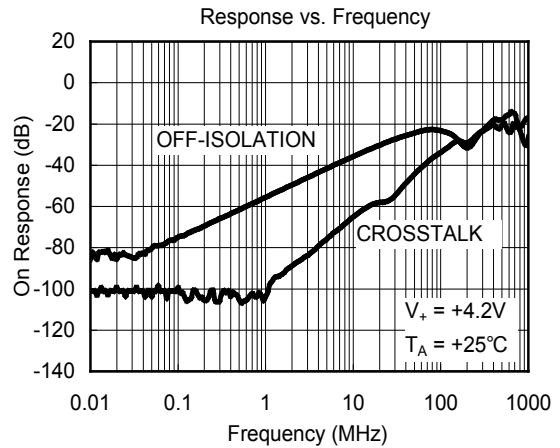
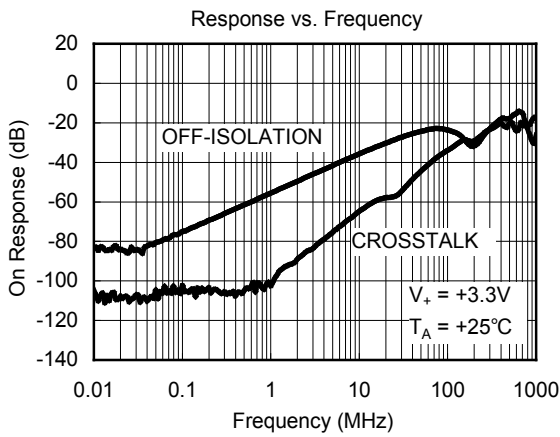
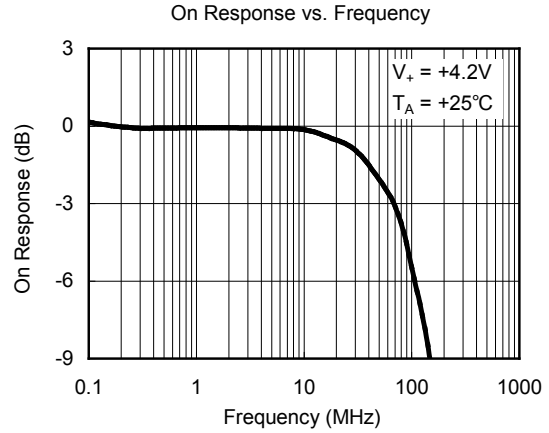
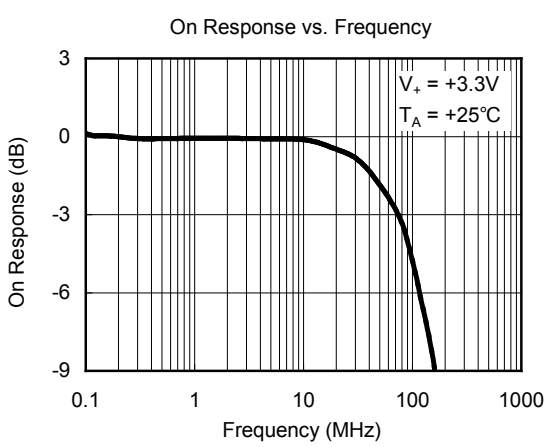
PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
ANALOG SWITCH							
Analog Signal Range	V _{NO} , V _{NC} , V _{COM}		Full	0		V ₊	V
On-Resistance	R _{ON}	V _{NO} or V _{NC} = 1V, I _{COM} = -100mA, Test Circuit 1	+25°C		0.5	0.85	Ω
			Full			1.2	Ω
On-Resistance Match Between Channels	ΔR _{ON}	V _{NO} or V _{NC} = 1V, I _{COM} = -100mA, Test Circuit 1	+25°C		0.1	0.22	Ω
			Full			0.45	Ω
On-Resistance Flatness	R _{FLAT(ON)}	V _{NO} or V _{NC} = 1V, 2.5V, I _{COM} = -100mA, Test Circuit 1	+25°C		0.15	0.25	Ω
			Full			0.35	Ω
Source Off Leakage Current	I _{NC(OFF)} , I _{NO(OFF)}	V _{NO} 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 _{COM} = 0.3V/3.3V, V _{NO} 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 _{IN} = 0V or 4.2V	Full			1	μA
DYNAMIC CHARACTERISTICS							
Turn-On Time	t _{ON}	V _{NO} or V _{NC} = 2V, R _L = 50Ω, C _L = 35pF, Test Circuit 2	+25°C		52		ns
Turn-Off Time	t _{OFF}		+25°C		25		ns
Charge Injection	Q	C _L = 1nF, V _G = 0V, R _G = 0Ω, Test Circuit 3	+25°C		30		pC
Break-Before-Make Time Delay	t _D	V _{NO} or V _{NC} = 1.5V, R _L = 50Ω, C _L = 35pF, Test Circuit 4	+25°C		8		ns
Off Isolation	O _{ISO}	Signal = 0dBm, R _L = 50Ω, C _L = 5pF, Test Circuit 5	f = 100kHz	+25°C		-75	dB
			f = 1MHz	+25°C		-55	
Channel-to-Channel Crosstalk	X _{TALK}	Signal = 0dBm, R _L = 50Ω, C _L = 5pF, Test Circuit 6	f = 1MHz	+25°C		-103	dB
			f = 10MHz	+25°C		-65	
-3dB Bandwidth	BW	Signal = 0dBm, R _L = 50Ω, C _L = 5pF, Test Circuit 7	+25°C		70		MHz
Channel On Capacitance	C _{NC(ON)} , C _{NO(ON)} , C _{COM(ON)}	f = 1MHz	+25°C		80		pF
POWER REQUIREMENTS							
Power Supply Range	V ₊		Full	1.8		4.35	V
Power Supply Current	I ₊	V _{IN} = 0V or V ₊	Full			1	μA

ELECTRICAL CHARACTERISTICS (continued)

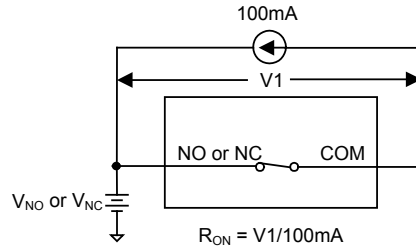
($V_+ = 2.7$ to $3.6V$, $GND = 0V$, $V_{IH} = 1.5V$, $V_{IL} = 0.4V$, Full = $-40^\circ C$ to $+85^\circ C$. Typical values are at $V_+ = 3V$, $T_A = +25^\circ C$, unless otherwise noted.)

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}	$V_+ = 2.7V, V_{NO}$ or $V_{NC} = 1V,$ $I_{COM} = -100mA$, Test Circuit 1	$+25^\circ C$		0.6	0.9	Ω
			Full			1.3	Ω
On-Resistance Match Between Channels	ΔR_{ON}	$V_+ = 2.7V, V_{NO}$ or $V_{NC} = 1V,$ $I_{COM} = -100mA$, Test Circuit 1	$+25^\circ C$		0.15	0.25	Ω
			Full			0.5	Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	$V_+ = 2.7V, V_{NO}$ or $V_{NC} = 1V, 2.5V,$ $I_{COM} = -100mA$, Test Circuit 1	$+25^\circ C$		0.15	0.25	Ω
			Full			0.35	Ω
Source Off Leakage Current	$I_{NC(OFF)}, I_{NO(OFF)}$	$V_+ = 3.6V, V_{NO}$ or $V_{NC} = 3.3V/0.3V,$ $V_{COM} = 0.3V/3.3V$	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} 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}	$V_+ = 3.6V, V_{IN} = 0V$ or $3.6V$	Full			1	μA
DYNAMIC CHARACTERISTICS							
Turn-On Time	t_{ON}	$V_+ = 3.3V, V_{NO}$ or $V_{NC} = 2V, R_L = 50\Omega,$	$+25^\circ C$		54		ns
Turn-Off Time	t_{OFF}	$C_L = 35pF$, Test Circuit 2	$+25^\circ C$		38		ns
Charge Injection	Q	$C_L = 1nF, V_G = 0V, R_G = 0\Omega$ Test Circuit 3	$+25^\circ C$		26		pC
Break-Before-Make Time Delay	t_D	V_{NO} or $V_{NC} = 1.5V, R_L = 50\Omega, C_L = 35pF,$ Test Circuit 4	$+25^\circ C$		12		ns
Off Isolation	O_{ISO}	Signal = 0dBm, $R_L = 50\Omega,$ $C_L = 5pF$, Test Circuit 5	f = 100kHz	$+25^\circ C$		-75	dB
			f = 1MHz	$+25^\circ C$		-55	
Channel-to-Channel Crosstalk	X_{TALK}	Signal = 0dBm, $R_L = 50\Omega,$ $C_L = 5pF$, Test Circuit 6	f = 1MHz	$+25^\circ C$		-103	dB
			f = 10MHz	$+25^\circ C$		-65	
-3dB Bandwidth	BW	Signal = 0dBm, $R_L = 50\Omega, C_L = 5pF,$ Test Circuit 7	$+25^\circ C$		70		MHz
Channel On Capacitance	$C_{NC(ON)}, C_{NO(ON)},$ $C_{COM(ON)}$	f = 1MHz	$+25^\circ C$		80		pF

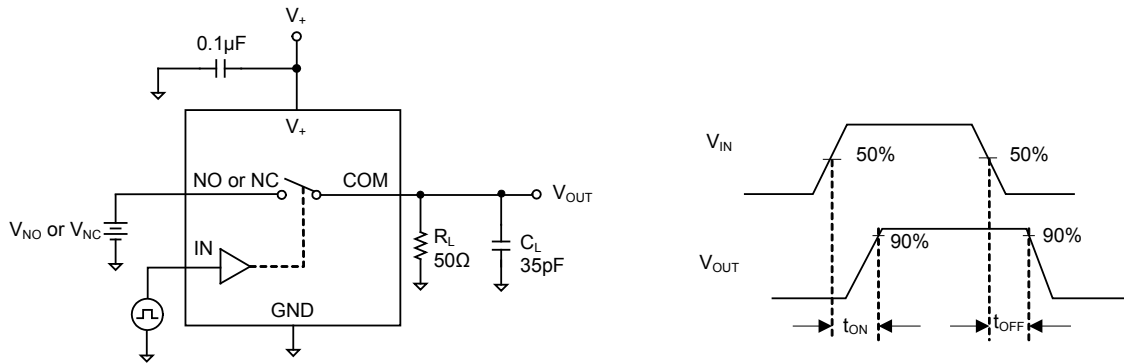
TYPICAL PERFORMANCE CHARACTERISTICS



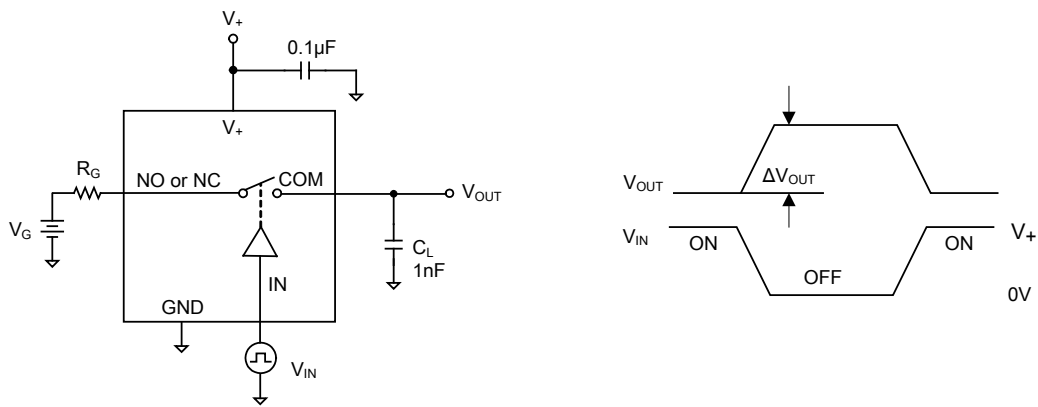
TEST CIRCUITS



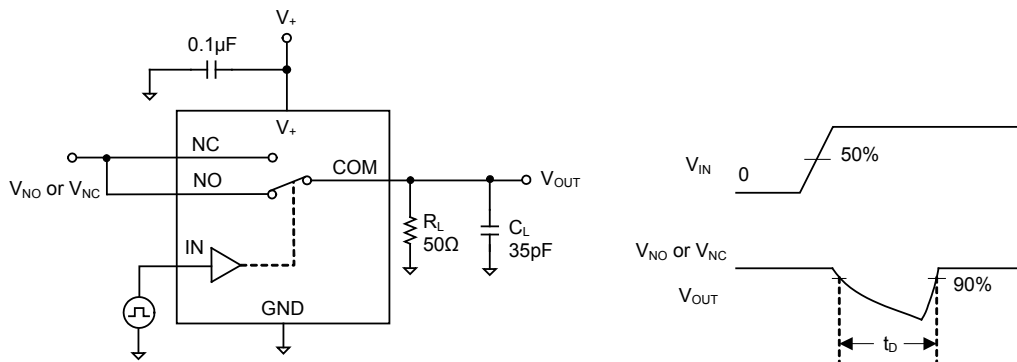
Test Circuit 1. On-Resistance



Test Circuit 2. Switching Times

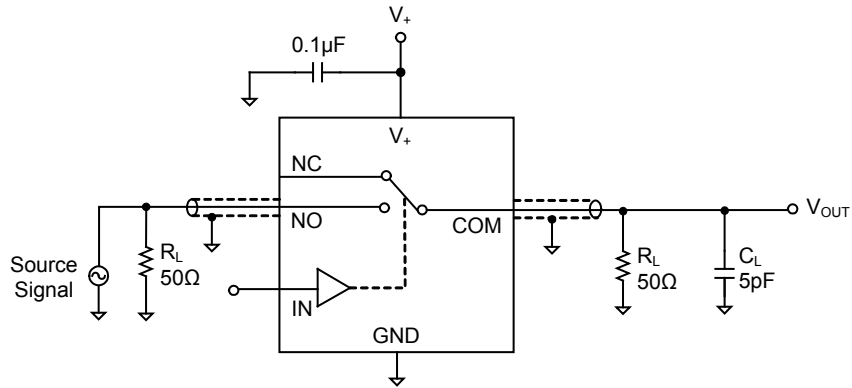


Test Circuit 3. Charge Injection

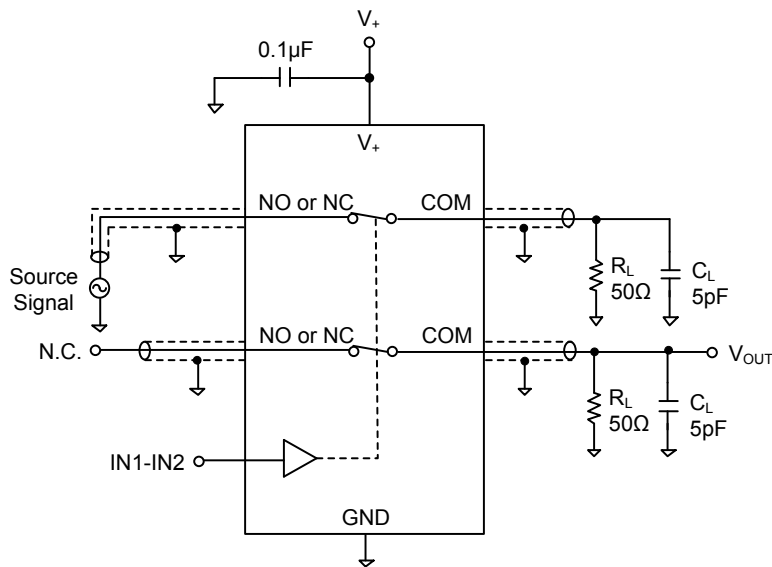


Test Circuit 4. Break-Before-Make Time Delay, t_D

TEST CIRCUITS (continued)

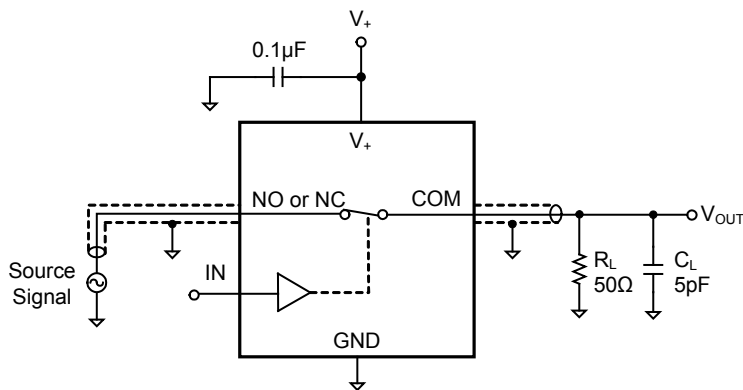


Test Circuit 5. Off Isolation



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

Test Circuit 6. Channel-to-Channel Crosstalk



Test Circuit 7. -3dB Bandwidth

REVISION HISTORY

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

MAY 2016 – REV.A.2 to REV.A.3

Changed Tape and Reel Information section 11

DECEMBER 2014 – REV.A.1 to REV.A.2

Changed Electrical Characteristics section 4, 5

NOVEMBER 2014 – REV.A to REV.A.1

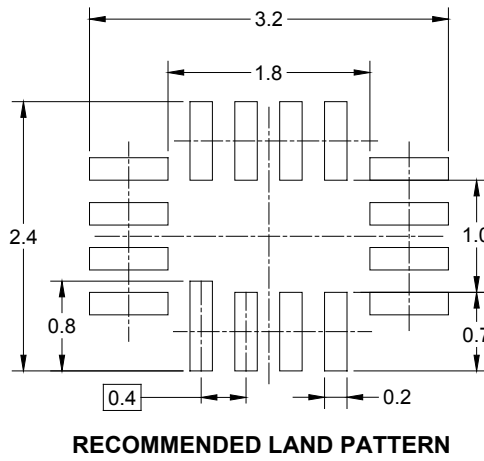
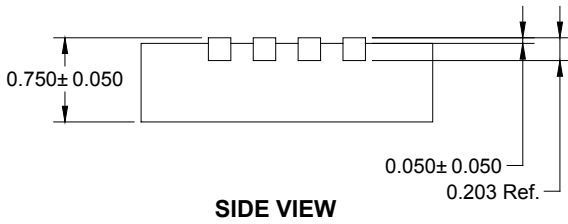
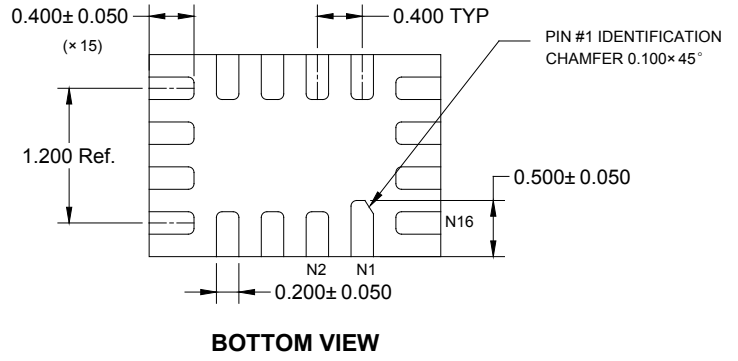
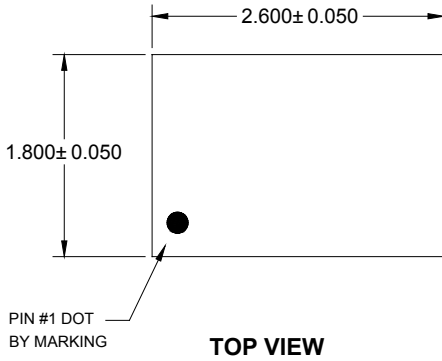
Changed Electrical Characteristics section 4, 5

Changes from Original (MAY 2013) 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