



SGM7232

High Speed Differential 3:1 Analog Multiplexer

GENERAL DESCRIPTION

The SGM7232 is a differential 3:1 analog multiplexer switch which operates from a single supply in the range of 2.7V to 4.3V. It can be used to multiplex between general signals and high-speed differential data signals.

The SGM7232 is available in Green UTQFN-2.2×1.4-12L package. It operates over a temperature range of -40°C to +85°C.

FEATURES

- **Low Distortion High Speed Analog Switches**
- **Power OFF Protection**
- **Short Protection between COM+/COM- and V_{CC}**
- **Crosstalk (100kHz): -90dB**
- **Off-Isolation (100kHz): -90dB**
- **Single Supply Operation: 2.7V to 4.3V**
- **Internal 5MΩ Pull-Down Resistors at C0, C1 Pins**
- **Available in Green UTQFN-2.2×1.4-12L Package**

APPLICATIONS

Cellular/Mobile Phone
Computer Peripherals
Portable Equipments

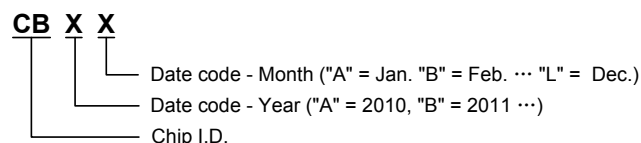


PACKAGE/ORDERING INFORMATION

MODEL	PIN-PACKAGE	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKAGE OPTION
SGM7232	UTQFN-2.2×1.4-12L	-40°C to +85°C	SGM7232YUQO12G/TR	CBXX	Tape and Reel, 3000

NOTE: XX = Date Code.

MARKING INFORMATION



For example: CBDJ (2013, October)

ABSOLUTE MAXIMUM RATINGS

V _{CC} to GND.....	-0.3V to 4.6V
I/O Voltages	
C0, C1, CH1-, CH1+, CH2-, CH2+, CH3-, CH3+, COM-, COM+ ⁽¹⁾	-0.3V to 4.6V
DC I/O Diode Current, V _{IN} < 0V.....	-50mA (MIN)
Continuous Current (CH3-, CH3+)	±60mA
Continuous Current (CH1-, CH1+, CH2-, CH2+)	±40mA
Operating Temperature Range.....	-40°C to +85°C
Junction Temperature.....	150°C
Storage Temperature Range.....	-65°C to +150°C
Lead Temperature (Soldering, 10s).....	260°C
ESD Susceptibility	
HBM.....	8000V
MM.....	400V

NOTES:

1. Signals on C0, C1, CH or COM exceeding GND will be clamped by internal diodes. Limit forward diode current to maximum current ratings.

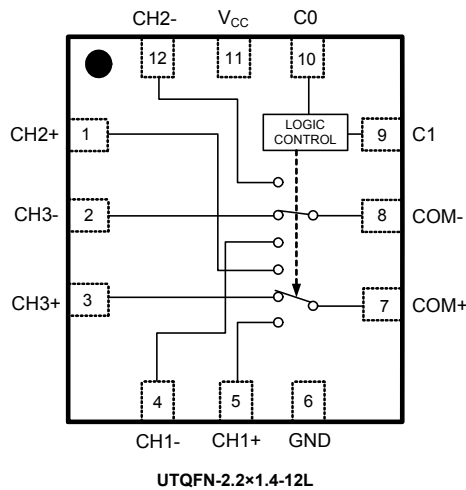
2. Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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.

SGMICRO reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact SGMICRO sales office to get the latest datasheet.

PIN CONFIGURATION (TOP VIEW)



NOTE:
SGM7232 switches shown for C1 = Logic “1” and C0 = Logic “1”. 5MΩ pull-down resistors on C1 and C0 are not shown.

PIN DESCRIPTION

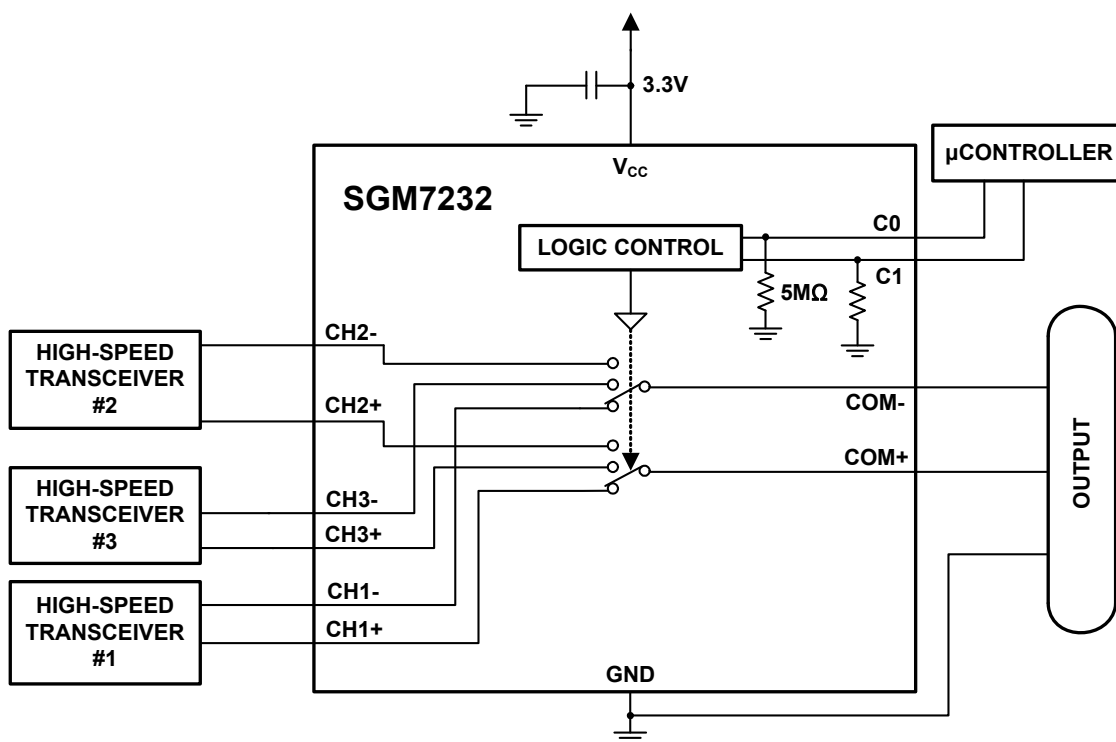
PIN	NAME	FUNCTION
1	CH2+	CH2 Differential Input.
2	CH3-	CH3 Differential Input.
3	CH3+	CH3 Differential Input.
4	CH1-	CH1 Differential Input.
5	CH1+	CH1 Differential Input.
6	GND	Ground Connection.
7	COM+	Common Pin of Mux.
8	COM-	Common Pin of Mux.
9	C1	Digital Control Input.
10	C0	Digital Control Input.
11	V _{CC}	Power Supply.
12	CH2-	CH2 Differential Input.

FUNCTION TABLE

C1	C0	CH1	CH2	CH3
0	0	OFF	OFF	OFF
0	1	ON	OFF	OFF
1	0	OFF	ON	OFF
1	1	OFF	OFF	ON

C0, C1: Logic “0” when ≤ 0.3V or float; Logic “1” when ≥ 1.4V with V_{CC} in the range of 2.7V to 4.3V.

BLOCK DIAGRAM

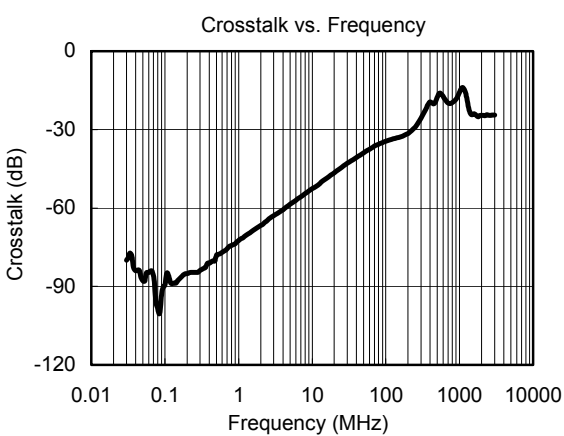
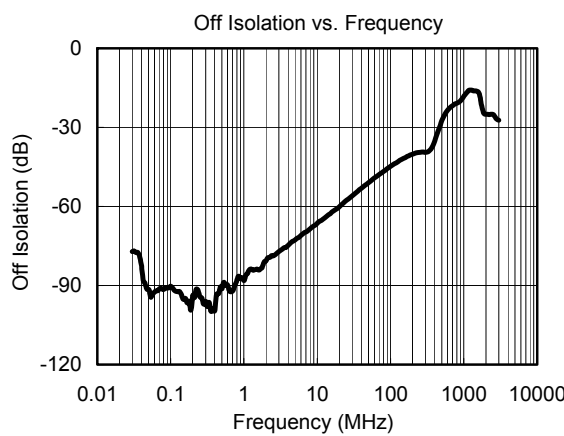
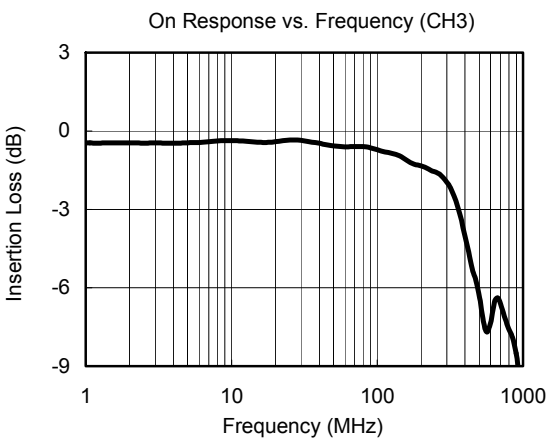
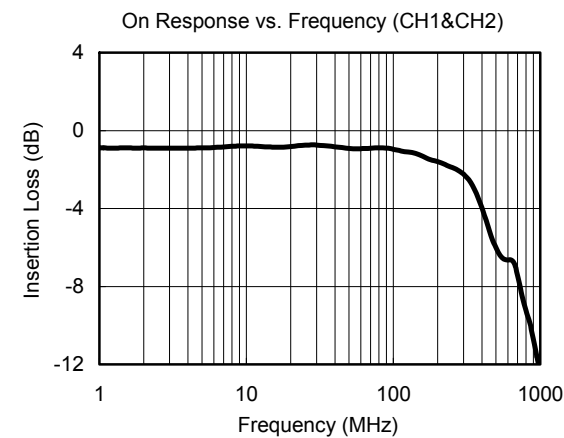


ELECTRICAL CHARACTERISTICS

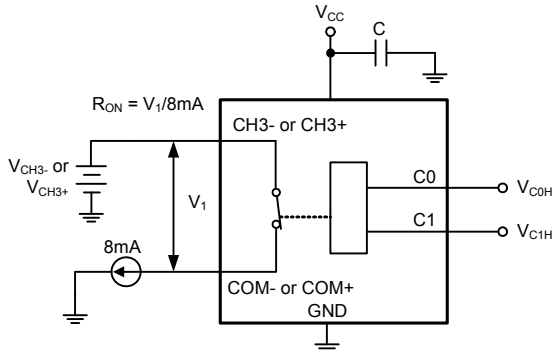
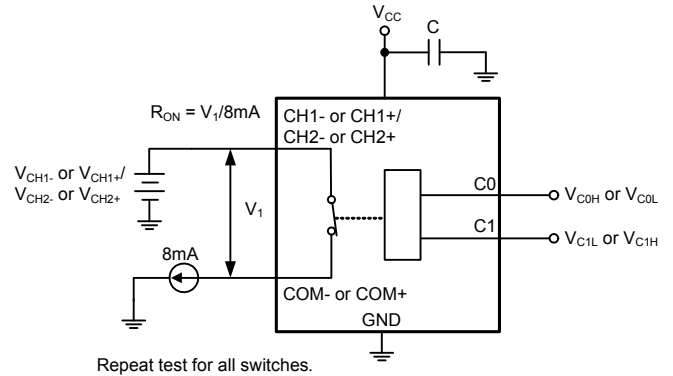
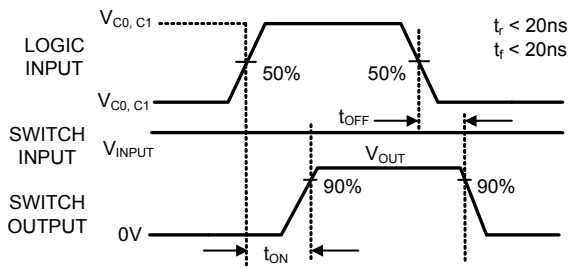
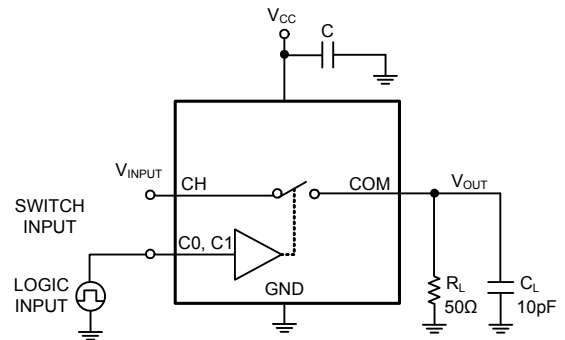
(V_{CC} = 2.7V to 4.3V, GND = 0V, Full = -40°C to +85°C. Typical values are at T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
ANALOG SWITCH								
Analog Signal Range	V _{ANALOG}			Full	0		V _{CC}	V
On-Resistance	R _{ON}	V _{CC} = 3.0V, I _{COM} = 8mA, V _{CH} = 1.0V	CH3 selected, Test Circuit 1	+25°C		4	5	Ω
				Full			5.5	
			CH1 or CH2 selected, Test Circuit 2	+25°C		9	11	
				Full			12	
On-Resistance Match Between Channels	ΔR _{ON}	V _{CC} = 3.0V, I _{COM} = 8mA, V _{CH} = 1.0V	CH3 selected	+25°C		0.1	0.7	Ω
				Full			0.8	
			CH1 or CH2 selected	+25°C		0.2	1.1	
				Full			1.2	
On-Resistance Flatness	R _{FLAT(ON)}	V _{CC} = 3.0V, I _{COM} = 8mA, V _{CH} = 0V to 1.0V	CH3 selected	+25°C		0.5	1	Ω
				Full			1.2	
			CH1 or CH2 selected	+25°C		1.3	2.2	
				Full			2.5	
OFF Leakage Current	I _{CH(OFF)}	V _{CC} = 3.6V, V _{C0} = V _{C1} = 0V, V _{CH} = 3.3V/0.3V, V _{COM} = 0.3V/3.3V		Full			1	μA
ON Leakage Current	I _{CH(ON)}	V _{CC} = 3.6V, CH1, CH2 or CH3 selected, V _{CH} = 3.3V/0.3V, V _{COM} = Float		Full			1	μA
DIGITAL INPUTS								
C0, C1 Voltage Low	V _{C0L} , V _{C1L}	V _{CC} = 2.7V to 4.3V		Full			0.3	V
C0, C1 Voltage High	V _{C0H} , V _{C1H}	V _{CC} = 2.7V to 4.3V		Full	1.4			V
C0, C1 Pull-Down Resistor	R _{C0} , R _{C1}	V _{CC} = 3.6V, V _{C0} = V _{C1} = 3.6V, measure current into C0 or C1 pin and calculate resistance value		+25°C		5		MΩ
DYNAMIC CHARACTERISTICS								
Turn-On Time	t _{ON}	V _{CC} = 3.0V, V _{CH} = V _{CC} , R _L = 50Ω, C _L = 10pF, Test Circuit 3		+25°C		90		ns
Turn-Off Time	t _{OFF}	V _{CC} = 3.0V, V _{CH} = V _{CC} , R _L = 50Ω, C _L = 10pF, Test Circuit 3		+25°C		60		ns
Break-Before-Make Time Delay	t _D	V _{CC} = 3.0V, V _{CH} = V _{CC} , R _L = 50Ω, C _L = 10pF, Test Circuit 4		+25°C		45		ns
-3dB Bandwidth	BW	Signal = 0dBm, R _L = 50Ω, C _L = 5pF, Test Circuit 5	CH3 selected	+25°C		380		MHz
			CH1 or CH2 selected	+25°C		400		MHz
Off Isolation	O _{ISO}	Signal = 0dBm, R _L = 50Ω, f = 100kHz, Test Circuit 6		+25°C		-90		dB
Channel-to-Channel Crosstalk	X _{TALK}	Signal = 0dBm, R _L = 50Ω, f = 100kHz, Test Circuit 7		+25°C		-90		dB
Channel OFF Capacitance	C _{CH(OFF)}	V _{CC} = 3.0V, V _{C0} = V _{C1} = 0V		+25°C		7		pF
COM ON Capacitance	C _{COM(ON)}	V _{CC} = 3.0V, CH1, CH2 or CH3 selected		+25°C		18		pF
POWER REQUIREMENTS								
Power Supply Range	V _{CC}			Full	2.7		4.3	V
Positive Supply Current	I _{CC}	V _{CC} = 3.6V, V _{C0} , V _{C1} = 0V or V _{CC}		Full			1	μA
Power OFF COM Current	I _{COM}	V _{CC} = 0V, V _{C0} = V _{C1} = Float, V _{COM} = 4.3V		Full			2	μA
Power OFF CH Current	I _{CH}	V _{CC} = 0V, V _{C0} = V _{C1} = Float, V _{CH} = 4.3V		Full			2	μA
Power OFF Logic Current	I _{C0} , I _{C1}	V _{CC} = 0V, V _{C0} = V _{C1} = 4.3V		Full			2	μA

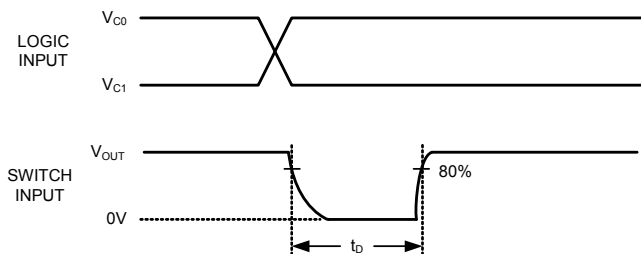
TYPICAL PERFORMANCE CHARACTERISTICS



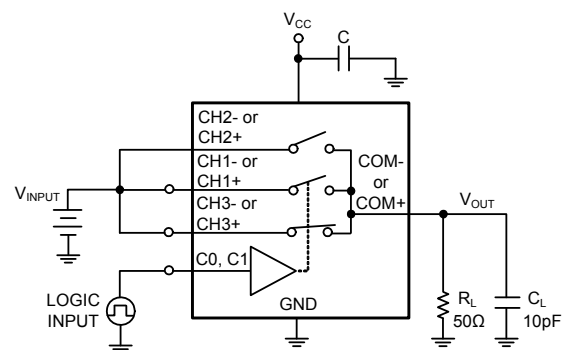
TEST CIRCUITS

Test Circuit 1. CH3 R_{ON} Test CircuitTest Circuit 2. CH1 and CH2 R_{ON} Test CircuitTest Circuit 3A. Address t_{ON} , t_{OFF} Measurement PointsTest Circuit 3B. Address t_{ON} , t_{OFF} Test Circuit

Test Circuit 3. Switching Times



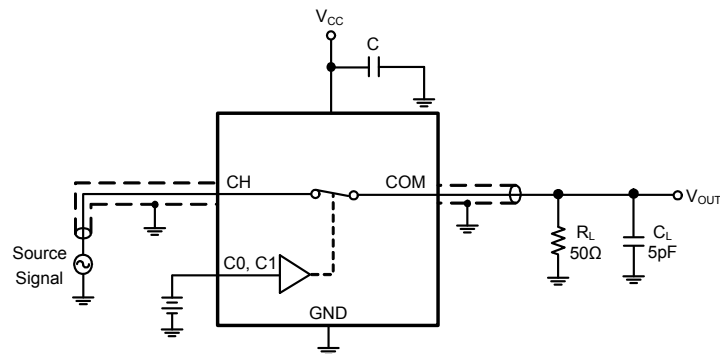
Test Circuit 4A. Measurement Points



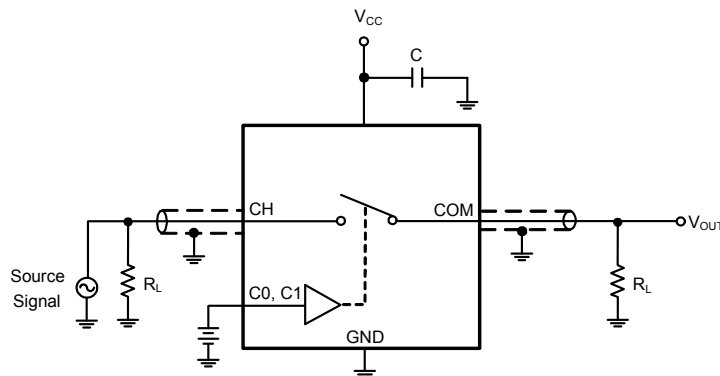
Test Circuit 4B. Test Circuit

Test Circuit 4. Break-Before-Make Time

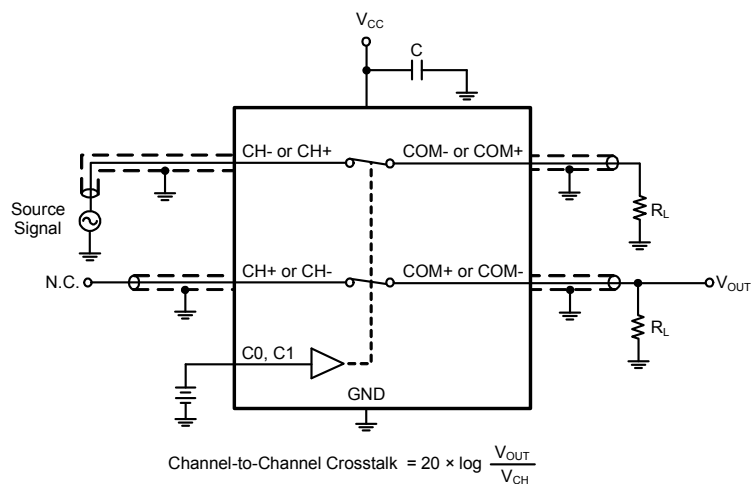
TEST CIRCUITS



Test Circuit 5. -3dB Bandwidth



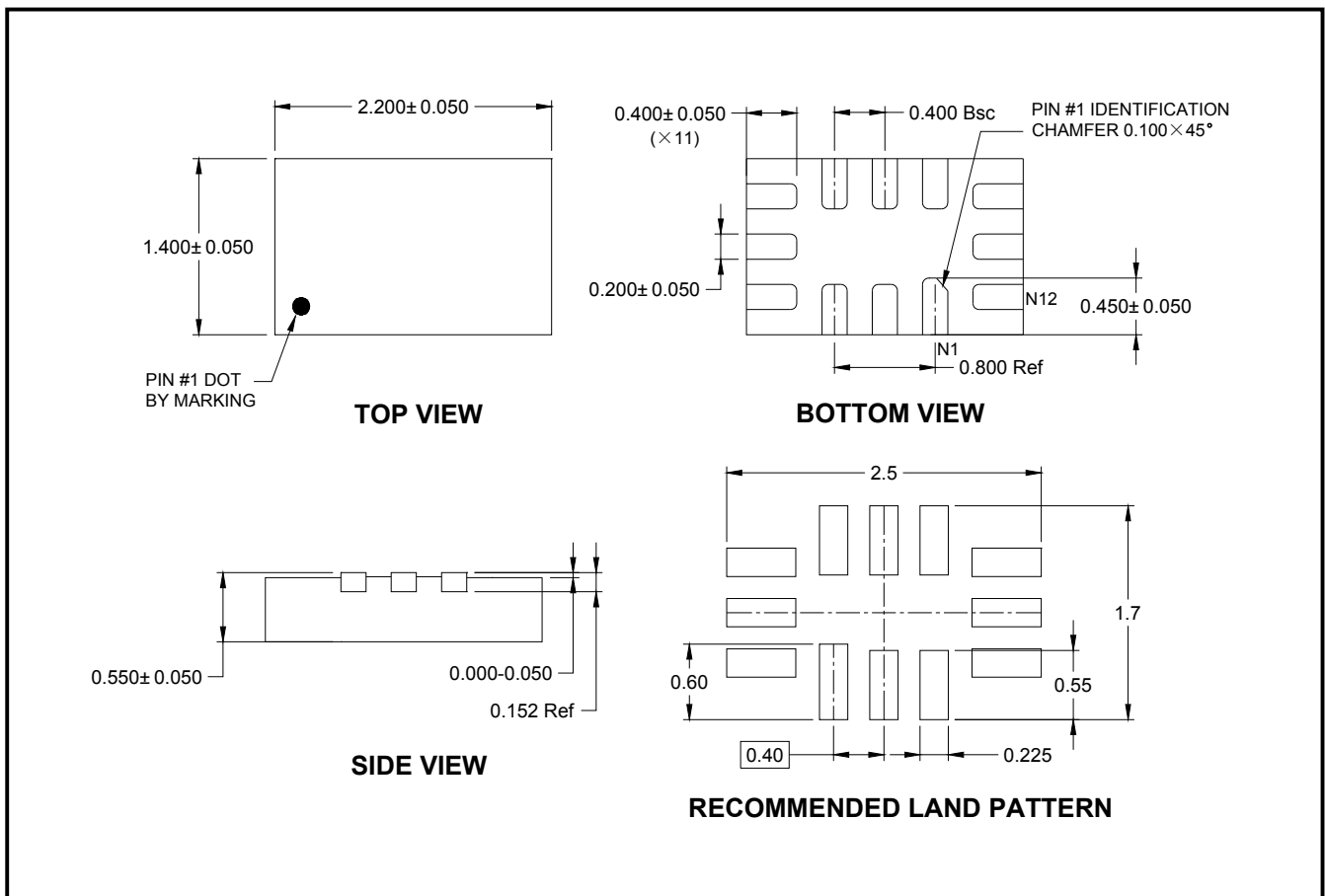
Test Circuit 6. Off Isolation



Test Circuit 7. Channel-to-Channel Crosstalk

PACKAGE OUTLINE DIMENSIONS

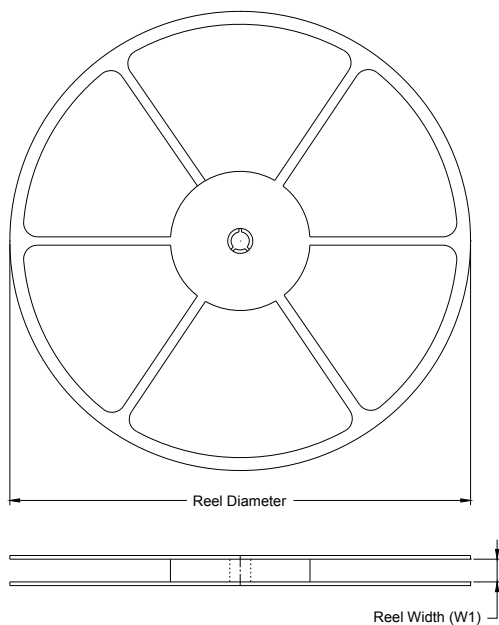
UTQFN-2.2×1.4-12L



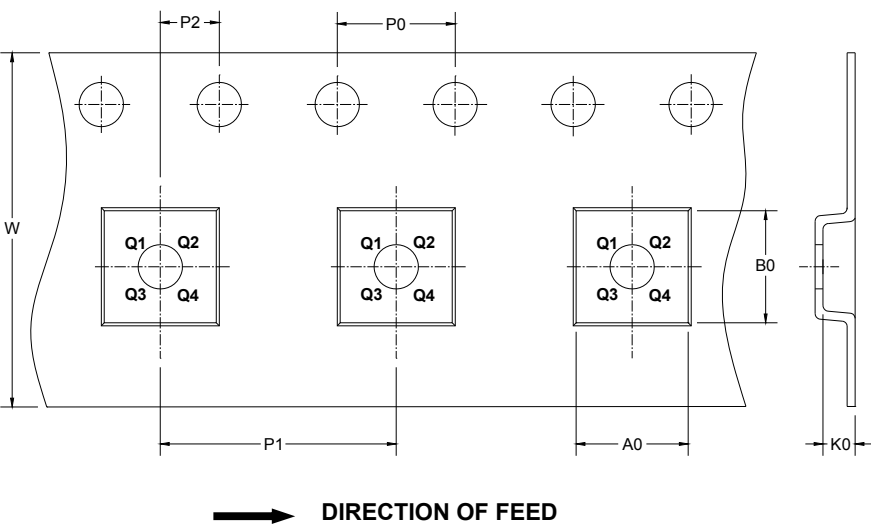
NOTE: All linear dimensions are in millimeters.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



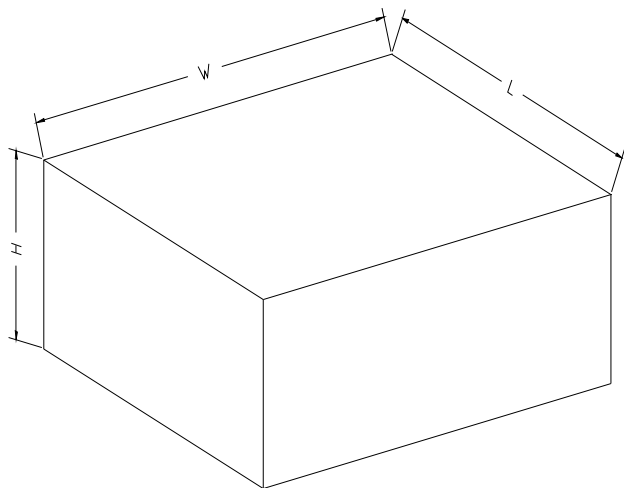
TAPE DIMENSIONS



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
UTQFN-2.2×1.4-12L	7"	9.0	1.6	2.4	0.7	4.0	4.0	2.0	8.0	Q1

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