



# SGM4717

## 4.5Ω, 300MHz Bandwidth, Dual, SPDT Analog Switch

### GENERAL DESCRIPTION

The SGM4717 is a dual, bidirectional, single-pole/double-throw (SPDT) CMOS analog switch designed to operate from a single 1.8V to 5.5V supply. It features high-bandwidth (300MHz) and low on-resistance (4.5Ω TYP), targeted applications for audio switching.

SGM4717 features guaranteed on-resistance matching (0.3Ω MAX) between switches and guaranteed on-resistance flatness over the signal range (2.3Ω TYP). This ensures excellent linearity and low distortion when switching audio signals.

The SGM4717 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.

SGM4717 is available in Green WLCSP-2.0×1.5-10B and MSOP-10 packages.

### APPLICATIONS

- Portable Instrumentation
- Battery-Operated Equipment
- Computer Peripherals
- Cell Phones
- PDA's
- MP3's

### FUNCTION TABLE

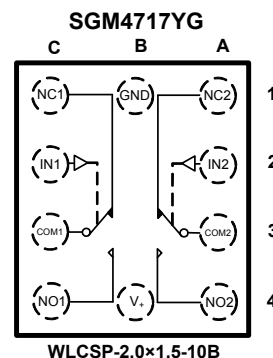
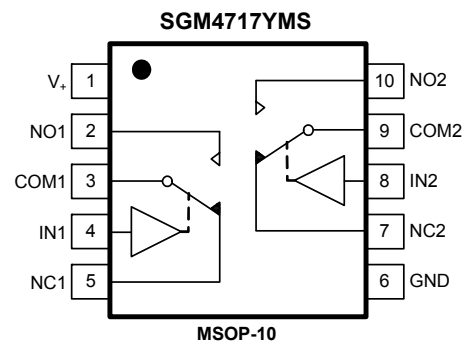
LOGIC	NO	NC
0	OFF	ON
1	ON	OFF

Switches Shown For Logic "0" Input

### FEATURES

- Voltage Operation: 1.8V to 5.5V
- On-Resistance: 4.5Ω (TYP) at 5.0V
- High Bandwidth: 300MHz
- Fast Switching Times
  - $t_{ON}$  26ns
  - $t_{OFF}$  20ns
- High Off-Isolation: -57dB at 10MHz
- Low Crosstalk: -99dB at 10MHz
- Rail-to-Rail Operation
- TTL/CMOS Compatible
- Break-Before-Make Switching
- Extended Industrial Temperature Range:
  - 40°C to +85°C
- Available in Green WLCSP-2.0×1.5-10B and MSOP-10 Packages

### PIN CONFIGURATIONS (TOP VIEW)



**SGM4717**

**PACKAGE/ORDERING INFORMATION**

MODEL	PIN-PACKAGE	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKAGE OPTION
SGM4717	WLCSP-2.0×1.5-10B	-40°C to +85°C	SGM4717YG/TR	4717YG	Tape and Reel, 3000
	MSOP-10	-40°C to +85°C	SGM4717YMS/TR	SGM4717YMS	Tape and Reel, 3000

**ABSOLUTE MAXIMUM RATINGS**

V+, IN to GND.....	-0.3V to 6V	Junction Temperature.....	150°C
Analog, Digital voltage range <sup>(1)</sup> .....	-0.3V to (V <sub>+</sub> ) + 0.3V	Storage Temperature Range.....	- 65°C to +150°C
Continuous Current NO, NC, or COM.....	±50mA	Lead Temperature (soldering, 10s).....	260°C
Peak Current NO, NC, or COM .....	±80mA	ESD (HBM).....	2000V
Operating Temperature Range.....	-40°C to +85°C		

NOTES:

1. Signals on NC, NO, or COM or IN exceeding V<sub>+</sub> 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 DESCRIPTION**

NAME	FUNCTION
V <sub>+</sub>	Power Supply.
GND	Ground.
IN1, IN2	Digital Control Pin to Connect the COM Terminal to the NO or NC Terminals.
COM1, COM2	Common Terminal.
NO1, NO2	Normally-Open Terminal.
NC1, NC2	Normally-Closed Terminal.

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

**ELECTRICAL CHARACTERISTICS**

( $V_+$  = +4.5V to +5.5V,  $V_{IH}$  = +2.0V,  $V_{IL}$  = +0.8V,  $T_A$  = -40°C to +85°C. Typical values are at  $V_+$  = +5.0V,  $T_A$  = +25°C, unless otherwise noted.)

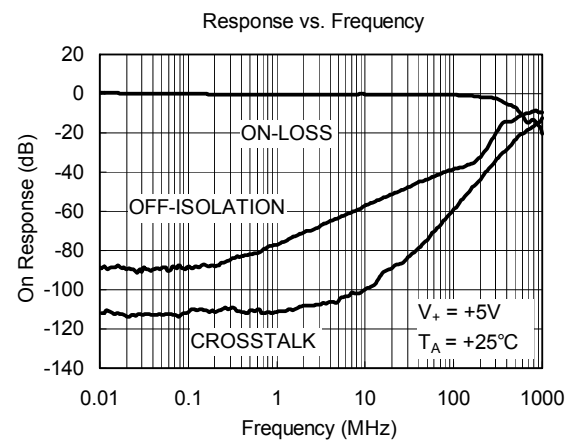
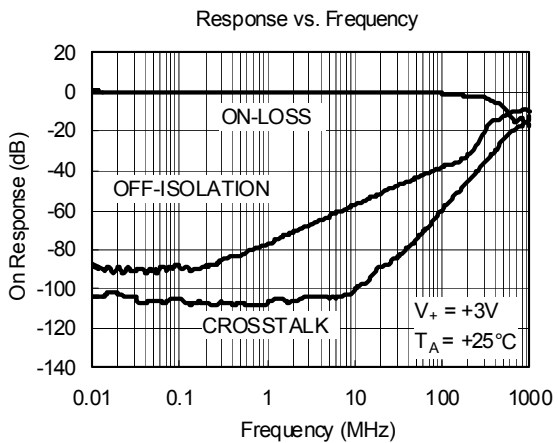
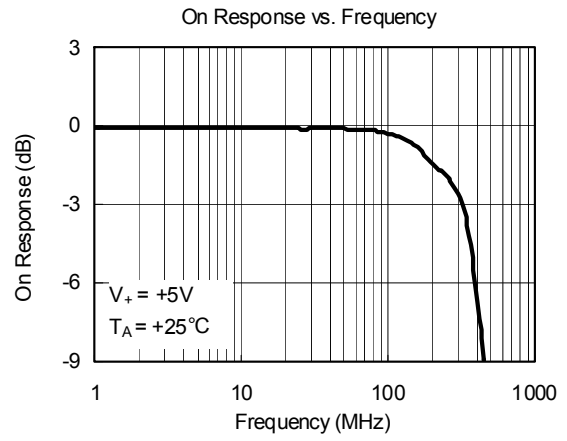
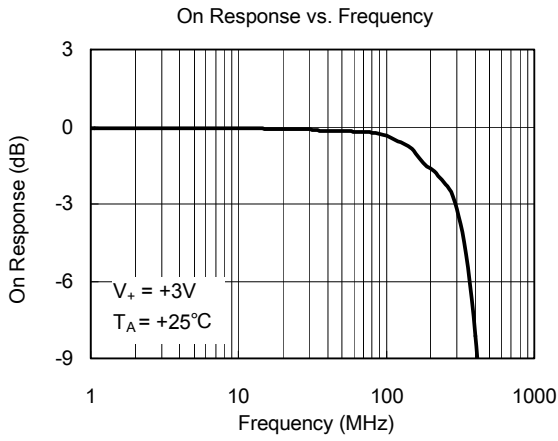
PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
<b>ANALOG SWITCH</b>							
Analog Signal Range	$V_{NO}, V_{NC}, V_{COM}$		-40°C to +85°C	0		$V_+$	V
On-Resistance	$R_{ON}$	$V_+$ = 4.5V, $V_{NO}$ or $V_{NC}$ = 3.5V, $I_{COM}$ = -10mA, Test Circuit 1	+25°C		4.5	8	Ω
			-40°C to +85°C			8.5	Ω
On-Resistance Match Between Channels	$\Delta R_{ON}$	$V_+$ = 4.5V, $V_{NO}$ or $V_{NC}$ = 3.5V, $I_{COM}$ = -10mA, Test Circuit 1	+25°C		0.15	0.3	Ω
			-40°C to +85°C			0.4	Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	$V_+$ = 4.5V, $V_{NO}$ or $V_{NC}$ = 1.0V, 2.0V, 3.5V, $I_{COM}$ = -10mA, Test Circuit 1	+25°C		2.3	3.3	Ω
			-40°C to +85°C			3.7	Ω
Source OFF Leakage Current	$I_{NC(OFF)}, I_{NO(OFF)}$	$V_+$ = 5.5V, $V_{NO}$ or $V_{NC}$ = 1.0V, 4.5V, $V_{COM}$ = 4.5V, 1.0V	-40°C to +85°C			1	μA
Channel ON Leakage Current	$I_{NC(ON)}, I_{NO(ON)}, I_{COM(ON)}$	$V_+$ = 5.5V, $V_{COM}$ = 1.0V, 4.5V, $V_{NO}$ or $V_{NC}$ = 1.0V, 4.5V, or floating	-40°C to +85°C			1	μA
<b>DIGITAL INPUTS</b>							
Input High Voltage	$V_{INH}$		-40°C to +85°C	1.5			V
Input Low Voltage	$V_{INL}$		-40°C to +85°C			0.6	V
Input Leakage Current	$I_{IN}$	$V_+$ = 5.5V, $V_{IN}$ = 0V or 5.5V	-40°C to +85°C			1	μA
<b>DYNAMIC CHARACTERISTICS</b>							
Turn-On Time	$t_{ON}$	$V_{NO}$ or $V_{NC}$ = 3.0V, $V_{IH}$ = 1.5V, $V_{IL}$ = 0V, $R_L$ = 300Ω, $C_L$ = 35pF, Test Circuit 2	+25°C		26		ns
Turn-Off Time	$t_{OFF}$	$V_{NO}$ or $V_{NC}$ = 3.0V, $V_{IH}$ = 1.5V, $V_{IL}$ = 0V, $R_L$ = 300Ω, $C_L$ = 35pF, Test Circuit 2	+25°C		20		ns
Break-Before-Make Time Delay	$t_D$	$V_{NO1}$ or $V_{NC1}$ = $V_{NO2}$ or $V_{NC2}$ = 3V, $R_L$ = 300Ω, $C_L$ = 35pF, Test Circuit 3	+25°C		4		ns
Skew	$t_{SKEW}$	$R_S$ = 39Ω, $C_L$ = 50pF, Test Circuit 4	+25°C		5.8		ns
Off Isolation	$O_{ISO}$	$R_L$ = 50Ω, $C_L$ = 5pF, Signal = 0dBm, Test Circuit 5	f = 10MHz	+25°C		-57	dB
			f = 1MHz	+25°C		-76	dB
Channel-to-Channel Crosstalk	$X_{TALK}$	$R_L$ = 50Ω, $C_L$ = 5pF, Test Circuit 6	f = 10MHz	+25°C		-99	dB
			f = 1MHz	+25°C		-110	dB
-3dB Bandwidth	BW	Signal = 0dBm, $R_L$ = 50Ω, $C_L$ = 5pF, Test Circuit 7	+25°C		300		MHz
Source OFF Capacitance	$C_{NC(OFF)}, C_{NO(OFF)}$	f = 1MHz	+25°C		5.5		pF
Channel ON Capacitance	$C_{NC(ON)}, C_{NO(ON)}, C_{COM(ON)}$	f = 1MHz	+25°C		15.5		pF
<b>POWER REQUIREMENTS</b>							
Power Supply Range	$V_+$		-40°C to +85°C	1.8		5.5	V
Power Supply Current	$I_+$	$V_+$ = 5.5V, $V_{IN}$ = 0V or $V_+$	-40°C to +85°C			5	μA

**ELECTRICAL CHARACTERISTICS**

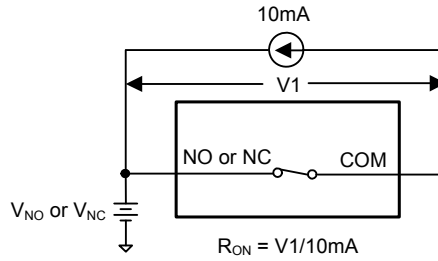
( $V_+$  = +2.7V to +3.6V,  $V_{IH}$  = +1.4V,  $V_{IL}$  = +0.5V,  $T_A$  = -40°C to +85°C. Typical values are at  $V_+$  = +3.0V,  $T_A$  = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
<b>ANALOG SWITCH</b>							
Analog Signal Range	$V_{NO}, V_{NC}, V_{COM}$		-40°C to +85°C	0		$V_+$	V
On-Resistance	$R_{ON}$	$V_+$ = 2.7V, $V_{NO}$ or $V_{NC}$ = 1.5V, $I_{COM}$ = -10mA, Test Circuit 1	+25°C		7	10	Ω
			-40°C to +85°C			10.5	Ω
On-Resistance Match Between Channels	$\Delta R_{ON}$	$V_+$ = 2.7V, $V_{NO}$ or $V_{NC}$ = 1.5V, $I_{COM}$ = -10mA, Test Circuit 1	+25°C		0.15	0.3	Ω
			-40°C to +85°C			0.4	Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	$V_+$ = 2.7V, $V_{NO}$ or $V_{NC}$ = 1.0V, 1.5V, 2.0V, $I_{COM}$ = -10mA, Test Circuit 1	+25°C		3	4	Ω
			-40°C to +85°C			4.3	Ω
Source OFF Leakage Current	$I_{NC(OFF)}, I_{NO(OFF)}$	$V_+$ = 3.6V, $V_{NO}$ or $V_{NC}$ = 0.3V, 3.3V, $V_{COM}$ = 3.3V, 0.3V	-40°C to +85°C			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	-40°C to +85°C			1	μA
<b>DIGITAL INPUTS</b>							
Input High Voltage	$V_{INH}$		-40°C to +85°C	1			V
Input Low Voltage	$V_{INL}$		-40°C to +85°C			0.5	V
Input Leakage Current	$I_{IN}$	$V_+$ = 5.5V, $V_{IN}$ = 0V or 3.6V	-40°C to +85°C			1	μA
<b>DYNAMIC CHARACTERISTICS</b>							
Turn-On Time	$t_{ON}$	$V_{NO}$ or $V_{NC}$ = 1.5V, $V_{IH}$ = 1.5V, $V_{IL}$ = 0V, $R_L$ = 300Ω, $C_L$ = 35pF, Test Circuit 2	+25°C		23		ns
Turn-Off Time	$t_{OFF}$	$V_{NO}$ or $V_{NC}$ = 1.5V, $V_{IH}$ = 1.5V, $V_{IL}$ = 0V, $R_L$ = 300Ω, $C_L$ = 35pF, Test Circuit 2	+25°C		22		ns
Break-Before-Make Time Delay	$t_D$	$V_{NO1}$ or $V_{NC1}$ = $V_{NO2}$ or $V_{NC2}$ = 3V, $R_L$ = 300Ω, $C_L$ = 35pF, Test Circuit 3	+25°C		4		ns
Skew	$t_{SKEW}$	$R_S$ = 39Ω, $C_L$ = 50pF, Test Circuit 4	+25°C		5		ns
Off Isolation	$O_{ISO}$	$R_L$ = 50Ω, $C_L$ = 5pF, Signal = 0dBm, Test Circuit 5	f = 10MHz	+25°C		-57	dB
			f = 1MHz	+25°C		-76	dB
Channel-to-Channel Crosstalk	$X_{TALK}$	$R_L$ = 50Ω, $C_L$ = 5pF, Test Circuit 6	f = 10MHz	+25°C		-98	dB
			f = 1MHz	+25°C		-103	dB
-3dB Bandwidth	BW	Signal = 0dBm, $R_L$ = 50Ω, $C_L$ = 5pF, Test Circuit 7	+25°C		300		MHz
Source OFF Capacitance	$C_{NC(OFF)}, C_{NO(OFF)}$	f = 1MHz	+25°C		5.5		pF
Channel ON Capacitance	$C_{NC(ON)}, C_{NO(ON)}, C_{COM(ON)}$	f = 1MHz	+25°C		15.5		pF
<b>POWER REQUIREMENTS</b>							
Power Supply Range	$V_+$		-40°C to +85°C	1.8		5.5	V
Power Supply Current	$I_+$	$V_+$ = 5.5V, $V_{IN}$ = 0V or $V_+$	-40°C to +85°C			5	μA

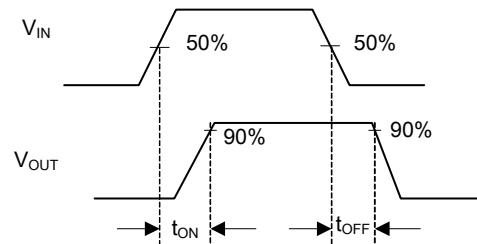
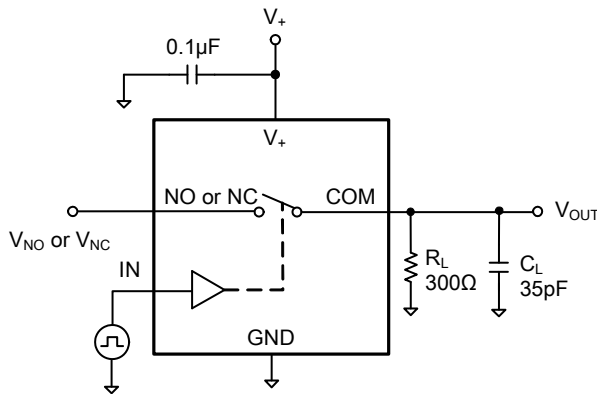
TYPICAL PERFORMANCE CHARACTERISTICS



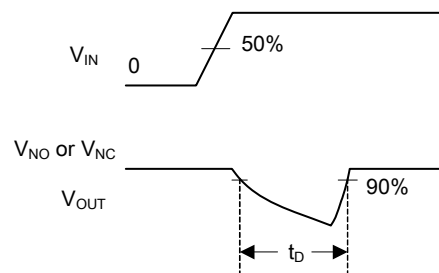
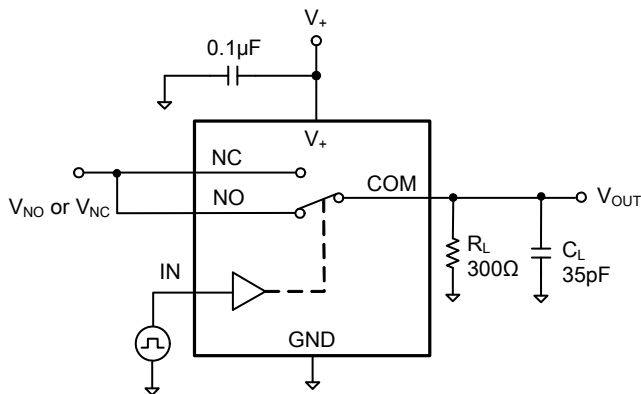
TEST CIRCUITS



Test Circuit 1. On Resistance

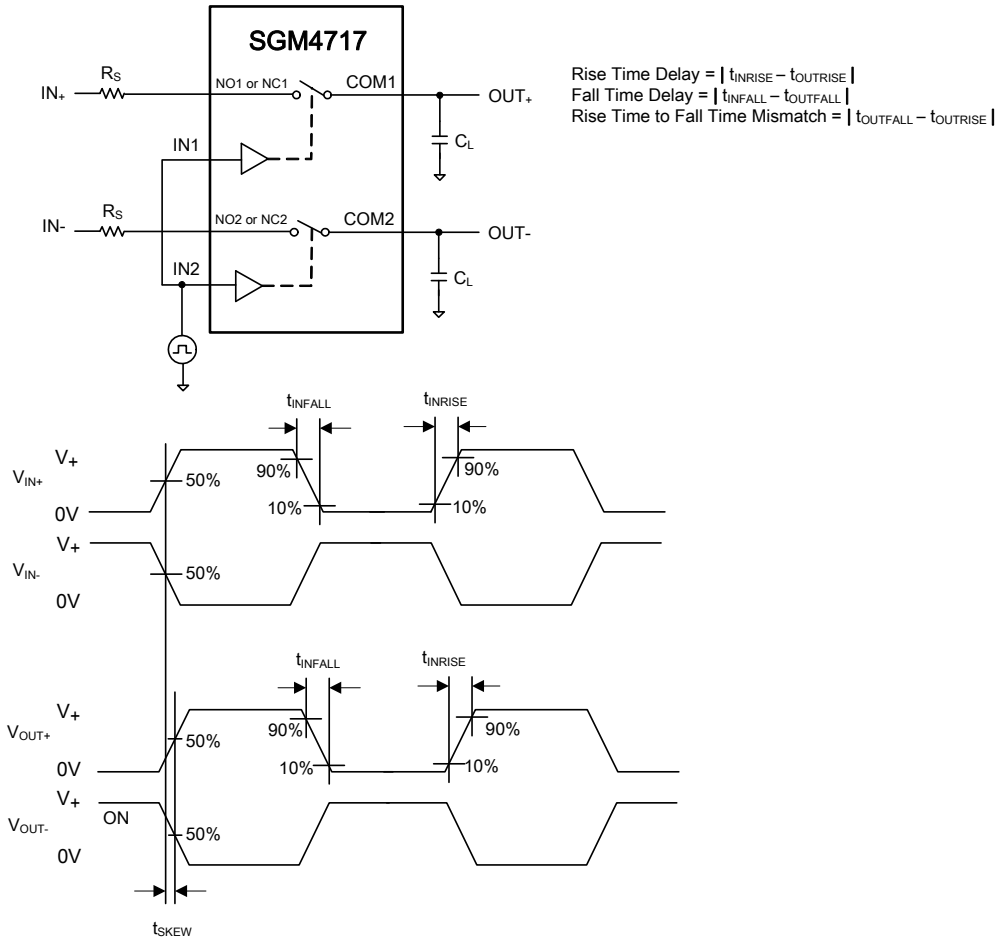


Test Circuit 2. Switching Times

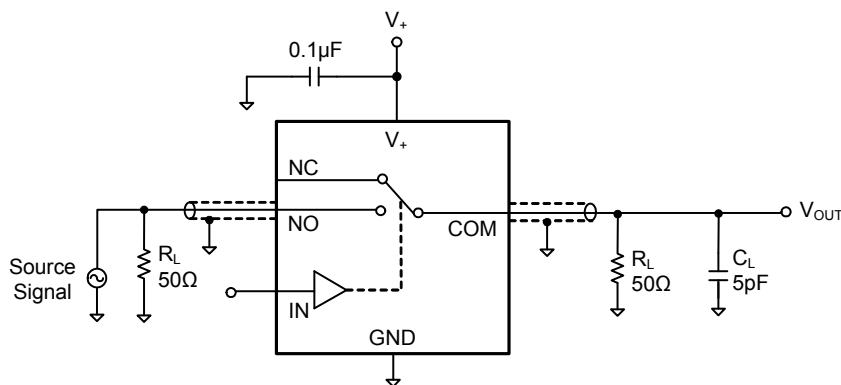


Test Circuit 3. Break-Before-Make Time Delay,  $t_D$

TEST CIRCUITS (Cont.)

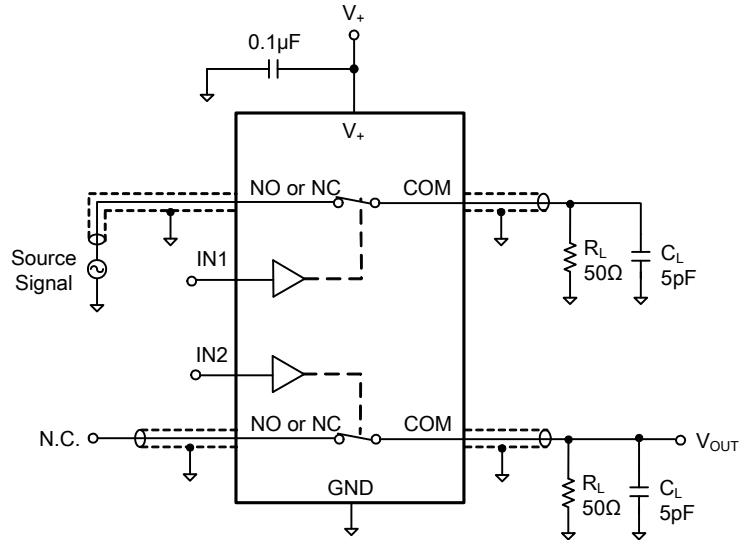


Test Circuit 4. Output Signal Skew



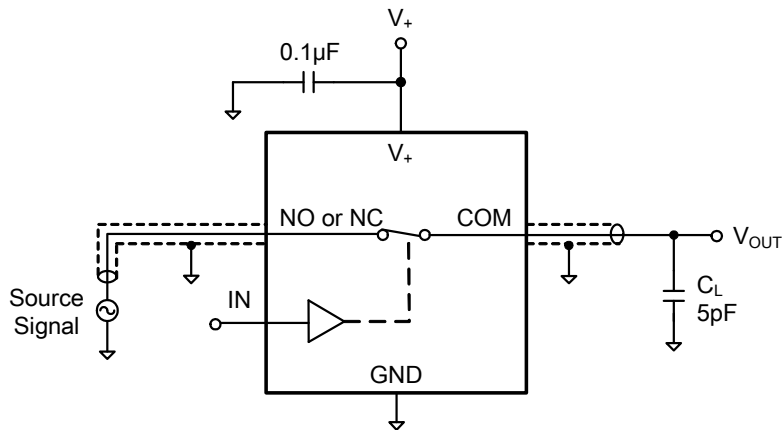
Test Circuit 5. Off Isolation

TEST CIRCUITS (Cont.)



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

Test Circuit 6. Channel-to-Channel Crosstalk

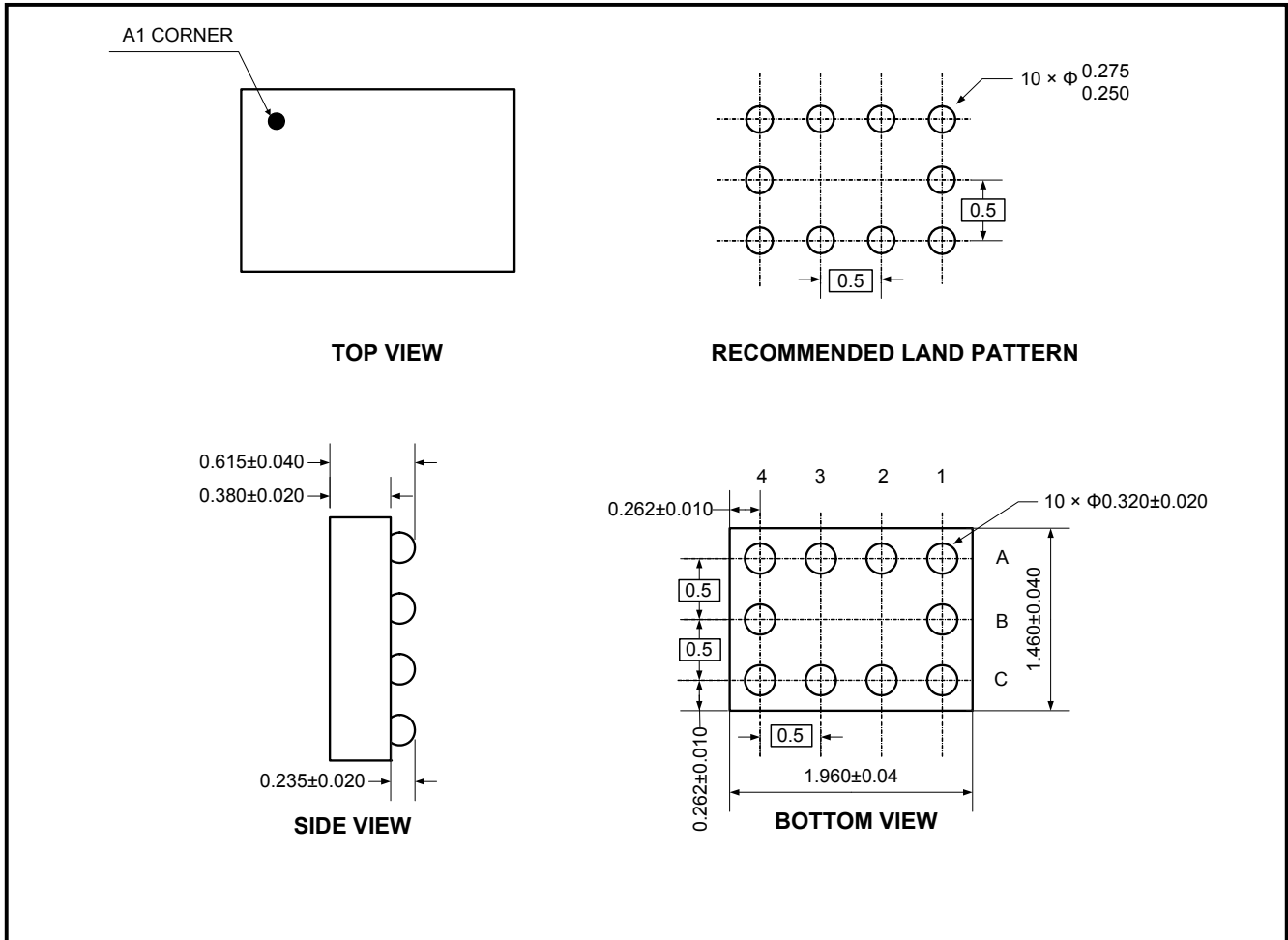


Test Circuit 7. -3dB Bandwidth



PACKAGE OUTLINE DIMENSIONS

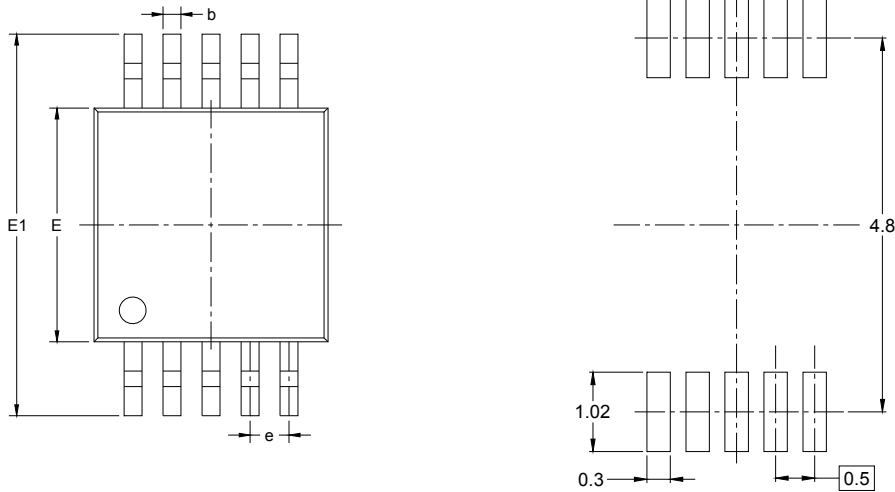
WLCSP-2.0×1.5-10B



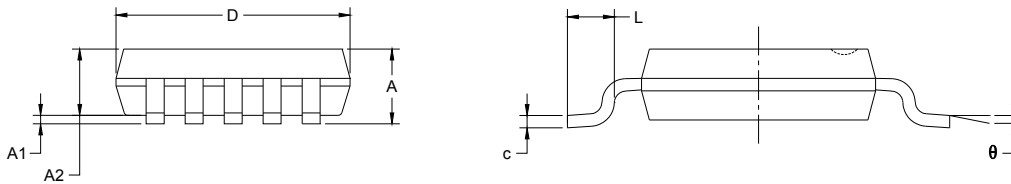
NOTE: All linear dimensions are in millimeters.

PACKAGE OUTLINE DIMENSIONS

MSOP-10



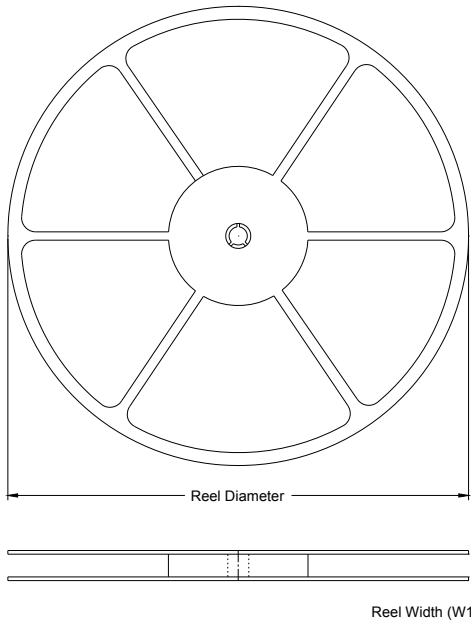
RECOMMENDED LAND PATTERN (Unit: mm)



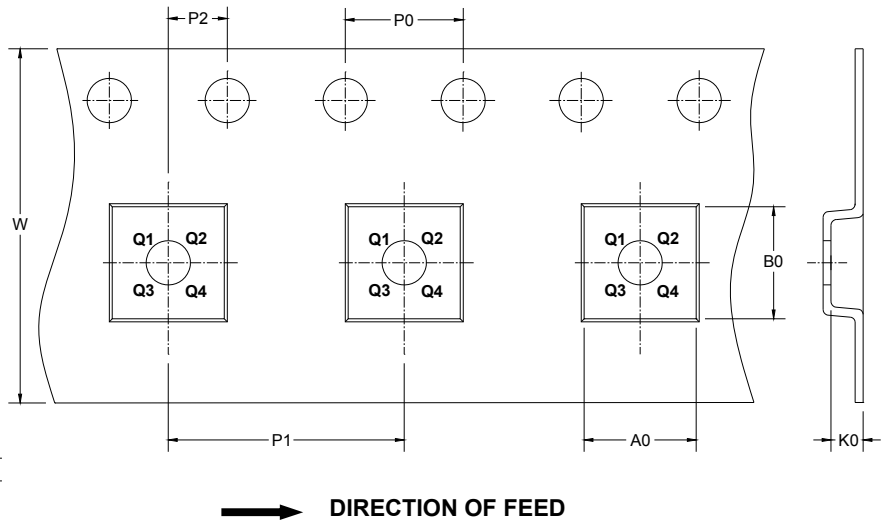
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.180	0.280	0.007	0.011
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.500 BSC		0.020 BSC	
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

**TAPE AND REEL INFORMATION**

**REEL DIMENSIONS**



**TAPE DIMENSIONS**



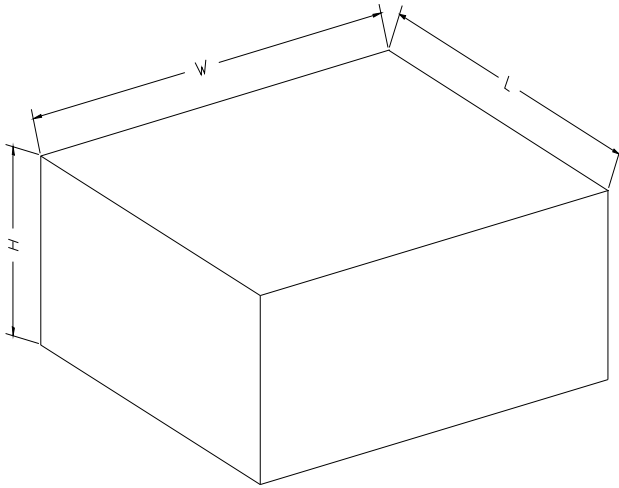
NOTE: The picture is only for reference. Please make the object as the standard.

**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
MSOP-10	13"	12.4	5.2	3.3	1.2	4.0	8.0	2.0	12.0	Q1
WLCSP-2.0×1.5-10B	7"	9.2	1.7	2.2	0.9	4.0	4.0	2.0	8.0	Q2

**SGM4717**

**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
13"	386	280	370	5

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[NLAST4599DTT1G](#) [DG403DY-T1-E3](#) [MAX4714EXTT](#) [MAX392CPE](#) [BGSX22G2A10E6327XTSA1](#) [ADG1611BRUZ-REEL7](#)