SGM4517
0.9Ω, High Voltage, Dual, SPDT Analog Switch

GENERAL DESCRIPTION

The SGM4517 is a high voltage, dual single-pole/ double-throw (SPDT) analog switch that is designed to operate for single power supply or dual power supply. Targeted applications include battery powered equipment that benefit from the SGM4517's low 0.9Ω (TYP) on-resistance and fast switching speeds.

The SGM4517 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.

The SGM4517 supports dual power supplies (V_{EE} and V_{CC}) or single power supply.

The SGM4517 is available in Green SOIC-14 and WLCSP-1.27×2.13-15B packages. It operates over an ambient temperature range of -40℃ to +85℃.

FEATURES

- **±2.7V to ±12V Dual Supply Operation**
- **2.7V to 24V Single Supply Operation**
- **On-Resistance for Switches: 0.9Ω (TYP)**
- **Fast Switching Times**
- **High Off-Isolation**
- **Very Low Crosstalk**
- **1.8V Logic Compatible Control Pin**
- **Break-Before-Make Switching**
- **-40℃ to +85℃ Operating Temperature Range**
- **Available in Green WLCSP-1.27×2.13-15B and SOIC-14 Packages**

APPLICATIONS

Portable Instrumentation

Battery-powered Equipment

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM4517	WLCSP-1.27×2.13-15B	-40℃ to +85℃	SGM4517YG/TR	XXXXX 4517	Tape and Reel, 3000
	SOIC-14	-40℃ to +85℃	SGM4517YS14G/TR	SGM4517YS14 XXXXX	Tape and Reel, 2500

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_{CC} to V_{EE} ..... 0V to 26.4V
IN1, IN2, EN to GND ..... 0V to 6V
Analog Voltage Range (1) ..... (V_{EE} - 0.3V) to (V_{CC} + 0.3V)
Continuous Current from NO to COM ..... ±350mA
Continuous Current from NC to COM ..... ±350mA
Peak Current from NO to COM ..... ±400mA
Peak Current from NC to COM ..... ±400mA
I/O Clamp Current (V_I < 0) ..... -30mA
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM 8000V
MM 400V
CDM 1000V

NOTE:
1. Signals on NC, NO, or COM exceeding V_{CC} will be clamped by internal diodes. Limit forward diode current to maximum current ratings.

RECOMMENDED OPERATING CONDITIONS

Dual Supply Operation ..... ±2.7V to ±12V
Single Supply Operation ..... 2.7V to 24V
Operating Temperature Range ..... -40℃ to +85℃

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

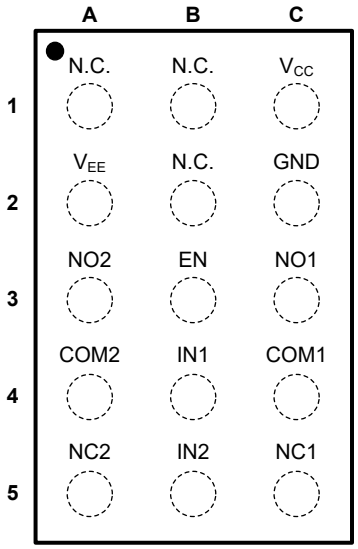
This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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.

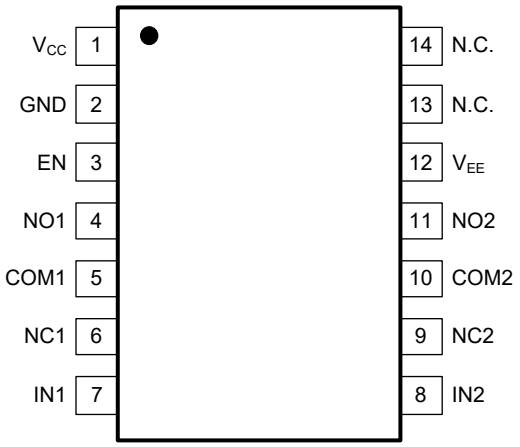
PIN CONFIGURATIONS

(TOP VIEW)



WLCSP-1.27×2.13-15B

(TOP VIEW)



SOIC-14

PIN DESCRIPTION

PIN		NAME	FUNCTION
WLCSP-1.27×2.13-15B	SOIC-14		
A1, B1, B2	13, 14	N.C.	No Connection.
C1	1	V_{CC}	Power Supply.
A2	12	V_{EE}	The Lowest Power Supply. Connect to negative power supply for dual power supply application, or connect to GND for single power supply application.
C2	2	GND	Ground.
A3	11	NO2	Normally-Open Terminal.
B3	3	EN	Enable Control. When EN = “Low”, both NC and NO will be disconnected with COM, negative charge pump doesn’t work and the SGM4517 will be in shutdown state. When EN = “High”, negative charge pump will work and the SGM4517 will be in working state, NC or NO will be connected with COM depending on the logical state of IN.
C3	4	NO1	Normally-Open Terminal.
A4	10	COM2	Common Terminal.
B4	7	IN1	Digital Control Pin to Connect the COM Terminal to the NO or NC Terminals.
C4	5	COM1	Common Terminal.
A5	9	NC2	Normally-Closed Terminal.
B5	8	IN2	Digital Control Pin to Connect the COM Terminal to the NO or NC Terminals.
C5	6	NC1	Normally-Closed Terminal.

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

FUNCTION TABLE

Table 1. Function Table of Switch 1:

EN	IN1	COM1
0	X	COM1 is disconnected with NO1 and NC1
1	0	COM1 = NC1
1	1	COM1 = NO1

Table 2. Function Table of Switch2:

EN	IN2	COM2
0	X	COM2 is disconnected with NO2 and NC2
1	0	COM2 = NC2
1	1	COM2 = NO2

ELECTRICAL CHARACTERISTICS

(V_{CC} = 3.3V, V_{EE} = -3.3V, Full = -40℃ to +85℃. Typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
ANALOG SWITCH								
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}			Full	V_{EE}		V_{CC}	V
On-Resistance	R_{ON}	$V_{EE} \le V_{NO}$, $V_{NC} \le V_{CC}$, I_{COM} = -50mA, Test Circuit 1	SOIC-14	+25℃		1	1.2	Ω
				Full			1.8	
			WLCSP-1.27×2.13-15B	+25℃		0.9	1.1	Ω
				Full			1.7	
On-Resistance Match Between Channels	ΔR_{ON}	$V_{EE} \le V_{NO}$ or $V_{NC} \le V_{CC}$, I_{COM} = -50mA, Test Circuit 1		+25℃		0.01	0.15	Ω
				Full			0.25	
On-Resistance Flatness	$R_{FLAT(ON)}$	$V_{EE} \le V_{NO}$ or $V_{NC} \le V_{CC}$, I_{COM} = -50mA, Test Circuit 1		+25℃		0.05	0.15	Ω
				Full			0.2	
Source Off Leakage Current	$I_{NC(OFF)}$, $I_{NO(OFF)}$	V_{NO} or V_{NC} = -2.8V, 2.8V, V_{COM} = 2.8V, -2.8V		+25℃	-0.5	0.01	0.5	μA
				Full			1	
Channel On Leakage Current	$I_{NC(ON)}$, $I_{NO(ON)}$, $I_{COM(ON)}$	V_{NO} or V_{NC} = -2.8V, 2.8V, V_{COM} = floating, or V_{NO} or V_{NC} = floating, V_{COM} = -2.8V, 2.8V		+25℃	-0.5	0.01	0.5	μA
				Full			1	
DIGITAL INPUTS								
Input High Voltage	V_{INH}			Full	1.5		5.5	V
Input Low Voltage	V_{INL}			Full	0		0.5	V
Pull Down Resistor	$R_{PULL\ DOWN}$			+25℃		600		kΩ
DYNAMIC CHARACTERISTICS								
Turn-On Time	t_{ON}	V_{NO} or V_{NC} = 1V, R_L = 50Ω, C_L = 35pF, Test Circuit 2		+25℃		400		ns
Turn-Off Time	t_{OFF}	V_{NO} or V_{NC} = 1V, R_L = 50Ω, C_L = 35pF, Test Circuit 2		+25℃		100		ns
Break-Before-Make Time Delay	t_D	V_{NO1} or V_{NC1} = V_{NO2} or V_{NC2} = 1V, R_L = 50Ω, C_L = 35pF, Test Circuit 3		+25℃		300		ns
Off Isolation	O_{ISO}	f = 1kHz, R_L = 32Ω, Signal = 0dBm, Test Circuit 4		+25℃		-135		dB
		f = 1MHz, R_L = 50Ω, Signal = 0dBm, C_L = 5pF, Test Circuit 4				-70		
Channel-to-Channel Crosstalk	X_{TALK}	f = 1kHz, R_L = 32Ω, Signal = 0dBm, Test Circuit 5		+25℃		-120		dB
		f = 1MHz, R_L = 50Ω, Signal = 0dBm, C_L = 5pF, Test Circuit 5				-90		
-3dB Bandwidth	BW	Signal = 0dBm, R_L = 50Ω, C_L = 5pF, Test Circuit 6		+25℃		100		MHz
Channel On Capacitance	C_{ON}			+25℃		50		pF
Charge Injection	Q	V_G = GND, R_G = 0Ω, C_L = 1nF, Test Circuit 7		+25℃		300		pC
Total Harmonic Distortion	THD	A-Weighting, Test Circuit 8	V_{NO}, V_{NC} = $2V_{RMS}$, R_L = 600Ω	+25℃		-113		dB
			V_{NO}, V_{NC} = $2V_{PP}$, R_L = 600Ω			-115		
			V_{NO}, V_{NC} = $2V_{PP}$, R_L = 32Ω			-113		
			V_{NO}, V_{NC} = $1V_{PP}$, R_L = 600Ω			-112		
			V_{NO}, V_{NC} = $1V_{PP}$, R_L = 32Ω			-110		
			V_{NO}, V_{NC} = $0.5V_{PP}$, R_L = 600Ω			-108		
			V_{NO}, V_{NC} = $0.5V_{PP}$, R_L = 32Ω			-104		

ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = 5V, V_{EE} = -5V, GND = 0V, Full = -40℃ to +85℃. Typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
ANALOG SWITCH								
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}			Full	V_{EE}		V_{CC}	V
On-Resistance	R_{ON}	$V_{EE} \le V_{NO}$, $V_{NC} \le V_{CC}$, I_{COM} = -50mA, Test Circuit 1	SOIC-14	+25℃		1	1.2	Ω
				Full			1.8	
			WLCSP-1.27×2.13-15B	+25℃		0.9	1.1	Ω
				Full			1.7	
On-Resistance Match Between Channels	ΔR_{ON}	$V_{EE} \le V_{NO}$ or $V_{NC} \le V_{CC}$, I_{COM} = -50mA, Test Circuit 1		+25℃		0.01	0.15	Ω
				Full			0.25	
On-Resistance Flatness	$R_{FLAT(ON)}$	$V_{EE} \le V_{NO}$ or $V_{NC} \le V_{CC}$, I_{COM} = -50mA, Test Circuit 1		+25℃		0.01	0.15	Ω
				Full			0.2	
Source Off Leakage Current	$I_{NC(OFF)}$, $I_{NO(OFF)}$	V_{NO} or V_{NC} = -4.5V, 4.5V, V_{COM} = 4.5V, -4.5V		+25℃	-0.5	0.01	0.5	μA
				Full			1	
Channel On Leakage Current	$I_{NC(ON)}$, $I_{NO(ON)}$, $I_{COM(ON)}$	V_{NO} or V_{NC} = -4.5V, 4.5V, V_{COM} = floating, or V_{NO} or V_{NC} = floating, V_{COM} = -4.5V, 4.5V		+25℃	-0.5	0.01	0.5	μA
				Full			1	
DIGITAL INPUTS								
Input High Voltage	V_{INH}			Full	1.5		5.5	V
Input Low Voltage	V_{INL}			Full	0		0.5	V
DYNAMIC CHARACTERISTICS								
Turn-On Time	t_{ON}	V_{NO} or V_{NC} = 1V, R_L = 50Ω, C_L = 35pF, Test Circuit 2		+25℃		400		ns
Turn-Off Time	t_{OFF}	V_{NO} or V_{NC} = 1V, R_L = 50Ω, C_L = 35pF, Test Circuit 2		+25℃		100		ns
Break-Before-Make Time Delay	t_D	V_{NO1} or V_{NC1} = V_{NO2} or V_{NC2} = 1V, R_L = 50Ω, C_L = 35pF, Test Circuit 3		+25℃		300		ns
Off Isolation	O_{ISO}	f = 1kHz, R_L = 32Ω, Signal = 0dBm, Test Circuit 4		+25℃		-135		dB
		f = 1MHz, R_L = 50Ω, Signal = 0dBm, C_L = 5pF, Test Circuit 4				-70		
Channel-to-Channel Crosstalk	X_{TALK}	f = 1kHz, R_L = 32Ω, Signal = 0dBm, Test Circuit 5		+25℃		-120		dB
		f = 1MHz, R_L = 50Ω, Signal = 0dBm, C_L = 5pF, Test Circuit 5				-90		
-3dB Bandwidth	BW	Signal = 0dBm, R_L = 50Ω, C_L = 5pF, Test Circuit 6		+25℃		100		MHz
Channel On Capacitance	C_{ON}			+25℃		50		pF
Charge Injection	Q	V_G = GND, R_G = 0Ω, C_L = 1nF, Test Circuit 7		+25℃		500		pC
Total Harmonic Distortion	THD	A-Weighting, Test Circuit 8	V_{NO}, V_{NC} = $2V_{RMS}$, R_L = 600Ω	+25℃		-117		dB
			V_{NO}, V_{NC} = $2V_{PP}$, R_L = 600Ω			-115		
			V_{NO}, V_{NC} = $2V_{PP}$, R_L = 32Ω			-113		
			V_{NO}, V_{NC} = $1V_{PP}$, R_L = 600Ω			-112		
			V_{NO}, V_{NC} = $1V_{PP}$, R_L = 32Ω			-110		
			V_{NO}, V_{NC} = $0.5V_{PP}$, R_L = 600Ω			-108		
			V_{NO}, V_{NC} = $0.5V_{PP}$, R_L = 32Ω			-104		

ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = 5V, V_{EE} = -5V, GND = 0V, Full = -40℃ to +85℃. Typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
POWER REQUIREMENTS							
Power Supply Current	I_{CC}	V_{IN} = 0V or 1.5V, V_{EN} = 1.5V	+25℃		350	450	μA
			Full			460	
	I_{EE}		+25℃		35	48	
			Full			50	
Power Supply Current in Shutdown State	I_{CC}	V_{IN} = 0V or 1.5V, V_{EN} = 0V	+25℃		0.4	1	μA
			Full			1.5	

ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = 12V, V_{EE} = -12V, GND = 0V, Full = -40℃ to +85℃. Typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
ANALOG SWITCH								
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}			Full	V_{EE}		V_{CC}	V
On-Resistance	R_{ON}	$V_{EE} \le V_{NO}$, $V_{NC} \le V_{CC}$, I_{COM} = -50mA, Test Circuit 1	SOIC-14	+25℃		1	1.2	Ω
				Full			1.8	
			WLCSP-1.27×2.13-15B	+25℃		0.9	1.1	Ω
				Full			1.7	
On-Resistance Match Between Channels	ΔR_{ON}	$V_{EE} \le V_{NO}$ or $V_{NC} \le V_{CC}$, I_{COM} = -50mA, Test Circuit 1		+25℃		0.01	0.15	Ω
				Full			0.25	
On-Resistance Flatness	$R_{FLAT(ON)}$	$V_{EE} \le V_{NO}$ or $V_{NC} \le V_{CC}$, I_{COM} = -50mA, Test Circuit 1		+25℃		0.01	0.15	Ω
				Full			0.2	
Source Off Leakage Current	$I_{NC(OFF)}$, $I_{NO(OFF)}$	V_{NO} or V_{NC} = -11.5V, 11.5V, V_{COM} = 11.5V, -11.5V		+25℃	-1.5	0.05	1.5	μA
				Full			9	
Channel On Leakage Current	$I_{NC(ON)}$, $I_{NO(ON)}$, $I_{COM(ON)}$	V_{NO} or V_{NC} = -11.5V, 11.5V, V_{COM} = floating, or V_{NO} or V_{NC} = floating, V_{COM} = -11.5V, 11.5V		+25℃	-1.5	0.05	1.5	μA
				Full			9	
DIGITAL INPUTS								
Input High Voltage	V_{INH}			Full	1.5		5.5	V
Input Low Voltage	V_{INL}			Full	0		0.5	V
DYNAMIC CHARACTERISTICS								
Turn-On Time	t_{ON}	V_{NO} or V_{NC} = 1V, R_L = 50Ω, C_L = 35pF, Test Circuit 2		+25℃		400		ns
Turn-Off Time	t_{OFF}	V_{NO} or V_{NC} = 1V, R_L = 50Ω, C_L = 35pF, Test Circuit 2		+25℃		100		ns
Break-Before-Make Time Delay	t_D	V_{NO1} or V_{NC1} = V_{NO2} or V_{NC2} = 1V, R_L = 50Ω, C_L = 35pF, Test Circuit 3		+25℃		300		ns
Off Isolation	O_{ISO}	f = 1kHz, R_L = 32Ω, Signal = 0dBm, Test Circuit 4		+25℃		-135		dB
		f = 1MHz, R_L = 50Ω, Signal = 0dBm, C_L = 5pF, Test Circuit 4				-70		
Channel-to-Channel Crosstalk	X_{TALK}	f = 1kHz, R_L = 32Ω, Signal = 0dBm, Test Circuit 5		+25℃		-120		dB
		f = 1MHz, R_L = 50Ω, Signal = 0dBm, C_L = 5pF, Test Circuit 5				-90		
-3dB Bandwidth	BW	Signal = 0dBm, R_L = 50Ω, C_L = 5pF, Test Circuit 6		+25℃		100		MHz
Channel On Capacitance	C_{ON}			+25℃		50		pF
Charge Injection	Q	V_G = GND, R_G = 0Ω, C_L = 1nF, Test Circuit 7		+25℃		600		pC
Total Harmonic Distortion	THD	A-Weighting, Test Circuit 8	V_{NO}, V_{NC} = $2V_{RMS}$, R_L = 600Ω	+25℃		-117		dB
			V_{NO}, V_{NC} = $2V_{PP}$, R_L = 600Ω			-115		
			V_{NO}, V_{NC} = $2V_{PP}$, R_L = 32Ω			-113		
			V_{NO}, V_{NC} = $1V_{PP}$, R_L = 600Ω			-112		
			V_{NO}, V_{NC} = $1V_{PP}$, R_L = 32Ω			-110		
			V_{NO}, V_{NC} = $0.5V_{PP}$, R_L = 600Ω			-108		
			V_{NO}, V_{NC} = $0.5V_{PP}$, R_L = 32Ω			-104		

ELECTRICAL CHARACTERISTICS (continued)

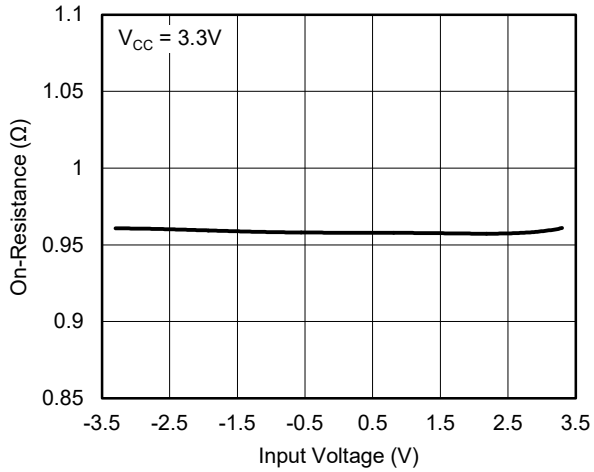
(V_{CC} = 12V, V_{EE} = -12V, GND = 0V, Full = -40℃ to +85℃. Typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
POWER REQUIREMENTS							
Power Supply Current	I_{CC}	V_{IN} = 0V or 1.5V, V_{EN} = 1.5V	+25℃		350	450	μA
			Full			460	
	I_{EE}		+25℃		35	48	
			Full			50	
Power Supply Current in Shutdown State	I_{CC}	V_{IN} = 0V or 1.5V, V_{EN} = 0V	+25℃		0.5	1.5	μA
			Full			2	

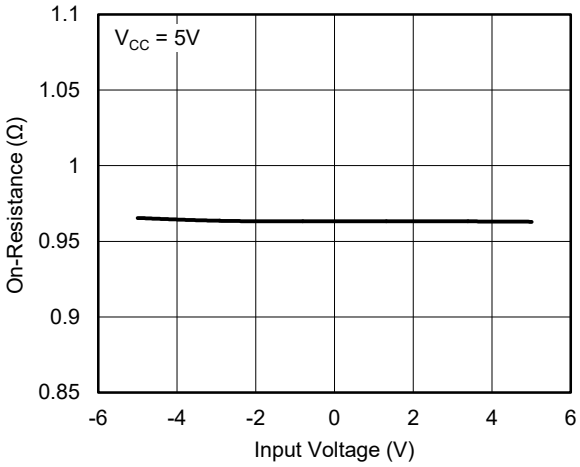
TYPICAL PERFORMANCE CHARACTERISTICS

T_A = +25℃, unless otherwise noted.

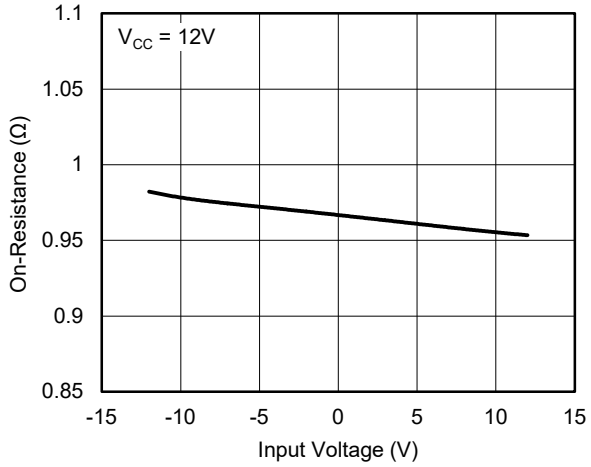
On-Resistance vs. Input Voltage



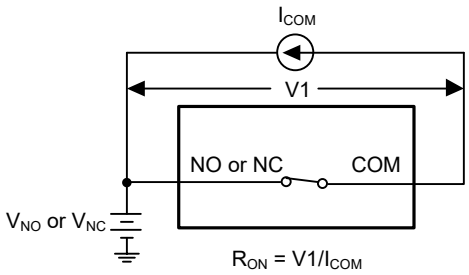
On-Resistance vs. Input Voltage



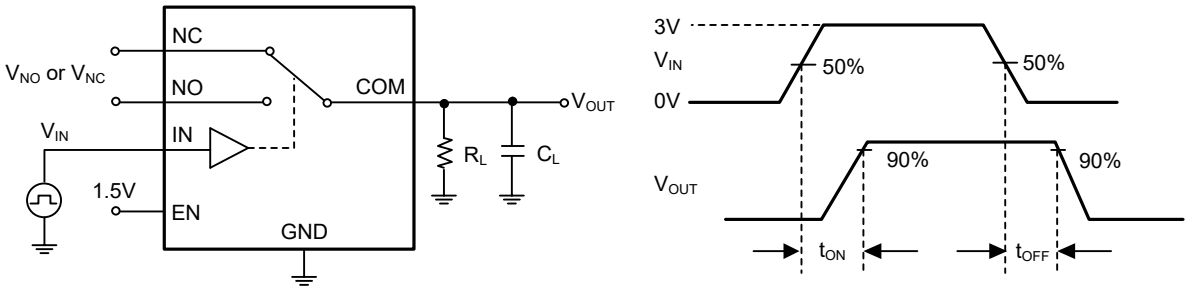
On-Resistance vs. Input Voltage



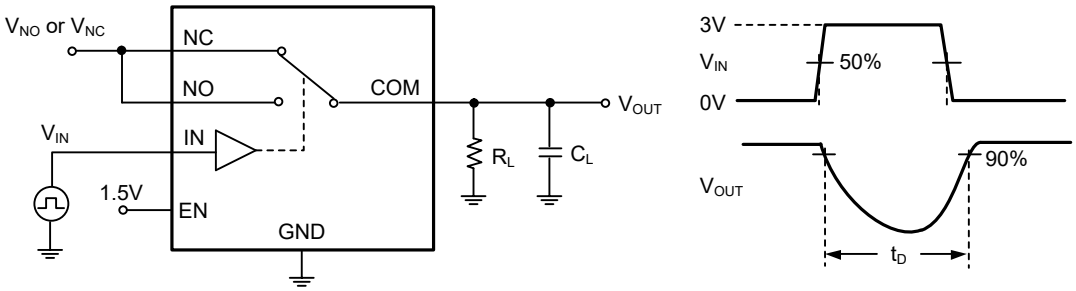
TEST CIRCUITS



Test Circuit 1. On-Resistance

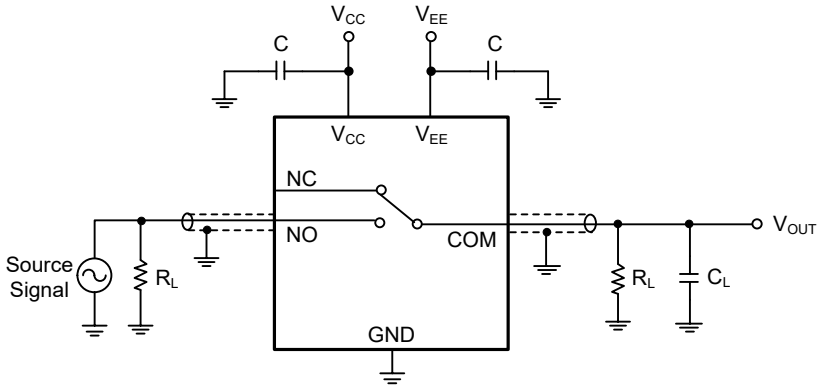


Test Circuit 2. Switching Times (t_{ON}, t_{OFF})

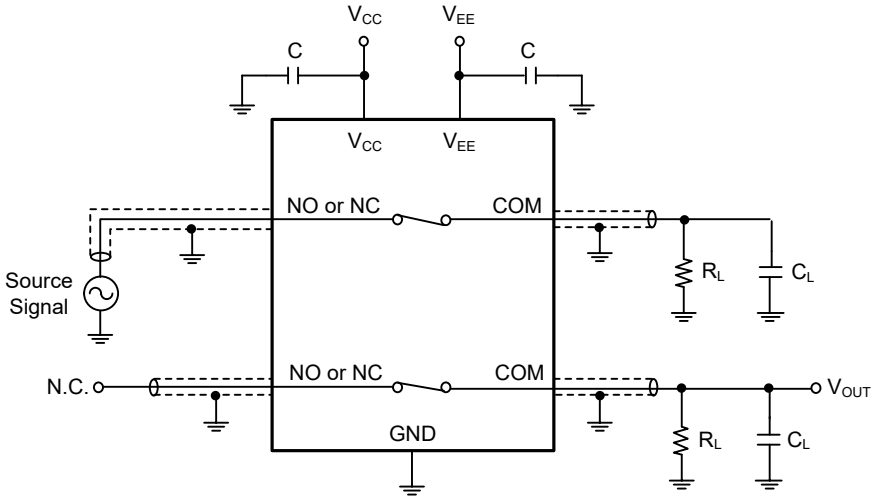


Test Circuit 3. Break-Before-Make Time Delay (t_D)

TEST CIRCUITS (continued)



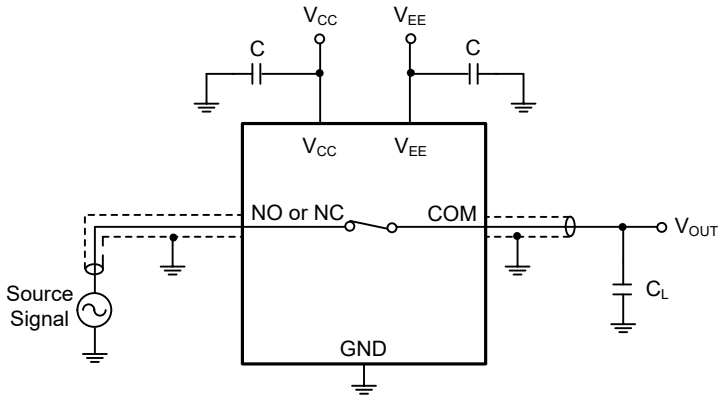
Test Circuit 4. Off Isolation



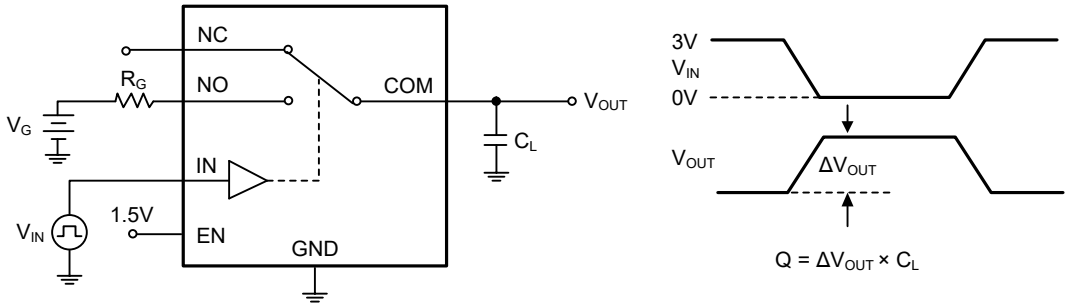
$$\text{Channel-to-Channel Crosstalk} = -20 \times \log \frac{V_{NO} \text{ or } V_{NC}}{V_{OUT}}$$

Test Circuit 5. Channel-to-Channel Crosstalk

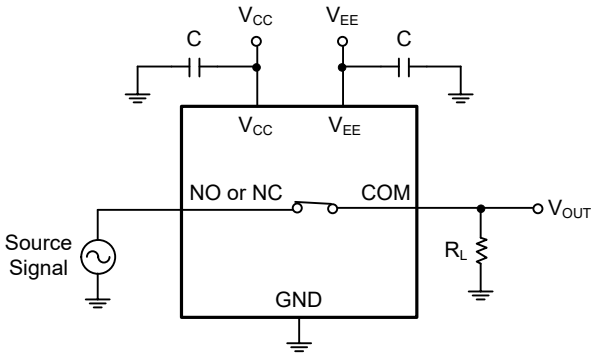
TEST CIRCUITS (continued)



Test Circuit 6. -3dB Bandwidth



Test Circuit 7. Charge Injection (Q)



Test Circuit 8. Total Harmonic Distortion (THD)

REVISION HISTORY

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

DECEMBER 2017 – REV.A to REV.A.1

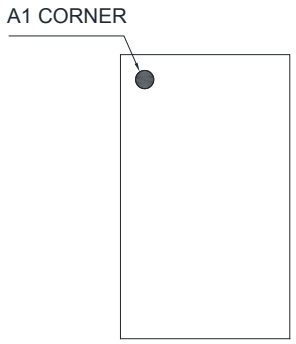
Added Typical Performance Characteristics section	10

Changes from Original (NOVEMBER 2017) to REV.A

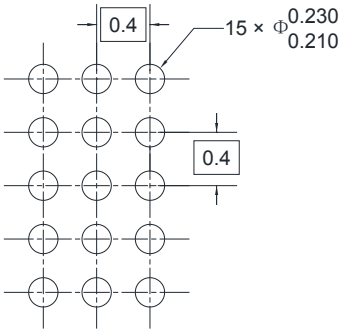
Changed from product preview to production data	All

PACKAGE OUTLINE DIMENSIONS

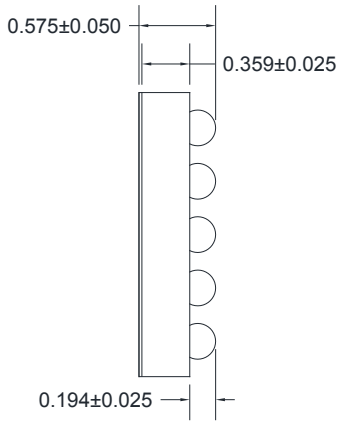
WLCSP-1.27×2.13-15B



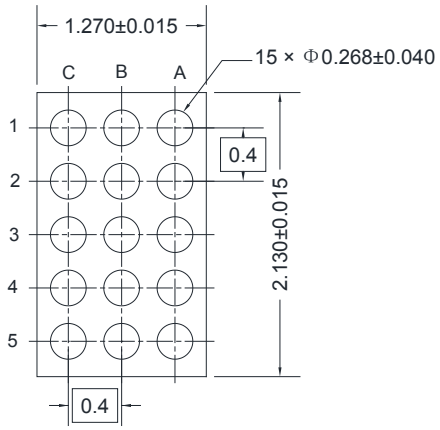
TOP VIEW



RECOMMENDED LAND PATTERN



SIDE VIEW

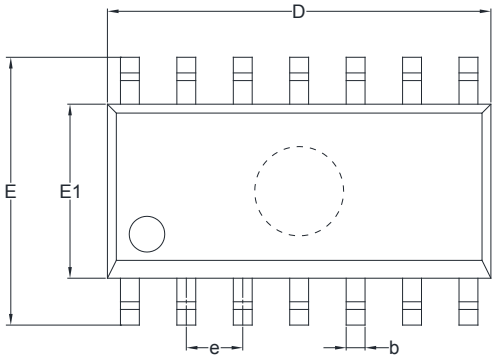


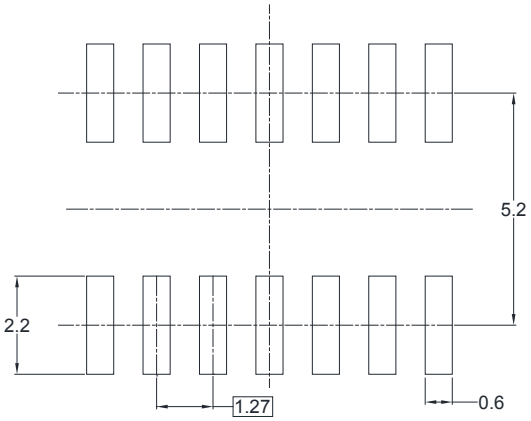
BOTTOM VIEW

NOTE: All linear dimensions are in millimeters.

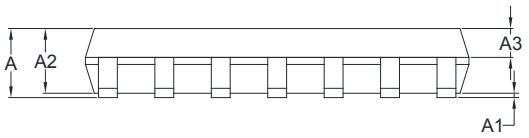
PACKAGE OUTLINE DIMENSIONS

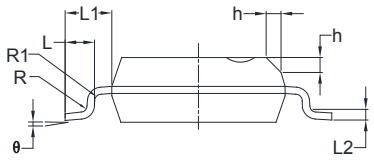
SOIC-14





RECOMMENDED LAND PATTERN (Unit: mm)

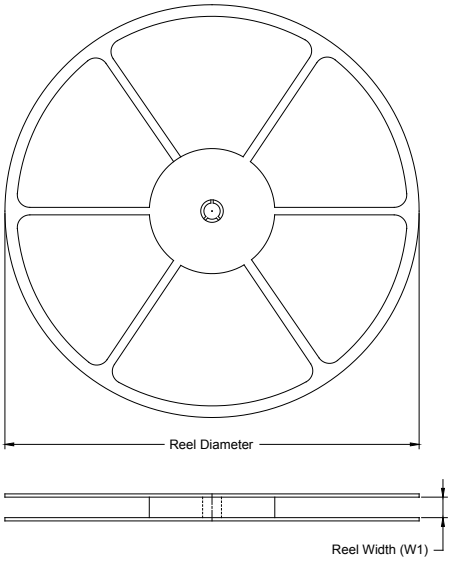




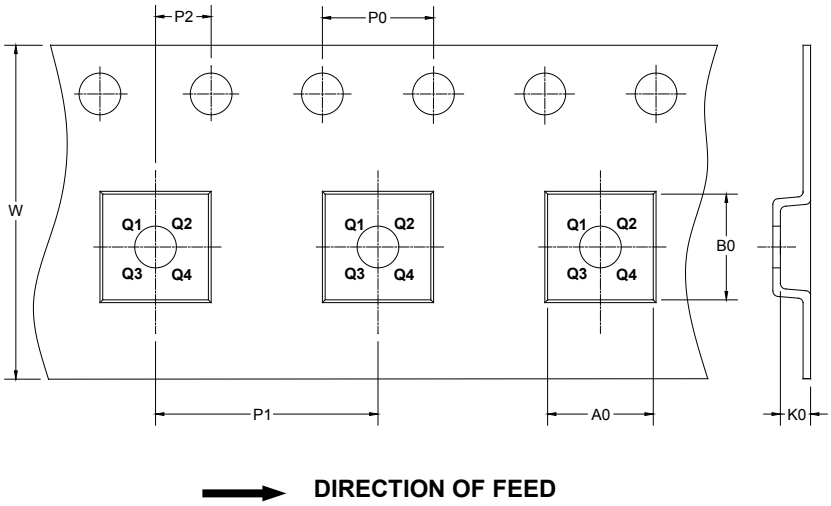
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.25	1.65	0.049	0.065
A3	0.55	0.75	0.022	0.030
b	0.36	0.49	0.014	0.019
D	8.53	8.73	0.336	0.344
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
L	0.45	0.80	0.018	0.032
L1	1.04 REF		0.040 REF	
L2	0.25 BSC		0.01 BSC	
R	0.07		0.003	
R1	0.07		0.003	
h	0.30	0.50	0.012	0.020
θ	0°	8°	0°	8°

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



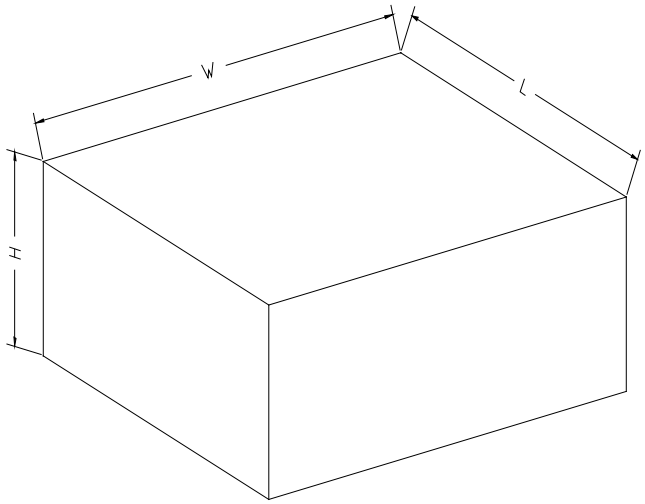
NOTE: The picture is only for reference. Please make the object as the standard.

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
WLCSP-1.27×2.13-15B	7″	9.5	1.47	2.37	0.78	4.0	4.0	2.0	8.0	Q1
SOIC-14	13″	16.4	6.60	9.30	2.10	4.0	8.0	2.0	16.0	Q1

DD0001

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

DD0002