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## Low ON-Resistance, Low Voltage, SPDT Analog Switch

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### FEATURES

- **-3dB Bandwidth: 120MHz**
- **High Speed, Typically 29ns**
- **Supply Range: +1.8V to +5.5V**
- **Low ON-State Resistance, 3.0Ω(TYP)**
- **Break-Before-Make Switching**
- **Rail-to-Rail Operation**
- **TTL/CMOS Compatible**
- **Micro SIZE PACKAGE: SC70-6**
- **Extended Industrial Temperature Range: -40°C to +125°C**

### APPLICATIONS

- **Wearable Devices**
- **Battery-Operated Equipment**
- **Signal Gating, Chopping, Modulation or Demodulation (Modem)**
- **Portable Computing**
- **Cell Phones**

### DESCRIPTION

The RS2101 is a low on-resistance, single-pole double-throw (SPDT) analog switch that is designed to operate from 1.8 V to 5.5 V.

The RS2101 device can handle both analog and digital signals. It features fast switching speeds ( $t_{ON} = 29ns$ ,  $t_{OFF} = 17ns$ ) and low on-resistance (3.0Ω TYP).

These features make this device suitable for a wide variety of portable applications including cell phones, audio devices, and instrumentation.

Applications include signal gating, chopping, modulation or demodulation (modem), and signal multiplexing for analog-to-digital and digital-to-analog conversion systems.

**Device Information (1)**

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RS2101	SC70-6	2.10mm×1.25mm

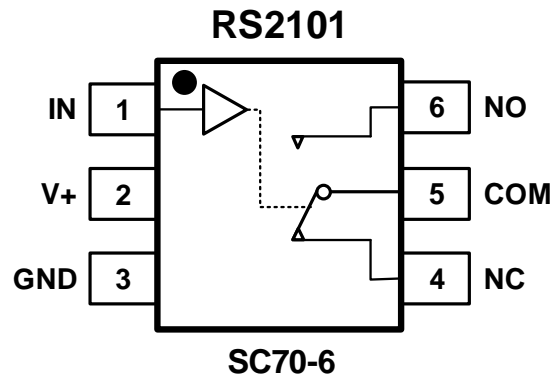
(1) For all available packages, see the orderable addendum at the end of the data sheet.

## Revision History

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

VERSION	Change Date	Change Item
C.3.1	2024/03/07	<ol style="list-style-type: none"><li>1. Added the TAPE AND REEL INFORMATION</li><li>2. Change Thermal Information on Page 2@RevC.3</li><li>3. Update PACKAGE MARKING on Page 3@RevC.3</li><li>4. Modify packaging naming</li></ol>

## Pin Configurations



### PIN DESCRIPTION

NAME	PIN	FUNCTION
IN	1	Digital Control Pin
V+	2	Power Supply
GND	3	Ground
NC	4	Normally-Closed Terminal
COM	5	Common Terminal
NO	6	Normally-Open Terminal

### FUNCTION TABLE

LOGIC	NO	NC
0	OFF	ON
1	ON	OFF

## SPECIFICATIONS

### Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted) <sup>(1)</sup>

SYMBOL	PARAMETER	MIN	MAX	UNIT
V <sub>+</sub>	Supply Voltage	-0.3	6.0	V
V <sub>IN</sub>	Input Voltage	-0.3	6.0	
	Analog, Digital Voltage Range <sup>(2)</sup>	-0.3	(V <sub>+</sub> )+0.3	
	Continuous Current NO, NC, or COM	-300	+300	mA
I <sub>PEAK</sub>	Peak Current NO, NC, or COM	-500	+500	
T <sub>J</sub>	Junction Temperature	-40	150	°C
T <sub>stg</sub>	Storage temperature	-65	+150	

(1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.

(2) Input terminals are diode-clamped to the power-supply rails. Input signals that can swing more than 0.3V beyond the supply rails should be current-limited to 10mA or less.

### ESD Ratings

		VALUE	UNIT
V <sub>(ESD)</sub>	Electrostatic discharge	Human-body model (HBM)	±3000
		Machine Model (MM)	±200

### Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

SYMBOL	PARAMETER	MIN	MAX	UNIT
V <sub>CC</sub>	Supply Voltage	1.8	5.5	V
T <sub>A</sub>	Operating temperature	-40	+125	°C

### Thermal Information

THERMAL METRIC		RS2101	UNIT
		6 PINS	
		SC70-6	
R <sub>θJA</sub>	Junction-to-ambient thermal resistance	214.7	°C/W
R <sub>θJC(top)</sub>	Junction-to-case(top) thermal resistance	127.1	°C/W
R <sub>θJB</sub>	Junction-to-board thermal resistance	60.0	°C/W
Ψ <sub>JT</sub>	Junction-to-top characterization parameter	33.4	°C/W
Ψ <sub>JB</sub>	Junction-to-board characterization parameter	59.8	°C/W
R <sub>θJC(bot)</sub>	Junction-to-case(bottom) thermal resistance	N/A	°C/W

**PACKAGE/ORDERING INFORMATION**

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING <sup>(1)</sup>	PACKAGE OPTION
RS2101	RS2101XC6	-40°C ~125°C	SC70-6 <sup>(2)</sup>	2101	Tape and Reel,3000

## NOTE:

- (1) There may be additional marking, which relates to the lot trace code information (data code and vendor code), the logo or the environmental category on the device.
- (2) Equivalent to SOT363.

## ELECTRICAL CHARACTERISTICS

V+ = 5.0 V, TA = -40°C to 125°C (unless otherwise noted)

PARAMETER	SYMBOL	CONDITIONS	V+	TA	MIN	TYP	MAX	UNIT
<b>ANALOG SWITCH</b>								
Analog Signal Range	VNO, VNC, VCOM			FULL	0		V+	V
On-Resistance	RON	0 ≤ (VNO or VNC) ≤ V+, ICOM = -10mA, Switch ON, See Figure 4	5V	+25°C		3.0	4.0	Ω
				FULL			5.0	Ω
			3.3V	+25°C		5.5	7.0	Ω
				FULL			7.5	Ω
On-Resistance Match Between Channels	ΔRON	0 ≤ (VNO or VNC) ≤ V+, ICOM = -10mA, Switch ON, See Figure 4	5V	+25°C		0.1	0.8	Ω
				FULL			0.9	Ω
			3.3V	+25°C		0.1	0.8	Ω
				FULL			0.9	Ω
On-Resistance Flatness	RFLAT(ON)	0 ≤ (VNO or VNC) ≤ V+, ICOM = -10mA, Switch ON, See Figure 4	5V	+25°C		0.7	0.85	Ω
				FULL			0.95	Ω
			3.3V	+25°C		2.5	3.0	Ω
				FULL			3.2	Ω
NC,NO OFF Leakage Current	INC(OFF), INO(OFF)	VNO or VNC = 0.3V, V+/2 VCOM = V+/2, 0.3V See Figure 5	1.8 to 5.5V	FULL			1	uA
NC,NO,COM ON Leakage Current	INC(ON), INO(ON), ICOM(ON)	VNO or VNC = 0.3V, Open VCOM = Open, 0.3V See Figure 5	1.8 to 5.5V	FULL			1	uA
<b>DIGITAL CONTROL INPUTS<sup>(1)</sup></b>								
Input High Voltage	VINH		5V	FULL	1.5			V
			3.3V	FULL	1.3			V
Input Low Voltage	VINL		5V	FULL			0.6	V
			3.3V	FULL			0.5	V
Input Leakage Current	IIN	VIN = VIO or 0	1.8 to 5.5V	FULL			1	uA

(1) All unused digital inputs of the device must be held at VIO or GND to ensure proper device operation.

**ELECTRICAL CHARACTERISTICS (continued)**
 $V_+ = 5.0\text{ V}$ ,  $T_A = -40^\circ\text{C}$  to  $125^\circ\text{C}$  (unless otherwise noted)

PARAMETER	SYMBOL	CONDITIONS	$V_+$	$T_A$	MIN	TYP	MAX	UNIT
<b>DYNAMIC CHARACTERISTICS</b>								
Turn-On Time	$t_{ON}$	$V_{COM} = V_+$ , $R_L = 300\Omega$ , $C_L = 35\text{pF}$ , See Figure 8	5V	+25°C		29		ns
			3.3V			33		
Turn-Off Time	$t_{OFF}$	$V_{COM} = V_+$ , $R_L = 300\Omega$ , $C_L = 35\text{pF}$ , See Figure 8	5V	+25°C		17		ns
			3.3V			18		
Break-Before-Make Time Delay	$t_{BBM}$	$V_{NO1} = V_{NC1} = V_{NO2} = V_{NC2} = 3\text{V}$ , $R_L = 300\Omega$ , $C_L = 35\text{pF}$ , See Figure 9	5V	+25°C		10		ns
			3.3V			11		
Off Isolation	$O_{ISO}$	$R_L = 50\Omega$ , Switch OFF, See Figure 11	f = 10MHz	+25°C		-43		dB
			f = 1MHz	+25°C		-67		dB
-3dB Bandwidth	BW	Switch ON, $R_L = 50\Omega$ See Figure 10		+25°C		120		MHz
NC,NO OFF Capacitance	$C_{NC(OFF)}$ , $C_{NO(OFF)}$	$V_{NC}$ or $V_{NO} = V_+/2$ or GND, Switch OFF, See Figure 7		+25°C		15		pF
NC,NO,COM ON Capacitance	$C_{NC(ON)}$ , $C_{NO(ON)}$ , $C_{COM(ON)}$	$V_{NC}$ or $V_{NO} = V_+/2$ or GND, Switch ON, See Figure 7		+25°C		50		pF
<b>POWER REQUIREMENTS</b>								
Power Supply Range	$V_+$			FULL	1.8		5.5	V
Power Supply Current	$I_+$	$V_{IN} = \text{GND}$ or $V_+$	5.5V	FULL			1	uA

### TYPICAL CHARACTERISTICS

$V_+ = 5.0\text{ V}$ ,  $T_A = -40^\circ\text{C}$  to  $125^\circ\text{C}$  (unless otherwise noted)

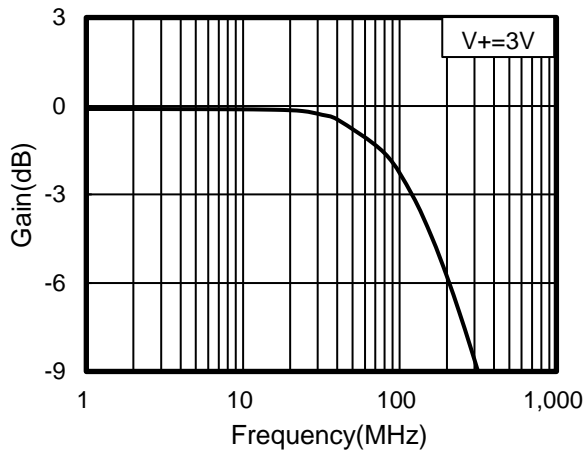


Figure 1. Bandwidth vs Frequency

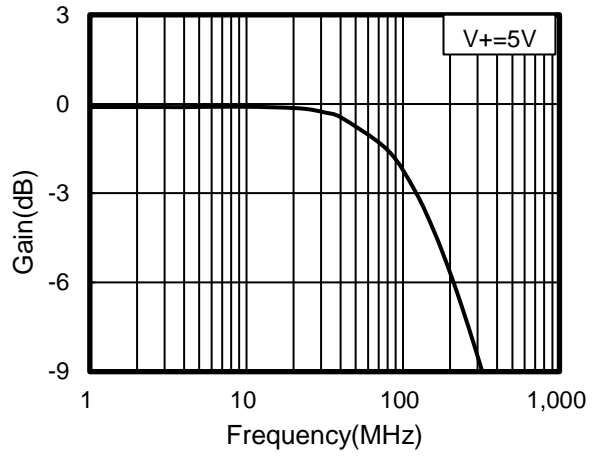


Figure 2. Bandwidth vs Frequency

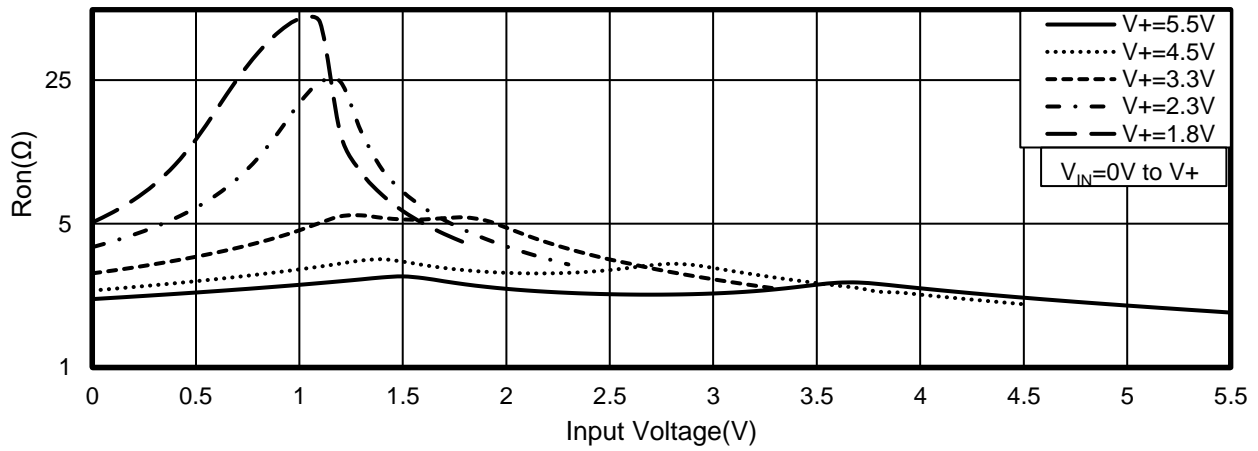


Figure 3. Typical Ron as a Function of Input Voltage



### Parameter Measurement Information

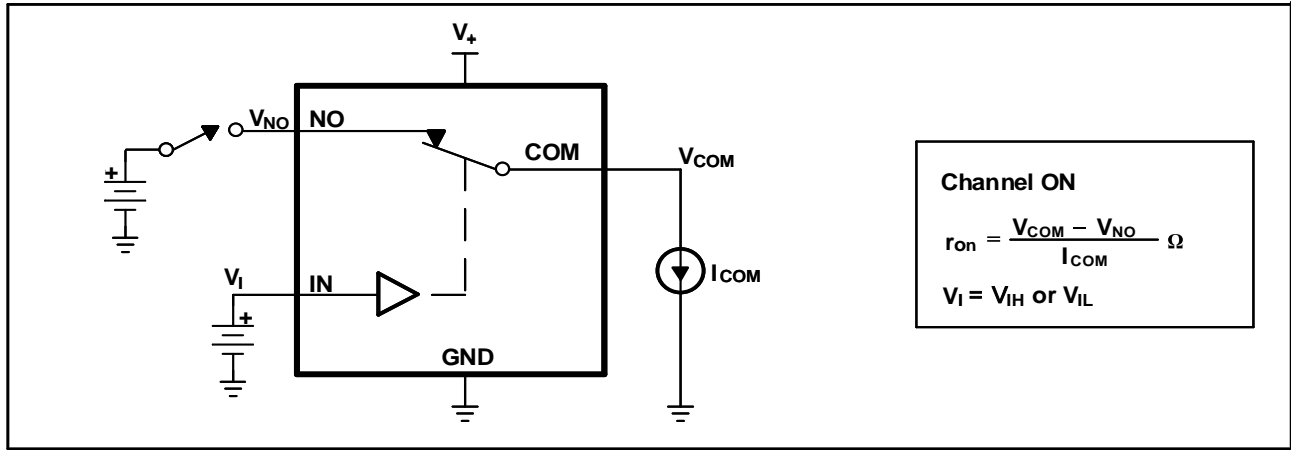


Figure 4. ON-State Resistance ( $R_{on}$ )

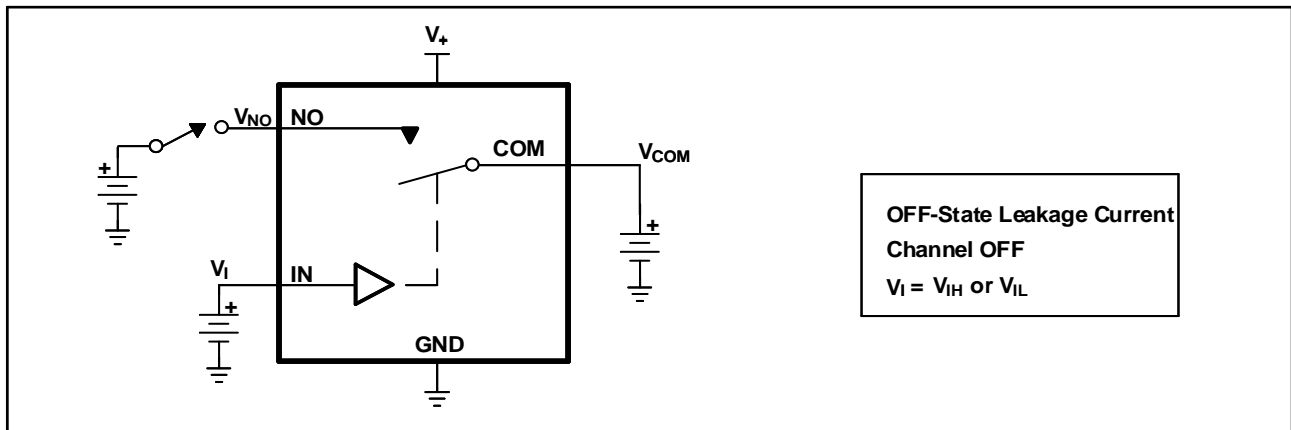


Figure 5. OFF-State Leakage Current ( $I_{COM (OFF)}$ ,  $I_{NO (OFF)}$ )

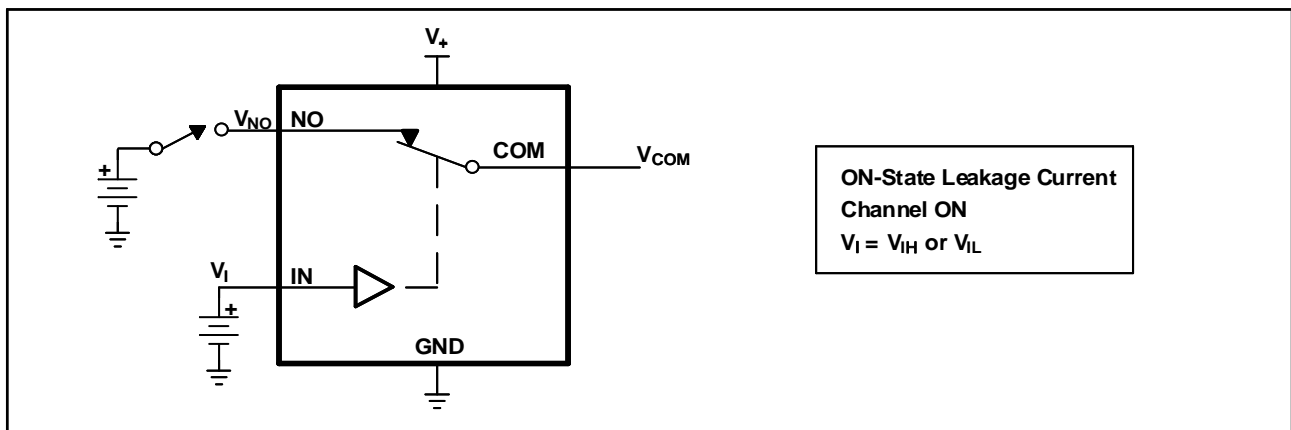


Figure 6. ON-State Leakage Current ( $I_{COM (ON)}$ ,  $I_{NO (ON)}$ )

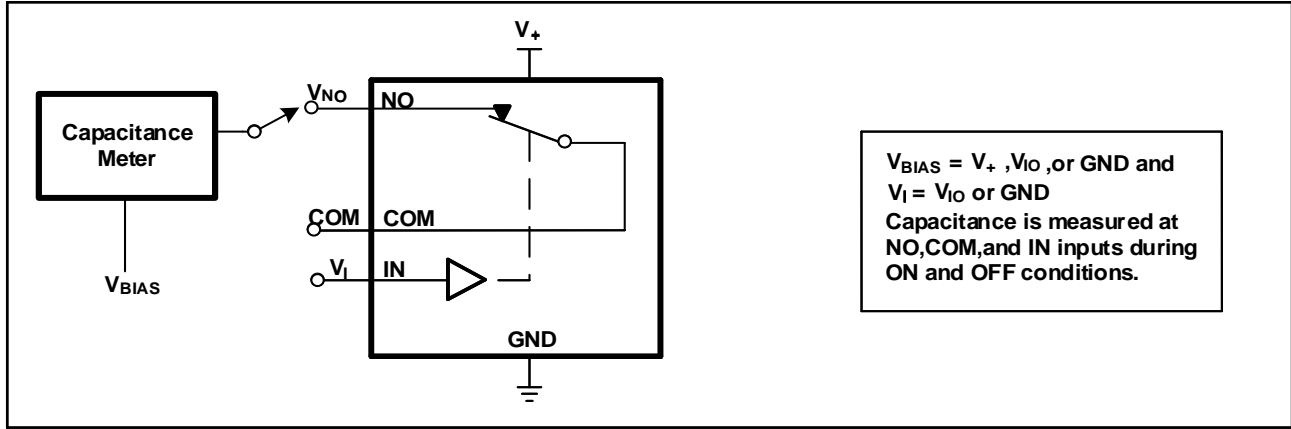


Figure 7. Capacitance ( $C_I$ ,  $C_{COM}$  (OFF),  $C_{COM}$  (ON),  $C_{NO}$  (OFF),  $C_{NO}$  (ON))

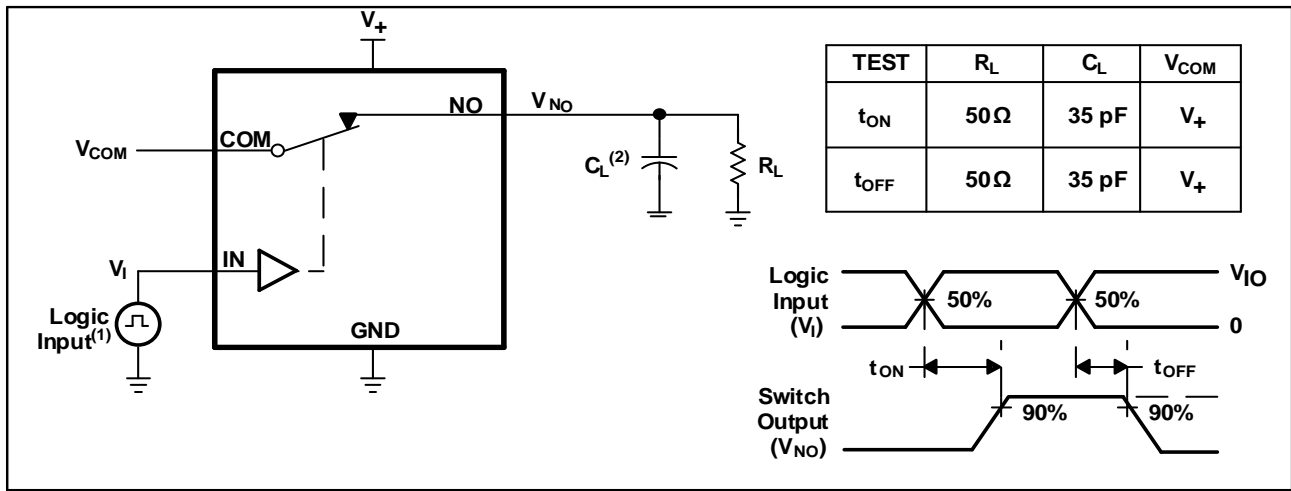


Figure 8. Turn-On ( $t_{ON}$ ) and Turn-Off Time ( $t_{OFF}$ )

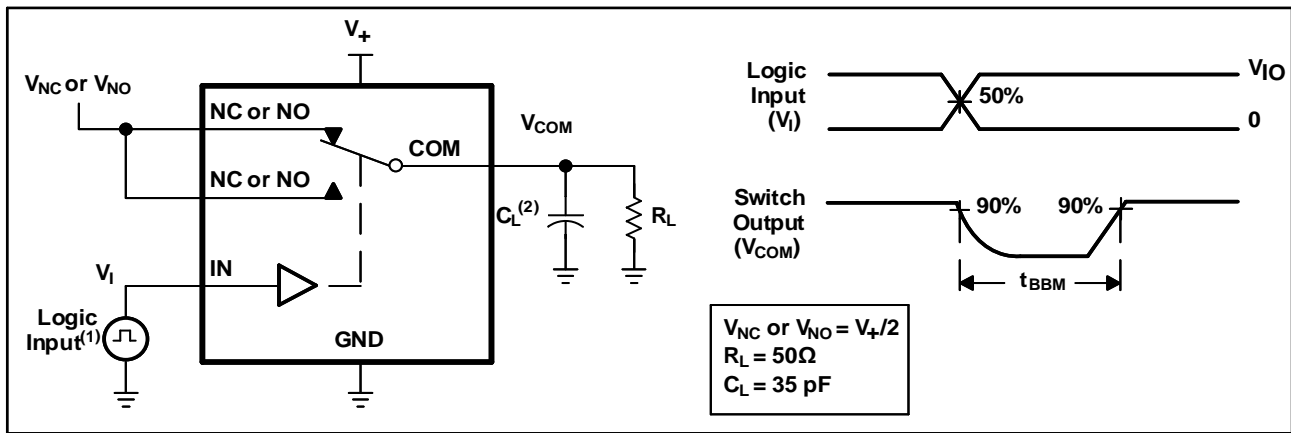


Figure 9. Break-Before-Make Time ( $t_{BBM}$ )

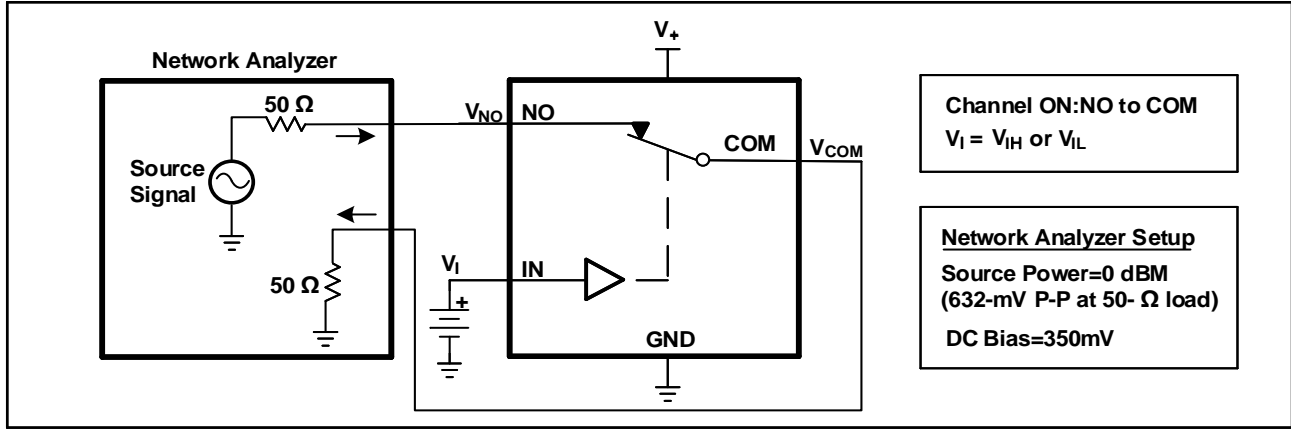


Figure 10. Bandwidth (BW)

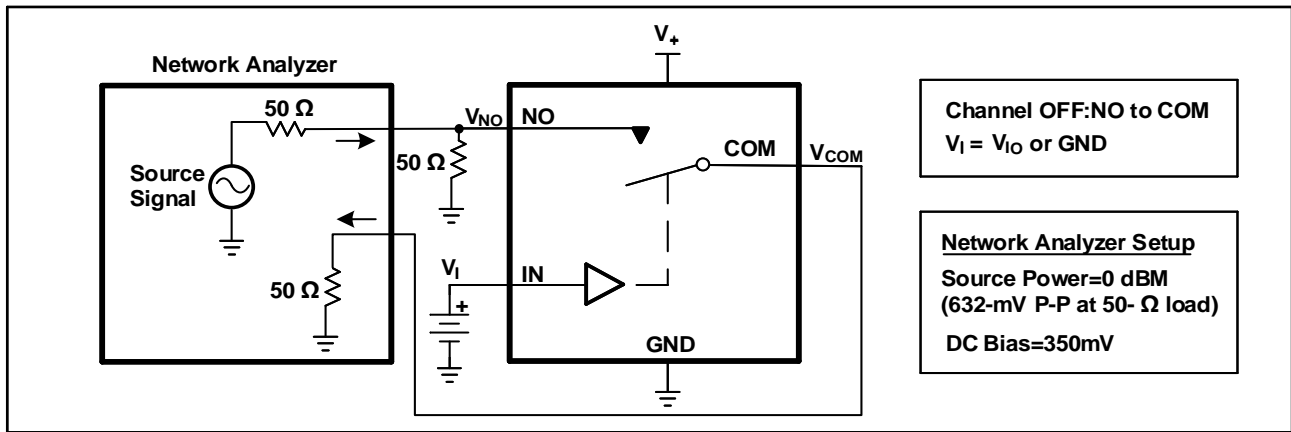


Figure 11. OFF Isolation ( $O_{ISO}$ )

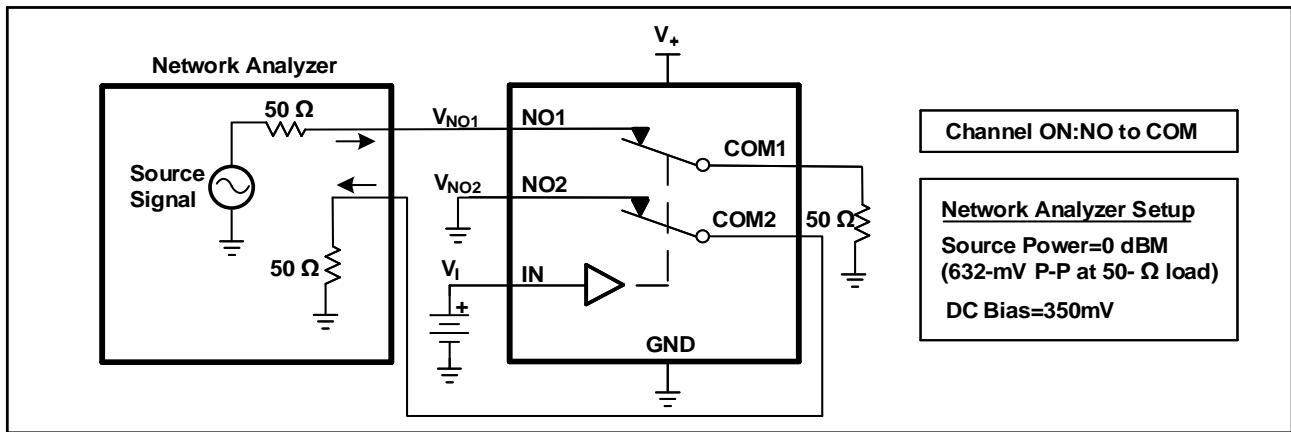


Figure 12. Crosstalk ( $X_{TALK}$ )

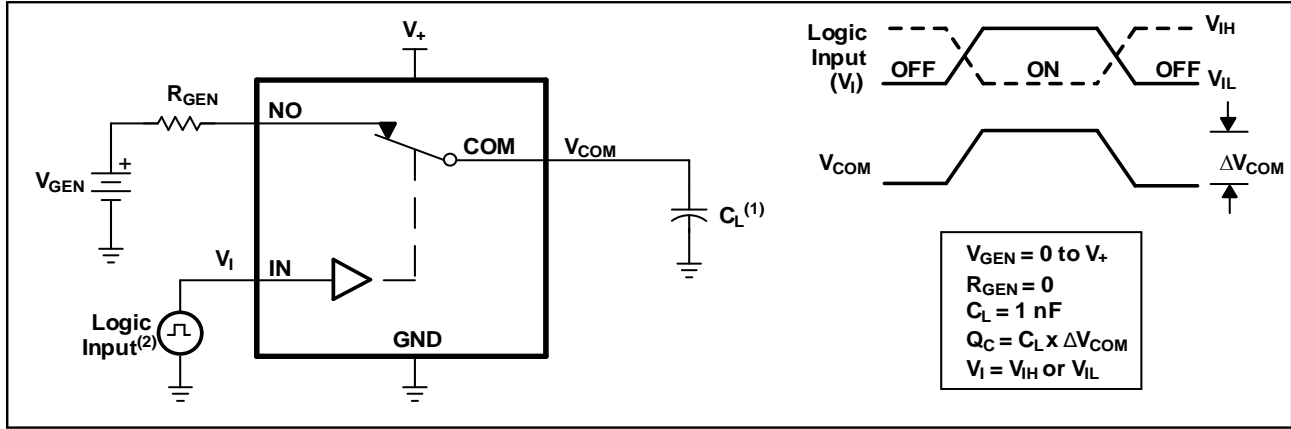


Figure 13. Charge Injection ( $Q_c$ )

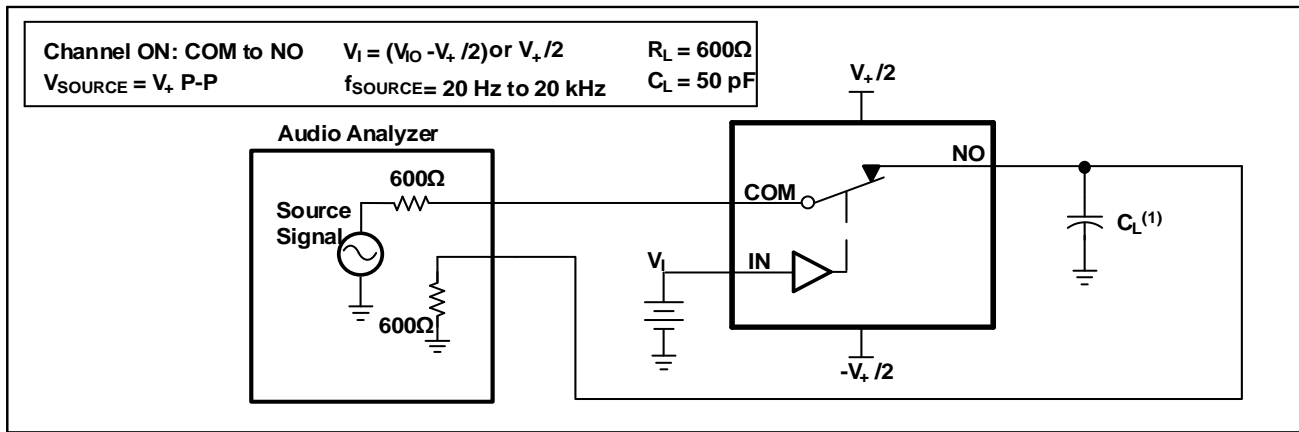
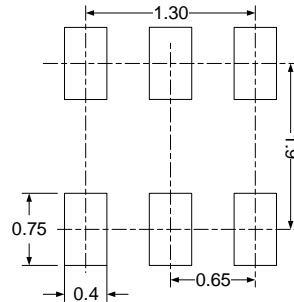
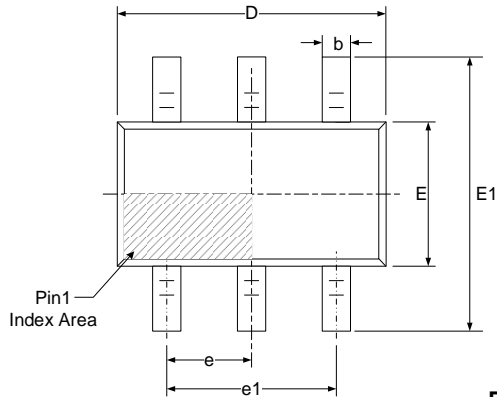
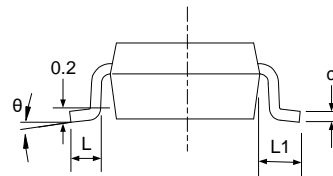
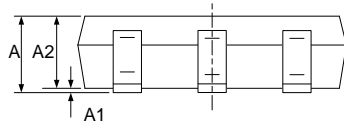


Figure 14. Total Harmonic Distortion (THD)

# PACKAGE OUTLINE DIMENSIONS

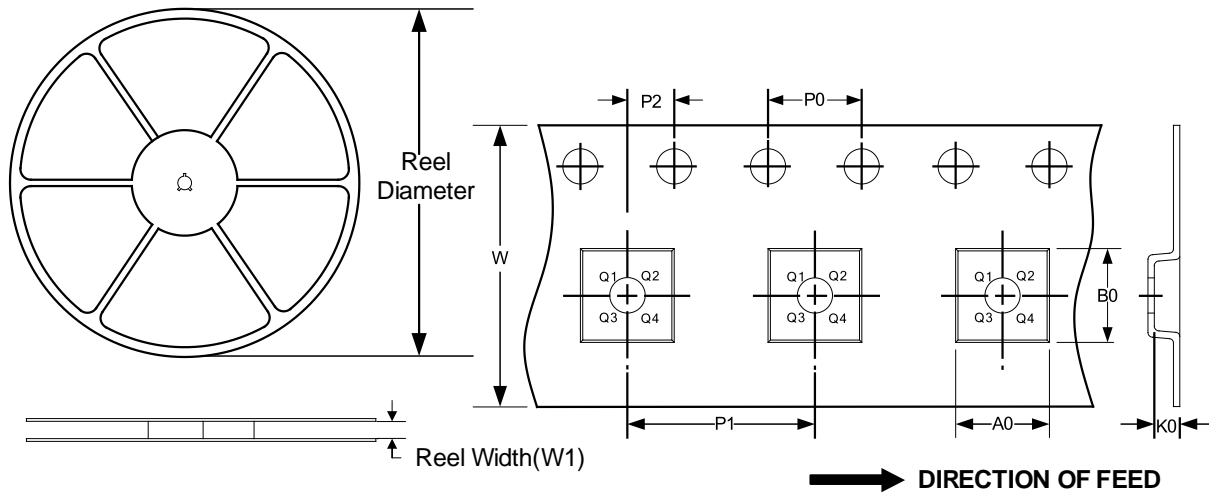
## SC70-6


**RECOMMENDED LAND PATTERN (Unit: mm)**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650(BSC)		0.026(BSC)	
e1	1.300(BSC)		0.051(BSC)	
L	0.260	0.460	0.010	0.018
L1	0.525		0.021	
θ	0°	8°	0°	8°

**TAPE AND REEL INFORMATION**  
**REEL DIMENSIONS**

**TAPE DIMENSION**



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(mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SC70-6	7"	9.5	2.40	2.50	1.20	4.0	4.0	2.0	8.0	Q3