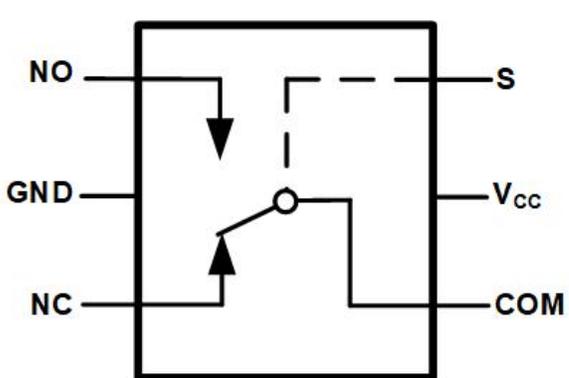# GT4157
2.2 Ω Low Voltage SPDT Analog Switch

1 Features	2 Application
- High bandwidth: 300 MHz - Supply range: +1.65 V to +5.5 V - Low on-state resistance: 2.2 Ω @ 4.5 V - Break-before-make switching - Rail-to-Rail signal range - TTL/CMOS compatible - Operation temperature range:-40°C to +85°C - Micro size packages:SOT23-6,SC70-6,DFN1.1*0.9-6L	- Cell phones - PADs - Portable instrumentation - Battery powered communications - Computer peripherals

3 Description	Circuit Diagram
The GT4157 is a single-pole double-throw (SPDT) analog switch that is designed to operate from1.65V to 5.5V. The GT4157 device can handle both analog and digital signals. It features high-bandwidth(300 MHz) and low on-resistance (2.2 Ω @ 4.5 V). Applications: signal gating, chopping, modulation or demodulation(modem), and signal multiplexing for analog-to-digital and digital-to-analog conversion systems.	

4 Device Summary, Pin and Packages

Table 4-1. Device Summary[1]

Serial Name	Part Name	Package	Body Size (Nom)	Marking[2][4]	MSL[3]	Package Qty
GT4157	GT4157S6	SOT23-6	2.92mm×1.65mm×1.10mm	GT4157 XXXXX	3	Tape and Reel,3000
	GT4157C6	SC70-6	2.10mm×1.25mm×1.00mm	4157 XXXX	3	Tape and Reel,3000
	GT4157D6	DFN1.1*0.9-6L	1.10mm×0.90mm×0.45mm	4157 XXXX	3	Tape and Reel,10000

(1) For all available packages, please contact product.

(2) 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.

(3) MSL, The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications.

(4) "XXXXX" in Marking will be appeared as the batch code.
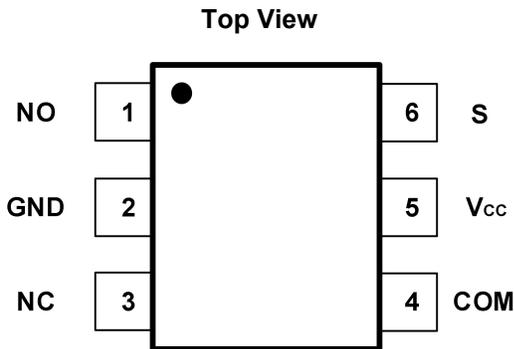
4 Device Summary, Pin and Packages(Continued)

Top View

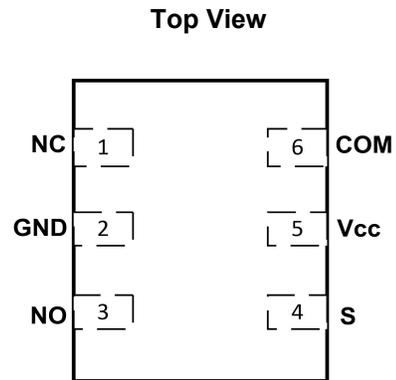Fig.4-1. GT4157: S6 (SOT23-6) Package

GT4157: C6 (SC70-6) Package

Top View

Fig.4-2. GT4157: D6 (DFN1.1*0.9-6L) Package

Table 4-2 Pin definition

Pin			Description
Name	S6 C6	D6	
NO	1	3	Data port
GND	2	2	Ground
NC	3	1	Data port (normally closed)
COM	4	6	Common output data port
V_{CC}	5	5	Power input
S	6	4	Logic control

Table 4-3 Function Table

LOGIC	Function
0	NC connected to COM
1	NO connected to COM

5 Voltage, Temperature, ESD and Thermal Ratings

5.1 Absolute Maximum Ratings[1]

Parameters		Min.	Max.	Unit
V_{CC}	Supply voltage range	-0.3	6.0	V
V_{IN}	Input voltage	-0.3	6.0	V
	Analog,digital voltage range[2]	-0.3	(V_{CC})+0.3	V
	Continuous current NO,NC or COM	-100	+100	mA
I_{PEAK}	Continuous channel current	-160	+160	mA
T_J	Junction temperature under bias	-65	150	°C
T_{stg}	Storage temperature range	-65	150	°C

(1) 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 under "Recommended Operating Conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

5.2 ESD Ratings

ESD			Value	Unit
V(ESD)	Electrostatic discharge	Human-Body Model (HBM)[1]	2.5 K	V
		Charged-Device Model (CDM)[2]	2 K	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

5.3 Recommended Operating Conditions[1]

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

Symbol	Parameter	Min	Max	Units
V_{CC}	Supply voltage	1.65	5.5	V
V_{IN}	Control input voltage	0	V_{CC}	V
	Switch input voltage	0	V_{CC}	V
V_{OUT}	Output voltage	0	V_{CC}	V
T_A	Ambient temperature	-40	85	°C

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

5.4 Thermal Information

Package Type	θ_{JA}	θ_{JC}	Unit
SOT23-6	187.3	126.5	°C/W
SC70-6	214.7	127.1	°C/W

6 Electrical Specifications

6.1 DC Electrical Characteristics

V_{CC}=1.65V to 5.5V, FULL=–40°C to +125°C. Typical values are at TA=+25°C (unless otherwise noted)

Parameter	Symbol	Conditions	V_{CC}	Temp	Min	Typ	Max	Units
Analog Signal Range	V_{NO},V_{NC},V_{COM}				0		V_{CC}	V
On-Resistance	R_{ON}	V_{NO} or V_{NC}=1.5V I_{COM}=-100mA	4.5V	+25°C		2.2	4.5	Ω
			3V	+25°C		3.8	7	
			2.3V	+25°C		6.9	12	
			1.65V	+25°C		12	20	
On-Resistance Match Between Channels	$\triangle R_{ON}$	0≤V_{NO} or V_{NC}≤V_{CC}, I_{COM}=-100mA	4.5V	+25°C		0.04		Ω
			3V	+25°C		0.08		
			2.3V	+25°C		0.01		
			1.65V	+25°C		0.02		
On-Resistance Flatness	RFLAT (ON)	0≤V_{NO} or V_{NC}≤V_{CC}, I_{COM}=-100mA	4.5V	+25°C		0.6	1	Ω
			3V	+25°C		1.7	3	
			2.3V	+25°C		4.5	7	
			1.65V	+25°C		8	15	
NC,NO Off Leakage Current	$I_{NC(OFF)}$,$I_{NO(OFF)}$	V_{NO} or V_{NC}=1V, 4.5V, V_{COM}=4.5V, 1V	5.5 V	Full			1	µA
NC,NO,COM On Leakage Current	$I_{NC(ON)}$,$I_{NO(ON)}$,$I_{COM(ON)}$	V_{COM}=1V, 4.5V, V_{NO} or V_{NC}=1V, 4.5V,or floating	5.5 V	Full			1	µA
Input High Voltoge	V_{INH}		3V	Full	1.7			V
Input Low Voltage	V_{INL}		3V	Full			0.5	V
Input Leakage Current	I_{IN}	V_S=V_{CC} or 0	5.5 V	Full			1	µA
Power Supply Current	I_{CC}	V_S=GND or V_{CC}	5.5 V	Full			1	µA

6 Electrical Specifications(Continued)

6.2 Switch And AC Characteristics

V_{CC}=1.65V to 5.5V, FULL=–40°C to +125°C. Typical values are at TA=+25°C (unless otherwise noted)

Parameter	Symbol	Conditions		V_{CC}	Temp	Min	Typ	Max	Units
Turn-On Time	t_{ON}	$V_{COM}=V_{CC}$, R_L=300Ω, C_L=35pF		5V	+25°C		6		ns
				3.3V			11		
Turn-Off Time	t_{OFF}	$V_{COM}=V_{CC}$, R_L=300Ω, C_L=35pF		5V	+25°C		7		ns
				3.3V			8		
Break-Before-Make Time Delay	t_{BBM}	$V_{NO1}=V_{NC1}=V_{NO2}=V_{NC2}$=3V R_L=300Ω,C_L=35pF		5V	+25°C		6		ns
				3.3V			9		
Off Isolation	O_{ISO}	R_L=50Ω,Switch OFF	f=10MHz	5V	+25°C		-47		dB
			f=1MHz				-66		
Crosstalk Isolation	X_{TALK}	R_L=50Ω,Switch OFF,f=10MHz		5V	+25°C		-53		dB
-3dB Bandwidth	BW	R_L=50Ω,Switch ON		5V	+25°C		300		MHz
Charge Injection	Q	C_L=1nF, V_{GEN}=0V, R_{GEN}=0Ω		5V	+25°C		10		pC
NC,NO Off Capacitance	$C_{NC(OFF)}$, $C_{NO(OFF)}$	f=1MHz		5V	+25°C		7		pF
NC,NO,COM On Capacitance	$C_{NC(ON)}$, $C_{NO(ON)}$, $C_{COM(ON)}$	f=1MHz		5V	+25°C		20		pF

7 Typical Characteristics

V_{CC}=1.65V or 5.5V, FULL=–40°C to +125°C. Typical values are at TA=+25°C (unless otherwise noted)
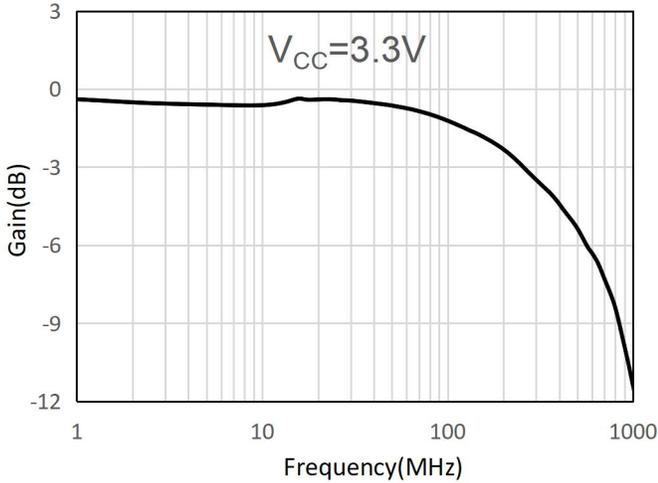
Fig.7-1. Bandwidth vs Frequency at 3.3V V$_{CC}$
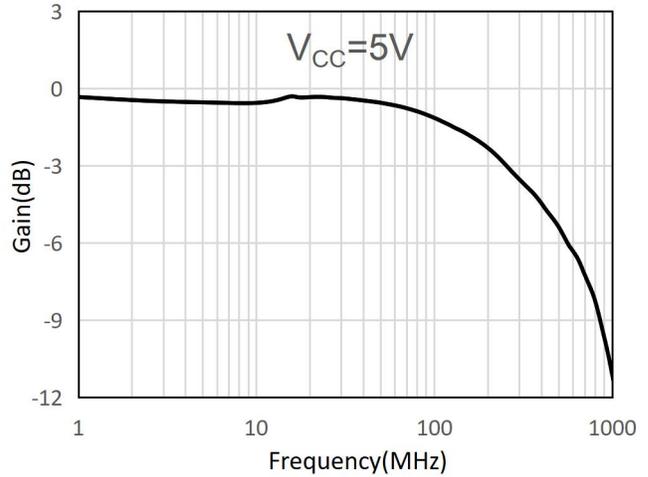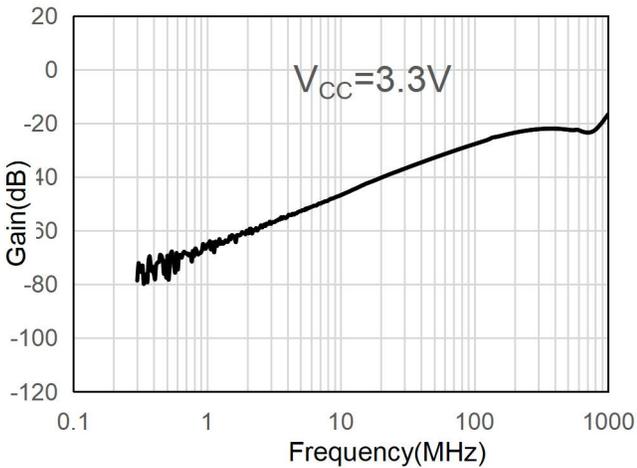

Fig.7-2. Bandwidth vs Frequency at 5V V$_{CC}$
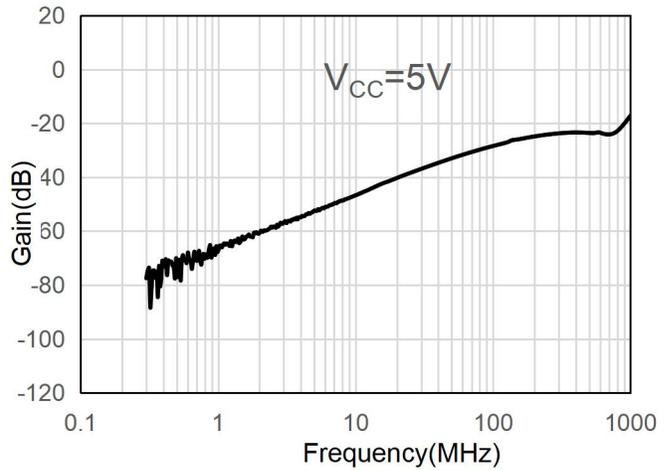

Fig.7-3. Off Isolation vs Frequency at 3.3V V$_{CC}$

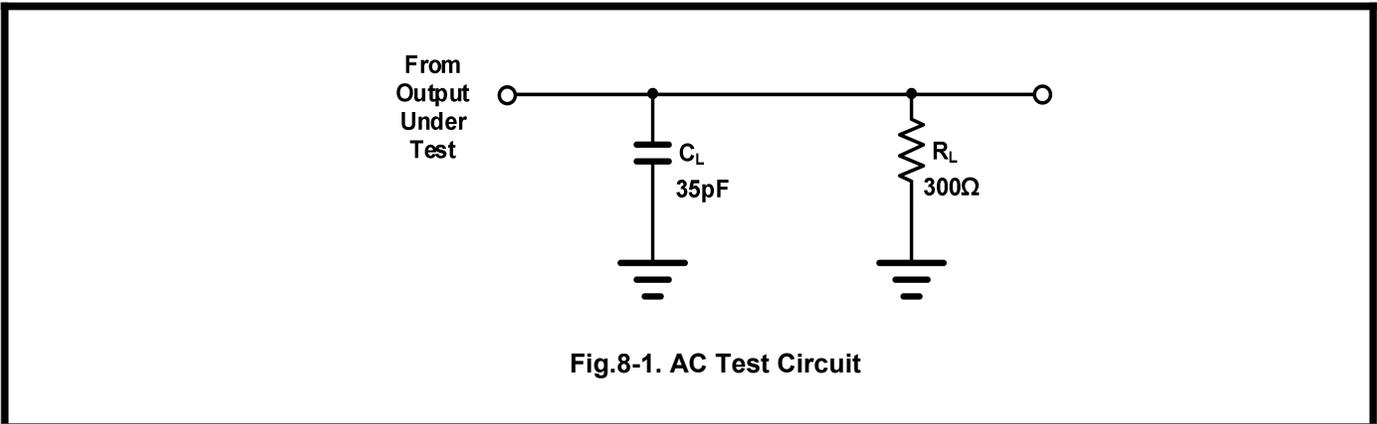**Fig.7-4. Off Isolation vs Frequency at 5V V$_{CC}$**

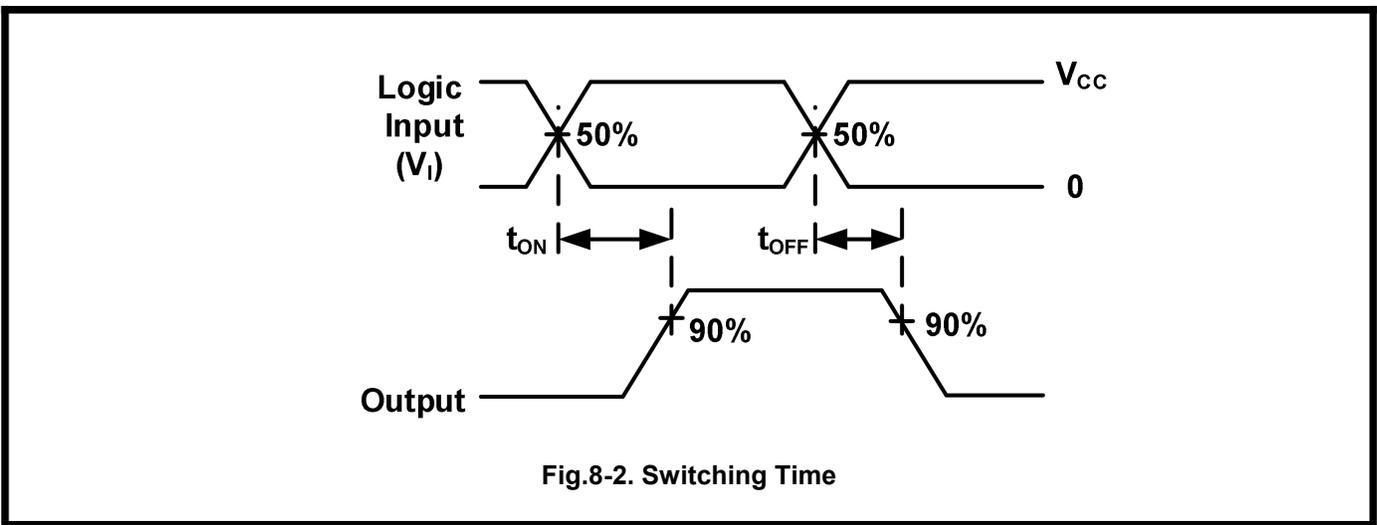## 8 Measurement Information

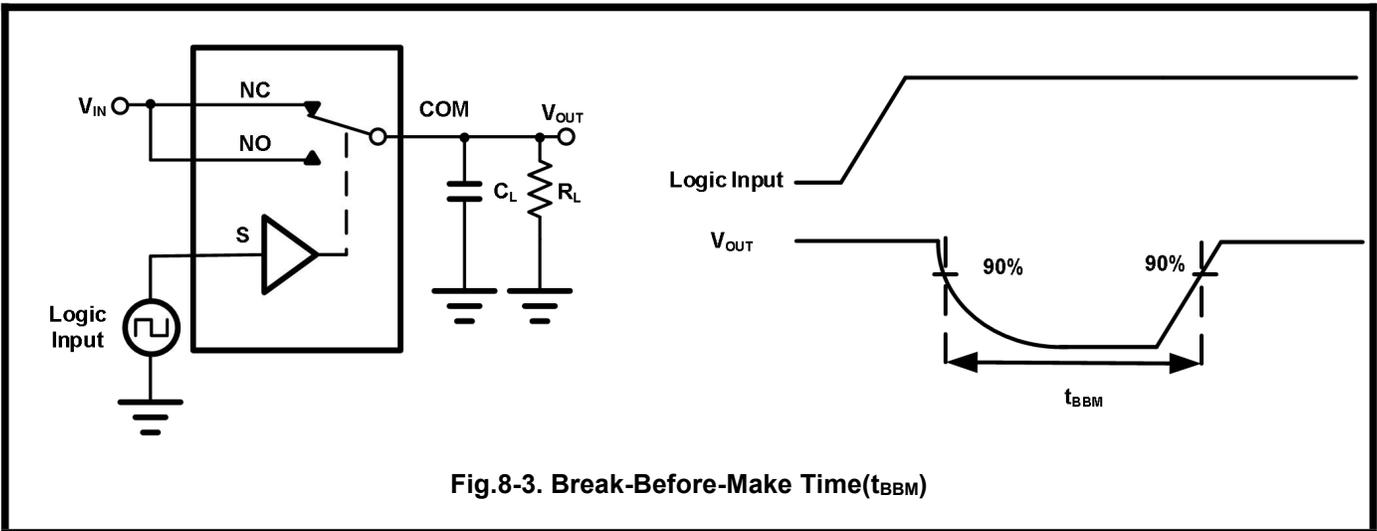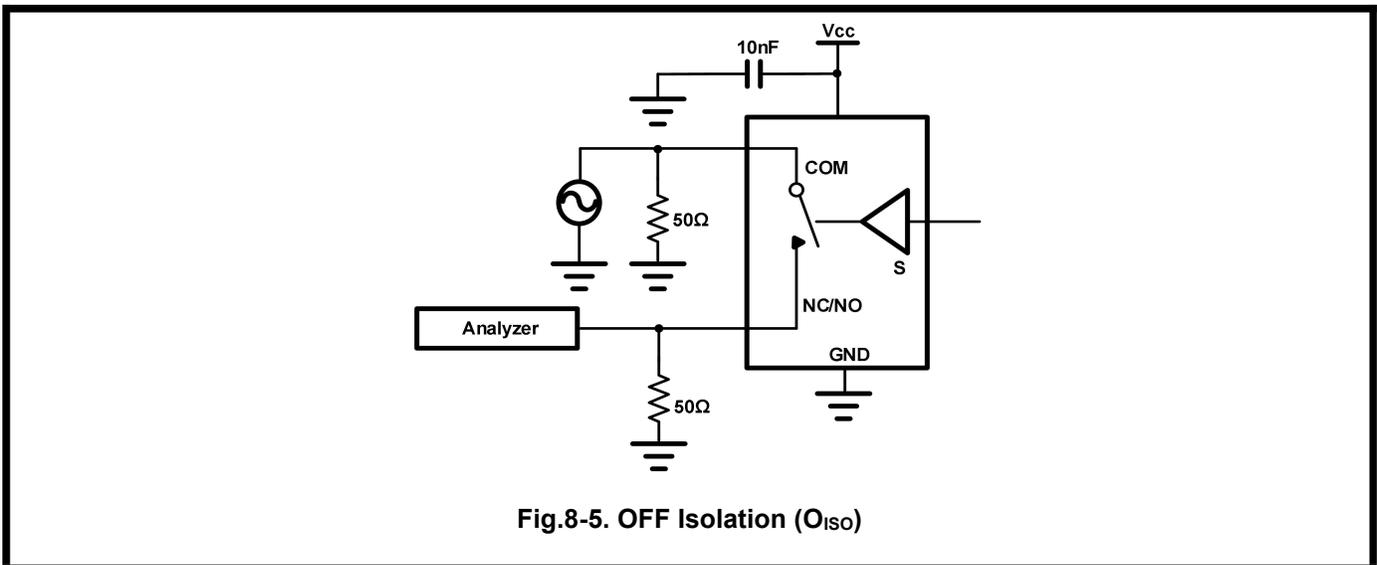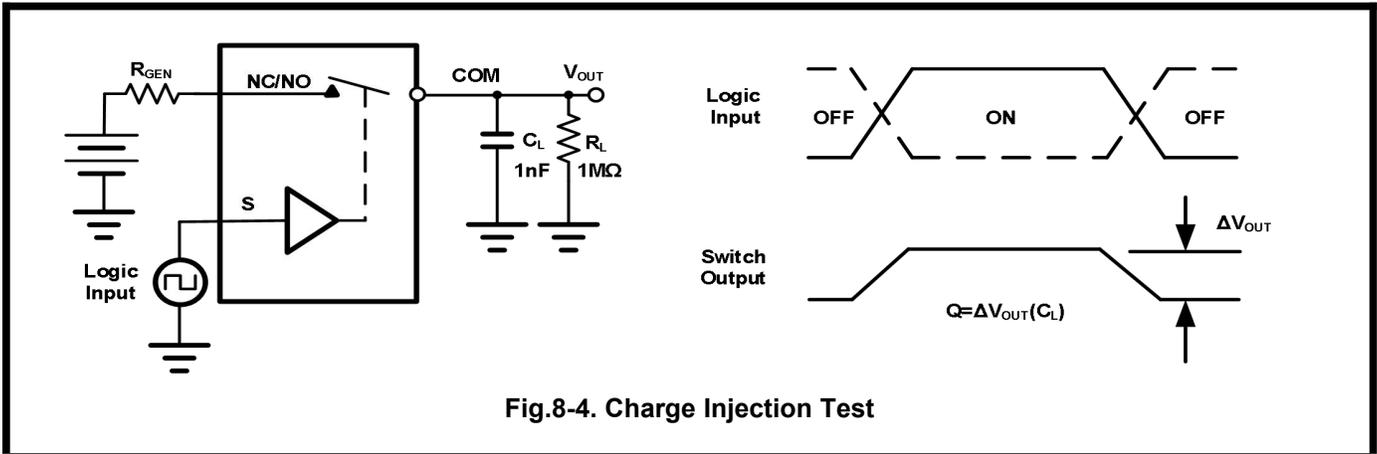

Fig.8-1. AC Test Circuit
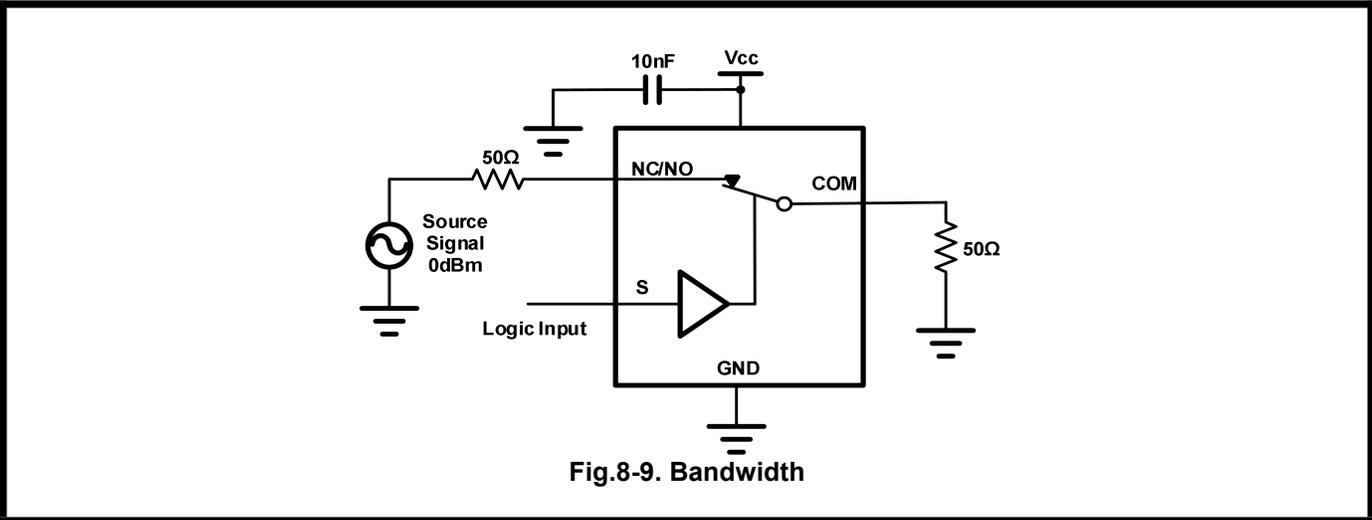

Fig.8-2. Switching Time

Fig.8-3. Break-Before-Make Time(t$_{BBM}$)

8 Measurement Information(Continued)

Fig.8-4. Charge Injection Test

Fig.8-5. OFF Isolation (O$_{ISO}$)

Fig.8-6. Crosstalk(X$_{TALK}$)

8 Measurement Information(Continued)

Fig.8-7. Channel Off Capacitance

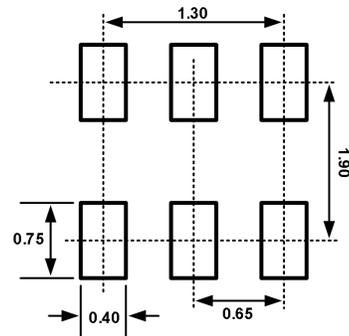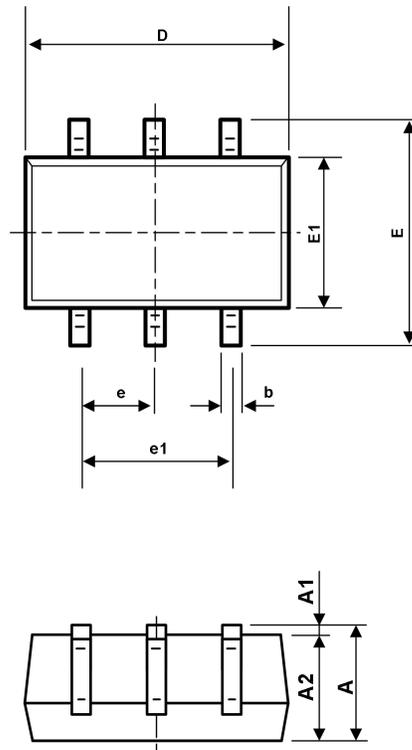**Fig.8-8. Channel On Capacitance**

Fig.8-9. Bandwidth
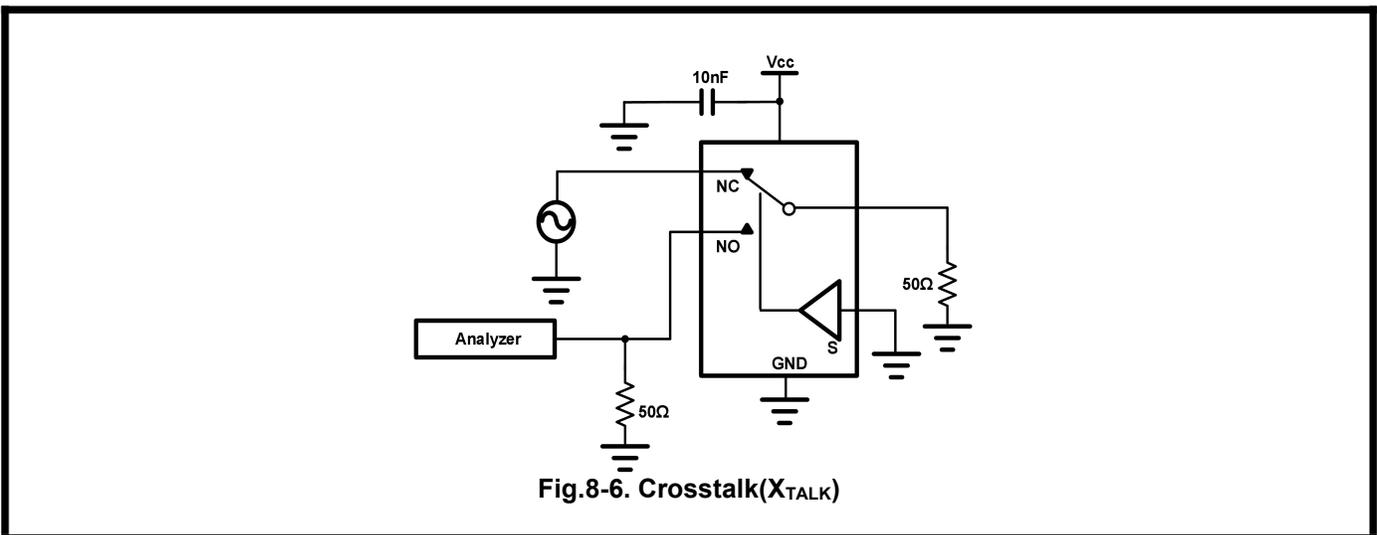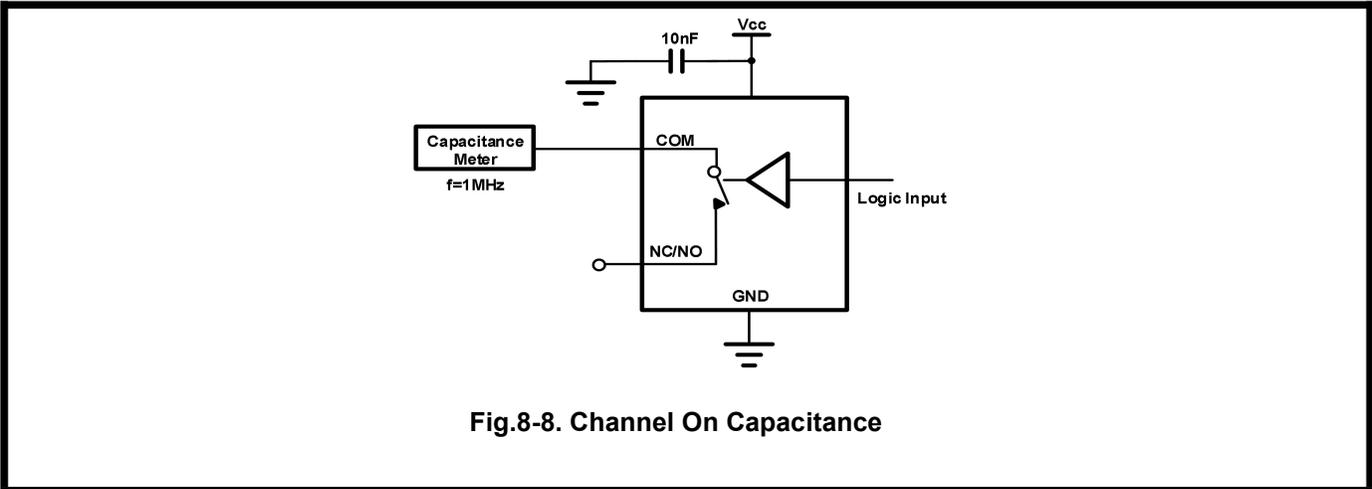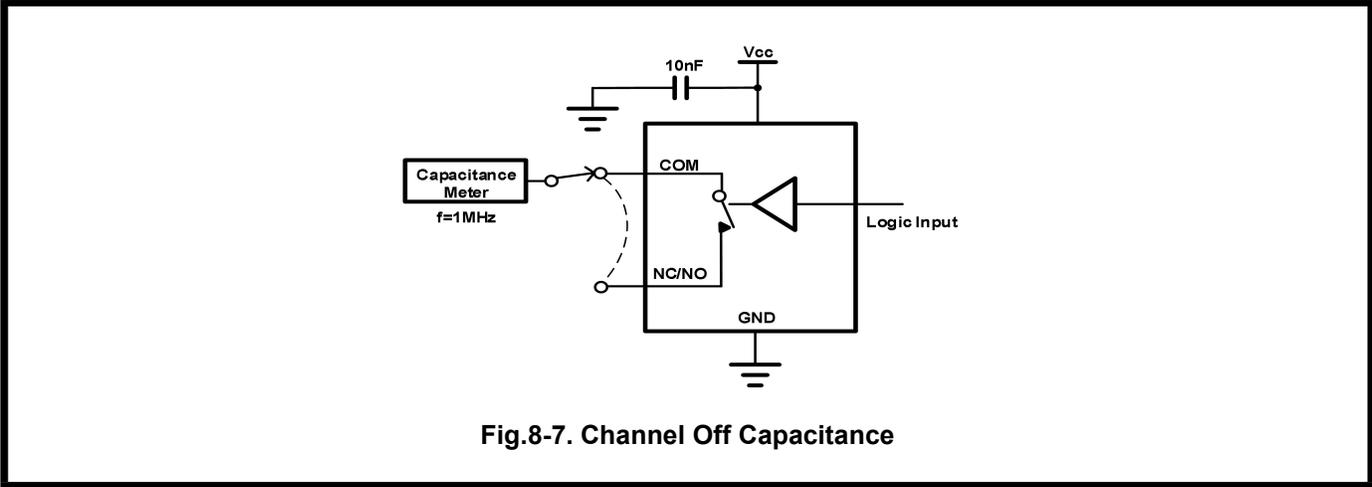
9 Package Outline Dimension

SOT23-6
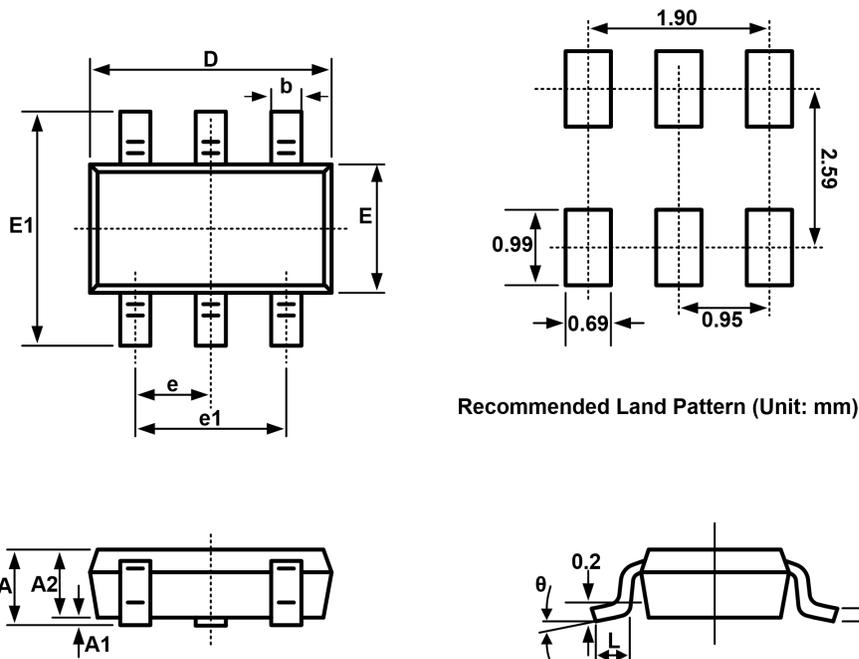
Recommended Land Pattern (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	**Max**	**Min**	**Max**
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950BSC		0.037BSC	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

9 Package Outline Dimension(Continued)

SC70-6
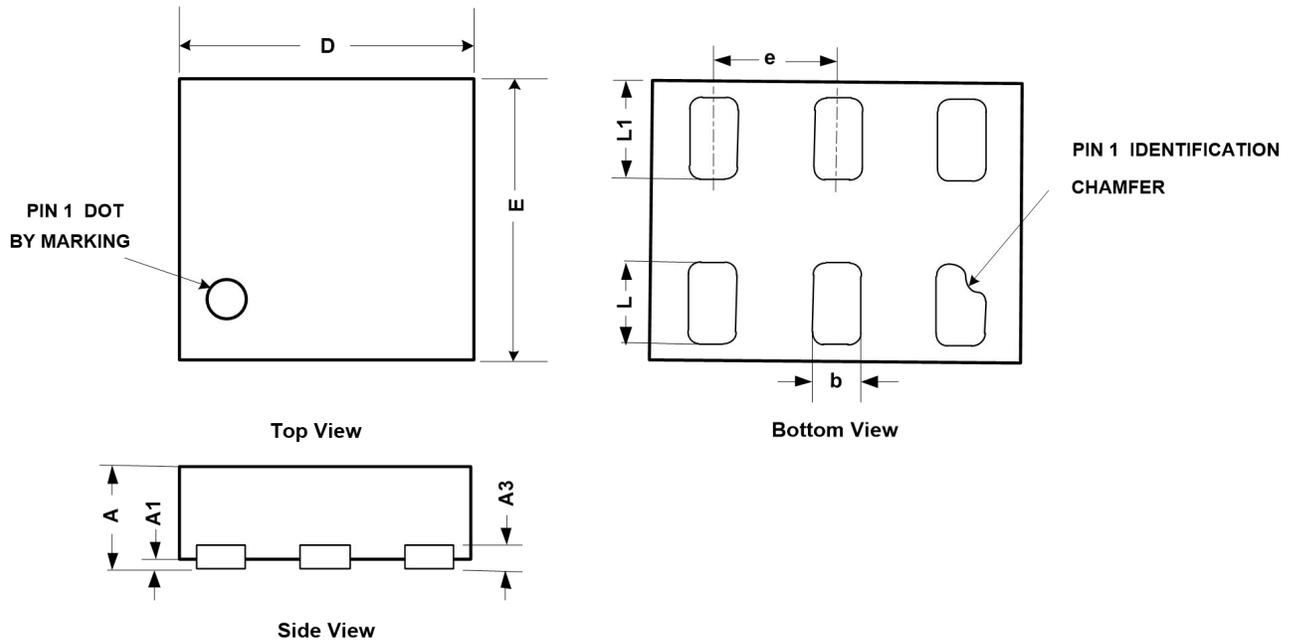

Recommended Land Pattern (Unit: mm)
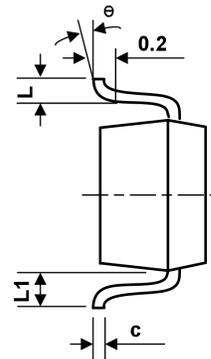
symbol	Dimension In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.110	0.175	0.004	0.007
D	2.000	2.200	0.079	0.087
E	2.150	2.450	0.085	0.096
E1	1.150	1.350	0.045	0.053
e	0.650TYP		0.026TYP	
e1	1.200	1.400	0.047	0.055
L	0.260	0.460	0.010	0.018
L1	0.525REF		0.021REF	
θ	0°	8°	0°	8°

9 Package Outline Dimension(Continued)

DFN1.1*0.9-6L

Top View

Bottom View

PIN 1 DOT
BY MARKING

PIN 1 IDENTIFICATION
CHAMFER

Side View

symbol	Dimension In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.400	0.500	0.016	0.020
A1	0.000	0.050	0.000	0.002
A3	0.125REF		0.005REF	
D	1.050	1.150	0.041	0.045
E	0.850	0.950	0.033	0.037
b	0.150	0.250	0.006	0.010
L	0.250	0.350	0.010	0.014
L1	0.300	0.400	0.012	0.016
e	0.400BSC		0.016BSC	

10 Tape and Reel Information

Reel Dimensions

Reel Diameter

W

Reel Width(w1)

Reel Dimensions

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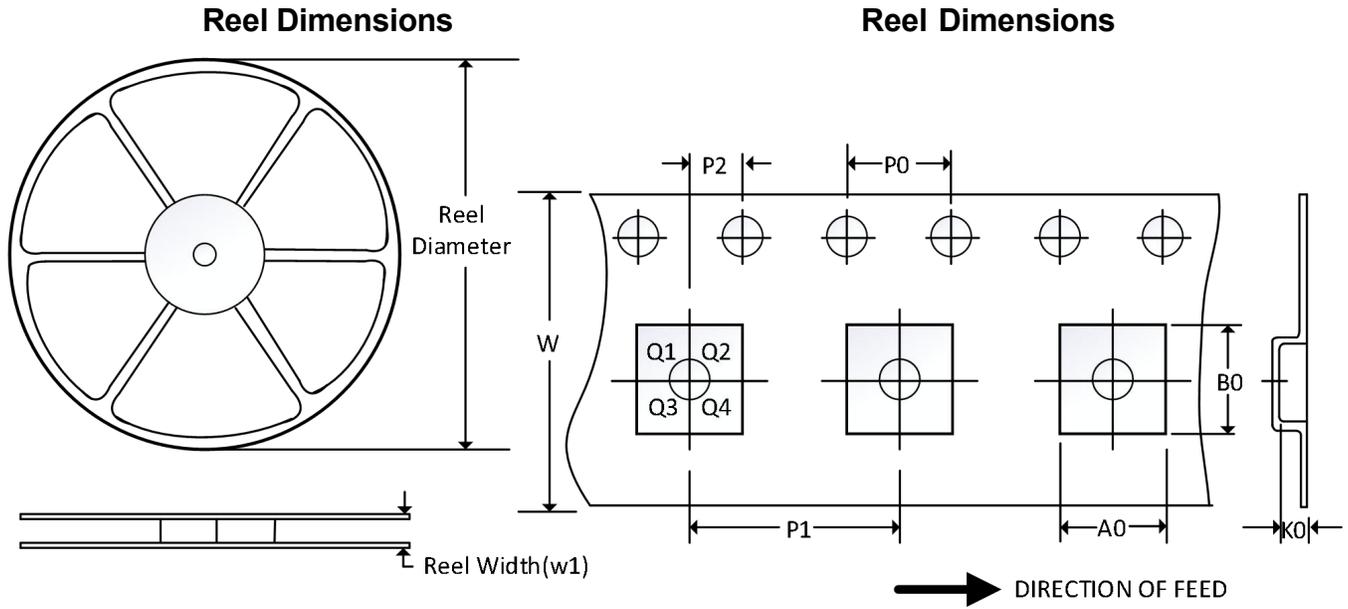
NOTE: The picture is only for reference. Please make the object as the standard.

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
SOT23-6	7''	9.5	3.17	3.23	1.37	4.0	4.0	2.0	8.0	Q3
SC70-6	7''	9.5	2.40	2.50	1.20	4.0	4.0	2.0	8.0	Q3
DFN1.1*0.9-6L	7''	9.5	1.03	1.25	0.60	4.00	2.00	2.00	8.00	Q3

NOTE:

1. All dimensions are nominal.
2. Plastic or metal protrusions of 0.15mm maximum per side are not included.