

# 0.6Ω Quad SPST Analog Switch 4-Channel 1:1 Multiplexer – Demultiplexer

## FEATURES

- **Bandwidth: 30MHz**
- **High Speed, Typically 50ns**
- **Supply Range: +1.8V to +5.5V**
- **Low ON-State Resistance, 0.6Ω(TYP)**
- **Break-Before-Make Switching**
- **Rail-to-Rail Operation**
- **TTL/CMOS Compatible**
- **Extended Industrial Temperature Range: -40°C to +125°C**

## DESCRIPTION

The RS2259 is a bidirectional 4-channel single-pole single -throw (SPST) analog switch, which is designed to operate from 1.8V to 5.5V.

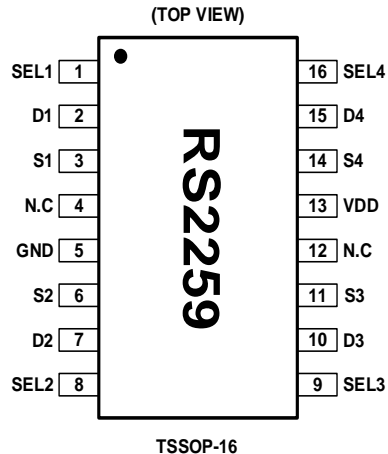
The RS2259 device can handle both analog and digital signals. It features bandwidth(30MHz) and low on-resistance (0.6Ω TYP).

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

## APPLICATIONS

- Video Switching
- Relay Replacements
- USB Switching
- Battery-Operated Equipment
- Cell Phones

## PIN CONFIGURATIONS



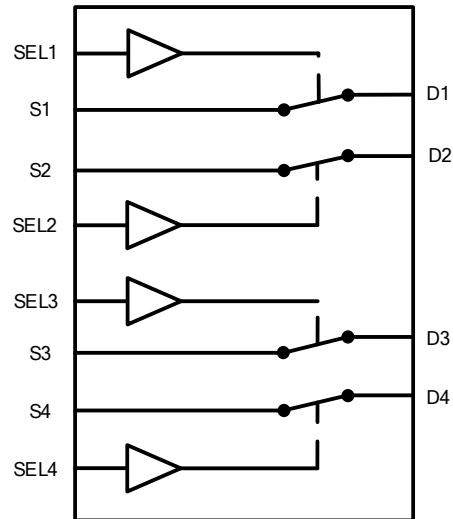
## FUNCTION TABLE

SELx	STATE
0	All Channels ON
1	All Channels OFF

## PIN DESCRIPTION

NAME	PIN	FUNCTION
VDD	13	Power Supply
GND	5	Ground
SEL1~SEL4	1,8,9,16	Logic Control Pin
D1~D4	2,7,10,15	Drain pin. Can be an input or output.
S1~S4	3,6,11,14	Source pin. Can be an input or output
N.C	4,12	No internet connection

BLOCK DIAGRAM



**ABSOLUTE MAXIMUM RATINGS (1)**

V+, IN to GND.....	-0.3V to 6.0V
Analog, Digital Voltage Range (2) .....	- 0.3 to (V+) + 0.3V
Source or drain Continuous Current .....	±500mA
Source or drain Peak Current.....	±800mA
Storage Temperature .....	-65°C to +150°C
Operating Temperature .....	-40°C to +125°C
Junction Temperature.....	150°C
Package Thermal Resistance @ TA = +25°C	
TSSOP-16.....	110°C/W
Lead Temperature (Soldering, 10s) .....	260°C
ESD Susceptibility	
HBM .....	1000V
MM .....	100V



**ESD SENSITIVITY CAUTION**

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.

- (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.

**PACKAGE/ORDERING INFORMATION**

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING	PACKAGE OPTION
RS2259	RS2259XTSS16	-40°C ~125°C	TSSOP-16	RS2259	Tape and Reel,3000

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

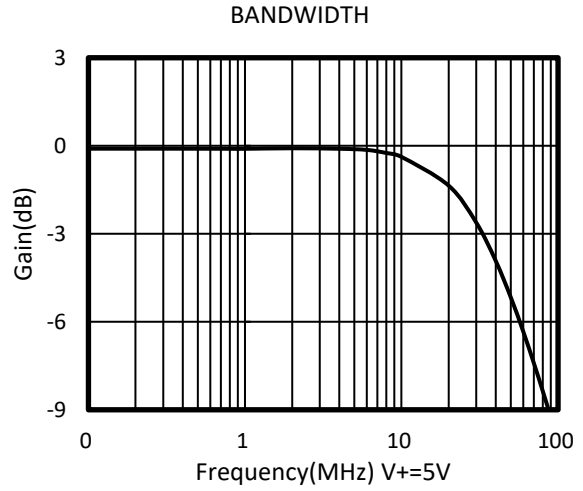
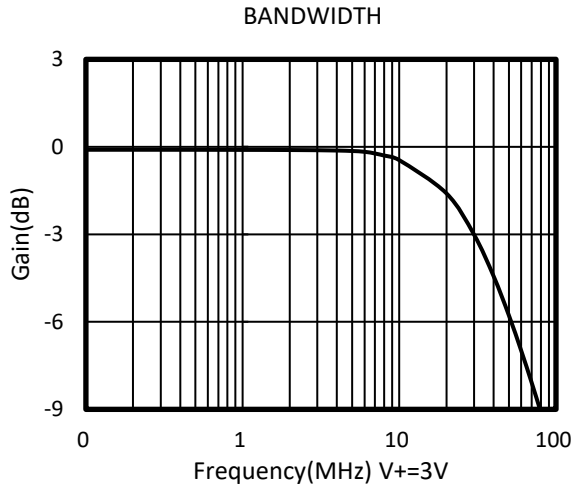
PARAMETER	SYMBOL	CONDITIONS	VDD	T <sub>A</sub>	MIN	TYP	MAX	UNITS
<b>ANALOG SWITCH</b>								
Analog Signal Range	V <sub>S</sub> , V <sub>D</sub>			FULL	0		V <sub>DD</sub>	V
On-Resistance	R <sub>ON</sub>	V <sub>S</sub> = V <sub>+</sub> /2, I <sub>SD</sub> = -10mA, Switch ON, See Figure 1	5V	+25°C		0.6	1.0	Ω
				FULL			1.2	Ω
			3.3V	+25°C		1.0	1.5	Ω
				FULL			1.7	Ω
On-Resistance Match Between Channels	ΔR <sub>ON</sub>	V <sub>S</sub> = V <sub>+</sub> /2, I <sub>SD</sub> = -10mA, Switch ON, See Figure 1	5V	+25°C		0.04	0.1	Ω
				FULL			0.12	Ω
			3.3V	+25°C		0.04	0.1	Ω
				FULL			0.12	Ω
On-Resistance Flatness	R <sub>FLAT(ON)</sub>	0 ≤ (V <sub>S</sub> ) ≤ V <sub>+</sub> /2, I <sub>SD</sub> = -10mA, Switch ON, See Figure 1	5V	+25°C		0.18	0.3	Ω
				FULL			0.4	Ω
			3.3V	+25°C		0.54	0.7	Ω
				FULL			0.8	Ω
Source, Drain OFF Leakage Current	I <sub>D(OFF)</sub> , I <sub>S(OFF)</sub>	V <sub>D</sub> = 0.3V, V <sub>+</sub> /2 V <sub>S</sub> = V <sub>+</sub> /2, 0.3V See Figure 2	1.8 to 5.5V	FULL			1	μA
Channel ON Leakage Current	I <sub>D(ON)</sub> , I <sub>S(ON)</sub>	V <sub>D</sub> = 0.3V, Open V <sub>S</sub> = Open, 0.3V See Figure 3	1.8 to 5.5V	FULL			1	μA
<b>DIGITAL CONTROL INPUTS<sup>(1)</sup></b>								
Input High Voltage	V <sub>IH</sub>		5V	FULL	1.5			V
			3.3V	FULL	1.3			V
Input Low Voltage	V <sub>IL</sub>		5V	FULL			0.6	V
			3.3V	FULL			0.5	V
Input Leakage Current	I <sub>IN</sub>	V <sub>IN</sub> = V <sub>IO</sub> or 0	1.8 to 5.5V	FULL			1	μA

(1) All unused digital inputs of the device must be held at V<sub>IO</sub> or GND to ensure proper device operation.

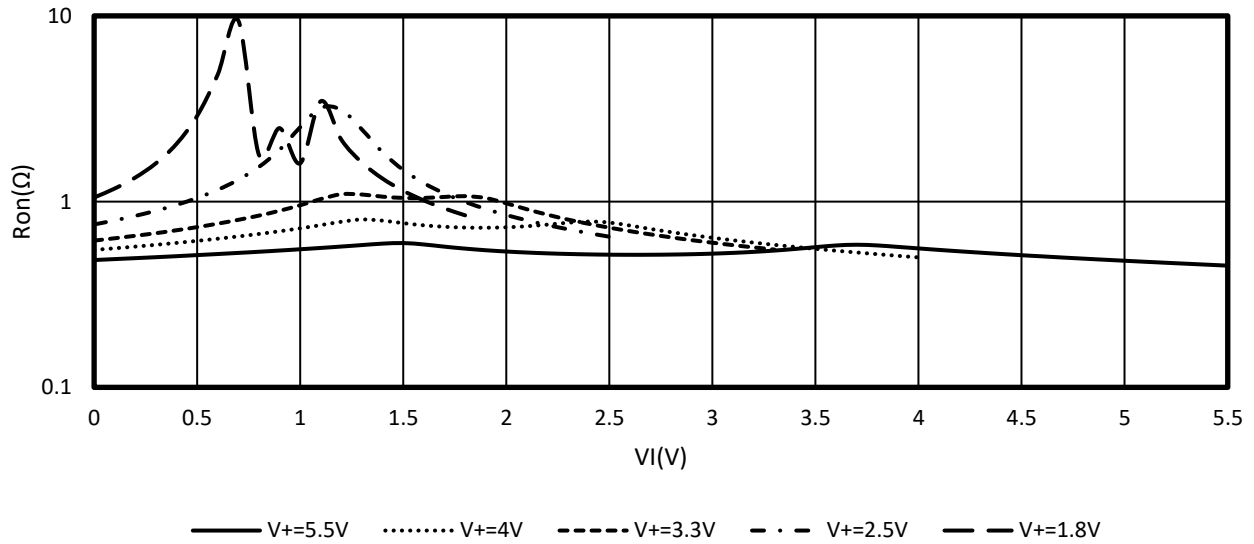
**ELECTRICAL CHARACTERISTICS (continued)**
 $V_+ = 5.0\text{ V}$ , TEMP=  $-40^\circ\text{C}$  to  $125^\circ\text{C}$  (unless otherwise noted)

PARAMETER	SYMBOL	CONDITIONS	V+	TEMP	MIN	TYP	MAX	UNITS
<b>DYNAMIC CHARACTERISTICS</b>								
Turn-On Time	$t_{ON}$	$V_S = V_+$ , $R_L = 300\Omega$ , $C_L = 35\text{pF}$ , See Figure 4	5V	+25°C		50		ns
			3.3V			50		
Turn-Off Time	$t_{OFF}$	$V_S = V_+$ , $R_L = 300\Omega$ , $C_L = 35\text{pF}$ , See Figure 4	5V	+25°C		15		ns
			3.3V			17		
Break-Before-Make Time Delay	$t_{BBM}$	$V_S = 3\text{V}$ , $R_L = 300\Omega$ , $C_L = 35\text{pF}$ , See Figure 5	5V	+25°C		10		ns
			3.3V			11		
Off Isolation	$O_{ISO}$	$R_L = 50\Omega$ , Switch OFF, See Figure 7	f = 10MHz	+25°C		-68		dB
			f = 1MHz	+25°C		-86		dB
-3dB Bandwidth	BW	Switch ON, $R_L = 50\Omega$ See Figure 6		+25°C		30		MHz
Source, Drain OFF Capacitance	$C_{S(OFF)}$ , $C_{D(OFF)}$	$V_S = V_+/2$ or GND, Switch OFF		+25°C		80		pF
Source, Drain ON Capacitance	$C_{S(ON)}$ , $C_{D(ON)}$	$V_S = V_+/2$ or GND, Switch ON		+25°C		350		pF
<b>POWER REQUIREMENTS</b>								
Power Supply Range	$V_{DD}$			FULL	1.8		5.5	V
Power Supply Current	$I_{DD}$	$V_{IN} = \text{GND}$ or $V_{DD}$	5.5V	FULL			1	$\mu\text{A}$

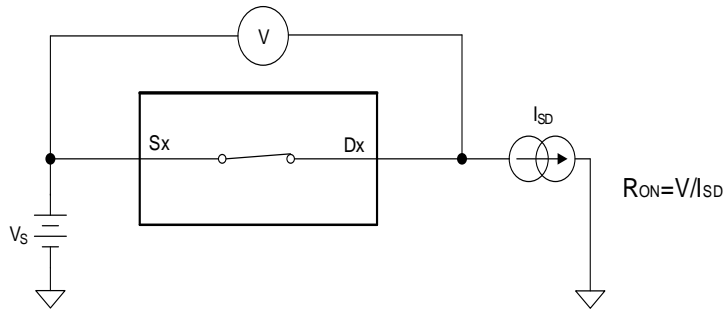
TYPICAL CHARACTERISTICS



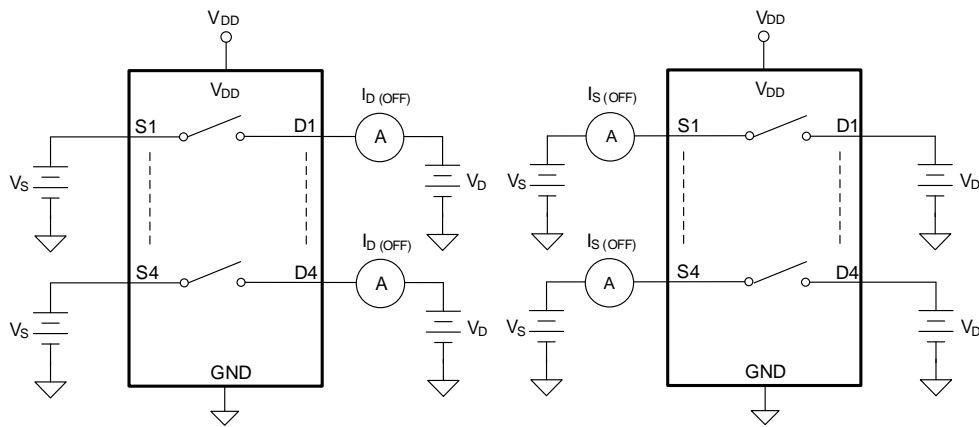
Typical ron as a Function of Input Voltage (VI ) for VI = 0 to V+



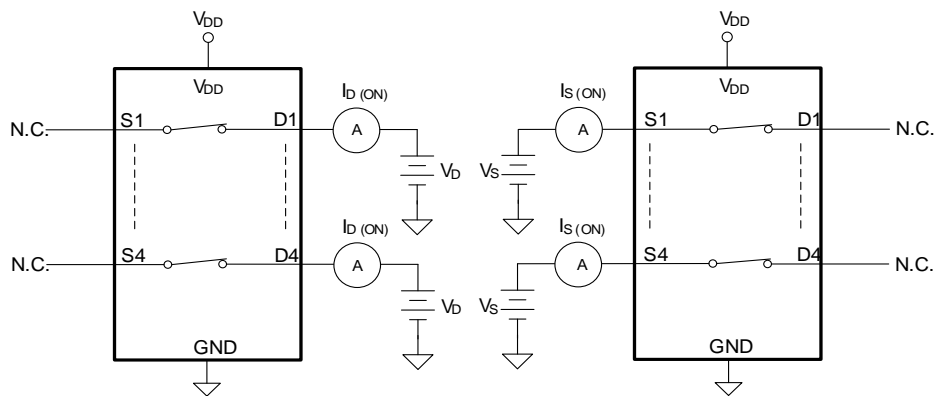
## Parameter Measurement Information



**Figure 1.ON-State Resistance ( $R_{ON}$ )**



**Figure 2.OFF-State Leakage Current ( $I_{D(OFF)}$ ,  $I_{S(OFF)}$ )**



**Figure 3.ON-State Leakage Current ( $I_{D(ON)}$ ,  $I_{S(ON)}$ )**

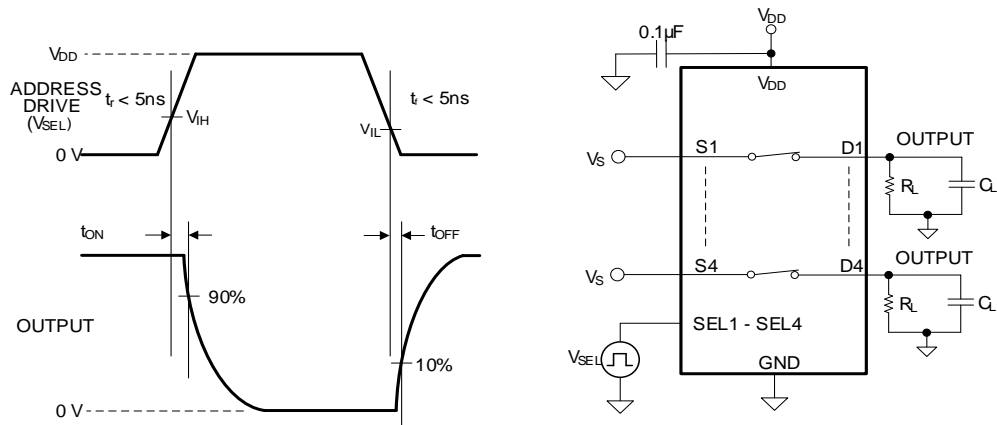


Figure 4. Turn-On ( $t_{ON}$ ) and Turn-Off Time ( $t_{OFF}$ )

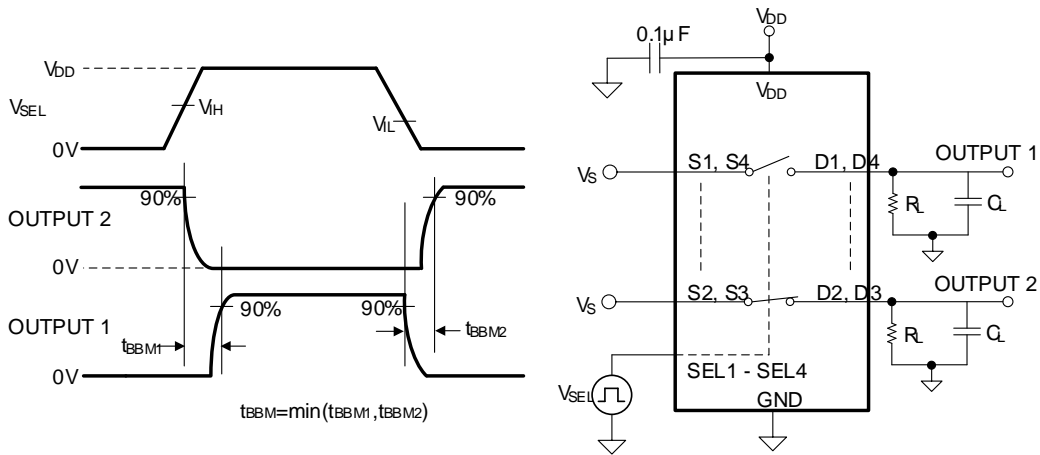


Figure 5. Break-Before-Make Time ( $t_{BBM}$ )

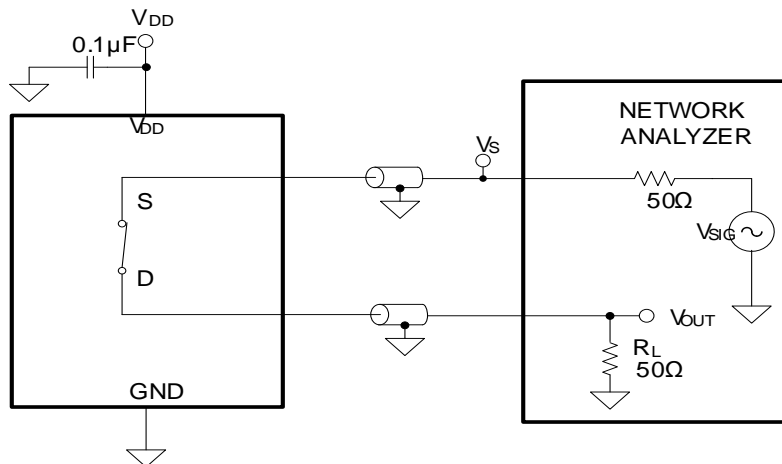
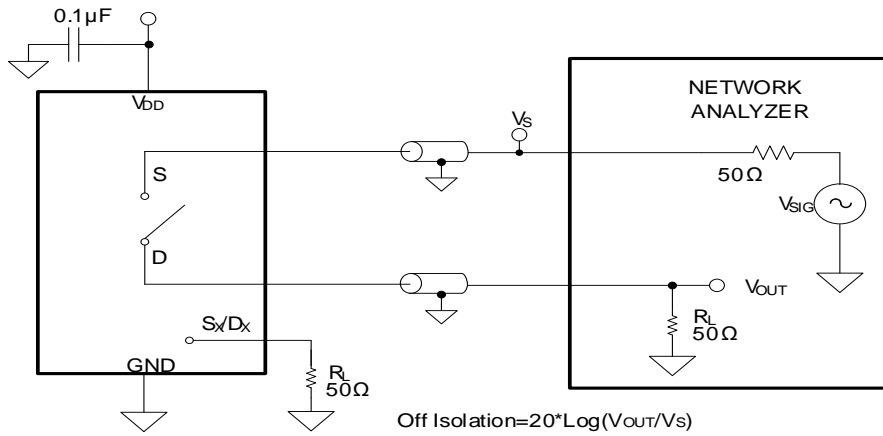
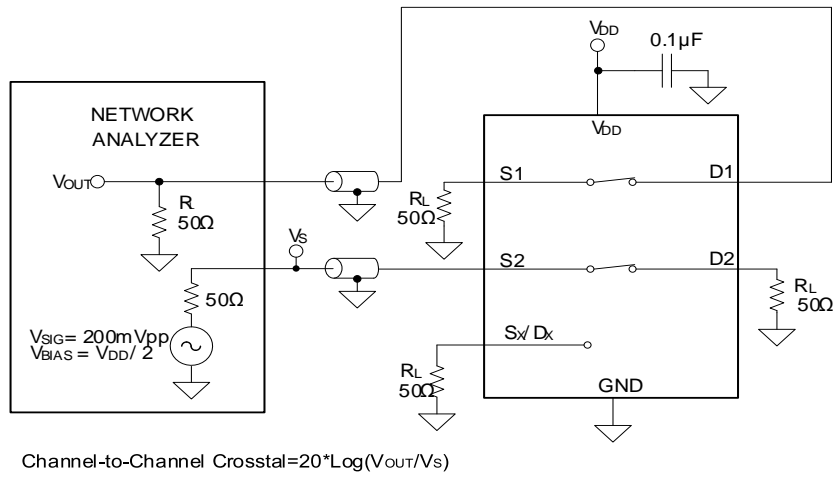


Figure 6. Bandwidth (BW)

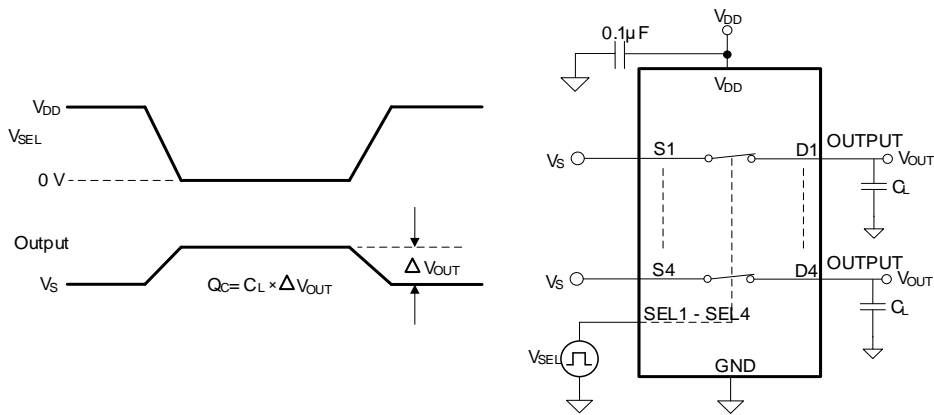




**Figure 7. OFF Isolation ( $O_{iso}$ )**



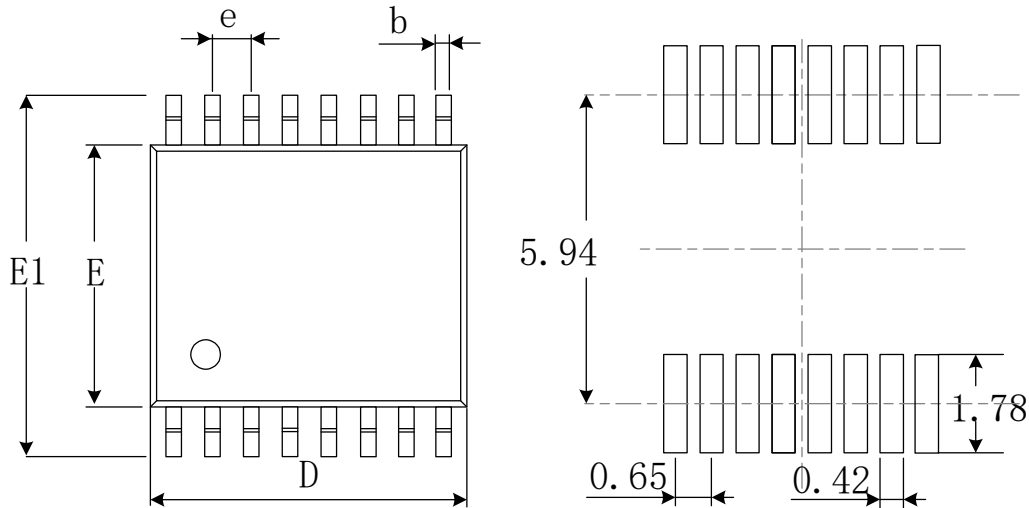
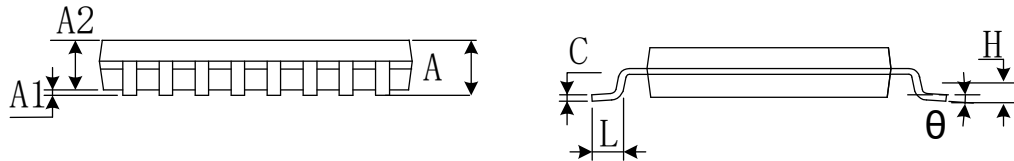
**Figure 8. Crosstalk ( $X_{TALK}$ )**



**Figure 9. Charge Injection ( $Q_c$ )**

# PACKAGE OUTLINE DIMENSIONS

## TSSOP-16


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


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A		1.200		0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.860	5.100	0.191	0.201
E	4.300	4.500	0.169	0.177
E1	6.200	6.600	0.244	0.260
e	0.650(BSC)		0.026(BSC)	
L	0.500	0.700	0.02	0.028
H	0.25TYP		0.01TYP	
$\theta$	1°	7°	1°	7°