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**

APPLICATIONS

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

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).

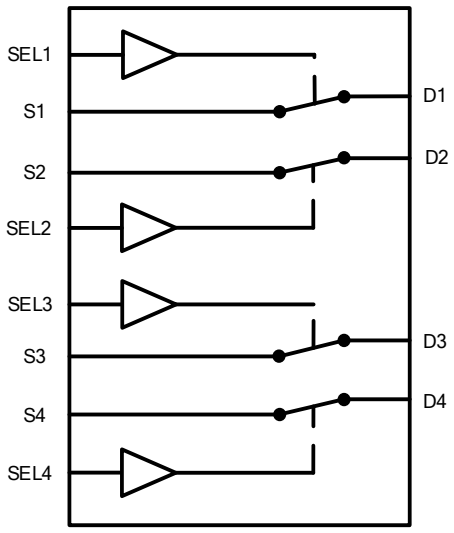
Applications include signal gating, chopping, modulation or demodulation (modem), and signal multiplexing for analog-to-digital and digital-to-analog conversion systems.

Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RS2259	TSSOP16	5.00mm×4.40mm

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

Functional Block Diagram

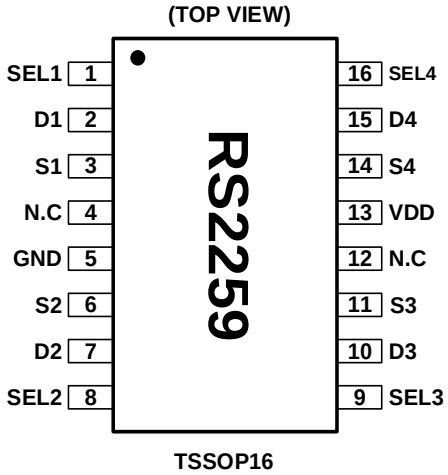


Revision History

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

VERSION	Change Date	Change Item
C.2.1	2024/03/07	1. Added the TAPE AND REEL INFORMATION 2. Change Thermal Information on Page 3@RevC.2 3. Modify packaging naming

PIN CONFIGURATIONS(Top View)



PIN DESCRIPTION

NAME	PIN	FUNCTION
	TSSOP16	
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

FUNCTION TABLE

SELx	STATE
0	All Channels ON
1	All Channels OFF

SPECIFICATIONS

Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted) (1)

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_+	Supply Voltage	-0.3	6	V
V_{IN}	Input Voltage (All inputs) (2)	-0.3	(V_+) + 0.3	
I_{IN}	Source or drain Continouous Current	-500	+500	mA
I_{PEAK}	Source or drain Peak Current	-800	+800	
T_J	Junction Temperature	-40	150	°C
T_{stg}	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
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM)	±1000	V
		Machine Model (MM)	±100	V

Recommended Operating Conditions

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

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_{CC}	Supply Voltage	1.8	5.5	V
T_A	Operating temperature	-40	+125	°C

Thermal Information

THERMAL METRIC		RS2259 16 PINS TSSOP16	UNIT
$R_{\Theta JA}$	Junction-to-ambient thermal resistance	110	°C/W
$R_{\Theta JC(top)}$	Junction-to-case(top) thermal resistance	45.3	°C/W
$R_{\Theta JB}$	Junction-to-board thermal resistance	56.9	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	5.4	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	56.3	°C/W
$R_{\Theta JC(bot)}$	Junction-to-case(bottom) thermal resistance	N/A	°C/W

PACKAGE/ORDERING INFORMATION

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING(1)	PACKAGE OPTION
RS2259	RS2259XTSS16	-40°C ~125°C	TSSOP16	RS2259	Tape and Reel,4000

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.

ELECTRICAL CHARACTERISTICS

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

PARAMETER	SYMBOL	CONDITIONS	V_+	T_A	MIN	TYP	MAX	UNIT
ANALOG SWITCH								
Analog Signal Range	V_S, V_D			FULL	0		V_{DD}	V
On-Resistance	R_{ON}	V_S = V+/2, I_{SD}= -10mA, Switch ON, See Figure 4	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_{ON}	V_S = V+/2, I_{SD} = -10mA, Switch ON, See Figure 4	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	$R_{FLAT(ON)}$	0 ≤ (V_S) ≤V+/2, I_{SD} = -10mA, Switch ON, See Figure 4	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	$I_{D(OFF)}$, $I_{S(OFF)}$	V_D = 0.3V, V+/2 V_S = V+/2, 0.3V See Figure 5	1.8 to 5.5V	FULL			1	uA
Channel ON Leakage Current	$I_{D(ON)}$, $I_{S(ON)}$	V_D = 0.3V, Open V_S = Open, 0.3V See Figure 6	1.8 to 5.5V	FULL			1	uA
DIGITAL CONTROL INPUTS(1)								
Input High Voltage	V_{IH}		5V	FULL	1.5			V
			3.3V	FULL	1.3			V
Input Low Voltage	V_{IL}		5V	FULL			0.6	V
			3.3V	FULL			0.5	V
Input Leakage Current	I_{IN}	V_{IN} = V_{IO} or 0	1.8 to 5.5V	FULL			1	uA

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

ELECTRICAL CHARACTERISTICS (continued)

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

PARAMETER	SYMBOL	CONDITIONS		V_+	T_A	MIN	TYP	MAX	UNIT
DYNAMIC CHARACTERISTICS									
Turn-On Time	t_{ON}	V_S = V+, R_L = 300Ω, C_L = 35pF, See Figure 7		5V	+25°C		50		ns
				3.3V			50		
Turn-Off Time	t_{OFF}	V_S = V+, R_L = 300Ω, C_L = 35pF, See Figure 7		5V	+25°C		15		ns
				3.3V			17		
Break-Before-Make Time Delay	t_{BBM}	VS = 3V, R_L = 300Ω, C_L = 35pF, See Figure 8		5V	+25°C		10		ns
				3.3V			11		
Off Isolation	O_{ISO}	R_L = 50Ω, Switch OFF, See Figure 10	f = 10MHz		+25°C		-68		dB
			f = 1MHz		+25°C		-86		dB
-3dB Bandwidth	BW	Switch ON, R_L = 50Ω, See Figure 9			+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
POWER REQUIREMENTS									
Power Supply Range	V_{DD}				FULL	1.8		5.5	V
Power Supply Current	I_{DD}	V_{IN} = GND or V_{DD}		5.5V	FULL			1	uA

TYPICAL CHARACTERISTICS

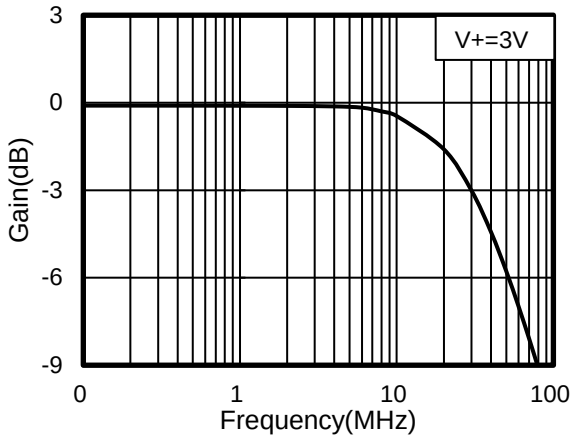


Figure 1. Bandwidth vs Frequency

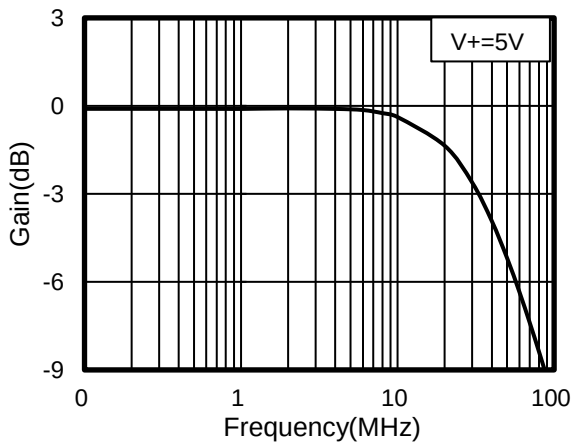


Figure 2. Bandwidth vs Frequency

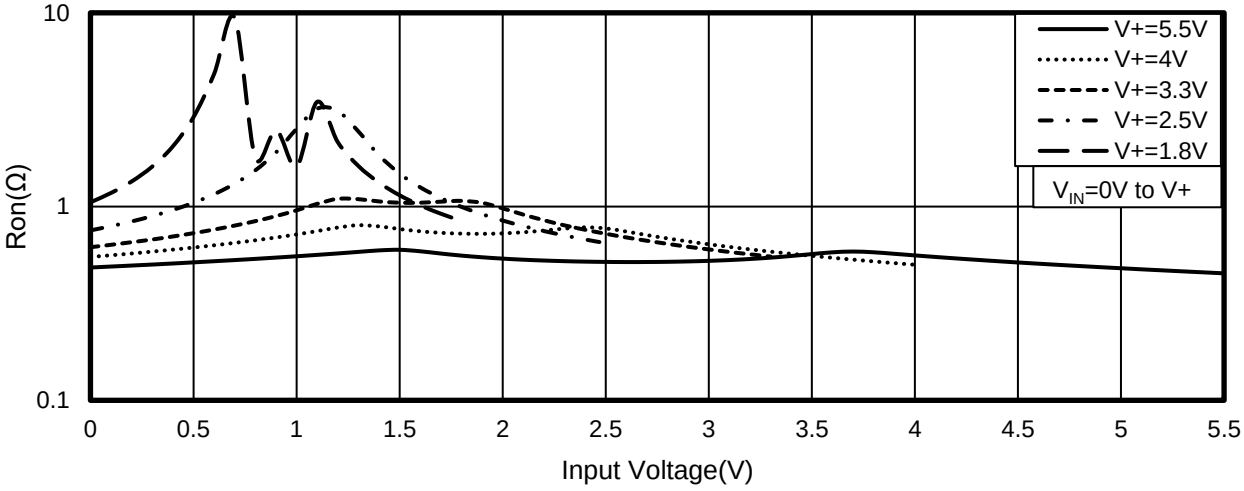


Figure 3. Typical Ron as a Function of Input Voltage

Parameter Measurement Information

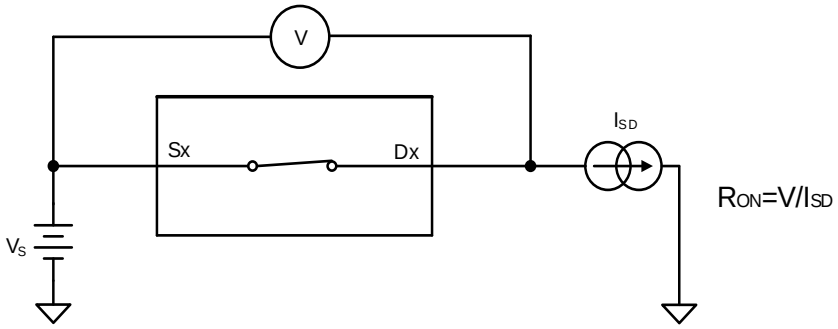


Figure 4. ON-State Resistance (R_{ON})

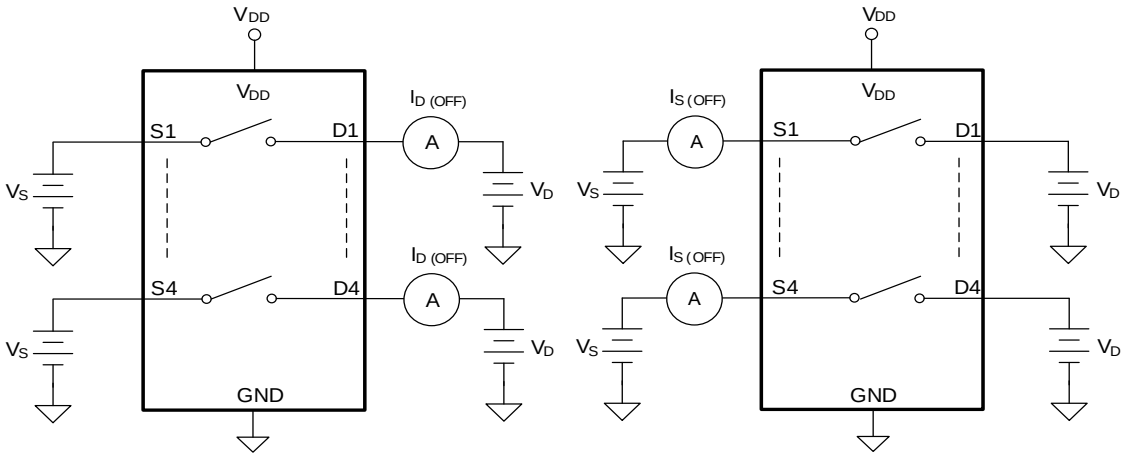


Figure 5. OFF-State Leakage Current ($I_{D\ (OFF)}$, $I_{S\ (OFF)}$)

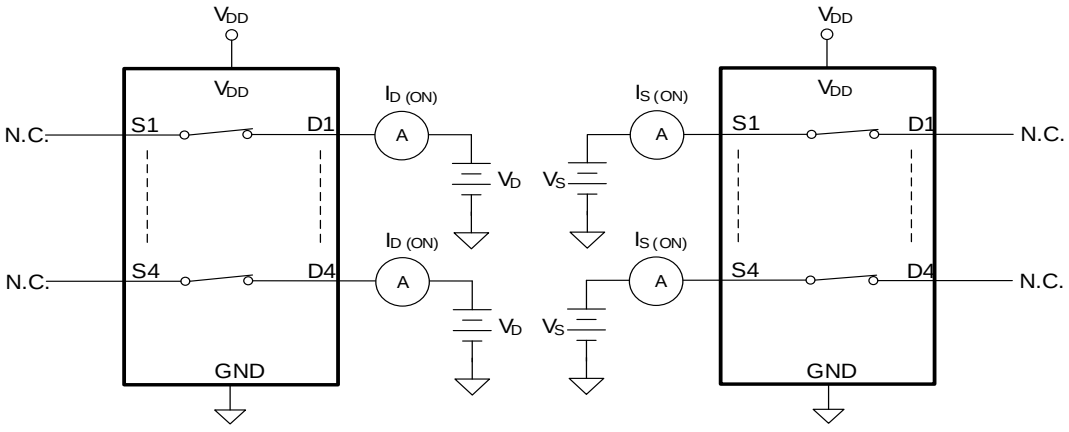


Figure 6. ON-State Leakage Current ($I_{D(ON)}$, $I_{S(ON)}$)

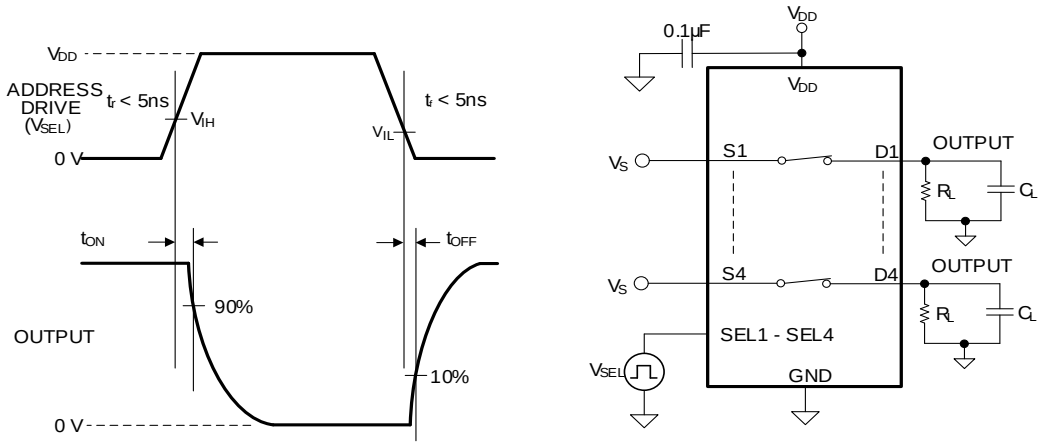


Figure 7. Turn-On (t_{ON}) and Turn-Off Time (t_{OFF})

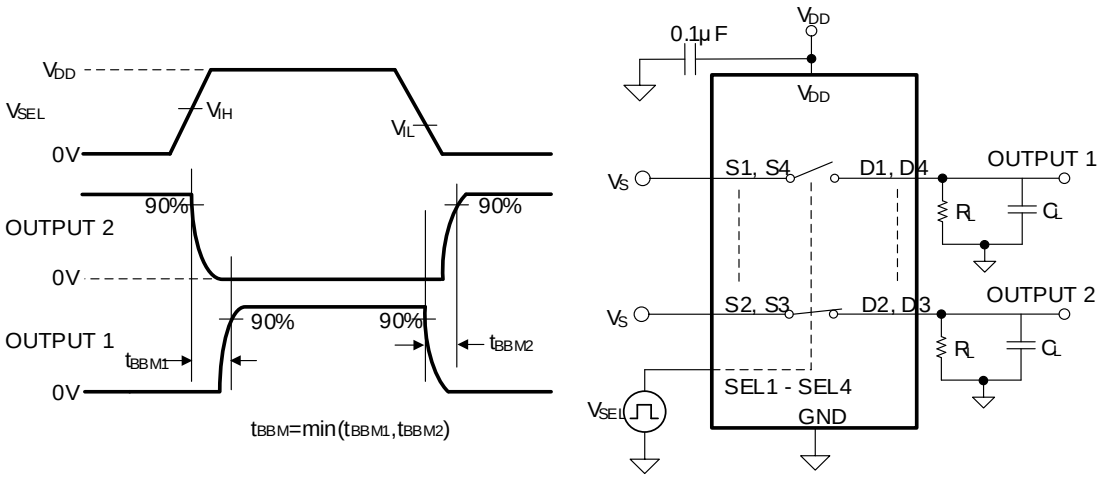


Figure 8. Break-Before-Make Time (t_{BBM})

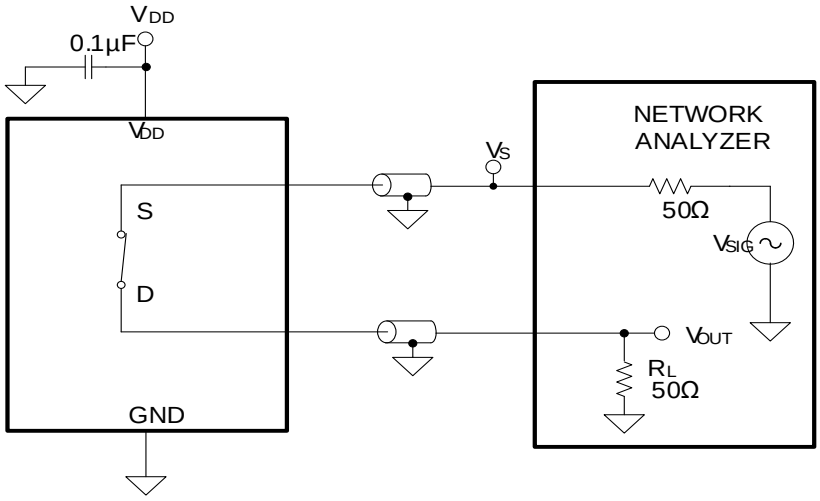


Figure 9. Bandwidth (BW)

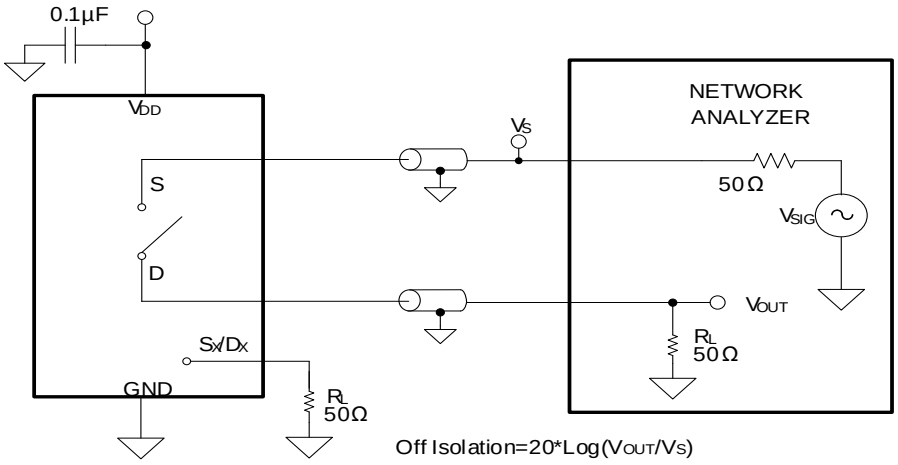


Figure 10. OFF Isolation (O_{ISO})

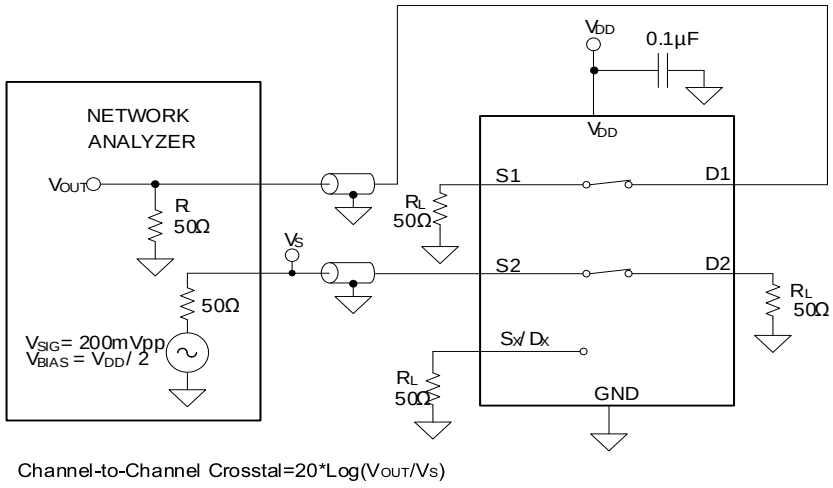


Figure 11. Crosstalk (X_{TALK})

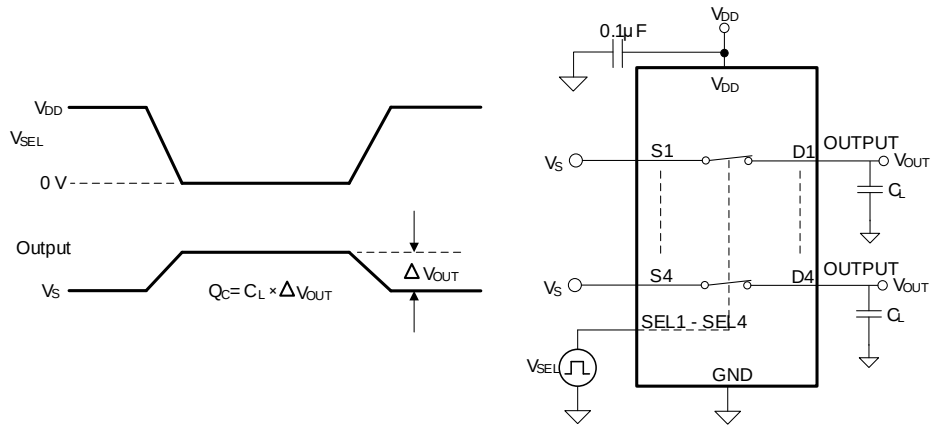
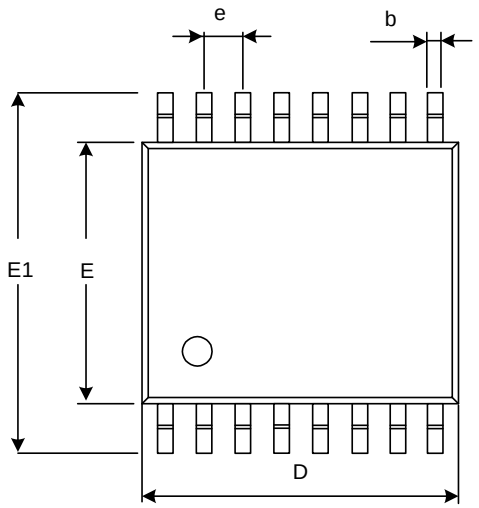
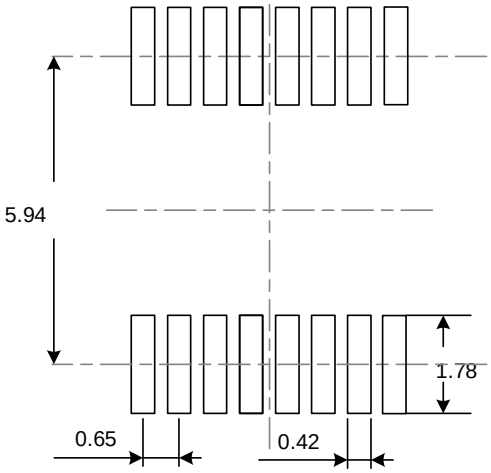


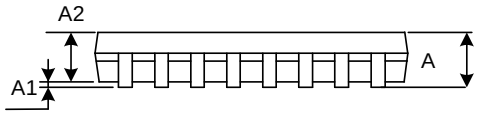
Figure 12.Charge Injection (Q_C)

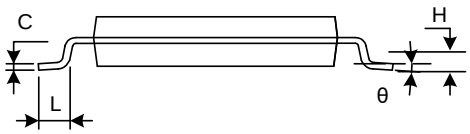
PACKAGE OUTLINE DIMENSIONS
TSSOP16





RECOMMENDED LAND PATTERN (Unit: mm)



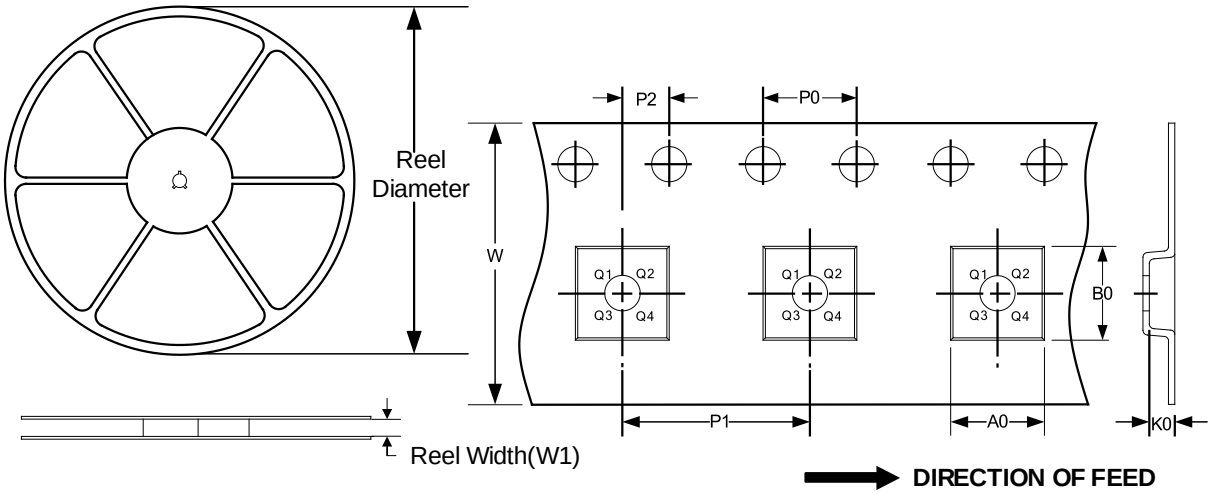


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A		1.200		0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.860	5.100	0.191	0.201
E	4.300	4.500	0.169	0.177
E1	6.200	6.600	0.244	0.260
e	0.650(BSC)		0.026(BSC)	
L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

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
TSSOP16	13”	12.4	6.90	5.60	1.20	4.0	8.0	2.0	12.0	Q1