

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

1 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**

2 APPLICATIONS

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

3 DESCRIPTIONS

The RS2259B is a bidirectional 4-channel single-pole single-throw (SPST) analog switch, which is designed to operate from 1.8V to 5.5V.

The RS2259B 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)
RS2259B	TSSOP16	5.00mm×4.40mm

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

4 FUNCTIONAL BLOCK DIAGRAM

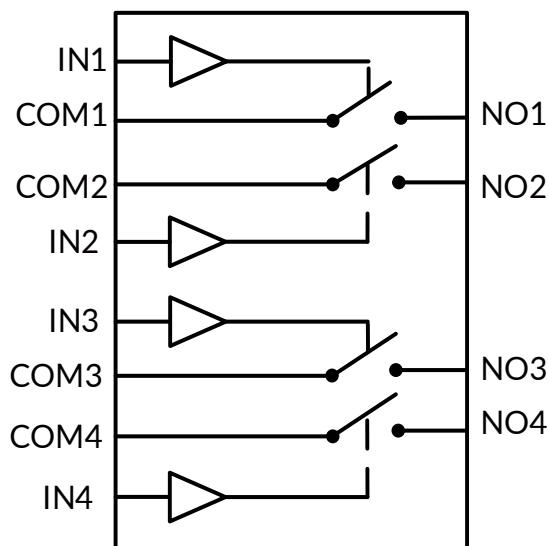


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5 REVISION HISTORY

Note: Page numbers for previous revisions may differ 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
C.3	2024/05/06	1. Add MSL on Page 5@RevC.2.1 2. Add Package thermal impedance on Page 4@RevC.2.1 3. Update PACKAGE note
C.4	2024/12/10	1. Delete t_{BEM} PARAMETER and test charts 2. Modify the test chart for Turn-On (t_{ON}) and Turn-Off Time (t_{OFF})

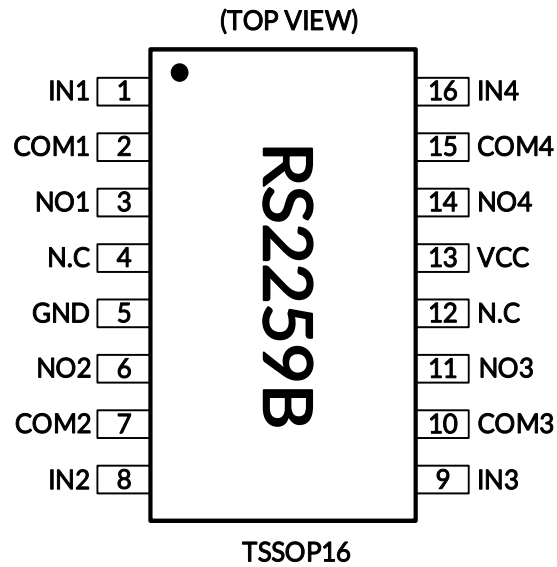
6 PACKAGE/ORDERING INFORMATION ⁽¹⁾

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING ⁽²⁾	MSL ⁽³⁾	PACKAGE OPTION
RS2259B	RS2259BXTSS16	-40°C ~125°C	TSSOP16	RS2259B	MSL3	Tape and Reel, 4000

NOTE:

- (1) This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the right-hand navigation.
- (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) Runic classify the MSL level with using the common preconditioning setting in our assembly factory conforming to the JEDEC industrial standard J-STD-20F, Please align with Runic if your end application is quite critical to the preconditioning setting or if you have special requirement.

7 PIN CONFIGURATIONS



7.1 Pin Description

NAME	PIN	FUNCTION
VCC	13	Power Supply
GND	5	Ground
IN _x	1,8,9,16	Digital Control Pin
COM _x	2,7,10,15	Common Terminal
NO _x	3,6,11,14	Normally-Open Terminal
N.C	4,12	No internet connection

7.2 Function Table

IN _x	NO _x
1	All Channels ON
0	All Channels OFF

8 SPECIFICATIONS

8.1 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)	-0.3	(V ₊)+0.3	
I _{IN}	Continuous Current COM or NO	-500	+500	mA
I _{PEAK}	Peak Current COM or NO	-800	+800	
θ _{JA}	Package thermal impedance ⁽²⁾	TSSOP16		°C/W
T _J	Junction Temperature ⁽³⁾	-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) The package thermal impedance is calculated in accordance with JESD-51.

(3) The maximum power dissipation is a function of T_{J(MAX)}, R_{θJA}, and T_A. The maximum allowable power dissipation at any ambient temperature is P_D = (T_{J(MAX)} - T_A) / R_{θJA}. All numbers apply for packages soldered directly onto a PCB.

8.2 ESD Ratings

The following ESD information is provided for handling of ESD-sensitive devices in an ESD protected area only.

		VALUE	UNIT	
V _(ESD)	Electrostatic discharge	Human-Body Model (HBM)	±1000	V
		Machine Model (MM)	±100	V



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.

8.3 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

8.4 Electrical Characteristics

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

PARAMETER	SYMBOL	CONDITIONS	V_{CC}	T_A	MIN ⁽²⁾	TYP ⁽³⁾	MAX ⁽²⁾	UNIT
ANALOG SWITCH								
Analog Signal Range	V_{COM}, V_{NO}			FULL	0		V_{CC}	V
On-Resistance	R_{ON}	$V_{NO} = V_{CC}/2$, $I_{COM} = -10\text{mA}$, 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}	$V_{NO} = V_{CC}/2$, $I_{COM} = -10\text{mA}$, 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	$R_{FLAT(ON)}$	$0 \leq (V_{NO}) \leq V_{CC}/2$, $I_{COM} = -10\text{mA}$, 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
NO, COM OFF Leakage Current	$I_{NO(OFF)}, I_{COM(OFF)}$	$V_{COM} = 0.3\text{V}, V_{CC}/2, V_{NO} = V_{CC}/2, 0.3\text{V}$ See Figure 5	1.8 to 5.5V	FULL			1	μA
NO, COM ON Leakage Current	$I_{NO(ON)}, I_{COM(ON)}$	$V_{COM} = 0.3\text{V}$, Open $V_{NO} = \text{Open}, 0.3\text{V}$ See Figure 6	1.8 to 5.5V	FULL			1	μA
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	μA

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

(2) Limits are 100% production tested at 25°C. Limits over the operating temperature range are ensured through correlations using statistical quality control (SQC) method.

(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration.

Electrical Characteristics (continued)

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

PARAMETER	SYMBOL	CONDITIONS	V_{CC}	T_A	MIN	TYP	MAX	UNIT	
DYNAMIC CHARACTERISTICS									
Turn-On Time	t_{ON}	$V_{NO} = V_{CC}$, $R_L = 300\Omega$, $C_L = 35\text{pF}$, See Figure 7	5V	+25°C		50		ns	
			3.3V			50			
Turn-Off Time	t_{OFF}	$V_{NO} = V_{CC}$, $R_L = 300\Omega$, $C_L = 35\text{pF}$, See Figure 7	5V	+25°C		15		ns	
			3.3V			17			
Off Isolation	O_{ISO}	$R_L = 50\Omega$, Switch OFF, See Figure 9		+25°C	f = 10MHz		-68		dB
					f = 1MHz		-86		dB
-3dB Bandwidth	BW	Switch ON, $R_L = 50\Omega$ See Figure 8		+25°C		30		MHz	
NO, COM OFF Capacitance	$C_{NO(OFF)}$, $C_{COM(OFF)}$	$V_{NO} = V_{CC}/2$ or GND, Switch OFF		+25°C		80		pF	
NO, COM ON Capacitance	$C_{NO(ON)}$, $C_{COM(ON)}$	$V_{NO} = V_{CC}/2$ or GND, Switch ON		+25°C		350		pF	
POWER REQUIREMENTS									
Power Supply Range	V_{CC}			FULL	1.8		5.5	V	
Power Supply Current	I_{CC}	$V_{IN} = \text{GND}$ or V_{CC}	5.5V	FULL			1	μA	

8.5 Typical Characteristics

NOTE: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only.

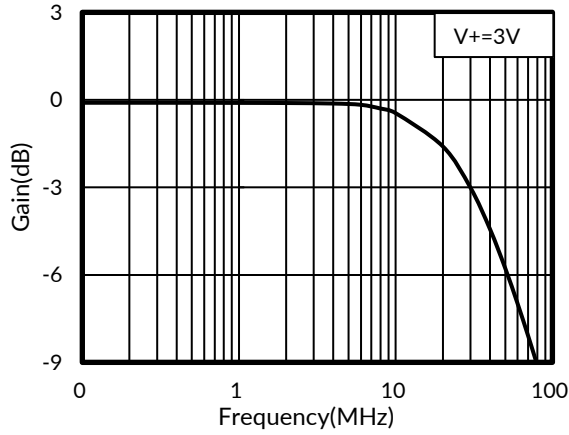


Figure 1. Bandwidth vs Frequency

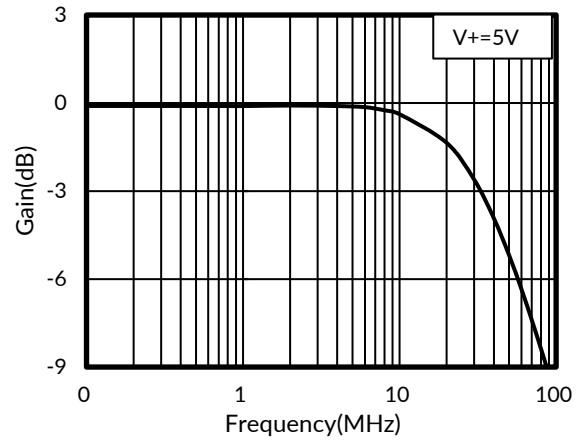


Figure 2. Bandwidth vs Frequency

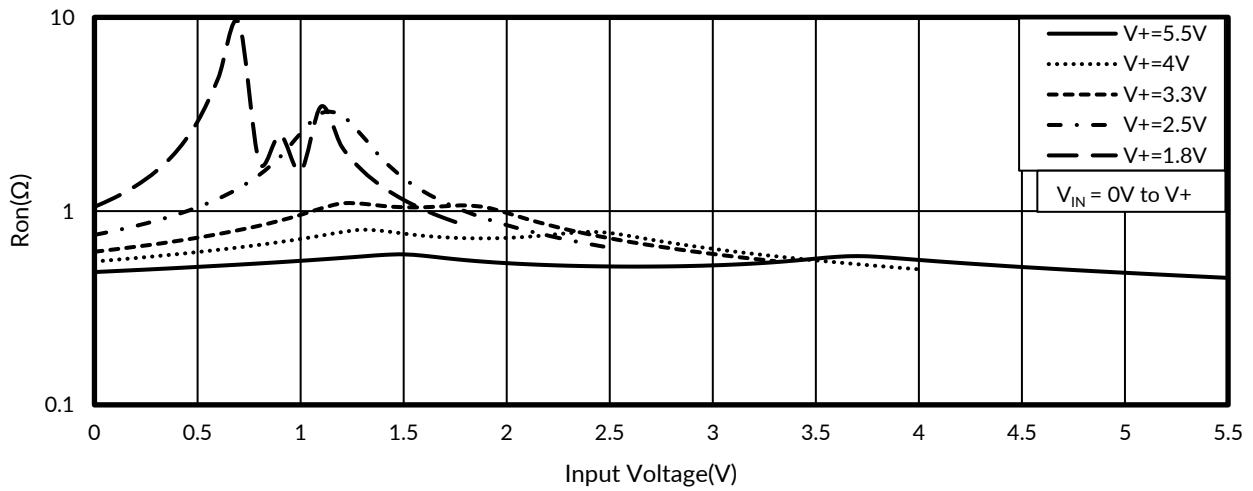


Figure 3. Typical Ron as a Function of Input Voltage

9 PARAMETER MEASUREMENT INFORMATION

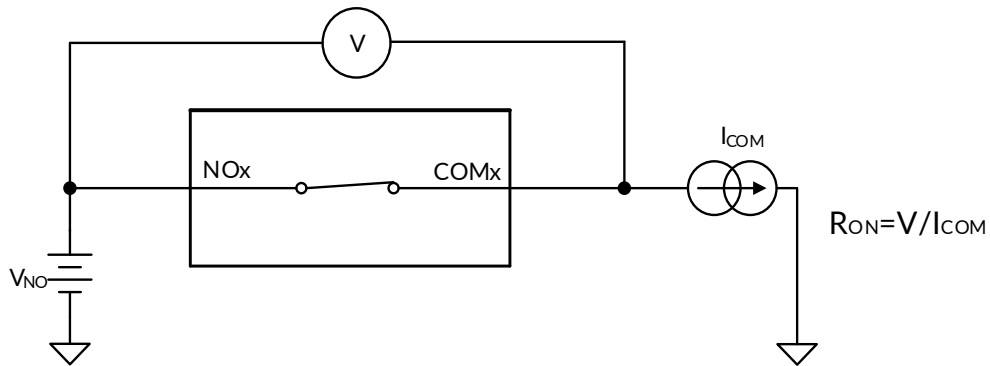


Figure 4. ON-State Resistance (R_{ON})

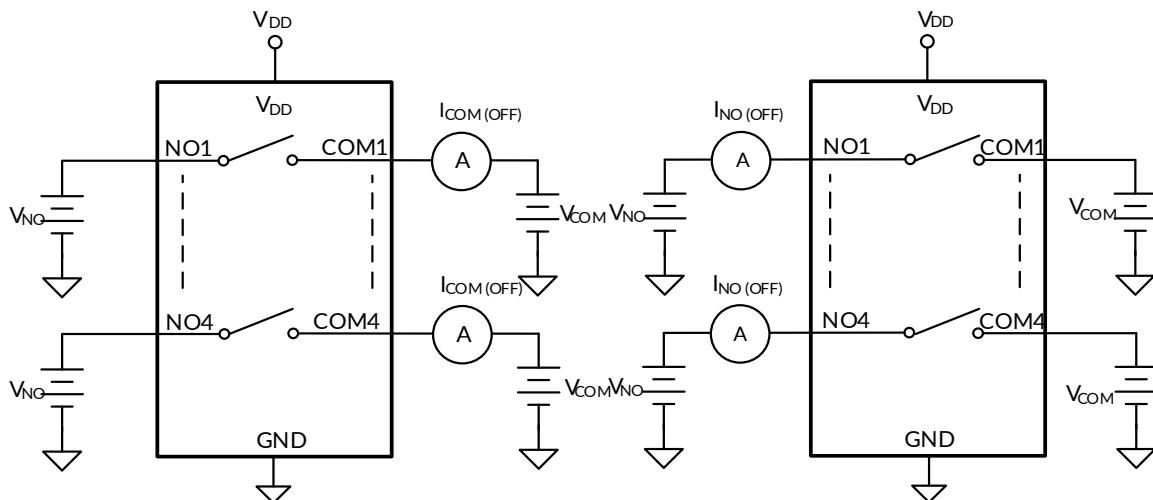


Figure 5. OFF-State Leakage Current ($I_{COM(OFF)}$, $I_{NO(OFF)}$)

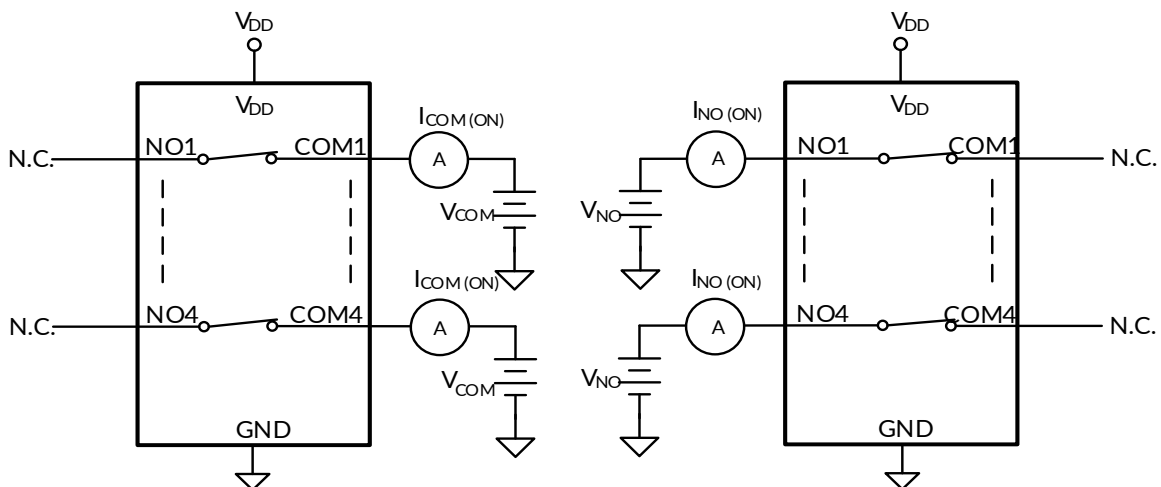


Figure 6. ON-State Leakage Current ($I_{COM(ON)}$, $I_{NO(ON)}$)

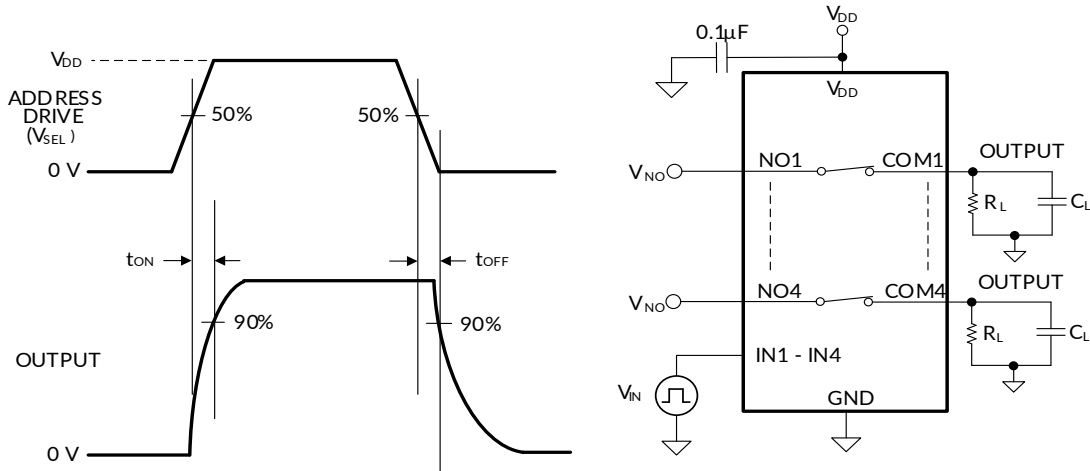


Figure 7. Turn-On (t_{ON}) and Turn-Off Time (t_{OFF})

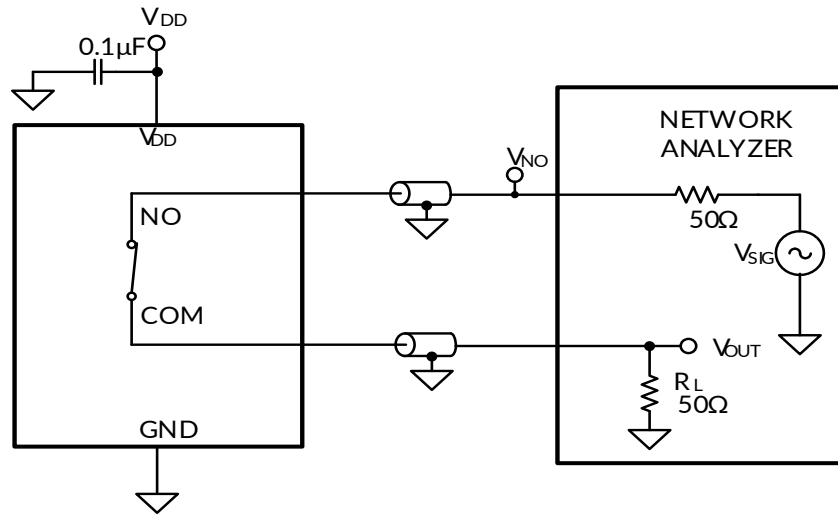


Figure 8. Bandwidth (BW)

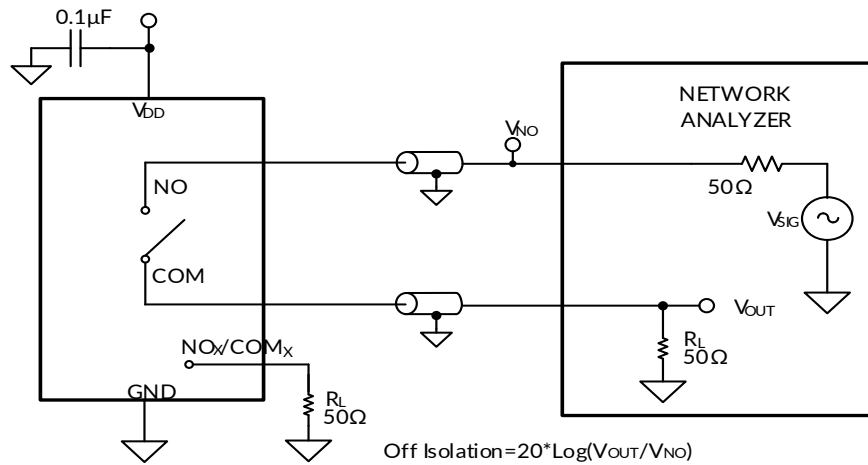


Figure 9. OFF Isolation (O_{Iso})

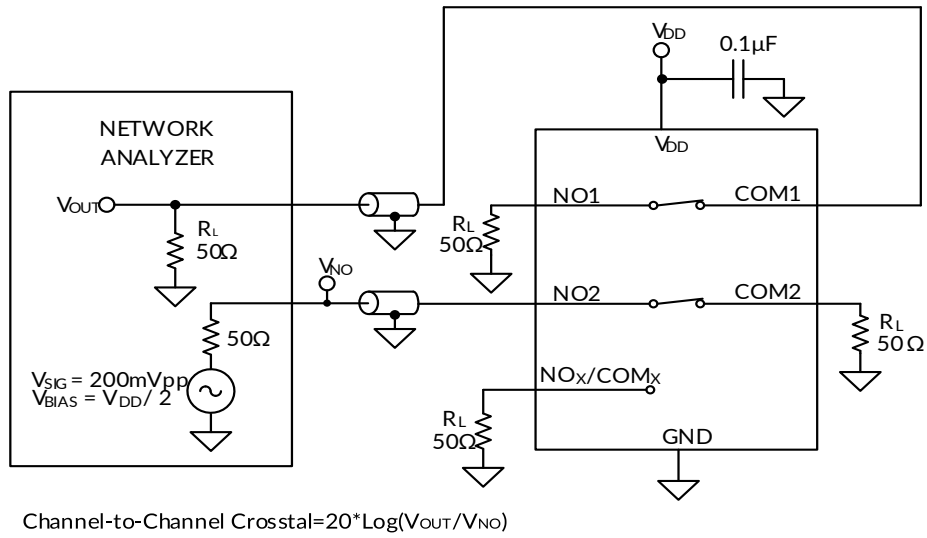


Figure 10. Crosstalk (X_{TALK})

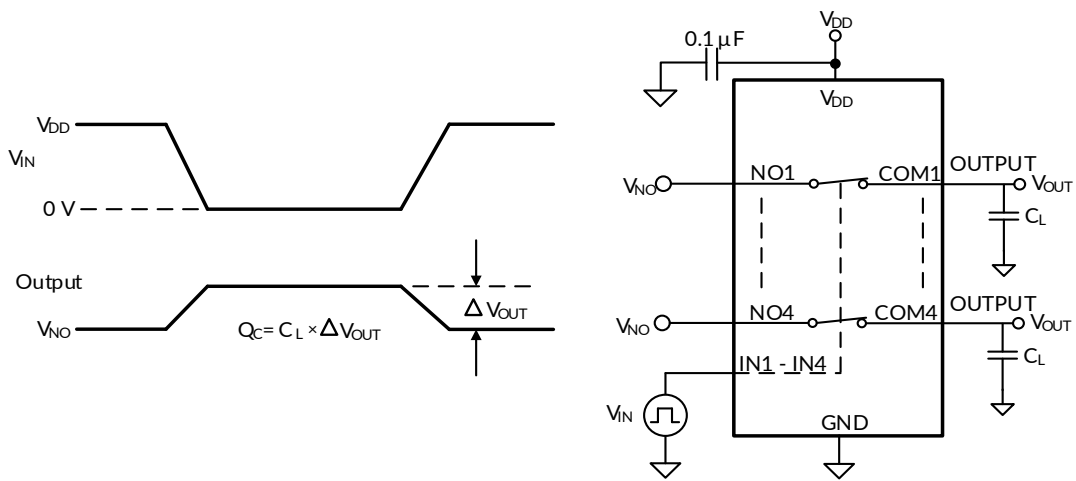
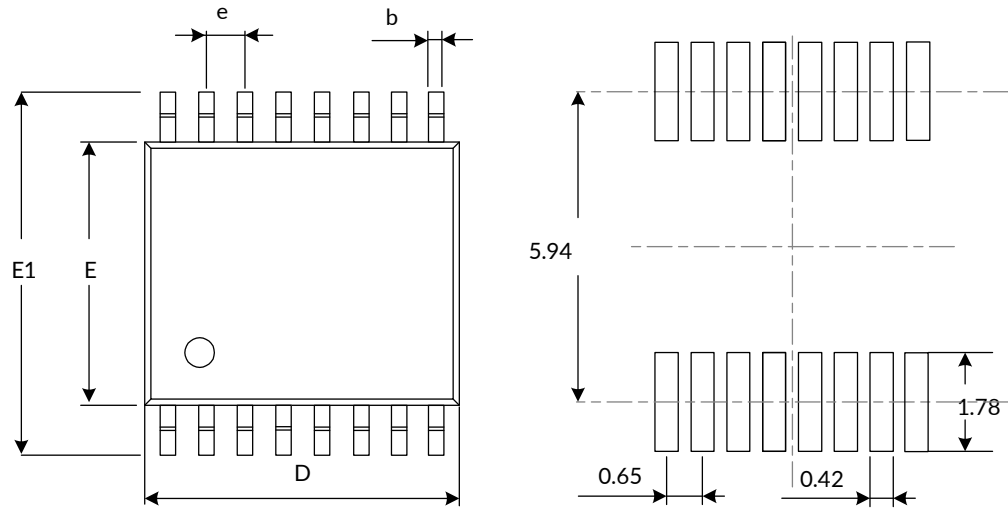
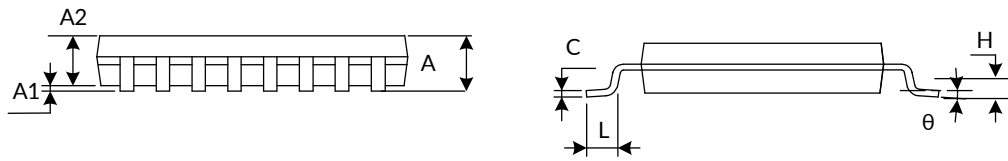


Figure 11. Charge Injection (Q_c)

10 PACKAGE OUTLINE DIMENSIONS

TSSOP16⁽³⁾


RECOMMENDED LAND PATTERN (Unit: mm)


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A ⁽¹⁾		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 ⁽¹⁾	4.860	5.100	0.191	0.201
E ⁽¹⁾	4.300	4.500	0.169	0.177
E1	6.200	6.600	0.244	0.260
e	0.650(BSC) ⁽²⁾		0.026(BSC) ⁽²⁾	
L	0.500	0.700	0.02	0.028
H	0.250 TYP		0.010 TYP	
θ	1°	7°	1°	7°

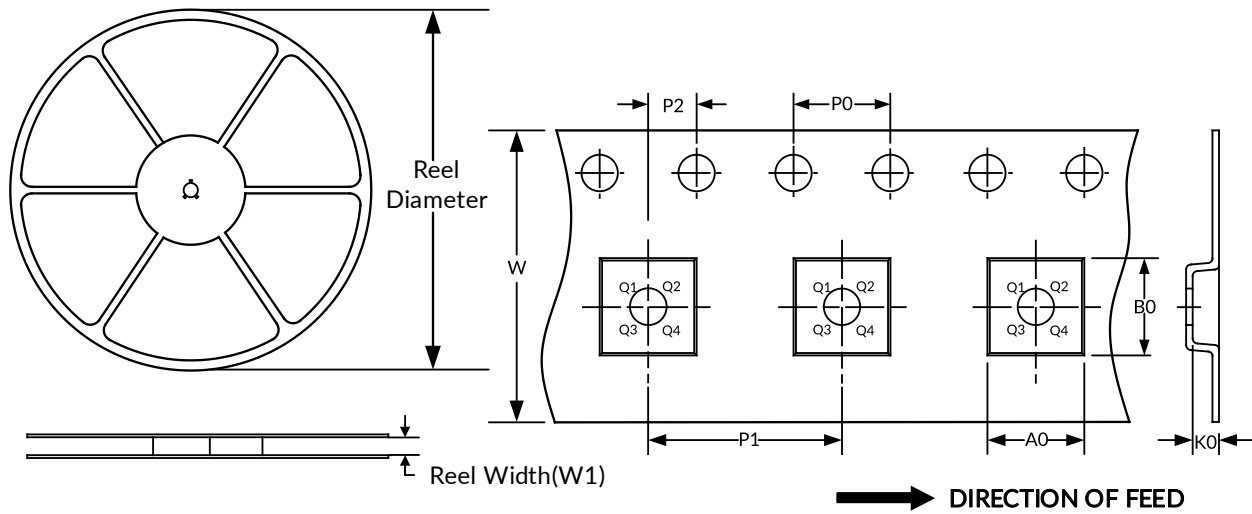
NOTE:

1. Plastic or metal protrusions of 0.15mm maximum per side are not included.
2. BSC (Basic Spacing between Centers), "Basic" spacing is nominal.
3. This drawing is subject to change without notice.

11 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

NOTE:

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

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