

# Wide-Bandwidth 4-Channel SPST Analog Switch

## 1 FEATURES

- **Wide Bandwidth: 300MHz**
- **Single Supply Operation +1.8V to +5.5V**
- **Low ON Resistance, 4.5Ω(TYP)**
- **High Speed: Typical 30ns**
- **Rail-to-Rail Operation**
- **TTL/CMOS Compatible**
- **Operating Temperature Range:  
-40°C to +125°C**
- **PACKAGES: SSOP-16, TSSOP-14**

## 2 APPLICATIONS

- **Game Consoles**
- **Audio and Video Switching**
- **Wired networking**
- **Personal Video Recorders**
- **Supports defense, aerospace and medical applications**
- **Desktop Video Editors**
- **Hard Disk Recorders**

## 3 DESCRIPTION

The RS2268 is a CMOS analog IC configured as a quad, bidirectional, single-pole/single-throw (SPST) switches. This CMOS device can operate from 1.8 V to 5.5 V.

The RS2268 device can handle both analog and digital signals. It features high-bandwidth (300MHz) and low on-resistance (4.5Ω TYP). Each switch is disabled when the associated output-enable (IN) input is low.

The RS2268 is available in Green SSOP-16, TSSOP-14 packages. It operates over an ambient temperature range of -40°C to +125°C.

### Device Information <sup>(1)</sup>

| PART NUMBER | PACKAGE  | BODY SIZE (NOM) |
|-------------|----------|-----------------|
| RS2268      | TSSOP-14 | 5.00mm×4.40mm   |
|             | SSOP-16  | 4.90mm×3.90mm   |

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

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## 4 Revision History

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

| Version | Change Date | Change Item                |
|---------|-------------|----------------------------|
| A.0     | 2022/03/10  | Initial version completed  |
| A.1     | 2022/06/20  | Official version completed |

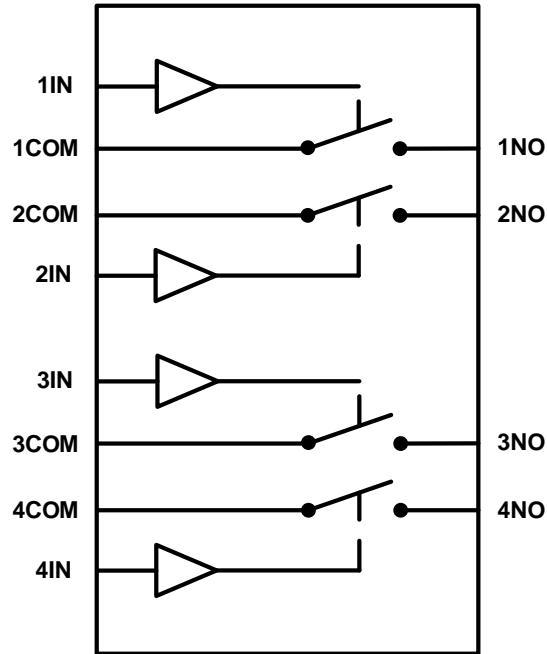
**5 PACKAGE/ORDERING INFORMATION**

| PRODUCT | ORDERING NUMBER | TEMPERATURE RANGE | PACKAGE LEAD | PACKAGE MARKING <sup>(1)</sup> | PACKAGE OPTION     |
|---------|-----------------|-------------------|--------------|--------------------------------|--------------------|
| RS2268  | RS2268XSS16     | -40°C~+125°C      | SSOP-16      | RS2268                         | Tape and Reel,4000 |
|         | RS2268XQ        | -40°C~+125°C      | TSSOP-14     | RS2268                         | 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.

## 6 Pin Configuration and Function

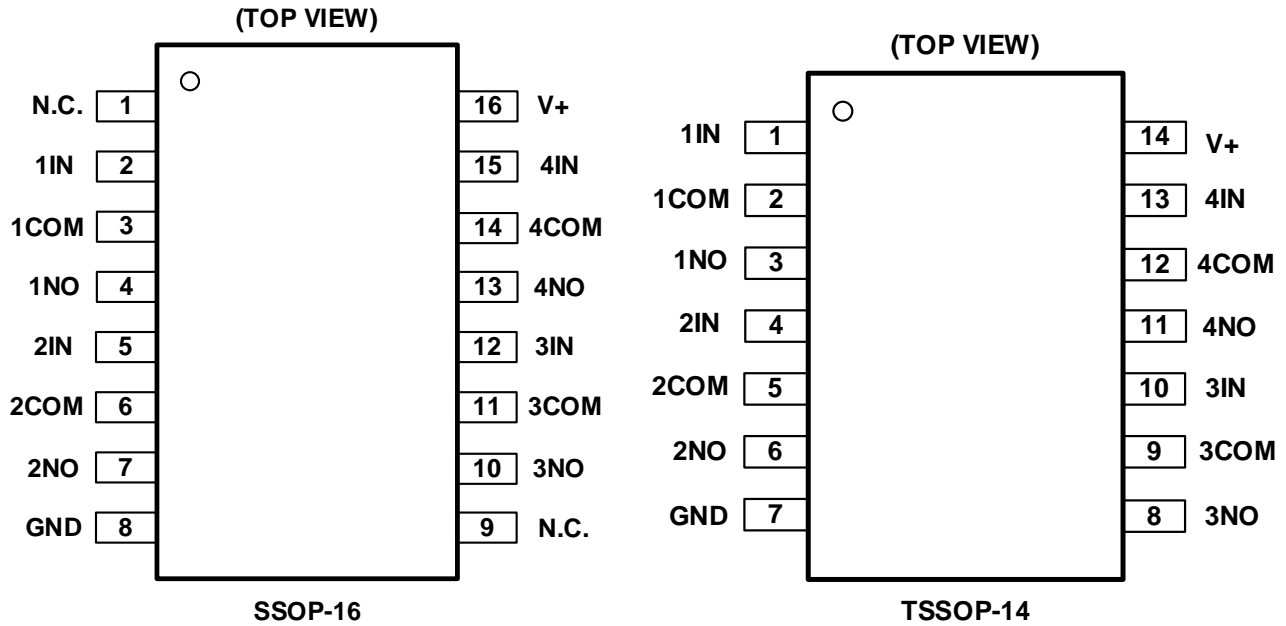


### FUNCTION TABLE

| INPUTS |  | FUNCTION           |
|--------|--|--------------------|
| IN     |  |                    |
| L      |  | Disconnect         |
| H      |  | COM Port = NO Port |

NOTE: Input and output pins are identical and inter-changeable. Either may be considered an input or output; signals pass equally well in either direction.

## 7 PIN CONFIGURATIONS



NOTE: N.C.= No internet connection

## PIN DESCRIPTION

| NAME | PIN     |          | FUNCTION                       |
|------|---------|----------|--------------------------------|
|      | SSOP-16 | TSSOP-14 |                                |
| N.C. | 1       | /        | No internet connection         |
| 1IN  | 2       | 1        | Channel 1 Switch-Enable Input. |
| 1COM | 3       | 2        | Channel 1, input or output     |
| 1NO  | 4       | 3        | Channel 1, input or output     |
| 2IN  | 5       | 4        | Channel 2 Switch-Enable Input. |
| 2COM | 6       | 5        | Channel 2, input or output     |
| 2NO  | 7       | 6        | Channel 2, input or output     |
| GND  | 8       | 7        | Ground.                        |
| N.C. | 9       | /        | No internet connection         |
| 3NO  | 10      | 8        | Channel 3, input or output     |
| 3COM | 11      | 9        | Channel 3, input or output     |
| 3IN  | 12      | 10       | Channel 3 Switch-Enable Input. |
| 4NO  | 13      | 11       | Channel 4, input or output     |
| 4COM | 14      | 12       | Channel 4, input or output     |
| 4IN  | 15      | 13       | Channel 4 Switch-Enable Input. |
| V+   | 16      | 14       | Power Supply.                  |

## 8 SPECIFICATIONS

### 8.1 Absolute Maximum Ratings <sup>(1)</sup>

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

| SYMBOL            | PARAMETER                  | MIN  | MAX  | UNIT |
|-------------------|----------------------------|------|------|------|
| V+                | Supply Voltage             | -0.3 | 6    | V    |
| V <sub>IN</sub>   | Input Voltage (All inputs) | -0.3 | 6    |      |
|                   | Continuous Current         | -300 | +300 | mA   |
| I <sub>PEAK</sub> | Peak Current               | -500 | +500 | mA   |
| T <sub>J</sub>    | Junction temperature       | -40  | 150  | °C   |
| T <sub>stg</sub>  | Storage temperature        | -65  | +150 | °C   |

(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.

### 8.2 ESD Ratings

|                    |                         | VALUE                  | UNIT  |
|--------------------|-------------------------|------------------------|-------|
| V <sub>(ESD)</sub> | Electrostatic discharge | Human-body model (HBM) | ±1000 |
|                    |                         | Machine Model (MM)     | ±100  |

### 8.3 Recommended Operating Conditions

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

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

### 8.4 Thermal Information

| THERMAL METRIC        |  | RS2268  |          | UNIT |
|-----------------------|--|---------|----------|------|
|                       |  | 16 PINS | 14 PINS  |      |
|                       |  | SSOP-16 | TSSOP-14 |      |
| R <sub>θJA</sub>      | Junction-to-ambient thermal resistance       | 118.7   | 119.5    | °C/W |
| R <sub>θJC(top)</sub> | Junction-to-case(top) thermal resistance     | 66.4    | 48.2     | °C/W |
| R <sub>θJB</sub>      | Junction-to-board thermal resistance         | 62.2    | 61.2     | °C/W |
| Ψ <sub>JT</sub>       | Junction-to-top characterization parameter   | 20.9    | 5.5      | °C/W |
| Ψ <sub>JB</sub>       | Junction-to-board characterization parameter | 61.7    | 60.6     | °C/W |
| R <sub>θJC(bot)</sub> | Junction-to-case(bottom) thermal resistance  | N/A     | NA       | °C/W |

## 8.5 ELECTRICAL CHARACTERISTICS

V+= +1.8V to +5.5 V, FULL= -40°C to +125°C, Typical values are at T<sub>A</sub> = +25°C. (unless otherwise noted)

| PARAMETER                                    | SYMBOL                             | CONDITIONS  | V+       | T <sub>A</sub> | MIN | TYP  | MAX  | UNIT |
|--|------------------------------------|---|----------|----------------|-----|------|------|------|
| <b>DC CHARACTERISTICS</b>                    |                                    |   |          |                |     |      |      |      |
| Analog Signal Range                          | V <sub>NO</sub> , V <sub>COM</sub> |   |          | FULL           | 0   |      | V+   | V    |
| On-Resistance                                | R <sub>ON</sub>                    | 0 ≤ V <sub>NO</sub> ≤ V+/2,<br>I <sub>COM</sub> = -10mA, Switch ON,<br>See Figure 4 | 5V       | +25°C          |     | 4.5  | 8    | Ω    |
|  |                                    |   |          | FULL           |     |      | 8.5  | Ω    |
|  |                                    |   | 3.3V     | +25°C          |     | 7    | 10   | Ω    |
|  |                                    |   |          | FULL           |     |      | 10.5 | Ω    |
| On-Resistance Match Between Channels         | ΔR <sub>ON</sub>                   | 0 ≤ V <sub>NO</sub> ≤ V+/2,<br>I <sub>COM</sub> = -10mA, Switch ON,<br>See Figure 4 | 5V       | +25°C          |     | 0.15 | 0.3  | Ω    |
|  |                                    |   |          | FULL           |     |      | 0.4  | Ω    |
|  |                                    |   | 3.3V     | +25°C          |     | 0.15 | 0.3  | Ω    |
|  |                                    |   |          | FULL           |     |      | 0.4  | Ω    |
| On-Resistance Flatness                       | R <sub>FLAT(ON)</sub>              | 0 ≤ V <sub>NO</sub> ≤ V+/2,<br>I <sub>COM</sub> = -10mA, Switch ON,<br>See Figure 4 | 5V       | +25°C          |     | 2    | 3    | Ω    |
|  |                                    |   |          | FULL           |     |      | 3.3  | Ω    |
|  |                                    |   | 3.3V     | +25°C          |     | 3    | 4    | Ω    |
|  |                                    |   |          | FULL           |     |      | 4.3  | Ω    |
| Leakage Current Off state                    | I <sub>Leak(OFF)</sub>             | V <sub>NO</sub> = 0.3V, V+/2, V <sub>COM</sub> = V+/2, 0.3V See Figure 5            | 1.8~5.5V | FULL           |     |      | 1    | μA   |
| Leakage Current On state                     | I <sub>Leak(ON)</sub>              | V <sub>NO</sub> = 0.3V, Open, V <sub>COM</sub> = Open, 0.3V See Figure 6            | 1.8~5.5V | FULL           |     |      | 1    | μA   |
| <b>DIGITAL CONTROL INPUTS <sup>(1)</sup></b> |                                    |   |          |                |     |      |      |      |
| High-level control input Voltage             | V <sub>INH</sub>                   |   | 5V       | FULL           | 1.5 |      |      | V    |
|  |                                    |   | 3.3V     | FULL           | 1.3 |      |      | V    |
| Low-level control input Voltage              | V <sub>INL</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  | 1.8~5.5V | 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

V+ = +1.8V to +5.5 V, FULL= -40°C to +125°C, Typical values are at T<sub>A</sub> = +25°C. (unless otherwise noted)

| PARAMETER                      | SYMBOL           | CONDITIONS   | V+   | T <sub>A</sub> | MIN   | TYP | MAX | UNITS |    |
|--------------------------------|------------------|--|------|----------------|-------|-----|-----|-------|----|
| <b>DYNAMIC CHARACTERISTICS</b> |                  |  |      |                |       |     |     |       |    |
| Turn-On Time                   | t <sub>ON</sub>  | V <sub>COM</sub> = V+, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF,<br>See Figure 8 | 5V   | +25°C          |       | 30  |     | ns    |    |
|                                |                  |  | 3.3V |                |       | 40  |     |       |    |
| Turn-Off Time                  | t <sub>OFF</sub> | V <sub>COM</sub> = V+, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF,<br>See Figure 8 | 5V   | +25°C          |       | 25  |     | ns    |    |
|                                |                  |  | 3.3V |                |       | 30  |     |       |    |
| Off Isolation                  | O <sub>ISO</sub> | R <sub>L</sub> = 50Ω, Switch OFF,<br>See Figure 10                                   |      | f = 10MHz      | +25°C |     | -52 |       | dB |
|                                |                  |  |      | f = 1MHz       | +25°C |     | -71 |       | dB |
| -3dB Bandwidth                 | BW               | Switch ON, R <sub>L</sub> =50Ω, See Figure 9   |      | +25°C          |       | 300 |     | MHz   |    |
| OFF Capacitance                | C <sub>OFF</sub> | V <sub>NO</sub> =V+/2 or GND, Switch OFF<br>See Figure 7                             |      | +25°C          |       | 5   |     | pF    |    |
| ON Capacitance                 | C <sub>ON</sub>  | V <sub>NO</sub> =V+/2 or GND, Switch ON<br>See Figure 7                              |      | +25°C          |       | 15  |     | pF    |    |
| <b>POWER REQUIREMENTS</b>      |                  |  |      |                |       |     |     |       |    |
| Power Supply Range             | V+               |  |      | FULL           | 1.8   |     | 5.5 | V     |    |
| Power Supply Current           | I+               | V <sub>IN</sub> = GND or V+  | 5.5V | FULL           |       |     | 4   | μA    |    |

## 8.6 TYPICAL CHARACTERISTICS

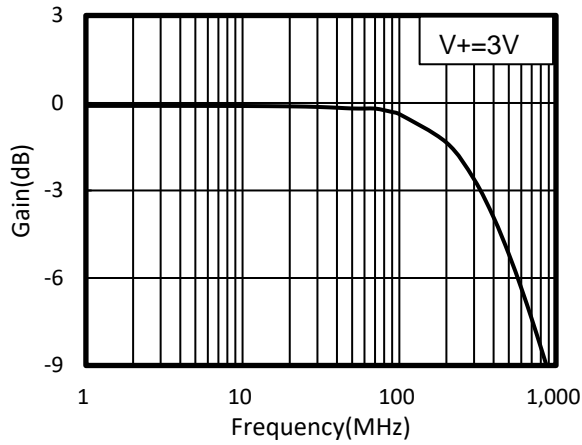


Figure 1. Bandwidth vs Frequency

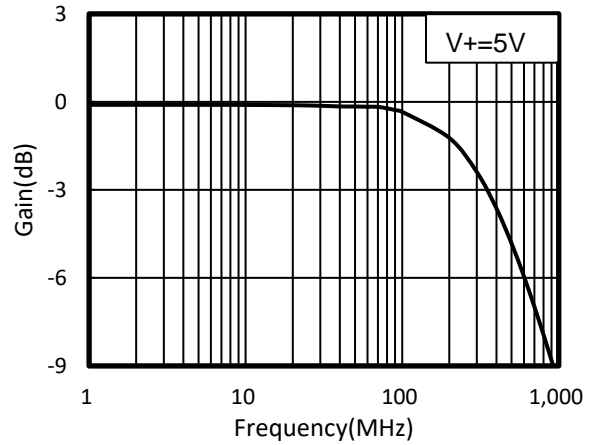


Figure 2. Bandwidth vs Frequency

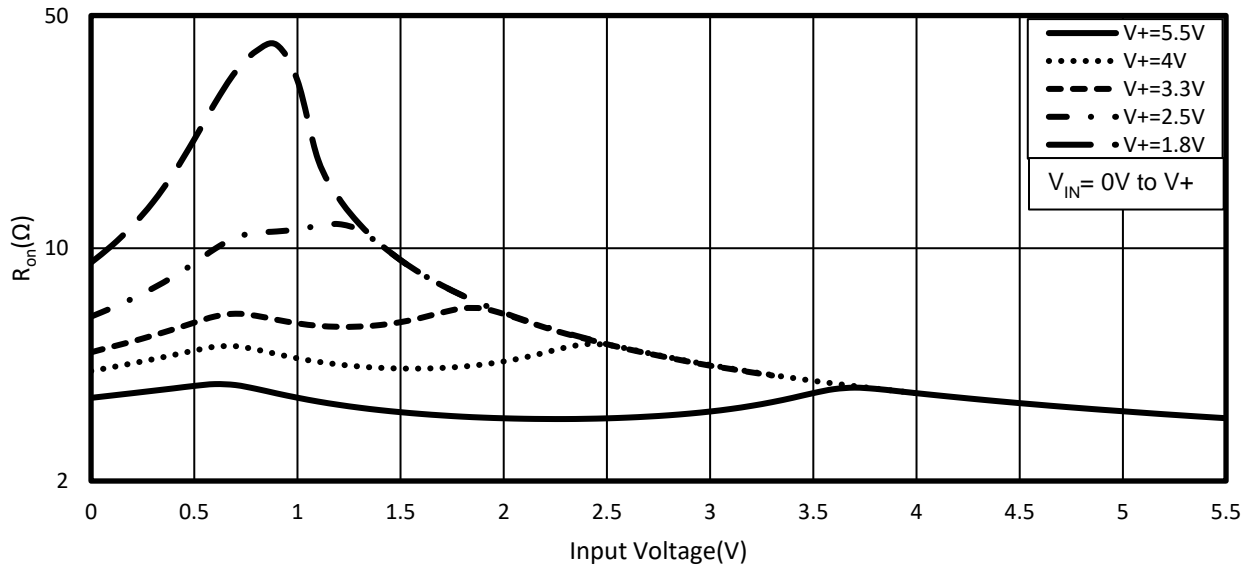


Figure 3. Typical Ron as a Function of Input Voltage

## 9 Parameter Measurement Information

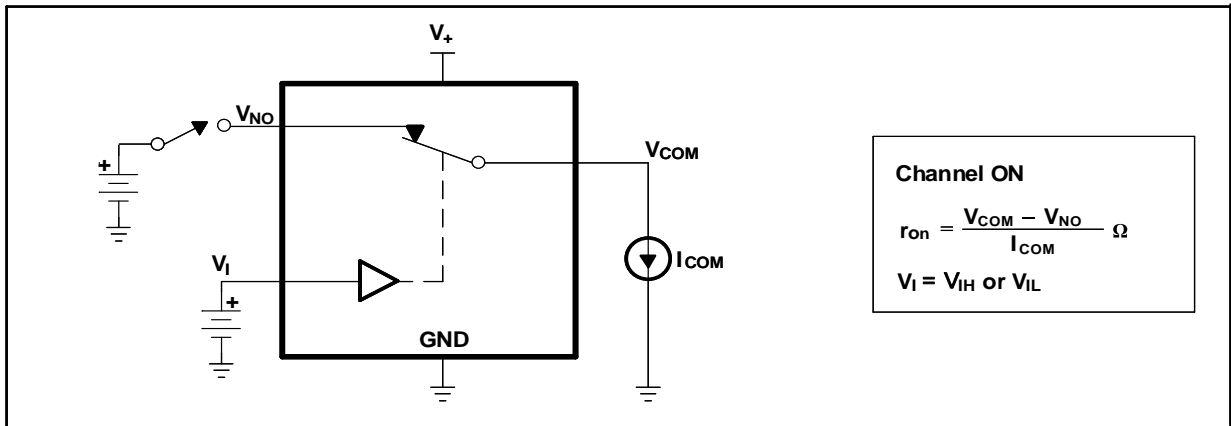


Figure 4. ON-State Resistance

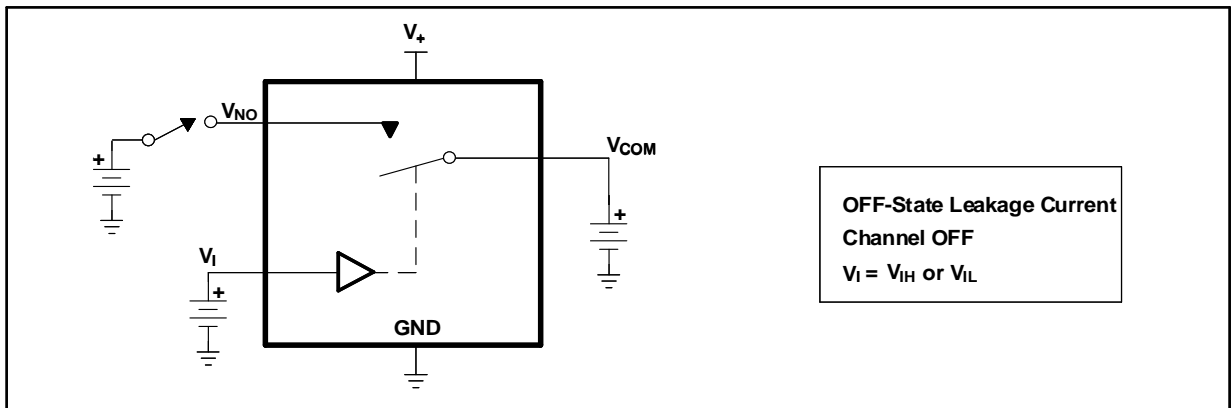


Figure 5. OFF-State Leakage Current

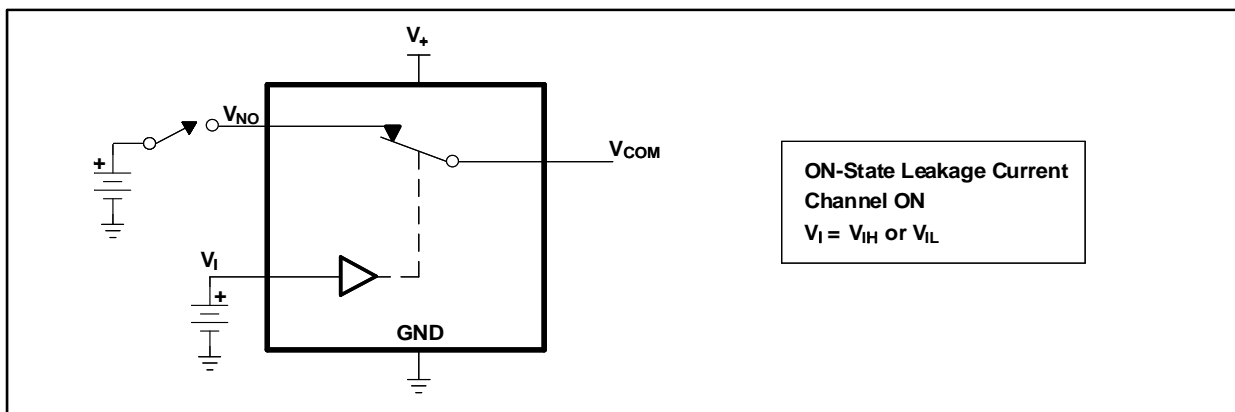


Figure 6. ON-State Leakage Current

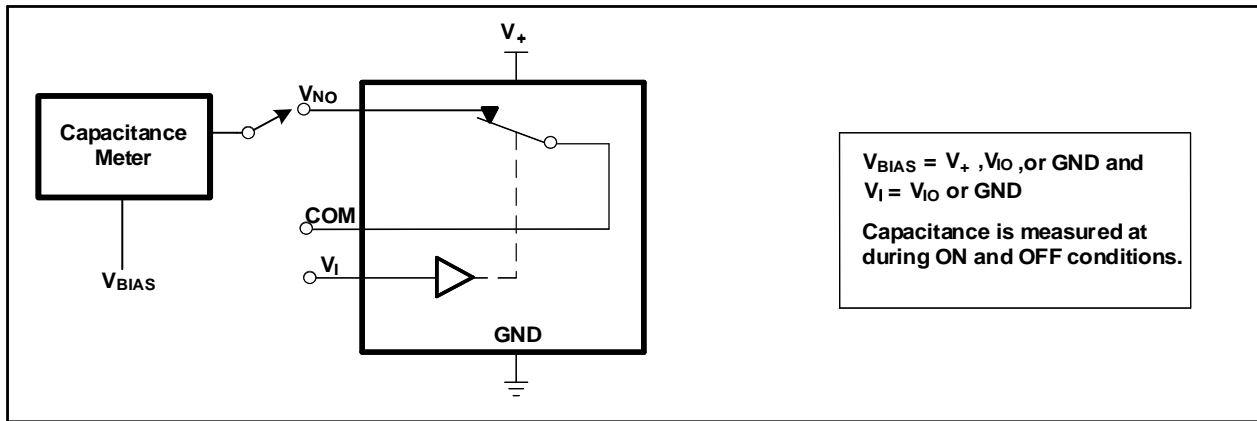


Figure 7. Capacitance  $C_{IN}$  or  $C_{OFF}$

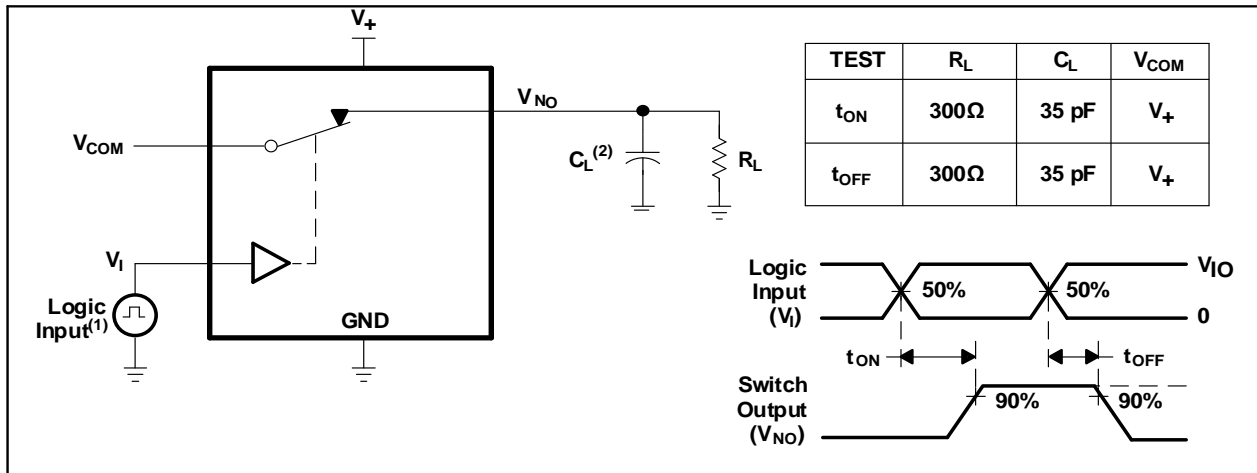


Figure 8. Turn-On ( $t_{ON}$ ) and Turn-Off Time ( $t_{OFF}$ )

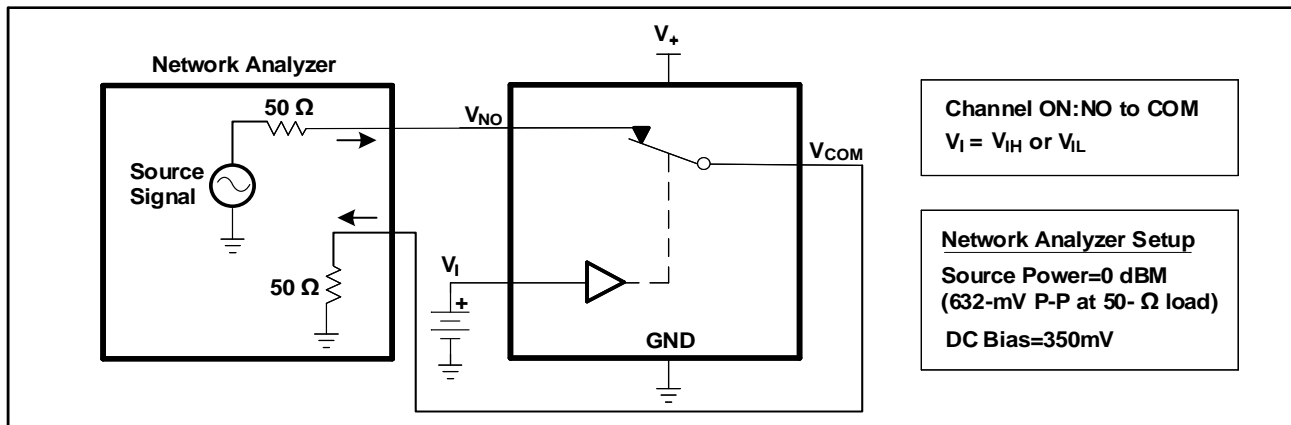


Figure 9. Bandwidth (BW)

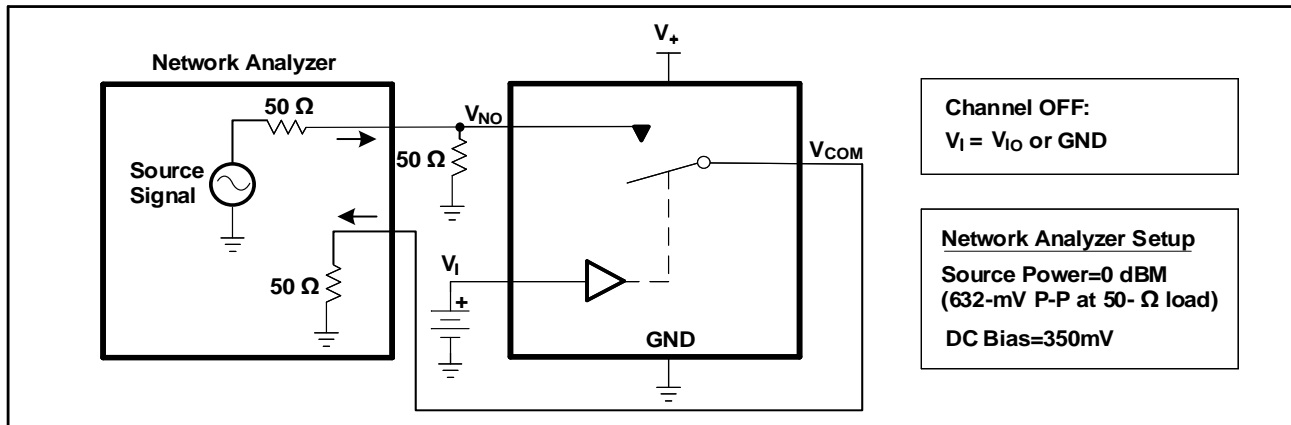
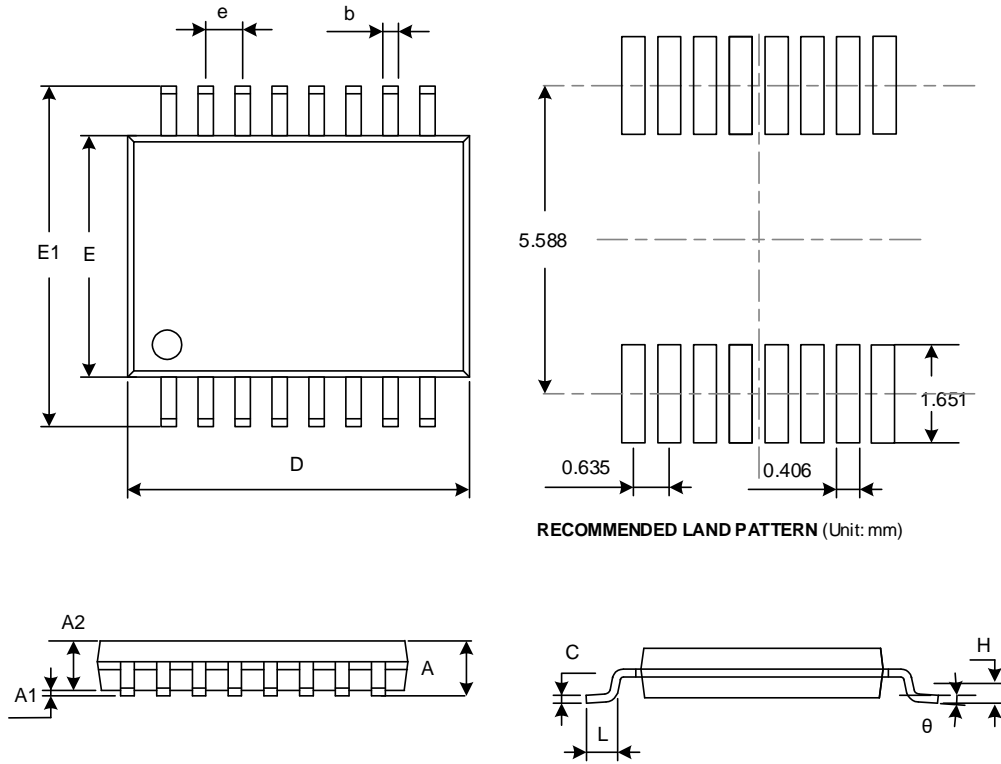


Figure 10. OFF Isolation ( $O_{iso}$ )

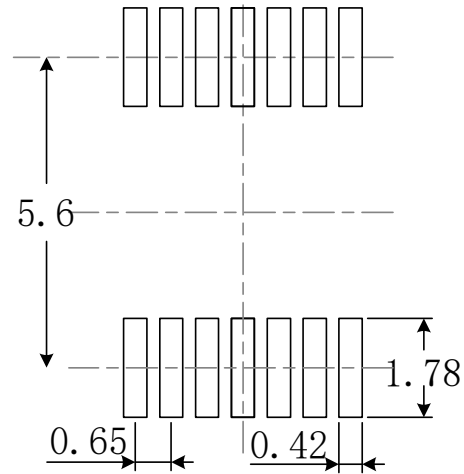
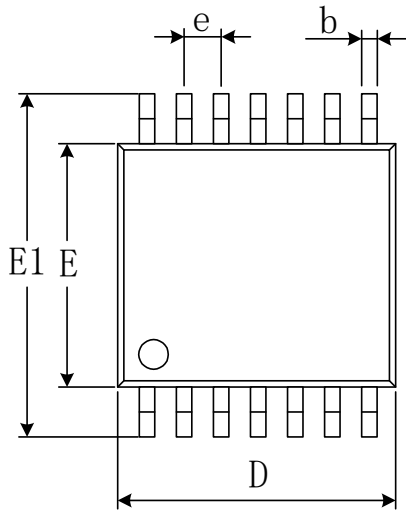
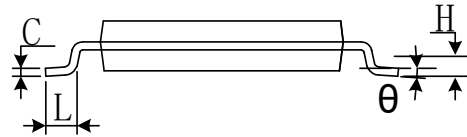
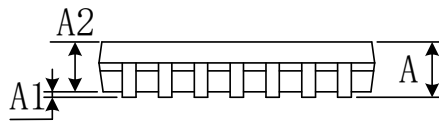
# 10 PACKAGE OUTLINE DIMENSIONS

## SSOP-16



RECOMMENDED LAND PATTERN (Unit: mm)

| Symbol   | Dimensions In Millimeters |       | Dimensions In Inches |       |
|----------|---------------------------|-------|----------------------|-------|
|          | Min                       | Max   | Min                  | Max   |
| A        | 1.350                     | 1.750 | 0.053                | 0.069 |
| A1       | 0.100                     | 0.250 | 0.004                | 0.010 |
| A2       | 1.350                     | 1.550 | 0.053                | 0.061 |
| b        | 0.200                     | 0.300 | 0.008                | 0.012 |
| c        | 0.170                     | 0.250 | 0.007                | 0.010 |
| D        | 4.700                     | 5.100 | 0.185                | 0.200 |
| E        | 3.800                     | 4.000 | 0.150                | 0.157 |
| E1       | 5.800                     | 6.200 | 0.228                | 0.244 |
| e        | 0.635(BSC)                |       | 0.025(BSC)           |       |
| L        | 0.400                     | 1.270 | 0.016                | 0.050 |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |

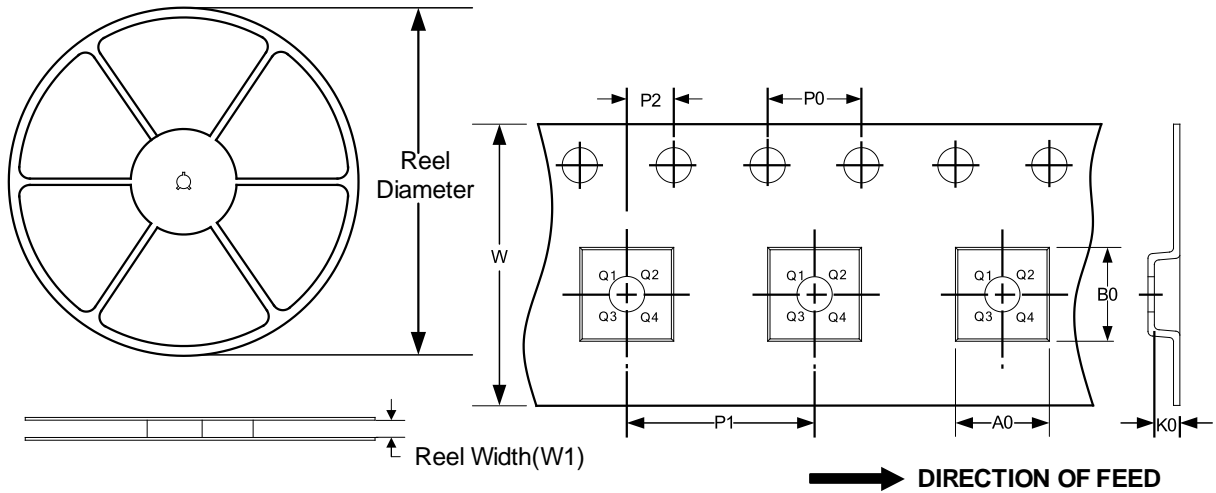
**TSSOP-14**

**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°    |

## 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 |
|--------------|---------------|----------------|---------|---------|---------|---------|---------|---------|--------|---------------|
| TSSOP-14     | 13"           | 12.4           | 6.95    | 5.60    | 1.20    | 4.0     | 8.0     | 2.0     | 14.0   | Q1            |
| SSOP-16      | 13"           | 12.4           | 8.30    | 6.70    | 2.10    | 4.0     | 8.0     | 2.0     | 12.0   | Q1            |