

# CMOS Single 8-Channel Analog Multiplexer/Demultiplexer

## 1 FEATURES

- **-3dB Bandwidth: 180MHz**
- **Single Supply Operation: +2.5V to +5.5V**
- **Low ON Resistance: 48Ω(TYP) With 5V Supply**
- **High Off-Isolation: -83dB (R<sub>L</sub> = 50Ω, f = 1MHz)**
- **Break-Before-Make Switching**
- **Binary Address Decoding on Chip**
- **Operating Temperature Range: -40°C to +125°C**
- **PACKAGES: SOP16, SSOP16, TSSOP16 and QFN3X3-16**

## 2 APPLICATIONS

- **Sensors**
- **Analog and Digital Multiplexing and Demultiplexing**
- **A/D and D/A Conversion**
- **Signal Gating**
- **Battery-Operated Equipment**
- **Factory Automation**
- **Appliances**
- **Communications Circuits**

## 3 DESCRIPTIONS

The RS2251 is a CMOS analog IC configured as an 8-channel multiplexer. This CMOS device can operate from 2.5 V to 5.5 V.

The RS2251 device are digitally-controlled analog switches. It has low on-resistance (48Ω TYP) and very low off-leakage current (1nA TYP).

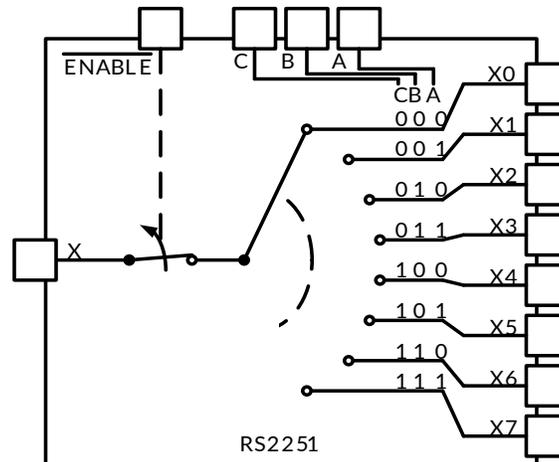
The RS2251 is available in Green SOP16, SSOP16, TSSOP16 and QFN3X3-16 packages. It operates over an ambient temperature range of -40°C to +125°C.

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

| PART NUMBER | PACKAGE   | BODY SIZE (NOM) |
|-------------|-----------|-----------------|
| RS2251      | SOP16     | 9.90mm×3.91mm   |
|             | SSOP16    | 4.90mm×3.90mm   |
|             | TSSOP16   | 5.00mm×4.40mm   |
|             | QFN3X3-16 | 3.00mm×3.00mm   |

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

## 4 Functional Diagrams of RS2251



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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.4     | 2020/11/17  | official version datasheet  |
| C.5     | 2024/01/03  | 1.Added the TAPE AND REEL INFORMATION<br>2.Update PIN DESCRIPTION on Page 2@RevC.4<br>3.Add MSL on Page 4@RevC.4<br>4.Update ELECTRICAL CHARACTERISTICS |
| C.5.1   | 2024/03/08  | Modify packaging naming   |

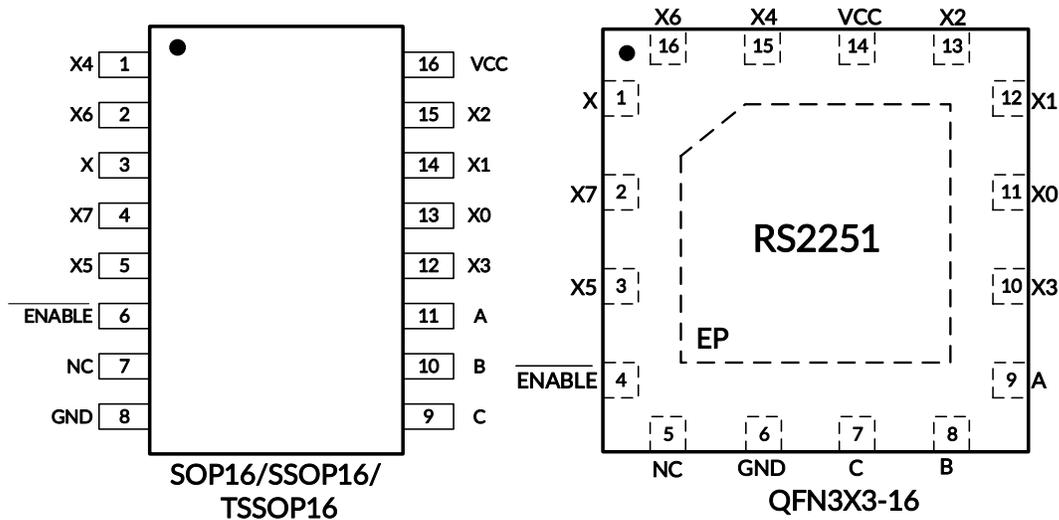
**6 PACKAGE/ORDERING INFORMATION (1)**

| PRODUCT | ORDERING NUMBER | TEMPERATURE RANGE | PACKAGE LEAD | PACKAGE MARKING (2) | MSL (3) | PACKAGE OPTION     |
|---------|-----------------|-------------------|--------------|---------------------|---------|--------------------|
| RS2251  | RS2251XS16      | -40°C ~+125°C     | SOP16        | RS2251              | MSL3    | Tape and Reel,4000 |
|         | RS2251XSS16     | -40°C ~+125°C     | SSOP16       | RS2251              | MSL3    | Tape and Reel,4000 |
|         | RS2251XTSS16    | -40°C ~+125°C     | TSSOP16      | RS2251              | MSL3    | Tape and Reel,4000 |
|         | RS2251XTQC16    | -40°C ~+125°C     | QFN3X3-16    | RS2251              | MSL3    | Tape and Reel,5000 |

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

## 7 PIN CONFIGURATIONS (TOP VIEW)



### 7.1 PIN DESCRIPTION

| NAME   | PIN                      |                       | FUNCTION   |
|--------|--------------------------|-----------------------|--|
|        | SOP16/SSOP16/<br>TSSOP16 | QFN3X3-16             |  |
| X0-X7  | 13,14,15,12,1,5,2,4      | 11,12,13,10,15,3,16,2 | Analog Switch Inputs or Outputs X0-X7.           |
| X      | 3                        | 1                     | Analog Switch "X" Input or Output.               |
| Vcc    | 16                       | 14                    | Positive Analog and Digital Supply Voltage Input |
| A      | 11                       | 9                     | Digital Address "A" Input.                       |
| B      | 10                       | 8                     | Digital Address "B" Input.                       |
| C      | 9                        | 7                     | Digital Address "C" Input.                       |
| GND    | 8                        | 6                     | Ground. Connect to digital ground.               |
| NC     | 7                        | 5                     | No Connect.                                      |
| ENABLE | 6                        | 4                     | Digital Enable Input. Normally connected to GND. |
| EP     | —                        | Exposed Pad           | Exposed Pad. Connect EP to GND.                  |

### 7.2 FUNCTION TABLE

| ENABLE INPUT | INPUT STATES |   |   | ON CHANNEL(S) |
|--------------|--------------|---|---|---------------|
|              | C            | B | A |               |
| 1            | X            | X | X | NONE          |
| 0            | 0            | 0 | 0 | X0            |
| 0            | 0            | 0 | 1 | X1            |
| 0            | 0            | 1 | 0 | X2            |
| 0            | 0            | 1 | 1 | X3            |
| 0            | 1            | 0 | 0 | X4            |
| 0            | 1            | 0 | 1 | X5            |
| 0            | 1            | 1 | 0 | X6            |
| 0            | 1            | 1 | 1 | X7            |

X=Don't care

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.

## 8 SPECIFICATIONS

### 8.1 Absolute Maximum Ratings

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

| SYMBOL            | PARAMETER                                |   | MIN       | MAX                  | UNIT |      |
|-------------------|--|---|-----------|----------------------|------|------|
| V <sub>CC</sub>   | Supply Voltage                           |   | -0.3      | 6                    | V    |      |
| V <sub>IN</sub>   | Input Voltage (All inputs)               |   | -0.3      | V <sub>CC</sub> +0.3 |      |      |
| I <sub>IN</sub>   | Switch Input Current                     | Any one input                           | -20       | +20                  | mA   |      |
| I <sub>PEAK</sub> | Peak Switch Current                      | Pulsed at 1ms Duration, <10% Duty Cycle | -40       | +40                  |      |      |
| θ <sub>JA</sub>   | Package thermal impedance <sup>(2)</sup> |   | SOP16     |                      | 150  | °C/W |
|                   |  |   | SSOP16    |                      | 110  |      |
|                   |  |   | TSSOP16   |                      | 45   |      |
|                   |  |   | QFN3X3-16 |                      | 70   |      |
| T <sub>J</sub>    | Junction Temperature <sup>(3)</sup>      |   | -40       | 150                  | °C   |      |
| T <sub>stg</sub>  | 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<sub>J(MAX)</sub>, R<sub>θJA</sub>, and T<sub>A</sub>. The maximum allowable power dissipation at any ambient temperature is P<sub>D</sub> = (T<sub>J(MAX)</sub> - T<sub>A</sub>) / R<sub>θJA</sub>. 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 <sub>(ESD)</sub> | Electrostatic discharge | Human-body model (HBM) | ±3000 | V    |
|                    |                         | Machine Model (MM)     | ±200  | 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 <sub>CC</sub> | Supply Voltage        | 2.5 | 5.5  | V    |
| T <sub>A</sub>  | Operating temperature | -40 | +125 | °C   |

## 8.4 ELECTRICAL CHARACTERISTICS

V<sub>CC</sub>= 5.0 V or 3.3V, FULL= -40°C to +125°C Typical values are at T<sub>A</sub> = +25°C (unless otherwise noted)

| PARAMETER                                       | SYMBOL  | CONDITIONS   | V <sub>CC</sub> | T <sub>A</sub> | MIN <sup>(2)</sup> | TYP <sup>(3)</sup> | MAX <sup>(2)</sup> | UNIT |
|---|---|--|-----------------|----------------|--------------------|--------------------|--------------------|------|
| <b>ANALOG SWITCH</b>                            |   |  |                 |                |                    |                    |                    |      |
| Analog Signal Range                             | V <sub>X-</sub> , V <sub>X</sub>  |  |                 | FULL           | GND                |                    | V <sub>CC</sub>    | V    |
| On-Resistance                                   | R <sub>ON</sub>   | V <sub>CC</sub> =5V, I <sub>X</sub> =1mA   | 5V              | +25°C          |                    | 48                 | 58                 | Ω    |
|   |   |  |                 | FULL           |                    |                    | 67                 | Ω    |
|   |   | V <sub>CC</sub> =3.3V, I <sub>X</sub> =1mA   | 3.3V            | +25°C          |                    | 100                | 130                | Ω    |
|   |   |  |                 | FULL           |                    |                    | 140                | Ω    |
| On-Resistance Match Between Channels            | ΔR <sub>ON</sub>  | V <sub>CC</sub> =5V, I <sub>X</sub> =1mA Switch ON                                       | 5V              | +25°C          |                    | 1.5                | 5                  | Ω    |
|   |   |  |                 | FULL           |                    |                    | 5.3                | Ω    |
| On-Resistance Flatness                          | R <sub>FLAT(ON)</sub>   | V <sub>CC</sub> =5V, I <sub>X</sub> =1mA Switch ON                                       | 5V              | +25°C          |                    | 17                 | 25                 | Ω    |
|   |   |  |                 | FULL           |                    |                    | 28                 | Ω    |
| X <sub>-</sub> Off, X Off, X On Leakage Current | I <sub>X(OFF)</sub> , I <sub>X(OFF)</sub><br>I <sub>X(ON)</sub>                 | V <sub>CC</sub> =5V, V <sub>X-</sub> =4.5V or 0V<br>V <sub>X</sub> =4.5V or 0V           | 5V              | +25°C          |                    | 1                  | 1000               | nA   |
|   |   | V <sub>CC</sub> =3.3V, V <sub>X-</sub> =1V or 3V<br>V <sub>X</sub> =3V or 1V             | 3.3V            | +25°C          |                    | 1                  | 1000               | nA   |
| <b>DIGITAL CONTROL INPUTS <sup>(1)</sup></b>    |   |  |                 |                |                    |                    |                    |      |
| Logic Input Logic Threshold High                | V <sub>AH</sub> , V <sub>BH</sub> , V <sub>CH</sub> ,<br>V <sub>ENABLE(H)</sub> |  | 5V              | +25°C          | 1.7                |                    |                    | V    |
|   |   |  | 3.3V            | +25°C          | 1.7                |                    |                    | V    |
| Logic Input Logic Threshold Low                 | V <sub>AL</sub> , V <sub>BL</sub> , V <sub>CL</sub> ,<br>V <sub>ENABLE(L)</sub> |  | 5V              | +25°C          |                    |                    | 0.5                | V    |
|   |   |  | 3.3V            | +25°C          |                    |                    | 0.5                | V    |
| Input-Current High                              | I <sub>AH</sub> , I <sub>BH</sub> , I <sub>CH</sub> ,<br>I <sub>ENABLE(H)</sub> | V <sub>A</sub> , V <sub>B</sub> , V <sub>C</sub> , V <sub>ENABLE</sub> = V <sub>CC</sub> | 3.3V to 5V      | +25°C          |                    | 1                  | 1000               | nA   |
| Input-Current Low                               | I <sub>AL</sub> , I <sub>BL</sub> , I <sub>CL</sub> ,<br>I <sub>ENABLE(L)</sub> | V <sub>A</sub> , V <sub>B</sub> , V <sub>C</sub> , V <sub>ENABLE</sub> = 0V              | 3.3V to 5V      | +25°C          |                    | 1                  | 1000               | nA   |

(1) All unused digital inputs of the device must be held at V<sub>CC</sub> 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<sub>CC</sub> = 5.0 V or 3.3V, FULL = -40°C to +125°C Typical values are at T<sub>A</sub> = +25°C (unless otherwise noted)

| PARAMETER                      | SYMBOL              | CONDITIONS  | V <sub>CC</sub> | T <sub>A</sub> | MIN | TYP   | MAX | UNIT |
|--------------------------------|---------------------|---|-----------------|----------------|-----|-------|-----|------|
| <b>DYNAMIC CHARACTERISTICS</b> |                     |   |                 |                |     |       |     |      |
| Address Transition Time        | t <sub>TRANS</sub>  | V <sub>X-</sub> = 3V/0V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, See Figure 2                                   | 5V              | +25°C          |     | 150   |     | ns   |
|                                |                     | V <sub>X-</sub> = 3V/0V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, See Figure 2                                   | 3.3V            | +25°C          |     | 230   |     | ns   |
| ENABLE Turn-On Time            | t <sub>ON</sub>     | V <sub>X-</sub> = 3V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, See Figure 3                                      | 5V              | +25°C          |     | 65    |     | ns   |
|                                |                     |   | 3.3V            |                |     | 110   |     |      |
| ENABLE Turn-Off Time           | t <sub>OFF</sub>    | V <sub>X-</sub> = 3V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, See Figure 3                                      | 5V              | +25°C          |     | 80    |     | ns   |
|                                |                     |   | 3.3V            |                |     | 130   |     |      |
| Break-Before-Make Time Delay   | t <sub>D</sub>      | V <sub>X-</sub> = 3V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, See Figure 4                                      | 5V              | +25°C          |     | 60    |     | ns   |
|                                |                     |   | 3.3V            | +25°C          |     | 90    |     | ns   |
| Charge Injection               | Q                   | R <sub>S</sub> = 0Ω, C <sub>L</sub> = 1nF, See Figure 5   | 5V              | +25°C          |     | 6     |     | pC   |
|                                |                     | R <sub>S</sub> = 0Ω, C <sub>L</sub> = 1nF, See Figure 5   | 3.3V            | +25°C          |     | 4     |     | pC   |
| Off Isolation                  | O <sub>ISO</sub>    | R <sub>L</sub> = 50Ω, f = 1MHz, See Figure 6  | 5V              | +25°C          |     | -83   |     | dB   |
| -3dB Bandwidth                 | BW                  | R <sub>L</sub> = 50Ω  | 5V              | +25°C          |     | 180   |     | MHz  |
|                                |                     |   | 3.3V            | +25°C          |     | 180   |     | MHz  |
| Input Off-Capacitance          | C <sub>X(OFF)</sub> | V <sub>X-</sub> = 0V, f = 1MHz, See Figure 7  | 5V              | +25°C          |     | 4     |     | pF   |
| Output Off-Capacitance         | C <sub>X(OFF)</sub> | V <sub>X-</sub> = 0V, f = 1MHz, See Figure 7  | 5V              | +25°C          |     | 10    |     | pF   |
| Output On- Capacitance         | C <sub>X(ON)</sub>  | V <sub>X-</sub> = 0V, f = 1MHz, See Figure 7  | 5V              | +25°C          |     | 16    |     | pF   |
| Total Harmonic Distortion      | THD                 | R <sub>L</sub> = 600Ω, f = 20Hz to 20kHz  | 5V              | +25°C          |     | 1.4   |     | %    |
| <b>POWER REQUIREMENTS</b>      |                     |   |                 |                |     |       |     |      |
| Power Supply Range             | V <sub>CC</sub>     |   |                 | FULL           | 2.5 |       | 5.5 | V    |
| Power Supply Current           | I <sub>CC</sub>     | V <sub>CC</sub> = 5.0V, V <sub>A</sub> , V <sub>B</sub> , V <sub>C</sub> , V <sub>ENABLE</sub> = V <sub>CC</sub> or 0 | 5V              | +25°C          |     | 0.001 | 6   | μA   |
|                                |                     | V <sub>CC</sub> = 3.3V, V <sub>A</sub> , V <sub>B</sub> , V <sub>C</sub> , V <sub>ENABLE</sub> = V <sub>CC</sub> or 0 | 3.3V            | +25°C          |     | 0.001 | 3   | 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.

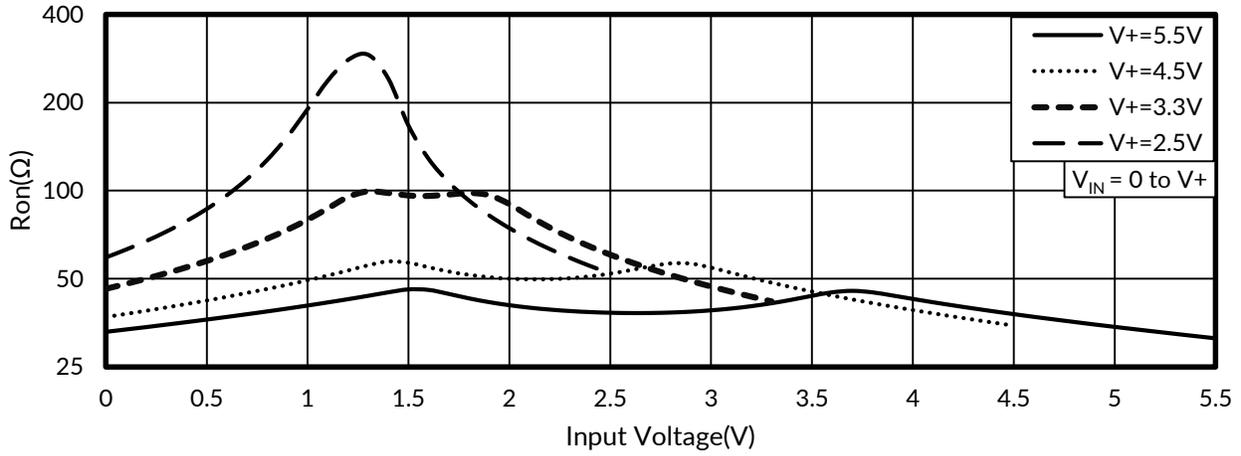
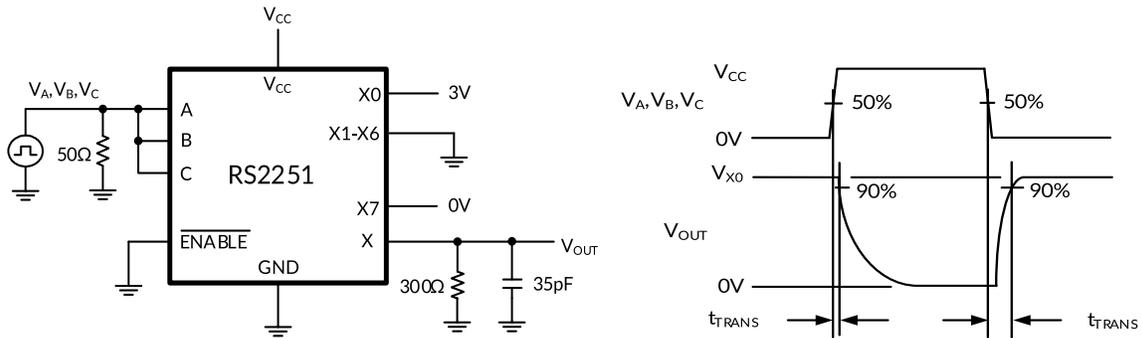
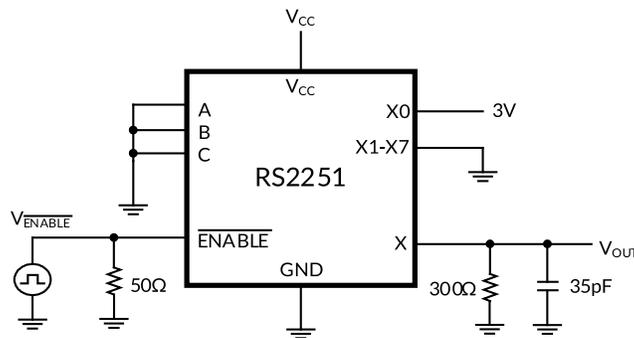


Figure 1. Typical Ron as a Function of Input Voltage

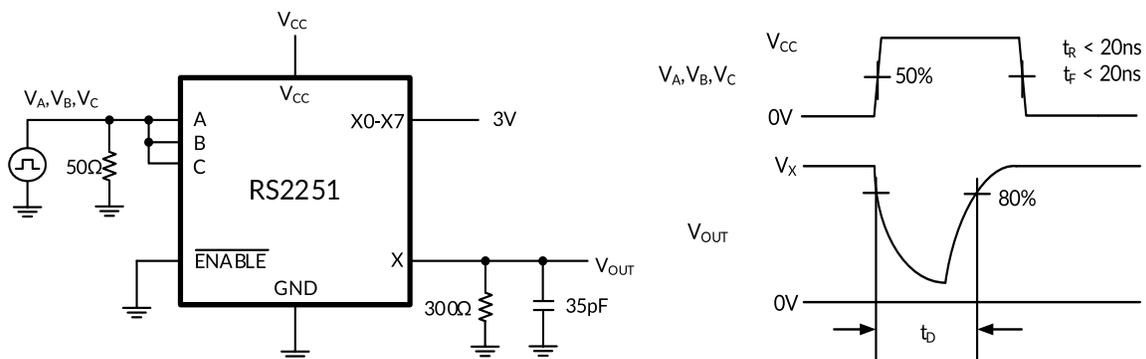
## 9 Parameter Measurement Information



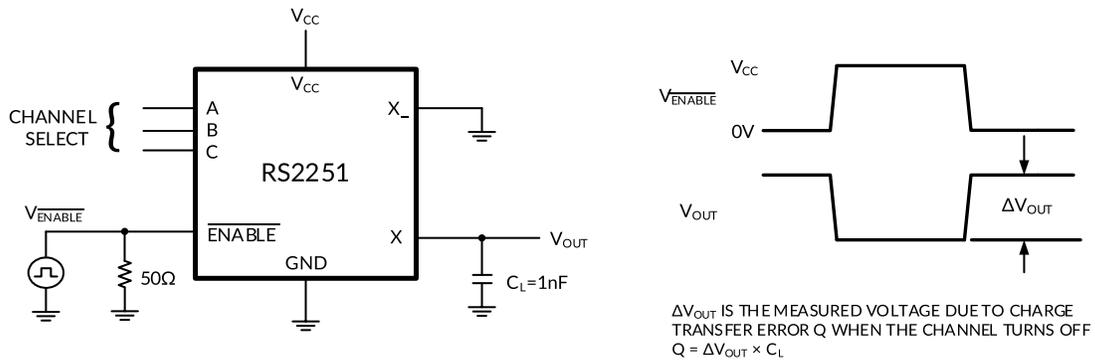
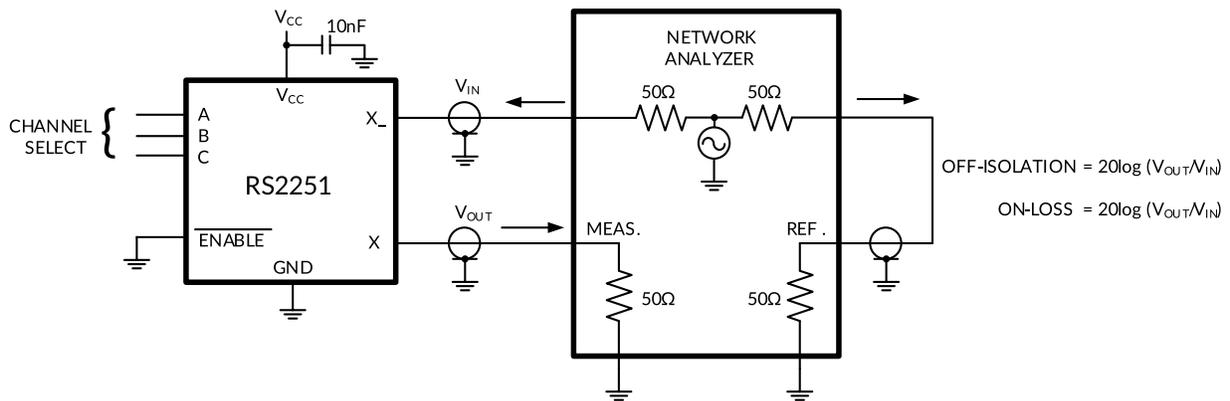
**Figure 2. Address Transition Times ( $t_{TRANS}$ )**



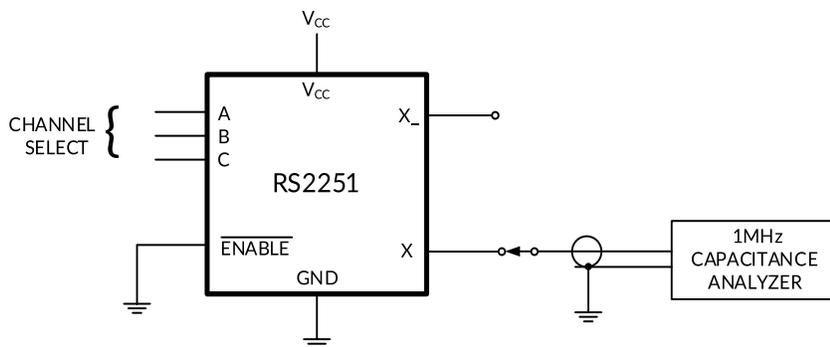
**Figure 3. Switching Times ( $t_{ON}$ ,  $t_{OFF}$ )**



**Figure 4. Break-Before-Make Time Delay ( $t_D$ )**

**Parameter Measurement Information (continued)**

**Figure 5. Charge Injection (Q)**


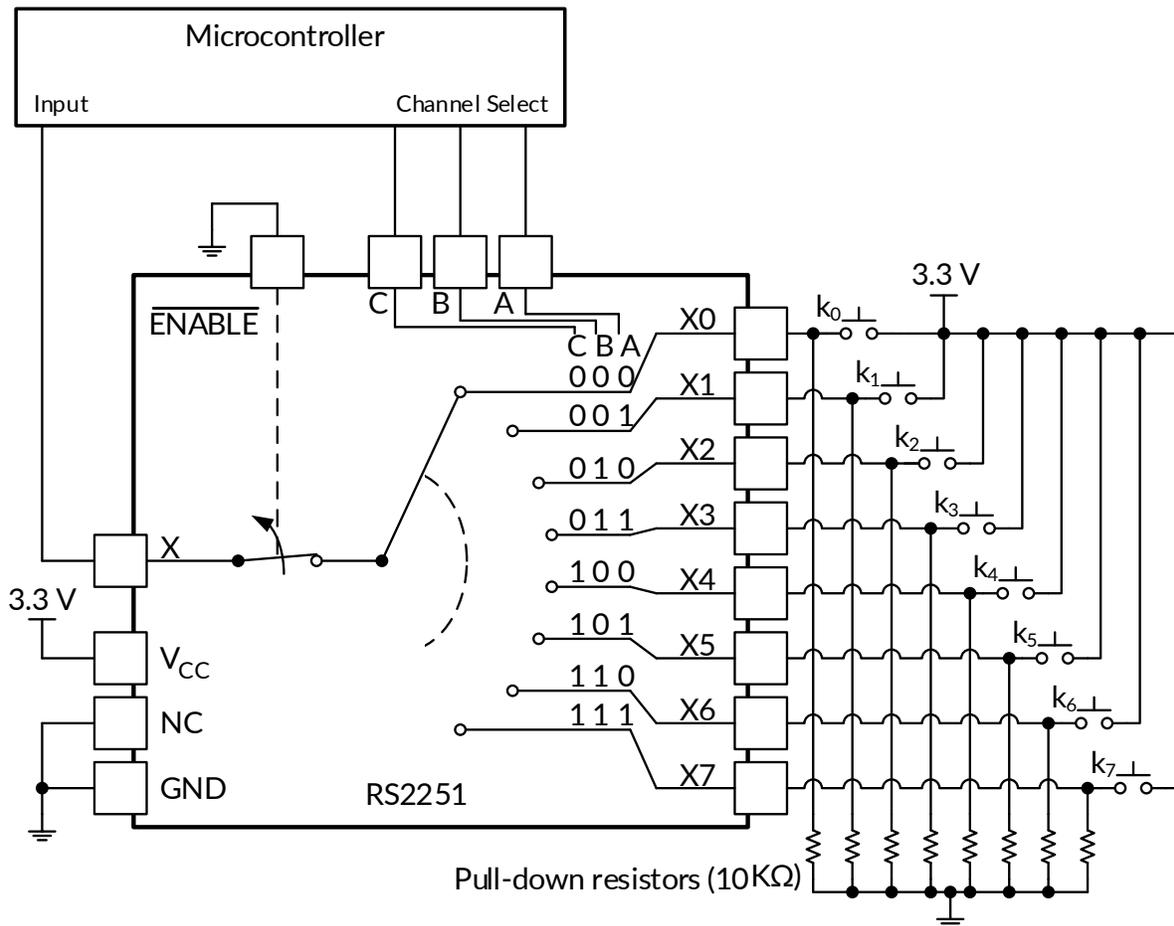
MEASUREMENTS ARE STANDARDIZED AGAINST SHORT AT SOCKET TERMINALS .  
 OFF-ISOLATION IS MEASURED BETWEEN COM AND "OFF" NO TERMINAL ON EACH SWITCH .  
 ON-LOSS IS MEASURED BETWEEN COM AND "ON" NO TERMINAL ON EACH SWITCH .  
 SIGNAL DIRECTION THROUGH SWITCH IS REVERSED ; WORST VALUES ARE RECORDED .

**Figure 6. Off Isolation, On Loss**

**Figure 7. Capacitance**

## 10 APPLICATION NOTES

The RS2251 device is a single 8-channel multiplexer having three binary control inputs, A, B, and C, and an inhibit input. The three binary signals select 1 of 8 channels to be turned on and connect one of the 8 inputs to the output.

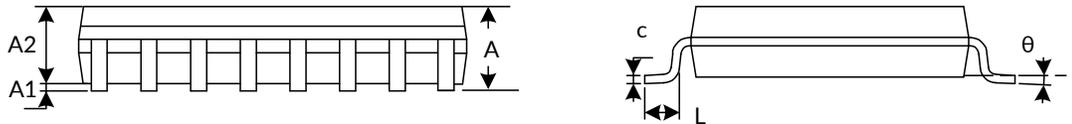
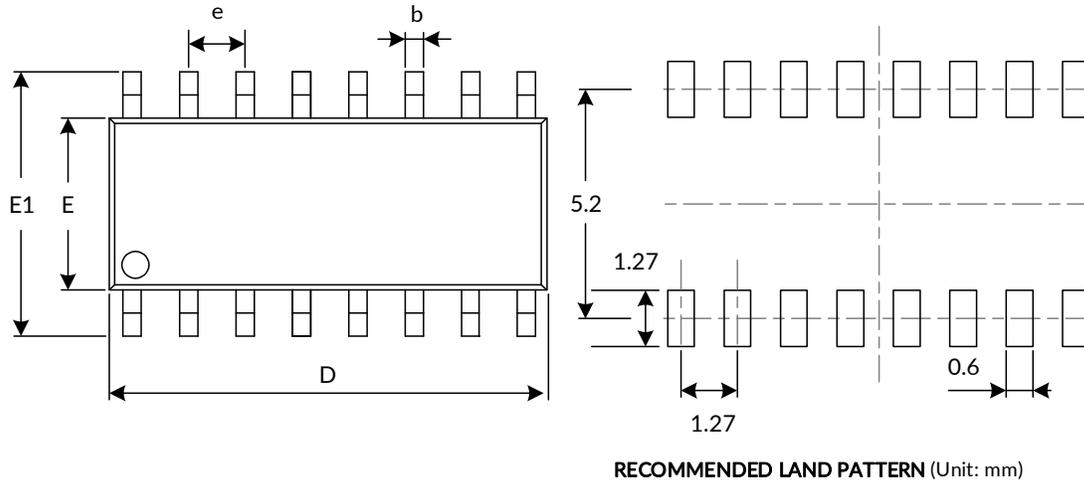
One application of the RS2251 is to use it in conjunction with a microcontroller to poll a keypad. Figure 8 shows the basic schematic for such a polling system. The microcontroller uses the channel select pins to cycle through the different channels while reading the input to see if a user is pressing any of the keys. This is a very robust setup, allowing for multiple simultaneous key-presses with very little power consumption. It also utilizes very few pins on the microcontroller. The down side of polling is that the microcontroller must continually scan the keys for a press and can do little else during this process.



**Figure 8. The RS2251 Being Used to Help Read Button Presses on a Keypad.**

# 11 PACKAGE OUTLINE DIMENSIONS

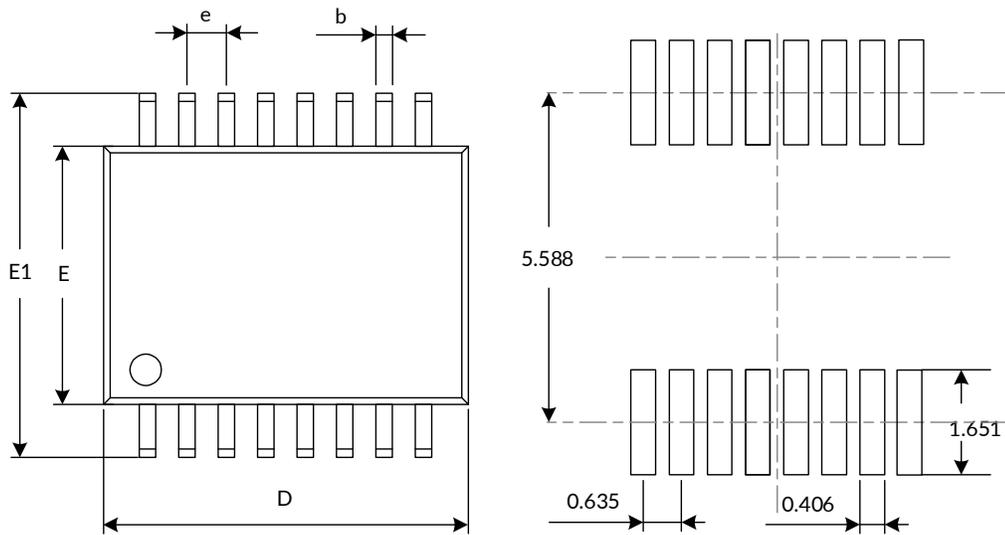
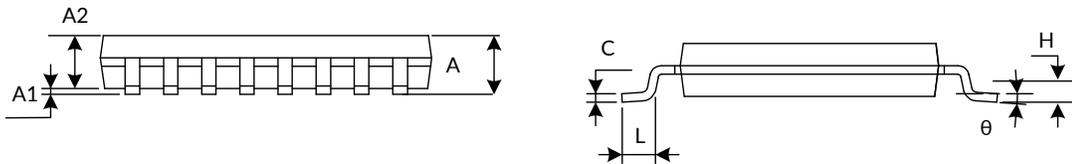
## SOP16<sup>(3)</sup>



| Symbol           | Dimensions In Millimeters |        | Dimensions In Inches      |       |
|------------------|---------------------------|--------|---------------------------|-------|
|                  | Min                       | Max    | Min                       | Max   |
| A <sup>(1)</sup> | 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                | 0.330                     | 0.510  | 0.013                     | 0.020 |
| c                | 0.170                     | 0.250  | 0.006                     | 0.010 |
| D <sup>(1)</sup> | 9.800                     | 10.200 | 0.386                     | 0.402 |
| E <sup>(1)</sup> | 3.800                     | 4.000  | 0.150                     | 0.157 |
| E1               | 5.800                     | 6.200  | 0.228                     | 0.244 |
| e                | 1.27(BSC) <sup>(2)</sup>  |        | 0.050(BSC) <sup>(2)</sup> |       |
| L                | 0.400                     | 1.270  | 0.016                     | 0.050 |
| θ                | 0°                        | 8°     | 0°                        | 8°    |

**NOTE:**

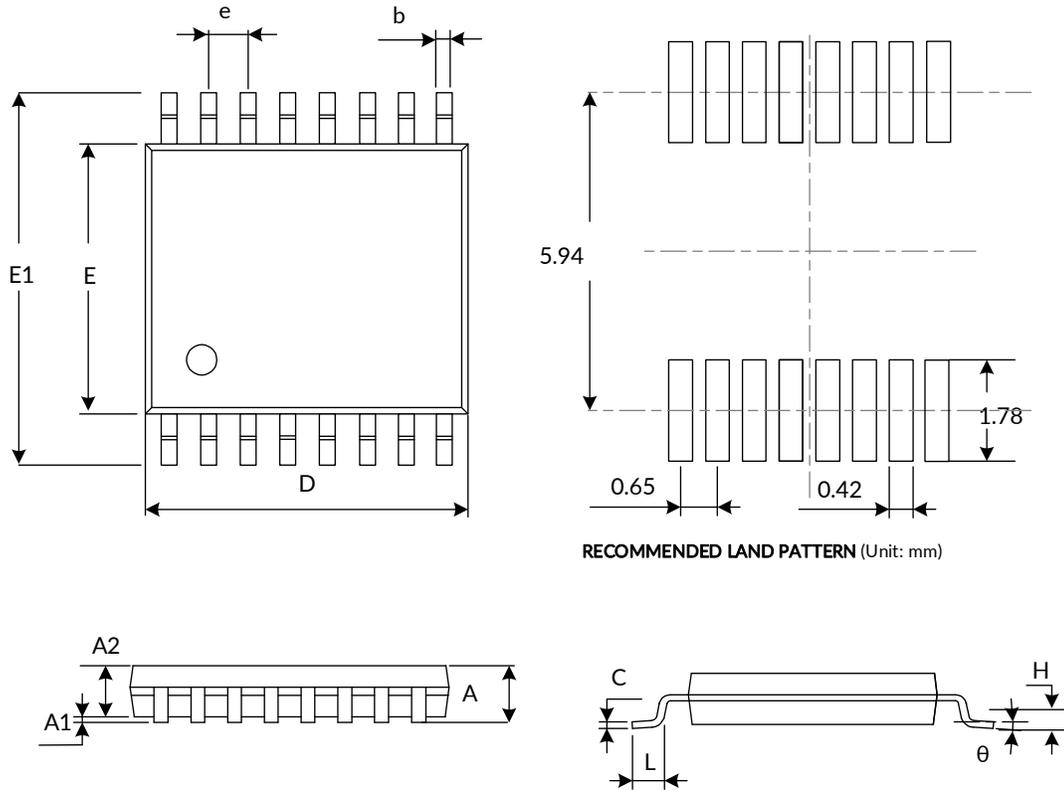
1. Plastic or metal protrusions of 0.15mm maximum per side are not included.
2. BSC (Basic Spacing between Centers), "Basic" spacing is nominal.
3. This drawing is subject to change without notice.

**SSOP16 (3)**

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


| Symbol           | Dimensions In Millimeters |       | Dimensions In Inches      |       |
|------------------|---------------------------|-------|---------------------------|-------|
|                  | Min                       | Max   | Min                       | Max   |
| A <sup>(1)</sup> | 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 <sup>(1)</sup> | 4.700                     | 5.100 | 0.185                     | 0.200 |
| E <sup>(1)</sup> | 3.800                     | 4.000 | 0.150                     | 0.157 |
| E1               | 5.800                     | 6.200 | 0.228                     | 0.244 |
| e                | 0.635(BSC) <sup>(2)</sup> |       | 0.025(BSC) <sup>(2)</sup> |       |
| L                | 0.400                     | 1.270 | 0.016                     | 0.050 |
| θ                | 0°                        | 8°    | 0°                        | 8°    |

**NOTE:**

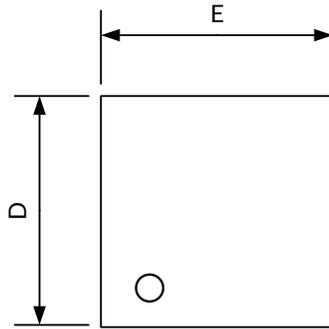
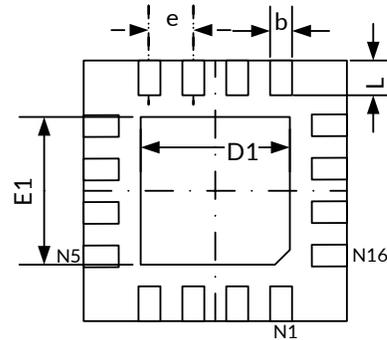
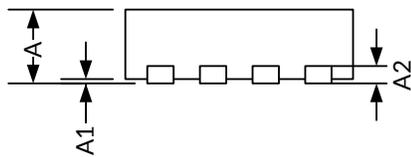
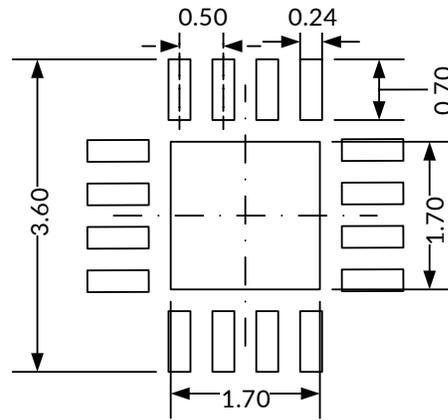
1. Plastic or metal protrusions of 0.15mm maximum per side are not included.
2. BSC (Basic Spacing between Centers), "Basic" spacing is nominal.
3. This drawing is subject to change without notice.

**TSSOP16 (3)**

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

| Symbol           | Dimensions In Millimeters |       | Dimensions In Inches      |       |
|------------------|---------------------------|-------|---------------------------|-------|
|                  | Min                       | Max   | Min                       | Max   |
| A <sup>(1)</sup> |                           | 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 <sup>(1)</sup> | 4.860                     | 5.100 | 0.191                     | 0.201 |
| E <sup>(1)</sup> | 4.300                     | 4.500 | 0.169                     | 0.177 |
| E1               | 6.200                     | 6.600 | 0.244                     | 0.260 |
| e                | 0.650(BSC) <sup>(2)</sup> |       | 0.026(BSC) <sup>(2)</sup> |       |
| L                | 0.500                     | 0.700 | 0.02                      | 0.028 |
| H                | 0.25TYP                   |       | 0.01TYP                   |       |
| 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.

**QFN3X3-16<sup>(2)</sup>**

**TOP VIEW**

**BOTTOM VIEW**

**SIDE VIEW**

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

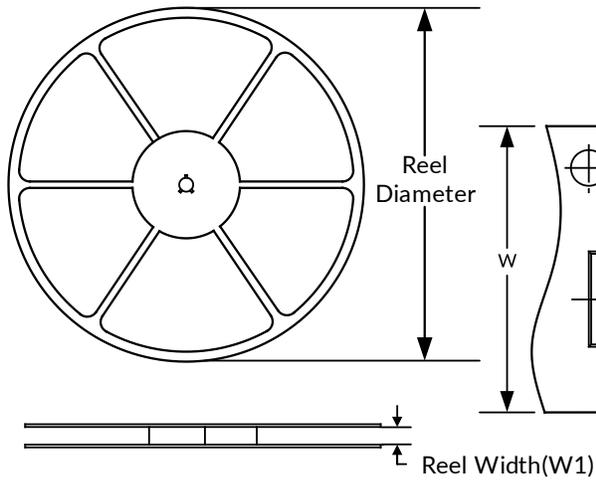
| Symbol           | Dimensions In Millimeters |       | Dimensions In Inches |       |
|------------------|---------------------------|-------|----------------------|-------|
|                  | Min                       | Max   | Min                  | Max   |
| A <sup>(1)</sup> | 0.700                     | 0.800 | 0.028                | 0.031 |
| A1               | 0.000                     | 0.050 | 0.000                | 0.002 |
| A2               | 0.203                     |       | 0.008                |       |
| b                | 0.180                     | 0.300 | 0.007                | 0.012 |
| D <sup>(1)</sup> | 2.900                     | 3.100 | 0.114                | 0.122 |
| D1               | 1.600                     | 1.800 | 0.063                | 0.071 |
| E <sup>(1)</sup> | 2.900                     | 3.100 | 0.114                | 0.122 |
| E1               | 1.600                     | 1.800 | 0.063                | 0.071 |
| e                | 0.500 TYP                 |       | 0.020 TYP            |       |
| L                | 0.300                     | 0.500 | 0.012                | 0.020 |

**NOTE:**

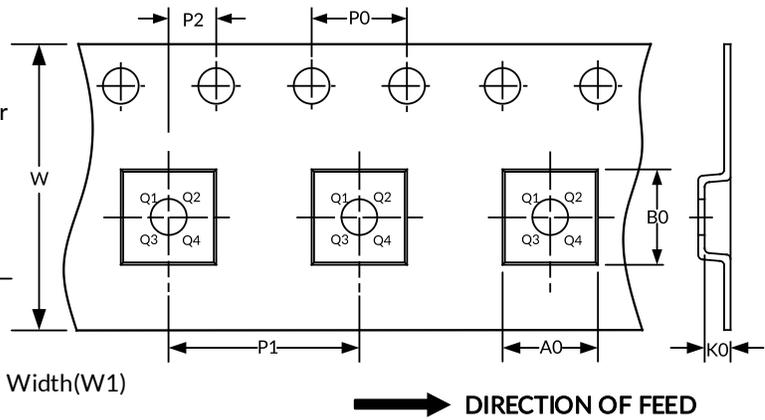
1. Plastic or metal protrusions of 0.075mm maximum per side are not included.
2. This drawing is subject to change without notice.

## 12 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 |
|--------------|---------------|----------------|---------|---------|---------|---------|---------|---------|--------|---------------|
| SOP16        | 13"           | 16.4           | 6.50    | 10.30   | 2.10    | 4.0     | 8.0     | 2.0     | 16.0   | Q1            |
| SSOP16       | 13"           | 12.4           | 8.30    | 6.70    | 2.10    | 4.0     | 8.0     | 2.0     | 12.0   | Q1            |
| TSSOP16      | 13"           | 12.4           | 6.90    | 5.60    | 1.20    | 4.0     | 8.0     | 2.0     | 12.0   | Q1            |
| QFN3X3-16    | 13"           | 12.4           | 3.35    | 3.35    | 1.13    | 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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