

## 0.1-8.2 GHz SPDT Switch

### Features

- Broadband frequency range: 0.1 to 8.2GHz
- Large supply voltage range: 1.65V to 3.3V
- Low insertion loss: 0.40dB typical @ 2.4 GHz
- Low insertion loss: 0.50dB typical @ 5.8 GHz
- High isolation: 37 dB @ 2.4 GHz
- High  $P_{0.1dB}$  of 32 dBm
- DFN 1.0 mm x 1.0 mm x 0.45 mm-6L package

### Applications

- IEEE 802.11a/b/g/n/ac/ax/be WLAN Networks
- ISM band radios
- WLAN repeaters
- Low power transmit receive systems
- Smartphones

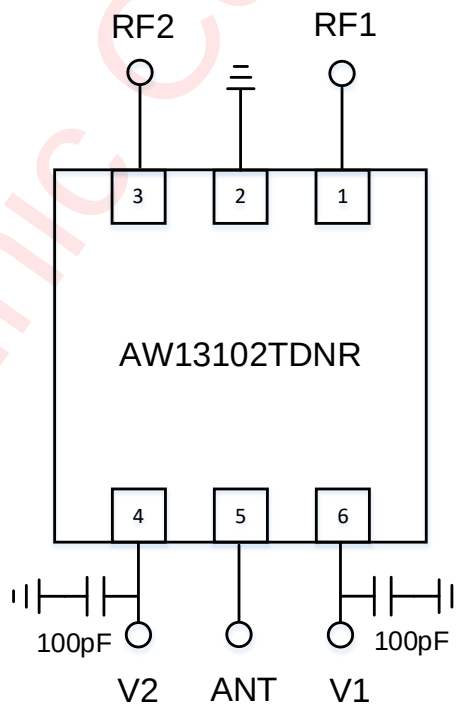
### General Description

The AW13102TDNR is a Silicon-On-Insulator(SOI) SPDT switch with low insertion loss, high isolation and high linearity at low supply voltage. It can be used to support mode switching in WLAN applications.

The symmetrical design of internal ports makes it convenient for PCB routing and adjustment of receiving and transmitting signals. The mode switching is realized by the GPIO pins as referenced in the chip block diagram and the control logic.

The AW13102TDNR is provided in a compact DFN 1.0 mm x 1.0 mm x 0.45 mm-6L package.

### Typical Application Circuit



**Figure 1** Typical Application Circuit of AW13102TDNR

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## Pin Configuration And Top Mark

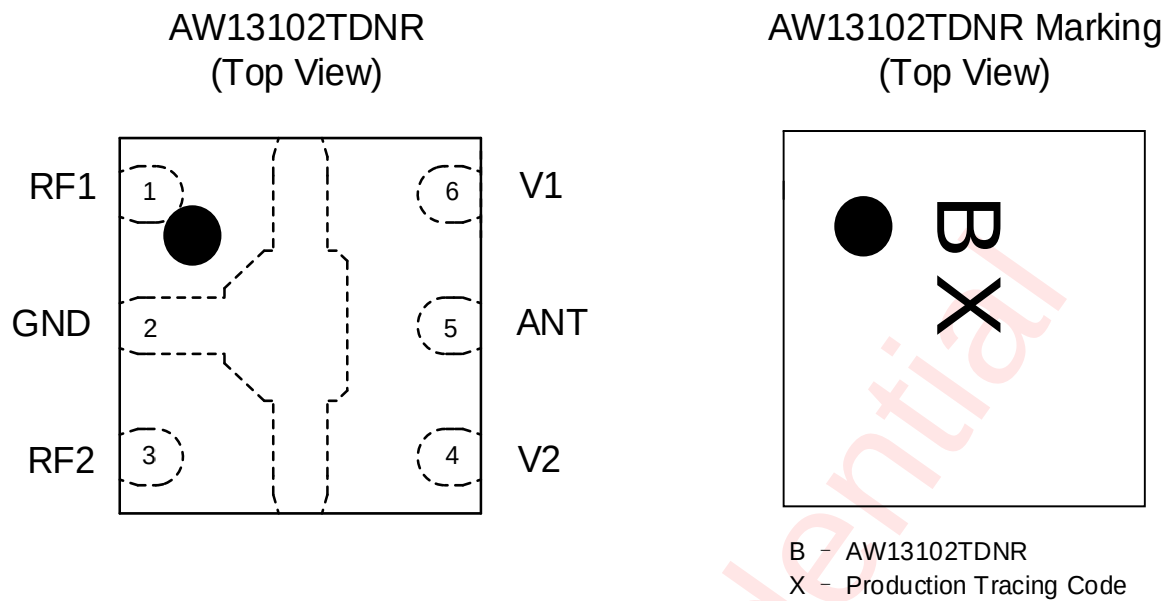


Figure 2 Pin Configuration and Top Mark

## Pin Definition

| No. | NAME | DESCRIPTION         |
|-----|------|---------------------|
| 1   | RF1  | RF I/O path 1       |
| 2   | GND  | Ground              |
| 3   | RF2  | RF I/O path 2       |
| 4   | V2   | DC control voltage2 |
| 5   | ANT  | Antenna port        |
| 6   | V1   | DC control voltage1 |

## Functional Block Diagram

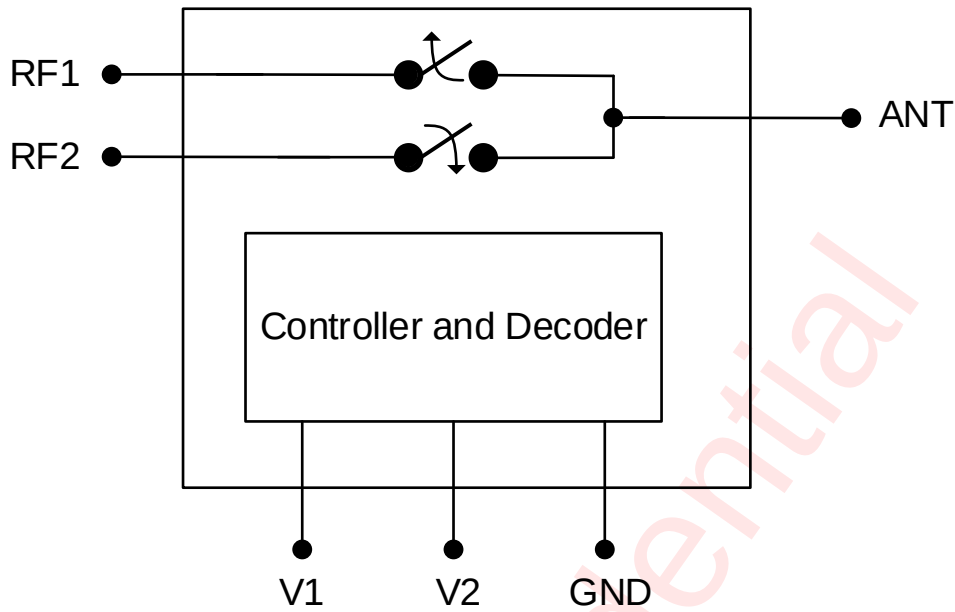


Figure 3 Functional Block Diagram

## Ordering Information

| Part Number | Temperature | Package                          | Marking | Moisture Sensitivity Level | Environmental Information | Delivery Form                |
|-------------|-------------|----------------------------------|---------|----------------------------|---------------------------|------------------------------|
| AW13102TDNR | -40°C~90°C  | DFN<br>1.0mmX1.0mm<br>X0.45mm-6L | B       | MSL1                       | ROHS+HF                   | 3000 units/<br>Tape and Reel |

**Absolute Maximum Ratings**<sup>(NOTE1)</sup>

| PARAMETERS                              |       | RANGE          |
|-----------------------------------------|-------|----------------|
| Control Voltage Range                   | V1,V2 | -0.3V to 3.6V  |
| RF input power(RF1/RF2)                 |       | 32 dBm         |
| Operating Free-air Temperature Range    |       | -40°C to 90°C  |
| Storage Temperature T <sub>STG</sub>    |       | -65°C to 150°C |
| Lead Temperature (Soldering 10 Seconds) |       | 260°C          |
| ESD (NOTE 2)                            |       |                |
| HBM                                     |       | ±1000V         |
| CDM                                     |       | ±500V          |

NOTE1: Conditions out of those ranges listed in "absolute maximum ratings" may cause permanent damages to the device. In spite of the limits above, functional operation conditions of the device should within the ranges listed in "recommended operating conditions". Exposure to absolute-maximum-rated conditions for prolonged periods may affect device reliability.

NOTE2: The human body model is a 100pF capacitor discharged through a 1.5kΩ resistor into each pin. HBM Test method: ESDA/JEDEC JS-001-2017. CDM Test method: ESDA/JEDEC JS-002-2018.

## Electrical Characteristics

V1=3.3V/0V, V2=0V/3.3V, PIN=0dBm, TEMP=+25°C, Z<sub>0</sub>=50Ω. (unless otherwise noted)

| PARAMETER                |                                              | TEST CONDITION                                                                         | MIN                              | TYP                                         | MAX                                         | UNIT |
|--------------------------|----------------------------------------------|----------------------------------------------------------------------------------------|----------------------------------|---------------------------------------------|---------------------------------------------|------|
| <b>DC Specifications</b> |                                              |                                                                                        |                                  |                                             |                                             |      |
| VCTL_H<br>VCTL_L         | Control Voltage<br>High<br>Low               |                                                                                        | 2.8<br>0                         |                                             | 3.3<br>0.3                                  | V    |
| ICTL                     | Control Current                              | VCTL = 3.3V                                                                            |                                  | 25                                          | 50                                          | μA   |
| <b>RF Specifications</b> |                                              |                                                                                        |                                  |                                             |                                             |      |
| IL                       | Insertion loss(ANT pin to RF1/RF2)           | 0.1-0.96GHz<br>0.96-1.9GHz<br>1.9-3.0GHz<br>3.0-5.8GHz<br>5.8-7.125GHz<br>7.125-8.2GHz |                                  | 0.27<br>0.37<br>0.39<br>0.48<br>0.55<br>0.7 | 0.33<br>0.46<br>0.55<br>0.65<br>0.75<br>0.9 | dB   |
| ISO                      | Isolation (ANT pin to RF1/RF2)               | 0.1-0.96GHz<br>0.96-1.9GHz<br>1.9-3.0GHz<br>3.0-5.8GHz<br>5.8-7.125GHz<br>7.125-8.2GHz | 38<br>30<br>29<br>25<br>20<br>18 | 41<br>34<br>34<br>29<br>24<br>21            |                                             | dB   |
| RL                       | Input return loss (ANT pin to RF1/RF2)       | 0.1-0.96GHz<br>0.96-1.9GHz<br>1.9-3.0GHz<br>3.0-5.8GHz<br>5.8-7.125GHz<br>7.125-8.2GHz | 25<br>20<br>17<br>16<br>15<br>12 | 30<br>25<br>20<br>19<br>18<br>16            |                                             | dB   |
| P <sub>0.1dB</sub>       | 0.1dB Compression Point (ANT pin to RF1/RF2) | 0.1–6GHz, 25% DC                                                                       |                                  | 32                                          |                                             | dBm  |
| 2f <sub>0</sub>          | Second Harmonics                             | f <sub>0</sub> =2.4GHz,<br>PIN=+26dBm,CW                                               |                                  | 91                                          |                                             | dBc  |
| 3f <sub>0</sub>          | Third Harmonics                              | f <sub>0</sub> =2.4GHz,<br>PIN=+26dBm,CW                                               |                                  | 96                                          |                                             | dBc  |
| Tsw                      | Switching On/Off Time                        | 50% of final control voltage to 10%/90% of final RF power, switching between RF1/2     |                                  | 190                                         | 270                                         | ns   |

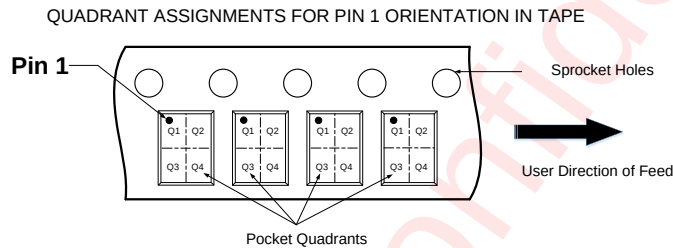
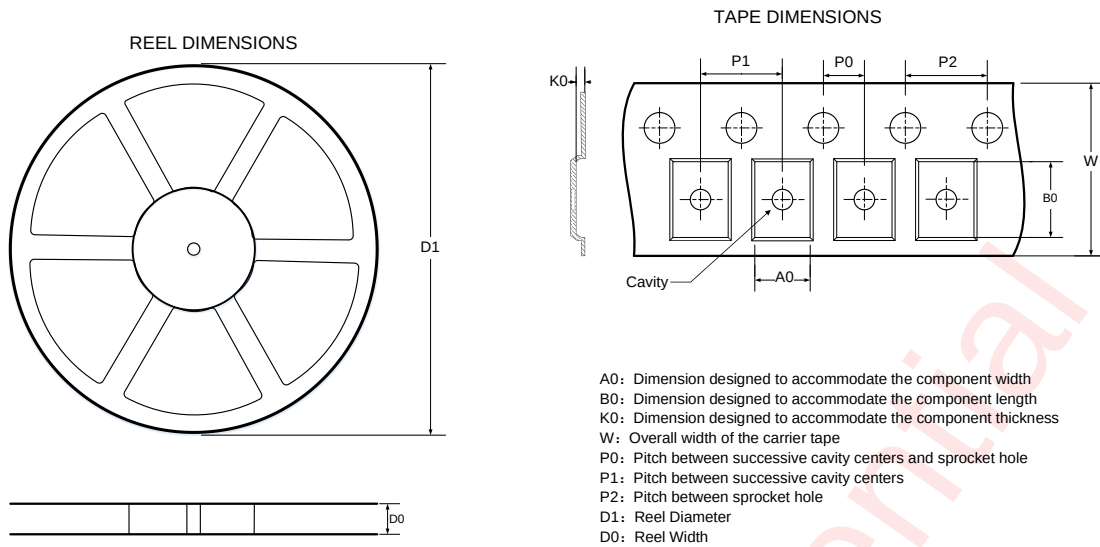
V1=1.8V/0V, V2=0V/1.8V, PIN=0dBm, T<sub>A</sub>=+25°C, Z<sub>0</sub>=50Ω. (unless otherwise noted)

| PARAMETER                |                                              | TEST CONDITION                                                                         | MIN                              | TYP                                          | MAX                                       | UNIT |
|--------------------------|----------------------------------------------|----------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------|------|
| <b>DC Specifications</b> |                                              |                                                                                        |                                  |                                              |                                           |      |
| VCTL_H<br>VCTL_L         | Control Voltage                              |                                                                                        | 1.65                             |                                              | 3.3                                       | V    |
|                          | High                                         |                                                                                        | 0                                |                                              | 0.3                                       |      |
| ICTL                     | Control Current                              | VCTL = 1.8V                                                                            |                                  | 20                                           | 40                                        | μA   |
| <b>RF Specifications</b> |                                              |                                                                                        |                                  |                                              |                                           |      |
| IL                       | Insertion loss(ANT pin to RF1/RF2)           | 0.1-0.96GHz<br>0.96-1.9GHz<br>1.9-3.0GHz<br>3.0-5.8GHz<br>5.8-7.125GHz<br>7.125-8.2GHz |                                  | 0.31<br>0.40<br>0.42<br>0.54<br>0.58<br>0.75 | 0.35<br>0.50<br>0.60<br>0.70<br>0.75<br>1 | dB   |
| ISO                      | Isolation (ANT pin to RF1/RF2)               | 0.1-0.96GHz<br>0.96-1.9GHz<br>1.9-3.0GHz<br>3.0-5.8GHz<br>5.8-7.125GHz<br>7.125-8.2GHz | 37<br>29<br>28<br>24<br>20<br>18 | 41<br>34<br>33<br>29<br>24<br>21             |                                           | dB   |
| RL                       | Input return loss (ANT pin to RF1/RF2)       | 0.1-0.96GHz<br>0.96-1.9GHz<br>1.9-3.0GHz<br>3.0-5.8GHz<br>5.8-7.125GHz<br>7.125-8.2GHz | 25<br>19<br>16<br>15<br>14<br>12 | 30<br>24<br>20<br>19<br>18<br>16             |                                           | dB   |
| P <sub>0.1dB</sub>       | 0.1dB Compression Point (ANT pin to RF1/RF2) | 1.0–6GHz, 25% DC                                                                       |                                  | 32                                           |                                           | dBm  |
| 2f <sub>0</sub>          | Second Harmonics                             | f <sub>0</sub> =2.4GHz,<br>PIN=+26dBm,CW                                               |                                  | 88                                           |                                           | dBc  |
| 3f <sub>0</sub>          | Third Harmonics                              | f <sub>0</sub> =2.4GHz,<br>PIN=+26dBm,CW                                               |                                  | 86                                           |                                           | dBc  |
| Tsw                      | Switching On/Off Time                        | 50% of final control voltage to 10%/90% of final RF power, switching between RF1/2     |                                  | 200                                          | 300                                       | ns   |

## Control Logic

| State | Active Path | V1 | V2 |
|-------|-------------|----|----|
| 0     | ANT to RF1  | 0  | 1  |
| 1     | ANT to RF2  | 1  | 0  |

## Tape And Reel Information



Note: The above picture is for reference only. Please refer to the value in the table below for the actual size

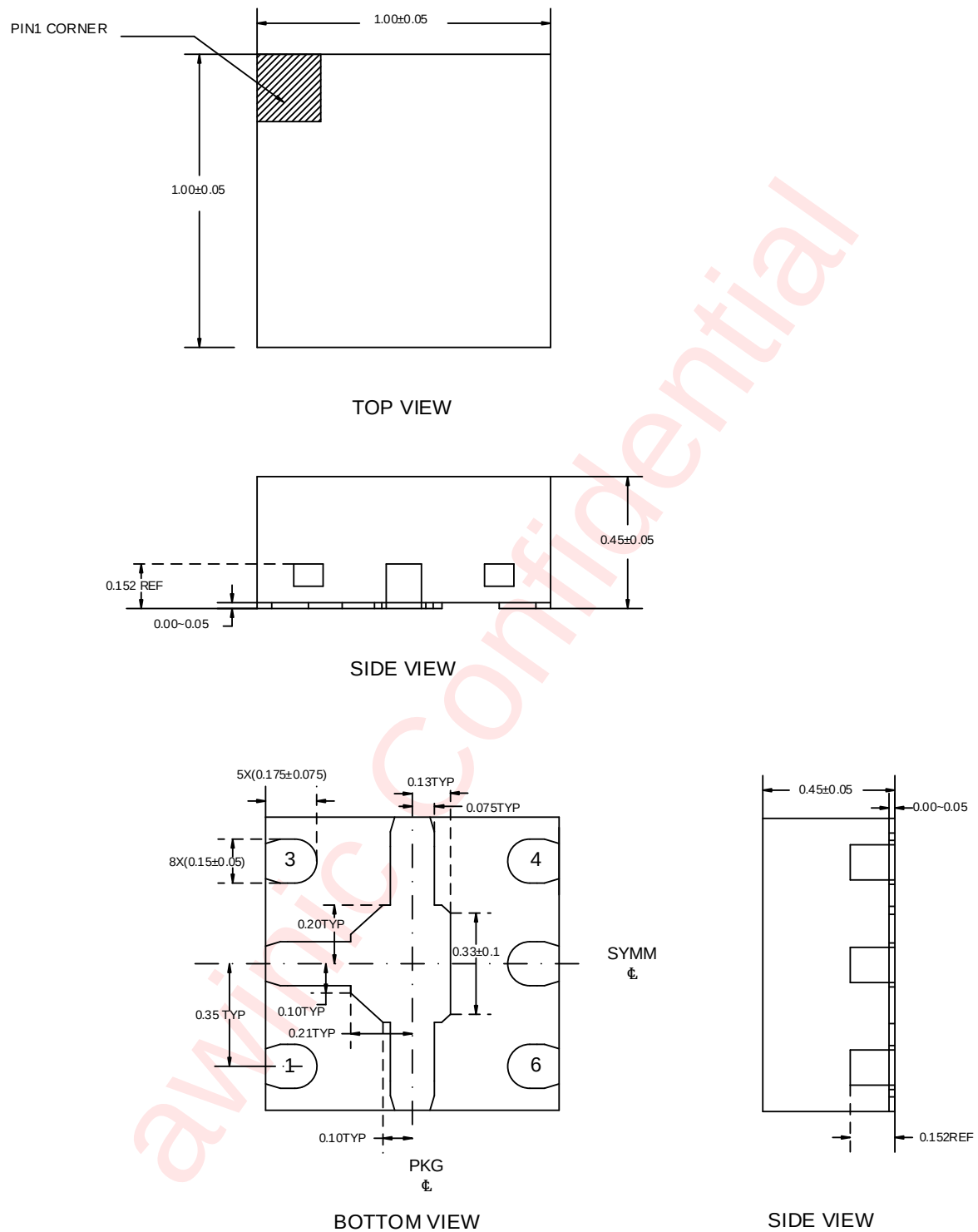
**DIMENSIONS AND PIN1 ORIENTATION**

| D1<br>(mm) | D0<br>(mm) | A0<br>(mm) | B0<br>(mm) | K0<br>(mm) | P0<br>(mm) | P1<br>(mm) | P2<br>(mm) | W<br>(mm) | Pin1 Quadrant |
|------------|------------|------------|------------|------------|------------|------------|------------|-----------|---------------|
| 178        | 8.4        | 1.14       | 1.17       | 0.56       | 2          | 4          | 4          | 8         | Q1            |

All dimensions are nominal

**Figure 4 Tape and Reel**

## Package Description

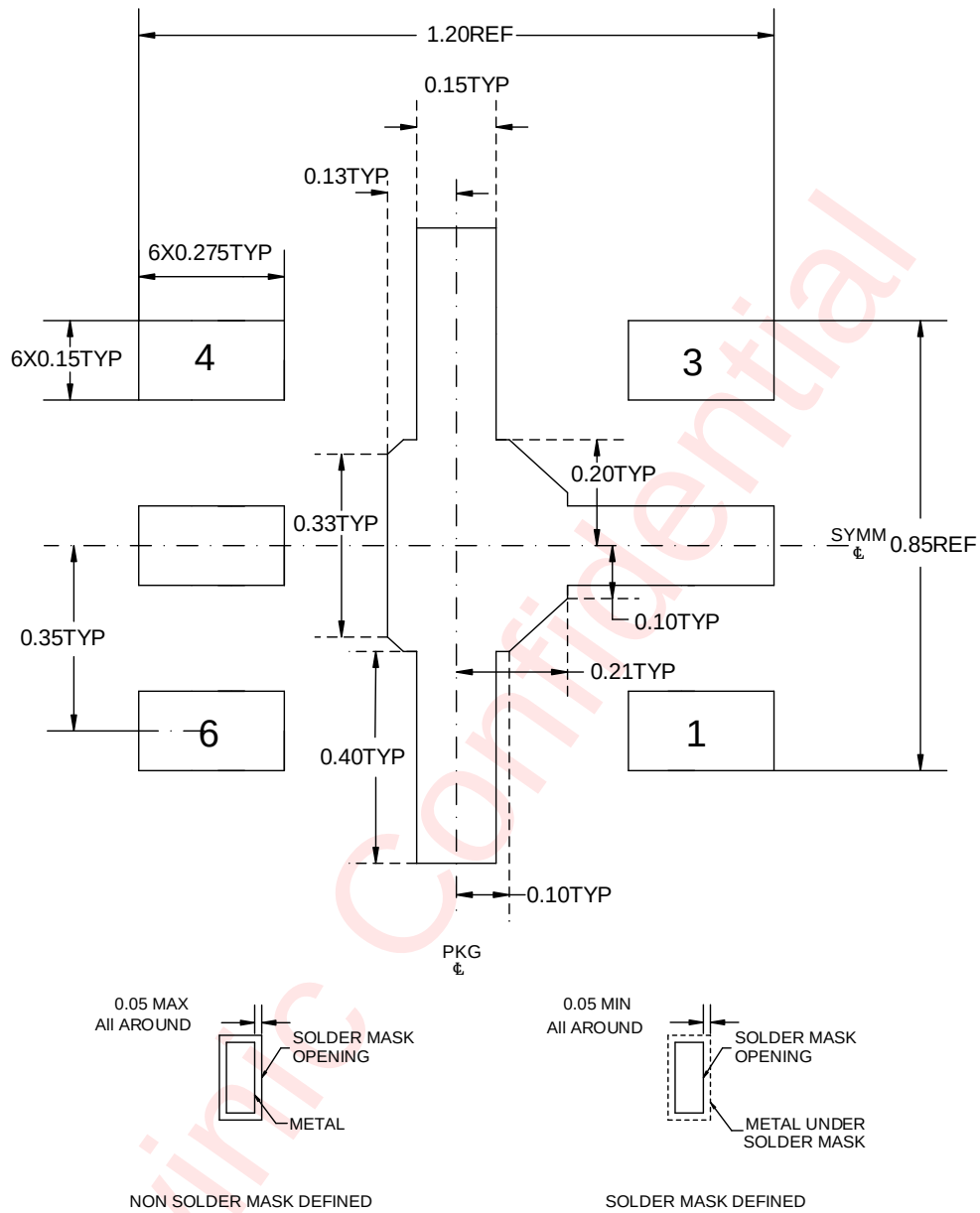


Unit: mm

Figure 5 Package Outline



## Land Pattern Data



Unit: mm

Figure 6 Land Pattern

## Revision History

| Vision | Date      | Change Record                                              |
|--------|-----------|------------------------------------------------------------|
| V1.0   | Sep. 2021 | Officially Released                                        |
| V1.1   | Aug. 2022 | Update Ordering Information and Electrical Characteristics |
| V1.2   | Aug. 2022 | Update AMR                                                 |
| V1.3   | Nov. 2022 | Update Electrical Characteristics                          |
| V1.4   | Jun. 2023 | Update the description of applications                     |

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