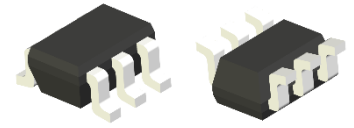


Description

The ASWD-S2-0005 is a low loss, high isolation, silicon-on-insulator (SOI) SPDT Radio-Frequency switch. Outstanding performance for ultra-low tuning-on resistance and ultra-high linearity are making it perfect to use for antenna tuning application for both high band and low band switches in GSM/WCDMA/LTE handset applications. The ASWD-S2-0005 is available in a small lead-free, RoHS-Compliant, SOT363 6-pin package.



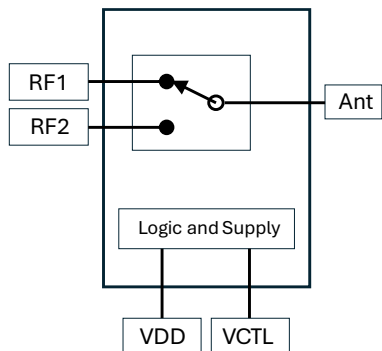
Key Features

- Frequency Range: 0.1 to 2.7GHz
- Low Insertion Loss: 0.37dB at 2.7GHz
- High Isolation: > 25dB at 2.7GHz
- GPIO Control for SPDT
- SOT363 Package for Ease of Manufacturing

Typical Applications

- Smart Phones, Tablets, PCs
- GSM/WCDMA/LTE band and Mode Switching
- Antenna Selection / Tuning Switch
- RF Combo Modules (Wi-Fi/BT, LTE/GNSS)
- AR/VR, Wi-Fi Speakers
- Access Point, Routers and Gateways

Functional Block Diagram



Ordering Information

| Part No. | Description |
|------------------|--|
| ASWD-S2-0005 | 0.1~ 2.7GHz SPDT Antenna Switch on Cut Tape |
| ASWD-S2-0005-T | 0.1~ 2.7GHz SPDT Antenna Switch on Tape & Reel |
| ASWD-S2-0005-EVB | 0.1~ 2.7GHz SPDT Antenna Switch EVB |

Absolute Maximum Ratings

| Parameter | Symbol | Absolute Maximum | | | Unit |
|---|--------------------|------------------|---|-----------------|------|
| Supply Voltage | V _{DD} | 1.6 | | 3.6 | V |
| Control Voltage | V _{CTL} | | | V _{DD} | V |
| Max Input Power | P _{INMAX} | - | - | +35 | dBm |
| Operating Temperature | T _{OP} | -40 | - | 85 | °C |
| Storage Temperature | T _{STG} | -55 | - | 150 | °C |
| Electrostatic Discharge, HBM ¹ | V _{ESD} | - | - | ±1500 | V |
| Electrostatic Discharge, CDM ² | | - | - | ±2000 | V |

1. HBM: ESDA/JEDEC JS-001-2017

2. CDM: ESDA/JEDEC JS-002-2018

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

| Parameter | Min. | Typ. | Max. | Unit |
|---------------------------------|------|------|------|------|
| VDD | 1.6 | 2.8 | 3.3 | V |
| Pin (RFC – RFX), CW, 50 Ω | | | 34.5 | dBm |
| T _j at MTTF>105 hrs. | - | 150 | - | °C |

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

RF Electrical Specifications

| Parameters | | Condition | Values | | | Unit |
|---|--------------------|-------------|---------|---------|---------|------|
| | | | Minimum | Typical | Maximum | |
| Insertion Loss | IL | 0.1-1.0 GHz | - | 0.30 | 0.50 | dB |
| | | 1.0-2.2 GHz | - | 0.35 | 0.55 | |
| | | 2.2-2.7 GHz | - | 0.37 | 0.60 | |
| Isolation | ISL | 0.1-1.0 GHz | 29 | 32 | - | dB |
| | | 1.0-2.2 GHz | 26 | 28 | - | |
| | | 2.2-2.7 GHz | 20 | 25 | - | |
| Return Loss | RL | 0.1-2.7 GHz | - | 13.9 | 20.8 | dB |
| Input P _{0.1dB} | P _{0.1dB} | 0.8-2.7 GHz | - | 34.5 | - | dBm |
| 2 nd Harmonics | 2F ₀ | Pin = 26dBm | - | -65 | -55 | dBc |
| 3 rd Harmonics | 3F ₀ | Pin = 26dBm | - | -75 | - | dBc |
| Turn-on switching time (50% of final VC to 10%/90% of final RF power) | t _{sw} | - | - | 1.0 | - | us |

DC Electrical Specifications

| Parameter | Symbol | Absolute Maximum | | | Unit |
|-----------------|--------------|------------------|-----|------|---------|
| Supply Voltage | V_{DD} | 1.6 | 2.8 | 3.3 | V |
| Supply Current | I_{DD} | - | 15 | 30 | μ A |
| Control Voltage | V_{CTL_H} | 1.2 | 1.8 | 2.85 | V |
| | V_{CTL_L} | 0 | - | 0.45 | V |
| Control Current | I_{CTL} | - | 0.5 | 1.0 | μ A |

Control Logic

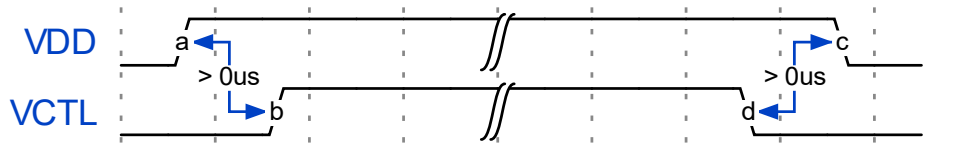
| Control Pin | RF1 | RF2 |
|-------------|-----|-----|
| 0 | ON | OFF |
| 1 | OFF | ON |

Timing Requirements

It is important that the user adheres to the correct timing sequences in order to avoid leakage power consumption.

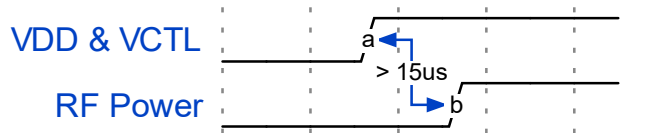
- VDD and VCTL cannot be powered on and off independently from one another. During power-on sequence, the user must power up VDD first, then power up VCTL. During power-off sequence, the user must power off VCTL first, then power off VDD.

In the state of VDD=OFF (0 V) and VCTL=ON(1.8V), it may cause leakage power consumption as ESD protection circuit inside the switch.



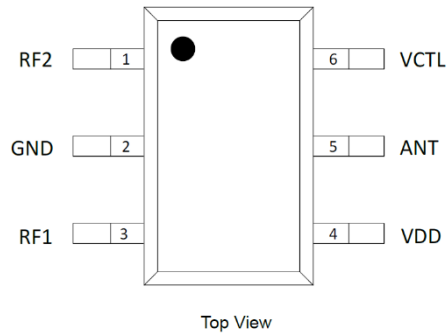
a: VDD ON b: VCTL ON c: VDD OFF d: VCTL OFF

- VDD and VCTL must be on for a minimum of 15 us before applying RF power



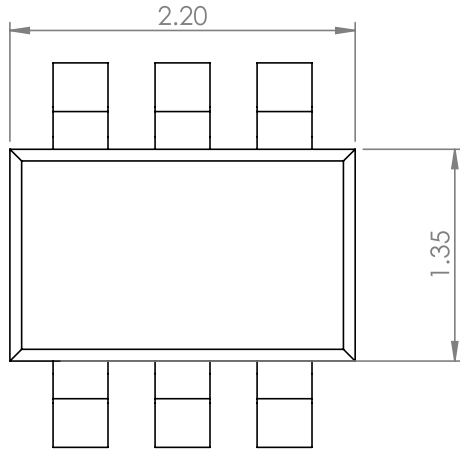
a: VDD and VCTL ON b: RF Power Up

Pin Configuration

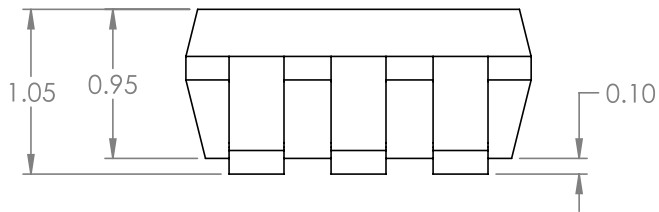


| Pin | Name | Description |
|-----|------|--------------------|
| 1 | RF2 | RF2 Port |
| 2 | GND | Ground |
| 3 | RF1 | RF1 Port |
| 4 | VDD | DC Control Voltage |
| 5 | ANT | Antenna Port |
| 6 | VCTL | Switch Control |

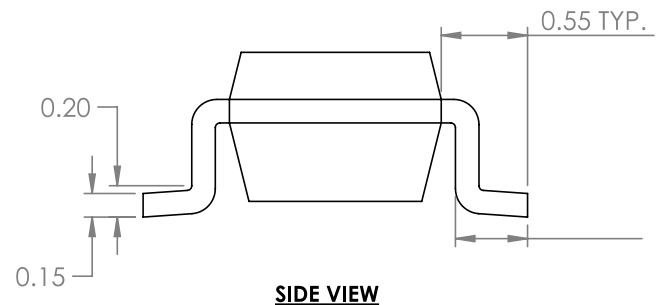
Product Dimensions



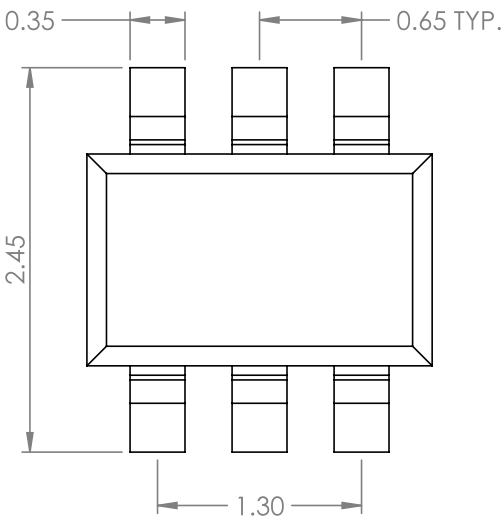
TOP VIEW



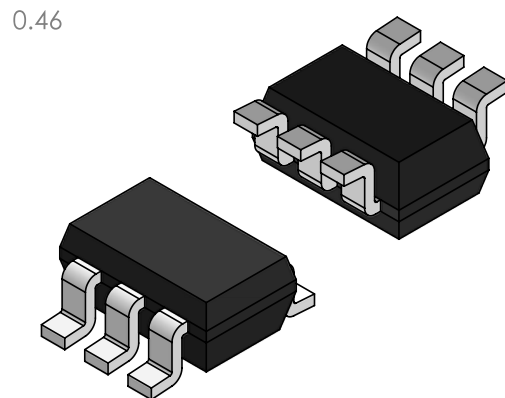
FRONT VIEW



SIDE VIEW

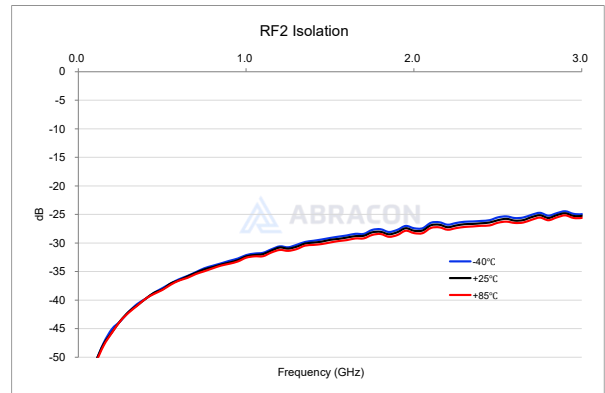
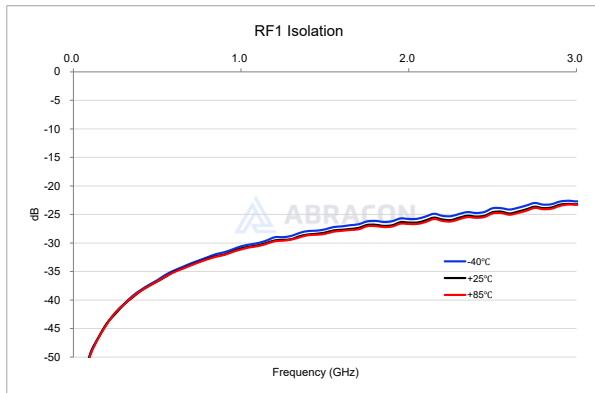
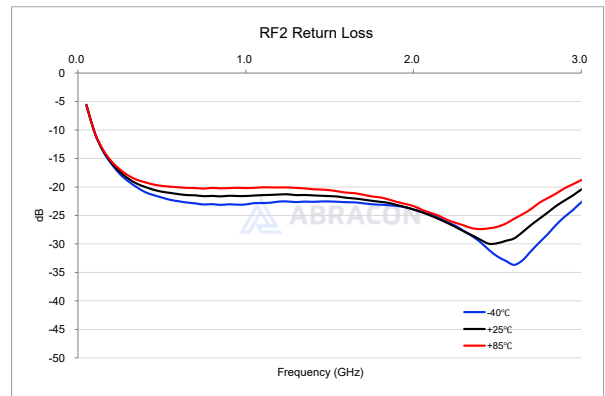
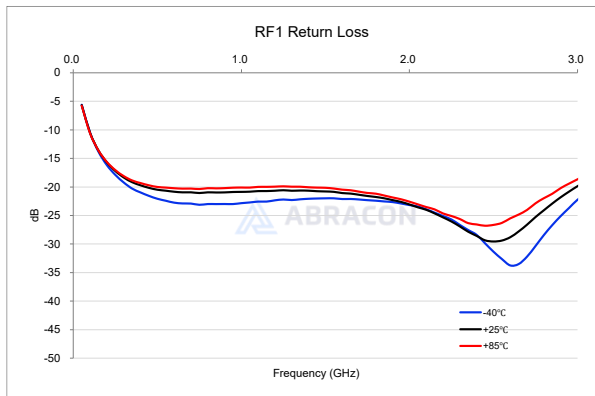
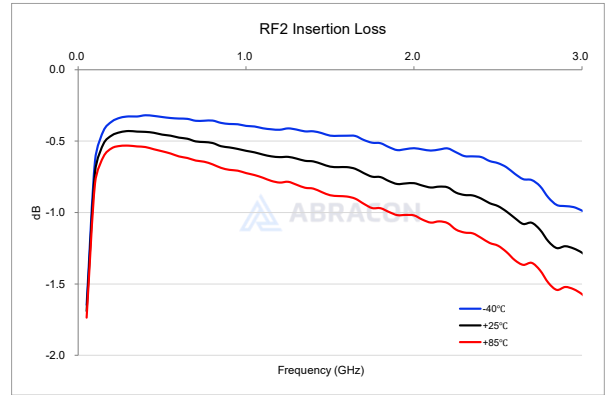
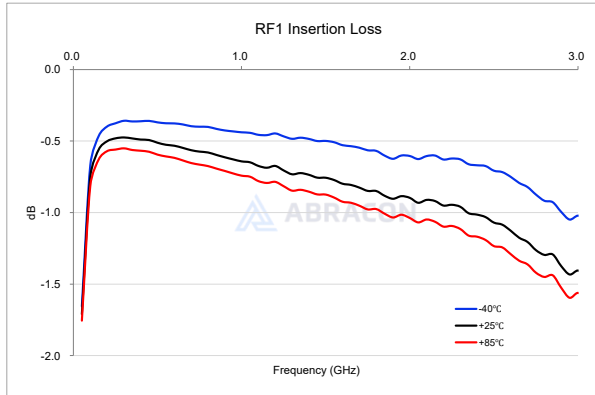


BOTTOM VIEW



Unit: mm

Performance Plots

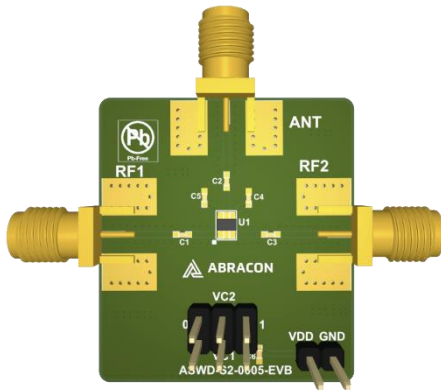


ASWD-S2-0005

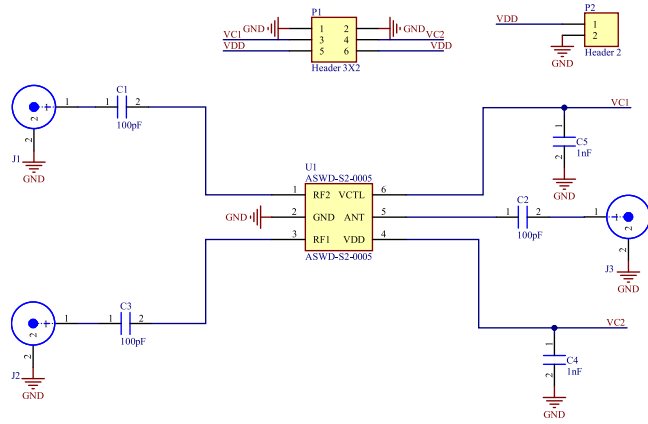
0.1~ 2.7GHz SPDT Antenna Switch



Evaluation Board ASWD-S2-0005-EVB



EVB



Schematic

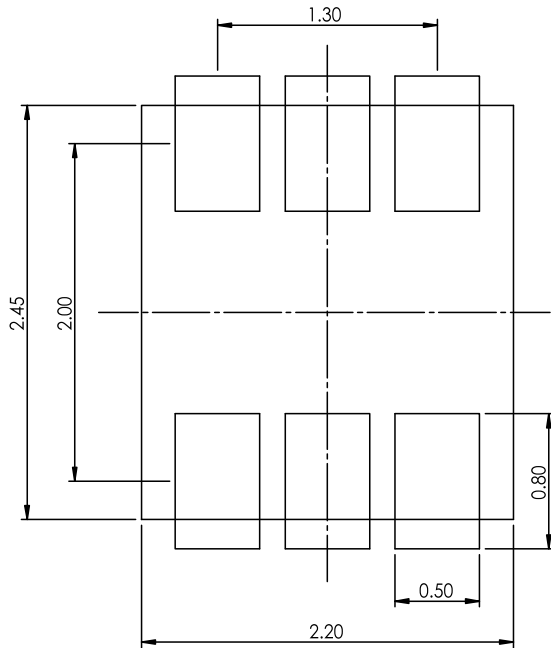
Bill of Material

| Component | Description | Manufacturer | Manufacturer Part | QTY |
|------------|---------------------|--------------|-------------------|-----|
| U1 | SPDT Antenna Switch | Abrakon | ASWD-S2-0005 | 1 |
| C1, C2, C3 | Capacitor (100pF) | Murata | GRM0222C0J101GA02 | 3 |
| C4, C5 | Capacitor (1nF) | Murata | GRM022R60J102KE19 | 2 |

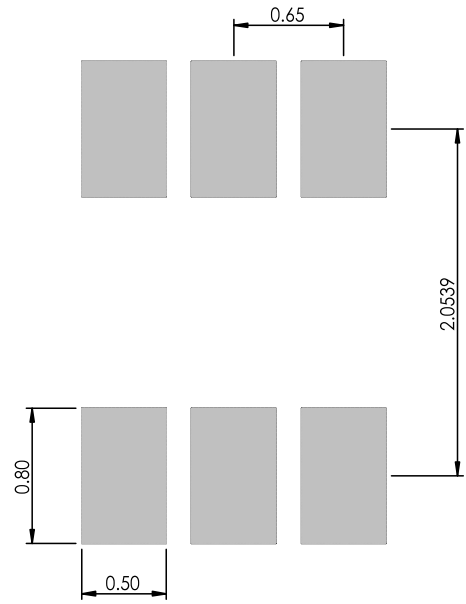
NOTES:

1. Input and output are 50-ohm lines.

IC Footprint & PCB Land Pattern



Footprint



Land Pattern

Reflow Profile [JEDEC J-STD-020]

Solder paste: Sn/3.0Ag/0.5Cu

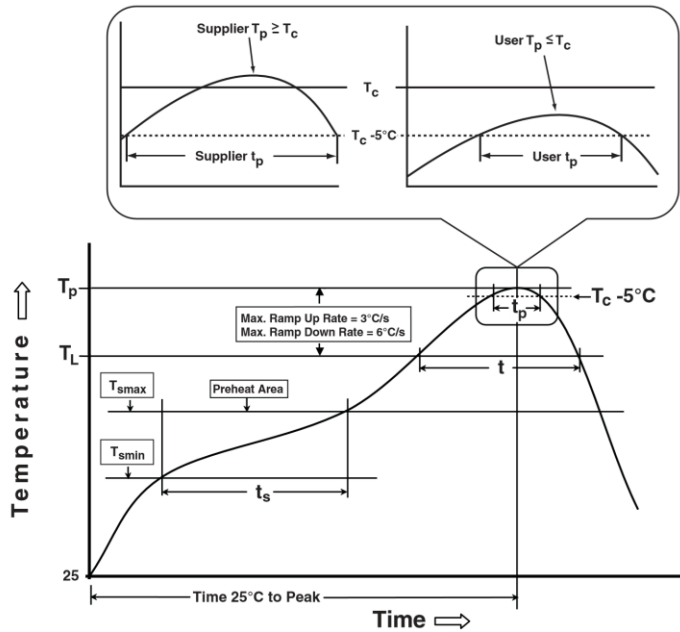


Table 1

| SnPb Eutectic Process Classification Temperatures (T _c) | | |
|--|-----------------------------|-----------------------------|
| Package Thickness | Volume mm ³ <350 | Volume mm ³ ≥350 |
| <2.5mm | 235°C | 220°C |
| ≥2.5mm | 220°C | 220°C |

Table 2

| Pb-Free Process Classification Temperatures (T _c) | | | |
|--|-----------------------------|---------------------------------|------------------------------|
| Package Thickness | Volume mm ³ <350 | Volume mm ³ 350-2000 | Volume mm ³ >2000 |
| <1.6mm | 260°C | 260°C | 260°C |
| 1.6mm - 2.5mm | 260°C | 250°C | 245°C |
| >2.5mm | 250°C | 245°C | 245°C |

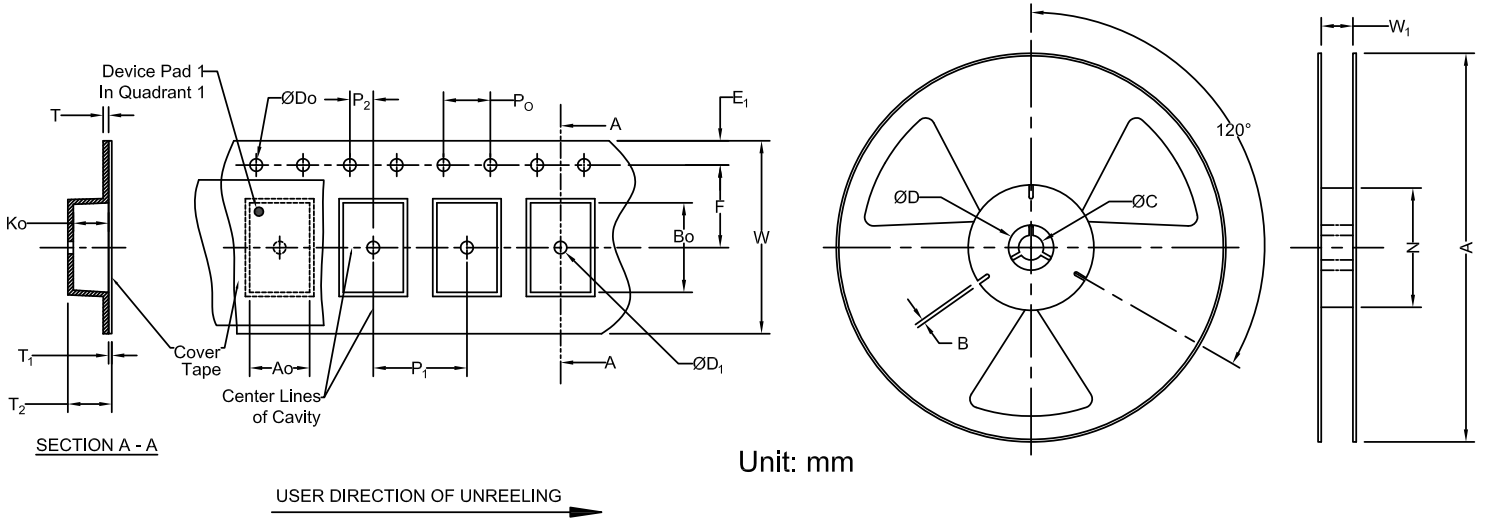
| Profile Feature | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|---|-------------------------|--------------------|
| Preheat / soak | | |
| Temperature minimum (T _{sm}) | 100°C | 150°C |
| Temperature maximum (T _{sm}) | 150°C | 200°C |
| Time (T _{sm} to T _{sm}) (t _s) | 60 – 120 sec. | 60 – 120 sec. |
| Average ramp-up rate (T _{sm} to T _p) | 3°C/sec. max | 3°C/sec. max |
| Liquidous temperature (T _L) | 183°C | 217°C |
| Time at Liquidous (T _L) | 60 – 90 sec. | 60 – 90 sec. |
| Peak package body temperature (T _p)* | See Table 1 | See Table 2 |
| Time (T _p)** within 5°C of the specified classification temperature (T _c) | 20 sec. | 10 sec. |
| Ramp-down rate (T _p to T _{sm}) | 3°C/sec. max | 3°C/sec. max |
| Time 25°C to peak temperature | 6 min. max | 8 min. max |
| Reflow cycles | 2 max | 2 max |

*Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.

**Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.

Packaging

Tape & Reel Dimension



Unit: mm

| Carrier Tape Specifications (mm) | | | | | | | | | | |
|----------------------------------|------------|-----------|-----------|-----------|-----------|-----------|------------|------------|-----------|----------|
| E1 | D0 | P0 | P2 | F | P1 | W | A0 | B0 | K0 | Reel Qty |
| 1.75 ± 0.1 | 1.50 ± 0.1 | 4.0 ± 0.1 | 2.0 ± 0.1 | 3.5 ± 0.1 | 4.0 ± 0.1 | 8.0 ± 0.2 | 2.28 ± 0.1 | 2.35 ± 0.1 | 1.2 ± 0.1 | 3,000 |

| Reel Specifications (mm) | | | | |
|--------------------------|------------|------------|-----------|------------|
| A | W1 | N | B | C |
| 178 | 12.4 ± 0.5 | 54.5 ± 2.0 | 2.4 ± 0.3 | 13.3 ± 0.3 |