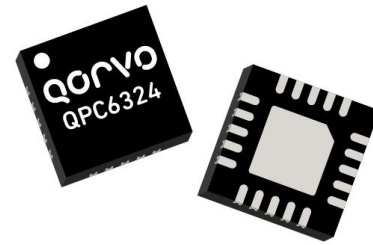


Product Overview

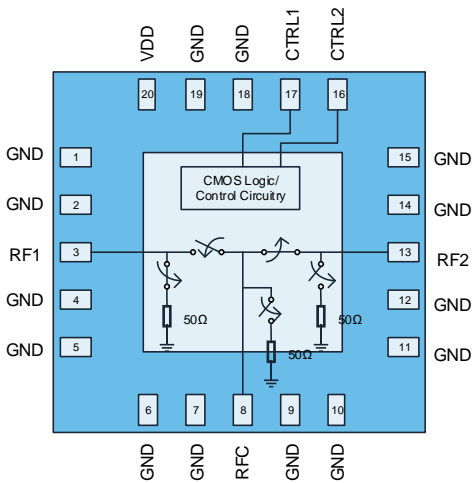
The QPC6324 is a Silicon on Insulator (SOI) single-pole, double-throw (SPDT) switch, designed for use in 4G/5G wireless infrastructure applications and other high-performance communications systems. It offers high isolation with excellent linearity and power handling capability. No blocking capacitors are necessary on the RF ports. The design is non-reflective such that the RFX ports are terminated into 50 Ω in the off state. The QPC6324 is +1.8V logic compatible.

The QPC6324 is packaged in a RoHS-compliant, compact QFN 4x4 mm surface-mount leadless package.



QFN 20 Pin 4 mm x 4 mm leadless SMT Package

Functional Block Diagram



Top View

Key Features

- 5 MHz to 6000 MHz Operation
- Non-Reflective (RFX ports)
- Terminated All-Off State mode
- No Blocking Caps needed unless voltage is on RF Line
- High Isolation: RFC-RFX: 63 dB at 2 GHz
RFX-RFX: 63 dB at 2 GHz
- +1.8 V Logic Compatible

Applications

- Wireless Infrastructure
- Macro or picocell base stations
- TDD-based architectures

Ordering Information

| Part No. | Description |
|---------------|------------------------|
| QPC6324TR13 | 2500 pcs on a 13" reel |
| QPC6324EVB-01 | Evaluation board |

Absolute Maximum Ratings

| Parameter | Rating | |
|------------------------------|---------------|--------|
| Storage Temperature | -50 to 150 °C | |
| VDD | +6 V | |
| V _{CTRL1/2} | High | +6 V |
| | Low | -0.2 V |
| Pin max (RFC-RFX), CW, 50 Ω | 37 dBm | |
| Pin max (RFX-TERM), CW, 50 Ω | 31 dBm | |

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

Recommended Operating Conditions

| Parameter | Min | Typ | Max | Units |
|--|------|-----|------|-------|
| V _{DD} | +2.7 | +5 | +5.5 | V |
| T _{CASE} | -40 | | +110 | °C |
| T _j at MTTF>10 ⁶ hrs | | | 125 | °C |

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

Electrical Specifications

Test conditions, unless otherwise noted: Temp = 25°C, VDD = +5V.

| Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------------------|--------------------------|-----|------|------|-------|
| Operational Frequency Range | | 5 | | 6000 | MHz |
| Insertion Loss ⁽¹⁾ | 100 – 2000 MHz | | 0.9 | 1.15 | dB |
| | 2000 – 4000 MHz | | 1.0 | 1.25 | dB |
| | 4000 – 5000 MHz | | 1.05 | 1.3 | dB |
| | 5000 - 6000 MHz | | 1.1 | 1.35 | dB |
| Insertion Loss Ripple | In any 400 MHz band | | 0.03 | | dB |
| Isolation, RFC-RFX ⁽¹⁾ | 100 - 2000 MHz | 55 | 61.5 | | dB |
| | 2000 – 4000 MHz | 50 | 57 | | dB |
| | 4000 – 5000 MHz | 48 | 54 | | dB |
| | 5000 - 6000 MHz | 44 | 50 | | dB |
| Isolation, RFX-RFX ⁽¹⁾ | 100 - 2000 MHz | 57 | 63 | | dB |
| | 2000 – 4000 MHz | 50 | 57 | | dB |
| | 4000 – 5000 MHz | 48 | 54 | | dB |
| | 5000 - 6000 MHz | 44 | 50 | | dB |
| Return Loss, RFC ⁽²⁾ | 100 - 4000 MHz | 14 | 17 | | dB |
| | 4000 – 5000 MHz | 13 | 16 | | dB |
| | 5000 - 6000 MHz | 14 | 17 | | dB |
| Return Loss, RFX ⁽²⁾ | 100 - 4000 MHz | 13 | 16 | | dB |
| | 4000 – 5000 MHz | 12 | 15 | | dB |
| | 5000 - 6000 MHz | 15 | 18 | | dB |
| Return Loss | RFC Terminated, 2000 MHz | | 22 | | dB |
| | RFC Terminated, 6000 MHz | | 15 | | dB |
| Return Loss | RFX Terminated, 2000 MHz | | 20 | | dB |
| | RFX Terminated, 6000 MHz | | 13 | | dB |

Note:

1. Production screen of product is done only at 2GHz and 6GHz.
2. Guaranteed by design only. Not tested in production.

Electrical Specifications Contd.

Test conditions, unless otherwise noted: Temp = 25°C, VDD = +5V.

| Parameter | Conditions | Min | Typ | Max | Units |
|---------------------------------------|--|-----|--------|------|-------|
| Input P1dB | RFC-RFX, 2600 MHz | 34 | 37 | | dBm |
| Input IP3 | RFC-RFX, 2600 MHz, 13dBm/tone, 1MHz Δf | 55 | 60 | | dBm |
| Switching Time | Turn-on, (50% Ctrl to 90% RF) | | 180 | | ns |
| | Turn-off, (50% Ctrl to 10% RF) | | 150 | | ns |
| | Turn-on, (50% Ctrl to 99% RF) | | 417 | | ns |
| | Turn-off, (50% Ctrl to 1% RF) | | 210 | | ns |
| Supply Current, IDD | VDD = +5V | | 90 | 200 | μA |
| Control Voltage, V _{CTRL1/2} | VIH | 1.2 | | VDD | V |
| | VIL | 0 | | 0.63 | V |
| Control Current, I _{CTRL1/2} | | | 1 | | μA |
| Spur Level | Any RF ports, >100MHz | | < -125 | | dBm |
| Thermal Resistance | | | 60 | | °C/W |

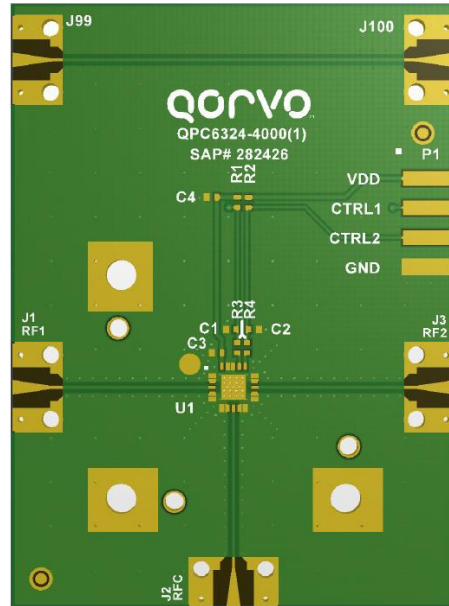
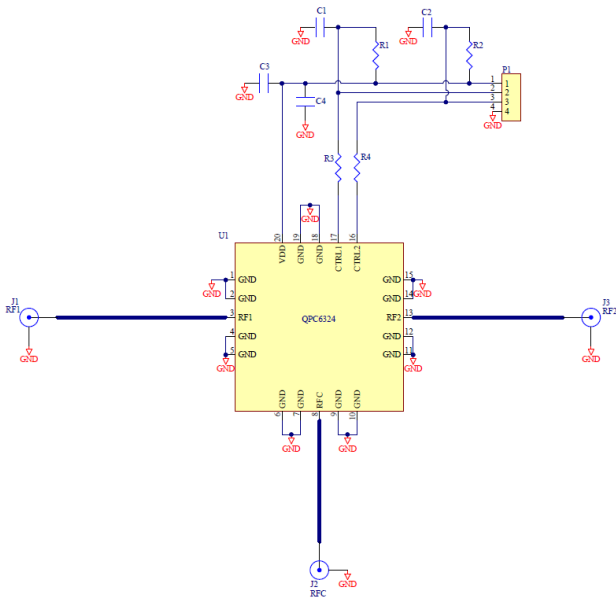
Power Handling Specification (MTTF ≥ 10⁶ Hours)

| Input Port | Port State | Power(dBm) | T _{CASE} |
|--|------------|------------|-------------------|
| RFC, RF1 or RF2 ^{1,3} | ON | 34.2 | 85°C |
| | | 31.6 | 105°C |
| | | 30.5 | 110°C |
| | | 29.0 | 115°C |
| | | 26.0 | 120°C |
| RFC, RF1 or RF2 | OFF | 28.4 | 85°C |
| | | 25.0 | 105°C |
| | | 23.8 | 110°C |
| | | 22.0 | 115°C |
| | | 19.5 | 120°C |
| RFC, RF1 and RF2 simultaneous ² | All OFF | 27.6 | 85°C |
| | | 24.2 | 105°C |
| | | 23.0 | 110°C |
| | | 21.5 | 115°C |
| | | 18.5 | 120°C |

Note

1. For high VSWR loads, this power reduces by 4dB
2. Power is on each input, not total
3. For < 20MHz, max power reduces by 6dB

Application Circuit Schematic and Layout



Bill of Material

| Ref Des | Value | Description | Manuf. | Part Number |
|------------|-------------|----------------------------|---------|-------------|
| n/a | n/a | Printed Circuit Board | Qorvo | |
| U1 | n/a | High Isolation SPDT Switch | Qorvo | QPC6324 |
| C1, C2 | 200 pF | CAP, 0402, 50V, 5%, C0G | Various | |
| C4 | 0.1 μ F | CAP, 0402, 50V, 10%, X7R | Various | |
| R3, R4 | 0 Ω | RES, 0402 | Various | |
| R1, R2, C3 | DNP | | | |

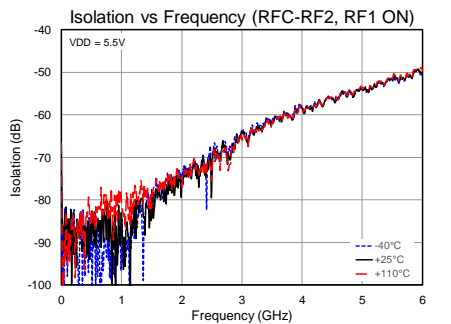
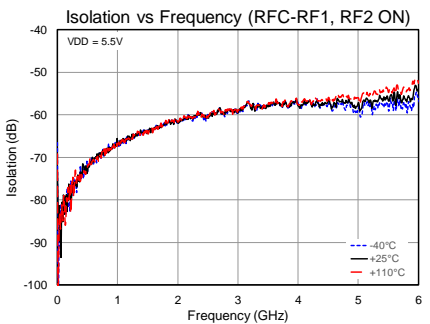
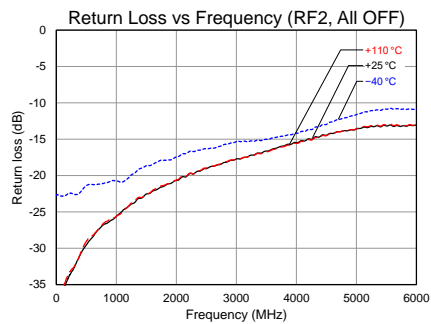
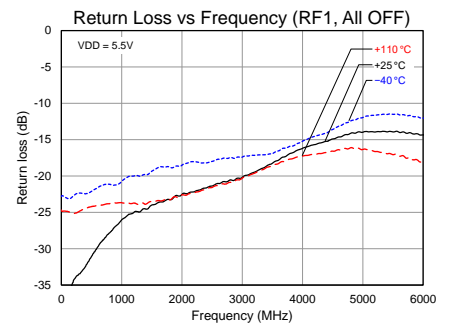
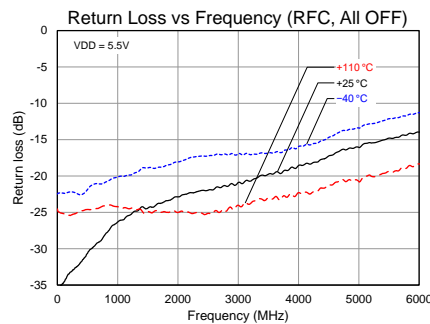
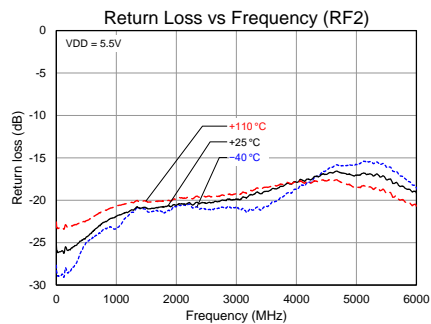
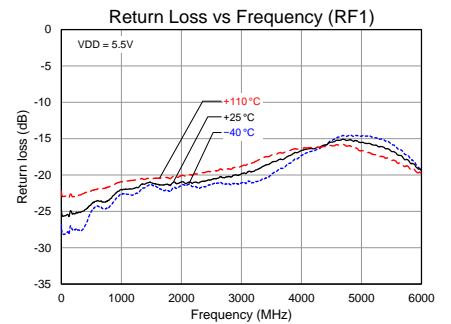
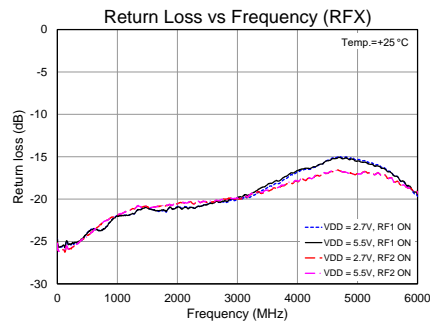
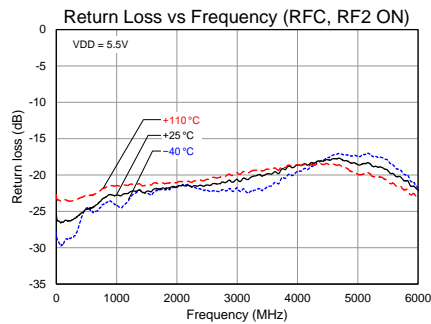
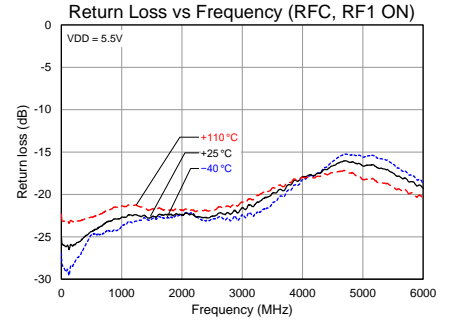
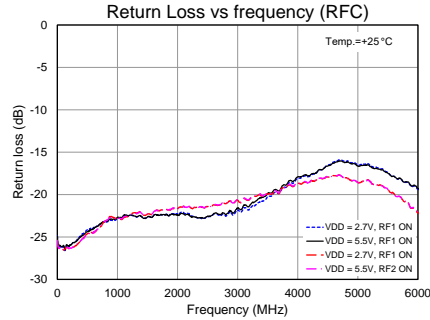
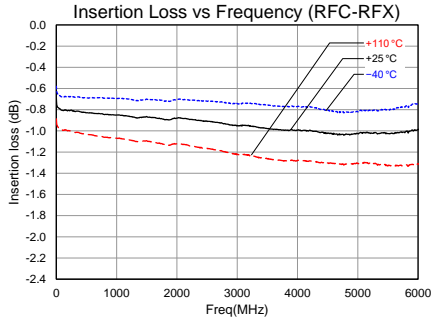
Logic Table

| CTRL1 | CTRL2 | RFC-RF1 | RFC-RF2 |
|-------|-------|--------------------|--------------------|
| 0 | 0 | OFF | OFF |
| 0 | 1 | OFF | ON |
| 1 | 0 | ON | OFF |
| 1 | 1 | OFF ⁽¹⁾ | OFF ⁽¹⁾ |

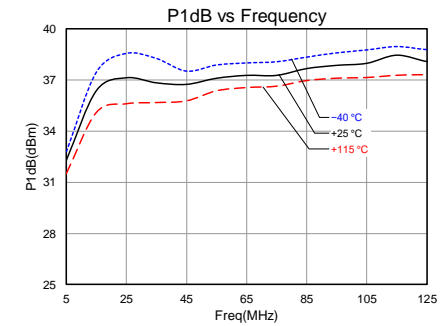
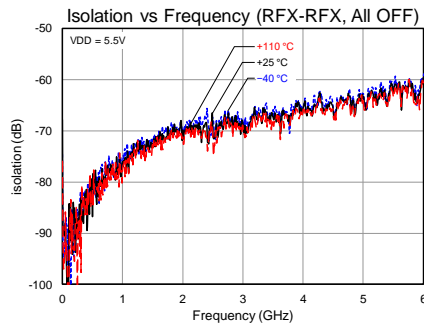
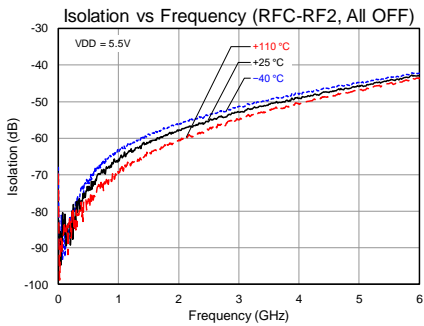
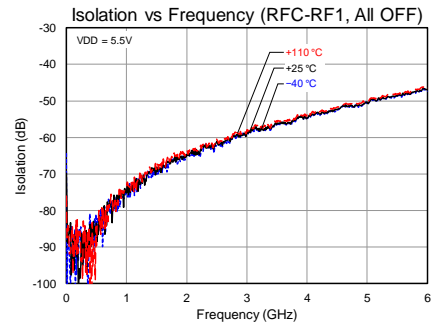
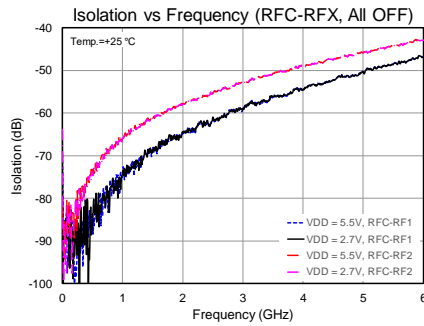
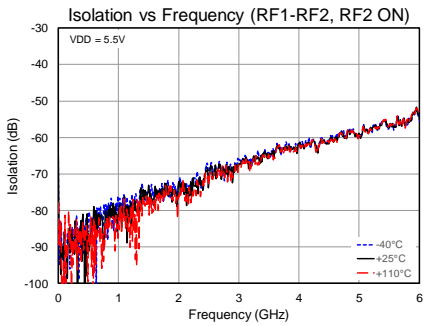
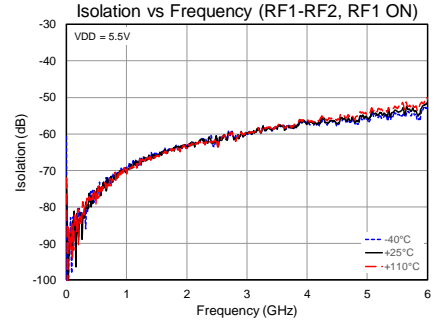
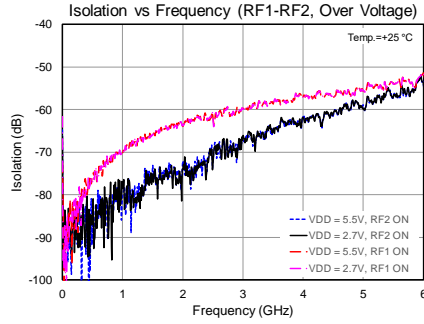
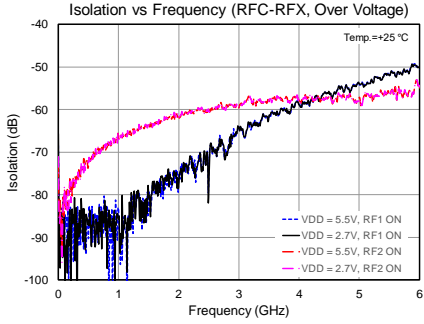
Notes:

1. This is not a supported 'switch' mode. RFC is not terminated.

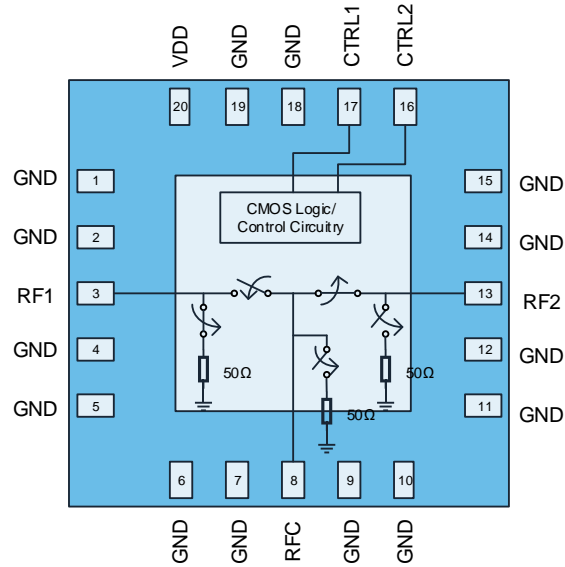
Performance Plots



Performance Plots Contd.



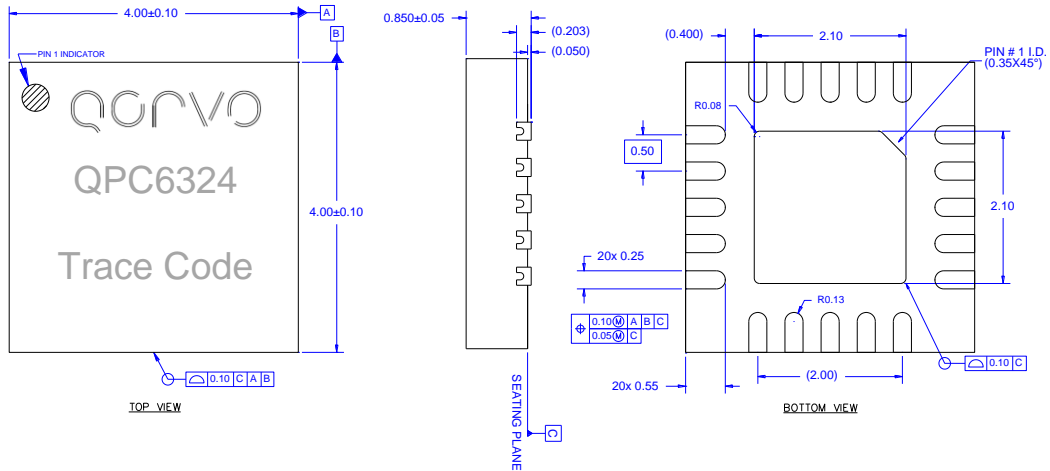
Pin Configuration and Description



Top View

| Pin No. | Label | Description |
|--------------------------|-------|---|
| 1,2,5,6,9,10,11,12,14,15 | GND | No internal connection, recommend grounding on PCB board for proper mounting integrity. |
| 4, 7, 18, 19 | GND | Internally connected and must be grounded on PCB board. |
| 3 | RF1 | Switch output port 1. Internally pulled to 0V (GND). |
| 8 | RFC | Switch common port. Internally pulled to 0V (GND). |
| 13 | RF2 | Switch output port 2. Internally pulled to 0V (GND). |
| 16 | CTRL2 | Switch control input 2 |
| 17 | CTRL1 | Switch control input 1 |
| 20 | VDD | Supply voltage. Bypassing capacitor(s) recommended. |
| Backside Pad | GND | Ground connection. The back side of the package should be connected to the ground plane though as short of a connection as possible. PCB via holes under the device are required. |

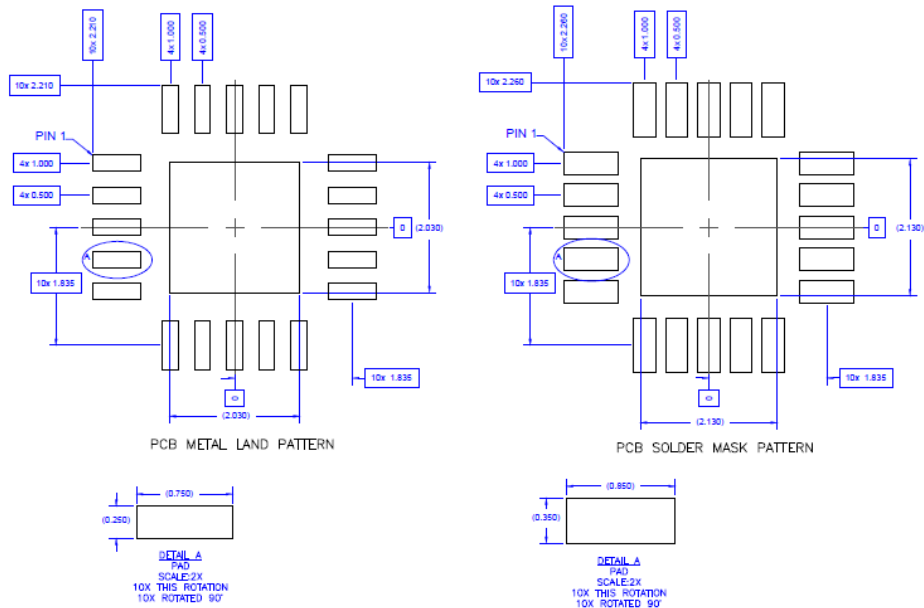
Package Marking and Dimensions



Notes:

1. All dimensions are in millimeters. Angles are in degrees.
2. Dimension and tolerance formats conform to ASME Y14.4M-1994.
3. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.

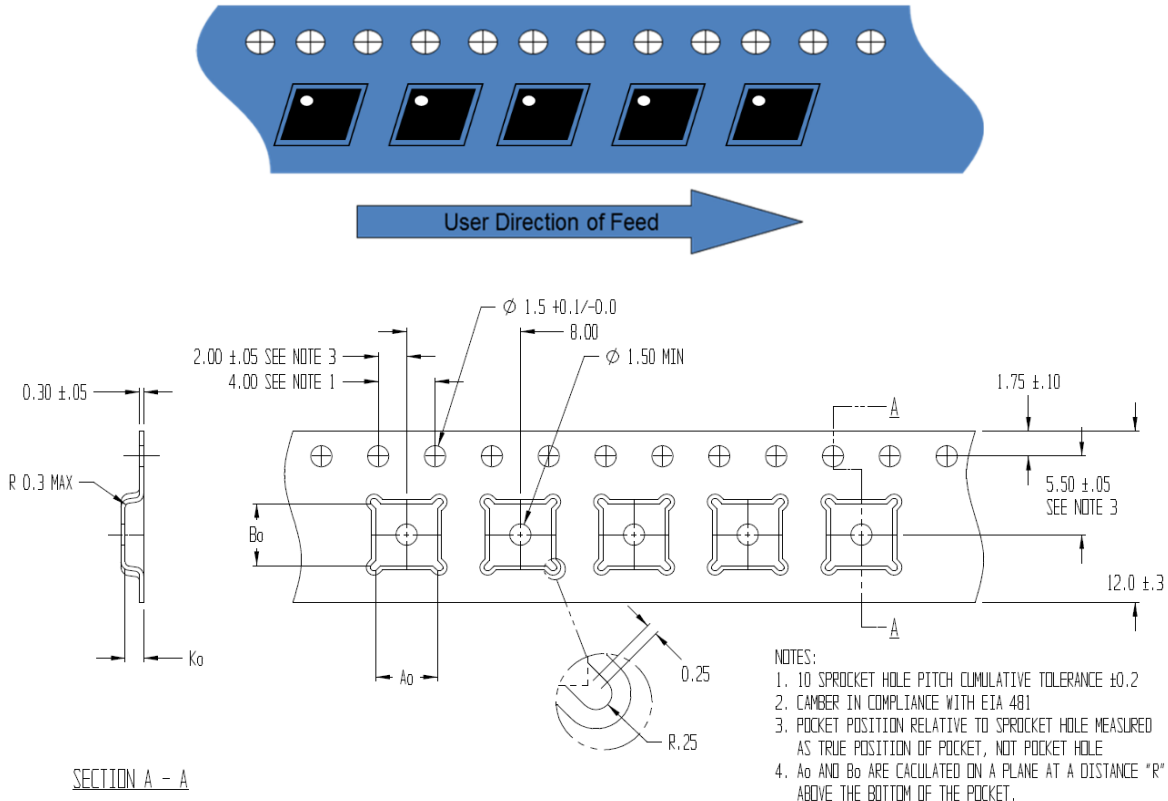
PCB Mounting Pattern



Notes:

1. All dimensions are in millimeters. Angles are in degrees.
2. Use 1 oz. copper minimum for top and bottom layer metal.
3. Via holes are required under the backside paddle of this device for proper RF/DC grounding and thermal dissipation.
4. Do not remove or minimize via hole structure in the PCB. Thermal and RF grounding is critical.
5. We recommend a 0.35 mm (#80/.0135") diameter bit for drilling via holes and a final plated thru diameter of 0.25 mm (0.01 ").
6. Ensure good package backside paddle solder attach for reliable operation and best electrical performance.

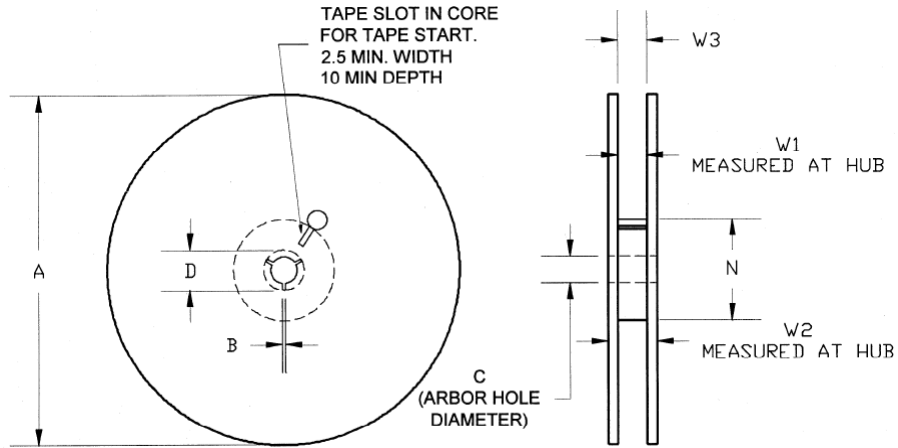
Tape and Reel Information – Carrier and Cover Tape Dimensions



| Feature | Measure | Symbol | Size (in) | Size (mm) |
|---------------------|--|--------|-----------|-----------|
| Cavity | Length | A0 | 0.171 | 4.35 |
| | Width | B0 | 0.171 | 4.35 |
| | Depth | K0 | 0.051 | 1.10 |
| | Pitch | P1 | 0.315 | 8.00 |
| Centerline Distance | Cavity to Perforation - Length Direction | P2 | 0.079 | 2.00 |
| | Cavity to Perforation - Width Direction | F | 0.217 | 5.50 |
| Cover Tape | Width | C | 0.362 | 9.20 |
| Carrier Tape | Width | W | 0.472 | 12.0 |

Tape and Reel Information – Reel Dimensions (13")

Standard T/R size = 2,500 pieces on a 13" reel.



| Feature | Measure | Symbol | Size (in) | Size (mm) |
|---------|----------------------|--------|-----------|-----------|
| Flange | Diameter | A | 12.992 | 330.0 |
| | Thickness | W2 | 0.717 | 18.2 |
| | Space Between Flange | W1 | 0.504 | 12.8 |
| Hub | Outer Diameter | N | 4.016 | 102.0 |
| | Arbor Hole Diameter | C | 0.512 | 13.0 |
| | Key Slit Width | B | 0.079 | 2.0 |
| | Key Slit Diameter | D | 0.787 | 20.0 |

Tape and Reel Information – Tape Length and Label Placement



- Notes:
1. Empty part cavities at the trailing and leading ends are sealed with cover tape. See EIA 481-1-A.
 2. Labels are placed on the flange opposite the sprockets in the carrier tape.

Handling Precautions

| Parameter | Rating | Standard |
|----------------------------------|----------|--------------------------|
| ESD – Human Body Model (HBM) | Class 2 | ESDA / JEDEC JS-001-2012 |
| ESD – Charged Device Model (CDM) | Class C3 | JEDEC JESD22-C101F |
| MSL – Moisture Sensitivity Level | Level 1 | IPC/JEDEC J-STD-020 |



Caution!
ESD-Sensitive Device

Solderability

Compatible with both lead-free (260°C max. reflow temp.) and tin/lead (245°C max. reflow temp.) soldering processes. Solder profiles available upon request.

Contact plating: NiPdAu (*Plating thickness: Ni 0.5000–2.0066 μm; Pd 0.01999–0.15011 μm; Au 0.00254–0.01501 μm*)

RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C₁₅H₁₂Br₄O₂) Free
- SVHC Free



Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

Web: www.qorvo.com

Tel: 1-844-890-8163

Email: customer.support@qorvo.com

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