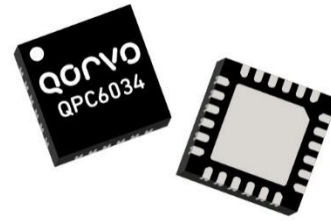


### Product Overview

The QPC6034 is a Silicon on Insulator (SOI) Single-Pole 3-Throw (SP3T) switch designed for uses in cellular, 3G, LTE and other high-performance communication systems. It offers a high isolation, symmetric throw ports with excellent linearity and power handling capability. No DC blocking capacitors are necessary on the RF ports. The design is non-reflective as such the RF1, RF2, and RF3 ports are terminated with 50  $\Omega$  load(s) in the non-throw or OFF state. The QPC6034 is 1.8V positive control logic compatible. It incorporates a single pin to disable the internal Negative Voltage Generator (NVG), and the required negative voltage supply from an off-chip external DC source.

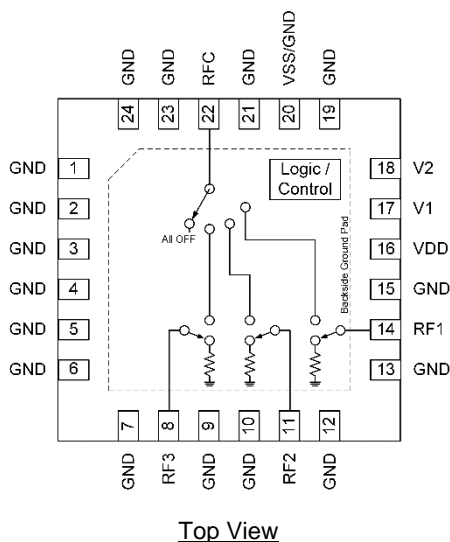


24-Pin, 4 x 4 mm QFN Package

### Key Features

- 5 – 6000 MHz Operation
- Symmetrical SP3T
- Non-Reflective RF1, RF2, & RF3 Ports & Terminated in ALL-OFF State
- No Blocking Capacitors Necessary Unless DC Voltage on RF line
- High Isolation: 62 dB at 2 GHz
- High Input IP3: +59 dBm
- +1.8 V Logic Compatible

### Functional Block Diagram



### Applications

- Cellular, 3G, 4G, 5G Infrastructure
- WiBro, WiMax, LTE
- High Performance Communication Systems
- Test Equipment

### Ordering Information

| Part No.       | Description  |
|----------------|--|
| QPC6034TR13    | 2,500 pieces on a 13" reel (standard)              |
| QPC6034 PCK401 | 5 MHz – 6GHz Evaluation Board with 5-piece samples |

### Absolute Maximum Ratings

| Parameter                                 |          |            | Rating         |
|---|----------|------------|----------------|
| Storage Temperature                       |          |            | -40 to +150 °C |
| RF Input Power, non-internally terminated |          |            | +37.5 dBm      |
| RF Input Power, RFX terminated            |          |            | +29 dBm        |
| Device Voltage                            | (VDD)    |            | +6 V           |
|   | (VSS)    |            | -6 V           |
| Control Voltage                           | (V1, V2) | Low / High | -0.2 V / +6 V  |

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

### Recommended Operating Conditions

| Parameter   | Min  | Typ  | Max  | Units |
|---|------|------|------|-------|
| Device Voltage (VDD)                                      | +2.7 | +5.0 | +5.5 | V     |
| Device Voltage (VSS), External Negative Voltage Supply    | -5.5 | -5.0 | -2.7 | V     |
| Device Voltage (VSS), Internal Negative Voltage Generator |      | 0    |      | V     |
| T <sub>CASE</sub> (Backside Paddle)                       | -40  |      | +105 | °C    |
| T <sub>j</sub> for >10 <sup>5</sup> hours MTTF            |      |      | +125 | °C    |

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

### Electrical Specifications

| Parameter   | Conditions <sup>(1)</sup> | Min | Typ  | Max  | Units |
|---|---------------------------|-----|------|------|-------|
| Operational Frequency Range                           |                           | 5   |      | 6000 | MHz   |
| Insertion Loss <sup>(2)</sup><br>(RFC to RF1/RF2/RF3) | 450 MHz                   |     | 0.84 |      | dB    |
|   | 900 MHz                   |     | 0.86 |      | dB    |
|   | 2100 MHz                  |     | 0.93 | 1.25 | dB    |
|   | 2600 MHz                  |     | 0.96 |      | dB    |
|   | 4000 MHz                  |     | 0.98 |      | dB    |
|   | 6000 MHz                  |     | 1.00 |      | dB    |
| Isolation<br>(RFC to RF1/RF2/RF3)                     | 450 MHz                   |     | 75   |      | dB    |
|   | 900 MHz                   |     | 70   |      | dB    |
|   | 2100 MHz                  | 50  | 62   |      | dB    |
|   | 2600 MHz                  |     | 61   |      | dB    |
|   | 4000 MHz                  |     | 61   |      | dB    |
|   | 6000 MHz                  |     | 60   |      | dB    |
| Isolation<br>(RF1/2/3 to RF1/2/3)                     | 450 MHz                   |     | 78   |      | dB    |
|   | 900 MHz                   |     | 73   |      | dB    |
|   | 2100 MHz                  |     | 65   |      | dB    |
|   | 2600 MHz                  |     | 62   |      | dB    |
|   | 4000 MHz                  |     | 55   |      | dB    |
|   | 6000 MHz                  |     | 48   |      | dB    |
| Return Loss<br>(RF1/RF2/RF3 ON-State)                 | 450 MHz                   |     | 29   |      | dB    |
|   | 900 MHz                   |     | 27   |      | dB    |
|   | 2100 MHz                  |     | 24   |      | dB    |
|   | 2600 MHz                  |     | 24   |      | dB    |
|   | 4000 MHz                  |     | 20   |      | dB    |
|   | 6000 MHz                  |     | 14   |      | dB    |
| Return Loss<br>(RF1/RF2/RF3 OFF-State)                | 450 MHz                   |     | 29   |      | dB    |
|   | 900 MHz                   |     | 27   |      | dB    |
|   | 2100 MHz                  |     | 30   |      | dB    |
|   | 2600 MHz                  |     | 25   |      | dB    |
|   | 4000 MHz                  |     | 30   |      | dB    |
|   | 6000 MHz                  |     | 16   |      | dB    |

## Electrical Specifications (Continued)

| Parameter   | Conditions <sup>(1)</sup>                                    | Min | Typ  | Max  | Units |
|---|--|-----|------|------|-------|
| Operational Frequency Range                           |  | 5   |      | 6000 | MHz   |
| Input IP2   | 1.0 GHz  |     | +110 |      | dBm   |
| Input IP3   | 1.0 GHz, +17 dBm input power per-tone,<br>1 MHz tone spacing | +55 | +59  |      | dBm   |
| Input 1 dB Compression Power                          |  |     | +36  |      | dBm   |
| NVG Spur  | Internal NVG ON  |     | -104 |      | dBm   |
| Setting Time  | 50% V1/V2/V3 to optimum functionality                        |     | 1    | 4    | μs    |
| Start-up Time   | 90% VDD to full functionality                                |     | 5    | 25   | μs    |
| Switching Time  | 50% control to 10/90% RF                                     |     | 150  | 500  | ns    |
| Supply Current (I <sub>VDD</sub> )                    | VDD 5.0V   |     | 90   |      | μA    |
| Control Current, (I <sub>V1</sub> , I <sub>V2</sub> ) | V1, V2 each at 5.0V  |     | 1    |      | μA    |
| VSS Current (I <sub>VSS</sub> )                       | VSS -5.0V, Internal NVG disabled                             |     | 100  |      | μA    |
| Low Control Voltage (V1, V2)                          | +1.8 V Logic compatible                                      | 0   |      | 0.63 | V     |
| High Control Voltage (V1, V2)                         |  | 1.1 |      | VDD  | V     |

**Notes:**

1. Test conditions unless otherwise noted: VDD = +5V, V1/V2 = 0/+5.0V, Temp = +25 °C, 50 Ω system, RF ports DC Voltage 0V, on EVB
2. PCB trace loss deducted

## Maximum Operating Power at High Temperature, ≥50 MHz CW

| Input Port            | State                 | Power at each port   |                            | Thermal Resistance, θ <sub>jc</sub> |
|-----------------------|-----------------------|----------------------|----------------------------|-------------------------------------|
|                       |                       | T <sub>c</sub> +85°C | T <sub>c</sub> +105°C      |                                     |
| RFC, RF1, RF2, or RF3 | ON, Active Throw      | 35.4 dBm             | 32.2 dBm <sup>(1)</sup>    | 56 °C/W                             |
| RF1, RF2, or RF3      | OFF, 1 port           | 27.8 dBm             | 24.8 dBm <sup>(3)</sup>    | 66 °C/W                             |
| RF1, RF2, RF3         | OFF, 2 ports adjacent | 26.7 dBm             | 23.7 dBm <sup>(2)(3)</sup> | 85 °C/W                             |
| RF1, RF2, and RF3     | OFF, All 3 ports      | 26.6 dBm             | 23.6 dBm <sup>(3)</sup>    | 86 °C/W                             |

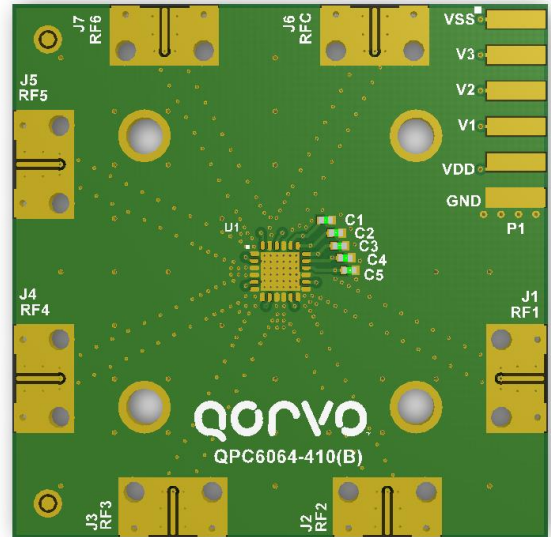
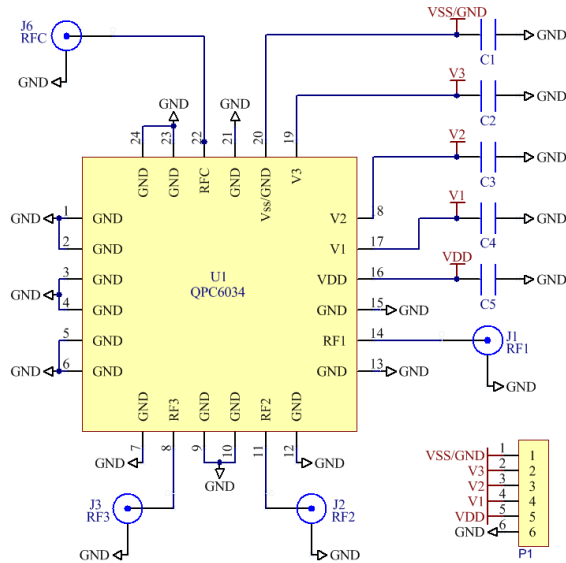
**Notes:**

1. For frequency <50 MHz, the maximum operating power at all temperatures should be at least 2 dB below P1dB refer to performance plot
2. Two ports adjacent being driven simultaneously
3. Internally terminated OFF state

## Truth Table

| Control Input |    | Mode of Signal Path     |
|---------------|----|-------------------------|
| V1            | V2 |                         |
| 0             | 0  | All OFF, RFC Reflective |
| 1             | 0  | RFC ⇌ RF1, Active ON    |
| 0             | 1  | RFC ⇌ RF2, Active ON    |
| 1             | 1  | RFC ⇌ RF3, Active ON    |

## 5 MHz to 6 GHz Evaluation Board – QPC6034PCB410



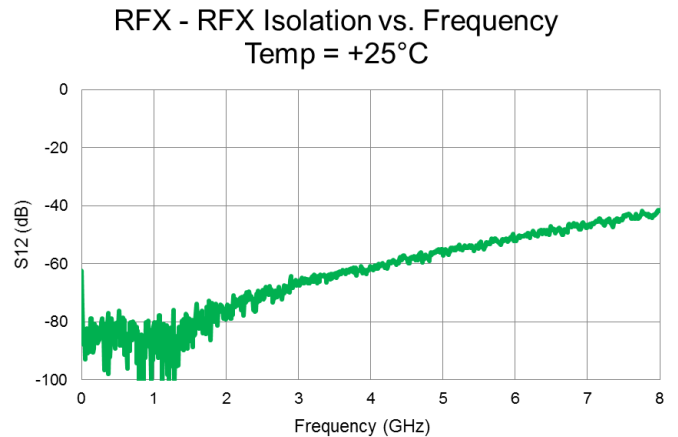
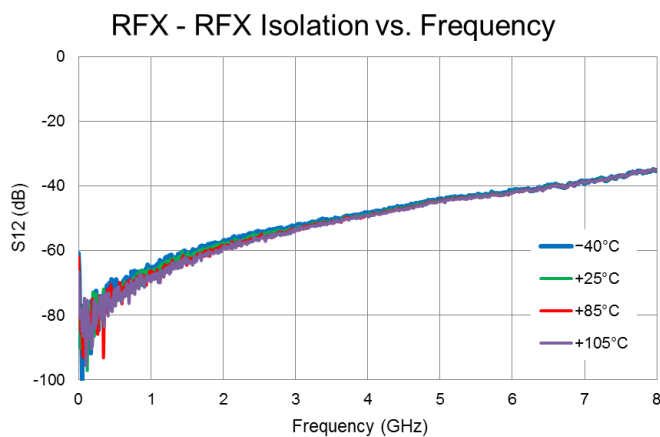
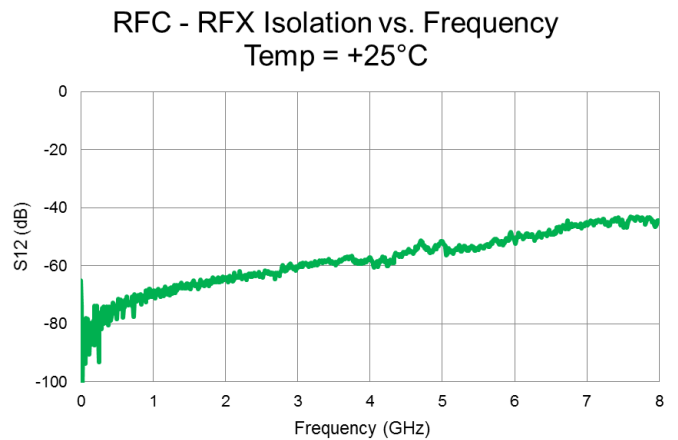
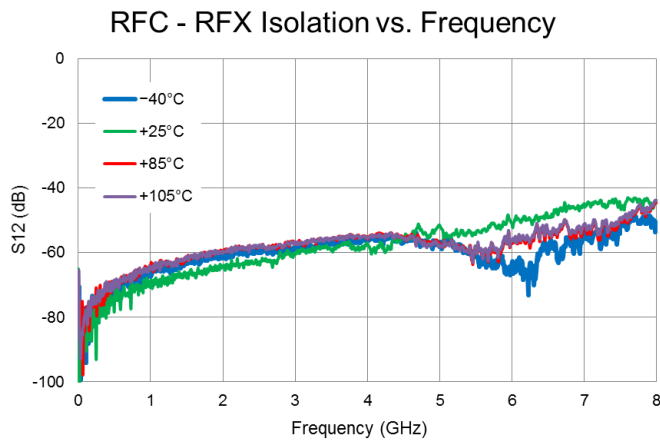
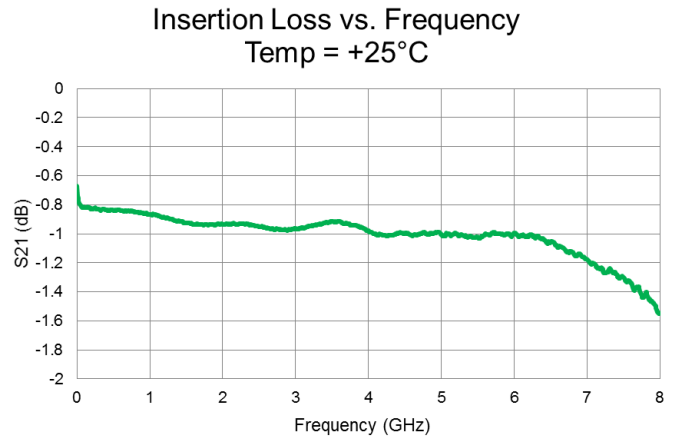
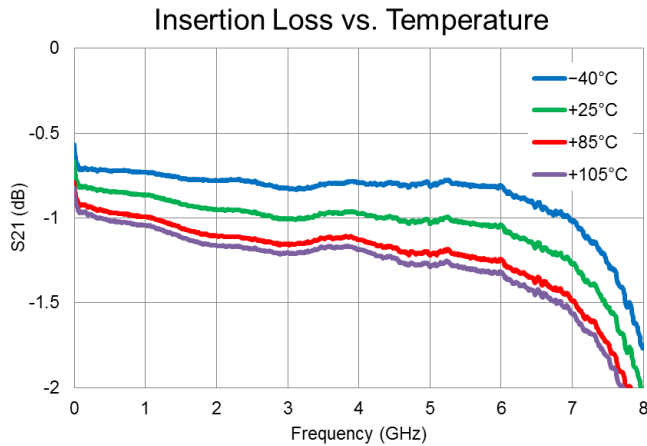
Note: The QPC6064-410 PCB is used within the family of QPC60x4 products

## Bill of Material – QPC6034PCB410

| Reference Des.     | Value  | Description                           | Manuf.      | Part Number         |
|--------------------|--------|---------------------------------------|-------------|---------------------|
| -                  | -      | Printed Circuit Board                 | Qorvo       | QpC6064-410(B)      |
| U1                 | -      | SOI, High Isolation SP3T RF switch    | Qorvo       | QPC6034             |
| C1, C2, C3, C4, C5 | 100 pF | CAP, 100 pF, 5%, 50V, C0G, 0402       | Taiyo Yuden | RM UMK105 CG101JV-F |
| J1, J2, J3, J4, J6 | SMA    | CONN, SMA, EL, FLT VIPER, MAT-21-1038 | Amphenol    | 901-10425           |
| P1                 | -      | CONN, HDR, ST, PLRZD, 6-Pin, 0.100"   | AMP         | 640454-6            |

## Performance Plots – QPC6034PCB410

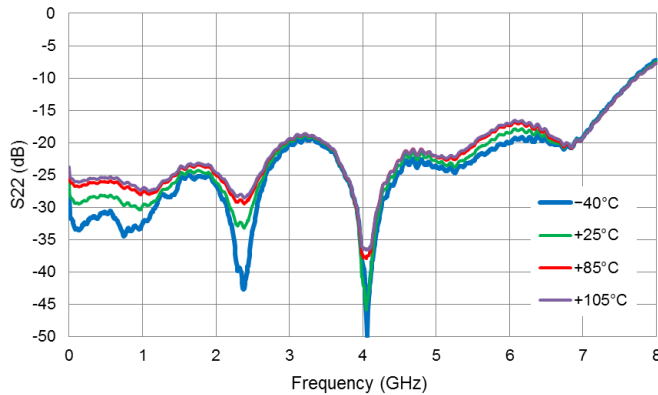
Test conditions unless otherwise noted: VDD = +5.0 V, Temp.=+25 °C, PCB trace loss deducted on Insertion Loss



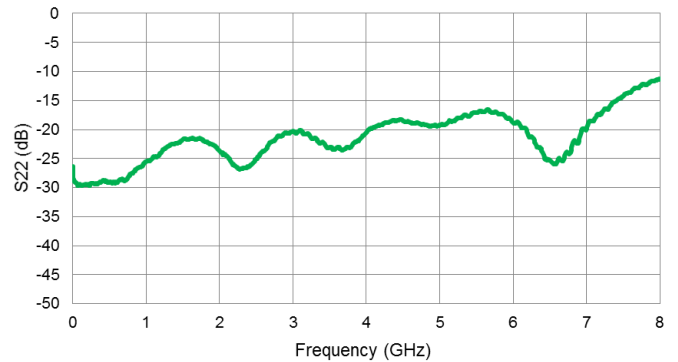
## Performance Plots – QPC6034PCB410 (Continued 1)

Test conditions unless otherwise noted: VDD = +5.0 V, Temp.=+25 °C

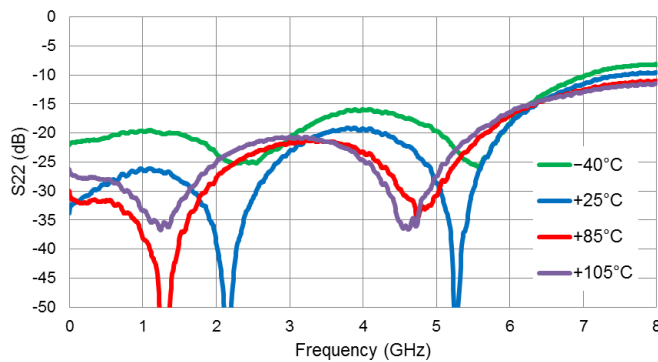
RFX (Active) Return Loss vs. Frequency



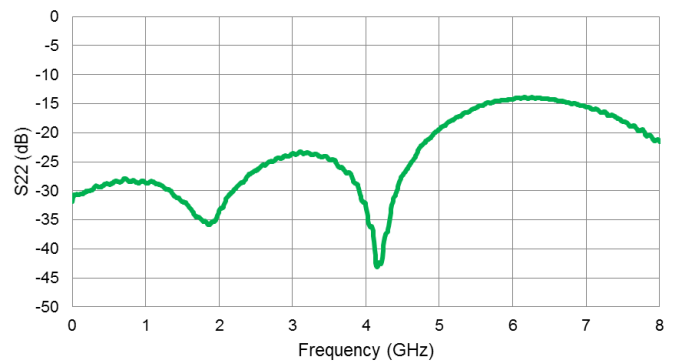
RFX (Active) Return Loss vs. Frequency  
Temp = +25°C



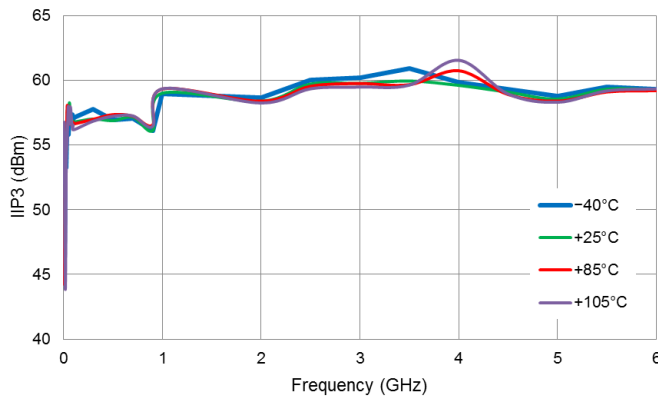
RFX (Terminated) Return Loss vs.  
Frequency



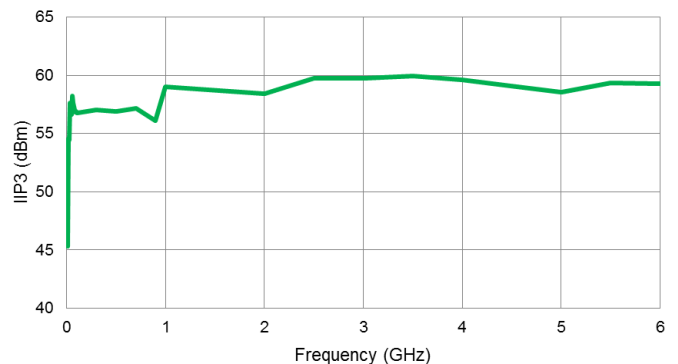
RFX (Terminated) Return Loss  
Temp = +25°C



Input IP3 vs. Frequency

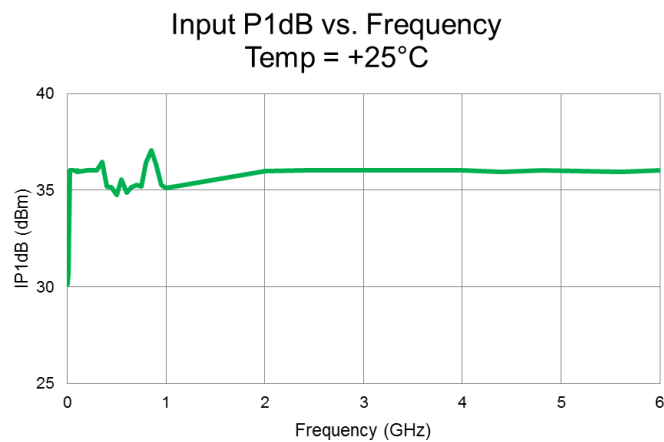


Input IP3 vs. Frequency  
Temp = +25°C

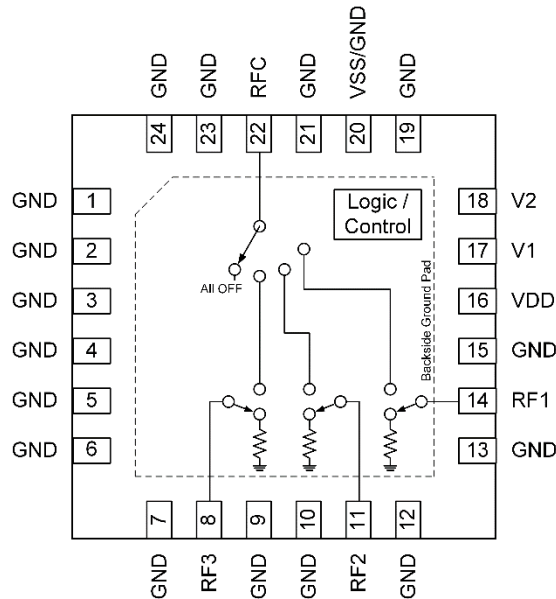


## Performance Plots – QPC6034PCB410 (Continued 2)

Test conditions unless otherwise noted: VDD = +5.0 V, Temp. = +25 °C



## Pad Configuration and Description



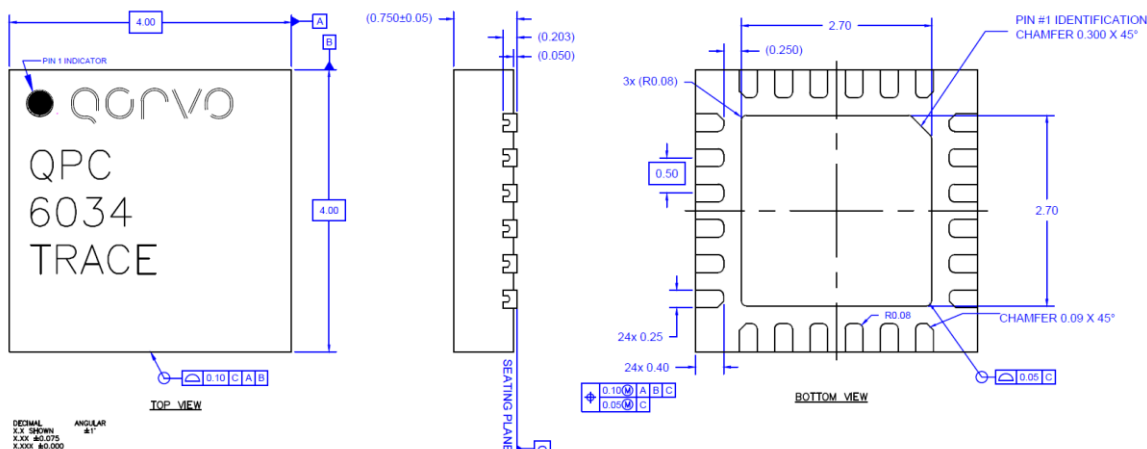
Top View

| Pad No.                                | Label   | Description   |
|--|---------|---|
| 1-7, 9, 10, 12, 13, 15, 19, 21, 23, 24 | GND     | DC and RF ground, connect to low inductive path to PCB ground   |
| 8                                      | RF3     | RF Port 3   |
| 11                                     | RF2     | RF Port 2   |
| 14                                     | RF1     | RF Port 1   |
| 16                                     | VDD     | DC Supply Voltage Input   |
| 17                                     | V1      | Control Input 1   |
| 18                                     | V2      | Control Input 2   |
| 20                                     | VSS/GND | Negative DC Supply Voltage and Internal Negative Voltage Generator (NVG) control input. Provide low inductive ground connection on this pin to enable internal NVG or directly connect -2.7V to -5V external voltage supply to disable the internal NVG. Re-enable internal NVG, VDD cycling required |
| 22                                     | RFC     | RF Common Port  |
| Backside Paddle                        | GND     | RF and DC ground. Must be soldered on PCB ground plane over a bed of via holes to minimize inductance and thermal resistance  |



### Package Marking and Dimensions

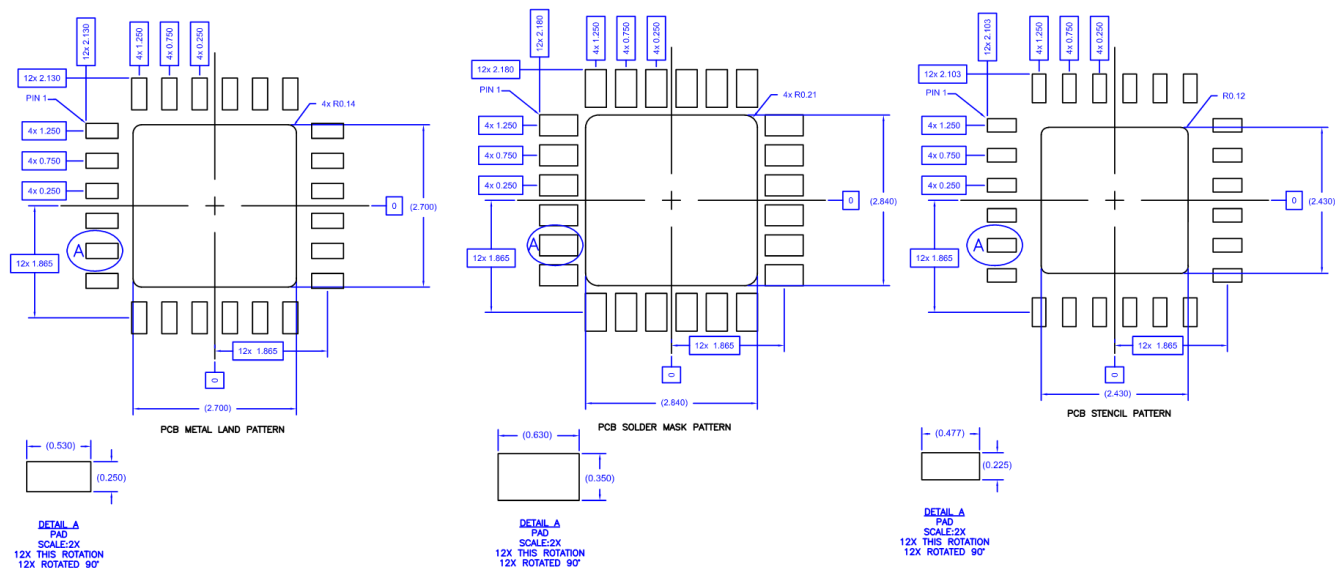
Marking: Part Number – QPC  
6034  
Trace Code – Assigned by subcontractor



#### Notes:

1. All dimensions are in millimeters. Angles are in degrees. Interpret dimensions and tolerances per ASME Y14.5 - 2009
2. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.
3. Contact plating: NiPdAu

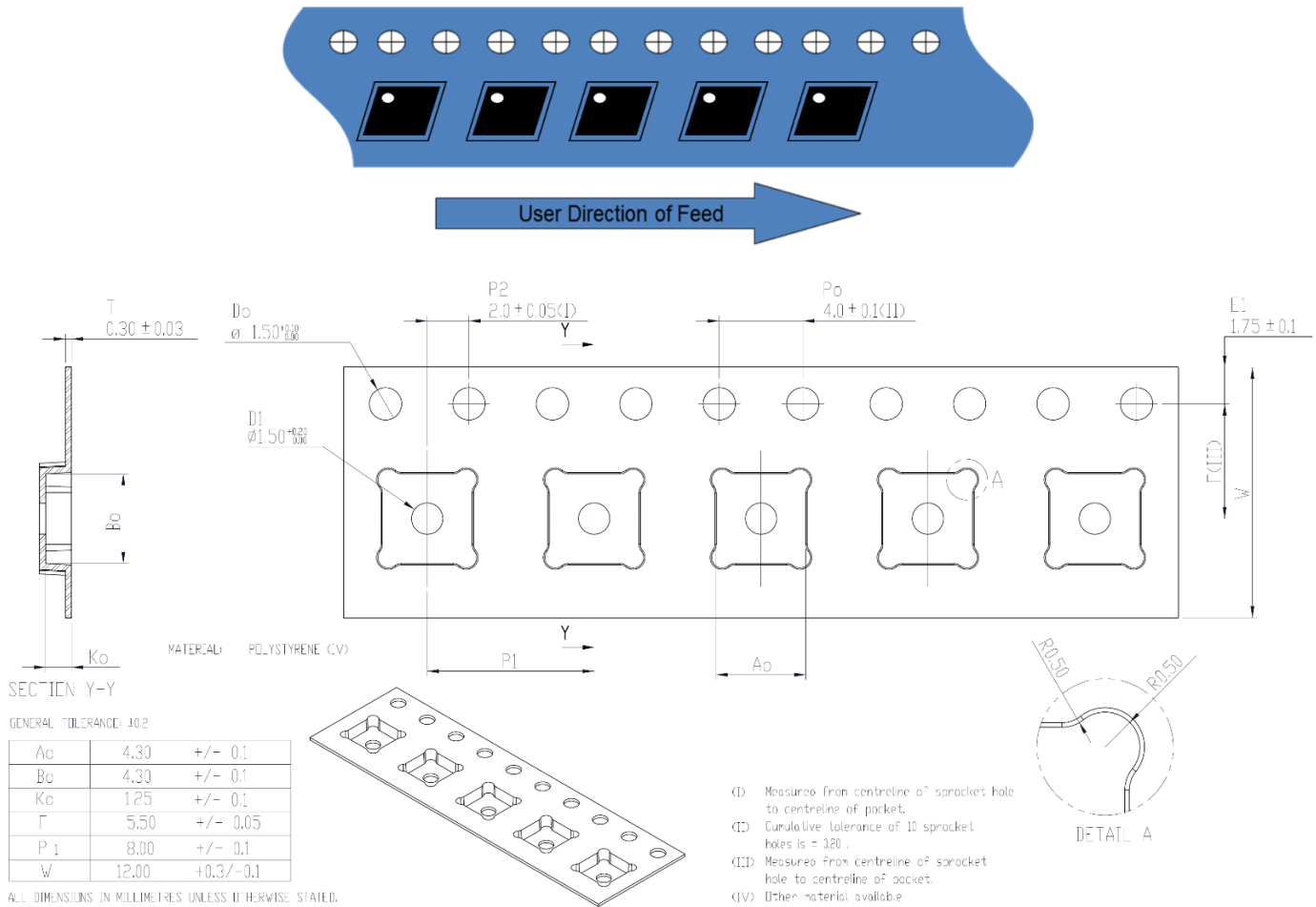
### PCB Mounting Pattern



#### 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. We recommend a 0.35mm (#80/.0135") diameter bit for drilling via holes and a final plated thru diameter of 0.25 mm (0.01").
4. Ensure good package backside paddle solder attach for reliable operation and best electrical performance.

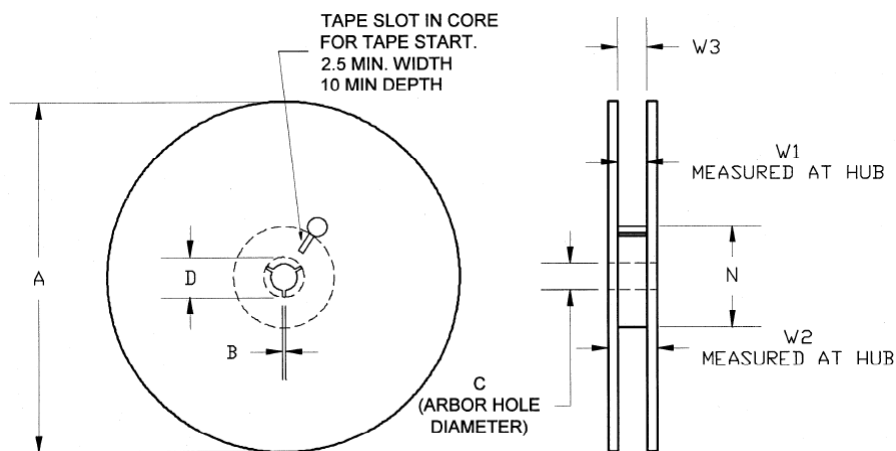
## Tape and Reel Information – Carrier and Cover Tape Dimensions



| Feature             | Measure                                  | Symbol | Size (in) | Size (mm) |
|---------------------|--|--------|-----------|-----------|
| Cavity              | Length                                   | A0     | 0.169     | 4.30      |
|                     | Width                                    | B0     | 0.169     | 4.30      |
|                     | Depth                                    | K0     | 0.049     | 1.25      |
|                     | Pitch                                    | P1     | 0.314     | 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 (Reference Only)                   | C      | 0.362     | 9.20      |
| Carrier Tape        | Width                                    | W      | 0.472     | 12.0      |

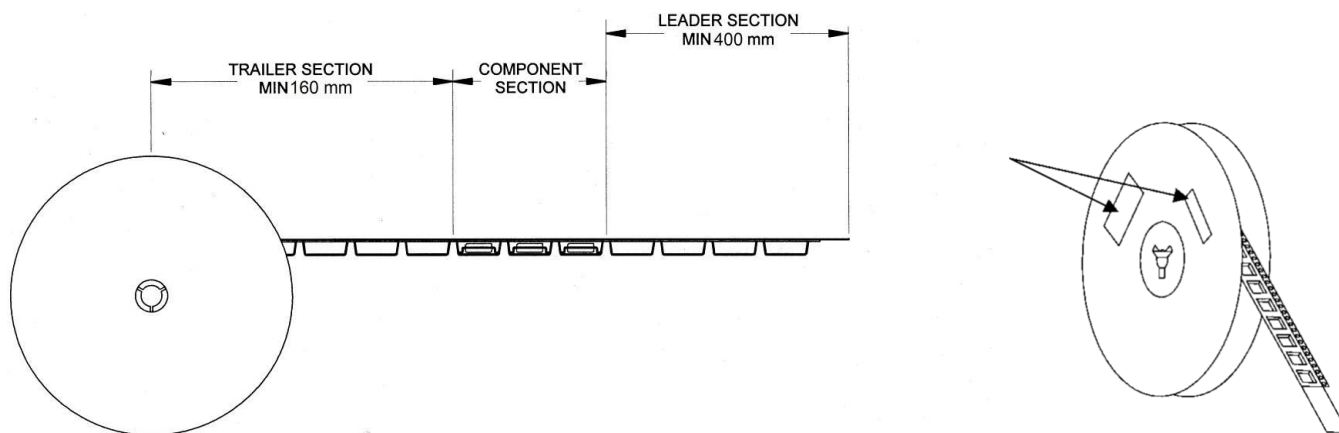
## Tape and Reel Information – Reel Dimensions

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

## 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 (C<sub>15</sub>H<sub>12</sub>Br<sub>4</sub>O<sub>2</sub>) Free
- SVHC Free
- PFOS Free



## Contact Information

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

Web: [www.qorvo.com](http://www.qorvo.com)

Tel: 1-844-890-8163

Email: [customer.support@qorvo.com](mailto:customer.support@qorvo.com)

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