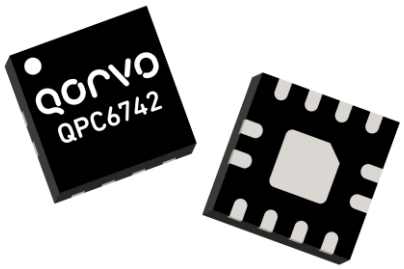
# QPC6742

## 75Ω SP4T Switch 5MHz to 2000MHz

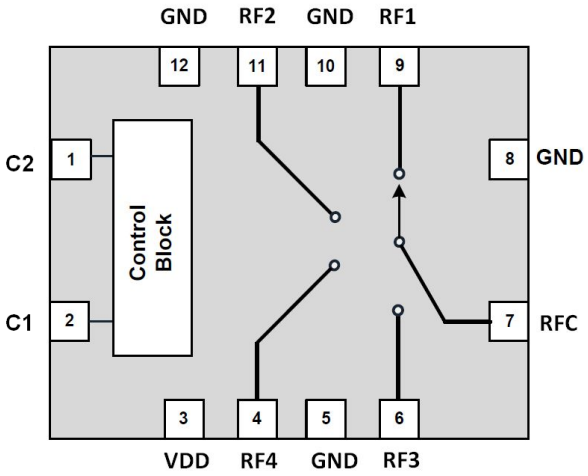
## Product Overview

The QPC6742 is a 75Ω Silicon on Insulator (SOI) single-pole, four throw (SP4T) switch designed for use in CATV, satellite set top, and other high-performance communications systems. It offers a high isolation symmetric topology with excellent linearity and power handling capability. No blocking caps are necessary on the RF ports. QPC6742 is packaged in a convenient 1.8mm x 1.8mm QFN package




12 Pin 1.8 x 1.8mm QFN Package

## Functional Block Diagram




Top View

## Key Features

- 5 MHz to 2000MHz Operation
- Low Insertion Loss: 0.35dB at 800MHz
- No Blocking Caps Required Unless Voltage on RF Line
- High Isolation: 34dB at 800MHz
- High Input IP3: 82dBm at 850MHz
- 2kV ESD
- +1.8V Logic Compatible
- 3V to 5V Operation

## Applications

- MDU Amplifiers
- Point To Point
- Optical Nodes
- Set Top Box
- PCTV
- Multi-tuner DVR

## Ordering Information

| Part No. | Description |
|---|---|
| QPC6742SQ | Sample bag with 25 pieces |
| QPC6742SR | 7" Reel with 100 pieces |
| QPC6742TR7 | 7" Reel with 2500 pieces |
| QPC6742PCK | 5 – 2000MHz PCBA with 5 pc. sample bag |

## Absolute Maximum Ratings

| Parameter | Rating |
|---|---|
| Control Voltage ($V_{C1, C2}$) | +3.0V |
| Supply Voltage ($V_{DD}$) | +6.0V |
| Maximum CW Input Power at 25°C | +35dBm |
| Max Input Power During Active Switching | +27dBm |
| Storage Temperature Range | −40 to +150°C |

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 |
|---|---|---|---|---|
| Supply Voltage, $V_{DD}$ | +2.7 | +3 | +5.5 | V |
| Temperature Range | −40 | | +85 | °C |

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

## Electrical Specifications

| Parameter | Conditions [1] | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Frequency Range | | 5 | | 2000 | MHz |
| Insertion Loss (RFC to RF1/RF2/RF3/RF4) | 5MHz | | 0.2 | | dB |
| | 50MHz | | 0.3 | | |
| | 800MHz | | 0.35 | | |
| | 1.2GHz | | 0.4 | | |
| | 2GHz | | 0.45 | | |
| Isolation (RFC to RF1/RF2/RF3/RF4) | 5MHz | | 49 | | dB |
| | 50MHz | | 58 | | |
| | 800MHz | | 34 | | |
| | 1.2GHz | | 30 | | |
| | 2GHz | | 26 | | |
| Isolation (RF1/RF2/RF3/RF4) | 5MHz | | 47 | | dB |
| | 50MHz | | 51 | | |
| | 800MHz | | 29 | | |
| | 1.2GHz | | 25 | | |
| | 2GHz | | 21 | | |
| Return Loss | 5MHz | | 43 | | dB |
| | 50MHz | | 36 | | |
| | 800MHz | | 19 | | |
| | 1.2GHz | | 20 | | |
| | 2GHz | | 19 | | |

Notes:

1. Test Conditions Unless Otherwise Specified: $T_A$ = +25°C, $V_{DD}$ = +5V, $V_{C1,C2}$ = 0/+2.5V, 75Ω system.

## Electrical Specifications (cont'd.)

| Parameter | Conditions [1] | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Input IP3 | 850MHz +12dBm input power per tone, 30MHz tone spacing | | 82 | | dBm |
| Input IP2 | 850MHz +12dBm input power per tone, 30MHz tone spacing | | 130.6 | | |
| Input 1dB Compression Point | 850MHz | | 40.2 | | |
| Input 0.1dB Compression Point | 850MHz | | 34.0 | | |
| MER | 75dBmV composite at 885MHz | | 41.7 | | dB |
| CCN | 75dBmV composite at 885MHz | | 55.8 | | |
| Switching Speed | 10/90% RF | | 0.6 | | µs |
| Switching Speed | 50% control to 10/90% RF | | 1.3 | | |
| Turn On Time | Time for VDD = 0V to part ON and RF = 90% | | 20 | | |
| NVG Spurs | F<30MHz | | -118 | | dBm |
| Harmonics-2nd | 5 MHz | | -76 | | dBc |
| | 50MHz | | -88 | | |
| | 850MHz | | -129 | | |
| | 1800MHz | | -114 | | |
| Harmonics-3rd | 5MHz | | -97 | | dBc |
| | 50MHz | | -110 | | |
| | 850MHz | | -129 | | |
| | 1800MHz | | -110 | | |

Notes:

1. Test Conditions Unless Otherwise Specified: $T_A$ = +25°C, $V_{DD}$ = +5V, $V_{CTL}$ = 0/+2.5V, 75Ω system. Drive RFC, RFx output.

## Electrical Specifications - Power Supply

| Parameter | Conditions [1] | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Supply Current ($I_{DD}$) | $V_{DD}$ = +5.0V | | 65 | 130 | µA |
| Control Current | | | | 5 | µA |
| Control Voltage High | | 1.3 | | 2.7 | V |
| Control Voltage Low | | 0 | | 0.45 | V |

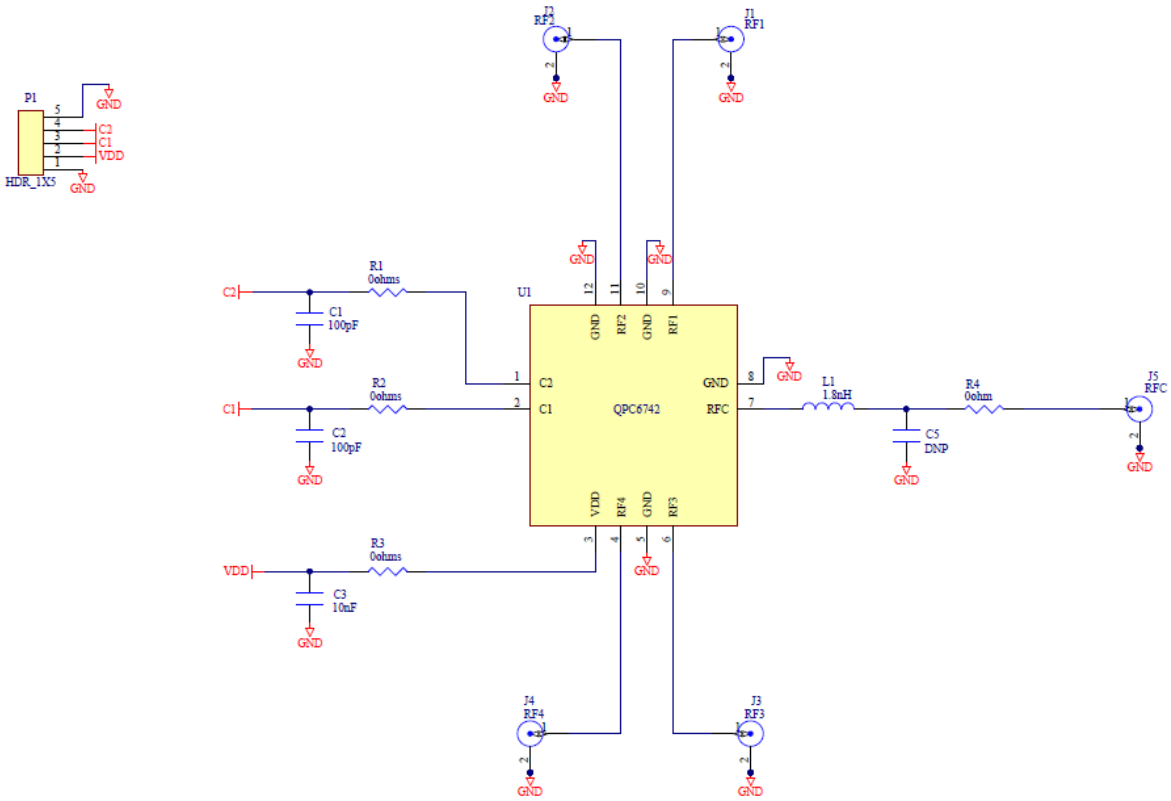
## Power Supply Sequencing Requirements

| Condition | Sequence |
|---|---|
| Power Up | Turn on VDD, then C1 and C2, then (20µs or greater), apply RF signal |
| Power Down | Turn off RF signal, then C1 and C2, turn off VDD |

## Truth Table

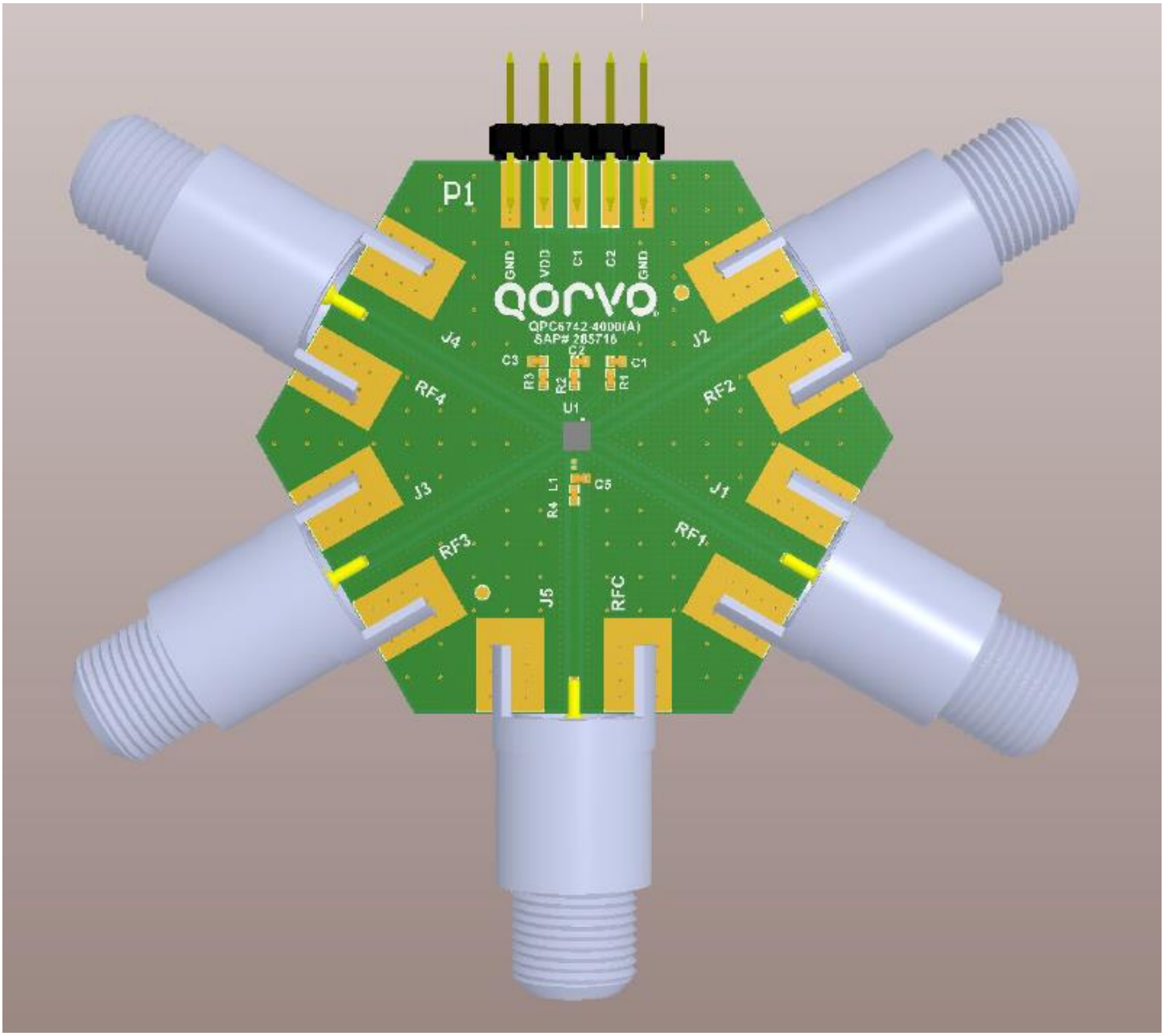
| Mode | Control Signals | |
|---|---|---|
| | C1 | C1 |
| RFC to RF1 | High | Low |
| RFC to RF2 | Low | High |
| RFC to RF3 | High | High |
| RFC to RF4 | Low | Low |

## 5-2000 MHz Evaluation Board Schematic (QPC6742PCK)



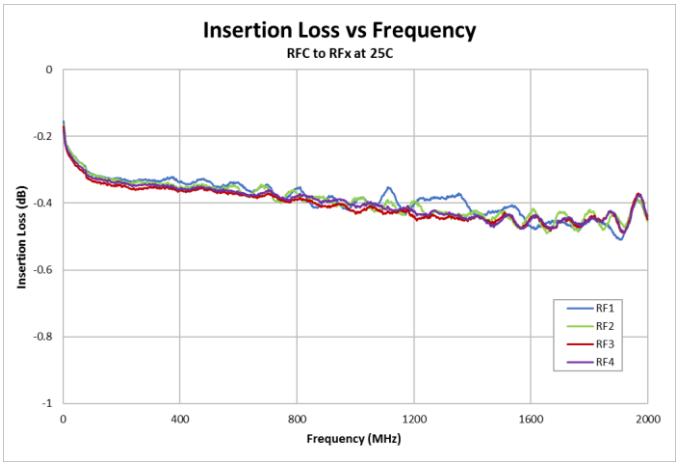

| Ref. Designator | Description | Manufacturer | Part Number |
|---|---|---|---|
| PCB | Evaluation Board PCB | Viasystems | QPC6742-4000 |
| U1 | 75ohm SP4T Switch | Qorvo | QPC6742SB |
| J1, J2, J3, J4, J5 | F Connector, Edge Mount, 75 Ω, 0.065" | Genesis Technology | GT20-300204 |
| R1, R2, R3, R4 | 0 Ω RES, 0402 | Kamaya, Inc | RMC1/16SJPTH |
| P1 | CONN, HDR, ST, PLRZD, 5-PIN, 0.100" | ITW Pancon | MPSS100-5-C |
| C1, C2 | CAP, 100pF, 5%, 50V, C0G, 0402 | Murata | GRM1555C1H101JA01D |
| C3 | CAP, 10nF, 10%, 25V, X7R, 0402 | Murata | GRM155R71E103KA01D |
| L1 | IND, 1.8nH, +/-0.1nH, M/L, Hi-Q, 0201 | Taiyo Uden | LG HKQ0603W1N8B-T |
| C5 | DNP | N/A | N/A |

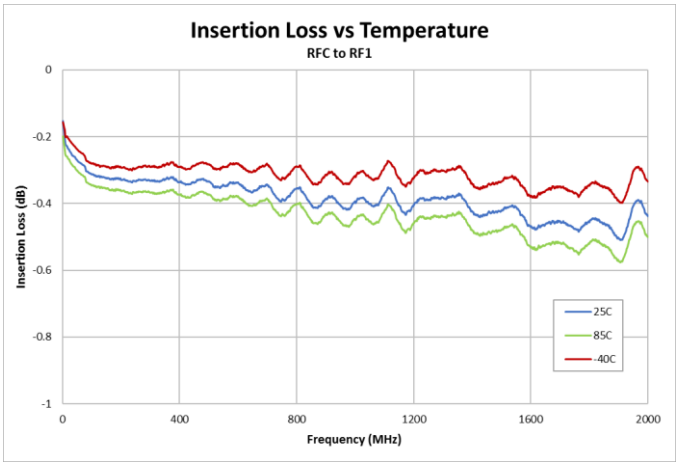
## Evaluation Board Assembly (QPC6742PCK)

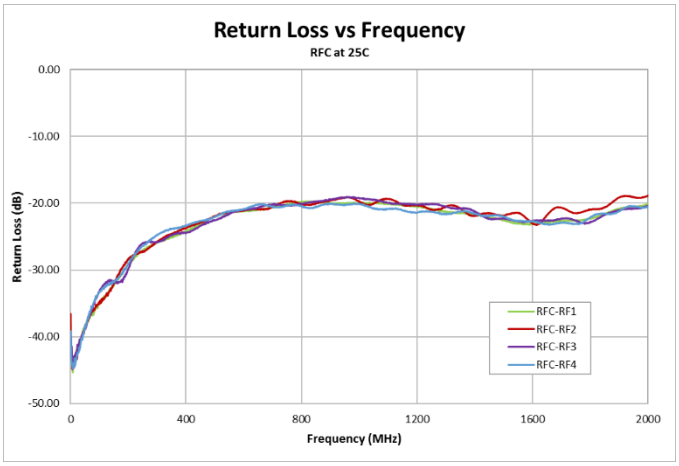


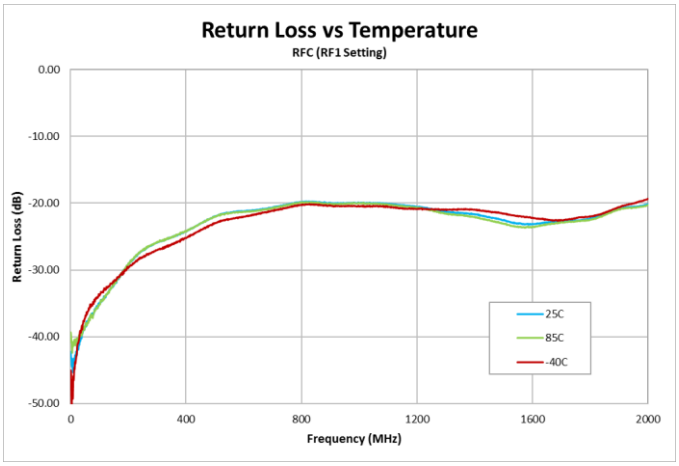
## Performance Plots

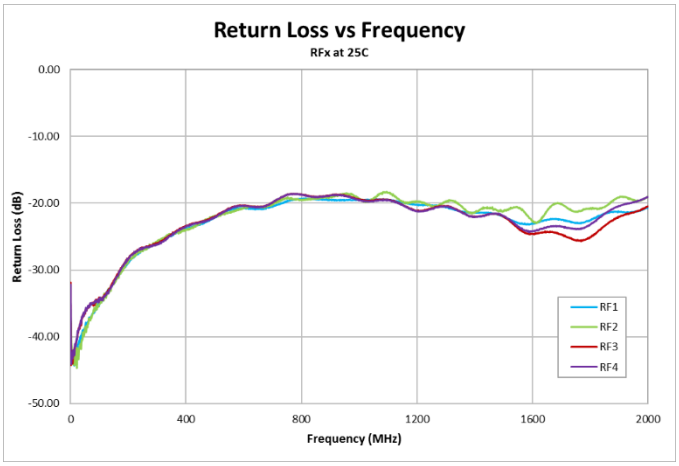
Test conditions unless otherwise noted: $V_{DD}$ =+5V, $V_{C1,C1}$= 0 / 2.5V, Temp= +25°C, $Z_o$ = 75Ω

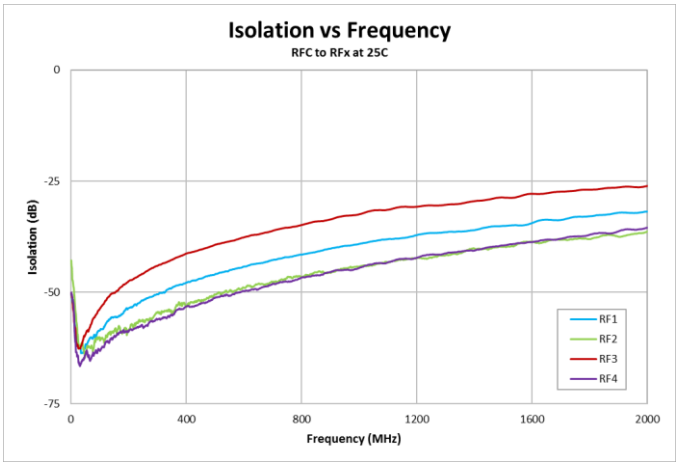


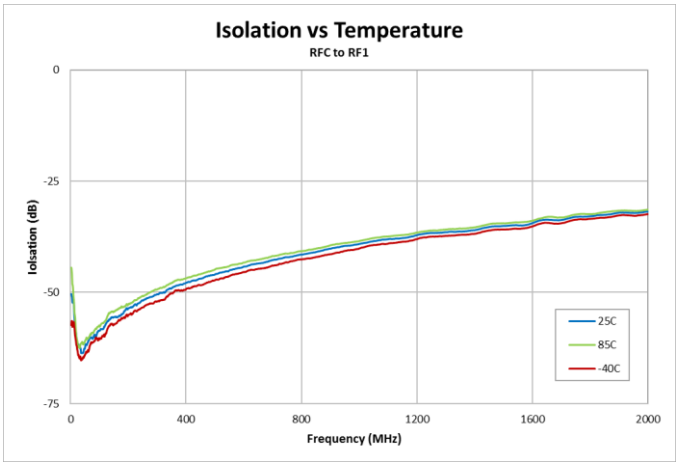



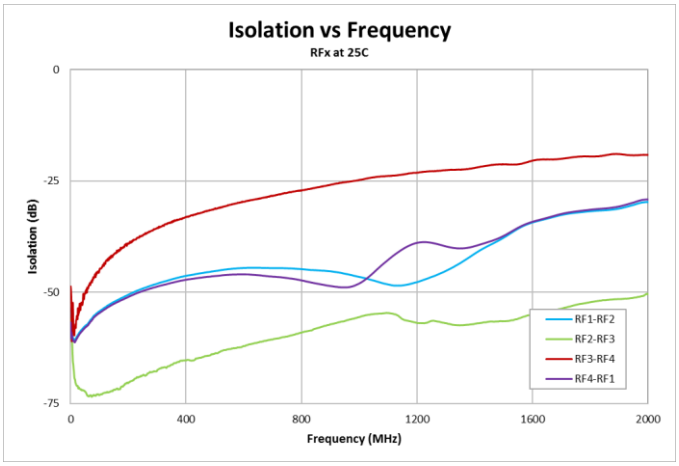

Notes:

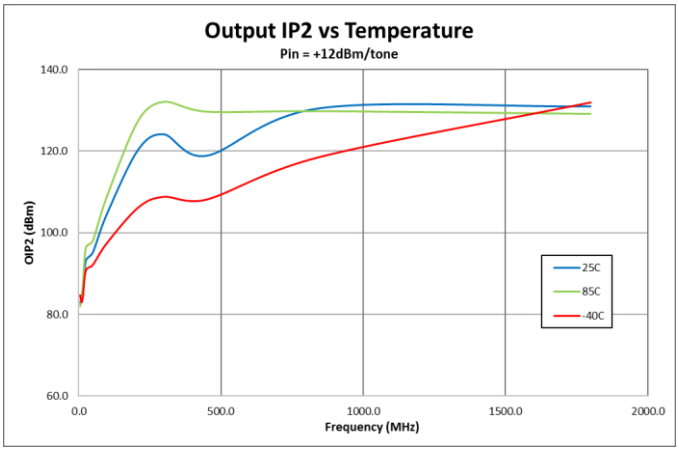
1. Insertion Loss plots are loss compensated to remove effects of EVB.

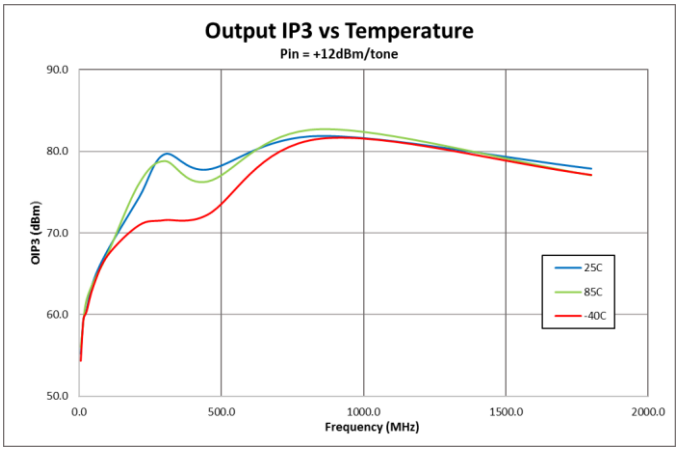
## Performance Plots (cont'd.)

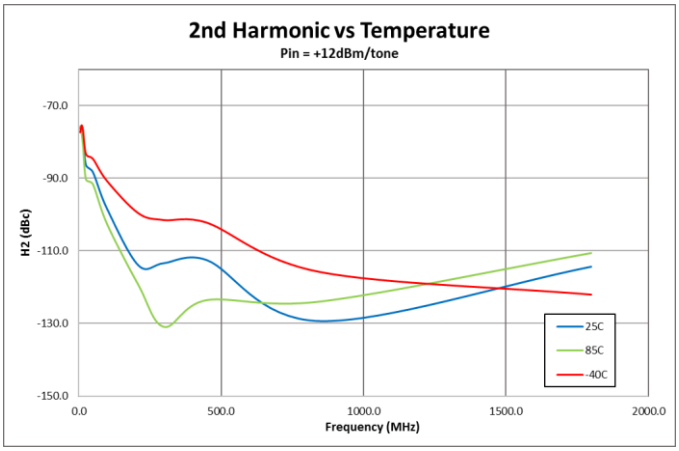
Test conditions unless otherwise noted: $V_{DD}$ =+5V, $V_{C1,C1}$= 0 / 2.5V, Temp= +25°C, $Z_o$ = 75Ω

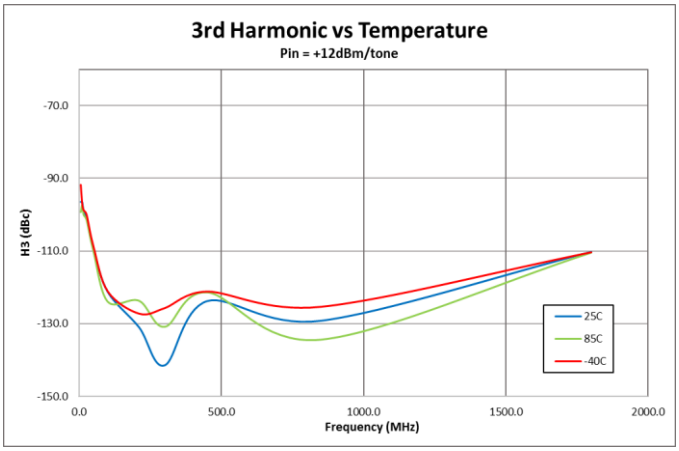


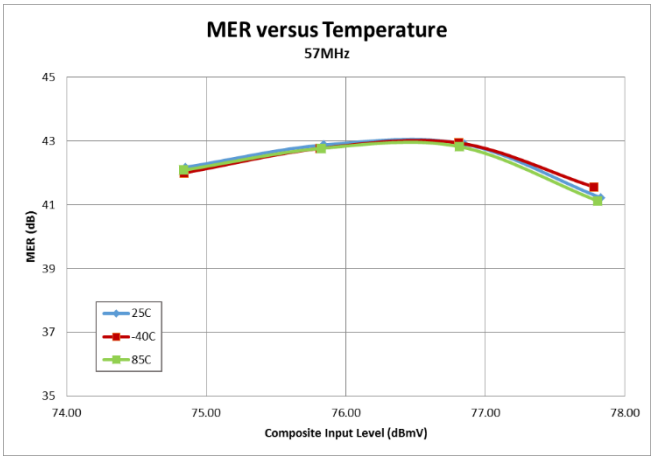



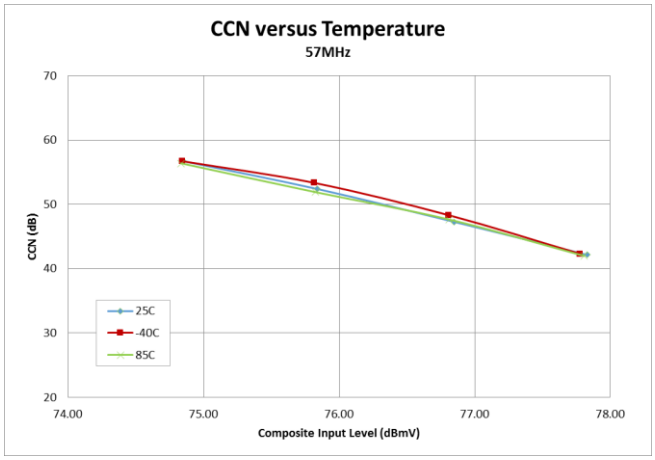



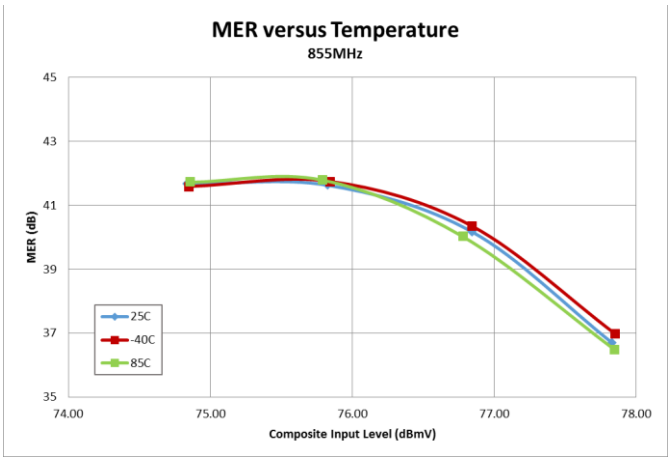



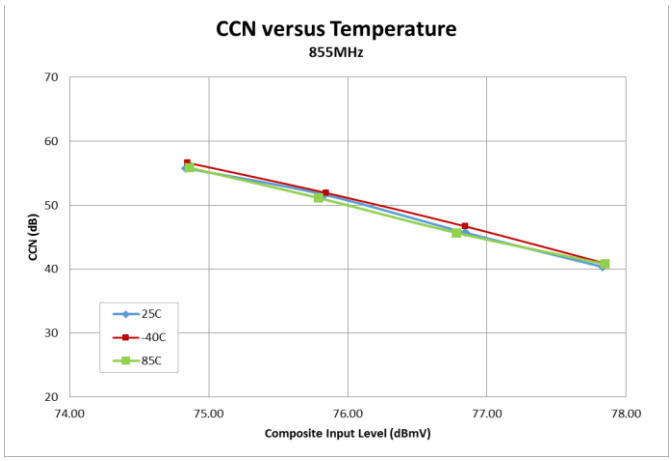
## Performance Plots (cont'd.)

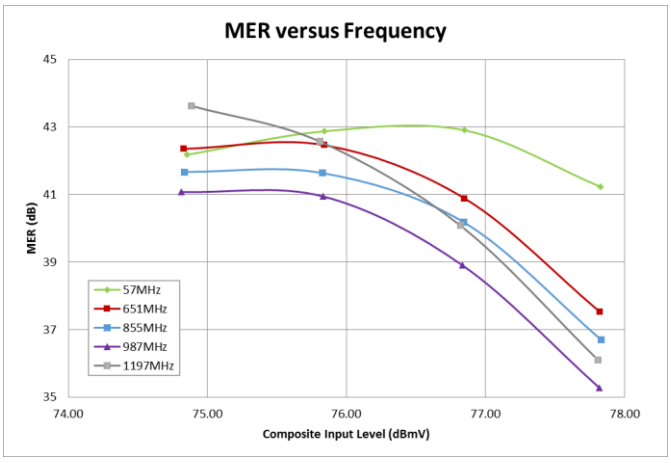
Test conditions unless otherwise noted: $V_{DD}$ =+5V, $V_{C1,C1}$= 0 / 2.5V, Temp= +25°C, $Z_o$ = 75Ω

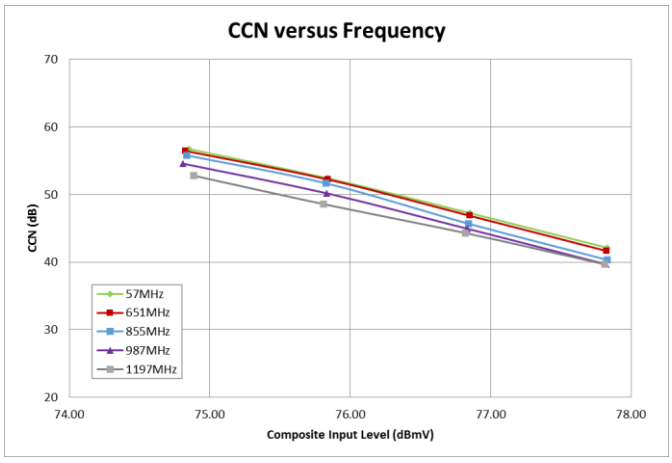


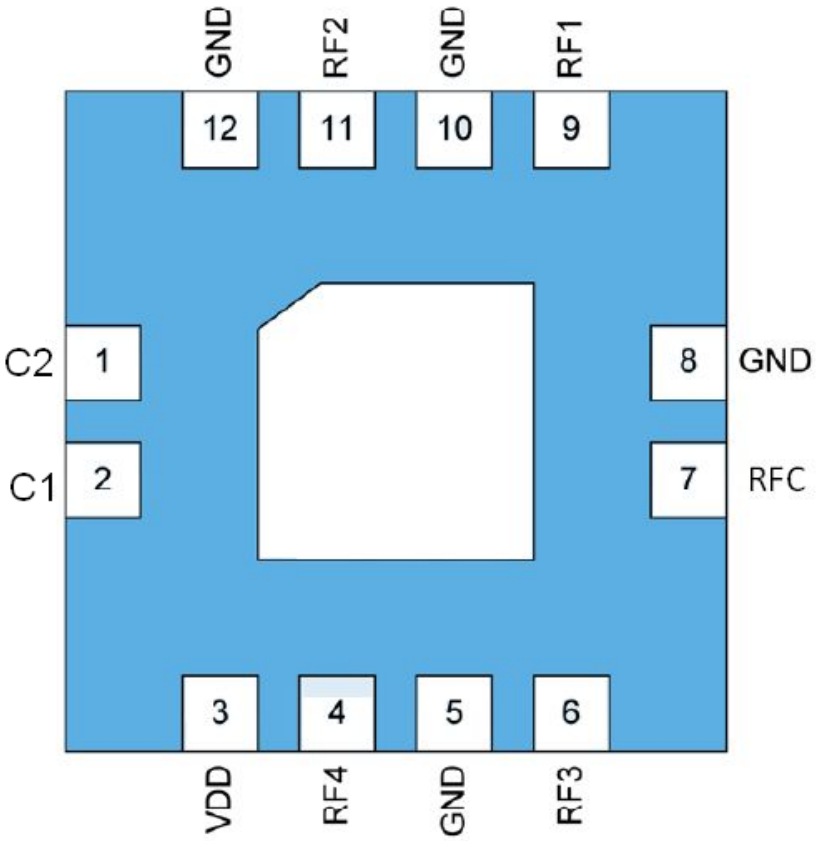




MER/CCN Test Conditions:

1. 190 QAM256 Channels, 57-1215MHz, ITU-T J.83, Annex B
2. CCN test procedure according to ANSI/SCTE 17. System BW 5.36MHz.

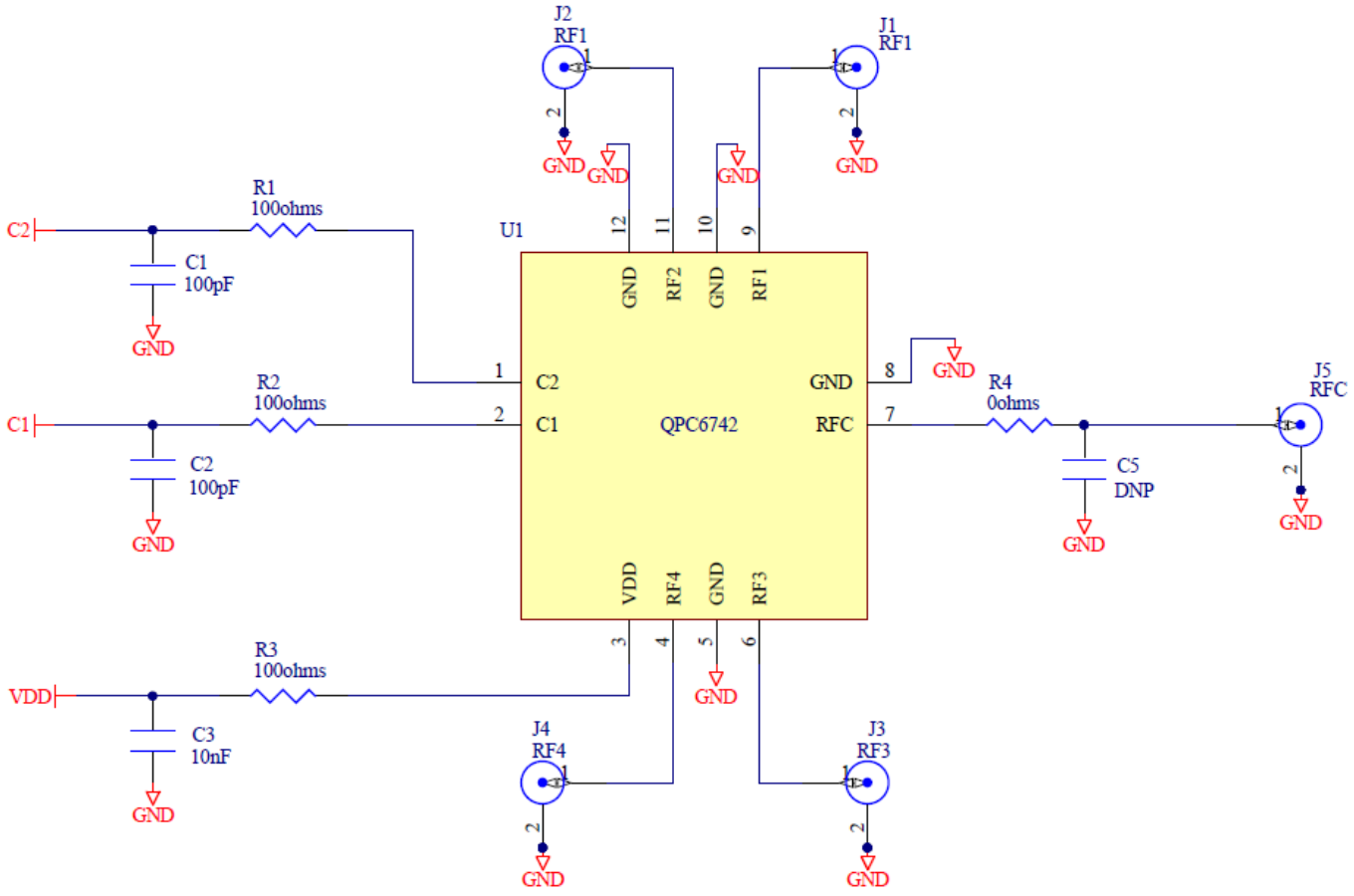
## Pin Configuration and Description




Top View

| Pad No. | Label | Description |
|---|---|---|
| 1 | C2 | Switch Logic Control 2 |
| 2 | C1 | Switch Logic Control 1 |
| 3 | VDD | Supply Voltage |
| 4 | RF4 | RF Output Port |
| 5 | GND | Ground |
| 6 | RF3 | RF Output Port |
| 7 | RFC | RF Input Port |
| 8 | GND | Ground |
| 9 | RF1 | RF Output Port |
| 10 | GND | Ground |
| 11 | RF2 | RF Output Port |
| 12 | GND | Ground |

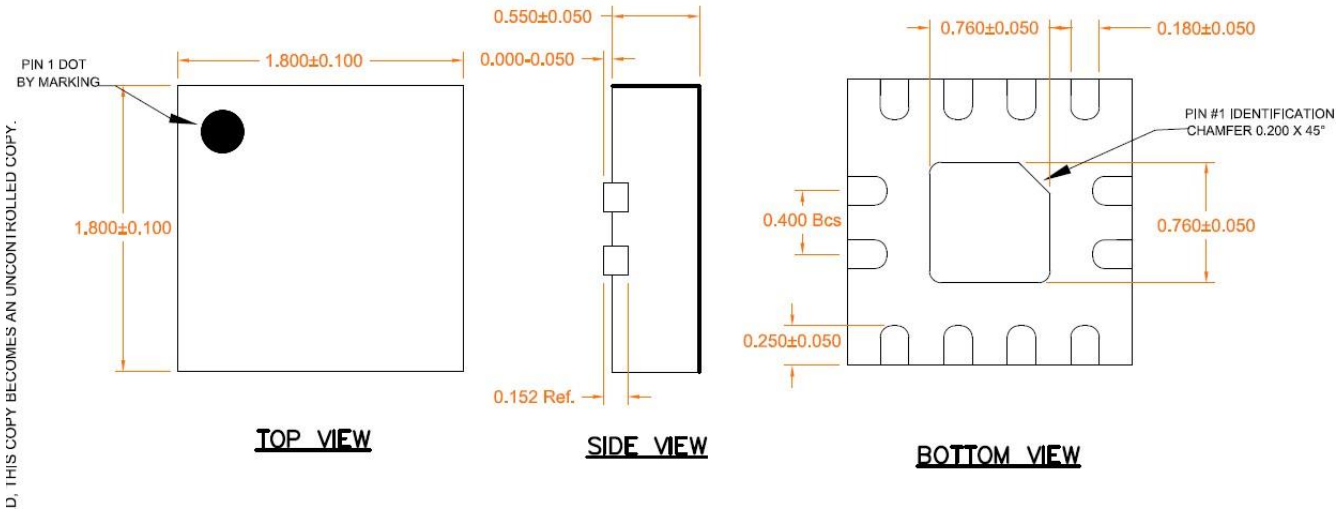
## Applications Schematic; 5-2000MHz




Notes:

1. R1-R3 optional for spurious or RFI suppression.
2. Isolation can be optimized by maximizing ground between RF Ports
3. R4, C5 optional for improving return loss at high frequencies (use small inductance in place of R4).

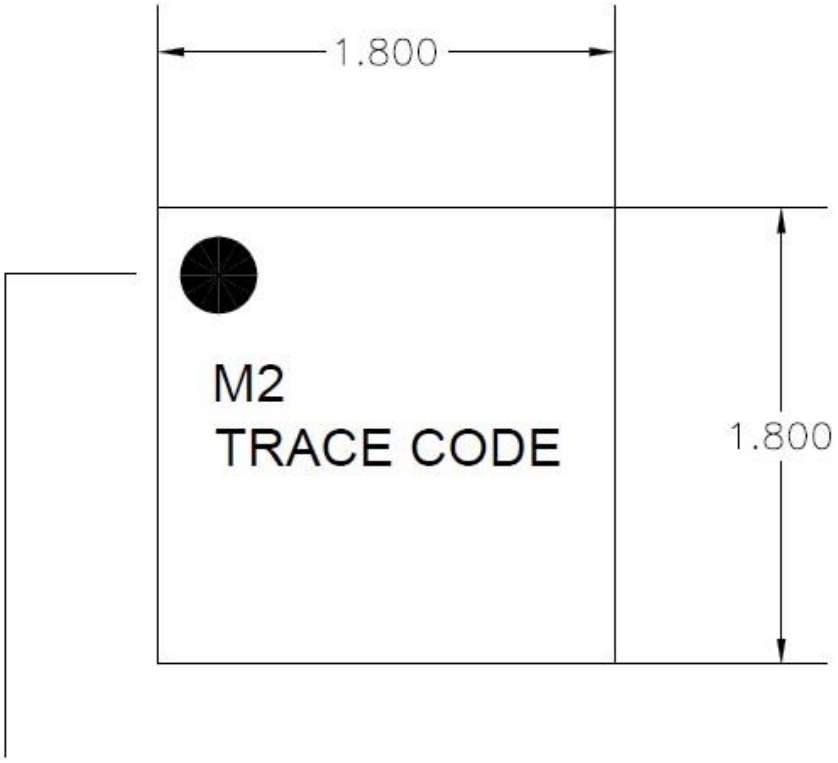
## Package Dimensions




Notes:

1. All dimensions are in millimeters. Angles are in degrees.
2. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.
3. Contact plating: Matte Sn

## Package Marking




Pin 1 Indicator
Trace Code to be assigned by SubCon

## Handling Precautions

| Parameter | Rating | Standard |
|---|---|---|
| ESD – Human Body Model (HBM) | Class 2 (2000V) | ANSI/ESD/JEDEC JS-001-2010 |
| ESD – Charged Device Model (CDM) | Class C3 (1000V) | JESD22-C101 |
| MSL – Moisture Sensitivity Level | MSL2 | 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: Matte Sn

## RoHS Compliance

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment). This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ($C_{15}H_{12}Br_4O_2$) Free
- PFOS Free
- SVHC Free
- Qorvo Green

## Contact Information

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

**Tel: 1-844-890-8163**

**Web: www.qorvo.com**

**Email: customer.support@qorvo.com**

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