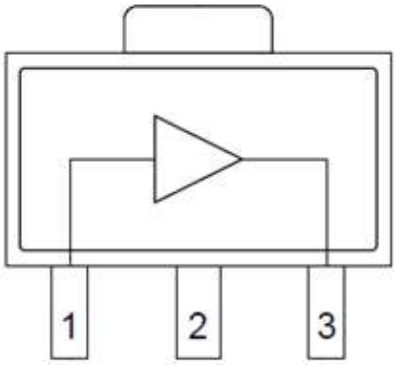
# QPL1817

## 75 Ω 16 dB CATV Amplifier 50 – 1800 MHz

## Product Overview

The QPL1817 is a GaAs pHEMT single ended RF amplifier IC featuring 16dB of gain and low noise. The balance of low noise and distortion provides an ideal solution for a wide range of broadband amplifiers used in Cable TV applications such as Optical Receivers and low noise front ends. QPL1817 is packaged in a SOT-89 package for convenient layout and design in set top and infrastructure projects for 75 Ω CATV and satellite applications.


## Functional Block Diagram




Top View

## Key Features

- 50 MHz to 1800 MHz Operation
- 4V to 8 V Single Power Supply
- Gain: 16 dB Typical
- Noise Figure: 3 dB Typical at 1250 MHz
- Convenient SOT-89 Package
- RoHS Compliant

## Applications

- FTTH GPON and GEPON
- DOCSIS 4.0
- Head End CMTS Equipment
- Optical Node
- Satellite Low Noise Amplifier
- Cable Modem and Set Top Box
- Single Ended Gain Block

## Ordering Information

| Part Number | Description |
|---|---|
| QPL1817SB | Sample bag with 5 pieces |
| QPL1817SR | 7" Reel with 100 pieces |
| QPL1817TR13 | 13" Reel with 2500 pieces |
| QPL1817EVB-01 | Evaluation Board |

## Absolute Maximum Ratings

| Parameter | Rating |
|---|---|
| Supply Voltage ($V_{DD}$) | +10 V |
| Supply Current ($I_{DD}$) | 150 mA |
| Maximum Input Level | 60 dBmV |
| Operating Temperature Range | -40 to +100 °C |
| Storage Temperature Range | −65 to +150 °C |
| Maximum Junction Temperature | +150 °C |

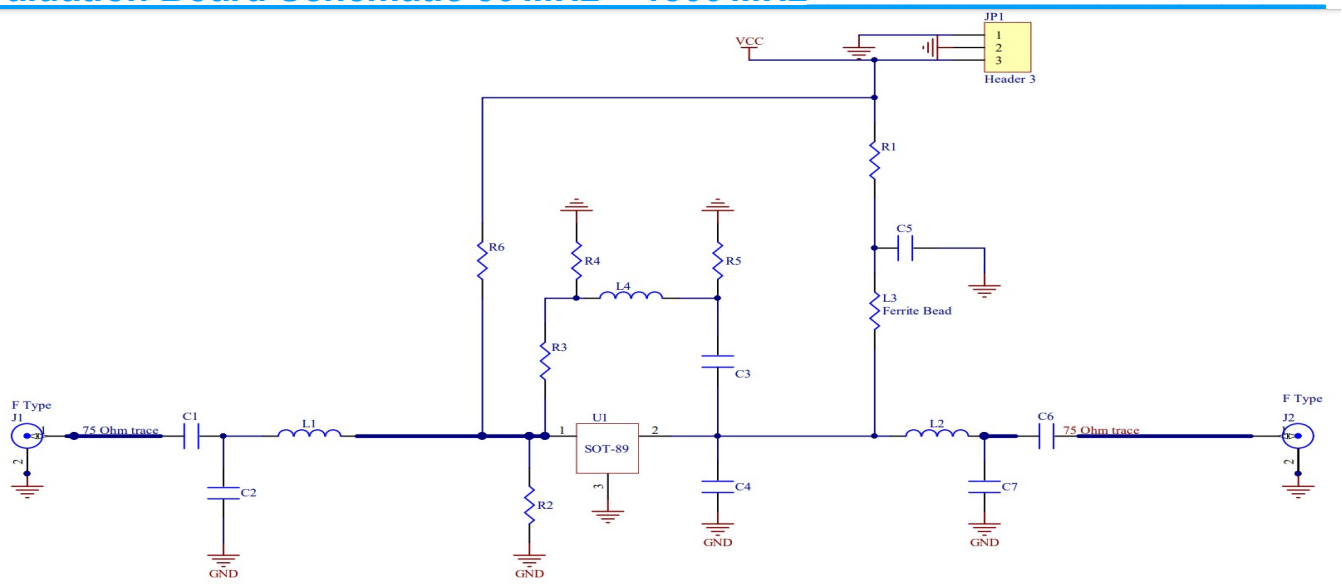
Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application o
Absolute Maximum Rating conditions to the device may reduce device reliability.

## Electrical Specifications at +7 V

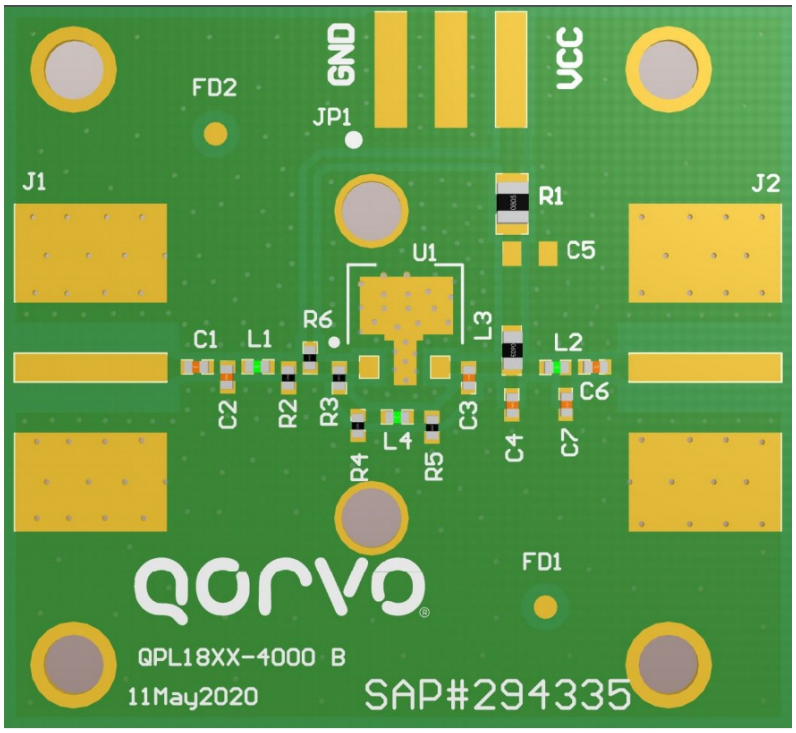
| Parameter | Condition [1] | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Supply Voltage ($V_{DD}$) | | 4 | 7 | 8 | V |
| Supply Current ($I_{DD}$) | | | 110 | | mA |
| Frequency Range | | 50 | | 1800 | MHz |
| Gain | | | 16 | | dB |
| Gain Flatness | | | ±1 | | dB |
| Reverse Isolation | | | 17 | | dB |
| Input Return Loss | | | 16 | | dB |
| Output Return Loss | | | 16 | | dB |
| Noise Figure | | | 2 | | dB |
| OIP2 (Lower) | 0 dBm / tone output | | 55 | | dBm |
| OIP2 (Upper) | 0 dBm / tone output | | 45 | | dBm |
| OIP3 | 0 dBm / tone output | | 36 | | dBm |
| OP1dB | | | 23 | | dBm |
| Thermal Resistance | $\Theta_{JC}$ | | 36 | | ˚C/W |

Note: Typical performance at these conditions: Temp = +25 °C, $V_{DD}$ = +7 V, 75 Ω system, Full band unless otherwise noted

## Evaluation Board Schematic 50 MHz – 1800 MHz



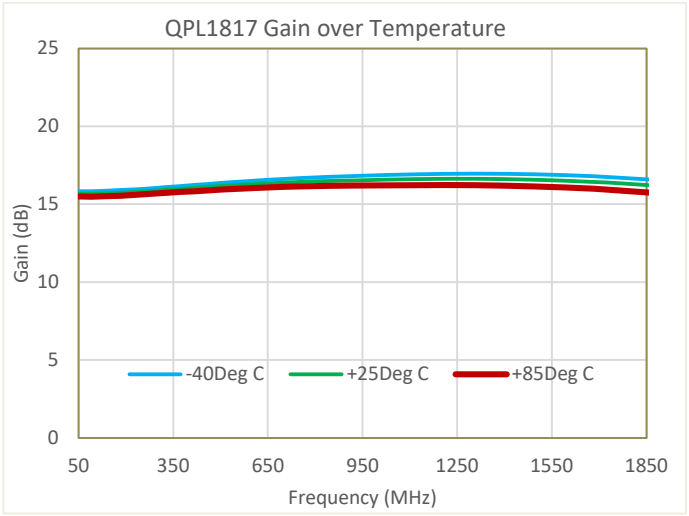

## Evaluation Board Assembly Drawing

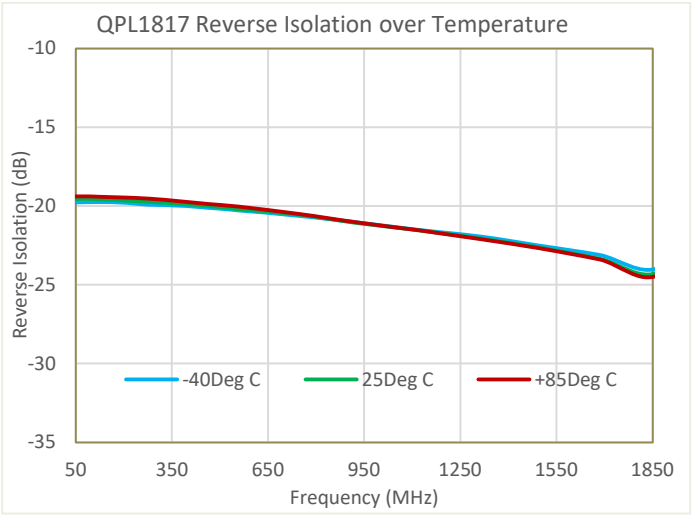


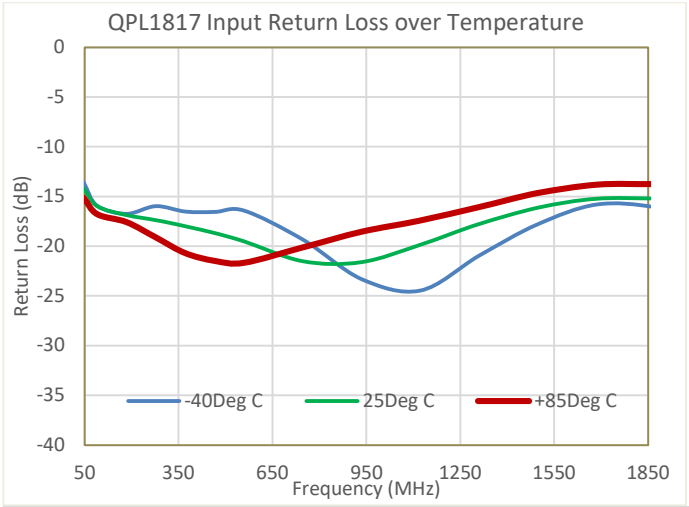
## Evaluation Board Bill of Materials

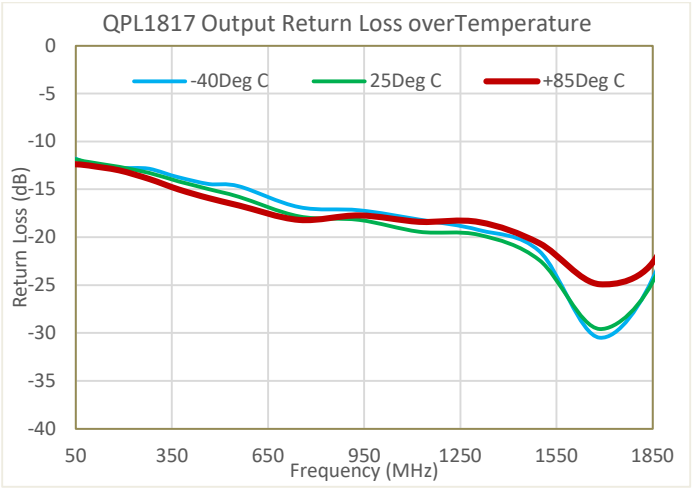
| Ref Des | Description | Manufacturer Name | Manufacturer Part # |
|---|---|---|---|
| U1 | CATV DOCSIS 4.0 LNA, 5V, 1.8GHz, 75-ohm | QORVO | QPL1817-SB |
| PCB | PCB, QPL1817 | QORVO | QPL1817-4000 B |
| C2 | CAP, 0.2pF, +/-0.1pF, 50V, HI-Q, 0402 | MURATA ELECTRONICS | GJM1555C1HR20BB01D |
| C1, C6, L4 | CAP, 1000pF, 10%, 50V, X7R, 0402 | TDK SINGAPORE | CGJ2B2X7R1H102K050BA |
| C5 | CAP, 1000 PF, 50V, 10%, 0603 | AVX Asia Limited | 06035C102KAT2A |
| C7 | CAP, 0.7pF, +/-0.1pF, 16V, HI-Q, 0402 | TAIYO YUDEN | RV EVK105CH0R7BW-F |
| C3, R3 | RES, 680 OHM, 5%, 1/16W, 0402 | Kamaya, Inc | RMC1/16S-681JTH |
| R1 | 0 OHM JUMPER 2A,0805 LF LEAD FREE | KOA Speer Electronics | RK73Z2ATTD |
| L1 | IND, 3.9nH, +/-0.3nH, M/L, 0402 | MURATA ELECTRONICS | LQG15HN3N9S02D |
| L2 | IND, 4.3nH, +/-0.1nH, T/F, 0402 | MURATA ELECTRONICS | LQP15MN4N3B02D |
| L3 | FER, BEAD, 1500 OHM, 500mA, 0603 | MURATA ELECTRONICS | BLM18HE152SN1D |
| JP1 | CONN, HDR, ST, 3-PIN, 0.100" | SAMTEC INC. | TSW-103-07-G-S |
| J1, J2 | F CONN EDGE MOUNT, 75 OHMS | Millimeter Wave Tech. | MW-846-C-DD-75 |
| R2, R6, R4, R5, C4 | NOT POPULATED ITEM-1 | | DUMMY PART |

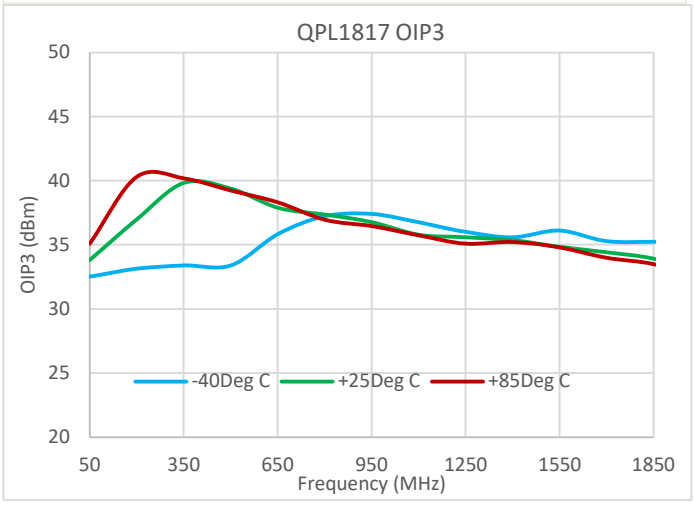
## Performance Data at +7 V Over Temperature

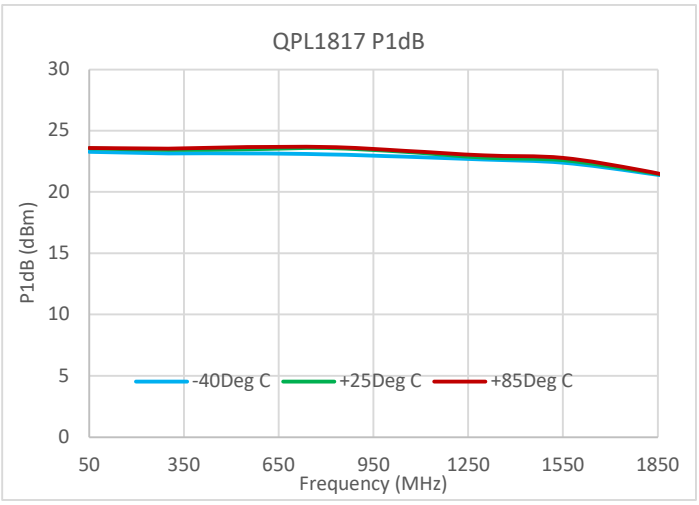



Notes: (1) OIP3: 0dBm/tone output

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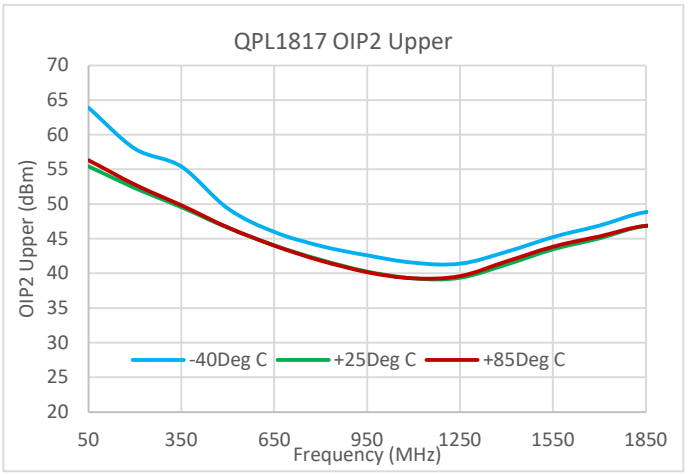
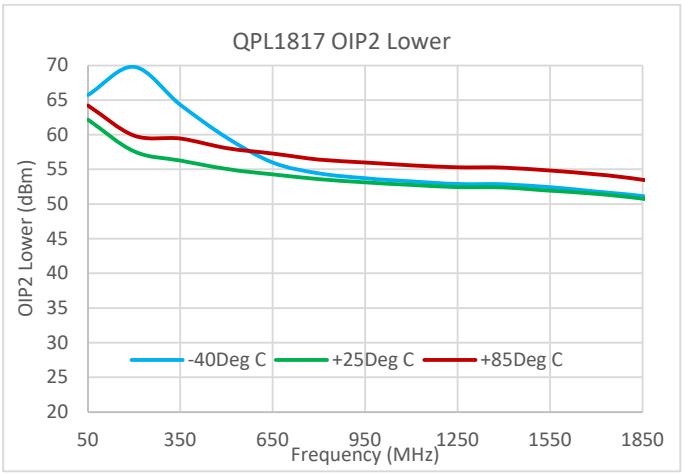
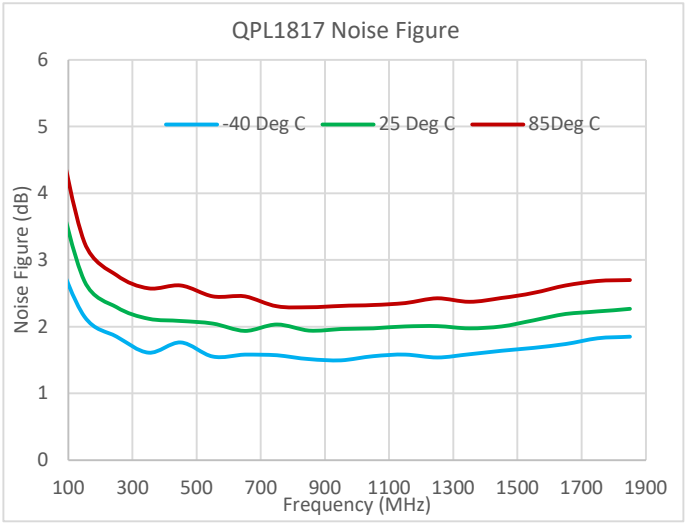


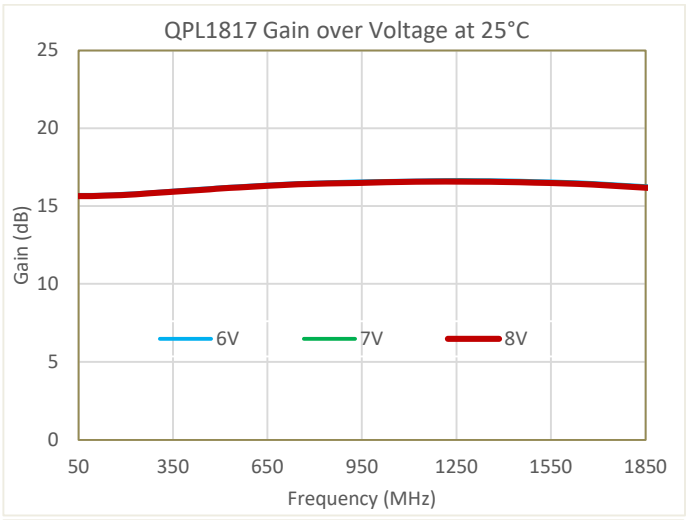



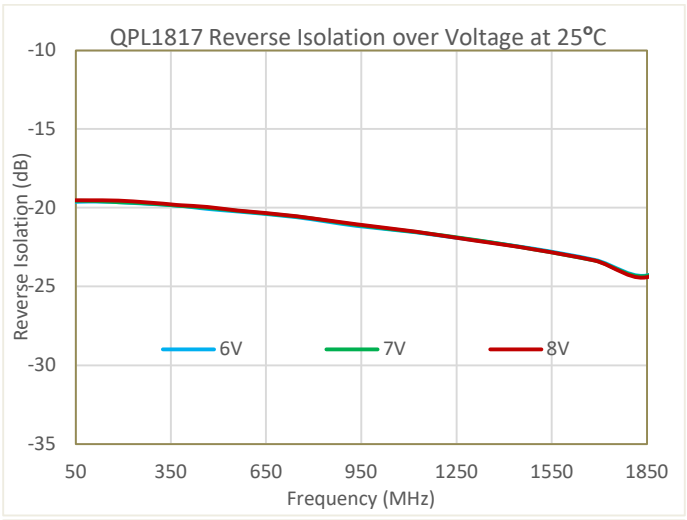



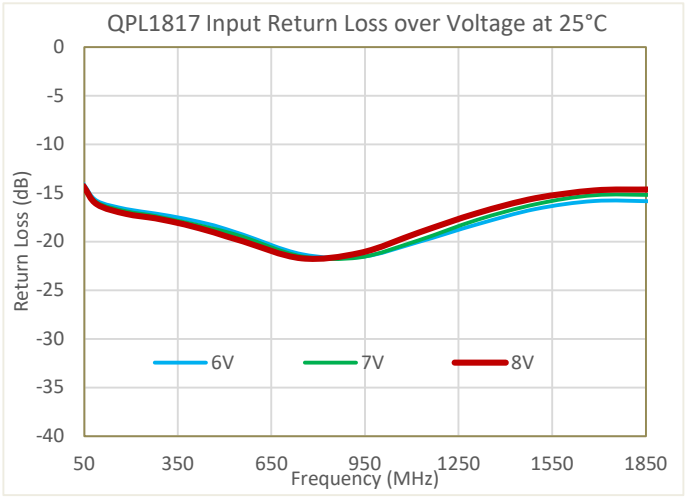

Notes:

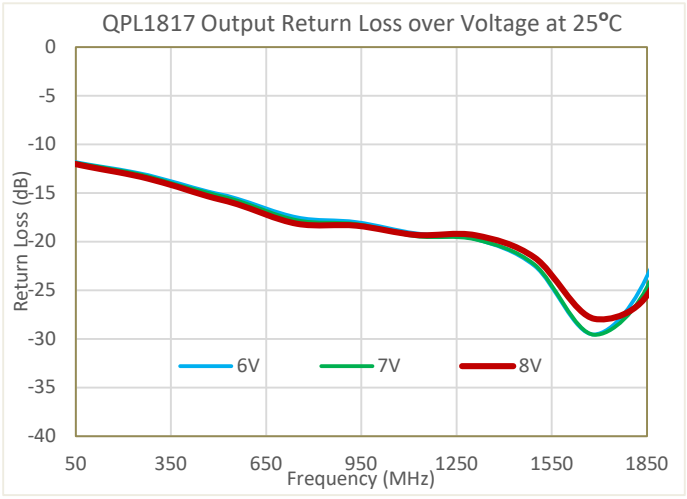
(1) OIP2: 0 dBm / tone output
(2) 54MHz to 1794MHz, 0dB tilt, 1 OFDM (54-246MHz) + 254 QAM (252-1794MHz) Channels. CCN Noise BW (ANSI/SCTE 17): 5.36MHz for J.83/B.
(3) Tx Data: ITU-T, Annex B, QAM256, 5.36 MSymbols/s

## Performance Data at 25Deg C Over Voltage



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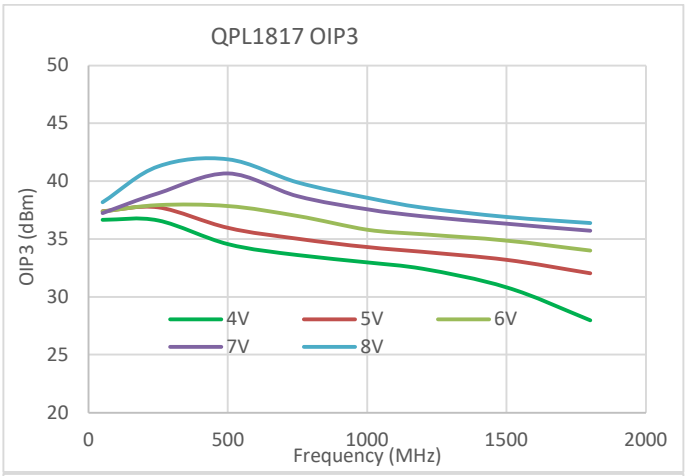


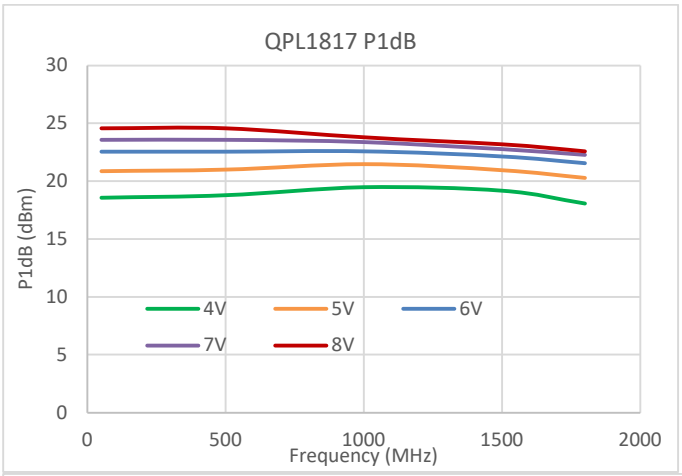


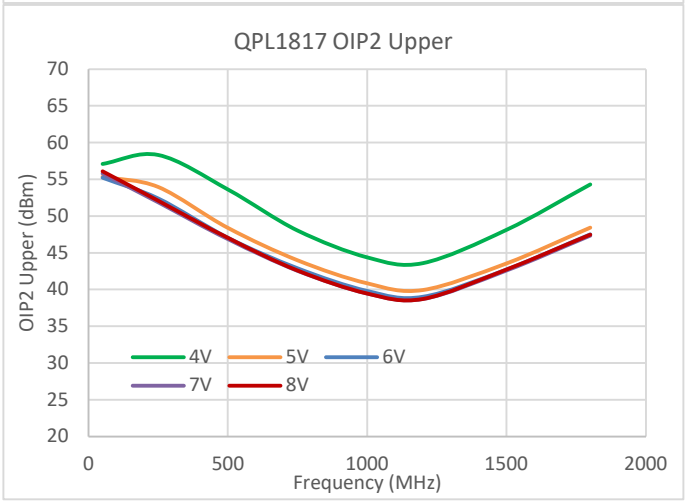


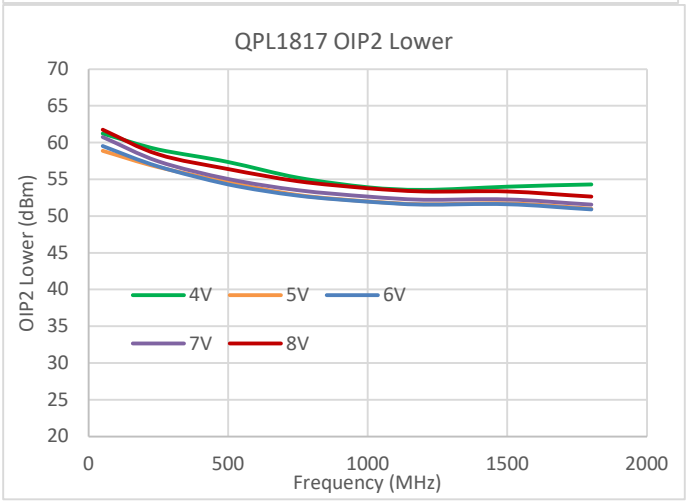


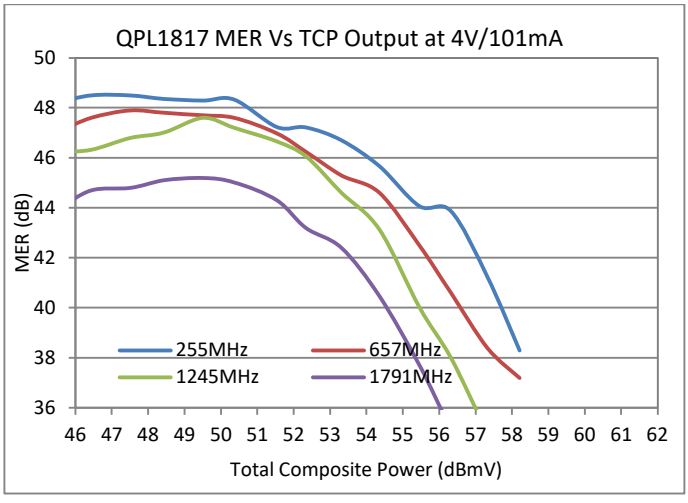


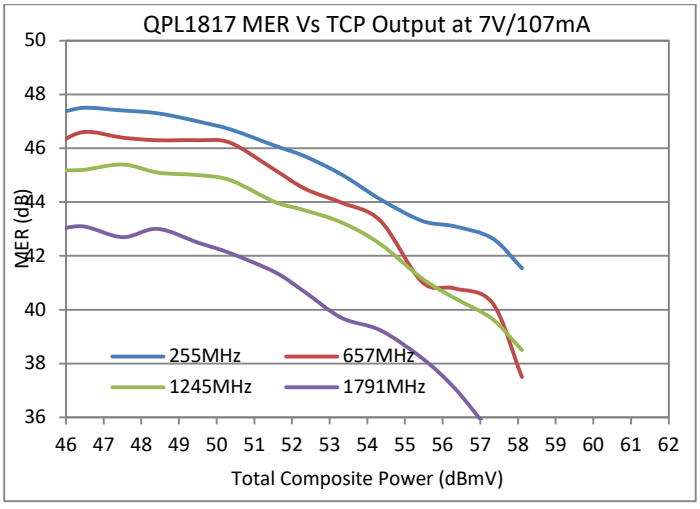


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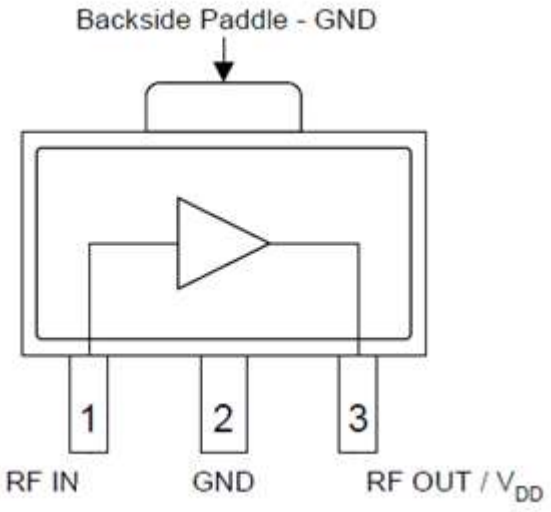
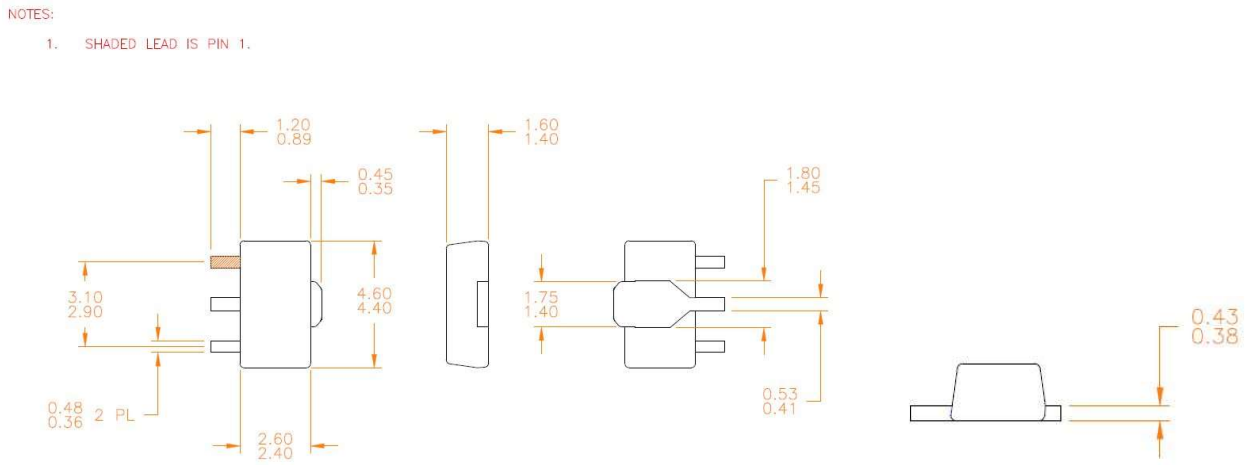
## Pin Configuration and Description



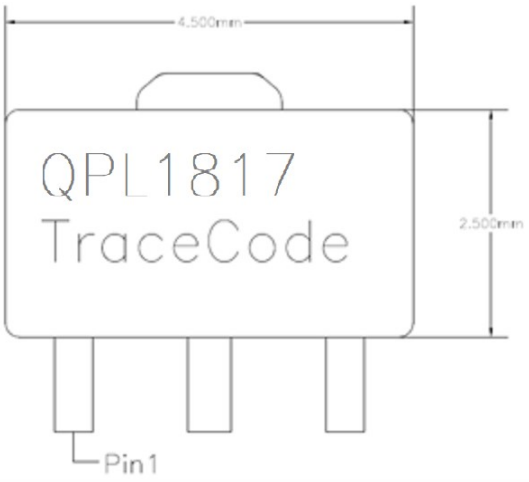

Top View

| Pin Number | Label | Description |
|---|---|---|
| 1 | RF IN | RF Input, DC blocking capacitor required |
| 2 | GND | Internally Not Connected |
| 3 | RF OUT / VDD | RF Output – VDD bias choke required |
| Backside Paddle | GND | Ground. Use recommended via pattern to minimize inductance and thermal resistance. See PCB Mounting Pattern for suggested footprint. |

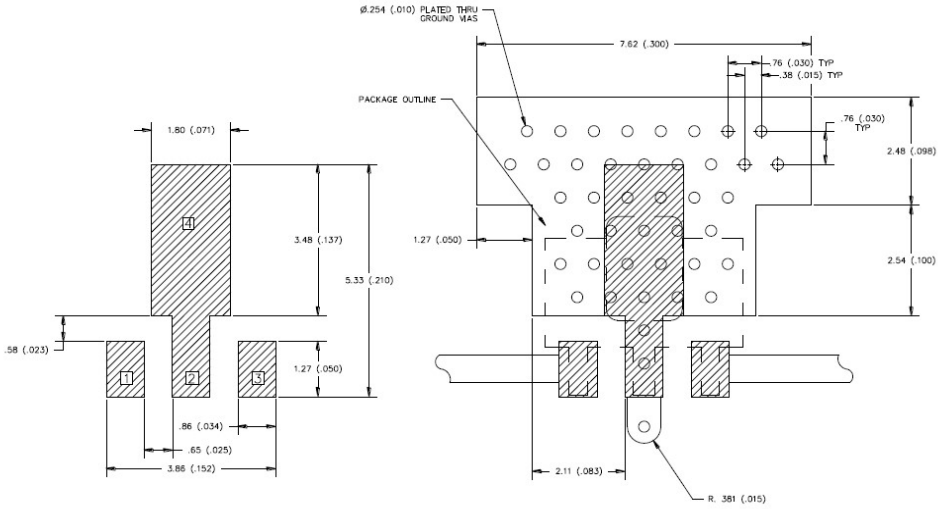
## Package Outline



## Package Marking




## Recommended Mounting Pattern




Notes:

1. Ground/thermal vias are critical for the proper performance of this device. Vias should use a .35 mm (#80 / .0135') diameter drill and have a final, plated thru diameter of 0.25 mm (0.010").
2. Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.
3. RF trace width depends upon the PC board material and construction.
4. All dimensions are in millimeters (inches). Angles are in degrees.

## Handling Precautions

| Parameter | Rating | Standard |
|---|---|---|
| ESD – Human Body Model (HBM) | Class 1C | ESDA/JEDEC JS-001 |
| ESD – Charged Device Model (CDM) | Class C3 | ESDA/JEDEC JS-002 |
| MSL – Moisture Sensitivity Level | Level 3 | 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: Matte Sn

## 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 ($C_{15}H_{12}Br_4O_2$) Free
- SVHC Free


## 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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