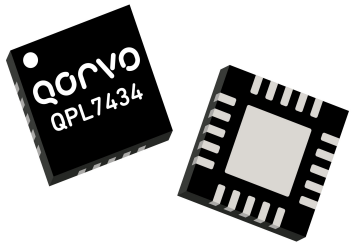
# QPL7434
## xPON Video Receiver

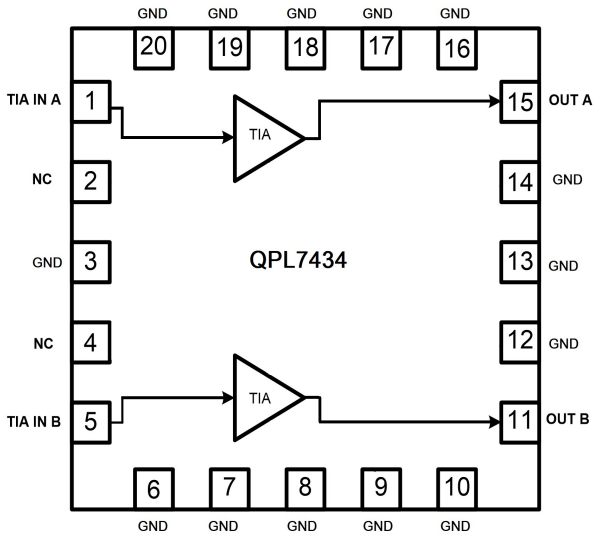
## Product Overview

The QPB7434 is a 47 – 1218 MHz High Gain, Low EIN, Differential RF Optical Receiver for FTTH PON applications. It is a technology leader with an optical input range from -20 dBm to +2 dBm. It runs on a single +5 V supply eliminating the need for an extra ONT supply. The differential input configuration enables direct connection of the Photo Diode to the device. This eliminates the Balun and improves overall EIN of the system.




20 Pad 4.0 x 4.0 x 0.85 mm QFN Package

## Functional Block Diagram




Top View

## Key Features

- Optical Input range: +2dBm to -20dBm
- High Gain: > 25dB at 550MHz
- Efficient Power Consumption: 1.0 W at +5 V
- Low Noise: 2.8 pA / √Hz Equivalent Input Noise Current (EINC)
- High Linearity
- 47 – 1218 MHz Operational Bandwidth
- Convenient QFN Package
- RoHS Compliant

## Applications

- FTTH xPON
- DOCSIS 3.1
- Head End CMTS Equipment
- Optical Node
- Cable Modem and Set Top Box

## Ordering Information

| Part No. | Description |
|---|---|
| QPL7434SB | Sample Bag with 5 Pieces |
| QPL7434SR | 7" Reel with 100 Pieces |
| QPL7434TR13 | 13" Reel with 2500 Pieces |
| QPL7434PCK-01 | EVB with 5 Piece Sample Bag |

## Absolute Maximum Ratings

| Parameter | Rating |
|---|---|
| Supply Voltage ($V_{DD}$) | +6.0 V |
| Storage Temperature Range | −40 to +150 °C |
| Maximum RF input Power | -10dBm |

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 redu device reliability.

## Recommended Operating Conditions

| Parameter | Min | Typ | Max | Units |
|---|---|---|---|---|
| Operating Temperature | −40 | | +85 | °C |
| Junction Temperature | | | +160 | °C |
| RF Power Supply Voltage | +4.5 | +5.0 | +5.5 | V |

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

## Optical to Electrical Receiver Application Specifications

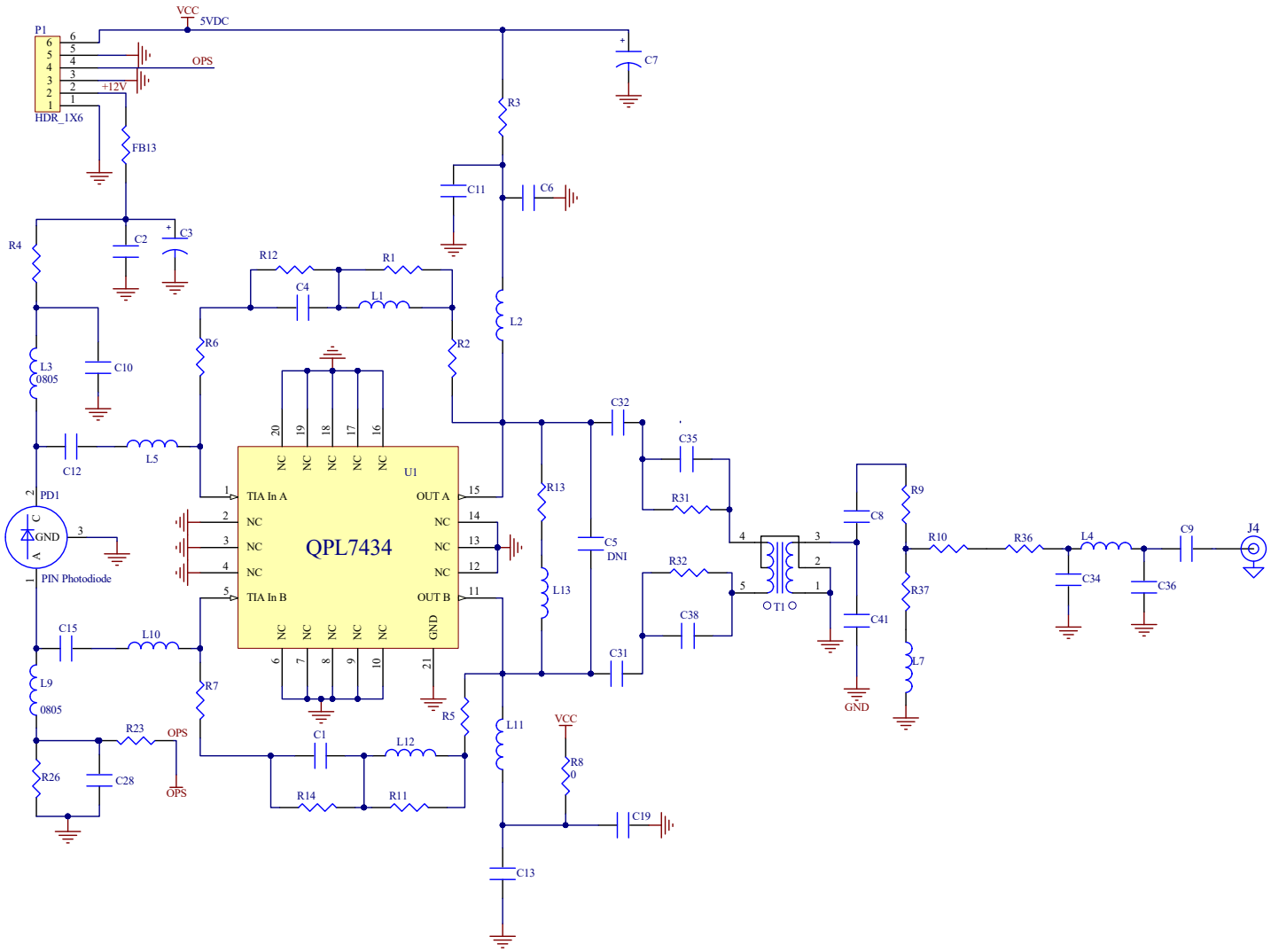
| Parameter | Condition (1) | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Supply Current ($I_{DD}$) | Steady state operation | | 210 | | mA |
| Frequency Range | | 47 | | 1218 | MHz |
| Optical Gain | At 550MHz. O/E gain is defined by 20*log (Zt/75) | | 27 | | dB |
| Gain Flatness | | | ±1.5 | | dB |
| Tilt | Linear tilt from 45 – 1218 MHz; higher tilt can be achieved by changing components | | 6 | | dB |
| Equivalent Input Noise | | | 2.8 | | pA / √Hz |
| Maximum RF Output Level at 547.25 MHz | Input from CATV Optical transmitter with an OMI of 4.5%. The PD responsivity was ~0.96(@1550nm | | +15 | | dBmV/ch |
| | At 45 MHz | | −17 | | dB |
| Output Return Loss | At 600 MHz | | −15 | | dB |
| | At 1218 MHz | | −18 | | dB |
| MER | 90MHz to 850MHz, 0dB tilt, 96 channels, 8MHz spacing. ITU-T Annex A 256 QAM 6.952 Msymbols/s. | | 32 | 44 | |
| BER | | | | 1E-04 | |

Notes:
1. Typical performance at these conditions: Temp. = +25 °C, $V_{DD}$ = +5 V, 75Ω system

## Optical Input Requirements

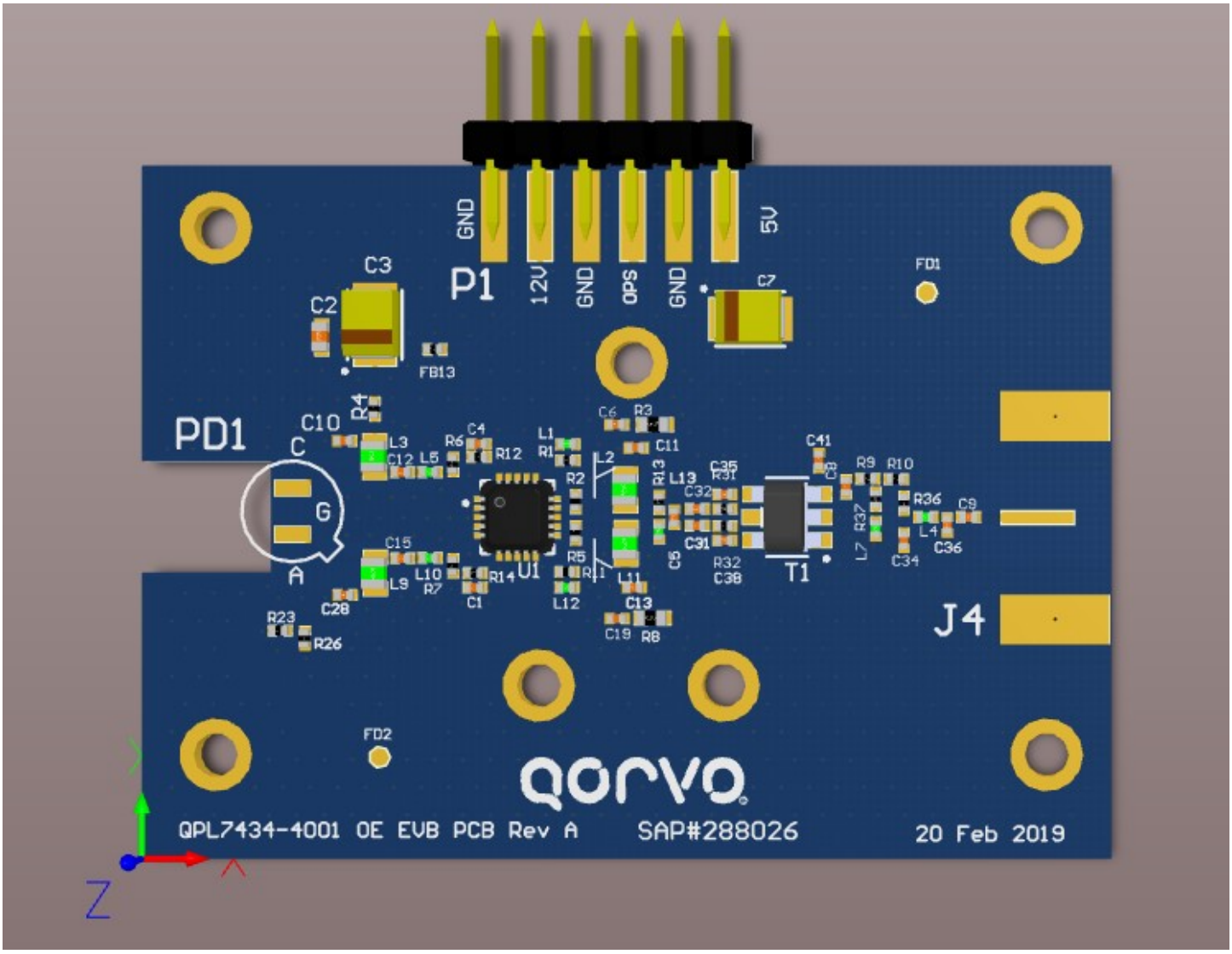
| Parameter | Unit | Min | Typical | Max |
|---|---|---|---|---|
| Optical Input Power | dBm | −20 | | +2 |
| Optical Modulation Index (OMI) | %/ch (79ch) | | 3.5 | 4.5 |
| 1550 nm PIN Responsivity | mA/mW | | 0.96 | |
| 1550 nm PIN Capacitance | pF | | 0.35 | |

## Typical Application Schematic



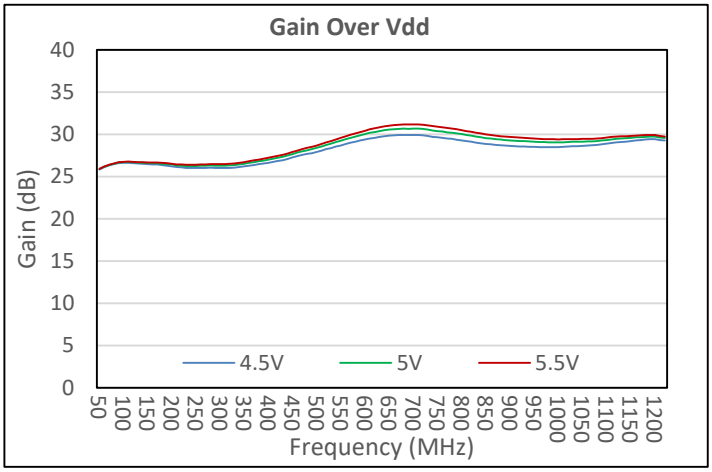
| Reference Designator | Description | Manufacturer | Manufacturer Part # |
|---|---|---|---|
| C1, C4, C8, C9, C12, C15 | CAP, 1000pF, 10%, 50V, X7R, 0402 | Taiyo Yuden | RM UMK105BJ102KV-F |
| C36 | CAP, 0.5pF, +/-0.1pF, 50V, HI-Q, 0402 | Johanson Technology | 500R07S0R5BV4TD |
| C11, C13 | CAP, 120pF, 5%, 50V, C0G, 0402 | Murata Electronics | GRM1555C1H121JA01D |
| C3, C7 | CAP, 10uF, 10%, 16V, TANT-B | AVX Asia Limited | TAJB106K016RNJ |
| C34 | CAP, 1pF, +/-0.1pF, 50V, HI-Q, 0402 | Johanson Technology | 500R07S1R0BV4TD |
| C31, C32 | CAP, 100pF, 10%, 50V, STD, 0402 | AVX Asia Limited | 04025C101KAT2A |
| C6, C10, C19, C28 | Cap, 10nF /10%/0402/X7R/25V/NISN | AVX Asia Limited | |
| C2 | Cap, 100nF/10%/0402/X7R/16V/NISN | AVX Asia Limited | |
| R1, R11, FB13, R36 | RES, 0 OHM, 5%, 1/10W, 0402 | Kamaya, Inc | RMC1/16SJPTH |
| R9, R10 | RES, 22 OHM, 5%, 1/16W, 0402 | Kamaya, Inc | RMC1/16S-220JTH |
| R13 | RES, 150 OHM, 5%, 1/16W, 0402 | Kamaya, Inc | RMC1/16S-151JTH |
| R2, R5, R6, R7 | RES, 3.3K, 5%, 1/16W, 0402 | Kamaya, Inc | RMC1/16S-332JTH |
| R12, R14 | RES, 1.5M, 5%, 1/16W, 0402 | Kamaya, Inc | RMC1/16S-155JTH |
| R23 | RES, 10K, 1%, 1/16W, 0402 | Panasonic Devices Sales | ERJ-2RKF1002X |
| R37 | RES, 360 OHM, 1%, 1/10W, 0402 | Kamaya, Inc | RMC1/16SK3600FTH |
| R31, R32 | RES, 47 OHM, 5%, 1/16W, 0402 | Panasonic Devices Sales | ERJ-2GEJ470 |
| R3, R8 | Res, 0R /0603/Chip | Kamaya, Inc | |
| R26, R4 | RES, 1K, 1%, 1/10W, 0402 | KOA Europe GmbH | RK73H1ETTPL1001F |
| PD1 | DIO, PHOTO, 1000-1650nm, 6GHz, SC/APC | SWT Beijing SWT Science & Technology | PDS133-CSA-C0104 |
| L4 | IND, 10nH, 5%, M/L, 0402 | Taiyo Yuden | LG HK 1005 10NJ-T |
| L7, L13 | IND, 68nH, 5%, W/W, 0402 | Coil craft, Inc. | 0402CS-68NXJRW |
| L3, L9 | IND, 880nH, 5%, W/W, 0805 | Gowanda Electronics | CC0805-880J-2 |
| L5, L10 | IND, 4.7nH, +/-0.1nH, W/W, 0402 | Murata Electronics | LQW15AN4N7B00D |
| L2, L11 | IND, 1uH, 20%,3A,1mm, W/W, 0805 HQ | CoilCraft Inc | 0805LS-0102 |
| T1 | XFMR, 1:3, 5-1200MHz, 75Ohms, 2W, S20 | Mini RF, Inc. | RFXF5743 |
| J4 | CONN. 75 OHM, EDGE LAUNCH F | Samtec Inc | LTI-FSF55NT-P |
| P1 | CONN, HDR, ST, 6-PIN, 0.100" | Samtec INC. | TSW-106-07-G-S |
| C5, C35, C38, C41, L1, L12 | NOT POPULATED ITEM-1 | | DUMMY PART |
| U1 | Differential TIA, QPL7434, 4x4 QFN | | QPL7434 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

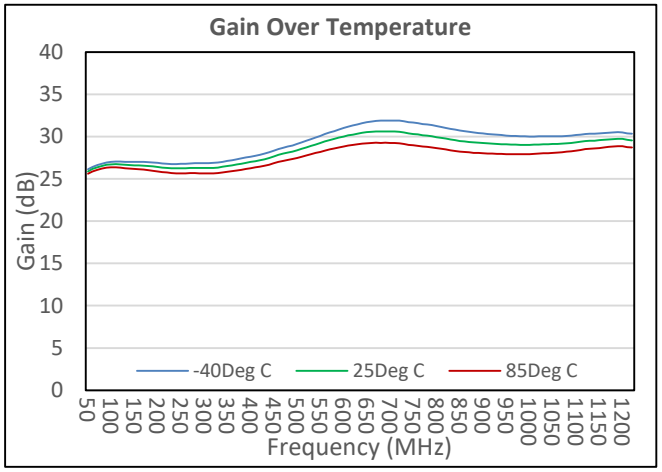
## Evaluation Board Assembly Drawing

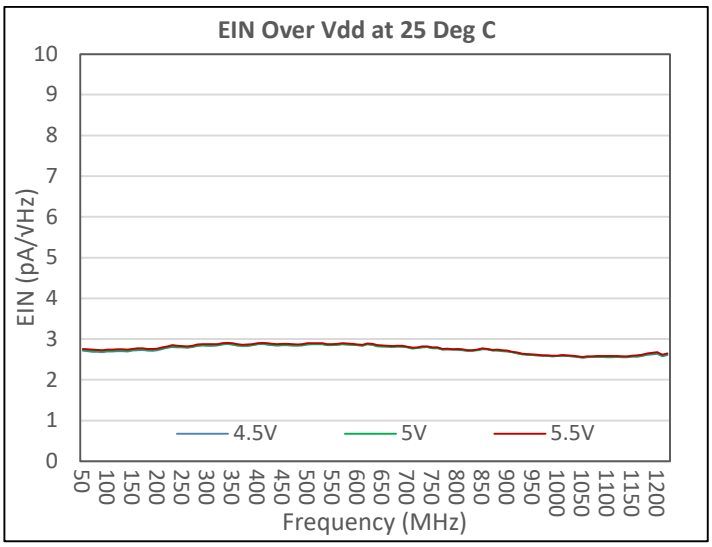


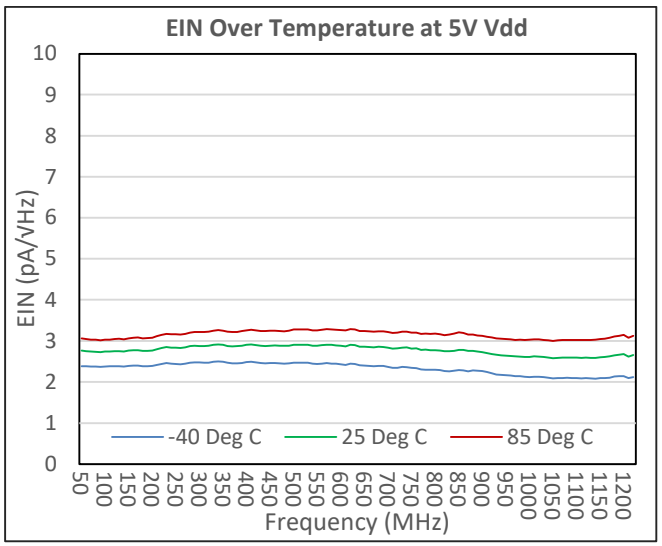
## Typical Performance

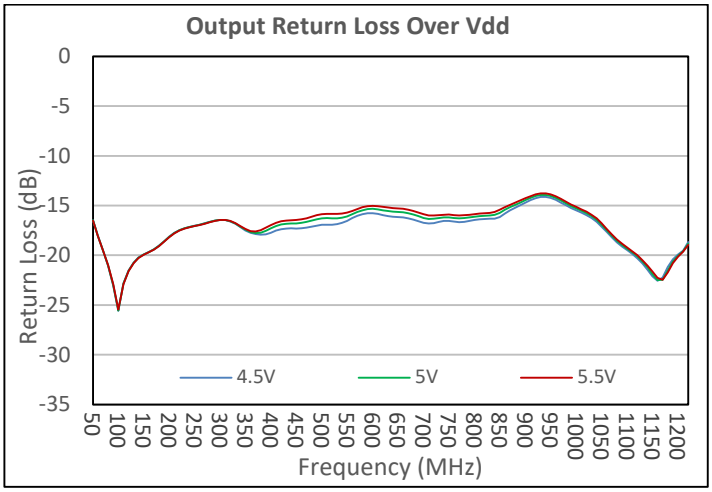
Test conditions unless otherwise stated: T = +25 °C, $V_{DD}$ = +5 V, OMI=4.5%

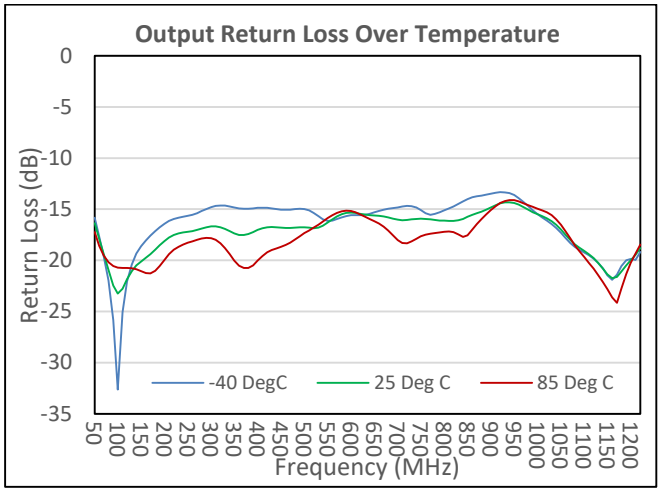


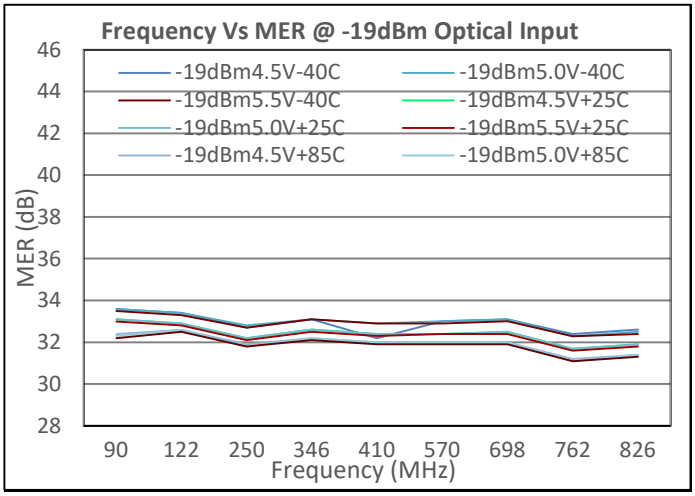



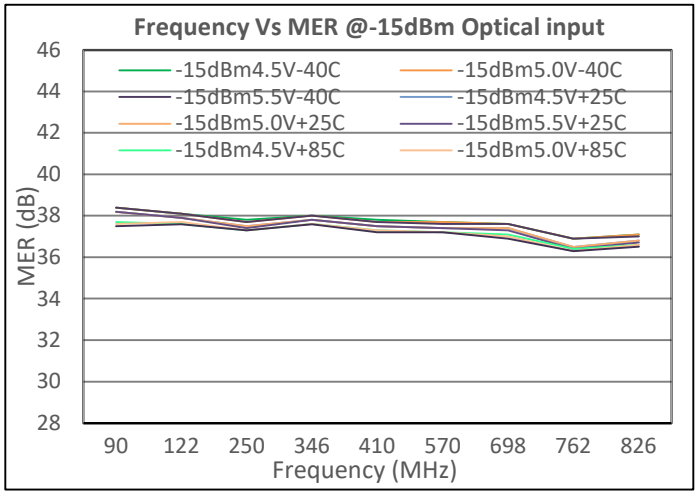



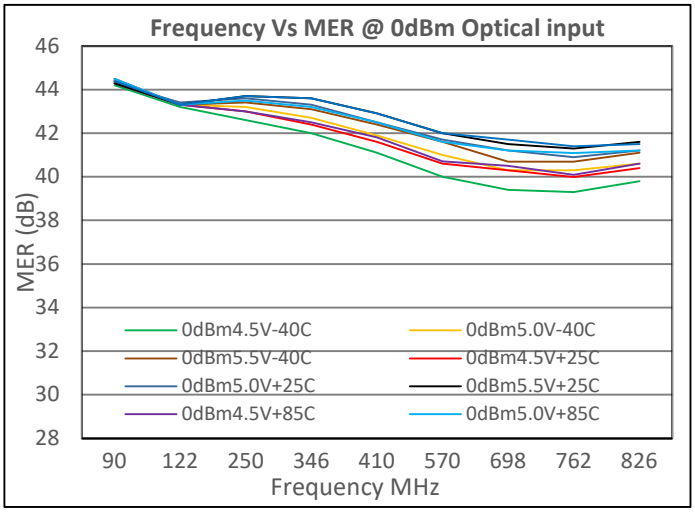



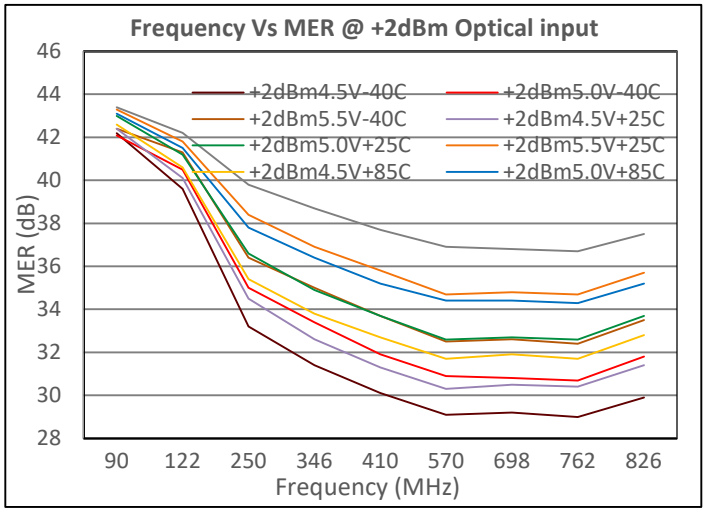
## Typical Performance

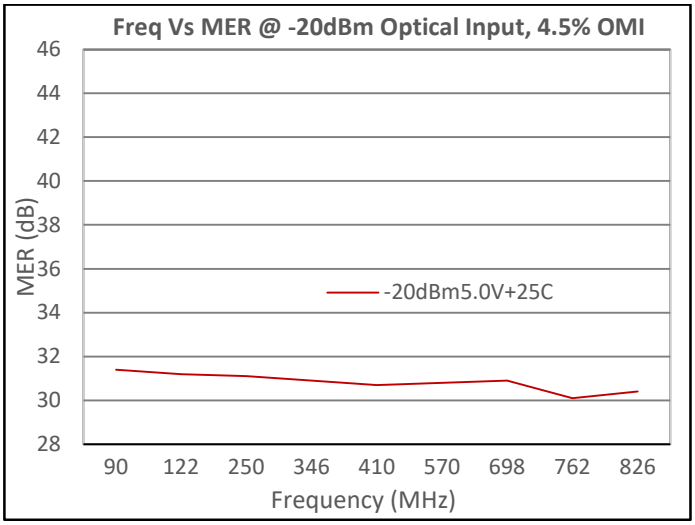
Test conditions unless otherwise stated: T = +25 °C, $V_{DD}$ = +5 V, OMI=4.5%

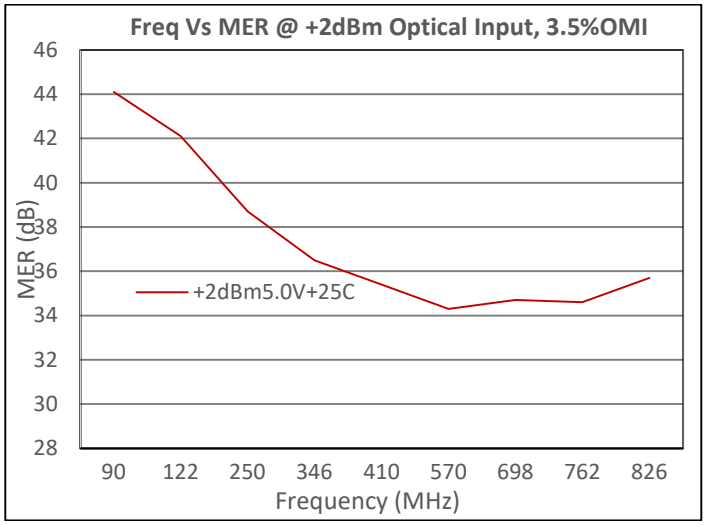


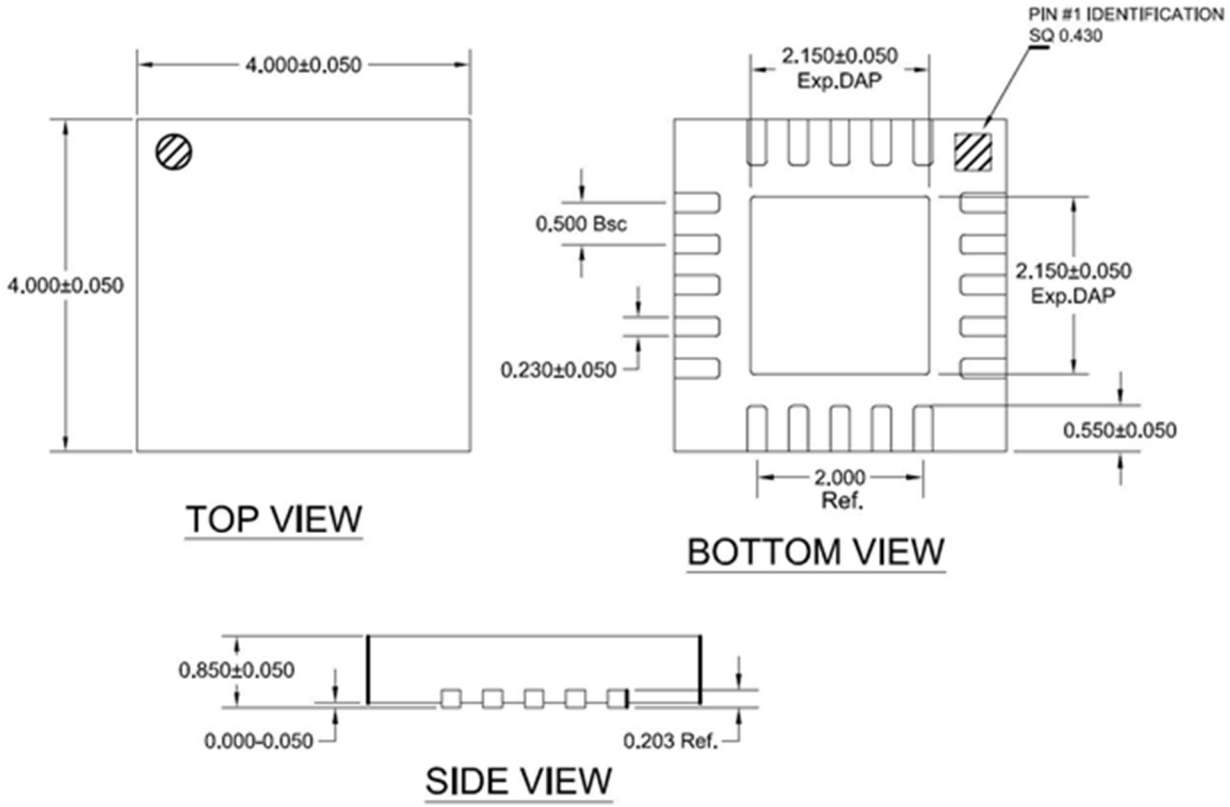



## Package Dimensions




Notes:
1. Dimensions in millimeters

## Package Marking


Pin 1 Indicator
Qorvo Logo - Use Qo5D
Trace Code to be assigned by SubCon

## Pin Configuration and Description

| Pin | Name | Description |
|---|---|---|
| 1 | TIA IN A | Input to the TIA |
| 2 | NC | Not Connected |
| 3 | GND | Connect to Ground |
| 4 | NC | Not Connected |
| 5 | TIA IN B | Input to the TIA |
| 6 | GND | Connect to Ground |
| 7 | GND | Connect to Ground |
| 8 | GND | Connect to Ground |
| 9 | GND | Connect to Ground |
| 10 | GND | Connect to Ground |
| 11 | OUT B | Output of the TIA |
| 12 | GND | Connect to Ground |
| 13 | GND | Connect to Ground |
| 14 | GND | Connect to Ground |
| 15 | OUT A | Output of the TIA |
| 16 | GND | Connect to Ground |
| 17 | GND | Connect to Ground |
| 18 | GND | Connect to Ground |
| 19 | GND | Connect to Ground |
| 20 | GND | Connect to Ground |