# TGL2217

## 0.1 – 20 GHz 10 Watt VPIN Limiter

## Product Description

Qorvo's TGL2217 is a high power, wideband GaAs VPIN limiter capable of protecting sensitive receive channel components against high power incident signals. The TGL2217 does not require DC bias and achieves a low insertion loss all in a small form factor. These features allow for simple integration with minimal impact to system performance.

The TGL2217 operates from 0.1–20 GHz with low insertion loss of less than 0.7 dB. Receive protection is rated up to 10 W incident pulsed-power with a low flat leakage of less than 18.5 dBm.

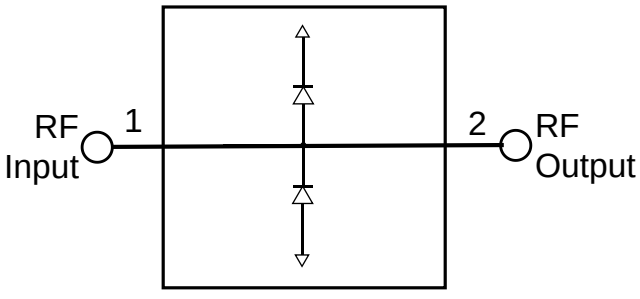
The TGL2217 is offered in die form. It is well suited for both commercial and defense related applications.


## Product Features

- Frequency Range: 0.1 – 20 GHz
- Insertion Loss: < 0.7 dB
- Peak Power Handling: 10 W (pulsed)
- Flat Leakage: < 18.5 dBm (pulsed)
- Spike Leakage: < 20.5 dBm
- Passive (no DC bias required)
- Recovery Time: < 40 nS
- Die Size: 1.50 x 1.0 x 0.10 mm

*Performance is typical across frequency. Please reference electrical specification table and data plots for more details.*

## Block Diagram




## Applications

- Receive Chain Protection
- Commercial and Military Radar
- Electronic Warfare
- Communications

## Ordering Information

| Part No. | Description |
|---|---|
| TGL2217 | 0.1–20 GHz 10W VPIN Limiter |
| TGL2217 EVB | Evaluation Board |

## Absolute Maximum Ratings

| Parameter | Value / Range |
|---|---|
| Incident Power, Pulsed[1], 50 Ω, 85 °C | 40 dBm |
| Incident Power, CW, 50 Ω, 25 °C | 36 dBm |
| Incident Power, CW, 50 Ω, 85 °C | 33 dBm |
| Mounting Temperature (30 seconds) | 320 °C |
| Storage Temperature | -40 to 150 °C |

Note:
[1] Pulse RF conditions: PW = 100 µs, Duty Cycle = 10%

Operation of this device outside the parameter ranges given above may cause permanent damage. These are stress ratings only, and functional operation of the device at these conditions is not implied.

## Recommended Operating Conditions

| Parameter | Min | Typ | Max | Units |
|---|---|---|---|---|
| Operating Temperature Range | -40 | +25 | +85 | °C |
| Passive – No Bias | | | | |

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

## Electrical Specifications

Test conditions, unless otherwise noted: 25 °C, Pulsed RF: PW = 100 µs, DC = 10%.

| Parameter | Min | Typ | Max | Units |
|---|---|---|---|---|
| Operational Frequency Range | 0.1 | – | 20 | GHz |
| Insertion Loss | | < 0.7 | | dB |
| Input Return Loss | | > 15 | | dB |
| Output Return Loss | | > 15 | | dB |
| Flat Leakage Power at $P_{IN}$ > 30 dBm | | < 18.5 | | dBm |
| Pulse Recovery Time | | < 40 | | nS |
| Spike Leakage | | < 20.5 | | dBm |
| Insertion Loss Temperature Coefficient | | 0.002 | | dB/ °C |

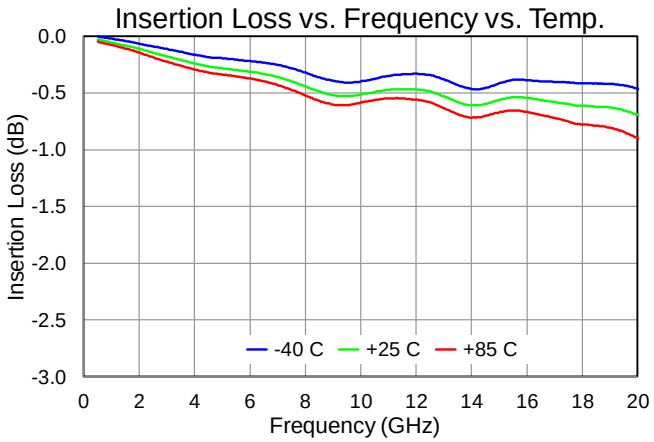
## Thermal and Reliability Information

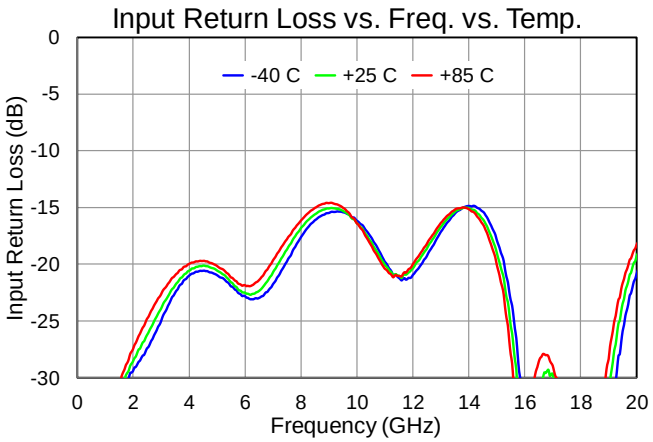
| Parameter | Test Conditions | Value | Units |
|---|---|---|---|
| Incident Power [(1)]<br>(RF Operational Life Test) | Frequency = 10 GHz,<br>RF Pulsed, PW=100 µs, DC=10%, 50 Ω, 25°C | 10 | W |

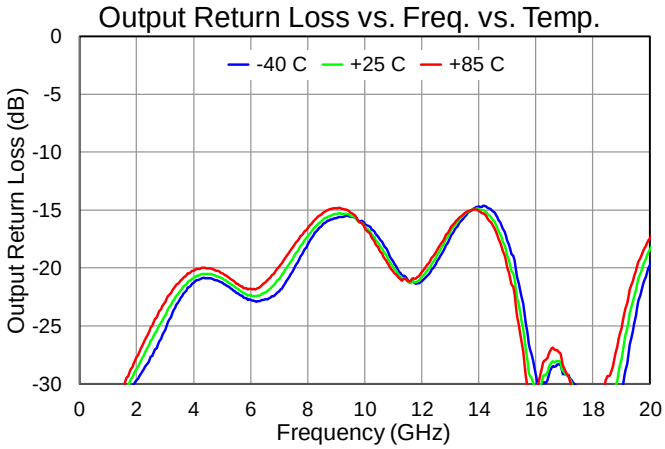
Notes:
1. Test terminated after 168 hours. Insertion Loss remained ≤ 1 dB for device under test.

## Performance Plots – Small Signal

Test conditions unless otherwise noted: Temp. = 25 °C

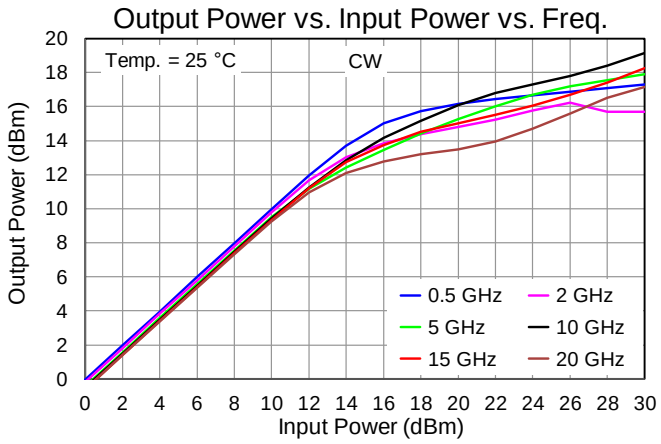


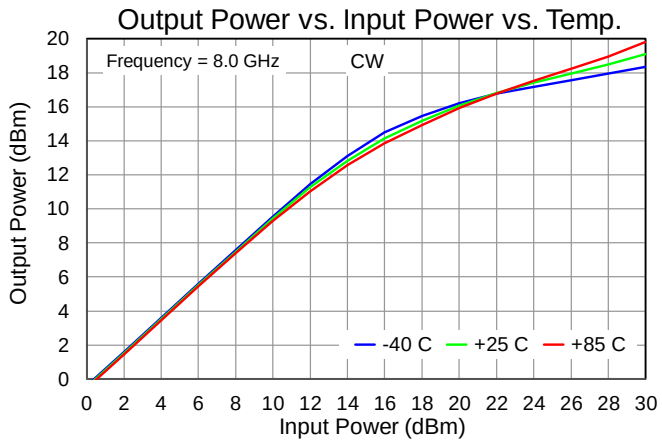



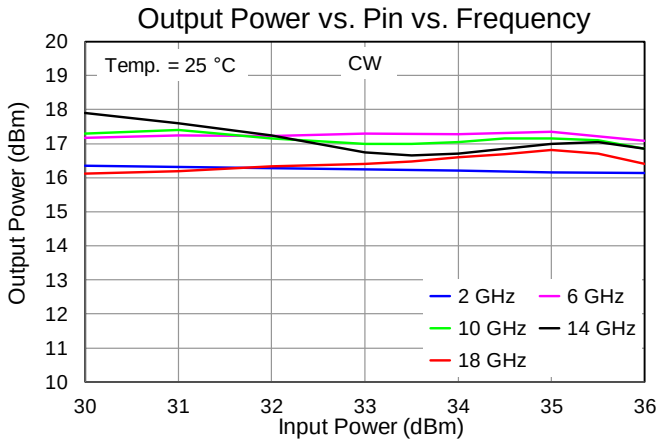



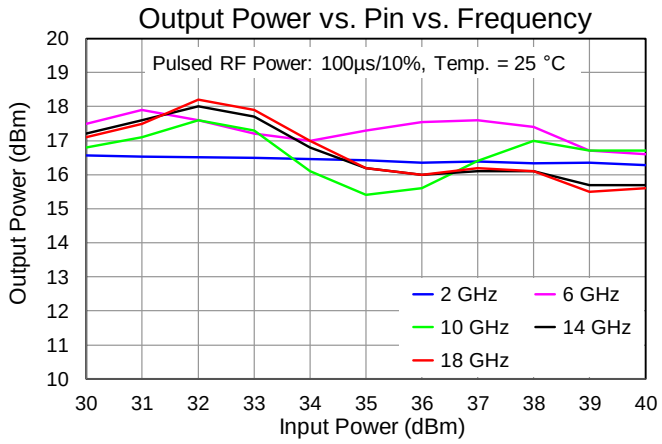
## Performance Plots – Large Signal

Test conditions unless otherwise noted: Temp. = 25 °C

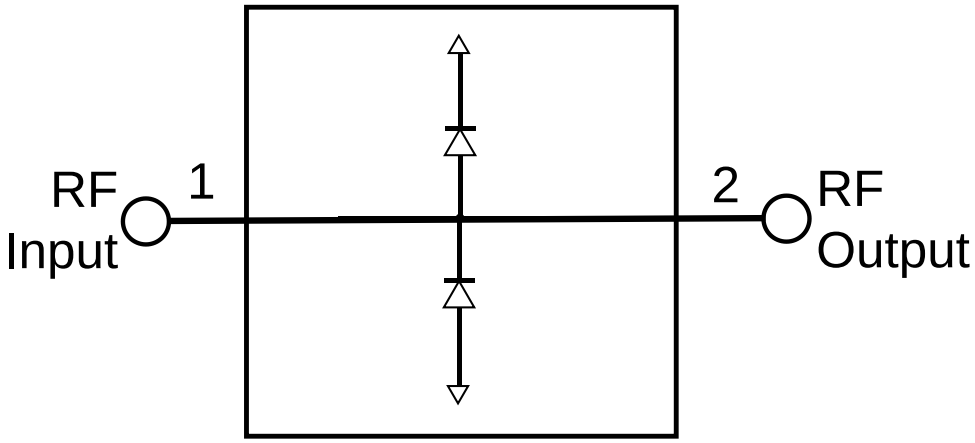


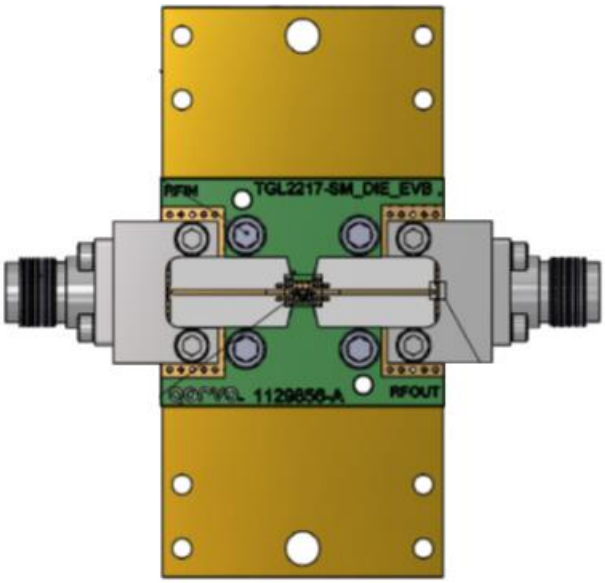



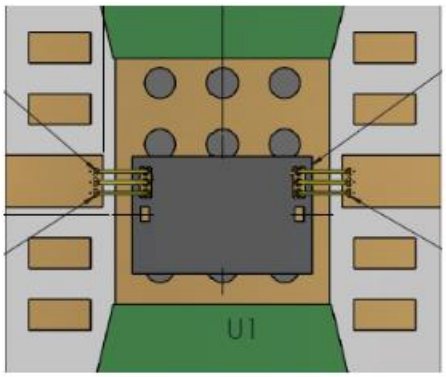
## Applications Circuit




Note: RF Input and RF Output ports are not interchangeable.

## Evaluation Board (EVB) Layout Assembly & Mounting Detail



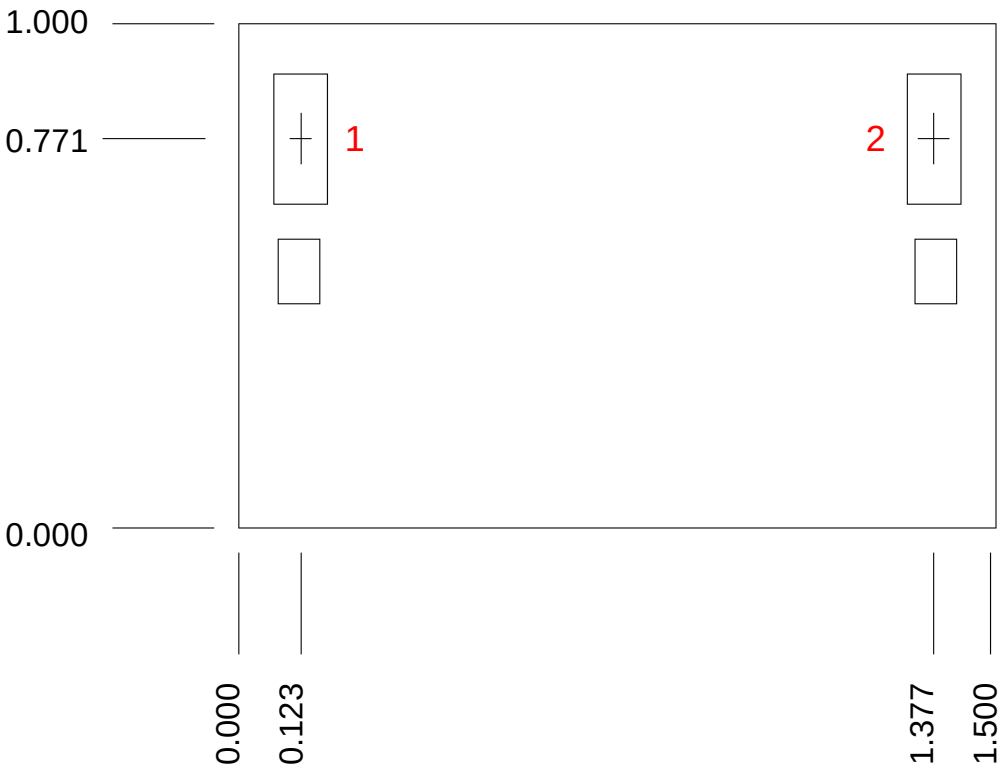

Die Mounting Detail

RF layer is 0.008” thick Rogers RO4003C, εr= 3.38. Metal layers are 0.5-oz copper. The microstrip line taper at the connector interface is optimized for the Southwest Microwave end-launch connector 1092-01A-5.

The pad pattern shown has been developed and tested for optimized assembly at Qorvo. The PCB land pattern has been developed to accommodate lead and package tolerances. Since surface mount processes vary from company to company, careful process development is recommended.

Note: Multiple vias should be employed under die to minimize inductance and thermal resistance.

## Mechanical Drawing and Bond Pad Description




Unit: millimeters
Thickness: 0.10
Die x, y size tolerance: ± 0.050
Chip edge to bond pad dimensions are shown to center of pad
Ground is backside of die

| Pad No. | Symbol | Description | Pad Size (um x um) |
|---|---|---|---|
| 1 | RF Input | RF Input, 50 Ω, DC coupled | 105 x 255 |
| 2 | RF Output | RF Output, 50 Ω, DC coupled | 105 x 255 |

NOTE: The RF Input and RF Output ports are not interchangeable.

## Assembly Notes

Component placement and adhesive attachment assembly notes:

- Vacuum pencils and/or vacuum collets are the preferred method of pick up.
- Air bridges must be avoided during placement.
- The force impact is critical during auto placement.
- Organic attachment (i.e., conductive epoxy) can be used in low-power applications.
- Curing should be done in a convection oven; proper exhaust is a safety concern.

Reflow process assembly notes:

- Use AuSn (80/20) solder and limit exposure to temperatures above 300 °C to 3 – 4 minutes, maximum.
- An alloy station or conveyor furnace with reducing atmosphere should be used.
- Do not use any kind of flux.
- Coefficient of thermal expansion matching is critical for long-term reliability.
- Devices must be stored in a dry nitrogen atmosphere.

Interconnect process assembly notes:

- Thermosonic ball bonding is the preferred interconnect technique.
- Force, time, and ultrasonic are critical parameters.
- Aluminum wire should not be used.
- Devices with small pad sizes should be bonded with 0.0007-inch wire.

## Handling Precautions

| Parameter | Rating | Standard |
|---|---|---|
| ESD – Human Body Model (HBM) | Class 3B | ESDA / JEDEC JS-001-2012 |

Caution!
ESD-Sensitive Device

## Solderability

Use only AuSn (80/20) solder, and limit exposure to temperatures above 300 °C to 3 – 4 minutes, maximum.

## RoHS Compliance

This product is compliant with the 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 ($C_{15}H_{12}Br_40_2$) Free
- PFOS 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**

## Important Notice

The information contained herein is believed to be reliable; however, Qorvo makes no warranties regarding the information contained herein and assumes no responsibility or liability whatsoever for the use of the information contained herein. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for Qorvo products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information. **THIS INFORMATION DOES NOT CONSTITUTE A WARRANTY WITH RESPECT TO THE PRODUCTS DESCRIBED HEREIN, AND QORVO HEREBY DISCLAIMS ANY AND ALL WARRANTIES WITH RESPECT TO SUCH PRODUCTS WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

Without limiting the generality of the foregoing, Qorvo products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.

Copyright 2021 © Qorvo, Inc. | Qorvo is a registered trademark of Qorvo, Inc.