

#### **Product Overview**

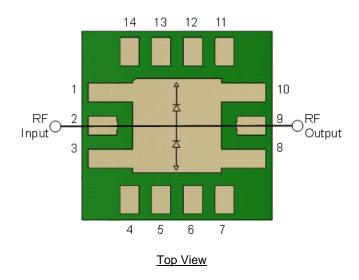
Qorvo's TGL2217-SM is a packaged high power, wideband GaAs VPIN limiter capable of protecting sensitive receive channel components against high power incident signals. The TGL2217-SM does not require DC bias and achieves a low insertion loss all in a small form factor. These features allow for simple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

The TGL2217-SM operates from 0.1–20.0 GHz with low insertion loss of less than 0.9 dB. Receive protection is rated up to 10 W incident pulsed power with a low flat leakage of less than 18.5 dBm.

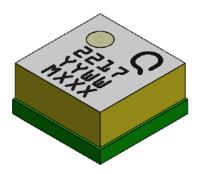
The TGL2217-SM is offered in a small 3.5 x 3.5 mm QFN package for simple board level assembly. Fully matched to 50 ohms on both RF ports, it is well suited for both commercial and defense related applications.

Lead-free and RoHS compliant.

## **Functional Block Diagram**



# **TGL2217-SM** 0.1 – 20 GHz 10 Watt VPIN Limiter



14 Pad 3.5 x 3.5 mm Air Cavity QFN Package

### **Key Features**

• Frequency Range: 0.1 to 20.0 GHz

• Insertion Loss: < 0.9 dB

• Peak Power Handling: 10 W (pulsed)

Flat Leakage: < 18.5 dBm</li>Spike Leakage < 20.5 dBm</li>

• Recovery Time < 40 nS

Passive (no DC bias required)

QFN Package Dimensions: 3.50 x 3.50 x 1.715 mm

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

# **Applications**

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

## **Ordering Information**

Part	Description
TGL2217-SM	0.1–20.0 GHz 10W VPIN Limiter
TGL2217-SMEVB01	0.1–20.0 GHz 10W VPIN Limiter
IGLZZII-SIVIEVBUI	Evaluation Board



### **Absolute Maximum Ratings**

Parameter	Rating
Incident Power, Pulsed, 50 $\Omega$ , 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 s max)	260 °C
Storage Temperature	-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	Тур	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

Parameter	Conditions (1)	Min	Тур	Max	Units
Operational Frequency Range		0.1		20.0	GHz
Insertion Loss	0.5 GHz 5 GHz 10 GHz 15 GHz 20 GHz		0.08 0.27 0.45 0.64 0.83	0.3 0.5 0.8 1.1 1.2	dB
Input Return Loss	0.5 GHz 5 GHz 10 GHz 15GHz 20 GHz		39 26 24 19 17		dB
Output Return Loss	0.5 GHz 5 GHz 10 GHz 15 GHz 20 GHz		40 26 27 18 17		dB
Flat Leakage Power at P <sub>IN</sub> > 30 dBm, (CW)	2 GHz 10 GHz 18 GHz		16.7 17.7 16.9		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) (RF Operational Life Test)	Frequency = 10 GHz, RF Pulsed, PW=100 $\mu$ s, DC=10%, 50 $\Omega$ , 25°C	10	W

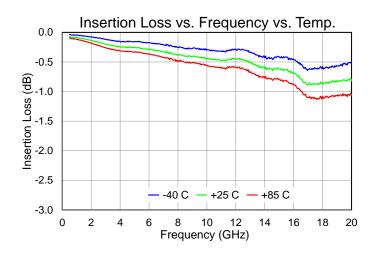
#### Notes:

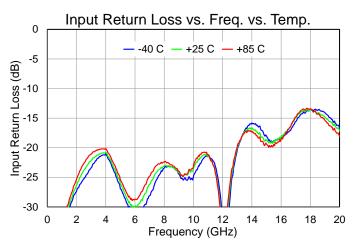
<sup>1.</sup> Test terminated after 168 hours. Insertion Loss remained ≤ 1 dB for device under test.

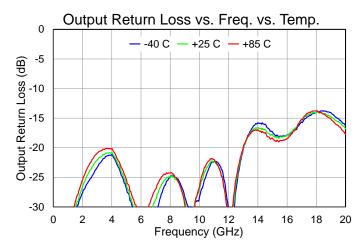


# **Performance Plots - Small Signal**

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



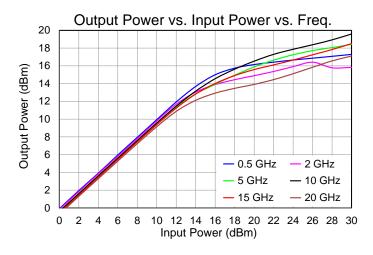


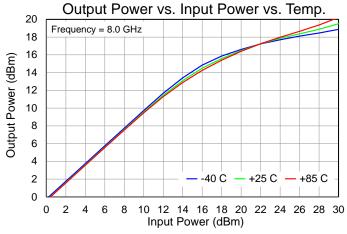


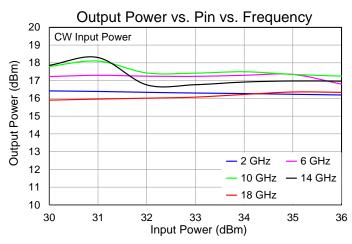


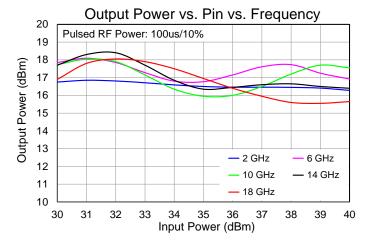
# **Performance Plots – Large Signal**

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



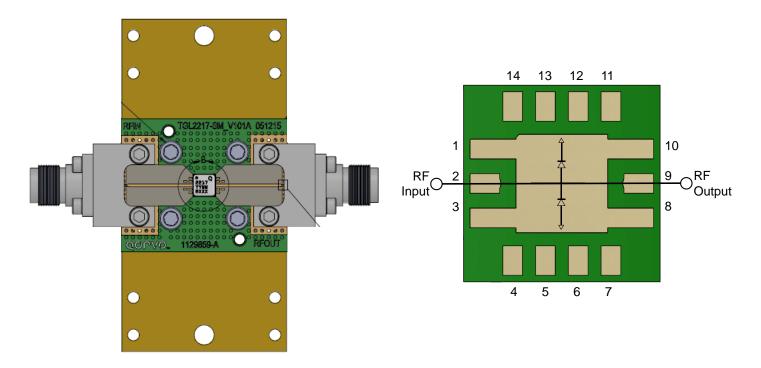








# **Application Circuit and Evaluation Board (EVB)**



#### Notes:

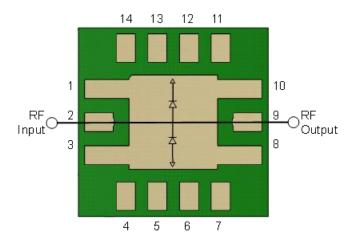
1. See Evaluation Board PCB Information for material and stack up.

### **Bill of Material - EVB**

Ref. Des.	Value	Description	Manuf.	Part Number
n/a	n/a	Printed Circuit Board	Qorvo	
U1	n/a	0.1 – 20 GHz 50 W VPIN Limiter	Qorvo	TGL2217-SM
J1, J2	n/a	2.92 mm End Launch Connector	Southwest Microwave	1092-01A-5



# **Pad Configuration and Description**



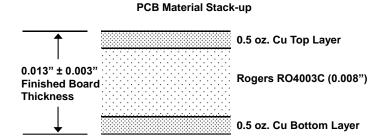
Top View

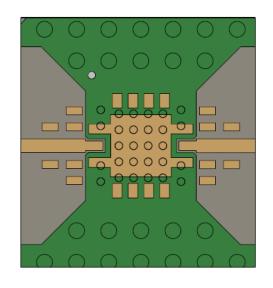
Pad No.	Label	Description
1, 3, 8, 10	GND	On PCB, multiple copper-filled vias should be employed under the center pad to minimize inductance and thermal resistance
2	RF Input	RF Input, matched to 50 Ohms, not DC blocked
4–7, 11–14	NC	No connection; connecting to ground may improve performance
9	RF Output	RF Output, matched to 50 Ohms, not DC blocked

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

# **Evaluation Board PCB Information and Mounting Detail**

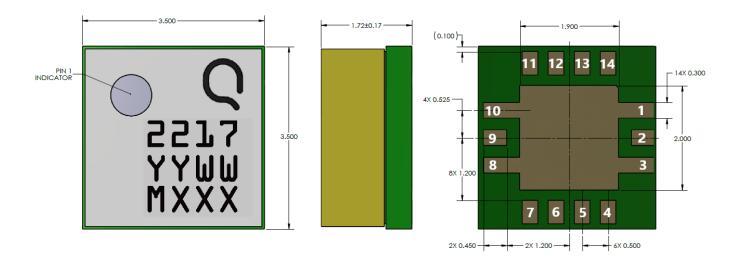
# **EVB PC Board Layout**







# **Package Marking and Dimensions**



#### Notes:

1. All dimensions are in millimeters. Angles are in degrees.

Tolerances:  $XX = \pm .25$  $XXX = \pm .100$ 

2. Package Base: Laminate

3. Package Lid: FR4

4. All Metalized Features Are Gold Plated.

5. The Part Is Epoxy Sealed

6. Part Marking:

2217: Part Number

YY: Part assembly Year

WW: Part Assembly Week

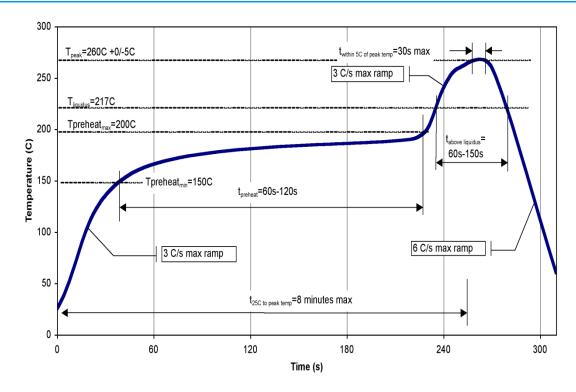
MXXX: Batch ID



# **Assembly Notes**

- Compatible with lead-free soldering process with 260°C peak reflow temperature.
- This package is non-hermetic, and therefore cannot be subjected to aqueous washing. The use of no-clean solder to avoid washing after soldering is recommended
- Solder rework not recommended.
- Contact plating: Ni-Au

# **Recommended Soldering Profile**





# **Handling Precautions**

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 3B	ESDA / JEDEC JS-001-2012
ESD - Charged Device Model (CDM)	Class C3	JEDEC JESD22-C101F
MSL – Moisture Sensitivity Level	Level 3	IPC/JEDEC J-STD-020



Caution! **ESD-Sensitive Device** 

# **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
- Antimony Free
- TBBP-A (C<sub>15</sub>H<sub>12</sub>Br<sub>4</sub>O<sub>2</sub>) Free
- PFOS Free

#### Contact Information

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

Web: www.gorvo.com Tel: 1-844-890-8163

Email: <u>customer.support@gorvo.com</u>

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