TGL2209

8 – 12 GHz 50 Watt VPIN Limiter

Product Description

The Qorvo TGL2209 is a high power, X-band GaAs VPIN limiter capable of protecting sensitive receive channel components against high power incident signals. The TGL2209 does not require DC bias and achieves a low insertion loss in a small form factor. These features allow for simple integration with minimal impact to system performance.

The TGL2209 operates from 8–12 GHz with low insertion loss of less than 0.5 dB. Receive protection is rated up to 50 W incident pulsed-power with a low flat leakage of less than 18 dBm.

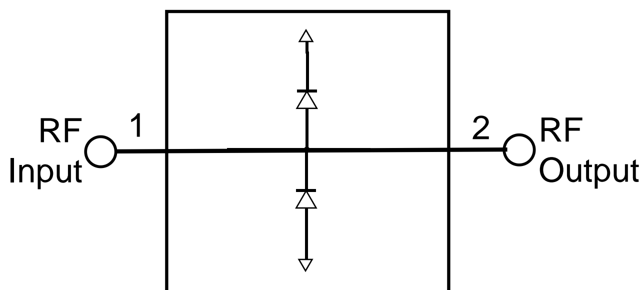
The TGL2209 is offered in die form and is well suited for both commercial and defense related applications.

Product Features

- Frequency Range: 8 – 12 GHz
- Insertion Loss: < 0.5 dB
- Peak Power Handling: 50 W (pulsed)
- Flat Leakage: < 18 dBm
- Spike Leakage: < 20 dBm
- Passive (no DC bias required)
- Recovery Time: < 30 nS
- Die Size: 2.00 x 2.00 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

Ordering Information

Part No.	Description
TGL2209	8–12 GHz 50W VPIN Limiter
1126046	Evaluation Board

Absolute Maximum Ratings

Parameter	Value / Range
Incident Power, Pulsed[1], 50 Ω, 25 °C	47 dBm
Incident Power, Pulsed[1], 50 Ω, 85 °C	46 dBm
Incident Power, CW, 50 Ω, 25 °C	40 dBm
Incident Power, CW, 50 Ω, 85 °C	36 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

Parameter	Min	Typ	Max	Units
Operational Frequency Range	8	–	12	GHz
Insertion Loss		< 0.5		dB
Input Return Loss		> 12		dB
Output Return Loss		> 12		dB
Flat Leakage Power at P_{IN} > 30 dBm		< 18		dBm
Pulse Recovery Time		< 30		nS
Spike Leakage		< 20		dBm
Insertion Loss Temperature Coefficient		0.006		dB/ °C

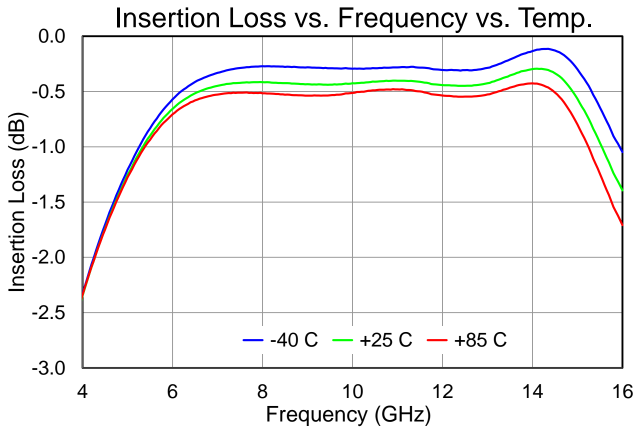
Thermal and Reliability Information

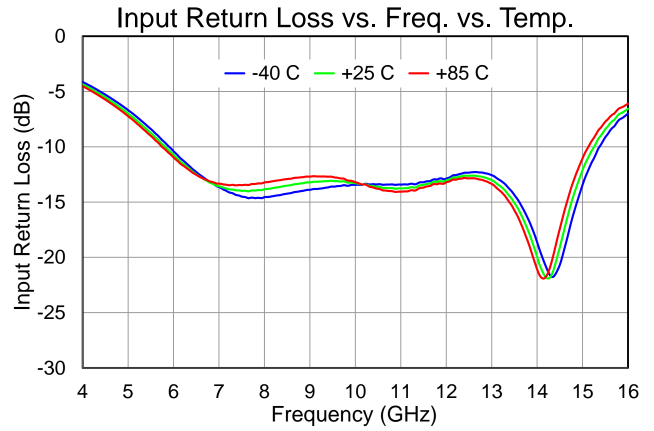
Parameter	Test Conditions	Value	Units
Incident Power (RF Operational Life Test [(1)])	10 GHz Pulsed, PW=100 µs, DC=10%, 50 Ω, 25°C	50	W

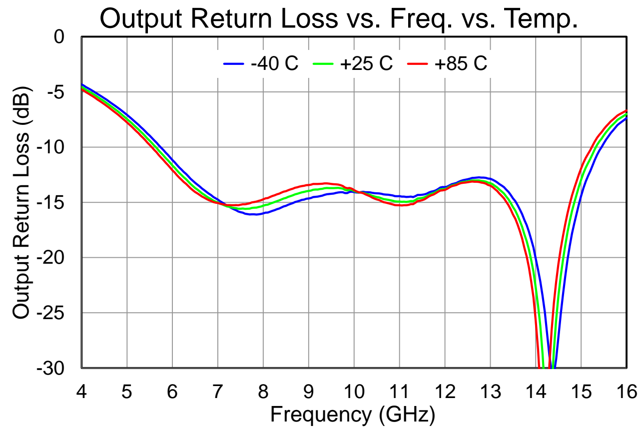
Notes:
1. Test terminated after 100 hours.

Performance Plots – Small Signal

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

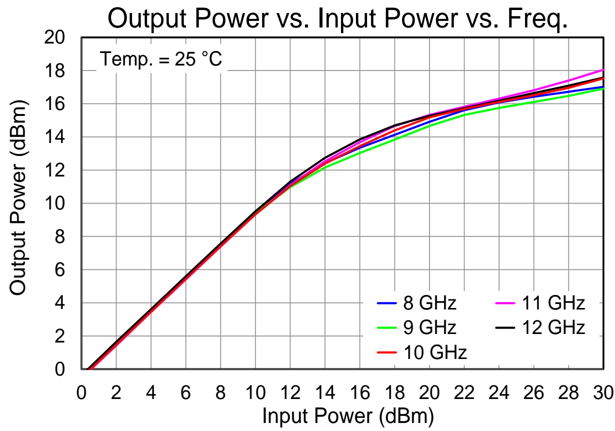


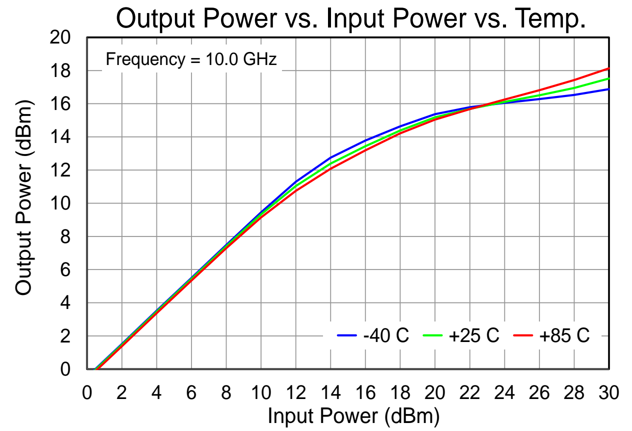


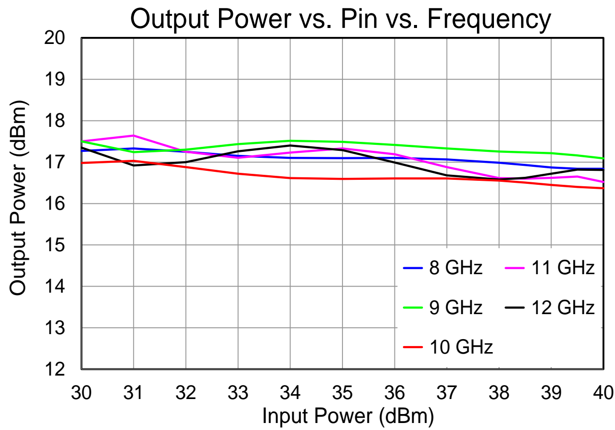


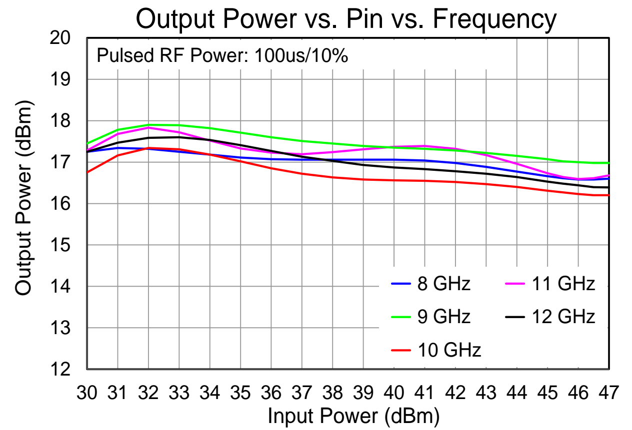
Performance Plots – Large Signal

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

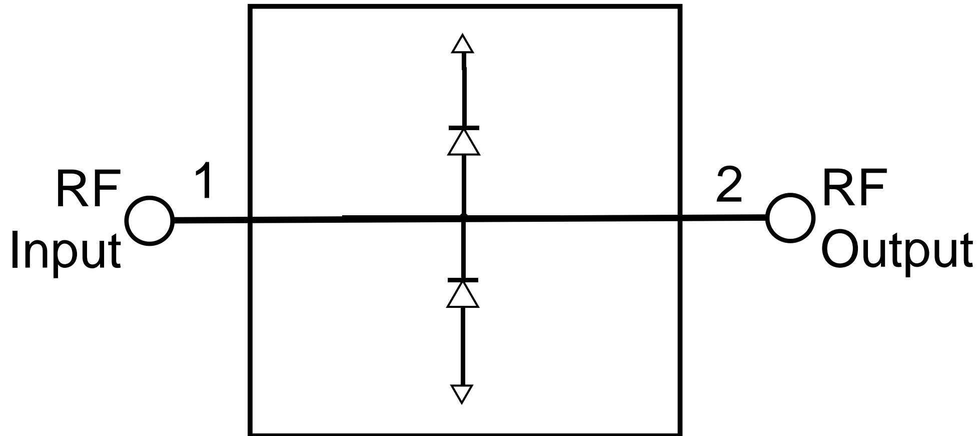






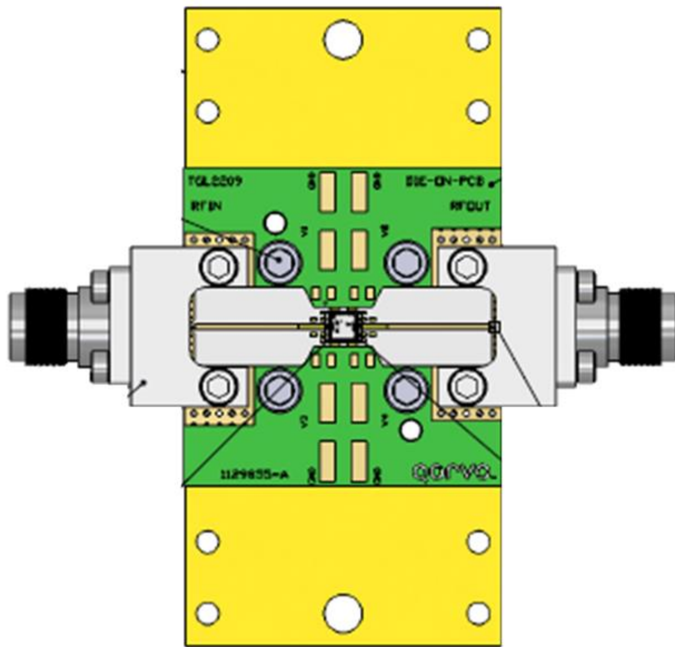


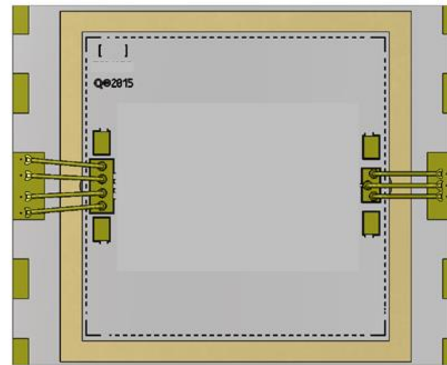
Applications Circuit



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

Evaluation Board (EVB) Layout Assembly & Mounting Detail





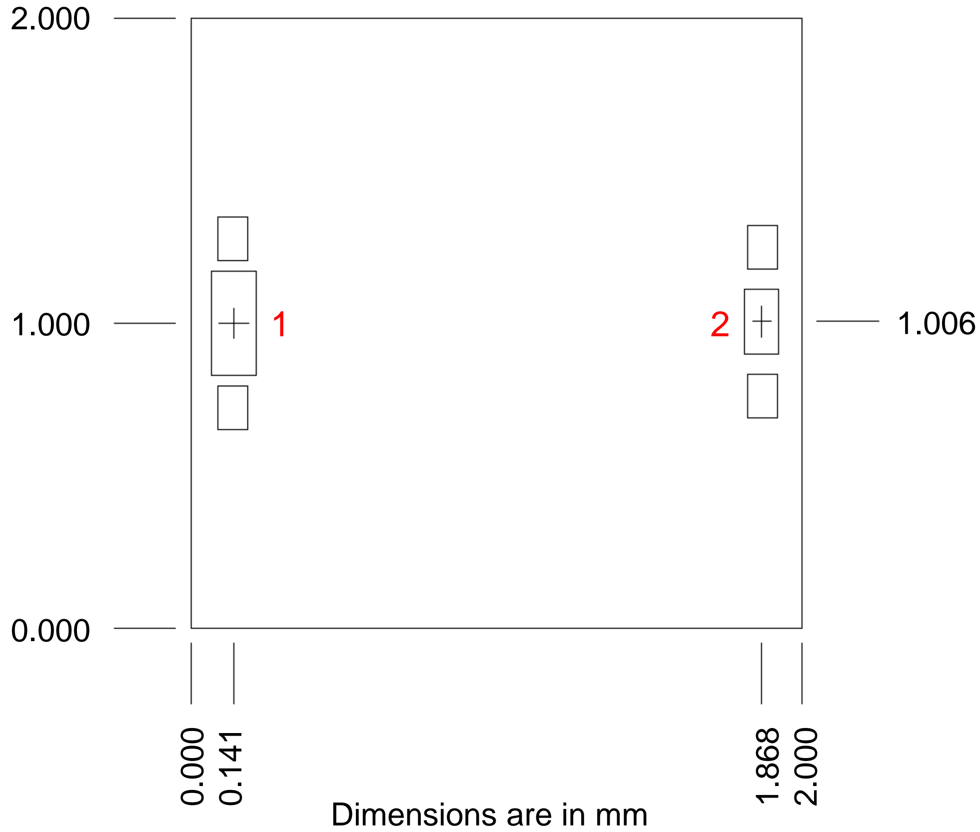
Die Mounting Detail

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 (mm x mm)
1	RF Input	RF Input, 50 Ω, DC coupled	0.145 x 0.340
2	RF Output	RF Output, 50 Ω, DC coupled	0.110 x 0.210

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.
- 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.