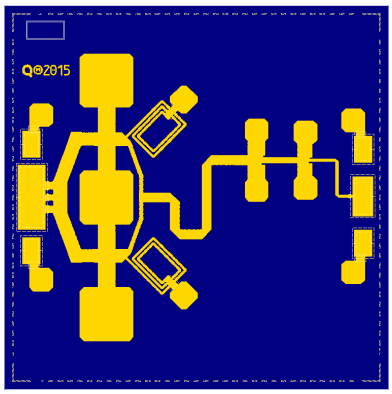
TGL2209

8.0-12.0 GHz 50 Watt VPIN Limiter

Applications

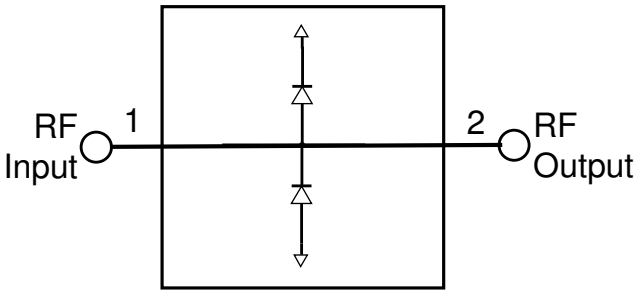
- Receive Chain Protection
- Commercial and Military Radar



Product Features

- Frequency Range: 8.0 to 12.0 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 < 115 ns
- Die Dimensions: 2.00 x 2.00 x 0.10 mm

Functional Block Diagram



General 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 8.0–12 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.

Lead-free and RoHS compliant.

Evaluation boards available on request.

Pad Configuration

Pad Number	Symbol
1	RF Input
2	RF Output

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

Ordering Information

Part	ECCN	Description
TGL2209	EAR99	8.0–12.0 GHz 50W VPIN Limiter
TGL2209_EVB	EAR99	8.0–12.0 GHz 50W VPIN Limiter Evaluation Board

Absolute Maximum Ratings

Parameter	Value
Incident Power, Pulsed[1], 50 Ω, 25 ℃	47 dBm
Incident Power, Pulsed[1], 50 Ω, 85 ℃	46 dBm
Incident Power, CW, 50 Ω, 25 ℃	40 dBm
Incident Power, CW, 50 Ω, 85 ℃	36 dBm
Mounting Temperature (3–4 minutes max.)	300 ℃
Storage Temperature	-40 to 150 ℃

Note:
[1] Pulse conditions: PW = 100 us, 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	Value
Passive – No bias	

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

Electrical Specifications

Test conditions unless otherwise noted: 25 ℃

Parameter	Min	Typical	Max	Units
Operational Frequency Range	8.0		12.0	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		< 115		ns
Spike Leakage		< 20		dBm
Insertion Loss Temperature Coefficient		0.006		dB/ ℃

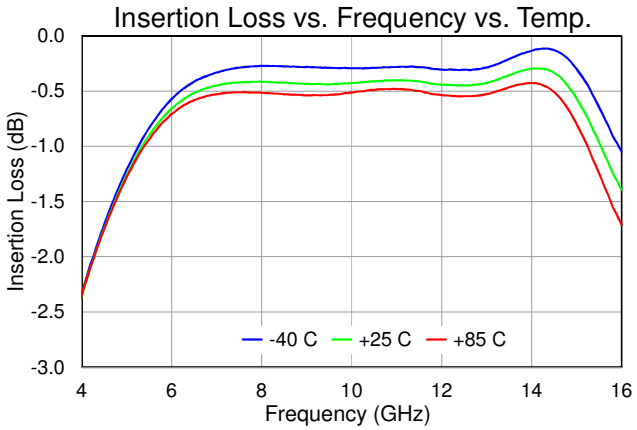
Thermal and Reliability Information

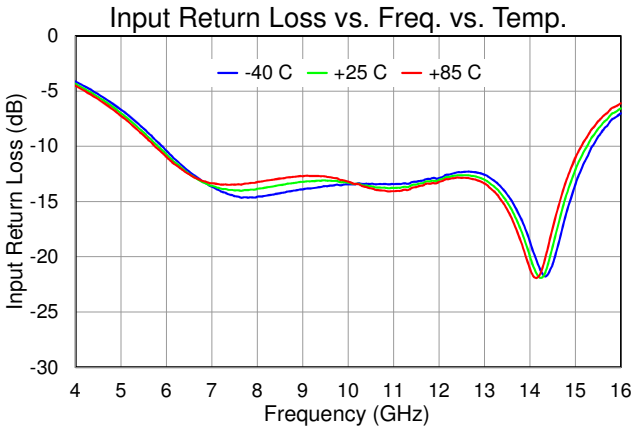
Parameter	Test Conditions	Value	Units
Incident Power (RF Operational Life Test [(1)])	10 GHz Pulsed, PW=10 us, DC=10%, 50 Ω, 25 ℃	50	W

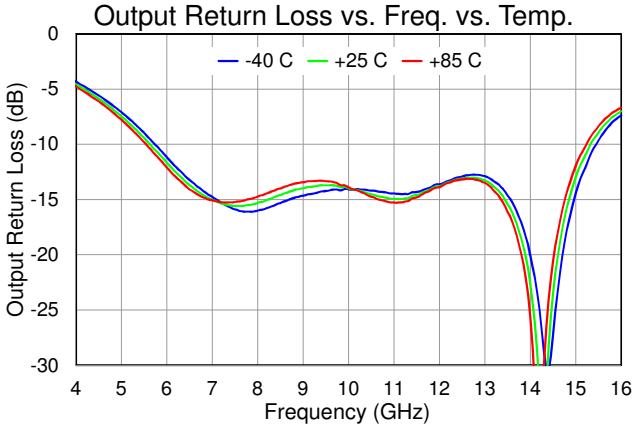
Notes:
1. Test terminated after 100 hours.

Typical Performance: Small Signal

Test conditions unless otherwise noted: 25 °C



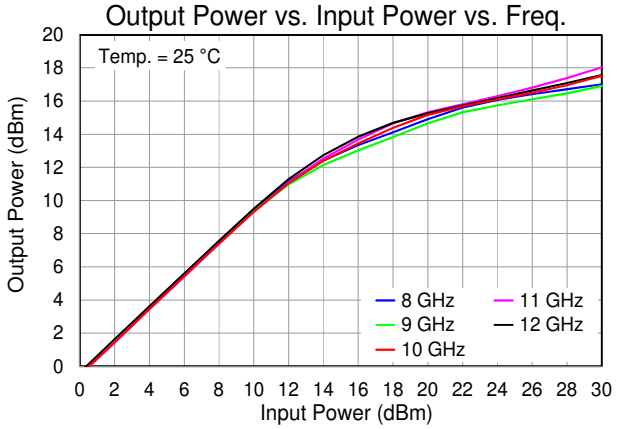




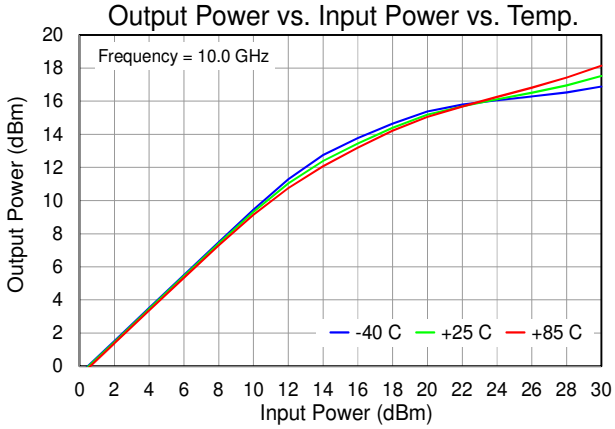
Typical Performance: Large Signal

Test conditions unless otherwise noted: 25 °C, CW Input Power

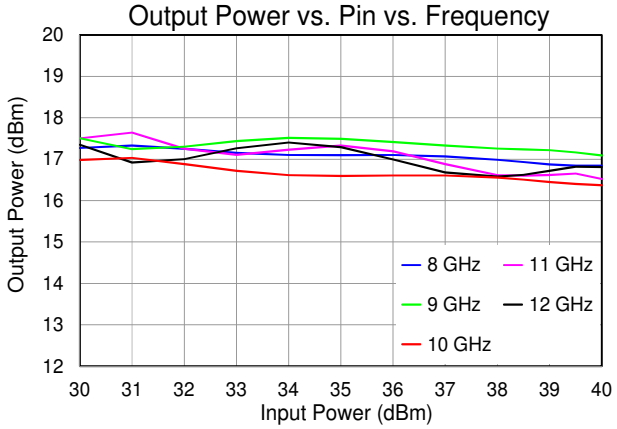
Output Power vs. Input Power vs. Freq.



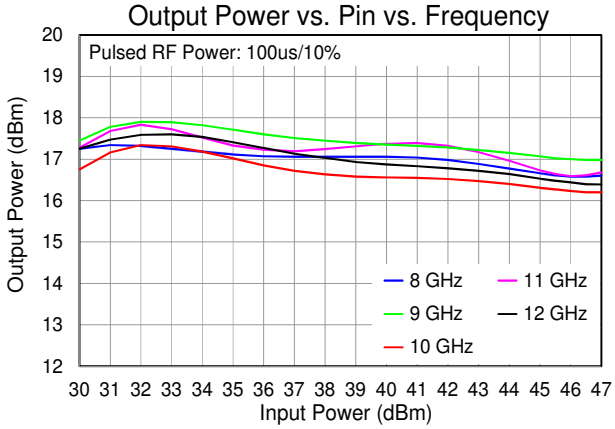
Output Power vs. Input Power vs. Temp.



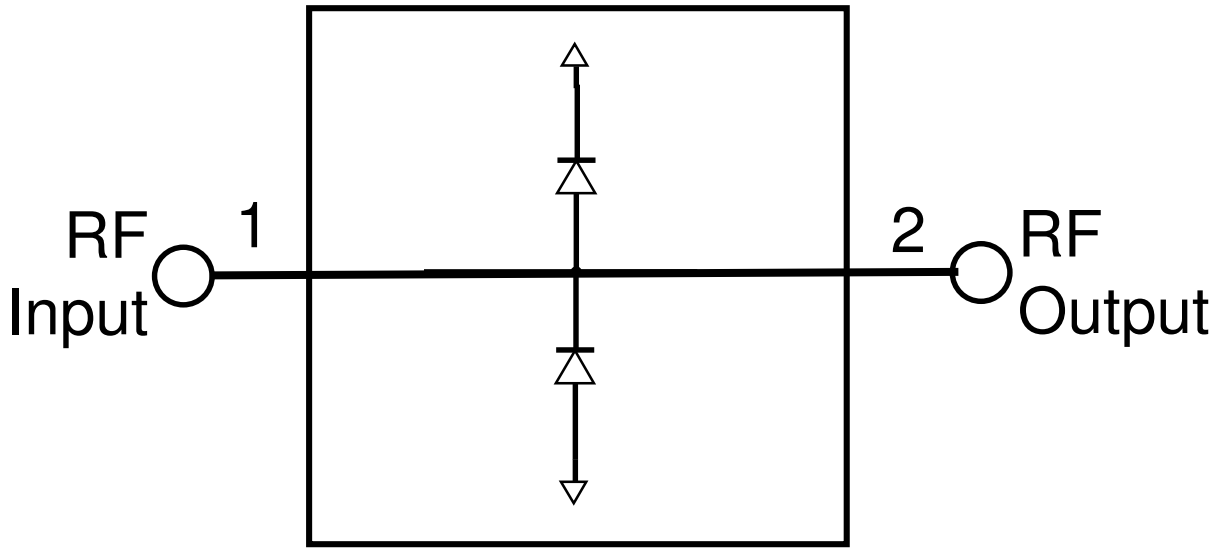
Output Power vs. Pin vs. Frequency



Output Power vs. Pin vs. Frequency



Applications Circuit

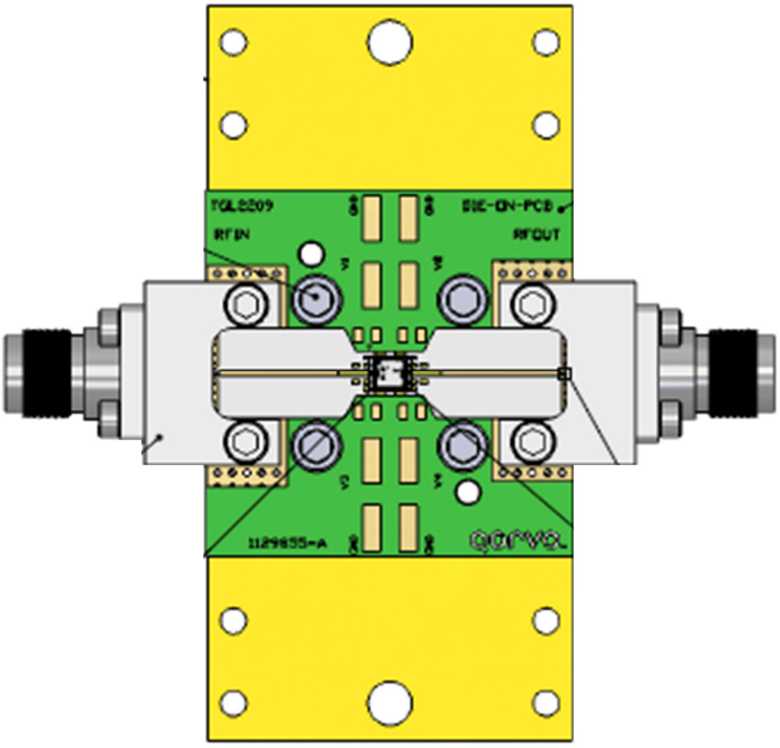


Applications Information – Evaluation Board (EVB)

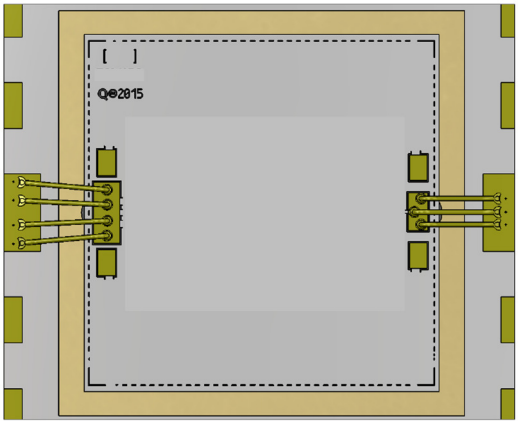
EVB Layout

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 TriQuint Semiconductor. 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.



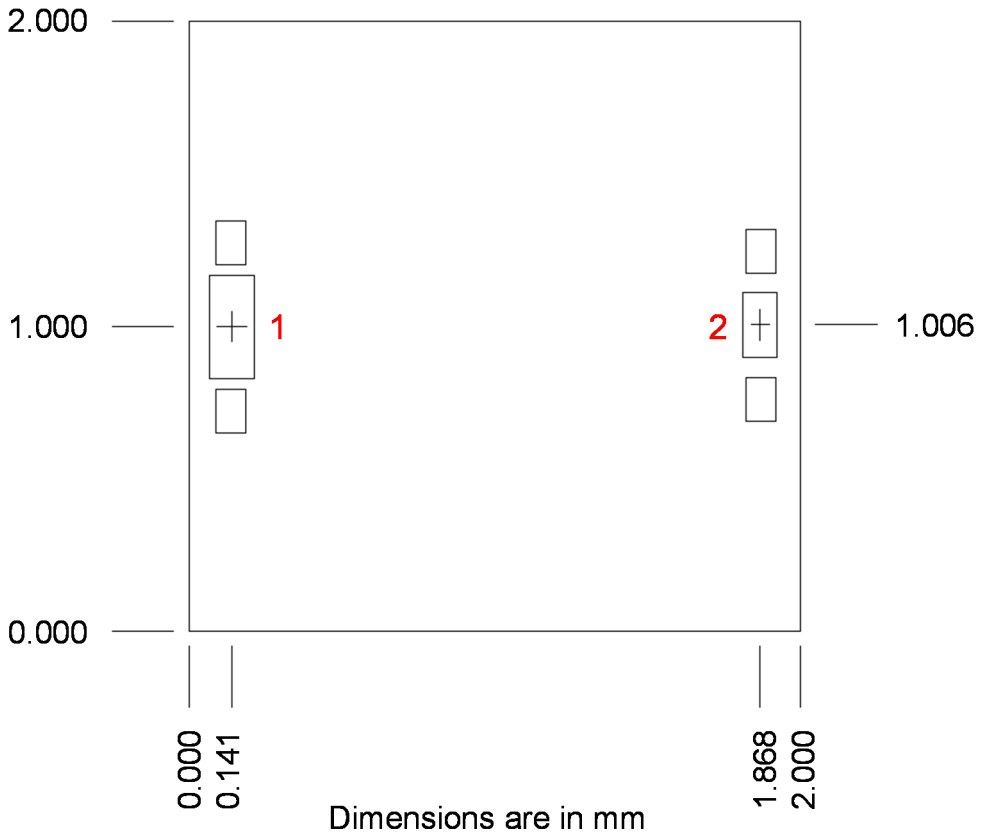
EVB Die Mounting Detail



Note:

Multiple copper-filled vias should be employed under die to minimize inductance and thermal resistance.

Mechanical Drawing and Bond Pad Description



Pad	Symbol	Description
1	RF Input	RF Input, 50 Ω, DC coupled
2	RF Output	RF Output, 50 Ω, DC coupled

NOTE: The RF Input and 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. epoxy) can be used in low-power applications and for die attach to soft substrates.
- 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 ultrasonics are critical parameters.
- Aluminum wire should not be used.
- Devices with small pad sizes should be bonded with 0.0007-inch wire.

Product Compliance Information

ESD Sensitivity Ratings

Caution! ESD-Sensitive Device

ESD Rating: TBD
Value: TBD
Test: Human Body Model (HBM)
Standard: JEDEC Standard JESD22-A114

ECCN

US Department of Commerce: EAR99

Solderability

Use only AuSn (80/20) solder and limit exposure to temperatures above 300 °C to 3-4 minutes, maximum. Conductive epoxy die attach is recommended for soft substrate PCBs.

RoHS-Compliance

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C15H12Br402) Free
- PFOS Free
- SVHC Free

Contact Information

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

Web: www.triquint.com **Tel:** +1.972.994.8465
Email: customer.support@qorvo.com

For information about the merger of RFMD and TriQuint as Qorvo:

Web: www.qorvo.com

For technical questions and application information: **Email:** info-products@tqs.com

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