

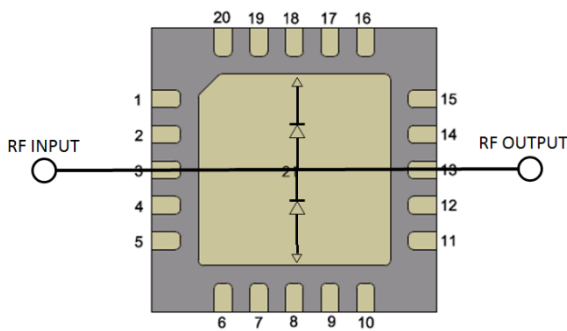
### Product Overview

Qorvo's QPP2209 is a high power VPIN limiter robust to short-pulse input signals up to 40W. It offers exceptionally low insertion loss over a wide bandwidth and requires no DC bias. The QPP2209 is housed in a low-cost plastic over-molded QFN package.

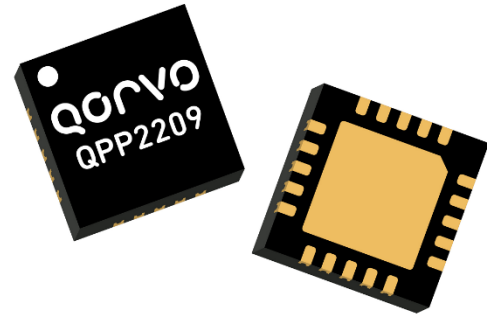
The QPP2209 is internally matched to 50 ohms and operates from 8 to 12 GHz with typical insertion loss less than 0.5dB and flat leakage below 19dBm. It is capable of withstanding 40W of incident power under short-pulse conditions. It is well suited for both commercial and defense related applications.

Lead-free and RoHS compliant.

### Functional Block Diagram



Top View



20L 4 x 4 mm OVM QFN Package

### Key Features

- Frequency Range: 8 to 12 GHz
- Insertion Loss: < 0.5 dB
- Peak Power Handling: 40 W (pulsed)
- Flat Leakage: < 19 dBm
- Spike Leakage < 20.5 dBm
- Passive (no DC bias required)
- Recovery time < 30 ns
- Package Dimensions: 4.00 x 4.00 x 0.85 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

### Ordering Information

Part	Description
QPP2209TR7	8–12 GHz 40W VPIN Limiter, 500 pcs, 7-inch reel
QPP2209TR7X	8–12 GHz 40W VPIN Limiter, 50 pcs, 7-inch reel
QPP2209EVB01	Evaluation Board

## Absolute Maximum Ratings

Parameter	Rating
Incident Power, Pulsed <sup>1</sup> , 50 Ω, 25 °C	46 dBm
Incident Power, Pulsed <sup>1</sup> , 50 Ω, 85 °C	46 dBm
Incident Power, CW, 50 Ω, 25 °C	37 dBm
Incident Power, CW, 50 Ω, 85 °C	34 dBm
Mounting Temperature (30 s max)	260 °C
Storage Temperature	-40 to 150 °C

**Note:**

<sup>1</sup> Pulse conditions: PW = 100 us, Duty Cycle = 10%

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	Typ.	Max	Units
Passive – No Bias				
Temperature Range	-40	+25	+85	°C

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

## Electrical Specifications

Parameter	Conditions <sup>(1)</sup>	Min	Typ.	Max	Units
Operational Frequency Range		8.0		12.0	GHz
Insertion Loss	8 GHz 10 GHz 12 GHz		0.32 0.35 0.47		dB
Input Return Loss	8 GHz 10 GHz 12 GHz		25 21 15		dB
Output Return Loss	8 GHz 10 GHz 12 GHz		30 21 15		dB
Flat Leakage Power at P <sub>IN</sub> > 30 dBm (Pulse)	8 GHz 10 GHz 12 GHz		18.2 18.0 18.2		dBm
Pulse Recovery Time			<30		ns
Spike Leakage			20.5		dBm
Insertion Loss Temperature Coefficient			0.004		dB/ °C

**Notes:**

1. Test conditions unless otherwise noted: Temp = +25 °C, 50 Ω system. S-Parameter CW, Power Pulse Parameters: PW= 100us, Duty Cycle = 10%

## Thermal and Reliability Information

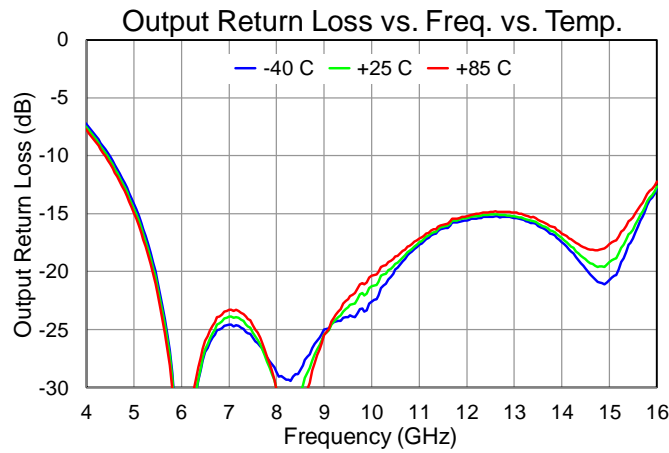
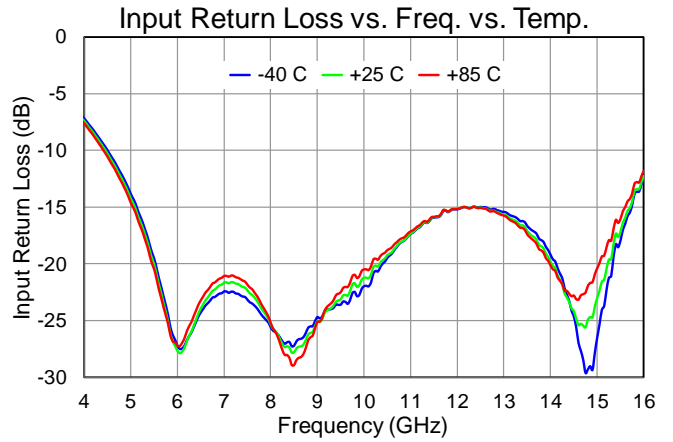
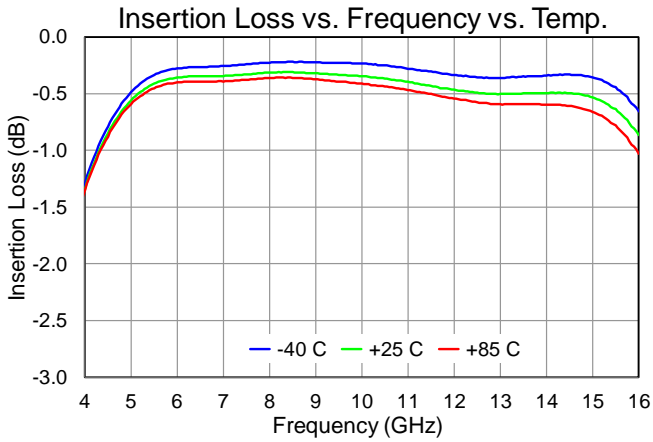
Parameter	Test Conditions	Value	Units
Incident Power (RF Operational Life Test <sup>(1)</sup> )	10 GHz Pulsed, PW=100 us, DC=10%, 50 Ω, 25 °C	40	W

**Notes:**

1. Test terminated after 100 hours.

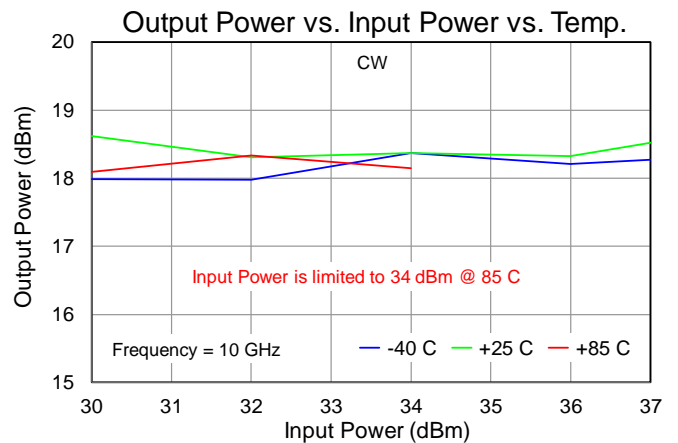
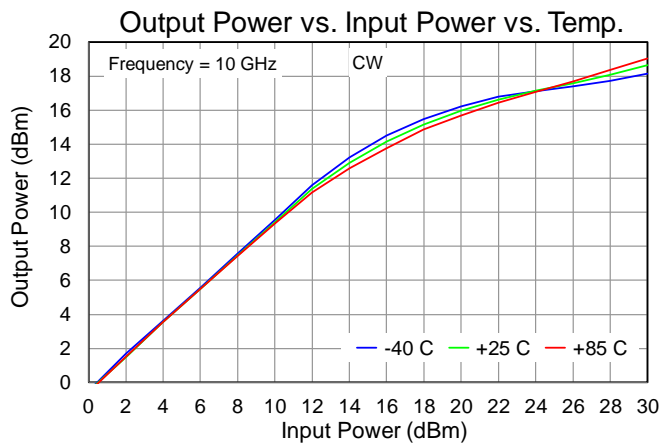
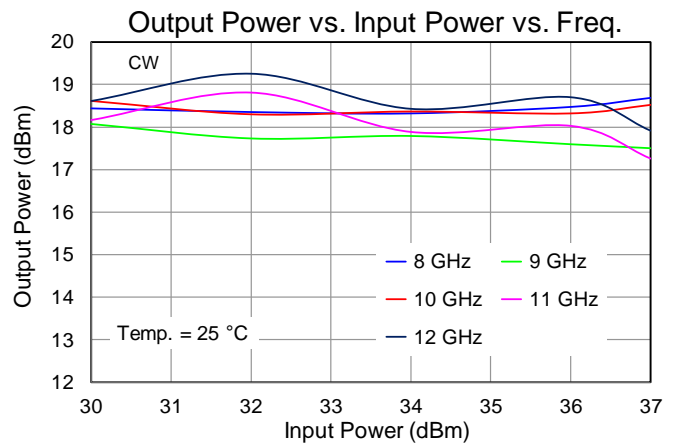
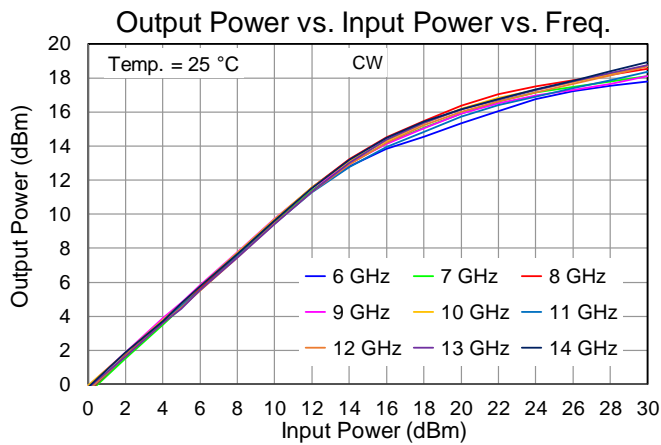
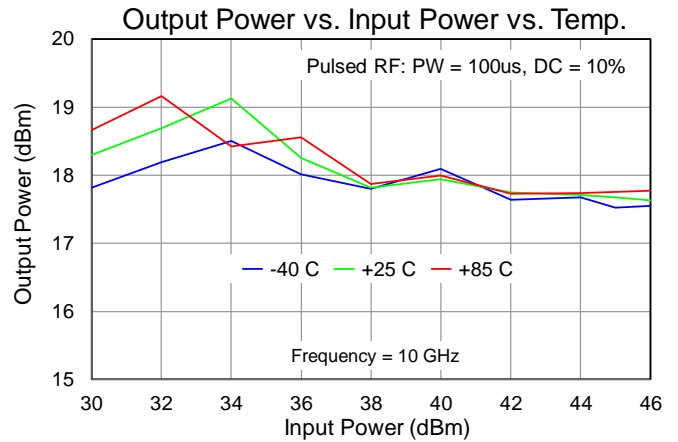
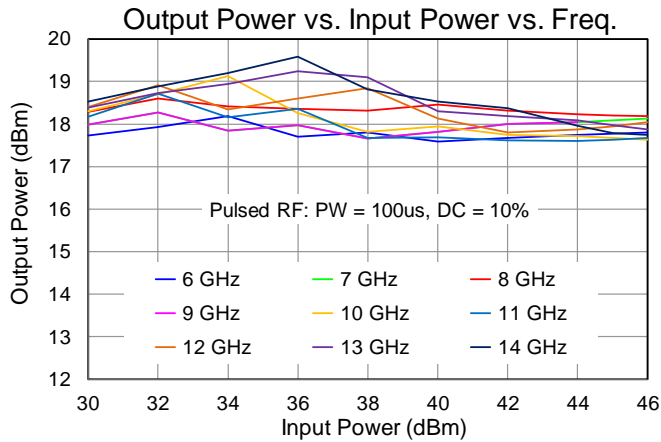
**Performance Plots – Small Signal**

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

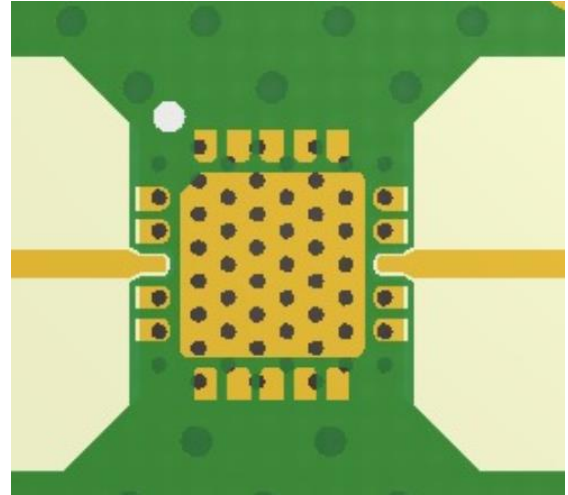
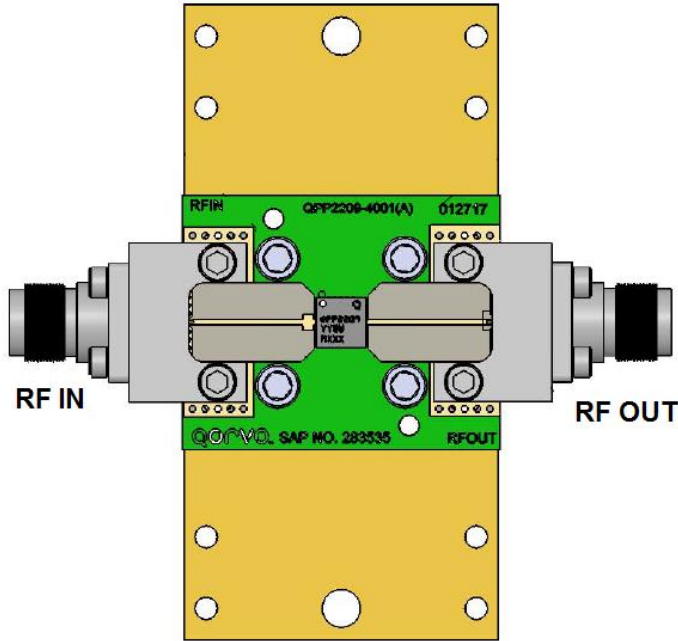


Performance Plots – Large Signal

Test conditions unless otherwise noted: Pulsed RF: PW = 100us, DC = 10%; Temp.=+25 °C



Application Circuit and Evaluation Board (EVB) and Mounting Detail



Notes:

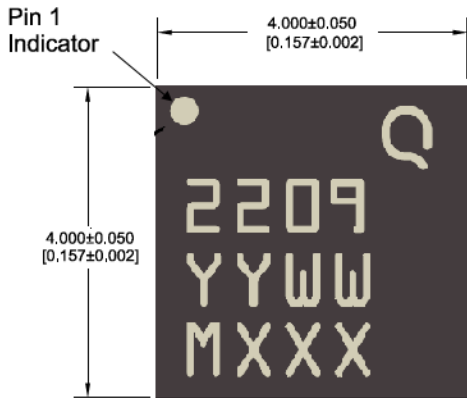
1. See Evaluation Board PCB Information for material and stack up.

Evaluation Board PCB Information

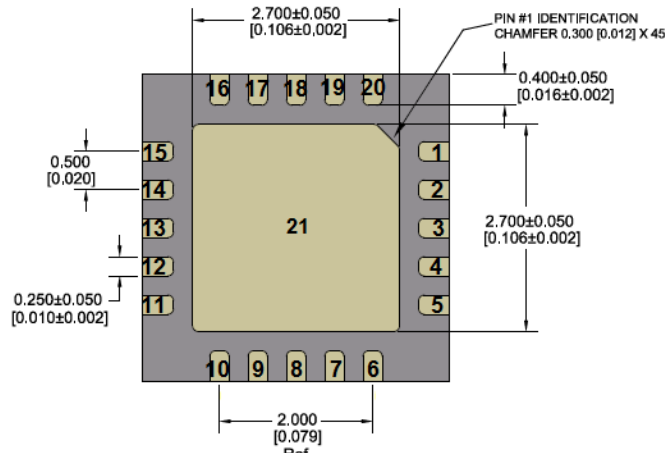
Layer Stack Legend

Material	Layer	Thickness	Dielectric Material	Type
	SILKSCREEN_TOP			Legend
Surface Material	SOLDERMASK_TOP	0.4mil	Solder Resist	Solder Mask
Copper	METAL1_TOP	1.3mil		Signal
Core		8.0mil	ROGERS 4003C	Dielectric
Copper	METAL2_BOT	1.3mil		Signal
<b>Total thickness: 11mil</b>				

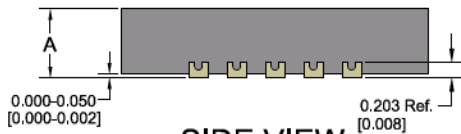
Package Marking, Pad Configuration and Description



TOP VIEW



BOTTOM VIEW



SIDE VIEW

A	MAX.	0.900 [0.035]
	NOM.	0.850 [0.033]
	MIN.	0.800 [0.031]

LASER MARK NOTES:

- 2209 IS PART #
- YY IS THE LAST TWO DIGITS OF THE CALENDAR YEAR
- WW IS THE WEEK NUMBER OF THE ASSEMBLY LOT START
- MXXX IS THE BATCH ID

NOTES: UNLESS OTHERWISE SPECIFIED;

1. TESTED QPP2209
2. PACKAGE IS MOLD ENCAPSULATED.
3. PACKAGE EXPOSED METALLIZATION ARE GOLD PLATED.

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN mm [INCHES]

.XX = ± .25 [0.01]  
 TOLERANCES .XXX = ± .100 [0.004] ANGLES = 0.5°  
 .XXXX = ± .0254 [0.01]

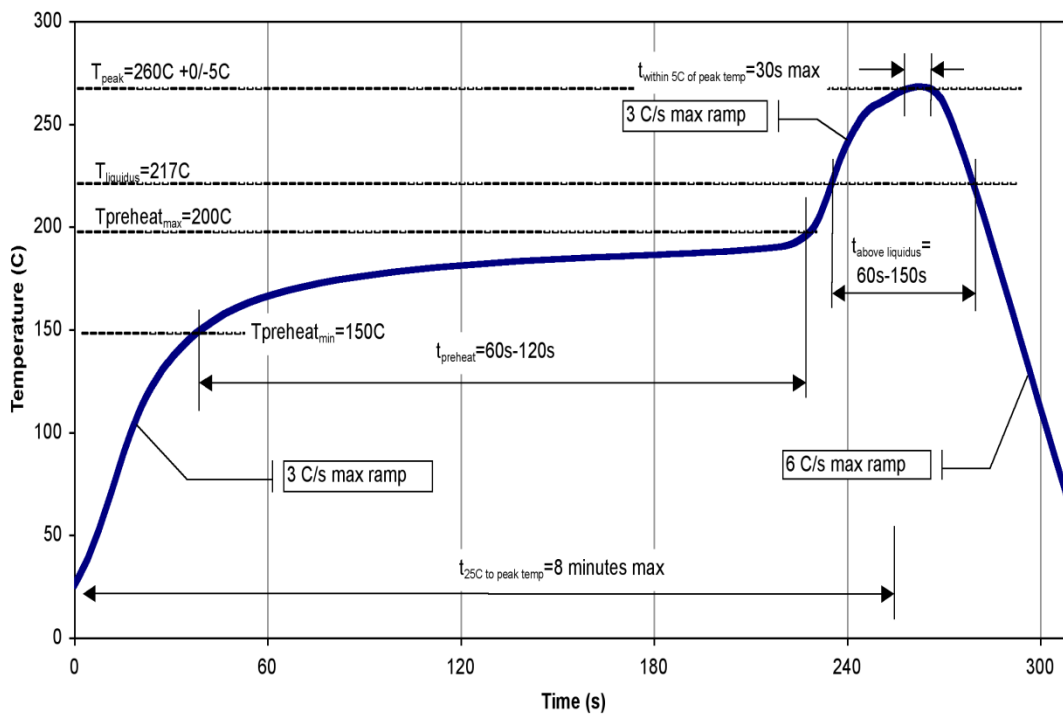
Pad No.	Label	Description
1, 2, 4–12, 14–20	NC	No connection; may be grounded if desired
3	RF Input	RF Input, matched to 50 Ohms, not DC blocked
13	RF Output	RF Output, matched to 50 Ohms, not DC blocked
21 (Slug)	GND	On PCB, multiple copper-filled vias should be employed under the center pad to minimize inductance and thermal resistance

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

## Assembly Notes

1. Compatible with lead-free soldering process with 260°C peak reflow temperature.
2. The use of no-clean solder to avoid washing after soldering is recommended.
3. Contact plating: Ni-Pd-Au

## Recommended Soldering Profile



## Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1C	ANSI/ESDA / JEDEC JS-001
ESD – Charged Device Model (CDM)	Class C3	ANSI/ESDA/JEDEC JS-002
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
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C<sub>15</sub>H<sub>12</sub>Br<sub>4</sub>O<sub>2</sub>) Free
- PFOS Free
- SVHC Free

## Contact Information

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

**Web:** [www.qorvo.com](http://www.qorvo.com)

**Tel:** 1-844-890-8163

**Email:** [customer.support@qorvo.com](mailto:customer.support@qorvo.com)

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