QPP2209

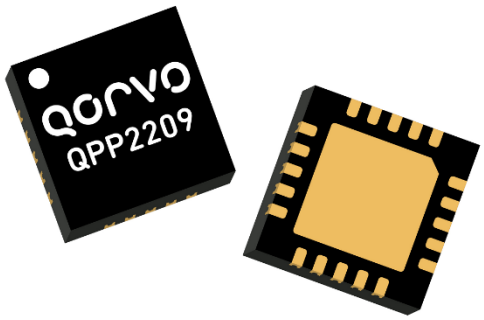
8 – 12 GHz 40 W VPIN Limiter

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 can withstand 40W of incident power under short-pulse conditions. It is well suited for both commercial and defense related applications.

Lead-free and RoHS compliant.



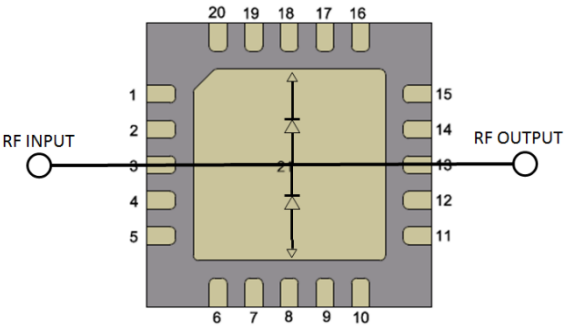
20L 4 x 4 mm OVM QFN Package

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.

Functional Block Diagram



Top View

Applications

- Receive Chain Protection
- Commercial and Military Radar

Ordering Information

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

Absolute Maximum Ratings

Parameter	Rating
Incident Power, Pulsed[1], 50 Ω, 25 °C	46 dBm
Incident Power, Pulsed[1], 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	-55 to 150 °C

Note:
[1] 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 (1)	Min	Typ.	Max	Units
Operational Frequency Range		8.0		12.0	GHz
Insertion Loss	8 GHz		0.32	0.75	dB
	10 GHz		0.35	0.90	
	12 GHz		0.47	1.00	
Input Return Loss	8 GHz		25		dB
	10 GHz		21		
	12 GHz		15		
Output Return Loss	8 GHz		30		dB
	10 GHz		21		
	12 GHz		15		
Flat Leakage Power at P_{IN} > 30 dBm (Pulse)	8 GHz	14	18.2	19.5	dBm
	10 GHz	14	18.0	19.5	
	12 GHz	14	18.2	19.5	
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 Parameter: PW = 100µs, Duty Cycle = 10%.

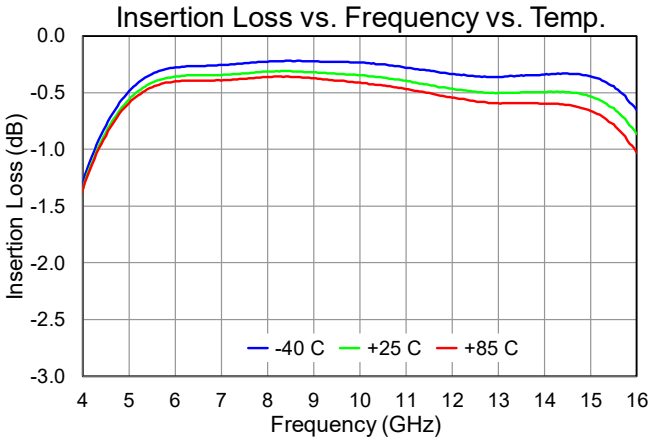
Thermal and Reliability Information

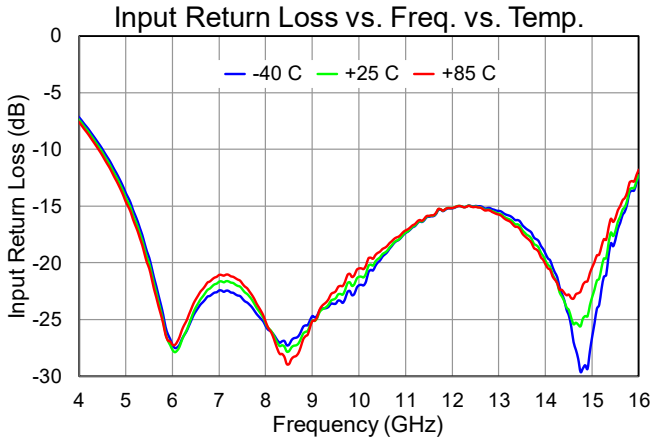
Parameter	Test Conditions	Value	Units
Incident Power (RF Operational Life Test (1))	10 GHz Pulsed, PW=100 us, DC=10%, 50 Ω, 25 °C	40	W

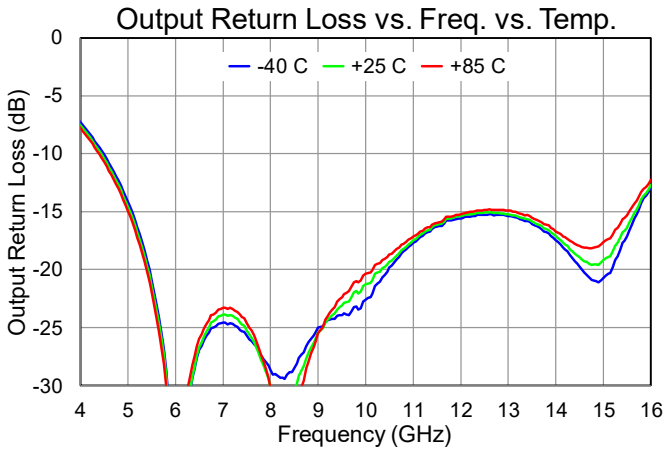
Notes:
1. Test was terminated after 100 hours.

Performance Plots – Small Signal

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

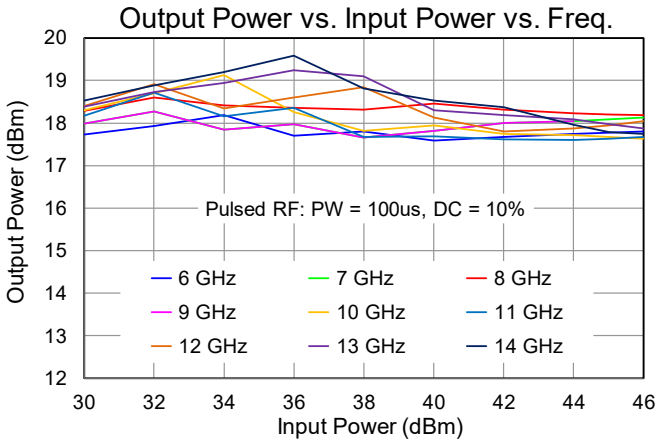


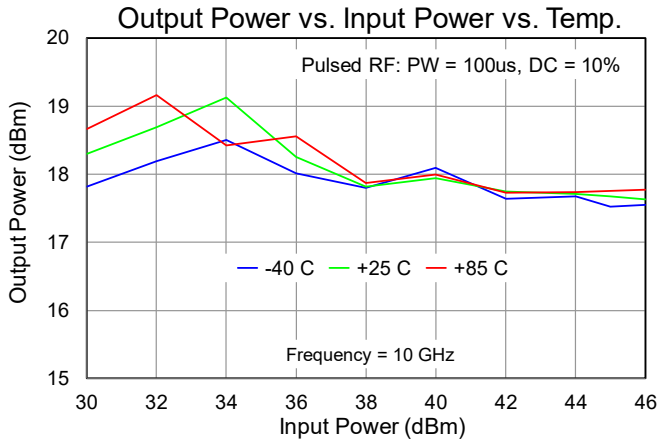


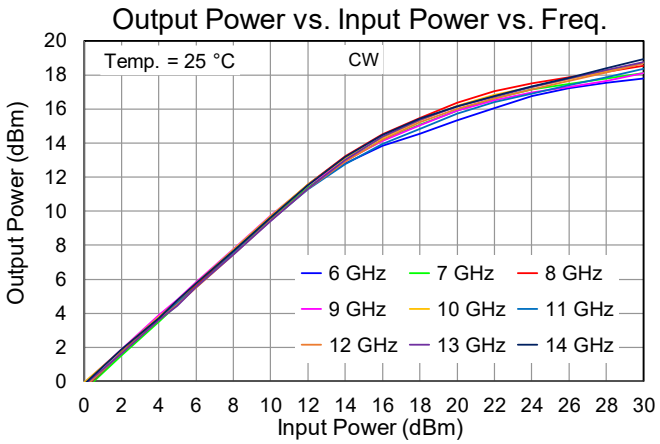


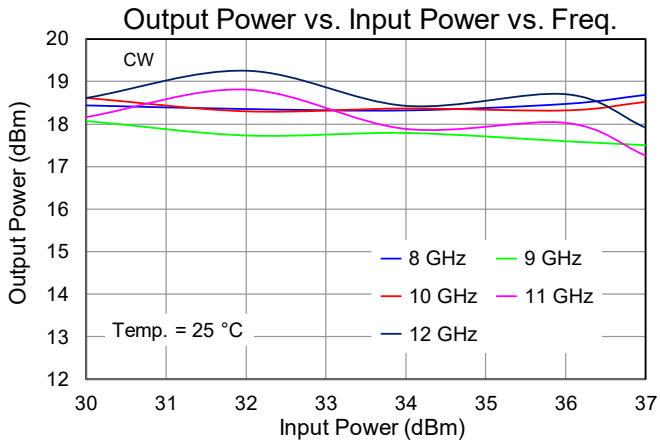
Performance Plots – Large Signal

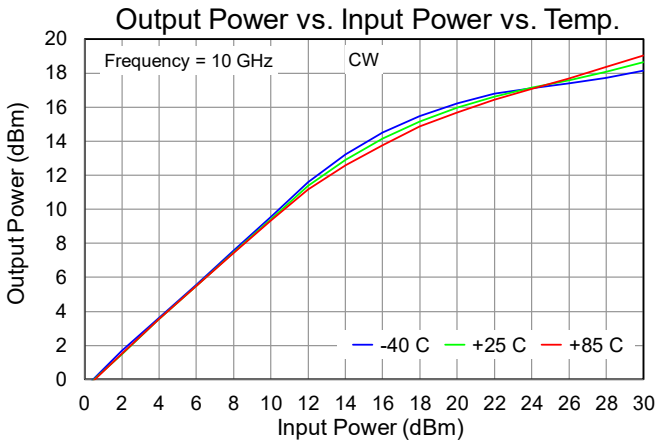
Test conditions unless otherwise noted: Pulsed RF: PW = 100us, DC = 10%; Temp.=+25 °C

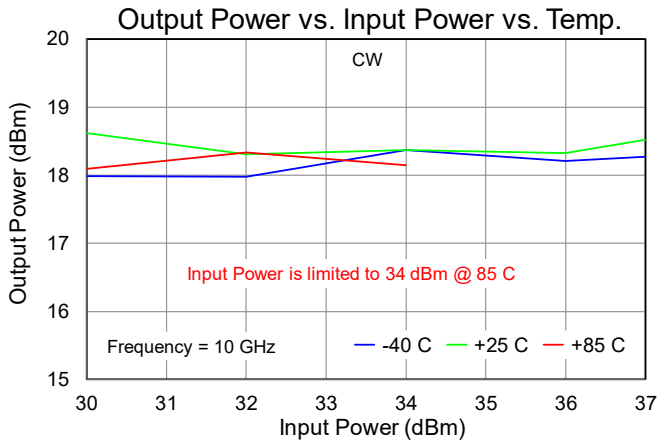




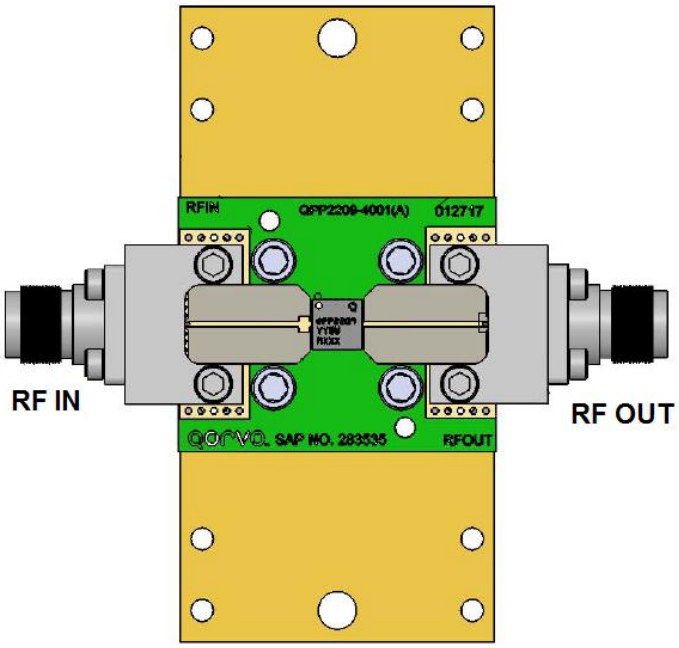


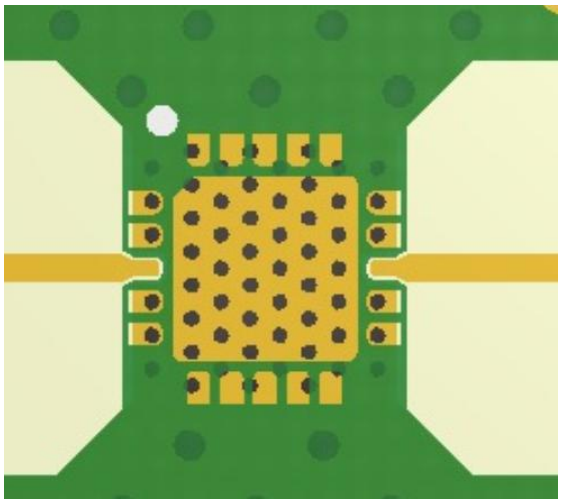






Application Circuit and Evaluation Board (EVB) and Mounting Detail

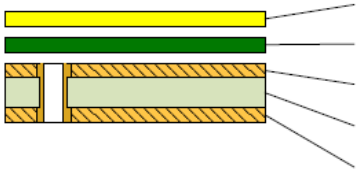




Notes:
1. See Evaluation Board PCB Information for material and stack up.

Evaluation Board PCB Information

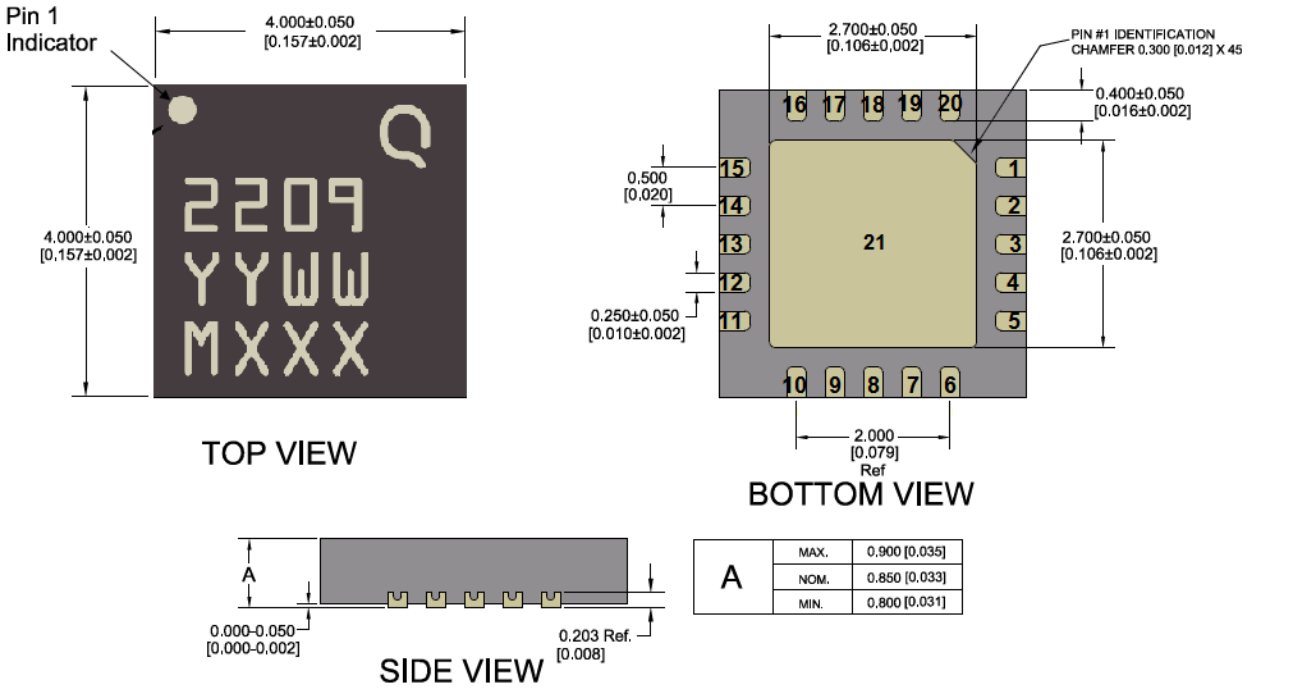
Layer Stack Legend



Material	Layer	Thickness	Dielectric Material	Type
	SILKSCREEN_TOP			Legend
Surface Material	SOLDERMASK_TOP	0.4mil	Solder Resist	Solder Mask
Copper	**METAL1_TOP**	**0.7mil**		**Signal**
Core		*8.0mil*	*ROGERS 4003C*	*Dielectric*
Copper	**METAL2_BOT**	**0.7mil**		**Signal**

Total thickness: 9.8mil

Package Marking, Pad Configuration and Description



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]

TOLERANCES .XX = ± .25 [.001]
.XXX = ± .100 [.004] ANGLES = 0.5 °
.XXXX = ± .0254 [.001]

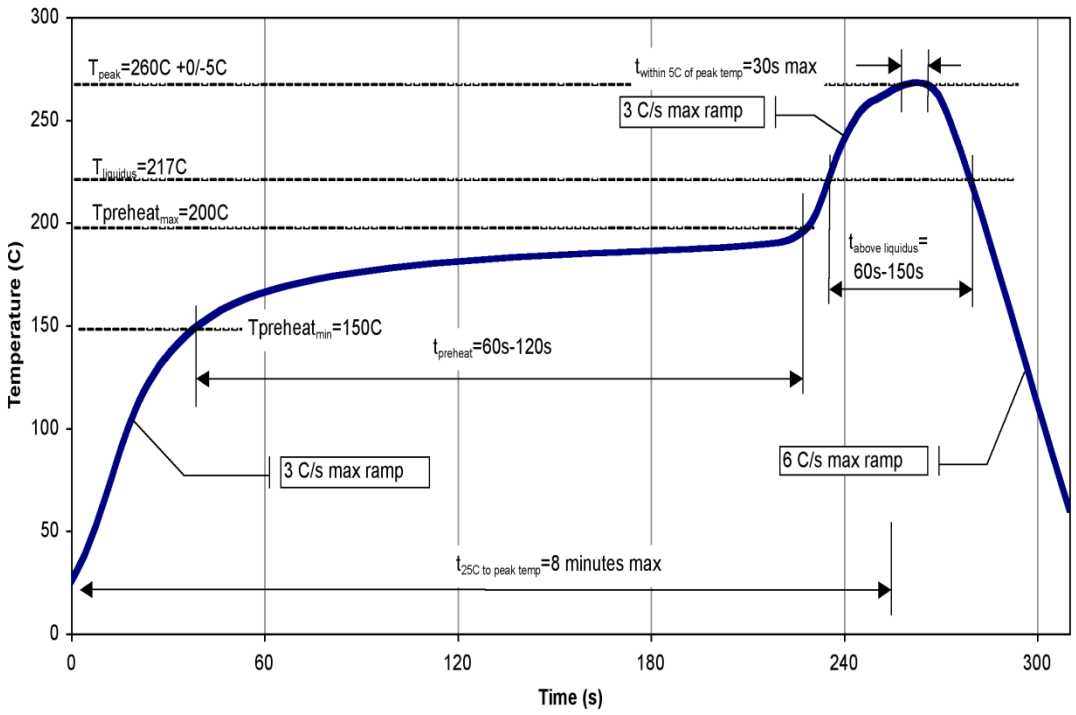
Pad No.	Label	Description
1, 2, 4–12, 14–20	NC	No connection; may be grounded if desired
3	RF Input	RF Input, matched to 50 Ohms, not DC blocked
13	RF Output	RF Output, matched to 50 Ohms, not DC blocked
21 (Slug)	GND	On PCB, multiple copper-filled vias should be employed under the center pad to minimize 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 ($C_{15}H_{12}Br_4O_2$) Free
- PFOS Free
- SVHC Free

Contact Information

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

Web: www.qorvo.com

Tel: 1-844-890-8163

Email: customer.support@qorvo.com

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