

### Product Description

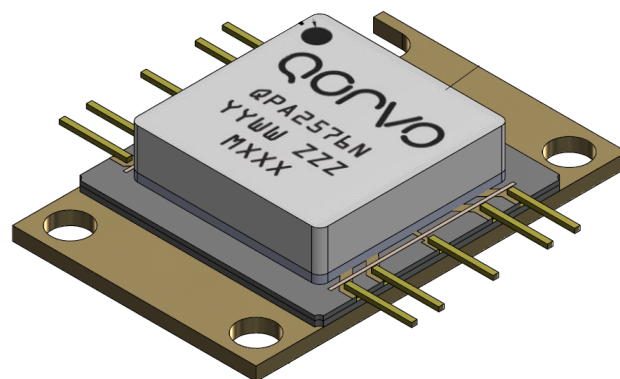
Qorvo's QPA2576N is a wideband power amplifier fabricated on Qorvo's proven 0.25  $\mu\text{m}$  GaN on SiC production technology. Operating from 2.5 to 6 GHz, the QPA2576N achieves 40 W of saturated output power, greater than 36% power-added efficiency and 29 dB small signal gain.

For ideal thermal management and handling, the QPA2576N is offered in a CuW-based flanged packaged and can operate in both CW and pulsed modes.

Both RF ports are fully matched to 50  $\Omega$ , the QPA2576N is ideally suited to support a variety of commercial and defense related applications.

Lead-free and RoHS compliant

Evaluation Boards are available up on request.

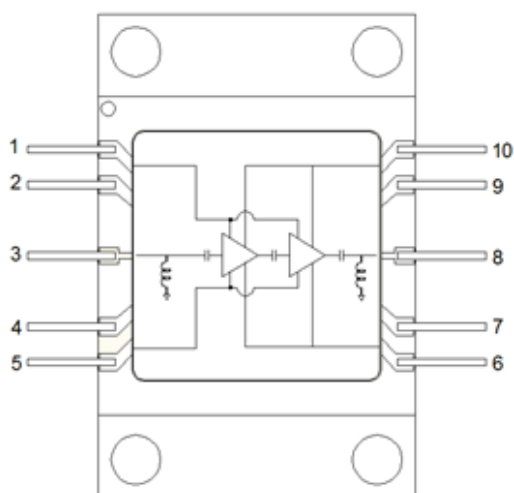


### Product Features

- Frequency Range: 2.5 to 6 GHz
- $P_{\text{SAT}}$ : 46.5 dBm ( $P_{\text{IN}} = 26$  dBm, CW)
- PAE: 36% ( $P_{\text{IN}} = 26$  dBm, CW)
- Small Signal Gain: 29 dB
- Bias:  $V_D = 30$  V,  $I_{DQ} = 1.55$  A,  $V_G = -2.5$  V Typical
- Dimensions: 11.4 x 17.3 x 3.0 mm

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

### Functional Block Diagram



### Applications

- Communications
- Electronic Warfare
- Test Instrumentation
- EMC Amplifier

### Ordering Information

Part	Description
QPA2576N	2.5 to 6.0 GHz 40 W GaN PA



# QPA2576N

## 2.5 to 6.0 GHz 40 W GaN Power Amplifier

### Absolute Maximum Ratings

Parameter	Value / Range
Drain Voltage ( $V_D$ )	40 V
Gate Voltage ( $V_G$ )	-5 to 0 V
Drain Current ( $I_D$ )	5000 mA
Gate Current ( $I_G$ )	-18 to +35 mA
Dissipated Power ( $P_{DISS}$ ) <sup>1</sup>	93 W
Input Power (50 $\Omega$ , 25 °C)	28 dBm
Mounting Temperature (30 seconds)	260 °C
Storage Temperature	-40 to 150 °C

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
Drain Voltage	30 V
Drain Current (quiescent, $I_{DQ}$ )	1550 mA
Drain Current (under drive, $I_D$ )	4300 mA
Gate Voltage	-2.5 V
Operating Temperature Range	-40 to 85 °C

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

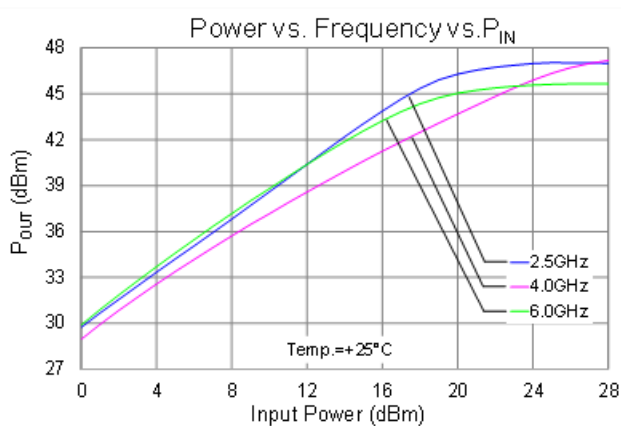
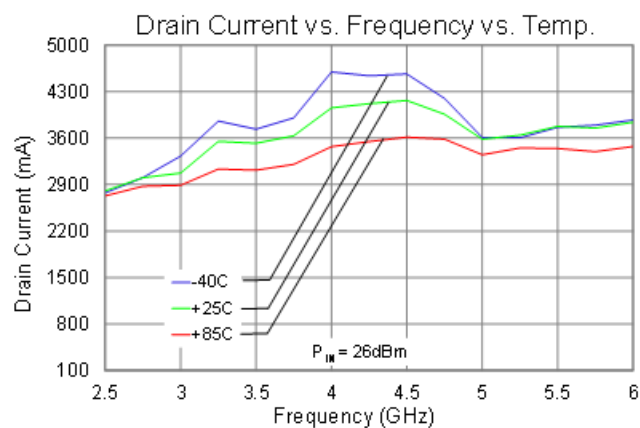
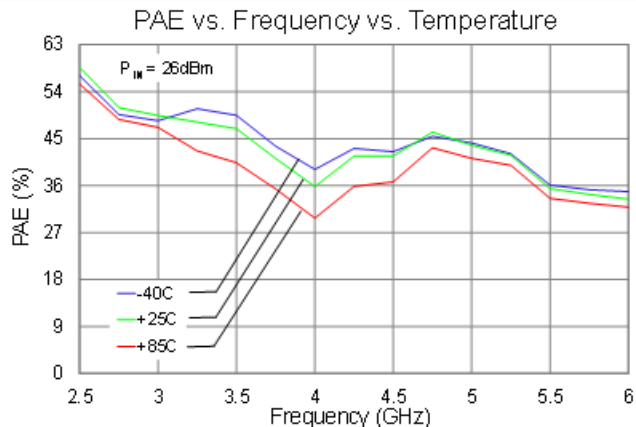
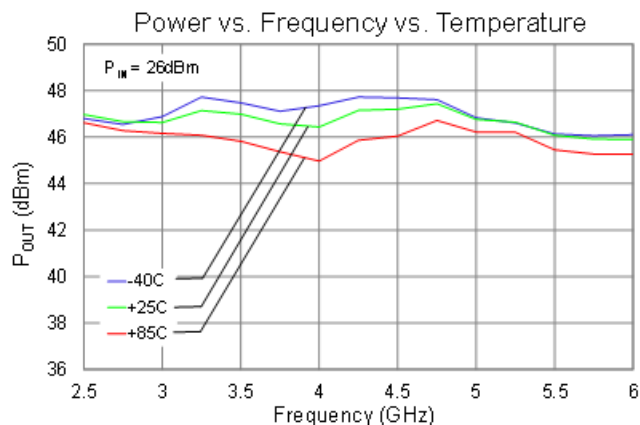
### Electrical Specifications

Test conditions, unless otherwise noted: 25 °C,  $V_D = 30$  V,  $I_{DQ} = 1550$  mA,  $V_G = -2.5$  V typical, CW

Parameter	Min	Typ	Max	Units
Operational Frequency Range	2.5		6.0	GHz
Output Power ( $P_{IN} = 26$ dBm)		46.5		dBm
Power Added Efficiency ( $P_{IN} = 26$ dBm, midband)		36		%
Small Signal Gain		29		dB
Input Return Loss		11		dB
Output Return Loss		13		dB
Small Signal Gain Temperature Coefficient		-0.020		dBm/°C
Output Power Temperature Coefficient		-0.020		dBm/°C

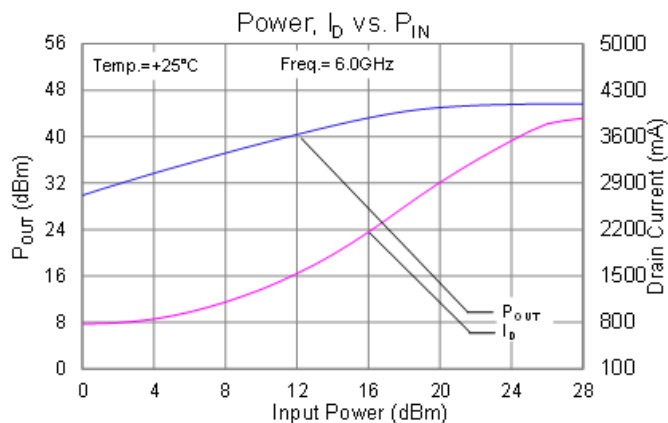
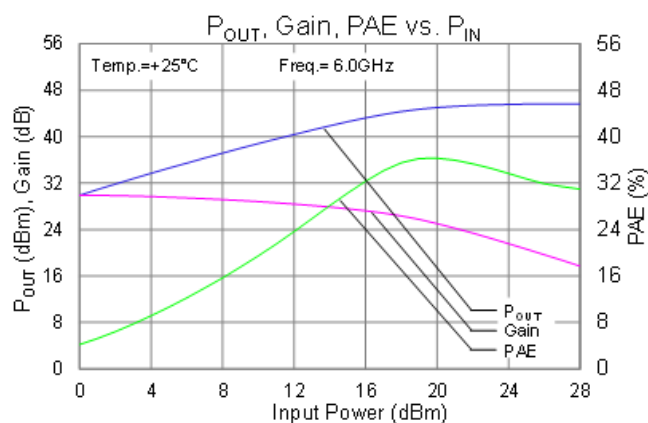
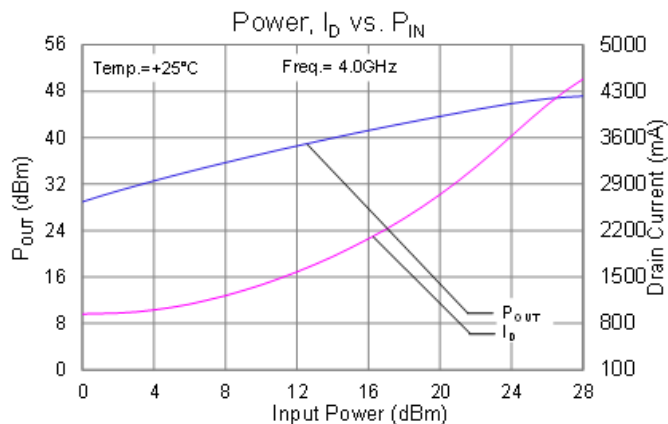
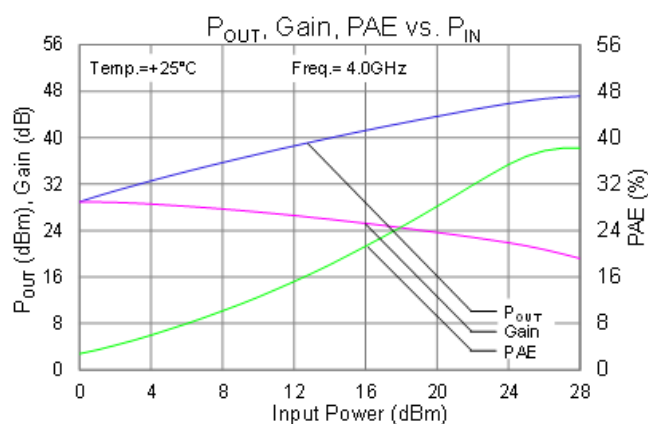
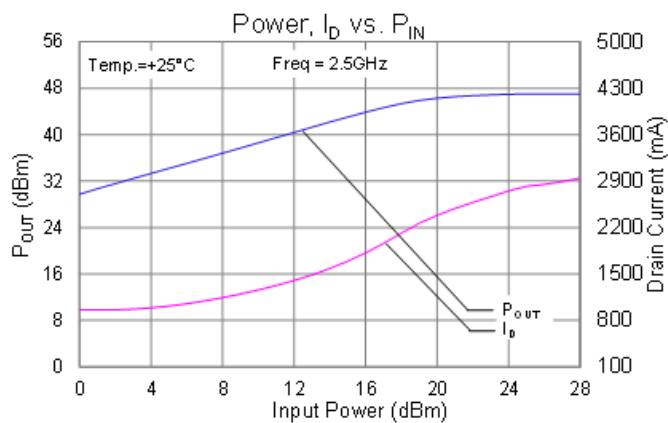
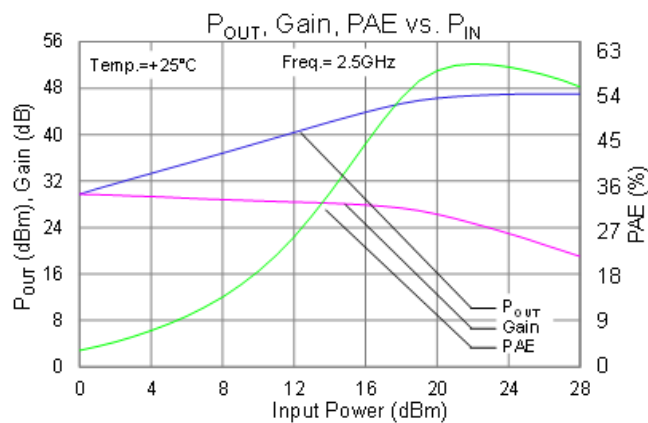
### Performance Plots – Large Signal (CW)

Test conditions unless otherwise noted:  $V_D = 30$  V,  $I_{DQ} = 1550$  mA,  $V_G = -2.5$  V typical, CW



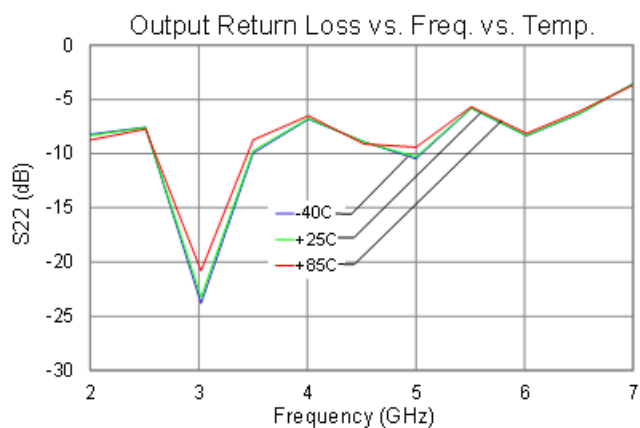
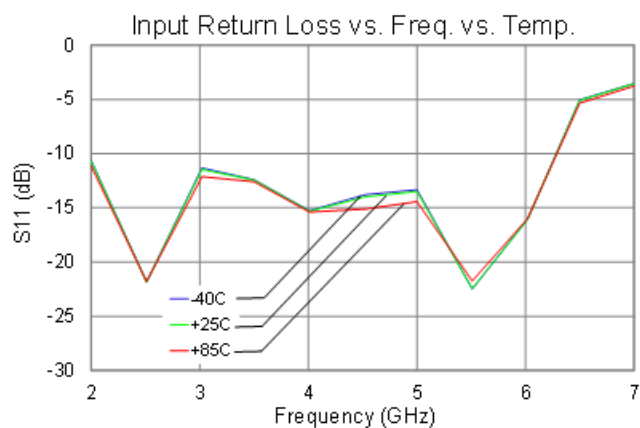
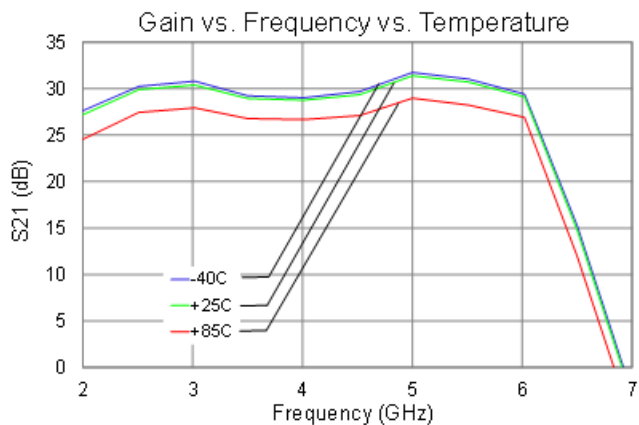
### Performance Plots – Large Signal (CW)

Test conditions unless otherwise noted:  $V_D = 30\text{ V}$ ,  $I_{DQ} = 1550\text{ mA}$ ,  $V_G = -2.5\text{ V}$  typical, CW



### Performance Plots – Small Signal

Test conditions unless otherwise noted:  $V_D = 30$  V,  $I_{DQ} = 1550$  mA,  $V_G = -2.5$  V typical, CW





# QPA2576N

## 2.5 to 6.0 GHz 40 W GaN Power Amplifier

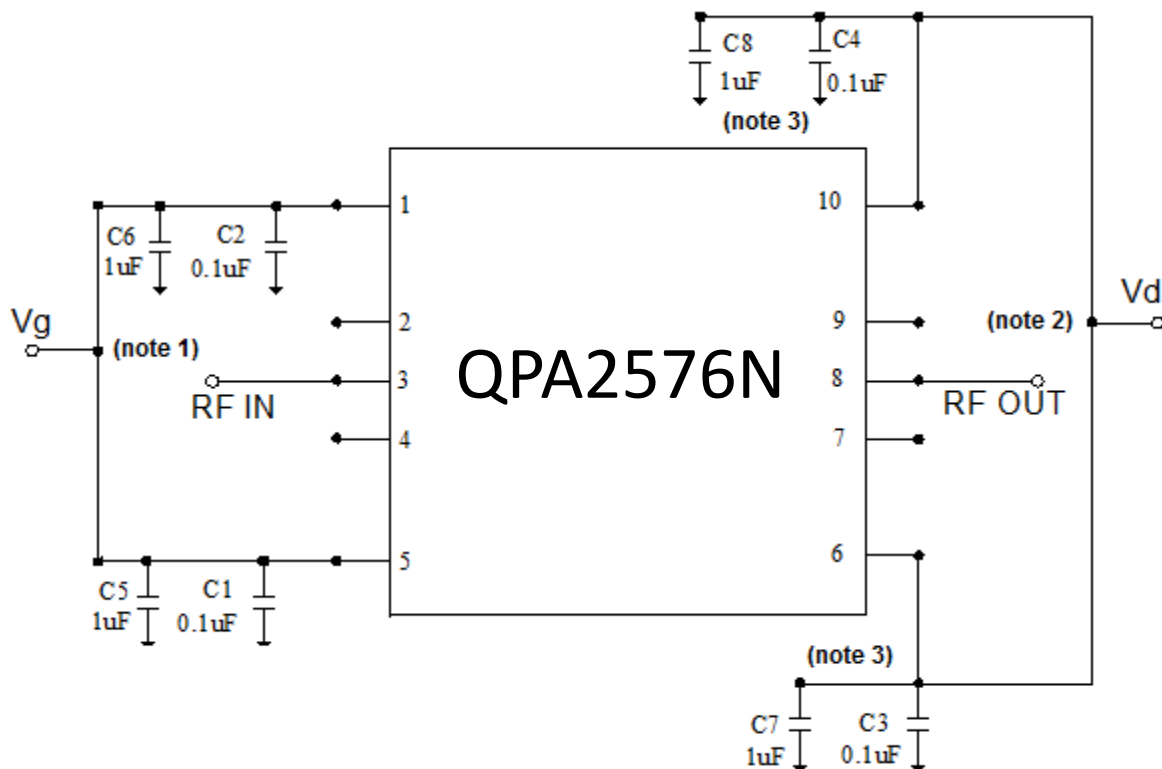
### Thermal and Reliability Information

Parameter	Test Conditions	Value	Units
Thermal Resistance ( $\theta_{JC}$ ) <sup>(1)</sup>	$T_{base} = 85^{\circ}\text{C}$	1.32	$^{\circ}\text{C/W}$
Channel Temperature ( $T_{CH}$ ) (Quiescent)	$V_D = 30\text{ V}$ , $I_{DQ} = 1500\text{ mA}$ , $I_{D\_DRIVE} = 3600\text{ mA}$ , $P_{OUT} = 46\text{ dBm}$ , $P_{DISS} = 68\text{ W}$	175	$^{\circ}\text{C}$

#### Notes:

1. Thermal resistance is measured to the backside of the package.
2. Refer to the following document: [GaN Device Channel Temperature, Thermal Resistance, and Reliability Estimates](#)

## Applications Circuit



### Notes:

1.  $V_G$  must be biased from both sides (pins 1 and 5).
2.  $V_D$  must be biased from both sides (pins 6 and 10).
3. Remove large capacitors for pulsed drain operation.

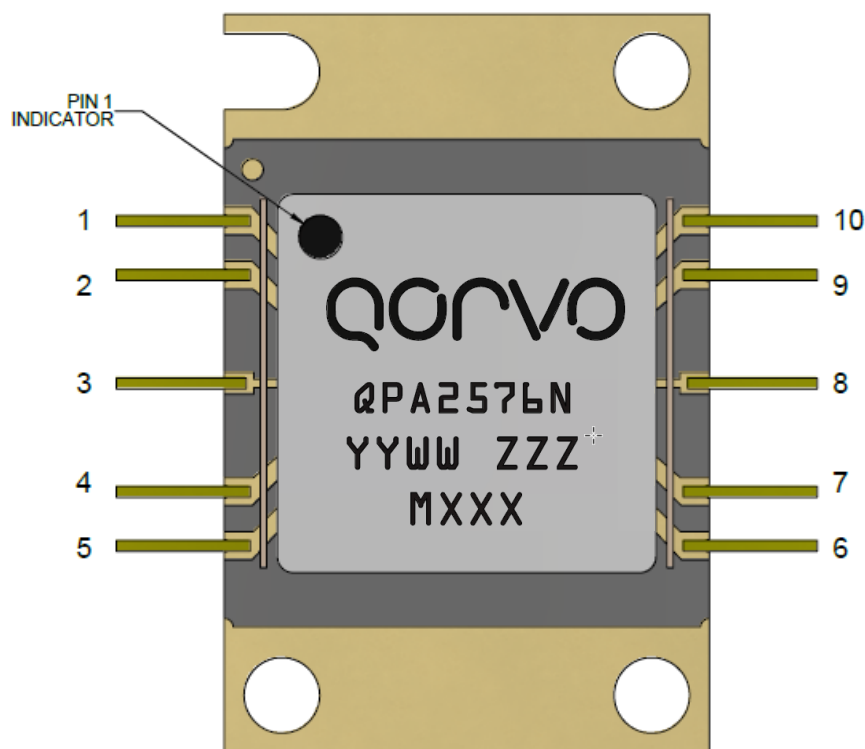
## Bias Up Procedure

1. Set  $I_D$  limit to 4500 mA,  $I_G$  limit to 20 mA
2. Set  $V_G$  to -5.0 V
3. Set  $V_D$  +30 V
4. Adjust  $V_G$  more positive until  $I_{DQ} = 1550$  mA ( $V_G \sim -2.5$  V Typical)
5. Apply RF signal

## Bias Down Procedure

1. Turn off RF signal
2. Reduce  $V_G$  to -5.0 V. Ensure  $I_{DQ} \sim 0$  mA
3. Set  $V_D$  to 0 V
4. Set  $V_G$  to 0 V

#### Pin Description



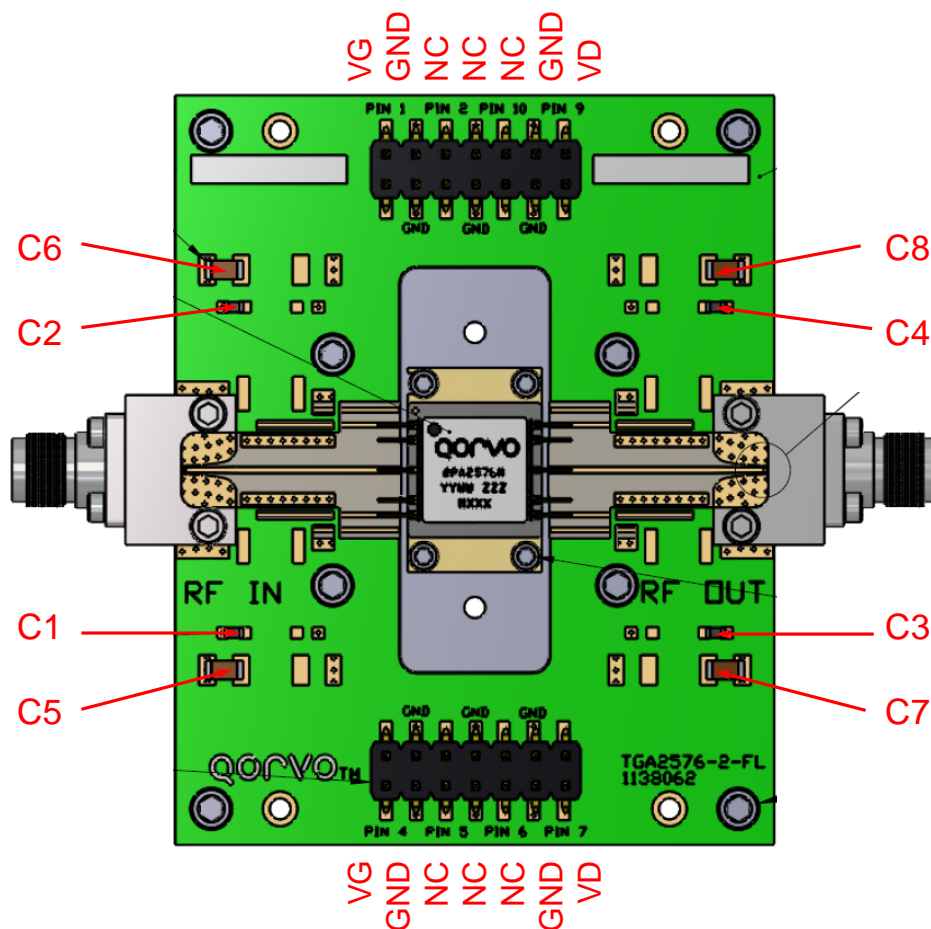
Pin Number	Symbol	Description
1, 5	$V_G$	Gate voltage <sup>(1)</sup>
2, 4, 7, 9	N/C	No internal connection; may be grounded or left open on PCB
3	RF IN	Input; matched to 50 $\Omega$ ; DC blocked and shorted to ground
6, 10	$V_D$	Drain voltage <sup>(2)</sup>
8	RF OUT	Output; matched to 50 $\Omega$ ; DC blocked and shorted to ground
	(Package Base)	RF and DC ground

#### Notes:

1. Bias network is required; must be biased from both sides (Pins 1 and 5); see Application Circuit on page 7 as an example.
2. Bias network is required; must be biased from both sides (Pins 6 and 10); see Application Circuit on page 7 as an example



### Evaluation Board and Mounting Detail

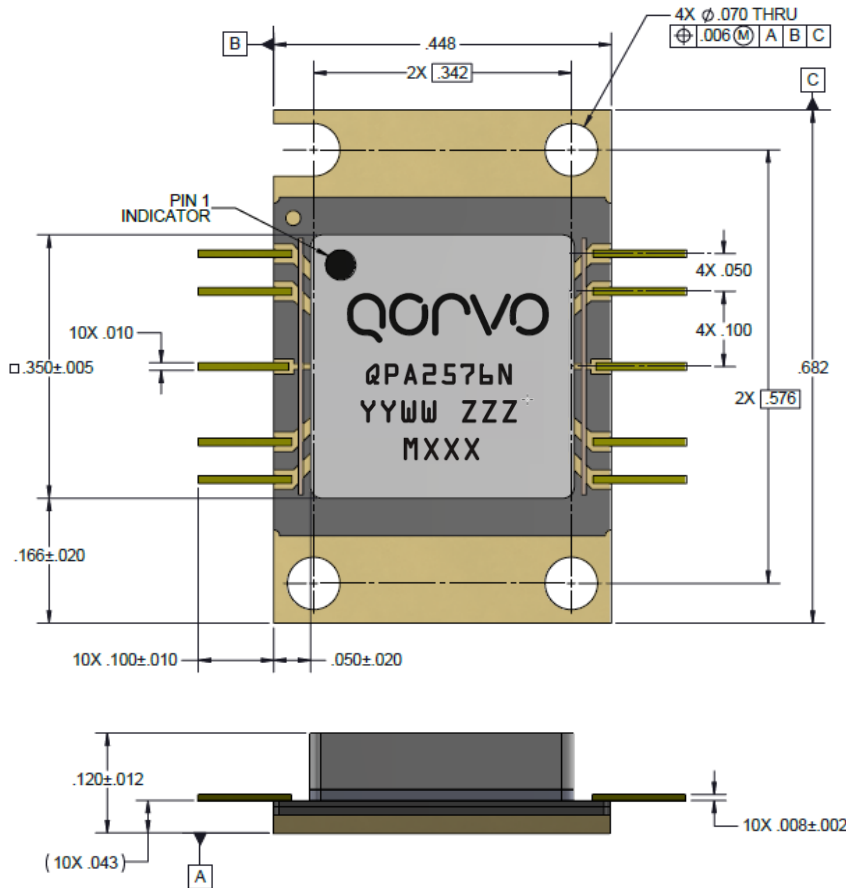


RF Layer is 0.008" thick Rogers Corp. RO4003C ( $\epsilon_r = 3.35$ ). Metal layers are 0.5 oz. copper. Note: Can remove C3, C4, C7, C8 for pulsed operation.

### Bill of Materials

Reference Des.	Value	Description	Manuf.	Part Number
C1 – C4	0.1 $\mu$ F	CAP, 0.1 uF, 10%, 50 V, X7R, 0603	Various	
C5 – C8	1 $\mu$ F	CAP, 1 uF, 5% 50 V, X7R, 1206	Various	
J1, J2	2.92 mm	CONNECTOR, FEMALE, ENDLAUNCH	Southwest Microwave	1092-01A-5

### Mechanical Information



#### NOTES:

1. PACKAGE; CERAMIC ON METAL FLANGE
2. THE PART IS EPOXY SEALED
3. ALL METALIZED FEATURES ARE GOLD PLATED
4. UNLESS SPECIFIED OTHERWISE, DIMENSIONS ARE IN INCHES
5. UNLESS SPECIFIED OTHERWISE, TOLERANCES ARE  $\pm 0.005$

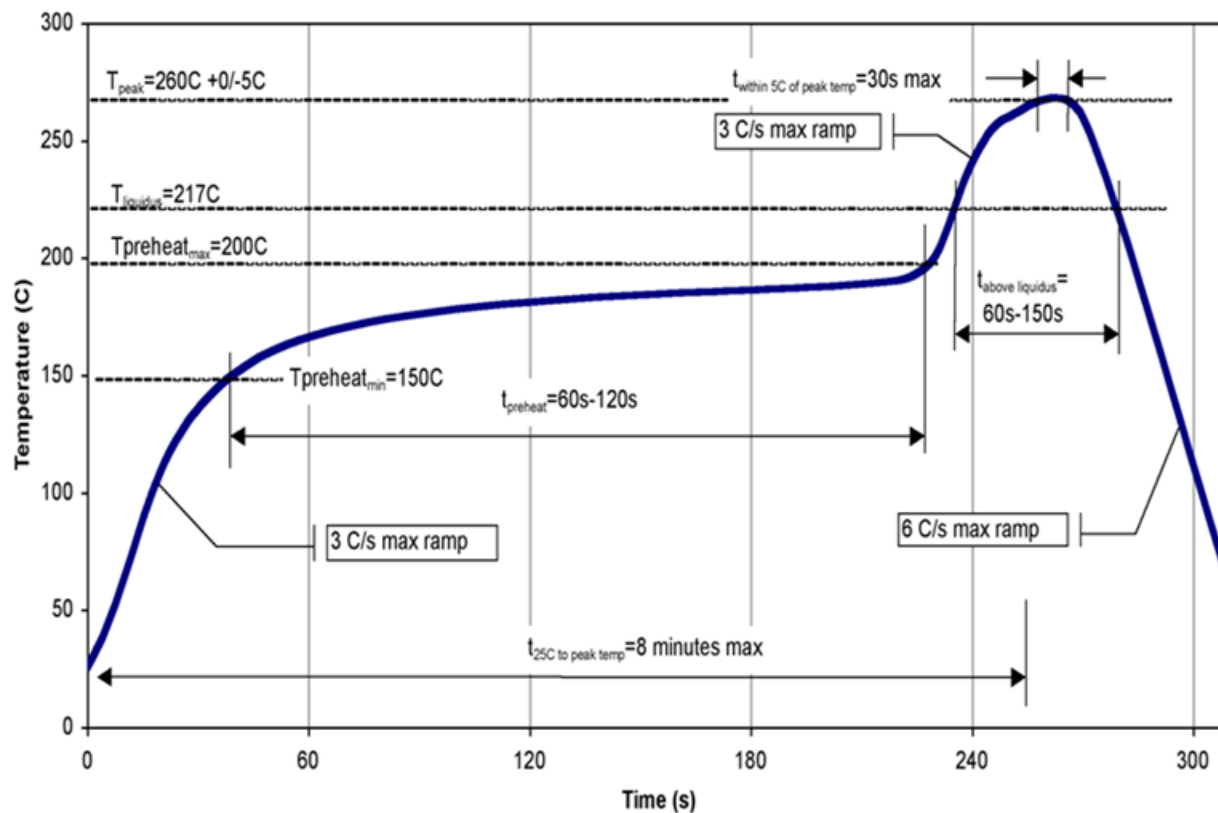
#### MARKING:

1. PART NUMBER: QPA2576N
2. YEAR/WEEK/LOT CODE: YYWW ZZZ
3. BATCH ID: MXXX

### Assembly Notes

1. 0-80 screws are recommended for mounting the QPA2576N to the heat sink
2. To improve the thermal and RF performance, attach a heat sink to the bottom of the board and apply thermal compound or 4 mils indium shim between the heat sink and the package
3. Apply solder to each pin of the QPA2576N
4. The use of no-clean solder to avoid washing after soldering is recommended.

## Recommended Soldering Temperature Profile



## Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1B	ANSI/ESD/JEDEC JS-001
MSL – Moisture Sensitivity Level	Level 5A	IPC/JEDEC J-STD-020



Caution!  
ESD-Sensitive Device

## Solderability

Compatible with the latest version of J-STD-020 Lead free solder, 260 °C. The use of no-clean solder to avoid washing after soldering is recommended.

## RoHS Compliance

This product is compliant with the 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
- Qorvo Green

## Contact Information

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

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

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

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

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