Spatium™ QPB3238N

32 – 38 GHz Ka-Band GaN Amplifier

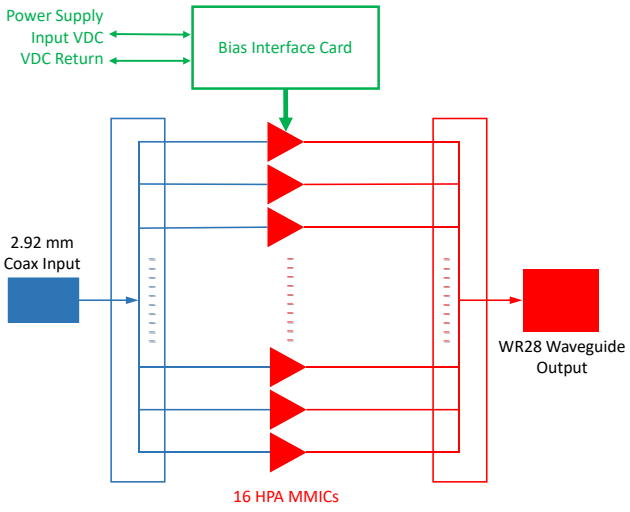
Product Description

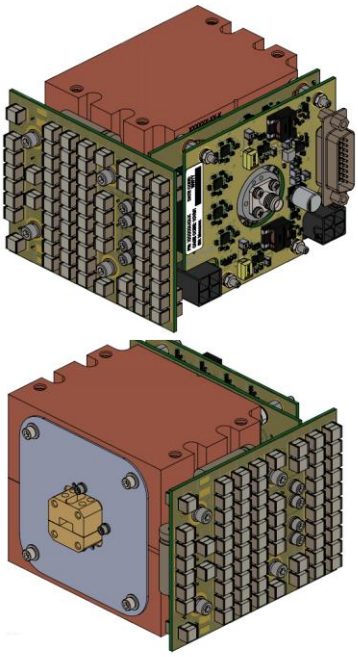
An excellent alternative to traveling wave tube amplifiers, Qorvo's Spatium™ QPB3238N is a solid state, spatial-combining amplifier with an operating range of 32–38 GHz. With its maximum performance in output power, gain, power added efficiency, and power flatness, this Spatium is the ideal building block for Satcom BUC's and other millimeter-wave subsystems with wide-ranging applications.

Qorvo's patented and field-proven Spatium combining technology provides unprecedented Solid-State Power Amplifier (SSPA) performance in a rugged, compact size and weight which reduces total cost of ownership compared to alternative technologies. This product offering combines Qorvo's market leadership in GaN technology and Ka-band MMIC design along with our high-count combining techniques for a best in class solution to power amplification.

The QPB3238N is equipped with an integrated bias card, which allows for convenience of operation, reducing electrical losses in the bias networks, and weight reduction over using a separate bias card. It provides individualized bias settings for each amplifier blade in the Spatium SSPA.

Functional Block Diagram





Input (T) and Output (B)

Product Features

- Frequency Range: 32 – 38 GHz
- Saturated Output Power: 51.6 dBm (P_{IN} = 43 dBm)
- Large Signal Gain: 8.6 dB (P_{IN} = 43 dBm)
- Solid State MMIC Reliability
- Multi-Element Redundancy
- Instant On (no warm-up)
- Integrated Bias Card

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

Applications

- TWTA Replacement

Ordering Information

Part No.	Description
QPB3238N	32 – 38 GHz Spatium™ Amplifier

Absolute Maximum Ratings

Parameter	Value / Unit
Prime Power (V_{DC})*	29.5 V
Drain Current (I_{D_DRIVE})	45 A
Load VSWR	3:1
Input Power (CW, VSWR 1.5:1, 25 °C)	43 dBm
Operating Temperature**	–40 to +85 °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.

* Rating for GaN Process
** Refers to outside clamp surface temperature

Recommended Operating Conditions

Parameter	Value / Unit
Drain Voltage (V_D) (operation above 24 V is not recommended)	24 V
Quiescent Drain Current (I_{DQ})	5 A
Operating Drain Current (I_D)	35 A
Operating Temperature* (CW)	–40 to +43 °C
Operating Temperature* (Duty Cycle ≤ 90%)	–40 to +55 °C
Operating Temperature* (Duty Cycle ≤ 78%)	–40 to +71 °C

* Refers to outside clamp max/min surface temperature. 2-sided cooling required.

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

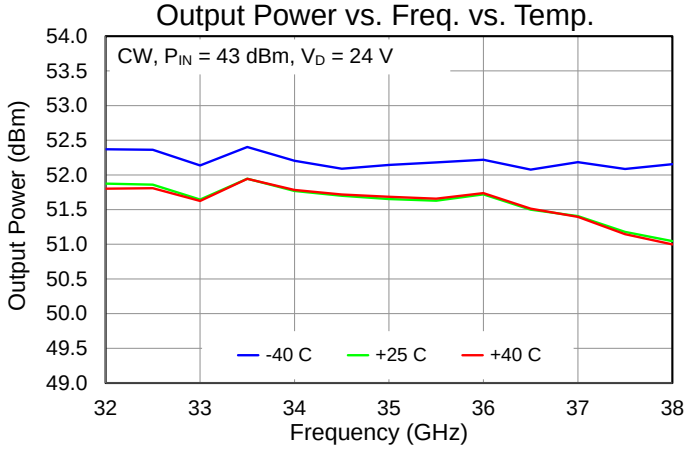
Electrical Specifications

Parameter	Min	Typ	Max	Units
Frequency	32		38	GHz
Output Power (CW, P_{IN} = 43 dBm)		51.6		dBm
Power Gain (CW, P_{IN} = 43 dBm)		8.6		dB
Gain Flatness vs Freq. (CW, P_{IN} = 43 dBm)		± 0.3		dB
Efficiency (CW, P_{IN} = 43 dBm)		17.4		%
Rise/Fall Time (PW=500 ns, F=35 GHz, P_{IN}=43 dBm)				
−40 °C		15.6 / 18.4		ns
+25 °C		15.2 / 20.8		ns
+55 °C		15.6 / 20.8		ns
+75 °C		17.2 / 26.8		ns
Input Return Loss (CW)		12		dB
DC Power (CW, P_{IN} = 43 dBm, average)		834		W
Input RF Interface		2.92 mm (F) Coaxial Connector		
Output RF Interface		WR-28 Waveguide		
Weight: Amplifier + Bias Card		6.1 (2.77)		lbs. (kg)
Dimensions: Amplifier + Bias Card (L) x (W) x (H)		3.94 x 2.91 x 3.85		inches
		100 x 74 x 98		millimeters
Test conditions unless otherwise noted: V_{DC} = 24 V, I_{DQ} = 5 A, CW, T = 25 °C				

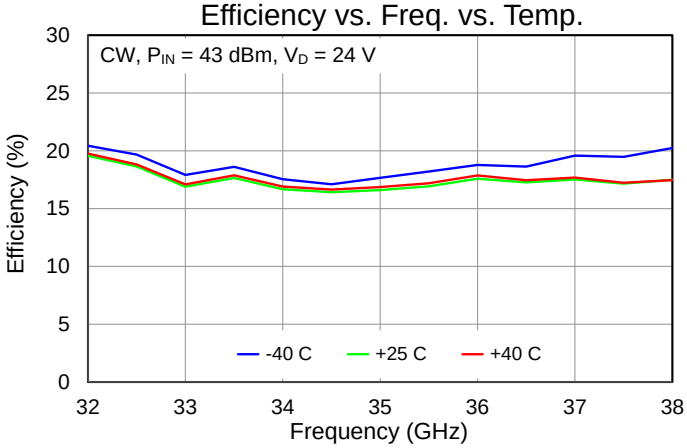
Typical Performance – Large Signal (CW)

Conditions unless otherwise specified: V_D = 24 V, I_{DQ} = 5 A, P_{IN} = 43 dBm, V = 24 V

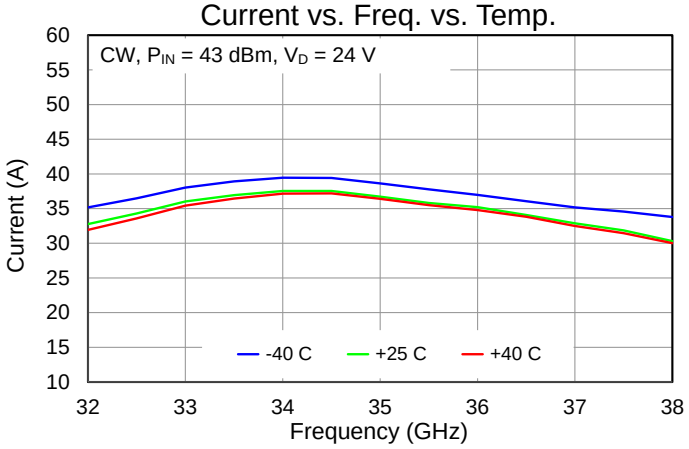
Output Power vs. Freq. vs. Temp.



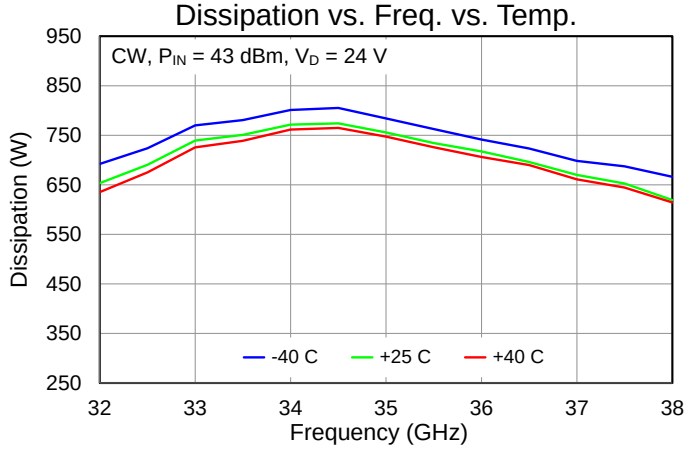
Efficiency vs. Freq. vs. Temp.



Current vs. Freq. vs. Temp.

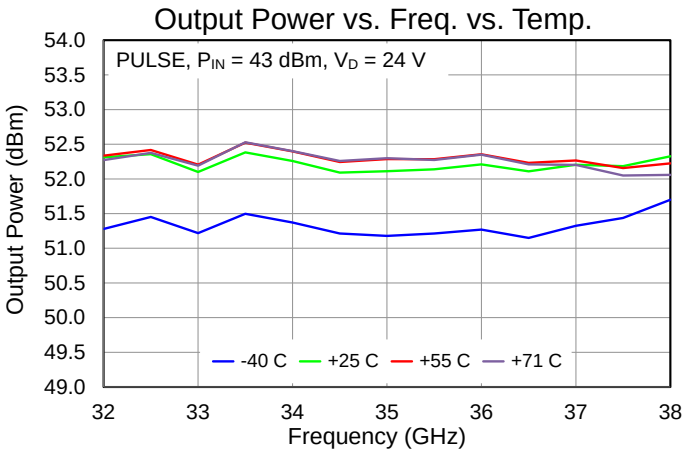


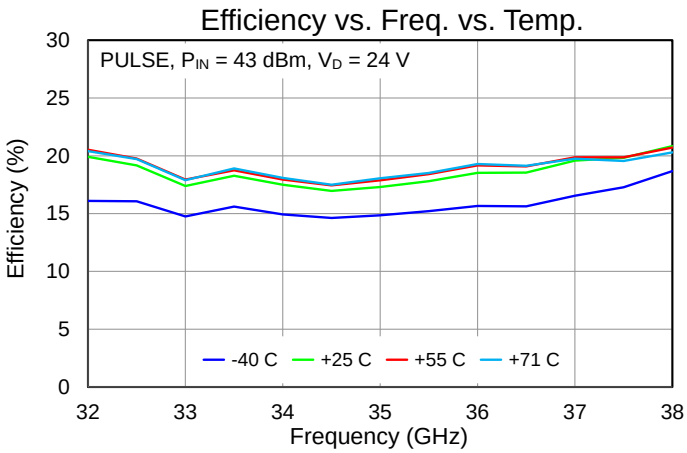
Dissipation vs. Freq. vs. Temp.

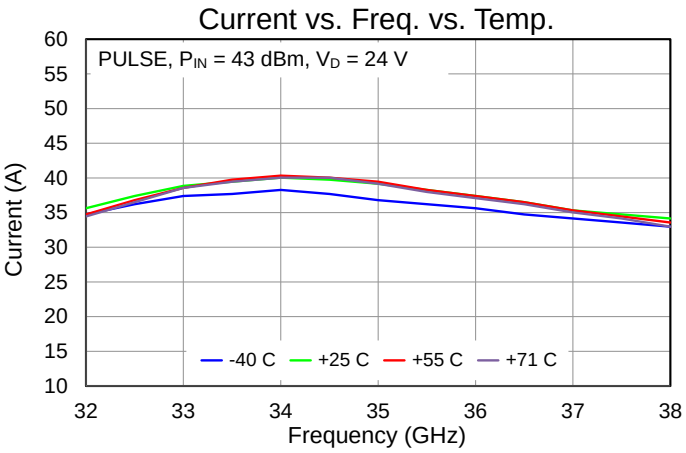


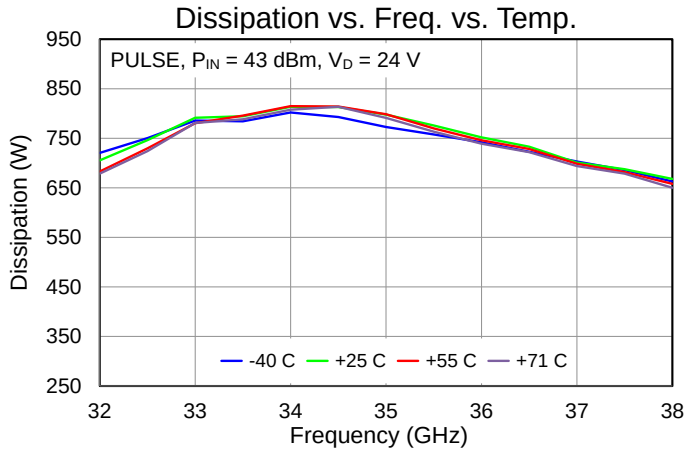
Typical Performance – Large Signal (Pulsed)

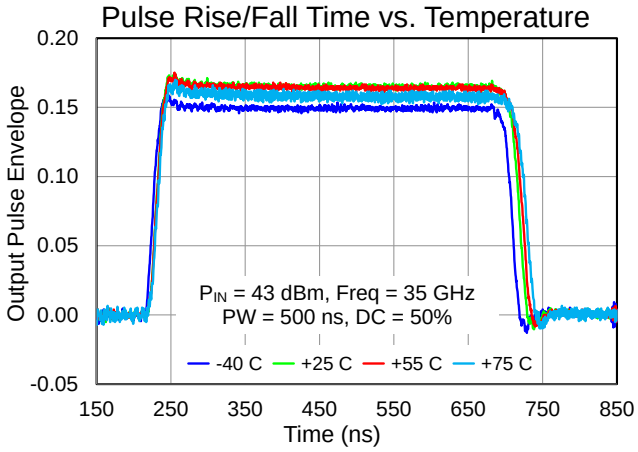
Conditions unless otherwise specified: V_D = 24 V, I_{DQ} = 5 A, P_{IN} = 43 dBm, V = 24 V, PW = 9 us, DC = 12%





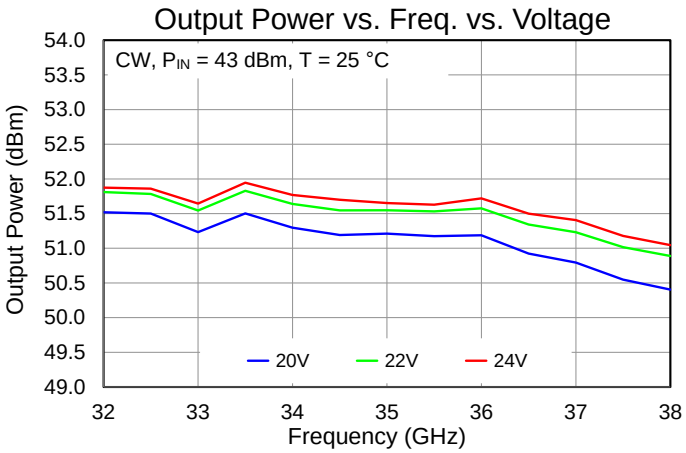


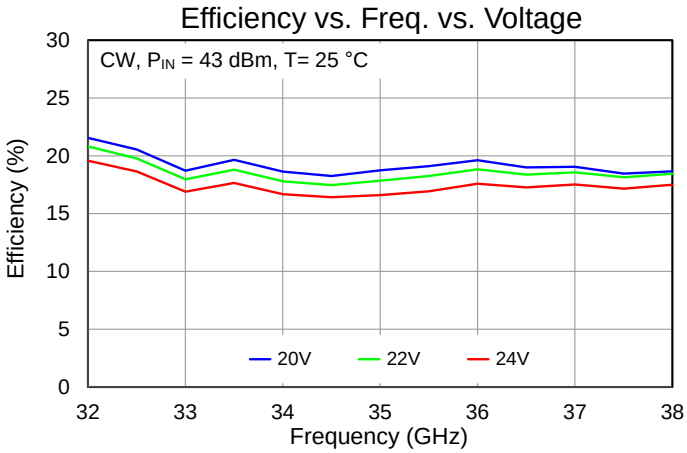


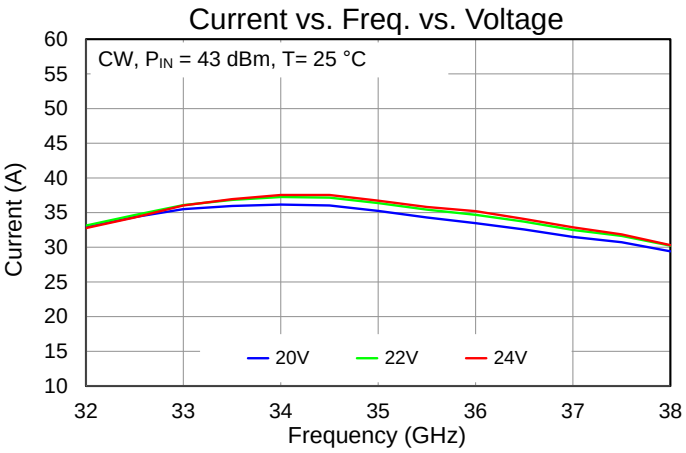


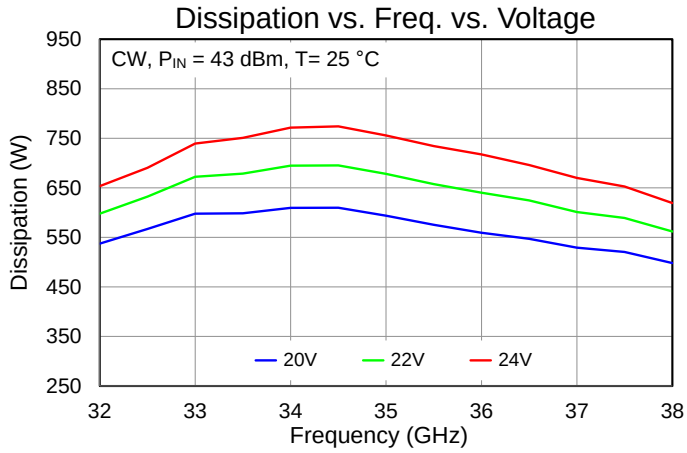
Typical Performance – Large Signal (CW)

Conditions unless otherwise specified: V_D = 24 V, I_{DQ} = 5 A, T = 25 °C, P_{IN} = 43 dBm



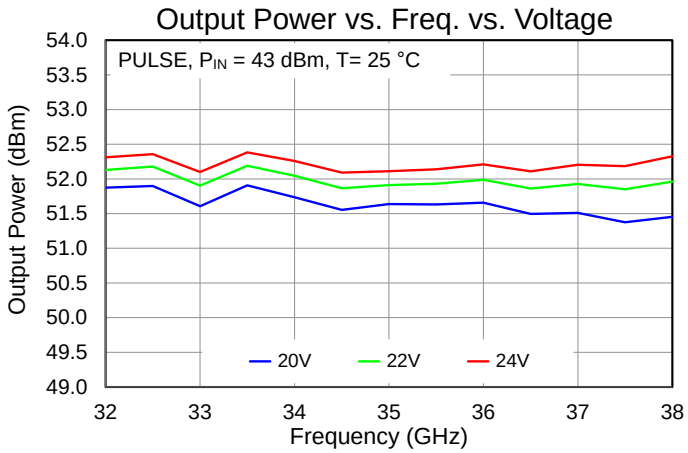


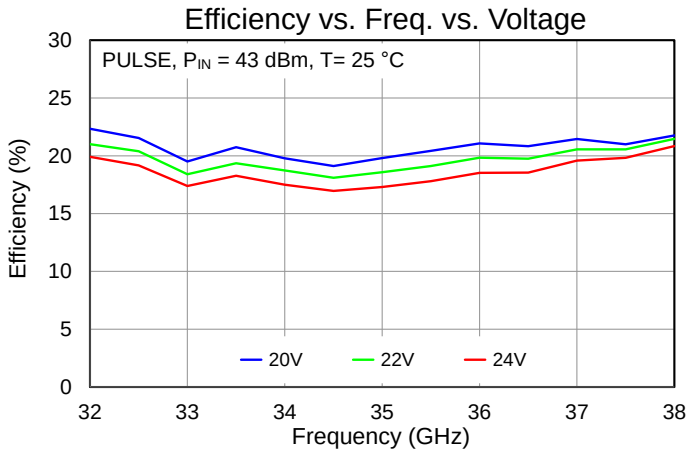


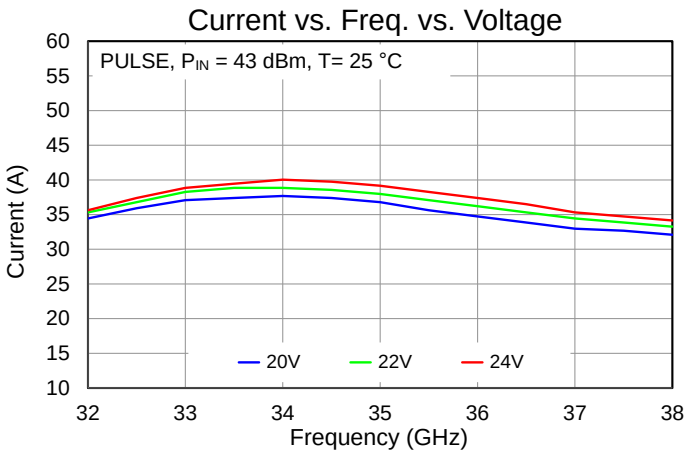


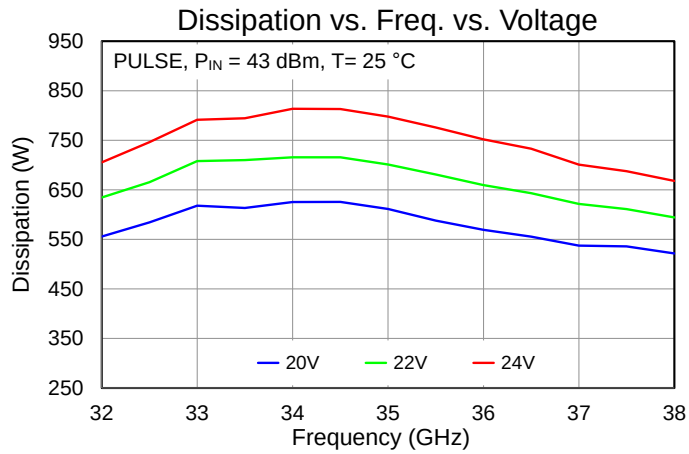
Typical Performance – Large Signal (Pulsed)

Conditions unless otherwise specified: V_D = 24 V, I_{DQ} = 5 A, T = 25 °C, P_{IN} = 43 dBm, PW = 9 us, DC = 12%



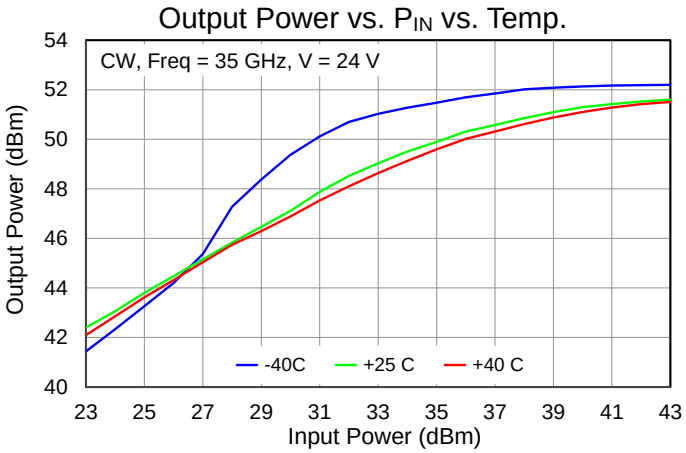


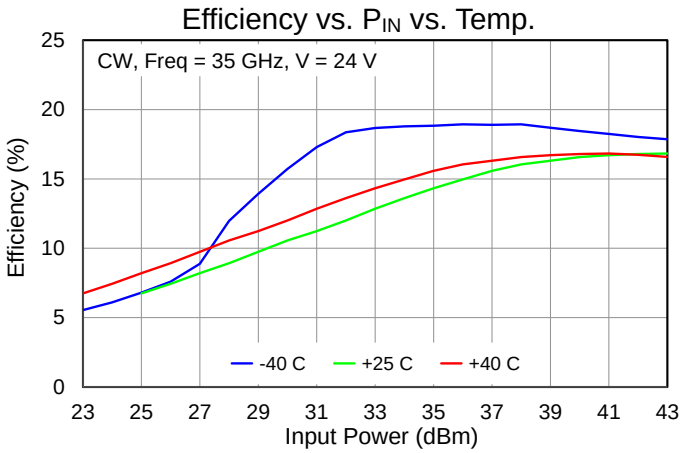


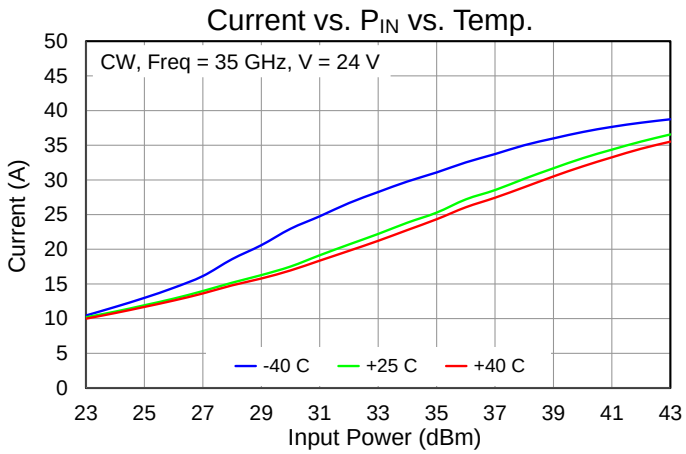


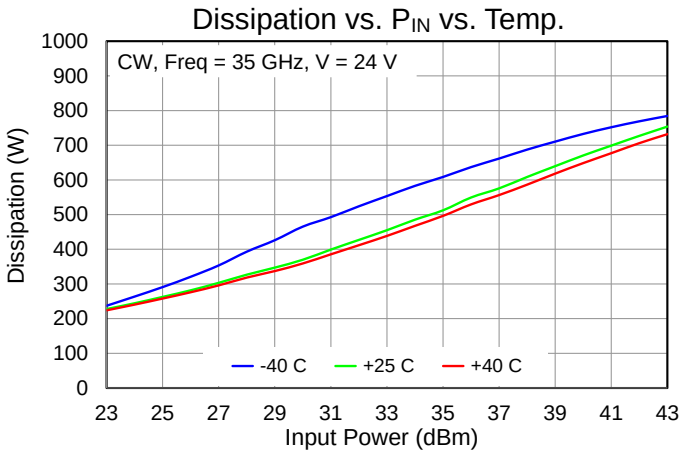
Typical Performance – Large Signal Drive Up (CW)

Conditions unless otherwise specified: V_D = 24 V, I_{DQ} = 5 A, CW



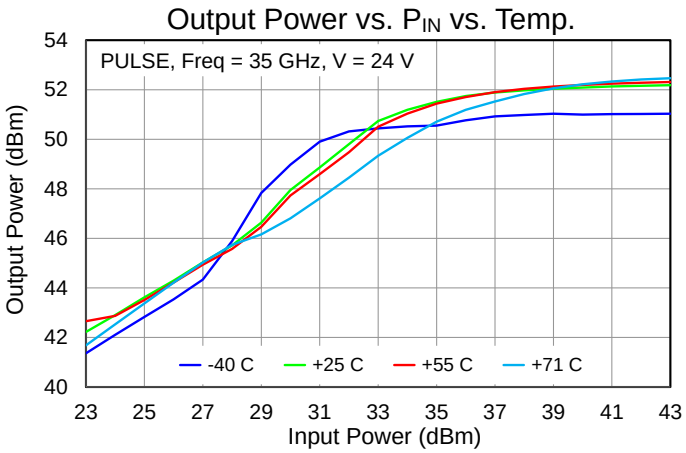


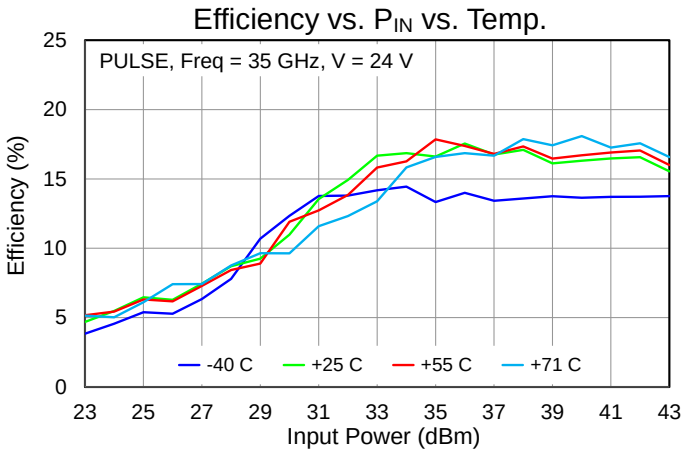


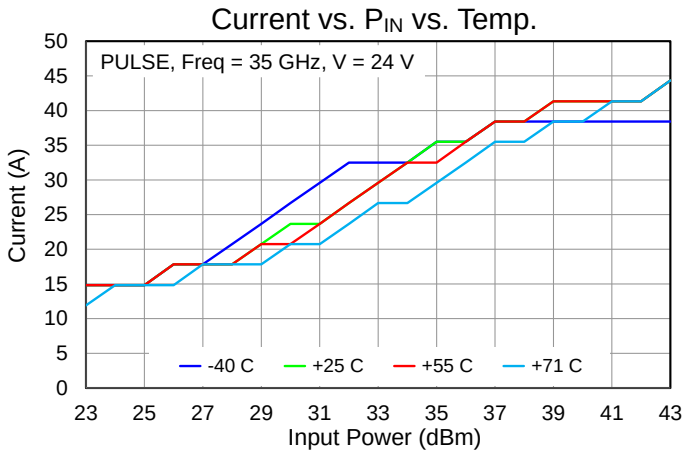


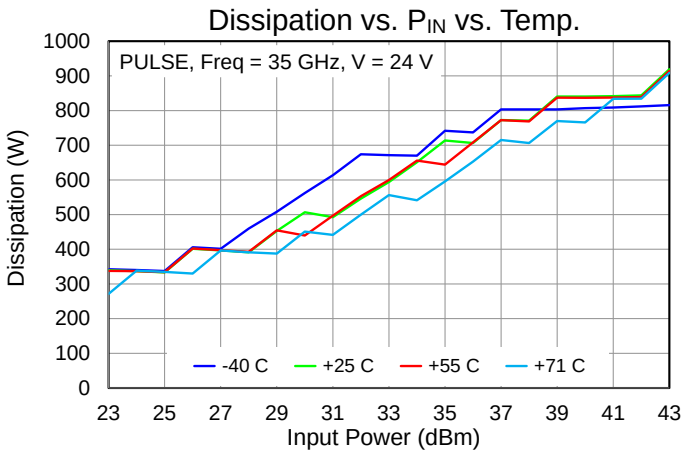
Typical Performance – Large Signal Drive Up (Pulsed)

Conditions unless otherwise specified: V_D = 24 V, I_{DQ} = 5 A, V = 24 V, PW = 9 us, DC = 12%



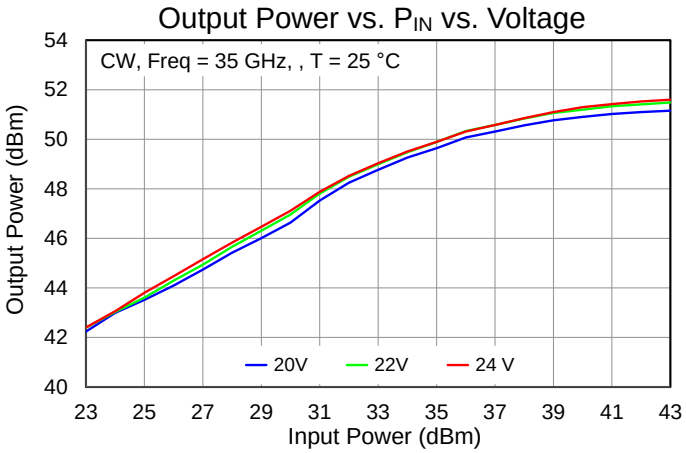


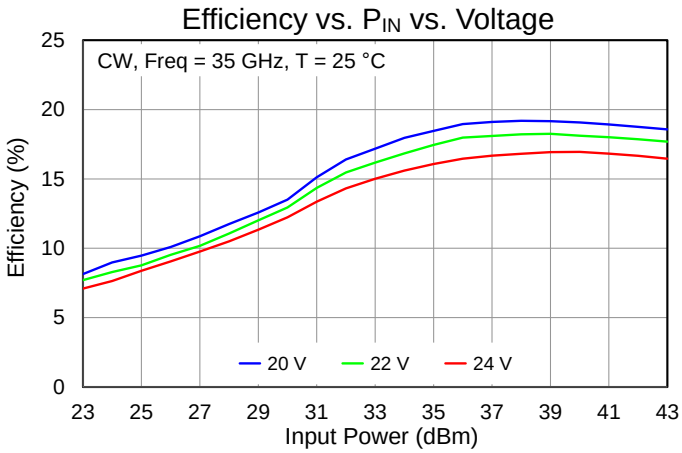


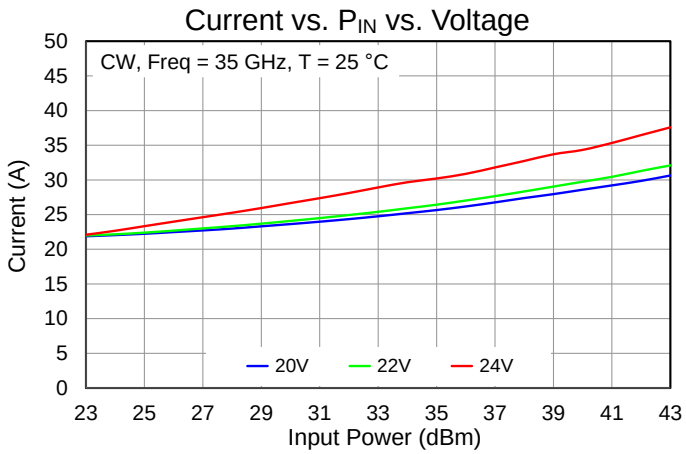


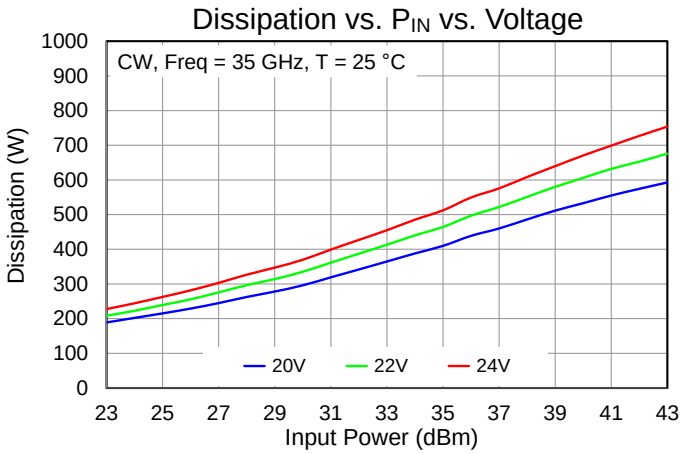
Typical Performance – Large Signal Drive Up (CW)

Conditions unless otherwise specified: V_D = 24 V, I_{DQ} = 5 A, T = 25 °C



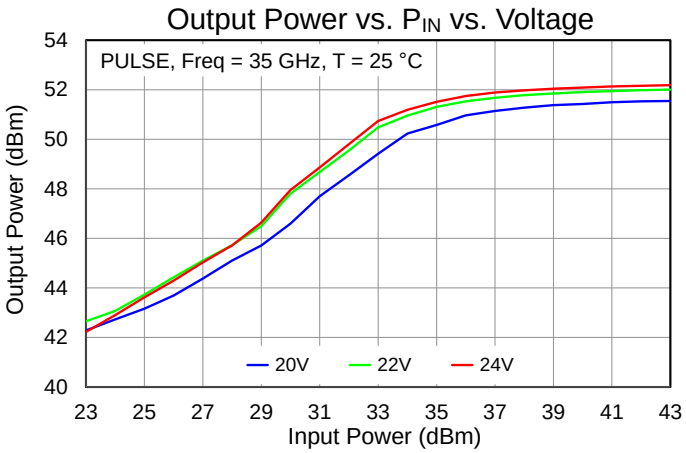


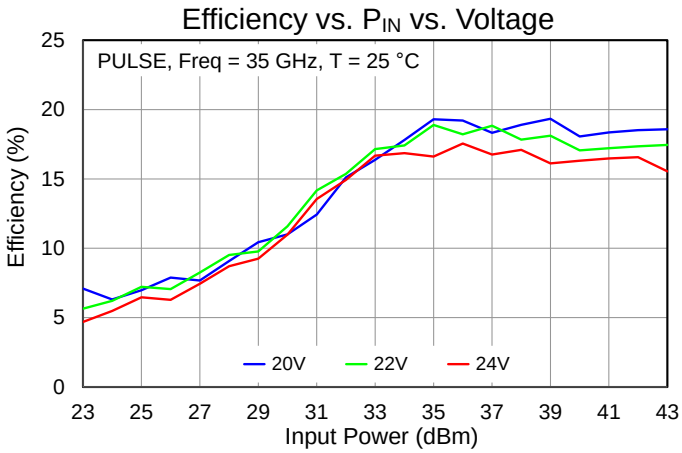


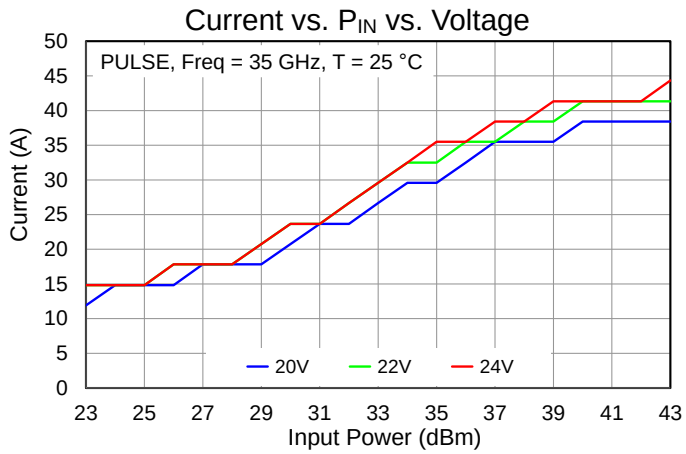


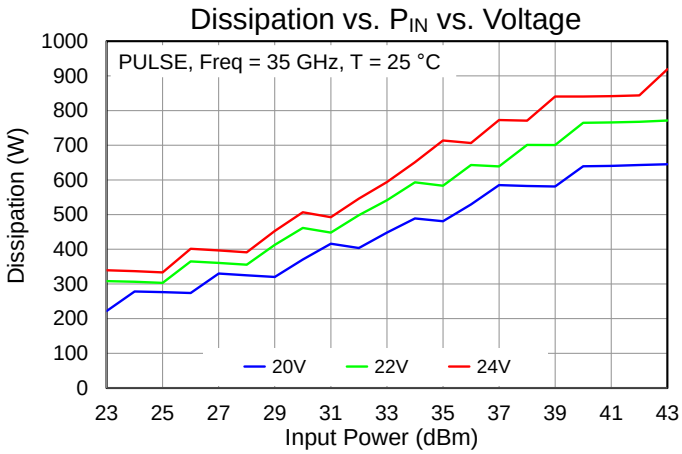
Typical Performance – Large Signal Drive Up (Pulsed)

Conditions unless otherwise specified: V_D = 24 V, I_{DQ} = 5 A, T = 25 °C, PW = 9 us, DC = 12%



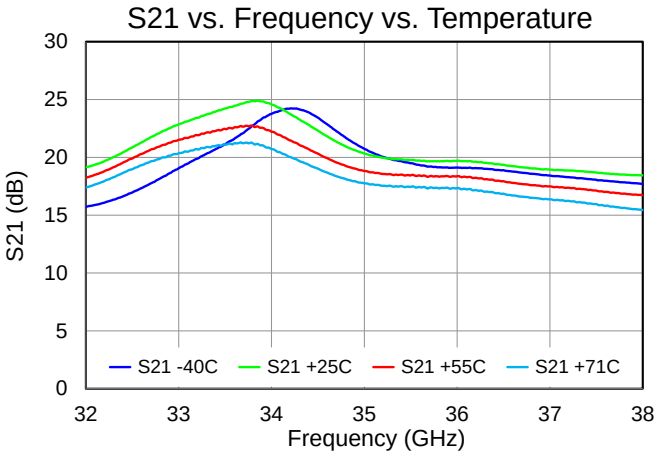


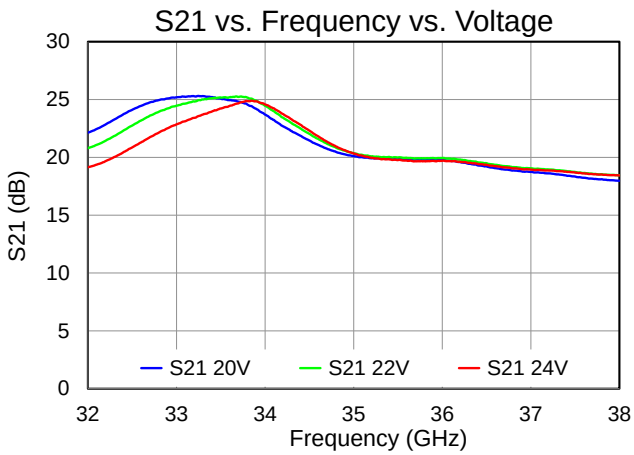


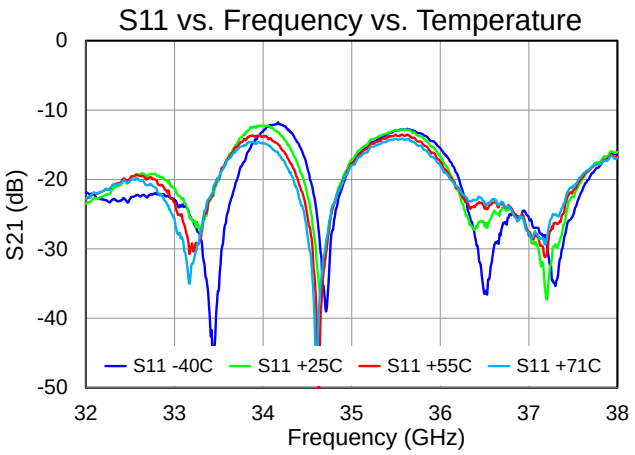


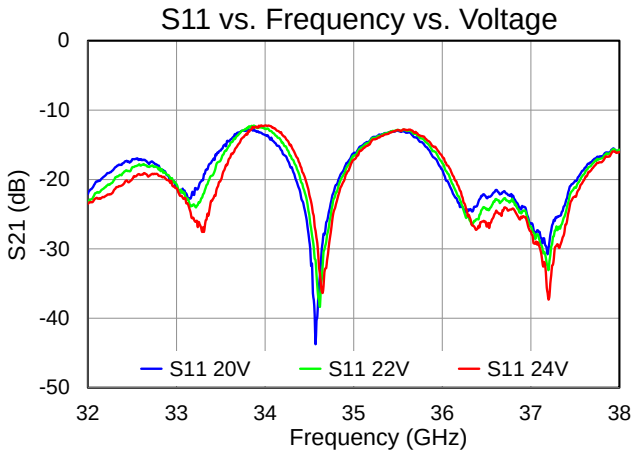
Typical Performance – Small Signal

Conditions unless otherwise specified: V_D = 24 V, I_{DQ} = 5 A, T = 25 °C, CW





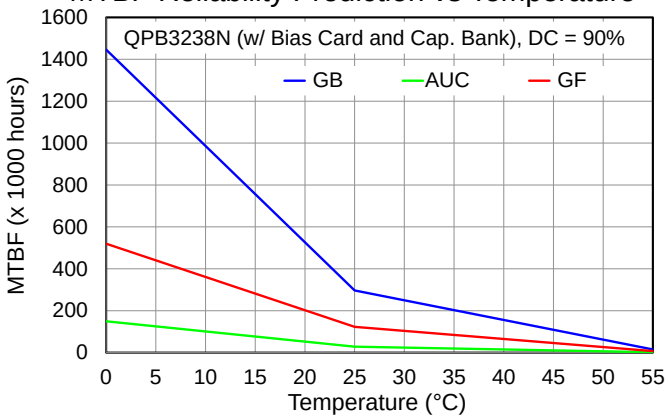




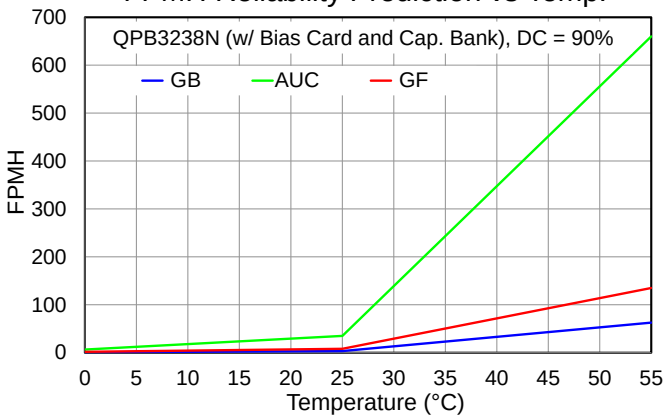
Reliability Information

Conditions unless otherwise specified: V_D = 24 V, I_{DQ} = 5 A, P_{IN} = 43 dBm

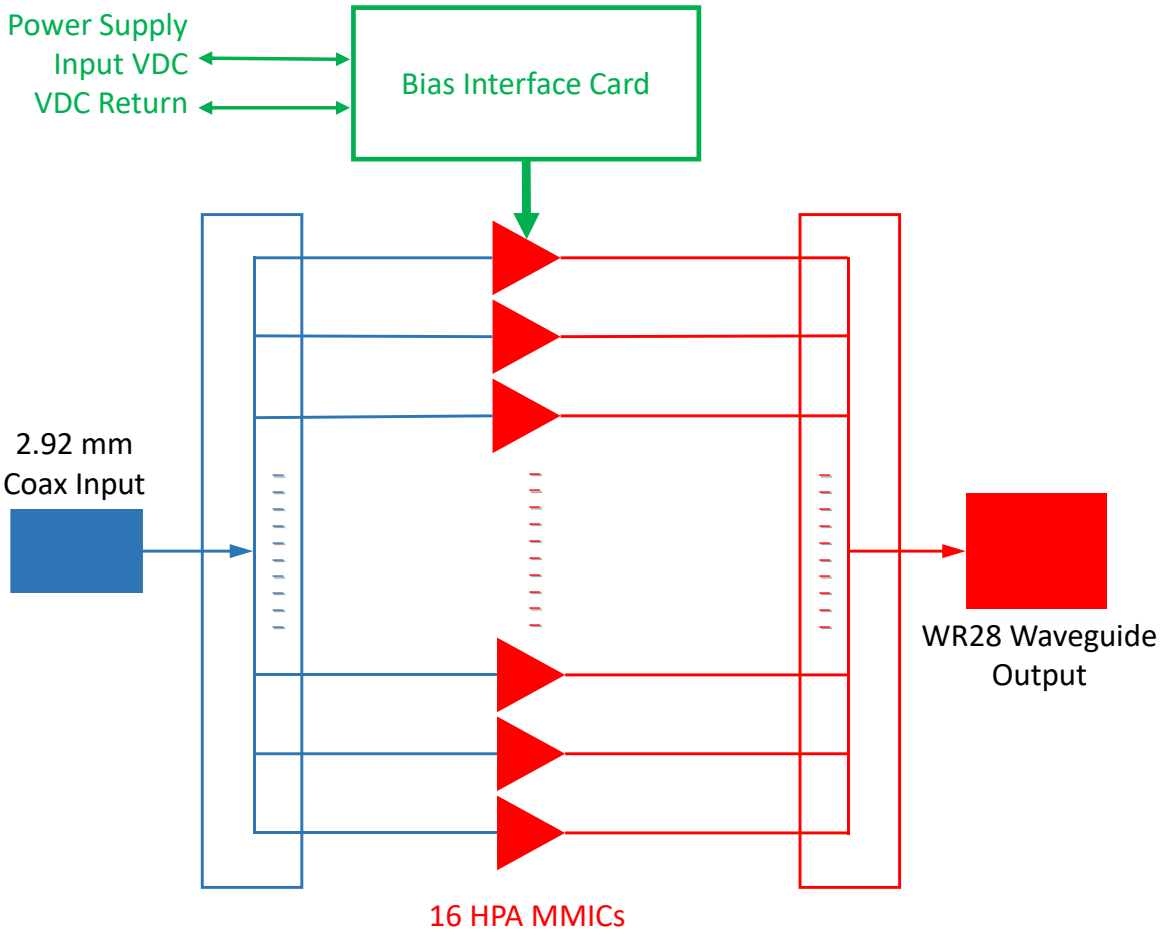
MTBF Reliability Prediction vs Temperature



FPMH Reliability Prediction vs Temp.

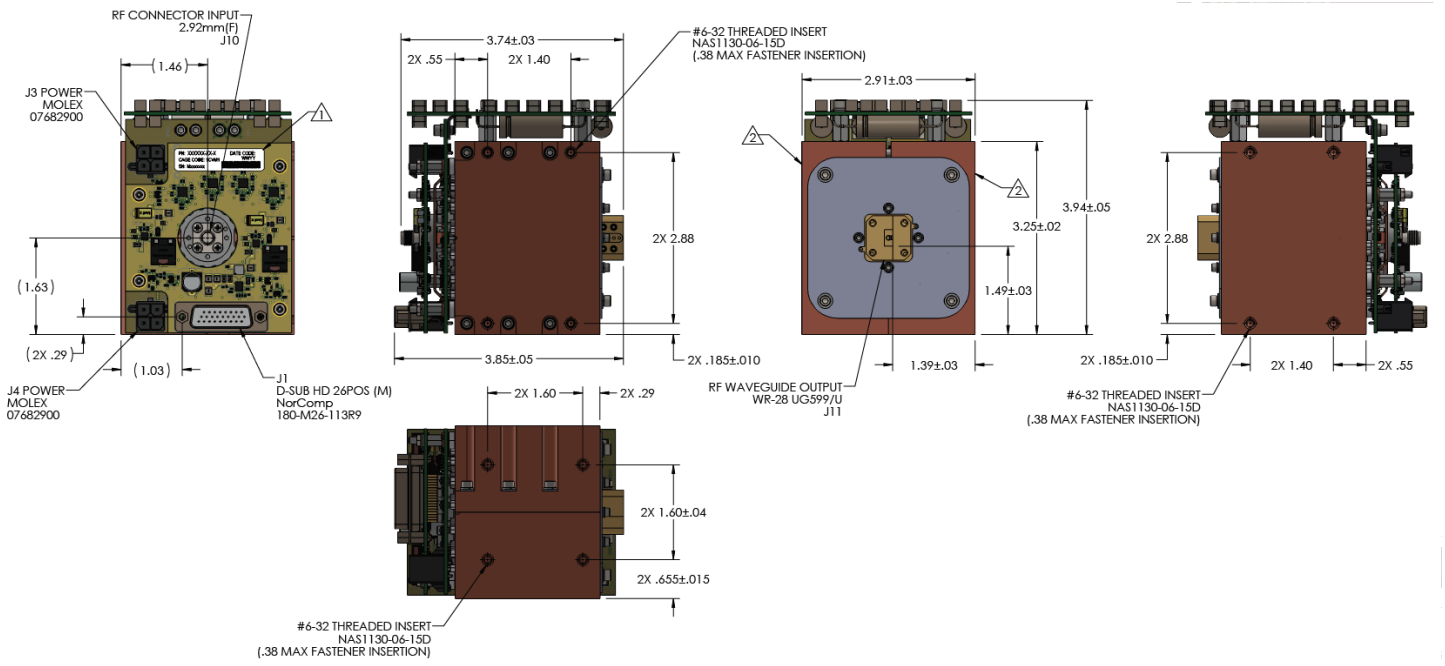


Block Diagram and Description



Pin No.	Label	Description
RF In	J10	2.92mm (F) Coaxial RF Input.
RF Out	J11	WR28 UG599/U Waveguide High Power RF Output
Auxiliary	J1	D-SUB HD 26POS (M), NorComp, 180-M26-113R9
Power	J3, J4	MOLEX, 07682900

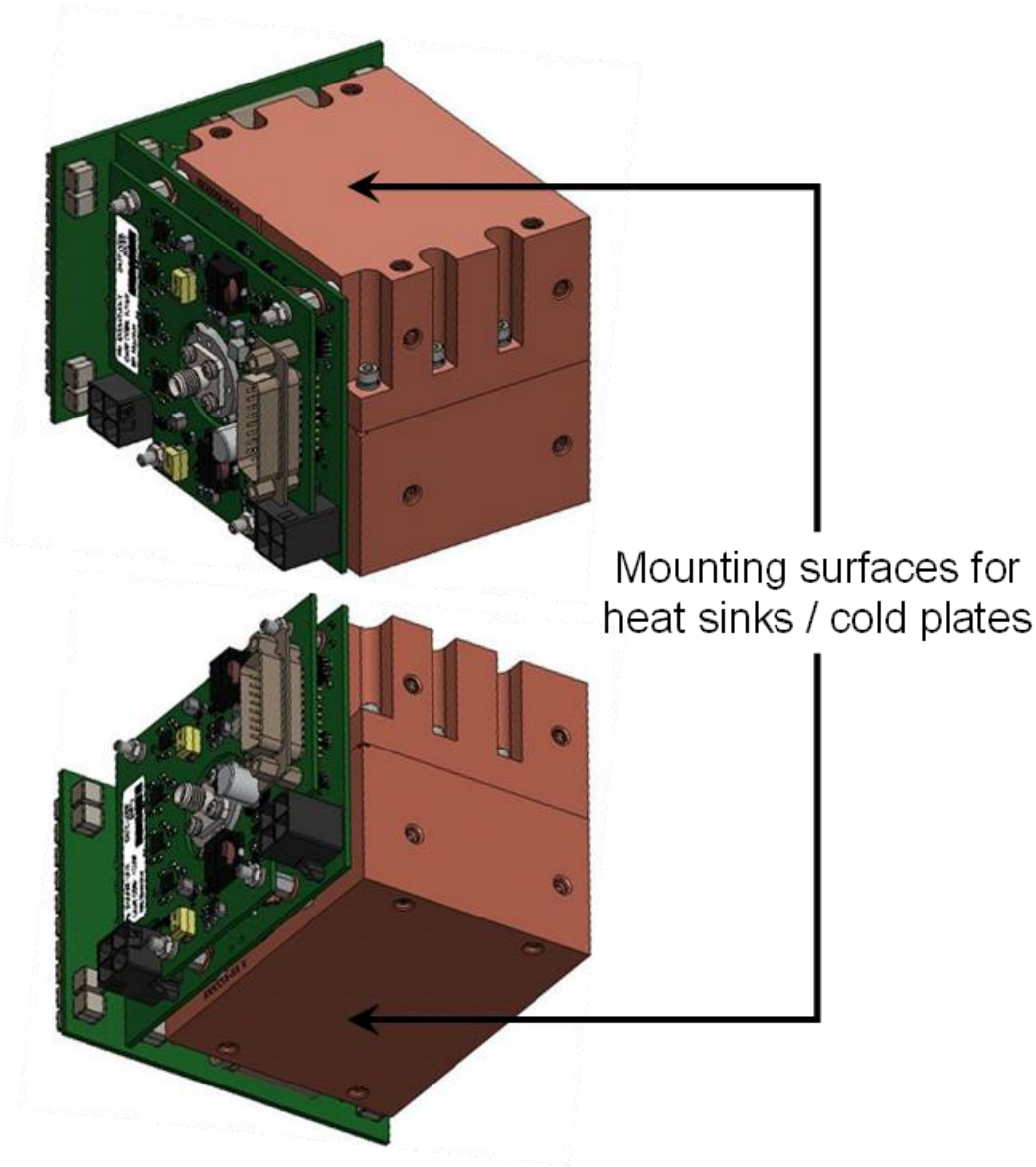
Mechanical Information – Outline Drawing



Dimensions are in INCHES

J1 AUXILARY		J3 AND J4 POWER	
PIN	SIGNAL	PIN	SIGNAL
1	IDRAIN1	1	+VD
2	IDRAIN2	2	GND
3	IDRAIN3	3	GND
4	IDRAIN4	4	+VD
5	IDRAIN5		
6	IDRAIN6		
7	IDRAIN7		
8	IDRAIN8		
9	IDRAIN9		
10	IDRAIN10		
11	IDRAIN11		
12	IDRAIN12		
13	IDRAIN13		
14	IDRAIN14		
15	IDRAIN15		
16	IDRAIN16		
17	+5V		
18	+5V		
19	GND		
20	GND		
21	VTEMP		
22	ENABLE		
23	SLC		
24	SDA		
25	RESET		
26	GND		

Mechanical Information – Location Drawing for Heat Sinks / Cold Plates



Handling Precautions

Caution!
ESD-Sensitive Device

RF VOLTAGE HAZARD: Contact with RF fields at the output connector can cause burns or electric shock. High levels of RF/Microwave energy may be present when the unit is operating.

HIGH DC CURRENT HAZARD: High levels of DC current are present when the unit is operating.

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

Important Notice

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