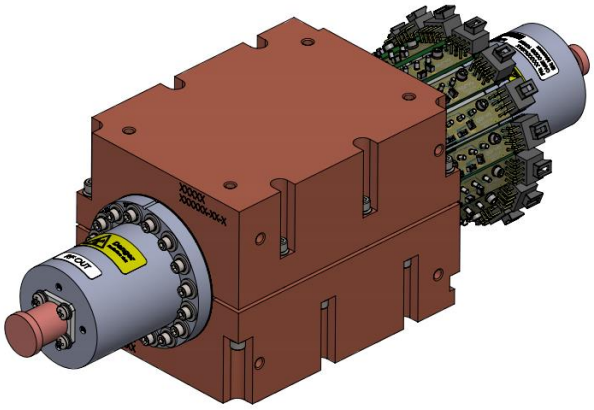
Spatium™ QPB0220

2 – 18 GHz Wideband GaN SSPA

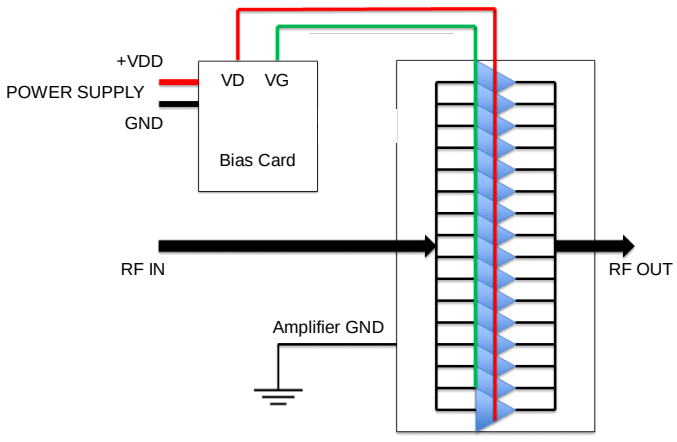
Product Description

An excellent alternative to traveling wave tube amplifiers, Qorvo's Spatium™ QPB0220 is a solid state, spatial-combining amplifier with an operating range of 2–18 GHz while achieving 53.5 dBm (225 Watts) of instantaneous saturated power. With its maximum performance in output power, gain, efficiency, and power flatness, this Spatium is the ideal building block for microwave high power transmitters for EW and radar 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 wideband MMIC design along with our high-count combining techniques for a best in class solution to power amplification.



Functional Block Diagram



Product Features

- Frequency Range: 2 – 18 GHz
- Saturated Output Power: 53.5 dBm
- Solid State MMIC Reliability
- Multi-Element Redundancy
- Instant On (no warm-up)

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

Applications

- TWTA Replacement

Ordering Information

Part No.	Description
QPB0220	2 – 18 GHz Spatium™ Amplifier

Absolute Maximum Ratings

Parameter	Value / Range
Prime Power (V_{DC})*	20 V
Drain Current (I_{D_DRIVE})	85 A
RF Input Power, max.	49 dBm
Storage 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 thermal reliability

Recommended Operating Conditions

Parameter	Value / Range
Drain Voltage (V_D)	18 V
Quiescent Drain Current (I_{DQ})	54 A
Operating Drain Current (I_D)	63 A
Operating Temperature**	–40 to +71 °C

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

** Refers to outside clamp surface temperature

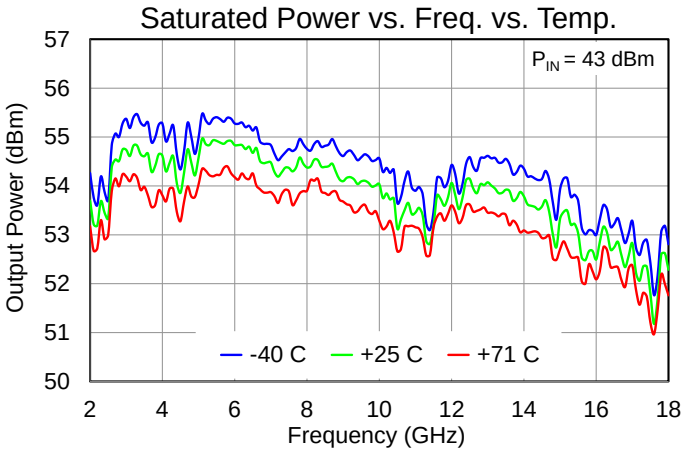
Electrical Specifications

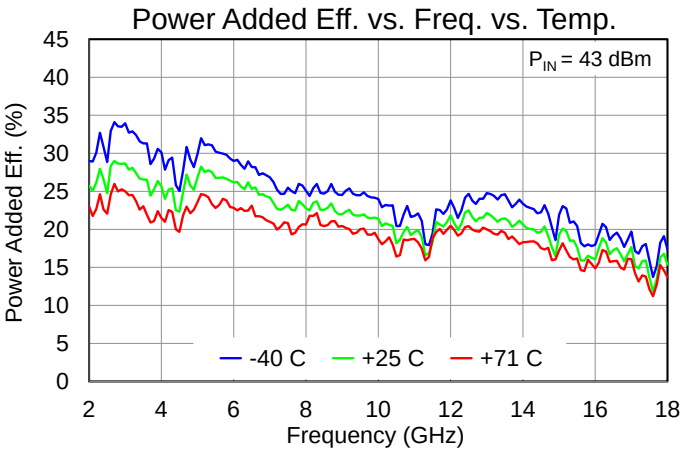
Test conditions unless otherwise noted: V_D = 18 V, I_{DQ} = 54 A, T_{CLAMP} = 25 °C, CW Operation

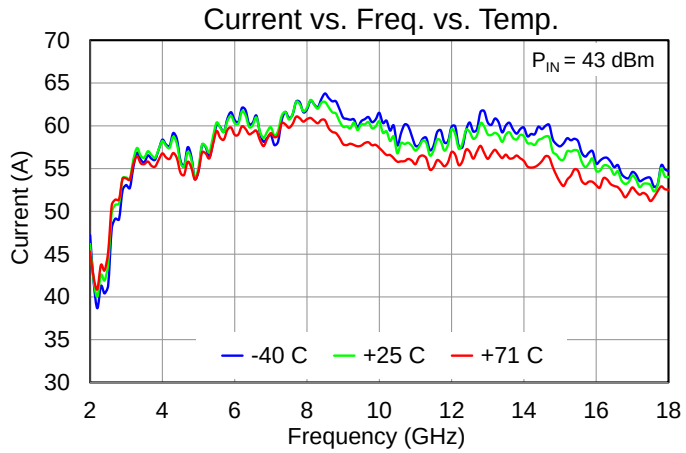
Parameter	Min	Typ	Max	Units
Frequency	2		18	GHz
Saturated P_{OUT}, CW (P_{IN} = 43 dBm)		53.8		dBm
Power-Added Efficiency, CW (P_{IN} = 43 dBm)		21.9		%
Power Gain, CW (P_{IN} = 43 dBm)		10.8		dB
Small Signal Gain		≥ 16.7		dB
Input Return Loss		≥ 7		dB
Second Harmonic, CW (In band, P_{IN} = 43 dBm)		≤ 16		dBc
Third Harmonic, CW (In band, P_{IN} = 43 dBm)		≤ 11		dBc
Input RF Interface		SMA (F)		
Output RF Interface		Type N (F)		
Weight – Amplifier Unit, Bias Card and Cable		18.2 (8.26)		lbs. (kg)
Dimensions – Amplifier Unit (L) x (W) x (H)		3.4 x 3.4 x 11.1		inches
		86.4 x 86.4 x 281.9		millimeters

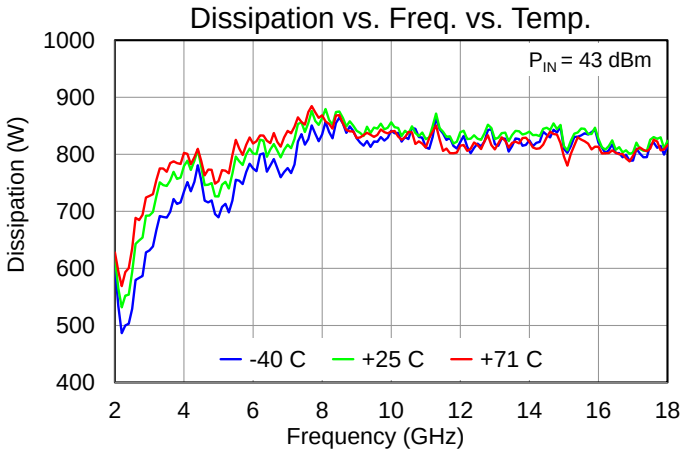
Typical Performance – Large Signal (CW)

Test conditions unless otherwise noted: V_D = 18 V, I_{DQ} = 54 A, T_{CLAMP} = 25 °C, CW Operation. P_{IN} = 43 dBm





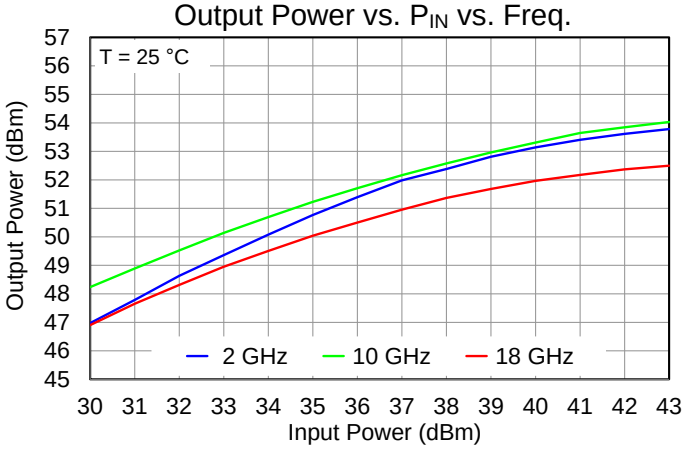




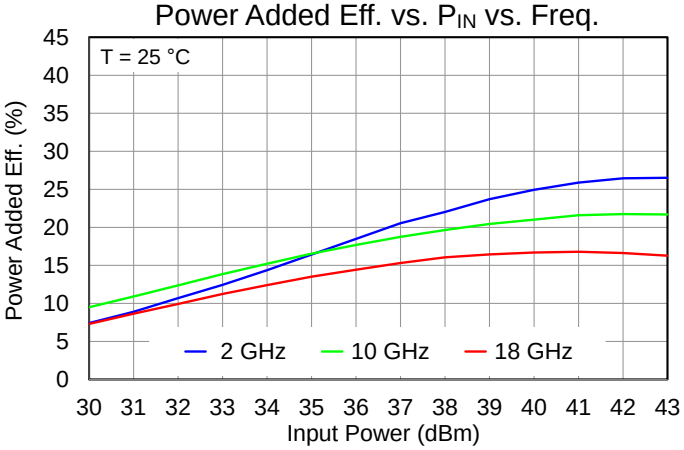
Typical Performance – Large Signal (CW)

Test conditions unless otherwise noted: V_D = 18 V, I_{DQ} = 54 A, T_{CLAMP} = 25 °C, CW Operation

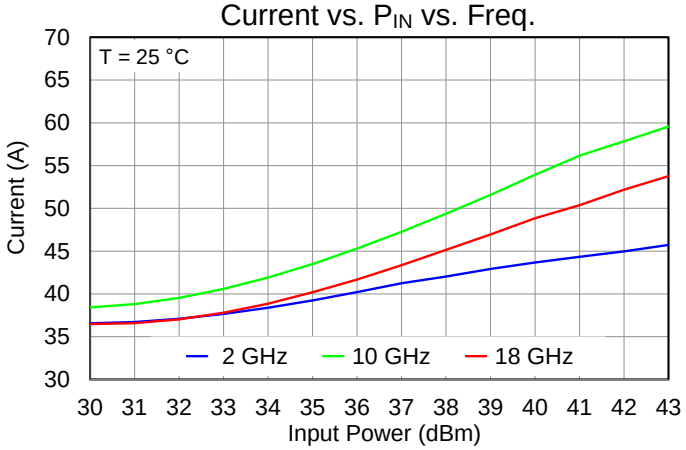
Output Power vs. P_{IN} vs. Freq.



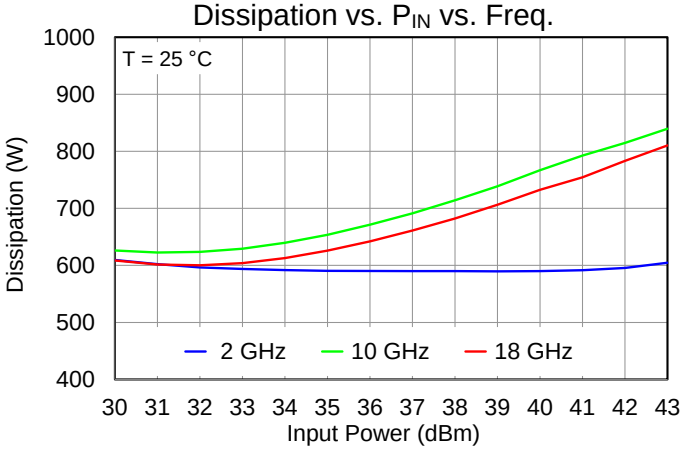
Power Added Eff. vs. P_{IN} vs. Freq.



Current vs. P_{IN} vs. Freq.

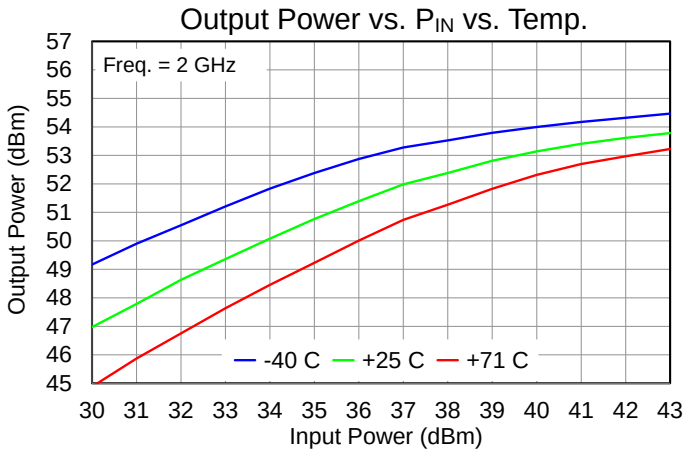


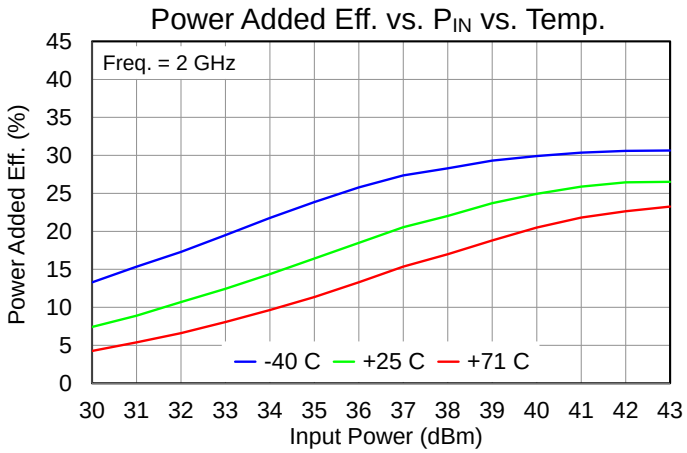
Dissipation vs. P_{IN} vs. Freq.

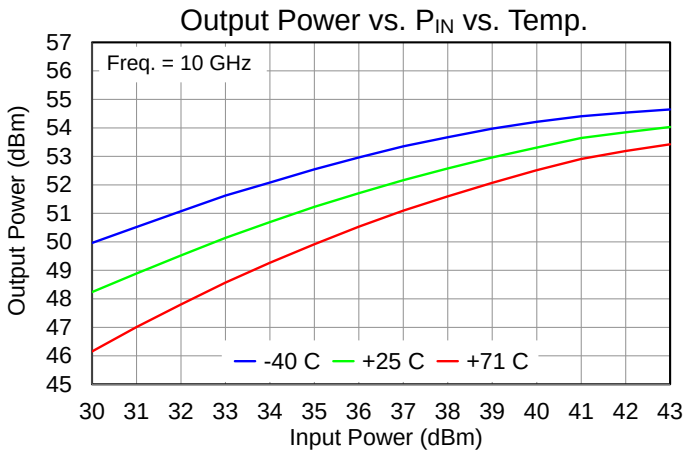


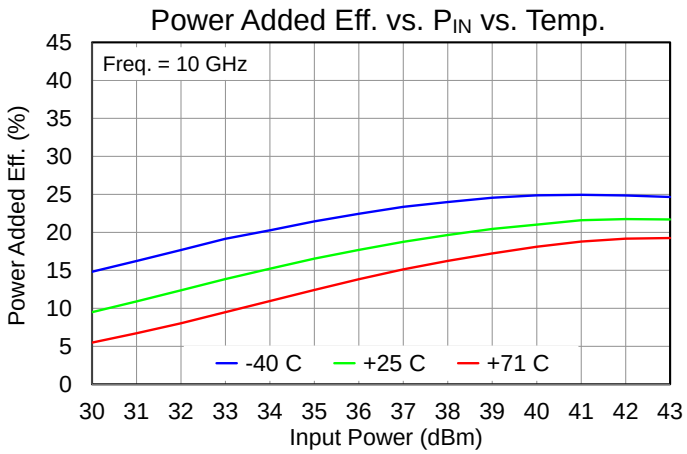
Typical Performance – Large Signal (CW)

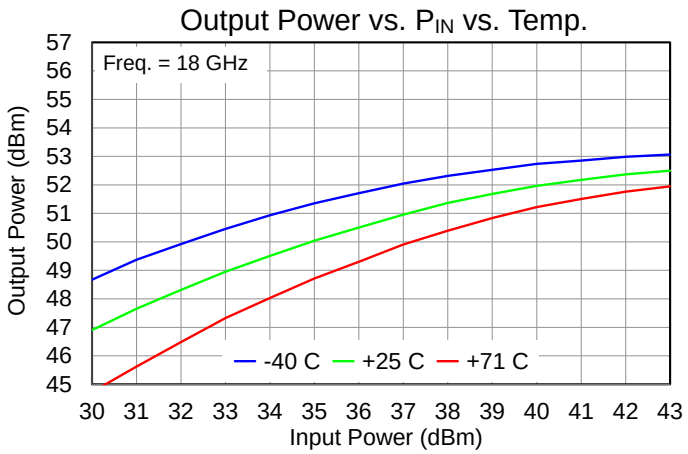
Test conditions unless otherwise noted: V_D = 18 V, I_{DQ} = 54 A, T_{CLAMP} = as shown, CW Operation

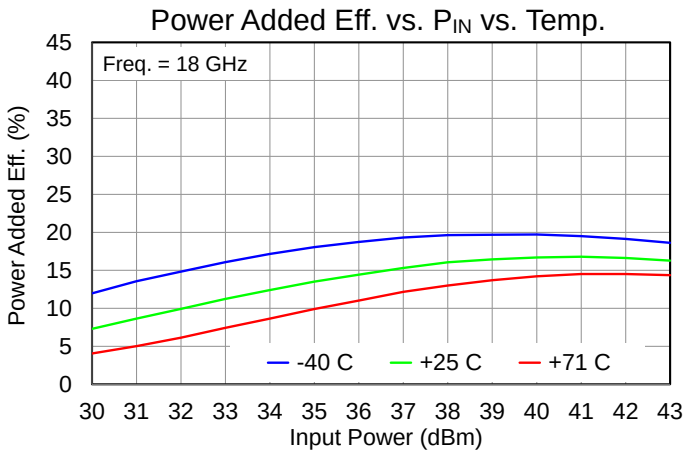






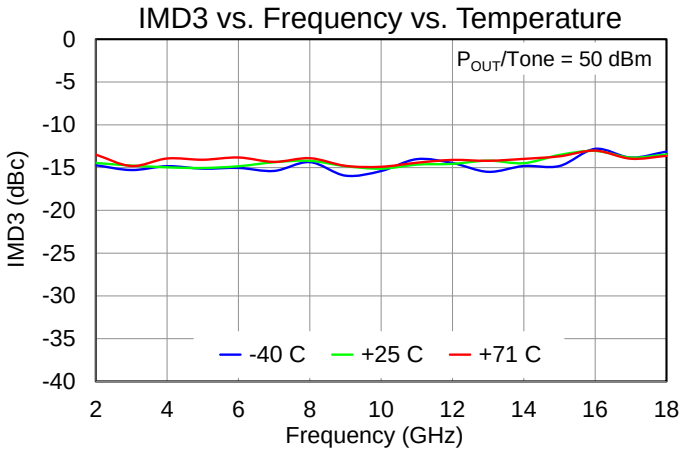


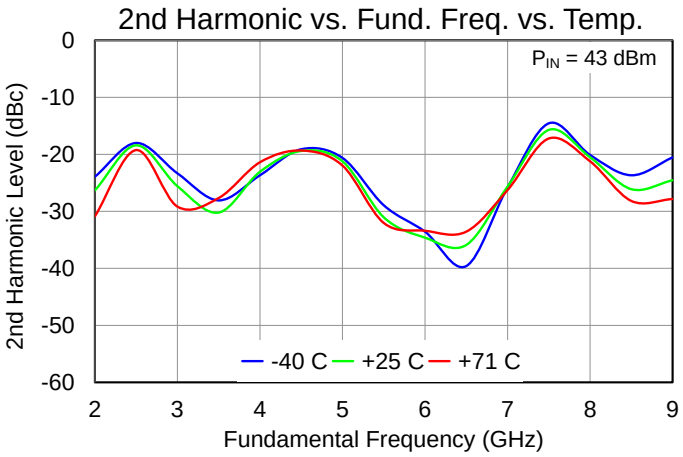


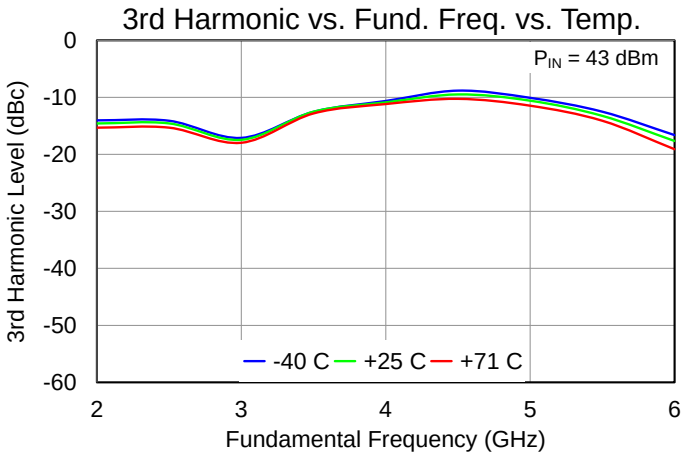


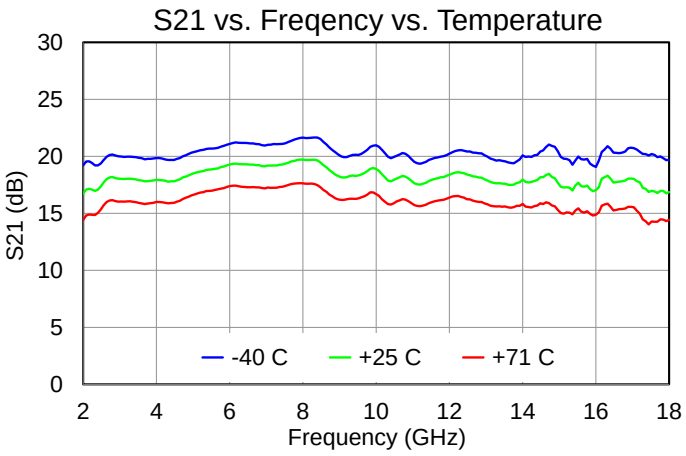
Typical Performance – Linearity, Harmonics, S-Parameters

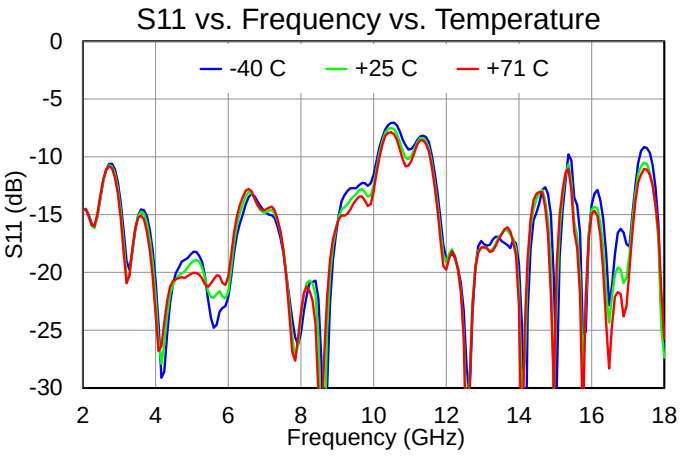
Test conditions unless otherwise noted: V_D = 18 V, I_{DQ} = 54 A, T_{CLAMP} = as shown, CW Operation, Tone Separation = 100 MHz





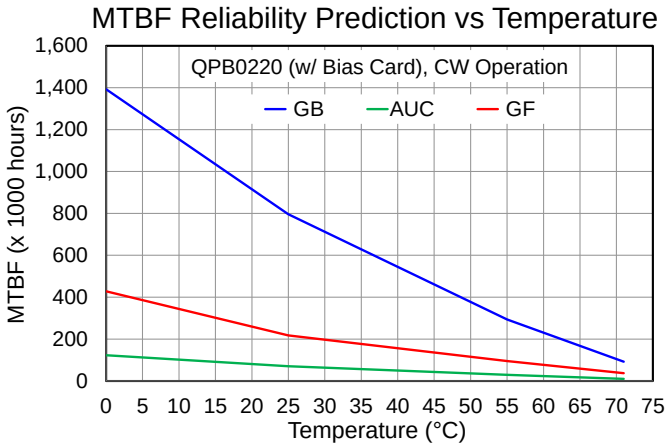


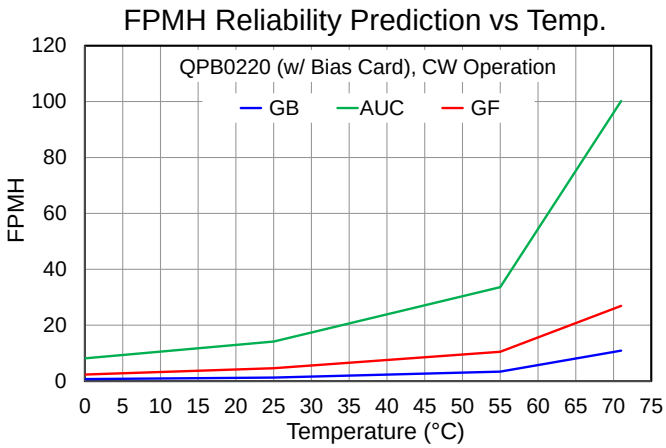




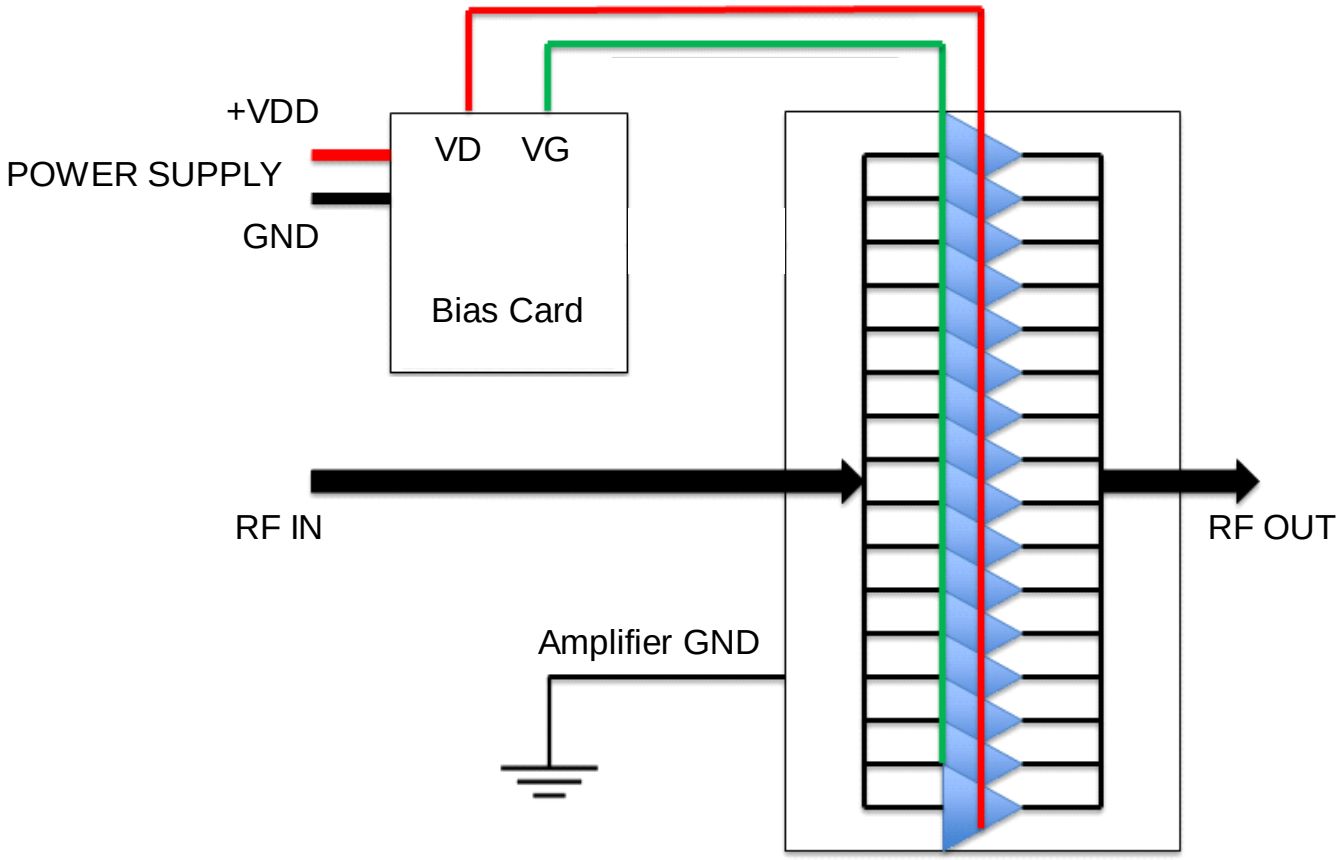
Typical Performance – Reliability

Test conditions unless otherwise noted: V_D =18 V, I_{DQ} = 54 A, T_{CLAMP} = as shown, CW Operation, P_{IN} = 43 dBm, P_{DISS} = 960 W



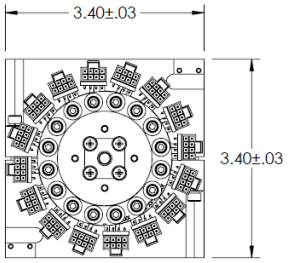


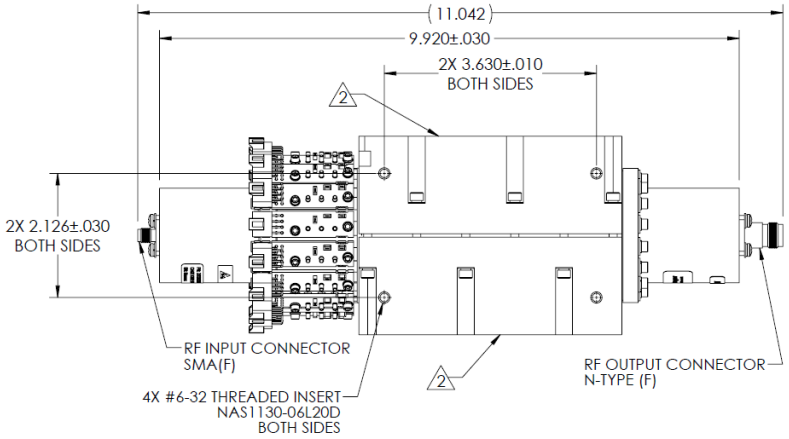
Block Diagram and Description



Pin No.	Label	Description
RF In	N/A	SMA (F) Coaxial RF Input.
RF Out	N/A	Type N (F) Coaxial RF Input.
Bias Card	P2001, P2003	HARTING connector, 09665527611
POWER SUPPLY +VDD	J2000	MOLEX connector, 76825-0008
POWER SUPPLY GND	J2001	MOLEX connector, 76825-0010

Mechanical Information – Outline Drawing (Spatium™ Unit)





NOTES: UNLESS OTHERWISE SPECIFIED

1. LABELS ARE IDENTICAL. ENSURE SERIAL NUMBERS ARE THE SAME ON BIAS CARD AND SPATIUM FOR A MATCHED SET.

SN: * ** ** ***
- BATCH I.D.
- WORK WEEK
- CALENDAR YEAR
- MANUFACTURER

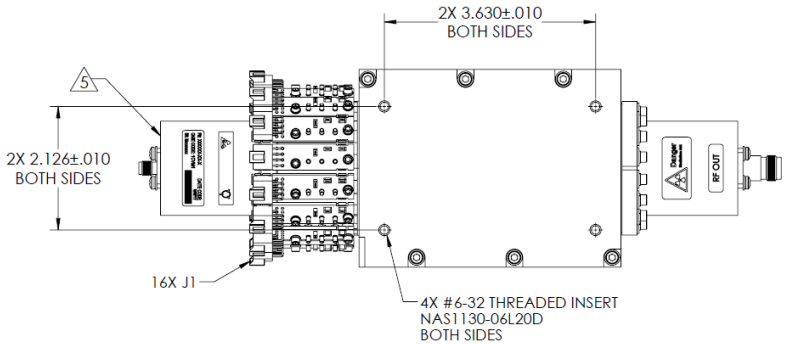
PN: XXXXXX-XX-X
CAGE CODE: 1CVM1
SN: Mxxxxxxx
DATE CODE: WWYY

2. SPATIUM REQUIRES 2 SIDED COOLING ON OPPOSITE FACES AS INDICATED.

3. BIAS CARD REQUIRES AIR FLOWING OVER IT AT A MINIMUM RATE OF 1m/Sec.

4. SPATIUM WEIGHT: 16.5 LBS, BIAS CARD WEIGHT: 0.5 LBS, CABLE WEIGHT: 1.2 LBS

5. BIAS CARD CONNECTORS P2001 AND P2003 SHOULD BE LOCATED NO FARTHER THAN 8 INCHES FROM THE RF INPUT CONNECTOR.

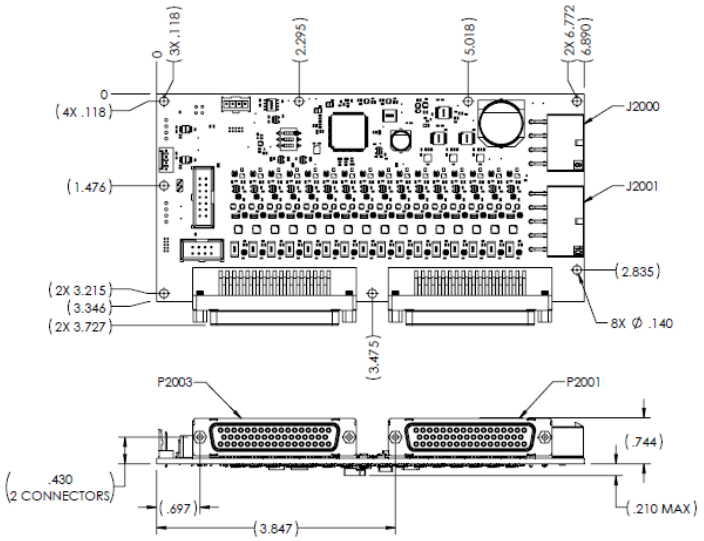


Dimensions are in INCHES

Mechanical Information – Outline Drawing (Bias Card)

BIAS CARD P2001 (HARTING: 09665527611) CABLE J501				
Pin No	Function		Pin No	Function
1	VG15		26	VD12
2	VD16		27	GND
3	GND		28	VG10
4	VD15		29	VD11
5	GND		30	GND
6	VD14		31	VD10
7	GND		32	GND
8	VD13		33	VD9
9	VG12		34	VG16
10	VD12		35	VD16
11	GND		36	GND
12	VG9		37	VD15
13	VD11		38	GND
14	GND		39	VD14
15	VD10		40	GND
16	GND		41	VD13
17	VD9		42	VG14
18	VD16		43	VD12
19	GND		44	GND
20	VD15		45	VG11
21	GND		46	VD11
22	VD14		47	GND
23	GND		48	VD10
24	VD13		49	GND
25	VG13		50	VD9

BIAS CARD P2003 (HARTING: 09665527611) CABLE J503				
Pin No	Function		Pin No	Function
1	VG7		26	VD4
2	VD8		27	GND
3	GND		28	VG2
4	VD7		29	VD3
5	GND		30	GND
6	VD6		31	VD2
7	GND		32	GND
8	VD5		33	VD1
9	VG4		34	VG8
10	VD4		35	VD8
11	GND		36	GND
12	VG1		37	VD7
13	VD3		38	GND
14	GND		39	VD6
15	VD2		40	GND
16	GND		41	VD5
17	VD1		42	VG6
18	VD8		43	VD4
19	GND		44	GND
20	VD7		45	VG3
21	GND		46	VD3
22	VD6		47	GND
23	GND		48	VD2
24	VD5		49	GND
25	VG5		50	VD1



BIAS CARD J2000 76825-0008 MOLEX	
Pin No	Function
1	+VDD
2	+VDD
3	+VDD
4	+VDD
5	+VDD
6	+VDD
7	+VDD
8	+VDD

BIAS CARD J2001 76825-0010 MOLEX	
Pin No	Function
1	GND
2	GND
3	GND
4	GND
5	GND
6	GND
7	GND
8	GND
9	GND
10	GND

BLADE INTERFACE PCB'S J1 105314-1308 MOLEX	
Pin No	Function
1	+VDD
2	+VDD
3	GND
4	GND
5	VG
6	N/C
7	N/C
8	GND

Dimensions are in INCHES

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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