Spatium™ QPB1000

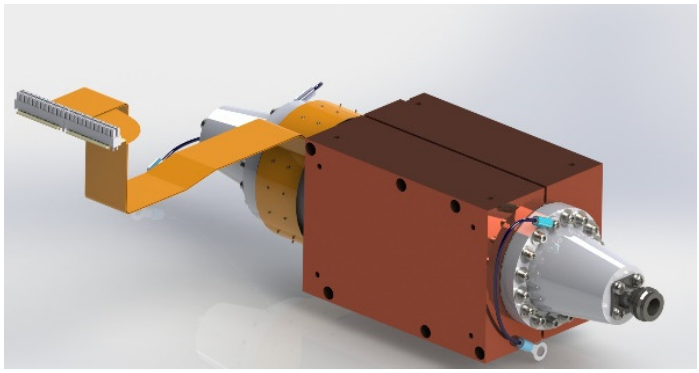
2.0 – 18.0 GHz 75 Watt Amplifier

General Description

The QPB1000 is a high power connectorized SSPA module with bias circuit card suitable for installation into OEM assemblies. The amplifier requires +22 Volts DC and customer supplied thermal management. The device is an excellent candidate for high power test equipment, communications, jamming applications, or any application requiring capability for simultaneous power amplification of signals across the 2.0 – 18.0 GHz spectrum.

The QPB1000 incorporates Qorvo high efficiency GaN MMICs, spatially combined in a compact structure to achieve robust, high performance power amplification across the 2.0 – 18.0 GHz frequency range.

The included bias circuit card assembly provides and sequences all required DC voltages from a single customer supplied +22 Volt DC input. Mute and pulse functionality, as well as a summary fault output are available. Individual device current monitoring in analog format is also available.

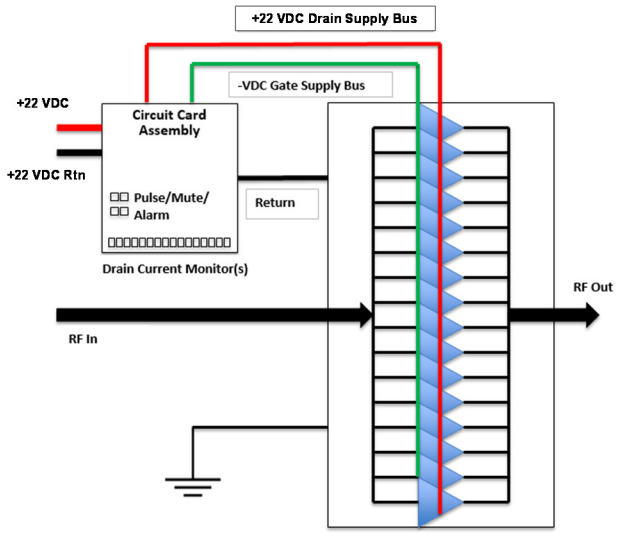


Product Features

- Frequency: 2.0 – 18.0 GHz
- Saturated Output Power: 75 watts (nominal)
- Small Signal Gain: 16 dB
- Bias Conditions: +22 V single supply, I_{DQ} = 9.6 A
- Included gate and drain voltage generation
- Included gate and drain voltage sequencing

Performance characteristics vary across the product's operating band. Refer to the electrical specification table and data plots for details, including variance across operating temperature.

Functional Block Diagram



Applications

- Jamming
- Radar
- Military Communications
- Defense Communications
- Test & Measurement
- EMI Testing

Ordering Information

Part No.	ECCN	Description
QPB1000	3A001.b.4.b.1	2.0 – 18.0 GHz 75 Watt Amplifier

Absolute Maximum Ratings

Parameter	Rating
RF Input Power, CW, 50 Ω, T_{CASE}=25 °C	+40 dBm
Load VSWR	3.0:1
Device Voltage (V_{DD})	+22.5 V
Dissipated Power (P_{DISS})	550 W
Storage Temperature	–55 to +100 °C

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
Voltage (V_{DC})		+22		V
Operating Temperature	–40	+25	+71	°C
Quiescent Current (Idq)	8.0	9.6	12.0	A

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

Electrical Specifications

Please reference data plots for more details.

Parameter	Conditions[1]	Min	Typ	Max	Units
Operational Frequency Range		2.0		18.0	GHz
Output Power (P_{IN} = 36 dBm)	2 GHz		49.1		dBm
	5 GHz		50.6		dBm
	8 GHz		49.0		dBm
	12 GHz		47.8		dBm
	15 GHz		49.1		dBm
	18 GHz		47.9		dBm
Power Added Efficiency	2 GHz		24.7		%
(P_{IN} = 36 dBm)	5 GHz		27.8		%
	8 GHz		17.5		%
	12 GHz		14.4		%
	15 GHz		17.8		%
	18 GHz		14.2		%
Small Signal Gain	2 GHz		26.1		dB
	5 GHz		27.8		dB
	8 GHz		28.0		dB
	12 GHz		22.8		dB
	15 GHz		22.7		dB
	18 GHz		21.0		dB
Small Signal Gain Flatness			± 6.0		dB
Input Return Loss (average)			See plot		dB
Output 2nd Harmonic	F_0 = 2 – 18 GHz, P_{IN} = 36 dBm		See plot		dBc
Output 3rd Harmonic	F_0 = 2 – 18 GHz, P_{IN} = 36 dBm		See plot		dBc
Non-Harmonic Spurious	F_0 = 2 – 18 GHz, P_{IN} = 36 dBm			–60	dBc
DC Input Power (average) (P_{IN} = 36 dBm)			420		W
Unit Weight	Spatium Only		13.40 (6.08)		Lbs. (kg)
Unit Weight	Spatium plus Bias Card		13.65 (6.19)		Lbs. (kg)

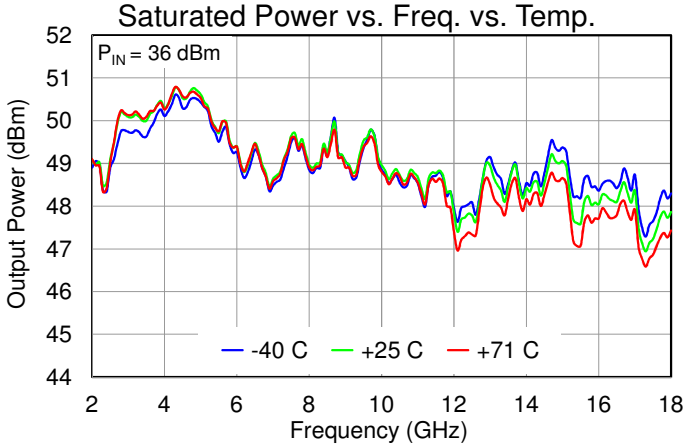
Notes:

1. Test conditions unless otherwise noted: V_{DC} = +22 V, Outer Clamp Temperature = +25 °C, 50 Ohm system

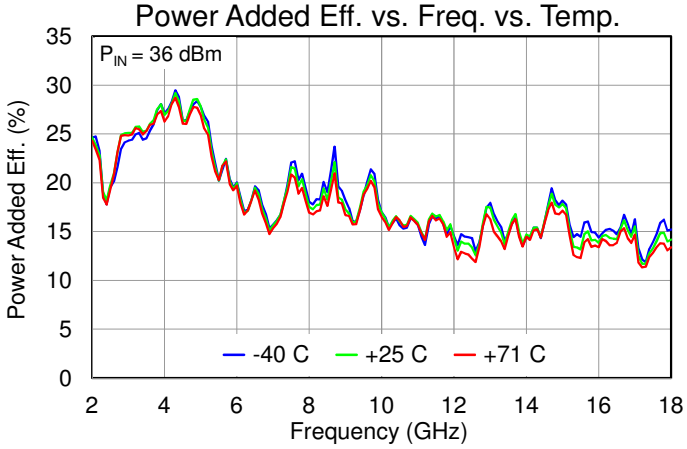
Performance Plots – QPB1000 Large Signal, Small Signal

Test conditions unless otherwise noted: V_{DC} = +22 V, Outer Clamp Temperature = +25 °C, 50 Ohm system

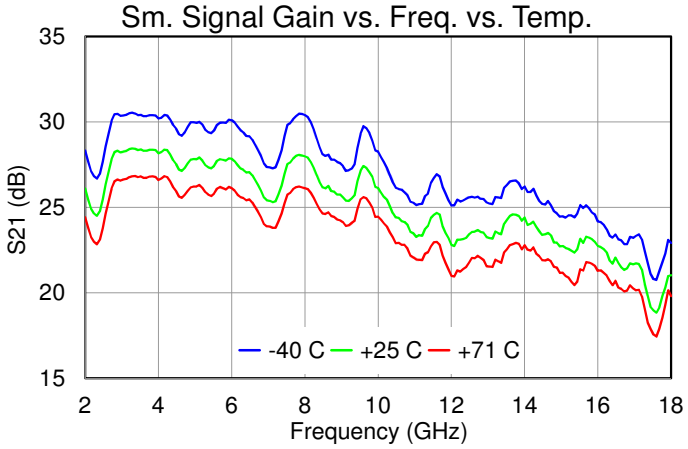
Saturated Power vs. Freq. vs. Temp.



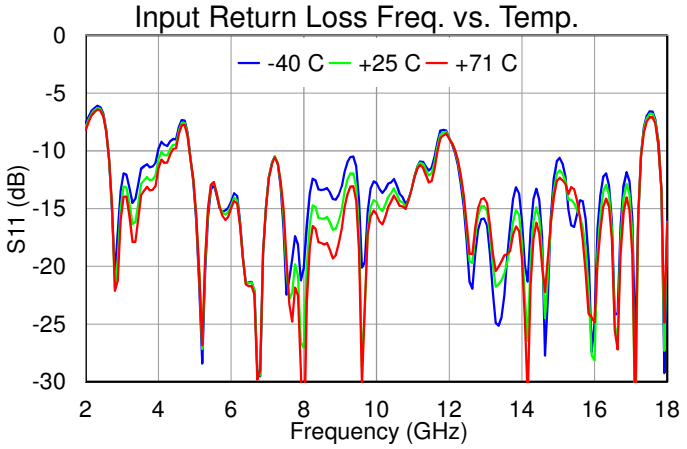
Power Added Eff. vs. Freq. vs. Temp.



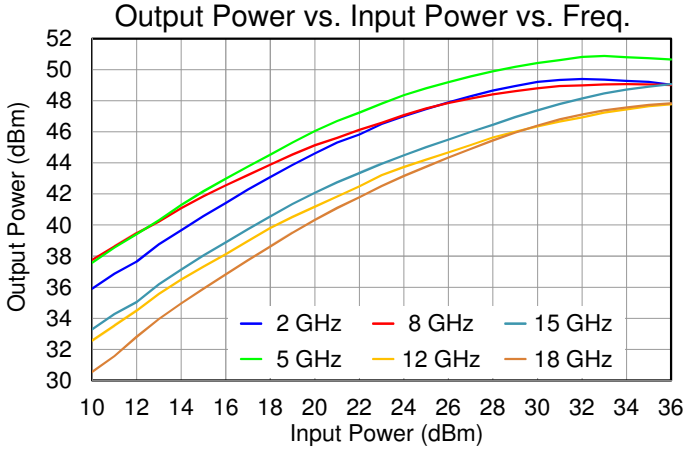
Sm. Signal Gain vs. Freq. vs. Temp.



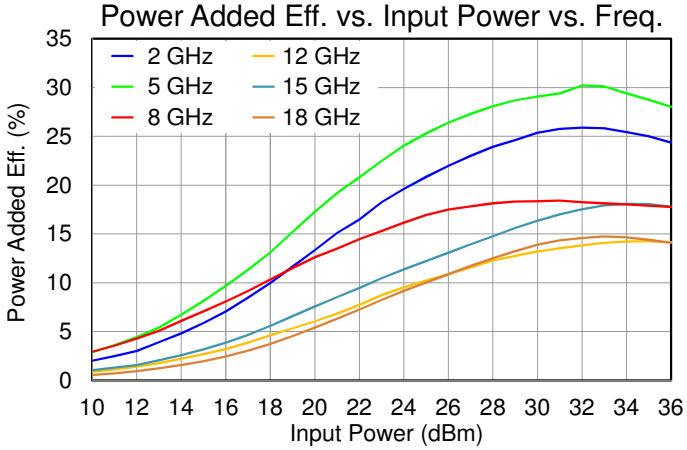
Input Return Loss Freq. vs. Temp.



Output Power vs. Input Power vs. Freq.



Power Added Eff. vs. Input Power vs. Freq.



Performance Plots – QPB1000 Large Signal

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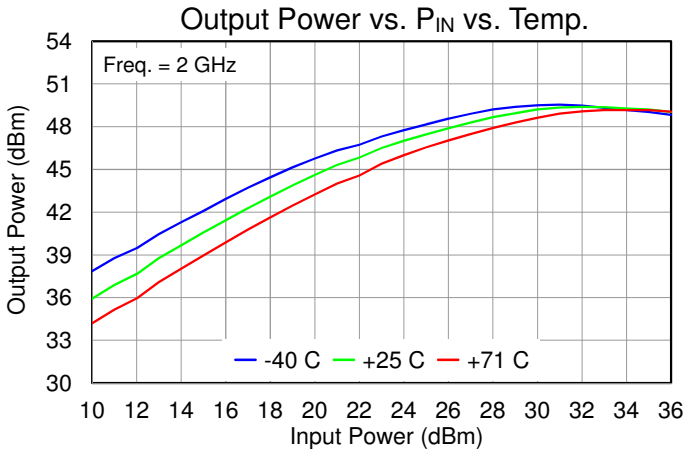

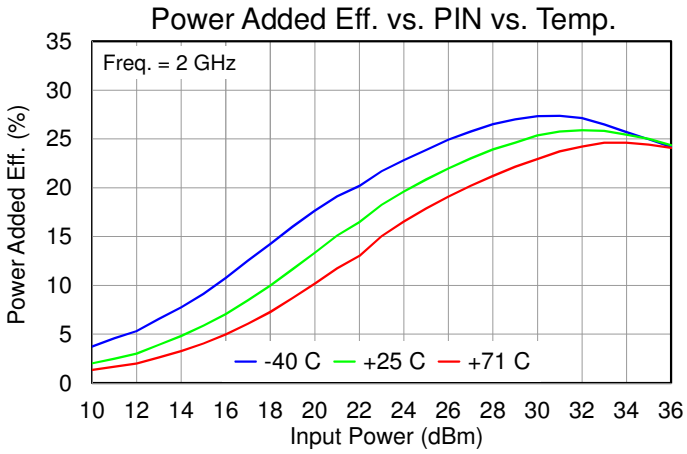

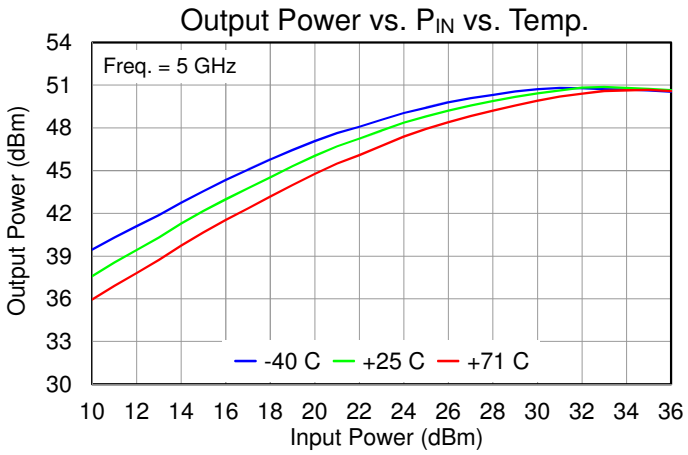

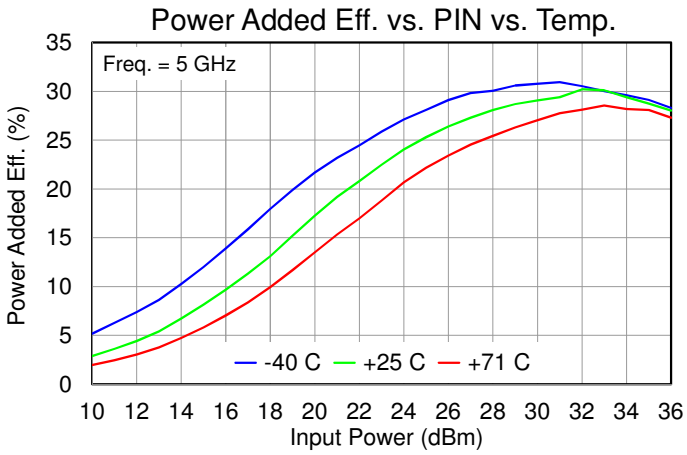

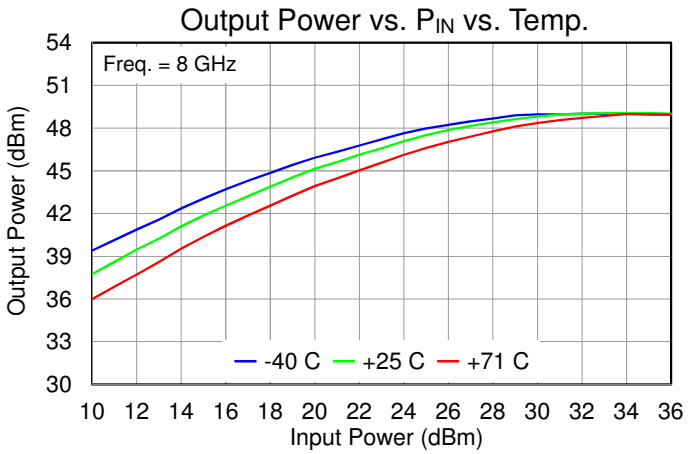

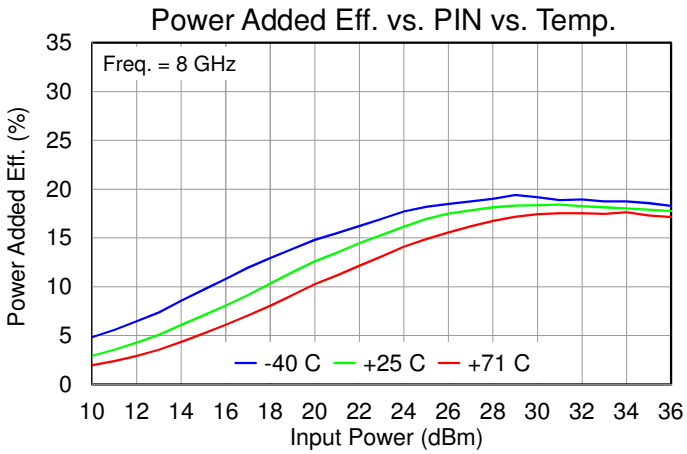

Performance Plots – QPB1000 Large Signal

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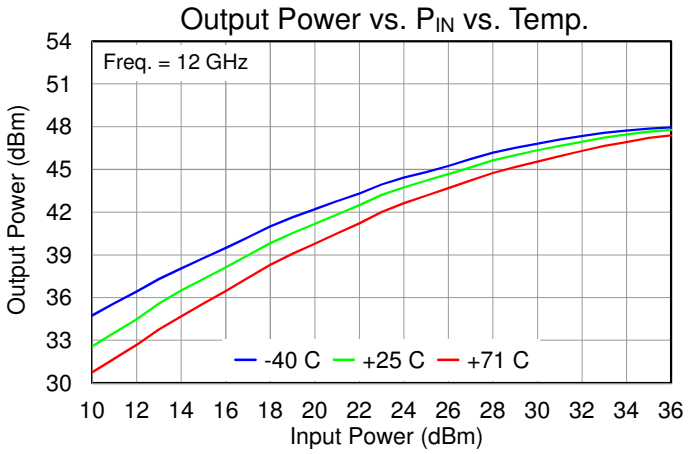

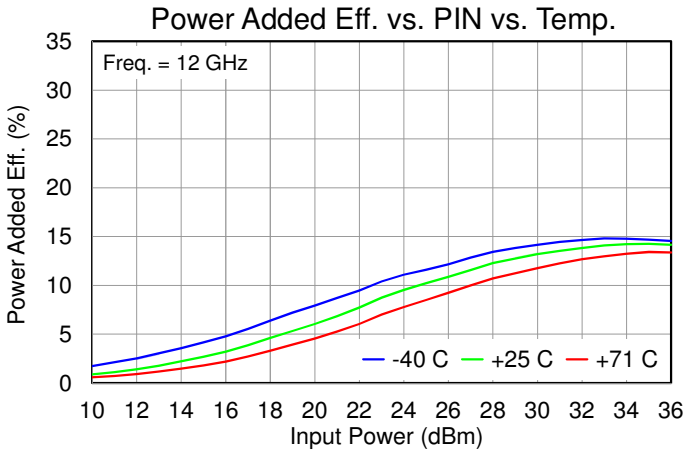

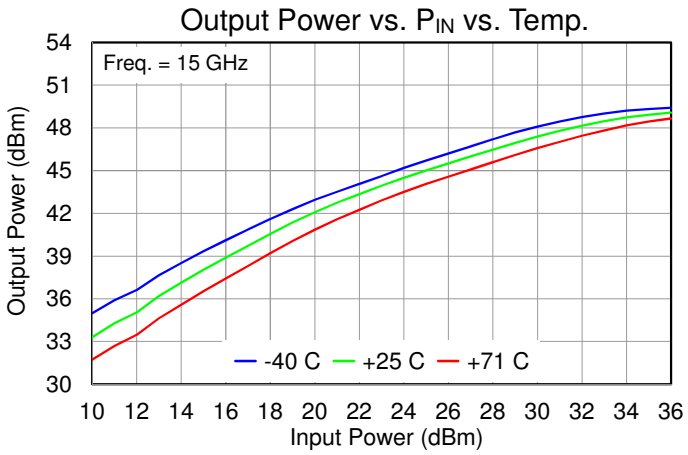

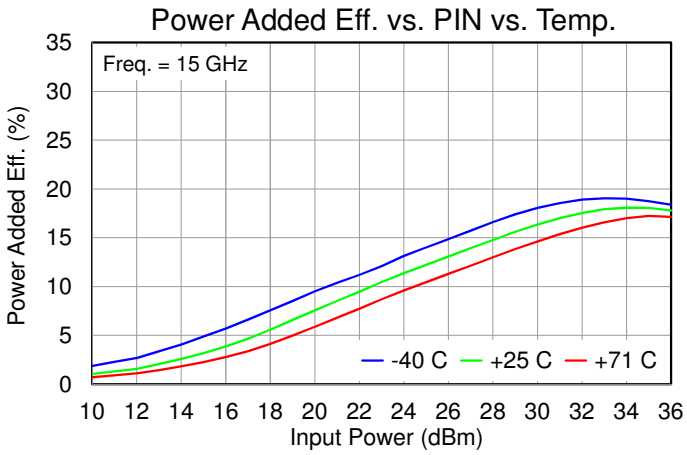

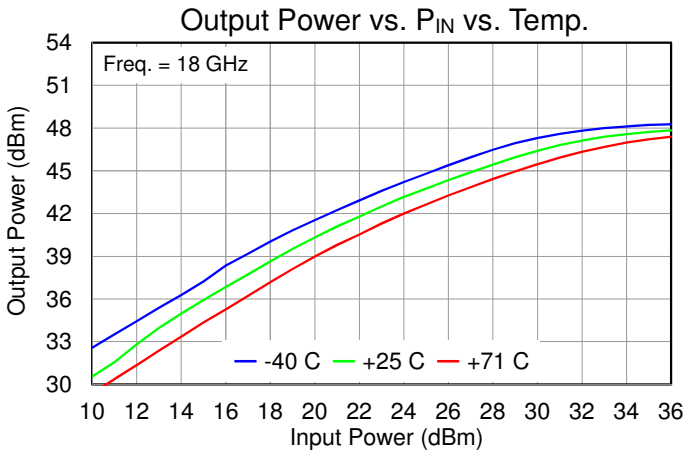

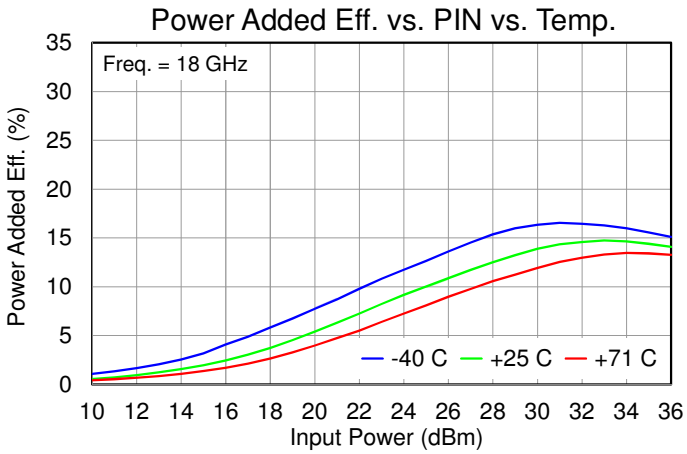

Performance Plots – QPB1000 Harmonics

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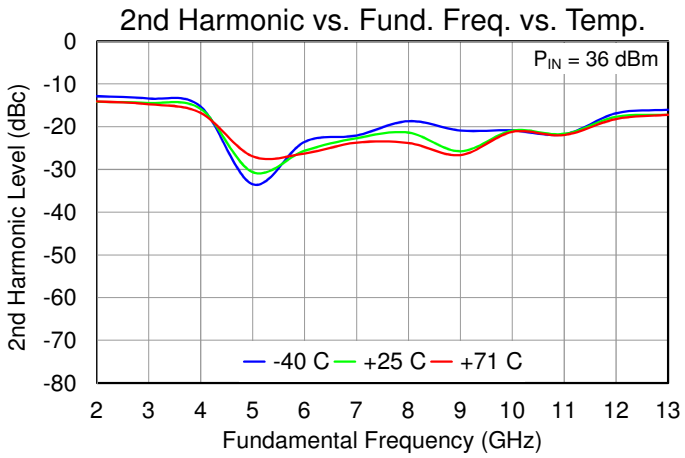
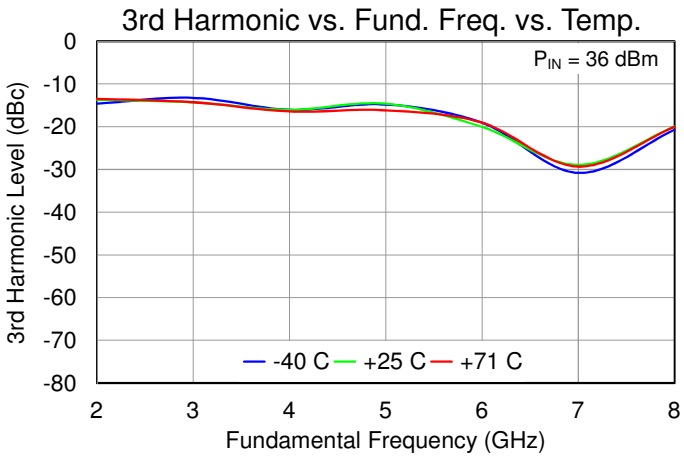
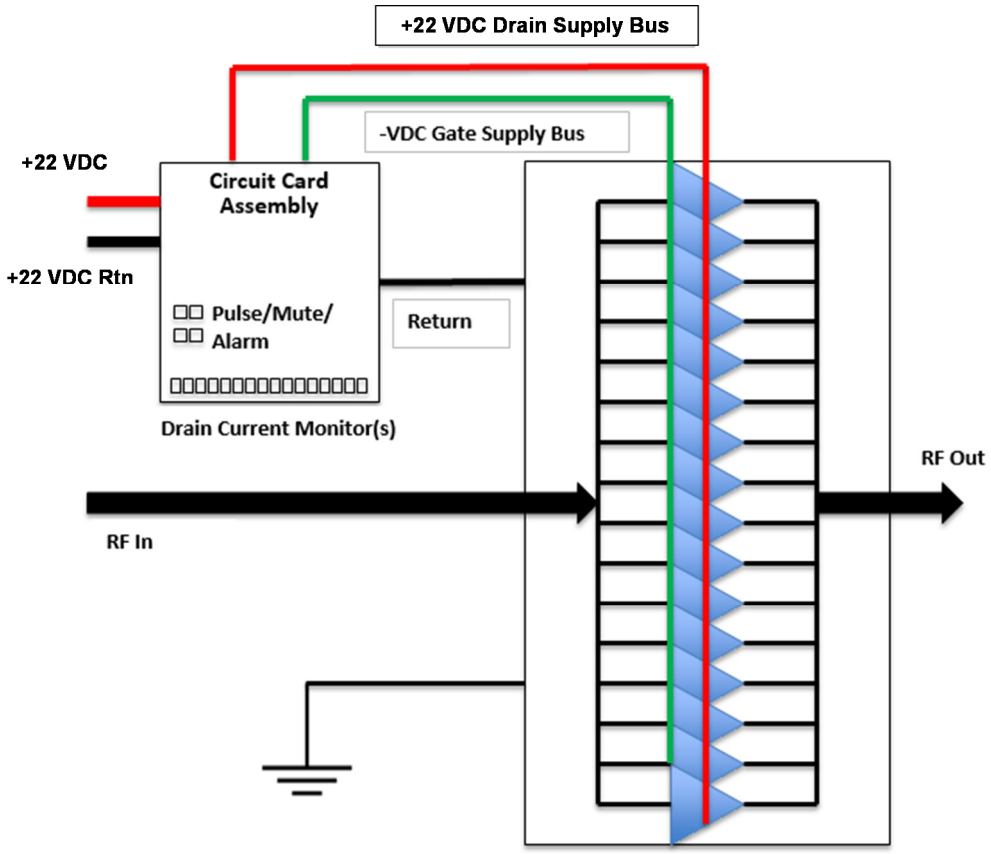


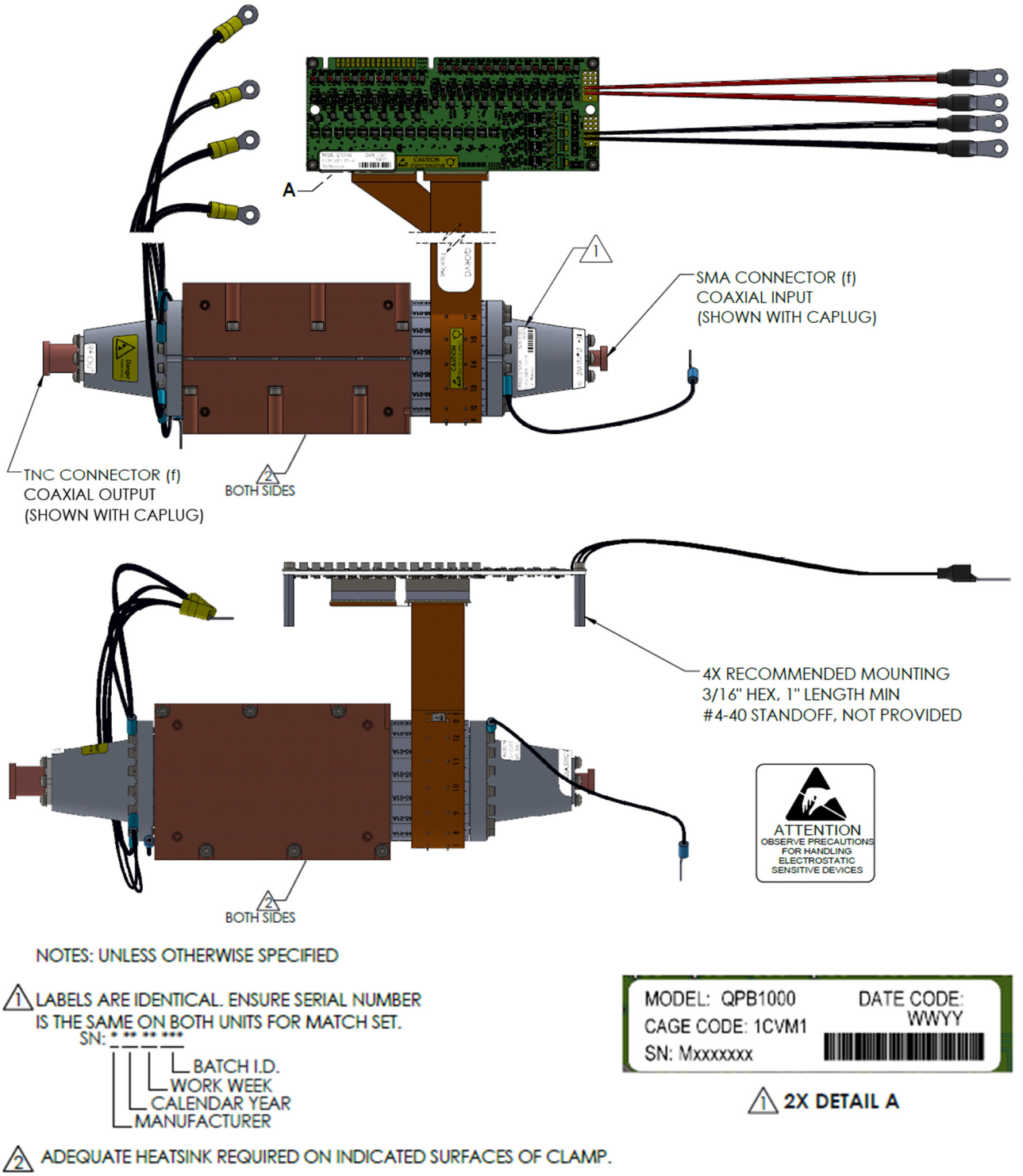


Block Diagram and Description



I/O Port	Label	Description
RF In	N/A	SMA (F) RF Input
RF Out	N/A	TNC (F) High Power RF Output
+22 VDC	N/A	Six 16 Ga Red Wires Ring Lug #10 Stud Terminated
+22 VDC Return	N/A	Six 16 Ga Black Wires Ring Lug #10 Stud Terminated

Package Marking and Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED

1. LABELS ARE IDENTICAL. ENSURE SERIAL NUMBER IS THE SAME ON BOTH UNITS FOR MATCH SET.
   SN: * ** ** ***
   - BATCH I.D.
   - WORK WEEK
   - CALENDAR YEAR
   - MANUFACTURER

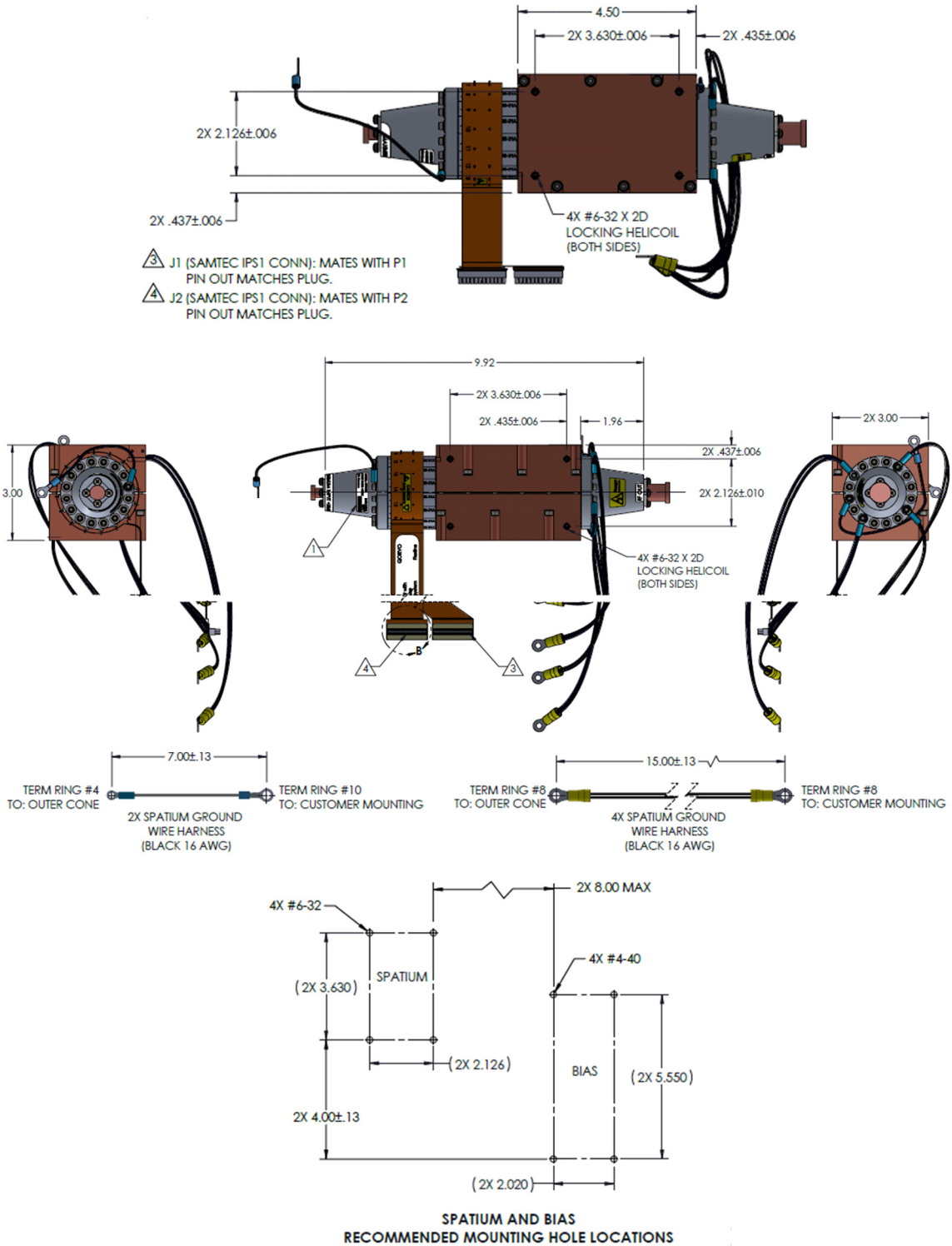
2. ADEQUATE HEATSINK REQUIRED ON INDICATED SURFACES OF CLAMP.

MODEL: QPB1000 DATE CODE: WWYY
CAGE CODE: 1CVM1
SN: Mxxxxxxx

1 2X DETAIL A

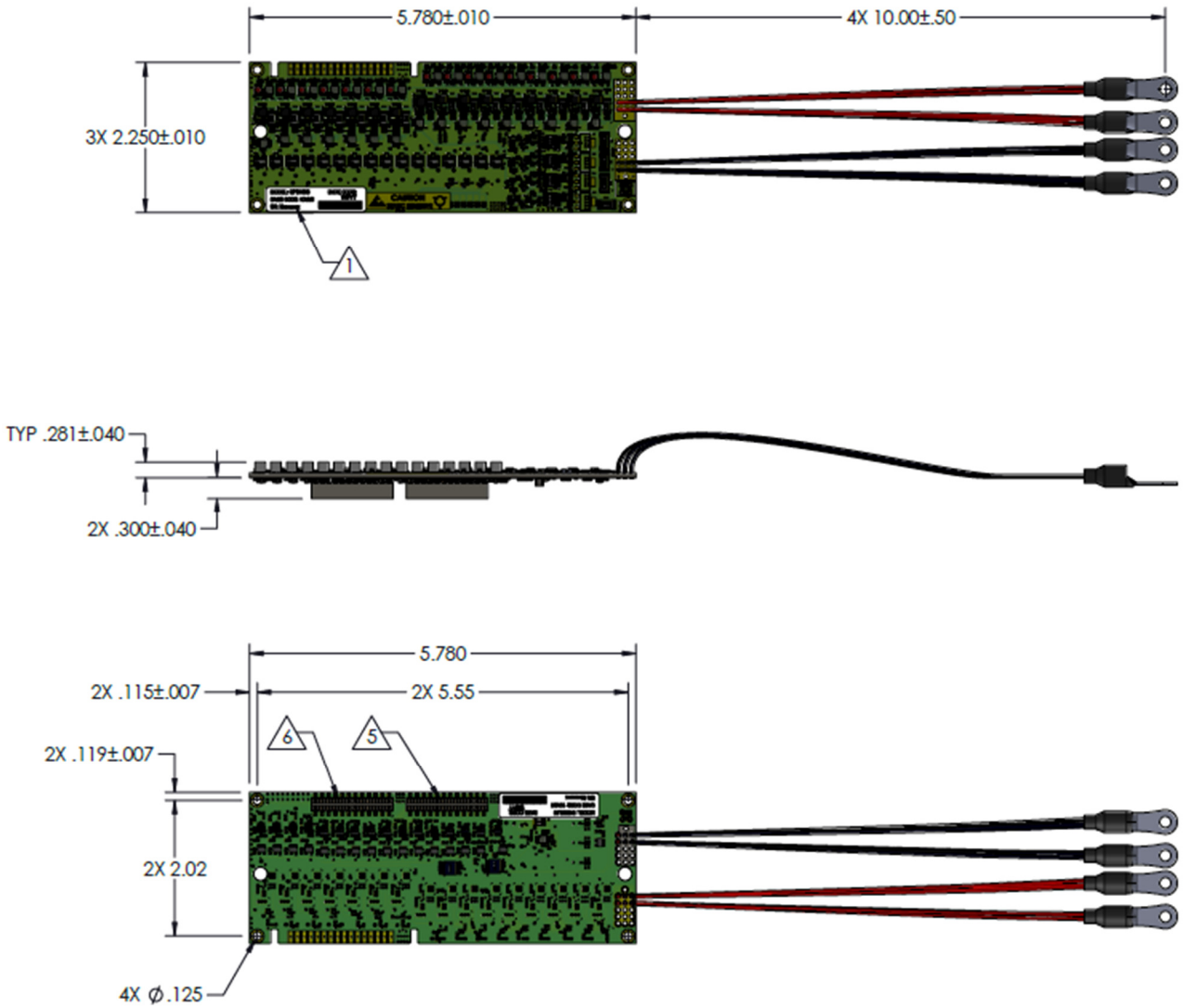
Dimensions in INCHES

Package Marking and Dimensions (continued)



Dimensions in INCHES

Package Marking and Dimensions (continued)



Bias Circuit Card Detail

Dimensions in INCHES

Handling Precautions

Caution!
ESD-Sensitive Device

Contact Information

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

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Email: customer.support@qorvo.com

For technical questions and application information: **Email:** spatium-info.engineering@qorvo.com

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