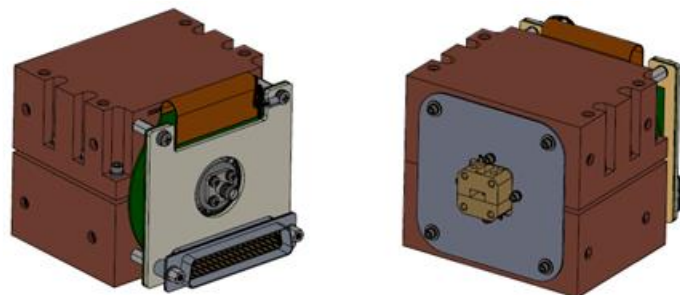


Product Description

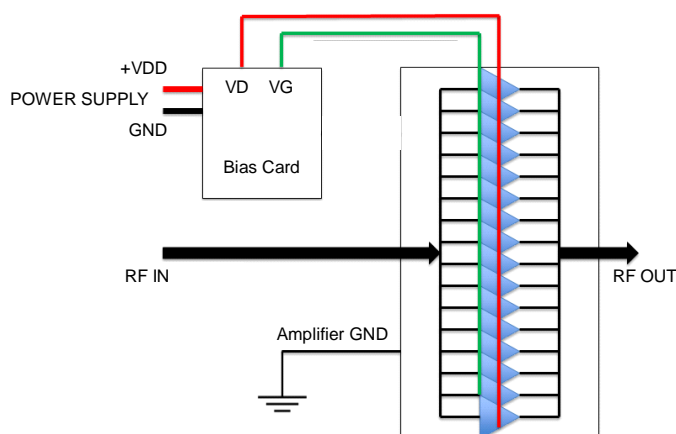
An excellent alternative to traveling wave tube amplifiers, Qorvo's Spatium™ QPB2731 is a solid state, spatial-combining amplifier with an operating range of 27.5–31 GHz while achieving a minimum of 49 dBm of instantaneous linear power. With its maximum performance in output power, gain, power added 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.



Input (L) and Output (R)

Functional Block Diagram



Product Features

- Frequency Range: 27.5 – 31 GHz
- Saturated Output Power: 53 dBm ($P_{IN} = 39$ dBm)
- Linear Power (71°C): > 49 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
QPB2731	27.5 – 31 GHz Spatium™ Amplifier

Absolute Maximum Ratings

Parameter	Value / Range
Prime Power (V_{DC})*	29.5 V
Drain Current (I_{D_DRIVE})	35 A
Operating Temperature**	-40 to +71 °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 / Range
Drain Voltage (V_D)	22 V
Quiescent Drain Current (I_{DQ})	4.5 A
Operating Drain Current (I_D)	30 A
Operating Temperature	-10 to +71 °C

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	27.5		31	GHz
Saturated Output Power (P_{SAT}) ($P_{IN} = 39$ dBm)		53.2		dBm
Power Added Efficiency (PAE) ($P_{IN} = 39$ dBm)		25.8		
Power Gain ($P_{IN} = 39$ dBm)		14.2		dB
Gain Flatness ($P_{IN} = 39$ dBm)		±0.5		dB
Linear Power ^{1,2} (P_{LIN}) at 55 °C		49.7		dBm
Linear Power ^{1,2} (P_{LIN}) at 71 °C		49.7		dBm
Small Signal Gain		24.6		dB
Input Return Loss		10		dB
DC Power at P_{SAT} (55°C)		760		W
Input RF Interface	2.92 mm (F) Coaxial Connector			
Output RF Interface	WR-28 Waveguide			
Weight – Amplifier Unit, Bias Card and Cable		7.3 (3.31)		lbs. (kg)
Dimensions – Amplifier Unit (L) x (W) x (H)		3.25 x 2.91 x 3.93		inches
		82.6 x 73.9 x 99.8		millimeters

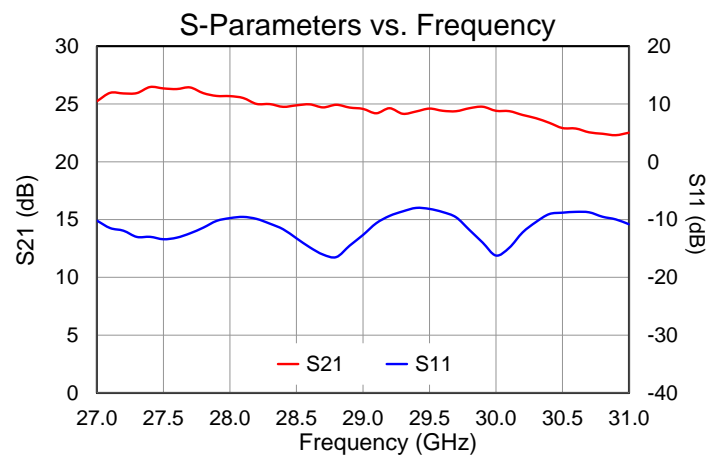
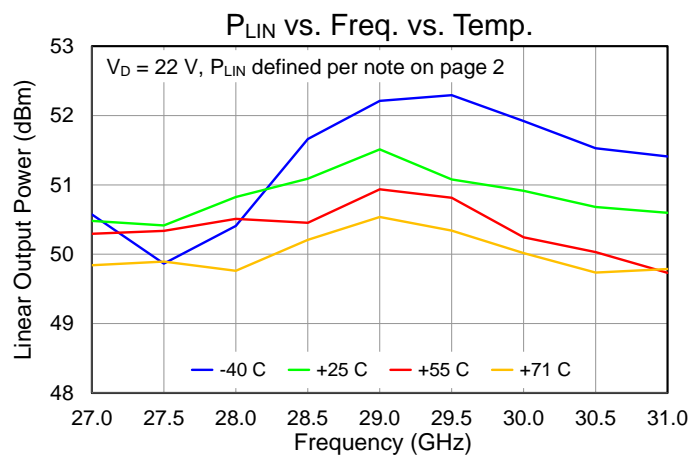
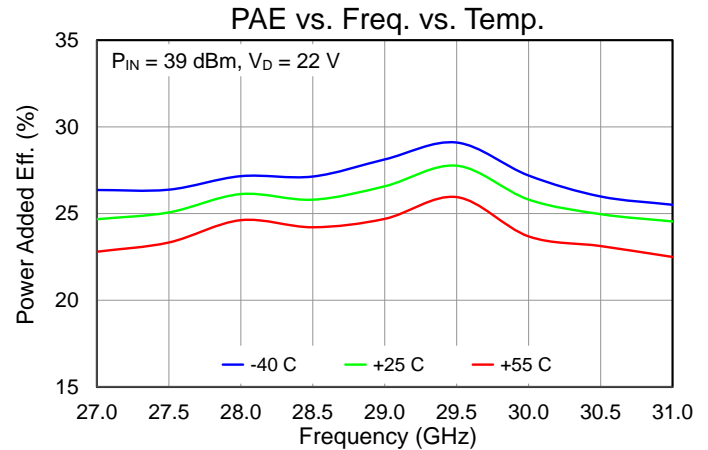
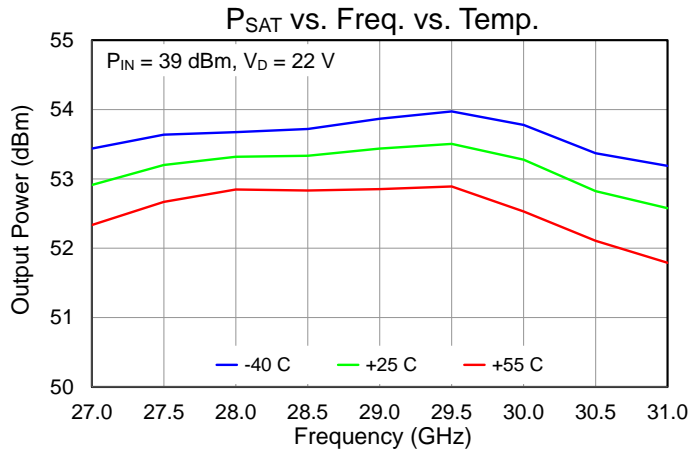
Test conditions unless otherwise noted: $V_D = 22$ V, $I_{DQ} = 4.5$ A, $T = 25$ °C

¹ Linear Power is defined as max output power at flange with -30 dBc at 1 MHz offset for 1MSPS OQPSK ($\alpha=0.35$) per MIL-STD-188-164b.

² Linear power is not guaranteed at cold temperatures (< 25 °C) below 28.5 GHz.

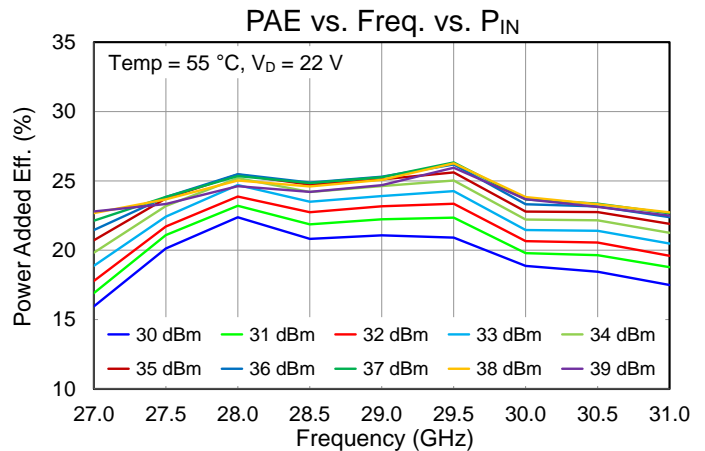
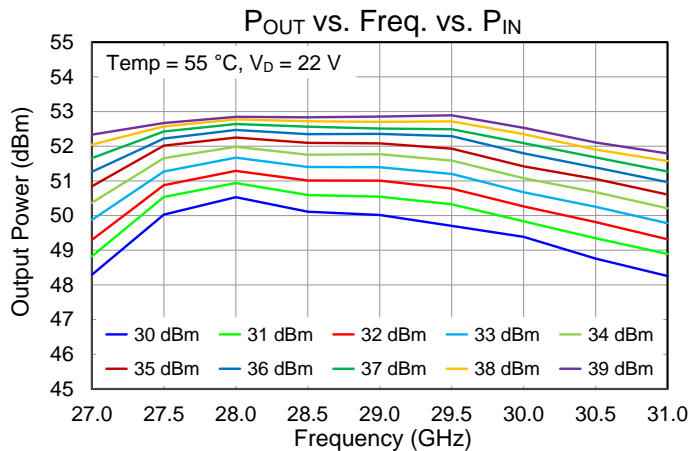
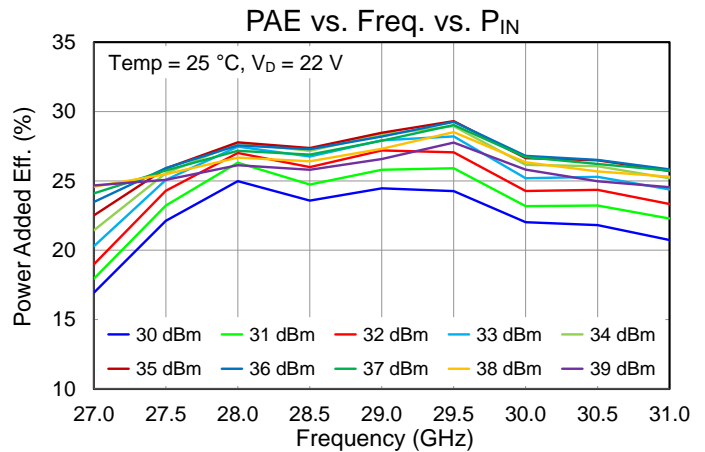
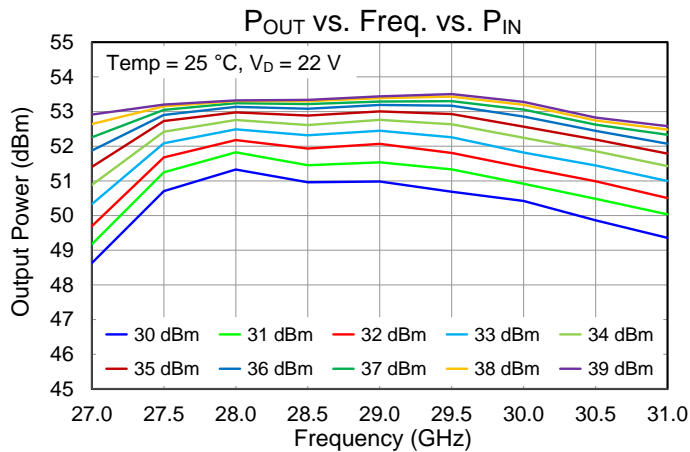
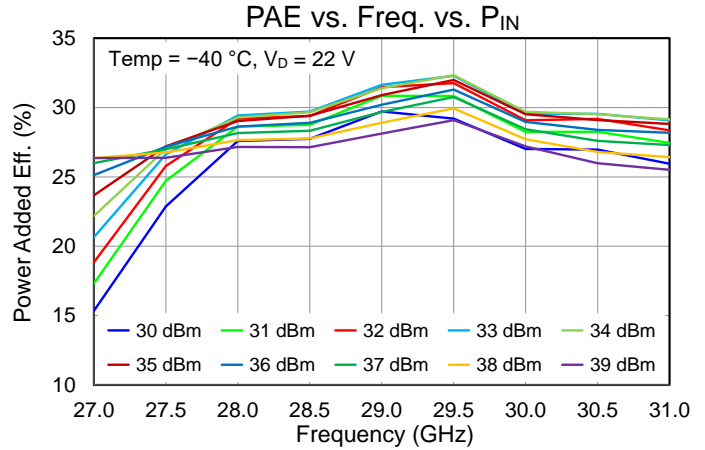
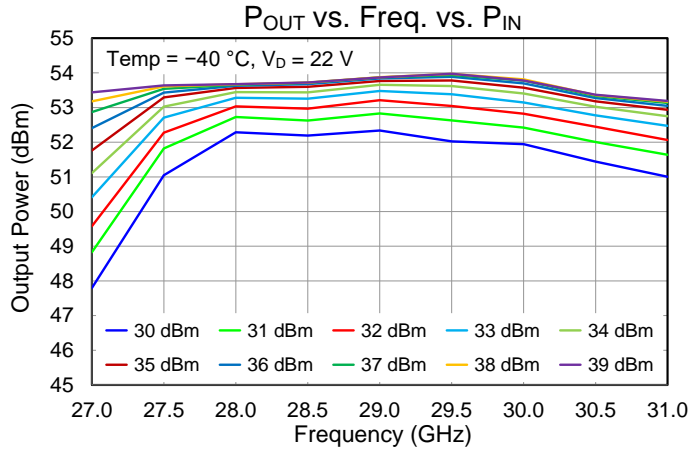
Typical Performance – P_{SAT} , PAE, P_{LIN} , S-Parameters

Conditions unless otherwise specified: $V_D = +22\text{ V}$, $I_{DQ} = 4.5\text{ A}$, $T = 25\text{ }^\circ\text{C}$, CW Operation

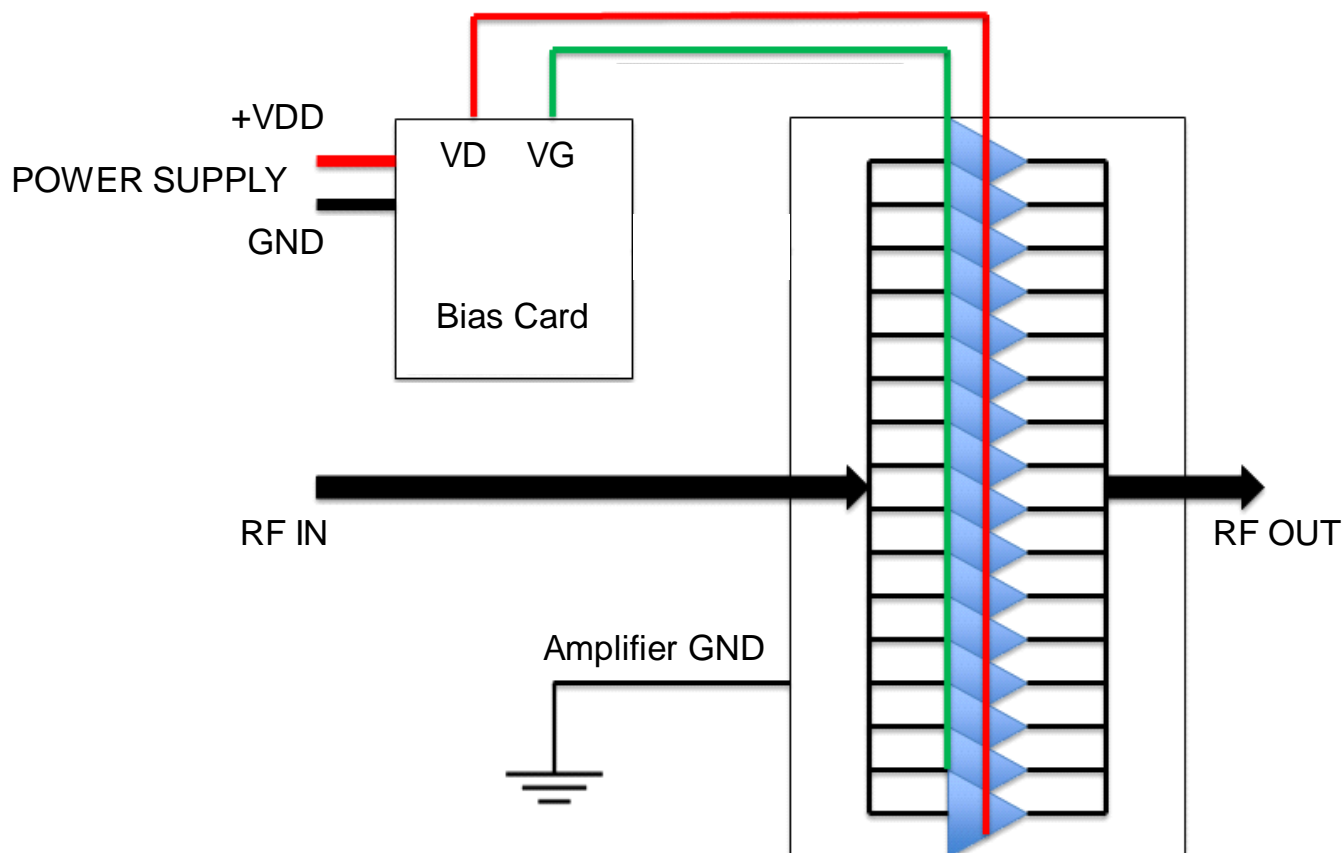


Typical Performance – Large Signal

Conditions unless otherwise specified: $V_D = +22\text{ V}$, $I_{DQ} = 4.5\text{ A}$, $T = 25\text{ }^\circ\text{C}$, CW Operation



Block Diagram and Description



Pin No.	Label	Description
RF In	N/A	2.92mm (F) Coaxial RF Input.
RF Out	N/A	WR28 Waveguide High Power RF Output
POWER SUPPLY +VDD	J2000	MOLEX connector, PN76825-0008
POWER SUPPLY GND	J2001	MOLEX connector, PN76825-0010

Mechanical Information – Outline Drawing (Spatium™ Unit)

NOTES: UNLESS OTHERWISE SPECIFIED

1. LABELS ARE IDENTICAL. ENSURE SERIAL NUMBERS ARE THE SAME ON BIAS CARD, SPATIUM, AND CABLE FOR MATCH SET.

SN: * * * * *

BATCH I.D.
WORK WEEK
CALENDAR YEAR
MANUFACTURER

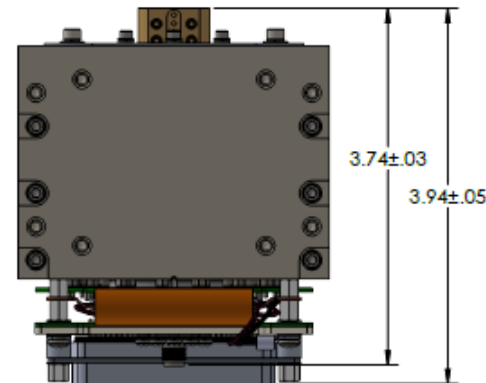
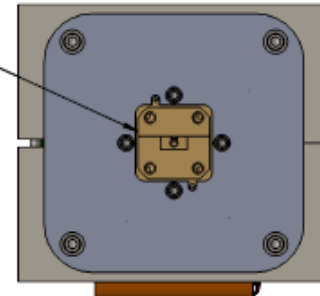
Part: XXXXXXX-XX-X DATE CODE: WWWW
CAGE CODE: 10VMH
S/N: XXXXXXX

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

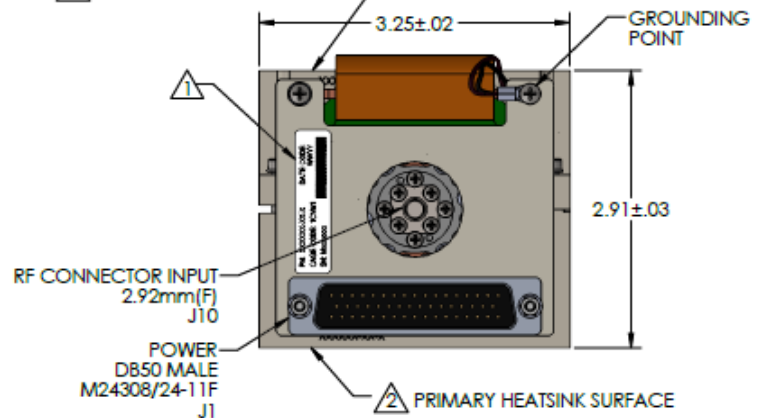
3. BIAS CARD REQUIRES AIR FLOWING OVER IT AT A MINIMUM RATE OF 1 m/sec.

4. PRIMARY AND ALTERNATE MOUNTING OPTIONS FOR COOLING OR ATTACHMENT ARE LISTED ON INDICATED FACE.

RF WAVEGUIDE OUTPUT
WR-28 UG599/U
J11

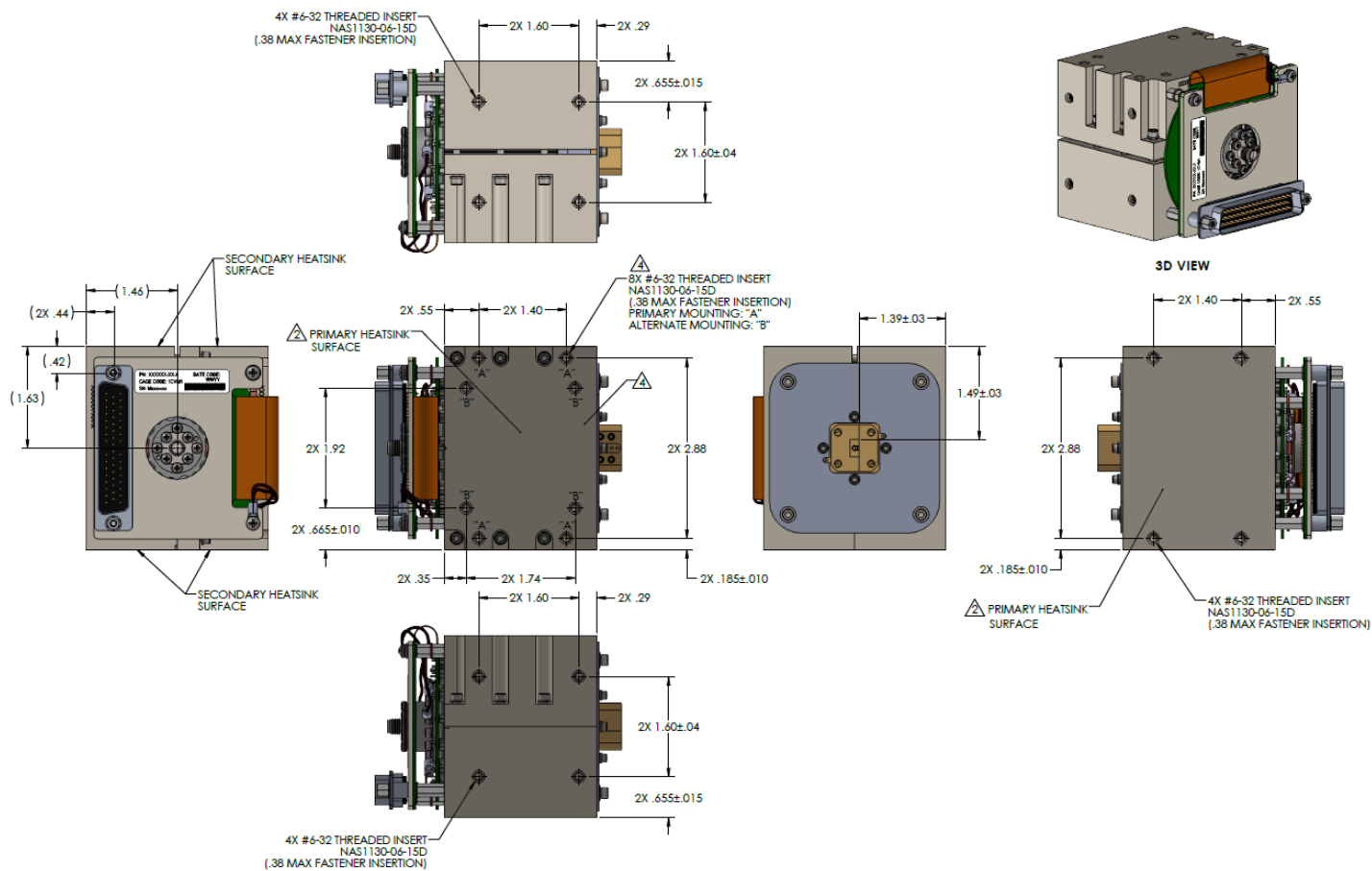


2. PRIMARY HEATSINK SURFACE



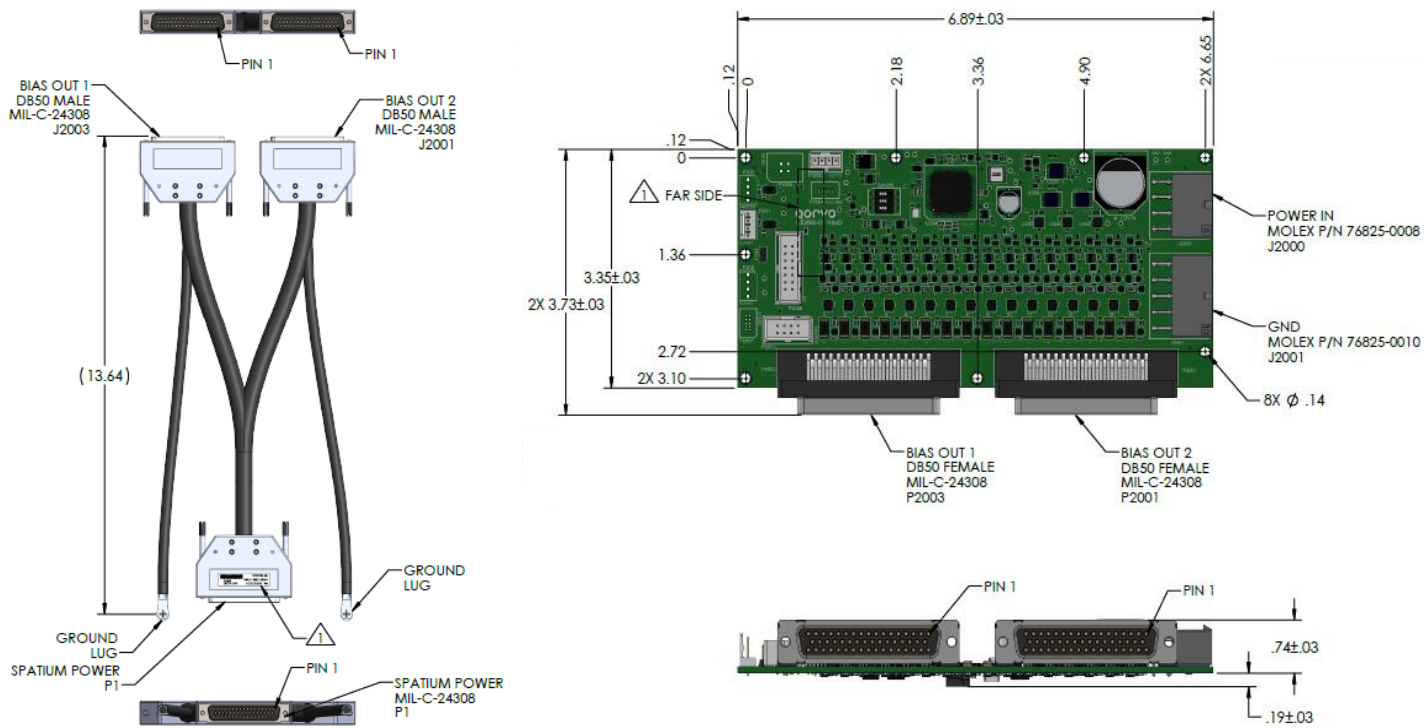
Dimensions are in INCHES

Mechanical Information – Outline Drawing (Spatium™ Unit)

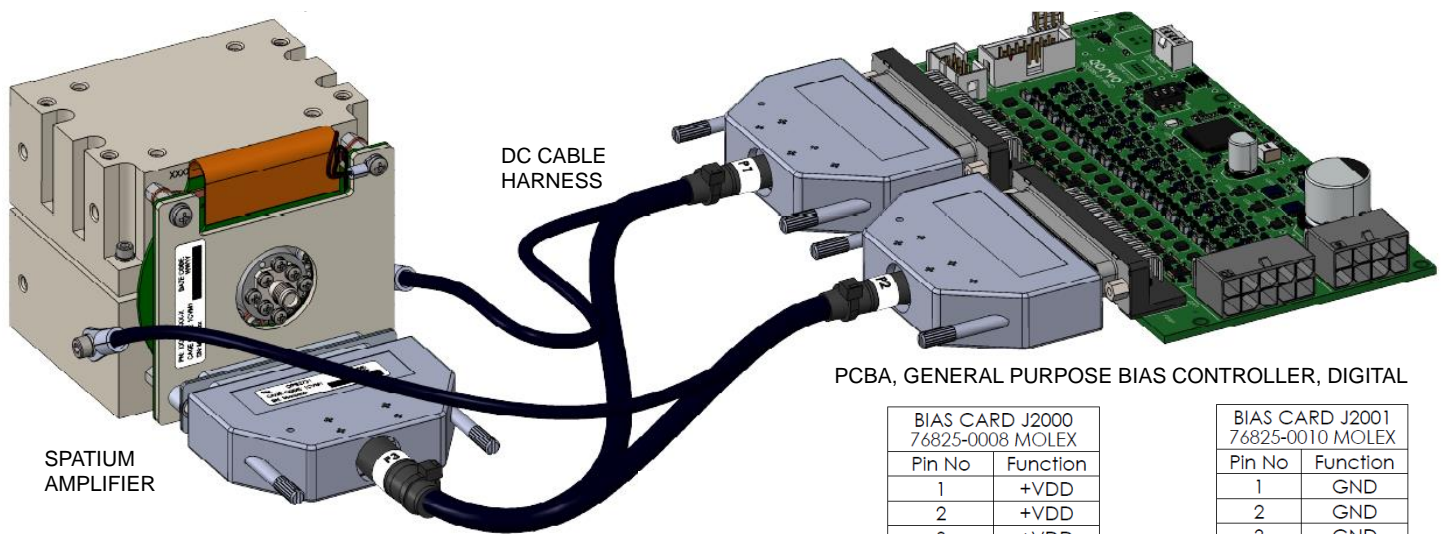


Dimensions are in INCHES

Mechanical Information – Outline Drawing (Bias Card & Cabling)



Dimensions are in INCHES



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



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

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