

Features

- Saturated Output Power: +41 dBm
- Linear Gain: 24 dB
- Power Added Efficiency: 30% at P_{SAT}
- 50 Ω Input / Output Match
- Ceramic Flange Mount Package
- RoHS* Compliant and 260°C Re-flow Compatible

Description

The MAAP-010168 is a two stage MMIC power amplifier designed for broadband high power applications. It can be used as either a driver or an output stage amplifier. This device is fully matched input and output to 50 Ω which eliminates any sensitive external RF tuning components.

The device is packaged in a lead free 10-lead flanged package for high volume manufacturing.

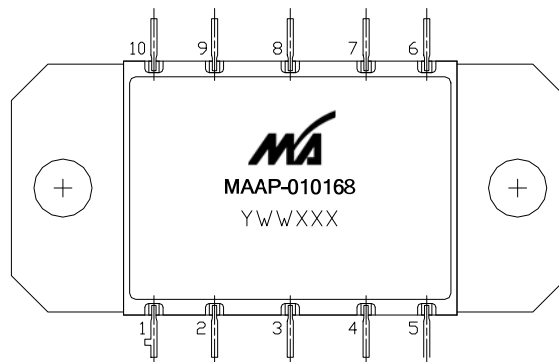
The MAAP-010168 is fabricated using a high reliability pHEMT process, to realize good power added efficiency and gain. The pHEMT process features full passivation for high performance and reliability.

Ordering Information¹

Part Number	Package
MAAP-010168-000000	Bulk

1. Reference Application Note M567 for package handling and mounting procedure.

Functional Schematic



Pin Configuration²

Pin No.	Function
1	V_{GG2}
2	V_{GG1}
3	RF Input
4	V_{GG1}
5	V_{GG2}
6	V_{DD1}
7	V_{DD2}
8	RF Output
9	V_{DD2}
10	V_{DD1}

2. Flange is DC and RF ground.

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

* Restrictions on Hazardous Substances,
European Union Directive 2002/95/EC.

Electrical Specifications:

Freq. = 0.5 - 3.0 GHz, $V_{DD} = 10\text{ V}$, $I_{DQ} = 3.5\text{ A}$, $T_A = 25\text{ }^\circ\text{C}$, $Z_0 = 50\text{ }\Omega$

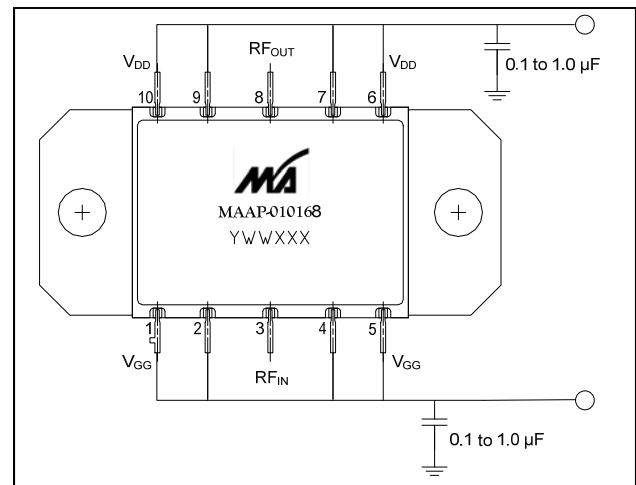
Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	Small signal	dB	19	24	—
Input Return Loss	—	dB	—	10	—
Output Return Loss	—	dB	—	10	—
P1dB	—	dBm	—	39	—
P_{SAT}	—	dBm	38	41	—
Current	I_{DQ} P_{SAT}	A	— —	3.5 5.5	— —
PAE	P_{SAT}	%	—	30	—
Gate Bias	—	V	—	-0.7	—
Duty Cycle	—	%	—	—	100

Absolute Maximum Ratings^{3,4,5}

Parameter	Absolute Maximum
Input Power	+24 dBm
Operating Supply Voltage	+11 Volts
Operating Gate Voltage	-2 Volts
Operating Temperature	-40°C to +85°C
Channel Temperature ⁶	+150 °C
Storage Temperature	-40°C to +150°C

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- M/A-COM Technology Solutions does not recommend sustained operation near these survivability limits.
- Operating at nominal conditions with $T_J \leq +150^\circ\text{C}$ will ensure $MTTF > 1 \times 10^6$ hours.
- Junction Temperature (T_J) = $T_C + \Theta_{JC} * ((V * I) - (P_{OUT} - P_{IN}))$
Typical thermal resistance (Θ_{JC}) = 2.0°C/W
 - For $T_C = 25^\circ\text{C}$ @ 1.5 GHz
 $T_J = +80^\circ\text{C}$ @ +10 V, 4000 mA, $P_{OUT} = 41\text{ dBm}$, $P_{IN} = 21\text{ dBm}$
 - For $T_C = 85^\circ\text{C}$ @ 1.5 GHz
 $T_J = +138^\circ\text{C}$ @ +10 V, 3900 mA, $P_{OUT} = 41\text{ dBm}$, $P_{IN} = 21\text{ dBm}$

Recommended Bias Configuration



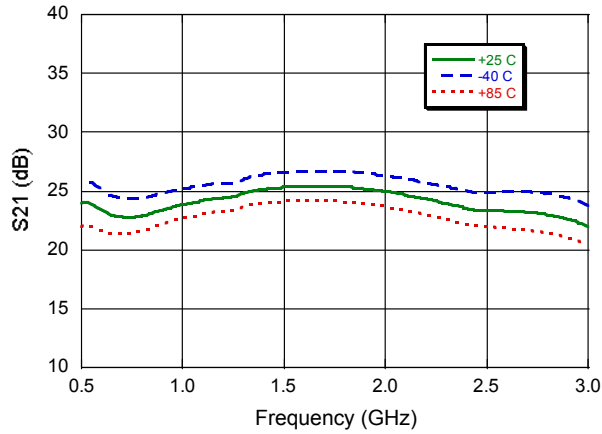
Operating the MAAP-010168

The MAAP-010168 is static sensitive. Please handle with care. To operate the device, follow these steps. Ramp down or shutdown in reverse order (gate bias on first and off last). All V_{GG} pins should have the same voltage applied at all times.

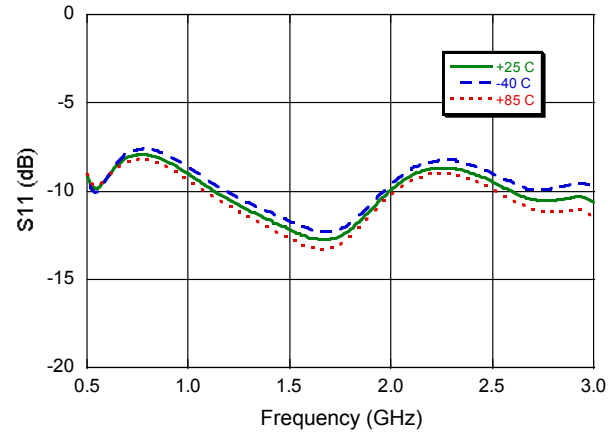
- Apply V_{GG} (-1.5 V).
- Apply V_{DD} (10.0 V Typical).
- Set I_{DQ} by adjusting V_{GG} .
- Apply RF_{IN} .

Typical Performance Curves

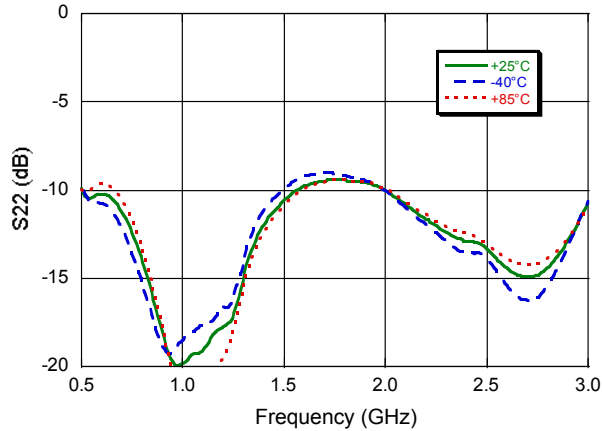
Gain



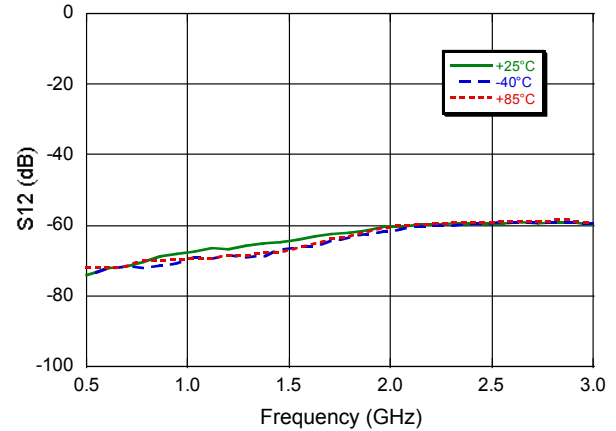
Input Return Loss



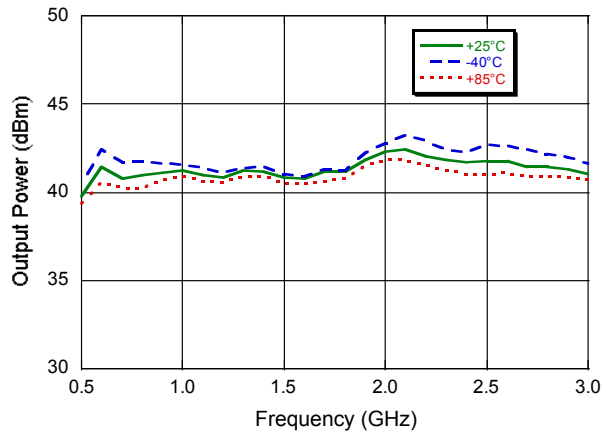
Output Return Loss



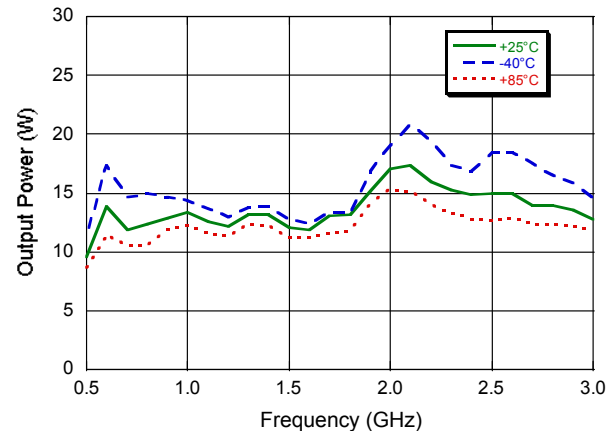
Reverse Isolation



Output Power (dBm)

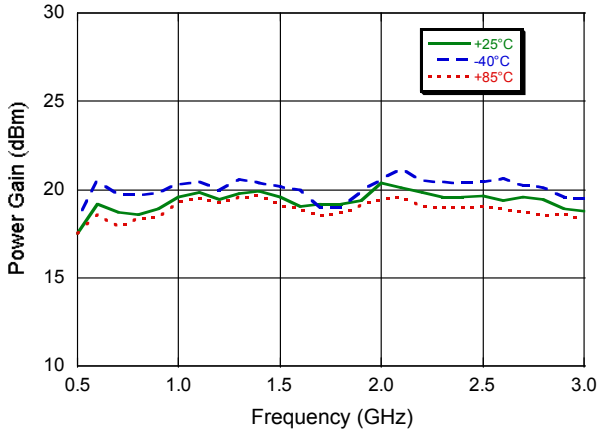


Output Power (W)

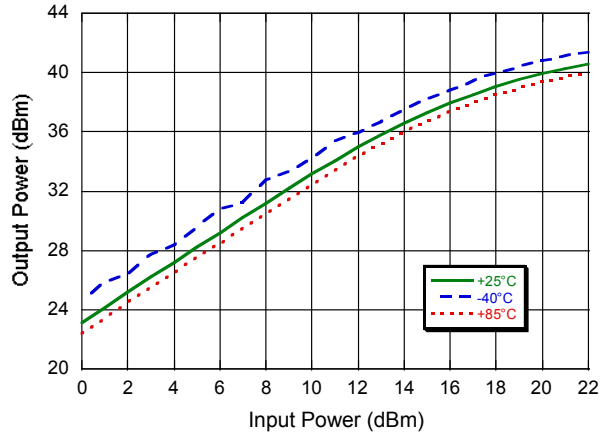


Typical Performance Curves

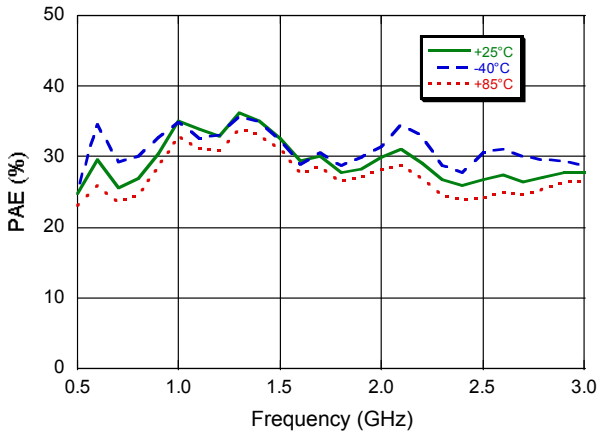
Power Gain



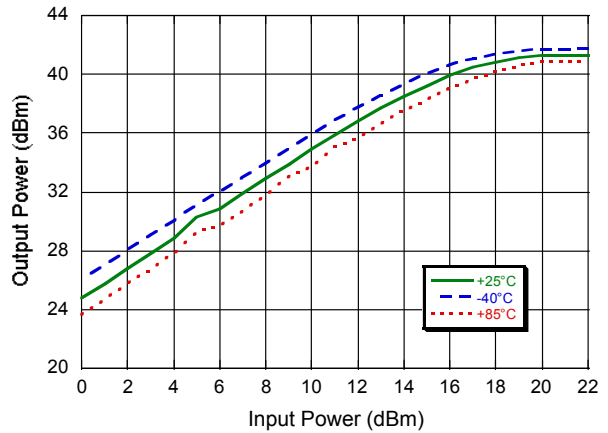
Output Power Sweep @ 0.7 GHz



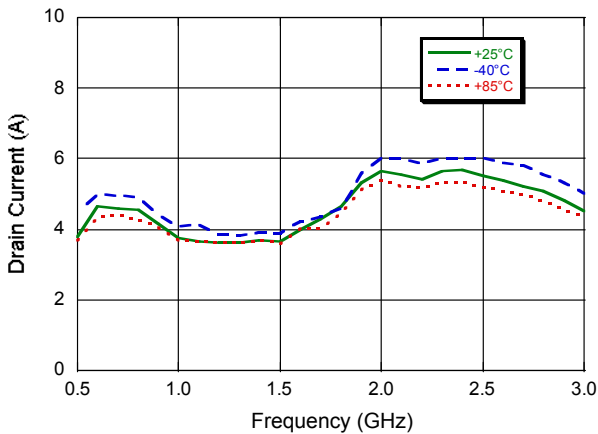
Power Added Efficiency



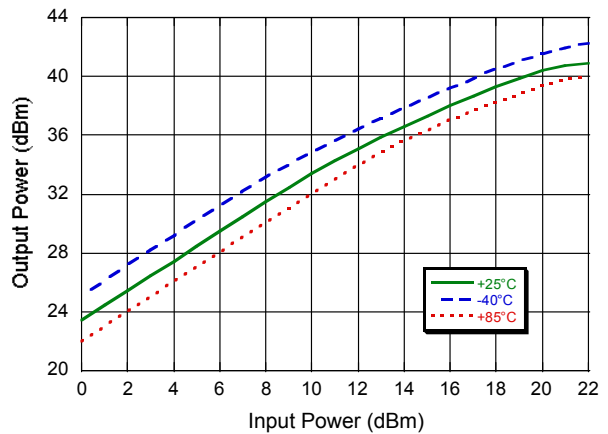
Output Power Sweep @ 1.5 GHz



Drain Current

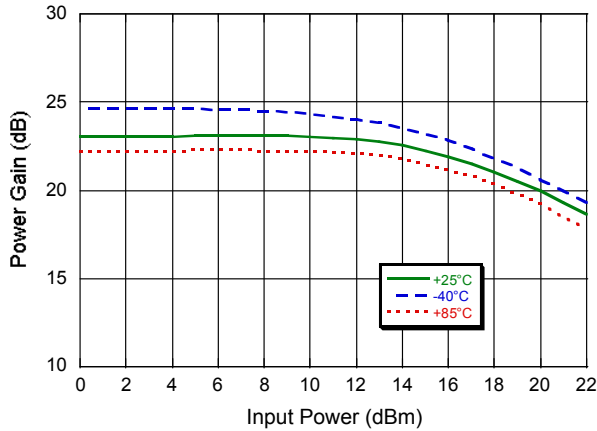


Output Power Sweep @ 2.5 GHz

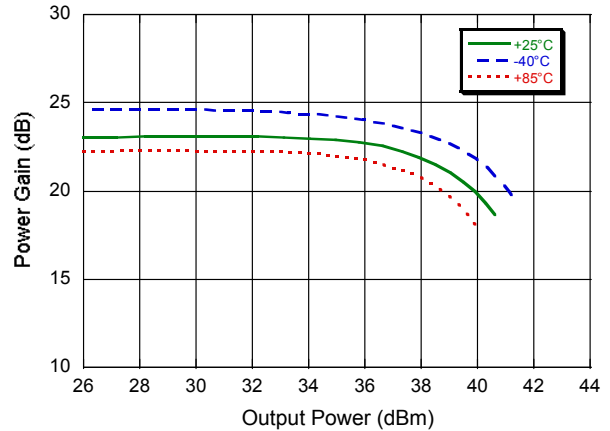


Typical Performance Curves

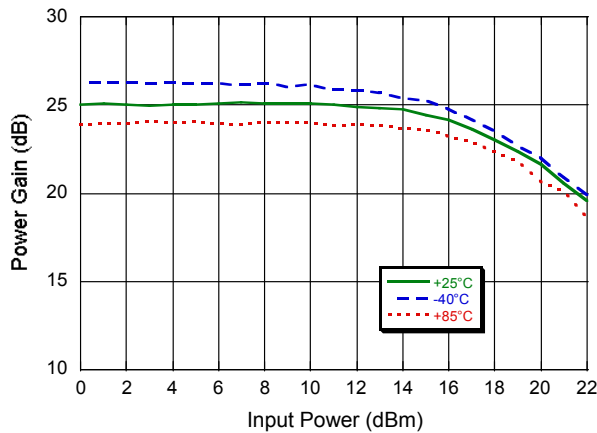
Power Gain vs. Input Power @ 0.7 GHz



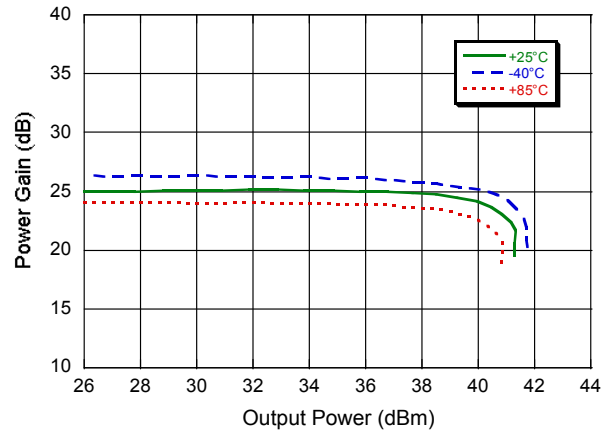
Power Gain vs. Output Power @ 0.7 GHz



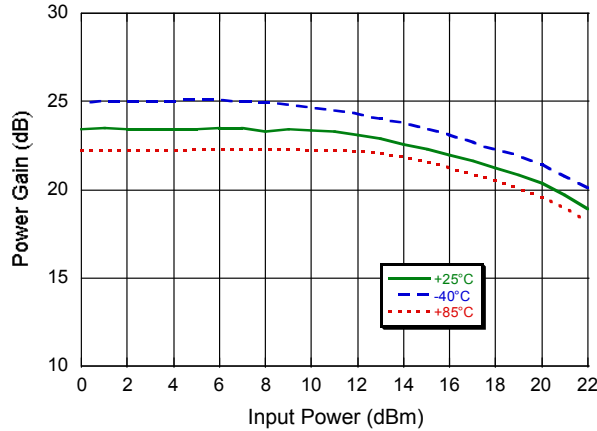
Power Gain vs. Input Power @ 1.5 GHz



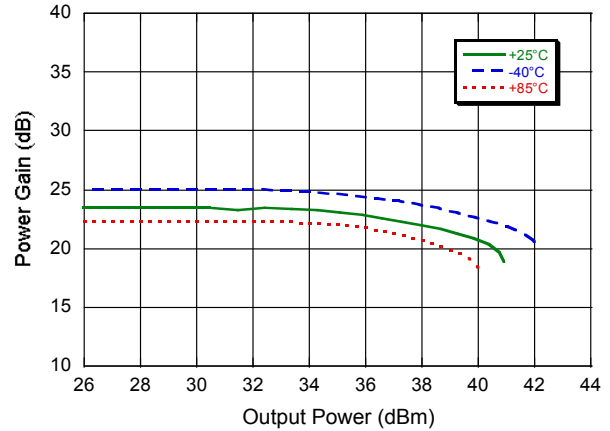
Power Gain vs. Output Power @ 1.5 GHz



Power Gain vs. Input Power @ 2.5 GHz

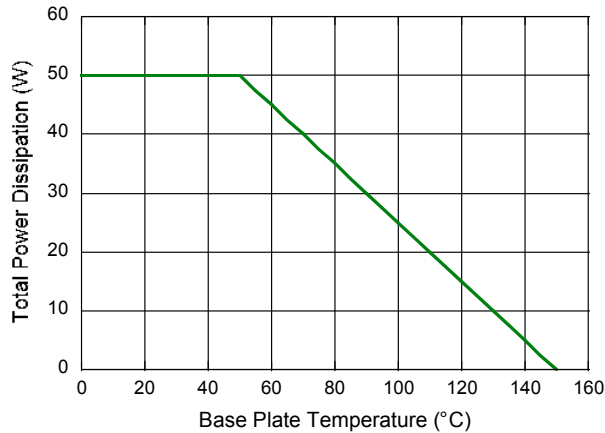


Power Gain vs. Output Power @ 2.5 GHz

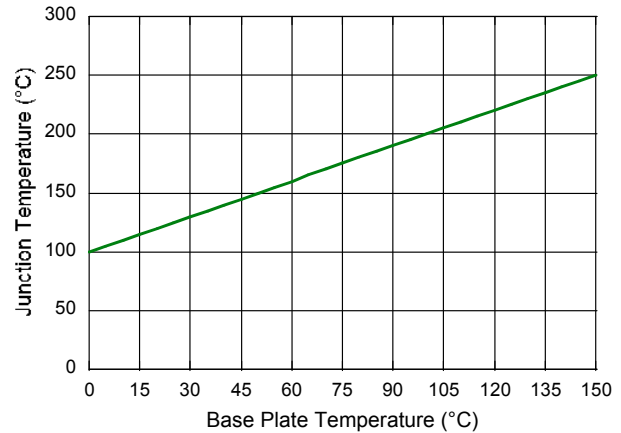


Typical Performance Curves

Max. Power Dissipation vs. Base Plate Temperature⁷

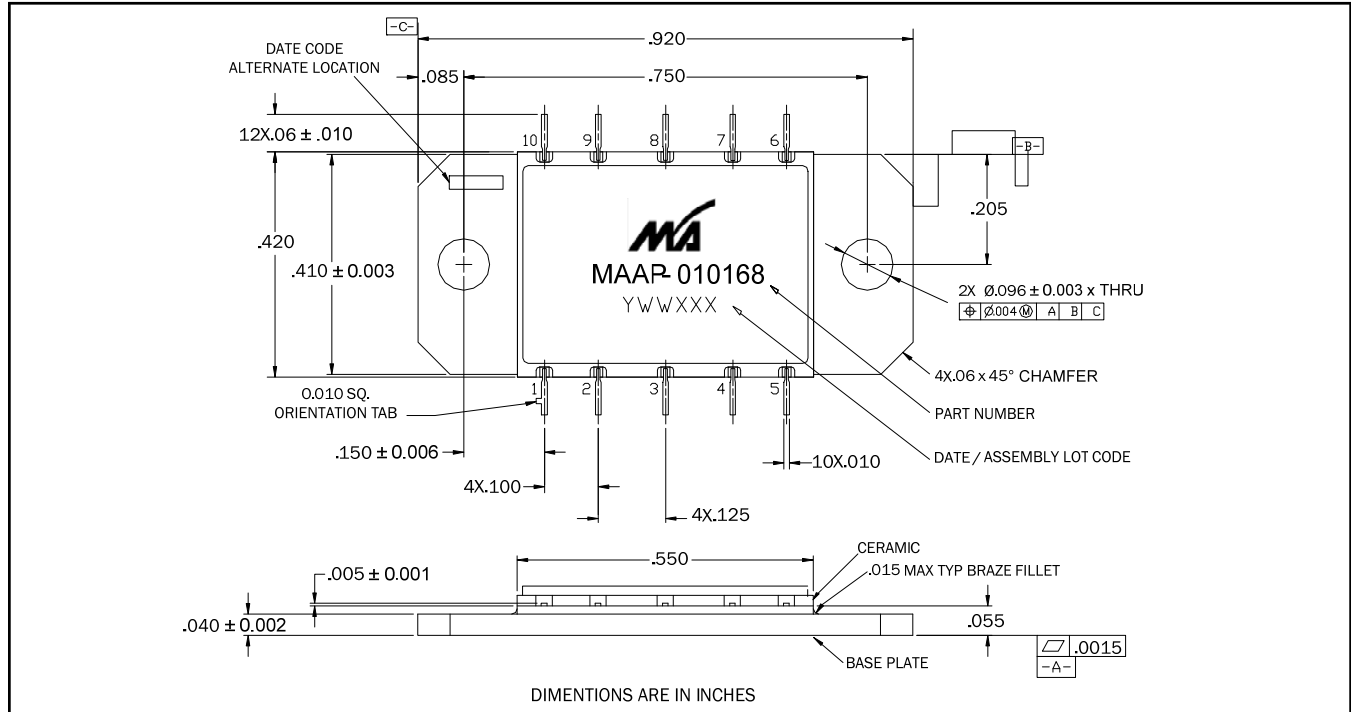


Junction Temperature vs. Base Plate Temperature with 50 W Power Dissipation



7. Power dissipation should not exceed the maximum plot shown above to maintain $T_J < 150^\circ\text{C}$. It is recommended to monitor power dissipation and decrease power dissipation in the device as required.

Ceramic Flange Mount Package[†]



[†] Reference Application Note M538 for lead-free solder reflow recommendations.

This is a high frequency, low thermal resistance package. The package consists of a cofired ceramic construction with a copper-tungsten base and iron-nickel-cobalt leads. The finish consists of electrolytic gold over nickel plate.