Cascadable Broadband InGaP MMIC Amplifier
DC-14 GHz P1A-1300MT

Description

P1dB's P1A-1300MT cascadable broadband InGaP HBT MMIC amplifier is a low-cost high-performance solution for your general-purpose RF and microwave amplification needs. This 50-ohm gain block is based upon a mature and reliable HBT (Heterojunction Bipolar Transistor) process and utilizes proprietary MMIC design techniques, providing best in class performance for small-signal applications.

The P1A-1300MT is packaged in a low-cost surface-mount ceramic package shipped in tape and reel, enabling ease of assembly for high-volume applications. The P1A-1300MT has a very simple application circuit including external DC decoupling caps which limit the low-frequency response as well as an external dropping resistor that provides excellent performance stability and design flexibility.

The P1A-1300MT is available in either packaged or die form, where its gold metallization is ideal for hybrid circuit designs. Packaged parts are available in bulk or tape and reel. Connectorized evaluation board designs are also available for characterization purposes.

Features

- Reliable Low-Cost InGaP HBT Design
- Extremely Broadband (optimized for low parasitic reactance)
- Excellent Gain Flatness and High P1dB
- Single Power Supply Operation
- 50 Ω Input/Output Matched
- Ceramic Micro X Package

Applications

- Narrowband and Broadband Applications for both Commercial and Military Designs
- Linear & saturated amplifier applications.
- Gain stage or driver amplifiers utilized in many applications such as point to point radio, test equipment, VSAT, and military communication systems.

Ordering Information

Part Number	Description
P1A-1300MT	Indivdual Part
P1A-1300MTK1	Tape & Reel, 1000 Pieces
P1A-1300MTE	Evaluation Board

Package Information

 188 Martinvale Lane Phone: (408) 414-1450 Fax: (408) 414-1461 Web: www.P1dB.com

Absolute Maximum Ratings

Parameter	Rating	Units
RF Input Power	+20	dBm
Power Dissipation	303	mW
Device Current	79	mA
Channel Temperature	150	°C
Operating Temperature	-45 to +85	°C
Storage Temperature	-65 to +150	°C
ESD Level (HBM)		V
Moisture Sensitivity Level		

Caution! ESD sensitive device.
Caution! Exceeding any one or a combination of these limits may cause permanent damage.
RoHS Compliant

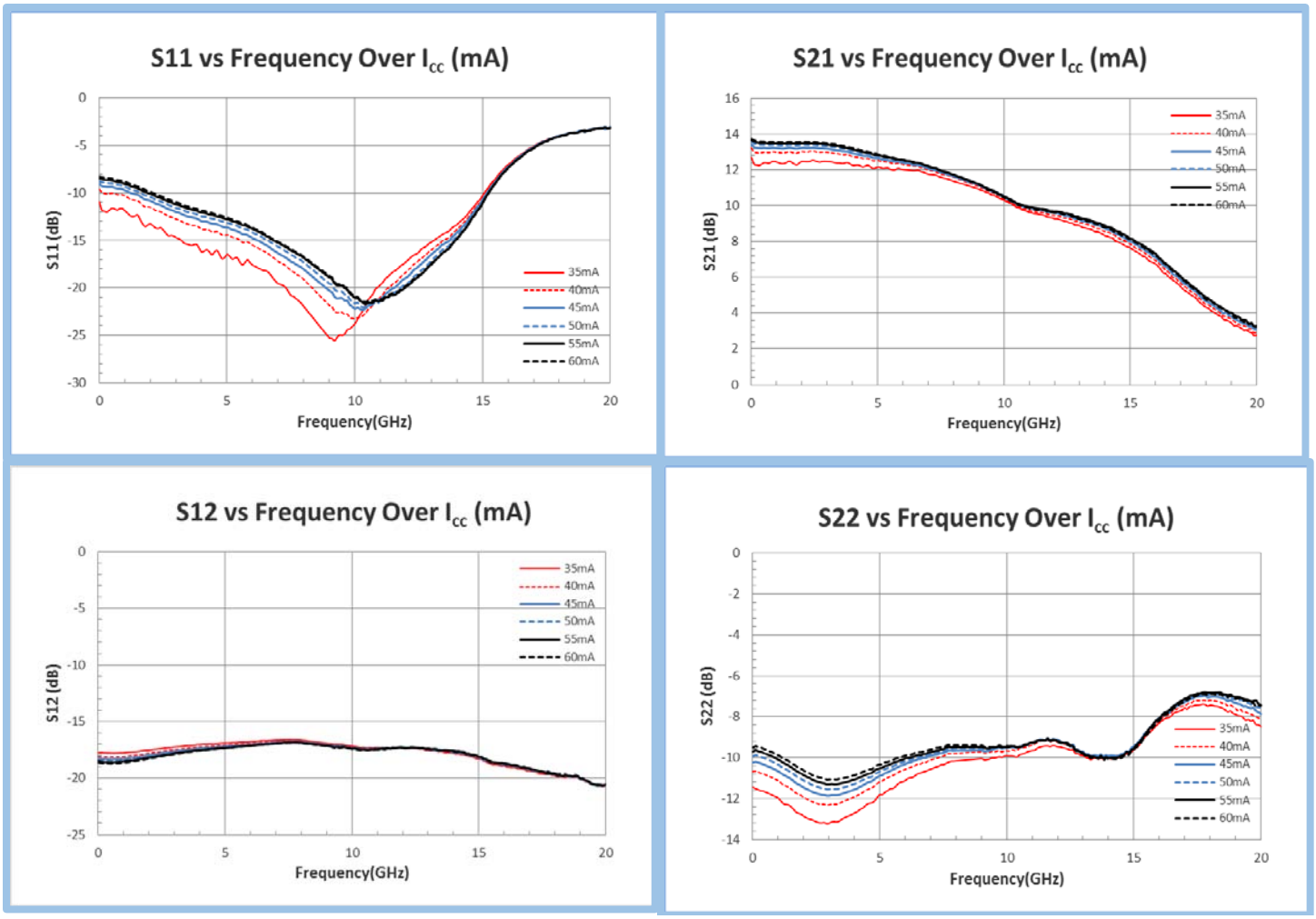
Nominal Operating Parameters

Parameter	Test Conditions	Units	Min.	Typ.	Max.
General Performance		Vd = +3.85V, Icc=50mA, Z_0=50Ω, Ta=+25°C			
Small Signal Power Gain, S_{21}	f=0.1 to 1.0 GHz f=1.0 to 4.0 GHz f=4.0 to 6.0 GHz f=6.0 to 12.0 GHz f=12.0 to 14.0 GHz	dB dB dB dB dB	13.3 13.0 12.7 10.3 9.2	13.4 13.2 13.1 11.4 9.7	
Gain Flatness, G_F	f=0.1 to 12.0 GHz	dB		±0.7	
Input and Output VSWR	f=0.1 to 4.0 GHz f=4.0 to 6.0 GHz f=6.0 to 12.0 GHz f=12.0 to 14.0 Ghz			1.8 1.8 1.8 1.8	
Bandwidth, BW	BW3 (3dB)	GHz		11.5	
Output Power @ 1-dB Compression, P1dB	f=2.0 GHz f =6.0 GHz f=12.0 GHz	dBm dBm dBm		14.0 14.5 13.4	
Noise Figure, NF	f=3.0 GHz	dB		5.5	
3rd Order Intercept, IP3	f=2.0 GHz	dBm		+28.0	
Reverse Isolation,S_{12}	f=0.1 to 14.0 GHz	dB		-16	
Device Voltage, Vd		V	3.7	3.85	3.95
Gain Temperature Coefficient, $\partial G_T/\partial T$		dB/°C		-0.0015	

Nominal Operating Parameters

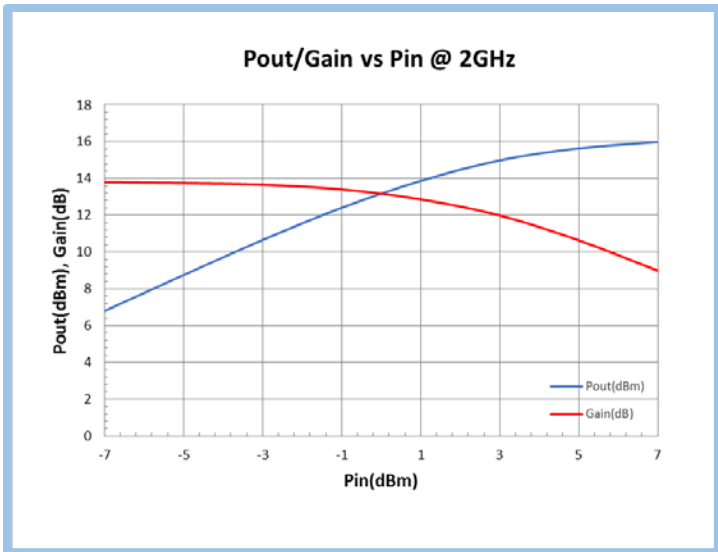
Parameter	Condition	Units	Min.	Typ.	Max.
MTTF versus Temperature at Icc = 50mA					
Case Temperature		°C		85	
Junction Temperature		°C		115	
MTTF		hours		>10[b]	
Termal Resistance					
θ_{JC}	$\theta_{JC} = (J_T - T_{CASE})/(V_D * I_{CC})$	°C/W		160	

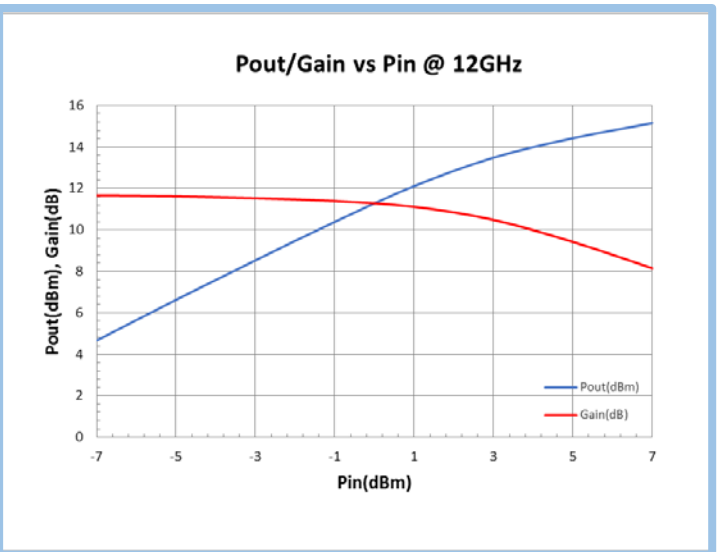
Typical Performance

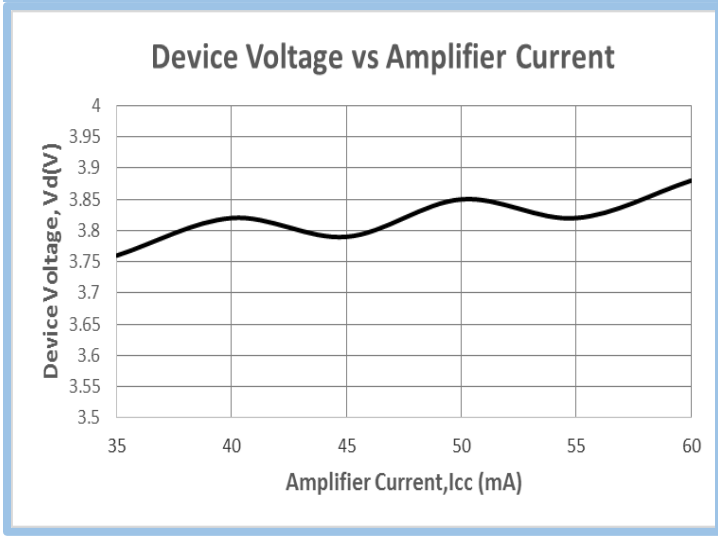


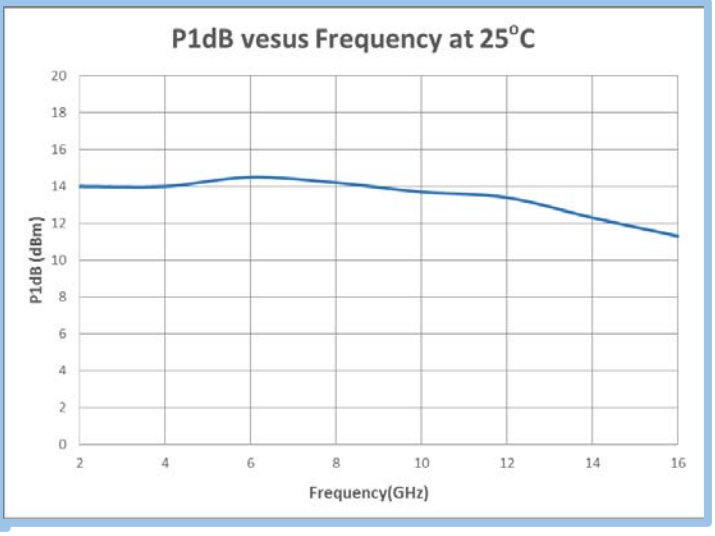
Note: The s-parameter gain results shown above were performed using a test fixture.

Typical Performance (continued)

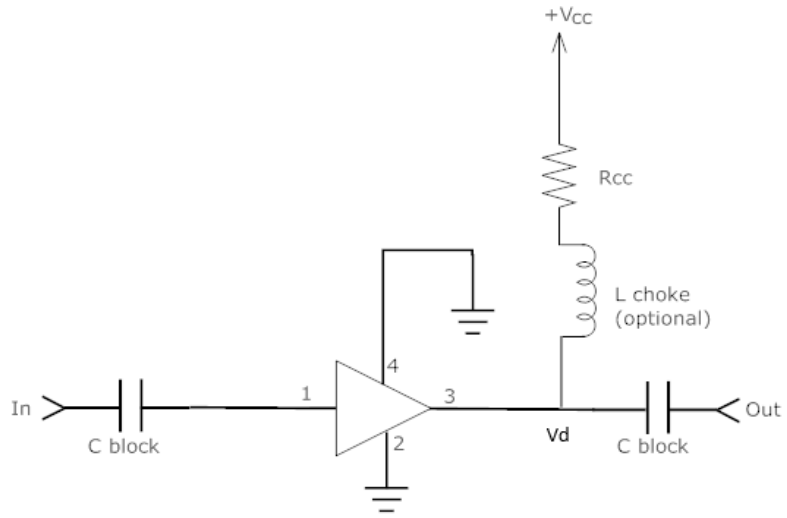






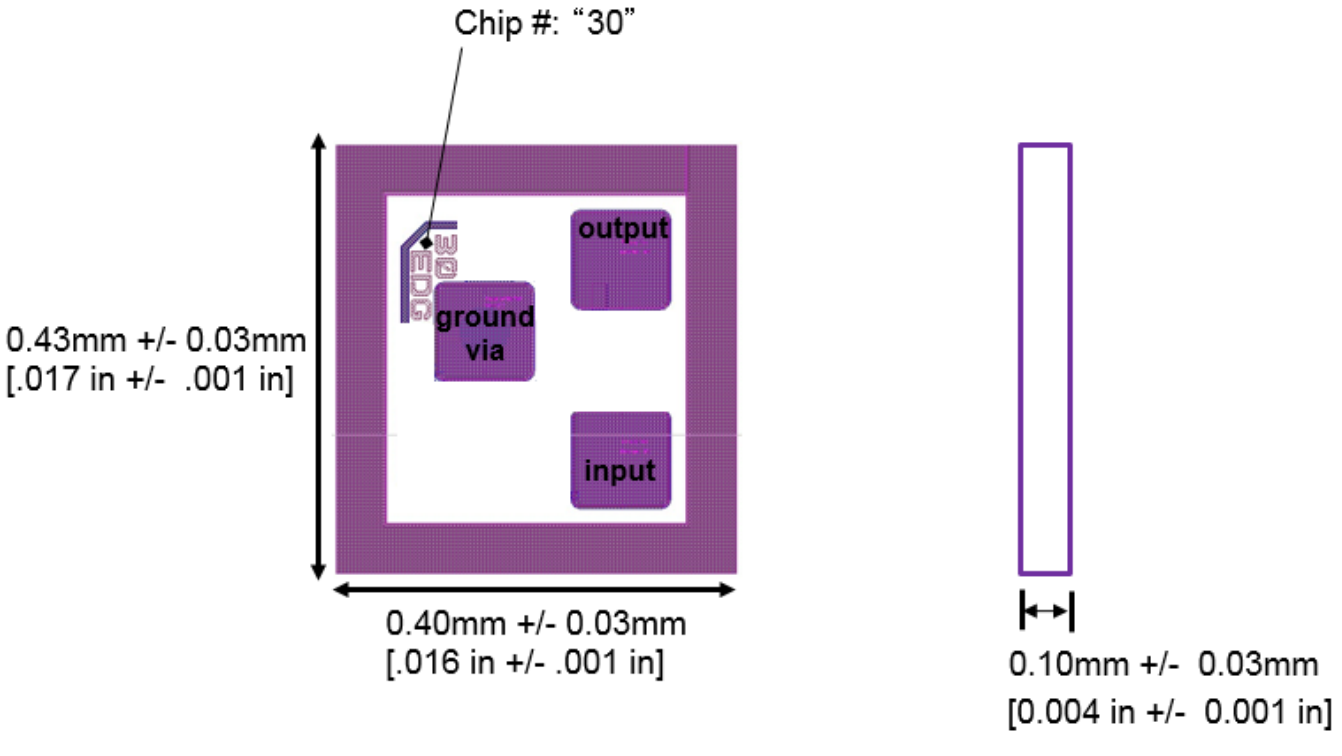


Typical Bias Configuration

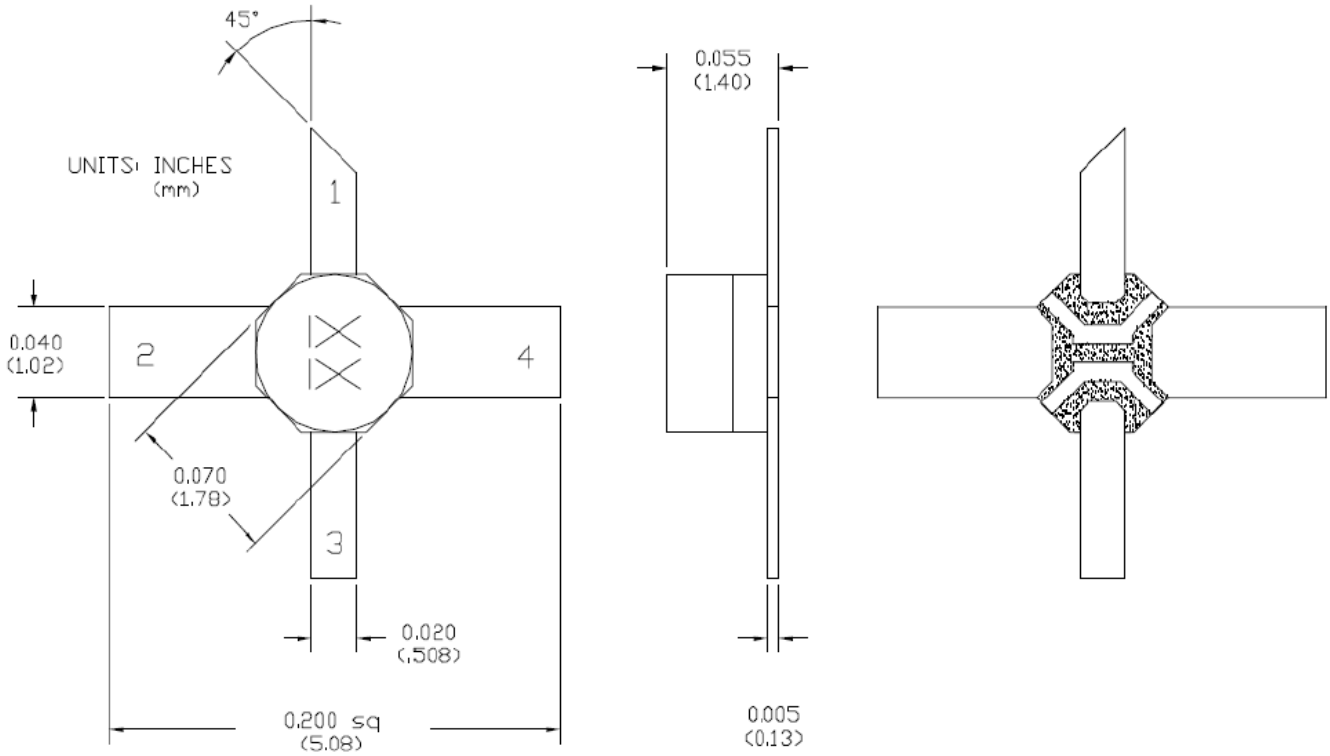


Recommended Bias Resistor Values @ Icc = 50 mA						
Supply Volatage, V_{cc} (V)	5	8	10	12	15	20
Bias Resistor, Rcc (Ω)	23	83	123	163	223	323

Die Drawing



Package Dimensions & Pin Descriptions



Pin	Name	Description
1	RF_{in}	RF input pin. A DC blocking capacitor specified for the frequency of operation should be used.
2	Gnd	Ground Connection.
3	RF_{out}	RF output and bias pin. Biasing is accomplished with an external series resistor and a choke inductor. The resistor value is determined by the following equation: $R = \frac{(Vcc-Vd)}{Icc}$
4	Gnd	Ground Connection.