Cascadable Broadband InGaP MMIC Amplifier
DC-14 GHz P1A-2400MT

Description

P1dB's P1A-2400MT 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-2400MT is packaged in a low-cost surface-mount plastic package shipped in tape and reel, enabling ease of assembly for high-volume applications. The P1A-2400MT 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-2400MT is available in either packaged or die form. 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
- Plastic 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-2400MT	Individual Part
P1A-2400MTD	Individual Part
P1A-2400MTK1	Tape & Reel, 1000 Pieces
P1A-2400MTE	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	353	mW
Device Current	90.5	mA
Channel Temperture	150	°C
Operating Temperature	-45 to +85	°C
Storage Temperature	-65 to +150	°C
ESD Level (HBM)	Class 1A	
Moisture Sensitivity Level	MSL-2	

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

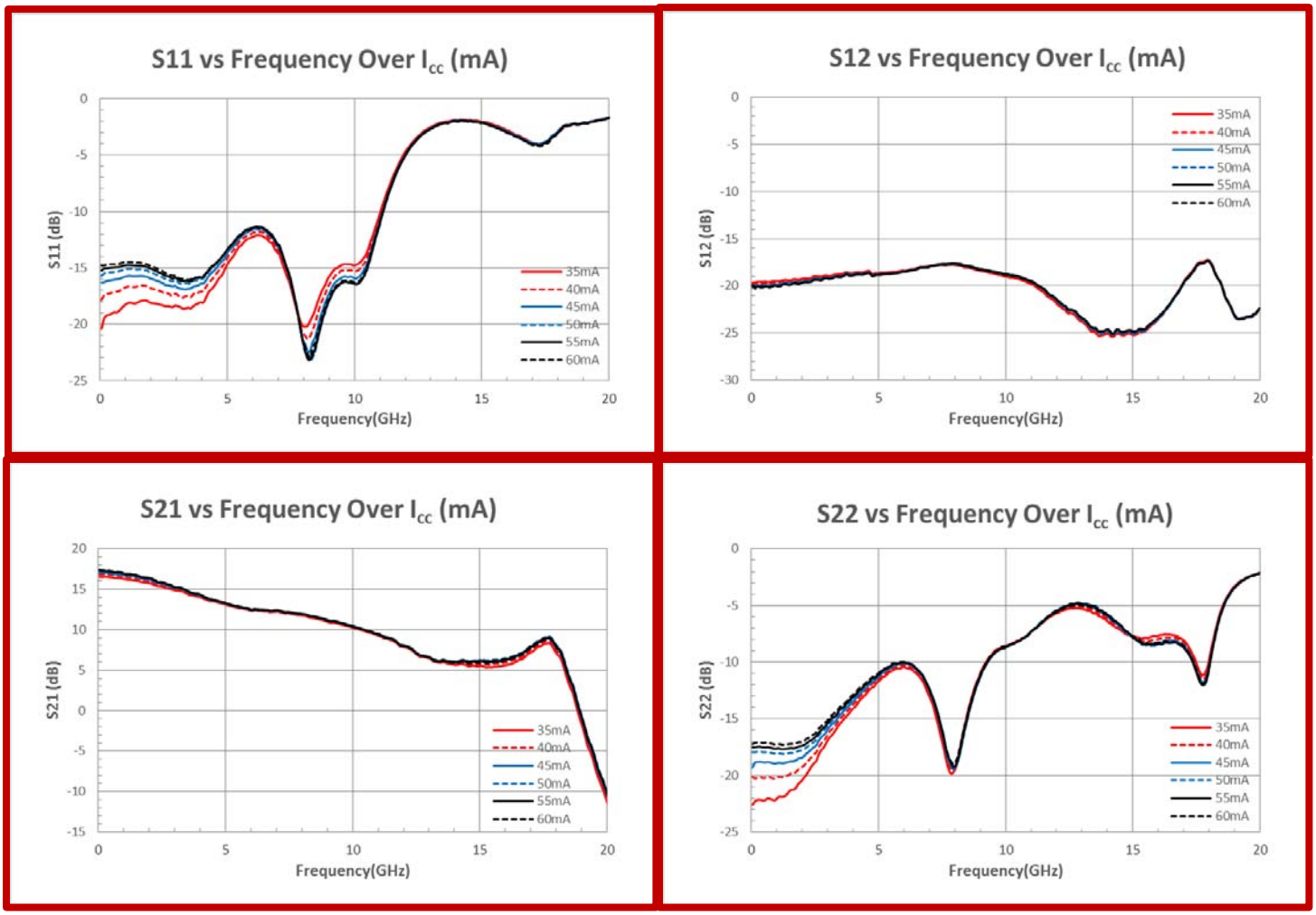
Nominal Operating Parameters

Parameter	Test Conditions	Units	Min.	Typ.	Max.
General Performance		Vd = +3.9V, 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	16.8 13.7 11.8 6.5 4.4	17.0 15.5 13.0 9.5 6.0	
Gain Flatness, G_F	f=0.1 to 6.0 GHz	dB		±2.5	
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			2.4:1 2.2:1 2.4:1	
Bandwidth, BW	BW3 (3dB)	GHz		4.0	
Output Power @ 1-dB Compression, P1dB	f =2.0 GHz f =6.0 GHz f=12.0 GHz	dBm dBm dBm		14.5 15.5 12.0	
Noise Figure, NF	f=3.0 GHz	dB		5	
3rd Order Intercept, IP3	f=2.0 GHz	dBm		+27	
Reverse Isolation,S_{12}	f=0.1 to 14.0 GHz	dB		-17	
Device Voltage, Vd		V	3.8	3.9	4.0
Gain Temperature Coefficient, $\partial G_T/\partial T$		dB/°C		-0.0015	

Nominal Operating Parameters

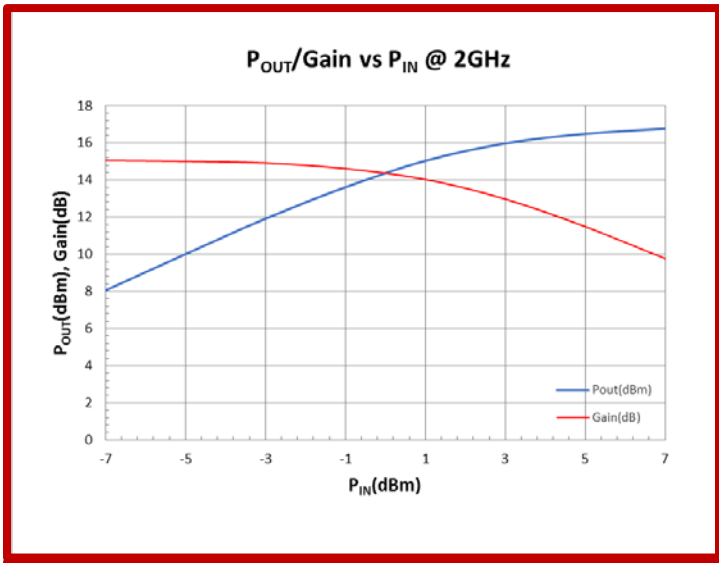
Parameter	Condition	Units	Min.	Typ.	Max.
MTTF versus Temperature at Icc = 50mA					
Case Temperature		°C		85	
Junction Temperature		°C		113	
MTTF		hours		>10^6	
Termal Resistance					
θ_{JC}	$\theta_{JC} = (J_T - T_{CASE})/(V_D * I_{CC})$	°C/W		185	

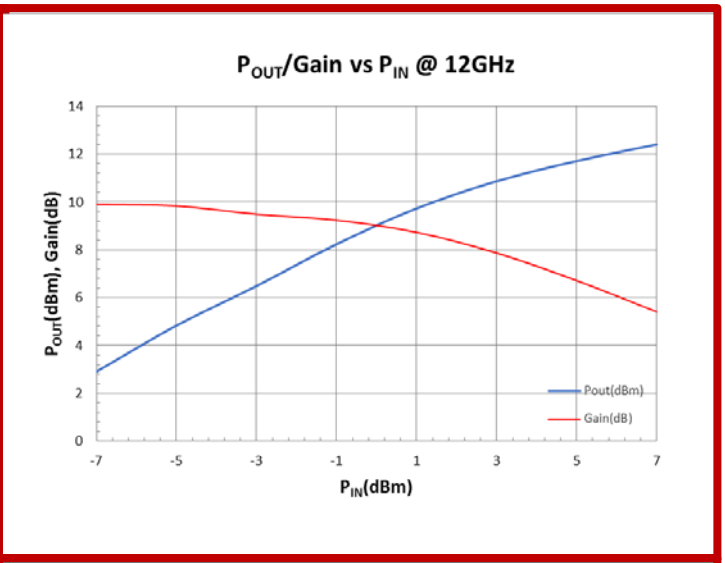
Typical Performance

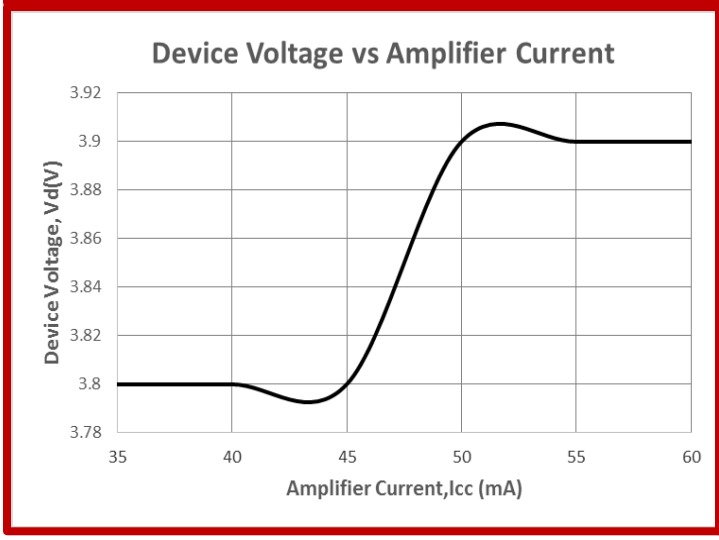


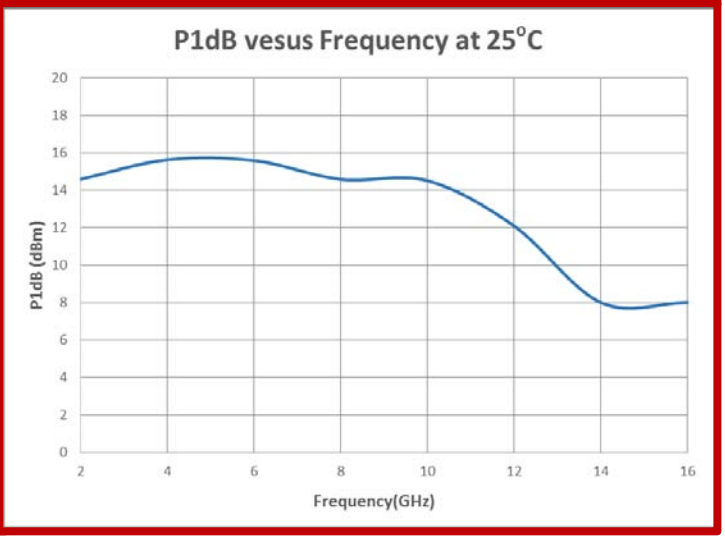
Note: The s-parameter gain results shown above were obtained using an evaluation board. A +0.9 dB S_{21} gain improvement at 12GHz can be expected with improved system impedence matching.

Typical Performance (continued)

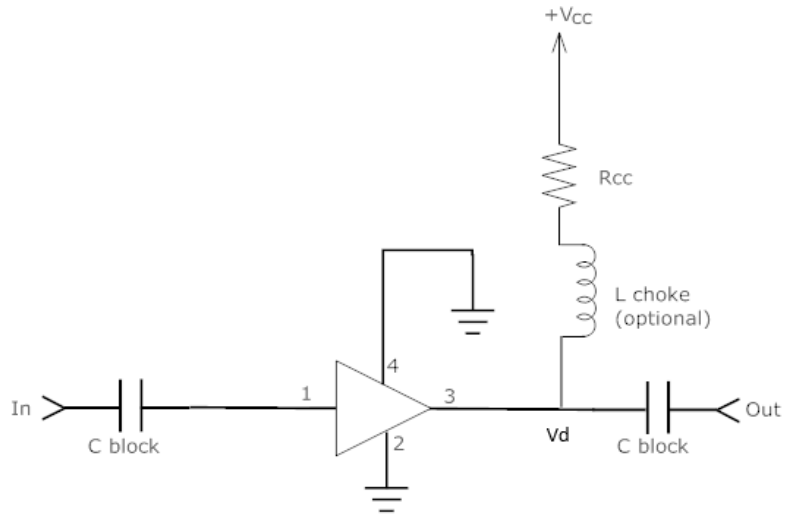






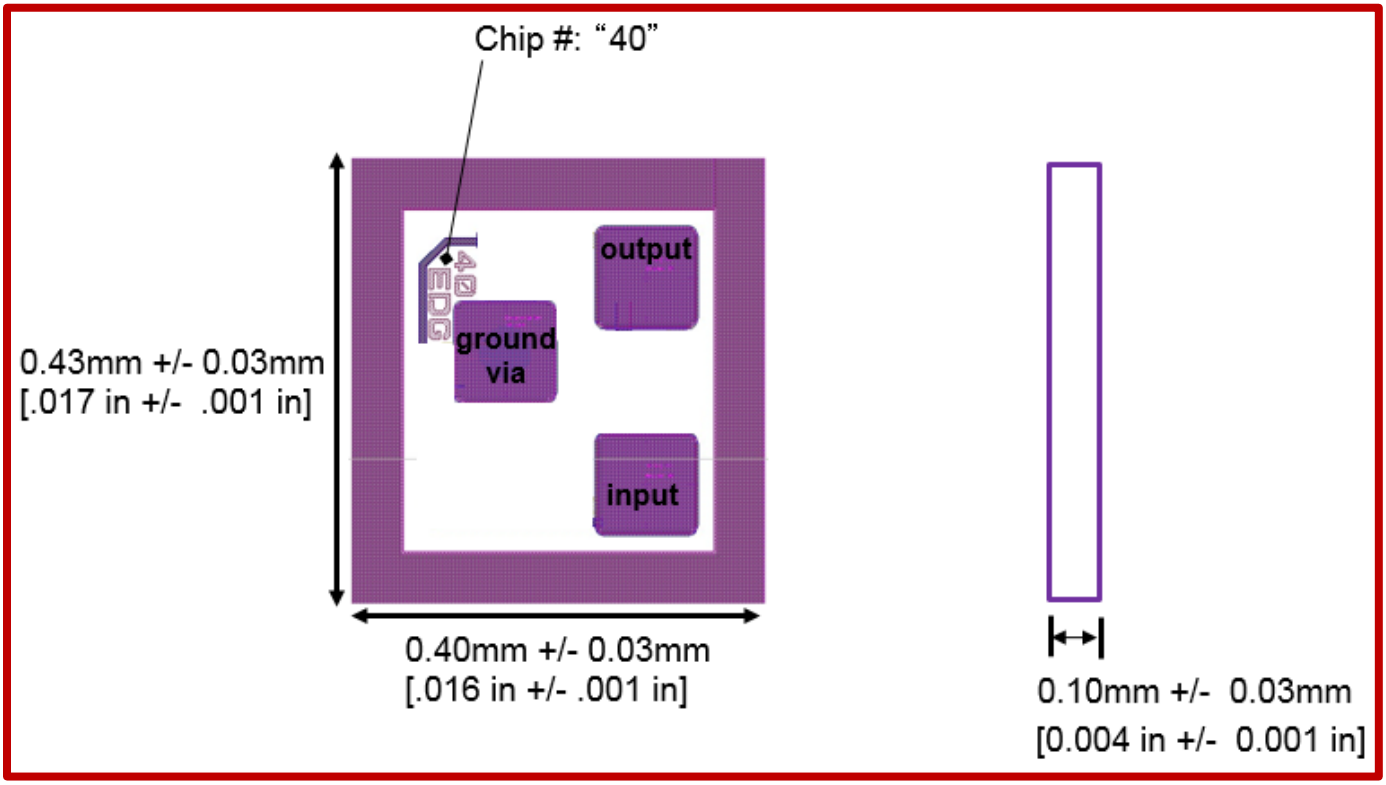


Typical Bias Configuration

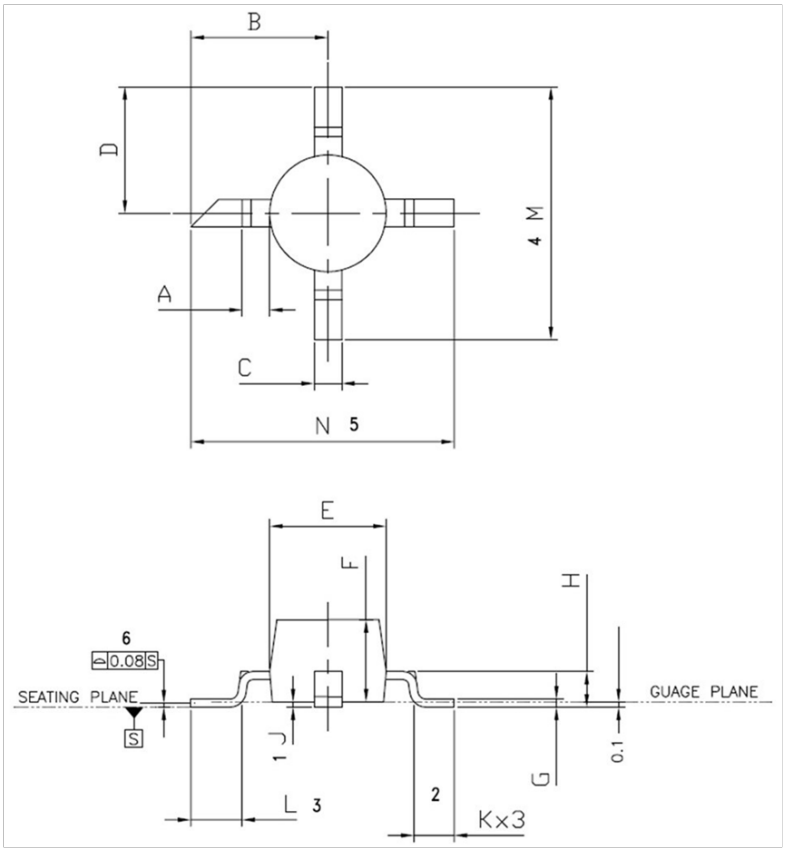


Recommended Bias Resistor Values @ Icc = 50 mA						
Supply Volatage, V_{cc} (V)	5	8	10	12	15	20
Bias Resistor, Rcc (Ω)	22	82	122	162	222	322

Die Drawing



Package Dimensions & Pin Descriptions



	Symbol	Milimeters			Inches		
		MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
	A	0.535 REF.			.021 REF.		
	B	2.39	2.54	2.69	.094	.100	.106
	C	0.436	0.510	0.711	.017	.020	.028
	D	2.19	2.34	2.49	.086	.092	.098
	E	1.91	2.16	2.41	.075	.085	.095
	F	1.32	1.52	1.72	.052	.060	.068
	G	0.10	0.15	0.20	.004	.006	.008
	H	0.535	0.660	0.785	.021	.026	.031
1	J	0.05	0.10	0.15	0.002	0.004	0.006
2	K	0.65	0.75	0.85	0.025	0.029	0.033
3	L	0.85	0.95	1.05	0.033	0.037	0.041
4	M	4.53	4.68	4.83	0.178	0.184	0.190
5	N	4.73	4.88	5.03	0.186	0.192	0.198

Note:
1. All dimensions are in millimeters, and the dimensions in inches are for reference only.

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.