M-Pulse Microwave

Silicon Bipolar MMIC Cascadable Amplifier

MP4TD0870

Features

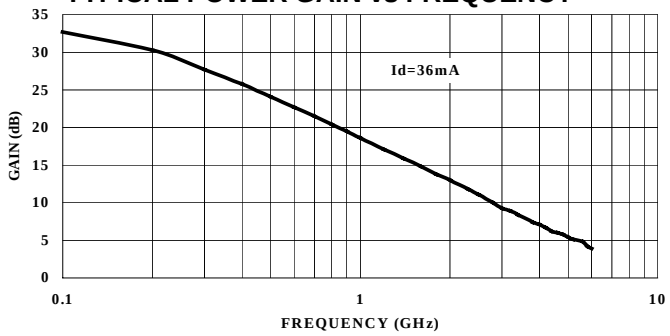
- Cascadable 50Ω Gain Block
- High Gain: 32.5 dB Typical Gain @ 0.1 GHz
  18.5 dB Typical Gain @ 1.0 GHz
- Low Noise Figure: 3.2 dB Typical @ 1.0 GHz
- Cost Effective Ceramic Microstrip Package
- Tape and Reel Packaging Available
- Unconditionally Stable (k>1)

Description

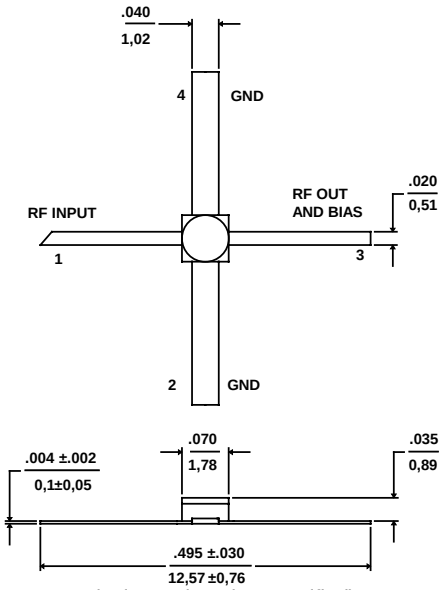
M-Pulse's MP4TD0870 is a high performance silicon bipolar MMIC housed in a hermetic high reliability package. The MP4TD0870 is useful where a general purpose 50Ω gain block with low (3.2 dB typical) noise figure is required. Typical applications include narrow and wide band IF and RF amplifiers in industrial and military applications.

The MP4TD0870 is fabricated using a 10 GHz f_T silicon bipolar technology that features gold metalization and IC passivation for increased performance and reliability.

TYPICAL POWER GAIN vs FREQUENCY



Gold-Ceramic Microstrip Package Outline[1,2]



Notes: (unless otherwise specified)
1. Dimensions are in / mm
2. Tolerance: in .xxx = ±.005; mm .xx = ±.13

Pin Configuration

Pin Number	Pin Description
1	RF Input
2 & 4	AC/DC Ground
3	RF Output and DC Bias

Ordering Information

Model No.	Package
MP4TD0870	Ceramic
MP4TD0870T	Tape and Reel

Electrical Specifications @ T_A = +25°C, I_d = 36 mA, Z_0 = 50Ω

Symbol	Parameters	Test Conditions	Units	Min.	Typ.	Max.
Gp	Power Gain ($\|S_{21}\|^2$)	f = 0.1 GHz	dB	-	32.5	-
		f = 1.0 GHz	dB	17.5	18.5	19.0
		f = 4.0 GHz	dB	-	7.0	-
SWR_{in}	Input SWR	f = 0.3 to 3.0 GHz	-	-	2.0	-
SWR_{out}	Output SWR	f = 0.4 to 3.0 GHz	-	-	1.5	-
P_{1dB}	Output Power @ 1 dB Gain Compression	f = 1.0 GHz	dBm	-	12.5	-
NF	50 Ω Noise Figure	f = 1.0 GHz	dB	-	3.2	-
IP_3	Third Order Intercept Point	f = 1.0 GHz	dBm	-	27.0	-
t_D	Group Delay	f = 1.0 GHz	ps	-	125	-
V_d	Device Voltage	-	V	7.0	7.8	8.4
dV/dT	Device Voltage Temperature Coefficient	-	mV/°C	-	-17.0	-

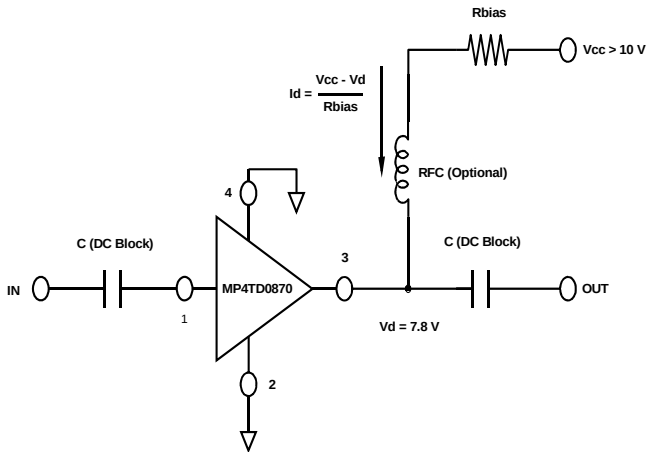
PH (408) 432-1480 FX (408) 432-3440

Absolute Maximum Ratings[1]

Parameter	Absolute Maximum
Device Current	80 mA
Power Dissipation[2,3]	750 mW
RF Input Power	+20 dBm
Junction Temperature	200°C
Storage Temperature	-65°C to +150°C
Thermal Resistance: θ_{jc} = 150°C/W	

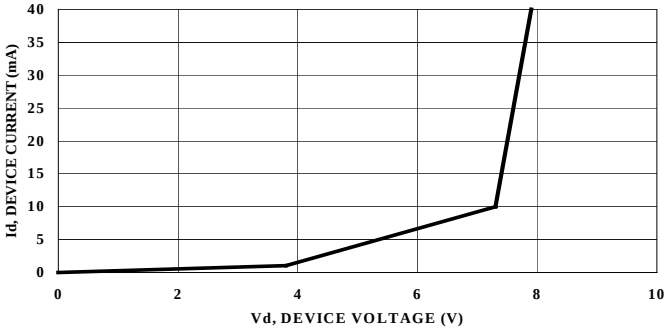
1. Exceeding these limits may cause permanent damage.
2. Case Temperature (Tc) = 25 °C.
3. Derate at 6.7 mW/°C for Tc > 69°C.

Typical Bias Configuration

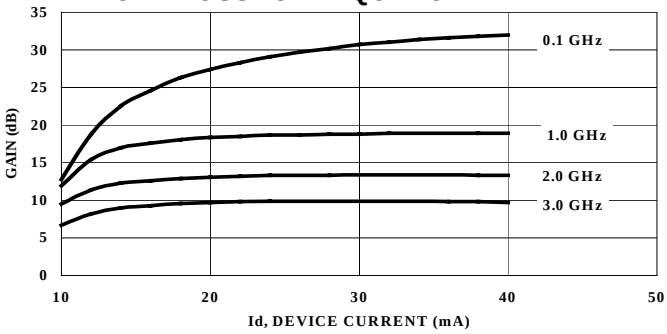


Typical Performance Curves @ I_d = 36 mA, T_A = +25°C (unless otherwise noted)

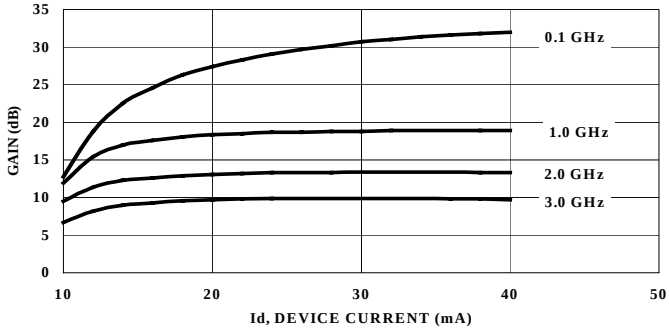
DEVICE CURRENT vs DEVICE VOLTAGE



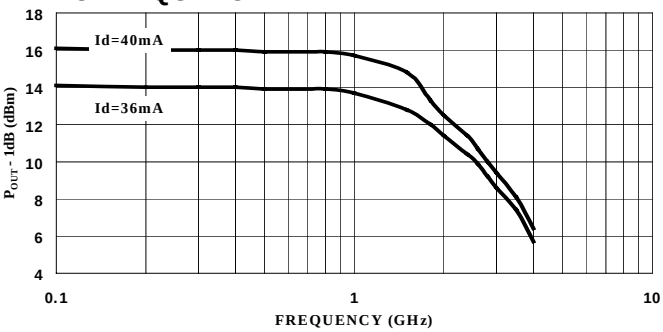
RETURN LOSS vs FREQUENCY



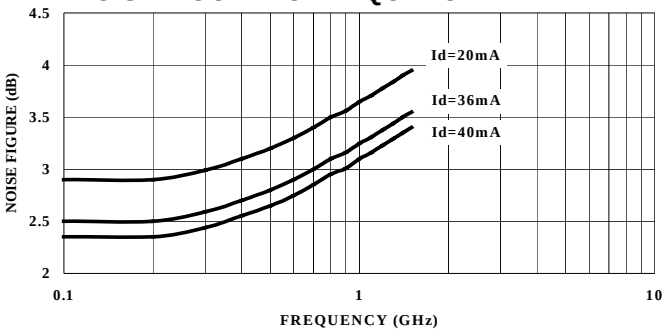
POWER GAIN vs CURRENT



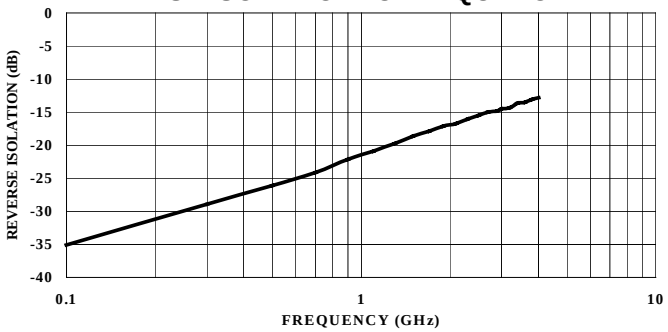
P_{OUT} @ 1dB GAIN COMPRESSION vs FREQUENCY



NOISE FIGURE vs FREQUENCY



REVERSE ISOLATION vs FREQUENCY



Typical Scattering Parameters

Z_0 = 50Ω, T_A = +25°C, I_d = 36mA

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	Mag.	Angle	Mag.	Angle	Mag.	Angle	Mag	Angle
0.1	0.656	-47.8	43.53	32.7	0.017	60.8	0.607	-52.7
0.2	0.471	-77.1	32.73	30.3	0.020	50.1	0.485	-89.4
0.4	0.311	-109.9	19.51	25.8	0.043	51.5	0.391	-129.5
0.6	0.360	-130.3	13.69	22.7	0.057	58.9	0.355	-151.2
0.8	0.242	-142.5	10.56	20.4	0.069	61.4	0.340	-165.9
1.0	0.233	-151.1	8.56	18.6	0.082	63.0	0.323	-176.4
1.5	0.239	-165.7	5.83	15.3	0.116	64.0	0.300	165.6
2.0	0.271	-178.4	4.50	13.0	0.141	61.6	0.287	151.7
2.5	0.277	168.8	3.60	11.1	0.166	61.5	0.235	140.4
3.0	0.296	160.1	2.95	9.3	0.187	61.3	0.195	137.3
3.5	0.334	152.2	2.56	8.1	0.206	59.3	0.168	140.2
4.0	0.363	140.9	2.27	7.1	0.227	60.5	0.155	145.5
4.5	0.407	131.5	2.03	6.1	0.236	57.9	0.169	153.1
5.0	0.455	120.3	1.87	5.4	0.249	60.5	0.204	155.7
6.0	0.556	99.1	1.56	3.9	0.288	62.8	0.309	151.7