M-Pulse Microwave

Silicon Bipolar MMIC Cascadable Amplifier

MP4TD0410

Features

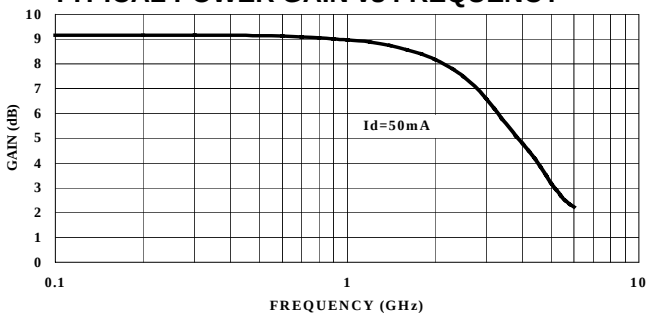
- Cascadable 50Ω Gain Block
- 3dB Bandwidth: DC to 3.0 GHz
- 9.0 dB Typical Gain @ 1.0 GHz
- Unconditionally Stable (k>1)
- Hermetic Gold-Ceramic Microstrip Package
- Tape and Reel Packaging Available

Description

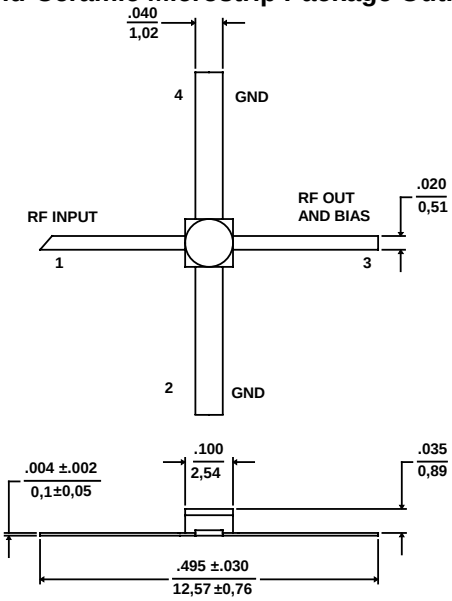
M-Pulse's MP4TD0410 is a high performance silicon bipolar MMIC housed in a hermetic high reliability package for surface mount usage. The MP4TD0410 is useful where a general purpose 50Ω gain block with moderate (+16 dBm) gain compression is required. Typical applications include narrow and wide band IF and RF amplifiers in industrial and military applications.

The MP4TD0410 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
MA4TD0410	Hermetic Ceramic
MA4TD0410T	Tape and Reel

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

Symbol	Parameters	Test Conditions	Units	Min.	Typ.	Max.
Gp	Power Gain ($\|S_{21}\|^2$)	f = 0.1 GHz	dB	8.0	9.0	9.5
ΔGp	Gain Flatness	f = 0.1 to 2.0 GHz	dB	-	±0.6	±1.0
$f_{3\ dB}$	3 dB Bandwidth	-	GHz	-	3.0	-
SWRin	Input SWR	f = 0.1 to 3.0 GHz	-	-	1.5	-
SWRout	Output SWR	f = 0.1 to 3.0 GHz	-	-	1.6	-
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	-	6.2	-
IP_3	Third Order Intercept Point	f = 1.0 GHz	dBm	-	25.5	-
t_D	Group Delay	f = 1.0 GHz	ps	-	125	-
Vd	Device Voltage	-	V	4.75	5.25	5.75
dV/dT	Device Voltage Temperature Coefficient	-	mV/°C	-	-8.0	-

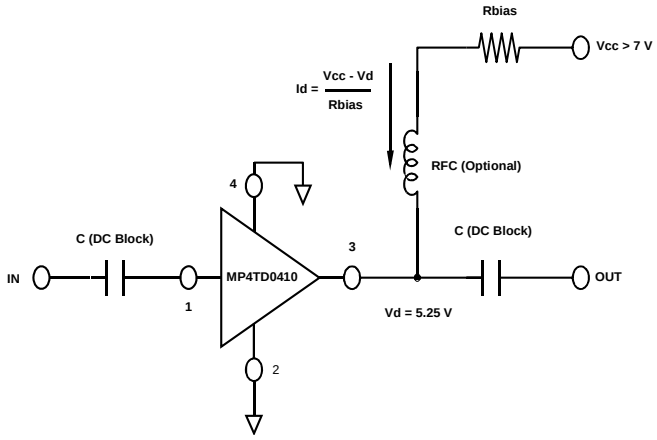
PH (408) 432-1480 FX (408) 432-3440

Absolute Maximum Ratings[1]

Parameter	Absolute Maximum
Device Current	100 mA
Power Dissipation[2,3]	650 mW
RF Input Power	+13 dBm
Junction Temperature	150°C
Storage Temperature	-65°C to +200°C
Thermal Resistance: θ_{jc} = 140 °C/W	

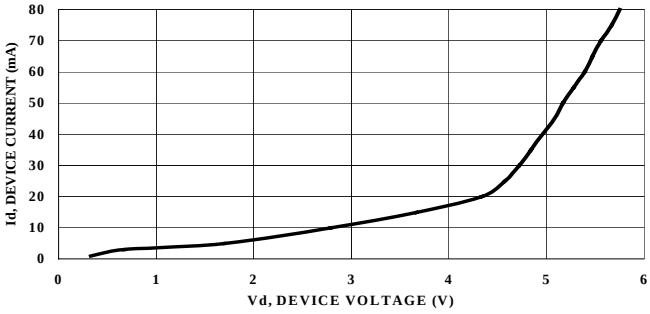
1. Exceeding these limits may cause permanent damage.
2. Case Temperature (Tc) = 25 °C.
3. Derate at 7.1 mW/°C for Tc > 109°C.

Typical Bias Configuration

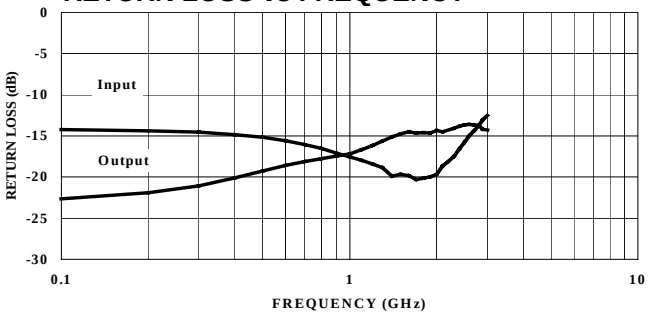


Typical Performance Curves @ I_d = 50 mA, T_A = +25°C (unless otherwise noted)

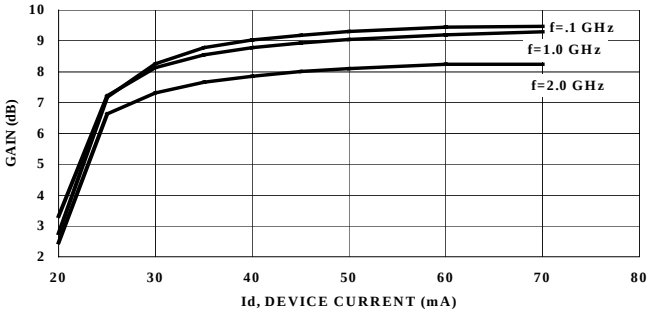
DEVICE CURRENT vs DEVICE VOLTAGE



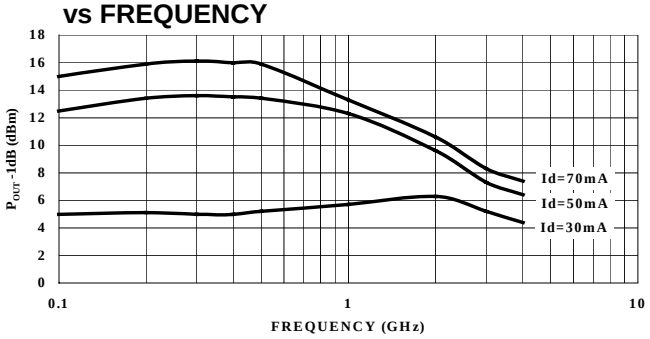
RETURN LOSS vs FREQUENCY



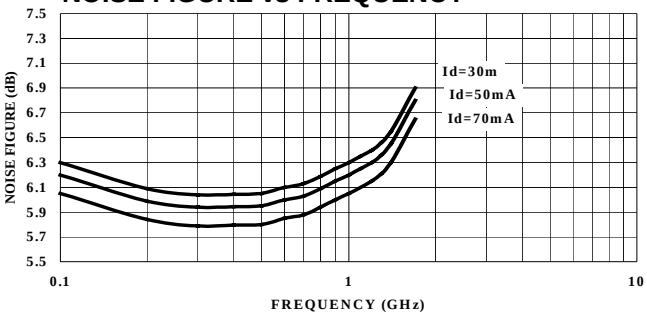
POWER GAIN vs CURRENT



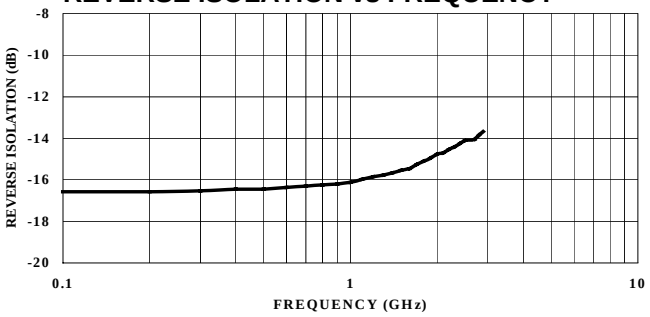
P_{OUT} @ 1DB GAIN COMPRESSION vs FREQUENCY



NOISE FIGURE vs FREQUENCY



REVERSE ISOLATION vs FREQUENCY



Typical Scattering Parameters

Z_0 = 50Ω, T_A = +25°C, I_d = 50 mA

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	Mag.	Angle	Mag.	Angle	Mag.	Angle	Mag	Angle
0.1	0.197	177.2	2.87	175.8	0.147	2.0	0.073	-14.7
0.2	0.191	175.3	2.87	171.6	0.148	3.9	0.080	-29.5
0.3	0.186	173.1	2.87	167.5	0.148	5.4	0.088	-42.7
0.4	0.181	171.2	2.87	163.2	0.150	7.0	0.098	-53.0
0.5	0.174	169.2	2.87	158.9	0.150	8.8	0.109	-61.5
0.6	0.165	167.3	2.87	154.6	0.152	10.5	0.117	-69.7
0.7	0.156	135.7	2.85	150.5	0.153	12.1	0.123	-76.7
0.8	0.140	163.9	2.84	140.3	0.153	13.4	0.128	-88.7
0.9	0.139	162.9	2.83	142.2	0.154	15.5	0.133	-90.7
1.0	0.132	162.0	2.83	138.1	0.156	17.2	0.137	-98.6
1.5	0.103	173.1	2.69	118.2	0.167	24.0	0.183	-128.2
2.0	0.100	174.5	2.52	100.0	0.181	29.8	0.185	-147.1
2.5	0.162	174.9	2.35	84.3	0.194	33.5	0.208	-163.5
3.0	0.236	165.9	2.19	73.2	0.207	37.6	0.194	-173.5