M-Pulse Microwave

Silicon Bipolar MMIC Cascadable Amplifier

MP4TD1135, MP4TD1136

Features

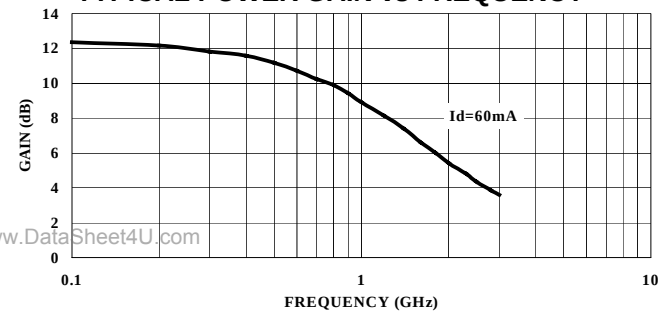
- High Dynamic Range Cascadable 50Ω/75Ω Gain Block
- 3dB Bandwidth: 50 MHz to 1.0 GHz
- 17 dBm Typical P_{1dB} @ 0.7 GHz
- 11 dB Typical Gain @ 0.5 GHz
- 4.0 dB Typical Noise Figre @ 0.7 GHz
- Cost Effective Ceramic Microstrip Package
- Tape and Reel Packaging Available

Description

M-Pulse's MP4TD1135 and MP4TD1136 are high performance silicon bipolar MMICs housed in cost effective ceramic microstrip packages. The MP4TD1135 and MP4TD1136 are designed for use in 50Ω or 75Ω systems where a high dynamic range gain block is required. Typical applications include narrow and wide band IF and RF amplifiers in industrial and military applications.

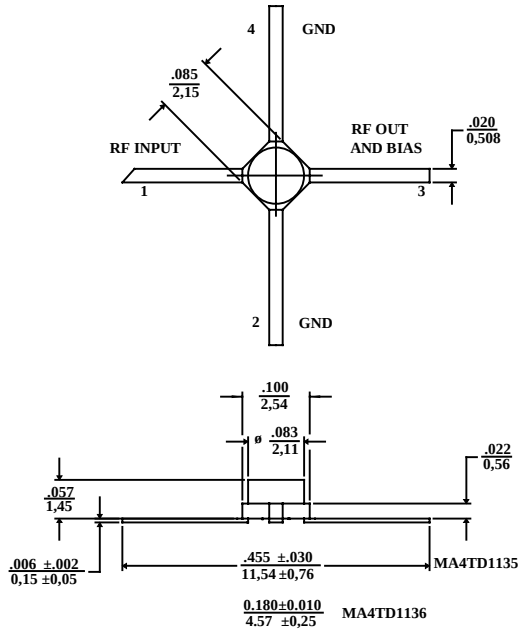
The MP4TD1135 and MP4TD1136 are fabricated using a 10 GHz f_T silicon bipolar technology that features gold metalization and IC passivation for increased performance and reliability.

TYPICAL POWER GAIN vs FREQUENCY



Ceramic Microstrip Case Style Outlines[1,2,3]

Available in short lead version as MP4TD1136.



Notes: (unless otherwise specified)

1. Dimensions are in / mm
2. Tolerance: in .xxx = ±.005; mm .xx = ±.13
3. See last page of data sheet for short lead Micro-X

Pin Configuration

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

Electrical Specifications @ T_A = +25°C, I_d = 60 mA, Z_0 = 50Ω

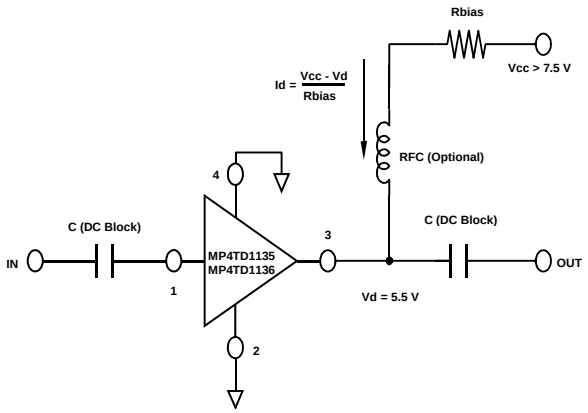
Symbol	Parameters	Test Conditions	Units	Min.	Typ.	Max.
Gp	Power Gain ($\|S_{21}\|^2$)	f = 0.1 GHz	dB	11.5	12.5	13.5
ΔGp	Gain Flatness	f = 0.1 to 0.7 GHz	dB	-	± 0.9	± 1.1
f_{3dB}	3 dB Bandwidth	ref 50 MHz Gain	GHz	-	1.0	-
SWRin	Input SWR	f = 0.1 to 2.0 GHz	-	-	2.0	-
SWRout	Output SWR	f = 0.1 to 2.0 GHz	-	-	1.9	-
P_{1dB}	Output Power @ 1dB Gain Compression	f = 0.7 GHz	dBm	16.0	17.0	-
NF	50 Ω Noise Figure	f = 0.7 GHz	dB	-	4.0	4.5
IP_3	Third Order Intercept Point	f = 1.0 GHz	dBm	-	30.0	-
t_D	Group Delay	f = 1.0 GHz	ps	-	160	-
Vd	Device Voltage	-	V	4.5	5.5	6.5
dV/dT	Device Voltage Temperature Coefficient	-	mV/°C	-	-8.0	-

Absolute Maximum Ratings[1]

Parameter	Absolute Maximum
Device Current	90 mA
Power Dissipation[2,3]	560 mW
RF Input Power	+20 dBm
Junction Temperature	200°C
Storage Temperature	-65°C to +200°C
Thermal Resistance: θ_{jc} = 135°C/W	

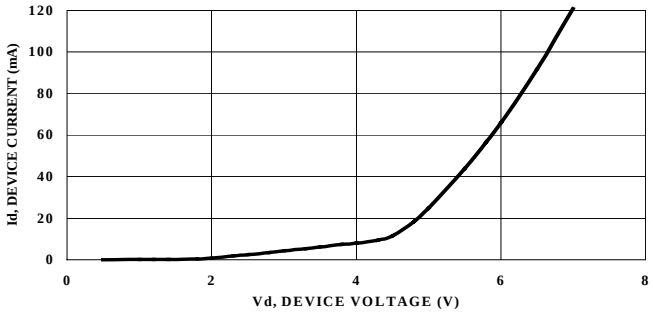
1. Exceeding these limits may cause permanent damage.
2. Case Temperature (Tc) = 25 °C.
3. Derate at 6.9 mW/°C for Tc > 124°C.

Typical Bias Configuration

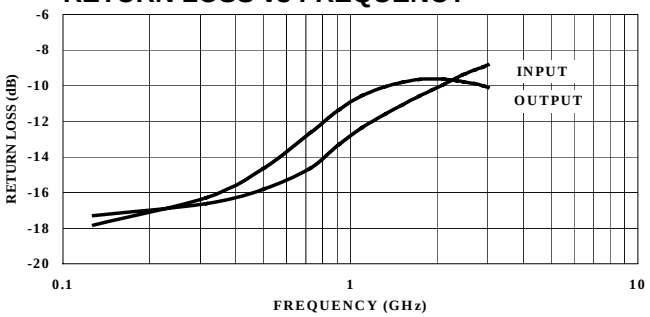


Typical Performance Curves @ I_d = 60 mA, T_A = +25°C (unless otherwise noted)

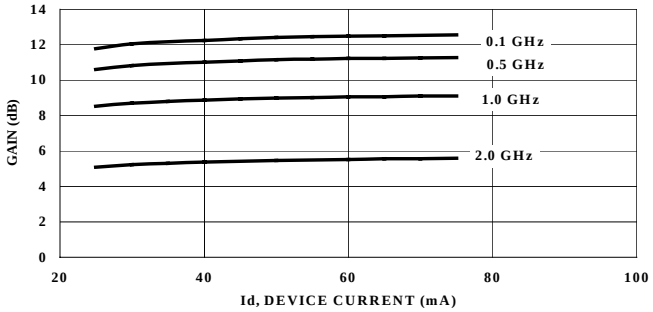
DEVICE CURRENT vs DEVICE VOLTAGE



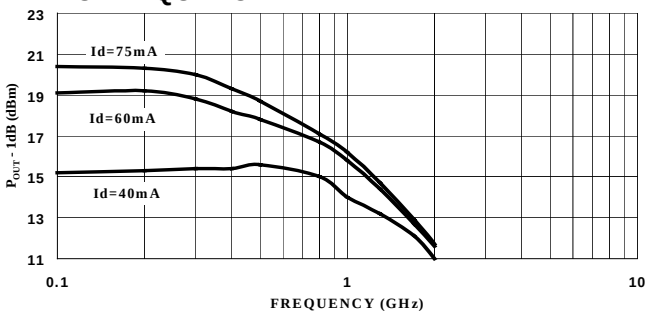
RETURN LOSS vs FREQUENCY



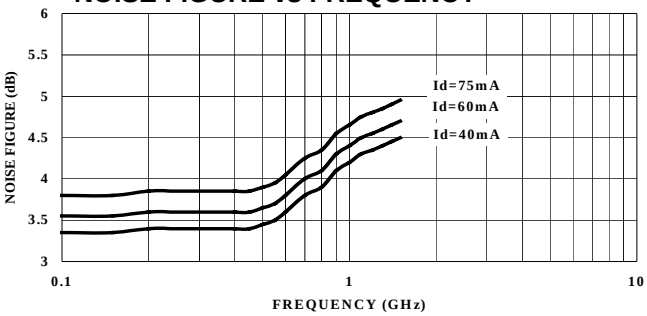
POWER GAIN vs CURRENT



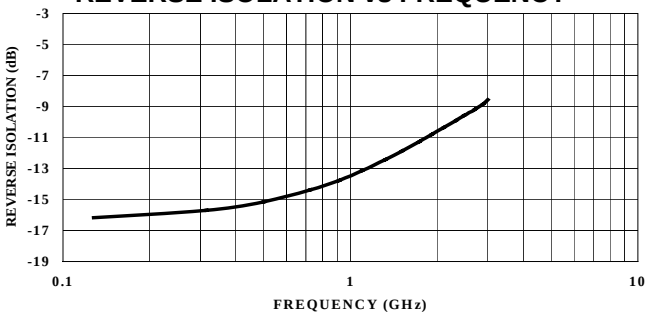
P_{OUT} @ 1dB GAIN COMPRESSION vs FREQUENCY



NOISE FIGURE vs FREQUENCY



REVERSE ISOLATION vs FREQUENCY



Typical Scattering Parameters

Z_0 = 50Ω, T_A = +25°C, I_d = 60 mA

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	Mag.	Angle	Mag.	Angle	Mag.	Angle	Mag	Angle
0.05	0.133	-104.9	4.23	157.5	0.152	14.4	0.120	-98.7
0.1	0.134	-106.7	4.19	156.2	0.154	14.8	0.124	-100.6
0.2	0.140	-112.4	4.05	151.7	0.158	16.2	0.137	-106.6
0.3	0.148	-118.6	3.90	146.8	0.164	17.7	0.153	-113.1
0.4	0.153	-123.0	3.79	143.2	0.168	18.8	0.165	-120.2
0.5	0.162	-129.9	3.62	137.8	0.174	20.5	0.185	-125.1
0.6	0.172	-137.3	3.44	131.2	0.182	22.4	0.208	-132.8
0.7	0.185	-144.4	3.25	124.7	0.190	24.6	0.233	-140.8
0.8	0.198	-148.7	3.12	120.4	0.196	26.3	0.249	-145.3
0.9	0.216	-154.6	2.95	114.4	0.205	28.4	0.271	-151.4
1.0	0.232	-159.8	2.79	108.8	0.214	30.3	0.287	-156.8
1.5	0.279	-179.0	2.23	89.4	0.254	35.8	0.323	-175.4
2.0	0.314	164.8	1.88	74.3	0.294	38.7	0.331	169.7

Ordering Information

Long Lead Model No.	Short Lead Model No.	Package
MP4TD1135	MP4TD1136	Ceramic
MP4TD1135T	MP4TD1136T	Tape and Reel

Mico-X Case Styles

(Long Lead)

(Short Lead)