

# M-Pulse Microwave

## Silicon Bipolar MMIC Cascadable Amplifier

# MP4TD1100

### Features

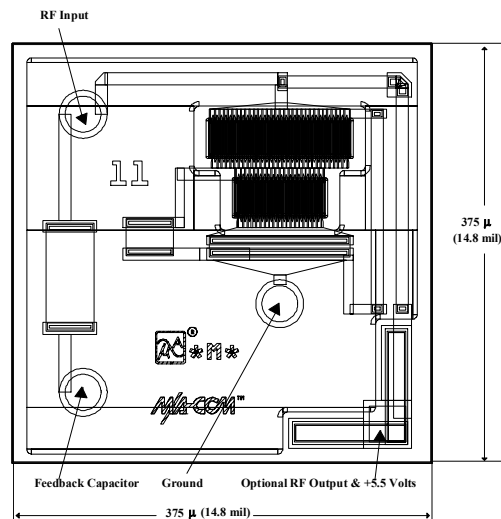
- High Dynamic Range Cascadable  
50Ω/75Ω Gain Block
- 3dB Bandwidth: 50 MHz to 1.0 GHz
- 17.5 dBm Typical  $P_{1dB}$  @ 0.7 GHz
- 11 dB Typical Gain @ 0.5 GHz
- 3.5 dB Typical Noise Figure @ 1.0 GHz

### Description

M-Pulse's MP4TD1100 is a high performance silicon bipolar MMIC chip. The MP4TD1100 is 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 MP4TD1100 is fabricated using a 10 GHz  $f_T$  silicon bipolar technology that features gold metalization and IC passivation for increased performance and reliability.

### Chip Outline Drawing<sup>1,2,3,4</sup>



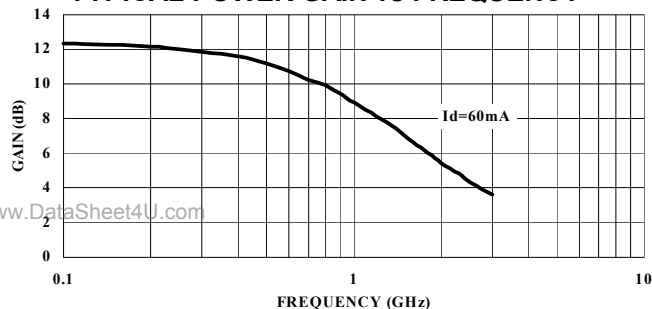
Notes: (unless otherwise specified)

1. Chip Thickness is 120 μm; 4.8 mils
2. Bond Pads are 40 μm; 1.6 mils typical in diameter
3. Output Contact & +DC Voltage Is Normally Made On Backside Of Chip At Die Attach
4. Tolerance: μm .xx = ±.13; mil .x = ±.5

### Ordering Information

Model No.	Type of Carrier
MP4TD1100G	GEL PACK
MP4TD1100W	Waffle Pack

### TYPICAL POWER GAIN vs FREQUENCY



### Electrical Specifications @ $T_A = +25^\circ\text{C}$ , $I_d = 60\text{ mA}$ , $Z_0 = 50\Omega$

Symbol	Parameters	Test Conditions	Units	Min.	Typ.	Max.
$G_p$	Power Gain ( $ S_{21} ^2$ )	$f = 0.1\text{ GHz}$	dB	-	12.5	-
$\Delta G_p$	Gain Flatness	$f = 0.1\text{ to }0.7\text{ GHz}$	dB	-	± 1.2	-
$f_{3dB}$	3 dB Bandwidth	ref 50 MHz Gain	GHz	-	1.0	-
SWR <sub>in</sub>	Input SWR	$f = 0.1\text{ to }2.0\text{ GHz}$	-	-	1.9	-
SWR <sub>out</sub>	Output SWR	$f = 0.1\text{ to }2.0\text{ GHz}$	-	-	1.9	-
$P_{1dB}$	Output Power @ 1dB Gain Compression	$f = 0.7\text{ GHz}$	dBm	-	17.5	-
NF	50 Ω Noise Figure	$f = 1.0\text{ GHz}$	dB	-	4.5	-
IP <sub>3</sub>	Third Order Intercept Point	$f = 1.0\text{ GHz}$	dBm	-	30.0	-
$t_D$	Group Delay	$f = 1.0\text{ GHz}$	ps	-	160	-
$V_d$	Device Voltage	-	V	4.5	5.5	6.5
dV/dT	Device Voltage Temperature Coefficient	-	mV/°C	-	-8.0	-

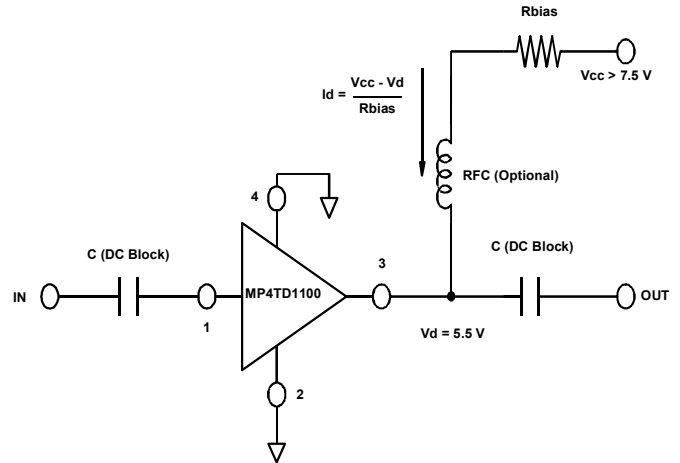
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**Absolute Maximum Ratings<sup>1</sup>**

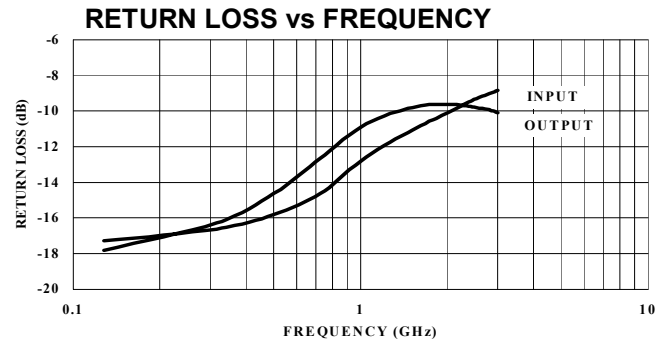
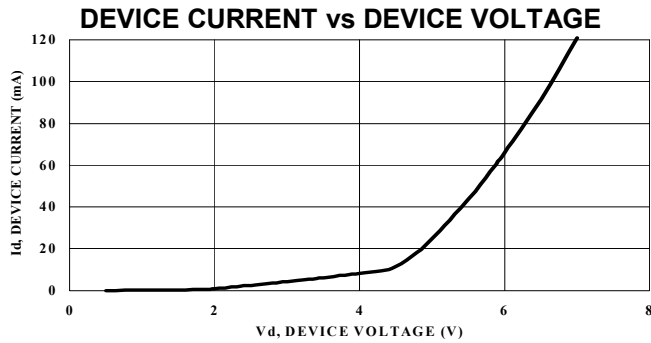
Parameter	Absolute Maximum
Device Current	100 mA
Power Dissipation <sup>2,3</sup>	650 mW
RF Input Power	+13 dBm
Junction Temperature	200°C
Storage Temperature	-65°C to +200°C
Thermal Resistance: $\theta_{jms} = 60^\circ\text{C/W}$	

1. Exceeding these limits may cause permanent damage.
2. Mounting Surface Temperature ( $T_{MS}$ ) = 25 °C.
3. Derate at 16.7 mW/°C for  $T_{MS} > 161^\circ\text{C}$

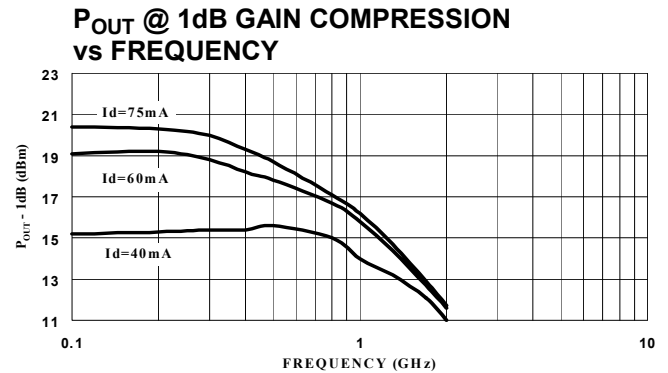
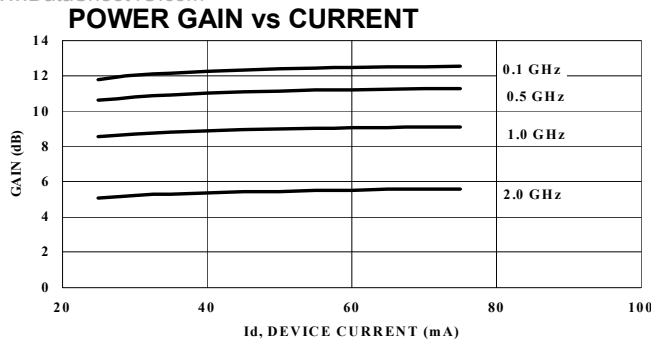
**Typical Bias Configuration**



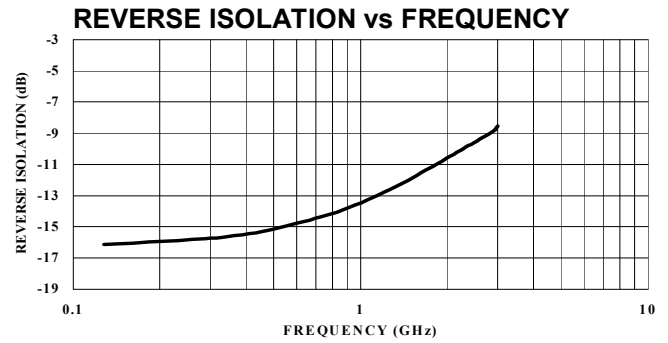
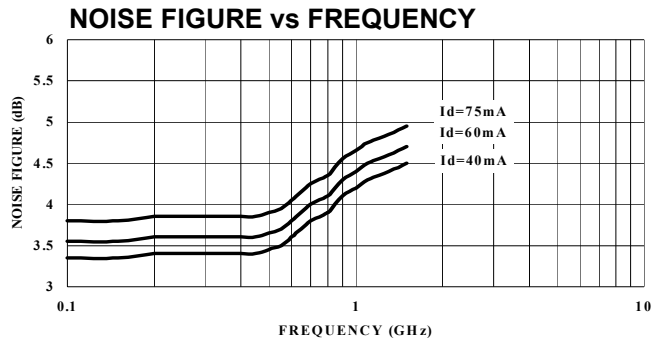
**Typical Performance Curves @  $I_d = 60\text{ mA}$ ,  $T_A = +25^\circ\text{C}$  (unless otherwise noted)**



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**Typical Scattering Parameters**

Z<sub>0</sub> = 50Ω, T<sub>A</sub> = +25°C, I<sub>D</sub> = 60 mA

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	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

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