

# M-Pulse Microwave

## Silicon Bipolar MMIC Cascadable Amplifier

# MP4TD0800

### Features

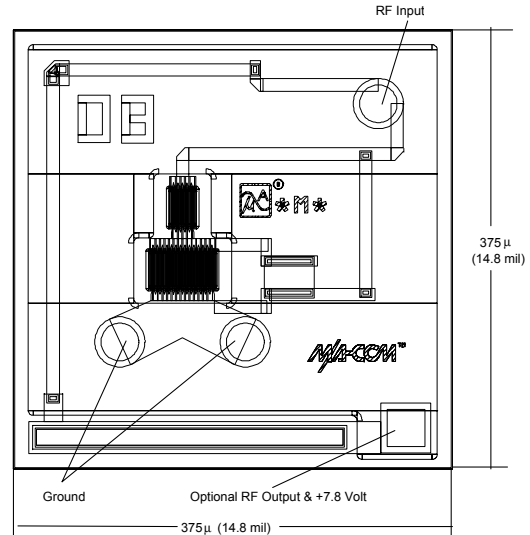
- Cascadable 50Ω Gain Block
- High Gain: 32.5 dB Typical Gain @ 0.1 GHz  
18.5 dB Typical Gain @ 1.0 GHz
- Low Noise Figure: 3.2 dB Typical @ 1.0 GHz
- Unconditionally Stable ( $k > 1$ )

### Description

M-Pulse's MP4TD0800 is a high performance silicon bipolar MMIC chip. The MP4TD0800 is designed for use where a low noise (3.2 dB typical) general purpose 50Ω gain block is required. Typical applications include narrow and wide band IF and RF amplifiers in industrial and military applications.

The MP4TD0800 is fabricated using a 10 GHz  $f_T$  silicon bipolar technology that features gold metallization and IC passivation for increased performance and reliability.

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



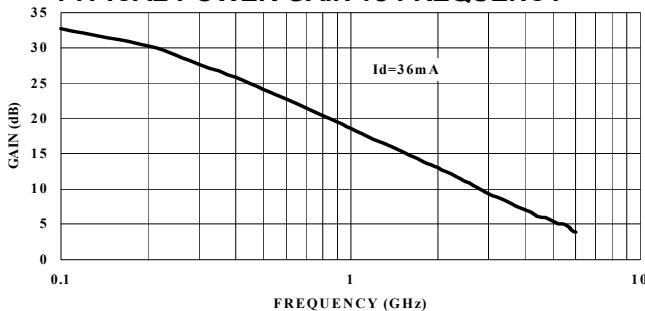
Notes: (unless otherwise specified)

1. Chip Thickness is 120 μm; 4.8 mils
2. Bond Pads are 40 μm; 1.6 mils typical in diameter
3. RF 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.	Package
MP4TD0800G	Gel Pack
MP4TD0800W	Waffle Pack

TYPICAL POWER GAIN vs FREQUENCY



### Electrical Specifications @ $T_A = +25^\circ\text{C}$ , $I_d = 36\text{ mA}$ , $Z_0 = 50\Omega$

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	-	18.5	-
		f = 4.0 GHz	dB	-	7.0	-
SWR <sub>in</sub>	Input SWR	f = 0.3 to 3.0 GHz	-	-	2.0	-
SWR <sub>out</sub>	Output SWR	f = 0.4 to 3.0 GHz	-	-	1.7	-
P <sub>1dB</sub>	Output Power @ 1 dB Gain Compression	f = 1.0 GHz	dBm	-	14.0	-
NF	50 Ω Noise Figure	f = 1.0 GHz	dB	-	3.2	-
IP <sub>3</sub>	Third Order Intercept Point	f = 1.0 GHz	dBm	-	27.0	-
t <sub>D</sub>	Group Delay	f = 1.0 GHz	ps	-	125	-
V <sub>d</sub>	Device Voltage	-	V	7.0	7.8	8.4
dV/dT	Device Voltage Temperature Coefficient	-	mV/°C	-	-17.0	-

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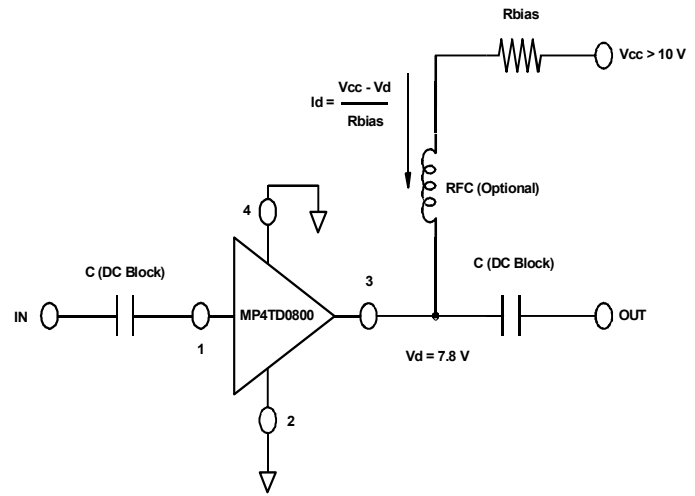
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**Absolute Maximum Ratings<sup>1</sup>**

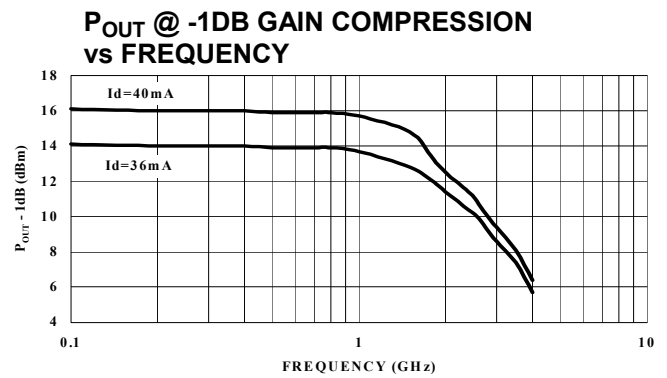
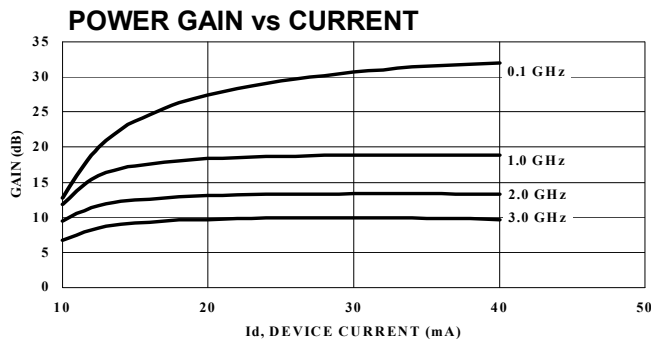
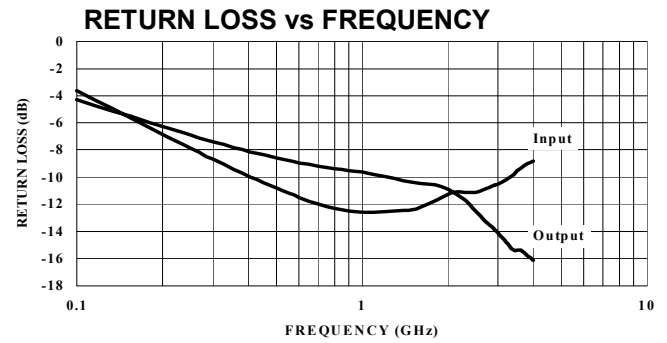
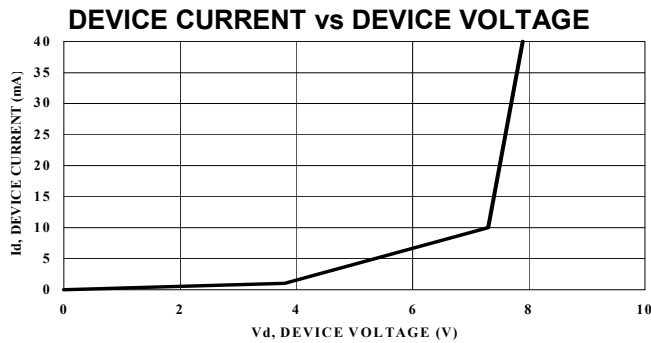
Parameter	Absolute Maximum
Device Current	80 mA
Power Dissipation <sup>2,3</sup>	750 mW
RF Input Power	+20 dBm
Junction Temperature	200°C
Storage Temperature	-65°C to +200°C
Thermal Resistance: $\theta_{jms} = 70^\circ\text{C/W}$	

1. Exceeding these limits may cause permanent damage.
2. Case Temperature ( $T_{MS}$ ) = 25 °C.
3. Derate at 14.3 mW/°C for  $T_{MS} > 147^\circ\text{C}$ .

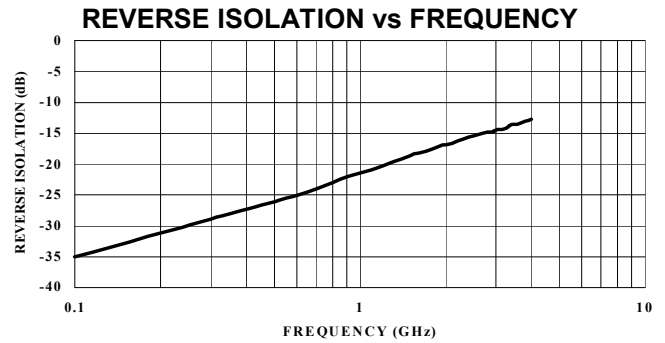
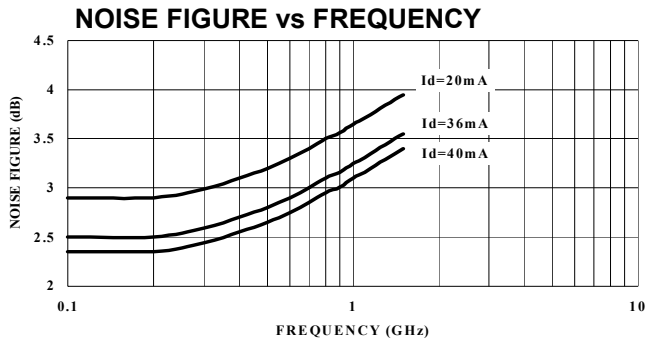
**Typical Bias Configuration**



**Typical Performance Curves @  $I_d = 36\text{ mA}$ ,  $T_A = +25^\circ\text{C}$  (unless otherwise noted)**



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**Typical Scattering Parameters**

$Z_0 = 50\Omega$ ,  $T_A = +25^\circ\text{C}$ ,  $I_D = 36\text{ mA}$

Frequency (GHz)	S11		S21		S12		S22	
	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

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