

# M-Pulse Microwave

## Silicon Bipolar MMIC Cascadable Amplifier

# MP4TD0700

V4.00

### Features

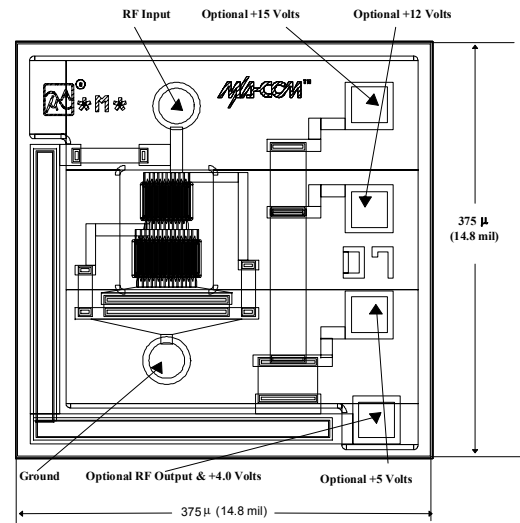
- Cascadable 50Ω Gain Block
- Low Operating Voltage (4.0 V Typical Vd)
- 3dB Bandwidth: DC to 2.0 GHz
- 11.5 dB Typical Gain @ 1.0 GHz
- Unconditionally Stable ( $k > 1$ )

### Description

M-Pulse's MP4TD0700 is a high performance silicon bipolar MMIC chip. The MP4TD0700 is designed for use where a general purpose 50Ω gain block is required. Typical applications include narrow and wide band IF and RF amplifiers in industrial and military applications.

The MP4TD0700 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>

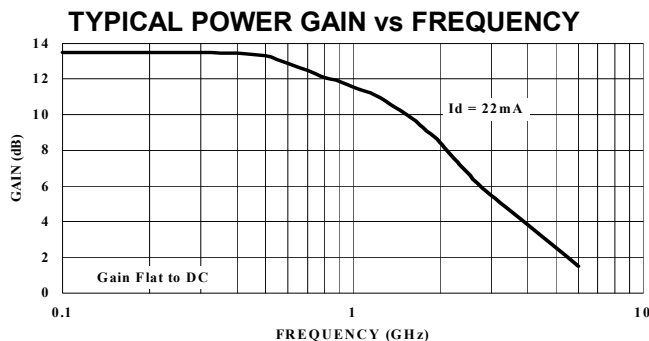


#### Notes: (unless otherwise specified)

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
MP4TD0700G	GEL PACK
MP4TD0700W	Waffle Pack



### Electrical Specifications @ T<sub>A</sub> = +25°C, I<sub>d</sub> = 22 mA; Z<sub>0</sub> = 50Ω

Symbol	Parameters	Test Conditions	Units	Min.	Typ.	Max.
G <sub>p</sub>	Power Gain ( S <sub>21</sub>   <sup>2</sup> )	f = 0.1 GHz	dB	-	13.5	-
ΔG <sub>p</sub>	Gain Flatness	f = 0.1 to 1.0 GHz	dB	-	± 0.6	-
f <sub>3dB</sub>	3 dB Bandwidth	-	GHz	-	1.5	-
SWR <sub>in</sub>	Input SWR	f = 0.1 to 2.0 GHz	-	-	1.6	-
SWR <sub>out</sub>	Output SWR	f = 0.1 to 2.0 GHz	-	-	1.5	-
P <sub>1dB</sub>	Output Power @ 1dB Gain Compression	f = 1.0 GHz	dBm	-	5.5	-
NF	50 Ω Noise Figure	f = 1.0 GHz	dB	-	4.5	-
IP <sub>3</sub>	Third Order Intercept Point	f = 1.0 GHz	dBm	-	19.0	-
t <sub>p</sub>	Group Delay	f = 1.0 GHz	ps	-	140	-
V <sub>d</sub>	Device Voltage	-	V	3.6	4.0	4.4
dV/dT	Device Voltage Temperature Coefficient	-	mV/°C	-	-7.0	-

Specification Subject to Change Without Notice

M-Pulse Microwave

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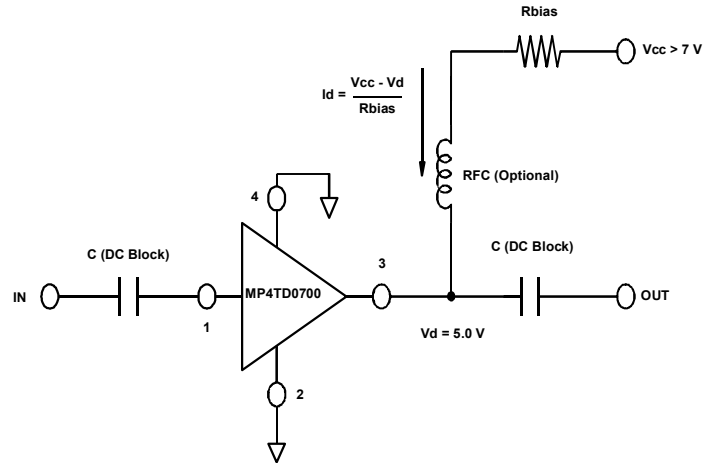
PH (408) 432-1480 FX (408) 432-3440

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

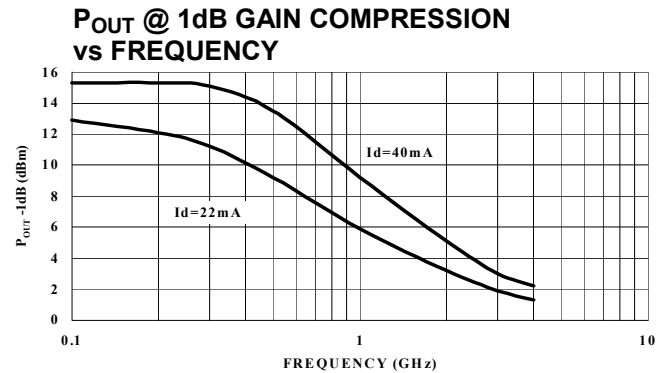
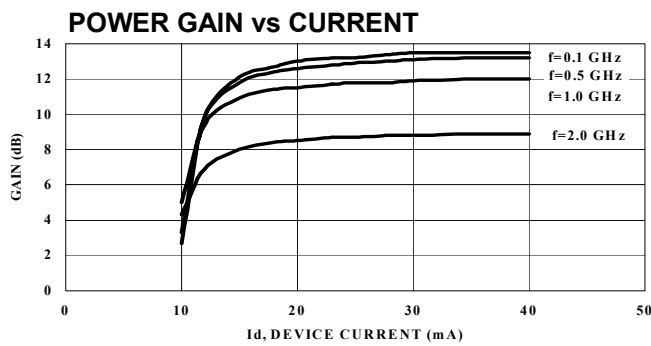
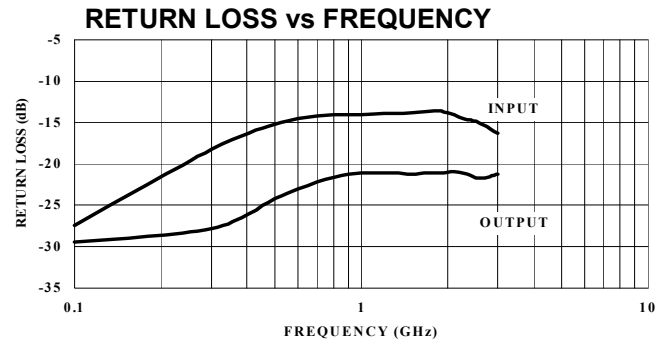
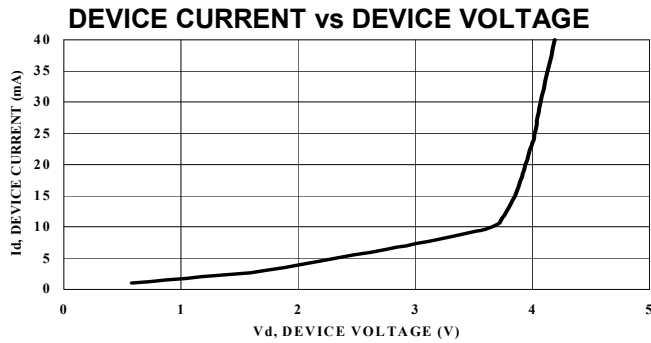
Parameter	Absolute Maximum
Device Current	80 mA
Power Dissipation <sup>2,3</sup>	275 mW
RF Input Power	+13 dBm
Junction Temperature	200°C
Storage Temperature	-65°C to +200°C
Thermal Resistance: $\theta_{jms} = 50^\circ\text{C/W}$	

1. Exceeding these limits may cause permanent damage.
2. Mounting Surface Temperature ( $T_{MS}$ ) = 25 °C.
3. Derate at 20 mW/°C for  $T_{MS} > 186^\circ\text{C}$

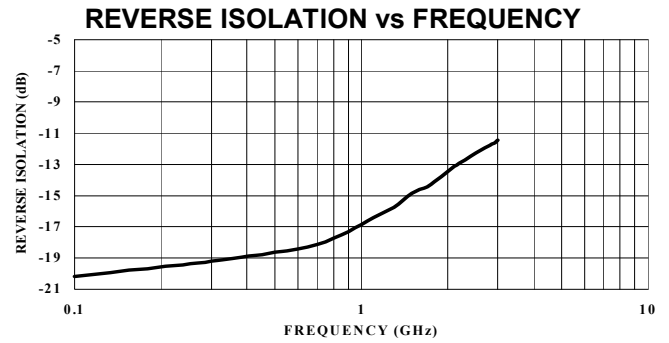
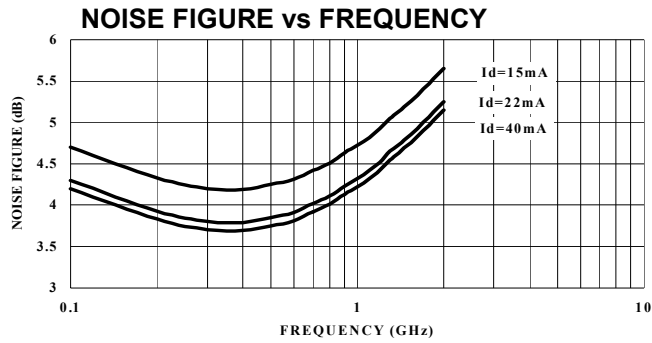
**Typical Bias Configuration**



**Typical Performance Curves @  $I_d = 22\text{ mA}$ ,  $T_A = +25^\circ\text{C}$  (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> = 22 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
0.1	0.042	96.5	4.73	171.5	0.098	9.3	0.033	-52.9
0.2	0.082	97.3	4.72	164.3	0.104	6.2	0.034	-56.2
0.4	0.153	107.3	4.70	150.9	0.116	15.6	0.051	-80.9
0.6	0.185	116.5	4.27	136.9	0.121	20.6	0.071	-103.6
0.8	0.198	128.5	4.03	122.4	0.132	25.7	0.083	-115.6
1.0	0.200	139.6	3.85	110.7	0.143	29.0	0.087	-123.9
1.5	0.203	165.4	3.24	86.3	0.180	34.7	0.086	-138.1
2.0	0.200	173.6	2.64	60.3	0.215	35.7	0.088	-150.0
2.5	0.180	174.2	2.16	46.9	0.243	33.0	0.082	-163.7
3.0	0.152	162.8	1.86	33.5	0.267	31.8	0.087	-163.6
3.5	0.123	144.0	1.69	20.5	0.296	30.3	0.119	-166.8
4.0	0.149	101.8	1.50	114.8	0.318	27.9	0.139	-171.4
4.5	0.250	84.1	1.45	4.7	0.355	25.8	0.183	-170.8
5.0	0.337	79.6	1.34	-2.9	0.389	21.7	0.229	-175.4
6.0	0.485	72.4	1.19	-12.9	0.456	16.5	0.272	178.3

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