

# M-Pulse Microwave

## Silicon Bipolar MMIC Cascadable Amplifier

# MP4TD0900

### Features

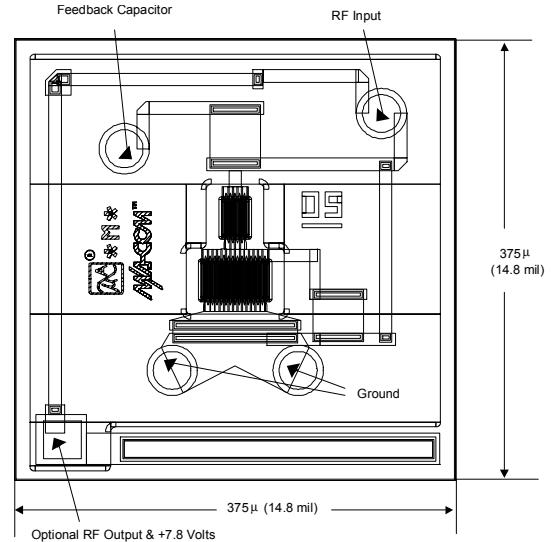
- Cascadable 50Ω Gain Block
- 3dB Bandwidth: DC to 4.5 GHz  
8.0 dB Typical Gain @ 1.0 GHz
- Low SWR: <1.5 from 0.1 to 3.0 GHz
- Unconditionally Stable ( $k > 1$ )

### Description

M-Pulse's MP4TD0900 is a high performance silicon bipolar MMIC chip. The MP4TD0900 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 MP4TD0900 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>

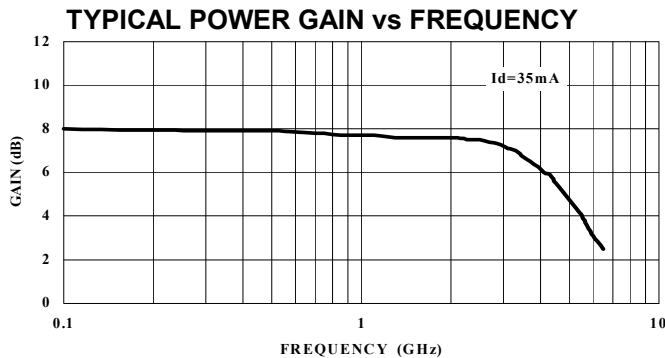


#### Notes: (unless otherwise specified)

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
MP4TD0900G	GEL PACK
MP4TD0900W	Waffle Pack



### Electrical Specifications @ $T_A = +25^\circ\text{C}$ , $I_D = 35\text{ mA}$ ; $Z_0 = 50\Omega$ (Performance Requires 45 pF Feedback Capacitor)

Symbol	Parameters	Test Conditions	Units	Min.	Typ.	Max.
$G_p$	Power Gain ( $ S_{21} ^2$ )	$f = 0.1\text{ GHz}$	dB	-	8.0	-
$\Delta G_p$	Gain Flatness	$f = 0.1\text{ to }3.0\text{ GHz}$	dB	-	± 0.3	-
$f_{3dB}$	3 dB Bandwidth	-	GHz	-	4.5	-
$SWR_{in}$	Input SWR	$f = 0.1\text{ to }3.0\text{ GHz}$	-	-	2.0	-
$SWR_{out}$	Output SWR	$f = 0.1\text{ to }3.0\text{ GHz}$	-	-	1.5	-
$P_{1dB}$	Output Power @ 1dB Gain Compression	$f = 1.0\text{ GHz}$	dBm	-	12.0	-
NF	50 Ω Noise Figure	$f = 1.0\text{ GHz}$	dB	-	6.0	-
$IP_3$	Third Order Intercept Point	$f = 1.0\text{ GHz}$	dBm	-	23.0	-
$t_D$	Group Delay	$f = 1.0\text{ GHz}$	ps	-	100	-
$V_d$	Device Voltage	-	V	7.0	7.8	8.6
$dV/dT$	Device Voltage Temperature Coefficient	-	mV/°C	-	-16.0	-

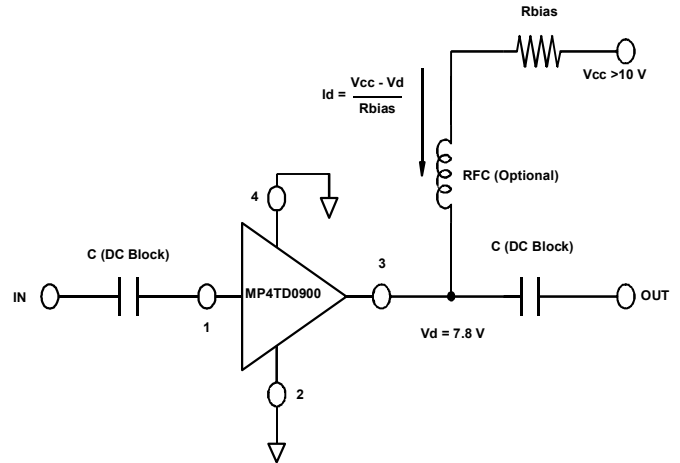
Specification Subject to Change Without Notice

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

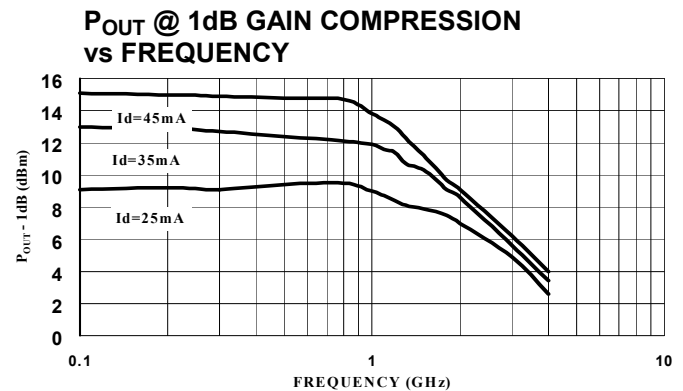
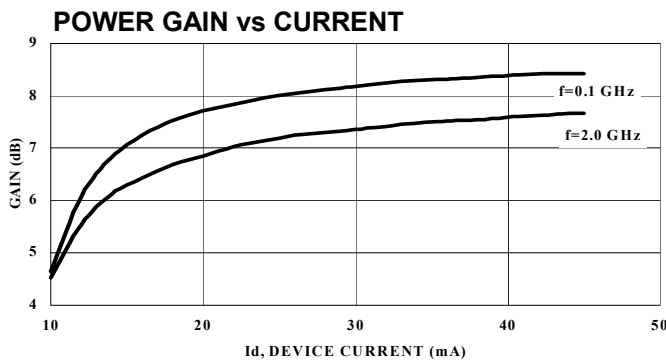
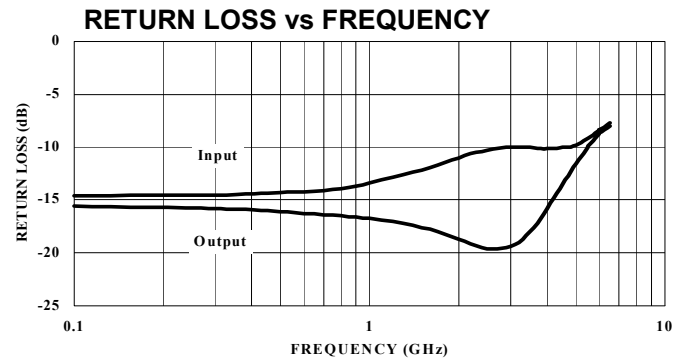
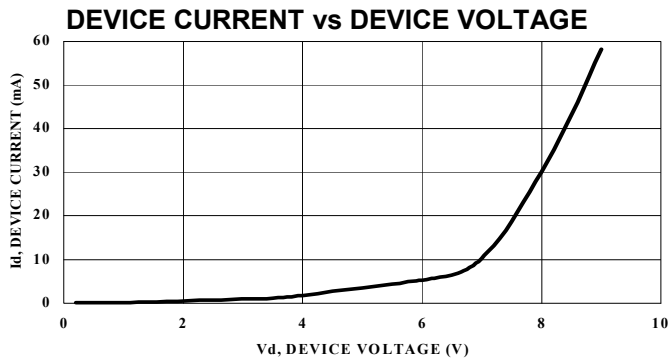
Parameter	Absolute Maximum
Device Current	80 mA
Power Dissipation <sup>2,3</sup>	750 mW
RF Input Power	+20 dBm
Junction Temperature	200°C
Storage Temperature	-65°C to +200°C
Thermal Resistance: $\theta_{jms} = 70^\circ\text{C/W}$	

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

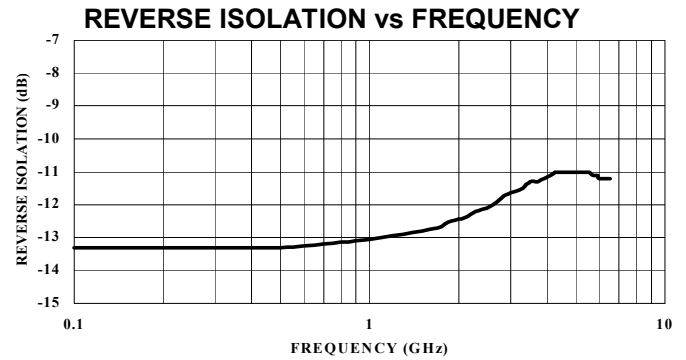
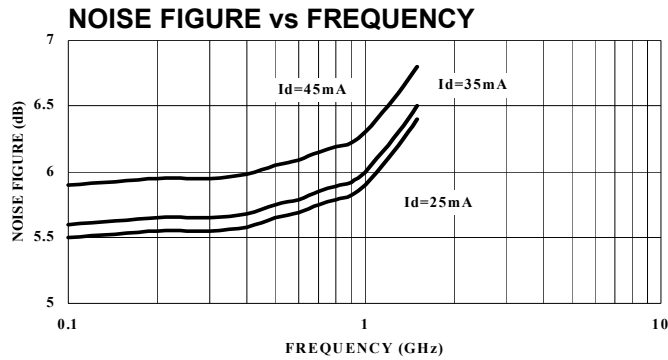
**Typical Bias Configuration**



**Typical Performance Curves @  $I_d = 35\text{ mA}$ ,  $T_A = +25^\circ\text{C}$  (unless otherwise noted)  
(Performance Required 45 pF Feedback Capacitor)**



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**Typical Scattering Parameters**  
 $Z_0 = 50\Omega$ ,  $T_A = +25^\circ\text{C}$ ,  $I_D = 35\text{ mA}$

Frequency (GHz)	S11		S21		S12		S22	
	Mag.	Angle	Mag.	Angle	Mag.	Angle	Mag	Angle
0.1	0.164	-166.6	2.38	163.7	0.214	5.4	0.186	-158.0
0.2	0.162	-169.8	2.37	162.8	0.214	5.4	0.187	-159.4
0.4	0.158	-176.5	2.35	160.2	0.215	5.8	0.189	-162.3
0.6	0.153	-175.9	2.33	156.7	0.216	6.5	0.194	-165.6
0.8	0.148	-167.9	2.31	152.2	0.218	7.3	0.201	-169.4
1.0	0.144	-162.1	2.30	146.7	0.220	8.7	0.213	-171.1
1.5	0.131	151.8	2.28	132.1	0.227	12.0	0.246	-176.1
2.0	0.116	147.0	2.27	117.4	0.236	15.0	0.280	175.4
2.5	0.104	149.7	2.24	102.2	0.248	17.2	0.304	165.5
3.0	0.106	157.1	2.17	87.2	0.259	18.6	0.313	155.3
3.5	0.127	162.0	2.06	73.2	0.269	19.2	0.315	147.3
4.0	0.164	161.4	1.93	60.6	0.276	19.6	0.308	142.6
4.5	0.212	154.1	1.78	49.4	0.280	19.4	0.313	140.2
5.0	0.266	144.6	1.64	39.1	0.281	19.7	0.323	139.7
6.0	0.365	123.0	1.35	23.7	0.275	21.5	0.381	138.6

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