

# M-Pulse Microwave

## Silicon Bipolar MMIC Cascadable Amplifier

# MP4TD0420

### Features

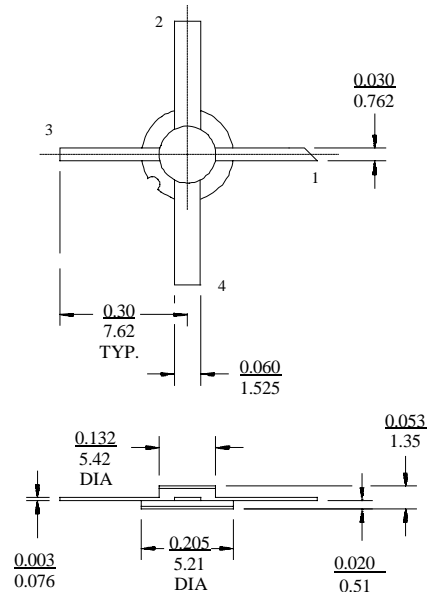
- Cascadable 50Ω Gain Block
- 3dB Bandwidth: DC to 2.5 GHz
- 9.5 dB Typical Gain @ 1.0 GHz
- Unconditionally Stable ( $k > 1$ )
- Hermetic Gold-BeO Microstrip Package
- Tape and Reel Packaging Available

### Description

M-Pulse's MP4TD0420 is a high performance silicon bipolar MMIC housed in a hermetic high reliability stripline package. The MP4TD0420 is useful where a general purpose 50Ω gain block with moderate  $P_1$  dB characteristic is required. Typical applications include narrow and wide band IF and RF amplifiers in industrial and military applications.

The MP4TD0420 is fabricated using a 10 GHz  $f_T$  silicon bipolar technology that features gold metalization and IC passivation for increased performance and reliability.

### Gold-BeO Microstrip Package Outline<sup>1,2</sup>



Notes: (unless otherwise specified)

1. Dimensions are in / mm
2. Tolerance: in .xxx = ±.005; mm .xx = ±.13

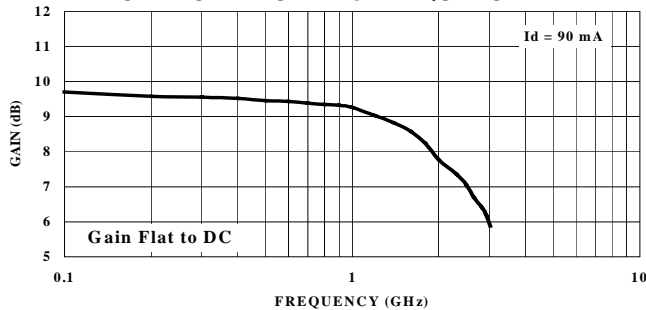
### Pin Configuration

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

### Ordering Information

Model No.	Package
MP4TD0420	Hermetic Ceramic

### TYPICAL POWER GAIN vs FREQUENCY



### Electrical Specifications @ $T_A = +25^\circ\text{C}$ , $I_d = 90$ mA, $Z_0 = 50\Omega$

Symbol	Parameters	Test Conditions	Units	Min.	Typ.	Max.
$G_p$	Power Gain ( $ S_{21} ^2$ )	$f = 0.1$ GHz	dB	8.5	9.5	10.0
$\Delta G_p$	Gain Flatness	$f = 0.1$ to 1.5 GHz	dB	-	±0.5	±0.8
$f_{3\text{ dB}}$	3 dB Bandwidth	-	GHz	-	2.5	-
$SWR_{in}$	Input SWR	$f = 0.1$ to 3.0 GHz	-	-	1.4	-
$SWR_{out}$	Output SWR	$f = 0.1$ to 3.0 GHz	-	-	1.8	-
$P_1$ dB	Output Power @ 1 dB Gain Compression	$f = 1.0$ GHz	dBm	14.0	15.0	-
NF	50 Ω Noise Figure	$f = 1.0$ GHz	dB	-	6.5	-
$IP_3$	Third Order Intercept Point	$f = 1.0$ GHz	dBm	-	28.0	-
$t_D$	Group Delay	$f = 1.0$ GHz	ps	-	140	-
$V_d$	Device Voltage	-	V	5.7	6.3	6.9
$dV/dT$	Device Voltage Temperature Coefficient	-	mV/°C	-	-8.0	-

Specification Subject to Change Without Notice

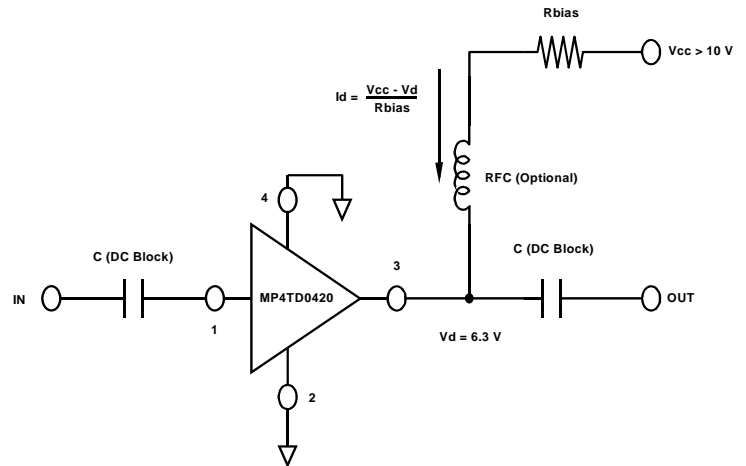
**Absolute Maximum Ratings<sup>1</sup>**

Parameter	Absolute Maximum
Device Current	120 mA
Power Dissipation <sup>2,3</sup>	850 mW
RF Input Power	+13 dBm
Junction Temperature	200°C
Storage Temperature	-65°C to +200°C

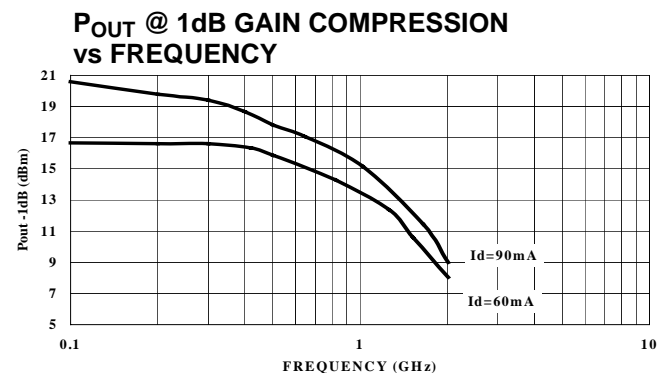
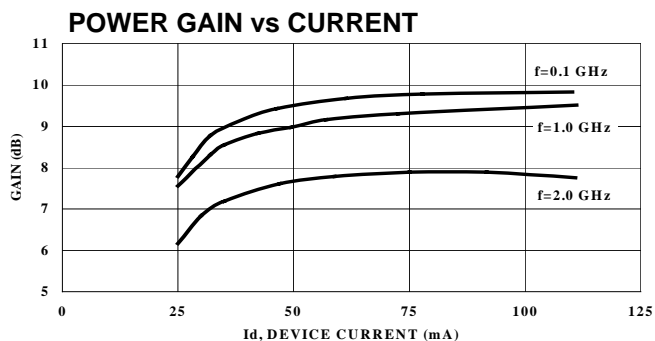
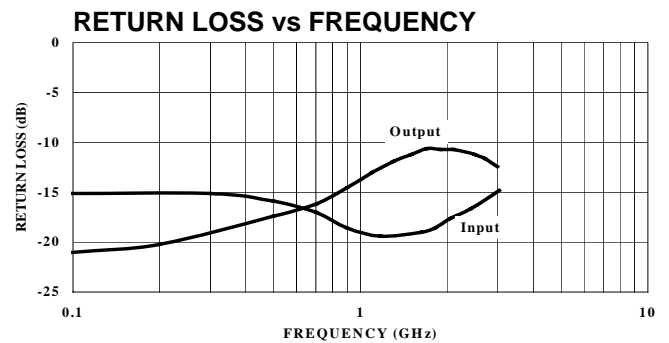
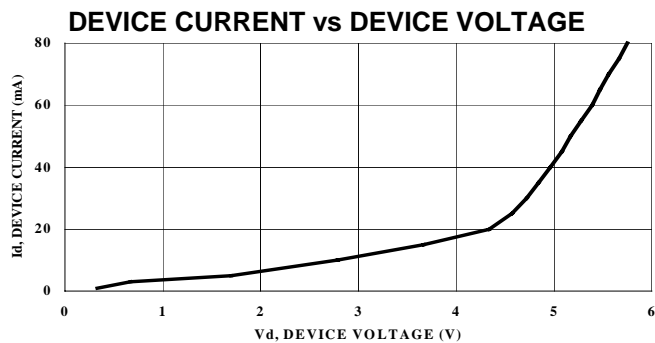
Thermal Resistance:  $\theta_{jC} = 40 \text{ }^\circ\text{C/W}$

1. Exceeding these limits may cause permanent damage.
2. Case Temperature ( $T_c$ ) = 25 °C.
3. Derate at 25 mW/°C for  $T_c > 166^\circ\text{C}$ .

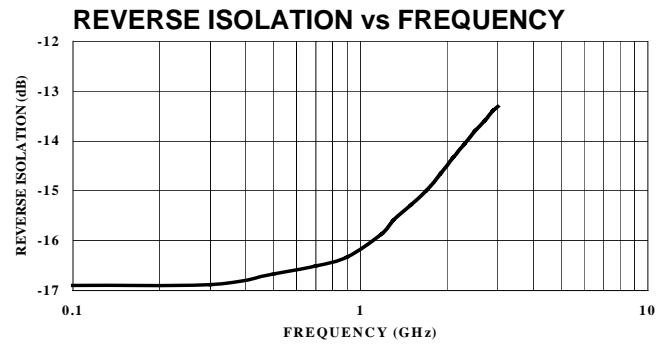
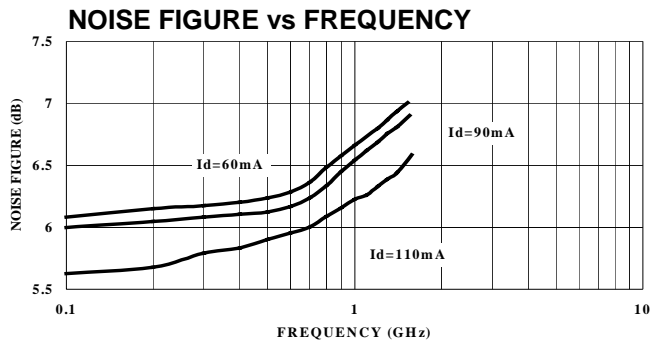
**Typical Bias Configuration**



**Typical Performance Curves @  $I_d = 90 \text{ mA}$ ,  $T_A = +25^\circ\text{C}$  (unless otherwise noted)**



Specification Subject to Change Without Notice



**Typical Scattering Parameters**

Z<sub>0</sub> = 50Ω, T<sub>A</sub> = +25°C, I<sub>d</sub> = 90 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	0.179	179.5	3.06	174.8	0.144	0.7	0.09	-17.8
0.2	0.177	179.6	3.05	169.7	0.144	2.0	0.10	-32.5
0.3	0.175	178.9	3.03	164.5	0.144	3.1	0.12	-43.3
0.4	0.171	177.5	3.01	159.8	0.144	5.1	0.13	-54.7
0.5	0.162	178.0	3.01	155.1	0.146	6.9	0.15	-66.2
0.6	0.153	178.2	3.00	150.1	0.147	7.3	0.16	-74.9
0.7	0.146	179.6	2.99	144.9	0.149	9.1	0.17	-81.5
0.8	0.138	-178.8	2.96	140.1	0.150	9.4	0.19	-88.5
0.9	0.131	-175.9	2.94	135.4	0.152	11.2	0.20	-92.9
1.0	0.124	-174.6	2.92	130.4	0.155	12.1	0.21	-97.7
1.1	0.118	-172.2	2.87	125.4	0.156	12.0	0.23	-102.1
1.2	0.116	-170.3	2.83	120.9	0.160	13.6	0.23	-106.9
1.3	0.120	-165.3	2.79	116.4	0.163	14.6	0.25	-111.2
1.4	0.124	-163.0	2.76	111.4	0.165	14.8	0.26	-114.3
1.5	0.130	-158.4	2.71	106.6	0.167	14.9	0.27	-116.3
1.6	0.127	-152.6	2.65	102.2	0.170	15.9	0.27	-118.5
1.7	0.132	-147.4	2.61	98.5	0.174	16.5	0.27	-118.9
1.8	0.127	-144.9	2.58	94.1	0.178	16.5	0.27	-120.2
1.9	0.131	-143.7	2.51	89.8	0.178	16.5	0.27	-122.5
2.0	0.131	-148.7	2.44	86.6	0.181	18.4	0.26	-127.2
2.1	0.133	-149.9	2.42	82.4	0.184	18.0	0.26	-130.4
2.2	0.142	-152.5	2.34	78.1	0.191	18.5	0.27	-134.3
2.3	0.156	-154.5	2.27	74.8	0.193	17.1	0.28	-135.5
2.4	0.163	-156.3	2.23	81.8	0.195	18.1	0.28	-135.7
2.5	0.166	-157.2	2.21	68.2	0.200	18.3	0.29	-134.2
2.6	0.166	-157.1	2.15	64.1	0.207	17.6	0.28	-134.4
2.7	0.173	-159.7	2.07	60.7	0.207	17.3	0.28	-134.8
2.8	0.171	-165.3	2.02	58.8	0.211	18.4	0.27	-136.8
2.9	0.175	-166.9	2.01	55.4	0.214	18.9	0.26	-138.2
3.0	0.194	-170.4	1.94	51.8	0.216	17.4	0.27	-139.8

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