

# M-Pulse Microwave

## Silicon Bipolar MMIC Cascadable Amplifier

### MP4TD1170

#### Features

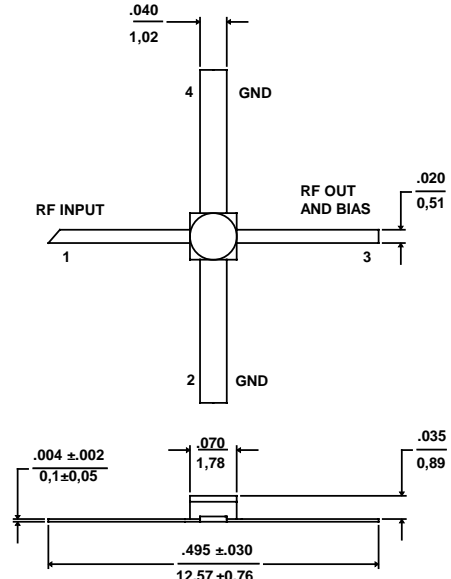
- High Dynamic Range Cascadable 50Ω/75Ω Gain Block
- 3dB Bandwidth: 50 MHz to 1.0 GHz
- 17.0 dBm Typical  $P_{1dB}$  @ 1.0 GHz
- 12 dB Typical Gain @ 0.5 GHz
- 4.0 dB Typical Noise Figure @ 1.0 GHz
- Hermetic Gold-Ceramic Microstrip Package
- Tape and Reel Packaging Available

#### Description

M-Pulse's MP4TD1170 is a high performance silicon bipolar MMIC housed in a hermetic high reliability package. The MP4TD1170 is designed for use in 50Ω or 75Ω systems where a high dynamic range and low distortion gain block is required. Typical applications include narrow and wide band IF and RF amplifiers in industrial and military applications.

The MP4TD1170 is fabricated using a 10 GHz  $f_T$  silicon bipolar technology that features gold metalization and IC passivation for increased performance and reliability.

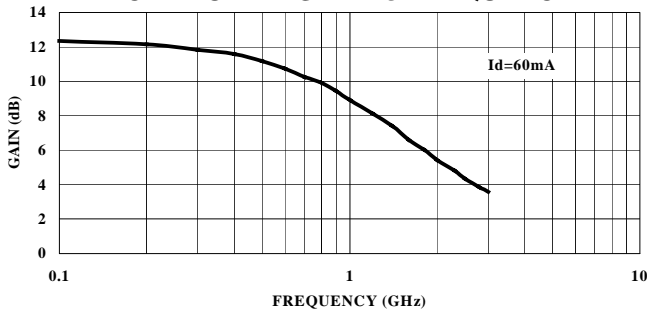
#### Gold-Ceramic Microstrip Package Outline<sup>1,2</sup>



Notes: (unless otherwise specified)

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

#### TYPICAL POWER GAIN vs FREQUENCY



#### 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
MP4TD1170	Hermetic Ceramic
MP4TD1170T	Tape and Reel

#### 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	11.5	12.5	13.5
$\Delta G_p$	Gain Flatness	$f = 0.1\text{ to }0.7\text{ GHz}$	dB	-	±0.9	±1.1
$f_{3dB}$	3 dB Bandwidth	ref 50 MHz Gain	GHz	-	1.0	-
$SWR_{in}$	Input SWR	$f = 0.1\text{ to }2.0\text{ GHz}$	-	-	1.8	-
$SWR_{out}$	Output SWR	$f = 0.1\text{ to }2.0\text{ GHz}$	-	-	1.9	-
$P_{1dB}$	Output Power @ 1 dB Gain Compression	$f = 0.7\text{ GHz}$	dBm	16.0	17.0	-
NF	50 Ω Noise Figure	$f = 0.7\text{ GHz}$	dB	-	4.0	4.5
$IP_3$	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	-

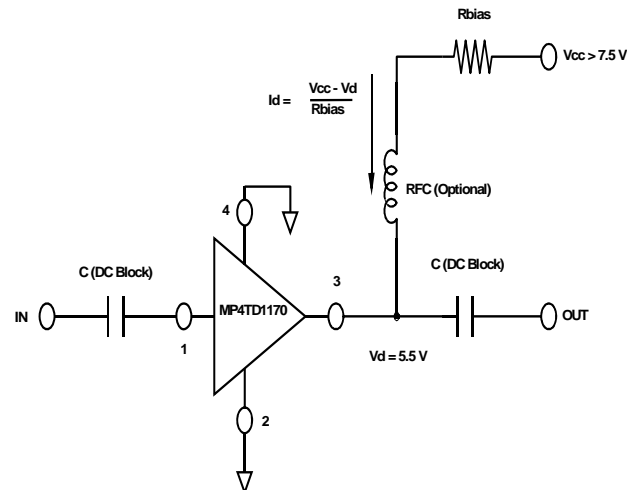
Specification Subject to Change Without Notice

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

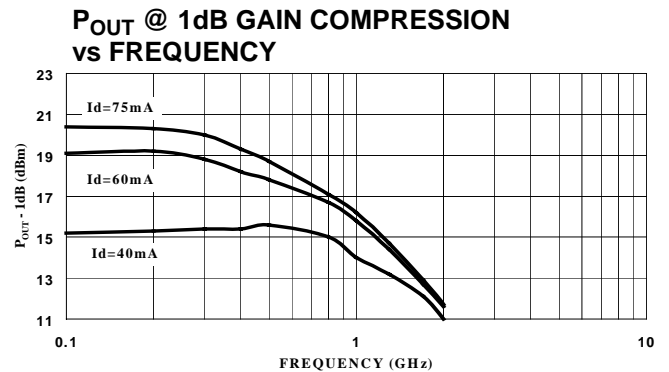
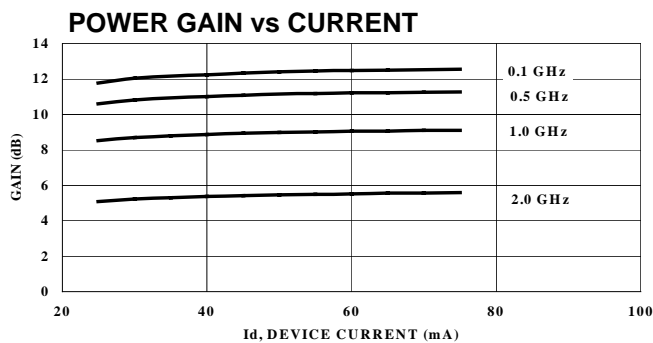
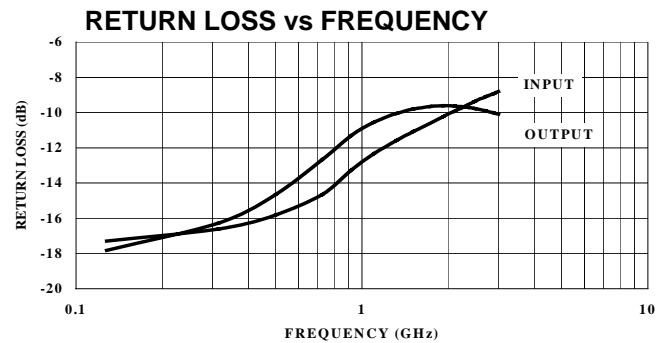
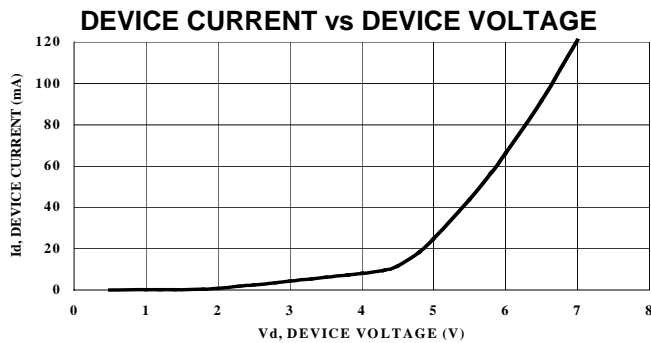
Parameter	Absolute Maximum
Device Current	90 mA
Power Dissipation <sup>2,3</sup>	560 mW
RF Input Power	+20 dBm
Junction Temperature	200°C
Storage Temperature	-65°C to +200°C
Thermal Resistance: $\theta_{jC} = 135^{\circ}\text{C/W}$	

1. Exceeding these limits may cause permanent damage.
2. Case Temperature ( $T_c$ ) = 25 °C.
3. Derate at 7.4 mW/°C for  $T_c > 124^{\circ}\text{C}$ .

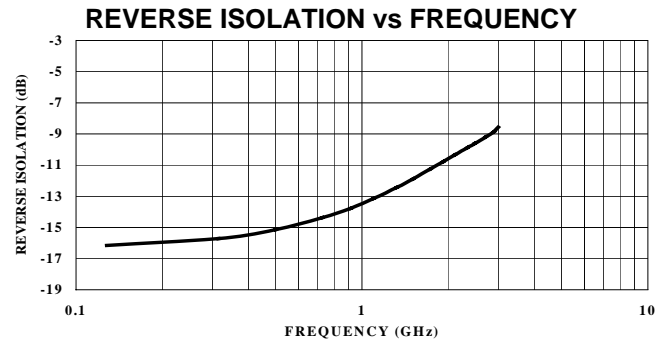
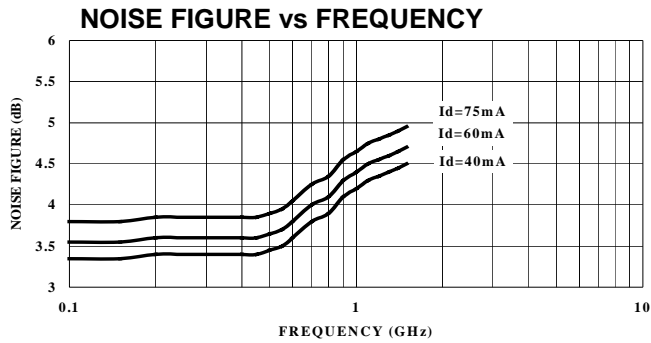
**Typical Bias Configuration**



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



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**Typical Scattering Parameters**

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

Frequency (GHz)	S11		S21		S12		S22	
	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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