

# M-Pulse Microwave

## Silicon Bipolar MMIC Cascadable Amplifier

### MP4TD0670

V4.00

#### Features

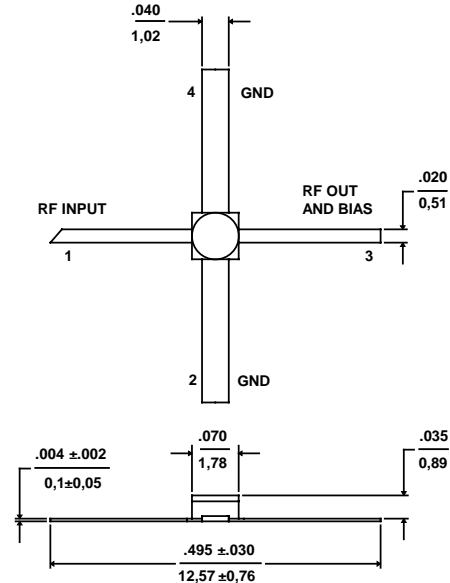
- Cascadable 50Ω Gain Block
- 3dB Bandwidth: DC to 0.8 GHz
- 18.5 dB Typical Gain @ 0.5 GHz
- Unconditionally Stable ( $k > 1$ )
- Low Voltage Operation
- Hermetic Gold-Ceramic Microstrip Package
- Tape and Reel Packaging Available

#### Description

M-Pulse's MP4TD0670 is a high performance silicon bipolar MMIC housed in a hermetic high reliability package for surface mount usage. The MP4TD0670 is useful where a general purpose 50Ω gain block with lower (3.0 dB) noise figure is required. Typical applications include narrow and wide band IF and RF amplifiers in industrial and military applications.

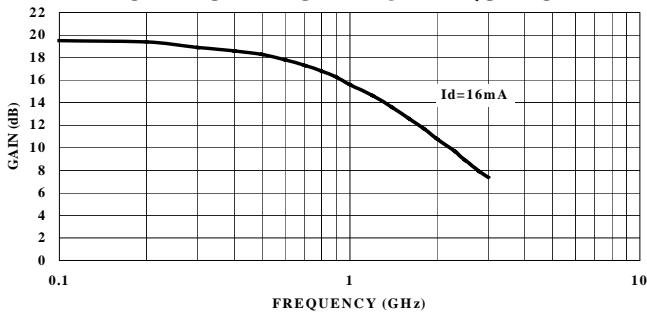
The MP4TD0670 is fabricated using a 10 GHz  $f_T$  silicon bipolar technology that features gold metalization and IC passivation for increased performance and reliability.

#### 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
MP4TD0670	Ceramic
MP4TD0670T	Tape and Reel

#### Electrical Specifications @ $T_A = +25^\circ\text{C}$ , $I_D = 16 \text{ mA}$ , $Z_0 = 50\Omega$

Symbol	Parameters	Test Conditions	Units	Min.	Typ.	Max.
Gp	Power Gain ( $ S_{21} ^2$ )	f = 0.1 GHz	dB	18.5	19.5	22
$\Delta G_p$	Gain Flatness	f = 0.1 to 0.6 GHz	dB	-	±0.7	±1.0
$f_{3 \text{ dB}}$	3 dB Bandwidth	-	GHz	-	0.8	-
SWR <sub>in</sub>	Input SWR	f = 0.1 to 1.5 GHz	-	-	1.8	-
SWR <sub>out</sub>	Output SWR	f = 0.1 to 1.5 GHz	-	-	1.8	-
P <sub>1 dB</sub>	Output Power @ 1 dB Gain Compression	f = 0.5 GHz	dBm	-	4.5	-
NF	50 Ω Noise Figure	f = 0.5 GHz	dB	-	3.0	3.5
IP <sub>3</sub>	Third Order Intercept Point	f = 0.5 GHz	dBm	-	14.5	-
t <sub>D</sub>	Group Delay	f = 0.5 GHz	ps	-	200	-
V <sub>d</sub>	Device Voltage	-	V	3.1	3.5	3.9
dV/dT	Device Voltage Temperature Coefficient	-	mV/°C	-	-8.0	-

Specification Subject to Change Without Notice

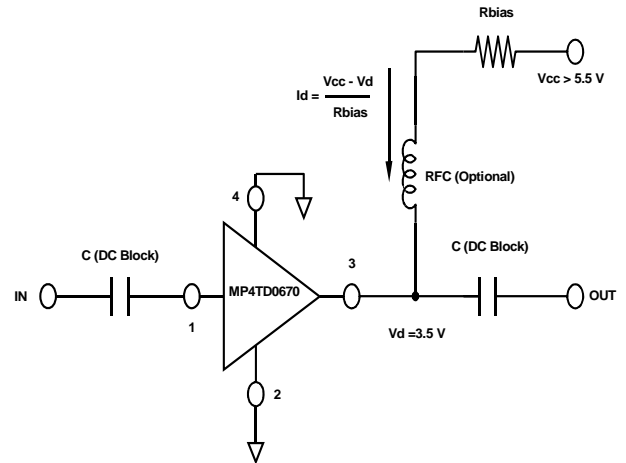
**Absolute Maximum Ratings<sup>1</sup>**

Parameter	Absolute Maximum
Device Current	50 mA
Power Dissipation <sup>2,3</sup>	200 mW
RF Input Power	+20 dBm
Junction Temperature	200°C
Storage Temperature	-65°C to +200°C

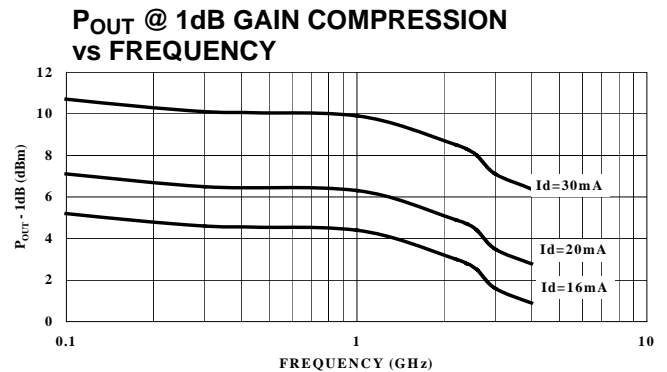
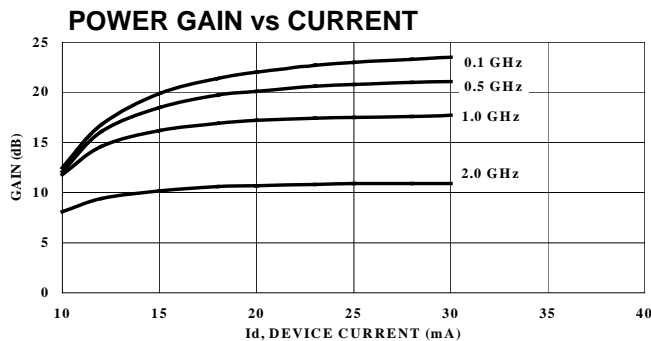
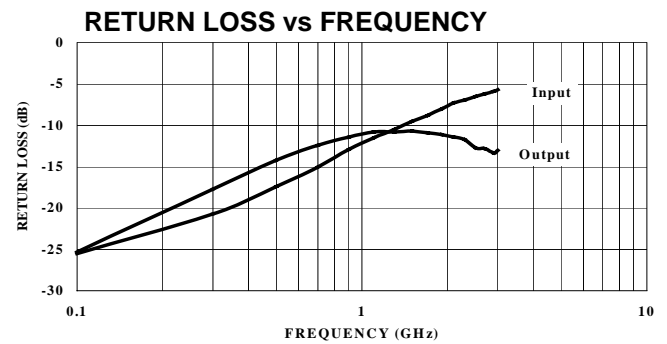
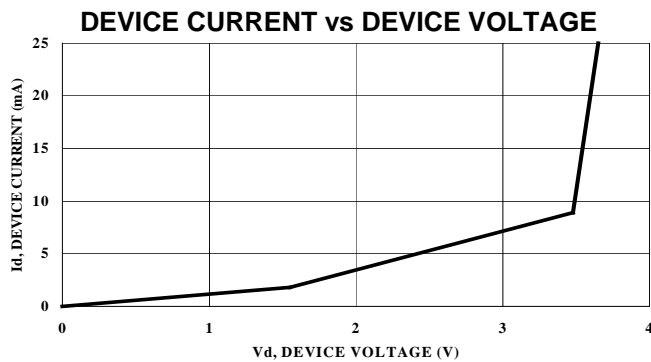
Thermal Resistance:  $\theta_{jC} = 150^{\circ}\text{C/W}$

1. Exceeding these limits may cause permanent damage.
2. Case Temperature ( $T_c$ ) = 25 °C.
3. Derate at 6.7 mW/°C for  $T_c > 170^{\circ}\text{C}$ .

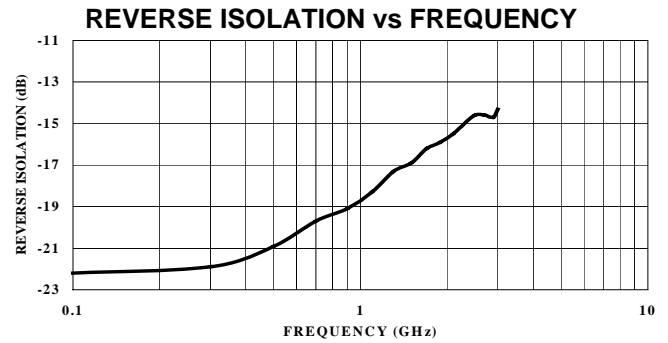
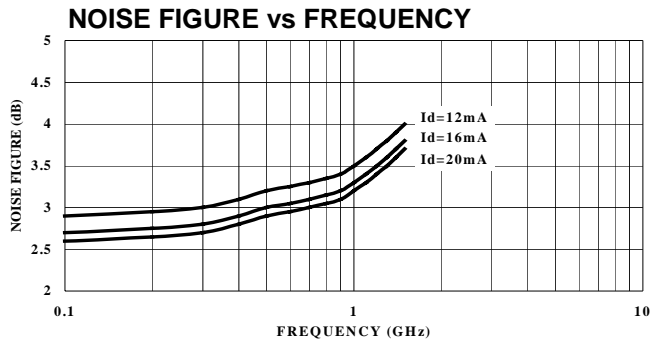
**Typical Bias Configuration**



**Typical Performance Curves @  $I_d = 16\text{ mA}$ ,  $T_A = +25^{\circ}\text{C}$  (unless otherwise noted)**



Specification Subject to Change Without Notice



**Typical Scattering Parameters**

$Z_0 = 50\Omega$ ,  $T_A = +25^\circ\text{C}$ ,  $I_D = 16\text{ mA}$

Frequency (GHz)	S11		S21		S12		S22	
	Mag.	Angle	Mag.	Angle	Mag.	Angle	Mag	Angle
0.1	0.055	-153.1	9.47	171.0	0.076	5.8	0.053	-55.9
0.2	0.068	-148.6	9.30	162.3	0.077	8.4	0.092	-79.0
0.3	0.094	-134.8	8.90	154.3	0.080	16.3	0.131	-101.8
0.4	0.111	-135.4	8.57	146.3	0.083	20.2	0.165	-113.0
0.5	0.134	-133.4	8.29	138.8	0.089	24.9	0.194	-123.2
0.6	0.156	-138.3	7.78	131.9	0.096	27.3	0.215	-135.2
0.7	0.175	-139.3	7.41	125.1	0.103	28.2	0.237	-142.7
0.8	0.200	-140.2	6.93	119.7	0.106	30.6	0.254	-153.5
0.9	0.224	-143.2	6.54	114.0	0.109	31.2	0.266	-159.7
1.0	0.243	-147.8	6.09	109.0	0.118	33.8	0.277	-167.4
1.5	0.334	-164.4	4.55	87.9	0.143	36.5	0.292	167.5
2.0	0.408	177.9	3.48	73.0	0.163	35.7	0.278	148.9
2.5	0.474	163.1	2.79	60.9	0.183	36.2	0.236	135.8
3.0	0.513	150.8	2.34	52.9	0.191	38.3	0.218	130.1

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