M/A-COM
an AMP company

Silicon Bipolar MMIC Cascadable Amplifier

MA4TD0639

V3.00

Features

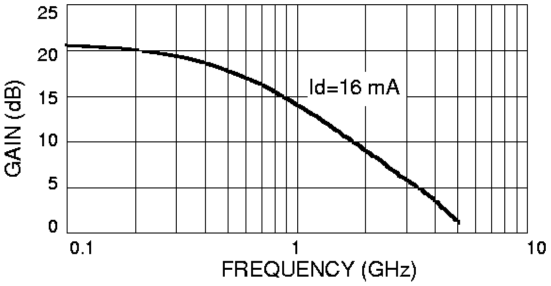
- Cascadable 50Ω Gain Block
- 3 dB Bandwidth: DC to 0.5 GHz
- 18.0 dB Typical Gain @ 0.5 GHz
- Unconditionally Stable (k>1)
- Low Voltage Operation
- SOT-143 Plastic Package
- Tape and Reel Packaging Available

Description

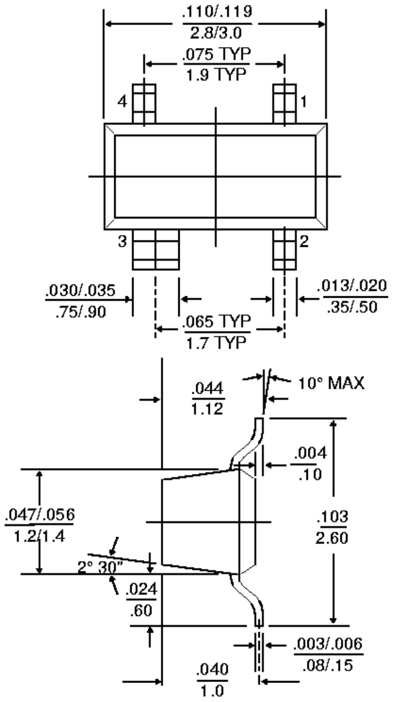
M/A-COM's MA4TD0639 is a high performance silicon bipolar MMIC housed in an SOT-143 plastic package. The MA4TD0639 is designed for use where a general purpose 50Ω gain block is required. Typical applications include narrow and wide band IF and RF amplifiers in industrial and commercial applications.

The MA4TD0639 is fabricated using a 10 GHz f_T silicon bipolar technology that features gold metalization and IC passivation for increased performance and reliability.

TYPICAL POWER GAIN vs FREQUENCY



SOT-143 Plastic Package Outline[1,2]



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

Electrical Specifications @ T_A = +25°C, I_d = 16 mA, Z_0 = 50Ω

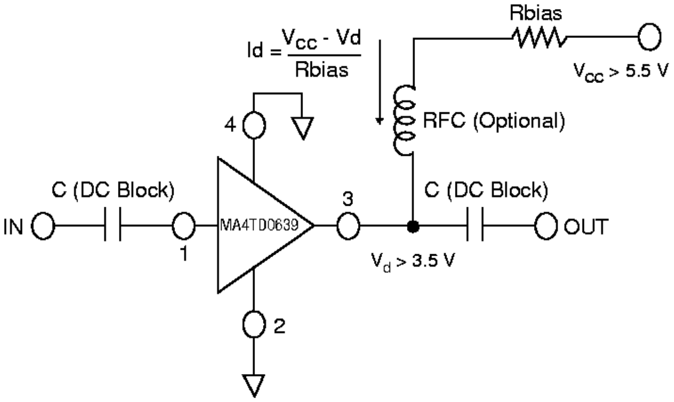
Symbol	Parameters	Test Conditions	Units	Min.	Typical	Max.
Gp	Power Gain ($\lvert S_{21}\rvert^2$)	f = 0.1 GHz	dB	19	20.5	22
ΔGp	Gain Flatness	f = 0.1 to 0.5 GHz	dB	-	±0.7	±1.0
f_{3dB}	3 dB Bandwidth	—	GHz	-	0.5	-
SWRin	Input SWR	f = 0.1 to 2.0 GHz	-	-	1.6	-
SWRout	Output SWR	f = 0.1 to 2.0 GHz	-	-	1.5	-
P_{1dB}	Output Power @ 1 dB Gain Compression	f = 0.5 GHz	dBm	-	2.5	-
NF	50Ω Noise Figure	f = 0.5 GHz	dB	-	3.0	4.0
IP_3	Third Order Intercept Point	f = 0.5 GHz	dBm	-	14.5	-
t_D	Group Delay	f = 0.5 GHz	ps	-	225	-
Vd	Device Voltage	—	V	2.6	3.5	4.0
dV/dT	Device Voltage Temperature Coefficient	—	mV/°C	-	-8.0	-

Absolute Maximum Ratings[1]

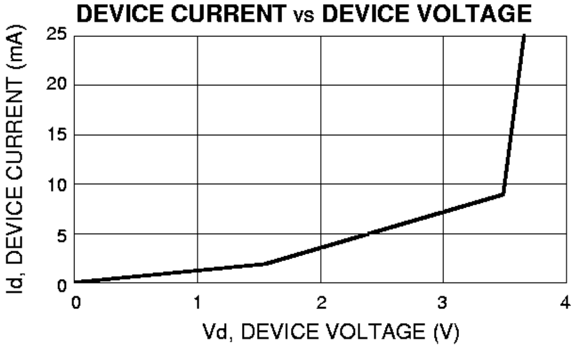
Parameter	Ratings
Device Current	50 mA
Power Dissipation[2,3]	200 mW
RF Input Power	+20 dBm
Junction Temperature	150°C
Storage Temperature	-65°C to +150°C
Thermal Resistance: θ_{jc} = 100°C/W	

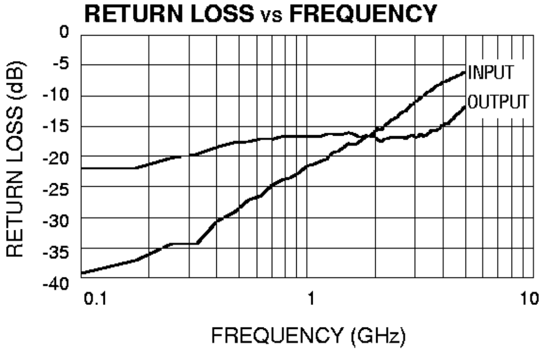
1. Exceeding these limits may cause permanent damage.
2. Case Temperature (T_C) = 25°C.
3. Derate at 6.7 mW/°C for T_C > 114°C.

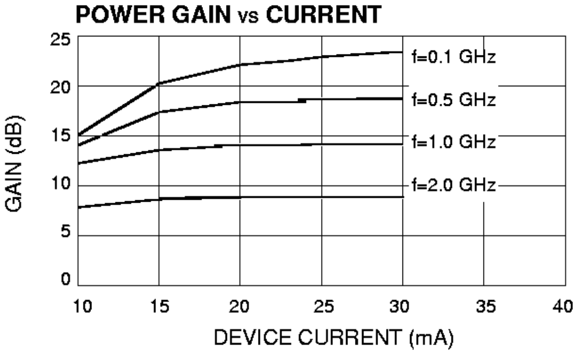
Typical Bias Configuration

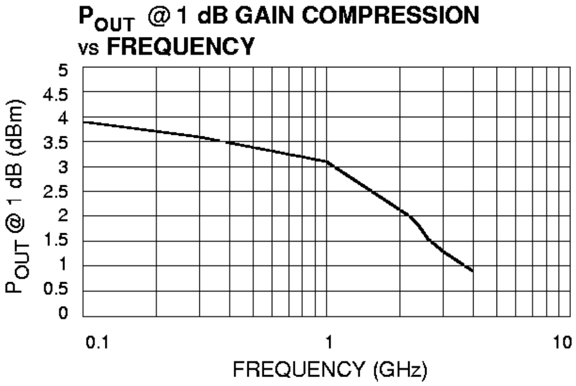


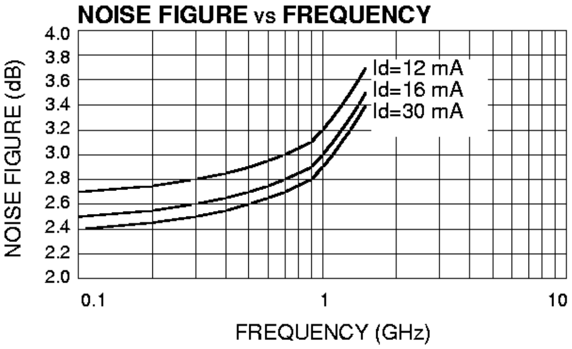
Typical Performance Curves - I_d = 16 mA, T_A = +25°C (unless otherwise noted)

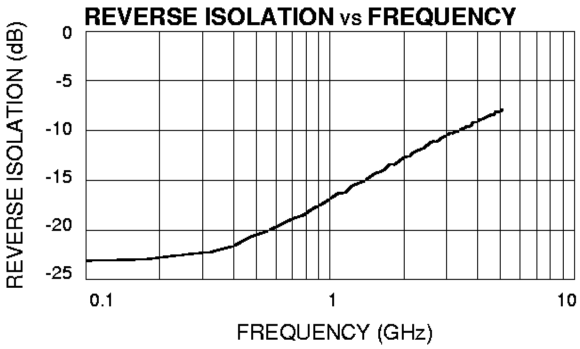

DEVICE CURRENT vs DEVICE VOLTAGE


RETURN LOSS vs FREQUENCY


POWER GAIN vs CURRENT


P_{OUT} @ 1 dB GAIN COMPRESSION vs FREQUENCY





Typical Scattering Parameters

$Z_0 = 50\Omega$, $T_A = +25°C$, $I_d = 16$ mA

Frequency (GHz)	S_{11}		S_{21}		S_{12}		S_{22}	
	Mag.	Angle	Mag.	Angle	Mag.	Angle	Mag.	Angle
0.1	0.011	77.0	10.69	165.9	0.070	9.1	0.080	-33.0
0.2	0.019	-45.0	9.43	142.8	0.076	20.3	0.101	-74.6
0.3	0.024	-49.6	9.00	137.4	0.080	24.8	0.110	-85.1
0.4	0.029	-54.1	8.57	131.9	0.083	29.3	0.119	-95.5
0.5	0.035	-61.0	7.99	125.0	0.092	33.9	0.130	-102.1
0.6	0.047	-71.6	7.46	118.9	0.088	36.6	0.133	-112.2
0.7	0.058	-84.0	6.50	108.5	0.114	37.7	0.138	-123.7
0.8	0.064	-91.8	6.07	130.6	0.118	39.8	0.146	-127.9
0.9	0.074	-107.3	5.37	95.1	0.135	40.4	0.146	-136.9
1.0	0.084	-106.9	5.06	91.5	0.143	44.0	0.147	-136.3
1.5	0.128	-136.9	3.59	69.9	0.192	43.2	0.157	-143.7
2.0	0.170	-164.9	2.76	52.0	0.234	38.6	0.138	-150.7
2.5	0.211	176.5	2.31	39.9	0.267	35.8	0.144	-149.0
3.0	0.283	157.7	1.95	26.9	0.302	31.4	0.145	-157.9

Ordering Information

Model No.	Package
MA4TD0639 PIN	SOT-143 Plastic
MA4TD0639 TR	Forward Tape and Reel