Silicon Bipolar MMIC Cascadable Amplifier

MA4TD0900

Features

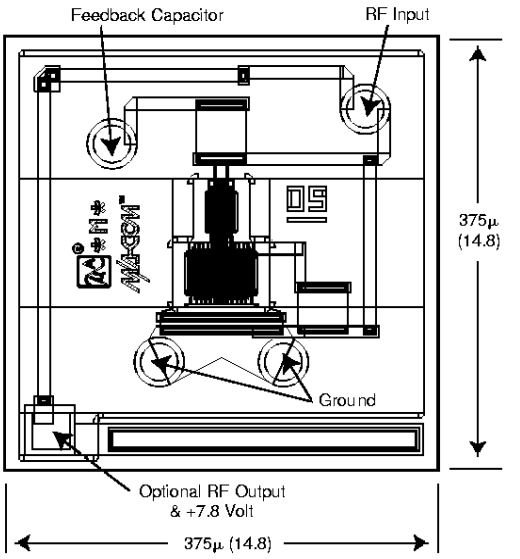
- Cascadable 50Ω Gain Block
- 3 dB Bandwidth: DC to 4.5 GHz
  8.0 dB Typical Gain @ 1.0 GHz
- Low SWR: <1.5 from 0.1 to 3.0 GHz

Description

M/A-COM's MA4TD0900 is a high performance silicon bipolar MMIC chip. The MA4TD0900 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.

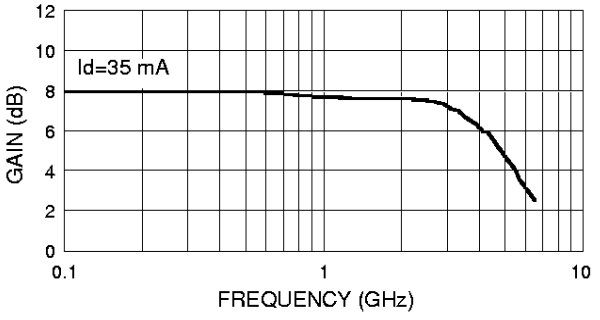
The MA4TD0900 is fabricated using a 10 GHz f_T silicon bipolar technology that features gold metalization and IC passivation for increased performance and reliability.

Chip Outline Drawing [1, 2, 3, 4]



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

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

Electrical Specifications @ T_A = +25°C, I_d = 35 mA, Z_0 = 50Ω

(Performance Requires 45 pF Feedback Capacitor)

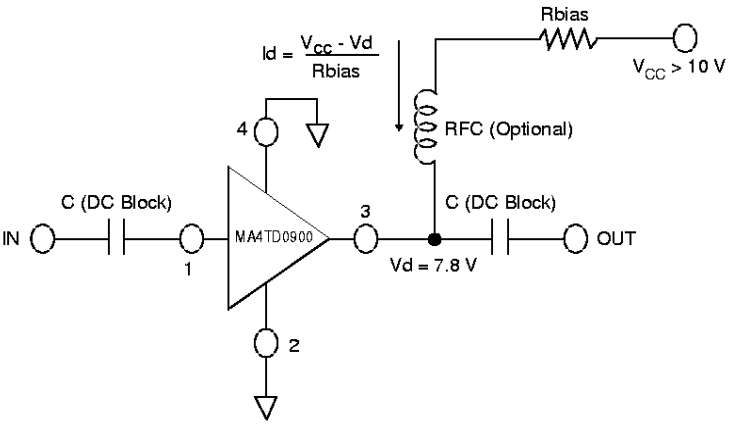
Symbol	Parameters	Test Conditions	Units	Min.	Typical	Max.
Gp	Power Gain ($\|S_{21}\|^2$)	f = 0.1 GHz	dB	-	8.0	-
ΔGp	Gain Flatness	f = 0.1 to 3.0 GHz	dB	-	±0.3	-
f_{3dB}	3 dB Bandwidth		GHz	-	4.5	-
SWRin	Input SWR	f = 0.1 to 3.0 GHz	-	-	2.0	-
SWRout	Output SWR	f = 0.1 to 3.0 GHz	-	-	1.5	-
P_{1dB}	Output Power @ 1 dB Gain Compression	f = 1.0 GHz	dBm	-	12	-
NF	50Ω Noise Figure	f = 1.0 GHz	dB	-	6.0	-
IP_3	Third Order Intercept Point	f = 1.0 GHz	dBm	-	23.0	-
t_D	Group Delay	f = 1.0 GHz	pS	-	100	-
Vd	Device Voltage		V	7.0	7.8	8.6
dV/dT	Device Voltage Temperature Coefficient		mV/°C	-	-16.0	-

Absolute Maximum Ratings[1]

Parameter	Ratings
Device Current	80 mA
Power Dissipation[2,3]	750 mW
RF Input Power	+20 dBm
Junction Temperature	200°C
Storage Temperature	-65°C to +200°C
Thermal Resistance: θ_{jms} = 70°C/W	

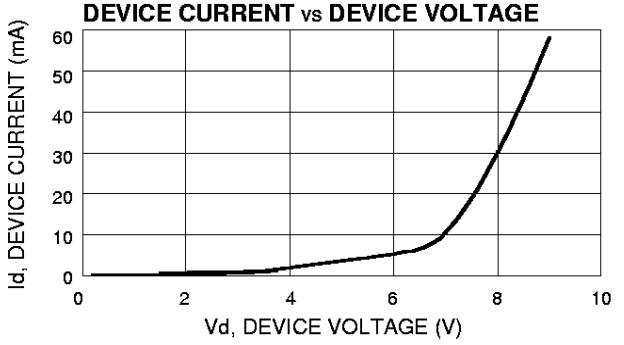
1. Exceeding these limits may cause permanent damage.
2. CaseTemperature (T_{MS}) = 25°C.
3. Derate at 14.3 mW/°C for T_{MS} > 147°C.

Typical Bias Configuration

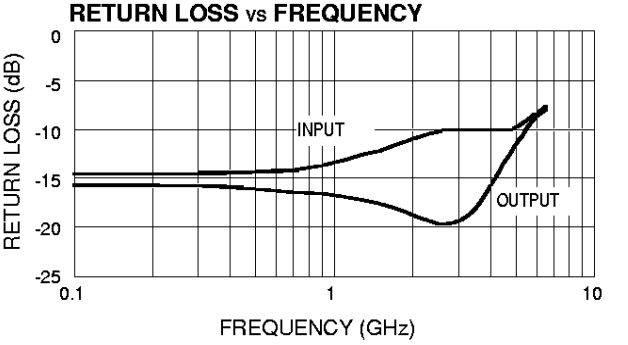


Typical Performance Curves - I_d = 35 mA, T_A = +25°C (unless otherwise noted)
(Performance Requires 45 pF Feedback Capacitor)

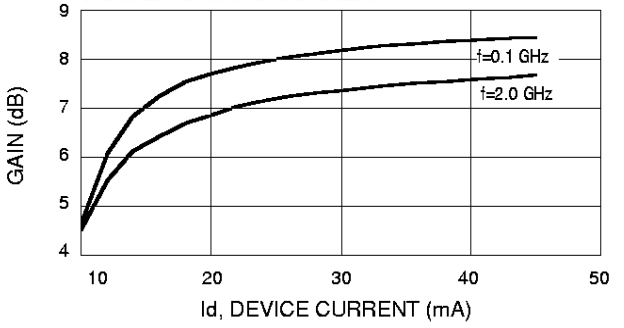
DEVICE CURRENT vs DEVICE VOLTAGE



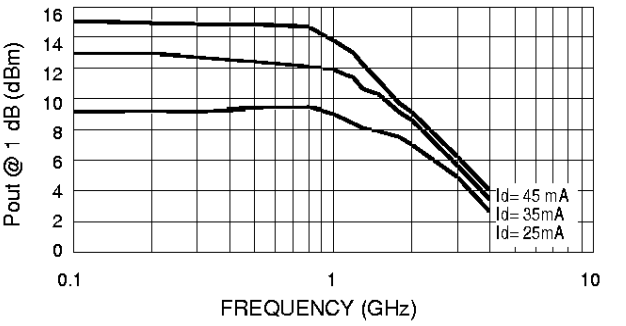
RETURN LOSS vs FREQUENCY

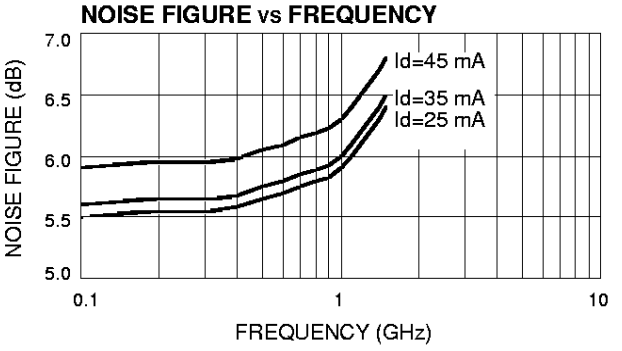


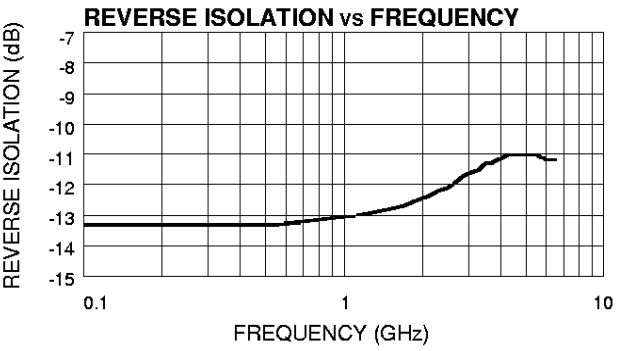
POWER GAIN vs CURRENT



Pout @ 1 dB GAIN COMPRESSION vs FREQUENCY







Typical Scattering Parameters in the Micro-X Package

Z_0 = 50Ω, T_A = +25°C, I_d = 35 mA

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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

Ordering Information

Model No.	Type of Carrier
MA4TD0900 GEL	Gel Pack
MA4TD0900 WAF	Waffle Pack
MA4TD0900 TF	Tape Frame