



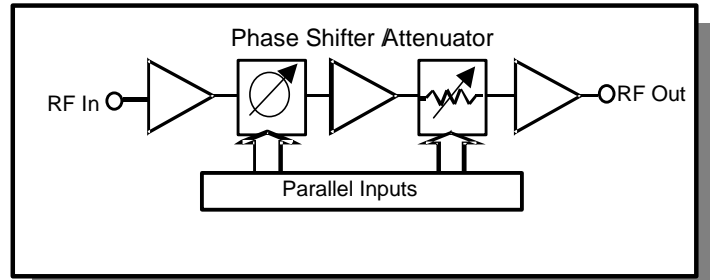
# X-Band Parallel Input 5-Bit Attenuator / 6-Bit Phase Shifter / Buffer Amplifier Die

**MA03503D**

Preliminary Release

## FEATURES

- 8 to 11 GHz Operation
- 50  $\Omega$  Input and Output Impedance
- Self-Aligned MSAG<sup>®</sup> MESFET Process



## Description

The MA03503D is an X-Band Parallel Input 5-Bit Attenuator / 6-Bit Phase Shifter / Buffer Amplifier fabricated using M/A-COM's mature GaAs Self-Aligned MSAG<sup>®</sup> MESFET Process. This product is fully matched to 50 ohms on both the input and the output.

## Maximum Ratings (T<sub>A</sub> = 25 °C unless otherwise noted)

Rating	Symbol	Value	Unit
DC Drain Supply Voltage	V <sub>D</sub>	8	V <sub>dc</sub>
DC Gate Supply Voltage	V <sub>G</sub>	-6	V <sub>dc</sub>
Digital Supply Voltage	V <sub>EE</sub>	-6	V <sub>dc</sub>
RF Input Power	P <sub>IN</sub>	200	mW
Junction Temperature	T <sub>J</sub>	150	°C
Storage Temperature	T <sub>STG</sub>	-40 to +150	°C

## ELECTRICAL CHARACTERISTICS V<sub>D</sub>=5.0 V, V<sub>G</sub> = -4.0 V, V<sub>EE</sub> = -4.0 V, T=25 °C, Input and Output Connected to 50 $\Omega$ .

Characteristic	Symbol	Min	Typ	Max	Unit
Frequency Range		8		11	GHz
Maximum Gain	G <sub>p</sub>		18		dB
Gain Flatness (Peak-to-Peak over any 250 MHz band)			0.5		dB
Input and Output Return Loss	RL		16		dB
Attenuation Range (5-Bits, 32 Steps 0.75 dB Nominal)			0.75 to 23.25		dB
RMS Attenuation Error (Uncorrected)			0.20		dB
0.75 dB Attenuator		-0.5	-0.8	-1.0	dB
1.5 dB Attenuator		-1.0	-1.5	-2.0	dB
3 dB Attenuator		-2.4	-3.0	-3.6	dB
6 dB Attenuator		-5.0	-6.0	-7.0	dB
12 dB Attenuator		-10.8	-12	-13.2	dB
Phase Shift Range (6-Bits, 64 Steps 5.6 degrees Nominal)			5.6 to 354.4		Deg
RMS Phase Error (uncorrected)			2		Deg
5.6 degree phase bit		-4	-5.3	-7	Deg
11.25 degree phase bit		-8	-11	-13	Deg
22.5 degree phase bit		-19	-22	-24	Deg
45 degree phase bit		-40	-44	-47	Deg
90 degree phase bit		-85	-90	-95	Deg
180 degree phase bit		-170	-180	-190	Deg
Gain Variation (Over all Phase Shifter Settings)			+/- 1.0		dB
Output Third Order Intercept Point	TOI		28		dBm
1-dB Compression Point	P <sub>1dB</sub>		22.5		dBm

Specifications subject to change without notice.

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- **North America:** Tel. (800)366-2266, Fax (800)618-8883
- **Asia/Pacific:** Tel. +81-44-844-8296, Fax +81-44-844-8298
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Characteristic	Symbol	Min	Typ	Max	Unit
Noise Figure	NF		10		dB
Clock Frequency			20		MHz

Characteristic	Symbol	Min	Typ	Max	Unit
DC Power Supplies					
<b>Microwave</b>					
Drain Supply Voltage	$V_D$		5		V
Gate Supply Voltage	$V_G$		-4		V
Drain Supply Current	$I_D$		325		mA
Gate Supply Current	$I_G$		1		mA
<b>Digital</b>					
Source Supply Voltage	$V_{EE}$		-4		V
Source Supply Current	$I_{EE}$		10		mA
<b>Logic Levels at Input</b>					
Input High Voltage	$V_{ih}$	3			V
Input Low Voltage	$V_{il}$			0.4	V
Input High Input Current	$I_{ih}$			0.5	mA
Input Low Input Current	$I_{il}$			0.1	mA
Timing Delay between enable signal and bit change			25		ns
Reliability (80 °C Baseplate)	MTTF	$10^6$			Hours

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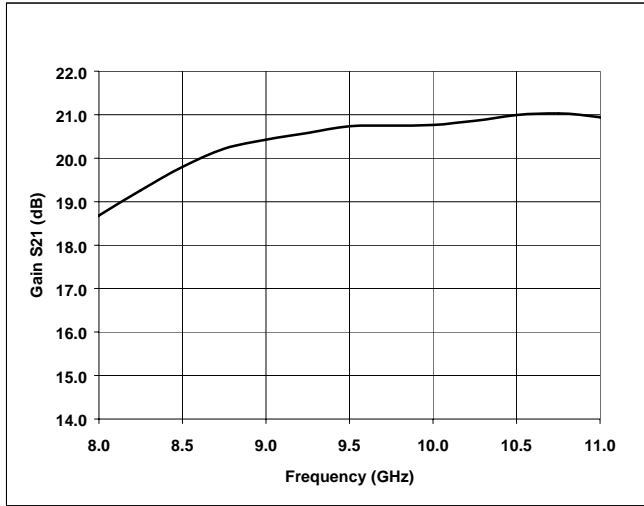


Figure 1. Gain vs. Frequency

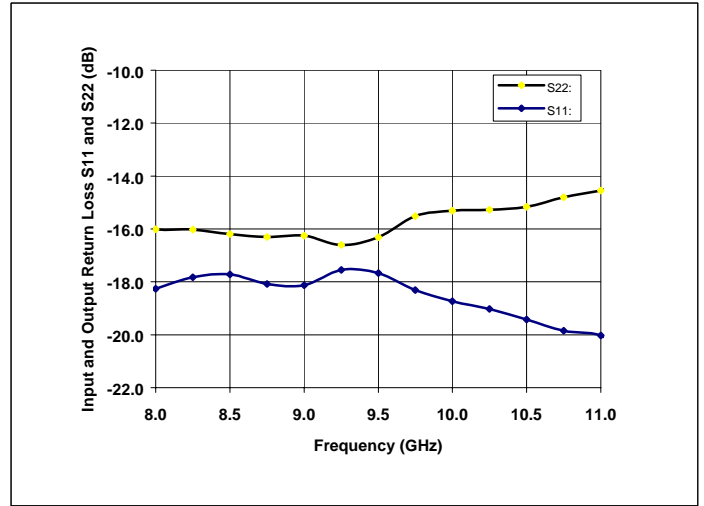
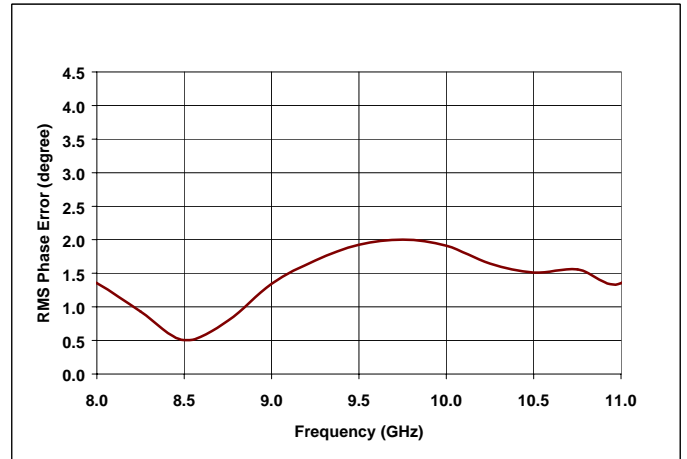
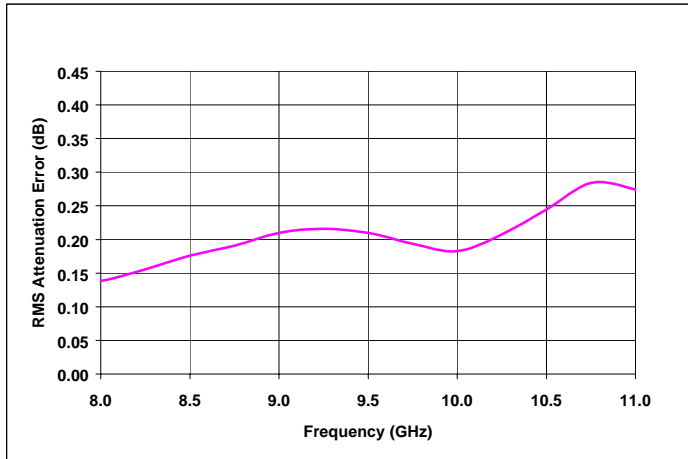


Figure 2. Input and Output Return Loss



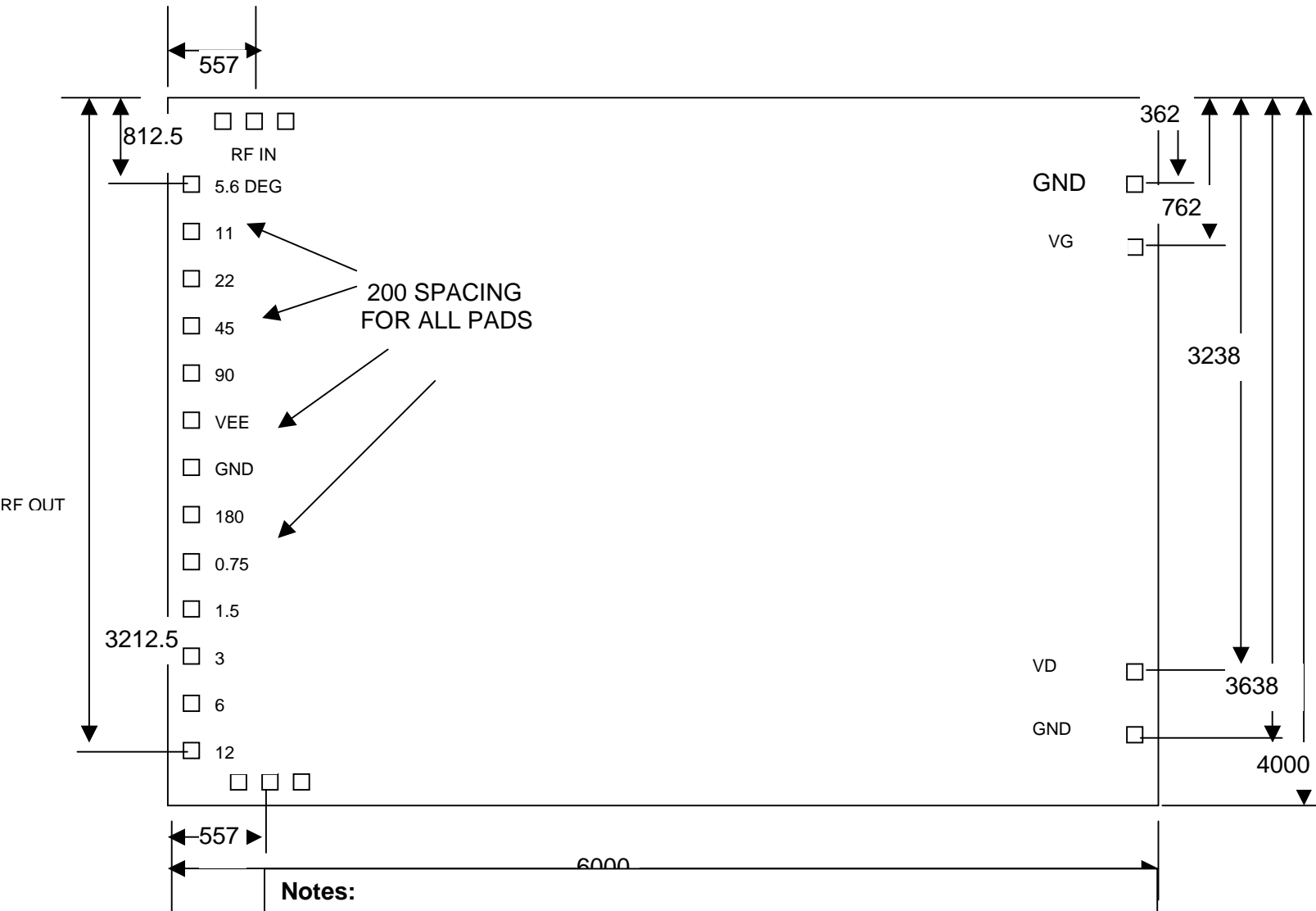
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**MECHANICAL INFORMATION**



**Notes:**

Dimensions in microns  
 Pad dimensions All pads 150umX150um  
 Ground-RF-Ground Spacing 225um



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