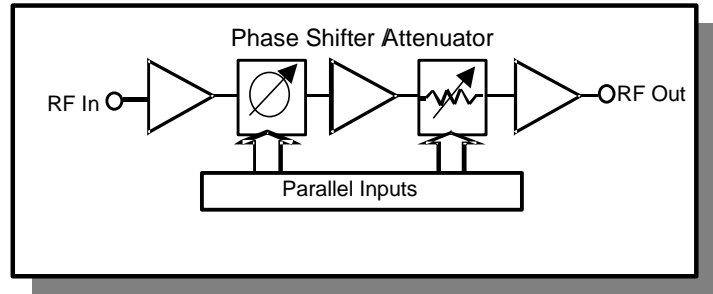


# M/A-COM X-Band Parallel Input 5-Bit Attenuator / 6-Bit Phase Shifter / Buffer Amplifier Die

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

 ( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted)

Rating	Symbol	Value	Unit
DC Drain Supply Voltage	$V_D$	8	$V_{dc}$
DC Gate Supply Voltage	$V_G$	-6	$V_{dc}$
Digital Supply Voltage	$V_{EE}$	-6	$V_{dc}$
RF Input Power	$P_{IN}$	200	mW
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-40 to +150	$^\circ\text{C}$

## ELECTRICAL CHARACTERISTICS

 ( $V_D=5.0\text{ V}$ ,  $V_G = -4.0\text{ V}$ ,  $V_{EE} = -4.0\text{ V}$ ,  $T=25\text{ }^\circ\text{C}$ , Input and Output Connected to 50  $\Omega$ ).

Characteristic	Symbol	Min	Typ	Max	Unit
Frequency Range		8		11	GHz
Maximum Gain	$G_p$		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	$P_{1dB}$		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
- Europe: Tel. +44 (1344) 869 595, Fax +44 (1344) 300 020

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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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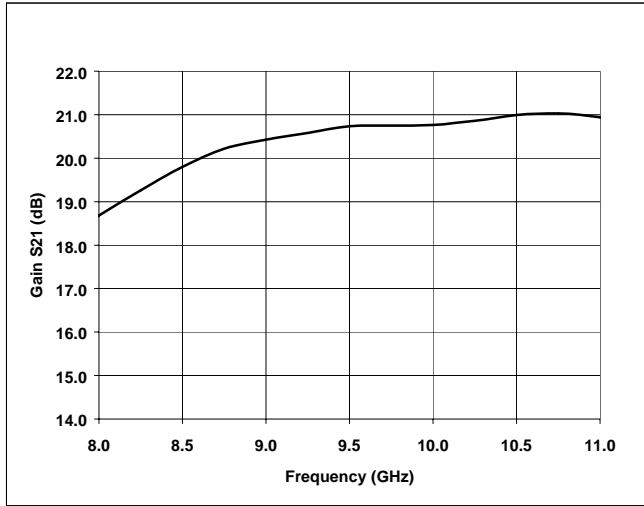


Figure 1. Gain vs. Frequency

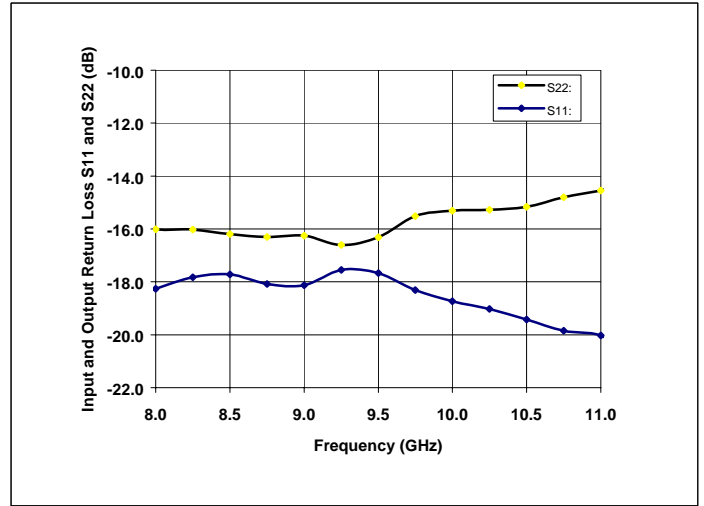
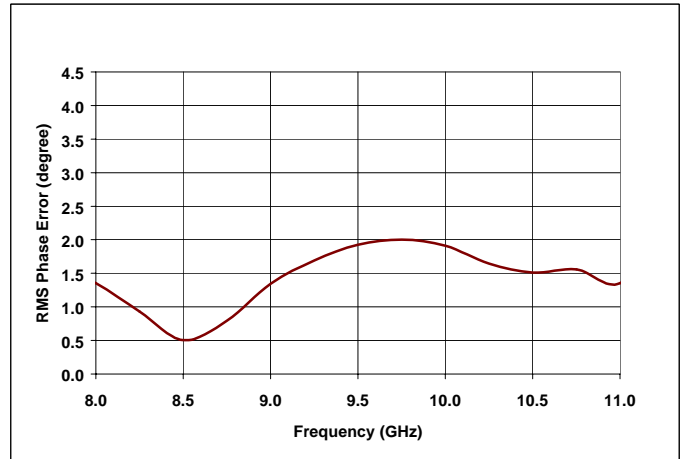
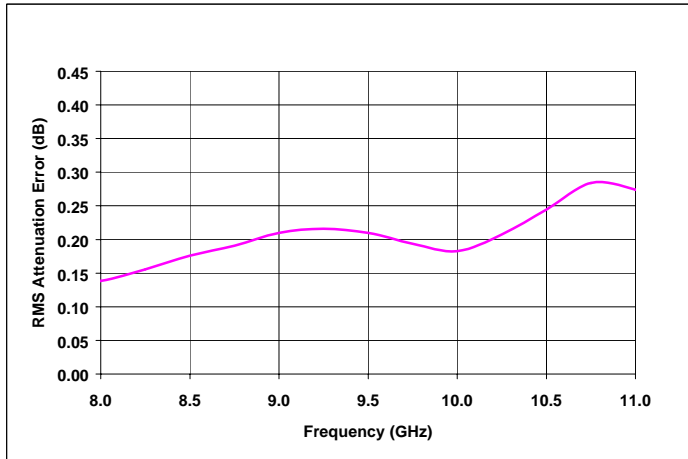


Figure 2. Input and Output Return Loss

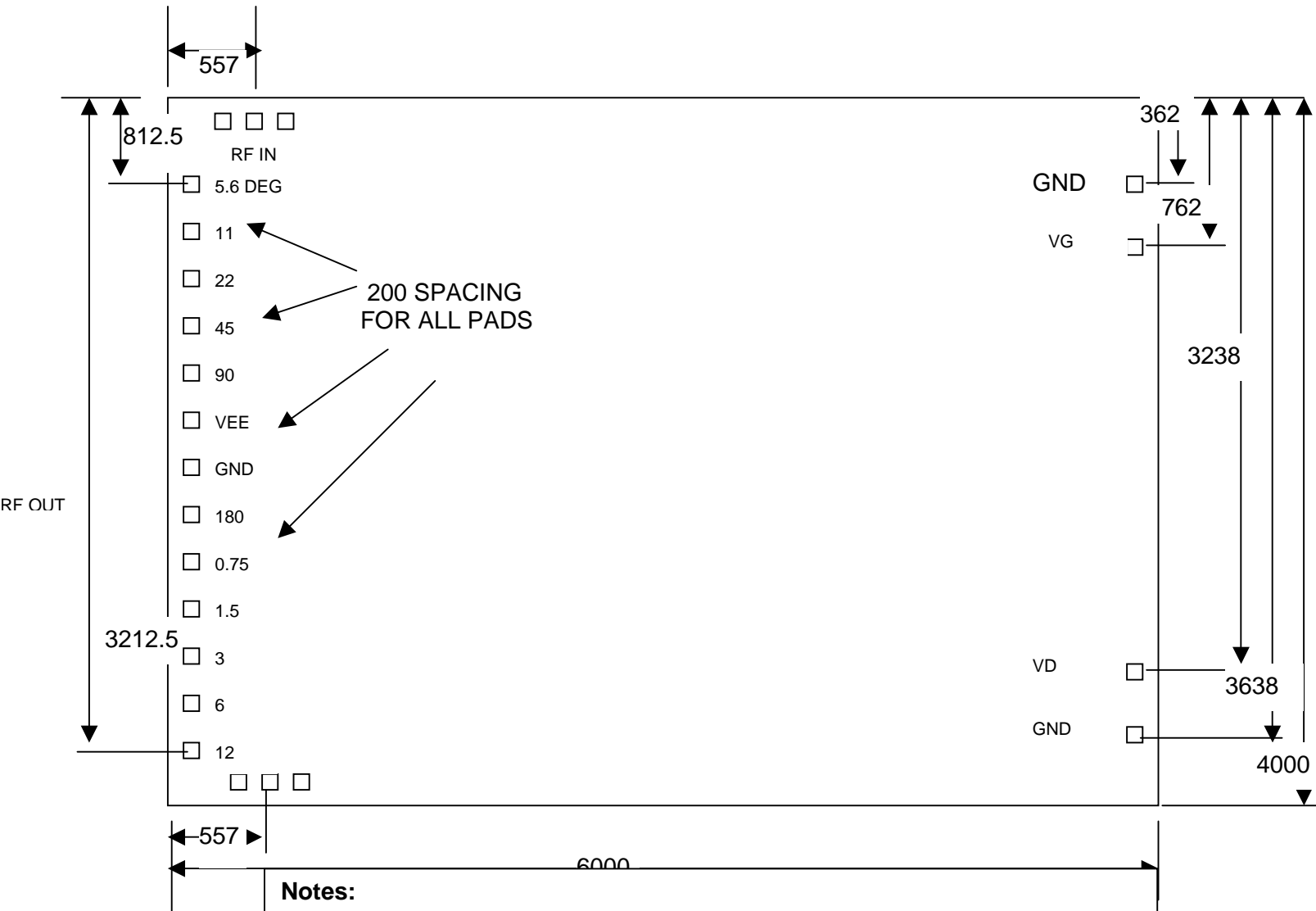


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**MECHANICAL INFORMATION**



**Notes:**

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



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