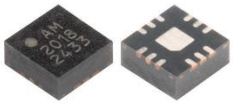
AM2018 – Attenuator

2 to 32 GHz, Voltage Variable

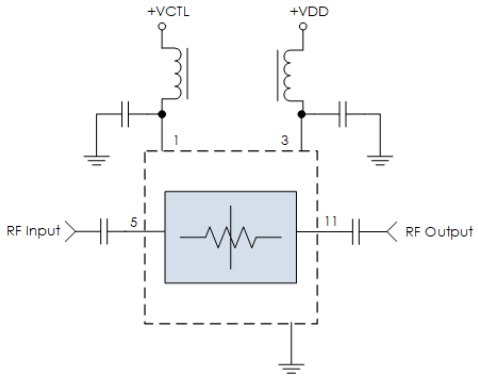


AM2018 is a broadband voltage variable attenuator covering the 2 to 32 GHz frequency, with a tuning voltage of 0 to +6V. The device provides low insertion loss, flat frequency response, and low attenuation error over the operating temperature range of -40C to +85C.

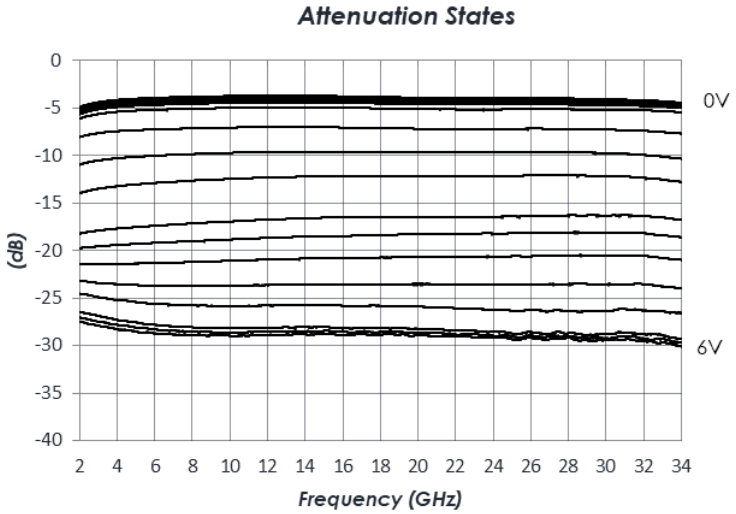
FEATURES

- Up to 30 dB of attenuation range
- Ultra broadband
- 4 dB Insertion Loss (0V)
- 0 to +6V tuning voltage
- Low phase shift vs attenuation
- +25 dBm IP3
- +5VDC
- 3mm QFN Package
- -40C to +85C Operation

FUNCTIONAL DIAGRAM



CHARACTERISTIC PERFORMANCE

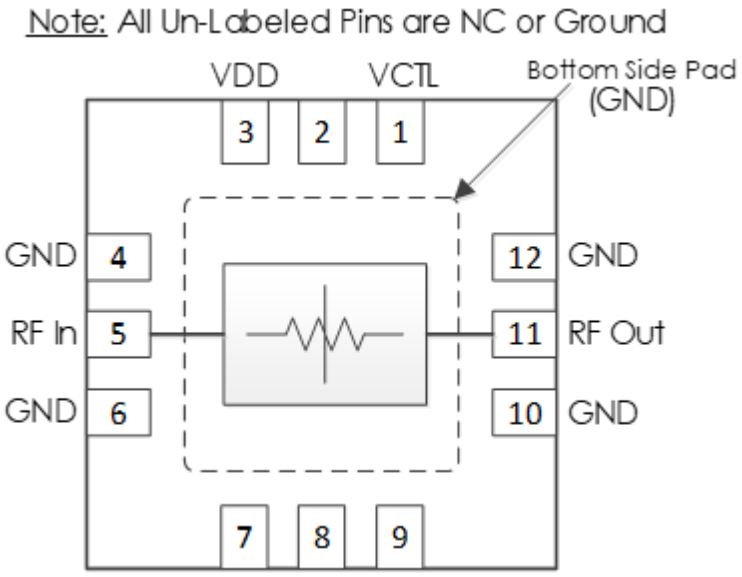


CONTENTS

REVISION HISTORY

Date	Revision	Notes
10/3/2024	1	Converted over to new format
2/12/2025	1.1	Updated plots

PIN LAYOUT AND DEFINITIONS



Pin	Name	Function
1	VCTL	Control Voltage (0 to +6V)
2	NC	No connect
3	VDD	Supply voltage (+5VDC)
4	GND	Ground - Common
5	RF IN	RF Input – 50 Ohms – DC Coupled, External DC blocking capacitor required
6	GND	Ground – Common
7	NC	No connect
8	NC	No connect
9	NC	No connect
10	GND	Ground – Common
11	RF OUT	RF Output – 50 Ohms, DC coupled
12	GND	Ground - Common

* NC pins may be left open or connected to ground

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+5.2 V
Control Voltage	-0.3 V	+6.0V
RF Input Power		+20dBm
Operating Junction Temperature	-40 C	+150 C
Storage Temperature Range	-55 C	+150 C

Note: Any device operation beyond the Absolute Maximum Ratings may result in permanent damage to the device. The values listed in this table are extremes and do not imply functional operation of the device at these or any other conditions beyond what is listed under Recommended Operating Conditions. Any part subjected to conditions outside of what is recommended for an extended amount of time may suffer from reliability concerns.

Handling Information

	Minimum	Maximum
Storage Temperature Range (Recommended)	-50 C	+125 C
Moisture Sensitivity Level	MSL 3	

Mercury products are electrostatic sensitive.
Follow safe handling practices to avoid damage.

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage	+4.5 V	+5.0 V	+5.2 V
Operating Case Temperature	-40 C		+85 C
Operating Junction Temperature	-40 C		+125 C

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
DC Supply Voltage		+4.5 V	+5.0 V	+5.2 V
DC Supply Current	Vdd = +5.0 V		3 mA	5 mA
Power Dissipated	Vdd = +5.0 V		15 mW	
Control Current			3 mA	5 mA

Thermal information

Junction to Package Ground Thermal Resistance (θ_{JC})	450 C/W

RF Performance

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
Frequency Range		2		32 GHz
Insertion Loss	f = 3 GHz		-4.3dB	
	f = 30 GHz		-4.1 dB	
Return Loss			-15 dB	
Input IP3	f = 3 GHz		+20 dBm	
	f = 30 GHz		+25 dBm	
P1dB	f = 3 GHz		+14dBm	
	F = 30 GHz		+20 dBm	

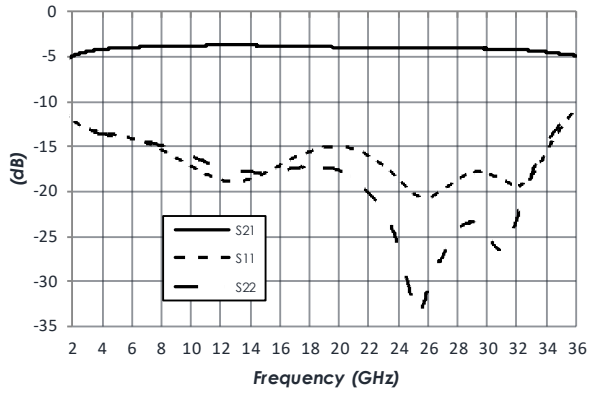
Timing Characteristics

Param	Min	Typical	Max
0 dB to 20 dB 50% CTL to 10% RF		50 µs	
20 dB to 0 dB 50% CTL to 90% RF		10 µs	

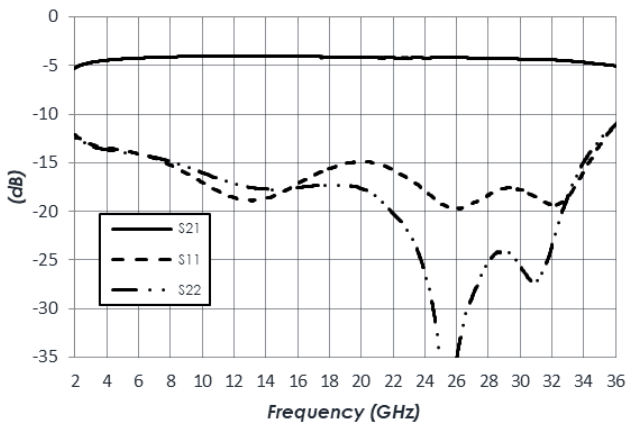
TYPICAL PERFORMANCE

(VDD = +5V, T = 25°C, board probed data, unless otherwise specified)

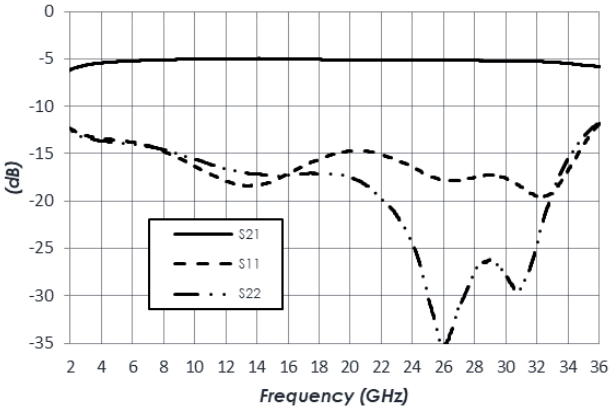
0.0V Minimum Insertion Loss



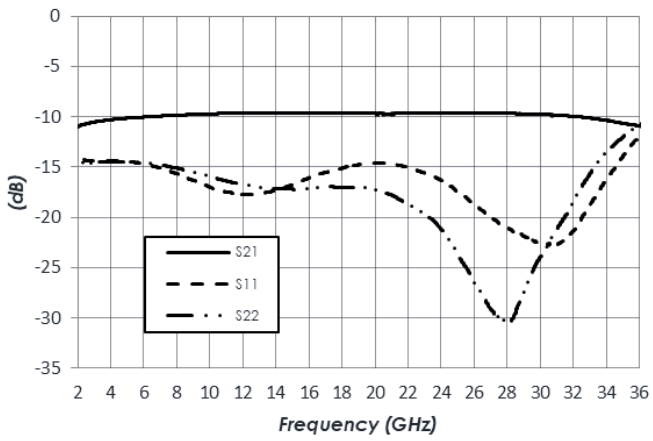
0.8V Attenuation State



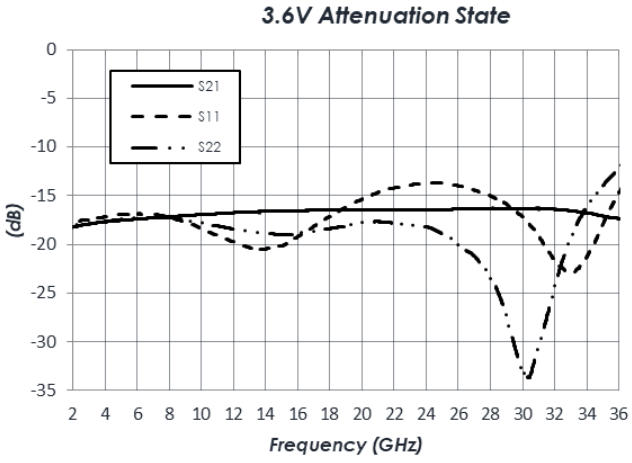
2V Attenuation State



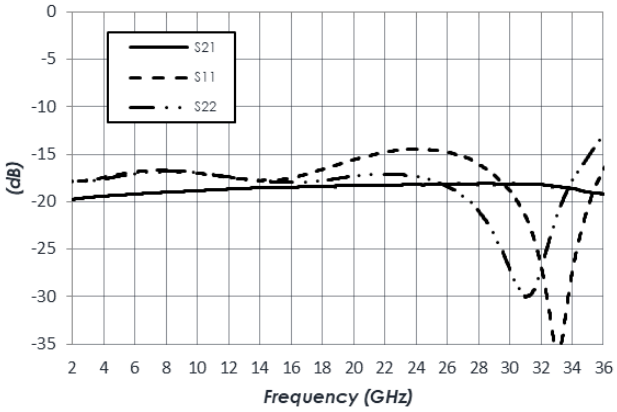
2.8V Attenuation State



3.6V Attenuation State

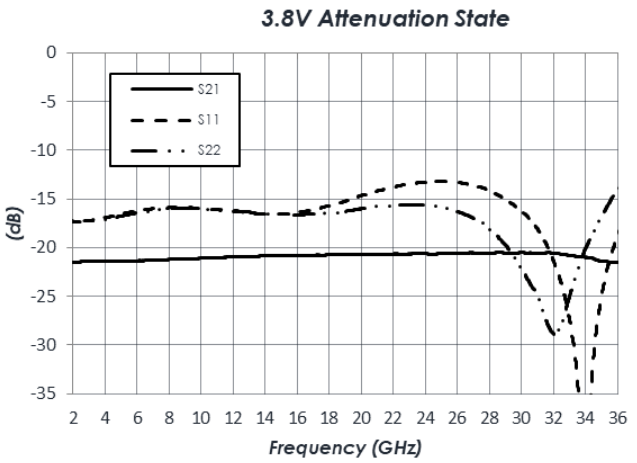


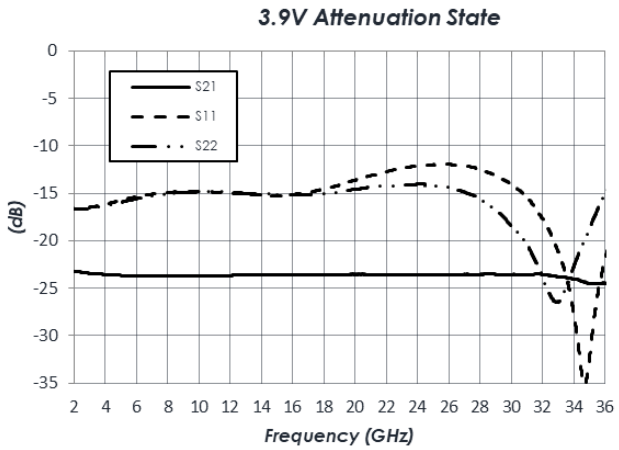
3.7V Attenuation State

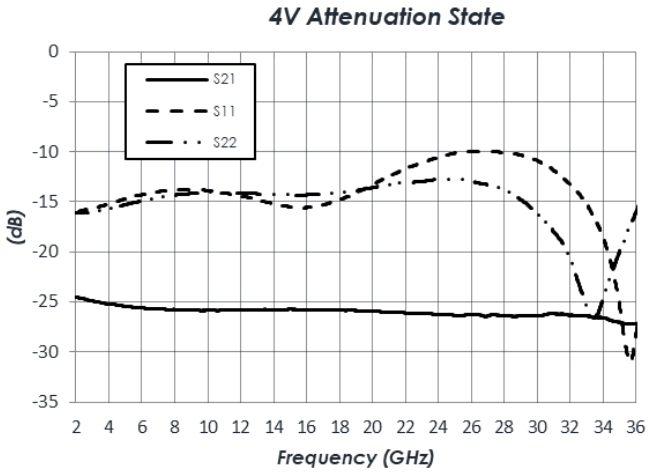


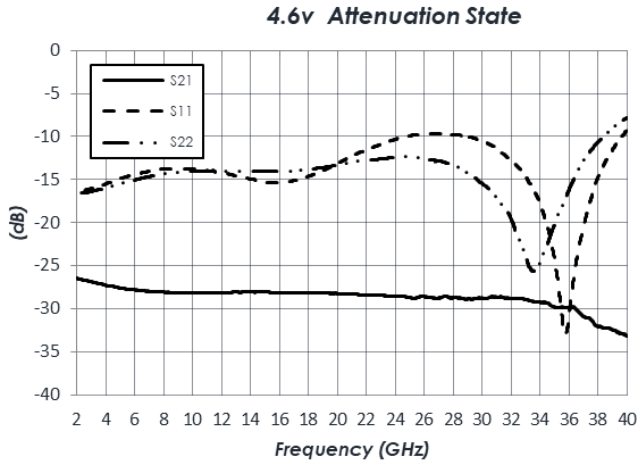
PIN LAYOUT AND DEFINITIONS (CONTINUED)

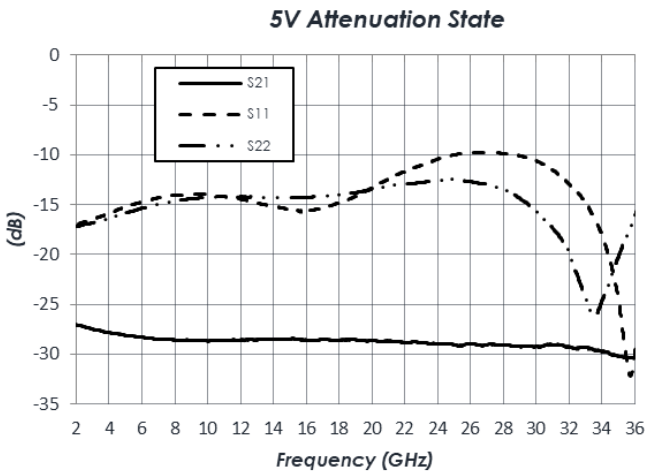
(VDD = +5V, T = 25°C, board probe data)

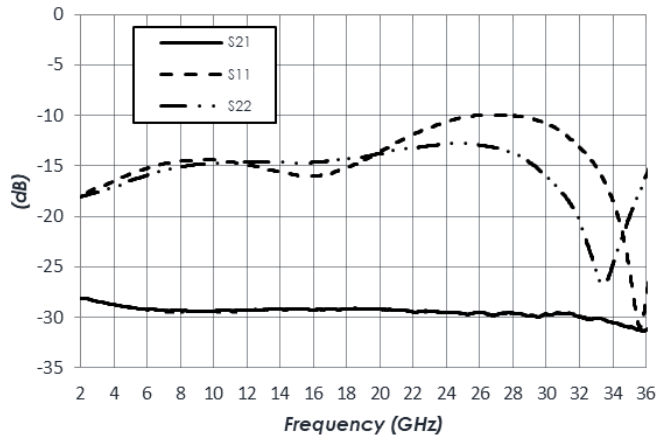


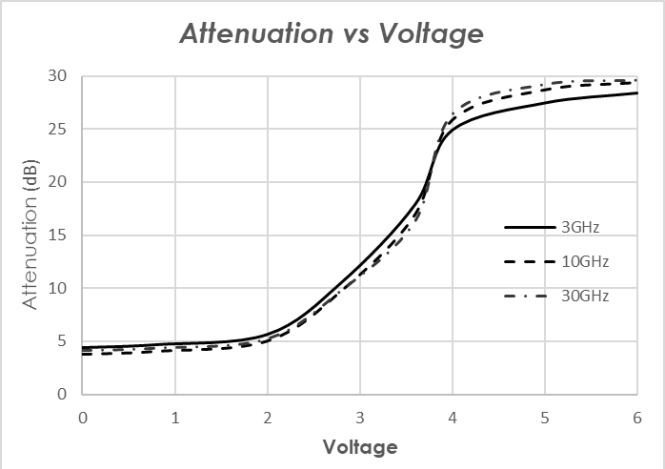


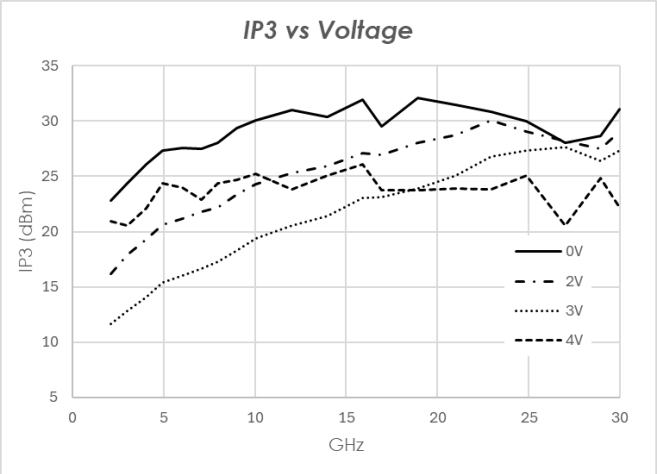


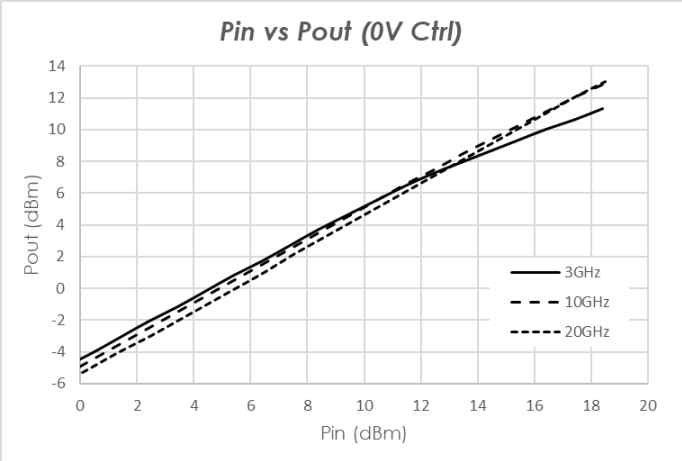


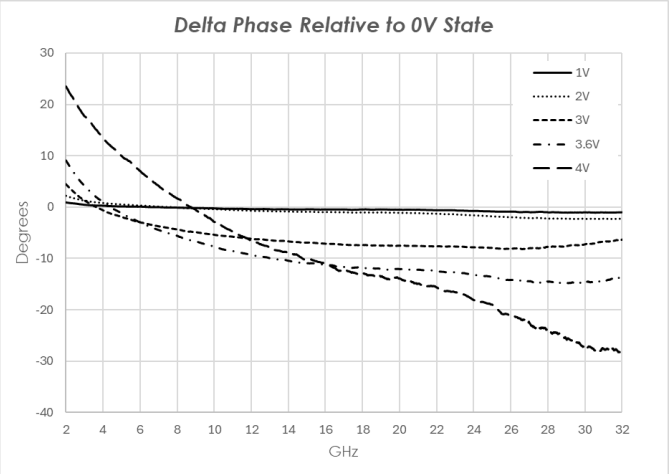




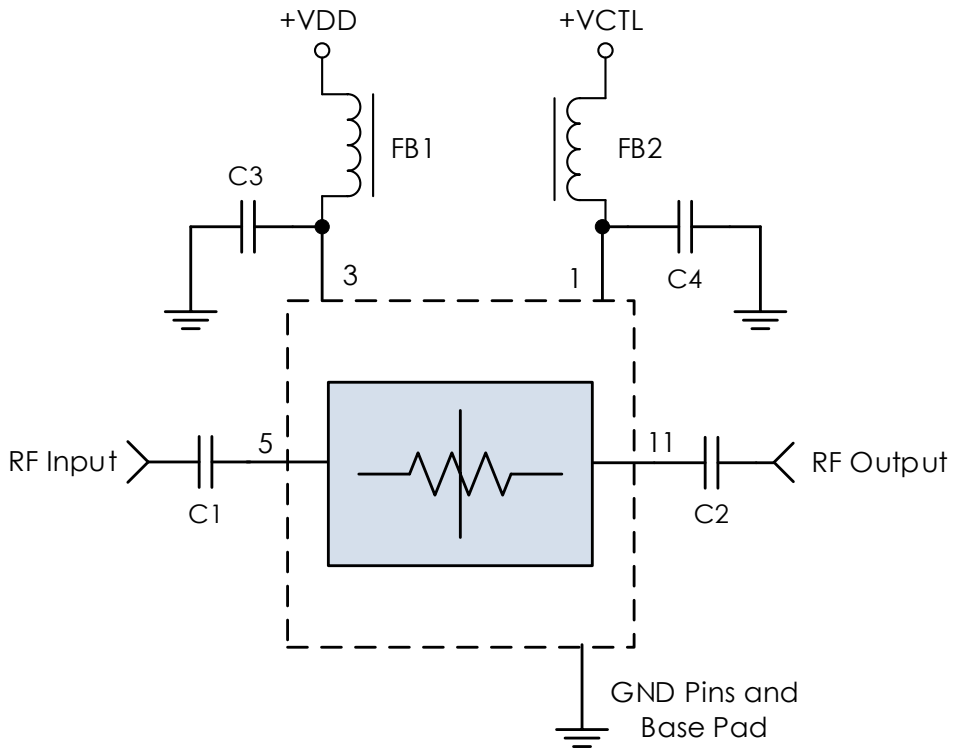

Attenuation vs Voltage
Attenuation (dB)
Voltage
3GHz
10GHz
30GHz


IP3 vs Voltage
IP3 (dBm)
GHz
0V
2V
3V
4V


Pin vs Pout (0V Ctrl)
Pout (dBm)
Pin (dBm)
3GHz
10GHz
20GHz


Delta Phase Relative to 0V State
Degrees
GHz
1V
2V
3V
3.6V
4V

TYPICAL APPLICATION



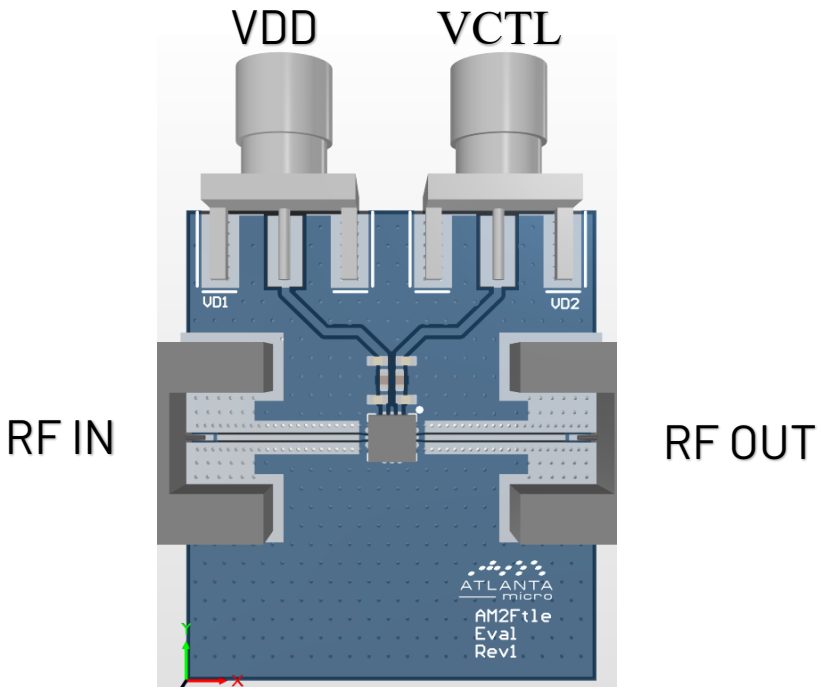
RECOMMENDED COMPONENT LIST (OR EQUIVALENT)

Part	Value	Part Number	Manufacturer
C1, C2	0.1 µF	0201BB104KW160	Passives Plus
C3 – C9	0.1 µF	C1005X7R1H104K050BB	TDK
FB1	-	MMZ1005A222E	TDK

Notes:

1. DC blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance.
2. VDD and control lines filtered internally to provide high frequency isolation.

EVALUATION PC BOARD



RELATED PARTS

Part Number		Description
AM2010	DC to 30 GHz	Digital Step Attenuator

COMPONENT COMPLIANCE INFORMATION

RoHS: Mercury Systems, Inc. hereby certifies that all products comply with the EC Directive 2011/65/EC on the Restriction of Hazardous Substances, commonly known as EU-RoHS 6 and 10. All products supplied by Mercury shall be compliant with the European Directive 2011/65/EC based on the following substance list.

Substance List	Allowable Maximum Concentration
Lead (Pb)	<1000 PPM (0.1% by weight)
Mercury (Hg)	<1000 PPM (0.1% by weight)
Cadmium (Cd)	<75 PPM (0.0075% by weight)
Hexavalent Chromium (CrVl)	<1000 PPM (0.1% by weight)
Polybrominated Biphenyls (PBB)	<1000 PPM (0.1% by weight)
Polybrominated Diphenyl ethers (PBDE)	<1000 PPM (0.1% by weight)
Decabromodiphenyl Deca BDE	<1000 PPM (0.1% by weight)
Bis (2-ethylheyl) Phthalate (DEHP)	<1000 PPM (0.1% by weight)
Butyl Benzyl Phthalate (BBP)	<1000 PPM (0.1% by weight)
Dibutyl Phthalate (DBP)	<1000 PPM (0.1% by weight)
Diisobutyl Phthalate (DIBP)	<1000 PPM (0.1% by weight)

REACH: Mercury Systems, Inc. neither uses nor intentionally adds any of the substances considered to be a Substance of Very High Concern (SVHC) as defined by the EU Regulation (EC) No. 1907-2006 on Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH).

CONFLICT MATERIALS: Mercury does not knowingly use materials that are sourced from the Democratic Republic of Congo (DRC) or any other known conflict regions. Mercury's supply chain is comprised of sources that are both environmentally and socially responsible. We periodically review this requirement with our vendors to ensure continued compliance.

Mercury takes its responsibility as a global partner seriously and will use due diligence within our supply chain to ensure all standards are met to the best of our knowledge.

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