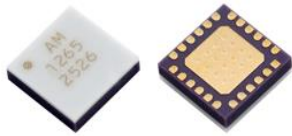


AM1265 – Amplifier / Attenuator

DC to 8 GHz Bypassable

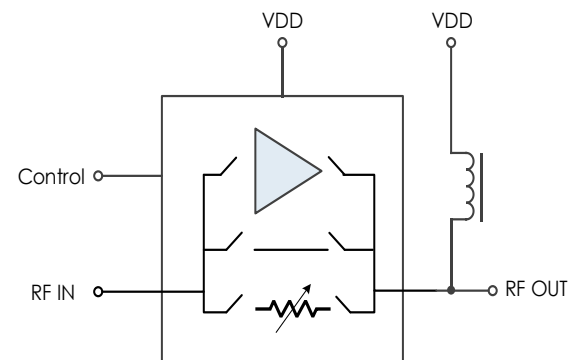


The AM1265 is a bypassable low-noise amplifier with a 31.5dB 6-bit digital attenuator covering up to 8 GHz. The device exhibits high dynamic range, low bypass insertion loss, and a flat 20dB gain. The digital attenuator provides low insertion loss, flat frequency response, and low attenuation error. Packaged in a 4mm QFN with internal 50Ω matching and requiring a single positive control voltage, the AM1265 represents a dramatic size reduction over a discrete implementation of a bypassable amplifier and attenuator.

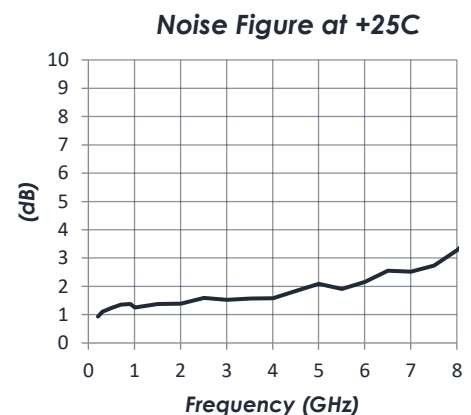
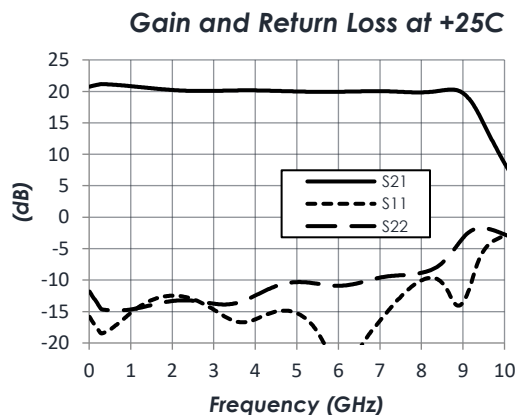
FEATURES

- 20 dB Gain
- 1.4 dB Bypass Insertion Loss
- 2.0 dB Noise Figure
- +31 dBm OIP3
- +18 dBm P1dB
- +20 dBm PSat
- +5.0V, 80/1 mA (Gain/Bypass)
- +5.0V Supply
- 0.5 dB step attenuations up to 31.5 dB
- 4mm QFN Package

FUNCTIONAL DIAGRAM



CHARACTERISTIC PERFORMANCE



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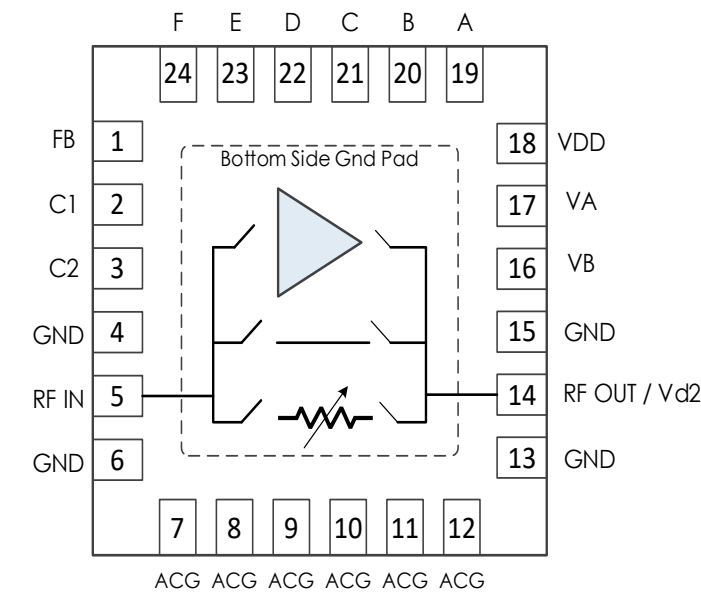
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REVISION HISTORY

Date	Revision	Notes
4/13/2026	1.0	Initial Release
6/5/2026	1.1	Corrected Formatting
6/25/26	2	Corrected Description

PIN LAYOUT AND DEFINITIONS



Pin	Name	Function
1	FB	Connect to pin 2 through external ferrite bead or large inductor.
2	C1	External Capacitor Connection 1 - Connect to pin 3 through capacitor
3	C2	External Capacitor Connection 2 - Connect to pin 2 through capacitor
4	GND	Ground - Common
5	RF IN	RF Input - 50 ohms - DC Coupled, External DC Block Required
6	GND	Ground - Common
7-12	ACG	AC ground for digital step attenuator. Capacitor to ground
13	GND	Ground - Common
14	RF OUT/VD2	RF Output and DC Power Input - 50 ohms - DC Coupled, External DC Block Required
15	GND	Ground - Common
16	VB	Switch Control (0 or +5.0V)
17	VA	Switch Control (0 or +5.0V)
18	VDD	+5.0V supply for switch, DSA
19	A	0.5 dB attenuation control
20	B	1 dB attenuation control
21	C	2 dB attenuation control
22	D	4 dB attenuation control
23	E	8 dB attenuation control
24	F	16 dB attenuation control

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	0.0 V	+6.0 V
RF Input Power		+25 dBm
Operating Junction Temperature	-40 C	+150 C
Storage Temperature Range	-50C	+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. Devices subjected to conditions outside of what is recommended for extended periods may affect device reliability.

Handling Information

	Minimum	Maximum
Storage Temperature Range (Recommended)	-50 C	+125 C
Moisture Sensitivity Level	MSL 1	



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

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage	+3.0 V	+4.7 V	+5.2 V
Operating Case Temperature	-40 C		+85 C
Operating Junction Temperature	-40 C		+125 C

Thermal Information

Thermal Resistance (°C / W)	
Junction to Package Ground Pad Thermal Resistance (θ_{JC})	63

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max.
DC Supply Voltage		+3.0 V	+4.7 V	+5.2 V
DC Supply Current	VDD = +5.0 V, Amp On	72 mA	80 mA	88 mA
	VDD = +5.0 V, Amp Byp.		1 mA	
Power Dissipated	VDD = +5.0 V, Amp On	0.36 W	0.40 W	0.44 W
Logic Level Low		-0.1 V		+0.4 V
Logic Level High		+2.2 V		+VDD
Control Current	CTL = +5.0V		200 μ A	

RF Performance

(T = 25 °C, Amplifier Enabled unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max.
Frequency Range		DC		8 GHz
Gain	VDD = +5.0 V		20 dB	
Return Loss	VDD = +5.0 V		13 dB	
Bypass Insertion Loss	VDD = +5.0 V		1.3 dB	
Output IP3	VDD = +5.0 V		+31 dBm	
Output P1dB	VDD = +5.0 V		+18 dBm	
Noise Figure	VDD = +5.0 V		2.0 dB	

Amplifier State Table

CTL-VA	CTL-VB	State
Low	Low	Attenuator
Low	High	Amplifier Bypass
High	Low	Amplifier Enabled
High	High	Amplifier Enabled

Attenuator State Table

A	B	C	D	E	F	Attenuation (dB)
L	L	L	L	L	L	Insertion Loss
H	L	L	L	L	L	0.5
L	H	L	L	L	L	1
L	L	H	L	L	L	2
L	L	L	H	L	L	4
L	L	L	L	H	L	8
L	L	L	L	L	H	16

Timing Characteristics

(T = 25 °C, VDD = +5.0V, CTL = 0.0V / +5.0V)

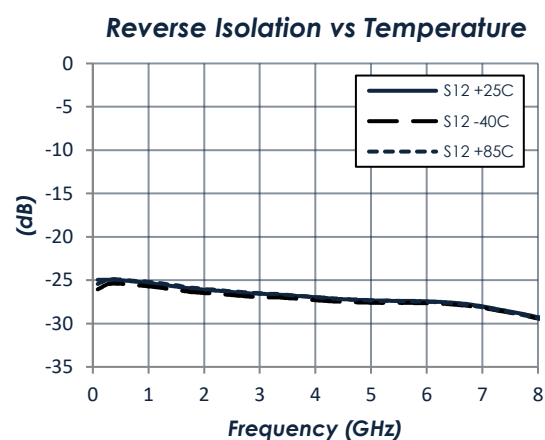
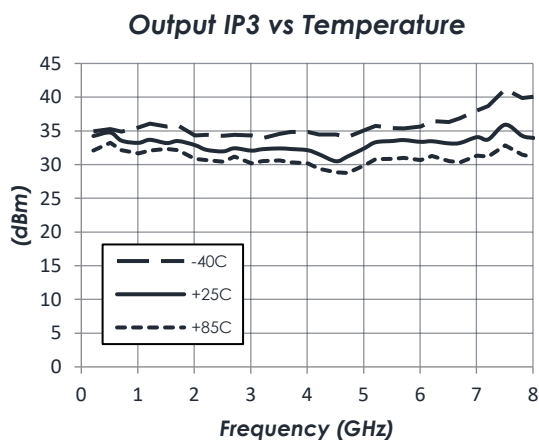
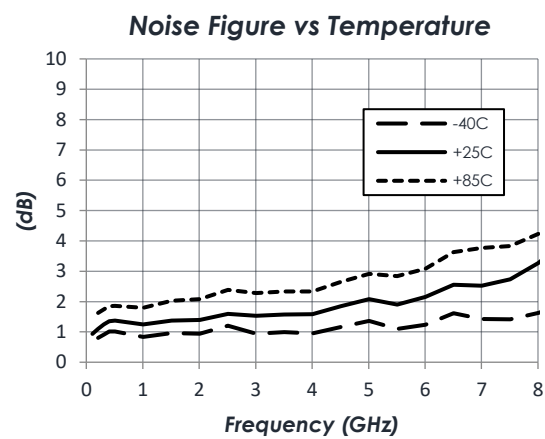
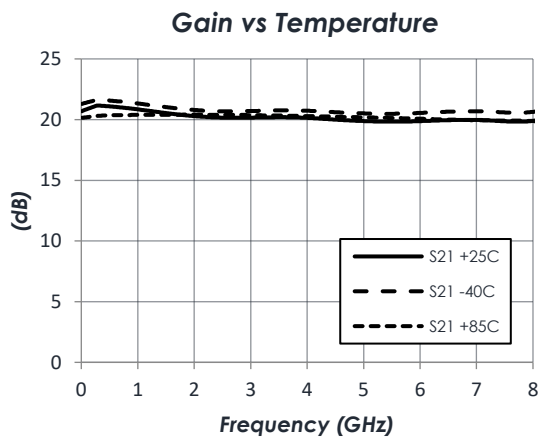
Switching Time	Minimum	Typical ²	Maximum
Amp On → Bypass		52.8 ns	
Amp Bypass → Amp On		174 ns	
Amp On → Attenuator		52.0 ns	
Attenuator → Amp On		170 ns	

Notes:

1. Switching speeds measured as 50% trigger to 10%/90% RF respectively.
2. Typical measurements reflect switching speeds of amp as configured in Typical Application section.

TYPICAL PERFORMANCE

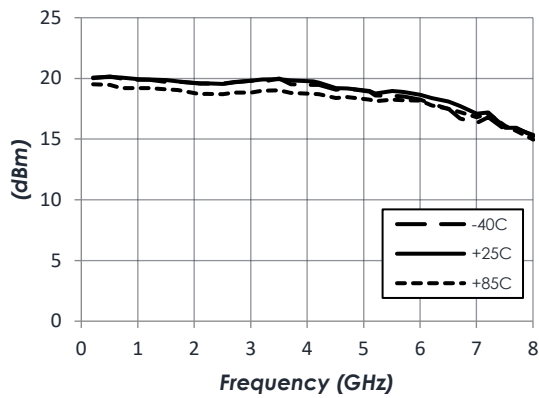
(Amplifier Enabled, VDD = +5.0 V, ID = 80mA)



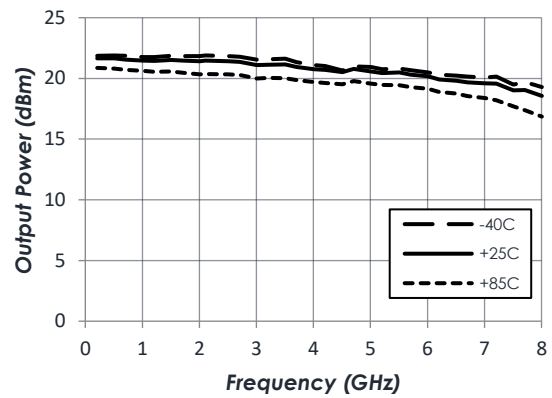
TYPICAL PERFORMANCE (continued)

(Amplifier Enabled, VDD = +5.0 V, ID = 80mA)

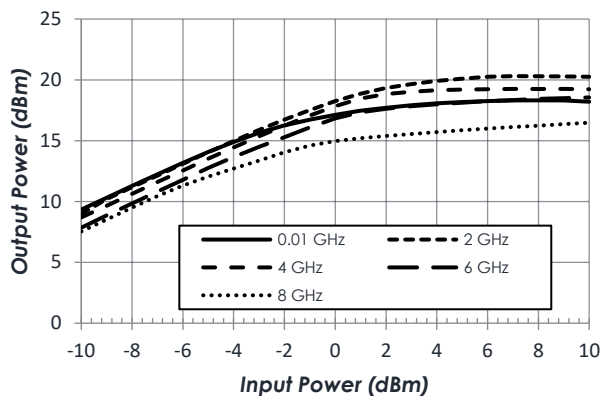
P1dB vs Temperature



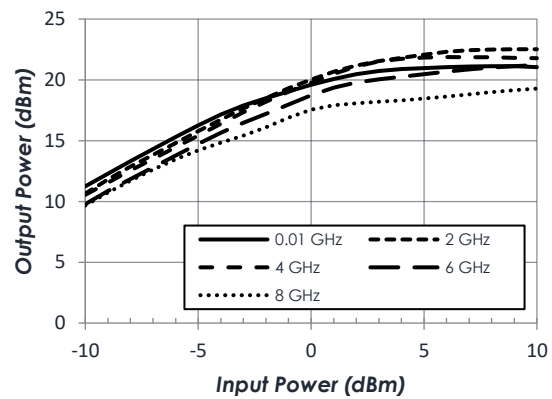
P_Sat vs Temperature



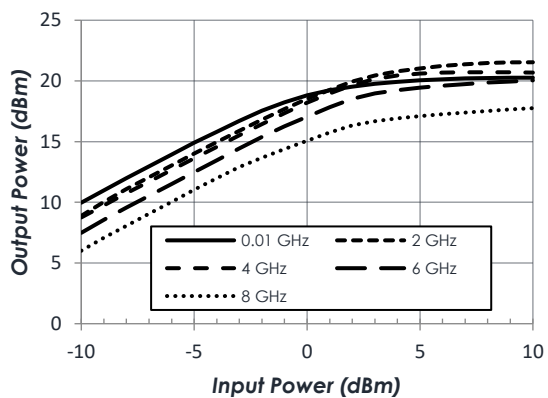
Pin vs. Pout at +25C



Pin vs. Pout at -40C

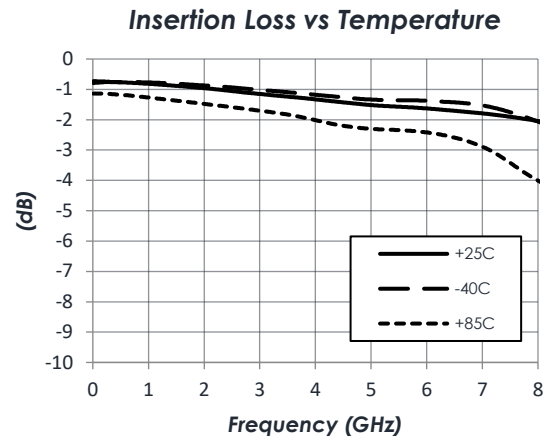
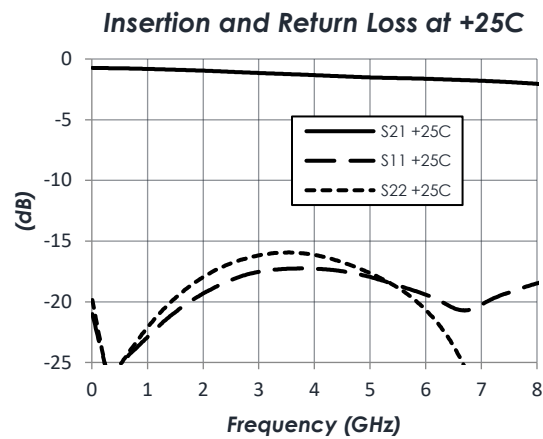


Pin vs. Pout at +85C



TYPICAL PERFORMANCE (CONTINUED)

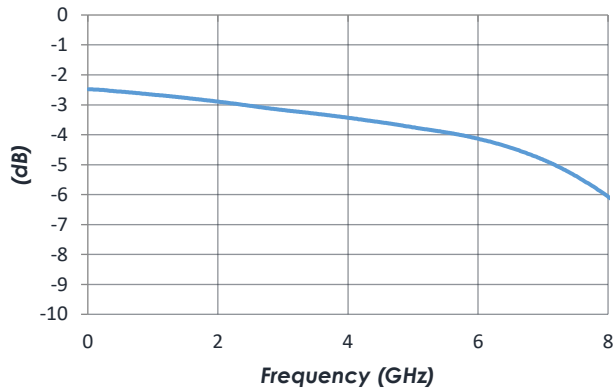
(Amplifier Bypass, VDD = +5.0 V, ID = 1mA)



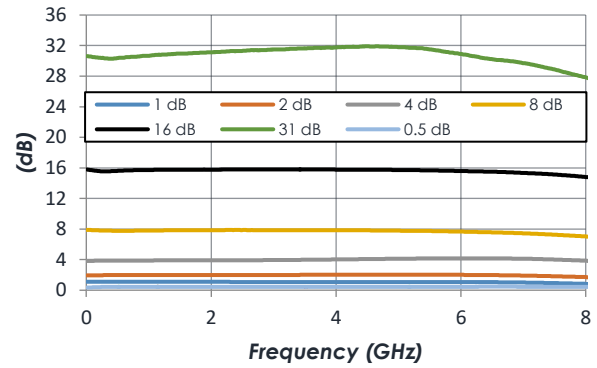
TYPICAL ATTENUATOR PERFORMANCE

(Attenuator State, VDD = +5.0V, T = 25 °C)

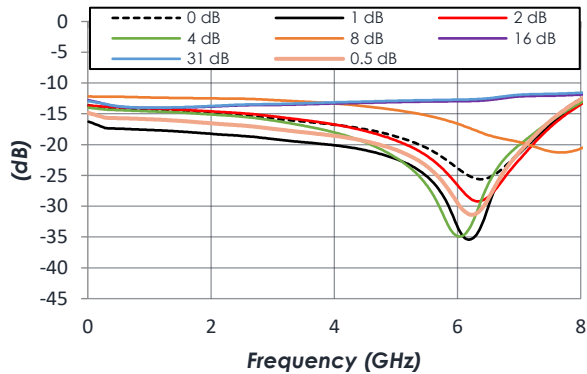
Insertion Loss



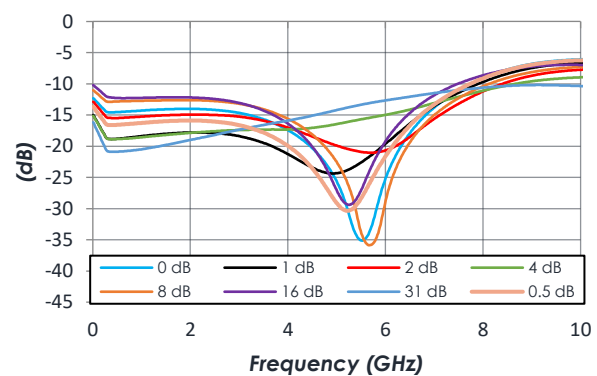
Normalized Major Attenuation States



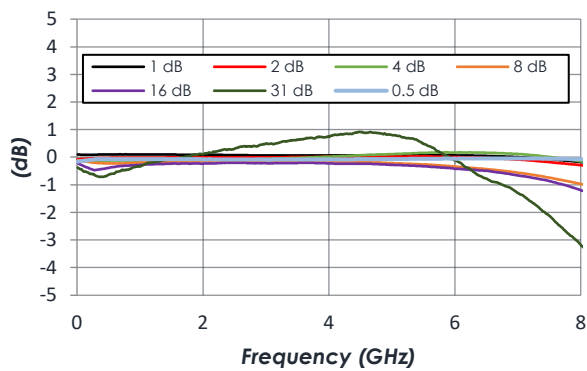
RF1 Return Loss



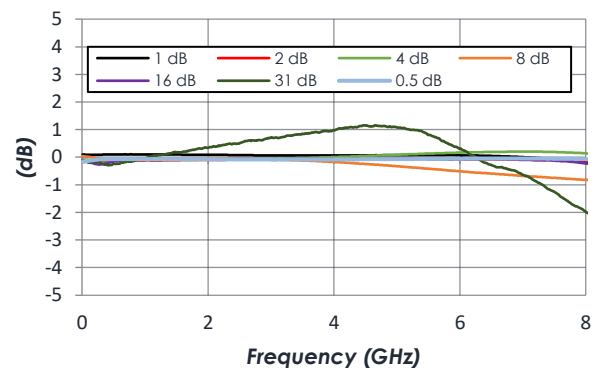
RF2 Return Loss



Attenuation Error

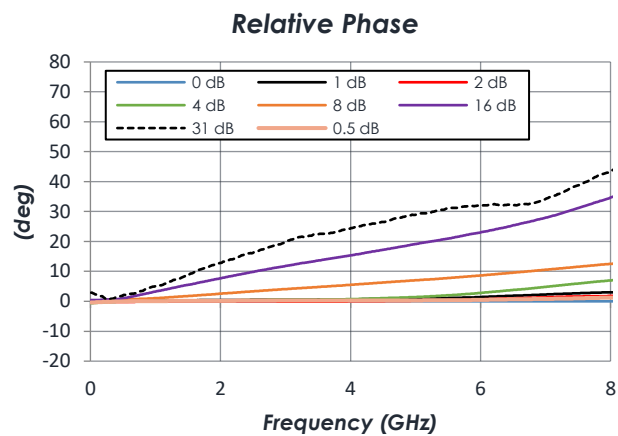


Step Error

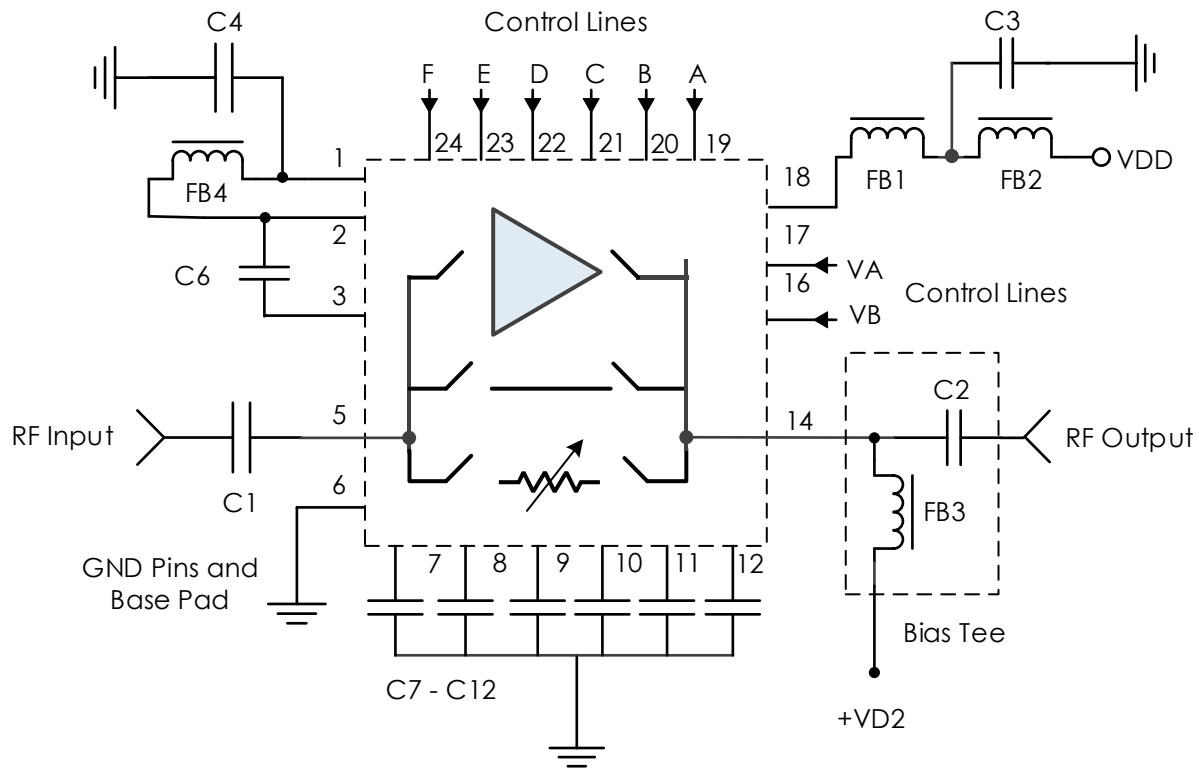


TYPICAL ATTENUATOR PERFORMANCE (CONTINUED)

(Attenuator State, VDD = +5.0V, T = 25 °C)



TYPICAL APPLICATION



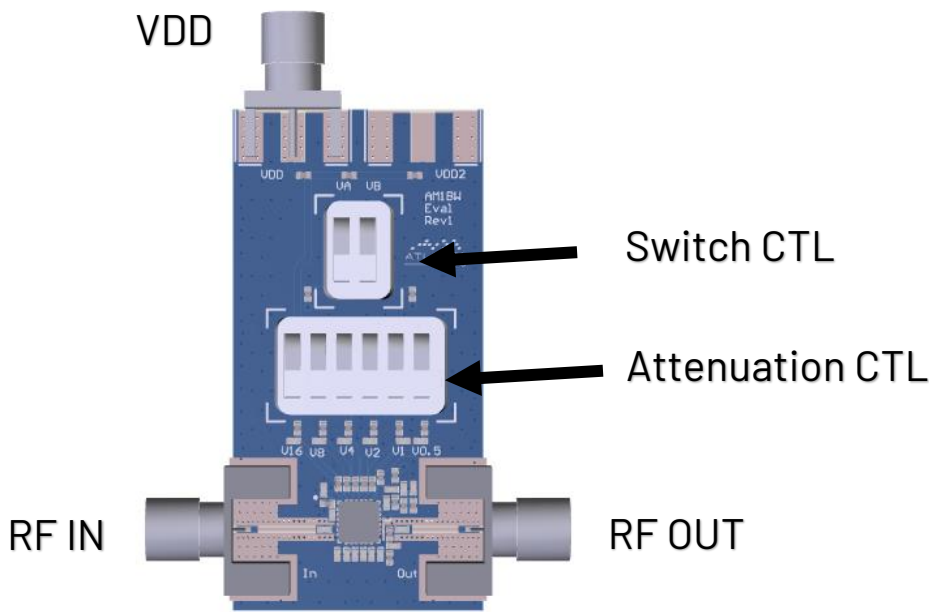
RECOMMENDED COMPONENT LIST (OR EQUIVALENT)

Part	Value	Part Number	Manufacturer
C1, C2, C4, C6	0.1 μ F	0402BB104KW160	Passives Plus
C3	0.1 μ F	GRM155R71C104KA88	Murata
C7-12	0.1 μ F	C1005X7R1H104K050BB	TDK
FB1 - FB4	-	MMZ1005A222E	TDK

Notes:

1. DC blocking capacitors C1 - C2 should be high performance, low-loss, broadband capacitors for optimum performance.
2. For low frequency performance (kHz), select large values for capacitors C1-C12 and consider using large conical inductors for FB1-4.
3. Select control line RC filter values based on desired logic source decoupling and switching speed.

EVALUATION PC BOARD



RELATED PARTS

Part Number		Description
AM1063-1	DC to 10 GHz	Gain Block
AM1063-2	DC to 10 GHz	Miniature Gain Block
AM1064-1	DC to 8 GHz	Gain Block
AM1064-2	DC to 8 GHz	Miniature Gain Block
AM1067	5 GHz to 20 GHz	Bypassable Gain Block
AM1073	DC to 8 GHz	Bidirectional / Bypassable Gain Block
AM1075	5 GHz to 26.5 GHz	Bypassable Gain Block
AM1077	5 GHz to 20 GHz	Bypassable Gain Block w/ Isolation State
AM1065	DC to 8 GHz	Bypassable Gain Block
AM2005	DC to 20 GHz	Attenuator
AM1081	DC to 8 GHz	Bypassable Gain Block (Higher IP3)

PARTS ORDERING DETAILS

Description	Part Number
4mm 24 Lead QFN	AM1265
AM1265 Evaluation Board	AM1265-Eval

COMPONENT COMPLIANCE INFORMATION

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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 (CrVI)	<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-ethylhexyl) 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)

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Corporate Headquarters

50 Minuteman Road
Andover, MA 01810 USA
+1 978.967.1401 tel
+1 866.627.6951 tel
+1 978.256.3599 fax

International Headquarters

Mercury International

Avenue Eugène-Lance, 38
PO Box 584
CH-1212 Grand-Lancy 1
Geneva, Switzerland
+41 22 884 5100 tel

Learn more

Visit: mrcy.com

For pricing details, contact: MMICsales@mrcy.com

For technical details, contact: MMICsupport@mrcy.com



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