

AM3089 – Filter Bank

Analog Tunable 2.0 to 18.0 GHz Bandpass

Description

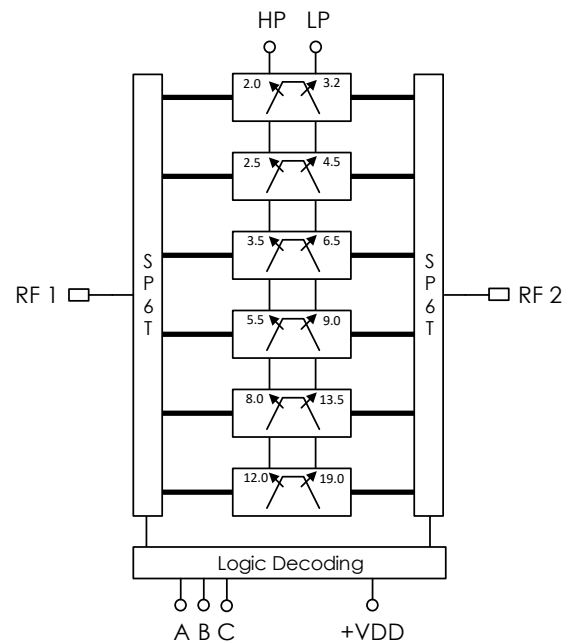
AM3089 is an analog voltage-tunable bandpass filter bank covering the 2.0 to 18.0 GHz frequency range. Six bandpass filters with SP6T switches on the input and output are contained in the multi-chip module (MCM). Separate low-pass and high-pass tuning voltages provide independent control of both center frequency and bandwidth. AM3089 provides an excellent filtering solution for receiver or transceiver requiring flexible center frequency and bandwidth, high dynamic range, and small size, weight, and power consumption.



Features

- Analog Tuning
- Independent LP and HP control
- +25 dBm Typical P1 dB
- +37 dBm Typical IIP3
- 8 dB Typical Insertion Loss
- +3.3V to +5V Supply
- +3V to +5V Control
- +0.5V to +10V Tuning Voltage Range
- 10mm QFN Package
- Rotationally Symmetric
- -40C to +85C Operation

Functional Diagram



Characteristic Performance

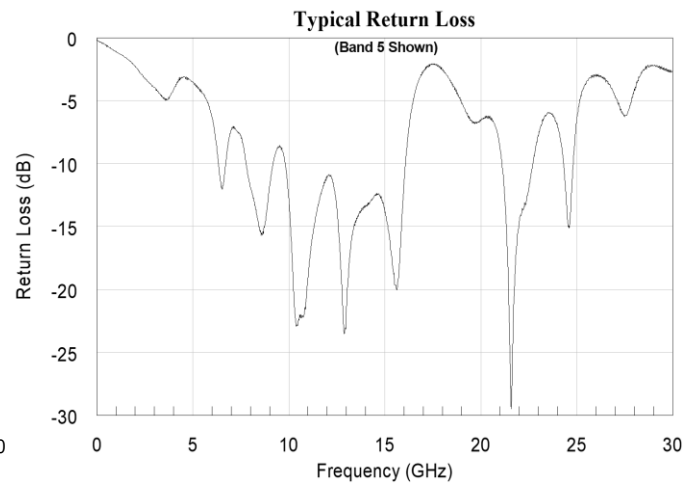
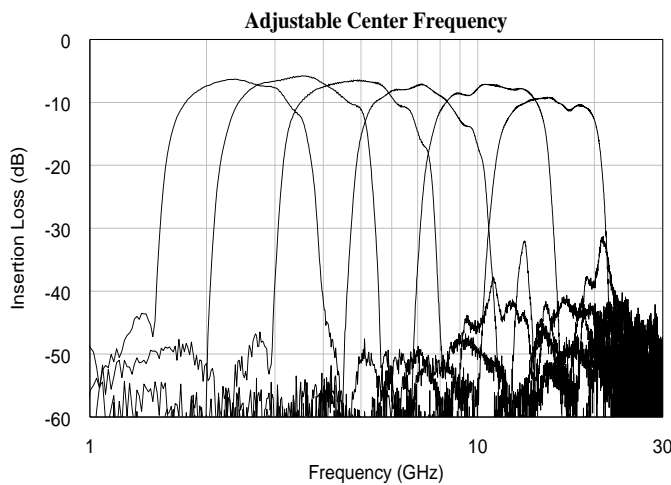


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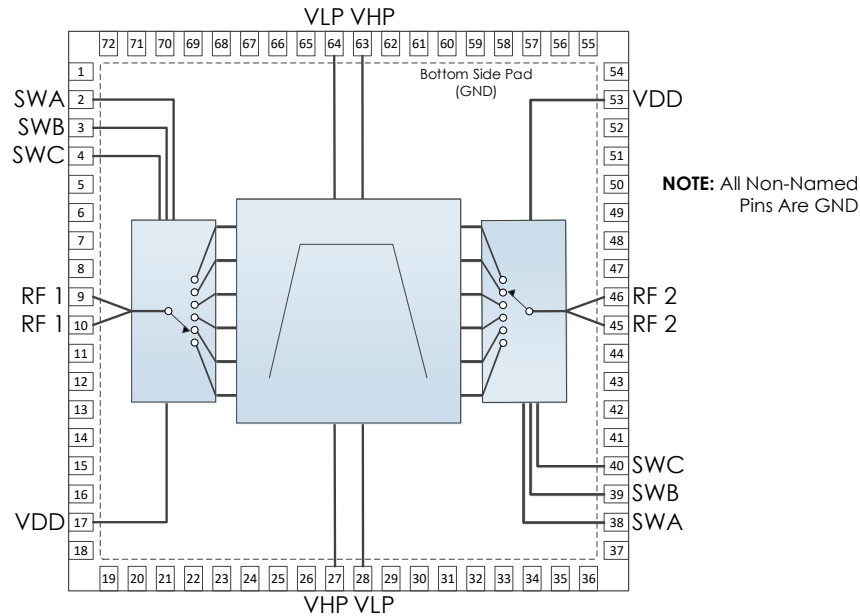
Revision History

Date	Revision Number	Notes
March 14, 2018	0	Preliminary Release
June 4, 2018	1	Initial Release

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Pin Layout and Definitions



Pin Number	Pin Name	Pin Function
1	GND	Ground
2	SWA	Switch Control A
3	SWB	Switch Control B
4	SWC	Switch Control C
5-8	GND	Ground
9,10	RF 1	RF 1 – 50 Ohms – DC Coupled, External Blocking Cap Needed
11-16	GND	Ground
17	VDD	DC Power Input
18-26	GND	Ground
27	VHP	High Pass DC Voltage Control
28	VLP	Low Pass DC Voltage Control
29-37	GND	Ground
38	SWA	Switch Control A
39	SWB	Switch Control B
40	SWC	Switch Control C
41-44	GND	Ground
45,46	RF 2	RF 2 – 50 Ohms – DC Coupled, External Blocking Cap Needed
47-52	GND	Ground
53	VDD	DC Power Input
54-62	GND	Ground
63	VHP	High Pass DC Voltage Control
64	VLP	Low Pass DC Voltage Control
65-72	GND	Ground
Case GND	GND	Ground

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Specifications

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+10.0 V
DC Control Voltage	0.0 V	+12.0 V
RF Input Power		+27 dBm
Operating Junction Temperature	-40 C	+150 C
Storage Temperature Range	-50 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	



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

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage	+3.0 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 Case Thermal Resistance (θ_{JC})	144

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DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Parameter	Testing Conditions	Minimum	Typical	Maximum
DC Supply Voltage		+3.0 V		+5.2 V
DC Supply Current	V Supply = +5.0 V		20 mA	
Power Dissipated	V Supply = +5.0 V		100 mW	
Logic Level Low		0.0 V		+0.5 V
Logic Level High		+2.0 V		+5.0 V
DC Control Voltage		+0.5 V		+10.0 V
DC Control Current			< 1 mA	

RF Performance

(T = 25 °C, VDD = +5.0 V unless otherwise specified)

Parameter	Testing Conditions	Minimum	Typical	Maximum
Frequency Range		2.0 GHz		18.0 GHz
Insertion Loss	f = 2.0 GHz		7.3 dB	
	f = 7.0 GHz		7.2 dB	
	f = 13.0 GHz		7.8 dB	
	f = 18.0 GHz		10.5 dB	
Return Loss	f = 2.0 GHz		20.4 dB	
	f = 7.0 GHz		18.0 dB	
	f = 13.0 GHz		23.5 dB	
	f = 18.0 GHz		16.9 dB	
Input IP3			+39 dBm	
Output P1dB			+25 dBm	

Timing Characteristics

Parameter	Minimum	Typical	Maximum
Switching Speed		850 ns	1µs

State Table

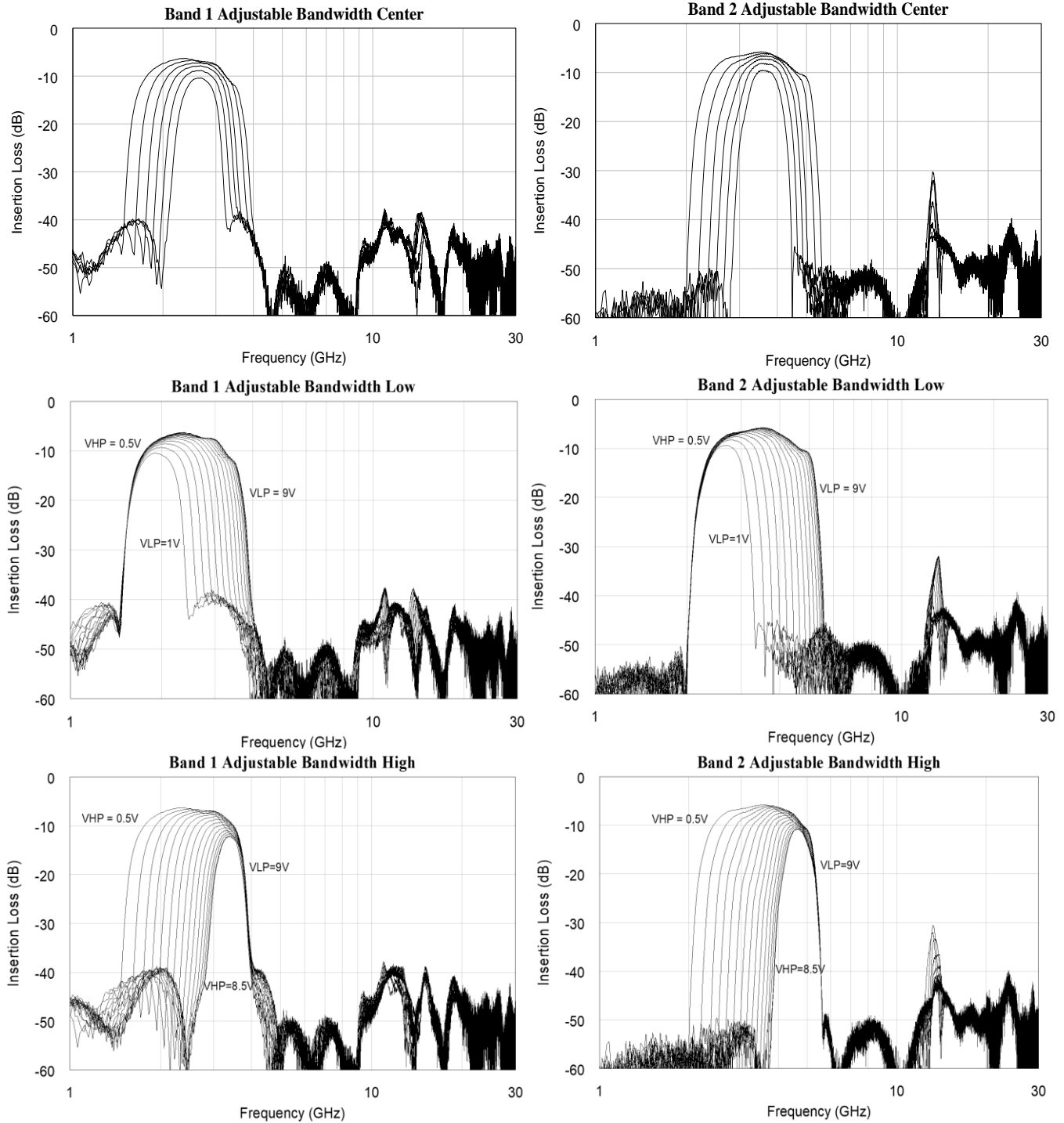
A	B	C	State
Low	Low	High	Band 2 – 2.5 - 4.5 GHz
Low	High	Low	Band 3 – 3.5 - 6.5 GHz
Low	High	High	Band 5 – 8.0 - 13.5 GHz
High	Low	Low	Band 4 – 5.5 - 9.0 GHz
High	Low	High	Band 6 – 12.0 - 20.0 GHz
High	High	Low	Band 1 – 2.0 - 3.2 GHz

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Typical Performance

(Note: Only some states shown for simplicity)



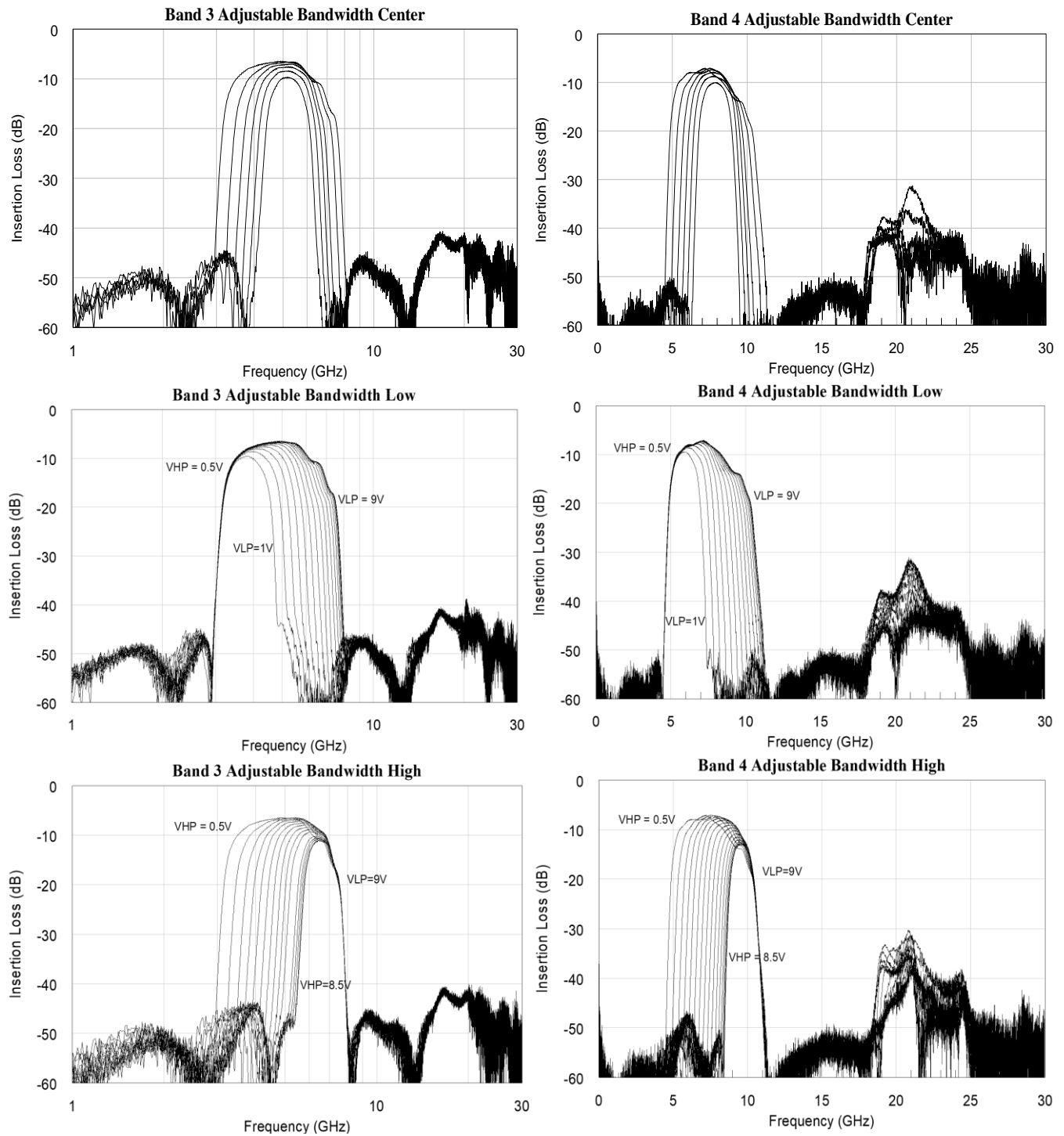
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Typical Performance (continued)

(Note: Only some states shown for simplicity)

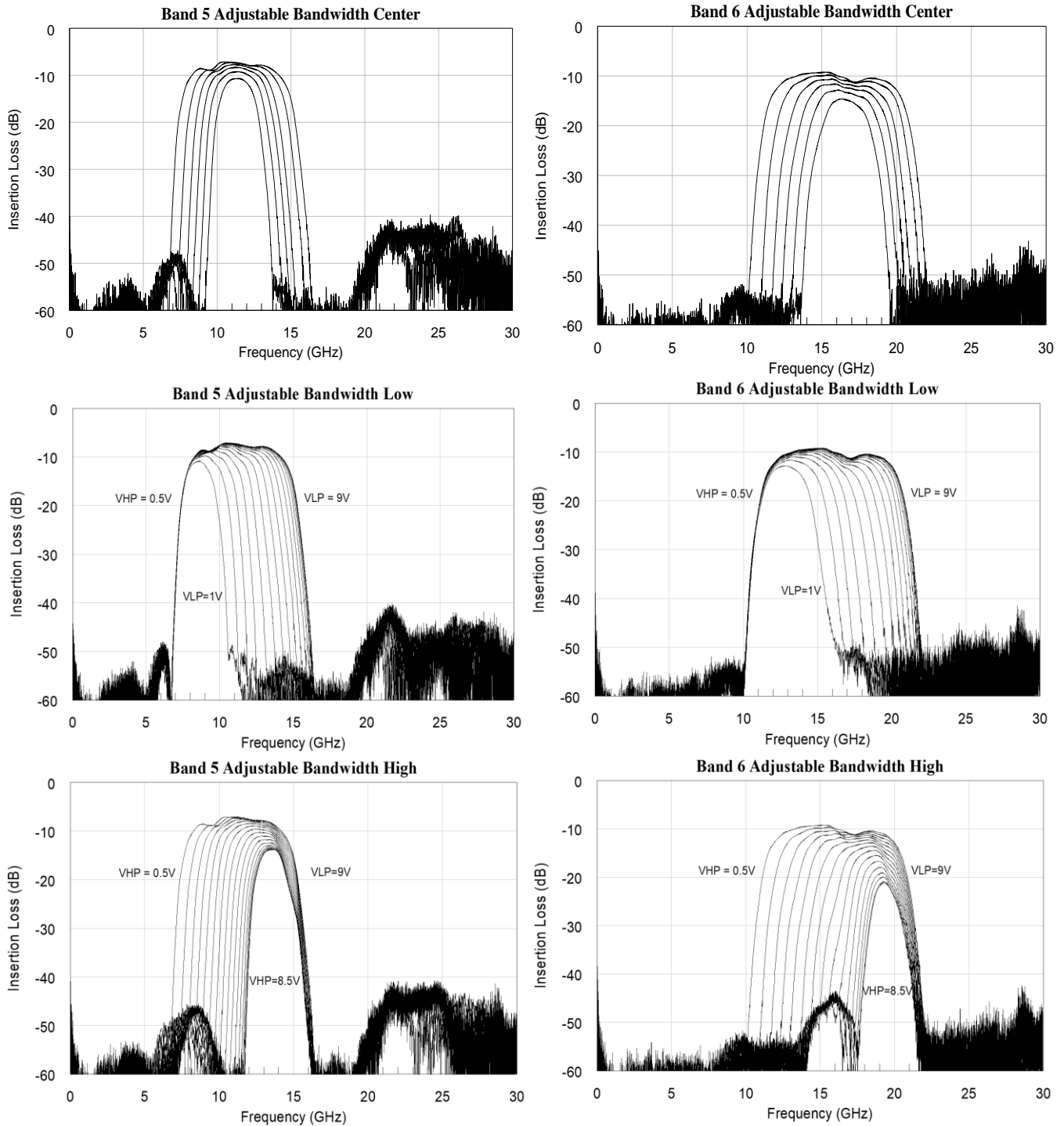


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Typical Performance (continued)

(Note: Only some states shown for simplicity)



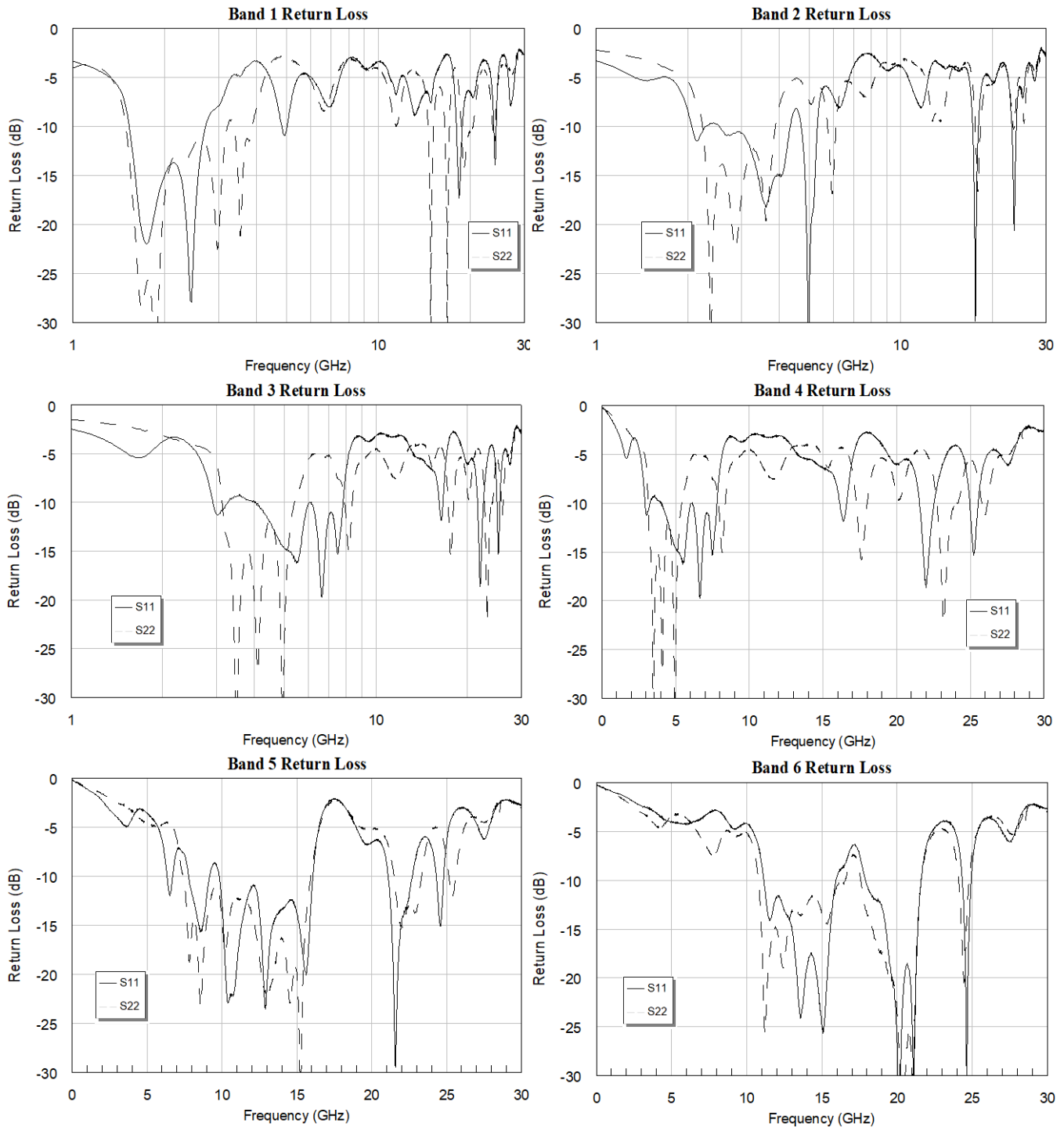
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Typical Performance (continued)

(Note: Only some states shown for simplicity)



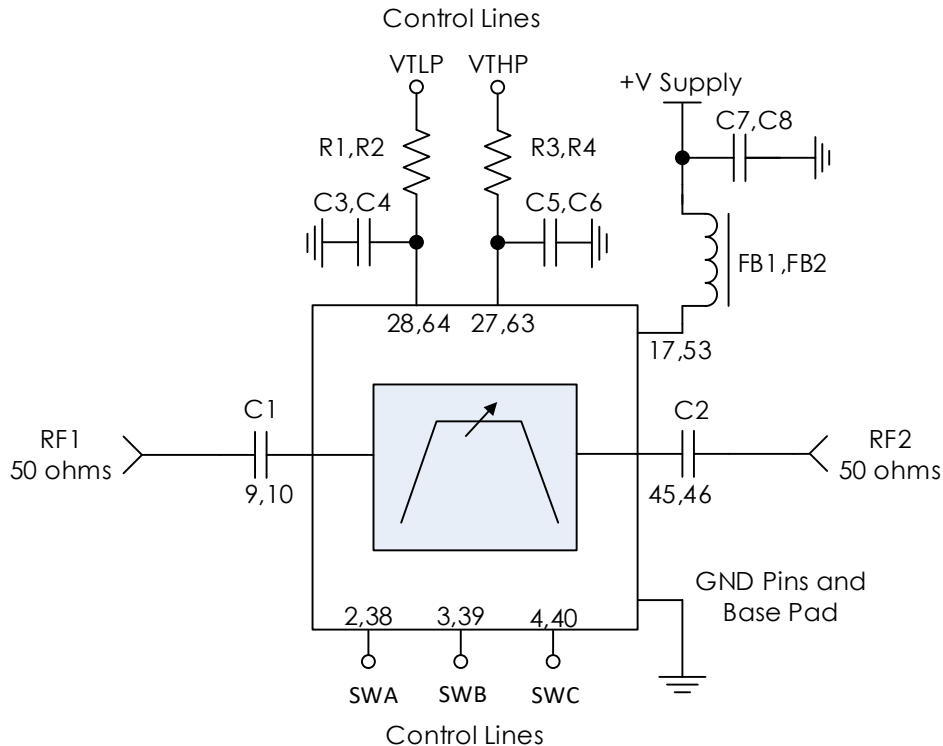
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Typical Application

Two Control Voltages



Recommended Component List (or equivalent):

Part	Value	Part Number	Manufacturer
C1,C2	0.1 μ F	0402BB104KW160	Passives Plus
C3-C8	0.1 μ F	C1005X7R1H104K050BB	TDK
FB1,FB2		MMZ1005A222E	TDK
R1,R2	100 Ω	CRCW0402100RFKED	Vishay

Notes:

1. RC filtering on the control lines is recommended to prevent digital noise from coupling to the RF path. Select control line RC filter values based on desired logic source decoupling and switching speed.

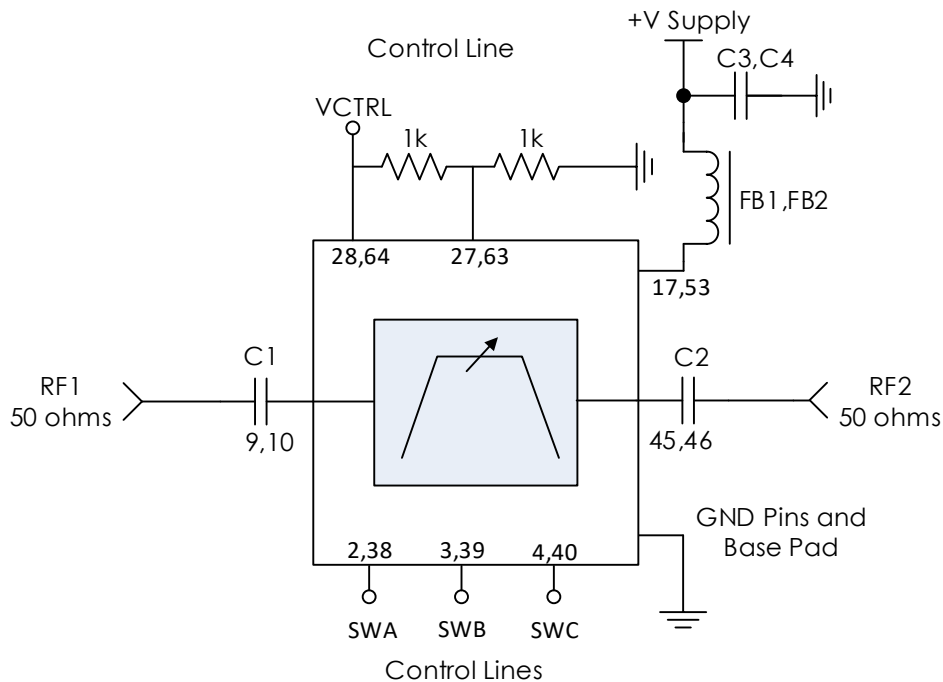
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Alternate Application

Single Control Voltage



Recommended Component List (or equivalent):

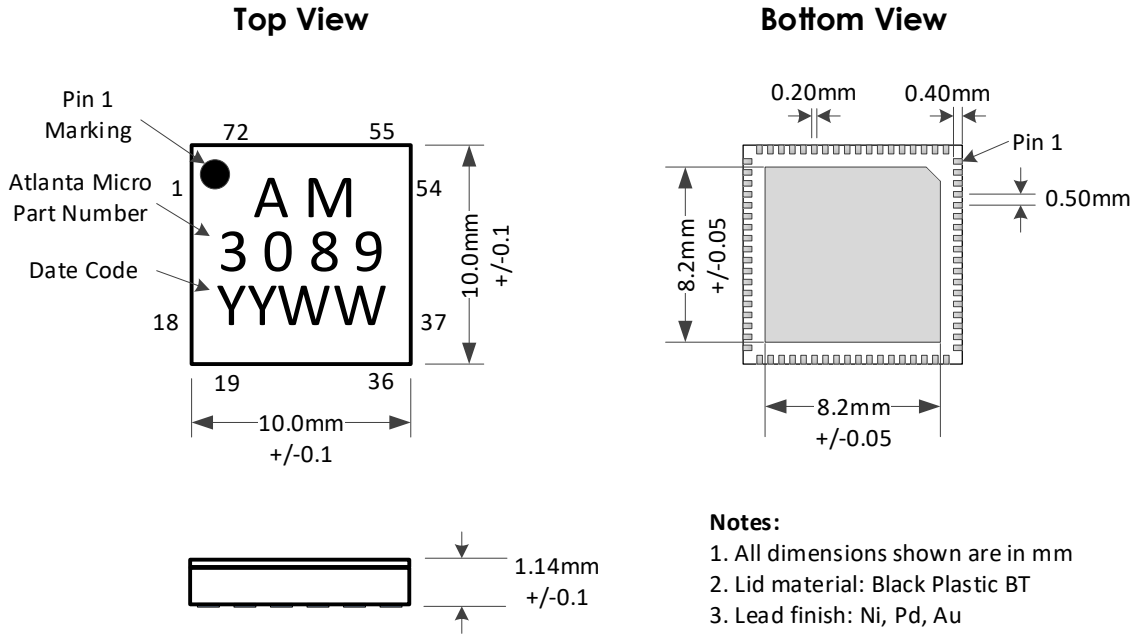
Part	Value	Part Number	Manufacturer
C1,C2	0.1 μ F	0402BB104KW160	Passives Plus
C3,C4	0.1 μ F	C1005X7R1H104K050BB	TDK
FB1,FB2		MMZ1005A222E	TDK

Notes:

1. The resistive divider between pins 28/64 and 27/63 exists to normalize percentage bandwidth over the full +0.5V - +10V range.
 - a. Tying pins 28/64 and 27/63 to the same control voltage without the divider is possible, but the bandwidth will be narrower with higher insertion loss over the tuning range
2. RC filtering on the control lines is recommended to prevent digital noise from coupling to the RF path. Select control line RC filter values based on desired logic source decoupling and switching speed.

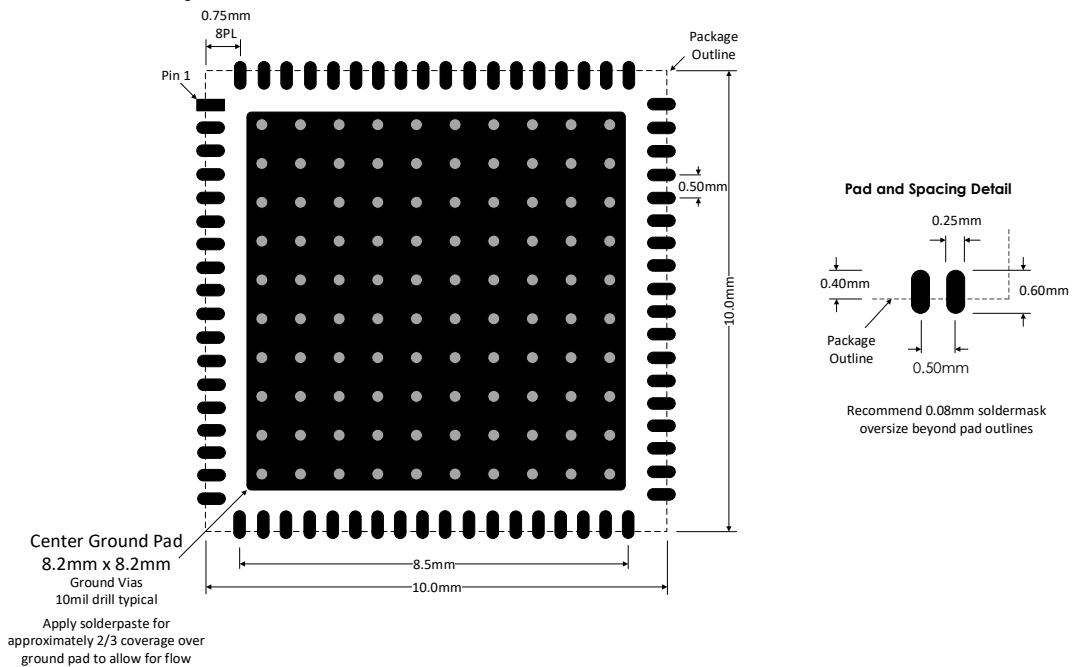
Package Details

Package Drawing



- Notes:**
1. All dimensions shown are in mm
 2. Lid material: Black Plastic BT
 3. Lead finish: Ni, Pd, Au

Recommended Footprint

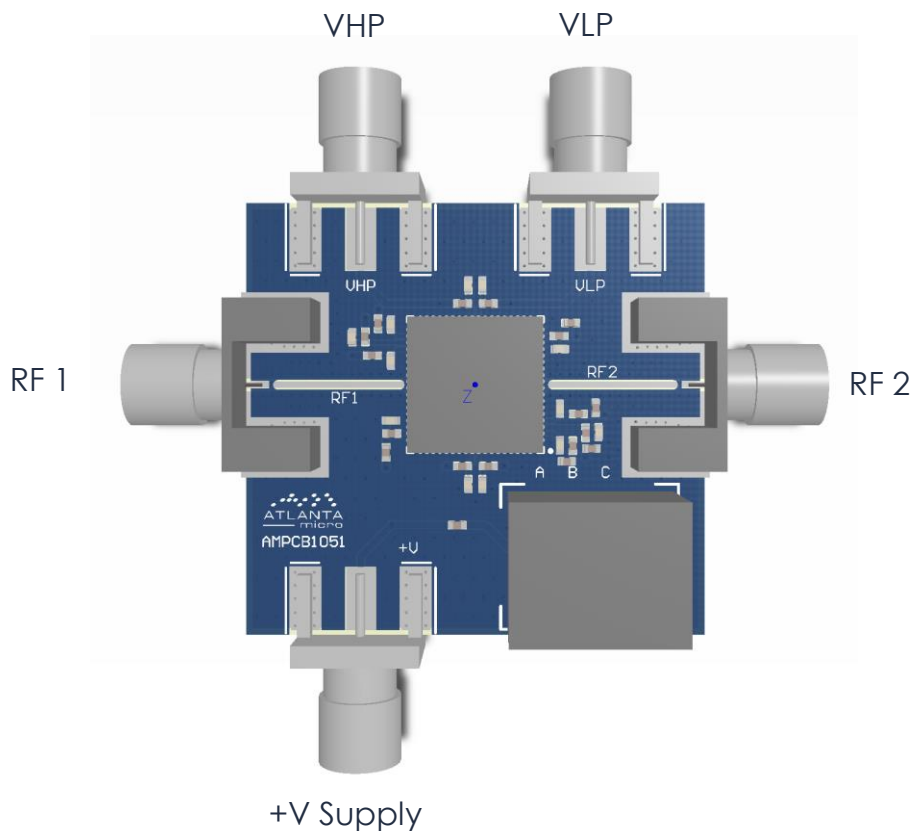


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Evaluation PC Board



Related Parts

Part Number	Description
AM3134	2.0 – 4.5 GHz Analog Tunable Filter Bank
AM3135	3.5 – 9.0 GHz Analog Tunable Filter Bank
AM3136	8.0 – 19.0 GHz Analog Tunable Filter Bank

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)

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