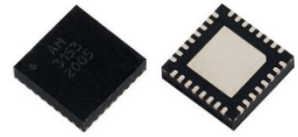


AM3170 – Filter Bank

Analog Tunable 6.0 to 18.0 GHz Notch

Description

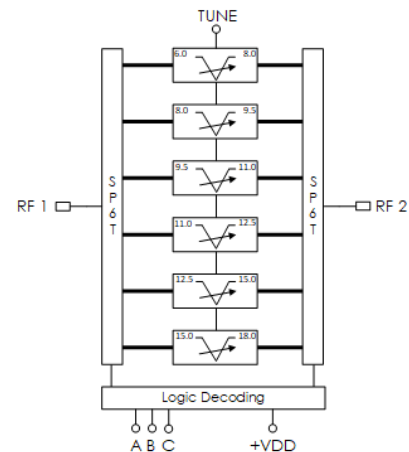
AM3170 is an analog-tunable notch filter bank with notches from 6.0 to 18.0 GHz. Six notch filters with SP6T switches on the input and output are contained in the multi-chip module (MCM). The tune voltage provides control of notch frequency, and a bypass path is provided by applying a 0.0V control voltage while switched to band 1. AM3170 provides an excellent filtering solution for receivers or transceivers requiring flexible center frequency removal, high dynamic range, low insertion loss, and small size, weight, and power consumption (low SWAP).



Features

- Analog Tuning
- 40dB Typical Notch Depth
- 5 dB Typical Insertion Loss
- +27 dBm Typical P1dB
- +38 dBm Typical IIP3
- +3.3V to +5.0V Supply
- 0.0V to +8.0V Tuning Voltage Range
- 10mm QFN package
- -40C to +85C Operation

Functional Diagram



Characteristic Performance

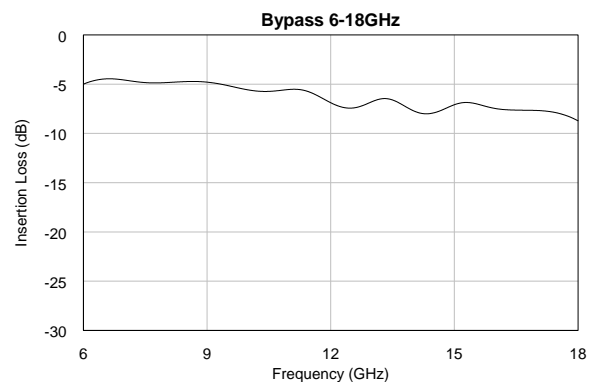
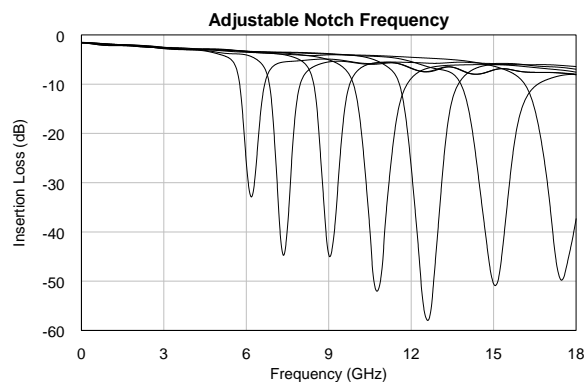


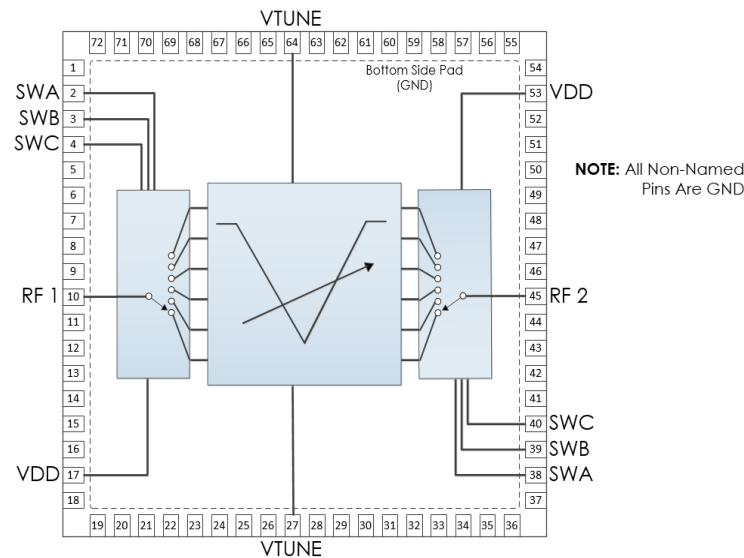
Table of Contents

Description	1	RF Performance	5
Features.....	1	Timing Characteristics	5
Functional Diagram.....	1	State Table	5
Characteristic Performance	1	Typical Performance ..	Error! Bookmark not defined.
Revision History	2	Typical Application.....	10
Pin Layout and Definitions.....	3	Package Details.....	Error! Bookmark not defined.
Specifications	4	Evaluation PC Board	13
Absolute Maximum Ratings.....	4	Related Parts.....	13
Handling Information.....	4	Component Compliance Information.....	14
Recommended Operating Conditions....	4		
Thermal Information.....	4		
DC Electrical Characteristics	5		

Revision History

Date	Revision Number	Notes
June 15, 2022	1	Initial Release

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
5-9	GND	Ground
10	RF1	RF1 – 50 Ohms – DC Coupled, External Blocking Cap Needed*
11-16	GND	Ground
17	VDD	DC Power Input
18-26	GND	Ground
27	VTUNE	DC Control Voltage**
28-37	GND	Ground
38	SWA	Switch Control A
39	SWB	Switch Control B
40	SWC	Switch Control C
41-44	GND	Ground
45	RF2	RF2 – 50 Ohms – DC Coupled, External Blocking Cap Needed*
46-52	GND	Ground
53	VDD	DC Power Input
54-63	GND	Ground
64	VTUNE	DC Control Voltage**
65-72	GND	Ground
Case GND	GND	Ground

*Note: DC blocking caps not required if in series with other Atlanta Micro parts of the same reference voltage.

**Note: Only one VTUNE input connection is required; the other should be left open.

AM3170 – Filter Bank

Analog Tunable 6.0 to 18.0 GHz Notch



Specifications

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+6.0 V
DC Control Voltage	0.0 V	+12.0 V
RF Input Power		+30 dBm
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
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	+2.7 V	+5.0 V	
Operating Case Temperature	-40 C		+85 C

Thermal Information

Junction to Case Thermal Resistance (θ_{JC})	144 C/W
---	---------

AM3170 – Filter Bank

Analog Tunable 6.0 to 18.0 GHz Notch

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Parameter	Testing Conditions	Minimum	Typical	Maximum
DC Supply Voltage		+2.7 V	+5.0 V	
DC Supply Current	V Supply = +3.3 V		16 mA	
	V Supply = +5.0 V		20 mA	
Power Dissipated	V Supply = +3.3 V		53 mW	
	V Supply = +5.0 V		100 mW	
Logic Level Low		0.0 V		+0.5 V
Logic Level High		Vdd – 0.5 V		Vdd
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		6.0 GHz		18.0 GHz
Insertion Loss	f = 6.0 GHz		3.0 dB	
	f = 12.0 GHz		5.0 dB	
	f = 18.0 GHz		7.0 dB	
Return Loss	f = 6.0 GHz		15.0 dB	
	f = 12.0 GHz		16.0 dB	
	f = 18.0 GHz		14.0 dB	
Input IP3			+38 dBm	
Input P1dB			+27 dBm	

Timing Characteristics

Parameter	Minimum	Typical	Maximum
Band Switching Speed		1 μ s	
Tune Voltage Settling Time		100 ns/V	1 μ s/V

Note: Switching speed measured without any tune line capacitors. Switching speed measured as time from 50% control to 90% RF.

State Table

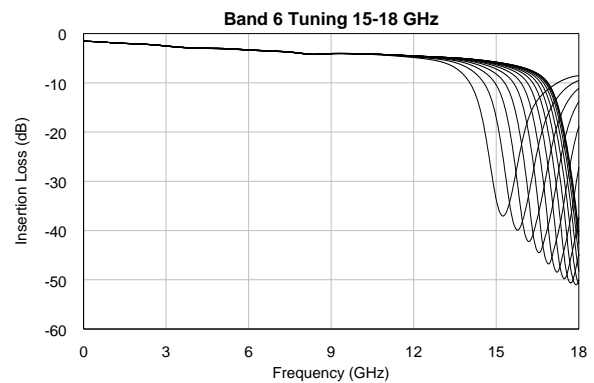
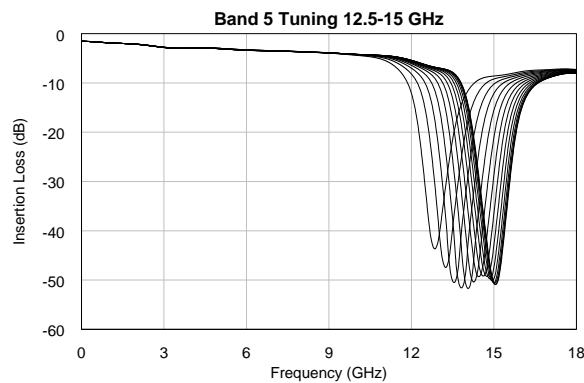
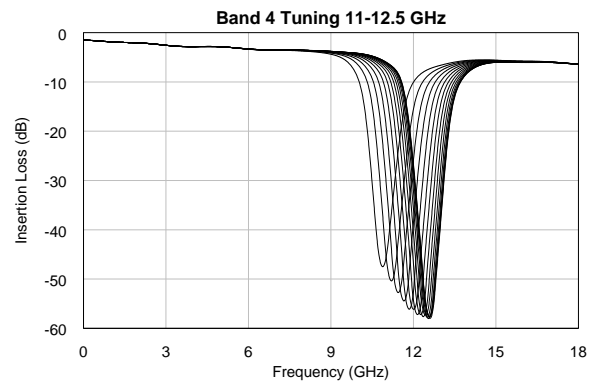
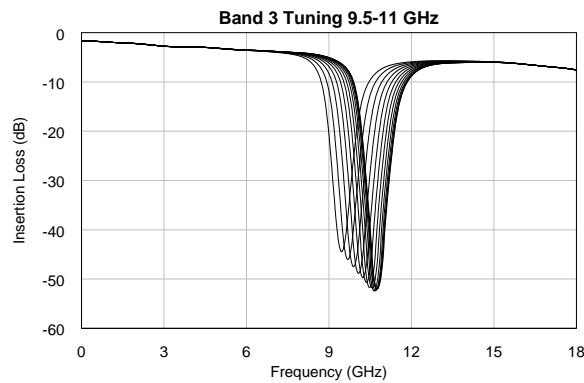
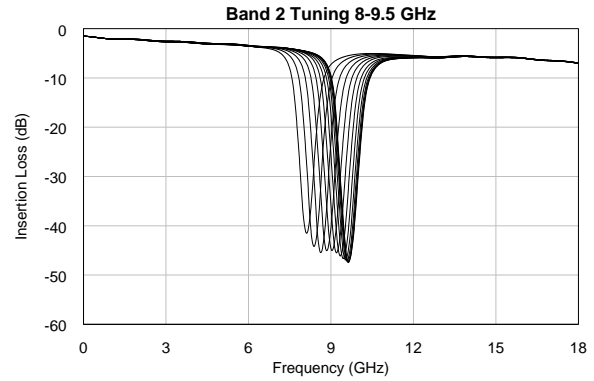
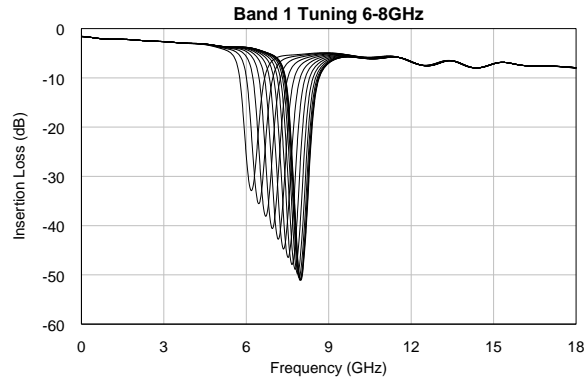
A	B	C	State
Low	Low	High	Band 5 – 12.5 - 15.0 GHz
Low	High	Low	Band 4 – 11.0 - 12.5 GHz
Low	High	High	Band 6 – 15.0 - 18.0 GHz
High	Low	Low	Band 3 – 9.5 - 11.0 GHz
High	Low	High	Band 2 – 8.0 - 9.5 GHz
High	High	Low	Band 1 – 6.0 - 8.0 GHz
All Other States			Do Not Use

AM3170 – Filter Bank

Analog Tunable 6.0 to 18.0 GHz Notch

Typical Performance

(T = 25 C, VDD = +5.0 V)



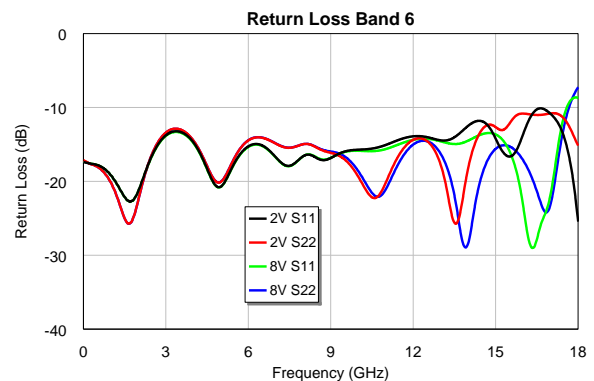
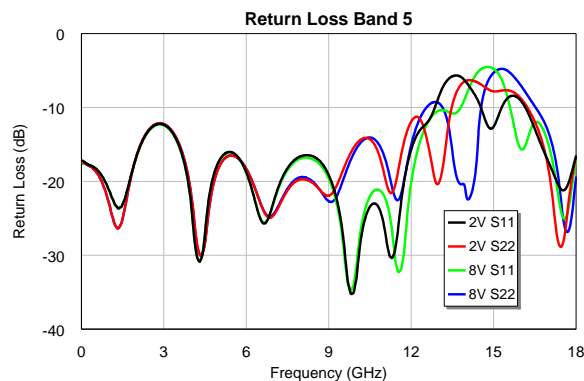
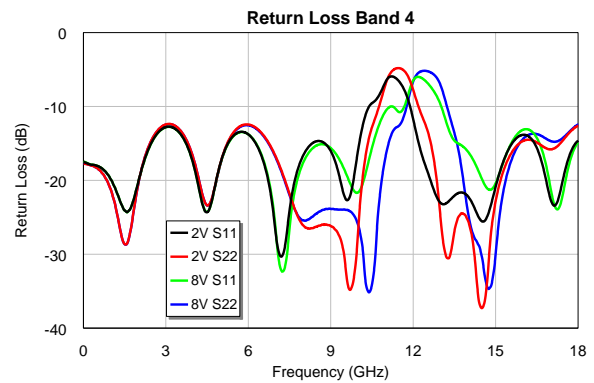
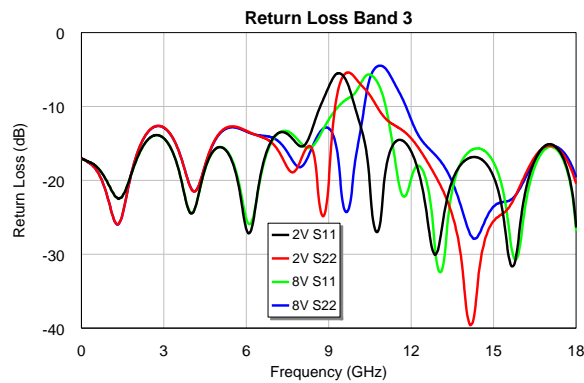
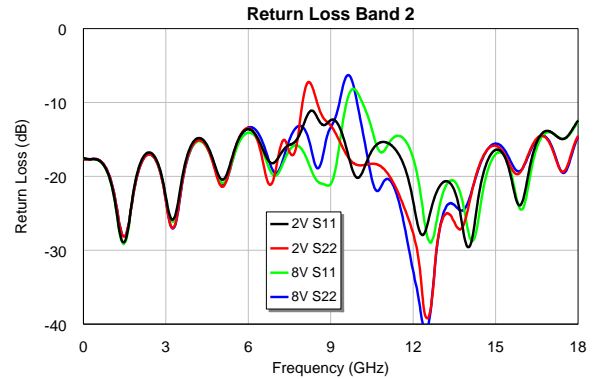
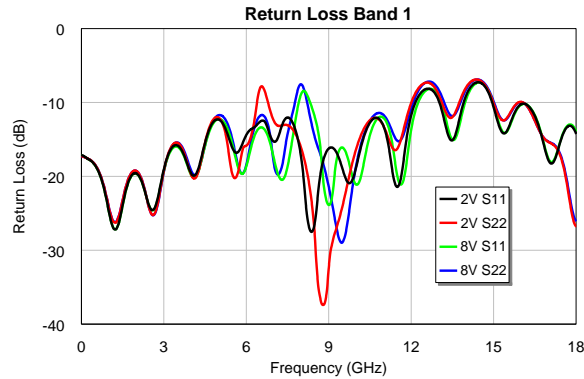
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AM3170 – Filter Bank

Analog Tunable 6.0 to 18.0 GHz Notch

Typical Performance (continued)

(T = 25 C, VDD = +5.0 V)



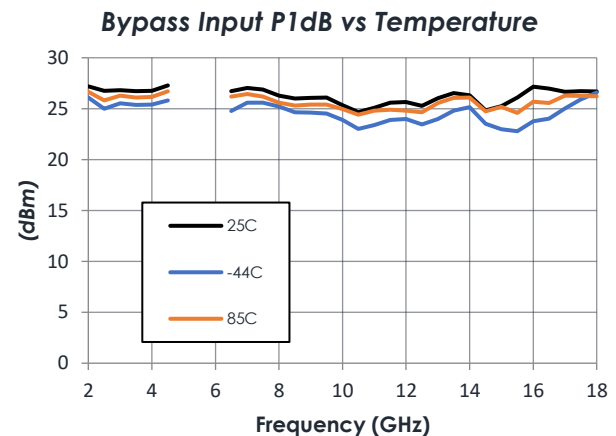
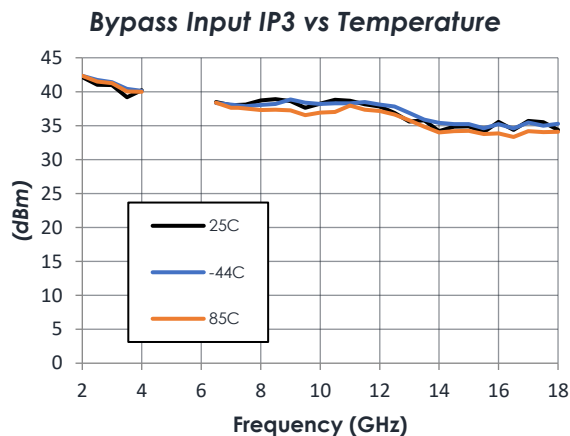
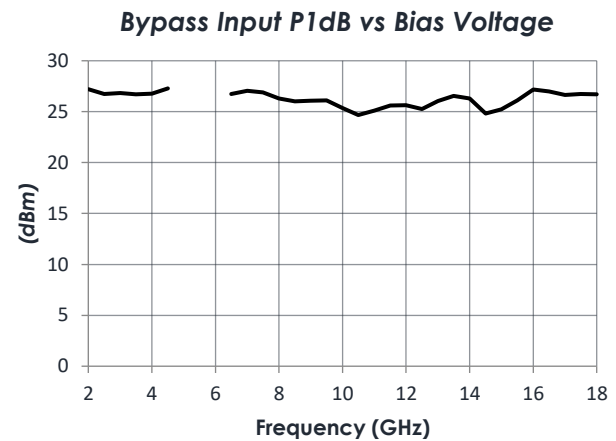
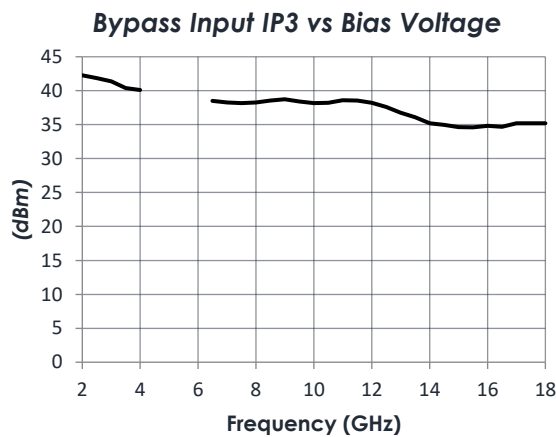
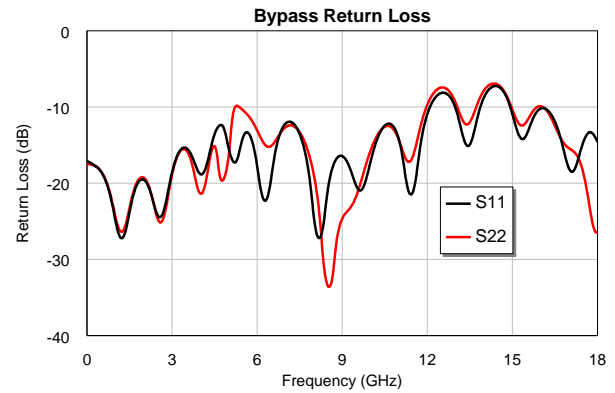
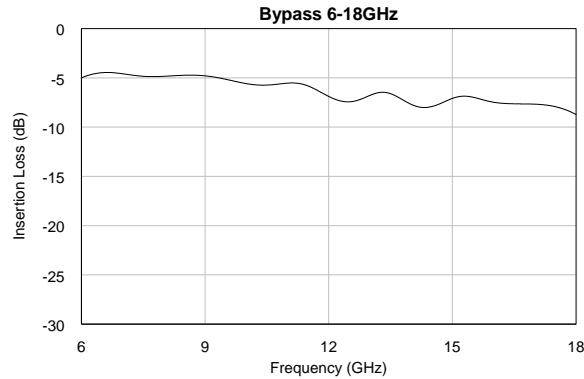
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AM3170 – Filter Bank

Analog Tunable 6.0 to 18.0 GHz Notch

Typical Performance (continued)

(T = 25 C, VDD = +5.0 V)



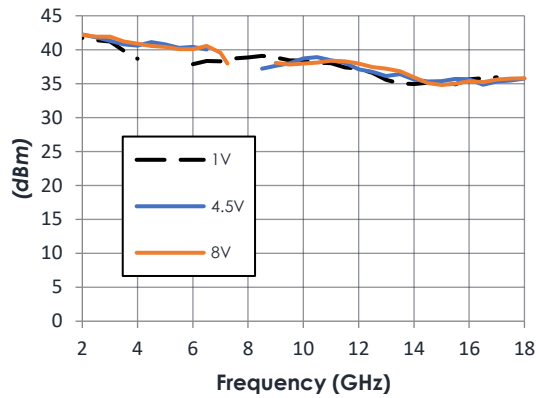
AM3170 – Filter Bank

Analog Tunable 6.0 to 18.0 GHz Notch

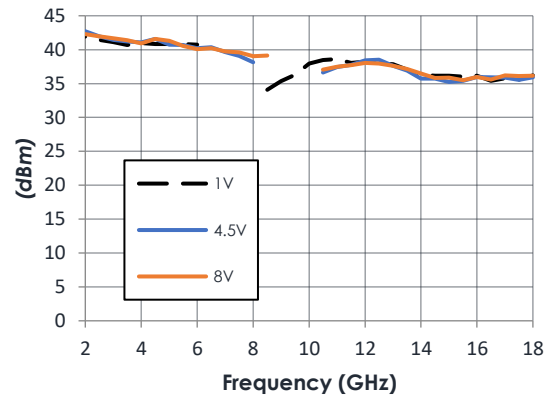
Typical Performance (continued)

(T = 25 C, VDD = +5.0 V)

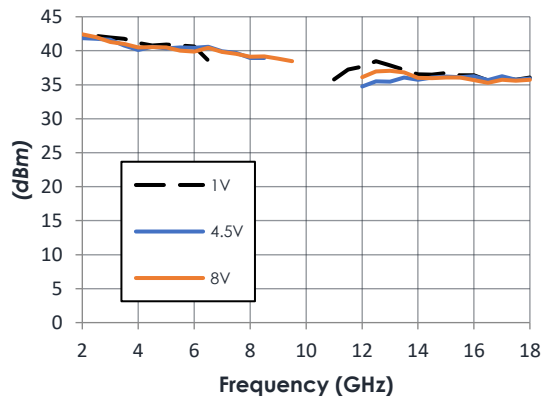
Band 1 Input IP3 vs Bias Voltage



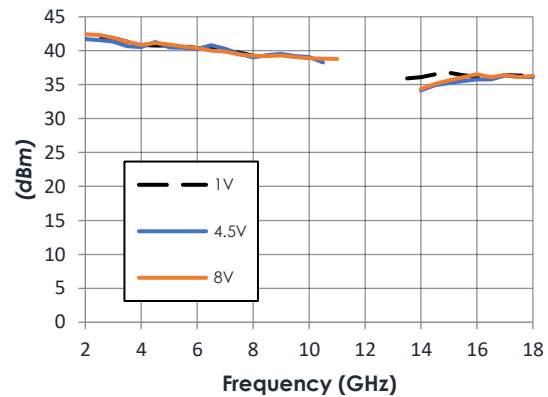
Band 2 Input IP3 vs Bias Voltage



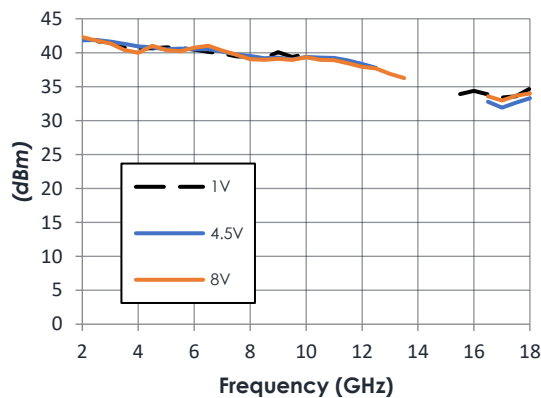
Band 3 Input IP3 vs Bias Voltage



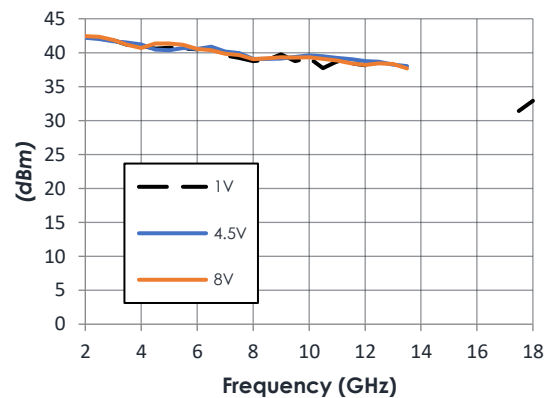
Band 4 Input IP3 vs Bias Voltage



Band 5 Input IP3 vs Bias Voltage



Band 6 Input IP3 vs Bias Voltage



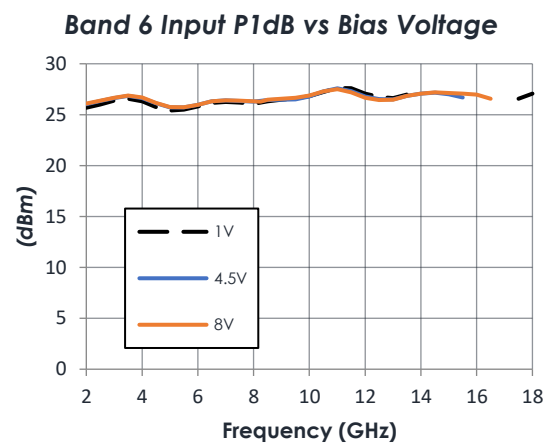
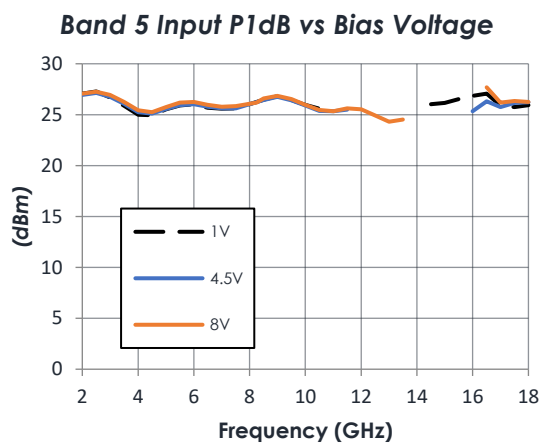
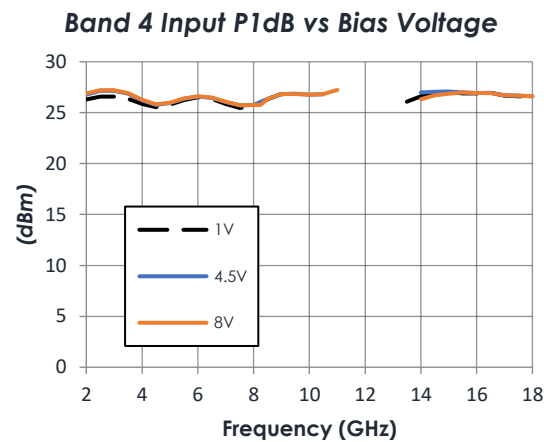
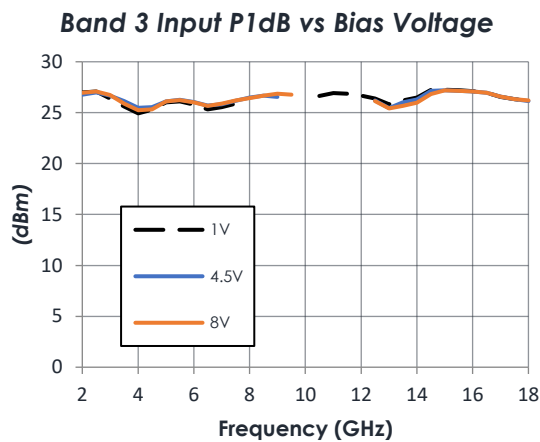
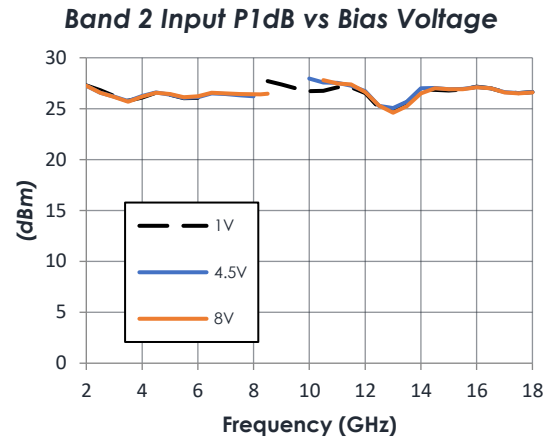
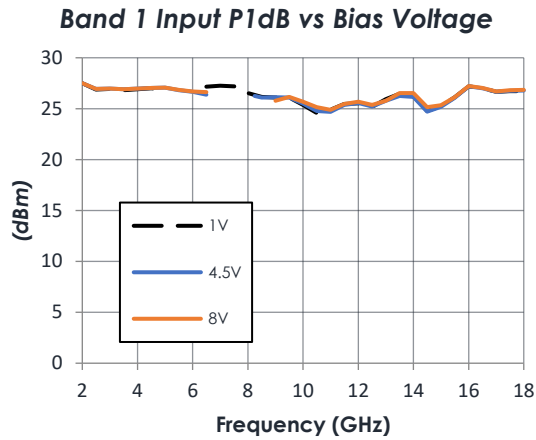
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AM3170 – Filter Bank

Analog Tunable 6.0 to 18.0 GHz Notch

Typical Performance (continued)

(T = 25 C, VDD = +5.0 V)



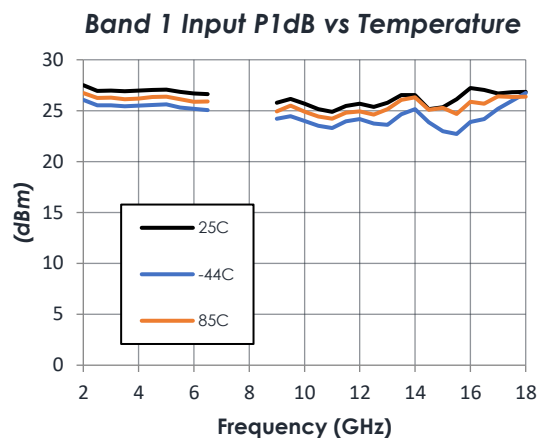
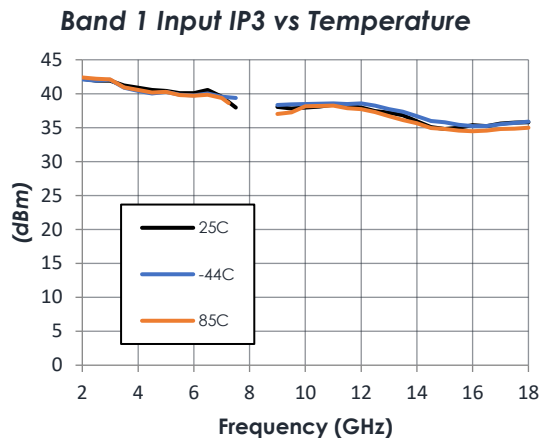
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AM3170 – Filter Bank

Analog Tunable 6.0 to 18.0 GHz Notch

Typical Performance (continued)

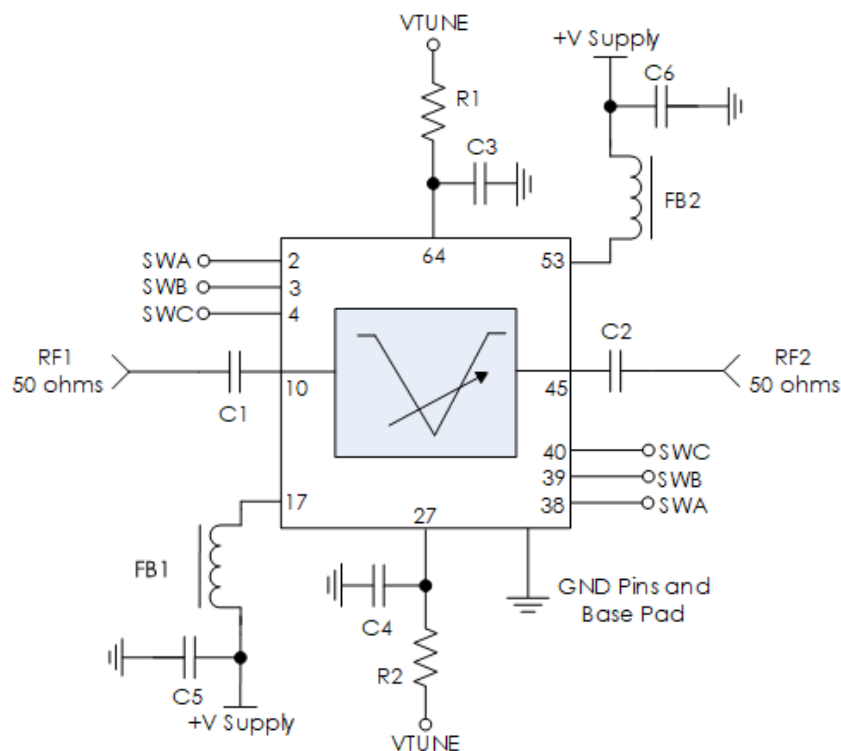
(VTUNE = +8.0 V, VDD = +5.0 V)



AM3170 – Filter Bank

Analog Tunable 6.0 to 18.0 GHz Notch

Typical Application



Recommended Component List (or equivalent):

Part	Value	Part Number	Manufacturer
C1, C2	0.1 μ F	0201BB104KW160	Passives Plus
C3-C6	0.1 μ F	C1005X7R1H104K050BB	TDK
FB1, FB2		MMZ1005A222E	TDK
R1, R2	100 Ω	CRCW0402100RFKED	Vishay

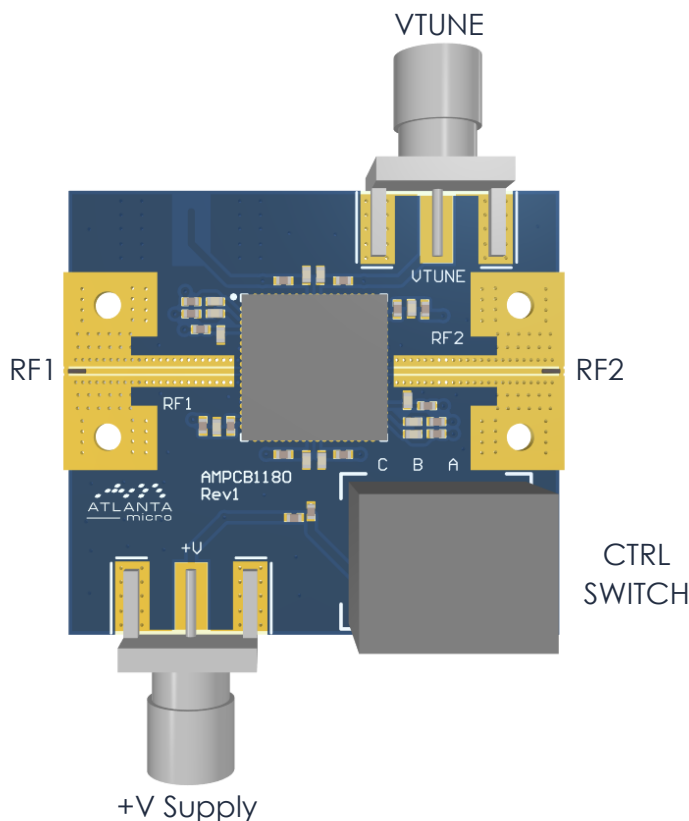
Notes:

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.

AM3170 – Filter Bank

Analog Tunable 6.0 to 18.0 GHz Notch

Evaluation PC Board



Related Parts

Part Number				Description
AM3063	6.0 GHz	to	18.0 GHz	Digitally Tunable Bandpass Filter Bank
AM3152	400 MHz	to	8.0 GHz	Digitally Tunable Bandpass Filter Bank
AM3153	6.0 GHz	to	26.5 GHz	Digitally Tunable Bandpass Filter Bank
AM3089	2.0 GHz	to	18.0 GHz	Analog Tunable Bandpass Filter Bank
AM3135	3.5 GHz	to	9.0 GHz	Analog Tunable Bandpass Filter Bank
AM3136	8.0 GHz	to	19.0 GHz	Analog Tunable Bandpass Filter Bank
AM3129	700 MHz	to	6.0 GHz	Analog Tunable Notch Filter Bank
AM3137	700 MHz	to	2.0 GHz	Analog Tunable Notch Filter Bank
AM3138	1.3 GHz	to	3.25 GHz	Analog Tunable Notch Filter Bank
AM3139	2.5 GHz	to	6.0 GHz	Analog Tunable Notch Filter Bank

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Component Compliance Information

RoHS: Atlanta Micro, 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 Atlanta Micro 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 (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)

REACH: Atlanta Micro, 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).

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Atlanta Micro 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.