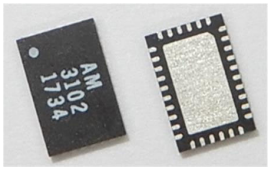
AM3102 – Filter Bank

Digitally Tunable 330 to 1200 MHz Bandpass

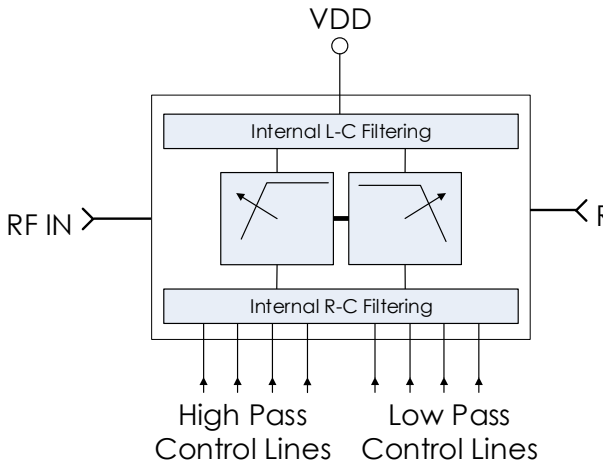


AM3102 is a miniature filter IC containing digitally tunable bandpass filters covering the 330 to 1200 MHz or 450 to 1500 MHz frequency range. Independent 4-bit digital control of the low-pass and high-pass corners provide control of both center frequency and bandwidth. AM3102 provides an excellent filtering solution for a receiver or transceiver requiring flexible center frequency and bandwidth, high dynamic range, and small size, weight, and power consumption.

FEATURES

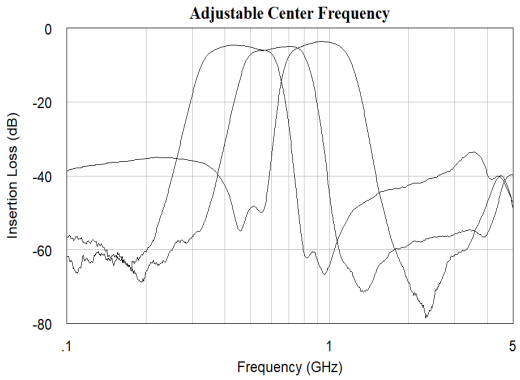
- Digitally Tunable Bandpass Filters
- Integrated Control Line Filtering
- Independent LP and HP Control
- 4-bit Control, 3V or 5V Logic
- +3.3V to +5.0V Supply
- 2.5 dB Insertion Loss
- +40dBm Input IP3
- -40C to +85C Operation

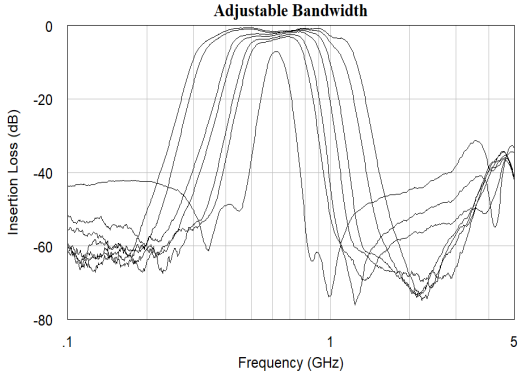
FUNCTIONAL DIAGRAM



CHARACTERISTIC PERFORMANCE

(Only some of the available states shown for simplicity)





CONTENTS

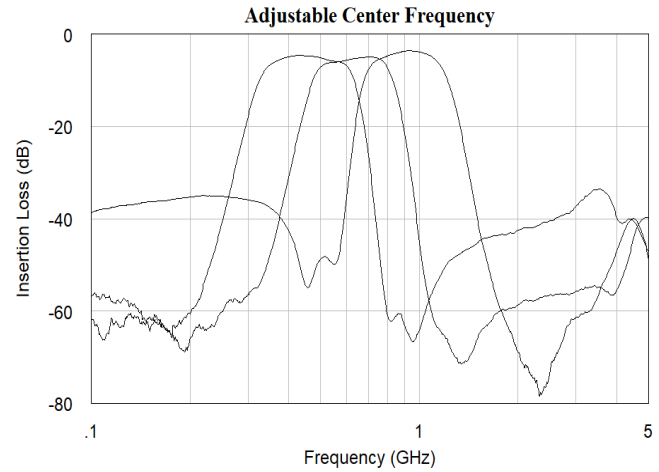
REVISION HISTORY

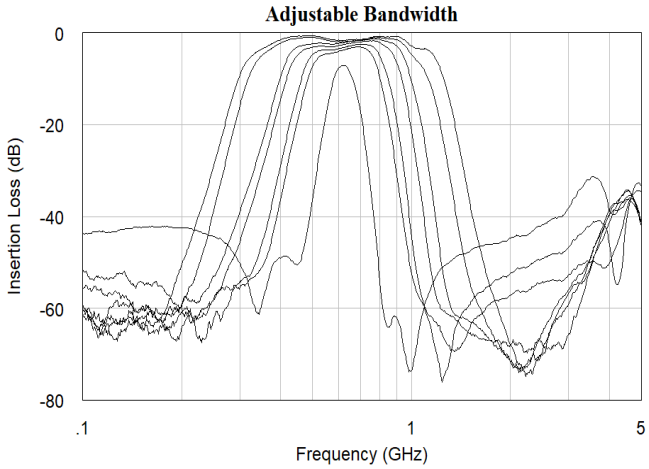
Date	Revision	Notes
August 3, 2018	6	
December 14, 2023	7	Updated datasheet format
June 20, 2024	8	Changed to Mercury branding. No content changes.

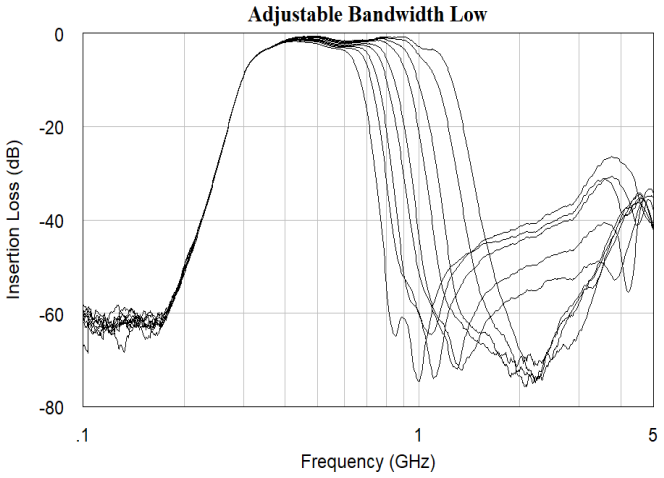
TYPICAL PERFORMANCE

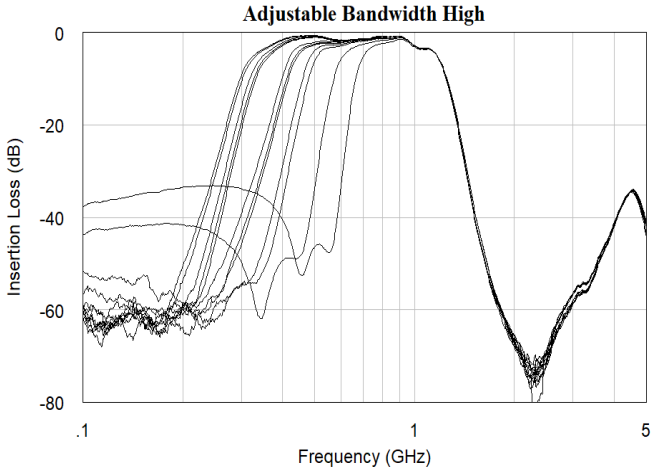
Configuration A: 330 MHz – 1200 MHz

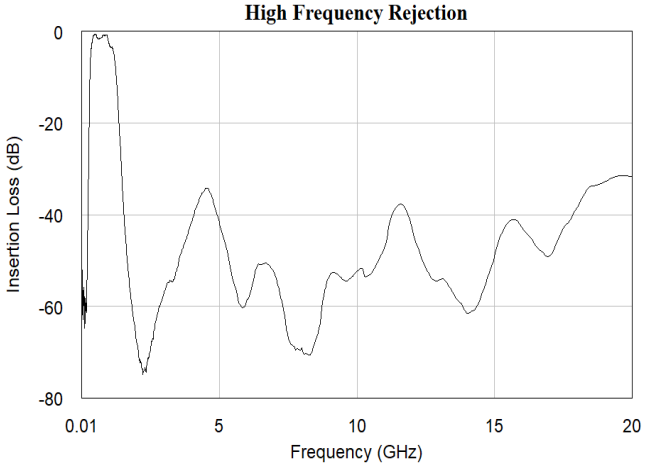
(Only some of the available states shown for simplicity)

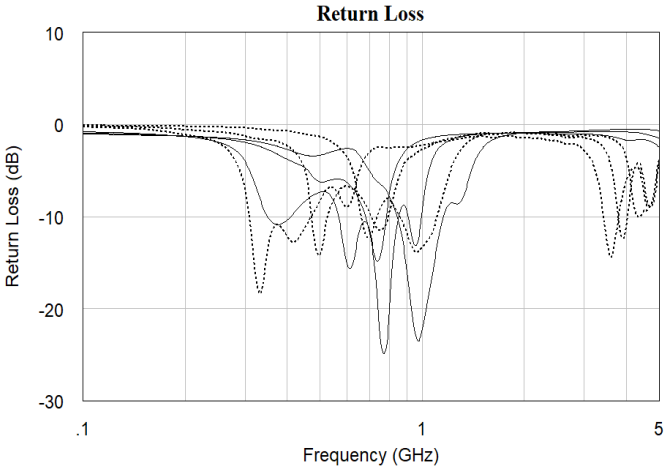








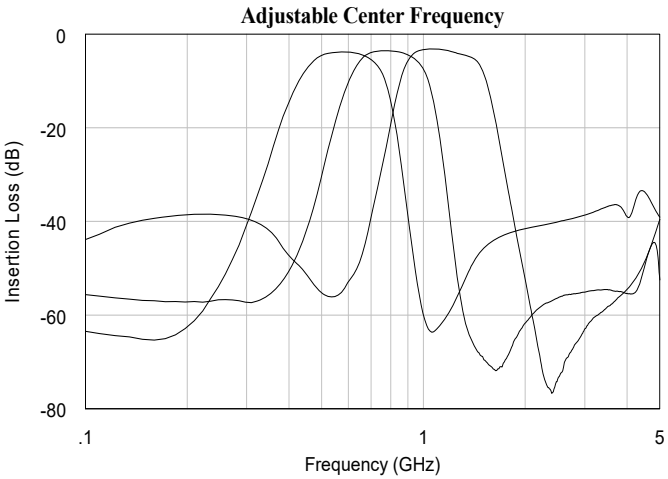


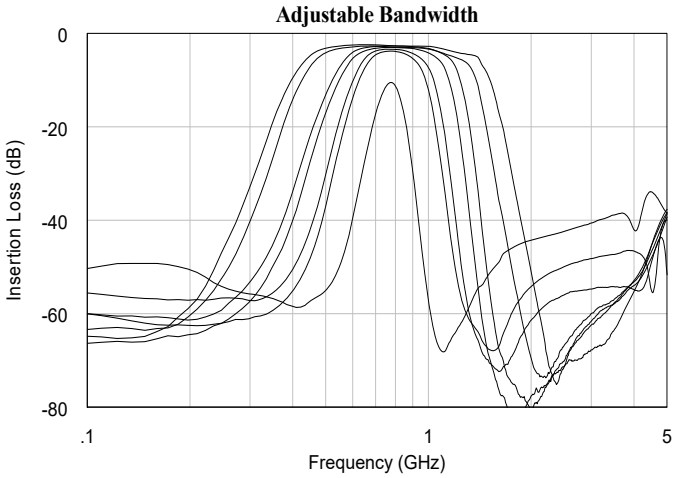


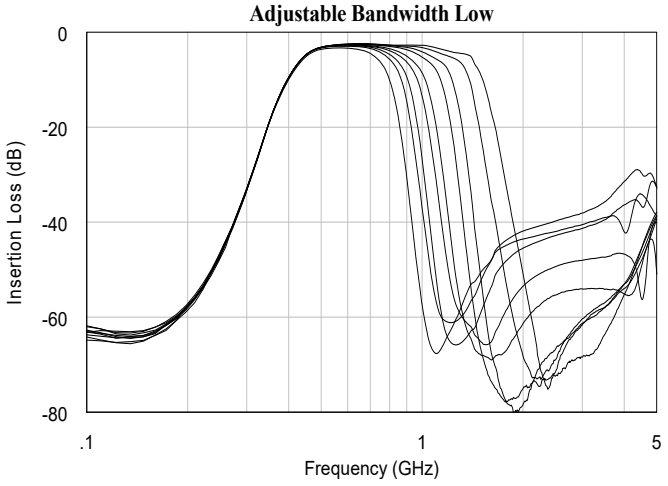
TYPICAL PERFORMANCE (CONTINUED)

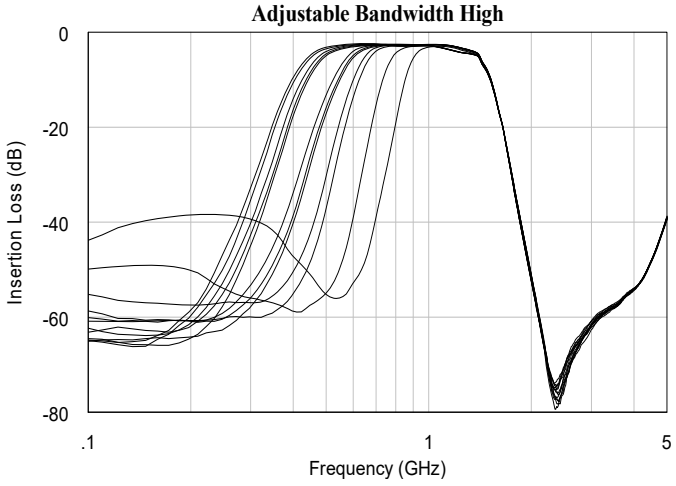
Configuration B: 450 MHz – 1500 MHz

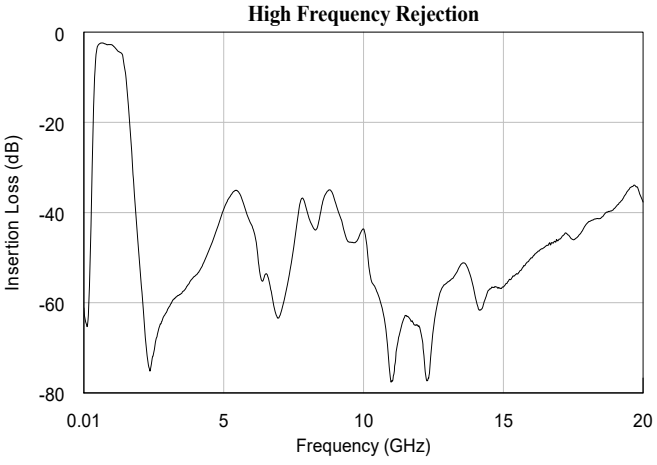
(Only some of the available states shown for simplicity)

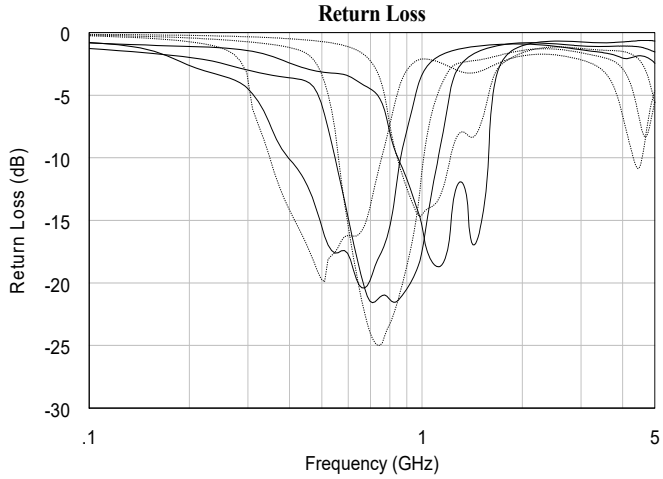






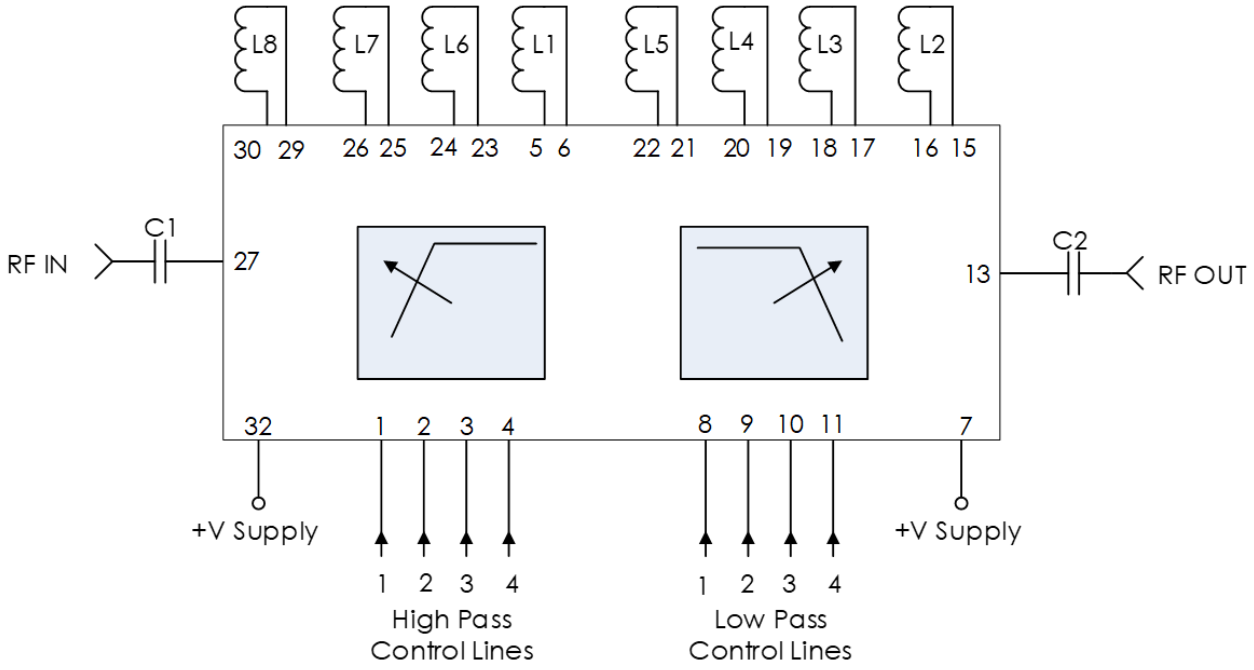






TYPICAL APPLICATION

Configuration A: 330 MHz to 1200 MHz



Recommended Component List (or Equivalent)

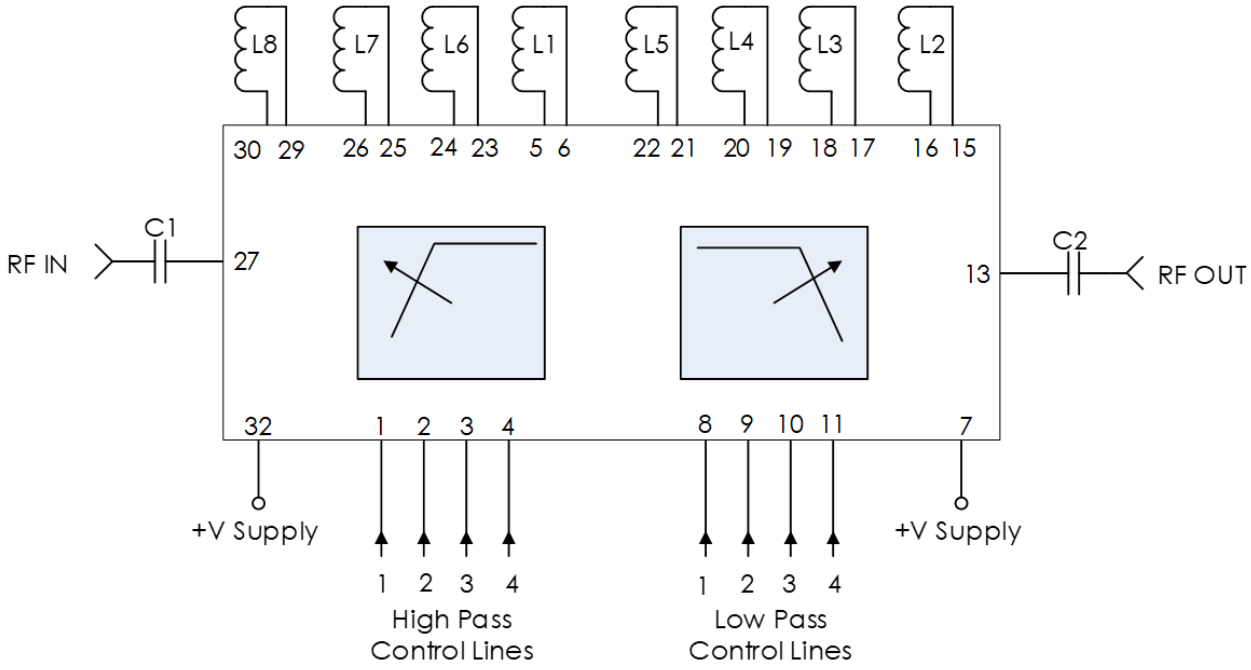
Part	Value	Part Number	Manufacturer
C1, C2	0.1 uF	0402BB104KW160	Passives Plus
L1, L8	13 nH	0402HP-13NXGLW	Coilcraft
L2, L5	6.2 nH	0402HP-6N2XGLW	Coilcraft
L3, L4	6.8 nH	0402HP-6N8XGLW	Coilcraft
L6, L7	9.0 nH	0402HP-9N0XGLW	Coilcraft

Notes:

1. RF blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance.
2. VDD and control lines filtered internally providing high-frequency isolation to 20+ GHz.

TYPICAL APPLICATION (CONTINUED)

Configuration B: 450 MHz to 1500 MHz



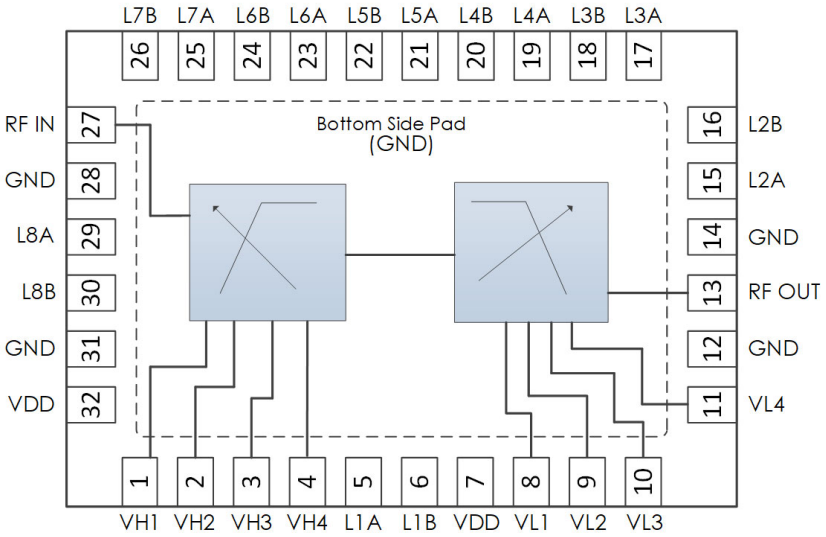
Recommended Component List (or Equivalent)

Part	Value	Part Number	Manufacturer
C1, C2	0.1 uF	0402BB104KW160	Passives Plus
L1, L8	9.5 nH	0402HP-9N5XGLW	Coilcraft
L2, L5	2.2 nH	0402HP-2N2XJLW	Coilcraft
L3, L4	2.7 nH	0402HP-2N7XGLW	Coilcraft
L6, L7	5.6 nH	0402HP-5N6XGLW	Coilcraft

Notes:

1. RF blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance.
2. VDD and control lines filtered internally providing high-frequency isolation to 20+ GHz.

PIN LAYOUT AND DEFINITIONS



Pin	Name	Function
1	VH1	High Pass Filter Control Bit 1 (LSB)
2	VH2	High Pass Filter Control Bit 2
3	VH3	High Pass Filter Control Bit 3
4	VH4	High Pass Filter Control Bit 4 (MSB)
5	L1A	External inductor L1 connection
6	L1B	External inductor L1 connection
7	VDD	DC Power Input
8	VL1	Low Pass Filter Control Bit 1 (LSB)
9	VL2	Low Pass Filter Control Bit 2
10	VL3	Low Pass Filter Control Bit 3
11	VL4	Low Pass Filter Control Bit 4 (MSB)
12	GND	Ground
13	RF OUT	RF Output – 50 Ohms – DC Coupled. External DC Block Required
14	GND	Ground
15	L2A	External inductor L2 connection
16	L2B	External inductor L2 connection

Pin	Name	Function
17	L3A	External inductor L3 connection
18	L3B	External inductor L3 connection
19	L4A	External inductor L4 connection
20	L4B	External inductor L4 connection
21	L5A	External inductor L5 connection
22	L5B	External inductor L5 connection
23	L6A	External inductor L6 connection
24	L6B	External inductor L6 connection
25	L7A	External inductor L7 connection
26	L7B	External inductor L7 connection
27	RF IN	RF Input – 50 Ohms – DC Coupled. External DC Block Required
28	GND	Ground
29	L8A	External inductor L8 connection
30	L8B	External inductor L8 connection
31	GND	Ground
32	VDD	DC Power Input

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+10.0 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	

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

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
DC Supply Voltage		+3.1 V*	+5.0 V	+5.2 V
DC Supply Current	VDD = +5.0 V		2 mA	
Power Dissipated	VDD = +5.0 V		10 mW	
Logic Level Low		-0.1 V		+0.5 V
Logic Level High	Test Condition	+2.0 V		+VDD V

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage	+3.1 V*	+5 V	+5.2 V
Operating Case Temperature	-40 C		+85 C
Operating Junction Temperature	-40 C		+125 C

Timing Characteristics

Switching Time	Minimum	Typical	Maximum
Switching Speed		1 µs	

RF Performance – Configuration A : 330 MHz - 1200 MHz

(T = 25 °C unless otherwise specified. Data taken from the HP = 0000, LP = 1111 state.)

Param	Testing Conditions	Min	Typical	Max
Frequency Range		330 MHz		1200 MHz
Insertion Loss	f = 330 MHz		4.7 dB	
	f = 630 MHz		1.6 dB	
	f = 1200 MHz		6.5 dB	
Return Loss	f = 330 MHz		12.5 dB	
	f = 630 MHz		6.6 dB	
	f = 1200 MHz		5.0dB	
Output IP3			+40 dBm	
Input P1dB ?			+ dBm	

SPECIFICATIONS (CONTINUED)

RF Performance – Configuration B : 450 MHz - 1500 MHz

(T = 25 °C unless otherwise specified. Data taken from the HP = 0000, LP = 1111 state.)

Param	Testing Conditions	Min	Typical	Max
Frequency Range		450 MHz		1500 MHz
Insertion Loss	f = 450 MHz		4.8 dB	
	f = 820 MHz		2.7 dB	
	f = 1500 MHz		9.1 dB	
Return Loss	f = 450 MHz		16.9 dB	
	f = 820 MHz		9.1 dB	
	f = 1500 MHz		6.8 dB	
Output IP3			+40 dBm	
Input P1dB ?			dBm	

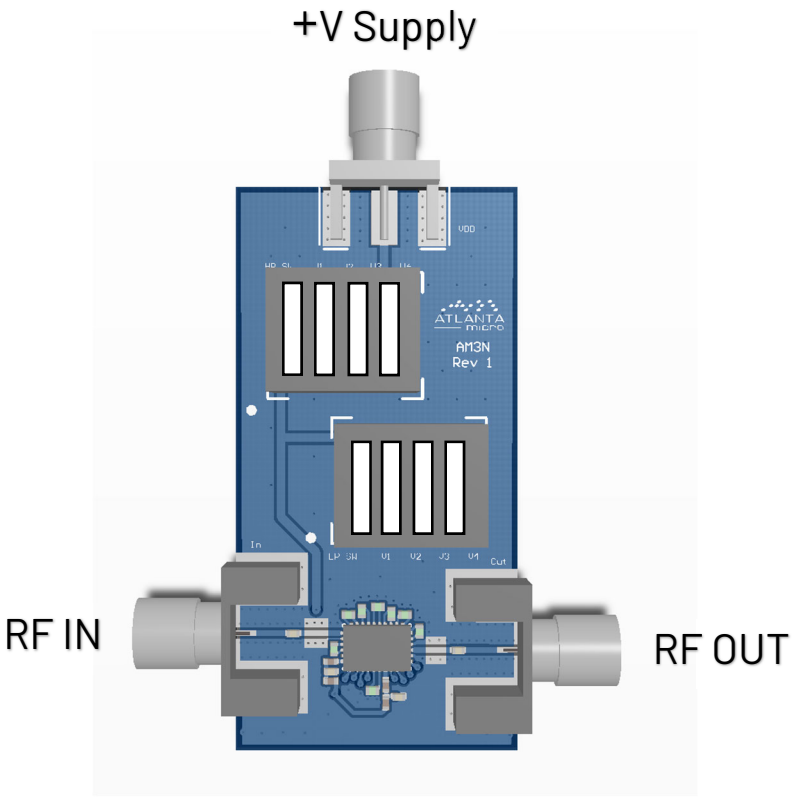
STATE TABLE

High Pass Control Lines				Typical Cutoff Frequency (MHz) Configuration A	Typical Cutoff Frequency (MHz) Configuration B
VH4	VH3	VH2	VH1		
L	L	L	L	330	450
L	L	L	H	332	452
L	L	H	L	338	460
L	L	H	H	341	464
L	H	L	L	354	476
L	H	L	H	359	481
L	H	H	L	373	495
L	H	H	H	381	504
H	L	L	L	443	584
H	L	L	H	448	589
H	L	H	L	463	603
H	L	H	H	473	613
H	H	L	L	508	657
H	H	L	H	531	684
H	H	H	L	618	794
H	H	H	H	717	916

STATE TABLE (CONTINUED)

Low Pass Control Lines				Typical Cutoff Frequency (MHz) Configuration A	Typical Cutoff Frequency (MHz) Configuration B
VH4	VH3	VH2	VH1		
L	L	L	L	493	614
L	L	L	H	503	631
L	L	H	L	518	653
L	L	H	H	530	671
L	H	L	L	552	701
L	H	L	H	567	723
L	H	H	L	587	753
L	H	H	H	604	775
H	L	L	L	661	844
H	L	L	H	690	881
H	L	H	L	731	940
H	L	H	H	767	989
H	H	L	L	850	1100
H	H	L	H	915	1192
H	H	H	L	1032	1340
H	H	H	H	1200	1500

EVALUATION PC BOARD



RELATED PARTS

Part Number		Description
AM3043	7 GHz to 15.5 GHz	Digitally Tunable Bandpass Filter
AM3045	3.5 GHz to 5.5 GHz	Digitally Tunable Bandpass Filter
AM3060	400 MHz to 6.5 GHz	Digitally Tunable Bandpass Filter
AM3063	6 GHz to 18 GHz	Digitally Tunable Low Pass Filter Bank
AM3065	6 GHz to 12 GHz	Digitally Tunable High Pass Filter
AM3066	18 GHz to 26.5 GHz	Digitally Tunable Bandpass Filter Bank
AM3103	1 GHz to 3 GHz	Digitally Tunable Bandpass Filter
AM3104	2.5 GHz to 6.5 GHz	Digitally Tunable Bandpass Filter

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 RoHS II. 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)

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).

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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.

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
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