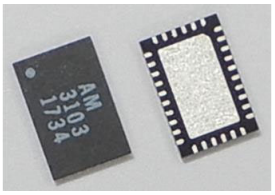
AM3103 – Filter Bank

Digitally Tunable 1.0 to 3.0 GHz Bandpass

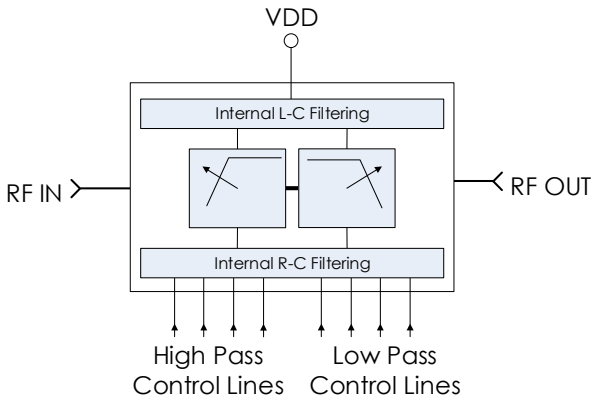


AM3103 is a miniature filter IC containing digitally tunable bandpass filters covering the 1.0 GHz to 3.0 GHz frequency range. Independent 4 bit digital control of the low-pass and high-pass corners provide control of both center frequency and bandwidth. AM3103 provides an excellent filtering solution for a receiver or transceiver requiring flexible center frequency and bandwidth, high dynamic range, and small size, weight, and power consumption.

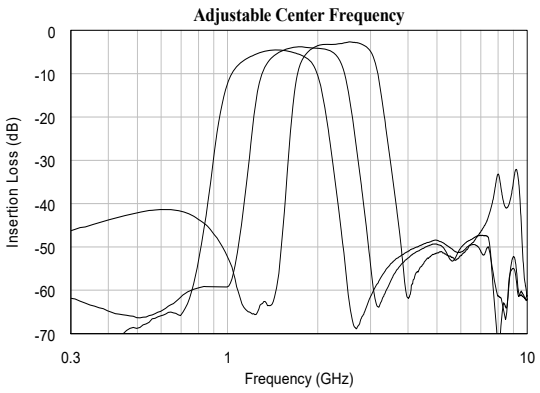
FEATURES

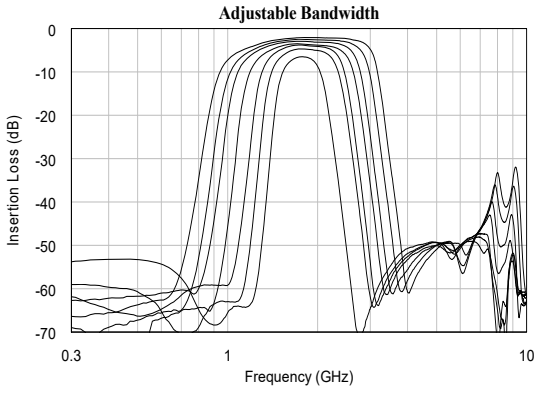
- Digitally Tunable Bandpass Filters
- Integrated Control Line Filtering
- Independent LP and HP Control
- 4-bit Control, 3V or 5V Logic
- +3.3V to +5.0V Supply
- 3.0 dB Insertion Loss
- +40dBm Input IP3
- -40C to +85C Operation

FUNCTIONAL DIAGRAM



CHARACTERISTIC PERFORMANCE



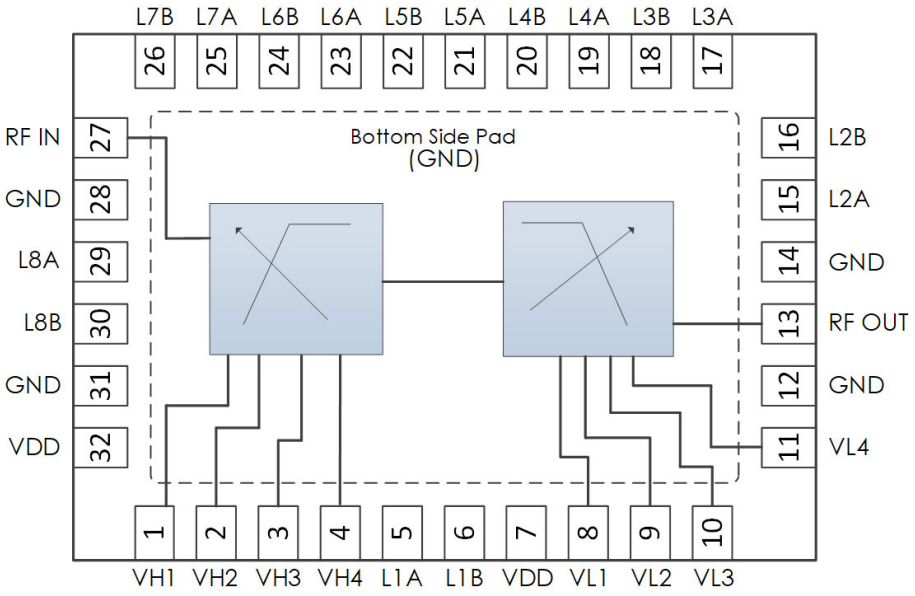


CONTENTS

REVISION HISTORY

Date	Revision	Notes
August 19, 2018	4	
December 14, 2023	5	Updated datasheet format.
June 20, 2024	6	Changed to Mercury branding. No content changes.

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)
5-6	GND	Ground
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
14-26	GND	Ground
27	RF IN	RF Input – 50 Ohms – DC Coupled. External DC Block Required
28-31	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		+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

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

Param	Testing Conditions	Min	Typical	Max
Frequency Range		1.0 GHz		3.0 GHz
Insertion Loss	f = 1.0 GHz		7.0 dB	
	f = 1.73 GHz		2.1 dB	
	f = 3.0 GHz		4.8 dB	
Return Loss	f = 1.0 GHz		15.5 dB	
	f = 1.73 GHz		16.4 dB	
	f = 3.0 GHz		14.4 dB	
Output IP3			+40 dBm	
Input P1dB ?			+ dBm	

STATE TABLE

High Pass Control Lines				Typical Cutoff Frequency (GHz)
VH4	VH3	VH2	VH1	
L	L	L	L	1.00
L	L	L	H	1.01
L	L	H	L	1.02
L	L	H	H	1.03
L	H	L	L	1.06
L	H	L	H	1.08
L	H	H	L	1.10
L	H	H	H	1.12
H	L	L	L	1.14
H	L	L	H	1.16
H	L	H	L	1.20
H	L	H	H	1.25
H	H	L	L	1.37
H	H	L	H	1.47
H	H	H	L	1.60
H	H	H	H	1.82

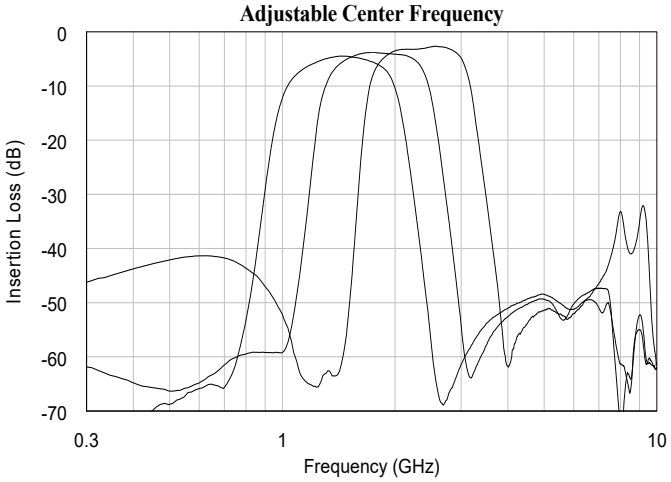
STATE TABLE (CONTINUED)

Low Pass Control Lines				Typical Cutoff Frequency (GHz)
VH4	VH3	VH2	VH1	
L	L	L	L	1.50
L	L	L	H	1.55
L	L	H	L	1.59
L	L	H	H	1.65
L	H	L	L	1.70
L	H	L	H	1.78
L	H	H	L	1.84
L	H	H	H	1.92
H	L	L	L	2.00
H	L	L	H	2.10
H	L	H	L	2.20
H	L	H	H	2.33
H	H	L	L	2.49
H	H	L	H	2.67
H	H	H	L	2.86
H	H	H	H	3.12

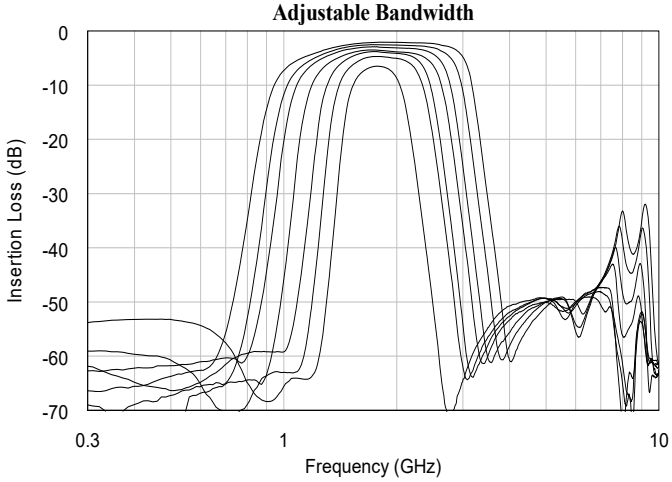
TYPICAL PERFORMANCE

(Only some of the available states shown for simplicity)

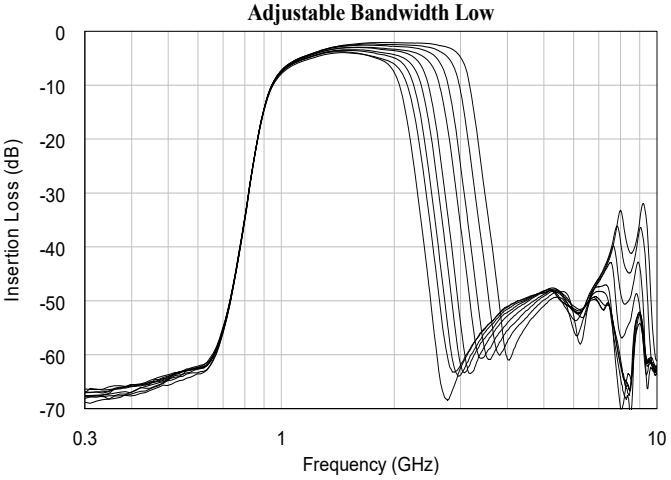
Adjustable Center Frequency



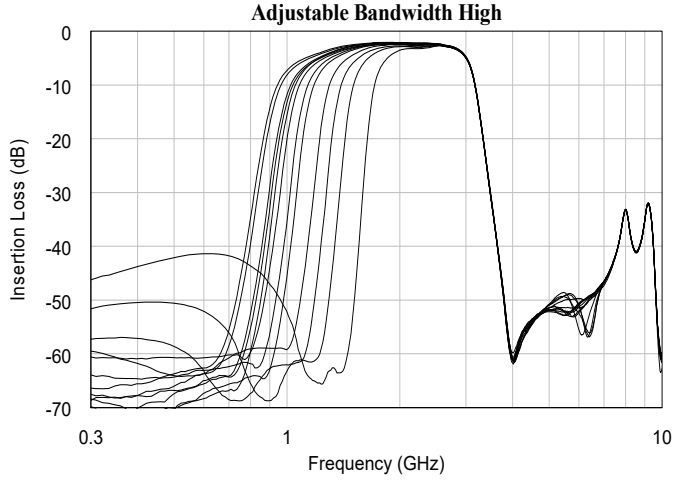
Adjustable Bandwidth



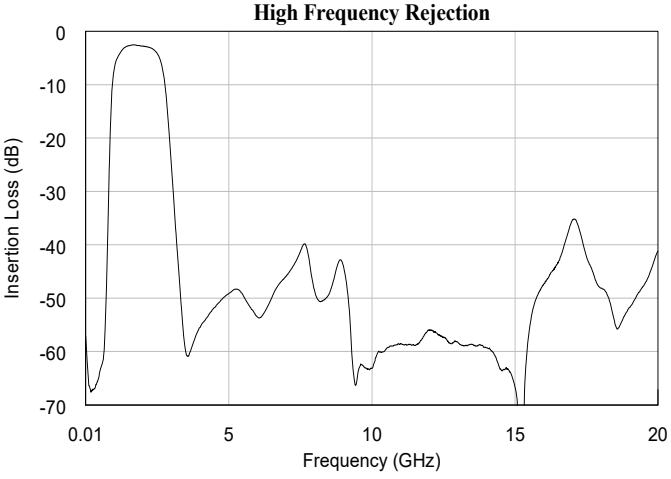
Adjustable Bandwidth Low



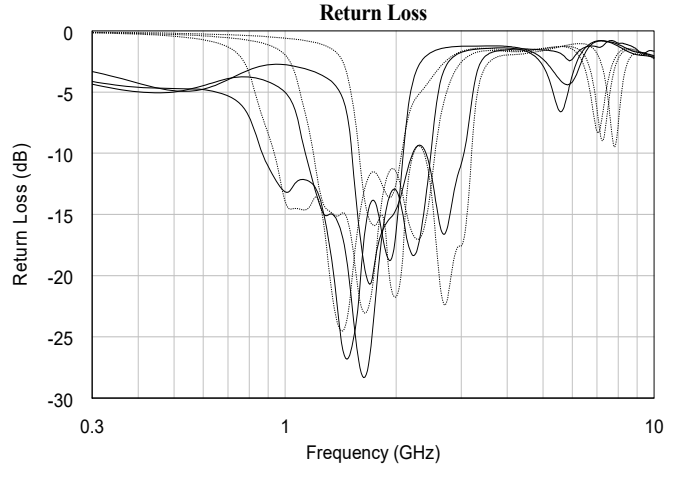
Adjustable Bandwidth High



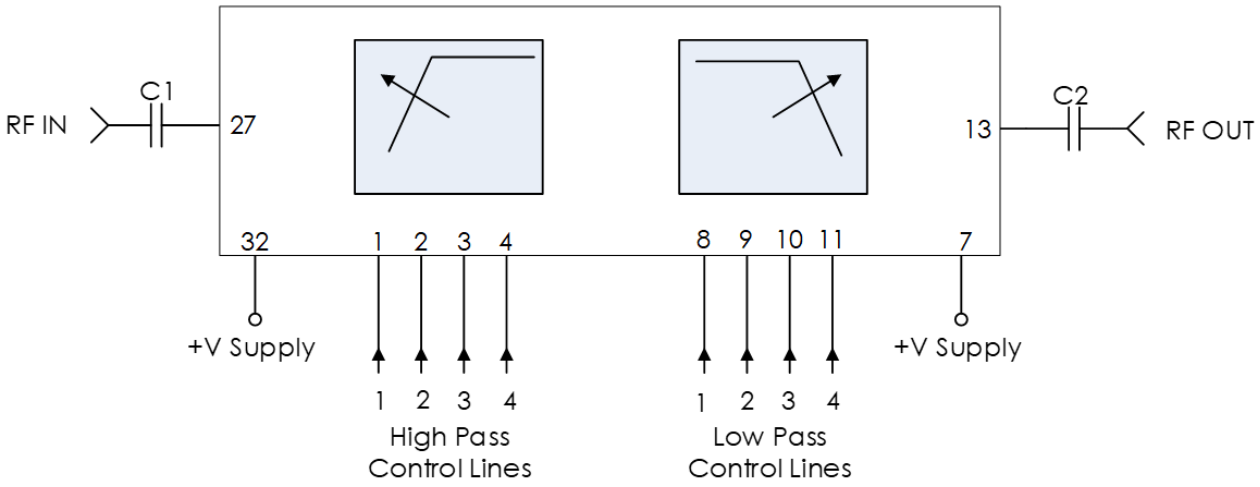
High Frequency Rejection



Return Loss



TYPICAL APPLICATION



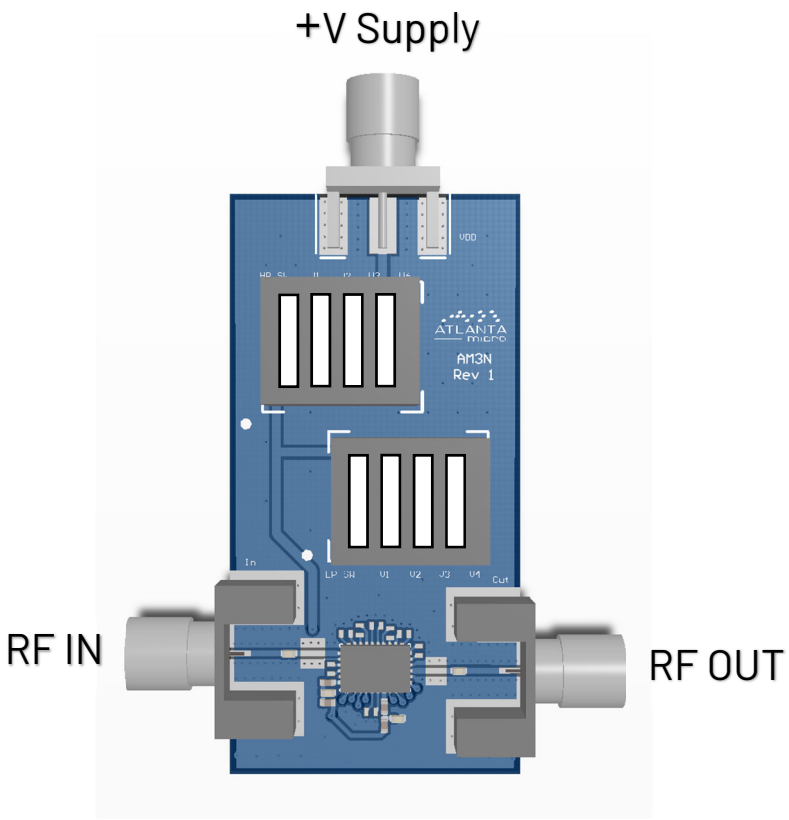
Recommended Component List (or Equivalent)

Part	Value	Part Number	Manufacturer
C1, C2	0.1 uF	0402BB104KW160	Passives Plus

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.

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	330 MHz to 1200 MHz	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).

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.

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