

Description

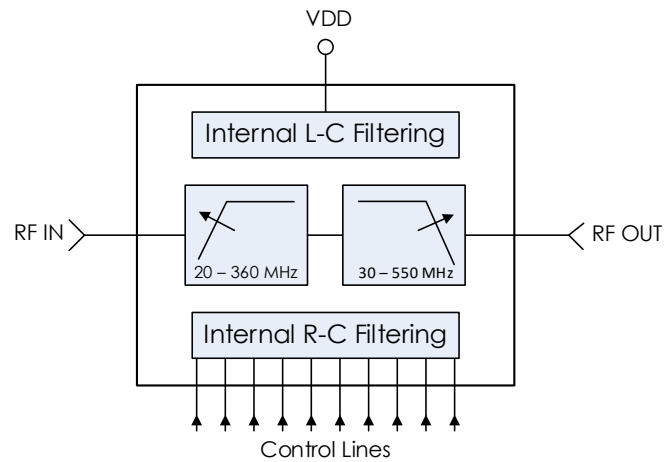
AM3155 is a digitally tunable bandpass filter covering the 20 MHz to 550 MHz frequency range. It is packaged in a 13.5mm x 24mm QFN package or in an RF shielded module. The filter provides 32 selectable lowpass cutoff states and 32 selectable highpass cutoff states with 5 digital control bits each for a total of 1024 unique states. The AM3155 also offers on chip power and control line filtering to help reduce component count for maximum space savings.

AM3155 is an excellent front-end for a receiver providing both low insertion loss and valuable flexibility for tuning center frequency and bandwidth. Its small size, weight, and power consumption make it an attractive solution for demanding low SWaP applications.

Features

- Digitally Tunable Bandpass Filter
- Integrated Control Line Filtering
- +3.3V to +5.0V Supply
- +3.3V to +5.0V Control
- 3.0 dB AVG Insertion Loss
- +40 dBm Input IP3
- +24 dBm Input P1dB
- -40C to +85C Operation
- Available in RF shielded module

Functional Diagram



Characteristic Performance

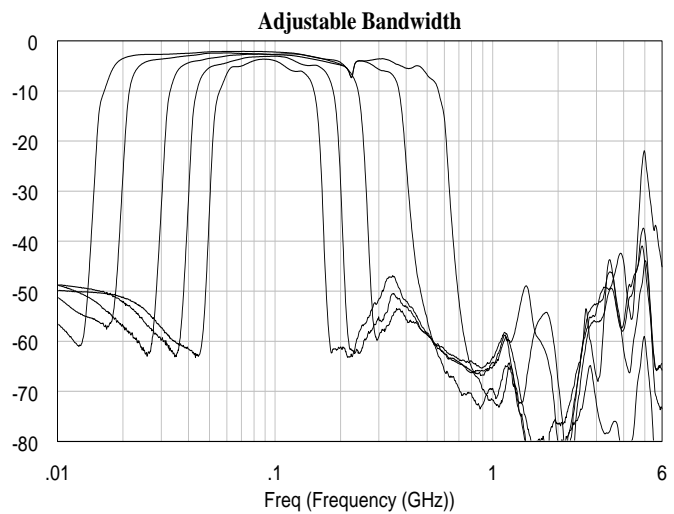
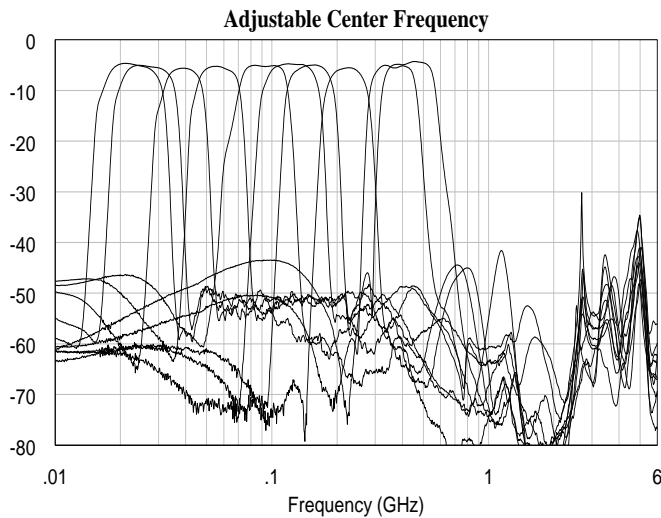


Table of Contents

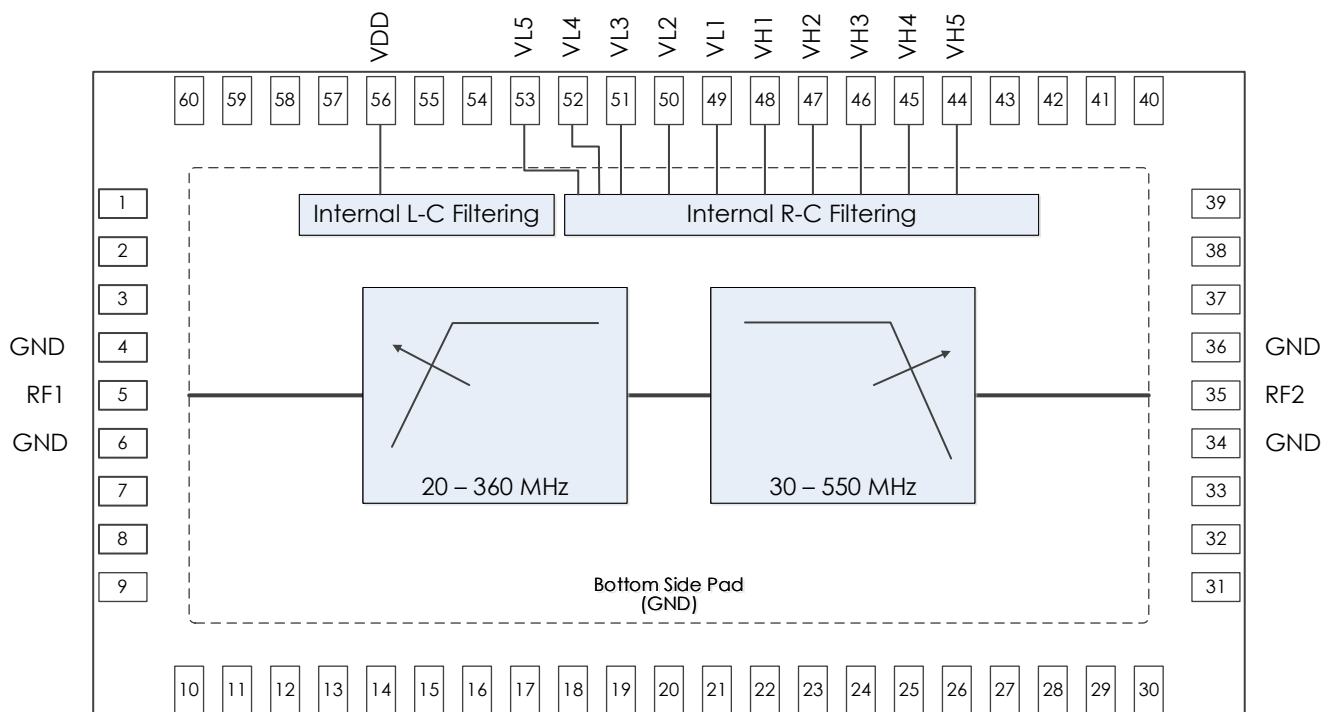
Description	1	RF Performance	5
Features	1	Timing Characteristics	5
Functional Diagram	1	State Table	6
Characteristic Performance	1	Typical Performance	8
Revision History	2	Typical Application	9
Pin Layout and Definitions	3	Related Parts	9
Specifications	4	Package Details	10
Absolute Maximum Ratings	4	Package Drawing	10
Handling Information	4	Recommended Footprint	10
Recommended Operating Conditions	4	Component Compliance Information	11
DC Electrical Characteristics	5		

Revision History

Date	Revision Number	Notes
May 10, 2022	0	Preliminary Release
May 16, 2023	1	Initial Release

Pin Layout and Definitions

NOTE: All Non-Named Pins are Ground



Pin Number	Pin Name	Pin Function
1 – 4	GND	Ground – Common
5	RF1	RF 1 – 50 Ohms – DC Coupled, External DC Block Required
6 – 34	GND	Ground – Common
35	RF2	RF 2 – 50 Ohms – DC Coupled, External DC Block Required
36 – 43	GND	Ground – Common
44	VH5	High Pass Filter Control Bit 5 (MSB)
45	VH4	High Pass Filter Control Bit 4
46	VH3	High Pass Filter Control Bit 3
47	VH2	High Pass Filter Control Bit 2
48	VH1	High Pass Filter Control Bit 1 (LSB)
49	VL1	Low Pass Filter Control Bit 1 (LSB)
50	VL2	Low Pass Filter Control Bit 2
51	VL3	Low Pass Filter Control Bit 3
52	VL4	Low Pass Filter Control Bit 4
53	VL5	Low Pass Filter Control Bit 5 (MSB)
54, 55	GND	Ground – Common
56	VDD	DC Power Input
57 – 60	GND	Ground – Common
Bottom Pad	GND	Ground – Common

AM3155 – Filter Bank

Digitally Tunable 20 to 550 MHz Bandpass

Specifications

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+6.0 V
RF Input Power		+27 dBm
Operating Junction Temperature	-40 C	+150 C
Storage Temperature Range	-55 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	+3.0 V	+5.0 V	+5.2 V
Operating Case Temperature	-40 C		+85 C
Operating Junction Temperature	-40 C		+125 C

AM3155 – Filter Bank

Digitally Tunable 20 to 550 MHz Bandpass

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Parameter	Testing Conditions	Minimum	Typical	Maximum
DC Supply Voltage		+3.0 V	+5.0 V	+5.2 V
DC Supply Current	VDD = +5.0 V		6 mA	
Power Dissipated	VDD = +5.0 V		30 mW	
Logic Level Low		-0.1 V		+0.5 V
Logic Level High		+2.0 V		+VDD V
Logic Current Drive	Vx = +3.3V	100 μ A		
	Vx = +5V	200 μ A		

RF Performance

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

Parameter	Testing Conditions	Minimum	Typical	Maximum
Frequency Range		20 MHz		550 MHz
Insertion Loss	HP Tune = LP Tune		-5 dB	
	HP Tune = 00000, LP Tune = 11111		-2 dB	
Return Loss	HP Tune = LP Tune		-10 dB	
	HP Tune = 00000, LP Tune = 11111		-10 dB	
Input IP3	VDD = +5.0V		+40 dBm	
Input IP2	VDD = +5.0V		+60 dBm	

Timing Characteristics

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

Parameter	Minimum	Typical	Maximum
Tuning Speed, Rise ¹ (Out of Band → In Band)		200 ns	
Tuning Speed, Fall ² (In Band → Out of Band)		250 ns	
Settling Time, Rise ³ (Out of Band → In Band)		1 μ s	5.7 μ s ⁴
Settling Time, Fall ³ (In Band → Out of Band)			500 ns

NOTES:

1. Tuning speed rise defined by 50% CTL to 90% RF.
2. Tuning speed fall defined as 50% CTL to 10% RF.
3. Settling time error band defined to be within 1% of steady state value.
4. 5.7 μ s settling time only observed in one switching instance, when switching from 0XXXX to 1XXXX on the highpass control where the signal went from out of band to in band. Signal was just outside of 1% error band for a long time before finally settling within the 1% band. All other switching metrics settled within 1 μ s.

AM3155 – Filter Bank

Digitally Tunable 20 to 550 MHz Bandpass

State Table

Low Pass Filter Typical Cutoff Frequencies (MHz)

VL5	VL4	VL3	VL2	VL1	Typical Cutoff
L	L	L	L	L	28
L	L	L	L	H	29
L	L	L	H	L	30
L	L	L	H	H	31
L	L	H	L	L	32
L	L	H	L	H	33
L	L	H	H	L	35
L	L	H	H	H	36
L	H	L	L	L	43
L	H	L	L	H	46
L	H	L	H	L	49
L	H	L	H	H	53
L	H	H	L	L	65
L	H	H	L	H	73
L	H	H	H	L	89
L	H	H	H	H	112
H	L	L	L	L	141
H	L	L	L	H	145
H	L	L	H	L	149
H	L	L	H	H	153
H	L	H	L	L	163
H	L	H	L	H	168
H	L	H	H	L	174
H	L	H	H	H	180
H	H	L	L	L	213
H	H	L	L	H	224
H	H	L	H	L	239
H	H	L	H	H	254
H	H	H	L	L	318
H	H	H	L	H	357
H	H	H	H	L	439
H	H	H	H	H	550

AM3155 – Filter Bank

Digitally Tunable 20 to 550 MHz Bandpass

State Table (Continued)

High Pass Filter Typical Cutoff Frequencies (MHz)

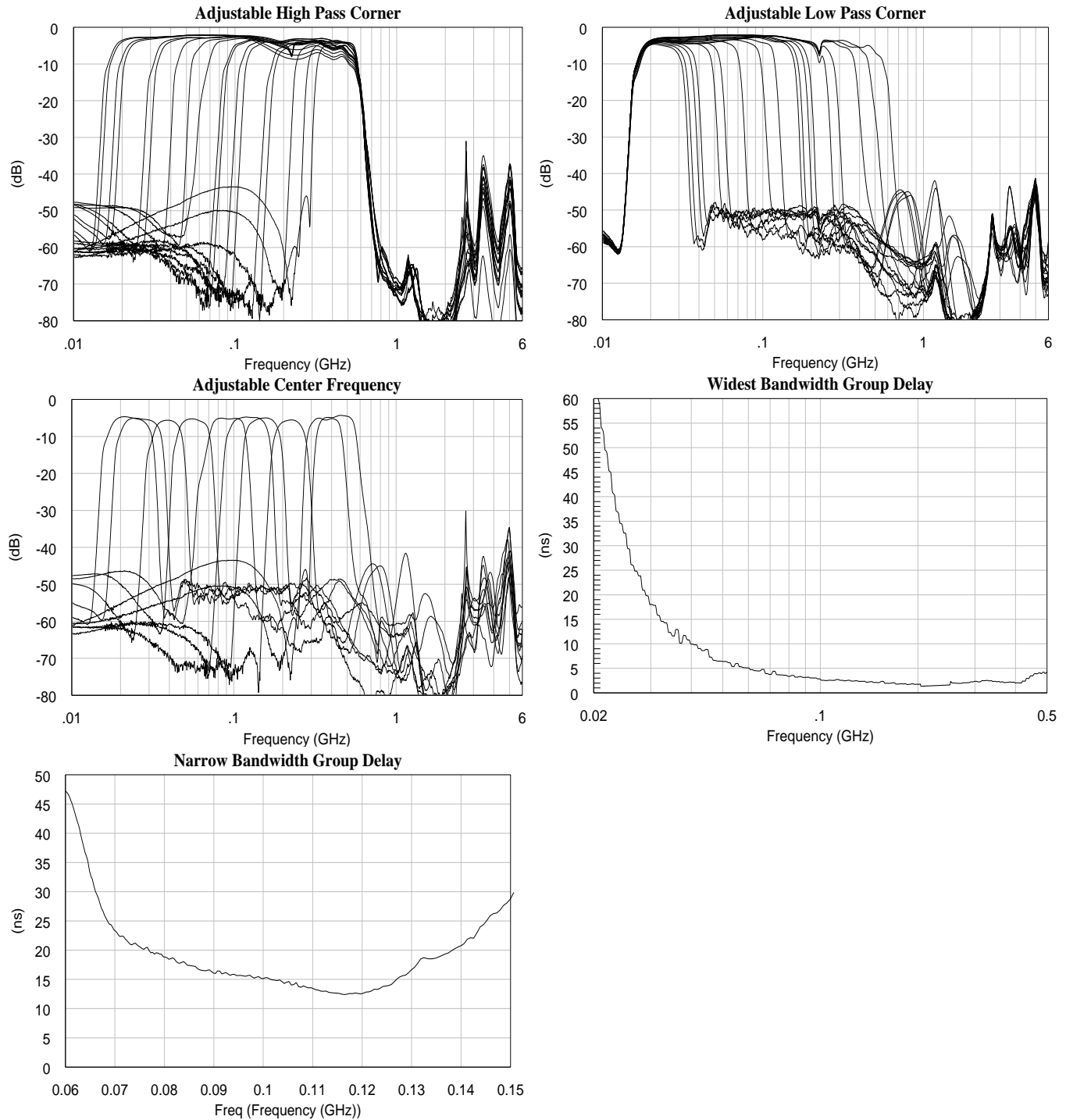
VH5	VH4	VH3	VH2	VH1	Typical Cutoff
H	L	L	L	L	19
H	L	L	L	H	19
H	L	L	H	L	20
H	L	L	H	H	20
H	L	H	L	L	23
H	L	H	L	H	23
H	L	H	H	L	24
H	L	H	H	H	25
H	H	L	L	L	35
H	H	L	L	H	36
H	H	L	H	L	38
H	H	L	H	H	39
H	H	H	L	L	50
H	H	H	L	H	53
H	H	H	H	L	64
H	H	H	H	H	76
L	L	L	L	L	100
L	L	L	L	H	100
L	L	L	H	L	103
L	L	L	H	H	105
L	L	H	L	L	121
L	L	H	L	H	124
L	L	H	H	L	131
L	L	H	H	H	136
L	H	L	L	L	193
L	H	L	L	H	196
L	H	L	H	L	209
L	H	L	H	H	215
L	H	H	L	L	260
L	H	H	L	H	272
L	H	H	H	L	316
L	H	H	H	H	355

AM3155 – Filter Bank

Digitally Tunable 20 to 550 MHz Bandpass

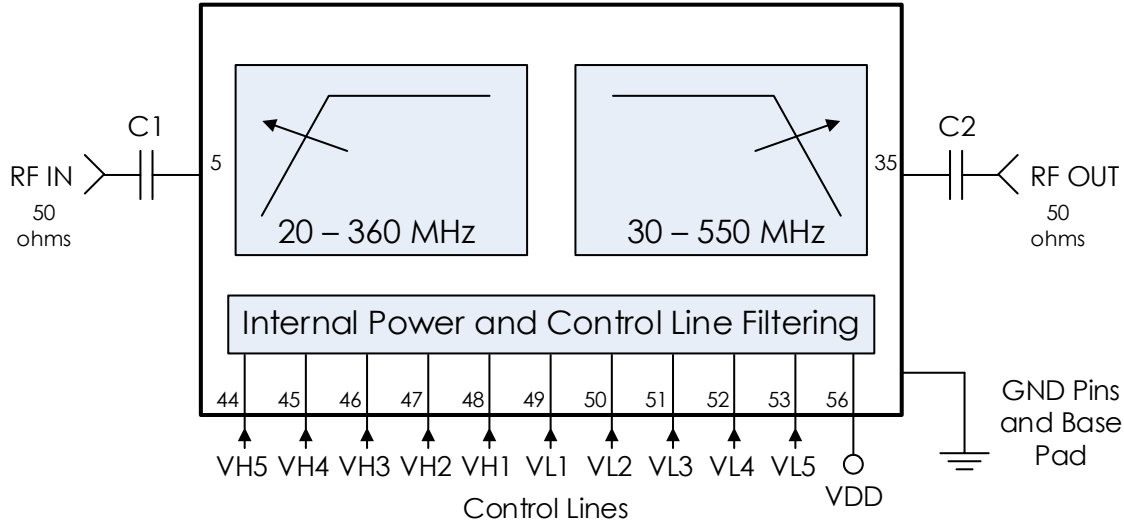
Typical Performance

(Only some states shown for simplicity, VDD = 5V)



To obtain price, delivery, or to place an order contact MMICsales@mrcy.com
 Atlanta Micro Inc., 3720 Davinci Ct, Suite 400, Peachtree Corners, GA 30092 • Phone: (470) 253-7640 • www.atlantamicro.com

Typical Application



Recommended Component List (or equivalent):

Part	Value	Part Number	Manufacturer
C1, C2	0.1 μ F	0201BB104KW160	Passives Plus

Notes:

1. DC blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance.
2. VDD and control lines filtered internally providing high frequency isolation.
3. RC time constant is \sim 20ns for control lines.

Related Parts

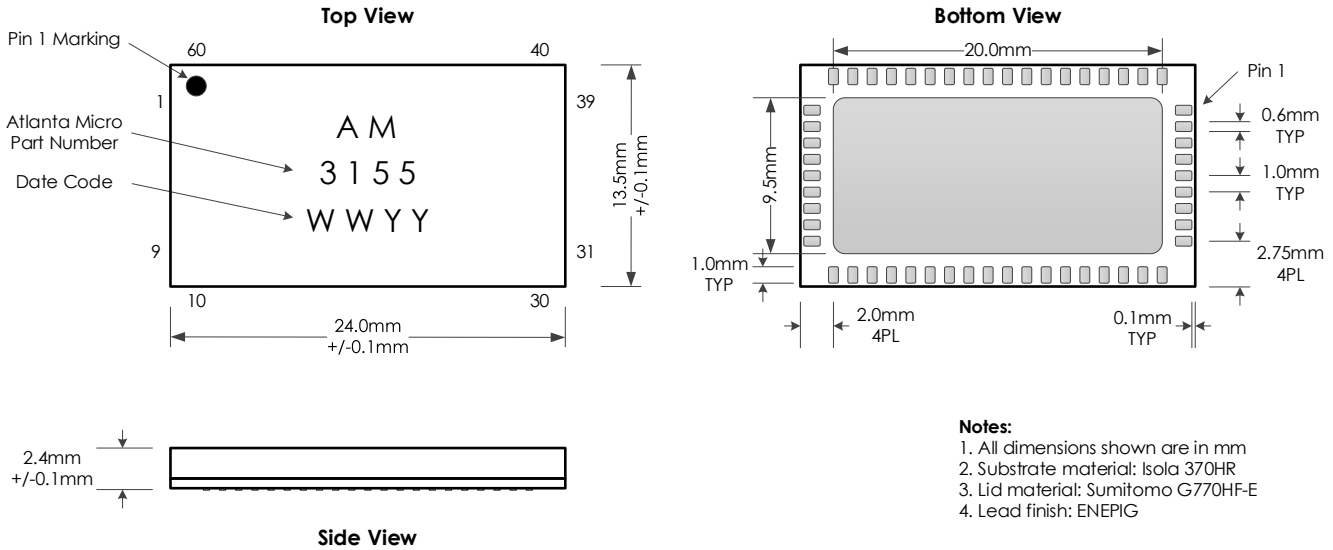
Part Number	Description
AM3060	320 MHz to 6.5 GHz Digitally Tunable Bandpass Filter
AM3090	100 MHz to 450 MHz Digitally Tunable Bandpass Filter
AM3150	30 MHz to 550 MHz Digitally Tunable Lowpass Filter
AM3151	20 MHz to 320 MHz Digitally Tunable Highpass Filter
AM3152	400 MHz to 8 GHz Digitally Tunable Bandpass Filter
AM3153	6 GHz to 26.5 GHz Digitally Tunable Bandpass Filter

AM3155 – Filter Bank

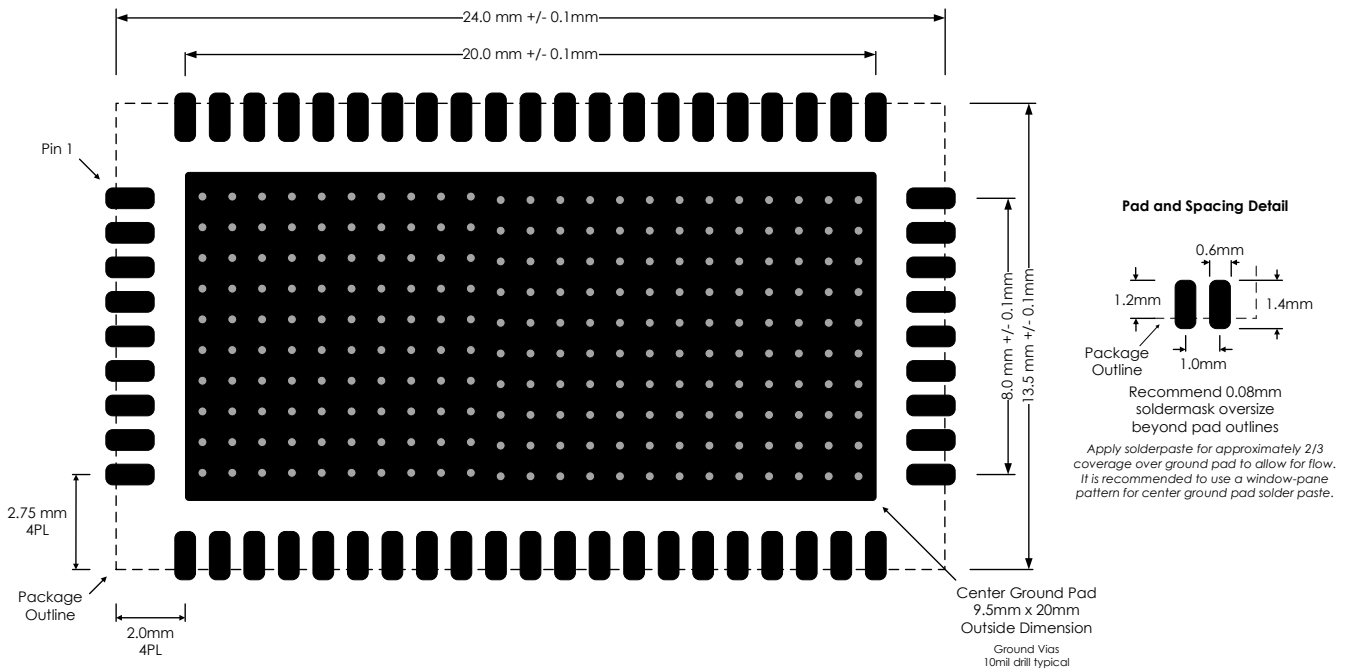
Digitally Tunable 20 to 550 MHz Bandpass

Package Details

Package Drawing



Recommended Footprint



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).

Conflict Materials: Atlanta Micro does not knowingly use materials that are sourced from the Democratic Republic of Congo (DRC) or any other known conflict regions. Atlanta Micro'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.

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.