

AM3136 – Analog Tunable Filter

Dual 8.0 to 13.5 GHz and 12.0 to 19.0 GHz Bandpass

Description

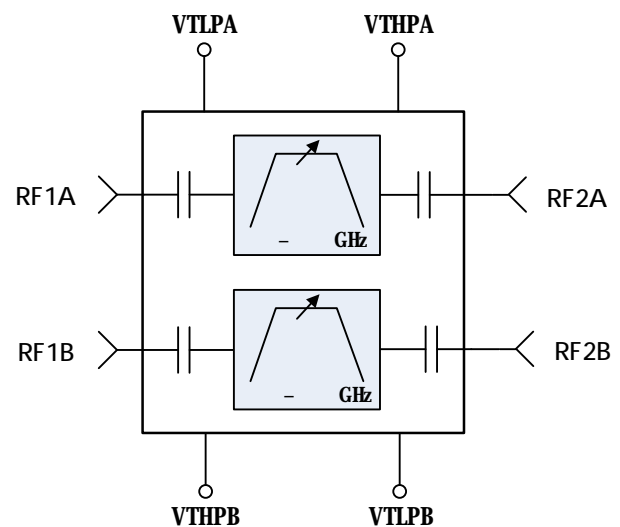
AM3136 is a dual MMIC analog voltage-tunable bandpass filter covering the 8.0 to 13.5 GHz and 12.0 to 19.0 GHz frequency ranges. Separate low-pass and high-pass tuning voltages provide independent control of both center frequency and bandwidth. AM3136 is packaged in a 5mm QFN package and operates over the -40 C to +85 C temperature range.



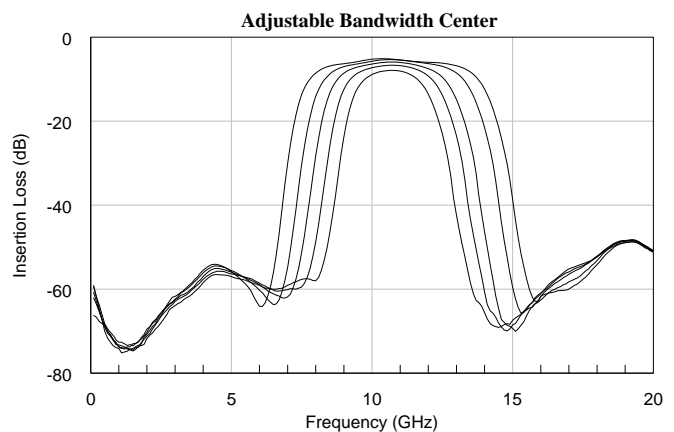
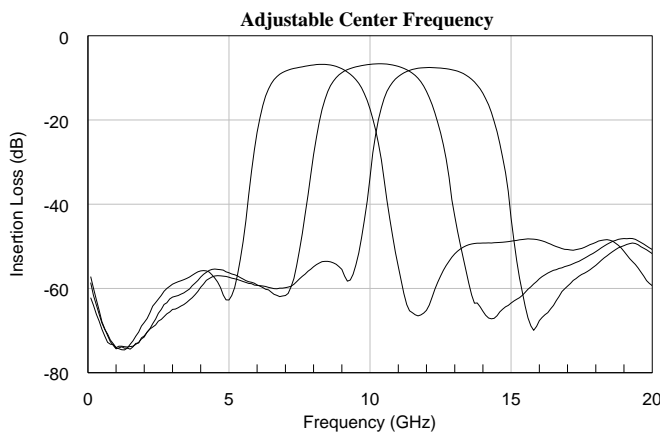
Features

- Analog Tuning
- Independent LP and HP Control
- 7.0 dB Typical Insertion Loss
- +29 dBm Typical IIP3
- +65 dBm Typical IIP2
- +1V to +10V Tuning Voltage
- 5mm QFN Package
- -40C to +85C Operation

Functional Diagram



Characteristic Performance



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Revision History

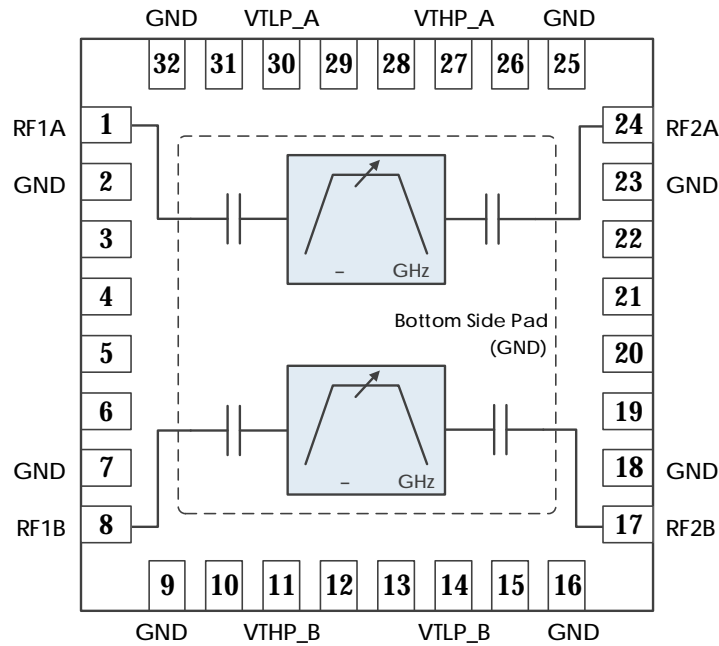
| Date | Revision Number | Notes |
|----------------|-----------------|---|
| March 15, 2018 | 1 | Initial Release |
| March 2, 2020 | 2 | Updated for Latest Datasheet Format. More Comprehensive Data Added. |
| May 15, 2020 | 3 | Package information moved to main product page |

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Pin Layout and Definitions

Note: All Non-Named Pins are NC. (Not Connected)



| Pin Number | Pin Name | Pin Function |
|------------|----------|--|
| 1 | RF1A | RF1A – 50 Ohms – AC Coupled, No Blocking Cap Needed |
| 2 | GND | Ground – Common |
| 3-6 | NC | Not Connected, Recommended to Be Connected to Ground |
| 7 | GND | Ground – Common |
| 8 | RF1B | RF1B – 50 Ohms – AC Coupled, No Blocking Cap Needed |
| 9 | GND | Ground – Common |
| 10 | NC | Not Connected, Recommended to Be Connected to Ground |
| 11 | VTHP_B | High Pass DC Control Voltage, Channel B |
| 12, 13 | NC | Not Connected, Recommended to Be Connected to Ground |
| 14 | VTLP_B | Low Pass DC Control Voltage, Channel B |
| 15 | NC | Not Connected, Recommended to Be Connected to Ground |
| 16 | GND | Ground – Common |
| 17 | RF2B | RF2B – 50 Ohms – AC Coupled, No Blocking Cap Needed |
| 18 | GND | Ground – Common |
| 19 - 22 | NC | Not Connected, Recommended to Be Connected to Ground |
| 23 | GND | Ground – Common |
| 24 | RF2A | RF2A – 50 Ohms – AC Coupled, No Blocking Cap Needed |
| 25 | GND | Ground – Common |
| 26 | NC | Not Connected, Recommended to Be Connected to Ground |
| 27 | VTHP_A | High Pass DC Control Voltage, Channel A |
| 28, 29 | NC | Not Connected, Recommended to Be Connected to Ground |
| 30 | VTLP_A | Low Pass DC Control Voltage, Channel A |
| 31 | NC | Not Connected, Recommended to Be Connected to Ground |
| 32 | GND | Ground - Common |
| Bottom Pad | GND | Ground – Common |

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Specifications

Absolute Maximum Ratings

| | Minimum | Maximum |
|--------------------------------|---------|---------|
| 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 |
|--------------------------------|---------|---------|---------|
| DC Control Voltage | +1.0 V | | +10.0 V |
| Operating Case Temperature | -40 C | | +85 C |
| Operating Junction Temperature | -40 C | | +125 C |

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DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

| Parameter | Testing Conditions | Minimum | Typical | Maximum |
|--------------------|--------------------|---------|---------|---------|
| DC Control Voltage | | +1.0 V | | +10.0 V |
| DC Supply Current | | | < 1 mA | |

RF Performance

(T = 25 °C unless otherwise specified)

| Parameter | Testing Conditions | Minimum | Typical | Maximum |
|-----------------|--------------------|----------|---------|----------|
| Frequency Range | Band A | 8.0 GHz | | 13.5 GHz |
| | Band B | 12.0 GHz | | 19.0 GHz |
| Insertion Loss | Band A | | 7.0 dB | |
| | Band B | | 8.9 dB | |
| Return Loss | | | 14 dB | |
| Input IP3 | Band A | | +28 dBm | |
| | Band B | | +29 dBm | |
| Input IP2 | Band A | | +65 dBm | |
| | Band B | | +57 dBm | |
| Input P1dB | | | +25 dBm | |

Timing Characteristics

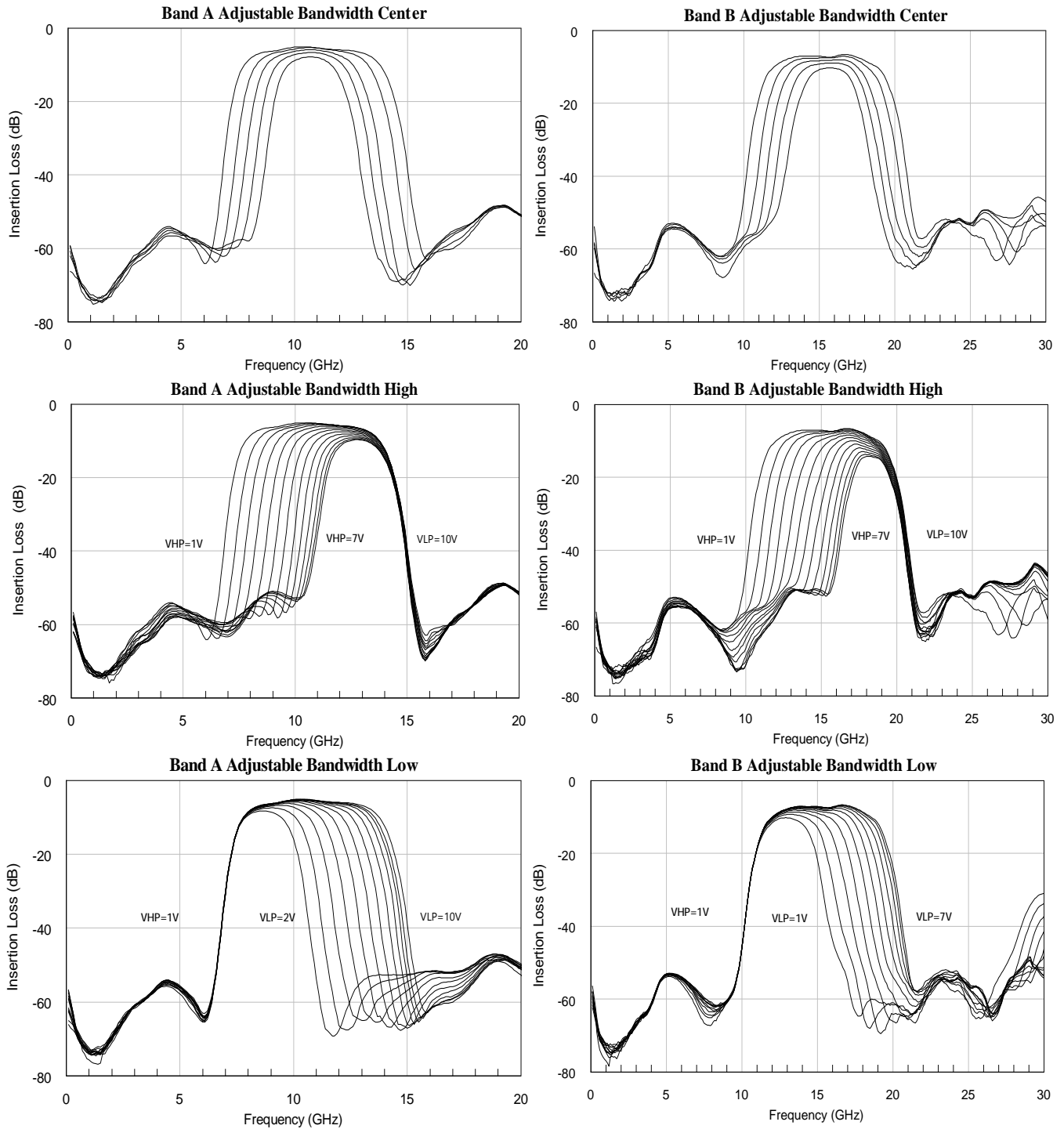
| Parameter | Minimum | Typical | Maximum |
|----------------------------|---------|---------|---------------|
| Tune Voltage Settling Time | | | 2 μ s / V |

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Typical Performance



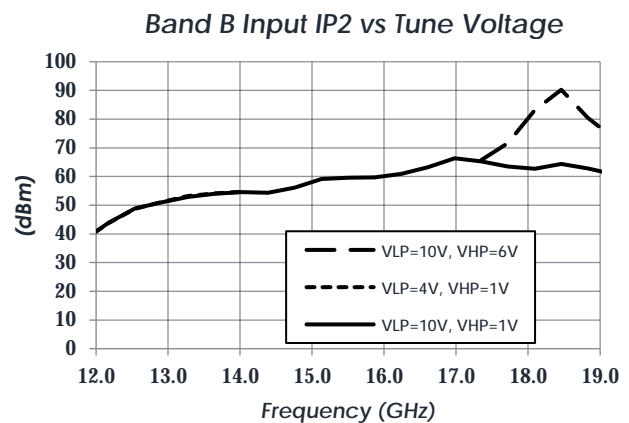
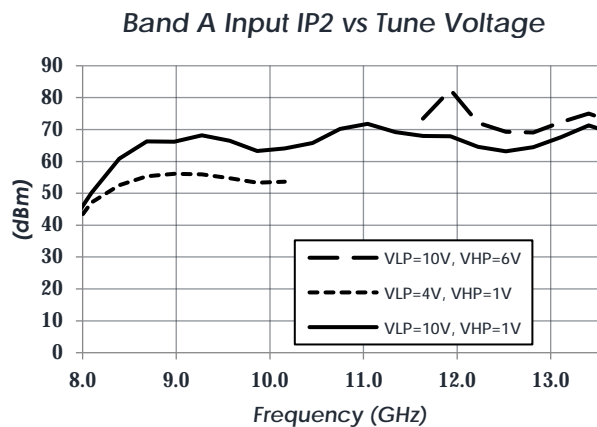
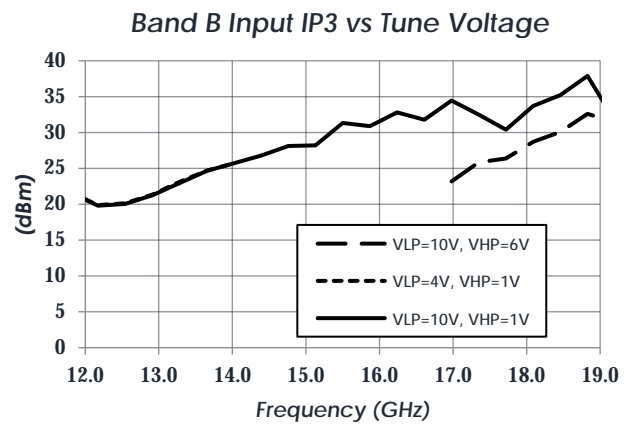
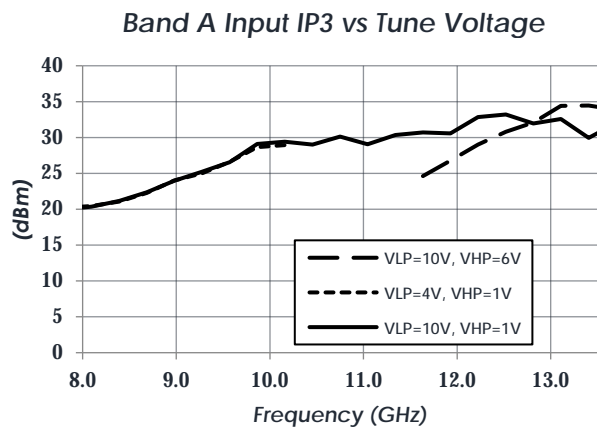
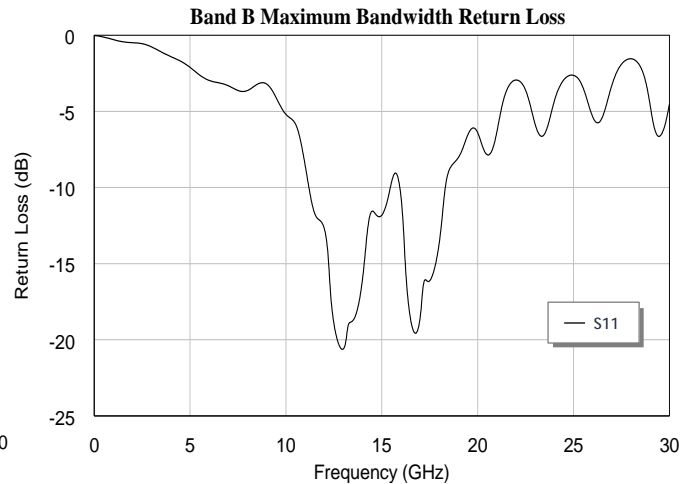
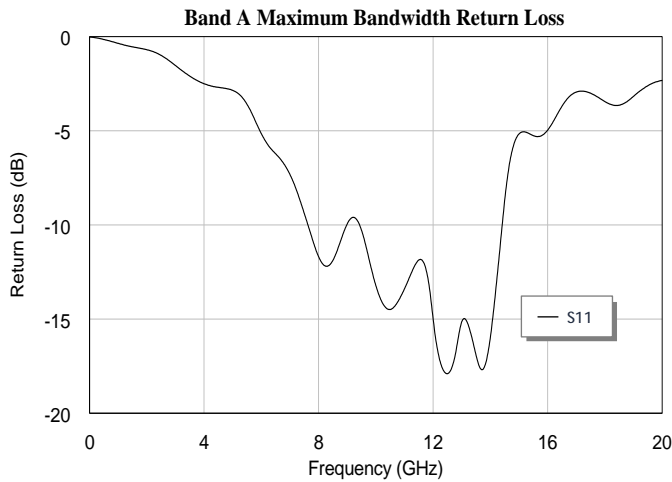
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Typical Performance (continued)



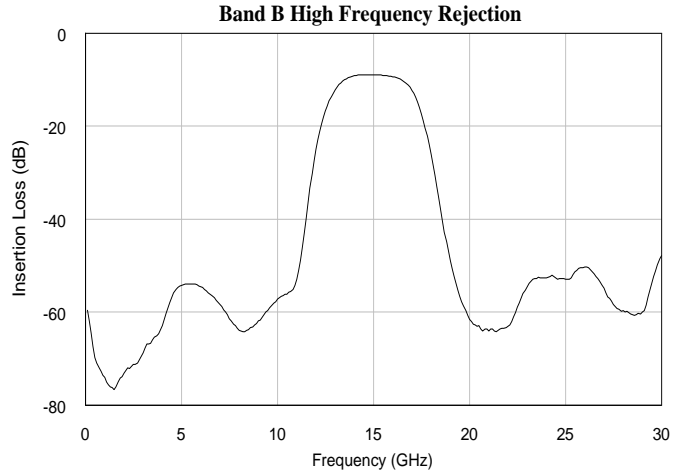
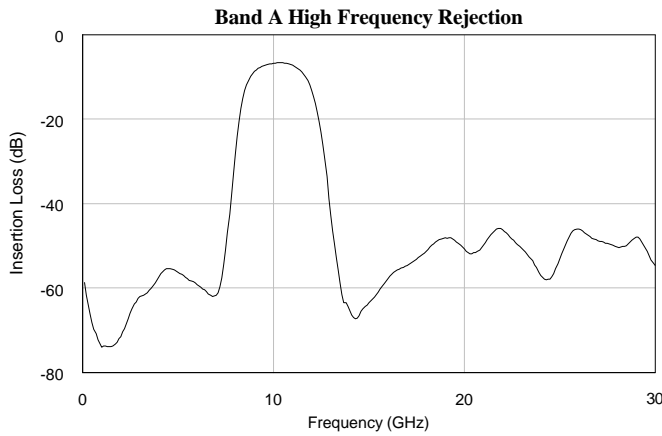
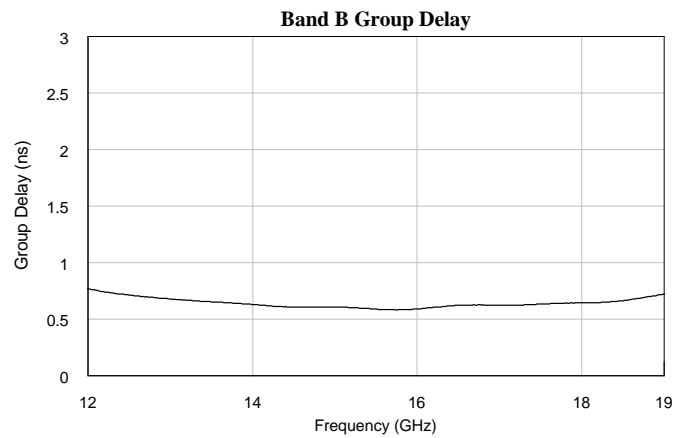
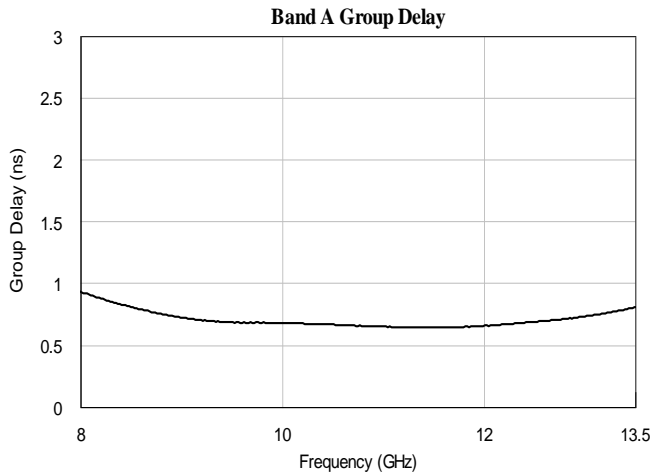
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Typical Performance (continued)

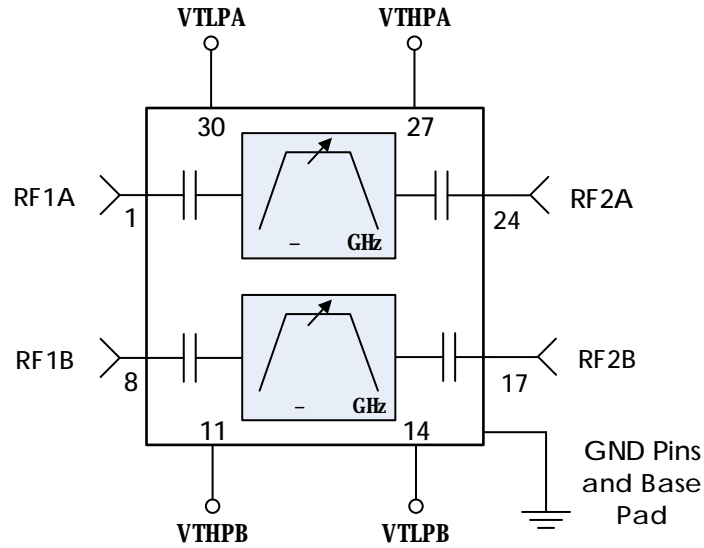


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Typical Application

Independent Low Pass and High Pass Control



Notes:

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

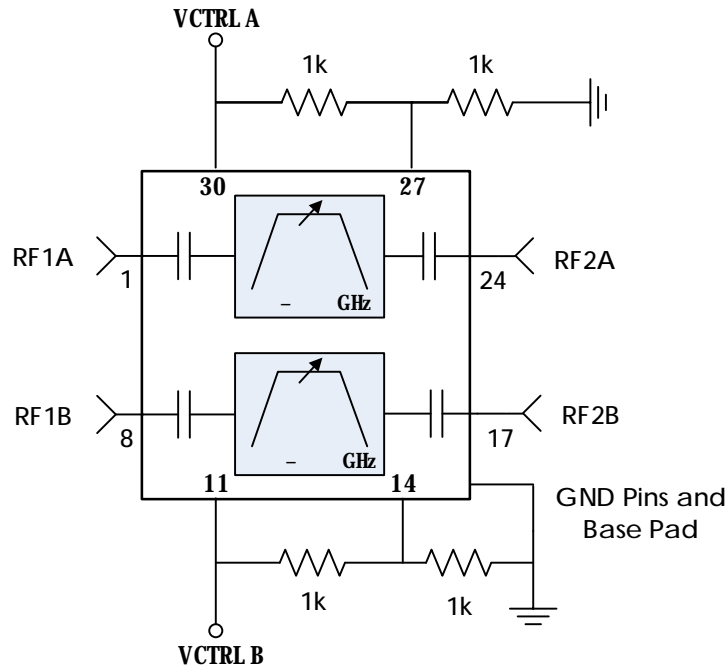
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Typical Application

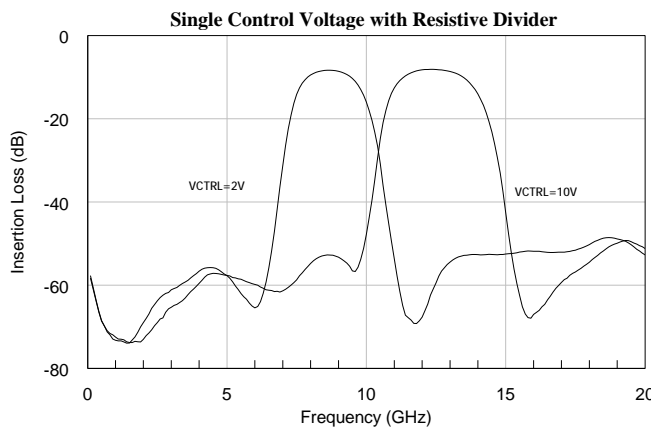
Single Control Voltage



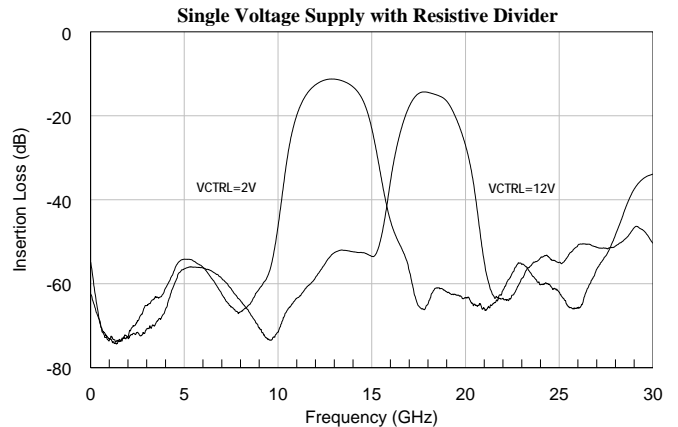
Notes:

- 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.
- The resistive dividers between pins 11 and 14 and 27 and 30 exist to normalize percentage bandwidth over the full 1-10 V range. Tying both pins to the same control voltage without the divider is possible, but the bandwidth will be narrower with higher insertion loss over the tuning range.

8.0 to 13.5 GHz Single Control Voltage:



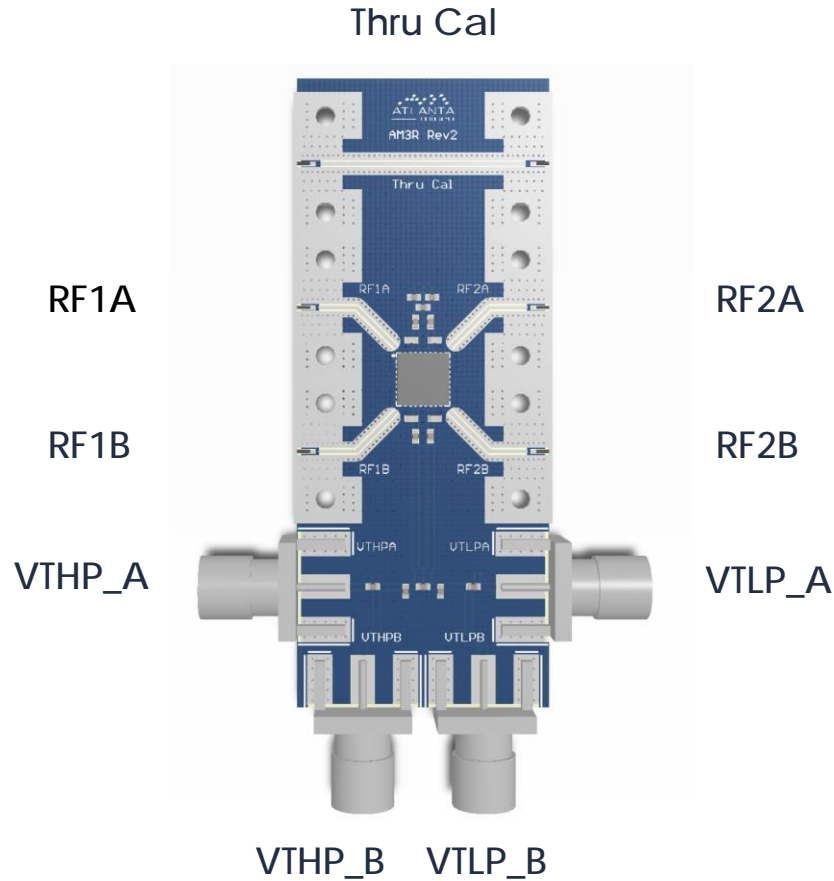
12.0 to 19.0 GHz Single Control Voltage:



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Evaluation PC Board



Related Parts

| Part Number | Description | | | |
|-------------|-------------|----|----------|--|
| AM3063 | 6.0 GHz | to | 18.0 GHz | Digitally Tunable Bandpass Filter Bank |
| AM3064 | 1.0 GHz | to | 6.5 GHz | Digitally Tunable Bandpass Filter Bank |
| AM3066 | 12.0 GHz | to | 26.5 GHz | Digitally Tunable Bandpass Filter Bank |
| AM3134 | 2.0 GHz | to | 4.5 GHz | Analog Tunable Bandpass Filter Bank |
| AM3135 | 3.5 GHz | to | 9.0 GHz | Analog Tunable Bandpass Filter Bank |
| AM3089 | 2.0 GHz | to | 18.0 GHz | Analog Tunable Bandpass 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

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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) |
| 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) |

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