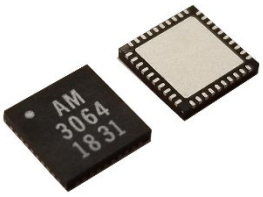
# AM3064 – Filter Bank

## Digitally Tunable 1.0 to 6.5 GHz Bandpass

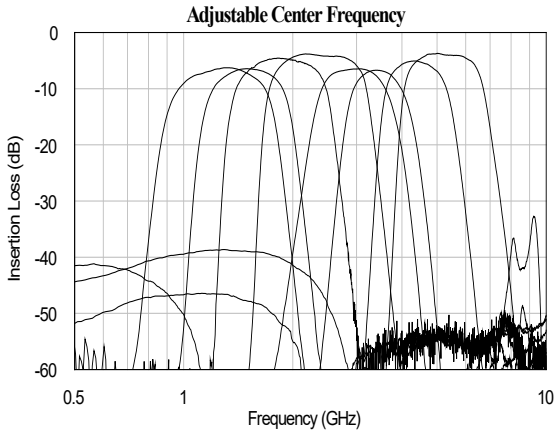



**AM3064 is a miniature filter IC containing digitally tunable bandpass filters covering the 1.0 GHz to 6.5 GHz frequency range.** Separate low-pass and high-pass control lines provide independent control of both center frequency and bandwidth. Power and Control lines are internally filtered using Mercury's AM35 filter chip. AM3064 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.

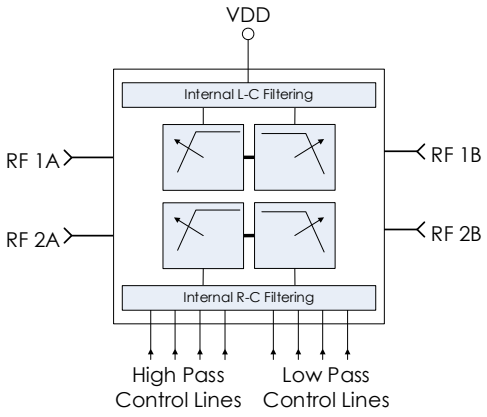
### FEATURES

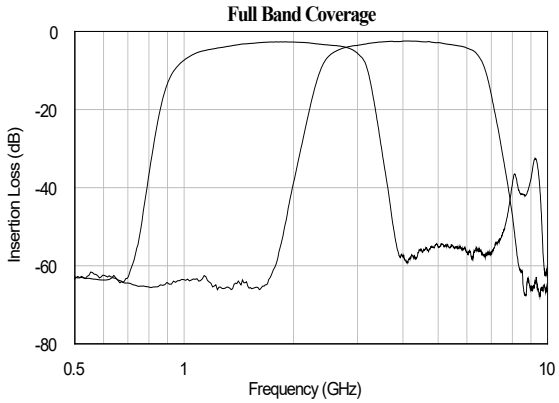
- Digitally Tunable Bandpass Filters
- Independent LP and HP control
- 3.0 dB Insertion Loss
- +40 dBm Input IP3
- +3.3V to +5.0V Supply
- Integrated Power and Control Line Filtering (See AM35 Datasheet) 4-bit Control
- 6mm QFN Package
- -40C to +85C Operation

### CHARACTERISTIC PERFORMANCE




### FUNCTIONAL DIAGRAM



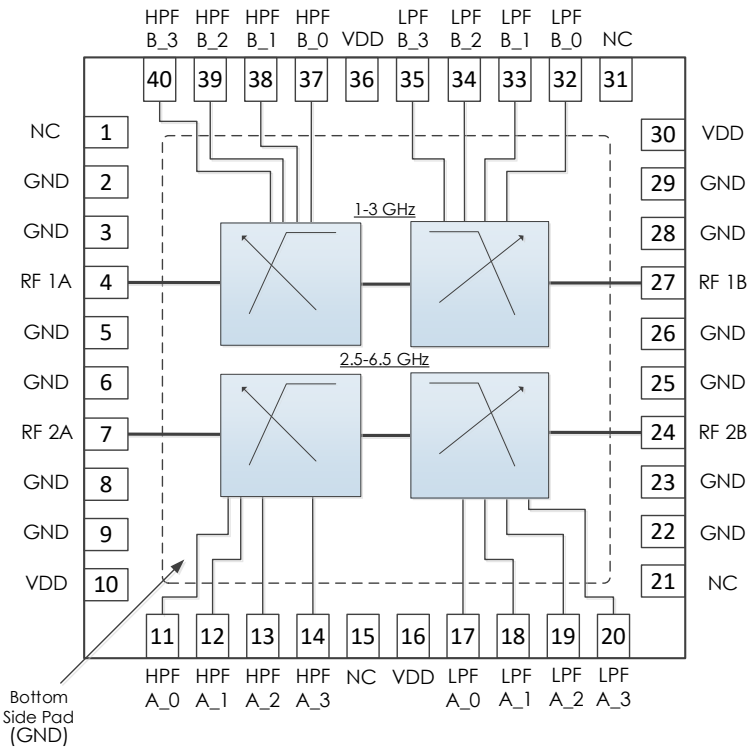
## CONTENTS



## REVISION HISTORY

| Date | Revision | Notes |
|---|---|---|
| August 17, 2018 | 1 | Initial Release. |
| July 17, 2019 | 2 | Various Notes Added, Component Footprint Updated, Various Performance Details Added. |
| July 28, 2020 | 3 | Moved Package Information to Main Product Details Page on Website. |
| June 26, 2024 | 4 | Changed to Mercury branding. No content changes. |

## PIN LAYOUT AND DEFINITIONS




| Pin | Name | Function |
|---|---|---|
| 1 | NC | Do Not Connect |
| 2,3 | GND | Ground – Common |
| 4 | RF1A | 1.0-3.0 GHz RF Port 1 – 50 ohms – DC coupled – DC blocking capacitor required* |
| 5,6 | GND | Ground – Common |
| 7 | RF2A | 2.5-6.5 GHz RF Port 1 – 50 ohms – DC coupled – DC blocking capacitor required* |
| 8,9 | GND | Ground – Common |
| 10 | VDD | DC Supply |
| 11 | HPFA_0 | 2.5-6.5 GHz HPF control bit 0 |
| 12 | HPFA_1 | 2.5-6.5 GHz HPF control bit 1 |
| 13 | HPFA_2 | 2.5-6.5 GHz HPF control bit 2 |
| 14 | HPFA_3 | 2.5-6.5 GHz HPF control bit 3 |
| 15 | NC | Do Not Connect |
| 16 | VDD | DC Supply |
| 17 | LPFA_0 | Ground – Common |
| 18 | LPFA_1 | 2.5-6.5 GHz RF Port 2 – 50 ohms – DC coupled – DC blocking capacitor required* |
| 19 | LPFA_2 | Ground – Common |
| 20 | LPFA_3 | 1.0-3.0 GHz RF Port 2 – 50 ohms – DC coupled – DC blocking capacitor required* |
| 21 | NC | Ground - Common |
| 22,23 | GND | DC Supply |
| 24 | RF2B | Do Not Connect |
| 25,26 | GND | 1.0-3.0 GHz LPF control bit 0 |
| 27 | RF1B | 1.0-3.0 GHz LPF control bit 1 |
| 28,29 | GND | 1.0-3.0 GHz LPF control bit 2 |
| 30 | VDD | 1.0-3.0 GHz LPF control bit 3 |
| 31 | NC | DC Supply |
| 32 | LPFB_0 | 1.0-3.0 GHz HPF control bit 0 |
| 33 | LPFB_1 | 1.0-3.0 GHz HPF control bit 1 |
| 34 | LPFB_2 | 1.0-3.0 GHz HPF control bit 2 |
| 35 | LPFB_3 | 1.0-3.0 GHz HPF control bit 3 |
| 36 | VDD | Ground - Common |
| 37 | HPFB_0 | Ground – Common |
| 38 | HPFB_1 | 2.5-6.5 GHz RF Port 2 – 50 ohms – DC coupled – DC blocking capacitor required* |
| 39 | HPFB_2 | Ground – Common |
| 40 | HPFB_3 | 1.0-3.0 GHz RF Port 2 – 50 ohms – DC coupled – DC blocking capacitor required* |
| Case GND | GND | Ground - Common |

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

## 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 | -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.

### Recommended Operating Conditions

| | Minimum | Typical | Maximum |
|---|---|---|---|
| Supply Voltage | +2.7 V | +5.0 V | |
| Operating Case Temperature | -40 C | | +85 C |
| Operating Junction Temperature | -40 C | | +125 C |

### Handling Information

| | Minimum | Maximum |
|---|---|---|
| Storage Temperature Range | -50 C | +125 C |
| Moisture Sensitivity Level | MSL 3 | |

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

### DC Electrical Characteristics

| Param | Testing Conditions | Min | Typical | Max |
|---|---|---|---|---|
| DC Supply Voltage | | +2.7 V | +5.0 V | |
| DC Supply Current | VDD = +3.3 V | <1 mA | | 3 mA |
| | VDD = +5.0 V | <1 mA | | 5 mA |
| Power Dissipated | VDD = +3.3 V | <3.3 mW | | 10 mW |
| | VDD = +5.0 V | <5 mW | | 25 mW |
| Logic Level Low | | -0.1 V | | +0.5 V |
| Logic Level High | | +2.0 V | | +VDD V |

*Power and Control lines are internally filtered. See AM35 datasheet for performance details.

### RF Performance

| Param | Testing Conditions | Min | Typical | Max |
|---|---|---|---|---|
| Frequency Range | | 1.0 GHz | | 6.5 GHz |
| Insertion Loss | | | 3.0 dB | |
| Return Loss | | | 15.0 dB | |
| Input IP3 | | | +40 dBm | |

### Timing Characteristic

| | Minimum | Typical | Maximum |
|---|---|---|---|
| Switching Speed | | 1 µs | |

### State Tables

| High Pass Typical Cutoff Frequencies (GHz) | | | | Band 1 | Band 2 |
|---|---|---|---|---|---|
| B_3/A_3 | B_2/Z_2 | B_1/A_1 | B_0/A0A | | |
| Low | Low | Low | Low | 1.00 | 2.50 |
| Low | Low | Low | High | 1.01 | 2.53 |
| Low | Low | High | Low | 1.02 | 2.56 |
| Low | Low | High | High | 1.03 | 2.59 |
| Low | High | Low | Low | 1.06 | 2.61 |
| Low | High | Low | High | 1.08 | 2.64 |
| Low | High | High | Low | 1.10 | 2.70 |
| Low | High | High | High | 1.12 | 2.74 |
| High | Low | Low | Low | 1.14 | 2.85 |
| High | Low | Low | High | 1.16 | 2.93 |
| High | Low | High | Low | 1.20 | 3.06 |
| High | Low | High | High | 1.25 | 3.20 |
| High | High | Low | Low | 1.37 | 3.26 |
| High | High | Low | High | 1.47 | 3.47 |
| High | High | High | Low | 1.60 | 3.84 |
| High | High | High | High | 1.82 | 4.36 |

### State Tables

| Low Pass Typical Cutoff Frequencies (GHz) | | | | Band 1 | Band 2 |
|---|---|---|---|---|---|
| B_3/A_3 | B_2/Z_2 | B_1/A_1 | B_0/A0A | | |
| Low | Low | Low | Low | 1.00 | 2.50 |
| Low | Low | Low | High | 1.01 | 2.53 |
| Low | Low | High | Low | 1.02 | 2.56 |
| Low | Low | High | High | 1.03 | 2.59 |
| Low | High | Low | Low | 1.06 | 2.61 |
| Low | High | Low | High | 1.08 | 2.64 |
| Low | High | High | Low | 1.10 | 2.70 |
| Low | High | High | High | 1.12 | 2.74 |
| High | Low | Low | Low | 1.14 | 2.85 |
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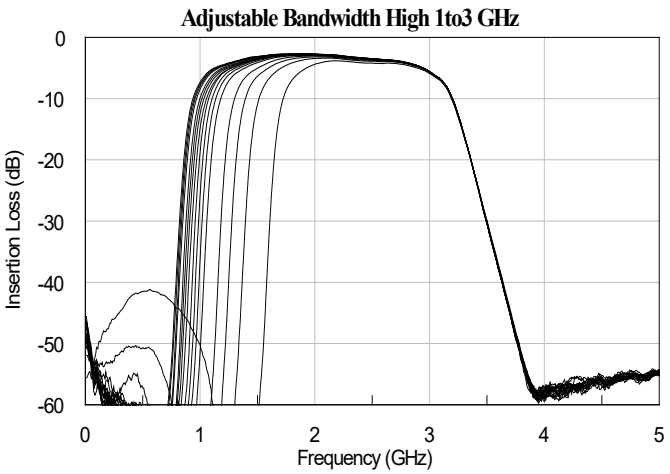
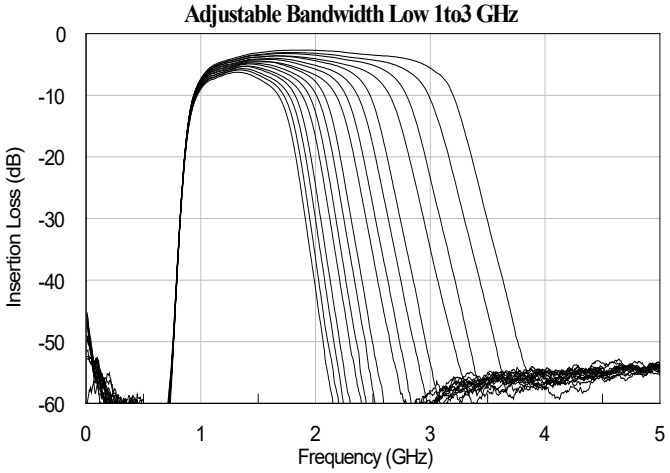
| High | High | Low | High | 1.47 | 3.47 |
| High | High | High | Low | 1.60 | 3.84 |
| High | High | High | High | 1.82 | 4.36 |

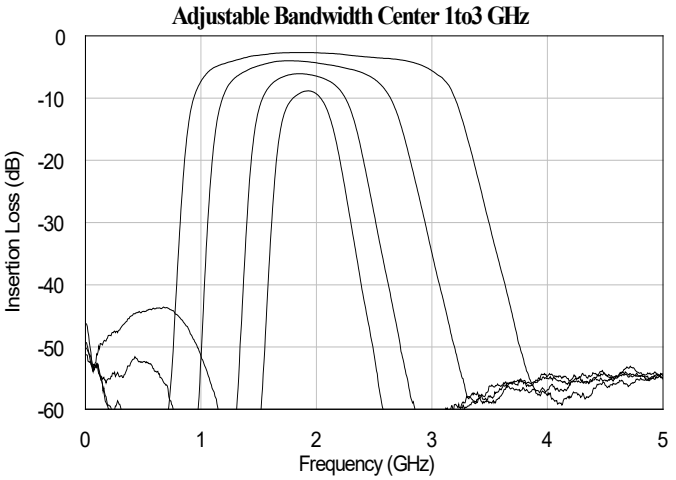
## TYPICAL PERFORMANCE

*Note: Only some states shown for simplicity

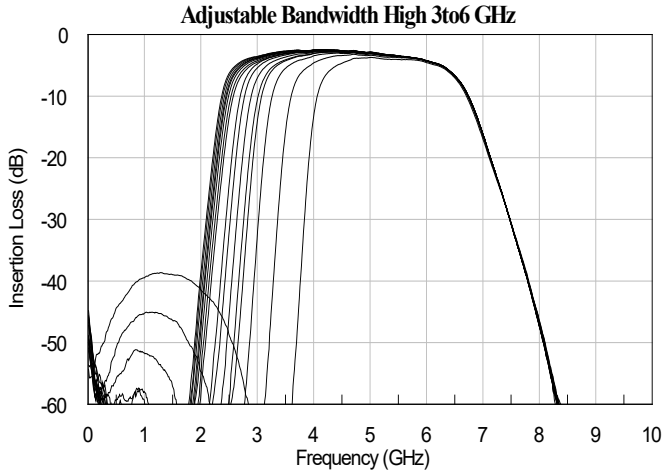
1.0 – 3.0 GHz

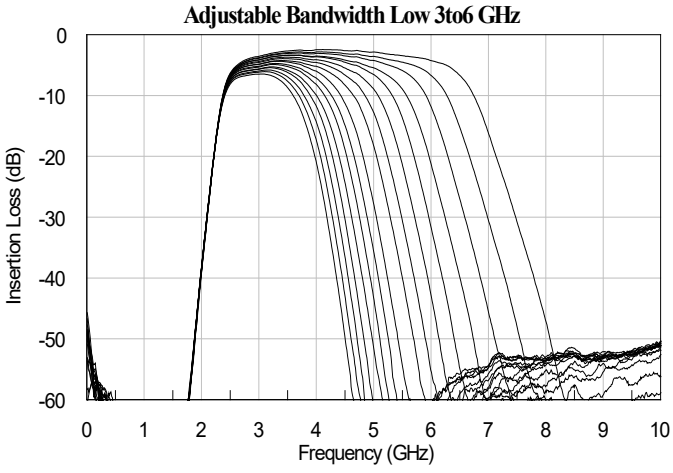


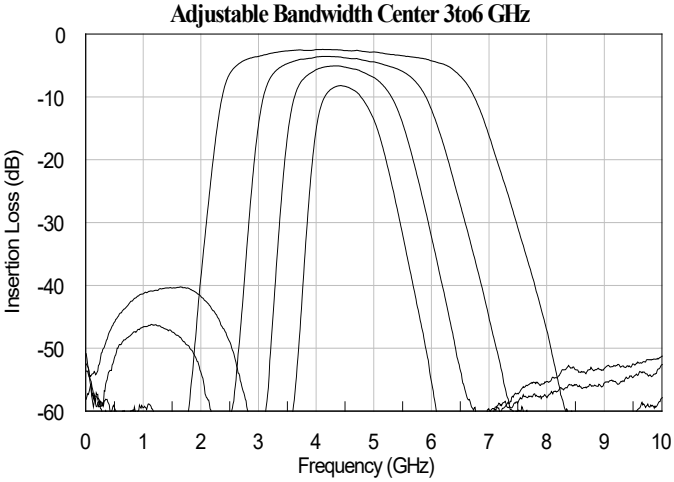




2.5 – 6.5 GHz

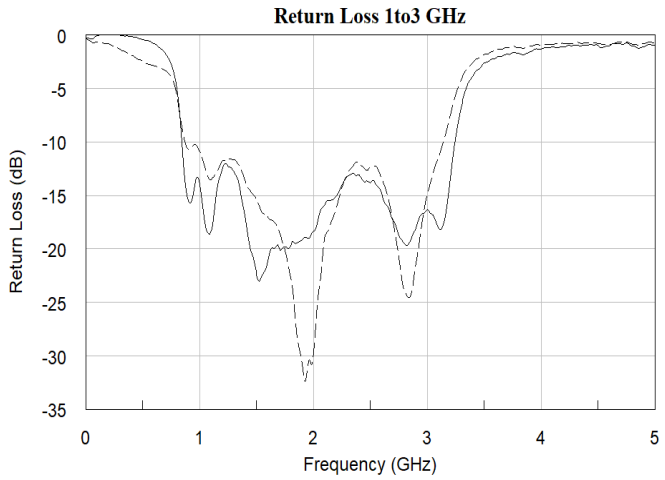


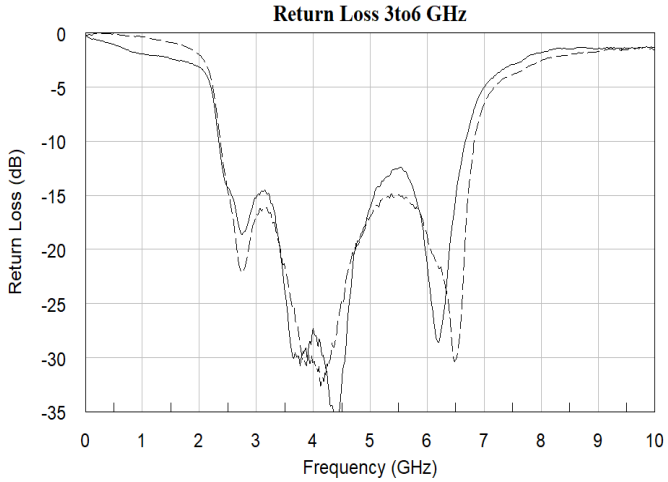



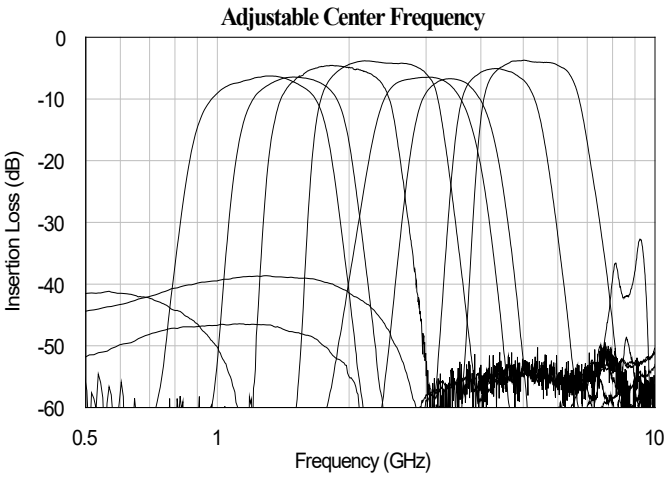



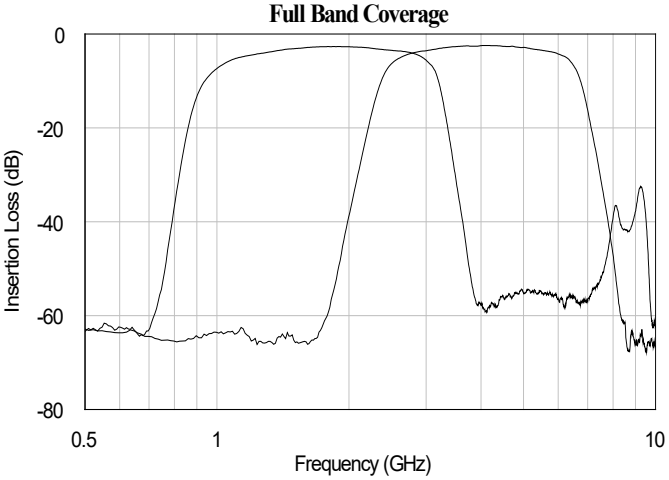
## TYPICAL PERFORMANCE (CONTINUED)

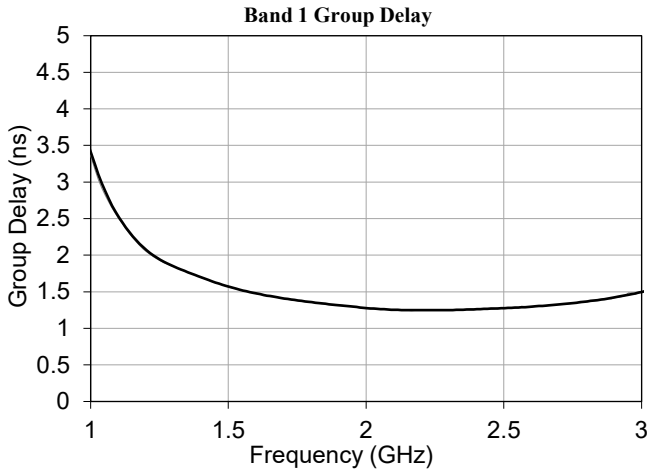
*Note: Only some states shown for simplicity

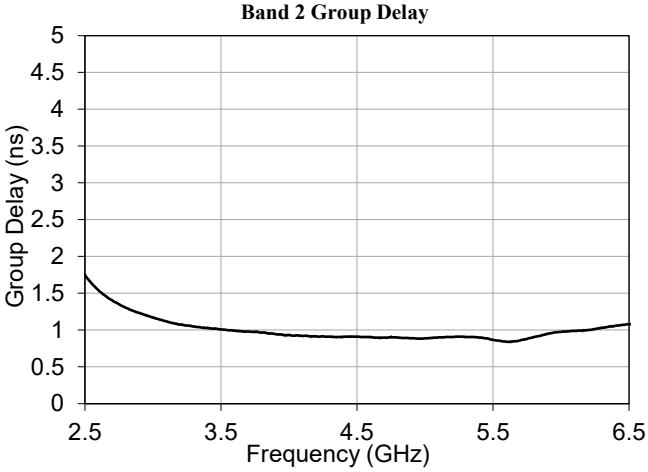


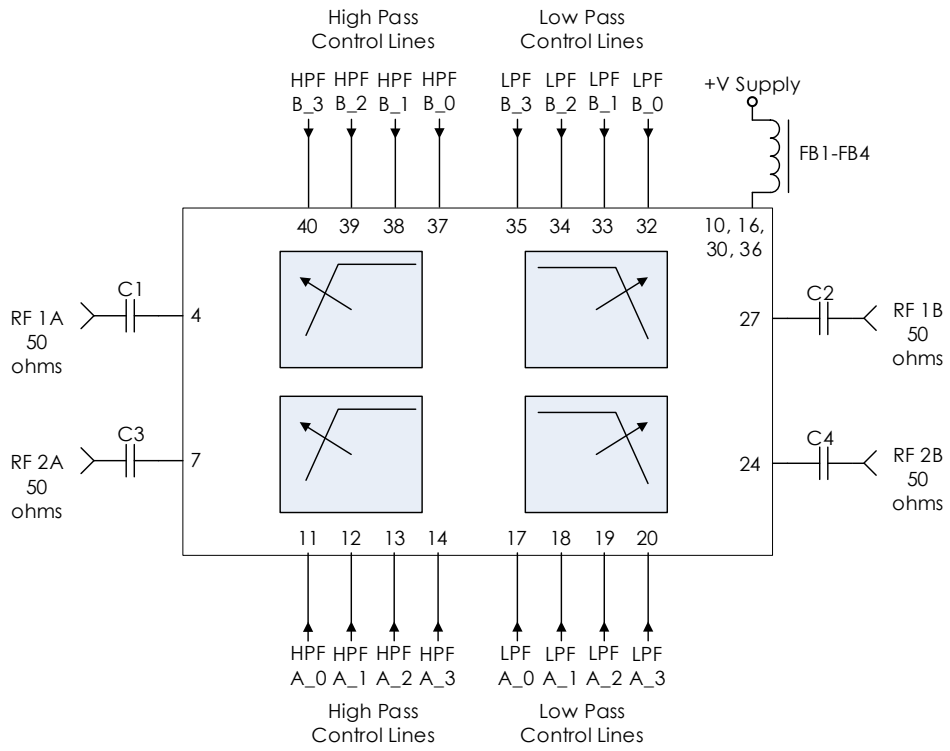



## TYPICAL APPLICATION



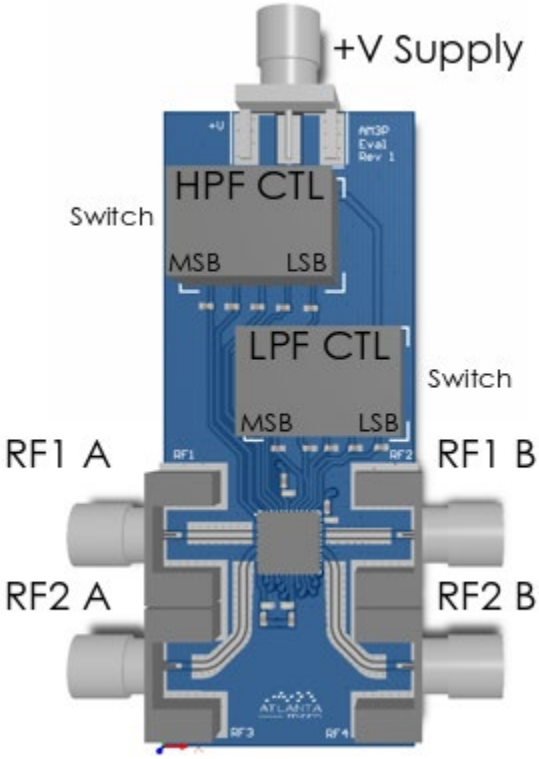

**Recommended Component List (or Equivalent)**

| Part | Value | Part Number | Manufacturer |
|---|---|---|---|
| C1 – C4 | 0.1 uF | 0201BB104KW160 | Passives Plus |
| FB1 – FB4 | - | MMZ1005A222E | TDK |

**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 up to 50+ GHz.
    a. No additional RC filtering required on control lines.
    b. Ferrite bead recommended on VDD lines for better low frequency performance.
    c. See AM35 datasheet for performance details

## EVALUATION PC BOARD




## RELATED PARTS

| Part Number | | Description |
|---|---|---|
| AM3060 | .32 GHz to 6.5 GHz | Switched Digitally Tunable BPF Bank |
| AM3063 | 6 GHz to 18 GHz | Digitally Tunable Bandpass Filter Bank |
| AM3065 | 6 GHz to 12 GHz | Digitally Tunable Bandpass Filter |
| AM3066 | 12 GHz to 26.5 GHz | Digitally Tunable Bandpass Filter Bank |
| | | |
| AM3089 | 2 GHz to 18 GHz | Switched Analog Tunable BPF Bank |
| AM3134 | 2 GHz to 4.5 GHz | Analog Tunable Bandpass Filter Bank |
| AM3135 | 3.5 GHz to 9 GHz | Analog Tunable Bandpass Filter Bank |
| AM3136 | 8 GHz to 19 GHz | Analog Tunable Bandpass Filter Bank |
| | | |
| AM35 | 100 MHz to 40 GHz | Power and Control EMI Filter Bank |

## 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 EU-RoHS 6 and 10. All products supplied by Mercury 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 (CrVl) | <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-ethylheyl) 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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**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.**

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