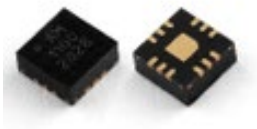
# AM1102 – Amplifier

## DC to 22 GHz Gain Block

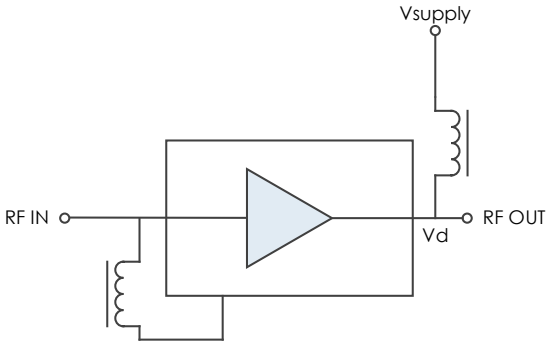


**AM1102 is a wideband, cascadable amplifier servicing the DC to 22 GHz frequency range.** The device exhibits moderate gain and excellent noise figure over a wide frequency range which makes the AM1102 a useful component for many broadband applications. Packaged in a 3mm QFN with internal 50Ω matching, and drawing less than 160mW of power, the AM1102 is suited for low SWaP applications.

### FEATURES

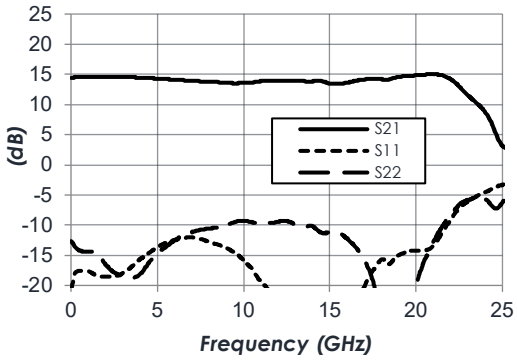
- 14 dB Gain
- 2.3 dB Noise Figure
- +26 dBm OIP3
- +15 dBm P1dB
- +3.3V Operation
- 158 mW Power Consumption
- 3mm QFN
- -40C to +85C Operation

### FUNCTIONAL DIAGRAM

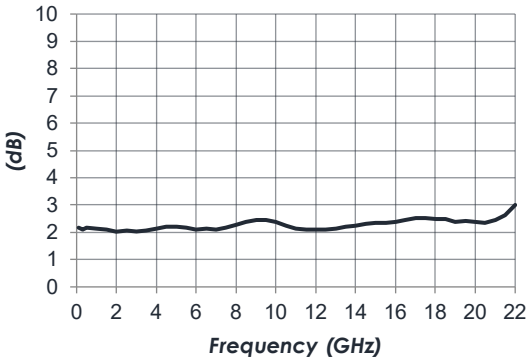



### CHARACTERISTIC PERFORMANCE

*Gain and Return Loss at +25C*




*Noise Figure at +25C*



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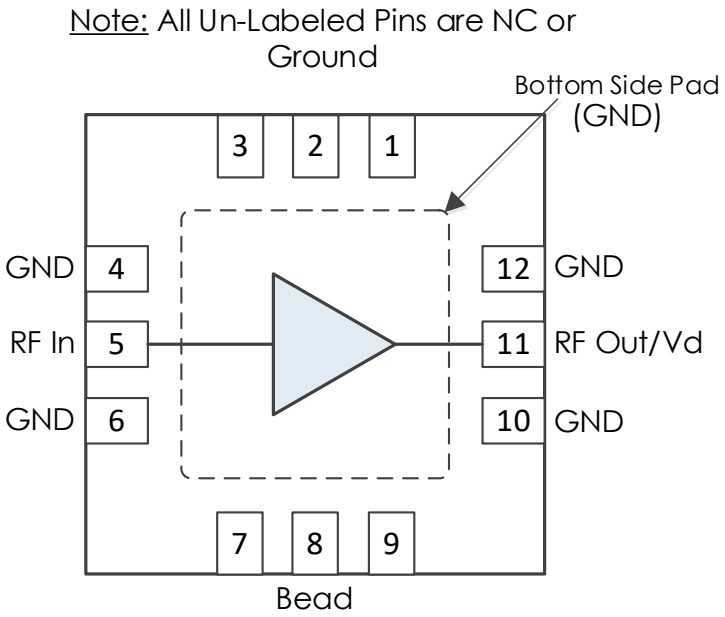
## REVISION HISTORY

| Date | Revision | Notes |
|---|---|---|
| June 12, 2020 | 1 | Initial Release |
| February 8, 2021 | 2 | Added Picture and Current Distribution Graph |
| July 12, 2021 | 3 | Changed Location of Pin 1 Indicator and Added Thermal Resistance |
| December 6, 2023 | 3.1 | Added notes on bias tee |
| January 30, 2024 | 4 | Updated Thermal Information |
| June 11, 2024 | 5 | Changed to Mercury branding. No content changes. |

## PIN LAYOUT AND DEFINITIONS




| Pin | Name | Function |
|---|---|---|
| 1-3 | NC | No Connect |
| 4 | GND | Ground – Common |
| 5 | RF In | RF Input – 50 Ohms – DC Coupled. External DC blocking capacitor required |
| 6 | GND | Ground – Common |
| 7 | NC | No Connect |
| 8 | Bead | Connect to RF In through external ferrite bead or large inductor |
| 9 | NC | No Connect |
| 10 | GND | Ground – Common |
| 11 | RF Out/Vd | RF Output and DC Power Input – 50 Ohms – DC Coupled. External DC blocking capacitor required |
| 12 | GND | Ground - Common |

## SPECIFICATIONS

### Absolute Maximum Ratings

| | Minimum | Maximum |
|---|---|---|
| Supply Voltage | -0.3 V | +3.5 V |
| RF Input Power | | +20 dBm |
| 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 | |

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

### Recommended Operating Conditions

| | Minimum | Typical | Maximum |
|---|---|---|---|
| Supply Voltage | +3.0 V | +3.3 V | +3.3 V |
| Operating Case Temperature | -40 C | | +85 C |

### Thermal Information

| | Thermal Resistance (°C / W) |
|---|---|
| Junction to Case Thermal Resistance ($\theta_{JC}$) | 178 C/W |
| Nominal Junction Temperature at +85 C ambient | +112 C |
| Junction to Case Thermal Resistance ($\theta_{JC}$) | +175 C |

## DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

| Param | Testing Conditions | Min | Typical | Max |
|---|---|---|---|---|
| DC Supply Voltage | | | +3.3 V | |
| DC Supply Current | | 40 mA | 46 mA | 55 mA |
| Power Dissipated | | | 158 mW | |

## RF Performance

(T = 25 °C unless otherwise specified)

| Param | Testing Conditions | Min | Typical | Max |
|---|---|---|---|---|
| Frequency Range | | DC | | 22 GHz |
| Gain | f = 0.1 GHz | | 14.5 dB | |
| | f = 10 GHz | | 14 dB | |
| | f = 21 GHz | | 15 dB | |
| Return Loss | f = 0.1 GHz | | -14 dB | |
| | f = 10 GHz | | -10 dB | |
| | f = 21 GHz | | -15 dB | |
| Output IP3 | f = 10 GHz | | +26 dBm | |
| Output P1dB | f = 10 GHz | | +15 dBm | |
| Noise Figure | f = 10 GHz | | 2.3 dB | |

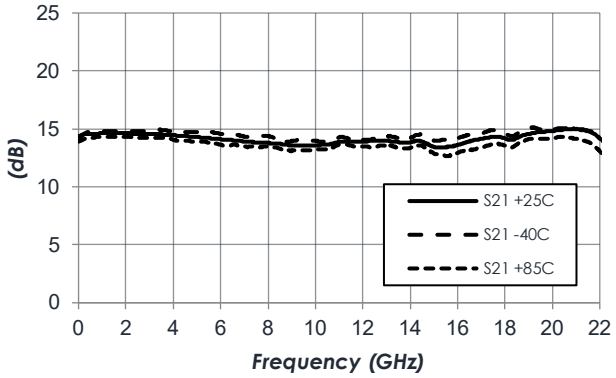
**Notes:**

1. OIP3 measured with 10MHz tone spacing.
2. Data measured directly at input and output of device exclusive of external bias tee loss.

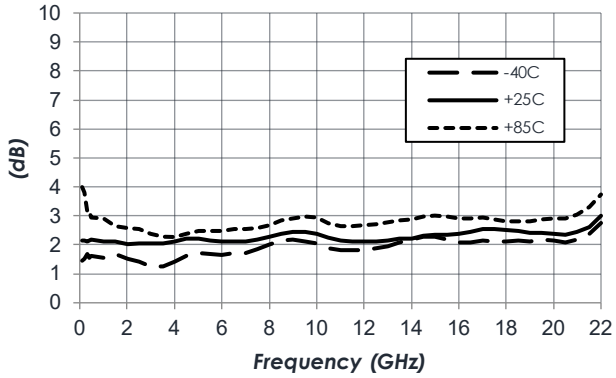
## TYPICAL PERFORMANCE

(VDD = +3.3V, T = 25°C unless otherwise specified)

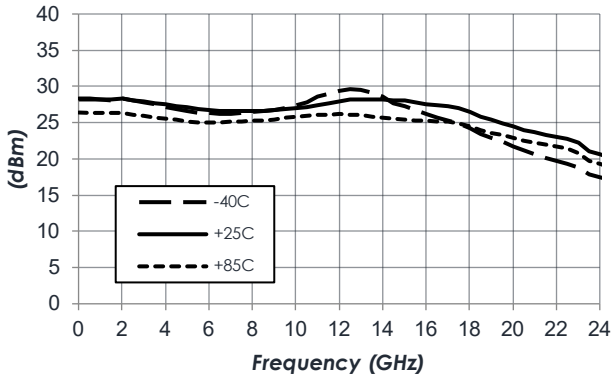
### Gain vs Temperature



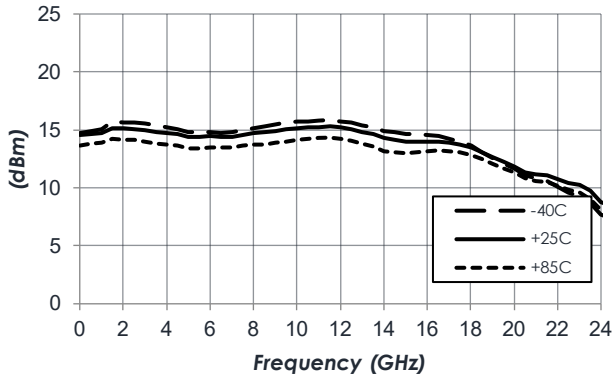

### Noise Figure vs Temperature



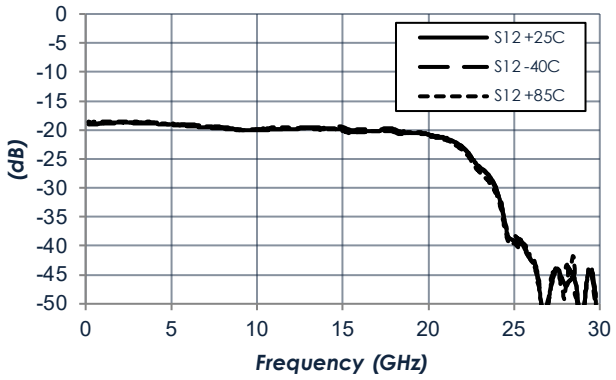

### Output IP3 vs Temperature



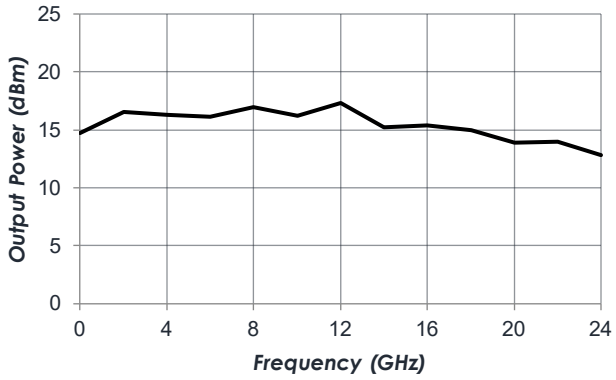

### P1dB vs Temperature




### Reverse Isolation vs Temperature

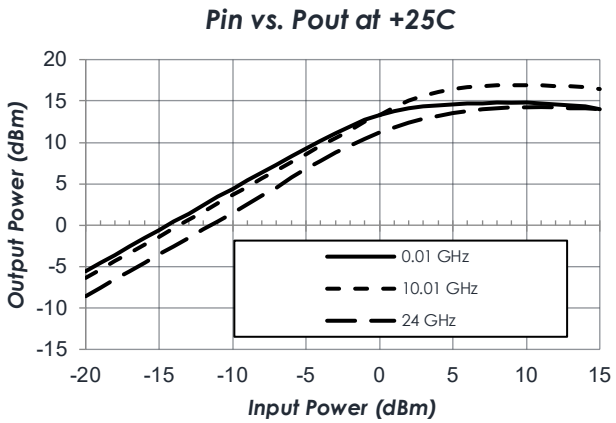



### P_Sat at +25C



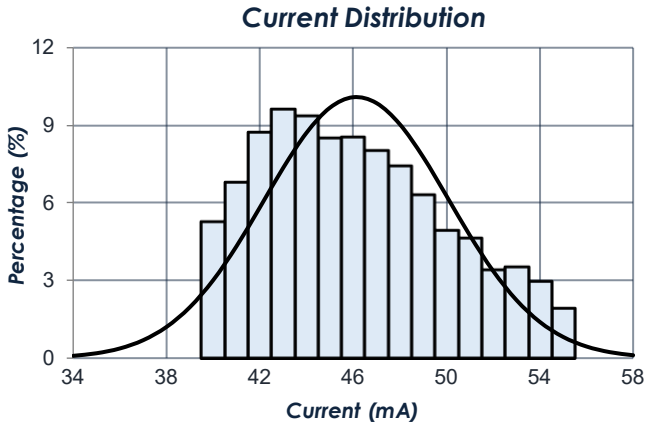
## TYPICAL PERFORMANCE (CONTINUED)

(VDD = +3.3V, T = 25°C unless otherwise specified)

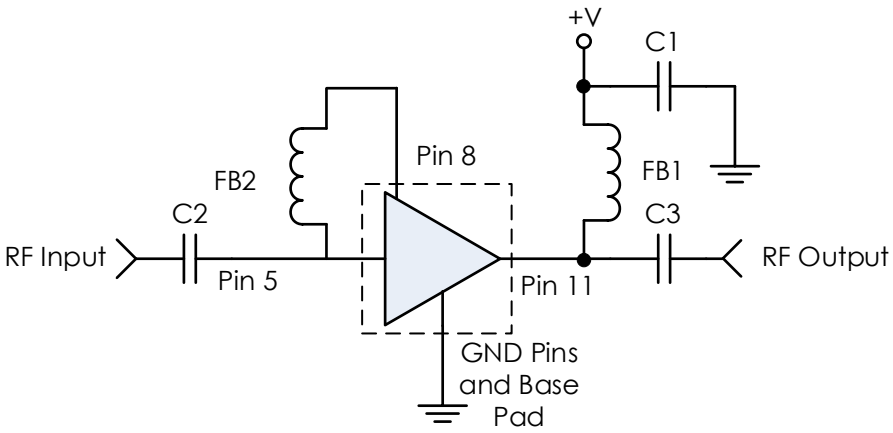



## TYPICAL DEVICE CHARACTERISTICS

(VDD = +3.3V, T = 25°C unless otherwise specified)



## TYPICAL APPLICATION



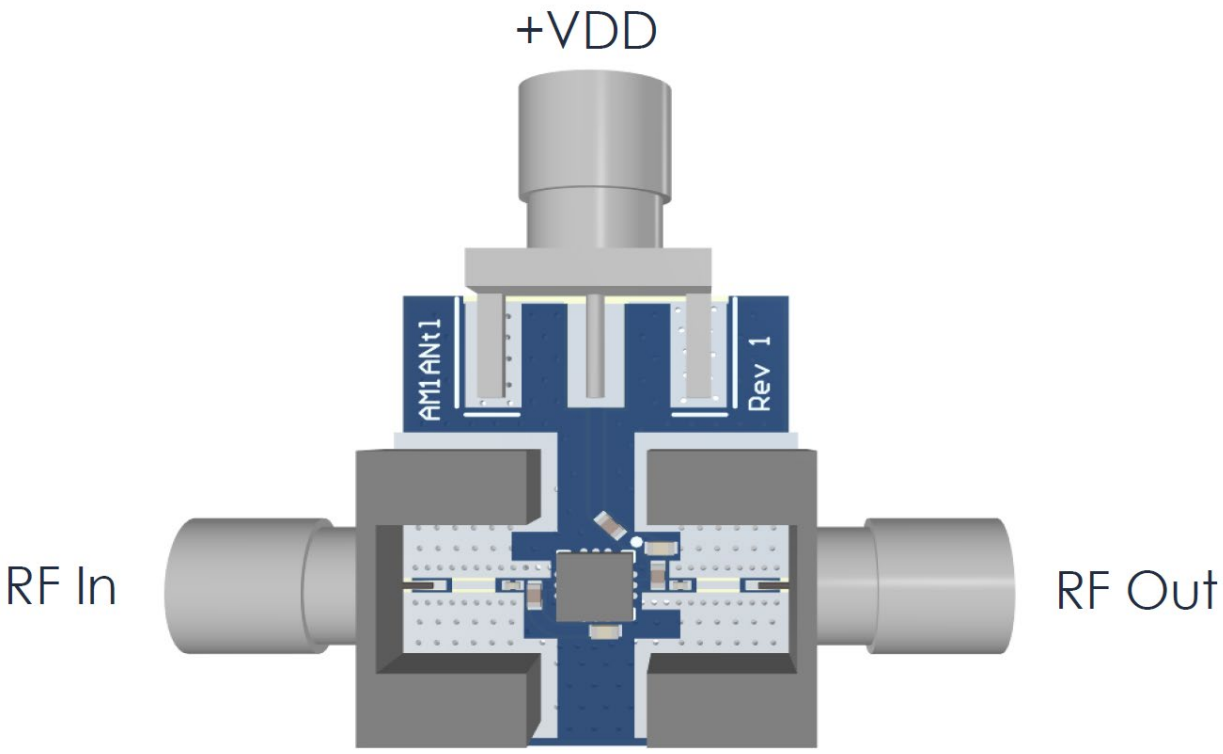

**Recommended Component List (or Equivalent)**

| Part | Value | Part Number | Manufacturer |
|---|---|---|---|
| C1 | 0.1 uF | GRM155R71C104KA88 | Murata |
| C2, C3 | 0.1 uF | 0201BB104KW160 | Passives Plus |
| FB1, FB2 | - | MMZ1005A222E | TDK |

**Note:**

1. Performance may be improved by replacing FB1 and FB2 with a lower loss inductor or bias tee.

## EVALUATION PC BOARD




**Note:** Not all components shown may be installed.

## RELATED PARTS

| Part Number | | Description |
|---|---|---|
| AM1053 | 5 GHz to 20 GHz | Gain Block |
| AM1070 | DC to 18 GHz | Broadband Gain Block |
| AM1071 | DC to 18 GHz | Broadband Gain Block |
| AM1100 | 2 GHz to 26.5 GHz | Low Noise Amplifier |
| AM1101 | 2 GHz to 26.5 GHz | Bypassable Amplifier |
| AM1163-1 | DC to 10 GHz | Low Noise Amplifier |
| AM1164-1 | DC to 8 GHz | Low Noise Amplifier |

## 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 (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-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) |

**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.**

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