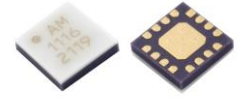


# AM1116 – Amplifier

20 MHz to 6 GHz Gain Block

## Description

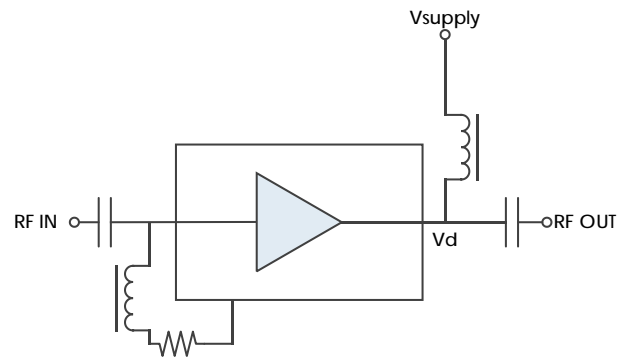
AM1116 is a high dynamic range gain block covering the 20 MHz to 6 GHz frequency range. The device exhibits flat gain, low noise figure and high third order intercept performance while also providing excellent gain stability over the operating temperature range. With internal 50 ohm matching and packaged in a 3mm QFN, the AM1116 represents a compact total PCB footprint.



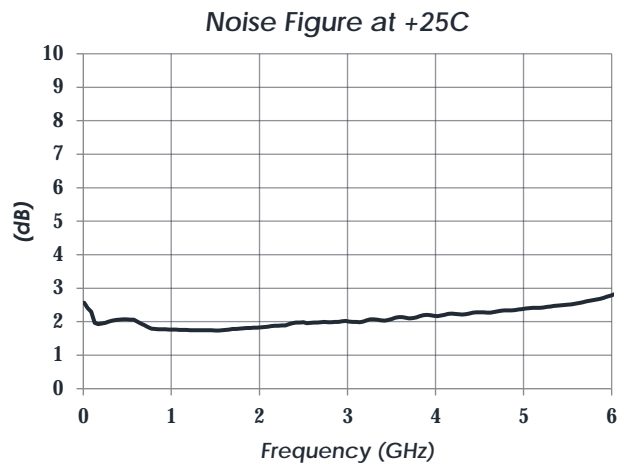
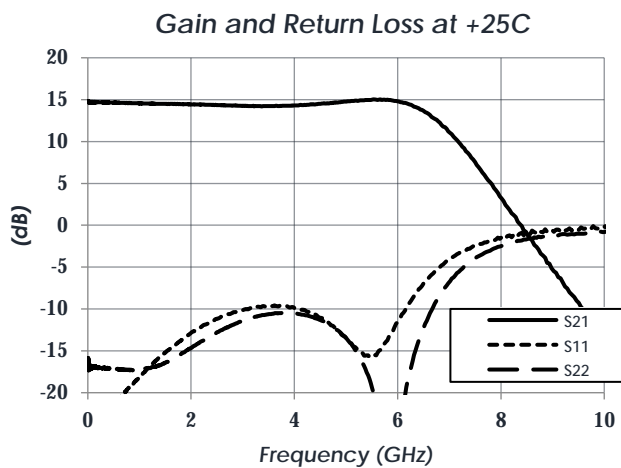
## Features

- 15 dB Gain
- 2 dB Noise Figure
- +17 dBm P1dB
- +31 dBm OIP3
- +3.3V Operation
- 168 mW Power Consumption
- 3mm QFN, or 1.3mm x 2mm DFN
- -40C to +85C Operation
- Unconditionally Stable

## Functional Diagram



## Characteristic Performance



## Table of Contents

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## Revision History

| Date              | Revision Number | Notes                             |
|-------------------|-----------------|-----------------------------------|
| October 25, 2021  | 1               | Initial Release                   |
| December 16, 2021 | 2               | Updated format, added DFN package |

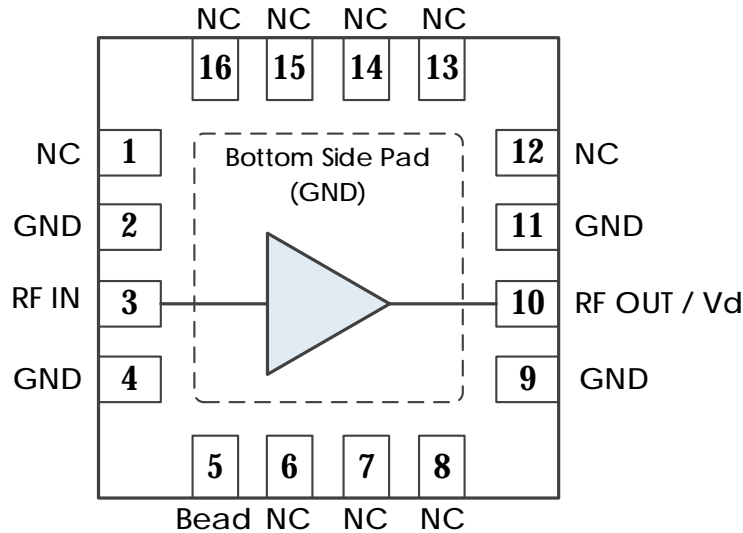
# AM1116 – Amplifier



20 MHz to 6 GHz Gain Block

## Pin Layout and Definitions

AM1116-1: 3mm QFN



| Pin Number | Pin Name    | Pin Function   |
|------------|-------------|--|
| 1          | NC          | Not Connected*   |
| 2          | GND         | Ground - Common  |
| 3          | RF IN       | RF Input – 50 Ohms – DC Coupled. External DC Blocking Capacitor Required                             |
| 4          | GND         | Ground - Common  |
| 5          | Bead        | Connect to RF IN through external ferrite bead or large inductor in series with a 32.4-ohm resistor. |
| 6-8        | NC          | Not Connected*   |
| 9          | GND         | Ground - Common  |
| 10         | RF OUT / Vd | RF Output and DC Power Input – 50 Ohms – DC Coupled. External DC Blocking Capacitor Required         |
| 11         | GND         | Ground - Common  |
| 12-16      | NC          | Not Connected*   |

\*NC Pins may be grounded or left open

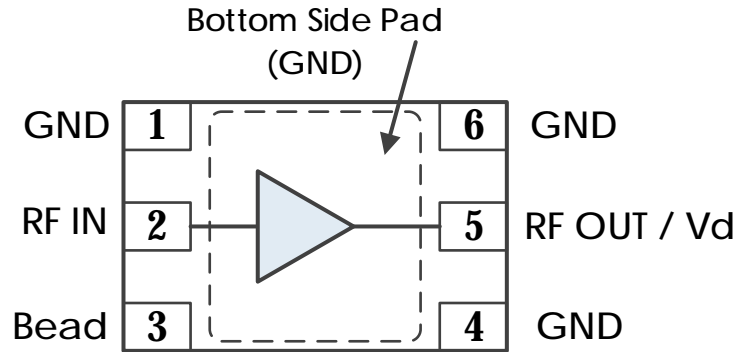
# AM1116 – Amplifier



20 MHz to 6 GHz Gain Block

## Pin Layout and Definitions (continued)

AM1116-2: 2mm DFN



| Pin Number | Pin Name | Pin Function   |
|------------|----------|--|
| 1          | GND      | Ground – Common  |
| 2          | RF In    | RF Input – 50 Ohms – DC Coupled. External DC Blocking Capacitor Required                             |
| 3          | Bead     | Connect to RF IN through external ferrite bead or large inductor in series with a 32.4-ohm resistor. |
| 4          | GND      | Ground – Common  |
| 5          | RF Out   | RF Output – 50 Ohms – DC Coupled. External DC Blocking Capacitor Required                            |
| 6          | GND      | Ground – Common  |

# AM1116 – Amplifier

## 20 MHz to 6 GHz Gain Block



### Specifications

#### Absolute Maximum Ratings

|                                | Minimum | Maximum |
|--------------------------------|---------|---------|
| Supply Voltage                 | -0.3 V  | +3.5 V  |
| RF Input Power                 |         | +20 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 (-1 package) | MSL 1    |         |
| (-2 package)                            | MSL 3    |         |
| ESD classification (HBM, survivable)    | Class 1a |         |



Atlanta Micro 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  | +3.5 V  |
| Operating Case Temperature     | -40 C   |         | +85 C   |
| Operating Junction Temperature | -40 C   |         | +125 C  |

#### Thermal Information

|   |         |
|---|---------|
| Junction to Case Thermal Resistance ( $\theta_{JC}$ ) | 234 C/W |
| Nominal junction temperature at +85degC               | +125 C  |
| Channel Temperature to maintain 1 million hour MTF    | +175 C  |

# AM1116 – Amplifier

## 20 MHz to 6 GHz Gain Block

### DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

| Parameter         | Testing Conditions | Minimum | Typical | Maximum |
|-------------------|--------------------|---------|---------|---------|
| DC Supply Voltage |                    |         | +3.3 V  |         |
| DC Supply Current | VDD = +3.3 V       |         | 51 mA   |         |
| Power Dissipated  | VDD = +3.3 V       |         | 168 mW  |         |

### RF Performance

(T = 25 °C unless otherwise specified)

| Parameter       | Testing Conditions         | Minimum  | Typical | Maximum |
|-----------------|----------------------------|----------|---------|---------|
| Frequency Range |                            | 0.02 GHz |         | 6.0 GHz |
| Gain            | f = 3 GHz                  |          | 14.5 dB |         |
| Return Loss     | f = 3 GHz                  |          | -10 dB  |         |
| Output IP2      | f = 3 GHz, Sum Spur        |          | +37 dBm |         |
|                 | f = 3 GHz, Difference Spur |          | +40 dBm |         |
| Output IP3      | f = 3 GHz                  |          | +30 dBm |         |
| Output P1dB     | f = 3 GHz                  |          | +17 dBm |         |
| Noise Figure    | f = 3 GHz                  |          | 2.0 dB  |         |

#### Notes:

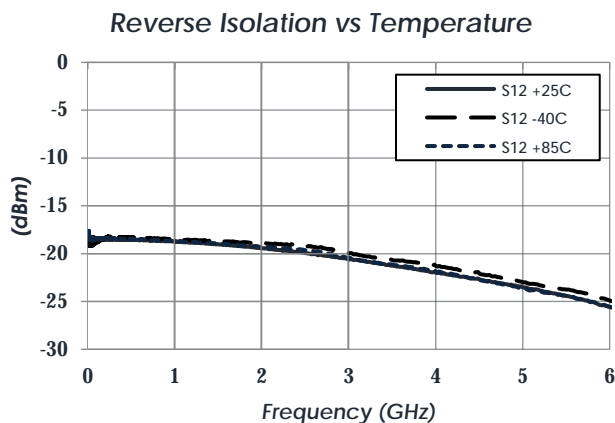
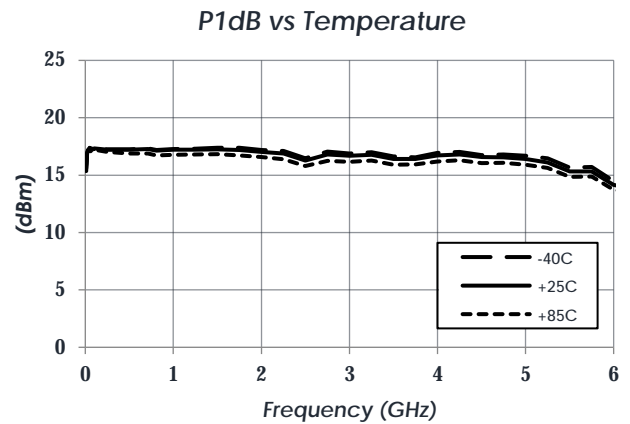
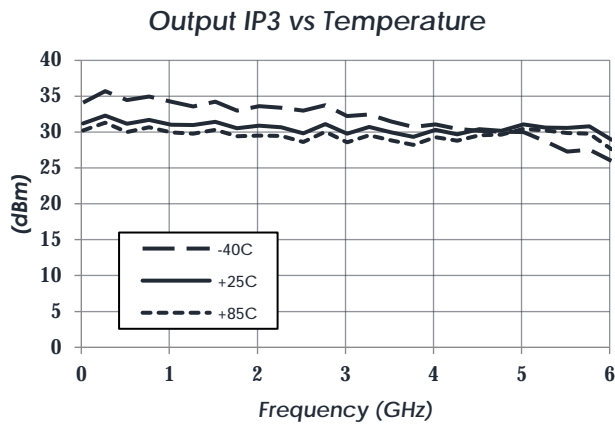
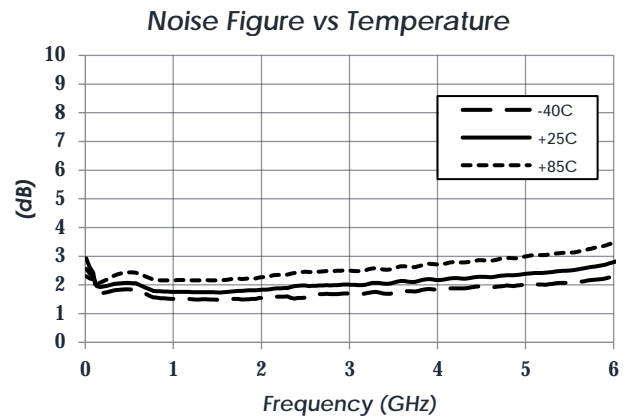
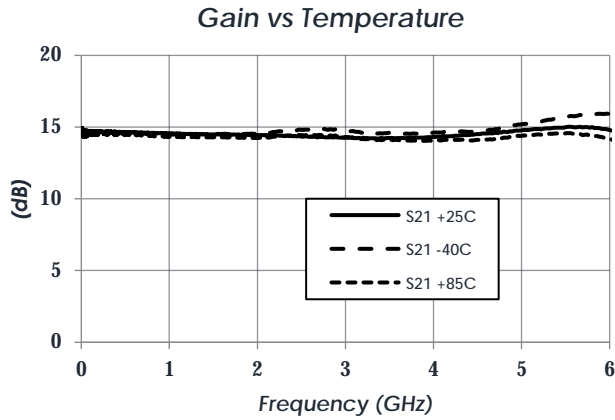
1. OIP3 measured with 10 MHz tone spacing
2. OIP2 characterized with sum and difference measurements
  - a. OIP2 sum measured with 10 MHz tone spacing. IM2 measured at  $f_1 + f_2$
  - b. OIP2 difference measured with tones at  $f_1$  and  $f_2 = 2f_1 + 10$ . IM2 measured at  $f_1 - f_2$

# AM1116 – Amplifier

## 20 MHz to 6 GHz Gain Block

### Typical Performance

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

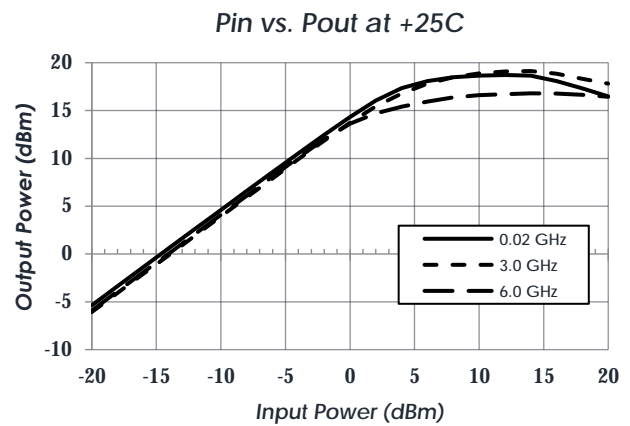
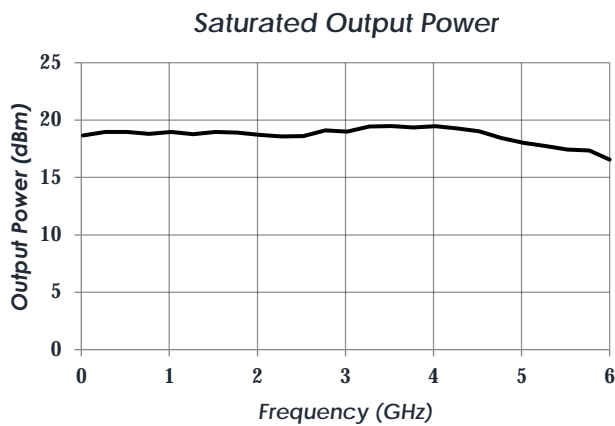
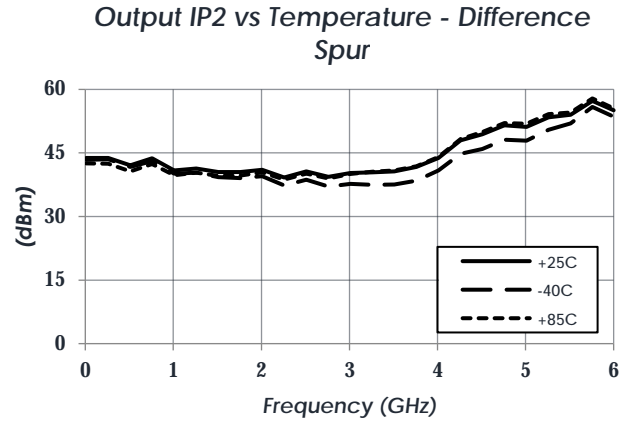
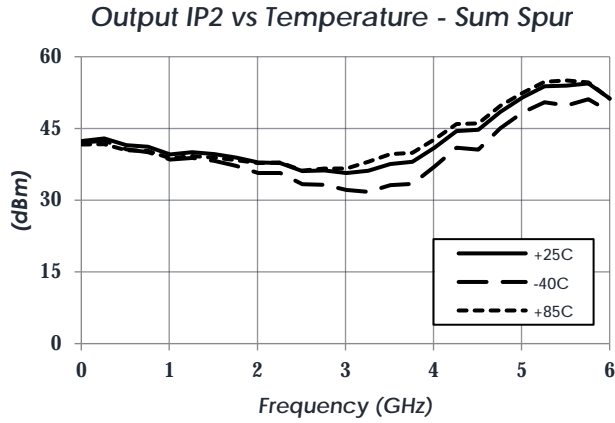


# AM1116 – Amplifier

## 20 MHz to 6 GHz Gain Block

### Typical Performance (continued)

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



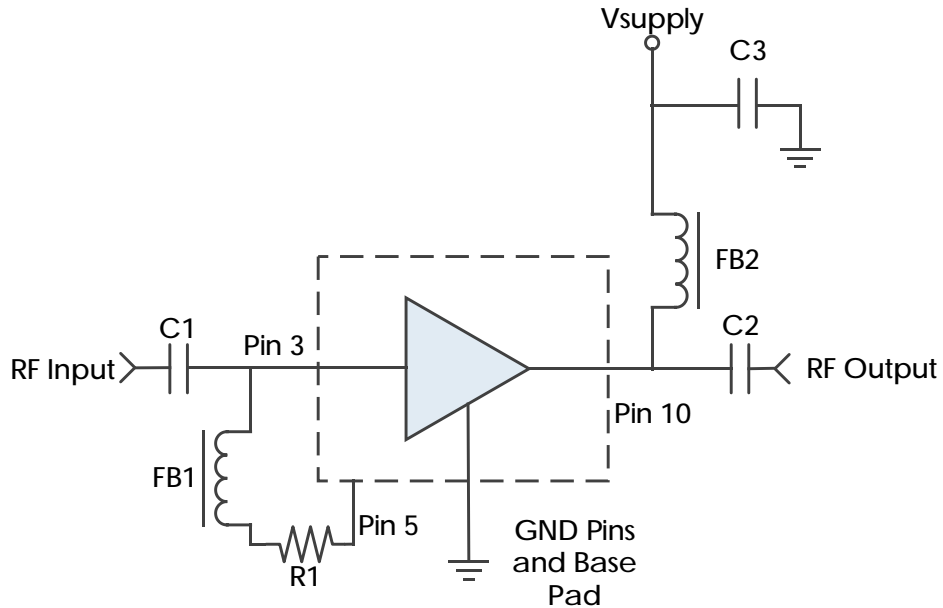


# AM1116 – Amplifier

## 20 MHz to 6 GHz Gain Block



### Typical Application



### Recommended Component List (or equivalent):

| Part     | Value  | Part Number       | Manufacturer  |
|----------|--------|-------------------|---------------|
| C1, C2   | 0.1uF  | 0201BB104KW160    | Passives Plus |
| C3       | 0.1uF  | GRM155R71C104KA88 | Murata        |
| FB1, FB2 | -      | MMZ1005A222E      | TDK           |
| R1       | 32.4 Ω | RC0402FR-0732R4L  | Yageo         |

### Notes:

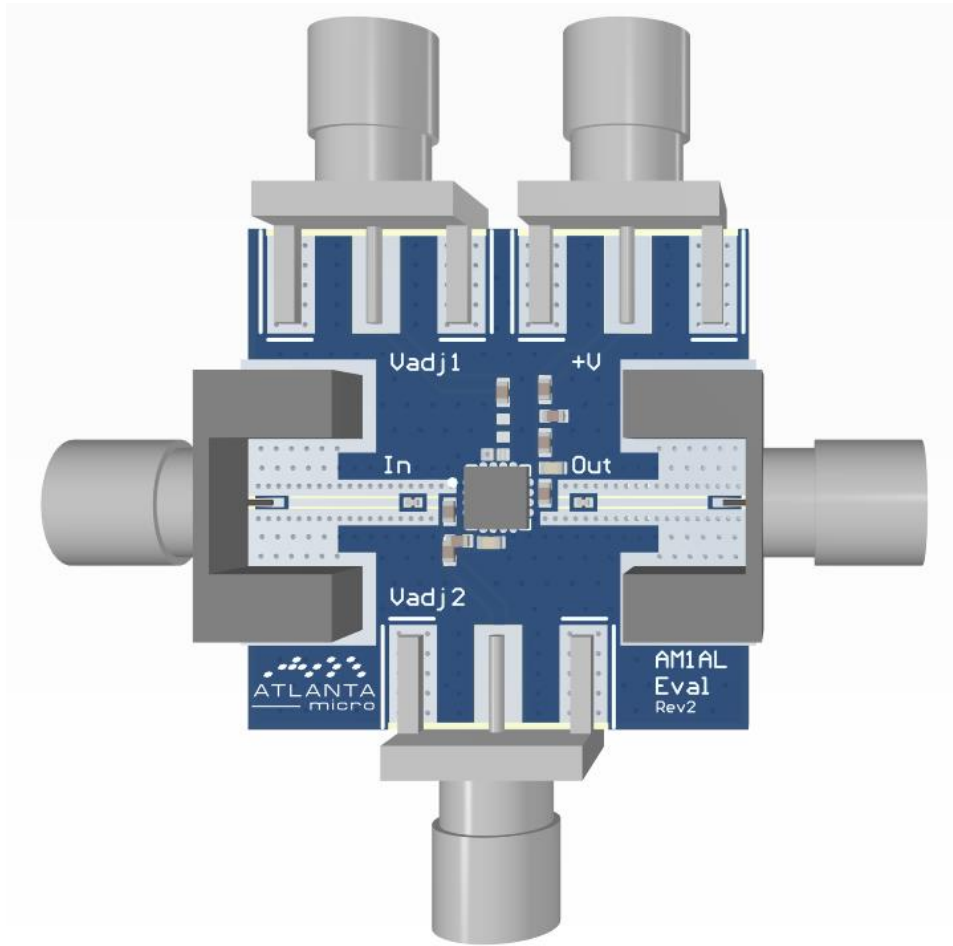
1. DC blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance.
2. R1 is required for optimum performance.

# AM1116 – Amplifier

## 20 MHz to 6 GHz Gain Block



### Evaluation PC Board



### Related Parts

| Part Number | Description                                  |
|-------------|--|
| AM1016      | 20 MHz to 6 GHz Low Noise Gain Block, +3.3 V |
| AM1018      | 20 MHz to 6 GHz Low Noise Gain Block, +3.3 V |
| AM1127      | 20 MHz to 6 GHz Driver Amplifier, +6 V       |

## 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)      |

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