## Product Features

- DC ~ 500MHz
- GaAs HBT MMIC
- 40dBm Output IP3
- 18dB Gain
- 19.8dBm P1 dB
- Pb Free / RoHS Standard

## Applications

- CDMA,W-CDMA Medium Power Amplifier
- High Linearity Drive Amplifier



Package Type : SOT-89

## Description

AP112 is a gain block amplifier designed with GaAs HBT MMIC in a low cost SOT-89 package.
This MMIC amplifier is designed for use as driver devices for infrastructure equipment in the DC ~ 500MHz

## Electrical Specifications @ Ta=+25℃, $V_{DD}$=+5V, +4.5V, Fc=880 MHz

| PARAMETER | UNIT | MIN | TYP | MAX | TYP |
|---|---|---|---|---|---|
| **Gain** | dB | 17.8 | 18 | - | 17.8 |
| **Input Return Loss** | dB | - | -14 | - | -13.6 |
| **Output Return Loss** | dB | - | -12 | - | -11.7 |
| **Output IP3** | dBm | 38 | 40.5 | - | 37 |
| **1dB Compression Point** | dBm | - | 19.8 | - | 18.6 |
| **Noise Figure** | dB | - | 2.9 | 3.1 | 2.8 |
| **DC Current** | mA | 90 | 110 | 130 | 75 |
| **Supply Voltage** | VDC | - | 5V | - | 4.7V |

OIP3 is measured with two tones, at an output power of 5dBm/tone separated by 1MHz

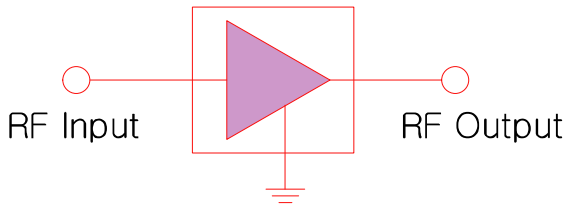
## Absolute Maximum Ratings

| PARAMETER | UNIT | MIN | MAX |
|---|---|---|---|
| **Device Voltage** | VDC | - | 5.5 |
| **RF Input Power** | dBm | - | 10 |
| **Storage Temperature** | ℃ | -40 | 150 |

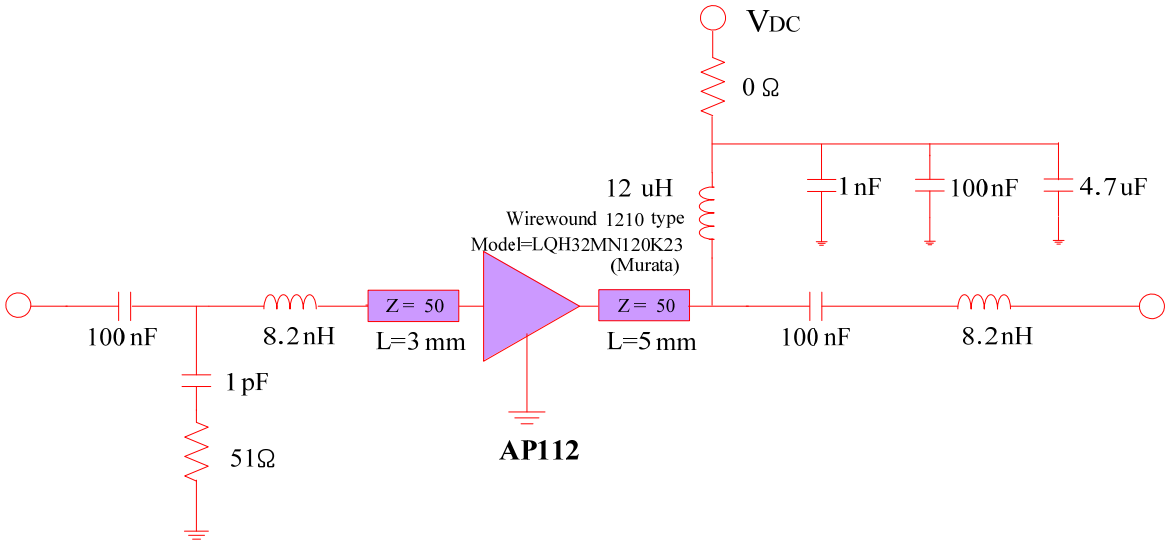
## Operating Ranges

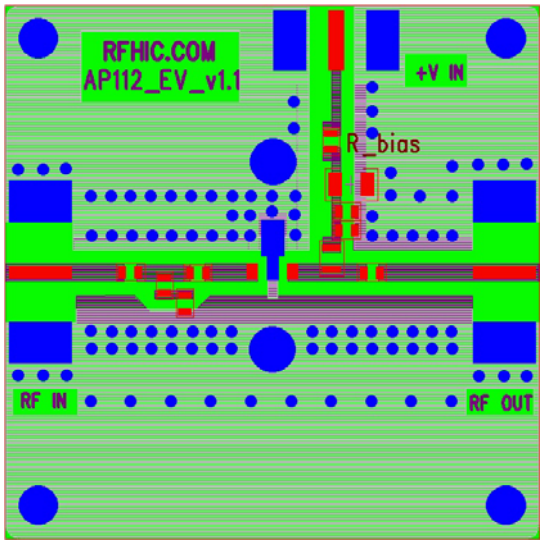
| PARAMETER | UNIT | MIN | TYP | MAX |
|---|---|---|---|---|
| **Operating Frequency** | MHz | DC | - | 500 |
| **Device Voltage** | VDC | - | 5 | 5.3 |
| **Case Temperature** | ℃ | -40 | - | 85 |

## Block Diagram




## Application Circuit



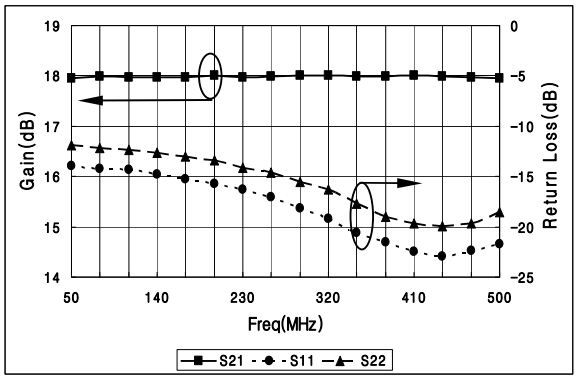

### Recommended Bias Resistor Values

| Vsupply | Rbias(5V) | Rbias(4.8V) | Rbias(4.5V) |
|---|---|---|---|
| 6V | 10 | 15 | 33 |
| 7V | 20 | 28 | 55 |
| 8V | 30 | 41 | 77 |
| 9V | 40 | 53 | 57 |

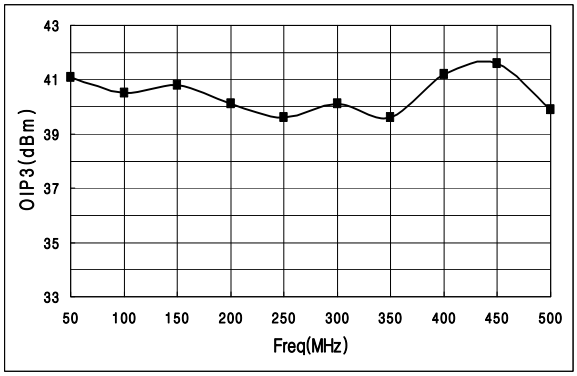
## Performance Charts @ $V_d$=5V, $I_d$=110mA, $T_c$=25℃

| Frequency | MHz | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gain | dB | 17.96 | 17.97 | 17.97 | 18 | 17.98 | 18 | 18 | 17.98 | 17.96 | 17.96 |
| S11 | dB | -13.9 | -14.4 | -14.9 | -15.7 | -16.9 | -18.4 | -19.7 | -21.5 | -22.2 | -20.7 |
| S22 | dB | -11.9 | -12.3 | -12.7 | -13.5 | -14.5 | -15.9 | -17.3 | -19.1 | -19.5 | -18.1 |
| OIP3 | dBm | 41.1 | 40.5 | 40.8 | 40.1 | 39.6 | 40.1 | 39.6 | 41.2 | 41.6 | 39.9 |
| P1dB | dBm | 19.8 | 19.9 | 19.9 | 20 | 20 | 20 | 20.1 | 20.1 | 19.9 | 19.8 |
| Noise Figure | dB | 2.85 | 2.94 | 3.01 | 3.06 | 3.11 | 3.18 | 3.21 | 3.26 | 3.31 | 3.36 |

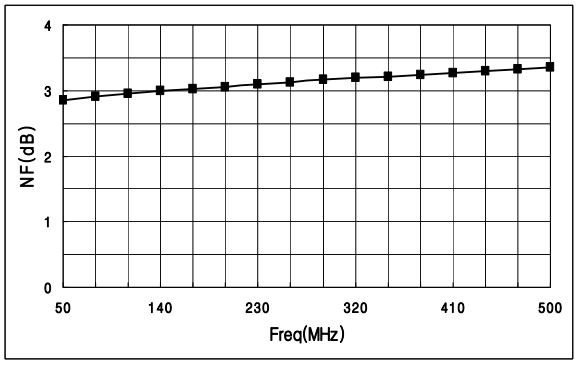
**S-Parameter vs. Frequency**



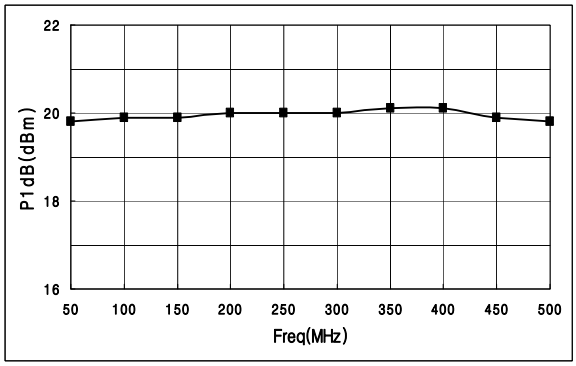

**OIP3 vs. Frequency**




**Noise Figure vs. Frequency**



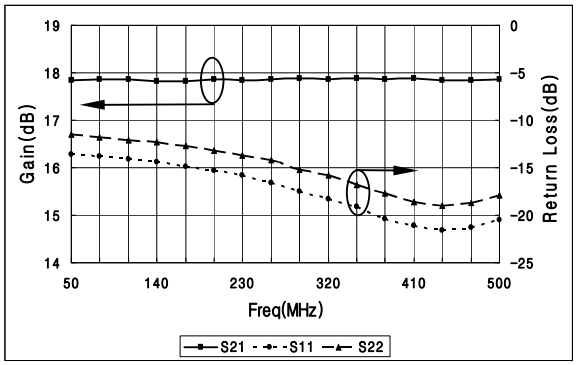

**P1dB vs. Frequency**



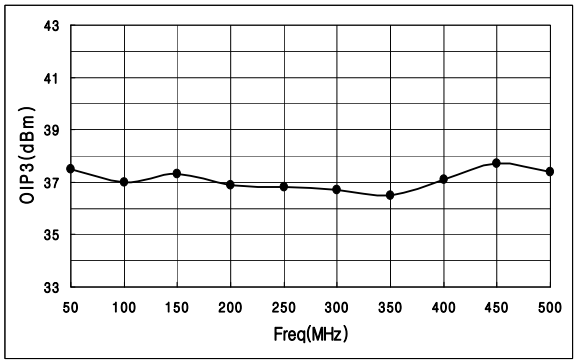
## Performance Charts @ $V_d$=4.7V, $I_d$=75mA, $T_c$=25℃

| Frequency | MHz | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gain | dB | 17.84 | 17.83 | 17.83 | 17.85 | 17.86 | 17.87 | 17.88 | 17.91 | 17.84 | 17.86 |
| S11 | dB | -13.6 | -14 | -14.5 | -15.3 | -16.3 | -17.8 | -19.1 | -20.7 | -21.7 | -20.5 |
| S22 | dB | -11.6 | -11.8 | -12.4 | -13.2 | -14.1 | -15.4 | -16.8 | -18.3 | -19.1 | -17.9 |
| OIP3 | dBm | 37.5 | 37 | 37.3 | 36.9 | 36.8 | 36.7 | 36.5 | 37.1 | 37.7 | 37.4 |
| P1dB | dBm | 18.6 | 18.6 | 18.6 | 18.6 | 18.8 | 18.6 | 18.7 | 18.7 | 18.7 | 18.7 |
| Noise Figure | dB | 2.8 | 2.84 | 2.92 | 3 | 3.04 | 3.12 | 3.16 | 3.23 | 3.27 | 3.32 |

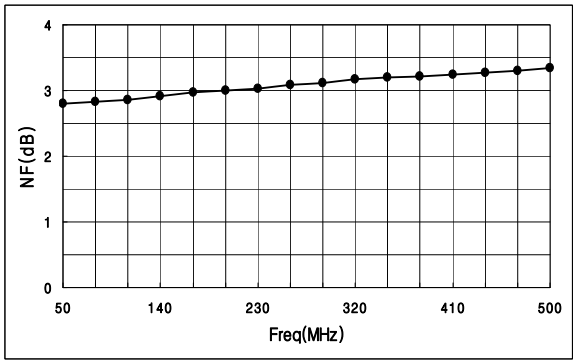
**S-Parameter vs. Frequency**



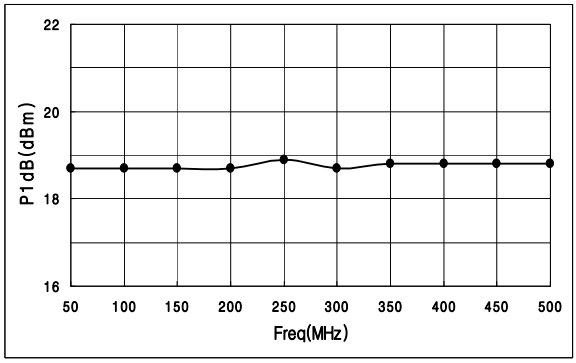

**OIP3 vs. Frequency**




**Noise Figure vs. Frequency**

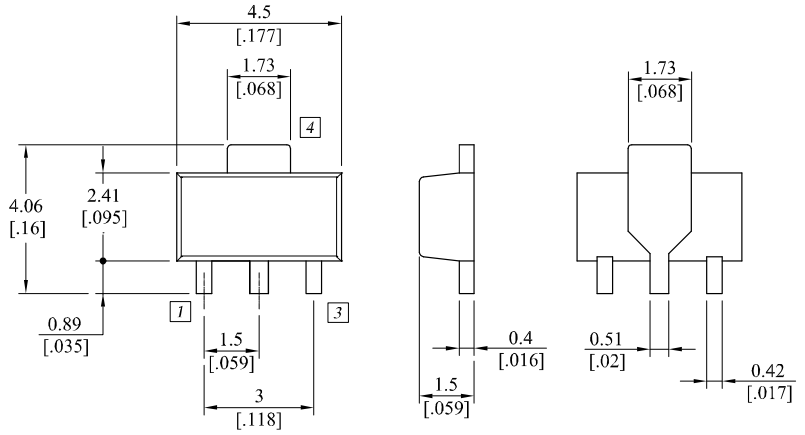



**P1dB vs. Frequency**



## Package Dimensions (Type: SOT-89)

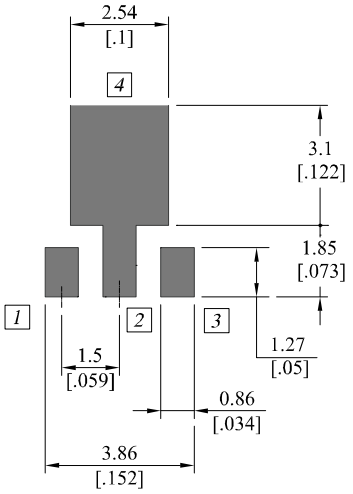
* Unit: mm[inch] | Tolerance ±0.2[.008]



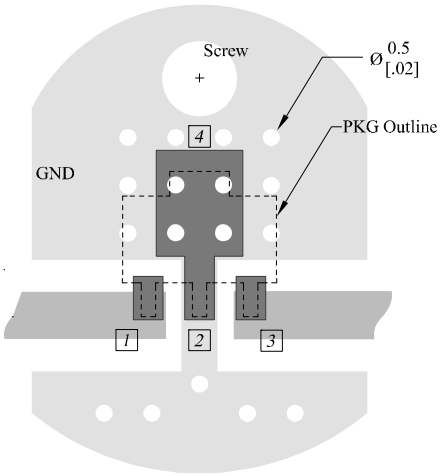

▲ Top View ▲ Side View ▲ Bottom View

| Pin Description | | | |
|---|---|---|---|
| **Pin No** | **Function** | **Pin No** | **Function** |
| 1 | Input | 4 | GND |
| 2 | GND | - | - |
| 3 | Output / Bias | - | - |

## Recommended Pattern




## Recommended Mounting Configuration




*** Mounting Configuration Notes**

1. Ground / thermal via holes are critical for the proper performance of this device.
2. Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.
3. Mounting screws can be added near the part to fasten the board to a heatsink. Ensure that the ground / thermal via hole region contacts the heatsink.
4. Do not put solder mask on the backside of the PCB in the region where the board contacts the heatsink.
5. RF trace width depends upon the PCB material and construction.
6. Use 1 oz. Copper minimum.

## Revision History

| Part Number | Release Date | Version | Modification | Data Sheet Status |
|---|---|---|---|---|
| AP112 | 2012.10.12 | 6.1 | Change by a new document form - | - |
| | | | | |
| | | | | |

RFHIC Corporation reserves the right to make changes to any products herein or to discontinue any product at any time without notice. While product specifications have been thoroughly examined for reliability, RFHIC Corporation strongly recommends buyers to verify that the information they are using is accurate before ordering. RFHIC Corporation does not assume any liability for the suitability of its products for any particular purpose, and disclaims any and all liability, including without limitation consequential or incidental damages.
RFHIC products are not intended for use in life support equipment or application where malfunction of the product can be expected to result in personal injury or death. Buyer uses or sells such products for any such unintended or unauthorized application, buyer shall indemnify, protect and hold RFHIC Corporation and its directors, officers, stockholders, employees, representatives and distributors harmless against any and all claims arising out of such unauthorized use.

Sales, inquiries and support should be directed to the local authorized geographic distributor for RFHIC Corporation. For customers in the US, please contact the US Sales Team at 919-677-8780. For all other inquiries, please contact the International Sales Team at 82-31-250-5078.