



### 4W Ultra Wide Band Power Amplifier 0.1GHz~22GHz



#### Features

- Wideband Solid State Power Amplifier
- Gain: 40 dB Typical
- Psat: +37 dBm Typical
- Noise Figure: 3dB Typical
- Supply Voltage: +24V (-NP) / +36V (-WP)

#### Typical Applications

- Military & Defense Applications
- Wireless Infrastructure
- Test and Measurement

#### Electrical Specifications, TA = +25°C

| Parameter                                   | Min.                           | Typ. | Max. | Min.          | Typ. | Max. | Units |
|---|--------------------------------|------|------|---------------|------|------|-------|
| Frequency Range                             | 0.1GHz – 10GHz                 |      |      | 11GHz – 22GHz |      |      | GHz   |
| Gain  |                                | 42   |      |               | 38   |      | dB    |
| Gain Flatness                               |                                | ±2   |      |               | ±5   |      | dB    |
| Gain Variation Over Temperature (-45 ~ +85) |                                | ±3   |      |               | ±3   |      | dB    |
| Noise Figure                                |                                | 3    |      |               | 3.5  |      | dB    |
| Input Return Loss                           |                                | 15   |      |               | 15   |      | dB    |
| Output Return Loss                          |                                | 25   |      |               | 25   |      | dB    |
| Output 3dB Compression Point (P3dB)*        |                                | 37   |      |               | 33   |      | dBm   |
| Saturated Output Power (Psat)*              |                                | 37.5 |      |               | 36   |      | dBm   |
| Supply Current –NP Model (VDC=+24V)         |                                | 1400 | 2000 |               | 1400 | 2000 | mA    |
| Supply Current –WP Model (VDC=+36V)         |                                | 900  | 1700 |               | 900  | 1700 | mA    |
| Isolation S12                               |                                | 85   |      |               | 86   |      | dB    |
| Input Max Power (No damage)                 | Psat – Gain                    |      |      | Psat – Gain   |      |      | dBm   |
| -NP model Weight (No heatsink)              |                                |      |      | 280           |      |      | g     |
| -WP model Weight (No heatsink)              |                                |      |      | 1285          |      |      | g     |
| Impedance                                   |                                |      |      | 50            |      |      | Ohms  |
| Input / Output Connectors                   | SMA-Female                     |      |      |               |      |      |       |
| Finish                                      | -NP model: Gold Plated         |      |      |               |      |      |       |
|   | -WP model: Nickel Plated       |      |      |               |      |      |       |
| Material                                    | Aluminum / Copper              |      |      |               |      |      |       |
| Package Sealing                             | Epoxy Sealed (Standard)        |      |      |               |      |      |       |
|   | Hermetically Sealed (Optional) |      |      |               |      |      |       |

\* P1dB, P3dB and Psat power testing signal: 200µs pulse width with 10% duty cycle.

\* For average CW power testing or increased duty cycle, a 5dB back off from Psat is required unless water/oil cooling system is applied.

4W Ultra Wide Band Power Amplifier 0.1-22GHz



| Absolute Maximum Ratings |               |
|--------------------------|---------------|
| Supply Voltage –NP / -WP | +28V / +60VDC |
| RF Input Power           | Psat – Gain   |

Note: Maximum RF input power is set to assure safety of amplifier. Input power may be increased at own risk to achieve full power of amplifier. Please reference gain and power curves.

| Biasing Up Procedure |   |
|----------------------|---|
| Step 1               | Connect input and output with 50 Ohm source/load. (in band VSWR<1.9:1 or >10dB return loss) |
| Step 2               | Connect Ground Pin  |
| Step 3               | Connect VDC   |
| Power OFF Procedure  |   |
| Step 1               | Turn Off VDC  |
| Step 2               | Remove RF Connection  |
| Step 3               | Remove Ground   |

### Environmental Specifications and Test Standards

| Parameter                        | Standard      | Description   |
|----------------------------------|---------------|---|
| Operational Temperature          | MIL-STD-39016 | -45°C~+55°C (Case Temperature less than 85C)  |
| Storage Temperature              |               | -50°C~+125°C  |
| Thermal Shock                    |               | 1 Hour@ -45°C → 1 Hour @ +85°C (5 Cycles)   |
| Random Vibration                 |               | Acceleration Spectral Density 6 (m/s)<br>Total 92.6 RMS   |
| Electrical & Temperature Burn In |               | Temperature +85°C for 72 Hours  |
| Shock                            |               | 1. Weight >20g, 50g half sine wave for 11ms, Speed variation 3.44m/s<br>2. Weight <=20g, 100g Half sine wave for 6ms, Speed variation 3.75m/s<br>3. Total 18 times (6 directions, 3 repetitions per direction). |
| Altitude                         |               | Standard: 30,000 Ft (Epoxy Sealed Controlled Environment)<br>Optional: Hermetically Sealed (60,000 ft. 1.0 PSI min)   |
| Hermetically Sealed (Optional)   | MIL-STD-883   | MIL-STD-883 (For Hermetically Sealed Units)   |

Note: The operating temperature for the unit is specified at the package base. It is the user's responsibility to ensure the part is in an environment capable of maintaining the temperature within the specified limits



| Ordering Information |   |
|----------------------|---|
| Part No.             | Description                                     |
| RFLUPA01M22GA-NP     | 0.1GHz~22GHz Power Amplifier<br>No Protection   |
| RFLUPA01M22GA-WP     | 0.1GHz~22GHz Power Amplifier<br>With Protection |

### Amplifier Use

Ensure that the amplifier input and output ports are safely terminated into a proper 50 ohm load before turning on the power. Never operate the amplifier without a load. A proper 50 ohm load is defined as a load with impedance less than 1.9:1 or return loss larger than 10dB relative to 50 Ohm within the specified operating band width.

#### Power Supply Requirements

Power supply must be able to provide adequate current for the amplifier. Power supply should be able to provide 1.5 times the typical current or 1.2 times the maximum current (whichever is greater).

In most cases, RF - Lambda amplifiers will withstand severe mismatches without damage. However, operation with poor loads is discouraged. If prolonged operation with poor or unknown loads is expected, an external device such as an isolator or circulator should be used to protect the amplifier.

Ensure that the power is off when connecting or disconnecting the input or output of the amp.

Prevent overdriving the amplifier. Do not exceed the recommended input power level.

Adequate heat-sinking required for RF amplifier modules. Please inquire.

Amplifiers do not contain Thermal protection, Reverse DC polarity or Over voltage protection with the exception of a few models. Please inquire.

Proper electrostatic discharge (ESD) precautions are recommended to avoid performance degradation or loss of functionality.

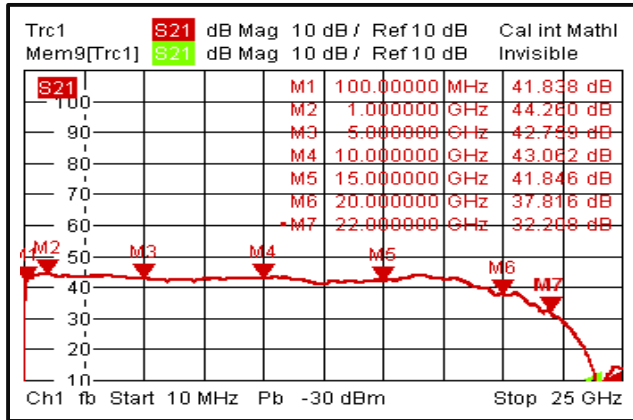
#### What is not covered with warranty?

Each RF - Lambda amplifier will go through power and temperature stress testing.

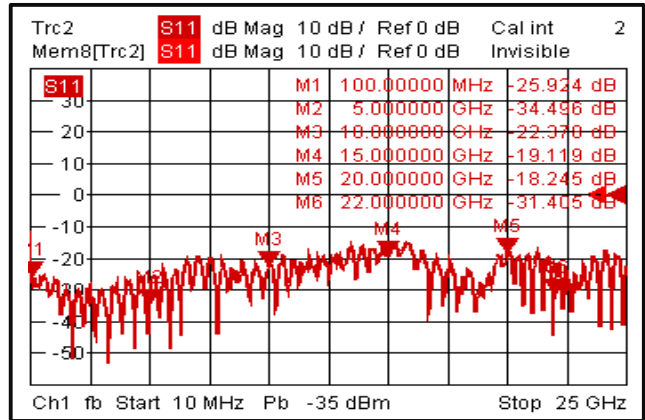
Since the die, ICs or MMICs are fragile, these are not covered by warranty. Any damage to these will NOT be free to repair.



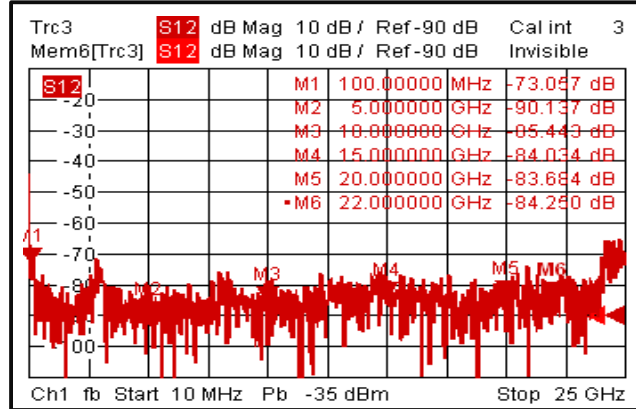
### Gain vs. Frequency



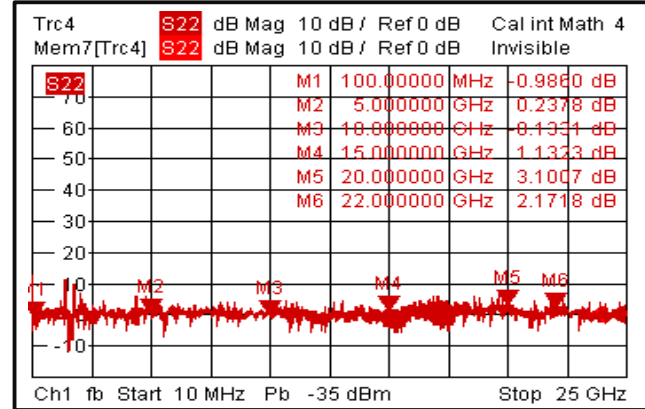
### Input Return Loss



### Isolation



### Output Return Loss



Note: Input/output return loss measurements include attenuators to protect equipment

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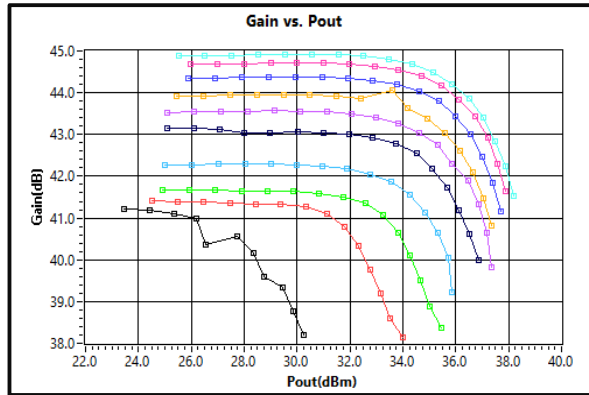


# RF-LAMBDA

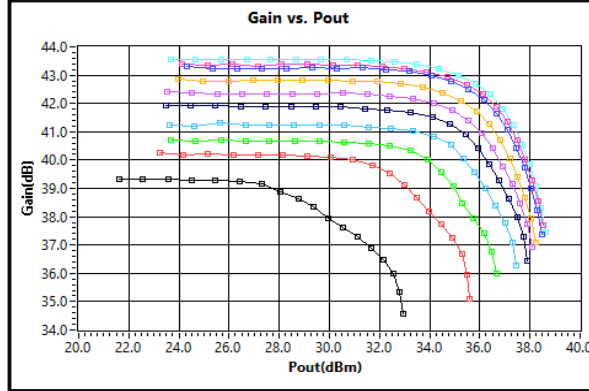
The power beyond expectations

## RFLUPA01M22GA

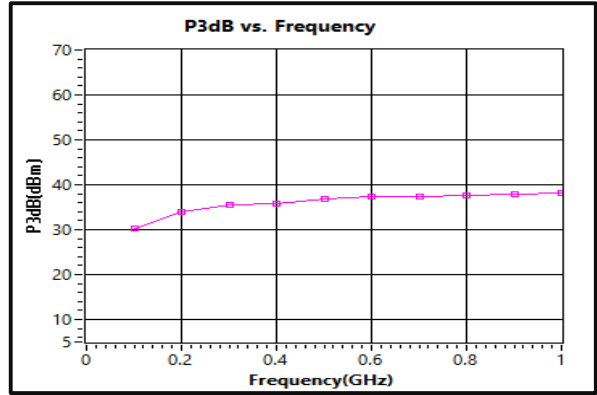
**Gain vs. Pout (100MHz – 1GHz CW Input)**



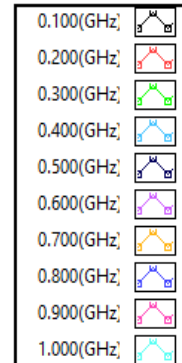
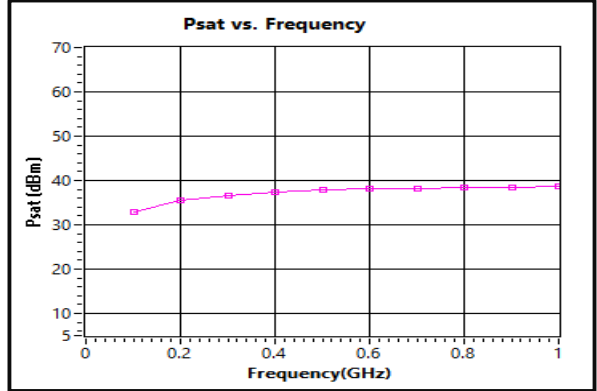
**Gain vs Pout (100MHz – 1GHz Pulsed Input)**



**P3dB vs. Frequency (CW Input)**



**Psat vs. Frequency (Pulsed Input)**



**4W Ultra Wide Band Power Amplifier 0.1-22GHz**

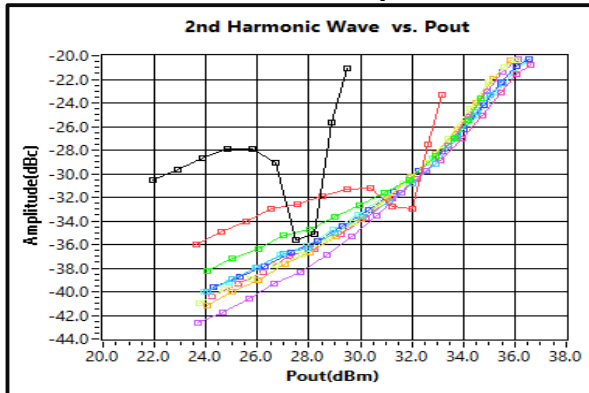


# RF-LAMBDA

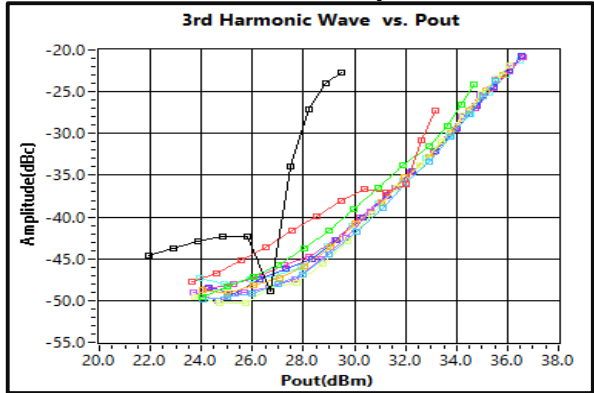
The power beyond expectations

## RFLUPA01M22GA

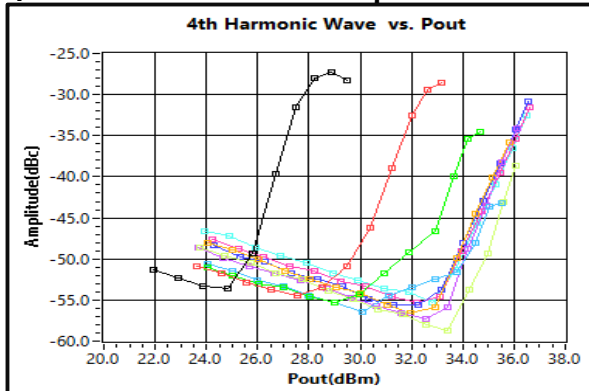
### 2nd Harmonic Wave vs Output Power



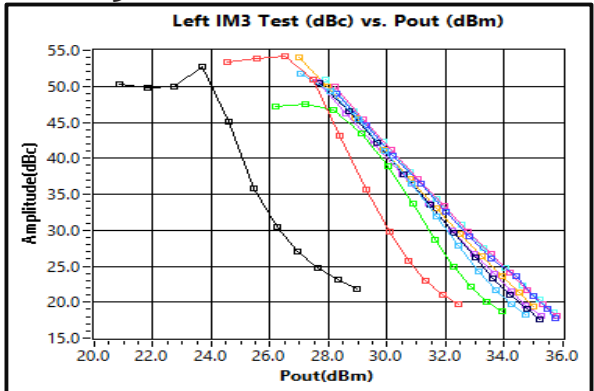
### 3rd Harmonic Wave vs Output Power



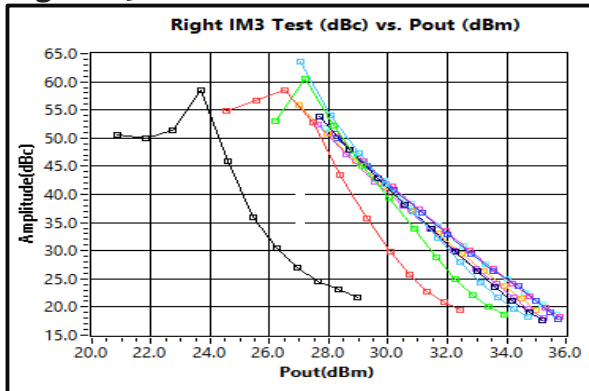
### 4th Harmonic Wave vs Output Power



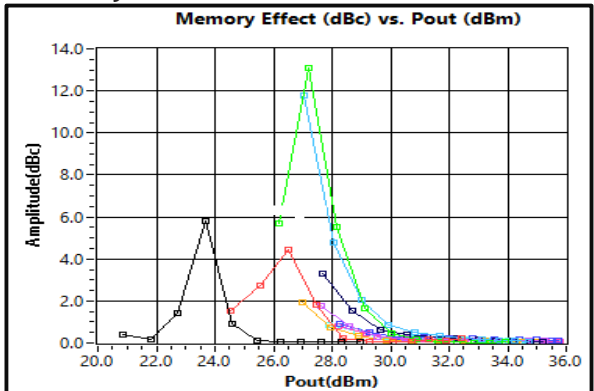
### Left IM3 vs Pout



### Right IM3 vs Pout



### Memory Effect vs Pout



|          |  |
|----------|--|
| 0.1(GHz) |  |
| 0.2(GHz) |  |
| 0.3(GHz) |  |
| 0.4(GHz) |  |
| 0.5(GHz) |  |
| 0.6(GHz) |  |
| 0.7(GHz) |  |
| 0.8(GHz) |  |
| 0.9(GHz) |  |
| 1.0(GHz) |  |

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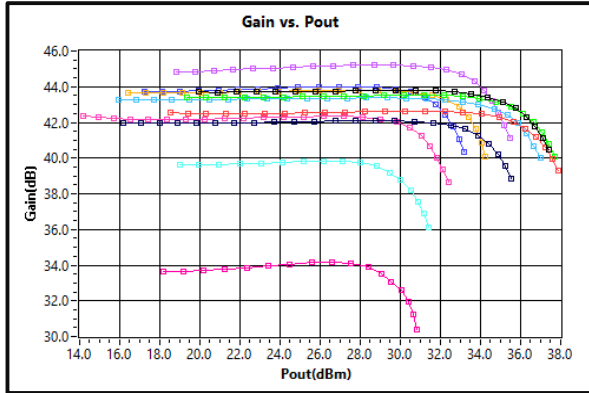


# RF-LAMBDA

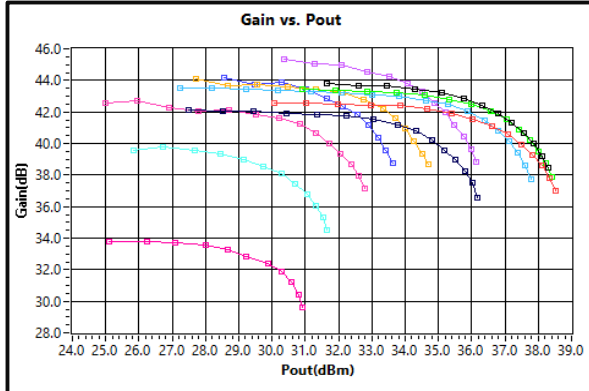
The power beyond expectations

## RFLUPA01M22GA

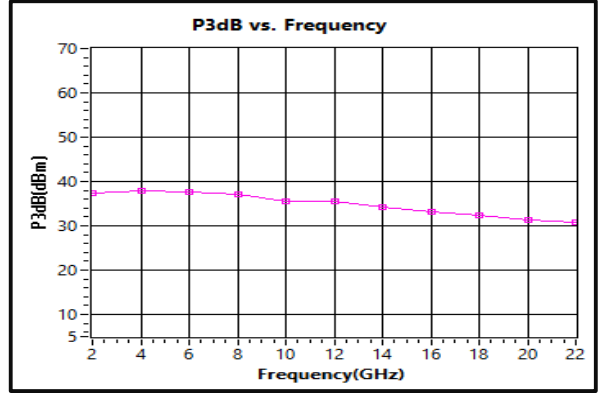
**Gain vs. Pout (2GHz - 22GHz CW Input)**



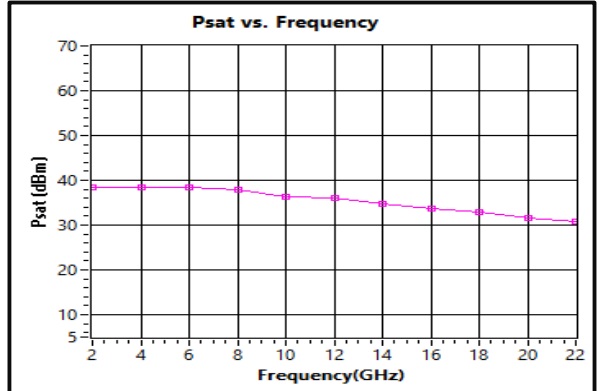
**Gain vs Pout (2GHz - 22GHz Pulsed Input)**



**P3dB vs. Frequency (CW Input)**



**Psat vs. Frequency (Pulsed Input)**

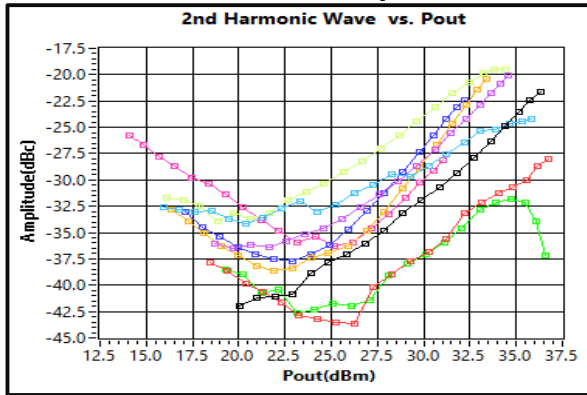


|             |  |
|-------------|--|
| 2.000(GHz)  |  |
| 4.000(GHz)  |  |
| 6.000(GHz)  |  |
| 8.000(GHz)  |  |
| 10.000(GHz) |  |
| 12.000(GHz) |  |
| 14.000(GHz) |  |
| 16.000(GHz) |  |
| 18.000(GHz) |  |
| 20.000(GHz) |  |
| 22.000(GHz) |  |

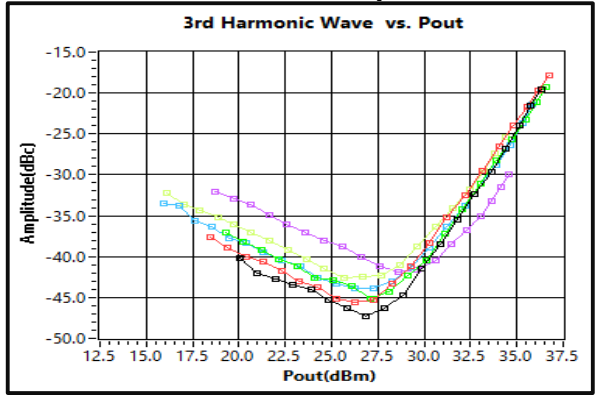
**4W Ultra Wide Band Power Amplifier 0.1-22GHz**



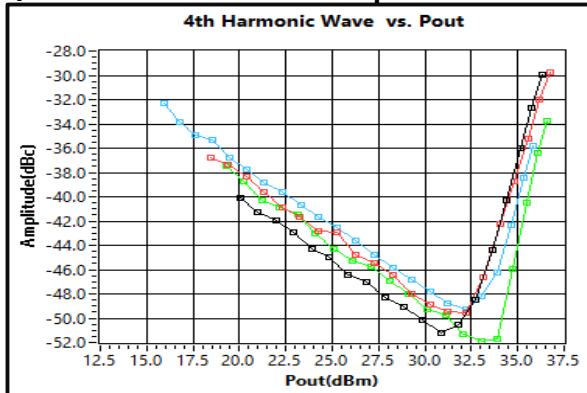
### 2nd Harmonic Wave vs Output Power



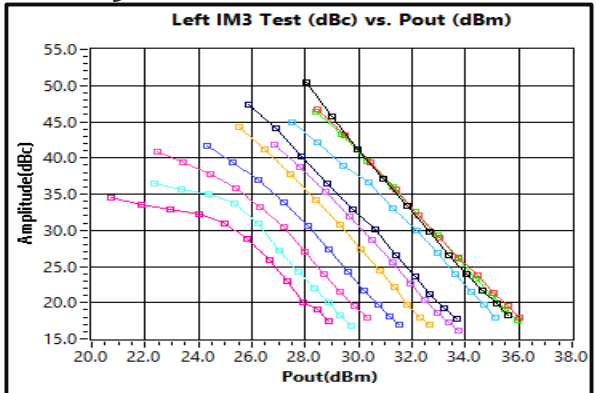
### 3rd Harmonic Wave vs Output Power



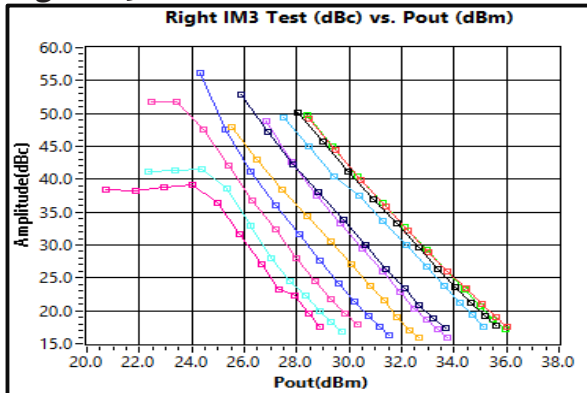
### 4th Harmonic Wave vs Output Power



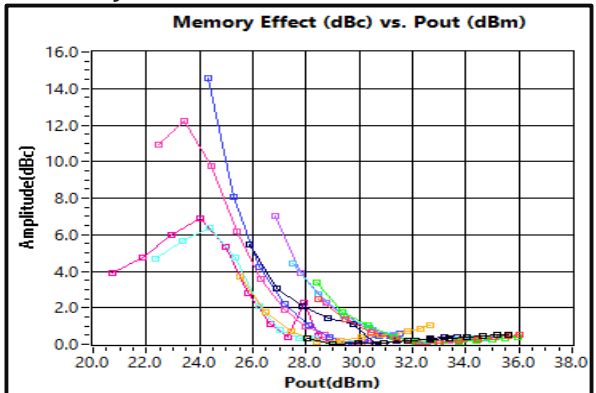
### Left IM3 vs Pout



### Right IM3 vs Pout



### Memory Effect vs Pout



|           |  |
|-----------|--|
| 2.0(GHz)  |  |
| 4.0(GHz)  |  |
| 6.0(GHz)  |  |
| 8.0(GHz)  |  |
| 10.0(GHz) |  |
| 12.0(GHz) |  |
| 14.0(GHz) |  |
| 16.0(GHz) |  |
| 18.0(GHz) |  |
| 20.0(GHz) |  |
| 22.0(GHz) |  |

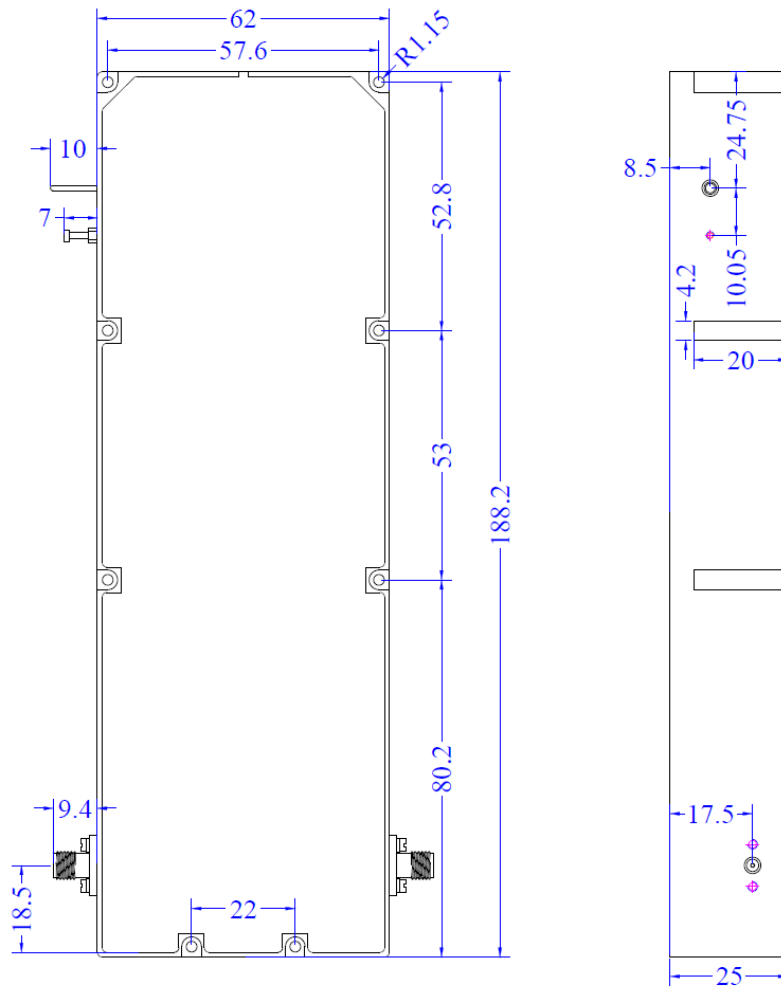
4W Ultra Wide Band Power Amplifier 0.1-22GHz





### -WP Outline Drawing:

All Dimensions in mm



\*\*\*Heat Sink and cooling fan required during operation\*\*\*

\*\*\*Includes current protection and over temp shutdown protection\*\*\*





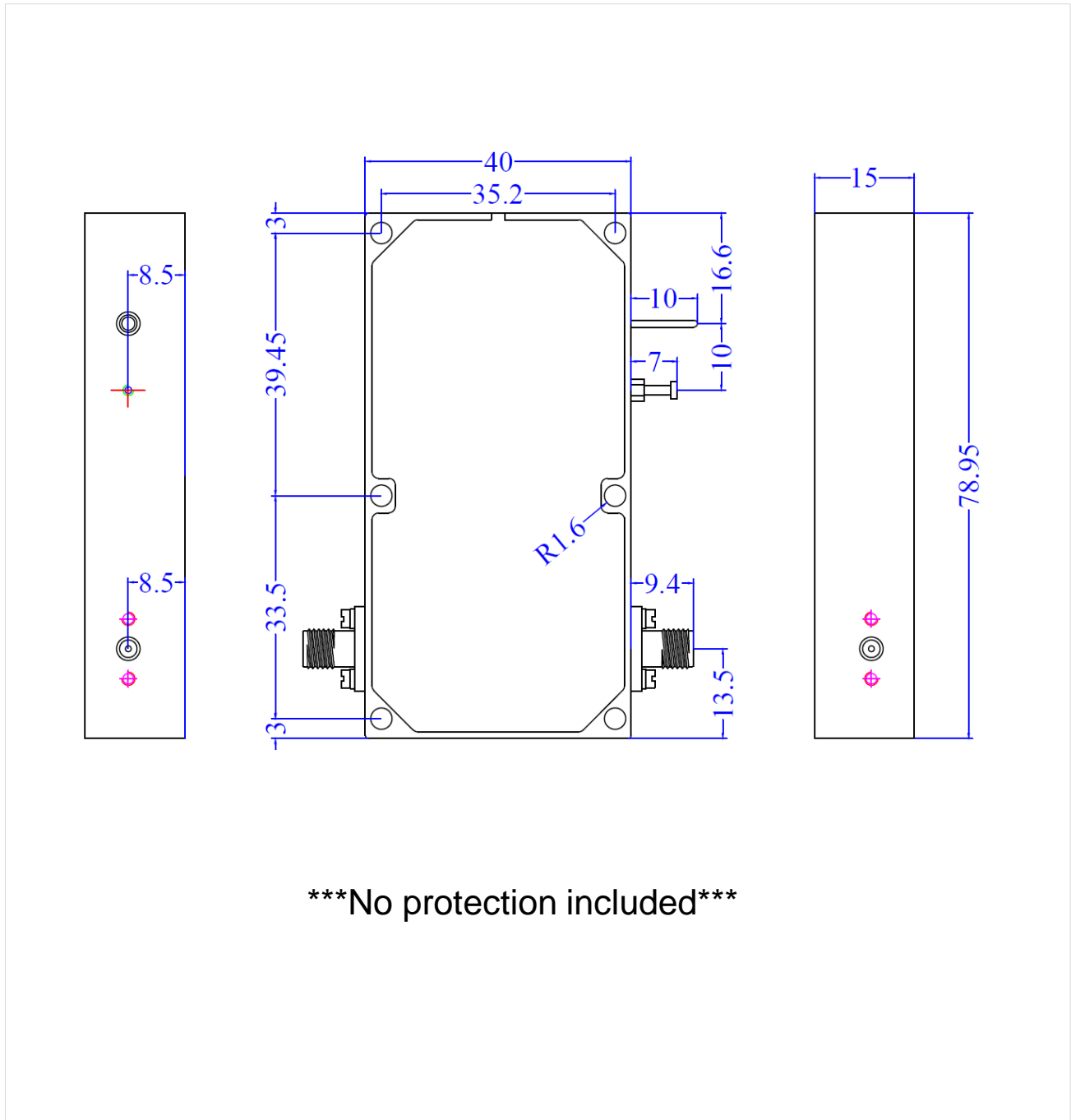
# RF-LAMBDA

The power beyond expectations

## RFLUPA01M22GA

### -NP Outline Drawing:

All Dimensions in mm



\*\*\*No protection included\*\*\*

\*\*\*Heat Sink and cooling fan required during operation\*\*\*

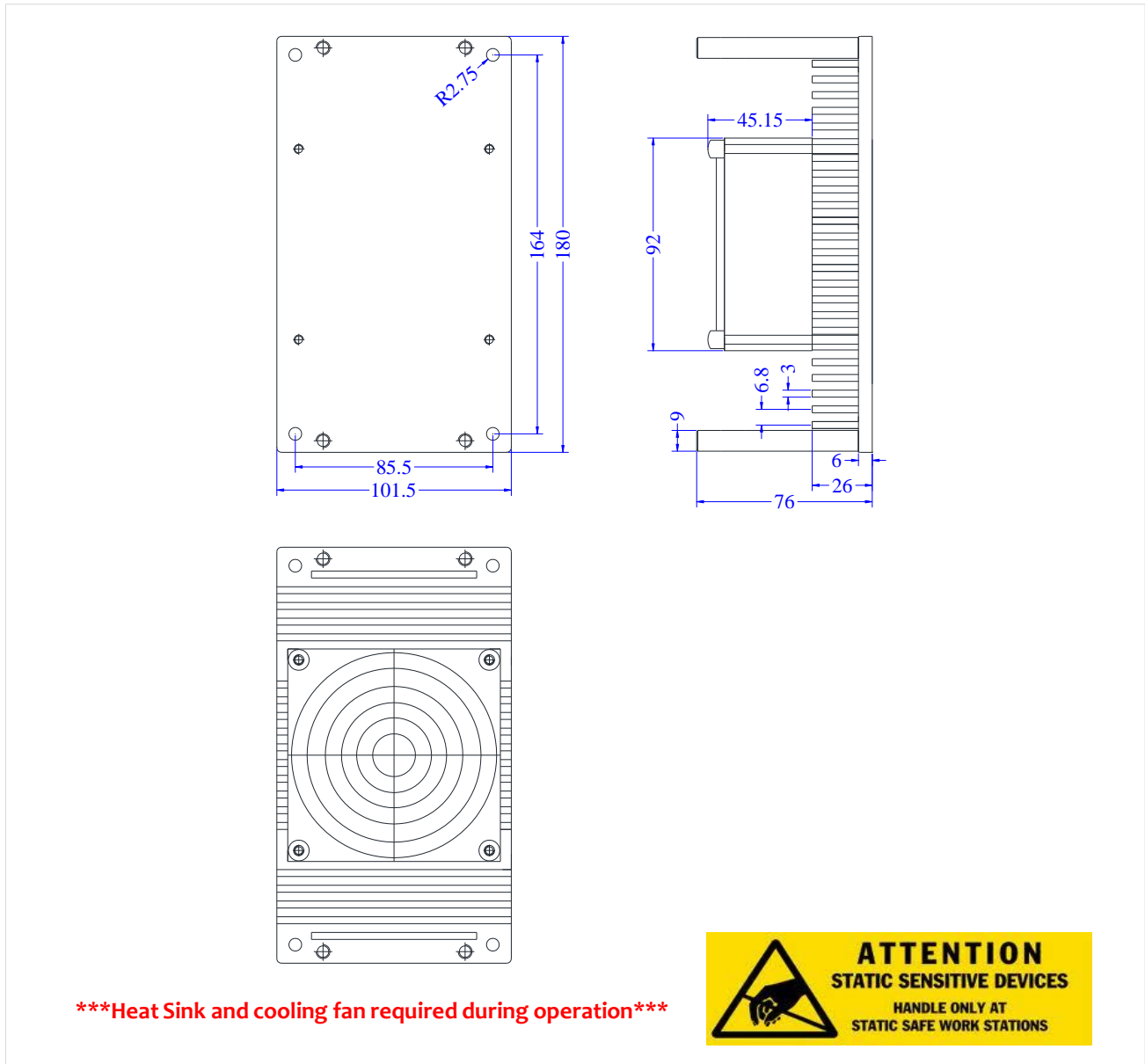


4W Ultra Wide Band Power Amplifier 0.1-22GHz



### -NP Outline Heatsink with Air Cooling Drawing:

All Dimensions in mm



4W Ultra Wide Band Power Amplifier 0.1-22GHz

### Important Notice

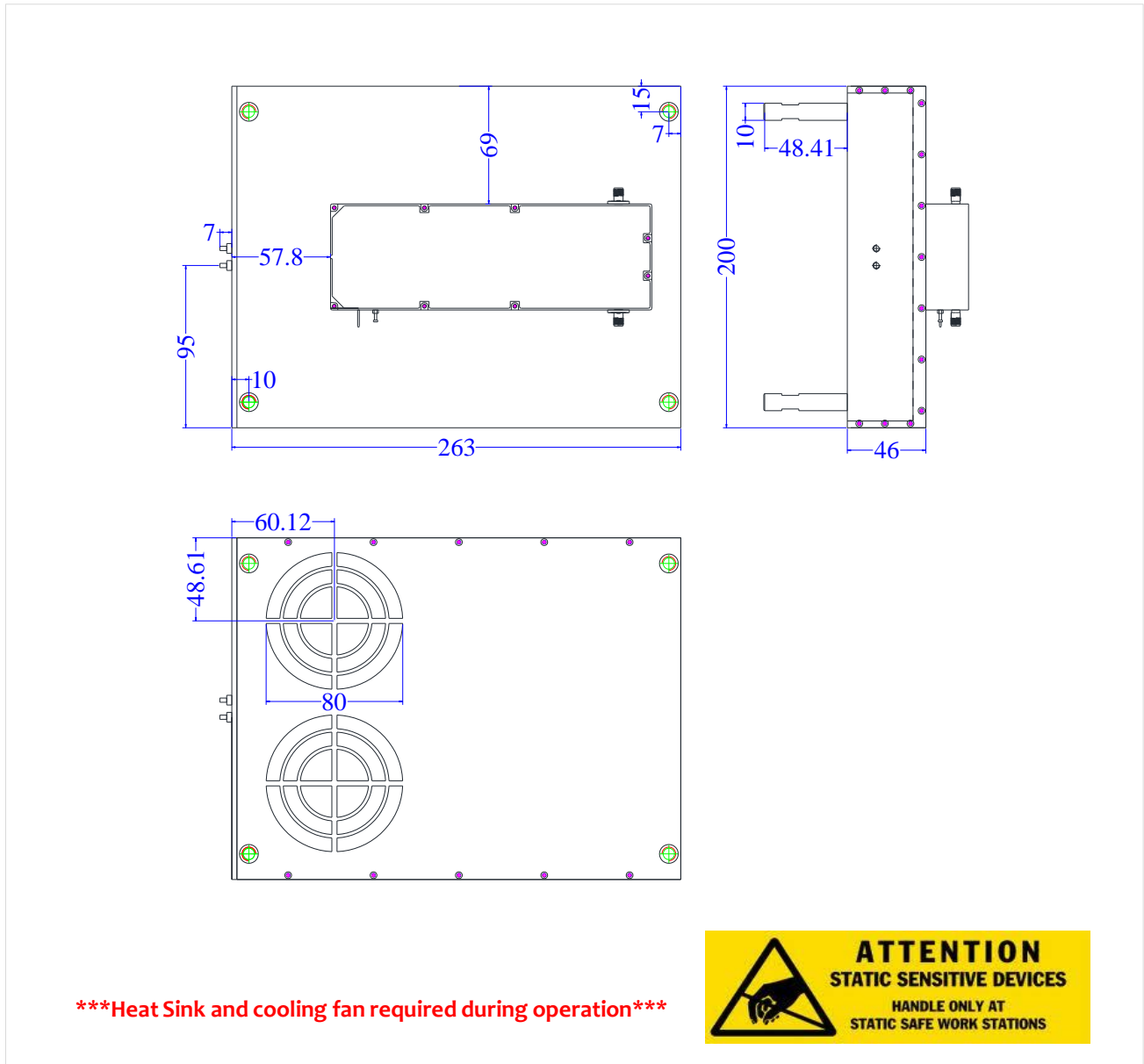
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### -WP Outline Heatsink with Air Cooling Drawing:

All Dimensions in mm



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