## Product Features

Frequency: 20MHz~700MHz

Noise Figure: 1.2dB@400MHz

Gain: 10.9dB@400MHz

Output Third-Order Interception: 43.6dBm@400MHz

Output Power for 1dB Compression: 24.1dBm@400MHz

Vdd=+5V, static current 100mA~160mA

Package: Compatible with SMO-8C

## Applications

Ultrashort-Wave Application

Large Dynamic Range Receiver

Anti-blocking Amplification System

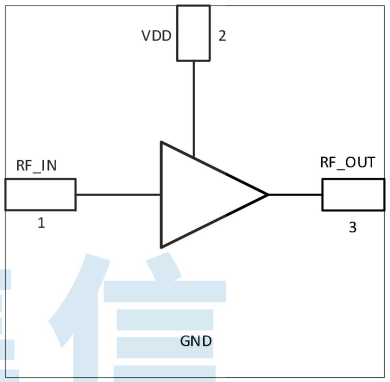
## Ordering Information

| Part Number | Package | Description |
|---|---|---|
| BR8122AFF | Compatible SMO-8C | 20MHz ~ 700MHz Anti-Blocking amplifier |

## General Description

BR8122AFF is a surface-mount, PCB substrate-based anti-blocking amplifier with a shielded metal enclosure, which covers a frequency range of 20MHz~700MHz. At 400MHz, the amplifier typically offers a gain of 10.9dB, an output IP3 of 43.6dBm and a noise figure of 1.2dB under the condition of +5V power supply. The product delivers excellent gain flatness across a wide frequency band, combined with high linearity, making it suitable for high-performance transceiver systems.

## Functional Block Diagram



## Electrical Specifications

| Parameters | Min. | Typ. | Max. | Units | Test Condition |
|---|---|---|---|---|---|
| Gain | - | 10.9 | - | dB | 400MHz |
| Output Power for 1dB Compression | - | 24.1 | - | dBm | 400MHz |
| Output Third-Order Interception | - | 43.6 | - | dBm | 400MHz |
| Noise Figure | - | 1.2 | - | dB | 400MHz |
| Input Return Loss | - | -12.3 | - | dB | 400MHz |
| Output Return Loss | - | -14.7 | - | dB | 400MHz |
| Reverse Isolation | - | -14.1 | - | dB | 400MHz |
| Supply Voltage | - | 5 | - | V | - |
| Supply Current | 100 | 127 | 160 | mA | - |
| Test Conditions: Vdd=+5V, OIP3 spacing=1MHz, Pout=+10dBm/tone, TA=+25℃ | | | | | |

## Absolute Maximum Ratings

Maximum Operating Voltage (Vdd): +9V

Maximum RF Input Power:

+17dBm (+5V Supply Voltage)

Maximum RF Input Power:

+19dBm (+9V Supply Voltage)

ESD Rating: Class 1C (< 1600V)

## Recommended Working Conditions

Power Supply Voltage: +5V

Static Working Current: 100mA~160mA

Working Temperature: -55℃ ~ +85℃

Storage Temperature: -65℃ ~ +125℃

Note: Operation of the device outside the parameter ranges given absolute-maximum-ratings conditions may cause permanent damage, and. exposure to absolute-maximum-ratings conditions for extended periods will affect the reliability.

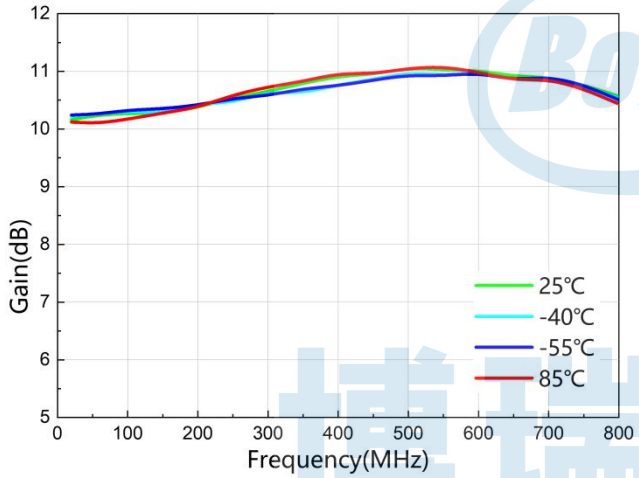
## ESD WARNING

**ELECTROSTATIC SENSITIVE DEVICE**

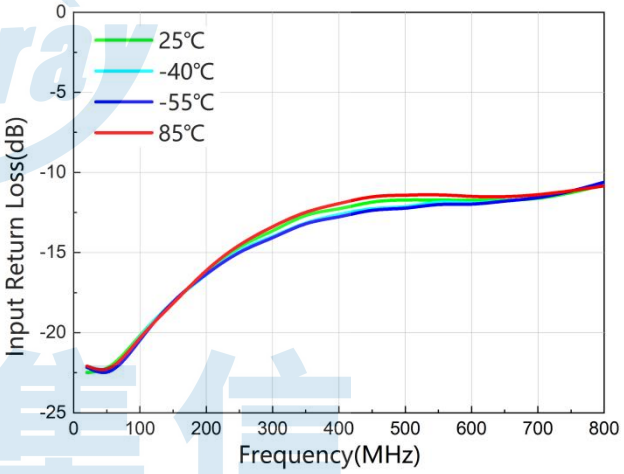
**OBSERVE HANDLING PRECAUTIONS**

## Typical Performance( (EVB test results at +5V supply voltage, 20MHz~1000MHz, 25℃)

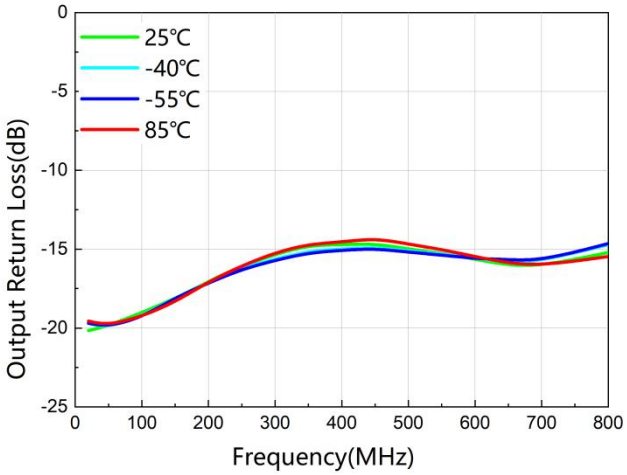
| Parameters | Typ. | | | | | | | | | Units |
|---|---|---|---|---|---|---|---|---|---|---|
| Frequency | 20 | 50 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | MHz |
| Gain | 10.2 | 10.2 | 10.3 | 10.4 | 10.7 | 10.9 | 11.0 | 11.0 | 10.9 | dB |
| Input Return Loss | -22.5 | -22.2 | -20.2 | -16.2 | -13.6 | -12.3 | -11.7 | -11.7 | -11.6 | dB |
| Output Return Loss | -20.2 | -19.8 | -19.0 | -17.1 | -15.3 | -14.7 | -15.0 | -15.6 | -16.1 | dB |
| Isolation | -13.6 | -13.6 | -13.7 | -13.8 | -13.9 | -14.1 | -14.3 | -14.4 | -14.7 | dB |
| Input Power for 1dB Compression | 14.6 | 14.7 | 14.5 | 14.5 | 14.6 | 14.3 | 14.0 | 15.0 | 14.6 | dBm |
| Output Power for 1dB Compression | 24.0 | 23.9 | 23.8 | 23.9 | 24.2 | 24.1 | 24.0 | 24.6 | 24.1 | dBm |
| Output Third-Order Intercept | 44.6 | 45.6 | 44.9 | 44.8 | 44.5 | 43.6 | 44.1 | 42.2 | 41.4 | dBm |
| Noise Figure | 1.4 | 1.0 | 1.0 | 1.0 | 1.0 | 1.2 | 1.4 | 1.5 | 1.7 | dB |
| Test Conditions: Vdd=+5V, I=127mA, OIP3 spacing=1MHz, Pout=+10dBm/tone, TA=+25℃ | | | | | | | | | | |



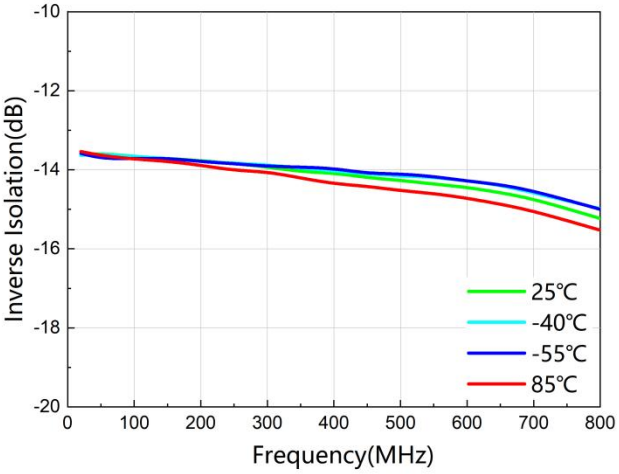

Gain vs. Freq



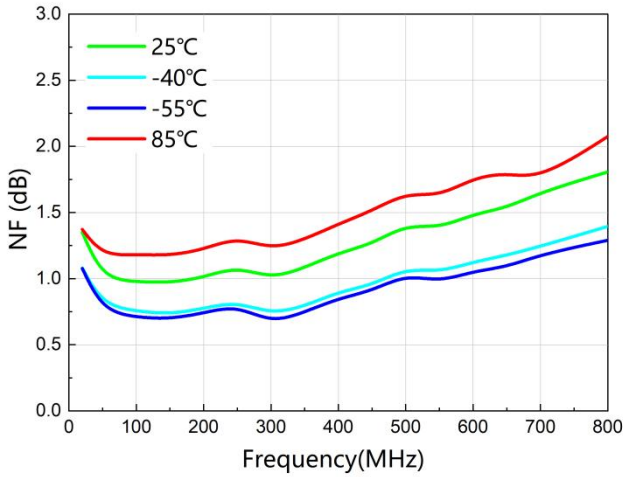

Input Return Loss vs. Freq



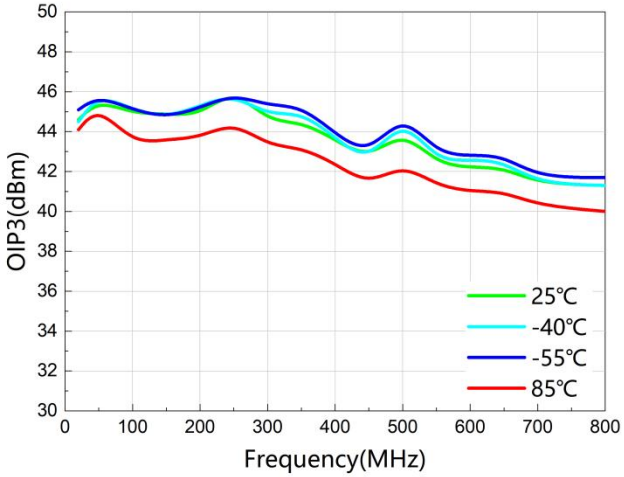

Output Return Loss vs. Freq



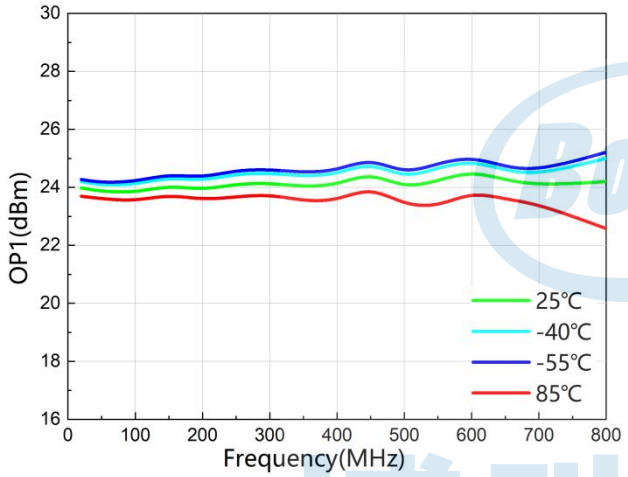

Reverse Isolation vs. Freq



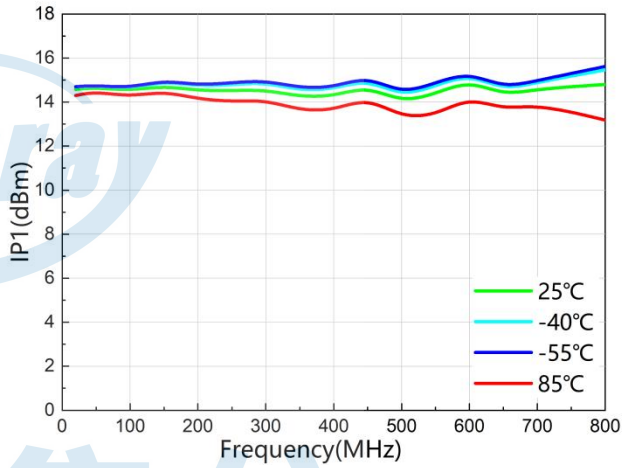

**Noise Figure vs. Freq**



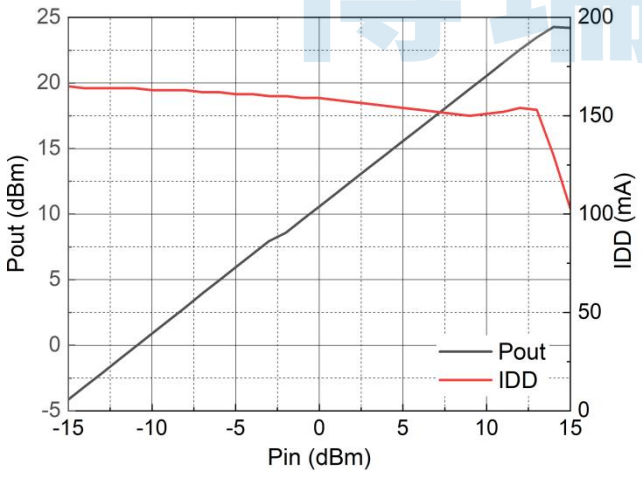

**Output Third-Order Intercept vs. Freq**



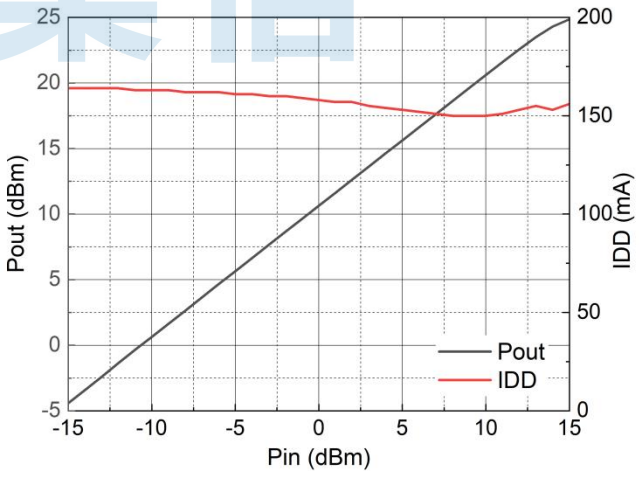

**Output Power for 1dB Compression vs. Freq**




**Input Power for 1dB Compression vs. Freq**



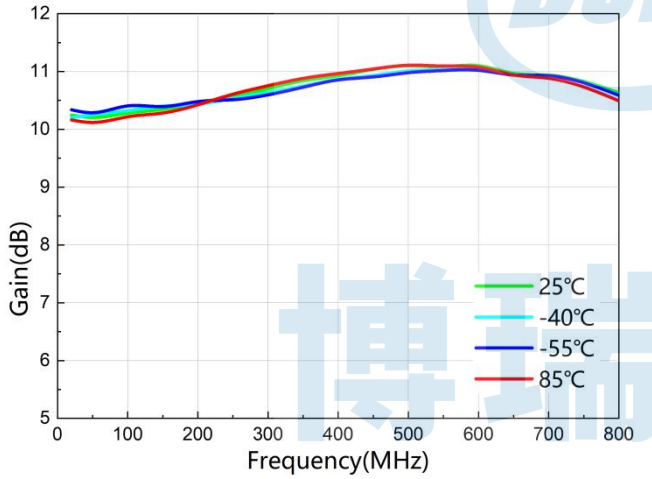

**$P_{out}$, IDD vs $P_{in}$ (400MHz)**



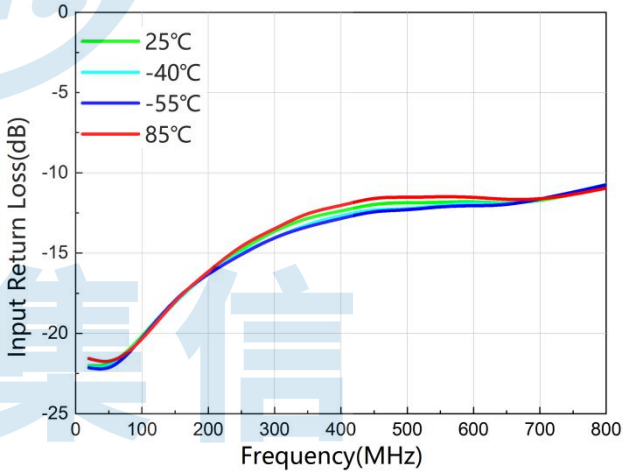

**$P_{out}$, IDD vs $P_{in}$ (700MHz)**

## Typical Performance( (EVB test results at +6V supply voltage, 20MHz~700MHz, 25℃)

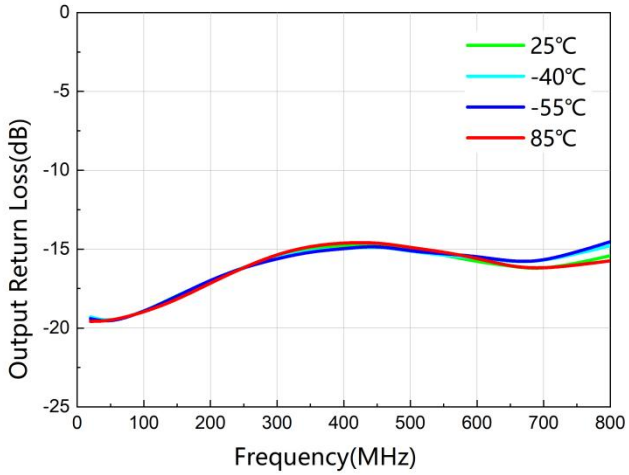
| Parameters | Typ. | | | | | | | | | Units |
|---|---|---|---|---|---|---|---|---|---|---|
| Frequency | 20 | 50 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | MHz |
| Gain | 10.2 | 10.2 | 10.3 | 10.5 | 10.7 | 10.9 | 11.1 | 11.1 | 10.9 | dB |
| Input Return Loss | -22.0 | -21.9 | -20.2 | -16.3 | -13.6 | -12.4 | -11.9 | -11.8 | -11.7 | dB |
| Output Return Loss | -19.5 | -19.6 | -19.0 | -17.0 | -15.4 | -14.8 | -15.0 | -15.8 | -16.4 | dB |
| Isolation | -13.6 | -13.6 | -13.6 | -13.8 | -13.9 | -14.1 | -14.2 | -14.4 | -14.7 | dB |
| Input Power for 1dB Compression | 16.0 | 16.1 | 15.9 | 15.9 | 15.9 | 15.6 | 15.3 | 16.2 | 15.9 | dBm |
| Output Power for 1dB Compression | 25.5 | 25.3 | 25.2 | 25.3 | 25.5 | 25.5 | 25.4 | 25.9 | 25.4 | dBm |
| Output Third-Order Intercept | 45.0 | 46.4 | 45.9 | 46.7 | 46.4 | 45.4 | 46.9 | 44.8 | 43.3 | dBm |
| Noise Figure | 1.4 | 1.1 | 1.0 | 1.1 | 1.0 | 1.3 | 1.5 | 1.6 | 1.8 | dB |
| Test Conditions: Vdd=+6V, I=180mA, OIP3 spacing=1MHz, Pout=+10dBm/tone, TA=+25℃ | | | | | | | | | | |



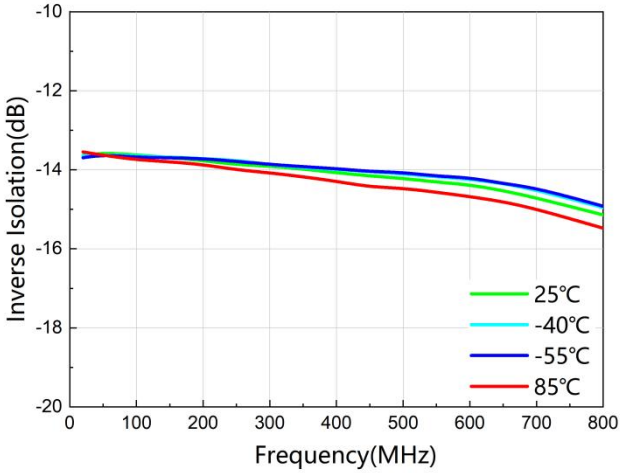

Gain vs. Freq



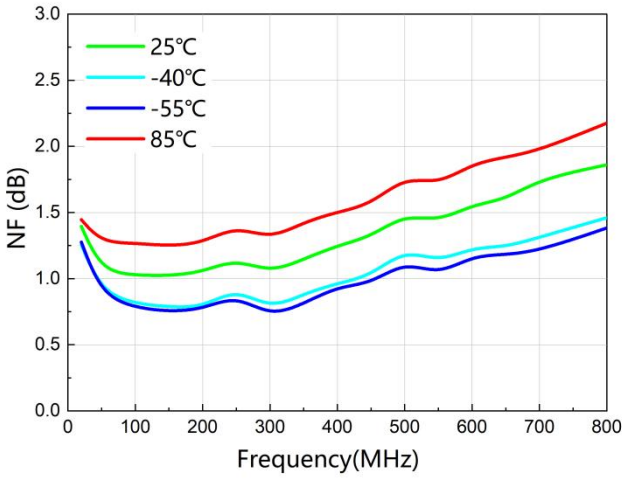

Input Return Loss vs. Freq



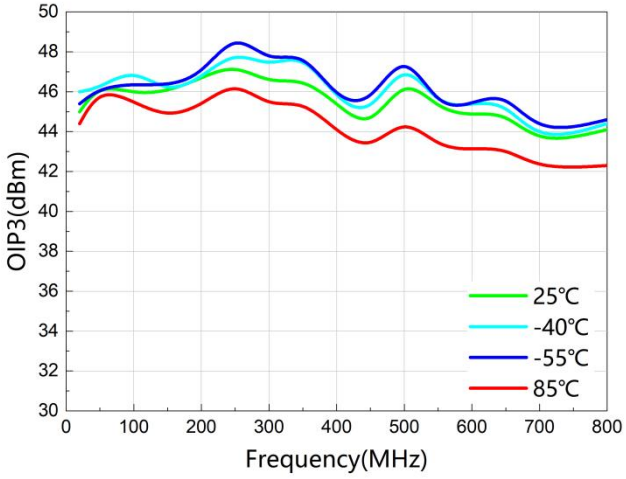

Output Return Loss vs. Freq



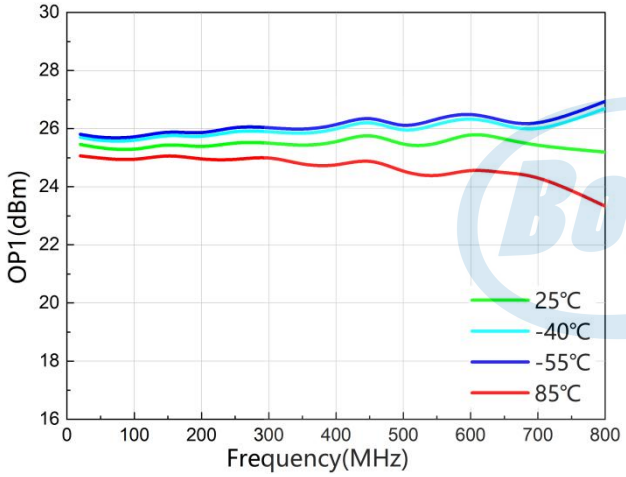

Reverse Isolation vs. Freq



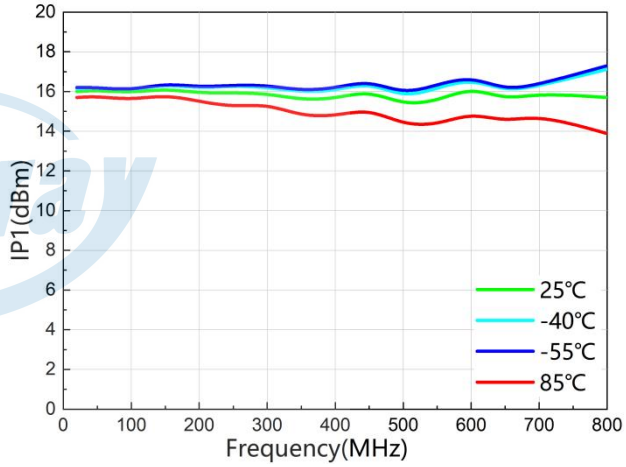

**Noise Figure vs. Freq**



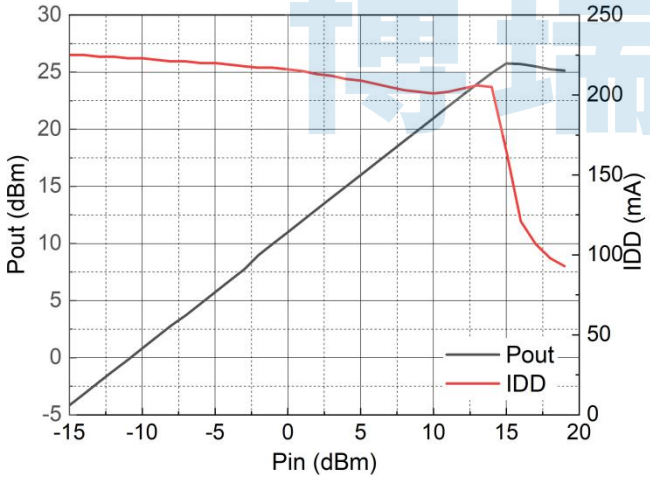

**Output Third-Order Intercept vs. Freq**



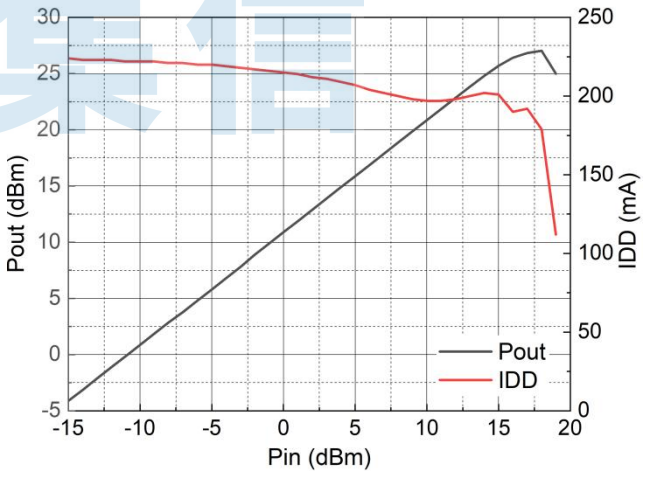

**Output Power for 1dB Compression vs. Freq**




**Input Power for 1dB Compression vs. Freq**



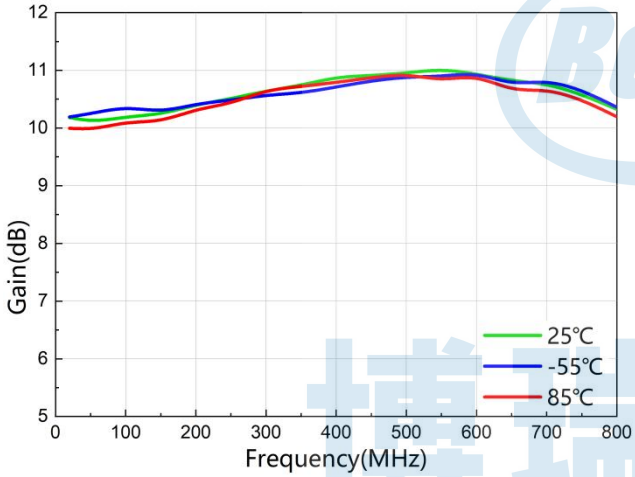

**$P_{out}$, IDD vs $P_{in}$(400MHz)**



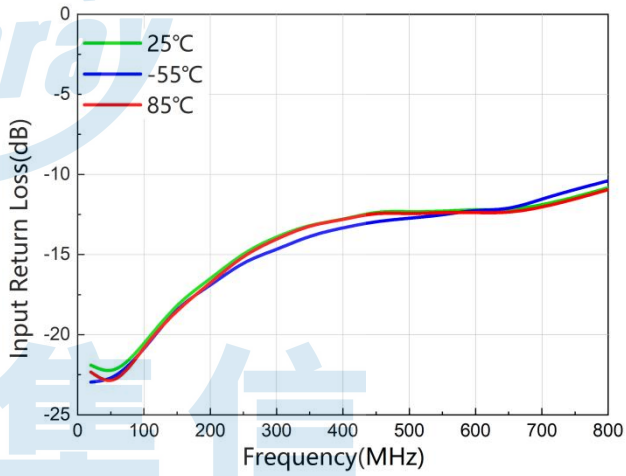

**$P_{out}$, IDD vs $P_{in}$ (700MHz)**

## Typical Performance( (EVB test results at +9V supply voltage , 20MHz~700MHz, 25℃)

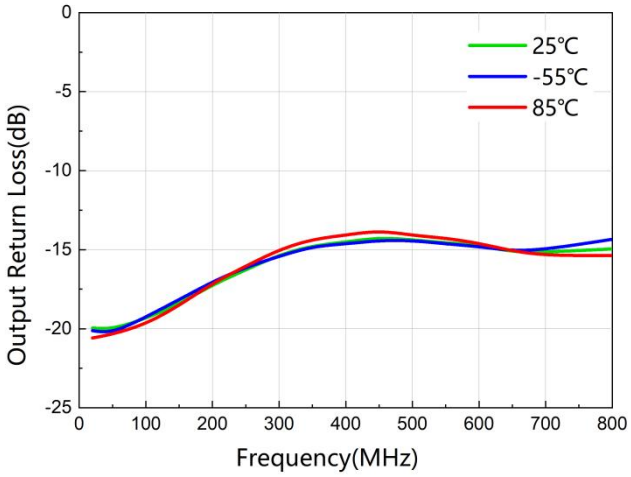
| Parameters | Typ. | | | | | | | | | Units |
|---|---|---|---|---|---|---|---|---|---|---|
| Frequency | 20 | 50 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | MHz |
| Gain | 10.2 | 10.1 | 10.2 | 10.4 | 10.6 | 10.9 | 11.0 | 10.9 | 10.7 | dB |
| Input Return Loss | -21.9 | -22.2 | -20.5 | -16.5 | -13.9 | -12.8 | -12.3 | -12.2 | -11.9 | dB |
| Output Return Loss | -20.0 | -20.0 | -19.3 | -17.2 | -15.3 | -14.5 | -14.4 | -14.7 | -15.2 | dB |
| Isolation | -13.6 | -13.7 | -13.8 | -13.8 | -14.0 | -14.2 | -14.4 | -14.5 | -14.8 | dB |
| Input Power for 1dB Compressiont | 19.5 | 19.3 | 19.0 | 19.3 | 19.0 | 18.7 | 17.8 | 17.8 | 17.6 | dBm |
| Output Power for 1dB Compression | 28.6 | 28.4 | 28.2 | 28.5 | 28.4 | 28.3 | 27.8 | 27.8 | 27.2 | dBm |
| Output Third-Order Interception | 43.3 | 44.9 | 45.4 | 45.8 | 45.7 | 45.3 | 44.0 | 43.4 | 43.2 | dBm |
| Noise Figure | 1.8 | 1.3 | 1.3 | 1.3 | 1.3 | 1.5 | 1.7 | 1.8 | 2.0 | dB |
| Test Conditions: Vdd=+9V, I=226mA, OIP3 spacing=1MHz, Pout=+10dBm/tone, TA=+25℃ | | | | | | | | | | |



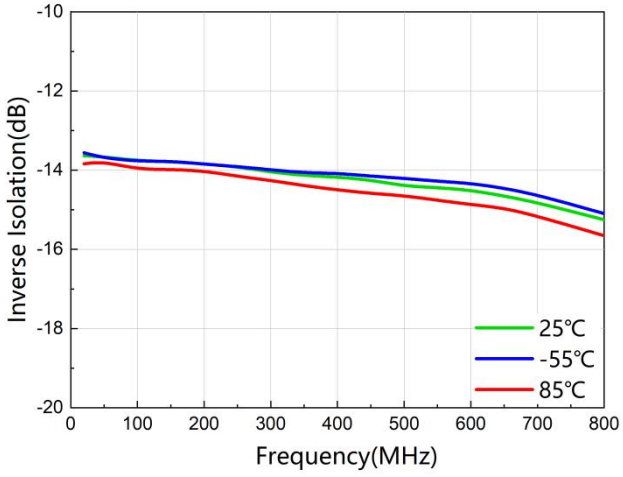

Gain vs. Freq



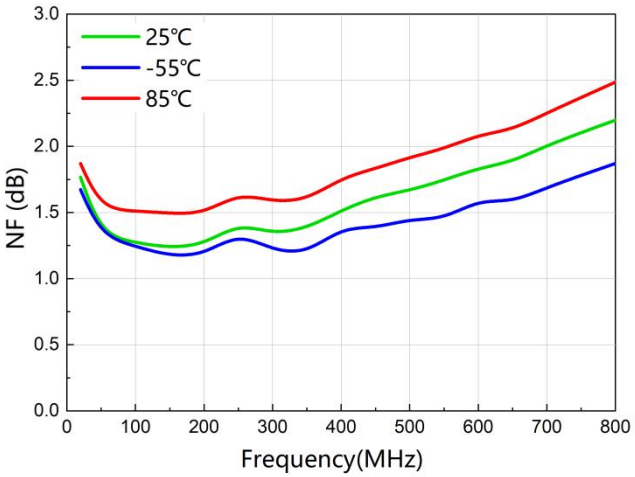

Input Return Loss vs. Freq



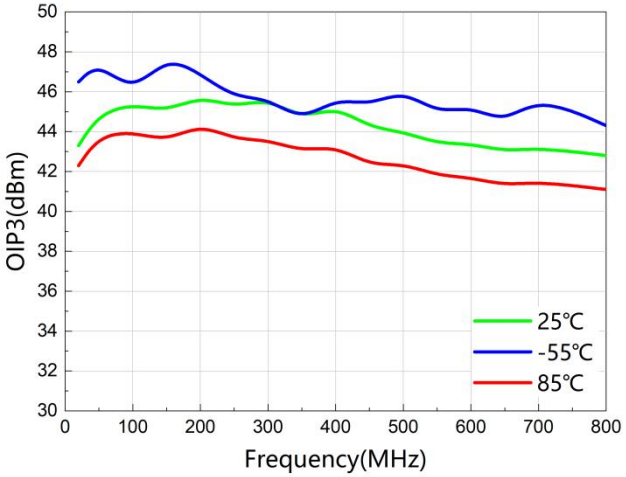

Output Return Loss vs. Freq



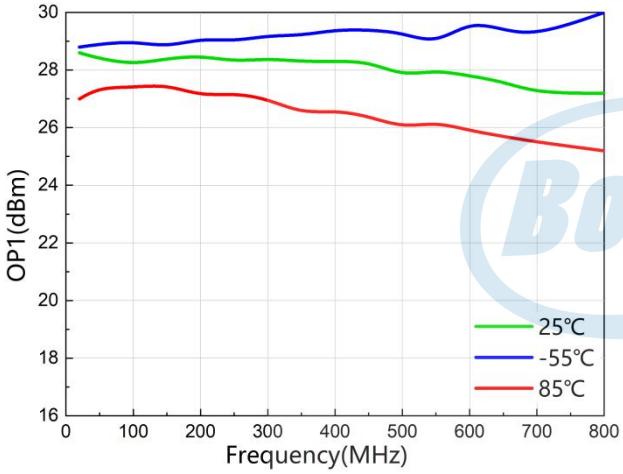

Reverse Isolation vs. Freq



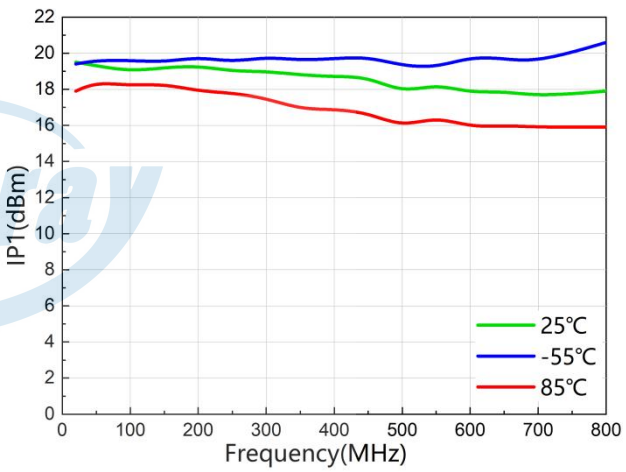

**Noise Figure vs. Freq**



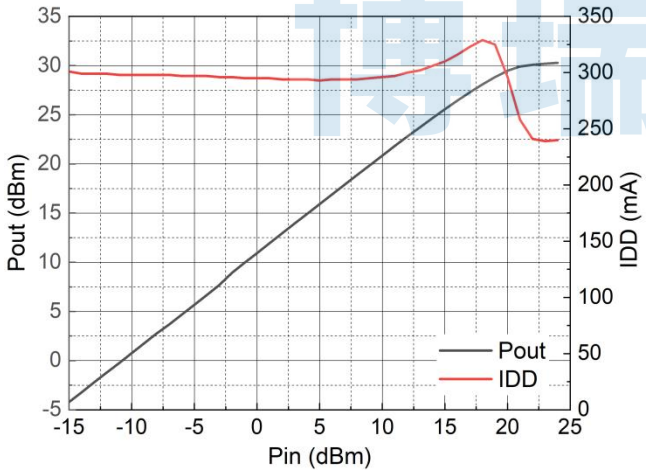

**Output Third-Order Interception vs. Freq**



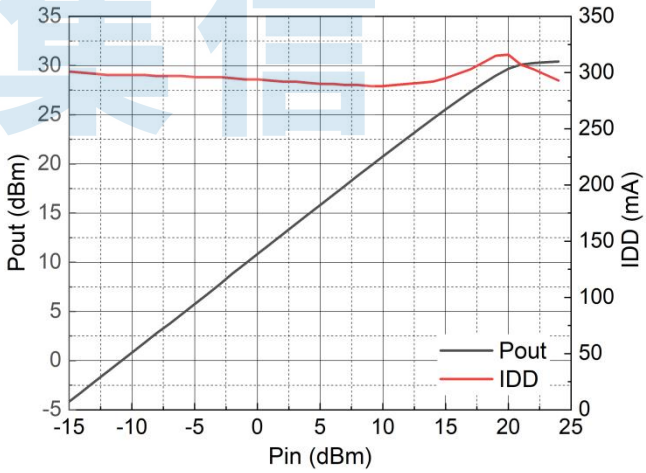

**Output Power for 1dB Compression vs. Freq**




**Input Power for 1dB Compression vs. Freq**

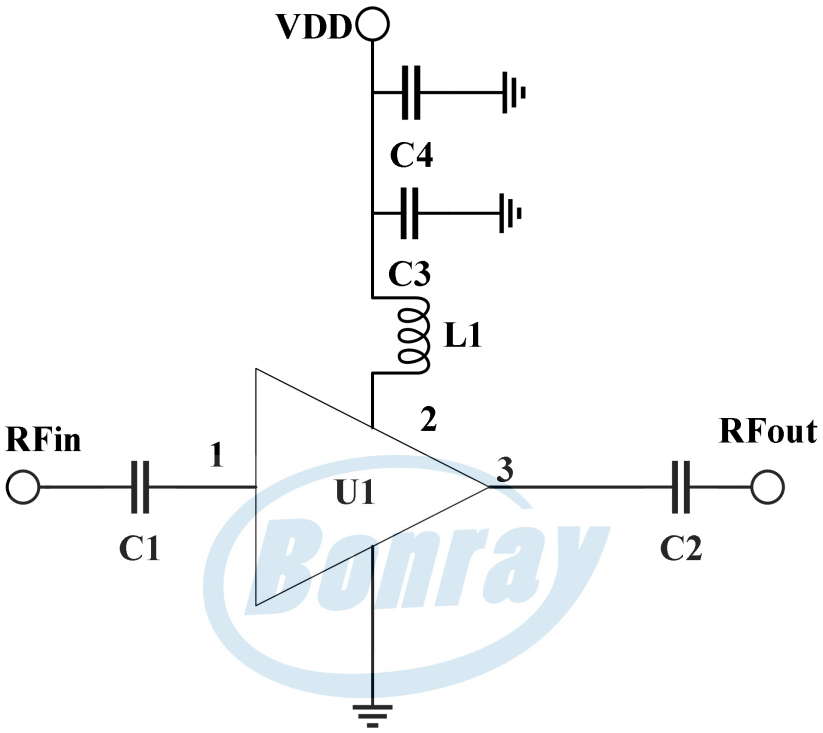



**$P_{out}$, IDD vs $P_{in}$ (400MHz)**




**$P_{out}$, IDD vs $P_{in}$ (700MHz)**

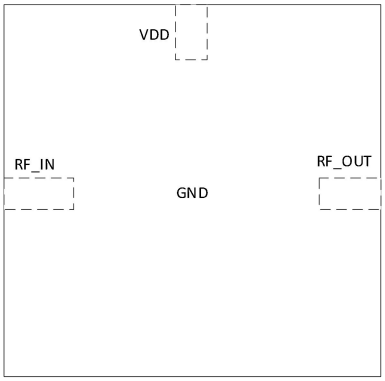
## Typical Application Schematic




## Bill of Material

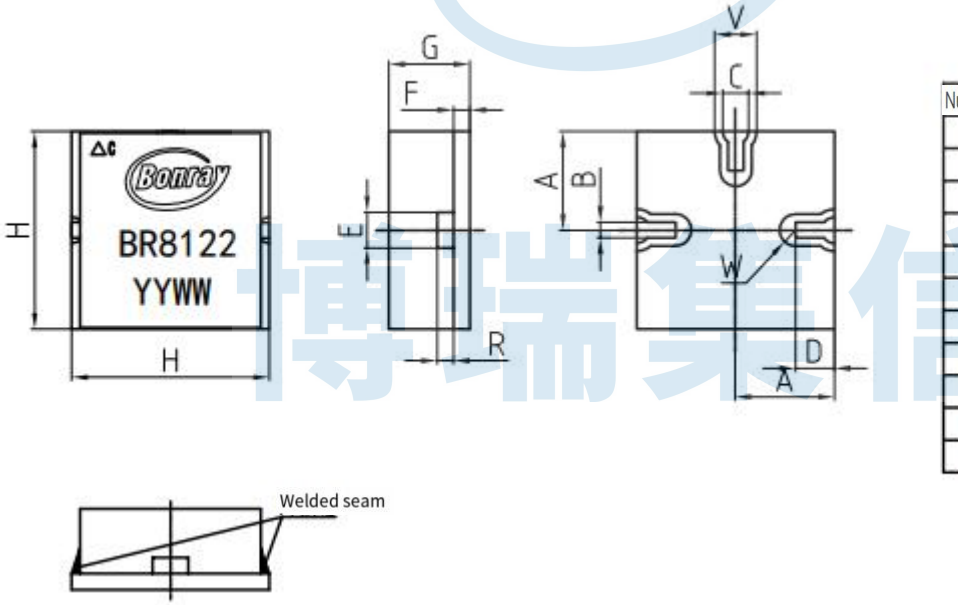
| Reference Designator | Package Size | Value | P/N |
|---|---|---|---|
| U1 | Compatible with SMO-8C | Anti-blocking amplifier | BR8122AFF |
| L1 | 0603 | 3.3 uH | 1008AF-332X_EC |
| C1, C2 | 0402 | 10nF | GRM155R71H103JA88D |
| C3 | 0402 | 1nF | GRM1555C1H102JA01D |
| C4 | 0402 | 1uF | C1005X5R1V105K050BC |

## Pin Configuration and Description




| Pin number | Pin name | Description |
|---|---|---|
| 1 | RFin | RF input pin. The pin is AC coupled |
| 2 | VDD | Power supply pin. |
| 3 | RFout | RF output pin. The pin is AC Coupled |
| 4 | GND | Ground pin. The pin must be connected to the RF/DC ground. |

## Package Dimensions (unit: mm)




| Numbering | Min. | Typ. | Max. |
|---|---|---|---|
| A | 5.9 | 6.1 | 6.3 |
| B | 0.9 | 1.0 | 1.1 |
| C | 1.5 | 1.6 | 1.7 |
| D | 2.3 | 2.4 | 2.5 |
| E | 3.2 | 3.4 | 3.6 |
| F | - | 1.0 | - |
| G | 4.8 | 5.0 | 5.2 |
| H | 12.1 | 12.2 | 12.3 |
| R | 0.8 | 1.0 | 1.2 |
| V | 2.2 | 2.4 | 2.6 |
| W | - | 0.99 | - |

**4 PIN description:** The pin is GND grounded and needs to be welded. The weld surface size is 12.2mm x 12.2mm rectangle minus the pin pin avoidance size.

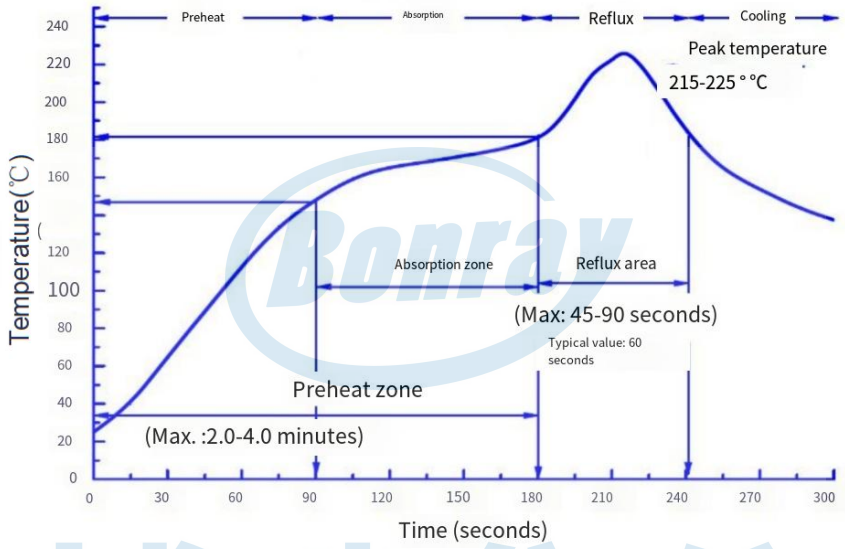
**Handling Precautions:**

1. The product is an ESD-sensitive device. Proper electrostatic protection measures must be implemented during transportation, assembly, and operation.

2. The component is classified as Moisture Sensitivity Level 3 (MSL3). Storage, handling, transportation, and packaging must comply with IPC/JEDEC J-STD-033 standards.

3. Ensure reliable grounding by connecting both the GND pin and the bottom metallized pad to the system ground plane.

4. Recommended assembly method: SMT (Surface Mount Technology) with Sn63/Pb37 solder paste (melting point: 183°C). Refer to the attached reflow temperature profile for process parameters.




The provided reflow temperature profile is a general recommendation. Actual parameters may vary depending on the substrate and reflow oven performance. The measured substrate temperature during reflow must not exceed the maximum assembly temperature specified in the absolute maximum ratings.

5. If rework or repair is necessary, the device must be baked according to Section 1 requirements prior to any heating process to prevent thermal damage. The total number of reflow and rework cycles shall not exceed three (3).

6. Customers must evaluate environmental conditions to determine if protective coating is required. For applications exposed to salt spray or corrosive environments, conformal coating (e.g., acrylic, silicone) must be applied after soldering and cleaning to enhance environmental resistance.

7. Due to the circuit architecture, dynamic current increases significantly near output power of 1dB Compression. To prevent interference with other ICs on the system board, it is recommended to power this device with a dedicated LDO (Low Dropout Regulator) capable of >400mA output current.

8. For operation at supply voltages ≥7V, a thermal pad (exposed copper area) must be added on the PCB underside, aligned with a structural heatsink (PCB window opening to contact the chassis); Optional front-side heatsink implementation should be determined by system-level thermal simulation results.