# NPA2204-FL

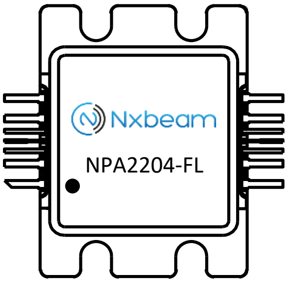
## 25.0 - 27.5 GHz GaN 30W Power Amplifier

### Product Description

The Nxbeam NPA2204-FL is a GaN Ka-band high power amplifier in a high-performance leaded flange package. The part operates from 25 to 27.5 GHz and provides an average of 30 W saturated output power, 25% PAE, and 23 dB of linear gain. The part provide 15 W of linear power based on -30dBc spectral regrowth for a QPSK modulated signal. The amplifier consists of three gain stages that can be biased independently providing flexibility to tailor performance to specific application needs. The NPA2204-FL has RF input and output matched to 50 Ω with internal blocking capacitors for easy system integration.

### Applications

- Ka-band Satellite Communications
- 5G Infrastructure
- Point-to-Point/Multipoint Digital Radios




### Key Features

- Frequency: 25 – 27.5 GHz
- Linear Gain: 23 dB
- Psat (Ave.): 30 W
- PAE (Ave.): 25%
- Linear Power: 15 W (-30dBc SRG, QPSK, 10 MSPS)

### Electrical Specifications

Test Condition: Vd = 26 V, Idq = 2.0 A, All Data is CW, Typical Performance at 25°C

| **Parameter** | | **Min** | **Typical** | **Max** | **Unit** |
|---|---|---|---|---|---|
| Frequency | | 25 | | 27.5 | GHz |
| Gain(Small Signal) | 25 GHz | | 21 | | dB |
| | 26 GHz | | 23 | | |
| | 27.5 GHz | | 21 | | |
| Output Power (at Psat, Pin=25.6dBm) | 25 GHz | | 44 | | dBm |
| | 26 GHz | | 45 | | |
| | 27.5 GHz | | 44 | | |
| PAE (at Psat, Pin=25.6dBm) | 25 GHz | | 18 | | % |
| | 26 GHz | | 25 | | |
| | 27.5 GHz | | 24 | | |
| Power Gain (at Psat, Pin=25.6dBm) | 25 GHz | | 17 | | dB |
| | 26 GHz | | 18 | | |
| | 27.5 GHz | | 18 | | |
| Input Return Loss | 25 GHz | | 12 | | dB |
| | 26 GHz | | 15 | | |
| | 27.5 GHz | | 28 | | |
| Output Return Loss | 25 GHz | | 6 | | dB |
| | 26 GHz | | 8 | | |
| | 27.5 GHz | | 12 | | |



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## Maximum Quiescent Bias

| Parameter | Min | Max | Unit |
|---|---|---|---|
| Drain Voltage (Vd1, Vd2,vd3) | | 28 | V |
| Drain Current (Id1) | | 264 | mA |
| Drain Current (Id2) | | 640 | mA |
| Drain Current (Id3) | | 2112 | mA |

Maximum quiescent bias represents the operational bias used during reliability life testing. Biasing the part at or below this bias ensures reliability will be bound by the published reliability results.

## Absolute Maximum Ratings (Temp. = 25°C)

| Parameter | Min | Max | Unit |
|---|---|---|---|
| Drain Voltage (Vd1, Vd2,vd3) | | 28 | V |
| Drain Current (Id1) | | 660 | mA |
| Drain Current (Id2) | | 1600 | mA |
| Drain Current (Id3) | | 5250 | mA |
| Gate Voltage(Vg1,Vg2,Vg3) | -8 | 0 | V |

Absolute maximum ratings represent the maximum current under power saturation conditions.

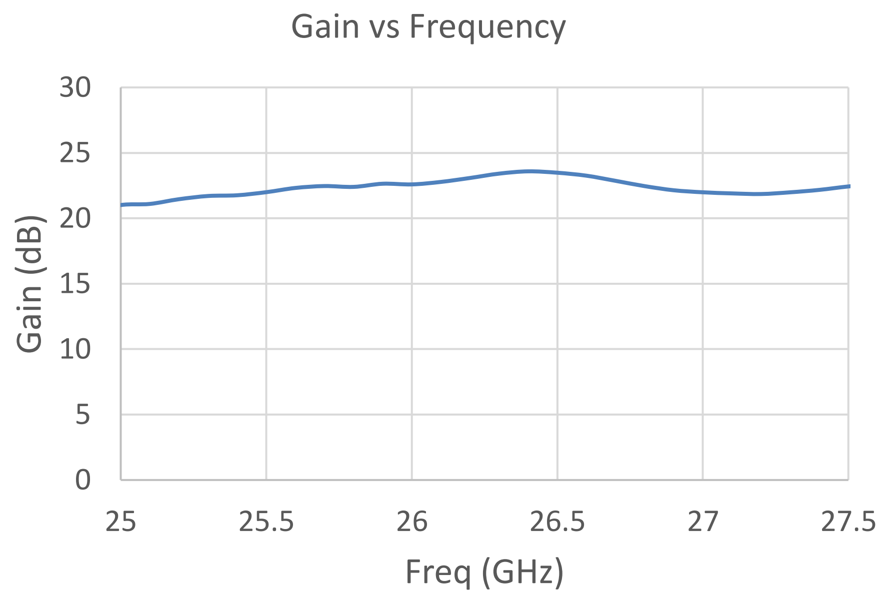
## Recommended Quiescent Operating Condition

| Parameter | Value | Unit |
|---|---|---|
| Drain Voltage (Vd1, Vd2) | 20-28 | V |
| Drain Current (Idq) | up to 3.2 | A |
| Gate Voltage(vg1,vg2,vg3)(Typical) | -4.8 | V |

Gate voltage will vary based on desired current per stage

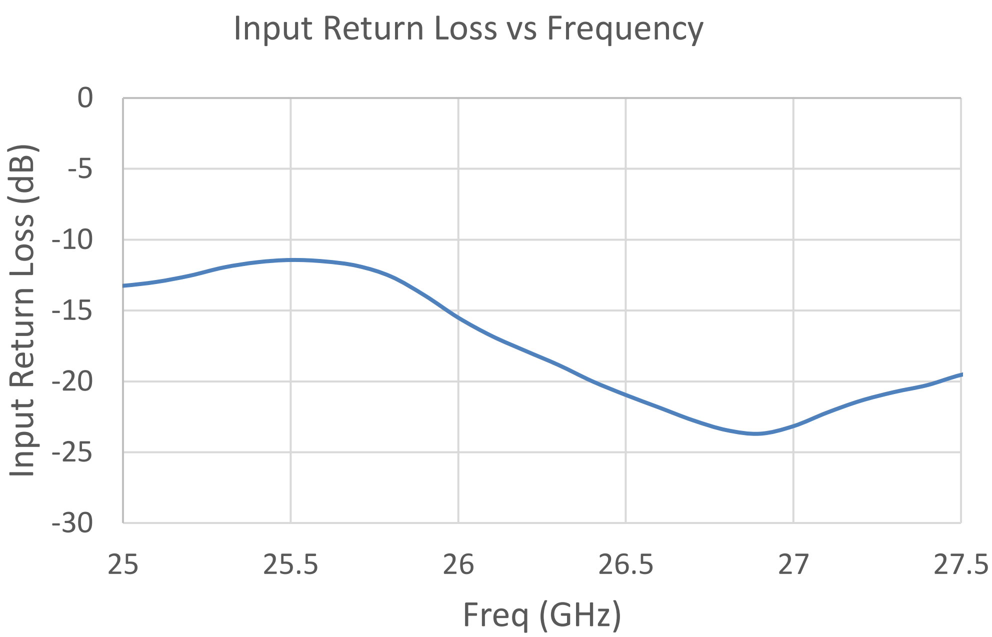
## Small Signal Performance

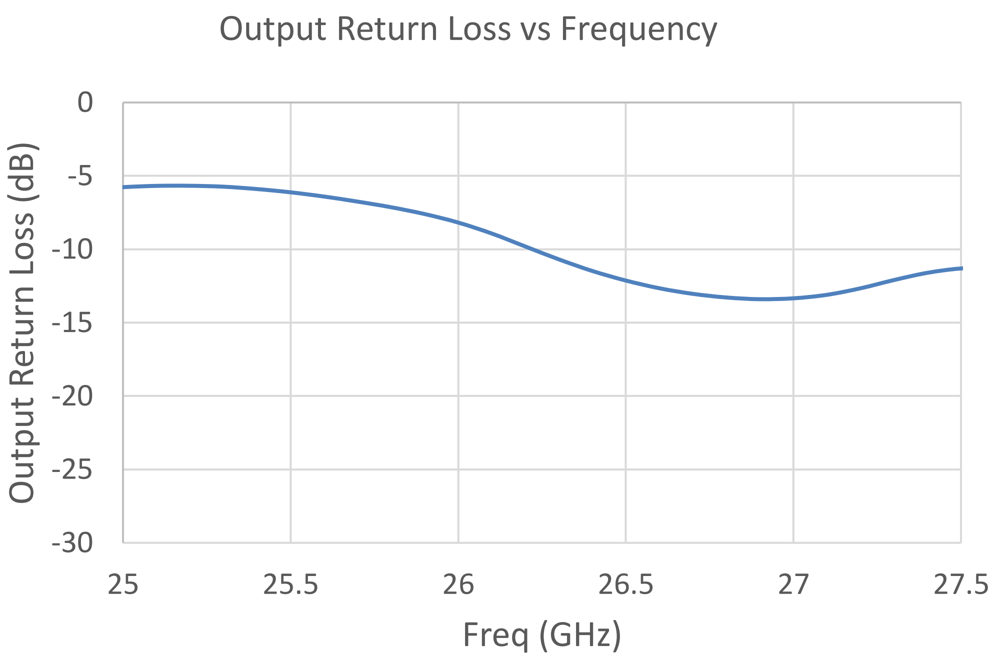
Test Condition: Vd = 26 V, Idq = 2 A, (CW Performance, Typical Performance at 25°C)



## Small Signal Performance

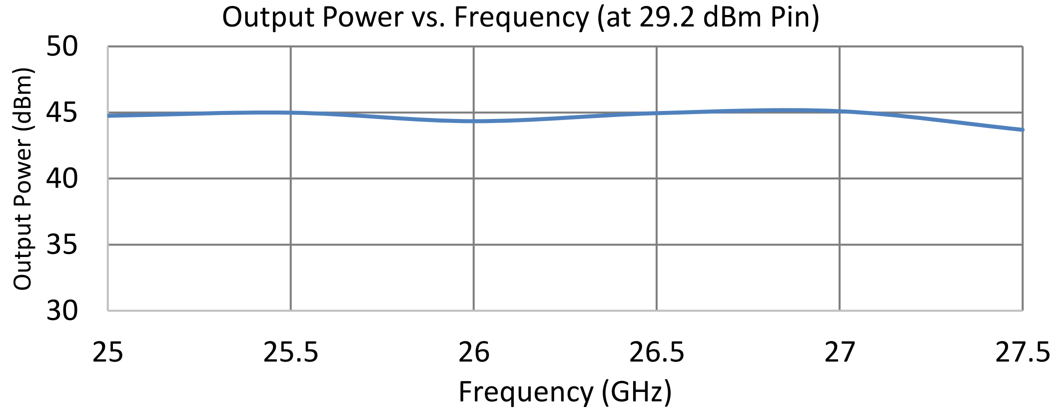
Test Condition: Vd = 26 V, Idq = 2 A, (CW Performance, Typical Performance at 25°C)

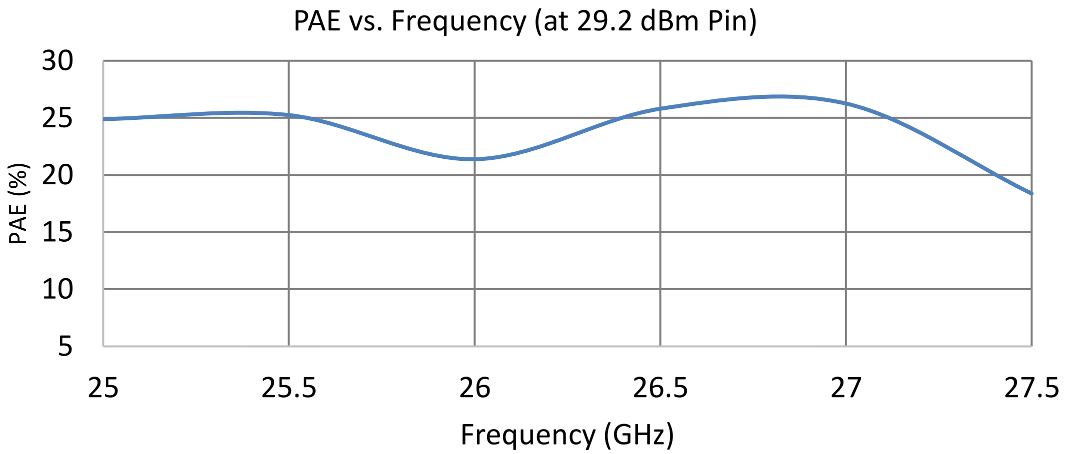


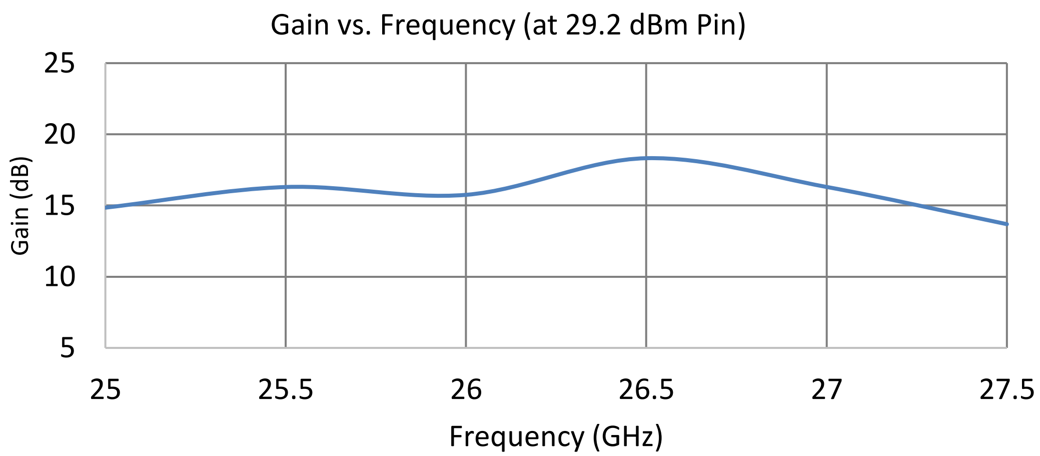



## Large Signal Performance

Test Condition: Vd = 26 V, Idq = 2.0 A, Temperature 25°C, CW Performance



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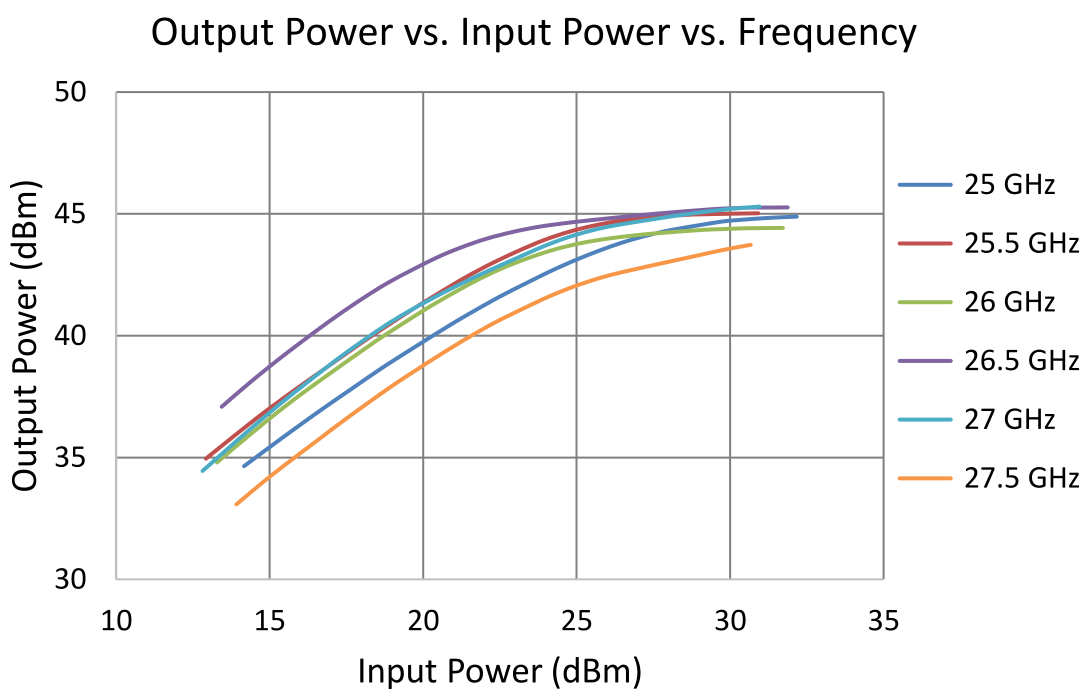
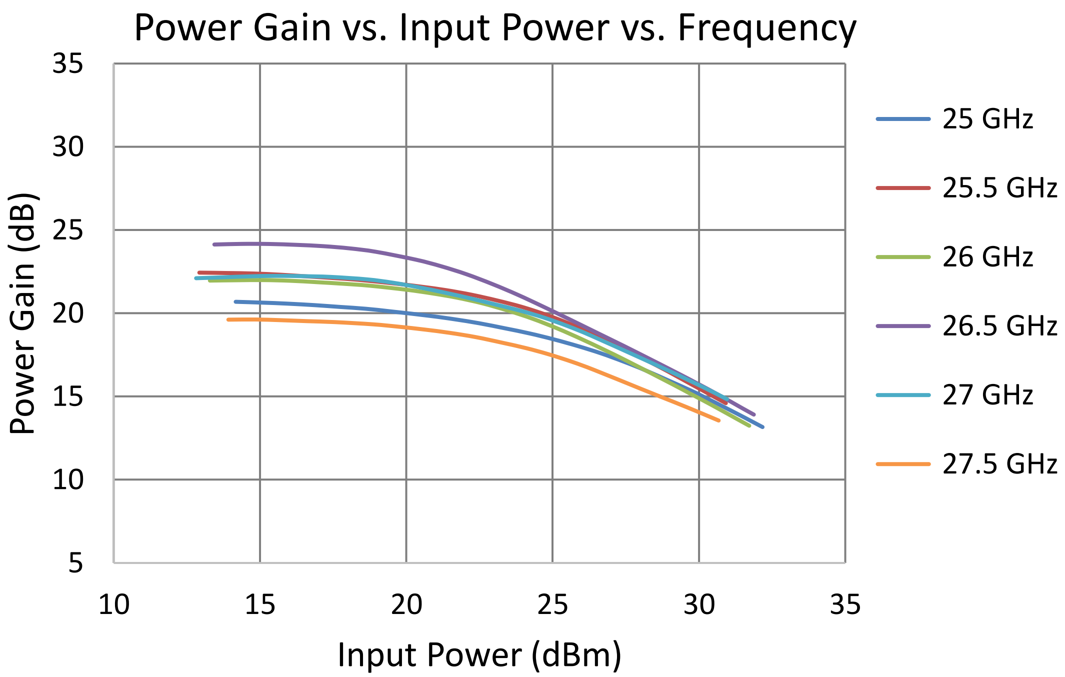
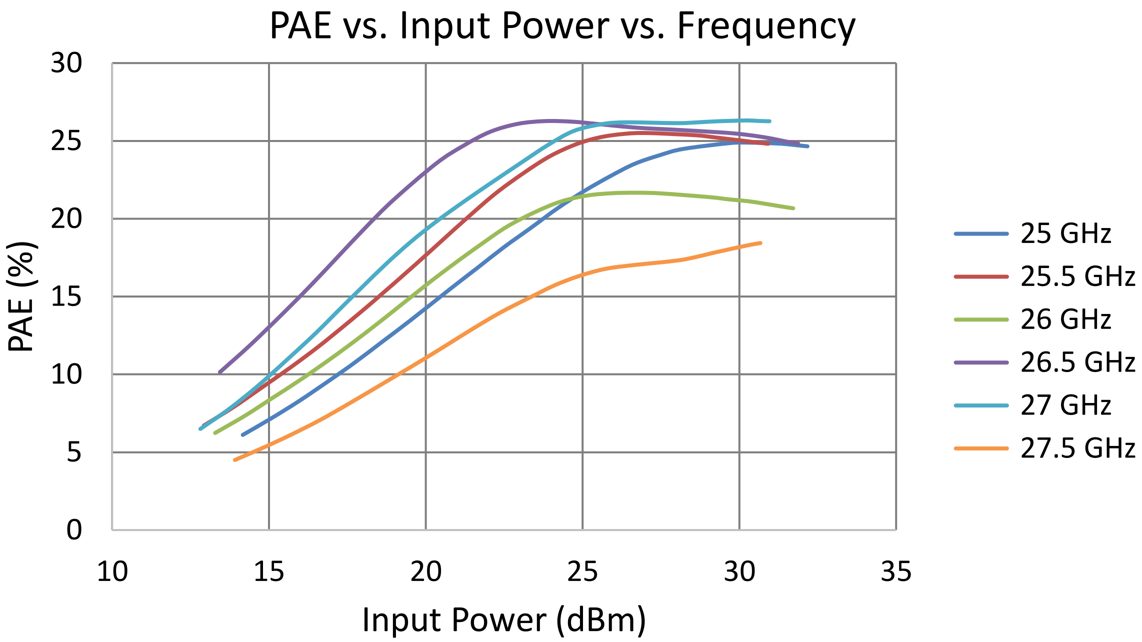
Test Condition: Vd = 26 V, Idq = 2.0 A, Temperature 25°C, CW Performance

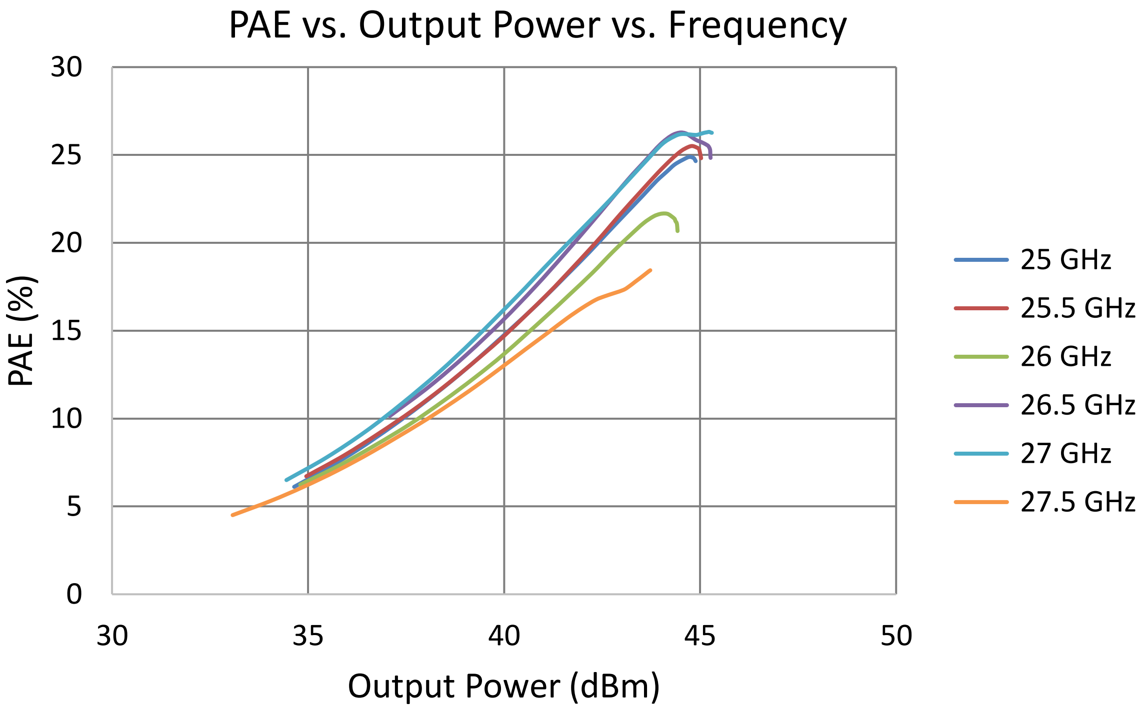


## Large Signal Performance

Test Condition: Vd = 26 V, Idq = 2.0 A, Temperature 25°C, CW Performance



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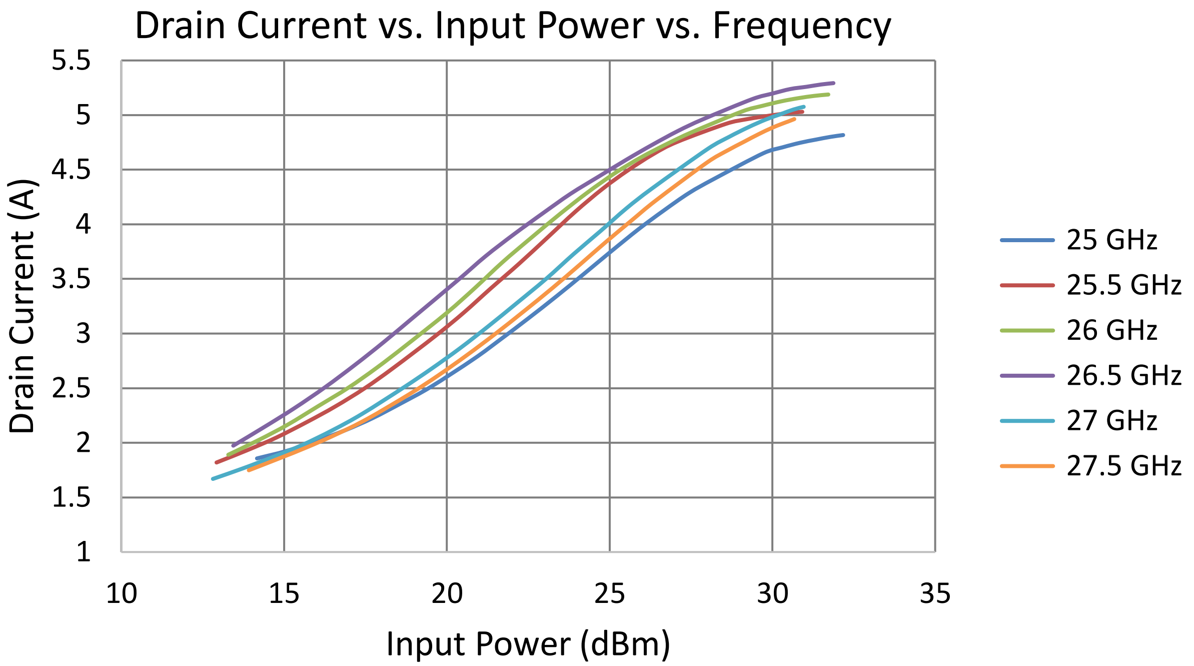
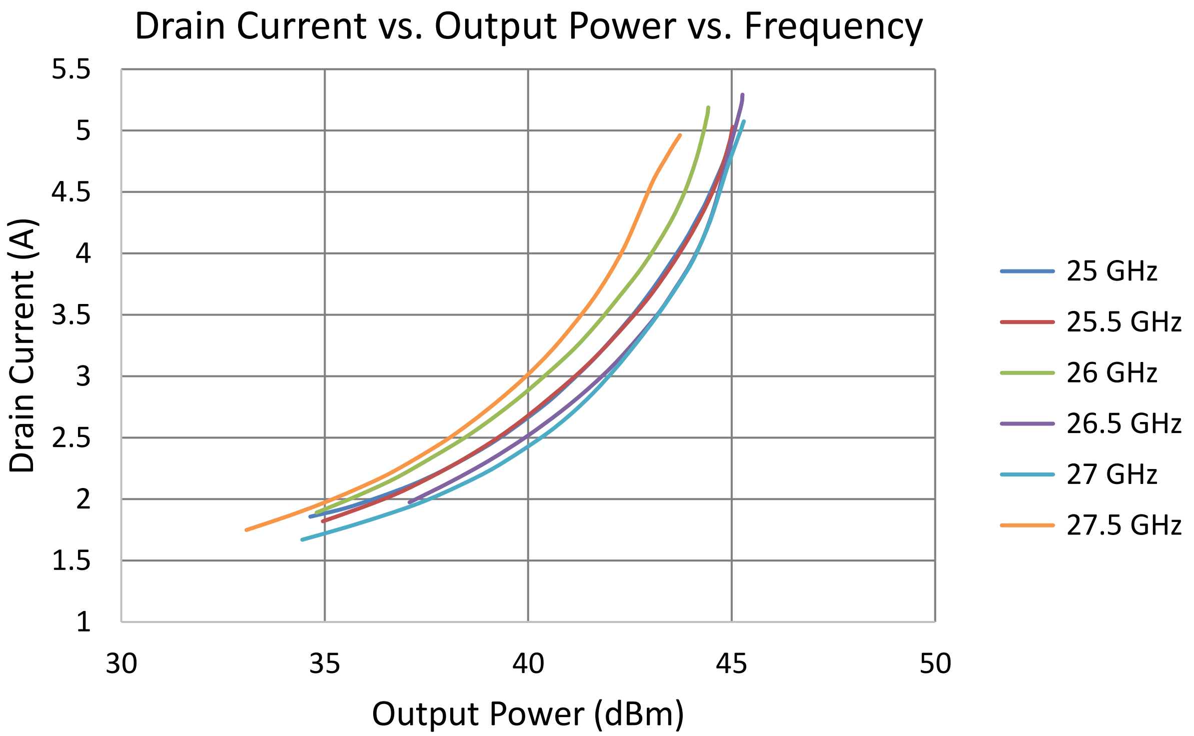
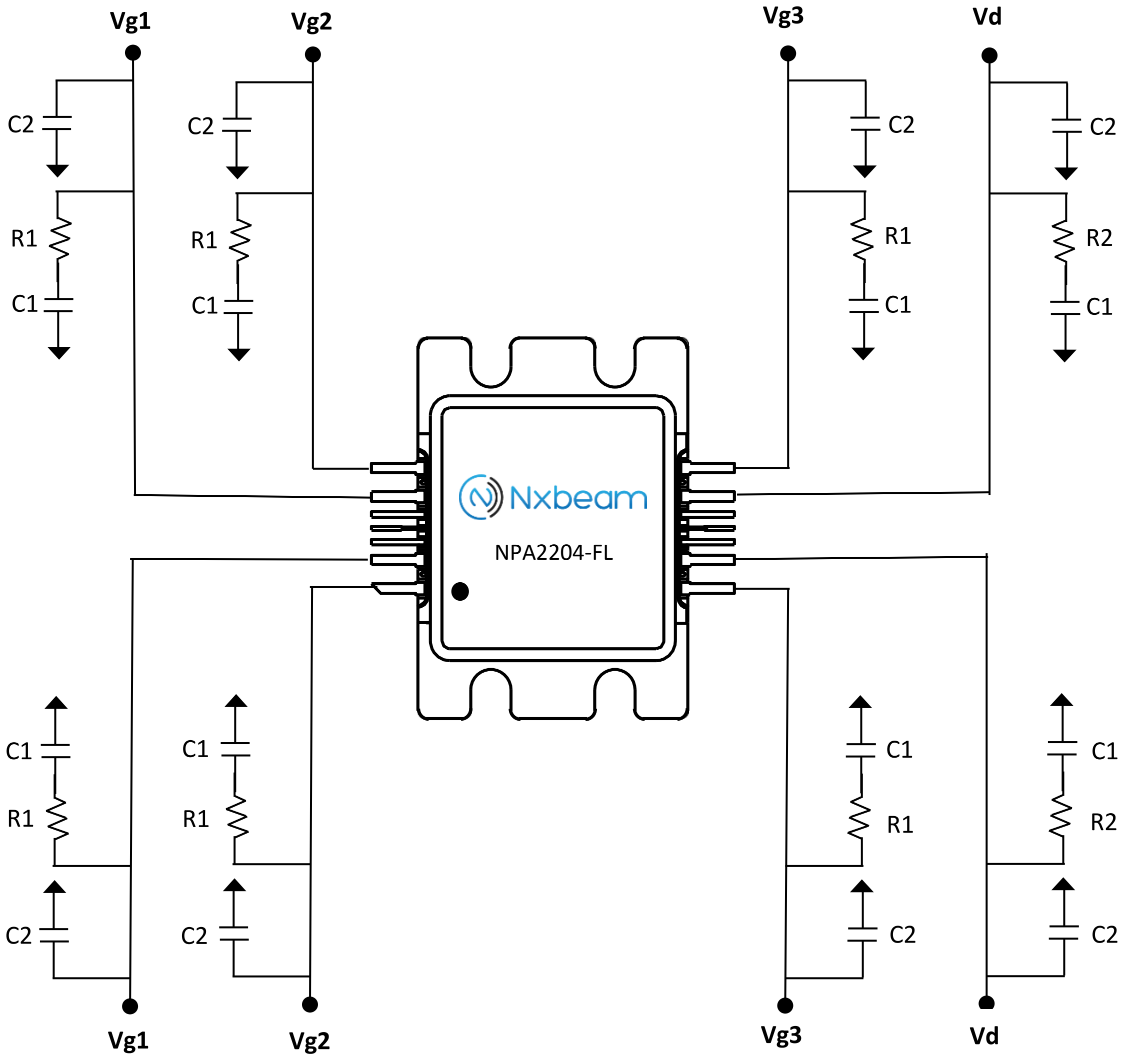
Test Condition: Vd = 26 V, Idq = 2.0 A, Temperature 25°C, CW Performance



## Suggested Off-Package Components

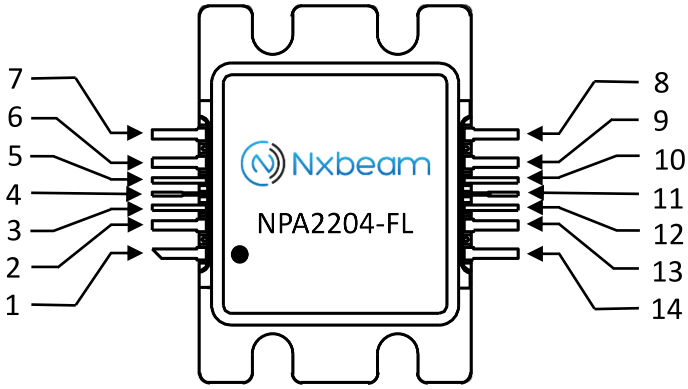
The following diagram shows the recommended off-package component.




| Capacitor | Value |
|---|---|
| C1 | 0.1 µF |
| C2 | 10 µF |

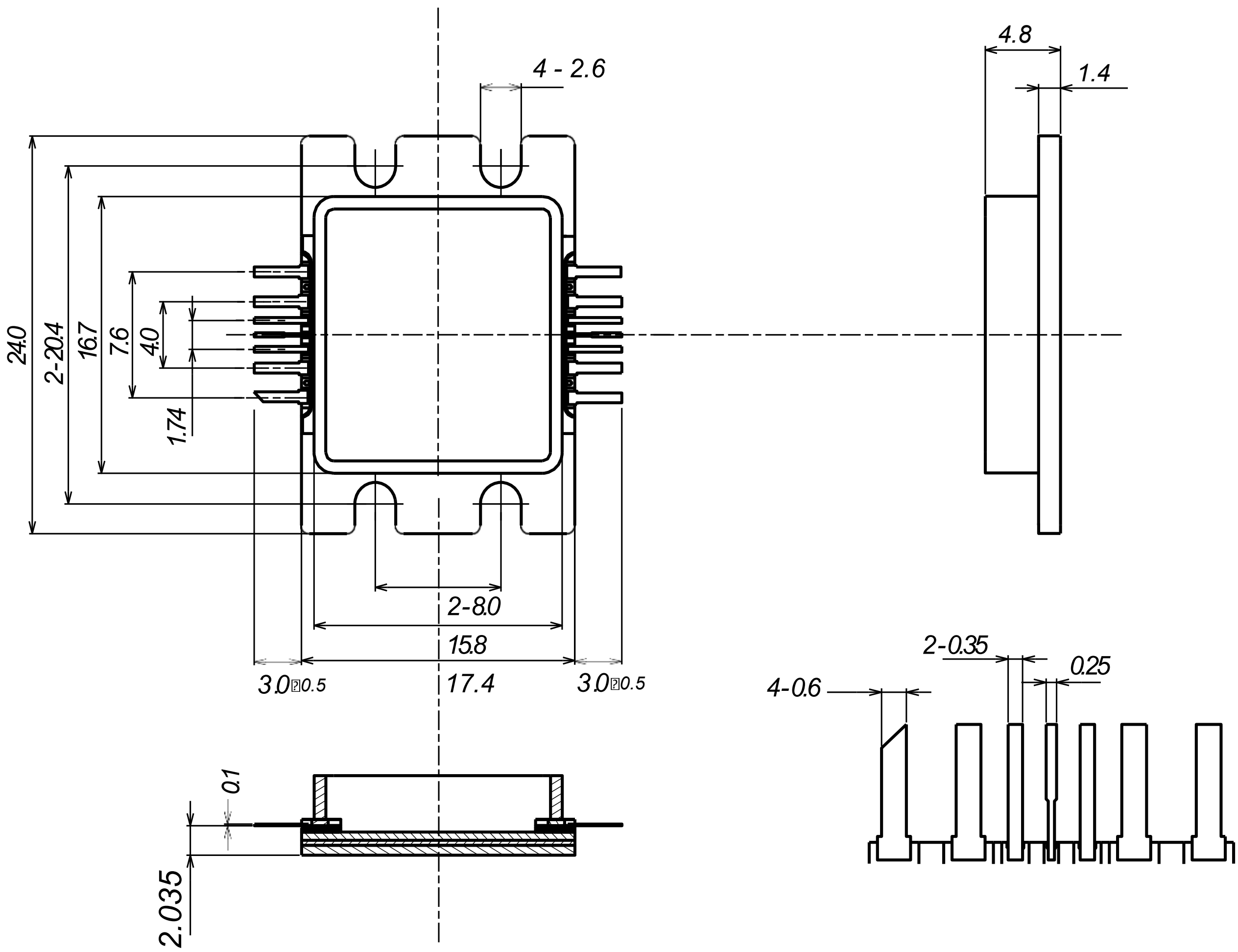
| Resistor | Value |
|---|---|
| R1 | 10 Ω |
| R2 | 1 Ω |

## Package Pin Connection Information




| Pad Num. | Function |
|---|---|
| 1, 7 | Vg2 |
| 2, 6 | Vg1 |
| 3, 5, 10, 12 | Gnd |
| 4 | RF in |
| 8, 14 | Vg3 |
| 9, 13 | Vd |
| 11 | RF out |

## Package Dimensions (all dimensions in mm)



## Bias Information

**Bias-up Procedure:**

1.) It is recommended that voltage and current limits are set on the voltage supply's prior to biasing the product.
2.) Ensure power supplies are properly grounded to the product test fixture.
3.) Apply a negative voltage of -7 V to Vg1, Vg2, and Vg3 to ensure all devices are pinched off.
4.) Gradually increase the drain voltage, Vd, to the desired level but not to exceed the maximum voltage of 28 V.
5.) Gradually increase the gate voltages (Vg1, Vg2, Vg3) while monitoring the drain current until the desired drain current is achieved for each amplifier stage.
6.) Apply RF signal.

**Bias-down Procedure:**

1.) Turn off RF signal.
2.) Gradually decrease the gate voltages Vg1, Vg2, and Vg3 down to -7 V.
3.) Gradually decrease the drain voltage, Vd, down to 0 V.
4.) Gradually increase gate voltages Vg1, Vg2, and Vg3 to 0 V.
5.) Turn off supply voltages

**ESD Sensitive Product**

## Important Information

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