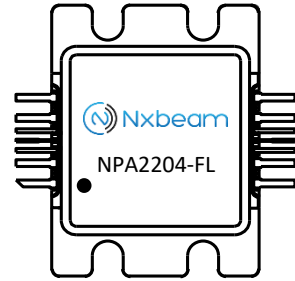


Product Description

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: $V_d = 26$ V, $I_{dq} = 2.0$ 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		

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

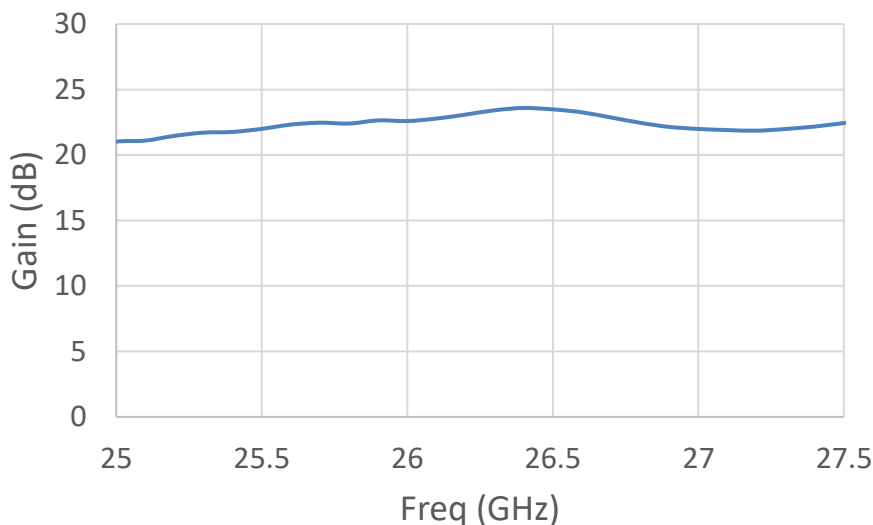
Parameter	Value	Unit
Drain Voltage (Vd1, Vd2)	20-28	V
Drain Current (Idq)	up to 3.2	A
Gate Voltage(vg1,vg2,vg3)(Typical)	-4.8	V

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)

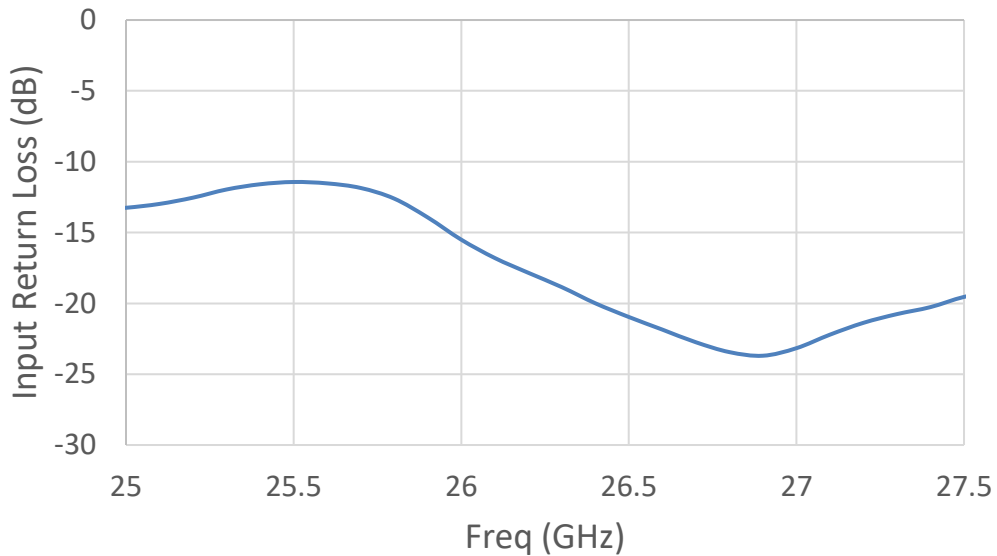
Gain vs Frequency



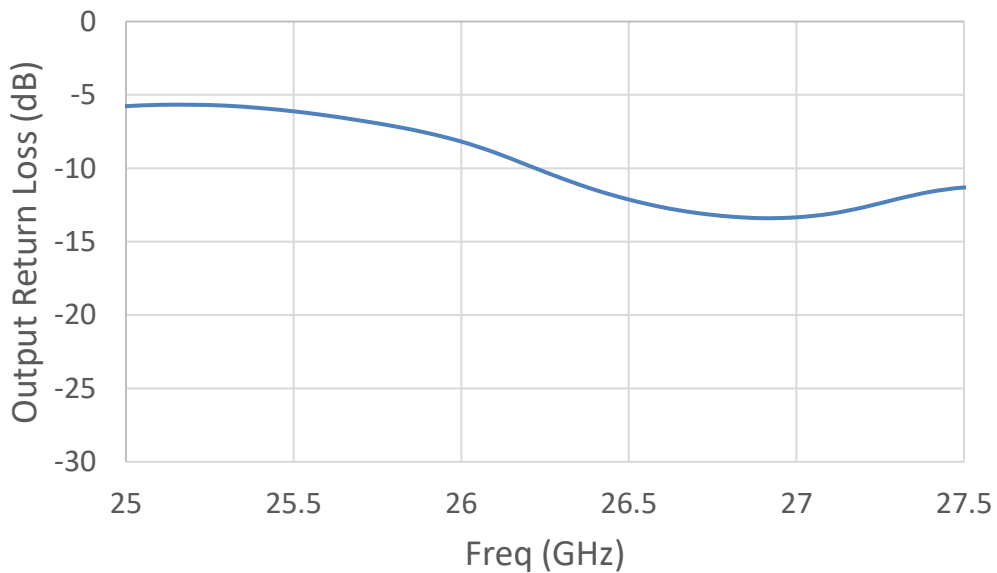
Small Signal Performance

Test Condition: $V_d = 26$ V, $I_{dq} = 2$ A, (CW Performance, Typical Performance at 25°C)

Input Return Loss vs Frequency



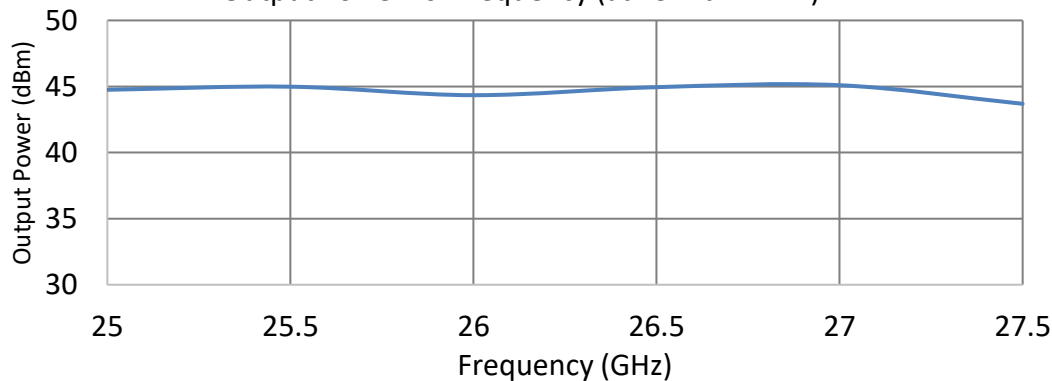
Output Return Loss vs Frequency



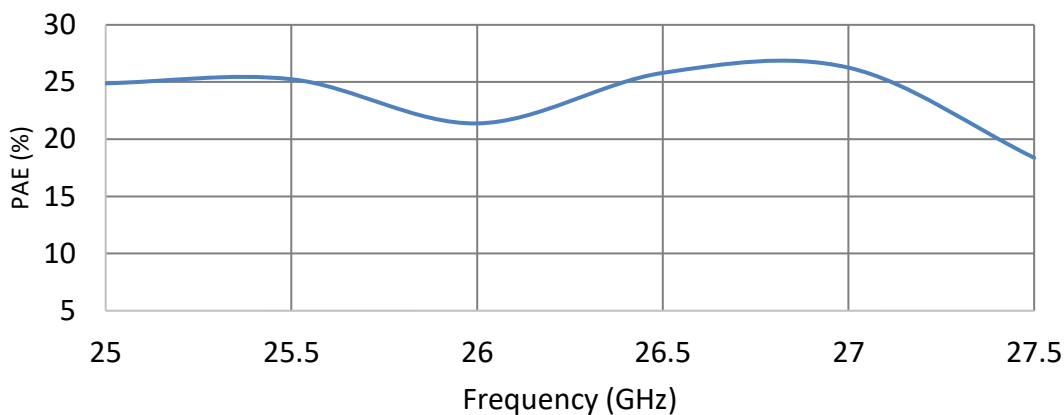
Large Signal Performance

Test Condition: $V_d = 26$ V, $I_{dq} = 2.0$ A, Temperature 25°C, CW Performance

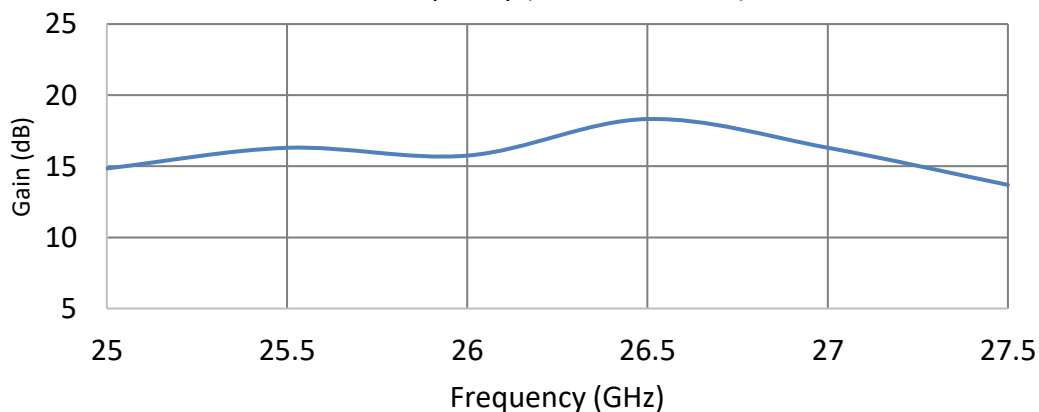
Output Power vs. Frequency (at 29.2 dBm Pin)



PAE vs. Frequency (at 29.2 dBm Pin)



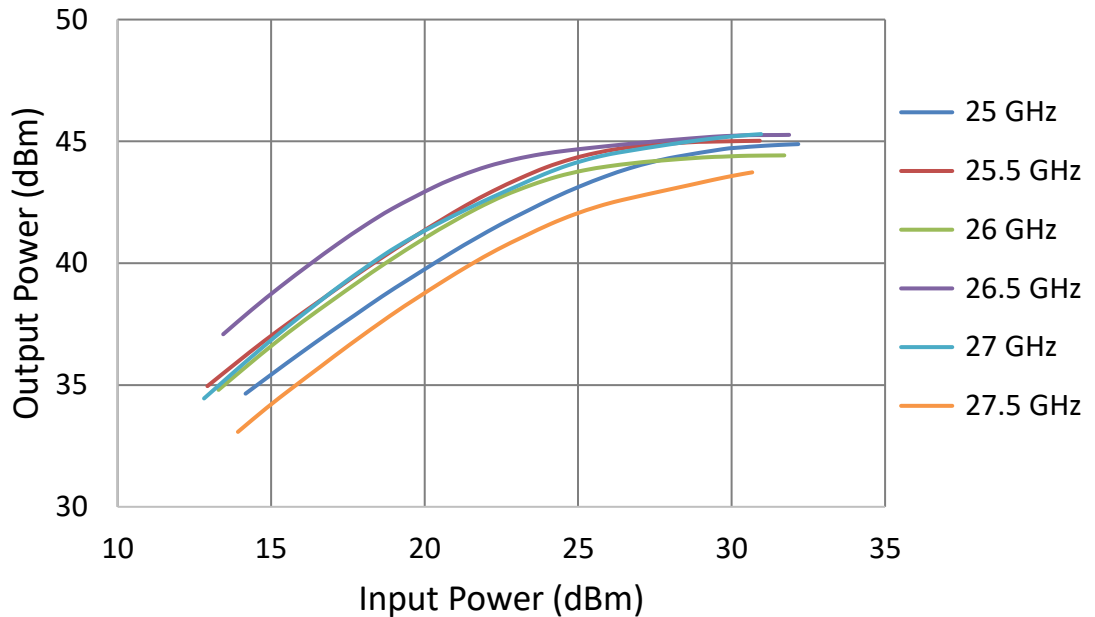
Gain vs. Frequency (at 29.2 dBm Pin)



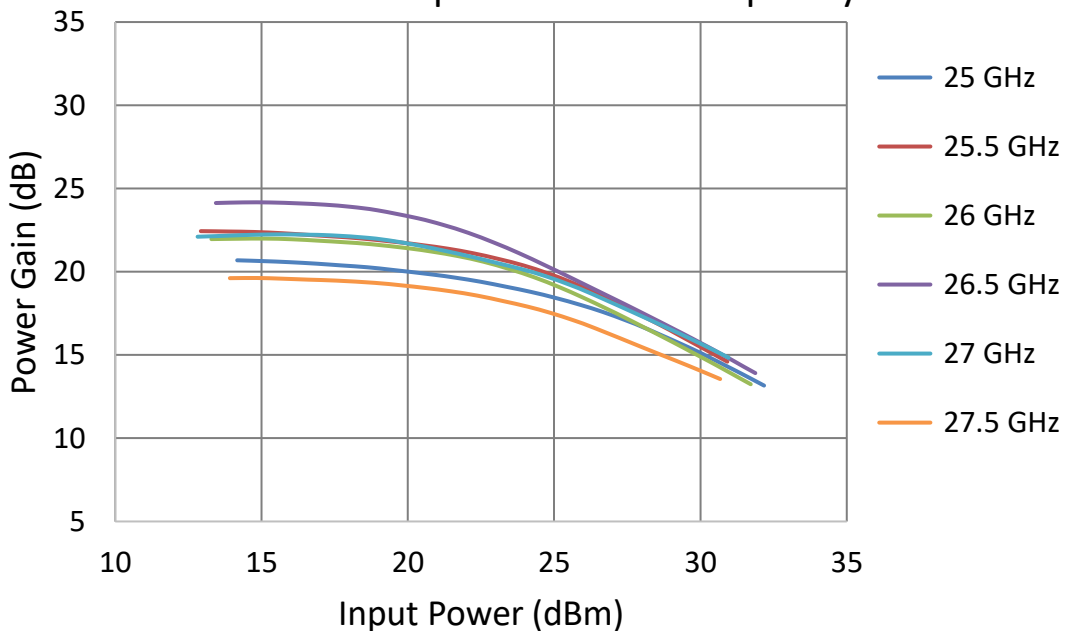
Large Signal Performance

Test Condition: $V_d = 26\text{ V}$, $I_{dq} = 2.0\text{ A}$, Temperature 25°C , CW Performance

Output Power vs. Input Power vs. Frequency



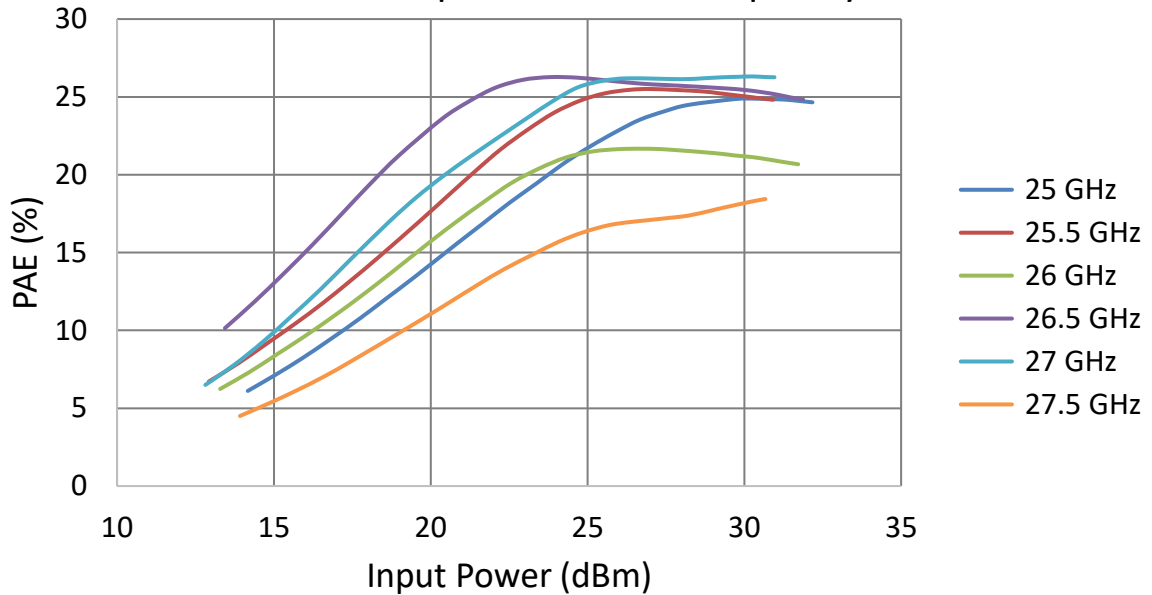
Power Gain vs. Input Power vs. Frequency



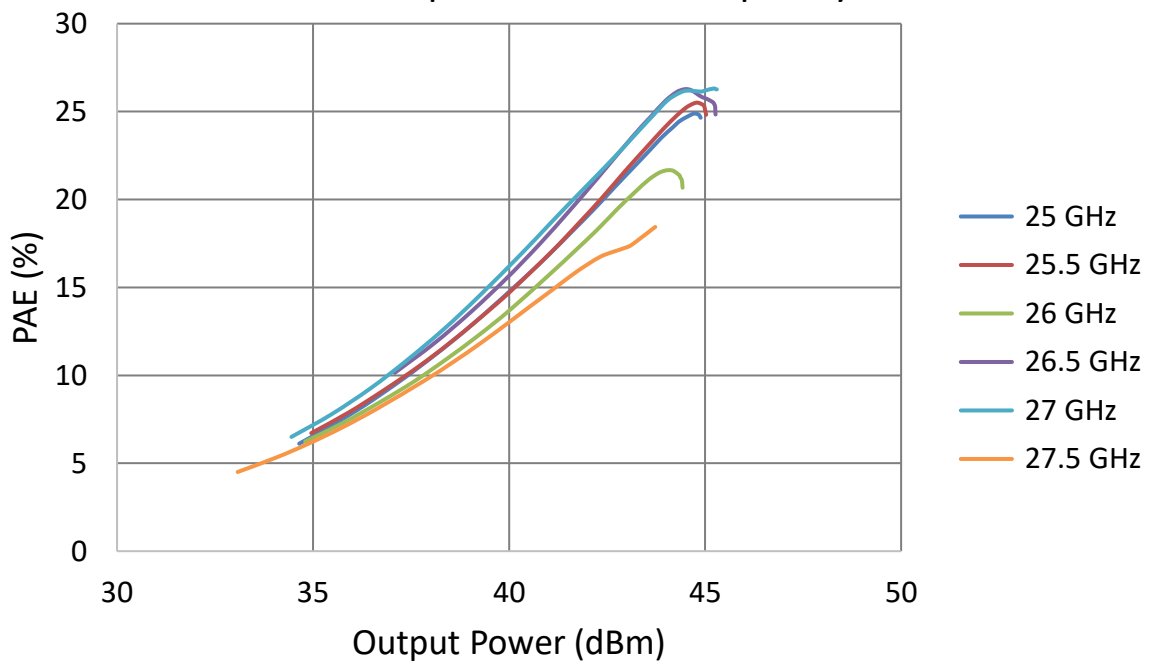
Large Signal Performance

Test Condition: $V_d = 26\text{ V}$, $I_{dQ} = 2.0\text{ A}$, Temperature 25°C , CW Performance

PAE vs. Input Power vs. Frequency



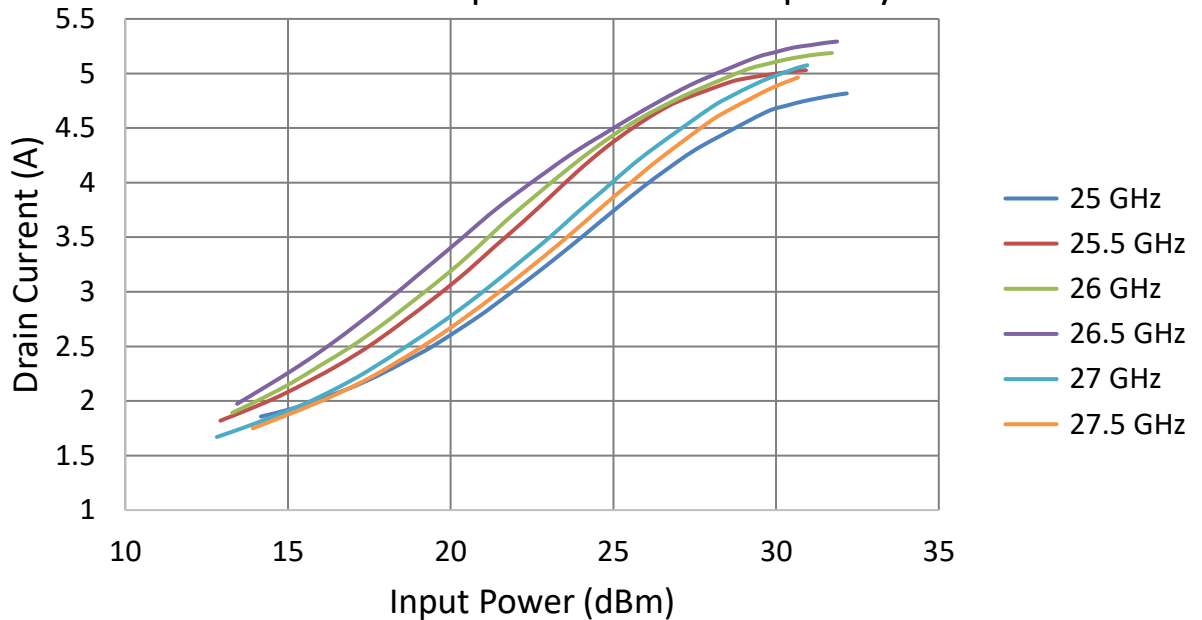
PAE vs. Output Power vs. Frequency



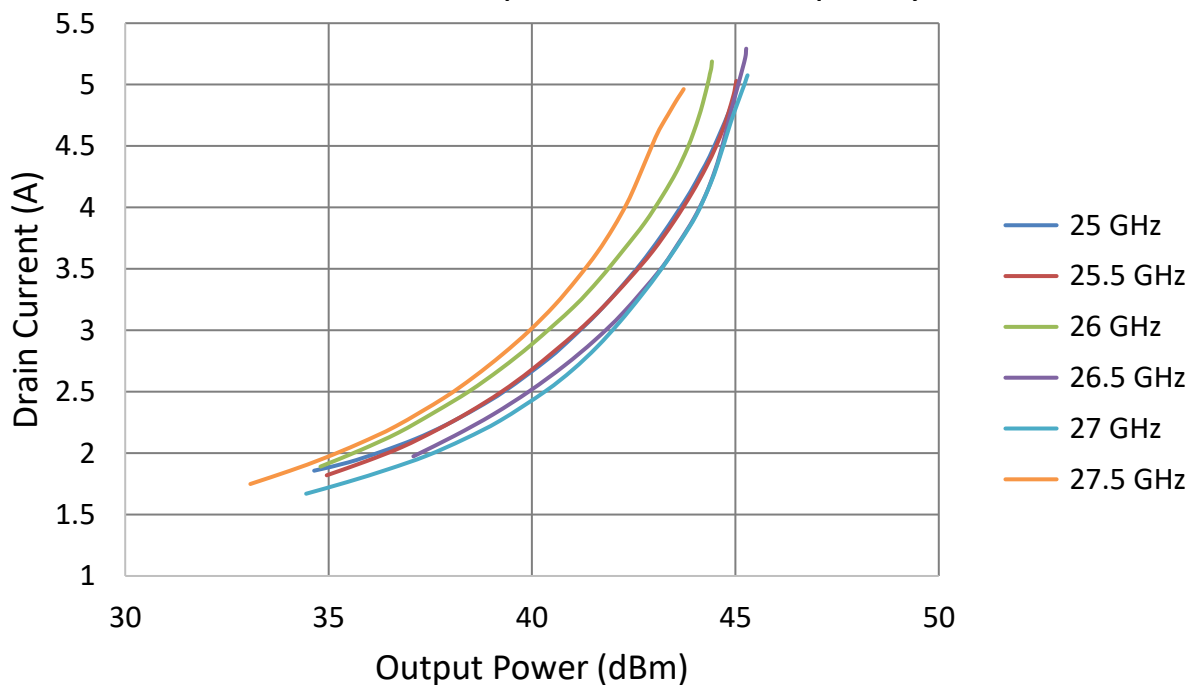
Large Signal Performance

Test Condition: $V_d = 26\text{ V}$, $I_{dq} = 2.0\text{ A}$, Temperature 25°C , CW Performance

Drain Current vs. Input Power vs. Frequency

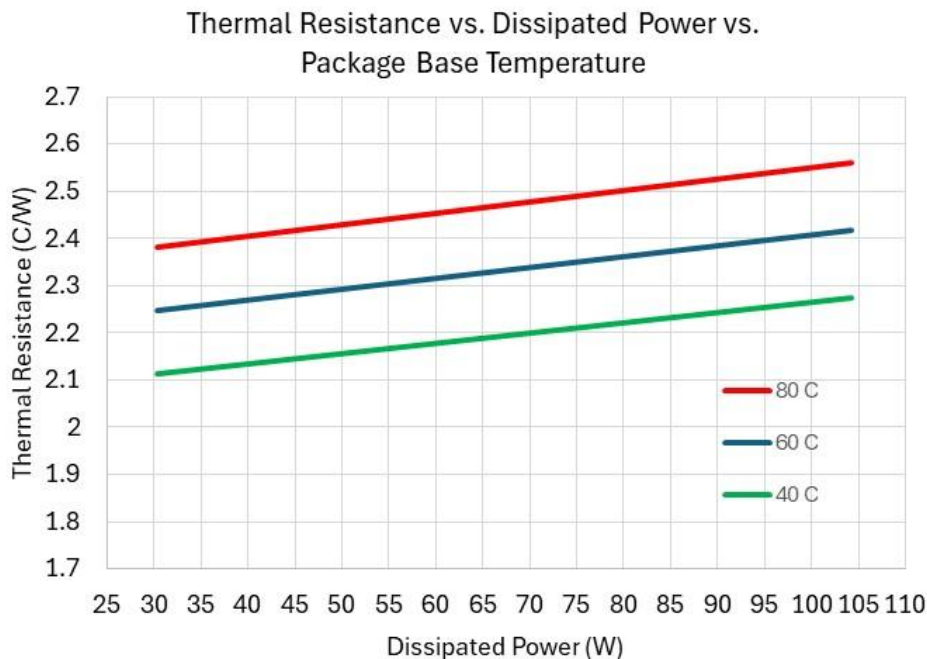
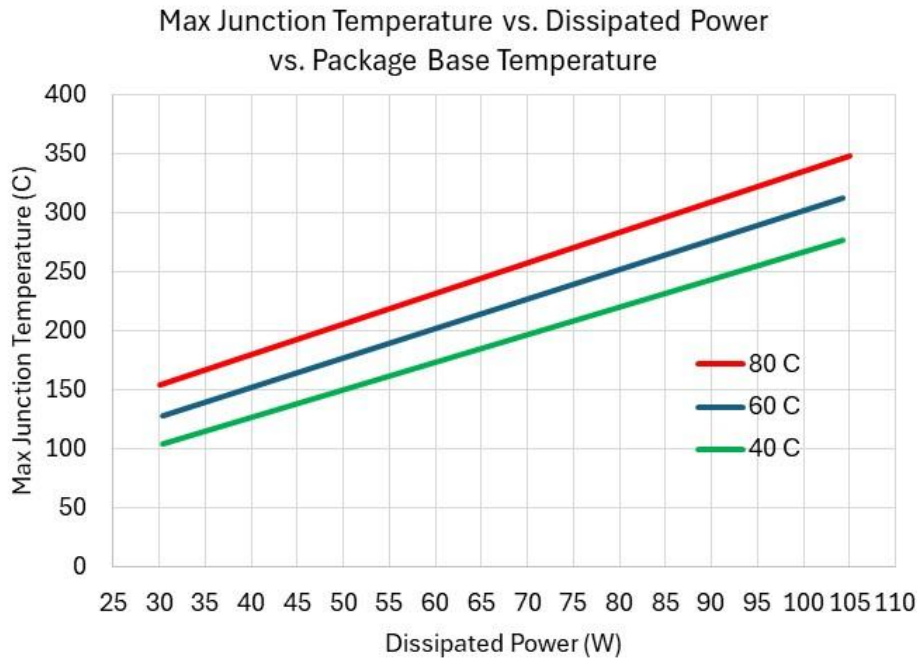


Drain Current vs. Output Power vs. Frequency



Thermal Information

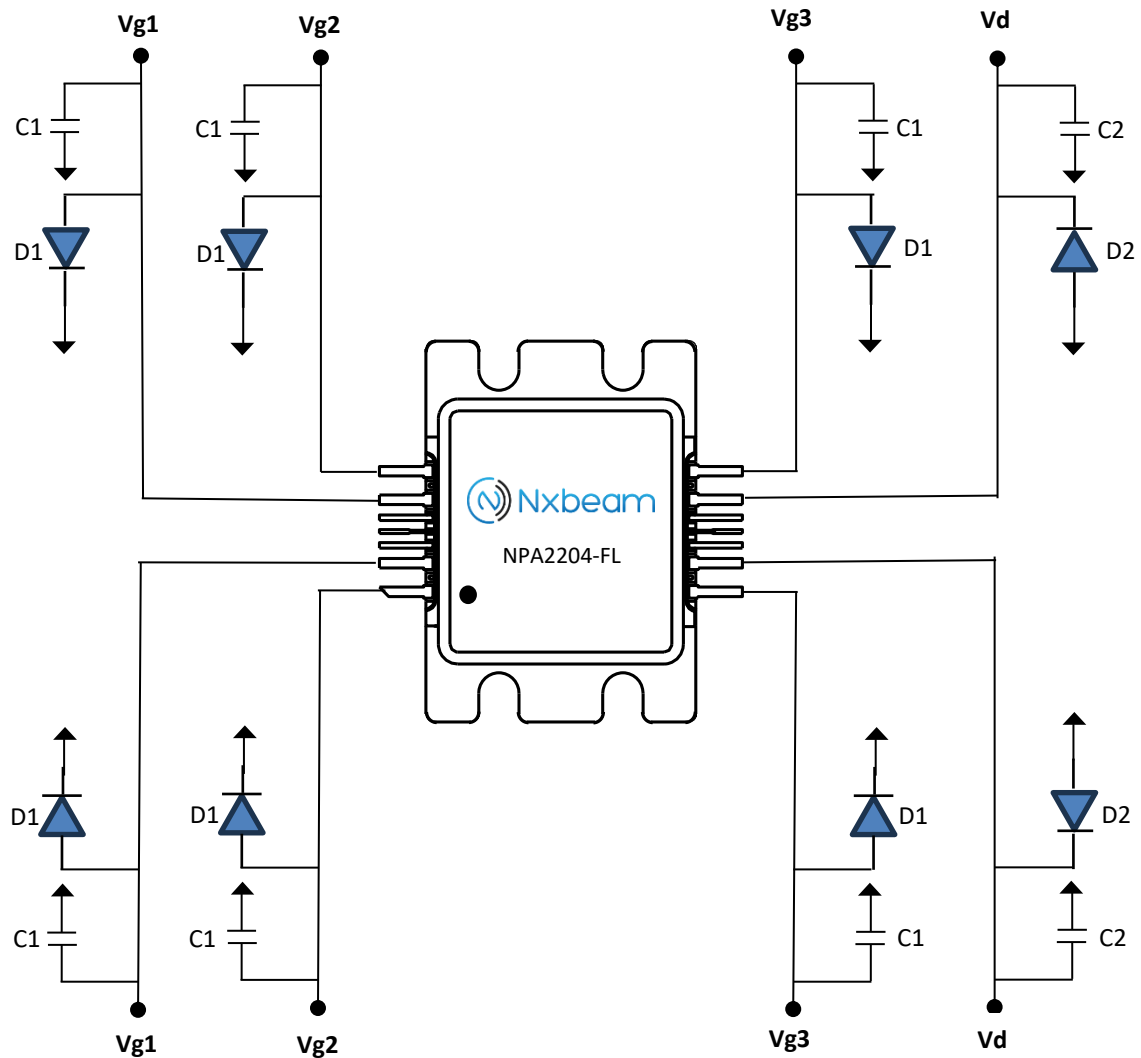
Temperature referenced from backside of package. Thermal curves are representative estimates. Actual values may vary with device bias and operating conditions.



Note 1: Junction temperature calculation methodology and mean time to failure (MTTF) information are provided in the following application note: [Nxbeam_GaN20MMIC_Reliability.pdf](#)

Suggested Off-Package Components

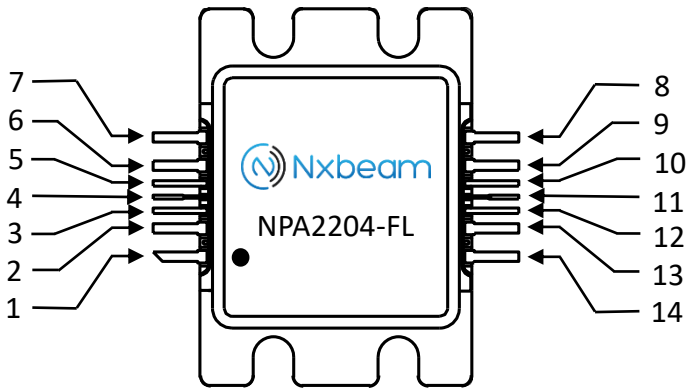
The following diagram shows the recommended off-package component.



Capacitor	Value
C1	0.1 μ F
C2	10 μ F

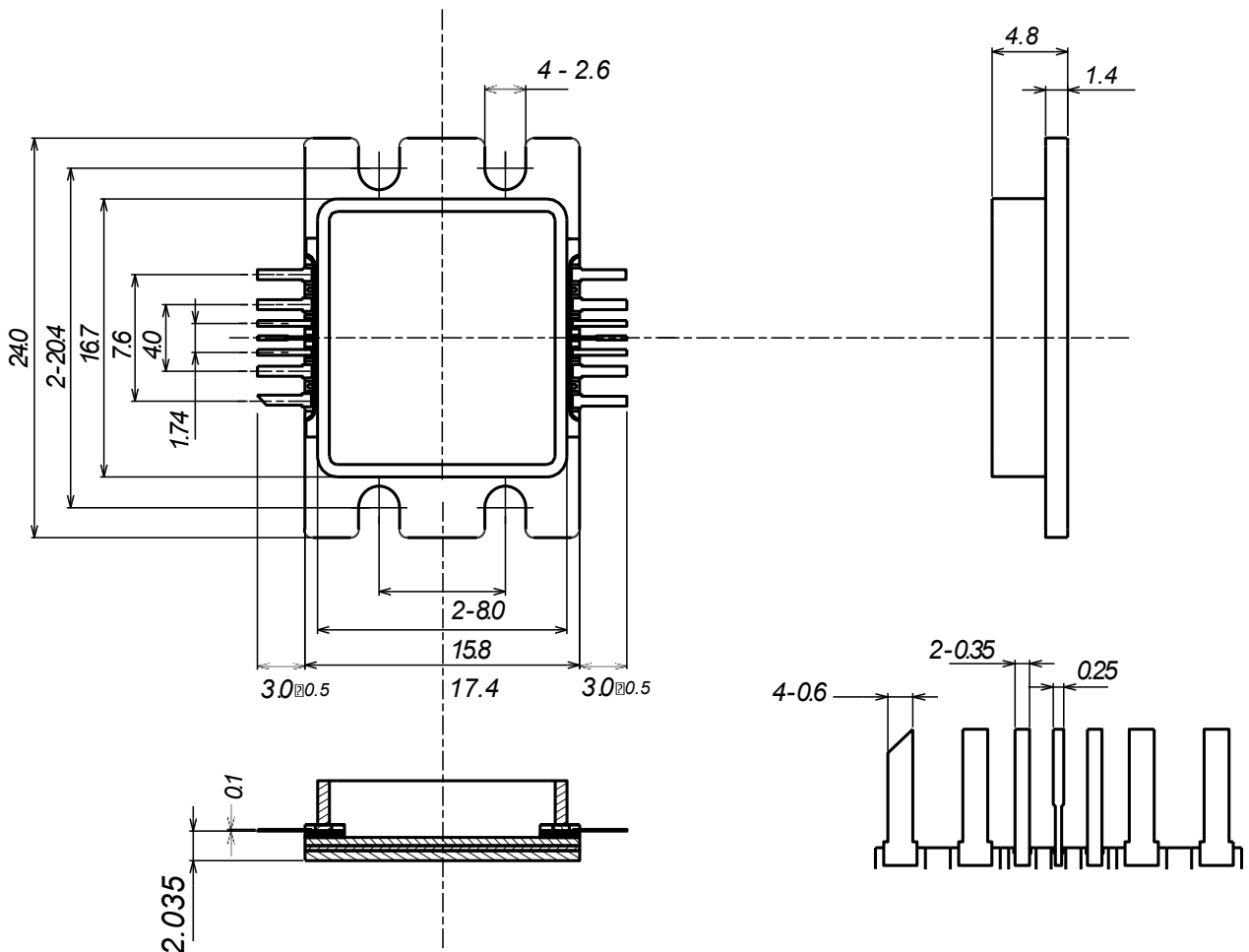
Resistor	Value
D1	AQHV12-01ETG
D2	AQHV36-01ETG

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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