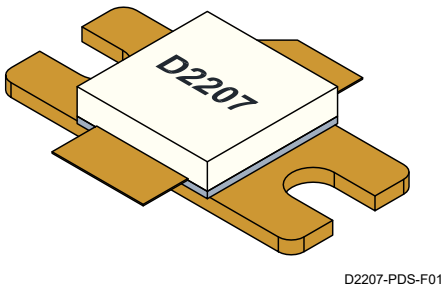
1. Description

- The D2207 is a 200W (P_{SAT}) wideband pre-matched gallium nitride (GaN) high electron mobility transistor (HEMT) with first generation RF GaN technology from Raytron.
- The D2207 operates from DC to 3GHz with a 48V supply rail. The device is offered in an industry standard air cavity package.



D2207-PDS-F01

Figure 1. D2207 Package Outline

2. Applications

- Military and Civilian Radar
- Land Mobile and Military Radio Communications
- Avionic and Test Instrumentation

3. Features

- Operating Frequency: DC–3GHz
- Output Power[1] (P_{SAT}): 53.0dBm (200W)
- Linear Gain[1]: 18.5dB
- Typical DE @P_{SAT}[1]: 68.8%
- Operating Voltage: 48V
- CW and Pulse Capable
- Package Type: 400F-A

[1] Measured in Infiwave DEMO @2.1GHz

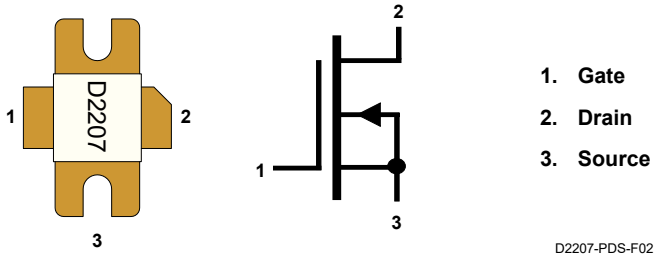
4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	1.4GHz	2.1GHz	2.6GHz	Units
Linear Gain	18.4	18.5	18.5	dB
Drain Efficiency	72.9	68.6	64.7	%
Output Power	53.3	53.0	52.5	dBm

- Typical Class AB performance in Infiwave DEMO with the device soldered onto the heatsink, test condition: V_{DS} = 48V, I_{DS} = 300mA, V_{GS} = -3.1V
- Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 10%

5. Block Diagram



D2207-PDS-F02

Figure 2. D2207 Block Diagram

Table of Contents

No.	Contents	Page
1	Description	1
2	Applications	1
3	Features	1
4	Brief Typical Performance	1
5	Block Diagram	1
6	Absolute Maximum Ratings	3
7	Recommended Operating Conditions	3
8	Electrical Characteristics	3
9	Typical Performance	5
10	Package Outline	6
11	Application Circuit	7
12	Recommended Solder Temperature Profile	8
13	Handling Precautions	8
14	Contact Information	8
15	Disclaimer	9

6. Absolute Maximum Ratings

Table 2. Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DSS}	150	V
Gate-Source Voltage	V_{GS}	-10 ~ +1	V
Operating Voltage	V_{DS}	10 ~ +55	V
Maximum Forward Gate Current	I_{GMax}	24.4	mA
Storage Temperature Range	T_{STG}	-65 ~ +150	°C
Operating Junction Temperature	T_J	250	°C

7. Recommended Operating Conditions

Table 3. Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Units
Drain-Source Voltage Range, V_{DS}	-	48	55	V
Drain Bias Current, I_{DS}	-	300	-	mA
Gate-Source Voltage, V_{GS}	-	-3.1	-	V
Channel Temperature, T_{CH}	-	-	225	°C

Table 4. Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance (Active Die Surface-to-Case)[1]	R_{thsc} (IR)	-	°C/W
Thermal Resistance (Junction-to-Case)[2]	R_{thjc} (FEA)	2.1	°C/W

1. Thermal Resistance at average power by infrared measurement, Active Die Surface-to-Case, $T_{base\text{-}plate}$ = 85℃, P_D = 70.0W
2. Thermal Resistance at average power by Finite Element Analysis, Junction-to-Case, $T_{base\text{-}plate}$ = 85℃, P_D = 70.0W

8. Electrical Characteristics (T_C = 25˚C)

Table 5. DC Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Drain-Source Breakdown Voltage[1] (V_{GS} = -10V, I_{DS} = 24.4mA)	$V_{DS(BR)}$	150	-	-	V
Saturated Drain Current[2] (V_{DS} = 10V, V_{GS} = 1.0V)	I_{Max}	-	26.4	-	A
Gate Threshold Voltage[3] (V_{DS} = 48V, I_{DS} = 24.4mA)	$V_{GS(TH)}$	-3.95	-3.30	-2.60	V
Gate Quiescent Voltage[3] (V_{DS} = 48V, I_{DS} = 300mA)	$V_{GS(Q)}$	-	-3.1	-	V

1. Measured on wafer prior to packaging
2. Measured with packaged device
3. Typical Class AB performance in Infiwave DEMO

Table 6. RF Characteristics[1,2]

Test Method	Parameter	Symbol	Min.	Typ.	Max.	Units
DEMO @1.4GHz	Linear Gain	G_{LIN}	-	18.4	-	dB
	Drain Efficiency	η_D	-	72.9	-	%
	Output Power	P_{SAT}	-	53.3	-	dBm
DEMO @2.1GHz	Linear Gain	G_{LIN}	-	18.5	-	dB
	Drain Efficiency	η_D	-	68.6	-	%
	Output Power	P_{SAT}	-	53.0	-	dBm
DEMO @2.6GHz	Linear Gain	G_{LIN}	-	18.5	-	dB
	Drain Efficiency	η_D	-	64.7	-	%
	Output Power	P_{SAT}	-	52.5	-	dBm

1. Typical Class AB performance in Infiwave DEMO with the device soldered onto the heatsink, test condition: V_{DS} = 48V, I_{DS} = 300mA, V_{GS} = -3.1V
2. Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 10%

Table 7. Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Input Capacitance	C_{GS}	-	81.11	-	pF
Output Capacitance	C_{DS}	-	8.52	-	pF
Feedback Capacitance	C_{GD}	-	1.81	-	pF

- Test Condition: V_{DS} = 48V, V_{GS} = -8V, f = 1MHz

9. Typical Performance

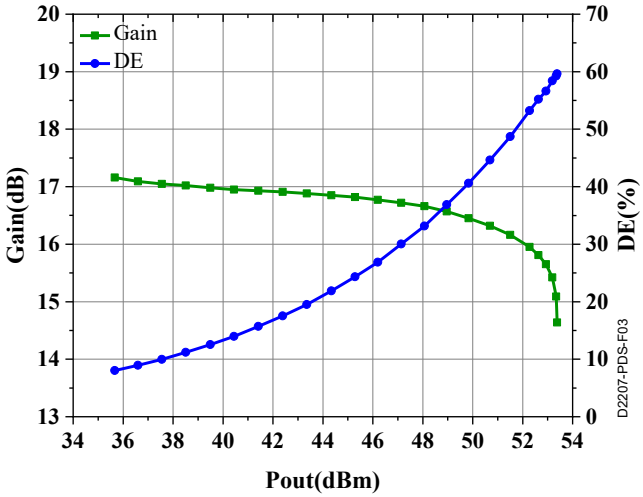


Figure 3. 1.4GHz Gain and DE @MXP vs. Output Power

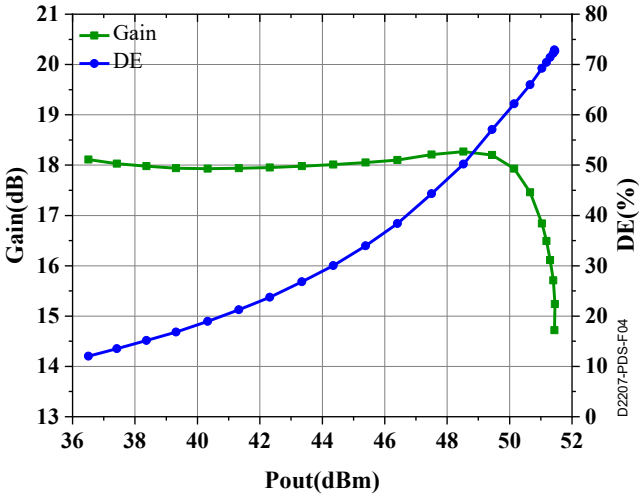


Figure 4. 1.4GHz Gain and DE @MXE vs. Output Power

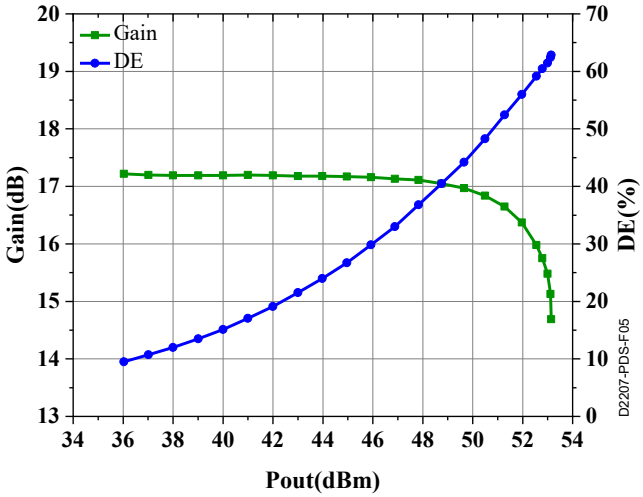


Figure 5. 2.1GHz Gain and DE @MXP vs. Output Power

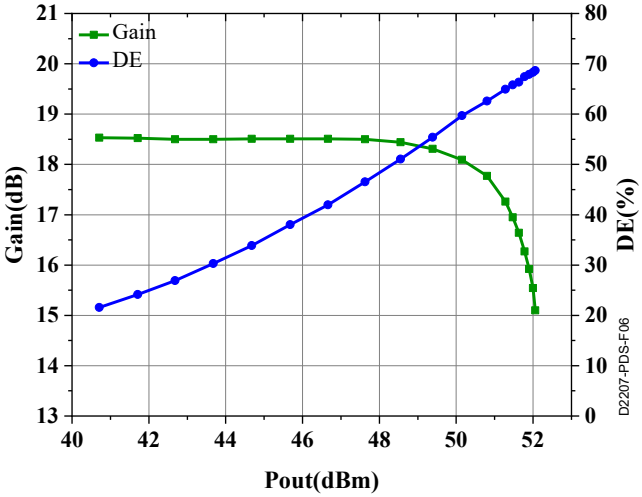


Figure 6. 2.1GHz Gain and DE @MXE vs. Output Power

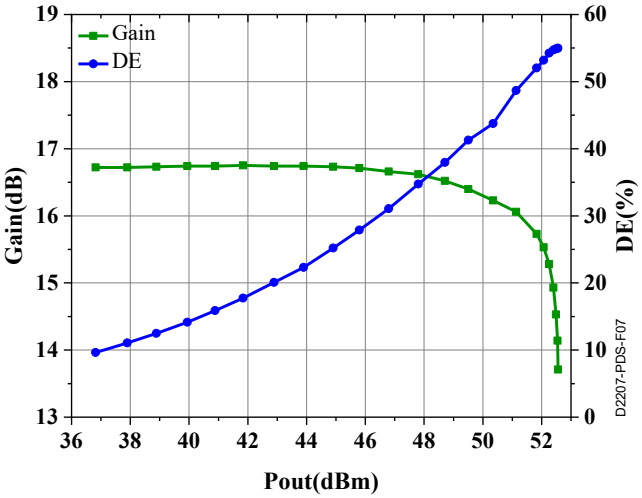


Figure 7. 2.6GHz Gain and DE @MXP vs. Output Power

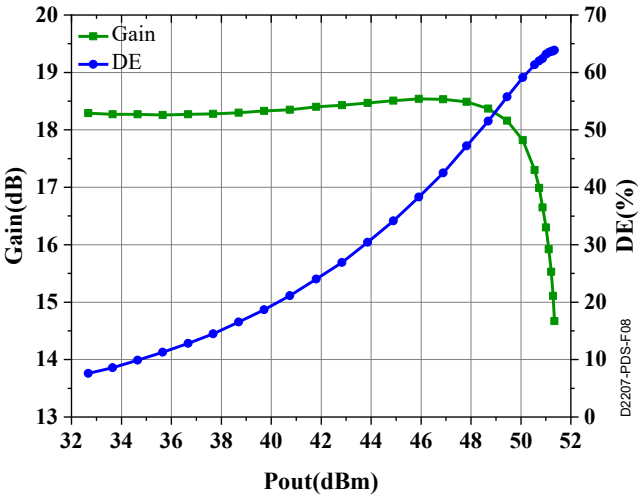


Figure 8. 2.6GHz Gain and DE @MXE vs. Output Power

- Typical performance in Infiwave DEMO with the device soldered onto the heatsink, test condition: V_{DS} = 48V, I_{DS} = 300mA, V_{GS} = -3.1V
- Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 10%

10. Package Outline

■ Pin Layout

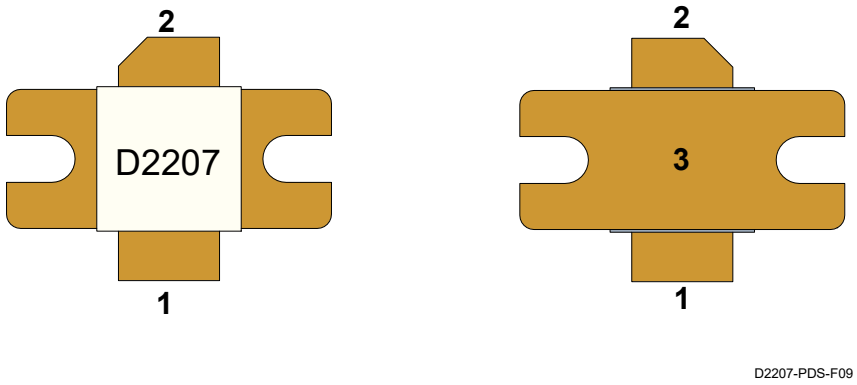


Figure 9. D2207 Pin Layout

Table 8. Pin Description

Pin	Symbol	Description
1	V_G / RF_{IN}	Gate Voltage / RF Input
2	V_D / RF_{OUT}	Drain Voltage / RF Output
3	Flange	Source to be Connected to Ground

■ Mechanical Drawing (Package Type: 400F-A)

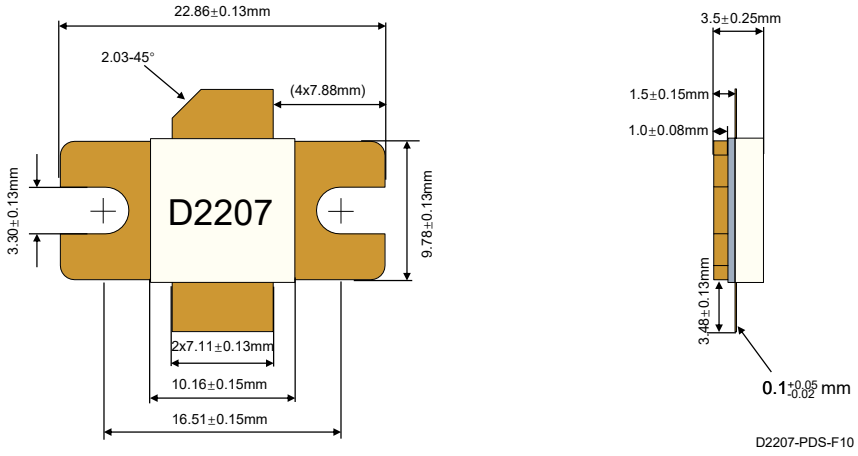


Figure 10. D2207 Mechanical Drawing

11. Application Circuit

■ Schematic

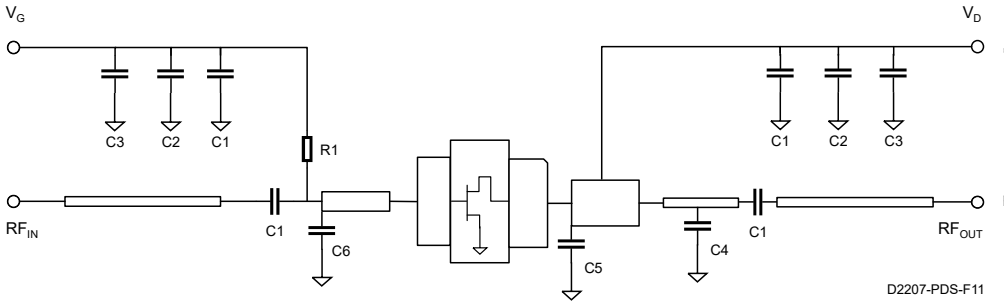


Figure 11. D2207 MXP@2.6GHz Application Circuit Schematic

Table 9. Bias Procedure

Bias-up Procedure	Bias-down Procedure
1) Set V_{GS} to the pinch-off voltage, typically -6V	1) Turn off RF signal
2) Turn on V_{DS} to nominal supply voltage (48V)	2) Turn off V_{DS}
3) Slowly adjust V_{GS} until I_{DS} current is attained	3) Wait two seconds to allow drain capacitor to discharge
4) Apply RF input power to desired level	4) Turn off V_{GS}

■ Layout

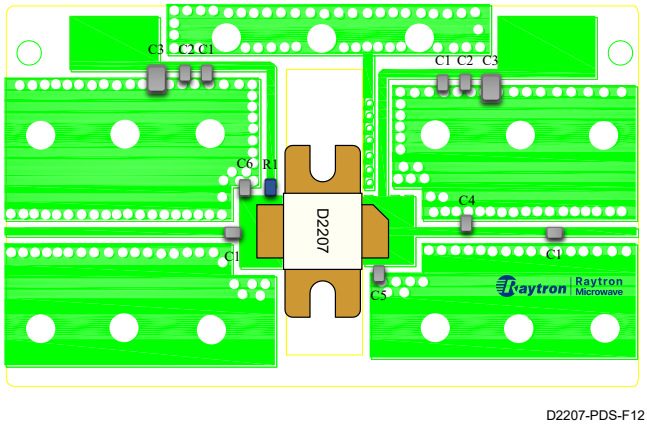


Figure 12. D2207 MXP@2.6GHz Application Circuit Layout
(DEMO Size: 8.3cm x 5.0cm)

Table 10. Bill of Materials

Component	Value	Description	Manufacturer	Part Number
PCB	20mil	N/A	Rogers	RO4350B
C1	2.7pF	C0G 250V 0805 Capacitor	Murata	GQM2195C2E2R7BB12
C2	10.0nF	X7R 100V 0603 Capacitor	Murata	GCM188R72A103KA37D
C3	1.0uF	X7R 100V 1210 Capacitor	Murata	GRM32ER72A105KA01
C4	4.3pF	C0G 250V 0805 Capacitor	Murata	GQM2195C2E4R3BB12
C5	1.2pF	C0G 250V 0805 Capacitor	Murata	GQM2195C2E1R2BB12
C6	6.5pF	C0G 250V 0805 Capacitor	Murata	GQM2195C2E6R5CB12
R1	10Ω	1/4W 0805 Resistor	Yageo	RC0805FR-0710RL

12. Recommended Solder Temperature Profile

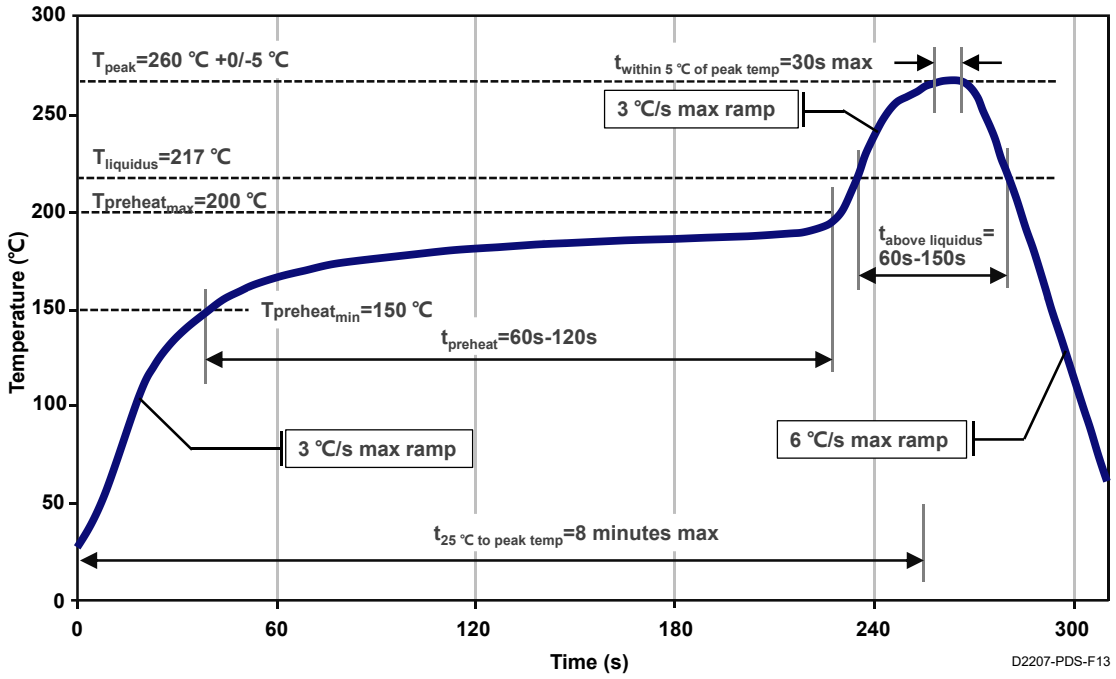


Figure 13. Recommended Solder Temperature Profile

13. Handling Precautions

- **ESD Caution**

  ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore proper ESD precautions should be taken to avoid performance degradation or loss of functionality.



14. Contact Information

For the latest specifications, additional product information, technical support and sales support, please contact:

- **Email:** RF.support@raytrontek.com
- **Web:** www.raytrontek.com

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