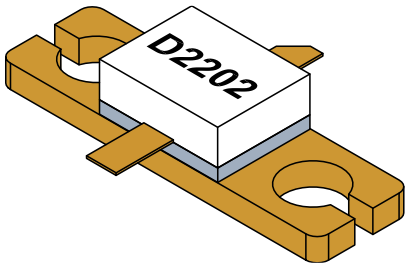
1. Description

- The D2202 is a 30W (P_{SAT}) wideband unmatched gallium nitride (GaN) high electron mobility transistor (HEMT) with first generation RF GaN technology from Raytron.
- The D2202 operates from DC to 6GHz with a 28V or a 48V supply rail. The device is offered in an industry standard air cavity package.



D2202-PDS1-F01

Figure 1. D2202 Package Outline

2. Applications

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

3. Features[1]

- Operating Frequency: DC–6GHz
- Output Power (P_{SAT}): 45.8dBm(38W)
- Linear Gain: 19.7dB
- Typical DE @P_{SAT}: 76.2%
- Operating Voltage: 48V
- CW and Pulse Capable
- Package Type: 200F-A

[1] Measured in Raytron DEMO @2.6GHz

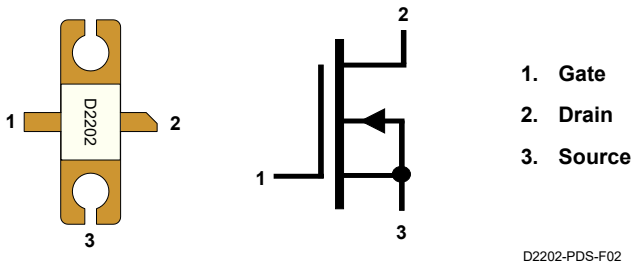
4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	2.6GHz	Units
Linear Gain	19.7	dB
Drain Efficiency	76.2	%
Output Power	45.8	dBm

- Typical Class AB performance in Raytron DEMO with the device soldered onto the heatsink, test condition: V_{DS} = 48V, I_{DS} = 100mA, V_{GS} = -2.4V
- Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 10%

5. Block Diagram



D2202-PDS-F02

Figure 2. D2202 Block Diagram

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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}	3.4	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}	-	100	-	mA
Gate-Source Voltage, V_{GS}	-	-2.4	-	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)	7.4	°C/W

[1] Thermal Resistance at average power by infrared measurement, Active Die Surface-to-Case, $T_{base\text{-}plate}$ = 85℃, P_D = 5.0W

[2] Thermal Resistance at average power by Finite Element Analysis, Junction-to-Case, $T_{base\text{-}plate}$ = 85℃, P_D = 5.0W

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} = 3.4mA)	$V_{DS(BR)}$	150	-	-	V
Saturated Drain Current[2] (V_{DS} = 10V, V_{GS} = 1.0V)	I_{Max}	-	3.14	-	A
Gate Threshold Voltage[3] (V_{DS} = 48V, I_{DS} = 3.4mA)	$V_{GS(TH)}$	-3.30	-2.80	-2.30	V
Gate Quiescent Voltage[3] (V_{DS} = 48V, I_{DS} = 100mA)	$V_{GS(Q)}$	-	-2.40	-	V

[1] Measured on wafer prior to packaging

[2] Measured with packaged device

[3] Measured in Raytron DEMO

Table 6. RF Characteristics[1]

Test Method	Parameter	Symbol	Min.	Typ.	Max.	Units
DEMO[2] @2.6GHz	Linear Gain	G_{LIN}	-	19.7	-	dB
	Drain Efficiency	η_D	-	76.2	-	%
	Output Power	P_{SAT}	-	45.8	-	dBm

1. Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 10%

2. Typical Class AB performance in Raytron DEMO with the device soldered onto the heatsink, test condition: V_{DS} = 48V, I_{DS} = 100mA, V_{GS} = -2.4V

Table 7. Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Input Capacitance	C_{GS}	-	4.19	-	pF
Output Capacitance	C_{DS}	-	2.14	-	pF
Feedback Capacitance	C_{GD}	-	0.255	-	pF

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

9. Typical Performance (48V)

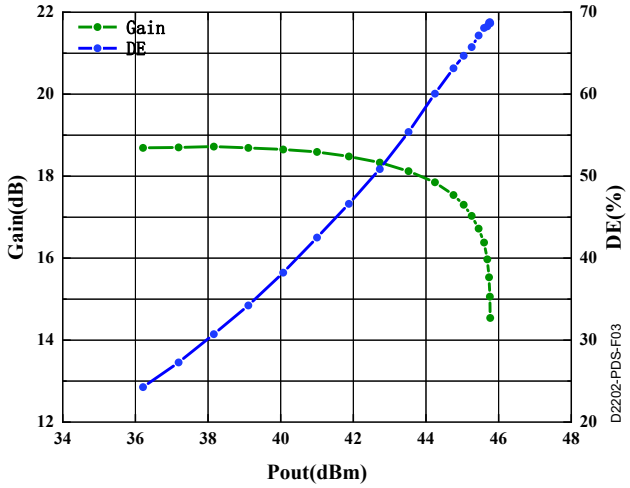


Figure 3. 2.6GHz Gain and DE @MXP vs. Output Power

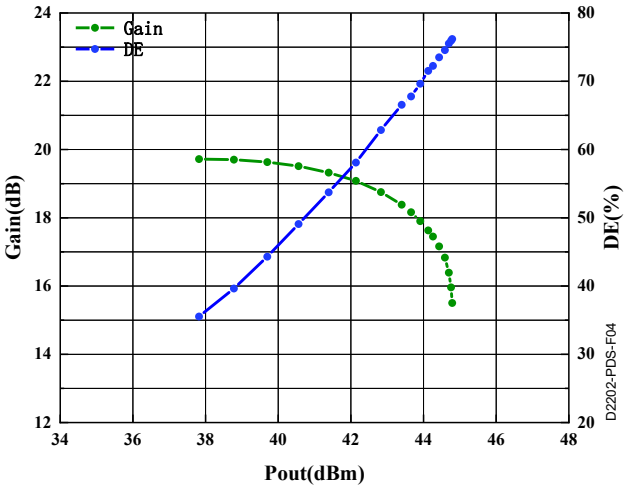


Figure 4. 2.6GHz Gain and DE @MXE vs. Output Power

- Typical Class AB performance in Raytron DEMO with the device soldered onto the heatsink, test condition: V_{DS} = 48V, I_{DS} = 100mA, V_{GS} = -2.4V
- Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 10%

10. Typical Performance（28V）

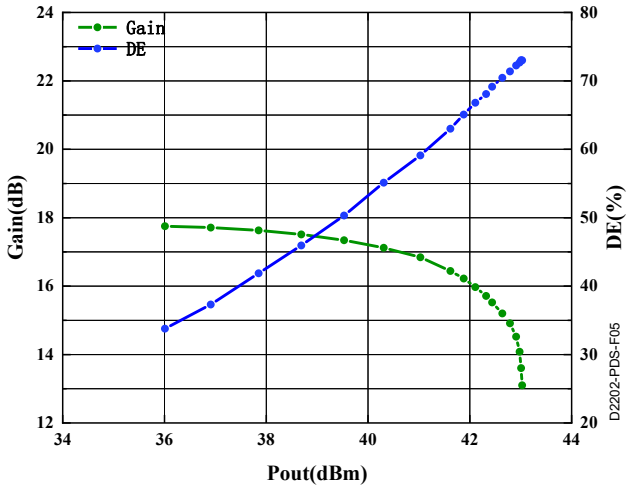


Figure 5. 2.6GHz Gain and DE @MXP vs. Output Power

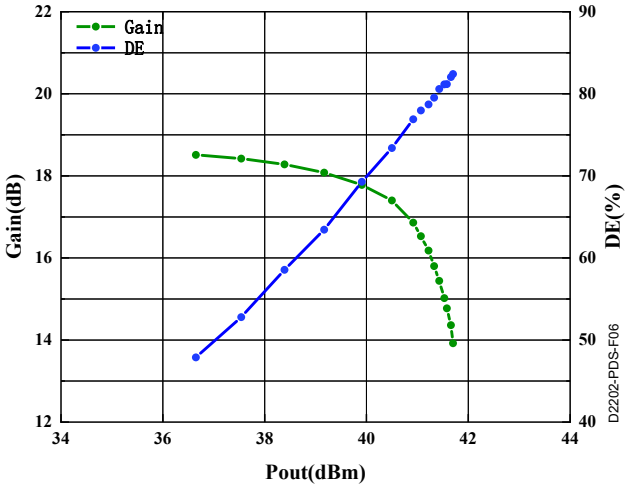


Figure 6. 2.6GHz Gain and DE @MXE vs. Output Power

- Typical Class AB performance in Raytron DEMO with the device soldered onto the heatsink, test condition: V_{DS} = 28V, I_{DS} = 100mA, V_{GS} = -2.4V
- Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 10%

11. Package Outline

■ Pin Layout

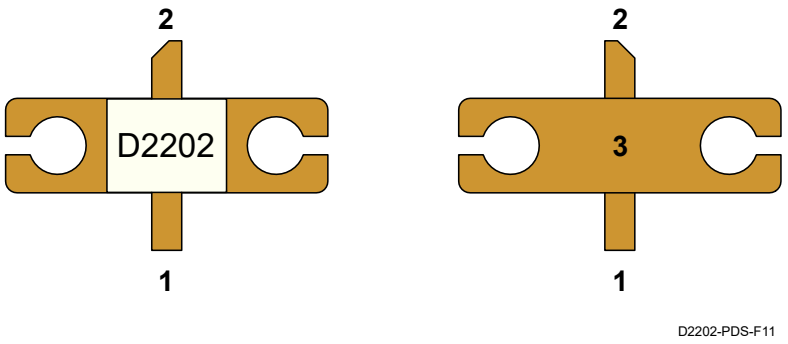


Figure 11. D2202 Pin Layout

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: 200F-A）

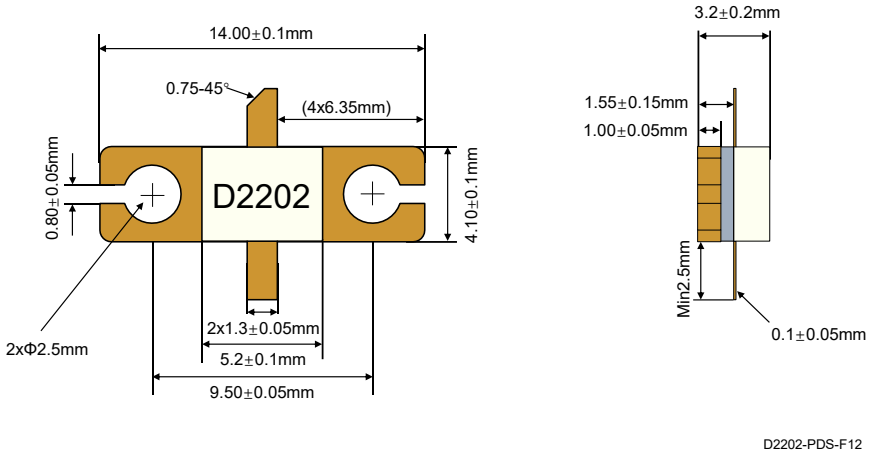


Figure 12. D2202 Mechanical Drawing

12. DEMO Summary

Table 9. DEMO Summary

NO.	D2202 DEMO Name	V_{DS} (V)	Freq (GHz)	Linear Gain(dB)	P_{SAT} (dBm)	P_{SAT} (W)	Drain Efficiency	Pulse or CW
1	DEMO_A, 30W	36	1.95-2.05	19.2	45.0	32	75.2%	CW
2	DEMO_B, 25W	48	2.45	20.6	44.5	28	67.0%	Pulse

13. Recommended Solder Temperature Profile

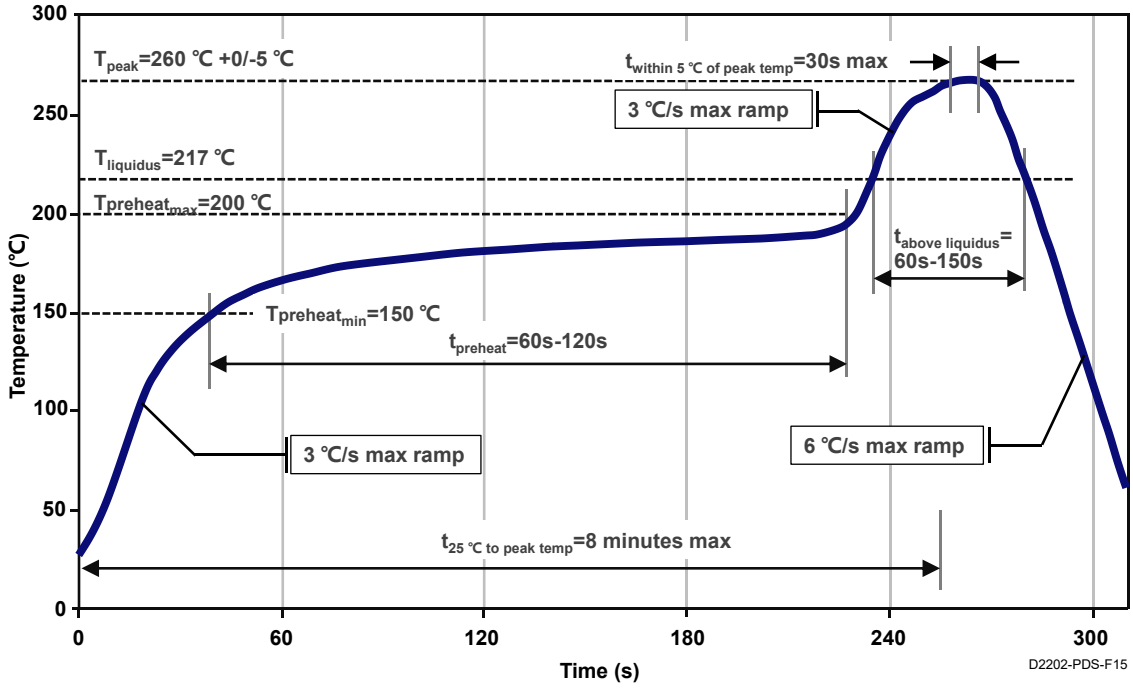


Figure 15. Recommended Solder Temperature Profile

14. 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.



15. 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

16. Disclaimer

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