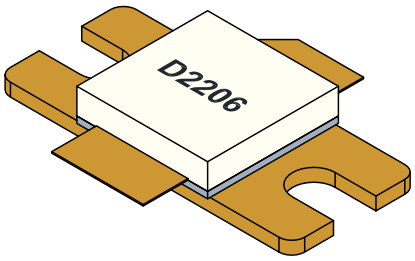
1. Description

- The D2206 is a 140W (P_{SAT}) wideband pre-matched gallium nitride (GaN) high electron mobility transistor (HEMT) with first generation RF GaN technology from Raytron.
- The D2206 operates from DC to 4GHz with a 48V supply rail. The device is offered in an industry standard air cavity package.



D2206-PDS-F01

Figure 1. D2206 Package Outline

2. Applications

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

3. Features

- Operating Frequency: DC–4GHz
- Output Power[1] (P_{SAT}): 51.5dBm (141W)
- Linear Gain[1]: 18.8dB
- Typical DE @P_{SAT}[1]: 72.0%
- Operating Voltage: 48V
- Linear Amplifiers Suitable for OFDM, W-CDMA, LTE, EDGE, CDMA Waveforms
- Package Type: 400F-A

[1] Measured in Raytron DEMO @2.6GHz

4. Brief Typical Performance[1]

Table 1. Brief Typical Performance

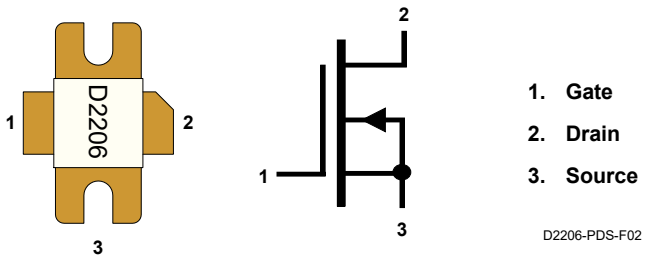
Test Method	Parameter	2.6GHz	Units
Load-pull[2]	Linear Gain	19.3	dB
	Drain Efficiency	73.4	%
	Output Power	51.7	dBm
DEMO[3]	Linear Gain	18.8	dB
	Drain Efficiency	72.0	%
	Output Power	51.5	dBm

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

[2] Typical Class AB performance is measured in Load-pull system, test condition: V_{DS} = 48V, I_{DS} = 150mA, V_{GS} = -3.1V

[3] Typical Class AB performance in Raytron DEMO with the device

5. Block Diagram



1. Gate
2. Drain
3. Source

D2206-PDS-F02

Figure 2. D2206 Block Diagram

Table of Contents

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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}	18.7	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}	-	150	-	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)	2.4	°C/W

[1.] Thermal Resistance at average power by infrared measurement, Active Die Surface-to-Case, $T_{base\text{-}plate}$ = 85℃, P_D = 56.0W

[2.] Thermal Resistance at average power by Finite Element Analysis, Junction-to-Case, $T_{base\text{-}plate}$ = 85℃, P_D = 56.0W

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} = 18.7mA)	$V_{DS(BR)}$	150	-	-	V
Saturated Drain Current[1.] (V_{DS} = 10V, V_{GS} = 1.0V)	I_{Max}	-	17.6	-	A
Gate Threshold Voltage[2.] (V_{DS} = 48V, I_{DS} = 18.7mA)	$V_{GS(TH)}$	-3.95	-3.32	-2.60	V
Gate Quiescent Voltage[2] (V_{DS} = 48V, I_{DS} = 150mA)	$V_{GS(Q)}$	-	-3.10	-	V

[1.] Measured on wafer prior to packaging

[2.] Measured in Raytron DEMO

Table 6. RF Characteristics[1]

Test Method	Parameter	Symbol	Min.	Typ.	Max.	Units
Load-pull[2] @2.6GHz	Linear Gain	G_{LIN}	-	19.3	-	dB
	Drain Efficiency	η_D	-	73.4	-	%
	Output Power	P_{SAT}	-	51.7	-	dBm
DEMO[3] @2.6GHz	Linear Gain	G_{LIN}	-	18.8	-	dB
	Drain Efficiency	η_D	-	72.0	-	%
	Output Power	P_{SAT}	-	51.5	-	dBm

1. Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 10%
2. Typical Class AB performance is measured in Load-pull system, test condition: V_{DS} = 48V, I_{DS} = 150mA, V_{GS} = -3.1V
3. Typical Class AB performance in Raytron DEMO with the device soldered onto the heatsink, test condition: V_{DS} = 48V, I_{DS} = 150mA, V_{GS} = -3.1V

Table 7. Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Input Capacitance	C_{GS}	-	16.10	-	pF
Output Capacitance	C_{DS}	-	5.74	-	pF
Feedback Capacitance	C_{GD}	-	0.92	-	pF

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

9. Typical Performance

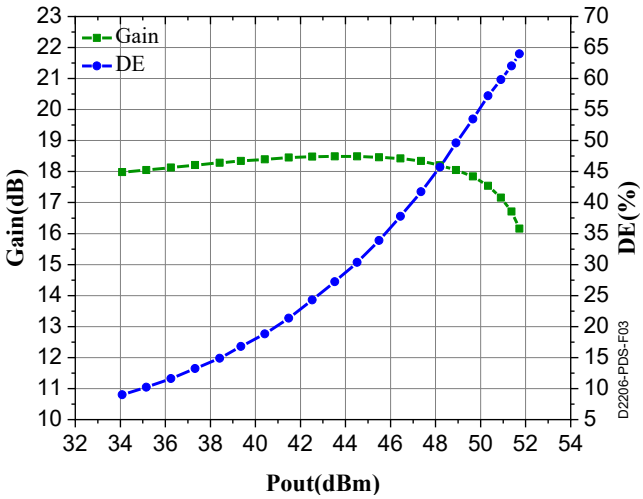


Figure 3. 2.6GHz Gain and DE @ MXP vs. Output Power

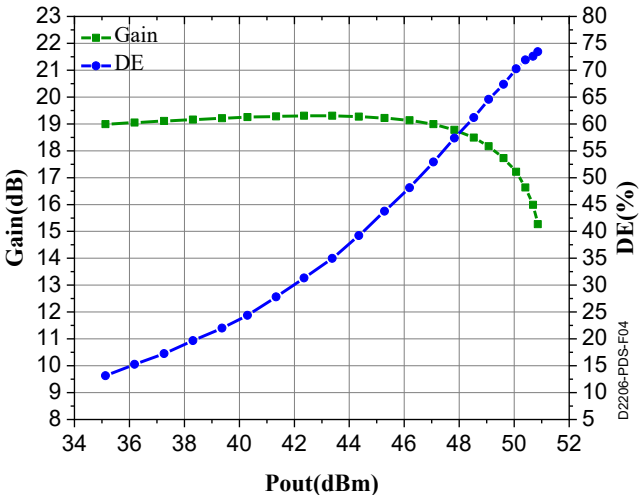


Figure 4. 2.6GHz Gain and DE @ MXE vs. Output Power

- Typical Class AB performance in TRL fixtures with the device soldered onto the heatsink, test condition: V_{DS} = 48V, I_{DS} = 150mA, V_{GS} = -3.1V
- Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 10%

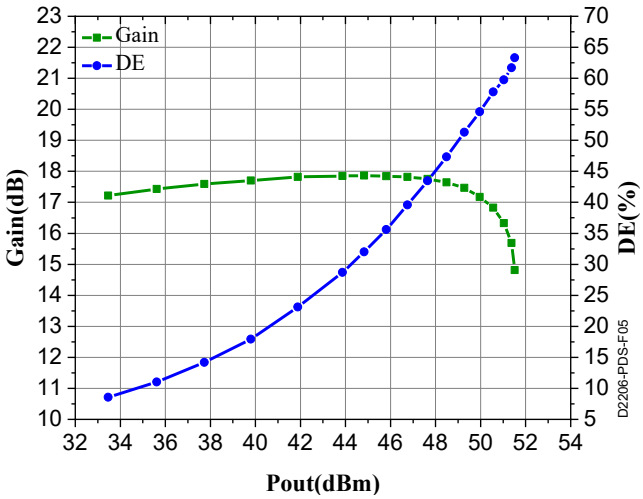


Figure 5. 2.6GHz Gain and DE @ MXP vs. Output Power

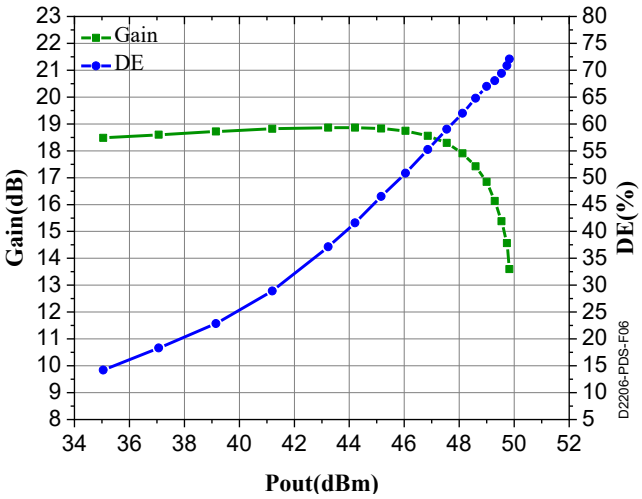


Figure 6. 2.6GHz Gain and DE @ MXE vs. Output Power

- Typical Class AB performance in Raytron DEMO with the device soldered onto the heatsink, test condition: V_{DS} = 48V, I_{DS}= 150mA, V_{GS} = -3.1V
- Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 10%

10. Package Outline

■ Pin Layout

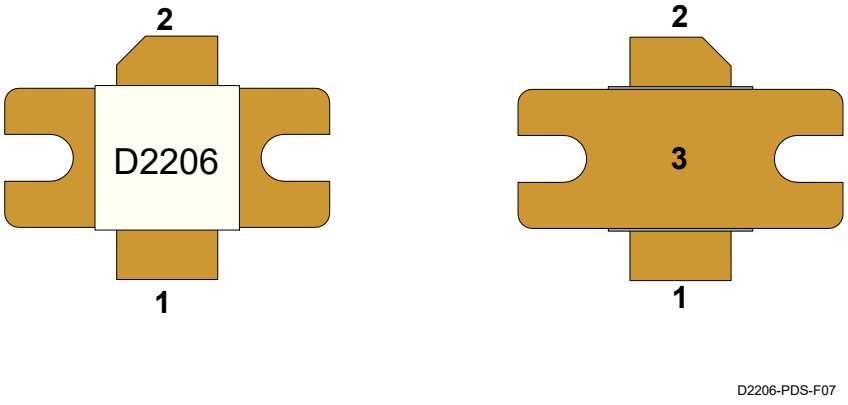


Figure 7. D2206 Pin Layout

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)

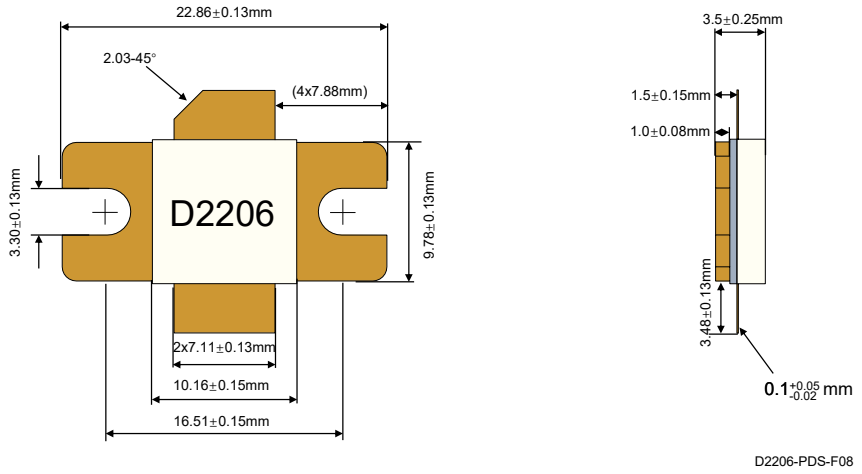


Figure 8. D2206 Mechanical Drawing

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}

11. Recommended Solder Temperature Profile

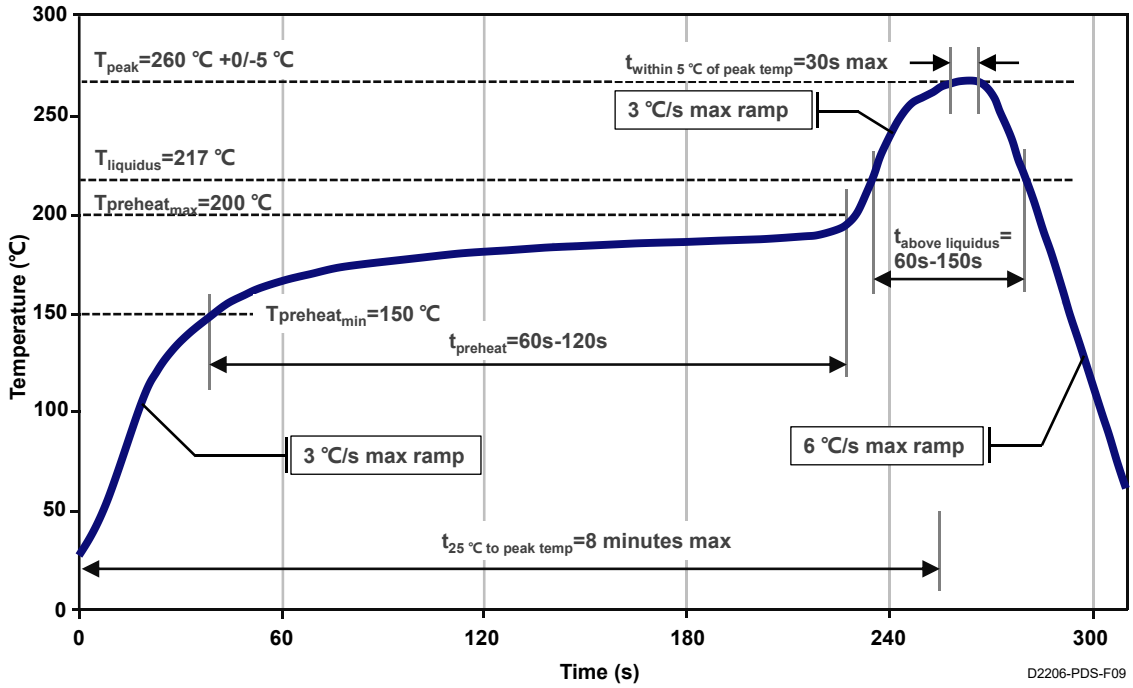


Figure 9. Recommended Solder Temperature Profile

12. 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.



13. 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

14. Disclaimer

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