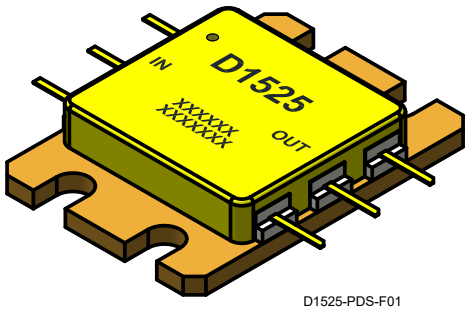
1. Description

- The D1525 is a 110W (P_{SAT}) wideband matched gallium nitride (GaN) high electron mobility transistor (HEMT) with first generation RF GaN technology from Raytron.
- The D1525 is matched to 50ohm on the input and 50ohm on the output. The device operates from 2.7 to 3.5GHz with a 32V supply rail. It is offered in a small hermetically sealed metal/ceramic flange package.



D1525-PDS-F01

Figure 1. D1525 Package Outline

2. Applications

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

3. Features[1]

- Operating Frequency: 2.7–3.5GHz
- Output Power (P_{SAT}): 50.5dBm (112W)
- Linear Gain: 12.5dB
- Typical DE @ P_{SAT}: 54.7%
- Operating Voltage: 32V
- CW and Pulse Capable
- Package Type: 630F-B

[1] Measured in Infiwave DEMO_A

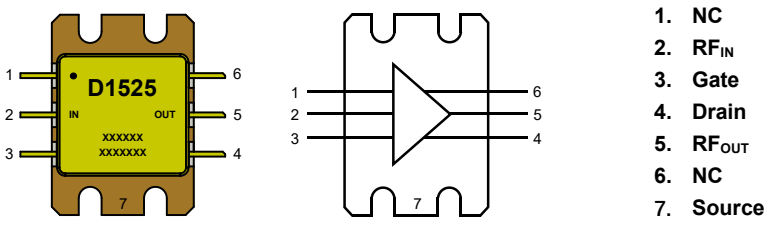
4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	2.7GHz	2.9GHz	3.1GHz	3.3GHz	3.5GHz	Units
Linear Gain	13.3	13.3	12.8	12.7	12.7	dB
Drain Efficiency	62.1	62.6	57.2	56.6	59.6	%
Output Power	51.5	50.9	50.5	51.2	51.1	dBm
Output Power	141	123	112	132	129	W

- Typical Class AB performance in Infiwave DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 32V, I_{DS} = 500mA, V_{GS} = -2.75V
- Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 20%

5. Block Diagram



1. **NC**
2. **RF_{IN}**
3. **Gate**
4. **Drain**
5. **RF_{OUT}**
6. **NC**
7. **Source**

D1525-PDS-F02

Figure 2. D1525 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}	120	V
Gate-Source Voltage	V_{GS}	-10 ~ +1	V
Operating Voltage	V_{DS}	10 ~ +40	V
Maximum Forward Gate Current	I_{GMax}	24.8	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
Operating Voltage, V_{DS}	-	32	-	V
Drain Bias Current, I_{DS}	-	500	-	mA
Gate-Source Voltage, V_{GS}	-	-2.75	-	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)	1.04	°C/W
Thermal Resistance (Junction-to-Case)[2]	R_{thjc} (FEA)	1.35	°C/W

[1]. Thermal Resistance at average power by infrared measurement, Active Die Surface-to-Case, $T_{base\text{-}plate}$ = 85℃, P_D = 76.0W

[2]. Thermal Resistance at average power by Finite Element Analysis, Junction-to-Case, $T_{base\text{-}plate}$ = 85℃, $T_{junction}$ = 200℃

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} = 24.8mA)	$V_{DS(BR)}$	120	-	-	V
Saturated Drain Current[2] (V_{DS} = 10V, V_{GS} = 1.0V)	I_{Max}	-	27.4	-	A
Gate Threshold Voltage[3] (V_{DS} = 32V, I_{DS} = 24.8mA)	$V_{GS(TH)}$	-3.3	-2.8	-2.3	V
Gate Quiescent Voltage[3] (V_{DS} = 32V, I_{DS} = 500mA)	$V_{GS(Q)}$	-	-2.75	-	V

[1]. Measured on wafer prior to packaging

[2]. Measured with packaged device

[3]. Measured in Infiwave DEMO

Table 6. RF Characteristics[1,2]

Freq.	Linear Gain (G_{LIN})	Drain Efficiency (η_D)	Out Power (P_{SAT})
2.7GHz	13.3dB	62.1%	51.5dBm (141W)
3.1GHz	12.8dB	57.2%	50.5dBm (112W)
3.5GHz	12.7dB	59.6%	51.1dBm (129W)

1. Typical Class AB performance in Infiwave DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 32V, I_{DS} = 500mA, V_{GS} = -2.75V
2. Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 20%

9. Typical Performance

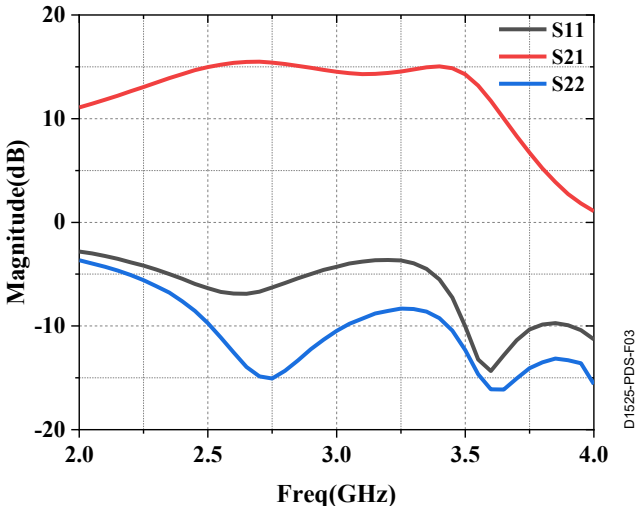


Figure 3. 2.7-3.5GHz S_{11}, S_{21} and S_{22} vs. Freq.

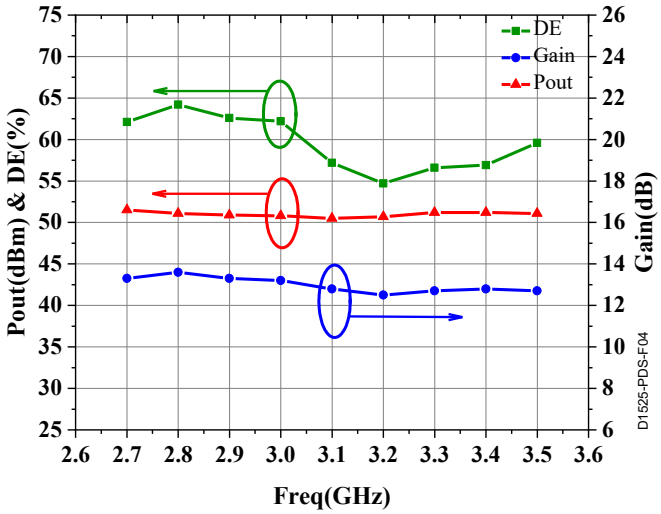


Figure 4. 2.7-3.5GHz Gain and Pout vs. Freq.

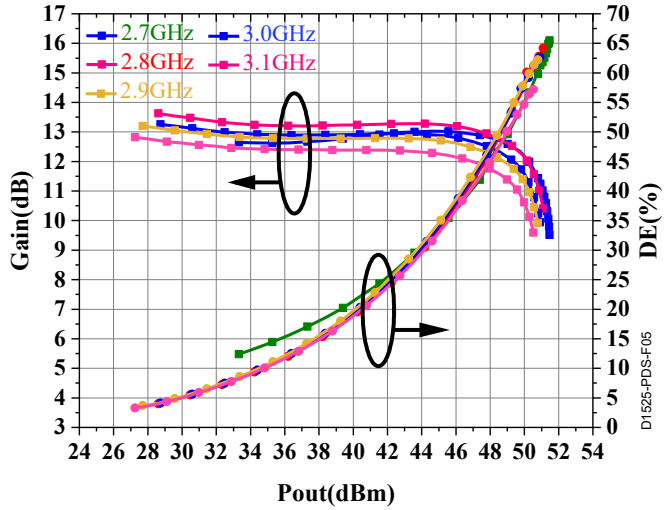


Figure 5. 2.7-3.1GHz Gain and DE vs. P_{OUT}

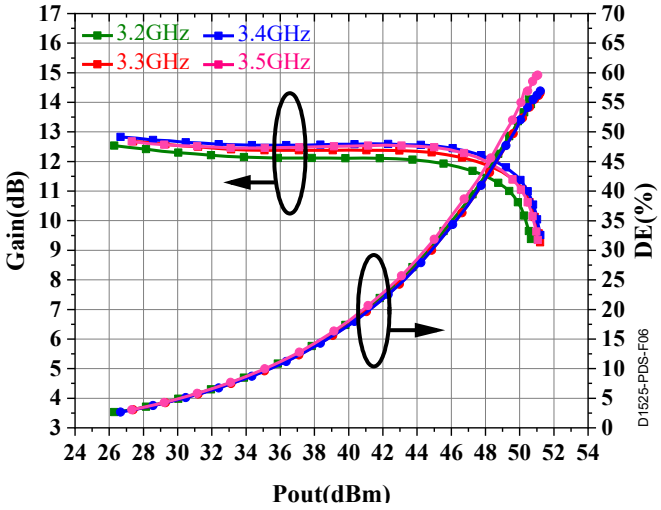


Figure 6. 3.2-3.5GHz Gain and DE vs. P_{OUT}

- Typical Class AB performance in Infiwave DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 32V, I_{DS} = 500mA, V_{GS} = -2.75V
- Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 20%

Table 7. RF Characteristics @ DEMO_A[1,2,3], 2.7-3.5GHz, Pulse, 32V

Freq.	Linear Gain (G_{LIN})	Drain Efficiency (η_D)	Out Power (P_{SAT})
2.7GHz	13.3dB	62.1%	51.5dBm (141W)
2.8GHz	13.6dB	64.2%	51.1dBm (129W)
2.9GHz	13.3dB	62.6%	50.9dBm (123W)
3.0GHz	13.2dB	62.2%	50.8dBm (120W)
3.1GHz	12.8dB	57.2%	50.5dBm (112W)
3.2GHz	12.5dB	54.7%	50.7dBm (117W)
3.3GHz	12.7dB	56.6%	51.2dBm (132W)
3.4GHz	12.8dB	56.9%	51.2dBm (132W)
3.5GHz	12.7dB	59.6%	51.1dBm (129W)

1. Typical Class AB performance in Infiwave DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 32V, I_{DS} = 500mA, V_{GS} = -2.75V
2. Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 20%
3. The output power reaches 50.5dBm (112W) at 2.7-3.5GHz when V_{DS}=32V.

10. Package Outline

■ Pin Layout

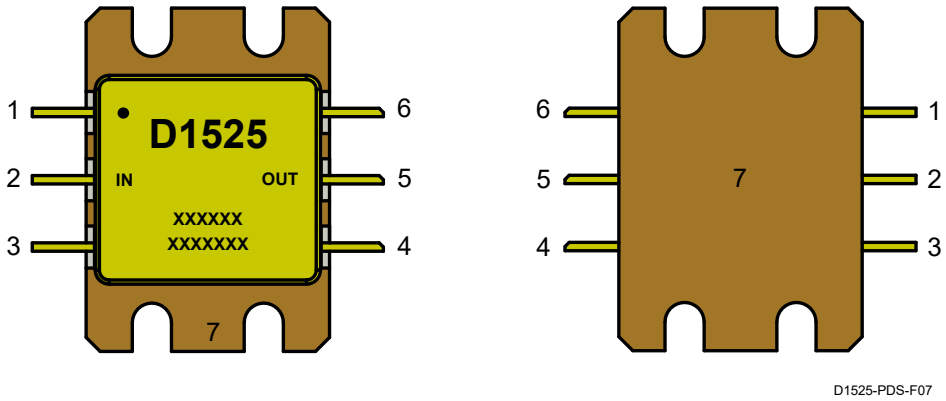


Figure 7. D1525 Pin Layout

Table 8. Pin Description

Pin	Symbol	Description
1	NC	Not Connected
2	RF_{IN}	RF Input
3	V_G	Gate Voltage
4	V_D	Drain Voltage
5	RF_{OUT}	RF Output
6	NC	Not Connected
7	Flange	Source to be Connected to Ground

■ Mechanical Drawing (Package Type:630F-B)

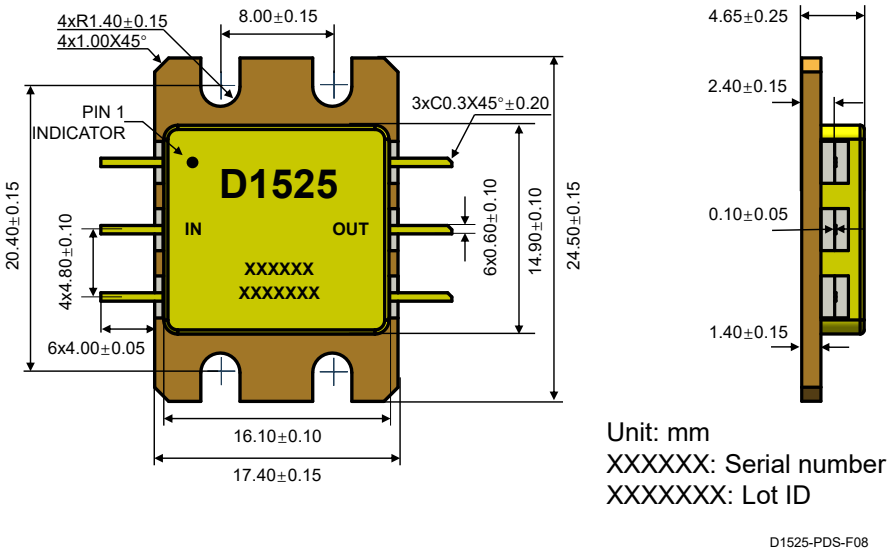


Figure 8. D1525 Mechanical Drawing

11. Application Circuit

■ Schematic

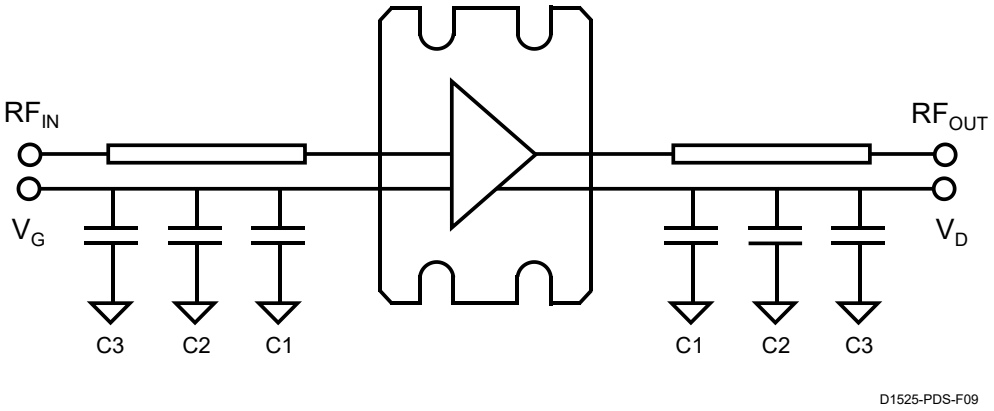


Figure 9. D1525 DEMO_A Application Circuit Schematic

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 (32V)	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

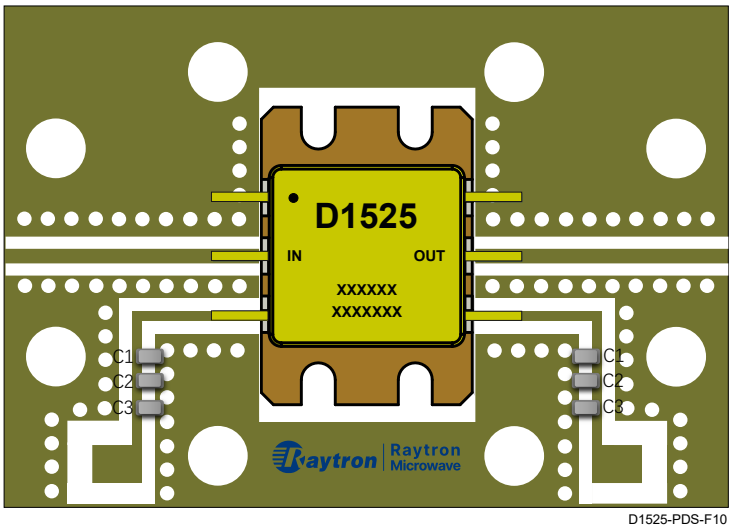


Figure 10. D1525 Application Circuit Layout
（DEMO_A Size: 5.8cm x 4.0cm）

Table 10. Bill of Materials

Component	Value	Description	Manufacturer	Part Number
PCB	20mil	N/A	Rogers	RO4350B
C1	100.0pF	C0G 250V 0805 Capacitor	Murata	GQM2195C2E101JB12
C2	10.0nF	X7R 100V 0603 Capacitor	Murata	GCM188R72A103KA37D
C3	1.0uF	X7R 100V 1210 Capacitor	Murata	GRM3195C2A104JA01

12. DEMO Summary

Table 11. DEMO Summary

NO.	D1525 DEMO Name	V_{DS} (V)	Freq. (GHz)	Linear Gain (dB)	P_{SAT} (dBm)	P_{SAT} (W)	Drain Efficiency (%)	Pulse or CW
1	DEMO_A, 110W	32	2.7-3.5	12.5	50.5	112	54.7	Pulse

13. Recommended Solder Temperature Profile

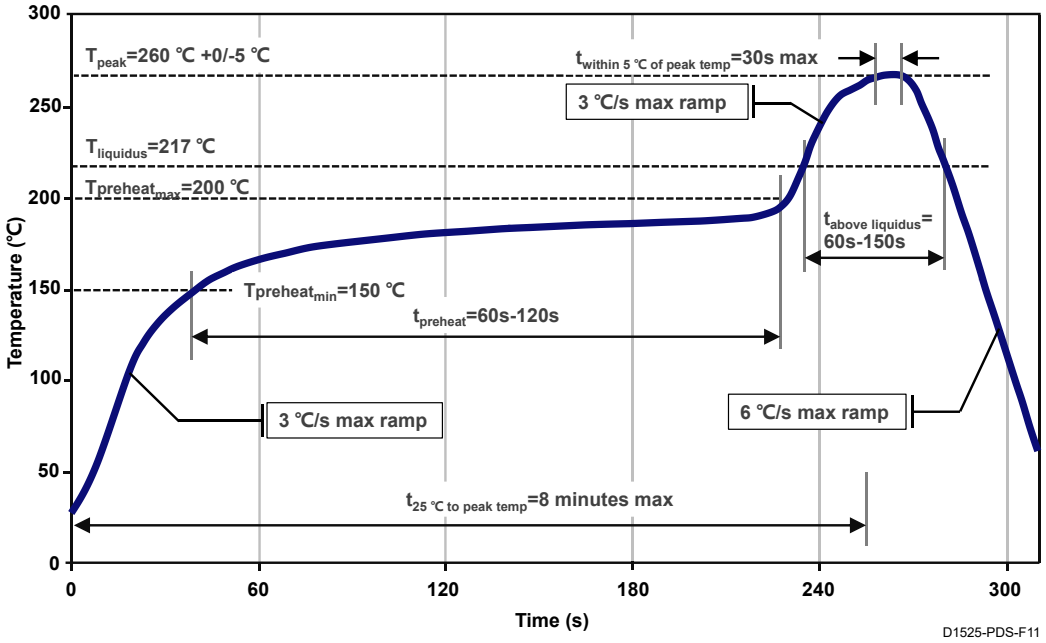


Figure 11. Recommended Solder Temperature Profile

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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