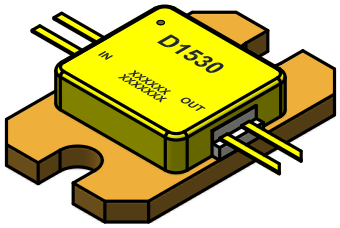
1. Description

- The D1530 is a 30W (P_{SAT}) wideband matched GaN-HEMT device. The D1530 is matched to 50ohm on the input and 50ohm on the output.
- The D1530 operates from 0.6 to 1.4GHz with a 28V supply rail. It is offered in a small hermetically sealed metal/ceramic flange package.



D1530-PDS-F01

Figure 1. D1530 Package Outline

2. Applications

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

3. Features[1]

- Operating Frequency: 0.6–1.4GHz
- Output Power (P_{SAT}): 45.2dBm (33W)
- Linear Gain: 18.6dB
- Typical DE @ P_{SAT}: 45.0%
- Operating Voltage: 28V
- CW and Pulse Capable
- Impedance Matched Z_{IN}/Z_{OUT} = 50ohm
- Hermetically Sealed Package
- Package Type: 450F-A

[1] Measured in Raytron DEMO_A

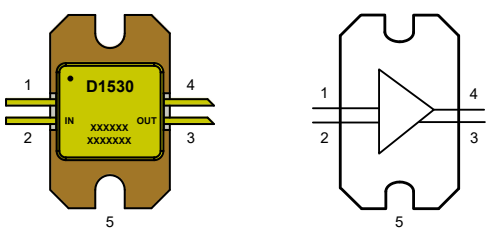
4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	0.6GHz	0.8GHz	1.0GHz	1.2GHz	1.4GHz	Units
Linear Gain	19.3	19.0	19.3	18.6	18.7	dB
Drain Efficiency	45.0	58.3	59.2	53.0	51.5	%
Output Power	45.5	47.4	47.2	46.1	45.2	dBm
Output Power	35.5	55.0	52.5	40.7	33.1	W

- Typical Class AB performance in Raytron DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 28V, I_{DS} = 100mA, V_{GS} = -3.1V
- Test Condition: CW

5. Block Diagram



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

D1530-PDS-F02

Figure 2. D1530 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	4
10	Package Outline	5
11	Application Circuit	6
12	DEMO Summary	7
13	Recommended Solder Temperature Profile	8
14	Handling Precautions	8
15	Contact Information	8
16	Disclaimer	9

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 ~ +32	V
Maximum Forward Gate Current	I_{GMax}	9.12	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}	-	28	32	V
Drain Bias Current, I_{DS}	-	100	-	mA
Gate-Source Voltage, V_{GS}	-	-3.10	-	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)	2.00	°C/W
Thermal Resistance (Junction-to-Case)[2]	R_{thjc} (FEA)	2.56	°C/W

1. Thermal Resistance at average power by infrared measurement, Active Die Surface-to-Case, $T_{base\text{-}plate}$ = 85℃, P_D = 45.0W
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} = 9.12mA)	$V_{DS(BR)}$	120	-	-	V
Saturated Drain Current[2] (V_{DS} = 10V, V_{GS} = 1.0V)	I_{Max}	-	10.49	-	A
Gate Threshold Voltage[3] (V_{DS} = 28V, I_{DS} = 9.12mA)	$V_{GS(TH)}$	-3.3	-2.8	-2.3	V
Gate Quiescent Voltage[3] (V_{DS} = 28V, I_{DS} = 100mA)	$V_{GS(Q)}$	-	-3.10	-	V

1. Measured on wafer prior to packaging
2. Measured with packaged device
3. Measured in Raytron DEMO

Table 6. RF Characteristics[1,2]

Freq.	Linear Gain (G_{LIN})	Drain Efficiency (η_D)	Output Power (P_{SAT})
0.6GHz	19.3dB	45.0%	45.5dBm (35.5W)
1.0GHz	19.3dB	59.2%	47.2dBm (52.5W)
1.4GHz	18.7dB	51.5%	45.2dBm (33.1W)

1. Typical Class AB performance in Raytron DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 28V, I_{DS} = 100mA, V_{GS} = -3.1V
2. Test Condition: CW

9. Typical Performance

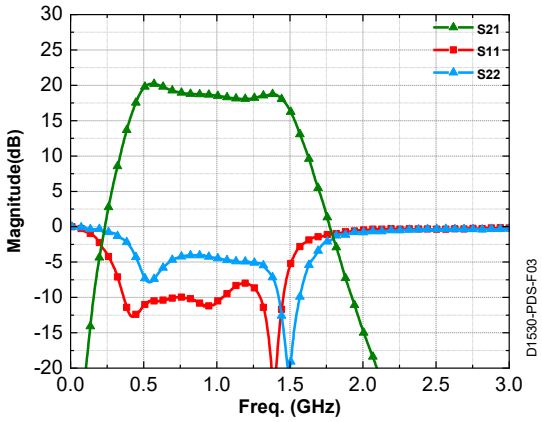


Figure 3. 0.6GHz-1.4GHz S_{11}, S_{21}, and S_{22} vs. Freq.

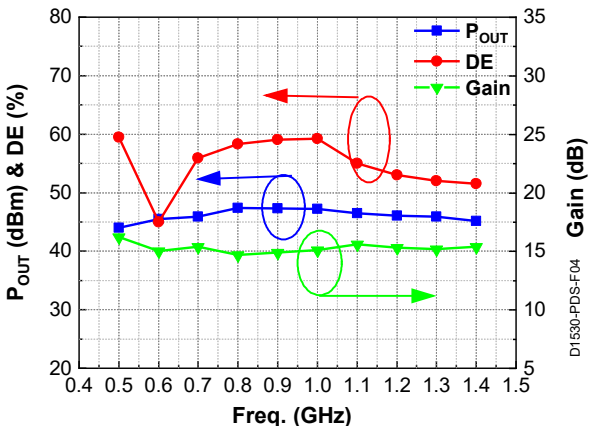


Figure 4. 0.6GHz-1.4GHz Gain, DE, and Pout vs. Freq.

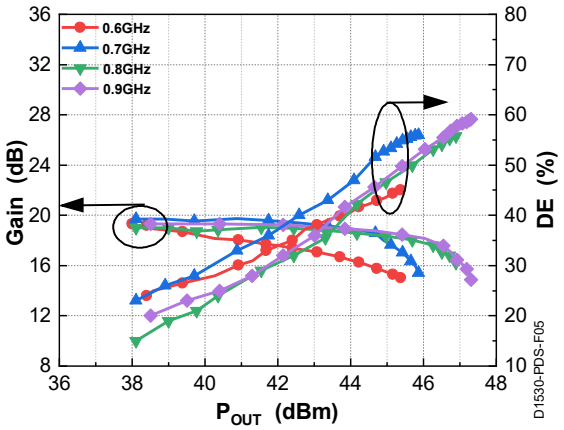


Figure 5. 0.6GHz-1.4GHz Gain and DE vs. P_{OUT}

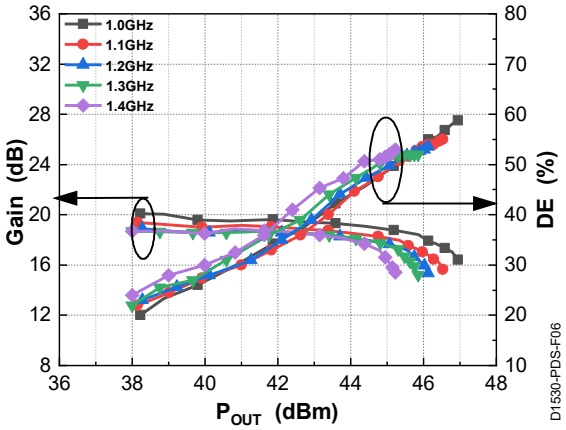


Figure 6. 0.6GHz-1.4GHz Gain and DE vs. P_{OUT}

- Typical Class AB performance in Raytron DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 28V, I_{DS} = 100mA, V_{GS} = -3.10V
- Test Condition: CW

Table 7. RF Characteristics @ DEMO_A[1,2,3], 0.6-1.4GHz, CW, 28V

Freq.	Linear Gain (G_{LIN})	Drain Efficiency (η_D)	Output Power (P_{SAT})
0.6GHz	19.3dB	45.0%	45.5dBm (35.5W)
0.7GHz	19.6dB	55.9%	45.9dBm (38.9W)
0.8GHz	19.0dB	58.3%	47.4dBm (55.0W)
0.9GHz	19.3dB	59.1%	47.3dBm (53.7W)
1.0GHz	19.3dB	59.2%	47.2dBm (52.5W)
1.1GHz	19.0dB	55.0%	46.5dBm (44.7W)
1.2GHz	18.6dB	53.0%	46.1dBm (40.7W)
1.3GHz	18.6dB	52.0%	45.9dBm (38.9W)
1.4GHz	18.7dB	51.5%	45.2dBm (33.1W)

1. Typical Class AB performance in Raytron DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 28V, I_{DS} = 100mA, V_{GS} = -3.1V
2. Test Condition: CW
3. The output power is 51.8dBm (151W) at 8.5-9.6GHz when V_{DS}=28V.

10. Package Outline

■ Pin Layout

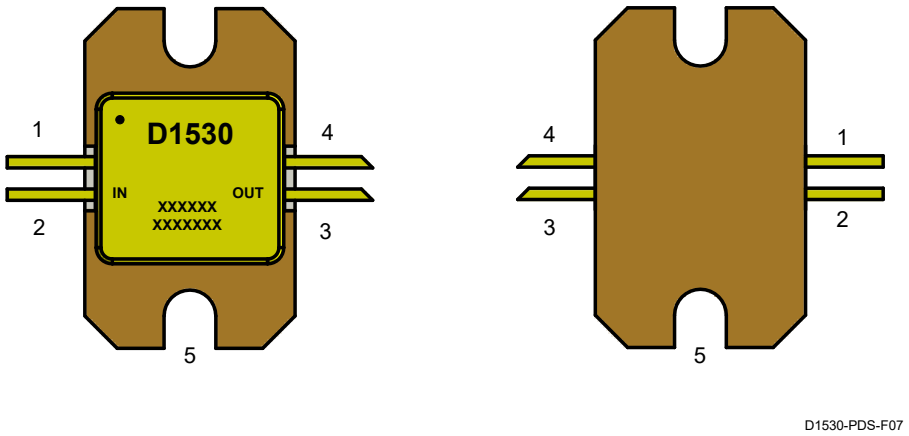


Figure 7. D1530 Pin Layout

Table 8. Pin Description

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

■ Mechanical Drawing (Package Type: 450F-A)

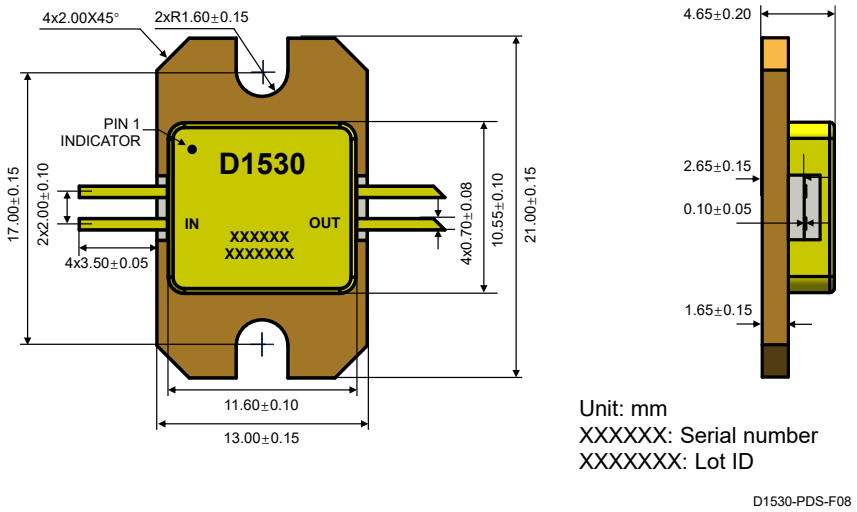


Figure 8. D1530 Mechanical Drawing

11. Application Circuit

■ Schematic

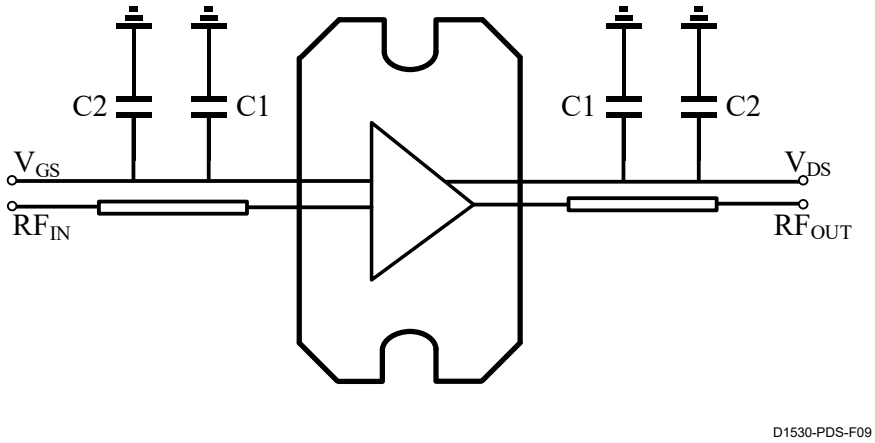


Figure 9. D1530 DEMO_A Application Circuit Schematic

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 (28V)	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

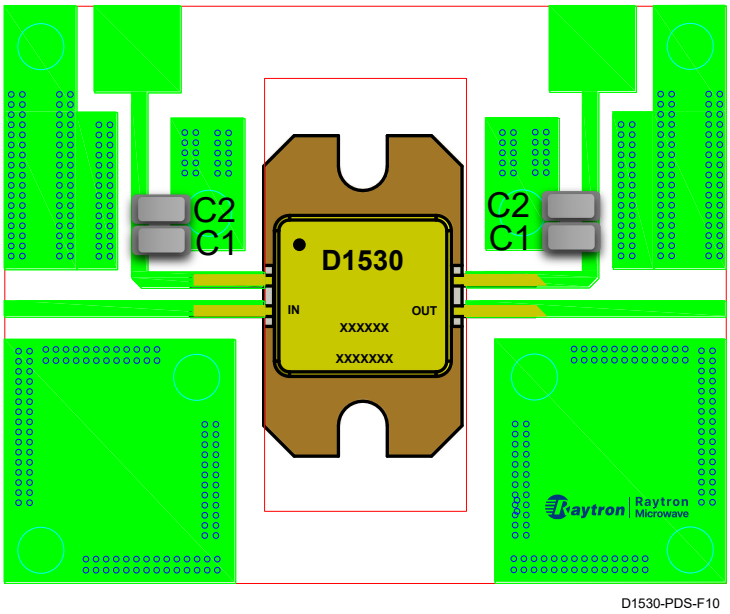


Figure 10. D1530 Application Circuit Layout
（DEMO_A Size: 5cm x 4cm）

Table 10. Bill of Materials

Component	Value	Description	Manufacturer	Part Number
PCB	20mil	N/A	Rogers	RO4350B
C1	1.0uF	X7R 100V 1206 Capacitor	Murata	GCM31CR72A105KA03L
C2	4.7uF	X7R 100V 1206 Capacitor	Murata	GRM31CZ72A475KE11L

12. DEMO Summary

Table 11. DEMO Summary

NO.	D1530 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	28	0.6-1.4	18.6	45.2	33	45.0	CW

13. Recommended Solder Temperature Profile

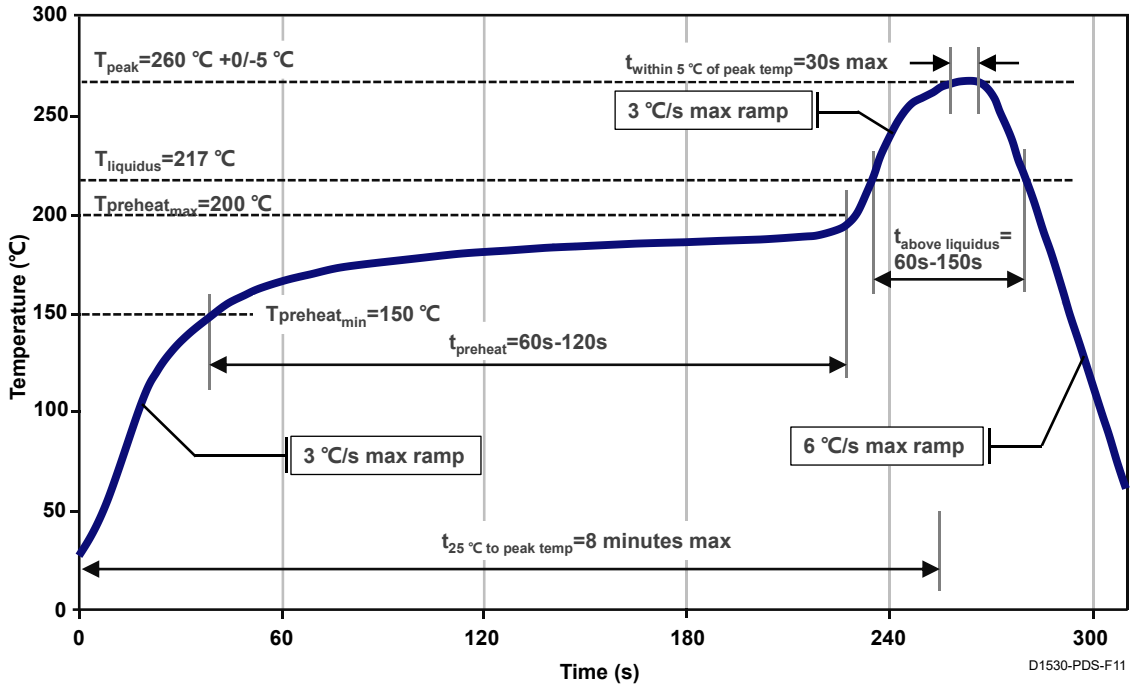


Figure 11. Recommended Solder Temperature Profile

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

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