1. Description

- The D1561 is a 150W (P_{SAT}) GaN-HEMT device matched to 50ohm on the input and 50ohm on the output.
- The D1561 operates at 4.3GHz with a 36V supply rail. It is offered in a small hermetically sealed metal/ceramic flange package.

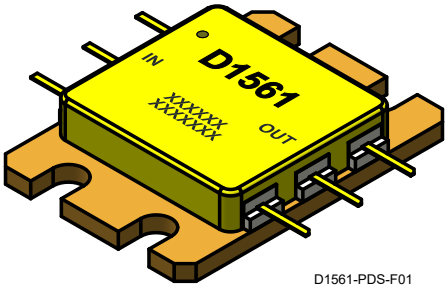


Figure 1. D1561 Package Outline

2. Applications

- 4.3GHz Radar Altimeter

3. Features[1]

- Operating Frequency: 4.3GHz
- Output Power (P_{SAT}): 51.8dBm (151W)
- Linear Gain: 15.1dB
- Typical DE @ P_{SAT}: 59.3%
- Operating Voltage: 36V
- Impedance Matched Z_{IN}/Z_{OUT}=50ohm
- Hermetically Sealed Package
- Pulse Capable
- Package Type: 630F-B

[1] Measured in Raytron DEMO_A

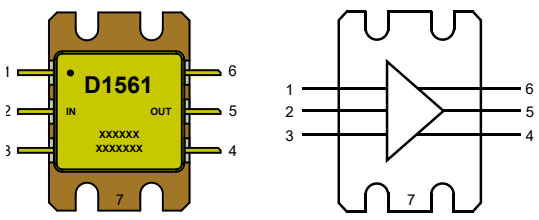
4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	4.3GHz	Units
Linear Gain	15.1	dB
Drain Efficiency	59.3	%
Output Power	51.8	dBm
Output Power	151	W

- Typical Class AB performance in Raytron DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 36V, I_{DS} = 500mA, V_{GS} = -2.66V
- Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 10%

5. Block Diagram



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

D1561-PDS-F02

Figure 2. D1561 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	7
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 ~ +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}	-	36	-	V
Drain Bias Current, I_{DS}	-	500	-	mA
Gate-Source Voltage, V_{GS}	-	-2.66	-	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)	1.30	°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} = 36V, I_{DS} = 24.8mA)	$V_{GS(TH)}$	-3.3	-2.8	-2.3	V
Gate Quiescent Voltage[3] (V_{DS} = 36V, I_{DS} = 500mA)	$V_{GS(Q)}$	-	-2.66	-	V

[1]. Measured on wafer prior to packaging

[2]. Measured with packaged device

[3]. Measured in Raytron DEMO

9. Typical Performance

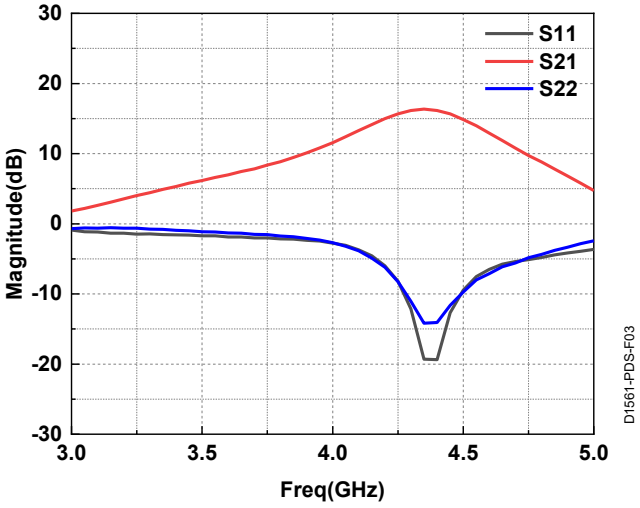


Figure 3. 4.3GHz S_{11}, S_{21} and S_{22} vs. Freq.

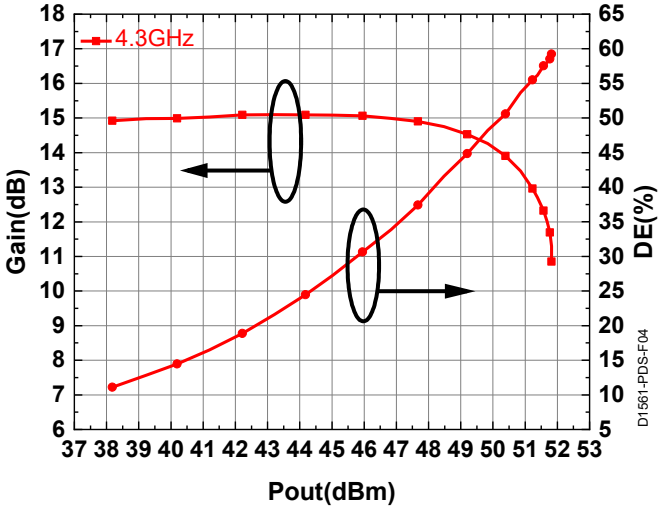


Figure 4. 4.3GHz Gain and DE vs. P_{OUT}.

- Typical Class AB performance in Raytron DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 36V, I_{DS} = 500mA, V_{GS} = -2.66V
- Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 10%

Table 6. RF Characteristics @ DEMO_A[1,2,3], 4.3GHz, Pulse, 36V

Freq.	Linear Gain (G_{LIN})	Drain Efficiency (η_D)	Out Power (P_{SAT})
4.3GHz	15.1dB	59.3%	51.8dBm (151W)

1. Typical Class AB performance in Raytron DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 36V, I_{DS} = 500mA, V_{GS} = -2.66V
2. Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 10%
3. The output power reaches 51.8dBm (151W) at 4.3GHz when V_{DS}=36V.

10. Package Outline

■ Pin Layout

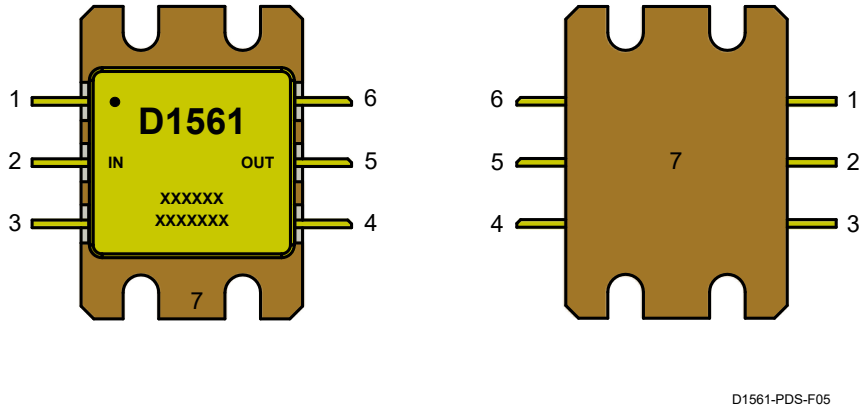


Figure 5. D1561 Pin Layout

Table 7. 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)

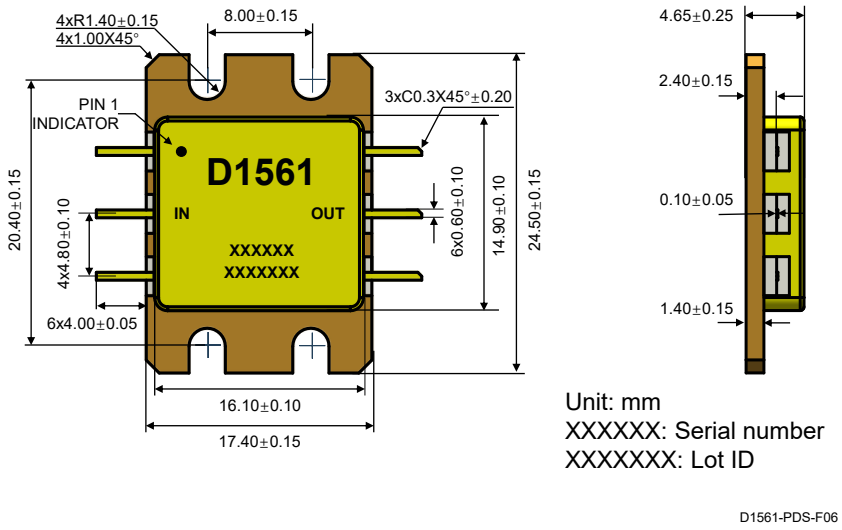


Figure 6. D1561 Mechanical Drawing

11. Application Circuit

■ Schematic

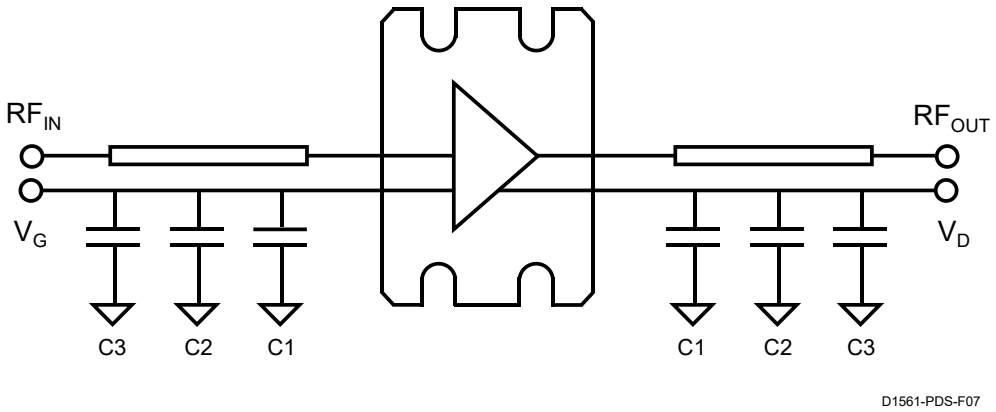


Figure 7. D1561 DEMO_A Application Circuit Schematic

Table 8. 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 (36V)	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

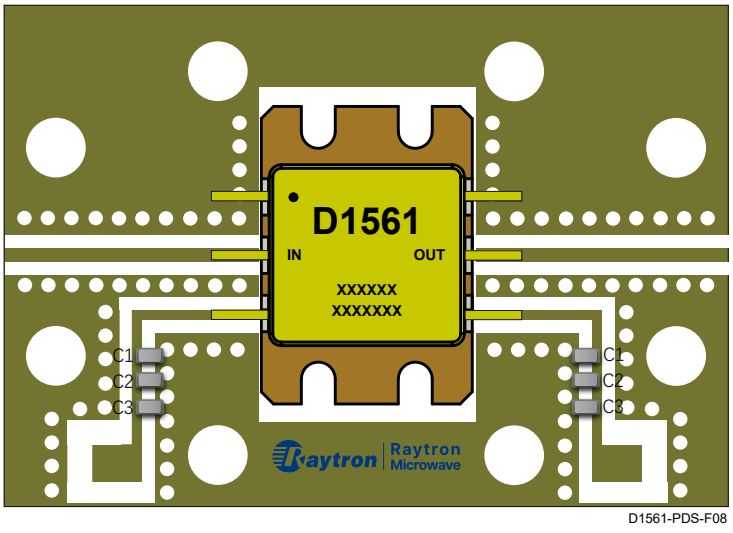


Figure 8. D1561 Application Circuit Layout
（DEMO_A Size: 5.8cm x 4.0cm）

Table 9. 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 10. DEMO Summary

NO.	D1561 DEMO Name	V_{DS} (V)	Freq. (GHz)	Linear Gain (dB)	P_{SAT} (dBm)	P_{SAT} (W)	Drain Efficiency (%)	Pulse or CW
1	DEMO_A, 150W	36	4.3	15.1	51.8	151	59.3	Pulse

13. Recommended Solder Temperature Profile

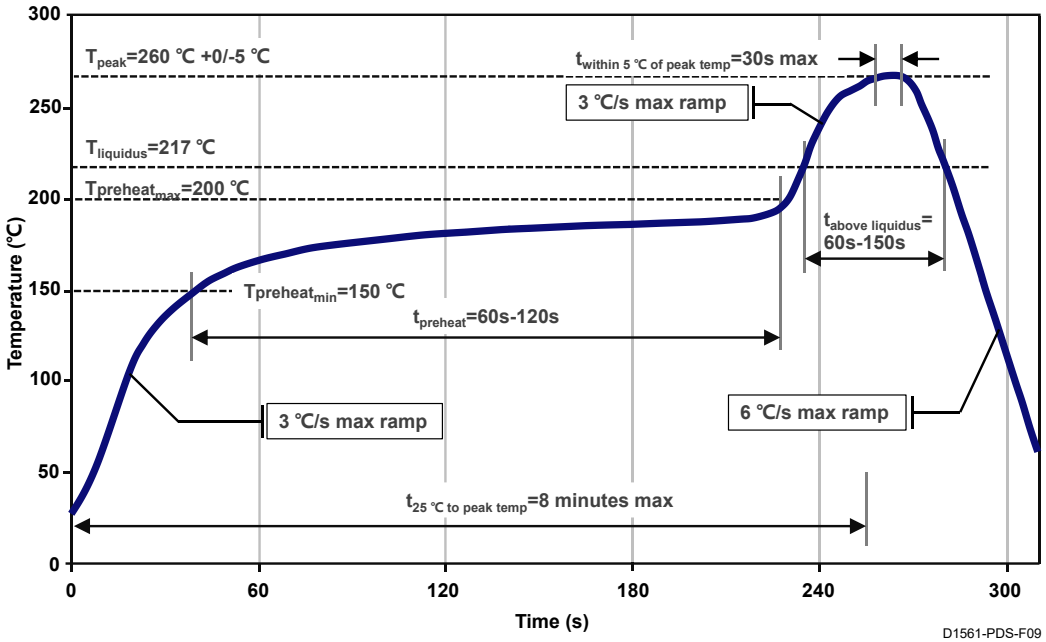


Figure 9. Recommended Solder Temperature Profile

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

The information provided here is believed to be reliable at the time of publication. Raytron reserves the right to make changes to its products, specifications and product descriptions at any time without notice. Raytron assumes no responsibility for the use of this information and all such information should entirely be at the user's own risk. Raytron makes no warranty about the suitability of its products for specific purpose or application and disclaims all liability, including without limitation consequential and incidental damages. Raytron does not authorize or warrant any Raytron products for use in the life support devices or systems.

Raytron Microwave

Copyright @ Raytron Technology Co., Ltd.