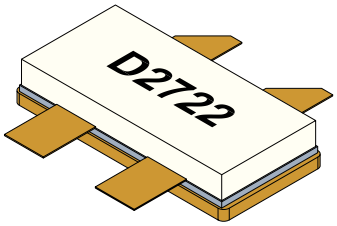
1. Description

- The D2722 is a 900W (P_{SAT}) wideband pre-matched gallium nitride (GaN) high electron mobility transistor (HEMT).
- The D2722 operates from DC to 3GHz with a 48V supply rail. The device is offered in an industry standard air cavity package.



D2722-PDS-F01

Figure 1. D2722 Package Outline

2. Applications

- Military and Civilian Radar
- Target Tracking Radar
- Air Traffic Control (ATC) Radar
- Avionics, IFF Transponders

3. Features

- Operating Frequency: DC–3GHz
- Output Power[1] (P_{SAT}): 59.9dBm (977W)
- Linear Gain[1]: 19.4dB
- Typical DE @P_{SAT}[1]: 72.7%
- Operating Voltage: 48V
- Package Type: 780P-A

[1] Measured in Infiwave DEMO @2.1GHz

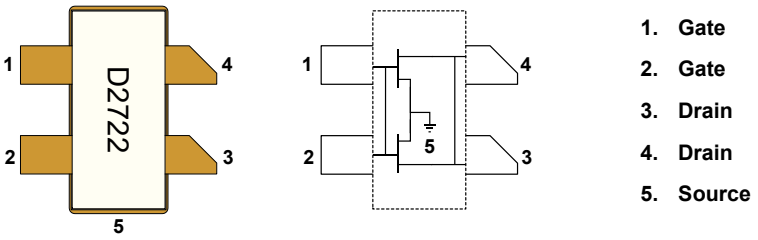
4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	1.2GHz	2.1GHz	Units
Linear Gain	20.4	19.4	dB
Drain Efficiency	76.0	72.7	%
Output Power	60.3	59.9	dBm
Output Power	1072	977	W

- Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 5%
- Typical Class AB performance in Infiwave DEMO with the device soldered onto the heatsink, test condition: V_{DS} = 48V, I_{DS} = 400mA V_{GS} = -3.15V

5. Block Diagram



1. Gate
2. Gate
3. Drain
4. Drain
5. Source

D2722-PDS-F02

Figure 2. D2722 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	Wide-band Application Performance	5
11	Package Outline	5
12	Application Circuit	6
13	DEMO Summary	8
14	Recommended Solder Temperature Profile	8
15	Handling Precautions	8
16	Contact Information	9
17	Disclaimer	9

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}	112.52	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}	-	400	-	mA
Gate-Source Voltage, V_{GS}	-	-3.15	-	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)	0.45	°C/W

1. Thermal Resistance at average power by infrared measurement, Active Die Surface-to-Case, $T_{base\text{-}plate}$ = 85℃, P_D = 140.0W

2. Thermal Resistance at average power by Finite Element Analysis, Junction-to-Case, $T_{base\text{-}plate}$ = 85℃, P_D = 140.0W

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} = 112.52mA)	$V_{DS(BR)}$	150	-	-	V
Saturated Drain Current[1] (V_{DS} = 10V, V_{GS} = 1.0V)	I_{Max}	-	116.98	-	A
Gate Threshold Voltage[2] (V_{DS} = 48V, I_{DS} = 112.52mA)	$V_{GS(TH)}$	-3.95	-3.32	-2.60	V
Gate Quiescent Voltage[2] (V_{DS} = 48V, I_{DS} = 400mA)	$V_{GS(Q)}$	-	-3.15	-	V

1. Scaled from PCM data

2. Measured in Infiwave DEMO

Table 6. RF Characteristics @ DEMO_A[1,2]

Parameter	0.38GHz	0.4GHz	0.5GHz	0.6GHz	0.7GHz	0.8GHz	Units
Linear Gain	15.9	16.9	18.8	17.4	18.1	17.6	dB
Drain Efficiency	52.0	51.3	67.5	60.7	59.0	67.5	%
Output Power	53.0	53.2	53.1	53.1	53.5	53.1	dBm
Output Power	200	209	204	204	224	204	W

[1.] Test Condition: CW

[2.] Typical Class AB performance in Infiwave DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 32V, I_{DS} = 400mA V_{GS} = -3.15V

Table 7. Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Input Capacitance	C_{GS}	-	170.69	-	pF
Output Capacitance	C_{DS}	-	41.48	-	pF
Feedback Capacitance	C_{GD}	-	5.77	-	pF

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

9. Typical Performance

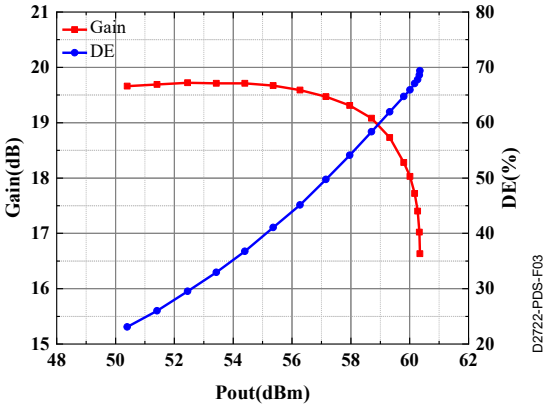


Figure 3. 1.2GHz Gain and DE @MXP vs. Output Power

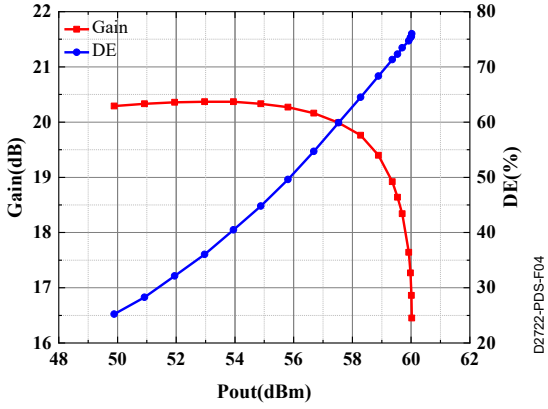


Figure 4. 1.2GHz Gain and DE @MXE vs. Output Power

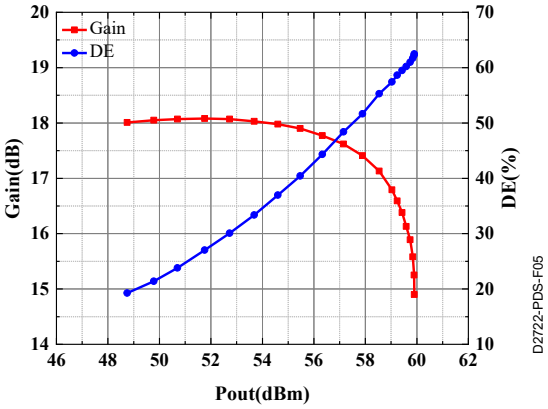


Figure 5. 2.1GHz Gain and DE @MXP vs. Output Power

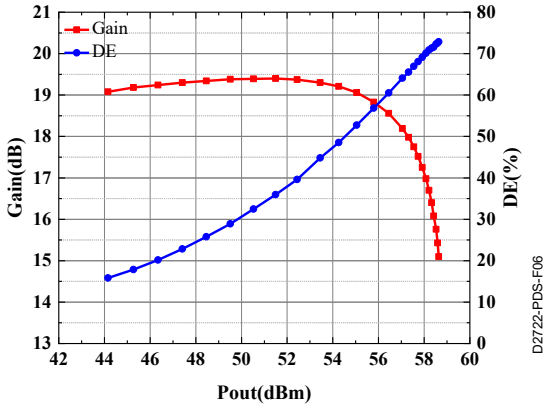


Figure 6. 2.1GHz Gain and DE @MXE vs. Output Power

- Typical performance in Infiwave DEMO with the device soldered onto the heatsink, test condition: V_{DS} = 48V, I_{DS}= 400mA, V_{GS} = -3.15V
- Test Condition: Pulse, Pulse width = 100μs, Duty cycle = 5%

10. Wide-band Application Performance

■ Wide-band Application Performance (DEMO_A: 0.38-0.8GHz)

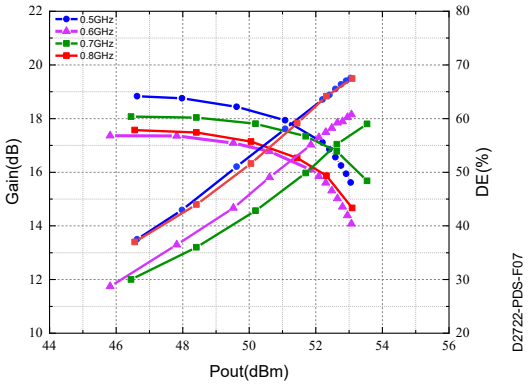


Figure 7. Wide-band Application Gain and DE vs. Output Power

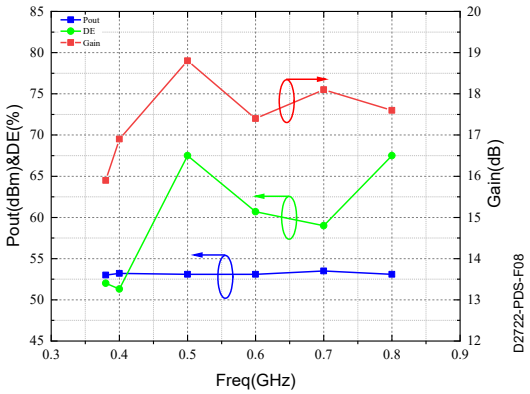


Figure 8. Wide-band Application P_{OUT}, Gain, and DE vs. Freq.

- Typical Class AB performance in Raytron Wide-band Application DEMO_A (0.38-0.8GHz) with the device soldered onto the heatsink, test condition: V_{DS} = 32V, I_{DS} = 400mA, V_{GS} = -3.15V
- Test Condition: CW
- The output power is 53.0dBm (200W) at 0.38-0.8GHz. It can be used in the avionics and radar application.

11. Package Outline

■ Pin Layout

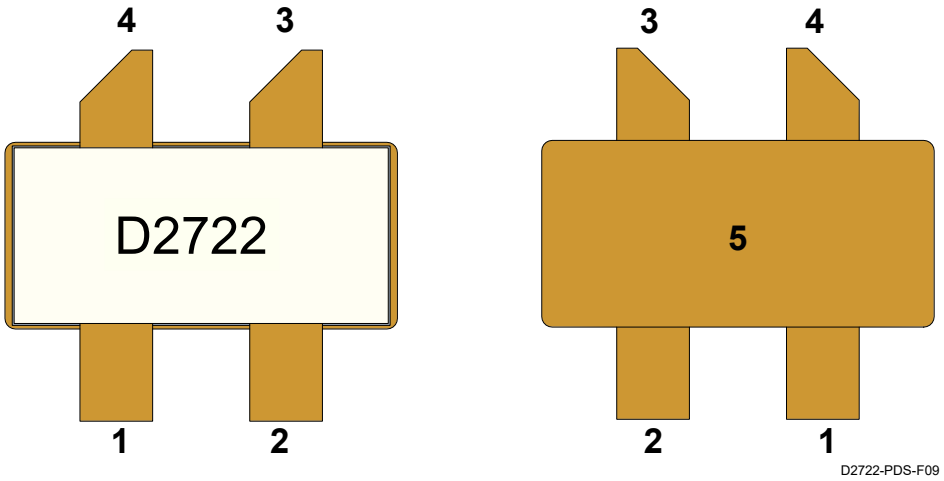


Figure 9. D2722 Pin Layout

Table 8. Pin Description

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

■ Mechanical Drawing (Package Type: 780P-A)

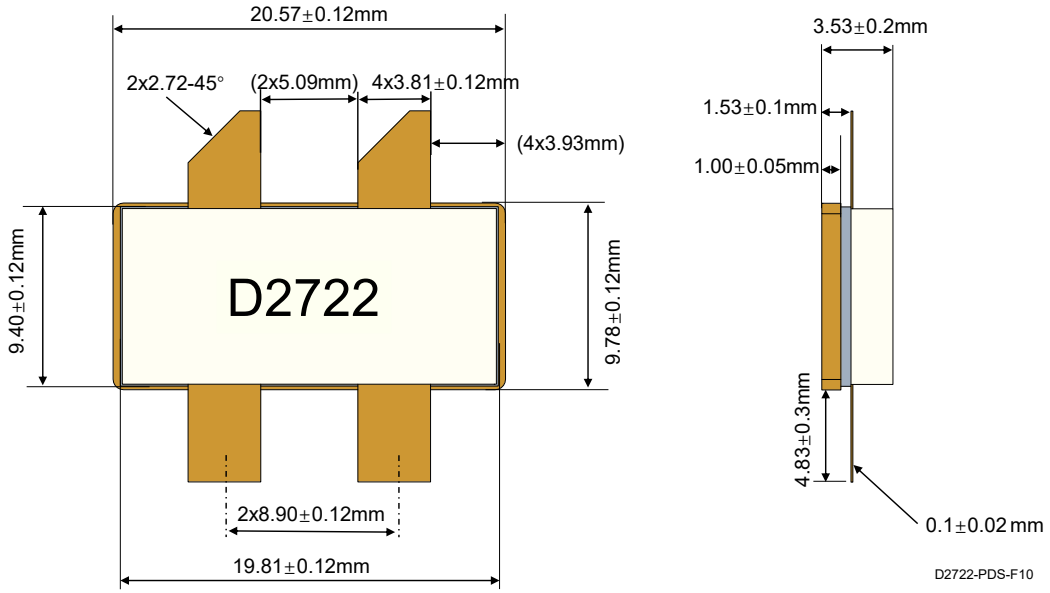


Figure 10. D2722 Mechanical Drawing

12. Application Circuit

■ Schematic

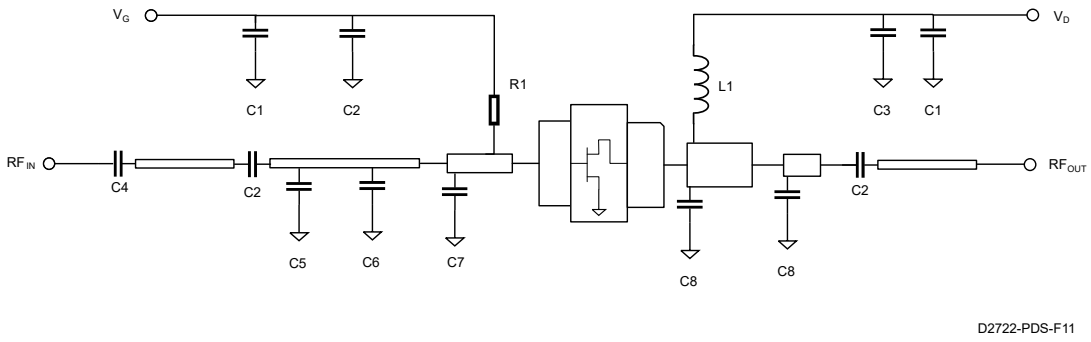


Figure 11. D2722 DEMO_A Application Circuit Schematic

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

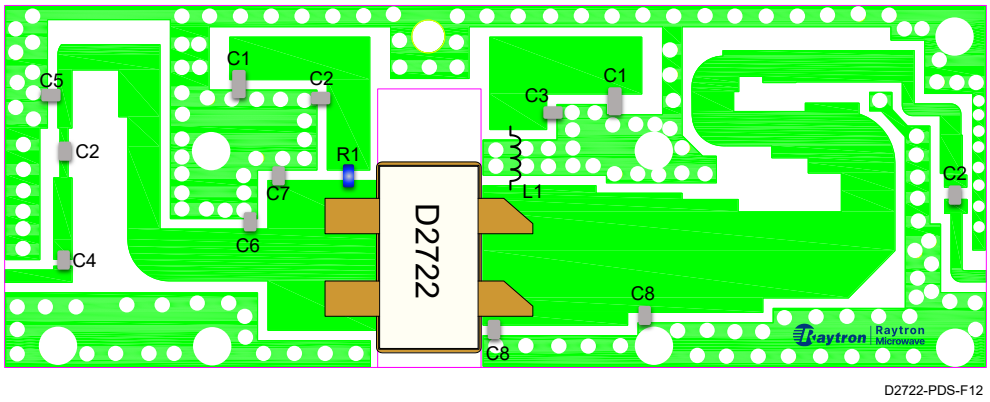


Figure 12. D2722 Application Circuit Layout
(DEMO_A Size: 9.5 x 3.5cm)

Table 10. Bill of Materials

Component	Value	Description	Manufacturer	Part Number
PCB	20mil	N/A	Taizhou Wangling	WL_CT615
C1	4.7uF	X7R 100V 1206 Capacitor	Murata	GRM31CC72A475KE11L
C2	100.0pF	C0G 250V 0805 Capacitor	Murata	GQM2195C2E101JB12
C3	51.0pF	C0G 250V 0805 Capacitor	Murata	GQM2195C2E510JB12
C4	25.0pF	C0G 250V 0805 Capacitor	Murata	GQM2195C2E250GB12
C5	2.3pF	C0G 250V 0805 Capacitor	Murata	GQM2195C2E2R3BB12
C6	15.0pF	C0G 250V 0805 Capacitor	Murata	GQM2195C2E150FB12
C7	20.0pF	C0G 250V 0805 Capacitor	Murata	GQM2195C2E200GB12
C8	7.5pF	C0G 250V 0805 Capacitor	Murata	GQM2195C2E7R5CB12
L1	N/A	4turn, D=5mm, d=1.5mm	N/A	N/A
R1	10Ω	1/8W 0805	Yageo	RC0805FR-0710RL

13. DEMO Summary

Table 11. DEMO Summary

NO.	D2722 DEMO Name	V_{DS} (V)	Freq (GHz)	Linear Gain(dB)	P_{SAT} (dBm)	P_{SAT} (W)	Drain Efficiency	Pulse or CW
1	DEMO_A, 200W	32	0.38-0.8	15.9	53.0	200	51.3%	CW

14. Recommended Solder Temperature Profile

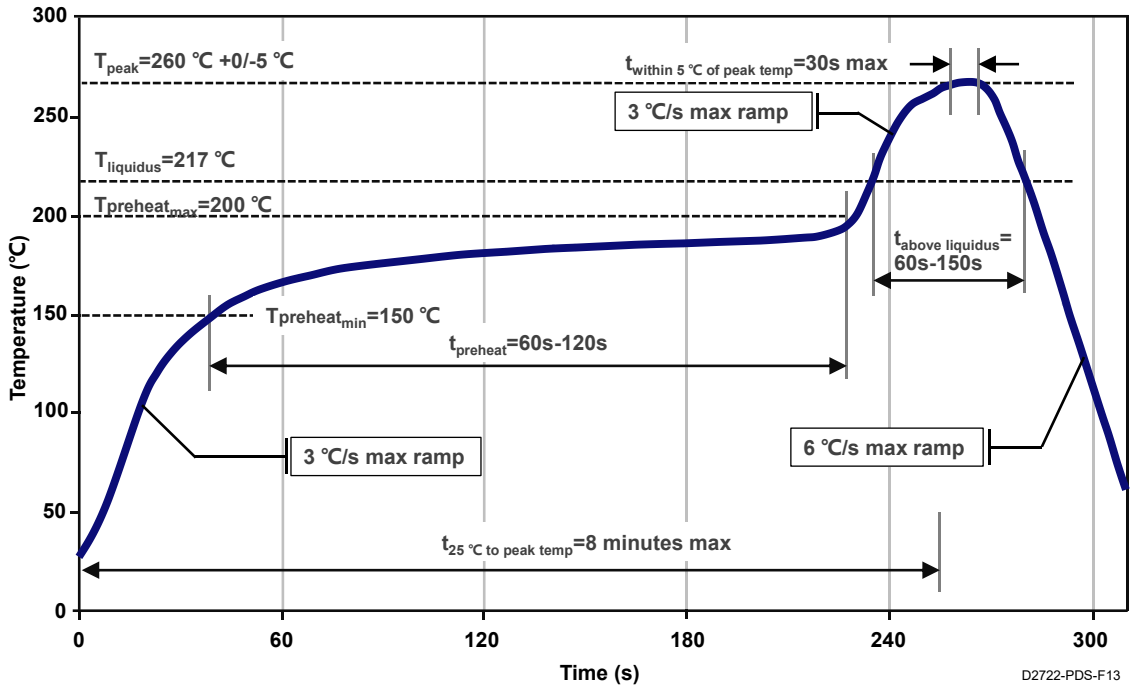


Figure 13. Recommended Solder Temperature Profile

15. 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.



16. 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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