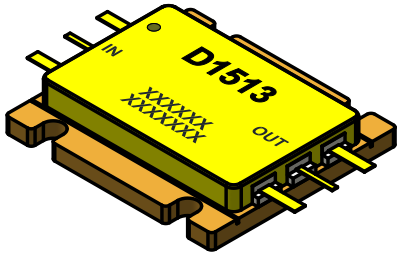
1. Description

- The D1513 is a high power (30W) GaN-HEMT that is internally matched for ultra broadband application to provide optimum power and gain in a 50ohm system.
- The device operates from 0.5 to 6.3GHz with a 28V, a 30V, or a 32V supply rail. It is offered in a small hermetically sealed metal/ceramic flange package.



D1513-PDS-F01

Figure 1. D1513 Package Outline

2. Applications

- Ultra Broadband Amplifiers
- Test Instrumentation
- EMC Amplifiers
- Electronic Countermeasures

3. Features[1]

- Operating Frequency: 0.5–6.3GHz
- Output Power (P_{SAT}): 44.8dBm (30W)
- Linear Gain: 11.0dB
- Typical DE @ P_{SAT}: 40.0%
- Operating Voltage: 28V
- Impedance Matched Z_{IN}/Z_{OUT} = 50ohm
- Hermetically Sealed Package
- Package Type: 670F-A

[1] Measured in Raytron DEMO_A

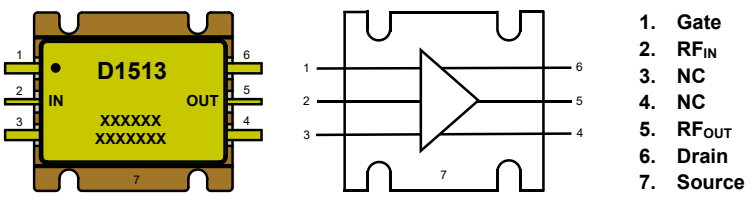
4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	0.5GHz	1.5GHz	2.5GHz	3.5GHz	4.5GHz	5.5GHz	6.3GHz	Units
Linear Gain	12.2	12.6	11.1	12.3	11.0	11.1	11.3	dB
Power Gain	9.2	9.6	8.1	9.3	8.0	8.1	8.3	dB
Drain Efficiency	61.5	62.3	50.5	44.9	42.8	45.4	47.7	%
Output Power	44.9	46.4	44.9	46.2	45.7	45.4	45.0	dBm
Output Power	31	44	31	42	37	35	32	W

- Typical Class AB performance in Raytron DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 28V, I_{DS} = 200mA, V_{GS} = -3.01V
- Test condition: CW

5. Block Diagram



D1513-PDS-F02

Figure 2. D1513 Block Diagram

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6. Absolute Maximum Ratings

Table 2. Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DSS}	84	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}	-	500	-	mA
Gate-Source Voltage, V_{GS}	-	-3.01	-	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)	$V_{DS(BR)}$	84	-	-	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)	$V_{GS(TH)}$	-3.30	-2.80	-2.30	V
Gate Quiescent Voltage[3] (V_{DS} = 28V, I_{DS} = 200mA)	$V_{GS(Q)}$	-	-3.01	-	V

1. Measured on wafer prior to packaging
2. Scaled from PCM data
3. Measured in Raytron DEMO

Table 6. RF Characteristics

Freq.	Linear Gain (G_{LIN})	Power Gain (G_P)	Drain Efficiency (η_D)	Output Power (P_{SAT})
0.5GHz	12.2dB	9.2dB	61.5%	44.9dBm (31W)
3.5GHz	12.3dB	9.3dB	44.9%	46.2dBm (42W)
6.0GHz	11.1dB	8.1dB	45.9%	44.8dBm (30W)

- Typical Class AB performance in Raytron DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 28V, I_{DS} = 200mA, V_{GS} = -3.01V
- Test condition: CW

9. Typical Performance

■ Wide-band Application Performance (DEMO_A, 0.5-6.3GHz, CW, 28V)

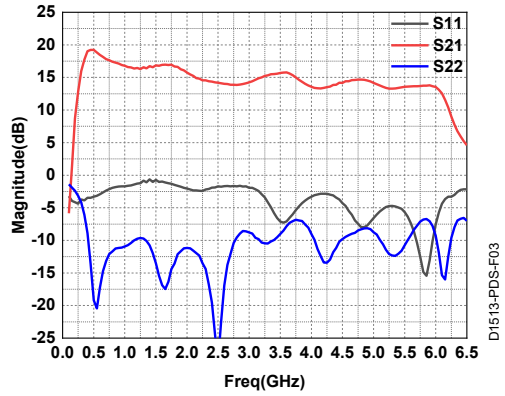


Figure 3. S_{11}, S_{21} and S_{22} vs. Freq.

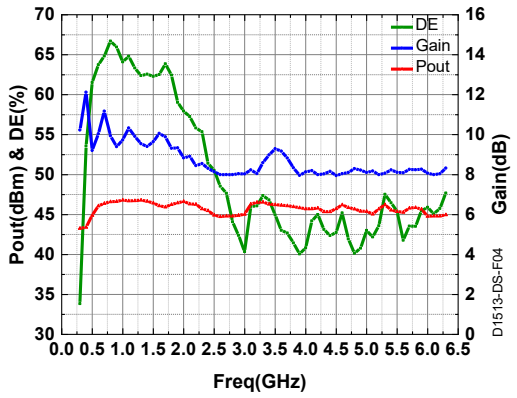


Figure 4. P_{OUT}, DE and Gain vs. Freq.

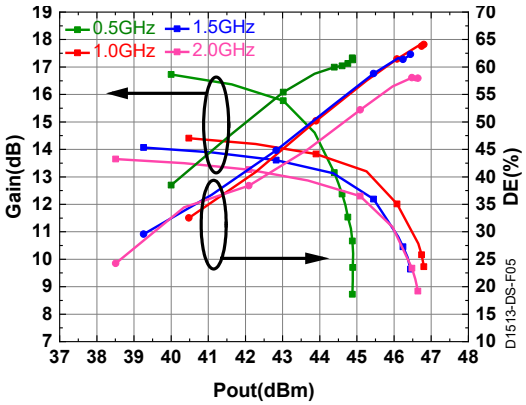


Figure 5. Gain and DE vs. P_{OUT}

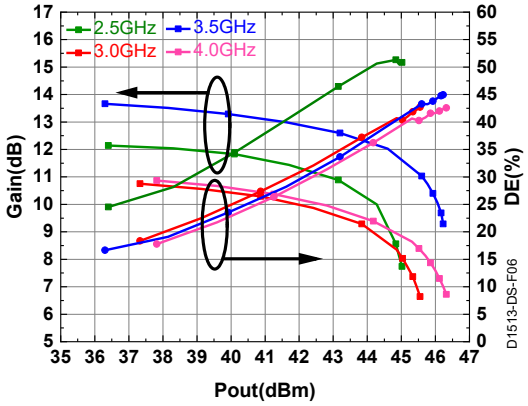


Figure 6. Gain and DE vs. P_{OUT}

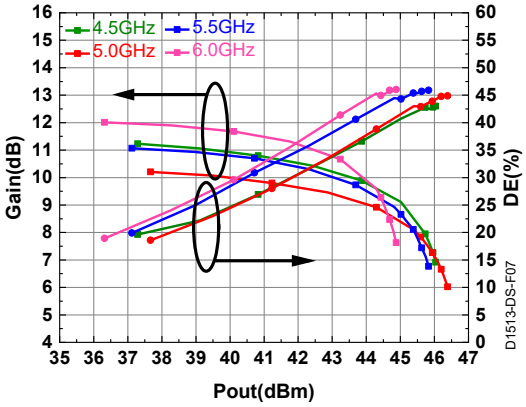


Figure 7. Gain and DE vs. P_{OUT}

Table 7. RF Characteristics @ DEMO_A, 0.5-6.3GHz, CW, 28V

Freq.	Linear Gain (G_{LIN})	Power Gain (G_P)	Drain Efficiency (η_D)	Output Power (P_{SAT})
0.3GHz	13.2dB	10.2dB	33.8%	43.3dBm (21W)
0.4GHz	15.1dB	12.1dB	53.6%	43.4dBm (22W)
0.5GHz	12.2dB	9.2dB	61.5%	44.9dBm (31W)
0.6GHz	13.0dB	10.0dB	63.7%	46.1dBm (41W)
0.7GHz	14.2dB	11.2dB	64.8%	46.4dBm (44W)
0.8GHz	12.9dB	9.9dB	66.7%	46.6dBm (46W)
0.9GHz	12.4dB	9.4dB	66.0%	46.6dBm (46W)
1.0GHz	12.7dB	9.7dB	64.1%	46.8dBm (48W)
1.1GHz	13.3dB	10.3dB	64.8%	46.7dBm (47W)
1.2GHz	12.9dB	9.9dB	63.3%	46.7dBm (47W)
1.3GHz	12.5dB	9.5dB	62.4%	46.8dBm (48W)
1.4GHz	12.4dB	9.4dB	62.6%	46.7dBm (46W)
1.5GHz	12.6dB	9.6dB	62.3%	46.4dBm (44W)
1.6GHz	13.1dB	10.1dB	62.5%	46.1dBm (41W)
1.7GHz	12.9dB	9.9dB	63.9%	45.9dBm (39W)
1.8GHz	12.3dB	9.3dB	62.5%	46.3dBm (42W)
1.9GHz	12.3dB	9.3dB	59.0%	46.5dBm (44W)
2.0GHz	11.8dB	8.8dB	58.0%	46.6dBm (46W)
2.1GHz	11.9dB	8.9dB	57.2%	46.3dBm (43W)
2.2GHz	11.5dB	8.5dB	55.8%	46.3dBm (42W)
2.3GHz	11.6dB	8.6dB	55.3%	45.7dBm (37W)
2.4GHz	11.3dB	8.3dB	51.4%	45.5dBm (35W)
2.5GHz	11.1dB	8.1dB	50.5%	44.9dBm (31W)
2.6GHz	11.0dB	8.0dB	48.6%	44.8dBm (30W)
2.7GHz	11.0dB	8.0dB	47.7%	44.8dBm (30W)
2.8GHz	11.0dB	8.0dB	44.1%	44.8dBm (30W)
2.9GHz	11.0dB	8.0dB	42.4%	44.9dBm (31W)
3.0GHz	11.0dB	8.0dB	40.4%	45.0dBm (32W)
3.1GHz	11.2dB	8.2dB	46.0%	46.3dBm (43W)
3.2GHz	11.1dB	8.1dB	46.1%	46.5dBm (45W)
3.3GHz	11.6dB	8.6dB	47.4%	46.6dBm (45W)
3.4GHz	12.0dB	9.0dB	46.8%	46.3dBm (43W)
3.5GHz	12.3dB	9.3dB	44.9%	46.2dBm (42W)
3.6GHz	12.2dB	9.2dB	43.0%	46.2dBm (41W)
3.7GHz	11.8dB	8.8dB	42.7%	46.1dBm (41W)
3.8GHz	11.3dB	8.3dB	41.4%	46.0dBm (40W)
3.9GHz	11dB	8.0dB	40.1%	45.8dBm (38W)
4.0GHz	11.1dB	8.1dB	40.8%	45.7dBm (37W)
4.1GHz	11.2dB	8.2dB	44.2%	45.7dBm (37W)
4.2GHz	11dB	8.0dB	45.0%	45.8dBm (38W)
4.3GHz	11dB	8dB	43.1%	45.4dBm (34W)
4.4GHz	11.2dB	8.2dB	42.4%	45.4dBm (34W)

Freq.	Linear Gain (G_{LIN})	Power Gain (G_P)	Drain Efficiency (η_D)	Output Power (P_{SAT})
4.5GHz	11.0dB	8.0dB	42.8%	45.7dBm (37W)
4.6GHz	11.0dB	8.0dB	45.2%	46.2dBm (42W)
4.7GHz	11.1dB	8.1dB	42.0%	45.9dBm (39W)
4.8GHz	11.3dB	8.3dB	40.2%	45.7dBm (37W)
4.9GHz	11.2dB	8.2dB	40.8%	45.4dBm (35W)
5.0GHz	11.1dB	8.1dB	43.0%	45.4dBm (35W)
5.1GHz	11.2dB	8.2dB	42.2%	45.1dBm (32W)
5.2GHz	11.0dB	8.0dB	43.6%	45.7dBm (37W)
5.3GHz	11.1dB	8.1dB	47.5%	46.2dBm (42W)
5.4GHz	11.2dB	8.2dB	46.5%	45.6dBm (36W)
5.5GHz	11.1dB	8.1dB	45.4%	45.4dBm (35W)
5.6GHz	11.1dB	8.1dB	41.8%	45.3dBm (34W)
5.7GHz	11.3dB	8.3dB	43.6%	45.8dBm (38W)
5.8GHz	11.2dB	8.2dB	43.5%	45.9dBm (39W)
5.9GHz	11.3dB	8.3dB	45.5%	45.7dBm (37W)
6.0GHz	11.1dB	8.1dB	45.9%	44.8dBm (30W)
6.1GHz	11.0dB	8.0dB	45.1%	44.8dBm (30W)
6.2GHz	11.0dB	8.0dB	45.8%	44.8dBm (30W)
6.3GHz	11.3dB	8.3dB	47.7%	45.0dBm (31W)

- Typical Class AB performance in Raytron DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 28V, I_{DS} = 200mA, V_{GS} = -3.01V
- Test condition: CW
- The output power is 44.8 dBm (30 W) at 0.5–6.3GHz when V_{DS}=28V.

■ Wide-band Application Performance (DEMO_A, 0.5-6.3GHz, CW, 30V)

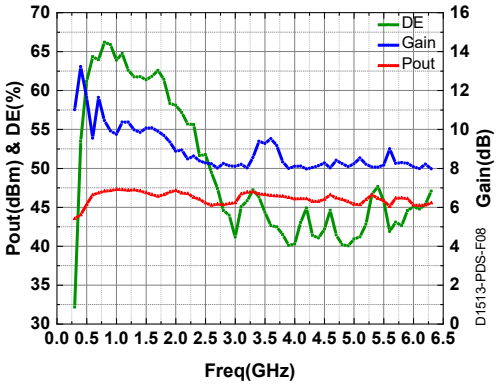


Figure 8. P_{OUT}, DE and Gain vs. Freq.

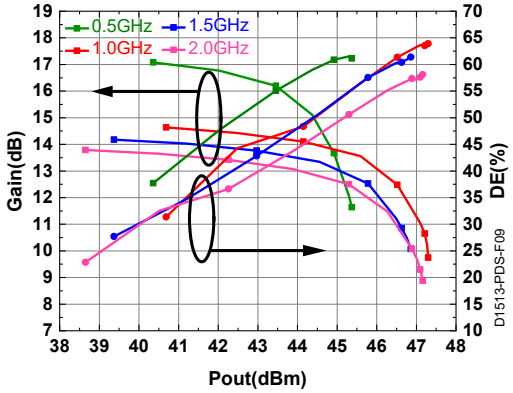


Figure 9. Gain and DE vs. P_{OUT}

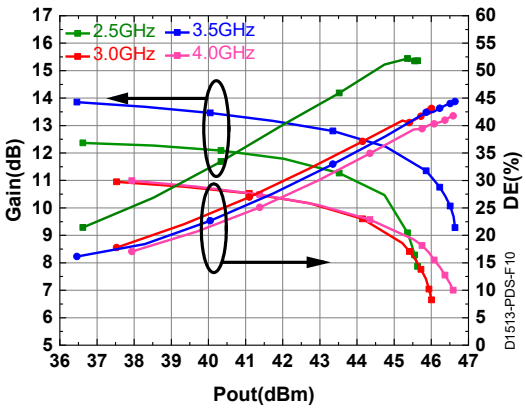


Figure 10. Gain and DE vs. P_{OUT}

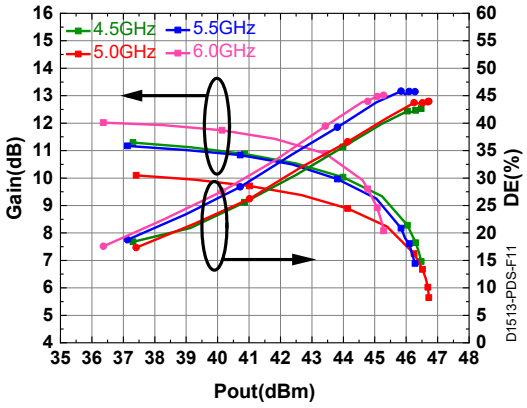


Figure 11. Gain and DE vs. P_{OUT}

Table 8. RF Characteristics @ DEMO_A, 0.5-6.3GHz, CW, 30V

Freq.	Linear Gain (G_{LIN})	Power Gain (G_P)	Drain Efficiency (η_D)	Output Power (P_{SAT})
0.3GHz	14.0dB	11.0dB	32.2%	43.6dBm (23W)
0.4GHz	16.2dB	13.2dB	53.5%	44.0dBm (25W)
0.5GHz	14.6dB	11.6dB	61.2%	45.4dBm (34W)
0.6GHz	12.6dB	9.6dB	64.3%	46.6dBm (46W)
0.7GHz	14.6dB	11.6dB	63.9%	46.9dBm (48W)
0.8GHz	13.5dB	10.5dB	66.2%	47.1dBm (51W)
0.9GHz	12.9dB	9.9dB	65.9%	47.1dBm (52W)
1.0GHz	12.8dB	9.8dB	63.9%	47.3dBm (54W)
1.1GHz	13.4dB	10.4dB	64.8%	47.3dBm (53W)
1.2GHz	13.4dB	10.4dB	62.6%	47.2dBm (52W)
1.3GHz	13.0dB	10.0dB	61.8%	47.2dBm (53W)
1.4GHz	12.9dB	9.9dB	61.8%	47.1dBm (51W)
1.5GHz	13.1dB	10.1dB	61.4%	46.9dBm (49W)
1.6GHz	13.1dB	10.1dB	61.8%	46.6dBm (46W)
1.7GHz	12.9dB	9.9dB	62.6%	46.4dBm (44W)
1.8GHz	12.7dB	9.7dB	61.4%	46.6dBm (46W)
1.9GHz	12.4dB	9.4dB	58.3%	47.0dBm (50W)
2.0GHz	11.9dB	8.9dB	58.1%	47.2dBm (52W)
2.1GHz	11.9dB	8.9dB	57.2%	46.8dBm (48W)
2.2GHz	11.5dB	8.5dB	55.7%	46.8dBm (47W)
2.3GHz	11.6dB	8.6dB	55.6%	46.3dBm (42W)
2.4GHz	11.4dB	8.4dB	51.6%	46.0dBm (40W)
2.5GHz	11.3dB	8.3dB	51.8%	45.6dBm (36W)
2.6GHz	11.2dB	8.2dB	49.5%	45.3dBm (34W)
2.7GHz	11.0dB	8.0dB	47.4%	45.4dBm (35W)
2.8GHz	11.3dB	8.3dB	44.6%	45.3dBm (34W)
2.9GHz	11.1dB	8.1dB	44.0%	45.5dBm (35W)
3.0GHz	11.1dB	8.1dB	41.2%	45.6dBm (36W)
3.1GHz	11.2dB	8.2dB	45.1%	46.7dBm (47W)
3.2GHz	11.0dB	8.0dB	45.8%	46.9dBm (49W)
3.3GHz	11.6dB	8.6dB	47.2%	47.0dBm (50W)
3.4GHz	12.4dB	9.4dB	46.3%	46.7dBm (47W)

Freq.	Linear Gain (G_{LIN})	Power Gain (G_P)	Drain Efficiency (η_D)	Output Power (P_{SAT})
3.5GHz	12.3dB	9.3dB	44.4%	46.6dBm (46W)
3.6GHz	12.5dB	9.5dB	42.6%	46.5dBm (45W)
3.7GHz	12.2dB	9.2dB	42.5%	46.5dBm (44W)
3.8GHz	11.3dB	8.3dB	41.5%	46.4dBm (44W)
3.9GHz	11.0dB	8.0dB	40.1%	46.3dBm (42W)
4.0GHz	11.1dB	8.1dB	40.3%	46.1dBm (41W)
4.1GHz	11.1dB	8.1dB	43.0%	46.1dBm (41W)
4.2GHz	11.0dB	8.0dB	44.9%	46.1dBm (41W)
4.3GHz	11.0dB	8.0dB	41.4%	45.8dBm (38W)
4.4GHz	11.1dB	8.1dB	41.1%	45.8dBm (38W)
4.5GHz	11.3dB	8.3dB	42.2%	46.0dBm (40W)
4.6GHz	11.0dB	8.0dB	44.6%	46.6dBm (46W)
4.7GHz	11.4dB	8.4dB	41.5%	46.2dBm (41W)
4.8GHz	11.2dB	8.2dB	40.2%	46.0dBm (40W)
4.9GHz	11.1dB	8.1dB	40.0%	45.7dBm (37W)
5.0GHz	11.2dB	8.2dB	40.9%	45.4dBm (35W)
5.1GHz	11.5dB	8.5dB	41.2%	45.3dBm (34W)
5.2GHz	11.2dB	8.2dB	42.8%	46.0dBm (40W)
5.3GHz	11.1dB	8.1dB	46.7%	46.6dBm (46W)
5.4GHz	11.1dB	8.1dB	47.7%	46.2dBm (41W)
5.5GHz	11.2dB	8.2dB	45.8%	45.8dBm (38W)
5.6GHz	12.0dB	9.0dB	41.9%	45.1dBm (32W)
5.7GHz	11.3dB	8.3dB	43.1%	46.2dBm (41W)
5.8GHz	11.3dB	8.3dB	42.7%	46.2dBm (42W)
5.9GHz	11.3dB	8.3dB	44.6%	46.1dBm (41W)
6.0GHz	11.1dB	8.1dB	45.1%	45.3dBm (34W)
6.1GHz	11.0dB	8.0dB	44.8%	45.2dBm (33W)
6.2GHz	11.2dB	8.2dB	45.4%	45.3dBm (34W)
6.3GHz	11.0dB	8.0dB	47.1%	45.6dBm (36W)

- Typical Class AB performance in Raytron DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 30V, I_{DS} = 200mA, V_{GS} = -3.01V
- Test condition: CW
- The output power is 45.1dBm (32W) at 0.5–6.3GHz when V_{DS}=30V.

■ Wide-band Application Performance (DEMO_A, 0.5-6.3GHz, CW, 32V)

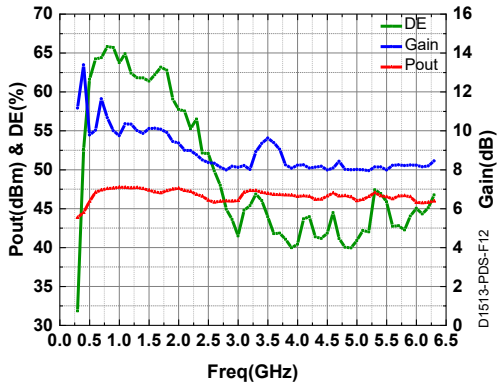


Figure 12. P_{OUT}, DE and Gain vs. Freq.

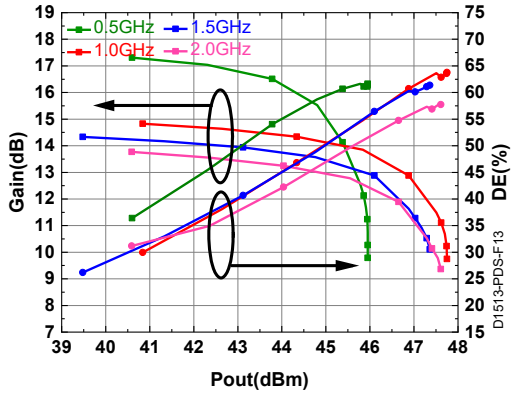


Figure 13. Gain and DE vs. P_{OUT}

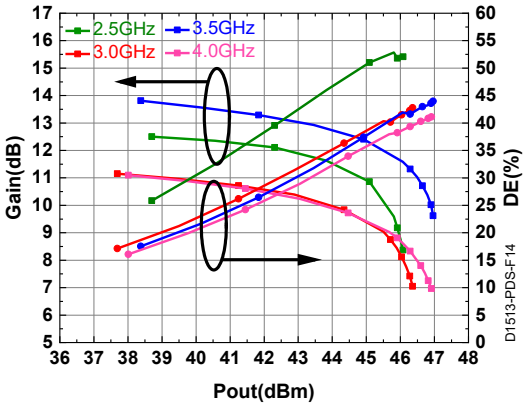


Figure 14. Gain and DE vs. P_{OUT}

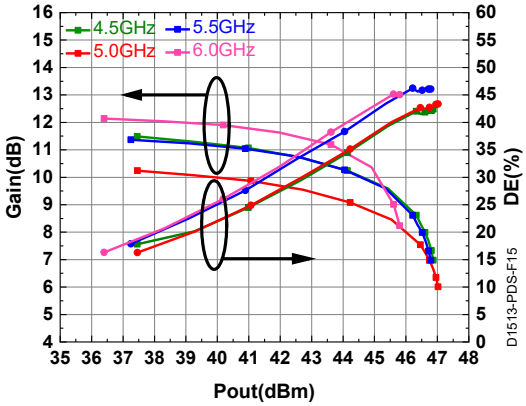


Figure 15. Gain and DE vs. P_{OUT}

Table 9. RF Characteristics @ DEMO_A, 0.5-6.3GHz, CW, 32V

Freq.	Linear Gain (G_{LIN})	Power Gain (G_P)	Drain Efficiency (η_D)	Output Power (P_{SAT})
0.3GHz	14.2dB	11.2dB	31.9%	43.9dBm (24W)
0.4GHz	16.4dB	13.4dB	52.6%	44.5dBm (28W)
0.5GHz	12.8dB	9.8dB	61.6%	46.0dBm (39W)
0.6GHz	13.0dB	10.0dB	64.2%	47.1dBm (51W)
0.7GHz	14.6dB	11.6dB	64.4%	47.4dBm (55W)
0.8GHz	13.7dB	10.7dB	65.8%	47.6dBm (57W)
0.9GHz	13.0dB	10.0dB	65.7%	47.6dBm (58W)
1.0GHz	12.8dB	9.8dB	63.8%	47.8dBm (60W)
1.1GHz	13.4dB	10.4dB	64.9%	47.7dBm (59W)
1.2GHz	13.3dB	10.3dB	62.4%	47.7dBm (58W)
1.3GHz	13.0dB	10.0dB	61.8%	47.7dBm (59W)
1.4GHz	12.9dB	9.9dB	61.8%	47.6dBm (57W)
1.5GHz	13.1dB	10.1dB	61.4%	47.4dBm (54W)
1.6GHz	13.1dB	10.1dB	62.2%	47.2dBm (52W)
1.7GHz	13.1dB	10.1dB	63.2%	47.0dBm (50W)
1.8GHz	12.9dB	9.9dB	62.8%	47.3dBm (54W)
1.9GHz	12.5dB	9.5dB	59.1%	47.5dBm (56W)
2.0GHz	12.4dB	9.4dB	57.8%	47.6dBm (58W)

Freq.	Linear Gain (G_{LIN})	Power Gain (G_P)	Drain Efficiency (η_D)	Output Power (P_{SAT})
2.1GHz	12.0dB	9.0dB	57.5%	47.3dBm (54W)
2.2GHz	12.0dB	9.0dB	55.3%	47.2dBm (53W)
2.3GHz	11.8dB	8.8dB	56.5%	46.8dBm (48W)
2.4GHz	11.5dB	8.5dB	52.1%	46.6dBm (46W)
2.5GHz	11.4dB	8.4dB	52.1%	46.1dBm (41W)
2.6GHz	11.3dB	8.3dB	49.8%	45.8dBm (38W)
2.7GHz	11.1dB	8.1dB	48.0%	45.9dBm (39W)
2.8GHz	11.0dB	8.0dB	44.9%	46.0dBm (40W)
2.9GHz	11.2dB	8.2dB	43.6%	46.0dBm (39W)
3.0GHz	11.1dB	8.1dB	41.5%	46.0dBm (40W)
3.1GHz	11.2dB	8.2dB	44.8%	47.1dBm (51W)
3.2GHz	11.0dB	8.0dB	45.4%	47.3dBm (54W)
3.3GHz	11.9dB	8.9dB	46.9%	47.3dBm (54W)
3.4GHz	12.4dB	9.4dB	46.0%	47.1dBm (51W)
3.5GHz	12.6dB	9.6dB	44.0%	47.0dBm (50W)
3.6GHz	12.4dB	9.4dB	41.8%	46.8dBm (48W)
3.7GHz	12.1dB	9.1dB	41.9%	46.8dBm (48W)
3.8GHz	11.3dB	8.3dB	41.1%	46.8dBm (47W)
3.9GHz	11.1dB	8.1dB	40.0%	46.7dBm (47W)
4.0GHz	11.2dB	8.2dB	40.4%	46.6dBm (45W)
4.1GHz	11.3dB	8.3dB	43.7%	46.7dBm (46W)
4.2GHz	11.1dB	8.1dB	44.0%	46.6dBm (45W)
4.3GHz	11.1dB	8.1dB	41.4%	46.2dBm (42W)
4.4GHz	11.2dB	8.2dB	41.2%	46.2dBm (42W)
4.5GHz	11.0dB	8.0dB	41.8%	46.6dBm (46W)
4.6GHz	11.1dB	8.1dB	44.5%	47.0dBm (50W)
4.7GHz	11.4dB	8.4dB	41.2%	46.6dBm (46W)
4.8GHz	11.0dB	8.0dB	40.0%	46.7dBm (46W)
4.9GHz	11.0dB	8.0dB	40.0%	46.5dBm (45W)
5.0GHz	11.0dB	8.0dB	40.9%	46.0dBm (40W)
5.1GHz	11.0dB	8.0dB	42.2%	46.2dBm (42W)
5.2GHz	11.0dB	8.0dB	42.0%	46.6dBm (45W)
5.3GHz	11.1dB	8.1dB	47.4%	47.1dBm (51W)
5.4GHz	11.1dB	8.1dB	46.9%	46.7dBm (46W)
5.5GHz	11.0dB	8.0dB	45.9%	46.5dBm (45W)
5.6GHz	11.2dB	8.2dB	42.7%	46.3dBm (42W)
5.7GHz	11.3dB	8.3dB	42.8%	46.6dBm (46W)
5.8GHz	11.2dB	8.2dB	42.3%	46.7dBm (46W)
5.9GHz	11.2dB	8.2dB	44.0%	46.5dBm (45W)
6.0GHz	11.2dB	8.2dB	45.0%	45.8dBm (38W)
6.1GHz	11.2dB	8.2dB	44.3%	45.7dBm (37W)
6.2GHz	11.2dB	8.2dB	45.1%	45.8dBm (38W)
6.3GHz	11.5dB	8.5dB	46.8%	46.0dBm (40W)

- Typical Class AB performance in Raytron DEMO_A with the device soldered onto the heatsink, test condition: V_{DS} = 32V, I_{DS} = 200mA, V_{GS} = -3.01V
- Test condition: CW
- The output power is 45.7dBm (37W) at 0.5–6.3GHz when V_{DS}=32V.

10. Package Outline

■ Pin Layout

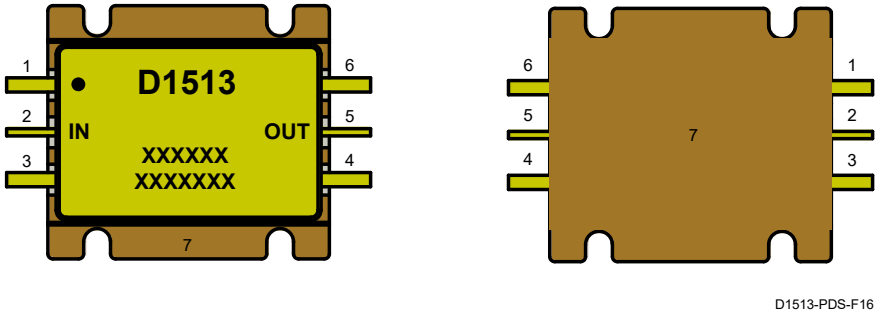


Figure 16. D1513 Pin Layout

Table 10. Pin Description

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

■ Mechanical Drawing (Package Type: 670F-A)

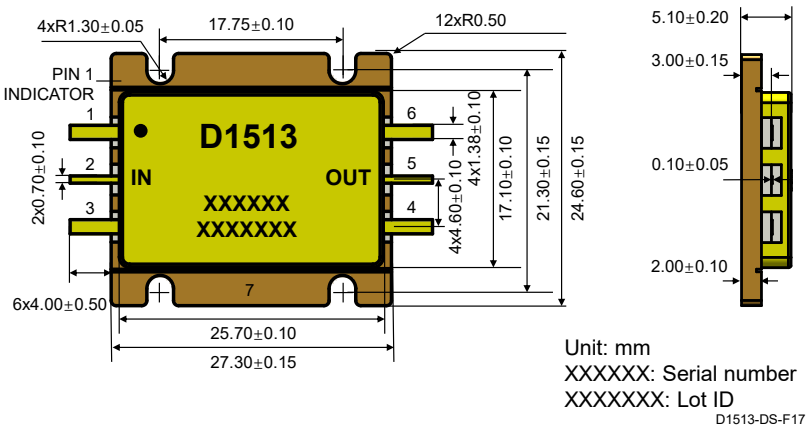


Figure 17. D1513 Mechanical Drawing

11. Application Circuit

■ Schematic

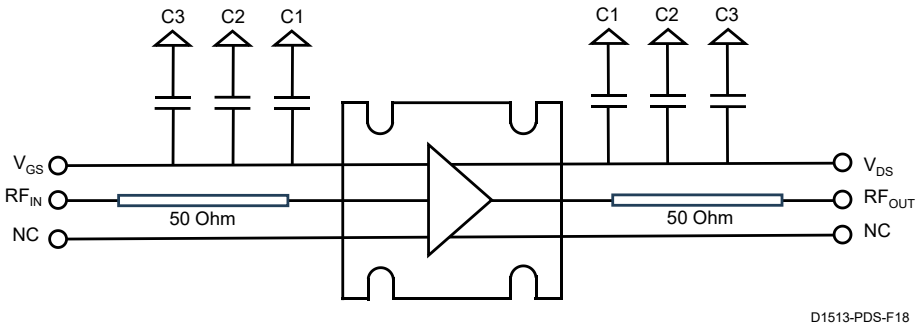


Figure 18. D1513 DEMO_A Application Circuit Schematic

Table 11. 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, 30V or 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

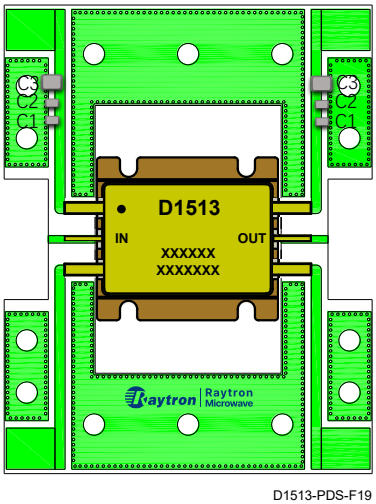


Figure 19. D1513 Application Circuit Layout (0.5-6.3GHz)
(DEMO_A Size: 7.0cm x 5.5cm)

Table 12. Bill of Materials

Component	Value	Description	Manufacturer	Part Number
PCB	20mil	N/A	Rogers	RO4350B
C1	1000.0pF	X7R 100V 0603 Capacitor	Murata	GCM188R72A102KA37D
C2	10.0nF	X7R 100V 0603 Capacitor	Murata	GCM188R72A103KA37D
C3	1.0uF	X7R 100V 1210 Capacitor	Murata	GRM32ER72A105KA01L

12. DEMO Summary

Table 13. DEMO Summary

NO.	D1513 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	0.5-6.3	11.0	44.8	30	40.0	CW
2	DEMO_A, 32W	30	0.5-6.3	11.0	45.1	32	40.0	CW
3	DEMO_A, 37W	32	0.5-6.3	11.0	45.7	37	40.0	CW

13. Recommended Solder Temperature Profile

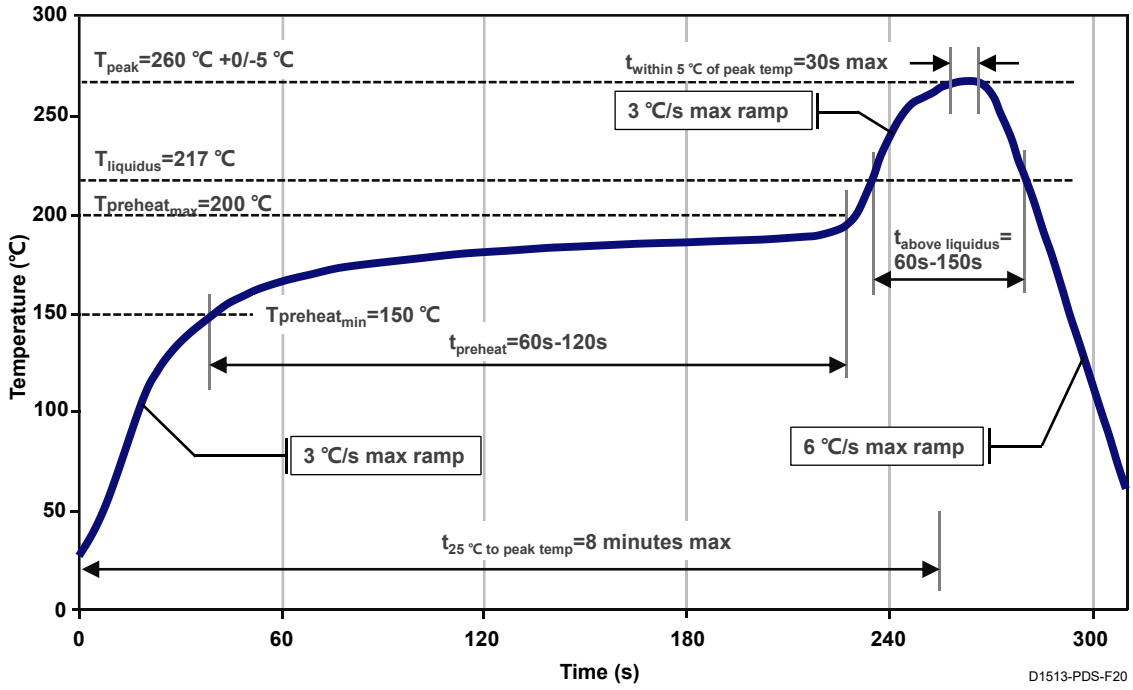


Figure 20. Recommended Solder Temperature Profile

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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