NPTB00025

Gallium Nitride 28V, 25W RF Power Transistor

Built using the SIGANTIC® NRF1 process - A proprietary GaN-on-Silicon technology

FEATURES

- Optimized for broadband operation from DC - 4000MHz
- 25W P_{3dB} CW narrowband power
- 10W P_{3dB} CW broadband power from 500-1000MHz
- Characterized for operation up to 32V
- 100% RF tested
- Thermally enhanced industry standard package
- High reliability gold metallization process
- Lead-free and RoHS compliant
- Subject to EAR99 export control

Broadband
25 Watt, 28 Volt
GaN HEMT

RoHS

RF Specifications (CW): V_{DS} = 28V, I_{DQ} = 225mA, Frequency = 3000MHz, T_C = 25°C, Measured in Nitronex Test Fixture

Symbol	Parameter	Min	Typ	Max	Units
P_{3dB}	Average Output Power at 3dB Gain Compression	22	25	-	W
P_{1dB}	Average Output Power at 1dB Gain Compression	18	21	-	W
G_{SS}	Small Signal Gain	12.5	13.5	-	dB
η	Drain Efficiency at 3dB Gain Compression	60	65	-	%
ψ	Output mismatch stress, VSWR = 10:1, all phase angles, $P_{OUT} = P_{SAT}$	No Performance Degradation After Test			

Absolute Maximum Ratings: Not simultaneous, T_C = 25°C unless otherwise noted

Symbol	Parameter	Max	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	-10 to 3	V
I_G	Gate Current	40	mA
P_T	Total Device Power Dissipation (Derated above 25°C)	33	W
θ_{JC}	Thermal Resistance (Junction-to-Case)	5.25	°C/W
T_{STG}	Storage Temperature Range	-65 to 150	°C
T_J	Operating Junction Temperature	200	°C
HBM	Human Body Model ESD Rating (per JESD22-A114)	1A (>250V)	
MM	Machine Model ESD Rating (per JESD22-A115)	M1 (>50V)	

DC Specifications: T_C = 25°C

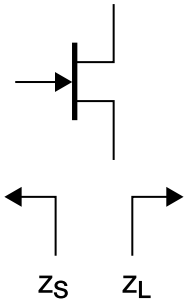
Symbol	Parameter	Min	Typ	Max	Units
Off Characteristics					
V_{BDS}	Drain-Source Breakdown Voltage (V_{GS} = -8V, I_D = 8mA)	100	-	-	V
I_{DLK}	Drain-Source Leakage Current (V_{GS} = -8V, V_{DS} = 60V)	-	1	5	mA
On Characteristics					
V_T	Gate Threshold Voltage (V_{DS} = 28V, I_D = 8mA)	-2.3	-1.8	-1.3	V
V_{GSQ}	Gate Quiescent Voltage (V_{DS} = 28V, I_D = 225mA)	-2.0	-1.5	-1.0	V
R_{ON}	On Resistance (V_{GS} = 2.0V, I_D = 60mA)	-	0.44	0.55	Ω
I_D	Drain Current (V_{DS} = 7V pulsed, 300µs pulse width, 0.2% duty cycle, V_{GS} = 2.0V)	4.9	5.4	-	A

Load-Pull Data, Reference Plane at Device Leads

V_{DS}=28V, I_{DQ}=225mA, T_A=25°C unless otherwise noted

Table 1: Optimum Source and Load Impedances for CW Gain, Drain Efficiency, and Output Power Performance

Frequency (MHz)	Z_S (Ω)	Z_L (Ω)
800	3.9 + j5.9	12.2 + j6.1
2000	3.7 - j5.1	7.7 - j1.1
3000	4.7 - j15.3	7.4 - j5.8



Z_S is the source impedance presented to the device.
Z_L is the load impedance presented to the device.

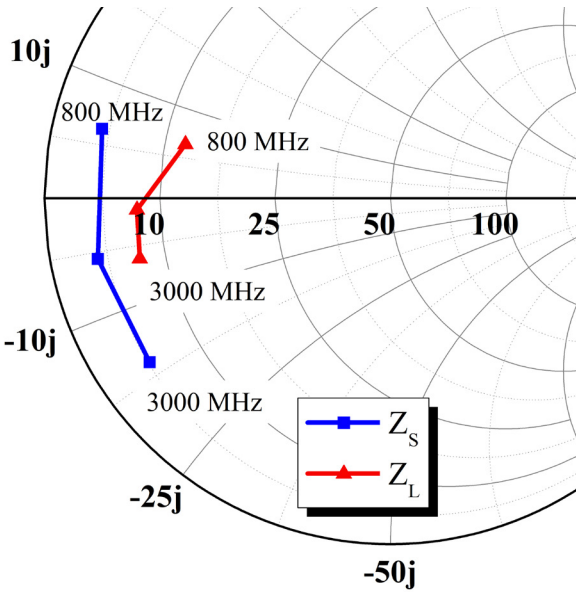


Figure 1 - Optimal Impedances for CW Performance, V_{DS} = 28V, I_{DQ} = 225mA

Load-Pull Data, Reference Plane at Device Leads

V_{DS}=28V, I_{DQ}=225mA, T_A=25°C unless otherwise noted.

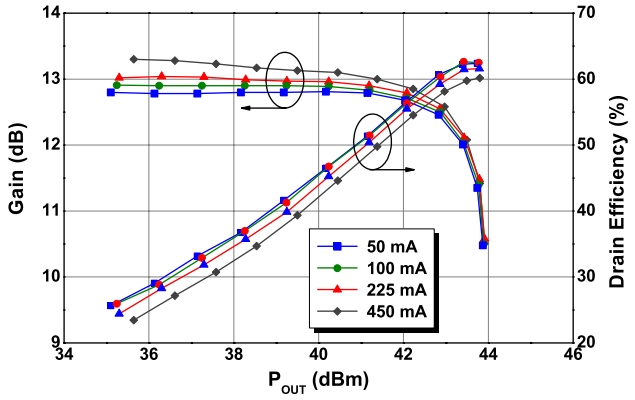


Figure 2 - Typical CW Performance, Over Current, Frequency = 3000MHz

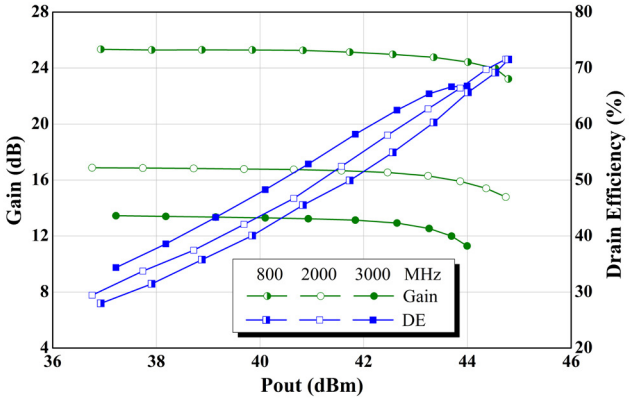


Figure 3 - Typical CW Performance Over Frequency

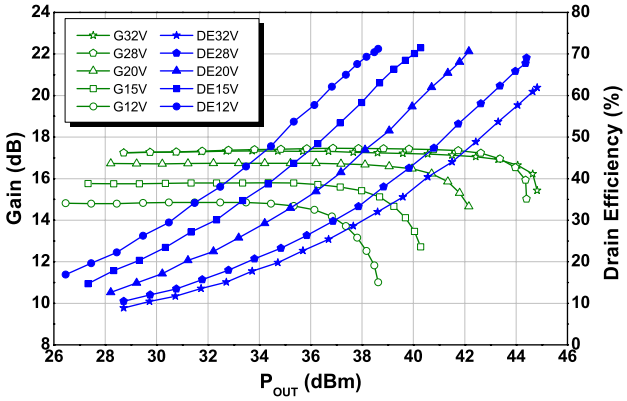


Figure 4 - Typical CW Performance Over Voltage, Impedances Held Constant, Frequency = 1800MHz

Typical Device Characteristics

V_{DS}=28V, I_{DQ}=225mA, T_A=25°C unless otherwise noted.

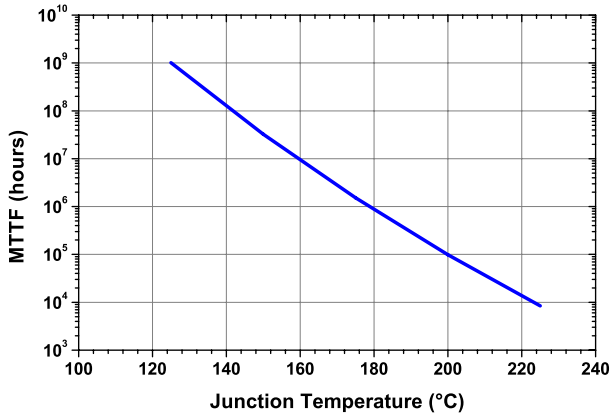


Figure 5 - MTTF of NRF1 Devices as a Function of Junction Temperature

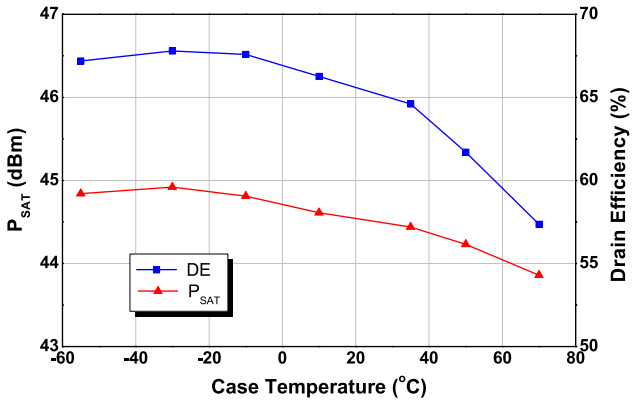


Figure 6 - Typical CW Performance in Nitronex Test Fixture, Frequency = 3000MHz

NPTB00025, 3000MHz CW Production Test Fixture

V_{DS}=28V, I_{DQ}=225mA, T_A=25°C unless otherwise noted. Additional design information and data available at www.nitronex.com.

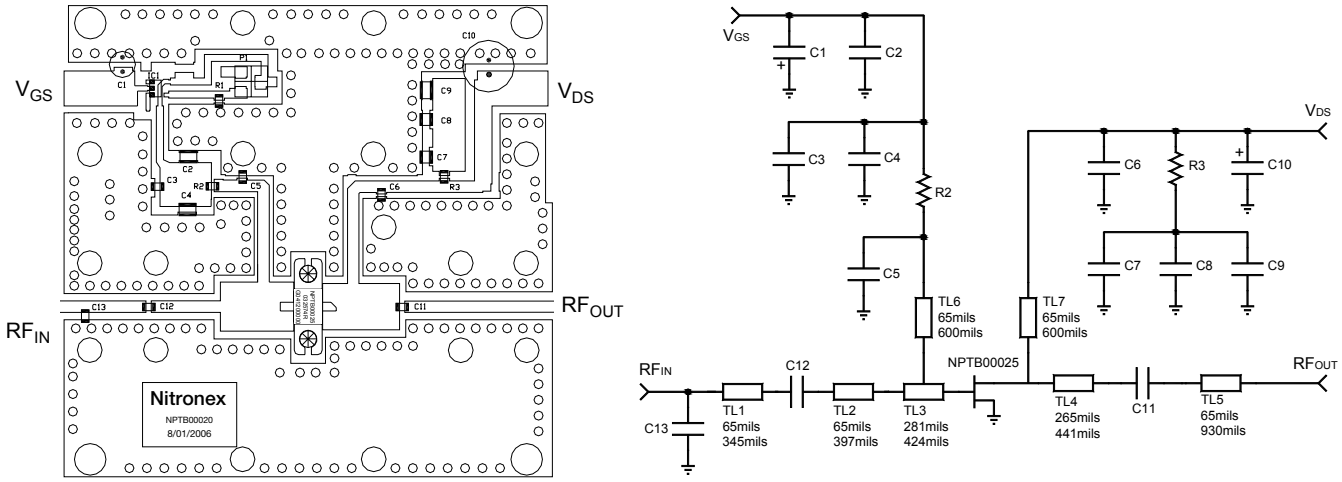


Figure 7 - NPTB00025 3000MHz Test Fixture

Table 2: NPTB00025 3000MHz Test Fixture Bill of Materials

Name	Value	Vendor	Part Number
C1	150uF	Nichicon	UPW1C151MED
C10	270uF	United Chmi-Con	ELXY630ELL271MK25S
C2, C8	0.1uF	Kemet	C1206C104K1RACTU
C3, C7	0.01uF	AVX	12061C103KAT2A
C4, C9	1.0 uF	Panasonic	ECJ-5YB2A105M
C5, C6, C11, C12	5.6pF	ATC	ATC600F5R6CT
C13	1.2pF	ATC	ATC600F1R2AT
R2	49.9 ohm	Panasonic	ERJ-6ENF49R9V
R3	0.33 ohm	Panasonic	ERJ-6RQFR33V
Substrate	-	Taconic	RF35, t=30mil, ε_r=3.5

Ordering Information[1]

Part Number	Description
NPTB00025B	NPTB00025 in AC200B-2 Metal-Ceramic Bolt-Down Package

1: To find a Nitronex contact in your area, visit our website at http://www.nitronex.com

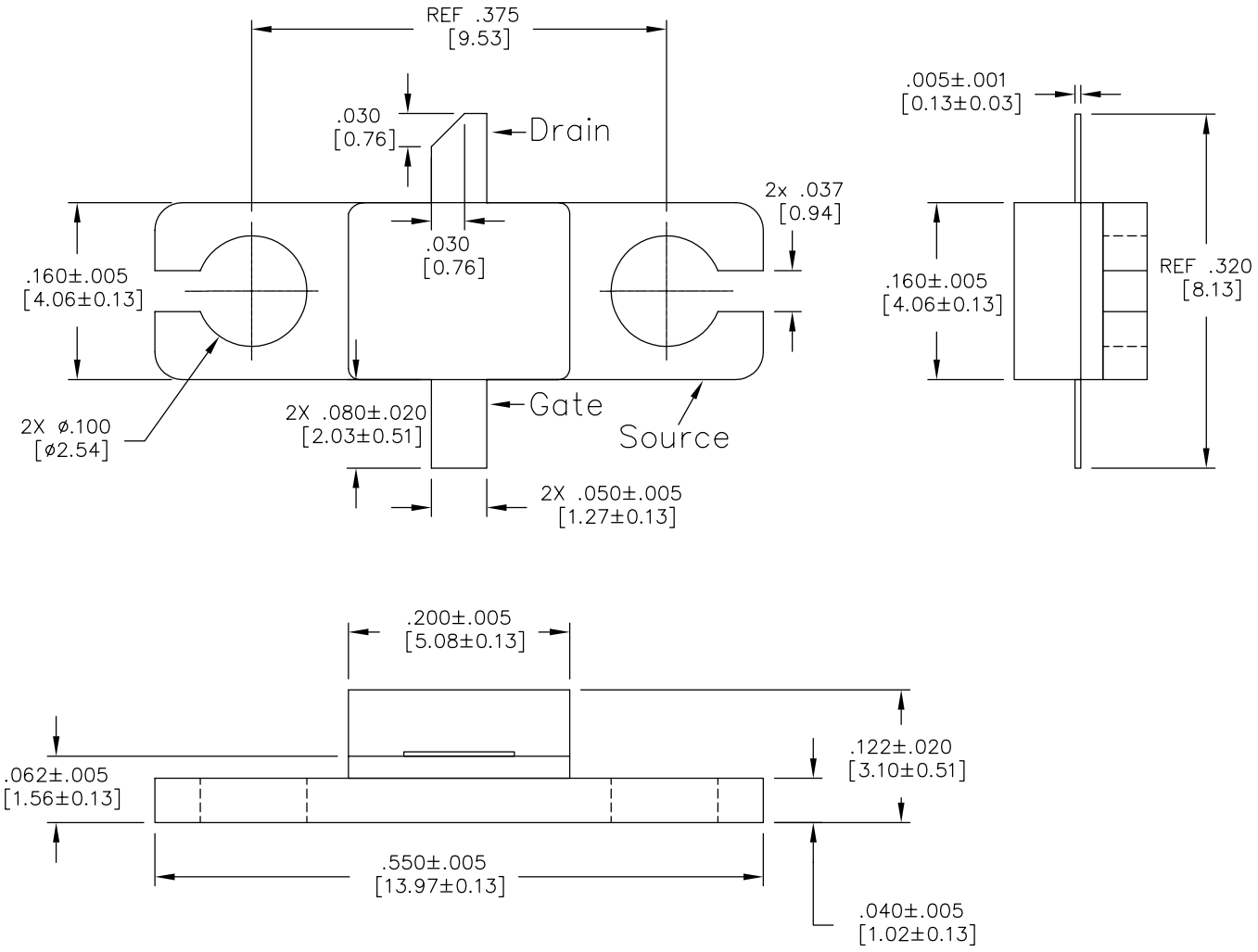


Figure 8 - AC200B-2 Metal-Ceramic Package Dimensions and Pinout (all dimensions are in inches [mm])

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Additional Information

This part is lead-free and is compliant with the RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

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