NPTB00050

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Contact applications@nitronex.com for questions or support

NITRONEX

Gallium Nitride 28V, 50W RF Power Transistor

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

FEATURES

- Optimized for broadband operation from DC - 4000MHz
- 50W P_{3dB} CW narrowband power
- 25W 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 ECCN 3A982.a.1 export control

Broadband
50 Watt, 28 Volt
GaN HEMT

RoHS

RF Specifications (CW): V_{DS} = 28V, I_{DQ} = 450mA, 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	45	50	-	W
P_{1dB}	Average Output Power at 1dB Gain Compression	33	38	-	W
G_{SS}	Small Signal Gain	10.5	11.5	-	dB
η	Peak Drain Efficiency at $P_{OUT} = P_{3dB}$	55	60	-	%
ψ	Output mismatch stress, VSWR = 7:1, all phase angles, $P_{OUT} = P_{1dB}$	No Performance Degradation After Test			

Typical OFDM Performance: V_{DS} = 28V, I_{DQ} = 300mA, Single carrier OFDM waveform 64-QAM 3/4, 8 burst, continuous frame data, 10MHz channel bandwidth. Peak/Avg = 10.3dB @ 0.01% probability on CCDF. Frequency = 2400 to 2600MHz. $P_{OUT,AVG}$ = 6W, T_C=25°C.

Symbol	Parameter	Typ	Units
G_P	Power Gain	12.0	dB
η	Drain Efficiency	23	%
EVM	Error Vector Magnitude	2.0	%

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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 = 16mA)	100	-	-	V
I_{DLK}	Drain-Source Leakage Current (V_{GS} = -8V, V_{DS} = 60V)	-	0.1	16	mA
On Characteristics					
V_T	Gate Threshold Voltage (V_{DS} = 28V, I_D = 16mA)	-2.3	-1.8	-1.3	V
V_{GSQ}	Gate Quiescent Voltage (V_{DS} = 28V, I_D = 450mA)	-2.0	-1.5	-1.0	V
R_{ON}	On Resistance (V_{GS} = 2V, I_D = 120mA)	-	0.25	0.40	Ω
I_D	Drain Current (V_{DS} = 7V pulsed, 300µs pulse width, 0.2% duty cycle, V_{GS} = 2V)	9.2	9.8	-	A

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	80	mA
P_T	Total Device Power Dissipation (Derated above 25°C)	55	W
θ_{JC}	Thermal Resistance (Junction-to-Case)	3.2	°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)	1B (>500V)	
MM	Machine Model ESD Rating (per JESD22-A115)	M2 (>100V)	

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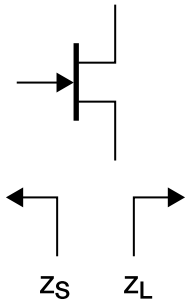
Load-Pull Data, Reference Plane at Device Leads

V_{DS}=28V, I_{DQ}=450mA, 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)	P_{SAT} (W)	Gain (dB)	Drain Efficiency @ P_{SAT} (%)
2000	3.2 - j3.5	4.8 - j2.5	50	15.0	65
2400	3.1 - j7.5	5.0 - j3.5	50	13.8	62
2500	3.1 - j8.4	5.2 - j3.6	50	13.8	62
2600	3.2 - j9.4	5.3 - j3.7	50	13.5	61
2700	3.7 - j11.0	5.2 - j4.9	50	13.1	60
3000	4.4 - j13.0	5.2 - j5.3	50	13.0	60



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

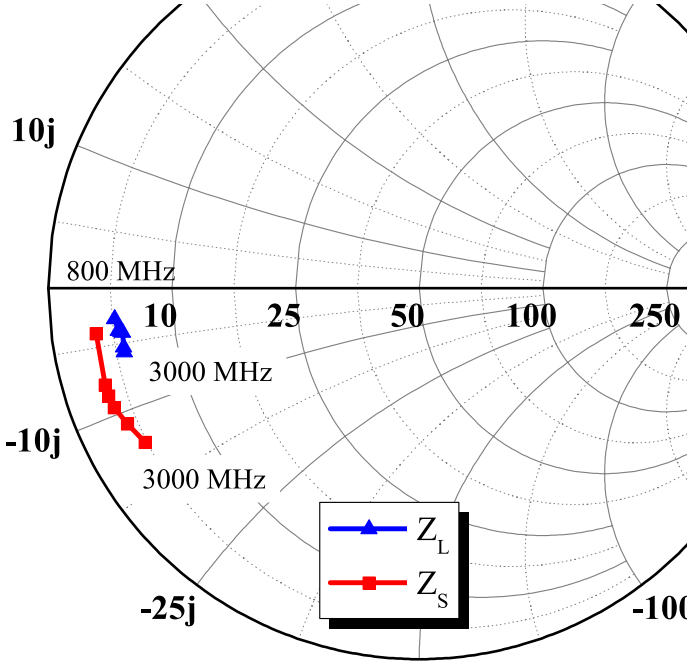


Figure 1 - Optimal Impedances for CW Performance, V_{DS} = 28V, I_{DQ} = 450mA

Load-Pull Data, Reference Plane at Device Leads

V_{DS}=28V, I_{DQ}=450mA, T_A=25°C unless otherwise noted.

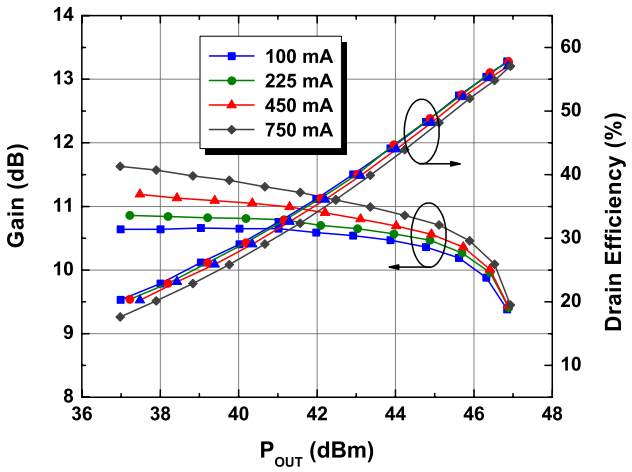


Figure 2 - Typical CW Performance vs. I_{DQ}
V_{DS} = 28V, 3000MHz

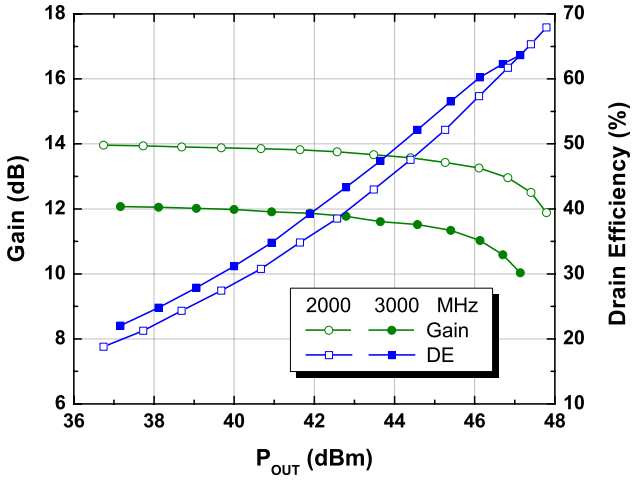


Figure 3 - Typical CW Performance
V_{DS} = 28V, I_{DQ} = 450mA

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Typical Device Characteristics

V_{DS}=28V, I_{DQ}=450mA, T_A=25°C unless otherwise noted.

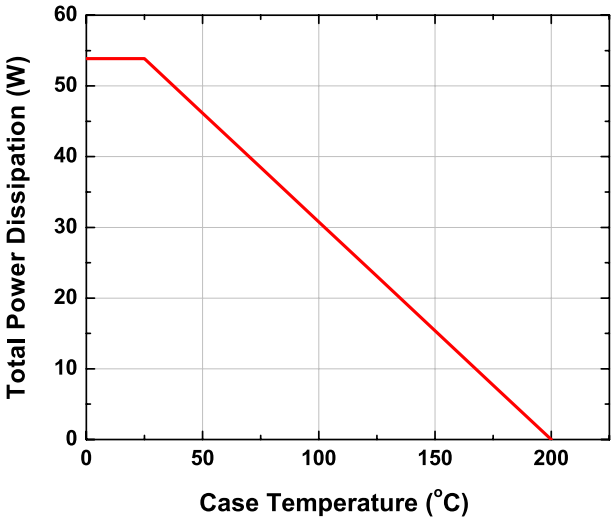

Figure 4 - Power Derating Curve

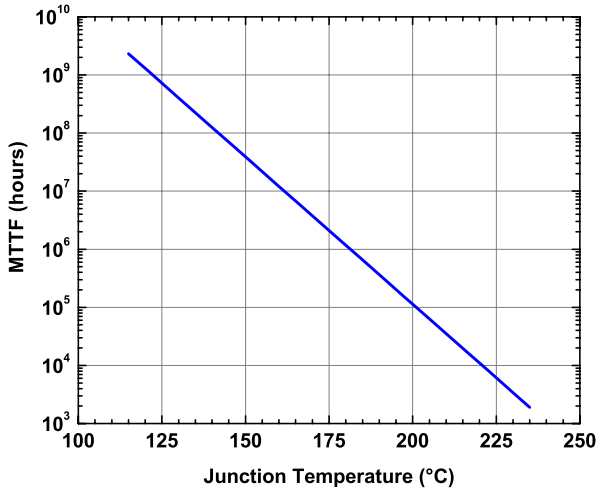

Figure 5 - MTTF of NRF1 Devices as a Function of Junction Temperature

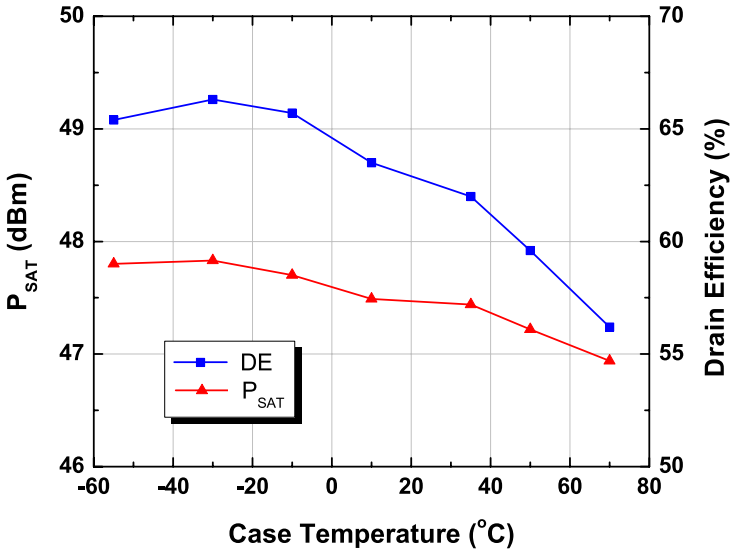

Figure 6 - Typical CW Performance vs. Temperature in Nitronex Test Fixture,
V_{DS} = 28V, I_{DQ} = 450 mA, 3000MHz

NPTB00050, 3000MHz CW Production Test Fixture

V_{DS}=28V, I_{DQ}=450mA, T_A=25°C unless otherwise noted. Additional design information and data available at www.nitronex.com.

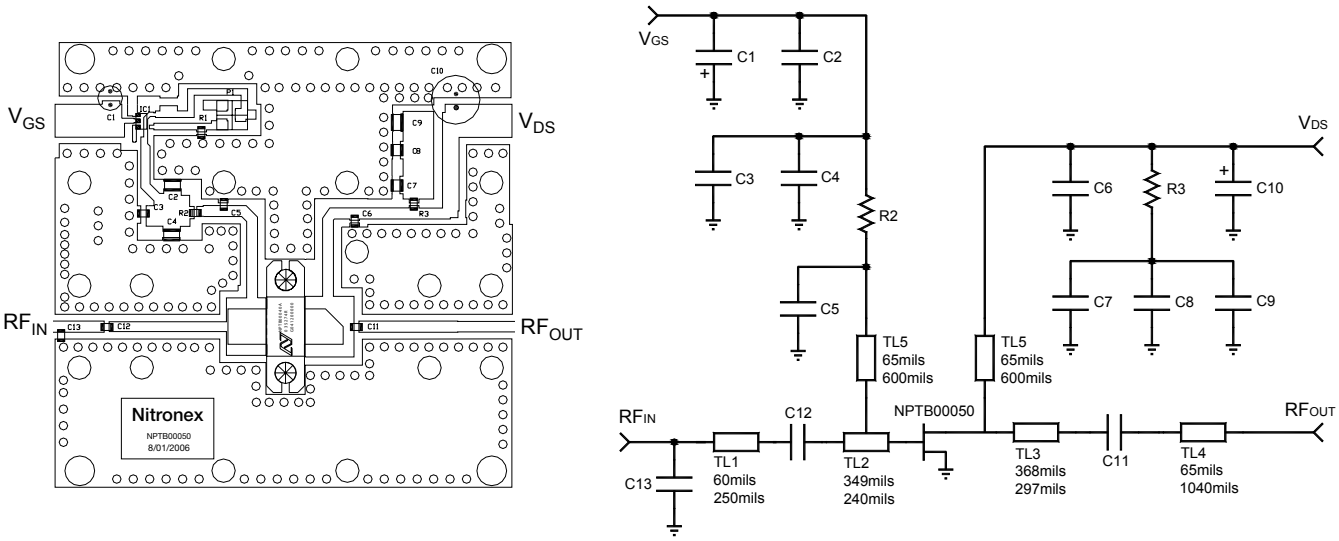

Figure 7 - NPTB00050 3000MHz Test Fixture

Table 2: NPTB00050 3000MHz Test Fixture Bill of Materials

Name	Value	Vendor	Vendor Number
C1	150uF	Nichicon	UPW1C151MED
C10	270uF	United Chmi-Con	ELXY630ELL271MK25S
C3, C7	0.01uF	AVX	12061C103KAT2A
C2, C8	0.1uF	Kemet	C1206C104K1RACTU
C4, C9	1.0 uF	Panasonic	ECJ-5YB2A105M
C5, C6, C12	5.6pF	ATC	ATC600F5R6CT
C11	1.8pF	ATC	ATC600F1R8AT
C13	0.7pF	ATC	ATC600F0R7AT
R2	33 ohm	Panasonic	ERJ-6ENF33R0V
R3	0.33 ohm	Panasonic	ERJ-6RQFR33V
Substrate	-	Taconic	RF35, t=30mil, ε_r=3.5

Ordering Information[1]

Part Number	Description
NPTB00050B	NPTB00050 in AC360B-2 Metal-Ceramic Bolt-Down Package

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

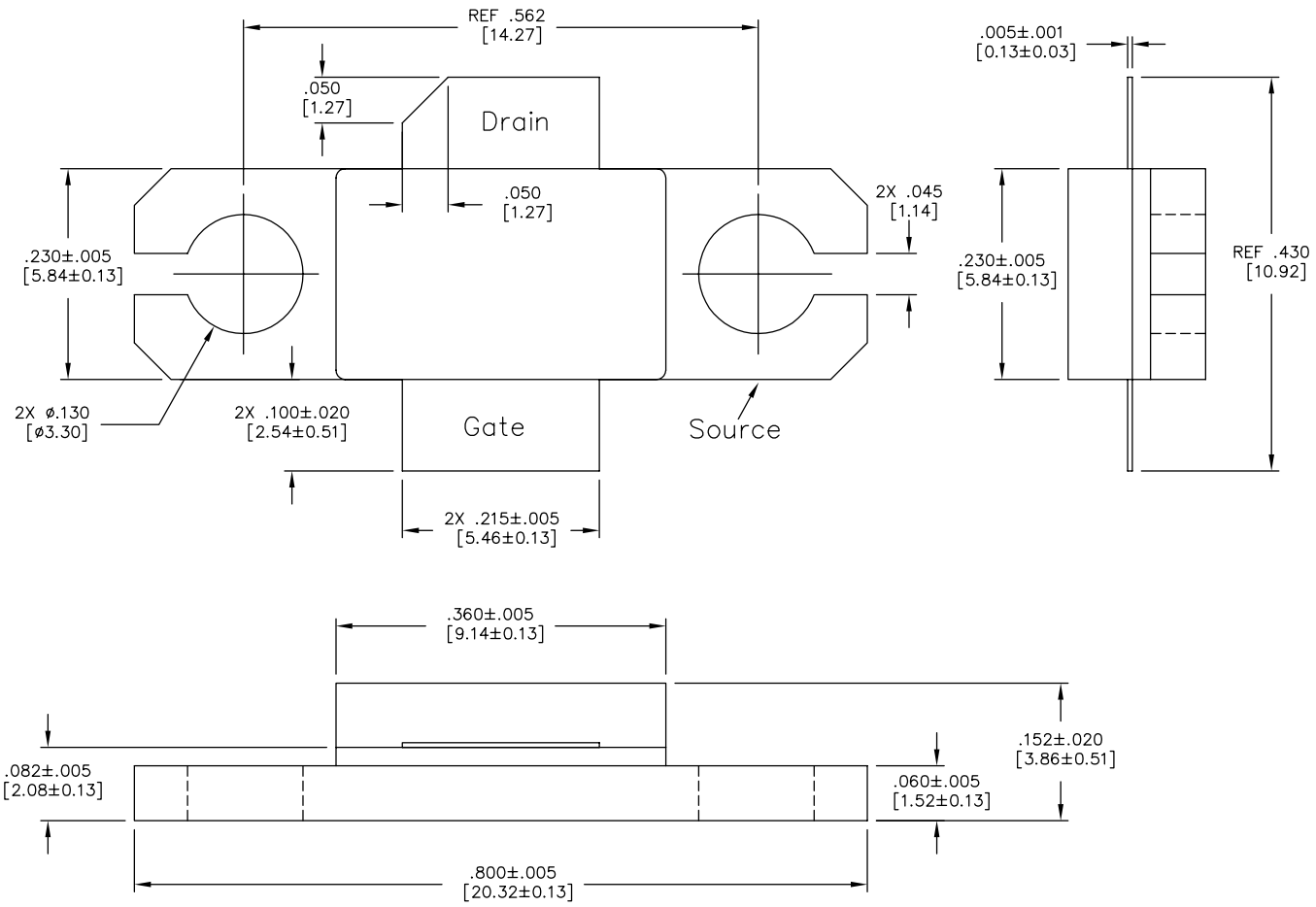

Figure 8 - AC360B-2 Metal-Ceramic Package Dimensions and Pinout (all dimensions are in inches [mm])

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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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