NPT2019 *Preliminary*

Gallium Nitride 48V, 25W, DC-6 GHz HEMT

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

Features

- Suitable for linear and pulsed applications
- Tunable from DC-6 GHz
- 48V Operation
- Industry Standard Plastic Package
- High Drain Efficiency (>60%)

Applications

- Defense Communications
- Land Mobile Radio
- Avionics
- Wireless Infrastructure
- ISM Applications
- VHF/UHF/L/S-Band Radar

DC-6 GHz
25W
GaN HEMT

RoHS

Product Description

The NPT2019 GaN HEMT is a wideband transistor optimized for DC-6 GHz operation. This device has been designed for CW, pulsed, and linear operation with pulsed output power levels to 25W (44 dBm) in an industry standard surface mount plastic package.

RF Specifications (Pulsed*, 2.5 GHz): V_{DS} = 48V, I_{DQ} = 150mA, T_C= 25°C

Symbol	Parameter	Min	Typ	Max	Units
G_{SS}	Small-signal Gain	-	16.2	-	dB
P_{SAT}	Saturated Output Power	-	44.8	-	dBm
η_{SAT}	Efficiency at Saturated Output Power	-	60	-	%
G_P	Gain at P_{OUT} = 25W*	-	16	-	dB
η	Drain Efficiency at P_{OUT} = 25W*	-	55	-	%
V_{DS}	Drain Voltage	-	48	-	V
Ψ	Ruggedness: Output Mismatch, all phase angles	VSWR = TBD:1, No Device Damage			

* Pulse Conditions: 100µS pulse width, 10% duty cycle

DC Specifications: T_C = 25°C

Symbol	Parameter	Min	Typ	Max	Units
Off Characteristics					
I_{DLK}	Drain-Source Leakage Current (V_{GS}=-8V, V_{DS}=160V)	-	-	6	mA
I_{GLK}	Gate-Source Leakage Current (V_{GS}=-8V, V_{DS}=0V)	-	-	3	mA
On Characteristics					
V_T	Gate Threshold Voltage (V_{DS}=48V, I_D=6mA)	-2.5	-1.5	-0.5	V
V_{GSQ}	Gate Quiescent Voltage (V_{DS}=48V, I_D=150mA)	-2.1	-1.2	-0.3	V
R_{ON}	On Resistance (V_{DS}=2V, I_D=45mA)	-	0.75	-	Ω
$I_{D, MAX}$	Maximum Drain Current (V_{DS}=7V pulsed, 300µS pulse width, 0.2% Duty Cycle)	-	3.5	-	A

Thermal Resistance Specification:

Symbol	Parameter	Typ	Units
$R_{\theta JC}$	Thermal Resistance (Junction-to-Case), T_J = 200 °C	3.8	°C/W

Junction Temperature (T_J) measured using IR Microscopy, Case Temperature (T_C) measured using a thermocouple embedded in heatsink.

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

Symbol	Parameter	Max	Units
V_{DS}	Drain-Source Voltage	160	V
V_{GS}	Gate-Source Voltage	-10 to 3	V
I_G	Gate Current	12	mA
P_T	Total Device Power Dissipation (Derated above 25°C)	46	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)	Class 1B	
MSL	Moisture sensitivity level (per IPC/JEDEC J-STD-020)	TBD	

Load-Pull Data, Reference Plane at Device Leads

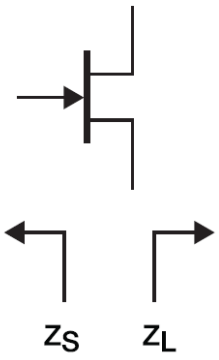
V_{DS}=48V, I_{DQ}=150mA, T_C=25°C unless otherwise noted

Optimum Source and Load Impedances:

(Pulsed CW* Drain Efficiency and Output Power Tradeoff Impedance)

Frequency (MHz)	Z_S (Ω)	Z_L (Ω)	P_{SAT} (W)	G_{SS} (dB)	Drain Efficiency @ P_{SAT} (%)
900	4.0 + j4.5	9.8 + j17.3	36	26.0	63
2500	2.7 - j3.9	5.7 + j9.0	35	17.0	58
4000	2.5 - j10.9	4.9 + j4.0	34	13.5	55
5800	3.1 - j13.5	2.8 - j2.8	30	12.5	52

* Pulse Conditions: 100µS pulse width, 10% duty cycle



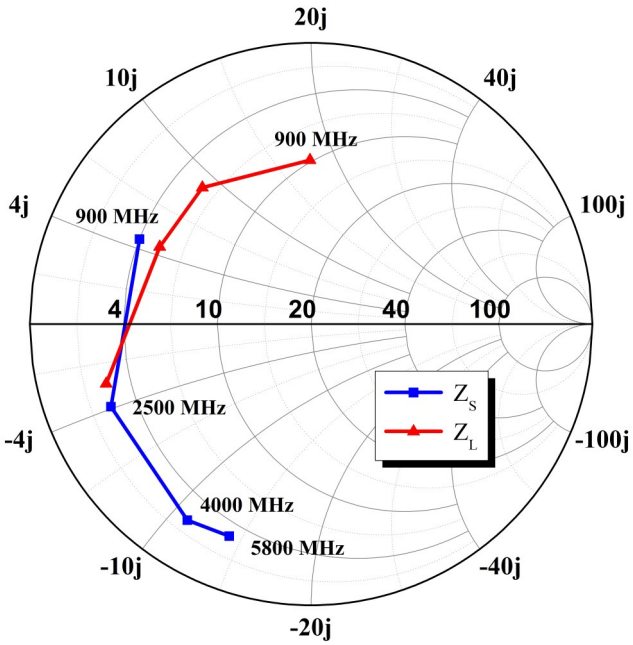


Figure 1: CW Power/Drain Efficiency Tradeoff Impedances, Z_O=20Ω

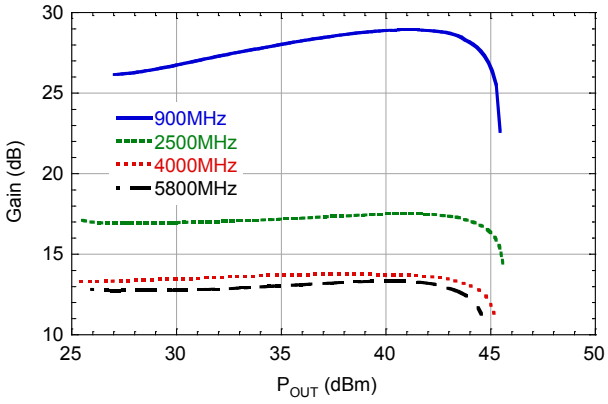


Figure 2: Gain vs. P_{OUT}

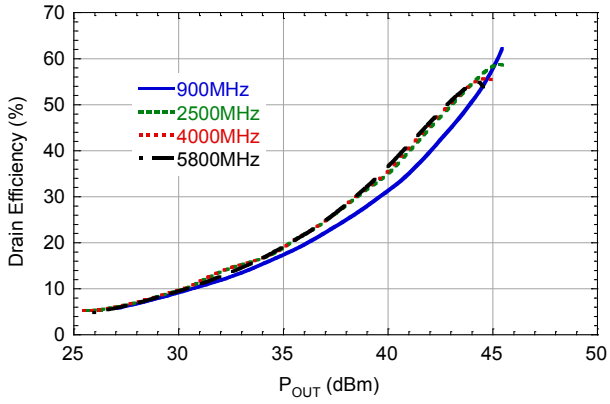


Figure 3: Efficiency vs. P_{OUT}

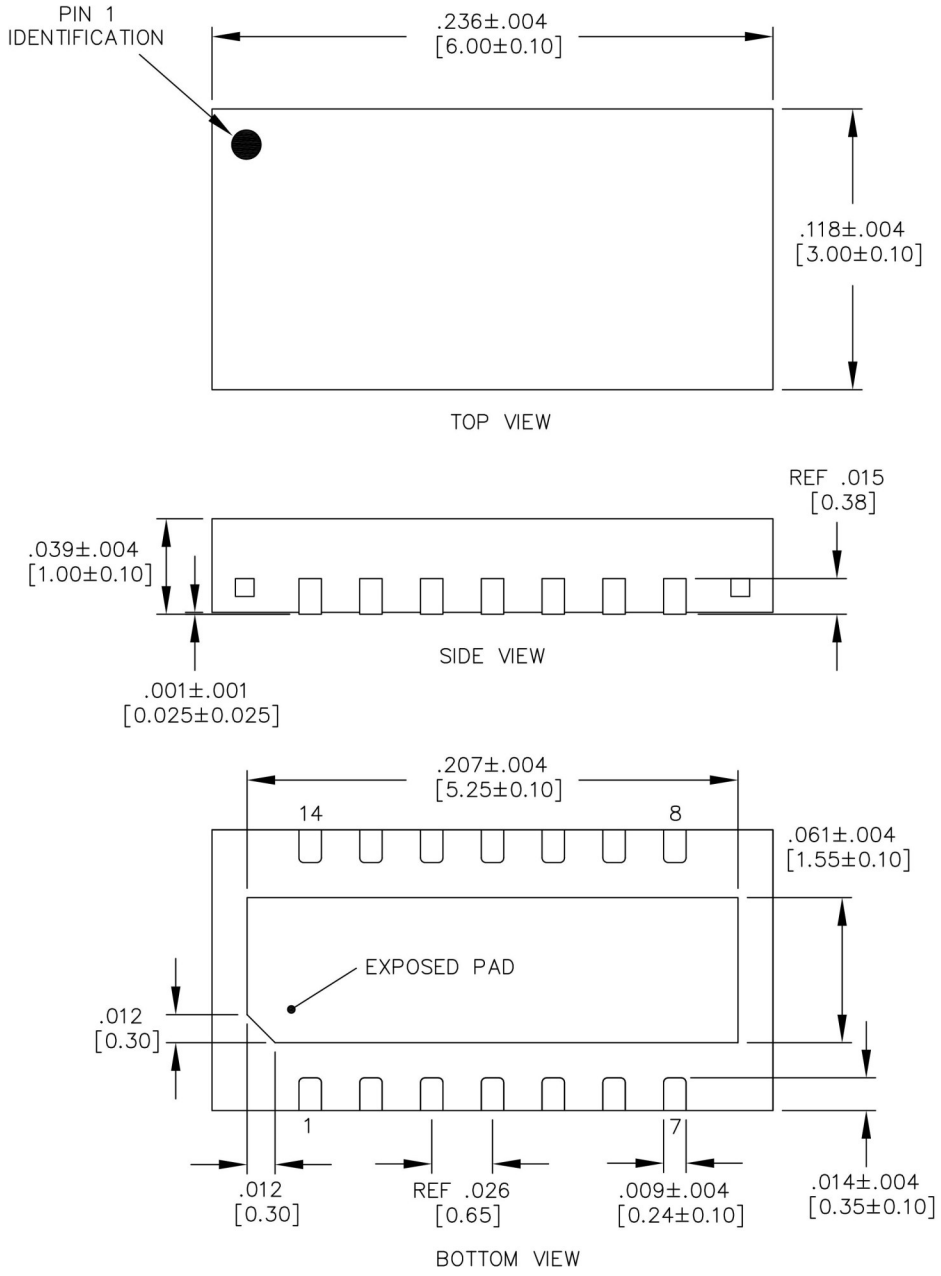


Figure 1 - DFN3X6-14 Plastic Package Dimensions (all dimensions in inches [millimeters])

Pin	Function
10, 11, 12	Gate — RF Input
2-6	Drain — RF Output
Exposed Pad	Source — Ground
1, 7, 8, 9, 13, 14	No Connect*

* All No Connect pins may be left floating or grounded

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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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