

## Gallium Nitride 48V, 50W, DC-2.2 GHz HEMT

Built using the SIGANTIC<sup>®</sup> process - A proprietary GaN-on-Silicon technology

### Features

- Suitable for linear and saturated applications
- Tunable from DC-2.2 GHz
- 48V Operation
- Industry Standard Package
- High Drain Efficiency (>60%)



### Applications

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

**DC-2.2 GHz**  
**50W**  
**GaN HEMT**



### Product Description

The NPT2021 GaN HEMT is a wideband transistor optimized for DC-2.2 GHz operation. This device has been designed for CW, pulsed, and linear operation with output power levels to 50W (47 dBm) in an industry standard plastic package with a bolt down flange.

**RF Specifications (CW, 2.15 GHz):**  $V_{DS} = 48V$ ,  $I_{DQ} = 300mA$ ,  $T_C = 25^{\circ}C$

Symbol	Parameter	Min	Typ	Max	Units
$G_{SS}$	Small-signal Gain	-	17	-	dB
$P_{SAT}$	Saturated Output Power	-	47.5	-	dBm
$\eta_{SAT}$	Efficiency at Saturated Output Power	-	60	-	%
$G_P$	Gain at $P_{OUT} = 50W$	-	15	-	dB
$\eta$	Drain Efficiency at $P_{OUT} = 50W$	-	55	-	%
$V_{DS}$	Drain Voltage	-	48	-	V
$\Psi$	Ruggedness: Output Mismatch, all phase angles	VSWR = TBD:1, No Device Damage			

## DC Specifications: $T_C = 25^\circ\text{C}$

Symbol	Parameter	Min	Typ	Max	Units
<b>Off Characteristics</b>					
$I_{DLK}$	Drain-Source Leakage Current ( $V_{GS}=-8\text{V}$ , $V_{DS}=160\text{V}$ )	-	-	12	mA
$I_{GLK}$	Gate-Source Leakage Current ( $V_{GS}=-8\text{V}$ , $V_{DS}=0\text{V}$ )	-	-	6	mA
<b>On Characteristics</b>					
$V_T$	Gate Threshold Voltage ( $V_{DS}=48\text{V}$ , $I_D=12\text{mA}$ )	-2.5	-1.5	-0.5	V
$V_{GSQ}$	Gate Quiescent Voltage ( $V_{DS}=48\text{V}$ , $I_D=300\text{mA}$ )	-2.1	-1.2	-0.3	V
$R_{ON}$	On Resistance ( $V_{DS}=2\text{V}$ , $I_D=90\text{mA}$ )	-	0.4	-	$\Omega$
$I_{D, MAX}$	Maximum Drain Current ( $V_{DS}=7\text{V}$ pulsed, 300 $\mu\text{s}$ pulse width, 0.2% Duty Cycle)	-	7	-	A

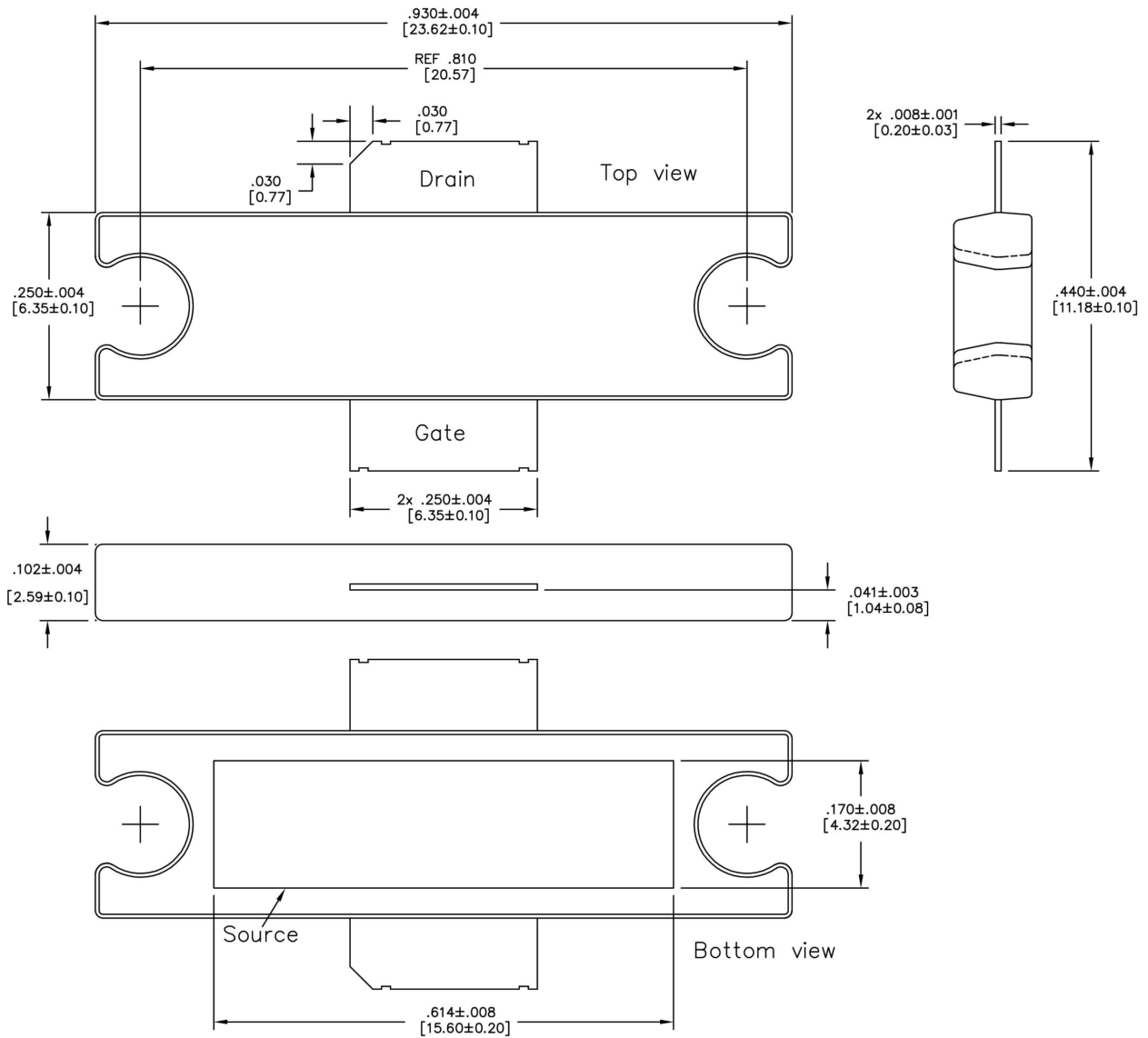
## Thermal Resistance Specification:

Symbol	Parameter	Typ	Units
$R_{\theta JC}$	Thermal Resistance (Junction-to-Case), $T_J = 200^\circ\text{C}$	1.9	$^\circ\text{C/W}$

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

## Absolute Maximum Ratings: Not simultaneous, $T_C = 25^\circ\text{C}$ 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	24	mA
$P_T$	Total Device Power Dissipation (Derated above $25^\circ\text{C}$ )	105	W
$T_{STG}$	Storage Temperature Range	-65 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature	225	$^\circ\text{C}$
HBM	Human Body Model ESD Rating (per JESD22-A114)	TBD	
MSL	Moisture sensitivity level (per IPC/JEDEC J-STD-020)	TBD	



**Figure 19 - TO272-2 Bolt-Down Plastic Package Dimensions (all dimensions in inches [millimeters])**

Function
Gate — RF Input
Drain — RF Output (Cut lead)
Source — Ground (Flange)

**Nitronex, LLC**

2305 Presidential Drive  
Durham, NC 27703 USA  
+1.919.807.9100 (telephone)  
+1.919.807.9200 (fax)  
[info@nitronex.com](mailto:info@nitronex.com)  
[www.nitronex.com](http://www.nitronex.com)

**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).**

**Important Notice**

Nitronex, LLC reserves the right to make corrections, modifications, enhancements, improvements and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to Nitronex terms and conditions of sale supplied at the time of order acknowledgment. The latest information from Nitronex can be found either by calling Nitronex at 1-919-807-9100 or visiting our website at [www.nitronex.com](http://www.nitronex.com).

Nitronex warrants performance of its packaged semiconductor or die to the specifications applicable at the time of sale in accordance with Nitronex standard warranty. Testing and other quality control techniques are used to the extent Nitronex deems necessary to support the warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

Nitronex assumes no liability for applications assistance or customer product design. Customers are responsible for their product and applications using Nitronex semiconductor products or services. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

Nitronex does not warrant or represent that any license, either express or implied, is granted under any Nitronex patent right, copyright, mask work right, or other Nitronex intellectual property right relating to any combination, machine or process in which Nitronex products or services are used.

Reproduction of information in Nitronex data sheets is permitted if and only if said reproduction does not alter any of the information and is accompanied by all associated warranties, conditions, limitations and notices. Any alteration of the contained information invalidates all warranties and Nitronex is not responsible or liable for any such statements.

Nitronex products are not intended or authorized for use in life support systems, including but not limited to surgical implants into the body or any other application intended to support or sustain life. Should Buyer purchase or use Nitronex, LLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold Nitronex, LLC, its officers, employees, subsidiaries, affiliates, distributors, and its successors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, notwithstanding if such claim alleges that Nitronex was negligent regarding the design or manufacture of said products.

Nitronex and the Nitronex logo are registered trademarks of Nitronex, LLC.

All other product or service names are the property of their respective owners.

©Nitronex, LLC 2013 All rights reserved.