

DC-4.0GHz, 120W, 28V, GaN RF Transistor

General Description

The GNNT4251HP is a wideband pre-matched gallium nitride (GaN) high electron mobility transistor (HEMT) , The device operates from DC to 4.0GHz with a 28V supply rail. Its typical saturated power is 120W@4.0GHz (P_{sat}). The P_{sat} gain is 11dB@4.0GHz above, and drain efficiency is 54% above.

Features

- Operating Frequencies: DC-4.0GHz
- Output Power (P_{sat}): 120W@4.0GHz
- Power Gain: 11.2dB@4.0GHz
- DE@P_{sat}: 54%@4.0GHz
- Operating Voltage: 28 V
- Support CW & Pulse mode

Typical Application Data

- 3GHz-3.3GHz: P_{sat} ≥ 51.2dBm
- 3.3GHz-3.6GHz: P_{sat} ≥ 51.3dBm
- 3.6GHz-4GHz: P_{sat} ≥ 50.7dBm

Recommended Operating Conditions

Parameter	Value
Drain-Source Voltage (V _D)	28 V (Typ)
Quiescent Current (I _{DQ})	150 mA (Typ)
Gate-Source Voltage(V _G)	-2.3 V (Typ)

Note:

- 1.All the RF spec tested under recommended conditions.
- 2.Bias-up Procedure : Set V_G to the pinch-off (V_P) voltage, typically -5 V , then turn on V_D to nominal supply voltage (28V)
- 3.Bias-down Procedure : Turn off RF signal , then turn off V_D and wait 1 second to allow drain capacitor dissipation, turn off V_G.

Absolute Maximum Ratings

Note:

1. Operating outside the rated range may cause irreversible damage to the device.

Parameter	Range Value
Drain-Source Breakdown Voltage (BV_{DS})	120 V
Drain-Source Voltage Range, (V_D)	20 to 32 V
Gate-Source Voltage Range, (V_G)	-10 to +1 V
Operating Temperature Range	-40 to 125°C
Storage Temperature Range	-65 to 150°C
Maximum Input Power, CW (P_{in}), $T_A = 25^\circ\text{C}$	42 dBm

RF Characteristics

Note:

1. Test condition: $T_A = 25^\circ\text{C}$, $V_D = 28\text{V}$, $I_{DQ} = 150\text{ mA}$, CW

Symbol	Parameter	Min	Typ	Max	Unit
G_{LIN}	Linear Gain	-	14.5	-	dB
P_{sat}	Output Power	-	120	-	W
DE_{sat}	Drain Efficiency	-	55	-	%
G_{sat}	Gain	-	11.5	-	dB

Thermal Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance	-	1.1	-	$^\circ\text{C}/\text{W}$

Test Data, 3GHz-3.3GHz

Test Condition: $T_A = 25\text{ }^{\circ}\text{C}$, $V_D = 28\text{ V}$, $I_{DQ} = 150\text{ mA}$, CW

Freq(GHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	I_D (A)	DE(%)
3	51.5	141.25	11.1	9.7	52.01
3.1	52	158.49	12.3	9.4	60.22
3.2	51.8	151.36	12	9.2	58.76
3.3	51.2	131.83	11.2	8.54	55.13

Test Data, 3.3GHz-3.6GHz

Test Condiktion: $T_A = 25\text{ }^{\circ}\text{C}$, $V_D = 28\text{ V}$, $I_{DQ} = 150\text{ mA}$, CW

Freq(GHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	I_D (A)	DE(%)
3.3	51.6	144.54	11.3	9.85	52.41
3.4	52	158.49	12.6	9.34	60.6
3.5	51.8	151.36	12.3	8.8	61.43
3.6	51.3	134.90	11.7	8.44	57.08

Test Data, 3.6GHz-4.0GHz

Test Condition: $T_A = 25\text{ }^{\circ}\text{C}$, $V_D = 28\text{ V}$, $I_{DQ} = 150\text{ mA}$, CW

Freq(GHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	I_D (A)	DE(%)
3.6	51	125.89	11.5	8.07	55.71
3.7	51	125.89	12.1	7.28	61.76
3.8	51	125.89	12.4	7.26	61.93
3.9	51	125.89	12.3	7.83	57.42
4	50.7	117.49	11.2	7.68	54.64

ESD Protection Characteristics

Test Methodology	Class	Standard
Human Body Model	$\pm 225\text{ V}$	JEDEC Standard JS-001-2017
Charge Device Model	$\pm 1000\text{ V}$	JEDEC Standard JS-002-2018

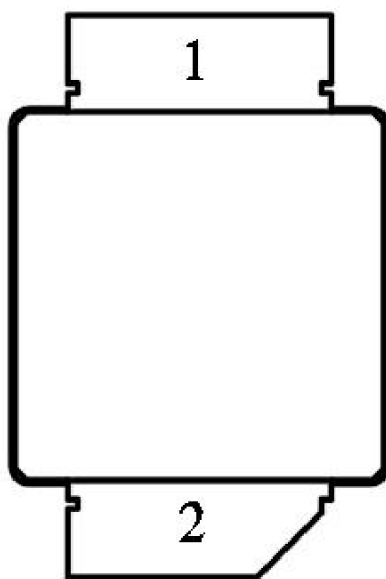
Solderability

This package is lead-free/RoHS-compliant. The plating material on the leads is NiAu. It is compatible with both lead-free (maximum 260 °C reflow temperature) and tin-lead (maximum 245°C reflow temperature) soldering processes.

RoHS Compliance

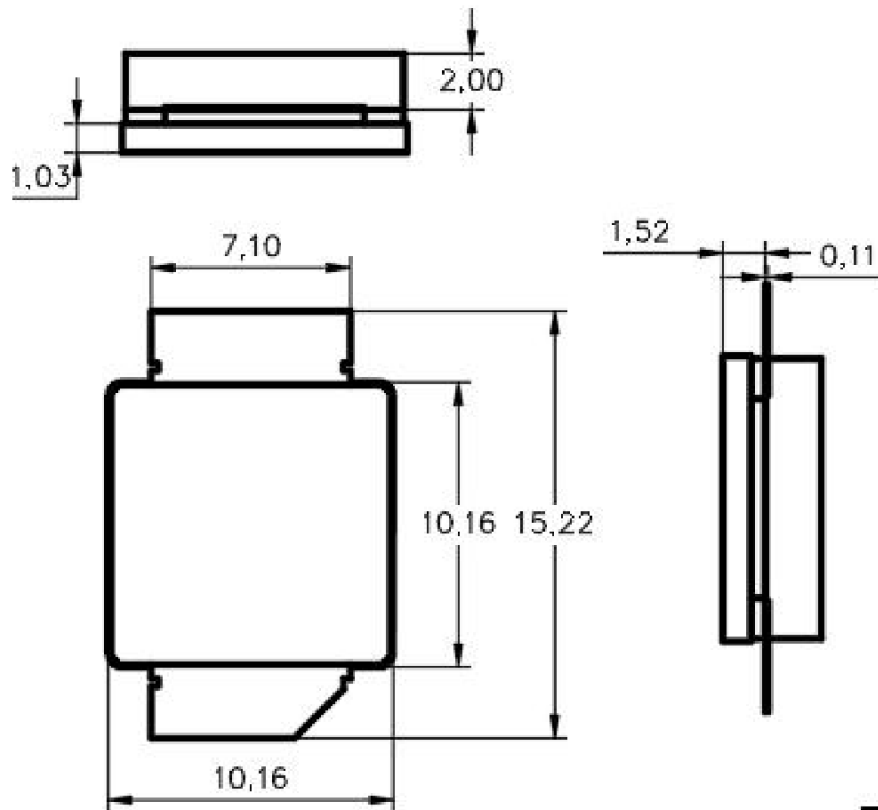
This part is compliant with 2015/863/ and EU 2011/65/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

Pin Configuration



PIN	Symbol	Description
1	V_G / RF IN	Gate voltage / RF Input to be matched to 50 ohms;
2	V_D / RF OUT	Drain voltage / RF Output to be matched to 50 ohms
--	Source	Source connected to ground, It needs to be welded onto the substrate under the window of PCB

Package dimensions



YJ304

Note:

- 1. All dimensions are in millimeters.
- 2. All dimension tolerances are +/- 0.10 or +/- 0.20 mm.

Revision History

Data	Revision	Datasheet Status
2025/05/15	1.0	Preliminary Datasheet