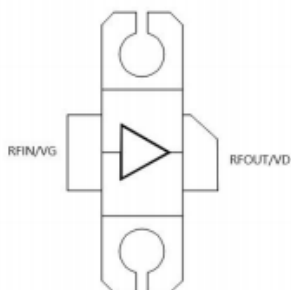


DC-4.0GHz, 50W, 28V, GaN RF PA

General Description

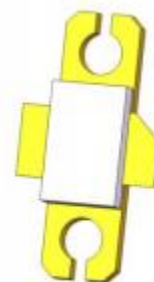
GNNT4047H is a wideband pre-matched gallium nitride (GaN) high electron mobility transistor (HEMT), The device operates from DC to 4.0GHz with a 28V supply rail. Its typical saturated power is 50W@2.0GHz (P_{sat}). The P_{sat} gain is 12dB@2.0GHz above, and drain efficiency is 65% above. The device is in an industry standard YJ201 ceramic package.

Block Diagram



Features

- Operating Frequencies: DC-4.0GHz
- Output Power (P_{sat}): 50 W@2.0GHz
- Power Gain: 12dB@2.0GHz
- DE@ P_{sat} : 65%@2.0GHz
- Operating Voltage: 28 V
- Support CW & Pulse mode



Typical Application Data

- 0.7GHz-2.0GHz: $P_{sat} \geq 46.8\text{dBm}$
- 1.6GHz-1.9GHz: $P_{sat} \geq 47.1\text{dBm}$
- 2.38GHz-2.50GHz: $P_{sat} \geq 48\text{dBm}$
- 3.6GHz-3.8GHz: $P_{sat} \geq 47.2\text{dBm}$

Recommended Operating Conditions

Parameter	Value
Drain-Source Voltage (V_D)	28 V (Typ)
Quiescent Current (I_{DQ})	200 mA (Typ)
Gate-Source Voltage(V_G)	-3.0 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}), $T_A = 25^\circ\text{C}$	40 dBm

RF Characteristics, 0.7GHz-2.0GHz EVB

Note:

1. Test condition: $T_A = 25^\circ\text{C}$, $V_D = 28\text{ V}$, $I_{DQ} = 200\text{ mA}$, CW

Symbol	Parameter	Min	Typ	Max	Unit
G_{LIN}	Linear Gain	-	15	-	dB
P_{sat}	Output Power	-	50	-	W
DE_{sat}	Drain Efficiency	-	65	-	%
G_{sat}	Gain	-	12	-	dB

Thermal Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance	-	1.8	-	$^\circ\text{C}/\text{W}$

Test Data, 0.7GHz-2.0Ghz

Test Condition: TA = 25 °C, VD = 28 V, IDQ = 200 mA, CW

Freq(MHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	ID(A)	DE(%)
0.7	46.80	47.9	11.60	2.54	67.3%
0.8	47.50	56.2	12.00	3.55	56.6%
0.9	48.00	63.1	13.30	3.70	60.9%
1.0	47.50	56.2	12.00	3.38	59.4%
1.1	47.50	56.2	12.75	3.30	60.9%
1.2	47.65	58.2	12.40	3.25	64.0%
1.3	47.40	55.0	12.10	3.13	62.7%
1.4	47.70	58.9	12.30	3.15	66.8%
1.5	47.90	61.7	12.20	3.29	66.9%
1.6	48.10	64.6	12.00	3.65	63.2%
1.7	48.50	70.8	13.30	3.60	70.2%
1.8	48.60	72.4	13.30	3.60	71.9%
1.9	47.60	57.5	12.70	3.03	67.8%
2.0	47.30	53.7	12.00	2.80	68.5%

Test Data, 1.6GHz-1.9Ghz

Test Condition: TA = 25 °C, VD = 28 V, IDQ = 200 mA, CW

Freq(MHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	ID(A)	DE(%)
1.6	47.1	51.29	13.1	3.5	52.33%
1.7	47.5	56.23	14.1	3.6	55.79%
1.8	47.5	56.23	14.8	3.2	62.76%
1.9	47.4	54.95	14.3	3.0	59.47%

Test Data, 2.38GHz-2.50GHz

Test Condition: TA = 25 °C, VD = 28 V, IDQ = 200 mA, CW

Freq(MHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	Id(A)	DE(%)
2.38	48.15	65.31	13.74	3.62	64.44%
2.45	48.18	65.77	13.42	3.64	64.53%
2.50	48.10	64.57	13.78	3.28	70.30%

Test Data, 3.6GHz-3.8GHz

Test Condition: TA = 25 °C, VD = 28 V, IDQ = 200 mA, CW

Freq(MHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	Id(A)	DE(%)
3.6	47.55	56.89	9.48	3.59	56.59%
3.7	47.47	55.85	9.35	3.36	59.36%
3.8	47.20	52.48	9.02	3.05	61.45%

ESD Protection Characteristic

Test Methodology	Class	Standard
Human Body Model	±225V	JEDEC Standard JS-001-2017
Charge Device Model	± 1000V	JEDEC Standard JS-002-2018

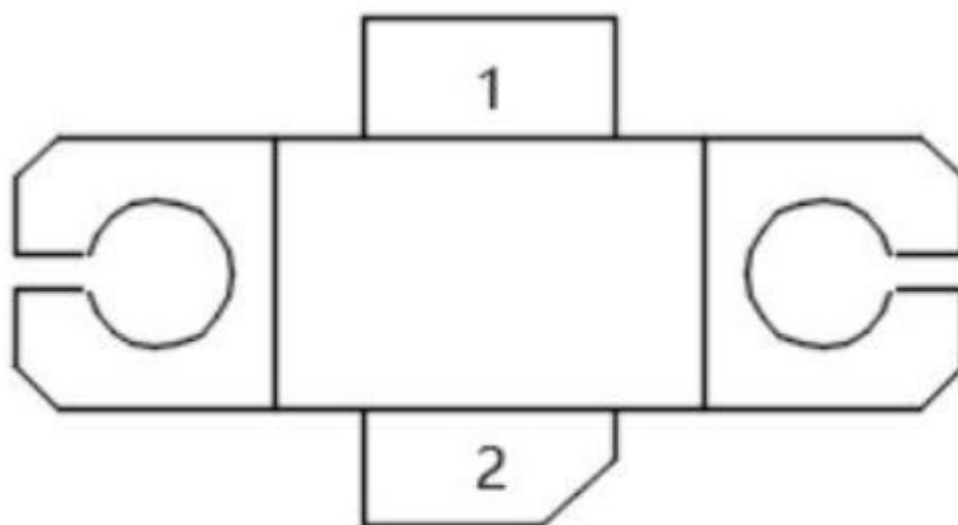
Solderability

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

Mechanical Information



Note:

1. All dimensions are in millimeters.
2. All dimension tolerances are ± 0.10 or ± 0.20 mm.

Revision History

Data	Revision	Datasheet Status
2023/8/20	1.0	Preliminary Datasheet
2024/3/10	2.0	Error data revise
2024/6/12	2.1	Consolidation form
2024/7/9	2.2	Update Test Data
2024/7/19	2.3	Update Test Data