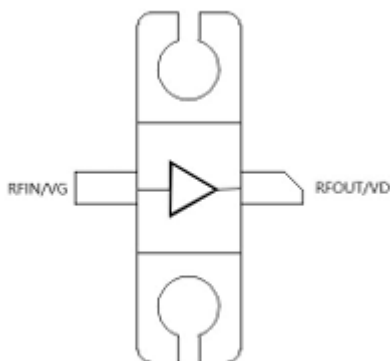
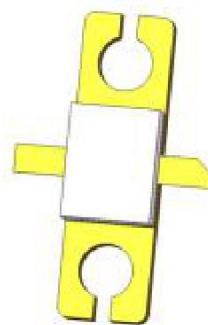


DC-4.0GHz, 50W, 48V, GaN RF Transistor

General Description

The GNHT4047H is a wideband pre-matched gallium nitride(GaN) high electron mobility transistor (HEMT) , The device operates from DC to 4.0GHz with a 48V supply rail. Its typical saturated power is 50W@1.0GHz (P_{sat}). The P_{sat} gain is 17dB@1.0GHz above, and drain efficiency is 55% above. The device is in an industry standard YJ203 ceramic package.



Typical Application Data

- 0.7GHz-1.225GHz: P_{sat} ≥ 46.8dBm
- 0.3GHz-1.5GHz: P_{sat} ≥ 45.2dBm
- 1GHz-3GHz: P_{sat} ≥ 45.4dBm

Recommended Operating Conditions

Parameter	Value
Drain-Source Voltage (V _D)	48 V (Typ)
Quiescent Current (I _{DQ})	100 mA (Typ)
Gate-Source Voltage(V _G)	-3.1V (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.

Features

- Operating Frequencies: DC-4.0GHz
- Output Power (P_{sat}): 50 W@1.0GHz
- Power Gain: 17dB@1.0GHz
- DE@P_{sat}: 55%@1.0GHz
- Operating Voltage: 48 V
- Support CW & Pulse mode

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 60 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}), $T_A = 25^\circ C$	35dBm

RF Characteristics, 0.7GHz-1.225GHz EVB

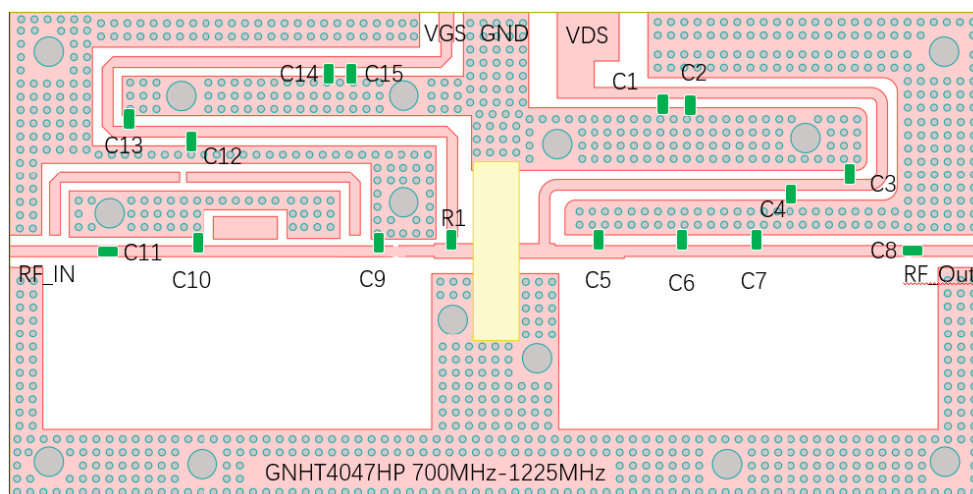
Note:

1. Test condition: $T_A = 25^\circ C$, $V_D = 48V$, $I_{DQ} = 100 mA$, CW

Symbol	Parameter	Min	Typ	Max	Unit
G_{LIN}	Linear Gain	-	20	-	dB
P_{sat}	Output Power	-	50	-	W
DE_{sat}	Drain Efficiency	-	55	-	%
G_{sat}	Gain	-	17	-	dB

Thermal Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance	-	1.9	-	°C/W



Note :

1.The EVB material used for RO4350B with thickness of 508um(20mil)

0.7GHz-1.225GHz EVB BOM list

Location	Value	Quantity	Brand
C1,C15	10uF	2	Murata
C2,C14	100nF	2	Murata
C3, C13	1000pF	2	Murata
C12,C11,C8,C4	100pF	4	Chuang Tian
C5	2pF	1	Chuang Tian
C6	2pF	1	Chuang Tian
C7	0.7pF	1	Chuang Tian
C9	10 pF	1	Chuang Tian
C10	3.3 pF	1	Chuang Tian
R1	22R	1	Murata

Test Data, 0.7GHz-1.225GHz

Test Condition: TA = 25 °C, VD =48 V, IDQ = 100 mA, CW

Freq(GHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	ID(A)	DE(%)
0.7	47.00	50.12	16.8	1.74	60.01%
0.8	47.20	52.48	16.9	1.86	58.78%
0.9	47.20	52.48	17.0	1.83	59.75%
1.0	47.10	51.29	17.6	1.81	59.03%
1.1	47.15	51.88	17.7	1.81	59.71%
1.2	47.00	50.12	18.3	1.76	59.33%
1.225	46.80	47.86	18.4	1.72	57.97%

Test Data, 0.3GHz-1.5GHz

Test Condition: TA = 25 °C, VD =48 V, IDQ = 50 mA, CW

Freq(GHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	ID(A)	DE(%)
0.3	45.5	35.48	17	1.39	53.18%
0.4	45.3	33.88	17.6	1.15	61.38%
0.5	45.5	35.48	17.7	0.93	79.48%
0.6	45.3	33.88	17.6	0.9	78.44%
0.7	45.4	34.67	17.7	1.02	70.82%
0.8	45.1	32.36	17.7	1.08	62.42%
0.9	46.9	48.98	17.7	1.57	64.99%
1	47.3	53.70	17.8	1.71	65.43%
1.1	47	50.12	17.9	1.65	63.28%
1.2	46.8	47.86	17.7	1.55	64.33%
1.3	46.6	45.71	17.7	1.54	61.84%
1.4	46	39.81	17.3	1.47	56.42%
1.5	45.2	33.11	17.1	1.3	53.07%

Test Data, 1GHz-3GHz

Test Condition: TA = 25 °C, VD =48 V, IDQ = 50 mA, CW

Freq(GHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	ID(A)	DE(%)
1	46.5	44.67	15.1	1.59	58.53%
1.1	47.2	52.48	15.4	1.59	68.76%
1.2	46.2	41.69	15.2	1.38	62.93%
1.3	46.6	45.71	14.2	1.47	64.78%
1.4	46.3	42.66	13.3	1.4	63.48%
1.5	45.8	38.02	13.4	1.33	59.55%
1.6	47.4	54.95	11.5	1.6	71.55%
1.7	46.3	42.66	11.4	1.43	62.15%
1.8	46.3	42.66	10.4	1.52	58.47%
1.9	45.6	36.31	10.3	1.53	49.44%
2	45.7	37.15	10.5	1.6	48.38%
2.1	46	39.81	10.7	1.61	51.51%
2.2	45.4	34.67	10.3	1.66	43.52%
2.3	45.5	35.48	10.3	1.74	42.48%
2.4	46.2	41.69	10.6	1.81	47.98%
2.5	46	39.81	10.7	1.78	46.59%
2.6	46	39.81	10.8	1.78	46.59%
2.7	46.7	46.77	10.9	1.84	52.96%
2.8	47	50.12	10.9	1.88	55.54%
2.9	46.8	47.86	10.4	1.9	52.48%
3	45.9	38.90	10.9	1.44	56.29%

ESD Protection Characteristics

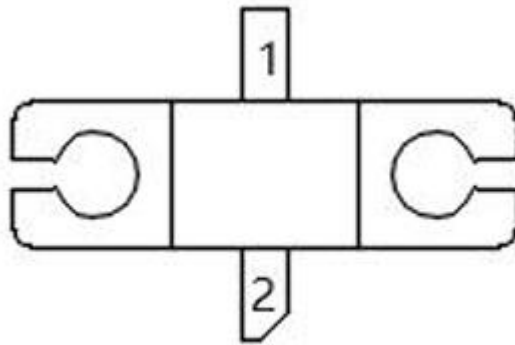
Test Methodology	Class	Standard
Human Body Model	± 225V	JEDEC Standard JS-001-2017
Charge Device Model	± 1000V	JEDEC Standard JS-002-2018

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.

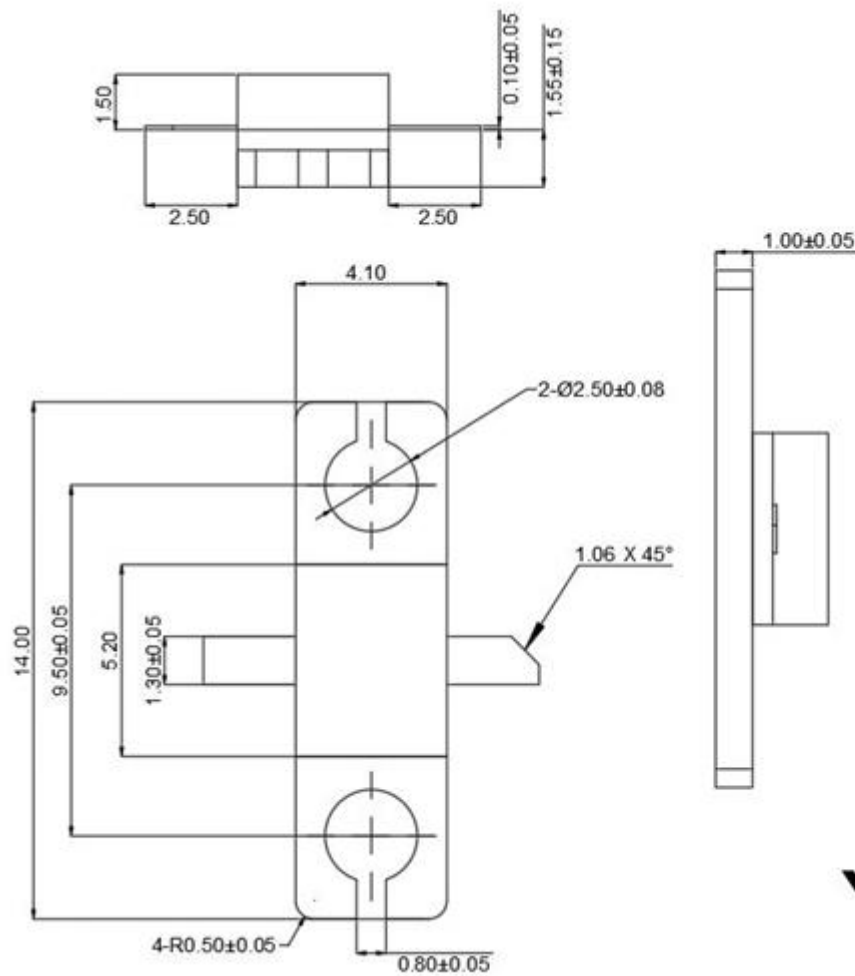
RoHs Compliance

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	Gate voltage / RF Input
2	V_D	Drain voltage / RF Output
--	Source	Source connected to ground, It needs to be welded onto the substrate under the window of PCB



YJ203

Note:

1. All dimensions are in millimeters.

2. All dimension tolerances are +/- 0.10 or +/- 0.20 mm.

Revision History

Data	Revision	Datasheet Status
2023/12/26	1.0	Preliminary Datasheet
2024/6/11	1.1	Uniform Format
2024/12/08	1.2	Update Test data