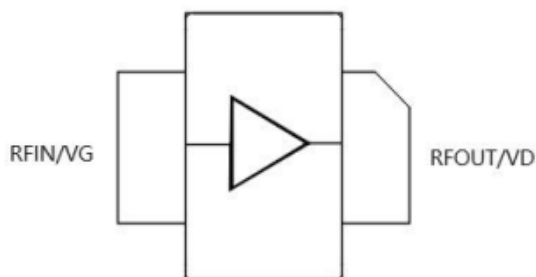


DC-4.0 GHz,120W,28V,GaN RF Transistor

General Description

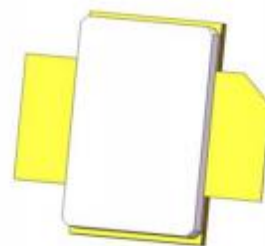
GNNT4051HP is a wideband pre-matched gallium nitride (GaN) high electron mobility transistor (HEMT), The device operates from DC to 4.0GHz with a 28V supply rail. Its typical saturated power is 120W (P_{3dB}). The P_{3dB} gain is 12dB@3.0GHz above, and drain efficiency PAE is 55% above. The device is in ceramic package.

Block Diagram



Features

- Operating Frequencies: DC ~4.0GHz
- Output Power (P_{3dB}): 120 W@3.0GHz
- Power Gain: 15dB@3.0GHz
- $DE@P_{3dB}$: 55%@3.0GHz
- Operating Voltage: 28 V
- Support CW & Pulse mode



Applications

- Military radar
- Commercial radar, civil radar
- Military Radio
- Test equipment
- Low frequency broadband application

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	-55 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, @3.0 Ghz

Note:

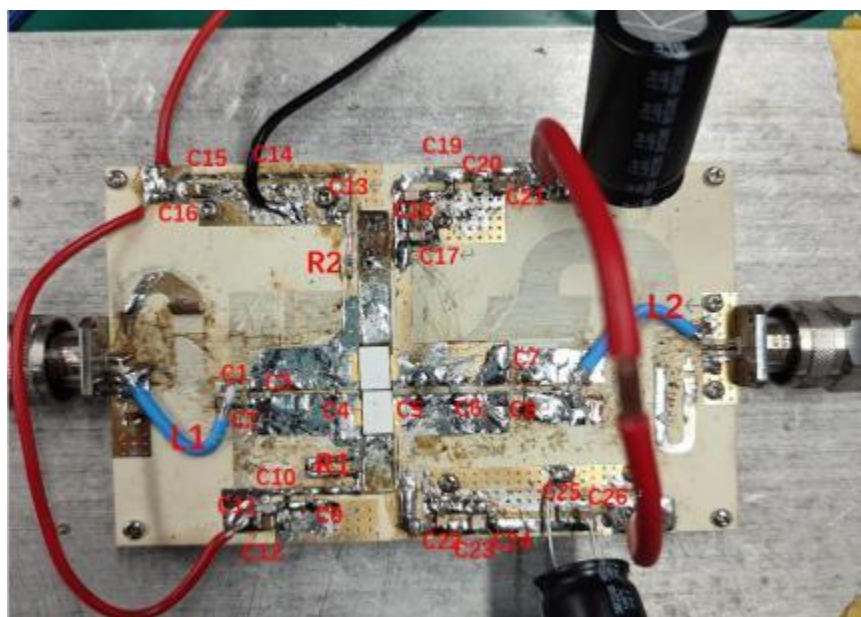
1. Test condition: $T_A = 25^\circ\text{C}$, $V_D = 28\text{ V}$, $I_{DQ} = 150\text{ mA}$, CW

Symbol	Parameter	Min	Typ	Max	Unit
G_{LIN}	Linear Gain	-	15	-	dB
P_{3dB}	Output Power@3dB	-	120	-	W
DE_{3dB}	Drain Efficiency@3dB	-	55	-	%
G_{3dB}	Gain@3dB	-	12	-	dB

Thermal Characteristics

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

EVB layout, 1.36GHz-1.78GHz (Dual in One)



Note:

1. The EVB is the RO4350B type, with a thickness of 508 μm (20 mils).

EVB BOM list, 1.36GHz-1.78GHz

Item	Value	Qty
C1,C2,C9,C13,C7,C9,C17,C22	30PF	8
C3	1PF	1
C4	1.6PF	1
C5	3.9PF	1
C6	0.5PF	1
C10,C14,C19,C24	1NF	4
C11,C15,C20,C25	100NF	4
C12,C16,C21,C26	10UF	4
C18,C23	100PF	2
L1	50 Ω , line length =40mm	1
L2	50 Ω , line length =40mm	1
R1,R2	33 Ω	2

EVB test data, 1.36GHz-1.78GHz (Dual in One)

Test Conditions: TA = 25 °C, VD = 28 V, IDQ = 400 mA (VG≈-2.3V) , CW

Freq(GHz)	Pout(dBm)	Pout(W)	PoutGain(dB)	Ids(A)	EFF(%)
1.36	53.50	223.87	12.30	11.50	69.53%
1.46	53.10	204.17	12.20	11.45	63.68%
1.56	53.30	213.80	12.20	12.90	59.19%
1.66	53.60	229.09	12.30	14.27	57.33%
1.78	53.30	213.80	12.10	13.37	57.11%

EVB test data, 0.75 ~ 0.97GHz (single-tube)

Test Conditions : TA = 25 °C, VD = 28 V, IDQ = 150 mA (VG≈-2.3V) , CW

Freq(GHz)	Pout(dBm)	Pout(W)	PoutGain(dB)	Ids(A)	EFF(%)
0.75	51.60	144.54	16.8	8.30	62.20%
0.86	51.20	131.83	15.4	8.00	58.85%
0.97	51.60	144.54	15.5	7.35	70.24%

EVB test data, 1.36 ~ 1.78GHz (single-tube)

Test Conditions : CW TA = 25 °C, VD = 28 V, IDQ = 150 mA (VG≈-2.3V) , CW

Freq(GHz)	Pout(dBm)	Pout(W)	PoutGain(dB)	Ids(A)	EFF(%)
1.36	51.1	128.82	12.7	7.37	62.43%
1.46	51.1	128.82	12.6	7.70	59.75%
1.56	51.1	128.82	12.4	7.73	59.52%
1.66	51.4	138.04	12.6	8.00	61.62%
1.78	50.5	112.20	12.7	6.80	58.93%

ESD Protection Characteristics

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

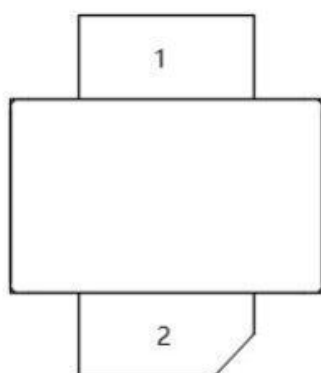
Solderability

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



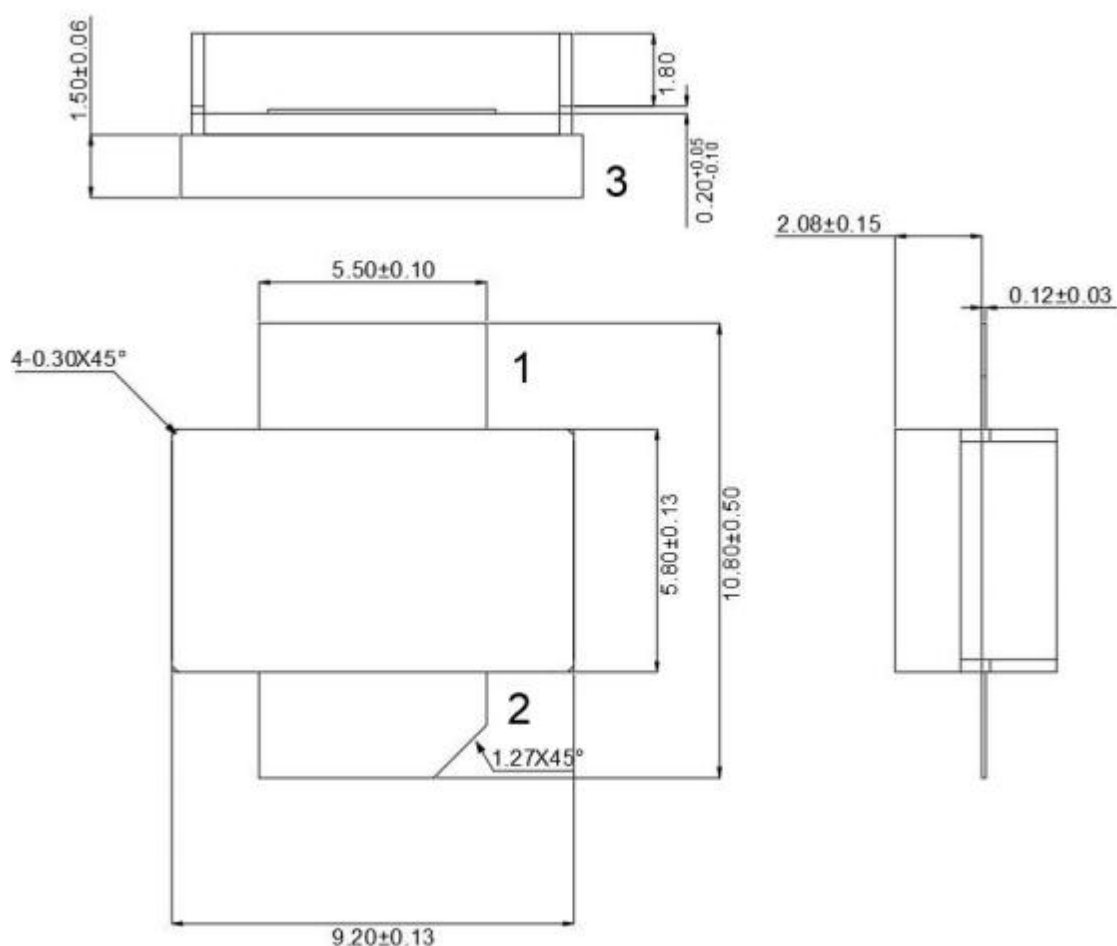
PIN	Symbol	Description
1	V_G / RF IN	Gate voltage / RF Input to be matched to 50 ohms;
2	V_D / RF OUT	Drain voltage / RF Output to be matched to 50 ohms
--	Source	Source connected to ground, It needs to be welded onto the substrate under the window of PCB

Mechanical Information

(Unit: mm) (1: Gate 2: Drain 3:Source)

GNNT4051HP

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



Note:

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

Revision History

Data	Revision	Datasheet Status
2023/6/20	1.0	Preliminary Datasheet
2024/2/21	2.0	Update Packageing information
2024/5/20	3.0	Update Test Data