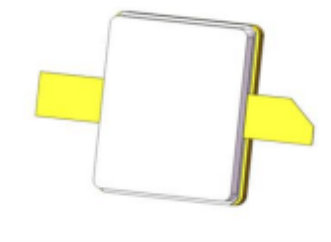


DC-6.0GHz, 10W, 28V, GaN RF Transistor

General Description

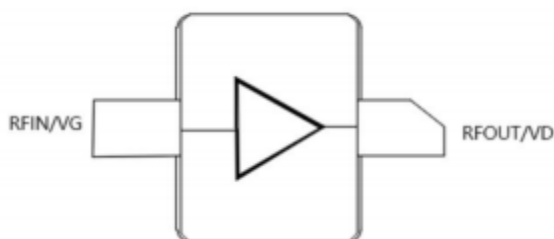
The GNNT6040HP is a GaN HEMT-based power amplifier operating from DC to 6.0 GHz, with a typical saturated output power of 10 W at 1.0 GHz (P_{sat}). It offers a saturated gain greater than 13 dB at 1.0 GHz and a drain efficiency exceeding 60%. The device is packaged in a YJ303 metal-ceramic case.



Typical Application Data

- 10MHz-1.5GHz: $P_{sat} \geq 40\text{dBm}$
- 3.0GHz-3.5GHz: $P_{sat} \geq 41\text{dBm}$
- 2.4GHz-6.0GHz: $P_{sat} \geq 39.8\text{dBm}$

Block Diagram



Recommended Operating Conditions

Parameter	Value
Drain-Source Voltage (V_D)	28 V (典型值)
Quiescent Current (I_{DQ})	100 mA (典型值)
Gate-Source Voltage(V_G)	-2.1 V (典型值)

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-6.0GHz
- Output Power (P_{sat}): 10W@1.0GHz
- Power Gain: 13dB@1.0GHz
- $DE@P_{sat}$: 60%@1.0GHz
- Operating Voltage: 28 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 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}), $T_A = 25^\circ\text{C}$	34dBm

RF Characteristics, 10MHz-1.5GHz EVB

Note:

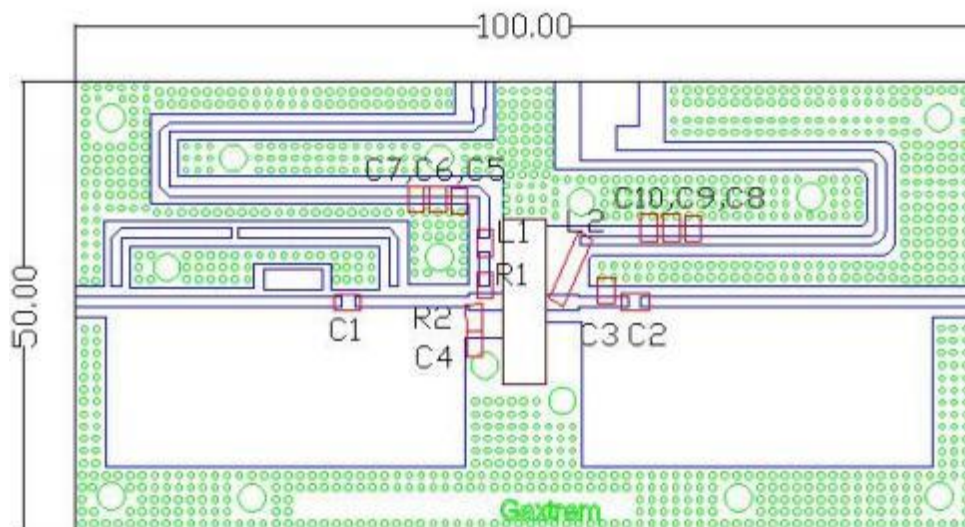
1. Test condition: $T_A = 25^\circ\text{C}$, $V_D = 28\text{V}$, $I_{DQ} = 150\text{mA}$, CW

Symbol	Parameter	Min	Typ	Max	Unit
G_{LIN}	Linear Gain	-	16	-	dB
P_{sat}	Output Power	-	10	-	W
DE_{sat}	Drain Efficiency	-	60	-	%
G_{sat}	Gain	-	13	-	dB

Thermal Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance	-	6	-	$^\circ\text{C}/\text{W}$

EVB Layout, 10MHz-1.5GHz



Note:

1. The material used by EVB is RO4350B, with a thickness of 508 microns (20 mils).

EVB Component List, 10MHz-1.5GHz

Position	Value	Manufacture
C1,C2	80nF	Murata0805
C3	1pF	ATC600F
C5,C10	1000pF	Murata
C6,C9	0.01μF	Murata
C4,C7,C8	10μF	Murata
R1	91Ω	YAGEO
R2	18Ω	YAGEO
L1	1μH	Murata0805
L2	3.5uH	Collcraft,4310LC-352KE

Test Data, 10MHz-1.5GHz EVB

Test Condition: TA = 25 °C, VD = 28 V, IDQ = 100 mA , CW

Psat(dBm)	Psat(W)	Power Gain(dB)	ID(A)	DE(%)
40.5	11.22	13.5	0.54	74.21%
40.8	12.02	13.8	0.53	81.02%
40.5	11.22	13.5	0.5	80.14%
40.6	11.48	13.6	0.5	82.01%
40.5	11.22	13.5	0.48	83.48%
41	12.59	14	0.52	86.46%
40.8	12.02	13.8	0.53	81.02%
40.4	10.96	13.4	0.52	75.31%
40.8	12.02	13.8	0.62	69.25%
40	10.00	13	0.64	55.80%
41.3	13.49	14.3	0.75	64.24%
41.1	12.88	14.1	0.78	58.99%
41.4	13.80	14.4	0.8	61.62%
41.6	14.45	14.6	0.77	67.04%
41.2	13.18	14.2	0.75	62.77%
41.2	13.18	14.2	0.8	58.85%
41.2	13.18	14.2	0.85	55.39%
40.2	10.47	13.2	0.75	49.86%
40.4	10.96	13.4	0.83	47.18%

Test Data, 3.0GHz-3.5GHz EVB

Test Condition: TA = 25 °C, VD = 28 V, IDQ = 100 mA , CW

Freq(MHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	ID(A)	DE(%)
3.0	41.59	14.42	14.68	0.80	64.38%
3.1	41.39	13.77	14.70	0.77	63.88%
3.2	41.72	14.86	14.70	0.87	61.00%
3.3	41.97	15.74	14.39	0.89	63.16%
3.4	41.89	15.45	14.04	0.87	63.80%
3.5	41.90	15.49	12.61	0.87	63.58%

Test Data, 2.4GHz-6.0GHz EVB

Test Condition: TA = 25 °C, VD = 28 V, IDQ = 50 mA , CW

Freq(MHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	ID(A)	DE(%)
2.4	41.27	13.40	11.44	0.98	48.82%
2.6	41.15	13.03	10.22	1.10	42.31%
2.8	41.16	13.06	9.82	1.11	42.03%
3.0	40.93	12.39	9.74	1.12	39.50%
3.2	40.67	11.67	8.74	1.10	37.88%
3.4	40.14	10.33	8.14	1.07	34.47%
3.6	39.40	8.71	8.03	1.06	29.35%
3.8	39.46	8.83	7.63	1.09	28.93%
4.0	40.04	10.09	8.35	1.11	32.47%
4.2	41.16	13.06	9.17	1.15	40.56%
4.4	41.14	13.00	9.45	1.07	43.40%
4.6	41.12	12.94	9.71	0.95	48.65%
4.8	41.41	13.84	9.09	0.91	54.30%
5.0	41.11	12.91	9.08	0.82	56.24%
5.2	40.49	11.19	8.34	0.76	52.61%
5.4	40.11	10.26	8.29	0.77	47.57%
5.6	40.26	10.62	7.53	0.82	46.24%
5.8	39.80	9.55	7.05	0.80	42.63%
6.0	39.83	9.62	6.50	0.78	44.03%

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

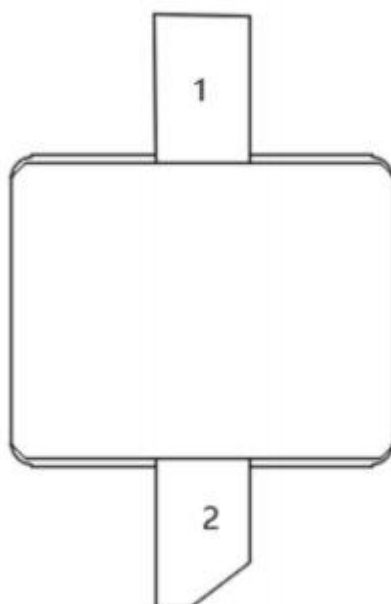
Solderability

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.

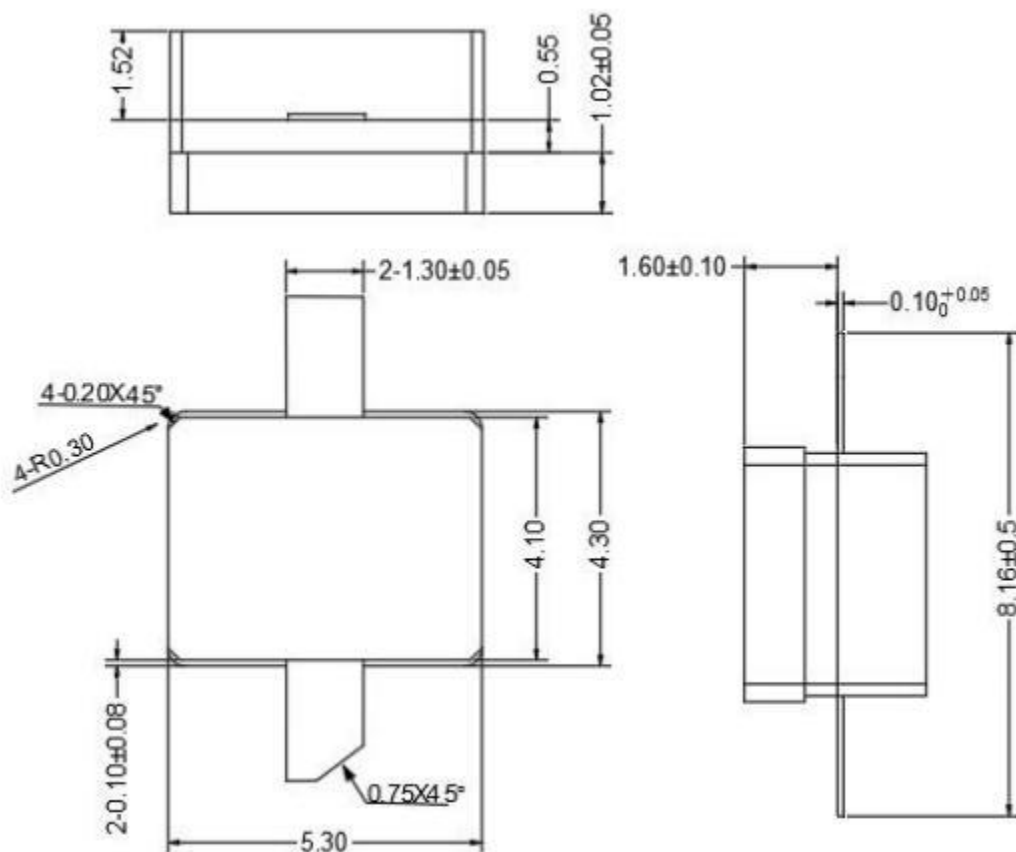
RoHS Compliance

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



YJ303

Note:

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

Revision History

Data	Revision	Datasheet Status
2023/9/20	1.0	Preliminary Datasheet
2024/6/12	1.1	Update Test Data
2024/7/2	1.2	Update Test Data