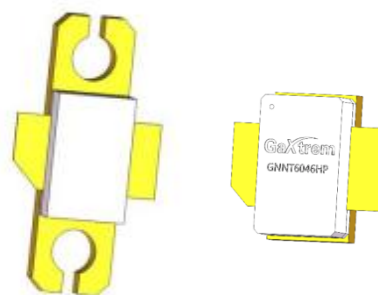


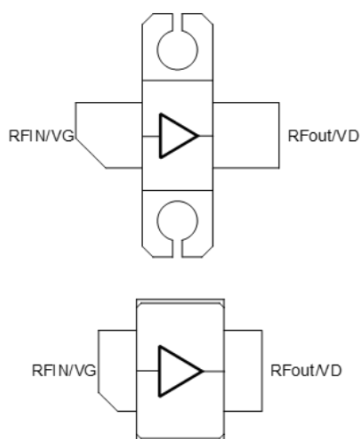
DC-6.0GHz, 40W, 28V, GaN RF Transistor

General Description

The GNNT6046H (HP) is a GaN HEMT-based power amplifier operating from DC to 6.0 GHz, with a typical saturated output power of 40 W at 4.0 GHz (P_{sat}). It offers a saturated gain greater than 12 dB at 4.0 GHz and a drain efficiency exceeding 55%. The device is packaged in a YJ201 metal-ceramic case.



Block Diagram



Features

- Operating Frequencies: DC-6.0GHz
- Output Power (P_{sat}): 40W@4.0GHz
- Power Gain: 12dB@4.0GHz
- $DE@P_{sat}$: 55%@4.0GHz
- Operating Voltage: 28 V
- Support CW & Pulse mode

Typical Application Data

- 1.0GHz-1.3GHz: $P_{sat} \geq 45.5\text{dBm}$
- 1.4GHz-1.7GHz: $P_{sat} \geq 45.6\text{dBm}$
- 2.7GHz-3.2GHz: $P_{sat} \geq 45.5\text{dBm}$
- 3.8GHz-4.2GHz: $P_{sat} \geq 45.5\text{dBm}$

Recommended Operating Conditions

Parameter	Value
Drain-Source Voltage (V_D)	28 V (TYP)
Quiescent Current (I_{DQ})	280 mA (TYP)
Gate-Source Voltage (V_G)	-2.85 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}), $T_A = 25^\circ\text{C}$	38 dBm

RF Characteristics, 3.8GHz-4.2GHz EVB

Note:

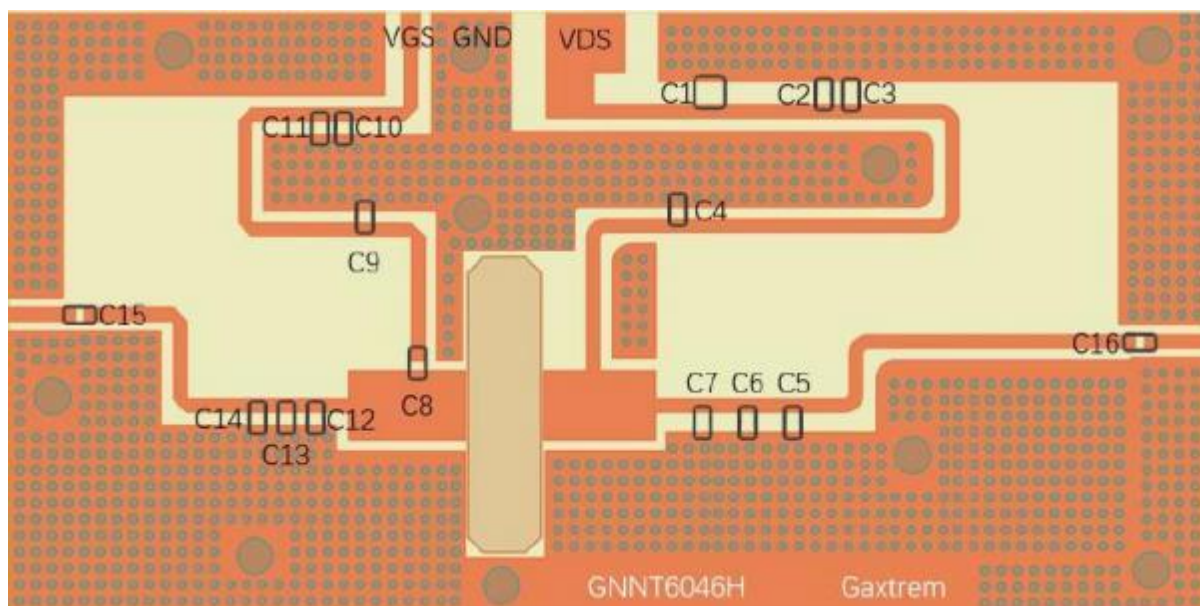
1. Test condition: $T_A = 25^\circ\text{C}$, $V_D = 28\text{ V}$, $I_{DQ} = 280\text{ mA}$, CW

Symbol	Parameter	Min	Typ	Max	Unit
G_{LIN}	Linear Gain	-	15	-	dB
P_{sat}	Output Power	-	36	-	W
DE_{sat}	Drain Efficiency	-	55	-	%
G_{sat}	Gain	-	12	-	dB

Thermal Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance	-	2.1	-	°C/W

EVB Layout, 1.0GHz -1.3GHz



Note:

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

EVB BOM List, 1.0GHz-1.3GHz

Ref.	Value	Qty	Manufacturer	Size
C1	10uF	1	Murata	1812
C11,C3	100nF	2	Murata	0805
C10,C2	1000pF	2	Murata	0805
C4,C9,C15,C16	30pF	4	ATC	600F
C12,14	1.6pF	2	ATC	600F
C13,C7	3.3pF	2	ATC	600F
C6	2.0pF	1	ATC	600F
C5	0.5pF	1	ATC	600F
C8	20 Ω	1		0805
	1000uF	1		Aluminum electrolytic capacitor

Test Data,1.0GHz-1.3GHz EVB

Test Condition: TA = 25 °C, V_D = 28 V, I_{DQ} = 280 mA , CW

Freq(MHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	I _D (A)	DE(%)
1.0	45.84	38.37	17.1	2.19	62.57%
1.1	45.75	37.58	18.0	2.31	58.11%
1.2	45.5	35.48	17.9	2.37	53.47%
1.3	45.8	38.02	18.2	2.27	59.82%

Test Data,1.4GHz-1.7GHz EVB

Test Condition: TA = 25 °C, V_D = 28 V, I_{DQ} = 280 mA , CW

Freq(MHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	I _D (A)	DE(%)
1.4	45.6	36.3	17.6	2.35	55.2%
1.5	45.8	38.0	18.4	2.31	58.8%
1.6	45.9	38.9	18.1	2.45	56.7%
1.7	45.8	38.0	18.4	2.66	51.1%

2.7GHz-3.2GHz EVB Test Data

Test Condition: TA = 25 °C, V_D = 28 V, I_{DQ} = 280 mA , CW

Freq(MHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	I _D (A)	DE(%)
2.7	46	39.81	12.5	2.46	57.80%
2.8	45.8	38.01	12.8	2.33	58.28%
2.9	45.56	35.97	12.4	2.28	56.35%
3.0	45.56	35.97	12	2.36	54.44%
3.1	45.5	35.48	11.8	2.53	50.09%
3.2	45.8	38.01	11.8	2.47	54.97%

Test Data, 3.8GHz-4.2GHz EVB

Test Condition: $T_A = 25\text{ }^{\circ}\text{C}$, $V_D = 28\text{ V}$, $I_{DQ} = 280\text{ mA}$, CW

Freq(MHz)	Psat(dBm)	Psat(W)	Power Gain(dB)	I_D (A)	DE(%)
3.8	45.5	35.48	12.1	2.25	56.32%
3.9	45.8	38.02	11.9	2.4	56.58%
4.0	45.6	36.31	12.6	2.33	55.65%
4.1	45.7	37.15	12.2	2.31	57.44%
4.2	46	39.81	12.3	2.19	64.92%

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

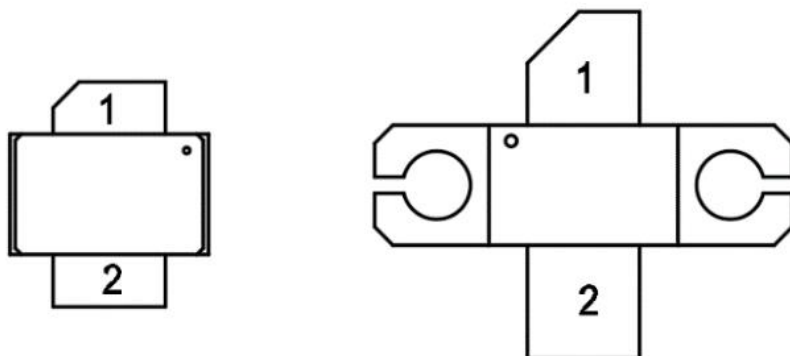
Solderability

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

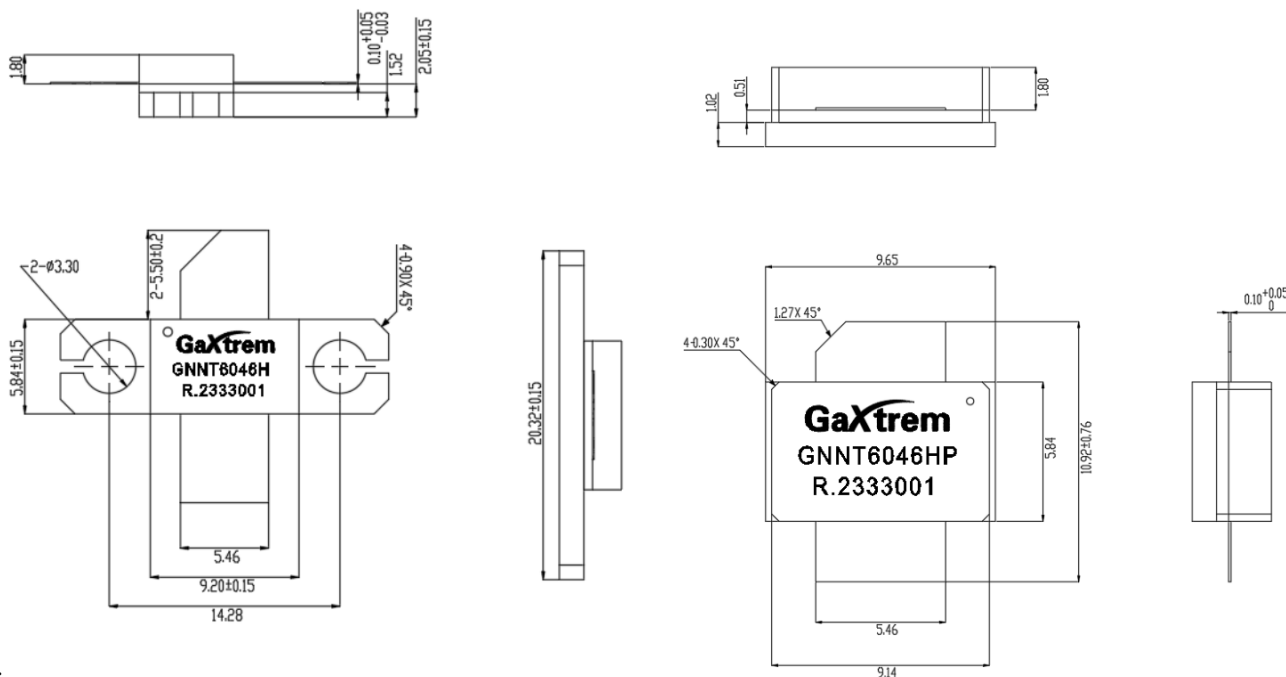
This part is compliant with 2015/863/ and EU 2011/65/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

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

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
2023/6/20	1.0	Preliminary Datasheet
2024/3/10	2.0	Update Test Data
2024/6/12	2.1	Update Test Data