HTN3D60S060HB

60W, 400 - 6000 MHz GaN Amplifier

Product Datasheet

Description

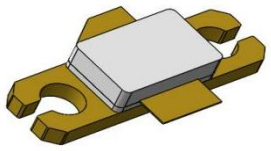
The HTN3D60S060HB is a discrete GaN Power Amplifier with 60W saturated output power covering frequency range from 0.4GHz to 6GHz.

Features

- Operating Frequency Range: 0.4 - 6GHz
- Operating Drain Voltage: +28V
- Saturation Output Power: 60W
- Excellent thermal stability due to low thermal resistance package
- Enhanced robustness design without device degradation

Applications

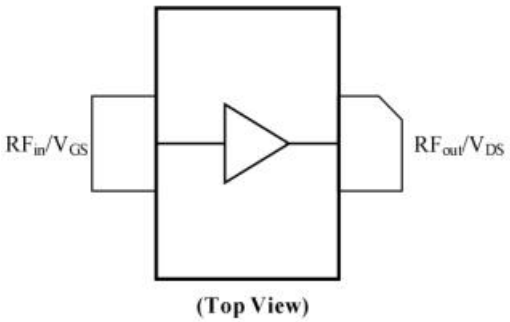
- Analog and Digital Broadcasting
- Meteorological and Aviation Radar
- Industrial Laser Sources and Plasma Equipment
- Various nuclear magnetic resonance instruments
- Particle accelerator



ACC0906B-2L

Flanged balanced
Air Cavity Ceramic Package;
2 Leads 2 Mounting Holes

HTN3D60S060HB



(Top View)

Note: Exposed backside of the package is the source terminal for the transistor

Pin Connections

Ordering Information

Part Number	Description
HTN3D60S060HB	Reel Package
HTN3D60S060HB EVB	5.7 - 5.9GHz EVB

Typical Performance

RF Characteristics (Pulsed CW)

Freq (MHz)	Gain (dB)	P1dB (dBm)	Eff (%)@P1dB	P3dB (dBm)	Eff(%)@P3dB
5700	14.2	48.6	60.5	49.4	64.9
5800	14.8	48.0	62.0	49.1	65.7
5900	14.7	47.3	61.4	48.6	65.6

Test conditions unless otherwise noted: 25 °C, VDD = +28Vdc, IDQ = 70mA Pulse Width = 100us, Duty Cycle = 10% test on WATECH Application Board

RF Characteristics (CW)

Freq (MHz)	Gain (dB)	P1dB (dBm)	Eff (%)@P1dB	P3dB (dBm)	Eff(%)@P3dB
5700	14.1	48.3	57.1	49.1	61.6
5800	14.6	47.7	58.2	48.9	62.9
5900	14.6	47.0	57.7	48.4	62.6

Test conditions unless otherwise noted: 25 °C, VDD = +28Vdc, IDQ = 70mA , CW test on WATECH Application Board

Absolute Maximum Ratings

Parameter	Range/Value	Unit
Drain voltage (VDSS)	0 to +84	V
Gate voltage (VGS)	-15 to 0	V
Storage Temperature (TSTG)	-55 to +150	°C
Junction Temperature (TJ)	+225	°C

Electrical Specification

DC Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Breakdown Voltage V(BR)DSS	Vgs=-10V, Vd=84V, Ids<16mA	84	-	-	V
Gate-Source Threshold Voltage VGS(th)	VDS=3V, Ids=16mA	-2.6	-1.8	-1.4	V
Drain Leakage Current IDSS	VDS=30V; VGS=-10V	-	-	8	mA
Gate Leakage Current IGSS	VDS=30V; VGS=-10V	-	-	8	mA

Load Mismatch Test

Condition	Test Result
VSWR=65:1, at all Phase Angles, V_{DD} = +28Vdc, I_{DQ}= 70mA, Pout = P3dB(60W), CW signal, Freq = 5800MHz, test on WATECH Application Board	Pass

Thermal Information

Symbol	Parameter	Condition	Value (Typ)	Units
Rth(s-c)(IR)	thermal resistance from active die surface to case by Infrared measurement	V_{DD} = +28Vdc, $I_{DQ_Carrier}$=0.26A, Measured under DC condition	3.8	℃/W

Load Pull Performance

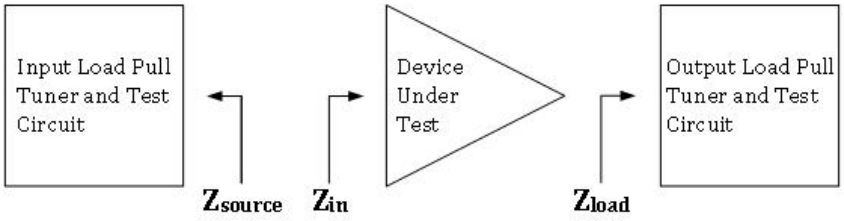
Test conditions unless otherwise noted: 25 °C, VDD = +28Vdc, IDQ= 70mA, Pulse Width = 40us, Duty Cycle = 4%

Max Output Power						
Freq (MHz)	Z_source (Ω)	Z_load [1] (Ω)	Gain (dB)	P3dB (dBm)	P3dB (W)	Eff (%)
5200	11.7 - j*21.0	4.8 - j*8.8	13.8	49.5	89.1	47.7
5400	9.5 - j*17.8	4.8 - j*9.7	13.4	49.4	87.1	48.4
5700	16.4 - j*24.2	6.5 - j*11.0	13.0	49.3	85.1	48.5
5900	25.2 - j*20.0	6.2 - j*11.6	13.1	49.3	85.1	48.7

[1] Load impedance for optimum P3dB pout

Max Drain Efficiency						
Freq (MHz)	Z_source (Ω)	Z_load [2] (Ω)	Gain (dB)	P3dB (dBm)	P3dB (W)	Eff (%)
5200	11.7 - j*21.0	2.5 - j*6.7	14.8	47.7	58.9	73.7
5400	9.5 - j*17.8	3.4 - j*7.5	15.2	48.4	69.2	70.6
5700	16.4 - j*24.2	3.8 - j*8.9	14.1	48.5	70.8	69.3
5900	25.2 - j*20.0	4.7 - j*9.9	14.5	48.7	74.1	68.9

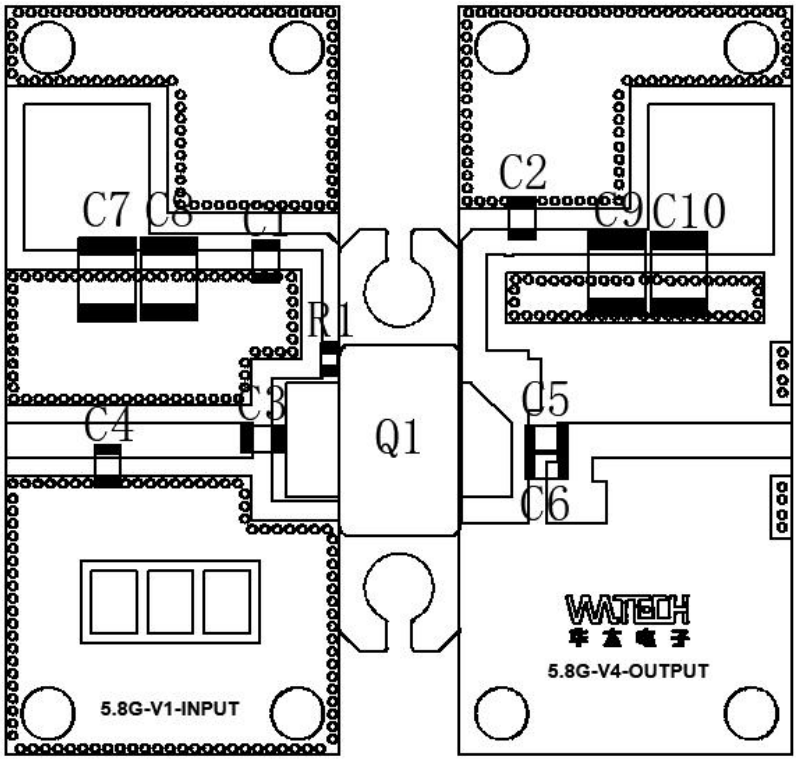
[2] Load impedance for optimum P3dB efficiency



Z_source : Measured impedance presented to the input of the device at the package reference plane

Z_load : Measured impedance presented to the output of the device at the package reference plane

HTN3D60S060HB 5.7 - 5.9GHz Reference Design



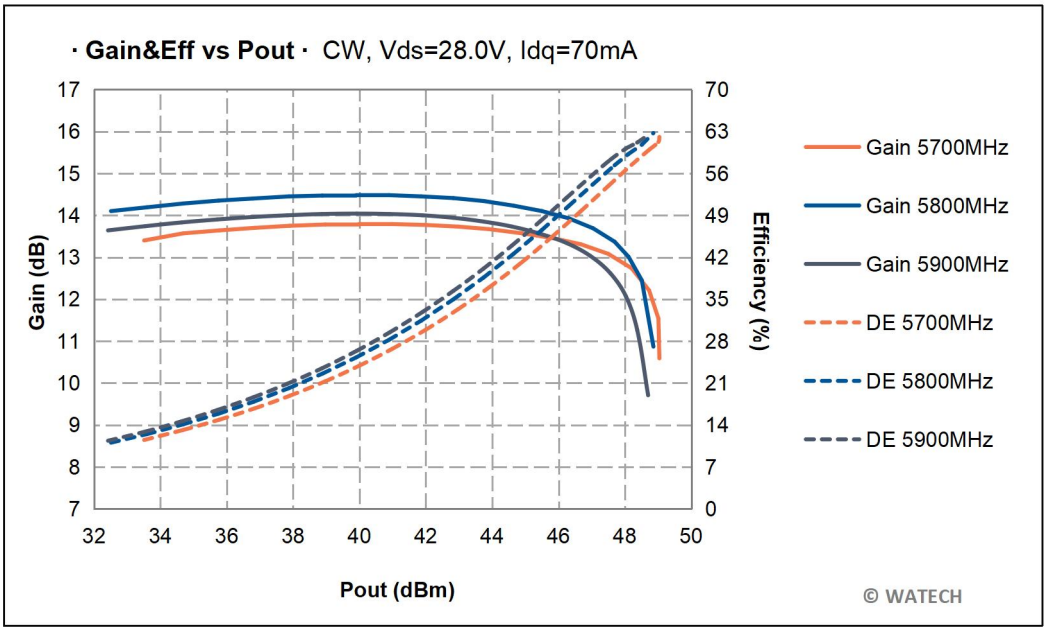
EVB Layout

Bill of Materials (BoM) - HTN3D60S060HB 5.7 - 5.9GHz Reference Design

Reference	Value	Description	Manufacturer	P/N
Q1	60W	0.4-6.0 GHz GaN PA	Watech	HTN3D60S060HB
C1/C2	3.0pF	0805 Chip Capacitor	Murata	GQM2195C2E3R0BB12D
C3	2.0pF	0805 Chip Capacitor	Murata	GQM2195C2E2R0BB12D
C4	0.6pF	0805 Chip Capacitor	Murata	GQM2195C2E0R6BB12D
C5	0.3pF	0805 Chip Capacitor	Johanson	251R15S0R3BV4S

C6	0.5pF	0805 Chip Capacitor	Johanson	251R15S0R5BV4S
C7/C8/C9/C10	10uF	1210 Chip Capacitor	Murata	GRM32ER61H106KA12L
R1	10 Ω	0603 Chip Resistor		
PCB	Rogers 4350B (er = 3.5), 30 mil, 35 µm (1oz)			

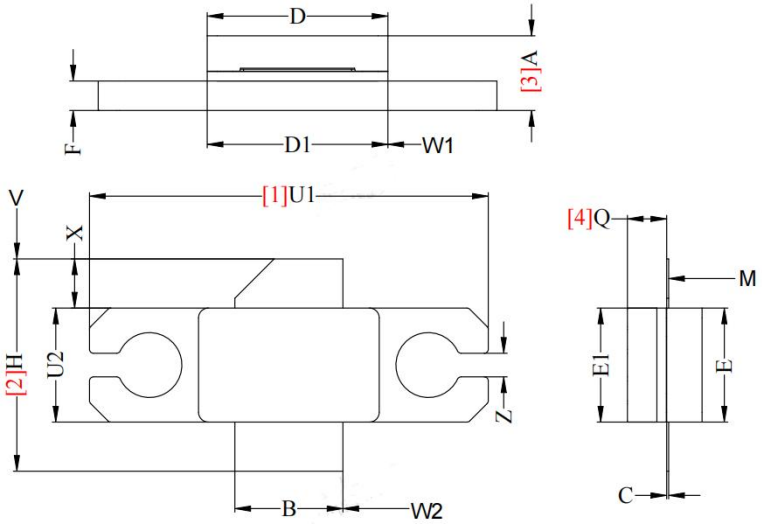
Performance Plots



CW, Gain and Efficiency vs Pout

Test conditions unless otherwise noted: 25 °C, VDD = +28Vdc, IDQ = 70mA , CW, test on WATECH Application Board

Package Marking and Dimensions



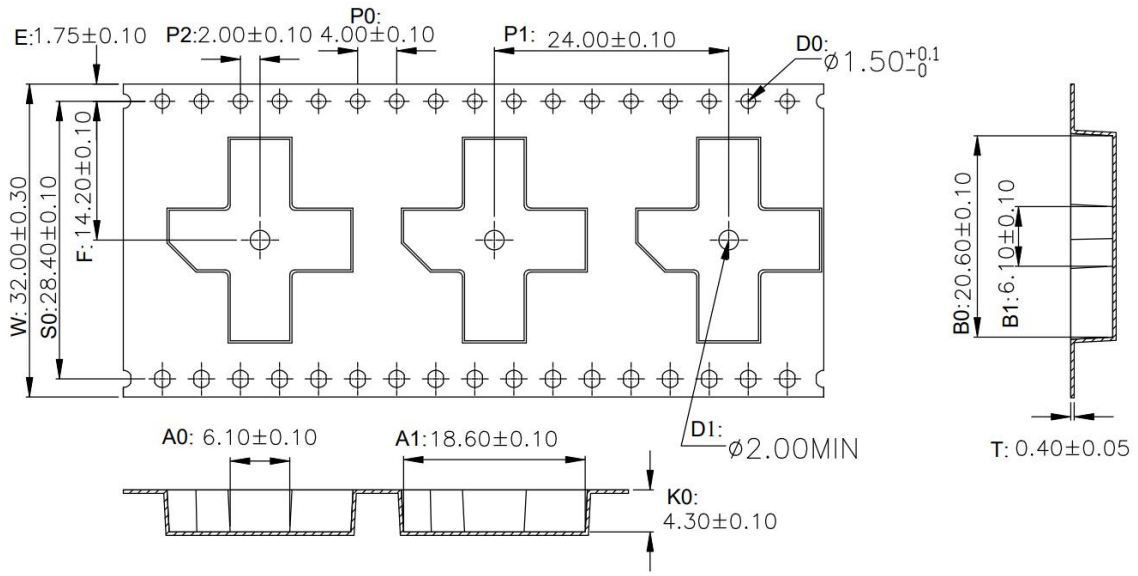
unit: mm

	A	B	C	D	D1	E	E1	F	H	Q	U1	U2	X	Z	V	W1	W2	M
max	4.300	5.600	0.150	9.200	9.330	5.800	5.930	1.600	11.300	2.230	20.330	5.930	2.600	1.320	0.500	0.500	0.500	0.100
nom	4.000	5.500	0.120	9.200	9.200	5.800	5.800	1.500	10.800	2.080	20.300	5.800	2.500	1.200	/	/	/	/
min	3.700	5.400	0.090	9.070	9.070	5.670	5.670	1.400	10.300	1.930	20.170	5.670	2.400	1.080	/	/	/	/

Package Dimensions

Tape and Reel Information

Package Type	Reel Size(inch)	Qty/Reel(pcs)	Qty/Box(pcs)	Qty/Carton(pcs)
ACC0906B-2L	13	500	500	1000



Tape & Reel Packaging Descriptions

Handling Precautions

Parameter	Grade
Moisture Sensitivity Level MSL	3

Parameter	Rating	Standard	
ESD – Human Body Model (HBM)	1C	JESD22-A114	
ESD – Charged Device Model (CDM)	C3	JESD22-C101	

RoHS Compliance

This product is compliant with the 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment), as amended by Directive 2015/863/EU.

Datasheet Status

Document status	Product status	Definition
Objective Datasheet	Design simulation	Product objective specification
Preliminary Datasheet	Customer sample	Engineering samples and first test results
Product Datasheet	Mass production	Final product specification

Abbreviations

Acronym	Definition
GAN	Gallium Nitride
CW	Continuous Waveform
RoHS	Restriction of Hazardous Substances
VSWR	Voltage Standing Wave Ratio

Revision history

Document ID	Datasheet Status	Release Date	Revision Version
Rev 0.1	Preliminary	May. 2025	Preliminary
Rev 1.0	Product	Jun. 2025	Product
Rev 1.1	Product	Jul. 2025	Update Performance Plots
Rev 1.2	Product	Jan. 2026	Update Thermal information

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations and information about WATECH:

- Web: www.watechelectronics.com
- Email: MKT@huatai-elec.com

For technical questions and application information:

- Email: MKT@huatai-elec.com

Important Notice

Information in this document is believed to be accurate and reliable. However, WATECH does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

“Typical” parameters are the average values expected by WATECH in large quantities and are provided for information purposes only. All information and specifications contained herein are subject to change without notice and customers should obtain and verify the latest relevant information before placing orders for WATECH products.

The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information.

Applications that are described herein for any of these products are for illustrative purposes only. WATECH makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification. Customers are responsible for the design and operation of their applications and products using WATECH products, and WATECH accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the WATECH product is suitable and fit for the customer’s applications and products planned, as well as for the planned application and use of customer’s third-party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

WATECH products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety- critical systems or equipment, nor in applications where failure or malfunction of a WATECH product can reasonably be expected to result in personal injury, death or severe property or environmental damage.This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.