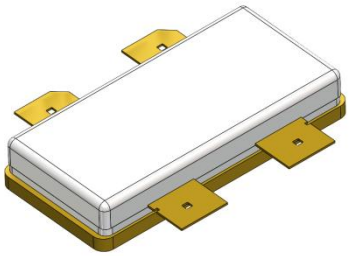
HTH2D25P300H

300W, 2.4 - 2.5 GHz GaN Amplifier

Product datasheet

Description

The HTH2D25P300H is an internally Input/Output pre-matched discrete GaN on SiC HEMT Power Amplifier with 300W saturated output power covering frequency range from 2.4 to 2.5 GHz.

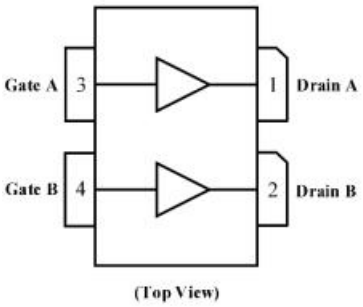


ACC2110S-4L

Earless Flanged Balanced

Air Cavity Ceramic Package; 4 Leads

HTH2D25P300H



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

Pin Connections

Features

- Operating Frequency Range: 2.4 - 2.5 GHz
- Operating Drain Voltage: 48V
- Saturation Output Power: 300W
- Excellent thermal stability due to low thermal resistance package
- Enhanced robustness design without device degradation
- Internally integrated enhanced ESD design

Applications

- RF Industrial Heating and Drying
- Solid-state Commercial and Industrial Cooking
- Plasma Lighting
- Semiconductor Equipment
- Automotive Ignition
- Medical & Scientific Sciences

Ordering Information

Part Number	Description
HTH2D25P300H	Tray Package
HTH2D25P300H EVB	2.4-2.5 GHz EVB

Typical Performance

RF Characteristics (Pulsed-CW)

Freq (MHz)	P3dB (dBm)	P3dB (W)	Gain (dB)	Eff(%)@P3dB
2400	56.0	398	19.8	74.6
2450	55.4	347	19.0	74.9
2500	54.8	302	18.2	74.3

Test conditions unless otherwise noted: 25 °C, VDD = +48Vdc, IDQ =100mA, PW = 100us, Duty Cycle= 10%, tested on WATECH Application Board

RF Characteristics (CW)

Freq (MHz)	P3dB (dBm)	P3dB (W)	Gain (dB)	Eff(%)@P3dB
2400	55.6	363	19.1	72.1
2450	55.1	324	18.8	72.3
2500	54.9	309	17.3	71.5

Test conditions unless otherwise noted: 25 °C, VDD = +48Vdc, IDQ =100mA, CW, tested on WATECH Application Board

Absolute Maximum Ratings

Parameter	Range/Value	Unit
Drain voltage (V_{DSS})	0 to 130	V
Gate voltage (V_{GS})	-10 to 2	V
Storage Temperature (T_{STG})	-55 to 150	°C
Junction Temperature (T_J)	225	°C

Electrical Specification

DC Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Breakdown Voltage $V_{(BR)DSS}$	Vgs= -10V,Ids=48mA	130	-	-	V
Gate-Source Threshold Voltage $V_{GS(th)}$	Vds=10V, Ids=48mA	-	-2.6	-	V
Drain Leakage Current I_{DSS}	Vgs= -10V, Vds=50V	-	-	19.2	mA
Gate Leakage Current I_{GSS}	Vgs=-10V, Vds=0V	-	-	4.8	mA

Load Mismatch Test

Condition	Test Result
VSWR=10:1 at all Phase Angles, V_{DD} = +48Vdc, I_{DQ}=100mA, P_{AVG} = 300W, PW = 100us, Duty Cycle=10% , freq@2450 MHz	No Device Degradation

Thermal Information

Parameter	Condition	Value (Typ)	Unit
Thermal Resistance Junction to Case (R_{TH})	Tj= 97°C, measured under DC condition	0.38	°C /W

Load Pull Performance

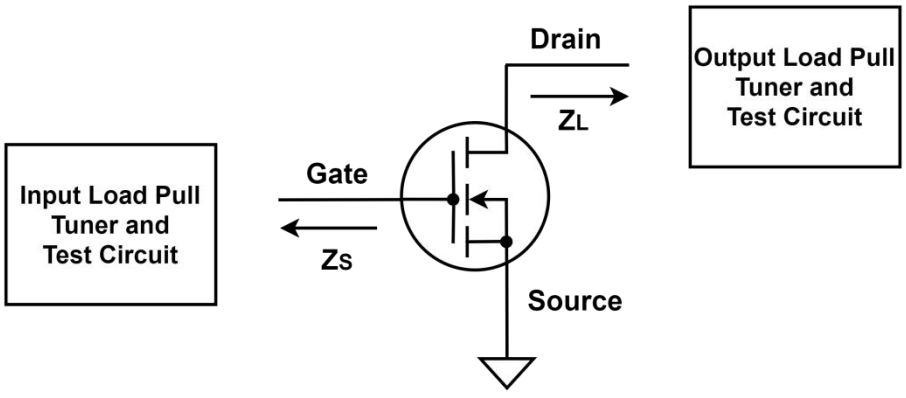
Test conditions unless otherwise noted: 25 °C, VDD = +48Vdc, IDQ= 100mA, PW = 100us, Duty Cycle= 10%

Max Output Power						
Freq (MHz)	Z_source (Ω)	Z_load [1] (Ω)	Gain (dB)	P3dB (dBm)	P3dB (W)	Eff (%)
2400	4.48+j*2.50	7.03-j*4.10	18.90	57.02	503.50	64.74
2500	2.10+j*1.86	7.70-j*3.59	19.10	56.96	496.59	67.02

[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 (%)
2400	4.48+j*2.50	2.70-j*3.80	20.31	55.20	331.13	75.58
2500	2.10+j*1.86	2.96-j*5.10	20.55	54.76	299.23	75.15

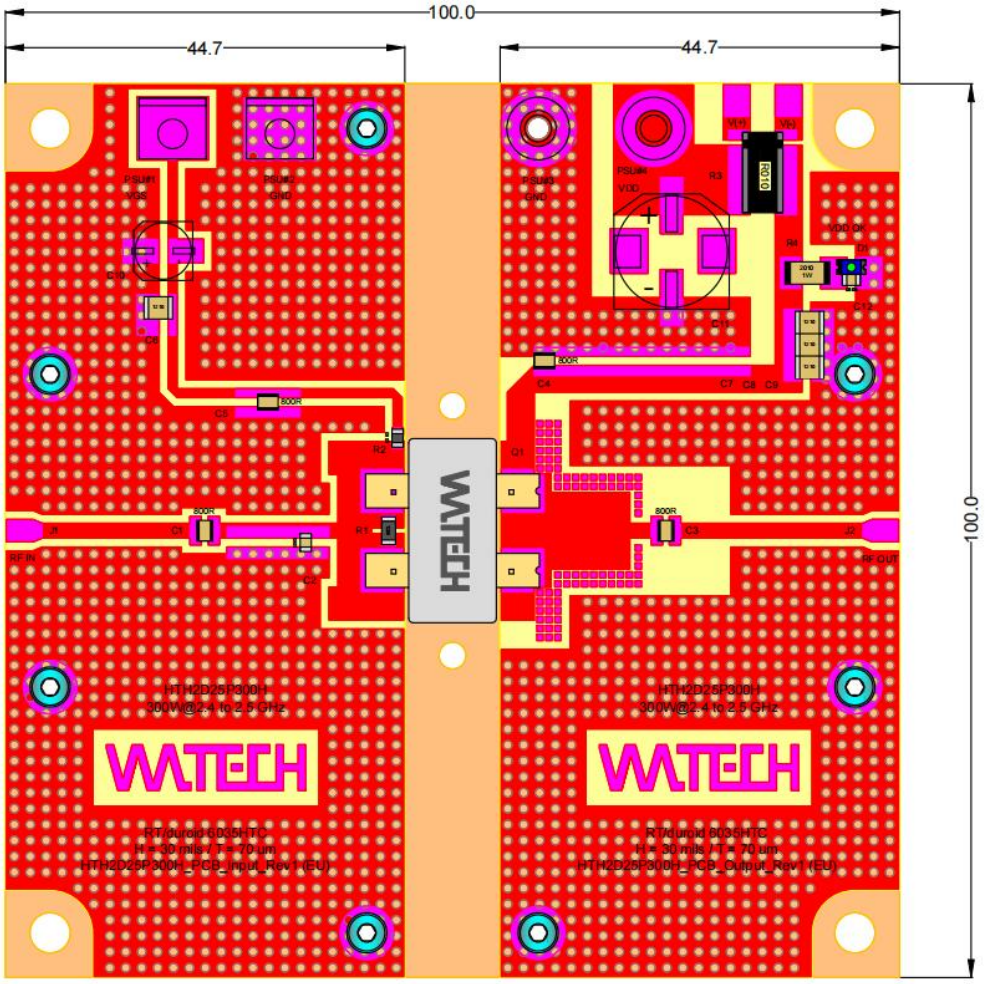
[2] Load impedance for optimum P3dB efficiency



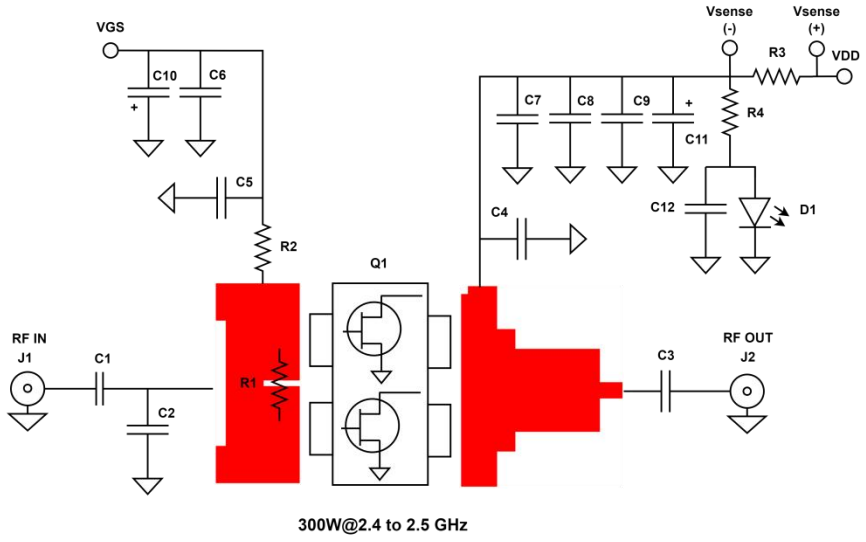
Z_source : Measured impedance presented to the input of the device at the package reference plane

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

HTH2D25P300H 2.4-2.5GHz Reference Design



EVB Layout HTH2D25P300H @2.4-2.5GHz Reference Design

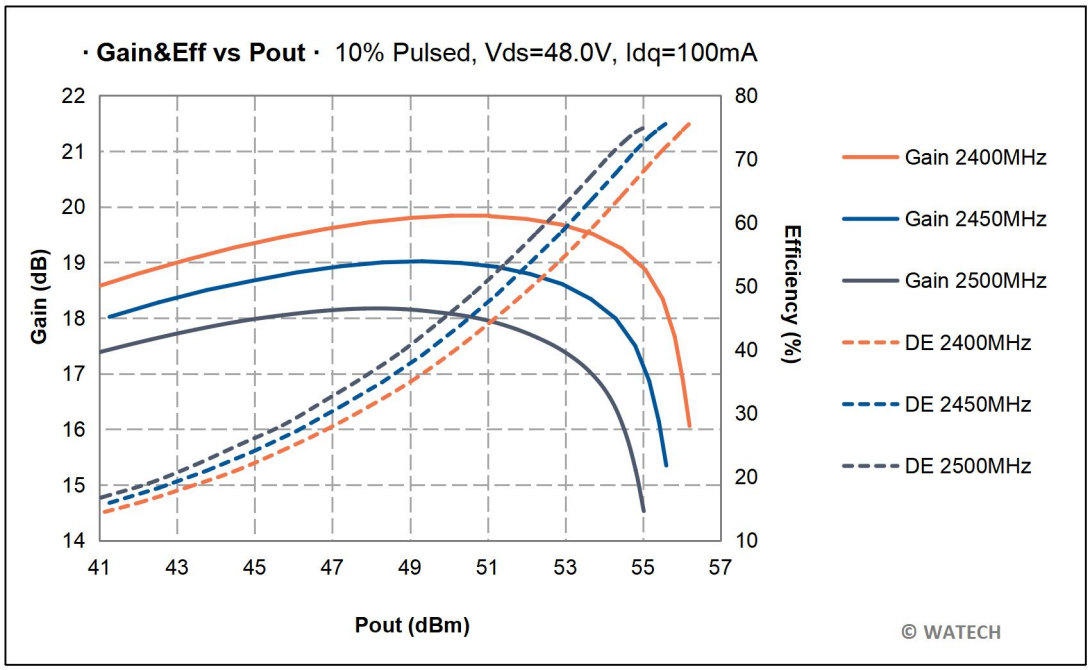


Schematic HTH2D25P300H @2.4-2.5GHz Reference Design

Bill of Materials (BoM) - HTH2D25P300H 2.4-2.5GHz Reference Design

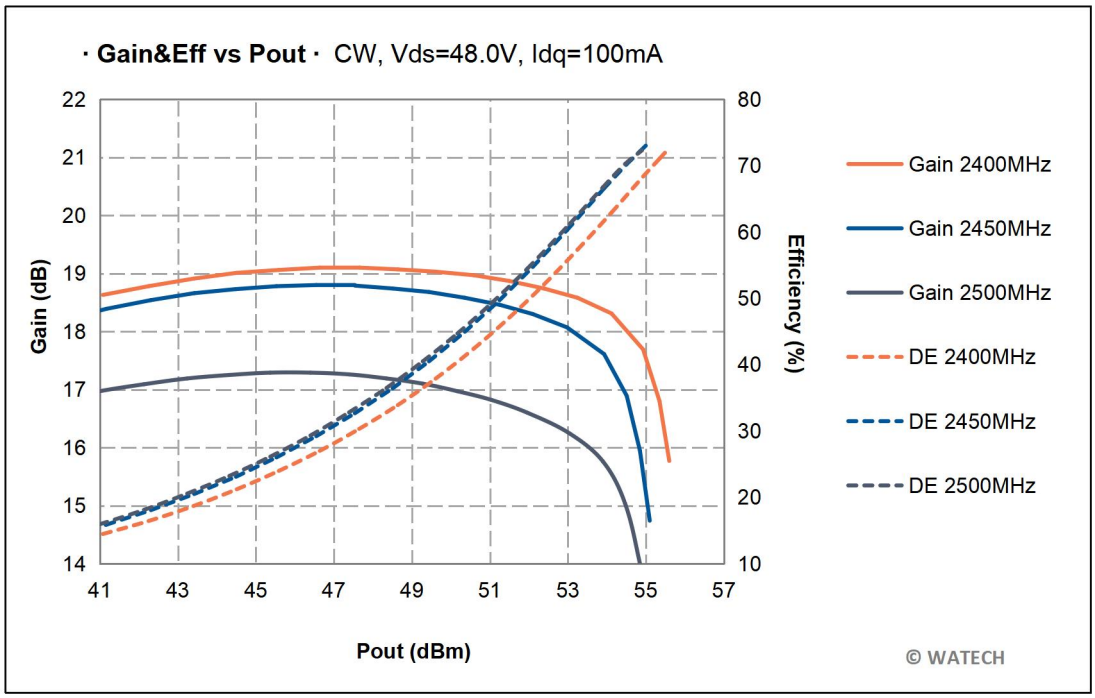
Reference	Value	Description	Manufacturer	P/N
Q1	-	300W, 2400 - 2500 MHz GaN on SiC Amplifier	WATECH	HTH2D25P300H
C1, C3, C4, C5	20pF/500VDC	MLCC	Beijing YuanLu	MQ101111M7G3A200JNMB
C2	2p2F/250VDC	GRM21A5C2E2R2FW01	Murata	GRM21A5C2E2R2FW01
C6, C8,C9	10uF/100VDC/1210	MLCC	Murata GRM	GRM32EC72A106KE05L
C7	390pF/500VDC/1210	MLCC	Beijing YuanLu	MQ101111M7G3A391JNMB
C11	22uF/35VDC	Aluminium Electrolytic Capacitor SMD	Nichicon	UWT1V220MCL1GB
C12	470uF/100VDC	Aluminium Electrolytic Capacitor SMD	Vishay	MAL215099913E3
R1	5.6Ω/1206	Thick Film Resistor	KOA	RK73B2BTTD5R6J
R2	12Ω/0805	Thick Film Resistor	KOA	RK73B2ATTDD120J
Diode Circuit				
D1	1206 w/LENS GREEN 570nm	Standard LED - SMD	Dialight	599-0460-127F
R4	1K3Ω/1%/1206	Thick Film Resistor	Vishay	CRCW12061K30FKEAHP
C12	1nF/250VDC/0805	MLCC	TDK	C2012X7R2E102M085AE
Connectors and PCB				
PSU#1, PSU#2	n/a	Terminals .250 FAST TAB	TE Connectivity	42117-2
PSU#3, PSU#4	n/a	Terminals WPSMBU SMT Bush Type A M3 Thread	Wurth Elektronik	7466003
J1, J2	n/a	N-type Panel Connector (F)	Amphenol	172228
PCB	RT/Duroid 6035HTC (er = 3.5 ± 0.05), 30 mil (0.762 mm), 70 µm (2oz)			

Performance Plots



Pulsed CW, Gain & Eff vs Pout

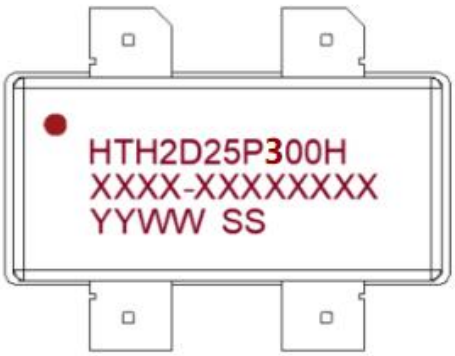
Test conditions unless otherwise noted: 25 °C , VDD = +48Vdc, IDQ = 100 mA, PW = 100us, Duty Cycle= 10%, tested on WATECH Application Board



CW, Gain & Eff vs Pout

Test conditions unless otherwise noted: 25 °C , VDD = +48Vdc, IDQ = 100 mA, CW, tested on WATECH Application Board

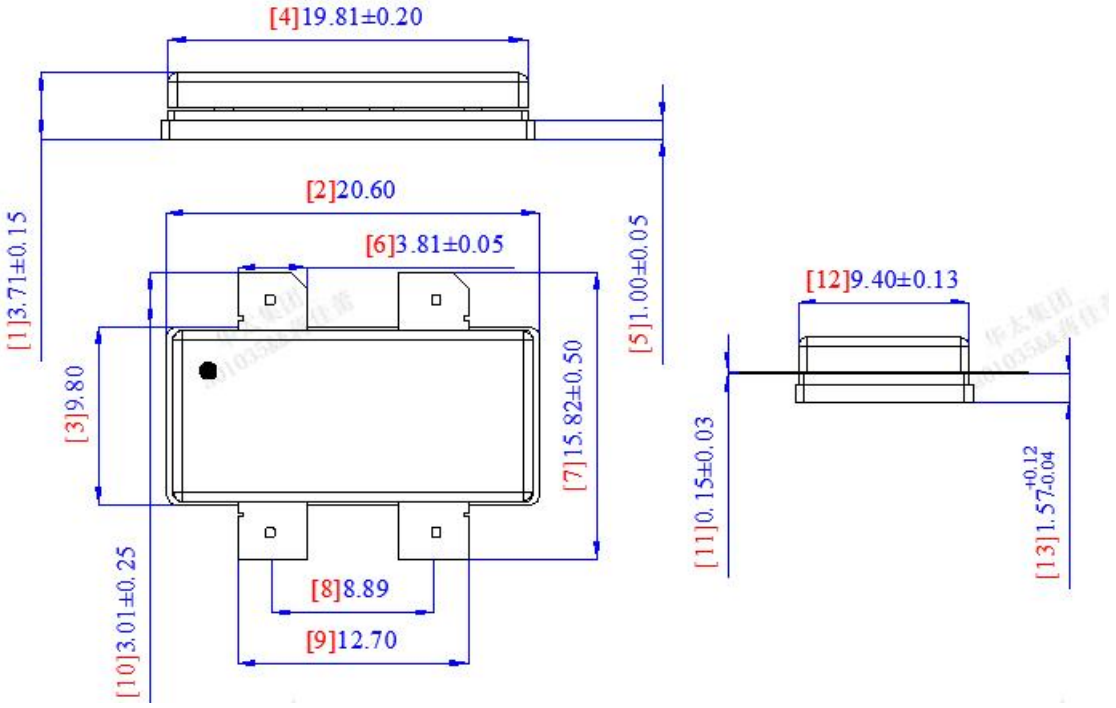
Package Marking and Dimensions



- Line1 (fixed): Device name in work order
- Line2 (unfixed): Mark Lot number in work order (Sample: E596-EERA0001)
- Line3 (unfixed): Date Code + "SS"(The last two digits of sub lot Number)

This Marking SPEC only stipulates the content of Marking. For marking requirements such as font and size, please refer to the latest version of "Watech Product Printing Specification"

Marking



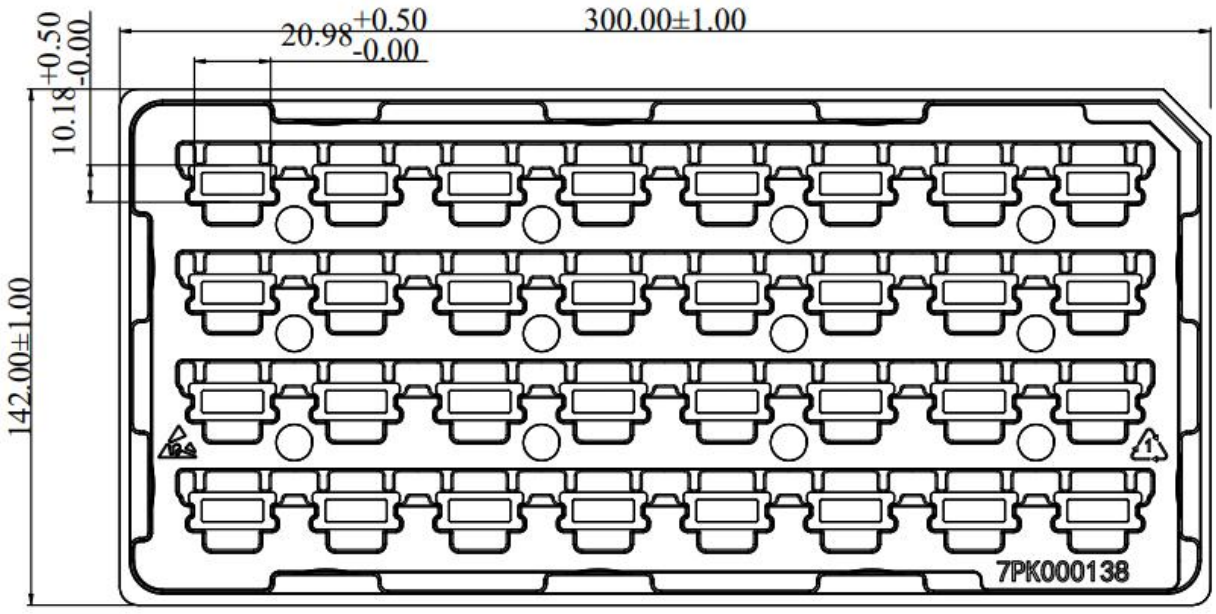
Package Dimensions

ACC2110S-4L Earless Flanged Balanced Air Cavity Ceramic Package; 4 leads

Packing Information

HTH2D25P300H:

Package Type	Qty/Tray(pcs)	Qty/Box(pcs)	Qty/Carton(pcs)
ACC2110S-4L	32	160	960



Packaging Descriptions

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1B	JESD22-A114
ESD – Human Body Model (MM)	Class A	EIA/JESD22-A115
ESD – Charged Device Model (CDM)	Class III	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

Revision history

Document ID	Datasheet Status	Release Date	Revision Version
Rev 1.0	Product	Jun.2024	Product version datasheet
Rev 1.1	Product	Jun.2024	Update CW test plot
Rev 1.2	Product	Jun.2024	New product version datasheet

Contact Information

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

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