

### Description

The HTE9G04P2K0H(B) is high ruggedness device designed for use in high VSWR ISM, Broadcast and Mobile Radio applications. It's unmatched Input/Output design supports frequency use from 1 to 400 MHz

### Features

- Operating Frequency Range: 1 -400 MHz
- Operating Drain Voltage: 65V
- Saturation Output Power: 2000W
- Excellent thermal stability due to low thermal resistance package
- Enhanced robustness design without device degradation
- Internally integrated enhanced ESD design
- High Breakdown voltage

### Applications

- Industrial Scientific Medical (ISM)
  - Laser generation
  - Plasma generation
  - Particle accelerators
  - MRI, RF ablation and skin treatment
  - Industrial heating, welding and drying systems

### Ordering Information

Part Number	Description
HTE9G04P2K0H(B)	Tray Package
HTE9G04P2K0H(B) EVB	13.56MHz EVB



**ACC3210S-4L** 

Earless Flanged Balanced  
Air Cavity Ceramic Package; 4 Leads

**HTE9G04P2K0H**



**ACC3210B-4L** 

Flanged balanced  
Air Cavity Ceramic Package; 4 Leads,  
2 Mounting holes

**HTE9G04P2K0HB**



(Top View)

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

**Pin Connections**

### Typical Performance

#### RF Characteristics (Pulsed-CW)

Freq(MHz)	Vdd (V)	Gain (dB)	Pout(dBm)	Pout(W)	Eff (%)
13.56	55	29.53	62.55	1800	82
60	65	29.23	63.23	2100	85
123-133	62	29.30	62.84	1900	68
128	65	27.30	63.05	2000	78
170	65	29.11	61.76	1500	81

Test conditions unless otherwise noted: 25 °C (Indirect water cooling), IDQ= 100mA, PW = 100us, Duty Cycle = 10% test on WATECH Application Board

#### RF Characteristics (CW)

Freq(MHz)	Vdd (V)	Gain (dB)	Pout(dBm)	Pout(W)	Eff (%)
13.56	55	29.68	62.33	1700	79
60	65	30.10	62.84	1900	83
170	65	29.40	61.51	1400	78

Test conditions unless otherwise noted: 25 °C (Indirect water cooling), IDQ= 100mA, PW = 1ms, test on WATECH Application Board

### Absolute Maximum Ratings

Parameter	Range/Value	Unit
Drain voltage (V <sub>DSS</sub> )	-0.5 to +190	V
Gate voltage (V <sub>GS</sub> )	-5 to +10	V
Storage Temperature (T <sub>STG</sub> )	-55 to +150	°C
Junction Temperature (T <sub>J</sub> )	+225	°C

### Electrical Specification

#### DC Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Breakdown Voltage V <sub>(BR)DSS</sub>	V <sub>gs</sub> =0V, I <sub>ds</sub> =619.2uA	203	208	-	V
Gate-Source Threshold Voltage V <sub>GS(th)</sub>	V <sub>gs</sub> =V <sub>ds</sub> , I <sub>ds</sub> =619.2uA	2.3	2.8	3.1	V
Drain Leakage Current I <sub>DSS</sub>	V <sub>gs</sub> =0V, V <sub>ds</sub> =65V	-	0.4	-	uA
Gate Leakage Current I <sub>GSS</sub>	V <sub>gs</sub> =5V, V <sub>ds</sub> =0V	-	0.4	-	uA

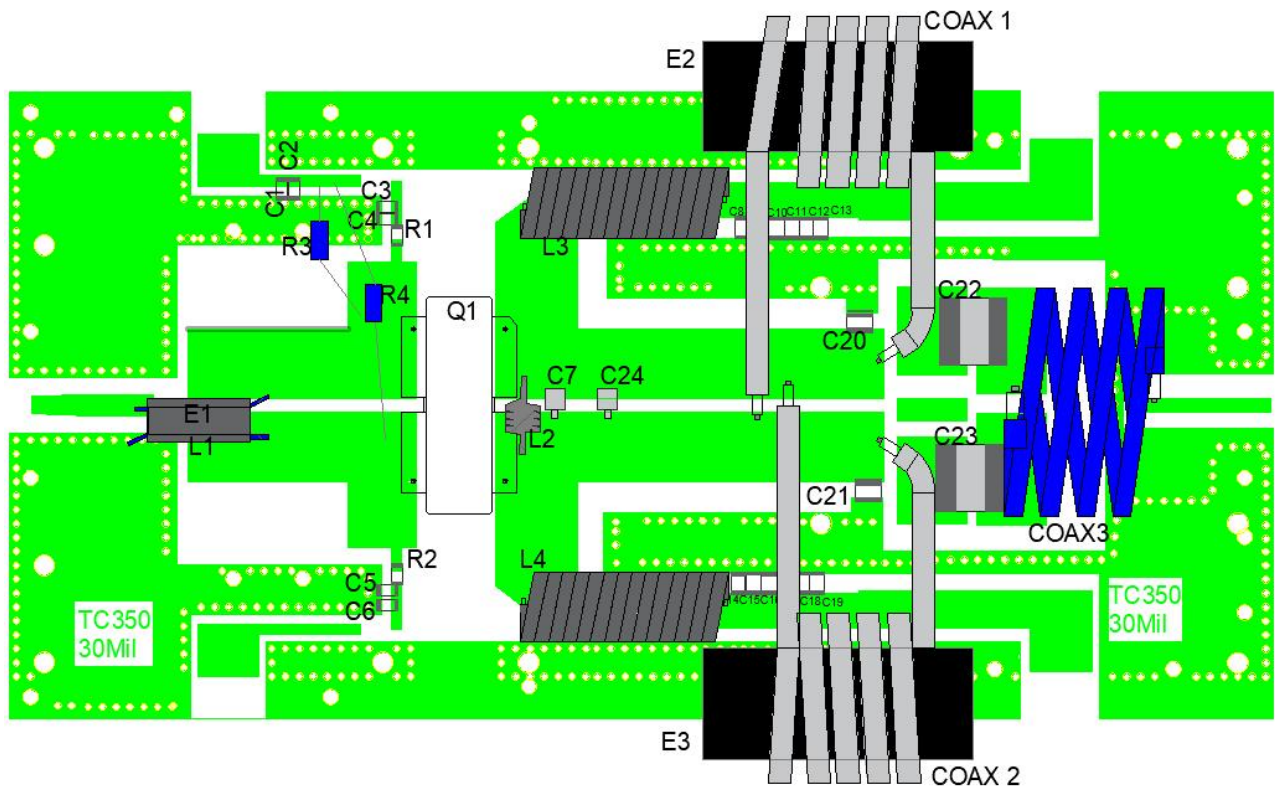
### Load Mismatch Test

Condition	Test Result
VSWR=65:1; $V_{DS} = 65\text{ V}$ ; $I_{DQ} = 100\text{ mA}$ per section; $P_L = 2000\text{ W}$ pulsed; $t_p = 100\text{ }\mu\text{s}$ ; $\delta = 10\%$ ; Frequency=60MHz test on WATECH Application Board	No Device Degradation

### Thermal Information

Parameter	Condition	Value (Typ)	Unit
Thermal Resistance Junction to Case ( $R_{TH}$ )	$T_j = 95^\circ\text{C}$ , $V_{DD} = 65\text{V}$ , $I_{DQ} = 6.75\text{A}$ , measured under DC condition	0.123	$^\circ\text{C}/\text{W}$

### HTE9G04P2K0H(B) 13.56MHz Reference Design



EVB Layout

### Bill of Materials (BoM) - HTE9G04P2K0H(B) 13.56 MHz Reference Design

Reference	Value	Description	Manufacturer	P/N
Q1		LDMOS transistor	WATECH	HTE9G04P2K0H(B)
C1 C4 C5 C9 C10 C15 C16	10 nF	1210 Chip Capacitor	Murata	GRM31CR71H103KA12L
C2 C3 C6 C12	10 $\mu\text{F}$	1210 Chip Capacitor	Murata	GRM31CR71H106KA12L



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Product datasheet

C13 C18 C19				
C7 C24	150pF	1210 Chip Capacitor	CDE	MIN02-002EC151J-F
C8 C14	220pF	1111 Chip Capacitor	Beijing YuanLu Hong Yuan Electronic Tech nology Co.,LTD	MQ101111M7G3A221JNMB
C11 C17	2.2μF	2525 Chip Capacitor	Murata	GRM31CR71H225KA12L
C20 C21	1nF	2525 Chip Capacitor	Beijing YuanLu Hong Yuan Electronic Tech nology Co.,LTD	MQ102525M7G3D102JNLC
C22 C23	5.1nF	3838 Chip Capacitor	Beijing YuanLu Hong Yuan Electronic Tech nology Co.,LTD	MQ103838M7G2H512KNNC
L1	2 turns	Air Inductor	0.8mm copper wire	
L2	3 turns,d = 10 mm	Air Inductor	2mm copper wire	
L3 L4	10 turns,d =10 mm	Air Inductor	2mm copper wire	
E1	#43	Multi-Aperture Core	Fair-Rite	
E2 E3	28.6*26*12.7		Beijing Seven Star Fight Electronic Technology Co.,LTD	
COAX1 COAX2	16.7Ohm SR Coax, 5turns 650mm	9:1	-	
COAX3	50Ohm SR Coax, 4turns 500mm	2:1	-	
R1 R2	51Ω	1206 Chip Resistor	KOA	
R3 R4	1KOhm, WireResistors	-	-	
PCB	20mil Thickness			Rogers4350B

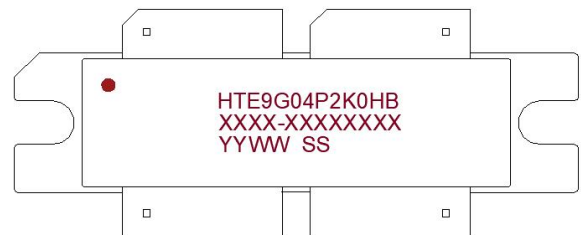
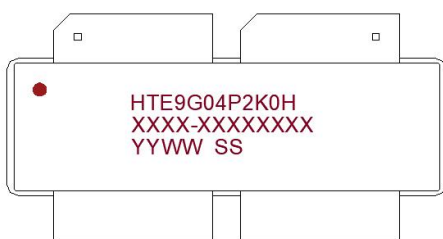
### Performance Plots



**CW, Gain and Efficiency vs Pout**

Test conditions unless otherwise noted: 25 °C, VDD = +55Vdc, IDQ= 100mA CW test on WATECH Application Board

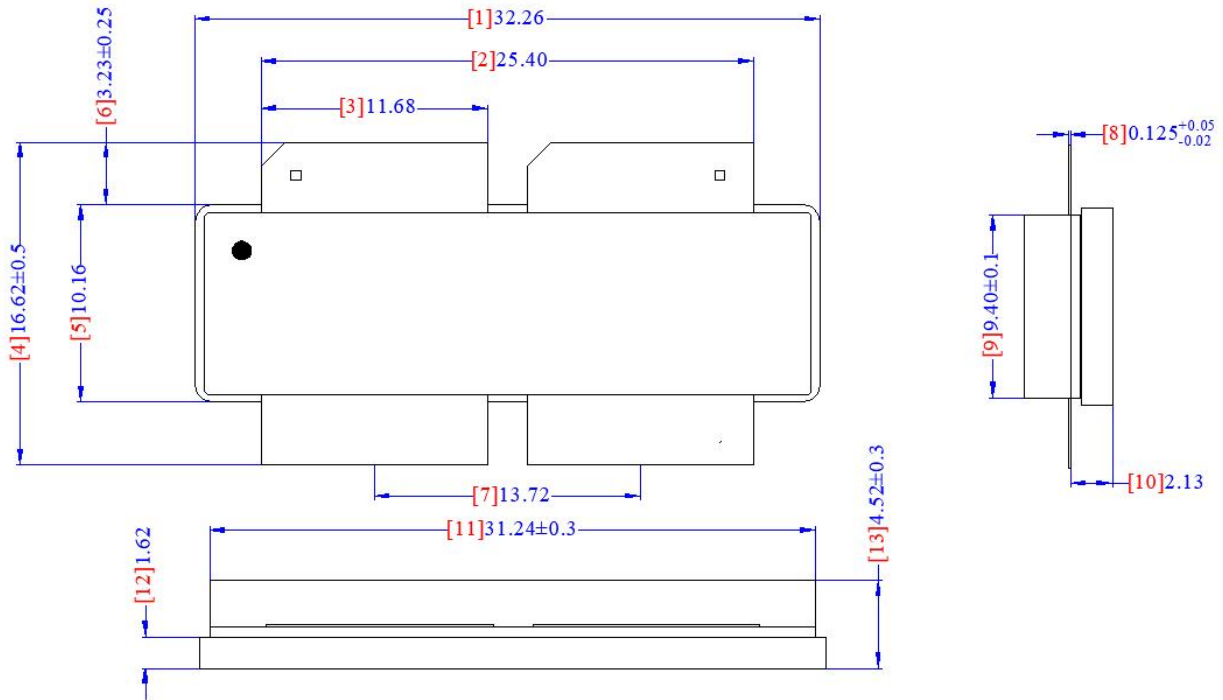
### Package Marking and Dimensions



- Line1 (fixed): Device name in work order
- Line2 (unfixed): Mark Lot number in work order (Sample: E596-20140001)
- Line3 (unfixed): Date Code + "SS"(The last two digits of sub lot Number)

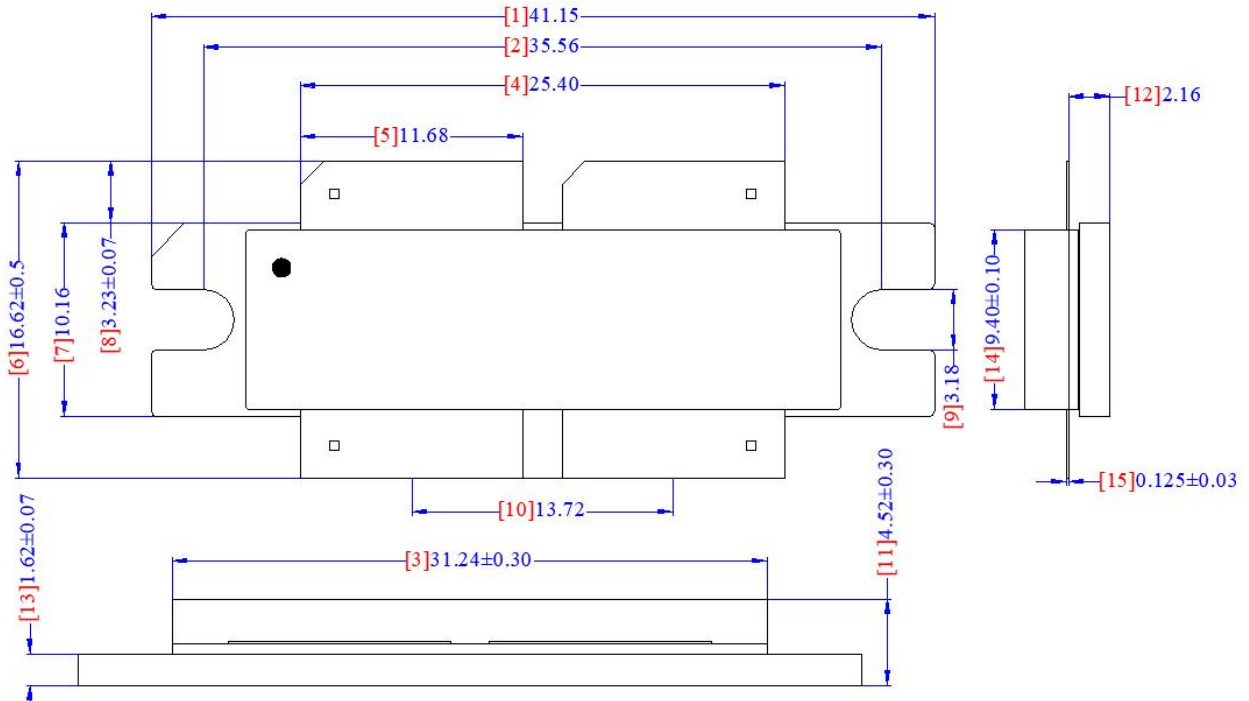
This Marking SPEC only stipulates the content of Marking. For marking requirements such as font and size, please refer to the latest version of "Watech Product Printing Specification"

#### Marking



Remark: 1.Unit: mm; 2.Unlabeled tolerance is ±0.13mm.

**ACC3210S-4L; Earless Flanged Balanced Air Cavity Ceramic Package; 4 Leads**



Remark: 1.Unit: mm; 2.Unlabeled tolerance is ±0.13mm.

**ACC3210B-4L; Flanged Balanced Air Cavity Ceramic Package; 2 Mounting holes, 4 Leads**

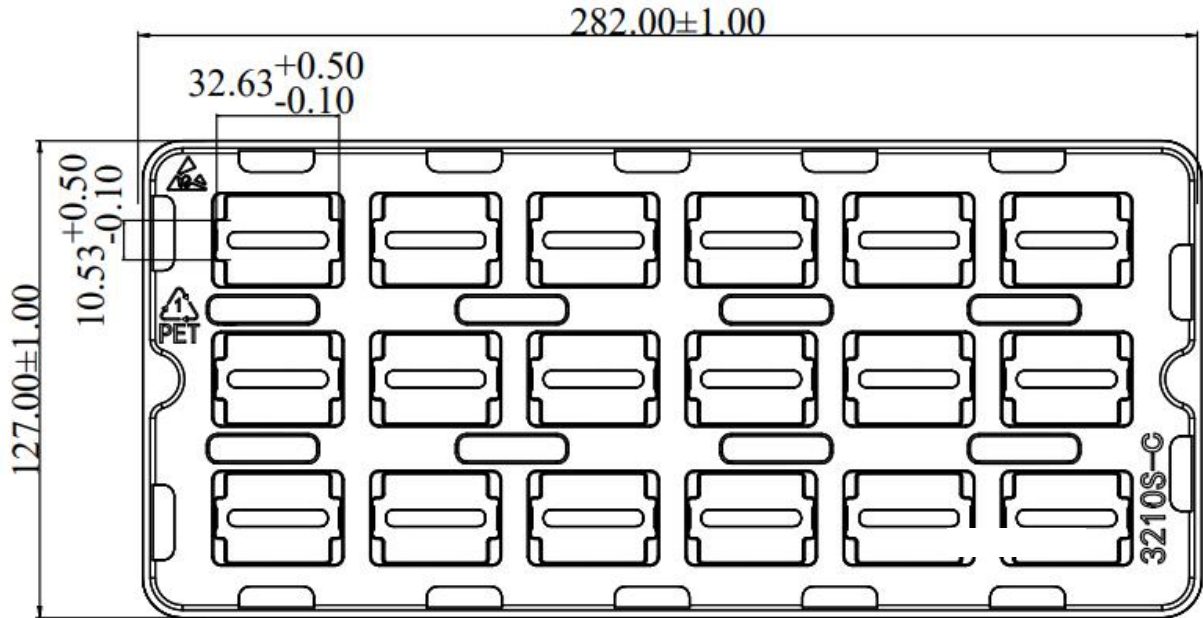
**Package Dimensions**



**Packaging Information**

**HTE9G04P2K0H:**

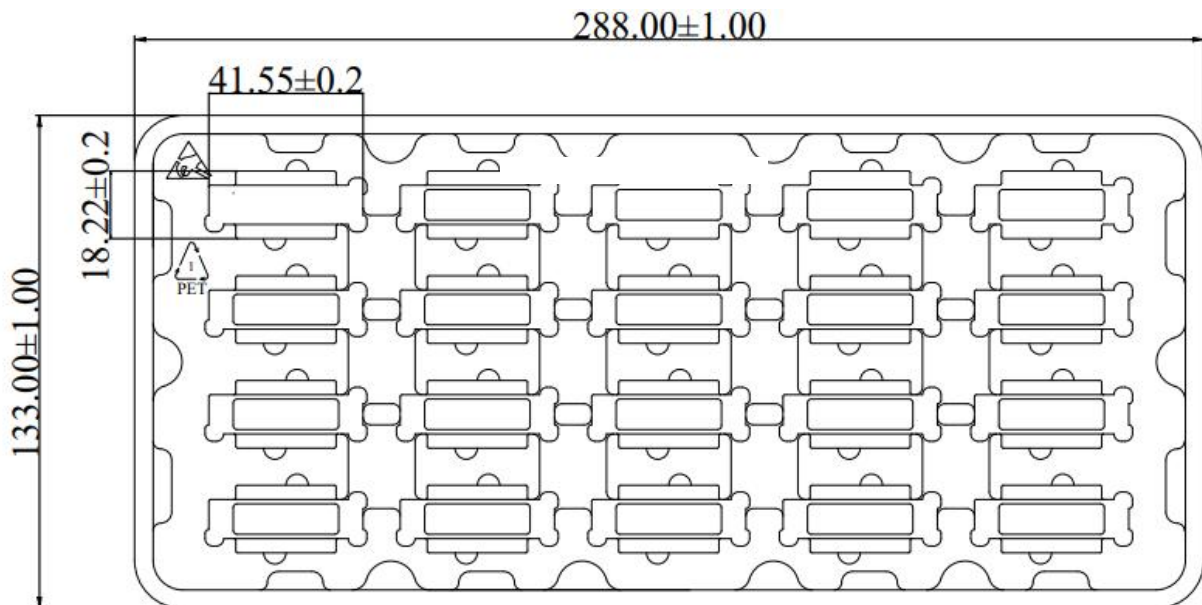
Package Type	Qty/Tray(pcs)	Qty/Box(pcs)	Qty/Carton(pcs)
ACC3210S-4L	18	90	540



Packaging Descriptions


**HTE9G04P2K0HB:**

Package Type	Qty/Tray(pcs)	Qty/Box(pcs)	Qty/Carton(pcs)
ACC3210B-4L	20	100	600



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
LDMOS	Laterally-Diffused Metal-Oxide Semiconductor
CW	Continuous Waveform
VSWR	Voltage Standing Wave Ratio

### Revision history

Document ID	Datasheet Status	Release Date	Revision Version
Rev 0.1	Objective	Oct. 2023	Objective
Rev 1.0	Preliminary	Jan.2024	Preliminary
Rev 1.1	Preliminary	Apr.2024	Update TBD information
Rev 2.0	Product	Jun.2024	Product Version





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Product datasheet

## Contact Information

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

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