

Description

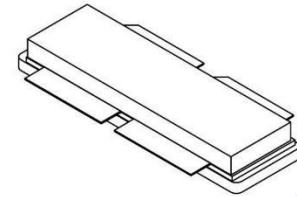
The HTH9G07P1K0H(B) is a 1000W LDMOS RF power transistor for asymmetrical broadcast Doherty transmitter applications which operates at 180 W DVB-T average power. The excellent ruggedness of this device makes it ideal for digital and analog transmitter applications in the frequency range from 400 MHz to 700 MHz.


Features

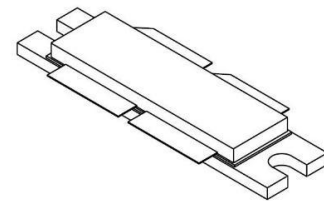
- Saturated output power :1000W
- Operating Drain Voltage: +50V
- Device can be used on a single-ended or in a push-pull configuration. Doherty application applicable
- Integrated ESD protection
- Excellent thermal stability due to low thermal resistance package
- Enhanced robustness design without device degradation


Applications

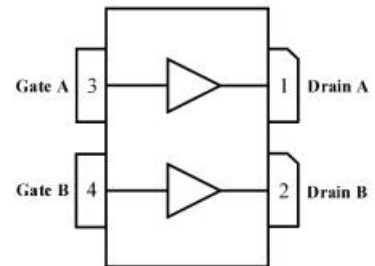
- Industrial Scientific Medical (ISM)
 - Laser generation
 - Plasma generation
 - Particle accelerators
 - MRI, RF ablation and skin treatment
 - Industrial heating, welding and drying systems
- Radio and VHF TV broadcast



ACC3210S-4L 
 Earless Flanged balanced
 Air Cavity Ceramic Package; 4 Leads
HTH9G07P1K0H



ACC3210B-4L 
 Flanged balanced
 Air Cavity Ceramic Package; 4 Leads,
 2 Mounting holes
HTH9G07P1K0HB



(Top View)

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

Pin Connections

Ordering Information

Part Number	Description
HTH9G07P1K0H(B)	Tray Package
HTH9G07P1K0H(B) EVB	400-700 MHz EVB

Typical Performance

RF Characteristics (Pulsed CW)

Frequency (MHz)	Gain (dB)	P5dB (dBm)	P5dB (W)	Eff (%)
470	16.6	59.7	926.8	55.1
500	17.7	60.0	988.6	54.1
550	17.6	59.7	929.0	52.3
600	17.1	60.0	997.7	52.6
650	17.1	59.9	986.3	55.2
700	17.7	58.7	741.3	54.3

Test conditions unless otherwise noted: 25 °C (Indirect water cooling), $V_{DD} = +50Vdc$, $I_{DQB} = 800\text{ mA}$, $PW = 100\mu s$, $DC = 10\%$ test on WATECH Application Board

RF Characteristics (WCDMA)

Frequency (MHz)	Gain (dB)	ACPR* @5MHz (dBc)	Eff (%)
470	16.5	-20.4	47.7
500	17.6	-23.9	51.0
550	17.6	-26.6	48.3
600	17.1	-29.7	47.6
650	17.6	-30.5	49.4
700	17.3	-24.4	48.0

Test conditions unless otherwise noted: 25 °C (Indirect water cooling), $V_{DD} = +50Vdc$, $I_{DQB} = 800\text{ mA}$, $V_{GSA} = 1.8V$, $P_{AVG} = +52.5\text{ dBm}$ (180W) 1C-WCDMA 5MHz Signal 9.9 dB PAR @ 0.01% CCDF test on WATECH Application Board

*Uncorrected DPD

RF Characteristics (DVB-T 8MHz Multi-carrier)

Frequency (MHz)	IMD_shldr (dBc)	MER (dB)	Eff (%)
474	-42.1/-42.6	38.9	45.6
506	-42.9/-42.3	39.7	44.3
562	-44.7/-44.5	41.0	46.7
618	-44.2/-44.8	41.9	42.9
698	-42.2/-41.7	38.8	46.8

Test conditions unless otherwise noted: 25 °C (Indirect water cooling), $V_{DD} = +50Vdc$, $I_{DQB} = 800\text{ mA}$, $V_{GSA} = 1.8V$, $P_{AVG} = +52.5\text{ dBm}$ (180W) DVB-T 8MHz Multi-carrier Signal $T_{case} = 60\text{ °C}$, based on WATECH broadband Doherty PA test board full wave exciter

Absolute Maximum Ratings

Parameter	Range/Value	Unit
Drain voltage (V_{DSS})	-0.5 to +110	V
Gate voltage (V_{GS})	-5 to +10	V
Drain voltage (V_{DD})	0 to +55	V
Storage Temperature (T_{STG})	-55 to +150	°C
Junction Temperature (T_J)	-40 to +225	°C

Electrical Specification

DC Characteristics (Way A)

Parameter	Conditions	Min	Typ	Max	Unit
Breakdown Voltage $V_{(BR)DSS}$	$V_{GS}=0V, I_{DS}=300\mu A$	110	-	-	V
Gate-Source Threshold Voltage $V_{GS(th)}$	$V_{DS}=10V, I_{DS}=300\mu A$	-	2.6	-	V
Drain Leakage Current I_{DSS}	$V_{DS}=50V, V_{GS}=0V$	-	10	-	μA
Gate Leakage Current I_{GSS}	$V_{DS}=0V, V_{GS}=10V$	-	1	-	μA

DC Characteristics (Way B)

Parameter	Conditions	Min	Typ	Max	Unit
Breakdown Voltage $V_{(BR)DSS}$	$V_{GS}=0V, I_{DS}=500\mu A$	110	-	-	V
Gate-Source Threshold Voltage $V_{GS(th)}$	$V_{DS}=10V, I_{DS}=500\mu A$	-	2.6	-	V
Drain Leakage Current I_{DSS}	$V_{DS}=50V, V_{GS}=0V$	-	10	-	μA
Gate Leakage Current I_{GSS}	$V_{DS}=0V, V_{GS}=10V$	-	1	-	μA

RF Characteristics (Pulsed CW)

Parameter	Freq (MHz)	Min	Typ.	Max	Unit
P1dB	550	-	59.0	-	dBm
P5dB	550	-	59.5	-	dBm
Eff@P5dB	550	-	52.0	-	dB

Test conditions unless otherwise noted: 25 °C (Indirect water cooling), $V_{DD} = +50V_{dc}$, $I_{DQB} = 800 mA$, $PW = 100\mu s$, $DC = 10\%$ test on WATECH Application Board

RF Characteristics (WCDMA)

Parameter	Conditions	Min	Typ.	Max	Unit
Frequency		550			MHz
Gain	PAVG = 52.5 dBm	-	17	-	dB
Eff	PAVG = 52.5 dBm	-	48	-	%
ACPR@5MHz*	PAVG = 52.5 dBm	-	-26	-	dBc

Test conditions unless otherwise noted: 25 °C (Indirect water cooling), VDD = +50Vdc, IDQB = 800 mA, VGSA=1.8V, 1C-WCDMA 5MHz Signal 9.9 dB PAR @ 0.01% CCDF test on WATECH Application Board *Uncorrected DPD, ACPR measured in 3.84MHz Channel Bandwidth @± 5MHz Offset

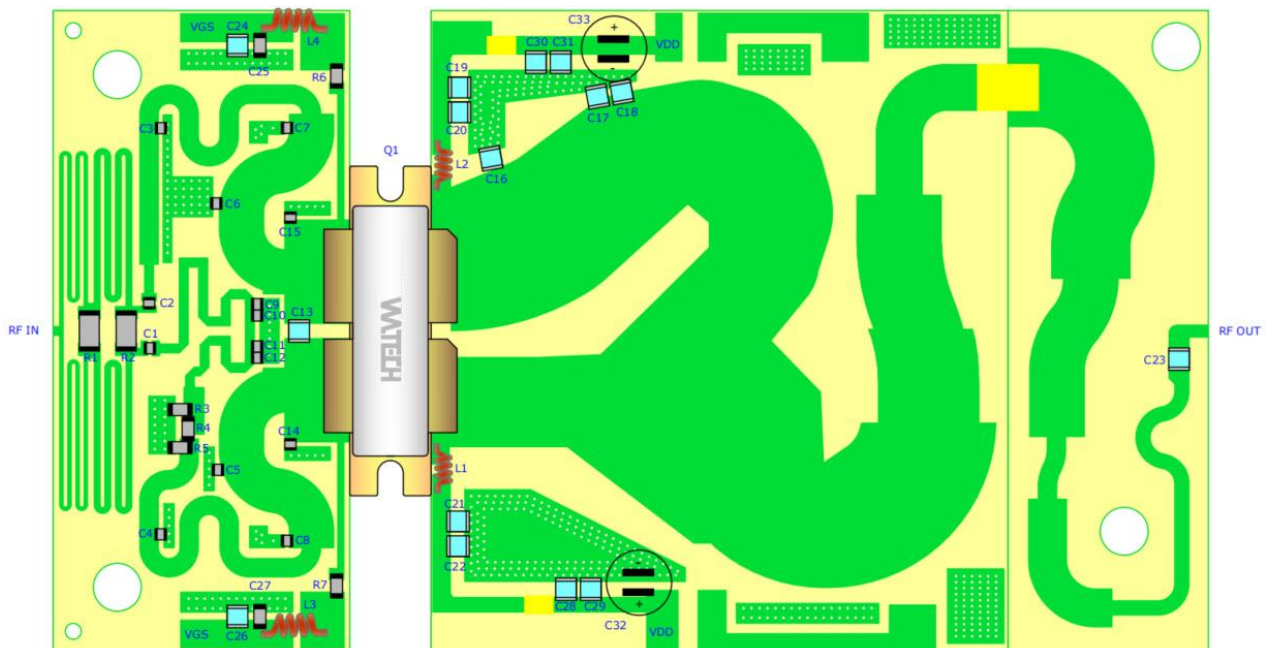
Thermal Information

Parameter	Condition	Value (Typ)	Unit
Thermal Resistance Junction to Case (R _{TH})	TCASE= 90°C, VDD=+50V, IDQB=800 mA, VGSA=1.8 V, PAVG = 52.5 dBm (180W)	0.25	°C /W

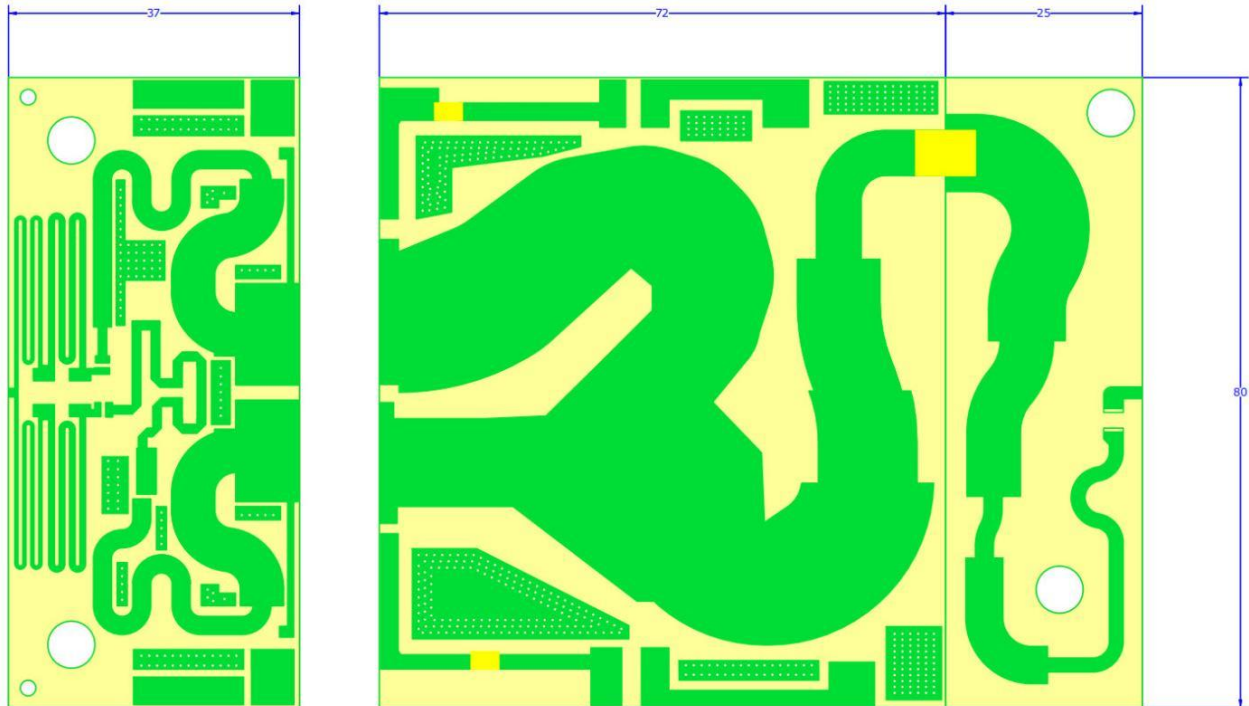
Load Mismatch Test

Condition	Test Result
VSWR=10:1, at all Phase Angles, VDD=+50Vdc, IDQB = 800 mA, VGSA=1.8V, 1C-WCDMA 5MHz Signal, 9.9 dB PAR @ 0.01% CCDF, PAVG =52.5 dBm (180W) test on WATECH Application Board	No Device Degradation

HTH9G07P1K0H(B) 470 – 700 MHz Asymmetric Ultra Wideband Doherty



EVB Layout @470 - 700 MHz (144 x 80 mm), Top View with components



- PCB Input/Output matching:
 - Rogers 4350b (er = 3.66)
 - H = 0.508 mm (20 mils)
 - T = 35 um (1 oz) copper

- PCB Output Transistor:
 - Rogers TC600 (er = 6.15)
 - H = 0.254 mm (10 mils)
 - T = 35 um (1 oz) copper

- PCB Input/Output matching:
 - Rogers 4350b (er = 3.66)
 - H = 0.508 mm (20 mils)
 - T = 35 um (1 oz) copper

PCB's on EVB Layout @470 - 700 MHz (144 x 80 mm)

Bill of Materials (BoM) - HTH9G07P1K0H(B) 400 – 470 MHz Reference Design

Reference	Value	Description	Manufacturer	P/N
Q1	-	1000W, 470 - 700 MHz LDMOS Transistor	Watech	HTH9G07P1K0H(B)
C1, C23	56pF	MLCC	ATC	ATC100B560JT
C2	47pF	MLCC	ATC	ATC800A470JT
C3, C4	3p9F	MLCC	ATC	ATC800A3R9JT
C5, C6	16pF	MLCC	ATC	ATC800A160JT
C7, C8	8p2F	MLCC	ATC	ATC800A8R2JT
C9, C12, C13	10pF	MLCC	ATC	ATC800A100JT
C10, C11	18pF	MLCC	ATC	ATC800A180JT
C14, C15	12pF	MLCC	ATC	ATC800A120JT
C24, C27, C30, C32	10uF	MLCC	TDK	C3225X7R2A106K250AC
C25, C27	10nF	MLCC	AVX	12103C103JAT2A
C16, C17,	10pF	MLCC	ATC	ATC100B100JT



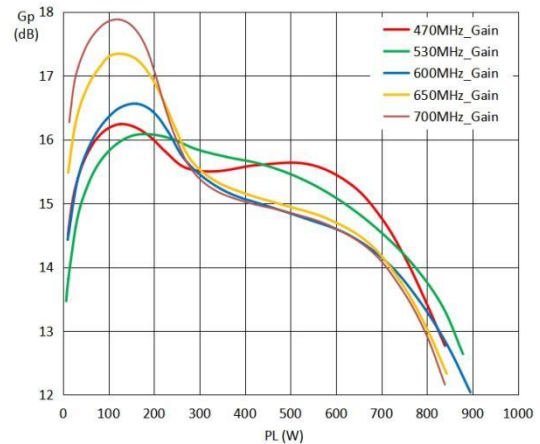
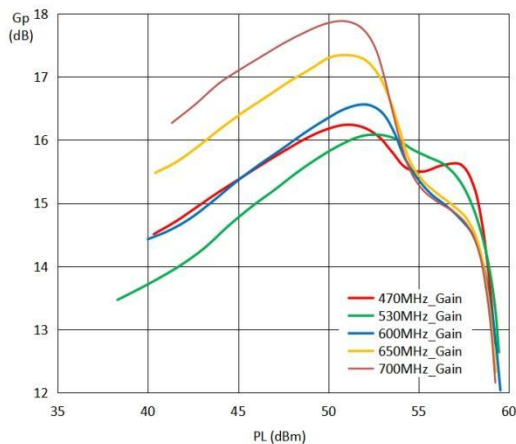
HTH9G07P1K0H(B)

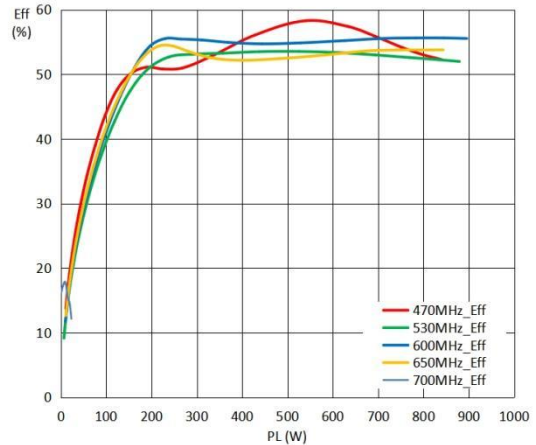
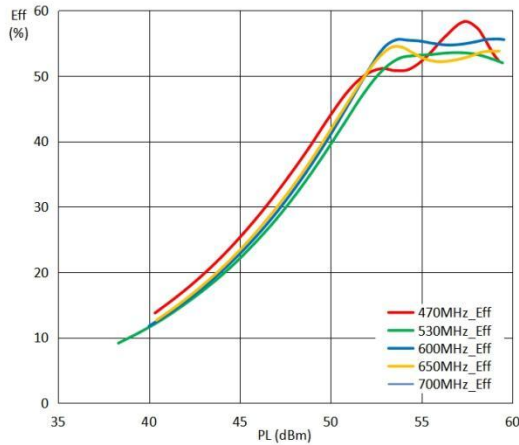
1000W, 400 - 700 MHz LDMOS Amplifier

Product datasheet

C18				
C20, C21	100pF	MLCC	ATC	ATC100B101JT
C19, C22	100nF	MLCC	AVX	12105C104JAT2A
C29, C31	4u7F/100V	MLCC	TDK	CNC6P1X7R2A475K250AE
C28, C30	2u2F/100V	MLCC	TDK	C3225X7R2A225K230AB
C32, C33	470uF/100V	Electrolytic Capacitor	Vishay	MAL203859471E3
R1	180Ω x2	Thick Film Resistor	TE	CRGP2010F180R
R2	510Ω x2	Thick Film Resistor	Bourns	CR2010-FX-5100ELF
R3, R5	360Ω	Thick Film Resistor	Bourns	CR1206-FX-3600ELF
R4	15Ω	Thick Film Resistor	Bourns	CR1206-FX-15R0ELF
R6, R7	6R8Ω	Thick Film Resistor	Vishay	CRCW12066R80FKEA
L1, L2	1.6*9.5*1T	Enameled wire	-	
L3, L4	1.1*5.5*5T	Enameled wire	-	
PCB	Rogers 4350b, er = 3.66; Thickness= 20mil (0.508mm);			
Input/Output	Thickness copper plating = 35 μm (1oz)			
PCB Output	TC600, er = 6.15; Thickness= 10mil (0.254mm);			
Transistor	Thickness copper plating = 35 μm (1oz)			

Performance Plots



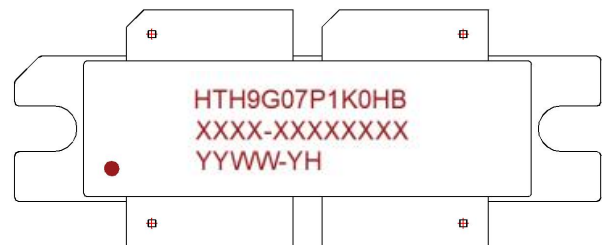
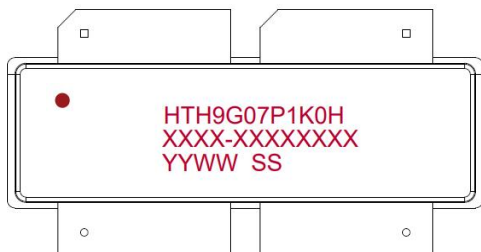


CW, Gain and Eff vs Pout

Freq (MHz)	Gain (dB)	P1dB (dBm)/ P1dB (W)	Eff (%)	P3dB (dBm)/ P3dB (W)	Eff (%)	Gain (dB) @52 dBm	Eff (%) @52 dBm
470	16.24	58.06/639	57.23	59.09/810	52.82	16.09	50.86
530	16.08	57.78/599	53.39	59.3/851	52.15	16.07	49.85
600	16.56	54.54/284	55.4	58.88/772	55.62	16.5	52.81
650	17.34	53.74/236	54.39	58.3/676	53.61	17.1	52.42
700	17.88	53.19/208	51.38	56.88/487	49.74	17.47	50.44

Test conditions unless otherwise noted: 25 °C (Indirect water cooling), VDD = +50Vdc, IDQB = 800 mA, PW = 1ms, DC = 10% tested on WATECH Application Board

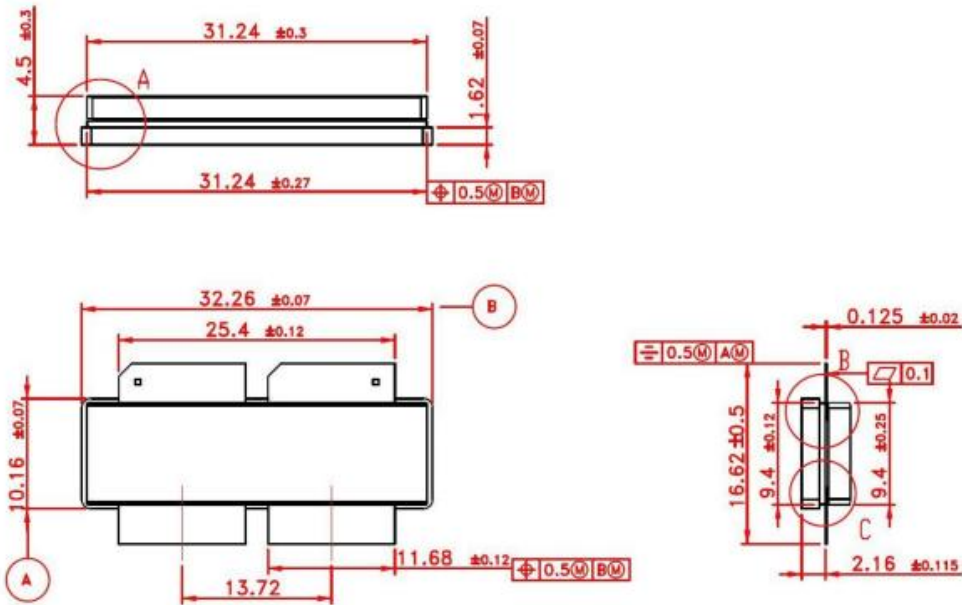
Package Marking and Dimensions



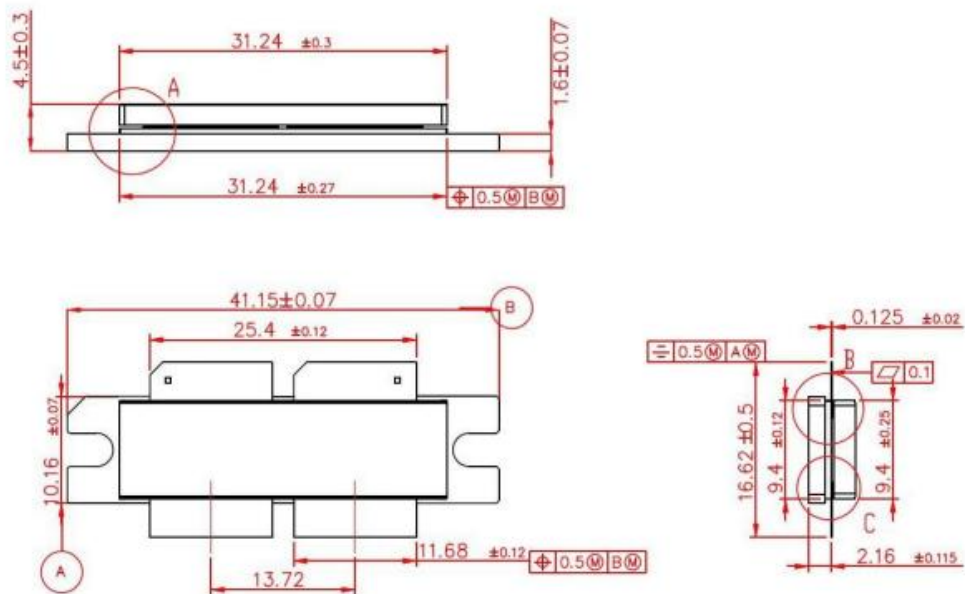
- Line1 (fixed): Device name in W/O
- Line2 (unfixed): Marking Lot No in W/O (Sample: E596-EERA0001)
- Line3 (unfixed): Date Code+YH

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



ACC3210S-4L; Earless flanged balanced Ceramic Package; 4 Leads

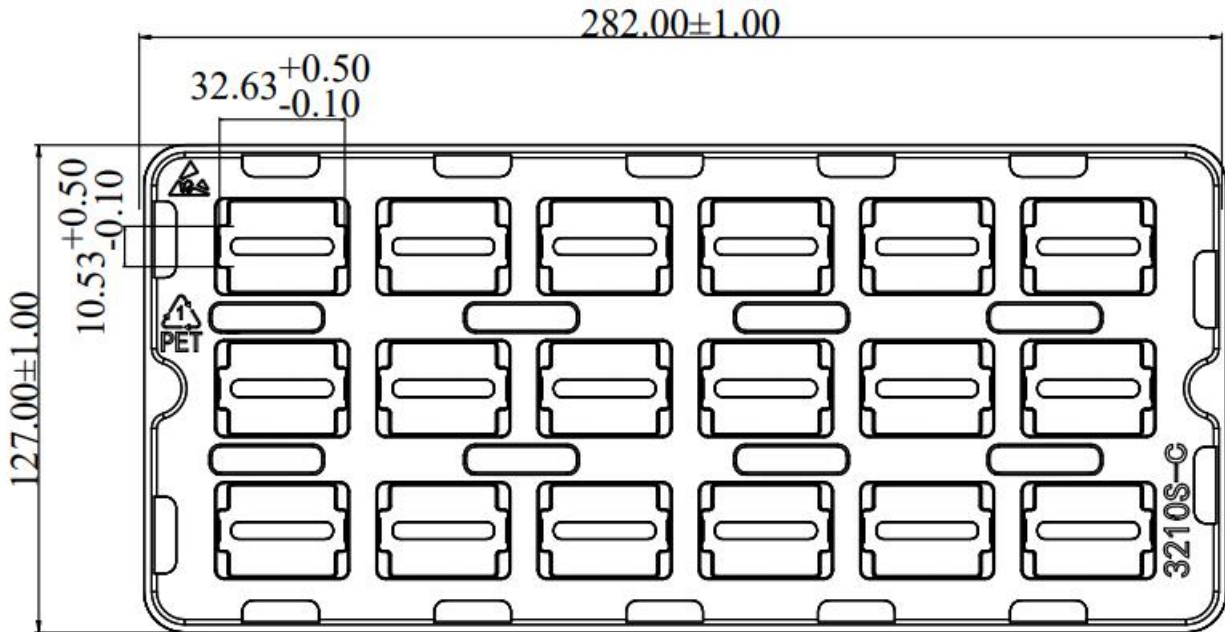


ACC3210B-4L; Flanged balanced Ceramic Package; 2 Mounting holes, 4 Leads
Package Dimensions

Packaging Information

HTH9G07P1K0H:

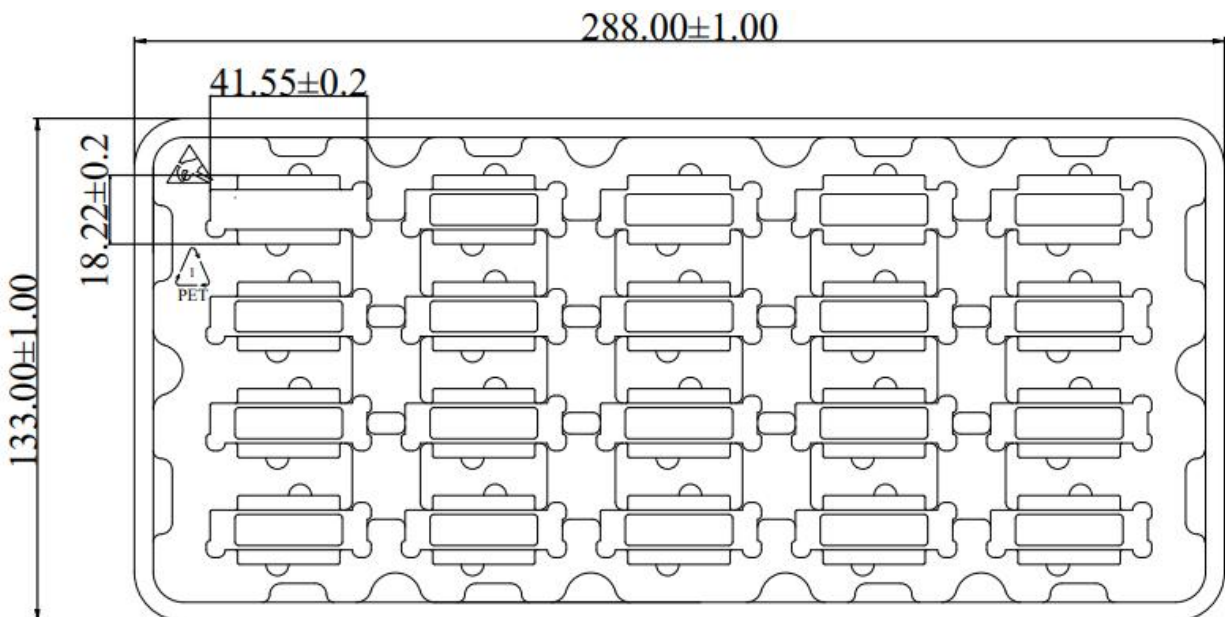
Package Type	Qty/Tray(pcs)	Qty/Box(pcs)	Qty/Carton(pcs)
ACC3210S-4L	18	90	540



Tray Packaging Descriptions

HTH9G07P1K0HB:


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



Tray Packaging Descriptions

Handling Precautions

Parameter	Grade
Moisture Sensitivity Level MSL	3

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 1.0	Preliminary	Dec. 2021	Preliminary
Rev 1.1	Preliminary	Dec. 2021	Add test temperature conditions
Rev 1.2	Preliminary	Dec. 2021	1. Supplement the correction performance after DPD 2. Add thermal resistance data
Rev 1.3	Preliminary	Dec. 2021	Correct thermal resistance data
Rev 1.4	Product	March 2023	New format based on English version datasheet
Rev 2.0	Product	Sept. 2023	Update TBD information
Rev 2.1	Product	March 2024	Version released after re review



Contact Information

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