

Description

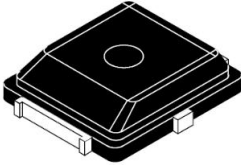
The HTN8G27S010P is an unmatched discrete LDMOS Power Amplifier with 10W saturated output power covering frequency range from 400 - 2700 MHz.


Features

- Operating Frequency Range: 400 - 2700 MHz
- Operating Drain Voltage: +28V
- Saturation Output Power: 10W
- Power Average: 1.26W
- Excellent thermal stability due to low thermal resistance package
- Enhanced robustness design without device degradation
- Internally integrated enhanced ESD design

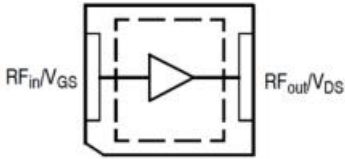
Applications

- CDMA
- W-CDMA
- GSM EDGE
- MC-GSM
- TDD/FDD LTE
- WiMAX



PQFN6X5 

Power Quad Flat No-lead



(Top View)

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

Pin Connections

Ordering Information

Part Number	Description
HTN8G27S010P	Reel Package
HTN8G27S010PEVB2	400 - 900 MHz EVB
HTN8G27S010PEVB	925 - 960 MHz EVB
HTN8G27S010PEVB1	2600 - 2690 MHz EVB

Typical Performance

RF Characteristics (Pulsed CW)

Freq (MHz)	Gain (dB)	P1dB (dBm)	P3dB (dBm)	Eff (%)
2600	18.6	40.7	41.6	48.7
2645	18.9	40.4	41.4	51.2
2690	18.6	40.0	41.1	51.4

Test conditions unless otherwise noted: 25 °C, VDD = +28Vdc, IDQ= 110mA, PW = 100us, DC= 10% test on WATECH Application Board

RF Characteristics (WCDMA)

Absolute Maximum Ratings

Parameter	Range/Value	Unit
Drain voltage (V _{DSS})	-0.5, +65	V
Gate voltage (V _{GS})	-5 to +10	V
Operation voltage (V _{DD})	+0 to +28	V
Storage Temperature (T _{STG})	-55 to +150	°C
CasesTemperature (T _c)	-40 to +150	°C
Junction Temperature (T _J)	-40 to +225	°C

Electrical Specification

DC Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Breakdown Voltage $V_{(BR)DSS}$	$V_{gs}=0V, I_{ds}=100\mu A$	65	-	-	V
Gate-Source Threshold Voltage $V_{GS(th)}$	$V_{ds}=V_{gs}, I_{ds}=100\mu A$	1.0	1.4	1.8	V
Drain Leakage Current I_{DSS}	$V_{gs}=0V, V_{ds}=65V$	-	-	10	μA
Gate Leakage Current I_{GSS}	$V_{gs}=5V, V_{ds}=0V$	-	-	1	μA

Load Mismatch Test

Condition	Test Result
VSWR=20:1, at all Phase Angles, VDD = +28Vdc, IDQ= 110mA, CW signal Pout=43 dBm(3dB input Overdrive from P3dB) @2140 MHz test on WATECH Application Board	No Device Degradation

Thermal Information

Parameter	Condition	Value (Typ)	Unit
Thermal Resistance Junction to Case (R_{TH})	$T_{CASE}= 50^{\circ}C$, CW signal 10W	3.8	$^{\circ}C / W$

RF Characteristics (WCDMA)

Parameter	Conditions	Min	Typ.	Max	Unit
Frequency		2645			MHz
Gain	$PAVG = 31.0 \text{ dBm}$	-	18.9	-	dB
Eff	$PAVG = 31.0 \text{ dBm}$	-	16.0	-	%
ACPR@5MHz*	$PAVG = 31.0 \text{ dBm}$	-	-42.5	-	dBc

Test conditions unless otherwise noted: 25 °C, VDD = +28Vdc, IDQ= 110mA, PAVG = 31.0 dBm (1.26W), 1C-WCDMA 5MHz Signal, 9.9 dB PAR @ 0.01% CCDF test on WATECH Application Board

**Uncorrected DPD, measured in 3.84MHz Channel Bandwidth @ ±5MHz Offset*

RF Characteristics (CW)

Parameter	Conditions	Min	Typ.	Max	Unit
P1dB	2645 MHz	-	40.5	-	dB
AM/PM (ϕ)	2600 -2690 MHz@P3dB	-	18.5	-	$^{\circ}$
VBWres	(IMD Third Order Inter modulation Inflection Point)	-	100	-	MHz
Gain Flatness	2600 -2690 MHz@90 MHz $PAVG = 31.0 \text{ dBm}$	-	0.3	-	dB

Test conditions unless otherwise noted: 25 °C, VDD = +28Vdc, IDQ= 110mA test on WATECH Application Board

Load Pull Performance for Maximum Power (P1dB/P3dB)

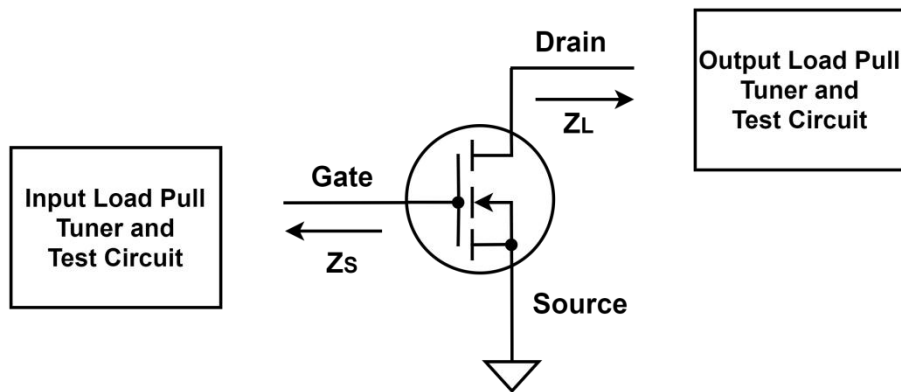
Test conditions unless otherwise noted: 25 °C, VDD = +28Vdc, IDQ= 110mA, PW = 40us, DC= 4%

Max Output Power P1dB						
Freq (MHz)	Z_source (Ω)	Z_load [1] (Ω)	Gain (dB)	P1dB (dBm)	P1dB (W)	Eff (%)
1880	0.45+j*0.64	4.88+j*2.39	21.83	41.86	15.3	55.27
2110	0.62-j*2.80	5.05+j*2.03	20.76	41.85	15.3	54.79
2600	0.45-j*4.97	4.20-j*1.18	20.51	41.59	14.4	53.15

[1] Load impedance for optimum P1dB pout

Max Output Power P3dB						
Freq (MHz)	Z_source (Ω)	Z_load [2] (Ω)	Gain (dB)	P3dB (dBm)	P3dB (W)	Eff (%)
1880	0.45+j*0.64	5.83+j*2.47	19.62	42.71	18.7	57.39
2110	0.62-j*2.80	6.06+j*2.27	18.61	42.64	18.4	56.16
2600	0.45-j*4.97	4.91-j*1.32	18.34	42.43	17.5	53.90

[2] Load impedance for optimum P3dB pout



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

Load Pull Performance for Maximum Efficiency (P1dB/P3dB)

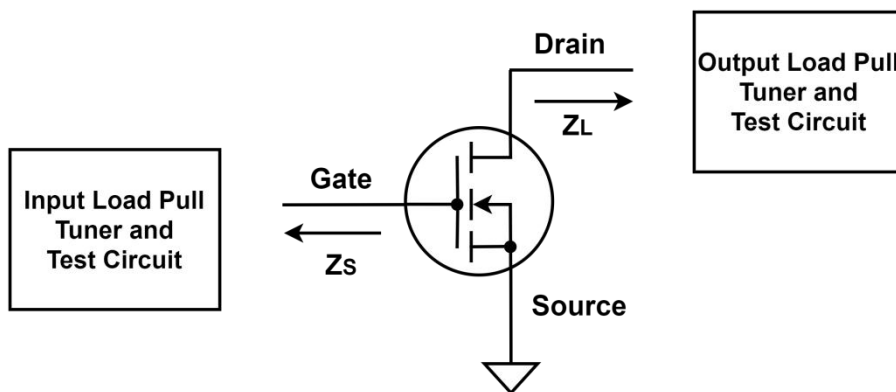
Test conditions unless otherwise noted: 25 °C, VDD = +28Vdc, IDQ= 110mA, PW = 40us, DC= 4%

Max Efficiency P1dB						
Freq (MHz)	Z_source (Ω)	Z_load [1] (Ω)	Gain (dB)	P1dB (dBm)	P1dB (W)	Eff (%)
1880	0.45+j*0.64	3.24+j*4.62	23.43	40.64	11.60	62.32
2110	0.62-j*2.80	3.30+j*3.57	22.10	40.87	12.20	60.77
2600	0.45-j*4.97	2.98-j*0.01	21.45	40.92	12.40	57.34

[1] Load impedance for optimum P1dB efficiency

Max Efficiency P3dB						
Freq (MHz)	Z_source (Ω)	Z_load [2] (Ω)	Gain (dB)	P3dB (dBm)	P3dB (W)	Eff (%)
1880	0.45+j*0.64	3.50+j*4.32	21.18	41.70	14.80	63.56
2110	0.62-j*2.80	3.68+j*3.35	19.84	41.88	15.40	61.31
2600	0.45-j*4.97	3.46-j*0.01	19.37	41.84	15.30	58.22

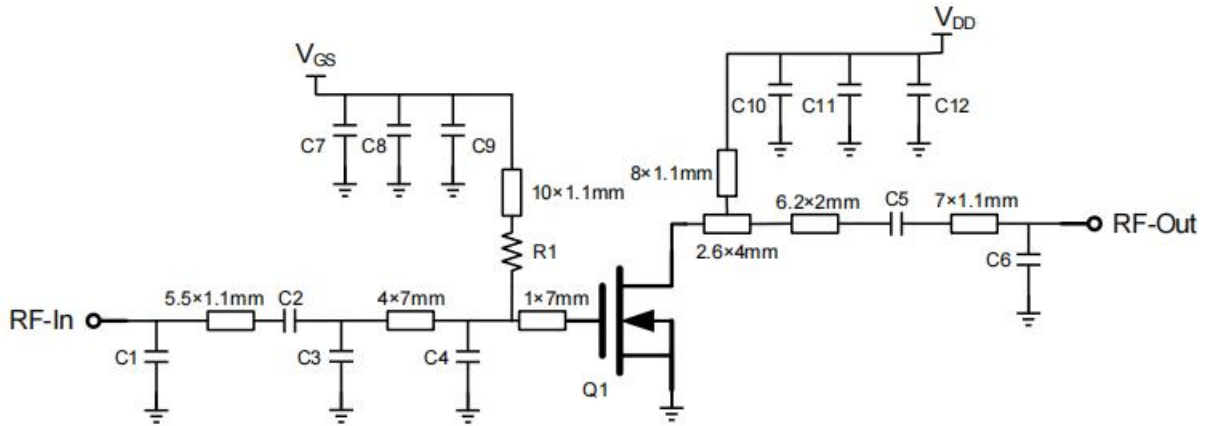
[2] Load impedance for optimum P3dB efficiency



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

HTN8G27S010P 925 - 960 MHz Reference Design



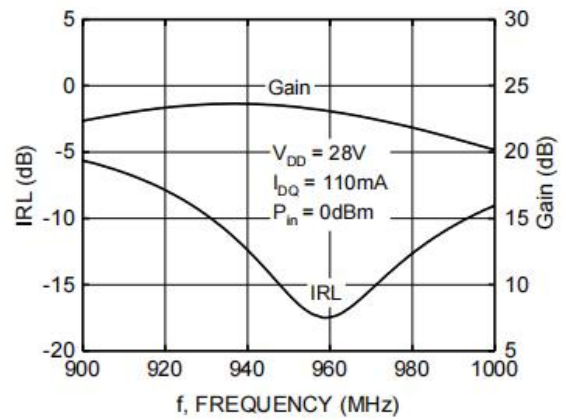
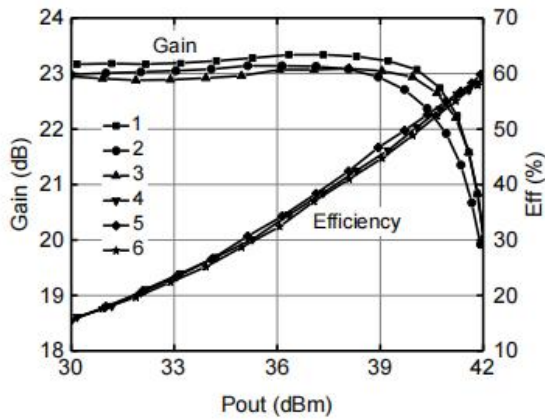
Schematic

Bill of Materials (BoM) - HTN8G27S010P

920 - 960 MHz Reference Design

Reference	Value	Description	Manufacturer	P/N
Q1	-	20W, 700 - 2700 MHz LDMOS PA	Watech	HTN8G27S010P
C1	10pF	MLCC	ATC	600S100JT250XT
C2, C5	56pF	MLCC	ATC	600S560JT250XT
C3	7pF	MLCC	Murata	GRM1885C1H7R0CA01D
C4	5pF	MLCC	Murata	GRM1885C1H5R0CA01D
C6	3pF	MLCC	Murata	GQM2195C2E3R0CB12D
C9, C10	47pF	MLCC	ATC	600S470JT250XT
C8, C11	100nF	MLCC	-	1210
C7, C12	10uF	MLCC	-	1210
R1	5.1Ω	Thick Film Resistor	-	0805
PCB	Rogers4350B (er = 3.66), 20 mil (0.508 mm), 35 μm (1oz)			

Performance Plots 920 - 960 MHz Reference Design

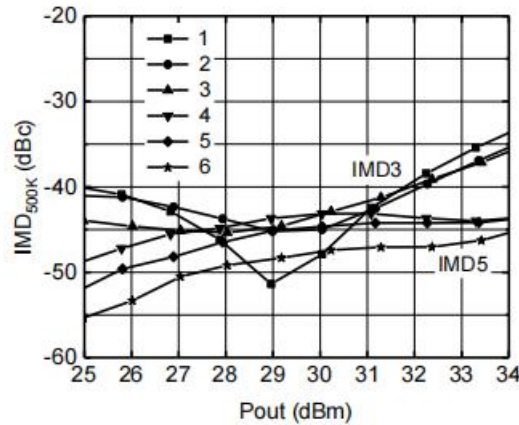


$V_{DS} = 28V$, $I_{DQ} = 110mA$, $t_p = 10\mu s$ @ 10%

- 1 G_p at $f = 925MHz$
- 2 G_p at $f = 940MHz$
- 3 G_p at $f = 960MHz$
- 4 η_D at $f = 925MHz$
- 5 η_D at $f = 940MHz$
- 6 η_D at $f = 960MHz$

Pulsed CW, Gain and Efficiency vs Pout

Pulsed CW, IRL vs Pout



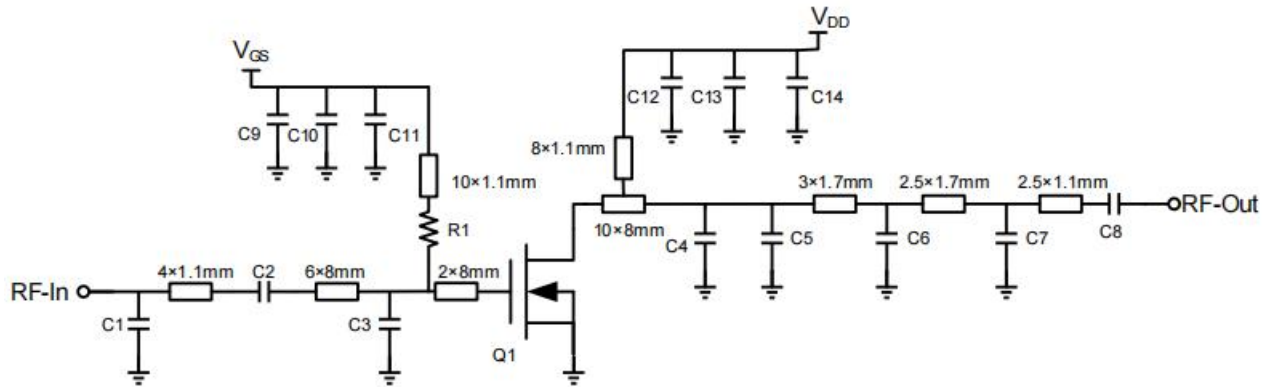
$V_{DS} = 28V$, $I_{DQ} = 90mA$, 2-Tone, Spacing = 500KHz

- 1 IMD3 at $f = 925MHz$
- 2 IMD3 at $f = 940MHz$
- 3 IMD3 at $f = 960MHz$
- 4 IMD5 at $f = 925MHz$
- 5 IMD5 at $f = 940MHz$
- 6 IMD5 at $f = 960MHz$

IMD vs Pout

Test conditions unless otherwise noted: 25 °C, $V_{DD} = +28V_{dc}$, $I_{DQ} = 110mA$, $PW = 100\mu s$, $DC = 10\%$ test on WATECH Application Board

HTN8G27S010P 2600 - 2690 MHz Reference Design

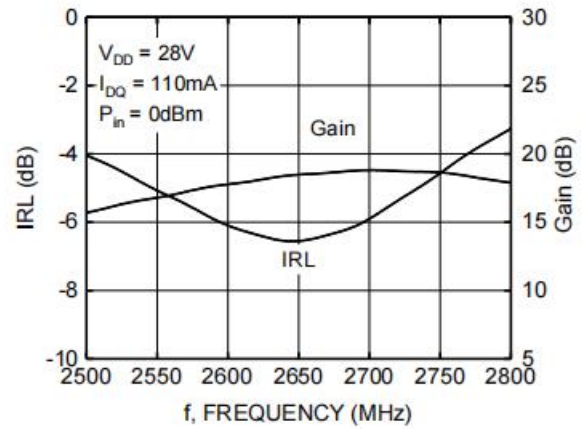
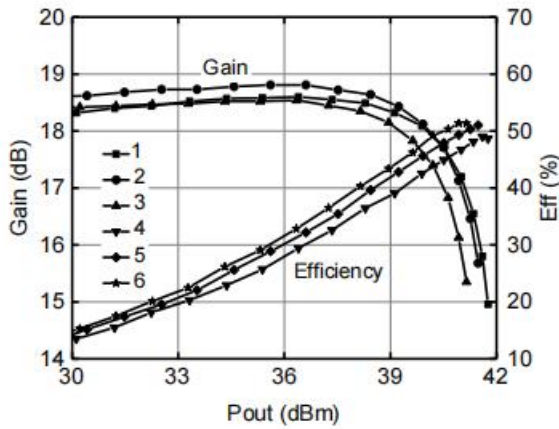


Schematic

Bill of Materials (BoM) - HTN8G27S010P 2600 - 2690 MHz Reference Design

Reference	Value	Description	Manufacturer	P/N
Q1	-	20W, 700 - 2700 MHz LDMOS PA	Watech	HTN8G27S010P
C1, C6	0p5F	MLCC	ATC	600S0R5AT250XT
C2	4p7F	MLCC	ATC	600S4R7BT250XT
C3	1p2F	MLCC	ATC	600S1R2BT250XT
C4, C5	1pF	MLCC	Murata	GQM1875C2E1R0BB12D
C7	0p3F	MLCC	ATC	600S0R3AT250XT
C8, C11, C12	6p8F	MLCC	ATC	600S6R8BT250XT
C10, C13	10nF	MLCC	-	0805
C9, C14	10uF	MLCC	-	1210
R1	5.1Ω	Thick Film Resistor	-	0805
PCB	Rogers4350B (er = 3.66), 20 mil (0.508 mm), 35 μm (1oz)			

Performance Plots 2600 - 2690 MHz Reference Design

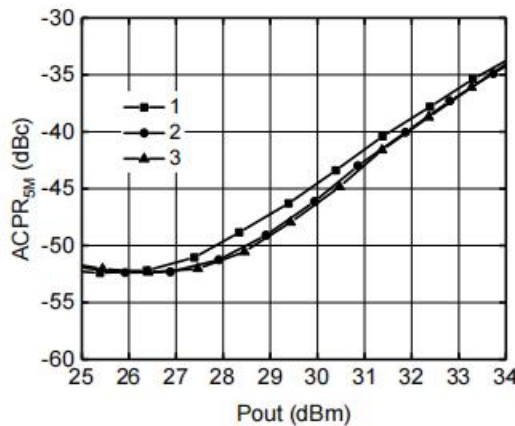


$V_{DS} = 28V, I_{DQ} = 110mA, t_p = 10\mu s @ 10\%$

- 1 G_p at $f = 2600MHz$
- 2 G_p at $f = 2645MHz$
- 3 G_p at $f = 2690MHz$
- 4 η_D at $f = 2600MHz$
- 5 η_D at $f = 2645MHz$
- 6 η_D at $f = 2690MHz$

Pulsed CW, Gain and Efficiency vs Pout

Pulsed CW, IRL vs Pout



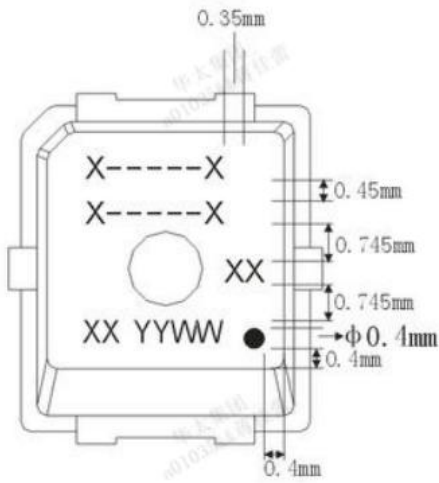
$V_{DS} = 28V, I_{DQ} = 110mA, \text{Single-Carrier W-CDMA, Spacing} = 5MHz, PAR = 9.9dB @ 0.01\% \text{ on CCDF.}$

- 1 ACPR at $f = 2600MHz$
- 2 ACPR at $f = 2645MHz$
- 3 ACPR at $f = 2690MHz$

IMD vs Pout

Test conditions unless otherwise noted: 25 °C, VDD = +28Vdc, IDQ=110mA, PW = 100us, DC= 10% test on WATECH Application Board

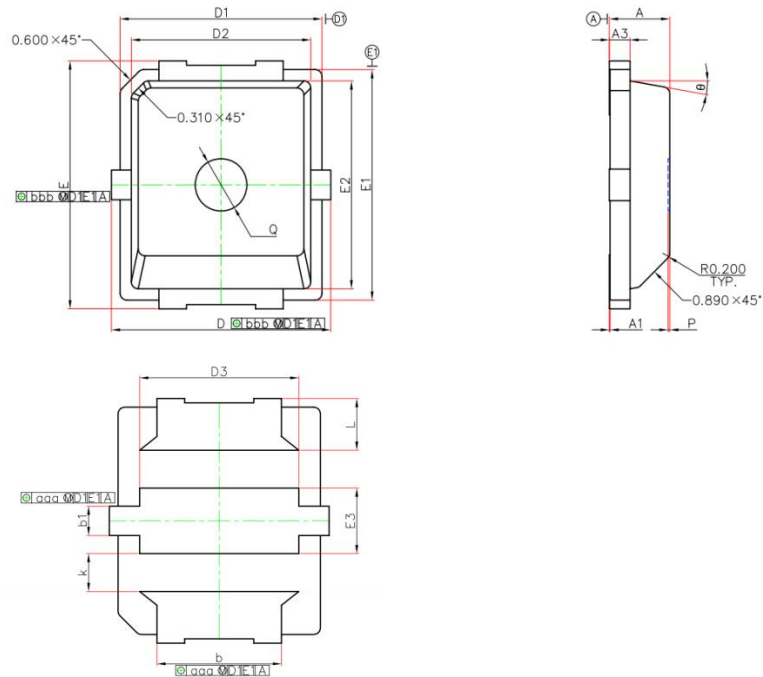
Package Marking and Dimensions



- Line1 (fixed): Device name in work order
 - Line2 (unfixed): Take the last 7 digits of Mark Lot Number in work order (Sample: E596-20140001, just take "0140001")
 - Line3 (unfixed): 2 digits of sub lot number
 - Line4 (unfixed): Take the first two digits of Mark Lot Number in work order+Date Code
 - Line5 (unfixed): Pin1 dot mark
- 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

PDFN5, 85 × 6, 60-2L (PLD) PACKAGE OUTLINE DIMENSIONS




Symbol	Dimensions in Millimeters		Dimensions in Inches		Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	1.650	1.850	0.065	0.073	E	7.000	7.200	0.276	0.283
A1	0.000	0.050	0.000	0.002	E1	6.500	6.700	0.256	0.264
A3	0.600 REF.		0.024 REF.		E2	5.850	6.050	0.230	0.238
b	3.500	3.700	0.138	0.146	E3	1.750	2.050	0.069	0.081
b1	0.700	1.000	0.028	0.039	k	1.100 REF.		0.034 REF.	
D	6.250	6.450	0.256	0.254	L	1.400	1.600	0.055	0.063
D1	5.750	5.950	0.226	0.234	P	0.000	0.100	0.000	0.004
D2	5.100	5.300	0.201	0.209	Q	1.400	1.600	0.055	0.063
D3	4.450	4.750	0.175	0.187	θ	5°	15°	5°	15°
aaa	0.100 REF.		0.004 REF.		bbb	0.130 REF.		0.005 REF.	

Package Dimensions

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



Revision history

Document ID	Datasheet Status	Release Date	Revision Version
Rev 1.0	Product	May 2017	
Rev 1.1	Product	March 2023	New format based on English version datasheet
Rev 1.2	Product	November 2023	Adjusted operation frequency band and added a EVB at lower frequency band



HTN8G27S010P

10W, 400 - 2700 MHz LDMOS Amplifier

Product datasheet

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

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