

HTN8G27S020PG (HTN020W) 20W, 700 - 2700 MHz LDMOS Amplifier

Product datasheet



Description

The HTN8G27S020PG (HTN020W) is an unmatched discrete LDMOS Power Amplifier with 20W saturated output power covering frequency range from 700 - 2700 MHz.

Features

- Operating Frequency Range: 700 - 2700 MHz
- Operating Drain Voltage: +28V
- Saturation Output Power: 20W
- Power Average: 2.5W
- 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

Ordering Information

Part Number	Description
HTN8G27S020PG	Reel Package
HTN8G27S020PGEVB	920 - 960 MHz
HTN8G27S020PGEVB1	2110 - 2170 MHz
HTN8G27S020PGEVB2	2500 - 2700 MHz

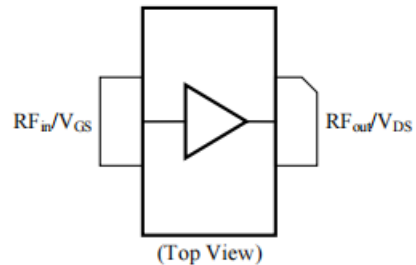


TO-270-A



Over-Molded 2 leads (Gull Wing)

HTN8G27S020PG



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

Pin Connections

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Typical Performance

RF Characteristics (Pulsed CW)

Freq (MHz)	Gain (dB)@ 34dBm	Eff (%)@ 34dBm	P1dB (dBm)	Eff (%)@ P1dB (dBm)	P3dB (dBm)	Eff (%)@ P3dB (dBm)
920	23.50	17.00	43.87	53.46	44.71	57.16
940	24.50	17.50	43.74	55.67	44.67	59.74
960	24.75	19.20	43.42	56.54	44.52	61.77

Test conditions unless otherwise noted: 25 °C, VDD = +28Vdc, IDQ=180mA, PW = 1ms, DC= 10% test on WATECH Application Board

Freq (MHz)	Gain (dB)@ 34dBm	Eff (%)@ 34dBm	P1dB (dBm)	Eff (%)@ P1dB (dBm)	P3dB (dBm)	Eff (%)@ P3dB (dBm)
2110	18.50	18.10	43.90	54.90	44.60	55.90
2140	18.60	18.80	43.50	55.30	44.30	56.60
2170	18.50	19.30	43.10	54.10	43.90	55.80

Test conditions unless otherwise noted: 25 °C, VDD = +28Vdc, IDQ=180mA, PW = 1ms, DC= 10% test on WATECH Application Board

Freq (MHz)	Gain (dB)@ 34dBm	Eff (%)@ 34dBm	P1dB (dBm)	Eff (%)@ P1dB (dBm)	P3dB (dBm)	Eff (%)@ P3dB (dBm)
2600	16.10	16.10	43.42	44.67	44.26	48.82
2645	17.25	18.20	43.06	49.60	43.82	50.75
2690	17.60	19.20	42.00	45.15	42.89	46.69

Test conditions unless otherwise noted: 25 °C, VDD = +28Vdc, IDQ=180mA, PW = 1ms, DC= 10% test on WATECH Application Board

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

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CaseTemperature (Tc)	-40 to +150	°C
Junction Temperature (Tj)	-40 to +225	°C

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Electrical Specification

DC Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Breakdown Voltage $V_{(BR)DSS}$	$V_{gs}=0V, I_{ds}=36\mu A$	65	-	-	V
Gate-Source Threshold Voltage $V_{GS(th)}$	$V_{ds}=V_{gs}, I_{ds}=36\mu A$	1	1.3	1.6	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

RF Characteristics (Pulsed CW)

Parameter	Conditions	Min	Typ	Max	Units
Frequency Range	$P_{out}=34\text{ dBm}$	1.805	/	1.88	GHz
P3dB	$Freq=1.84\text{GHz}$	43.6	/	45	dBm

Test conditions, unless otherwise noted: 25 °C, $V_{DD}=+28V_{dc}$, $IDQ = 190\text{ mA}$, Pulse Width = 100 us, Duty Cycle = 10%, Based on FT board

RF Characteristics (WCDMA)

Parameter	Conditions	Min	Typ	Max	Units
Frequency Range	$P_{out}=34\text{ dBm}$	1.805	/	1.88	GHz
Gain	$Freq=1.84\text{GHz}, P_{out}=34\text{dBm}$	18	/	22	dB
Eff	$Freq=1.84\text{GHz}, P_{out}=34\text{dBm}$	18	/	22	%
ACLR@5MHz	$Freq=1.84\text{GHz}, P_{out}=34\text{dBm}$	-60	/	-38	dBc

Test conditions, unless otherwise noted: 25 °C, $V_{DD}=+28V_{dc}$, $IDQ = 190\text{ mA}$, single-carrier, 5MHz WCDMA signal with 9.9 dB PAR @ 0.01% CCDF Based on FT board

RF Characteristics (Small-Signal)

Parameter	Conditions	Min	Typ	Max	Units
Input Return Loss	$Freq=1.84\text{GHz}$	/	/	-6	dB

Test conditions. unless otherwise noted: 25 °C. $V_{DD}=+28V_{dc}$. $IDQ = 190\text{ mA}$. CW. Based on FT board

Load Mismatch Test

Condition	Test Result
VSWR=10:1, at all Phase Angles, $V_{DD} = +28V_{dc}$, $IDQ= 260\text{mA}$,	No Device

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CW signal Pout=46.0dBm (3dB input Overdrive from P3dB) @2140 MHz test on WATECH Application Board	Degradation
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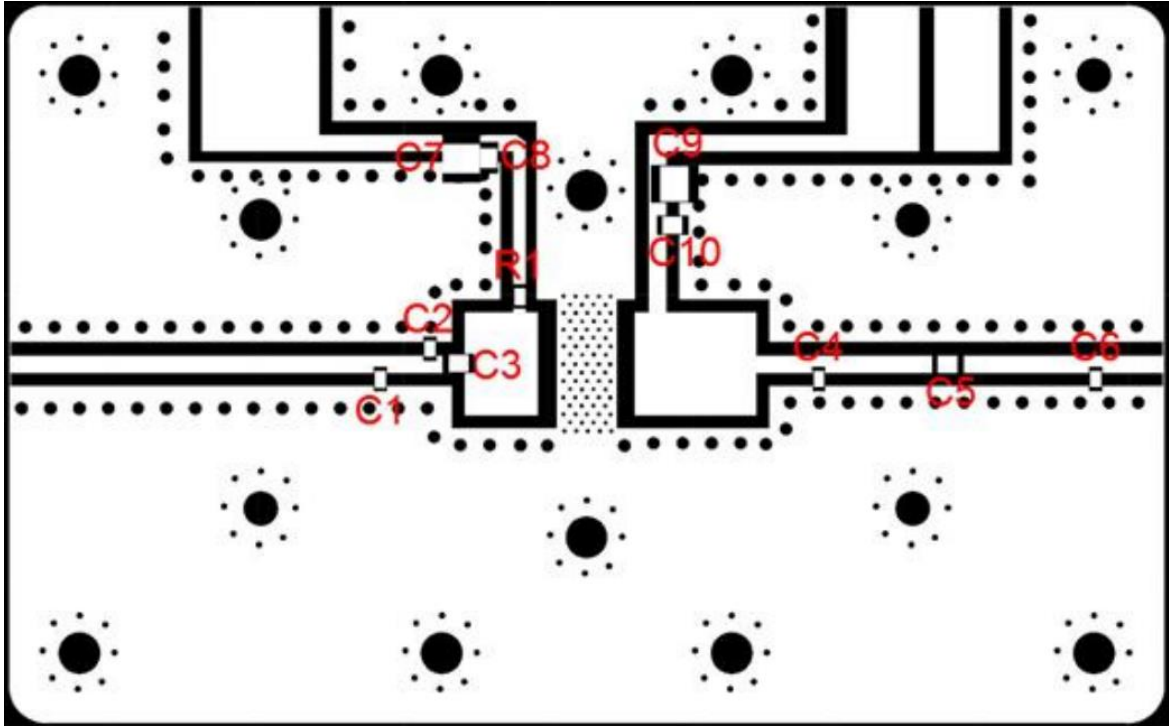
Thermal Information

Parameter	Condition	Value (Typ)	Unit
Thermal Resistance Junction to Case (R _{TH})	T _{CASE} = 50°C, CW signal 20W	2.3	°C /W

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HTN8G27S020PG 920- 960 MHz Reference Design



EVB Layout

Bill of Materials (BoM) - HTN8G27S020PG 920- 960 MHz Reference Design

Reference	Value	Description	Manufacturer	P/N
Q1	-	20W, 700 - 2700 MHz LDMOS PA	Watech	HTN8G27S020PG(G)
C1	16pF	MLCC	Murata	GQM1875G2E160JB12
C2	5pF	MLCC	Murata	GQM1875G2E5R0BB12
C3, C5, C8, C10	47pF	MLCC	Murata	GQM2195G2E470JB12
C4	9pF	MLCC	Murata	GQM1875G2E9R0BB12
C6	3p3F	MLCC	Murata	GQM1875G2E3R3BB12
C7, C9	10uF	MLCC	Murata	GRM32EC72A106KE05L
R1	11Ω	Thick Film Resistor	-	0805

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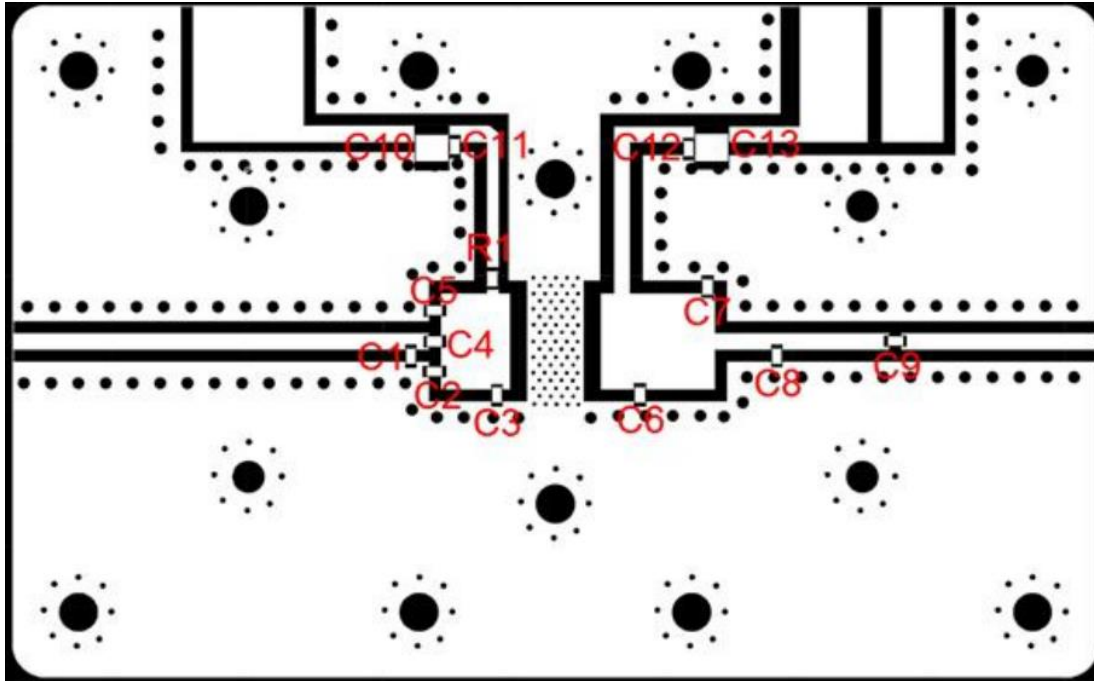


PCB	Rogers4350B (er = 3.66), 20 mil (0.508 mm), 35 μ m (1oz)
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HTN8G27S020PG (HTN020W)
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HTN8G27S020PG 2110 - 2170 MHz Reference Design



EVB Layout

Bill of Materials (BoM) - HTN8G27S020PG 2110 - 2170 MHz Reference Design

Reference	Value	Description	Manufacturer	P/N
Q1	-	20W, 700 - 2700 MHz LDMOS PA	Watech	HTN8G27S020PG(G)
C1	0p8F	MLCC	Murata	GQM1875G2ER80BB12
C2	0p5F	MLCC	Murata	GQM1875G2ER50BB12
C3	3pF	MLCC	Murata	GQM1875G2E3R0BB12
C4, C9, C11, C12	5p6F	MLCC	Murata	GQM1875G2E5R6BB12
C5	1p8F	MLCC	Murata	GQM1875G2E1R8BB12
C6, C7	2p7F	MLCC	Murata	GQM1875G2E2R7BB12
C8	1p2F	MLCC	Murata	GQM1875G2E1R2BB12

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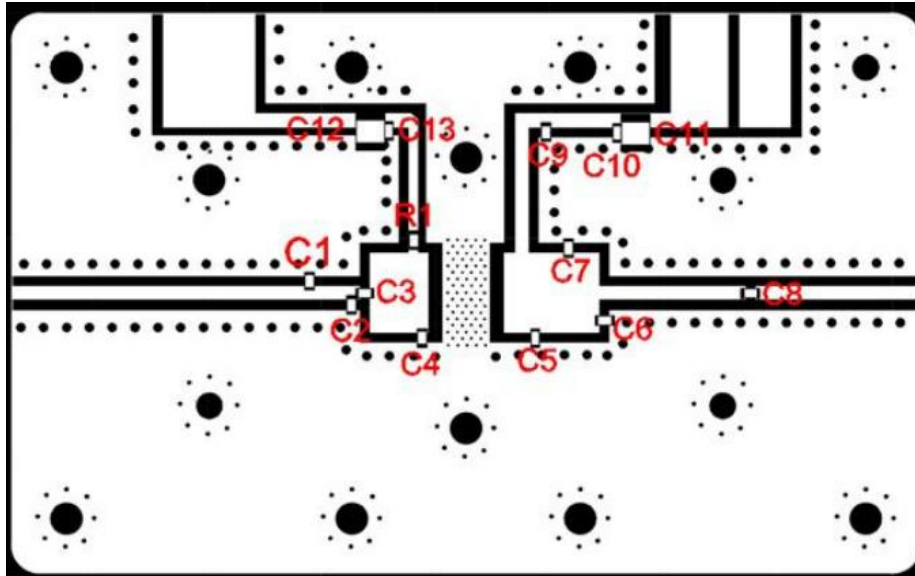


C10, C13	10uF	MLCC	Murata	GRM32EC72A106KE05L
R1	11Ω	Thick Film Resistor	-	0805
PCB	Rogers4350B (er = 3.66), 20 mil (0.508 mm), 35 μm (1oz)			

HTN8G27S020PG (HTN020W)
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HTN8G27S020PG 2500 - 2700 MHz Reference Design



EVB Layout

Bill of Materials (BOM) - HTN8G27S020PG 2500 - 2700 MHz Reference Design

Reference	Value	Description	Manufacturer	P/N
Q1	-	20W, 700 - 2700 MHz LDMOS PA	Watech	HTN8G27S020PG(G)
C1	2p7F	MLCC	Murata	GQM1875G2E2R7BB12
C2	3pF	MLCC	Murata	GQM1875G2E3R0BB12
C3	1p5F	MLCC	Murata	GQM1875G2E1R5BB12
C4	2pF	MLCC	Murata	GQM1875G2E2R0BB12
C5	0p9F	MLCC	Murata	GQM1875G2ER90BB12
C6	0p5F	MLCC	Murata	GQM1875G2ER50BB12
C7	1p6F	MLCC	Murata	GQM1875G2E1R6BB12
C8, C10, C13	5p6F	MLCC	Murata	GQM1875G2E5R6BB12
C9	8pF	MLCC	Murata	GQM1875G2E8R0BB12

HTN8G27S020PG (HTN020W)
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C11, C12	10uF	MLCC	Murata	GRM32EC72A106KE05L
R1	9.2Ω	Thick Film Resistor	-	0805
PCB	Rogers4350B (er = 3.66), 20 mil (0.508 mm), 35 μm (1oz)			

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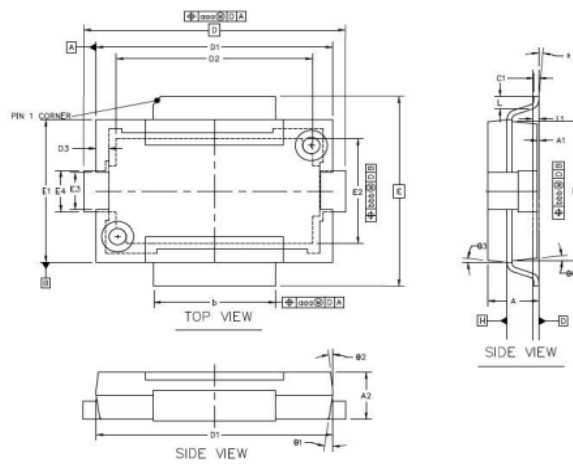


Package Marking and Dimensions



- Line1 (fixed): Device name in work order
 - Line2 (unfixed): Mark Lot number in work order (Sample: E596-20140001)
 - Line3 (unfixed): Date Code + "JY"+two spaces+ "SS"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



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	1.960	2.230	0.077	0.088
A1	0.020	0.100	0.001	0.004
A2	1.980	2.080	0.078	0.082
D	10.570	10.770	0.416	0.424
D1	9.600	9.700	0.378	0.382
D2	7.370MIN		0.290MIN	
D3	0.410	0.610	0.016	0.024
E	8.030	8.230	0.316	0.324
E1	6.050	6.150	0.238	0.242
E2	3.810MIN		0.150MIN	
E3	1.480	1.680	0.058	0.066
E4	1.680	1.880	0.066	0.074
E5	5.870	5.970	0.231	0.235
b	4.900	5.060	0.193	0.199
c1	0.180	0.230	0.230 0.007	0.009
L	0.460	0.610	0.610 0.018	0.024
L1	0.260BSC		0.010BSC	
θ	2°	8°	2°	8°
aaa	0.100		0.004	
bbb	0.200		0.008	

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Package Dimensions TO-270

HTN8G27S020PG (HTN020W)

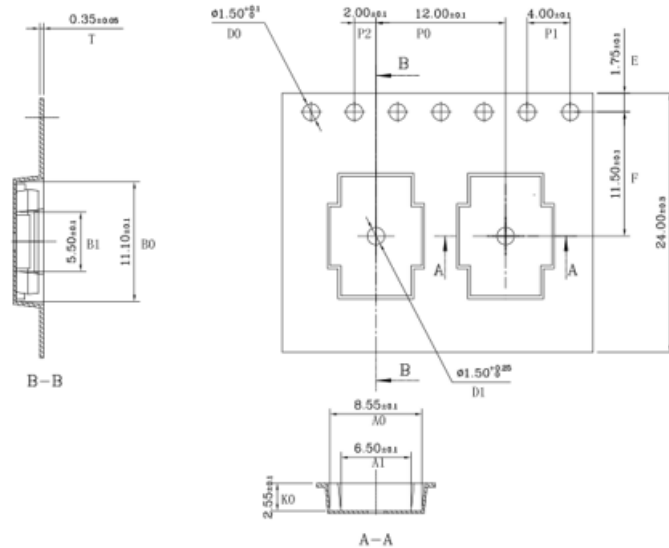
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Tape and Reel Information

Package Type	Reel Size(inch)	Qty/Reel(pcs)	Qty/Box(pcs)	Qty/Carton(pcs)
TO270(Gull Wing)	13inch	1200	1200	6000



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

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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 2.2	Product	March 2021	Updated the POD diagram of TO-270-A
Rev 2.3	Product	May 2021	Updated Chip Silkscreen
Rev 2.4	Product	March 2023	New format based on English version datasheet
Rev 2.5	Product	May 2024	Update the picture of TO-270-A

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Contact Information

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from competent authorities.