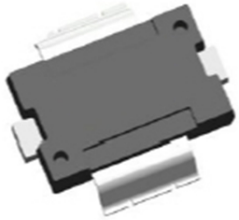
HTH9G24S025PG
25 W, 0.4-2.4 GHz LDMOS Amplifier

Product Datasheet

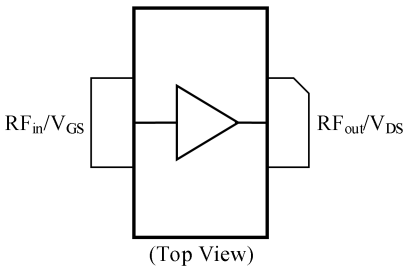
Description

The HTH9G24S025PG is an unmatched discrete LDMOS Power Amplifier with 25W Saturated output power covering frequency range from 400 - 2400 MHz.



HTH9G24S025PG
Package: TO-270-A

Block Diagram



(Top View)

Pin connection

Features

- Operating Frequency Range: 0.4 to 2.4 GHz
- Operating Drain Voltage: +50 V
- Saturation Output Power: 25 W
- 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

Order Information

Part Number	Description
HTH9G24S025PG	Reel Package

Typical Performances

Freq=758MHz~803MHz

Freq(MHz)	Gain(dB)	P3dB (dBm)	P3dB(W)	Eff(%)
758	23.6	44.7	29.7	68.3
780.5	23.5	44.8	30.4	68.3
803	23.1	44.8	30.3	65.1

Test conditions unless otherwise noted: 25 °C,VDD = 50 Vdc, IDQ = 150 mA, Pulsed CW, 100 us, Duty Cycle = 10%, Test on H O L T O Application Board.

Freq(MHz)	Gain(dB)	Eff(%)	ACPR 5MHz(dBc)
758	23.5	17.7	-45.0
780.5	23.5	18.0	-45.1
803	22.9	17.6	-45.4

Test conditions unless otherwise noted: 25 °C, VDD = 50Vdc, IDQA= 150mA, Pout = 33.5 dBm 1C-WCDMA 5MHz Signal, 11 dB PAR @ 0.01% CCDF test on H O L T O Application Board

Freq=2110MHz~2170MHz

Freq(MHz)	Gain(dB)	P3dB (dBm)	P3dB(W)	Eff(%)
2110	18.9	44.4	27.2	50.6
2140	19.9	44.4	27.7	54.6
2170	19.2	44.0	25.2	53.2

Test conditions unless otherwise noted: 25 °C,VDD = 50 Vdc, IDQ = 150 mA, Pulsed CW, 100 us, Duty Cycle = 10%, Test on H O L T O Application Board.

Freq(MHz)	Gain(dB)	Eff(%)	ACPR 5MHz(dBc)
2110	18.3	15.2	-41.2
2140	19.2	15.7	-41.1
2170	19.1	16.1	-40.2

Test conditions unless otherwise noted: 25 °C, VDD = 50Vdc, IDQA= 150mA, Pout = 33.5 dBm 1C-WCDMA 5MHz Signal, 10.5 dB PAR @ 0.01% CCDF test on H O L T O Application Board

Load Pull Performance

Max Output Power						
Freq (MHz)	Z_source (Ω)	Z_load [1] (Ω)	Gain (dB)	P3dB (dBm)	P3dB (W)	Eff (%)
760	1.1+6.0j	23.5+13.5j	27.8	45.7	36.7	64.3
960	1+3.7j	8+14.7j	27.1	45.5	35.7	64.3
1880	0.8-2.7j	6.9+6.5j	22.4	45.4	34.8	60.4
2400	TBD	TBD	TBD	TBD	TBD	TBD

Test conditions unless otherwise noted: 25 °C, VDD = 50Vdc, Idq= 150mA, Pulsed CW, 100 us, Duty Cycle = 10%, Test on H O L T O Loadpull fixture.

[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 (%)
760	1.1+6.0j	16.0+20.2j	27.8	45.7	31.6	72.5
960	1+3.7j	8+14.7j	27.1	45.5	26.7	66.4
1880	0.8-2.7j	3.8+7.1j	22.4	45.5	29.7	67.7
2400	TBD	TBD	TBD	TBD	TBD	TBD

Test conditions unless otherwise noted: 25 °C, VDD = 50Vdc, Idq= 150mA, Pulsed CW, 100 us, Duty Cycle = 10%, Test on H O L T O Loadpull fixture.

[2] Load impedance for optimum P3dB efficiency

Absolute Maximum Ratings

Parameter	Range/Value	Units
Drain voltage (VDSS)	-0.5 to +115V	V
Gate voltage (VGS)	-5 to 10	V
Storage Temperature (TSTG)	-55 to 150	℃
Case Temperature (TC)	-40 to 150	℃
Junction Temperature (TJ)	-40 to 225	℃

Electrical Specification

DC Characteristics

Parameter	Conditions	Min	Typ	Max	Units
Breakdown Voltage V(BR)DSS	VGS=0V;IDS=16.8uA	115		135	V
Gate-Source threshold Voltage VGS(th)	VDS=10V;IDS=16.8uA	2.2		3.2	V
Drain leakage Current IDSS	VDS=50V;VGS=0V	-500		500	nA
Gate leakage Current IGSS	VDS=0V;VGS= 5V	-100		100	nA

RF Characteristics (Pulsed CW)

Parameter	Conditions	Min	Typ	Max	Units
Frequency Range		2.11		2.17	GHz
P3dB		44.0			dBm
Gain	Freq=2.14GHz,Pout=33.5dBm	18	19		dB
Eff	Freq=2.14GHz,Pout=44dBm	45	50		%
IRL	Freq=2.14GHz,Pout=0dBm		10		dB

Test conditions, unless otherwise noted: 25 °C, VDD=+50Vdc, IDQ =150 mA, , Pulse Width = 100 us, Duty Cycle = 10%, Based on FT board.

RF Characteristics (WCDMA)

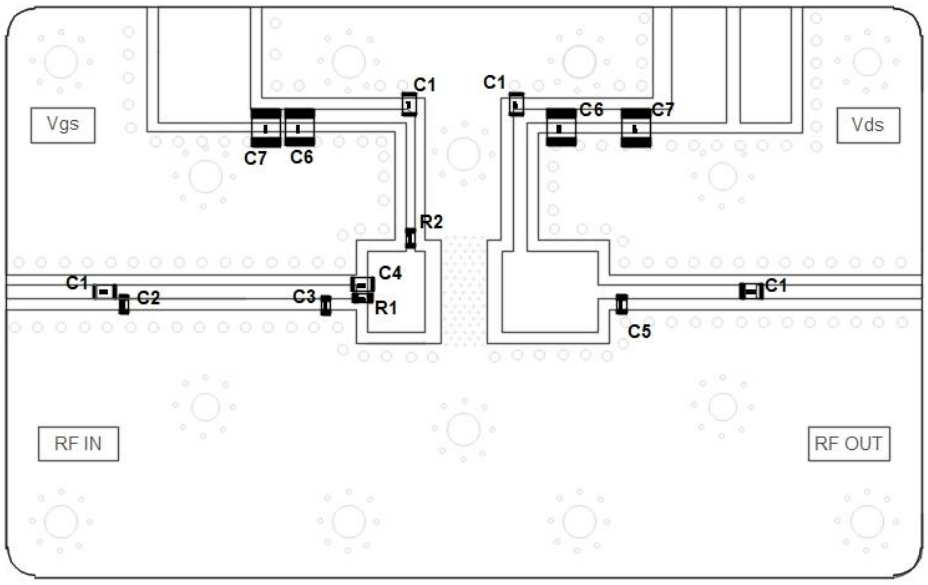
Parameter	Conditions	Min	Typ	Max	Units
Frequency Range		2.11		2.17	GHz
Gain	Pout=33.5dBm	18			dB
Eff	Pout=33.5dBm	14	16		%
IRL			10		dB
ACLR@5MHz			-40		dBc

Test conditions, unless otherwise noted: 25 °C, VDD=+50Vdc, IDQ = 150 mA, 5MHz WCDMA signal with 10.5 dB PAR @ 0.01% CCDF Based on FT board.

Thermal Information

Parameter	Condition	Value (Typ)	Units
Thermal Resistance Junction to Case (RTH)	Active die surface to Case (Rth) T-Case =85℃	2.6	°C/W

HTH9G24S025PG 758-803MHz Reference Design



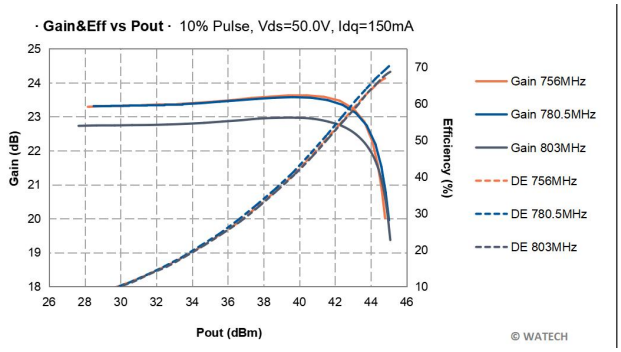
EVB Layout

Rogers 4350B, thickness=20 mil(0.508 mm); Thickness copper plating = 35 µm
PCB is soldered on a 50mm by 80 mm copper base plate with 10 mm thickness

BOM-HTH9G24S025PG 758-803MHz Reference Design

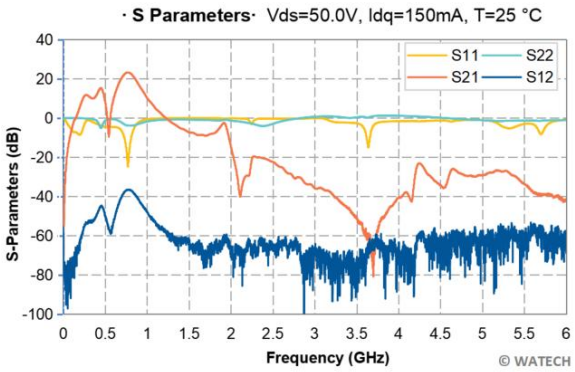
Component	Type	Value	Description	Manufacturer	P/N
C1	Capacitor	56pF	0805 SMD	Murata	GQM2195C2E560GB12
C2	Capacitor	10pF	0603 SMD	Murata	GQM1875C2E100GB12D
C3	Capacitor	10pF	0603 SMD	Murata	GQM1875C2E100GB12D
C4	Capacitor	36pF	0805 SMD	Murata	GQM2195C2E360GB12
C5	Capacitor	2.4pF	0603 SMD	Murata	GQM1875C2E2R4BB12D
C6	Capacitor	4.7uF	1210 SMD	Murata	-
C7	Capacitor	10uF	1210 SMD	Murata	GRM32EC72A106KE05L
R1	Resistor	8.2 Ohm	0603 SMD	Arbitraty	-
R2	Resistor	10 Ohm	0603 SMD	Arbitraty	-

Performance Plots



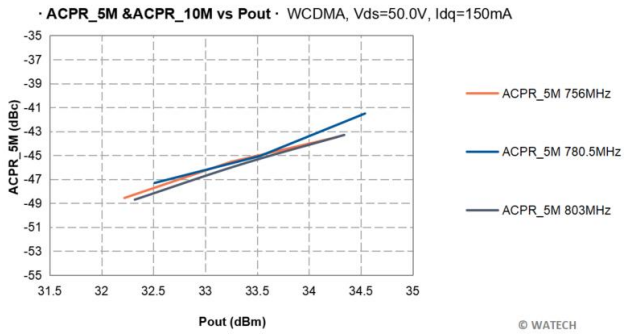
Pulsed-CW performance(Gain+Eff)

Test conditions, unless otherwise noted: 25°C, VDD=+50Vdc, IDQ = 150 mA, Pulse Width =100 us, Duty Cycle = 10%, test on H O L T O EVB

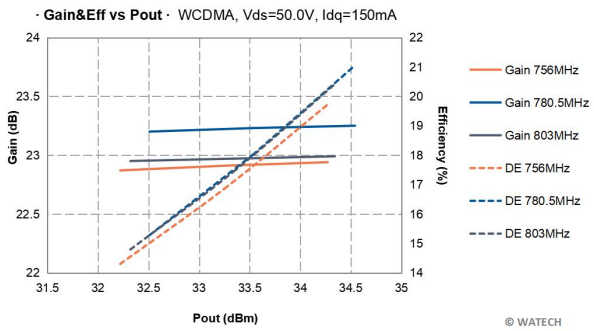


S-Parameter

Test conditions, unless otherwise noted: 25°C, VDD=+50Vdc, IDQ = 150 mA, CW signal with -20dBm channel base power, test on H O L T O EVB



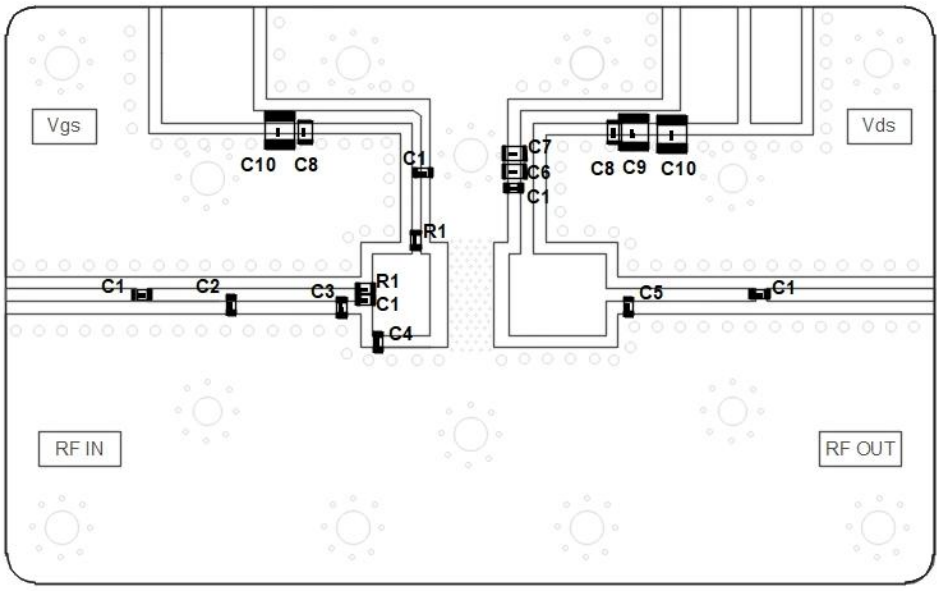
ACPR



WCDMA performance(Gain+Eff)

Test conditions, unless otherwise noted: 25 °C, VDD=+50Vdc, IDQ = 150 mA, 5MHz WCDMA signal with 11 dB PAR @ 0.01%, test on H O L T O EVB.

HTH9G24S025PG 2.11-2.17 GHz Reference Design



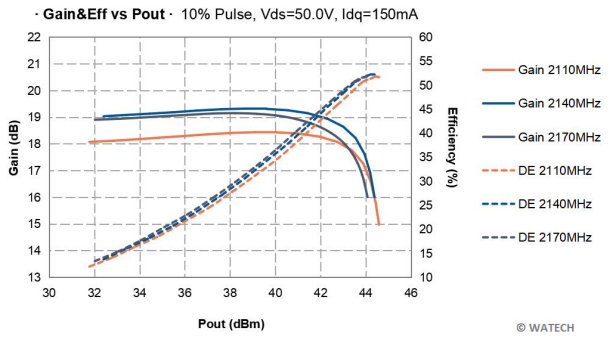
EVB Layout

Rogers 4350B, thickness=20mil; Thickness copper plating = 35 µm
PCB is soldered on a 50mm by 80 mm copper base plate with 10 mm thickness

BOM-HTH9G24S025P 2.11-2.17 GHz Reference Design

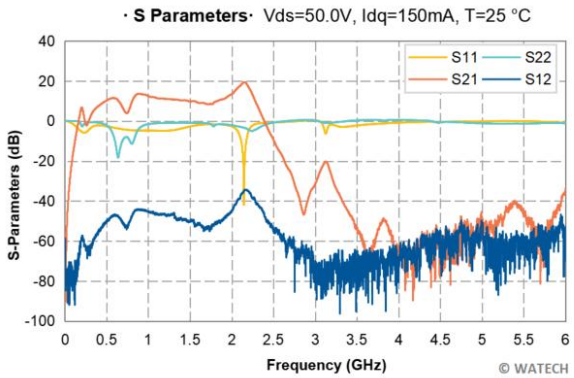
Component	Type	Value	Description	Manufacturer	P/N
C1	Capacitor	15pF	0603 SMD	Murata	GQM1875C2E150GB12D
C2	Capacitor	3.3pF	0603 SMD	Murata	GQM1875C2E3R3BB12D
C3	Capacitor	1.8pF	0603 SMD	Murata	GQM1875C2E1R8BB12D
C4	Capacitor	3.6pF	0603 SMD	Murata	GQM1875C2E3R6BB12D
C5	Capacitor	3.3pF	0603 SMD	Murata	GQM1875C2E3R3BB12D
C6	Capacitor	56pF	0805 SMD	Murata	GQM2195C2E560GB12
C7	Capacitor	220pF	0805 SMD	Murata	GRM2165C2A221JA01
C8	Capacitor	1nF	0805 SMD	Murata	GRM2165C2A1021A01
C9	Capacitor	4.7uF	1210 SMD	Murata	-
C10	Capacitor	10uF	1210 SMD	Murata	GRM32EC72A106KE05L
R1	Resistor	10 Ohm	0603 SMD	Arbitraty	-

Performance Plots



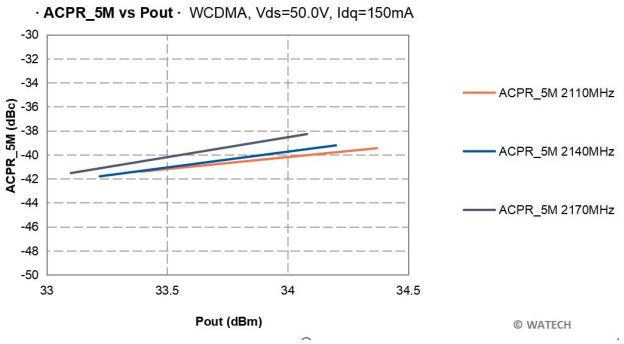
Pulsed-CW performance(Gain+Eff)

Test conditions, unless otherwise noted: 25°C, VDD=+50Vdc, IDQ = 150 mA, Pulse Width =100 us, Duty Cycle = 10%, test on H O L T O EVB

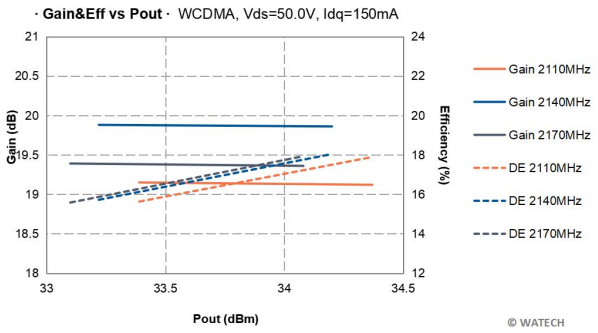


S-Parameter

Test conditions, unless otherwise noted: 25°C, VDD=+50Vdc, IDQ = 150 mA, CW signal with -20dBm channel base power, test on H O L T O EVB



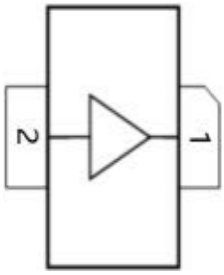
ACPR



WCDMA performance(Gain+Eff)

Test conditions, unless otherwise noted: 25 °C, VDD=+50Vdc, IDQ = 150 mA, 5MHz WCDMA signal with 11 dB PAR @ 0.01%, test on H O L T O EVB.

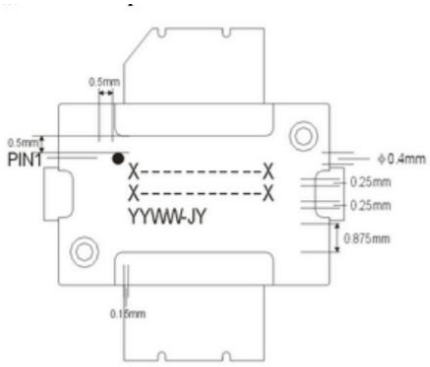
Pin Configuration and Description



Pin Configuration

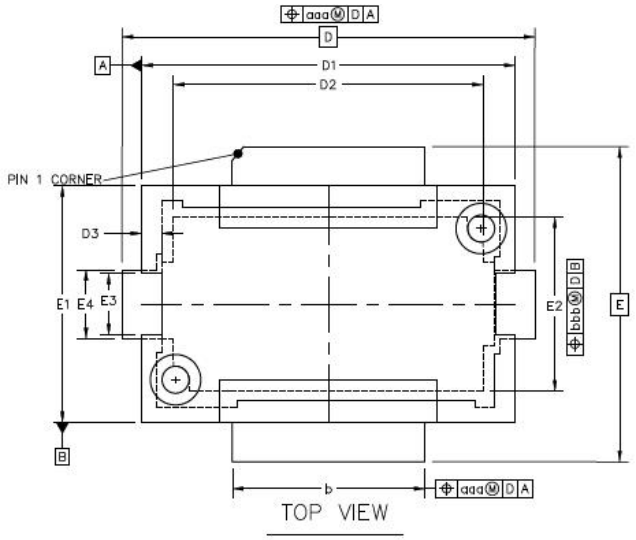
Pin Number	Label	Description
1	RF_{out}/VDS	Output
2	RF_{in}/VGS	Input

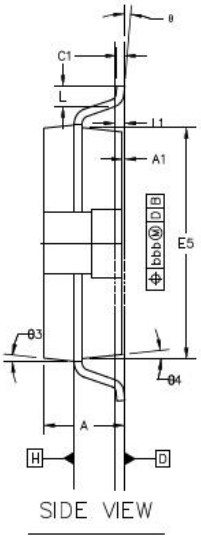
Package Marking and Dimensions

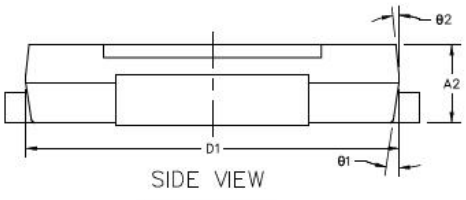


Text 1:	X----X,客户型号全取
Text 2:	X----X,取工单"Mark Lot No"栏位中内容(列如:E596-20140001,那么 line2 marking 内容为 E596-20140001）；
Text 3:	YYWW-JY, YYWW:取企划开单时间；-JY：固定码

Marking





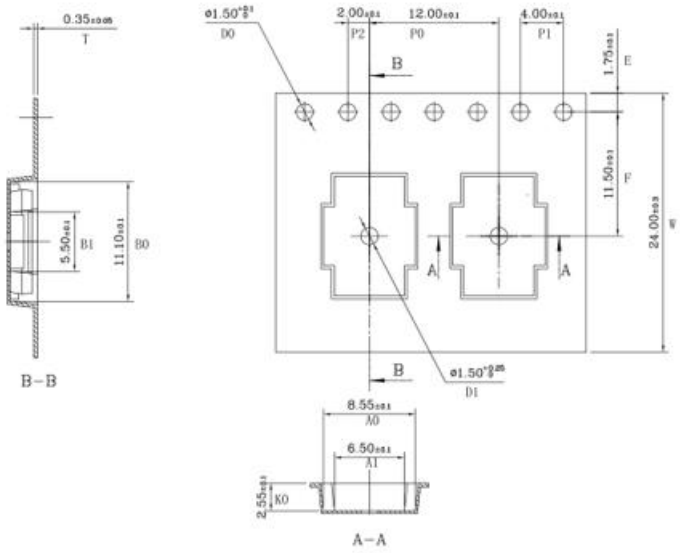


Symbol	Dimesions in Milimeters		Dimesions in Inches	
	Min.	Max.	Min.	Max.
A	1.960	2.230	0.077	0.088
A1	0.020	0.100	0.001	0.004
A2	1.980	2.080	0.078	0.082
D	10.570	10.770	0.416	0.424
D1	9.600	9.700	0.378	0.382
D2	7.370MIN		0.290MIN	
D3	0.410	0.610	0.016	0.024
E	8.030	8.230	0.316	0.324
E1	6.050	6.150	0.238	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	

Package Dimensions

Packing Information

Package Type	Reel Size(inch)	Qty/Reel(pcs)	Qty/Box(pcs)	Qty/Carton(pcs)
TO270 (Gull Wing)	13inch	1500	1500	7500



Tape & Reel Packaging Descriptions

Handling Precautions

Parameter	Rating	Standard	
ESD – Human Body Model (HBM)	1B	JEDEC-JS-001	
ESD – Charged Device Model (CDM)	C3	JEDEC-JS-002	

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

Revision history

Document ID	Datasheet status	Release date	Version revision record
Rev 1.0	Preliminary	DEC. 2023	Initial Version
Rev 2.0	Preliminary	MAR.2024	Preliminary
Rev3.0	Product	JUN.2024	Product

Acronym	Definition
LDMOS	Laterally-diffused metal-oxide semiconductor
GaN	Gallium Nitride
CW	Continuous Waveform
VSWR	Voltage Standing Wave Ratio

Contact Information

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

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- Email: andehk@andesource.com

For technical questions and application information:

- Email: andetech@andesource.com

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