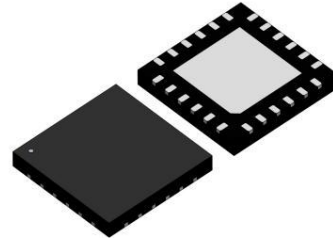


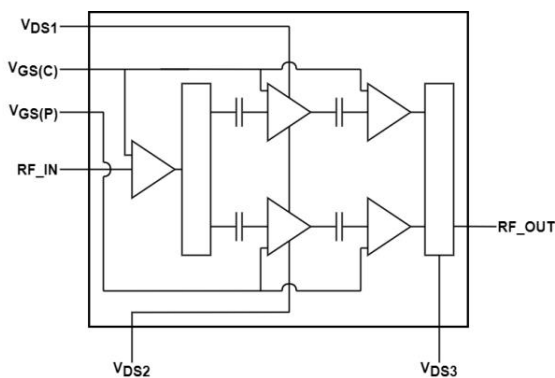
Description

The H9G3336M12Q is a LDMOS integrated Asymmetrical Doherty 3-stage Power Amplifier designed for cellular base station applications with 1.58 W average output power covering frequency range from 3.3 to 3.6 GHz.



QFN 6 x 6 x 0.85 mm, 24-pins

Block Diagram



Features

- Operating Frequency Range: 3.3 to 3.6 GHz
- Operating Drain Voltage: +28V
- P3dB: 14W (+41.5 dBm)
- 50 Ω Input matched
- Integrated Input Divider
- High Efficiency
- High Gain over the Frequency Range
- Footprint: QFN 6 x 6 x 0.85 mm, 24-pin

Applications

- 3GPP 5G NR FR1 n78 and 4G/LTE band B42.
- Power Amplifier for Small cells.
- Driver Amplifier for micro and macro base stations.
- Active antenna array for 5G mMIMO.
- Repeaters/DAS.

Order Information

Part Number	Description
H9G3336M12Q	Reel Package
H9G3336M12Q EVB	3.3 - 3.6GHz EVB

Typical Performances

RF Characteristics (Pulsed CW)

Freq(MHz)	P3dB(dBm)	Gain(dB)*	EFF(%)*	IRL(dB)*
3300	42.0	34.3	40.6	-13.3
3450	42.0	33.4	41.8	-14.9
3600	41.9	33.4	40.9	-18.0

Test conditions unless otherwise noted: 25°C, 10% Pulse, $V_{ds} = 28\text{ V}$, $I_{dq_carr} = 28\text{ mA}$, $V_{gs_peak} = V_{gs_carr} - 0.52\text{ V}$, test on Watech Application Board.

* @Pout=32dBm

RF Characteristics (WCDMA)

Freq(MHz)	Gain(dB)	EFF(%)	ACPR_5MHz (dBc)*	ACPR_10MHz (dBc)*
3300	33.7	38.0	-26.8	-41.2
3450	32.7	38.9	-28.8	-40.5
3600	32.7	37.9	-27.7	-38.6

Test conditions unless otherwise noted: 25°C, $V_{ds} = 28\text{ V}$, $I_{dq_carr} = 28\text{ mA}$, $V_{gs_peak} = V_{gs_carr} - 0.52\text{ V}$, $P_{avg} = 32\text{ dBm}$, 1C-WCDMA 5MHz Signal, 9.9 dB PAR @ 0.01% CCDF, test on WATECH Application Board.

*Uncorrected DPD

Absolute Maximum Ratings

Parameter	Range/Value	Units
Drain voltage (VDSS)	-0.5 to 65	V
Gate voltage (VGS)	-5 to 10	V
Storage Temperature (TSTG)	-55 to 150	°C
Case Temperature (TC)	-40 to 125	°C
Junction Temperature (TJ)	-40 to 175	°C

Electrical Specification

DC Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Breakdown Voltage V(BR)DSS	Vgs=0V, Ids=15.8 uA	65	-	-	V
Gate-Source Threshold Voltage of Carrier VGS(th)_C	Vds=28V, Ids=3.48uA	1.2	-	2.0	V
Gate-Source Threshold Voltage of Peak VGS(th)_P	Vgs=28V, Ids=12.32uA	1.2	-	2.0	V
Drain Leakage Current IDSS	Vgs=0V, Vds=28V	-	-	2.0	uA
Gate Leakage Current IGSS	Vgs=10V, Vds=0V	-	-	2.1	uA

Test conditions unless otherwise noted: 25 °C

RF Characteristics (Pulsed CW)

Parameter	Conditions	Min	Typ	Max	Unit
Frequency Range	Pout=32dBm	3.3	/	3.6	GHz
P3dB	Freq=3.6GHz	41	42	42.5	dBm

Test conditions unless otherwise noted: 25°C, 10% Pulse, Vds = 28 V, Idq_carr = 28 mA, Vgs_peak = Vgs_carr - 0.52 V, test on WATECH Production Board.

RF Characteristics (WCDMA)

Parameter	Conditions	Min	Typ.	Max	Unit
Frequency Range	Pout=32dBm	3.3	/	3.6	GHz
Gain	Freq=3.6GHz, Pout=32dBm	30.5	33	35.5	dB
Eff	Freq=3.6GHz, Pout=32dBm	31.5	37	/	%
IRL	Freq=3.6GHz, Pout=32dBm	/	/	-8	dB
ACPR@5MHz	Freq=3.6GHz, Pout=32dBm	/	-27.8	-24	dBc

Test conditions unless otherwise noted: 25°C, Vds = 28 V, Idq_carr = 28 mA, Vgs_peak = Vgs_carr - 0.52 V, Pave = 32 dBm, 1C-WCDMA 5MHz Signal, 9.9 dB PAR @ 0.01% CCDF test on WATECH Production Board.

*Uncorrected DPD



H9G3336M12Q
14W, 3.3-3.6 GHz Doherty Amplifier
Product Datasheet

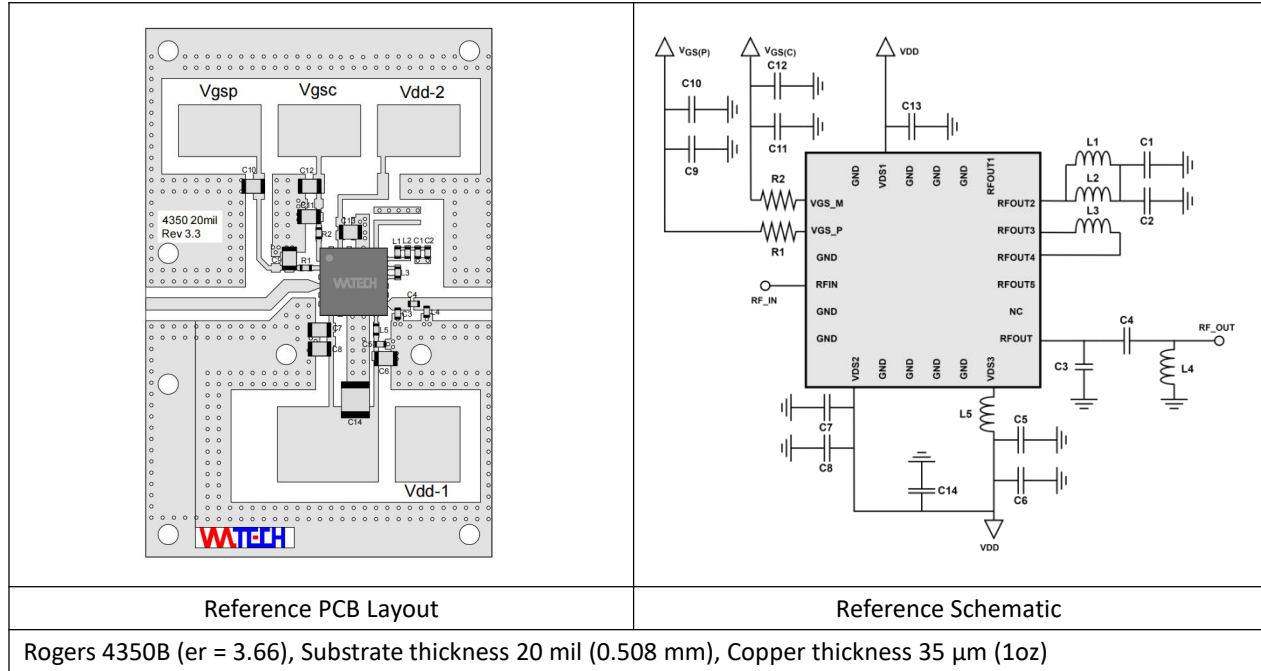
Load Mismatch Test

Condition	Test Result
VSWR=10:1, at all Phase Angles, Vds=+28Vdc, Idq_carr = 28mA, Vgs_peak = Vgs_carr - 0.52 V, Pave = 32 dBm, Frequency = 3.6 GHz, test on WATECH Application Board	Pass

Thermal Information

Parameter	Condition	Value (Typ)	Unit
Thermal Resistance Junction to Case (R _{TH})	T _{CASE} = 90°C, 1C-WCDMA 5MHz Signal, 9.9dB PAR, Pave = 32dBm	8.1	°C /W

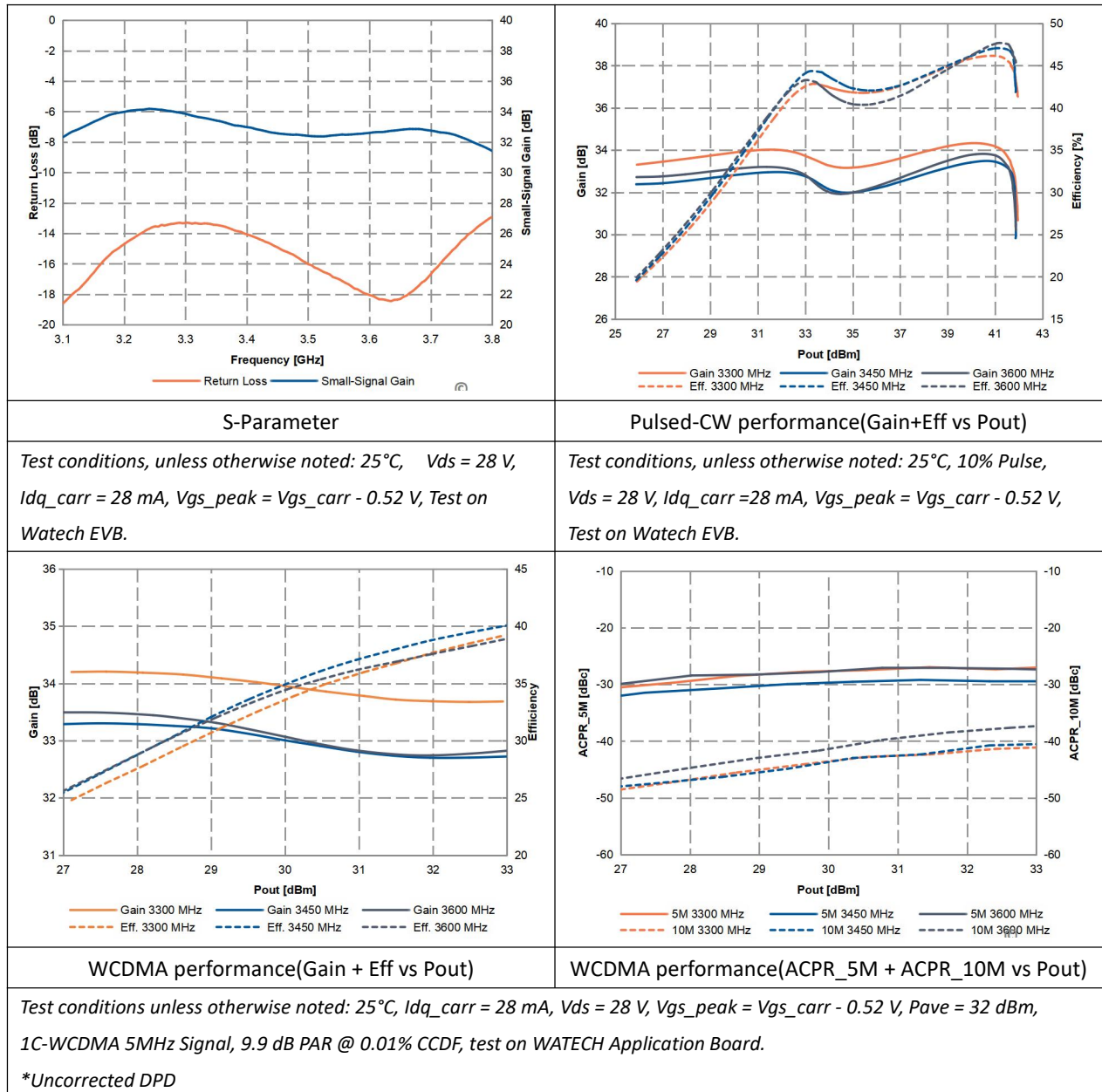
H9G3336M12Q 3.3-3.6 GHz Reference Design



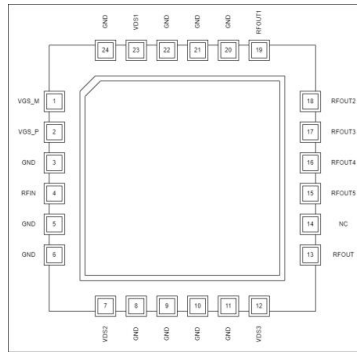
Bill of Materials (BoM) - H9G3336M12Q 3.3-3.6 GHz Reference Design

Component	Type	Value	Description	P/N
C1	Capacitor	6.8pF	Multi-layer ceramic capacitor	GQM1555C2D6R8BB01D
C2	Capacitor	100nF	Multi-layer ceramic capacitor	GRM155B31E104KE14
C3	Capacitor	0.5pF	Multi-layer ceramic capacitor	GQM1555C2D0R5BB01D
C4	Capacitor	0.7pF	Multi-layer ceramic capacitor	GQM1555C2D0R7BB01D
C5	Capacitor	7.5pF	Multi-layer ceramic capacitor	GQM1555C2D7R5BB01D
C6 - C13	Capacitor	1 uF	Multi-layer ceramic capacitor	GRM21BC72A105KE01L
C14	Capacitor	10 uF	Multi-layer ceramic capacitor	GRM32EC72A106KE05L
L1, L2	Inductor	1.5nH	HQ inductor	LQW15AN1N5B80D
L3	Inductor	2.2nH	HQ inductor	LQW15AN2N2B80D
L4	Inductor	3.6nH	HQ inductor	LQW15AN3N6B80D
L5	Inductor	8.2nH	HQ inductor	LQW15AN8N2B80D
R1, R2	Resistor	0ohm	Resistor	RC0402FR-070RL

Performance Plots



Pin Configuration and Description



Pin Configuration

Pin Number	Label	Description
1	VGS_M	Gate-source voltage of main
2	VGS_P	Gate-source voltage of peak
3	GND	Ground
4	RFin	RF input
5	GND	Ground
6	GND	Ground
7	VDS2	Drain-source voltage of peak driver
8	GND	Ground
9	GND	Ground
10	GND	Ground
11	GND	Ground
12	VDS3	Drain-source voltage of final stage
13	RFout	RF output
14	NC	NOT CONNECTED
15	RFout5	RF output5
16	RFout4	RF output4
17	RFout3	RF output3
18	RFout2	RF output2
19	RFout1	RF output1
20	GND	Ground
21	GND	Ground
22	GND	Ground
23	VDS1	Drain-source voltage of main driver
24	GND	Ground

Package Marking and Dimensions

marking sample ↓



Line1: fixed : Device name

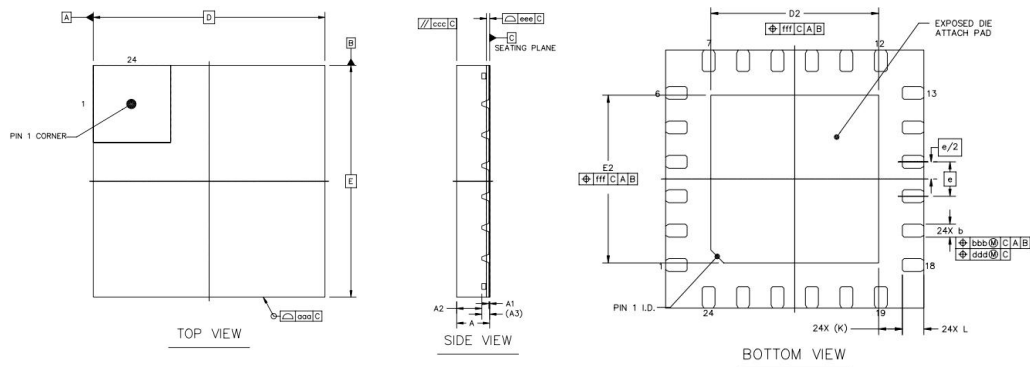
Line2 :unfixed: The last eight digits of Marking Lot No
(Sample:EEYY0001)

Line3 :unfixed: Date Code+ JY

2D Code : Line2+Sub Lot No+Strip No+XXYY(Coordinates on Strip)

●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

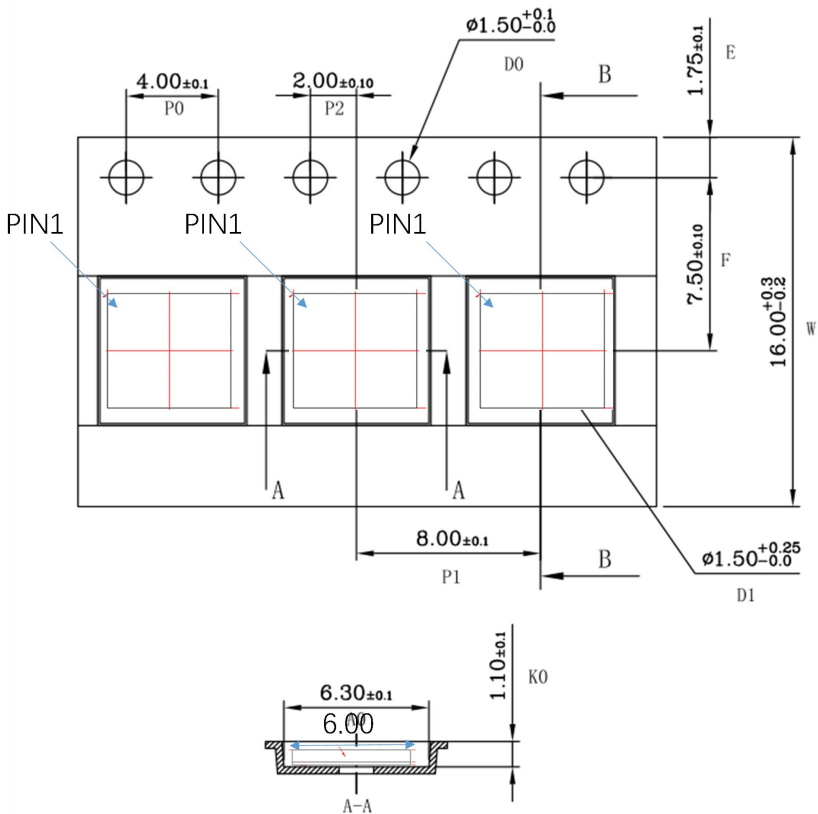


	SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS	A	0.8	0.85	0.9
STAND OFF	A1	0	0.02	0.05
MOLD THICKNESS	A2	---	0.65	---
L/F THICKNESS	A3		0.203 REF	
LEAD WIDTH	b	0.25	0.3	0.35
BODY SIZE	X	D	6 BSC	
	Y	E	6 BSC	
LEAD PITCH	e		0.8 BSC	
EP SIZE	X	D2	3.8	3.9
	Y	E2	3.8	3.9
LEAD LENGTH	L	0.4	0.5	0.6
LEAD TIP TO EXPOSED PAD EDGE	K		0.55 REF	
PACKAGE EDGE TOLERANCE	aaa		0.1	
MOLD FLATNESS	ccc		0.1	
COPLANARITY	eee		0.08	
LEAD OFFSET	bbb		0.1	
EXPOSED PAD OFFSET	ddd		0.05	
	fff		0.1	

Package Dimensions

Packing Information

Package Type	Reel Size(inch)	Qty/Reel(pcs)	Qty/Box(pcs)	Qty/Carton(pcs)
QFN 6x6x0.85, 24-pins	13	3000	3000	15000



Tape & Reel Packaging Descriptions

Handling Precautions

Parameter	Grade	
Moisture Sensitivity Level MSL	3	
Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1A	JESD22-A114
ESD – Charged Device Model (CDM)	Class C1	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
GaN	Gallium Nitride
CW	Continuous Waveform
VSWR	Voltage Standing Wave Ratio



H9G3336M12Q
14W, 3.3-3.6 GHz Doherty Amplifier
Product Datasheet

Revision History

Document ID	Datasheet status	Release date	Version revision record
Rev 0.1	Preliminary	2023/03	Preliminary Version
Rev 0.1	Product	2023/07	Product Version
Rev 0.2	Product	2024/08	Update format
Rev 0.3	Product	2024/10	Update Reference PCB Layout



Contact Information

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

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- Email: MKT@watechelectronics.com

For technical questions and application information:

- Email: MKT@watechelectronics.com

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