H9G1822M60P

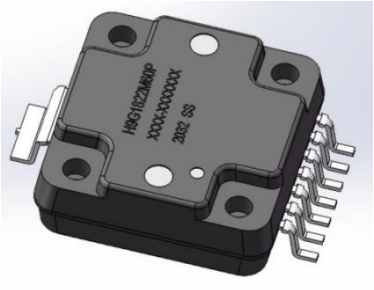
60W, 1.8 - 2.2 GHz LDMOS MMIC Amplifier

Product datasheet

Description

The H9G1822M60P is a LDMOS MMIC Integrated Asymmetrical Doherty based on 2-Stage with 60W saturated output power covering frequency range from 1.8 - 2.2 GHz.

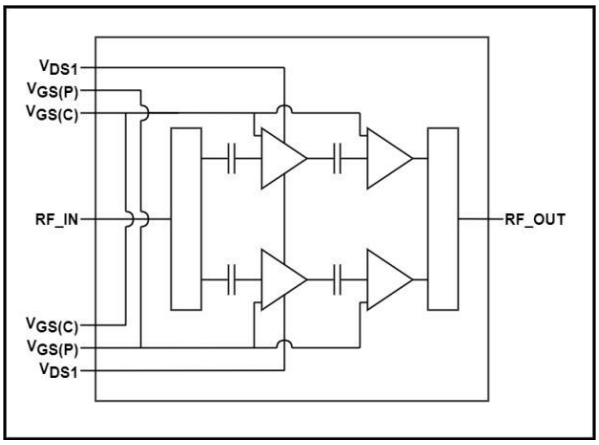
The amplifier is 50 Ω Input matched with integrated input divider and output combiner into a small compact footprint which makes it ideal for integration.



OMP400-8

Over Molded Plastic Package 8 pin

Block Diagram



H9G1822M60P Block Diagram

Features

- Operating Frequency Range: 1.8 - 2.2 GHz
- Operating Drain Voltage: +28V
- Saturation Output Power: 60W
- Power Average: 3.15W
- 50 Ω Input matched
- Integrated Input Divider
- Integrated Output Combiner
- Integrated Asymmetrical Doherty Final Stage
- High Efficiency: 30%@2.19GHz, WCDMA
- High Gain: 28dB@2.19GHz, WCDMA
- Small footprint: OMP400-8, 10.3x10.3mm

Applications

- 3GPP 5G NR FR1 n1/34/39/65/66/70 and 4G-LTE B1/2/3/4/34/37/39/65/66/70
- Power Amplifier for Small Cells
- Driver Amplifier for Micro and Macro Base Stations
- Active Antenna Array for 5G mMIMO
- Repeaters/DAS
- Mobile Infrastructure

Ordering Information

Part Number	Description
H9G1822M60P	Reel Package
H9G1822M60PEVB	1.8 - 2.2 GHz EVB

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Typical Performance

RF Characteristics (Pulsed CW)

Freq (GHz)	P3dB (dBm)	Gain (dB)	Eff (%)	IRL (dB)
1.805	48.25	29.06	30.31	14.6
1.8425	48.17	28.89	29.21	15.7
1.880	48.21	28.95	29.90	17.1
2.100	48.43	28.62	31.29	22.8
2.150	48.16	28.38	28.70	21.8
2.200	47.98	28.67	29.37	18.8

Test conditions unless otherwise noted: 25 °C, V_{DD} = +28Vdc, $I_{DQ\_Carrier}$= 100mA, I_{DQ_Peak}= 17mA, PW = 100us, DC= 10% test on HOTLO Application Board

RF Characteristics (WCDMA)

Freq (GHz)	Gain (dB)	Eff (%)	ACPR* @5MHz (dBc)	ACPR* @10MHz (dBc)
1.805	29.05	29.49	-32.92	-52.58
1.8425	28.84	29.36	-33.22	-51.83
1.880	28.78	30.45	-33.15	-51.03
2.100	28.43	30.52	-36.18	-50.03
2.150	28.33	28.76	-37.55	-50.47
2.200	28.54	29.75	-36.86	-50.82

Test conditions unless otherwise noted: 25 °C, V_{DD} = +28Vdc, $I_{DQ\_Carrier}$= 100mA, I_{DQ_Peak}= 17mA, P_{AVG} = 35 dBm 1C-WCDMA 5MHz Signal, 7.6 dB PAR @ 0.01% CCDF test on HOTLO Application Board
**Uncorrected DPD*

Absolute Maximum Ratings

Parameter	Range/Value	Unit
Drain voltage (V_{DSS})	-0.5 to +65	V
Gate voltage (V_{GS})	-5 to +10	V
Drain voltage (V_{DD})	0 to +28	V
Storage Temperature (T_{STG})	-55 to +150	°C
Case Temperature (T_C)	-40 to +125	°C
Junction Temperature (T_J)	-40 to +175	°C

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Electrical Specification

DC Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Breakdown Voltage $V_{(BR)DSS}$ [2]	Vgs=0V, Ids=100uA	65	-	-	V
Gate-Source Threshold Voltage $V_{GS(th)}$ [1]	Vgs=28V, Ids=17uA	1.2	-	2.0	V
Drain Leakage Current I_{DSS} [2]	Vgs=0V, Vds=28V	-	-	0.5	uA
Gate Leakage Current I_{GSS} [1]	Vgs=10V, Vds=0V	-	-	0.05	uA

[1] Including Driver and Final stage

[2] Including Carrier and Peak

RF Characteristics (Pulsed CW)

Parameter	Freq (GHz)	Min	Typ.	Max	Unit
P3dB	2.2	47.5	48.0	-	dBm

Test conditions unless otherwise noted: 25 °C, V_{DD} = +28Vdc, $I_{DQ\_Carrier}$= 100mA, I_{DQ_Peak}= 17mA, PW = 100us, DC= 10% test on HOTLO Production Board

RF Characteristics (WCDMA)

Parameter	Conditions	Min	Typ.	Max	Unit
Frequency	2.19				GHz
Gain	P_{AVG} = 35 dBm	26.5	28	32	dB
Eff	P_{AVG} = 35 dBm	27	30	35	%
ACPR@5MHz*	P_{AVG} = 35 dBm	-40	-36	-28	dBc

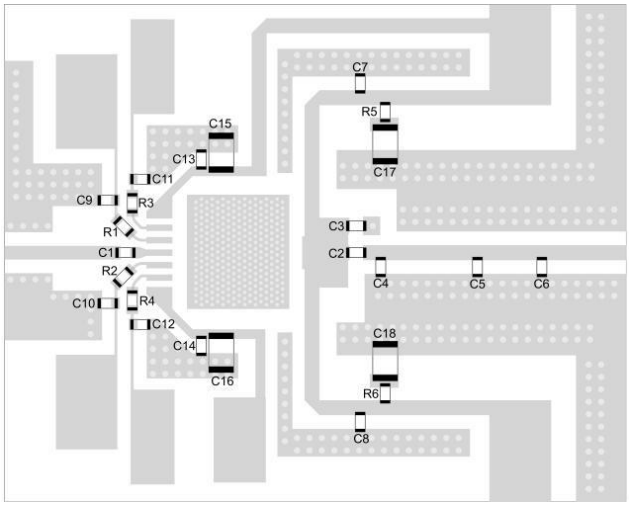
Test conditions unless otherwise noted: 25 °C, V_{DD} = +28Vdc, $I_{DQ\_Carrier}$= 100mA, I_{DQ_Peak}= 17mA, 1C-WCDMA 20MHz Signal, 7.6 dB PAR @ 0.01% CCDF test on HOTLO Production Board

**Uncorrected DPD*

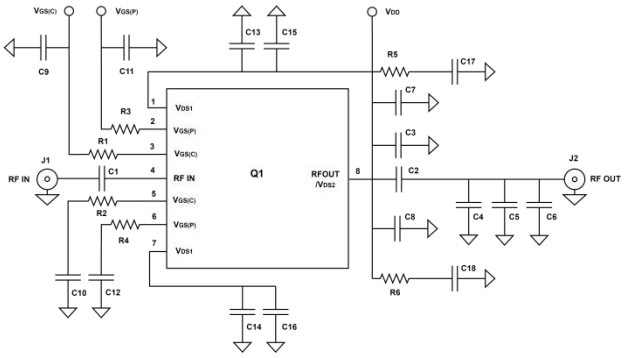
Thermal Information

Parameter	Condition	Value (Typ)	Unit
Thermal Resistance Junction to Case (R_{TH})	T_{CASE}= 90°C, 1C-WCDMA 5MHz Signal, 7.6 dB PAR, P_{AVG} = 35 dBm	2.5	°C /W

H9G1822M60P 1.8 - 2.2 GHz Reference Design (50 x40 mm)



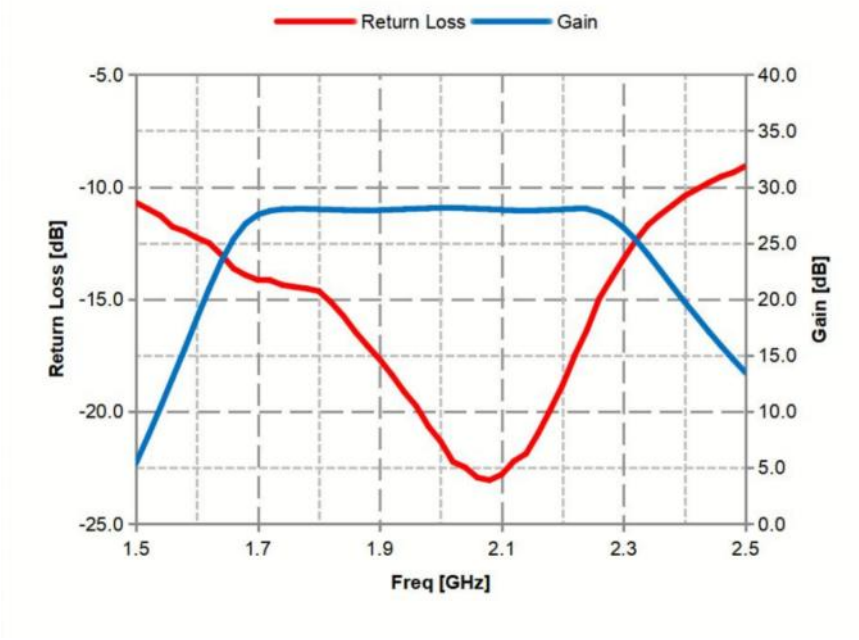
EVB Layout



EVB Schematic

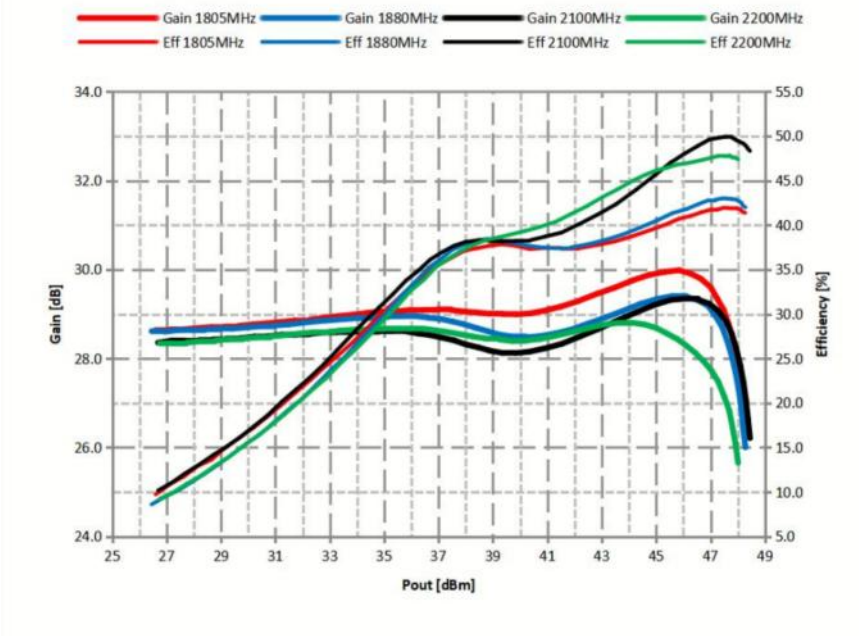
Bill of Materials (BoM) - H9G1822M60P 1.8 - 2.2 GHz Reference Design

Reference	Value	Description	Manufacturer	P/N
Q1	-	60W, 1.8 - 2.2 GHz LDMOS MMIC PA	Holto	H9G1822M60P
C1, C4	2p7F	Multi-Layer Ceramic Capacitor	Murata	GQM2195C2E2R7BB12
C2	2p4F	Multi-Layer Ceramic Capacitor	Murata	GQM2195C2E2R4BB12
C3, C6	1p5F	Multi-Layer Ceramic Capacitor	Murata	GQM2195C2E1R5BB12
C5	3pF	Multi-Layer Ceramic Capacitor	Murata	GQM2195C2E3R0BB12
C7, C8	15pF	Multi-Layer Ceramic Capacitor	Murata	GQM2195C2E150GB12
C9-C14	1nF	Multi-Layer Ceramic Capacitor	Murata	GRM21A5C2E102JWA1
C15-C18	10uF	Multi-Layer Ceramic Capacitor	Murata	GRM32EC72A106KE05
R1-R4	33Ω	Thick Film Resistor	YAGEO	RC0805FR-0733RL
R5, R6	10Ω	Thick Film Resistor	YAGEO	RC0805FR-0710RL
PCB	• Rogers 4350B, er = 3.66; Thickness= 20 mil (0.508 mm); Thickness copper plating = 35 µm (1oz) • Soldered on a 50x40x10 mm Copper Base-Plate			



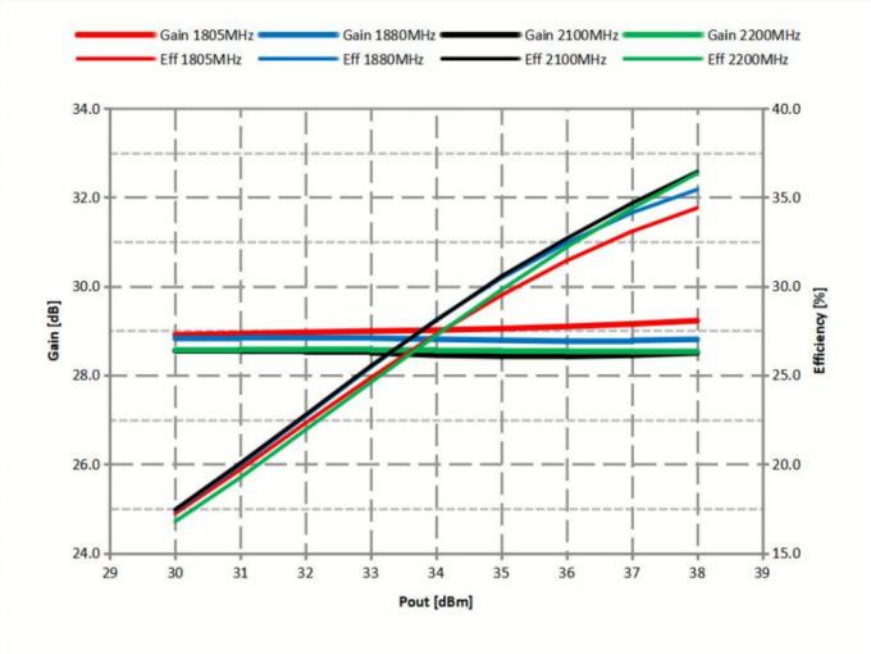
Small Signal, Gain and Return Loss vs Frequency

Test conditions unless otherwise noted: 25 °C, V_{DD} = +28Vdc, $I_{DQ\_Carrier}$= 100mA, I_{DQ_Peak}= 17mA test on HOTLO Application Board



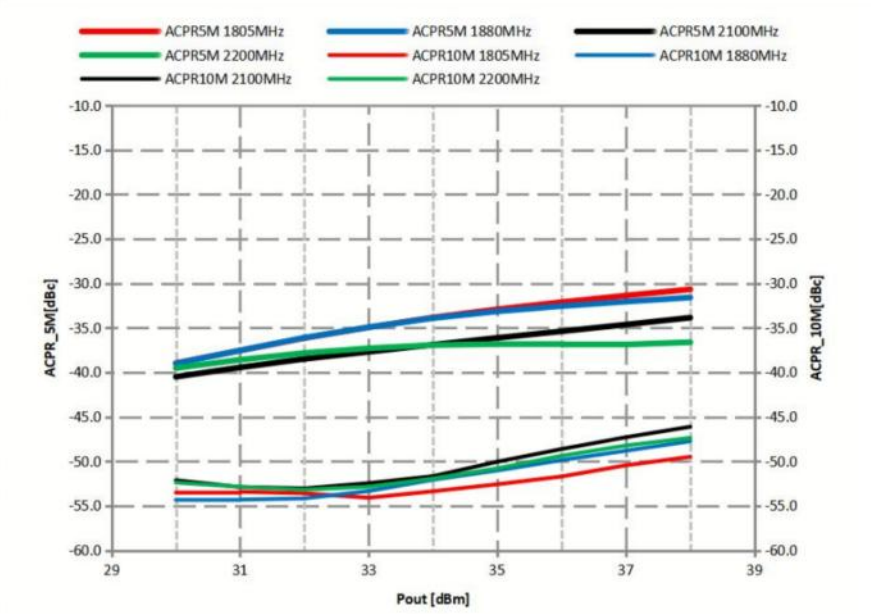
Pulsed CW, Gain and Efficiency vs Pout

Test conditions unless otherwise noted: 25 °C, V_{DD} = +28Vdc, $I_{DQ\_Carrier}$= 100mA, I_{DQ_Peak}= 17mA, PW = 100us, DC= 10% test on HOTLO Application Board



WCDMA, Gain and Efficiency vs Pout

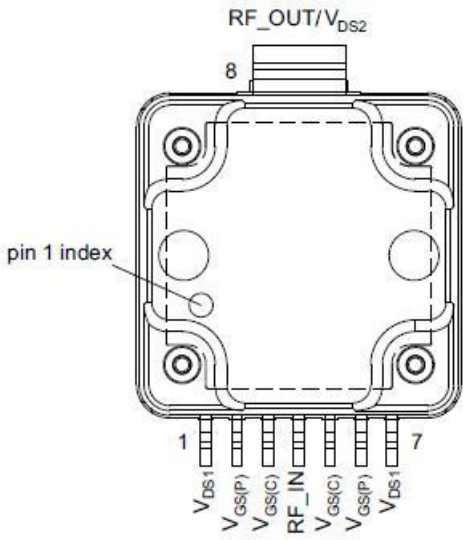
Test conditions unless otherwise noted: 25 °C, V_{DD} = +28Vdc, $I_{DQ\_Carrier}$= 100mA, I_{DQ_Peak}= 17mA, 1C-WCDMA 5MHz Signal, 7.6 dB PAR @ 0.01% CCDF test on HOTLO Application Board



WCDMA, ACPR_5MHz, ACPR_10MHz vs Pout

Test conditions unless otherwise noted: 25 °C, V_{DD} = +28Vdc, $I_{DQ\_Carrier}$= 100mA, I_{DQ_Peak}= 17mA, 1C-WCDMA 5MHz Signal, 7.6 dB PAR @ 0.01% CCDF test on HOTLO Application Board

Pin Configuration and Description

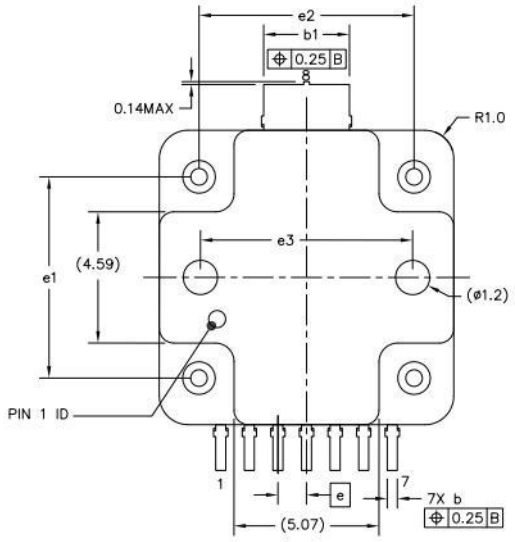


Pinout Device Configuration

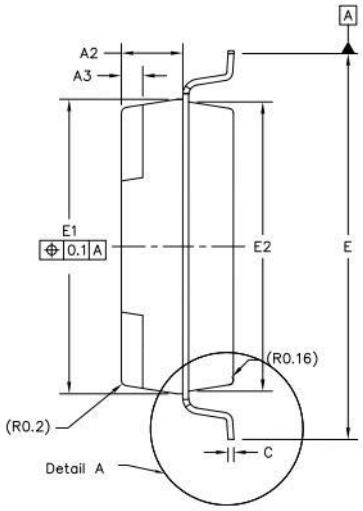
Pin Number	Label	Description
1	VDS1	Drain-Source Voltage Driver Stage
2	VGS(P)	Gate-Source Voltage Peak
3	VGS(C)	Gate-Source Voltage Main
4	RF IN	RF Input
5	VGS(C)	Gate-Source Voltage Main
6	VGS(P)	Gate-Source Voltage Peak
7	VDS1	Drain-Source Voltage Driver Stage
8	RF OUT/VDS2	RF Output & Drain-Source Voltage Final Stage

Package Marking and Dimensions

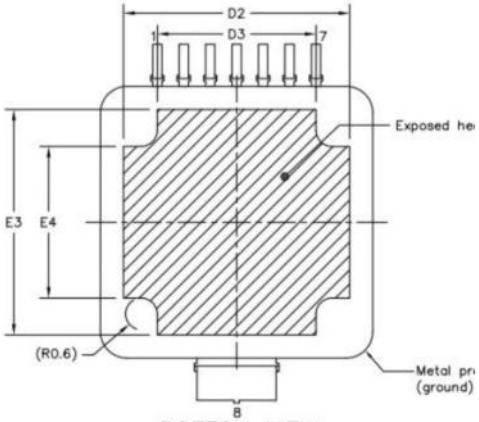
Marking



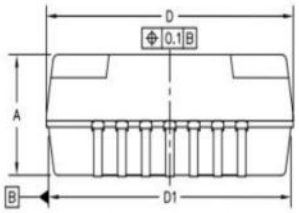
TOP VIEW



SIDE VIEW



BOTTOM VIEW



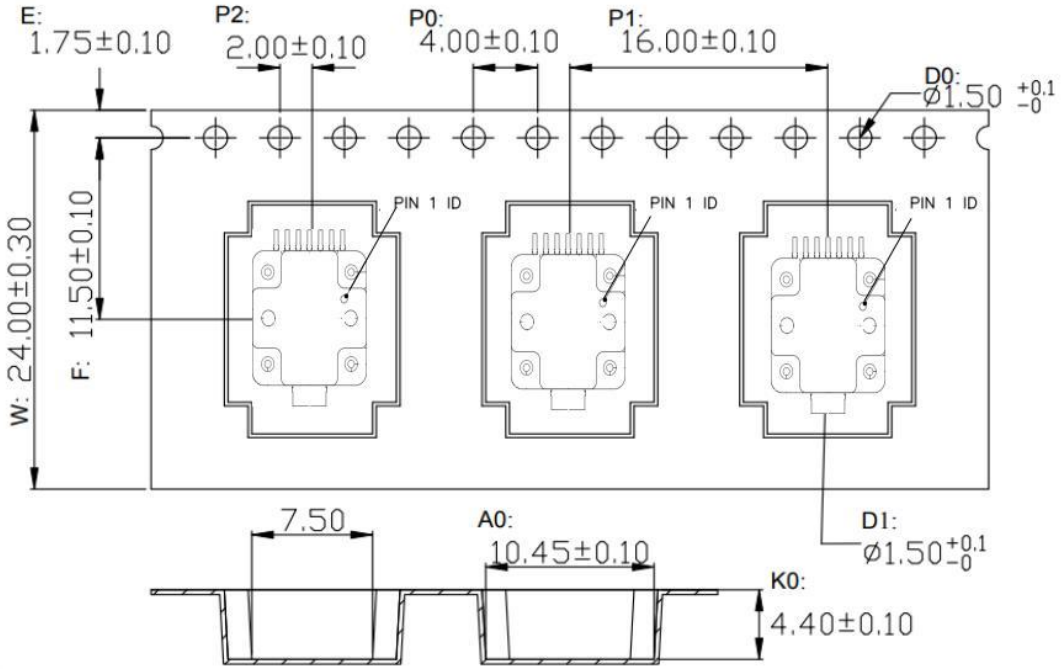
SIDE VIEW

SYMBOL	MIN	NOM	MAX
A	3.87	3.92	4
A1	−0.02	0	0.06
A2		2.15 REF	
A3		0.75 REF	
A4		1.57 REF	
b	0.3	0.35	0.4
b1	2.95	3	3.05
D	10.25	10.3	10.35
D1	10.07	10.12	10.17
D2	8.4	8.55	8.7
D3	5.8	6	6.2
E	13.2	13.5	13.8
E1	10.25	10.3	10.35
E2	10.07	10.12	10.17
E3	8.4	8.55	8.7
E4	5.55	5.75	5.95
e		1 BSC	
e1		7.04 REF	
e2		7.52 REF	
e3		7.42 REF	
L	0.8	0.95	1.1
C	0.17	0.22	0.27
θ	0°	3°	7°

Package Dimensions

Tape and Reel Information

Package Type	Reel Size(inch)	Qty/Reel(pcs)	Qty/Box(pcs)	Qty/Carton(pcs)
OM400-8L	13	600	600	3000



Tape & Reel 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
MMIC	Monolithic Microwave Integrated Circuit

Revision history

Document ID	Datasheet Status	Release Date	Revision Version
Rev 2.0	Product	Nov 2022	Product release
Rev 2.1	Product	March 2023	New format based on English version datasheet

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Contact Information

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