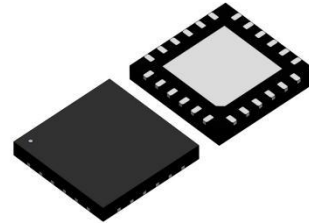


Description

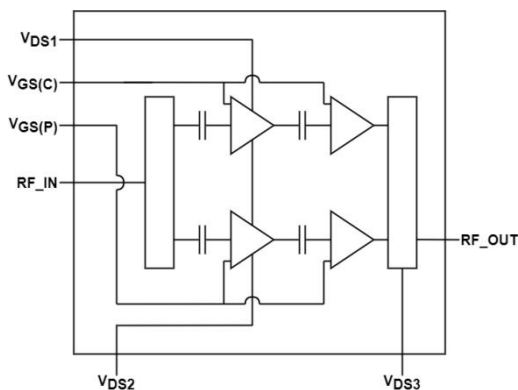
The H9G1819M10Q is a LDMOS integrated Asymmetrical Doherty 2-stage Power Amplifier designed for cellular base station applications with 1.26 W average output power covering frequency range from 1.805 to 1.88 GHz.



24 Lead QFN 6x6 mm Plastic Package



Block Diagram



Features

- Operating Frequency Range: 1.805 to 1.88 GHz
- Operating Drain Voltage: +28 V
- Saturation Output Power: 10 W
- Integrated Input Divider
- High Efficiency
- High Gain over the Frequency Range
- Small footprint package, 6mm x 6mm QFN

Applications

- 3GPP 5G NR FR1 n3 and 4G/LTE band B3.
- 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 |
|----------------|---------------------|
| H9G1819M10Q | Reel Package |
| H9G1819M10QEVB | 1.805 - 1.88GHz EVB |

Typical Performances

| Freq(MHz) | P3dB(dBm) | Gain(dB) | Eff(%) | IRL(dB) |
|-----------|-----------|----------|--------|---------|
| 1805 | 40.7 | 28.2 | 50.6 | -12.2 |
| 1845 | 40.5 | 28.4 | 50.4 | -12.7 |
| 1880 | 40.4 | 28.4 | 49.2 | -13.5 |

$V_{DD}=28V_{dc}$, $I_{DQ}=24mA$, $V_{gsp}=V_{gsm}-0.5V$, $P_{out}=31\text{ dBm}$, Pulsed CW, 100 us, Duty Cycle = 10%, Test on Watech EVB.

| Freq(MHz) | Gain(dB) | Eff(%) | ACPR_5MHz(dBc) | ACPR_10MHz(dBc) |
|-----------|----------|--------|----------------|-----------------|
| 1805 | 27.6 | 46.5 | -26.5 | -38.4 |
| 1845 | 27.7 | 46.4 | -27.3 | -38.9 |
| 1880 | 27.7 | 45.5 | -28.3 | -39.0 |

$V_{DD}=28V_{dc}$, $I_{DQ}=24mA$, $V_{gsp}=V_{gsm}-0.5V$, $P_{out}=31\text{ dBm}$, 5MHz WCDMA, PAR=9.9 dB, Test on Watech EVB.

Absolute Maximum Ratings

| Parameter | Range/Value | Units |
|----------------------------|-------------|-------|
| Drain voltage (VDSS) | -0.5 to 65 | V |
| Gate voltage (VGS) | -6 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 | Units |
|---|----------------------|-----|-----|------|-------|
| IGSS_C Gate leakage Current for Carrier | Vgs=10V, Vds=0V | / | / | 1.05 | uA |
| IGSS_P Gate leakage Current for Peak | Vgs=10V, Vds=0V | / | / | 1.05 | uA |
| IDSS Drain leakage Current | Vgs=0V, Vds=28V | / | / | 2 | uA |
| BVDS Breakdown Voltage | Vgs=0V, Ids=10.98 uA | 65 | / | / | V |
| VGS(th)_C Gate-Source threshold Voltage of Carrier | Vgs=Vds, Ids=3.48 uA | 1.2 | / | 2 | V |
| VGS(th)_P Gate-Source threshold Voltage of Peak | Vgs=Vds, Ids=7.5 uA | 1.2 | / | 2 | V |

RF Characteristics (Pulsed CW)

| Parameter | Conditions | Min | Typ | Max | Units |
|-----------------|--------------|-------|------|------|-------|
| Frequency Range | Pout=31 dBm | 1.805 | / | 1.88 | GHz |
| P3dB | Freq=1.88GHz | 39.5 | 40.5 | / | dBm |

Test conditions, unless otherwise noted: 25 °C, VDD=+28Vdc, IDQ = 24 mA, Vgsp=Vgsm-0.5V, Pulse Width = 100 us, Duty Cycle = 10%,Based on FT board

RF Characteristics (WCDMA)

| Parameter | Conditions | Min | Typ | Max | Units |
|-----------------|--------------------------|-------|------|------|-------|
| Frequency Range | Pout=31 dBm | 1.805 | / | 1.88 | GHz |
| Gain | Freq=1.88GHz, Pout=31dBm | 26 | 27.7 | 31 | dB |
| Eff | Freq=1.88GHz, Pout=31dBm | 42.5 | 46 | / | % |
| ACLR@5MHz | Freq=1.88GHz, Pout=31dBm | / | -25 | -22 | dBc |

Test conditions, unless otherwise noted: 25 °C, VDD=+28Vdc, IDQ = 24 mA, Vgsp=Vgsm-0.5V, single-carrier, 5MHz WCDMA signal with 9.9 dB PAR @ 0.01% CCDF Based on FT board

RF Characteristics (Small-Signal)

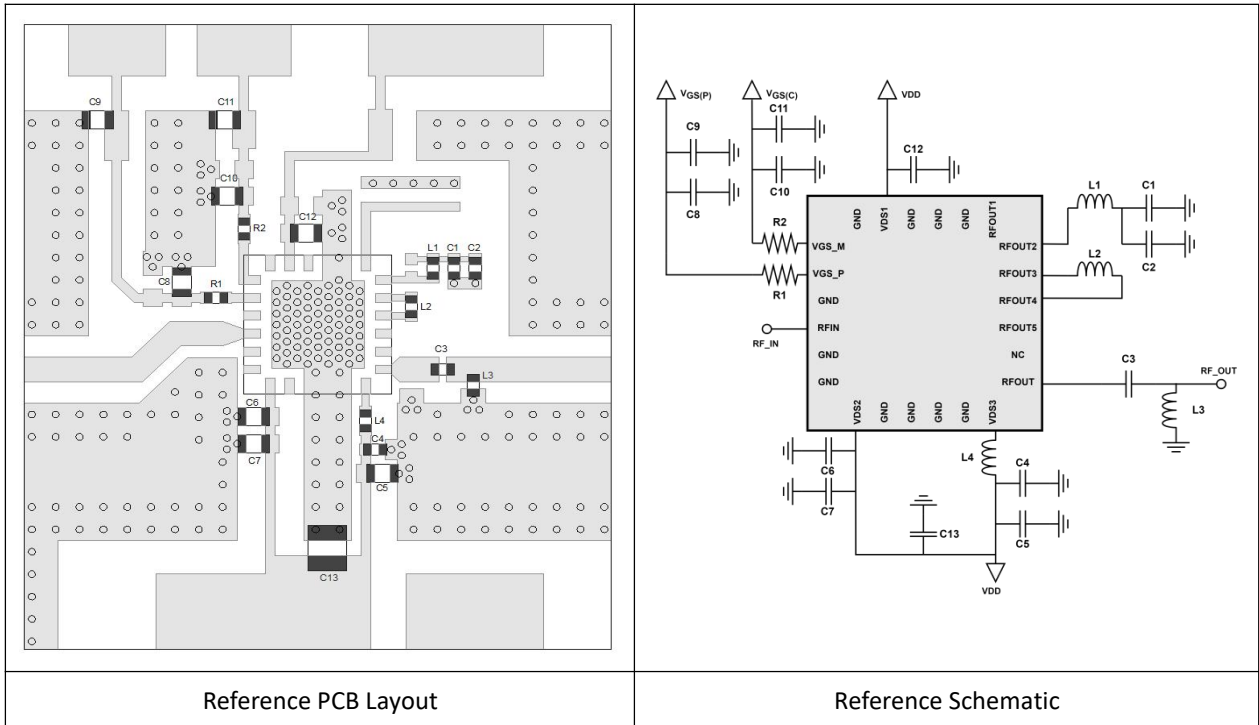
| Parameter | Conditions | Min | Typ | Max | Units |
|-------------------|--------------|-----|-----|-----|-------|
| Input Return Loss | Freq=1.88GHz | / | / | -8 | dB |

Test conditions, unless otherwise noted: 25 °C, VDD=+28Vdc, IDQ = 24 mA, Vgsp=Vgsm-0.5V, CW, Based on FT board

Thermal Information

| Parameter | Condition | Value (Typ) | Units |
|---|--|-------------|-------|
| Thermal Resistance Junction to Case (RTH) | Tcase= 90°C, WCDMA single-carrier, Pavg = 31 dBm | 8.1 | C/W |

H9G1819M10Q 1.805-1.88 GHz Reference Design



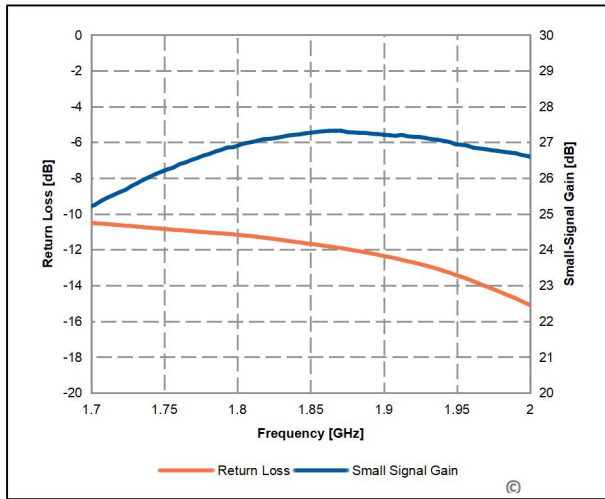
Rogers 4350B, thickness=20mil

PCB is soldered on a 25 mm by 28 mm copper base plate with 10 mm thickness

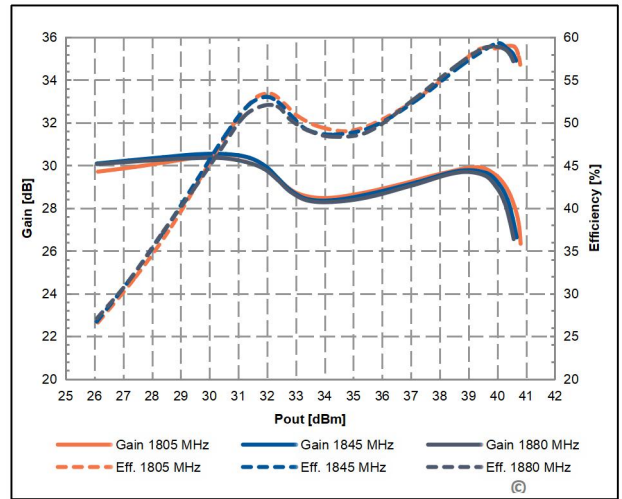
BOM-H9G1819M10Q 1.805 – 1.88 GHz Reference Design

| Component | Type | Value | Description | P/N |
|-----------|-----------|-------|-------------------------------|--------------------|
| C1,C4 | Capacitor | 20pF | Multi-layer ceramic capacitor | GQM1555C2D200GB01D |
| C2 | Capacitor | 100nF | Multi-layer ceramic capacitor | GRM155B31E104KE14 |
| C3 | Capacitor | 2.7pF | Multi-layer ceramic capacitor | GQM1555C2D2R7BB01D |
| C5 - C12 | Capacitor | 1 uF | Multi-layer ceramic capacitor | GRM21BC72A105KE01L |
| C13 | Capacitor | 10 uF | Multi-layer ceramic capacitor | GRM32EC72A106KE05L |
| L1 | Inductor | 6.3nH | HQ inductor | LQW15AN6N3B80D |
| L2 | Inductor | 6.8nH | HQ inductor | LQW15AN6N8B80D |
| L3 | Inductor | 3.9nH | HQ inductor | LQW15AN3N9B80D |
| L4 | Inductor | 4.1nH | HQ inductor | LQW15AN4N1B80D |
| R1, R2 | Resistor | 0ohm | Resistor | RC0402FR-070RL |

Performance Plots

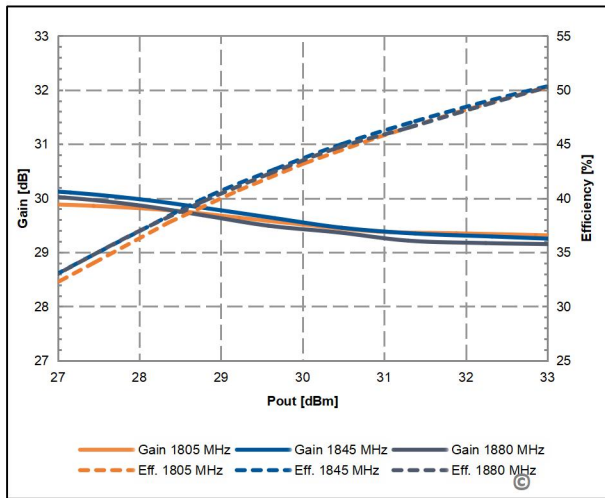


S-Parameter

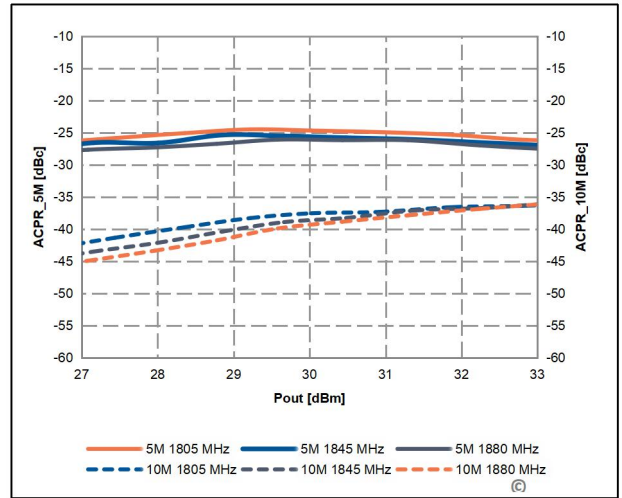


Pulsed-CW performance(Gain+Eff vs Pout)

Test conditions, unless otherwise noted: 25 °C, VDD=28 Vdc, IDQ = 24 mA, Vgsp=Vgsm-0.5V, Pulse Width = 100 us, Duty Cycle = 10%, test on WATECH EVB.



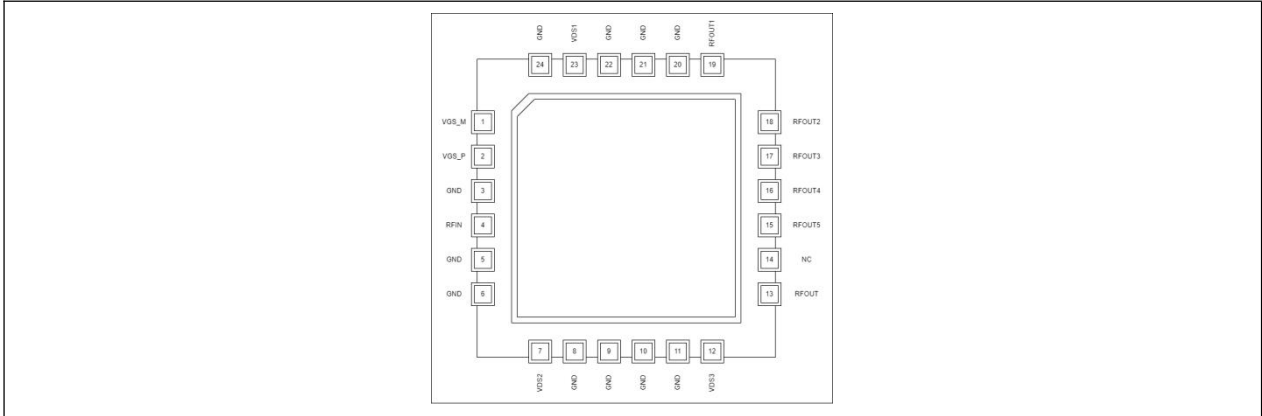
WCDMA performance(Gain+Eff vs Pout)



WCDMA performance(ACPR_5M+ACPR_10M vs Pout)

Test conditions, unless otherwise noted: 25 °C, VDD=+28Vdc, IDQ = 24 mA, Vgsp=Vgsm-0.5V, 1-carrier WCDMA, PAR=9.9 dB, test on WATECH EVB.

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 Spec No. | H9G1819M10Q Marking spec_A

Marking Spec

marking sample ↓

Line1: fixed : Device name

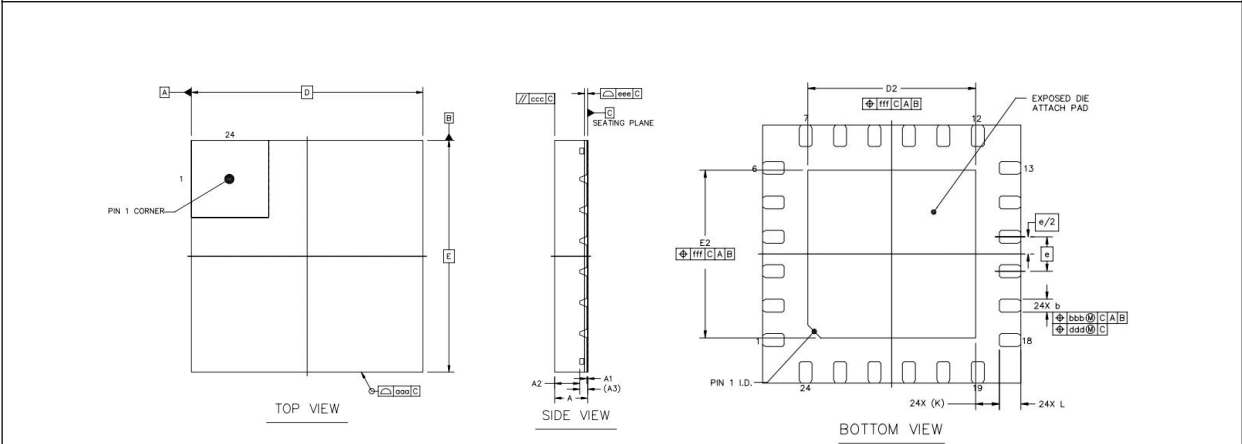
Line2 :unfixed: The last eight digits of Marking Lot No (Sample:EEYY0001)

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”.

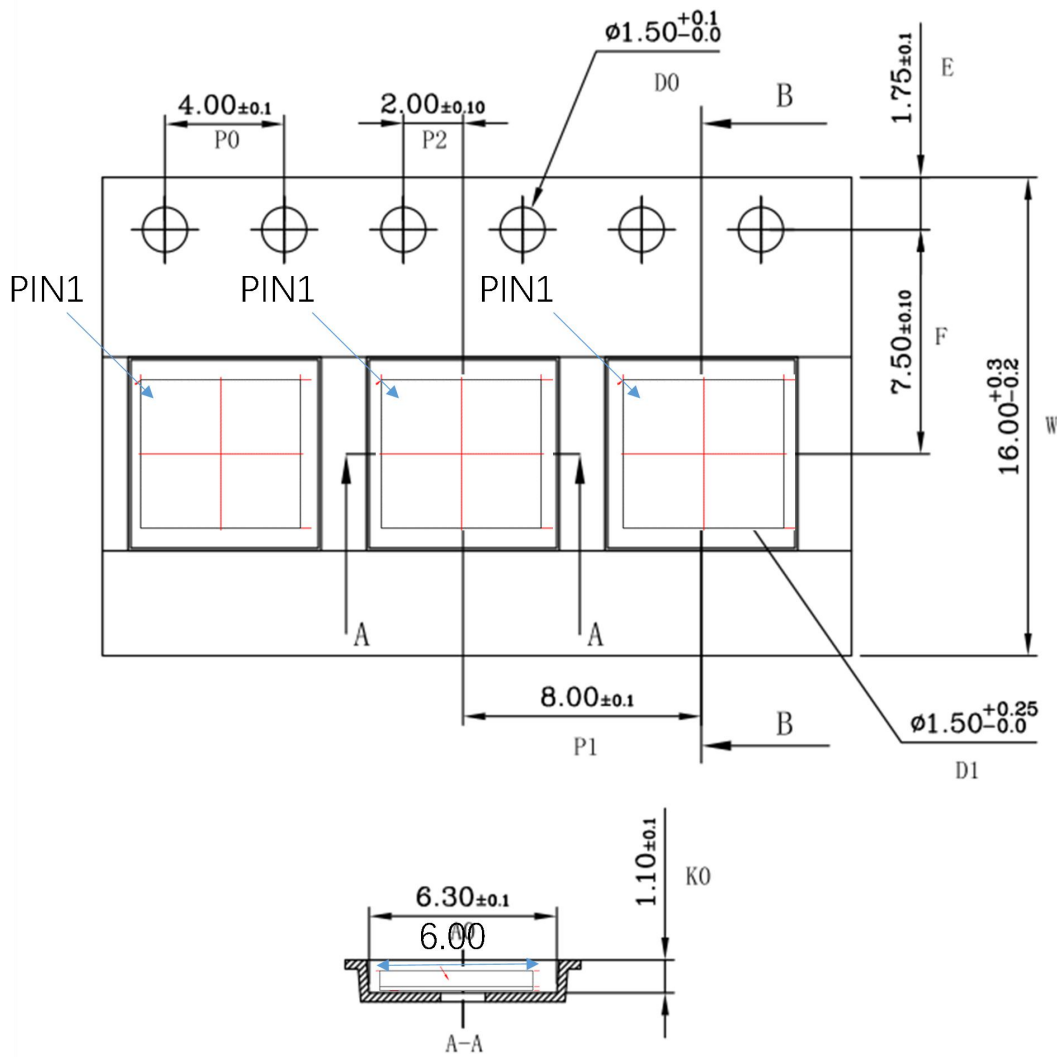
Marking



| | 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 | | | |
| | Y | E | | | |
| LEAD PITCH | e | 0.8 BSC | | | |
| EP SIZE | X | D2 | 3.8 | 3.9 | 4 |
| | Y | E2 | 3.8 | 3.9 | 4 |
| 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 | | | |

Packing Information

| Package Type | Reel Size(inch) | Qty/Reel(pcs) | Qty/Box(pcs) | Qty/Carton(pcs) |
|-----------------|-----------------|---------------|--------------|-----------------|
| QFN 6X6X0.85 24 | 13 | 3000 | 3000 | 15000 |



Handling Precautions

| Parameter | Rating | Standard | |
|----------------------------------|--------|---------------------------------|--|
| ESD – Human Body Model (HBM) | 1A | ANSI/ESDA/JEDEC Standard JS-001 | |
| ESD – Charged Device Model (CDM) | C1 | ANSI/ESDA/JEDEC Standard JS-002 | |
| MSL – 260°C Convection Reflow | MSL3 | IPC/JEDEC Standard J-STD-020 | |

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 |
|-------------|------------------|--------------|-------------------------|
| H9G1819M10Q | Preliminary | 2023/03 | Preliminary Version |
| H9G1819M10Q | Product | 2023/07 | Product Version |

Abbreviations

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

Contact Information

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- Email: MKT@watechelectronics.com

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