

0.1-3.8GHz SP8T Switch for High Power Applications

Features

- Broadband frequency range: 0.1 to 3.8 GHz
- Low insertion loss: 0.75dB typical @ 2.7 GHz
- High isolation: >20dB @ 2.7 GHz
- Integrated logic
- Small QFN 2.0mm x 2.0mm-14L package

Applications

- 2G/3G/4G antenna diversity and primary
- Cellular modems, tablets and USB Devices
- Other RF front-end modules

General Description

The AW13418HQNR is a SP8T switch with low insertion loss and high Isolation. It can be used to support band switching and mode switching in antenna diversity systems for 2G/3G/4G, data cards and tablets.

The symmetrical design of internal ports makes it convenient for PCB routing and adjustment of receiving and transmitting signals. The band/mode switching is realized by the GPIO pins as referenced in the chip block diagram and the control logic.

The AW13418HQNR is provided in a compact QFN 2.0mm x 2.0mm-14L package.

Typical Application Circuit

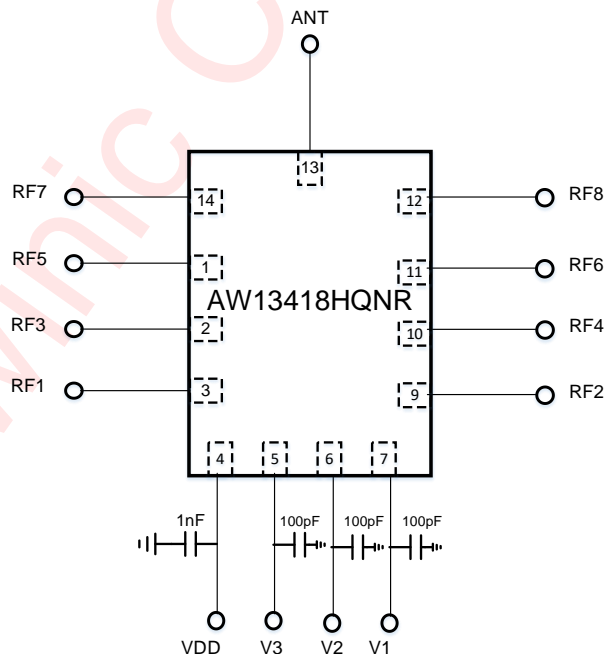
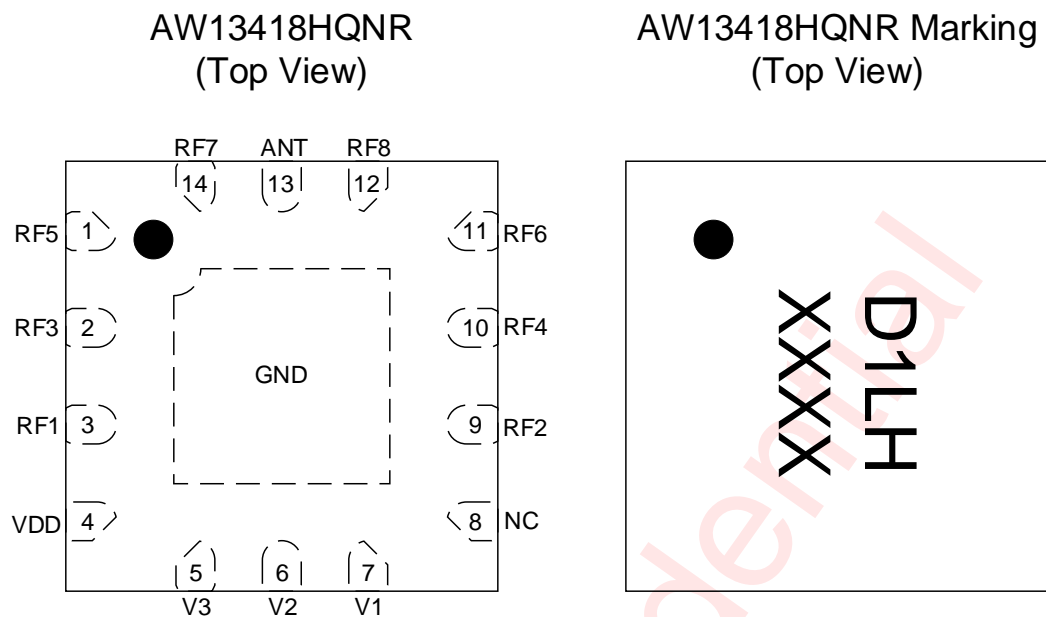


Figure 1 Typical Application Circuit of AW13418HQNR

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Pin Configuration And Top Mark



D1LH - AW13418HQNR
XXXX - Production Tracing Code

Figure 2 Pin Configuration and Top Mark

Pin Definition

| No. | NAME | DESCRIPTION |
|-----|------|----------------------|
| 1 | RF5 | RF I/O path 5 |
| 2 | RF3 | RF I/O path 3 |
| 3 | RF1 | RF I/O path 1 |
| 4 | VDD | DC power supply |
| 5 | V3 | DC control voltage 3 |
| 6 | V2 | DC control voltage 2 |
| 7 | V1 | DC control voltage 1 |
| 8 | NC | Not connected |
| 9 | RF2 | RF I/O path 2 |
| 10 | RF4 | RF I/O path 4 |
| 11 | RF6 | RF I/O path 6 |
| 12 | RF8 | RF I/O path 8 |
| 13 | ANT | Antenna port |
| 14 | RF7 | RF I/O path 7 |

Note: Bottom ground paddles must be connected to ground.

Functional Block Diagram

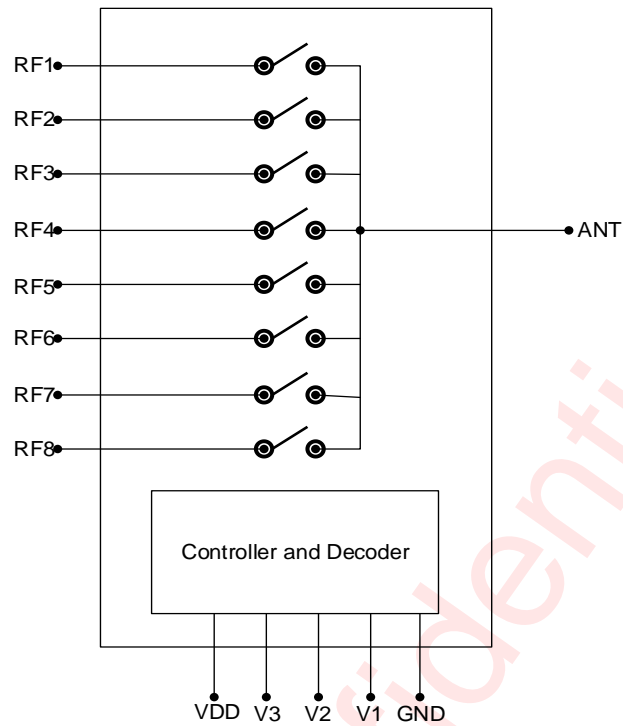


Figure 3 Functional Block Diagram

Ordering Information

| Part Number | Temperature | Package | Marking | Moisture Sensitivity Level | Environmental Information | Delivery Form |
|-------------|-------------|------------------------|---------|----------------------------|---------------------------|---------------------------------|
| AW13418HQNR | -40°C~90°C | QFN 2mmX2mm -14L | D1LH | MSL1 | ROHS+HF | 4500 units/ Tape and Reel |

Absolute Maximum Ratings^(NOTE1)

| PARAMETERS | | RANGE |
|--|----------|----------------|
| Supply Voltage Range VDD | | -0.3V to 4V |
| Control Voltage Range | V1,V2,V3 | 0V to 3.6V |
| RF input power(RF1 to RF8) | | 36dBm |
| Maximum Junction temperature T _{JMAX} | | 125 °C |
| Operating Free-air Temperature Range | | -40°C to 90°C |
| Storage Temperature T _{STG} | | -65°C to 150°C |
| Lead Temperature (Soldering 10 Seconds) | | 260°C |
| ESD | | |
| HBM (NOTE 2) | | ±2000V |
| CDM (NOTE 3) | | ±1000V |

NOTE1: Conditions out of those ranges listed in "absolute maximum ratings" may cause permanent damages to the device. In spite of the limits above, functional operation conditions of the device should within the ranges listed in "recommended operating conditions". Exposure to absolute-maximum-rated conditions for prolonged periods may affect device reliability.

NOTE2: The human body model is a 100pF capacitor discharged through a 1.5kΩ resistor into each pin. Test method: ESDA/JEDEC JS-001-2017

NOTE3: All pins. Test Condition: ESDA/JEDEC JS-002-2018

Electrical Characteristics

VDD=2.8V, V1=V2=V3=0/1.8V, PIN=0dBm, Temp=+25°C, Z₀=50Ω. (unless otherwise noted)

| PARAMETER | | TEST CONDITION | MIN | TYP | MAX | UNIT |
|--|--|--|----------|----------|------------|------|
| DC Specifications | | | | | | |
| V _{DD} | Supply Voltage | | 1.65 | 2.8 | 3.3 | V |
| I _{DD} | Supply Current | | | 28 | 60 | μA |
| V _{CTL_H} V _{CTL_L} | Control Voltage High Low | | 0.8 0 | 1.2 0 | 3.3 0.4 | V |
| I _{CTL} | Control Current | V _{CTL} = 2.8V | | 0.1 | 1 | μA |
| T _{ON} | Turn-on Switching Time | 50% of final control voltage to 90% of final RF power, switching between RF1/2/3/4/5/6/7/8 | | 0.8 | 1.5 | μS |
| RF Specifications | | | | | | |
| IL | Insertion loss(ANT pin to RF1-RF8) | 0.1-1.0G | | 0.49 | 0.58 | dB |
| | | 1.0-2.0G | | 0.57 | 0.67 | dB |
| | | 2.0-2.7G | | 0.67 | 0.78 | dB |
| | | 2.7-3.8G | | 0.75 | 0.95 | dB |
| ISO | Isolation (ANT pin to RF1-RF8) | 0.1-1.0G | 28 | 36 | | dB |
| | | 1.0-2.0G | 22 | 30 | | dB |
| | | 2.0-2.7G | 20 | 27 | | dB |
| | | 2.7-3.8G | 16 | 23 | | dB |
| RL | Input return loss (ANT pin to RF1-RF8) | 0.1-1.0G | 18 | 23 | | dB |
| | | 1.0-2.0G | 16 | 21 | | dB |
| | | 2.0-2.7G | 13 | 17 | | dB |
| | | 2.7-3.8G | 10 | 13 | | dB |
| 2fo | Second harmonics (ANT pin to RF1-RF8) | PIN=+26dBm, 0.1-3.8GHz | 80 | 85 | | dBc |
| 3fo | Third harmonics (ANT pin to RF1-RF8) | PIN=+26dBm, 0.1-3.8GHz | 75 | 80 | | dBc |
| P _{0.1dB} | 0.1dB Compression Point (ANT pin to RF1-RF8) | 0.1GHz-3.8GHz | | 35 | | dBm |

Timing Diagram (Power ON and OFF sequence)

It is very important that the user adheres to the correct power-on/off sequence in order to avoid damaging the device. The control signal V1, V2, V3 should be set to 0V unless VDD is set in the operating voltage range.

Power ON:

- 1) Apply voltage supply --- VDD
- 2) Set Controls---V1, V2, V3
- 3) Apply RF input

Change switch position from one RF port to another:

- 1) Remove RF input
- 2) Change control voltages V1, V2, V3 to set the switch to desired RF port
- 3) Apply RF input

Power OFF:

- 1) Remove RF input
- 2) Remove control voltages-V1, V2, V3
- 3) Remove VDD input

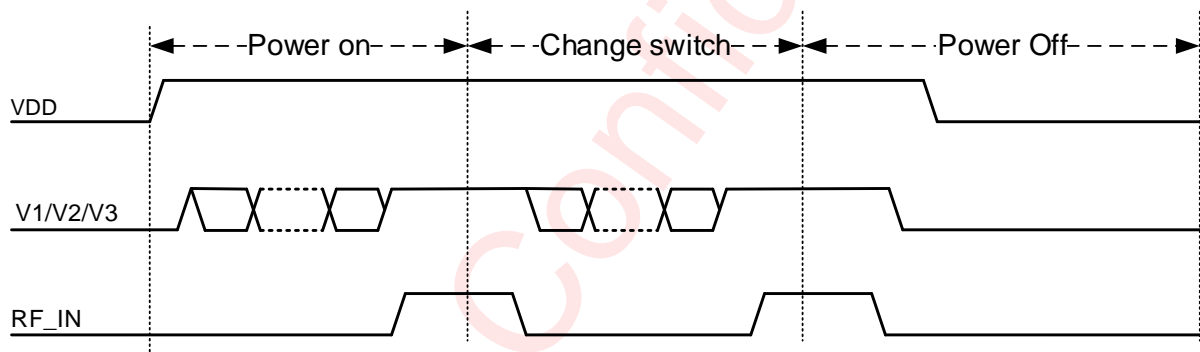
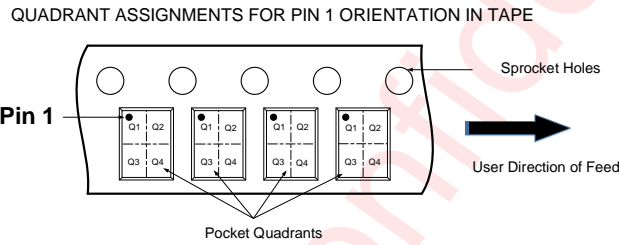
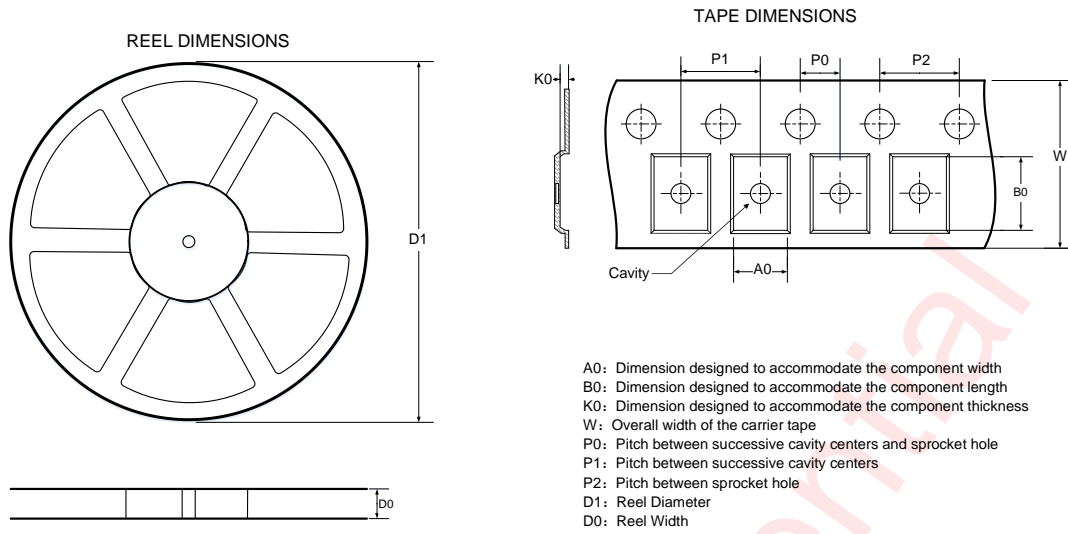


Figure 4 Power on/Change switch/Power off sequence

AW13418HQR Control Logic

| Control Pins | | | Switch RF I/O | | | | | | | |
|--------------|----|----|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| V1 | V2 | V3 | RF1 | RF2 | RF3 | RF4 | RF5 | RF6 | RF7 | RF8 |
| 0 | 0 | 0 | ON | Isolation | Isolation | Isolation | Isolation | Isolation | Isolation | Isolation |
| 0 | 0 | 1 | Isolation | ON | Isolation | Isolation | Isolation | Isolation | Isolation | Isolation |
| 0 | 1 | 0 | Isolation | Isolation | ON | Isolation | Isolation | Isolation | Isolation | Isolation |
| 0 | 1 | 1 | Isolation | Isolation | Isolation | ON | Isolation | Isolation | Isolation | Isolation |
| 1 | 0 | 0 | Isolation | Isolation | Isolation | Isolation | ON | Isolation | Isolation | Isolation |
| 1 | 0 | 1 | Isolation | Isolation | Isolation | Isolation | Isolation | ON | Isolation | Isolation |
| 1 | 1 | 0 | Isolation | Isolation | Isolation | Isolation | Isolation | Isolation | ON | Isolation |
| 1 | 1 | 1 | Isolation | Isolation | Isolation | Isolation | Isolation | Isolation | Isolation | ON |

Tape and Reel Information



Note: The above picture is for reference only. Please refer to the value in the table below for the actual size

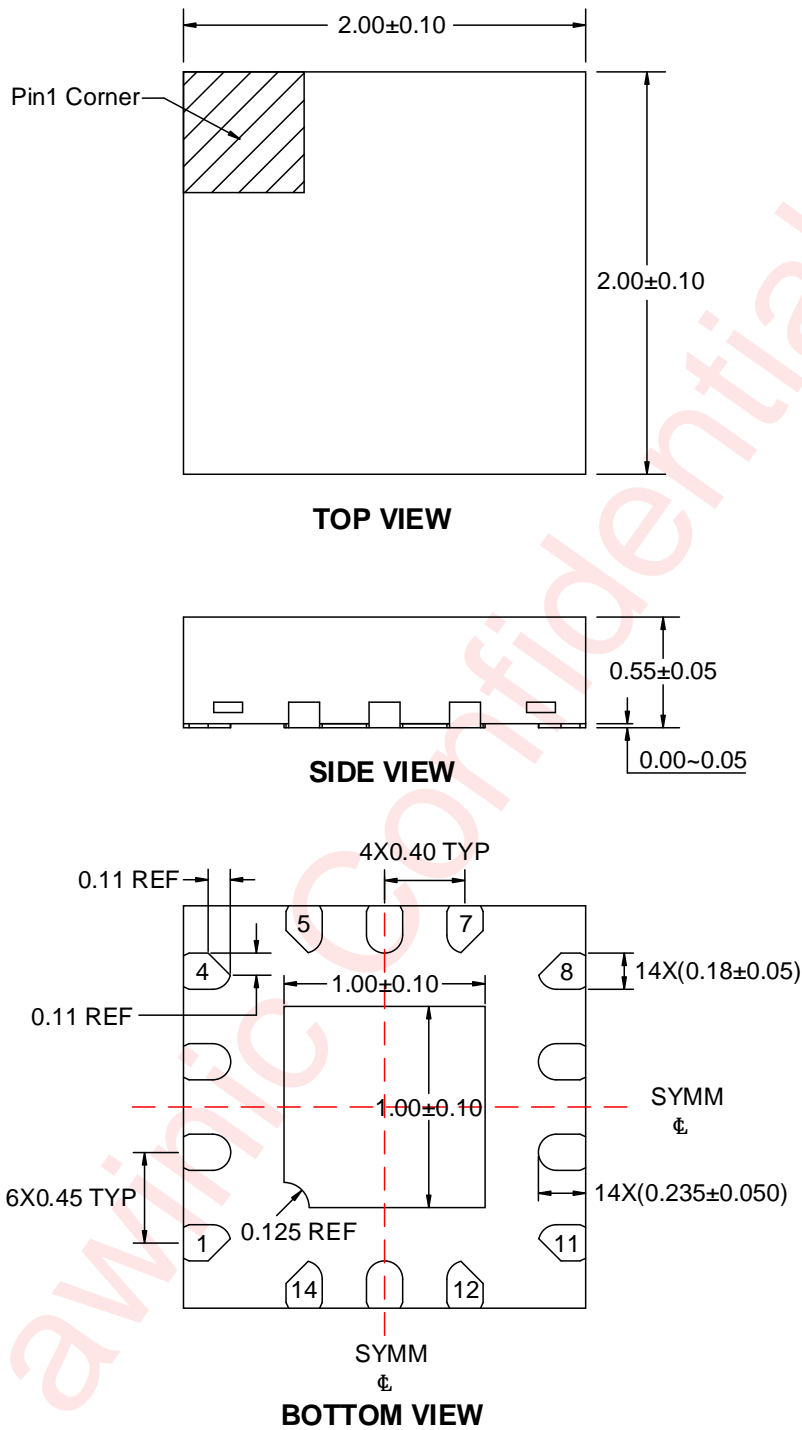
DIMENSIONS AND PIN1 ORIENTATION

| D1 (mm) | D0 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P0 (mm) | P1 (mm) | P2 (mm) | W (mm) | Pin1 Quadrant |
|---------|---------|---------|---------|---------|---------|---------|---------|--------|---------------|
| 178 | 8.4 | 2.25 | 2.25 | 0.75 | 2 | 4 | 4 | 8 | Q1 |

All dimensions are nominal

Figure 5 Tape and Reel

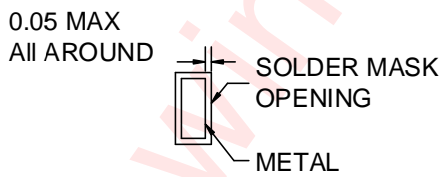
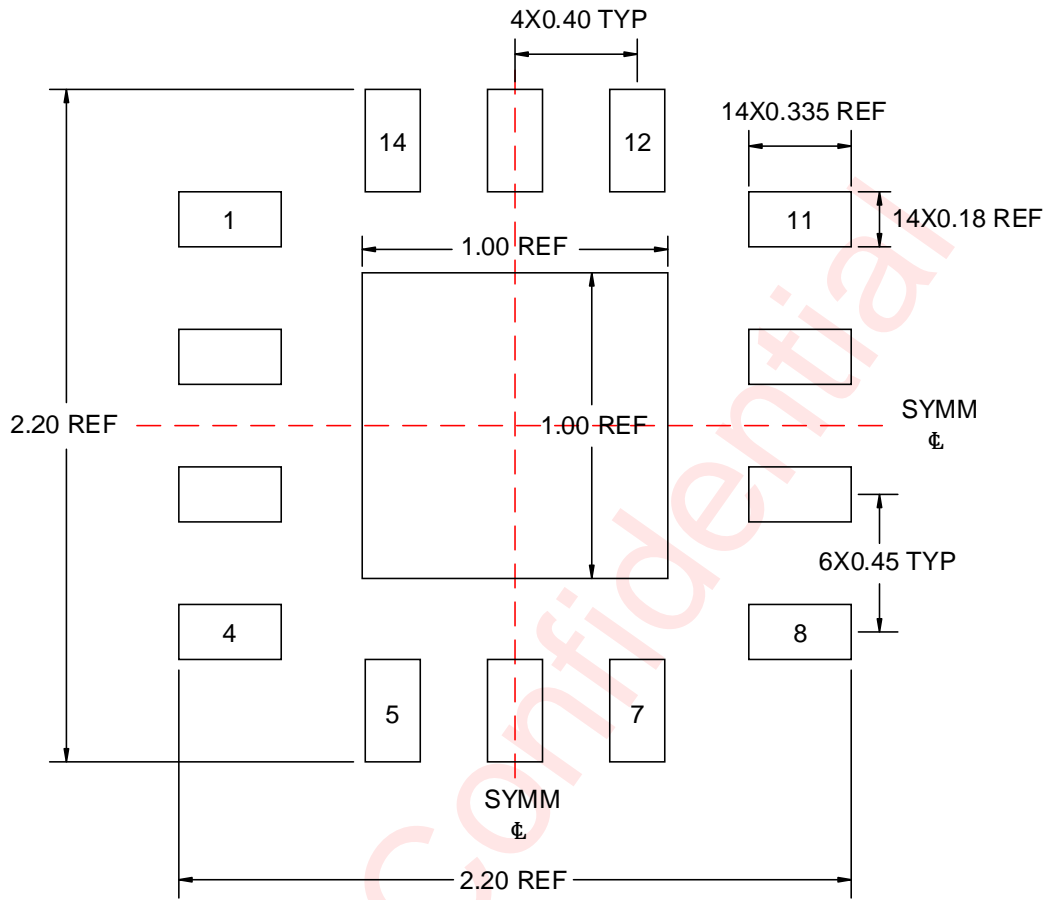
Package Description



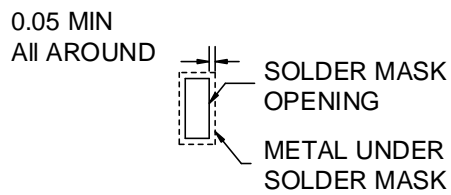
Unit: mm

Figure 6 Package Description

Land Pattern Data



NON-SOLDER MASK DEFINED



SOLDER MASK DEFINED

Unit: mm

Figure 7 Land Pattern Data

Revision History

| Vision | Date | Change Record |
|--------|-----------|-------------------------------------|
| V1.0 | Apr. 2023 | Officially Released |
| V1.1 | Jun. 2023 | Update AMR Supply Voltage Range VDD |

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