

## 30V N-Channel MOSFET

### Features

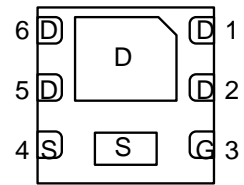
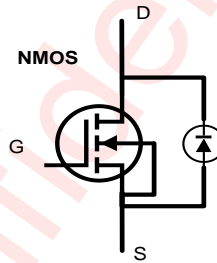
- Low on-state resistance
- RoHS compliant
- 100% UIS tested
- 100% R<sub>g</sub> tested
- DFN 2mmX2mmX0.75mm-6L Package

### Applications

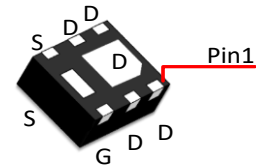
- Motor controllers
- DC-to-DC convertors
- Battery-driven electronic products, electrical equipment and machines

### General Description

| Product Summary     |  |
|---------------------|--|
| V <sub>DS</sub>     | 30V                                    |
| R <sub>DS(ON)</sub> | 6.55 mΩ (Typ.) @V <sub>GS</sub> = 10V  |
|                     | 9.00 mΩ (Typ.) @V <sub>GS</sub> = 4.5V |
| I <sub>D</sub>      | 13.2A                                  |

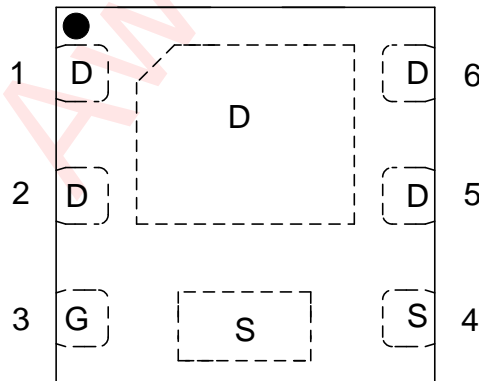


Bottom View

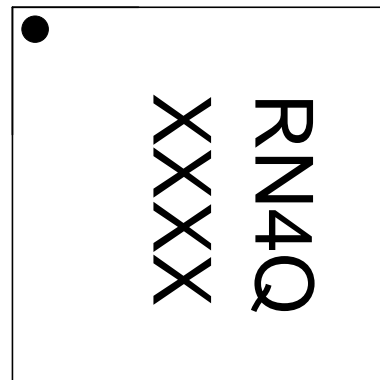


### Pin Configuration and Top Mark

AW403045NDNR  
(Top View)



AW403045NDNR Marking  
(Top View)



RN4Q-AW403045NDNR  
XXXX-Production Tracing Code

## Ordering Information

| Part Number  | Package           | Marking | Moisture Sensitivity Level | Environmental Information | Delivery Form                |
|--------------|-------------------|---------|----------------------------|---------------------------|------------------------------|
| AW403045NDNR | DFN<br>2mmX2mm-6L | RN4Q    | MSL1                       | RoHS+HF                   | 3000 units/<br>Tape and Reel |

## Absolute Maximum Ratings<sup>(NOTE1)</sup>

$T_A = T_C = 25^\circ\text{C}$  unless otherwise noted.

| Symbol    | Parameter   | Maximum                  | Unit             |   |
|-----------|---|--------------------------|------------------|---|
| $V_{DS}$  | Drain-Source Voltage  | 30                       | V                |   |
| $V_{GS}$  | Gate-Source Voltage   | $\pm 20$                 | V                |   |
| $I_D$     | Drain Current (DC) <sup>(NOTE2, 6)</sup>                          | $T_A = 25^\circ\text{C}$ | 13.2             | A |
|           |   | $T_A = 75^\circ\text{C}$ | 10.2             | A |
| $I_{DM}$  | Drain Current (Pulse) <sup>(NOTE3)</sup>                          | 150                      | A                |   |
| $P_D$     | Power Dissipation ( $T_A = 25^\circ\text{C}$ ) <sup>(NOTE2)</sup> | 2.6                      | W                |   |
| $T_J$     | Maximum Operating Junction Temperature                            | 150                      | $^\circ\text{C}$ |   |
| $T_{STG}$ | Storage Temperature   | -55 to 150               | $^\circ\text{C}$ |   |
| $I_{AS}$  | Avalanche Current <sup>(NOTE5)</sup>                              | 23.5                     | A                |   |
| $E_{AS}$  | Avalanche Energy <sup>(NOTE5)</sup>                               | 27.6                     | mJ               |   |

## Thermal Information

| Symbol          | Parameter   | Condition    | Value | Unit               |
|-----------------|---|--------------|-------|--------------------|
| $R_{\theta JA}$ | Maximum Junction to Ambient <sup>(NOTE2, 4)</sup> | Steady-State | 48.48 | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Maximum Junction to Ambient <sup>(NOTE2, 4)</sup> | Steady-State | 3.54  | $^\circ\text{C/W}$ |

**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 be within the ranges listed in "recommended operating conditions". Exposure to absolute-maximum-rated conditions for prolonged periods may affect device reliability.

**NOTE2:** Mounted on FR-4 material with 1inch<sup>2</sup>, 2oz. Copper.

**NOTE3:** Test condition 200 $\mu\text{s}$  25 $^\circ\text{C}$ .

**NOTE4:** Thermal resistance from junction to ambient is highly dependent on PCB layout.

**NOTE5:**  $L = 0.1\text{mH}$ ,  $V_{GS} = 10\text{V}$ ,  $R_g = 25\Omega$ ,  $V_{DS} = 15\text{V}$ .

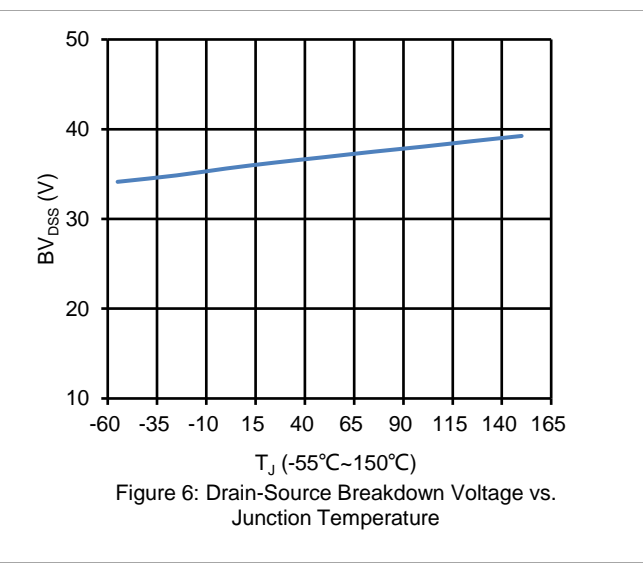
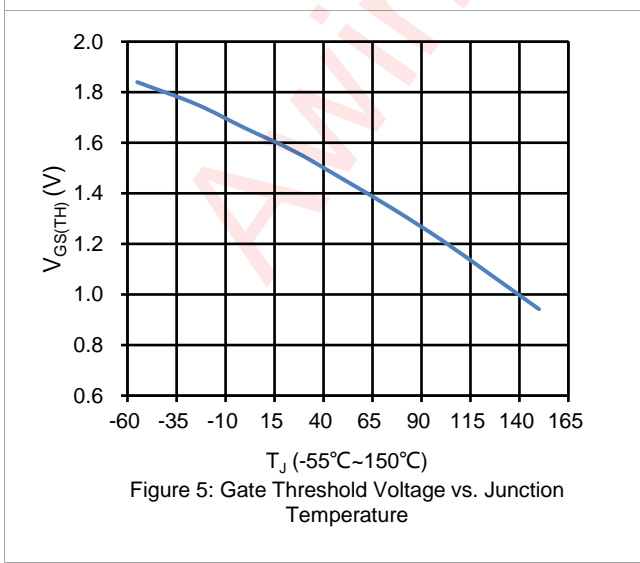
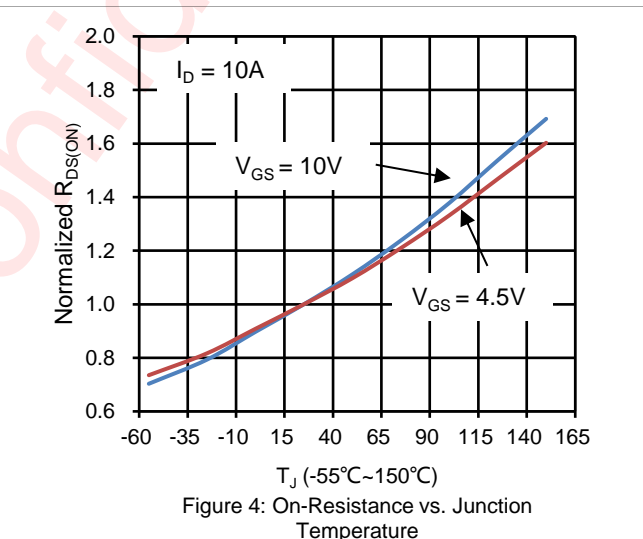
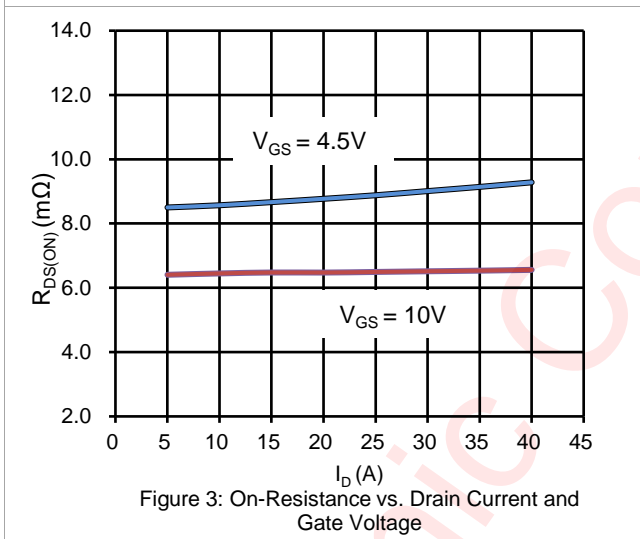
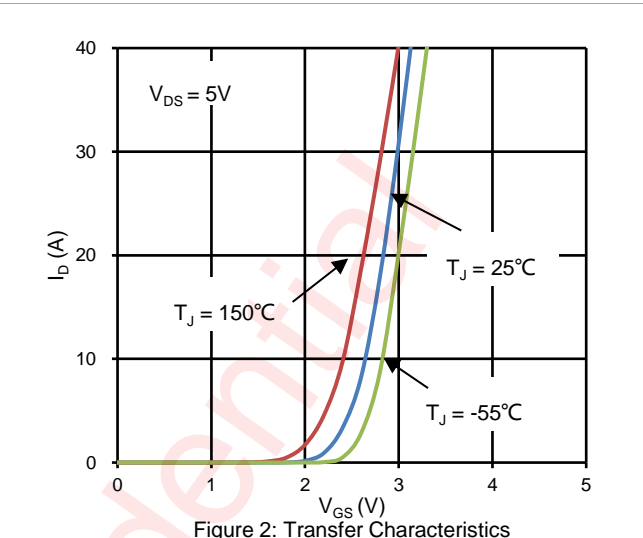
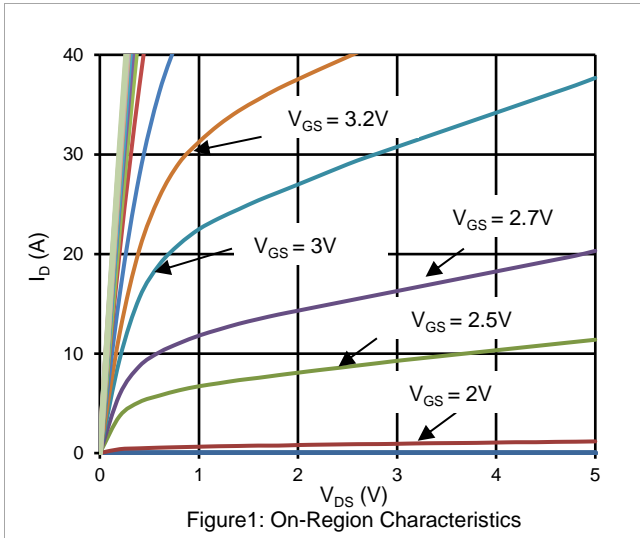
**NOTE6:** Rated according to  $R_{\theta JA}$ .

## Electrical Characteristics

$T_J = 25^\circ\text{C}$  for typical values (unless otherwise noted).

| Symbol                      | Parameter                            | Test Condition  | Min  | Typ  | Max       | Unit          |
|-----------------------------|--------------------------------------|---|------|------|-----------|---------------|
| <b>STATIC PARAMETERS</b>    |                                      |   |      |      |           |               |
| $BV_{DSS}$                  | Drain-Source Breakdown Voltage       | $I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$   | 30   | -    | -         | V             |
| $I_{DSS}$                   | Zero Gate Voltage Drain Current      | $V_{DS} = 30\text{V}$ , $V_{GS} = 0\text{V}$  | -    | -    | 1         | $\mu\text{A}$ |
| $I_{GSS}$                   | Gate Leakage Current                 | $V_{DS} = 0\text{V}$ , $V_{GS} = \pm 20\text{V}$  | -    | -    | $\pm 100$ | nA            |
| $V_{GS(TH)}$                | Gate Threshold Voltage               | $V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$  | 1.00 | 1.55 | 2.50      | V             |
| $R_{DS(ON)}$                | Static Drain to Source On-Resistance | $V_{GS} = 10\text{V}$ , $I_D = 10\text{A}$  | -    | 6.55 | 8.60      | m $\Omega$    |
|                             |                                      | $V_{GS} = 4.5\text{V}$ , $I_D = 10\text{A}$   | -    | 9.00 | 12.00     | m $\Omega$    |
| $g_{FS}$                    | Forward Transconductance             | $V_{DS} = 5\text{V}$ , $I_D = 10\text{A}$   | -    | 50   | -         | S             |
| $V_{SD}$                    | Diode Forward Voltage                | $I_S = 1\text{A}$ , $V_{GS} = 0\text{V}$  | -    | 0.7  | 1         | V             |
| <b>DYNAMIC PARAMETERS</b>   |                                      |   |      |      |           |               |
| $R_g$                       | Gate Resistance                      | $f = 1\text{MHz}$   | -    | 3.5  | -         | $\Omega$      |
| $C_{iss}$                   | Input Capacitance                    | $V_{GS} = 0\text{V}$ , $V_{DS} = 15\text{V}$ , $f = 1\text{MHz}$                        | -    | 1240 | -         | pF            |
| $C_{oss}$                   | Output Capacitance                   |   | -    | 150  | -         | pF            |
| $C_{rss}$                   | Reverse Transfer Capacitance         |   | -    | 120  | -         | pF            |
| <b>SWITCHING PARAMETERS</b> |                                      |   |      |      |           |               |
| $Q_g$                       | Total Gate Charge                    | $V_{GS} = 10\text{V}$ , $V_{DS} = 15\text{V}$ , $I_D = 10\text{A}$                      | -    | 23.0 | -         | nC            |
| $Q_{gs}$                    | Gate Source Charge                   |   | -    | 3.5  | -         | nC            |
| $Q_{gd}$                    | Gate Drain Charge                    |   | -    | 4.1  | -         | nC            |
| $t_{d(on)}$                 | Turn-On Delay Time                   | $V_{DS} = 15\text{V}$ , $I_D = 10\text{A}$ , $R_g = 3\Omega$ ,<br>$V_{GS} = 10\text{V}$ | -    | 6    | -         | ns            |
| $t_r$                       | Turn-On Rise Time                    |   | -    | 3    | -         | ns            |
| $t_{d(off)}$                | Turn-Off Delay Time                  |   | -    | 26   | -         | ns            |
| $t_f$                       | Turn-Off Fall Time                   |   | -    | 11   | -         | ns            |
| $t_{rr}$                    | Body Diode Reverse Recovery Time     | $I_D = 10\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}$                                  | -    | 17   | -         | ns            |
| $Q_{rr}$                    | Body Diode Reverse Recovery Charge   | $I_D = 10\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}$                                  | -    | 10   | -         | nC            |

## Typical Electrical and Thermal Characteristics



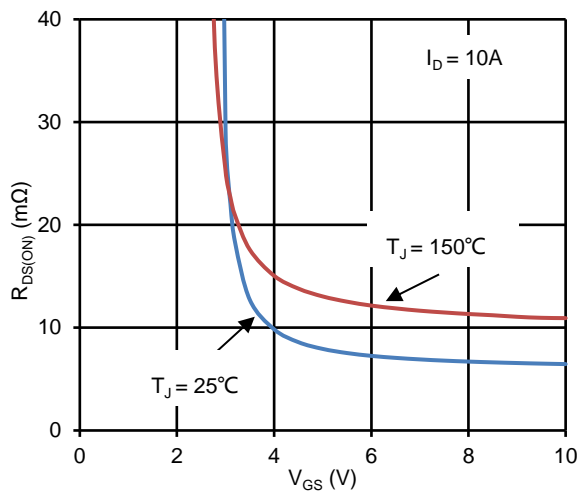


Figure 7: On-Resistance vs. Gate-Source Voltage

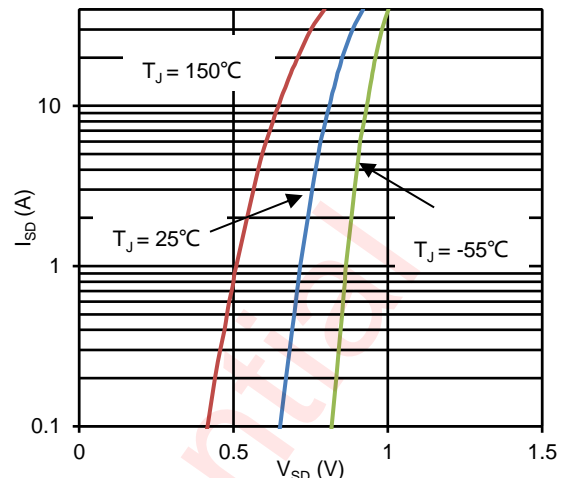


Figure 8: Forward Source to Drain Characteristics

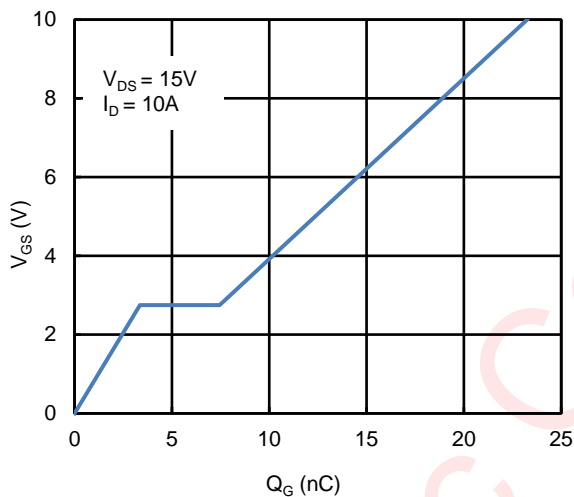


Figure 9: Gate-Charge Characteristics

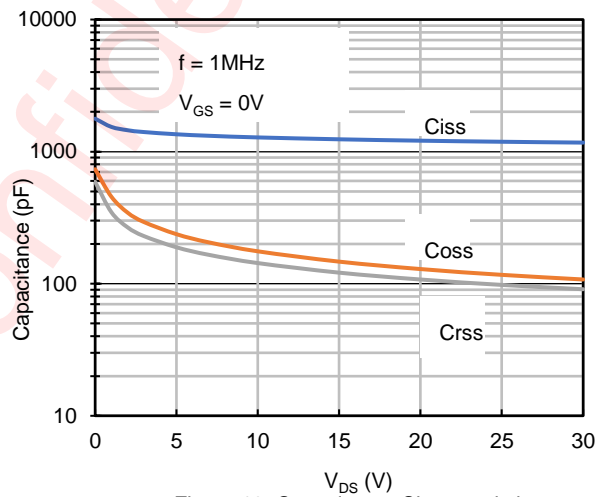


Figure 10: Capacitance Characteristics

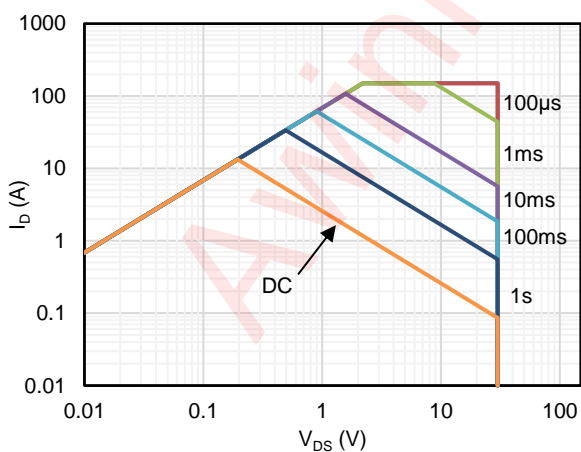


Figure 11: Maximum Forward Biased Safe Operating Area

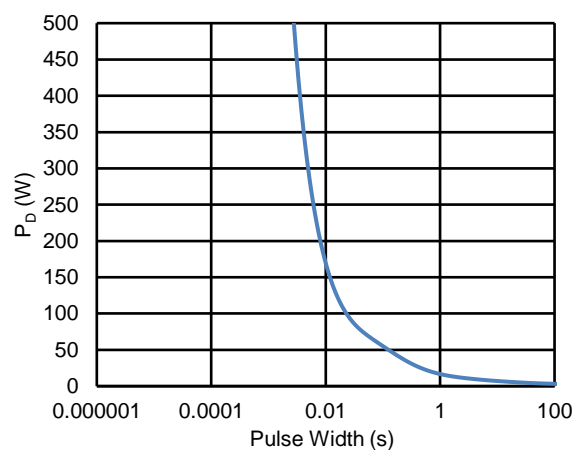
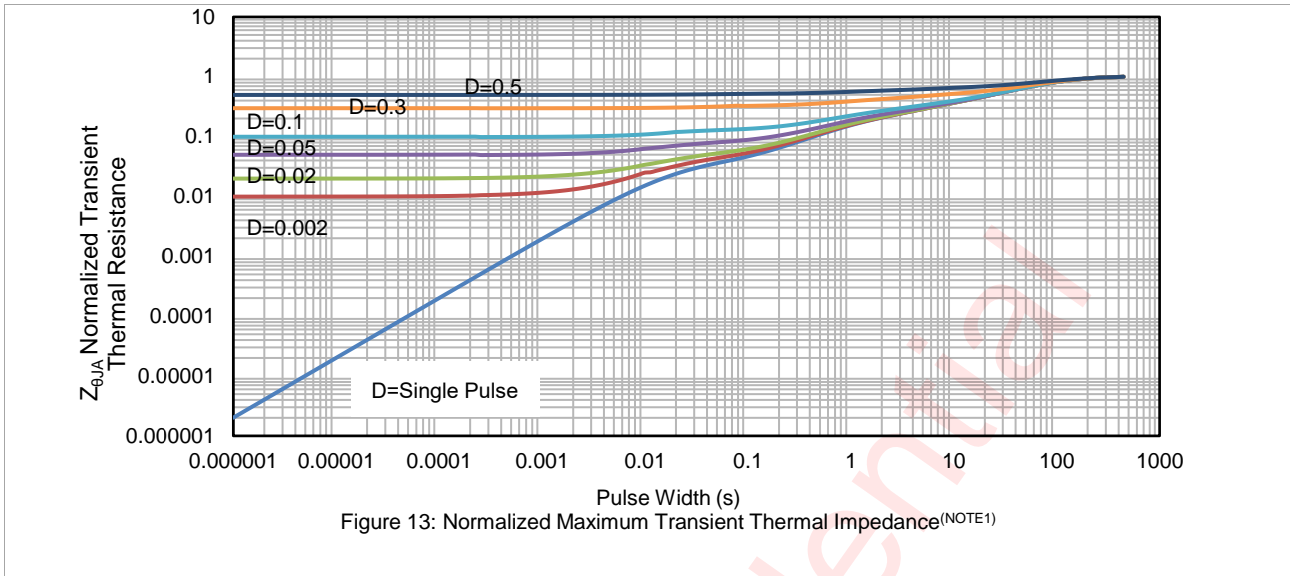
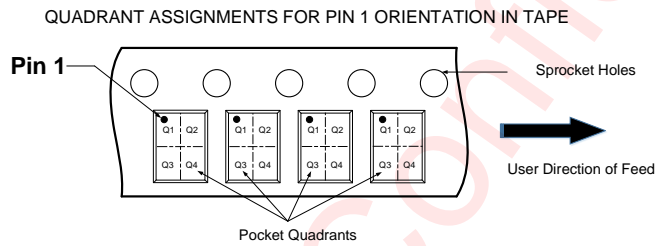
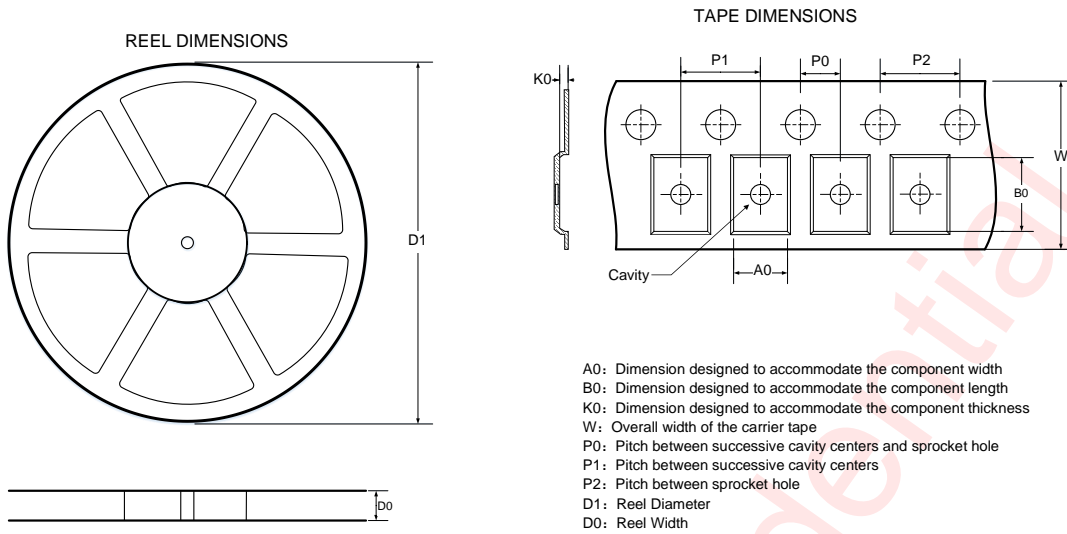


Figure 12: Single Pulse Power Rating Junction-to-Case



## Tape And Reel Information



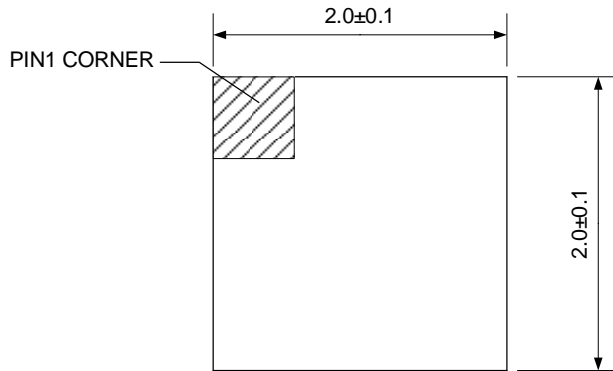
Note: The above picture is for reference only. Please refer to the value in the table below for the actual size

DIMENSIONS AND PIN1 ORIENTATION

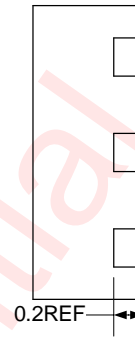
| D1 (mm) | D0 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P0 (mm) | P1 (mm) | P2 (mm) | W (mm) | Pin1 Quadrant |
|---------|---------|---------|---------|---------|---------|---------|---------|--------|---------------|
| 178     | 8.4     | 2.3     | 2.3     | 1       | 2       | 4       | 4       | 8      | Q1            |

All dimensions are nominal

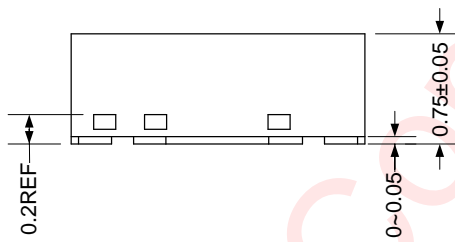
Package Description



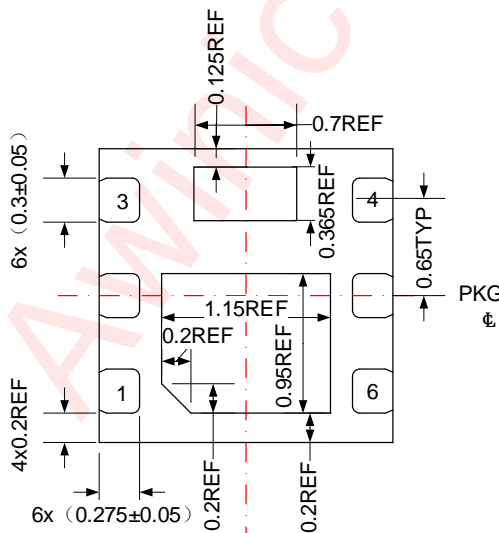
Top View



Side View



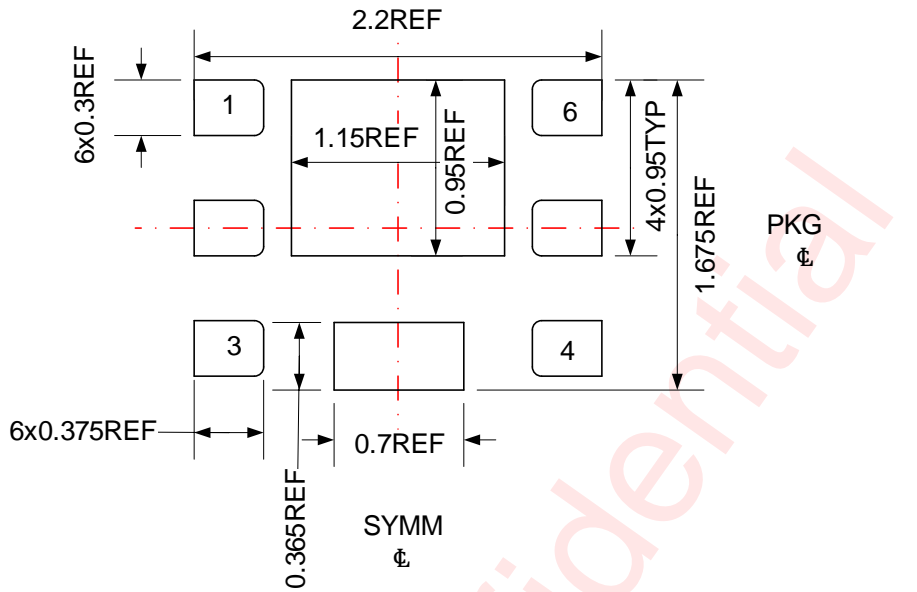
Side View



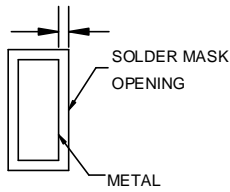
Bottom View

Unit: mm

Land Pattern Data

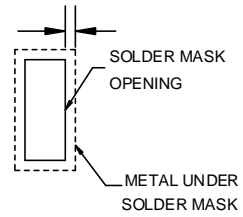


0.05 MAX  
All AROUND



NON SOLDER MASK DEFINED

0.05 MIN  
All AROUND



SOLDER MASK DEFINED

Unit: mm

## Revision History

| Version | Date      | Change Record       |
|---------|-----------|---------------------|
| V1.0    | Mar. 2025 | Officially released |

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