

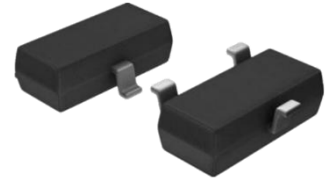
|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                   |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| <b>SPECIFICATION SHEET NO.</b>          | S0508- MDD2305000S0S5                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                   |
| <b>ORIGINAL MFG/PART NO.</b>            | MDD Diodes/MDD2305                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                   |
| <b>NEXTGEN PART CODE</b>                | MDD2305000S0S5                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Indicate This Code For <a href="#">RFQ</a> /Order |
| <b>DATE</b>                             | May 8, 2025                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                   |
| <b>REVISION</b>                         | A4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Updated With Most Recent Data                     |
| <b>DESCRIPTION AND MAIN PARAMETRICS</b> | <p>SMD MOSFET Case SOT-23 MDD2 Series, 3 Pads</p> <p>P-Channel Enhancement Model</p> <p>Drain-Source Voltage (V<sub>DS</sub>): -20V. Continuous Drain Current (I<sub>D</sub>): -4.2A Max.</p> <p>Power Dissipation (P<sub>D</sub>): 1.25W Max.</p> <p>Junction Temperature and Storage Temperature: -50°C ~+150°C</p> <p>Package in Tape/Reel, 3000pcs/Reel</p> <p>RoHS/RoHS III compliant, RoHS Annex III lead Exemption (Exempt per RoHS EU 2015/863) and Halogen Free (HF)</p> |                                                   |
| <b>CUSTOMER</b>                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                   |
| <b>CUSTOMER PART NUMBER</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                   |
| <b>CROSS REF. PART NUMBER</b>           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                   |
| <b>MEMO</b>                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                   |

|                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>VENDOR APPROVE</b>                                                                                                                                                                                                                                                                                          |
| <div>Issued/Checked/Approved</div> <div>    </div> |
| Effective Date: May 8, 2025                                                                                                                                                                                                                                                                                    |

|                         |
|-------------------------|
| <b>CUSTOMER APPROVE</b> |
|                         |
| Date:                   |

## MAIN FEATURE

- Trench FET Power MOSFET
- Surface Mount Package Ideally Suited for Automatic Insertion
- Meet MSL 1 Requirement
- Cross Competitors Parts and More.
- RoHS/RoHS III compliant, RoHS Annex III lead Exemption (Exempt per RoHS EU 2015/863) and Halogen Free (HF)



*Image shown is a representation only. Exact specifications should be obtained from the product dimension.*

## APPLICATION

- Load Switch for Portable Devices
- DC/DC Converters

## ELECTRICAL CHARACTERISTICS

- See Page 5 ~Page 7
- All Parameters are Subject To NextGen Components' Final Confirmation



## HOW TO ORDER

- Please Follow Up Part Code Guide And Indicate NextGen Part Code MDD2305000S0S5 For RFQ and Order.

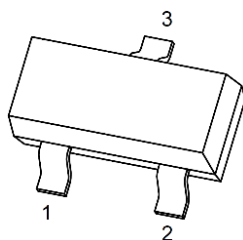
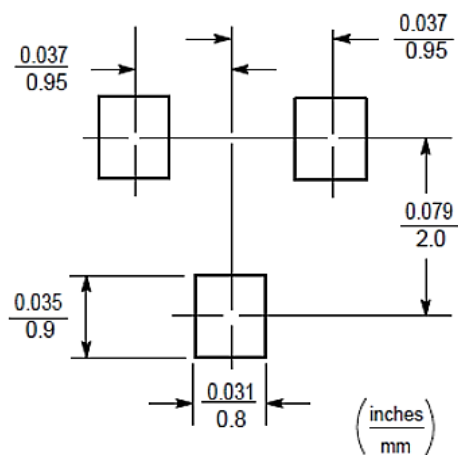
## PART CODE GUIDE

**RFQ**

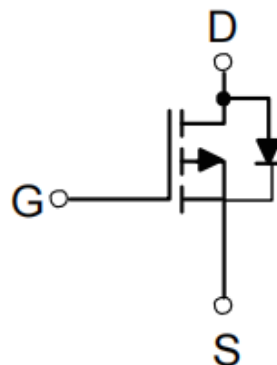
[Request For Quotation](#)

| CODE  | NAME                           | KEY SPECIFICATION OPTION                                                 |
|-------|--------------------------------|--------------------------------------------------------------------------|
| MDD2  | Product Series Code            | SMD MOSFET Case SOT-23 MDD2 Series, 3 Pads                               |
| 305   | Parameters Code                | Letter or Digits (A~Z, a~z or 0~9)                                       |
| 000S0 | Internal Control Code          | Letter or Digits (A~Z, a~z or 0~9)                                       |
| S5    | Marking Code                   | Marking "S5"                                                             |
| XX    | Special/Custom Parameters Code | Letter or Digits (A~Z, a~z or 0~9) for Special Parametric;<br>Blank: N/A |

## RECOMMEND PAD LAYOUT - Unit: mm, Tol. ±0.05mm.



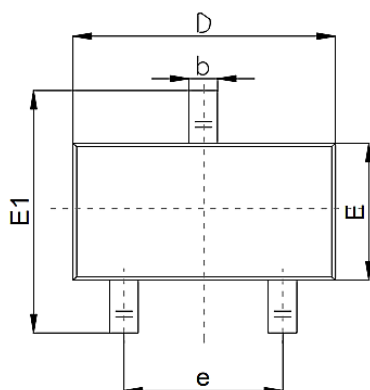
1. Gate (G) 2. Source (S) 3. Drain (D)



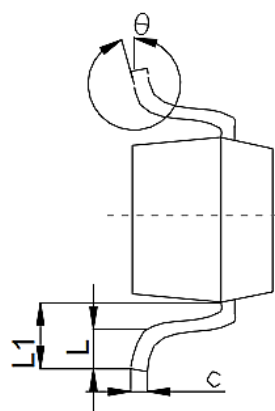
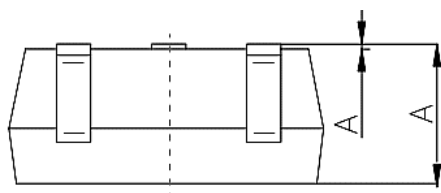
Equivalent Circuit

**DIMENSION**- Unit: mm, Case SOT-23 Outline

Top View



Side View



| SYMBOL   | DIMENSION (MM) |      |      |
|----------|----------------|------|------|
|          | MIN.           | TYP. | MAX. |
| A        | 0.65           |      | 1.40 |
| A1       | 0.00           |      | 0.20 |
| b        | 0.30           |      | 0.55 |
| c        | 0.08           |      | 0.20 |
| D        | 2.70           |      | 3.10 |
| E        | 1.15           |      | 1.65 |
| E1       | 2.10           |      | 2.80 |
| e        | 1.70           |      | 2.10 |
| L        | 0.15           |      | 0.50 |
| L1       | 0.35           |      | 0.70 |
| $\theta$ | 0°             |      | 12°  |

## -20V P-CHANNEL MODE MOSFET

| V(BR)DSS | RDS(on) Typ. | ID Max. |
|----------|--------------|---------|
| -20V     | 37mΩ @-4.5V  | -4.2A   |
|          | 40mΩ @-3.3V  | -4.0A   |

### ABSOLUTE MAXIMUM RATINGS - AT Ta=25 °C , unless otherwise specified

| PARAMETERS                                                         | SYMBOL    | VALUE      | UNITS |
|--------------------------------------------------------------------|-----------|------------|-------|
| Drain-Source Voltage                                               | VDS       | -20        | V     |
| Gate-Source Voltage                                                | VGS       | ±10        | V     |
| Continuous Drain Current                                           | ID        | -4.0       | A     |
| Pulsed Drain Current (See Page 7 Note 1)                           | IDM       | -16.8      | A     |
| Power Dissipation (See Page 7 Note 2)                              | PD        | 1.25       | W     |
| Thermal Resistance from Junction to Ambient<br>(See Page 7 Note 2) | ReJA      | 100        | °C/W  |
| Junction Temperature and Storage Temperature                       | TJ , TSTG | -50 ~ +150 | °C    |

#### Notes:

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

**MOSFET STATIC CHARACTERISTICS** - AT Ta=25 °C unless otherwise specified

| PARAMETER                                               | SYMBOL              | VALUE |      |      | UNIT | CONDITION                                                   |
|---------------------------------------------------------|---------------------|-------|------|------|------|-------------------------------------------------------------|
|                                                         |                     | MIN.  | TYP. | MAX. |      |                                                             |
| Drain-source Breakdown Voltage                          | V(BR)DSS            | -20   | -    | -    | V    | V <sub>GS</sub> =0V, I <sub>D</sub> = 250μA                 |
| Drain-Source Leakage Current                            | I <sub>DSS</sub>    | -     | -    | -1.0 | μA   | V <sub>DS</sub> = -20V, V <sub>GS</sub> =0V                 |
| Gate-Source Leakage Current                             | I <sub>GSS</sub>    | -     | -    | ±100 | nA   | V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V                  |
| Gate threshold Voltage                                  | V <sub>GS(TH)</sub> | -0.4  | -0.6 | -1.0 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA |
| Drain-Source On-State Resistance<br>(See Page 7 Note 3) | R <sub>DS(ON)</sub> | -     | 37   | 48   | mΩ   | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3.0A             |
|                                                         |                     | -     | 45   | 60   |      | V <sub>GS</sub> = -2.5V, I <sub>D</sub> =-2.0A              |
|                                                         |                     | -     | -    | -    |      |                                                             |

**DYNAMIC ELECTRICAL CHARACTERISTICS** - AT Ta=25 °C unless otherwise specified

| PARAMETER                    | SYMBOLS          | VALUE |      |      | UNIT | CONDITION                                                                   |
|------------------------------|------------------|-------|------|------|------|-----------------------------------------------------------------------------|
|                              |                  | MIN.  | TYP. | MAX. |      |                                                                             |
| Input Capacitance            | C <sub>iss</sub> | -     | 760  | -    | pF   | V <sub>DS</sub> = -10V<br>V <sub>GS</sub> =0V<br>f=1MHz                     |
| Output Capacitance           | C <sub>oss</sub> | -     | 94   | -    | pF   |                                                                             |
| Reverse Transfer Capacitance | C <sub>rss</sub> | -     | 76   | -    | pF   |                                                                             |
| Total Gate Charge            | Q <sub>g</sub>   | -     | 7.8  | -    | nC   | V <sub>DS</sub> = -10V<br>V <sub>GS</sub> = -4.5V<br>I <sub>D</sub> = -3.0A |
| Gate Source Charge           | Q <sub>gs</sub>  | -     | 0.9  | -    | nC   |                                                                             |
| Gate Drain Charge            | Q <sub>gd</sub>  | -     | 1.8  | -    | nC   |                                                                             |

**SWITCHING CHARACTERISTICS** - AT Ta=25 °C unless otherwise specified

| PARAMETER           | SYMBOLS | VALUE |      |      | UNIT | CONDITION                                                                                                                    |
|---------------------|---------|-------|------|------|------|------------------------------------------------------------------------------------------------------------------------------|
|                     |         | MIN.  | TYP. | MAX. |      |                                                                                                                              |
| Turn on Delay Time  | td(on)  | -     | 5.5  | -    | ns   | V <sub>DS</sub> =-10V<br>V <sub>GS</sub> = -4.5V<br>I <sub>D</sub> = -2.0A<br>R <sub>G</sub> = 3.3Ω<br>R <sub>L</sub> = 1.2Ω |
| Turn on Rise Time   | tr      | -     | 3.9  | -    | ns   |                                                                                                                              |
| Turn Off Delay Time | td(off) | -     | 11.3 | -    | ns   |                                                                                                                              |
| Turn Off Fall Time  | tf      | -     | 36   | -    | ns   |                                                                                                                              |

**SOURCE DRAIN DIODE CHARACTERISTICS** - AT Ta=25 °C unless otherwise specified

| PARAMETER                          | SYMBOLS         | VALUE |       |      | UNIT | CONDITION                                   |
|------------------------------------|-----------------|-------|-------|------|------|---------------------------------------------|
|                                    |                 | MIN.  | TYP.  | MAX. |      |                                             |
| Source drain current (Body Diode)  | I <sub>SD</sub> | -     | -     | -2.0 | A    | Ta=25 °C                                    |
| Drain-Source Diode Forward Voltage | V <sub>SD</sub> | -     | -0.87 | -1.2 | V    | V <sub>GS</sub> =0V, I <sub>S</sub> = -4.0A |

Notes

1. Pulse width limited by maximum allowable junction temperature
2. The value of P<sub>D</sub> & R<sub>θJA</sub> is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, double sided, in a still air environment with Ta=25°C.
3. Pulse test: Pulse width ≤ 300μs, duty cycle ≤2%

**RATINGS AND CHARACTERISTICS CURVES** - For Reference Only, Ta=25°C Unless Otherwise Specified.

Figure 1. Typical Output Characteristics

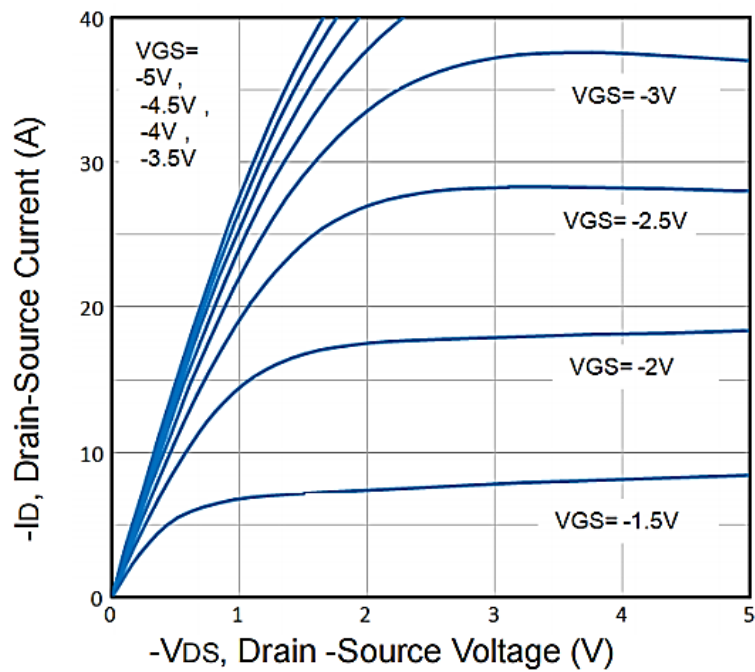
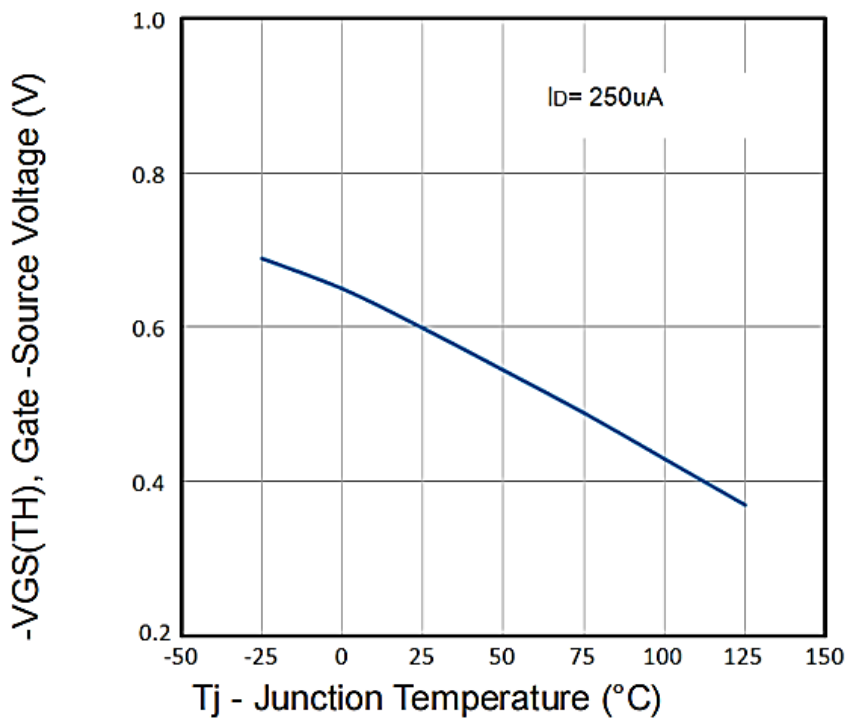


Figure 2. Normalized Threshold Voltage Vs. Temperature



**RATINGS AND CHARACTERISTICS CURVES-** For Reference Only, Ta=25°C Unless Otherwise Specified.

Figure 3. Typical Transfer Characteristics

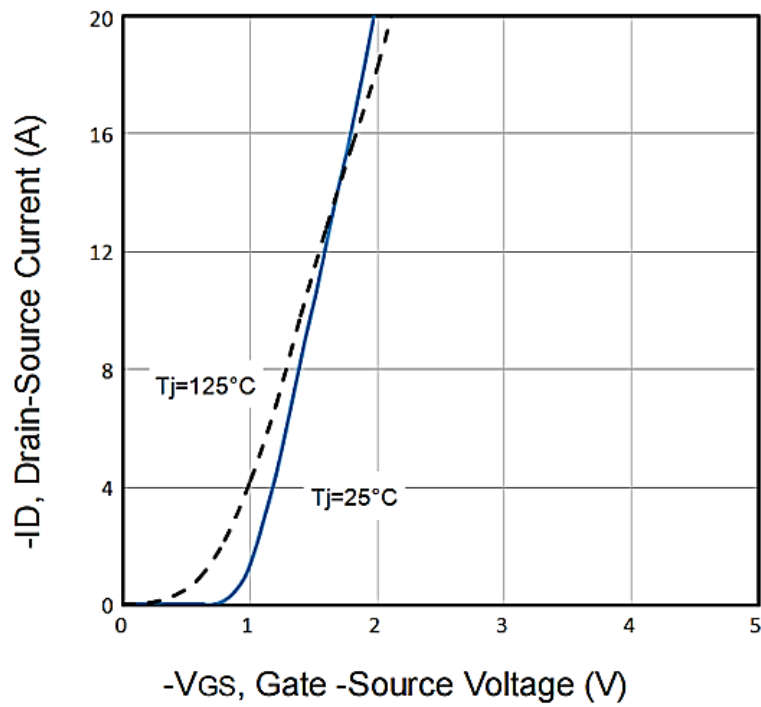
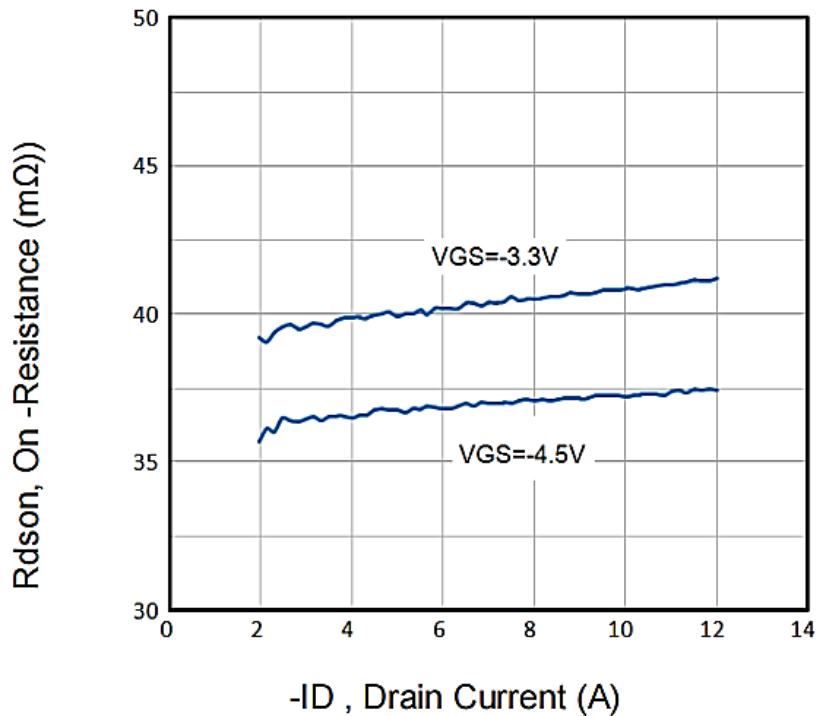


Figure 4. On-Resistance vs. Drain Current and Gate Voltage



**RATINGS AND CHARACTERISTICS CURVES-** For Reference Only, Ta=25°C Unless Otherwise Specified.

Figure 5. Typical Source-Drain Diode Forward Voltage

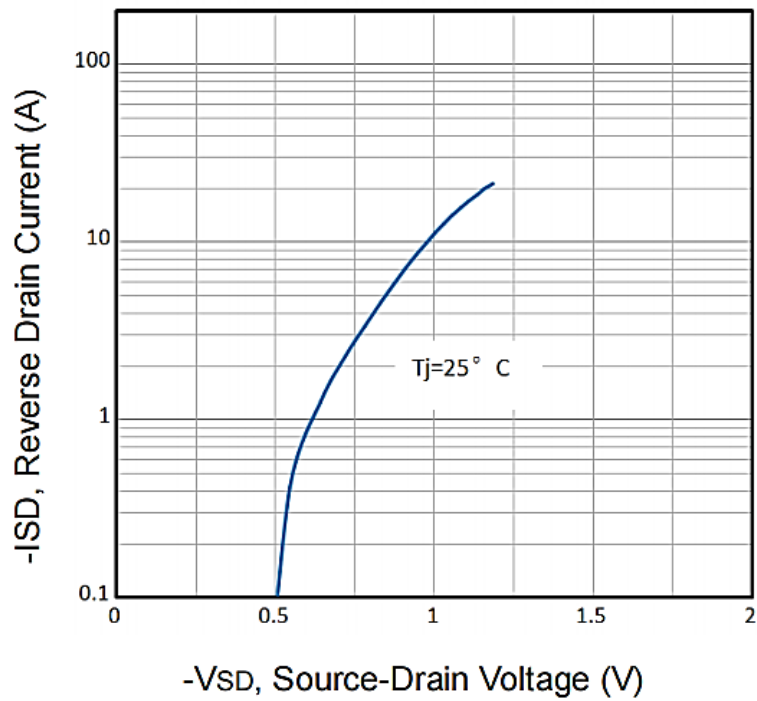
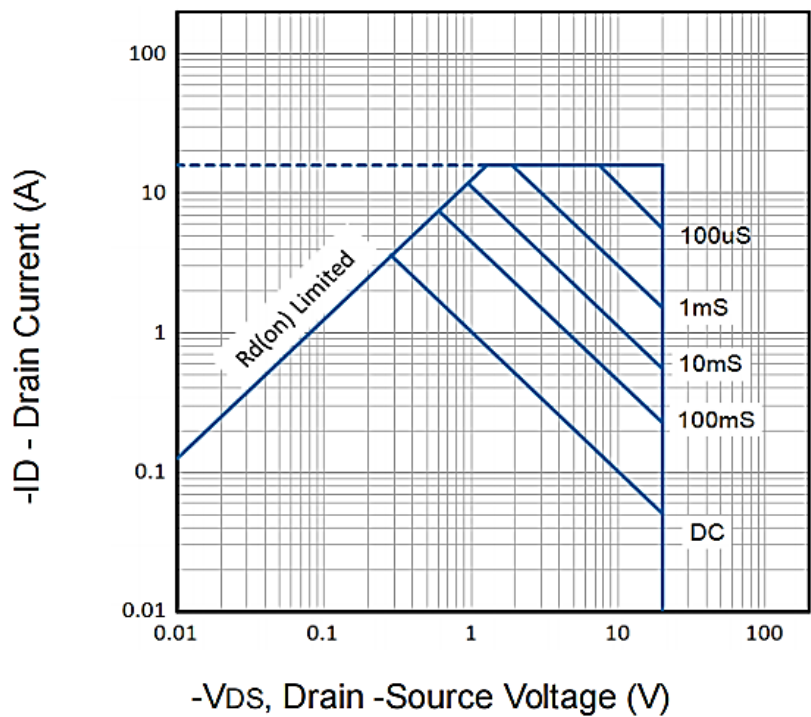


Figure 6. Maximum Safe Operating Area



**RATINGS AND CHARACTERISTICS CURVES-** For Reference Only, Ta=25°C Unless Otherwise Specified.

Figure 7. Typical Capacitance Vs. Drain-Source Voltage

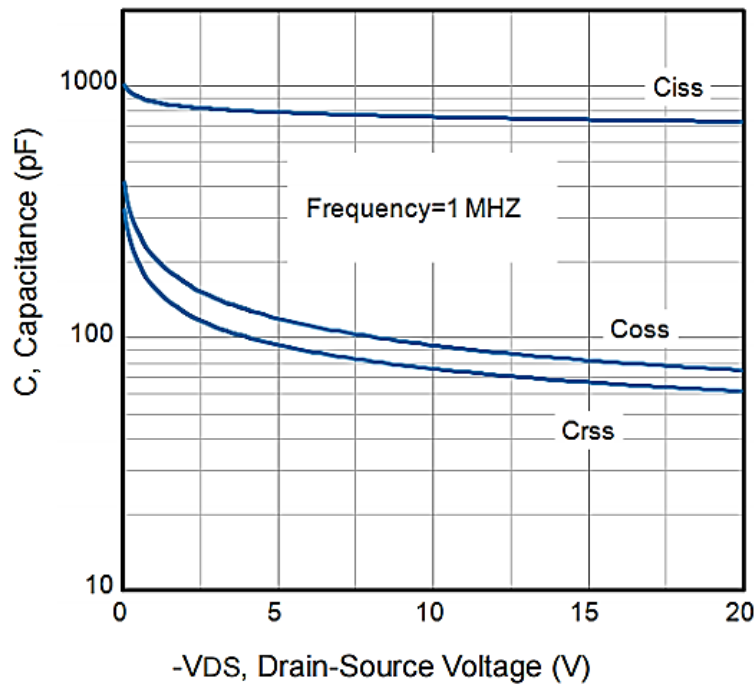
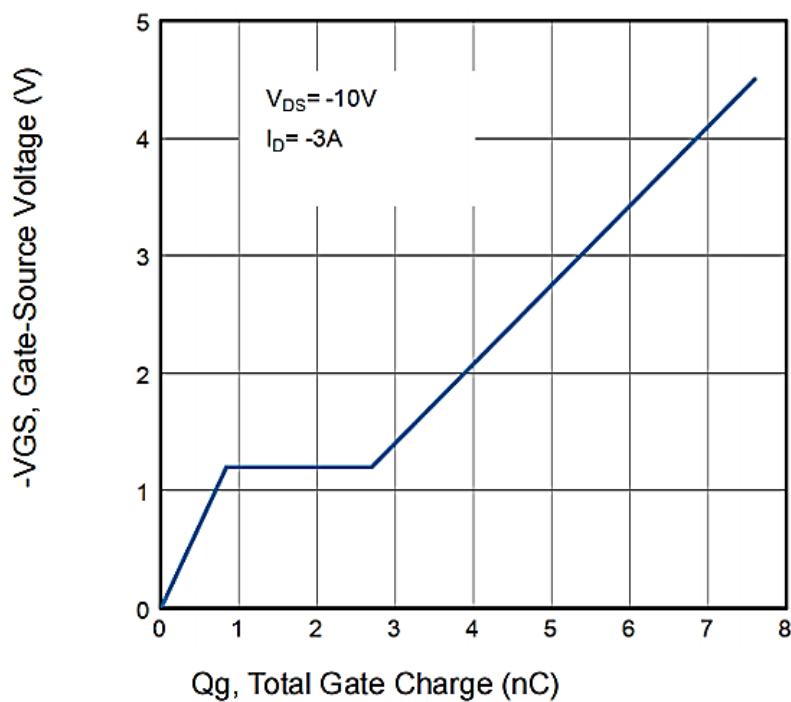


Figure 8. Typical Gate Charge Vs. Gate-Source Voltage



**TYPICAL PERFORMANCE CHARACTERISTIC CURVES** - For Reference Only

Figure 9. Normalized Maximum Transient Thermal Impedance

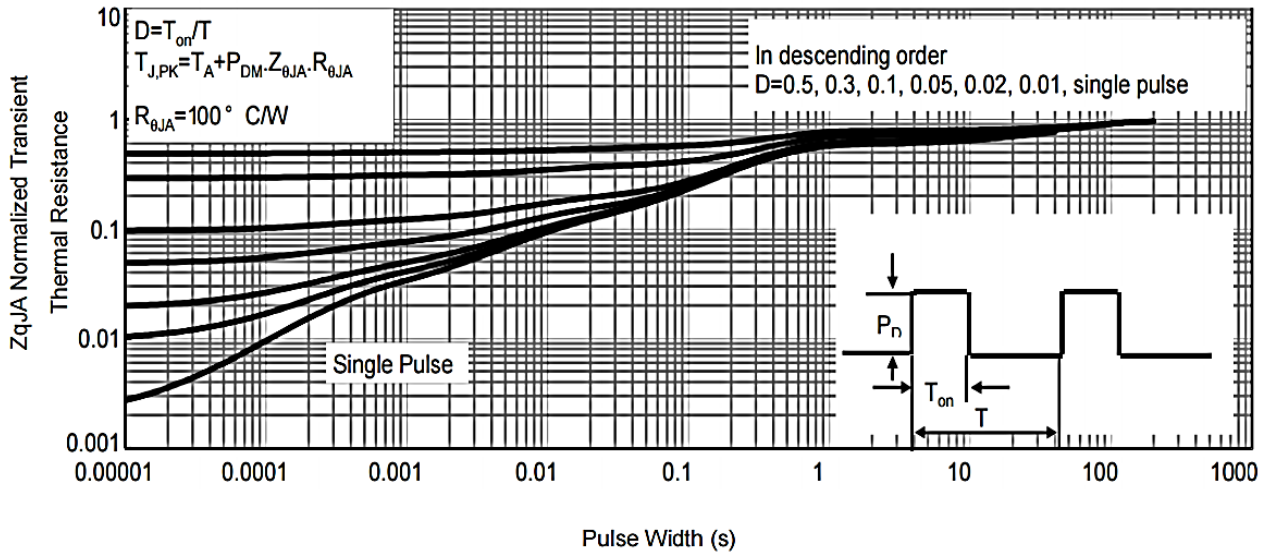
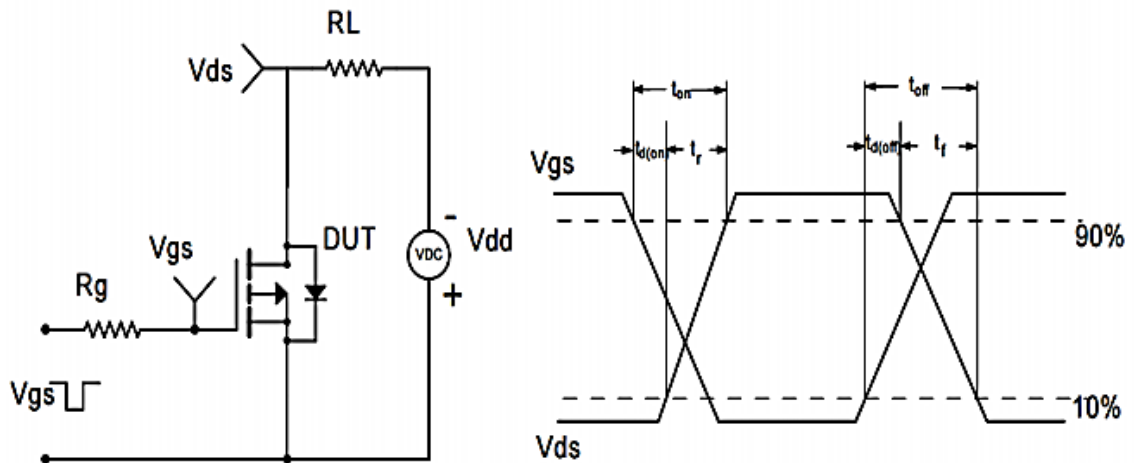
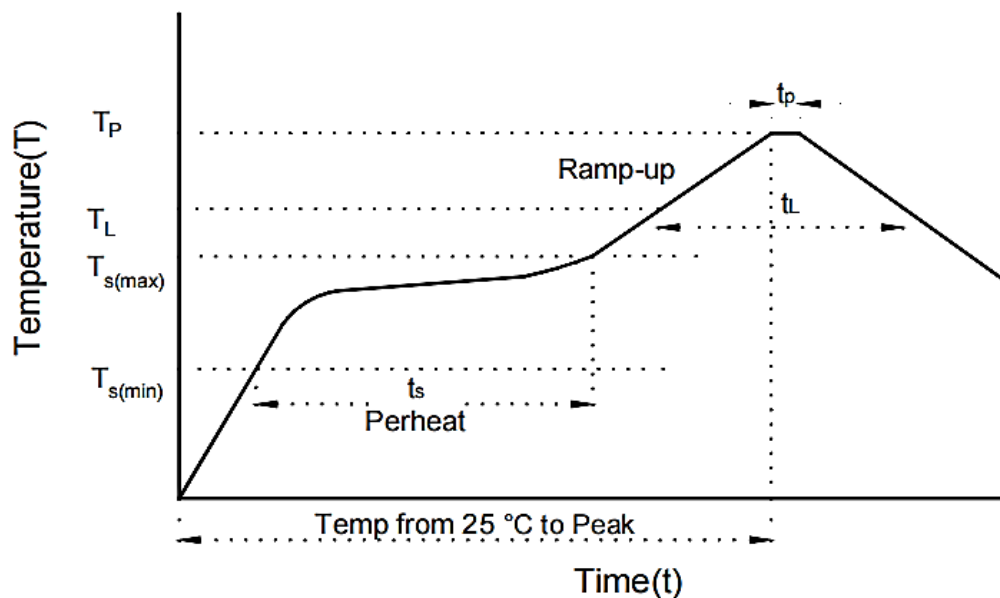


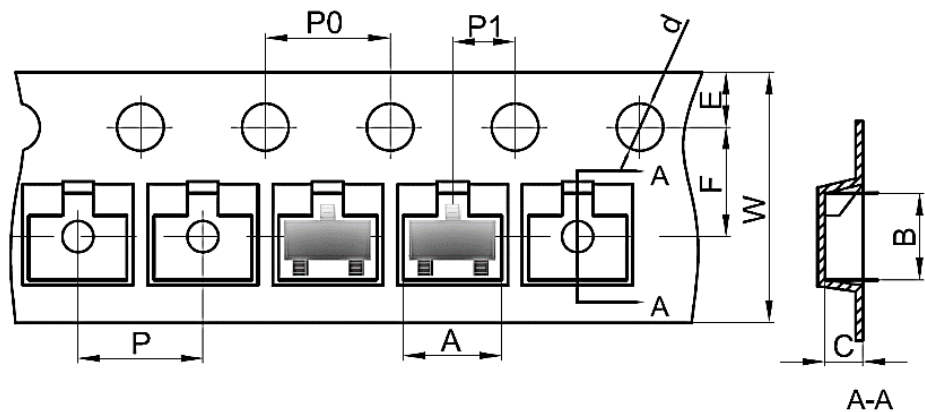
Figure 10. Switching Time Test Circuit and waveforms



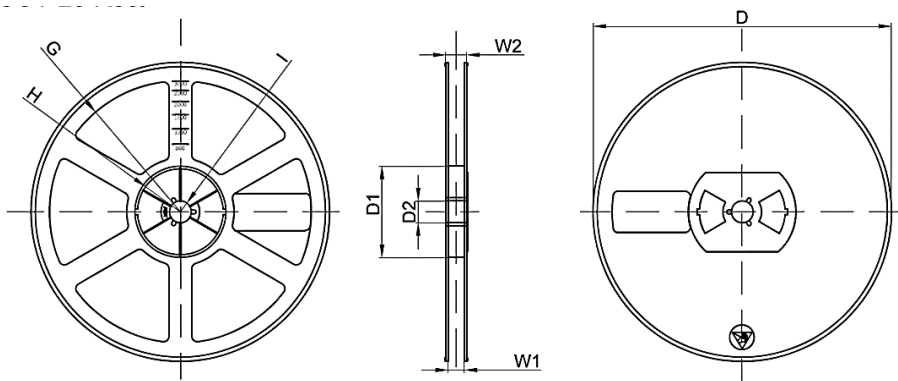
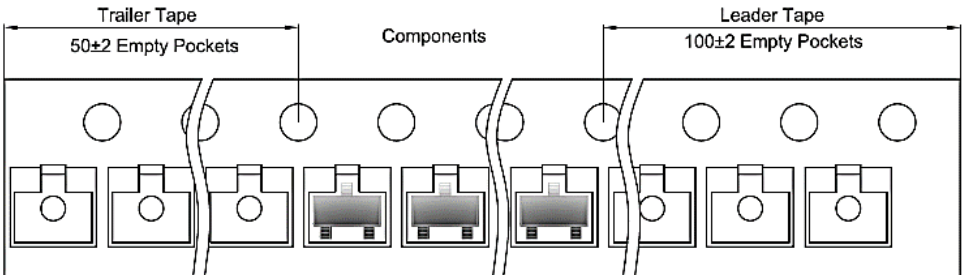
**RECOMMENDED SOLDERING PARAMETERS – FOR REFERENCE ONLY**


| PROFILE FEATURE                                      |                                  | PB-FREE ASSEMBLY  |
|------------------------------------------------------|----------------------------------|-------------------|
| Average Ramp-up Rate ( $T_L$ Max to $T_p$ )          |                                  | 3°C/second Max    |
| Preheat                                              | Temperature Min ( $T_s$ Min.)    | 150°C             |
|                                                      | Temperature Max ( $T_s$ Max.)    | 200°C             |
|                                                      | Time ( $t_s$ Min. to $t_s$ Max.) | 60 ~ 180 seconds  |
| Time maintained above                                | Temperature ( $T_L$ )            | 217°C             |
|                                                      | Time ( $t_L$ )                   | 60 ~ 150 seconds  |
| Peak/Classification Temperature ( $T_p$ )            |                                  | 260 °C            |
| Time within 5°C of actual Peak Temperature ( $t_p$ ) |                                  | 10 seconds Max.   |
| Ramp-down Rate                                       |                                  | 6 °C /Second Max. |
| Time 25 °C to Peak Temperature                       |                                  | 8 Minutes Max.    |
| Suggest reflow times                                 |                                  | 3 Times Max.      |

**TAPE/REEL** - Unit: mm, All Devices are packed in accordance with EIA standard RS-481-A and specifications



| Case   | A    | B    | C    | d    | E    | F   | P0  | P   | P1  | W   |
|--------|------|------|------|------|------|-----|-----|-----|-----|-----|
| SOT-23 | 3.15 | 2.77 | 1.22 | Ø1.5 | 1.75 | 3.5 | 4.0 | 4.0 | 2.0 | 8.0 |



| Reel Size | D    | D1   | D2   | G     | H     | I    | W1  | W2   | Qty. (pcs) |
|-----------|------|------|------|-------|-------|------|-----|------|------------|
| 7"        | Ø178 | 54.4 | 13.0 | R78.0 | R25.6 | R6.5 | 9.5 | 12.3 | 3000       |

## IMPORTANT NOTES AND DISCLAIMER

1. **ROHS COMPLIANCE:** The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU RoHS Directive (EU) 2015/863 EC (RoHS3). RoHS Test Report for this product can be obtained at Download Center.
2. **REACH COMPLIANCE:** REACH substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, REACH Test Report for this product can be obtained at Download Center.
3. All Product parametric performance is indicated in the Electrical Characteristics for the listed herein test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
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