

# MOSFET – Power, Single N-Channel, STD Gate, DUAL COOL<sup>®</sup>, DFN8 5x6

80 V, 2.1 mΩ, 181 A

## Preliminary Document NTMFSCHT2D1N08X

### Features

- Advanced Dual-Side Cool Package with Enhanced Heat-Dissipation Molding Compound
- Low  $Q_{RR}$ , Soft Recovery Body Diode
- Low  $R_{DS(on)}$  to Minimize Conduction Losses
- Low  $Q_g$  to Minimize Gate Driving Losses
- MSL1 Robust Packaging Design
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- Power Supply Unit (PSU)
- DC/DC Intermediated Bus Converter
- Control FET in High Switching Frequency Application
- Synchronous Rectifier
- ORing FET

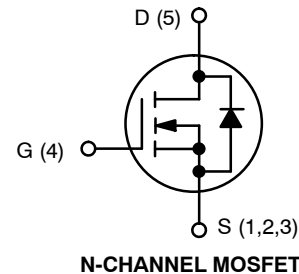
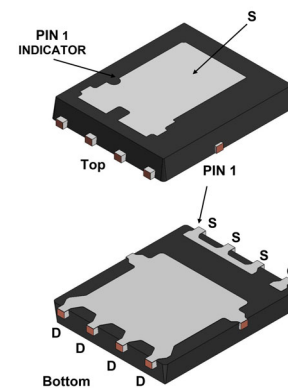
### MAXIMUM RATINGS ( $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise stated)

| Parameter                                                         | Symbol                                                                 | Value       | Unit               |
|-------------------------------------------------------------------|------------------------------------------------------------------------|-------------|--------------------|
| Drain-to-Source Voltage                                           | $V_{DSS}$                                                              | 80          | V                  |
| Gate-to-Source Voltage                                            | $V_{GS}$                                                               | $\pm 20$    | V                  |
| Continuous Drain Current (Note 1)                                 | $T_C = 25\text{ }^{\circ}\text{C}$                                     | $I_D$       | 181                |
|                                                                   | $T_C = 100\text{ }^{\circ}\text{C}$                                    |             | 128                |
| Power Dissipation (Note 1)                                        | $T_C = 25\text{ }^{\circ}\text{C}$                                     | $P_D$       | 148                |
| Pulsed Drain Current                                              | $T_C = 25\text{ }^{\circ}\text{C}$ ,<br>$t_p = 100\text{ }\mu\text{s}$ | $I_{DM}$    | 761                |
| Pulsed Source Current (Body Diode)                                |                                                                        | $I_{SM}$    | 761                |
| Operating Junction and Storage Temperature Range                  | $T_J, T_{STG}$                                                         | -55 to +175 | $^{\circ}\text{C}$ |
| Source Current (Body Diode)                                       | $I_S$                                                                  | 224         | A                  |
| Single Pulse Avalanche Energy ( $I_{PK} = 55\text{ A}$ ) (Note 3) | $E_{AS}$                                                               | 151         | mJ                 |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | $T_L$                                                                  | 260         | $^{\circ}\text{C}$ |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

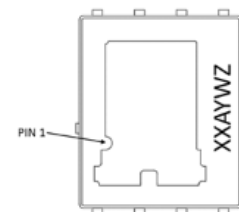
- The entire application environment impacts the thermal resistance values shown. They are not constants and are only valid for the particular conditions noted.
- Actual continuous current will be limited by thermal and electromechanical application board design
- $E_{AS}$  of 151 mJ is based on started  $T_J = 25\text{ }^{\circ}\text{C}$ ,  $I_{AS} = 55\text{ A}$ ,  $V_{DD} = 64\text{ V}$ ,  $V_{GS} = 10\text{ V}$ , 100% avalanche tested

|               |                          |                   |
|---------------|--------------------------|-------------------|
| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ MAX}$ | $I_D \text{ MAX}$ |
| 80 V          | 2.1 mΩ @ 10 V            | 181 A             |



DFN8  
CASE 506EA

### MARKING DIAGRAM



XX = Specific Device Code  
A = Assembly Location  
Y = Year  
W = Work Week  
Z = Assembly Lot Code

### ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

This Preliminary document is for informational purposes only. onsemi may update or withdraw it without notice. Content and referenced products are under development and subject to change.

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## THERMAL CHARACTERISTICS

| Parameter                                            | Symbol           | Max | Unit |
|------------------------------------------------------|------------------|-----|------|
| Thermal Resistance, Junction-to-Case (Bottom)        | $R_{\theta JCB}$ | 1.0 | °C/W |
| Thermal Resistance, Junction-to-Case (Top)           | $R_{\theta JCT}$ | 1.1 |      |
| Thermal Resistance, Junction-to-Ambient (Notes 4, 5) | $R_{\theta JA}$  | 39  |      |

4. Surface mounted on FR4 board using a 1 in<sup>2</sup>, 1 oz. Cu pad.

5.  $R_{\theta JA}$  is determined by the user's board design.

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|-----------|--------|----------------|-----|-----|-----|------|
|-----------|--------|----------------|-----|-----|-----|------|

### OFF CHARACTERISTICS

|                                               |                                   |                                                        |    |      |     |       |
|-----------------------------------------------|-----------------------------------|--------------------------------------------------------|----|------|-----|-------|
| Drain-to-Source Breakdown Voltage             | $V_{(BR)DSS}$                     | $V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$               | 80 |      |     | V     |
| Drain-to-Source Breakdown Voltage (transient) | $\Delta V_{(BR)DSS} / \Delta T_J$ | $I_D = 1\text{ mA}$ , Referenced to $25^\circ\text{C}$ |    | 31.6 |     | mV/°C |
| Zero Gate Voltage Drain Current               | $I_{DSS}$                         | $V_{DS} = 80\text{ V}, T_J = 25^\circ\text{C}$         |    |      | 10  | μA    |
|                                               |                                   | $V_{DS} = 80\text{ V}, T_J = 125^\circ\text{C}$        |    |      | 250 |       |
| Gate-to-Source Leakage Current                | $I_{GSS}$                         | $V_{DS} = 0\text{ V}, V_{GS} = 20\text{ V}$            |    |      | 100 | nA    |

### ON CHARACTERISTICS

|                                            |                                  |                                           |     |      |     |       |
|--------------------------------------------|----------------------------------|-------------------------------------------|-----|------|-----|-------|
| Drain-to-Source On Resistance              | $R_{DS(on)}$                     | $V_{GS} = 10\text{ V}, I_D = 43\text{ A}$ |     | 1.9  | 2.1 | mΩ    |
|                                            |                                  | $V_{GS} = 8\text{ V}, I_D = 43\text{ A}$  |     | 2.1  | 2.5 |       |
| Gate Threshold Voltage                     | $V_{GS(TH)}$                     | $V_{GS} = V_{DS}, I_D = 213\text{ μA}$    | 2.4 |      | 3.6 | V     |
| Negative Threshold Temperature Coefficient | $\Delta V_{GS(TH)} / \Delta T_J$ | $V_{GS} = V_{DS}, I_D = 213\text{ μA}$    |     | -7.5 |     | mV/°C |
| Forward Transconductance                   | $g_{FS}$                         | $V_{DS} = 5\text{ V}, I_D = 43\text{ A}$  |     | 135  |     | S     |

### CHARGES AND CAPACITANCES

|                                       |              |                                                                 |      |      |      |    |
|---------------------------------------|--------------|-----------------------------------------------------------------|------|------|------|----|
| Input Capacitance (Note 6)            | $C_{ISS}$    | $V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$   | 1900 | 3800 | 5700 | pF |
| Output Capacitance (Note 6)           | $C_{OSS}$    |                                                                 |      | 1100 | 1650 |    |
| Reverse Transfer Capacitance (Note 6) | $C_{RSS}$    |                                                                 |      | 17   | 34   |    |
| Output Charge                         | $Q_{OSS}$    |                                                                 |      | 79   |      |    |
| Total Gate Charge (Note 6)            | $Q_{G(TOT)}$ | $V_{DD} = 40\text{ V}, I_D = 43\text{ A}, V_{GS} = 8\text{ V}$  |      | 43   | 65   | nC |
|                                       |              | $V_{DD} = 40\text{ V}, I_D = 43\text{ A}, V_{GS} = 10\text{ V}$ |      | 53   | 80   |    |
| Threshold Gate Charge (Note 6)        | $Q_{G(TH)}$  | $V_{DD} = 40\text{ V}, I_D = 43\text{ A}, V_{GS} = 10\text{ V}$ |      | 12   |      | nC |
| Gate-to-Source Charge                 | $Q_{GS}$     |                                                                 |      | 18   |      |    |
| Gate-to-Drain Charge (Note 6)         | $Q_{GD}$     |                                                                 |      | 8    | 15   |    |
| Gate Plateau Voltage                  | $V_{GP}$     |                                                                 |      | 4.7  |      |    |
| Gate Resistance                       | $R_G$        | $f = 1\text{ MHz}$                                              | 0.4  | 0.8  | 1.2  | Ω  |

### SWITCHING CHARACTERISTICS

|                     |              |                                                                                                             |  |    |  |    |
|---------------------|--------------|-------------------------------------------------------------------------------------------------------------|--|----|--|----|
| Turn-On Delay Time  | $t_{d(ON)}$  | Resistive Load, $V_{GS} = 0/10\text{ V}$ ,<br>$V_{DD} = 40\text{ V}, I_D = 43\text{ A}, R_G = 2.5\text{ Ω}$ |  | 26 |  | ns |
| Rise Time           | $t_r$        |                                                                                                             |  | 9  |  |    |
| Turn-Off Delay Time | $t_{d(OFF)}$ |                                                                                                             |  | 38 |  |    |
| Fall Time           | $t_f$        |                                                                                                             |  | 8  |  |    |

### DRAIN-SOURCE DIODE CHARACTERISTICS

|                       |          |                                                                   |  |      |     |   |
|-----------------------|----------|-------------------------------------------------------------------|--|------|-----|---|
| Forward Diode Voltage | $V_{SD}$ | $I_S = 43\text{ A}, V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$  |  | 0.82 | 1.2 | V |
|                       |          | $I_S = 43\text{ A}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$ |  | 0.66 |     |   |

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## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|-----------|--------|----------------|-----|-----|-----|------|
|-----------|--------|----------------|-----|-----|-----|------|

### DRAIN-SOURCE DIODE CHARACTERISTICS

|                         |          |                                                                                                          |  |     |  |    |
|-------------------------|----------|----------------------------------------------------------------------------------------------------------|--|-----|--|----|
| Reverse Recovery Time   | $t_{RR}$ | $V_{GS} = 0\text{ V}, I_S = 43\text{ A},$<br>$dI_S/dt = 1000\text{ A}/\mu\text{s}, V_{DD} = 40\text{ V}$ |  | 25  |  | ns |
| Charge Time             | $t_a$    |                                                                                                          |  | 14  |  |    |
| Discharge Time          | $t_b$    |                                                                                                          |  | 11  |  |    |
| Reverse Recovery Charge | $Q_{RR}$ |                                                                                                          |  | 183 |  | nC |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

6. Defined by design, not subject to production test.

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## TYPICAL CHARACTERISTICS

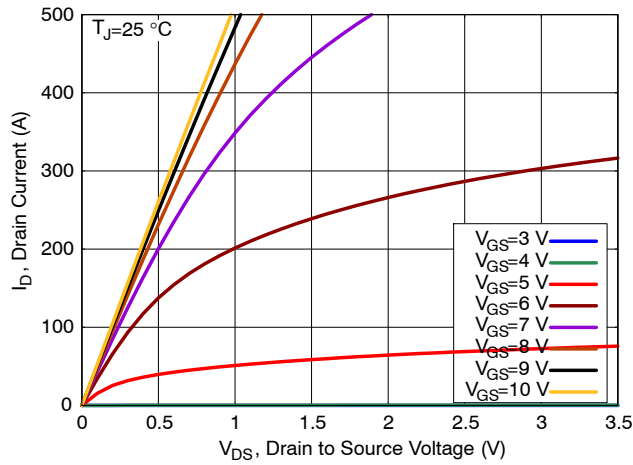


Figure 1. On-Region Characteristics

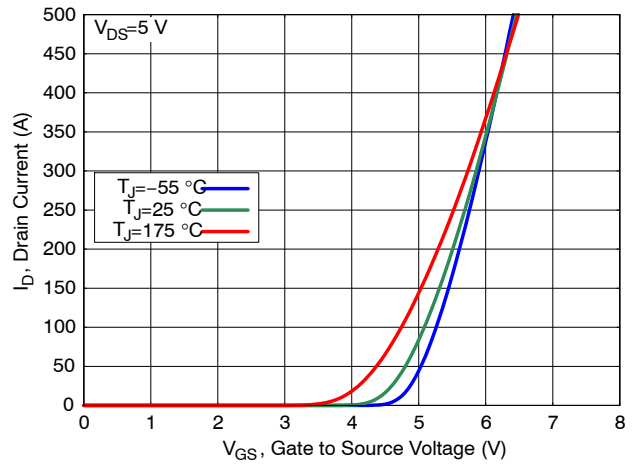


Figure 2. Transfer Characteristics

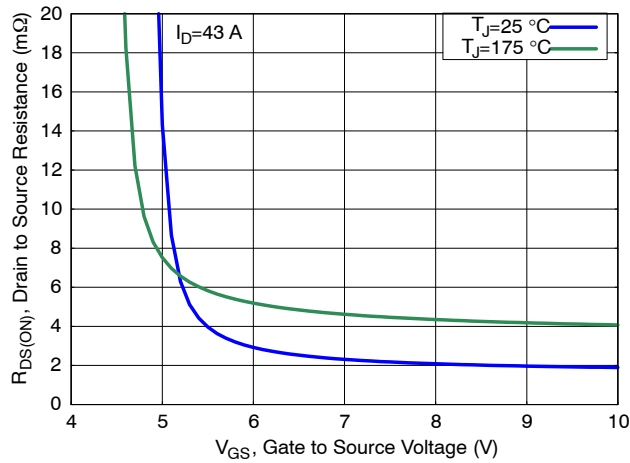


Figure 3. On-Resistance vs. Gate Voltage

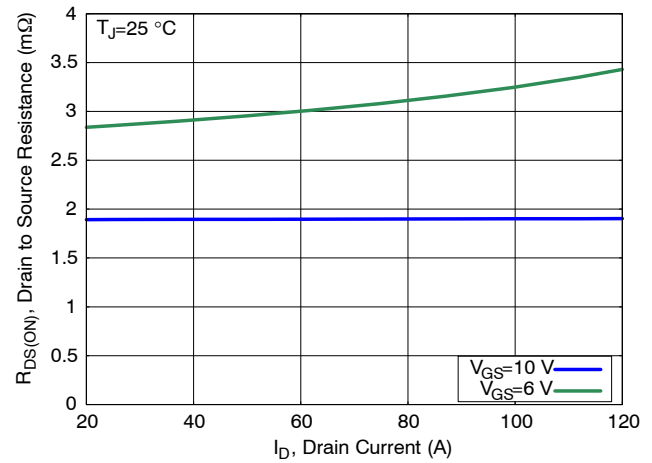


Figure 4. On-Resistance vs. Drain Current

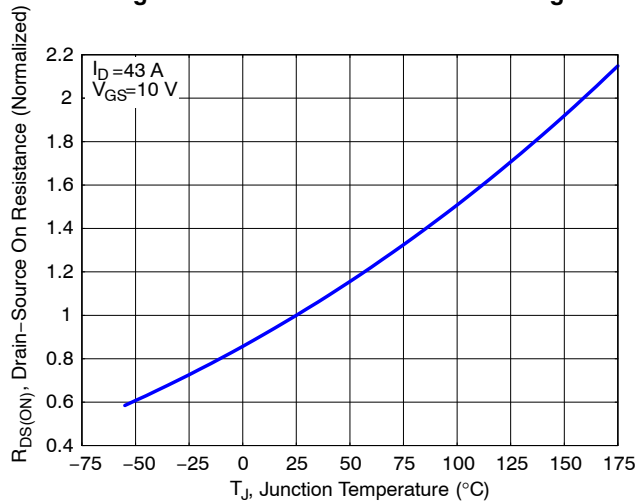


Figure 5. Normalized ON Resistance vs. Junction Temperature

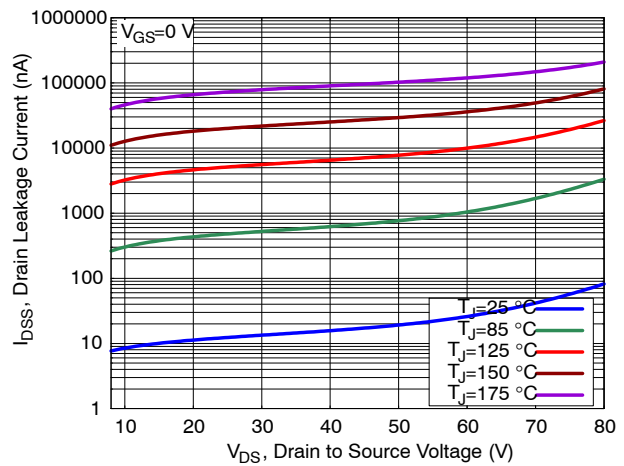


Figure 6. Drain Leakage Current vs. Drain Voltage

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## TYPICAL CHARACTERISTICS

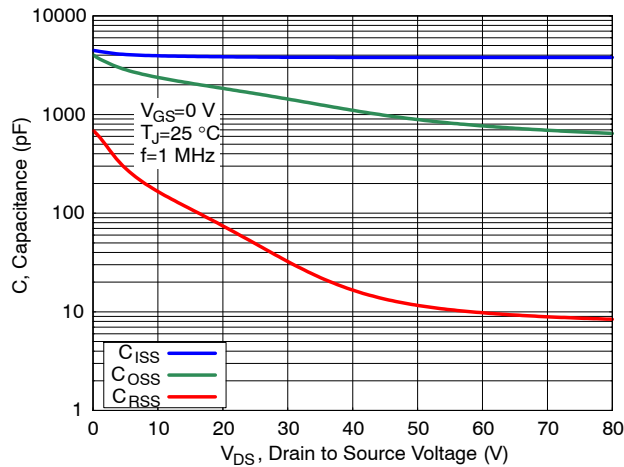


Figure 7. Capacitance Characteristics

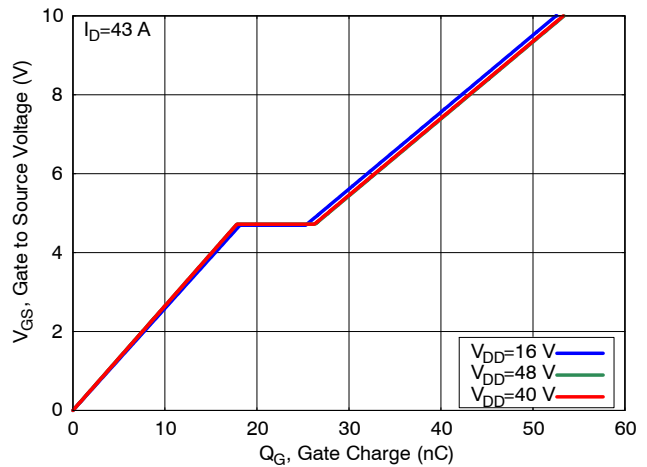


Figure 8. Gate Charge Characteristics

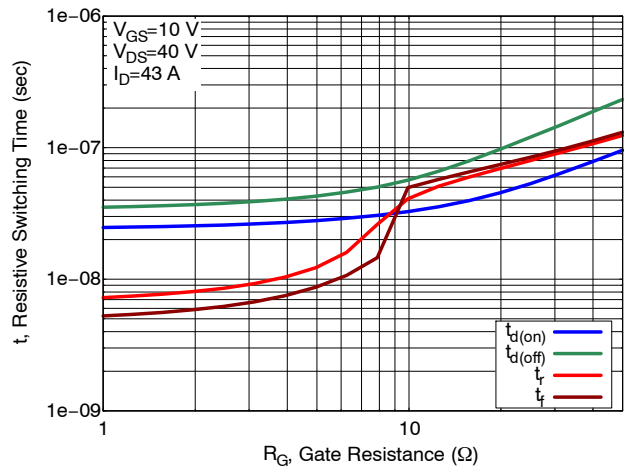


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

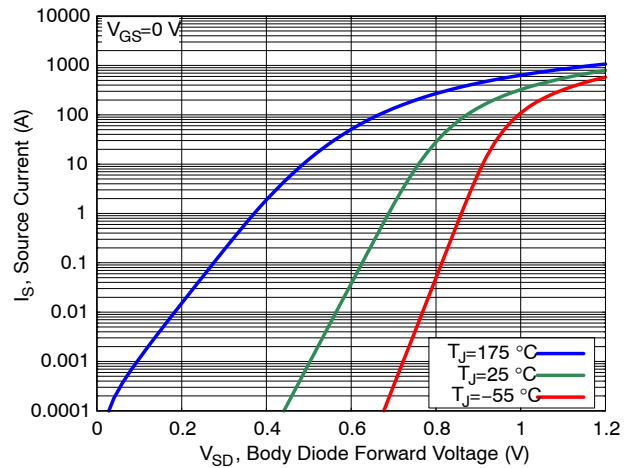


Figure 10. Diode Forward Characteristics

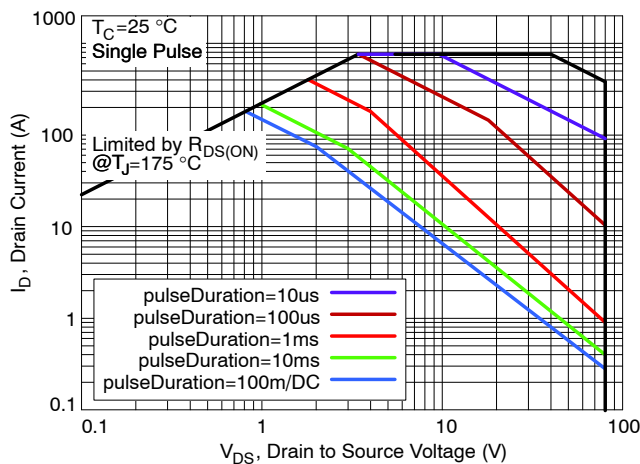


Figure 11. Safe Operating Area (SOA)

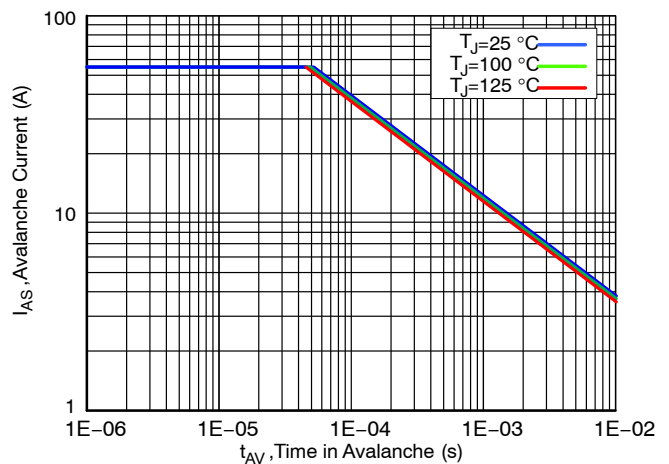


Figure 12. Avalanche Current vs Pulse Time (UIS)

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## TYPICAL CHARACTERISTICS

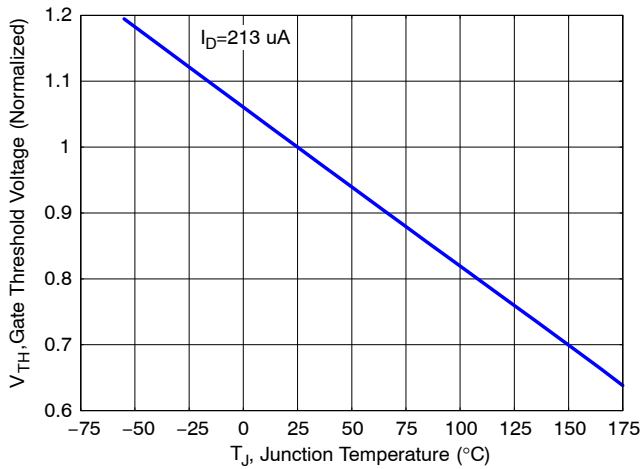


**Figure 13. Gate Threshold Voltage vs. Junction Temperature**

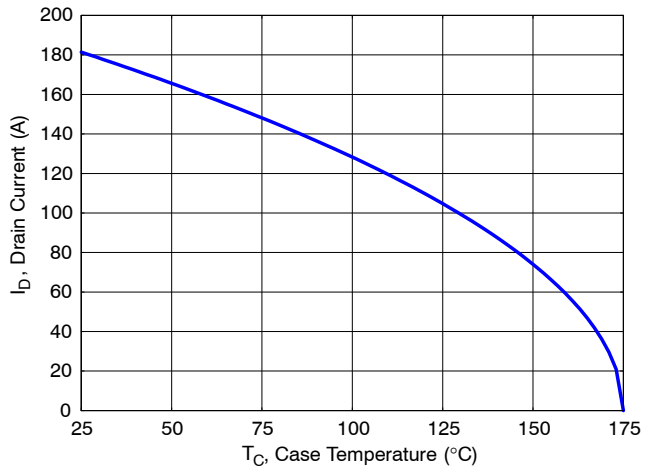


**Figure 14. Maximum Current vs. Case Temperature**

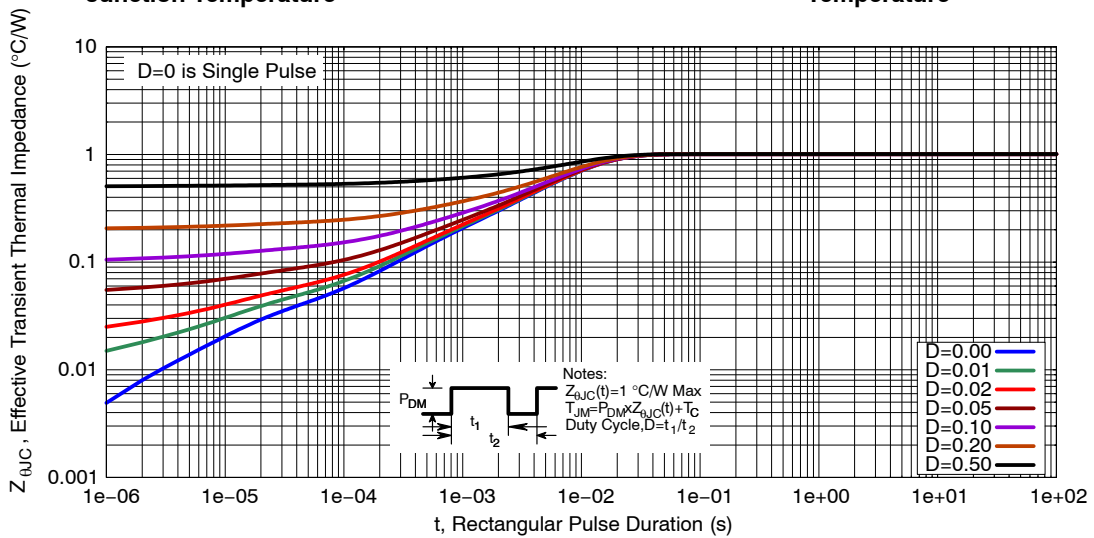


**Figure 15. Transient Thermal Response**

## ORDERING INFORMATION

| Device             | Device Marking | Package                                | Shipping <sup>†</sup> |
|--------------------|----------------|----------------------------------------|-----------------------|
| NTMFSCHT2D1N08XTWG | TBD            | DFN8 4.9x5.8<br>(Pb-Free/Halogen Free) | 3000 / Tape & Reel    |

<sup>†</sup> For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

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# NTMFSCHT2D1N08X

## REVISION HISTORY

| Revision | Description of Changes                                                                                                         | Date      |
|----------|--------------------------------------------------------------------------------------------------------------------------------|-----------|
| P0       | Initial Preliminary Document release.                                                                                          | 4/27/2026 |
| P1       | Maximum Ratings, Thermal Characteristics and Electrical Characteristics tables updated, Typical Characteristics figures added. | 5/20/2026 |



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