

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

80 V, 2.6 mΩ, 154 A

## NTMFSC2D6N08X

### Features

- Advanced Dual-Sided Cooled Packaging
- Low  $Q_{RR}$ , Soft Recovery Body Diode
- Low  $R_{DS(on)}$  to Minimize Conduction Losses
- Low  $Q_G$  and Capacitance to Minimize Driver Losses
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Typical Applications

- Synchronous Rectification (SR) in DC-DC and AC-DC
- Primary Switch in Isolated DC-DC Converter
- Motor Drives

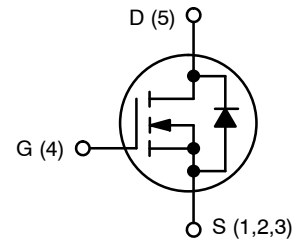
### MAXIMUM RATINGS ( $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise stated)

| Parameter                                                            |                                                                        | Symbol         | Value       | Unit               |
|----------------------------------------------------------------------|------------------------------------------------------------------------|----------------|-------------|--------------------|
| Drain-to-Source Voltage                                              |                                                                        | $V_{DSS}$      | 80          | V                  |
| Gate-to-Source Voltage                                               |                                                                        | $V_{GS}$       | ±20         | V                  |
| Continuous Drain Current<br>(Note 1)                                 | $T_C = 25\text{ }^{\circ}\text{C}$                                     | $I_D$          | 154         | A                  |
|                                                                      | $T_C = 100\text{ }^{\circ}\text{C}$                                    |                | 109         |                    |
| Power Dissipation<br>(Note 1)                                        | $T_C = 25\text{ }^{\circ}\text{C}$                                     | $P_D$          | 133         | W                  |
| Pulsed Drain Current                                                 | $T_C = 25\text{ }^{\circ}\text{C}$ ,<br>$t_p = 100\text{ }\mu\text{s}$ | $I_{DM}$       | 634         | A                  |
| Pulsed Source Current<br>(Body Diode)                                |                                                                        | $I_{SM}$       | 634         |                    |
| Operating Junction and Storage<br>Temperature Range                  |                                                                        | $T_J, T_{STG}$ | −55 to +175 | $^{\circ}\text{C}$ |
| Source Current (Body Diode)                                          |                                                                        | $I_S$          | 201         | A                  |
| Single Pulse Avalanche Energy<br>( $I_{PK} = 53\text{ A}$ ) (Note 3) |                                                                        | $E_{AS}$       | 140         | mJ                 |
| Lead Temperature for Soldering<br>Purposes (1/8" from case for 10 s) |                                                                        | $T_L$          | 260         | $^{\circ}\text{C}$ |

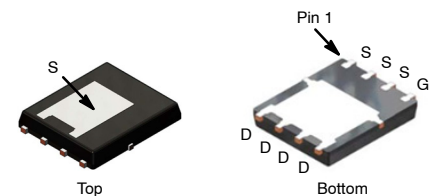
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

- 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 & electromechanical application board design.
- $E_{AS}$  of 140 mJ is based on started  $T_J = 25\text{ }^{\circ}\text{C}$ ,  $I_{AS} = 53\text{ A}$ ,  $V_{DD} = 64\text{ V}$ ,  $V_{GS} = 10\text{ V}$ , 100% avalanche tested

| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ MAX}$ | $I_D \text{ MAX}$ |
|---------------|--------------------------|-------------------|
| 80 V          | 2.6 mΩ @ 10 V            | 154 A             |

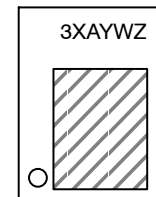


N-CHANNEL MOSFET



DFN8 5x6.15  
DUAL COOL 56  
CASE 506EG

### MARKING DIAGRAM



- 3X = 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.

## THERMAL CHARACTERISTICS

| Parameter                                    | Symbol          | Max  | Unit                 |
|----------------------------------------------|-----------------|------|----------------------|
| Thermal Resistance, Junction-to-Case, Bottom | $R_{\theta JC}$ | 1.12 | $^{\circ}\text{C/W}$ |
| Thermal Resistance, Junction-to-Case, Top    | $R_{\theta JC}$ | 1.7  | $^{\circ}\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient      | $R_{\theta JA}$ | 39   | $^{\circ}\text{C/W}$ |

4. Surface-mounted on FR4 board using 1 in<sup>2</sup> pad, 1 oz. Cu.  
 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 Conditions | 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 Temperature Coefficient | $\Delta V_{(BR)DSS} / \Delta T_J$ | $I_D = 1\text{ mA}$ . Referenced to $25^{\circ}\text{C}$ |    | 31.6 |     | mV/ $^{\circ}\text{C}$ |
| Zero Gate Voltage Drain Current                           | $I_{DSS}$                         | $V_{DS} = 80\text{ V}, T_J = 25^{\circ}\text{C}$         |    |      | 10  | $\mu\text{A}$          |
|                                                           |                                   | $V_{DS} = 80\text{ V}, T_J = 125^{\circ}\text{C}$        |    |      | 250 |                        |
| Gate-to-Source Leakage Current                            | $I_{GSS}$                         | $V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$              |    |      | 100 | nA                     |

## ON CHARACTERISTICS

|                                                |                                  |                                                 |     |      |     |                        |
|------------------------------------------------|----------------------------------|-------------------------------------------------|-----|------|-----|------------------------|
| Drain-to-Source On Resistance                  | $R_{DS(on)}$                     | $V_{GS} = 10\text{ V}, I_D = 37\text{ A}$       |     | 2.2  | 2.6 | m $\Omega$             |
|                                                |                                  | $V_{GS} = 6\text{ V}, I_D = 18\text{ A}$        |     | 3.3  | 5.2 |                        |
| Gate Threshold Voltage                         | $V_{GS(TH)}$                     | $V_{GS} = V_{DS}, I_D = 184\text{ }\mu\text{A}$ | 2.4 |      | 3.6 | V                      |
| Gate Threshold Voltage Temperature Coefficient | $\Delta V_{GS(TH)} / \Delta T_J$ | $V_{GS} = V_{DS}, I_D = 184\text{ }\mu\text{A}$ |     | -7.5 |     | mV/ $^{\circ}\text{C}$ |
| Forward Transconductance                       | $g_{FS}$                         | $V_{DS} = 5\text{ V}, I_D = 37\text{ A}$        |     | 115  |     | S                      |

## CHARGES, CAPACITANCES &amp; GATE RESISTANCE

|                               |              |                                                                 |      |      |      |          |
|-------------------------------|--------------|-----------------------------------------------------------------|------|------|------|----------|
| Input Capacitance*            | $C_{ISS}$    | $V_{GS} = 0\text{ V}, V_{DS} = 40\text{ V}, f = 1\text{ MHz}$   | 1600 | 3200 | 4800 | pF       |
| Output Capacitance*           | $C_{OSS}$    |                                                                 |      | 930  | 1400 |          |
| Reverse Transfer Capacitance* | $C_{RSS}$    |                                                                 |      | 14   | 26   |          |
| Output Charge                 | $Q_{OSS}$    |                                                                 |      | 66   |      |          |
| Total Gate Charge*            | $Q_{G(TOT)}$ | $V_{GS} = 6\text{ V}, V_{DD} = 40\text{ V}, I_D = 37\text{ A}$  |      | 28   |      | nC       |
|                               |              | $V_{GS} = 10\text{ V}, V_{DD} = 40\text{ V}, I_D = 37\text{ A}$ |      | 45   | 68   |          |
| Threshold Gate Charge         | $Q_{G(TH)}$  | $V_{GS} = 10\text{ V}, V_{DD} = 40\text{ V}, I_D = 37\text{ A}$ |      | 10   |      |          |
| Gate-to-Source Charge         | $Q_{GS}$     |                                                                 |      | 15   |      |          |
| Gate-to-Drain Charge*         | $Q_{GD}$     |                                                                 |      | 7    | 13   |          |
| Gate Plateau Voltage          | $V_{GP}$     |                                                                 |      | 4.7  |      |          |
| Gate Resistance*              | $R_G$        | $f = 1\text{ MHz}$                                              | 0.4  | 0.8  | 1.2  | $\Omega$ |

## SWITCHING CHARACTERISTICS

|                     |              |                                                                                                                    |  |    |  |    |
|---------------------|--------------|--------------------------------------------------------------------------------------------------------------------|--|----|--|----|
| Turn-On Delay Time  | $t_{d(ON)}$  | Resistive Load,<br>$V_{GS} = 0/10\text{ V}, V_{DD} = 40\text{ V},$<br>$I_D = 37\text{ A}, R_G = 2.5\text{ }\Omega$ |  | 24 |  | ns |
| Rise Time           | $t_r$        |                                                                                                                    |  | 8  |  |    |
| Turn-Off Delay Time | $t_{d(OFF)}$ |                                                                                                                    |  | 35 |  |    |
| Fall Time           | $t_f$        |                                                                                                                    |  | 6  |  |    |



# NTMFSC2D6N08X

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

| Parameter                                    | Symbol   | Test Conditions                                                                                        | Min | Typ  | Max | Unit |
|----------------------------------------------|----------|--------------------------------------------------------------------------------------------------------|-----|------|-----|------|
| <b>SOURCE-TO-DRAIN DIODE CHARACTERISTICS</b> |          |                                                                                                        |     |      |     |      |
| Forward Diode Voltage                        | $V_{SD}$ | $V_{GS} = 0\text{ V}, I_S = 37\text{ A}, T_J = 25\text{ }^{\circ}\text{C}$                             |     | 0.82 | 1.2 | V    |
|                                              |          | $V_{GS} = 0\text{ V}, I_S = 37\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$                            |     | 0.66 |     |      |
| Reverse Recovery Time                        | $t_{RR}$ | $V_{GS} = 0\text{ V}, dI/dt = 1000\text{ A}/\mu\text{s},$<br>$I_S = 37\text{ A}, V_{DD} = 40\text{ V}$ |     | 23   |     | ns   |
| Charge Time                                  | $t_a$    |                                                                                                        |     | 13   |     |      |
| Discharge Time                               | $t_b$    |                                                                                                        |     | 11   |     |      |
| Reverse Recovery Charge                      | $Q_{RR}$ |                                                                                                        |     | 163  |     | 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.

\* Defined by design, not subject to production test.



TYPICAL CHARACTERISTICS

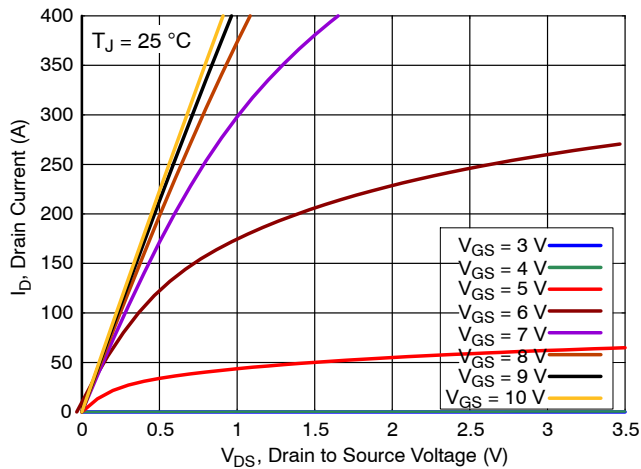


Figure 1. On-Region Characteristics

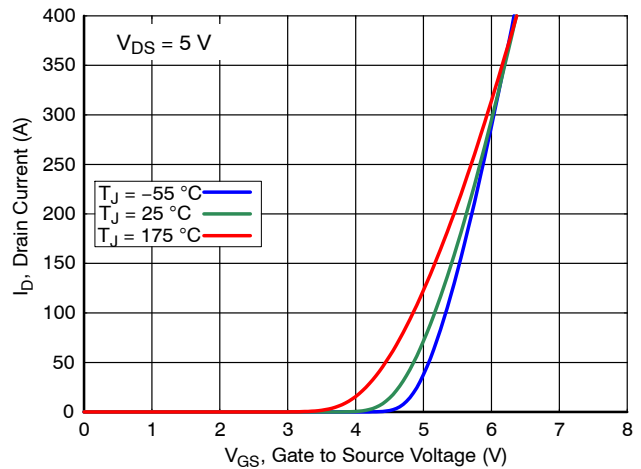


Figure 2. Transfer Characteristics

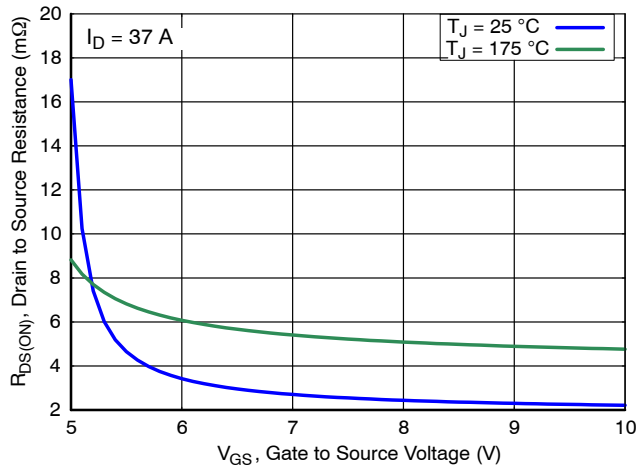


Figure 3. On-Resistance vs. Gate Voltage

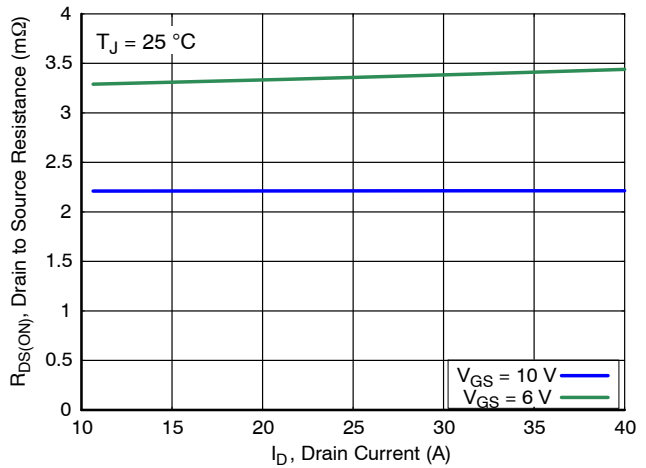


Figure 4. On-Resistance vs. Drain Current

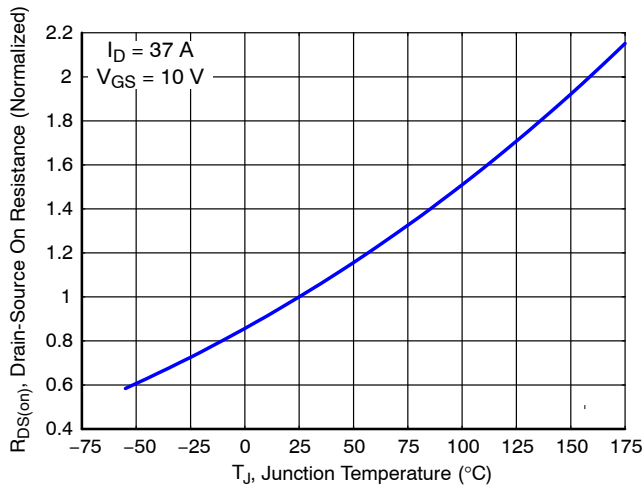


Figure 5. Normalized ON Resistance vs. Junction Temperature

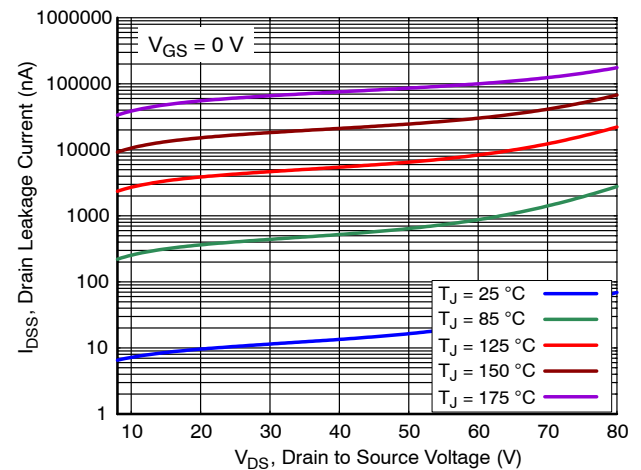


Figure 6. Drain Leakage Current vs. Drain Voltage

TYPICAL CHARACTERISTICS

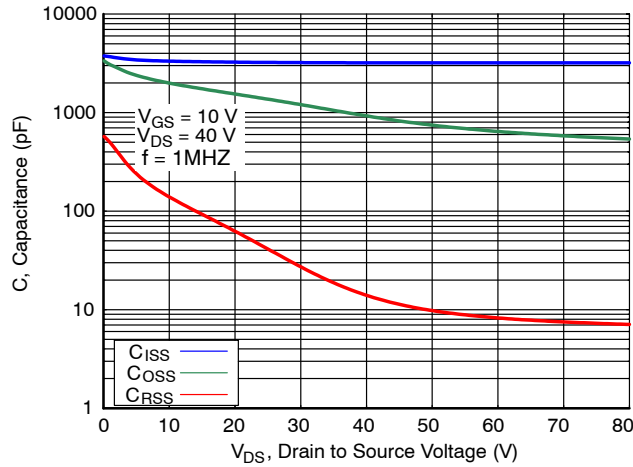


Figure 7. Capacitance Characteristics

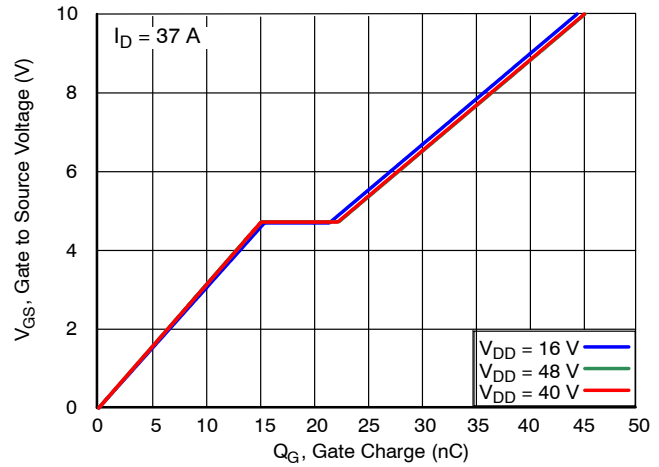


Figure 8. Gate Charge Characteristics

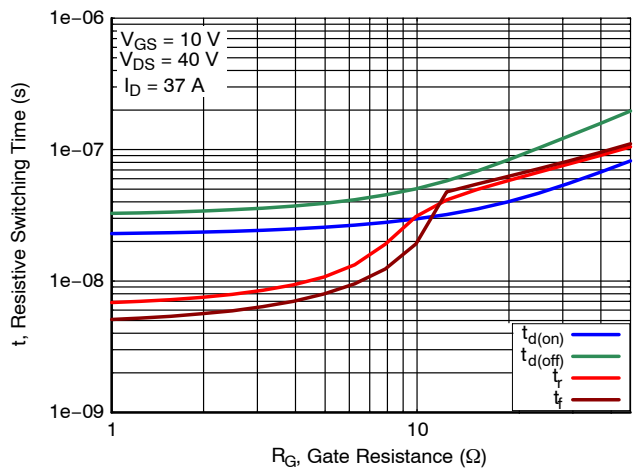


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

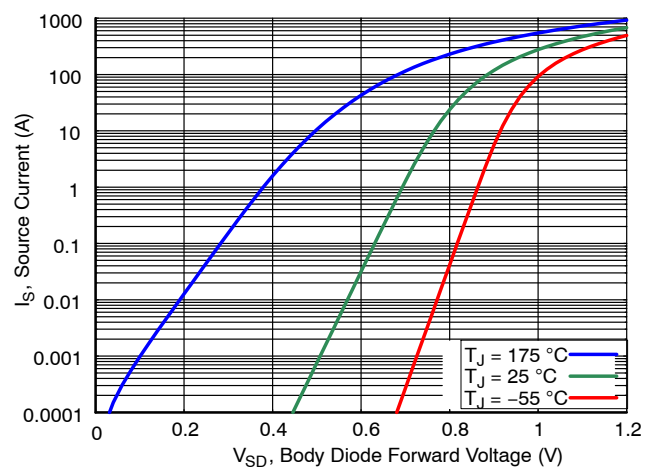


Figure 10. Diode Forward Characteristics

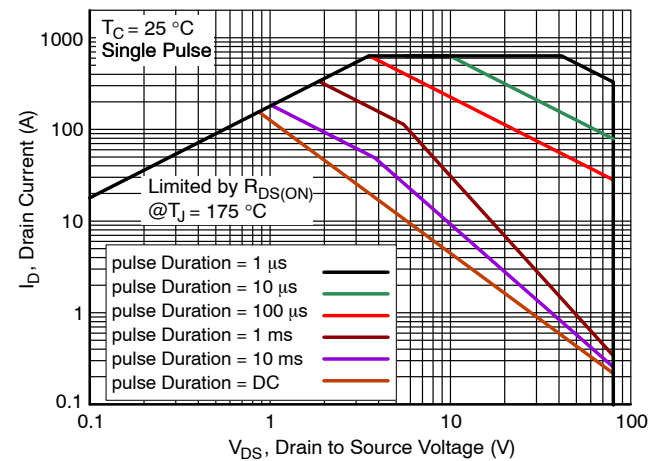


Figure 11. Safe Operating Area (SOA)

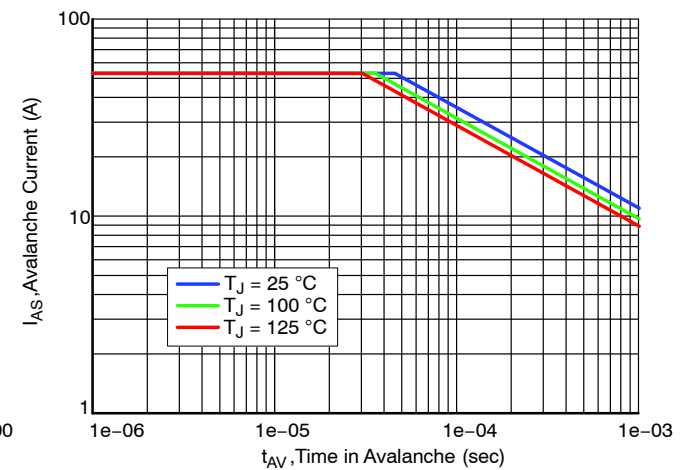


Figure 12. Avalanche Current vs. Pulse Time (UIS)

# NTMFSC2D6N08X

## TYPICAL CHARACTERISTICS

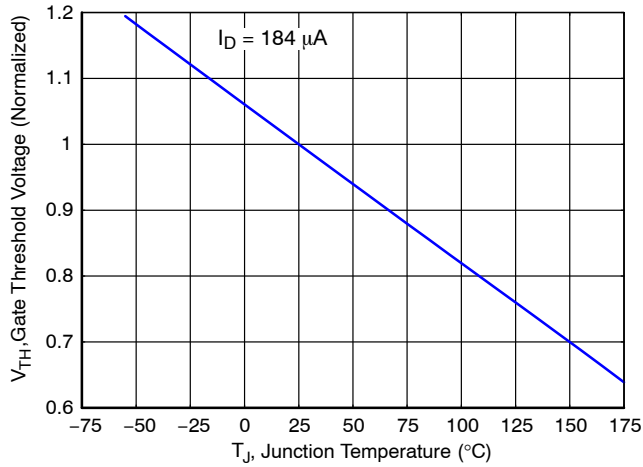


Figure 13. Gate Threshold Voltage vs. Junction Temperature

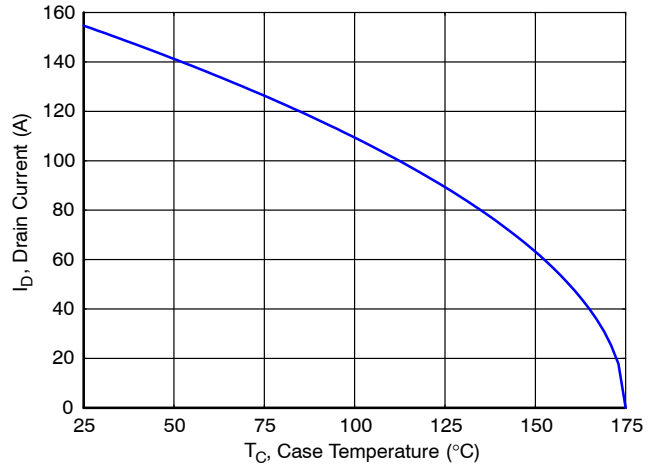


Figure 14. Maximum Current vs. Case Temperature

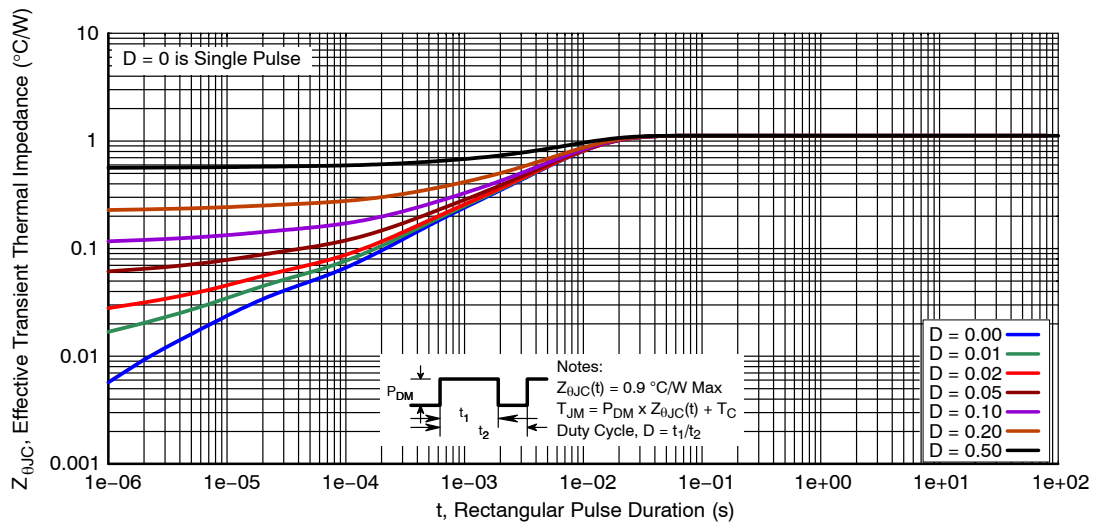


Figure 15. Transient Thermal Response

## ORDERING INFORMATION

| Device Order Number | Device Marking | Package Type                       | Shipping†          |
|---------------------|----------------|------------------------------------|--------------------|
| NTMFSC2D6N08XTWG    | 3X             | DFN8 5x6<br>(Pb-Free/Halogen Free) | 3000 / Tape & Reel |

† 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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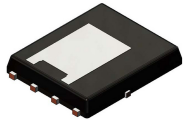
## NTMFSC2D6N08X

### REVISION HISTORY

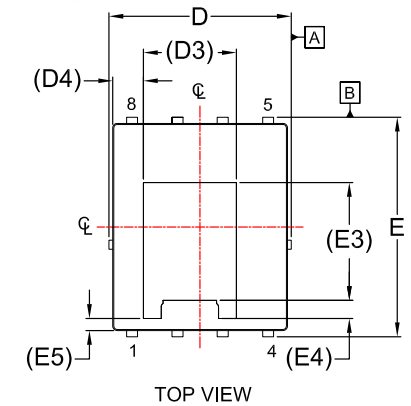
| Revision | Description of Changes                                                                                                                            | Date      |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 0        | Initial production data sheet version release.                                                                                                    | 4/22/2025 |
| 1        | Added Min and Max values for Charges, Capacitance, and Gate Resistance in the Electrical Characteristics table. + Rebrand to <b>onsemi</b> format | 5/4/2026  |

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

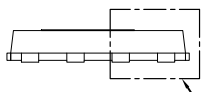



**DFN8 5x6.15, 1.27P, DUAL COOL**  
**CASE 506EG**  
**ISSUE D**

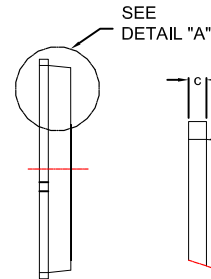
DATE 25 AUG 2020



TOP VIEW



FRONT VIEW

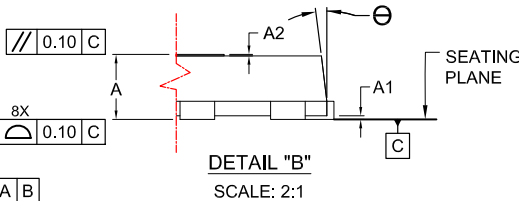
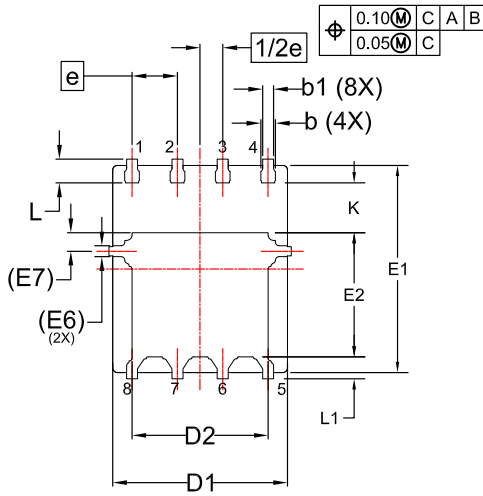


SIDE VIEW

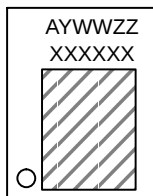
DETAIL "A"  
SCALE: 2:1

## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
5. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.


DETAIL "B"  
SCALE: 2:1


BOTTOM VIEW

**GENERIC**  
**MARKING DIAGRAM\***


XXXX = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
ZZ = Assembly Lot Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

| DIM  | MILLIMETERS |      |      |
|------|-------------|------|------|
|      | MIN.        | NOM. | MAX. |
| A    | 0.85        | 0.90 | 0.95 |
| A1   | -           | -    | 0.05 |
| A2   | -           | -    | 0.05 |
| b    | 0.31        | 0.41 | 0.51 |
| b1   | 0.21        | 0.31 | 0.41 |
| c    | 0.20        | 0.25 | 0.30 |
| D    | 4.90        | 5.00 | 5.10 |
| D1   | 4.80        | 4.90 | 5.00 |
| D2   | 3.67        | 3.82 | 3.97 |
| D3   | 2.60 REF    |      |      |
| D4   | 0.86 REF    |      |      |
| E    | 6.05        | 6.15 | 6.25 |
| E1   | 5.70        | 5.80 | 5.90 |
| E2   | 3.38        | 3.48 | 3.58 |
| E3   | 3.30 REF    |      |      |
| E4   | 0.50 REF    |      |      |
| E5   | 0.34 REF    |      |      |
| E6   | 0.30 REF    |      |      |
| E7   | 0.52 REF    |      |      |
| e    | 1.27 BSC    |      |      |
| 1/2e | 0.635 BSC   |      |      |
| K    | 1.30        | 1.40 | 1.50 |
| L    | 0.56        | 0.66 | 0.76 |
| L1   | 0.52        | 0.62 | 0.72 |
| Θ    | 0°          | ---  | 12°  |

LAND PATTERN  
RECOMMENDATION  
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SOLDERING AND MOUNTING TECHNIQUES  
REFERENCE MANUAL, SOLDERRM/D.

**DOCUMENT NUMBER:** 98AON84257G

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**DESCRIPTION:** DFN8 5x6.15, 1.27P, DUAL COOL

**PAGE 1 OF 1**

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