

MOSFET - Power, Single N-Channel, DUAL COOL[®], DFN8 5x6

80 V, 1.4 mΩ, 270 A

NTMFSCH1D4N08X

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

Typical Applications

- Power Supply Unit (PSU)
- DC/DC Intermediated Bus Converter
- Motor Drives
- Synchronous Rectifier
- ORing

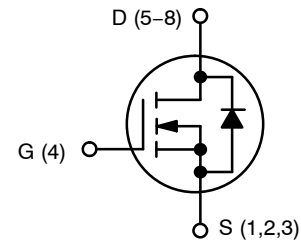
MAXIMUM RATINGS ($T_J = 25\text{ }^{\circ}\text{C}$, Unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------|-------------|--------------------|
| Drain-to-Source Voltage | V_{DSS} | 80 | V |
| Gate-to-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current (Notes 1, 2) | $T_C = 25\text{ }^{\circ}\text{C}$ | I_D | 270 |
| | $T_C = 100\text{ }^{\circ}\text{C}$ | | 191 |
| Power Dissipation (Notes 1, 2) | $T_C = 25\text{ }^{\circ}\text{C}$ | P_D | 208 |
| Pulsed Drain Current | $T_C = 25\text{ }^{\circ}\text{C}$, $t_p = 100\text{ }\mu\text{s}$ | I_{DM} | 1110 |
| Pulsed Source Current (Body Diode) | | I_{SM} | 1110 |
| Operating Junction and Storage Temperature | T_J, T_{stg} | -55 to +175 | $^{\circ}\text{C}$ |
| Source Current (Body Diode) | $T_C = 25\text{ }^{\circ}\text{C}$ | I_S | 231 |
| Single Pulse Avalanche Energy ($I_{pk} = 81\text{ A}$) (Note 3) | E_{AS} | 328 | mJ |
| Lead Temperature Soldering Reflow for Soldering Purposes (1/8" from case for 10 s) | T_L | 260 | $^{\circ}\text{C}$ |

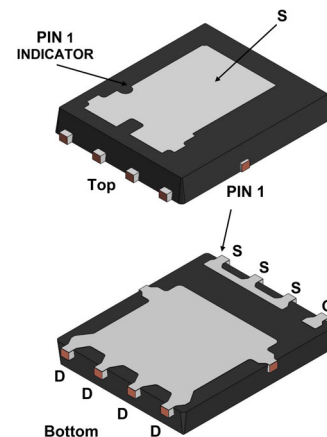
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

- 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 & electromechanical application board design.
- EAS of 328 mJ is based on started $T_J = 25\text{ }^{\circ}\text{C}$, $I_{AS} = 81\text{ A}$, $V_{DD} = 64\text{ V}$, $V_{GS} = 10\text{ V}$, 100% avalanche tested.

| $V_{(BR)DSS}$ | $R_{DS(ON)}\text{ MAX}$ | $I_D\text{ MAX}$ |
|---------------|-------------------------|------------------|
| 80 V | 1.4 mΩ @ 10 V | 270 A |

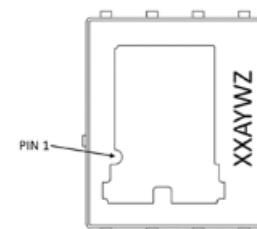


N-CHANNEL MOSFET



DFN8 5x6
CASE 506FF

MARKING DIAGRAM



3V = 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.

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THERMAL CHARACTERISTICS

| Parameter | Symbol | Max | Unit |
|-----------------------------------------------|------------------|------|------|
| Thermal Resistance, Junction-to-Case (Bottom) | $R_{\theta JCB}$ | 0.72 | °C/W |
| Thermal Resistance, Junction-to-Case (Top) | $R_{\theta JCT}$ | 0.78 | |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 39 | |

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 | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = 1\text{ mA}, T_J = 25^\circ\text{C}$ | 80 | | | V |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | $\Delta V_{(BR)DSS} / \Delta T_J$ | $I_D = 1\text{ mA}$. Referenced to 25°C | | 32 | | 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 | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 30\text{ A}, T_J = 25^\circ\text{C}$ | | 1.1 | 1.4 | m Ω |
| | | $V_{GS} = 6\text{ V}, I_D = 30\text{ A}, T_J = 25^\circ\text{C}$ | | 1.7 | 2.4 | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}, I_D = 348\text{ }\mu\text{A}, T_J = 25^\circ\text{C}$ | 2.4 | | 3.6 | V |
| Gate Threshold Voltage Temperature Coefficient | $\Delta V_{GS(TH)} / \Delta T_J$ | $V_{GS} = V_{DS}, I_D = 348\text{ }\mu\text{A}$ | | -7 | | mV/°C |
| Forward Transconductance | g_{FS} | $V_{DS} = 5\text{ V}, I_D = 30\text{ A}$ | | 133 | | S |

CHARGES, CAPACITANCES & GATE RESISTANCE

| | | | | | | |
|------------------------------|--------------|-----------------------------------------------------------------|--|------|--|----------|
| Input Capacitance | C_{ISS} | $V_{GS} = 0\text{ V}, V_{DS} = 40\text{ V}, f = 1\text{ MHz}$ | | 6140 | | pF |
| Output Capacitance | C_{OSS} | | | 1780 | | |
| Reverse Transfer Capacitance | C_{RSS} | | | 27 | | |
| Output Charge | Q_{OSS} | | | 130 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS} = 6\text{ V}, V_{DD} = 40\text{ V}; I_D = 30\text{ A}$ | | 54 | | nC |
| | | $V_{GS} = 10\text{ V}, V_{DD} = 40\text{ V}; I_D = 30\text{ A}$ | | 86 | | |
| Threshold Gate Charge | $Q_{G(TH)}$ | $V_{GS} = 10\text{ V}, V_{DD} = 40\text{ V}; I_D = 30\text{ A}$ | | 19 | | |
| Gate-to-Source Charge | Q_{GS} | | | 28 | | |
| Gate-to-Drain Charge | Q_{GD} | | | 13 | | |
| Gate Plateau Voltage | V_{GP} | | | 4.6 | | |
| Gate Resistance | R_G | $f = 1\text{ MHz}$ | | 0.4 | | Ω |

SWITCHING CHARACTERISTICS

| | | | | | | |
|---------------------|--------------|---------------------------------------------------------------------------------------------------------------|--|----|--|----|
| Turn-On Delay Time | $t_{d(ON)}$ | Resistive Load, $V_{GS} = 0/10\text{ V}, V_{DD} = 40\text{ V}, I_D = 30\text{ A}, R_G = 2.5\text{ }\Omega$ | | 33 | | ns |
| Rise Time | t_r | | | 9 | | |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | | 50 | | |
| Fall Time | t_f | | | 8 | | |

SOURCE-TO-DRAIN DIODE CHARACTERISTICS

| | | | | | | |
|-----------------------|----------|-------------------------------------------------------------------|--|-----|-----|---|
| Forward Diode Voltage | V_{SD} | $V_{GS} = 0\text{ V}, I_S = 30\text{ A}, T_J = 25^\circ\text{C}$ | | 0.8 | 1.2 | V |
| | | $V_{GS} = 0\text{ V}, I_S = 30\text{ A}, T_J = 125^\circ\text{C}$ | | 0.6 | | |

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

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|----------------------------------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|------|
| SOURCE-TO-DRAIN DIODE CHARACTERISTICS | | | | | | |
| Reverse Recovery Time | t_{RR} | $V_{GS} = 0\text{ V}$, $dI/dt = 1000\text{ A}/\mu\text{s}$, $I_S = 30\text{ A}$, $V_{DD} = 40\text{ V}$, $T_J = 25\text{ }^{\circ}\text{C}$ | | 28 | | ns |
| Charge Time | t_a | | | 16 | | |
| Discharge Time | t_b | | | 12 | | |
| Reverse Recovery Charge | Q_{RR} | | | 231 | | 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.

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TYPICAL CHARACTERISTICS

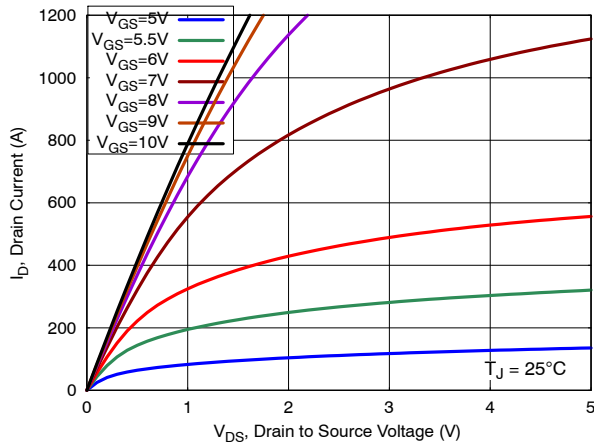


Figure 1. On-Region Characteristics

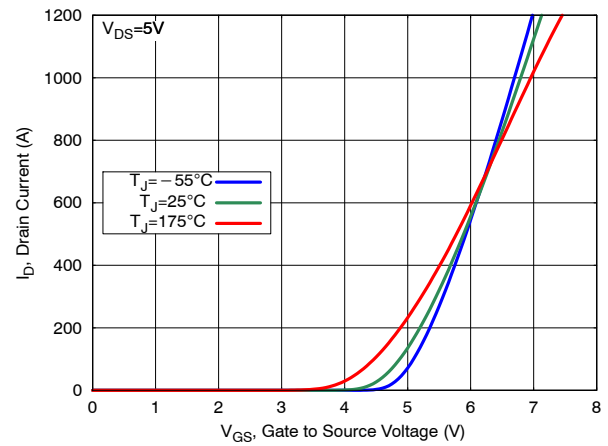


Figure 2. Transfer Characteristics

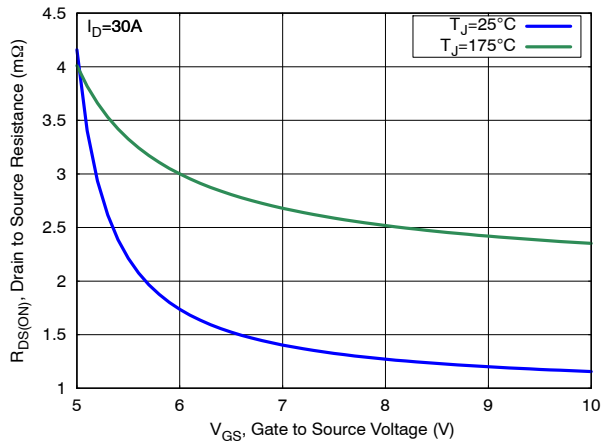


Figure 3. On-Resistance vs. Gate Voltage

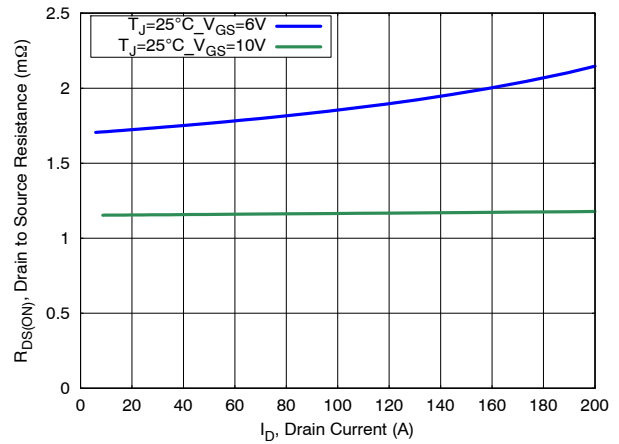


Figure 4. On-Resistance vs. Drain Current

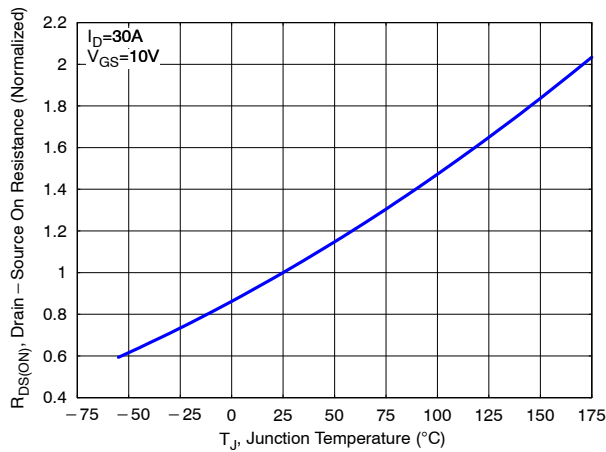


Figure 5. Normalized ON Resistance vs. Junction Temperature

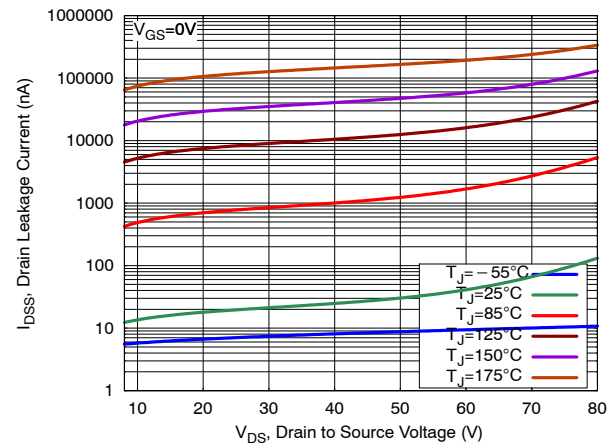


Figure 6. Drain Leakage Current vs. Drain Voltage

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TYPICAL CHARACTERISTICS

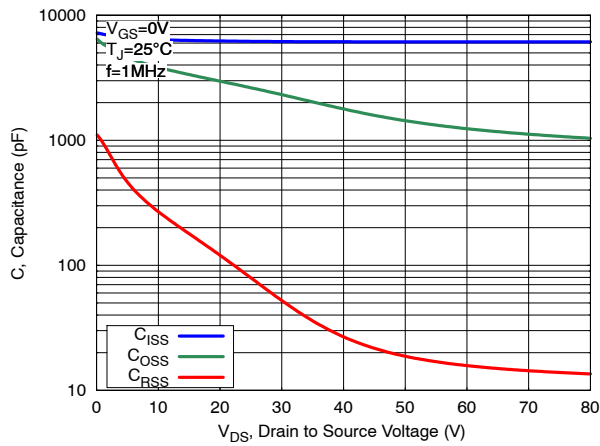


Figure 7. Capacitance Characteristics

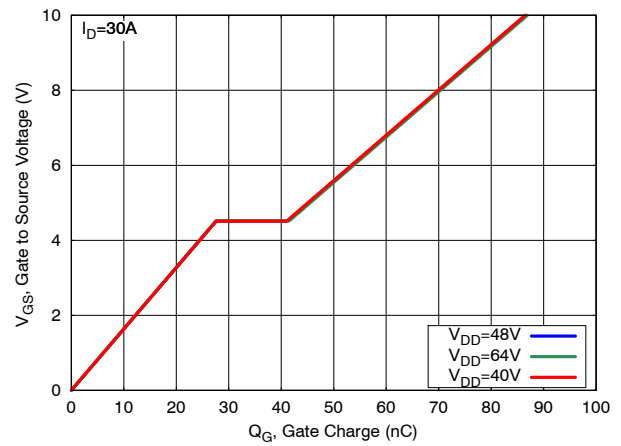


Figure 8. Gate Charge Characteristics

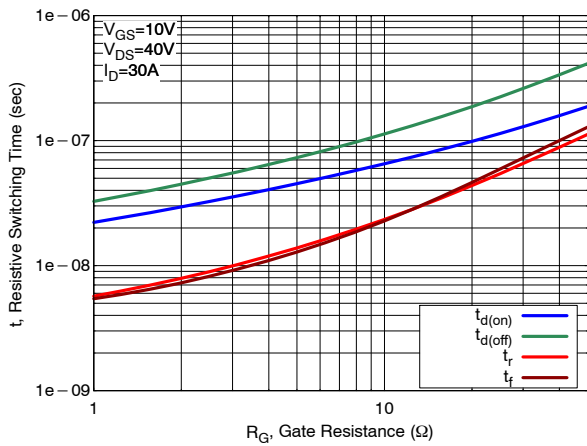


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

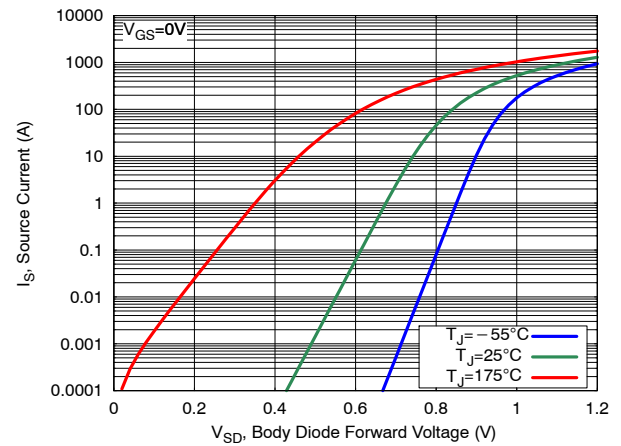


Figure 10. Diode Forward Characteristics

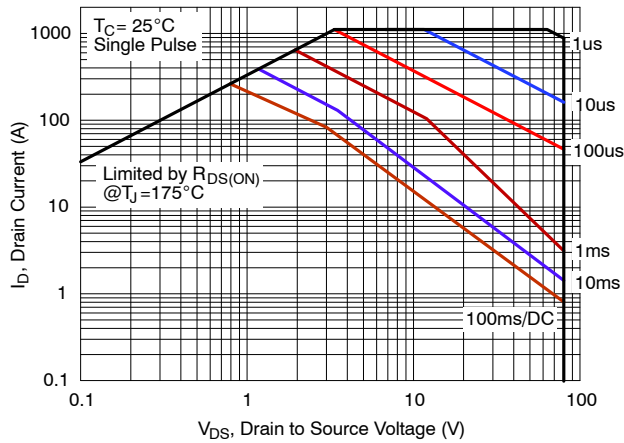


Figure 11. Safe Operating Area (SOA)

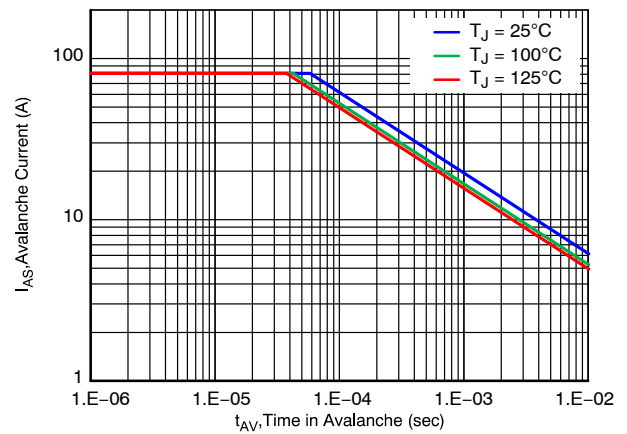


Figure 12. Avalanche Current vs Pulse Time (UIS)

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TYPICAL CHARACTERISTICS

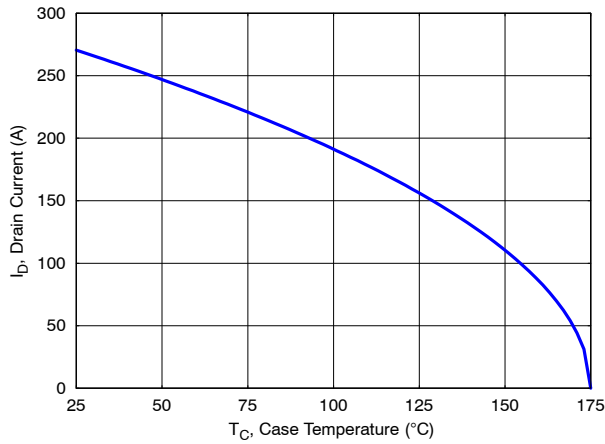


Figure 13. Maximum Current vs. Case Temperature

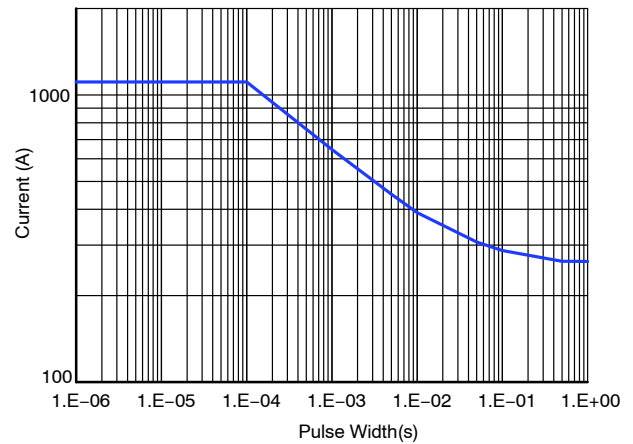


Figure 14. IDM vs. Pulse Width

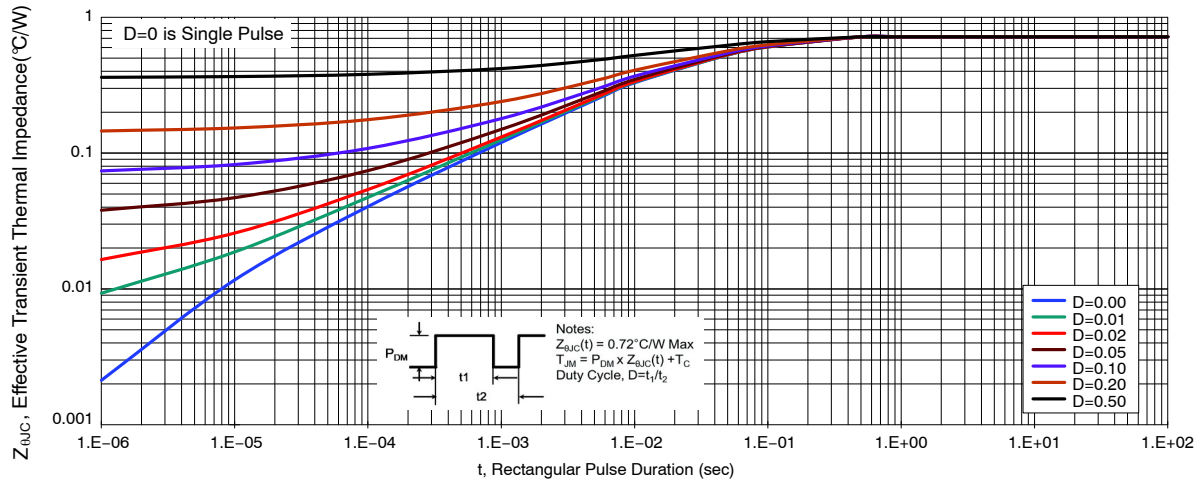


Figure 15. Transient Thermal Response

ORDERING INFORMATION

| Device | Device Marking | Package | Shipping [†] |
|-------------------|----------------|-----------------------------------------|-----------------------|
| NTMFSCH1D4N08XTWG | 3V | DFN8 5.1x6.15 (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](#).

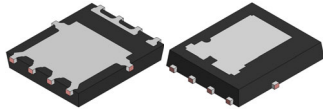
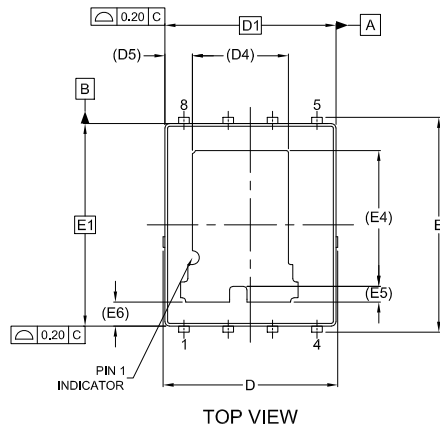
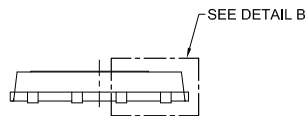
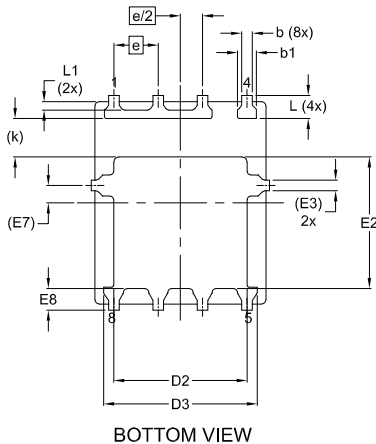
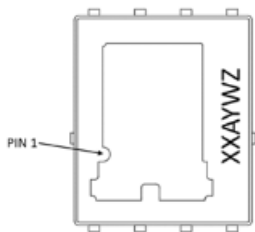
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REVISION HISTORY

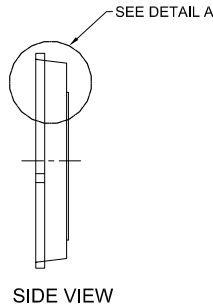
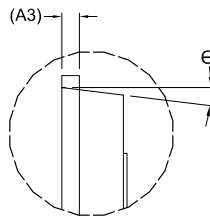
| Revision | Description of Changes | Date |
|----------|------------------------|------------|
| 2 | Final version release. | 07/29/2025 |

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 4.90x5.80x0.90, 1.27P
CASE 506FF
ISSUE D
DATE 21 MAR 2025

TOP VIEW

FRONT VIEW

BOTTOM VIEW
GENERIC MARKING DIAGRAM*


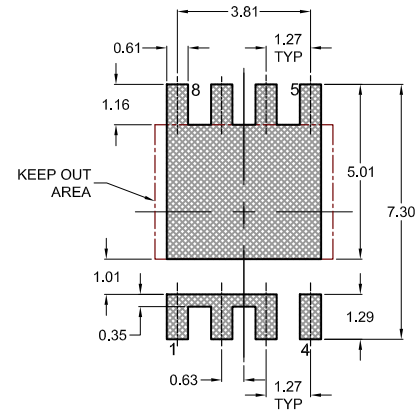
XX = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
Z = Assembly Lot Code

*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.


SIDE VIEW

DETAIL A
SCALE: 2:1

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
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.


LAND PATTERN RECOMMENDATION

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

| DIM | MILLIMETERS | | |
|-----|-------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 0.85 | 0.90 | 0.95 |
| A1 | - | - | 0.05 |
| A3 | 0.25 REF | | |
| b | 0.21 | 0.31 | 0.41 |
| b1 | 0.44 | 0.54 | 0.64 |
| D | 4.90 | 5.00 | 5.10 |
| D1 | 4.90 BSC | | |
| D2 | 3.72 | 3.82 | 3.92 |
| D3 | 4.30 | 4.40 | 4.50 |
| D4 | 2.75 REF | | |
| D5 | 0.79 REF | | |
| E | 6.05 | 6.15 | 6.25 |
| E1 | 5.80 BSC | | |
| E2 | 3.67 | 3.77 | 3.87 |
| E3 | 0.30 REF | | |
| E4 | 3.89 REF | | |
| E5 | 0.45 REF | | |
| E6 | 0.69 REF | | |
| E7 | 0.50 REF | | |
| E8 | 0.52 | 0.62 | 0.72 |
| e | 1.27 BSC | | |
| e/2 | 0.635BSC | | |
| k | 1.10 REF | | |
| L | 0.56 | 0.66 | 0.76 |
| L1 | 0.15 | 0.25 | 0.35 |
| Θ | 0° | -- | 7° |

DOCUMENT NUMBER: 98AON54466H

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DESCRIPTION: DFN8 4.90x5.80x0.90, 1.27P

PAGE 1 OF 1

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