

# MOSFET - Power, Single N-Channel, TOLL 80 V, 0.79 mΩ, 457 A NVBLS0D8N08X

## Features

- Low  $Q_{RR}$ , Soft Recovery Body Diode
- Low  $R_{DS(on)}$  to Minimize Conduction Losses
- Low  $Q_G$  and Capacitance to Minimize Driver Losses
- AEC-Q101 Qualified and PPAP Capable
- 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
- 48 V Battery Switch
- Battery Management System

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

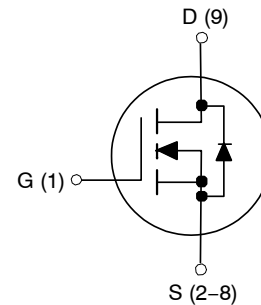
| Parameter                                                         | Symbol         | Value                                                 | Unit             |
|-------------------------------------------------------------------|----------------|-------------------------------------------------------|------------------|
| Drain-to-Source Voltage                                           | $V_{DSS}$      | 80                                                    | V                |
| Gate-to-Source Voltage                                            | $V_{GS}$       | $\pm 20$                                              | V                |
| Continuous Drain Current                                          | $I_D$          | $T_C = 25^\circ\text{C}$                              | A                |
|                                                                   |                | $T_C = 100^\circ\text{C}$                             |                  |
| Power Dissipation                                                 | $P_D$          | $T_C = 25^\circ\text{C}$                              | W                |
| Pulsed Drain Current                                              | $I_{DM}$       | $T_C = 25^\circ\text{C}$ ,<br>$t_p = 100 \mu\text{s}$ | A                |
| Pulsed Source Current (Body Diode)                                | $I_{SM}$       |                                                       |                  |
| Operating Junction and Storage Temperature Range                  | $T_J, T_{stg}$ | $-55$ to $+175$                                       | $^\circ\text{C}$ |
| Source Current (Body Diode)                                       | $I_S$          | 547                                                   | A                |
| Single Pulse Avalanche Energy ( $I_{PK} = 103 \text{ A}$ )        | $E_{AS}$       | 530                                                   | 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.

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Actual continuous current will be limited by thermal & electromechanical application board design.
3.  $E_{AS}$  of 530 mJ is based on started  $T_J = 25^\circ\text{C}$ ,  $I_{AS} = 103 \text{ A}$ ,  $V_{DD} = 64 \text{ V}$ ,  $V_{GS} = 10 \text{ V}$ , 100% avalanche tested.

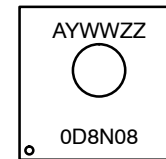
| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ MAX}$ | $I_D \text{ MAX}$ |
|---------------|--------------------------|-------------------|
| 80 V          | 0.79 mΩ @ 10 V           | 457 A             |

## N-CHANNEL MOSFET



H-PSOF8L  
CASE 100CU

## MARKING DIAGRAM



- A = Assembly Location  
Y = Year  
WW = Work Week  
ZZ = Assembly Lot Code  
0D8N08 = Specific Device Code

## ORDERING INFORMATION

| Device          | Package            | Shipping†          |
|-----------------|--------------------|--------------------|
| NVBLS0D8N08XTXG | H-PSOF8L (Pb-Free) | 2000 / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

**Table 1. THERMAL CHARACTERISTICS**

| Parameter                               | Symbol          | Value | Unit |
|-----------------------------------------|-----------------|-------|------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 0.46  | °C/W |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 43    |      |

**Table 2. ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise noted)

| 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 $25^\circ\text{C}$                                                           |     | 35.5  |      | mV/°C         |
| Zero Gate Voltage Drain Current                           | $I_{DSS}$                         | $V_{DS} = 80\text{ V}, T_J = 25^\circ\text{C}$                                                                   |     |       | 2    | $\mu\text{A}$ |
|                                                           |                                   | $V_{DS} = 80\text{ V}, T_J = 125^\circ\text{C}$                                                                  |     |       | 250  |               |
| Gate-to-Source Leakage Current                            | $I_{GSS}$                         | $V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$                                                                      |     |       | 100  | nA            |
| ON CHARACTERISTICS                                        |                                   |                                                                                                                  |     |       |      |               |
| Drain-to-Source On Resistance                             | $R_{DS(on)}$                      | $V_{GS} = 10\text{ V}, I_D = 80\text{ A}, T_J = 25^\circ\text{C}$                                                |     | 0.69  | 0.79 | m $\Omega$    |
| Gate Threshold Voltage                                    |                                   | $V_{GS} = V_{DS}, I_D = 720\text{ }\mu\text{A}, T_J = 25^\circ\text{C}$                                          | 2.4 |       | 3.6  | V             |
| Gate Threshold Voltage Temperature Coefficient            | $\Delta V_{GS(th)} / \Delta T_J$  | $V_{GS} = V_{DS}, I_D = 720\text{ }\mu\text{A}$                                                                  |     | -7.95 |      | mV/°C         |
| Forward Transconductance                                  | $g_{FS}$                          | $V_{DS} = 10\text{ V}, I_D = 80\text{ A}$                                                                        |     | 485   |      | S             |
| CHARGES, CAPACITANCES & GATE RESISTANCE                   |                                   |                                                                                                                  |     |       |      |               |
| Input Capacitance                                         | $C_{iss}$                         | $V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$                                                    |     | 12920 |      | pF            |
| Output Capacitance                                        | $C_{oss}$                         |                                                                                                                  |     | 3670  |      |               |
| Reverse Transfer Capacitance                              | $C_{rss}$                         |                                                                                                                  |     | 55    |      |               |
| Output Charge                                             | $Q_{oss}$                         |                                                                                                                  |     | 262   |      | nC            |
| Total Gate Charge                                         | $Q_{G(tot)}$                      | $V_{DD} = 40\text{ V}, I_D = 80\text{ A}, V_{GS} = 6\text{ V}$                                                   |     | 109   |      |               |
|                                                           |                                   | $V_{DD} = 40\text{ V}, I_D = 80\text{ A}, V_{GS} = 10\text{ V}$                                                  |     | 174   |      |               |
| Threshold Gate Charge                                     | $Q_{G(th)}$                       |                                                                                                                  | 34  |       |      |               |
| Gate-to-Source Charge                                     | $Q_{gs}$                          |                                                                                                                  | 54  |       |      |               |
| Gate-to-Drain Charge                                      | $Q_{gd}$                          |                                                                                                                  | 32  |       |      |               |
| Gate Plateau Voltage                                      | $V_{gp}$                          |                                                                                                                  | 4.6 |       | V    |               |
| Gate Resistance                                           | $R_g$                             | $f = 1\text{ MHz}$                                                                                               |     | 0.5   |      | $\Omega$      |
| SWITCHING CHARACTERISTICS                                 |                                   |                                                                                                                  |     |       |      |               |
| Turn-On Delay Time                                        | $t_{d(on)}$                       | Resistive Load, $V_{GS} = 0/10\text{ V}$ ,<br>$V_{DD} = 64\text{ V}, I_D = 80\text{ A}, R_G = 2.5\text{ }\Omega$ |     | 35    |      | ns            |
| Rise Time                                                 | $t_r$                             |                                                                                                                  |     | 15    |      |               |
| Turn-Off Delay Time                                       | $t_{d(off)}$                      |                                                                                                                  |     | 74    |      |               |
| Fall Time                                                 | $t_f$                             |                                                                                                                  |     | 20    |      |               |
| SOURCE-TO-DRAIN DIODE CHARACTERISTICS                     |                                   |                                                                                                                  |     |       |      |               |
| Forward Diode Voltage                                     | $V_{SD}$                          | $I_S = 80\text{ A}, V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$                                                 |     | 0.8   |      | V             |
|                                                           |                                   | $I_S = 80\text{ A}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$                                                |     | 0.66  |      |               |
| Reverse Recovery Time                                     | $t_{rr}$                          | $V_{GS} = 0\text{ V}, I_S = 80\text{ A}$<br>$di/dt = 1000\text{ A}/\mu\text{s}, V_{DD} = 64\text{ V}$            |     | 57    |      | ns            |
| Charge Time                                               | $t_a$                             |                                                                                                                  |     | 26    |      |               |
| Discharge Time                                            | $t_b$                             |                                                                                                                  |     | 31    |      |               |
| Reverse Recovery Charge                                   | $Q_{rr}$                          |                                                                                                                  |     | 650   |      | 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.

# TYPICAL CHARACTERISTICS

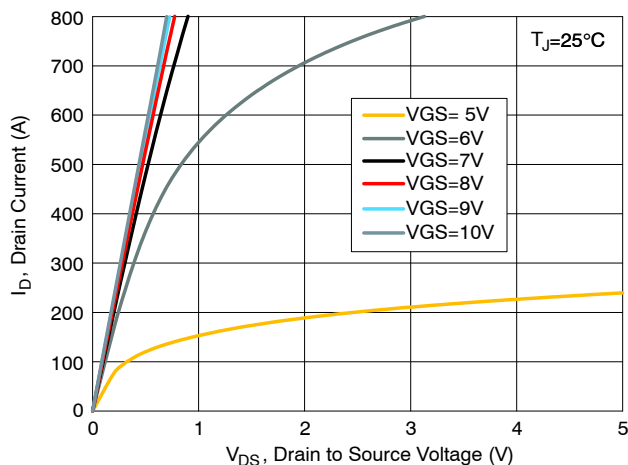


Figure 1. On-Region Characteristics

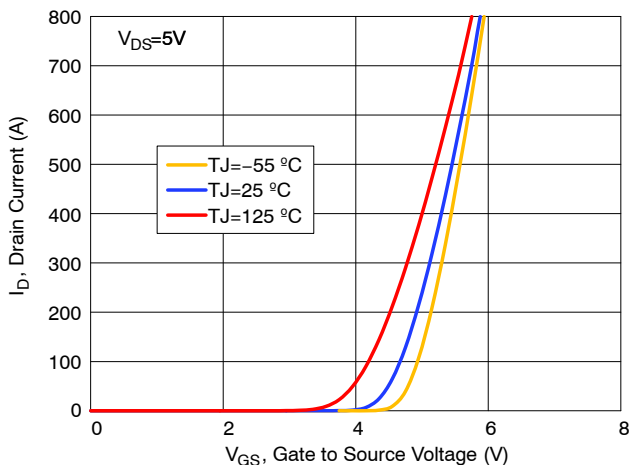


Figure 2. Transfer Characteristics

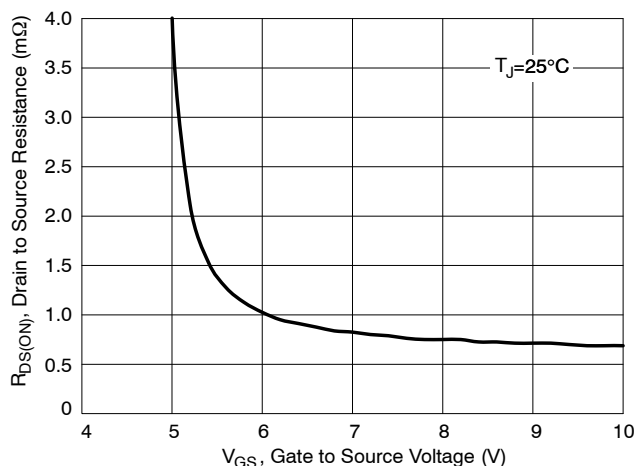


Figure 3. On-Resistance vs. Gate Voltage

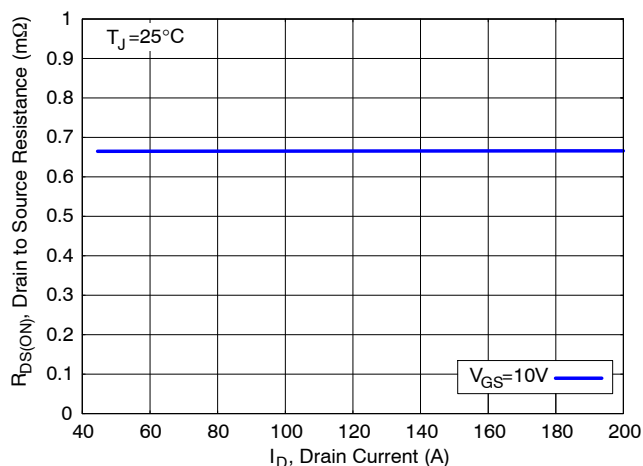


Figure 4. On-Resistance vs. Drain Current

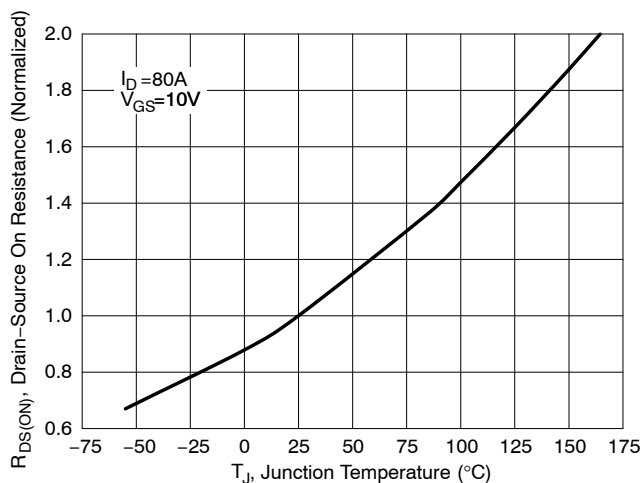


Figure 5. Normalized On-Resistance vs. Junction Temperature

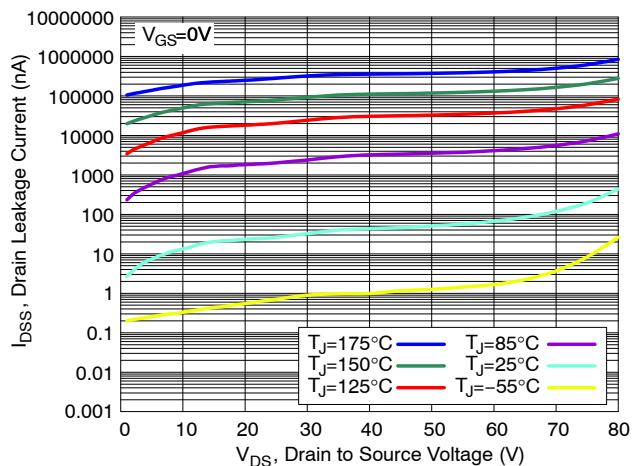


Figure 6. Drain Leakage Current vs. Drain Voltage

TYPICAL CHARACTERISTICS

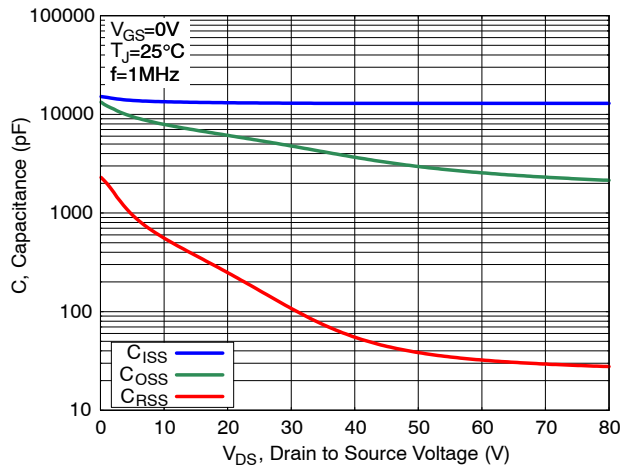


Figure 7. Capacitance Characteristics

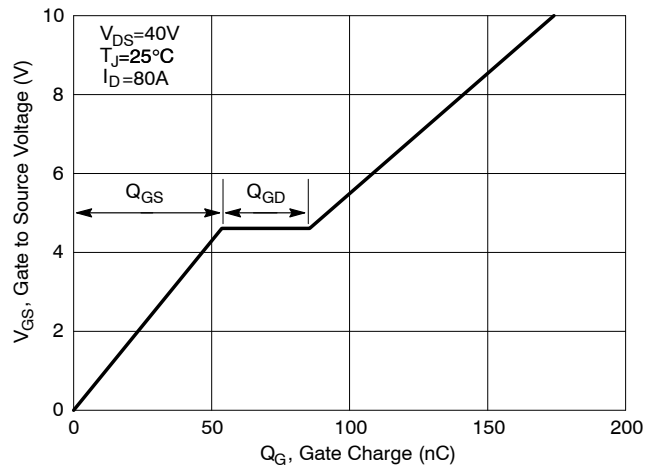


Figure 8. Gate Charge Characteristics

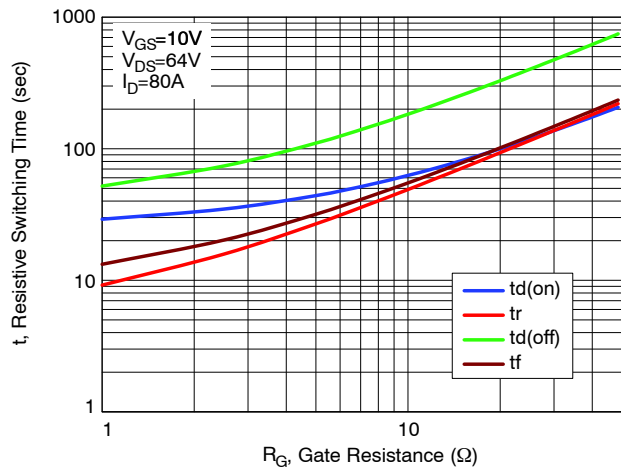


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

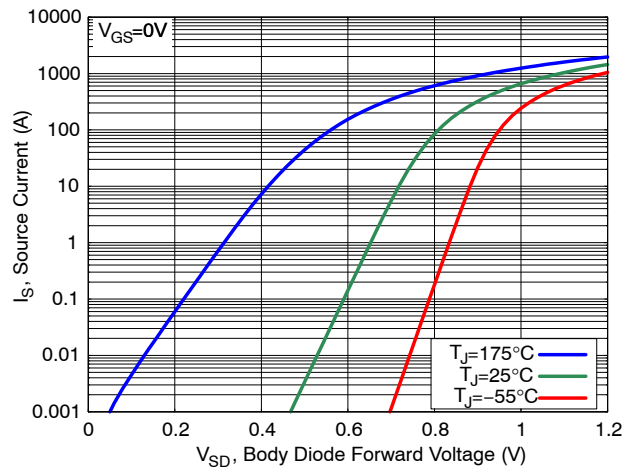


Figure 10. Diode Forward Characteristics

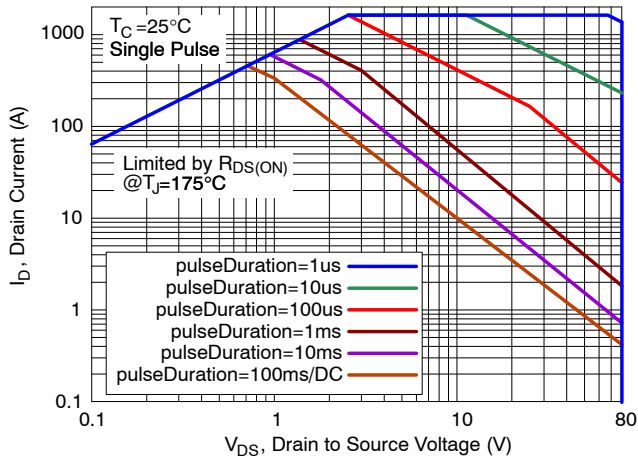


Figure 11. Safe Operating Area (SOA)

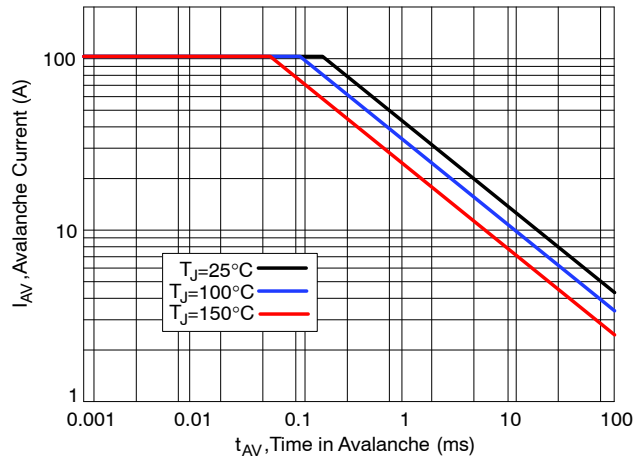


Figure 12. Avalanche Current vs. Pulse Time (UIS)

TYPICAL CHARACTERISTICS

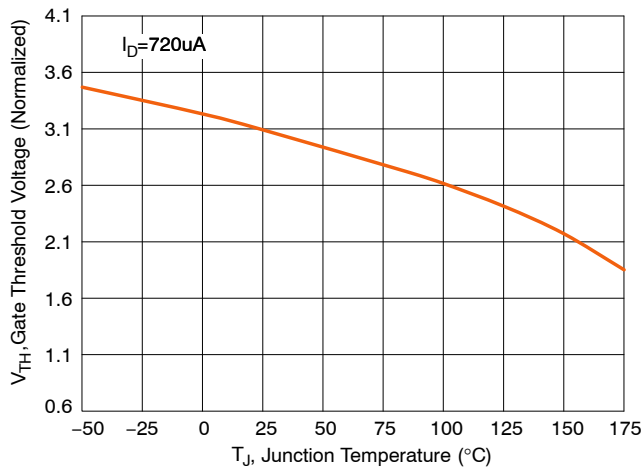


Figure 13. Gate Threshold Voltage vs. Junction Temperature

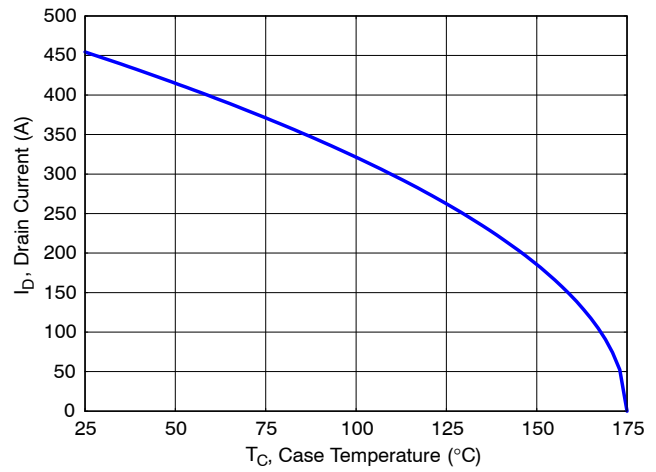


Figure 14. Maximum Current vs. Case Temperature

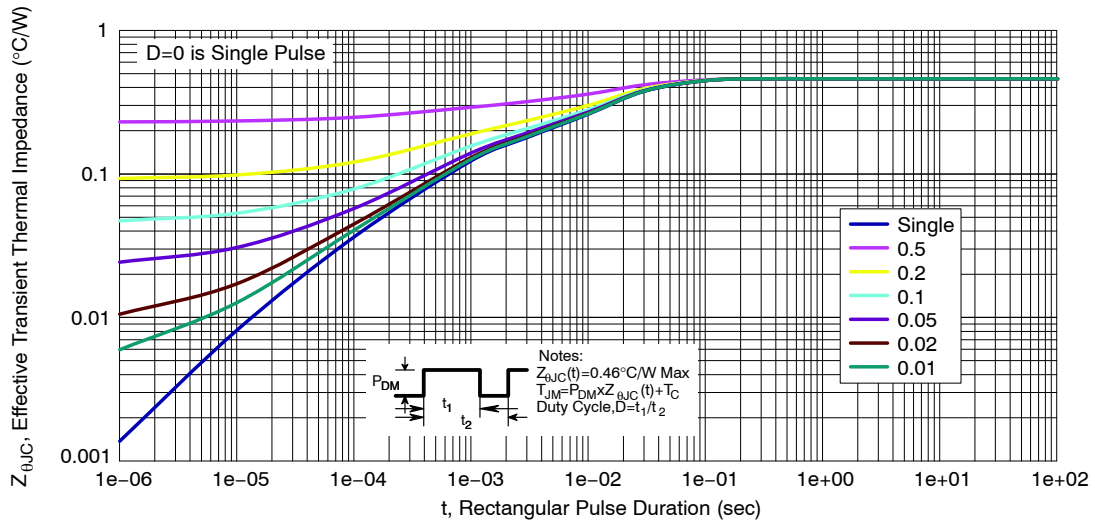
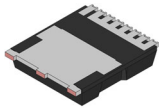
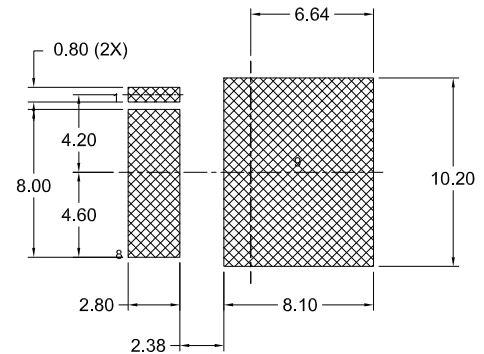
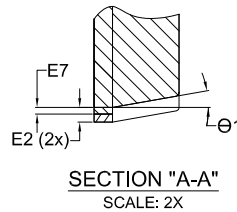
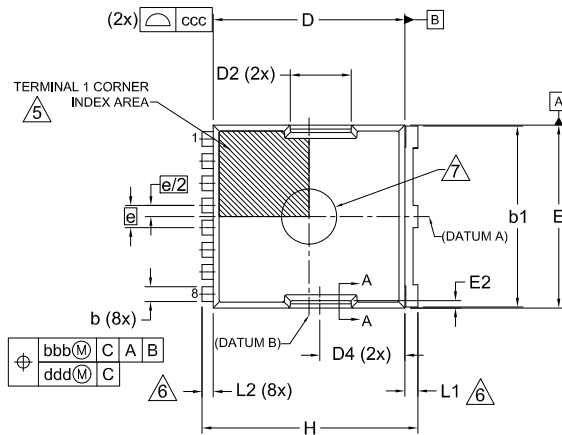


Figure 15. Transient Thermal Response

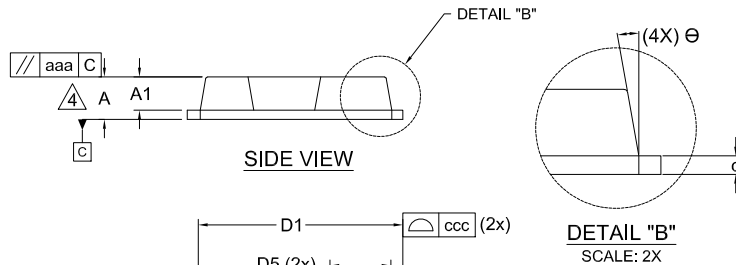


H-PSOF8L 11.68x9.80x2.30, 1.20P  
CASE 100CU  
ISSUE F

DATE 30 JUL 2024

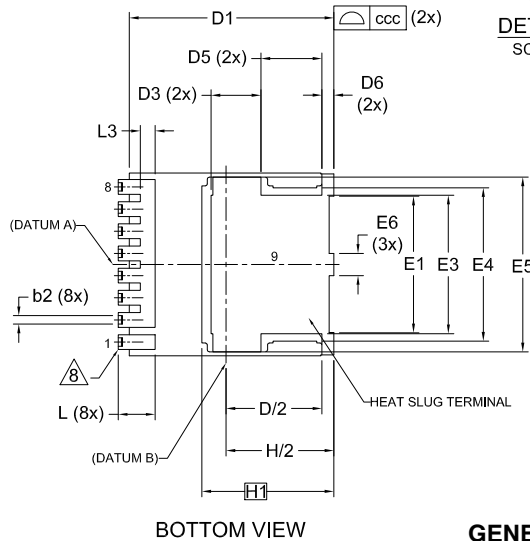


\*FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERM/D.



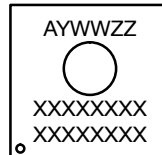
NOTES:

1. PACKAGE STANDARD REFERENCE: JEDEC MO-299, ISSUE B.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
3. "e" REPRESENTS THE TERMINAL PITCH.
4. THIS DIMENSION INCLUDES ENCAPSULATION THICKNESS "A1", AND PACKAGE BODY THICKNESS, BUT DOES NOT INCLUDE ATTACHED FEATURES, e.g., EXTERNAL OR CHIP CAPACITORS. AN INTEGRAL HEATSLUG IS NOT CONSIDERED AS ATTACHED FEATURE.
5. A VISUAL INDEX FEATURE MUST BE LOCATED WITHIN THE HATCHED AREA.
6. DIMENSIONS b1, L1, L2 APPLY TO PLATED TERMINALS.
7. THE LOCATION AND SIZE OF EJECTOR MARKS ARE OPTIONAL.
8. THE LOCATION AND NUMBER OF FUSED LEADS ARE OPTIONAL.



GENERIC  
MARKING DIAGRAM\*

A = Assembly Location  
Y = Year  
WW = Work Week  
ZZ = Assembly Lot Code  
XXXX = Specific Device 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   | 2.20        | 2.30  | 2.40  |
| A1  | 1.70        | 1.80  | 1.90  |
| b   | 0.70        | 0.80  | 0.90  |
| b1  | 9.70        | 9.80  | 9.90  |
| b2  | 0.35        | 0.45  | 0.55  |
| c   | 0.40        | 0.50  | 0.60  |
| D   | 10.28       | 10.38 | 10.48 |
| D/2 | 5.09        | 5.19  | 5.29  |
| D1  | 10.98       | 11.08 | 11.18 |
| D2  | 3.20        | 3.30  | 3.40  |
| D3  | 2.60        | 2.70  | 2.80  |
| D4  | 4.45        | 4.55  | 4.65  |
| D5  | 3.20        | 3.30  | 3.40  |
| D6  | 0.55        | 0.65  | 0.75  |
| E   | 9.80        | 9.90  | 10.00 |
| E1  | 7.30        | 7.40  | 7.50  |
| E2  | 0.30        | 0.40  | 0.50  |
| E3  | 7.40        | 7.50  | 7.60  |
| E4  | 8.20        | 8.30  | 8.40  |

| DIM | MILLIMETERS |       |       |
|-----|-------------|-------|-------|
|     | MIN.        | NOM.  | MAX.  |
| E5  | 9.36        | 9.46  | 9.56  |
| E6  | 1.10        | 1.20  | 1.30  |
| E7  | 0.15        | 0.18  | 0.21  |
| e   | 1.20 BSC    |       |       |
| e/2 | 0.60 BSC    |       |       |
| H   | 11.58       | 11.68 | 11.78 |
| H/2 | 5.74        | 5.84  | 5.94  |
| H1  | 7.15 BSC    |       |       |
| L   | 1.90        | 2.00  | 2.10  |
| L1  | 0.60        | 0.70  | 0.80  |
| L2  | 0.50        | 0.60  | 0.70  |
| L3  | 0.70        | 0.80  | 0.90  |
| Θ   | 10° REF     |       |       |
| Θ1  | 10° REF     |       |       |
| aaa | 0.20        |       |       |
| bbb | 0.25        |       |       |
| ccc | 0.20        |       |       |
| ddd | 0.20        |       |       |
| eee | 0.10        |       |       |

DOCUMENT NUMBER: 98AON13813G

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DESCRIPTION: H-PSOF8L 11.68x9.80x2.30, 1.20P

PAGE 1 OF 1

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