

MOSFET – POWERTRENCH® N-Channel

100 V, 240 A, 4.1 mΩ

FDBL86066-F085

Features

- Typical $R_{DS(on)}$ = 3.3 mΩ at V_{GS} = 10 V, I_D = 80 A
- Typical $Q_{g(tot)}$ = 47 nC at V_{GS} = 10 V, I_D = 80 A
- UIS Capability
- Qualified to AEC Q101
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Automotive Engine Control
- PowerTrain Management
- Solenoid and Motor Drivers
- Electrical Power Steering
- Integrated Starter/Alternator
- Distributed Power Architectures and VRM
- Primary Switch for 12 V Systems

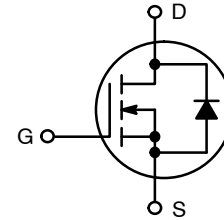
MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

| Symbol | Parameter | Value | Unit |
|----------------|--|----------------|------|
| V_{DSS} | Drain-to-Source Voltage | 100 | V |
| V_{GS} | Gate-to-Source Voltage | ±20 | V |
| I_D | Drain Current – Continuous, (V_{GS} = 10 V) T_C = 25°C (Note 1) | 185 | A |
| | Pulsed Drain Current, T_C = 25°C | (See Figure 4) | A |
| E_{AS} | Single Pulse Avalanche Energy (Note 2) | 93.6 | mJ |
| P_D | Power Dissipation | 300 | W |
| | Derate Above 25°C | 2 | W/°C |
| T_J, T_{STG} | Operating and Storage Temperature | –55 to +175 | °C |

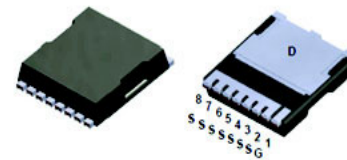
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Current is limited by silicon.
2. Starting T_J = 25°C, L = 30 μH, I_{AS} = –79 A, V_{DD} = 100 V during inductor charging and V_{DD} = 0 V during time in avalanche.

| V_{DSS} | $R_{DS(on)}$ MAX | I_D MAX |
|-----------|------------------|-----------|
| 100 V | 4.1 mΩ @ 10 V | 240 A |

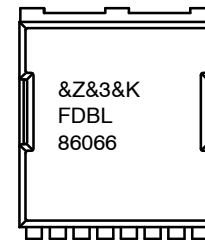


N-CHANNEL MOSFET



H-PSOF8L
CASE 100CU

MARKING DIAGRAM



&Z = Assembly Plant Code
 &3 = Numeric Date Code
 &K = Lot Code
 FDBL86066 = Specific Device Code

ORDERING INFORMATION

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

THERMAL CHARACTERISTICS

| Symbol | Parameter | Value | Unit |
|-----------------|--|-------|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 0.5 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 3) | 43 | |

3. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design, while $R_{\theta JA}$ is determined by the board design. The maximum rating presented here is based on mounting on a 1 in² pad of 2oz copper.

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

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

OFF CHARACTERISTICS

| | | | | | | |
|-----------|-----------------------------------|---|--------|--------|-----------|---------------|
| BV_{DS} | Drain-to-Source Breakdown Voltage | $I_D = 250\ \mu\text{A}$, $V_{GS} = 0\ \text{V}$ | 100 | – | – | V |
| I_{DSS} | Drain-to-Source Leakage Current | $V_{DS} = 100\ \text{V}$, $V_{GS} = 0\ \text{V}$ $T_J = 25^\circ\text{C}$ $T_J = 175^\circ\text{C}$ (Note 4) | – – | – – | 1 1 | μA |
| I_{GSS} | Gate-to-Source Leakage Current | $V_{GS} = \pm 20\ \text{V}$ | – | – | ± 100 | nA |

ON CHARACTERISTICS

| | | | | | | |
|--------------|--------------------------------------|--|--------|------------|------------|------------|
| $V_{GS(th)}$ | Gate to Source Threshold Voltage | $V_{GS} = V_{DS}$, $I_D = 250\ \mu\text{A}$ | 2 | 2.9 | 4.0 | V |
| $R_{DS(on)}$ | Static Drain to Source On Resistance | $V_{GS} = 10\ \text{V}$, $I_D = 80\ \text{A}$ $T_J = 25^\circ\text{C}$ $T_J = 175^\circ\text{C}$ (Note 4) | – – | 3.3 7.3 | 4.1 8.8 | m Ω |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|--------------|-------------------------------|---|---|------|----|----------|
| C_{iss} | Input Capacitance | $V_{DS} = 50\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1\ \text{MHz}$ | – | 3240 | – | pF |
| C_{oss} | Output Capacitance | | – | 1950 | – | pF |
| C_{rss} | Reverse Transfer Capacitance | | – | 26 | – | pF |
| R_g | Gate Resistance | $V_{GS} = 0.5\ \text{V}$, $f = 1\ \text{MHz}$ | – | 0.5 | – | Ω |
| $Q_{g(tot)}$ | Total Gate Charge | $V_{GS} = 0\ \text{V}$ to $10\ \text{V}$, $V_{DD} = 50\ \text{V}$, $I_D = 80\ \text{A}$ | – | 47 | 69 | nC |
| $Q_{g(th)}$ | Threshold Gate Charge | $V_{GS} = 0\ \text{V}$ to $2\ \text{V}$, $V_{DD} = 50\ \text{V}$, $I_D = 80\ \text{A}$ | – | 6 | – | nC |
| Q_{gs} | Gate to Source Charge | $V_{DD} = 50\ \text{V}$, $I_D = 80\ \text{A}$ | – | 15 | – | nC |
| Q_{gd} | Gate to Drain “Miller” Charge | $V_{DD} = 50\ \text{V}$, $I_D = 80\ \text{A}$ | – | 10 | – | nC |

SWITCHING CHARACTERISTICS

| | | | | | | |
|--------------|----------------|---|---|----|----|----|
| t_{on} | Turn-On Time | $V_{DD} = 50\ \text{V}$, $I_D = 80\ \text{A}$, $V_{GS} = 10\ \text{V}$, $R_{GEN} = 6\ \Omega$ | – | – | 35 | ns |
| $t_{d(on)}$ | Turn-On Delay | | – | 18 | – | ns |
| t_r | Rise Time | | – | 9 | – | ns |
| $t_{d(off)}$ | Turn-Off Delay | | – | 36 | – | ns |
| t_f | Fall Time | | – | 13 | – | ns |
| t_{off} | Turn-Off Time | | – | – | 68 | ns |

DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | |
|----------|---------------------------------------|--|---|------|------|----|
| V_{SD} | Source to Drain Diode Forward Voltage | $I_{SD} = 80\ \text{A}$, $V_{GS} = 0\ \text{V}$ | – | 0.9 | 1.25 | V |
| | | $I_{SD} = 40\ \text{A}$, $V_{GS} = 0\ \text{V}$ | – | 0.85 | 1.2 | |
| t_{rr} | Reverse Recovery Time | $I_F = 80\ \text{A}$, $dI_{SD}/dt = 300\ \text{A}/\mu\text{s}$ | – | 36 | 54 | ns |
| Q_{rr} | Reverse Recovery Charge | $I_F = 80\ \text{A}$, $dI_{SD}/dt = 1000\ \text{A}/\mu\text{s}$ | – | 84 | 126 | nC |
| t_{rr} | Reverse Recovery Time | | – | 32 | 48 | ns |
| Q_{rr} | Reverse Recovery Charge | | – | 243 | 365 | 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.

4. The maximum value is specified by design at $T_J = 175^\circ\text{C}$. Product is not tested to this condition in production.

TYPICAL CHARACTERISTICS

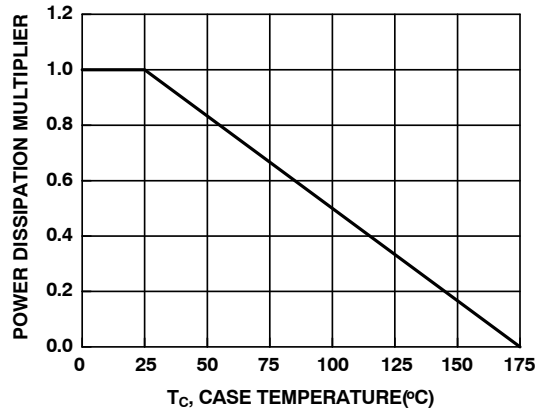


Figure 1. Normalized Power Dissipation vs. Case Temperature

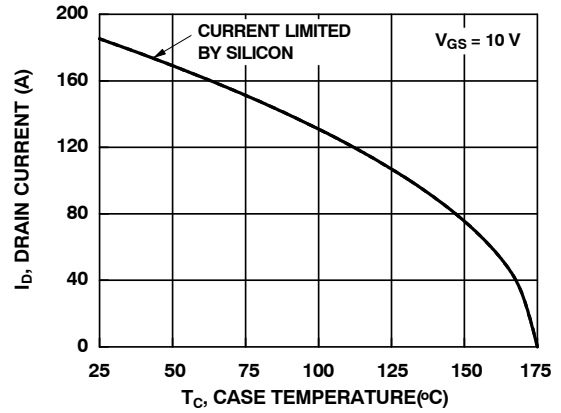


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

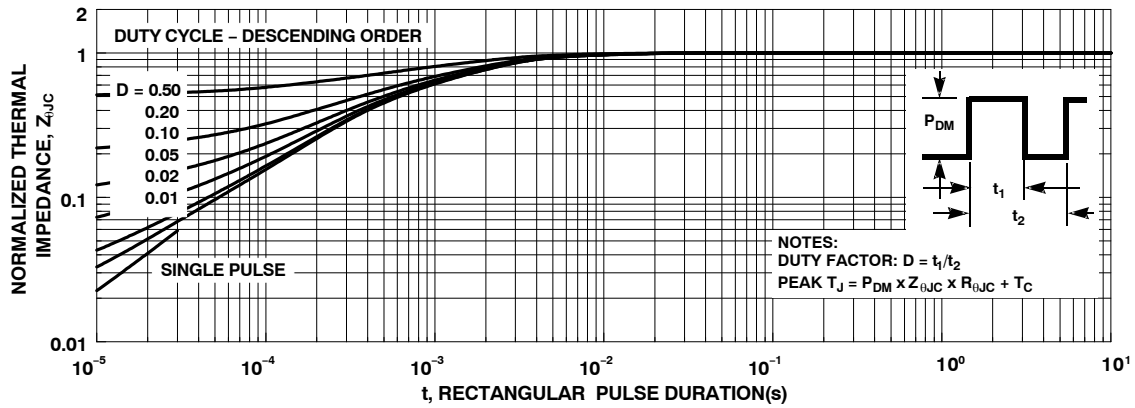


Figure 3. Normalized Maximum Transient Thermal Impedance

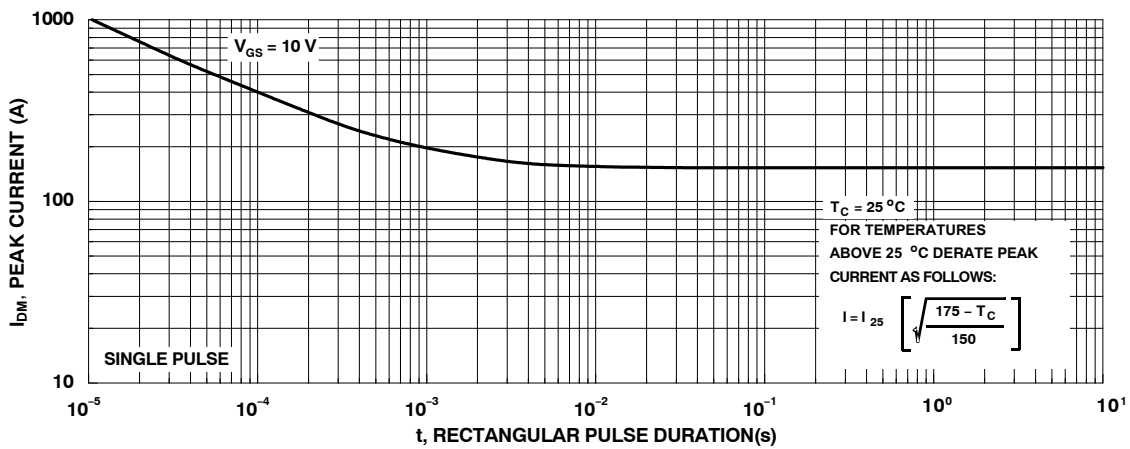


Figure 4. Peak Current Capability

TYPICAL CHARACTERISTICS

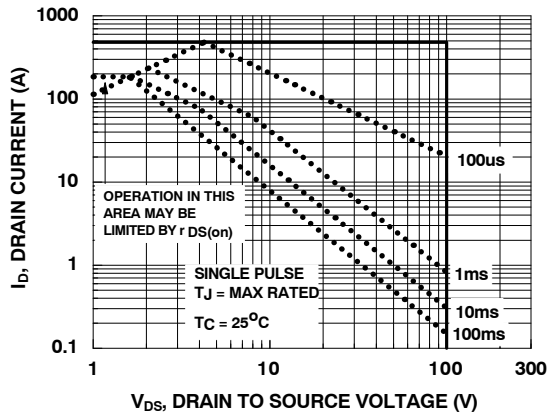


Figure 5. Forward Bias Safe Operating Area

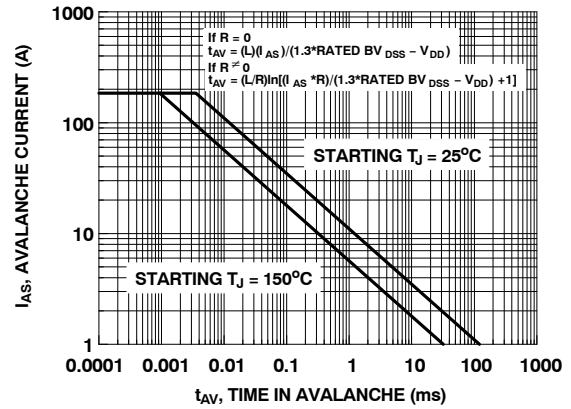


Figure 6. Unclamped Inductive Switching Capability

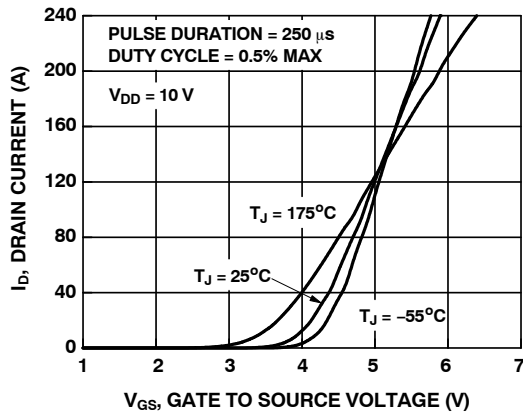


Figure 7. Transfer Characteristics

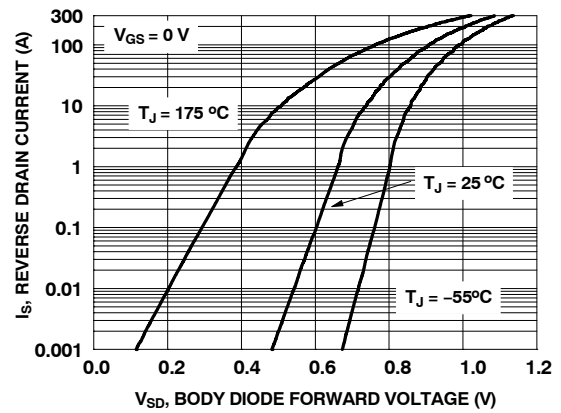


Figure 8. Forward Diode Characteristics

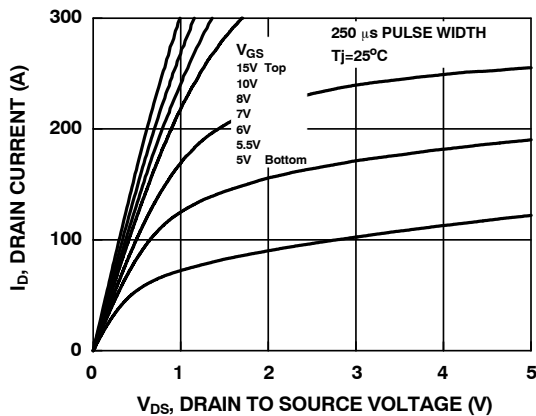


Figure 9. Saturation Characteristics

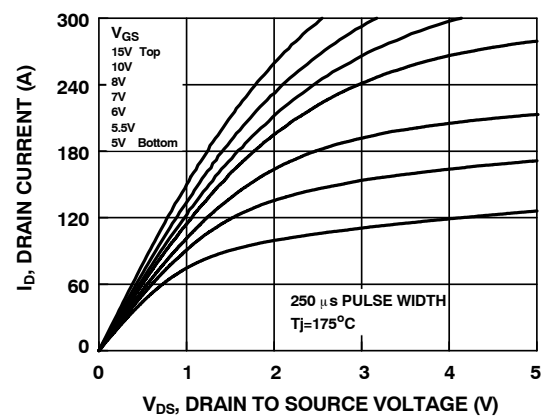


Figure 10. Saturation Characteristics

TYPICAL CHARACTERISTICS

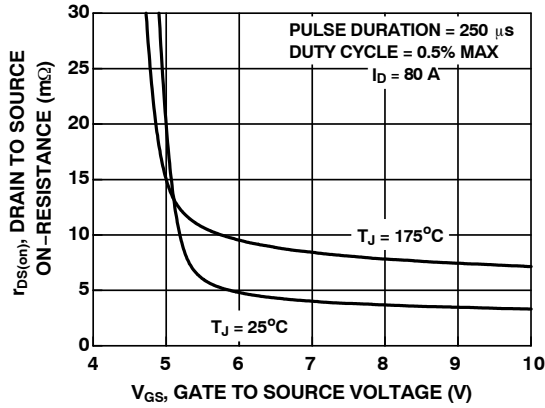


Figure 11. $R_{DS(on)}$ vs. Gate Voltage

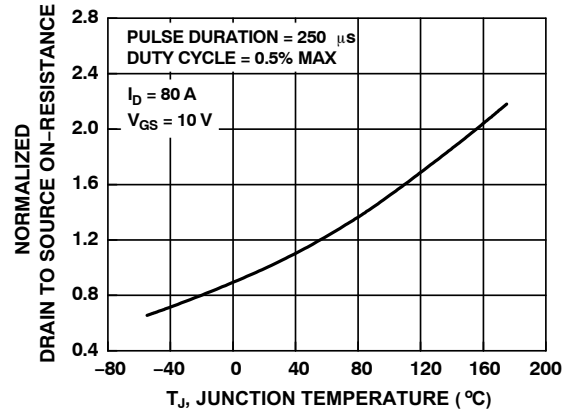


Figure 12. Normalized $R_{DS(on)}$ vs. Junction Temperature

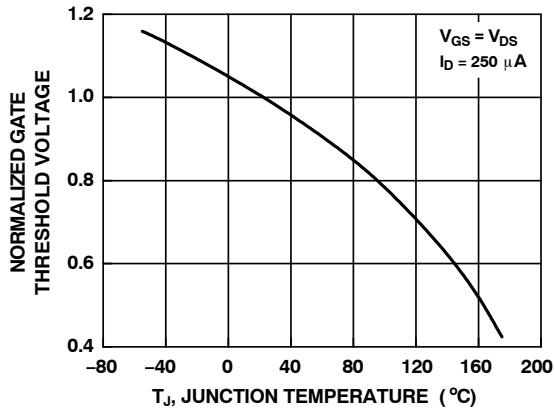


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

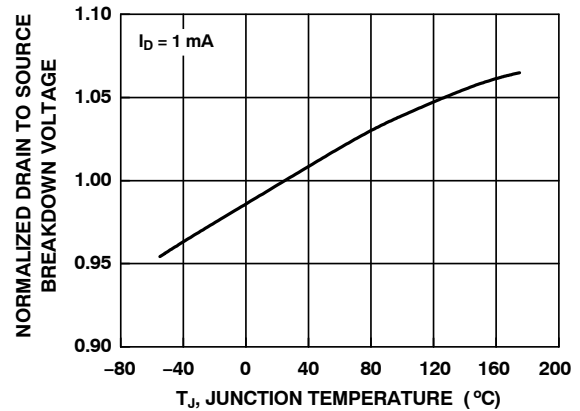


Figure 14. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

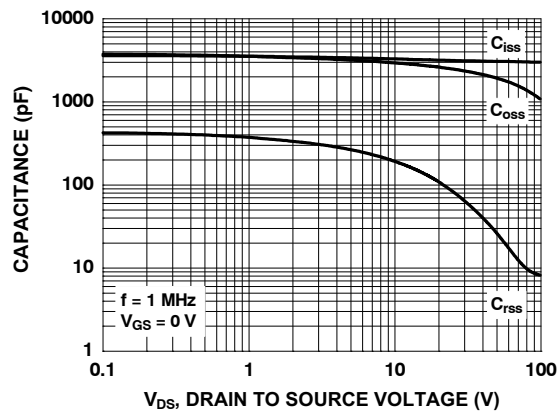


Figure 15. Capacitance vs. Drain to Source Voltage

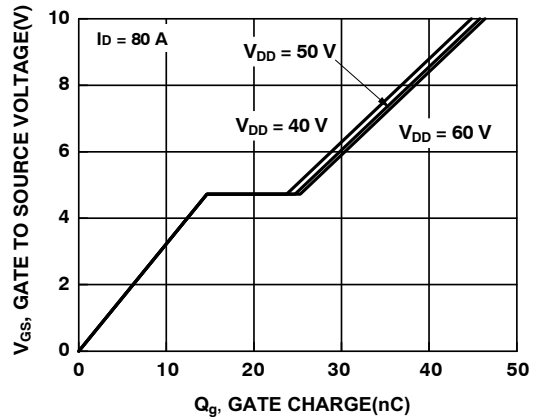


Figure 16. Gate Charge vs. Gate to Source Voltage

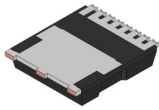
FDBL86066–F085

PACKAGE MARKING AND ORDERING INFORMATION

| Device | Marking | Package | Shipping [†] |
|----------------|-----------|--------------------------------------|--------------------------|
| FDBL86066–F085 | FDBL86066 | H-PSOF8L (Pb-Free / Halogen Free) | 2000 Units / Tape & Reel |

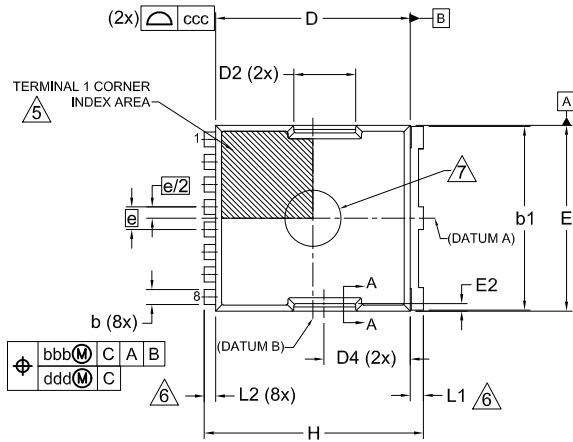
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

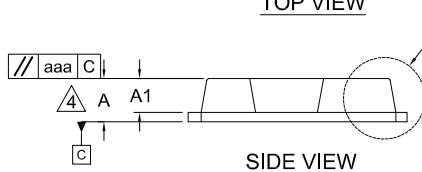


H-PSOF8L 11.68x9.80x2.30, 1.20P
CASE 100CU
ISSUE D

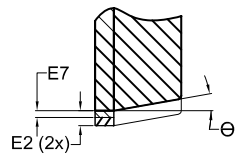
DATE 25 APRIL 2024



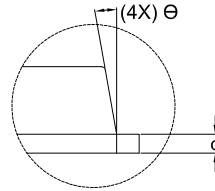
TOP VIEW



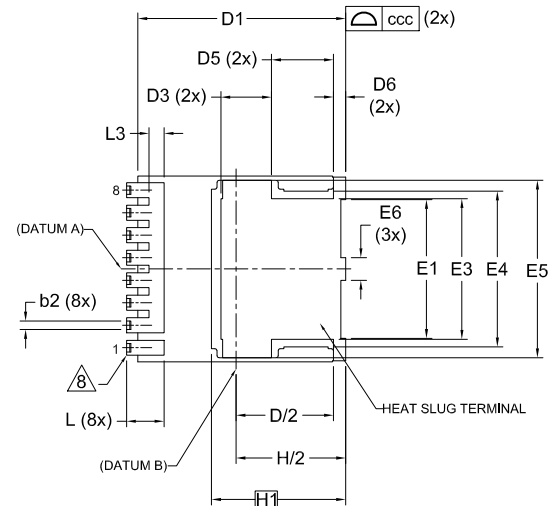
SIDE VIEW



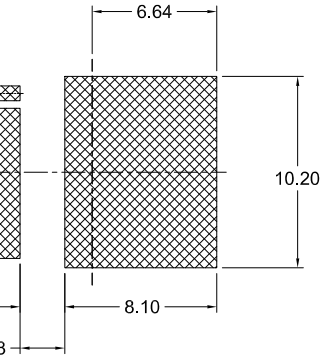
DETAIL "A"
SCALE: 2X



DETAIL "B"
SCALE: 2X



BOTTOM VIEW



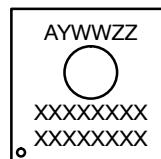
LAND PATTERN
RECOMMENDATION

*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 | 9.47 |
| 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 | | |
| θ 1 | 10° REF | | |
| aaa | 0.20 | | |
| bbb | 0.25 | | |
| ccc | 0.20 | | |
| ddd | 0.20 | | |
| eee | 0.10 | | |

| | | |
|------------------|---------------------------------|---|
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| DESCRIPTION: | H-PSOF8L 11.68x9.80x2.30, 1.20P | PAGE 1 OF 1 |

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