

MOSFET – N-Channel, POWERTRENCH®

80 V, 240 A, 2.0 mΩ

FDBL86363-F085

Features

- Typical $R_{DS(on)} = 1.5 \text{ m}\Omega$ at $V_{GS} = 10 \text{ V}$, $I_D = 80 \text{ A}$
- Typical $Q_{g(tot)} = 130 \text{ nC}$ at $V_{GS} = 10 \text{ V}$, $I_D = 80 \text{ A}$
- UIS Capability
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

Applications

- Automotive Engine Control
- PowerTrain Management
- · Solenoid and Motor Drivers
- Integrated Starter/Alternator
- Primary Switch for 12 V Systems

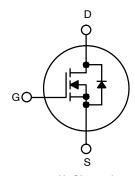
MOSFET MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

| Symbol | Parameter | Ratings | Unit |
|-----------------------------------|---|--------------|------|
| V _{DSS} | Drain-to-Source Voltage | 80 | V |
| V _{GS} | Gate-to-Source Voltage | ±20 | V |
| I _D | Drain Current – Continuous (V _{GS} = 10), T _C = 25°C (Note 1) | | Α |
| | Pulsed Drain Current, T _C = 25°C | See Figure 4 | |
| E _{AS} | Single Pulse Avalanche Energy (Note 2) | 512 | mJ |
| P _D | Power Dissipation | 357 | W |
| | Derate Above 25°C | 2.38 | W/°C |
| T _J , T _{STG} | Operating and Storage Temperature | -55 to +175 | °C |
| $R_{	heta JC}$ | Thermal Resistance, Junction to Case | 0.42 | °C/W |
| $R_{\theta JA}$ | Maximum Thermal Resistance, Junction to Ambient (Note 3) | 43 | °C/W |

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 $T_J = 25^{\circ}C$, L = 0.25 mH, $I_{AS} = 64$ A, $V_{DD} = 80$ V during inductor charging and $V_{DD} = 0$ V during time in avalanche.
- 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.

1



N-Channel



H-PSOF8L CASE 100CU

MARKING DIAGRAM



| \$Y | = onsemi Logo |
|-----|-----------------------|
| &Z | = Assembly Plant Code |
| &3 | = Numeric Date Code |
| &K | = Lot Code |

FDBL86363 = Specific Device Code

ORDERING INFORMATION

| Device | Top Mark | Package | Shipping [†] |
|--------------------|-----------|----------|--------------------------|
| FDBL86363 -F085 | FDBL86363 | H-PSOF8L | 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 Specification Brochure, BRD8011/D.

^{*}For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

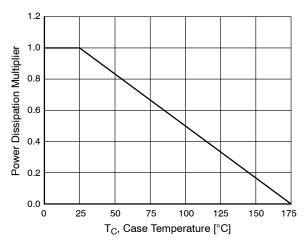
$\textbf{ELECTRICAL CHARACTERISTICS} \ (T_J = 25^{\circ}C \ unless \ otherwise \ noted)$

| Symbol | Parameter | Test Conditions | | Min. | Тур. | Max. | Unit |
|---------------------|-----------------------------------|---|---------------------------------|------|-------|------|------|
| OFF CHARAC | CTERISTICS | | | | | • | |
| BV _{DSS} | Drain-to-Source Breakdown Voltage | I _D = 250 μA, V _{GS} = 0 V | | 80 | - | _ | V |
| I _{DSS} | Drain-to-Source Leakage Current | V _{DS} = 80 V, V _{GS} = 0 V | T _J = 25°C | - | - | 1 | μΑ |
| | | | T _J = 175°C (Note 4) | - | - | 1 | mA |
| I _{GSS} | Gate-to-Source Leakage Current | V _{GS} = ±20 V | | _ | - | ±100 | nA |
| ON CHARACT | TERISTICS | | | | | | |
| V _{GS(th)} | Gate to Source Threshold Voltage | $V_{GS} = V_{DS}, I_D =$ | 250 μΑ | 2.0 | 3.0 | 4.0 | V |
| R _{DS(on)} | Drain to Source on Resistance | I _D = 80 A, T _J = 25°C | | _ | 1.5 | 2.0 | mΩ |
| | | V _{GS} = 10 V | T _J = 175°C (Note 4) | _ | 3.1 | 4.1 | mΩ |
| DYNAMIC CH | ARACTERISTICS | | | | | | |
| C _{iss} | Input Capacitance | V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz | | _ | 10000 | _ | pF |
| C _{oss} | Output Capacitance | | | _ | 1540 | _ | pF |
| C _{rss} | Reverse Transfer Capacitance | | | _ | 70 | _ | pF |
| R_{g} | Gate Resistance | f = 1 MHz | | _ | 2.8 | _ | Ω |
| Q _{g(ToT)} | Total Gate Charge at 10 V | V _{GS} = 0 to 10 V V _{DD} = 64 V, V _{GS} = 0 to 2 V I _D = 80 A | | _ | 130 | 169 | nC |
| Q _{g(th)} | Threshold Gate Charge | | | _ | 18 | 27 | nC |
| Q_{gs} | Gate-to-Source Gate Charge | V _{DD} = 64 V, I _D = 80 A | | - | 47 | - | nC |
| Q_gd | Gate-to-Drain "Miller" Charge | | | _ | 24 | _ | nC |
| SWITCHING C | CHARACTERISTICS | | | | | | |
| t _{on} | Turn-On Time | V _{DD} = 40 V, I _D = | 80 A, | _ | - | 133 | ns |
| t _{d(on)} | Turn-On Delay | V_{GS} = 10 V, R_{GE} | EN = 6 Ω | _ | 39 | - | ns |
| t _r | Rise Time | | | _ | 63 | - | ns |
| $t_{d(off)}$ | Turn-Off Delay | | | _ | 61 | _ | ns |
| t _f | Fall Time | | | - | 33 | - | ns |
| t _{off} | Turn-Off Time | | | _ | - | 140 | ns |
| DRAIN-SOUF | RCE DIODE CHARACTERISTIC | | | | | | |
| V_{SD} | Source-to-Drain Diode Voltage | I _{SD} = 80 A, V _{GS} = 0 V | | _ | - | 1.25 | V |
| | | I _{SD} = 40 A, V _{GS} | = 0 V | - | - | 1.2 | V |
| t _{rr} | Reverse-Recovery Time | $I_F = 80 \text{ A}, dI_{SD}/c$ | lt = 100 A/μs, | _ | 83 | 108 | ns |
| Q _{rr} | Reverse-Recovery Charge | V _{DD} = 64 V | | _ | 118 | 153 | 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°C. Product is not tested to this condition in production.

TYPICAL CHARACTERISTICS



350 Current limited V_{GS} = 10 V by silicon 280 ID, Drain Current [A] 210 140 70 0 L 25 50 100 125 175 200 75 150 T_C, Case Temperature [°C]

Figure 1. Normalized Power Dissipation vs. Case Temperature

Figure 2. Maximum Continuous Drain Current vs. Case Temperature

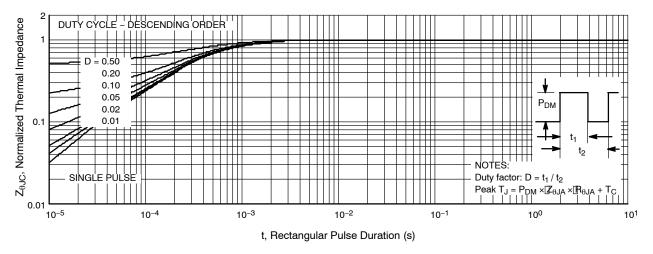


Figure 3. Normalized Maximum Transient Thermal Impedance

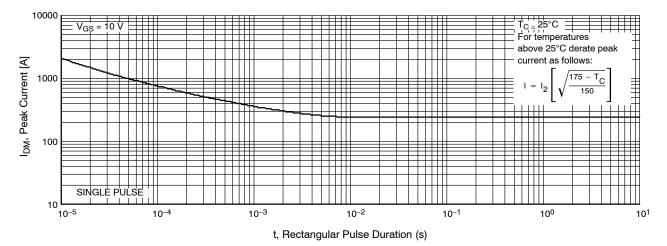


Figure 4. Peak Current Capability

TYPICAL CHARACTERISTICS (CONTINUED)

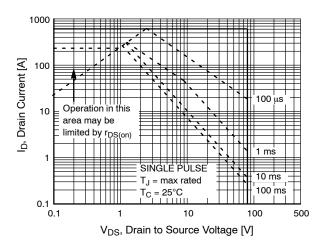


Figure 5. Forward Bias Safe Operating Area

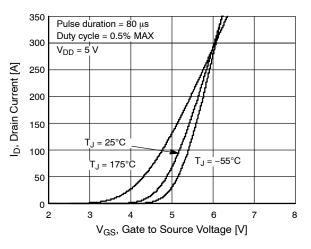


Figure 7. Transfer Characteristics

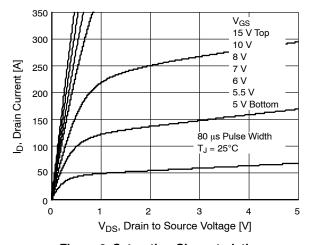
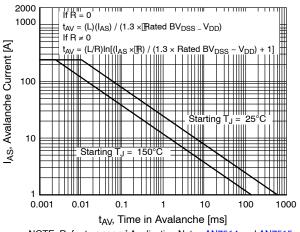
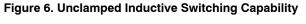


Figure 9. Saturation Characteristics



NOTE: Refer to **onsemi** Application Notes AN7514 and AN7515.



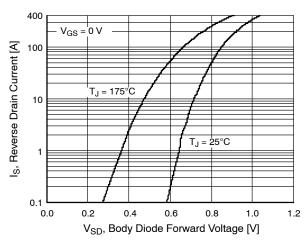


Figure 8. Forward Diode Characteristics

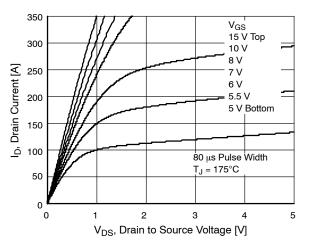


Figure 10. Saturation Characteristics

TYPICAL CHARACTERISTICS (CONTINUED)

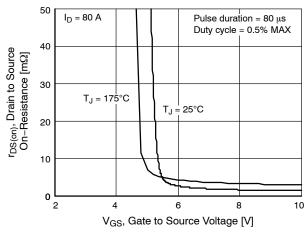


Figure 11. R_{DSON} vs. Gate Voltage

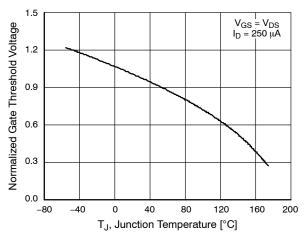


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

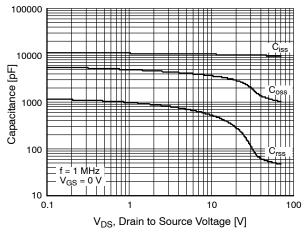


Figure 15. Capacitance vs. Drain to Source Voltage

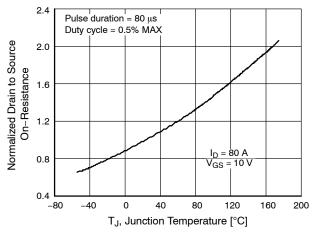


Figure 12. Normalized R_{DSON} vs. Junction Temperature

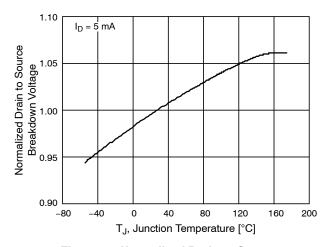


Figure 14. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

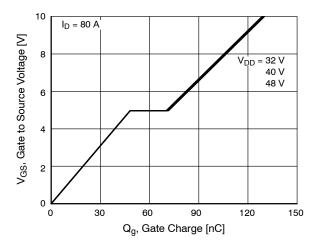
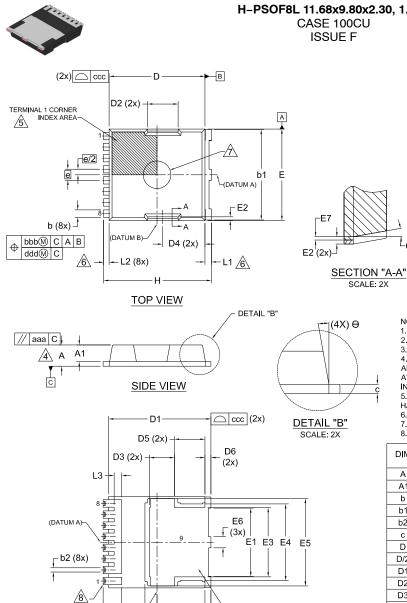


Figure 16. Gate Charge vs. Gate to Source Voltage

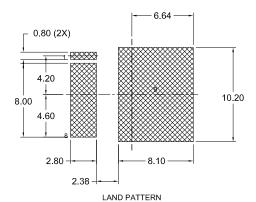
POWERTRENCH is a registered trademark of Semiconductor Components Industries, LLC dba "onsemi" or its affiliates and/or subsidiaries in the United States and/or other countries.





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

DATE 30 JUL 2024



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

NOTES:

HATCHED AREA

- 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
- 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.

| DIM | MILLIMETERS | | | |
|-----|-------------|-------|-------|--|
| | MIN. | NOM. | MAX. | |
| Α | 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 | |
| С | 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 | | | | |
|------|----------------|----------|-------|--|--|
| Divi | MIN. | NOM. | MAX. | | |
| E5 | 9.36 | 9.46 | 9.56 | | |
| E6 | 1.10 | 1.20 | 1.30 | | |
| E7 | 0.15 | 0.18 | 0.21 | | |
| е | | 1.20 BSC | ; | | |
| e/2 | (| 0.60 BSC | ; | | |
| Н | 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 0.7 | | | | |
| 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 | | | | |

GENERIC MARKING DIAGRAM*

HEAT SLUG TERMINAL

Α = Assembly Location

BOTTOM VIEW

D/2

= Year

L (8x)

(DATUM B)

WW = Work Week

= Assembly Lot Code XXXX = Specific Device Code

AYWWZZ XXXXXXX XXXXXXX

*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.

| DOCUMENT NUMBER: | 98AON13813G | Electronic versions are uncontrolled except when accessed directly from the Document Repositor Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. | | |
|------------------|---------------------------------|---|-------------|--|
| DESCRIPTION: | H-PSOF8L 11.68x9.80x2.30, 1.20P | | PAGE 1 OF 1 | |

onsemi and ONSEMi, are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, Onsemi, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "onsemi" or its affiliates and/or subsidiaries in the United States and/or other countries. onsemi owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of onsemi's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. Onsemi reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and onsemi makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using onsemi products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by onsemi. "Typical" parameters which may be provided in onsemi data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. onsemi does not convey any license under any of its intellectual property rights nor the rights of others. onsemi products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA class 3 medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

 $\textbf{Technical Library:} \ \underline{www.onsemi.com/design/resources/technical-documentation}$

onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at

www.onsemi.com/support/sales