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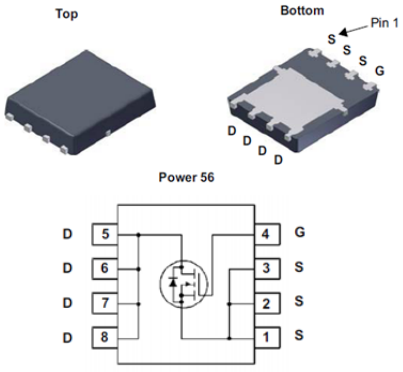
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ON Semiconductor®

# FDMS5362L-F085

## N-Channel Power Trench® MOSFET

### 60V, 22A, 33mΩ




### Features

- Typ $r_{DS(on)}$ = 26mΩ at $V_{GS}$ = 10V, $I_D$ = 17.6A
- Typ $Q_{g(tot)}$ = 17nC at $V_{GS}$ = 10V, $I_D$ = 17.6A
- UIS Capability
- RoHS Compliant
- Qualified to AEC Q101

### Applications

- Automotive Engine Control
- Powertrain Management
- Solenoid and Motor Drivers
- Integrated Starter/alternator
- Primary Switch for 12V Systems

### MOSFET Maximum Ratings $T_J$ = 25°C unless otherwise noted

| Symbol | Parameter | | Ratings | Units |
|---|---|---|---|---|
| $V_{DSS}$ | Drain to Source Voltage | | 60 | V |
| $V_{GS}$ | Gate to Source Voltage | | ±20 | V |
| $I_D$ | Drain Current - Continuous ($V_{GS}$=10) (Note 1) | $T_C$ = 25°C | 17.6 | A |
| | Pulsed Drain Current | $T_C$ = 25°C | See Figure4 | |
| $E_{AS}$ | Single Pulse Avalanche Energy | (Note 2) | 32 | mJ |
| $P_D$ | Power Dissipation | | 41.7 | W |
| | Derate above 25°C | | 0.28 | W/°C |
| $T_J$, $T_{STG}$ | Operating and Storage Temperature | | -55 to + 175 | °C |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | | 3.6 | °C/W |
| $R_{\theta JA}$ | Maximum Thermal Resistance Junction to Ambient | (Note 3) | 50 | °C/W |

### Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|---|---|---|---|---|---|
| FDMS5362L | FDMS5362L-F085 | Power 56 | 13” | 12mm | 3000 units |

Notes:
1: Current is limited by junction temperature.
2: Starting $T_J$ = 25°C, L = 0.32mH, $I_{AS}$ = 14.1A, $V_{DD}$ = 60V during inductor charging and $V_{DD}$ = 0V 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 user's board design. The maximum rating presented here is based on mounting on a 1 $in^2$ pad of 2oz copper.

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## Electrical Characteristics $T_J$ = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $B_{VDSS}$ | Drain to Source Breakdown Voltage | $I_D$ = 250μA, $V_{GS}$ = 0V | 60 | - | - | V |
| $I_{DSS}$ | Drain to Source Leakage Current | $V_{DS}$=60V, $V_{GS}$ = 0V, $T_J$ = 25°C | - | - | 1 | μA |
| | | $V_{DS}$=60V, $V_{GS}$ = 0V, $T_J$ = 175°C(Note 4) | - | - | 1 | mA |
| $I_{GSS}$ | Gate to Source Leakage Current | $V_{GS}$ = ±20V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate to Source Threshold Voltage | $V_{GS}$ = $V_{DS}$, $I_D$ = 250μA | 1.0 | 1.9 | 3.0 | V |
| $r_{DS(on)}$ | Drain to Source On Resistance | $I_D$ = 17.6A, $V_{GS}$= 10V, $T_J$ = 25°C | - | 26 | 33 | mΩ |
| | | $I_D$ = 17.6A, $V_{GS}$= 10V, $T_J$ = 175°C(Note 4) | - | 59 | 74 | mΩ |
| | | $I_D$ = 17.6A, $V_{GS}$= 4.5V, $T_J$ = 25°C | - | 34 | 42 | mΩ |
| | | $I_D$ = 17.6A, $V_{GS}$= 4.5V, $T_J$ = 175°C(Note 4) | - | 74 | 90 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 25V, $V_{GS}$ = 0V, f = 1MHz | - | 878 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 79 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 39 | - | pF |
| $R_g$ | Gate Resistance | f = 1MHz | - | 2.4 | - | Ω |
| $Q_{g(ToT)}$ | Total Gate Charge at 10V | $V_{GS}$ = 0 to 10V, $V_{DD}$ = 48V, $I_D$ = 17.6A | - | 17 | 21 | nC |
| $Q_{g(th)}$ | Threshold Gate Charge | $V_{GS}$ = 0 to 2V, $V_{DD}$ = 48V, $I_D$ = 17.6A | - | 8.3 | 10.5 | nC |
| $Q_{gs}$ | Gate to Source Gate Charge | | - | 3 | - | nC |
| $Q_{gd}$ | Gate to Drain “Miller“ Charge | | - | 4 | - | nC |

## Switching Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $t_{on}$ | Turn-On Time | $V_{DD}$ = 30V, $I_D$ = 17.6A, $V_{GS}$ = 10V, $R_{GEN}$ = 6Ω | - | - | 17 | ns |
| $t_{d(on)}$ | Turn-On Delay Time | | - | 11 | - | ns |
| $t_r$ | Rise Time | | - | 4 | - | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 31 | - | ns |
| $t_f$ | Fall Time | | - | 4 | - | ns |
| $t_{off}$ | Turn-Off Time | | - | - | 44 | ns |

### Drain-Source Diode Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $V_{SD}$ | Source to Drain Diode Voltage | $I_{SD}$ = 17.6A, $V_{GS}$ = 0V | - | - | 1.25 | V |
| $T_{rr}$ | Reverse Recovery Time | $I_F$ = 17.6A, $dI_{SD}/dt$ = 100A/μs, $V_{DD}$=48V | - | 25 | 38 | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 16.8 | 22 | nC |

**Notes:**

4: The maximum value is specified by design at $T_J$ = 175°C. Product is not tested to this condition in production.

## Typical Characteristics

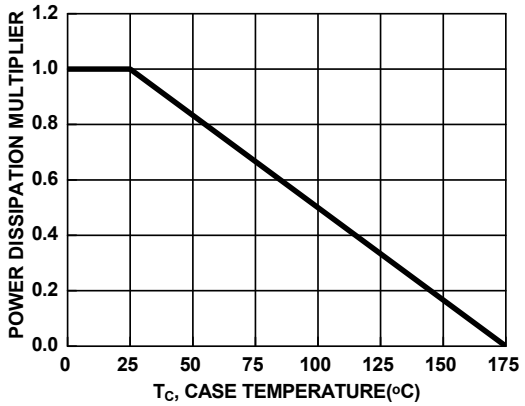



**Figure 1. Normalized Power Dissipation vs Case Temperature**

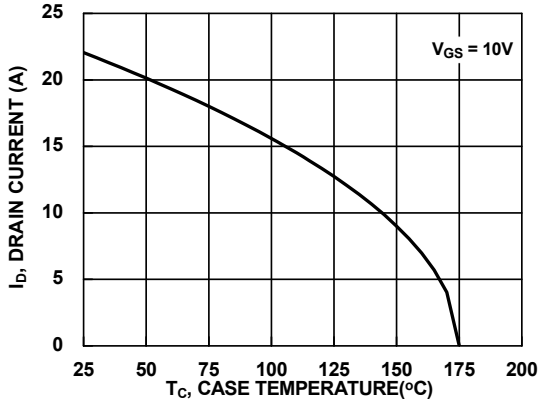



**Figure 2. Maximum Continuous Drain Current vs Case Temperature**

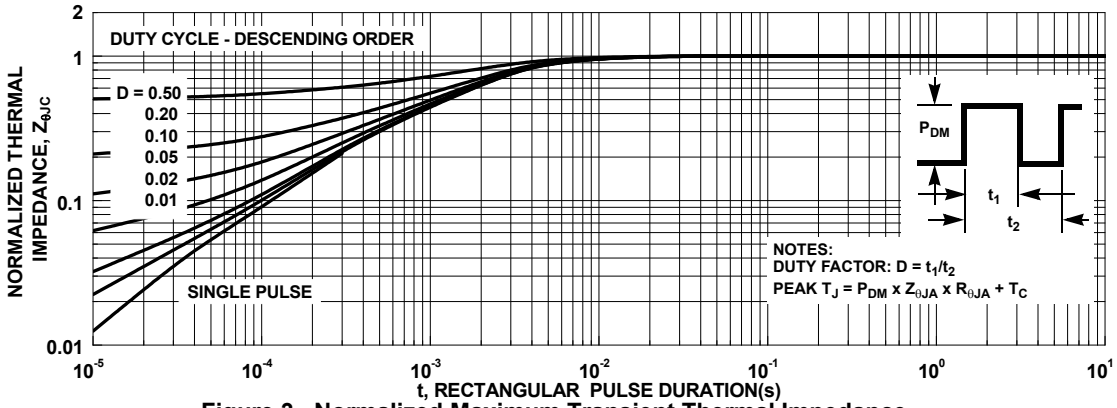



**Figure 3. Normalized Maximum Transient Thermal Impedance**

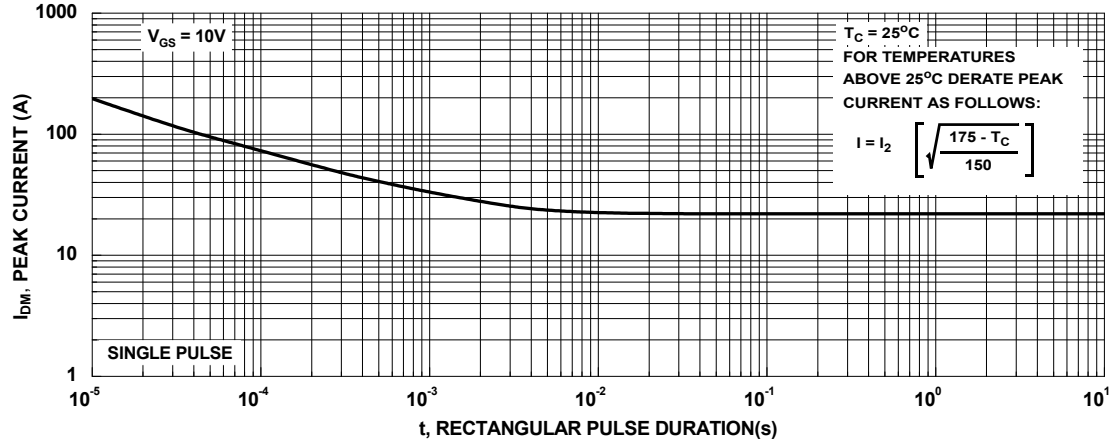



**Figure 4. Peak Current Capability**

## Typical Characteristics

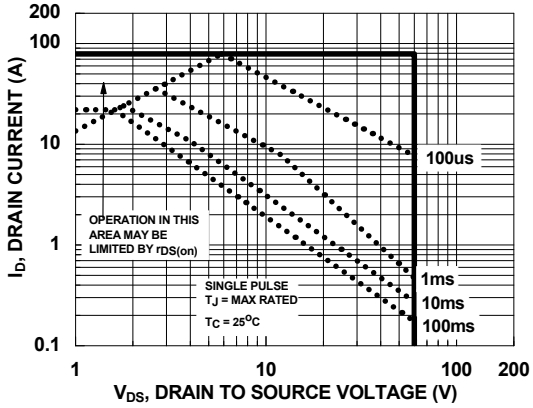
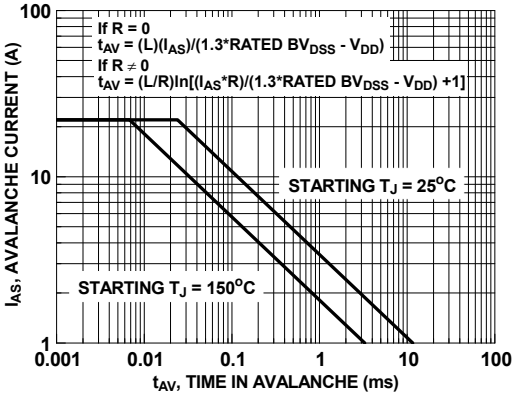



**Figure 5. Forward Bias Safe Operating Area**




NOTE: Refer to ON Semiconductor Application Notes AN7514 and AN7515

**Figure 6. Unclamped Inductive Switching Capability**

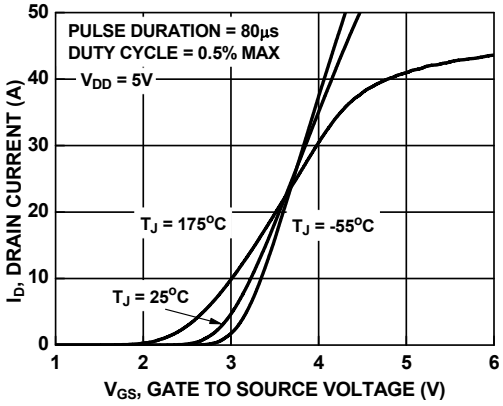



**Figure 7. Transfer Characteristics**

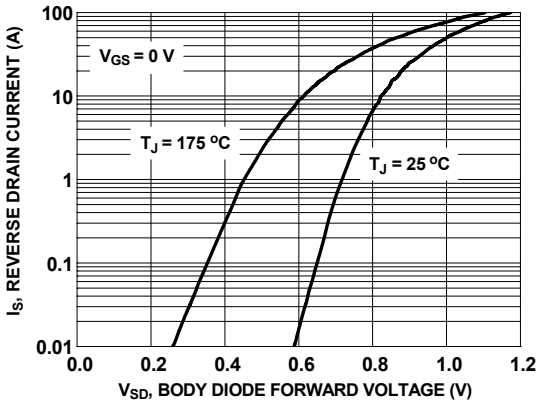



**Figure 8. Forward Diode Characteristics**

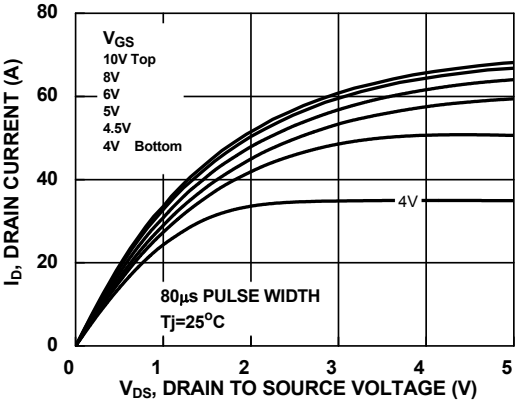



**Figure 9. Saturation Characteristics**

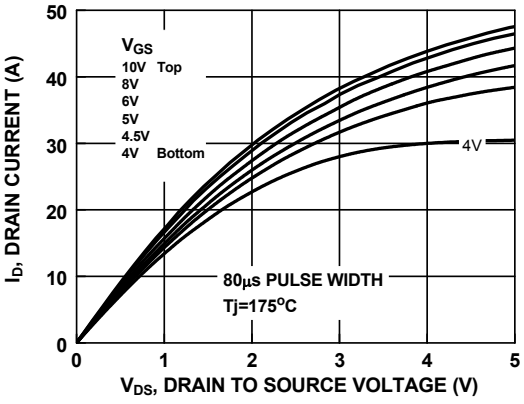



**Figure 10. Saturation Characteristics**

## Typical Characteristics

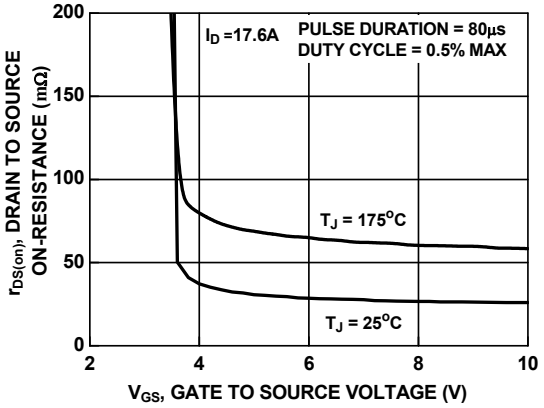



**Figure 11. Rdson vs Gate Voltage**

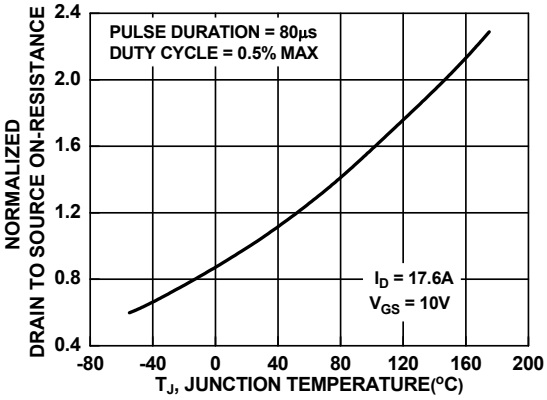



**Figure 12. Normalized Rdson vs Junction Temperature**

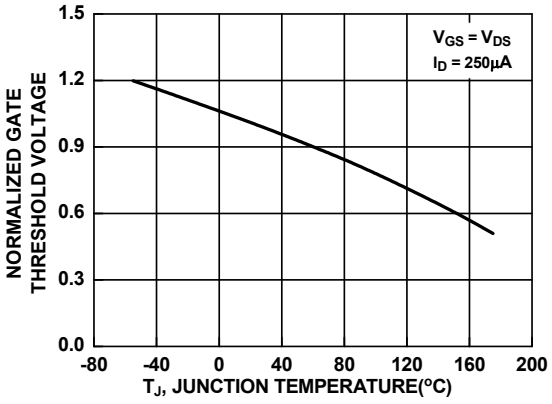



**Figure 13. Normalized Gate Threshold Voltage vs Temperature**

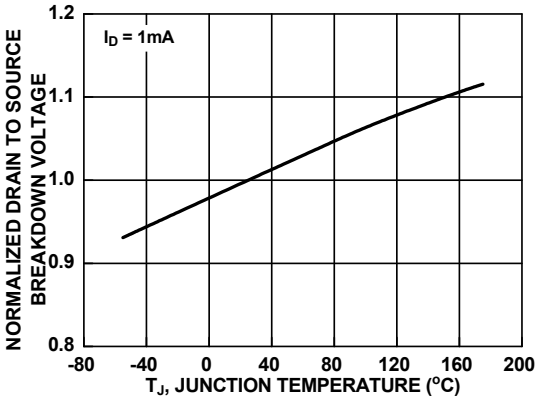



**Figure 14. Normalized Drain to Source Breakdown Voltage vs Junction Temperature**

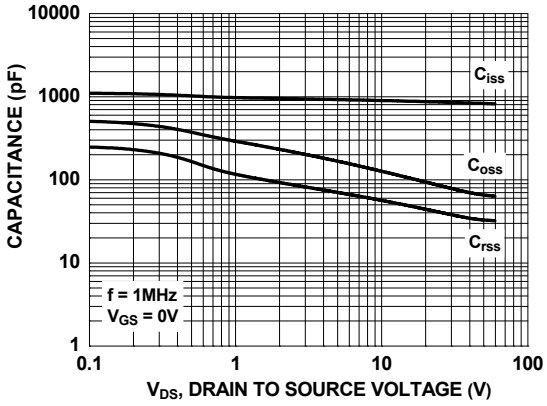



**Figure 15. Capacitance vs Drain to Source Voltage**

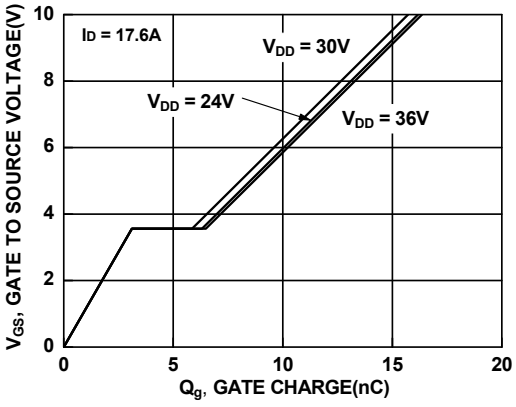



**Figure 16. Gate Charge vs Gate to Source Voltage**

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