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## FDD6637-F085

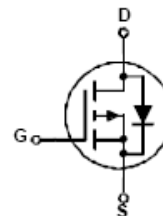
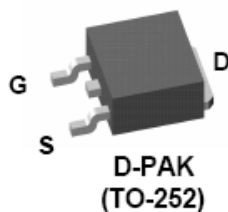
### P-Channel PowerTrench® MOSFET -35V, -21A, 18mΩ

#### Features

- Typ  $r_{DS(on)}$  = 9.7mΩ at  $V_{GS} = -10V$ ,  $I_D = -14A$
- Typ  $r_{DS(on)}$  = 14.4mΩ at  $V_{GS} = -4.5V$ ,  $I_D = -11A$
- Typ  $Q_{g(10)}$  = 45nC at  $V_{GS} = -10V$
- High performance trench technology for extremely low  $r_{DS(on)}$ .
- Qualified to AEC Q101
- RoHS Compliant

#### Applications

- Inverter
- Power Supplies



**MOSFET Maximum Ratings**  $T_C = 25^\circ\text{C}$  unless otherwise noted

| Symbol                     | Parameter  | Ratings      | Units                     |
|----------------------------|--|--------------|---------------------------|
| $V_{DSS}$                  | Drain to Source Voltage  | -35          | V                         |
| $V_{DS(\text{Avalanche})}$ | Drain to Source Avalanche Voltage (maximum)                                    | -45          | V                         |
| $V_{GS}$                   | Gate to Source Voltage   | $\pm 25$     | V                         |
| $I_D$                      | Drain Current Continuous ( $T_C < 155^\circ\text{C}$ , $V_{GS} = 10\text{V}$ ) | -21          | A                         |
|                            | Pulsed   | See Figure 4 |                           |
| $E_{AS}$                   | Single Pulse Avalanche Energy (Note 1)   | 61           | mJ                        |
| $P_D$                      | Power Dissipation  | 68           | W                         |
|                            | Dreate above $25^\circ\text{C}$  | 0.46         | $\text{W}/^\circ\text{C}$ |
| $T_J, T_{STG}$             | Operating and Storage Temperature  | -55 to + 175 | $^\circ\text{C}$          |

**Thermal Characteristics**

|                 |   |     |                           |
|-----------------|---|-----|---------------------------|
| $R_{\theta JC}$ | Maximum Thermal Resistance Junction to Case   | 2.2 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Maximum Thermal Resistance Junction to Ambient TO-252, $1\text{in}^2$ copper pad area | 40  | $^\circ\text{C}/\text{W}$ |

**Package Marking and Ordering Information**

| Device Marking | Device       | Package | Reel Size | Tape Width | Quantity   |
|----------------|--------------|---------|-----------|------------|------------|
| FDD6637        | FDD6637-F085 | TO-252  | 13"       | 12mm       | 2500 units |

**Electrical Characteristics**  $T_C = 25^\circ\text{C}$  unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|--------|-----------|-----------------|-----|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-----|-------|

**Off Characteristics**

|            |                                   |   |     |   |           |               |
|------------|-----------------------------------|---|-----|---|-----------|---------------|
| $B_{VDSS}$ | Drain to Source Breakdown Voltage | $I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$ | -35 | - | -         | V             |
| $I_{DSS}$  | Zero Gate Voltage Drain Current   | $V_{DS} = -28\text{V}$ , $V_{GS} = 0\text{V}$ | -   | - | -1        | $\mu\text{A}$ |
| $I_{GSS}$  | Gate to Source Leakage Current    | $V_{GS} = \pm 25\text{V}$                     | -   | - | $\pm 100$ | nA            |

**On Characteristics**

|              |                                  |  |    |      |      |                  |
|--------------|----------------------------------|--|----|------|------|------------------|
| $V_{GS(th)}$ | Gate to Source Threshold Voltage | $V_{GS} = V_{DS}$ , $I_D = -250\mu\text{A}$                              | -1 | -1.6 | -3   | V                |
| $r_{DS(on)}$ | Drain to Source On Resistance    | $I_D = -14\text{A}$ , $V_{GS} = -10\text{V}$                             | -  | 9.7  | 11.6 | $\text{m}\Omega$ |
|              |                                  | $I_D = -11\text{A}$ , $V_{GS} = -4.5\text{V}$                            | -  | 14.4 | 18   |                  |
|              |                                  | $I_D = -14\text{A}$ , $V_{GS} = -10\text{V}$ , $T_C = 150^\circ\text{C}$ | -  | 15.3 | 18   |                  |
| $g_{FS}$     | Forward Transconductance         | $V_{DS} = -5\text{V}$ , $I_D = -14\text{A}$                              | -  | 35   | -    | S                |

**Dynamic Characteristics**

|                     |                               |   |   |   |      |    |    |
|---------------------|-------------------------------|---|---|---|------|----|----|
| C <sub>iss</sub>    | Input Capacitance             | V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V,<br>f = 1MHz |   | - | 2370 | -  | pF |
| C <sub>oss</sub>    | Output Capacitance            |   |   | - | 470  | -  | pF |
| C <sub>rss</sub>    | Reverse Transfer Capacitance  |   |   | - | 250  | -  | pF |
| R <sub>G</sub>      | Gate Resistance               | f = 1MHz  |   | - | 3.6  | -  | Ω  |
| Q <sub>g(TOT)</sub> | Total Gate Charge at -10V     | V <sub>GS</sub> = 0 to -10V                               | V <sub>DD</sub> = -20V<br>I <sub>D</sub> = -14A | - | 45   | 63 | nC |
| Q <sub>g(5)</sub>   | Total Gate Charge at -5V      | V <sub>GS</sub> = 0 to -5V                                |   | - | 25   | 35 | nC |
| Q <sub>gs</sub>     | Gate to Source Gate Charge    |   |   | - | 7    | -  | nC |
| Q <sub>gd</sub>     | Gate to Drain “Miller” Charge |   |   | - | 10   | -  | nC |

**Electrical Characteristics**  $T_C = 25^\circ\text{C}$  unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|--------|-----------|-----------------|-----|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-----|-------|

**Switching Characteristics**

|              |                     |  |   |    |     |    |
|--------------|---------------------|--|---|----|-----|----|
| $t_{d(on)}$  | Turn-On Delay Time  | $V_{DD} = -20\text{V}$ , $I_D = -1\text{A}$ ,<br>$V_{GS} = -10\text{V}$ ,<br>$R_{GEN} = 6\Omega$ | - | 18 | 32  | ns |
| $t_r$        | Rise Time           |  | - | 10 | 20  | ns |
| $t_{d(off)}$ | Turn-Off Delay Time |  | - | 62 | 100 | ns |
| $t_f$        | Fall Time           |  | - | 36 | 58  | ns |

**Drain-Source Diode Characteristics**

|          |                               |  |   |      |      |    |
|----------|-------------------------------|--|---|------|------|----|
| $V_{SD}$ | Source to Drain Diode Voltage | $I_{SD} = -14\text{A}$                                       | - | -0.8 | -1.2 | V  |
| $t_{rr}$ | Reverse Recovery Time         | $I_F = -14\text{A}$ , $dI_{SD}/dt = 100\text{A}/\mu\text{s}$ | - | 28   | 37   | ns |
| $Q_{rr}$ | Reverse Recovery Charge       |  | - | 15   | 20   | nC |

**Notes:**

1: Starting  $T_J = 25^\circ\text{C}$ ,  $L = 1\text{mH}$ ,  $I_{AS} = -11\text{A}$ ,  $V_{GS} = 10\text{V}$ ,  $V_{DD} = -35\text{V}$  during the inductor charging time and  $0\text{V}$  during the time in avalanche

This product has been designed to meet the extreme test conditions and environment demanded by the automotive industry. For a copy of the requirements, see AEC Q101 at: <http://www.aecouncil.com/>

## Typical Characteristics

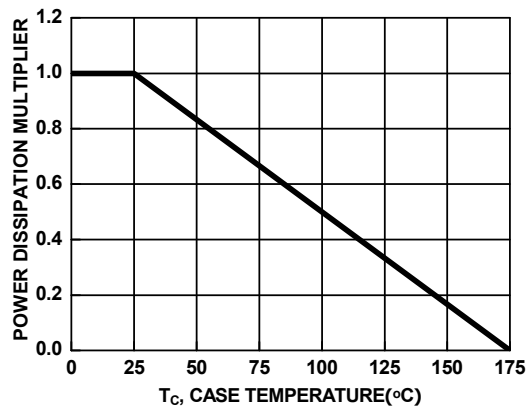


Figure 1. Normalized Power Dissipation vs Case Temperature

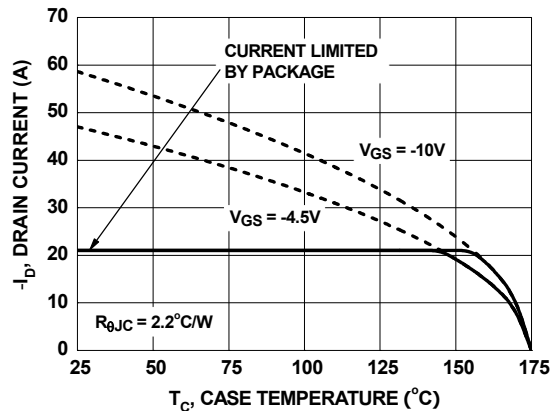


Figure 2. Maximum Continuous Drain Current vs Case Temperature

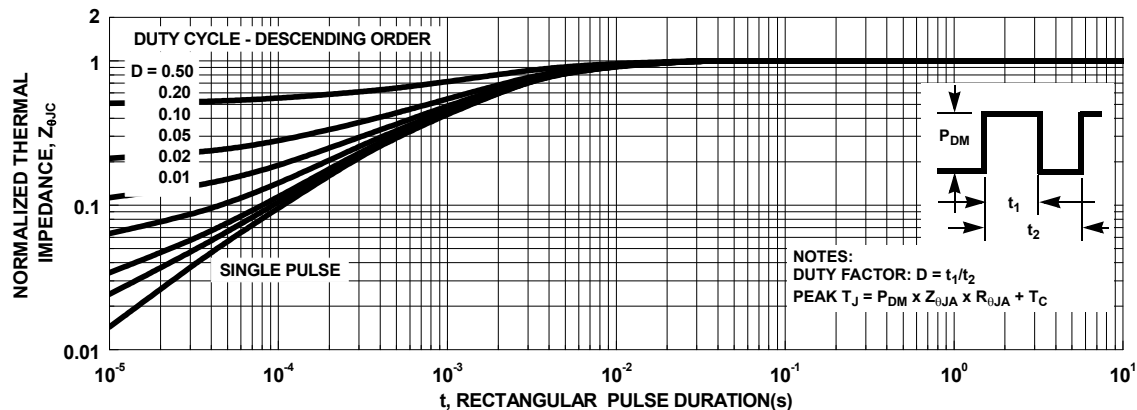


Figure 3. Normalized Maximum Transient Thermal Impedance

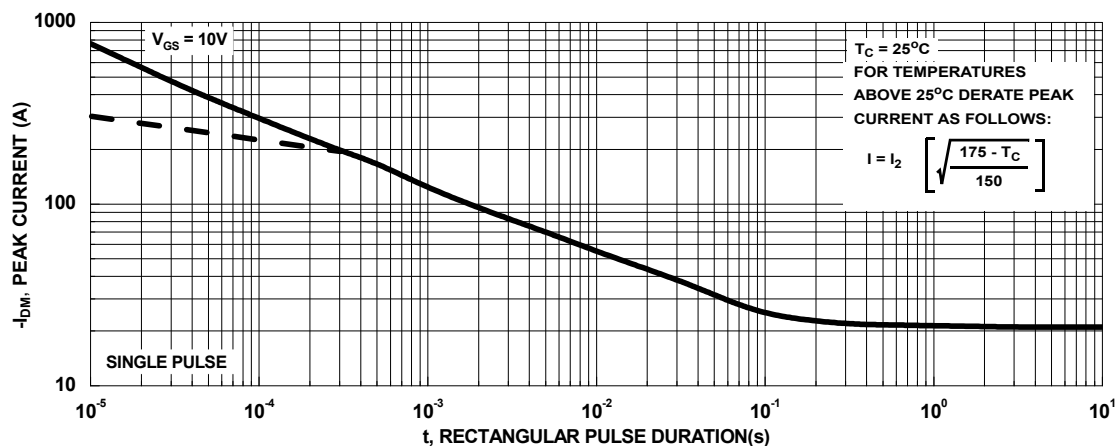


Figure 4. Peak Current Capability

## Typical Characteristics

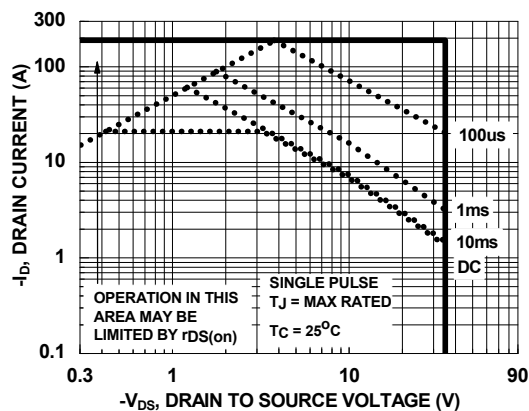
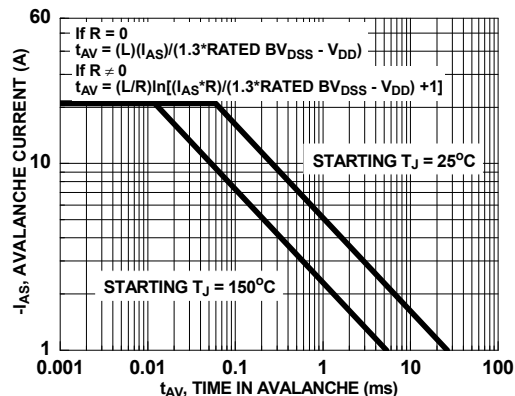


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to ON Semiconductor Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

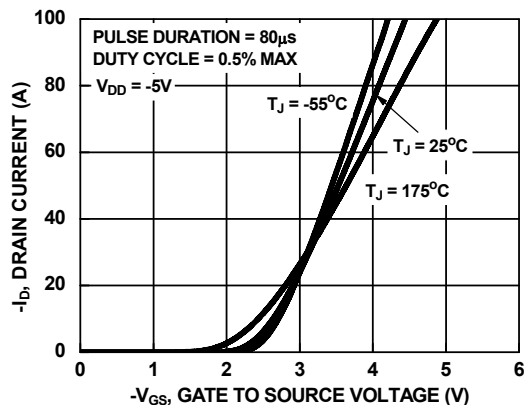


Figure 7. Transfer Characteristics

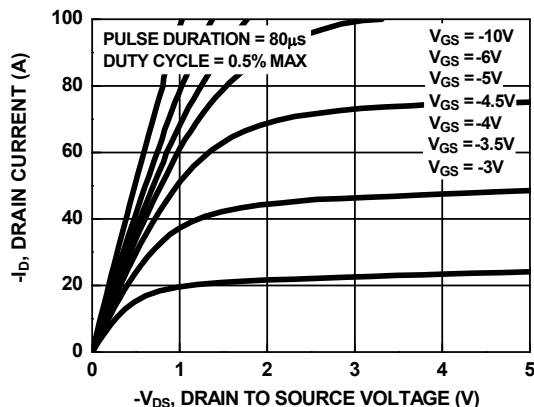


Figure 8. Saturation Characteristics

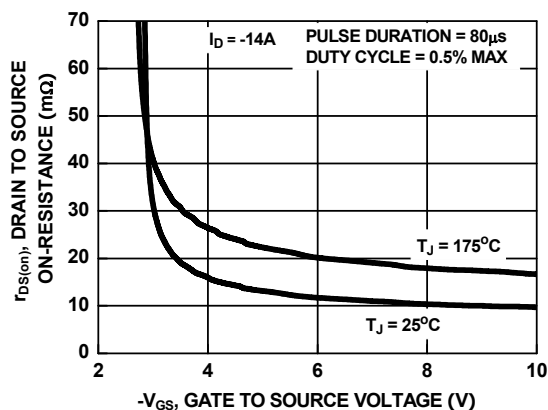


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

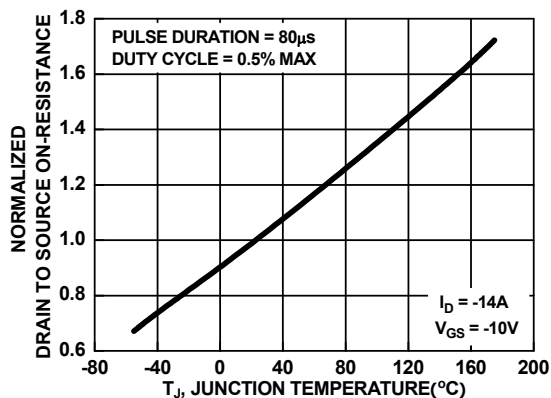


Figure 10. Normalized Drain to Source On-Resistance vs Junction Temperature

## Typical Characteristics

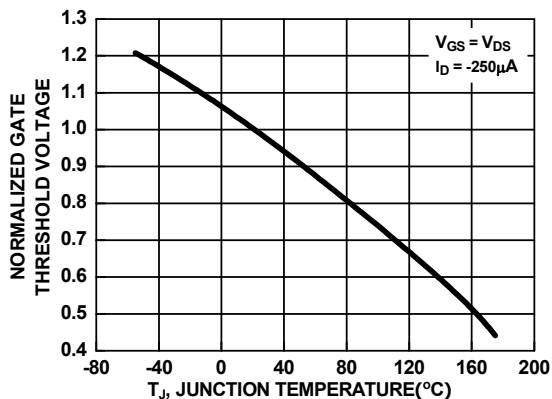


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

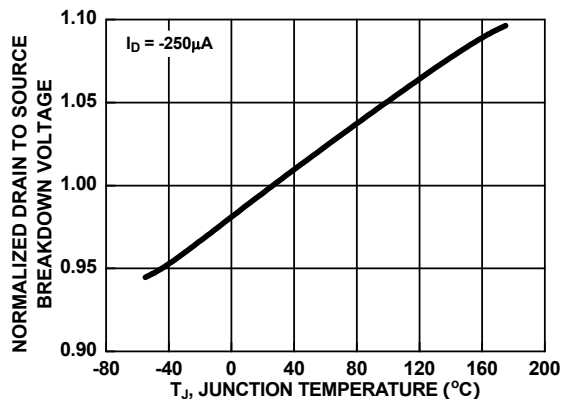


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

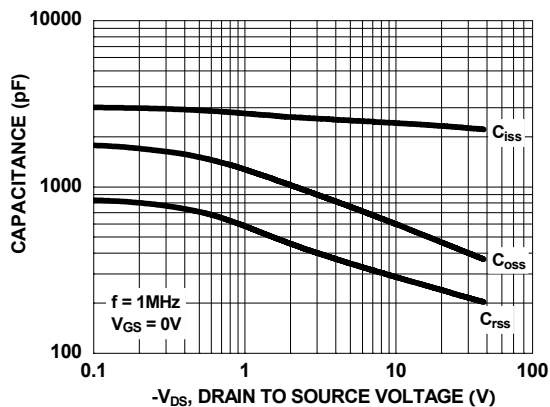


Figure 13. Capacitance vs Drain to Source Voltage

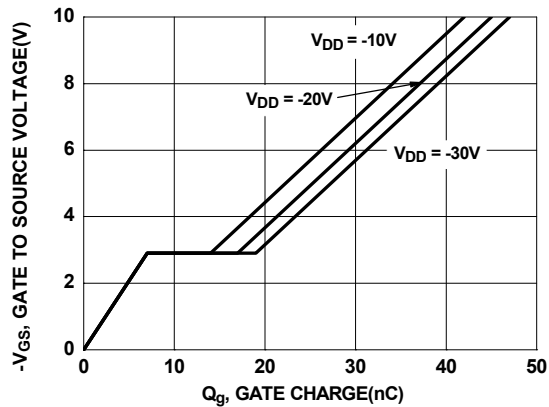


Figure 14. Gate Charge vs Gate to Source Voltage

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