

### FDB8832

# N-Channel Logic Level PowerTrench® MOSFET 30V, 80A, 2.1m $\Omega$

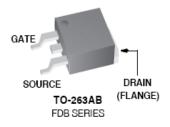
#### **Features**

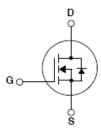
- Typ  $r_{DS(on)}$  = 1.5m $\Omega$  at  $V_{GS}$  = 5V,  $I_D$  = 80A
- Typ  $Q_{g(5)}$  = 100nC at  $V_{GS}$  = 5V
- Low Miller Charge
- Low Q<sub>rr</sub> Body Diode
- UIS Capability (Single Pulse and Repetitive Pulse)
- RoHS Compliant



### **Applications**

- Starter / Alternator Systems
- Electronic Power Steering Systems
- DC-DC Converters





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

| Symbol          | Parameter  | Ratings      | Units |
|-----------------|--|--------------|-------|
| $V_{DSS}$       | Drain to Source Voltage  | 30           | V     |
| $V_{GS}$        | Gate to Source Voltage   | ±20          | V     |
|                 | Drain Current Continuous (T <sub>C</sub> < 165°C, V <sub>GS</sub> = 10V)                                     | 80           |       |
|                 | Drain Current Continuous (T <sub>C</sub> < 163°C, V <sub>GS</sub> = 5V)                                      | 80           | Α     |
| 'D              | Drain Current Continuous ( $T_{amb} = 25^{\circ}C$ , $V_{GS} = 10V$ , with $R_{\theta JA} = 43^{\circ}C/W$ ) | 34           | A     |
|                 | Pulsed   | See Figure 4 |       |
| E <sub>AS</sub> | Single Pulse Avalanche Energy (Note 1)   | 1246         | mJ    |
| D               | Power Dissipation  | 300          | W     |
| $P_{D}$         | Derate above 25°C  | 2            | W/°C  |
| $T_J, T_{STG}$  | Operating and Storage Temperature  | -55 to +175  | °C    |

#### **Thermal Characteristics**

| $R_{\theta JC}$ | Thermal Resistance, Junction to Case                                      | 0.5 | °C/W |      |
|-----------------|---|-----|------|------|
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 2)                          |     | 62   | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient, lin <sup>2</sup> copper pad area |     | 43   | °C/W |

### **Package Marking and Ordering Information**

| Device Marking | Device  | Package  | Reel Size | Tape Width | Quantity  |
|----------------|---------|----------|-----------|------------|-----------|
| FDB8832        | FDB8832 | TO-263AB | 330mm     | 24mm       | 800 units |

### **Electrical Characteristics** $T_J = 25^{\circ}C$ unless otherwise noted

| Symbol            | Parameter                         | Test Conditions                 | Min | Тур | Max  | Units |
|-------------------|-----------------------------------|---------------------------------|-----|-----|------|-------|
| Off Cha           | aracteristics                     |                                 |     |     |      |       |
| B <sub>VDSS</sub> | Drain to Source Breakdown Voltage | $I_D = 250 \mu A, V_{GS} = 0 V$ | 30  | -   | -    | V     |
| 1                 | Zero Gate Voltage Drain Current   | V <sub>DS</sub> = 24V           | -   | -   | 1    | μА    |
| IDSS              | Zelo Gale Voltage Dialii Cullent  | $V_{GS} = 0V$ $T_J = 150$ °C    | -   | -   | 250  | μΑ    |
| I <sub>GSS</sub>  | Gate to Source Leakage Current    | V <sub>GS</sub> = ±20V          | -   | -   | ±100 | nA    |

#### On Characteristics

| V <sub>GS(th)</sub>               | Gate to Source Threshold Voltage | $V_{DS} = V_{GS}, I_{D} = 250 \mu A$                                  | 1.0 | 1.6 | 3.0 | V  |
|-----------------------------------|----------------------------------|---|-----|-----|-----|----|
|                                   |                                  | $I_D = 80A, V_{GS} = 10V$   | -   | 1.4 | 1.9 |    |
|                                   |                                  | $I_D = 80A, V_{GS} = 5V$  | -   | 1.5 | 2.1 |    |
| r <sub>DS(on)</sub> Drain to Sour | Drain to Source On Resistance    | $I_D = 80A, V_{GS} = 4.5V$  | -   | 1.6 | 2.2 | mΩ |
|                                   |                                  | I <sub>D</sub> = 80A, V <sub>GS</sub> = 10V<br>T <sub>J</sub> = 175°C | -   | 2.3 | 3.0 |    |

#### **Dynamic Characteristics**

| C <sub>iss</sub> | Input Capacitance                | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V,<br>f = 1MHz |   | - | 11400 | -    | pF |
|------------------|----------------------------------|--|---|---|-------|------|----|
| C <sub>oss</sub> | Output Capacitance               |  |   | - | 2140  | -    | pF |
| C <sub>rss</sub> | Reverse Transfer Capacitance     | 1 - 1101112  | I = IIVIDZ                                    |   | 1260  | -    | pF |
| $R_G$            | Gate Resistance                  | V <sub>GS</sub> = 0.5V, f = 1MHz                         |   | - | 1.2   | -    | Ω  |
| $Q_{g(TOT)}$     | Total Gate Charge at 10V         | $V_{GS}$ = 0 to 10V                                      |   | - | 204   | 265  | nC |
| $Q_{g(5)}$       | Total Gate Charge at 5V          | $V_{GS} = 0$ to 5V                                       | ]., , <u>,</u> ,,                             | - | 100   | 130  | nC |
| $Q_{g(TH)}$      | Threshold Gate Charge            | $V_{GS} = 0$ to 1V                                       | V <sub>DD</sub> = 15V<br>I <sub>D</sub> = 80A | - | 10.9  | 14.2 | nC |
| $Q_{gs}$         | Gate to Source Gate Charge       |  | $I_0 = 0.0A$                                  | - | 33    | -    | nC |
| Q <sub>gs2</sub> | Gate Charge Threshold to Plateau |  | ·g  | - | 22    | -    | nC |
| $Q_{gd}$         | Gate to Drain "Miller" Charge    |  |   | - | 43    | -    | nC |

## Electrical Characteristics T<sub>J</sub> = 25°C unless otherwise noted

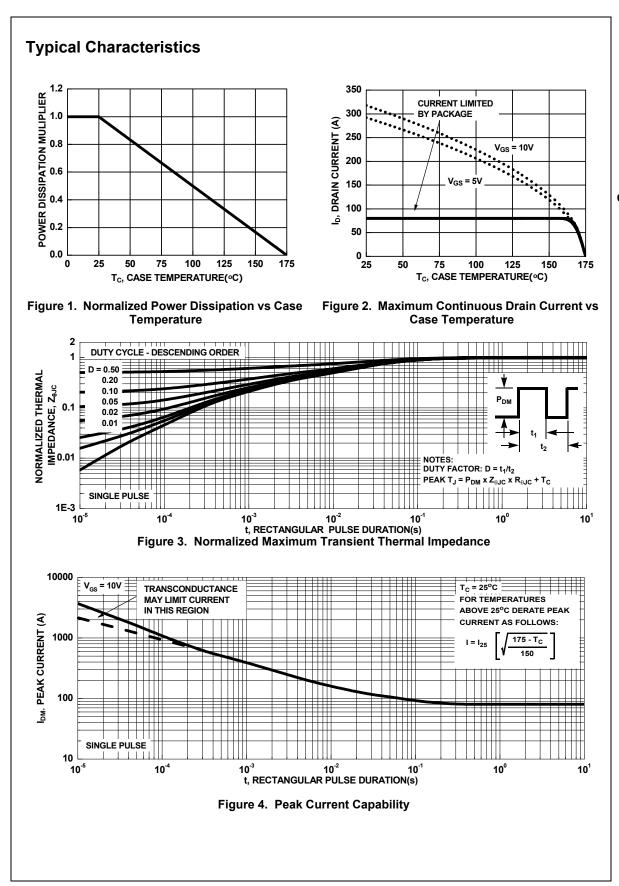
| Symbol              | Parameter           | Test Conditions  | Min | Тур | Max | Units |
|---------------------|---------------------|--|-----|-----|-----|-------|
| Switchi             | ing Characteristics |  |     |     |     |       |
| t <sub>(on)</sub>   | Turn-On Time        |  | -   | -   | 155 | ns    |
| t <sub>d(on)</sub>  | Turn-On Delay Time  |  | -   | 24  | -   | ns    |
| t <sub>r</sub>      | Turn-On Rise Time   | V <sub>DD</sub> = 15V, I <sub>D</sub> = 80A                    | -   | 73  | -   | ns    |
| t <sub>d(off)</sub> | Turn-Off Delay Time | $V_{DD} = 15V, I_D = 80A$<br>$V_{GS} = 5V, R_{GS} = 1.5\Omega$ | -   | 54  | -   | ns    |
| t <sub>f</sub>      | Turn-Off Fall Time  |  | -   | 38  | -   | ns    |
| t <sub>off</sub>    | Turn-Off Time       |  | -   | -   | 149 | ns    |

#### **Drain-Source Diode Characteristics**

| V <sub>SD</sub> Source | Source to Drain Diode Voltage | I <sub>SD</sub> = 75A                 | - | 0.8 | 1.25 | V  |
|------------------------|-------------------------------|---------------------------------------|---|-----|------|----|
|                        | Source to Drain Diode Voltage | I <sub>SD</sub> = 40A                 | - | 0.8 | 1.0  | V  |
| t <sub>rr</sub>        | Reverse Recovery Time         | I <sub>F</sub> = 75A, di/dt = 100A/μs | - | 59  | 77   | ns |
| Q <sub>rr</sub>        | Reverse Recovery Charge       | I <sub>F</sub> = 75A, di/dt = 100A/μs | - | 67  | 87   | nC |

**Notes:** 1: Starting  $T_J$  = 25°C, L = 0.61mH,  $I_{AS}$  = 64A,  $V_{DD}$  = 30V,  $V_{GS}$  = 10V. 2: Pulse width = 100s.

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## Typical Characteristics

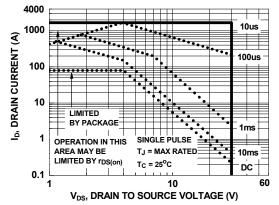
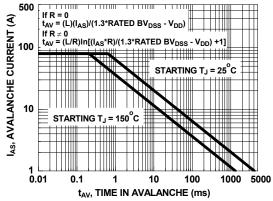


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

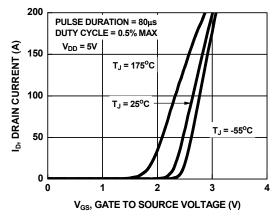


Figure 7. Transfer Characteristics

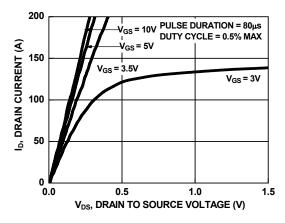


Figure 8. Saturation Characteristics

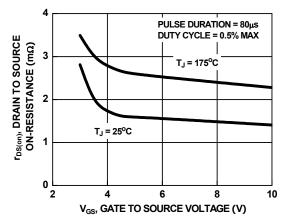


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

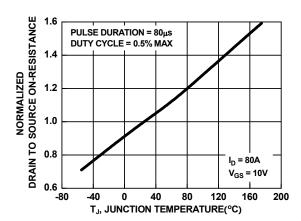


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

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#### **Typical Characteristics**

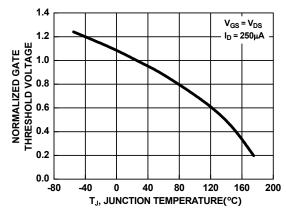
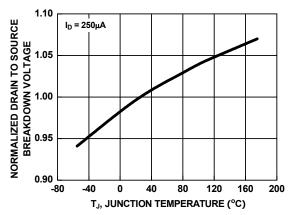


Figure 11. Normalized Gate Threshold Voltage vs Figure 12. Normalized Drain to Source **Breakdown Voltage vs Junction Temperature** 



40000 CAPACITANCE (pF)
00001
00001 f = 1MHz  $V_{GS} = 0V$ 100 0.1 1 10 V<sub>DS</sub>, DRAIN TO SOURCE VOLTAGE (V) 50

**Junction Temperature** 

V<sub>GS</sub>, GATE TO SOURCE VOLTAGE(V) ID = 80A 8 V<sub>DD</sub> = 12V V<sub>DD</sub> = 15V  $V_{DD} = 18V$ 0 50 100 250 0 150 200 Qg, GATE CHARGE(nC)

Figure 13. Capacitance vs Drain to Source Voltage

Figure 14. Gate Charge vs Gate to Source Voltage





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