

March 2013

FDB8443

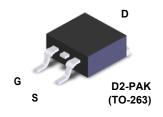
N-Channel PowerTrench[®] MOSFET 40 V, 182 A, 3.0 m Ω

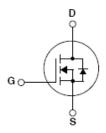
Features

- $R_{DS(on)} = 2.3 \text{ m}\Omega \text{ (Typ.)} @ V_{GS} = 10 \text{ V, } I_D = 80 \text{ A}$
- Q_{G(tot)} = 142 nC (Typ.)
- Low Miller Charge, Q_{GD} = 32 nC(Typ.)
- UIS Capability (Single Pulse and Repetitive Pulse)
- RoHS Compliant

Applications

- Power Tools
- Motor drives and Uninterruptible Power Supplies
- Synchronous Rectification
- Battery Protection Circuit





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

| Symbol | | Parameter | FDB8443 | Unit |
|-----------------------------------|-----------------------------|--|--------------|------|
| V_{DSS} | Drain to Source Voltage | | 40 | V |
| V_{GS} | Gate to Source Voltage | | ±20 | V |
| | | - Continuous (T _C = 25°C, Silicon Limited) | 182* | |
| | Drain Current | - Continuous (T _C = 100°C, Silicon Limited) | 129* | |
| ID | | - Continuous (T _C = 25°C, Package Limited) | 120 | Α |
| | | - Continuous ($T_A = 25^{\circ}C$, $R_{\theta JA} = 43^{\circ}C/W$) | 25 | |
| I _{DM} | Drain Current | - Pulsed | See Figure 4 | |
| E _{AS} | Single Pulse Avalanche Ener | gy (Note 1) | 531 | mJ |
| D | Power Dissipation | | 188 | W |
| P_{D} | Derate above 25°C | | 1.25 | W/°C |
| T _J , T _{STG} | Operating and Storage Temp | erature | -55 to +175 | °C |

^{*}Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 120A.

Thermal Characteristics

| Symbol | Parameter | FDB8443 | Unit |
|-----------------|---|---------|------|
| $R_{\theta JC}$ | Thermal Resistance Junction to Case, Max. | 0.8 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient, Max. (Note 2) | 62 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient TO-263, 1in ² copper pad area, Max. | 43 | °C/W |

Unit

nΑ

Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|-----------------------|---------|----------|-----------|------------|-----------|
| FDB8443 | FDB8443 | TO-263AB | 330mm | 24mm | 800 units |

Electrical Characteristics T_C = 25°C unless otherwise noted

Parameter

Gate to Source Leakage Current

| Off Characteristics | | | | | | |
|---------------------|-----------------------------------|------------------------------------|----|---|-----|----|
| B _{VDSS} | Drain to Source Breakdown Voltage | $I_D = 250 \mu A, V_{GS} = 0 V$ | 40 | - | - | V |
| | Toro Cata Valtago Proin Current | V _{DS} = 32V, | - | - | 1 | ^ |
| IDSS | Zero Gate Voltage Drain Current | $V_{GS} = 0V$ $T_C = 150^{\circ}C$ | - | - | 250 | μΑ |

 $V_{GS} = \pm 20V$

Test Conditions

Min

Тур

Max

±100

On Characteristics

Symbol

| V _{GS(th)} | Gate to Source Threshold Voltage | $V_{GS} = V_{DS}, I_D = 250 \mu A$ | 2 | 2.8 | 4 | V |
|---------------------|---|---|-----|-----|-----|----|
| | I _D = 80A, V _{GS} = 10V | - | 2.3 | 3.0 | | |
| r _{DS(on)} | Drain to Source On Resistance | I_D = 80A, V_{GS} = 10V, T_J = 175°C | - | 4.2 | 5.5 | mΩ |

Dynamic Characteristics

| C _{iss} | Input Capacitance | V - 25V V - 4 | V 05V V 0V | | 9310 | - | pF |
|------------------|----------------------------------|--|-----------------------|---|------|-----|----|
| C _{oss} | Output Capacitance | V _{DS} = 25V, V _{GS} = (f = 1MHz | JV, | - | 800 | - | pF |
| C _{rss} | Reverse Transfer Capacitance | 1 - 1111112 | I = IIVIDZ | | 510 | - | pF |
| R_G | Gate Resistance | V _{GS} = 0.5V, f = 1MHz | | - | 0.9 | - | Ω |
| $Q_{g(TOT)}$ | Total Gate Charge at 10V | V _{GS} = 0 to 10V | | - | 142 | 185 | nC |
| $Q_{g(TH)}$ | Threshold Gate Charge | V _{GS} = 0 to 2V | V _{DD} = 20V | - | 17.5 | 23 | nC |
| Q _{gs} | Gate to Source Gate Charge | | I _D = 35A | - | 36 | - | nC |
| Q _{gs2} | Gate Charge Threshold to Plateau | | $I_g = 1mA$ | - | 18.8 | - | nC |
| Q_{gd} | Gate to Drain "Miller" Charge | | | - | 32 | - | nC |

Switching Characteristics (V_{GS} = 10V)

| t _{on} | Turn-On Time | | - | - | 58 | ns |
|---------------------|---------------------|--|---|------|-----|----|
| t _{d(on)} | Turn-On Delay Time | V_{DD} = 20V, I_{D} = 35A V_{GS} = 10V, R_{GS} = 2 Ω | - | 18.4 | 1 | ns |
| t _r | Rise Time | | - | 17.9 | - | ns |
| t _{d(off)} | Turn-Off Delay Time | | - | 55 | - | ns |
| t _f | Fall Time | | - | 13.5 | - | ns |
| t _{off} | Turn-Off Time | | - | - | 109 | ns |

Drain-Source Diode Characteristics

| | V_{SD} | Source to Drain Diode Voltage | I _{SD} = 35A | - | 0.8 | 1.25 | \/ | |
|----------------|-----------------|-------------------------------|---|---|-----|------|----|--|
| ' | | | I _{SD} = 15A | - | 0.8 | 1.0 | V | |
| t _r | rr | Reverse Recovery Time | I _{SD} = 35A, dI _{SD} /dt = 100A/μs | - | 42 | 55 | ns | |
| C | Q _{rr} | Reverse Recovery Charge | isp = 33A, disp/dt = 100A/μs | ı | 48 | 62 | nC | |

- **1:** Starting $T_J = 25^{\circ}C$, L = 0.26mH, $I_{AS} = 64$ A. **2:** Pulse width = 100s.

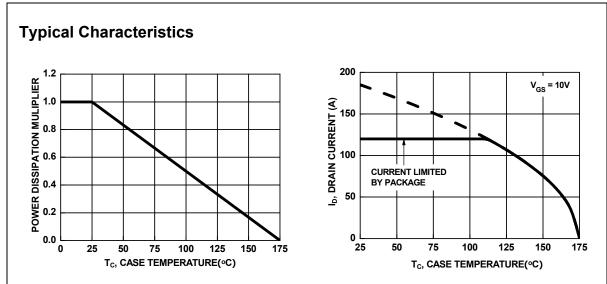


Figure 1. Normalized Power Dissipation vs Case Temperature

Figure 2. Maximum Continuous Drain Current vs Case Temperature

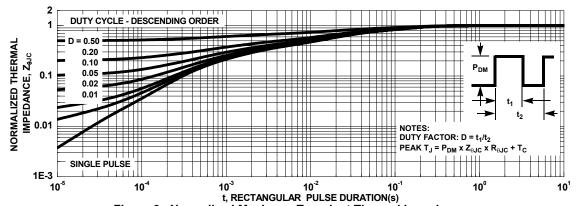


Figure 3. Normalized Maximum Transient Thermal Impedance

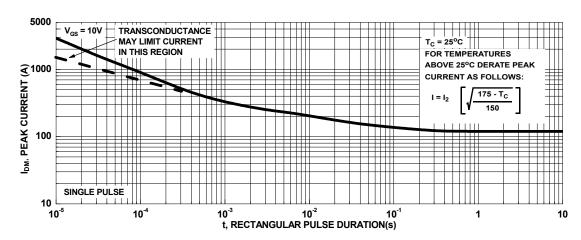
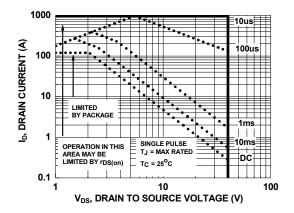


Figure 4. Peak Current Capability

Typical Characteristics



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If R = 0 t_{AV} = (L)(I_{AS})/(1.3*RATED BV_{DSS}

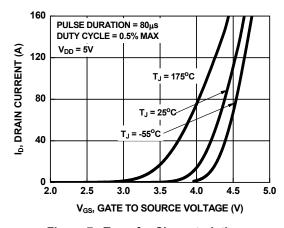
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Figure 5. Forward Bias Safe Operating Area

NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching

Capability



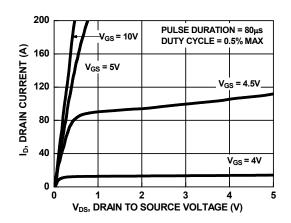
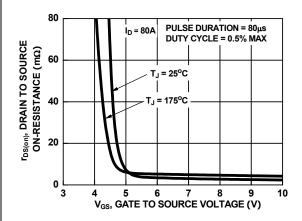


Figure 7. Transfer Characteristics

Figure 8. Saturation Characteristics



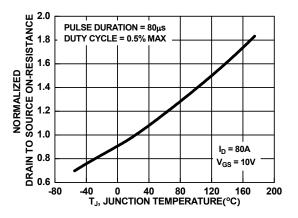


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

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

Typical Characteristics

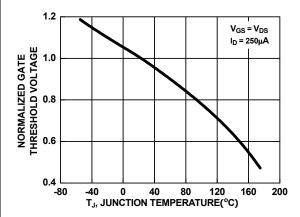


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

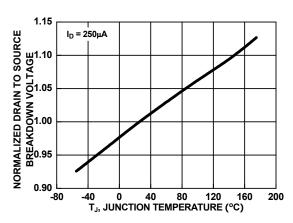


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

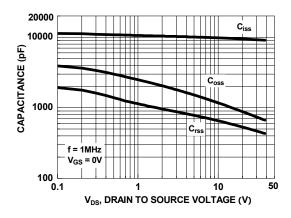


Figure 13. Capacitance vs Drain to Source Voltage

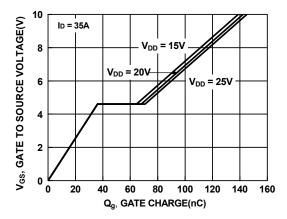


Figure 14. Gate Charge vs Gate to Source Voltage





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