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April 2015

FDB082N15A

N-Channel PowerTrench[®] MOSFET 150 V, 117 A, 8.2 m Ω

Features

- $R_{DS(on)}$ = 6.7 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 75 A
- · Fast Switching Speed
- Low Gate Charge, Q_G = 64.5 nC (Typ.)
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- · High Power and Current Handling Capability
- RoHS Compliant

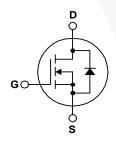
Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advance PowerTrench® process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

Applications

- · Synchronous Rectification for ATX / Server / Telecom PSU
- · Battery Protection Circuit
- · Motor drives and Uninterruptible Power Supplies
- · Micro Solar Inverter





Absolute Maximum Ratings T_C = 25°C unless otherwise noted.

| Symbol | | Parameter | FDB082N15A | Unit |
|-----------------------------------|---|--|-------------|------|
| V _{DSS} | Drain to Source Voltage | 150 | V | |
| V_{GSS} | Gate to Source Voltage | - DC | ±20 | V |
| | Gate to Source voltage | - AC (f > 1 Hz) | ±30 | V |
| I _D | - Continuous (T _C = 25°C, Silicon Limited) | | 117 | ^ |
| | Drain Current | - Continuous (T _C = 100°C, Silicon Limited) | 83 | Α |
| I _{DM} | Drain Current | - Pulsed (Note 1) | 468 | Α |
| E _{AS} | Single Pulsed Avalanche Energ | y (Note 2) | 542 | mJ |
| dv/dt | Peak Diode Recovery dv/dt | (Note 3) | 6 | V/ns |
| D | Dower Dissipation | $(T_C = 25^{\circ}C)$ | 294 | W |
| P_{D} | Power Dissipation - Derate Sbove 25°C | | 1.96 | W/°C |
| T _J , T _{STG} | Operating and Storage Tempera | ature Range | -55 to +175 | °C |
| Tı | Maximum Lead Temperature fo | r Soldering, 1/8" from Case for 5 Seconds | 300 | οС |

Thermal Characteristics

| Symbol | Parameter FDB082N15A | | | |
|-----------------|---|------|-------|--|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max. | 0.51 | °C/W | |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient, Max. | 62.5 | °C/VV | |

Package Marking and Ordering Information

| Part Number | Top Mark | Package | Packing Method | Reel Size | Tape Width | Quantity |
|-------------|------------|---------------------|----------------|-----------|------------|-----------|
| FDB082N15A | FDB082N15A | D ² -PAK | Tape and Reel | 330 mm | 24 mm | 800 units |

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

| Symbol | Parameter | Test Conditions | Min. | Тур. | Max. | Unit |
|---|--|---|------|------|------|------|
| Off Charac | cteristics | | | | | |
| BV _{DSS} | Drain to Source Breakdown Voltage | $I_D = 250 \mu A, V_{GS} = 0 V, T_C = 25^{\circ}C$ | 150 | - | - | V |
| ΔBV _{DSS} / ΔΤ _J | Breakdown Voltage Temperature Coefficient | I_D = 250 μ A, Referenced to 25°C | - | 0.08 | - | V/°C |
| 1 | Zero Gate Voltage Drain Current | V _{DS} = 120 V, V _{GS} = 0 V | - | - | 1 | μА |
| IDSS | Zero Gate voltage Drain Current | $V_{DS} = 120 \text{ V}, T_{C} = 150^{\circ}\text{C}$ | - | - | 500 | μΑ |
| I_{GSS} | Gate to Body Leakage Current | V _{GS} = ±20 V, V _{DS} = 0 V | - | - | ±100 | nA |

On Characteristics

| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS} = V_{DS}, I_{D} = 250 \mu A$ | 2.0 | - | 4.0 | V |
|---------------------|--------------------------------------|---|-----|-----|------|----|
| R _{DS(on)} | Static Drain to Source On Resistance | V _{GS} = 10 V, I _D = 75 A | 1 | 6.7 | 8.20 | mΩ |
| 9 _{FS} | Forward Transconductance | V _{DS} = 10 V, I _D = 75 A | 1 | 139 | - | S |

Dynamic Characteristics

| _ | | | | | | | |
|---------------------|------------------------------------|--|---------|---|------|------|----|
| C _{iss} | Input Capacitance | V - 25 V V - 2 V | | \ | 4645 | 6040 | pF |
| C _{oss} | Output Capacitance | $V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V},$ f = 1 MHz | | - | 1445 | 1880 | pF |
| C _{rss} | Reverse Transfer Capacitance | 1 - 1 101112 | | - | 100 | - | pF |
| C _{iss} | Input Capacitance | V - 75 V V - 0 V | | - | 4570 | 6040 | pF |
| Coss | Output Capacitance | $V_{DS} = 75 \text{ V}, V_{GS} = 0 \text{ V},$ f = 1 MHz | | - | 460 | 1880 | pF |
| C _{rss} | Reverse Transfer Capacitance | 1 - 1 101112 | | - | 20 | - | pF |
| Q _{g(tot)} | Total Gate Charge at 10V | | | - | 64.5 | 84 | nC |
| Q_{gs} | Gate to Source Gate Charge | $V_{DS} = 120 \text{ V}, I_{D} = 75 \text{ A},$ | | - | 19.1 | - | nC |
| Q _{gs2} | Gate Charge Threshold to Plateau | V _{GS} = 10 V | | - | 8.7 | - | nC |
| Q _{gd} | Gate to Drain "Miller" Charge | | (Note4) | - | 13.5 | - | nC |
| ESR | Equivalent Series Resistance (G-S) | f = 1 MHz | | - | 2.5 | - | Ω |
| | | | | | | | |

Switching Characteristics

| t _{d(on)} | Turn-On Delay Time | V _{DD} = 75 V, I _D = 75 A, | - | 22 | 54 | ns |
|---------------------|---------------------|--|-----|----|-----|----|
| t _r | Turn-On Rise Time | $V_{GS} = 10 \text{ V}, R_{G} = 4.7 \Omega$ | / - | 58 | 126 | ns |
| t _{d(off)} | Turn-Off Delay Time | | - | 61 | 132 | ns |
| t _f | Turn-Off Fall Time | (Note4) | - | 26 | 62 | ns |

Drain-Source Diode Characteristics

| I _S | Maximum Continuous Drain to Source Diode Forward Current | | | - | 117 | Α |
|-----------------|---|--|---|-----|---------|----|
| I _{SM} | Maximum Pulsed Drain to Source Diode Forward Current | | | - | 468 | Α |
| V_{SD} | Drain to Source Diode Forward Voltage V _{GS} = 0 V, I _{SD} = 75 A | | - | | 1.25 | V |
| t _{rr} | Reverse Recovery Time | V _{GS} = 0 V, I _{SD} = 75 A, | - | 96 | // - | ns |
| Q _{rr} | Reverse Recovery Charge | $dI_F/dt = 100 A/\mu s$ | - | 268 | \\ - \\ | nC |

Notes:

- 1. Repetitive rating: pulse-width limited by maximum junction temperature.
- 2. Starting T_J = 25°C, L = 3 mH, I_{SD} = 19 A.
- 3. I $_{SD} \leq 75$ A, di/dt ≤ 200 A/µs, V $_{DD} \leq BV_{DSS},$ starting T $_{J}$ = 25°C.
- 4. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

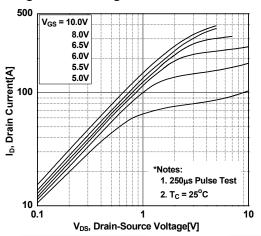


Figure 3. On-Resistance Variation vs.
Drain Current and Gate Voltage

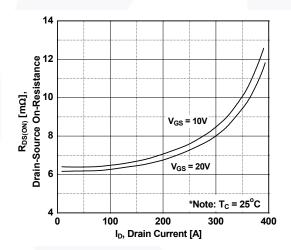


Figure 5. Capacitance Characteristics

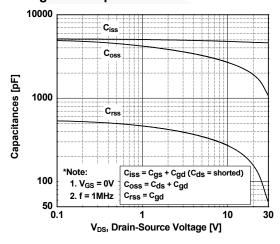


Figure 2. Transfer Characteristics

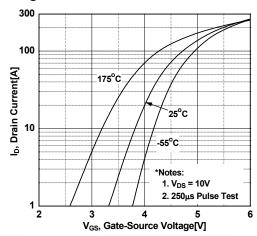


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

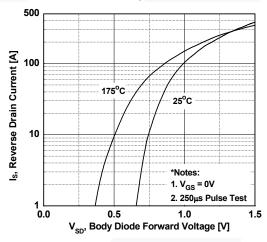
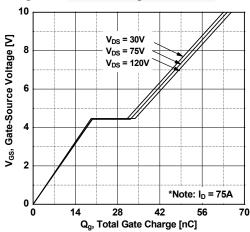


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

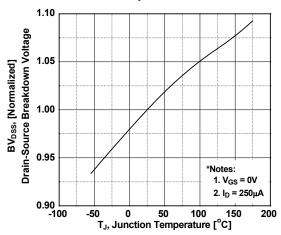


Figure 9. Maximum Safe Operating Area

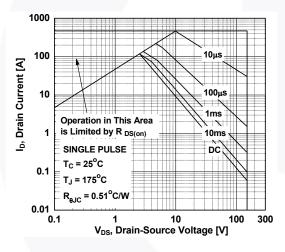


Figure 11. Unclamped Inductive Switching Capability

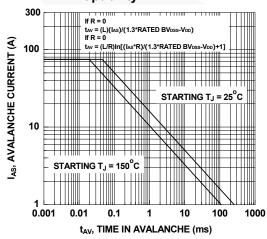


Figure 8. On-Resistance Variation vs. Temperature

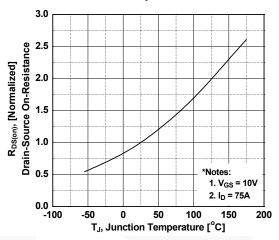
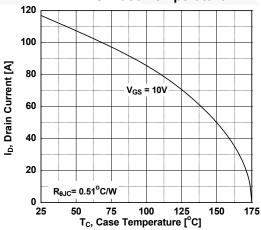
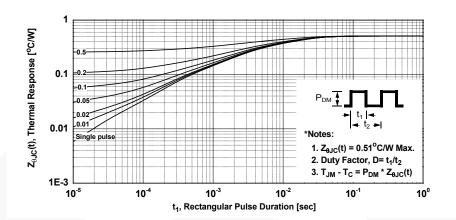


Figure 10. Maximum Drain Current vs. Case Temperature



Typical Performance Characteristics

Figure 12. Transient Thermal Response Curve



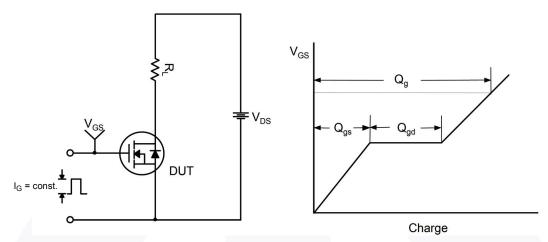


Figure 13. Gate Charge Test Circuit & Waveform

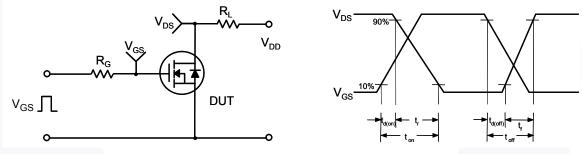


Figure 14. Resistive Switching Test Circuit & Waveforms

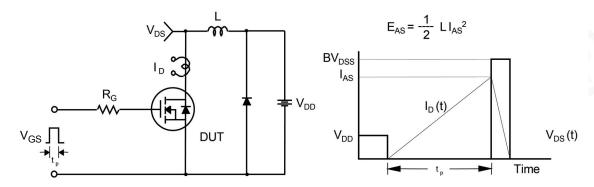


Figure 15. Unclamped Inductive Switching Test Circuit & Waveforms

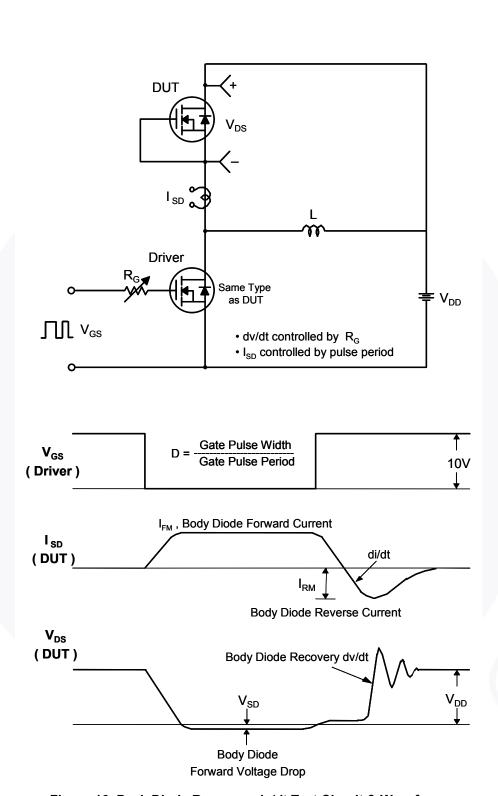
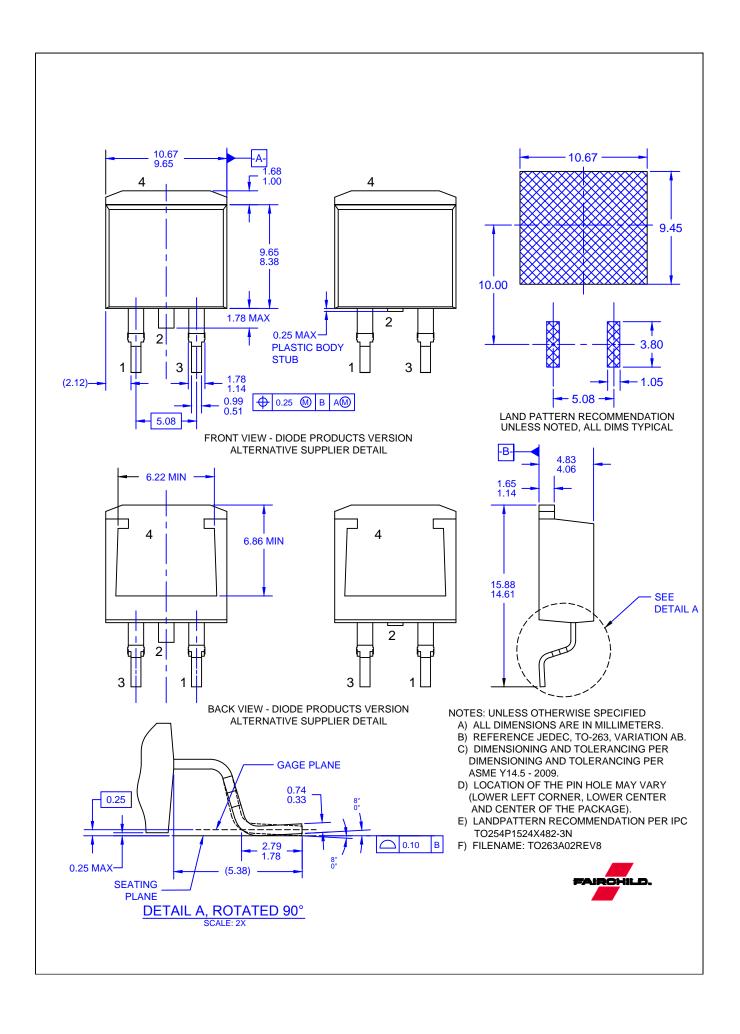


Figure 16. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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