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November 2013

FDB28N30

N-Channel UniFETTM MOSFET 300 V, 28 A, 129 m Ω

Features

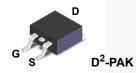
- $R_{DS(on)}$ = 108 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 14 A
- Low Gate Charge (Typ. 39 nC)
- Low C_{rss} (Typ. 35 pF)
- · 100% Avalanche Tested
- RoHS Compliant

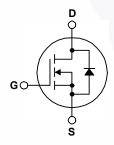
Applications

- · Uninterruptible Power Supply
- · AC-DC Power Supply

Description

UniFETTM MOSFET is Fairchild Semiconductor's high voltage MOSFET family based on planar stripe and DMOS technology. This MOSFET is tailored to reduce on-state resistance, and to provide better switching performance and higher avalanche energy strength. This device family is suitable for switching power converter applications such as power factor correction (PFC), flat panel display (FPD) TV power, ATX and electronic lamp ballasts.





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

| Symbol | | Parameter | | FDB28N30 | Unit |
|-----------------------------------|-------------------------|--|-----------|-------------|------|
| V_{DSS} | Drain to Source Voltage | | | 300 | V |
| V_{GSS} | Gate to Source Voltage | | | ±30 | V |
| | Drain Current | - Continuous (T _C = 25°C) | / | 28 | А |
| ID | DialifCullent | - Continuous (T _C = 100°C) | | 19 | ^ |
| I _{DM} | Drain Current | - Pulsed | (Note 1) | 112 | Α |
| E _{AS} | Single Pulsed Avalanche | Energy | (Note 2) | 588 | mJ |
| I _{AR} | Avalanche Current | | (Note 1) | 28 | Α |
| E _{AR} | Repetitive Avalanche En | ergy | (Note 1) | 25 | mJ |
| dv/dt | Peak Diode Recovery dv | /dt | (Note 3) | 4.5 | V/ns |
| Б | Dower Discinction | (T _C = 25°C) | | 250 | W |
| P_{D} | Power Dissipation | - Derate above 25°C | | 2.0 | W/°C |
| T _J , T _{STG} | Operating and Storage T | emperature Range | | -55 to +150 | °C |
| T_L | Maximum Lead Tempera | ture for Soldering, 1/8" from Case for | 5 Seconds | 300 | °C |

Thermal Characteristics

| Symbol | Parameter | FDB28N30 | Unit |
|-----------------|---|----------|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max. | 0.5 | |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (1 in ² Pad of 2-oz Copper), Max. 40 | | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Minimum Pad of 2-oz Copper), Max. 62.5 | | |

Package Marking and Ordering Information

| Part Number | Top Mark | Package | Packing Method | Reel Size | Tape Width | Quantity |
|-------------|----------|---------------------|----------------|-----------|------------|-----------|
| FDB28N30 | FDB28N30 | 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 | eteristics | | | | | |
| BV _{DSS} | Drain to Source Breakdown Voltage | $I_D = 250 \mu A, V_{GS} = 0 V, T_J = 25^{\circ} C$ | 300 | - | - | V |
| ΔBV _{DSS} / ΔT _J | Breakdown Voltage Temperature Coefficient | I_D = 250 μ A, Referenced to 25°C | - | 0.4 | - | V/°C |
| | Zero Gate Voltage Drain Current | V _{DS} = 300 V, V _{GS} = 0 V | - | - | 1 | ^ |
| IDSS | Zero Gate Voltage Drain Current | $V_{DS} = 240 \text{ V}, T_{C} = 125^{\circ}\text{C}$ | - | - | 10 | μΑ |
| I _{GSS} | Gate to Body Leakage Current | V _{GS} = ±30 V, V _{DS} = 0 V | - | - | ±100 | nA |

On Characteristics

| V _{GS(th)} | Gate Threshold Voltage | $V_{GS} = V_{DS}, I_{D} = 250 \mu\text{A}$ | 3.0 | - | 5.0 | V |
|---------------------|--------------------------------------|---|-----|-------|-------|---|
| R _{DS(on)} | Static Drain to Source On Resistance | V _{GS} = 10 V, I _D = 14 A | - | 0.108 | 0.129 | Ω |
| 9 _{FS} | Forward Transconductance | V _{DS} = 40 V, I _D = 14 A | ı | 24.8 | - | S |

Dynamic Characteristics

| C _{iss} | Input Capacitance | V 05.V.V 0.V | | - | 1690 | 2250 | pF |
|------------------|-------------------------------|---|----------|-----|------|------|----|
| C _{oss} | Output Capacitance | V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz | | - | 305 | 405 | pF |
| C _{rss} | Reverse Transfer Capacitance | 1 - 1 1011 12 | | -\ | 35 | 50 | pF |
| Q_{g} | Total Gate Charge at 10V | V _{DS} = 240 V, I _D = 28 A, | | - \ | 39 | 50 | nC |
| Q _{gs} | Gate to Source Gate Charge | V _{GS} = 10 V | | - \ | 12 | - | nC |
| Q_{gd} | Gate to Drain "Miller" Charge | | (Note 4) | - | 17 | - | nC |

Switching Characteristics

| t _{d(on)} | Turn-On Delay Time | | - | 35 | 80 | ns |
|---------------------|---------------------|---|---|-----|-----|----|
| t _r | | $V_{DD} = 150 \text{ V}, I_D = 28 \text{ A},$ | - | 135 | 280 | ns |
| t _{d(off)} | Turn-Off Delay Time | V_{GS} = 10 V, R_G = 25 Ω | - | 79 | 168 | ns |
| t _f | Turn-Off Fall Time | (Note 4) | - | 69 | 148 | ns |

Drain-Source Diode Characteristics

| I _S | Maximum Continuous Drain to Source Diode Forward Current | | _ | - | 28 | Α |
|-----------------|--|--|---|-----|-----|----|
| I _{SM} | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 112 | Α |
| V_{SD} | Drain to Source Diode Forward Voltage | V _{GS} = 0 V, I _{SD} = 28 A | - | - | 1.4 | V |
| t _{rr} | Reverse Recovery Time | V _{GS} = 0 V, I _{SD} = 28 A, | - | 279 | - | ns |
| Q _{rr} | Reverse Recovery Charge | $V_{GS} = 0 \text{ V, } I_{SD} = 28 \text{ A,}$ $dI_F/dt = 100 \text{ A/}\mu\text{s}$ | - | 2.7 | - | μC |

Notes

- 1. Repetitive rating: pulse-width limited by maximum junction temperature.
- 2. L = 1.5 mH, I $_{AS}$ = 28 A, V $_{DD}$ = 50 V, R $_{G}$ = 25 $\Omega,$ starting T $_{J}$ = 25 $^{\circ}C.$
- 3. I_{SD} \leq 28 A, di/dt \leq 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

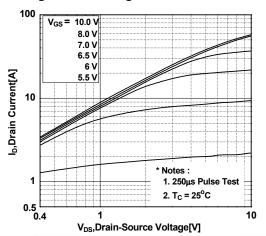


Figure 3. On-Resistance Variation vs.
Drain Current and Gate Voltage

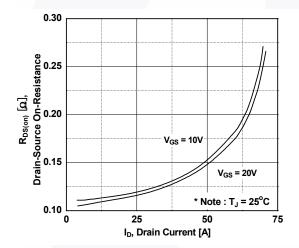


Figure 5. Capacitance Characteristics

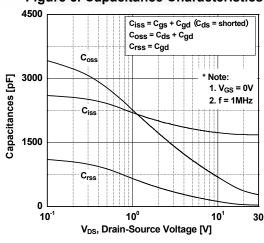


Figure 2. Transfer Characteristics

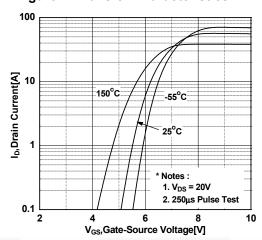


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

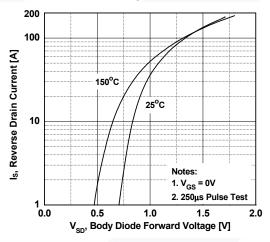
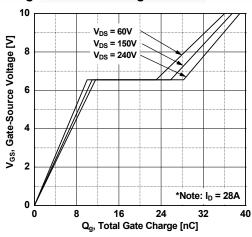


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

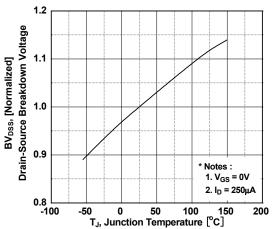


Figure 8. On-Resistance Variation vs. Temperature

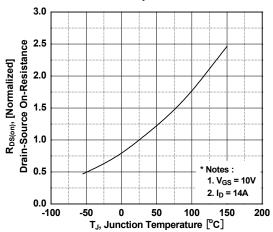


Figure 9. Maximum Safe Operating Area

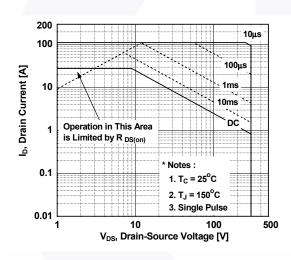


Figure 10. Maximum Drain Current vs. Case Temperature

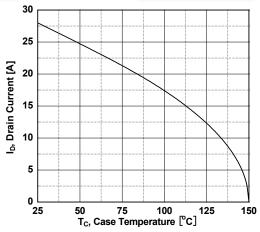
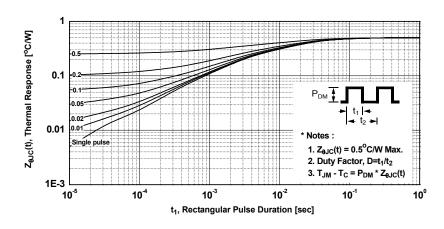


Figure 11. Transient Thermal Response Curve



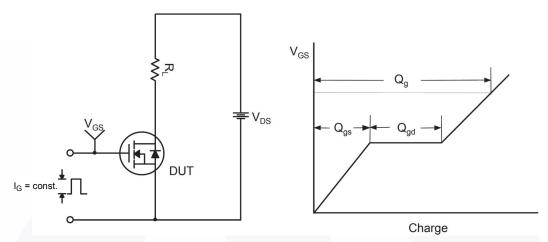


Figure 12. Gate Charge Test Circuit & Waveform

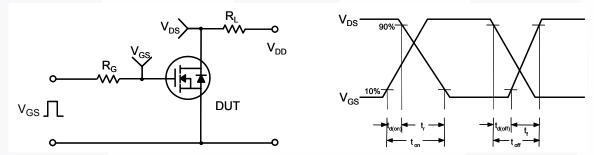


Figure 13. Resistive Switching Test Circuit & Waveforms

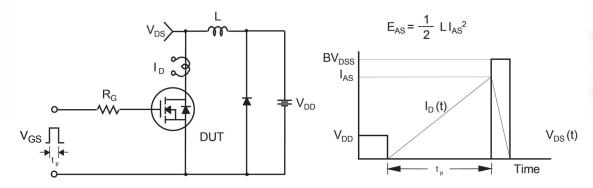


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

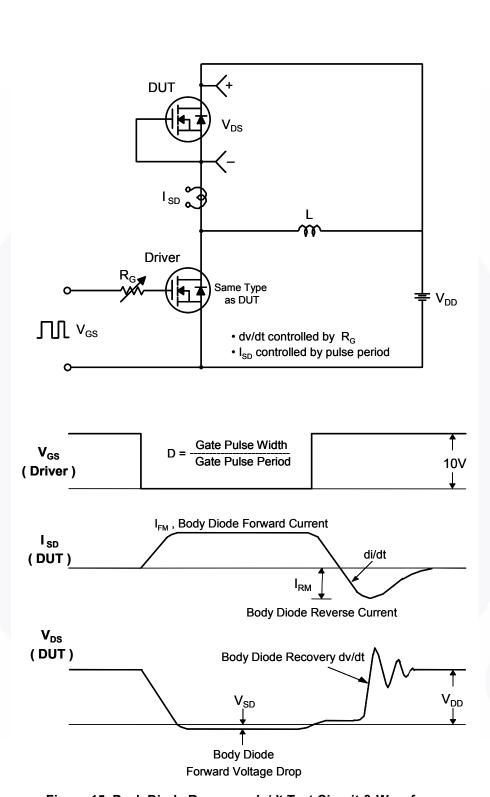


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

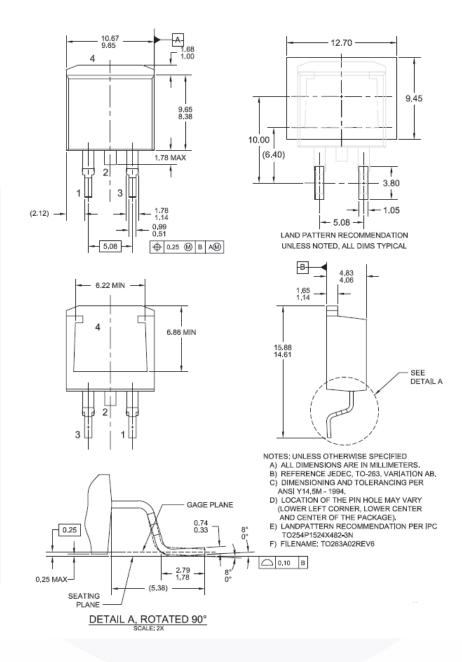


Figure 16. TO263 (D²PAK), Molded, 2-Lead, Surface Mount

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