

FDP8876

N-Channel PowerTrench® MOSFET

30V, 71A, 8.5mΩ

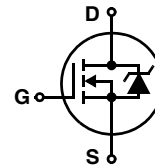
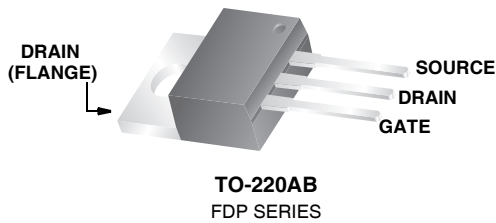
General Descriptions

This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $r_{DS(ON)}$ and fast switching speed.



Features

- $r_{DS(ON)} = 8.5m\Omega$, $V_{GS} = 10V$, $I_D = 40A$
- $r_{DS(ON)} = 10.3m\Omega$, $V_{GS} = 4.5V$, $I_D = 40A$
- High performance trench technology for extremely low $r_{DS(ON)}$
- Low gate charge
- High power and current handling capability
- RoHS Compliant



MOSFET Maximum Ratings $T_A = 25^\circ C$ unless otherwise noted

| Symbol | Parameter | Ratings | Units |
|----------------|---|------------|------------|
| V_{DSS} | Drain to Source Voltage | 30 | V |
| V_{GS} | Gate to Source Voltage | ± 20 | V |
| I_D | Drain Current | 70 | A |
| | Continuous ($T_C = 25^\circ C$, $V_{GS} = 10V$) | | |
| | Continuous ($T_C = 25^\circ C$, $V_{GS} = 4.5V$) | 64 | A |
| | Pulsed | Figure 4 | A |
| E_{AS} | Single Pulse Avalanche Energy (Note 1) | 180 | mJ |
| P_D | Power dissipation | 70 | W |
| T_J, T_{STG} | Operating and Storage Temperature | -55 to 175 | $^\circ C$ |

Thermal Characteristics

| | | | |
|-----------------|---|------|--------------|
| $R_{\theta JC}$ | Thermal Resistance Junction to Case TO-263 | 2.14 | $^\circ C/W$ |
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient TO-263, 1in ² copper pad area | 62 | $^\circ C/W$ |

Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|---------|----------|-----------|------------|----------|
| FDP8876 | FDP8876 | TO-220AB | Tube | N/A | 50 units |

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

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

Off Characteristics

| | | | | | | |
|------------|-----------------------------------|---|----|---|-----------|---------------|
| B_{VDSS} | Drain to Source Breakdown Voltage | $I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$ | 30 | - | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 24\text{V}$ | - | - | 1 | μA |
| | | $V_{GS} = 0\text{V}, T_A = 150^\circ\text{C}$ | - | - | 250 | |
| I_{GSS} | Gate to Source Leakage Current | $V_{GS} = \pm 20\text{V}$ | - | - | ± 100 | nA |

On Characteristics

| | | | | | | |
|--------------|----------------------------------|--|-----|-----|------|------------|
| $V_{GS(TH)}$ | Gate to Source Threshold Voltage | $V_{GS} = V_{DS}, I_D = 250\mu\text{A}$ | 1.2 | - | 2.5 | V |
| $r_{DS(ON)}$ | Drain to Source On Resistance | $I_D = 40\text{A}, V_{GS} = 10\text{V}$ | - | 6.1 | 8.7 | m Ω |
| | | $I_D = 40\text{A}, V_{GS} = 4.5\text{V}$ | - | 7.7 | 10.5 | |
| | | $I_D = 40\text{A}, V_{GS} = 10\text{V}, T_A = 175^\circ\text{C}$ | - | 11 | 14 | |

Dynamic Characteristics

| | | | | | | | |
|--------------|----------------------------------|--|---|------|-----|----------|----|
| C_{ISS} | Input Capacitance | $V_{DS} = 15\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ | - | 1700 | - | pF | |
| C_{OSS} | Output Capacitance | | - | 340 | - | pF | |
| C_{RSS} | Reverse Transfer Capacitance | | - | 210 | - | pF | |
| R_G | Gate Resistance | $V_{GS} = 0.5\text{V}, f = 1\text{MHz}$ | - | 2.3 | - | Ω | |
| $Q_{g(TOT)}$ | Total Gate Charge at 10V | $V_{GS} = 0\text{V to } 10\text{V}$ | $V_{DD} = 15\text{V}$ $I_D = 40\text{A}$ $I_g = 1.0\text{mA}$ | - | 32 | 45 | nC |
| $Q_{g(5)}$ | Total Gate Charge at 5V | $V_{GS} = 0\text{V to } 5\text{V}$ | | - | 17 | 24 | nC |
| $Q_{g(TH)}$ | Threshold Gate Charge | $V_{GS} = 0\text{V to } 1\text{V}$ | | - | 1.6 | 2.4 | nC |
| Q_{gs} | Gate to Source Gate Charge | | - | 4.7 | - | nC | |
| Q_{gs2} | Gate Charge Threshold to Plateau | | - | 3.1 | - | nC | |
| Q_{gd} | Gate to Drain "Miller" Charge | | - | 7.0 | - | nC | |

Switching Characteristics ($V_{GS} = 10\text{V}$)

| | | | | | | |
|--------------|---------------------|---|---|----|-----|----|
| t_{ON} | Turn-On Time | $V_{DD} = 15\text{V}, I_D = 40\text{A}$ $V_{GS} = 10\text{V}, R_{GS} = 10\Omega$ | - | - | 189 | ns |
| $t_{d(ON)}$ | Turn-On Delay Time | | - | 9 | - | ns |
| t_r | Rise Time | | - | 97 | - | ns |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | - | 51 | - | ns |
| t_f | Fall Time | | - | 39 | - | ns |
| t_{OFF} | Turn-Off Time | | - | - | 135 | ns |

Drain-Source Diode Characteristic

| | | | | | | |
|----------|-------------------------------|---|---|---|------|----|
| V_{SD} | Source to Drain Diode Voltage | $I_{SD} = 40\text{A}$ | - | - | 1.25 | V |
| | | $I_{SD} = 3.2\text{A}$ | - | - | 1.0 | V |
| t_{rr} | Reverse Recovery Time | $I_{SD} = 40\text{A}, di_{SD}/dt = 100\text{A}/\mu\text{s}$ | - | - | 22 | ns |
| Q_{RR} | Reverse Recovered Charge | $I_{SD} = 40\text{A}, di_{SD}/dt = 100\text{A}/\mu\text{s}$ | - | - | 9 | nC |

Notes:

- Starting $T_J = 25^\circ\text{C}, L = 1\text{mH}, I_{AS} = 19\text{A}, V_{DD} = 27\text{V}, V_{GS} = 10\text{V}$
- Pulse width = 100s

Typical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

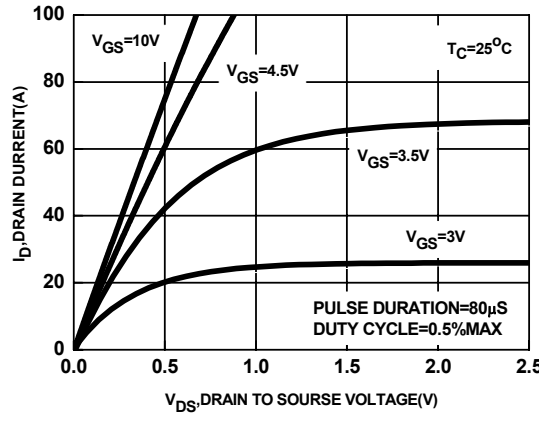


Figure 1. On Region Characteristics

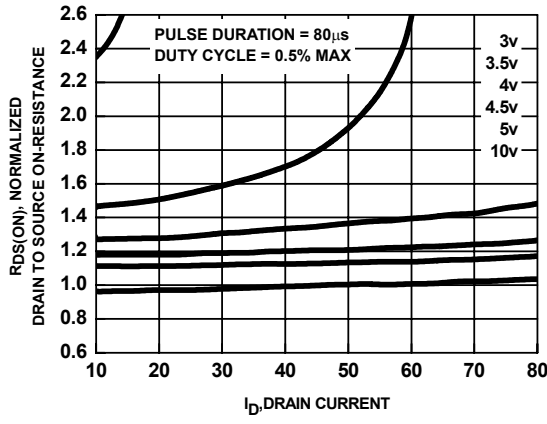


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

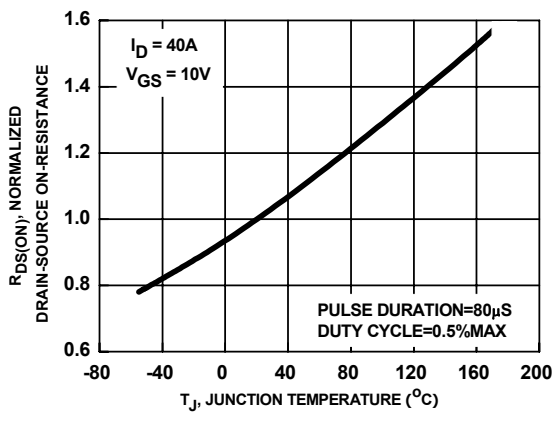


Figure 3. On Resistance Variation with Temperature

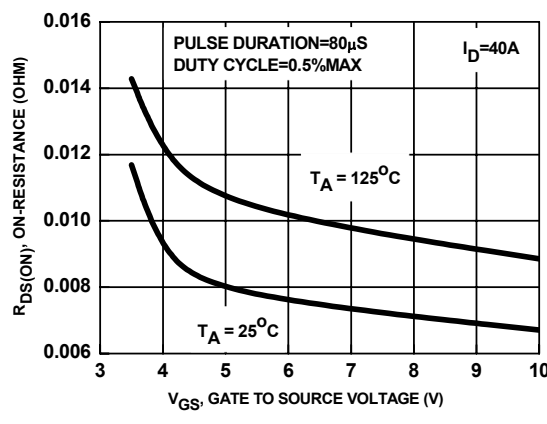


Figure 4. On-Resistance Variation with Gate-to-Source Voltage

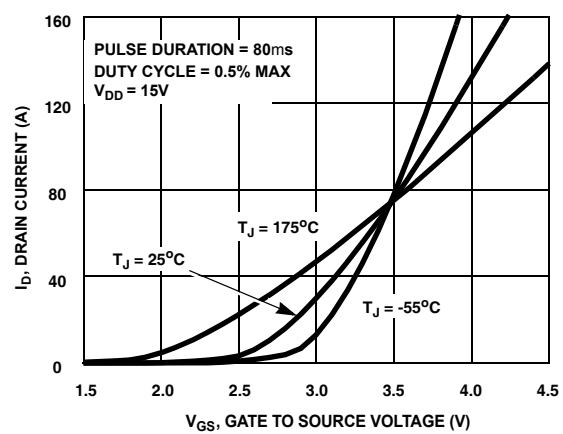


Figure 5. Transfer Characteristics

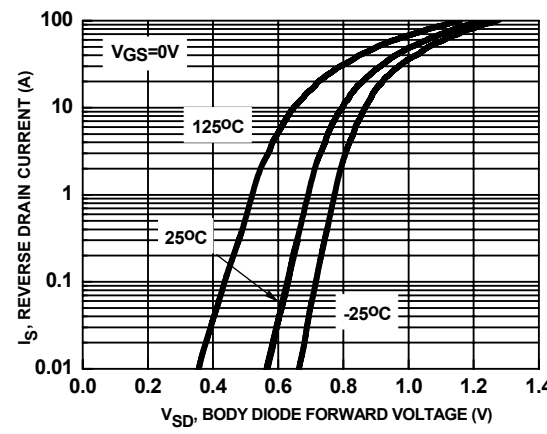


Figure 6. Body Diode Forward Voltage Variation With Source Current and Temperature

Typical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

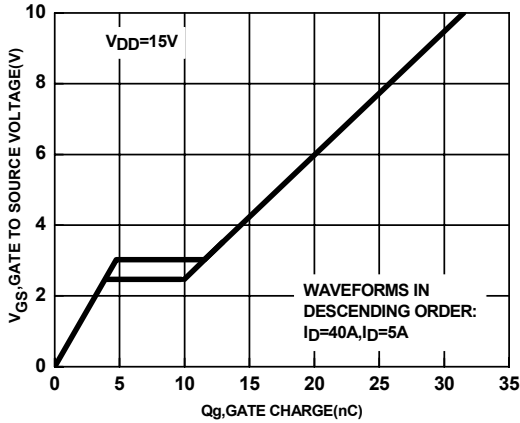


Figure 7. Gate Charge characteristics

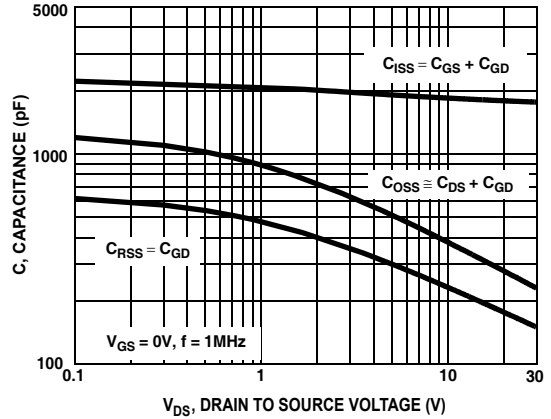


Figure 8. Saturation characteristics

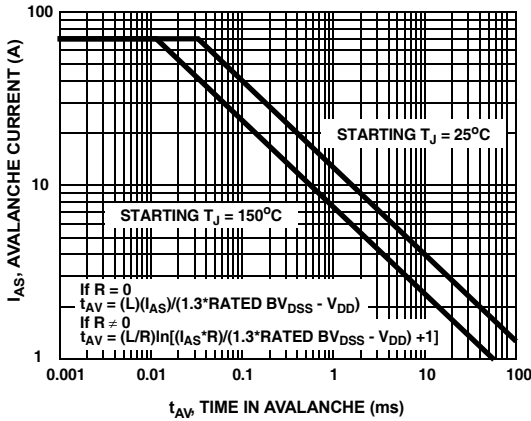


Figure 9. Unclamped Inductive Switching Capability

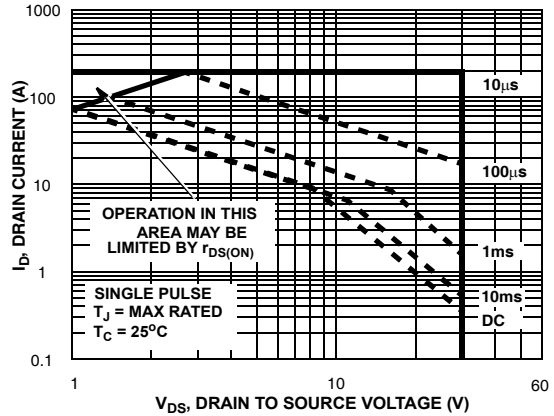


Figure 10. Safe Operating Area

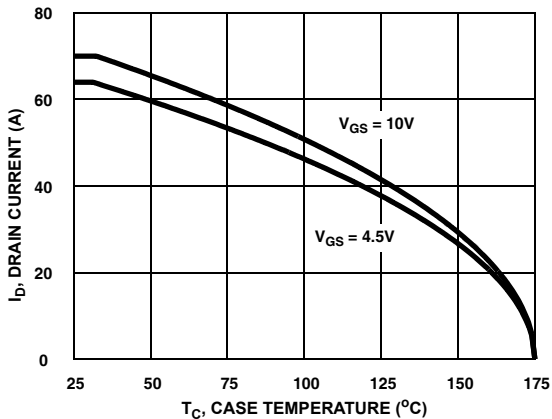


Figure 11. Maximum Continuous Drain Current vs Case Temperature

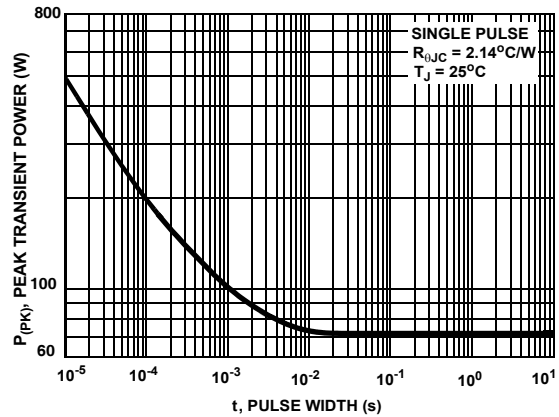


Figure 12. Normalized Drain to Source Break Down Voltage vs Junction Temperature

Typical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

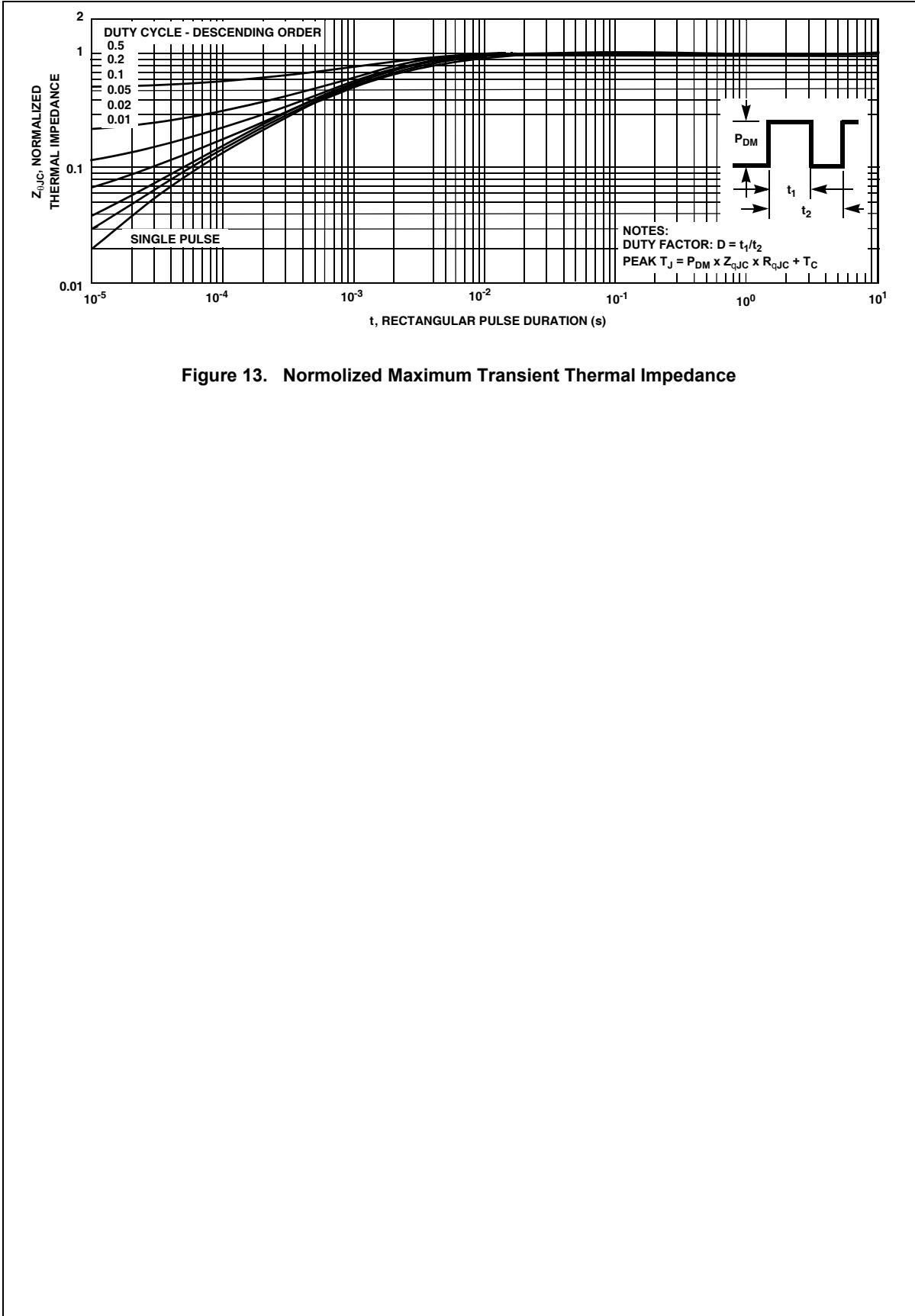


Figure 13. Normalized Maximum Transient Thermal Impedance

FDP8876 N-Channel PowerTrench[®] MOSFET

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