

# FDP8876

## N-Channel PowerTrench® MOSFET

30V, 71A, 8.5mΩ

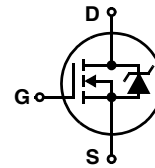
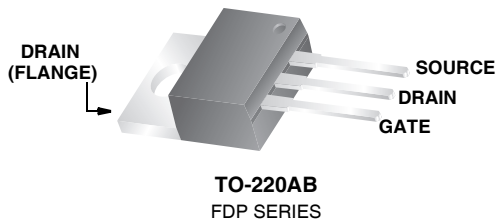
### General Descriptions

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

Symbol	Parameter	Ratings	Units
$V_{DSS}$	Drain to Source Voltage	30	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current	70	A
	Continuous ( $T_C = 25^\circ\text{C}$ , $V_{GS} = 10V$ )		
	Continuous ( $T_C = 25^\circ\text{C}$ , $V_{GS} = 4.5V$ )	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	$^\circ\text{C}$

### Thermal Characteristics

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

### 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
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**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	$\mu\text{A}$
		$V_{GS} = 0\text{V}, T_A = 150^\circ\text{C}$	-	-	250	
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}$	-	-	$\pm 100$	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 $\Omega$
		$I_D = 40\text{A}, V_{GS} = 4.5\text{V}$	-	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	-	$\Omega$
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0\text{V to } 10\text{V}$	-	32	45	nC
$Q_{g(5)}$	Total Gate Charge at 5V	$V_{GS} = 0\text{V to } 5\text{V}$				
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0\text{V to } 1\text{V}$				
$Q_{gs}$	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

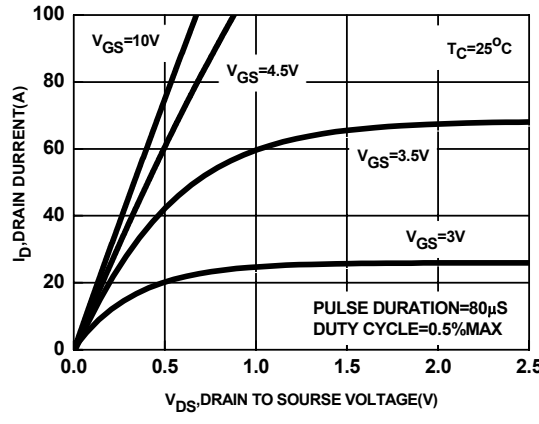
**Drain-Source Diode Characteristic**

$V_{SD}$	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

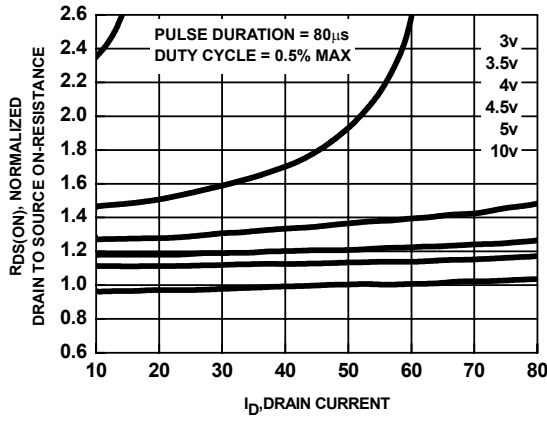
**Notes:**

- 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

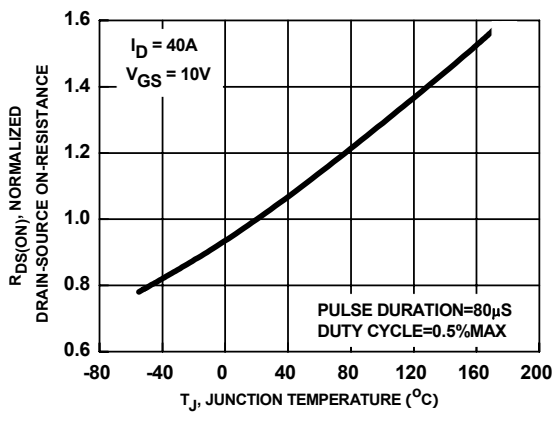
**Typical Characteristics**  $T_A = 25^\circ\text{C}$  unless otherwise noted



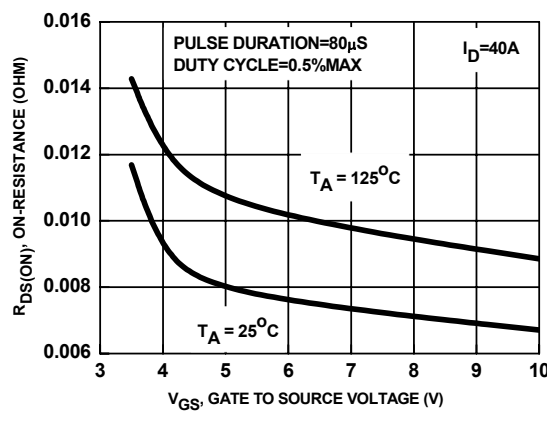
**Figure 1. On Region Characteristics**



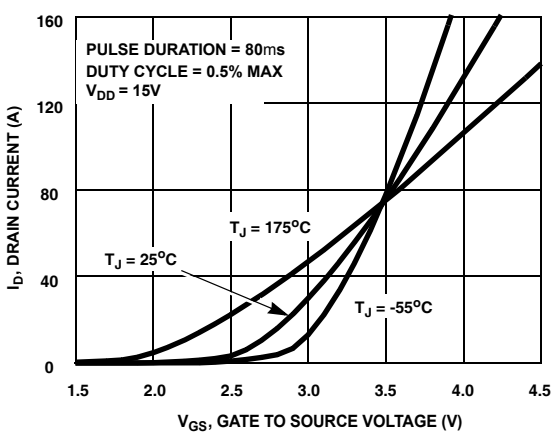
**Figure 2. On-Resistance Variation with Drain Current and Gate Voltage**



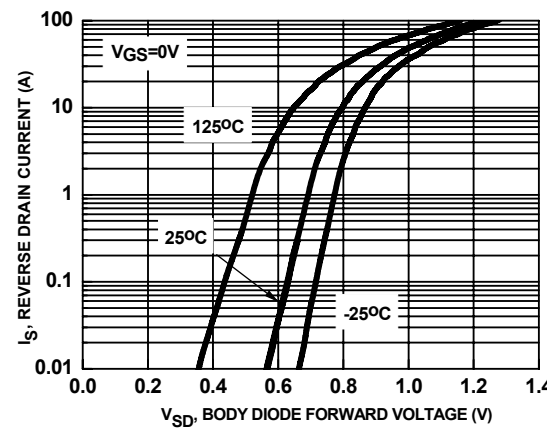
**Figure 3. On Resistance Variation with Temperature**



**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

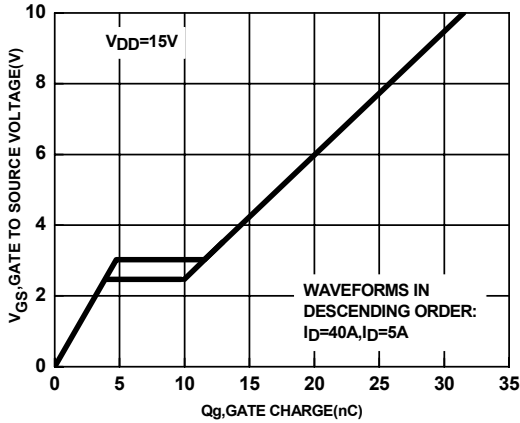


Figure 7. Gate Charge characteristics

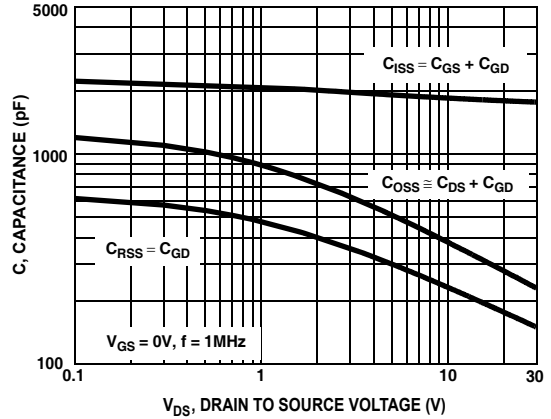


Figure 8. Saturation characteristics

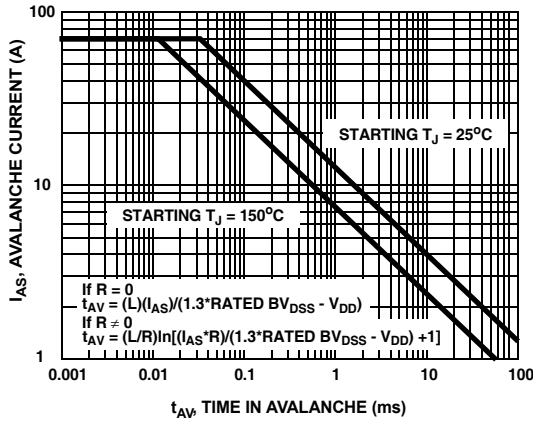


Figure 9. Unclamped Inductive Switching Capability

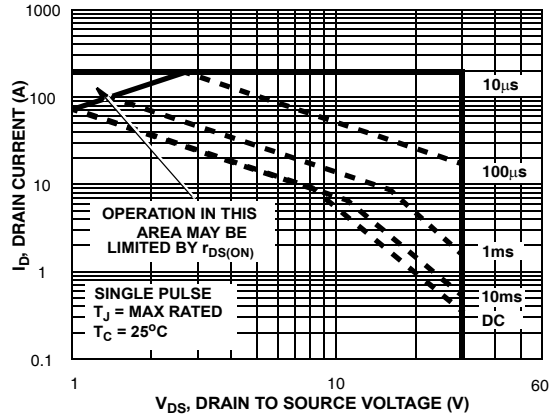


Figure 10. Safe Operating Area

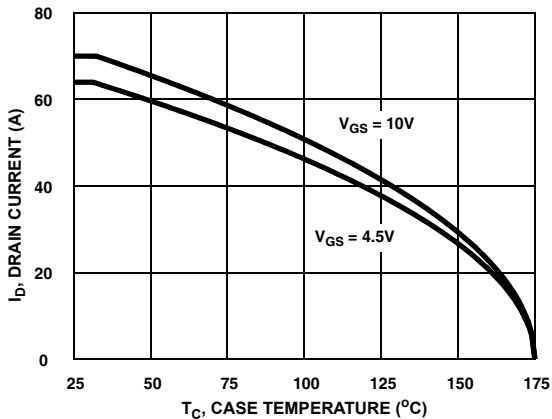


Figure 11. Maximum Continuous Drain Current vs Case Temperature

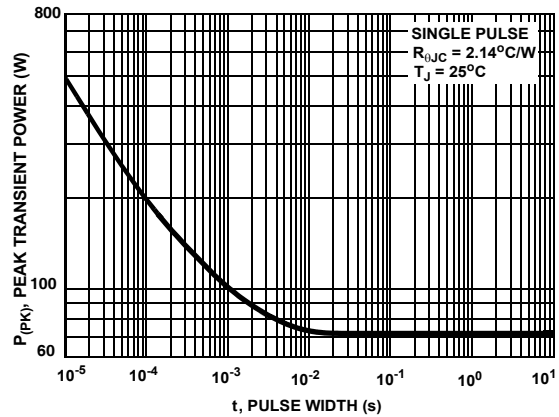


Figure 12. Normalized Drain to Source Break Down Voltage vs Junction Temperature

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

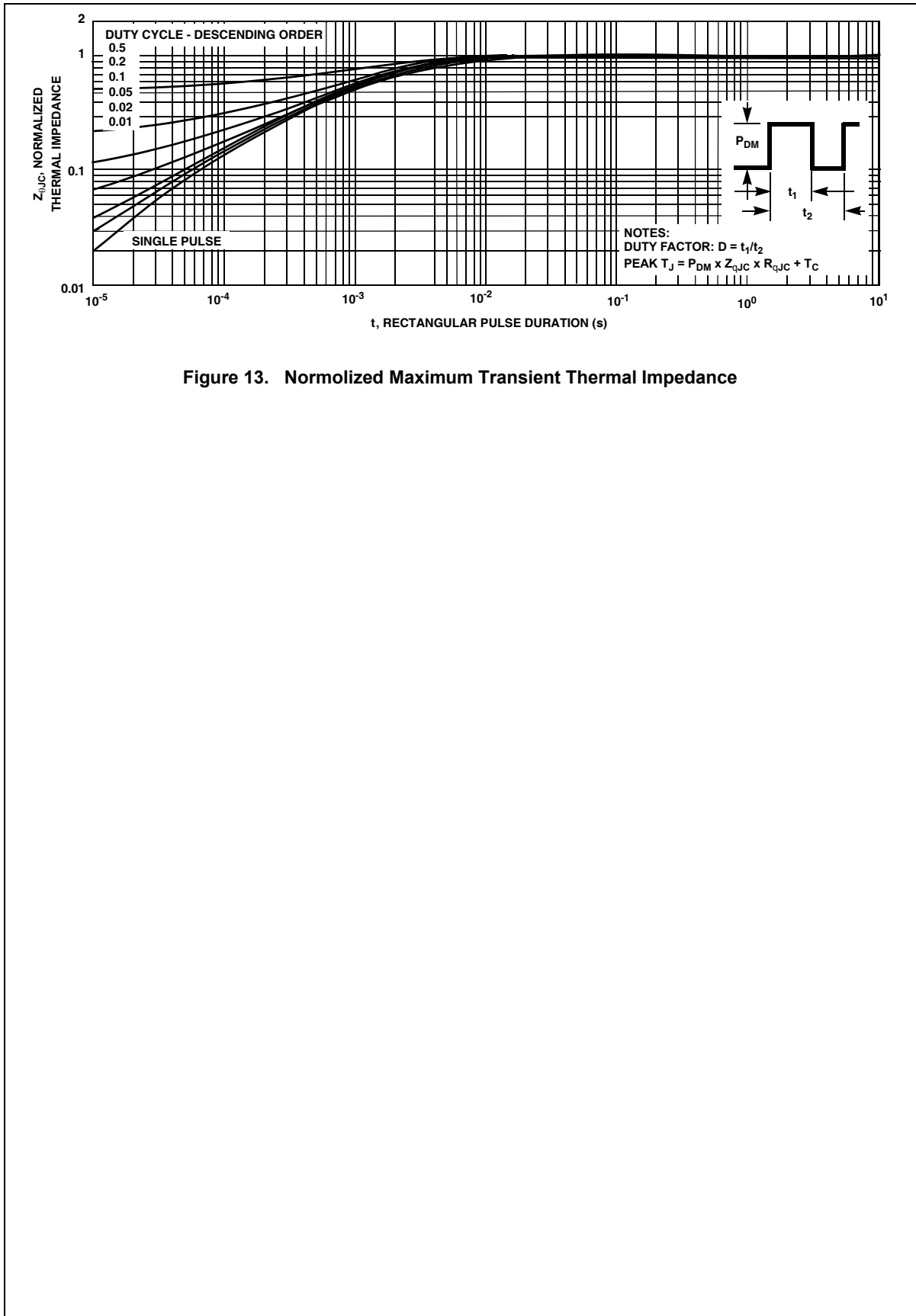


Figure 13. Normalized Maximum Transient Thermal Impedance

FDP8876 N-Channel PowerTrench<sup>®</sup> MOSFET

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