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November 2005

FDB8876

N-Channel PowerTrench[®] MOSFET

30V, 71A, 8.5mΩ

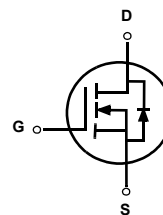
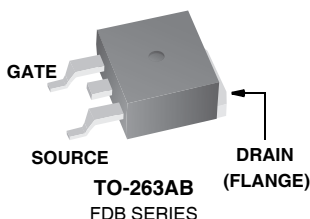
General Descriptions

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	71	A
	Continuous ($T_C = 25^\circ C$, $V_{GS} = 10V$)		
	Continuous ($T_C = 25^\circ C$, $V_{GS} = 4.5V$)	65	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	43	$^\circ C/W$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB8876	FDB8876	TO-263AB	330mm	24mm	800 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	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	$I_D = 40\text{A}, V_{GS} = 10\text{V}$	-	5.7	8.5	m Ω
		$I_D = 40\text{A}, V_{GS} = 4.5\text{V}$	-	7.3	10.3	
		$I_D = 40\text{A}, V_{GS} = 10\text{V}, T_A = 175^\circ\text{C}$	-	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		-	220	-	pF	
R_G	Gate Resistance	$V_{GS} = 0.5\text{V}, f = 1\text{MHz}$	-	2.1	-	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		-	6.8	-	nC	

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

t_{ON}	Turn-On Time	$V_{DD} = 15\text{V}, I_D = 40\text{A}$ $V_{GS} = 10\text{V}, R_{GS} = 10\Omega$	-	-	183	ns
$t_{d(ON)}$	Turn-On Delay Time		-	9	-	ns
t_r	Rise Time		-	113	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time		-	50	-	ns
t_f	Fall Time		-	41	-	ns
t_{OFF}	Turn-Off Time		-	-	137	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	$I_{SD} = 40\text{A}, dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	-	8	nC

Notes:

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

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

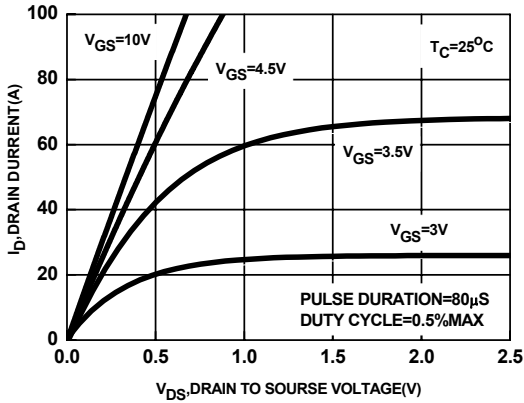


Figure 1. On Region Characteristics

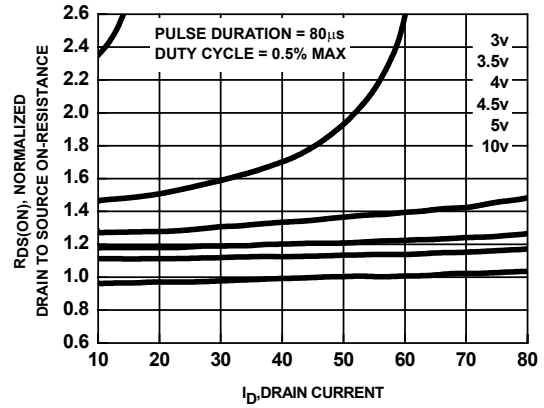


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

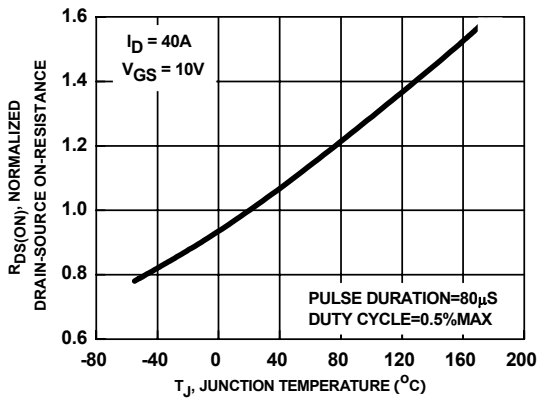


Figure 3. On Resistance Variation with Temperature

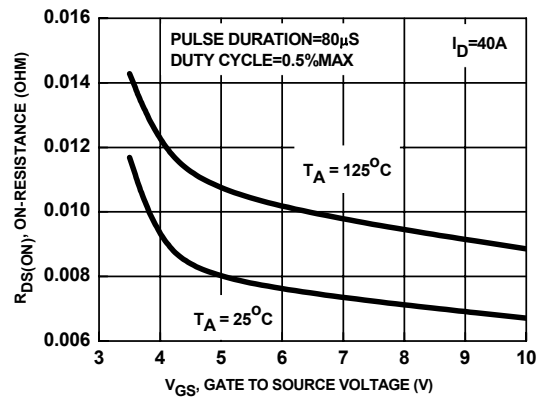


Figure 4. On-Resistance Variation with Gate-to-Source Voltage

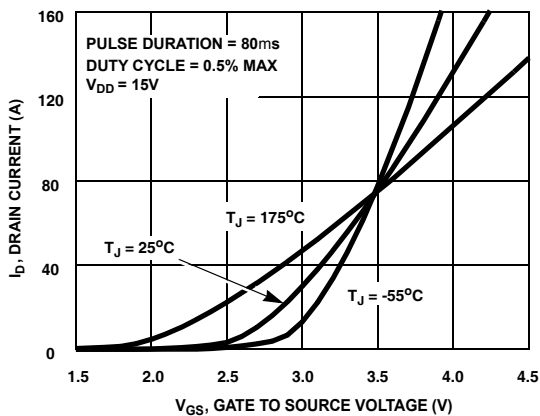


Figure 5. Transfer Characteristics

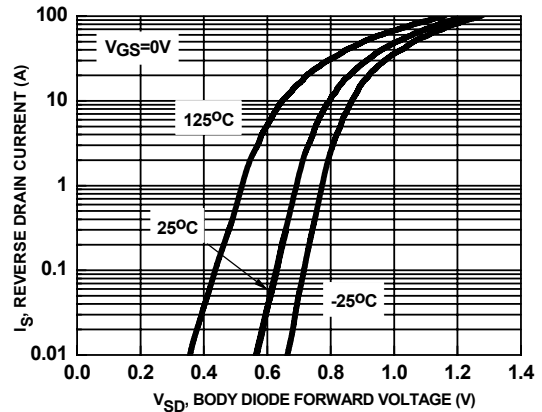


Figure 6. Body Diode Forward Voltage Variation With Source Current and Temperature

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

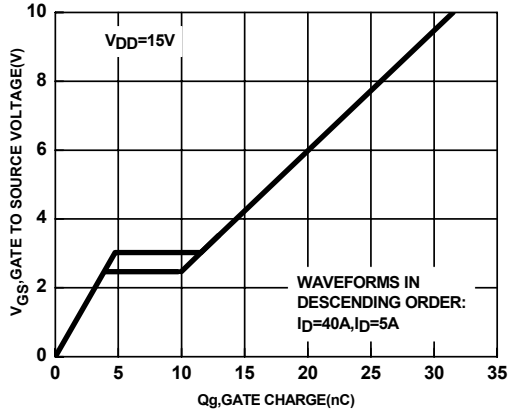


Figure 7. Gate Charge characteristics

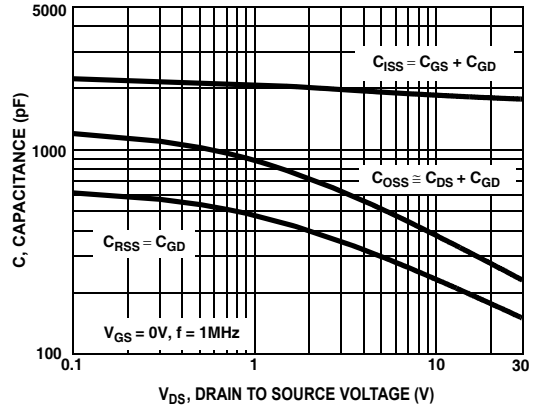


Figure 8. Saturation characteristics

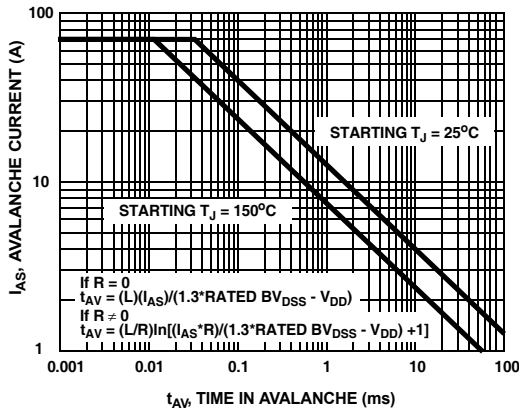


Figure 9. Unclamped Inductive Switching Capability

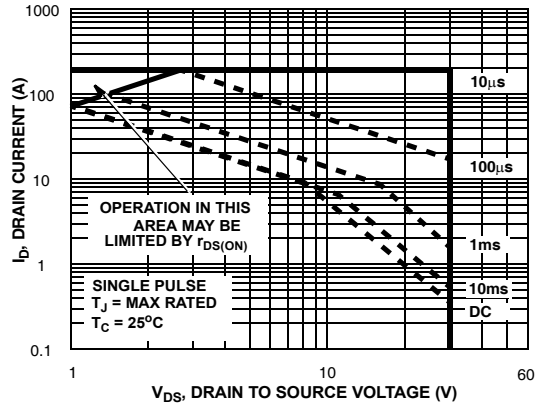


Figure 10. Safe Operating Area

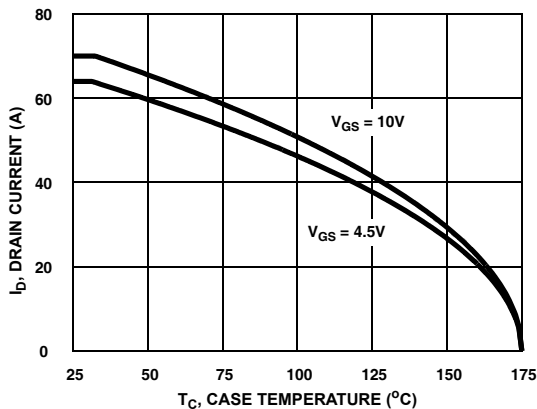


Figure 11. Maximum Continuous Drain Current vs Case Temperature

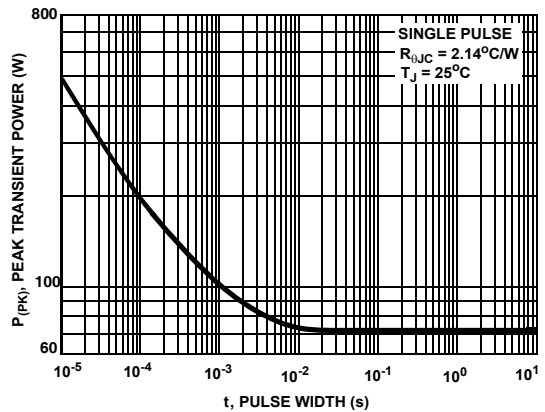


Figure 12. Normalized Drain to Source Breake Down Voltage vs Junction Temperature

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

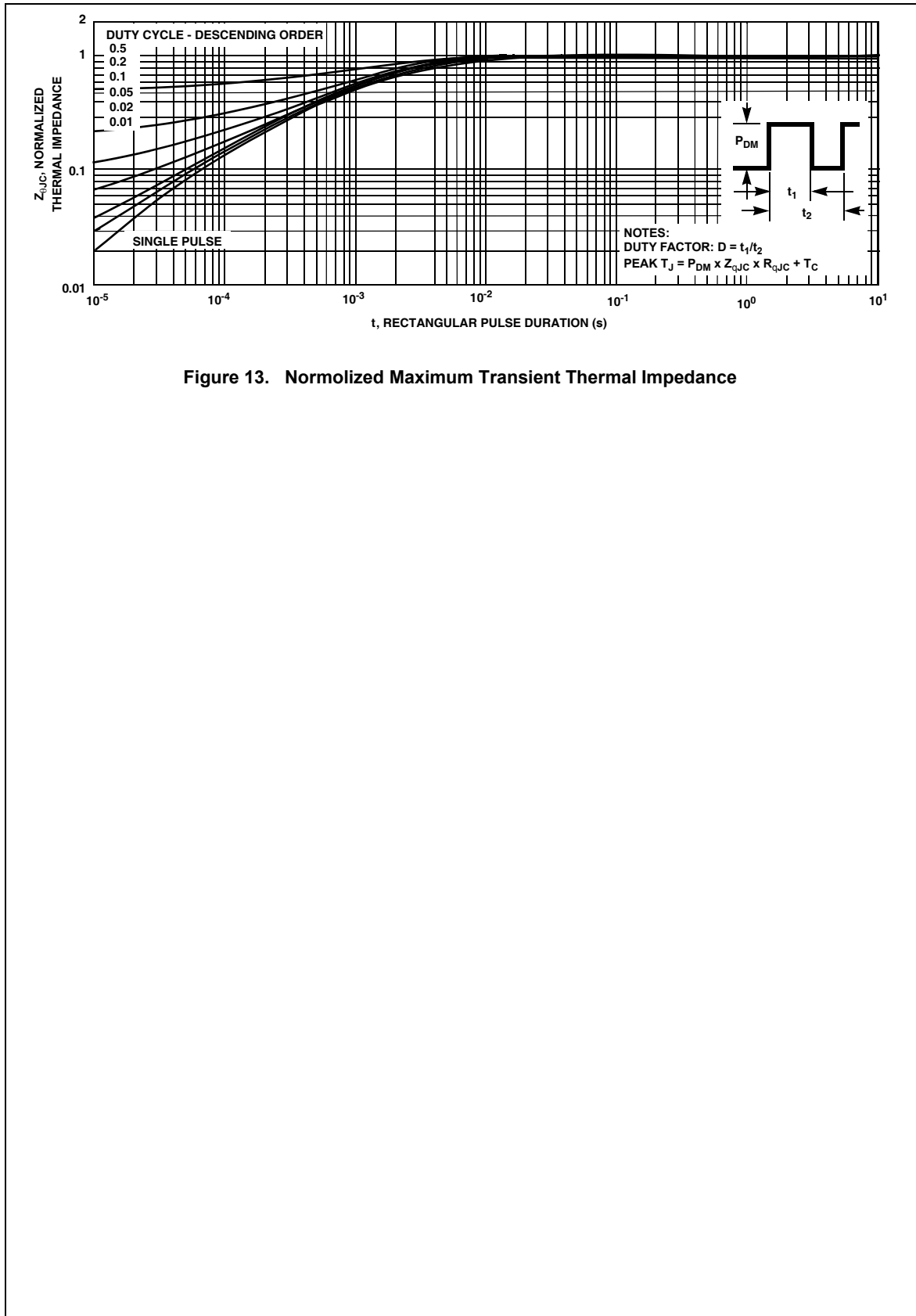


Figure 13. Normalized Maximum Transient Thermal Impedance

FDB8876 N-Channel PowerTrench[®] MOSFET

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