

FDP8870

N-Channel PowerTrench® MOSFET 30V, 156A, 4.1mΩ

General Description

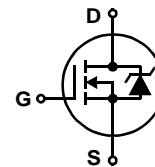
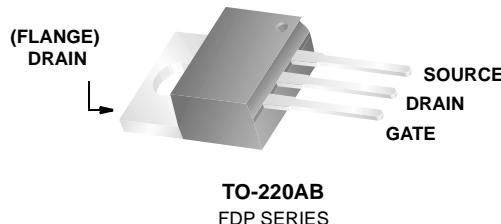
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $r_{DS(ON)}$ and fast switching speed.

Applications

- DC/DC converters

Features

- $r_{DS(ON)} = 4.1\text{m}\Omega$, $V_{GS} = 10\text{V}$, $I_D = 35\text{A}$
- $r_{DS(ON)} = 4.6\text{m}\Omega$, $V_{GS} = 4.5\text{V}$, $I_D = 35\text{A}$
- High performance trench technology for extremely low $r_{DS(ON)}$
- Low gate charge
- High power and current handling capability
- RoHS Compliant



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

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage	± 20	V
I_D	Drain Current Continuous ($T_C = 25^\circ\text{C}$, $V_{GS} = 10\text{V}$) (Note 1)	156	A
	Continuous ($T_C = 25^\circ\text{C}$, $V_{GS} = 4.5\text{V}$) (Note 1)	147	A
	Continuous ($T_{amb} = 25^\circ\text{C}$, $V_{GS} = 10\text{V}$, with $R_{\theta JA} = 62^\circ\text{C/W}$)	19	A
	Pulsed	Figure 4	A
E_{AS}	Single Pulse Avalanche Energy (Note 2)	300	mJ
P_D	Power dissipation	160	W
	Derate above 25°C	1.07	W/ $^\circ\text{C}$
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-220	0.94	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-220 (Note 3)	62	$^\circ\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP8870	FDP8870	TO-220AB	Tube	N/A	50 units

Electrical Characteristics $T_C = 25^\circ\text{C}$ 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	$V_{DS} = 24\text{V}$ $V_{GS} = 0\text{V}$	-	-	1	μA
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	$I_D = 35\text{A}, V_{GS} = 10\text{V}$	-	0.0034	0.0041	Ω
		$I_D = 35\text{A}, V_{GS} = 4.5\text{V}$	-	0.0040	0.0046	
		$I_D = 35\text{A}, V_{GS} = 10\text{V}, T_J = 175^\circ\text{C}$	-	0.0051	0.0065	

Dynamic Characteristics

C_{ISS}	Input Capacitance	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$	-	5200	-	pF	
C_{OSS}	Output Capacitance		-	970	-	pF	
C_{RSS}	Reverse Transfer Capacitance		-	570	-	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	$V_{GS} = 0\text{V to } 10\text{V}$	-	106	132	nc	
$Q_{g(5)}$	Total Gate Charge at 5V	$V_{GS} = 0\text{V to } 5\text{V}$	-	56	69	nc	
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0\text{V to } 1\text{V}$	$V_{DD} = 15\text{V}$ $I_D = 35\text{A}$ $I_g = 1.0\text{mA}$	-	5.0	6.5	nc
Q_{gs}	Gate to Source Gate Charge	-		15	-	nc	
Q_{gs2}	Gate Charge Threshold to Plateau	-		10	-	nc	
Q_{gd}	Gate to Drain "Miller" Charge	-		23	-	nc	

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

t_{ON}	Turn-On Time	$V_{DD} = 15\text{V}, I_D = 35\text{A}$ $V_{GS} = 4.5\text{V}, R_{GS} = 3.3\Omega$	-	-	168	ns
$t_{d(ON)}$	Turn-On Delay Time		-	11	-	ns
t_r	Rise Time		-	105	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time		-	70	-	ns
t_f	Fall Time		-	46	-	ns
t_{OFF}	Turn-Off Time		-	-	173	ns

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Voltage	$I_{SD} = 35\text{A}$	-	-	1.25	V
		$I_{SD} = 15\text{A}$	-	-	1.0	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 35\text{A}, dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	-	37	ns
Q_{RR}	Reverse Recovered Charge	$I_{SD} = 35\text{A}, dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	-	21	nc

Notes:

- 1: Package current limitation is 80A.
- 2: Starting $T_J = 25^\circ\text{C}$, $L = 0.15\text{mH}$, $I_{AS} = 64\text{A}$, $V_{DD} = 27\text{V}$, $V_{GS} = 10\text{V}$.
- 3: Pulse width = 100s.

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

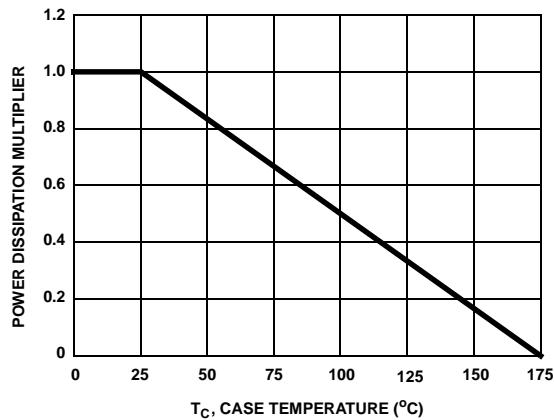


Figure 1. Normalized Power Dissipation vs Case Temperature

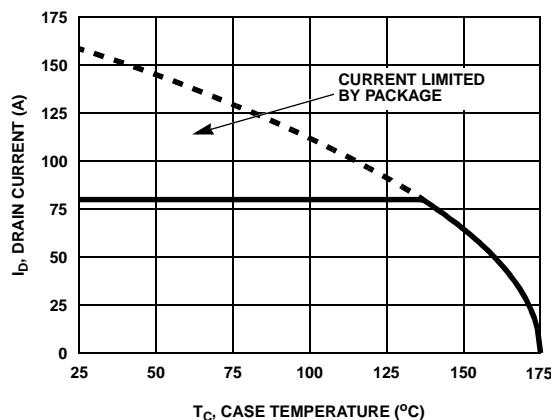


Figure 2. Maximum Continuous Drain Current vs Case Temperature

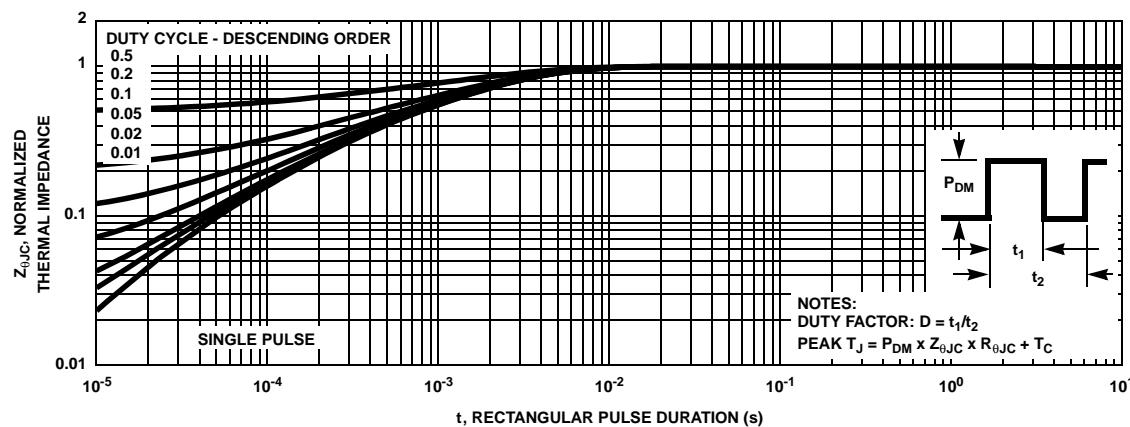


Figure 3. Normalized Maximum Transient Thermal Impedance

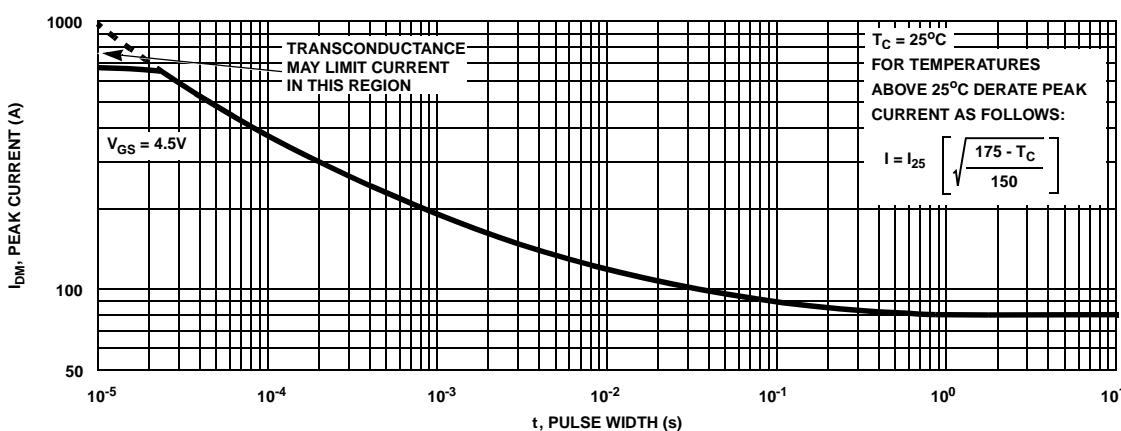


Figure 4. Peak Current Capability