FDP8874

N-Channel PowerTrench® MOSFET
30V, 114A, 5.3mΩ

General Description

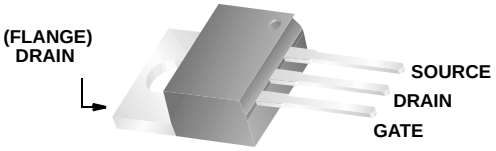
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $r_{DS(ON)}$ and fast switching speed.

Applications

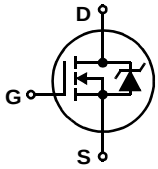
- DC/DC converters

Features

- $r_{DS(ON)}$ = 5.3mΩ, V_{GS} = 10V, I_D = 40A
- $r_{DS(ON)}$ = 6.6mΩ, 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



TO-220AB
FDP SERIES



MOSFET Maximum Ratings T_C = 25°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°C, V_{GS} = 10V) (Note 1)	114	A
	Continuous (T_C = 25°C, V_{GS} = 4.5V) (Note 1)	102	A
	Continuous (T_{amb} = 25°C, V_{GS} = 10V, with $R_{\theta JA}$ = 62°C/W)	16	A
	Pulsed	Figure 4	A
E_{AS}	Single Pulse Avalanche Energy (Note 2)	105	mJ
P_D	Power dissipation	110	W
	Derate above 25°C	0.73	W/°C
T_J, T_{STG}	Operating and Storage Temperature	-55 to 175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case TO-220	1.36	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-220 (Note 3)	62	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP8874	FDP8874	TO-220AB	Tube	N/A	50 units

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
B_{VDSS}	Drain to Source Breakdown Voltage	I_D = 250µA, V_{GS} = 0V	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24V, V_{GS} = 0V	-	-	1	µA
		V_{DS} = 24V, V_{GS} = 0V, T_C = 150°C	-	-	250	µA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(TH)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250µA	1.2	-	2.5	V
$r_{DS(ON)}$	Drain to Source On Resistance	I_D = 40A, V_{GS} = 10V	-	0.0036	0.0053	Ω
		I_D = 40A, V_{GS} = 4.5V	-	0.0045	0.0066	Ω
		I_D = 40A, V_{GS} = 10V, T_J = 175°C	-	0.0062	0.0090	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz	-	3130	-	pF
C_{OSS}	Output Capacitance	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz	-	590	-	pF
C_{RSS}	Reverse Transfer Capacitance	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz	-	345	-	pF
R_G	Gate Resistance	V_{GS} = 0.5V, f = 1MHz	-	1.9	-	Ω
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0V to 10V; V_{DD} = 15V, I_D = 40A, I_g = 1.0mA	-	56	72	nC
$Q_{g(5)}$	Total Gate Charge at 5V	V_{GS} = 0V to 5V; V_{DD} = 15V, I_D = 40A, I_g = 1.0mA	-	30	38	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0V to 1V; V_{DD} = 15V, I_D = 40A, I_g = 1.0mA	-	3.0	4.0	nC
Q_{gs}	Gate to Source Gate Charge	V_{DD} = 15V, I_D = 40A, I_g = 1.0mA	-	9.0	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau	V_{DD} = 15V, I_D = 40A, I_g = 1.0mA	-	6.0	-	nC
Q_{gd}	Gate to Drain "Miller" Charge	V_{DD} = 15V, I_D = 40A, I_g = 1.0mA	-	11	-	nC
Switching Characteristics (V_{GS} = 10V)						
t_{ON}	Turn-On Time	V_{DD} = 15V, I_D = 40A, V_{GS} = 4.5V, R_{GS} = 4.7Ω	-	-	207	ns
$t_{d(ON)}$	Turn-On Delay Time	V_{DD} = 15V, I_D = 40A, V_{GS} = 4.5V, R_{GS} = 4.7Ω	-	10	-	ns
t_r	Rise Time	V_{DD} = 15V, I_D = 40A, V_{GS} = 4.5V, R_{GS} = 4.7Ω	-	128	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time	V_{DD} = 15V, I_D = 40A, V_{GS} = 4.5V, R_{GS} = 4.7Ω	-	44	-	ns
t_f	Fall Time	V_{DD} = 15V, I_D = 40A, V_{GS} = 4.5V, R_{GS} = 4.7Ω	-	31	-	ns
t_{OFF}	Turn-Off Time	V_{DD} = 15V, I_D = 40A, V_{GS} = 4.5V, R_{GS} = 4.7Ω	-	-	112	ns
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Voltage	I_{SD} = 40A	-	-	1.25	V
		I_{SD} = 20A	-	-	1.0	V
t_{rr}	Reverse Recovery Time	I_{SD} = 40A, dI_{SD}/dt = 100A/µs	-	-	32	ns
Q_{RR}	Reverse Recovered Charge	I_{SD} = 40A, dI_{SD}/dt = 100A/µs	-	-	18	nC

Notes:
1: Package current limitation is 80A.
2: Starting T_J = 25°C, L = 51uH, I_{AS} = 64A, V_{DD} = 27V, V_{GS} = 10V.
3: Pulse width = 100s.

Typical Characteristics T_C = 25°C unless otherwise noted

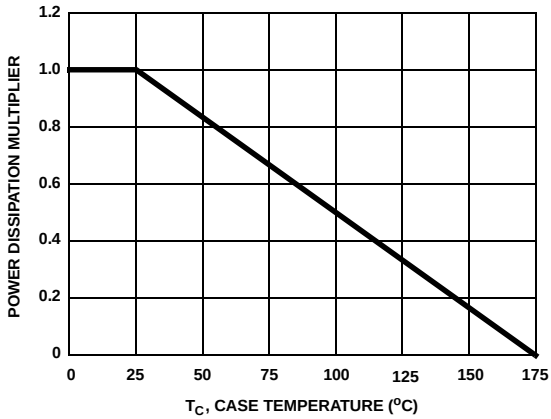


Figure 1. Normalized Power Dissipation vs Case Temperature

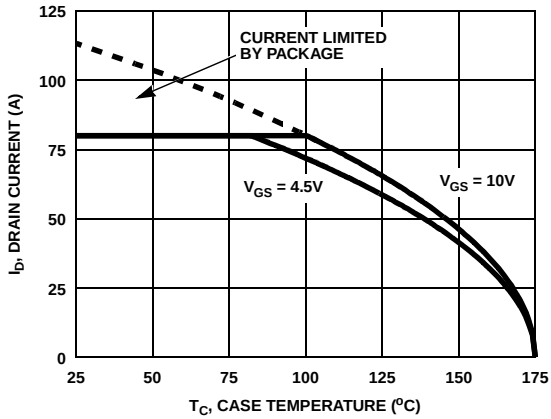


Figure 2. Maximum Continuous Drain Current vs Case Temperature

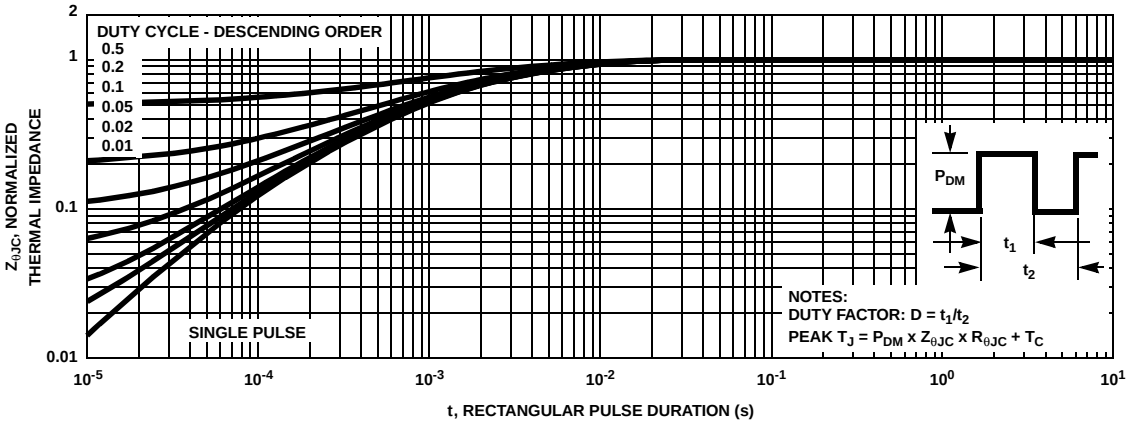


Figure 3. Normalized Maximum Transient Thermal Impedance

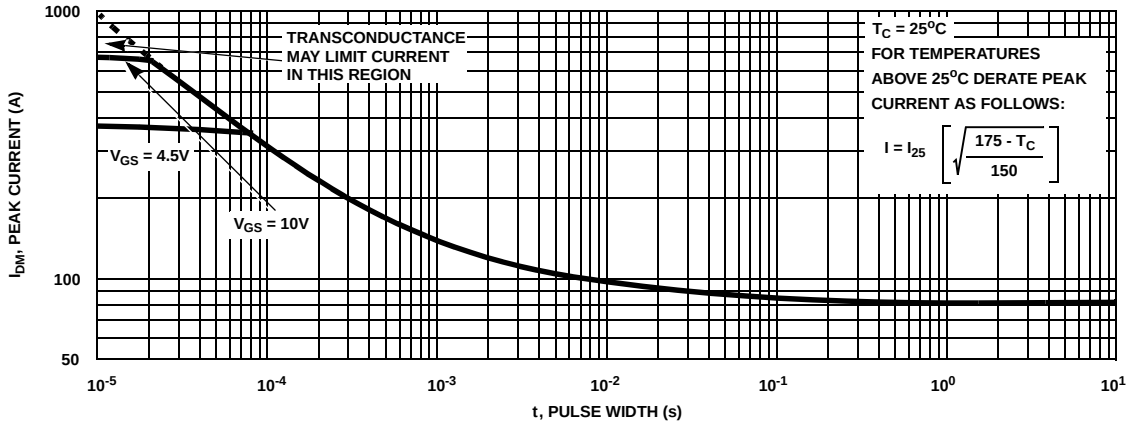


Figure 4. Peak Current Capability