

FDU8880

N-Channel PowerTrench® MOSFET 30V, 58A, 10mΩ

General Description

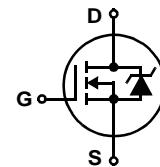
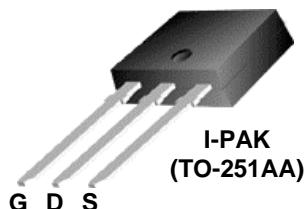
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $r_{DS(ON)}$ and fast switching speed.

Applications

- DC/DC converters

Features

- $r_{DS(ON)} = 10\text{m}\Omega$ $V_{GS} = 10\text{V}$, $I_D = 35\text{A}$
- $r_{DS(ON)} = 13\text{m}\Omega$ $V_{GS} = 4.5\text{V}$, $I_D = 35\text{A}$
- High performance trench technology for extremely low $r_{DS(ON)}$
- Low gate charge
- High power and current handling capability



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)	58	A
	Continuous ($T_C = 25^\circ\text{C}$, $V_{GS} = 4.5\text{V}$) (Note 1)	51	A
	Continuous ($T_{amb} = 25^\circ\text{C}$, $V_{GS} = 10\text{V}$, with $R_{\theta JA} = 52^\circ\text{C/W}$)	13	A
	Pulsed	Figure 4	A
E_{AS}	Single Pulse Avalanche Energy (Note 2)	53	mJ
P_D	Power dissipation	55	W
	Derate above 25°C	0.37	$\text{W}/^\circ\text{C}$
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-251	2.73	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-251	100	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-251, 1in ² copper pad area	52	$^\circ\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDU8880	FDU8880	TO-251AA	Tube	N/A	75 units
FDU8880	FDU8880_NL (Note 3)	TO-251AA	Tube	N/A	75 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	$I_D = 35\text{A}, V_{GS} = 10\text{V}$	-	0.007	0.010	Ω	
		$I_D = 35\text{A}, V_{GS} = 4.5\text{V}$	-	0.009	0.013		
		$I_D = 35\text{A}, V_{GS} = 10\text{V}, T_J = 175^\circ\text{C}$	-	0.013	0.016		
Dynamic Characteristics							
C_{ISS}	Input Capacitance	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$	-	1260	-	pF	
C_{OSS}	Output Capacitance		-	260	-	pF	
C_{RSS}	Reverse Transfer Capacitance		-	150	-	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	$V_{GS} = 0\text{V to } 10\text{V}$	-	23	31	nc	
$Q_{g(5)}$	Total Gate Charge at 5V	$V_{GS} = 0\text{V to } 5\text{V}$	-	13	17	nc	
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0\text{V to } 1\text{V}$	$V_{DD} = 15\text{V}$ $I_D = 35\text{A}$ $I_g = 1.0\text{mA}$	-	1.3	1.7	nc
Q_{gs}	Gate to Source Gate Charge	-		3.8	-	nc	
Q_{gs2}	Gate Charge Threshold to Plateau	-		2.5	-	nc	
Q_{gd}	Gate to Drain "Miller" Charge	-		5.0	-	nc	
Switching Characteristics ($V_{GS} = 10\text{V}$)							
t_{ON}	Turn-On Time	$V_{DD} = 15\text{V}, I_D = 35\text{A}$ $V_{GS} = 10\text{V}, R_{GS} = 10\Omega$	-	-	147	ns	
$t_{d(ON)}$	Turn-On Delay Time		-	8	-	ns	
t_r	Rise Time		-	91	-	ns	
$t_{d(OFF)}$	Turn-Off Delay Time		-	38	-	ns	
t_f	Fall Time		-	33	-	ns	
t_{OFF}	Turn-Off Time		-	-	108	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	$I_{SD} = 35\text{A}, dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	-	27	ns	
Q_{RR}	Reverse Recovered Charge	$I_{SD} = 35\text{A}, dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	-	14	nc	
Notes:							
1: Package current limitation is 35A.							
2: Starting $T_J = 25^\circ\text{C}$, $L = 0.14\text{mH}$, $I_{AS} = 28\text{A}$, $V_{DD} = 27\text{V}$, $V_{GS} = 10\text{V}$.							
3: FDU8880_NL is lead free product. FDU8880_NL marking will appear on the reel label.							

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

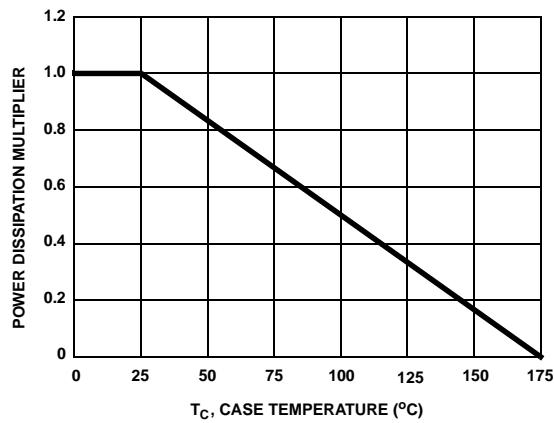


Figure 1. Normalized Power Dissipation vs Case Temperature

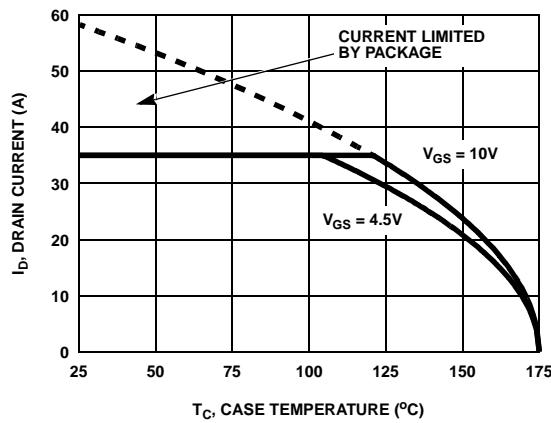


Figure 2. Maximum Continuous Drain Current vs Case Temperature

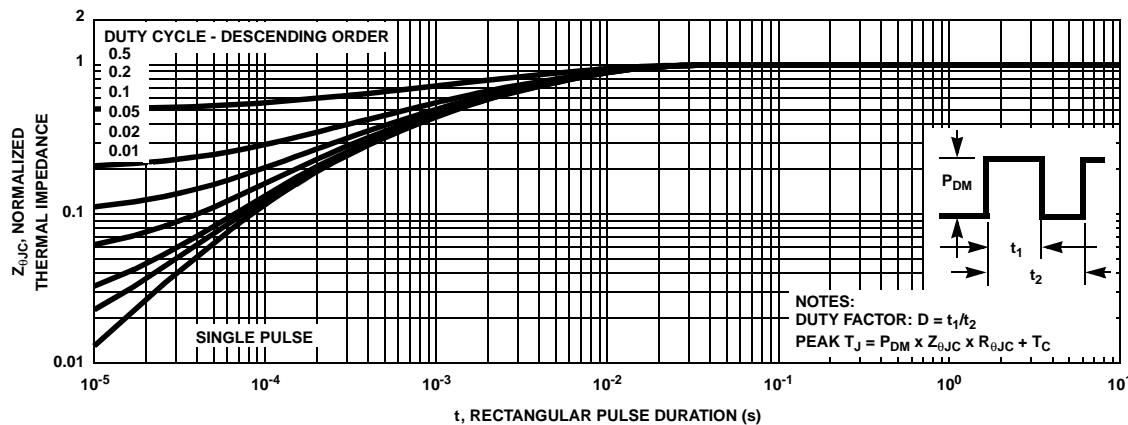


Figure 3. Normalized Maximum Transient Thermal Impedance

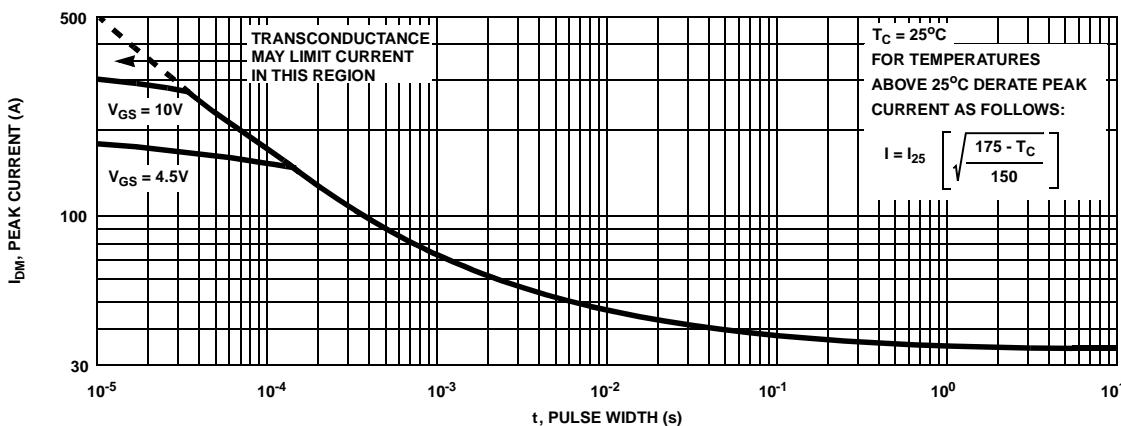


Figure 4. Peak Current Capability