



FDD8878 / FDU8878 N-Channel PowerTrench[®] MOSFET 30V, 40A, 15mΩ

Features

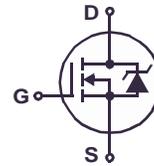
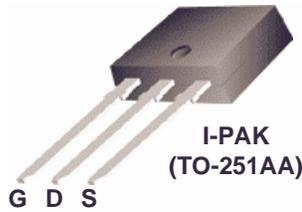
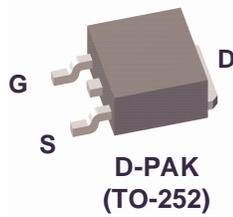
- $r_{DS(ON)} = 15m\Omega$, $V_{GS} = 10V$, $I_D = 35A$
- $r_{DS(ON)} = 18.5m\Omega$, $V_{GS} = 4.5V$, $I_D = 35A$
- High performance trench technology for extremely low $r_{DS(ON)}$
- Low gate charge
- High power and current handling capability

Applications

- DC/DC converters

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.



Absolute 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)	40	A
	Continuous ($T_C = 25^\circ\text{C}$, $V_{GS} = 4.5\text{V}$) (Note 1)	36	A
	Continuous ($T_{amb} = 25^\circ\text{C}$, $V_{GS} = 10\text{V}$, with $R_{\theta JA} = 52^\circ\text{C/W}$)	11	A
	Pulsed	Figure 4	A
E_{AS}	Single Pulse Avalanche Energy (Note 2)	25	mJ
P_D	Power dissipation	40	W
	Derate above 25°C	0.27	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-252, TO-251	3.75	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-252, TO-251	100	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-252, 1in ² copper pad area	52	$^\circ\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD8878	FDD8878	TO-252AA	13"	12mm	2500 units
FDU8878	FDU8878	TO-251AA	Tube	N/A	75 units
FDD8878	FDD8878_NL (Note 3)	TO-252AA	13"	12mm	2500 units
FDU8878	FDU8878_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
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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
		$V_{GS} = 0\text{V}$, $T_C = 150^\circ\text{C}$	-	-	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	$I_D = 35\text{A}$, $V_{GS} = 10\text{V}$	-	0.011	0.015	Ω
		$I_D = 35\text{A}$, $V_{GS} = 4.5\text{V}$	-	0.014	0.0185	
		$I_D = 35\text{A}$, $V_{GS} = 10\text{V}$, $T_J = 175^\circ\text{C}$	-	0.018	0.024	

Dynamic Characteristics

C_{ISS}	Input Capacitance	$V_{DS} = 15V, V_{GS} = 0V,$ $f = 1MHz$	-	880	-	pF	
C_{OSS}	Output Capacitance		-	195	-	pF	
C_{RSS}	Reverse Transfer Capacitance		-	110	-	pF	
R_G	Gate Resistance	$V_{GS} = 0.5V, f = 1MHz$	-	3.1	-	Ω	
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0V$ to 10V	$V_{DD} = 15V$ $I_D = 35A$ $I_g = 1.0mA$	-	19	26	nC
$Q_{g(5)}$	Total Gate Charge at 5V	$V_{GS} = 0V$ to 5V		-	10	14	nC
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0V$ to 1V		-	0.9	1.3	nC
Q_{gs}	Gate to Source Gate Charge			-	2.6	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau			-	1.7	-	nC
Q_{gd}	Gate to Drain "Miller" Charge			-	4.5	-	nC

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

t_{ON}	Turn-On Time	$V_{DD} = 15V, I_D = 35A$ $V_{GS} = 4.5V, R_{GS} = 16\Omega$	-	-	129	ns
$t_{d(ON)}$	Turn-On Delay Time		-	7	-	ns
t_r	Rise Time		-	79	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time		-	38	-	ns
t_f	Fall Time		-	27	-	ns
t_{OFF}	Turn-Off Time		-	-	97	ns

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Voltage	$I_{SD} = 35A$	-	-	1.25	V
		$I_{SD} = 3.2A$	-	-	1.0	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 35A, di_{SD}/dt = 100A/\mu s$	-	-	23	ns
Q_{RR}	Reverse Recovered Charge	$I_{SD} = 35A, di_{SD}/dt = 100A/\mu s$	-	-	9	nC

Notes:

- 1: Package current limitation is 35A.
- 2: Starting $T_J = 25^\circ C, L = 65\mu H, I_{AS} = 28A, V_{DD} = 27V, V_{GS} = 10V$.
- 3: FDD8878_NL / FDU8878_NL is lead free product.
FDD8878_NL / FDU8878_NL marking will appear on the reel label.

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

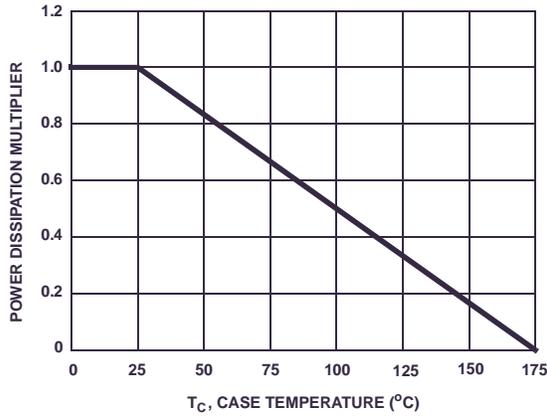


Figure 1. Normalized Power Dissipation vs Case Temperature

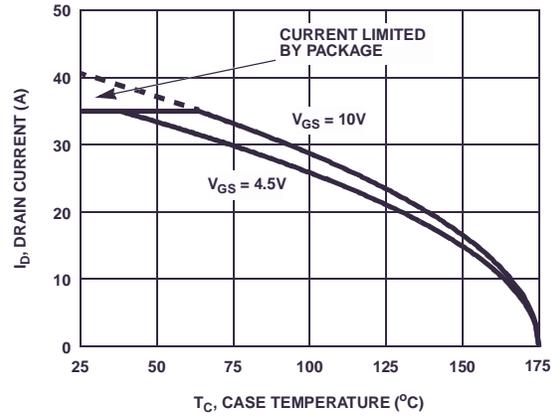


Figure 2. Maximum Continuous Drain Current vs Case Temperature

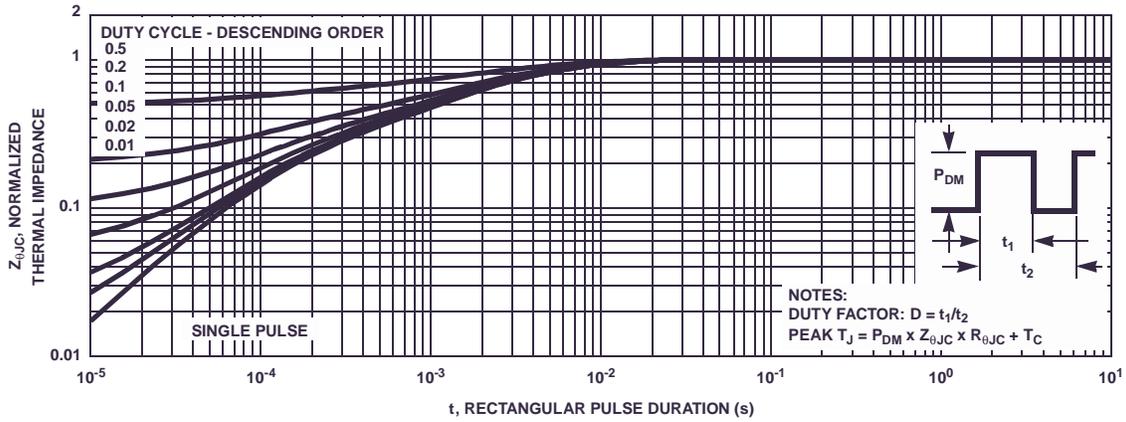


Figure 3. Normalized Maximum Transient Thermal Impedance

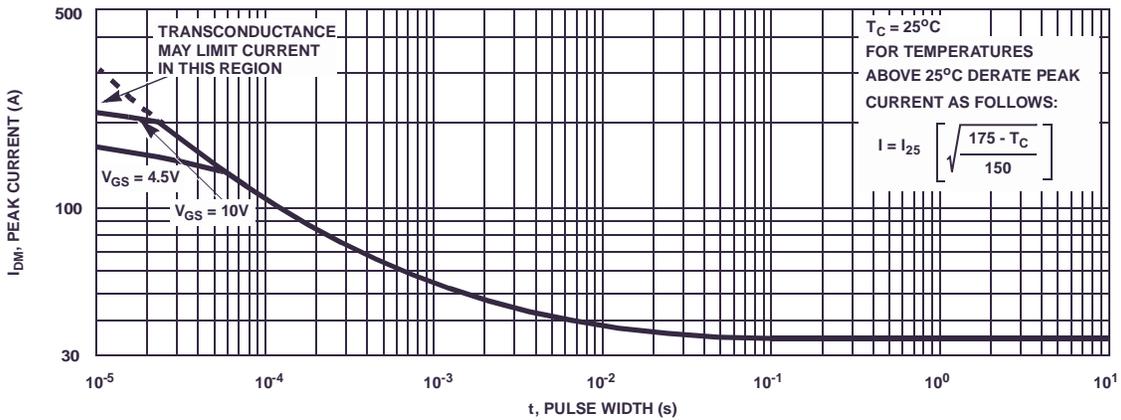


Figure 4. Peak Current Capability