FDD8896 / FDU8896

N-Channel PowerTrench® MOSFET
30V, 94A, 5.7mΩ

General Description

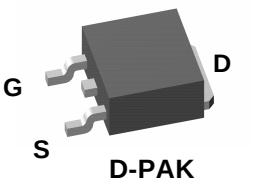
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $r_{DS(ON)}$ and fast switching speed.

Applications

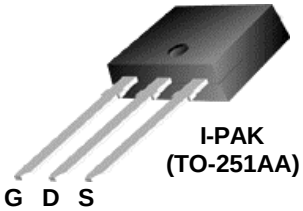
- DC/DC converters

Features

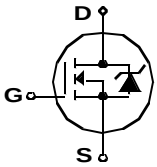
- $r_{DS(ON)}$ = 5.7mΩ, V_{GS} = 10V, I_D = 35A
- $r_{DS(ON)}$ = 6.8mΩ, V_{GS} = 4.5V, I_D = 35A
- High performance trench technology for extremely low $r_{DS(ON)}$
- Low gate charge
- High power and current handling capability



D-PAK
(TO-252)



I-PAK
(TO-251AA)



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)	94	A
	Continuous (T_C = 25°C, V_{GS} = 4.5V) (Note 1)	85	A
	Continuous (T_{amb} = 25°C, V_{GS} = 10V, with $R_{\theta JA}$ = 52°C/W)	17	A
	Pulsed	Figure 4	A
E_{AS}	Single Pulse Avalanche Energy (Note 2)	168	mJ
P_D	Power dissipation	80	W
	Derate above 25°C	0.53	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-252, TO-251	1.88	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-252, TO-251	100	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-252, 1in^2 copper pad area	52	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD8896	FDD8896	TO-252AA	13”	12mm	2500 units
FDU8896	FDU8896	TO-251AA	Tube	N/A	75 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	
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 = 35A, V_{GS} = 10V	-	0.0047	0.0057	Ω
		I_D = 35A, V_{GS} = 4.5V	-	0.0057	0.0068	
		I_D = 35A, V_{GS} = 10V, T_J = 175°C	-	0.0075	0.0092	
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz	-	2525	-	pF
C_{OSS}	Output Capacitance		-	490	-	pF
C_{RSS}	Reverse Transfer Capacitance		-	300	-	pF
R_G	Gate Resistance	V_{GS} = 0.5V, f = 1MHz	-	2.1	-	Ω
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0V to 10V; V_{DD} = 15V, I_D = 35A, I_g = 1.0mA	-	46	60	nC
$Q_{g(5)}$	Total Gate Charge at 5V	V_{GS} = 0V to 5V	-	24	32	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0V to 1V	-	2.3	3.0	nC
Q_{gs}	Gate to Source Gate Charge		-	6.9	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau		-	4.6	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	9.8	-	nC
Switching Characteristics (V_{GS} = 10V)						
t_{ON}	Turn-On Time	V_{DD} = 15V, I_D = 35A, V_{GS} = 10V, R_{GS} = 6.2Ω	-	-	171	ns
$t_{d(ON)}$	Turn-On Delay Time		-	9	-	ns
t_r	Rise Time		-	106	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time		-	53	-	ns
t_f	Fall Time		-	41	-	ns
t_{OFF}	Turn-Off Time		-	-	143	ns
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Voltage	I_{SD} = 35A	-	-	1.25	V
		I_{SD} = 15A	-	-	1.0	V
t_{rr}	Reverse Recovery Time	I_{SD} = 35A, dI_{SD}/dt = 100A/µs	-	-	27	ns
Q_{RR}	Reverse Recovered Charge	I_{SD} = 35A, dI_{SD}/dt = 100A/µs	-	-	12	nC

Notes:
1: Package current limitation is 35A.
2: Starting T_J = 25°C, L = 0.43mH, I_{AS} = 28A, V_{DD} = 27V, V_{GS} = 10V.

Typical Characteristics T_C = 25°C unless otherwise noted

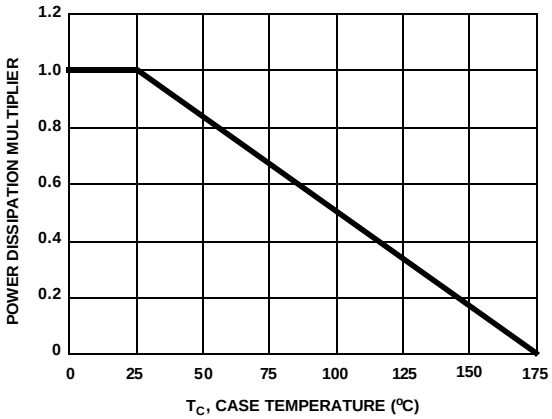


Figure 1. Normalized Power Dissipation vs Case Temperature

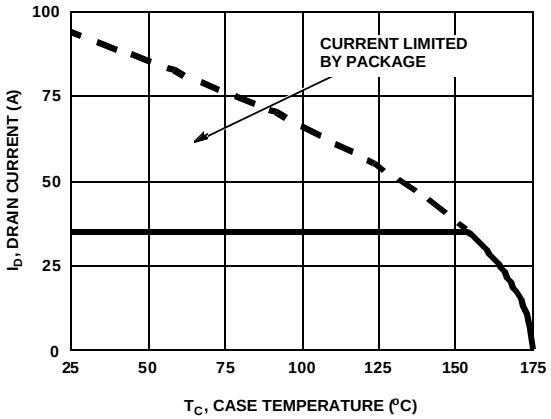


Figure 2. Maximum Continuous Drain Current vs Case Temperature

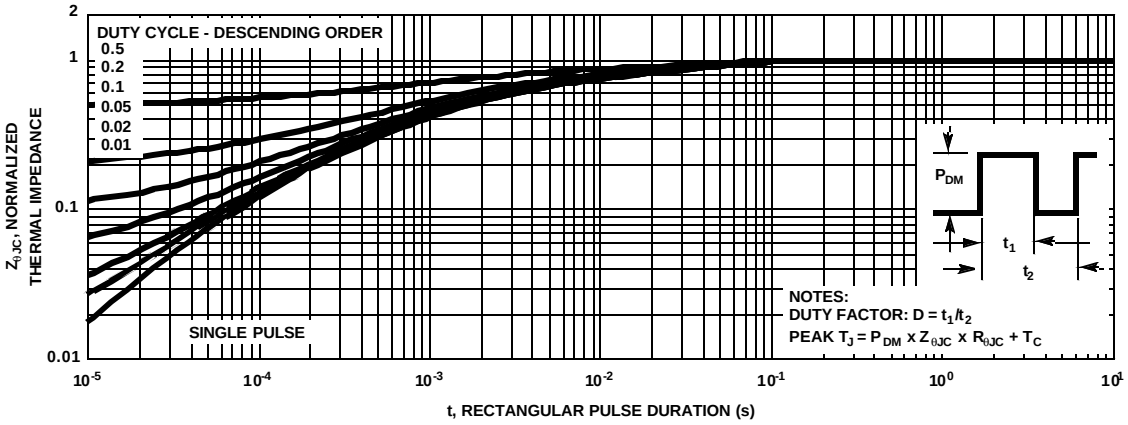


Figure 3. Normalized Maximum Transient Thermal Impedance

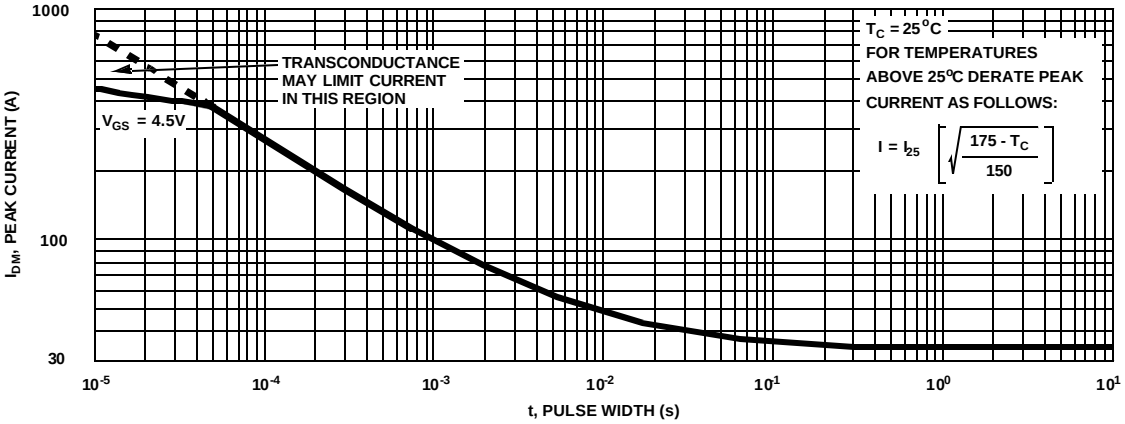


Figure 4. Peak Current Capability