

FDD8796/FDU8796 N-Channel PowerTrench[®] MOSFET 25V, 35A, $5.7m\Omega$



General Description

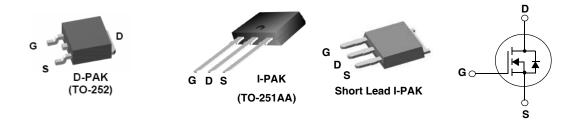
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $r_{\text{DS}(\text{on})}$ and fast switching speed.

Application

- Vcore DC-DC for Desktop Computers and Servers
- VRM for Intermediate Bus Architecture

Features

- Max $r_{DS(on)} = 5.7 \text{m}\Omega$ at $V_{GS} = 10 \text{V}$, $I_D = 35 \text{A}$
- Max $r_{DS(on)}$ = 8.0m Ω at V_{GS} = 4.5V, I_D = 35A
- Low gate charge: Q_{q(10)} = 37nC(Typ), V_{GS} = 10V
- Low gate resistance
- Avalanche rated and 100% tested
- RoHS Compliant



MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units	
V_{DS}	Drain to Source Voltage	25	V	
V_{GS}	Gate to Source Voltage	±20	V	
	Drain Current -Continuous (Package Limited)		35	
I _D	-Continuous (Die Limited)		98	Α
	-Pulsed	(Note 1)	305	
E _{AS}	Single Pulse Avalanche Energy	91	mJ	
P_{D}	Power Dissipation	88	W	
T _J , T _{STG}	Operating and Storage Temperature		-55 to 175	°C

Thermal Characteristics

$R_{ heta JC}$	Thermal Resistance, Junction to Case TO_252, TO_251	1.7	°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
FDD8796	FDD8796	TO-252AA	13"	12mm	2500 units
FDU8796	FDU8796	TO-251AA	N/A (Tube)	N/A	75 units
FDU8796	FDU8796_F071	TO-251AA	N/A (Tube)	N/A	75 units

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Off Chara	cteristics			•	•	
B _{VDSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$	25			V
$\frac{\Delta B_{VDSS}}{\Delta T_{J}}$	Breakdown Voltage Temperature Coefficient	I _D = 250μA, referenced to 25°C		7		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 20V V _{GS} = 0V			1 250	μΑ
I _{GSS}	Gate to Source Leakage Current	V _{GS} = ±20V			±100	nA
	cteristics			1		1
V _{GS(th)}	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu A$	1.2	1.8	2.5	V
$\Delta V_{GS(th)}$ ΔT_J	Gate to Source Threshold Voltage Temperature Coefficient	I _D = 250μA, referenced to 25°C		-6.7		mV/°C
•		V _{GS} = 10V, I _D = 35A		4.5	5.7	mΩ
_	Drain to Source On Resistance	V _{GS} = 4.5V, I _D = 35A		6.0	8.0	
r _{DS(on)}	Drain to Source On Resistance	$V_{DS} = 10V, I_{D} = 35A$ $T_{J} = 175^{\circ}C$		6.9	9.5	
Dynamic	Characteristics				•	
C _{iss}	Input Capacitance	., ,,,,,		1960	2610	pF
C _{oss}	Output Capacitance	─V _{DS} = 13V, V _{GS} = 0V, —f = 1MHz		455	605	pF
C _{rss}	Reverse Transfer Capacitance	1 - 1101112		315	475	pF
R_G	Gate Resistance	f = 1MHz		1.1		Ω
Switching	Characteristics					•
t _{d(on)}	Turn-On Delay Time			10	20	ns
t _r	Rise Time	V _{DD} =13V, I _D = 35A		24	39	ns
t _{d(off)}	Turn-Off Delay Time	$V_{GS} = 10V, R_{GS} = 20\Omega$		99	158	ns
t _f	Fall Time			57	91	ns
Q _g	Total Gate Charge	$V_{GS} = 0 \text{ to } 10V$ $V_{GS} = 0 \text{ to } 5V$ $I_{D} = 35A$		37	52	nC
Qg	Total Gate Charge	$V_{GS} = 0 \text{ to } 5V$ $V_{DD} = 13V$,		19	27	nC
Q _{gs}	Gate to Source Gate Charge	I _D = 35A, I _q = 1.0mA		6		nC
Q _{gd}	Gate to Drain Charge			6		nC
Drain-Soເ	urce Diode Characteristics					
\/	Source to Drain Diede Voltage	V _{GS} = 0V, I _S = 35A		0.9	1.25	V
V_{SD}	Source to Drain Diode Voltage	V _{GS} = 0V, I _S = 15A		8.0	1.0	V
t _{rr}	Reverse Recovery Time	$I_F = 35A$, di/dt = $100A/\mu s$		30	45	ns
Q _{rr}	Reverse Recovery Charge	$I_F = 35A$, di/dt = 100A/ μ s		23	35	nC

[|] Q_{TT} | Notes: 1: Pulse time < 300μs, Duty cycle = 2%. 2: Starting $T_J = 25^{\circ}$ C, L = 0.3mH, $I_{AS} = 24.7$ A, $V_{DD} = 23$ V, $V_{GS} = 10$ V.

Typical Characteristics T_J = 25°C unless otherwise noted

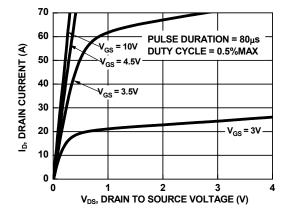


Figure 1. On Region Characteristics

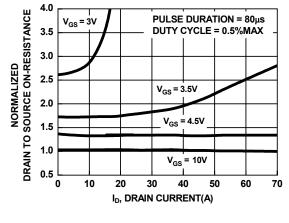


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

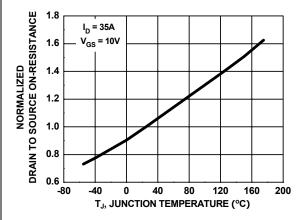


Figure 3. Normalized On Resistance vs Junction Temperature

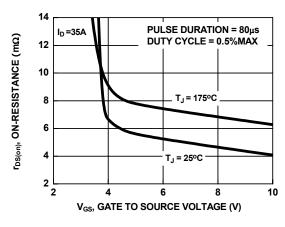


Figure 4. On-Resistance vs Gate to Source Voltage

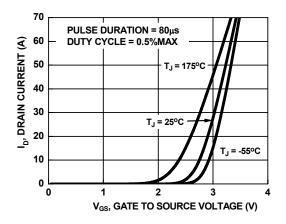


Figure 5. Transfer Characteristics

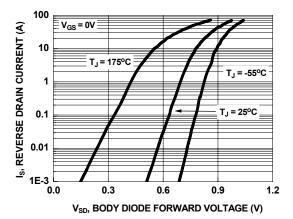


Figure 6. Source to Drain Diode Forward Voltage vs Source Current



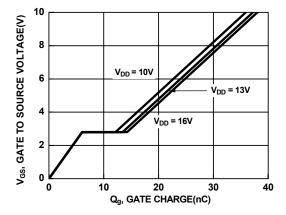


Figure 7. Gate Charge Characteristics

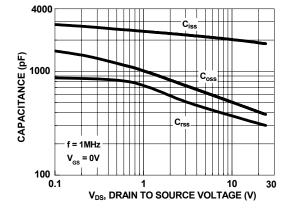


Figure 8. Capacitance vs Drain to Source Voltage

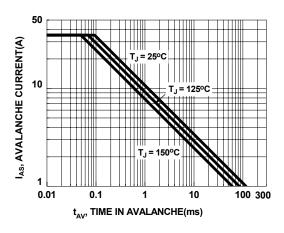


Figure 9. Unclamped Inductive Switching Capability

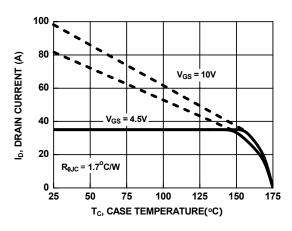


Figure 10. Maximum Continuous Drain Current vs Case Temperature

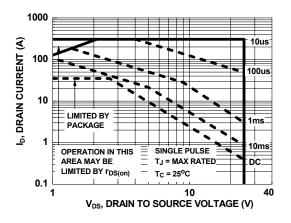


Figure 11. Forward Bias Safe Operating Area

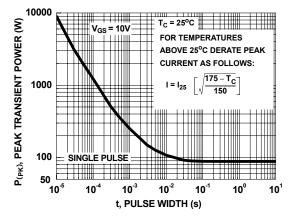


Figure 12. Single Pulse Maximum Power Dissipation

10¹

10°

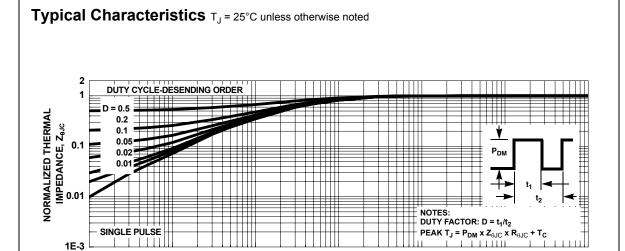


Figure 13. Transient Thermal Response Curve

10⁻²

t, RECTANGULAR PULSE DURATION(s)

10⁻¹

10⁻³

10⁻⁵

10⁻⁴

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