FDD8780/FDU8780
N-Channel PowerTrench® MOSFET
25V, 35A, 8.5mΩ

General Description

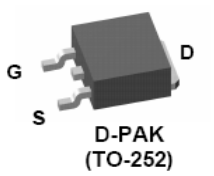
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $r_{DS(on)}$ and fast switching speed.

Application

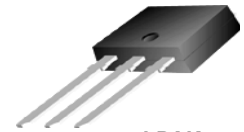
- Vcore DC-DC for Desktop Computers and Servers
- VRM for Intermediate Bus Architecture

Features

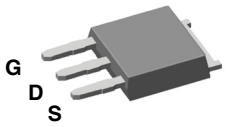
- Max $r_{DS(on)}$ = 8.5mΩ at V_{GS} = 10V, I_D = 35A
- Max $r_{DS(on)}$ = 12.0mΩ at V_{GS} = 4.5V, I_D = 35A
- Low gate charge: $Q_{g(10)}$ = 21nC(Typ), V_{GS} = 10V
- Low gate resistance
- Avalanche rated and 100% tested
- RoHS Compliant



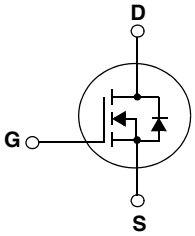
D-PAK
(TO-252)



I-PAK
(TO-251AA)



Short Lead I-PAK



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
I_D	Drain Current -Continuous (Package Limited)	35	A
	-Continuous (Die Limited)	60	
	-Pulsed (Note 1)	224	
E_{AS}	Single Pulse Avalanche Energy (Note 2)	73	mJ
P_D	Power Dissipation	50	W
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	3.0	°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
FDD8780	FDD8780	TO-252AA	13”	12mm	2500 units
FDU8780	FDU8780	TO-251AA	N/A(Tube)	N/A	75 units
FDU8780	FDU8780_F071	TO-251AA	N/A(Tube)	N/A	75 units

Electrical Characteristics T_J = 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	25			V
$\frac{\Delta B_{VDSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C		12		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 20V, V_{GS} = 0V			1	μA
		T_J = 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	1.8	2.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C		-6.3		mV/°C
$r_{DS(on)}$	Drain to Source On Resistance	V_{GS} = 10V, I_D = 35A		6.5	8.5	mΩ
		V_{GS} = 4.5V, I_D = 35A		9.1	12.0	
		V_{GS} = 10V, I_D = 35A T_J = 175°C		10.4	15.0	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 13V, V_{GS} = 0V, f = 1MHz		1080	1440	pF
C_{oss}	Output Capacitance			265	355	pF
C_{rss}	Reverse Transfer Capacitance			180	270	pF
R_g	Gate Resistance	f = 1MHz		0.9		Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 13V, I_D = 35A V_{GS} = 10V, R_{GS} = 17Ω		7	14	ns
t_r	Rise Time			9	18	ns
$t_{d(off)}$	Turn-Off Delay Time			43	69	ns
t_f	Fall Time			24	38	ns
Q_g	Total Gate Charge	V_{GS} = 0V to 10V; V_{DD} = 13V, I_D = 35A, I_g = 1.0mA		21	29	nC
Q_g	Total Gate Charge	V_{GS} = 0V to 5V		11.2	16	nC
Q_{gs}	Gate to Source Gate Charge			3.5		nC
Q_{gd}	Gate to Drain "Miller"Charge			4.7		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0V, I_S = 35A		0.92	1.25	V
		V_{GS} = 0V, I_S = 15A		0.84	1.0	
t_{rr}	Reverse Recovery Time	I_F = 35A, di/dt = 100A/μs		28	42	ns
Q_{rr}	Reverse Recovery Charge	I_F = 35A, di/dt = 100A/μs		20	30	nC

Notes:
1: Pulse time < 300μs, Duty cycle = 2%.
2: Starting T_J = 25°C, L = 0.3mH, I_{AS} = 22A ,V_{DD} = 23V, V_{GS} = 10V.

Typical Characteristics T_J = 25°C unless otherwise noted

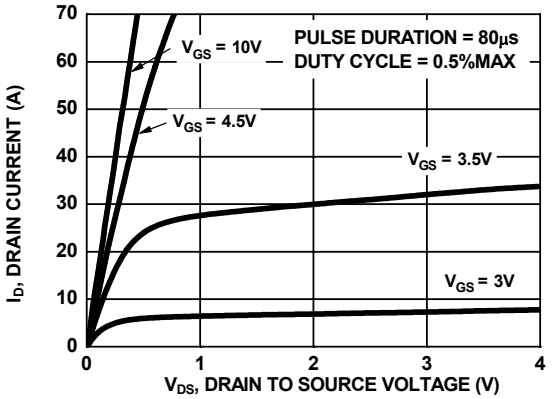


Figure 1. On Region Characteristics

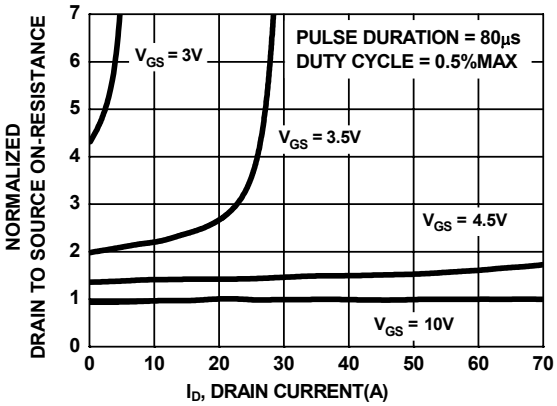


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

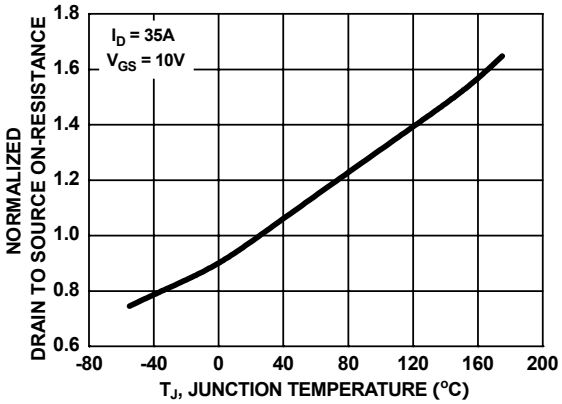


Figure 3. Normalized On Resistance vs Junction Temperature

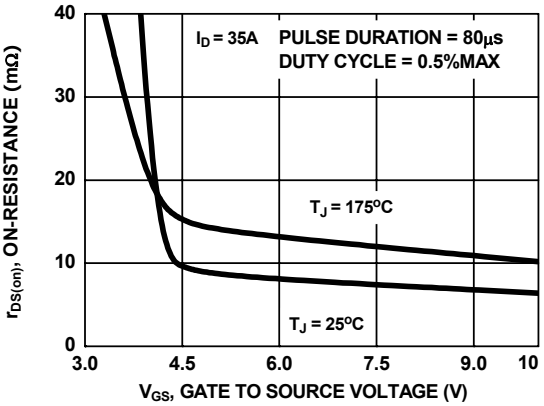


Figure 4. On-Resistance vs Gate to Source Voltage

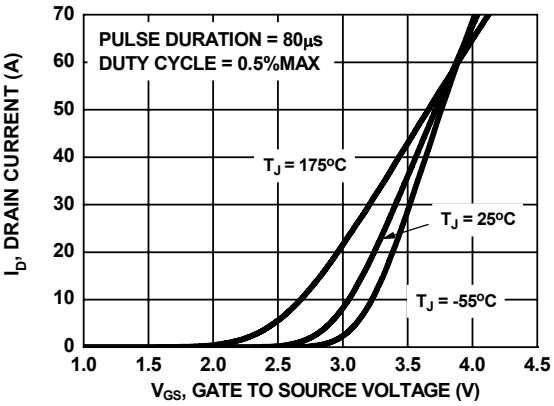


Figure 5. Transfer Characteristics

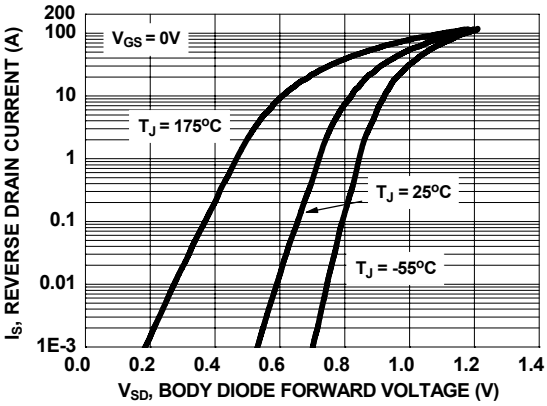


Figure 6. Source to Drain Diode Forward Voltage vs Source Current