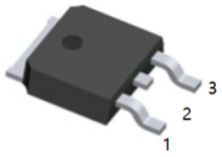
25 V N -Channel MOSFET

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.

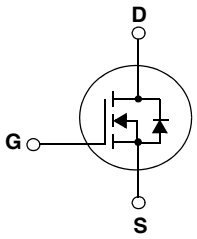


1.G 2.D 3.S

TO-252(DPAK) top view

Features

- V_{DS}(V) = 25V
- I_D =35A (V_{GS}= 10V)
- $R_{DS(ON)}$ < 8.5mΩ (V_{GS} =10V)
- $R_{DS(ON)}$ < 12mΩ (V_{GS} = 4.5V)
- Low gate charge: $Q_{g(10)}$ = 21nC(Typ), V_{GS} = 10V
- Low gate resistance



Application

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

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

Electrical Characteristics T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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
		V_{DS} = 20V, V_{GS} = 0V, T_J = 150°C			250	
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V			±100	nA
$V_{GS(th)}$	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	
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
$t_{d(on)}$	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, V_{DD} = 13V, I_D = 35A, I_g = 1.0mA		11.2	16	nC
Q_{gs}	Gate to Source Gate Charge	V_{DD} = 13V, I_D = 35A, I_g = 1.0mA		3.5		nC
Q_{gd}	Gate to Drain “Miller”Charge	V_{DD} = 13V, I_D = 35A, I_g = 1.0mA		4.7		nC
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

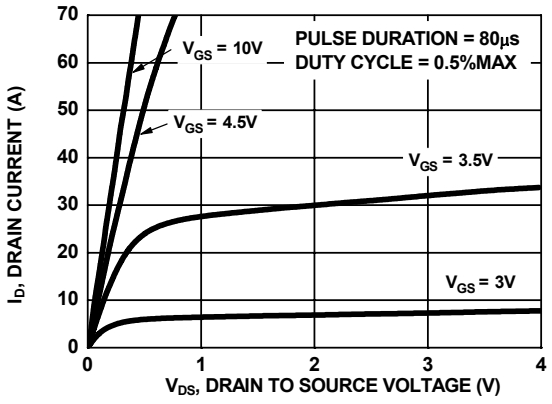


Figure 1. On Region Characteristics

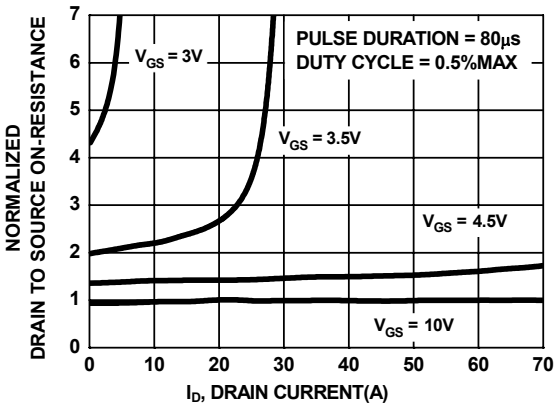


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

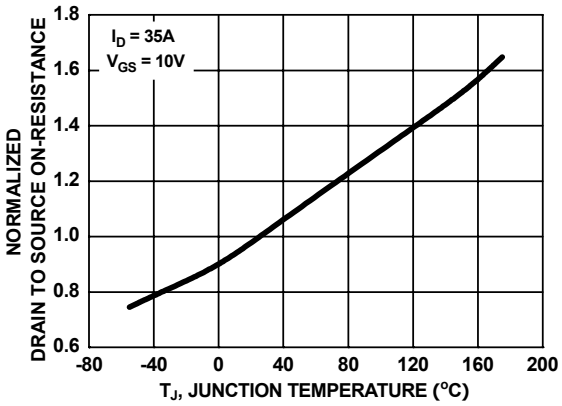


Figure 3. Normalized On Resistance vs Junction Temperature

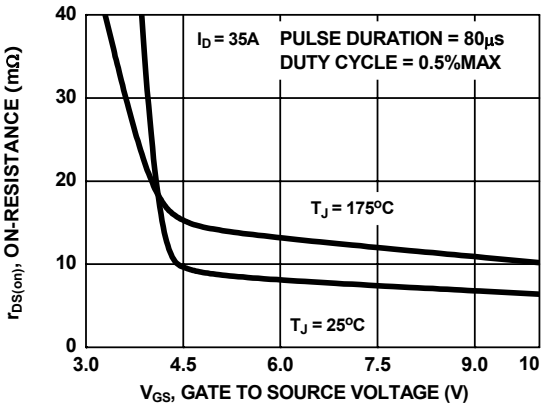


Figure 4. On-Resistance vs Gate to Source Voltage

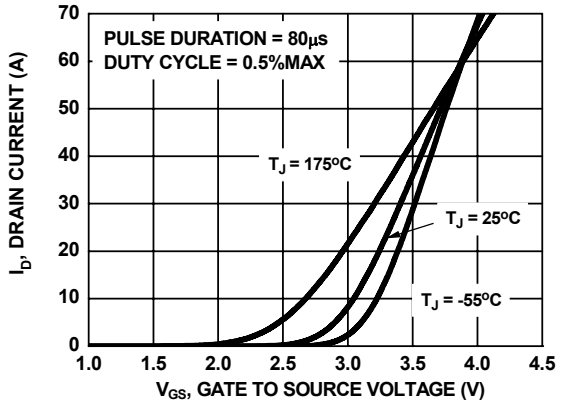


Figure 5. Transfer Characteristics

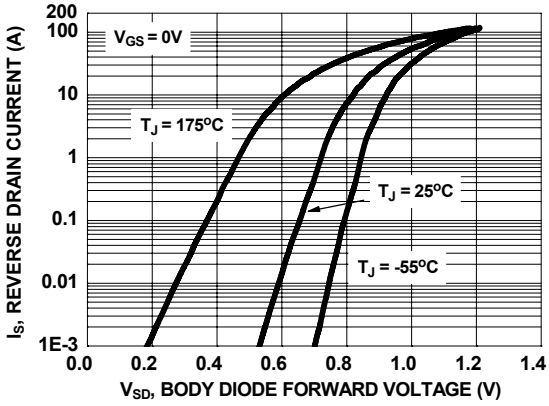


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25°C unless otherwise noted

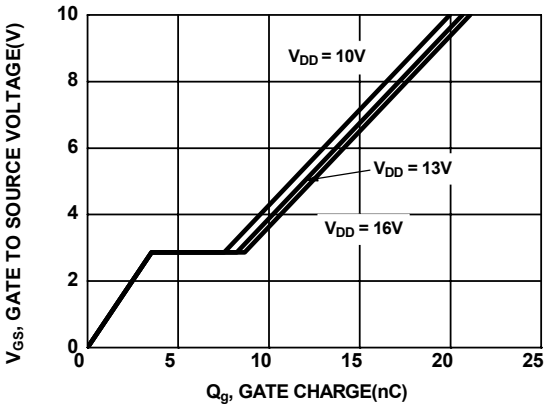


Figure 7. Gate Charge Characteristics

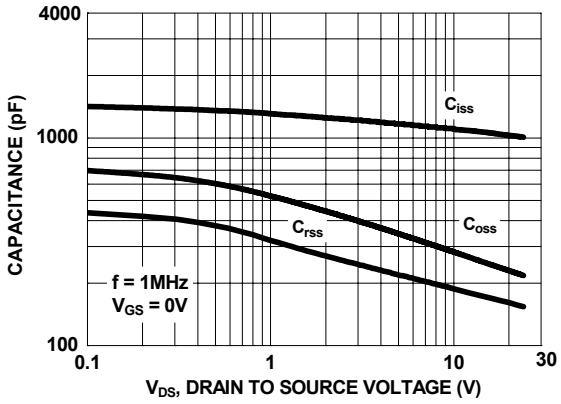


Figure 8. Capacitance vs Drain to Source Voltage

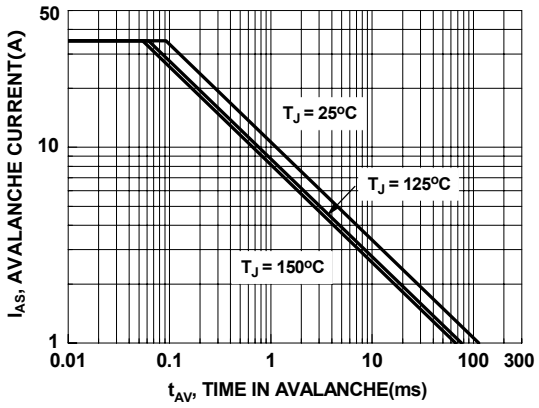


Figure 9. Unclamped Inductive Switching Capability

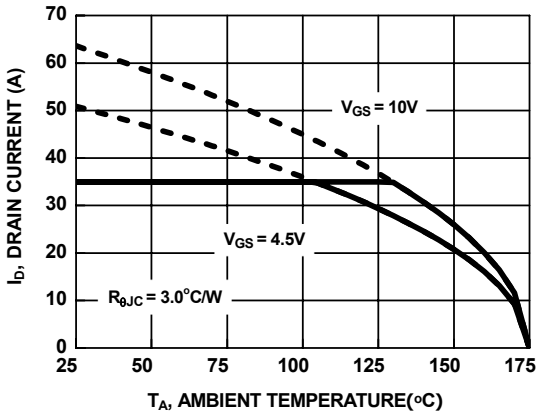


Figure 10. Maximum Continuous Drain Current vs Case Temperature

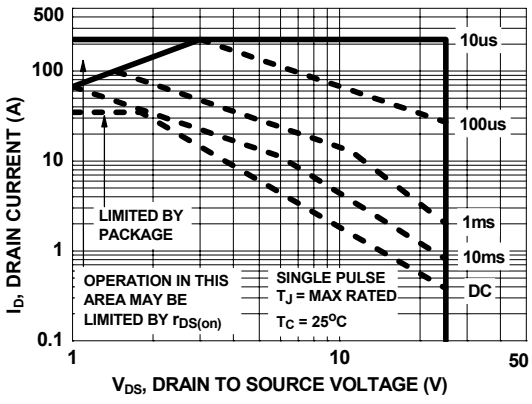


Figure 11. Forward Bias Safe Operating Area

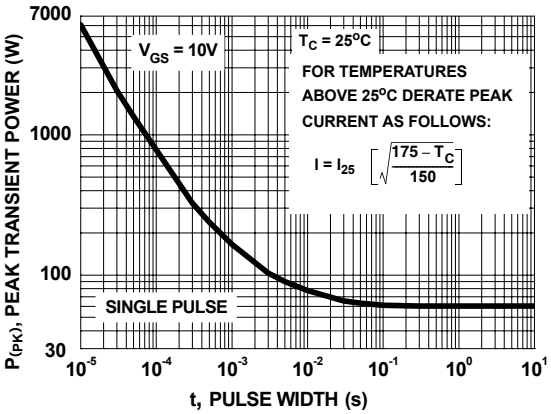


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25°C unless otherwise noted

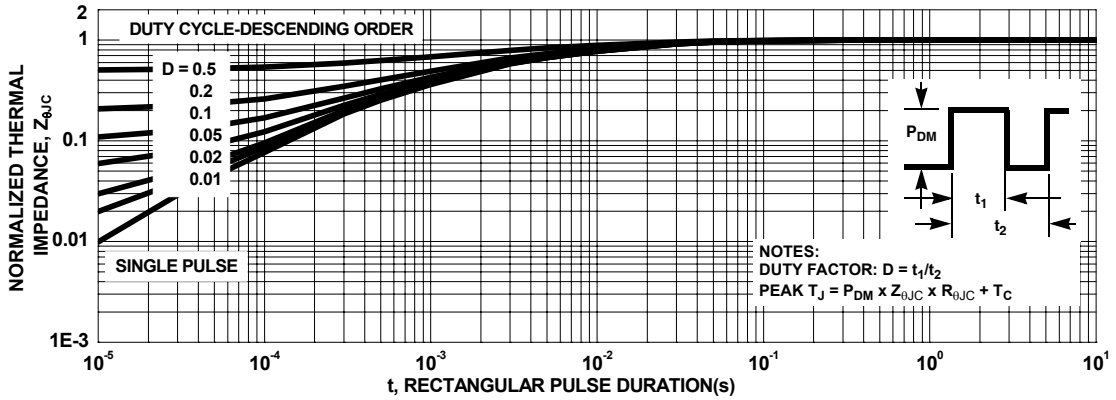
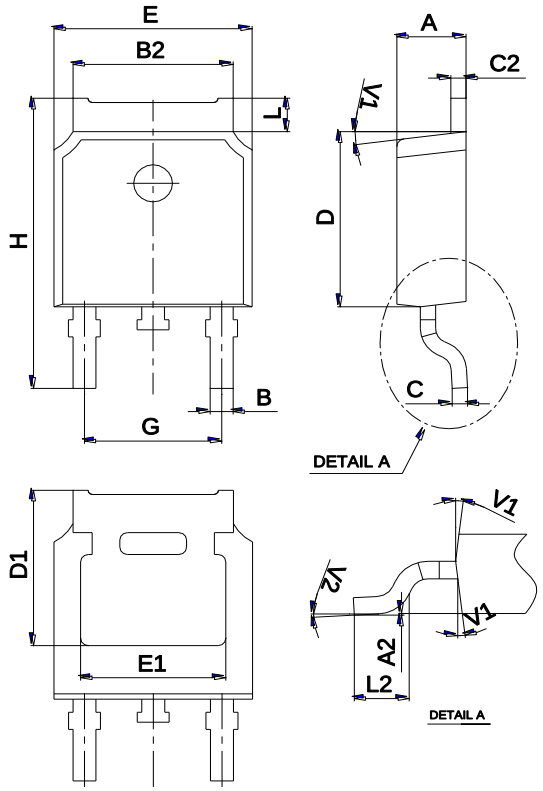


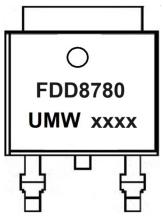
Figure 13. Transient Thermal Response Curve

Package Mechanical Data TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW FDD8780	TO-252	2500	Tape and reel

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