UMW FDD8780

25V N-Channel MOSFET

1.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.

2.Features

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

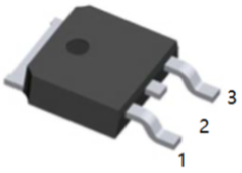
3.Application

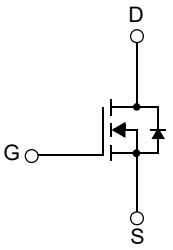
- Vcore DC-DC for Desktop Computers and Servers
- VRM for Intermediate Bus Architecture

4.Pinning information

Pin	Symbol	Description
1	G	GATE
2	D	DRAIN
3	S	SOURCE

TO-252(DPAK)
top view





5.Absolute Maximum Ratings T_C= 25°C

Parameter		Symbol	Rating	Units
Drain to Source Voltage		V_{DS}	25	V
Gate to Source Voltage		V_{GS}	±20	
Drain Current -Continuous (Package Limited)		I_D	35	A
-Continuous (Die Limited)			60	
-Pulsed	(Note 1)		224	
Single Pulse Avalanche Energy	(Note 2)	E_{AS}	73	mJ
Power Dissipation		P_D	50	W
Storage Junction Temperature Range		T_J, T_{STG}	-55 to 175	°C

6.Thermal Characteristics

Parameter	Symbol	Rating	Units
Thermal Resistance, Junction-to-Case TO-252,TO-251	$R_{\theta JC}$	3	°C/W
Thermal Resistance, Junction-to-Ambient TO-252,TO-251	$R_{\theta JA}$	100	°C/W
Thermal Resistance, Junction-to-Ambient TO-252,1in^2 copper pad area	$R_{\theta JA}$	52	°C/W

7.Electrical Characteristic (T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	25			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I_D=250μA Referenced to 25°C		12		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V			1	μA
		V_{GS}=0V, T_J=150°C			250	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS}=±20V			±100	nA
Gate to Source Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.2	1.8	2.5	V
Gate to Source Threshold Voltage Temperature Coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	I_D=250μA Referenced to 25°C		-6.3		mV/°C
Drain to Source On Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=35A		6.5	8.5	mΩ
		V_{GS}=4.5V, I_D=35A		9.1	12	mΩ
Input Capacitance	C_{iss}	V_{DS}=13V, V_{GS}=0V, f=1MHz		1080	1440	pF
Output Capacitance	C_{oss}			265	355	pF
Reverse Transfer Capacitance	C_{rss}			180	270	pF
Gate Resistance	R_g	f=1MHz		0.9		Ω
Turn-On DelayTime	$t_{D(on)}$	V_{DD}=13V, I_D=35A V_{GS}=10V, R_{GEN}=17Ω		7	14	ns
Rise Time	t_r			9	18	ns
Turn-Off DelayTime	$t_{D(off)}$			43	69	ns
Fall Time	t_f			24	38	ns
Total Gate Charge	Q_g	V_{GS}=0V to 10V, V_{DD}=13V		21	29	nC
Total Gate Charge	Q_g	V_{GS}=0V to 5V, I_D=35A		11.2	16	nC
Gate to Source Gate Charge	Q_{gs}	I_g=1mA		3.5		nC
Gate to Drain “Miller” Charge	Q_{gd}			4.7		nC
Source to Drain Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=35A		0.92	1.25	V
		V_{GS}=0V, I_S=15A		0.84	1	V

Reverse Recovery Time	t_{rr}	I_F=35A, di/dt=100A/μs		28	42	ns
Reverse Recovery Charge	Q_{rr}	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.

8.1Typical characteristic

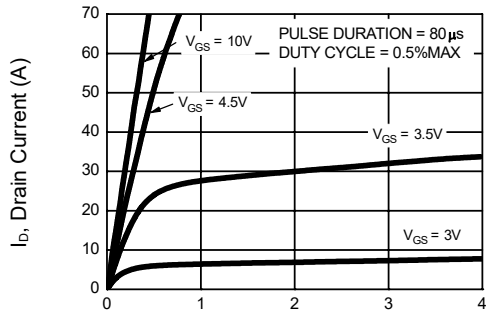


Figure 1: On-Region Characteristics

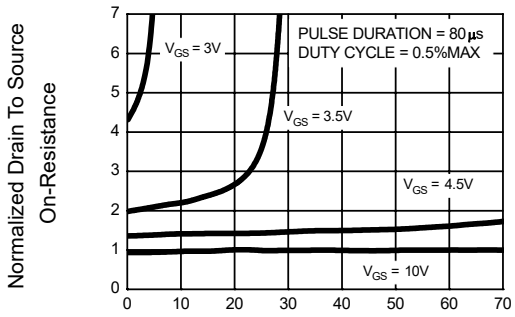


Figure 2: Normalized On-Resistance vs Drain Current and Gate Voltage

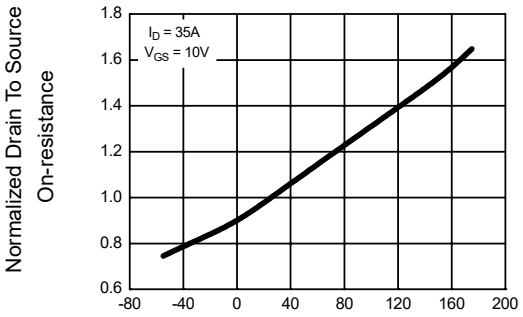


Figure 3: Normalized On Resistance vs Junction Temperature

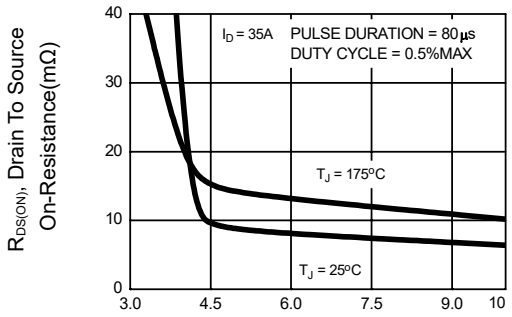


Figure 4: On-Resistance Variation with Gate-to-Source Voltage

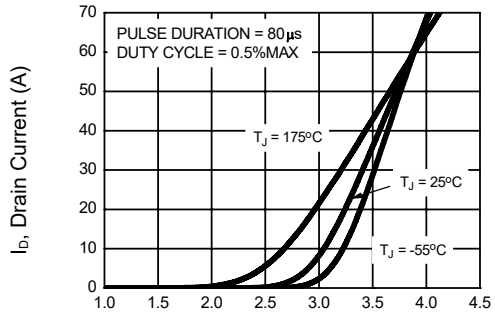


Figure 5: Transfer Characteristics

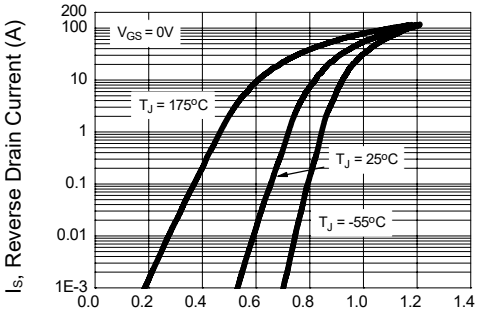


Figure 6: Source to Drain Diode Forward Voltage vs Source Current

8.2Typical characteristic

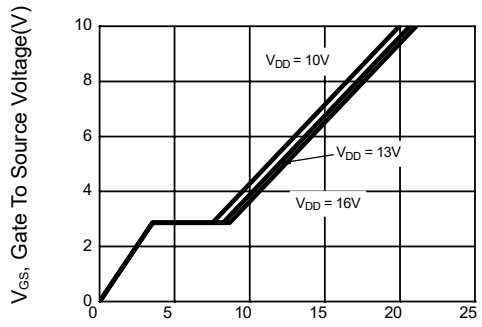


Figure 7: Gate Charge Characteristics

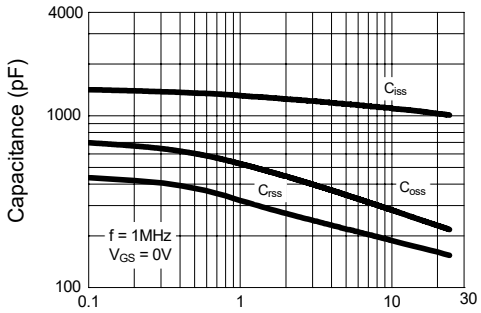


Figure 8: Capacitance vs Drain to Source Voltage

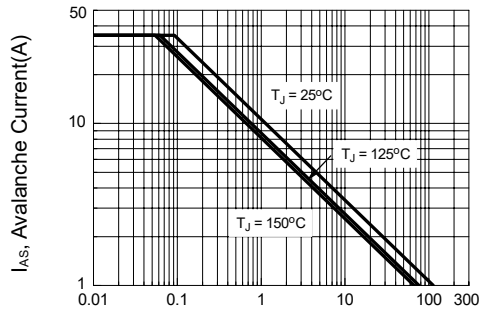


Figure 9: Unclamped Inductive Switching Capability

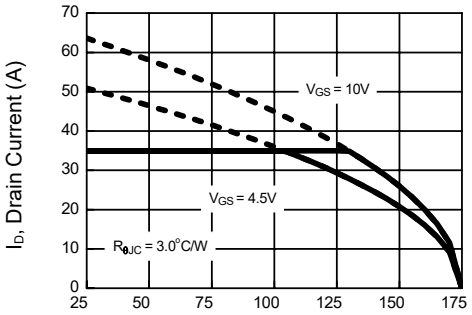


Figure 10: Maximum Continuous Drain Current vs Case Temperature

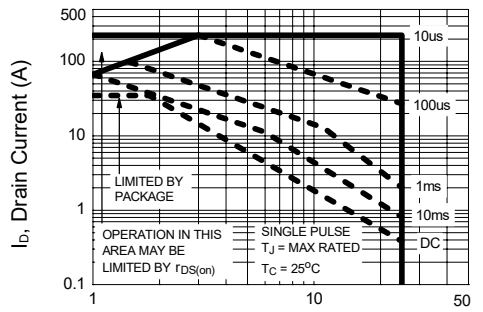


Figure 11: Forward Bias Safe Operating Area

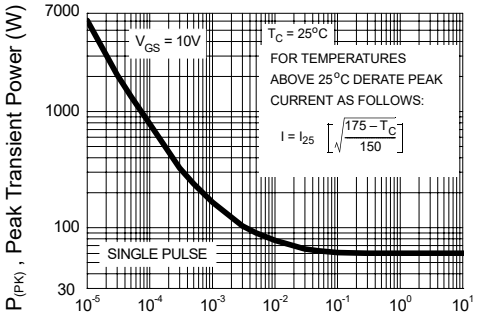


Figure 12: Single Pulse Maximum Power Dissipation

8.3Typical characteristic

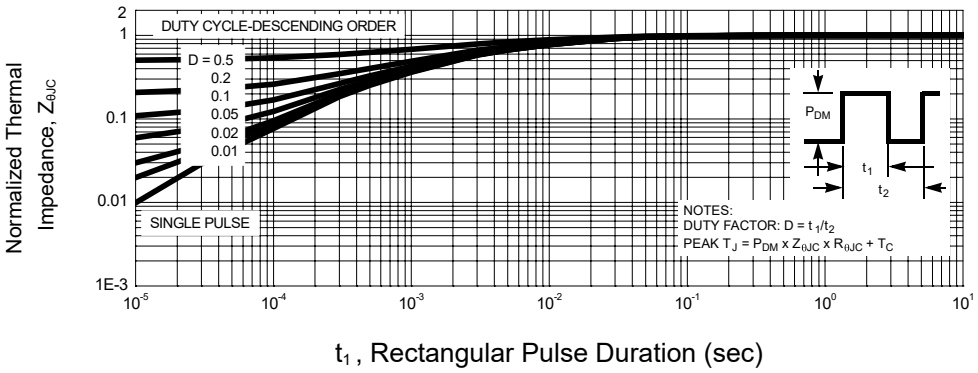
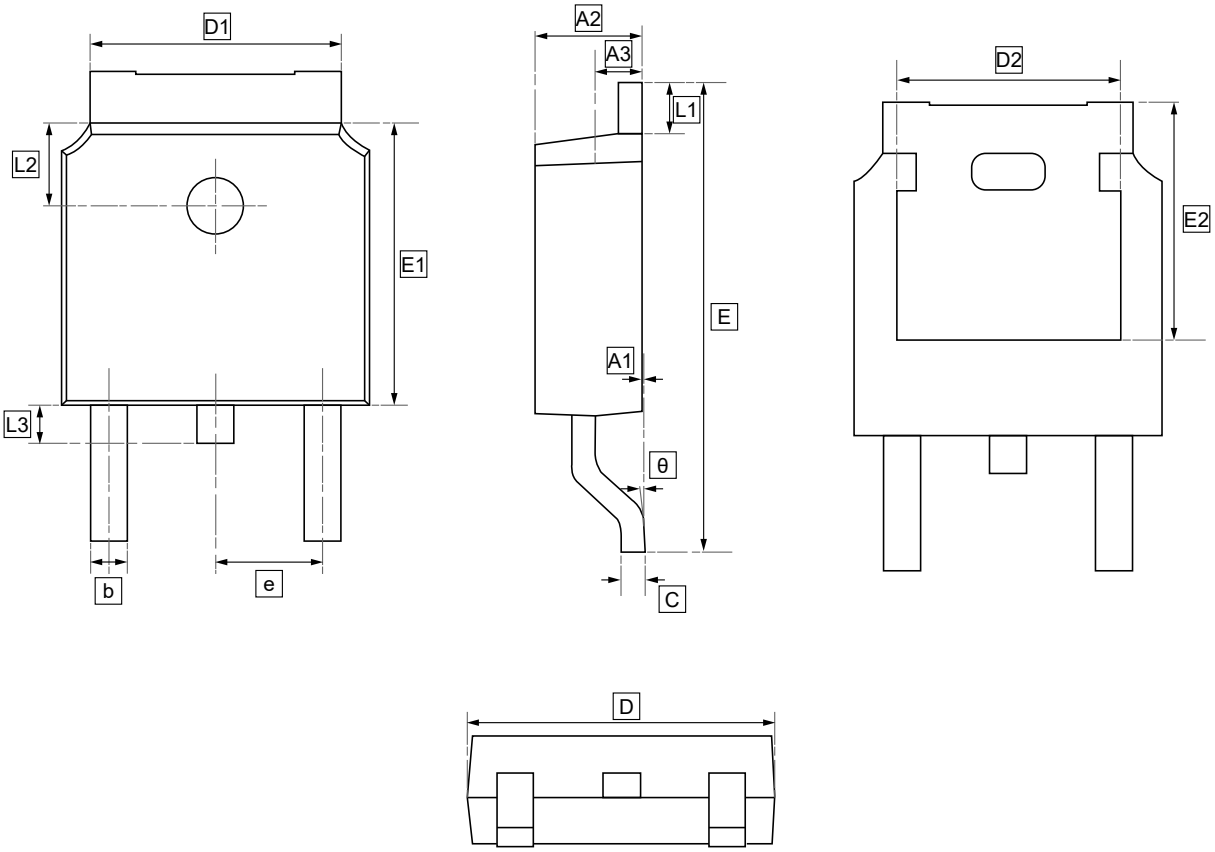


Figure 13: Transient Thermal Response Curve

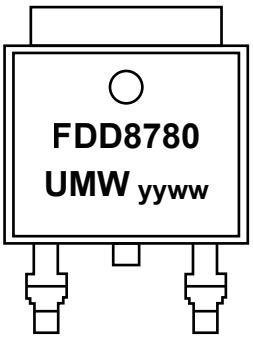
9.TO-252 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A1	A2	A3	b	c	D	D1	D2	E	E1	E2	e	L1	L2	L3	θ
Min	0.00	2.18	0.90	0.65	0.46	6.35	4.95	4.32	9.40	5.97	5.21	2.286	0.89	1.70	0.60	0.00
Max	0.13	2.39	1.10	0.85	0.61	6.73	5.46	4.90	10.41	6.22	5.38	BSC	1.27	1.90	1.00	8.00

10.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW FDD8780	TO-252	2500	Tape and reel

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