UMW FDD8586

20V 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

- $V_{DS(V)}$=20V
- I_D=35A
- $R_{DS(ON)}$<5.5mΩ(V_{GS}=10V)
- $R_{DS(ON)}$<8.5mΩ(V_{GS}=4.5V)
- Low gate resistance
- Low gate charge: $Q_{g(TOT)}$=34nC(Typ), V_{GS}=10V

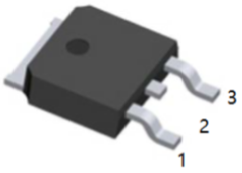
3.Application

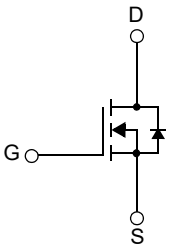
- Vcore DC-DC for Desktop Computers and Servers
- VRM for Intermediate Bus Architecture

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}	20	V
Gate to Source Voltage		V_{GS}	±20	
Drain Current -Continuous (Package Limited)		I_D	35	A
-Continuous (Die Limited)			93	
-Pulsed	(Note 1)		354	
Single Pulse Avalanche Energy	(Note 2)	E_{AS}	144	mJ
Power Dissipation		P_D	77	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	$R_{\theta JC}$	1.94	°C/W
Thermal Resistance, Junction-to-Ambient TO-252	$R_{\theta JA}$	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	20			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I_D=250μA Referenced to 25°C		14.6		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=16V			1	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	1.6	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		-6.7		mV/°C
Drain to Source On Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=35A		4	5.5	mΩ
		V_{GS}=4.5V, I_D=33A		5.7	8.5	mΩ
		V_{GS}=10V,I_D=35A,T_J=175°C		6.5	8.9	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V, I_D=35A		175		S
Input Capacitance	C_{iss}	V_{DS}=10V, V_{GS}=0V f=1MHz		1865	2480	pF
Output Capacitance	C_{oss}			550	730	pF
Reverse Transfer Capacitance	C_{rss}			335	445	pF
Gate Resistance	R_g	f=1MHz		1.2		Ω
Turn-On DelayTime	$t_{D(on)}$	V_{DD}=10V, I_D=35A V_{GS}=10V, R_{GEN}=10Ω		9	18	ns
Rise Time	t_r			11	20	ns
Turn-Off DelayTime	$t_{D(off)}$			47	75	ns
Fall Time	t_f			25	40	ns
Total Gate Charge at 10V	$Q_{g(TOT)}$	V_{GS}=0V to 10V; V_{DD}=10V		34	48	nC
Total Gate Charge at 5V	$Q_{g(5)}$	V_{GS}=0V to 5V; I_D=35A		16	22	nC
Gate to Source Gate Charge	Q_{gs}	I_g=1mA		3.2		nC
Gate to Drain “Miller” Charge	Q_{gd}			5.9		nC
Source to Drain Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=35A		0.89	1.25	V
		V_{GS}=0V, I_S=15A		0.82	1.2	V

Reverse Recovery Time	t_{rr}	I_F=35A, di/dt=100A/μs		30	45	ns
Reverse Recovery Charge	Q_{rr}	I_F=35A, di/dt=100A/μs		23	35	nC

Notes:

1: Pulse time<300μs, Duty cycle = 2%.

2: Starting T_J=25°C, L=0.3mH, I_{AS}=31A ,V_{DD}=18V, V_{GS}=10V.

8.1Typical characteristic

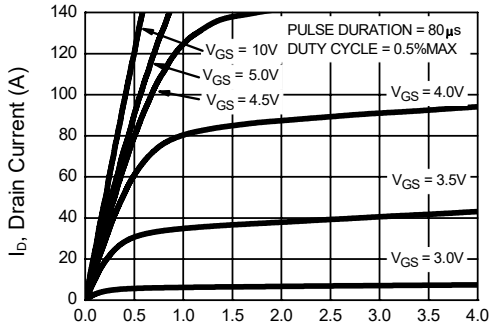


Figure 1: On-Region Characteristics

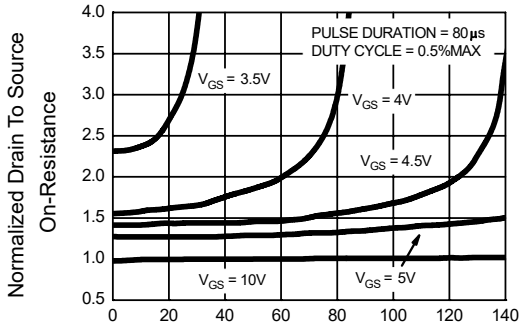


Figure 2: Normalized On-Resistance vs Drain Current and Gate Voltage

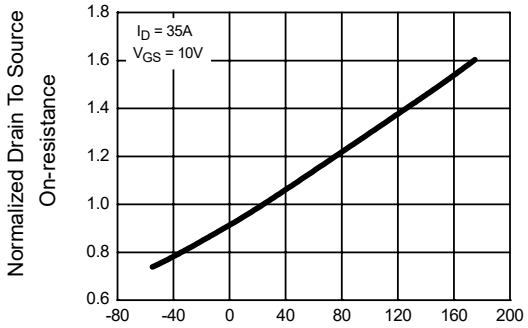


Figure 3: Normalized On Resistance vs Junction Temperature

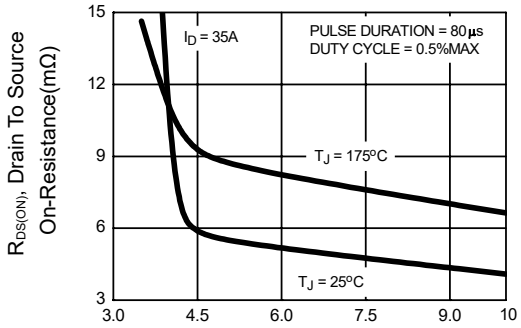


Figure 4: On-Resistance Variation with Gate-to-Source Voltage

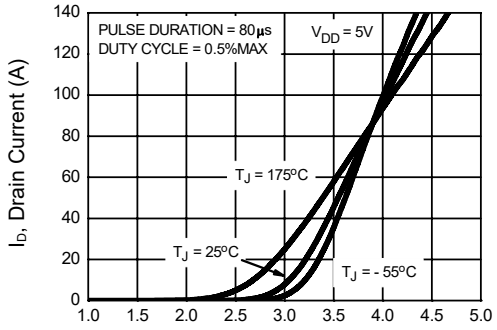


Figure 5: Transfer Characteristics

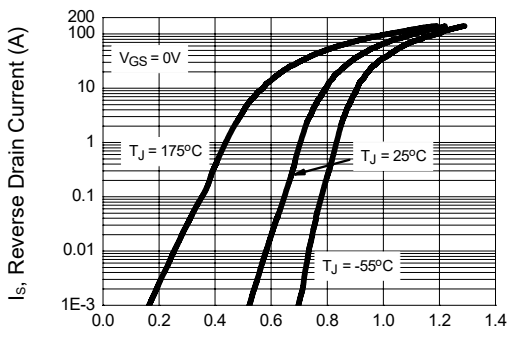


Figure 6: Source to Drain Diode Forward Voltage vs Source Current

8.2Typical characteristic

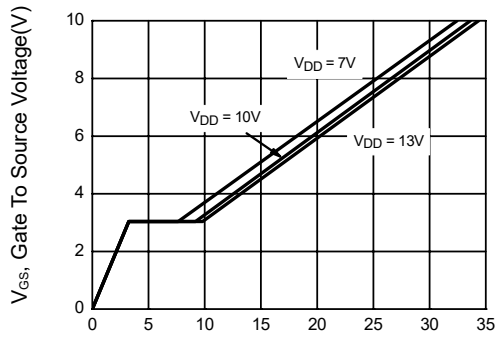


Figure 7: Gate Charge Characteristics

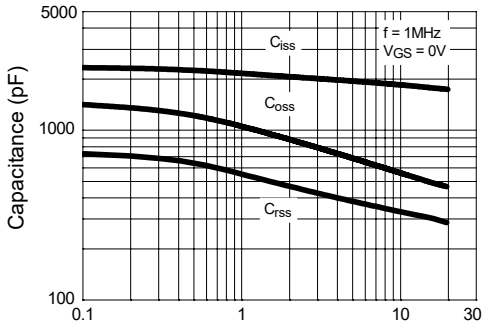


Figure 8: Capacitance vs Drain to Source Voltage

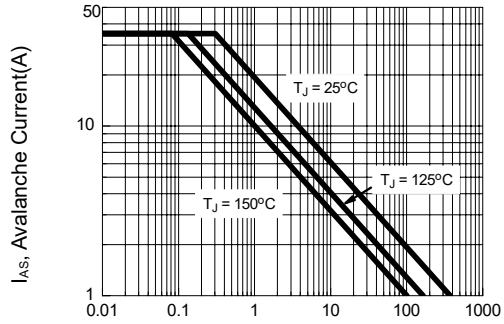


Figure 9: Unclamped Inductive Switching Capability

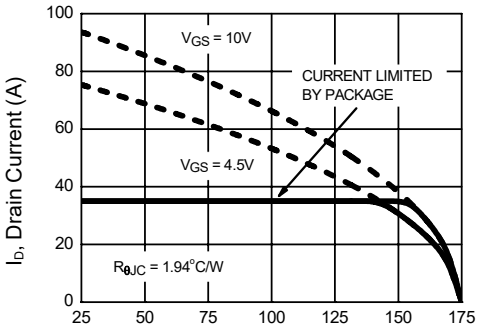


Figure 10: Maximum Continuous Drain Current vs Case Temperature

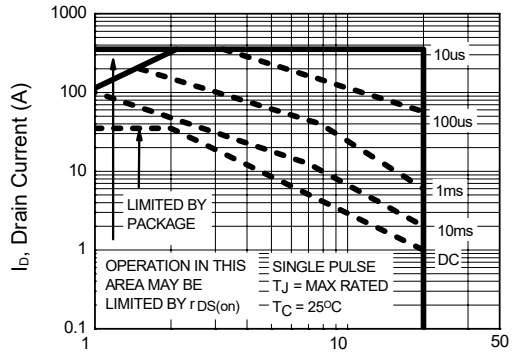


Figure 11: Forward Bias Safe Operating Area

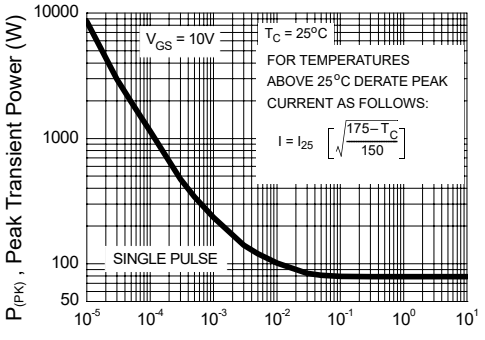


Figure 12: Single Pulse Maximum Power Dissipation

8.3Typical characteristic

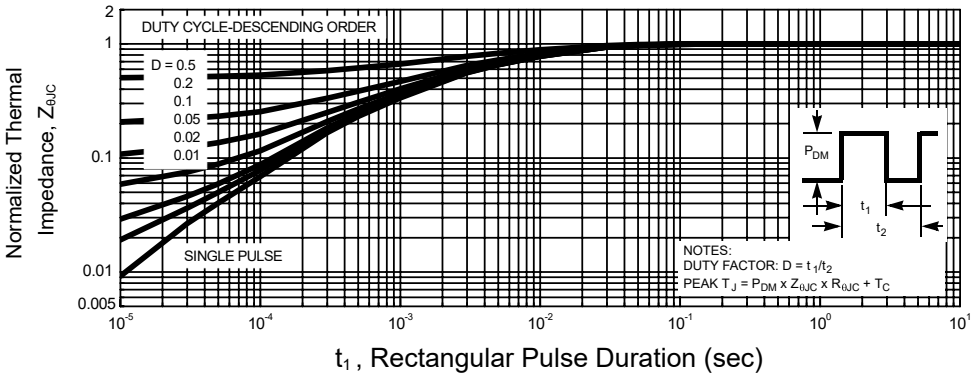
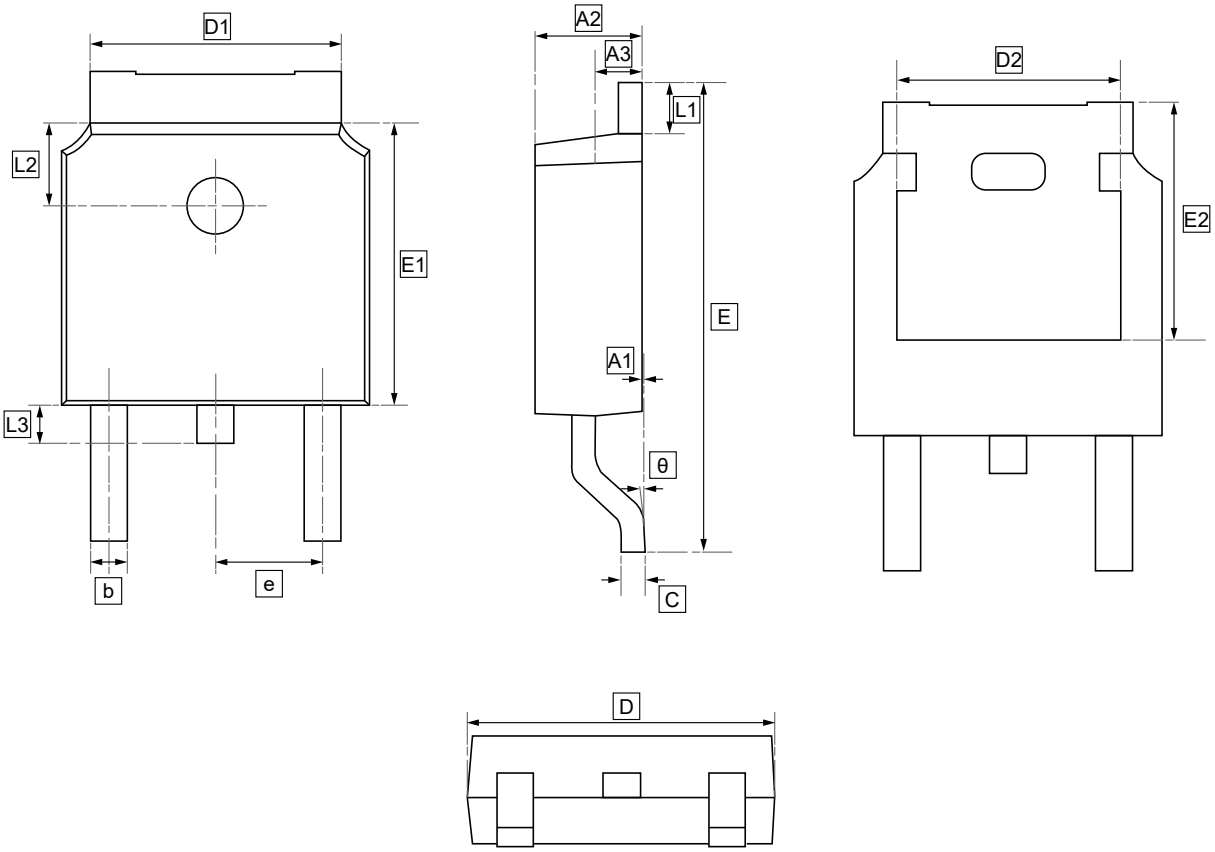


Figure 13: Transient Thermal Response Curve

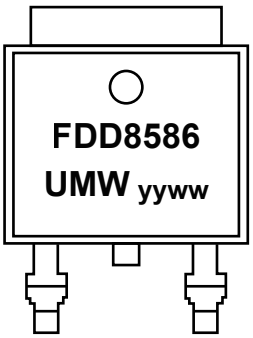
9.TO-252 Package Outline Dimensions



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 FDD8586	TO-252	2500	Tape and reel

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