UMW FDP8860

30V 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.

2.1Features

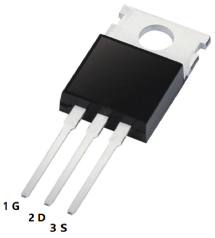
- $V_{DS\ (V)}$=30V
- I_D=80A
- $R_{DS(ON)}$<2.5mΩ(V_{GS}=10V)
- $R_{DS(ON)}$<2.9mΩ(V_{GS}=4.5V)

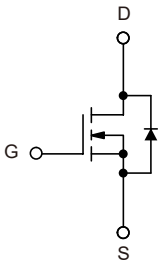
2.2Features

- UIL Capability (Single Pulse and Repetitive Pulse)
- RoHS Compliant
- Low Miller Charge
- Low Q_{rr} Body Diode

3.Pinning information

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





4.Absolute Maximum Ratings T_C= 25°C

Parameter		Symbol	Rating	Units
Drain to Source Voltage		V_{DS}	30	V
Gate to Source Voltage		V_{GS}	±20	V
Drain Current - Continuous (Package limited)	T_C=25°C	I_D	80	A
- Continuous(Silicon limited)	T_C=25°C		219	A
- Pulsed	(Note 1)		556	A
Single Pulse Avalanche Energy	(Note 2)	E_{AS}	673	mJ
Power Dissipation		P_D	254	W
Operating and Storage Temperature		T_J, T_{STG}	-55 to 175	°C

5.Thermal Characteristics

Parameter	Symbol	Rating	Units
Thermal Resistance, Junction to Case TO220	$R_{\theta JC}$	0.59	°C/W
Thermal Resistance, Junction to Ambient TO220	$R_{\theta JA}$	62	°C/W

* Calculate the continuous current (based on the maximum allowable junction temperature). The current limit of thepackage is 120 A.

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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain to Source Breakdown Voltage	BV_{DSS}	I_D=1mA, V_{GS}=0V	30			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I_D=1mA Referenced to 25°C		22		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=24V, V_{GS}=0V			1	μA
		V_{DS}=24V, 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	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		-9.6		mV/°C
Drain to Source On Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=80A		1.9	2.5	mΩ
		V_{GS}=5V, I_D=80A		2	2.8	mΩ
		V_{GS}=4.5V, I_D=80A		2.1	2.9	mΩ
		V_{GS}=10V,I_D=80A,T_J=150°C		2.9	3.8	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V, I_D=80A		3.4		S
Input Capacitance	C_{iss}	V_{DS}=15V, V_{GS}=0V f=1MHz		9200	12240	pF
Output Capacitance	C_{oss}			1700	2260	pF
Reverse Transfer Capacitance	C_{rss}			1060	1590	pF
Gate Resistance	R_g	f=1MHz		1.7		Ω
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=15V, I_D=80A V_{GS}=5V, R_{GEN}=3Ω		35	56	ns
Rise Time	t_r			135	216	ns
Turn-Off Delay Time	$t_{D(off)}$			64	103	ns
Fall Time	t_f			59	95	ns
Total Gate Charge at 10V	$Q_{g(tot)}$	V_{GS}=0V to 10V, V_{DD}=15V, I_D=80A		158	222	nC
Total Gate Charge at 5V	$Q_{g(5)}$	V_{GS}=0V to 5V, V_{DD}=15V, I_D=80A		81	114	nC
Gate to Source Gate Charge	Q_{gs}	V_{DD}=15V, I_D=80A		27		nC
Gate to Drain “Miller” Charge	Q_{gd}	V_{DD}=15V, I_D=80A		33		nC

Source to Drain Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=80A		0.88	1.25	V
		V_{GS}=0V, I_S=40A		0.81	1.2	V
Reverse Recovery Time	t_{rr}	I_F=80A, di/dt=100A/μs		60	90	ns
Reverse Recovery Charge	Q_{rr}			74	111	nC

Notes:

1: Pulse Test: Pulse Width<80μs, Duty cycle < 0.5%.

2: Starting T_J=25°C, L=0.3mH, I_{AS}=67A,V_{DD}=27V, V_{GS}=10V.

7.1Typical characteristic

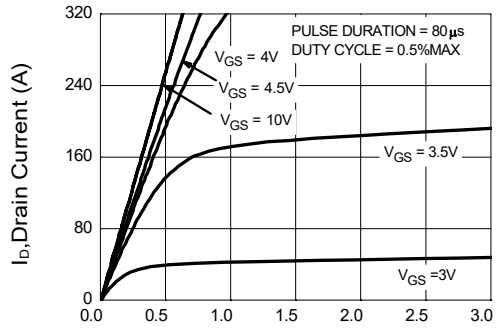


Figure 1: On Region Characteristics

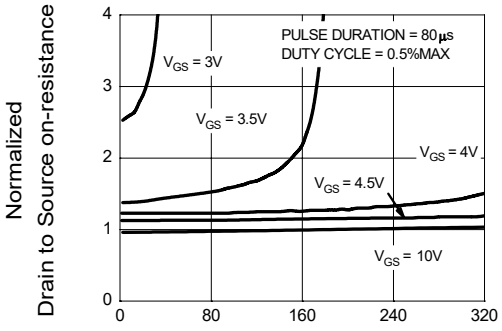


Figure 2: Normalized On-Resistance vs Drain Current and Gate Voltage

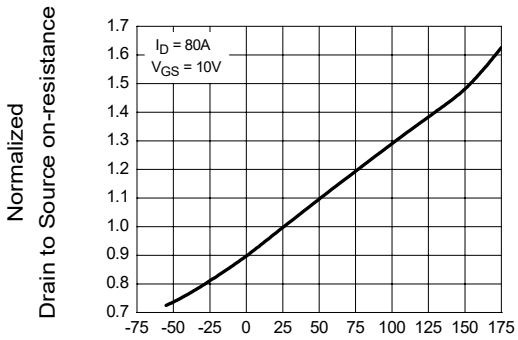


Figure 3: Normalized On Resistance vs Junction Temperature

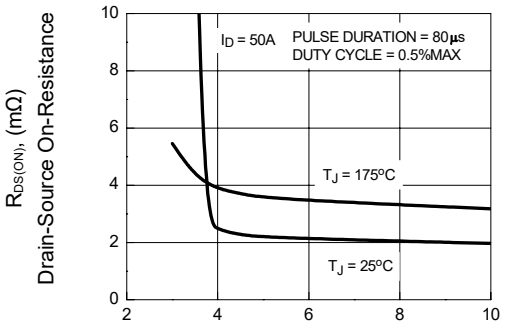


Figure 4: On-Resistance vs Gate to Source Voltage

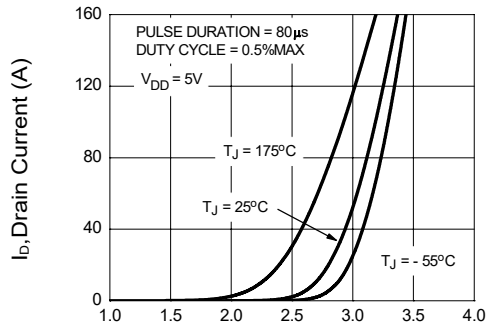


Figure 5: Transfer Characteristics

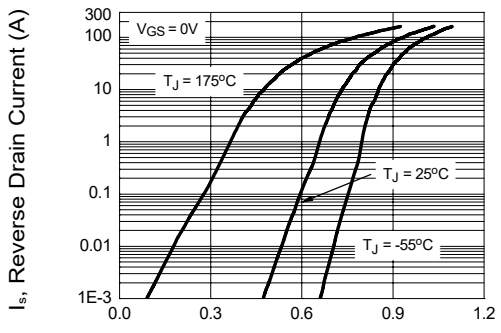


Figure 6: Source to Drain Diode Forward Voltage vs Source Current

7.2Typical characteristic

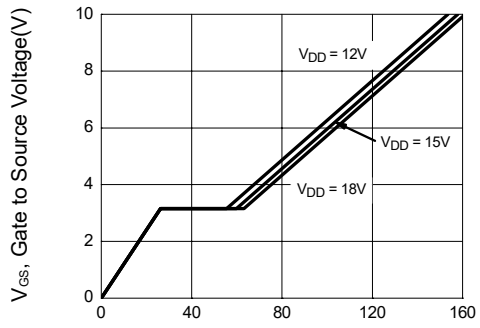


Figure 7: Gate Charge Characteristics

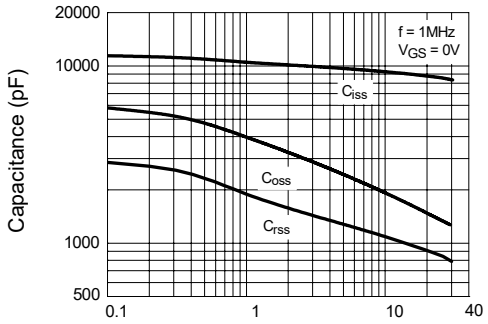


Figure 8: Capacitance vs Drain to Source Voltage

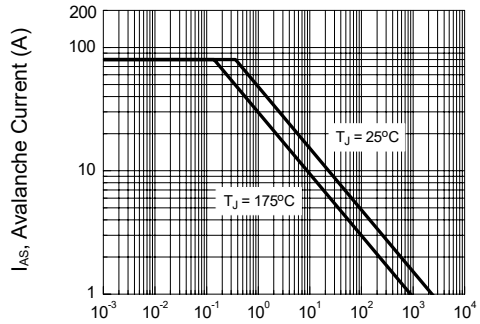


Figure 9: Unclamped Inductive Switching Capability

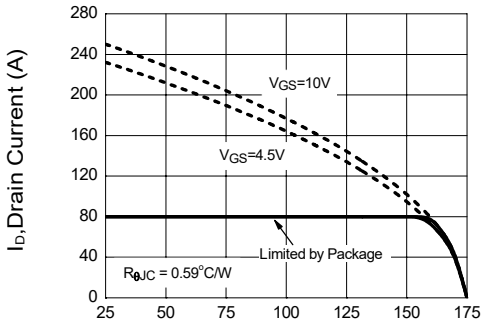


Figure 10: Maximum Continuous Drain Current vs Case Temperature

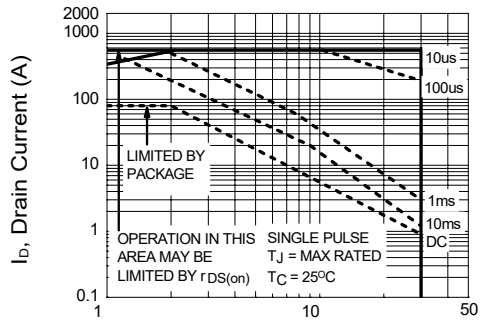


Figure 11: Forward Bias Safe Operating Area

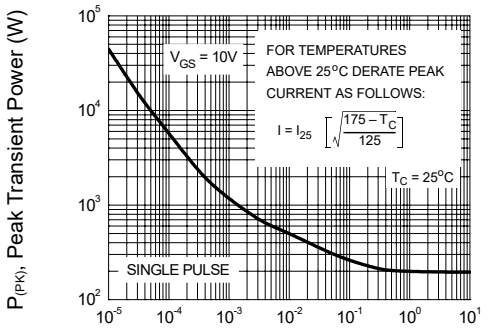


Figure 12: Single Pulse Maximum Power Dissipation

7.3Typical characteristic

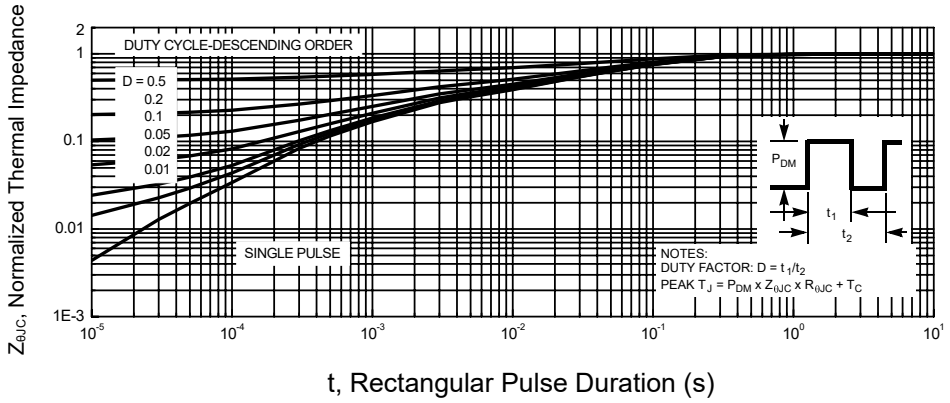
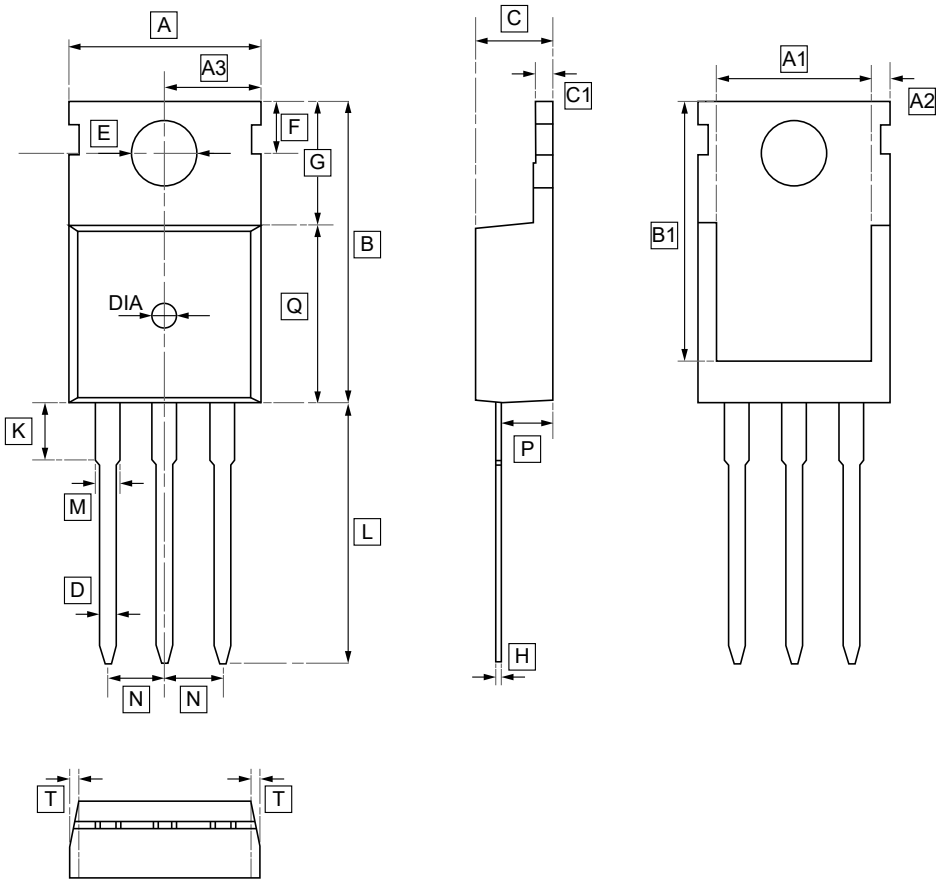


Fig 13: Transient Thermal Response Curve

8.TO-220 Package Outline Dimensions

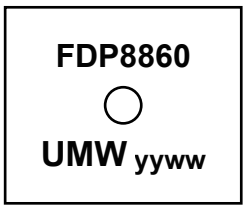


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	B	B1	C	C1	D	E	F	G
Min	9.7	8.44	1.05	4.8	15.4	12.9	4.28	1.1	0.6	3.4	2.65	5.2
Max	10.3	8.84	1.25	5.2	16.2	13.5	4.68	1.5	1.0	3.8	3.25	5.8

Symbol	H	K	L	L1	M	N	P	Q	T	DIA
Min	0.4	2.9	12.8	2.7	1.15	2.49	2.1	8.7	W:0.35	⊙1.5 (deep 0.2)
Max	0.6	3.3	13.6	3.3	1.35	2.59	2.7	9.3		

9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW FDP8860	TO-220	1000	Tube and box

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