UMW FDS7779Z

-30V P-Channel MOSFET

1.Description

This P-channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers, and battery chargers.

2.1Features

- $V_{DS\ (V)}$=-30V
- I_D=-16A
- $R_{DS(ON)}$<7.2mΩ(V_{GS}=-10V)
- $R_{DS(ON)}$<11.5mΩ(V_{GS}=-4.5V)

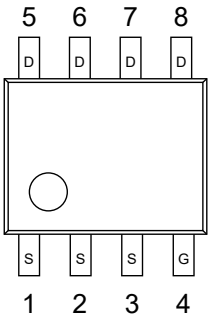
2.2Features

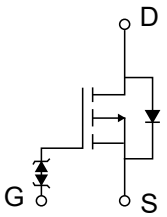
- ESD protection diode (note 3)
- High power and current handling capability
- High performance trench technology for extremely low $R_{DS(ON)}$

3.Pinning information

Pin	Symbol	Description
4	G	GATE
1,2,3	S	SOURCE
5,6,7,8	D	DRAIN

SOP-8





4.Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Value	Units
Drain-Source Voltage		V_{DSS}	-30	V
Gate-Source Voltage		V_{GSS}	±25	V
Drain Current – Continuous		I_D	-16	A
– Pulsed	(Note 1a)		-50	
Power Dissipation for Single Operation	(Note 1a)	P_D	2.5	W
	(Note 1b)		1.2	
	(Note 1c)		1	
Operating and Storage Junction Temperature Range		T_J, T_{STG}	-55 to 150	°C

5.Thermal Characteristics

Parameter	Symbol	Rating	Units
Thermal Resistance, Junction-to-Ambient (Note 1a)	$R_{\theta JA}$	50	°C/W
Thermal Resistance, Junction-to-Case (Note 1)	$R_{\theta JC}$	25	°C/W

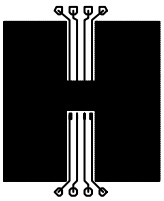
6.Electrical Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=-250μA, V_{GS}=0V	-30			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I_D=-250μA Referenced to 25°C		-22		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-24V, V_{GS}=0V			-1	μA
Gate–Body Leakage	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±10	μA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-1	-1.5	-3	V
Gate Threshold Voltage Temperature Coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	I_D=-250μA Referenced to 25°C		5		mV/°C
Static Drain–Source On–Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-16A		6	7.2	mΩ
		V_{GS}=-4.5V, I_D=-15A		9	11.5	mΩ
On–State Drain Current	$I_{D(ON)}$	V_{GS}=-4.5V, V_{DS}=-5V	-50			A
Forward Transconductance	g_{FS}	V_{DS}=-5V, I_D=-13A		43		S
Input Capacitance	C_{iss}	V_{DS}=-15V V_{GS}=0V f =1MHz		3800		pF
Output Capacitance	C_{oss}			980		pF
Reverse Transfer Capacitance	C_{rss}			490		pF
Gate Resistance	R_G	V_{GS}=15mV, f =1MHz		3		Ω
Turn-On DelayTime	$t_{D(on)}$	V_{DD}=-15V, I_D=-1A V_{GS}=-10V, R_{GEN}=6Ω		20	36	ns
Turn-On Rise Time	t_r			9	18	ns
Turn-Off DelayTime	$t_{D(off)}$			100	160	ns
Turn-Off Fall Time	t_f			55	88	ns
Total Gate Charge	Q_g	V_{DS}=-15V, I_D=-16A V_{GS}=-10V		70	98	nC
Gate–Source Charge	Q_{gs}			10		nC
Gate–Drain Charge	Q_{gd}			16		nC
Maximum Continuous Drain–Source Diode Forward Current	I_S				-2.5	A

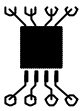
Drain–Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=-2.5A (Note 2)		-0.7	-1.2	V
Diode Reverse Recovery Time	T_{rr}	I_F=-16A, d_{IF}/d_t=100A/μs		39		nS
Diode Reverse Recovery Charge	Q_{rr}	(Note 2)		24		nC

Notes:

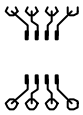
1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) 50°C/W (10 sec)
62.5°C/W steady state
when mounted on a
1in ^{2} pad of 2 oz copper



b) 105° C/W when
mounted on a 0.4 in ^{2}
pad of 2 oz. copper.

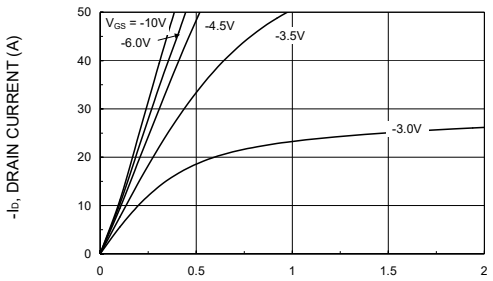


c) 125° C/W when
mounted on a minimum
pad.
Scale 1:1 on letter size paper

2. Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%

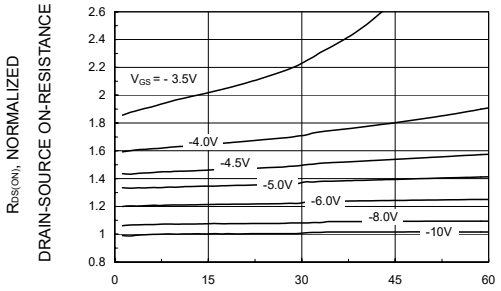
3. The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

7.1TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



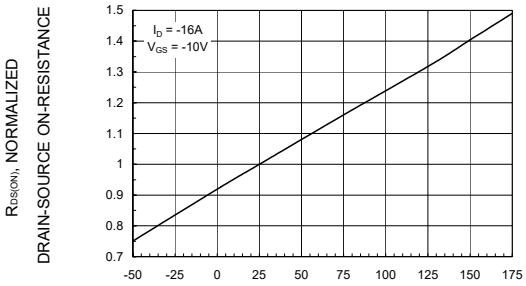
-$V_{DS,}$ DRAIN TO SOURCE VOLTAGE (V)

Fig 1: On-Region Characteristics.



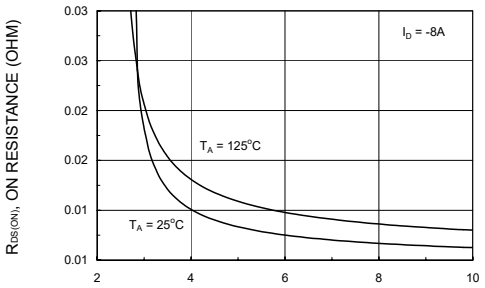
-I_D, DRAIN CURRENT (A)

Figure 2: On-Resistance Variation with Drain Current and Gate Voltage.



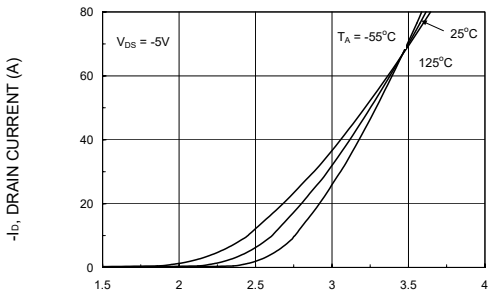
T_J, JUNCTION TEMPERATURE (°C)

Figure 3: On-Resistance Variation with Temperature.



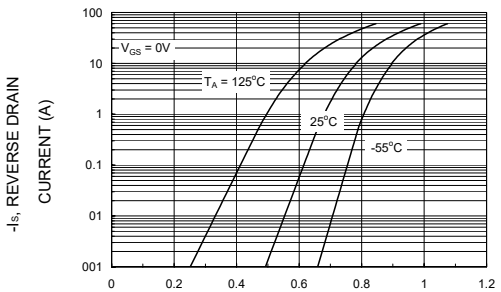
-V_{GS}, GATE TO SOURCE VOLTAGE (V)

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



-V_{GS}, GATE TO SOURCE VOLTAGE (V)

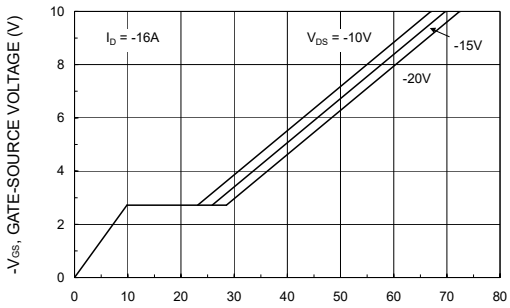
Figure 5: Transfer Characteristics.



-V_{SD}, BODY DIODE VOLTAGE (V)

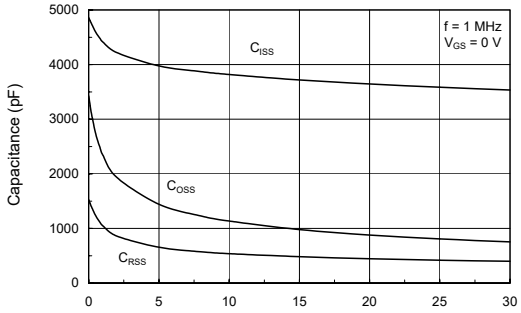
Figure 6: . Body Diode Forward Voltage Variation with Source Current and Temperature.

7.2TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



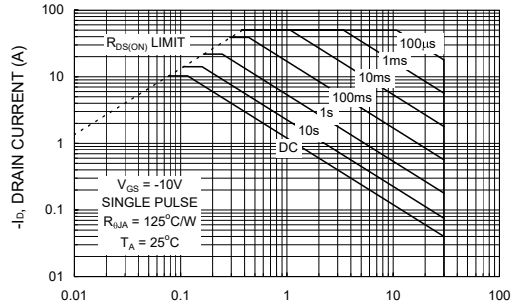
Q_g, GATE CHARGE (nC)

Figure 7: Gate-Charge Characteristics.



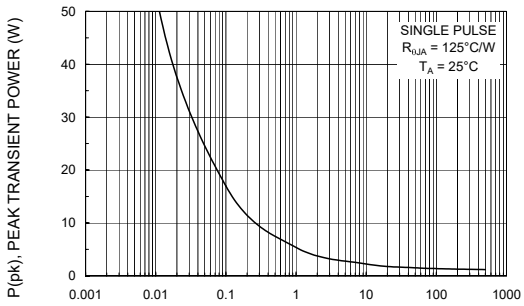
$-V_{DS}$, DRAIN TO SOURCE VOLTAGE (V)

Figure 8: Capacitance Characteristics.



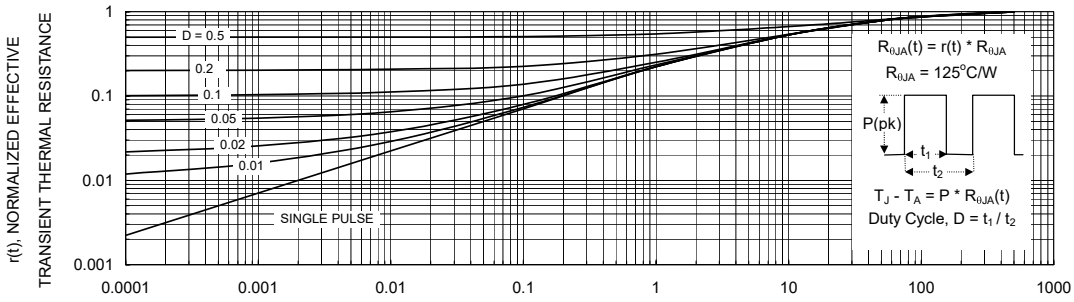
$-V_{DS}$, DRAIN-SOURCE VOLTAGE (V)

Figure 9: Maximum Safe Operating Area.



t_1, TIME (sec)

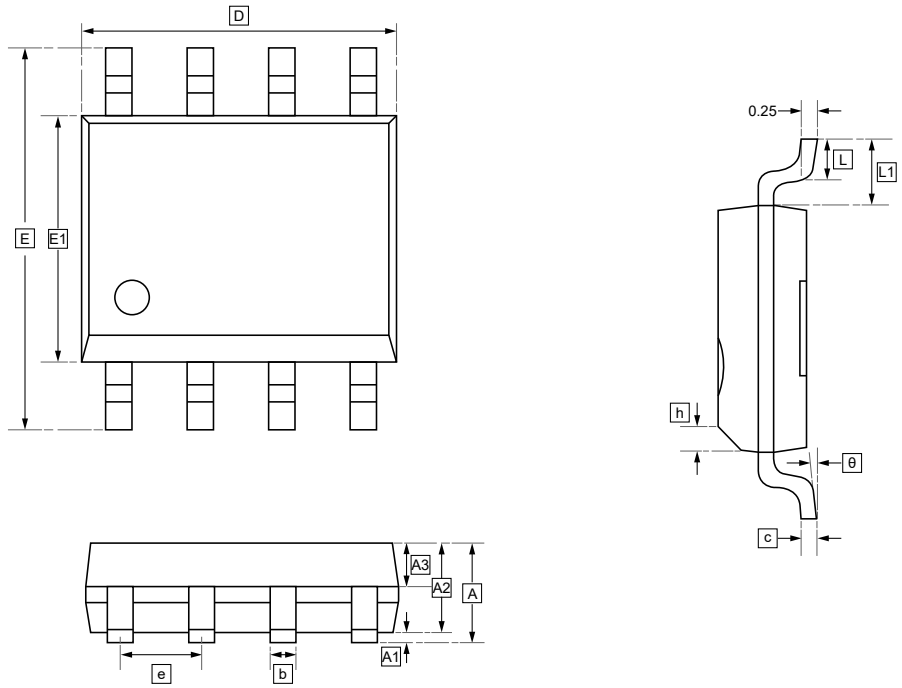
Figure 10: Single Pulse Maximum Power Dissipation.



t_1,TIME (sec)

Figure 11: Transient Thermal Response Curve.

8.SOP-8 Package Outline Dimensions

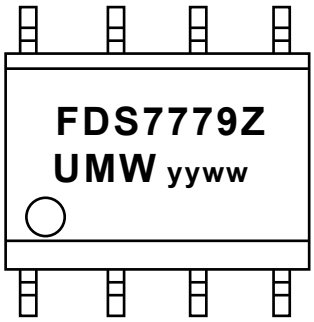


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	c	D	E	E1	e	h	L
Min	-	0.05	1.30	0.60	0.39	0.20	4.70	5.80	3.80	1.24	0.30	0.50
Max	1.75	0.20	1.50	0.70	0.47	0.24	5.10	6.20	4.00	1.30	0.50	0.80

Symbol	L1	θ
Min	1.00	0°
Max	1.10	8°

9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW FDS7779Z	SOP-8	3000	Tape and reel

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