UMW FDS9435A

-30V P-Channel MOSFET

1.Description

This P-Channel MOSFET is a rugged gate version of advanced PowerTrench process. It has been optimized for power management applications requiring a wide range of gave drive voltage ratings (4.5V – 25V).

2.1Features

- $V_{DS\ (V)}$=-30V
- I_D=-5.3A
- $R_{DS(ON)}$<50mΩ(V_{GS}=-10V)
- $R_{DS(ON)}$<80mΩ(V_{GS}=-4.5V)

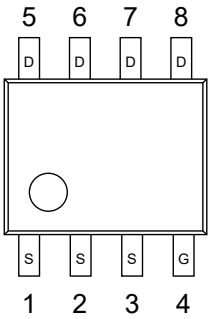
2.2Features

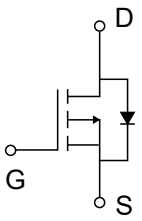
- High power and current handling capability
- High performance trench technology for extremely low $R_{DS(ON)}$
- Fast switching speed
- Low gate charge

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	-5.3	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 175	°C

5.Thermal Characteristics

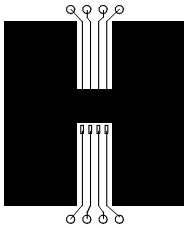
Parameter	Symbol	Rating	Units
Thermal Resistance, Junction-to-Ambient (Note 1a)	$R_{\theta JA}$	50	°C/W
Thermal Resistance, Junction-to-Ambient (Note 1c)	$R_{\theta JA}$	125	°C/W
Thermal Resistance, Junction-to-Case (Note 1)	$R_{\theta JC}$	25	°C/W

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

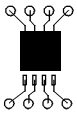
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=-250μA, V_{GS}=0V	-30			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I_D=-250μA Referenced to 25°C		-23		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-24V, V_{GS}=0V			-1	μA
Gate–Body Leakage, Forward	I_{GSSF}	V_{GS}=25V, V_{DS}=0V			100	nA
Gate–Body Leakage, Reverse	I_{GSSR}	V_{GS}=-25V, V_{DS}=0V			-100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-1	-1.7	-3	V
Gate Threshold Voltage Temperature Coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	I_D=-250μA Referenced to 25°C		4.5		mV/°C
Static Drain–Source On–Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-5.3A		42	50	mΩ
		V_{GS}=-4.5V, I_D=-4A		65	80	mΩ
On–State Drain Current	$I_{D(ON)}$	V_{GS}=-10V, V_{DS}=-5V	-25			A
Forward Transconductance	g_{FS}	V_{DS}=-5V, I_D=-5.3A		10		S
Input Capacitance	C_{iss}	V_{DS}=-15V V_{GS}=0V f =1MHz		528		pF
Output Capacitance	C_{oss}			132		pF
Reverse Transfer Capacitance	C_{rss}			70		pF
Turn-On DelayTime	$t_{D(on)}$	V_{DD}=-15V, I_D=-1A V_{GS}=-10V, R_{GEN}=6Ω		7	14	ns
Turn-On Rise Time	t_r			13	24	ns
Turn-Off DelayTime	$t_{D(off)}$			14	25	ns
Turn-Off Fall Time	t_f			9	17	ns
Total Gate Charge	Q_g	V_{DS}=-15V, I_D=-4A V_{GS}=-10V		10	14	nC
Gate–Source Charge	Q_{gs}			2.2		nC
Gate–Drain Charge	Q_{gd}			2		nC
Maximum Continuous Drain–Source Diode Forward Current	I_S				-2.1	A
Drain–Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=-2.1A (Note 2)		-0.8	-1.2	V

Notes:

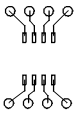
1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) 50° C/W when mounted on a 1 in ^{2} pad of 2 oz. copper.



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

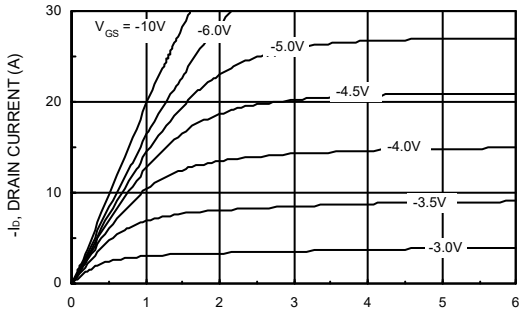


c) 125° C/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

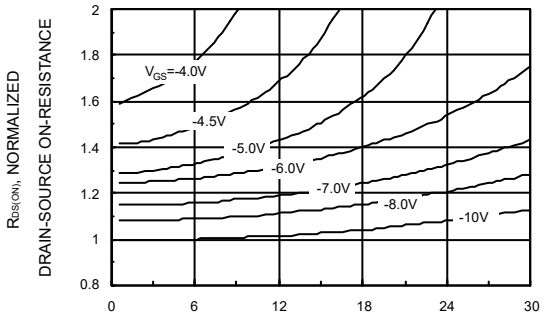
2. Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%

7.1TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



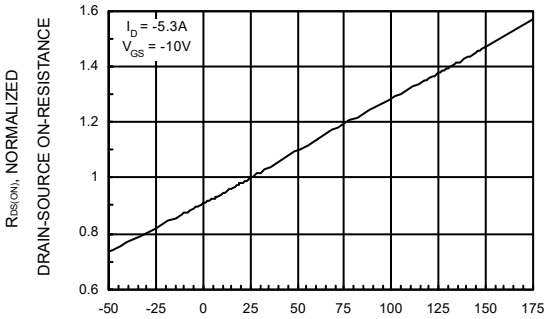
$-V_{DS,}$ DRAIN TO SOURCE VOLTAGE (V)

Fig 1: On-Region Characteristics.



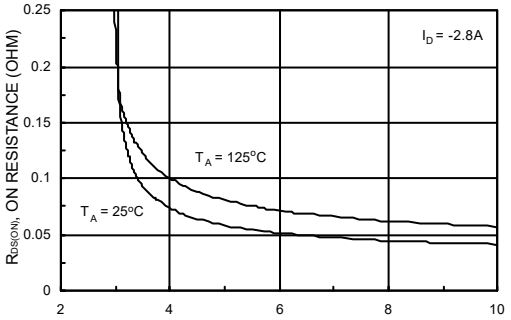
$-I_D$, DRAIN CURRENT (A)

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



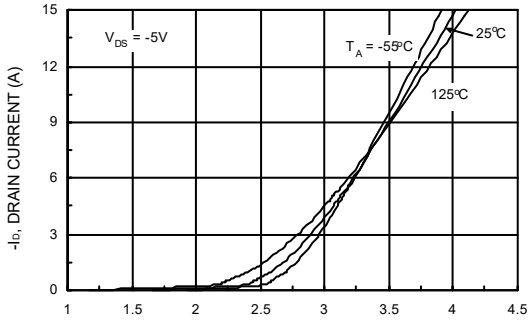
T_J, JUNCTION TEMPERATURE (°C)

Figure 3: On-Resistance Variation with Temperature.



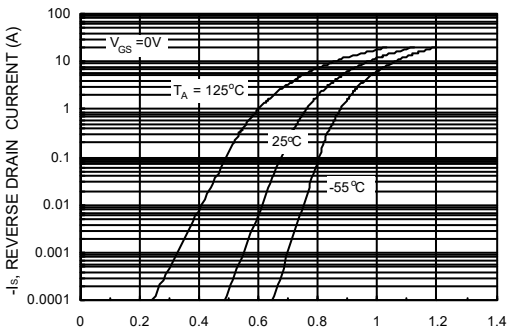
$-V_{GS}$, GATE TO SOURCE VOLTAGE (V)

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



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

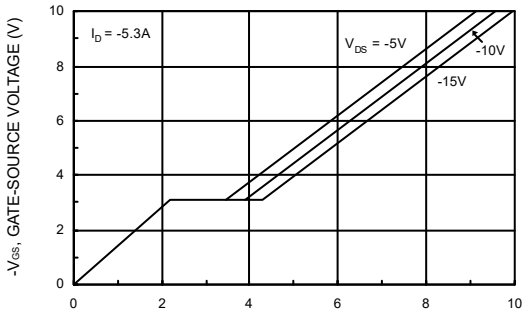
Figure 5: Transfer Characteristics.



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

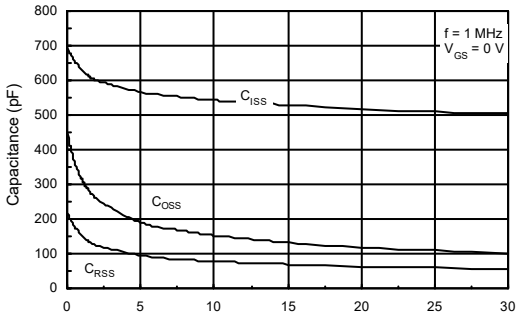
Figure 6: . Body Diode Forward Voltage Variation with Source Current and Temperature.

7.2TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



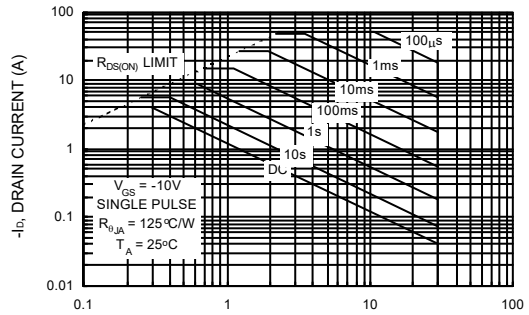
Q_g, GATE CHARGE (nC)

Figure 7: Gate-Charge Characteristics



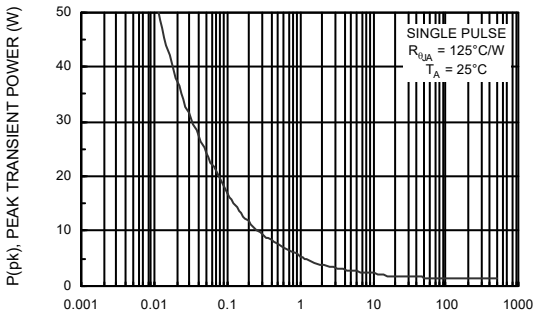
-V_{DS}, DRAIN TO SOURCE VOLTAGE (V)

Figure 8: Capacitance Characteristics



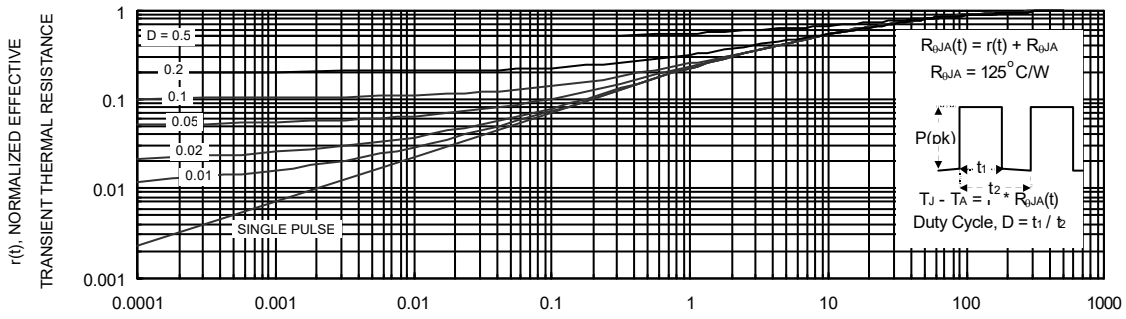
-V_{DS}, DRAIN-SOURCE VOLTAGE (V)

Figure 9: Maximum Safe Operating Area.



t_1, TIME (sec)

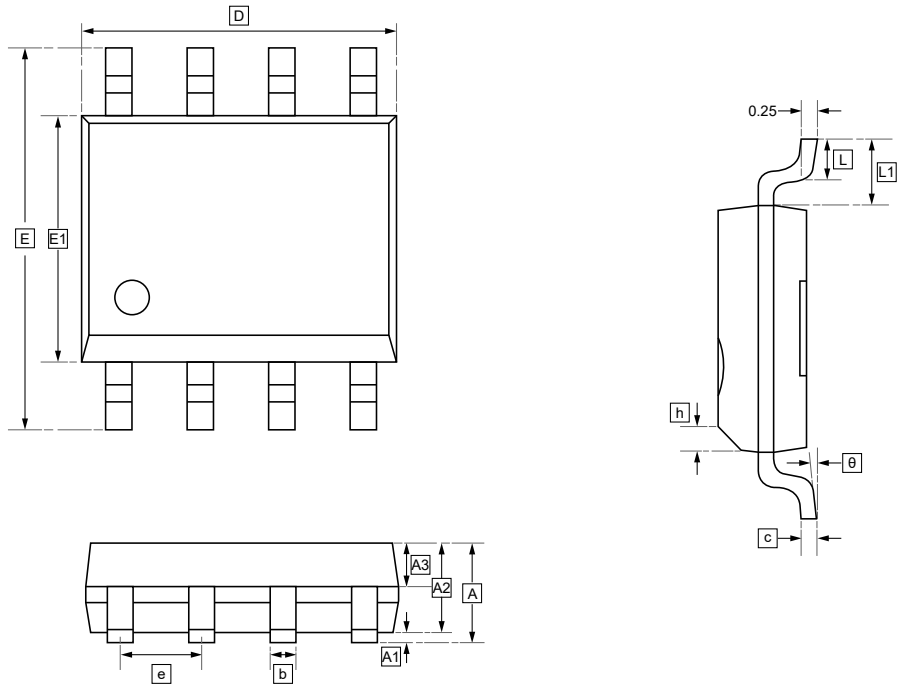
Figure 10: Single Pulse Maximum Power Dissipation.



t_1,TIME (sec)

Figure 11: Transient Thermal Response Curve.

8.SOP-8 Package Outline Dimensions

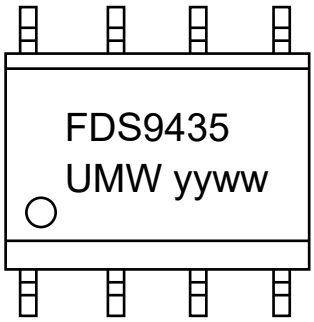


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	c	D	E	E1	e	h	L
Min	-	0.05	1.30	0.60	0.39	0.20	4.80	5.80	3.80	1.24	0.30	0.50
Max	1.75	0.20	1.50	0.70	0.47	0.24	5.00	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 FDS9435A	SOP-8	3000	Tape and reel

10.Disclaimer

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