UMW FDS6676AS

30V N-Channel MOSFET

1.Description

The FDS6676AS is designed to replace a single SO-8 MOSFET and Schottky diode in synchronous DC:DC power supplies.This 30V MOSFET is designed to maximize power conversion efficiency, providing a low $R_{DS(ON)}$ and low gate charge.

2.1Features

- $V_{DS\ (V)}$=30V
- I_D=14.5A(V_{GS}=10V)
- $R_{DS(ON)}$<6mΩ(V_{GS}=10V)
- $R_{DS(ON)}$<7.25mΩ(V_{GS}=4.5V)

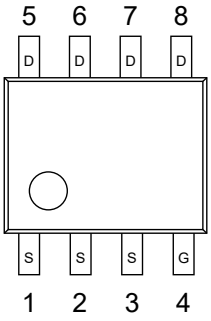
2.2Features

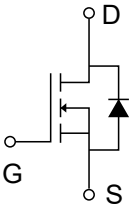
- High power and current handling capability.
- High performance trench technology for extremely low $R_{DS(ON)}$ and fast switching RoHS Compliant
- Includes SyncFET Schottky body diode
- Low gate charge (45nC typical)

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}	±20	V
Drain Current – Continuous		I_D	14.5	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

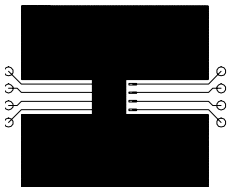
6.Electrical Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Off Characteristics						
Drain-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=10mA Referenced to 25°C		20		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=24V, V_{GS}=0V			500	μA
Gate–Body Leakage	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±100	nA
On Characteristics (Note 2)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=1mA	1	1.5	3	V
Gate Threshold Voltage Temperature Coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	I_D=10mA Referenced to 25°C		-4		mV/°C
Static Drain–Source On–Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=14.5A		4.5	6	mΩ
		V_{GS}=4.5V, I_D=13.2A		5.9	7.25	
On–State Drain Current	$I_{D(ON)}$	V_{GS}=10V, V_{DS}=5V	50			A
Forward Transconductance	g_{FS}	V_{DS}=10V, I_D=14.5A		66		S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=15V, V_{GS}=0V, f =1MHz		2510		pF
Output Capacitance	C_{oss}			710		pF
Reverse Transfer Capacitance	C_{rss}			270		pF
Gate Resistance	R_G	V_{GS}=15mV, f =1MHz		1.6	2.8	Ω
SWITCHING PARAMETERS (Note 2)						
Turn-On DelayTime	$t_{D(on)}$	V_{DD}=15V, I_D=1A V_{GS}=10V, R_{GEN}=6Ω		10	20	ns
Turn-On Rise Time	t_r			12	22	ns
Turn-Off DelayTime	$t_{D(off)}$			43	69	ns
Turn-Off Fall Time	t_f			29	46	ns

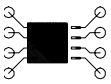
Turn-On DelayTime	$t_{D(on)}$	V_{DD}=15V, I_D=1A V_{GS}=4.5V, R_{GEN}=6Ω		17	31	ns
Turn-On Rise Time	t_r			22	35	ns
Turn-Off DelayTime	$t_{D(off)}$			34	54	ns
Turn-Off Fall Time	t_f			29	46	ns
Total Gate Charge at V_{GS}=10V	Q_g(TOT)	V_{DD}=15V, I_D=14.5A		45	63	nC
Total Gate Charge at V_{GS}=5V	Q_g			25	35	nC
Gate–Source Charge	Q_{gs}			7		nC
Gate–Drain Charge	Q_{gd}			8		nC
Drain-Source Diode Characteristics						
Drain–Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=3.5A (Note 2)		0.4	0.7	V
		V_{GS}=0V, I_S=7A (Note 2)		0.5		V
Diode Reverse Recovery Time	t_{rr}	I_F=14.5A dI_F/dt=300A/μs (Note 3)		27		nS
Diode Reverse Recovery Current	I_{RM}			1.9		A
Diode Reverse Recovery Charge	Q_{rr}			26		nC

Notes:

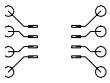
1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.



a) 50° C/W when mounted on a 0.5 in ^{2} pad of 2 oz. copper.

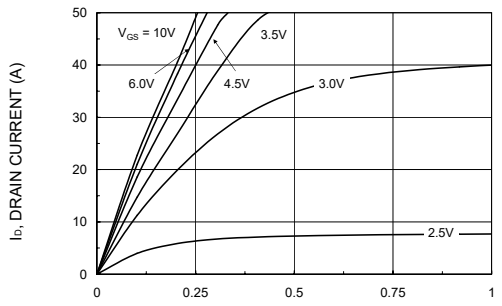


b) 105° C/W when mounted on a 0.02 in ^{2} pad of 2 oz. copper.



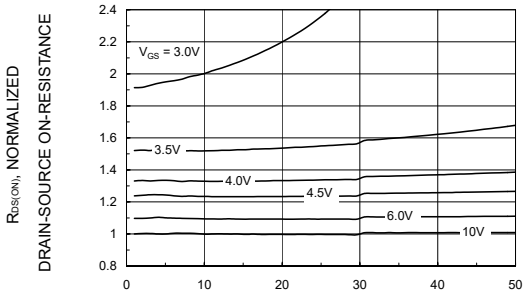
c) 125° C/W when mounted on a 0.003 in ^{2} pad of 2 oz. copper.

7.1TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



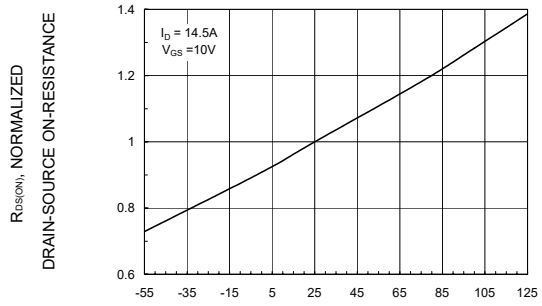
V_{DS}, DRAIN TO SOURCE VOLTAGE (V)

Fig 1: On-Region Characteristics.



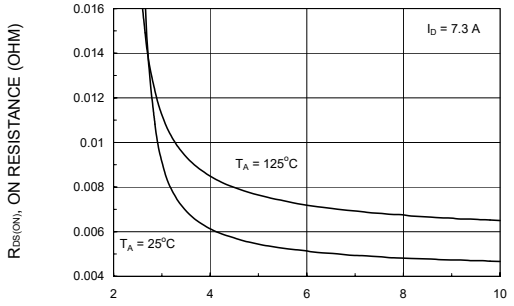
I_D, DRAIN CURRENT (A)

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



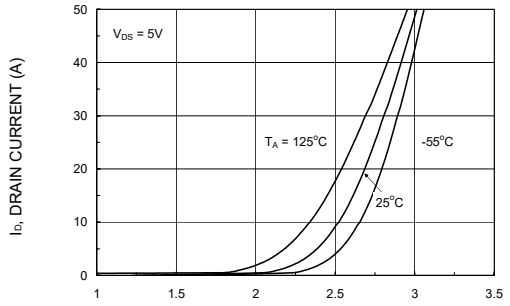
T_J, JUNCTION TEMPERATURE (°C)

Figure 3: On-Resistance Variation with Temperature.



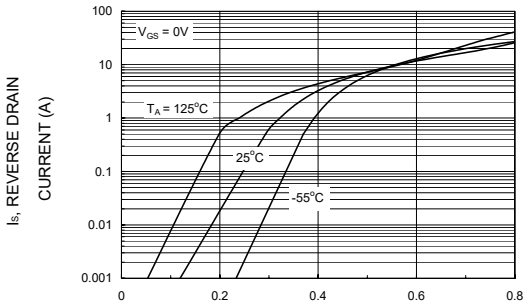
V_{GS}, GATE TO SOURCE VOLTAGE (V)

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

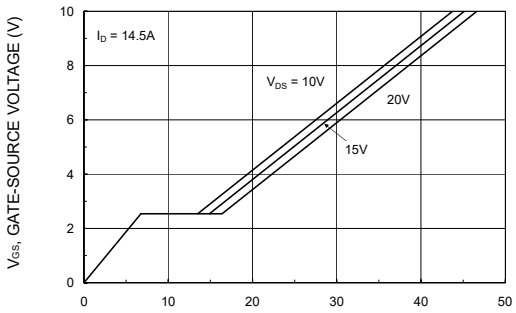


Figure 7: Gate-Charge Characteristics

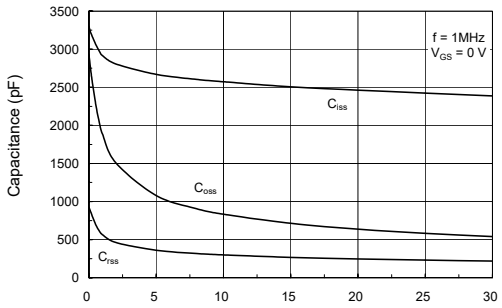


Figure 8: Capacitance Characteristics

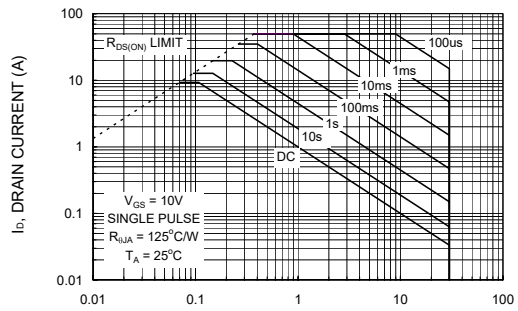


Figure 9: Maximum Safe Operating Area.

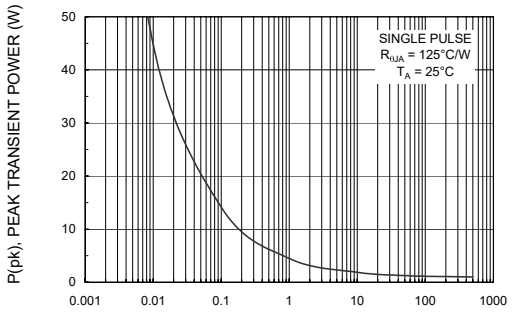


Figure 10: Single Pulse Maximum Power Dissipation.

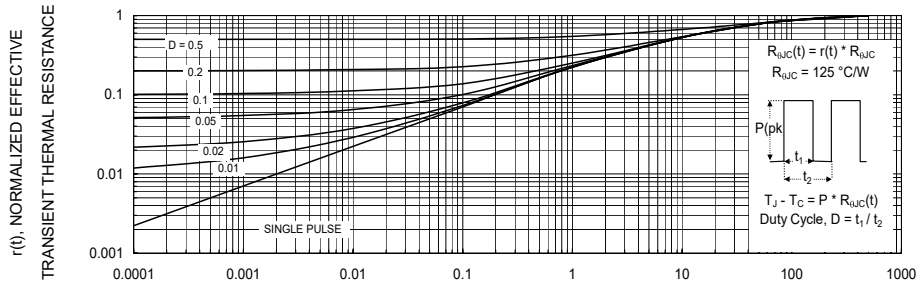


Figure 11: Transient Thermal Response Curve.

7.3TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

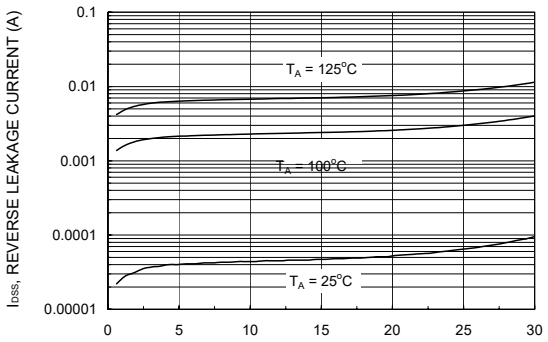


Figure 12: SyncFET body diode reverse leakage versus drain-source voltage and temperature.

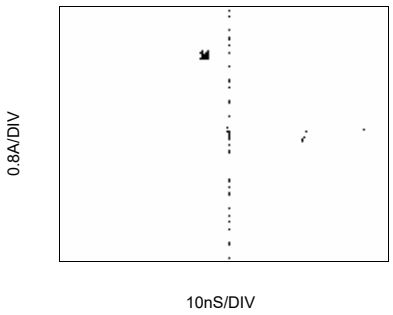


Figure 13: . FDS6676AS SyncFET body diode reverse recovery characteristic.

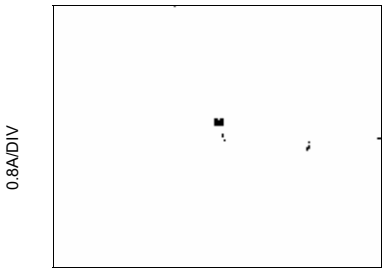
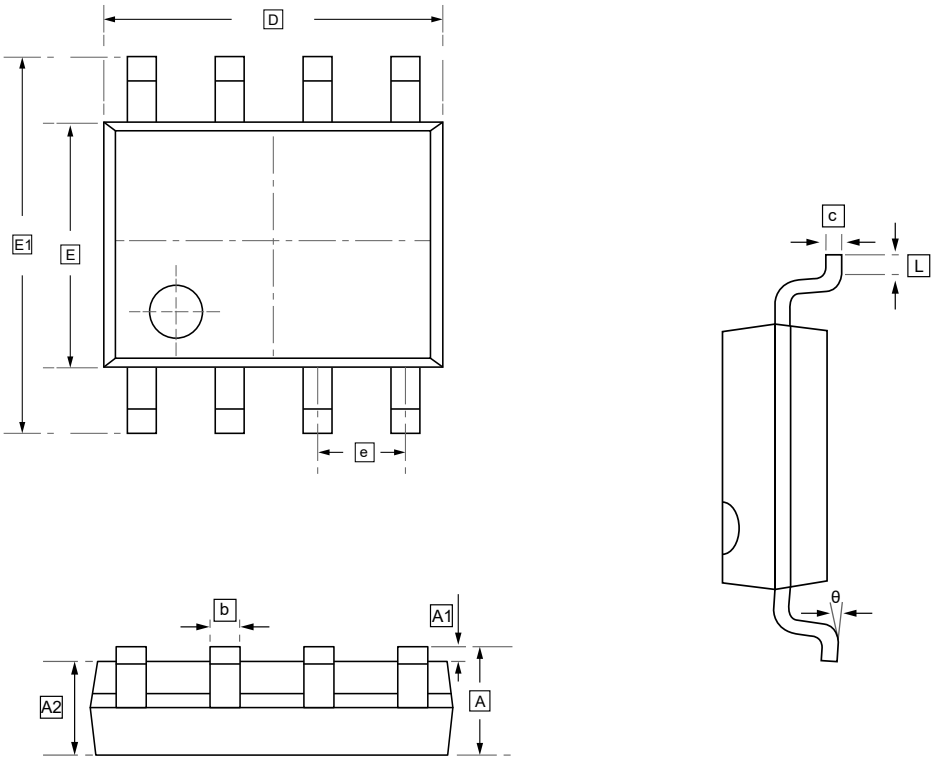


Figure 14: Non-SyncFET (FDS6676) body diode reverse recovery characteristic

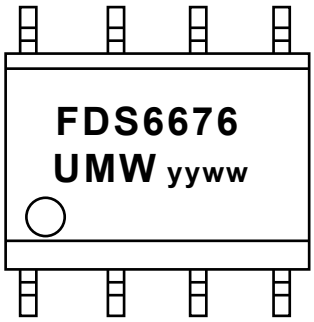
8.SOP-8 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	c	D	E	E1	e	L	θ
Min	1.350	0.000	1.350	0.330	0.170	4.700	3.800	5.800	1.270	0.400	0°
Max	1.750	0.100	1.550	0.510	0.250	5.100	4.000	6.200	BSC	1.270	8°

9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW FDS6676AS	SOP-8	3000	Tape and reel

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