# 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
- $R_{DS(ON)}$<6mΩ($V_{GS}$=10V)
- $R_{DS(ON)}$<7.25mΩ($V_{GS}$=4.5V)

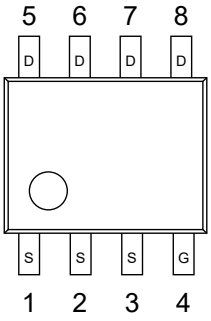
## 2.2Features

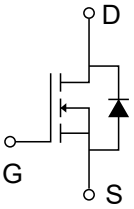
- High power and current handling capability.
- High performance trench technology for extremely low $R_{DS(ON)}$ and fast switching RoHS Compliant
- Includes SyncFET Schottky body diode
- Low gate charge (45nC typical)

## 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 |

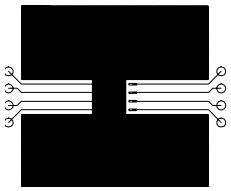
## 6.Electrical Characteristics ($T_A$=25°C unless otherwise noted)

| 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<br>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<br>Temperature Coefficient | $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | $I_D$=10mA<br>Referenced to 25°C | | -4 | | mV/°C |
| Static Drain–Source<br>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<br>$V_{GS}$=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 |

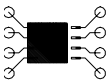
| | | | | | | |
|---|---|---|---|---|---|---|
| Turn-On DelayTime | $t_{D(on)}$ | $V_{DD}$=15V, $I_D$=1A<br>$V_{GS}$=4.5V, $R_{GEN}$=6Ω | | 17 | 31 | ns |
| Turn-On Rise Time | $t_r$ | | | 22 | 35 | ns |
| Turn-Off DelayTime | $t_{D(off)}$ | | | 34 | 54 | ns |
| Turn-Off Fall Time | $t_f$ | | | 29 | 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<br>$dI_F/dt$=300A/μs (Note 3) | | 27 | | nS |
| Diode Reverse Recovery Current | $I_{RM}$ | | | 1.9 | | A |
| Diode Reverse Recovery Charge | $Q_{rr}$ | | | 26 | | nC |

Notes:

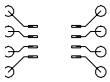
1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.



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

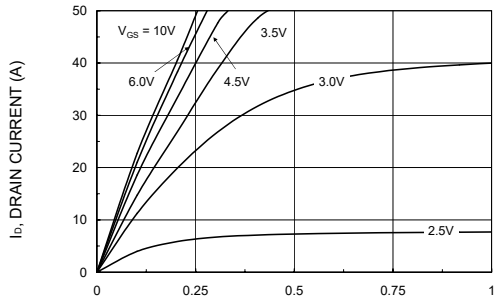


b) 105° C/W when mounted on a 0.02 in $^2$ pad of 2 oz. copper.



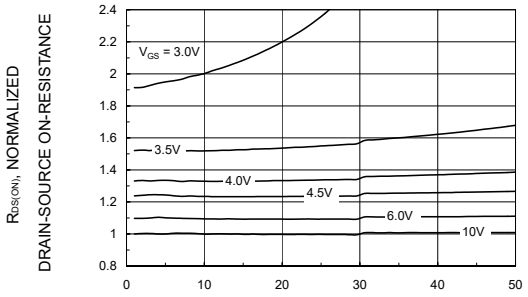
c) 125° C/W when mounted on a 0.003 in $^2$ pad of 2 oz. copper.

## 7.1 Typical Electrical And Thermal Characteristics



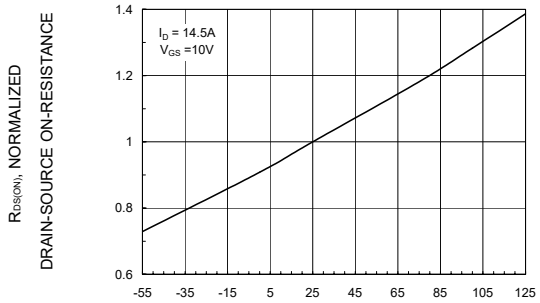

$V_{DS}$, DRAIN TO SOURCE VOLTAGE (V)

Fig 1: On-Region Characteristics.



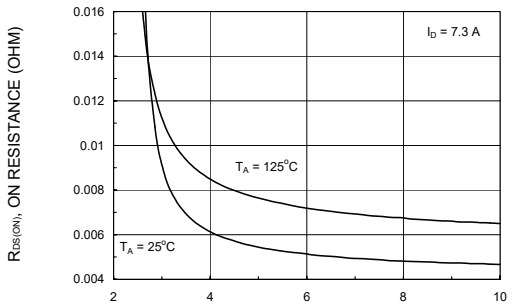

$I_D$, DRAIN CURRENT (A)

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



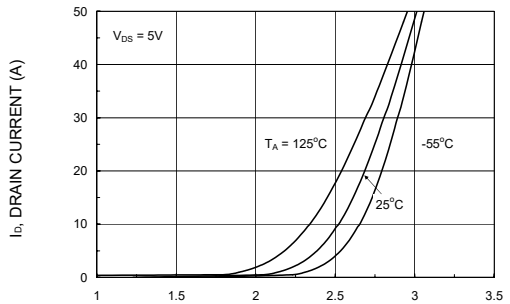

$T_J$, JUNCTION TEMPERATURE (°C)

Figure 3: On-Resistance Variation with Temperature.



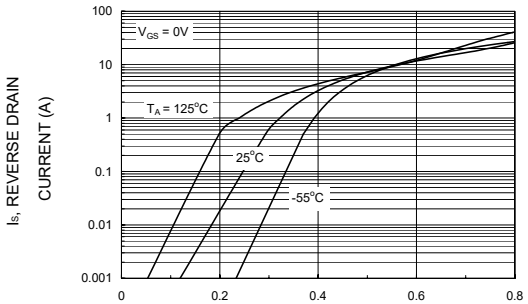

$V_{GS}$, GATE TO SOURCE VOLTAGE (V)

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.

## 7.2 Typical Electrical And Thermal Characteristics

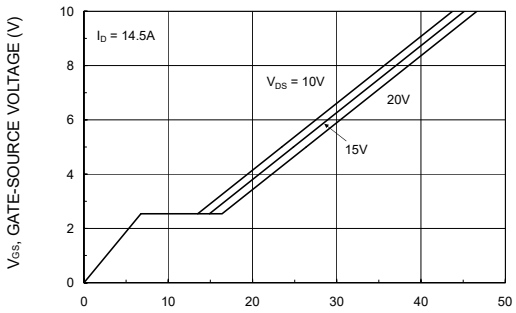



Figure 7: Gate-Charge Characteristics

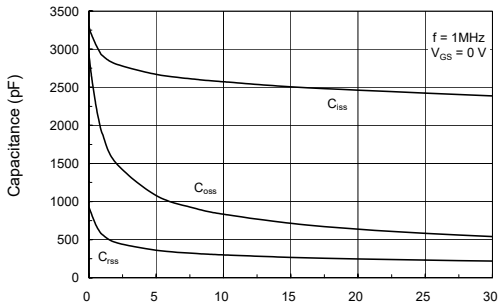



Figure 8: Capacitance Characteristics

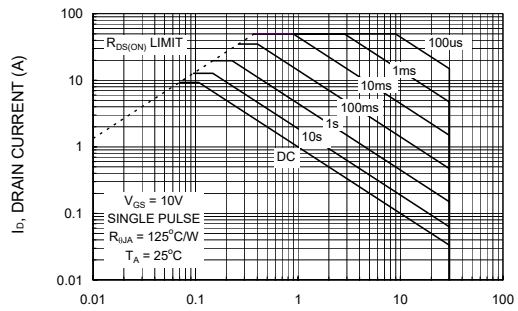



Figure 9: Maximum Safe Operating Area.

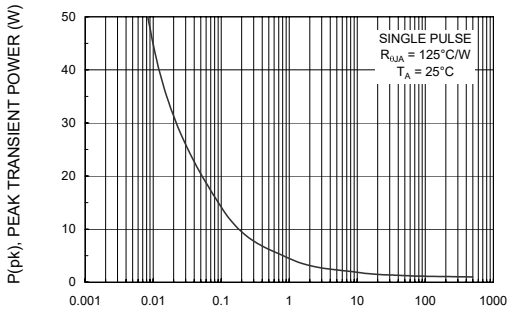



Figure 10: Single Pulse Maximum Power Dissipation.

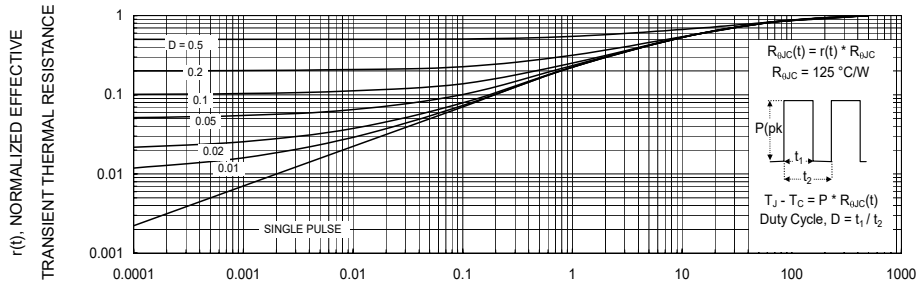
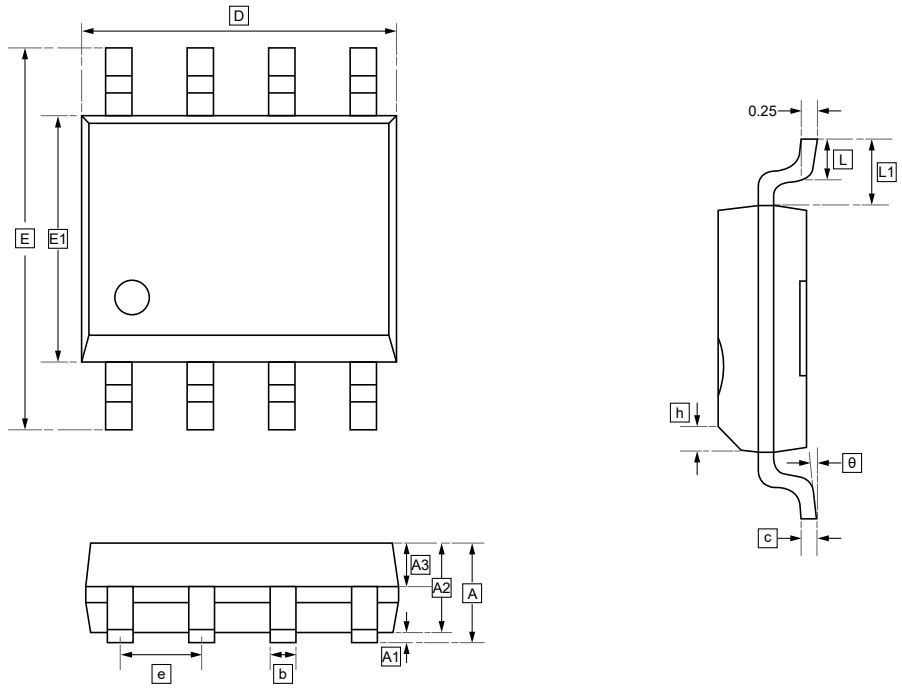



Figure 11: Transient Thermal Response Curve.

## 8.SOP-8 Package Outline Dimensions

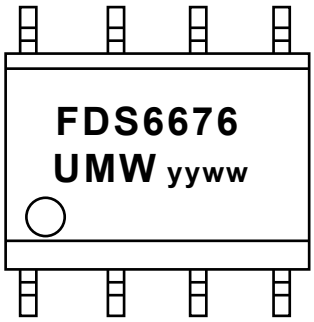



**DIMENSIONS (mm are the original dimensions)**

| 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 FDS6676AS | SOP-8 | 3000 | Tape and reel |

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