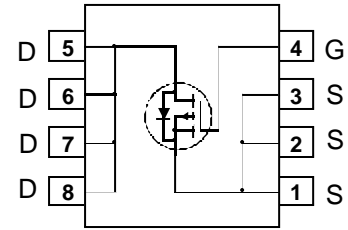


### General Description

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 gate drive voltage ratings (4.5V – 25V).



### Features

- $V_{DS(V)} = -30V$
- $I_D = -8.8 A (V_{GS} = 10V)$
- $R_{DS(ON)} < 20m\Omega (V_{GS} = -10V)$
- $R_{DS(ON)} < 35 m\Omega (V_{GS} = -4.5V)$
- Low gate charge (17nC typical)
- Fast switching speed
- High performance trench technology for extremely low  $R_{DS(ON)}$
- High power and current handling capability

### Applications

- Power management
- Load switch
- Battery protection

### Absolute Maximum Ratings T<sub>A</sub>=25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V <sub>DSS</sub>	Drain-Source Voltage	-30	V
V <sub>GSS</sub>	Gate-Source Voltage	±25	V
I <sub>D</sub>	Drain Current – Continuous (Note 1a)	-8.8	A
		-50	
P <sub>D</sub>	Power Dissipation for Single Operation (Note 1a)	2.5	W
		1.2	
		1	
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Junction Temperature Range	-55 to +175	°C

### Thermal Characteristics

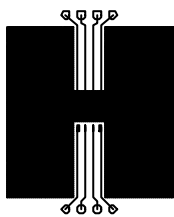
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1a)	50	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1c)	125	°C/W
R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case (Note 1)	25	°C/W

**Electrical Characteristics**  $T_A = 25^\circ\text{C}$  unless otherwise noted

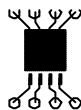
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$	-30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$		-21		$\text{mV}/^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -24\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
$I_{GSSF}$	Gate-Body Leakage, Forward	$V_{GS} = 25\text{ V}, V_{DS} = 0\text{ V}$			100	nA
$I_{GSSR}$	Gate-Body Leakage, Reverse	$V_{GS} = -25\text{ V}, V_{DS} = 0\text{ V}$			-100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-1	-1.7	-3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$		5		$\text{mV}/^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = -10\text{ V}, I_D = -8.8\text{ A}$ $V_{GS} = -4.5\text{ V}, I_D = -6.7\text{ A}$		15 22	20 35	$\text{m}\Omega$
$I_{D(on)}$	On-State Drain Current	$V_{GS} = -10\text{ V}, V_{DS} = -5\text{ V}$	-25			A
$g_{FS}$	Forward Transconductance	$V_{DS} = -5\text{ V}, I_D = -8.8\text{ A}$		24		S
$C_{iss}$	Input Capacitance	$V_{DS} = -15\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		1604		pF
$C_{oss}$	Output Capacitance			408		pF
$C_{rss}$	Reverse Transfer Capacitance			202		pF
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -15\text{ V}, I_D = -1\text{ A},$ $V_{GS} = -10\text{ V}, R_{GEN} = 6\ \Omega$		13	23	ns
$t_r$	Turn-On Rise Time			13.5	24	ns
$t_{d(off)}$	Turn-Off Delay Time			42	68	ns
$t_f$	Turn-Off Fall Time			25	40	ns
$Q_g$	Total Gate Charge	$V_{DS} = -15\text{ V}, I_D = -8.8\text{ A},$ $V_{GS} = -5\text{ V}$		17	24	nC
$Q_{gs}$	Gate-Source Charge			5		nC
$Q_{gd}$	Gate-Drain Charge			6		nC
$I_S$	Maximum Continuous Drain-Source Diode Forward Current				-2.1	A
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = -2.1\text{ A}$ (Note 2)		-0.73	-1.2	V

**Notes:**

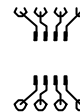
- $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.



a)  $50^\circ\text{C}/\text{W}$  when mounted on a  $1\text{ in}^2$  pad of 2 oz copper



b)  $105^\circ\text{C}/\text{W}$  when mounted on a  $.04\text{ in}^2$  pad of 2 oz copper



c)  $125^\circ\text{C}/\text{W}$  when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

- Pulse Test: Pulse Width <  $300\ \mu\text{s}$ , Duty Cycle < 2.0%

Typical Characteristics

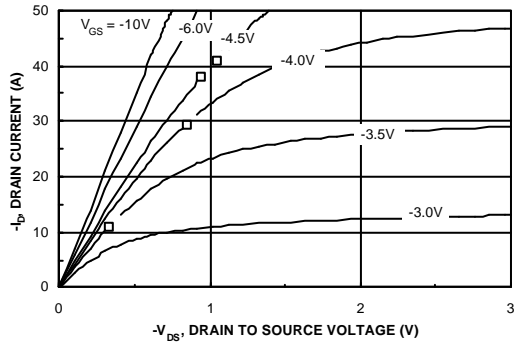


Figure 1. On-Region Characteristics.

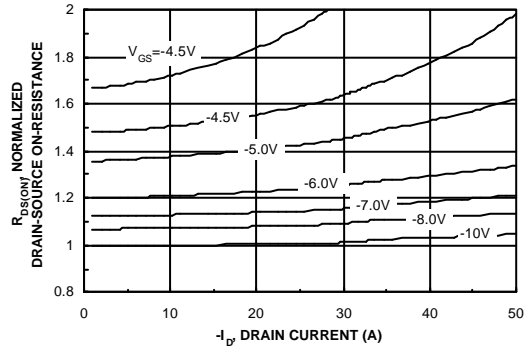


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

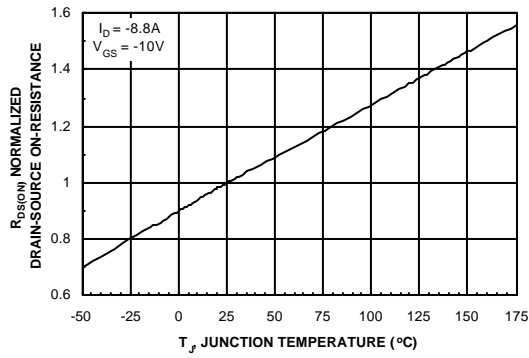


Figure 3. On-Resistance Variation with Temperature.

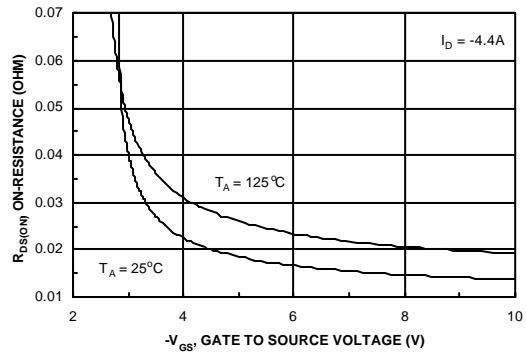


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

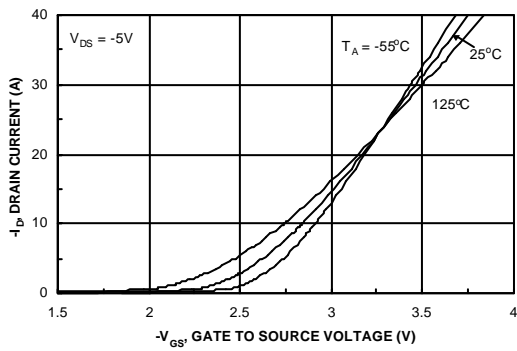


Figure 5. Transfer Characteristics.

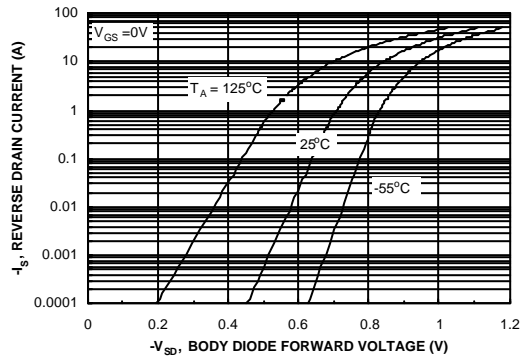


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

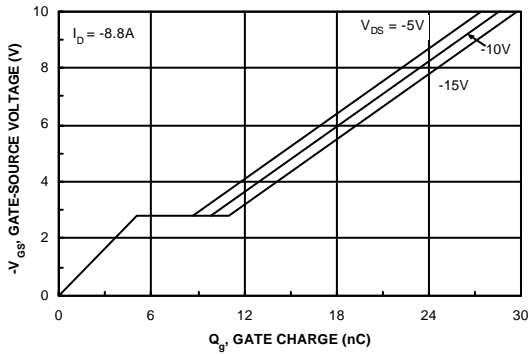


Figure 7. Gate Charge Characteristics.

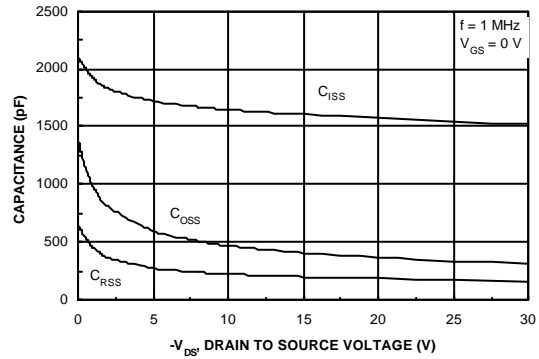


Figure 8. Capacitance Characteristics.

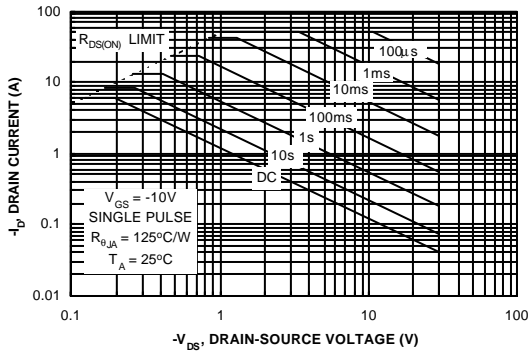


Figure 9. Maximum Safe Operating Area.

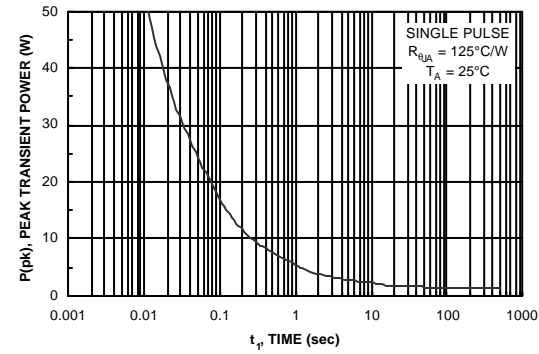


Figure 10. Single Pulse Maximum Power Dissipation.

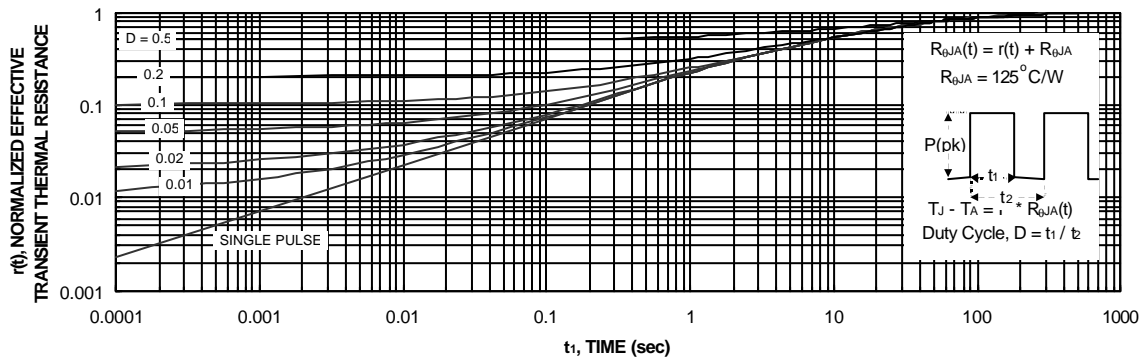
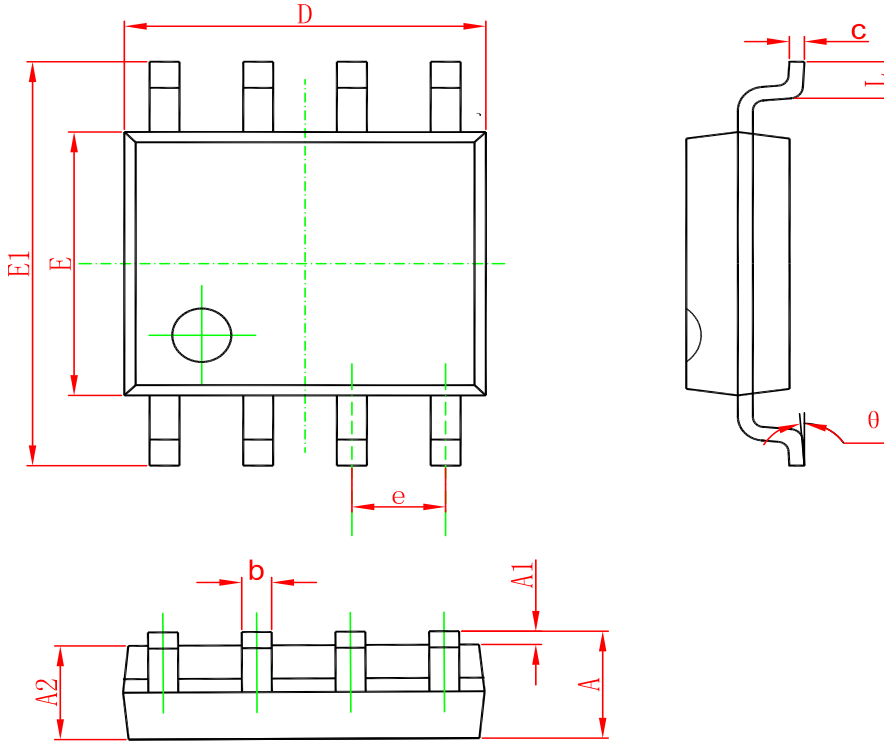


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1c. Transient thermal response will change depending on the circuit board design.

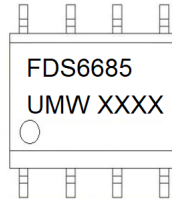
PACKAGE OUTLINE DIMENSIONS

SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
theta	0°	8°	0°	8°

## Marking



## Ordering information

Order code	Package	Baseqty	Deliverymode
UMW FDS6685	SOP-8	3000	Tape and reel