

## 1. Description

These devices are well suited for low voltage and battery powered applications where low in-line power loss and fast switching are required.

## 2.2 Features

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

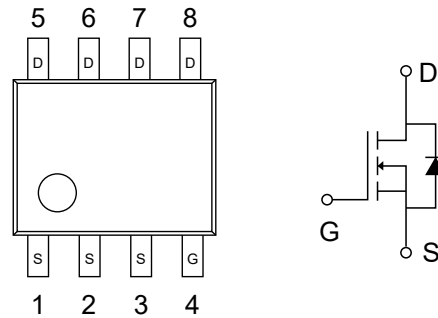
## 2.1 Features

- $V_{DS(V)}=30V$
- $I_D=12.5A(V_{GS}=10V)$
- $R_{DS(ON)}<9.5m\Omega(V_{GS}=10V)$
- $R_{DS(ON)}<13m\Omega(V_{GS}=4.5V)$

## 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 $T_A=25^\circ C$ unless otherwise noted

Parameter	Symbol	Value	Units
Drain-Source Voltage	$V_{DSS}$	30	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current – Continuous	$I_D$	12.5	A
– Pulsed (Note 1a)		50	
Power Dissipation for Single Operation	$P_D$	2.5	W
		1.2 (Note 1b)	
		1 (Note 1c)	
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$



## 5. Thermal Characteristics

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



## 6. Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

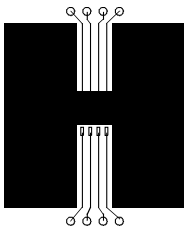
Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	30			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I <sub>D</sub> =250μA Referenced to 25°C		25		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V			1	μA
		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C			10	μA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V			±100	nA
<b>On Characteristics (Note 2)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	2	3	V
Gate Threshold Voltage Temperature Coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	I <sub>D</sub> =250μA Referenced to 25°C		-4.9		mV/°C
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =12.5A		7.8	9.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10.5A		9.9	13	
On-State Drain Current	I <sub>D(on)</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =5V	25			A
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =12.5A		64		S
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz		1620		pF
Output Capacitance	C <sub>oss</sub>			380		pF
Reverse Transfer Capacitance	C <sub>rss</sub>			160		pF
Gate Resistance	R <sub>G</sub>	V <sub>GS</sub> =15mV, f=1MHz		1.3		Ω
<b>SWITCHING PARAMETERS (Note 2)</b>						
Turn-On Delay Time	t <sub>D(on)</sub>	V <sub>DD</sub> =15V, I <sub>D</sub> =1A V <sub>GS</sub> =10V, R <sub>GEN</sub> =6Ω		10	19	ns
Turn-On Rise Time	t <sub>r</sub>			5	10	ns
Turn-Off Delay Time	t <sub>D(off)</sub>			27	43	ns
Turn-Off Fall Time	t <sub>f</sub>			15	27	ns



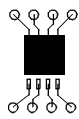
Total Gate Charge	$Q_g$	$V_{DS}=15V, I_D=12.5A$ $V_{GS}=5V$		16	23	nC
Gate–Source Charge	$Q_{gs}$			5		nC
Gate–Drain Charge	$Q_{gd}$			5.8		nC
<b>Drain–Source Diode Characteristics and Maximum Ratings</b>						
Maximum Continuous Drain–Source Diode Forward Current	$I_s$				2.1	A
Drain–Source Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_s=2.1A$ (Note 2)		0.73	1.2	V
Diode Reverse Recovery Time	$t_{rr}$	$I_F=12.5A, d_{IF}/d_t=100A/\mu s$		28		nS
Diode Reverse Recovery Charge	$Q_{rr}$			18		nC

Notes:

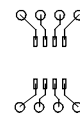
1.  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient resistance where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta JA}$  is determined by the user's board design.



a) 50° C/W when mounted on a 0.5 in<sup>2</sup> pad of 2 oz. copper.



b) 105° C/W when mounted on a 0.02 in<sup>2</sup> 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%

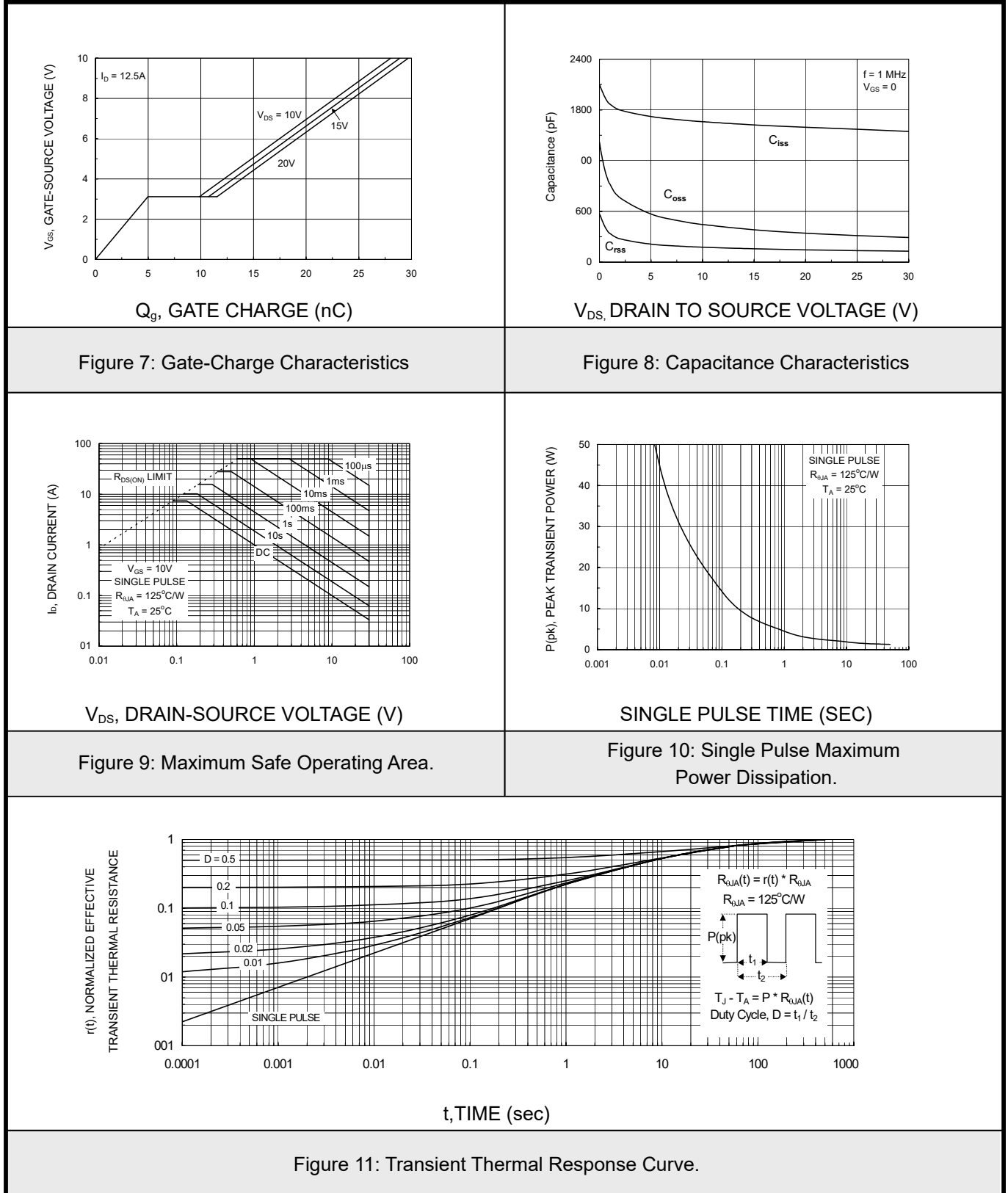


## 7.1 TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

<p><math>I_D</math>, DRAIN CURRENT (A)</p> <p><math>V_{GS}</math>, GATE TO SOURCE VOLTAGE (V)</p>	<p><math>R_{DS(on)}</math>, NORMALIZED DRAIN-SOURCE ON-RESISTANCE</p> <p><math>I_D</math>, DRAIN CURRENT (A)</p>
<p>Fig 1: On-Region Characteristics.</p>	<p>Figure 2: On-Resistance Variation with Drain Current and Gate Voltage.</p>
<p><math>R_{DS(on)}</math>, NORMALIZED DRAIN-SOURCE ON-RESISTANCE</p> <p><math>T_J</math>, JUNCTION TEMPERATURE (<math>^{\circ}C</math>)</p>	<p><math>R_{DS(on)}</math>, ON RESISTANCE (OHM)</p> <p><math>V_{GS}</math>, GATE TO SOURCE VOLTAGE (V)</p>
<p>Figure 3: On-Resistance Variation with Temperature.</p>	<p>Figure 4: On-Resistance Variation with Gate-to-Source Voltage.</p>
<p><math>I_D</math>, DRAIN CURRENT (A)</p> <p><math>V_{GS}</math>, GATE TO SOURCE VOLTAGE (V)</p>	<p><math>I_S</math>, REVERSE DRAIN CURRENT (A)</p> <p><math>V_{SD}</math>, BODY DIODE VOLTAGE (V)</p>
<p>Figure 5: Transfer Characteristics.</p>	<p>Figure 6: . Body Diode Forward Voltage Variation with Source Current and Temperature.</p>

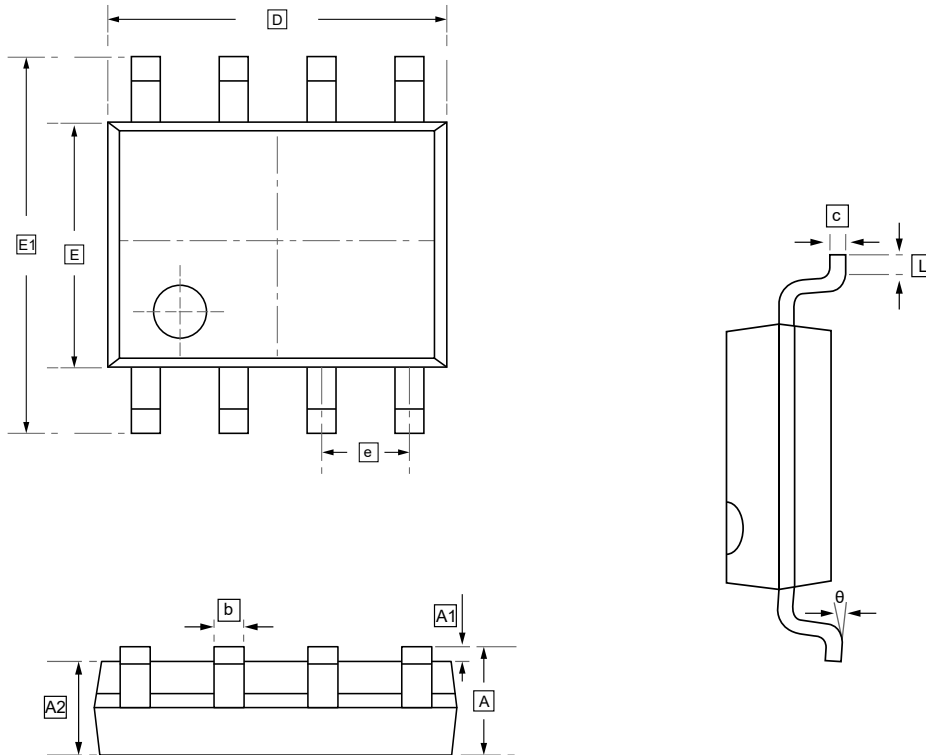


## 7.2 TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS





## 8.SOP-8 Package Outline Dimensions

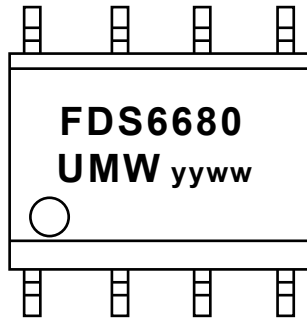


### DIMENSIONS (mm are the original dimensions)

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 FDS6680A	SOP-8	3000	Tape and reel



## 10. Disclaimer

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