

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.

2.2Features

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

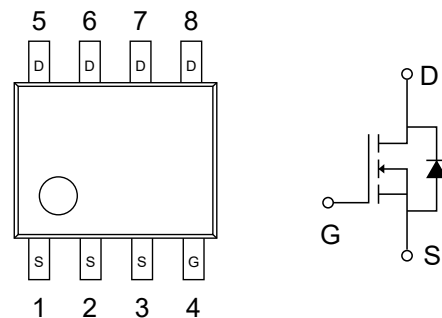
2.1Features

- $V_{DS(V)}=30V$
- $I_D=13A(V_{GS}=10V)$
- $R_{DS(ON)}<8m\Omega(V_{GS}=10V)$
- $R_{DS(ON)}<10m\Omega(V_{GS}=4.5V)$
- Low gate charge
- Fast switching speed

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}	± 20	V
Drain Current – Continuous	I_D	13	A
– Pulsed (Note 1a)		50	
Power Dissipation for Single Operation (Note 1a)	P_D	2.5	W
(Note 1b)		1	
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	°C/W
Thermal Resistance, Junction-to-Case (Note 1b)	$R_{\theta JA}$	125	°C/W
Thermal Resistance, Junction-to-Case (Note 1)	$R_{\theta JC}$	25	°C/W



6. Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	30			V
Breakdown Voltage Temperature Coefficient	$\frac{V_{\Delta BV_{DSS}}}{\Delta T_J}$	$I_D=250\mu\text{A}$ Referenced to 25°C		26		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=24\text{V}$, $V_{GS}=0\text{V}$			1	μA
		$V_{DS}=24\text{V}$, $V_{GS}=0\text{V}$, $T_J=55^\circ\text{C}$			10	nA
Gate-Body Leakage	I_{GSS}	$V_{GS}=\pm 20\text{V}$, $V_{DS}=0\text{V}$			± 100	nA
On Characteristics (Note 2)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1	1.8	3	V
Gate Threshold Voltage Temperature Coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	$I_D=250\mu\text{A}$ Referenced to 25°C		-5.3		mV/ $^\circ\text{C}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}$, $I_D=13\text{A}$		6	8	m Ω
		$V_{GS}=4.5\text{V}$, $I_D=10.5\text{A}$		7.2	10	
On-State Drain Current	$I_{D(on)}$	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	50			A
Forward Transconductance	g_{FS}	$V_{DS}=15\text{V}$, $I_D=13\text{A}$		55		S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=15\text{V}$, $V_{GS}=0\text{V}$, $f=1\text{MHz}$		2220		pF
Output Capacitance	C_{oss}			535		pF
Reverse Transfer Capacitance	C_{rss}			200		pF
Gate Resistance	R_G	$V_{GS}=15\text{mV}$, $f=1\text{MHz}$		1.7		Ω
SWITCHING PARAMETERS (Note 2)						
Turn-On Delay Time	$t_{D(on)}$	$V_{DD}=10\text{V}$, $I_D=1\text{A}$ $V_{GS}=10\text{V}$, $R_{GEN}=6\Omega$		11	19	ns
Turn-On Rise Time	t_r			13	24	ns
Turn-Off Delay Time	$t_{D(off)}$			40	64	ns
Turn-Off Fall Time	t_f			13	24	ns



Total Gate Charge	Q _g	V _{DS} =15V, I _D =13A V _{GS} =5V		21	30	nC
Gate–Source Charge	Q _{gs}			6		nC
Gate–Drain Charge	Q _{gd}			7		nC
Drain–Source Diode Characteristics and Maximum Ratings						
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)		0.7	1.2	V
Diode Reverse Recovery Time	t _{rr}	I _F =13A, d _I F/d _t =100A/μs		32		nS
Diode Reverse Recovery Charge	Q _{rr}			21		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 1in² pad of 2 oz
copper



b) 125°C/W when mounted
on a minimum pad
Scale 1 : 1 on letter size paper

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



7.1 TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

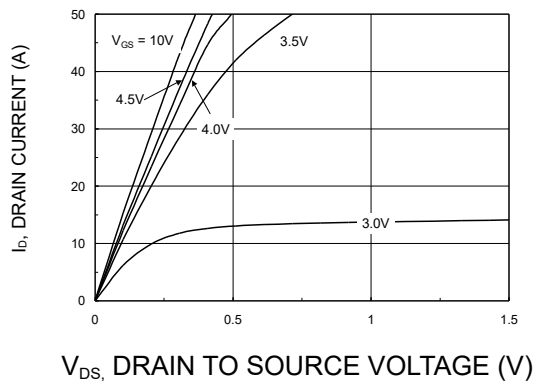


Fig 1: On-Region Characteristics.

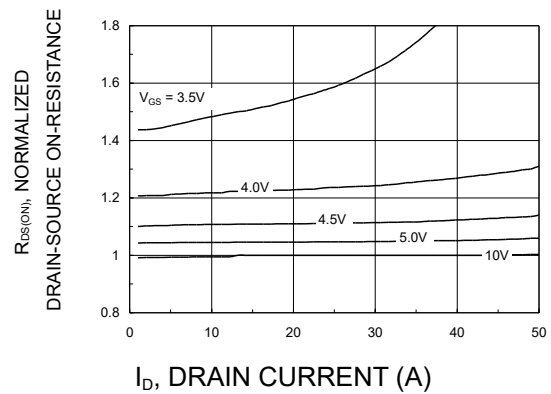


Figure 2: On-Resistance Variation with Drain Current and Gate Voltage.

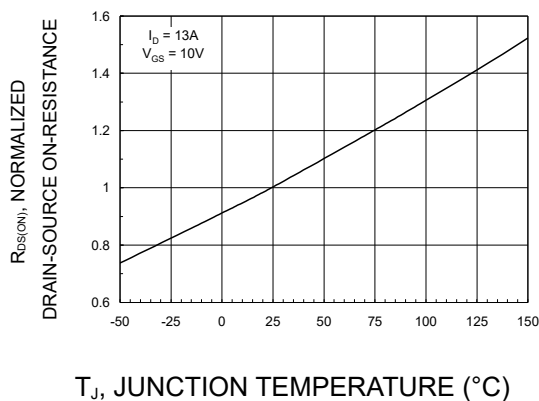


Figure 3: On-Resistance Variation with Temperature.

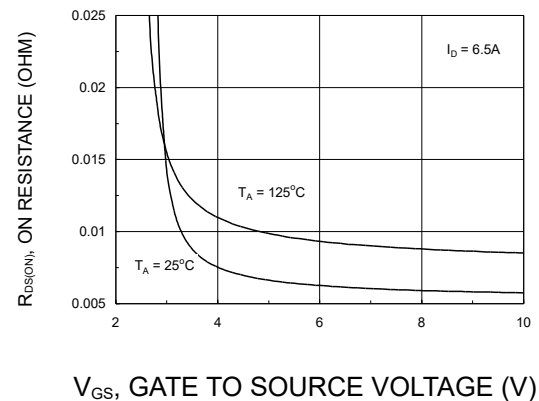


Figure 4: On-Resistance Variation with Gate-to-Source Voltage.

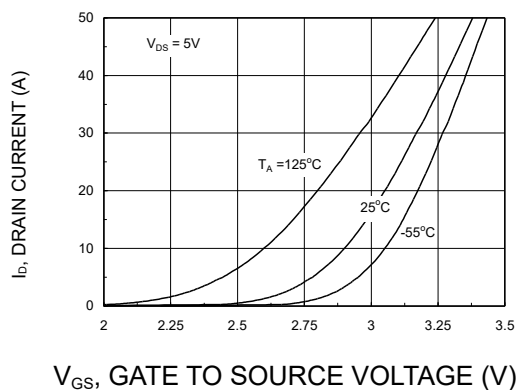


Figure 5: Transfer Characteristics.

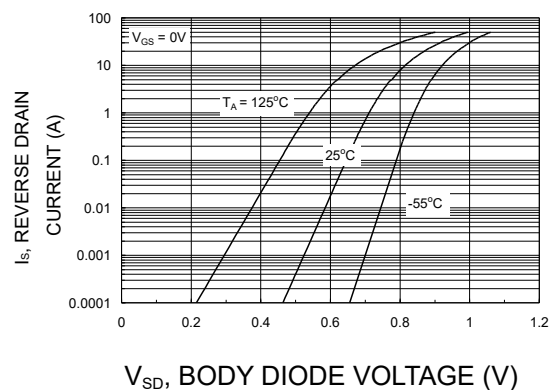


Figure 6: . Body Diode Forward Voltage Variation with Source Current and Temperature.



7.2 TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

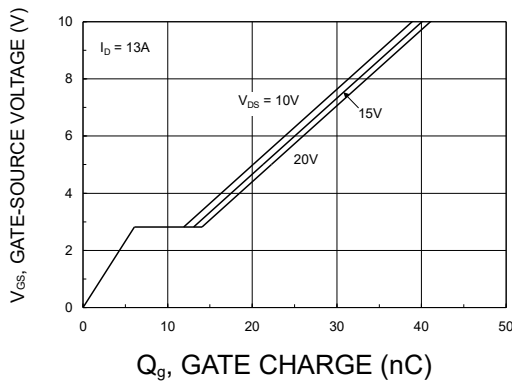


Figure 7: Gate-Charge Characteristics

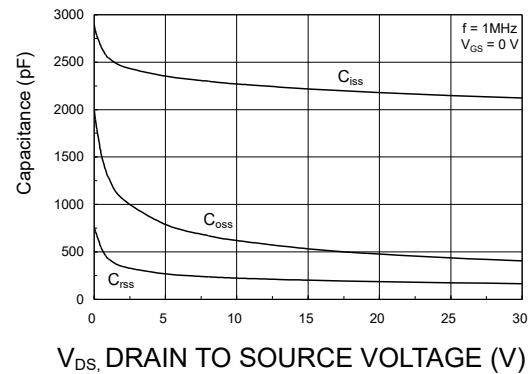


Figure 8: Capacitance Characteristics

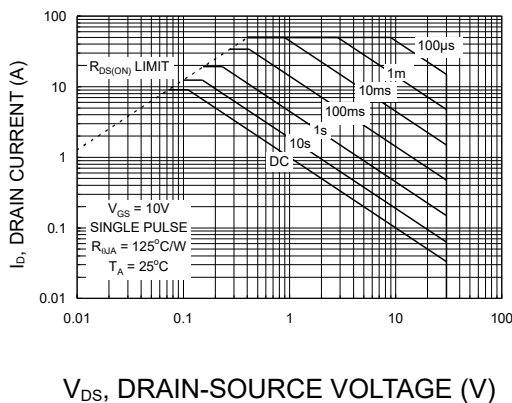


Figure 9: Maximum Safe Operating Area.

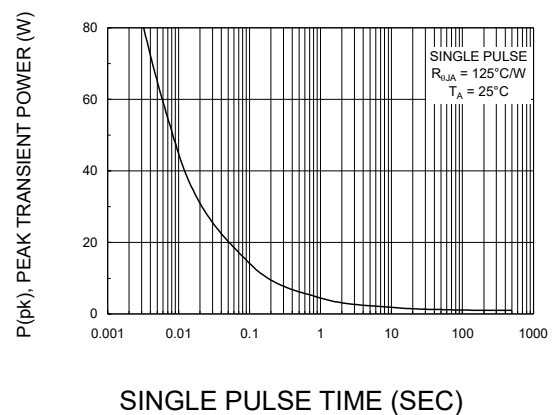


Figure 10: Single Pulse Maximum Power Dissipation.

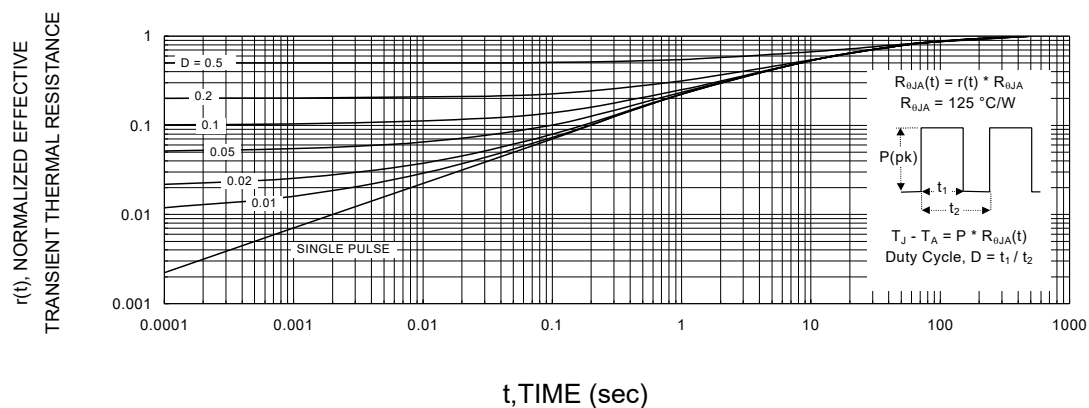
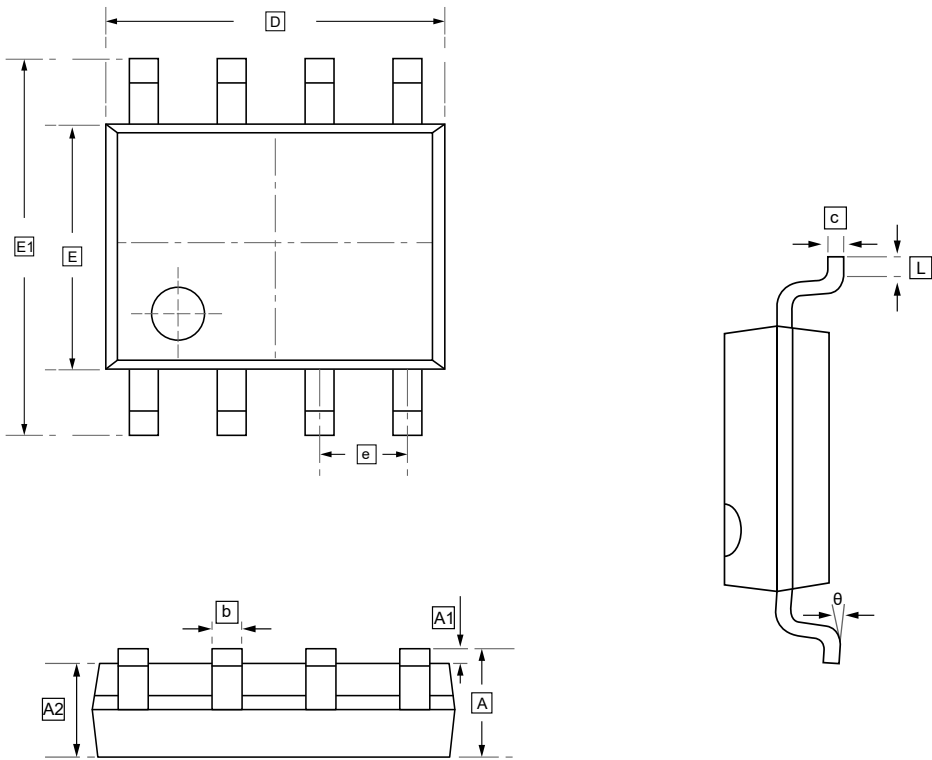


Figure 11: Transient Thermal Response Curve.



8.SOP-8 Package Outline Dimensions

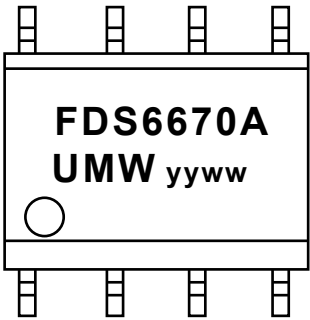


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	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 FDS6670A	SOP-8	3000	Tape and reel



10.Disclaimer

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