UMW FDD6685

-30V P-Channel MOSFET

1.Description

This P-Channel MOSFET has been optimized for power management applications requiring a wide range of gave drive voltage ratings (4.5V – 25V).

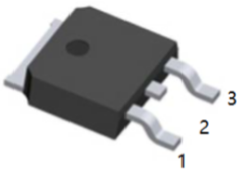
2.Features

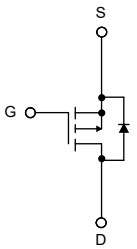
- $V_{DS\ (V)}$=-30V
- I_D=-40A
- $R_{DS(ON)}$<14mΩ(V_{GS}=-4.5V)
- $R_{DS(ON)}$<21mΩ(V_{GS}=-2.5V)
- Fast switching speed
- High performance trench technology for extremely low $R_{DS(ON)}$
- High power and current handling capability

3.Pinning information

Pin	Symbol	Description
1	G	GATE
2	D	DRAIN
3	S	SOURCE

TO-252(DPAK) top view





4.Absolute Maximum Ratings T_A= 25°C

Parameter			Symbol	Rating	Units
Drain-Source Voltage			V_{DSS}	-30	V
Gate-Source Voltage			V_{GSS}	±25	
Continuous Drain Current	@T_C=25°C	(Note 3)	I_D	-40	A
	@T_A=25°C	(Note 1a)		-11	
	Pulsed	(Note 1a)		-100	
Power Dissipation	@T_C=25°C	(Note 3)	P_D	52	W
	@T_A=25°C	(Note 1a)		3.8	
	@T_A=25°C	(Note 1b)		1.6	
Operating and Storage Junction Temperature Range			T_J, T_{STG}	-55 to 175	°C

5.Thermal Characteristics

Parameter		Symbol	Rating	Units
Thermal Resistance, Junction-to-Case	(Note 1)	$R_{\theta JC}$	2.9	°C/W
Thermal Resistance, Junction-to-Ambient	(Note 1a)	$R_{\theta JA}$	40	°C/W
Thermal Resistance, Junction-to-Ambient	(Note 1b)	$R_{\theta JA}$	96	°C/W

6.Electrical Characteristic (T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Avalanche Ratings (Note 4)						
Single Pulse Drain-Source Avalanche Energy	E_{AS}	I_D=-11A		42		mJ
Maximum Drain-Source Avalanche Current	I_{AS}			-11		A
Off Characteristics						
Drain–Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=-250μA	-30			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I_D=-250μA Referenced to 25°C		-24		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-24V, V_{GS}=0V			-1	μA
Gate–Body Leakage	I_{GSS}	V_{GS}=±25V, V_{DS}=0V			±100	nA
On Characteristics (Note 2)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-1	-1.8	-3	V
Gate Threshold Voltage Temperature Coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	I_D=-250μA Referenced to 25°C		5		mV/°C
Static Drain–Source On–Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-11A		14	20	mΩ
		V_{GS}=-4.5V, I_D=-9A		21	30	mΩ
On–State Drain Current	$I_{D(ON)}$	V_{GS}=-10V, V_{DS}=-5V	-20			A
Forward Transconductance	g_{FS}	V_{DS}=-5V, I_D=-11A		26		S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=-15V, V_{GS}=0V f=1MHz		1715		pF
Output Capacitance	C_{oss}			440		pF
Reverse Transfer Capacitance	C_{rss}			225		pF
Gate Resistance	R_g	V_{GS}=15mV, f=1MHz		3.6		Ω

Switching Characteristics (Note 2)						
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=-15V, I_D=-1A V_{GS}=-10V, R_{GEN}=6Ω		17	31	ns
Turn-On Rise Time	t_r			11	21	ns
Turn-Off Delay Time	$t_{D(off)}$			43	68	ns
Turn-Off Fall Time	t_f			21	34	ns
Total Gate Charge	Q_g	V_{DS}=-15V, I_D=-11A V_{GS}=-5V		17	24	nC
Gate-Source Charge	Q_{gs}			9		nC
Gate-Drain Charge	Q_{gd}			4		nC
Drain–Source Diode Characteristics and Maximum Ratings						
Drain–Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=-3.2A (Note 2)		-0.8	-1.2	V
Diode Reverse Recovery Time	t_{rr}	I_F=-11A		26		ns
Diode Reverse Recovery Charge	Q_{rr}	diF/dt =100A/μs		13		nC

Notes:

1. $R_{\theta JA}$ 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) $R_{\theta JA}$=40°C/W when mounted on a 1in ^{2} pad of 2oz copper.

b) $R_{\theta JA}$= 96°C/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

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

3. Maximum current is calculated as: $\sqrt{\frac{P_D}{R_{DS(ON)}}}$

where P_D is maximum power dissipation at T_C=25°C and $R_{DS(ON)}$ is at $T_{J(max)}$ and V_{GS}=10V.

4. Starting T_J=25°C, L=0.69mH, I_{AS}=-11A.

7.1Typical characteristic

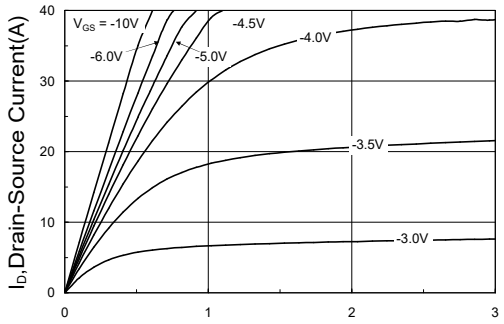


Figure 1: On-Region Characteristics

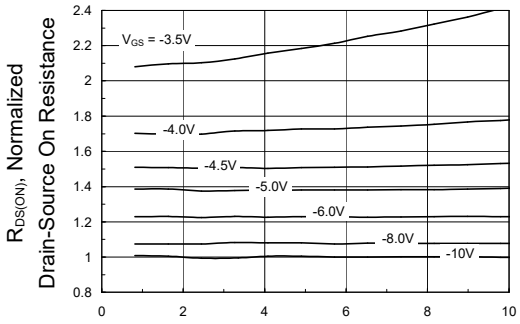


Figure 2: On-Resistance Variation with Drain Current and Gate Voltage

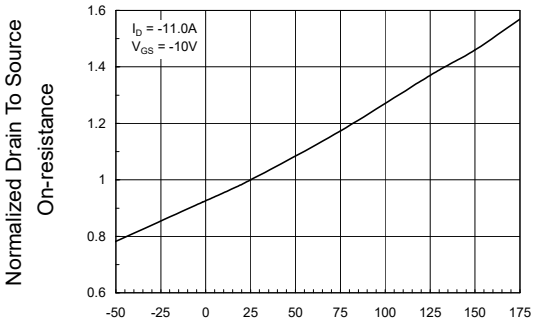


Figure 3: On-Resistance Variation with Temperature

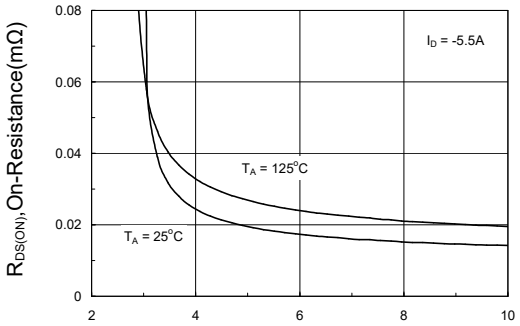


Figure 4: On-Resistance Variation with Gate-to-Source Voltage

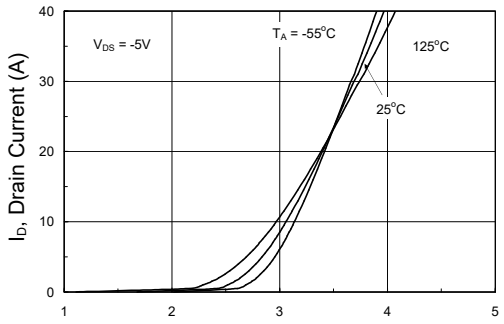


Figure 5: Transfer Characteristics

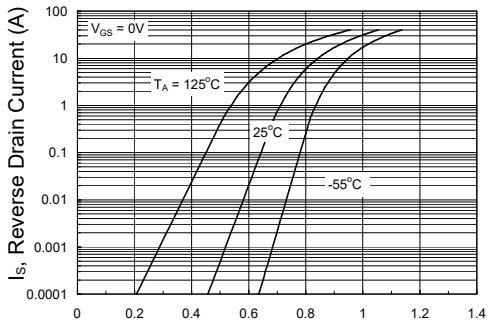


Figure 6: . Body Diode Forward Voltage Variation with Source Currentand Temperature

7.2Typical characteristic

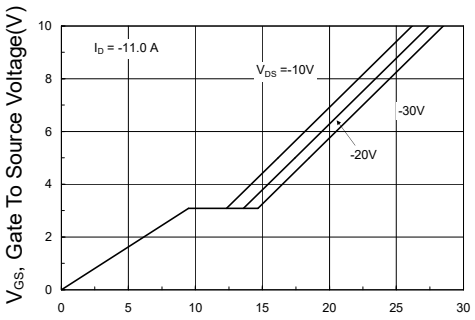


Figure 7: Gate Charge Characteristics

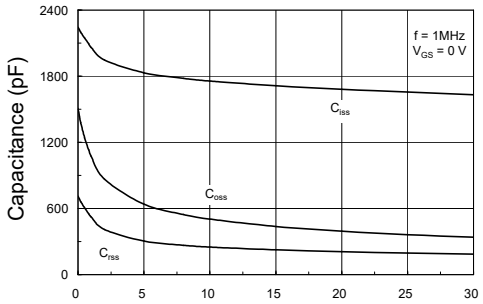


Figure 8: Capacitance Characteristics

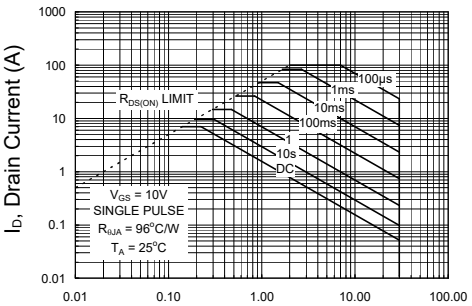


Figure 9: Maximum Safe Operating Area

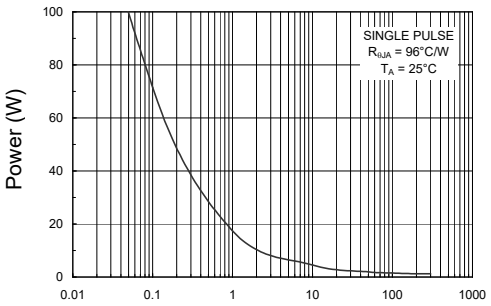


Figure 10: Single Pulse Maximum Power Dissipation

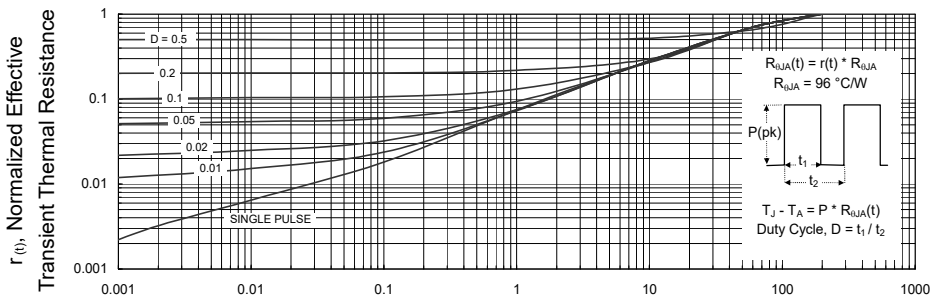
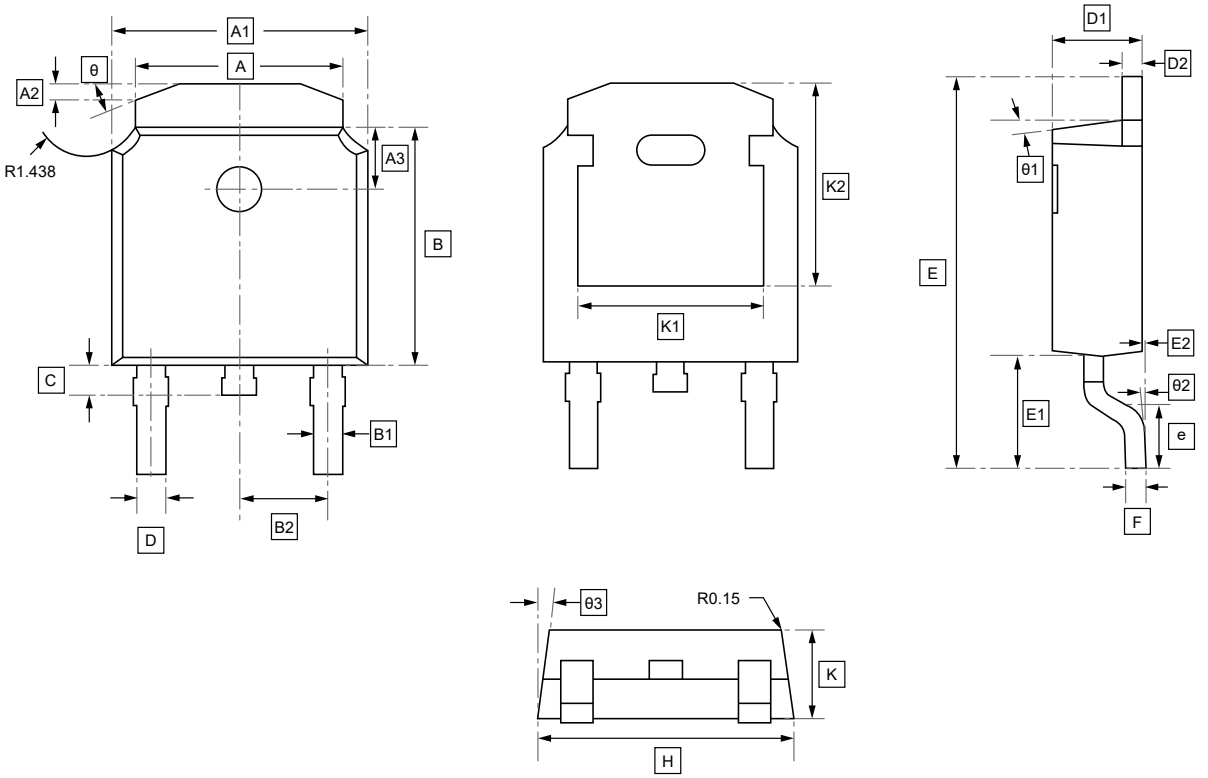


Figure 11: Transient Thermal Response Curve

8.TO-252 Package Outline Dimensions

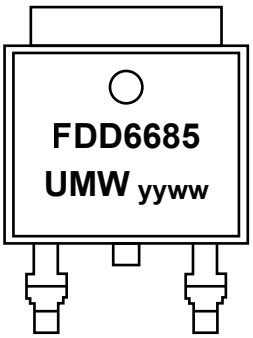


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	B	B1	B2	C	D	D1	D2	E
Min	5.20	6.50	0.40	1.40	6.00	0.740	2.286	0.60	0.74	2.15	0.50	9.80
Max	5.46	6.70	(typ)	1.80	6.20	0.940	(typ)	1.0	0.86	2.45	(typ)	10.40

Symbol	E1	E2	e	F	H	K	K1	K2	θ	θ1	θ2	θ3
Min	2.60	0.00	1.65	0.50	6.50	2.15	4.63	5.10	20°	7°	0°	7°
Max	3.20	0.127	(typ)	0.60	6.70	2.45	5.03	5.50	(typ)	(typ)	8°	(typ)

9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW FDD6685	TO-252	2500	Tape and reel

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