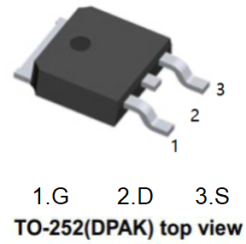**UMW**®

General Description

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

1.G   2.D   3.S
TO-252(DPAK) top view

Features

● $V_{DS\,(V)}$ = -30V

● $R_{DS(ON)}$ $<$ 26 mΩ (V_{GS} = -4.5V)

● $R_{DS(ON)}$ $<$ 34 mΩ (V_{GS} = -2.5V)

● Fast switching speed

● High performance trench technology for extremely low $R_{DS(ON)}$

● High power and current handling capability
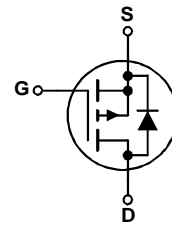
Absolute Maximum Ratings T_A=25°C unless otherwise noted

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

Thermal Characteristics

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

Electrical Characteristics

$T_A = 25°C$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Drain-Source Avalanche Ratings (Note 4)						
E_{AS}	Single Pulse Drain-Source Avalanche Energy	$I_D = -11$ A		42		mJ
I_{AS}	Maximum Drain-Source Avalanche Current			−11		A
Off Characteristics						
BV_{DSS}	Drain–Source Breakdown Voltage	$V_{GS} = 0$ V, $I_D = -250$ µA	−30			V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = -250$ µA, Referenced to 25°C		−24		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -24$ V, $V_{GS} = 0$ V			−1	µA
I_{GSS}	Gate–Body Leakage	$V_{GS} = ±25$V, $V_{DS} = 0$ V			±100	nA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = -250$ µA	−1	−1.8	−3	V
$\Delta V_{GS(th)} / \Delta T_J$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250$ µA, Referenced to 25°C		5		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = -4.5$ V, $I_D = -11$ A		22	26	mΩ
		$V_{GS} = -2.5$ V, $I_D = -9$ A		28	34	
$I_{D(on)}$	On–State Drain Current	$V_{GS} = -10$ V, $V_{DS} = -5$ V	−20			A
g_{FS}	Forward Transconductance	$V_{DS} = -5$ V, $I_D = -11$ A		26		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = -15$ V, $V_{GS} = 0$ V, f = 1.0 MHz		1715		pF
C_{oss}	Output Capacitance			440		pF
C_{rss}	Reverse Transfer Capacitance			225		pF
R_G	Gate Resistance	$V_{GS} = 15$ mV, f = 1.0 MHz		3.6		Ω
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = -15$ V, $I_D = -1$ A, $V_{GS} = -10$ V, $R_{GEN} = 6$ Ω		17	31	ns
t_r	Turn–On Rise Time			11	21	ns
$t_{d(off)}$	Turn–Off Delay Time			43	68	ns
t_f	Turn–Off Fall Time			21	34	ns
Q_g	Total Gate Charge	$V_{DS} = -15$V, $I_D = -11$ A, $V_{GS} = -5$ V		17	24	nC
Q_{gs}	Gate–Source Charge			9		nC
Q_{gd}	Gate–Drain Charge			4		nC
Drain–Source Diode Characteristics and Maximum Ratings						
V_{SD}	Drain–Source Diode Forward Voltage	$V_{GS} = 0$ V, $I_S = -3.2$ A (Note 2)		−0.8	−1.2	V
Trr	Diode Reverse Recovery Time	IF = −11 A, diF/dt = 100 A/µs		26		ns
Qrr	Diode Reverse Recovery Charge			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.
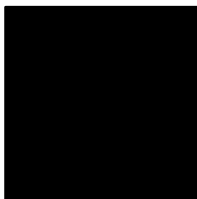
a) $R_{\theta JA} = 40°C/W$ when mounted on a 1in² pad of 2 oz copper

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: $\sqrt{\dfrac{P_D}{R_{DS(ON)}}}$ 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, $I_{AS} = -11A$
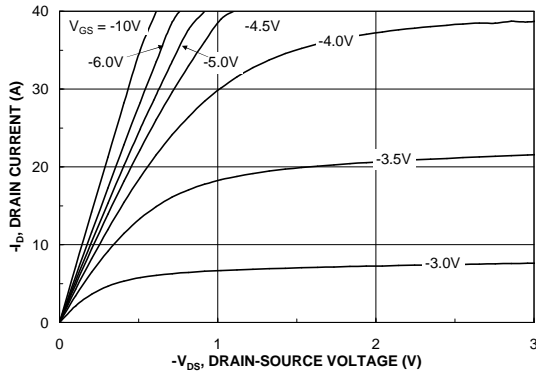
Typical Characteristics

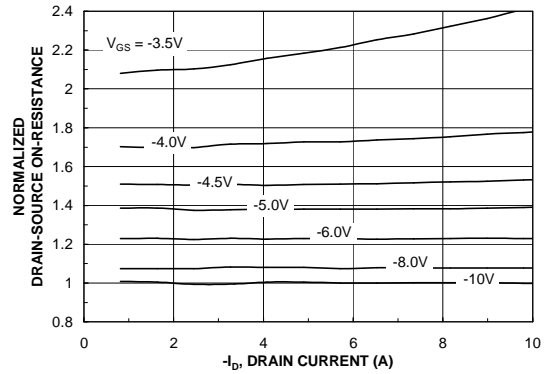Figure 1. On-Region Characteristics.

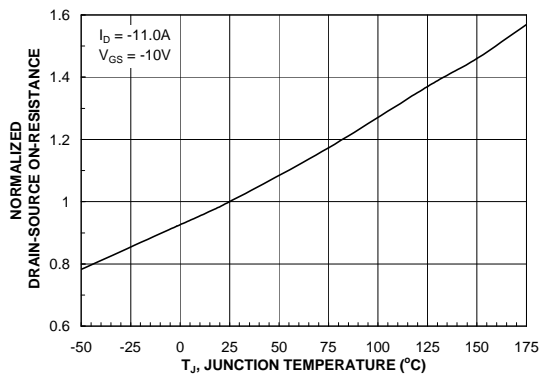Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

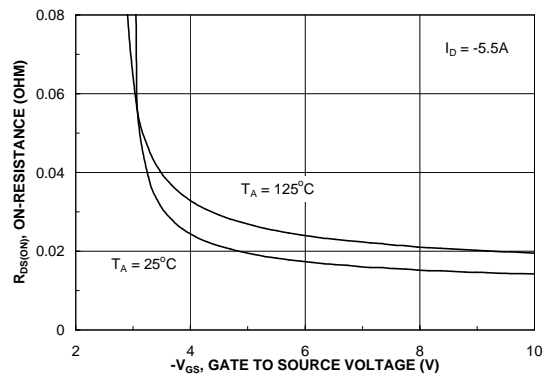Figure 3. On-Resistance Variation with Temperature.

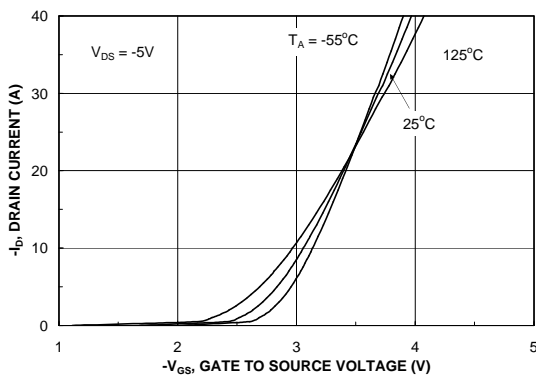Figure 4. On-Resistance Variation with Gate-to-Source Voltage.
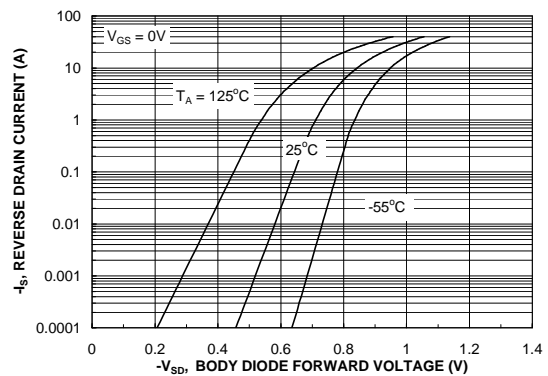

Figure 5. Transfer Characteristics.

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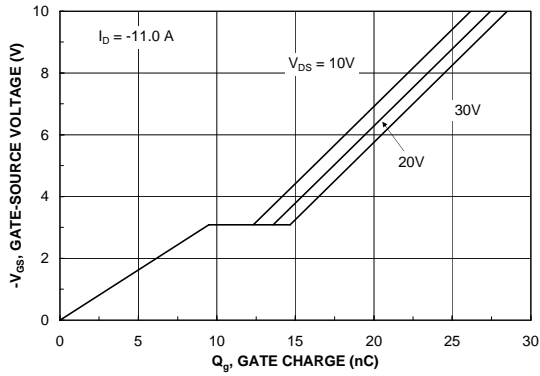
Typical Characteristics
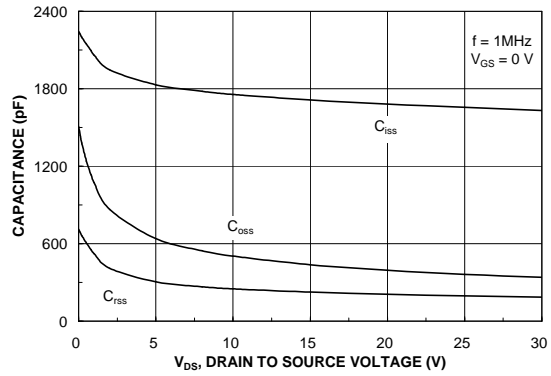

Figure 7. Gate Charge Characteristics.

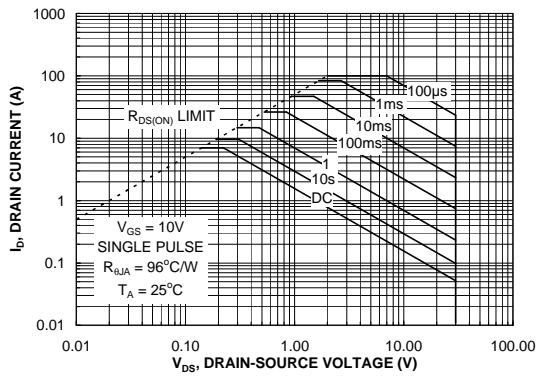**Figure 8. Capacitance Characteristics.**

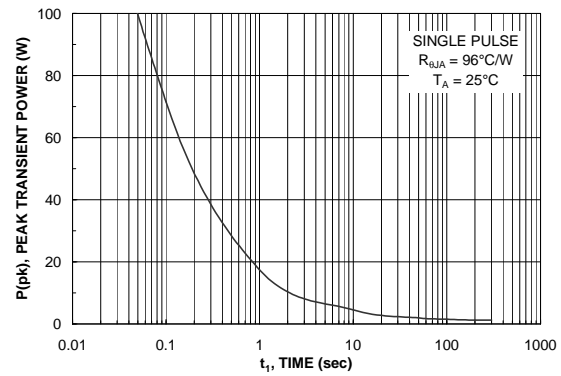**Figure 9. Maximum Safe Operating Area.**

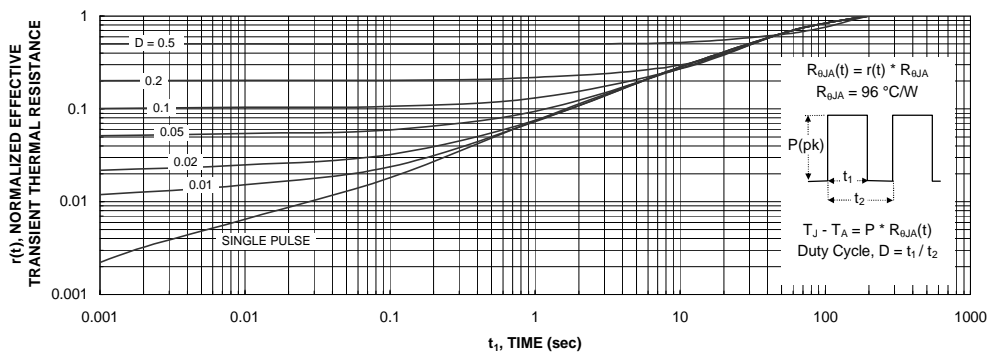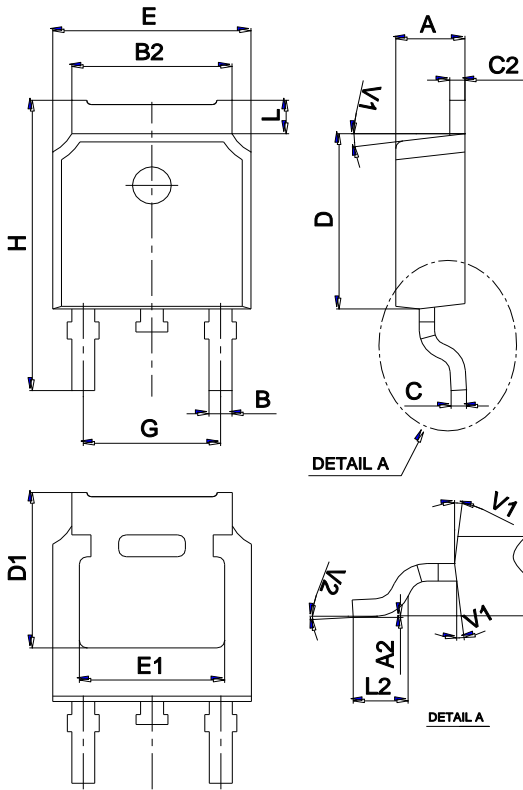**Figure 10. Single Pulse Maximum Power Dissipation.**

**Figure 11. Transient Thermal Response Curve.**

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

Package Mechanical Data TO-252

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Marking
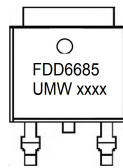
FDD6685
UMW xxxx

Ordering information

Order code	Package	Baseqty	Deliverymode
UMW FDD6685	TO-252	2500	Tape and reel