UMW FDD5680

60V N-Channel MOSFET

1.Features

- $V_{DS\ (V)}$=60V
- I_D=38A
- $R_{DS(ON)}$<21mΩ(V_{GS}=10V)
- $R_{DS(ON)}$<25mΩ(V_{GS}=6V)
- Low gate charge (33nC typical).
- Fast switching speed.
- High performance trench technology for extremely low $R_{DS(ON)}$.

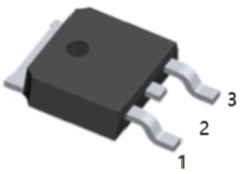
3.Application

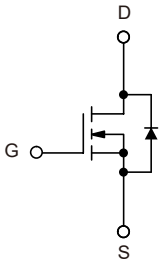
- DC/DC converter
- Motor drives

4.Pinning information

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

TO-252(DPAK)
top view





5.Absolute Maximum Ratings T_A= 25°C

Parameter		Symbol	Rating	Units
Drain - Source Voltage		V_{DSS}	60	V
Gate - Source Voltage		V_{GSS}	±20	
Maximun Drain Current - Continuous	(Note 1)	I_D	38	A
	(Note 1a)		8.5	
Maximum Drain Current	- Pulsed		100	
Maximum Power Dissipation	T_C=25°C (Note 3)	P_D	60	W
	T_A=25°C (Note 1a)		2.8	
	T_A=25°C (Note 1b)		1.3	W
Operating and Storage Junction Temperature Range		T_J, T_{STG}	-55 to 150	°C

6.Thermal Characteristics

Parameter		Symbol	Rating	Units
Thermal Resistance, Junction to Case	(Note 1)	$R_{\theta JC}$	2.1	°C/W
Thermal Resistance, Junction to Ambient	(Note 1b)	$R_{\theta JA}$	96	°C/W

7.Electrical Characteristic (T_A=25°C unless otherwise noted)

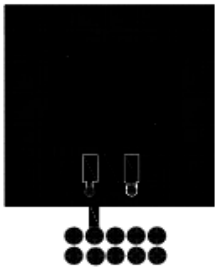
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Off Characteristics						
Single Pulse Drain-Source Avalanche Energy	W_{DSS}	V_{DD}=30V, I_D=38A			140	mJ
Maximum Drain-Source Avalanche Current	I_{AR}				38	A
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	60			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I_D=250μA Referenced to 25°C		60		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=48V, V_{GS}=0V			1	μA
Gate-Body Leakage Current Forward	I_{GSSF}	V_{GS}=20V, V_{DS}=0V			100	nA
Gate-Body Leakage Current Reverse	I_{GSSR}	V_{GS}=-20V, V_{DS}=0V			-100	nA
On Characteristics (Note 2)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1		2.2	V
Gate Threshold Voltage Temperature Coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	I_D=250μA Referenced to 25°C		-6.4		mV/°C
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=8.5A		17	21	mΩ
		V_{GS}=6V, I_D=7.5A		19	25	mΩ
On-State Drain Current	$I_{D(ON)}$	V_{GS}=10V, V_{DS}=5V	50			A
Forward Transconductance	g_{FS}	V_{DS}=5V, I_D=8.5A		30		S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=30V, V_{GS}=0V, f=1MHz		1835		pF
Output Capacitance	C_{oss}			210		pF
Reverse Transfer Capacitance	C_{rss}			90		pF

Switching Characteristics (Note 2)						
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=30V, I_D=1A V_{GS}=10V, R_{GEN}=6Ω		15	27	ns
Turn-On Rise Time	t_r			9	18	ns
Turn-Off Delay Time	$t_{D(off)}$			35	56	ns
Turn-Off Fall Time	t_f			16	26	ns
Total Gate Charge	Q_g	V_{DS}=30V, I_D=8.5A, V_{GS}=10V		33	46	nC
Gate-Source Charge	Q_{gs}			6.5		nC
Gate-Drain Charge	Q_{gd}			7.5		nC
Drain–Source Diode Characteristics and Maximum Ratings						
Maximum Continuous Drain–Source Diode Forward Current	I_S				2.3	A
Drain–Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=2.3A (Note 2)		0.75	1.2	V

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 drain tab.

$R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.



a) $R_{\theta JA}$=45°C/W when mounted on a 1in^2 pad of 2oz copper.



b) $R_{\theta JA}$= 96°C/W when mounted on a 0.076 pad of 2oz copper.

Scale 1 : 1 on letter size paper

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

8.1Typical characteristic

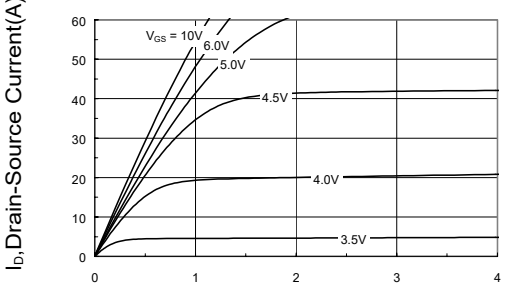


Figure 1: On-Region Characteristics

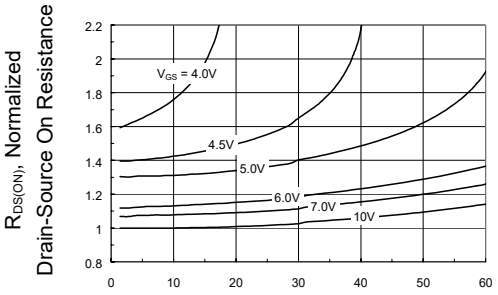


Figure 2: On-Resistance Variation with Drain Current and Gate Voltage

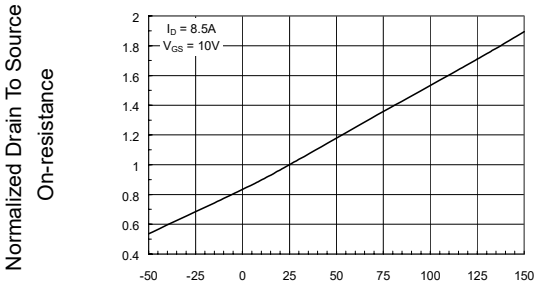


Figure 3: On-Resistance Variation with Temperature

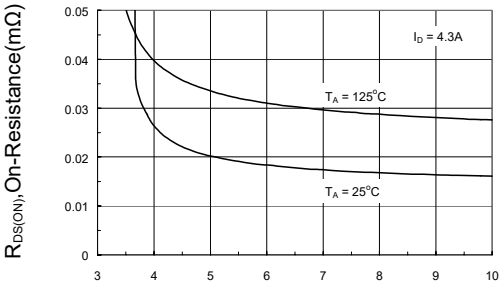


Figure 4: On-Resistance Variation with Gate-to-Source Voltage

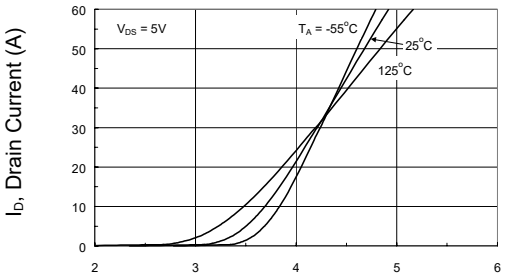


Figure 5: Transfer Characteristics

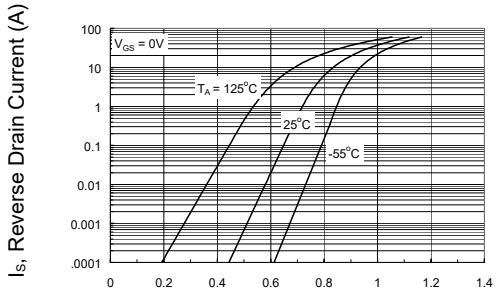
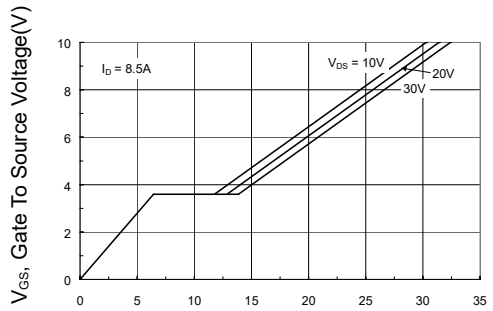


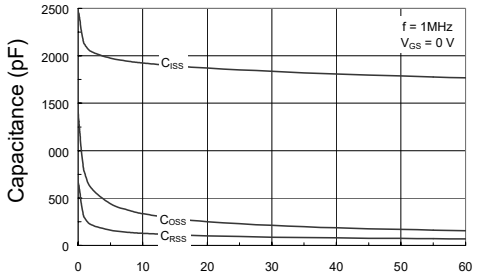
Figure 6: . Body Diode Forward Voltage Variation with Source Currentand Temperature

8.2Typical characteristic



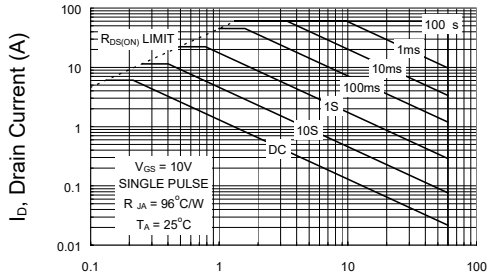
Q_g, Gate Charge (nC)

Figure 7: Gate Charge Characteristics



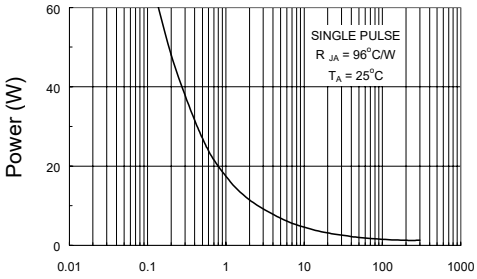
$V_{DS,}$ Drain To Source Voltage (V)

Figure 8: Capacitance Characteristics



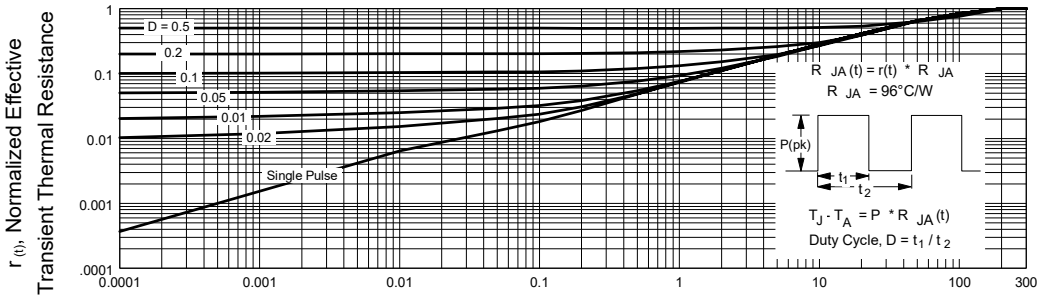
V_{DS}, Drain-source Voltage (V)

Figure 9: Maximum Safe Operating Area



Single Pulse Time (sec)

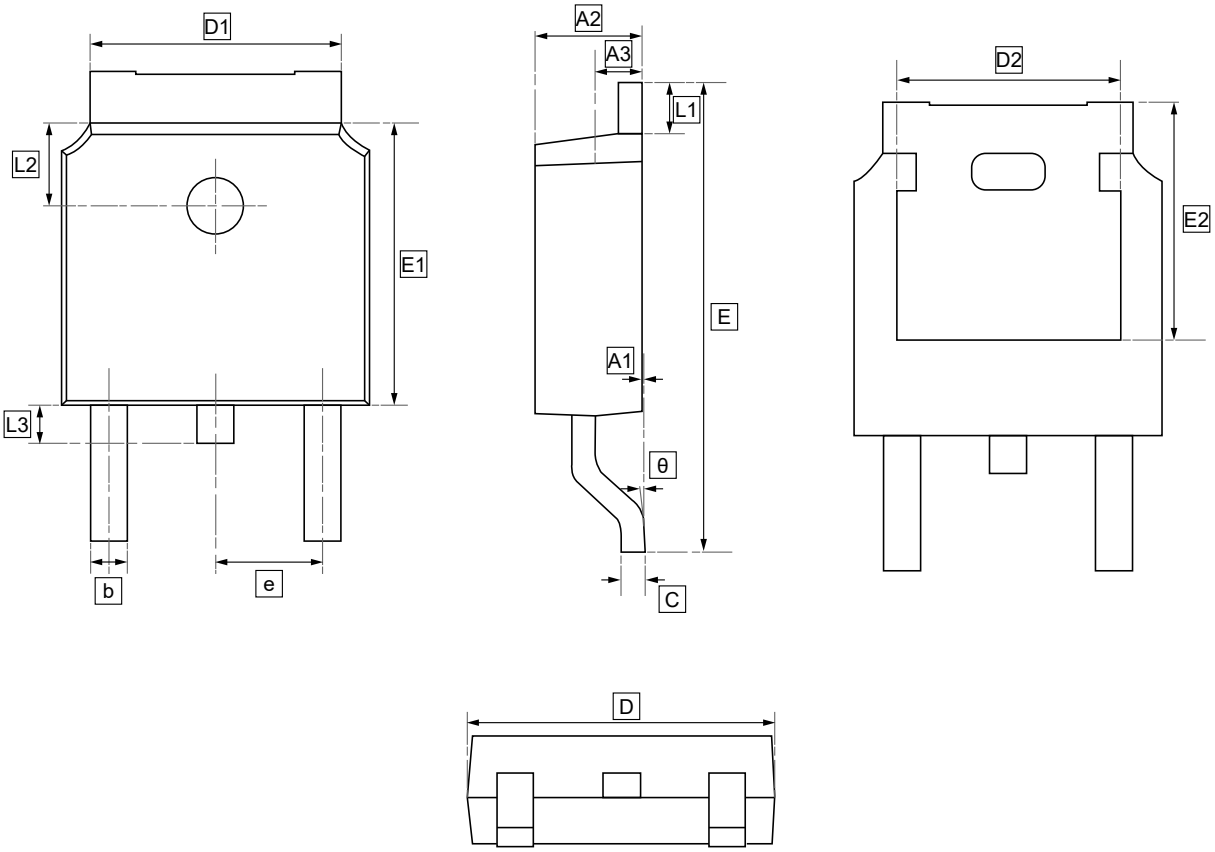
Figure 10: Single Pulse Maximum Power Dissipation



t_1, TIME (sec)

Figure 11: Transient Thermal Response Curve

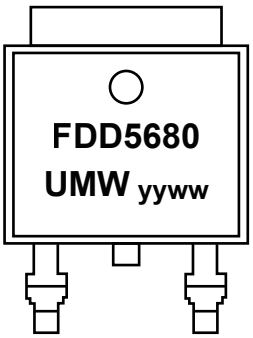
9.TO-252 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A1	A2	A3	b	c	D	D1	D2	E	E1	E2	e	L1	L2	L3	θ
Min	0.00	2.18	0.90	0.65	0.46	6.35	4.95	4.32	9.40	5.97	5.21	2.286	0.89	1.70	0.60	0.00
Max	0.13	2.39	1.10	0.85	0.61	6.73	5.46	4.90	10.41	6.22	5.38	BSC	1.27	1.90	1.00	8.00

10.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW FDD5680	TO-252	2500	Tape and reel

11.Disclaimer

UMW reserves the right to make changes to all products, specifications. Customers should obtain the latest version of product documentation and verify the completeness and currency of the information before placing an order.

When applying our products, please do not exceed the maximum rated values, as this may affect the reliability of the entire system. Under certain conditions, any semiconductor product may experience faults or failures. Buyers are responsible for adhering to safety standards and implementing safety measures during system design, prototyping, and manufacturing when using our products to prevent potential failure risks that could lead to personal injury or property damage.

Unless explicitly stated in writing, UMW products are not intended for use in medical, life-saving, or life-sustaining applications, nor for any other applications where product failure could result in personal injury or death. If customers use or sell the product for such applications without explicit authorization, they assume all associated risks.

When reselling, applying, or exporting, please comply with export control laws and regulations of China, the United States, the United Kingdom, the European Union, and other relevant countries, regions, and international organizations.

This document and any actions by UMW do not grant any intellectual property rights, whether express or implied, by estoppel or otherwise. The product names and marks mentioned herein may be trademarks of their respective owners.