UMW FDP8440

40V N-Channel MOSFET

1.Features

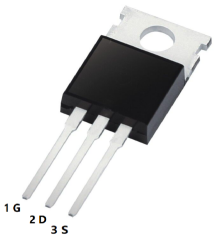
- $V_{DS\ (V)}$=40V
- I_D=277A
- $R_{DS(ON)}$<2.2mΩ(V_{GS}=10V)
- $R_{DS(ON)}$<2.4mΩ(V_{GS}=4.5V)
- Low Miller Charge
- Low Q_{rr} Body Diode

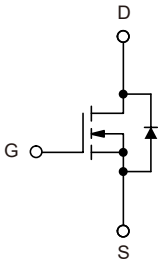
2.Applications

- Power Tools
- Synchronous Rectification
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies

3.Pinning information

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





4.Absolute Maximum Ratings T_C= 25°C

Parameter			Symbol	Rating	Units
Drain to Source Voltage			V_{DSS}	40	V
Gate to Source Voltage			V_{GSS}	±20	V
Drain Current	- Continuous(T_C=25°C, Silicon Limited)		I_D	277*	A
	- Continuous(T_C=100°C, Silicon Limited)			196*	A
	- Continuous(T_C=25°C, Package Limited)			100	A
	- Pulsed	(Note 1)	I_{DM}	500	A
Single Pulse Avalanche Energy		(Note 2)	E_{AS}	1682	mJ
Power Dissipation	(T_C=25°C)		P_D	306	W
	- Derate above 25°C			2.04	W/°C
Operating and Storage Temperature Range			T_J, T_{STG}	-55 to 175	°C
Maximum Lead Temperature for Soldering Purpose, 1/8” from Case for 5 Seconds			T_L	300	°C

5.Thermal Characteristics

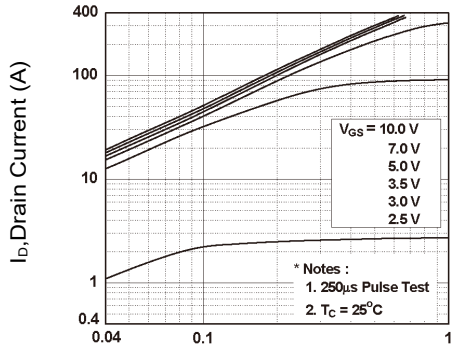
Parameter	Symbol	Rating	Units
Thermal Resistance, Junction to Case, Max.	$R_{\theta JC}$	0.49	°C/W
Thermal Resistance, Case to Sink (Typ.)	$R_{\theta JS}$	0.5	°C/W
Thermal Resistance, Junction to Ambient, Max.	$R_{\theta JA}$	62.5	°C/W

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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain to Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	40			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=32V			1	μA
		V_{GS}=0V, T_C=150°C			250	μA
Gate to Body Leakage Current	I_{GSS}	V_{GS}=±20V			±100	nA
Gate to Source Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1		3	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=80A		1.88	2.4	mΩ
		V_{DS}=10V, I_D=80A		1.64	2.2	mΩ
		V_{DS}=10V,I_D=80A,T_C=175°C		3.00	4.4	mΩ
Input capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1MHz		18600	24740	pF
output capacitance	C_{oss}			1840	2450	pF
Reverse Transfer Capacitance	C_{rss}			1400	2100	pF
Gate Resistance	R_g	V_{GS}=0.5V, f=1MHz		1.1		Ω
Total Gate Charge at 10V	$Q_{g(tot)}$	V_{GS}=0V to 10V; V_{DD}=20V		345	450	nC
Threshold Gate Charge	$Q_{g(2)}$	V_{GS}=0V to 2V; I_D=80A		32.5		nC
Gate to Source Gate Charge	Q_{gs}	I_g=1mA		49		nC
Gate Charge Threshold to Plateau	Q_{gs2}			16.5		nC
Gate to Drain “Miller” Charge	Q_{gd}			74		nC
Turn-On Time	t_{on}	V_{DD}=20V, I_D=80A, V_{GS}=10V,R_{GEN}=7Ω		175	360	ns
Turn-On Delay Time	$t_{D(on)}$			43	95	ns
Rise Time	t_r			130	275	ns
Turn-Off Delay Time	$t_{D(off)}$			435	875	ns
Fall Time	t_f			290	590	ns
Turn-Off Time	t_{off}			730	1470	ns
Source to Drain Diode Voltage	V_{SD}	I_{SD}=80A			1.25	V
		I_{SD}=40A			1	V
Reverse Recovery Time	t_{rr}	I_{SD}=75A, dI_{SD}/dt=100A/μs		59		ns
Reverse Recovery Charge	Q_{rr}	I_{SD}=75A, dI_{SD}/dt=100A/μs		77		nC

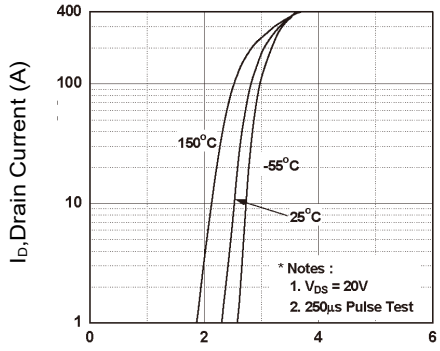
1: Pulse width limited by maximum junction temperature. 2: Starting T_J=25°C, L=1mH, I_{AS}=58A, V_{DD}=36V, V_{GS}=10V.

7.1Typical characteristic



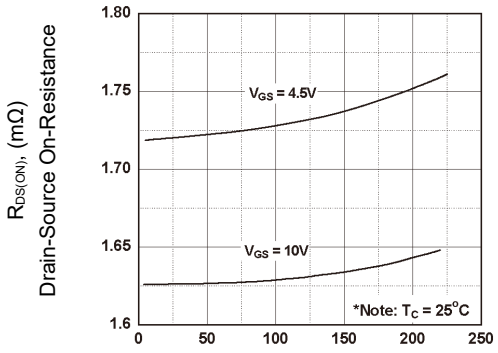
V_{DS},Drain-to-Source Voltage (V)

Figure 1: On-Region Characteristics



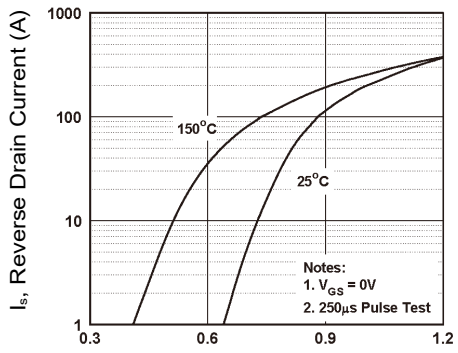
V_{GS},Gate-to-Source Voltage (V)

Figure 2: Transfer Characteristics



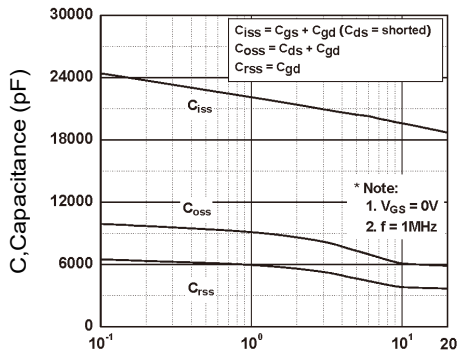
I_D,Drain Current (A)

Figure 3: On - resistance variation and drain current



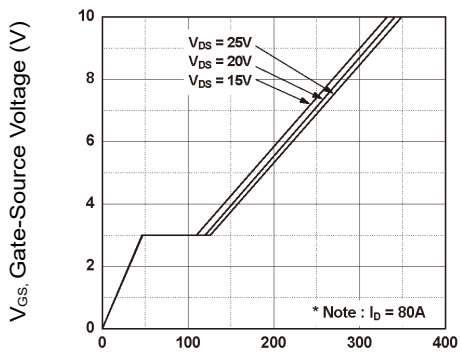
V_{SD},Body Diode Forward Voltage(V)

Figure 4: Body Diode Forward Voltage Variation vs. Source Current and Temperatue



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

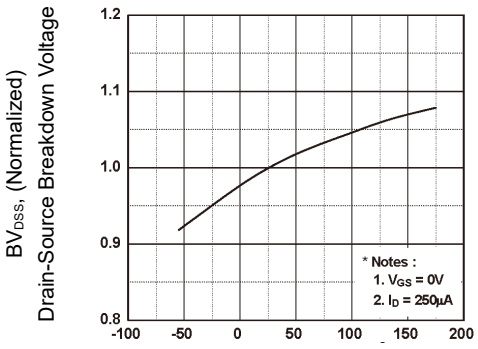
Figure 5: Capacitance Characteristics



Q_g, Total Gate Charge (nC)

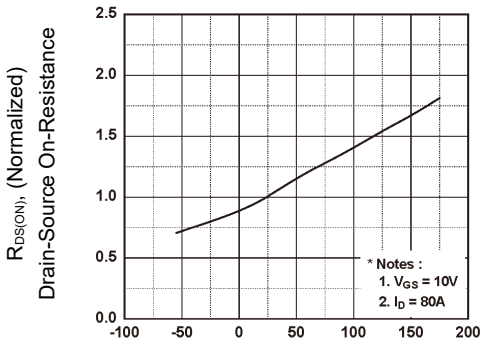
Figure 6: Gate Charge Characteristics

7.2Typical characteristic



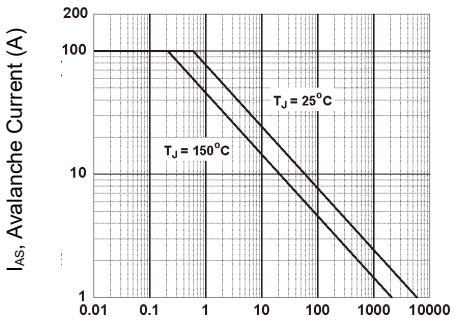
T_J,Junction Temperature (°C)

Figure 7: Breakdown Voltage Variation vs. Temperature



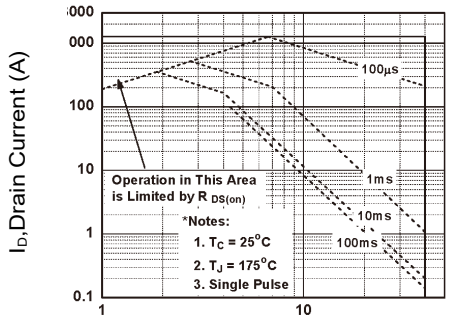
T_J,Junction Temperature (°C)

Figure 8: On-Resistance Variation vs. Temperature



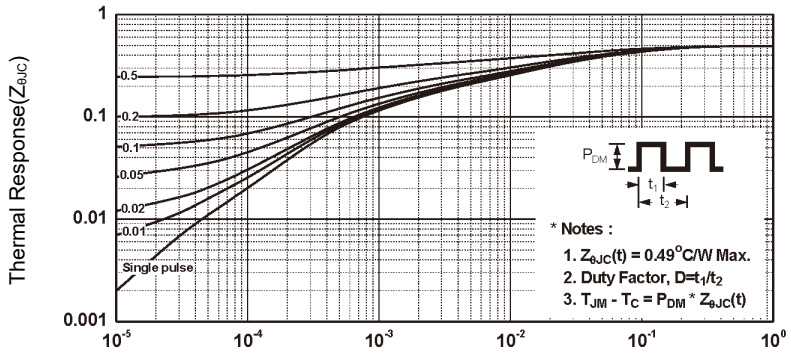
t_{AV}, Time In Avalanche(ms)

Figure 9: Unclamped Inductive Switching Capability



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

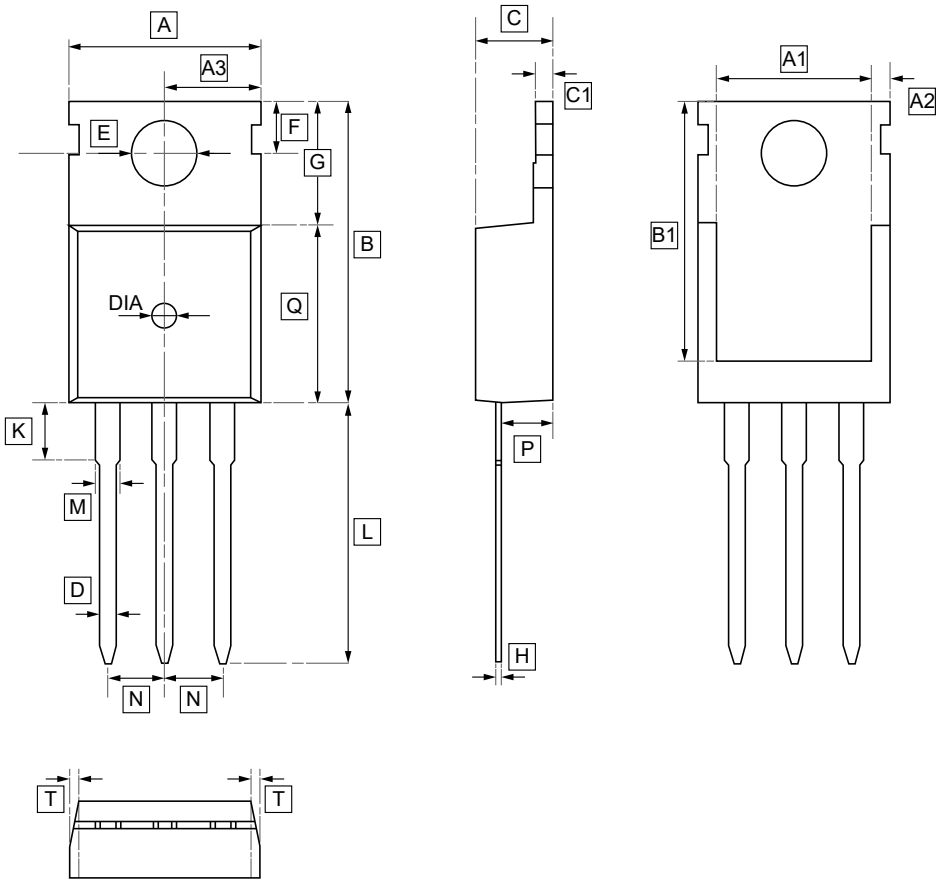
Figure 10: Safe Operating Area



Rectangular Pulse Duration (sec)

Fig 11: Transient Thermal Response Curve

8.TO-220 Package Outline Dimensions

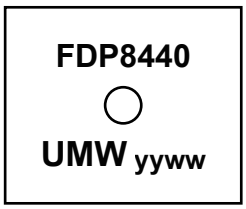


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	B	B1	C	C1	D	E	F	G
Min	9.7	8.44	1.05	4.8	15.4	12.9	4.28	1.1	0.6	3.4	2.65	5.2
Max	10.3	8.84	1.25	5.2	16.2	13.5	4.68	1.5	1.0	3.8	3.25	5.8

Symbol	H	K	L	L1	M	N	P	Q	T	DIA
Min	0.4	2.9	12.8	2.7	1.15	2.49	2.1	8.7	W:0.35	⊙1.5 (deep 0.2)
Max	0.6	3.3	13.6	3.3	1.35	2.59	2.7	9.3		

9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW FDP8440	TO-220	1000	Tube and box

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