UMW FDP045N10A

100V N-Channel MOSFET

1.Description

This N-channel MOSFET is produced by process,which is specially designed to minimize the on resistance and maintain excellent switching performance.

2.1Features

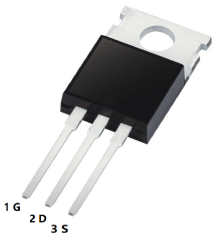
- $V_{DS\ (V)}$=100V
- I_D=164A
- $R_{DS(ON)}$<3.8mΩ(V_{GS}=10V)

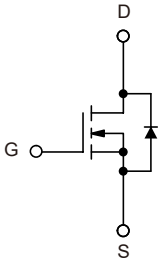
2.2Features

- High power and high current handling capacity
- High performance channel technology can achieve very low $R_{DS(ON)}$.
- Meet RoHS standards
- Fast switching speed
- Low gate charge, Q_G=54nC(typical)

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}	100	V
Gate to Source Voltage		V_{GSS}	±20	V
Drain Current - Continuous	T_C=25°C (Silicon Limited)	I_D	164*	A
- Continuous	T_C=100°C (Silicon Limited)		116	A
- Continuous	T_C=25°C (packaging limit)		120	A
- Pulsed	(Note 1)	I_{DM}	656	A
Single Pulse Avalanche Energy	(Note 2)	E_{AS}	637	mJ
Diode restores dv/dt peak value	(Note 3)	dv/dt	6	V/ns
Power consumption	T_C=25°C	P_D	263	W
Power consumption	- Reduce to above 25°C		1.75	W/°C

Storage Temperature Range	T_J, T_{STG}	-55 to 175	°C
Maximum Lead Temperature for Soldering, 1/8” from Case for 5 Seconds	T_L	300	°C

5.Thermal Characteristics

Parameter	Symbol	Rating	Units
Maximum junction-to- shell thermal resistance	$R_{\theta JC}$	0.57	°C/W
Maximum junction-to- ambient thermal resistance	$R_{\theta JA}$	62.5	°C/W

* Calculate the continuous current (based on the maximum allowable junction temperature). The current limit of thepackage is 120 A.

6.Electrical Characteristic (T_J=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	100			V
Temperature coefficient of breakdown voltage	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I_D=250μA Referenced to 25°C		0.07		V/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=80V, V_{GS}=0V			1	μA
		V_{DS}=80V, T_J=150°C			500	μA
Gate- body leakage current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	2		4	V
Static on-resistance from drain to source	$R_{DS(ON)}$	V_{GS}=10V, I_D=100A		3.8	4.5	mΩ
Forward transconductance	g_{FS}	V_{DS}=10V, I_D=100A		132		S
Input capacitance	C_{iss}	V_{DS}=50V, V_{GS}=0V, f=1MHz		3960	5270	pF
output capacitance	C_{oss}			925	1230	pF
Reverse transmission capacitance	C_{rss}			34		pF
Energy-dependent output capacitance	$C_{oss(er)}$	V_{DS}=50V, V_{GS}=0V		1520		pF
Total gate charge of 10 V	$Q_{g(tot)}$	V_{DS}=50V, I_D=100A V_{GS}=10V (Note 4)		54	74	nC
Gate- source gate charge	Q_{gs}			17		nC
Gate platform charge threshold	Q_{gs2}			8		nC
Gate- drain "Miller" charge	Q_{gd}			13		Ω
Equivalent Series Resistance (G-S)	E_{SR}	f=1MHz		1.9		ns
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=50V, I_D=100A V_{GS}=10V,R_G=4.7Ω (Note 4)		23	56	ns
Rise Time	t_r			26	62	ns
Turn-Off Delay Time	$t_{D(off)}$			50	110	ns
Fall Time	t_f			15	40	
Maximum Pulsed Drain to Source Diode Forward Current	I_S				164*	A
Maximum Pulsed Drain to Source Diode Forward Current	I_{SM}				656	A

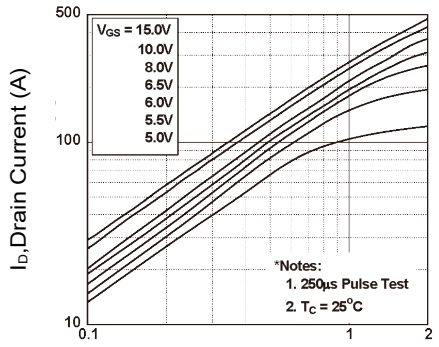
Drain to Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_{SD}=100A			1.3	V
Reverse Recovery Time	t_{rr}	V_{GS}=0V, V_{DD}=50V, I_{SD}=100A		75		ns
Reverse Recovery Charge	Q_{rr}	dI_F/dt=100A/μs		120		nC

1. Repetition rating: The pulse width is limited by the maximum junction temperature.

2. L=3MH, I_{AS}=20.6 A, R_G=25, and T_J=25°C.

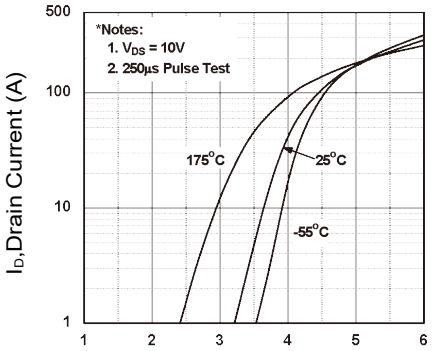
3.I_{SD}100a, di/dt 200a/s, V_{DD} BV_{DSS}, start TJ=25°C.

7.1Typical characteristic



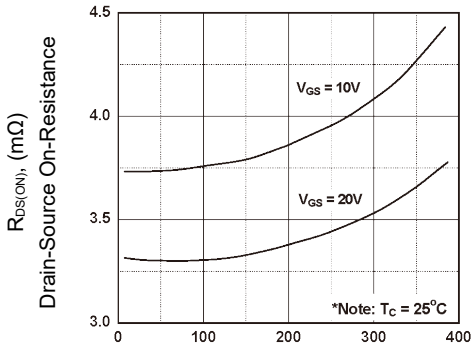
V_{DS},Drain-to-Source Voltage (V)

Figure 1: Conduction Region Characteristics



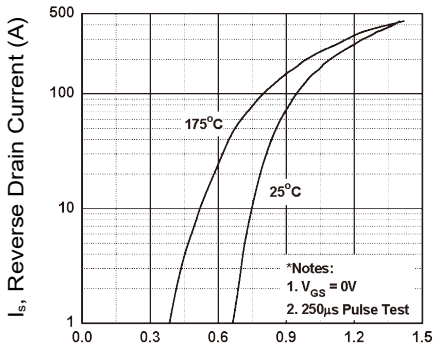
V_{GS},Gate-to-Source Voltage (V)

Figure 2: Transfer Characteristics



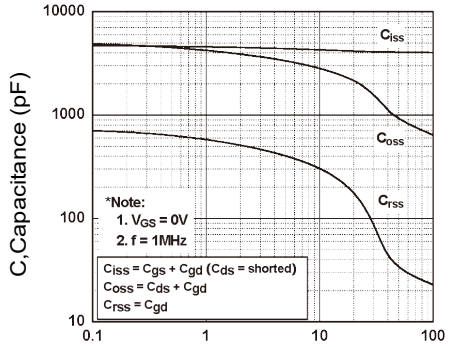
I_D,Drain Current (A)

Figure 3: On - resistance variation and drain current



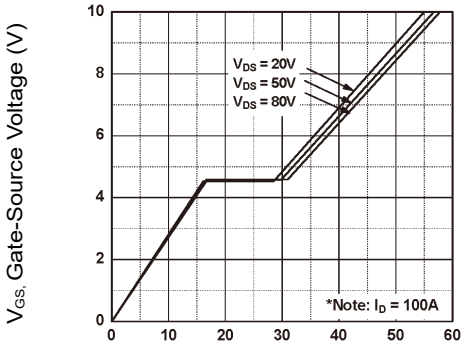
V_{SD},Body Diode Forward Voltage(V)

Figure 4: Relationship between direct voltage variation of body diode and source current and gate voltage



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

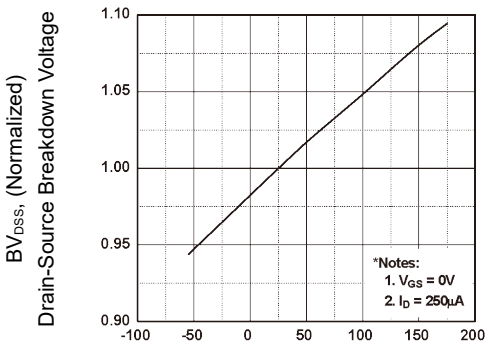
Figure 5: Capacitance Characteristics



Q_g, Total Gate Charge (nC)

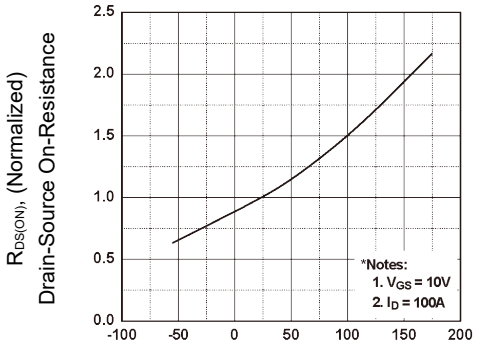
Figure 6: Gate Charge Characteristics

7.2Typical characteristic



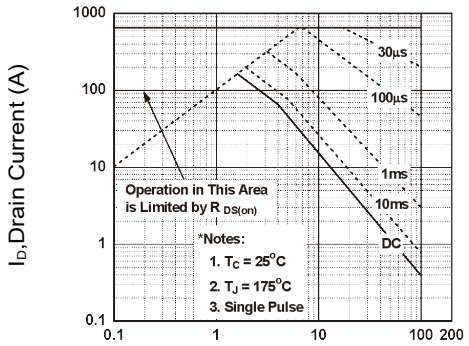
T_J,Junction Temperature (°C)

Figure 7: Relationship between Breakdown Voltage Change and Temperature andtemperature



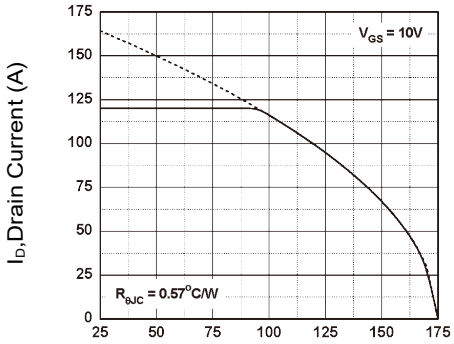
T_J,Junction Temperature (°C)

Figure 8: Relationship between- on resistance change



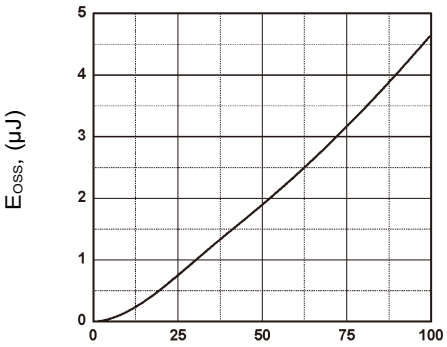
V_{DS},Drain-Source Voltage (V)

Figure 9: Maximum Safe Operating Area



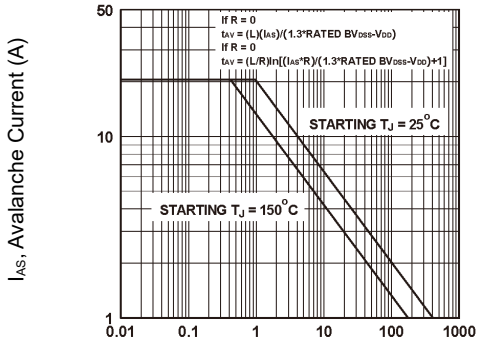
T_C,Case Temperature (°C)

Figure 10: Maximum Drain Current vs. Case Temperature



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

Figure 11: Eoss and drain source voltage



t_{AV}, Time In Avalanche(ms)

Figure 12: Uncomped Inductive Switching Capability

7.3Typical characteristic

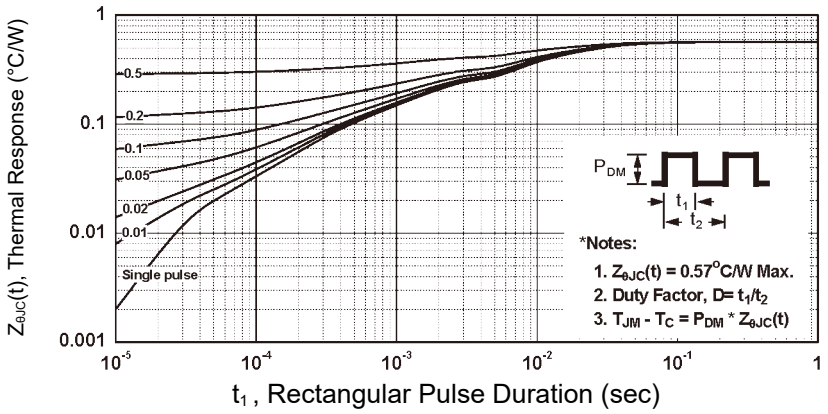
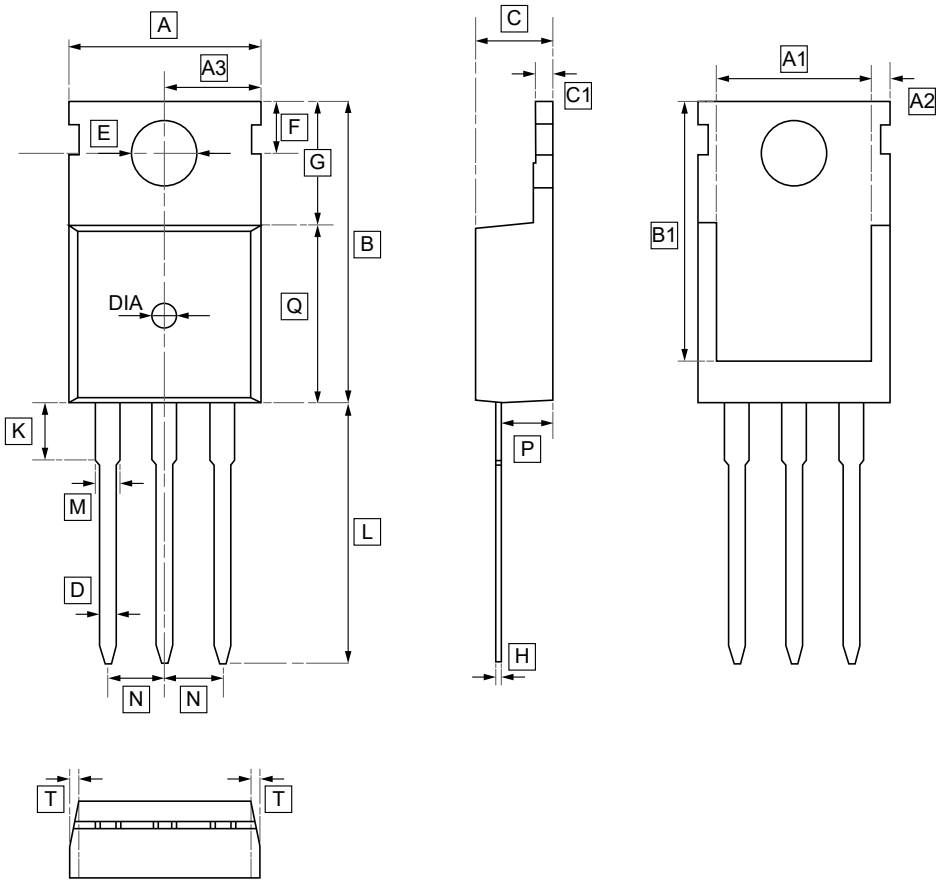


Fig 13: Transient Thermal Response Curve

8.TO-220 Package Outline Dimensions

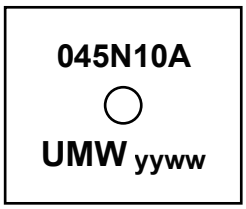


DIMENSIONS (mm are the original dimensions)

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 FDP045N10A	TO-220	1000	Tube and box

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