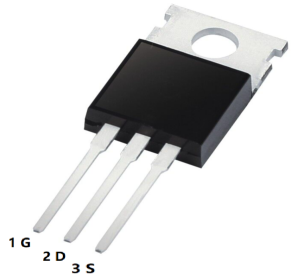
100 V N-Channel MOSFET

Explain

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

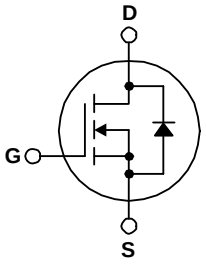


Applications

- Synchronous rectification for ATX/ server/telecom PSU
- Battery protection circuit
- Motor drive and uninterruptible power supply
- Micro photovoltaic inverter

Trait

- Fast switching speed
- Low gate charge, QG=54 nC (typical)
- High performance channel technology can achieve very low $R_{DS(on)}$.
- High power and high current handling capacity
- Meet RoHS standards
- V_{DS} = 100V
- I_D (at V_{GS}=10V)=100A
- $R_{DS(ON)}$ (at V_{GS}=10V) < 3.8mΩ



Maximum rating of MOSFET T_C =25°C unless otherwise specified.

symbol	parameter		FDP045N10A	unit
V_{DSS}	Drain-source voltage		100	V
V_{GSS}	Gate-source voltage		±20	V
I_D	drain current	- continuous (TC = 25 C, silicon limit)	164*	A
		- continuous (TC = 100°C, silicon limit)	116	
		- continuous (TC = 25 C, packaginglimit)	120	
I_{DM}	drain current	- Pulse (Note 1)	656	A
E_{AS}	Single pulse avalanche energy	(Note 2)	637	mJ
dv/dt	Diode restores dv/dt peak value	(Note 3)	6.0	V/ns
P_D	power consumption	(T_C = 25°C)	263	W
		- Reduce to above 25 C.	1.75	W/°C
T_J, T_{STG}	Operating and storage temperature range		-55 to +175	°C
T_L	Maximum lead temperature for welding, 1/8 "from the housing for 5 seconds.		300	°C

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

Hot property

symbol	parameter	FDP045N10A	unit
$R_{\theta JC}$	Maximum junction-to- shell thermal resistance	0.57	°C/W
$R_{\theta JA}$	Maximum junction-to- ambient thermal resistance	62.5	

Electrical Characteristics T_J = 25 °C unless otherwise noted.

symbol	parameter	test condition	minimum value	typical value	maximum	unit
BV_{DSS}	Drain- source breakdown voltage	I_D = 250 μA, V_{GS} = 0 V	100			V
ΔBV_{DSS} / ΔT_J	Temperature coefficient of breakdown voltage	Id = 250a, and the reference temperature is 25 C.		0.07		V/°C
I_{DSS}	Zero gate voltage drain current	V_{DS} = 80 V, V_{GS} = 0 V			1	μA
		V_{DS} = 80 V, T_C = 150°C			500	
I_{GSS}	Gate- body leakage current	V_{GS} = ±20 V, V_{DS} = 0 V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{GS} = V_{DS}, I_D = 250 μA	2.0		4.0	V
$R_{DS(on)}$	Static on-resistance from drain to source	V_{GS} = 10 V, I_D = 100 A		3.8	4.5	mΩ
g_{FS}	Forward transconductance	V_{DS} = 10 V, I_D = 100 A		132		S
C_{iss}	Input capacitance	V_{DS} = 50 V, V_{GS} = 0 V f = 1 MHz		3960	5270	pF
C_{oss}	output capacitance			925	1230	pF
C_{rss}	Reverse transmission capacitance			34		pF
C_{oss}(er)	Energy-dependent output capacitance	V_{DS} = 50 V, V_{GS} = 0 V		1520		pF
$Q_{g(tot)}$	Total gate charge of 10 V	V_{GS} = 10 V, V_{DS} = 50 V, I_D = 100 A (Note 4)		54	74	nC
Q_{gs}	Gate- source gate charge			17		nC
Q_{gs2}	Gate platform charge threshold			8		nC
Q_{gd}	Gate- drain "Miller" charge			13		nC
ESR	Equivalent series resistance (GS)	f = 1 MHz		1.9		Ω
$t_{d(on)}$	On- delay time	V_{DD} = 50 V, I_D = 100 A, V_{GS} = 10 V, R_G = 4.7 Ω (Note 4)		23	56	ns
t_r	Opening rise time			26	62	ns
$t_{d(off)}$	Turn-off delay time			50	110	ns
t_f	Turn- off falling time			15	40	ns
I_S	Maximum continuous forward current of drain-source diode				164*	A
I_{SM}	Maximum forward pulse current of drain-source diode				656	A
V_{SD}	Drain- source diode direct voltage	V_{GS} = 0 V, I_{SD} = 100 A			1.3	V
t_{rr}	Reverse recovery time	V_{GS} = 0 V, V_{DD} = 50 V, I_{SD} = 100 A, dI_F/dt = 100 A/μs		75		ns
Q_{rr}	Reverse recovery charge			120		nC

note:

1. Repetition rating: The pulse width is limited by the maximum junction temperature.
2. L = 3 MH, IAS = 20.6 A, RG = 25, and TJ = 25 C.
3. Isd100a, di/dt 200a/s, vdd bvdss, start TJ = 25 C.

Typical performance characteristics

Figure 1. Conduction Region Characteristics

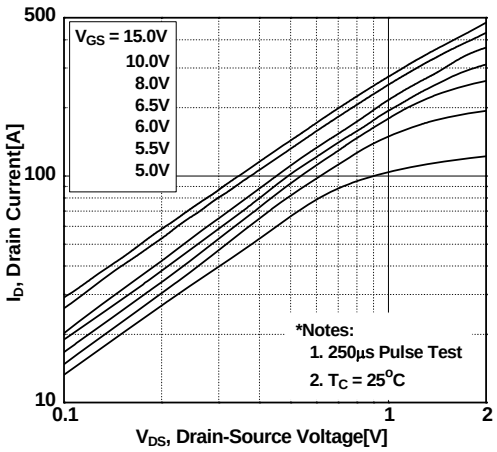


Figure 2. Transmission characteristics

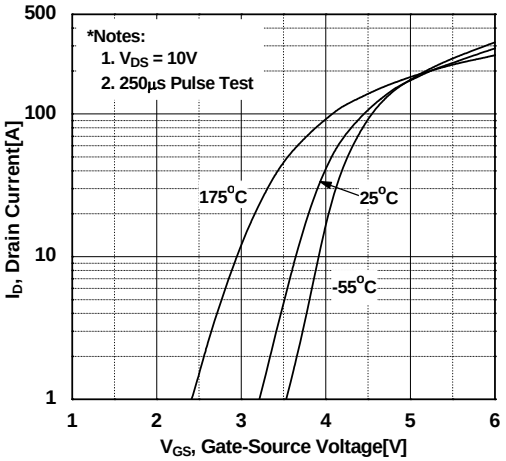


Figure 3. On - resistance variation and drain current

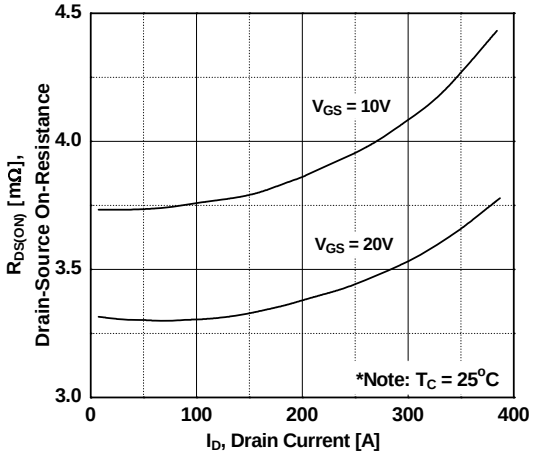


Fig. 4. Relationship between direct voltage variation of body diode and source current and gate voltage. And temperature.

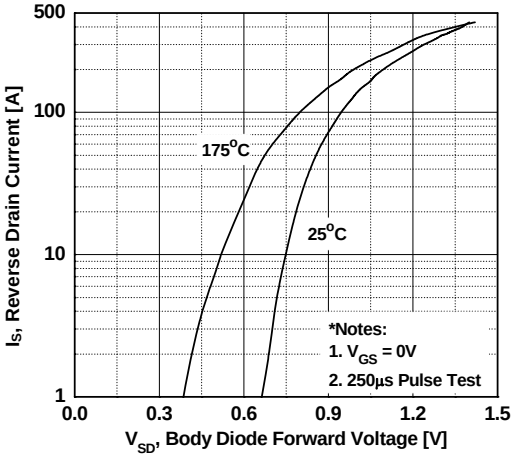


Figure 5. Capacitance characteristics

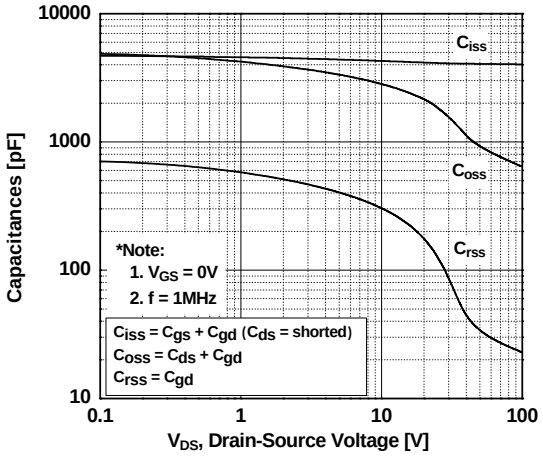
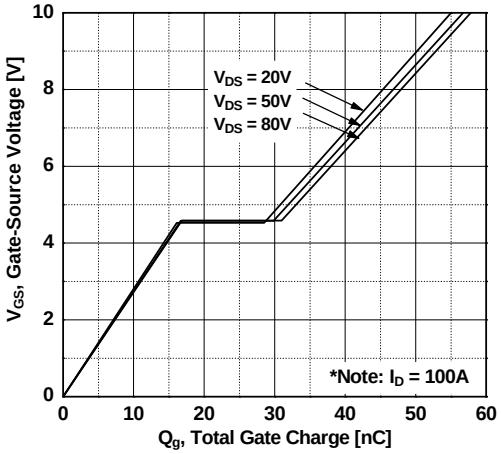


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Relationship between Breakdown Voltage Change and Temperature and temperature

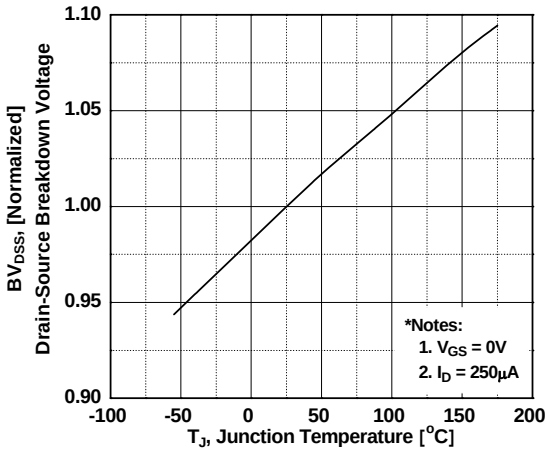


Figure 8. Relationship between on resistance change

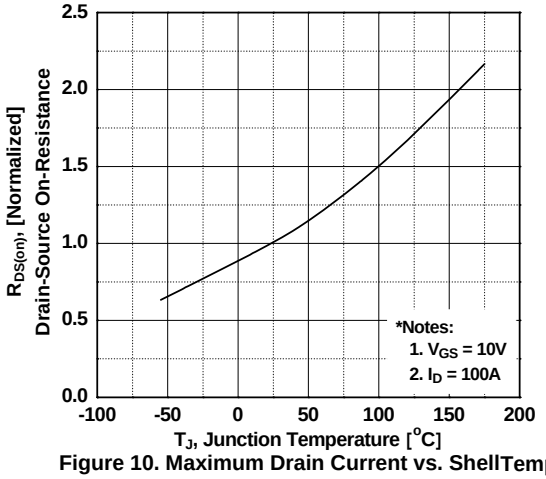


Figure 9. Maximum Safe Work Area

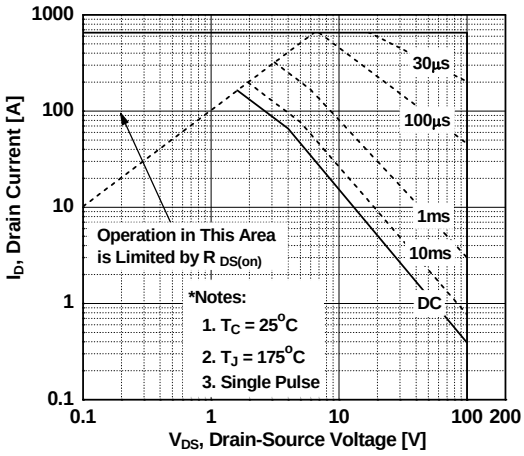


Figure 10. Maximum Drain Current vs. Shell Temperature

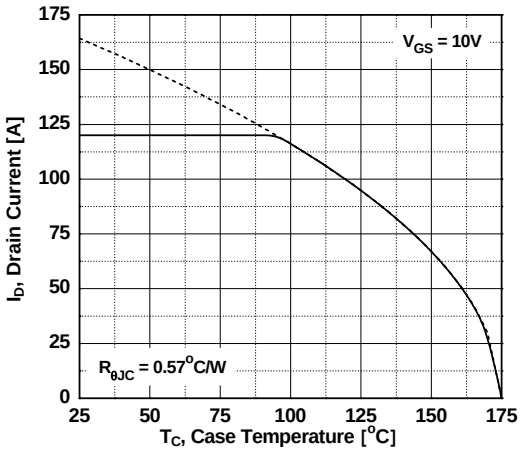


Figure 11. Eoss and drain source voltage

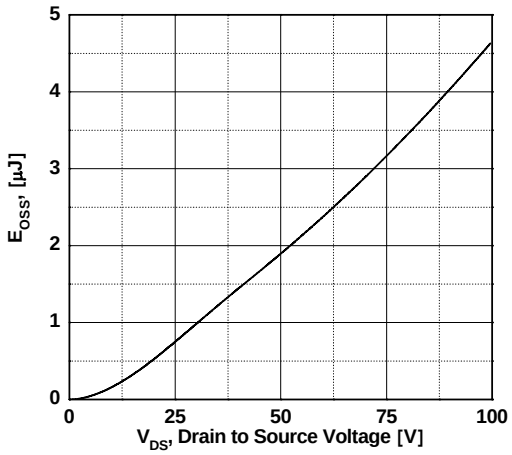
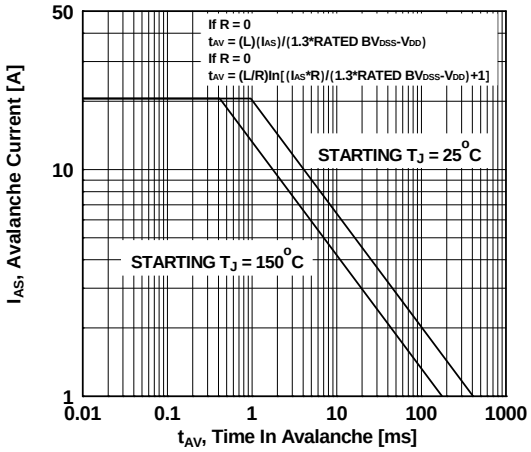
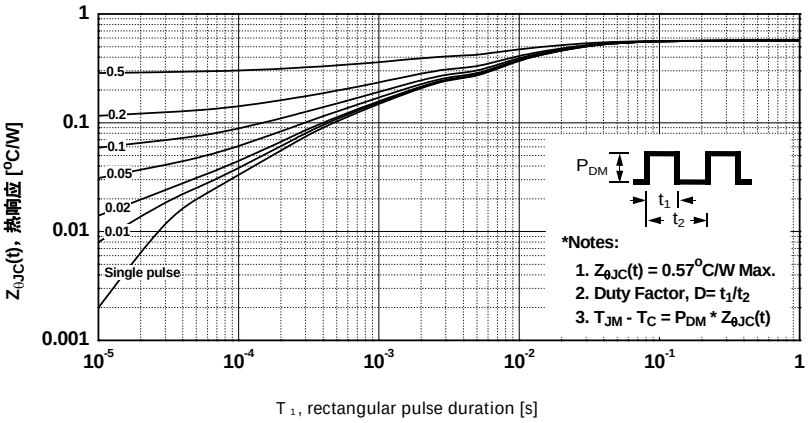


Figure 12. Uncomped Inductive Switching Capability

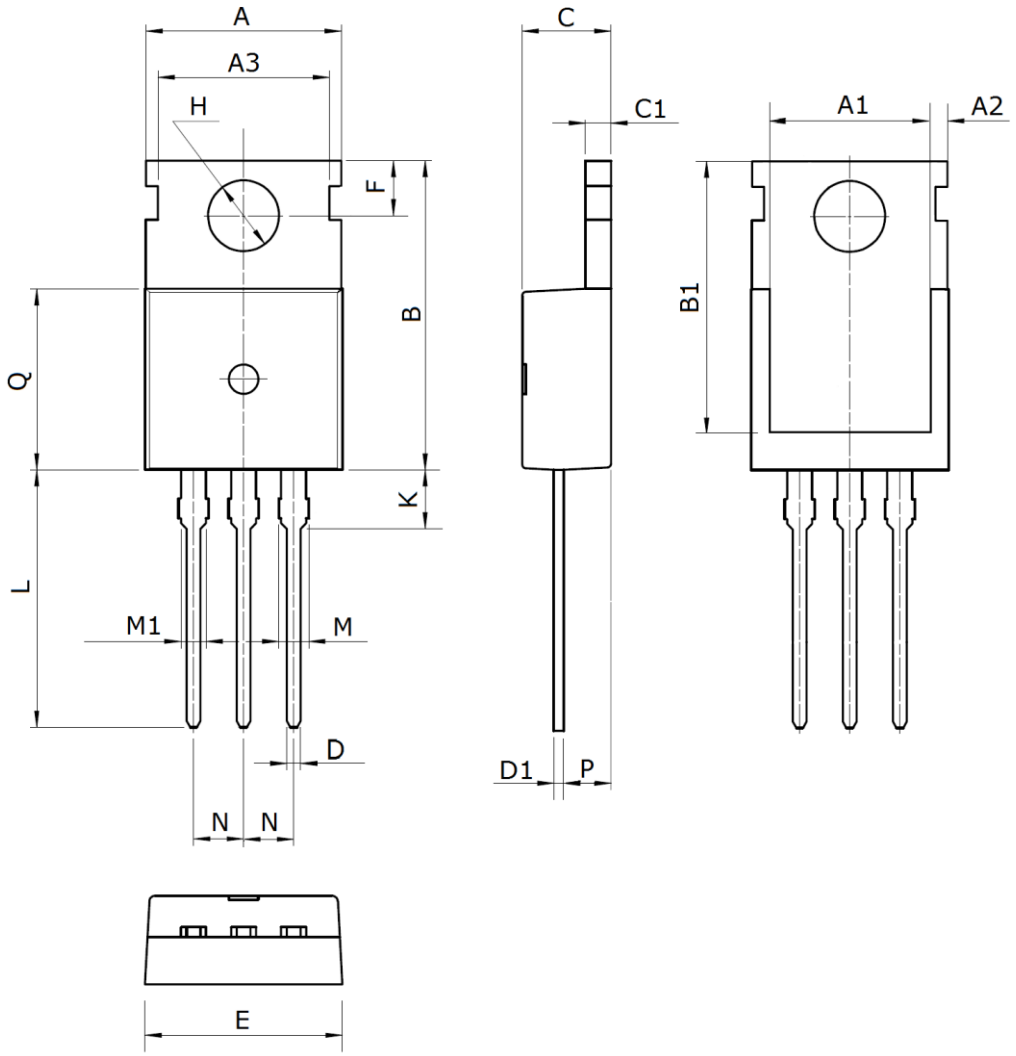


Typical performance characteristics (continued)

Figure 13 Transient thermal response curve

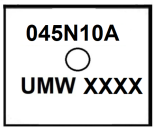


Package Mechanical Data TO-220



Symbol	Dimensions （mm）	Symbol	Dimensions (mm)	Symbol	Dimensions (mm)
A	10.0±0.3	C1	1.3±0.2	L	13.2±0.4
A1	8.0±0.2	D	0.8±0.2	M	1.38±0.1
A2	0.94±0.1	D1	0.5±0.1	M1	1.28±0.1
A3	8.7±0.1	E	10.0±0.3	N	2.54(typ)
B	15.6±0.4	F	2.8 ±0.1	P	2.4±0.3
B1	13.2 ±0.2	H	3.6±0.1	Q	9.15±0. 25
C	4.5±0. 2	K	3.1±0.2		

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW FDP045N10A	TO-220	1000	Tube and box