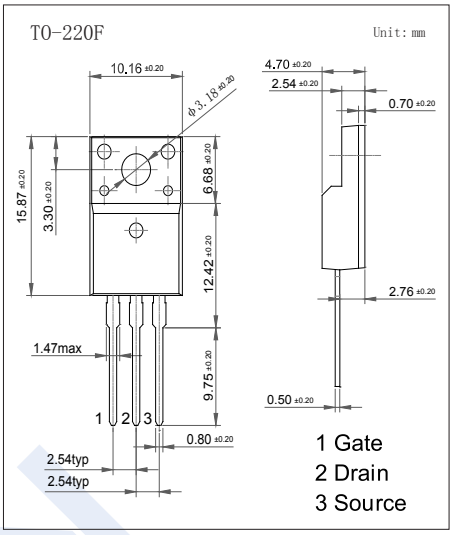
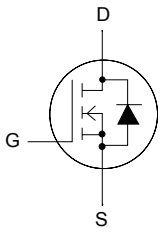
N-Channel MOSFET

KX4N60F



■ Features

- $V_{DS\ (V)}$ = 600V
- I_D = 2.4 A (V_{GS} = 10V)
- $R_{DS(ON)}$ < 2.5Ω (V_{GS} = 10V)



■ Absolute Maximum Ratings Ta = 25℃

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	600	V
Drain-Gate Voltage		V_{DG}	600	
Gate-Source Voltage		V_{GS}	±30	
Continuous Drain Current	Ta=25℃	I_D	2.4	A
	Ta=100℃		1.5	
Pulsed Drain Current		I_{DM}	18	
Repetitive and Non-Repetitive Avalanche Current		I_{AS},I_{AR}	4.5	
Power Dissipation		P_D	35	W
Non-Repetitive Avalanche Energy		E_{AS}	295	mJ
Repetitive Avalanche Energy		E_{AR}	9	
Thermal Resistance.Junction- to-Ambient		R_{thJA}	55	℃/W
Thermal Resistance.Junction- to-Case		R_{thJC}	3.6	
Junction Temperature		T_J	150	℃
Storage Temperature Range		T_{stg}	-55 to 150	

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■ Electrical Characteristics Ta = 25℃

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{DSS}	I_D=250μA, V_{GS}=0V	600			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=600V, V_{GS}=0V		2	100	μA
		V_{DS}=480V, V_{GS}=0V, T_J=125℃		50	500	
Gate-Body Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±30V		10	200	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} , I_D=250μA	2	3	4	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=2.25A		2.1	2.5	Ω
Forward Transconductance	g_{FS}	V_{DS}=30V, I_D=2.25A	2	3.4		S
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz		600		pF
Output Capacitance	C_{oss}			80		
Reverse Transfer Capacitance	C_{rss}			46		
Total Gate Charge	Q_g	V_{GS}=10V, V_{DS}=480V, I_D=4.5A		48	60	nC
Gate Source Charge	Q_{gs}			4	6	
Gate Drain Charge	Q_{gd}			24	30	
Turn-On DelayTime	$t_{d(on)}$	V_{GS}=10V, V_{DS}=300V, R_L=68Ω,R_G=12Ω		12		ns
Turn-On Rise Time	t_r			33		
Turn-Off DelayTime	$t_{d(off)}$			82		
Turn-Off Fall Time	t_f			36		
Body Diode Reverse Recovery Time	t_{rr}	I_F= 4.5A, dI/dt= 100A/μs,V_{GS}=0		480		
Body Diode Reverse Recovery Charge	Q_{rr}			4		nC
Internal drain inductance	L_d	Measured from drain lead to centre of die		4.5		nH
Internal source inductance	L_S	Measured from source lead to source bond pad		7.5		
Capacitance from T2 to external heatsink	C_{isol}	f=1MHz		10		pF
R.M.S. isolation voltage from all three terminals to external heatsink	V_{isol}	f = 50-60 Hz; sinusoidal waveform;R.H≤65% ; clean and dustfree			2500	V
Maximum Body-Diode Continuous Current	I_S				4.5	A
Pulsed source current	I_{SM}				18	
Diode Forward Voltage	V_{SD}	I_S=4.5A,V_{GS}=0V			1.2	V

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■ Typical Characterisitics

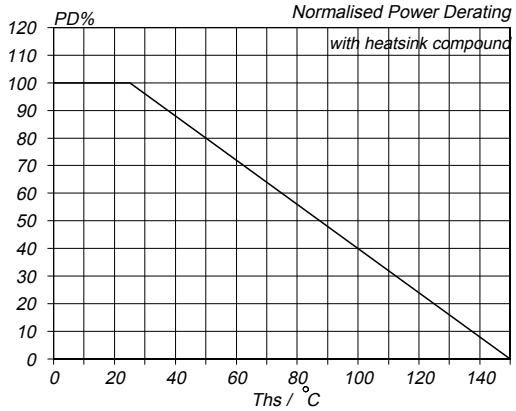

Fig.1. Normalised power dissipation.
PD% = 100·P_D/$P_{D\ 25\ °C}$ = f(T_{hs})

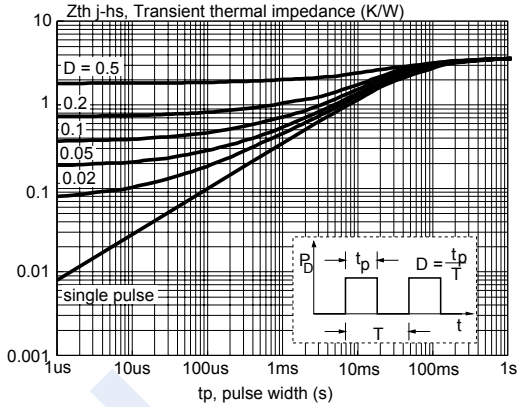

Fig.4. Transient thermal impedance.
$Z_{th\ j\text{-}hs}$ = f(t); parameter D = t_p/T

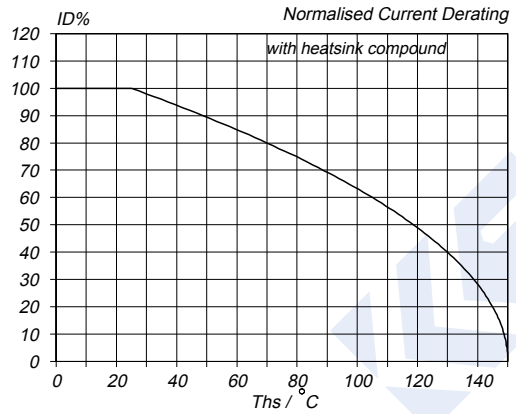

Fig.2. Normalised continuous drain current.
ID% = 100·I_D/$I_{D\ 25\ °C}$ = f(T_{hs}); conditions: V_{GS} ≥ 10 V

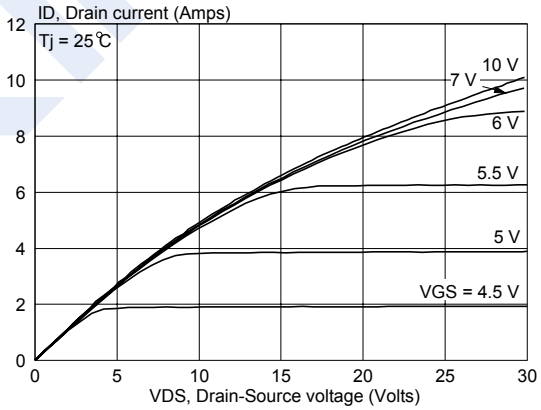

Fig.5. Typical output characteristics.
I_D = f(V_{DS}); parameter V_{GS}

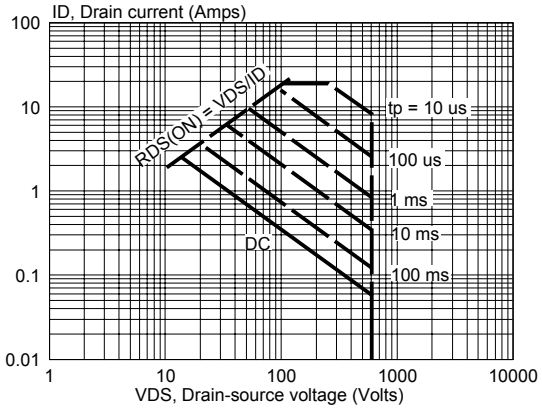

Fig.3. Safe operating area. T_{hs} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

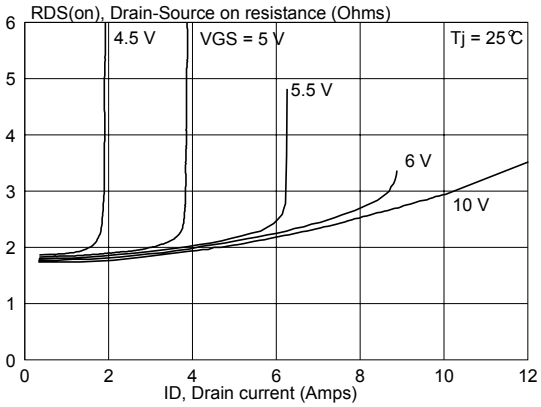

Fig.6. Typical on-state resistance.
$R_{DS(ON)}$ = f(I_D); parameter V_{GS}

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■ Typical Characterisitics

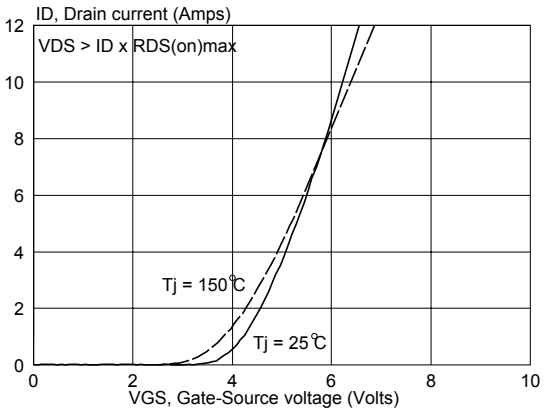

Fig.7. Typical transfer characteristics.
$I_D = f(V_{GS})$; parameter T_j

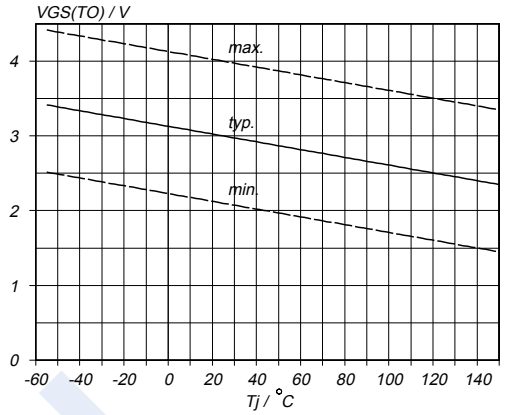

Fig.10. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 0.25 mA; $V_{DS} = V_{GS}$

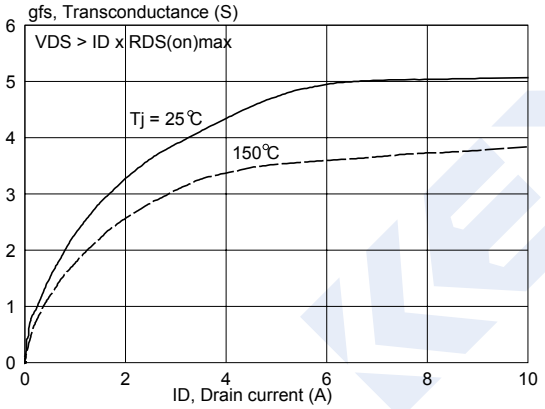

Fig.8. Typical transconductance.
$g_{fs} = f(I_D)$; parameter T_j

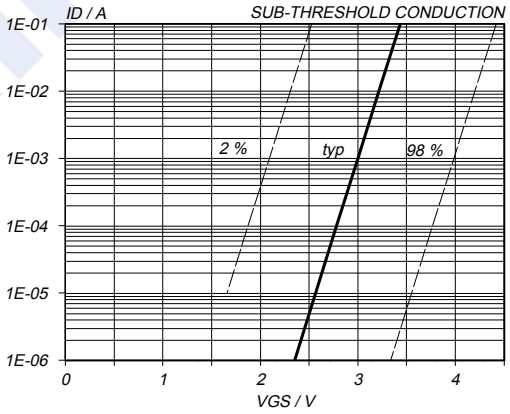

Fig.11. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: T_j = 25 ˚C; $V_{DS} = V_{GS}$

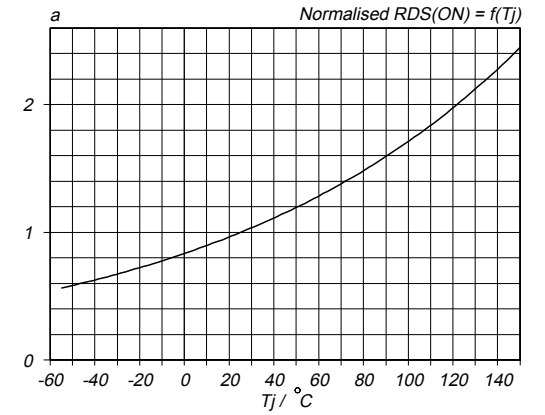

Fig.9. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\ ^\circ C} = f(T_j)$; I_D = 2.25 A; V_{GS} = 10 V

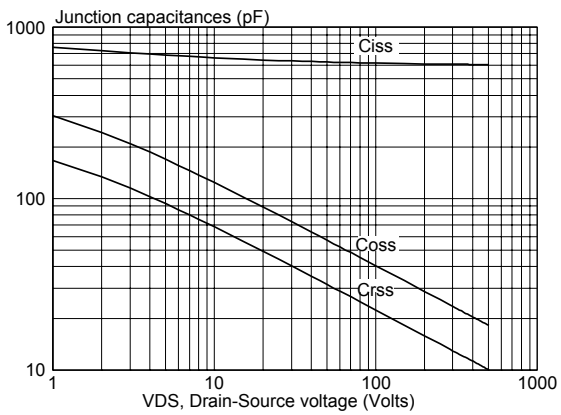

Fig.12. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: V_{GS} = 0 V; f = 1 MHz

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■ Typical Characterisitics

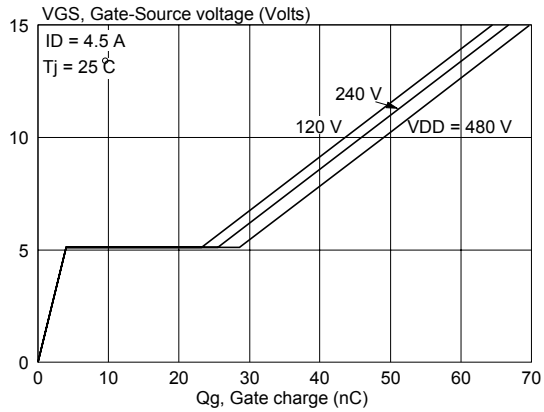

Fig.13. Typical turn-on gate-charge characteristics. $V_{GS} = f(Q_G)$; parameter V_{DS}

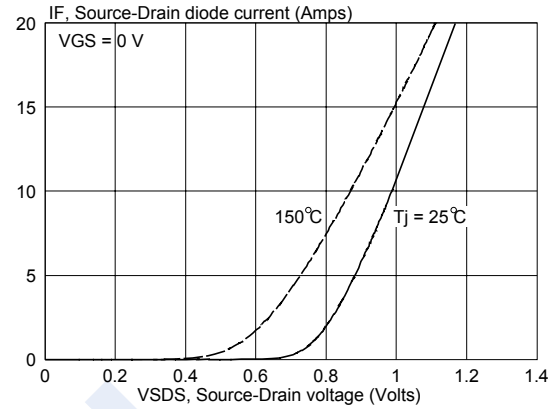

Fig.16. Source-Drain diode characteristic. $I_F = f(V_{SDS})$; parameter T_j

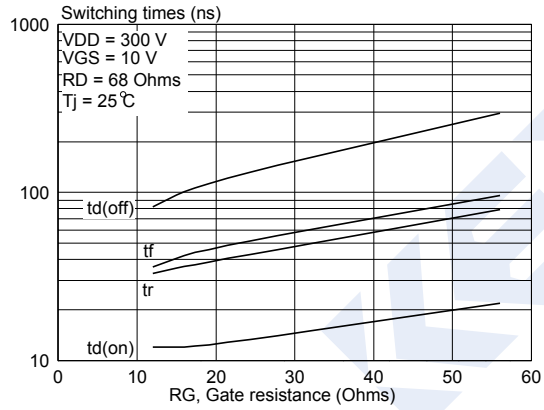

Fig.14. Typical switching times; $t_{d(on)}$, t_r, $t_{d(off)}$, $t_f = f(R_G)$

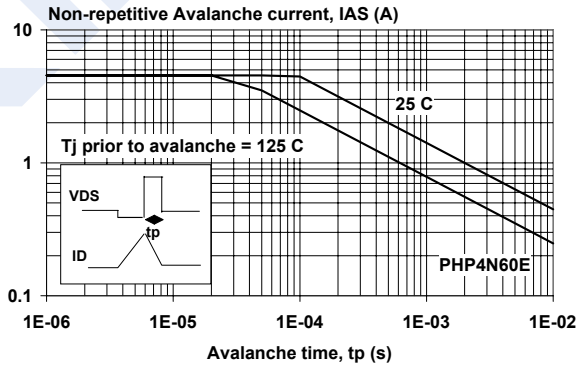

Fig.17. Maximum permissible non-repetitive avalanche current (I_{AS}) versus avalanche time (t_p); unclamped inductive load

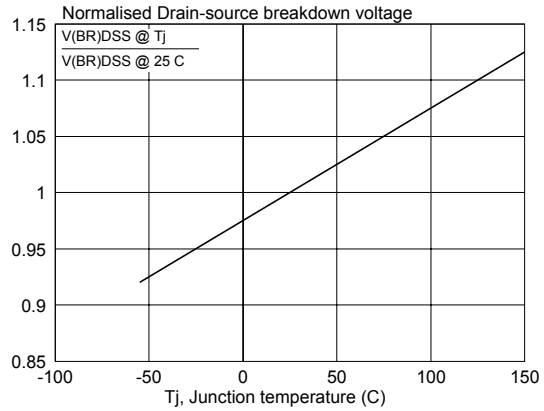

Fig.15. Normalised drain-source breakdown voltage; $V_{(BR)DSS}/V_{(BR)DSS\ 25\ ^\circ C} = f(T_j)$

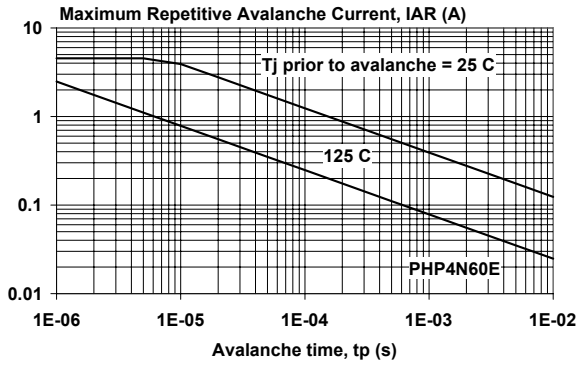

Fig.18. Maximum permissible repetitive avalanche current (I_{AR}) versus avalanche time (t_p)