NIKO-SEM

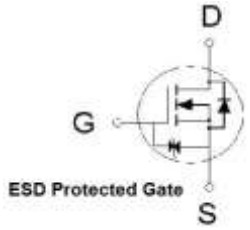
N-Channel Enhancement Mode Field Effect Transistor

PE5M6EA
PDFN 3x3P
Halogen-Free & Lead-Free

RoHS Compliant

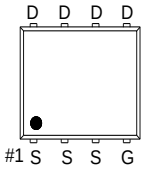
PRODUCT SUMMARY

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D[3]
24V	5mΩ	51A



Features
- Pb−Free, Halogen Free and RoHS compliant.
- Low $R_{DS(on)}$ to Minimize Conduction Losses.
- Ohmic Region Good $R_{DS(on)}$ Ratio.
- Optimized Gate Charge to Minimize Switching Losses.
- Products Integrated ESD diode with ESD Protected.

Applications
- Protection Circuits Applications.
- Logic/Load Switch Circuits Applications.



G : GATE
D : DRAIN
S : SOURCE

100% UIS Tested
100% Rg Tested

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C Unless Otherwise Noted)

PARAMETERS/TEST CONDITIONS		SYMBOL	LIMITS	UNITS
Drain-Source Voltage		V_{DS}	24	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current[3]	T_C = 25 °C	I_D	51	A
	T_C = 100 °C		32	
	T_A = 25 °C		18.6	
	T_A = 70 °C		15	
Pulsed Drain Current[1]		I_{DM}	120	
Avalanche Current		I_{AS}	30	
Avalanche Energy	L = 0.1mH	E_{AS}	45	mJ
Power Dissipation[4]	T_C = 25 °C	P_D	24	W
	T_C = 100 °C		9.6	
	T_A = 25 °C		3.1	
	T_A = 70 °C		2	
Operating Junction & Storage Temperature Range		T_j, T_{stg}	-55 to 150	°C

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE		SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Ambient[2]	t ≦10s	$R_{\theta JA}$		40	°C / W
Junction-to-Ambient[2]	Steady-State	$R_{\theta JA}$		70	
Junction-to-Case	Steady-State	$R_{\theta JC}$		5.2	

[1]Pulse width limited by maximum junction temperature.
[2]The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C.
[3]Package limitation current is 36A
[4]The Power dissipation is based on $R_{\theta JA}$ t ≦10s value.

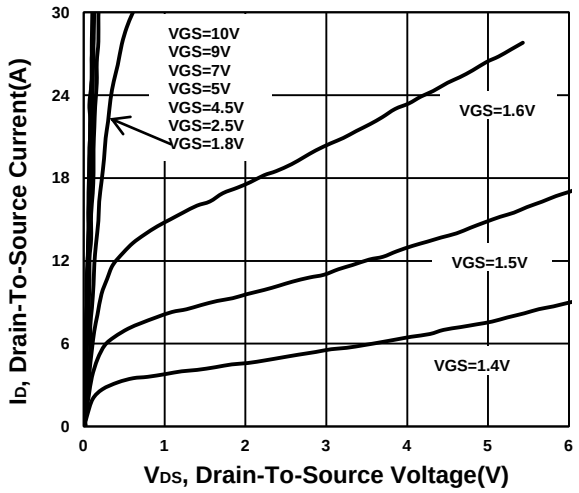
ELECTRICAL CHARACTERISTICS (T_J = 25 °C, Unless Otherwise Noted)

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS MIN	LIMITS TYP	LIMITS MAX	UNIT
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	24			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	0.7	0.8	1.3	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±10V			±30	uA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20V, V_{GS} = 0V			1	μA
		V_{DS} = 20V, V_{GS} = 0V, T_J = 55 °C			10	
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 2.5V, I_D = 10A		5.2	8.5	mΩ
		V_{GS} = 4.5V, I_D = 10A		3.7	5.5	
		V_{GS} = 10V, I_D = 15A		3.1	5	
Forward Transconductance[1]	g_{fs}	V_{DS} = 5V, I_D = 15A		66		S
DYNAMIC						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 12V, f = 1MHz		1803		pF
Output Capacitance	C_{oss}			294		
Reverse Transfer Capacitance	C_{rss}			225		
Gate Resistance	R_g	V_{GS} = 0V, V_{DS} = 0V, f = 1MHz		1.9		Ω
Total Gate Charge[2]	$Q_{g(VGS=10V)}$	V_{DS} = 12V , I_D = 15A		41		nC
	$Q_{g(VGS=4.5V)}$			20		
Gate-Source Charge[2]	Q_{gs}			2		
Gate-Drain Charge[2]	Q_{gd}			6.7		
Turn-On Delay Time[2]	$t_{d(on)}$	V_{DD} = 12V I_D ≅ 15A, V_{GEN} = 10V, R_G =6Ω		13		nS
Rise Time[2]	t_r			89		
Turn-Off Delay Time[2]	$t_{d(off)}$			77		
Fall Time[2]	t_f			136		

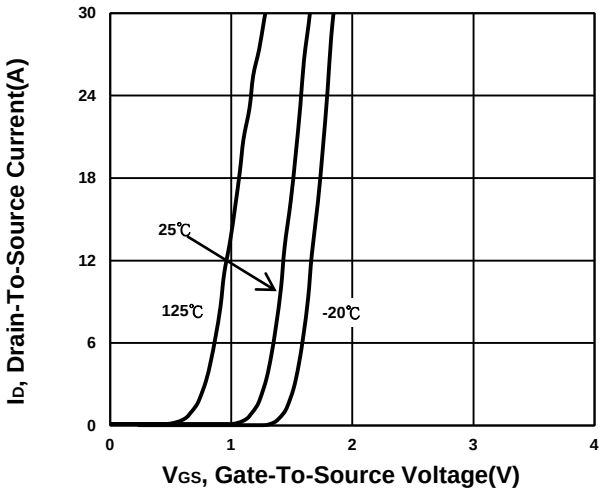
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_J = 25 °C)						
Continuous Current[3]	I_S				20	A
Forward Voltage[1]	V_{SD}	I_F = 15A, V_{GS} = 0V			1.2	V
Reverse Recovery Time	t_{rr}	I_F =15A , dI_F/dt = 100A / μS		22		nS
Reverse Recovery Charge	Q_{rr}			7.7		nC

[1]Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.
[2]Independent of operating temperature.
[3]Package limitation current is 36A

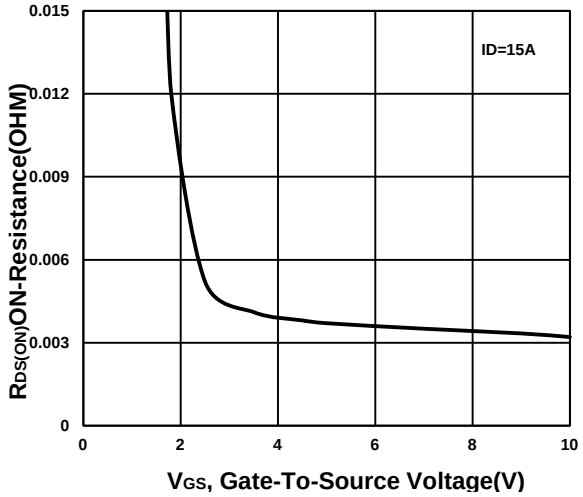
Output Characteristics



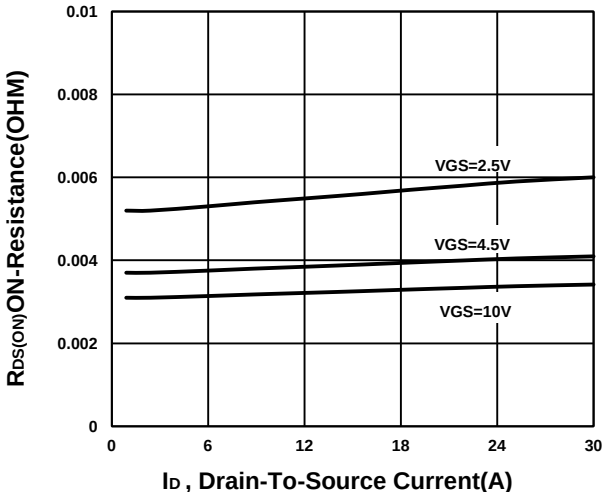
Transfer Characteristics



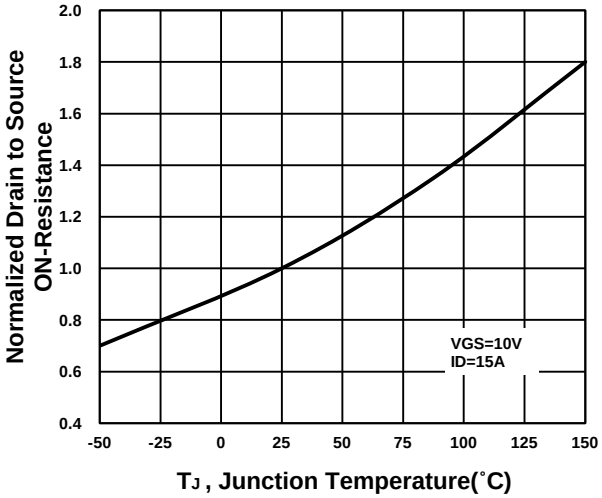
On-Resistance VS Gate-To-Source



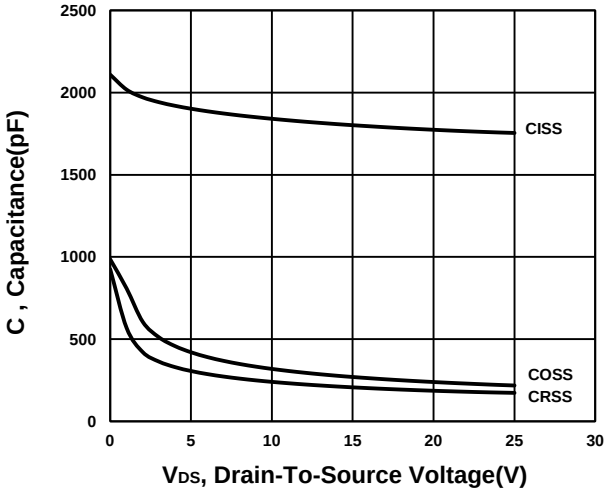
On-Resistance VS Drain Current



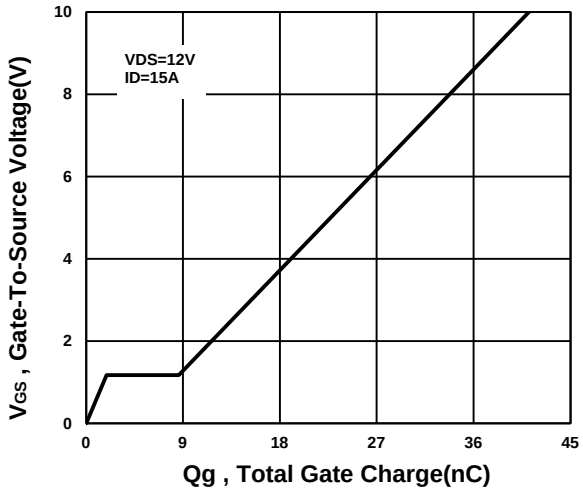
On-Resistance VS Temperature



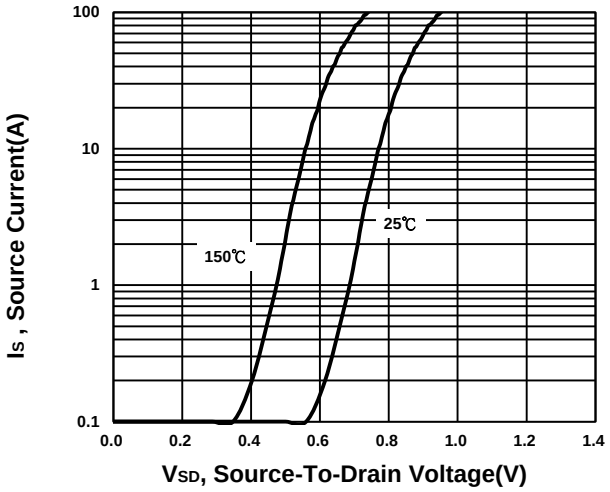
Capacitance Characteristic



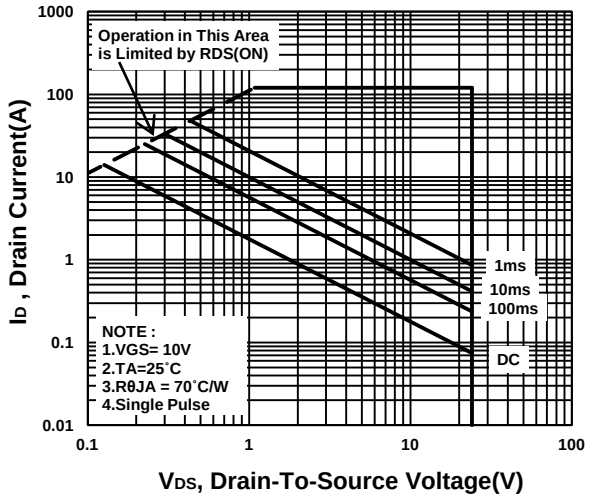
Gate charge Characteristics



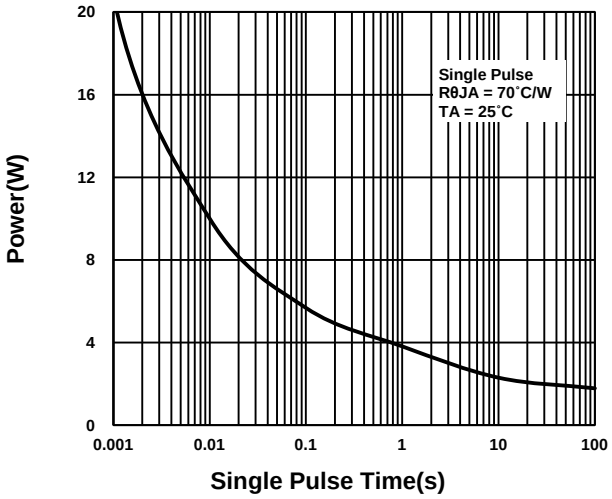
Source-Drain Diode Forward Voltage



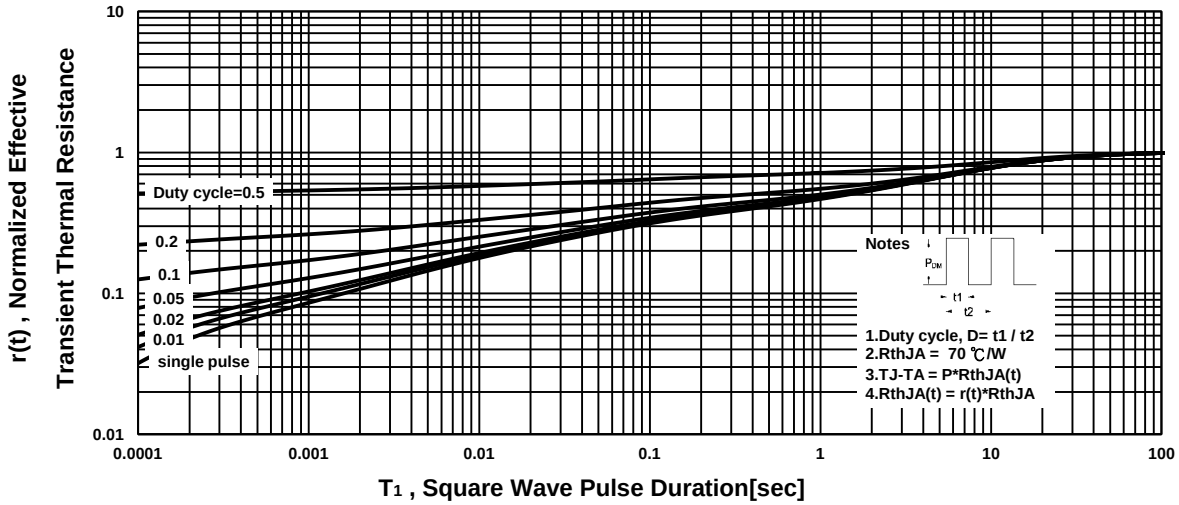
Safe Operating Area



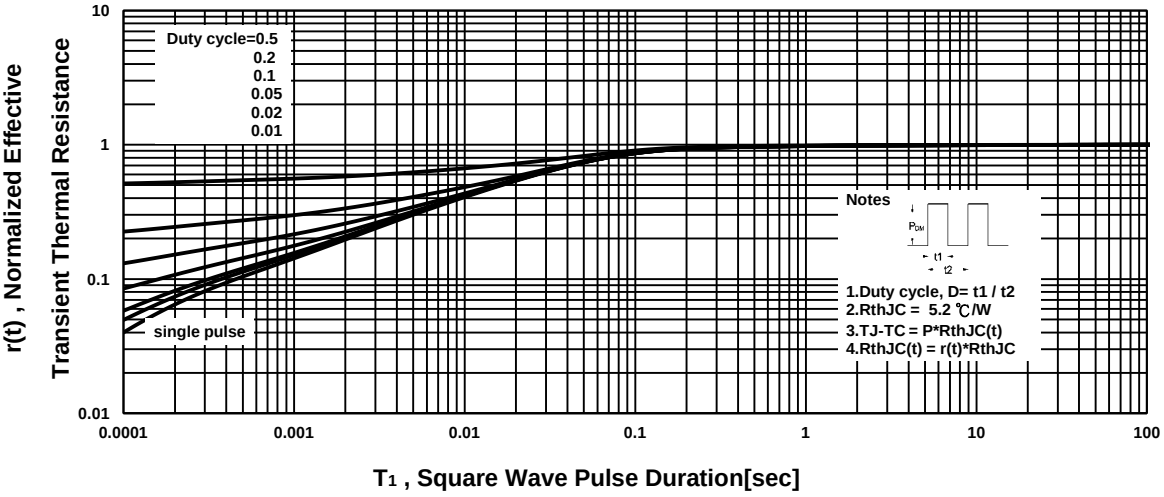
Single Pulse Maximum Power Dissipation



Transient Thermal Response Curve



Transient Thermal Response Curve



T_1 , Square Wave Pulse Duration[sec]