NIKO-SEM

N-Channel Enhancement Mode Field Effect Transistor

PE6A6BA
PDFN 3x3P
Halogen-Free & Lead-Free

PRODUCT SUMMARY

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D
40V	7mΩ	46A
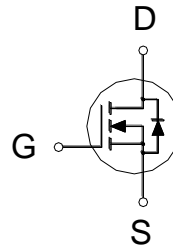
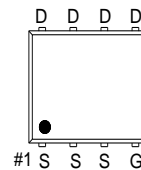**RoHS Compliant**

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.

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

G. GATE
D. DRAIN
S. SOURCE

D D D D
#1 S S S G

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}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current[4]	T_C = 25 °C	I_D	46	A
	T_C = 100 °C		29.5	
Pulsed Drain Current[1]		I_{DM}	80	
Continuous Drain Current[4]	T_A = 25 °C	I_D	14	
	T_A = 70 °C		11.8	
Avalanche Current		I_{AS}	31	
Avalanche Energy	L = 0.1mH	E_{AS}	48	mJ
Power Dissipation	T_C = 25 °C	P_D	31.2	W
	T_C = 100 °C		12.5	
Power Dissipation[3]	T_A = 25 °C	P_D	3.1	W
	T_A = 70 °C		2	
Operating Junction & Storage Temperature Range		T_j, T_{stg}	-55 to 150	°C

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THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE		SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Ambient[2]	t $\leq$ 10s	$R_{\theta JA}$		40	
Junction-to-Ambient[2]	Steady-State	$R_{\theta JA}$		58	°C / W
Junction-to-Case	Steady-State	$R_{\theta JC}$		4	

[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]The Power dissipation is based on $R_{\theta JA}$ t $\leq$ 10s value.
[4]Package limitation current is 13A.

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250µA	40			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250µA	1.3	1.75	2.3	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 32V, V_{GS} = 0V			1	µA
		V_{DS} = 30V, V_{GS} = 0V, T_J = 55 °C			10	µA
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 4.5V, I_D = 11A		5.4	9	mΩ
		V_{GS} = 10V, I_D = 11A		4.6	7	mΩ
Forward Transconductance[1]	g_{fs}	V_{DS} = 5V, I_D = 11A		75		S
DYNAMIC						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 20V, f = 1MHz		1916		pF
Output Capacitance	C_{oss}			215		pF
Reverse Transfer Capacitance	C_{rss}			147		pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS} = 0V, f = 1MHz		1		Ω
Total Gate Charge[2]	Q_g (V_{GS} = 10V)	V_{DS} = 20V , V_{GS} = 10V, I_D = 11A		37		nC
	Q_g (V_{GS} = 4.5V)			20		nC
Gate-Source Charge[2]	Q_{gs}			4.8		nC
Gate-Drain Charge[2]	Q_{gd}			8.3		nC
Turn-On Delay Time[2]	$t_{d(on)}$	V_{DS} = 20V , $I_D \cong$ 11A, V_{GS} = 10V, R_{GEN} = 6Ω		25		nS
Rise Time[2]	t_r			15		nS
Turn-Off Delay Time[2]	$t_{d(off)}$			41		nS
Fall Time[2]	t_f			20		nS

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SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_J = 25 °C)						
Continuous Current[3]	I_S				24	A
Forward Voltage[1]	V_{SD}	I_F = 11A, V_{GS} = 0V			1.3	V
Reverse Recovery Time	t_{rr}	I_F = 11A, dI_F/dt = 100A / μS		20		nS
Reverse Recovery Charge	Q_{rr}			8.1		nC

[1]Pulse test : Pulse Width $\leq$ 300 μsec, Duty Cycle $\leq$ 2%.
[2]Independent of operating temperature.
[3]Package limitation current is 13A.

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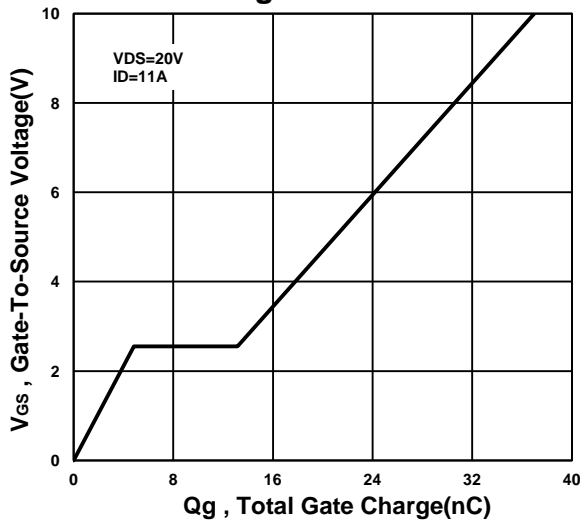### PDFN 3x3P
Halogen-Free & Lead-Free
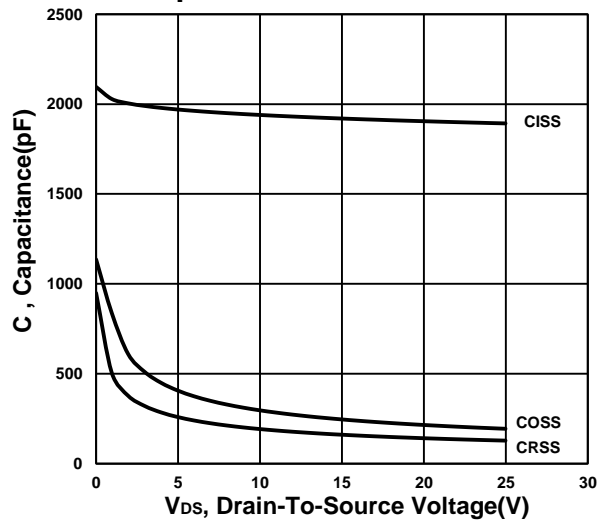
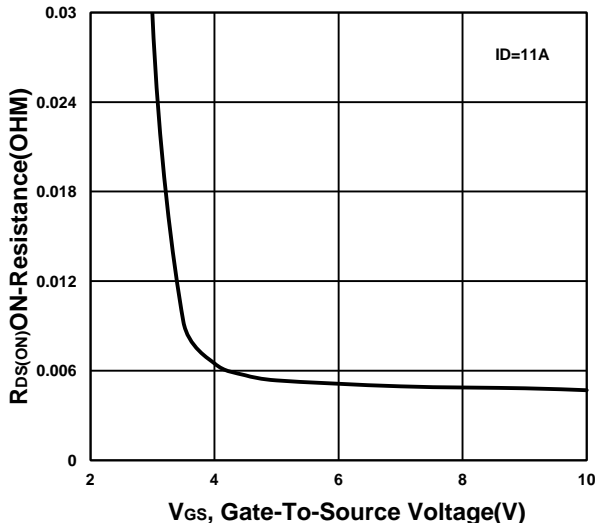## Output Characteristics
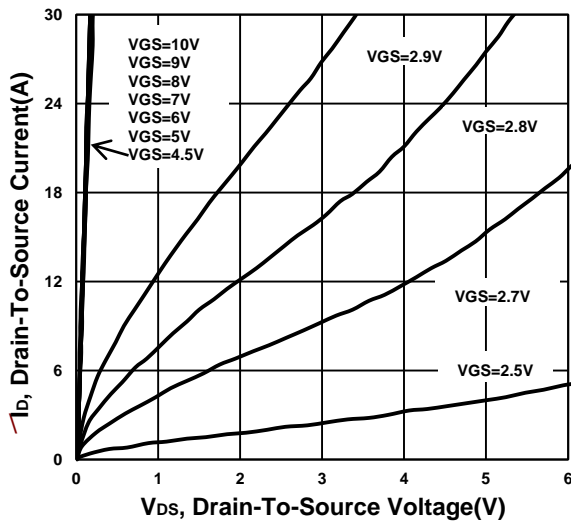
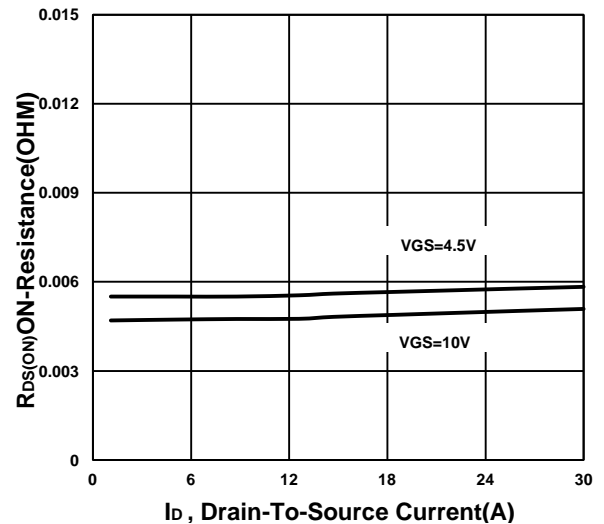## Transfer Characteristics
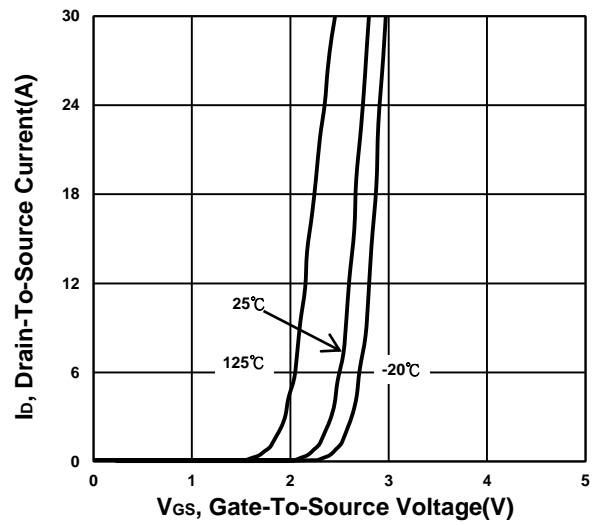
Gate charge Characteristics

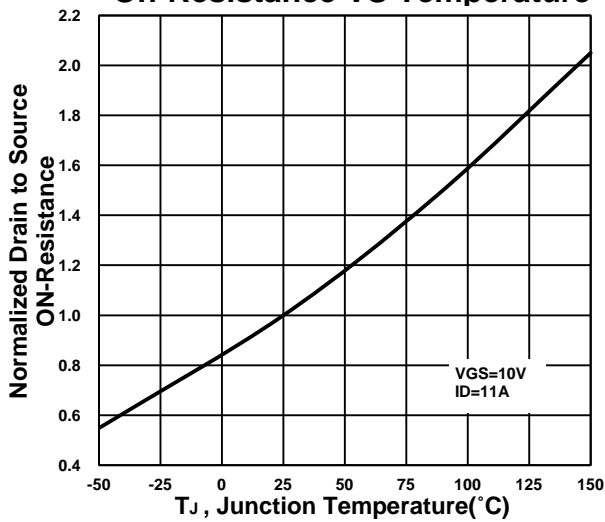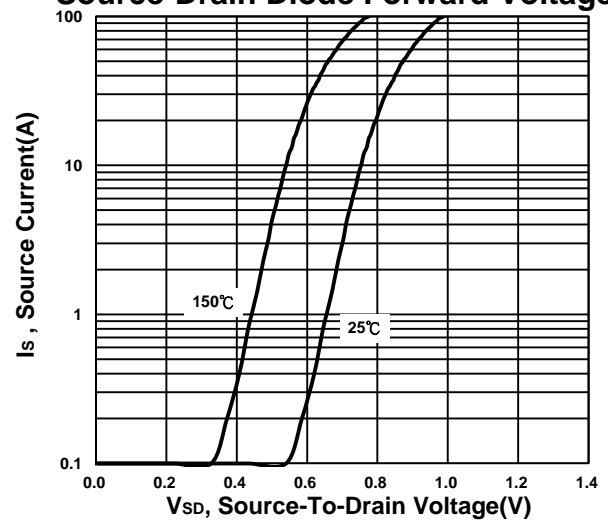## Capacitance Characteristic

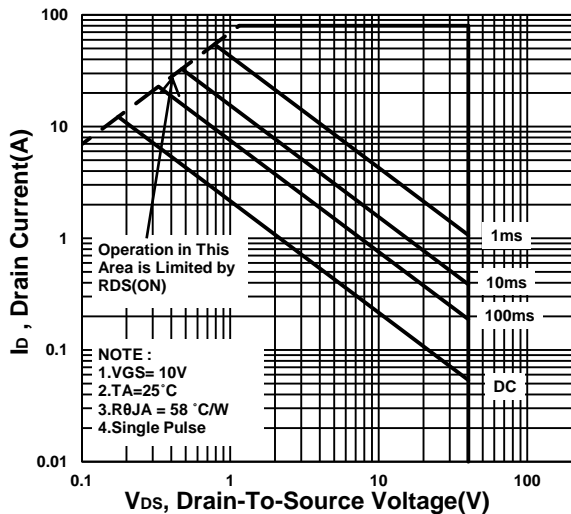## On-Resistance VS Gate-To-Source

On-Resistance VS Drain Current
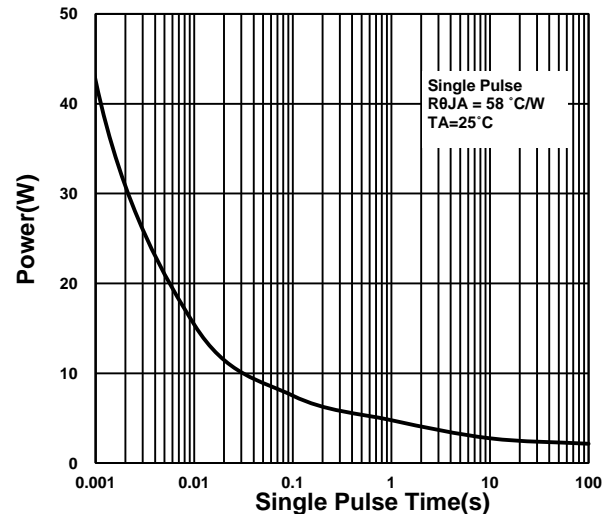
On-Resistance VS Temperature

VGS=10V
ID=11A

Normalized Drain to Source ON-Resistance vs T_J, Junction Temperature(°C)

Source-Drain Diode Forward Voltage

150℃   25℃

I_S, Source Current(A) vs V_{SD}, Source-To-Drain Voltage(V)

Safe Operating Area

1ms
10ms
100ms
DC

Operation in This
Area is Limited by
RDS(ON)

NOTE :
1.VGS= 10V
2.TA=25˚C
3.RθJA = 58 ˚C/W
4.Single Pulse

I_D, Drain Current(A) vs V_{DS}, Drain-To-Source Voltage(V)

Single Pulse Maximum Power Dissipation

Single Pulse
RθJA = 58 ˚C/W
TA=25˚C

Power(W) vs Single Pulse Time(s)

Transient Thermal Response Curve

Duty cycle=0.5
0.2
0.1
0.05
0.02
0.01
single pulse

Notes
P_{DM}
t1
t2

1.Duty cycle, D= t1 / t2
2.RthJA = 58 ℃/W
3.TJ-TA = P*RthJA(t)
4.RthJA(t) = r(t)*RthJA

r(t) , Normalized Effective Transient Thermal Resistance vs T_1, Square Wave Pulse Duration[sec]