NIKO-SEM

N-Channel Enhancement Mode Field Effect Transistor

P2206BK
PDFN 5x6P
Halogen-Free & Lead-Free

PRODUCT SUMMARY

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D
60V	22.5mΩ	24A
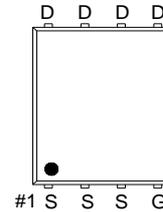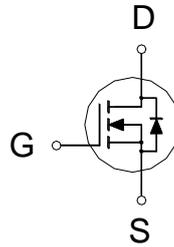
G. GATE
D. DRAIN
S. SOURCE

ABSOLUTE MAXIMUM RATINGS (T$_A$ = 25 °C Unless Otherwise Noted)

PARAMETERS/TEST CONDITIONS		SYMBOL	LIMITS	UNITS
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C = 25 °C	I_D	24	A
	T_C = 100 °C		15	
Pulsed Drain Current[1]		I_{DM}	80	
Continuous Drain Current	T_A = 25 °C	I_D	8	
	T_A = 70 °C		6.8	
Avalanche Current		I_{AS}	26	
Avalanche Energy	L = 0.1mH	E_{AS}	33.8	mJ
Power Dissipation	T_C = 25 °C	P_D	30	W
	T_C = 100 °C		12	
Power Dissipation[3]	T_A = 25 °C	P_D	3.6	W
	T_A = 70 °C		2.3	
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 $\leq$10s	$R_{\theta JA}$		35	
Junction-to-Ambient[2]	Steady-State	$R_{\theta JA}$		65	°C / W
Junction-to-Case	Steady-State	$R_{\theta JC}$		4.2	

[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]The Power dissipation is based on $R_{\theta JA}$ t $\leq$10s value.

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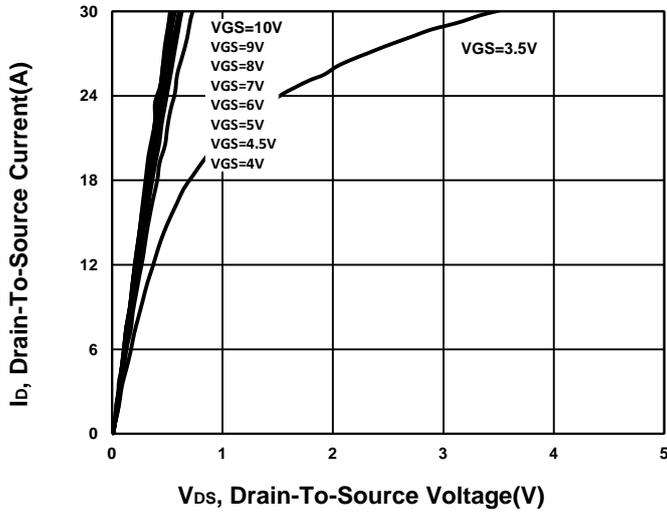## N-Channel Enhancement Mode Field Effect Transistor

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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	60			V
Gate Threshold Voltage	V$_{GS(th)}$	V$_{DS}$ = V$_{GS}$, I$_D$ = 250µA	1.3	1.75	2.3	
Gate-Body Leakage	I$_{GSS}$	V$_{DS}$ = 0V, V$_{GS}$ = ±20V			±100	nA
Zero Gate Voltage Drain Current	I$_{DSS}$	V$_{DS}$ = 48V, V$_{GS}$ = 0V			1	µA
		V$_{DS}$ = 40V, V$_{GS}$ = 0V, T$_J$ = 55 °C			10	
Drain-Source On-State Resistance[1]	R$_{DS(ON)}$	V$_{GS}$ = 4.5V, I$_D$ = 8A		19	30	mΩ
		V$_{GS}$ = 10V, I$_D$ = 8A		16.5	22.5	
Forward Transconductance[1]	g$_{fs}$	V$_{DS}$ = 5V, I$_D$ = 8A		35		S
DYNAMIC						
Input Capacitance	C$_{iss}$	V$_{GS}$ = 0V, V$_{DS}$ = 25V, f = 1MHz		1039		pF
Output Capacitance	C$_{oss}$			123		
Reverse Transfer Capacitance	C$_{rss}$			82		
Gate Resistance	R$_g$	V$_{GS}$ = 0V, V$_{DS}$ = 0V, f = 1MHz		1		Ω
Total Gate Charge[2]	Q$_g$ (V$_{GS}$ = 10V)	V$_{DS}$ = 30V , I$_D$ = 8A		23		nC
	Q$_g$ (V$_{GS}$ = 4.5V)			13		
Gate-Source Charge[2]	Q$_{gs}$			3.4		
Gate-Drain Charge[2]	Q$_{gd}$			7.6		
Turn-On Delay Time[2]	t$_{d(on)}$	V$_{DS}$ = 30V , I$_D$ ≅ 8A, V$_{GS}$ = 10V, R$_{GEN}$ =6Ω		38		nS
Rise Time[2]	t$_r$			22		
Turn-Off Delay Time[2]	t$_{d(off)}$			100		
Fall Time[2]	t$_f$			32		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T$_J$ = 25 °C)						
Continuous Current	I$_S$				2.7	A
Forward Voltage[1]	V$_{SD}$	I$_F$ = 8A, V$_{GS}$ = 0V			1.3	V
Reverse Recovery Time	t$_{rr}$	I$_F$ = 8A, dI$_F$/dt = 100A / µS		20		nS
Reverse Recovery Charge	Q$_{rr}$			11		nC

[1]Pulse test : Pulse Width ≤ 300 µsec, Duty Cycle ≤ 2%.
[2]Independent of operating temperature.

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Output Characteristics

VGS=10V
VGS=9V
VGS=8V
VGS=7V
VGS=6V
VGS=5V
VGS=4.5V
VGS=4V

VGS=3.5V

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

Transfer Characteristics

125℃   -20℃
25℃

I_D, Drain-To-Source Current(A) vs V_{GS}, Gate-To-Source Voltage(V)
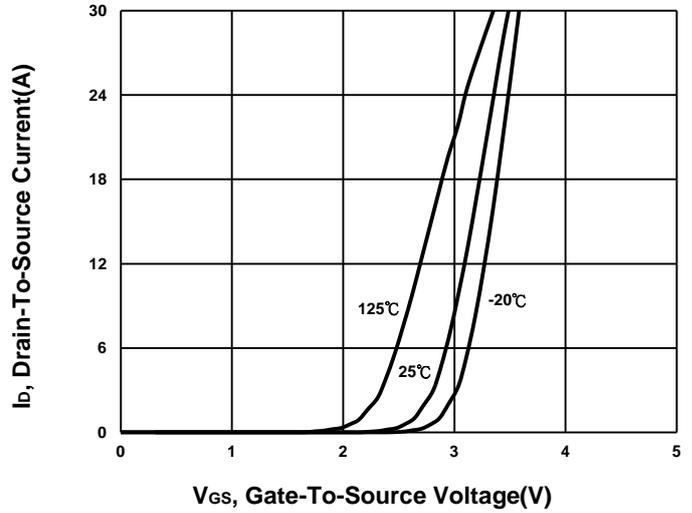
Gate charge Characteristics

VDS=30V
ID=8A

V_{GS}, Gate-To-Source Voltage(V) vs Q_g, Total Gate Charge(nC)
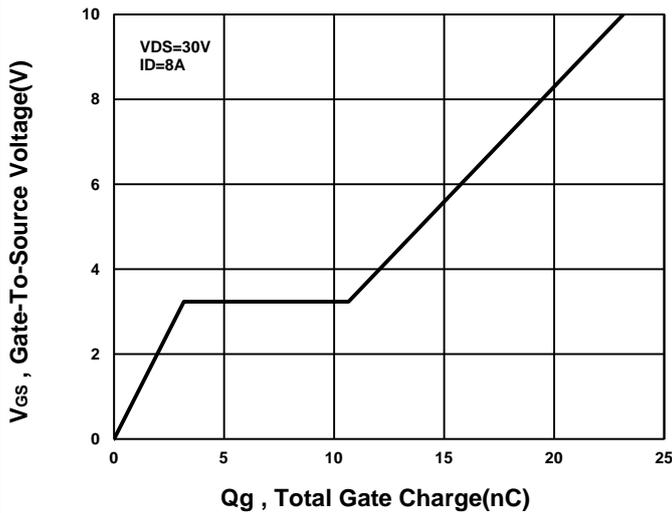
Capacitance Characteristic

CISS
COSS
CRSS

C, Capacitance(pF) vs V_{DS}, Drain-To-Source Voltage(V)
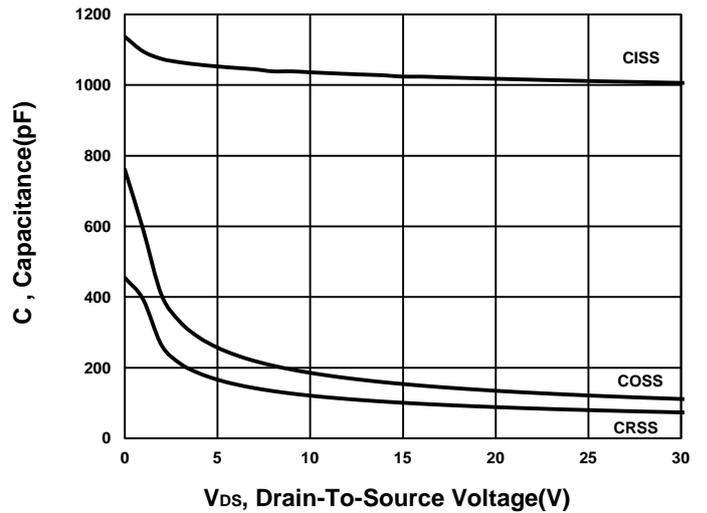
On-Resistance VS Gate-To-Source

ID=8A

$R_{DS(ON)}$ON-Resistance(OHM) vs V_{GS}, Gate-To-Source Voltage(V)
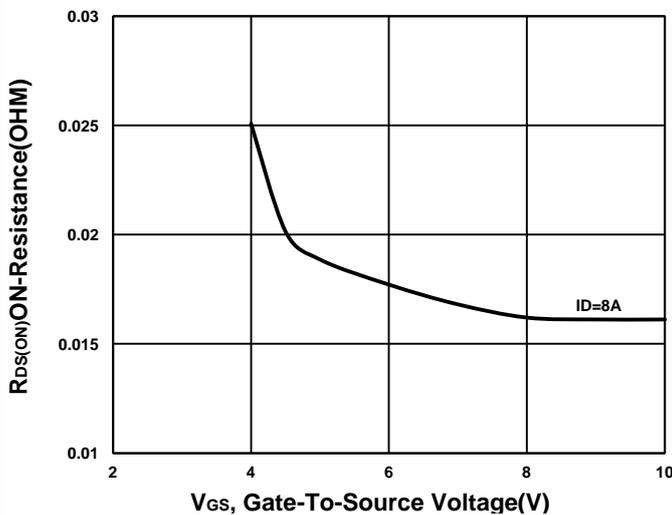
On-Resistance VS Drain Current

VGS=4.5V
VGS=10V

$R_{DS(ON)}$ON-Resistance(OHM) vs I_D, Drain-To-Source Current(A)
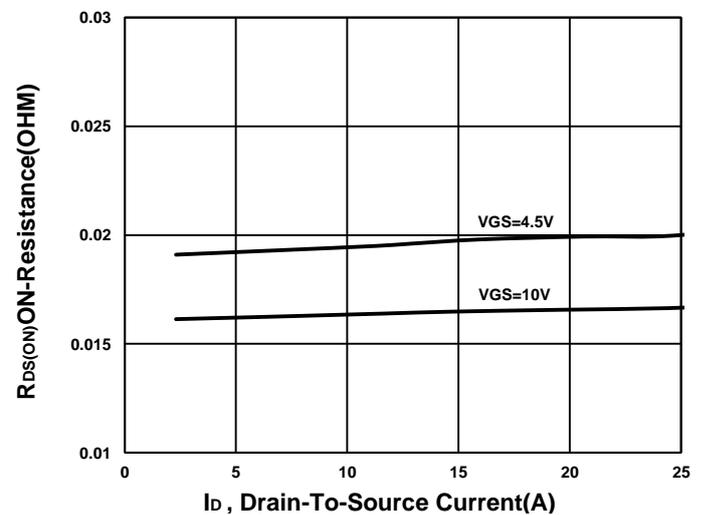
On-Resistance VS Temperature

VGS=10V
ID=8A

TJ , Junction Temperature(°C)

Normalized Drain to Source ON-Resistance
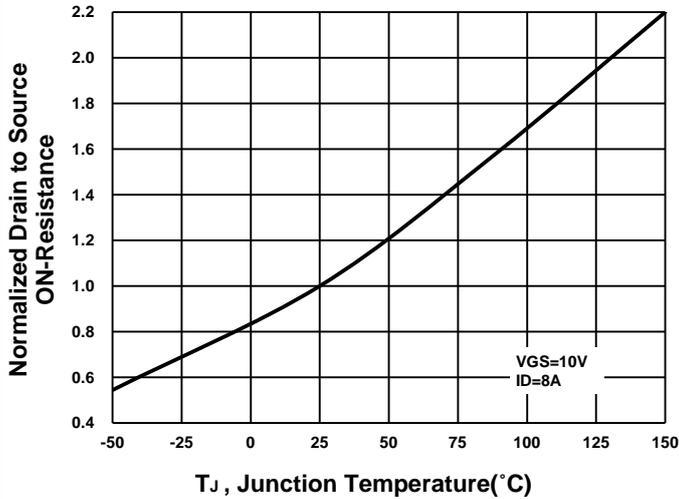
Source-Drain Diode Forward Voltage

150°C 25°C

VSD, Source-To-Drain Voltage(V)

Is , Source Current(A)

Safe Operating Area

Operation in This Area is Limited by RDS(ON)

1ms
10ms
100ms
DC

NOTE :
1.VGS= 10V
2.TA=25°C
3.RθJA = 65°C/W
4.Single Pulse

VDS, Drain-To-Source Voltage(V)
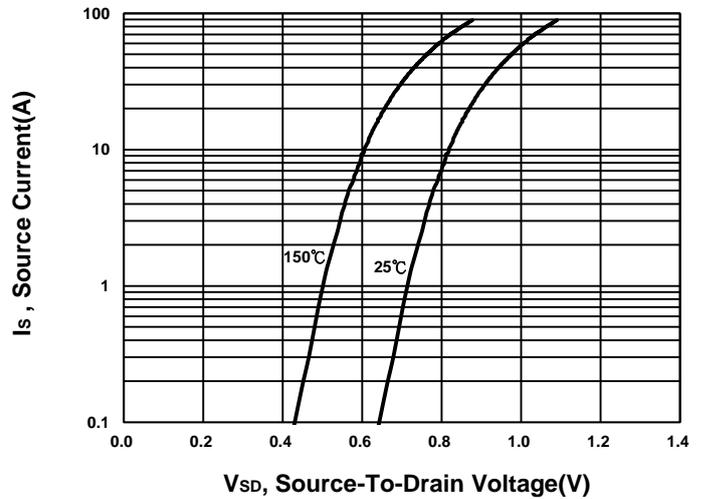
ID , Drain Current(A)
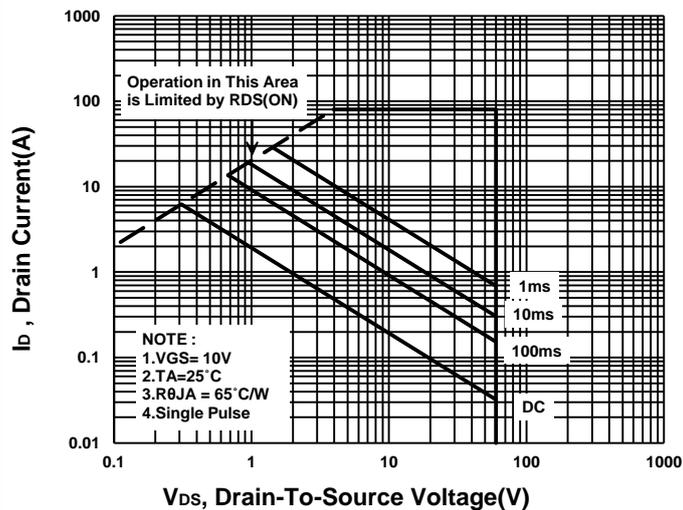
Single Pulse Maximum Power Dissipation

Single Pulse
RθJA = 65°C/W
TA=25°C

Single Pulse Time(s)

Power(W)
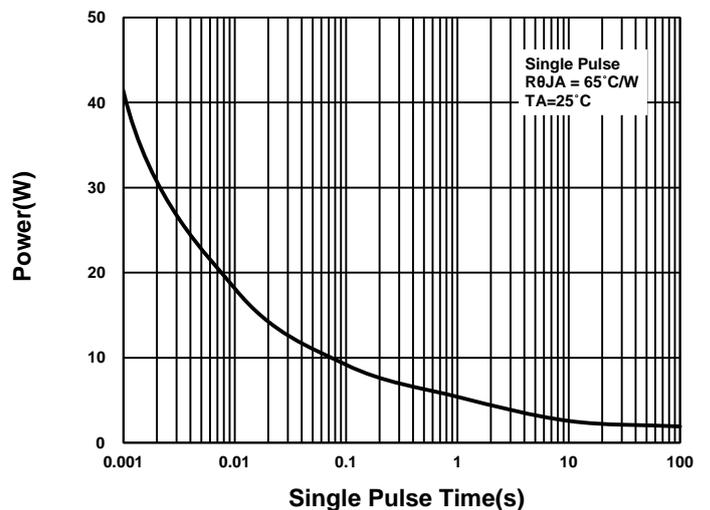
Transient Thermal Response Curve

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 = 65 °C/W
3.TJ-TA = P*RthJA(t)
4.RthJA(t) = r(t)*RthJA

T1 , Square Wave Pulse Duration[sec]

r(t) , Normalized Effective Transient Thermal Resistance