NIKO-SEM

Dual P-Channel Enhancement Mode Field Effect Transistor

PB5A3JW
PDFN 2x2S
Halogen-Free & Lead-Free

PRODUCT SUMMARY

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D
-20V	65mΩ	-3.6A

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.
- Products Integrated ESD diode with ESD Protected up to 2KV.

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

D1   D2

G1   G2

ESD Protected Gate   **ESD Protected Gate**

S1   S2

PIN1

4	5	6
D2		D1
3	2	1

PIN1

100% RG Test , 100% UIL Test
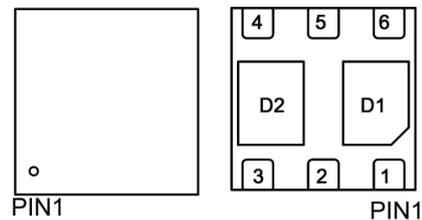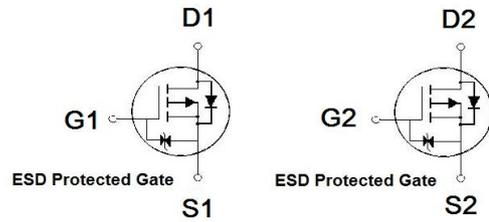
1 : S1.   4 : S2.
2 : G1.   5 : G2.
3 : D2.   6 : D1.

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

PARAMETERS/TEST CONDITIONS		SYMBOL	LIMITS	UNITS
Drain-Source Voltage		V_{DS}	-20	V
Gate-Source Voltage		V_{GS}	±8	V
Continuous Drain Current	T_A = 25 °C	I_D	-3.6	A
	T_A = 70 °C		-2.9	
Pulsed Drain Current[1]		I_{DM}	-14	
Power Dissipation	T_A = 25 °C	P_D	1.4	W
	T_A = 70 °C		0.9	
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]	$R_{\theta JA}$		86	°C／W

[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. Coppe.

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	-20			V
Gate Threshold Voltage	V$_{GS(th)}$	V$_{DS}$ = V$_{GS}$, I$_D$ = -250µA	-0.3	-0.45	-1	V
Gate-Body Leakage	I$_{GSS}$	V$_{DS}$ = 0V, V$_{GS}$ = ±8V			±10	uA
Zero Gate Voltage Drain Current	I$_{DSS}$	V$_{DS}$ = -16V, V$_{GS}$ = 0V			-1	µA
		V$_{DS}$ = -10V, V$_{GS}$ = 0V, T$_J$ = 55 °C			-10	
Drain-Source On-State Resistance[1]	R$_{DS(ON)}$	V$_{GS}$ = -4.5V, I$_D$ = -2.5A		46	65	mΩ
		V$_{GS}$ = -2.5V, I$_D$ = -2A		56	85	
		V$_{GS}$ = -1.8V, I$_D$ = -1A		69	120	
Forward Transconductance[1]	g$_{fs}$	V$_{DS}$ = -5V, I$_D$ = -2.5A		10		S
DYNAMIC						
Input Capacitance	C$_{iss}$	V$_{GS}$ = 0V, V$_{DS}$ = -10V, f = 1MHz		501		pF
Output Capacitance	C$_{oss}$			68		
Reverse Transfer Capacitance	C$_{rss}$			53		
Gate Resistance	R$_g$	V$_{GS}$ = 0V, V$_{DS}$ = 0V, f = 1MHz		11		Ω
Total Gate Charge[2]	Q$_{g(V_{GS}=-4.5V)}$	V$_{DS}$ = -10V , I$_D$ = -2.5A		7		nC
	Q$_{g(V_{GS}=-2.5V)}$			4		
Gate-Source Charge[2]	Q$_{gs}$			0.6		
Gate-Drain Charge[2]	Q$_{gd}$			1.8		
Turn-On Delay Time[2]	t$_{d(on)}$	V$_{DD}$ = -10V I$_D$ ≅ -2.5A, V$_{GEN}$ = -4.5V, R$_G$ = 6Ω		7		nS
Rise Time[2]	t$_r$			30		
Turn-Off Delay Time[2]	t$_{d(off)}$			53		
Fall Time[2]	t$_f$			59		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T$_J$ = 25 °C)						
Continuous Current	I$_S$				-1.1	A
Forward Voltage[1]	V$_{SD}$	I$_F$ = -2.5A, V$_{GS}$ = 0V			1.2	V
Reverse Recovery Time	t$_{rr}$	I$_F$ = -2.5A , dI$_F$/dt = 100A / µS		21		nS
Reverse Recovery Charge	Q$_{rr}$			6.8		nC

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

Output Characteristics

VGS=-6V
VGS=-5V
VGS=-4.5V
VGS=-4V
VGS=-3.5V
VGS=-2.5V
VGS=-2V
VGS=-1.8V

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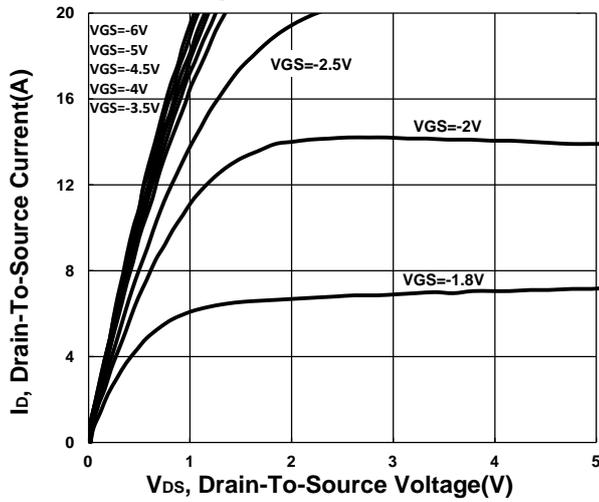
Transfer Characteristics

25℃
125℃
-20℃

I_D, Drain-To-Source Current(A) vs V_{GS}, Gate-To-Source Voltage(V)
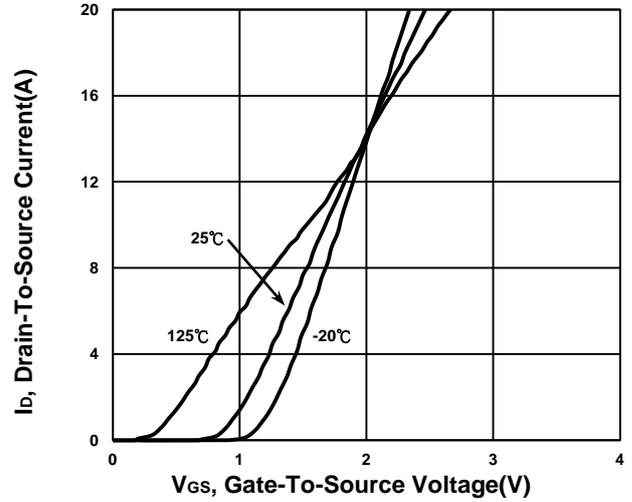
On-Resistance VS Gate-To-Source

ID=-2.5A

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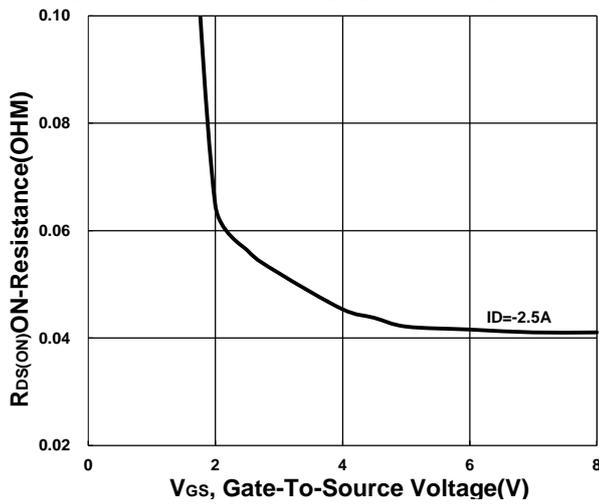
On-Resistance VS Drain Current

VGS=-1.8V
VGS=-2.5V
VGS=-4.5V

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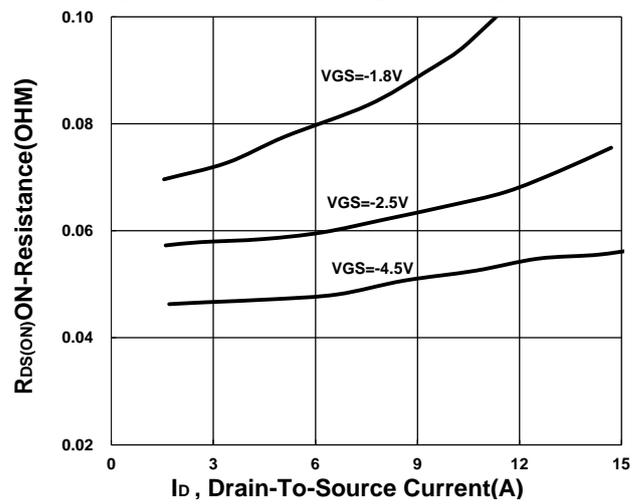
On-Resistance VS Temperature

VGS=4.5V
ID=-2.5A

Normalized Drain to Source ON-Resistance vs T_J, Junction Temperature(℃)
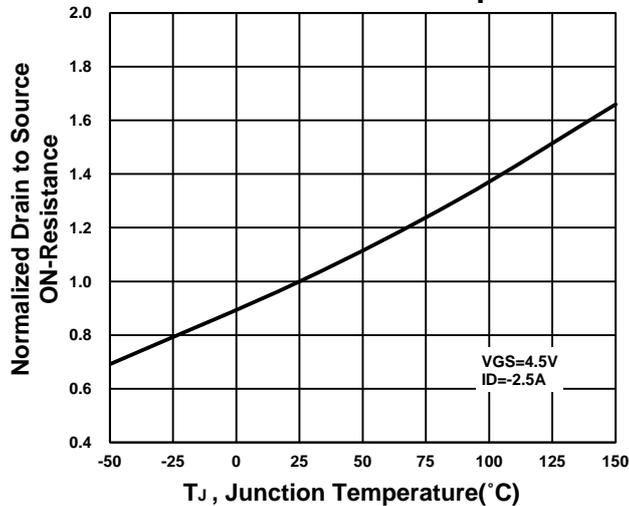
Capacitance Characteristic

CISS
COSS
CRSS

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

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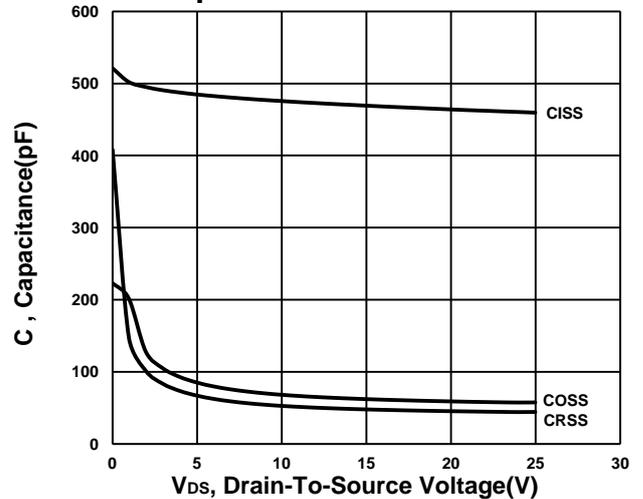
Gate charge Characteristics

VDS=-10V
ID=-2.5A

V$_{GS}$, Gate-To-Source Voltage(V) vs Qg, Total Gate Charge(nC)
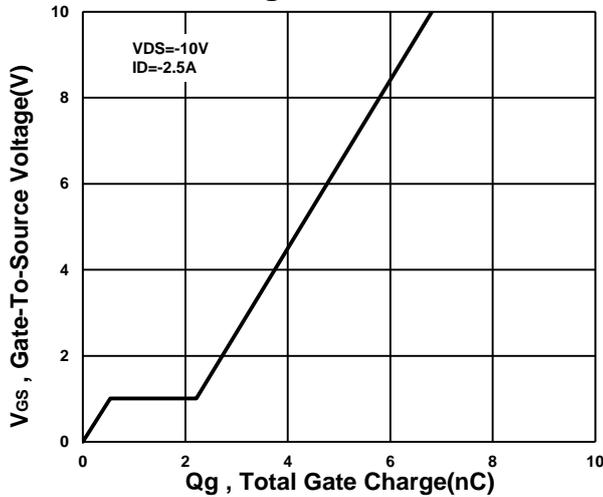
Source-Drain Diode Forward Voltage

150℃   25℃

I$_S$, Source Current(A) vs V$_{SD}$, Source-To-Drain Voltage(V)

Safe Operating Area

Operation in This Area is Limited by RDS(ON)

1ms
10ms
100ms
DC

NOTE :
1.VGS= 4.5V
2.TA=25˚C
3.R0JA = 86˚C/W
4.Single Pulse

I$_D$, Drain Current(A) vs V$_{DS}$, Drain-To-Source Voltage(V)
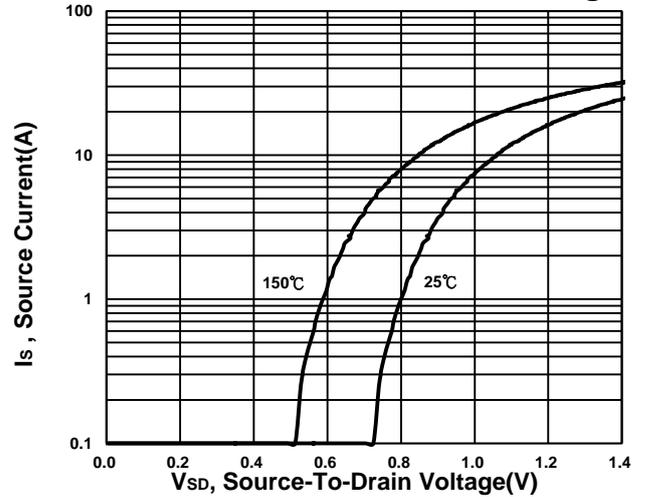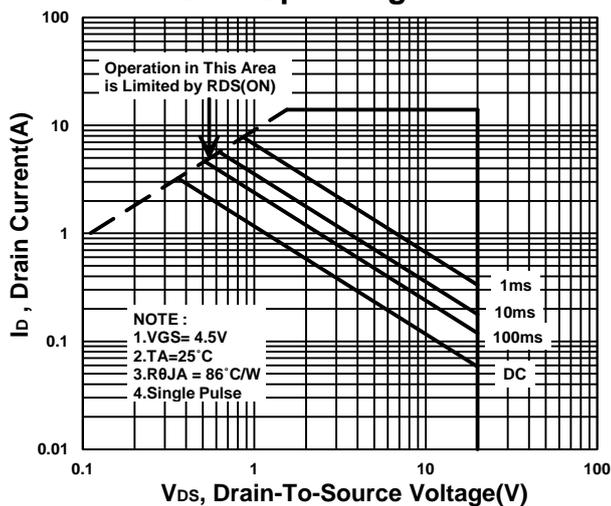
Single Pulse Maximum Power Dissipation

Single Pulse
R0JA = 86˚C/W
TA=25˚C

Power(W) vs Single Pulse Time(s)
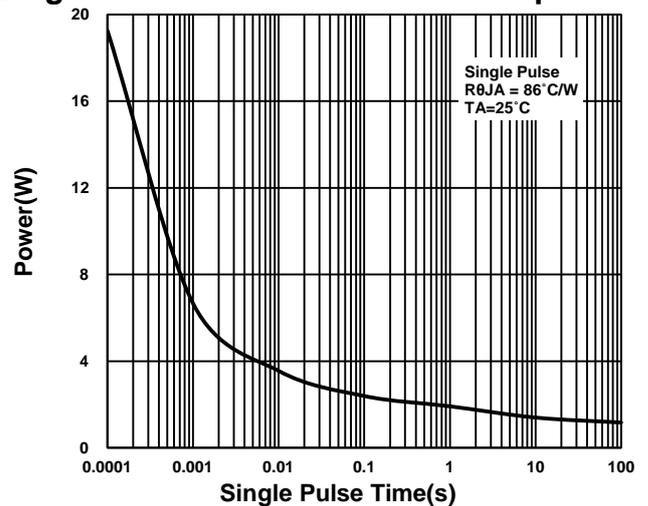
Transient Thermal Response Curve

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 = 86 ℃/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]