NIKO-SEM

N-Channel Enhancement Mode Field Effect Transistor

P3710BD
TO-252
Halogen-Free & Lead-Free

RoHS Compliant

PRODUCT SUMMARY

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D
100V	37mΩ	25A

D

G

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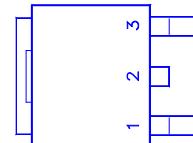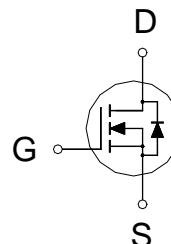
1. GATE
2. DRAIN
3. SOURCE

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

PARAMETERS/TEST CONDITIONS		SYMBOL	LIMITS	UNITS
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C = 25 °C	I_D	25	A
	T_C = 100 °C		16	
Pulsed Drain Current[1]		I_{DM}	75	
Avalanche Current[2]		I_{AS}	16	
Avalanche Energy[2]		E_{AS}	128	mJ
Power Dissipation	T_C = 25 °C	P_D	50	W
	T_C = 100 °C		20	
Junction & Storage Temperature Range		T_J, T_{stg}	-55 to 150	°C

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Case	$R_{\theta JC}$		2.5	°C / W

[1]Pulse width limited by maximum junction temperature.
[2]Starting T_j =25 °C, L=1mH, V_{DD}=50V

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

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	100			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1	2	3	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 80V, V_{GS} = 0V			1	μA
		V_{DS}=80V, V_{GS}=0V, T_J=125 °C			10	
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 4.5V, I_D = 10A		35	48	mΩ
	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 10A		28	37	mΩ
Forward Transconductance[1]	g_{fs}	V_{DS} = 10V, I_D = 10A		23		S

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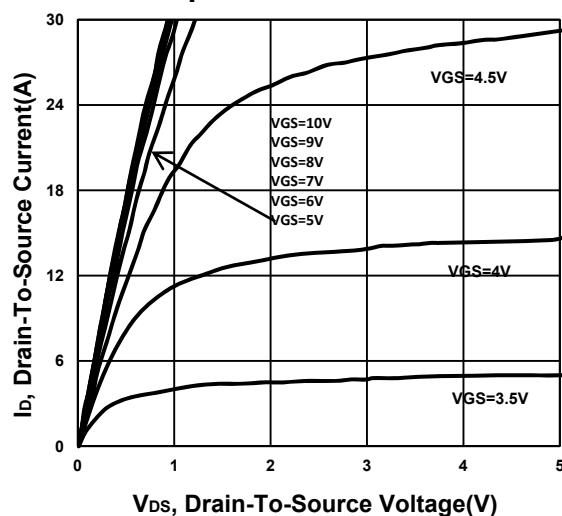| DYNAMIC						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		996		pF
Output Capacitance	C_{oss}			127		pF
Reverse Transfer Capacitance	C_{rss}			53		pF
Total Gate Charge[2]	Q_g	V_{DS} = 50V, I_D = 10A V_{GS} = 10V		25		nC
Gate-Source Charge[2]	Q_{gs}			3.9		nC
Gate-Drain Charge[2]	Q_{gd}			8		nC
Turn-On Delay Time[2]	$t_{d(on)}$	V_{DD} = 50V $I_D \cong$ 10A, V_{GS} = 10V, R_{GS} = 6Ω		29		nS
Rise Time[2]	t_r			2		nS
Turn-Off Delay Time[2]	$t_{d(off)}$			39		nS
Fall Time[2]	t_f			15		nS
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_J = 25 °C)						
Continuous Current	I_S				25	A
Forward Voltage[1]	V_{SD}	I_F = 10A, V_{GS} = 0V			1.2	V
Reverse Recovery Time	t_{rr}	I_F = 10A, dI_F/dt = 100A / μS		36		nS
Reverse Recovery Charge	Q_{rr}			52		nC

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

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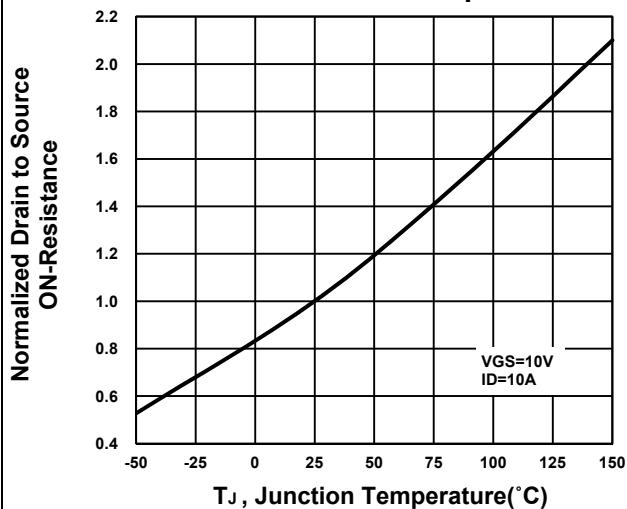### P3710BD
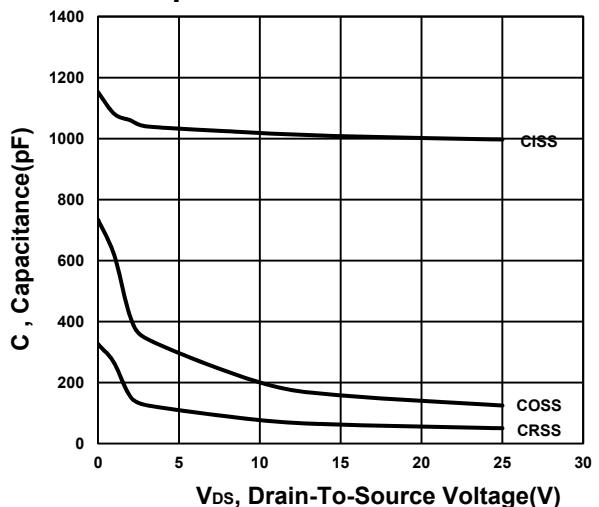**TO-252**
Halogen-Free & Lead-Free

Output Characteristics

VGS=4.5V
VGS=10V
VGS=9V
VGS=8V
VGS=7V
VGS=6V
VGS=5V
VGS=4V
VGS=3.5V

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)
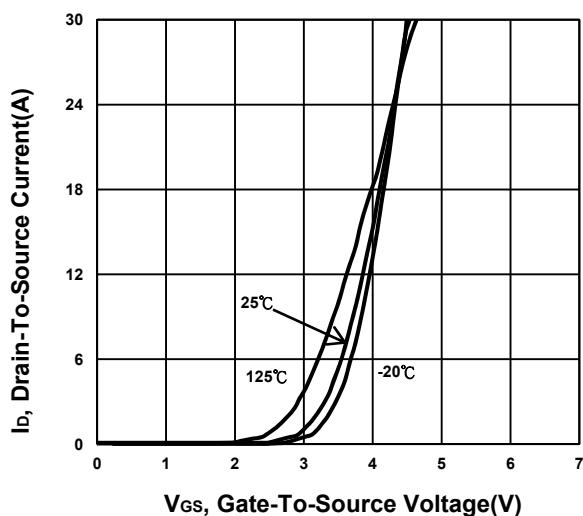
On-Resistance VS Temperature

VGS=10V
ID=10A

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

Capacitance Characteristic

CISS
COSS
CRSS

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

Gate charge Characteristics

VDS=50V
ID=10A

V_{GS}, Gate-To-Source Voltage(V) vs Q_g, Total Gate Charge(nC)
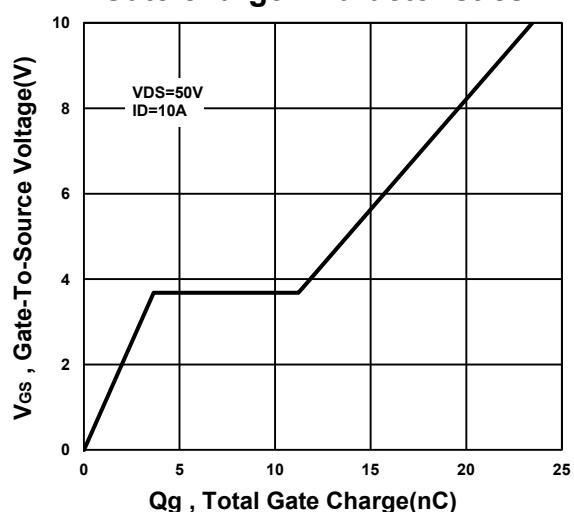
Source-Drain Diode Forward Voltage
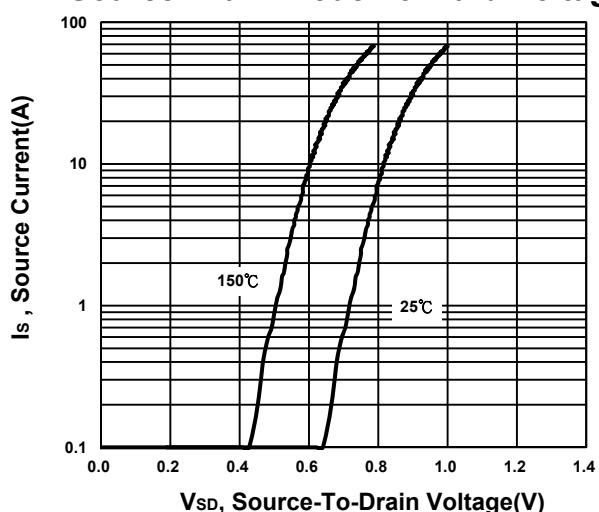
150℃
25℃

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

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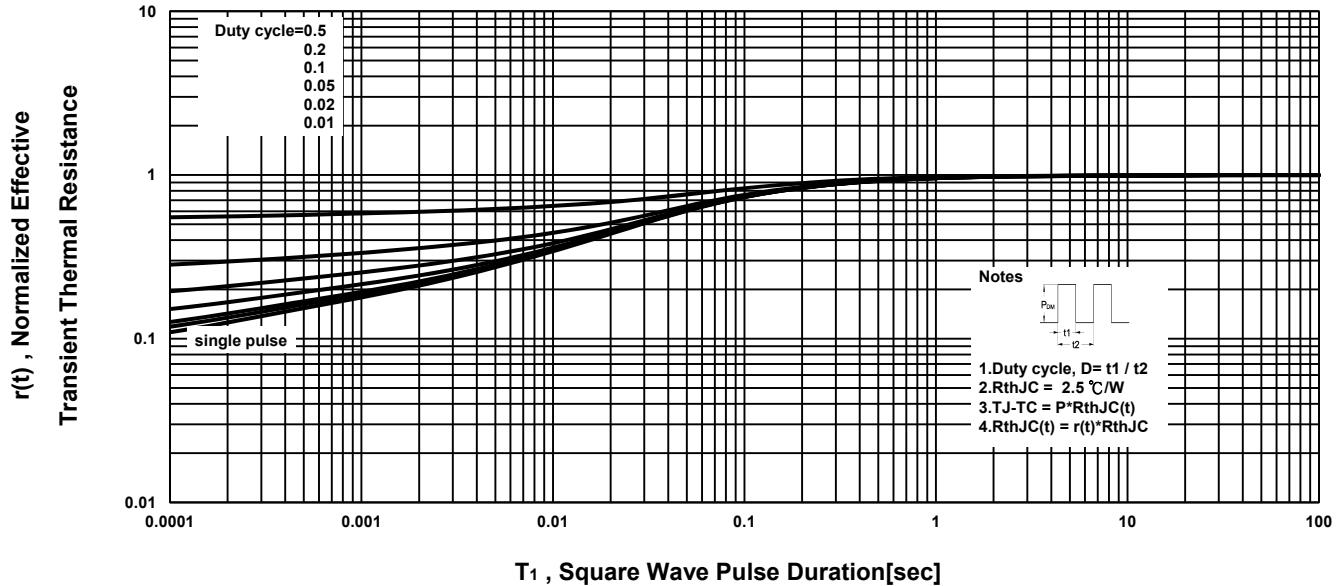## TO-252
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Safe Operating Area

I_D, Drain Current(A)

Operation in This Area is Limited by RDS(ON)

1ms
10ms
100ms
DC

NOTE :
1.VGS= 10V
2.TC=25˚C
3.RθJC = 2.5˚C/W
4.Single Pulse

V_{DS}, Drain-To-Source Voltage(V)
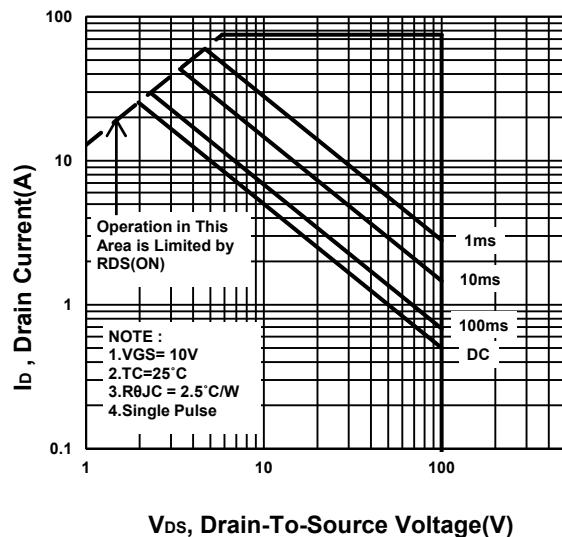
Single Pulse Maximum Power Dissipation

Power(W)

Single Pulse
RθJC = 2.5˚C/W
TC=25˚C

Single Pulse Time(s)

Transient Thermal Response Curve

r(t) , Normalized Effective Transient Thermal Resistance

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.RthJC = 2.5 ℃/W
3.TJ-TC = P*RthJC(t)
4.RthJC(t) = r(t)*RthJC

T_1 , Square Wave Pulse Duration[sec]

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