NIKO-SEM

N-Channel Enhancement Mode Field Effect Transistor

PA410BD
TO-252
Halogen-Free & Lead-Free

PRODUCT SUMMARY

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D
100V	140mΩ	10A

D

G

S

1. GATE
2. DRAIN
3. SOURCE

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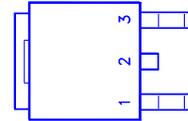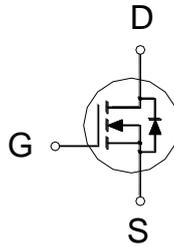
ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C Unless Otherwise Noted)

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	10	A
	T_C = 100 °C		7	
Pulsed Drain Current[1]		I_{DM}	30	
Avalanche Current		I_{AS}	10	
Avalanche Energy	L = 0.1mH	E_{AS}	5	mJ
Power Dissipation	T_C = 25 °C	P_D	35	W
	T_C = 100 °C		14	
Junction & Storage Temperature Range		T_J, T_{stg}	-55 to 150	°C

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Case	$R_{\theta JC}$		3.5	°C / W
Junction-to-Ambient	$R_{\theta JA}$		62.5	

[1]Pulse width limited by maximum junction temperature.

**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	1.3	1.9	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} = 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 = 5A		103	170	mΩ
		V_{GS} = 10V , I_D = 5A		93	140	
Forward Transconductance[1]	g_{fs}	V_{DS} = 10V, I_D = 5A		13		S

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| DYNAMIC						
Input Capacitance	C_{iss}	$V_{GS} = 0V$, $V_{DS} = 25V$, f = 1MHz		330		pF
Output Capacitance	C_{oss}			50		
Reverse Transfer Capacitance	C_{rss}			22		
Total Gate Charge[2]	Q_g	$V_{GS} = 10V$, $V_{DS} = 50V$, $I_D = 5A$		8.6		nC
Gate-Source Charge[2]	Q_{gs}			1.2		
Gate-Drain Charge[2]	Q_{gd}			3.5		
Turn-On Delay Time[2]	$t_{d(on)}$	$V_{DS} = 50V$ $I_D \cong 5A$, $V_{GS} = 10V$, $R_{GEN} = 6\,\Omega$		22		nS
Rise Time[2]	t_r			60		
Turn-Off Delay Time[2]	$t_{d(off)}$			30		
Fall Time[2]	t_f			40		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ($T_J = 25\ °C$)						
Continuous Current	I_S				10	A
Forward Voltage[1]	V_{SD}	$I_F = 5A$, $V_{GS} = 0V$			1.1	V
Reverse Recovery Time	t_{rr}	$I_F = 5A$, $dI_F/dt = 100A / \mu S$		25		nS
Reverse Recovery Charge	Q_{rr}			25		nC

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

Output Characteristics

VGS=10V
VGS=9V
VGS=8V
VGS=7V
VGS=6V
VGS=5V
VGS=4.5V
VGS=3.5V
VGS=3V

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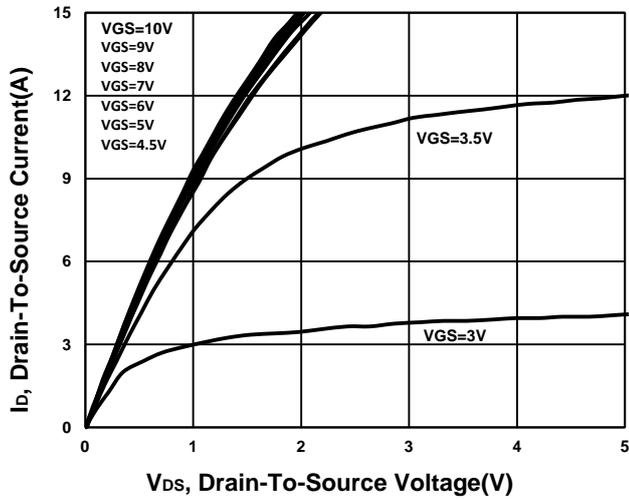
Transfer Characteristics

125℃, 25℃, -20℃

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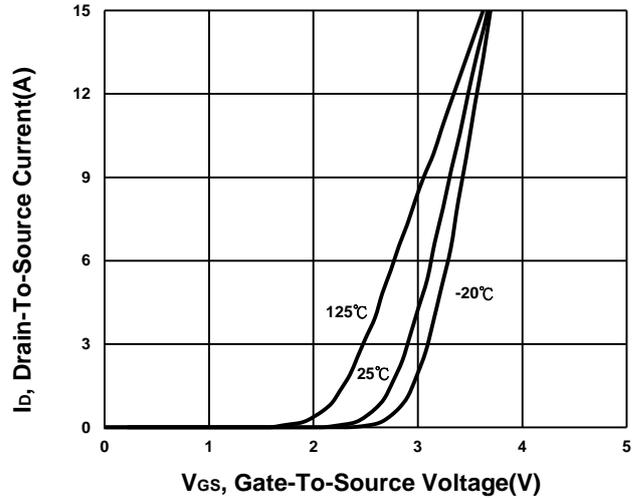
On-Resistance VS Temperature

VGS=10V
ID=5A

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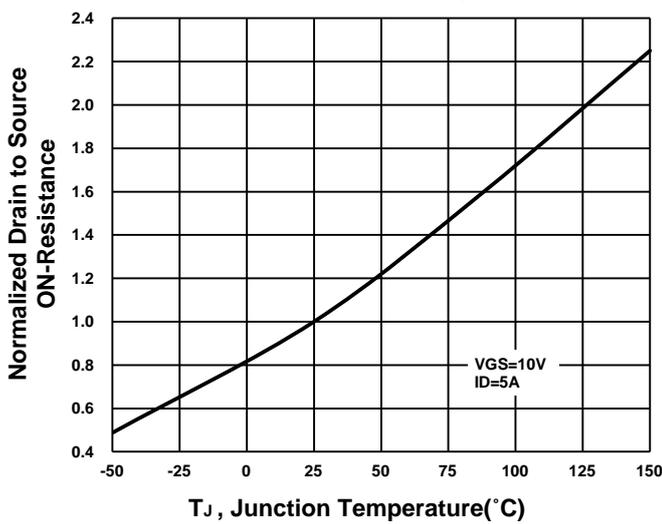
Capacitance Characteristic

CISS
COSS
CRSS

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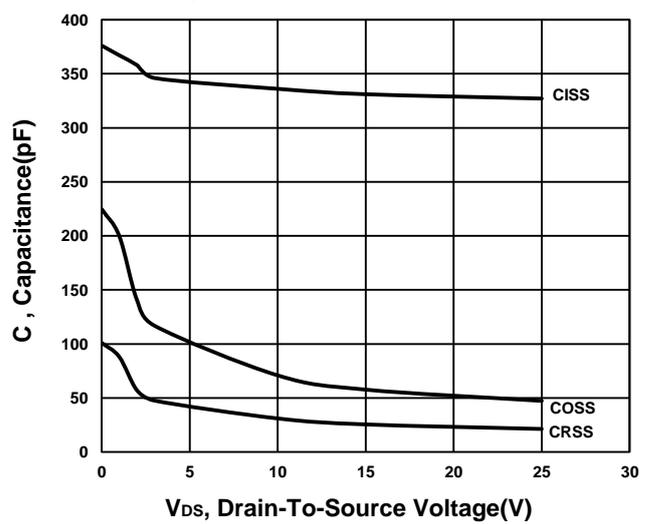
Gate charge Characteristics

V_{DS}=50V
I_D=5A

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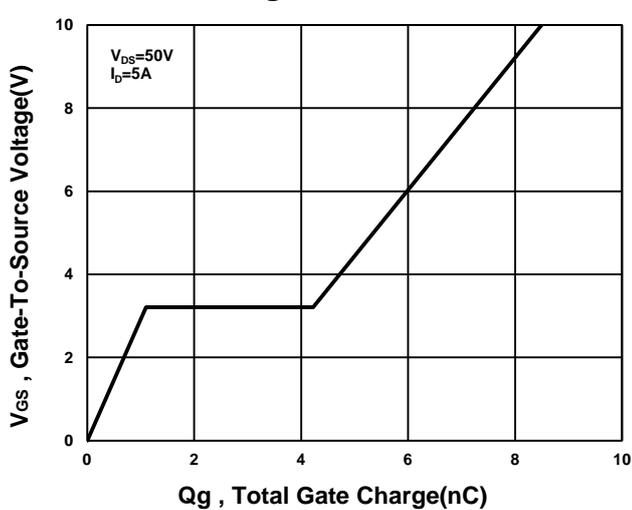
Source-Drain Diode Forward Voltage

150℃, 25℃

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

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Safe Operating Area

Operation in This Area
is Limited by RDS(ON)

I_D , Drain Current(A)

1ms
10ms
100ms
DC

NOTE :
1.VGS= 10V
2.TC=25°C
3.RθJC = 3.5 °C/W
4.Single Pulse

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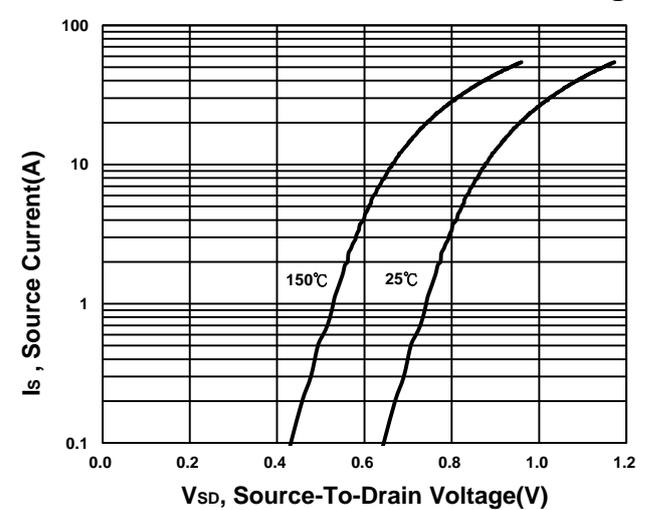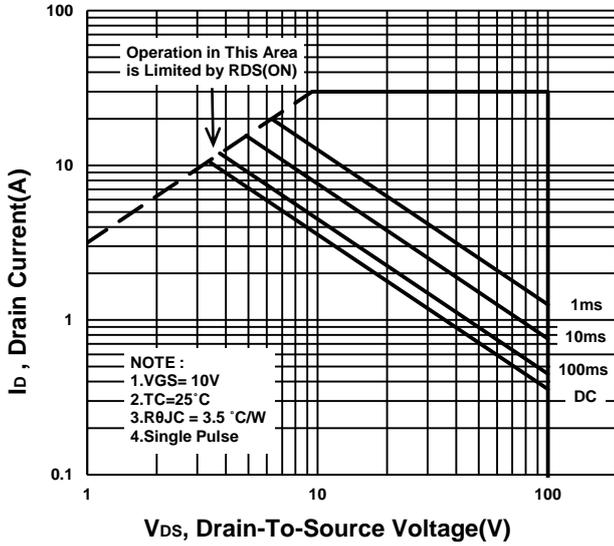
Single Pulse Maximum Power Dissipation

Single Pulse
RθJC = 3.5 °C/W
TC=25°C

Power(W)

Single Pulse Time(s)
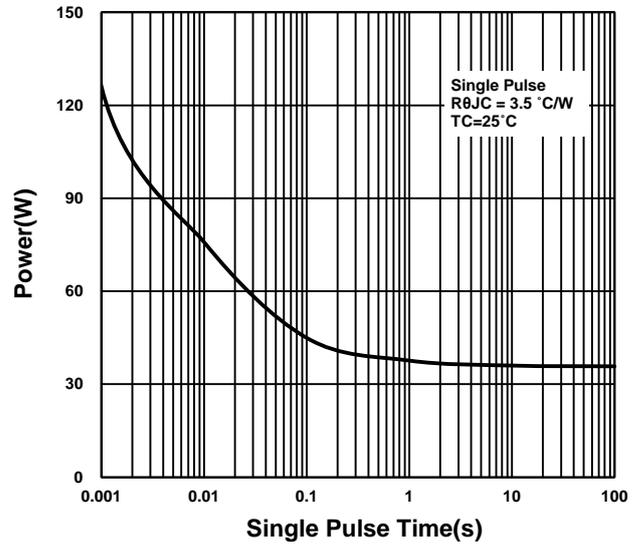
Transient Thermal Response Curve

r(t) , Normalized Effective
Transient Thermal Resistance

Duty cycle=0.5
0.2
0.1
0.05
0.02
0.01
single pulse

Notes

i
P_{DM}
t
t1
t2

1.Duty cycle, D= t1 / t2
2.RthJC = 3.5 °C/W
3.TJ-TC = P*RthJC(t)
4.RthJC(t) = r(t)*RthJC

T_1 , Square Wave Pulse Duration[sec]
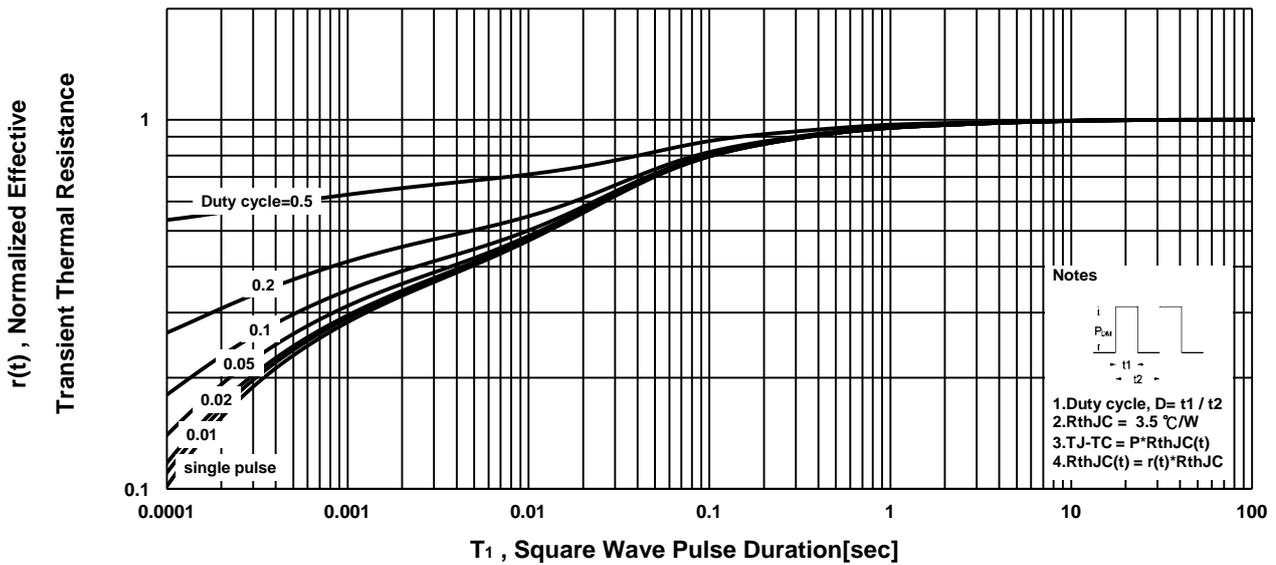
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