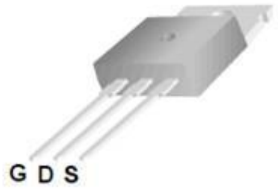
UNIKC Semiconductor

P0910ATG

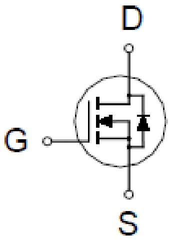
N-Channel Enhancement Mode MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D
100V	9.5mΩ @V_{GS} = 10V	89A



TO-220



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

PARAMETERS/TEST CONDITIONS		SYMBOL	LIMITS	UNITS
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current[1]	T_C = 25 °C	I_D	89	A
	T_C = 100 °C		63	
Pulsed Drain Current[2]		I_{DM}	250	
Avalanche Current		I_{AS}	113	
Avalanche Energy	L = 0.1mH	E_{AS}	647	mJ
Power Dissipation	T_C = 25 °C	P_D	156	W
	T_C = 100 °C		62.5	
Operating Junction & Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Case	$R_{\theta JC}$		0.8	°C / W
Junction-to-Ambient	$R_{\theta JA}$		62.5	

[1] Pulse width limited by maximum junction temperature.

[2] Limited by package.

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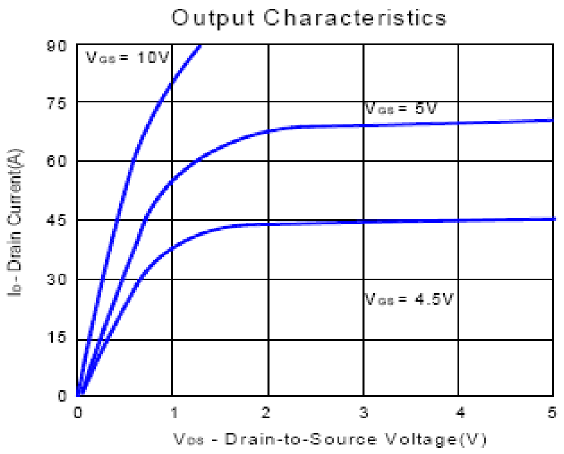
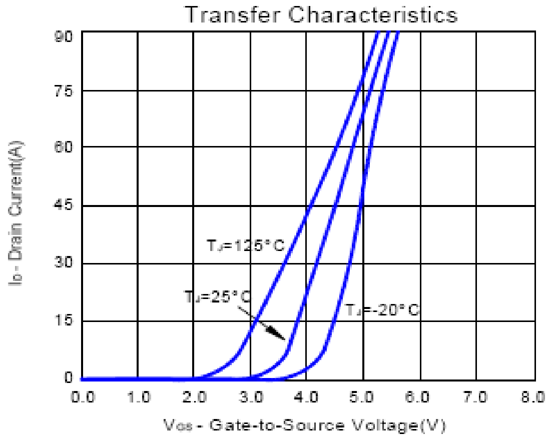
ELECTRICAL CHARACTERISTICS (T_J = 25 °C, Unless Otherwise Noted)

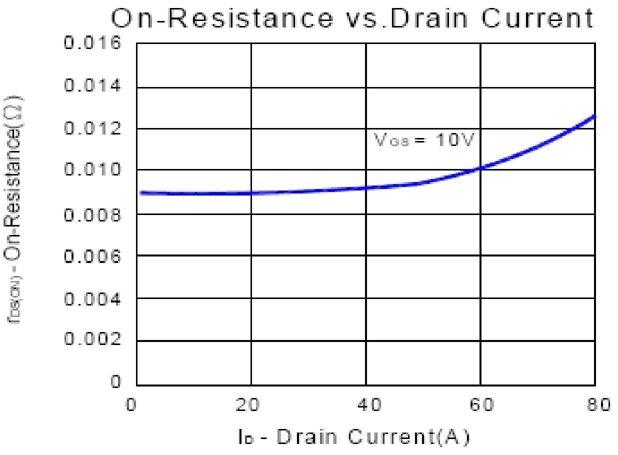
PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	100			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.5	2.3	4.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V			±250	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 80V, V_{GS} = 0V			1	μA
		V_{DS} = 80V, V_{GS} = 0V , T_J = 125 °C			10	
On-State Drain Current[1]	$I_{D(ON)}$	V_{DS} = 10V, V_{GS} = 10V	250			A
Drain-Source On-State	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 20A		8.2	9.5	mΩ
Forward Transconductance[1]	g_{fs}	V_{DS} = 25V, I_D = 20A		90		S
DYNAMIC						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		12		nF
Output Capacitance	C_{oss}			0.9		
Reverse Transfer Capacitance	C_{rss}			0.5		
Gate Resistance	R_g	V_{GS} = 0V, V_{DS} = 0V, f = 1MHz		4		Ω
Total Gate Charge[2]	Q_g	V_{DS} = 50V, V_{GS} = 10V, I_D = 20A		217		nC
Gate-Source Charge[2]	Q_{gs}			71		
Gate-Drain Charge[2]	Q_{gd}			75		
Turn-On Delay Time[2]	$t_{d(on)}$	V_{DD} = 50V, I_D ≅ 20A, V_{GS} = 10V, R_{GEN} = 25Ω		23		nS
Rise Time[2]	t_r			205		
Turn-Off Delay Time[2]	$t_{d(off)}$			94		
Fall Time[2]	t_f			190		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_J = 25 °C)						
Continuous Current[2]	I_S				89	A
Forward Voltage[1]	V_{SD}	I_F = 20A, V_{GS} = 0V			1.3	V
Reverse Recovery Time	t_{rr}	I_F = 20A, V_{GS} = 0V dI_F/dt = 100A / μS		80		nS
Reverse Recovery Charge	Q_{rr}			220		nC

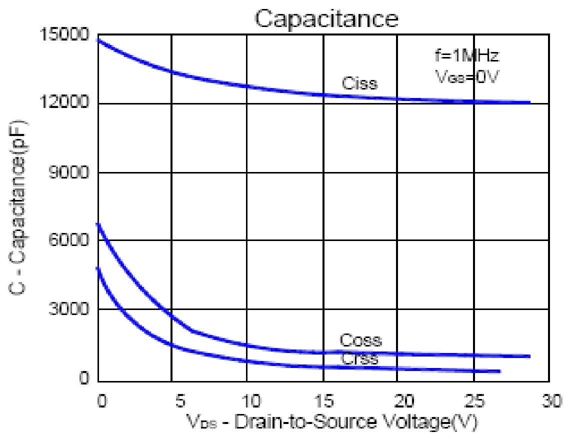
[1] Pulse test : Pulse Width ≤ 380 μsec, Duty Cycle ≤ 2%.

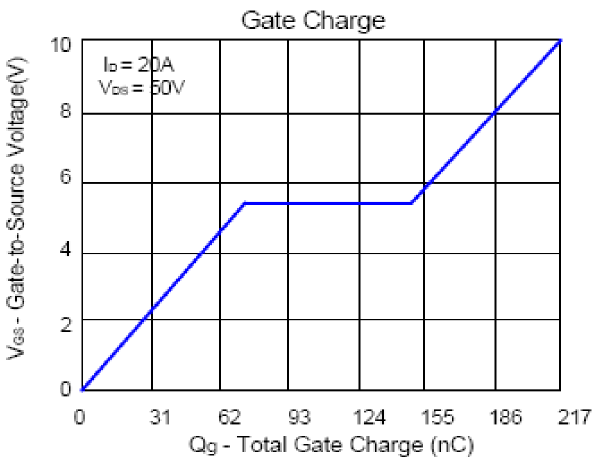
[2] Independent of operating temperature.

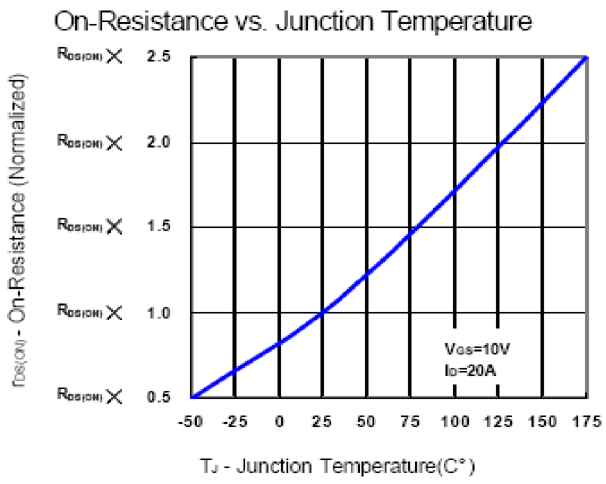

Output Characteristics
ID - Drain Current(A)
VDS - Drain-to-Source Voltage(V)
90
75
60
45
30
15
0
0
1
2
3
4
5
VGS = 10V
VGS = 5V
VGS = 4.5V


Transfer Characteristics
ID - Drain Current(A)
VGS - Gate-to-Source Voltage(V)
90
75
60
45
30
15
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
TJ=125° C
TJ=25° C
TJ=-20° C

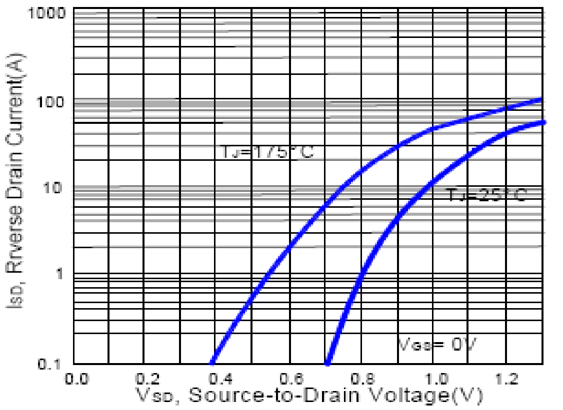

On-Resistance vs.Drain Current
rDS(ON) - On-Resistance(Ω)
ID - Drain Current(A)
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0
0
20
40
60
80
VGS = 10V


Capacitance
C - Capacitance(pF)
VDS - Drain-to-Source Voltage(V)
15000
12000
9000
6000
3000
0
0
5
10
15
20
25
30
f=1MHz
VGS=0V
Ciss
Coss
Crss

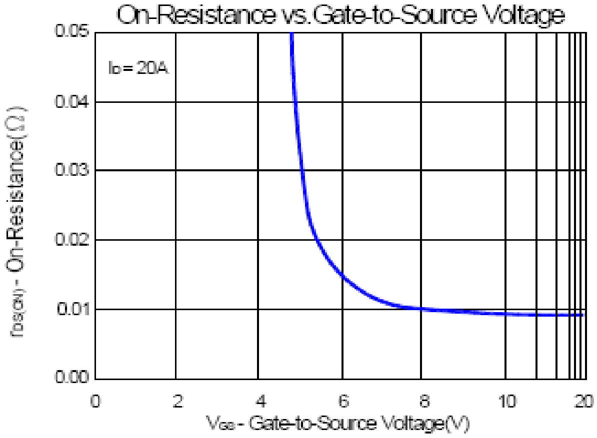

Gate Charge
VGS - Gate-to-Source Voltage(V)
Qg - Total Gate Charge (nC)
10
8
6
4
2
0
0
31
62
93
124
155
186
217
ID = 20A
VDS = 50V


On-Resistance vs. Junction Temperature
rDS(ON) - On-Resistance (Normalized)
TJ - Junction Temperature(C°)
RDS(ON) X 2.5
RDS(ON) X 2.0
RDS(ON) X 1.5
RDS(ON) X 1.0
RDS(ON) X 0.5
-50
-25
0
25
50
75
100
125
150
175
VGS=10V
ID=20A

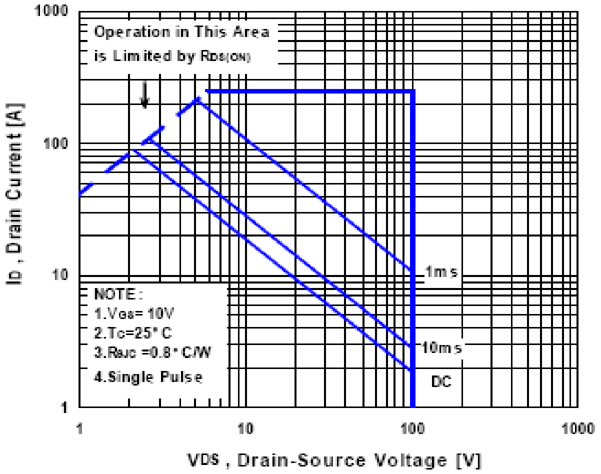
Typical Source-Drain Diode Forward Voltage



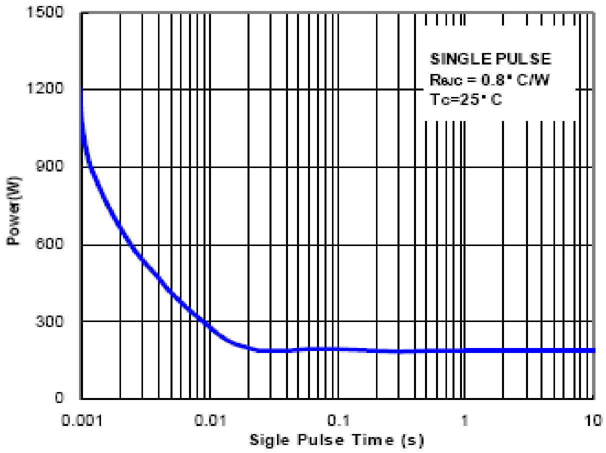
On-Resistance vs.Gate-to-Source Voltage

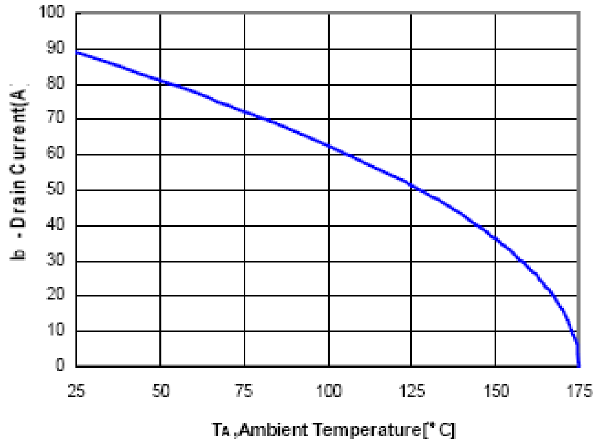


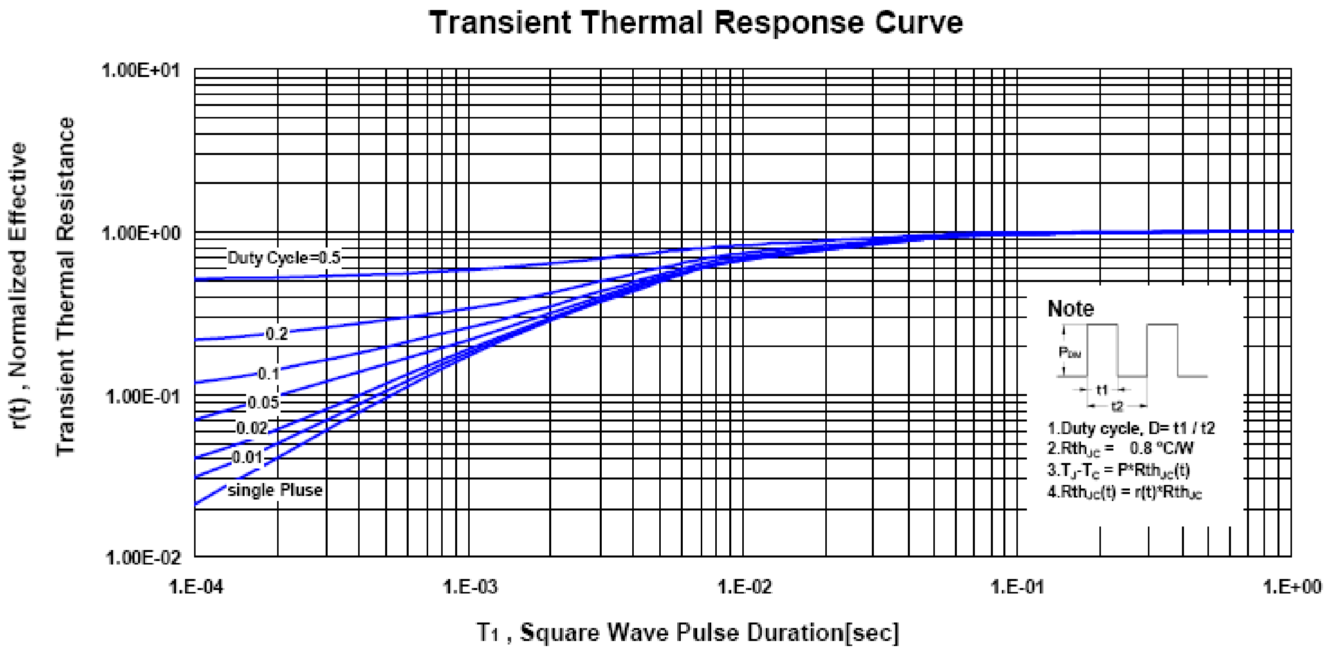
Safe Operating Area



Single Pulse Maximun Power dissipation






Transient Thermal Response Curve
r(t) , Normalized Effective
Transient Thermal Resistance
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.E-04
1.E-03
1.E-02
1.E-01
1.E+00
T1 , Square Wave Pulse Duration[sec]
Duty Cycle=0.5
0.2
0.1
0.05
0.02
0.01
single Pluse
Note
PDM
t1
t2
1.Duty cycle, D= t1 / t2
2.RthJC = 0.8 °C/W
3.TJ-TC = P*RthJC(t)
4.RthJC(t) = r(t)*RthJC

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Package Dimension

TO-220 (3-Lead) MECHANICAL DATA

Dimension	mm			Dimension	mm		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	9.652	10.16	11.5	H	2.04	2.54	3.04
B	2.54	2.79	3.048	I	1.15	1.52	1.778
C	17.3		22.86	J	3.556	4.57	4.826
D	26.924	29.03	31.242	K	0.508	1.3	1.45
E	14.224	15.45	16.510	L	1.89	2.69	3.09
F	8.382	9.20	9.40	M	0.34	0.5	0.6
G	0.381	0.81	1.016	N