

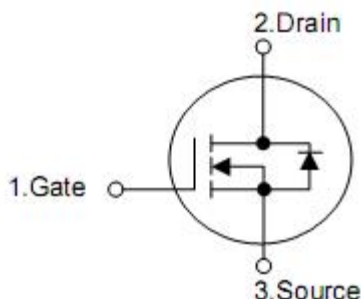
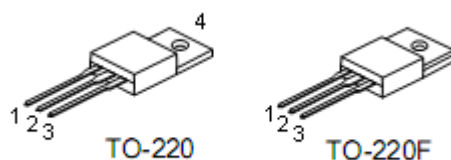
1. General Description

This Power MOSFET is produced using KIA's advanced planar stripe DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies, active power factor correction based on half bridge topology.

2. Features

- n** 7.5A, 650V, $R_{DS(on)}$ typ. = 1.1Ω @ $V_{GS} = 10\text{ V}$
- n** Low gate charge (typical 25nC)
- n** High ruggedness
- n** Fast switching
- n** 100% avalanche tested
- n** Improved dv/dt capability

3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source
4	Drain

4. Ordering Information

Part Number	Package	Brand
KNF4665A	TO-220F	KIA
KNP4665A	TO-220	KIA

5. Absolute maximum ratings

(T_C = 25°C , unless otherwise noted)

Symbol	Parameter	KNP4665A	KNF4665A	Units
V _{DSS}	Drain-Source Voltage	650		V
I _D	Drain Current -Continuous (T _C = 25 °C)	7.5	7.5 *	A
	-Continuous (T _C = 100 °C)	4.5	4.5*	A
I _{DM}	Drain Current -Pulsed (Note 1)	30	30*	A
V _{GSS}	Gate-Source Voltage	±30		V
E _{AS}	Single Pulsed Avalanche Energy (Note 2)	230		mJ
I _{AR}	Avalanche Current (Note 1)	7.5		A
E _{AR}	Repetitive Avalanche Energy (Note 1)	21		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5		V/ns
P _D	Power Dissipation (T _C = 25 °C)	147	40	W
	-Derate above 25 °C	1.18	0.32	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150		°C
T _L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300		°C

* Drain current limited by maximum junction temperature.

6. Thermal Characteristics

Symbol	Parameter	KNP4665A	KNF4665A	Units
R _{θJC}	Thermal Resistance, Junction-to-Case	0.85	3.1	°C /W
R _{θJS}	Thermal Resistance, Case-to-Sink Typ.	0.5	--	°C /W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	62.5	62.5	°C /W

7. Electrical characteristics

(T_C = 25°C , unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
B _V DSS	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 uA	650	--	--	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 uA, Referenced to 25 °C	--	0.65	--	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 650 V, V _{GS} = 0 V	--	--	1	uA
		V _{DS} = 520 V, T _C = 125 °C	--	--	10	uA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 30 V, V _{DS} = 0 V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -30 V, V _{DS} = 0 V	--	--	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 uA	2.0	--	4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 3.75 A	--	1.1	1.4	Ω
g _{FS}	Forward Transconductance	V _{DS} = 40 V, I _D = 3.75 A ^(Note 4)	--	6.5	--	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz	--	970	--	pF
C _{oss}	Output Capacitance		--	40	--	pF
Crss	Reverse Transfer Capacitance		--	9	--	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 325 V, I _D = 7.5 A, R _G = 25 Ω ^(Note 4.5)	--	28	--	ns
t _r	Turn-On Rise Time		--	21	--	ns
t _{d(off)}	Turn-Off Delay Time		--	100	--	ns
t _f	Turn-Off Fall Time		--	42	--	ns
Q _g	Total Gate Charge	V _{DS} = 520 V, I _D = 7.5 A, V _{GS} = 10 V ^(Note 4, 5)	--	25	--	nC
Q _{gs}	Gate-Source Charge		--	5.5	--	nC
Q _{gd}	Gate-Drain Charge		--	10	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	7.5	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	30	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 7.5 A	--	--	1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 7.5 A, dI _F / dt = 100 A/us ^(Note 4)	--	580	--	ns
Q _{rr}	Reverse Recovery Charge		--	5.3	--	nC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 3.8mH, I_{AS} = 7.5A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 7.5A, di/dt ≤ 200A/μs, V_{DD} ≤ B_VDSS, Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

7. Typical Characteristics

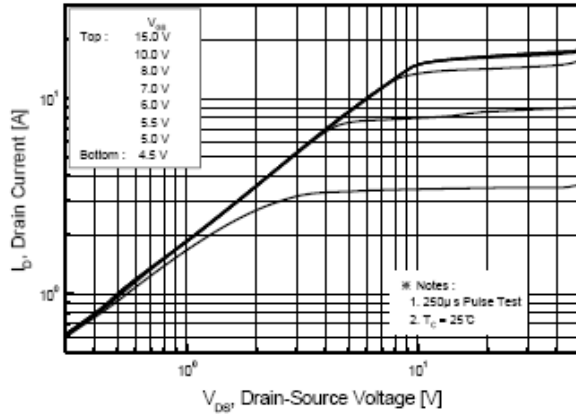


Figure 1. On-Region Characteristics

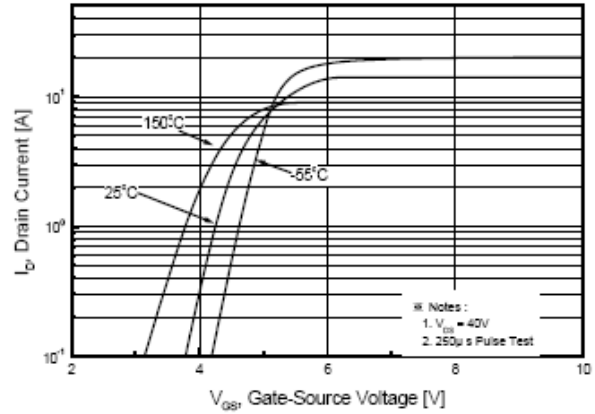


Figure 2. Transfer Characteristics

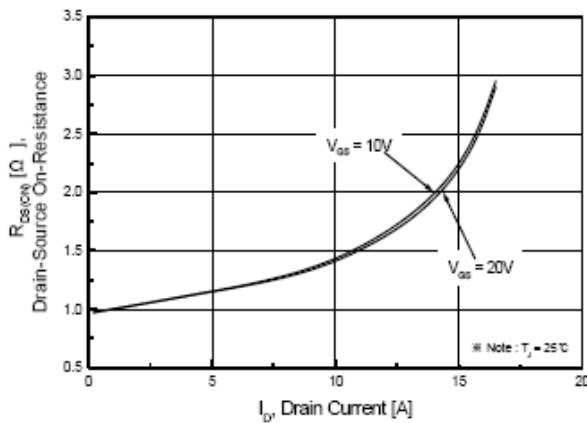


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

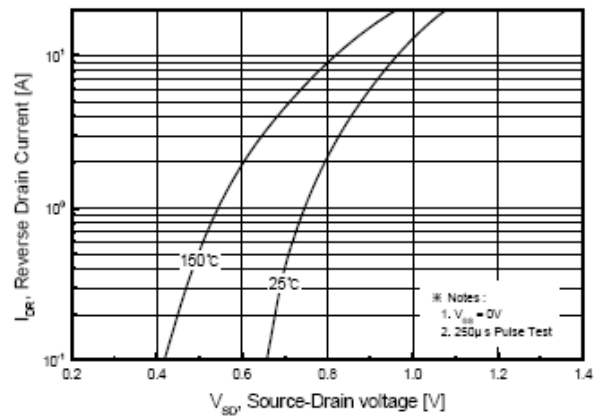


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

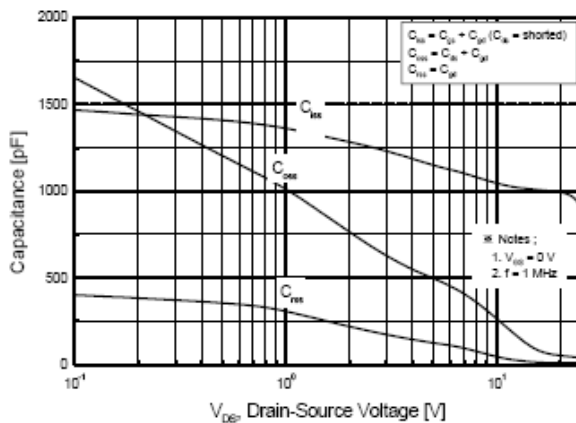


Figure 5. Capacitance Characteristics

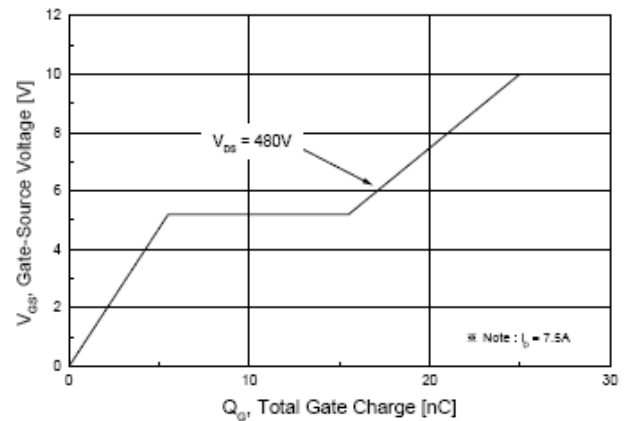


Figure 6. Gate Charge Characteristics

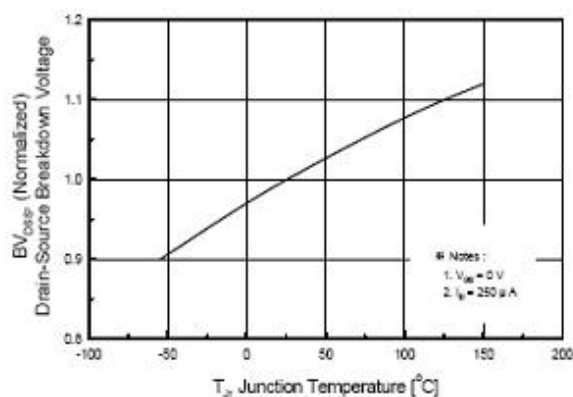


Figure 7. Breakdown Voltage Variation vs Temperature

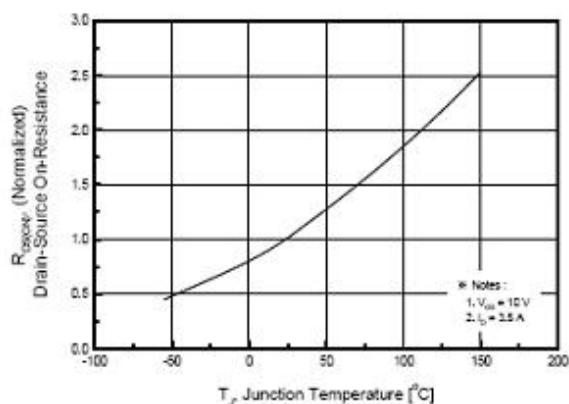


Figure 8. On-Resistance Variation vs Temperature

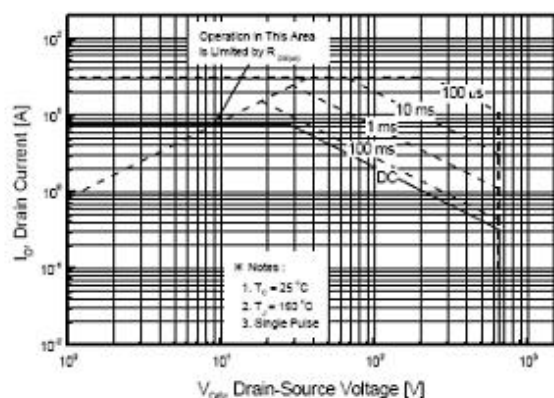


Figure 9-1. Maximum Safe Operating Area for KNP4665A

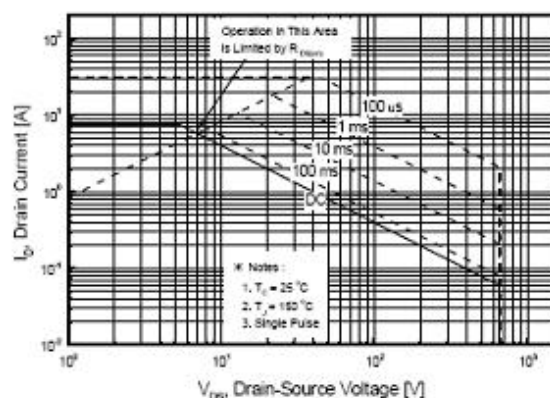


Figure 9-2. Maximum Safe Operating Area for KNF4665A

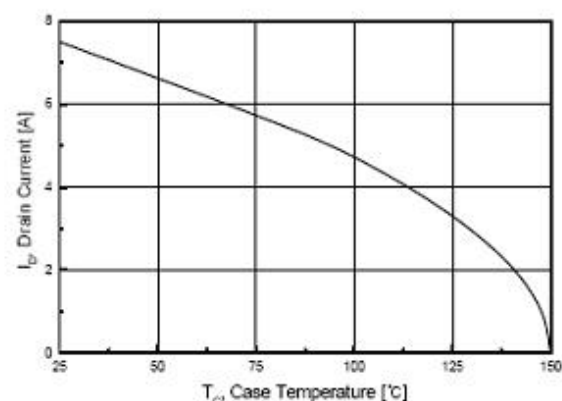


Figure 10. Maximum Drain Current vs Case Temperature

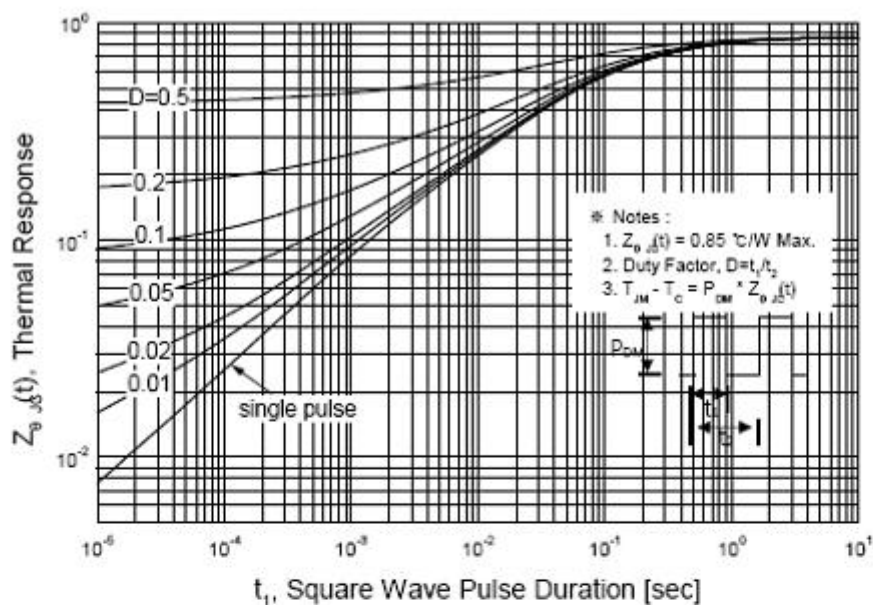


Figure 11-1. Transient Thermal Response Curve for KNP4665A

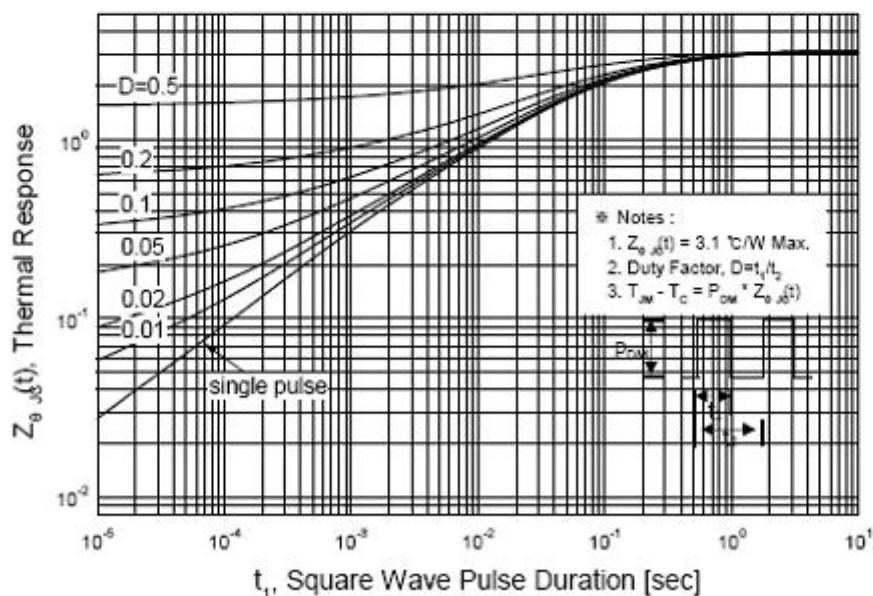


Figure 11-2. Transient Thermal Response Curve for KNF4665A