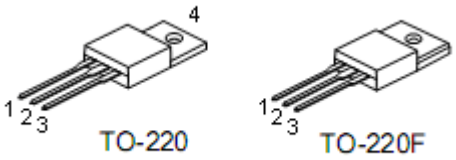
1. General Description

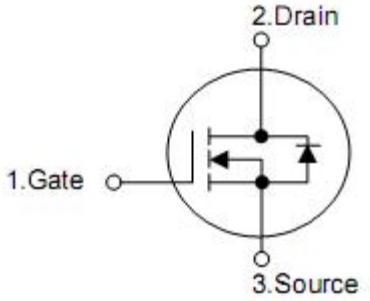
This Power MOSFET is produced using KIA's advanced planar stripe DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well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

2. Features

- 7.5A, 650V, R_{DS}(on) typ. = 1.1Ω@V_{GS} = 10 V
- Low gate charge (typical 25nC)
- High ruggedness
- Fast switching
- 100% avalanche tested
- 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= 25ºC , unless otherwise noted)

Symbol	Parameter	KNP4665A	KNF4665A	Units
V_{DSS}	Drain-Source Voltage	650		V
I_D	Drain Current -Continuous (T_C = 25 ºC)	7.5	7.5 *	A
	-Continuous (T_C = 100 ºC)	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 ºC)	147	40	W
	-Derate above 25 ºC	1.18	0.32	W/ºC
T_J,T_{STG}	Operating and Storage Temperature Range	-55 to +150		ºC
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300		ºC

* Drain current limited by maximum junction temperature.

6. Thermal Characteristics

Symbol	Parameter	KNP4665A	KNF4665A	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.85	3.1	ºC /W
$R_{\theta JS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	--	ºC /W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	62.5	ºC /W

7. Electrical characteristics

(T_C= 25ºC , unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
B_{VDSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 uA	650	--	--	V
$\triangle BV_{DSS}$ / $\triangle T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250 uA, Referenced to 25 ºC	--	0.65	--	V/ºC
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 650 V, V_{GS} = 0 V	--	--	1	uA
		V_{DS} = 520 V, T_C = 125 ºC	--	--	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
Qrr	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/us, V_{DD} ≤B_{VDSS}, Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

7. Typical Characteristics

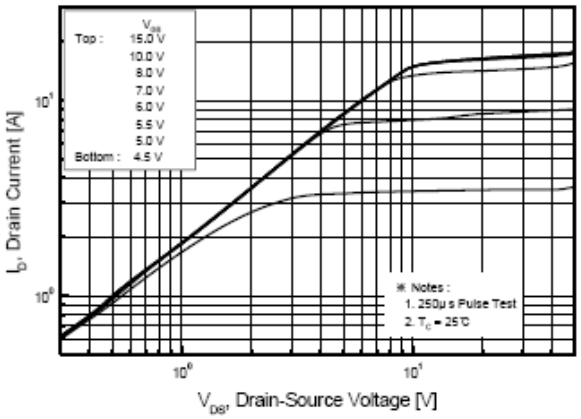


Figure 1. On-Region Characteristics

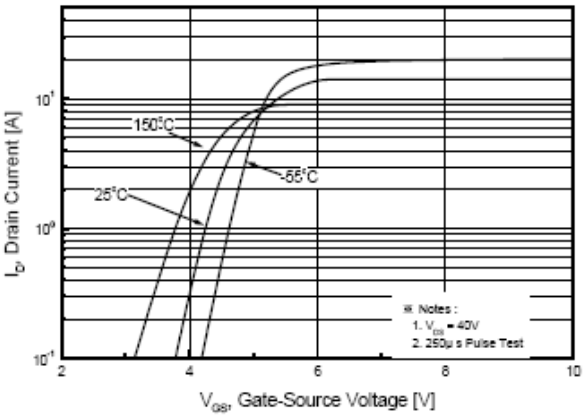


Figure 2. Transfer Characteristics

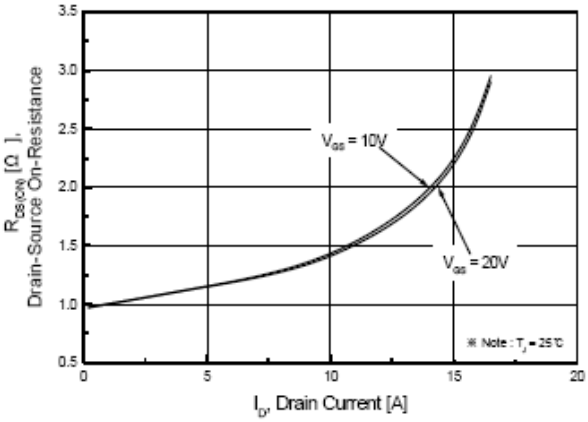


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

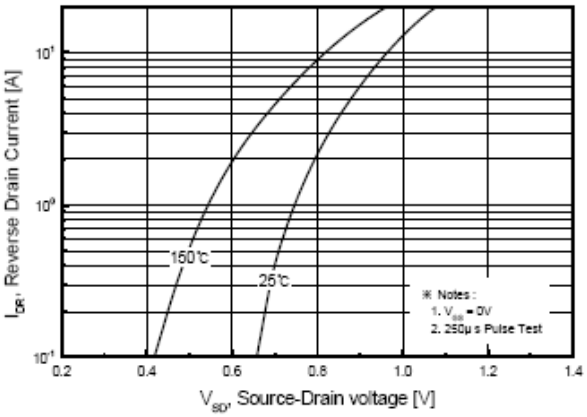


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

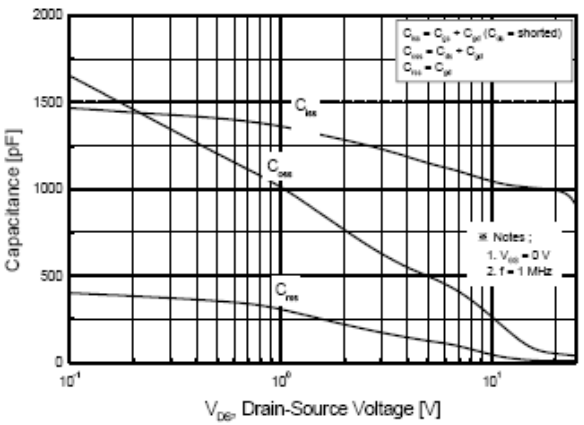


Figure 5. Capacitance Characteristics

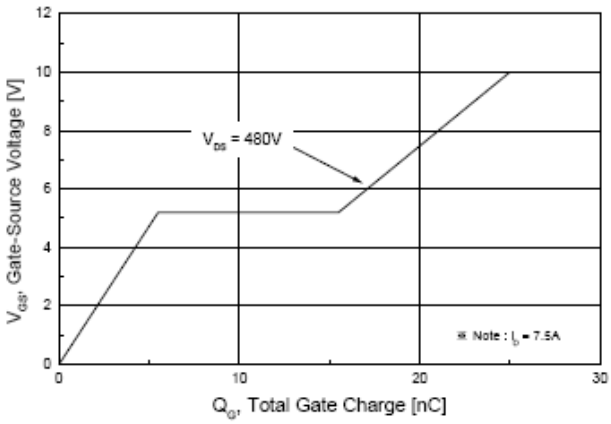


Figure 6. Gate Charge Characteristics

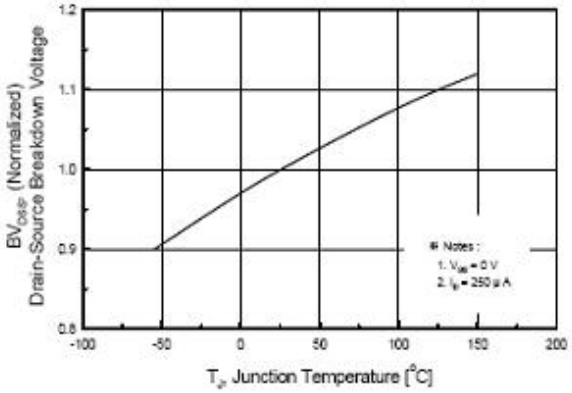


Figure 7. Breakdown Voltage Variation vs Temperature

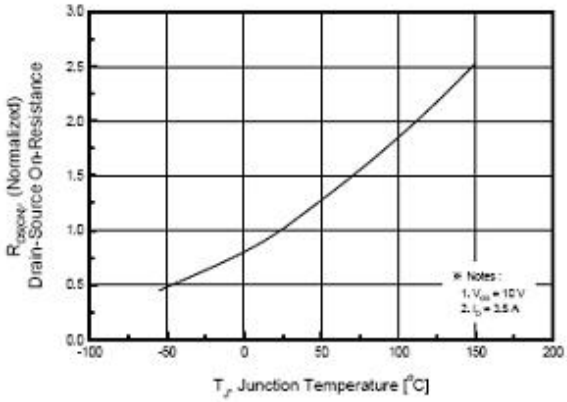


Figure 8. On-Resistance Variation vs Temperature

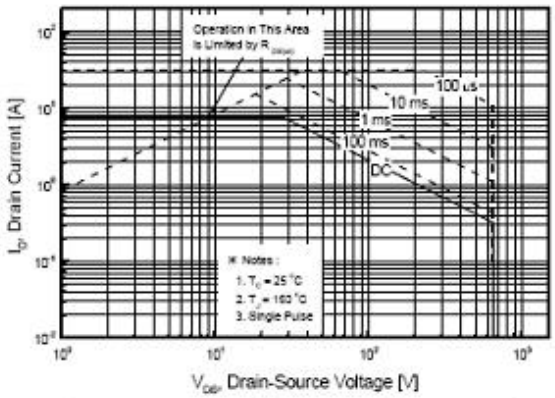


Figure 9-1. Maximum Safe Operating Area for KNP4665A

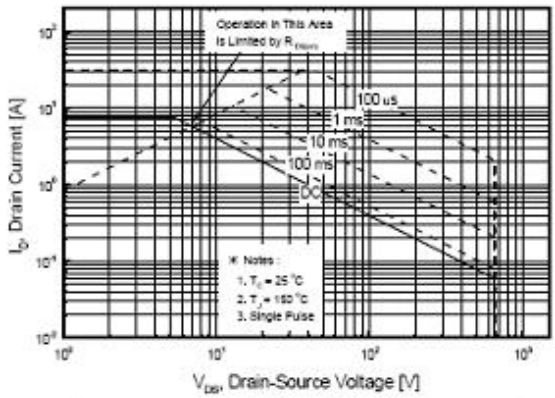


Figure 9-2. Maximum Safe Operating Area for KNF4665A

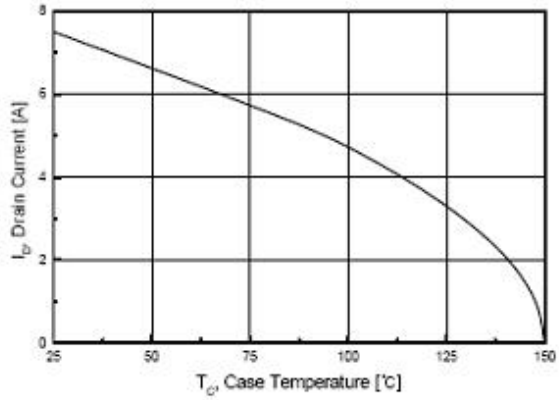


Figure 10. Maximum Drain Current vs Case Temperature

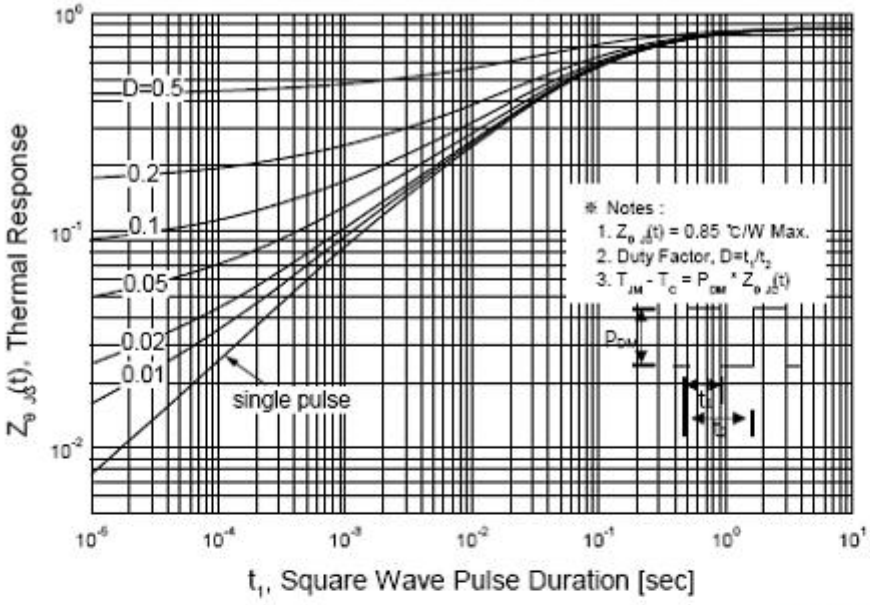


Figure 11-1. Transient Thermal Response Curve for KNP4665A

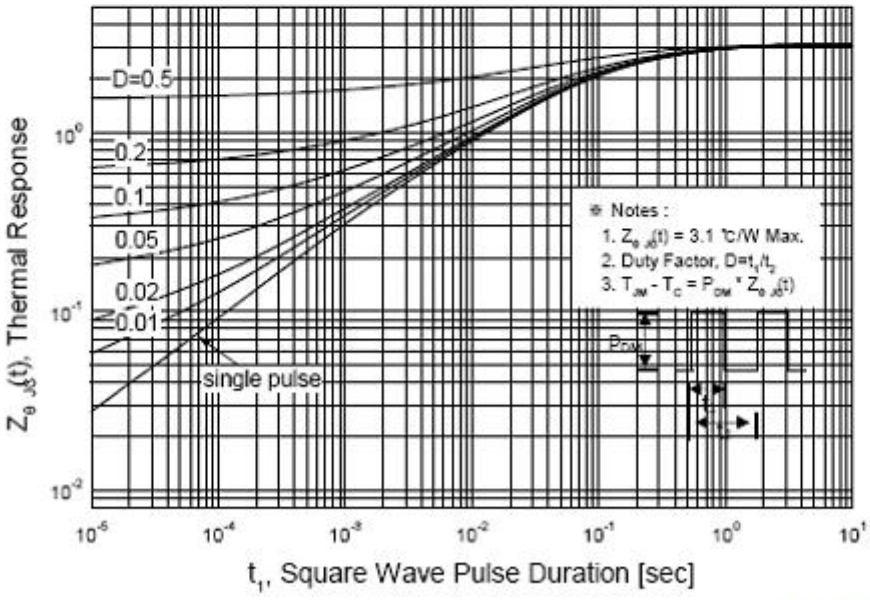


Figure 11-2. Transient Thermal Response Curve for KNF4665A