

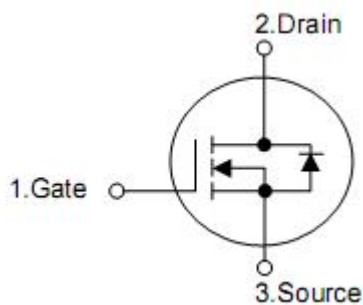
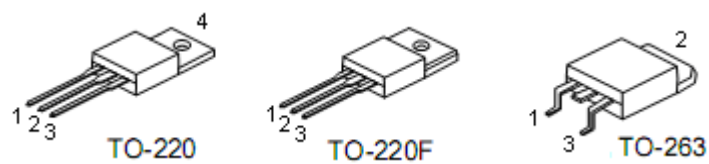
1. Description

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

- $R_{DS(on)}=1.0\Omega @ V_{GS}=10V$
- Ultra low gate charge (typical 27nC)
- Low reverse transfer capacitance
- Fast switching capability
- Avalanche energy tested
- Improved dv/dt capability, high ruggedness

3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source
4	Drain

4. Absolute maximum ratings

($T_C=25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Rating			Units	
		TO-220	TO-220F	TO-263		
Drain-source voltage	V_{DSS}	600			V	
Gate-source voltage	V_{GSS}	± 30			V	
Drain current continuous	I_D	$T_C=25^\circ\text{C}$	7.0	7.0*	7.0	A
		$T_C=100^\circ\text{C}$	4.2	4.2*	4.2	A
Drain current pulsed (note1)	I_{DP}	28	28*	28	A	
Avalanche energy	Repetitive (note1)	E_{AR} 13.5			mJ	
	Single Pulse (note2)	E_{AS} 215			mJ	
Peak diode recovery dv/dt (note3)	dv/dt	4.5			V/ns	
Total power dissipation	P_D	$T_C=25^\circ\text{C}$	140	45	140	W
		Derate above 25°C	1.11	0.35	1.11	W/ $^\circ\text{C}$
Junction temperature	T_J	+150			$^\circ\text{C}$	
Storage temperature	T_{STG}	-55~+150			$^\circ\text{C}$	

* Drain current limited by maximum junction temperature.

5. Thermal characteristics

Parameter	Symbol	Rating			Unit
		TO-220	TO-220F	TO-263	
Thermal resistance junction-ambient	R_{thJA}	62.5			$^\circ\text{C}/\text{W}$
Thermal resistance case-to-sink typ.	R_{thCS}	0.5	-	0.5	
Thermal resistance junction-case	R_{thJC}	0.9	2.8	0.9	

6. Electrical characteristics

($T_J=25^{\circ}\text{C}$, unless otherwise notes)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Off characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	600	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V$	-	-	1	μA
		$V_{DS}=480V, T_C=125^{\circ}\text{C}$	-	-	10	μA
Gate-body leakage current	Forward	I_{GSS}	-	-	100	nA
	Reverse				-100	nA
Breakdow voltage temperature coefficient	$\Delta BV_{DSS} \Delta T_J$	$I_D=250\mu A$	-	0.6	-	V/ $^{\circ}\text{C}$
On characteristics						
Gate threshold voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
Static drain-source on-resistance	$R_{DS(ON)}$	$V_{DS}=10V, I_D=3.5A$	-	1.0	1.2	Ω
Dynamic characteristics						
Input capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V,$ $f=1\text{MHz}$	-	900	-	pF
Output capacitance	C_{OSS}		-	100	-	pF
Reverse transfer capacitance	C_{RSS}		-	11.5	-	pF
Switching characteristics						
Turn-on delay time	$t_{D(ON)}$	$V_{DD}=300V, R_G=25\Omega,$ $I_D=7.0A$ (note 4,5)	-	20	-	ns
Rise time	t_R		-	45	-	ns
Turn-off delay time	$t_{D(OFF)}$		-	75	-	ns
Fall time	t_F		-	70	-	ns
Total gate charge	Q_G	$V_{DS}=480V, V_{GS}=10V$ $I_D=7.0A$ (note 4,5)	-	27	-	nC
Gate-source charge	Q_{GS}		-	4.5	-	nC
Gate-drain charge	Q_{GD}		-	12	-	nC
Drain-source diode characteristics						
Drain-source diode forward voltage	V_{SD}	$V_{GS}=0V, I_{SD}=7.0A$	-	-	1.4	V
Continuous drain-source current	I_{SD}		-	-	7.0	A
Pulsed drain-source current	I_{SM}		-	-	28	A
Reverse recovery time	t_{RR}	$V_{GS}=0V, I_{SD}=7.0A,$ $di_{SD}/dt=100A/\mu s$ (note 4)	-	320	-	ns
Reverse recovery charge	Q_{RR}		-	3.0	-	μC

Note: 1. Repetitive rating: pulse width limited by maximum junction temperature

2. $L=8.5\text{mH}, I_{AS}=7.0A, V_{DD}=50V, R_G=25\Omega$, starting $T_J=25^{\circ}\text{C}$

3. $I_{SD} \leq 7.0A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$, starting $T_J=25^{\circ}\text{C}$

4. Pulse test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$

5. Essentially independent of operating temperature

7. Test circuits and waveforms

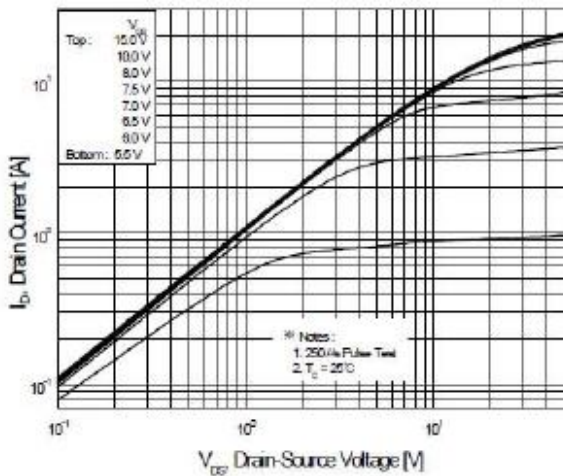


Figure 1. On-Region Characteristics

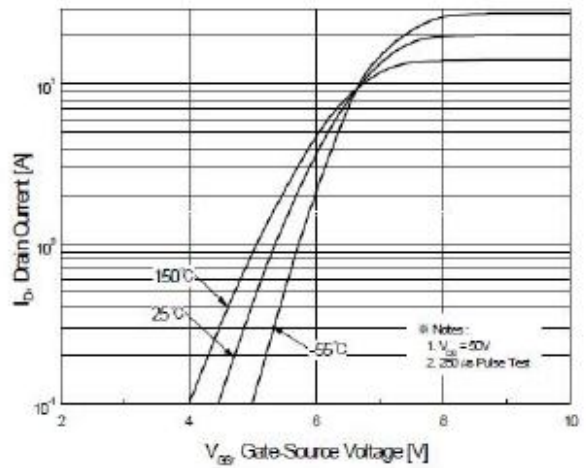


Figure 2. Transfer Characteristics

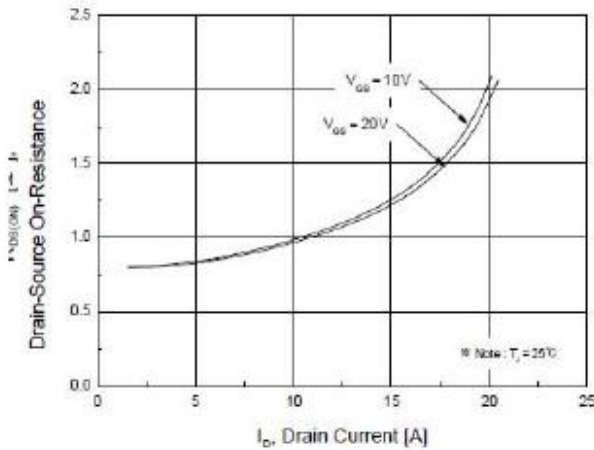


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

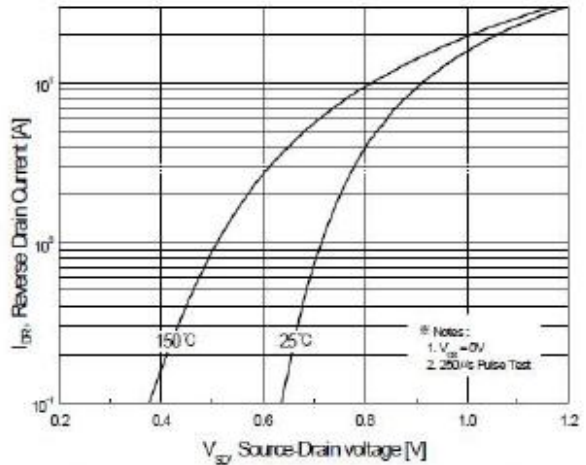


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

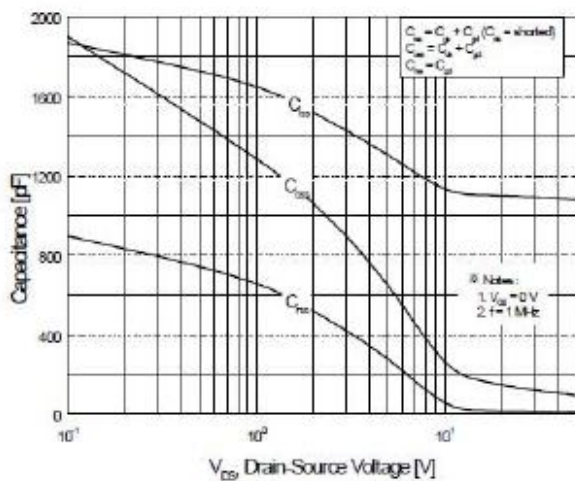


Figure 5. Capacitance Characteristics

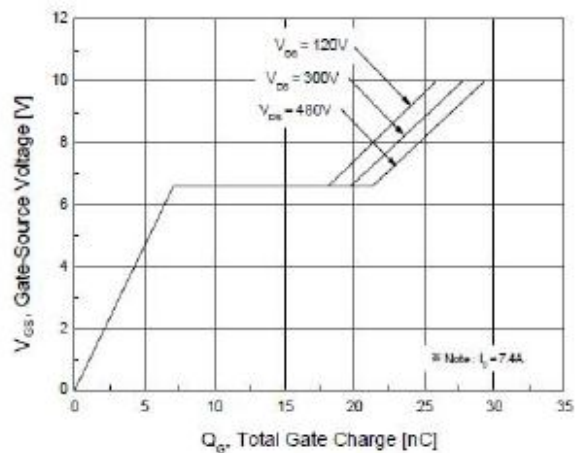


Figure 6. Gate Charge Characteristics

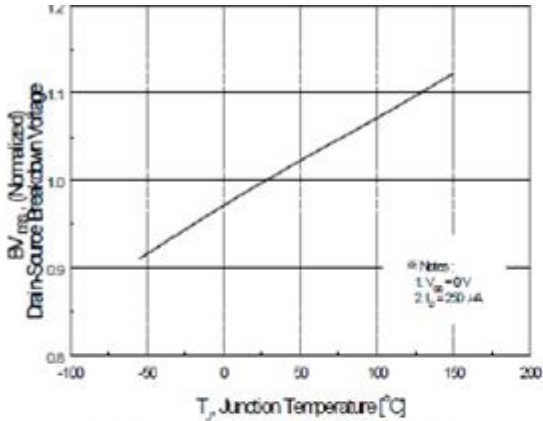


Figure 7. Breakdown Voltage Variation vs. Temperature

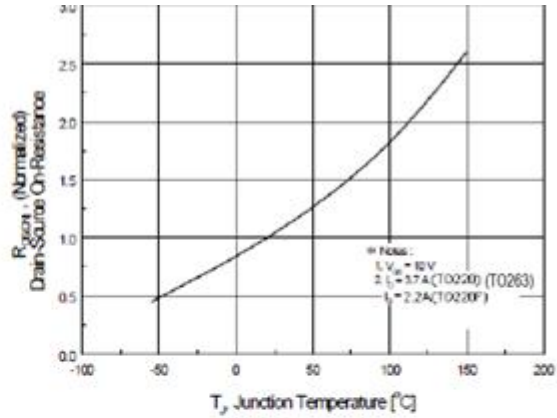


Figure 8. On-Resistance Variation vs. Temperature

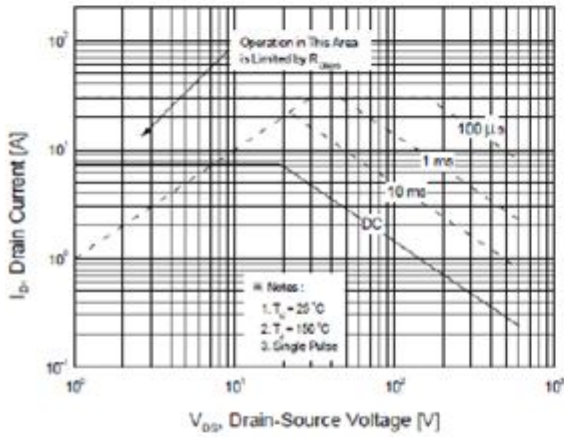


Figure 9. Maximum Safe Operating Area

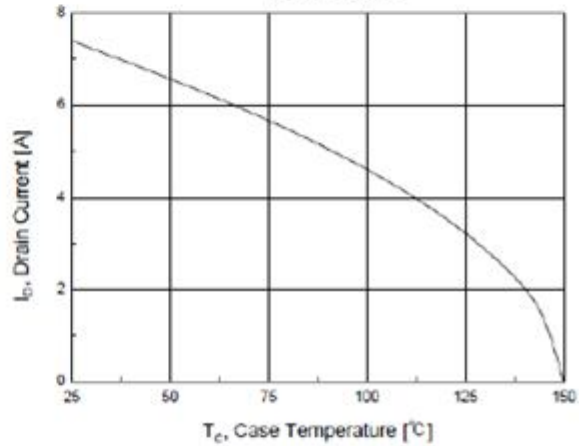


Figure 10. Maximum Drain Current vs. Case Temperature

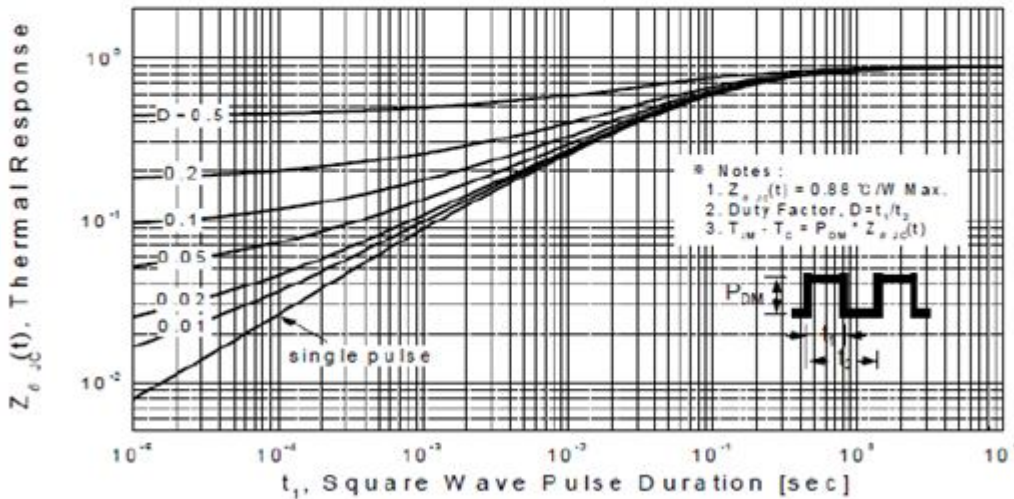


Figure 11-1. Transient Thermal Response Curve for TO220 & TO263

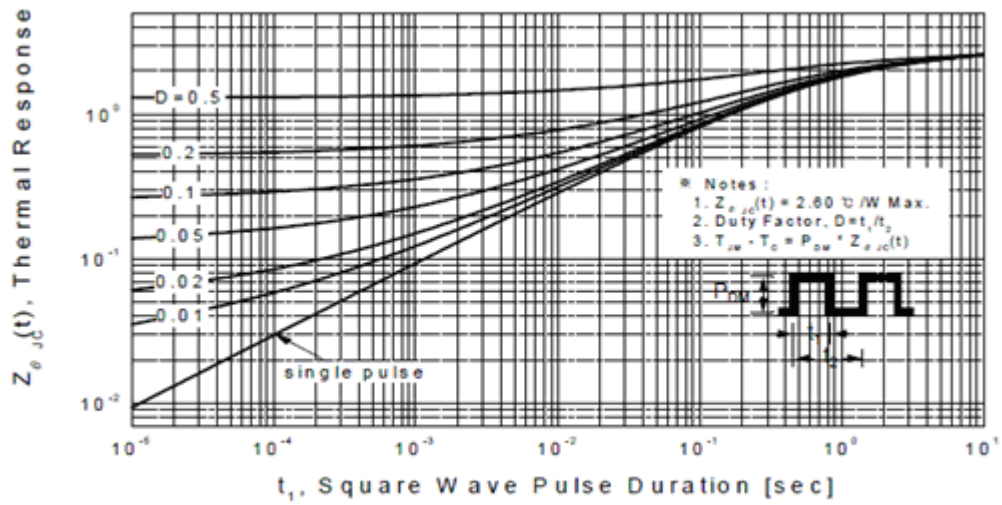


Figure 11-2. Transient Thermal Response Curve for TO220F