

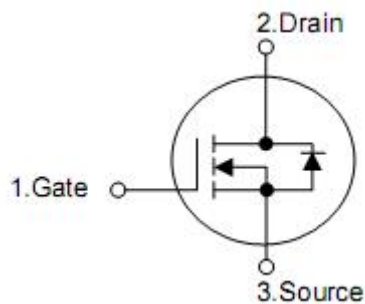
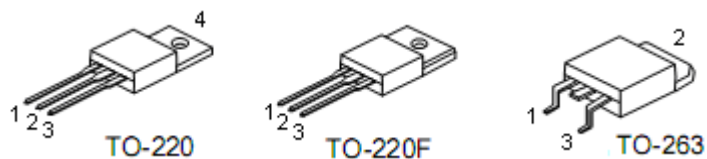
## 1. Description

The power MOSFET is produced using KIA semi'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  $R_{DS(on)}=1.2\Omega$  @  $V_{GS}=10V$
- n Low gate charge (typical 29nC)
- 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. Absolute maximum ratings

(T<sub>C</sub>=25°C , unless otherwise noted)

Parameter	Symbol	Rating			Units	
		TO263	TO220	TO220F		
Drain-source voltage	V <sub>DSS</sub>	650			V	
Gate-source voltage	V <sub>GSS</sub>	±30			V	
Drain current continuous	I <sub>D</sub>	T <sub>C</sub> =25°C	7.0	7.0	7.0*	A
		T <sub>C</sub> =100°C	4.2	4.2	4.2*	A
Drain current pulsed (note1)	I <sub>DM</sub>	28	28	28*	A	
Avalanche energy	Repetitive (note1)	14.7			mJ	
	Single Pulse (note2)	230			mJ	
Peak diode recovery dv/dt (note3)	dv/dt	4.5			V/ns	
Total power dissipation	P <sub>D</sub>	T <sub>C</sub> =25°C	147	147	48	W
		Derate above 25°C	1.18	1.18	0.38	W/°C
Operating and storage temperature range	T <sub>J</sub> ,T <sub>STG</sub>	-55~+150			°C	
Maximum lead temperature for soldering purposes, 1/8"from case for 5 seconds	T <sub>L</sub>	300			°C	

#### 5. Thermal characteristics

Parameter	Symbol	Rating			Unit
		TO263	TO220	TO220F	
Thermal resistance junction-ambient	R <sub>thJA</sub>	62.5			°C/W
Thermal resistance,case-to-sink typ.	R <sub>thCS</sub>	0.5	0.5	-	
Thermal resistance junction-case	R <sub>thJC</sub>	0.85	0.85	2.6	

## 6. Electrical characteristics

(T<sub>J</sub>=25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Off characteristics						
Drain-source breakdown voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	650	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V	-	-	1	μA
		V <sub>DS</sub> =520V, T <sub>C</sub> =125°C	-	-	10	μA
Gate-body leakage current	Forward	I <sub>GSS</sub>	-	-	100	nA
	Reverse				-100	nA
Breakdown voltage temperature coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> =250μA, Referenced to 25°C	-	0.7	-	V/°C
On characteristics						
Gate threshold voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0	-	4.0	V
Static drain-source on-resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =3.5A	-	1.2	1.4	Ω
Dynamic characteristics						
Input capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	-	1000	-	pF
Output capacitance	C <sub>OSS</sub>		-	110	-	pF
Reverse transfer capacitance	C <sub>RSS</sub>		-	12.6	-	pF
Switching characteristics						
Turn-on delay time	t <sub>D(ON)</sub>	V <sub>DD</sub> =325V, R <sub>G</sub> =25Ω, I <sub>D</sub> =7.0A (note 4,5)	-	20	-	ns
Rise time	t <sub>R</sub>		-	50	-	ns
Turn-off delay time	t <sub>D(OFF)</sub>		-	80	-	ns
Fall time	t <sub>F</sub>		-	70	-	ns
Total gate charge	Q <sub>G</sub>	V <sub>DS</sub> =520V, V <sub>GS</sub> =10V, I <sub>D</sub> =7.0A (note 4,5)	-	29	-	nC
Gate-source charge	Q <sub>GS</sub>		-	4.7	-	nC
Gate-drain charge	Q <sub>GD</sub>		-	12.5	-	nC
Drain-source diode characteristics						
Drain-source diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =7.5A	-	-	1.4	V
Continuous drain-source current	I <sub>S</sub>		-	-	7.0	A
Pulsed drain-source current	I <sub>SM</sub>		-	-	28	A
Reverse recovery time	t <sub>RR</sub>	I <sub>S</sub> =7.5A,	-	350	-	ns
Reverse recovery charge	Q <sub>RR</sub>	dI <sub>SD</sub> /dt=100A/μs (note 4)	-	3.3	-	μC

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

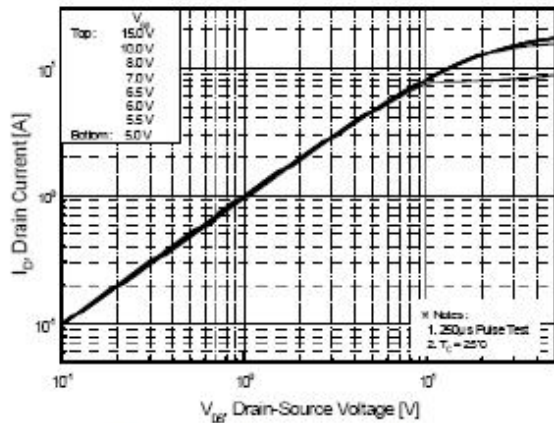
2. L=7.3mH, I<sub>AS</sub>=7.0A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, starting T<sub>J</sub>=25°C

3. I<sub>SD</sub>≤7.0A, di/dt≤200A/μs, V<sub>DD</sub>≤BV<sub>DSS</sub>, starting T<sub>J</sub>=25°C

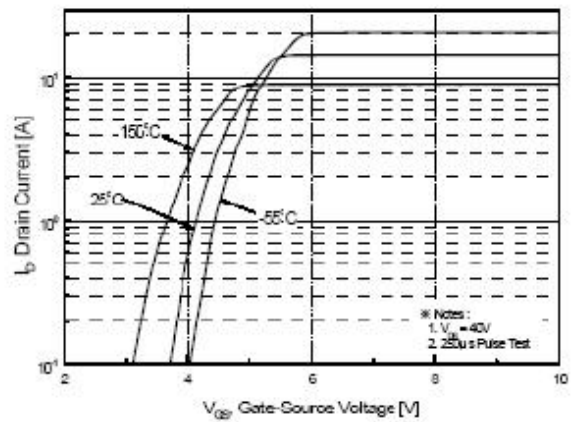
4. Pulse test: pulse width ≤300μs, duty cycle ≤2%

5. Essentially independent of operating temperature

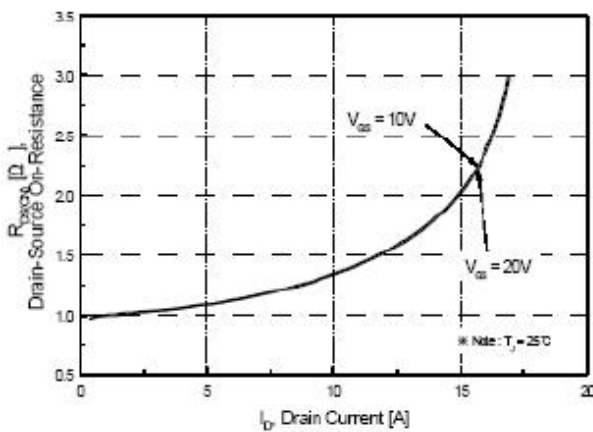
**7. Test circuits and waveforms**



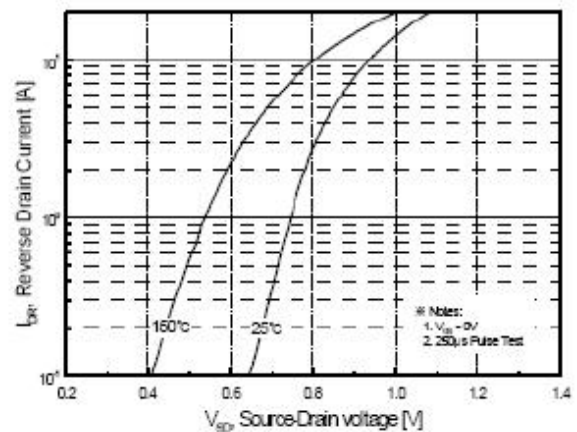
**Figure 1. On-Region Characteristics**



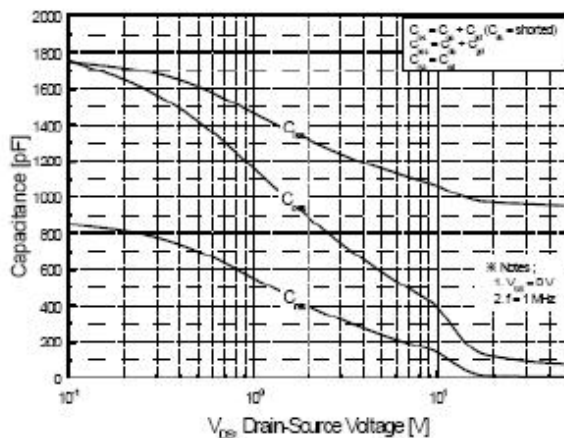
**Figure 2. Transfer Characteristics**



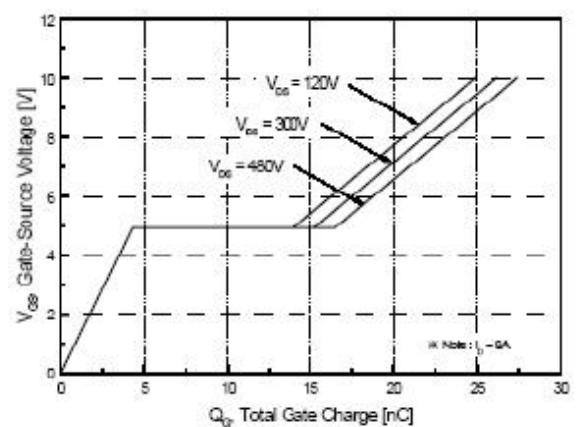
**Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage**



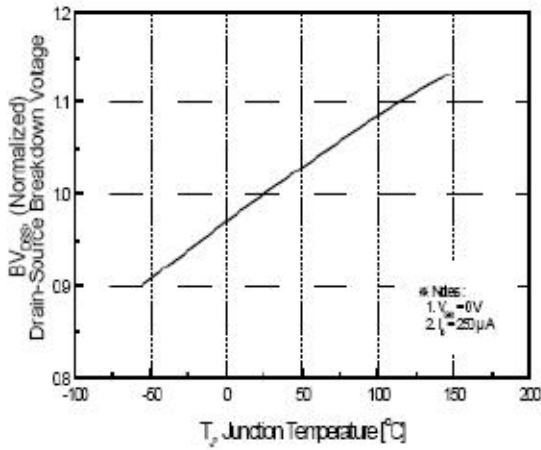
**Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature**



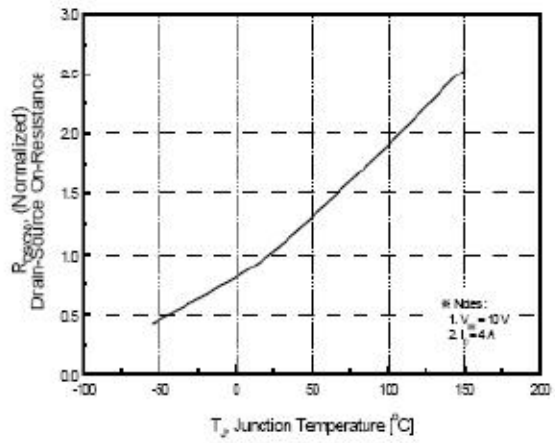
**Figure 5. Capacitance Characteristics**



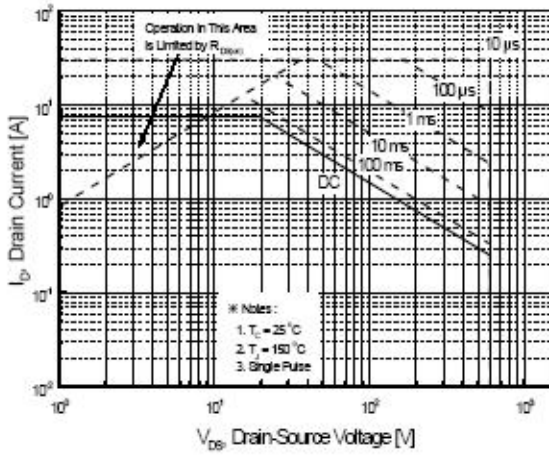
**Figure 6. Gate Charge Characteristics**



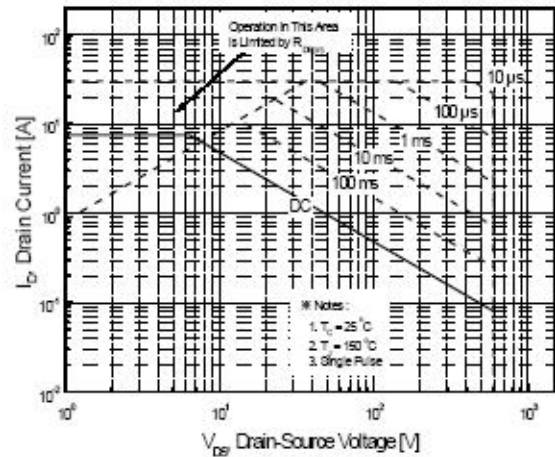
**Figure 7. Breakdown Voltage Variation vs Temperature**



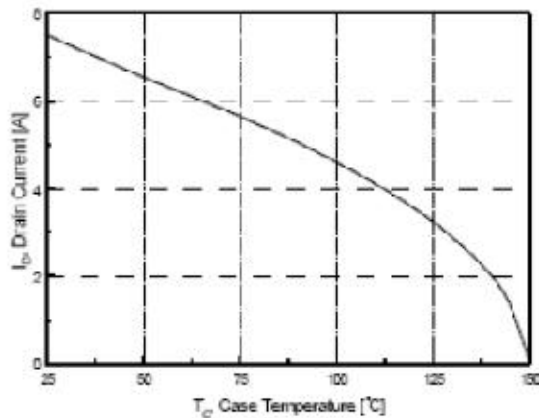
**Figure 8. On-Resistance Variation vs Temperature**



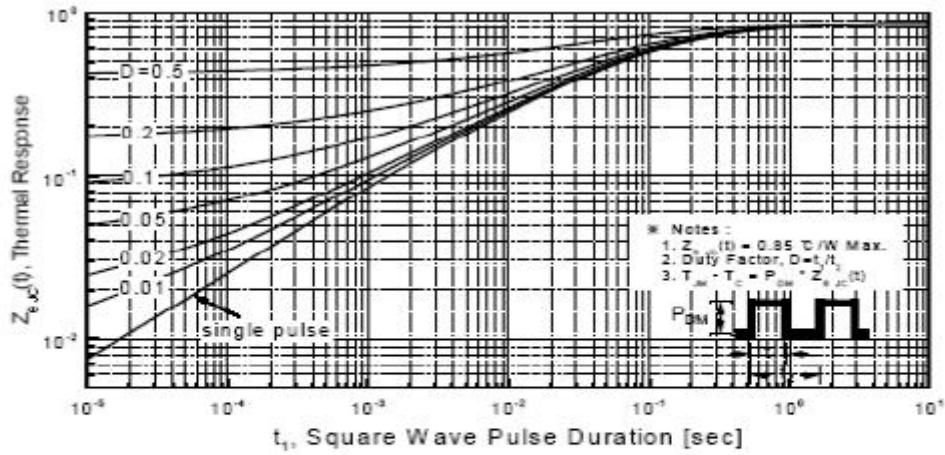
**Figure 9-1. Maximum Safe Operating Area for TO-263 TO-220**



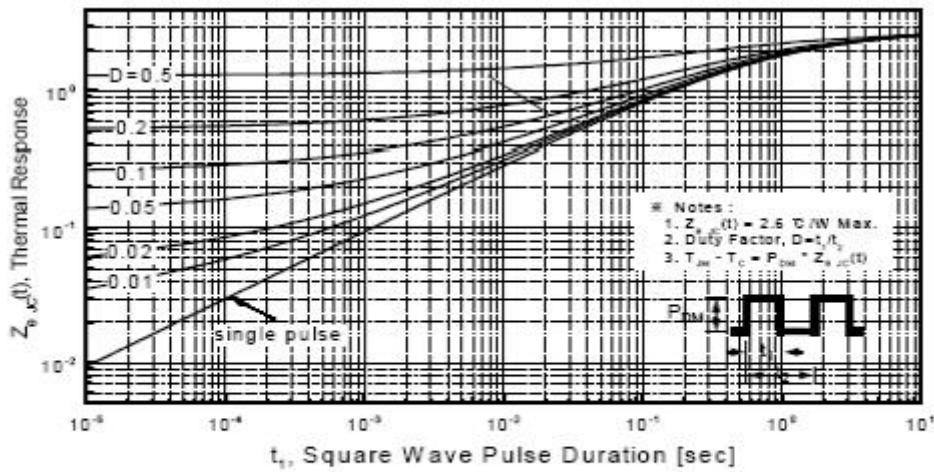
**Figure 9-2. Maximum Safe Operating Area for TO-220F**



**Figure 10. Maximum Drain Current vs Case Temperature**



**Figure 11-1. Transient Thermal Response Curve  
for TO-263 TO-220**



**Figure 11-2. Transient Thermal Response Curve  
for TO-220F**