

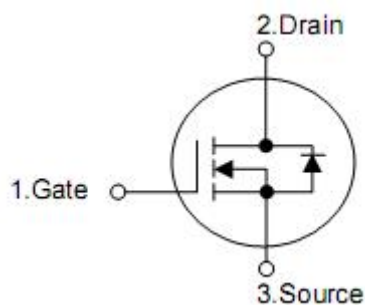
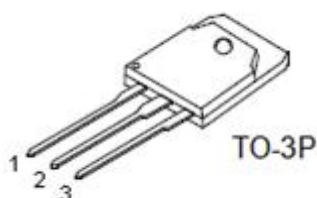
1. Description

This Power MOSFET is produced using KIA semi's advanced super-junction technology. This advanced technology has been especially tailored to minimize conduction loss, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for AC/DC power conversion in switching mode operation for higher efficiency.

2. Features

- n $R_{DS(ON)}=60m\Omega@V_{GS}=10\text{ V}$
- n Low gate charge (typical 170nC)
- 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_c= 25 °C , unless otherwise specified)

Parameter		Symbol	Ratings	Units
Drain-source voltage		V _{DSS}	600	V
Gate-source voltage		V _{GSS}	±30	V
Drain current continuous	T _c =25°C	I _D	47	A
	T _c =100°C		29	A
Drain current pulsed (note1)		I _{DM}	140	A
Avalanche energy	Repetitive (note1)	E _{AR}	1.72	mJ
	Single pulse (note2)	E _{AS}	1135	mJ
Avalanche current (note1)		I _{AR}	9.3	A
Peak diode recovery dv/dt (note3)		dv/dt	50	V/ns
Total power dissipation	T _c =25°C	P _D	391	W
	Derate above 25°C		3.13	W/°C
Operating and storage temperature range		T _J , T _{STG}	-55~+150	°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		T _L	300	°C

* Drain current limited by maximum junction temperature

5. Thermal characteristics

Parameter	Symbol	Rating	Unit
Thermal resistance, Junction-ambient	R _{thJA}	62	°C/W
Thermal resistance, case-to-sink typ.	R _{thJS}	0.5	°C/W
Thermal resistance, Junction-case	R _{thJC}	0.32	°C/W

6. Electrical characteristics

(T_J=25°C, unless otherwise noted)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Units
Off characteristics							
Drain-source breakdown voltage	T _J =25℃	BV _{DSS}	V _{GS} =0V,I _D =250μA,	600	-	-	V
	T _J =150℃			-	650	-	V
Drain-source leakage current		I _{DSS}	V _{DS} =600V,V _{GS} =0V	-	-	1	μA
			V _{DS} =480V,T _C =125℃	-	10	-	μA
Gate-body leakage current	Forward	I _{GSS}	V _{GS} =30V,V _{DS} =0V	-	-	100	nA
	Reverse		V _{GS} =-30V,V _{DS} =0V	-	-	-100	nA
Breakdown voltage temperature coefficient		ΔBV _{DSS} /ΔT _J	I _D =250μA, referenced to 25℃	-	0.6	-	V/℃
On characteristics							
Gate threshold voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.5	3.5	4.5	V
Static drain-source on-resistance		R _{DS(ON)}	V _{GS} =10V,I _D =23.5A	-	60	70	mΩ
Dynamic characteristics							
Input capacitance		C _{ISS}	V _{DS} =25V,V _{GS} =0V, f=1MHz	-	3100	-	pF
Output capacitance		C _{OSS}		-	750	-	pF
Reverse transfer capacitance		C _{RSS}		-	10	-	pF
Switching characteristics							
Turn-on delay time		t _{D(ON)}	V _{DD} =480V,I _D =23.5A, R _G =20Ω	-	16	-	ns
Rise time		t _R		-	12	-	ns
Turn-off delay time		t _{D(OFF)}		-	83	-	ns
Fall time		t _F		-	5	-	ns
Total gate charge		Q _G	V _{DS} =480V, I _D =23.5A, V _{GS} =10V	-	170	-	nC
Gate-source charge		Q _{GS}		-	21	-	nC
Gate-drain charge		Q _{GD}		-	87	-	nC
Drain-source diode characteristics							
Drain-source diode forward voltage		V _{SD}	V _{GS} =0V,I _{SD} =23.50A	-	-	1.5	V
Continuous drain-source current		I _S		-	-	47	A
Pulsed drain-source current		I _{SM}		-	-	140	A
Reverse recovery time		t _{RR}	V _{GS} =0V,I _S =23.5A, di _F /dt=100A/μs	-	720	-	ns
Reverse recovery charge		Q _{RR}		-	19	-	μC

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

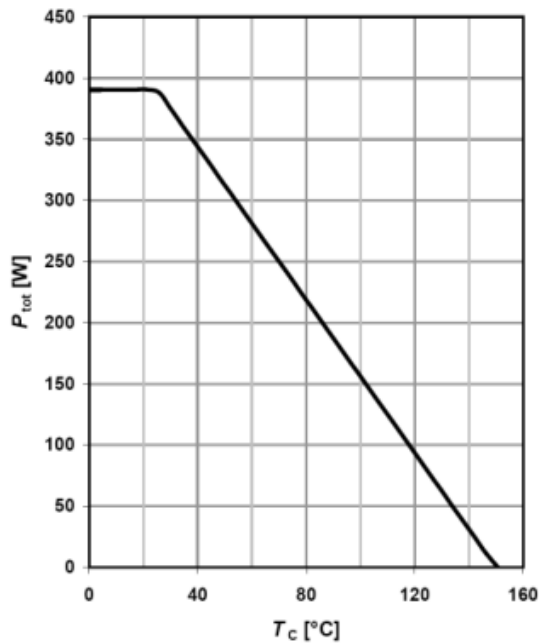
2. L= 25mH, I_{AS}= 9.3A, V_{DD}=50V, R_G=25Ω, starting T_J=25°C

3. I_{SD}≤I_D, di/dt≤200A/μs, V_{DD}≤BV_{DSS}, starting T_J=25°C

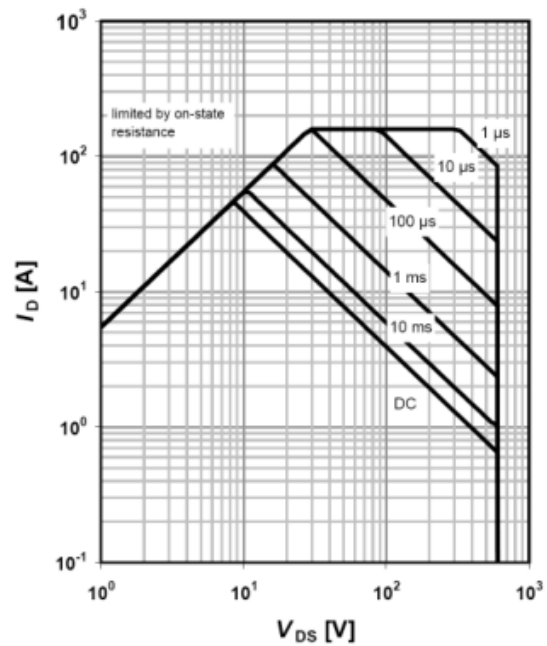
4. Pulse test : pulse width≤300μs, duty cycle≤2%

5. Essentially independent of operating temperature

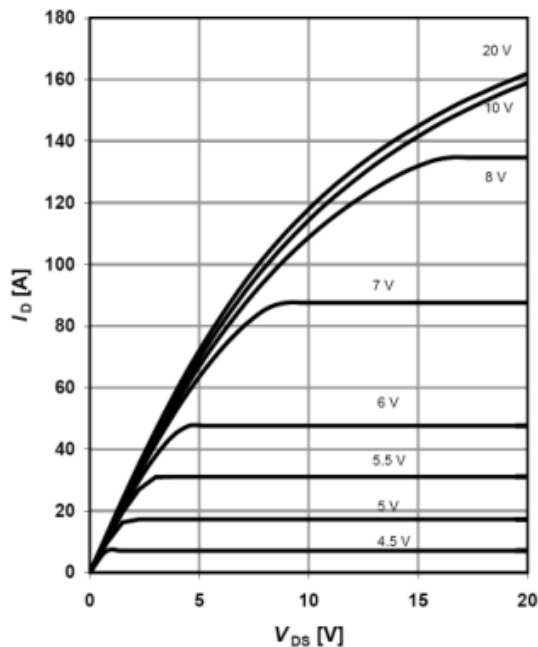
7. Typical characteristics



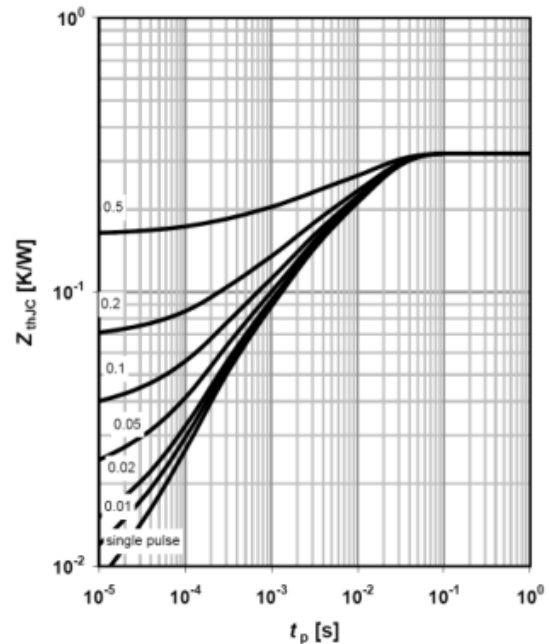
$P_{tot}=f(T_c)$
Figure1: Power dissipation



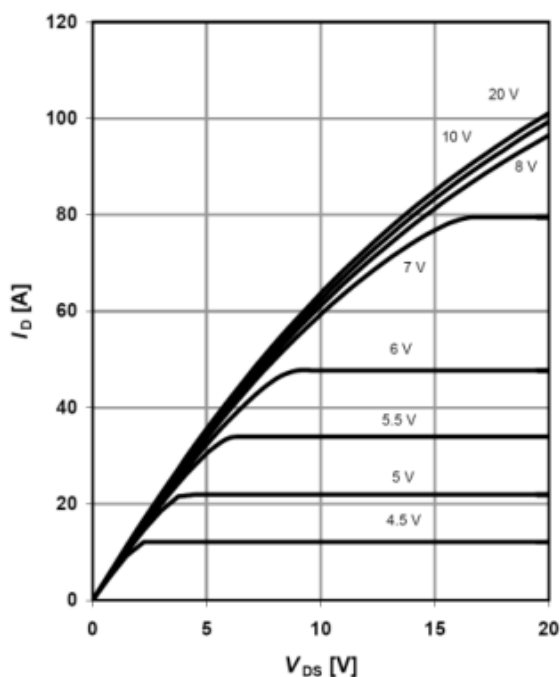
$I_D=f(V_{DS}); T_c=25^\circ\text{C}; D=0$; parameter t_p
Figure2: Safe operating area $T_j=25^\circ\text{C}$



$Z_{thJC}=f(t_p)$; parameter $D=tp/T$
Figure3: Max. transient thermal impedance

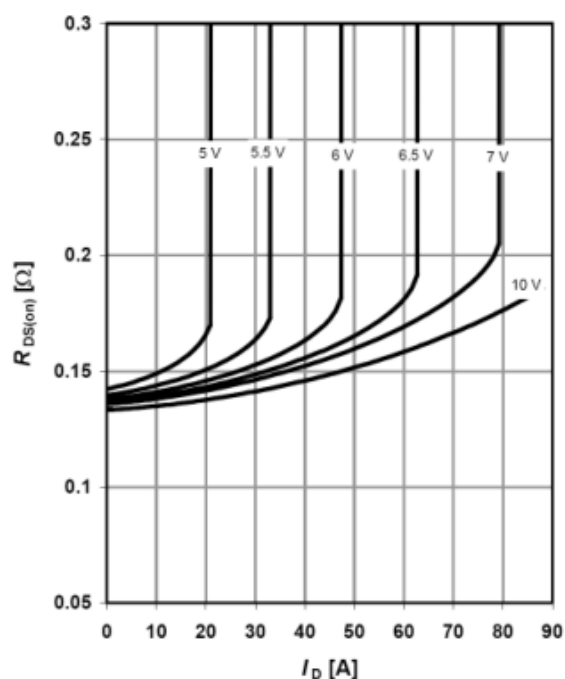


$I_D=f(V_{DS}); T_j=25^\circ\text{C}$; parameter: V_G
Figure4: Typ. output characteristics $T_j=25^\circ\text{C}$



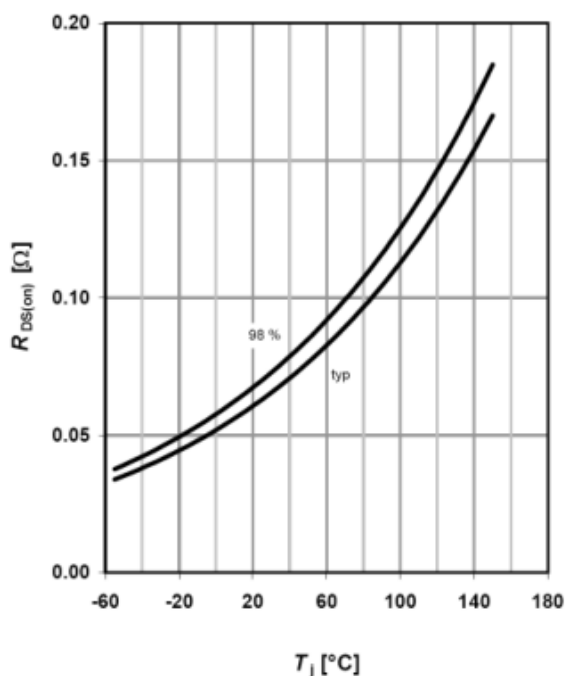
$I_D = f(V_{DS})$; $T_j = 125^\circ\text{C}$; parameter: V_{GS}

Figure5: Typ. output characteristics $T_j = 25^\circ\text{C}$



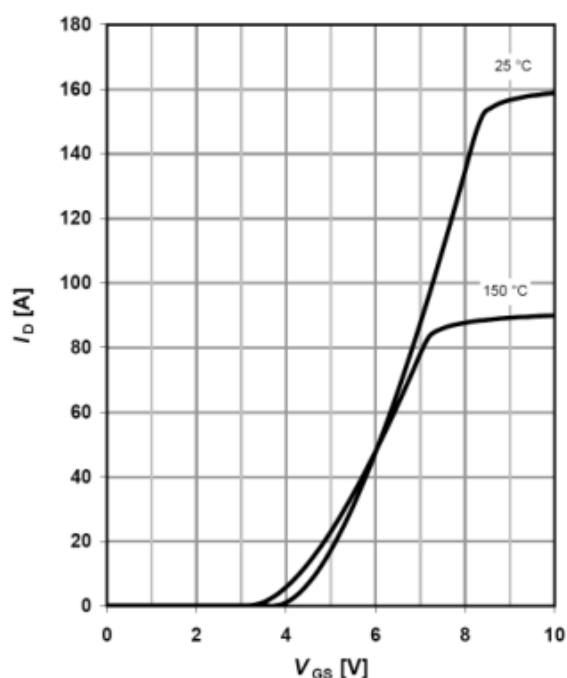
$R_{DS(on)} = f(I_D)$; $T_j = 125^\circ\text{C}$; parameter: V_{GS}

Figure6: Typ. drain-source on-state resistance



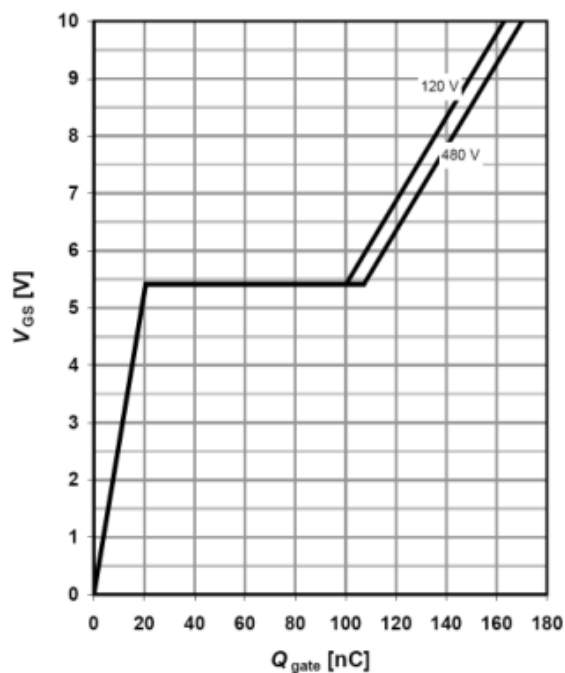
$R_{DS(on)} = f(T_j)$; $I_D = 23\text{ A}$; $V_{GS} = 10\text{ V}$

Figure7: Typ. drain-source on-state resistance

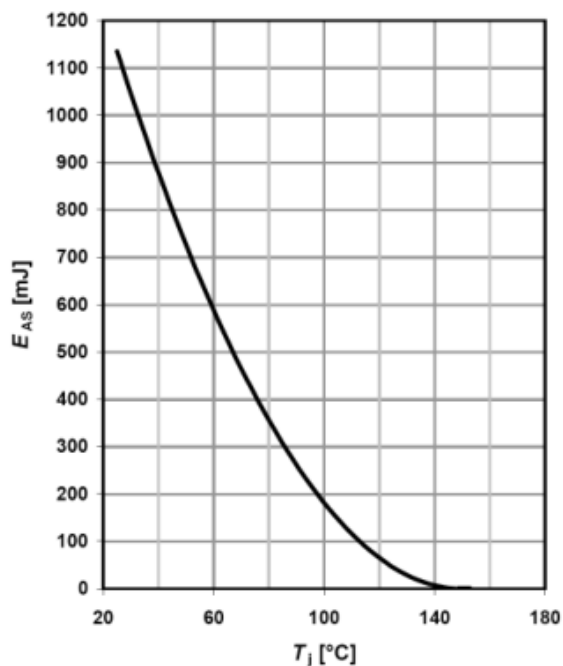


$I_D = f(V_{GS})$; $V_{DS} = 40\text{ V}$

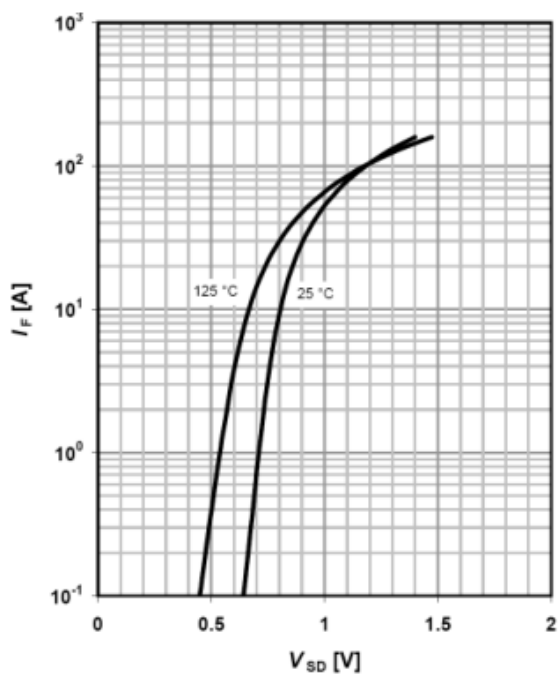
Figure8: Typ. transfer characteristics



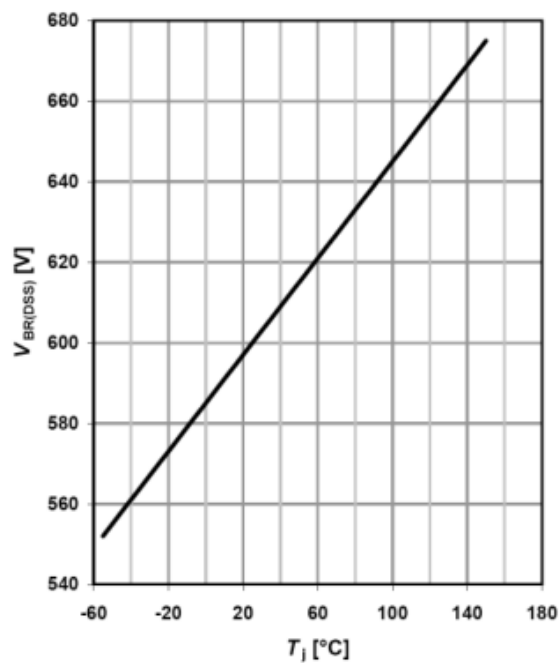
$V_{GS}=f(Q_g)$, $I_D=23A$ pulsed
Figure9: Typ. gate charge



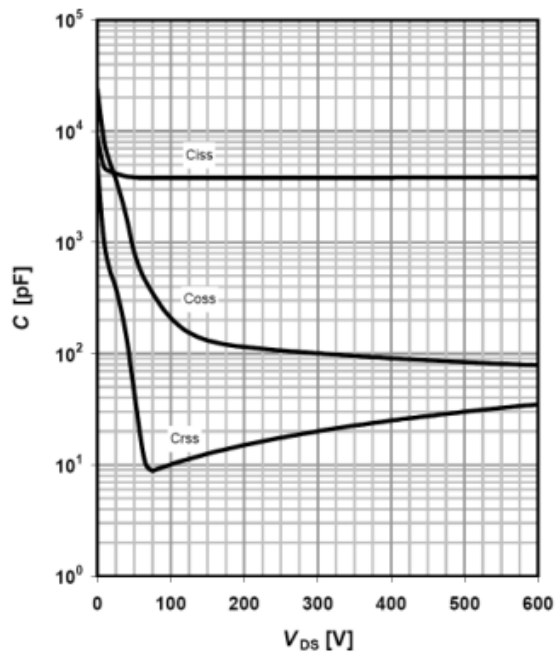
$E_{AS}=f(T_j)$; $I_D=9.3A$; $V_{DD}=50V$
Figure10: Avalanche energy



$I_F=f(V_{SD})$; parameter: T_j
Figure11: Forward characteristics of reverse diode

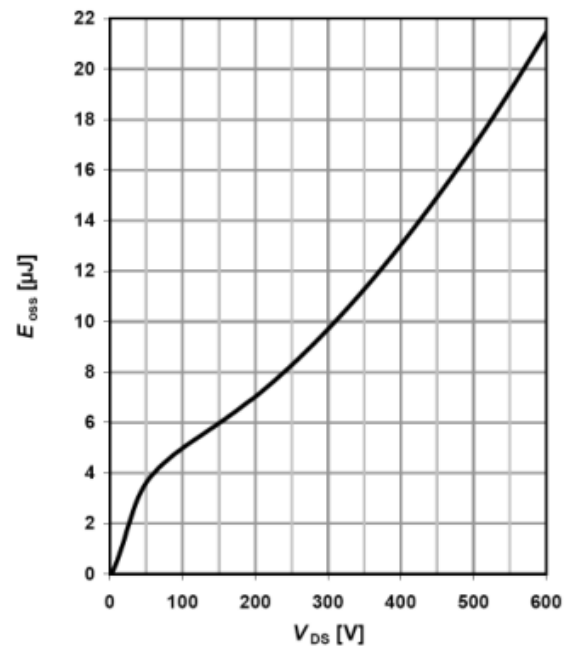


$V_{BR(DSS)}=f(T_j)$; $I_D=0.25mA$
Figure12: Drain-source breakdown voltage



$C=f(V_{DS})$; $V_{GS}=0$ V; $f=1$ MHz

Figure13: Typ. capacitances



$E_{OSS}=f(V_{DS})$

Figure14: Typ. Coss stored energy