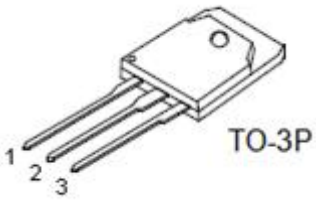
1. Description

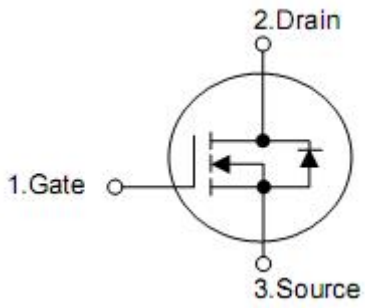
This Power MOSFET is produced using KIA semi`s advanced super-junction technology. This advanced technology has been especially tailored to minimize conduction loss, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited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

2. Features

- $R_{DS(ON)}$=60mΩ@V_{GS}=10 V
- Low gate charge (typical 170nC)
- High ruggedness
- Fast switching
- 100%avalanche tested
- Improved dv/dt capability

3. Pin configuration





Pin	Function
1	Gate
2	Drain
3	Source

4. Absolute maximum ratings

(T_C= 25 ºC , unless otherwise specified)

Parameter		Symbol	Ratings	Units
Drain-source voltage		V_{DSS}	600	V
Gate-source voltage		V_{GSS}	±30	V
Drain currenet 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 cyrrent (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	ºC/W
Thermal resistance, case-to-sink typ.	R_{thJS}	0.5	ºC/W
Thermal resistance, Junction-case	R_{thJC}	0.32	ºC/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		$\triangle BV_{DSS}/\triangle T_J$	I_D=250μA, referenced to 25℃	-	0.6	-	V/°C
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

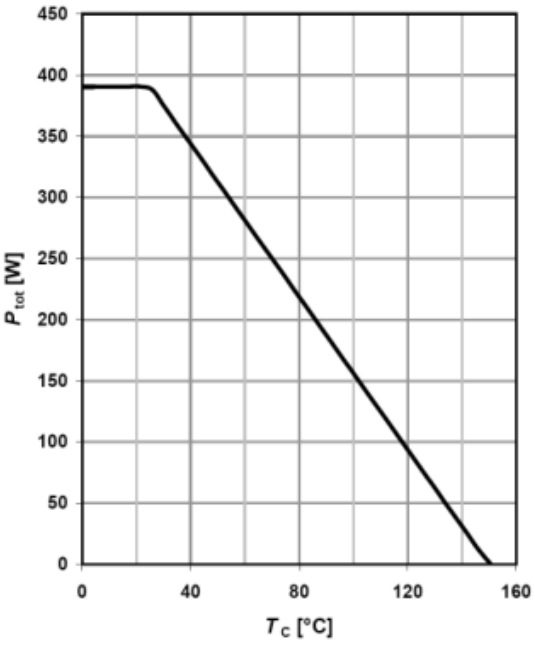
2. L= 25mH, I_{AS}= 9.3A, V_{DD}=50V, R_G=25Ω,starting T_J=25°C

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

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

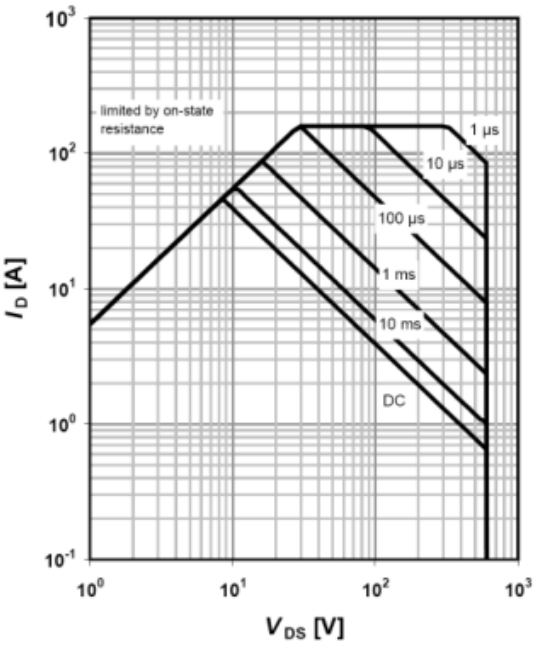
5. Essentially independent of operating temperature

7. Typical characteristics



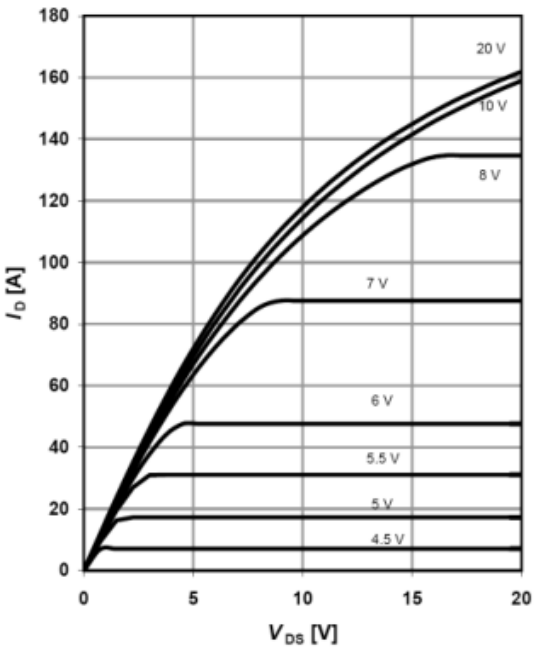
Ptot=f(Tc)

Figure1：Power dissipation



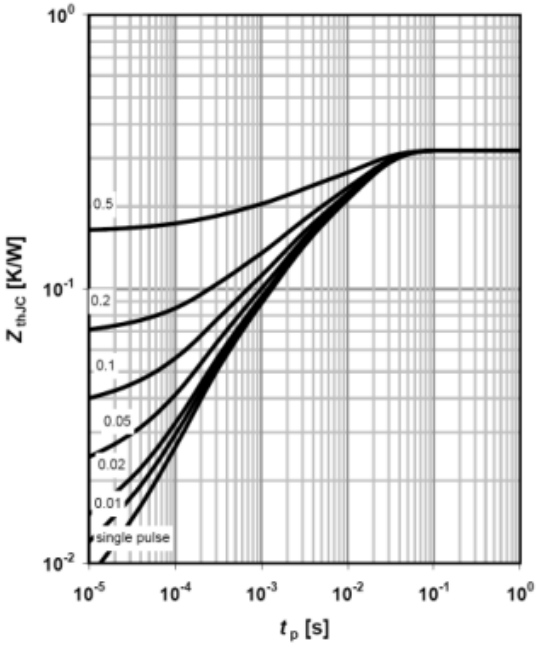
Id=f(Vds);Tc=25℃； D=0;parameter tp

Figure2：Safe operating area T_j=25 ℃



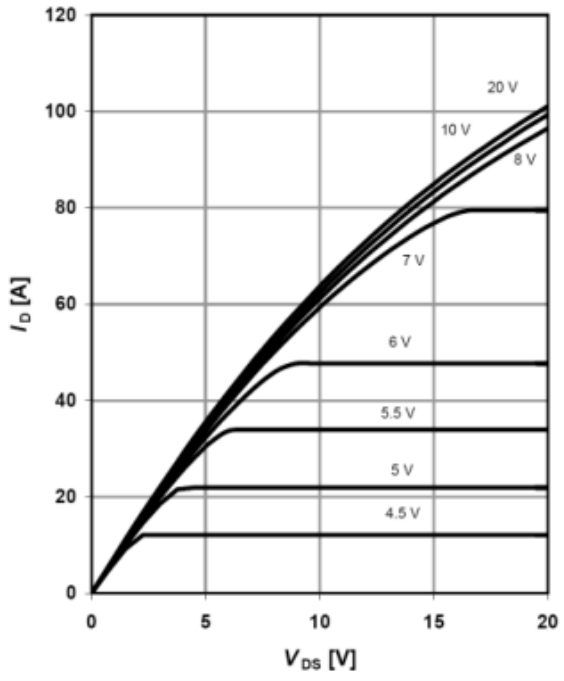
Z(thJC)=f(tp);parameter D=tp/T

Figure3：Max. transient thermal impedance



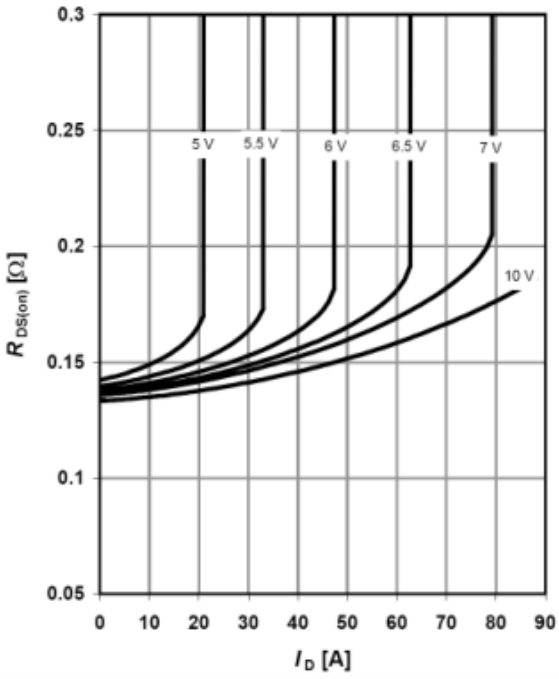
ID=f(VDS); Tj=25 ℃ ; parameter: VG

Figure4：Typ. output characteristics Tj=25 ℃



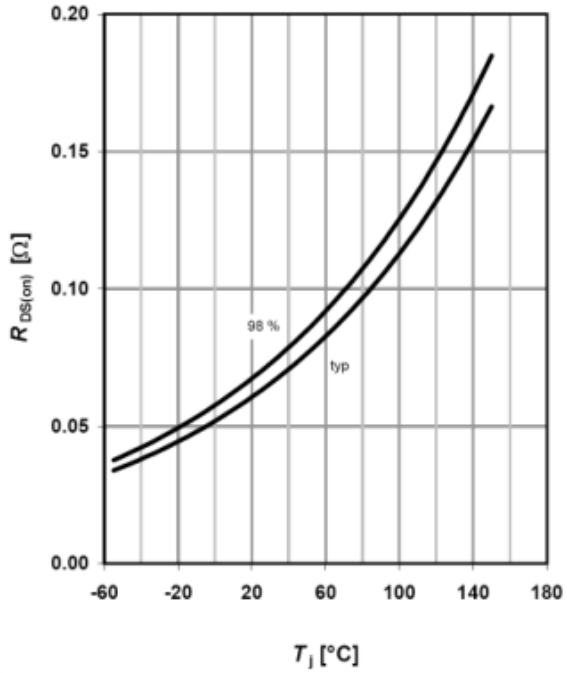
ID=f(VDS); Tj=125 ℃ ; parameter: VGS

Figure5： Typ. output characteristics T_j=25 ℃



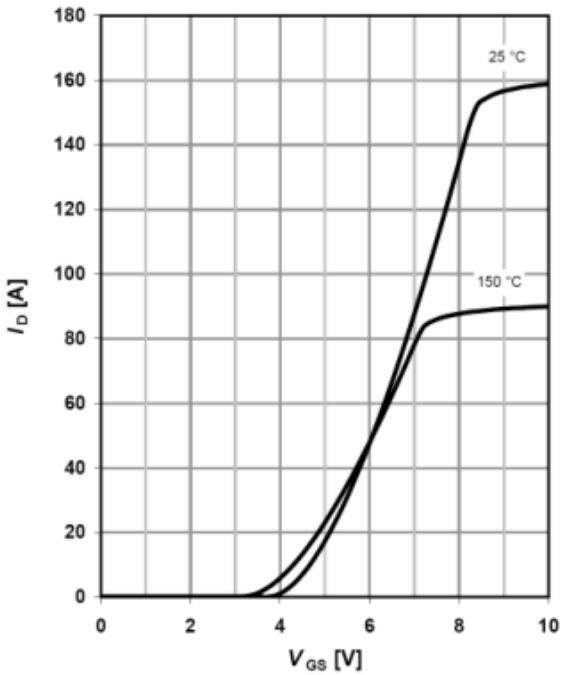
RDS(on)=f(ID); Tj=125 ℃ ; parameter:VGS

Figure6： Typ. drain-source on-state resistance



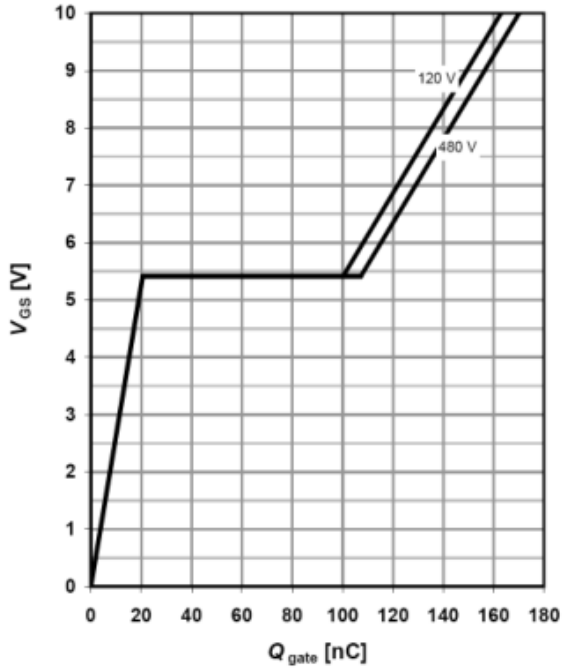
RDS(on)=f(Tj); ID=23 A; VGS=10 V

Figure7： Typ. drain-source on-state resistance



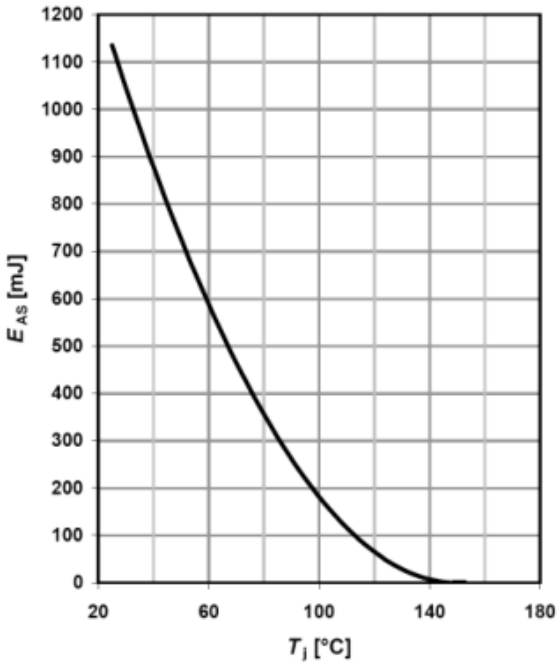
ID=f(VGS); VDS=40V

Figure8： Typ. transfer characteristics



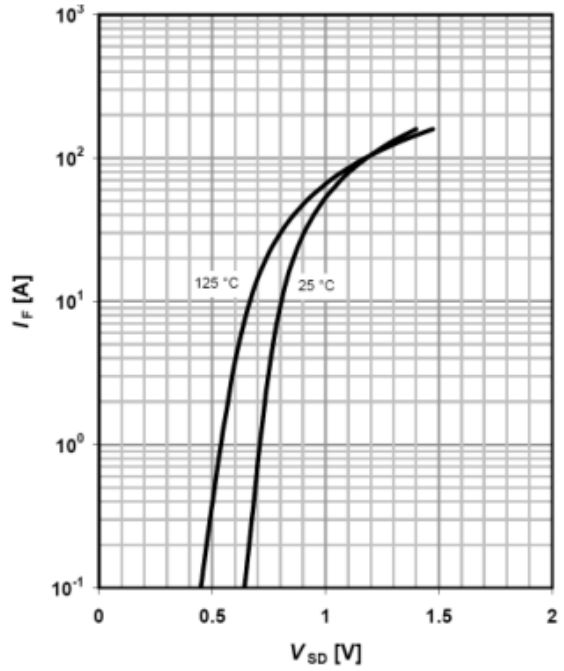
VGS=f(Qg), ID=23A pulsed

Figure9：Typ. gate charge



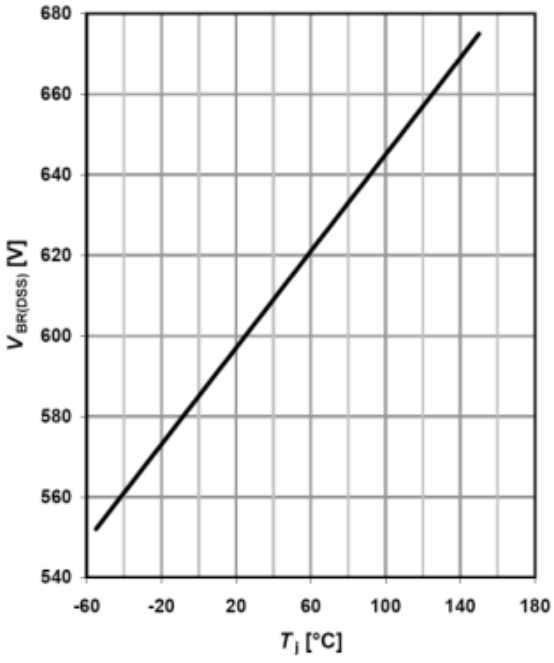
EAS=f(Tj); ID=9.3A; VDD=50 V

Figure10：Avalanche energ



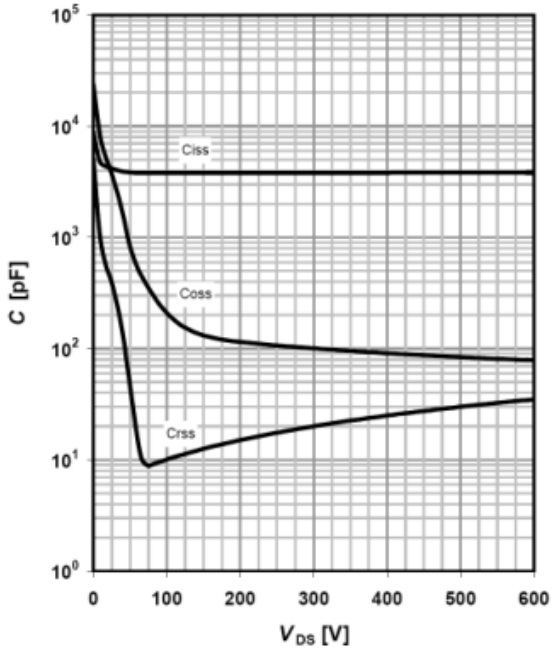
IF=f(VSD); parameter: Tj

Figure11：Forward characteristics of reverse diode



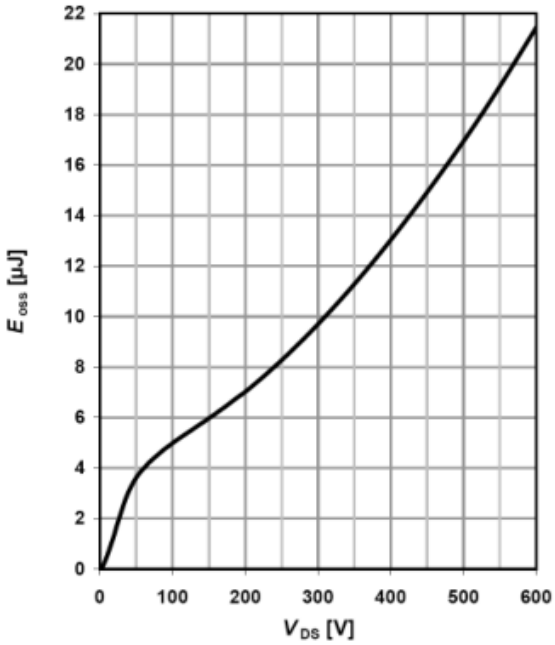
VBR(DSS)=f(Tj); ID=0.25mA

Figure12：Drain-source breakdown voltage



C=f(VDS); VGS=0 V; f=1 MHz

Figure13：Typ. capacitances



EOSS=f(VDS)

Figure14：Typ. Coss stored energy