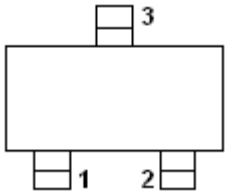
1. Description

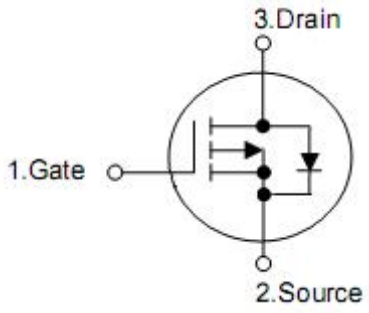
The KIA3415 uses advanced trench technology to provide excellent $R_{DS(on)}$,low gate charge and operation with gate voltages as low as 1.8V.This device is suitable for use as a load switch or in PWM applications.Standard Product KIA3415 is Pb-free(meets ROHS & Sony 259 specifications).KIA3415 is a Green Product ordering option.KIA3415 is electrically identical.

2. Features

- V_{DS}(V)=-20V
- I_D=-4.0A
- $R_{DS(on)}$<45mΩ(V_{GS}=-4.5V,I_D=-4.0A)
- $R_{DS(on)}$<54mΩ(V_{GS}=-2.5V,I_D=-4.0A)
- $R_{DS(on)}$<75mΩ(V_{GS}=-1.8V,I_D=-2.0A)

3.Symbol





Pin	Function
1	Gate
2	Source
3	Drain

4. Absolute maximum ratings

(T_A=25°C,unless otherwise noted)

Parameter		Symbol	Rating	Units
Drain-source voltage		V_{DS}	-20	V
Gate-source voltage		V_{GS}	±8	V
Continuous drain current [A]	T_A=25ºC	I_D	-4.0	A
	T_A=70ºC		-3.5	
Pulsed drain current [B]		I_{DM}	-30	A
Total power dissipation [A]	T_A=25 ºC	P_D	1.4	W
	T_A=70ºC		0.9	W
Junction and storage temperature range		T_J,T_{STG}	-55 to150	ºC

5. Thermal characteristics

Parameter	Symbol	Typ	Max	Unit
Maximum junction-ambient [A](t≤10s)	$R_{\theta JA}$	65	90	ºC/W
Maximum junction-ambient [A]	$R_{\theta JA}$	85	125	ºC/W
Maximum junction-Lead [C]	$R_{\theta JL}$	43	60	ºC/W

6. Electrical characteristics

(T_A=25°C,unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V,I_D=-250μA	-20	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=-16V, V_{GS}=0V	-	-	-50	nA
Gate- body leakage current	I_{GSS}	V_{GS}=±8V, V_{DS}=0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-0.4	-0.55	-0.8	V
On state drain current	$I_{D(on)}$	V_{GS}=-4.5V, V_{DS}=-5V	-25	-	-	A
Static drain-source on-resistance	$R_{DS(on)}$	V_{GS}=-4.5V,I_D=-4.0A	-	40	45	mΩ
		V_{GS}=-2.5V,I_D=-4.0A	-	50	54	
		V_{GS}=-1.8V,I_D=-2.0A	-	70	75	
Forward transconductance	gfs	V_{DS}=-5.0V, I_D=-4A	8	16	-	S
Diode forward voltage	V_{SD}	V_{GS}=0V,I_S=-1A	-	-0.78	-1.28	V
Maximum body-diode continuous current	I_S		-	-	-2.2	A
Input capacitance	C_{iss}	V_{DS}=-10V,V_{GS}=0V, f=1MHz	-	1450	-	pF
Output capacitance	C_{oss}		-	205	-	
Reverse transfer capacitance	C_{rss}		-	160	-	
Gate resistance	R_g	V_{DS}=0V, V_{GS}=0V,f=1MHz	-	6.5	-	Ω
Total gate charge	Q_g	V_{DS}=-10V, V_{GS}=-4.5V I_D =-4.0A	-	17.2	-	nC
Gate-source charge	Q_{gs}		-	1.3	-	
Gate-drain charge	Q_{gd}		-	4.5	-	
Turn-on delay time	$t_{d(on)}$	V_{DS}=-10V, R_L=2.5Ω,, R_G=3Ω, V_{GS}=-4.5V	-	9.5	-	ns
Rise time	t_r		-	17	-	
Turn-off delay time	$t_{d(off)}$		-	94	-	
Fall time	t_f		-	35	-	
Reverse recovery time	t_{rr}	IF=-4A,dI/dt=100A/μs,	-	31	-	nS
Reverse recovery charge	Q_{rr}		-	13.8	-	nC

Note: A.The value of $R_{\theta JA}$ is measured with the device mounted on 1 in^2 FR-4 board with 2oz.Copper,in a still air environment with T_A=25℃.The value in any given application depends on the user's specific board design. The current rating is based on the t≤10s thermal resistance rating.

B.Repetitive rating, pulse width limited by junction temperature.

C.The $R_{\theta JA}$ the sum of the thermal inpedence from junction to lead $R_{\Theta JA}$ and lead to ambient.

D.The static characteristics in Figures 1 to 6,12,14 are obtained using 80μs pulses, duty cycle 0.5% max.

E.These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper,in a still air environment with T_A=25℃.The SOA curve provides a single pulse rating.

7. Test circuits and waveforms

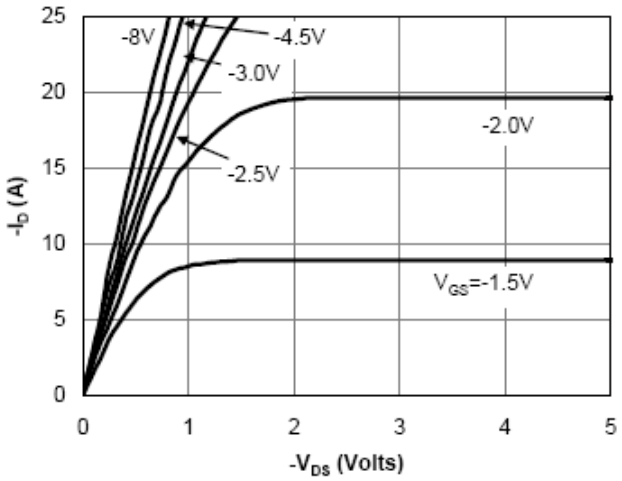


Fig 1: On-Region Characteristics

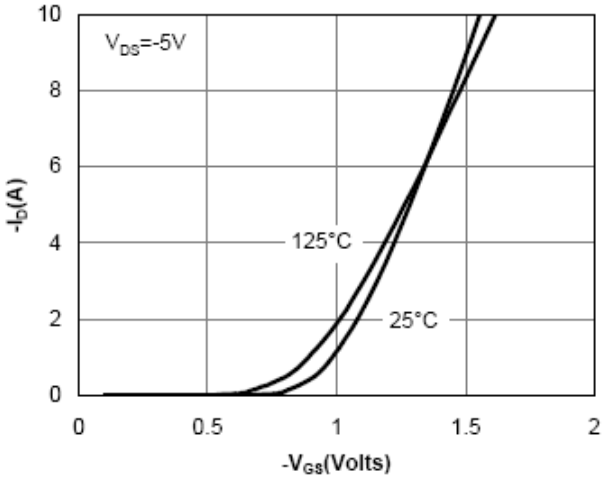


Figure 2: Transfer Characteristics

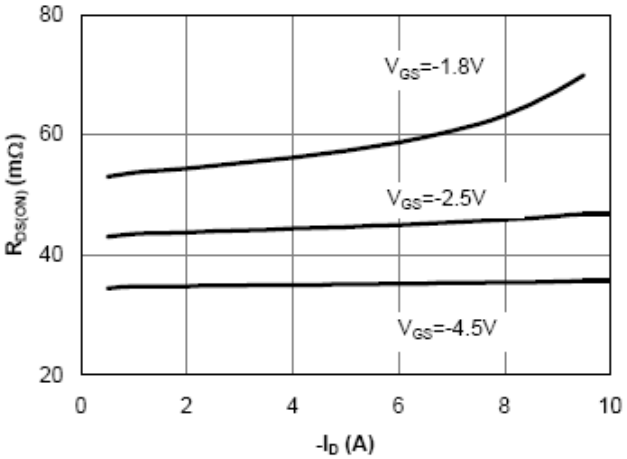


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

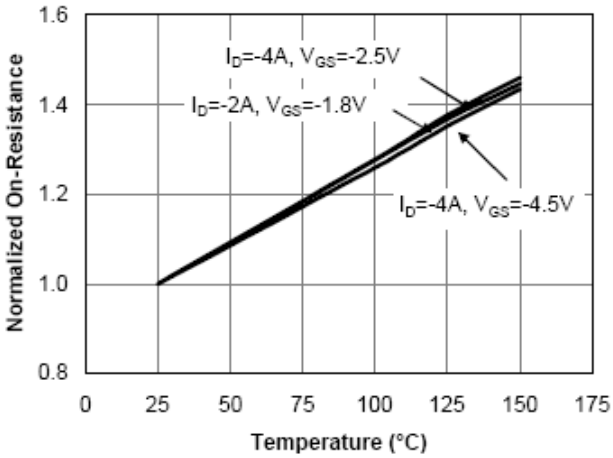


Figure 4: On-Resistance vs. Junction Temperature

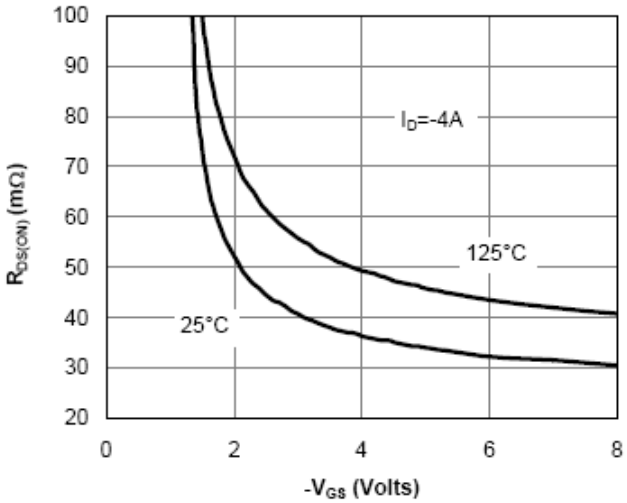


Figure 5: On-Resistance vs. Gate-Source Voltage

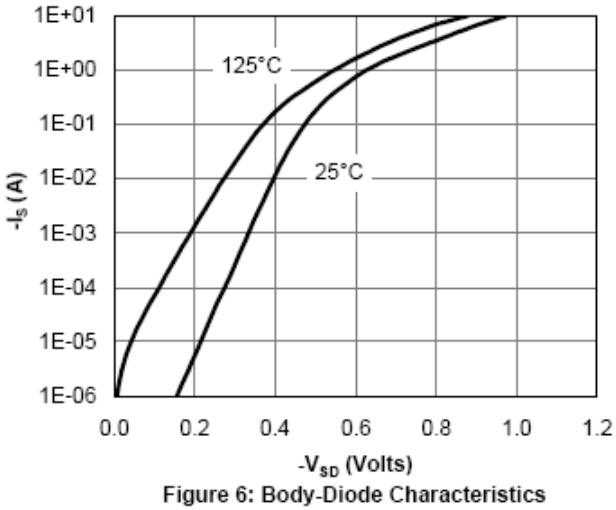


Figure 6: Body-Diode Characteristics

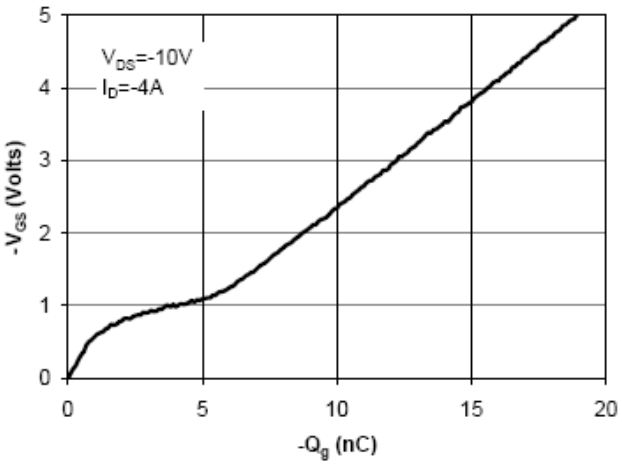


Figure 7: Gate-Charge Characteristics

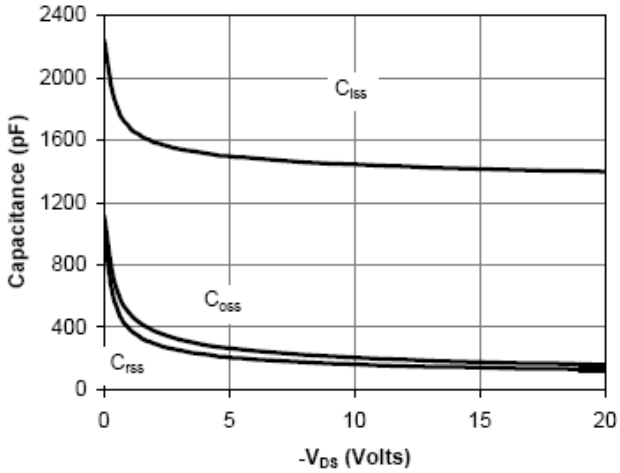


Figure 8: Capacitance Characteristics

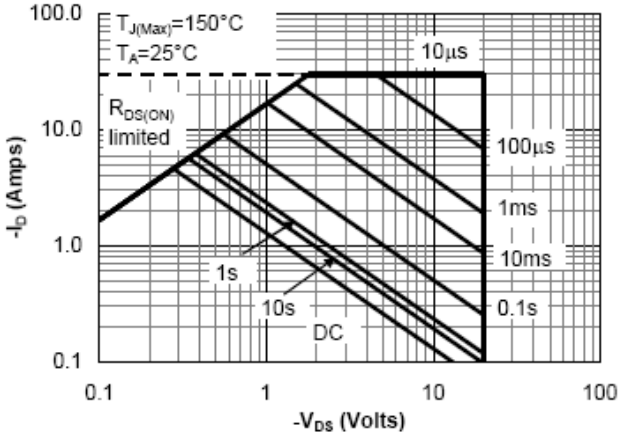


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

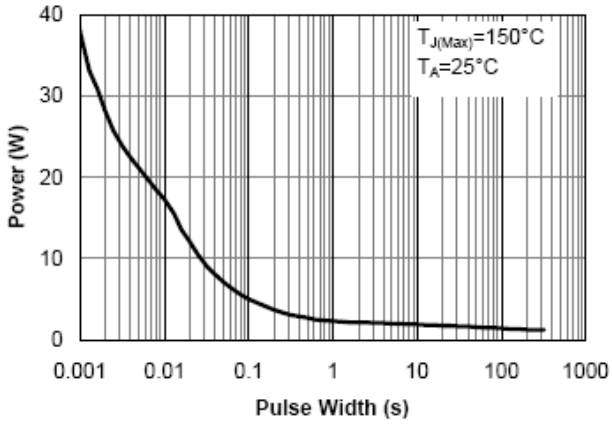


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

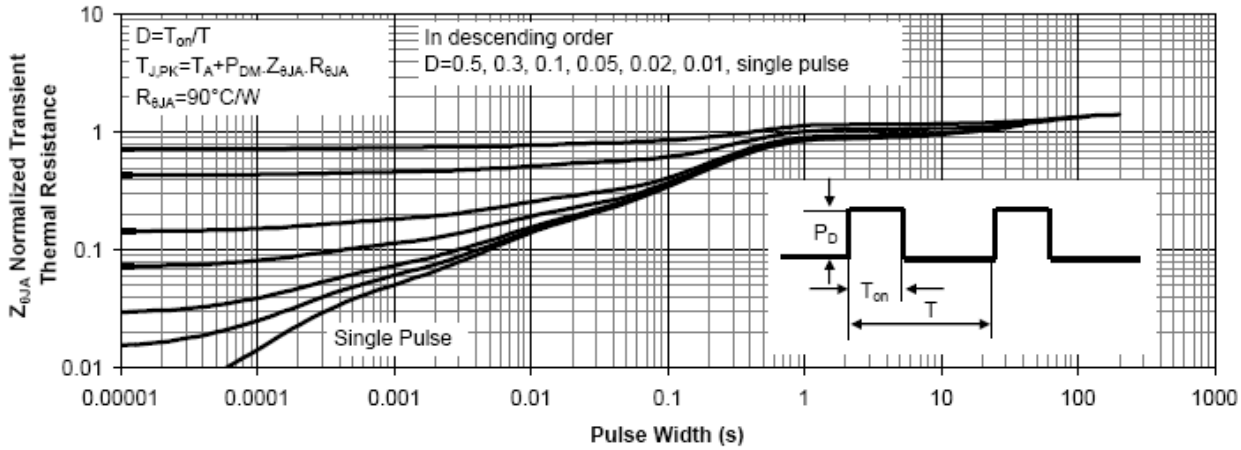


Figure 11: Normalized Maximum Transient Thermal Impedance