1. Description

- Uses advanced SGT technology
- High robustness and reliability
- Increases maximum current capability
- Low power loss, high power density
- Easy paralleling

2. Features

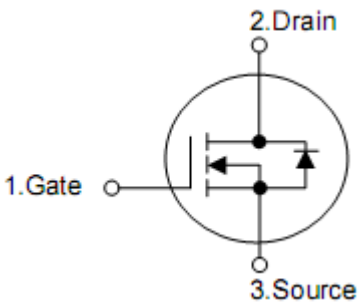
- $R_{DS(on)}$ =2.0mΩ(typ.)@Vgs=10V
- Extremely low on-resistance $R_{DS(on)}$
- Excellent Low Ciss

3. Application

- Synchronous Rectification for AC/DC Quick Charger
- Battery management
- Uninterruptible Power Supply

4. Pin configuration

TO-263 TO-220



Pin	Function
1	Gate
2	Drain
3	Source

5. Ordering Information

Part Number	Package	Brand
KCB2904A	TO-263	KIA
KCP2904A	TO-220	KIA

6. Absolute maximum ratings

Parameter		Symbol	Value	Unit
Drain-source voltage		V_{DS}	45	V
Continuous drain current	T_C=25°C (Silicon limit)	I_D	130	A
	T_C=25°C (Package limit)	I_D	300	A
	T_C=100°C (Silicon limit)	I_D	137	A
	Ta=25°C	I_D	24	A
Pulsed drain current (T_C=25°C, t_p=100uS)		I_D pulse	865	A
Avalanche energy, single pulse (L=0.5Mh, Vds=32V)		E_{AS}	200	mJ
Gate-Source voltage		V_{GS}	±20	V
Power dissipation	T_C=25°C	P_{tot}	125	W
	Ta=25°C	P_{tot}	1.5	W
Operating junction and storage temperature		T_j , T_{stg}	-55 to +150	°C
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)		Tsold	260	°C

7. Thermal Data

Parameter	Symbol	Ratings	Units
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	1.0	°C/W
Junction-to-Ambient Thermal Resistance	$R_{\theta JA}$	81	°C/W

8. Electrical characteristics

(T_J=25°C,unless otherwise noted)

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	45	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	2	-	4	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=45V,V_{GS}=0V,T_j=25°C	-	0.05	1	uA
		V_{DS}=45V,V_{GS}=0V,T_j=150°C	-	-	100	uA
Gate-source leakage current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	±10	±100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=20A	-	2.0	2.6	mΩ
Transconductance	g_{FS}	V_{DS}=5V,I_D=20A	-	43	-	S
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=20V, f=1MHz	-	4195	-	pF
Output Capacitance	C_{oss}		-	1380	-	pF
Reverse Transfer Capacitance	C_{rss}		-	110	-	pF
Gate Total Charge	Q_G	V_{DS}=20V,I_D=50A, V_{GS}=10V	-	60	-	nC
Gate-Source charge	Q_{gs}		-	21	-	
Gate-Drain charge	Q_{gd}		-	8	-	
Turn-on delay time	$t_{d(on)}$	V_{GS}=10V, V_{DD}=7V, R_G=2.2Ω,I_D=30A	-	16	-	ns
Rise time	t_r		-	18.3	-	
Turn-off delay time	$t_{d(off)}$		-	44	-	
Fall time	t_f		-	11.5	-	
Gate resistance	R_G	V_{GS}=0V, V_{DS}=0V, f=1MHz	-	2.5	-	Ω
Body Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_{SD}=20A	-	0.78	1.2	V
Body Diode Continuous Forward Current	I_S	T_C=25°C	-	-	216	A
Body Diode Pulsed Current	I_S pulse	T_C=25°C	-	-	865	A
Body Diode Reverse Recovery Time	t_{rr}	I_F=35A,V_R=30V, dI/dt=100A/μs	-	98	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	199	-	nC

9. Typical Electrical Characteristics

Fig 1: Output Characteristics

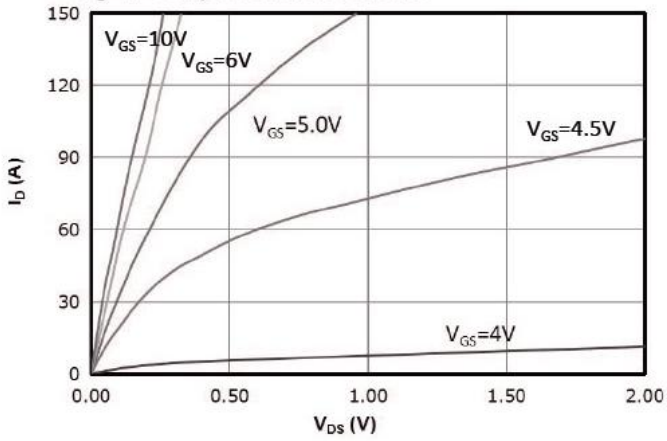


Fig 2: Transfer Characteristics

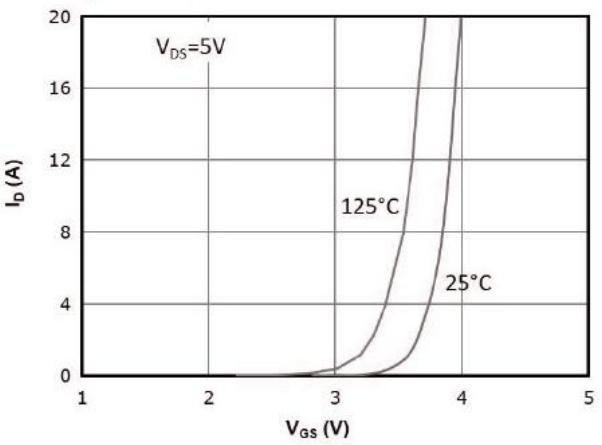


Fig 3: Rds(on) vs Drain Current and Gate Voltage

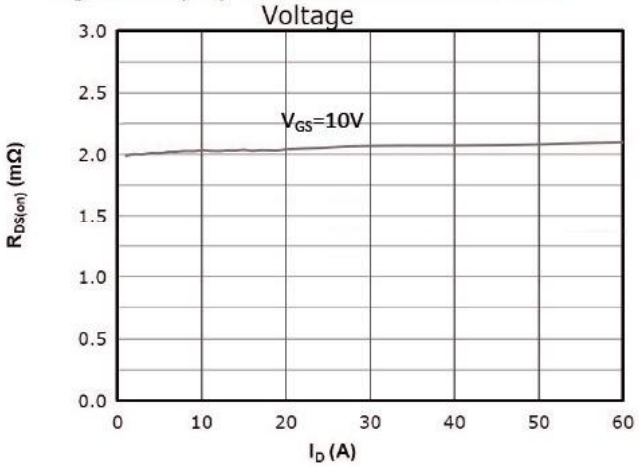


Fig 4: Rds(on) vs Gate Voltage

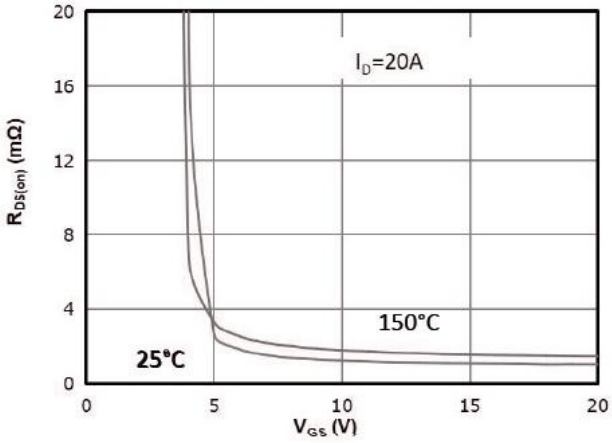


Fig 5: Rds(on) vs. Temperature

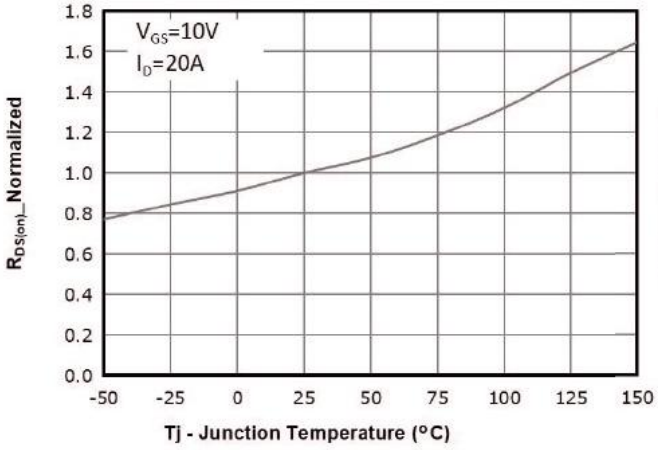


Fig 6: Vgs(th) vs. Temperature

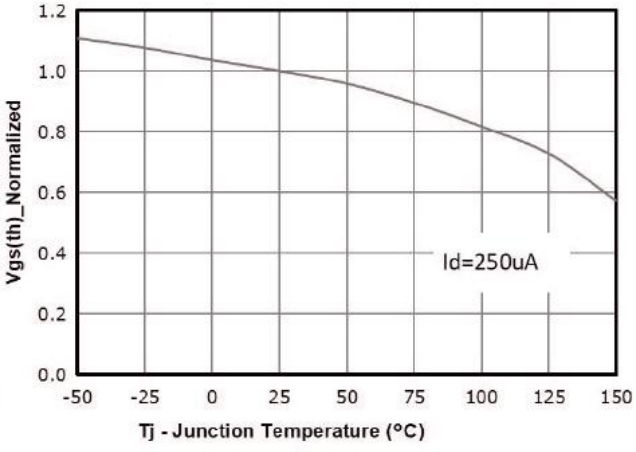


Fig 7: BVdss vs. Temperature

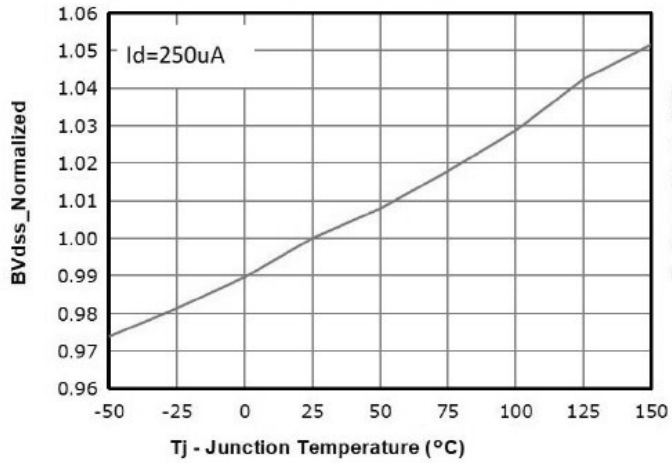


Fig 8: Capacitance Characteristics

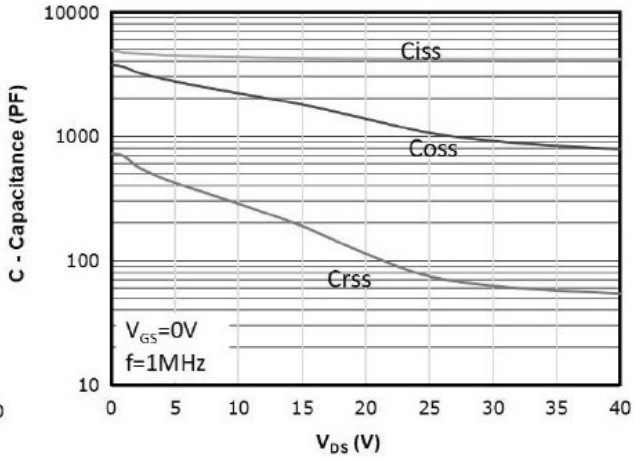


Fig 9: Gate ChargeCharacteristics

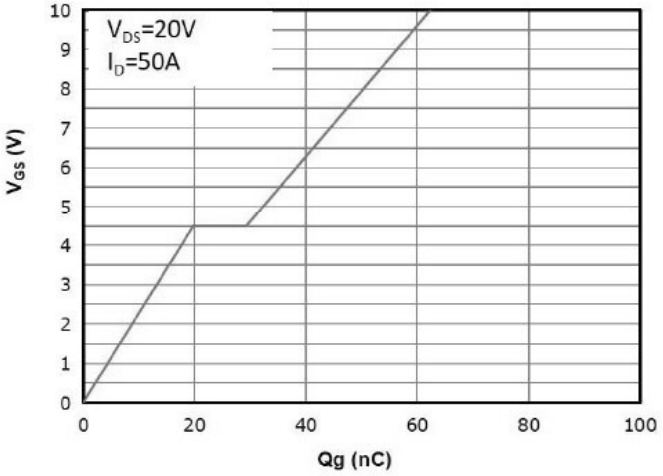


Fig 10: Body-diode Forward Characteristics

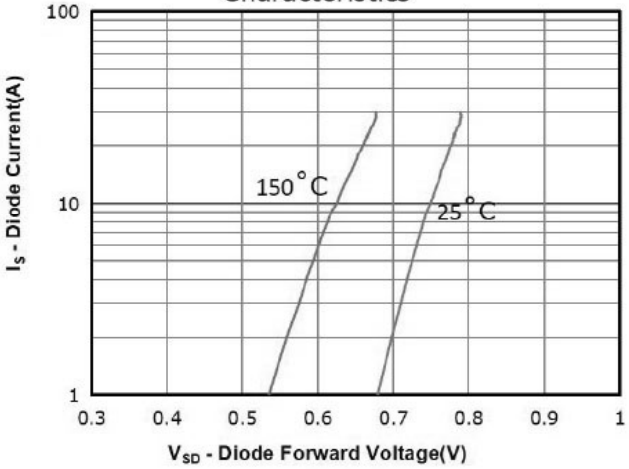


Fig 11: Power Dissipation

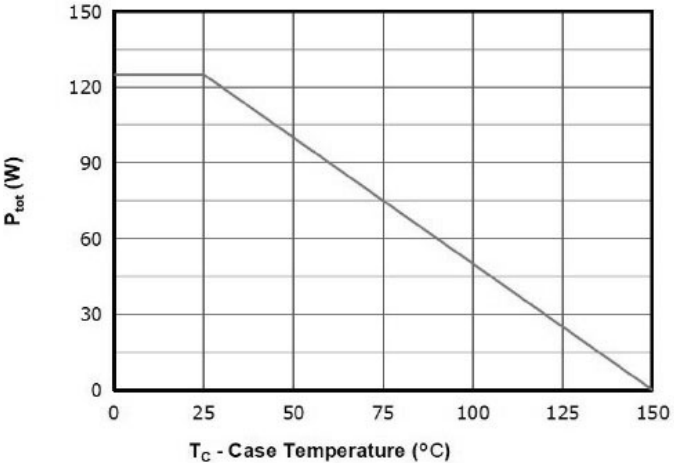


Fig 12: Drain Current Derating

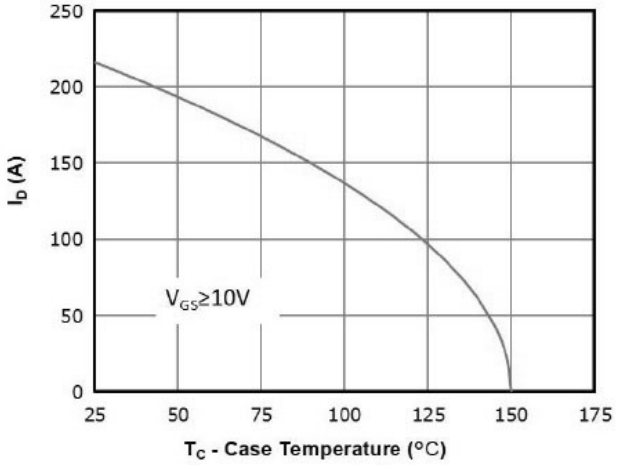


Fig 13: Safe Operating Area

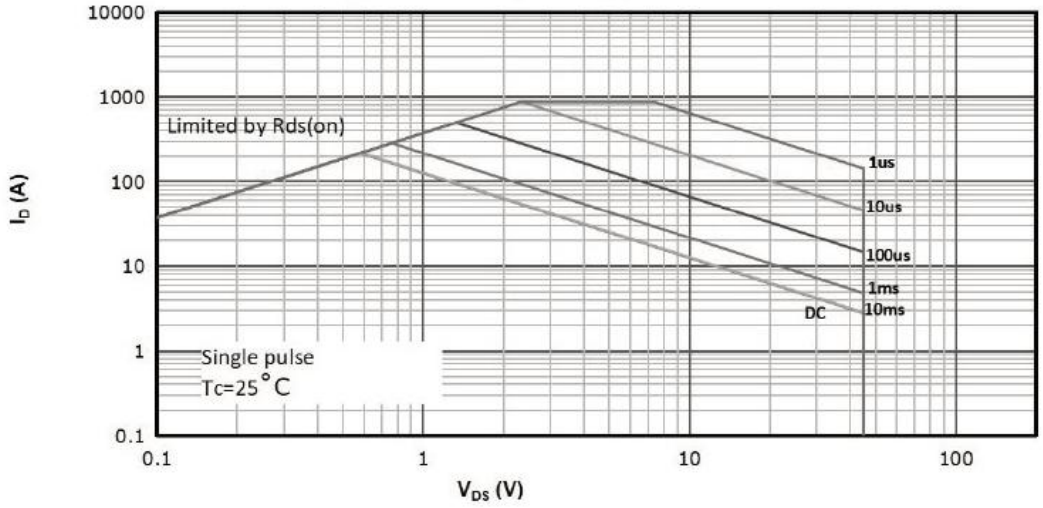
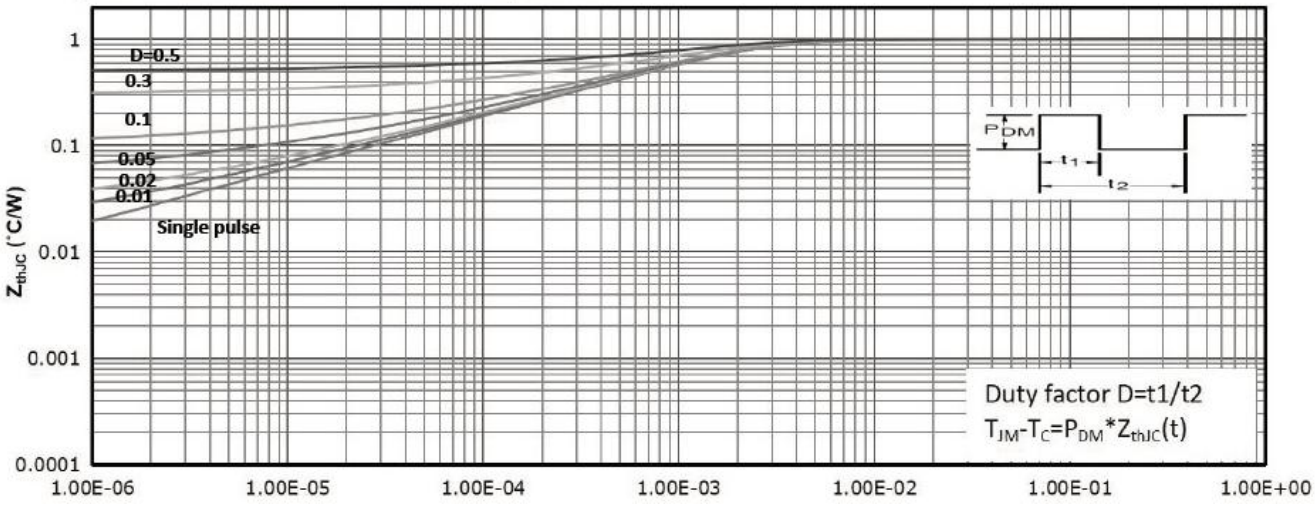
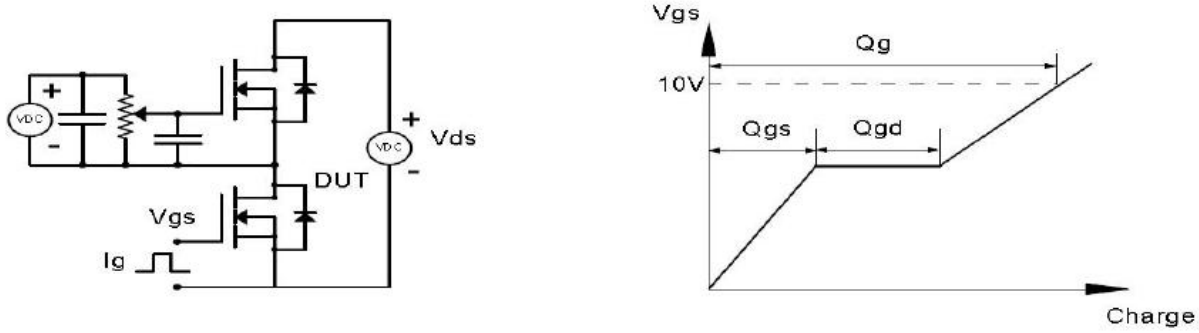


Fig 14: Max. Transient Thermal Impedance

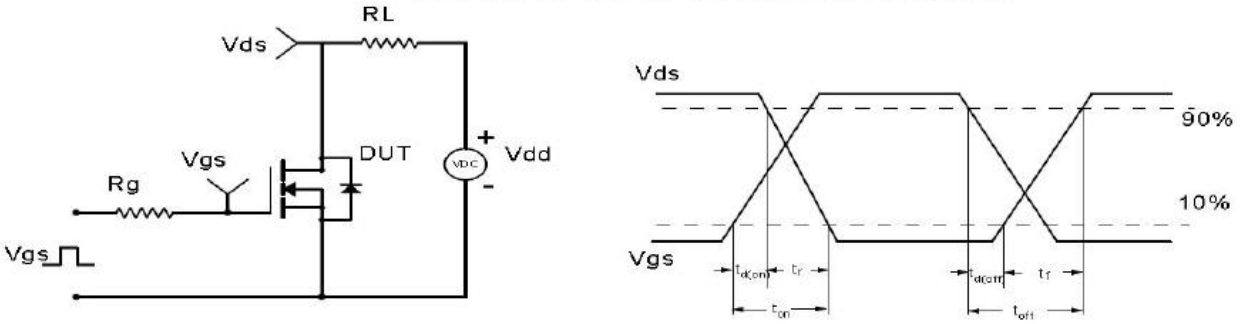


10. Test Circuits and Waveforms

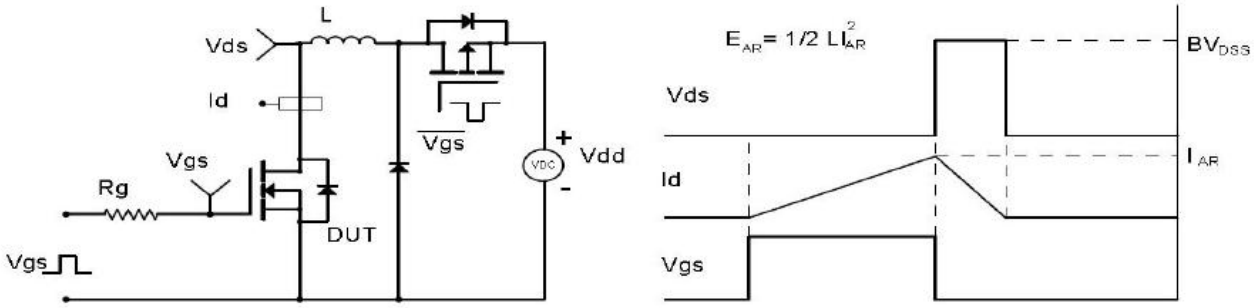
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms