

1. Features

- SGT MOSFET technology
- High ruggedness
- $R_{DS(ON)}=2.9m\Omega(\text{typ.}) @ V_{GS}=10V$
- Low Gate Charge (Typ 151nC)
- Improved dv/dt Capability
- 100% Avalanche Tested

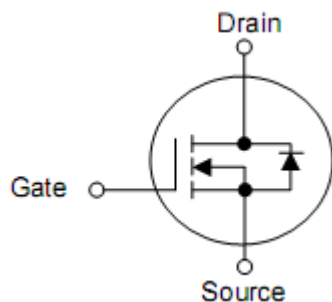
2. Applications

- Synchronous Rectification
- Motor Control
- Li Battery Protect Board

3. Pin configuration



TOLL-8



Pin	Function
1	Gate
9	Drain
2,3,4,5,6,7,8	Source

4. Ordering Information

Part Number	Package	Brand
KCT2213A	TOLL-8	KIA

5. Absolute maximum ratings

$T_C = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

Parameter		Symbol	Ratings	Unit
Drain-to-Source Voltage		V_{DSS}	135	V
Gate-to-Source Voltage		V_{GSS}	± 20	V
Continuous Drain Current *	$T_C = 25\text{ }^{\circ}\text{C}$	I_D	200	A
	$T_C = 100\text{ }^{\circ}\text{C}$	I_D	180	A
Drain Current ¹⁾		I_{DM}	880	A
Single Pulse Avalanche Energy ²⁾		EAS	1156	mJ
Repetitive avalanche energy ¹⁾		E_{AR}	100	mJ
Peak Diode Recovery dv/dt ³⁾		dv/dt	5	V/ns
Power Dissipation		P_D	403	W
Derating Factor above 25°C		P_D	3.2	W/ $^{\circ}\text{C}$
Maximum lead temperature for soldering Purpose, 1/8 from case for 5 seconds		T_L	300	$^{\circ}\text{C}$
Operating and Storage Temperature Range		$T_J \& T_{STG}$	-55 to 150	$^{\circ}\text{C}$

*Drain current is limited by junction temperature.

6. Thermal characteristics

Parameter	Symbol	Ratings	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.31	$^{\circ}\text{C/W}$

7. Electrical characteristics

 $T_J=25^{\circ}\text{C}$, unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-to-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	135	-	-	V
Breakdown voltage temperature coefficient	$\Delta BV_{DSS} / \Delta T_J$	$I_D=250\mu A$, referenced to 25°C	-	0.1	-	$V/^{\circ}\text{C}$
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS}=135V, V_{GS}=0V$	-	-	1	μA
		$V_{DS}=108V, T_J=125^{\circ}\text{C}$	-	-	50	μA
Gate-to-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Drain-to-Source ON Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=30A$, $T_J=25^{\circ}\text{C}$	-	2.9	3.6	$m\Omega$
		$T_J=125^{\circ}\text{C}$	-	4.7	-	$m\Omega$
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	-	4.5	V
Forward transconductance	G_{fs}	$V_{DS}=5V, I_D=30A$	-	87	-	S
Gate resistance	R_g	$f=1\text{MHz}$	-	2.1	-	Ω
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=68V$, $f=100\text{kHz}$	-	10000	-	pF
Output Capacitance	C_{oss}		-	1200	-	pF
Reverse Transfer Capacitance	C_{rss}		-	30	-	pF
Total Gate Charge	Q_g	$V_{DS}=108V, I_D=30A$, $V_{GS}=10V, I_G=5\text{mA}$ ^{4),5)}	-	150	-	nC
Gate-to-Source Charge	Q_{gs}		-	54	-	nC
Gate-to-Drain (Miller) Charge	Q_{gd}		-	34	-	nC
Turn-on Delay Time	$t_{d(ON)}$	$V_{DS}=68V, I_D=30A$, $R_G=4.7\Omega, V_{GS}=10V$ ^{4),5)}	-	55	-	nS
Rise Time	t_{rise}		-	68	-	nS
Turn-Off Delay Time	$t_{d(OFF)}$		-	86	-	nS
Fall Time	t_{fall}		-	38	-	nS
Continuous Source Current	I_{SD}	Integral PN-diode in MOSFET	-	-	200	A
Pulsed Source Current	I_{SM}		-	-	880	A
Forward Voltage	V_{SD}	$I_S=50A, V_{GS}=0V$	-	-	1.4	V
Reverse recovery time	t_{rr}	$I_S=30A, V_{GS}=0V$, $di_F/dt=100A/\mu s$	-	104	-	ns
Reverse recovery charge	Q_{rr}		-	331	-	μC

Note:

- 1) Repetitive rating: pulse width limited by junction temperature.
- 2) $L=0.5\text{mH}$, $I_{AS}=68A$, $V_{DD}=50V$, $R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$
- 3) $I_{SD}\leq 30A$, $di/dt=100A/\mu s$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^{\circ}\text{C}$
- 4) Pulse Test: Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 5) Essentially independent of operating temperature.

8. Test circuits and waveforms

Fig. 1. On-state characteristics

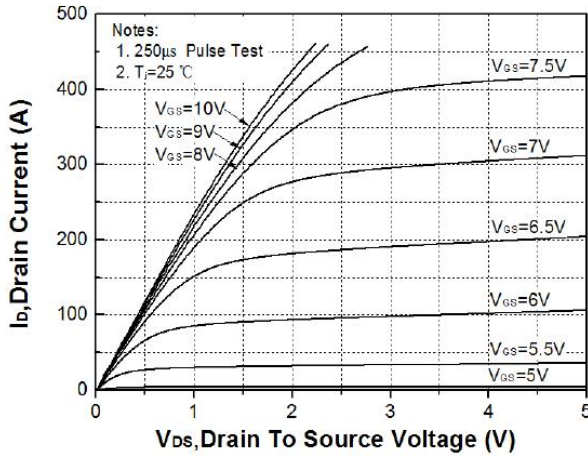


Fig. 2. Transfer Characteristics

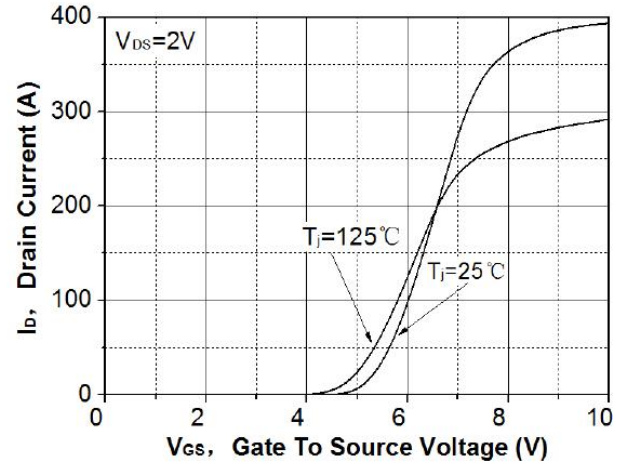


Fig. 3. On-resistance variation vs. drain current and gate voltage

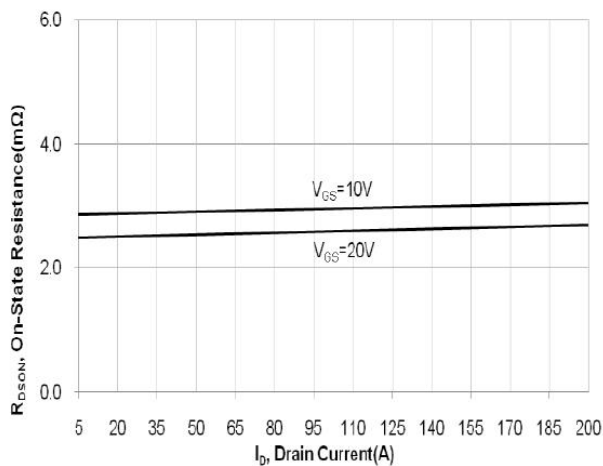


Fig. 4. On-state current vs. diode forward voltage

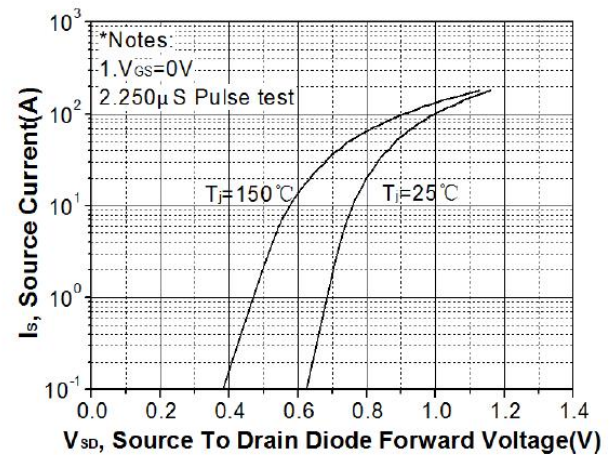


Fig 5. Breakdown voltage variation vs. junction temperature

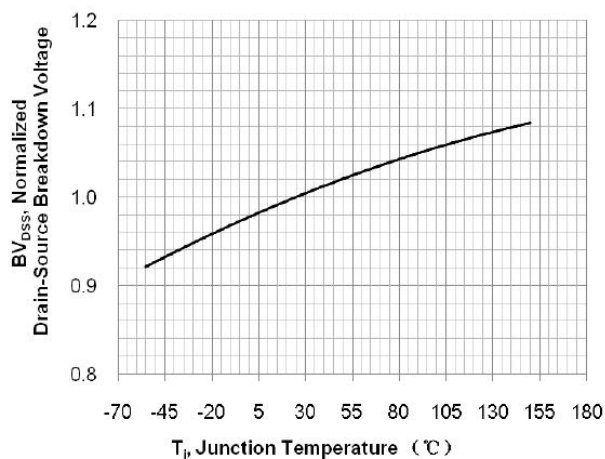


Fig. 6. On-resistance variation vs. junction temperature

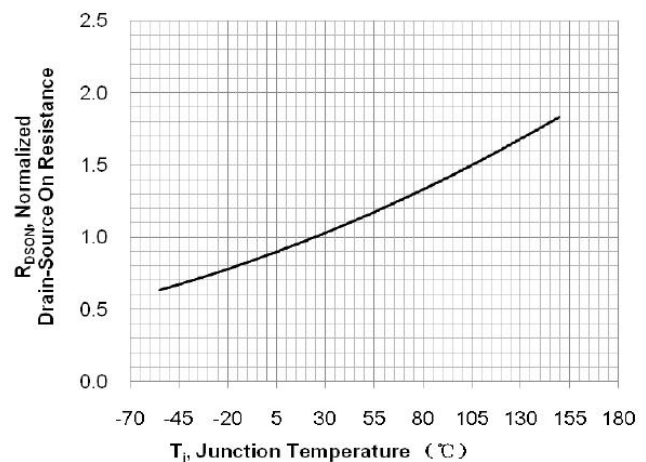


Fig. 7. Gate charge characteristics

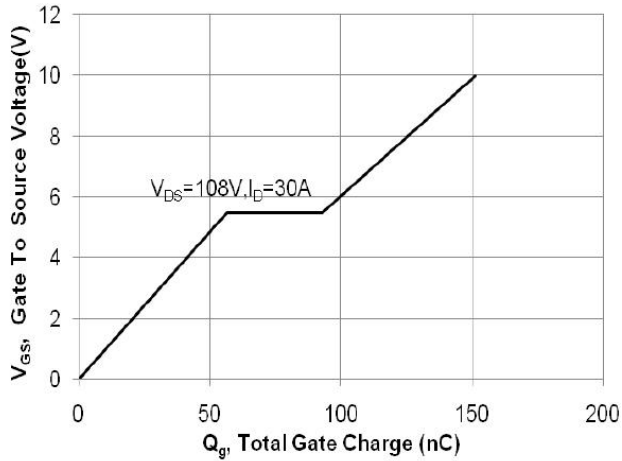


Fig. 8. Capacitance Characteristics

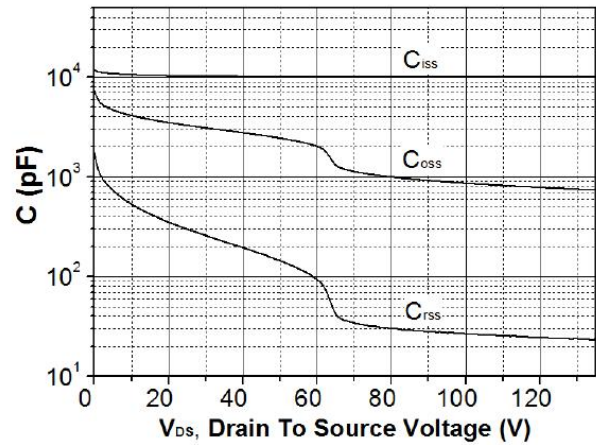


Fig. 9. Maximum safe operating area

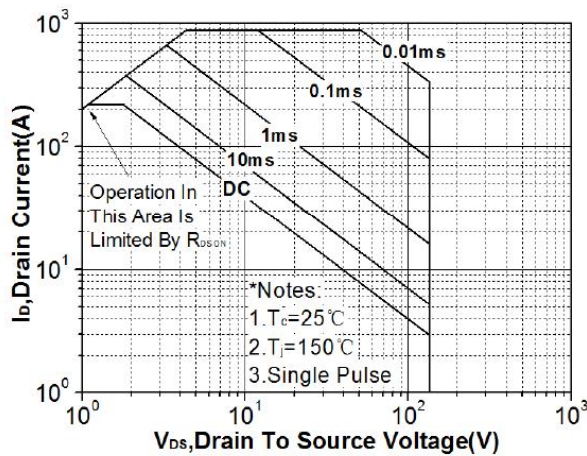


Fig. 10. Maximum drain current vs. case temperature

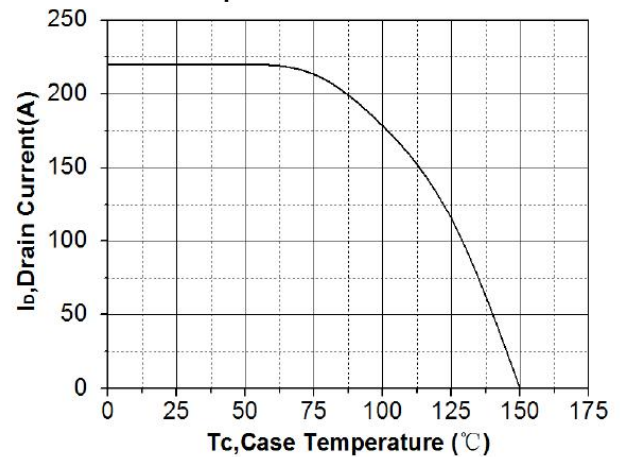
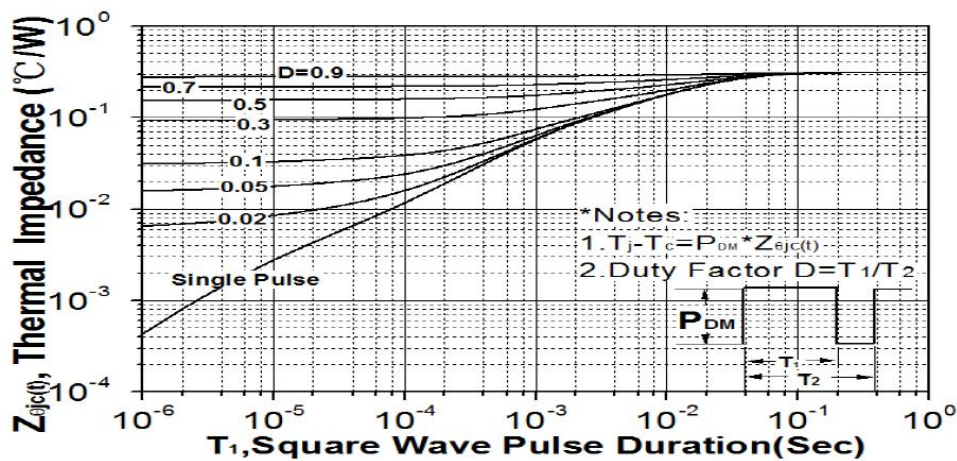


Fig. 11. Transient thermal response curve



9. Test Circuits and Waveforms

Fig. 12. Gate charge test circuit & waveform

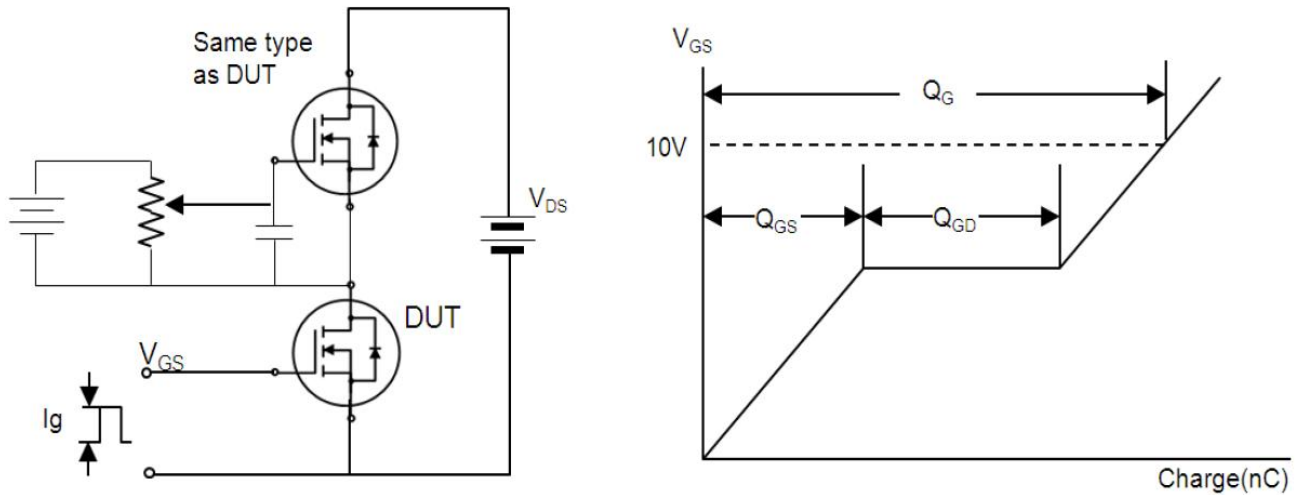


Fig. 13. Switching time test circuit & waveform

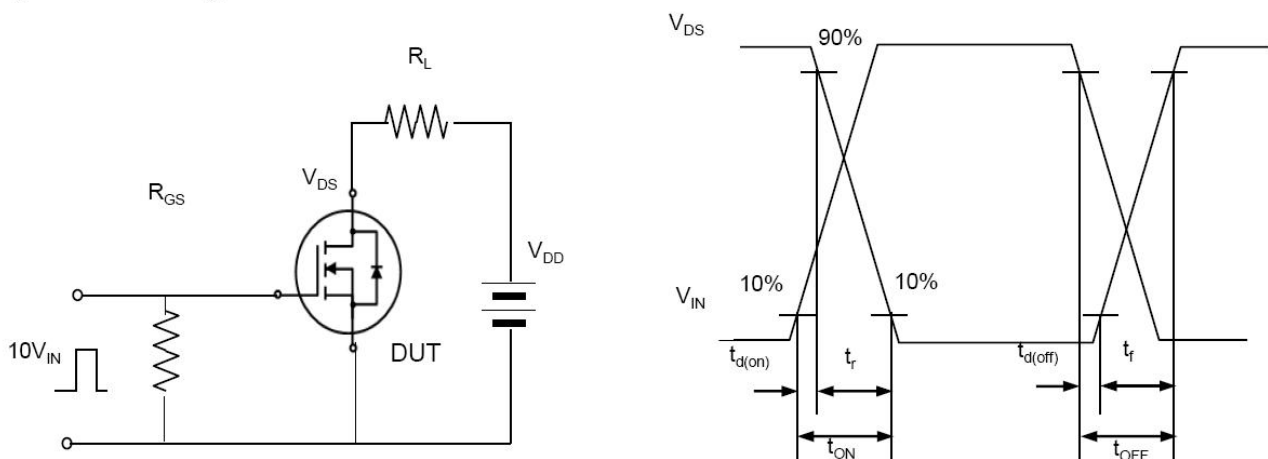


Fig. 14. Unclamped Inductive switching test circuit & waveform

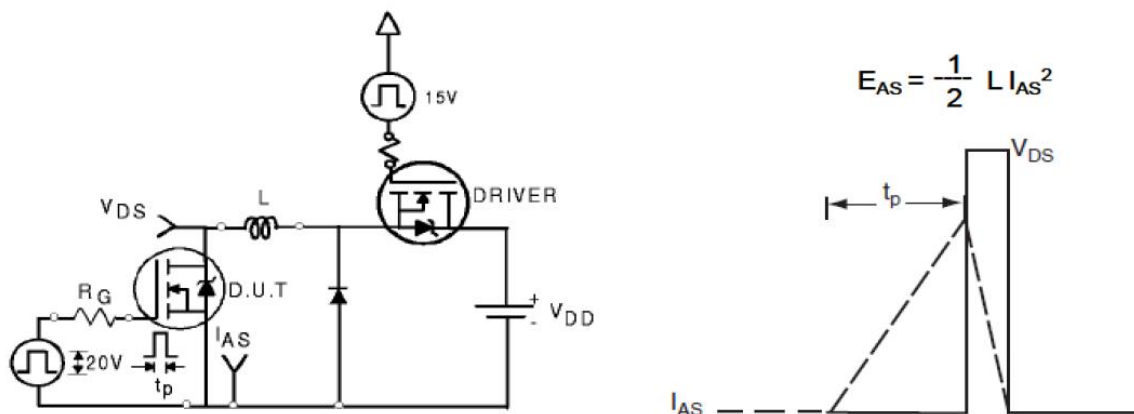


Fig. 15. Peak diode recovery dv/dt test circuit & waveform

