HFZT

SCT3022KL

TO-247 Plastic-Encapsulate MOSFETS

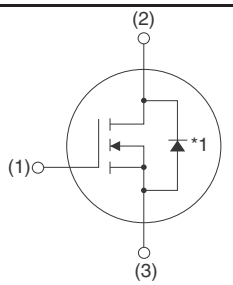
Features

- Low on-resistance
- Fast switching speed
- Fast reverse recovery
- Easy to parallel
- Simple to drive
- Pb-free lead plating ; RoHS compliant
- N-channel SiC power MOSFET

MECHANICAL DATA

- Case style:TO-247 molded plastic
- Mounting position:any

●Inner circuit



(1) Gate
(2) Drain
(3) Source

*1 Body Diode

●Packaging specifications

Type	Packing	Tube
	Basic ordering unit (pcs)	30
	Taping code	C11
	Marking	SCT3022KL

MAXIMUM RATINGS AND CHARACTERISTICS

@ 25°C Ambient Temperature (unless otherwise noted)

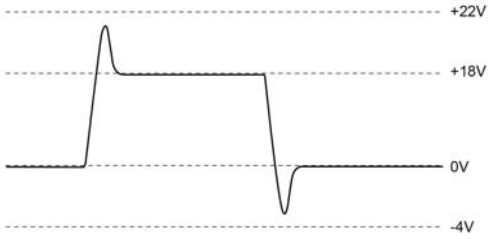
Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	1200	V
Continuous drain current	T_c = 25°C	I_D *1	95	A
	T_c = 100°C	I_D *1	67	A
Pulsed drain current		$I_{D,pulse}$ *2	237	A
Gate - Source voltage		V_{GSS}	–4 to 22	V
Gate-Source Surge Voltage		V_{GSS_surge}	–4 to 22	V
Recommended Drive Voltage		V_{GS_op}	0 / 18	V
Junction temperature		T_j	175	°C
Range of storage temperature		T_{stg}	–55 to +175	°C

V_{DSS}	1200V
$R_{DS(on)}$ (Typ.)	22mΩ
I_D	95A
P_D	427W

MOSFET ELECTRICAL CHARACTERISTICS T_A =25 ℃ unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 1mA	1200	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} = 1200V, V_{GS} = 0V T_j = 25°C T_j = 150°C	- -	1 2	1 -	0μA
Gate - Source leakage current	I_{GSS+}	V_{GS} = +22V, V_{DS} = 0V	-	-	100	nA
Gate - Source leakage current	I_{GSS-}	V_{GS} = –4V, V_{DS} = 0V	-	-	100–	nA
Gate threshold voltage	$V_{GS\ (th)}$	V_{DS} = 10V, I_D = 18.2mA	2.7	-	5.6	V
Static drain - source on - state resistance	$R_{DS(on)}$ *3	V_{GS} = 18V, I_D = 36A T_j = 25°C T_j = 125°C	- -	22 3	28.6 3 -	mΩ
Gate input resistance	R_G	f = 1MHz, open drain	-	4	-	Ω
Thermal resistance, junction - case	R_{thJC}		-	0.27	0.35	°C/W

●Example of acceptable Vgs waveform



RATINGS AND CHARACTERISTIC CURVES

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Transconductance	g_{fs} *3	V_{DS} = 10V, I_D = 36A	-	14.2	-	S
Input capacitance	C_{iss}	V_{GS} = 0V	-	2879	-	pF
Output capacitance	C_{oss}	V_{DS} = 800V	-	237	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	108	-	
Effective output capacitance, energy related	$C_{o(er)}$	V_{GS} = 0V V_{DS} = 0V to 600V	-	213	-	pF
Turn - on delay time	$t_{d(on)}$ *3	V_{DD} = 400V, I_D = 18A	-	29	-	ns
Rise time	t_r *3	V_{GS} = 18V/0V	-	44	-	
Turn - off delay time	$t_{d(off)}$ *3	R_L = 22Ω	-	67	-	
Fall time	t_f *3	R_G = 0Ω	-	28	-	
Turn - on switching loss	E_{on} *3	V_{DD} = 600V, I_D=36A V_{GS} = 18V/0V R_G = 0Ω L=250μH *E_{on} includes diode reverse recovery	-	632	-	μJ
Turn - off switching loss	E_{off} *3		-	243	-	

●Gate Charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *3	V_{DD} = 600V	-	178	-	nC
Gate - Source charge	Q_{gs} *3	I_D = 36A	-	40	-	
Gate - Drain charge	Q_{gd} *3	V_{GS} = 18V	-	80	-	
Gate plateau voltage	$V_{(plateau)}$	V_{DD} = 600V, I_D = 36A	-	9.6	-	V

*1 Limited only by maximum temperature allowed.

*2 PW ≤ 10μs, Duty cycle ≤ 1%

*3 Pulsed

●Body diode electrical characteristics (Source-Drain) (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I_S *1	T_c = 25°C	-	-	95	A
Inverse diode direct current, pulsed	I_{SM} *2		-	-	237	A
Forward voltage	V_{SD} *3	V_{GS} = 0V, I_S = 36A	-	3.2	-	V
Reverse recovery time	t_{rr} *3	I_F =36A, V_R = 600V di/dt = 1100A/μs	-	28	-	ns
Reverse recovery charge	Q_{rr} *3		-	175	-	nC
Peak reverse recovery current	I_{rrm} *3		-	12	-	A

RATINGS AND CHARACTERISTIC CURVES

Fig.1 Power Dissipation Derating Curve

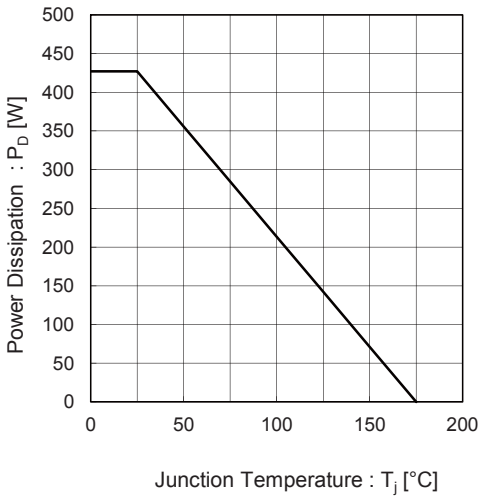


Fig.2 Maximum Safe Operating Area

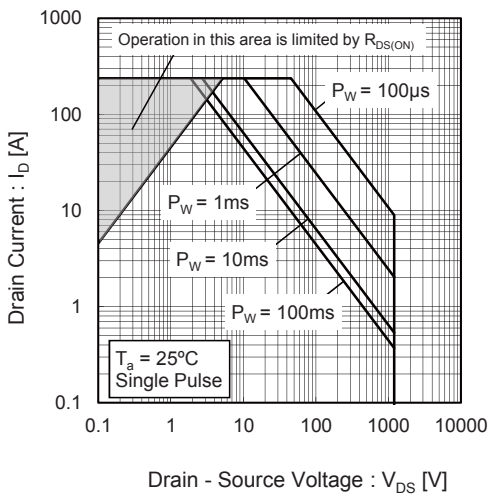


Fig.3 Typical Transient Thermal Resistance vs. Pulse Width

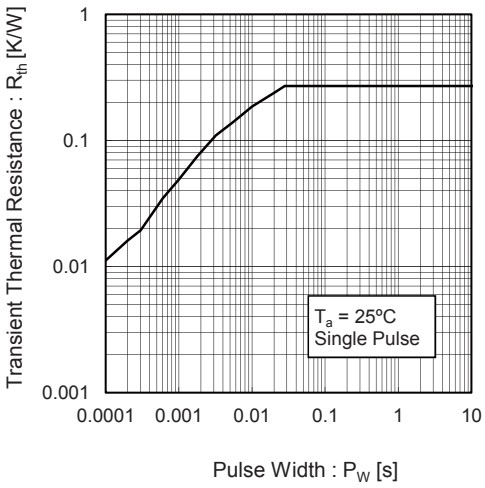


Fig.4 Typical Output Characteristics(I)

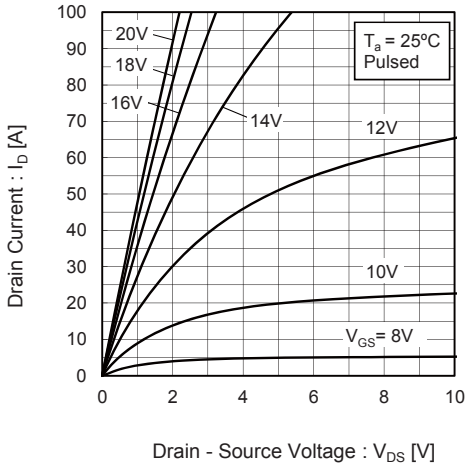


Fig.5 Typical Output Characteristics(II)

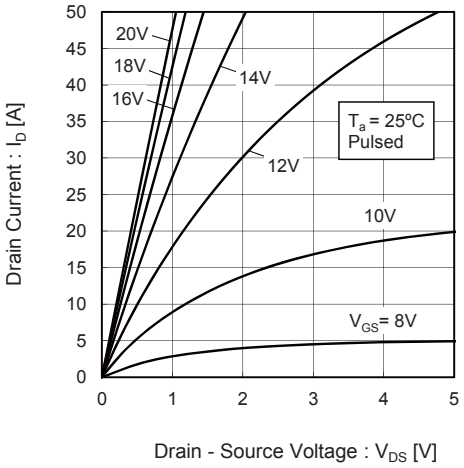


Fig.6 T_j = 150°C Typical Output Characteristics(I)

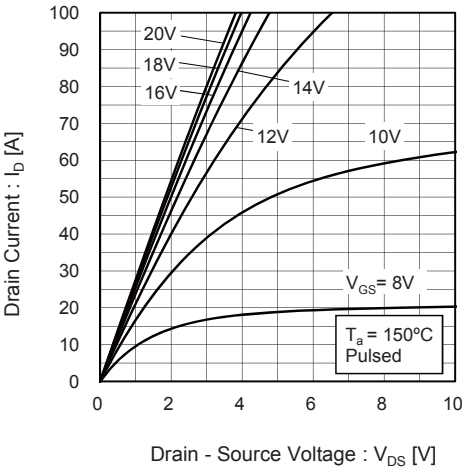


Fig.7 T_j = 150°C Typical Output Characteristics(II)

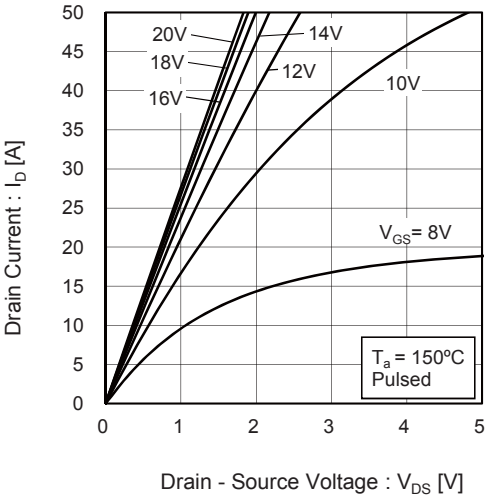


Fig.8 Typical Transfer Characteristics (I)

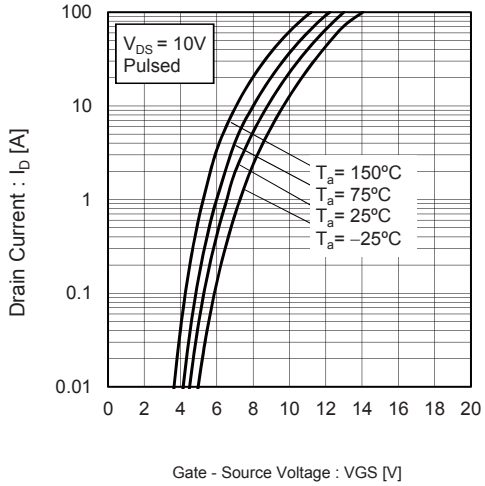
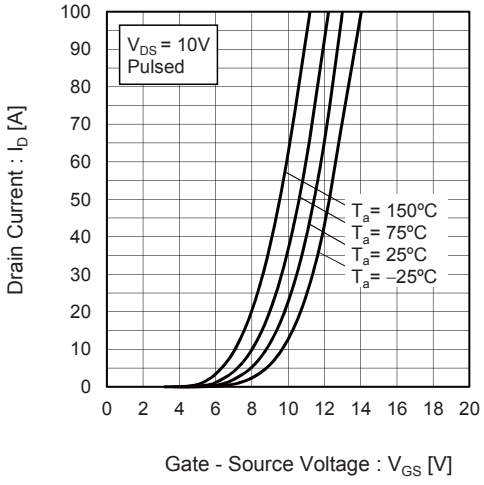


Fig.9 Typical Transfer Characteristics (II)



RATINGS AND CHARACTERISTIC CURVES

Fig.10 Gate Threshold Voltage vs. Junction Temperature

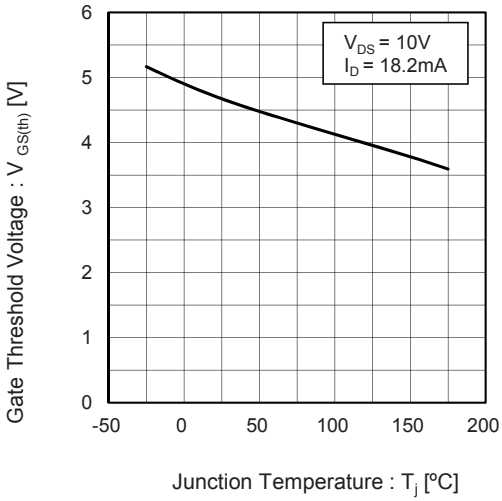


Fig.11 Transconductance vs. Drain Current

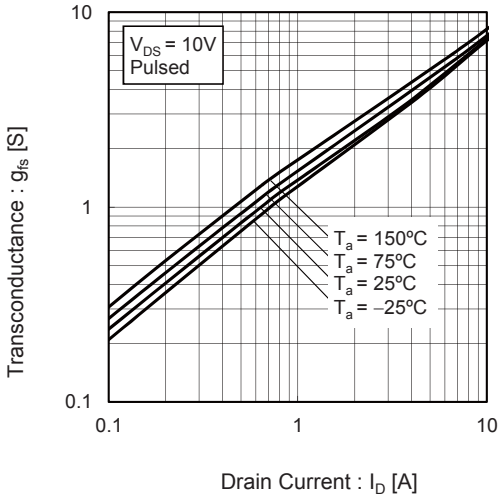


Fig.12 Static Drain - Source On - State Resistance vs. Gate - Source Voltage

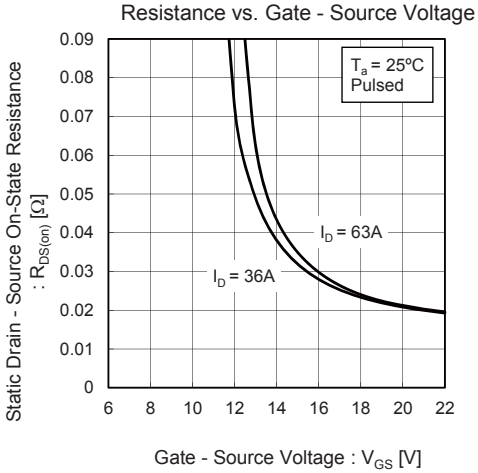


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature

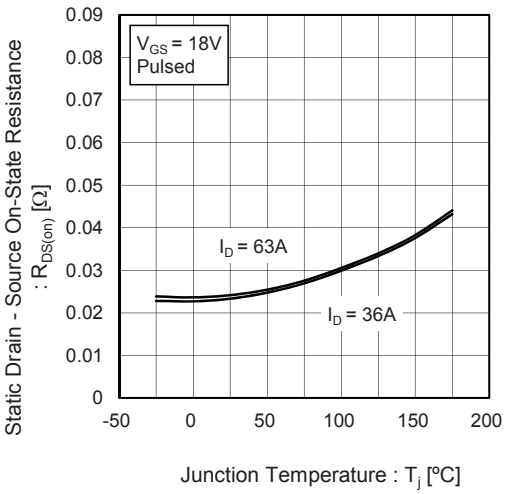


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current

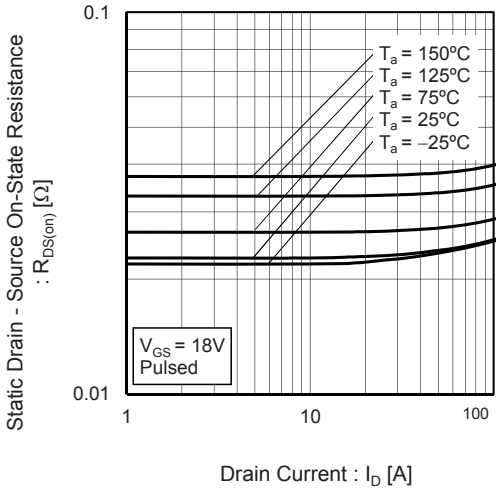


Fig.15 Typical Capacitance vs. Drain - Source Voltage

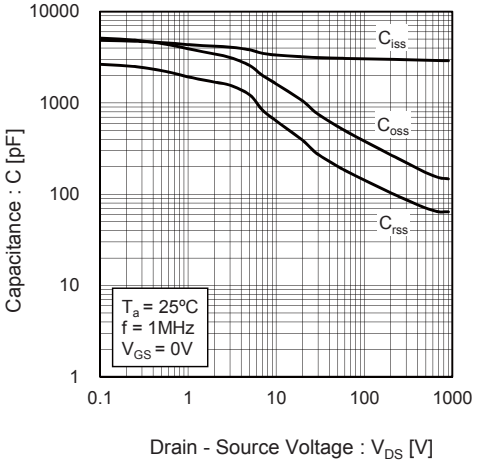


Fig.16 Coss Stored Energy

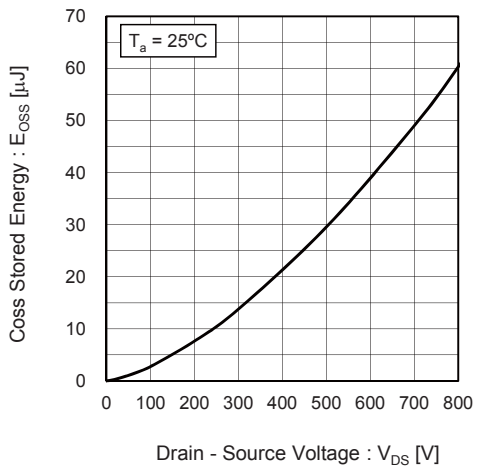


Fig.17 Switching Characteristics

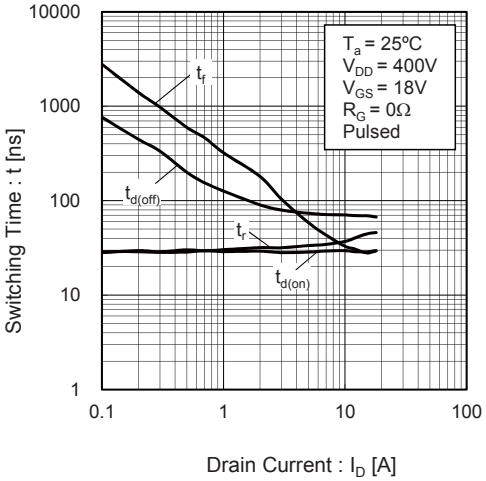
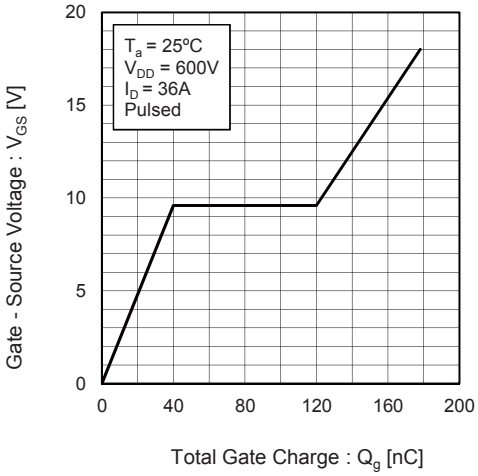


Fig.18 Dynamic Input Characteristics



RATINGS AND CHARACTERISTIC CURVES

Fig.19 Typical Switching Loss vs. Drain - Source Voltage

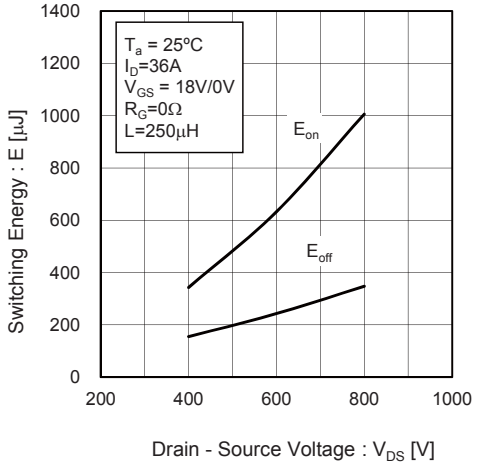


Fig.20 Typical Switching Loss vs. Drain Current

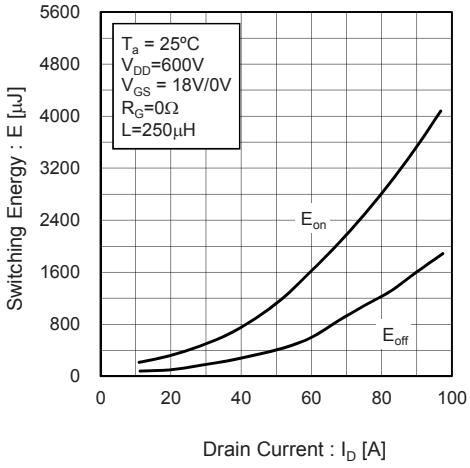


Fig.21 Typical Switching Loss vs. External Gate Resistance

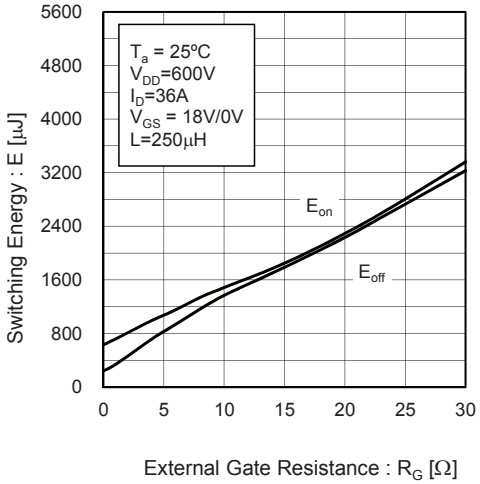


Fig.22 Inverse Diode Forward Current vs. Source - Drain Voltage

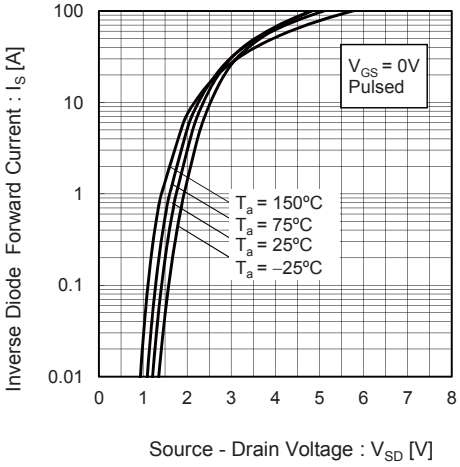
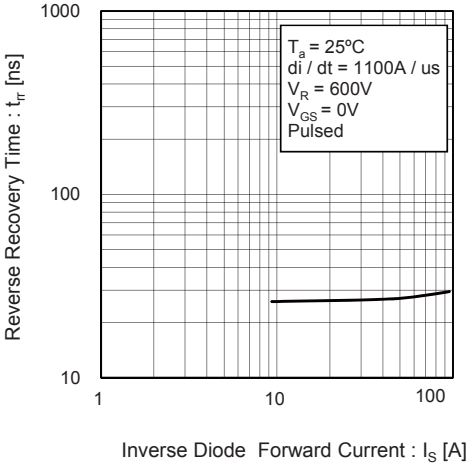


Fig.23 Reverse Recovery Time vs.Inverse Diode Forward Current



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

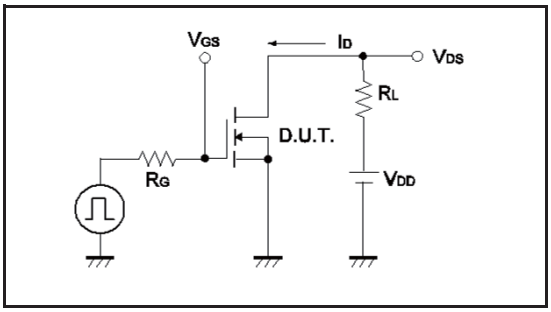


Fig.1-2 Switching Waveforms

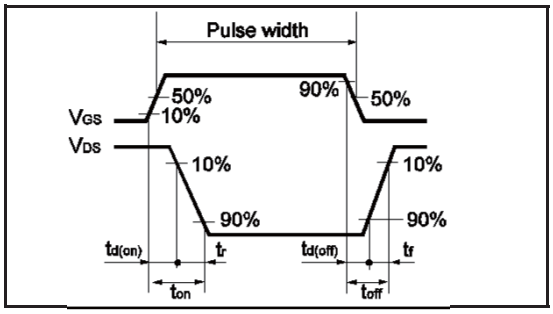


Fig.2-1 Gate Charge Measurement Circuit

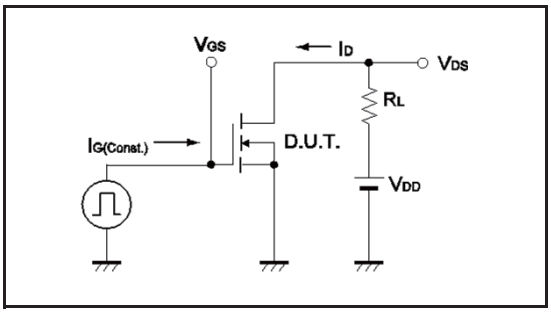


Fig.2-2 Gate Charge Waveform

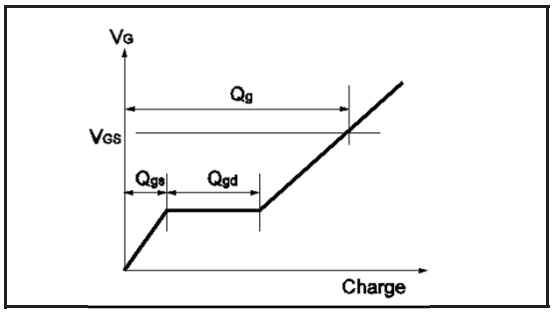


Fig.3-1 Switching Energy Measurement Circuit

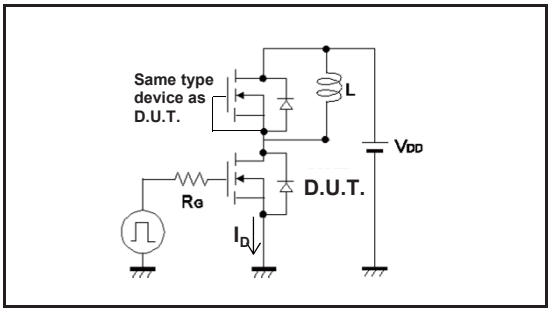


Fig.3-2 Switching Waveforms

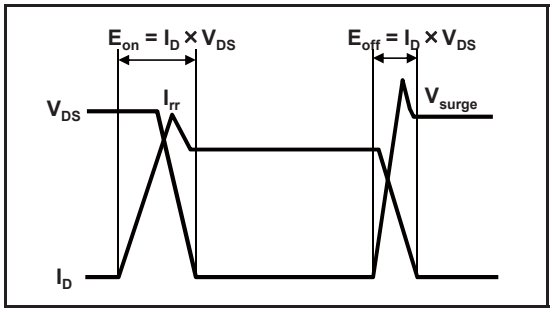


Fig.4-1 Reverse Recovery Time Measurement Circuit

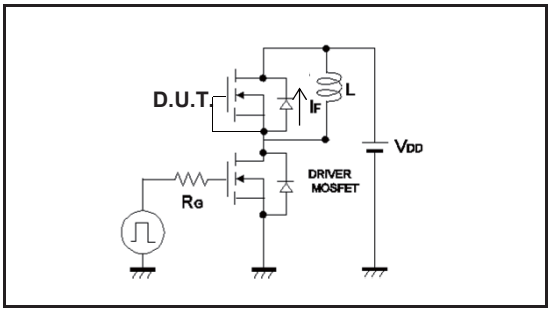


Fig.4-2 Reverse Recovery Waveform