

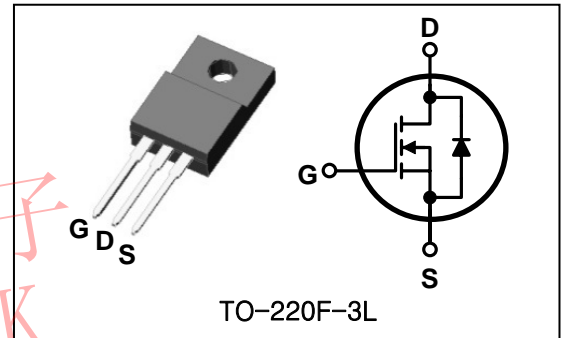
SWITCHING REGULATOR APPLICATIONS

Features

- High Voltage : $BV_{DSS}=700V(\text{Min.})$
- Low C_{RSS} : $C_{RSS}=6.0pF(\text{Typ.})$
- Low gate charge : $Q_g=7.2nC(\text{Typ.})$
- Low $R_{DS(on)}$: $R_{DS(on)}=6.3\Omega(\text{Max.})$

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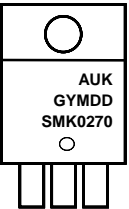
PIN Connection



Ordering Information

Type No.	Marking	Package Code
SMK0270F	SMK0270	TO-220F-3L

Marking Diagram

	Column 1 : Manufacturer
	Column 2 : Production Information e.g.) GYMDD
	- G : Factory management code
	- YMDD : Date Code (year, month, date)
	Column 3 : Device Code

Absolute maximum ratings ($T_c=25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	700	V
Gate-source voltage	V_{GSS}	± 30	V
Drain current (DC) *	I_D	($T_c=25^\circ\text{C}$)	2.0
		($T_c=100^\circ\text{C}$)	1.3
Drain current (Pulsed) *	I_{DM}	8.0	A
Power dissipation	P_D	25	W
Avalanche current (Single) ②	I_{AS}	2.0	A
Single pulsed avalanche energy ②	E_{AS}	41	mJ
Avalanche current (Repetitive) ①	I_{AR}	2.0	A
Repetitive avalanche energy ①	E_{AR}	1.8	mJ
Junction temperature	T_J	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55~150	

* Limited by maximum junction temperature

Characteristic	Symbol	Typ.	Max.	Unit
Thermal resistance	Junction-case	-	4.46	$^\circ\text{C}/\text{W}$
	Junction-ambient	-	62.5	

Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	$I_D=250\mu\text{A}, V_{GS}=0$	700	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu\text{A}, V_{DS}=V_{GS}$	2.0	-	4.0	V
Drain-source cut-off current	I_{DSS}	$V_{DS}=700\text{V}, V_{GS}=0\text{V}$	-	-	1	μA
Gate leakage current	I_{GSS}	$V_{DS}=0\text{V}, V_{GS}=\pm 30\text{V}$	-	-	± 100	nA
Drain-source on-resistance ④	$R_{DS(ON)}$	$V_{GS}=10\text{V}, I_D=1.0\text{A}$	-	4.8	6.3	Ω
Forward transfer conductance ④	g_{fs}	$V_{DS}=10\text{V}, I_D=1.0\text{A}$	-	2.5	-	S
Input capacitance	C_{iss}	$V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1\text{MHz}$	-	395	494	pF
Output capacitance	C_{oss}		-	32	41	
Reverse transfer capacitance	C_{rss}		-	6	8	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=300\text{V}, I_D=2.0\text{A}, R_G=25\Omega$	-	22	-	ns
Rise time	t_r		-	10.5	-	
Turn-off delay time	$t_{d(off)}$		-	7	-	
Fall time	t_f		-	10.5	-	
Total gate charge	Q_g	$V_{DS}=560\text{V}, V_{GS}=10\text{V}, I_D=2.0\text{A}$	-	7.2	9.0	nC
Gate-source charge	Q_{gs}		-	2.5	-	
Gate-drain charge	Q_{gd}		-	1.5	-	

Source-Drain Diode Ratings and Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Source current (DC)	I_S	Integral reverse diode in the MOSFET	-	-	2.0	A
Source current (Pulsed) ①	I_{SM}		-	-	8.0	
Forward voltage ④	V_{SD}	$V_{GS}=0\text{V}, I_S=2.0\text{A}$	-	-	1.4	V
Reverse recovery time	t_{rr}	$I_S=2.0\text{A}, V_{GS}=0\text{V}, dI_F/dt=100\text{A}/\mu\text{s}$	-	260	-	ns
Reverse recovery charge	Q_{rr}		-	1.09	-	μC

Note ;

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- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ② $L=19\text{mH}, I_{AS}=2.0\text{A}, V_{DD}=50\text{V}, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$
- ③ Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
- ④ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1 $I_D - V_{DS}$

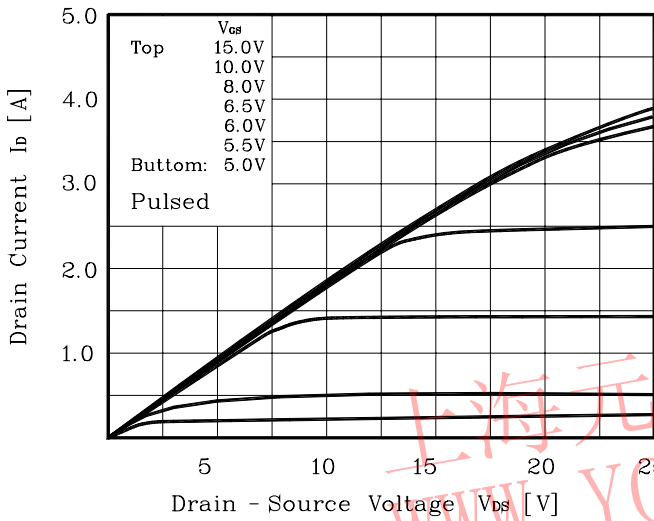


Fig. 2 $I_D - V_{GS}$

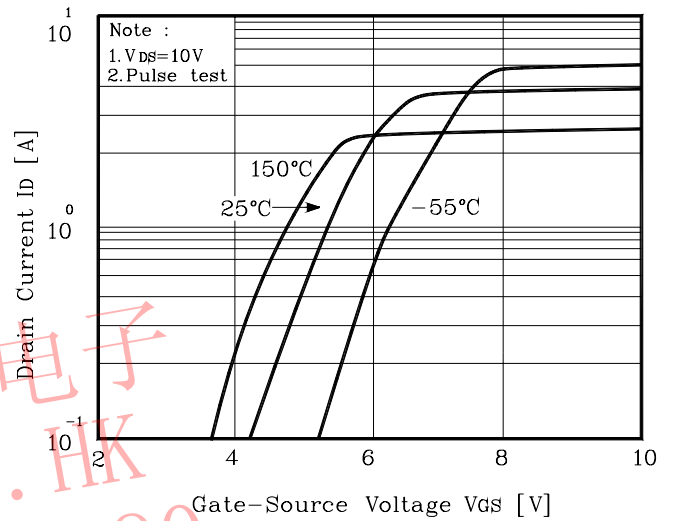


Fig. 3 $R_{DS(on)} - I_D$

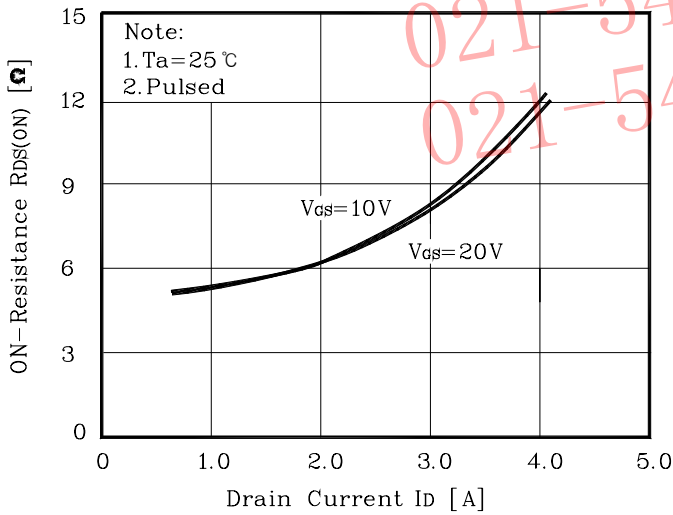


Fig. 4 $I_S - V_{SD}$

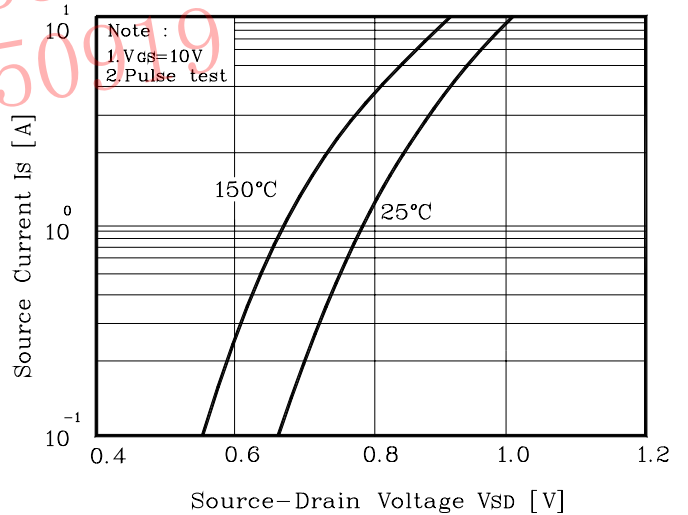


Fig. 5 Capacitance - V_{DS}

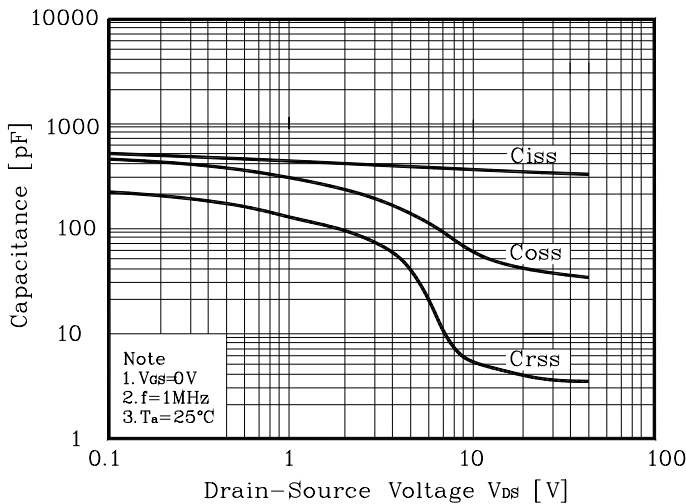


Fig. 6 $V_{GS} - Q_G$

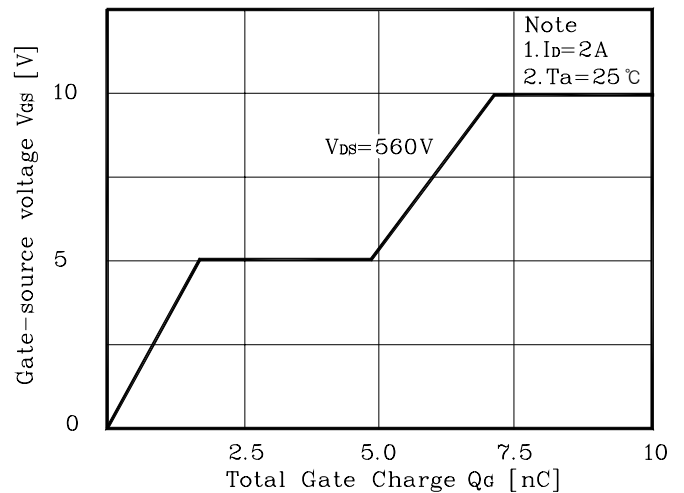


Fig. 7 $V_{DSS} - T_J$

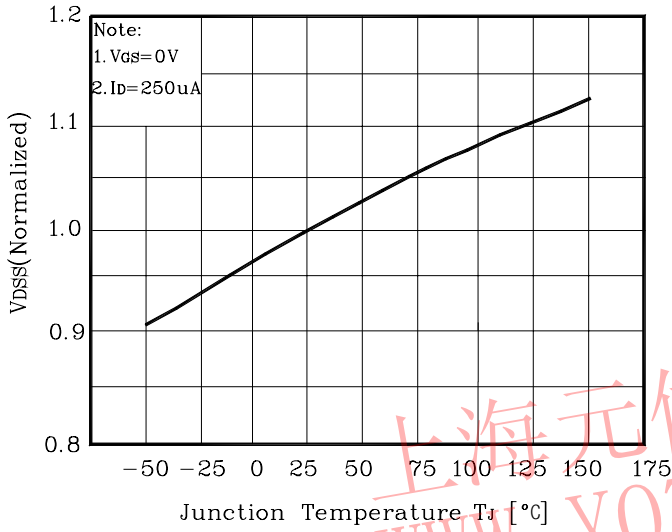


Fig. 8 $R_{DS(on)} - T_J$

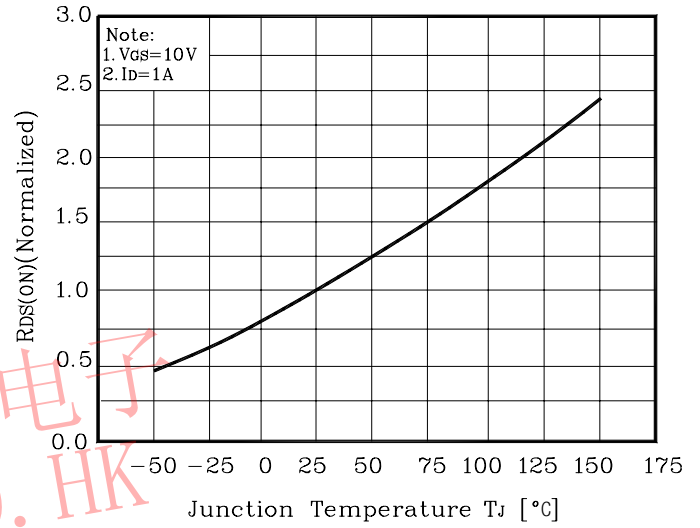


Fig. 9 $I_D - T_C$

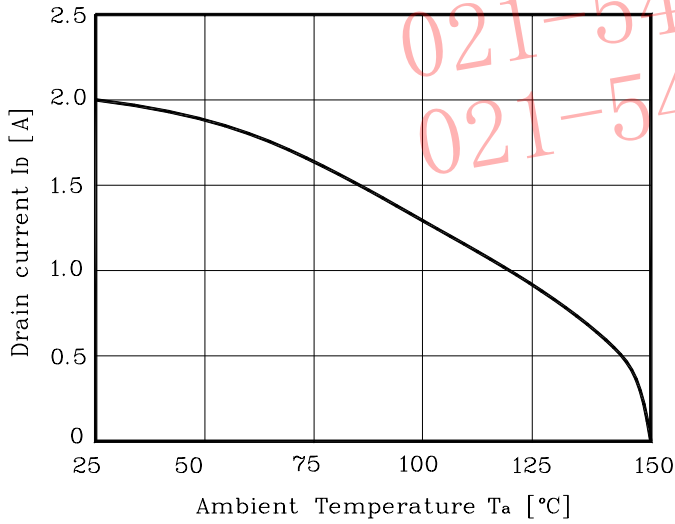


Fig. 10 Safe Operating Area

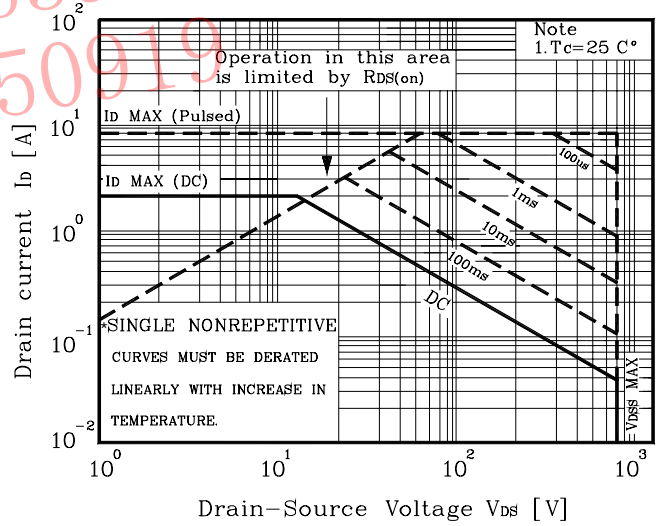


Fig. 11 Gate Charge Test Circuit & Waveform

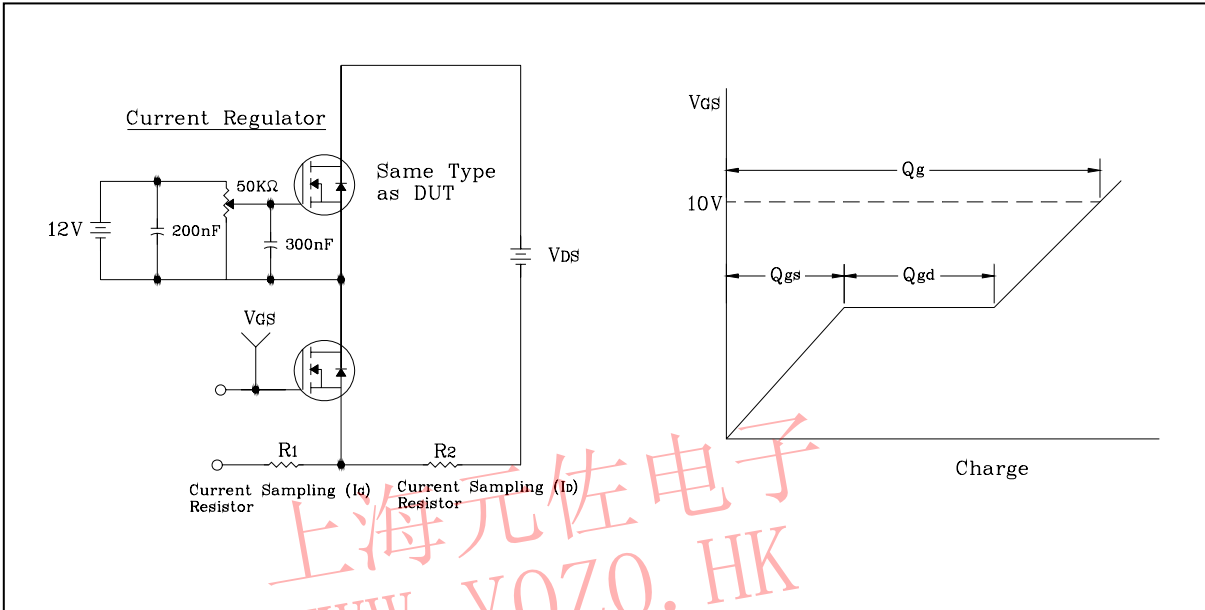


Fig. 12 Resistive Switching Test Circuit & Waveform

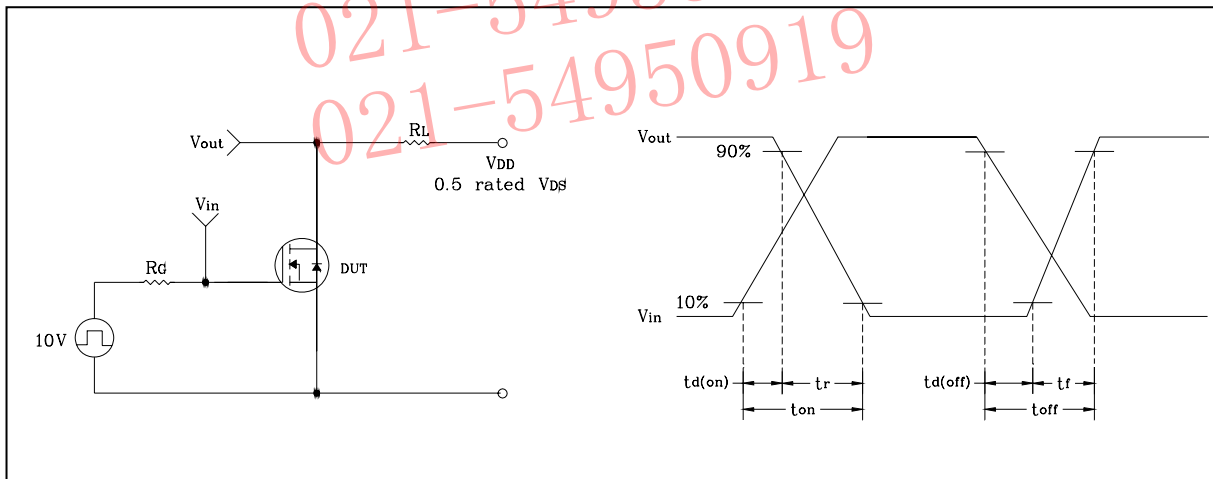


Fig. 13 EAS Test Circuit & Waveform

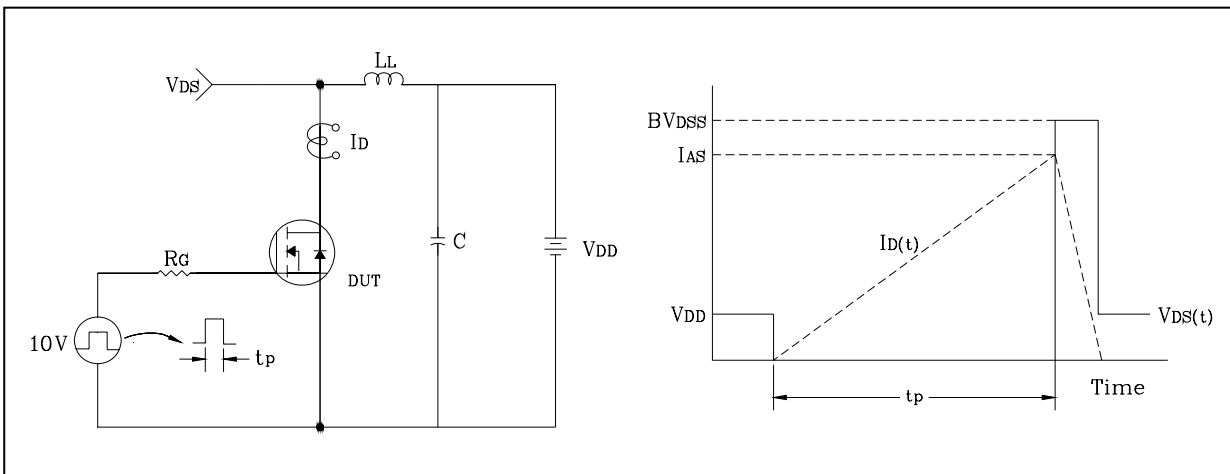
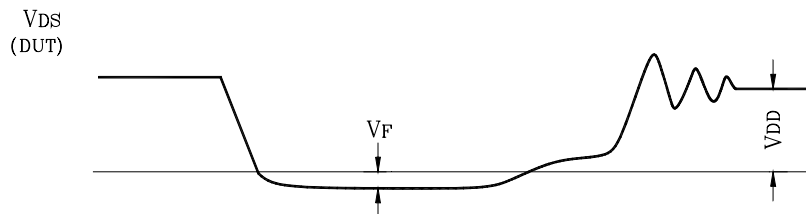
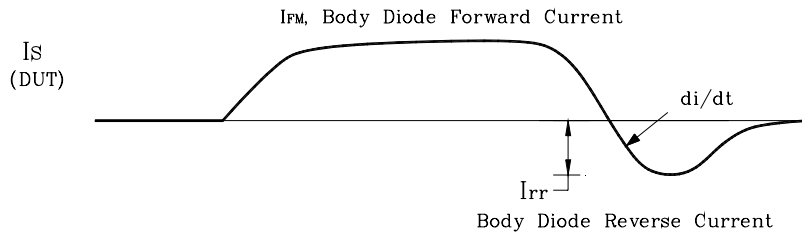
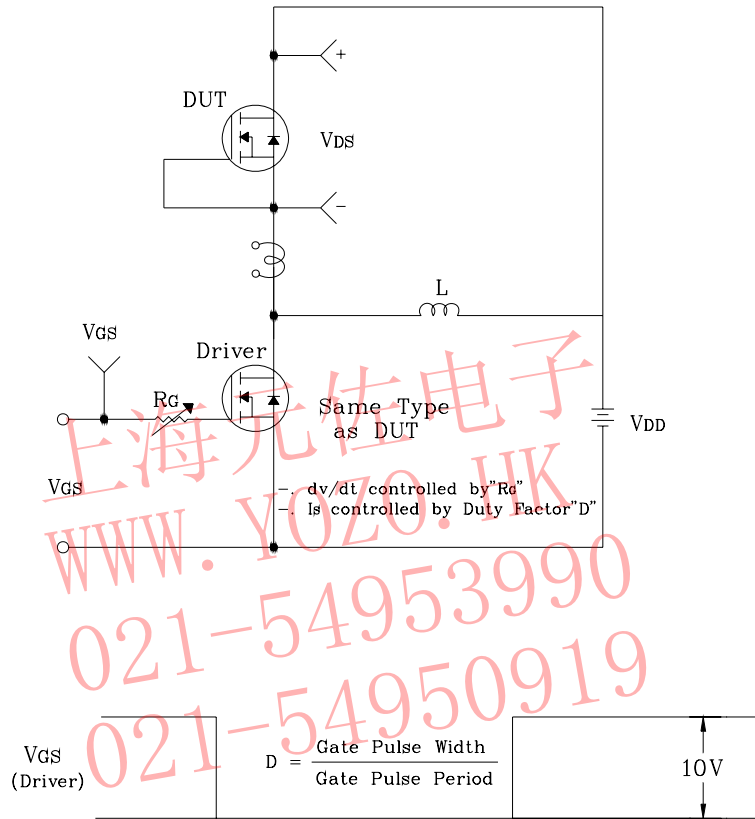
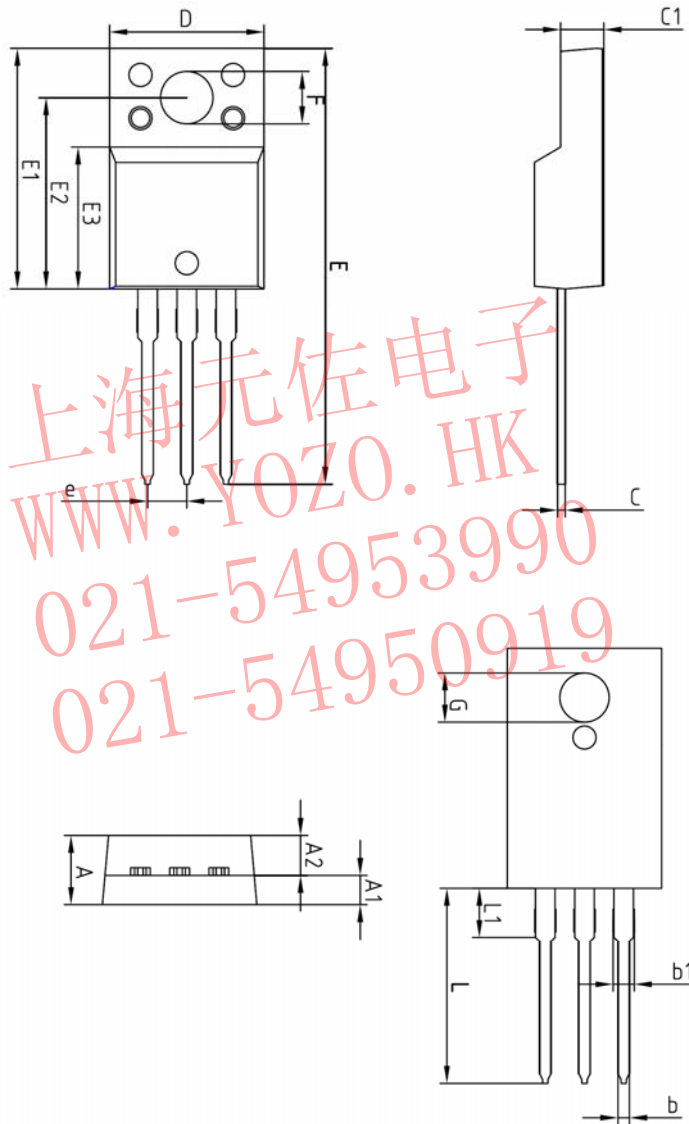


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



Outline Dimension



SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	-	-	4.60	
A1	2.45	2.50	2.55	
A2	1.95	2.00	2.05	
b	0.65	0.75	0.85	
b1	1.07	1.27	1.47	
C	0.40	0.50	0.60	
C1	2.70	2.80	2.90	
D	9.90	10.00	10.10	
E	28.00	-	28.60	
E1	15.50	15.60	15.70	
E2	12.30	12.40	12.50	
E3	9.15	9.20	9.25	
F	3.30	3.40	3.50	
G	3.10	3.20	3.30	
e	2.54 BSC			
L	12.40	-	13.00	
L1	3.46 BSC			