

SWITCHING REGULATOR APPLICATIONS

**Features**

- High Voltage:  $BV_{DSS}=800V(\text{Min.})$
- Low  $C_{rss}$  :  $C_{rss}=3.9F(\text{Typ.})$
- Low gate charge :  $Q_g=14.2nC(\text{Typ.})$
- Low  $R_{DS(on)}$  :  $R_{DS(on)}=4.5\Omega(\text{Max.})$

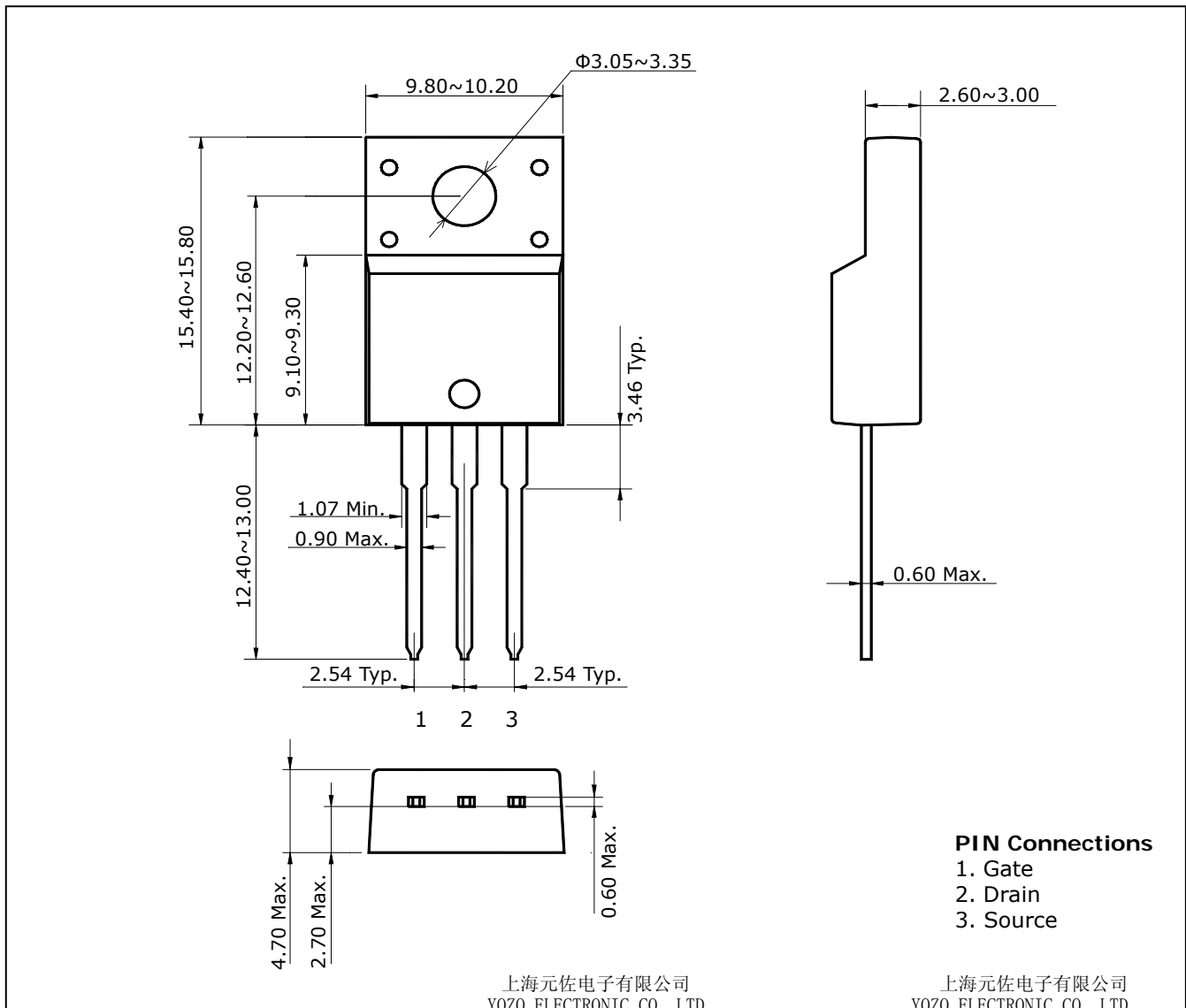
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**Ordering Information**

Type NO.	Marking	Package Code
STK0380F	STK0380	TO-220F-3L

**Outline Dimensions**

unit : mm



## Absolute maximum ratings

(Tc=25°C)

Characteristic	Symbol	Rating	Unit	
Drain-source voltage	$V_{DSS}$	800	V	
Gate-source voltage	$V_{GSS}$	±30	V	
Drain current (DC)	$I_D$	T <sub>C</sub> =25°C	3.0	A
		T <sub>C</sub> =100°C	1.8	A
Drain current (Pulsed) *	$I_{DM}$	12	A	
Drain power dissipation	$P_D$	30	W	
Avalanche current (Single) ②	$I_{AS}$	3	A	
Single pulsed avalanche energy ②	$E_{AS}$	335	mJ	
Avalanche current (Repetitive) ①	$I_{AR}$	3	A	
Repetitive avalanche energy ①	$E_{AR}$	11.5	mJ	
Junction temperature	$T_J$	150	°C	
Storage temperature range	$T_{stg}$	-55~150	°C	

\* Limited by maximum junction temperature

Characteristic		Symbol	Typ.	Max	Unit
Thermal resistance	Junction-case	$R_{th(J-C)}$	-	4.16	°C/W
	Junction-ambient	$R_{th(J-A)}$	-	62.5	

## Electrical Characteristics

(Tc=25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D=250\ \mu A, V_{GS}=0V$	800	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\ \mu A, V_{GS}=V_{DS}$	3.0	-	5.0	V
Drain-source cut-off current	$I_{DSS}$	$V_{DS}=800V, V_{GS}=0V$	-	-	1	$\mu A$
Gate leakage current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 30V$	-	-	$\pm 100$	nA
Drain-source on-resistance ④	$R_{DS(on)}$	$V_{GS}=10V, I_D=1.5A$	-	3.5	4.5	$\Omega$
Forward transfer conductance ④	$g_{fs}$	$V_{DS}=50V, I_D=1.5A$	-	2.5	-	S
Input capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=25V$ $f=1\ MHz$	-	706	917	pF
Output capacitance	$C_{oss}$		-	54	70	
Reverse transfer capacitance	$C_{rss}$		-	3.9	7.2	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=400V, I_D=3.0A$ $R_G=25\ \Omega$	-	16	42	ns
Rise time	$t_r$		-	44	98	
Turn-off delay time	$t_{d(off)}$		-	22	56	
Fall time	$t_f$		-	32	76	
Total gate charge	$Q_g$	$V_{DS}=640V, V_{GS}=10V$ $I_D=3.0A$	-	14.2	-	nC
Gate-source charge	$Q_{gs}$		-	3.4	-	
Gate-drain charge	$Q_{gd}$		-	5.4	-	

## Source-Drain Diode Ratings and Characteristics

(Tc=25°C)

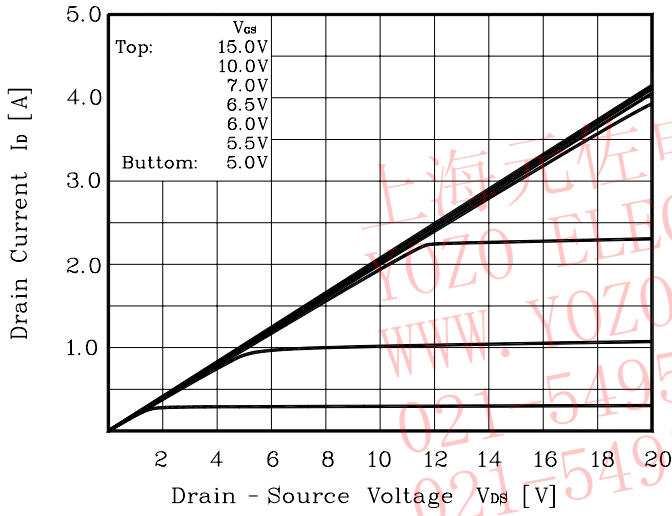
Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Source current (DC)	$I_S$	Integral reverse diode in the MOSFET	-	-	3.0	A
Source current (Pulsed) ①	$I_{SP}$		-	-	12	
Forward voltage ④	$V_{SD}$	$V_{GS}=0V, I_S=3.0A$	-	-	1.4	V
Reverse recovery time	$t_{rr}$	$I_S=3.0A, V_{GS}=0V$ $dI_S/dt=100A/\mu s$	-	520	-	ns
Reverse recovery charge	$Q_{rr}$		-	3.2	-	$\mu C$

Note ;

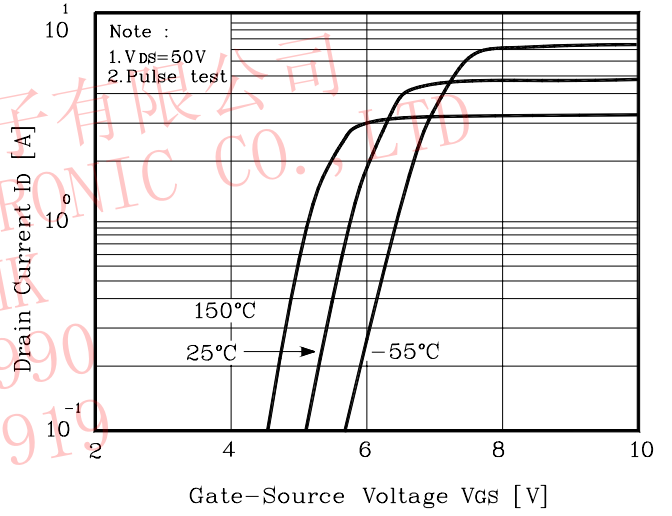
- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ②  $L=69.7mH, I_{AS}=3A, V_{DD}=50V, R_G=25\ \Omega$
- ③ Pulse Test : Pulse width  $\leq 300\ \mu s$ , Duty cycle  $\leq 2\%$
- ④ Essentially independent of operating temperature

**Electrical Characteristic Curves**

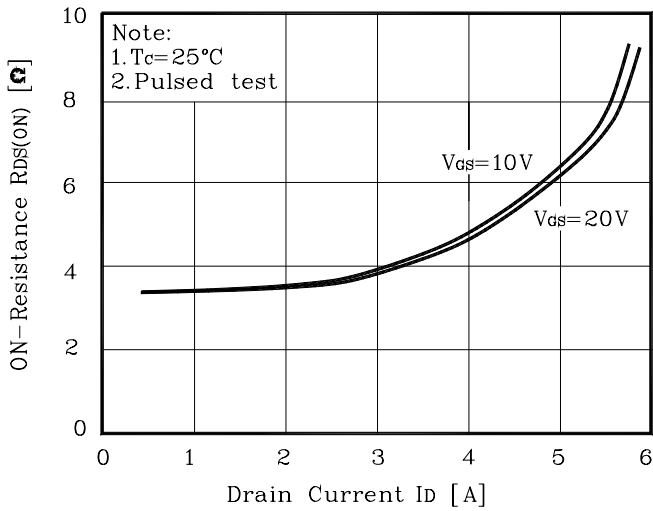
**Fig. 1  $I_D - V_{DS}$**



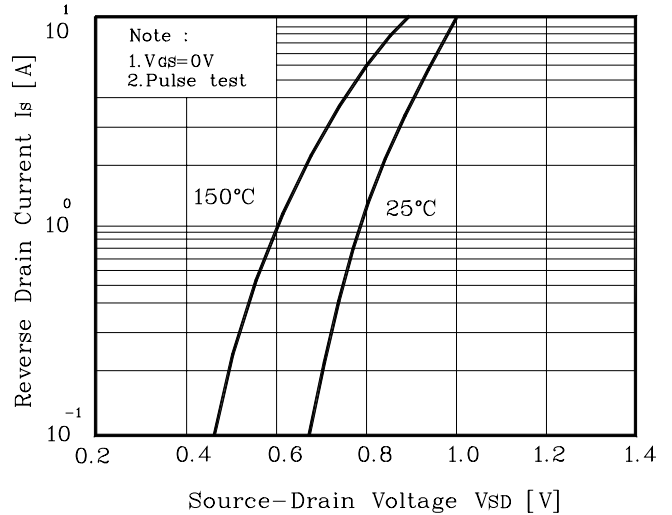
**Fig. 2  $I_D - V_{GS}$**



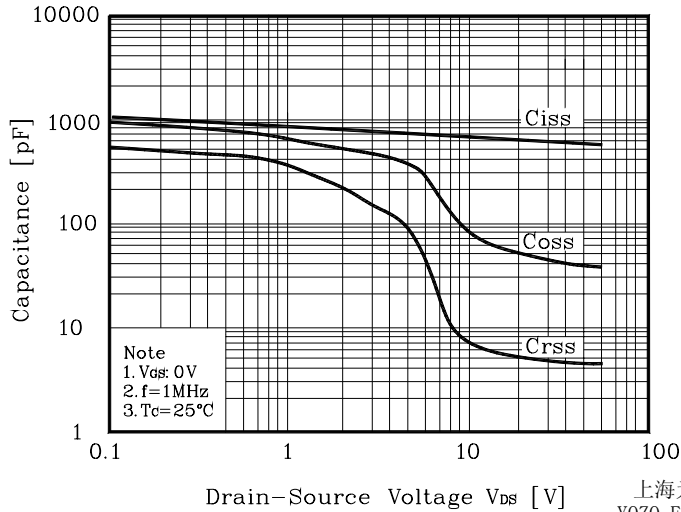
**Fig. 3  $R_{DS(on)} - I_D$**



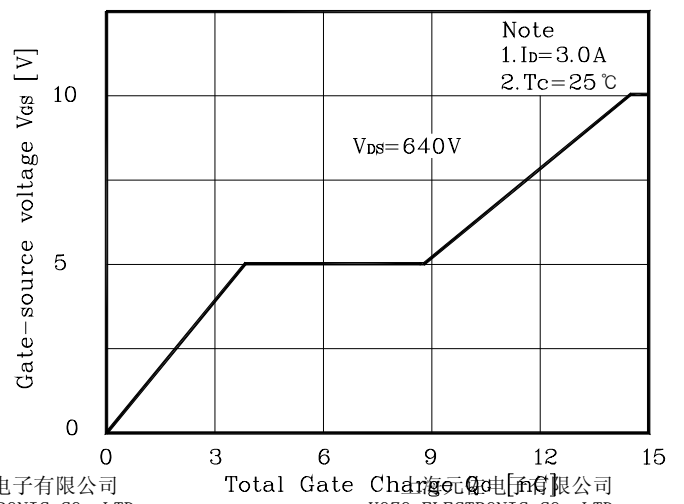
**Fig. 4  $I_S - V_{SD}$**



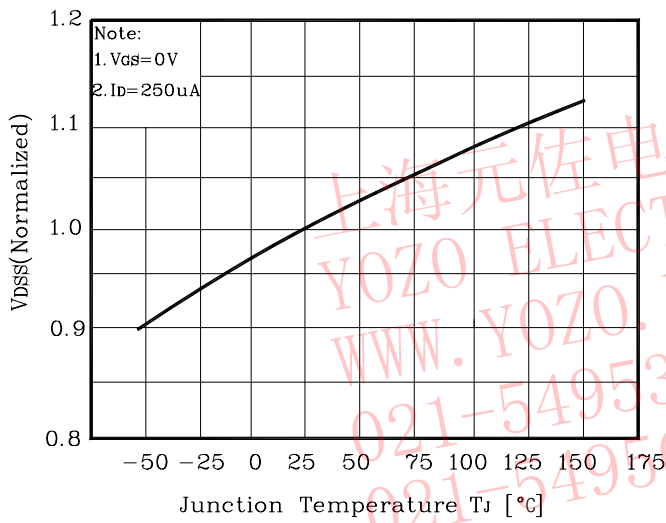
**Fig. 5 Capacitance -  $V_{DS}$**



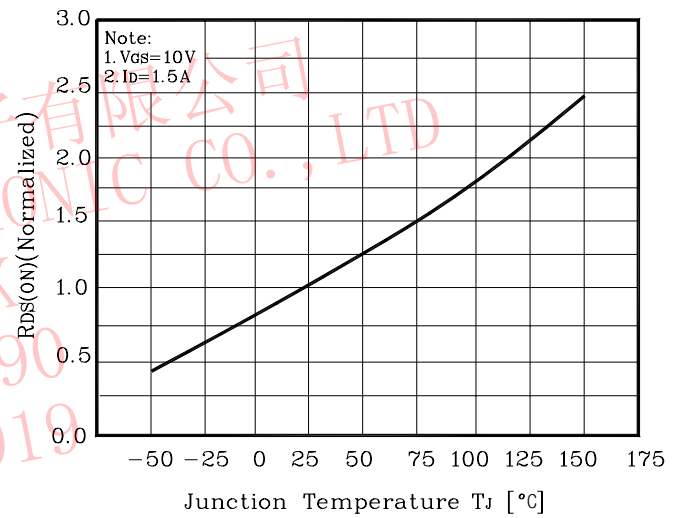
**Fig. 6  $V_{GS} - Q_G$**



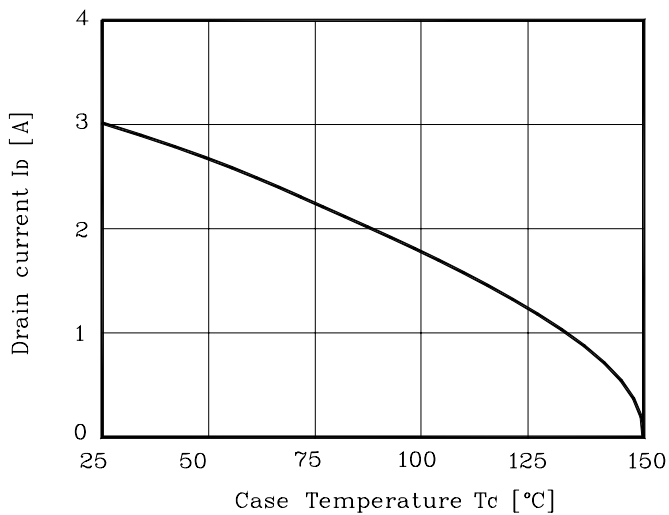
**Fig. 7  $V_{DS} - T_J$**



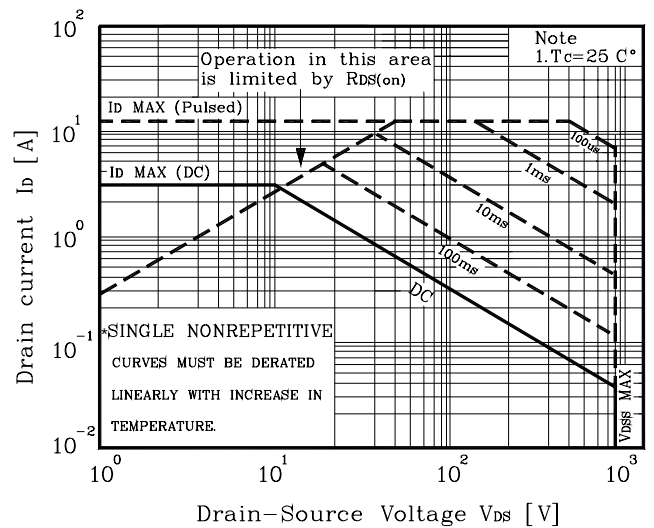
**Fig. 8  $R_{DS(on)} - T_J$**



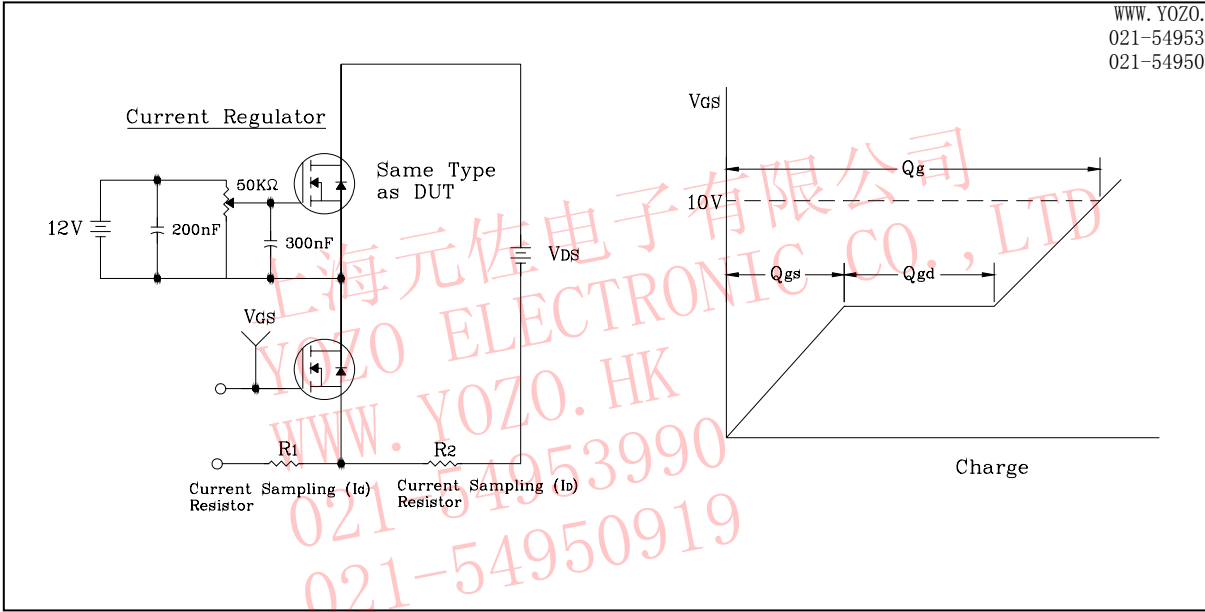
**Fig. 9  $I_D - T_C$**



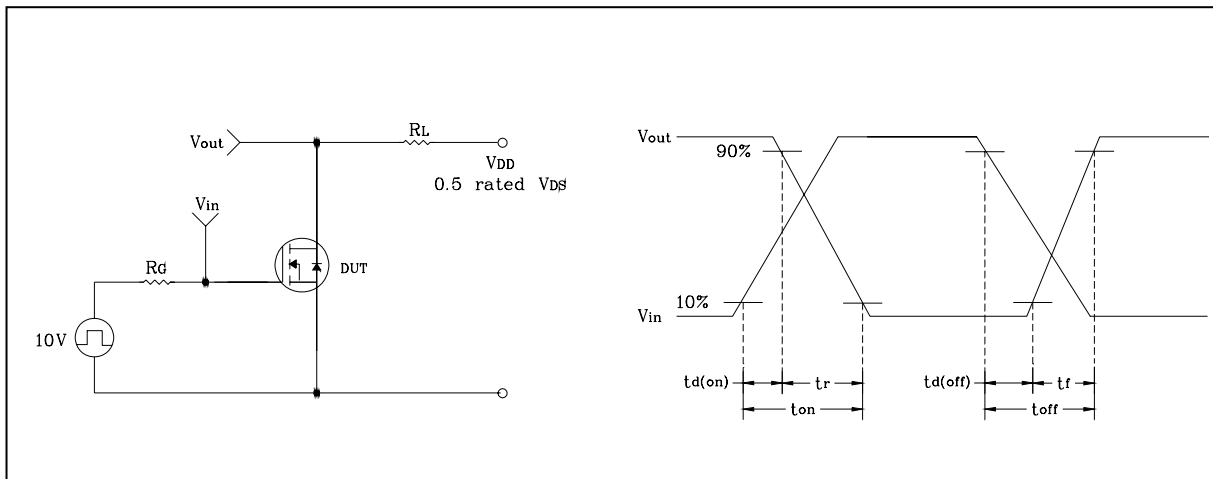
**Fig. 10 Safe Operating Area**



**Fig. 11 Gate Charge Test Circuit & Waveform**



**Fig. 12 Resistive Switching Test Circuit & Waveform**



**Fig. 13  $E_{AS}$  Test Circuit & Waveform**

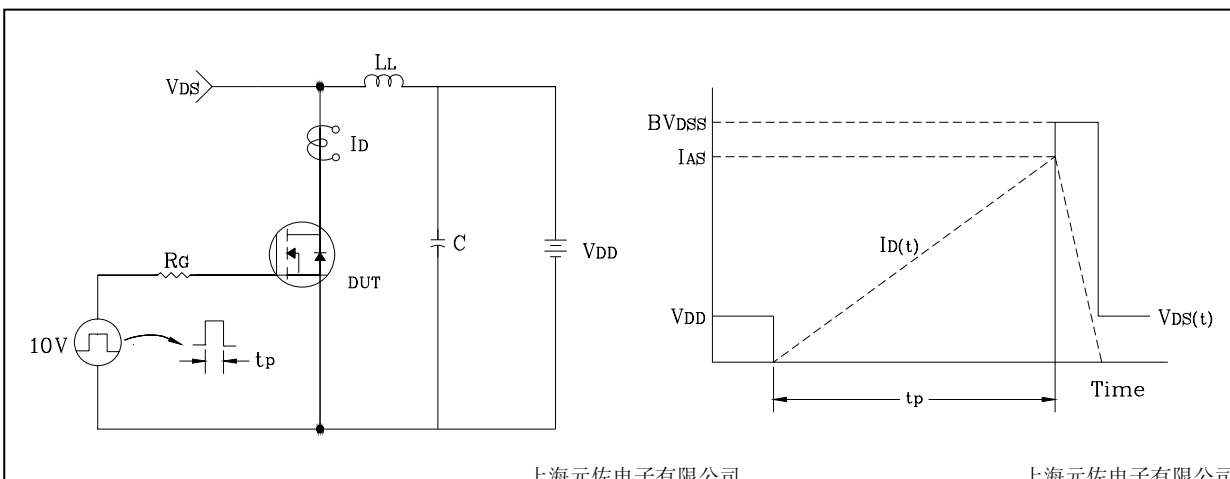


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform

