

SWITCHING REGULATOR APPLICATIONS

**Features**

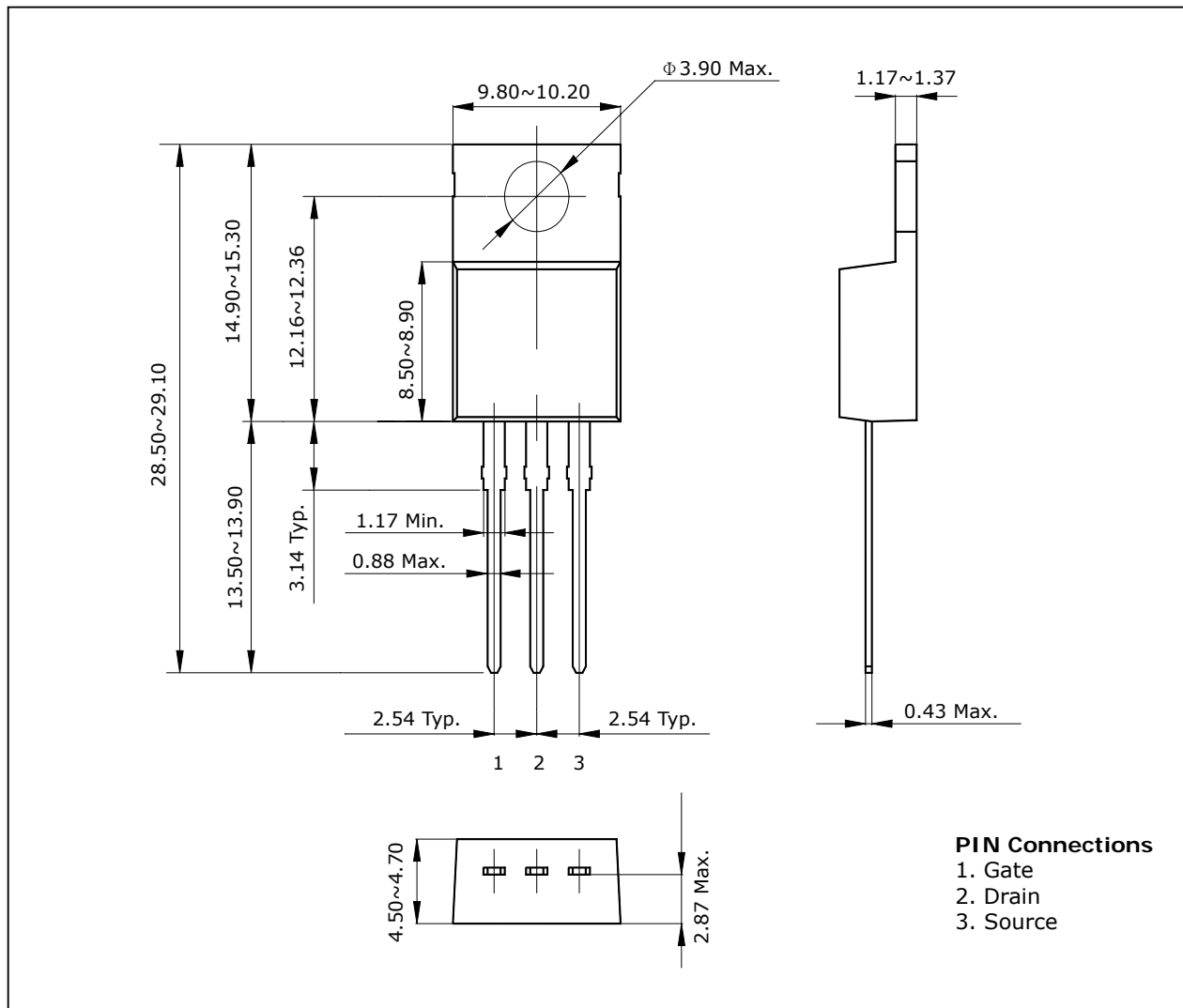
- High Voltage:  $BV_{DSS}=400V(\text{Min.})$
- Low  $C_{rss}$  :  $C_{rss}=8.4pF(\text{Typ.})$
- Low gate charge :  $Q_g=16nC(\text{Typ.})$
- Low  $R_{DS(on)}$  :  $R_{DS(on)}=1.0\Omega(\text{Max.})$

**Ordering Information**

Type NO.	Marking	Package Code
STK730P	STK730	TO-220AB-3L

**Outline Dimensions**

unit : mm



## Absolute maximum ratings

(Tc=25°C)

Characteristic	Symbol	Rating	Unit	
Drain-source voltage	$V_{DSS}$	400	V	
Gate-source voltage	$V_{GSS}$	±30	V	
Drain current (DC)	$I_D$	Tc=25°C	5.5	A
		Tc=100°C	3.4	A
Drain current (Pulsed) *	$I_{DP}$	22	A	
Drain power dissipation	$P_D$	71	W	
Avalanche current (Single) ②	$I_{AS}$	5.5	A	
Single pulsed avalanche energy ②	$E_{AS}$	270	mJ	
Avalanche current (Repetitive) ①	$I_{AR}$	5.5	A	
Repetitive avalanche energy ①	$E_{AR}$	7.3	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	$R_{th(J-C)}$	-	1.75	°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	$V_{(BR)DSS}$	$I_D=250 \mu A, V_{GS}=0$	400	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250 \mu A, V_{DS}=V_{GS}$	2.0	-	4.0	V
Drain-source cut-off current	$I_{DSS}$	$V_{DS}=400V, V_{GS}=0$	-	-	10	$\mu A$
Gate leakage current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 30V$	-	-	$\pm 100$	nA
Drain-source on-resistance ④	$R_{DS(on)}$	$V_{GS}=10V, I_D=2.75A$	-	0.8	1	$\Omega$
Forward transfer conductance ④	$g_{fs}$	$V_{DS}=10V, I_D=2.75A$	-	3.6	-	S
Input capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=25V$ $f=1 \text{ MHz}$	-	550	825	pF
Output capacitance	$C_{oss}$		-	46	70	
Reverse transfer capacitance	$C_{rss}$		-	8.4	13	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=200V, I_D=5.5A$ $R_G=12\Omega$	-	13	-	ns
Rise time	$t_r$		-	65	-	
Turn-off delay time	$t_{d(off)}$		-	21	-	
Fall time	$t_f$		-	38	-	
Total gate charge	$Q_g$	$V_{DS}=200V, V_{GS}=10V$ $I_D=5.5A$	-	16	24	nC
Gate-source charge	$Q_{gs}$		-	2.5	3.8	
Gate-drain charge	$Q_{gd}$		-	6.6	10	

## 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	-	-	5.5	A
Source current (Pulsed) ①	$I_{SP}$		-	-	22	
Forward voltage ④	$V_{SD}$	$V_{GS}=0V, I_S=5.5A$	-	-	1.5	V
Reverse recovery time	$t_{rr}$	$I_S=5.5A, V_{GS}=0V$ $dI_S/dt=100A/\mu S$	-	270	-	ns
Reverse recovery charge	$Q_{rr}$		-	2.16	-	$\mu C$

Note ;

- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ②  $L=13.7mH, I_{AS}=5.5A, V_{DD}=50V, R_G=27\Omega$
- ③ Pulse Test : Pulse Width  $\leq 400 \mu S$ , Duty cycle  $\leq 2\%$
- ④ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1  $I_D - V_{DS}$

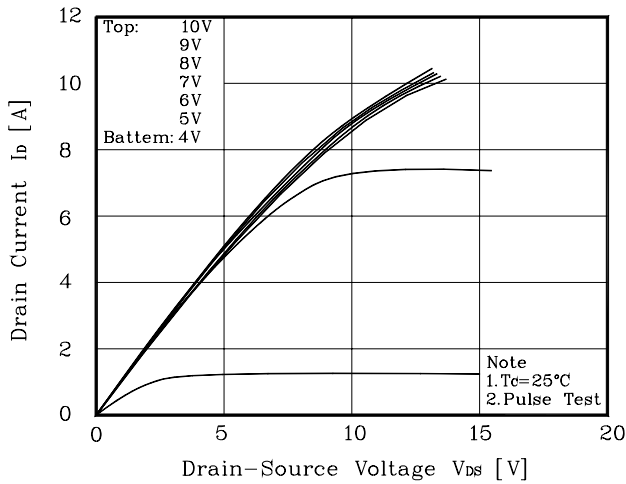


Fig. 2  $I_D - V_{GS}$

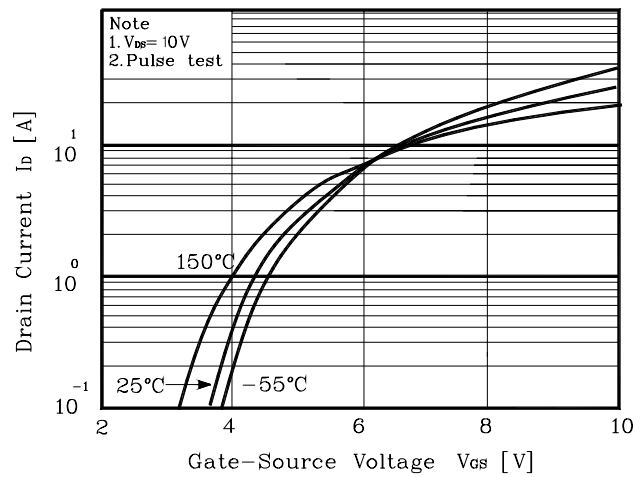


Fig. 3  $R_{DS(on)} - I_D$

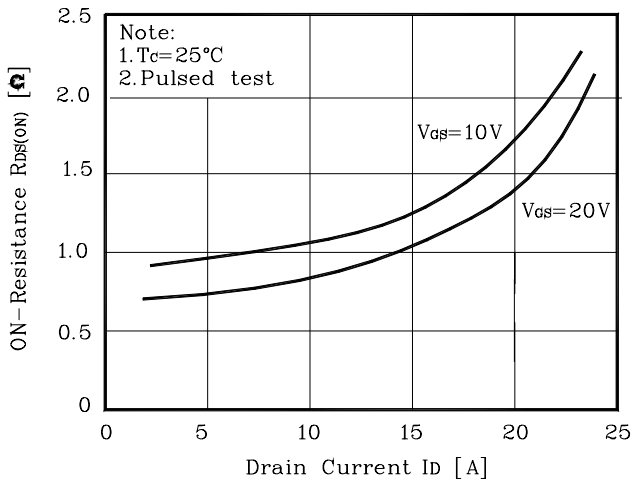


Fig. 4  $I_S - V_{SD}$

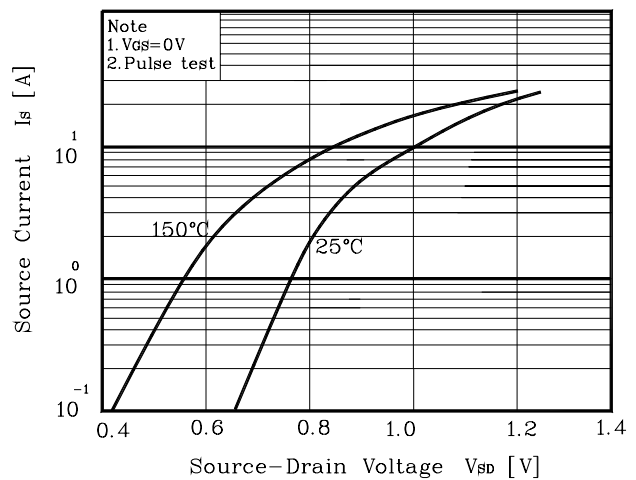


Fig. 5 Capacitance -  $V_{DS}$

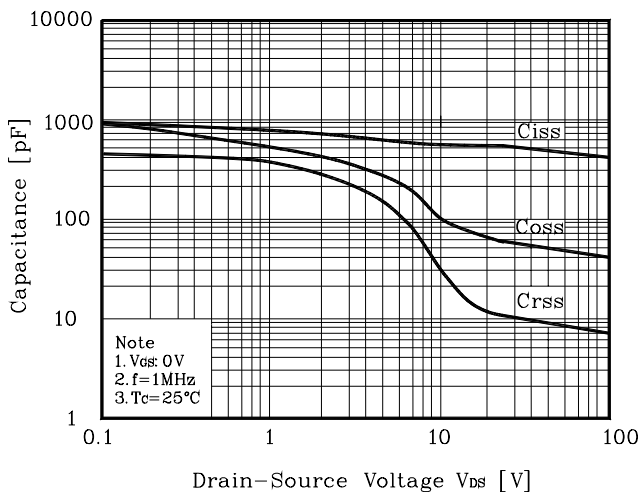
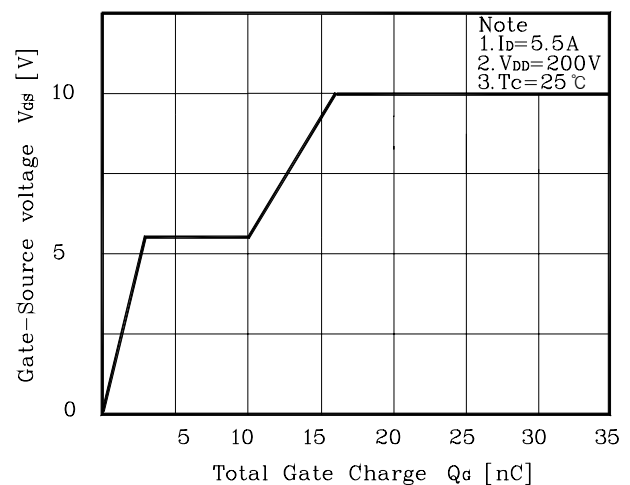
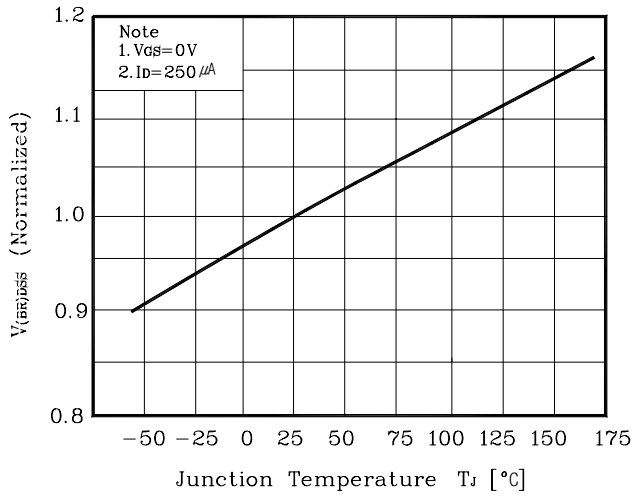


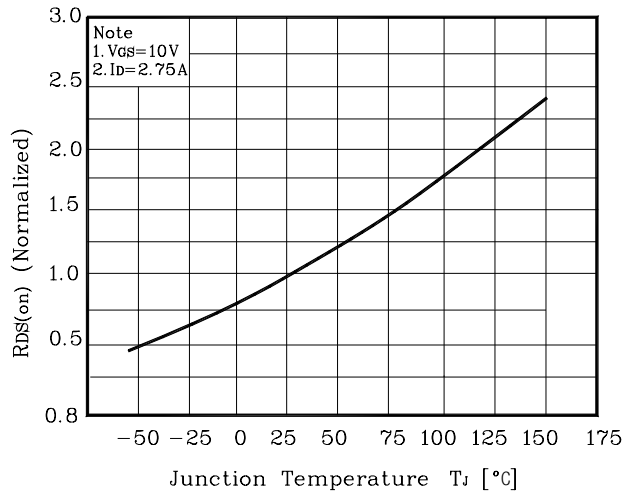
Fig. 6  $V_{GS} - Q_G$



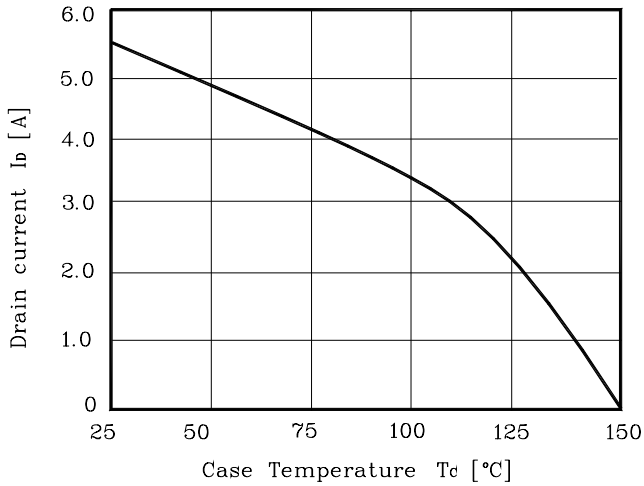
**Fig. 7  $V_{DS} - T_J$**



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



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



**Fig. 10 Safe Operating Area**

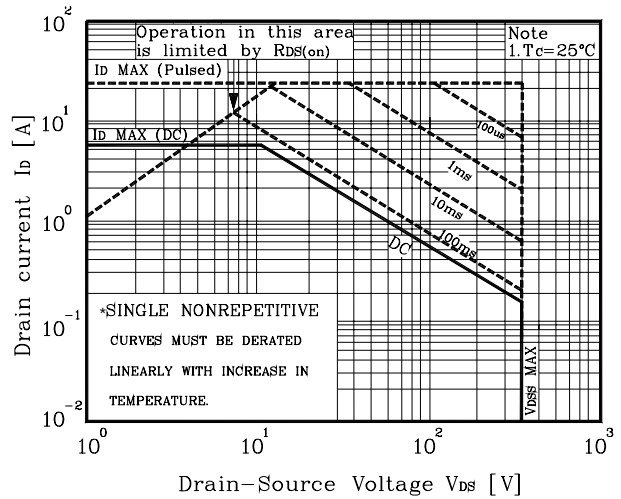


Fig. 11 Gate Charge Test Circuit & Waveform

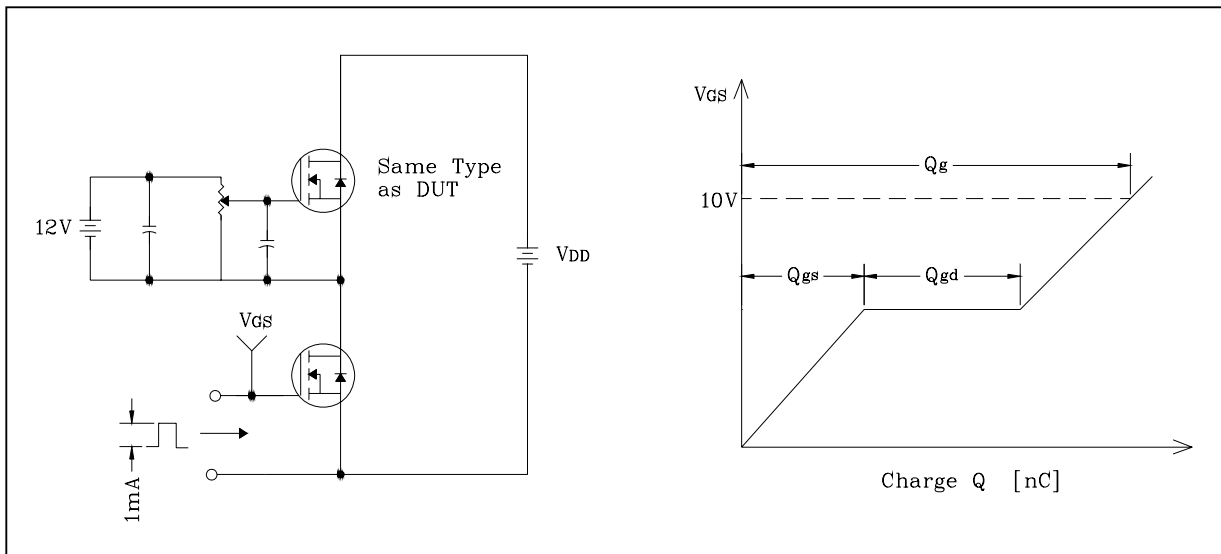


Fig. 12 Resistive Switching Test Circuit & Waveform

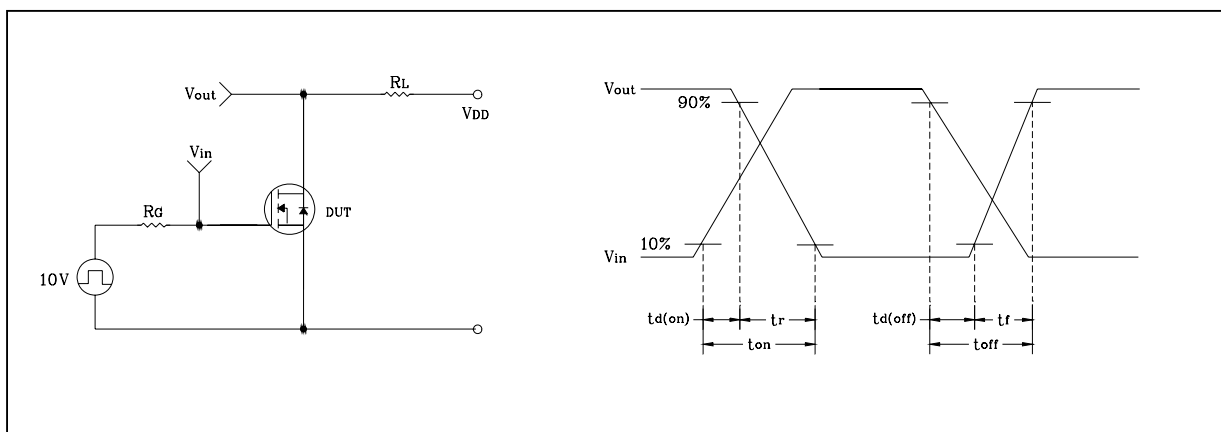


Fig. 13  $E_{AS}$  Test Circuit & Waveform

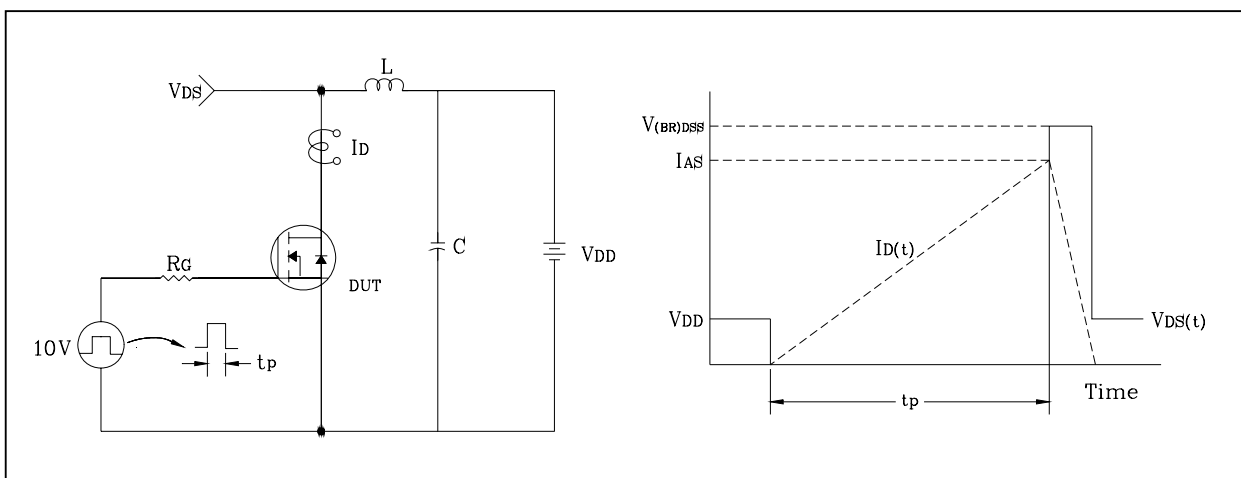
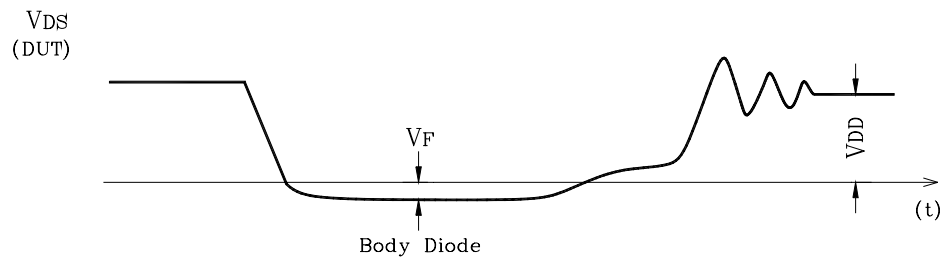
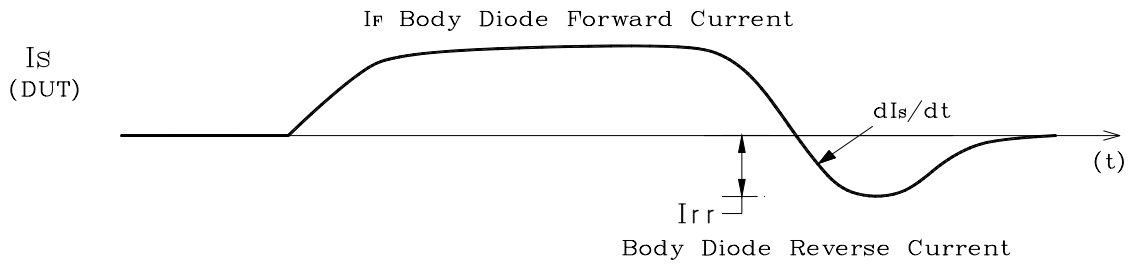
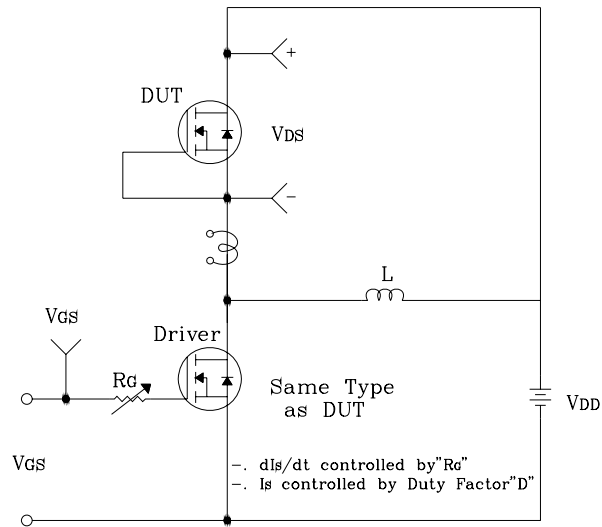


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



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