

SWITCHING REGURATOR APPLICATIONS

**Features**

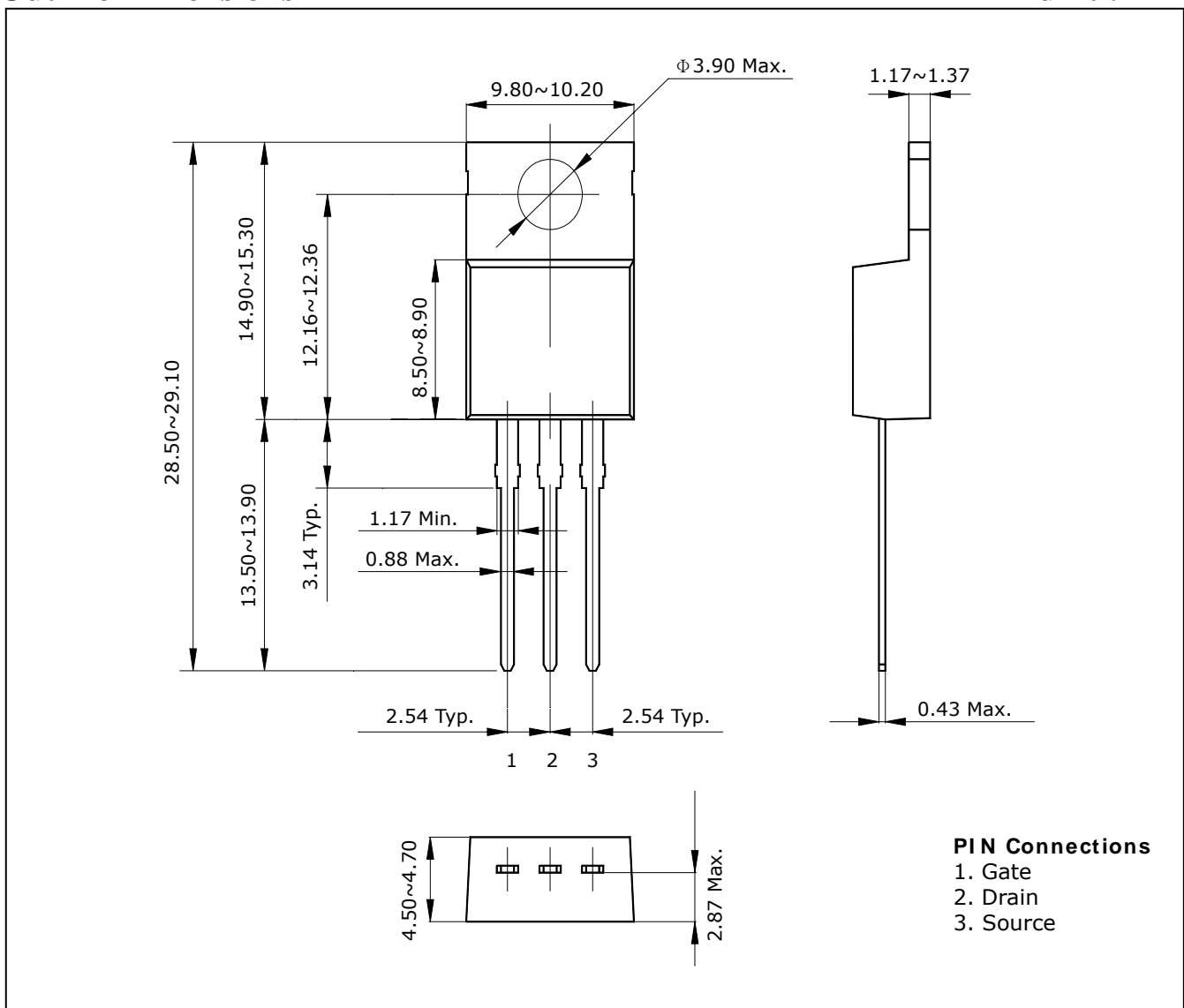
- High Voltage:  $BV_{DSS}=60V(\text{Min.})$
- Low  $C_{rSS}$  :  $C_{rSS}=84pF(\text{Typ.})$
- Low gate charge :  $Qg=26.7nC(\text{Typ.})$
- Low  $R_{DS(on)}$  :  $R_{DS(on)}=22m\Omega(\text{Max.})$

**Ordering Information**

Type NO.	Marking	Package Code
STK5006P	STK5006	TO-220AB-3L

**Outline Dimensions**

unit : mm



## Absolute maximum ratings (Tc=25°C)

Characteristic	Symbol	Rating	Unit
Drain-Source voltage	$V_{DSS}$	60	V
Gate-Source voltage	$V_{GSS}$	±20	V
Continuous Drain current (Tc=25°C)	$I_D$	50	A
Continuous Drain current (Tc=100°C)	$I_D$	35.4	A
Drain Current-Pulsed ①	$I_{DM}$	200	A
Power Dissipation (Tc=25°C)	$P_D$	120	W
Single Pulsed Avalanche Energy ②	$E_{AS}$	490	mJ
Avalanche current ①	$I_{AR}$	50	A
Repetitive Avalanche Energy ①	$E_{AR}$	12	mJ
Junction temperature	$T_J$	150	°C
Storage temperature range	$T_{stg}$	-55~175	

## Thermal Resistance

Characteristic	Symbol	Typ.	Max	Units
Junction to Case	$R_{th(J-C)}$	-	1.24	°C/W
Junction to Ambient	$R_{th(J-a)}$	-	62.5	

## Electrical Characteristics (Tc=25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit	
Drain-Source breakdown voltage	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0$	60	-	-	V	
Gate-Threshold voltage	$V_{GS(th)}$	$I_D=250\mu A, V_{DS}=V_{GS}$	2.0	-	4.0	V	
Drain-source leakage current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V$	-	-	1	$\mu A$	
Gate-source leakage	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	$\pm 100$	nA	
Drain-Source on-resistance ④	$R_{DS(ON)}$	$V_{GS}=10V, I_D=25A$	-	18	22	m $\Omega$	
Forward transfer admittance ④	$g_{fs}$	$V_{DS}=25V, I_D=25A$	-	22	-	S	
Input capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=25V, f=1MHz$	-	1289	1675	pF	
Output capacitance	$C_{oss}$		-	445	580		
Reverse transfer capacitance	$C_{rss}$		-	84	110		
Turn-on delay time	$t_{d(on)}$	$V_{DD}=30V, I_D=25A$ $R_G=25\Omega$	-	15	40	ns	
Rise time	$t_r$		-	105	220		
Turn-off delay time	$t_{d(off)}$		④ ⑤	-	80		180
Fall time	$t_f$		-	85	180		
Total gate charge	$Q_g$	$V_{DS}=48V, V_{GS}=10V,$ $I_D=50A$	-	26.7	34	nC	
Gate-source charge	$Q_{gs}$		-	5.0	-		
Gate-drain("Miller")charge	$Q_{gd}$		④ ⑤	-	10.2		-

## Source-Drain Diode Ratings and Characteristics (Tc=25°C)

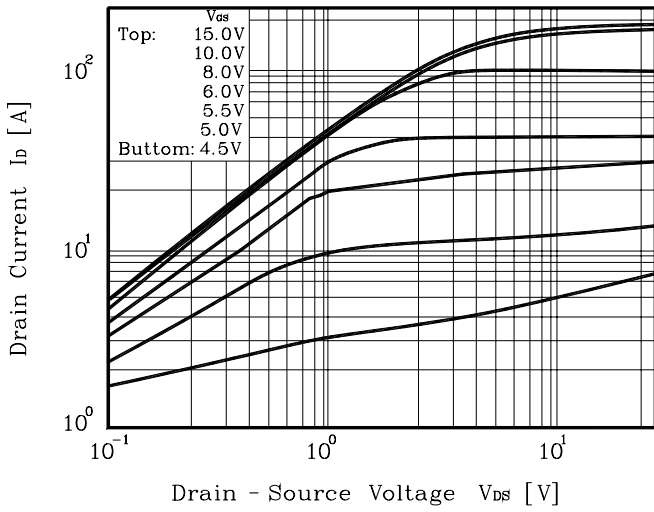
Characteristic	Symbol	Test Condition	Min	Typ	Max	Units
Continuous source current	$I_S$	Integral reverse diode in the MOSFET	-	-	50	A
Pulsed-source current ①	$I_{SM}$		-	-	200	
Diode forward voltage ④	$V_{SD}$	$V_{GS}=0V, I_S=50A$	-	-	1.5	V
Reverse recovery time	$t_{rr}$	$I_S=50A$ $di_F/dt=100A/us$	-	45	-	ns
Reverse recovery charge	$Q_{rr}$		④	-	70	-

Note ;

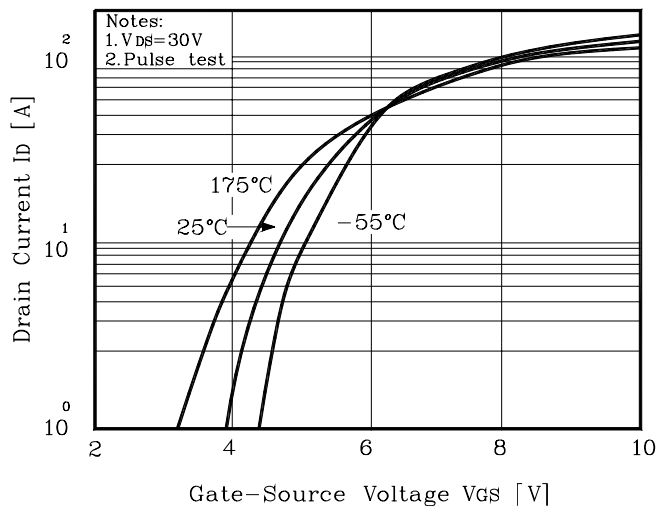
- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ②  $L=230\mu H, I_{AS}=50A, V_{DD}=25V, R_G=25\Omega$ , starting  $T_J=25^\circ C$
- ③  $I_S \leq 50A, di/dt \leq 300A/us, V_{DD} \leq BV_{DSS}$ , starting  $T_J=25^\circ C$
- ④ Pulse Test : Pulse Width < 300us, Duty cycle  $\leq 2\%$
- ⑤ Essentially independent of operating temperature

## Electrical Characteristic Curves

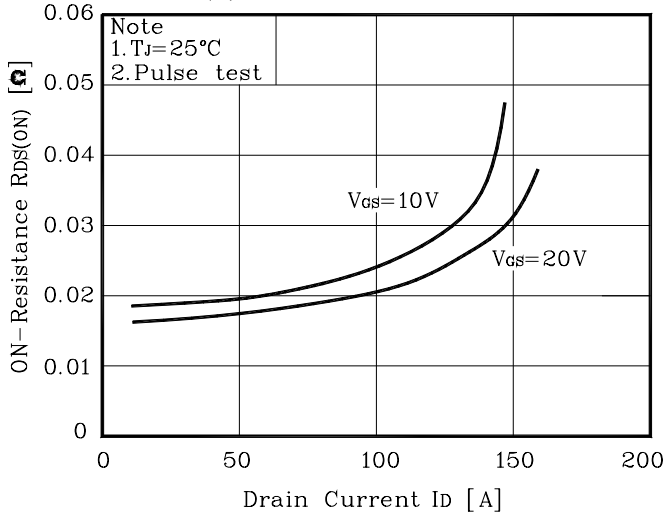
**Fig. 1  $I_D - V_{DS}$**



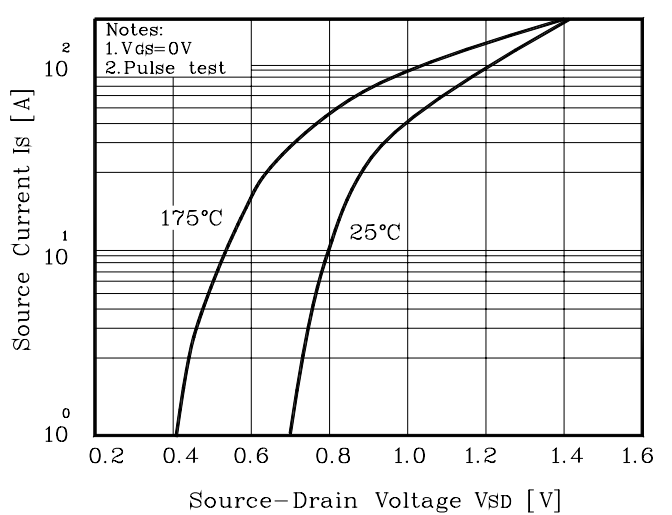
**Fig. 2  $I_D - V_{GS}$**



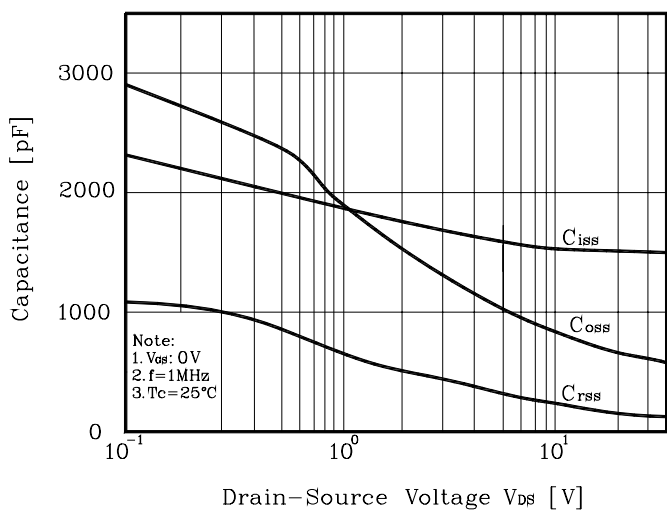
**Fig. 3  $R_{DS(on)} - I_D$**



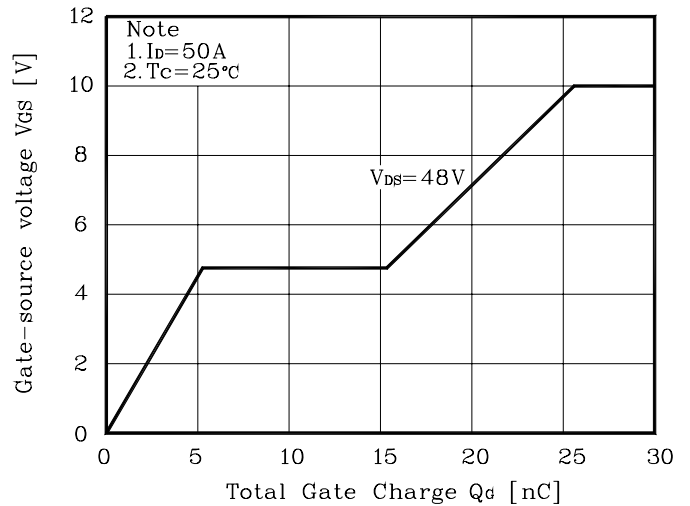
**Fig. 4  $I_S - V_{SD}$**



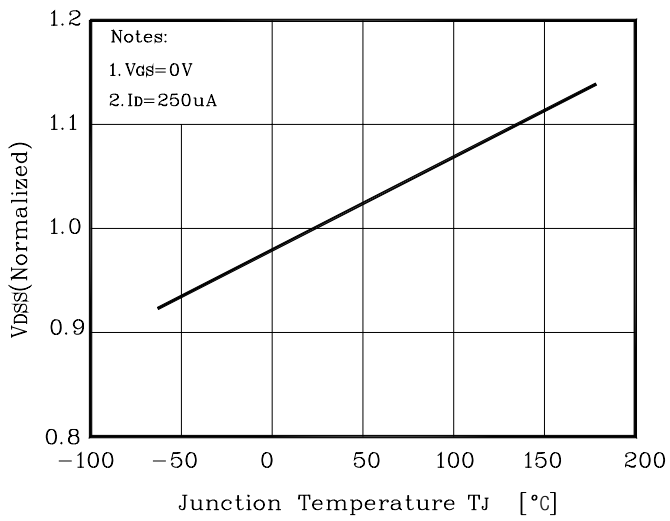
**Fig. 5 Capacitance -  $V_{DS}$**



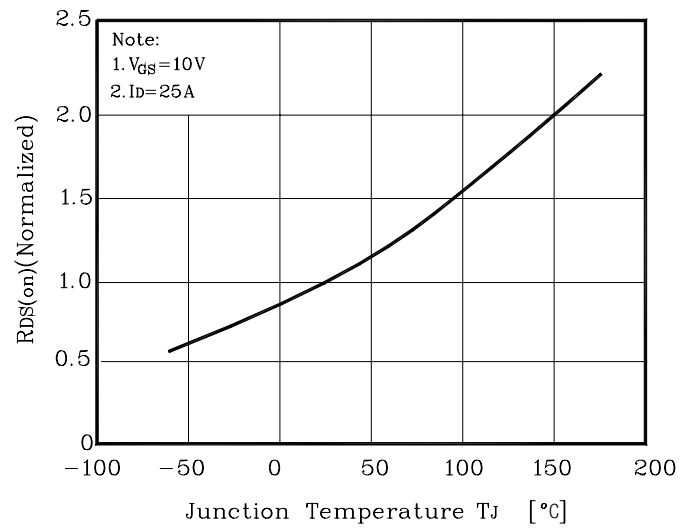
**Fig. 6  $V_{GS} - Q_G$**



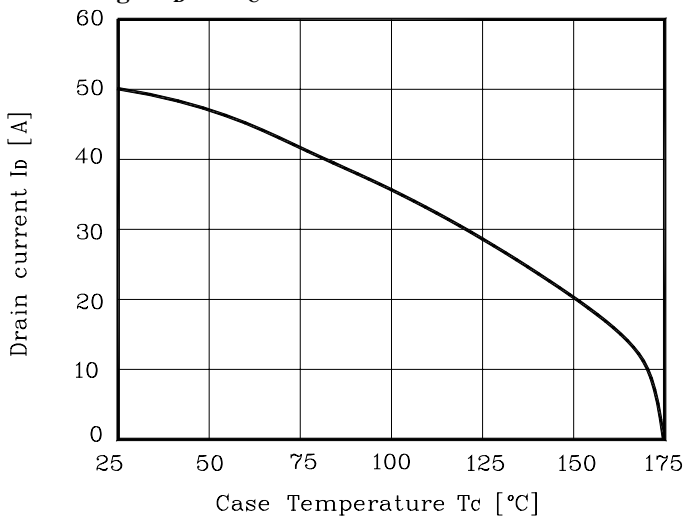
**Fig. 7  $V_{DSS} - T_J$**



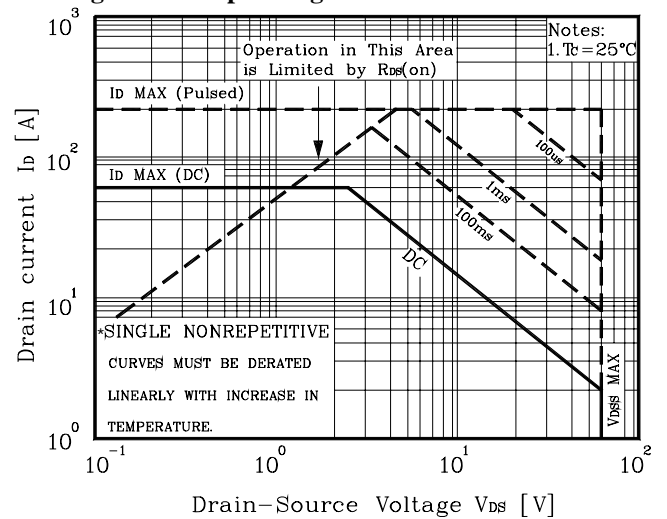
**Fig. 8  $R_{DS(on)} - T_J$**



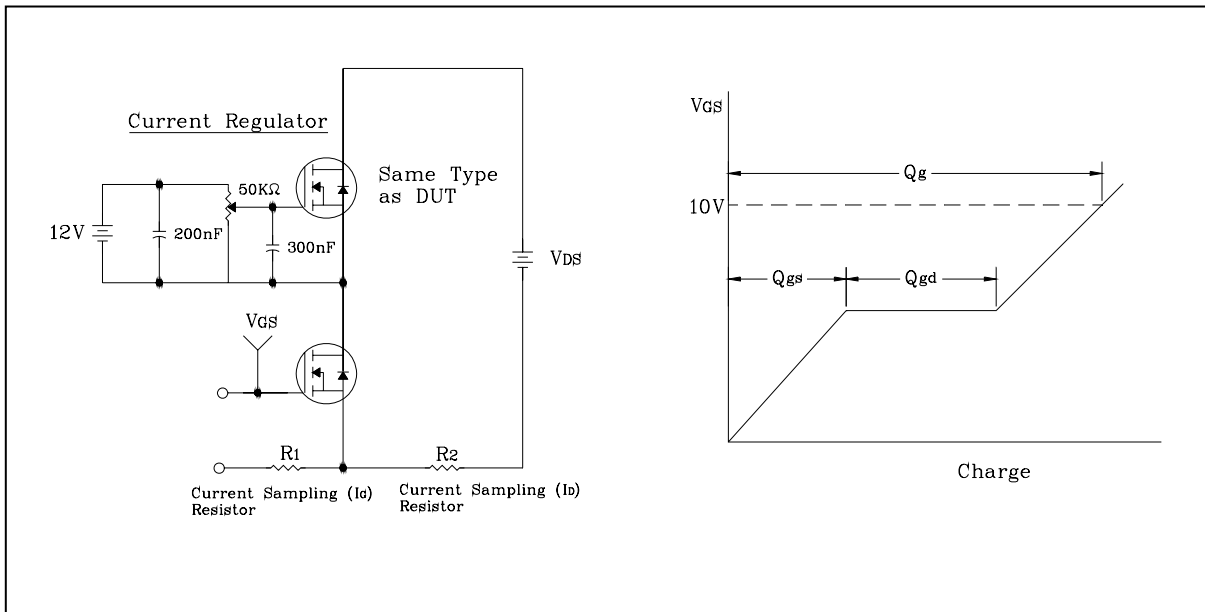
**Fig. 9  $I_D - T_C$**



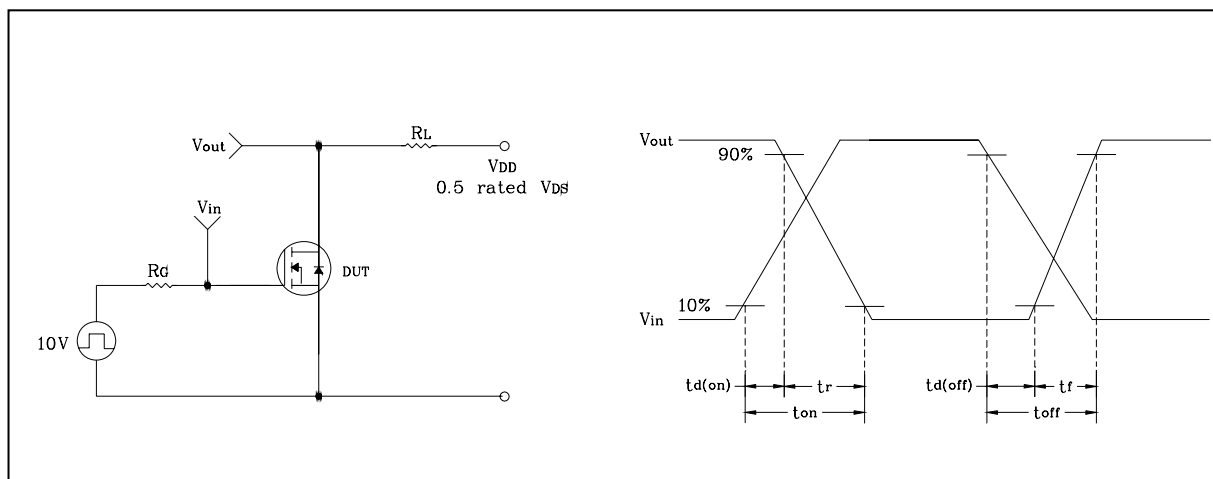
**Fig. 10 Safe Operating Area**



**Fig. 10 Gate Charge Test Circuit & Waveform**



**Fig. 11 Resistive Switching Test Circuit & Waveform**



**Fig. 12 E<sub>AS</sub> Test Circuit & Waveform**

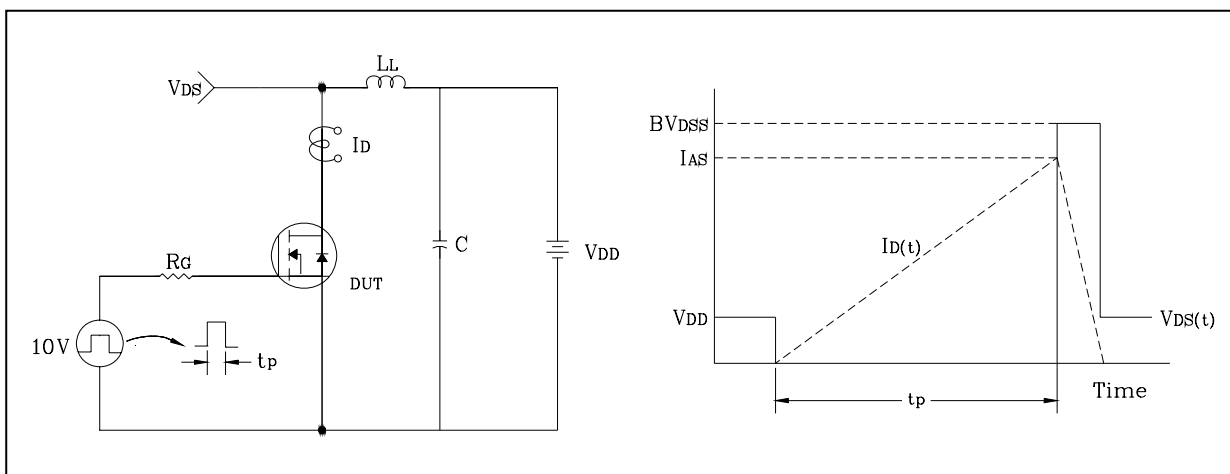
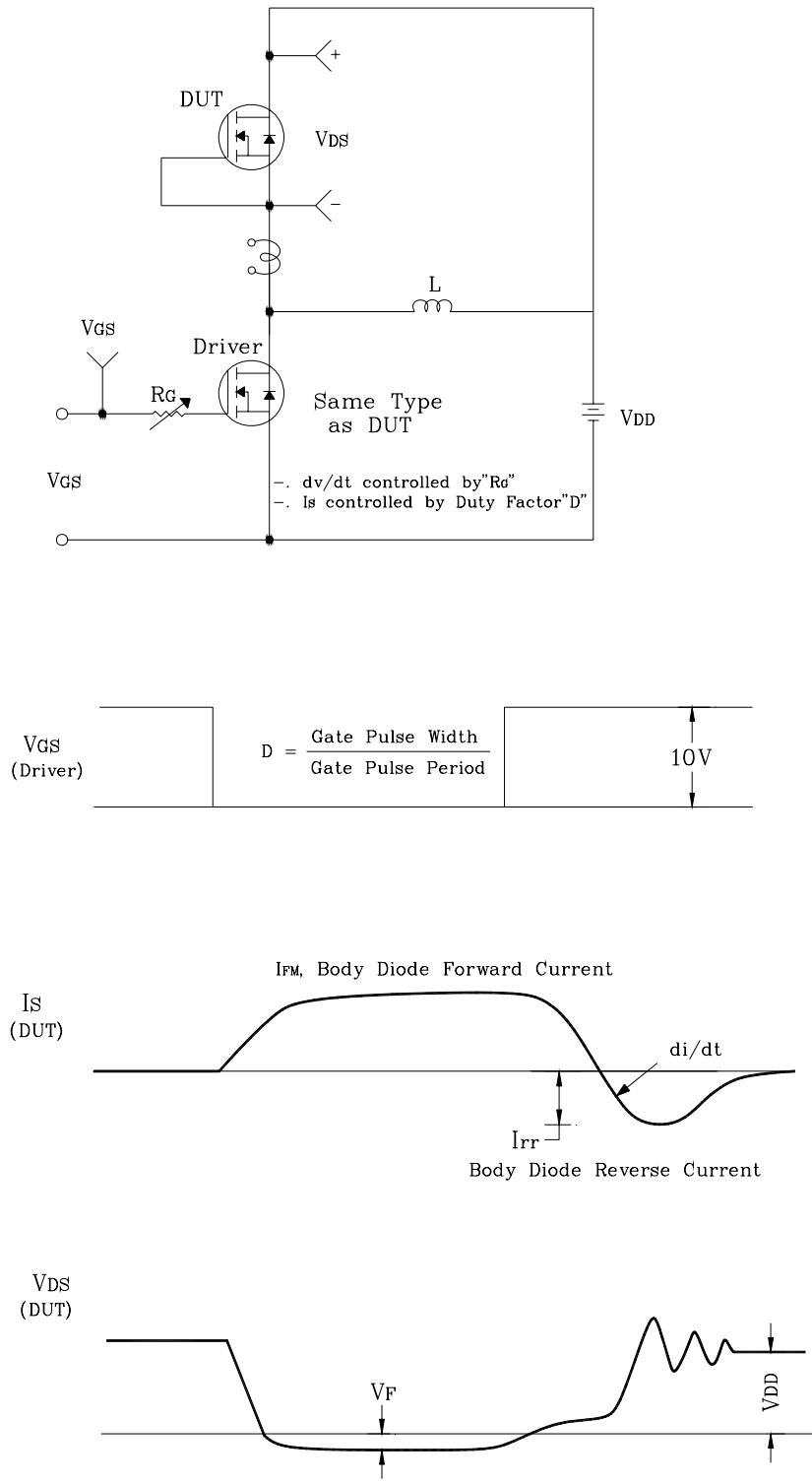


Fig. 13 Diode Reverse Recovery Time Test Circuit & Waveform



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