

**DC-DC CONVERTER APPLICATION  
HIGH VOLTAGE SWITCHING APPLICATIONS**

**Features**

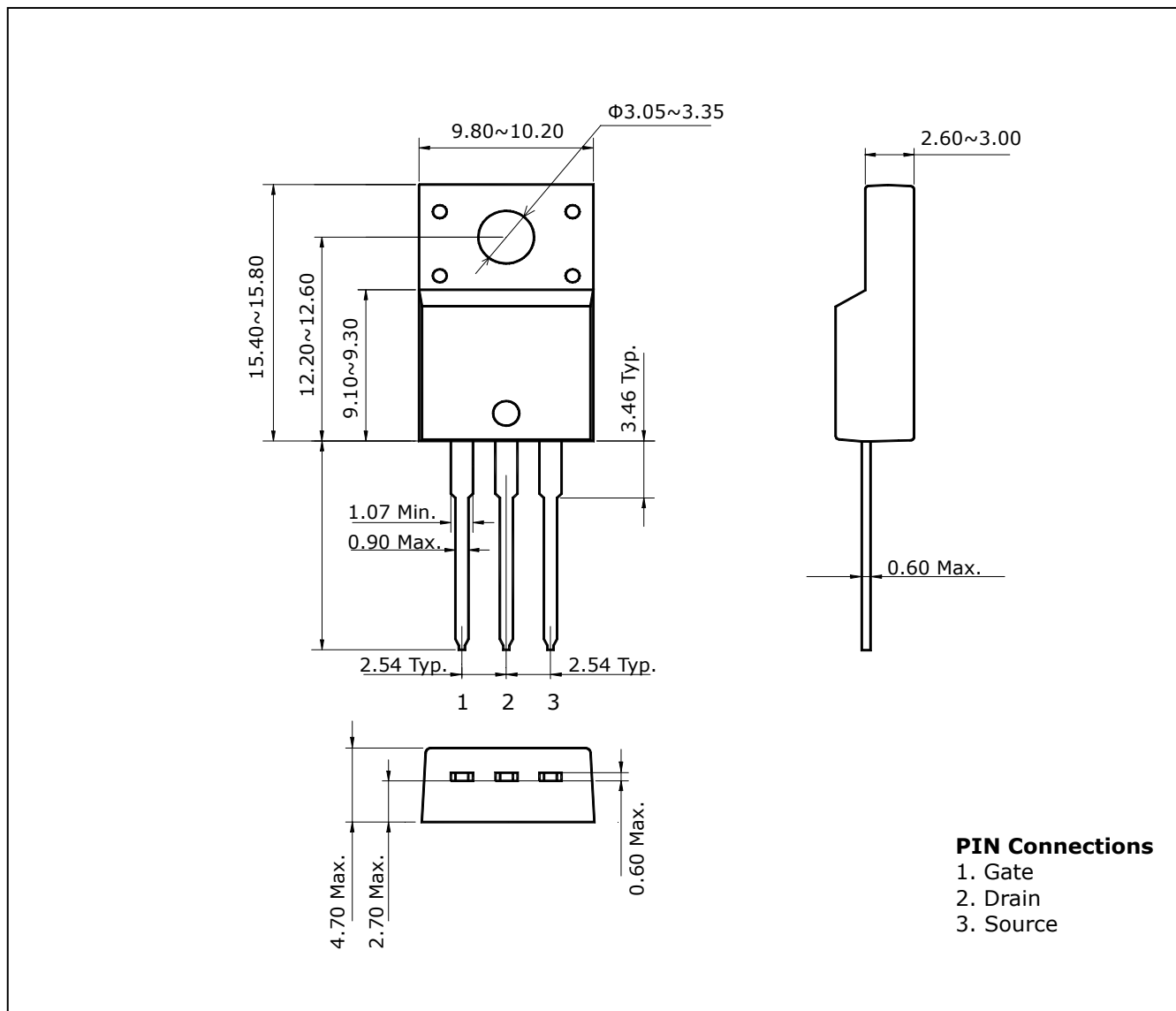
- High Voltage:  $BV_{DSS}=200V(\text{Min.})$
- Low  $C_{rSS}$  :  $C_{rSS}=22pF(\text{Typ.})$
- Low gate charge :  $Qg=30nC(\text{Typ.})$
- Low  $R_{DS(on)}$  :  $R_{DS(on)}=0.17\Omega(\text{Max.})$

**Ordering Information**

Type NO.	Marking	Package Code
STK1820F	STK1820	TO-220F-3L

**Outline Dimensions**

unit : mm



**PIN Connections**

1. Gate
2. Drain
3. Source

## Absolute maximum ratings

(Tc=25°C)

Characteristic	Symbol	Rating	Unit	
Drain-source voltage	$V_{DSS}$	200	V	
Gate-source voltage	$V_{GSS}$	±30	V	
Drain current (DC)	$I_D$	(Tc=25°C)	18	A
		(Tc=100°C)	8.6	A
Drain current (Pulsed) *	$I_{DP}$	72	A	
Drain Power dissipation	$P_D$	30	W	
Avalanche current (Single) ②	$I_{AS}$	18	A	
Single pulsed avalanche energy ②	$E_{AS}$	396	mJ	
Avalanche current (Repetitive) ①	$I_{AR}$	18	A	
Repetitive avalanche energy ①	$E_{AR}$	13.9	mJ	
Junction temperature	$T_J$	150	°C	
Storage temperature range	$T_{stg}$	-55~150		

\* 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	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0$	200	-	-	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	$I_{DSS}$	$V_{DS}=200V, V_{GS}=0V$	-	-	10	$\mu A$	
Gate-source leakage	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 30V$	-	-	$\pm 100$	nA	
Drain-Source on-resistance ④	$R_{DS(on)}$	$V_{GS}=10V, I_D=9A$	-	0.14	0.17	$\Omega$	
Forward transfer admittance ④	$g_{fs}$	$V_{DS}=40V, I_D=9A$	-	8.5	-	S	
Input capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=25V, f=1MHz$	-	840	1260	pF	
Output capacitance	$C_{oss}$		-	150	225		
Reverse transfer capacitance	$C_{rss}$		-	22	33		
Turn-on delay time	$t_{d(on)}$	$V_{DD}=100V, I_D=18A$ $R_G=25\Omega$	-	24	36	ns	
Rise time	$t_r$		-	29	43		
Turn-off delay time	$t_{d(off)}$		③④	-	68		102
Fall time	$t_f$		-	29	43		
Total gate charge	$Q_g$	$V_{DD}=100V, V_{GS}=10V$ $I_D=18A$	-	30	45	nC	
Gate-source charge	$Q_{gs}$		-	4.8	7.2		
Gate-drain charge	$Q_{gd}$		③④	-	11.5		17.3

## Source-Drain Diode Ratings and Characteristics

(Tc=25°C)

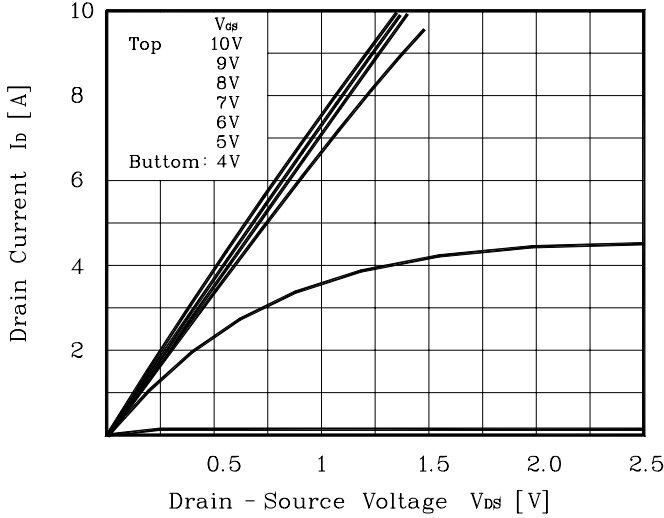
Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Continuous source current	$I_S$	Integral reverse diode in the MOSFET	-	-	18	A
Source current (Pulsed) ①	$I_{SP}$		-	-	72	
Forward voltage ④	$V_{SD}$	$V_{GS}=0V, I_S=18A$	-	-	1.4	V
Reverse recovery time	$t_{rr}$	$I_S=18A, V_{GS}=0V$ $di_s/dt=100A/us$	-	253	-	ns
Reverse recovery charge	$Q_{rr}$		-	2.63	-	$\mu C$

Note ;

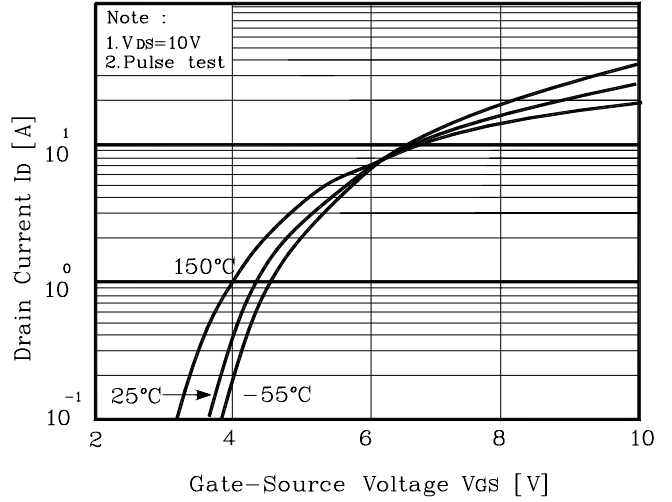
- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature  $\mu$
- ②  $L=2.0mH, I_{AS}=18A, V_{DD}=50V, R_G=25\Omega$
- ③ Pulse Test : Pulse Width < 300us, Duty cycle  $\leq$  2%
- ④ Essentially independent of operating temperature

## Electrical Characteristic Curves

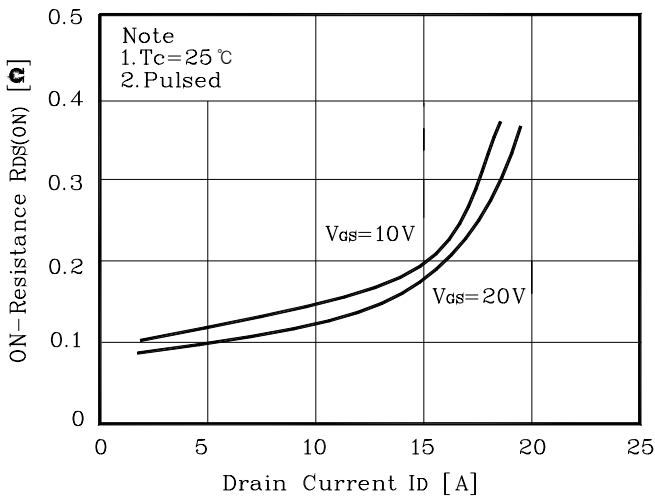
**Fig. 1  $I_D - V_{DS}$**



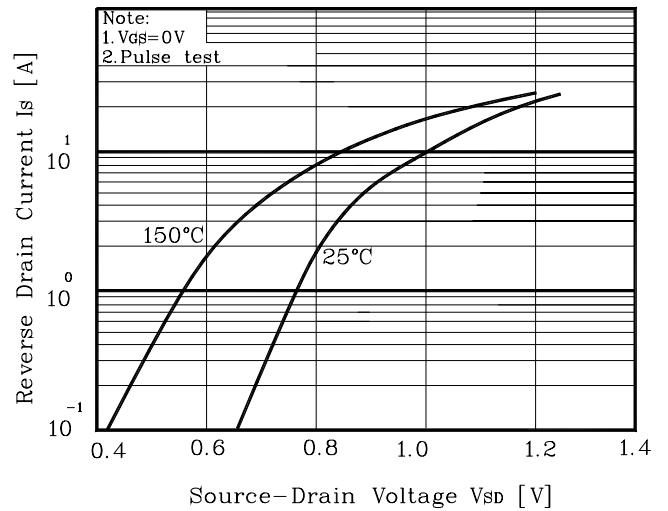
**Fig. 2  $I_D - V_{GS}$**



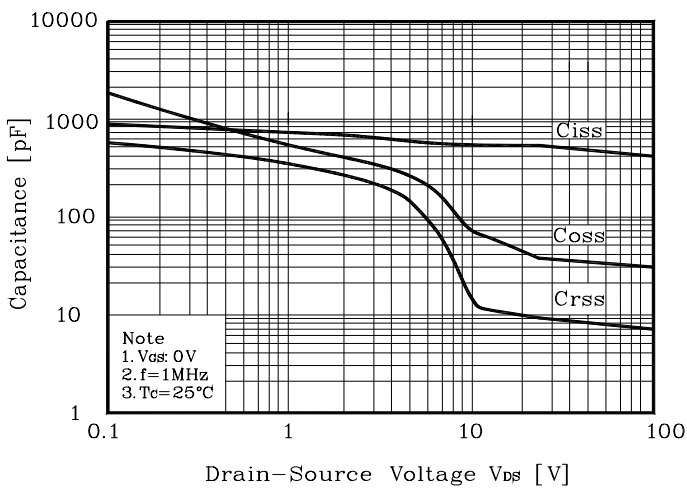
**Fig. 3  $R_{DS(on)} - I_D$**



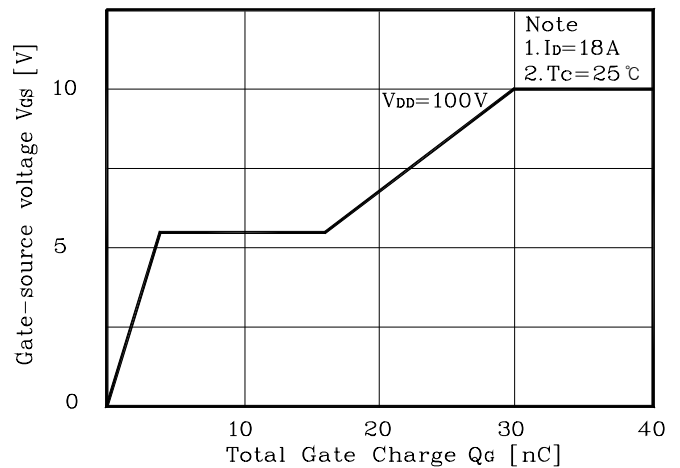
**Fig. 4  $I_S - V_{SD}$**



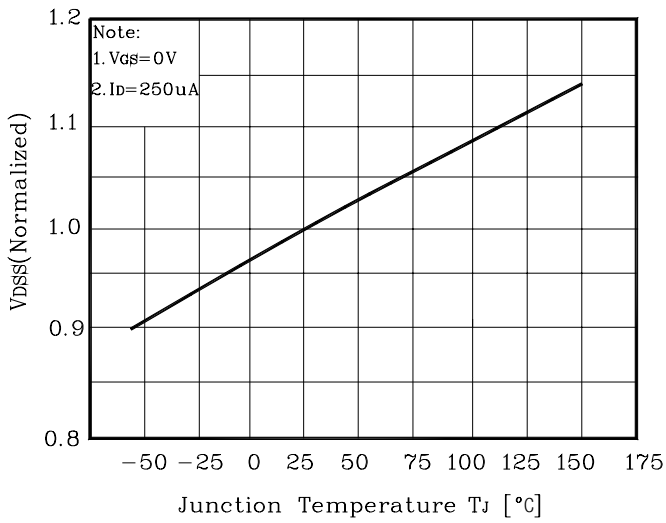
**Fig. 5 Capacitance -  $V_{DS}$**



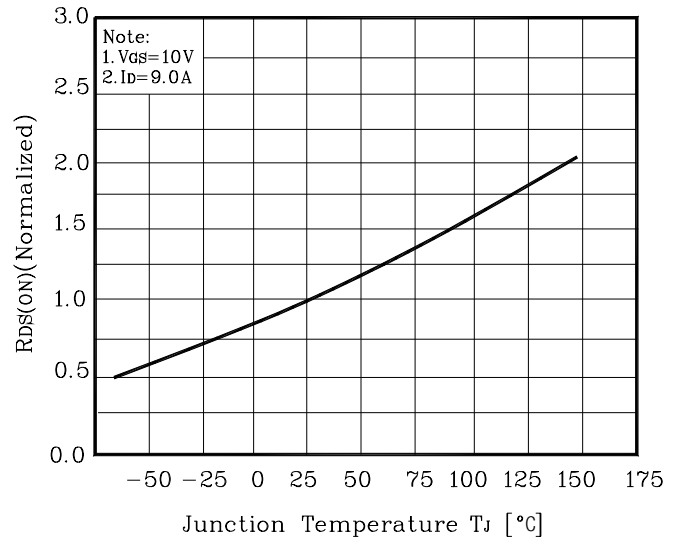
**Fig. 6  $V_{GS} - Q_G$**



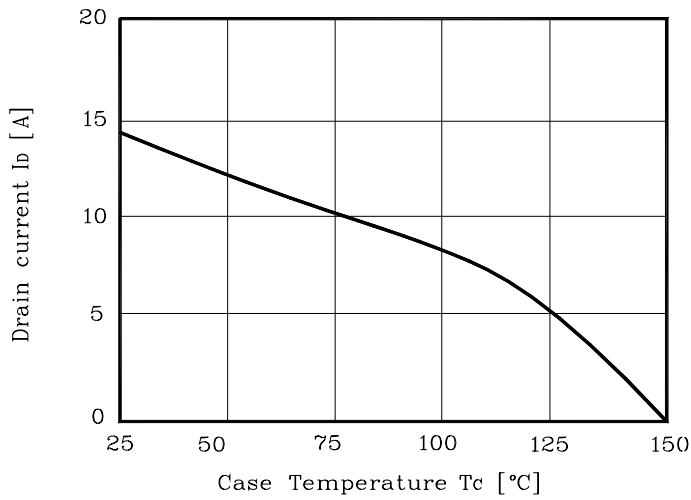
**Fig. 7  $V_{DSS} - T_J$**



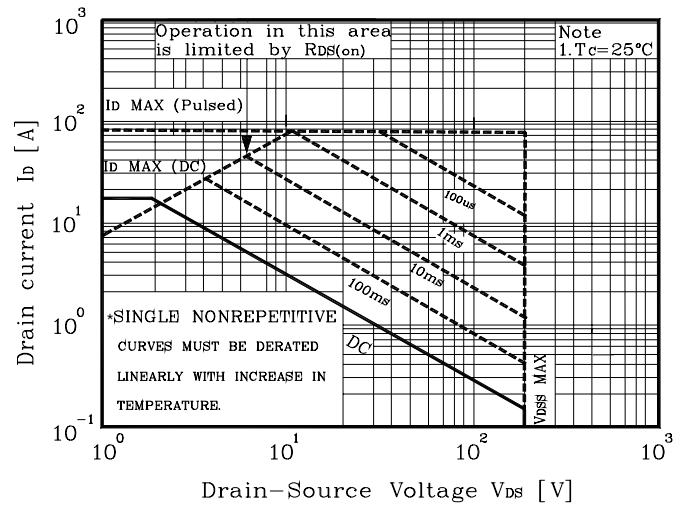
**Fig. 8  $R_{DS(on)} - T_J$**



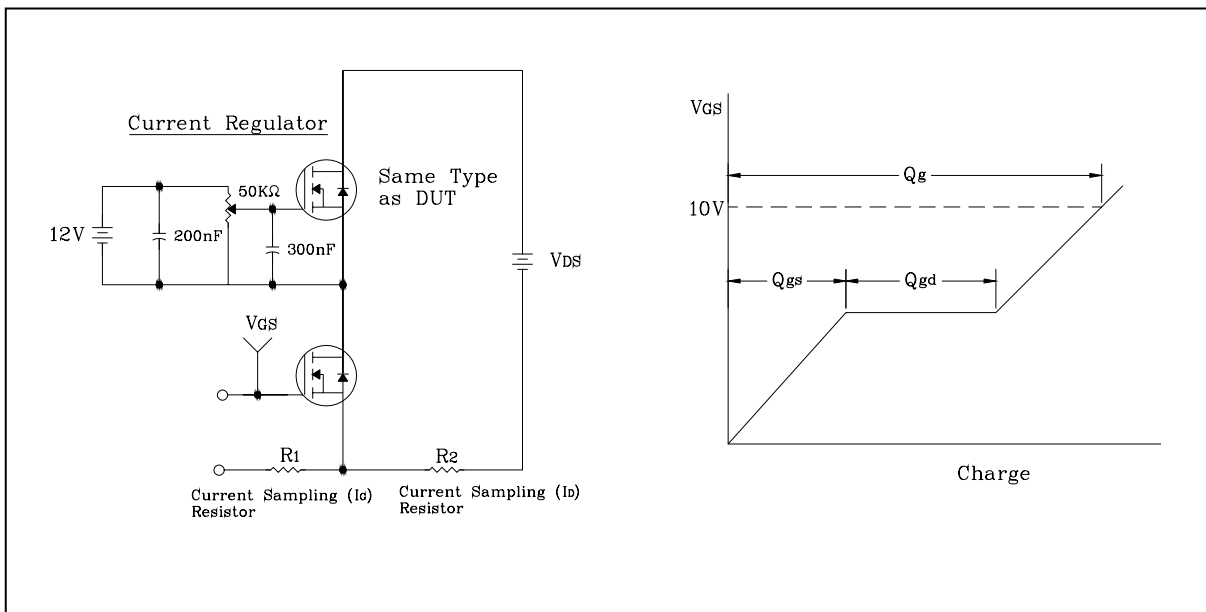
**Fig. 9  $I_D - T_C$**



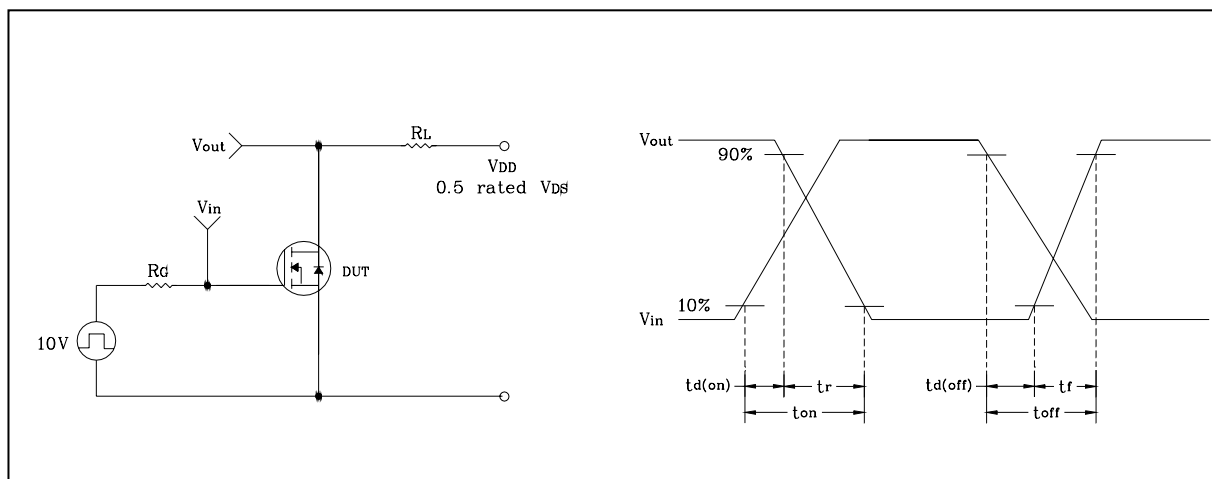
**Fig. 10 Safe Operating Area**



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



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



**Fig. 13 E<sub>AS</sub> Test Circuit & Waveform**

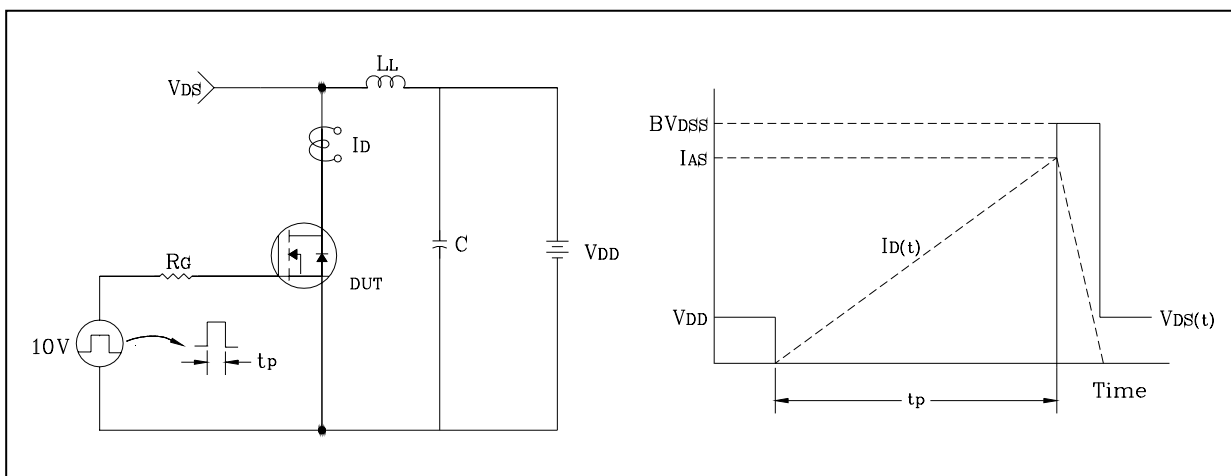
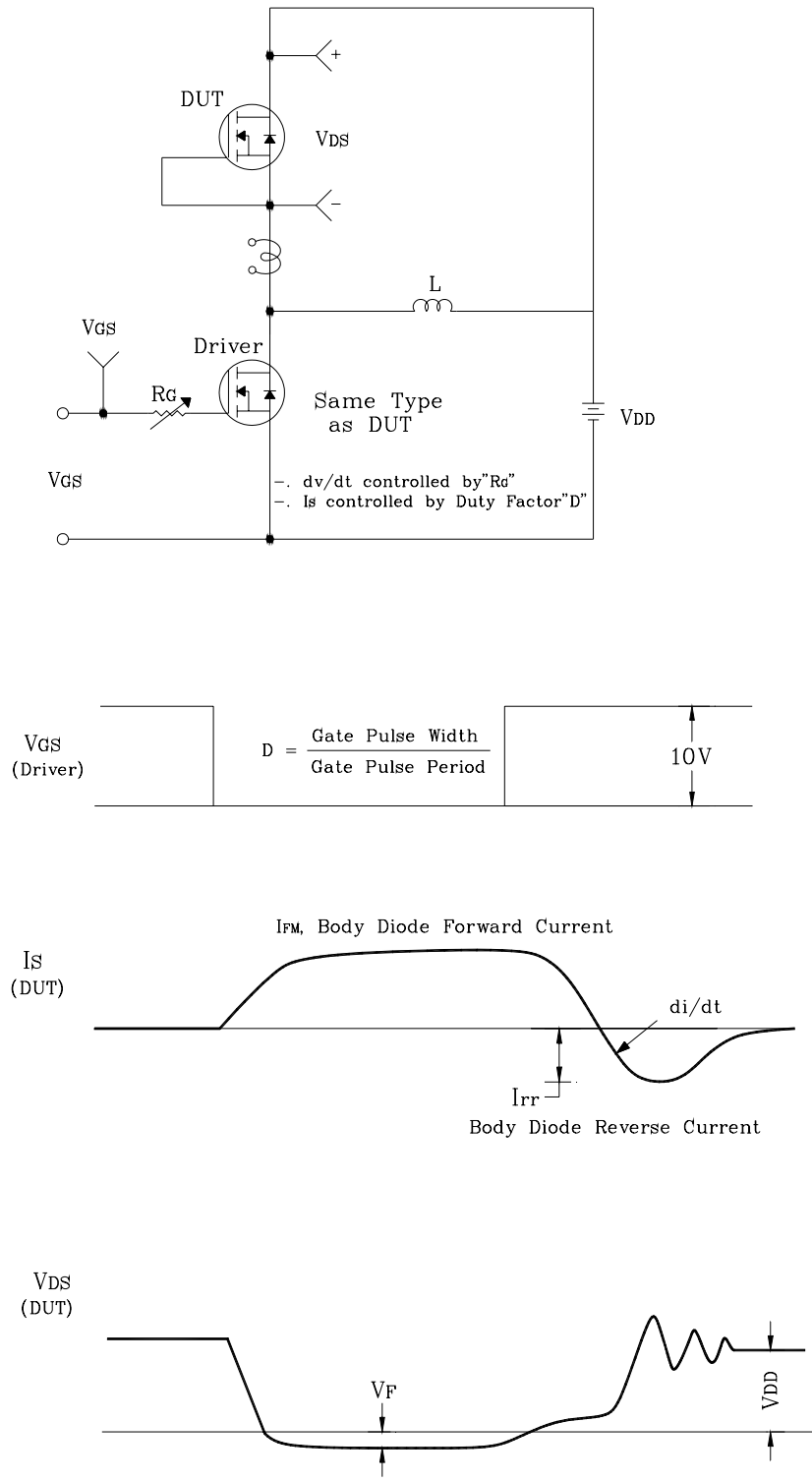


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



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