

## SWITCHING REGULATOR APPLICATIONS

### Features

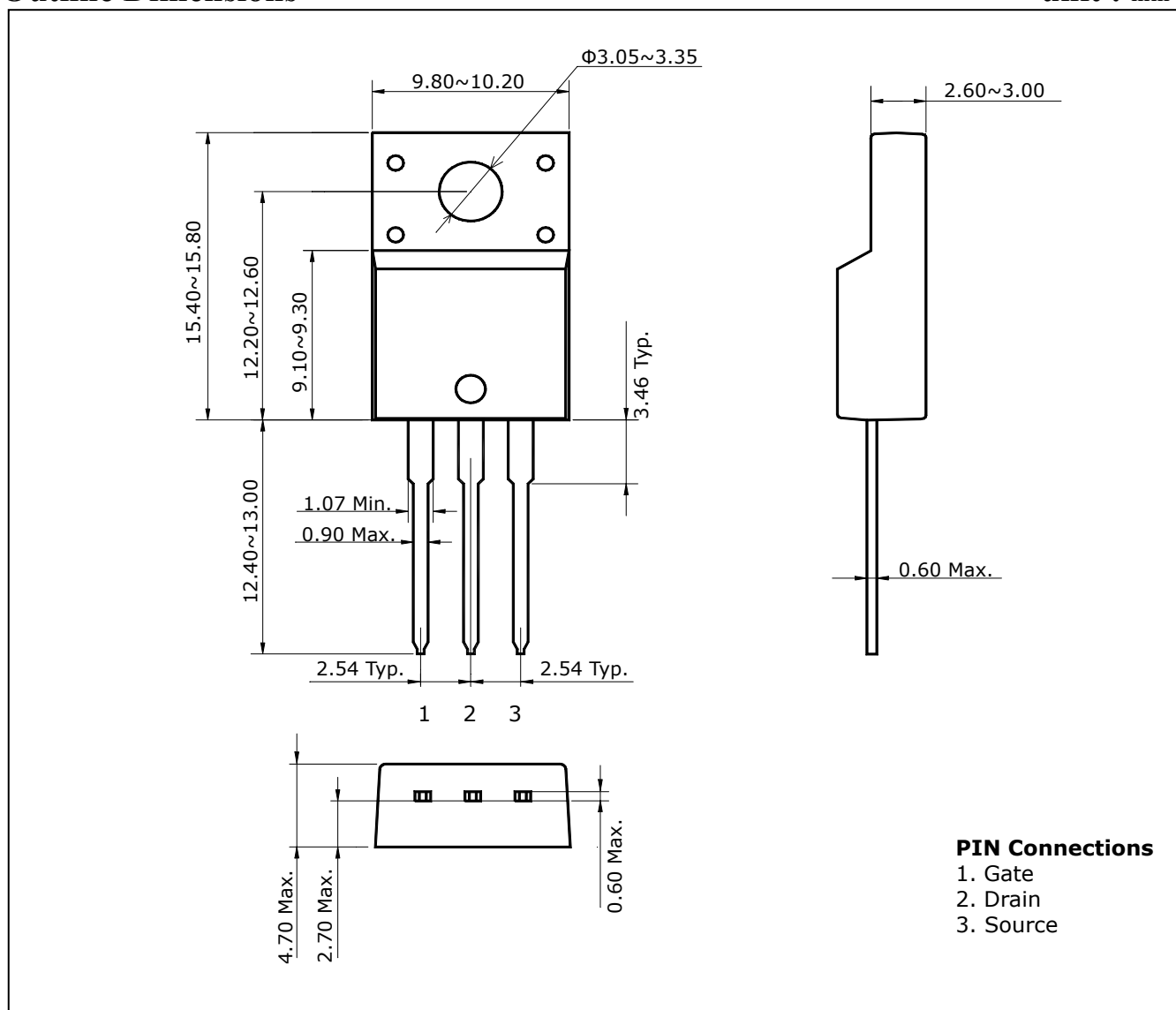
- High Voltage:  $BV_{DSS}=600V(\text{Min.})$
- Low  $C_{rss}$  :  $C_{rss}=7.5pF(\text{Typ.})$
- Low gate charge :  $Q_g=16nC(\text{Typ.})$
- Low  $R_{DS(on)}$  :  $R_{DS(on)}=2.5\Omega(\text{Max.})$

### Ordering Information

Type NO.	Marking	Package Code
STK0460F	STK0460	TO-220F-3L

### Outline Dimensions

unit : mm



**Absolute maximum ratings**
**(Tc=25°C)**

Characteristic	Symbol	Rating	Unit
Drain-source voltage	$V_{DSS}$	600	V
Gate-source voltage	$V_{GSS}$	±30	V
Drain current (DC)	$I_D$	(Tc=25°C)	4
		(Tc=100°C)	2.2
Drain current (Pulsed) *	$I_{DM}$	16	A
Drain Power dissipation	$P_D$	25	W
Avalanche current (Single) ②	$I_{AS}$	4	A
Single pulsed avalanche energy ②	$E_{AS}$	150	mJ
Avalanche current (Repetitive) ①	$I_{AR}$	4	A
Repetitive avalanche energy ①	$E_{AR}$	7	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	$R_{th(J-C)}$	-	5.0	°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	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0$	600	-	-	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	$I_{DSS}$	$V_{DS}=600V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-source leakage	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 30V$	-	-	$\pm 100$	nA
Drain-Source on-resistance ④	$R_{DS(on)}$	$V_{GS}=10V, I_D=2.0A$	-	1.9	2.5	$\Omega$
Forward transfer admittance ④	$g_{fs}$	$V_{DS}=10V, I_D=2.0A$	-	3.0	-	S
Input capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=25V, f=1MHz$	-	520	780	pF
Output capacitance	$C_{oss}$		-	35	53	
Reverse transfer capacitance	$C_{rss}$		-	7.5	12	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=300V, I_D=4A$ $R_G=25\Omega$ ③④	-	10	-	ns
Rise time	$t_r$		-	42	-	
Turn-off delay time	$t_{d(off)}$		-	38	-	
Fall time	$t_f$		-	46	-	
Total gate charge	$Q_g$	$V_{DS}=300V, V_{GS}=10V$ $I_D=4A$ ③④	-	16	24	nC
Gate-source charge	$Q_{gs}$		-	2.8	4.2	
Gate-drain charge	$Q_{gd}$		-	5.5	8.3	

## 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	-	-	4	A
Source current (Pulsed) ①	$I_{SM}$		-	-	16	
Forward voltage ④	$V_{SD}$	$V_{GS}=0V, I_S=4A$	-	-	1.4	V
Reverse recovery time	$t_{rr}$	$I_S=4A$ $di_s/dt=100A/us$	-	310	-	ns
Reverse recovery charge	$Q_{rr}$		-	2.26	-	$\mu C$

Note ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ②  $L=17mH, I_{AS}=4A, V_{DD}=50V, R_G=27\Omega$
- ③ Pulse Test : Pulse Width < 300us, Duty cycle ≤ 2%
- ④ Essentially independent of operating temperature

## Electrical Characteristic Curves

Fig. 1  $I_D - V_{DS}$

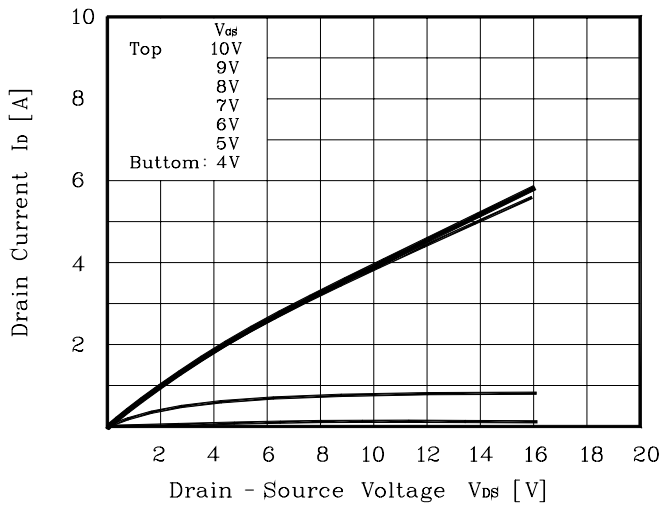


Fig. 2  $I_D - V_{GS}$

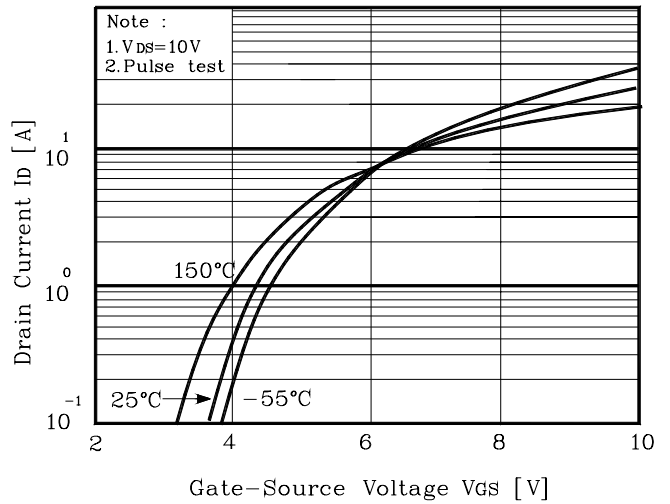


Fig. 3  $R_{DS(on)} - I_D$

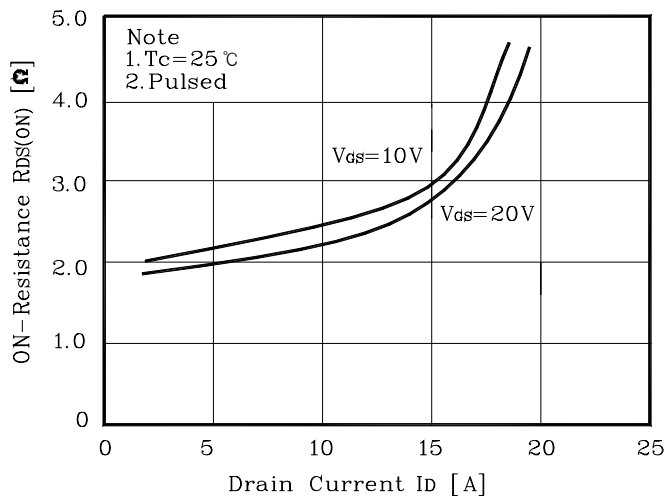


Fig. 4  $I_S - V_{SD}$

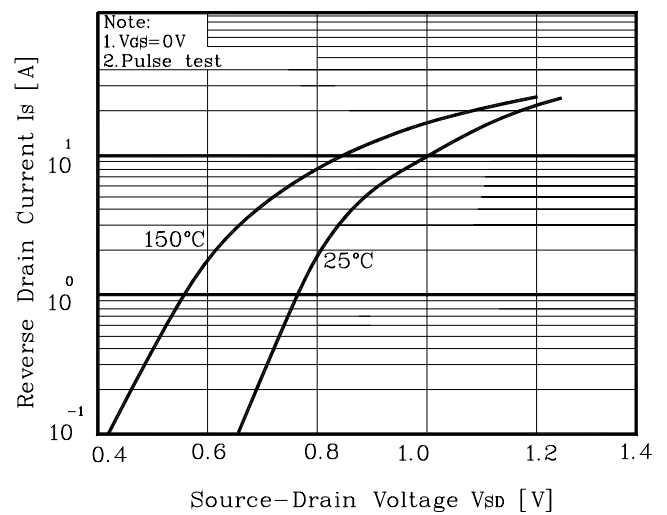


Fig. 5 Capacitance -  $V_{DS}$

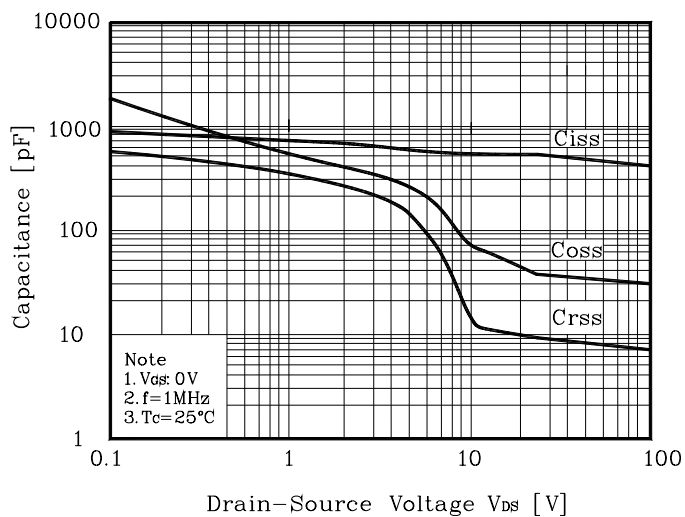


Fig. 6  $V_{GS} - Q_G$

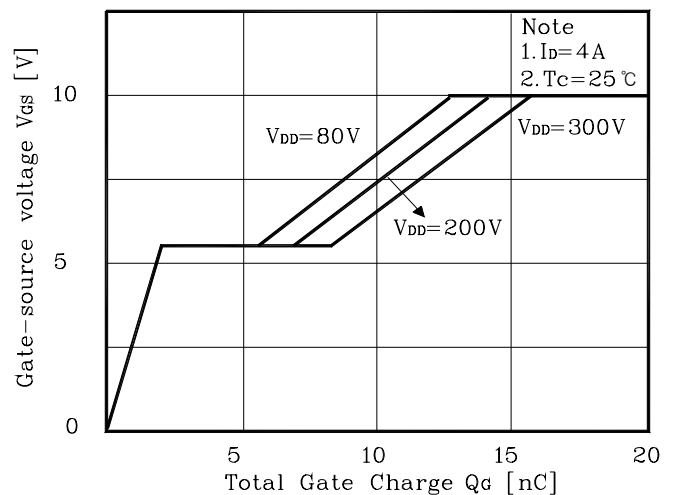


Fig. 7  $V_{DS} - T_J$

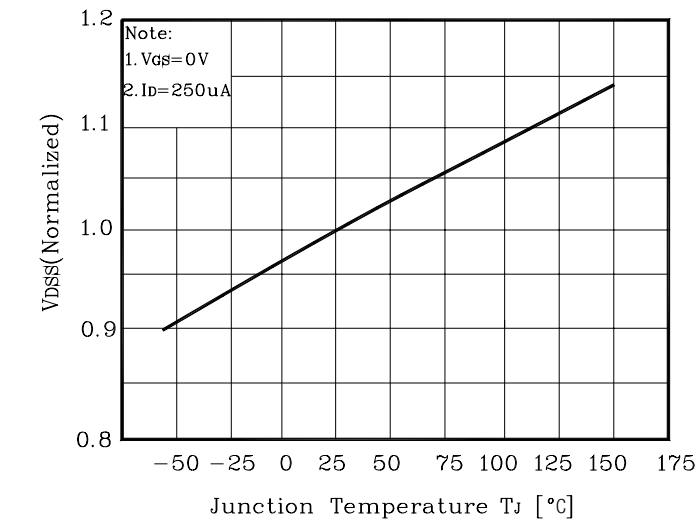


Fig. 8  $R_{DS(on)} - T_J$

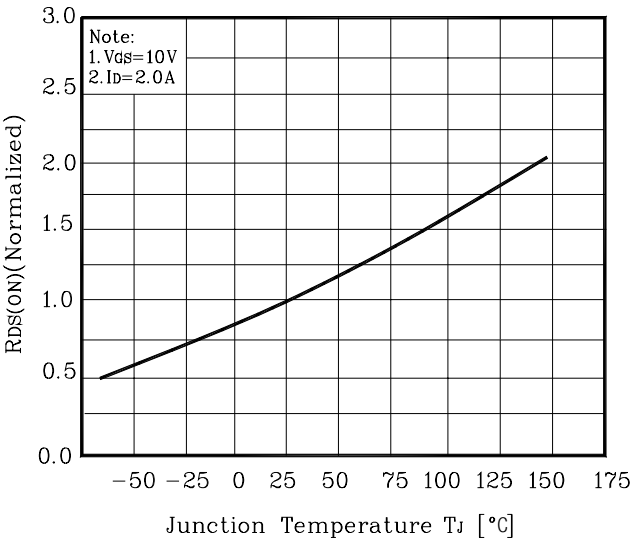


Fig. 9  $I_D - T_C$

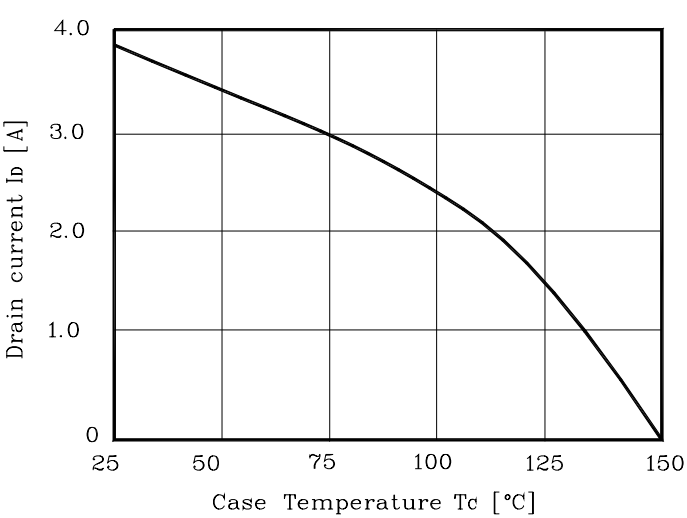
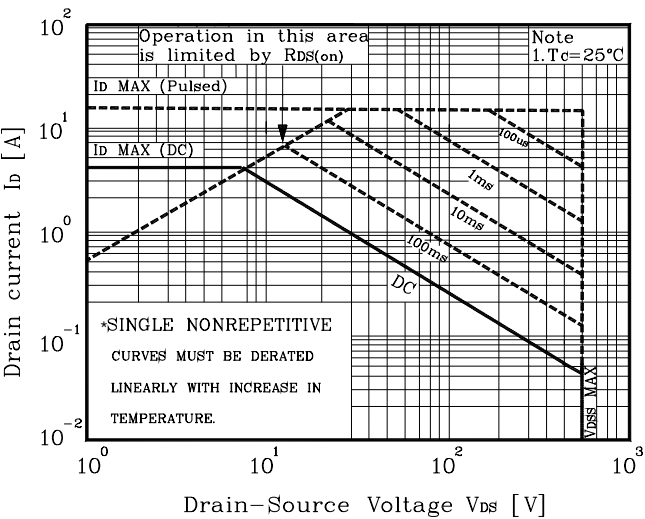
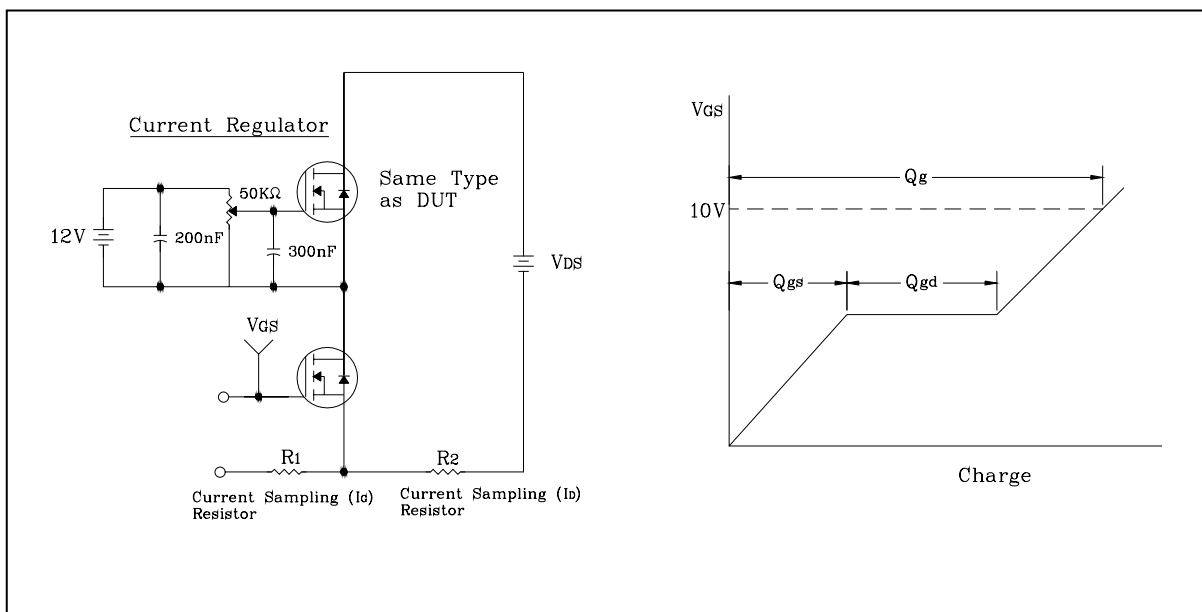


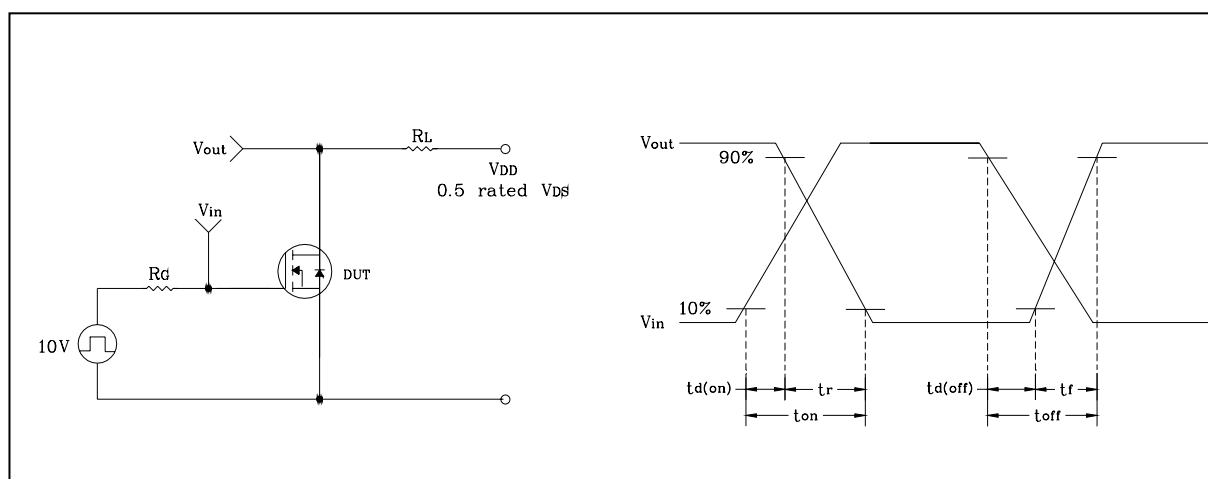
Fig. 10 Safe Operating Area



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



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



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

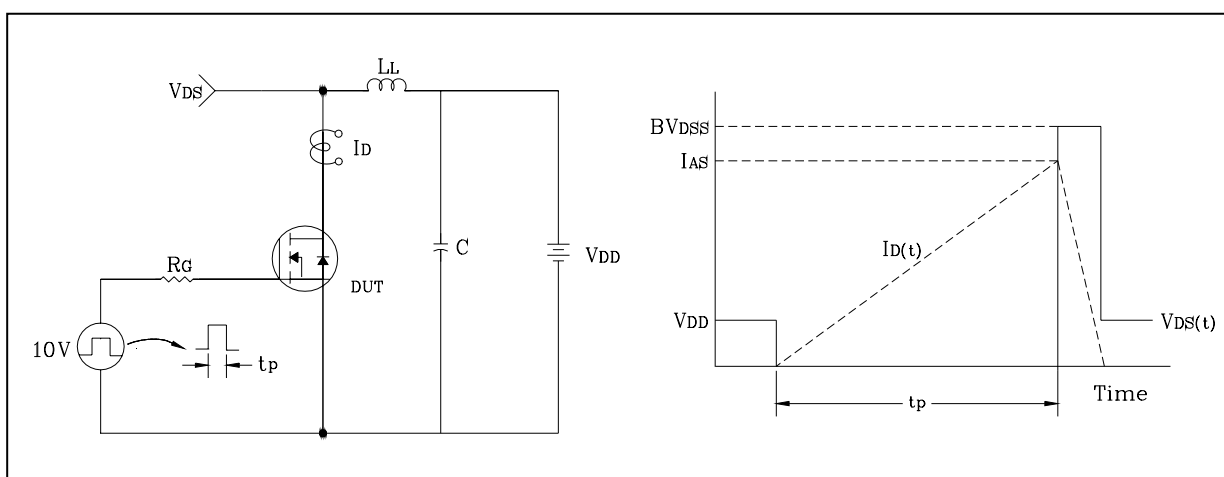
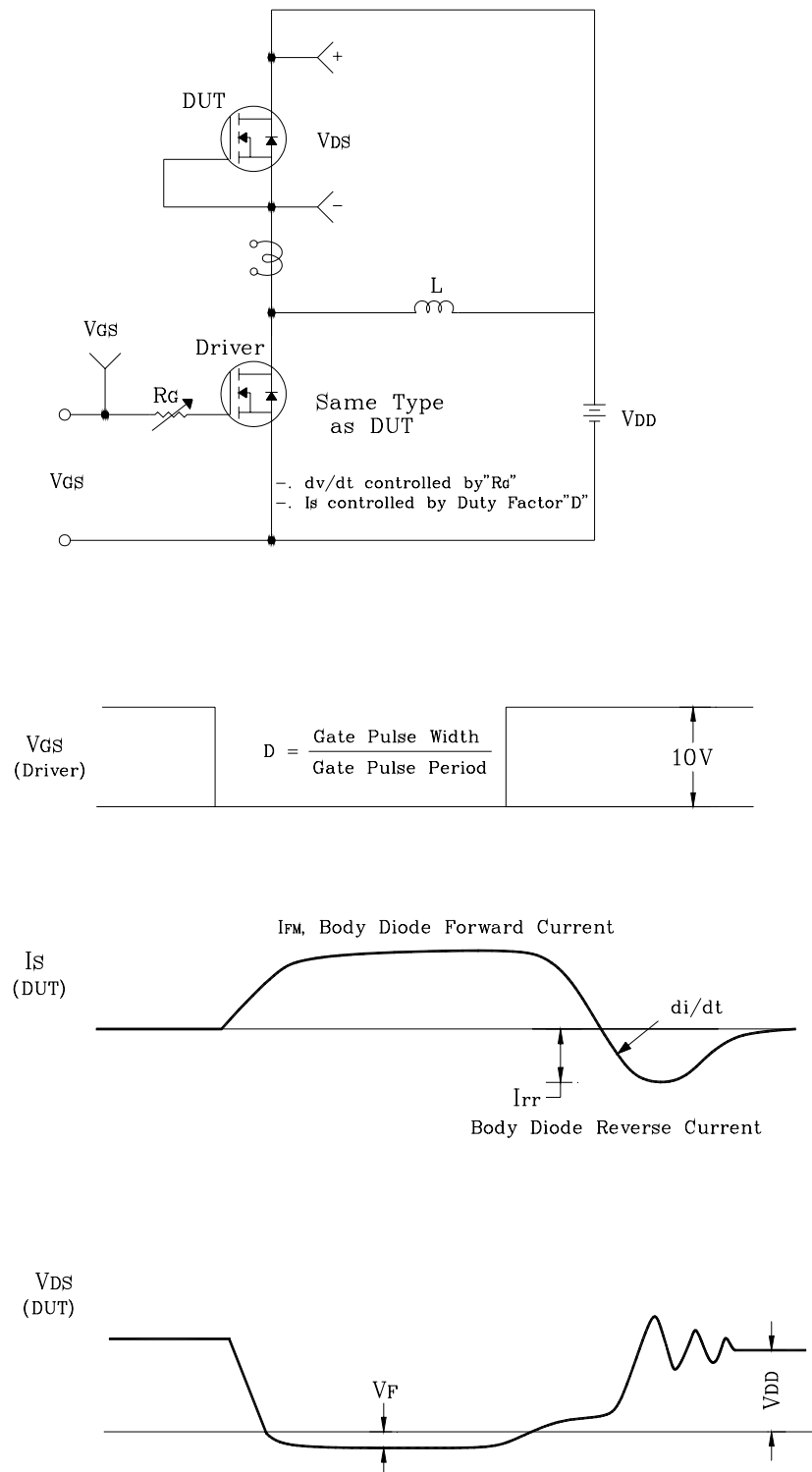


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



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