

SWITCHING REGURATOR APPLICATIONS

Features

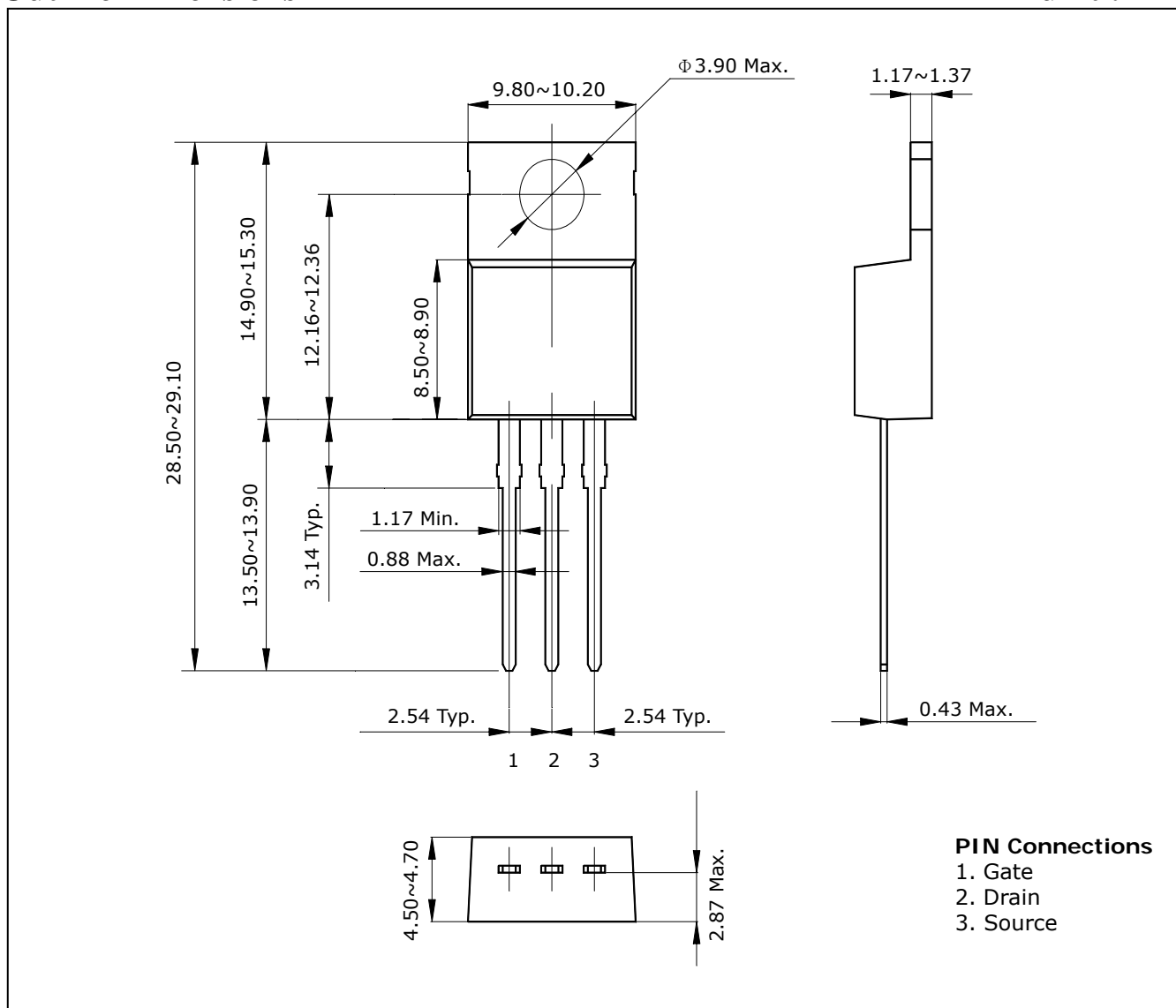
- High Voltage: $BV_{DSS}=60V(\text{Min.})$
- Low C_{rSS} : $C_{rSS}=84pF(\text{Typ.})$
- Low gate charge : $Qg=26.7nC(\text{Typ.})$
- Low $R_{DS(on)}$: $R_{DS(on)}=25m\Omega(\text{Max.})$

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	μA	
Gate-source leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA	
Drain-Source on-resistance ④	$R_{DS(ON)}$	$V_{GS}=10V, I_D=25A$	-	18	22	m Ω	
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 $I_D - V_{DS}$

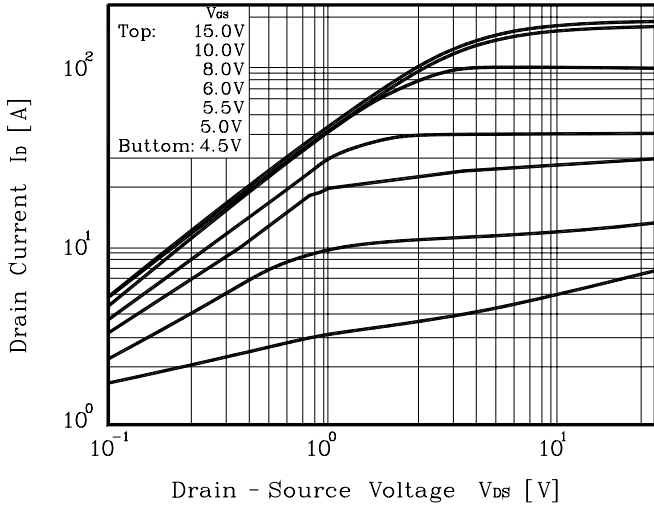


Fig. 2 $I_D - V_{GS}$

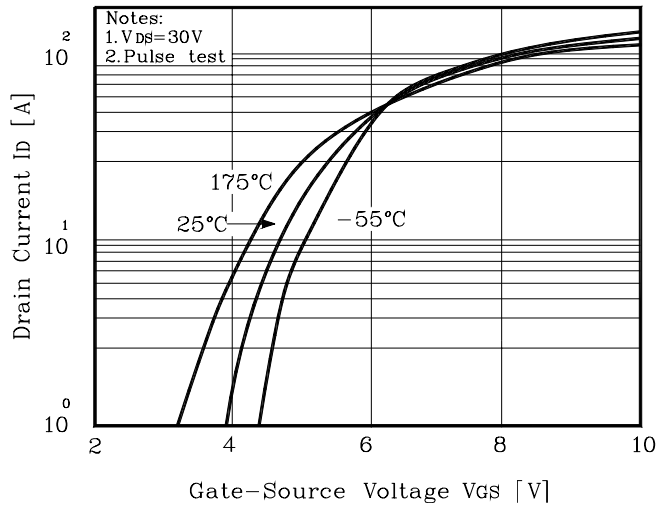


Fig. 3 $R_{DS(on)} - I_D$

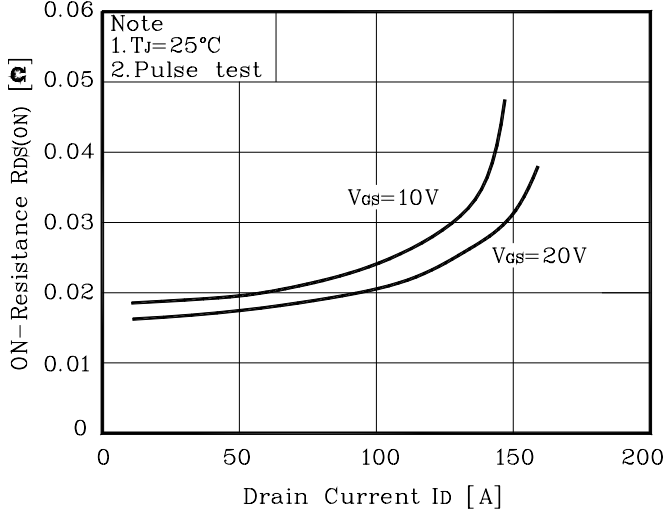


Fig. 4 $I_S - V_{SD}$

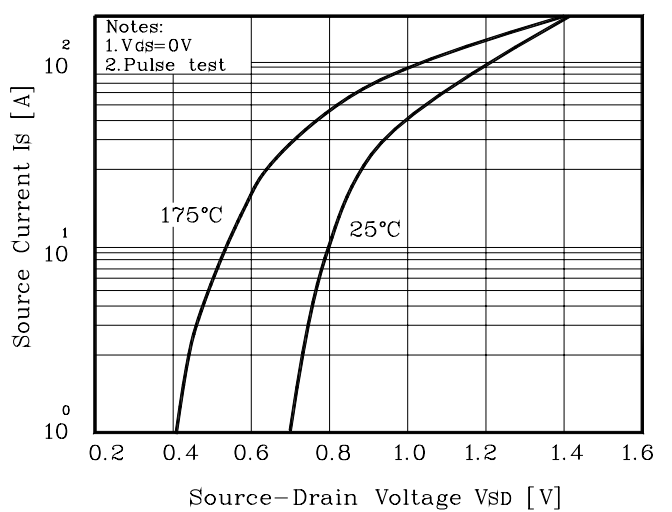


Fig. 5 Capacitance - V_{DS}

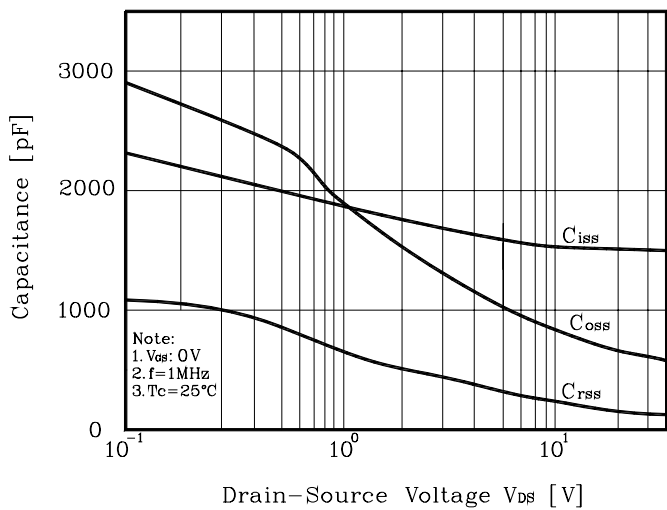


Fig. 6 $V_{GS} - Q_G$

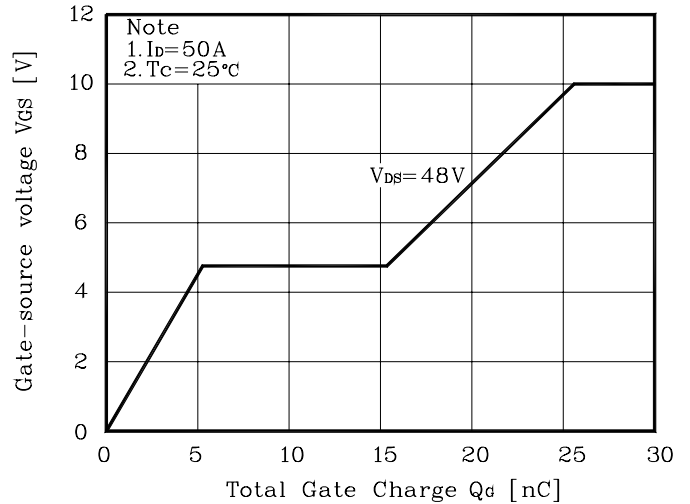


Fig. 7 $V_{DSS} - T_J$

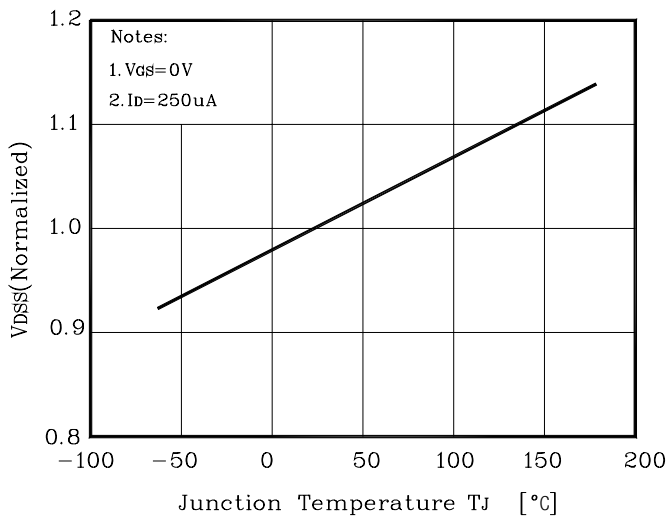


Fig. 8 $R_{DS(on)} - T_J$

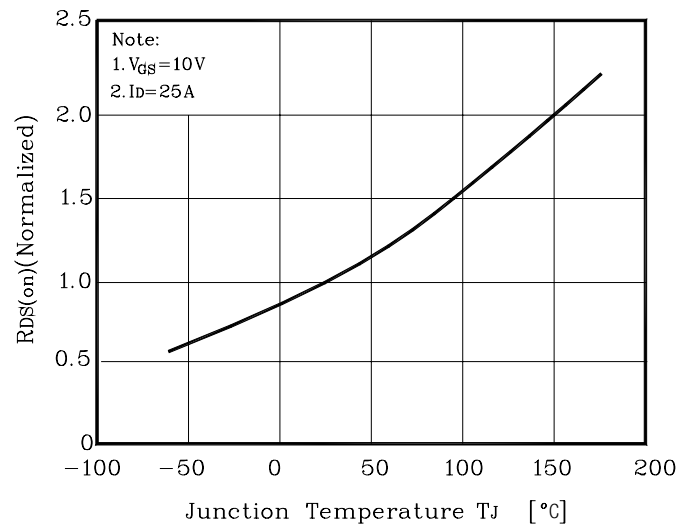


Fig. 9 $I_D - T_C$

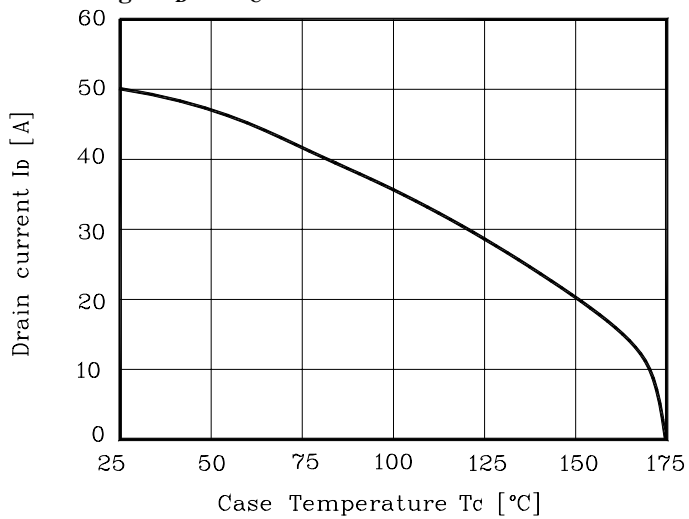


Fig. 10 Safe Operating Area

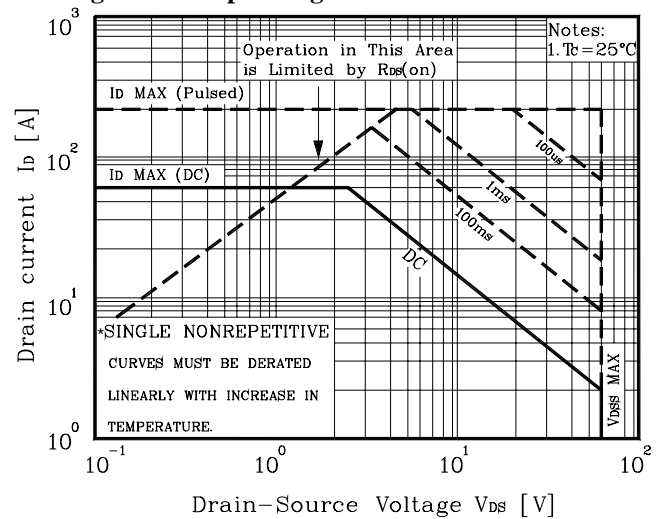


Fig. 10 Gate Charge Test Circuit & Waveform

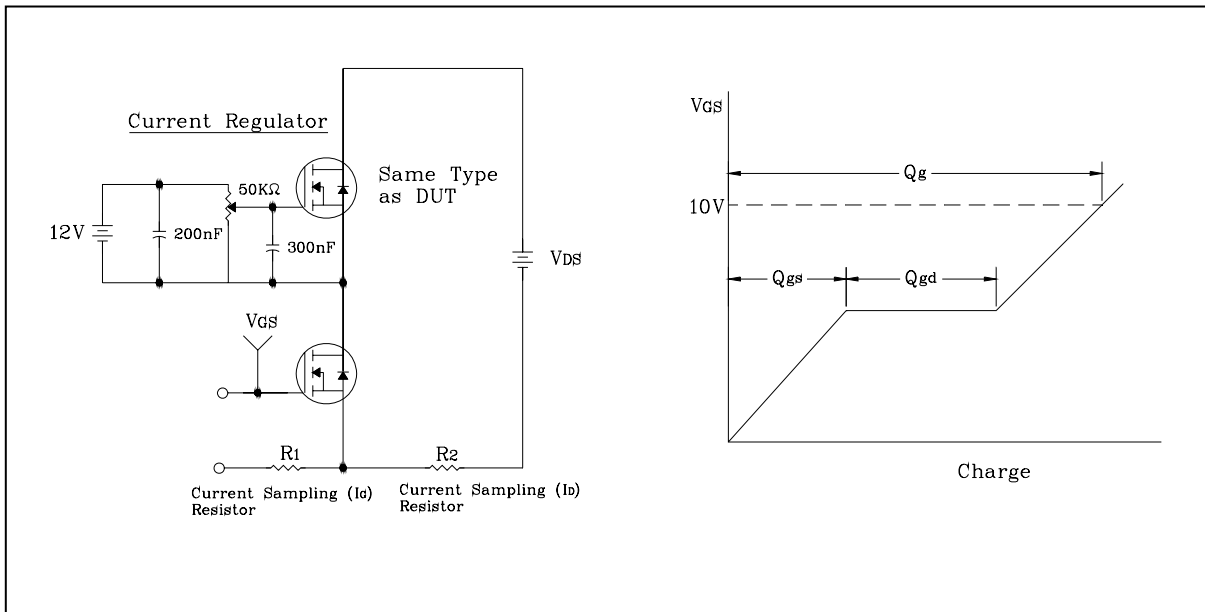


Fig. 11 Resistive Switching Test Circuit & Waveform

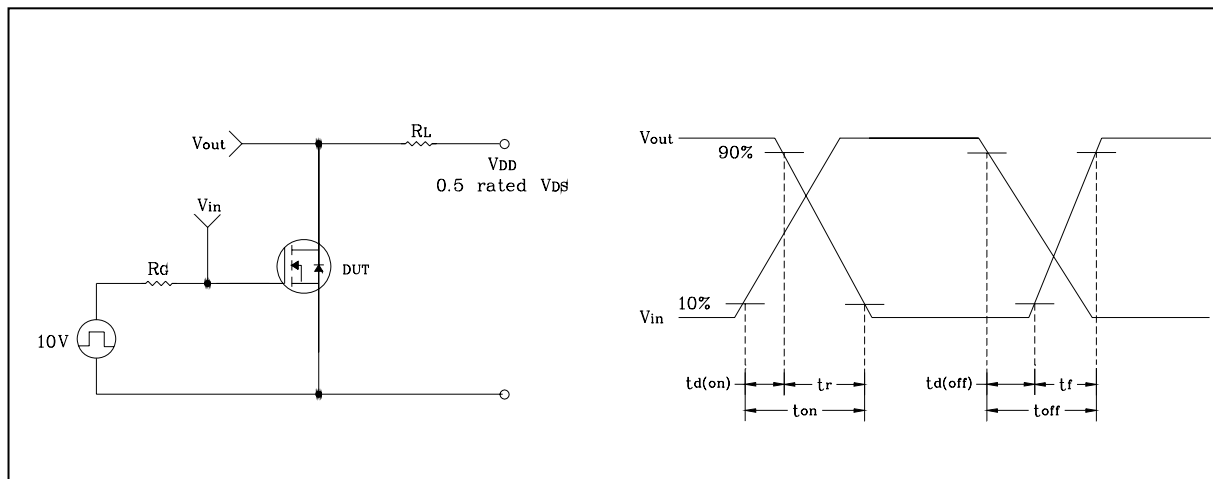


Fig. 12 E_{AS} Test Circuit & Waveform

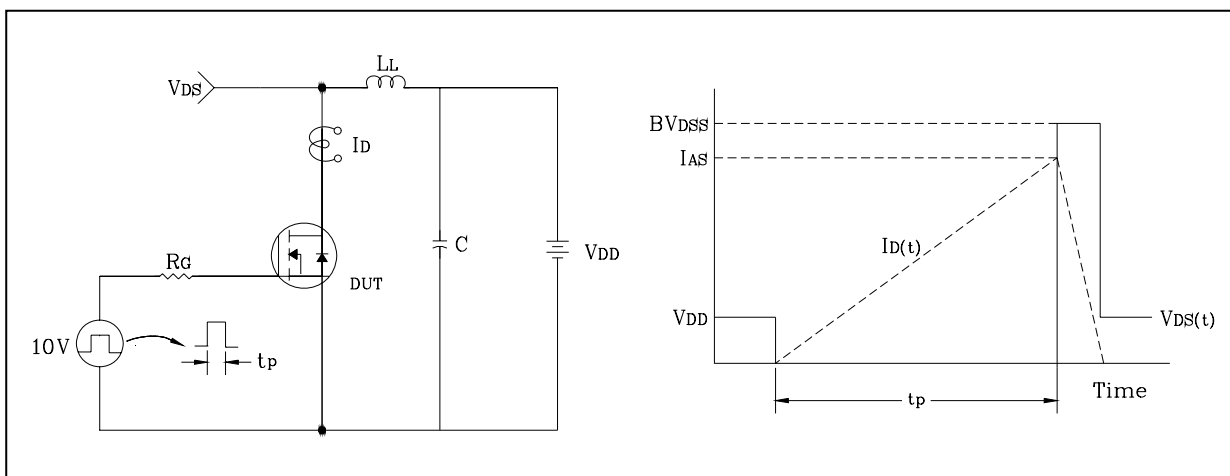
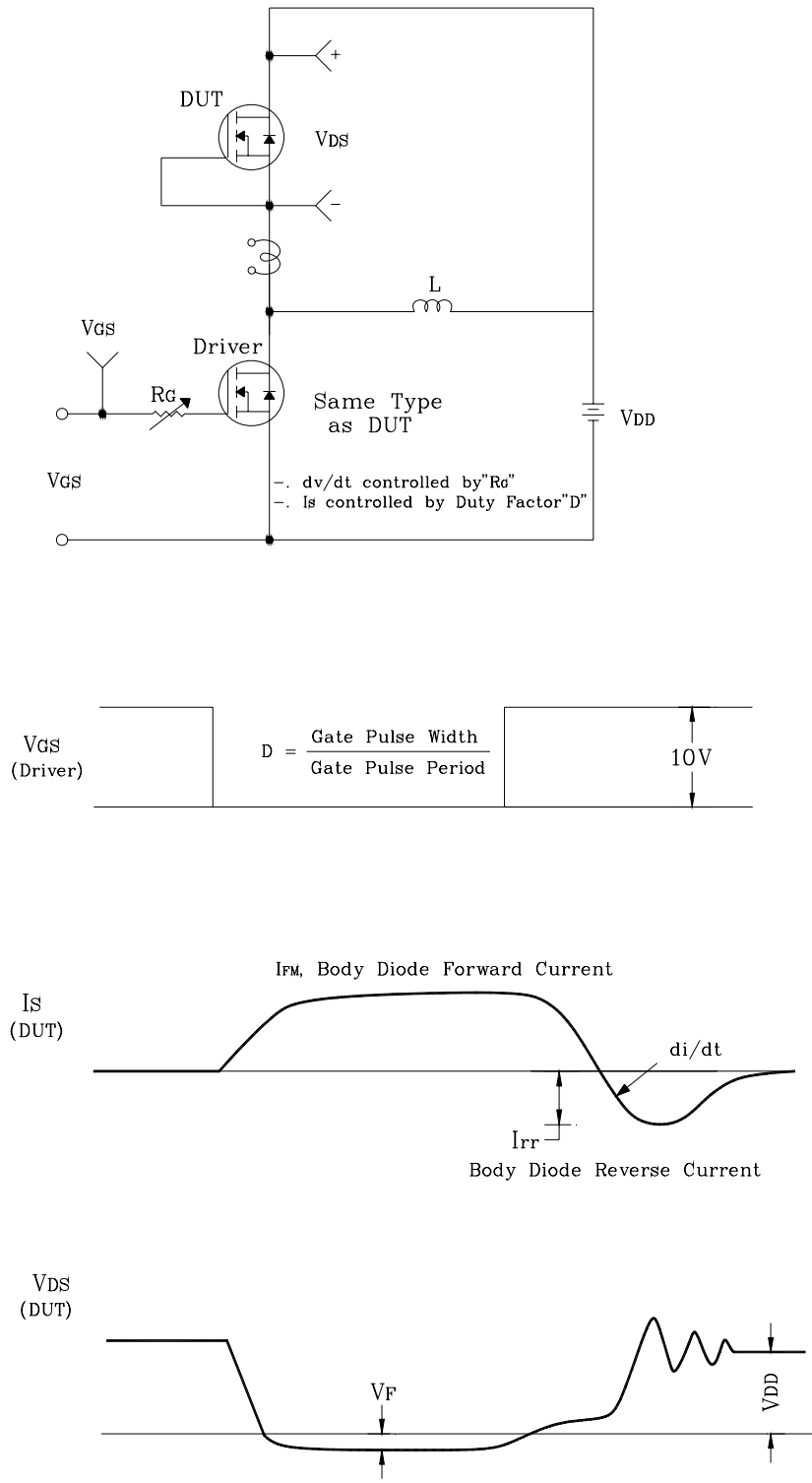


Fig. 13 Diode Reverse Recovery Time Test Circuit & Waveform



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