

Features

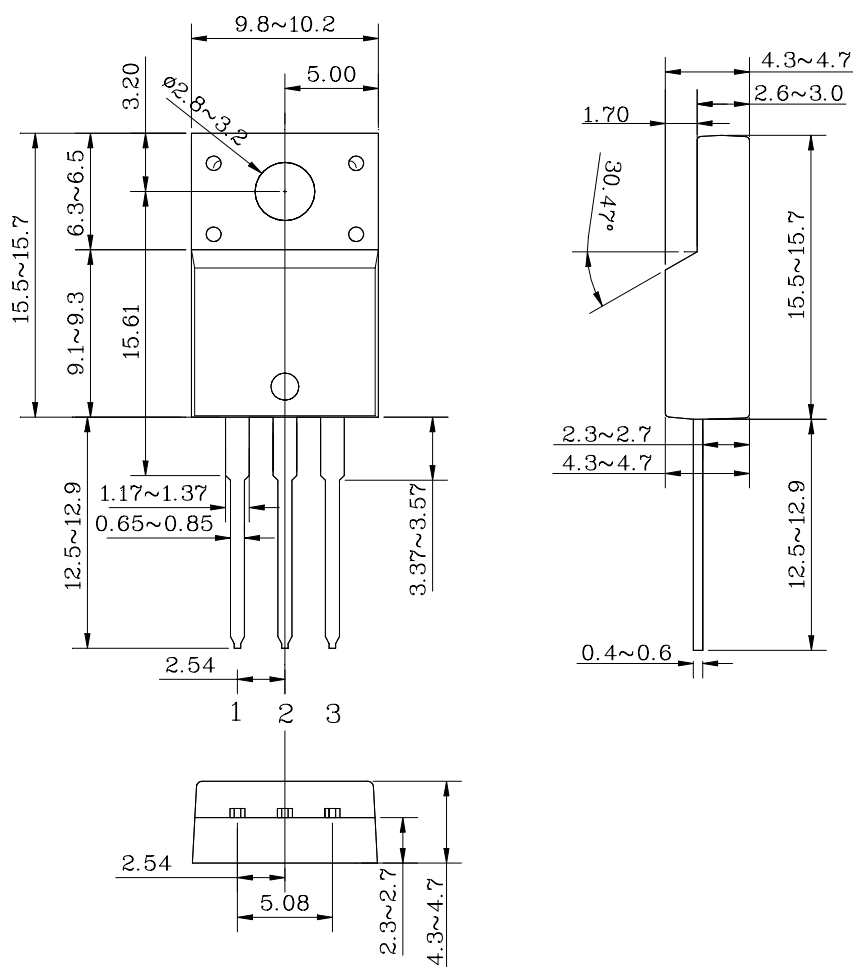
- Avalanche rugged technology.
- Low input capacitance.
- Improved gate charge.
- Low leakage current : 10uA (Max.) @ $V_{DS}=500V$.
- Low $R_{DS(ON)}$: 1.17Ω (Typ.)

Ordering Information

Type NO.	Marking	Package Code
STK830F	STK830	TO-220F

Outline Dimensions

unit : mm



PIN Connections

1. Gate
2. Drain
3. Source

Absolute maximum ratings

Characteristic	Symbol	Rating	Unit
Drain-Source voltage	V_{DSS}	500	V
Gate-Source voltage	V_{GS}	± 30	V
Continuous Drain current ($T_c=25^\circ\text{C}$)	I_D	4.5*	A
Continuous Drain current ($T_c=100^\circ\text{C}$)	I_D	2.9*	A
Drain Current-Pulsed ①	I_{DM}	18	A
Power Dissipation ($T_c=25^\circ\text{C}$)	P_D	38	W
Linear Derating Factor		0.3	W/ $^\circ\text{C}$
Single Pulsed Avalanche Energy ②	E_{AS}	270	mJ
Avalanche current ①	I_{AR}	4.5	A
Repetitive Avalanche Energy ①	E_{AR}	7.3	mJ
Peak Diode Recovery dv/dt	dv/dt	5.5	V/ns
Operating Junction and Storage temperature range	T_J, T_{stg}	-55~150	$^\circ\text{C}$
Maximum lead temp. for soldering Purpose, 1/8" from case for 5-seconds	T_L	300	$^\circ\text{C}$

* Limited by Maximum junction Temperature

Thermal Resistance

Characteristic	Symbol	Typ.	Max	Units
Junction-to-Case	$R_{\theta JC}$		3.31	$^\circ\text{C}/\text{W}$
Case-to-Sink	$R_{\theta CS}$	0.5		
Junction-to-Ambient	$R_{\theta JA}$		62.5	

Electrical Characteristics (Tc=25°C unless otherwise specified)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-Source breakdown voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0$	500			V
Gate-Threshold voltage	$V_{GS(th)}$	$I_D=250\mu A, V_{DS}=5V$	2.0		4.0	V
Drain-source leakage current	I_{DSS}	$V_{DS}=500V$			10	μA
Gate-source leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 30V$			± 100	nA
Drain-Source on-resistance ④	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2.25A$			1.5	Ω
Forward transconductance ④	g_{fs}	$V_{DS}=50V, I_D=2.25A$		3.87		S
Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=25V, f=1MHz$		760	900	pF
Output capacitance	C_{oss}			85	100	
Reverse transfer capacitance	C_{rss}			15	22	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=250V, I_D=4.5A$ $R_G=12\Omega$ ④ ⑤		15	40	ns
Rise time	t_r			16	40	
Turn-off delay time	$t_{d(off)}$			66	140	
Fall time	t_f			22	55	
Total gate charge	Q_g	$V_{DS}=400V, V_{GS}=10V,$ $I_D=4.5A$ ④ ⑤		33	43	nC
Gate-source charge	Q_{gs}			4.4		
Gate-drain("Miller")charge	Q_{gd}			16.6		

Source-Drain Diode Ratings and Characteristics

Characteristic	Symbol	Test Condition	Min	Typ	Max	Units
Continuous source current	I_S	Integral reverse pn-diode in the MOSFET			4.5	A
Pulsed-source current ①	I_{SM}				18	
Diode forward voltage ④	V_{SD}	$T_J=25^\circ C, V_{GS}=0V, I_S=4.5A$			1.4	V
Reverse recovery time	t_{rr}	$T_J=25^\circ C, I_F=4.5A$ $di_F/dt=100A/us$ ④		285		ns
Reverse recovery charge	Q_{rr}			2.0		μC

Note ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② $L=30mH, I_{AS}=4.5A, V_{DD}=50V, R_G=27\Omega$, starting $T_J=25^\circ C$
- ③ $I_{SD} \leq 4.5A, di/dt \leq 130A/us, V_{DD} \leq BV_{DSS}$, starting $T_J=25^\circ C$
- ④ Pulse Test : Pulse Width=250us, Duty cycle $\leq 2\%$
- ⑤ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1 $I_D - V_{DS}$

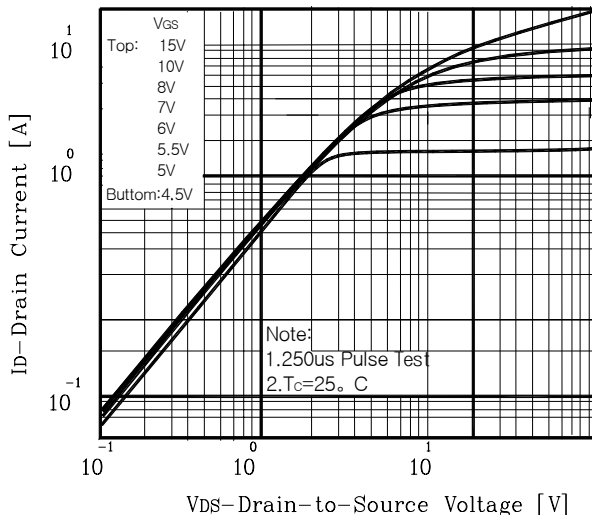


Fig. 2 $I_D - V_{GS}$

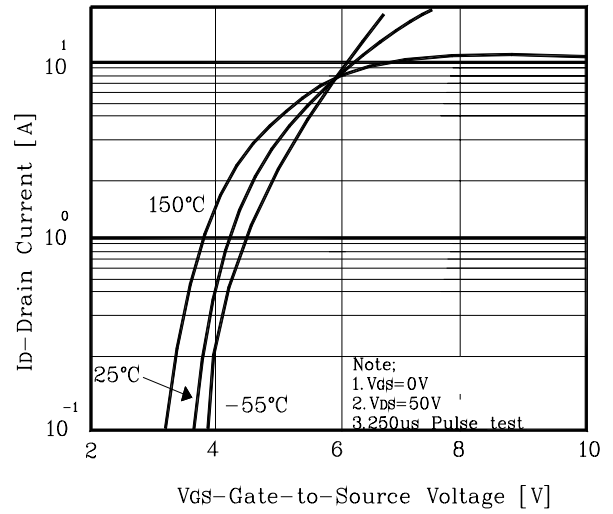


Fig. 3 $R_{DS(on)} - I_D$

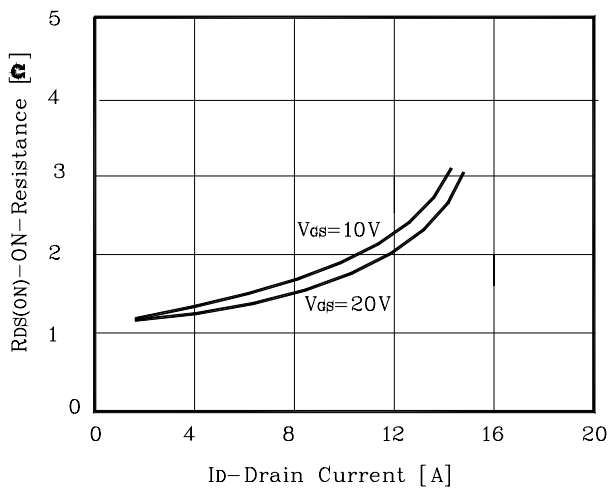


Fig. 4 $I_{DR} - V_{SD}$

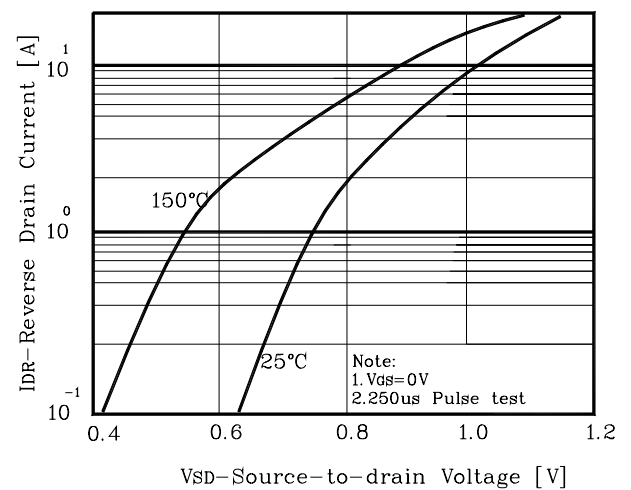


Fig. 5 Capacitance - V_{DS}

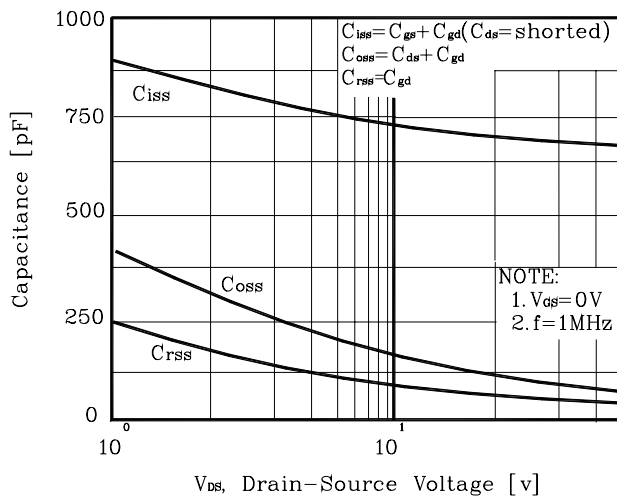


Fig. 6 $V_{GS} - Q_G$

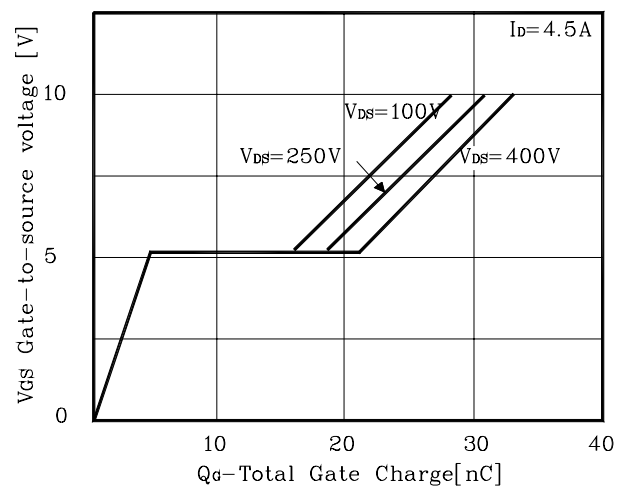


Fig. 7 $BV_{DSS} - T_J$

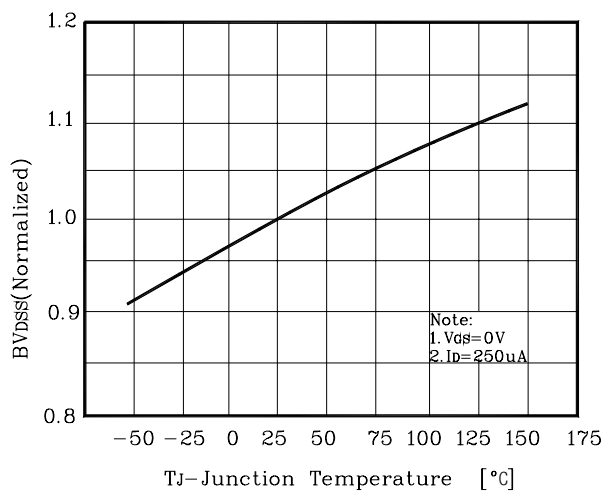


Fig. 8 $R_{DS(on)} - T_J$

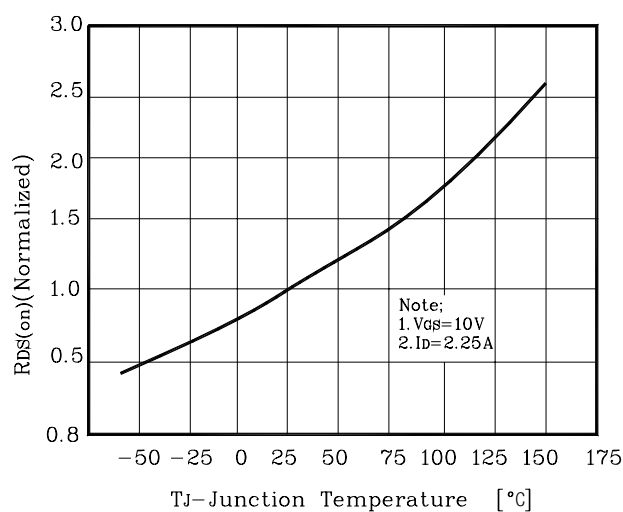


Fig. 9 $I_D - T_C$

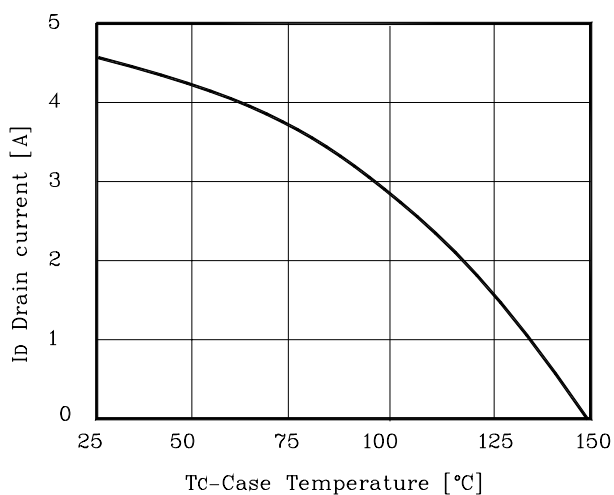


Fig. 10 Safe operating Area

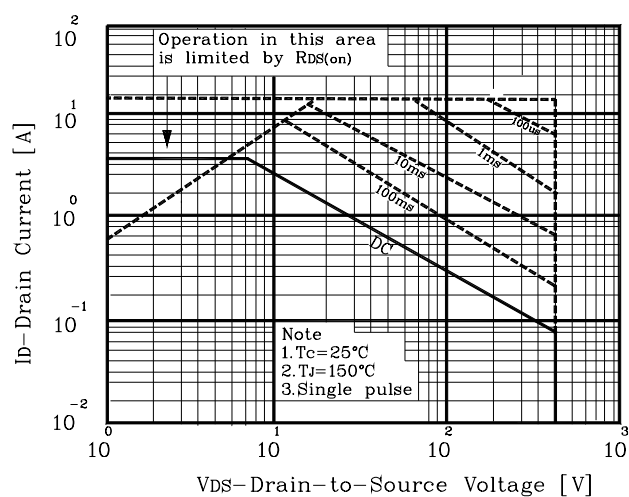


Fig. 11 Thermal Response

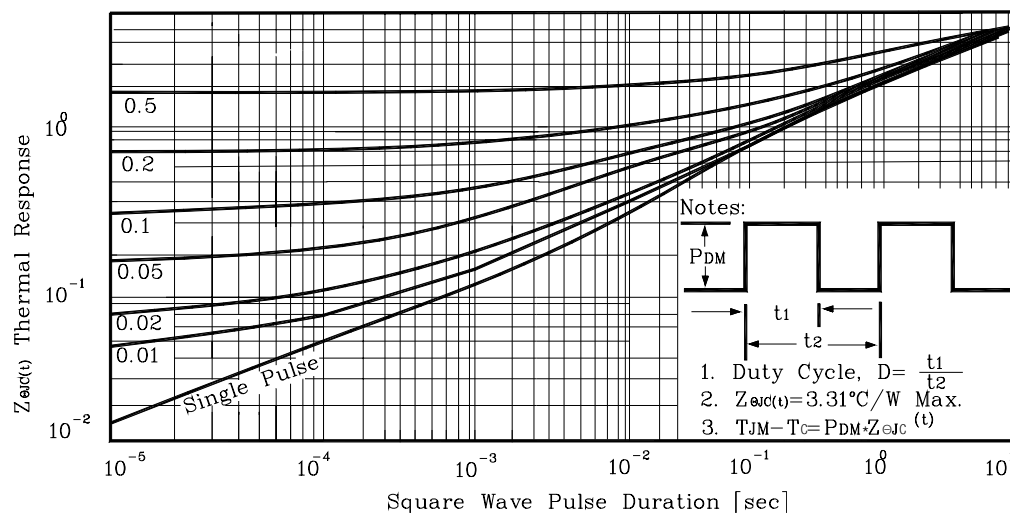


Fig. 12 Gate Charge Test Circuit & Waveform

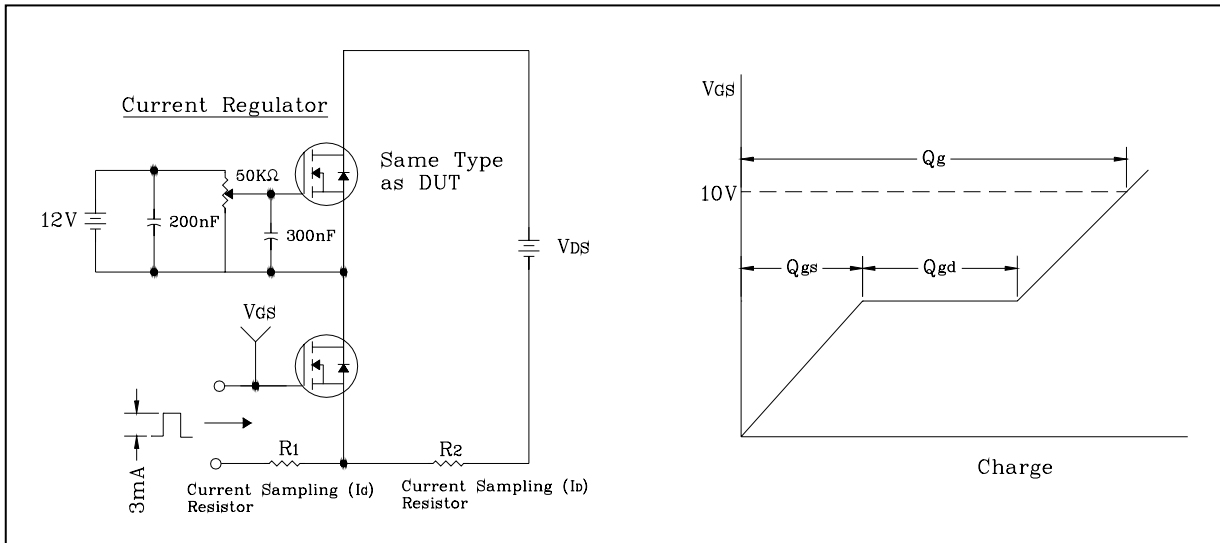


Fig. 13 Resistive Switching Test Circuit & Waveform

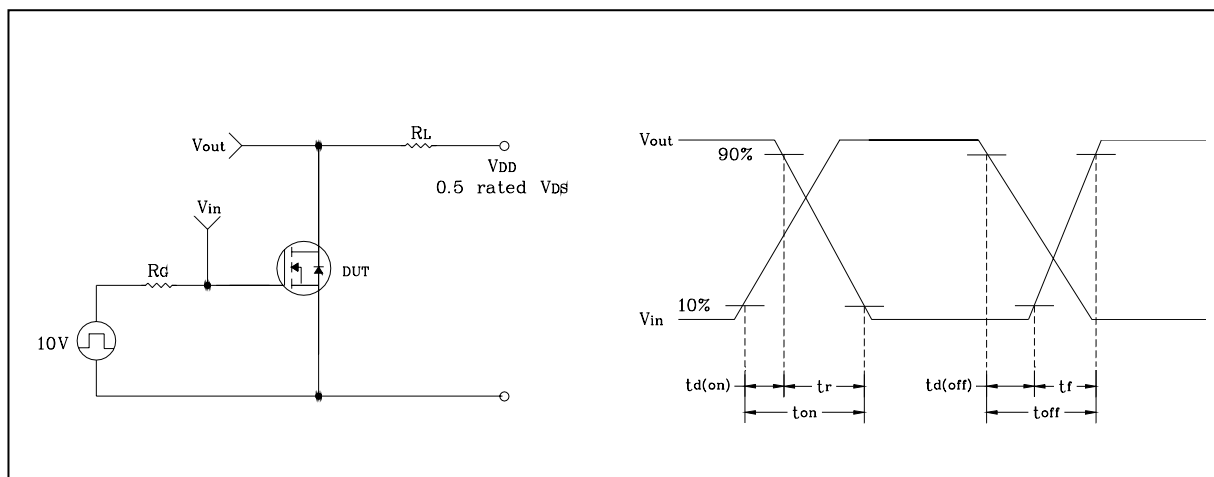


Fig. 14 Unclamped Inductive Switching Test Circuit & Waveform

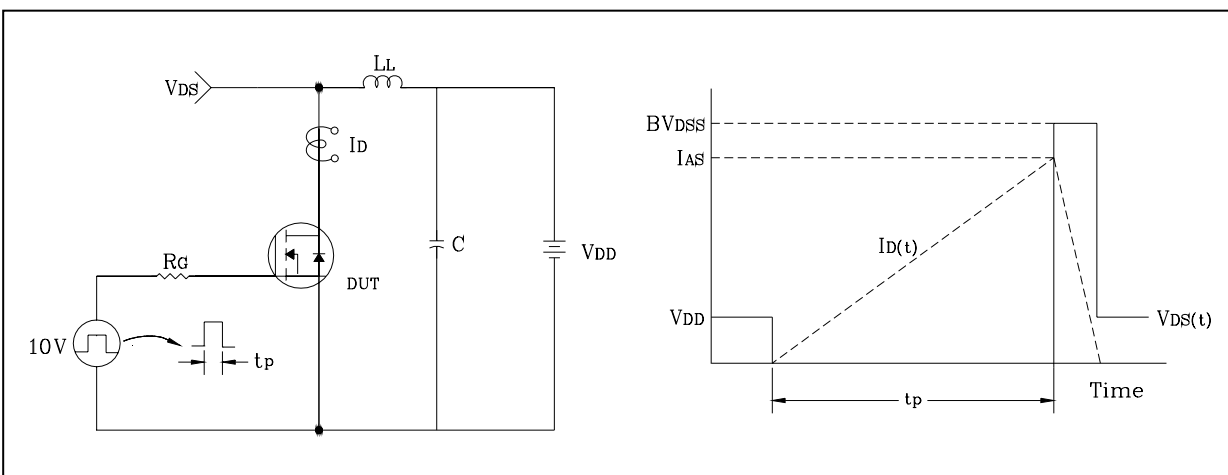
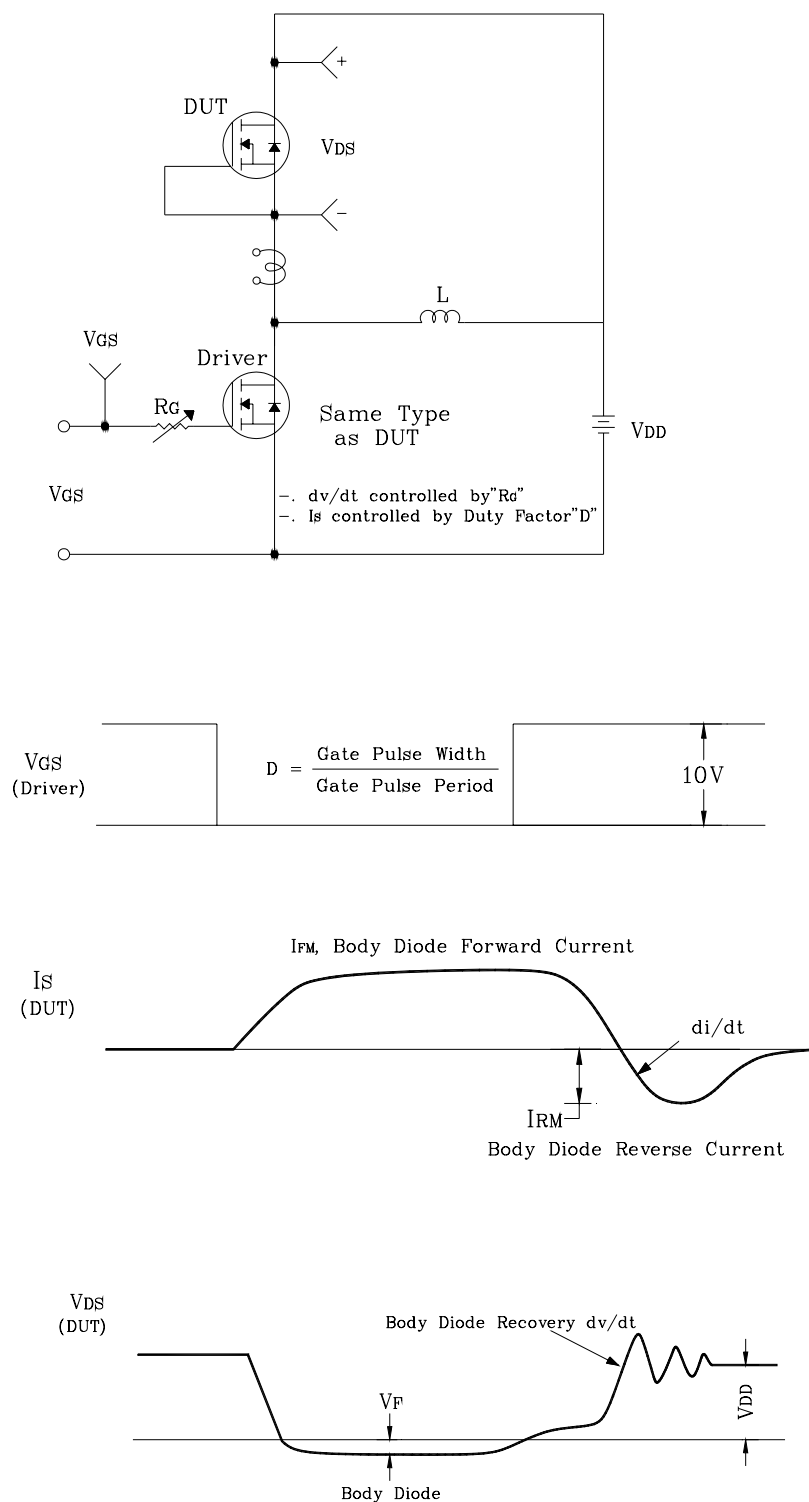


Fig. 15 Peak Diode Recovery dv/dt Test Circuit & Waveform



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