

SWITCHING REGULATOR APPLICATIONS

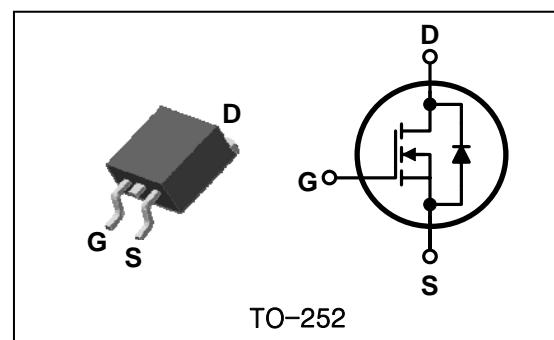
Features

- High Voltage : $BV_{DSS}=500V$ (Min.)
- Low C_{rss} : $C_{rss}=33pF$ (Typ.)
- Low gate charge : $Q_g=16nC$ (Typ.)
- Low $R_{DS(on)}$: $R_{DS(on)}=1.5\Omega$ (Max.)

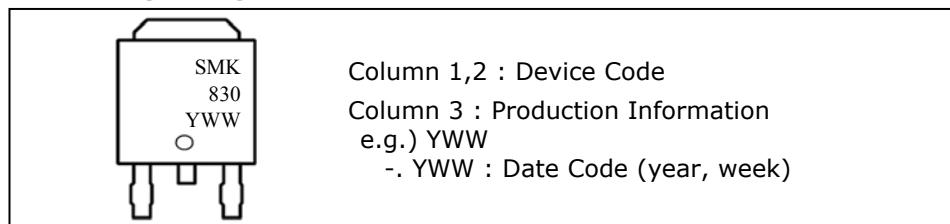
Ordering Information

Type No.	Marking	Package Code
SMK830D	SMK830	TO-252

PIN Connection



Marking Diagram



Absolute maximum ratings ($T_c=25^\circ C$ unless otherwise noted)

Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	500	V
Gate-source voltage	V_{GSS}	± 30	V
Drain current (DC) *	I_D	($T_c=25^\circ C$)	A
		($T_c=100^\circ C$)	A
Drain current (Pulsed) *	I_{DM}	18	A
Power dissipation	P_D	48	W
Avalanche current (Single) ②	I_{AS}	4.5	A
Single pulsed avalanche energy ②	E_{AS}	250	mJ
Avalanche current (Repetitive) ①	I_{AR}	4.5	A
Repetitive avalanche energy ①	E_{AR}	5.0	mJ
Junction temperature	T_J	150	$^\circ C$
Storage temperature range	T_{stg}	-55~150	

* Limited by maximum junction temperature

Characteristic	Symbol	Typ.	Max.	Unit
Thermal resistance	$R_{th(J-C)}$	-	2.6	$^\circ C/W$
	$R_{th(J-A)}$	-	50	

** When mounted on the minimum pad size recommended (PCB Mount)

Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	$I_D=250\mu\text{A}, V_{GS}=0$	500	-	-	V
Gate threshold voltage	$V_{GS(\text{th})}$	$I_D=250\mu\text{A}, V_{DS}=V_{GS}$	2.0	-	4.0	V
Drain-source cut-off current	I_{DSS}	$V_{DS}=500\text{V}, V_{GS}=0\text{V}$	-	-	1	μA
Gate leakage current	I_{GSS}	$V_{DS}=0\text{V}, V_{GS}=\pm 30\text{V}$	-	-	± 100	nA
Drain-source on-resistance ④	$R_{DS(\text{ON})}$	$V_{GS}=10\text{V}, I_D=2.25\text{A}$	-	1.2	1.5	Ω
Forward transfer conductance ④	g_{fs}	$V_{DS}=10\text{V}, I_D=2.25\text{A}$	-	5.2	-	S
Input capacitance	C_{iss}	$V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1\text{MHz}$	-	745	930	pF
Output capacitance	C_{oss}		-	82	102	
Reverse transfer capacitance	C_{rss}		-	33	42	
Turn-on delay time	$t_{d(\text{on})}$	$V_{DD}=250\text{V}, I_D=4.5\text{A}$ $R_G=25\Omega$	-	12	-	ns
Rise time	t_r		-	46	-	
Turn-off delay time	$t_{d(\text{off})}$		-	50	-	
Fall time	t_f		-	48	-	
Total gate charge	Q_g	$V_{DS}=400\text{V}, V_{GS}=10\text{V}$ $I_D=4.5\text{A}$	-	16	20	nC
Gate-source charge	Q_{gs}		-	5.5	-	
Gate-drain charge	Q_{gd}		-	4.0	-	

Source-Drain Diode Ratings and Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Source current (DC)	I_s	Integral reverse diode in the MOSFET	-	-	4.5	A
Source current (Pulsed) ①	I_{sM}		-	-	18	
Forward voltage ④	V_{SD}	$V_{GS}=0\text{V}, I_s=4.5\text{A}$	-	-	1.4	V
Reverse recovery time	t_{rr}	$I_s=4.5\text{A}, V_{GS}=0\text{V}$ $dI_F/dt=100\text{A}/\mu\text{s}$	-	263	-	ns
Reverse recovery charge	Q_{rr}		-	1.9	-	μC

Note :

- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ② $L=22.2\text{mH}, I_{AS}=4.5\text{A}, V_{DD}=50\text{V}, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
- ③ Pulse Test : Pulse width $\leq 300\text{us}$, Duty cycle $\leq 2\%$
- ④ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1 I_D - V_{DS}

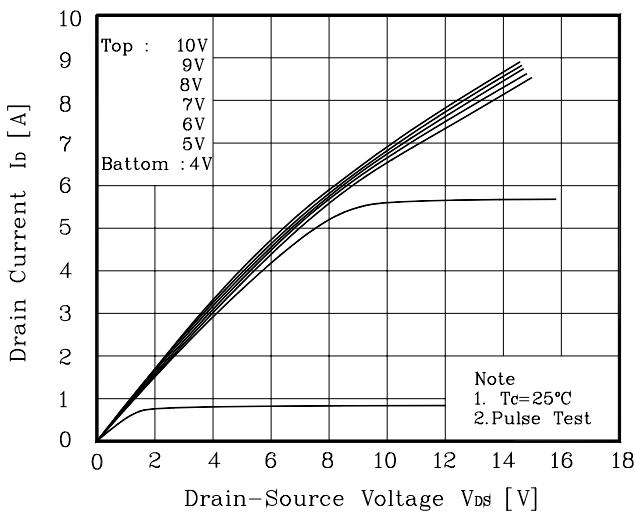


Fig. 2 I_D - V_{GS}

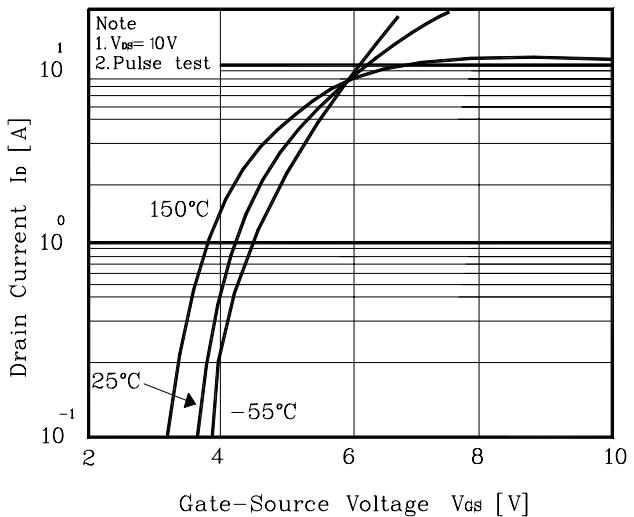


Fig. 3 $R_{DS(on)}$ - I_D

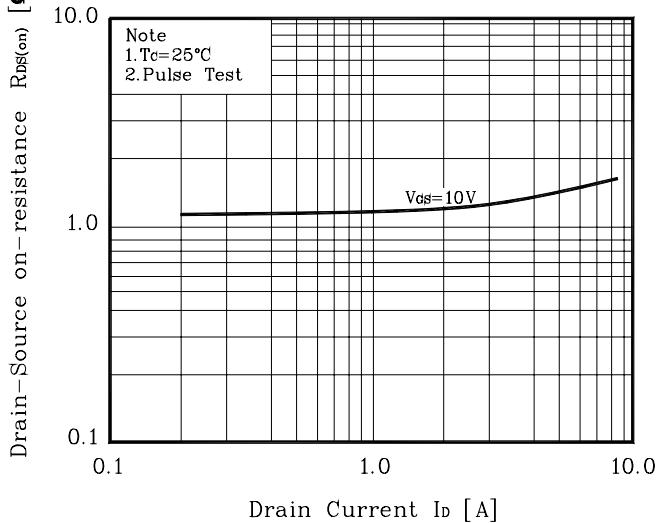


Fig. 4 I_S - V_{SD}

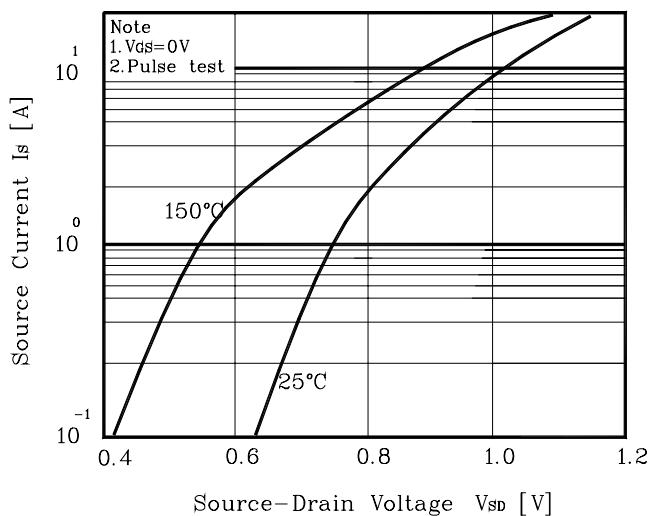


Fig. 5 Capacitance - V_{DS}

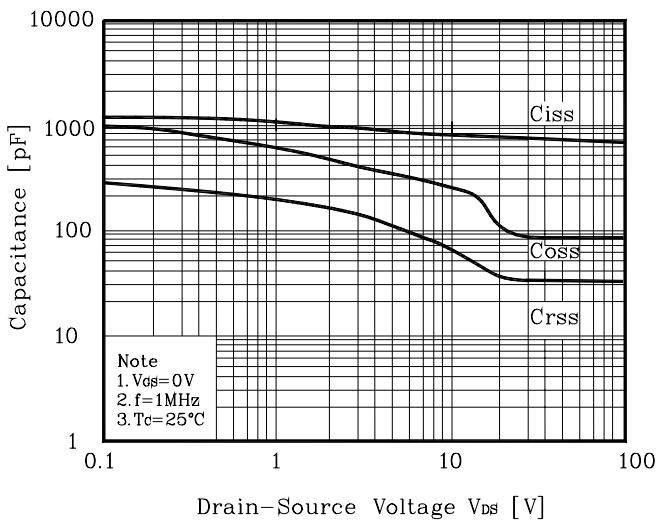


Fig. 6 V_{GS} - Q_G

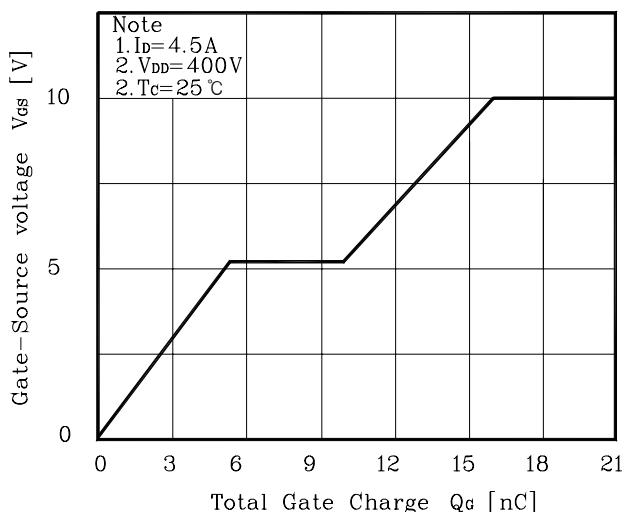


Fig. 7 $V_{(BR)DSS}$ - T_J

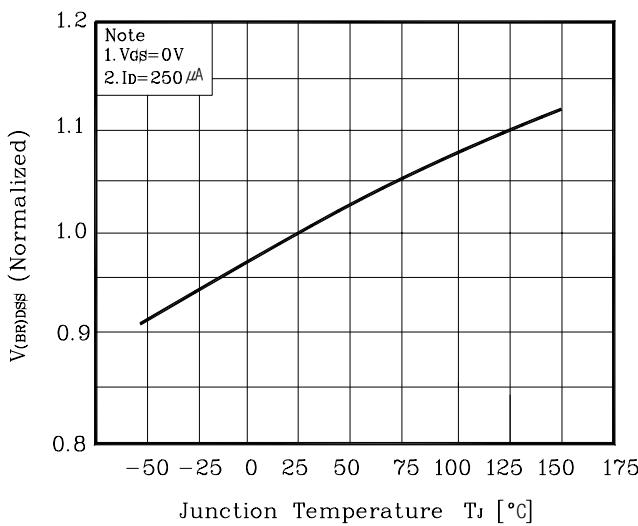


Fig. 8 $R_{DS(on)}$ - T_J

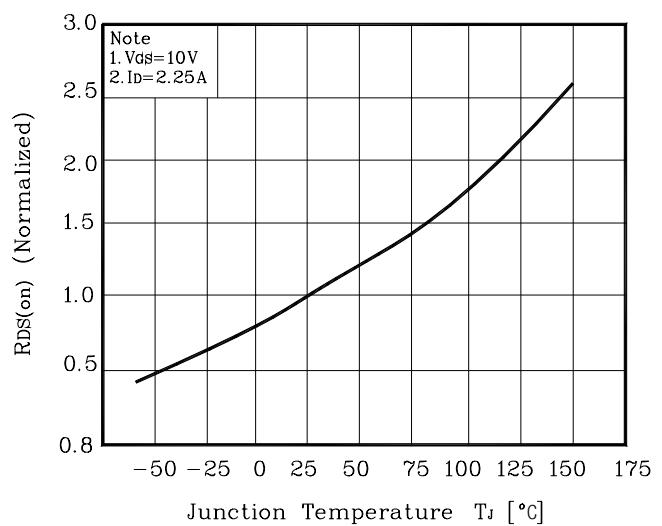


Fig. 9 I_D - T_C

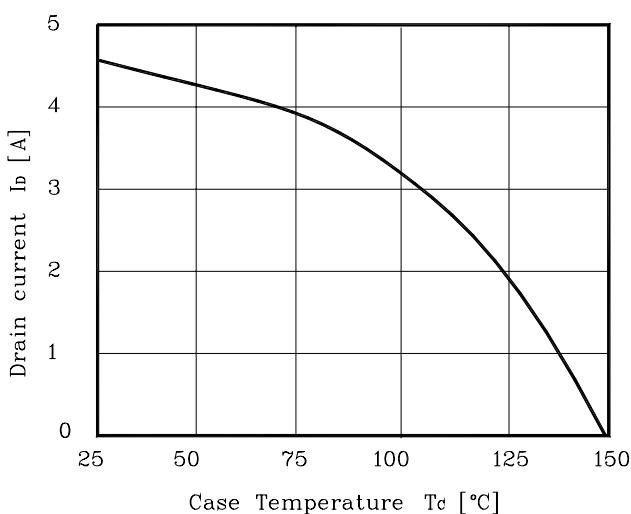


Fig. 10 Safe Operating Area

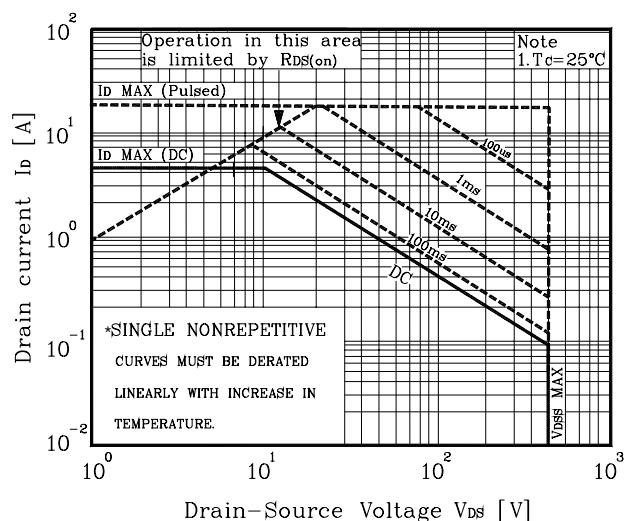


Fig. 11 Gate Charge Test Circuit & Waveform

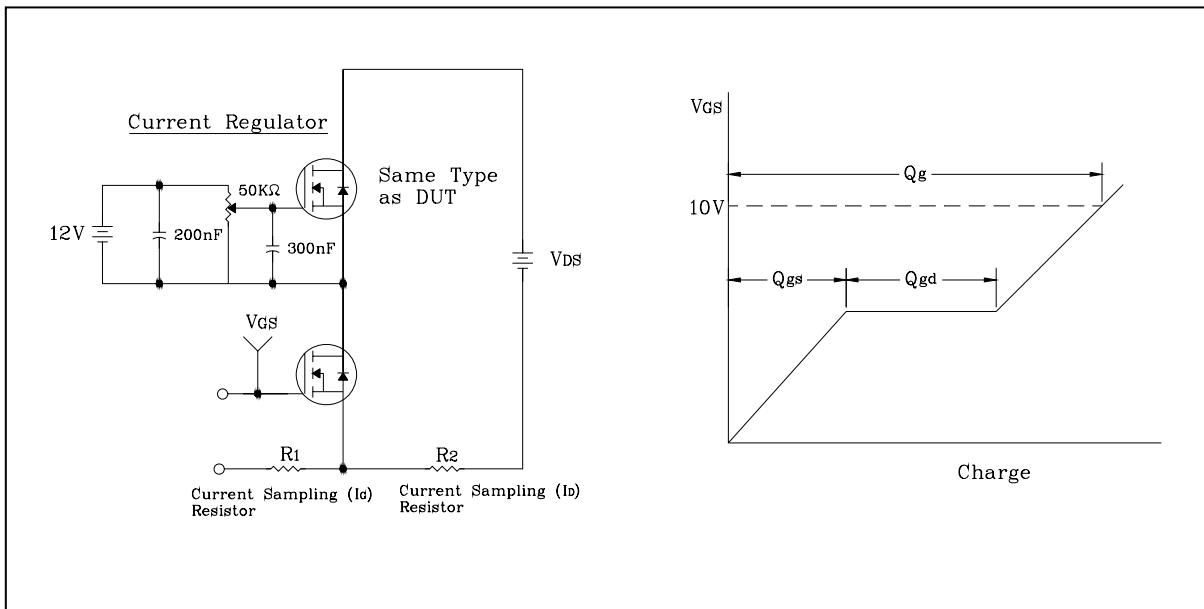


Fig. 12 Resistive Switching Test Circuit & Waveform

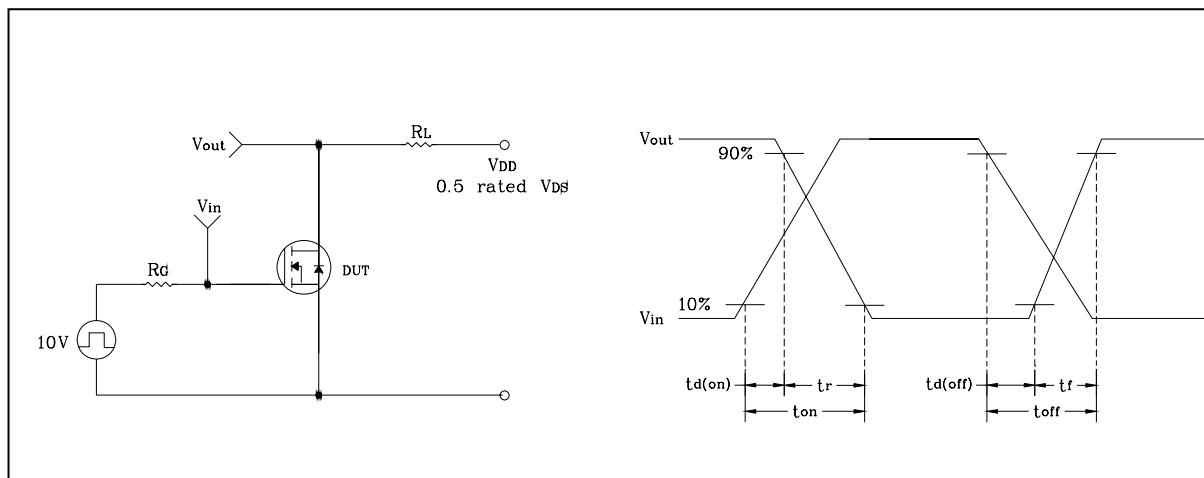


Fig. 13 E_{AS} Test Circuit & Waveform

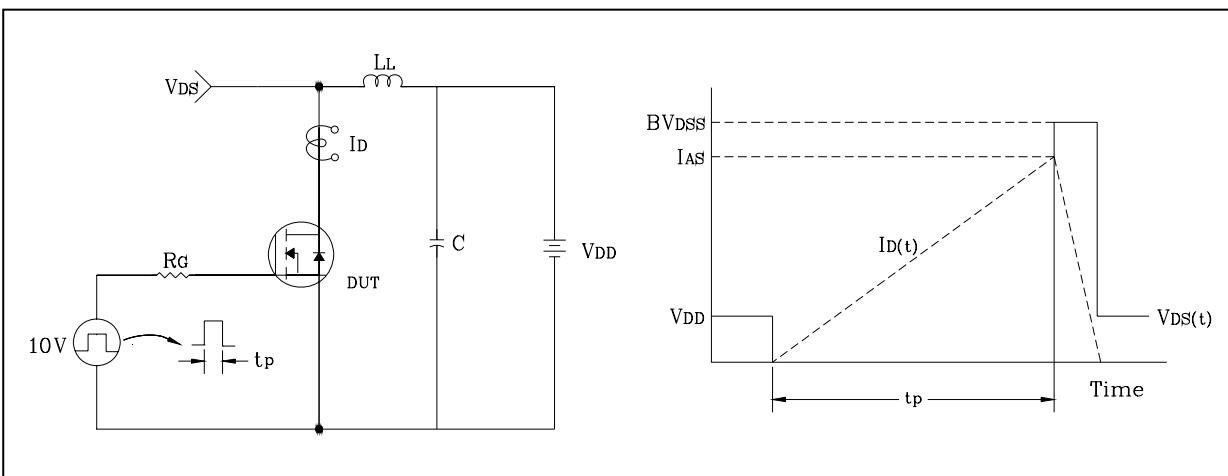
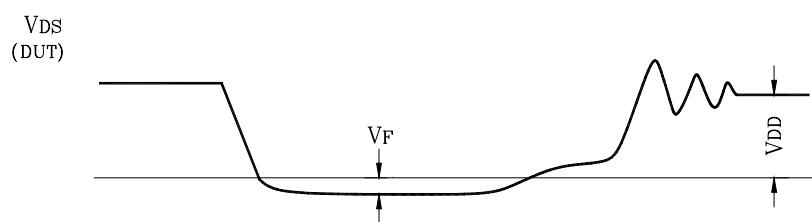
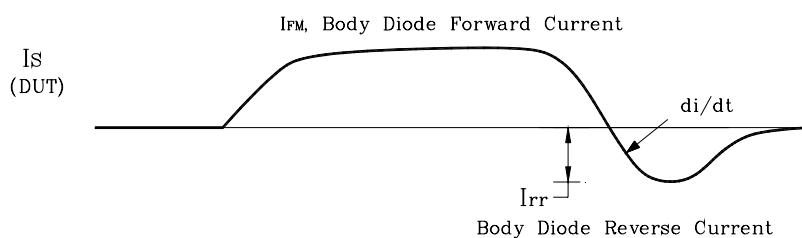
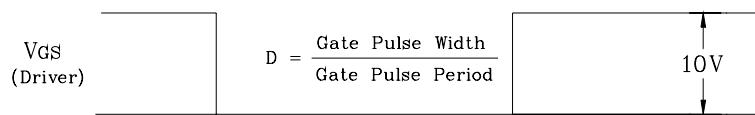
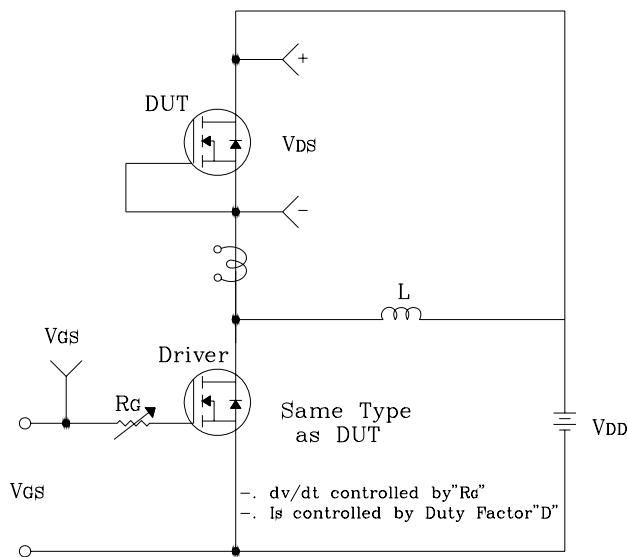
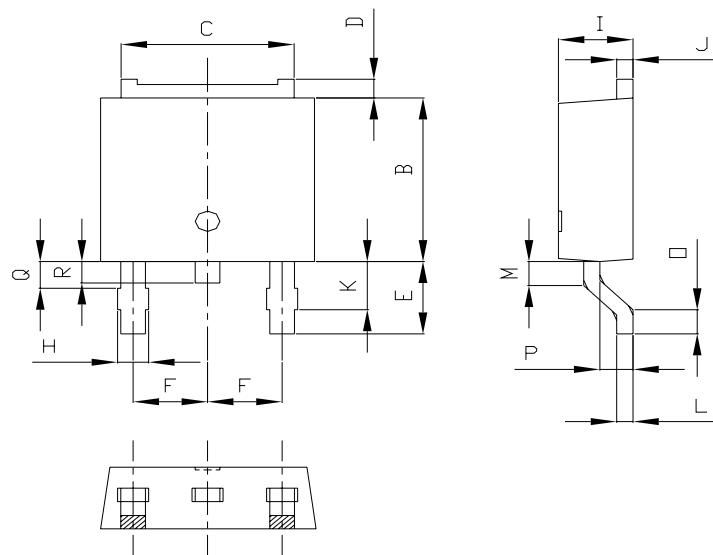


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform

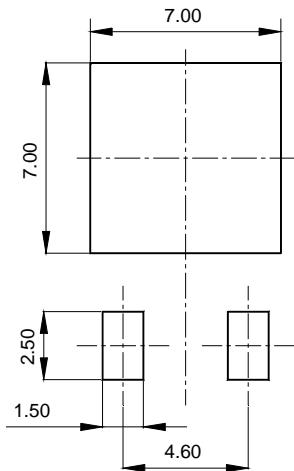


Outline Dimension

unit: mm



SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	6.40	6.60	6.80	
B	5.90	6.10	6.30	
C	5.04	5.34	5.64	
D	0.50	0.70	0.90	
E	2.50	2.70	2.90	
F	2.10	2.30	2.50	
H	Ø 0.96 MAX			
I	2.20	2.30	2.40	
J	0.40	0.50	0.60	
K	1.60	1.80	2.00	
L	0.40	0.50	0.60	
M	0.81	0.91	1.01	
O	0.80	0.90	1.00	
P	0.90	1.00	1.10	
Q	Ø 0.95 MAX			
R	0.60	0.80	1.00	

Recommended Land Pattern [unit: mm]

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