

## SWITCHING REGULATOR APPLICATIONS

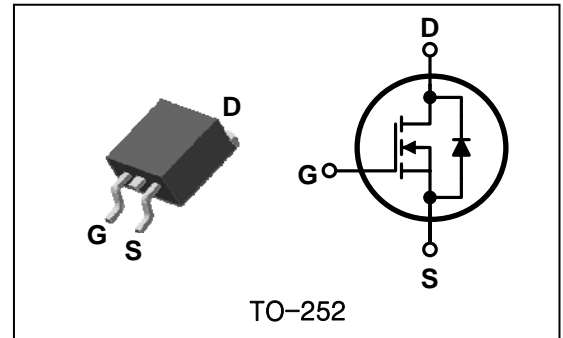
### Features

- High Voltage :  $BV_{DSS}=700V(\text{Min.})$
- Low  $C_{RSS}$  :  $C_{RSS}=6.0pF(\text{Typ.})$
- Low gate charge :  $Qg=7.2nC(\text{Typ.})$
- Low  $R_{DS(on)}$  :  $R_{DS(on)}=6.3\Omega(\text{Max.})$

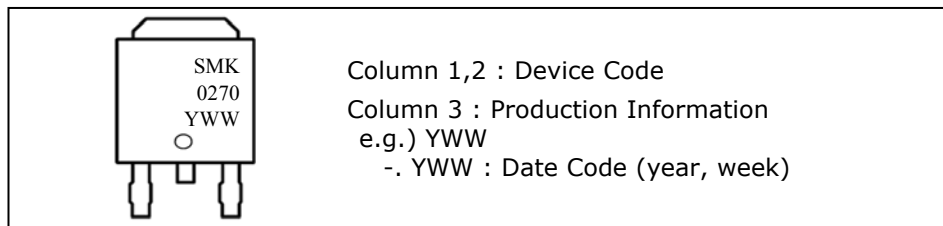
### Ordering Information

Type No.	Marking	Package Code
SMK0270D	SMK0270	TO-252

### PIN Connection



### Marking Diagram



### Absolute maximum ratings ( $T_C=25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Rating	Unit	
Drain-source voltage	$V_{DSS}$	700	V	
Gate-source voltage	$V_{GSS}$	$\pm 30$	V	
Drain current (DC) *	$I_D$	( $T_C=25^\circ\text{C}$ )	2.0	A
		( $T_C=100^\circ\text{C}$ )	1.3	A
Drain current (Pulsed) *	$I_{DM}$	8.0	A	
Power dissipation	$P_D$	25	W	
Avalanche current (Single) ②	$I_{AS}$	2.0	A	
Single pulsed avalanche energy ②	$E_{AS}$	41	mJ	
Avalanche current (Repetitive) ①	$I_{AR}$	2.0	A	
Repetitive avalanche energy ①	$E_{AR}$	1.8	mJ	
Junction temperature	$T_J$	150	$^\circ\text{C}$	
Storage temperature range	$T_{stg}$	-55~150		

\* Limited by maximum junction temperature

Characteristic	Symbol	Typ.	Max.	Unit	
Thermal resistance	Junction-case	$R_{th(J-C)}$	-	4.46	$^\circ\text{C/W}$
	Junction-ambient	$R_{th(J-A)}$	-	62.5	

## Electrical Characteristics (T<sub>C</sub>=25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit	
Drain-source breakdown voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0	700	-	-	V	
Gate threshold voltage	V <sub>GS(th)</sub>	I <sub>D</sub> =250μA, V <sub>DS</sub> =V <sub>GS</sub>	2.0	-	4.0	V	
Drain-source cut-off current	I <sub>DSS</sub>	V <sub>DS</sub> =700V, V <sub>GS</sub> =0V	-	-	1	μA	
Gate leakage current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±30V	-	-	±100	nA	
Drain-source on-resistance ④	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =1.0A	-	4.8	6.3	Ω	
Forward transfer conductance ④	g <sub>fs</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =1.0A	-	2.5	-	S	
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz	-	395	494	pF	
Output capacitance	C <sub>oss</sub>		-	32	41		
Reverse transfer capacitance	C <sub>rss</sub>		-	6	8		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =300V, I <sub>D</sub> =2.0A R <sub>G</sub> =25Ω	-	22	-	ns	
Rise time	t <sub>r</sub>		-	10.5	-		
Turn-off delay time	t <sub>d(off)</sub>		③④	-	7		-
Fall time	t <sub>f</sub>		-	10.5	-		
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> =560V, V <sub>GS</sub> =10V I <sub>D</sub> =2.0A	-	7.2	9.0	nC	
Gate-source charge	Q <sub>gs</sub>		-	2.5	-		
Gate-drain charge	Q <sub>gd</sub>		③④	-	1.5		-

## Source-Drain Diode Ratings and Characteristics (T<sub>C</sub>=25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Source current (DC)	I <sub>S</sub>	Integral reverse diode in the MOSFET	-	-	2.0	A
Source current (Pulsed) ①	I <sub>SM</sub>		-	-	8.0	
Forward voltage ④	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =2.0A	-	-	1.4	V
Reverse recovery time	t <sub>rr</sub>	I <sub>S</sub> =2.0A, V <sub>GS</sub> =0V dI <sub>F</sub> /dt=100A/μs	-	260	-	ns
Reverse recovery charge	Q <sub>rr</sub>		-	1.09	-	μC

Note ;

- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ② L=19mH, I<sub>AS</sub>=2.0A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C
- ③ Pulse Test : Pulse width≤300μs, Duty cycle≤2%
- ④ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1  $I_D - V_{DS}$

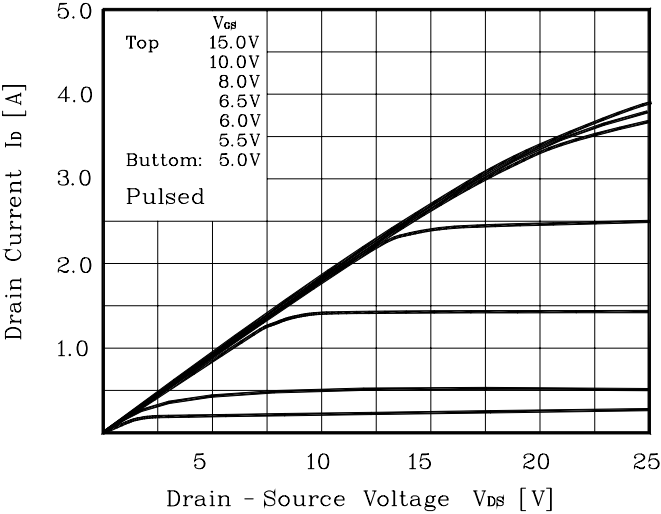


Fig. 2  $I_D - V_{GS}$

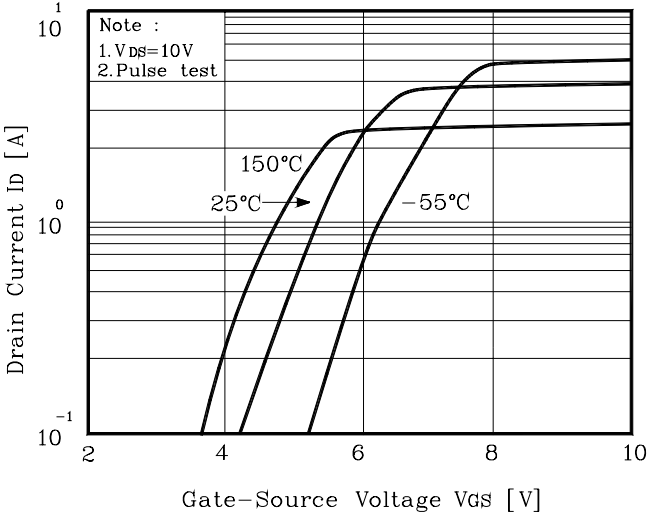


Fig. 3  $R_{DS(on)} - I_D$

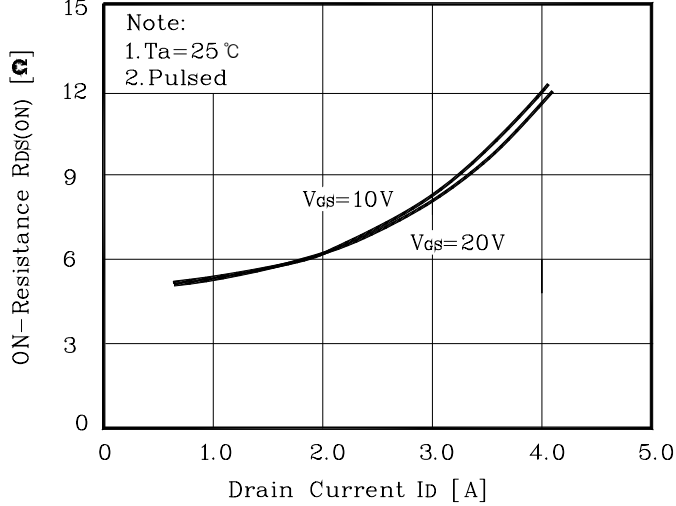


Fig. 4  $I_S - V_{SD}$

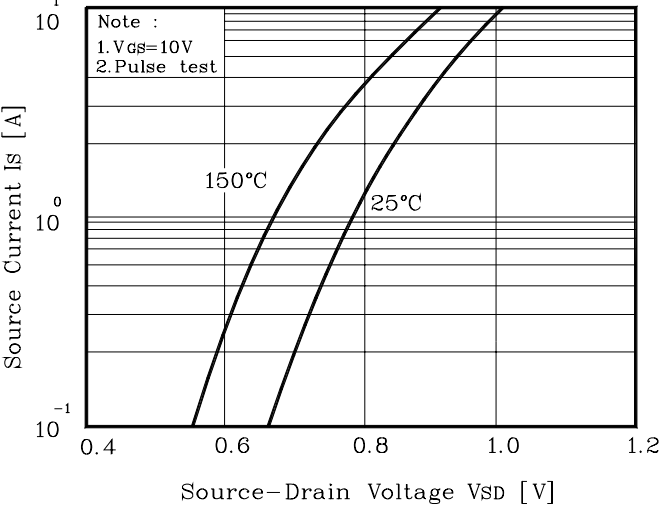


Fig. 5 Capacitance -  $V_{DS}$

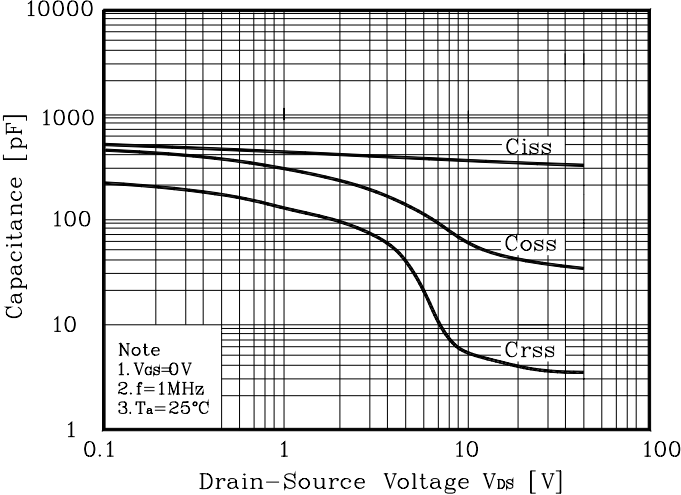
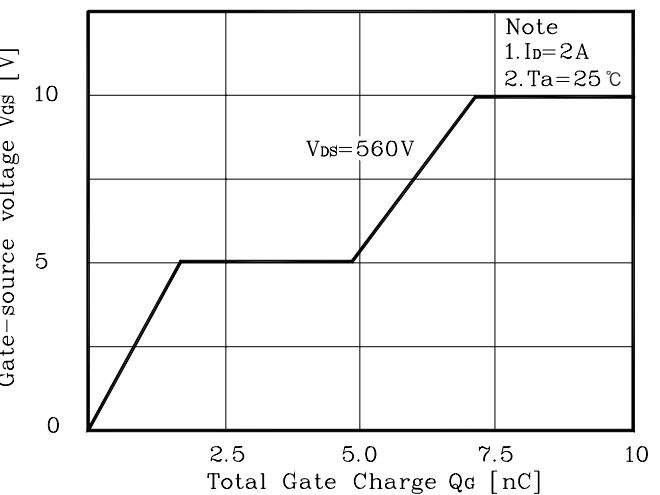
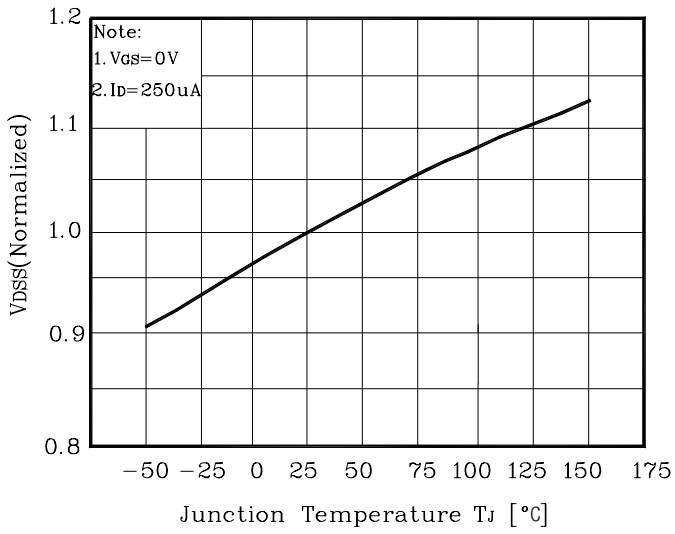


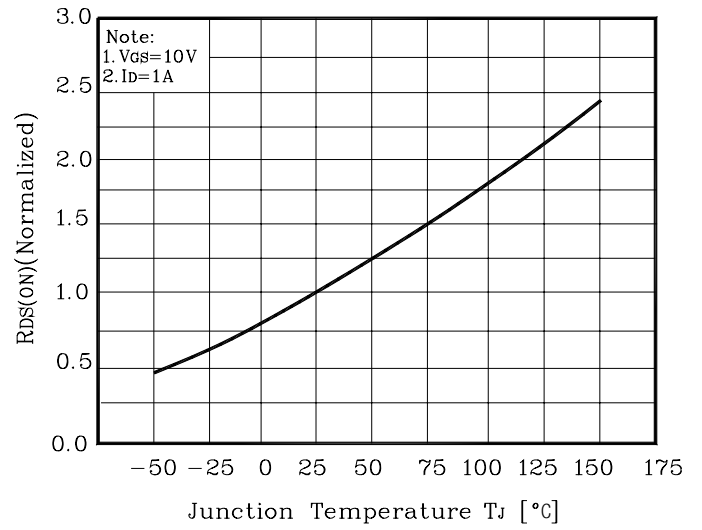
Fig. 6  $V_{GS} - Q_G$



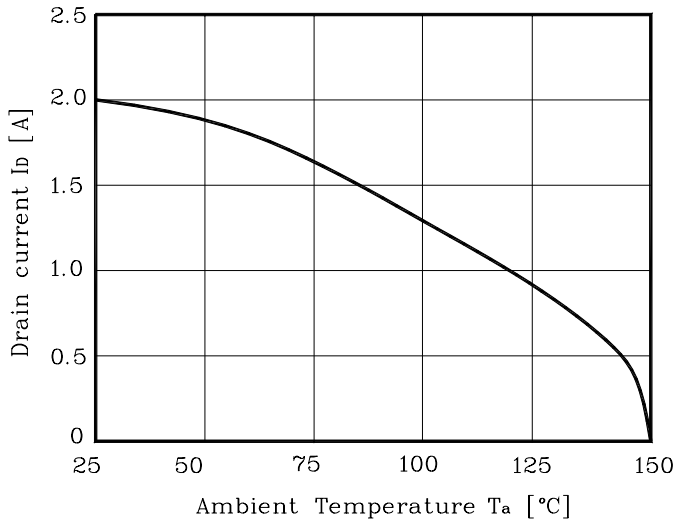
**Fig. 7  $V_{DSS} - T_J$**



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



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



**Fig. 10 Safe Operating Area**

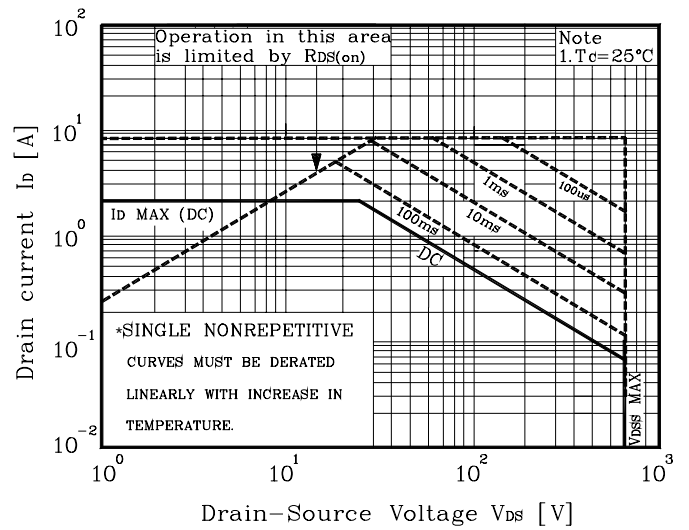


Fig. 11 Gate Charge Test Circuit & Waveform

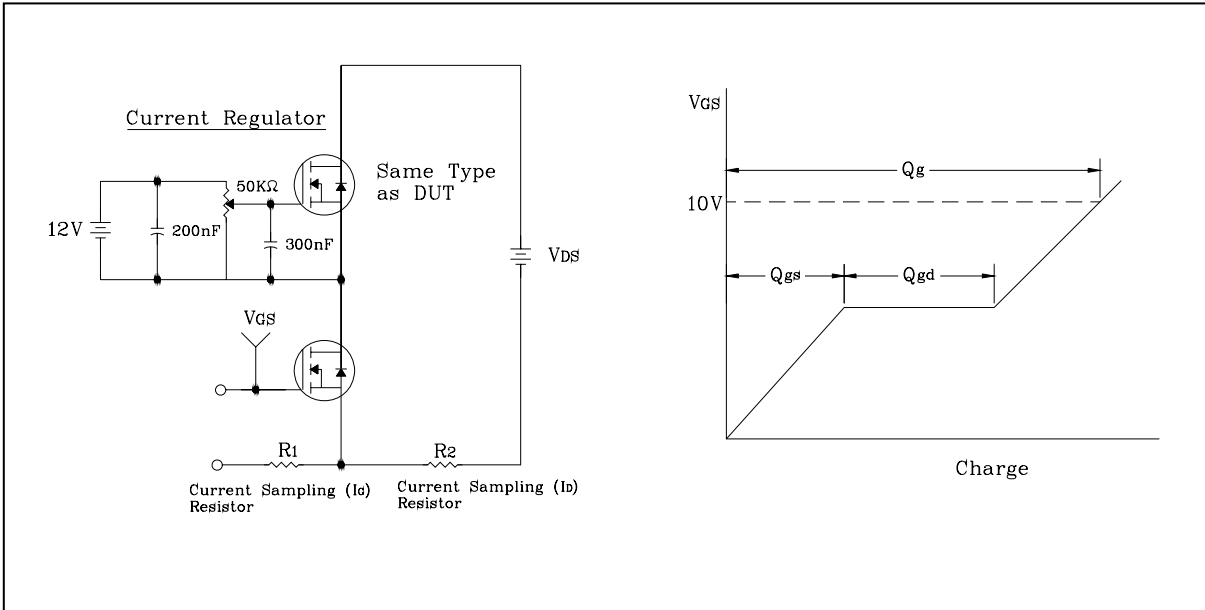


Fig. 12 Resistive Switching Test Circuit & Waveform

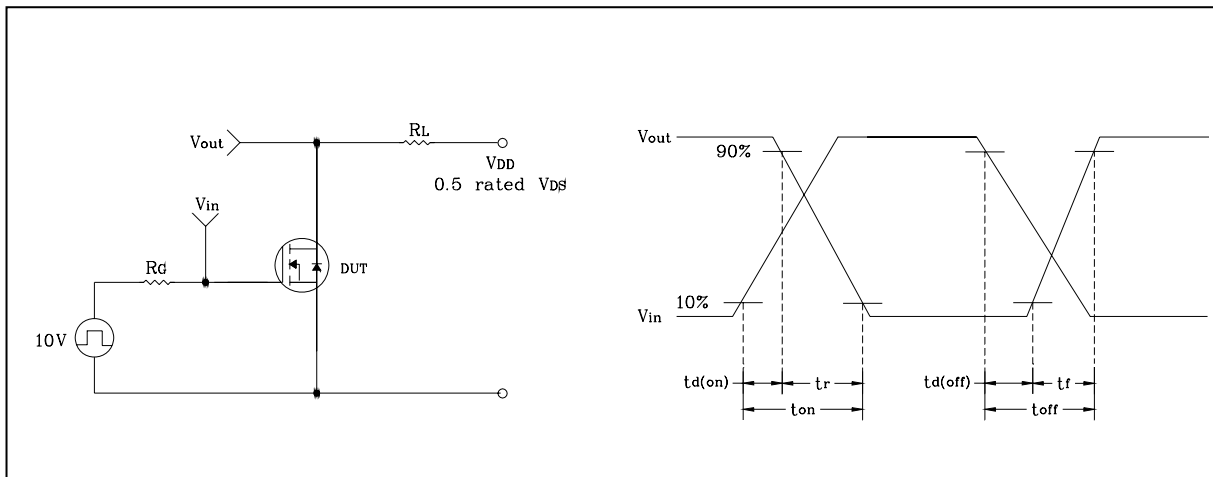


Fig. 13 EAS Test Circuit & Waveform

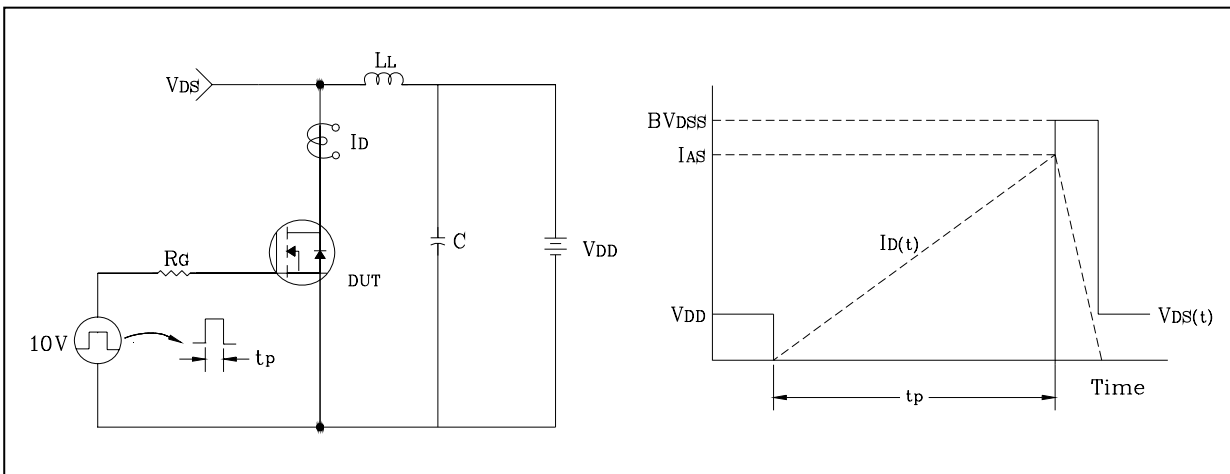
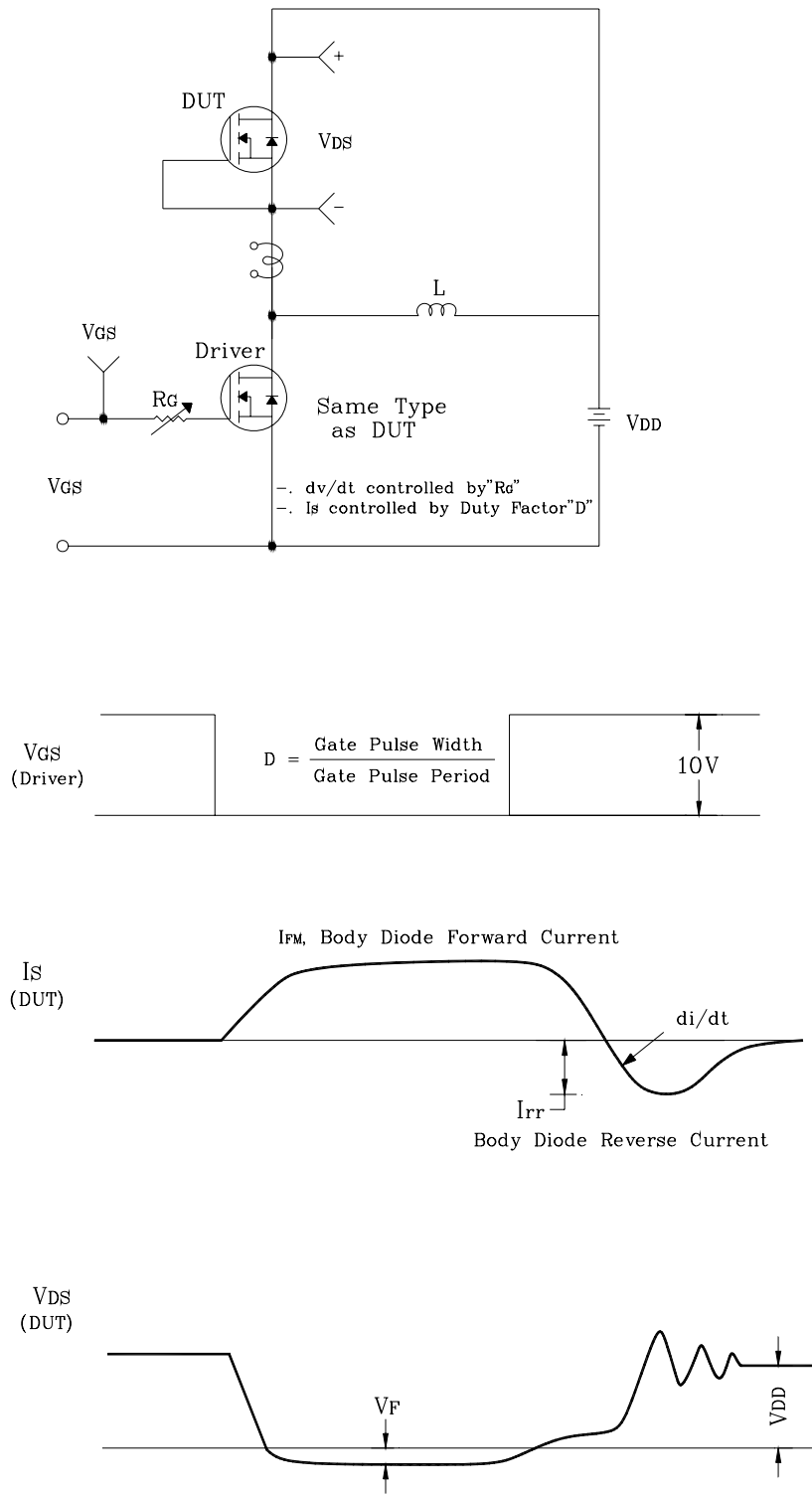
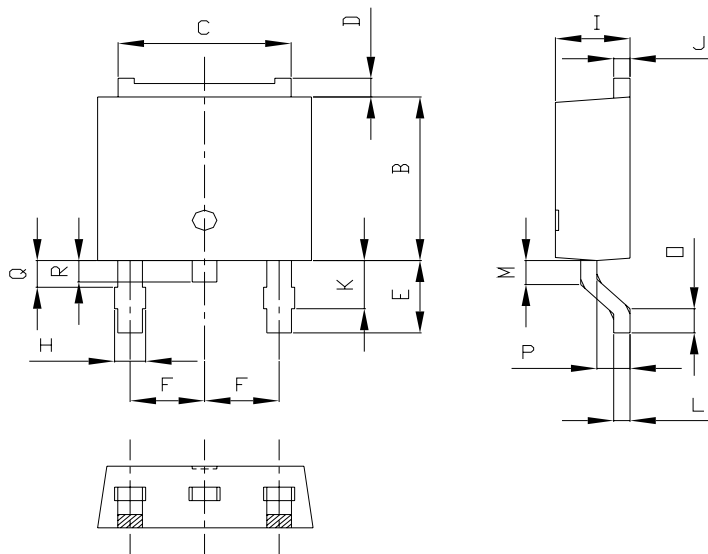


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



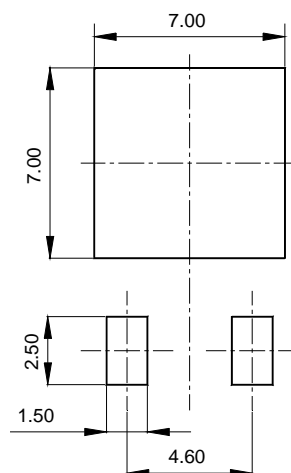
## Outline Dimension

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	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	0.95 MAX			
R	0.60	0.80	1.00	

## Recommended Land Pattern [unit: mm]



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