

## SWITCHING REGULATOR APPLICATIONS

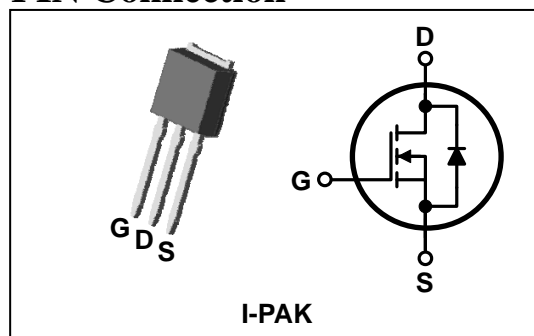
### Features

- High Voltage :  $BV_{DSS}=700V(\text{Min.})$
- Low  $C_{RSS}$  :  $C_{RSS}=2.6pF(\text{Typ.})$
- Low gate charge :  $Qg=4.1nC(\text{Typ.})$
- Low  $R_{DS(ON)}$  :  $R_{DS(ON)}=15\Omega(\text{Max.})$

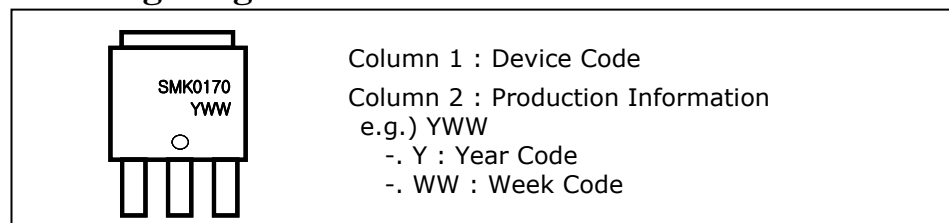
### Ordering Information

Type No.	Marking	Package Code
SMK0170I	SMK0170	I-PAK

### 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) *	$I_D$	( $T_C=25^\circ\text{C}$ )	1.0
		( $T_C=100^\circ\text{C}$ )	0.63
Drain current (Pulsed) *	$I_{DP}$	4.0	A
Total Power dissipation	$P_D$	28	W
Avalanche current (Single) ②	$I_{AS}$	1.0	A
Single pulsed avalanche energy ②	$E_{AS}$	17	mJ
Avalanche current (Repetitive) ①	$I_{AR}$	1.0	A
Repetitive avalanche energy ①	$E_{AR}$	0.5	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	-	4.46	$^\circ\text{C}/\text{W}$
	Junction-ambient	-	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	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =0.5A	-	12.5	15.0	Ω	
Forward transfer conductance ④	g <sub>fs</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =0.5A	-	0.5	-	S	
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz	-	124	155	pF	
Output capacitance	C <sub>oss</sub>		-	17.7	22.1		
Reverse transfer capacitance	C <sub>rss</sub>		-	2.6	3.3		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =300V, I <sub>D</sub> =1.0A R <sub>G</sub> =25Ω	-	7	-	ns	
Rise time	t <sub>r</sub>		-	21	-		
Turn-off delay time	t <sub>d(off)</sub>		③④	-	13		-
Fall time	t <sub>f</sub>		-	27	-		
Total gate charge	Q <sub>g</sub>	V <sub>DD</sub> =560V, V <sub>GS</sub> =10V I <sub>D</sub> =1.0A	-	4.1	5.1	nC	
Gate-source charge	Q <sub>gs</sub>		③④	-	1.8		-
Gate-drain charge	Q <sub>gd</sub>		-	0.9	-		

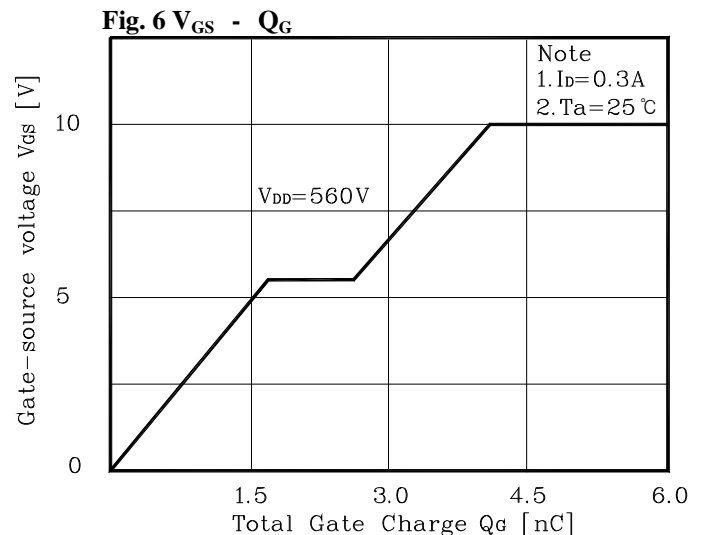
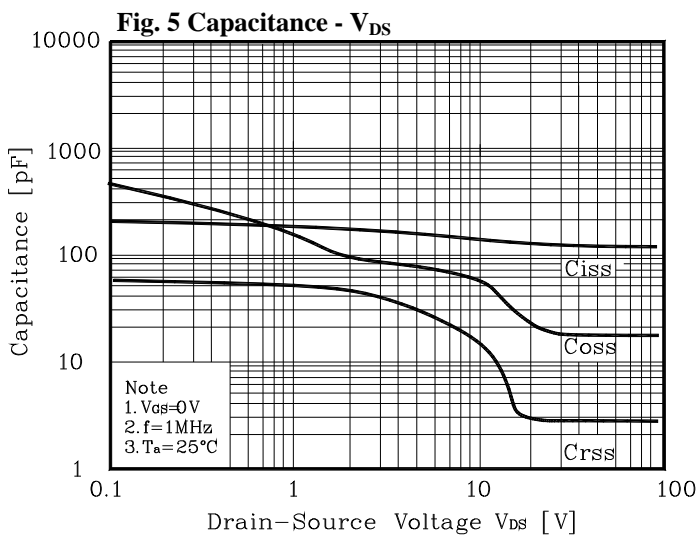
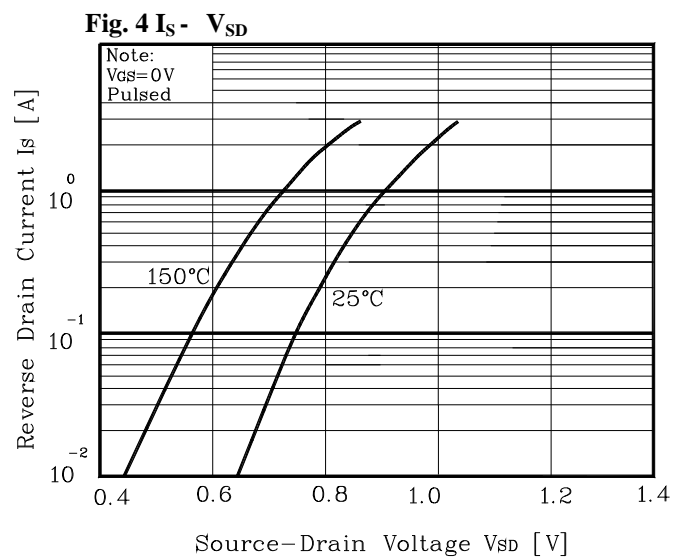
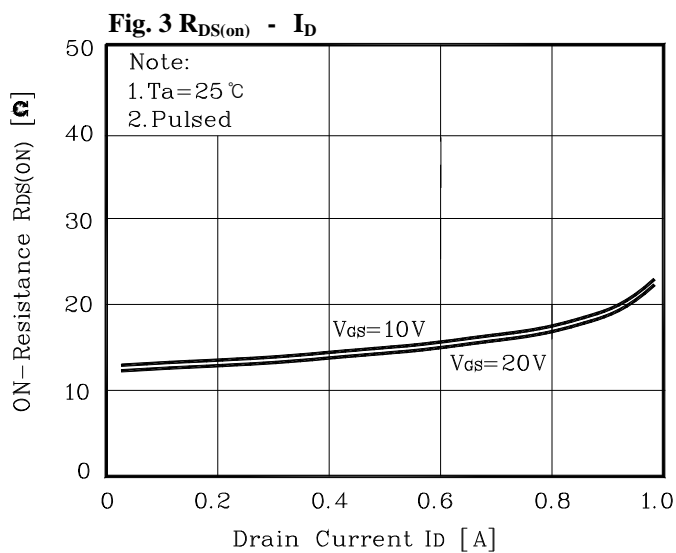
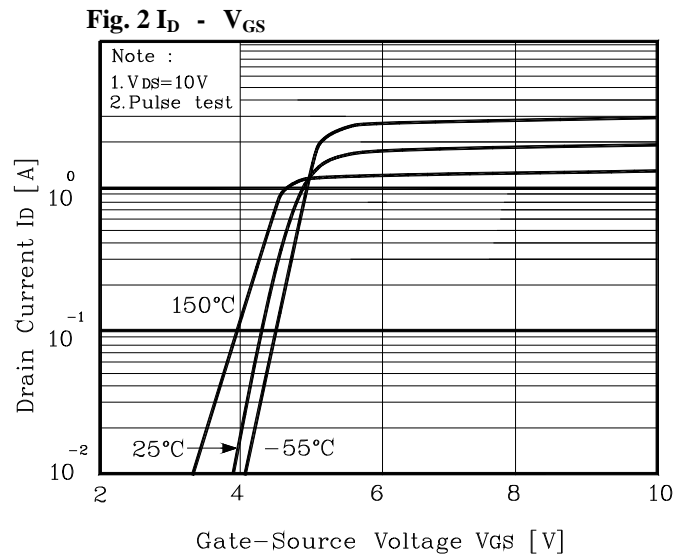
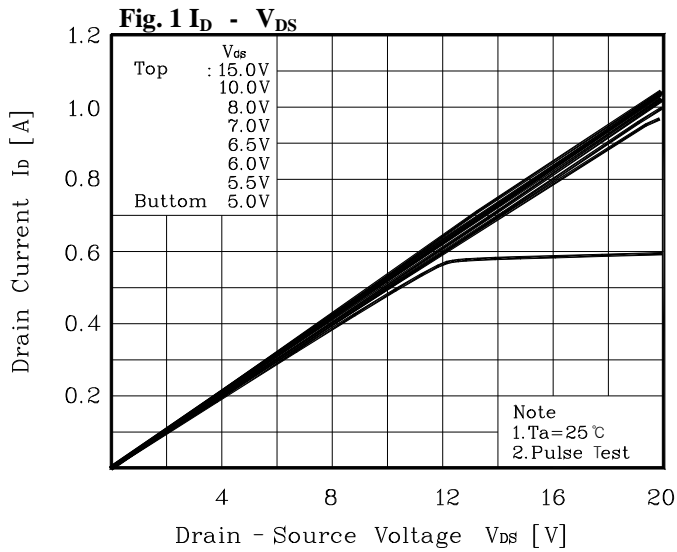
## Source-Drain Diode Ratings and Characteristics (T<sub>C</sub>=25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Source current	I <sub>S</sub>	Integral reverse diode in the MOSFET	-	-	1.0	A
Source current (Pulsed) ①	I <sub>SM</sub>		-	-	4.0	
Forward voltage ④	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =1.0A	-	-	1.4	V
Reverse recovery time	t <sub>rr</sub>	I <sub>S</sub> =1.0A, V <sub>GS</sub> =0V dI <sub>S</sub> /dt=100A/us	-	190	-	ns
Reverse recovery charge	Q <sub>rr</sub>		-	0.53	-	uC

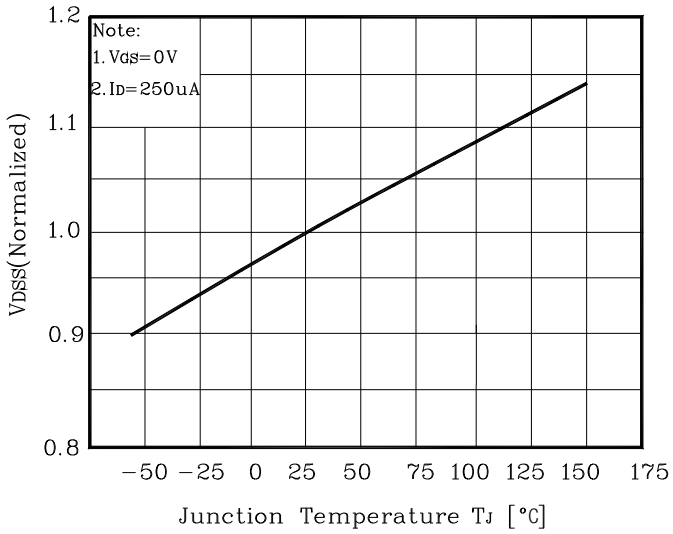
Note ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② L=50mH, I<sub>AS</sub>=0.8A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω
- ③ Pulse Test : Pulse Width < 300us, Duty cycle ≤ 2%
- ④ Essentially independent of operating temperature

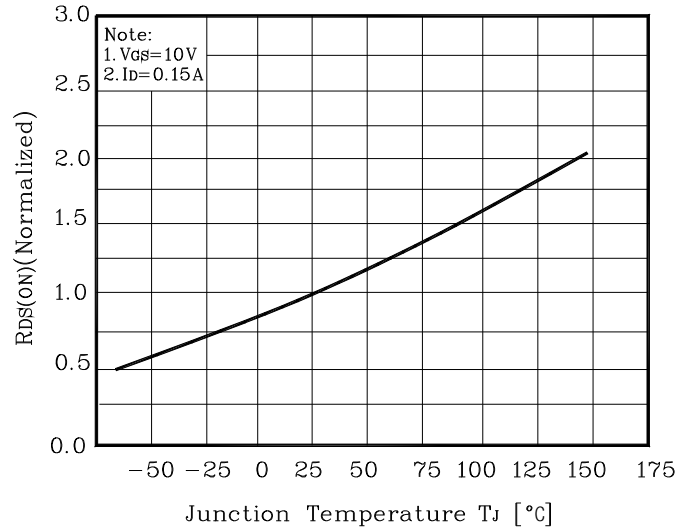
## Electrical Characteristic Curves



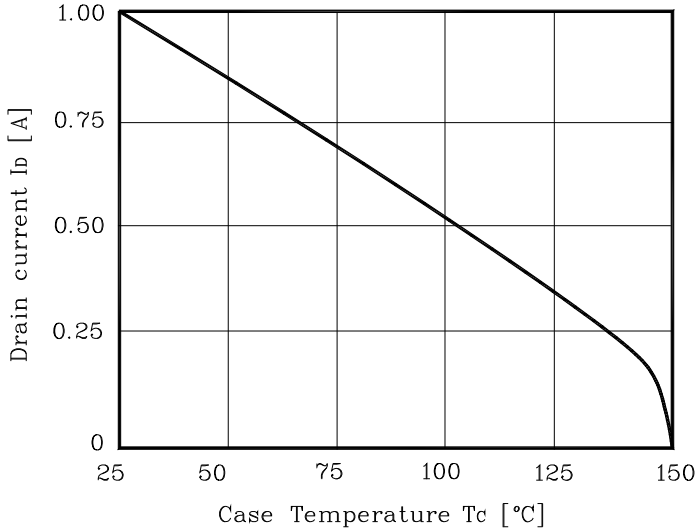
**Fig. 7  $V_{DSS} - T_J$**



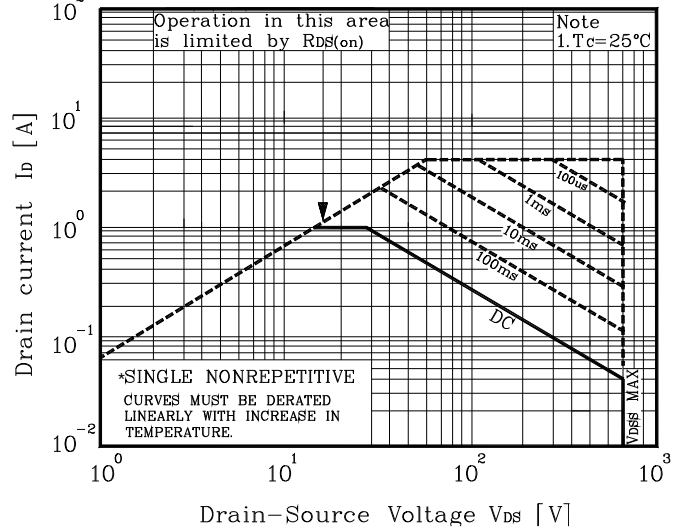
**Fig. 8  $R_{DS(on)} - T_J$**



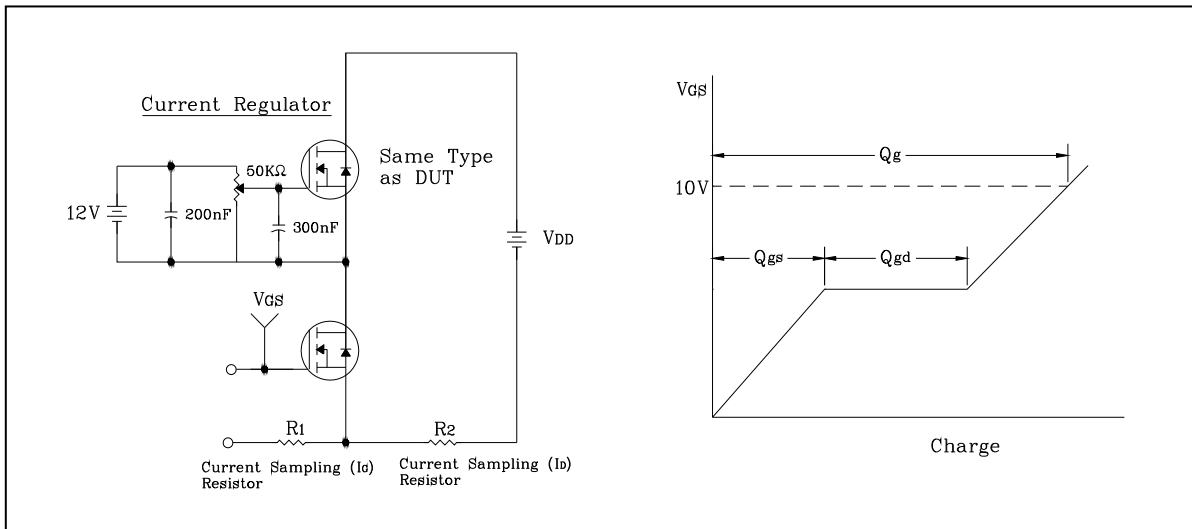
**Fig. 9  $I_D - T_c$**



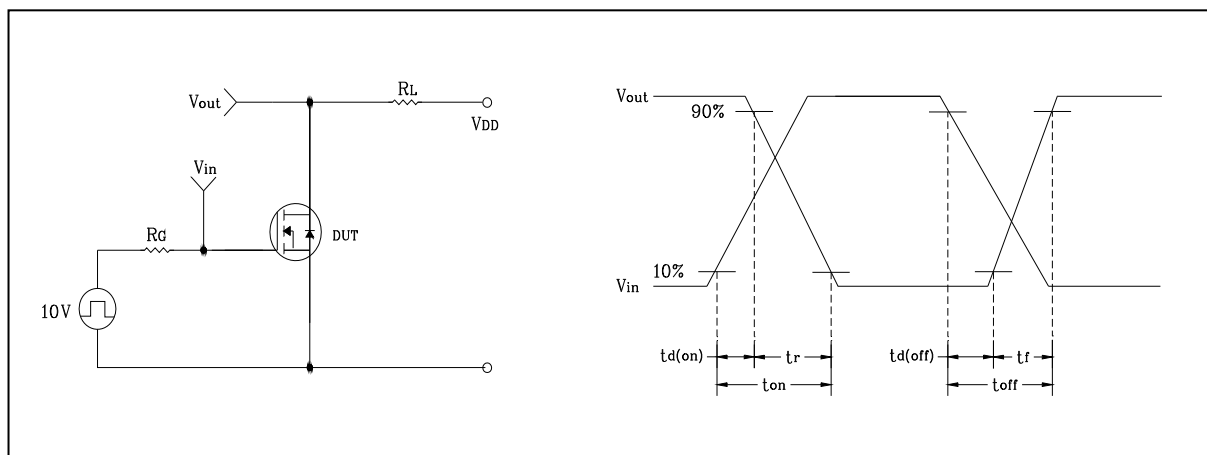
**Fig. 10 Safe Operating Area**



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



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



**Fig. 13 EAS Test Circuit & Waveform**

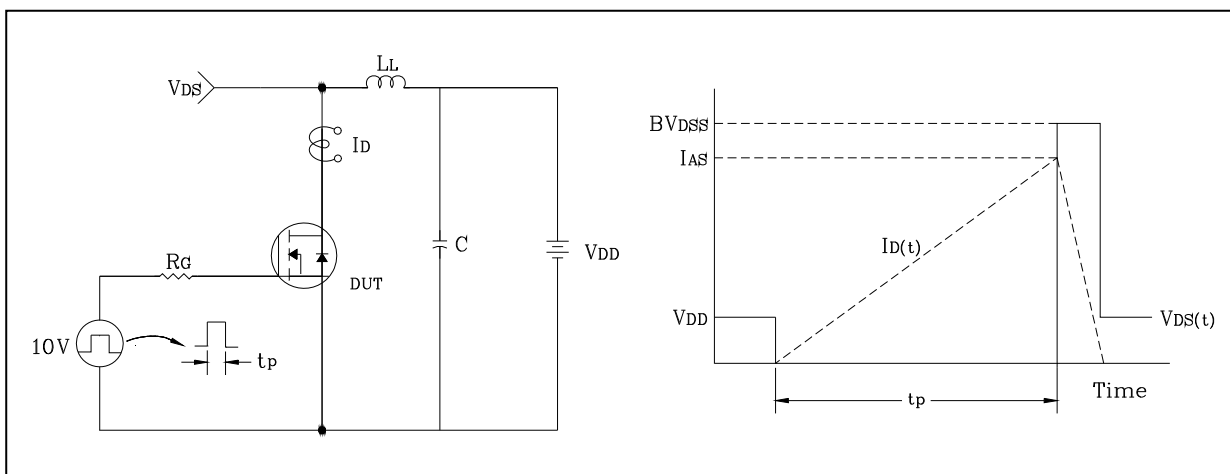
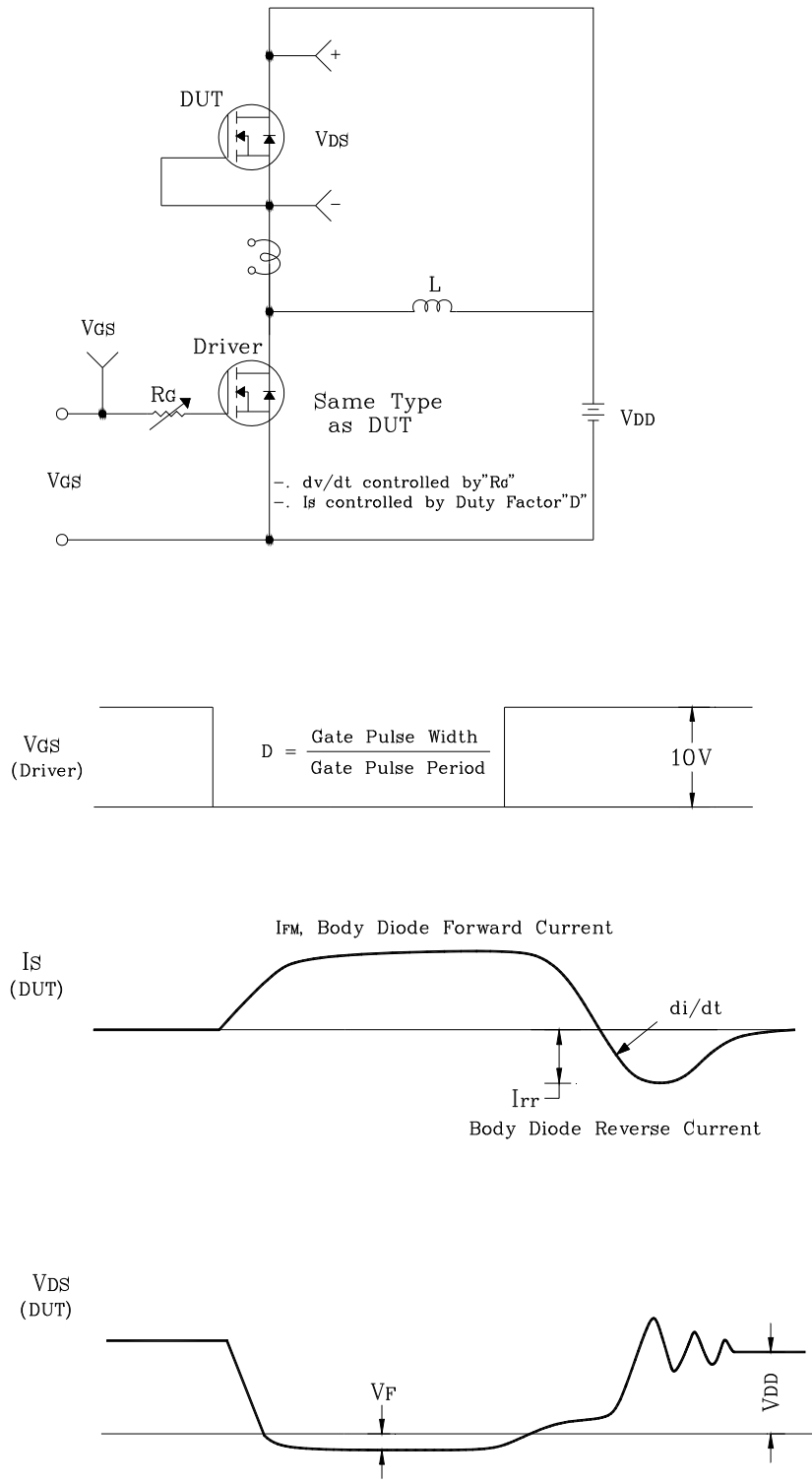
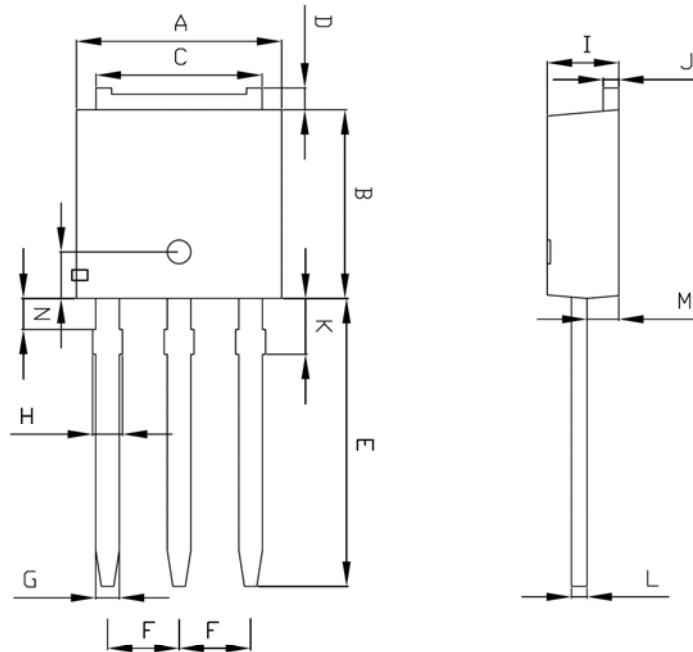


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



## 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	9.00	9.30	9.60	
F	2.10	2.30	2.50	
G	0.66	0.76	0.86	
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	0.72	1.02	1.32	
N	0.90	1.00	1.10	
O	1.50			

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