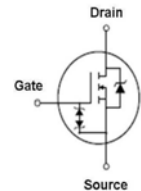


## SWITCHING REGULATOR APPLICATION

### Features

- High voltage:  $BV_{DSS}=300V$  (Min.)
- Low gate charge:  $Q_g=2.9nC$  (Typ.)
- Low drain-source On resistance:  $R_{DS(on)}=8\Omega$  (Max.)
- Built-in protection zener diode
- RoHS compliant device

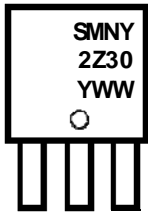


### Ordering Information

Part Number	Marking	Package
SMNY2Z30	SMNY2Z30	TO-92

**TO-92**

### Marking Information



Column 1, 2: Device Code  
 Column 3: Production Information  
 e.g.) YWW  
 - . YWW: Date Code (year, week)

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

Characteristic	Symbol	Rating	Unit	
Drain-source voltage	$V_{DSS}$	300	V	
Gate-source voltage	$V_{GSS}$	$\pm 30$	V	
Drain current (DC) *	$I_D$	$T_a=25^\circ C$	0.2	A
		$T_a=100^\circ C$	0.12	A
Drain current (Pulsed) *	$I_{DM}$	1	A	
Avalanche current <sup>(Note 2)</sup>	$I_{AS}$	1.3	A	
Single pulsed avalanche energy <sup>(Note 2)</sup>	$E_{AS}$	182.6	mJ	
Repetitive avalanche current <sup>(Note 1)</sup>	$I_{AR}$	0.2	A	
Repetitive avalanche energy <sup>(Note 1)</sup>	$E_{AR}$	1.5	mJ	
Power dissipation	$P_D$	0.6	W	
Junction temperature	$T_J$	150	$^\circ C$	
Storage temperature range	$T_{stg}$	-55~150	$^\circ C$	

\* Limited only maximum junction temperature

## Thermal Characteristics

Characteristic	Symbol	Rating	Unit
Thermal resistance, junction to ambient	$R_{th(j-a)}$	Max. 200	°C/W

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	$BV_{DSS}$	$I_D=250\mu\text{A}, V_{GS}=0$	300	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu\text{A}, V_{DS}=V_{GS}$	1.5	2	2.5	V
Drain-source cut-off current	$I_{DSS}$	$V_{DS}=300\text{V}, V_{GS}=0\text{V}$	-	-	1	$\mu\text{A}$
Gate leakage current	$I_{GSS}$	$V_{DS}=0\text{V}, V_{GS}=\pm 10\text{V}$	-	-	$\pm 10$	$\mu\text{A}$
Drain-source on-resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}, I_D=100\text{mA}$	-	6	8	$\Omega$
Forward transfer conductance (Note 3)	$g_{fs}$	$V_{DS}=10\text{V}, I_D=100\text{mA}$	-	0.4	-	S
Input capacitance	$C_{iss}$	$V_{DS}=25\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$	-	101	130	pF
Output capacitance	$C_{oss}$		-	15	20	
Reverse transfer capacitance	$C_{rss}$		-	3.2	5	
Turn-on delay time (Note 3,4)	$t_{d(on)}$	$V_{DD}=150\text{V}, I_D=0.2\text{A}, R_G=25\Omega$	-	5	-	ns
Rise time (Note 3,4)	$t_r$		-	17	-	
Turn-off delay time (Note 3,4)	$t_{d(off)}$		-	21	-	
Fall time (Note 3,4)	$t_f$		-	35	-	
Total gate charge (Note 3,4)	$Q_g$	$V_{DS}=240\text{V}, V_{GS}=10\text{V}, I_D=0.2\text{A}$	-	2.9	4.5	nC
Gate-source charge (Note 3,4)	$Q_{gs}$		-	0.4	-	
Gate-drain charge (Note 3,4)	$Q_{gd}$		-	0.7	-	

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Source current (DC)	$I_S$	Integral reverse diode in the MOSFET	-	-	0.2	A
Source current (Pulsed)	$I_{SM}$		-	-	1	A
Forward voltage	$V_{SD}$	$V_{GS}=0\text{V}, I_S=8\text{A}$	-	-	1.4	V
Reverse recovery time (Note 3,4)	$t_{rr}$	$I_S=0.2\text{A}, V_{GS}=0\text{V}, di_F/dt=100\text{A}/\mu\text{s}$	-	270	-	ns
Reverse recovery charge (Note 3,4)	$Q_{rr}$		-	0.27	-	$\mu\text{C}$

## Gate to Source Zener Diode Characteristic ( $T_a=25^\circ\text{C}$ unless otherwise noted)

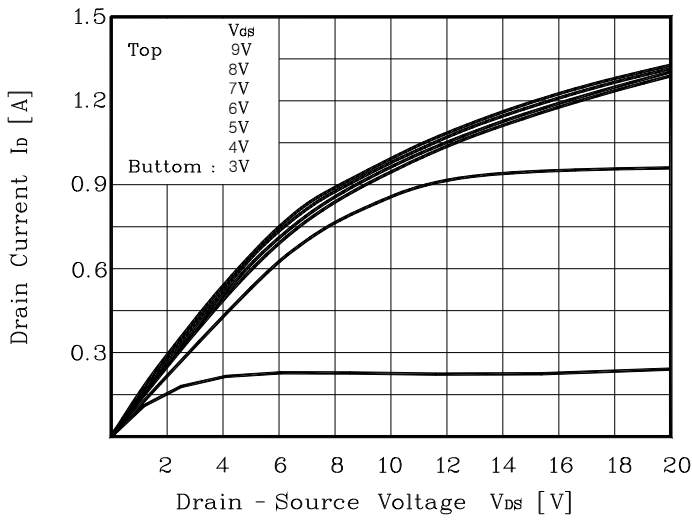
Characteristic	Symbol	Min.	Typ.	Max.	Unit
Gate-Source breakdown voltage	$I_G=\pm 1\text{mA}, V_{DS}=0\text{V}$	$\pm 20$	$\pm 24$	-	V

Note:

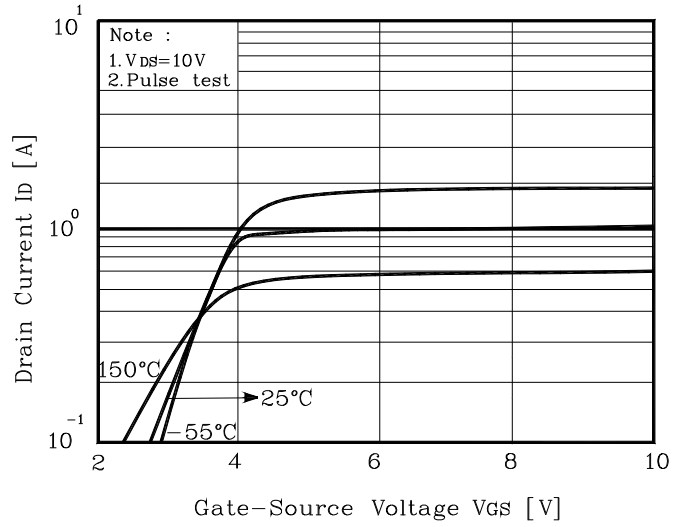
1. Repeated rating: Pulse width limited by safe operating area
2.  $L=8.9\text{mH}, I_{AS}=8\text{A}, V_{DD}=50\text{V}, R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$
3. Pulse test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$
4. Essentially independent of operating temperature typical characteristics

## Electrical Characteristic Curves

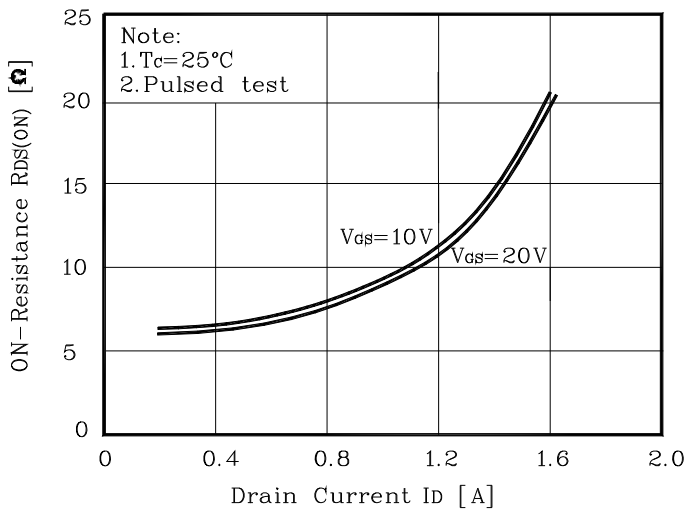
**Fig. 1  $I_D - V_{DS}$**



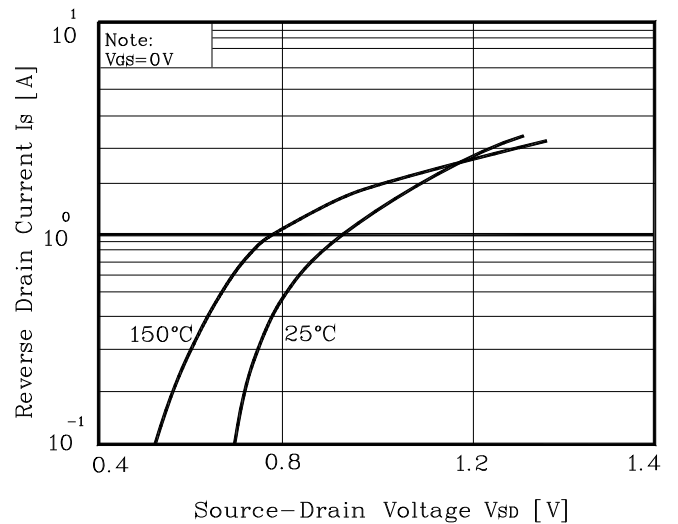
**Fig. 2  $I_D - V_{GS}$**



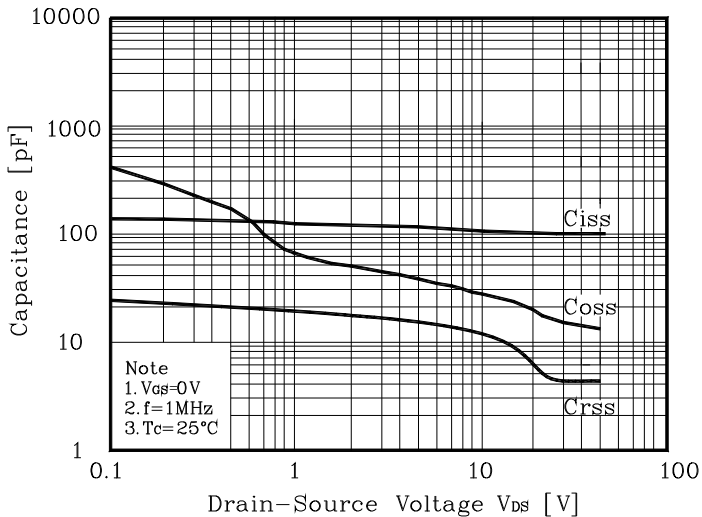
**Fig. 3  $R_{DS(ON)} - I_D$**



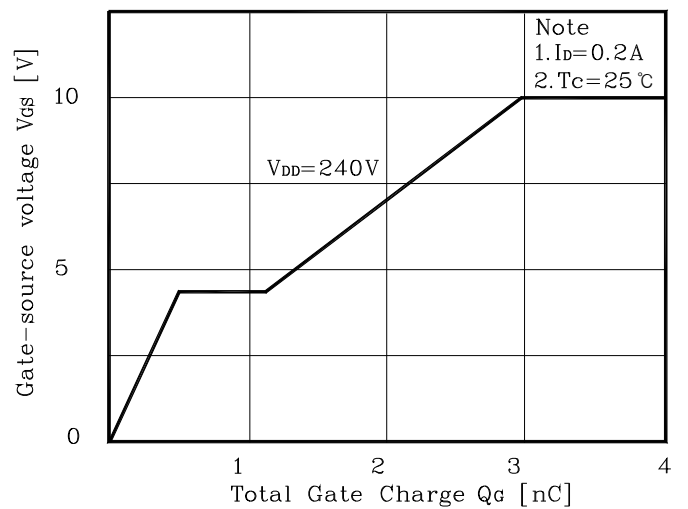
**Fig. 4  $I_S - V_{SD}$**



**Fig. 5 Capacitance -  $V_{DS}$**

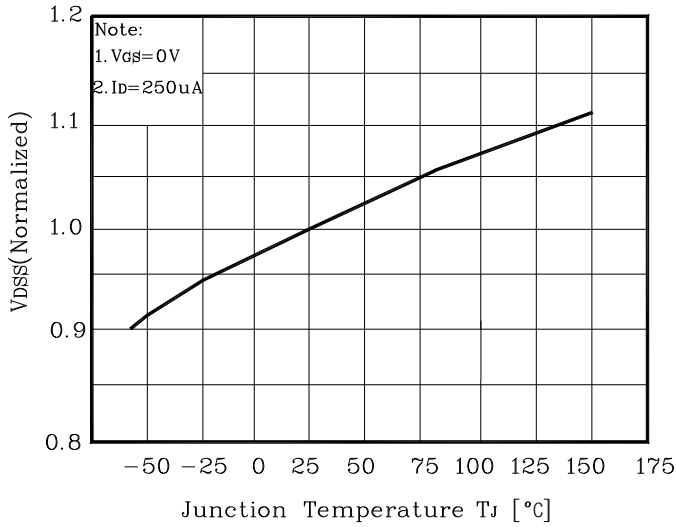


**Fig. 6  $V_{GS} - Q_G$**

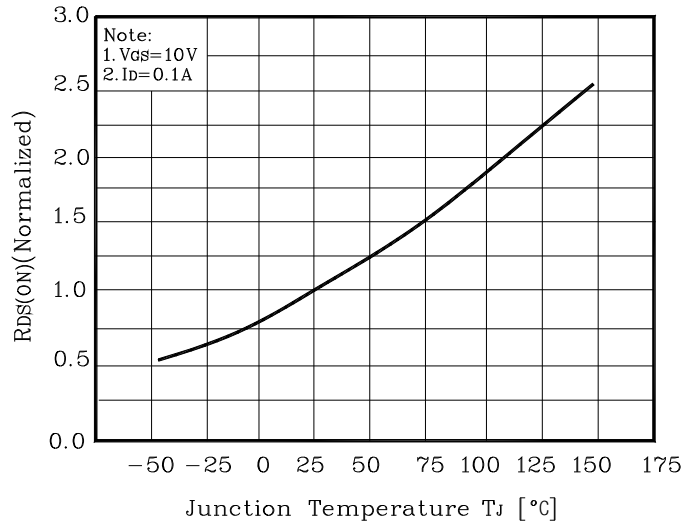


## Electrical Characteristic Curves (Continue)

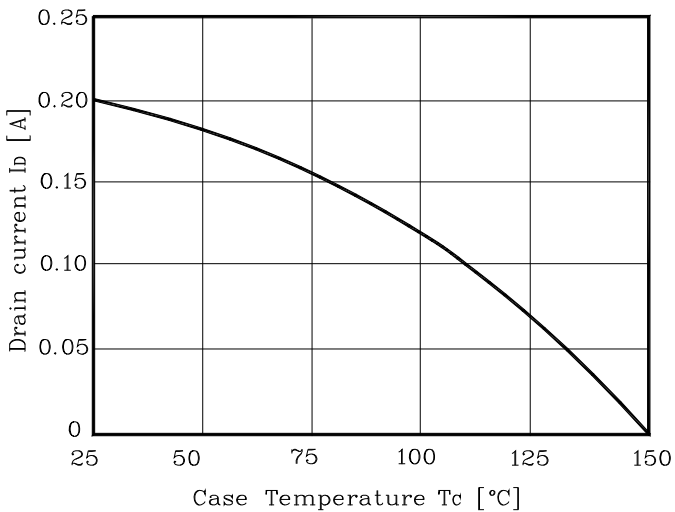
**Fig. 7  $V_{DSS} - T_J$**



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



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



**Fig. 10 Safe Operating Area**

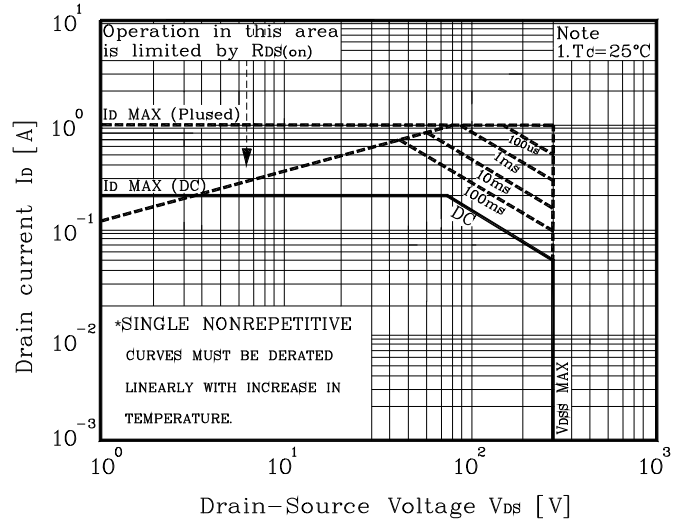


Fig. 11 Gate Charge Test Circuit & Waveform

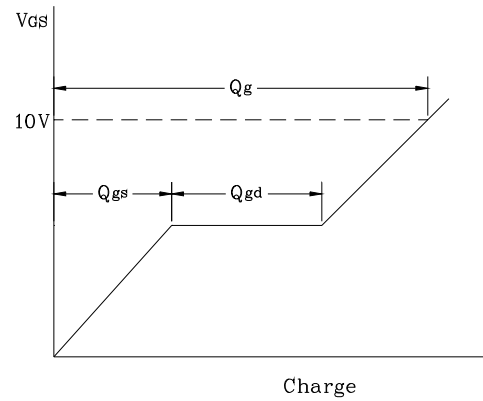
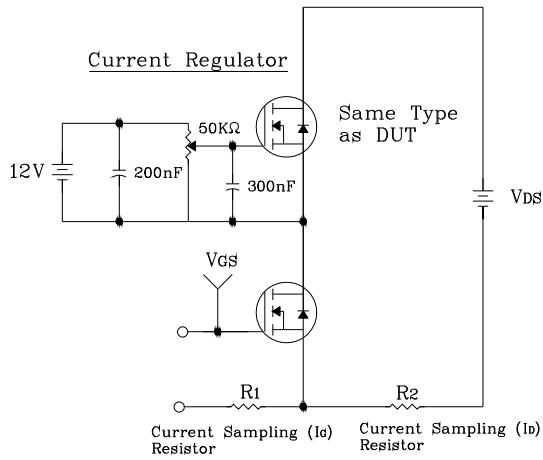


Fig. 12 Resistive Switching Test Circuit & Waveform

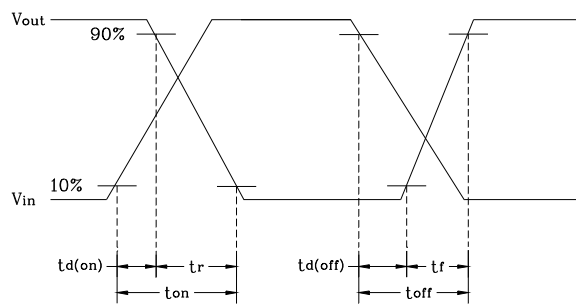
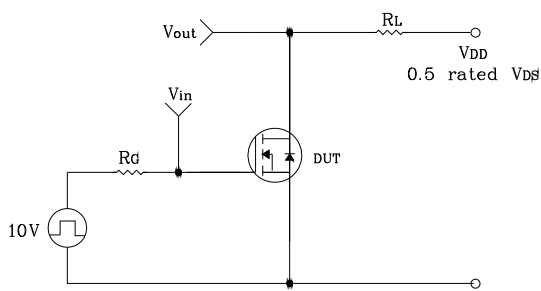


Fig. 13 EAS Test Circuit & Waveform

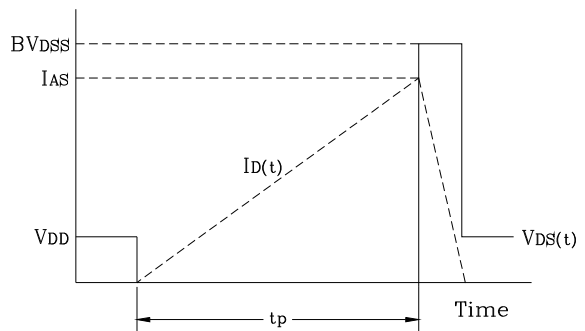
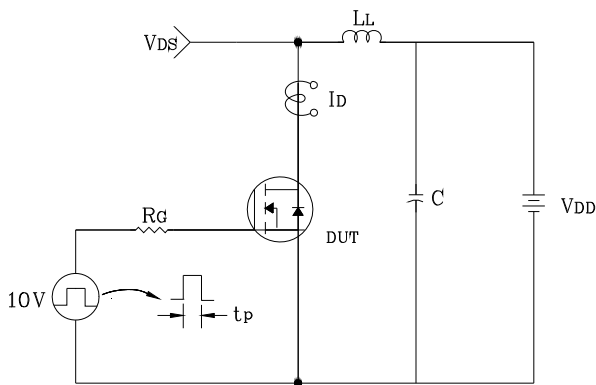
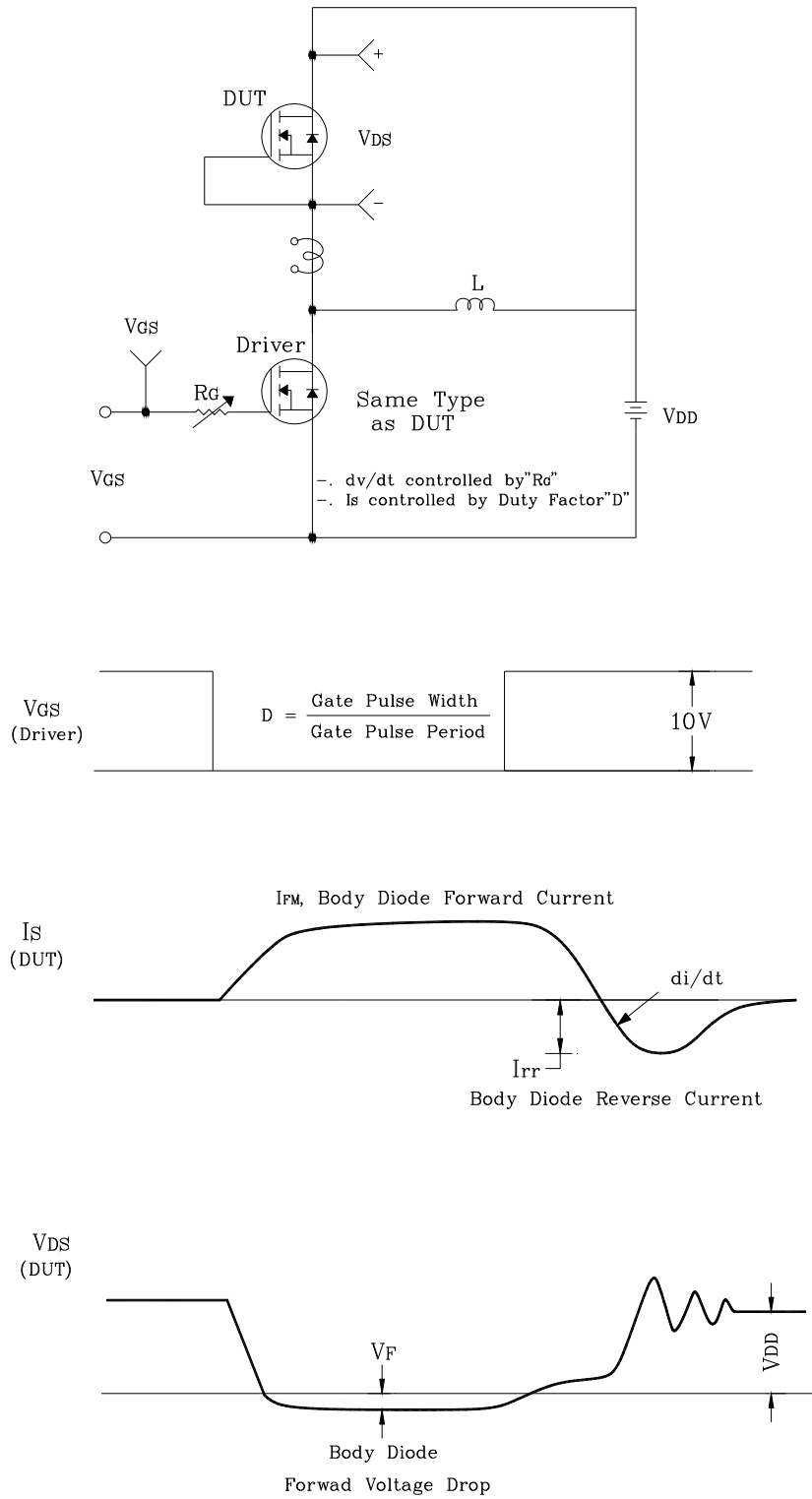
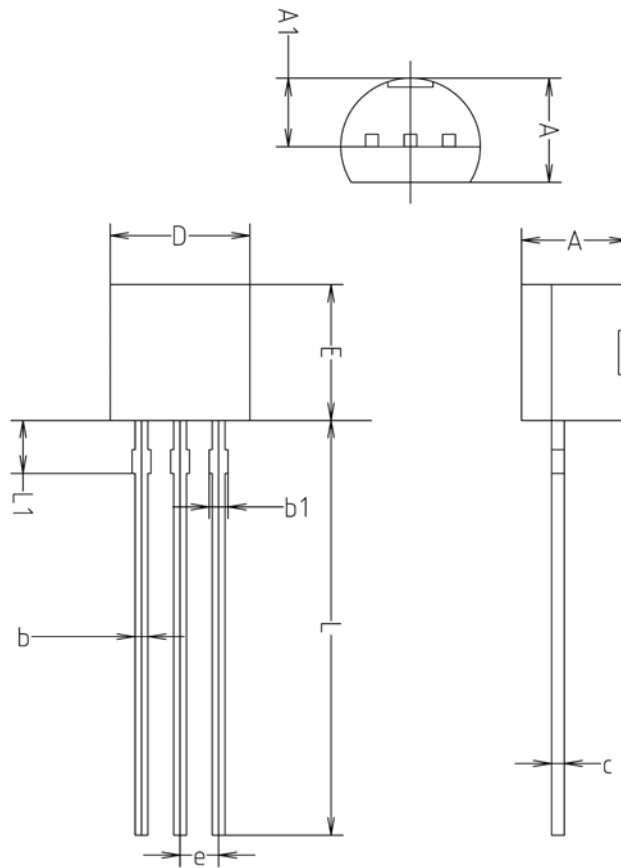


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



## Package Outline Dimensions



SYMBOL	MILLIMETERS(mm)		
	MINIMUM	NOMINAL	MAXIMUM
A	3.40	3.50	3.66
A1	2.46	2.51	2.59
b	0.39	0.44	0.53
b1	0.39	-	0.63
c	0.35	0.42	0.47
D	4.48	4.60	4.70
E	4.48	4.60	4.70
e	1.17	1.27	1.37
L	13.70	14.00	14.77
L1	1.55	1.70	2.15

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