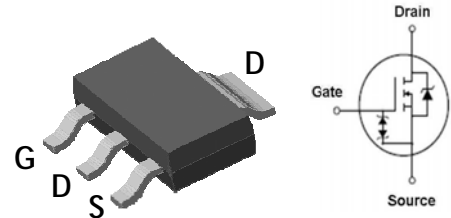


Logic Level Gate Drive Application

Features

- Logic level gate drive
- Max. $R_{DS(ON)} = 135m\Omega$ at $V_{GS} = 10V$, $I_D = 0.5A$
- Low $R_{DS(on)}$ provides higher efficiency
- ESD protected: 1000V (HBM $\pm 500V$)
- Halogen free and RoHS compliant device

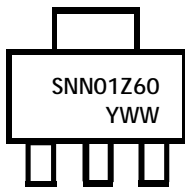


Ordering Information

Part Number	Marking	Package
SNN01Z60Q	SNN01Z60	SOT-223

SOT-223

Marking Information



Column 1: Device Code
 Column 2: Production Information
 e.g.) YWW
 - Y: Year Code
 - WW: Week Code

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

Characteristic	Symbol	Rating	Unit	
Drain-source voltage	V_{DSS}	60	V	
Gate-source voltage	V_{GSS}	± 20	V	
Drain current (DC) *	I_D	$T_C=25^\circ C$	1	A
		$T_C=100^\circ C$	0.63	A
Drain current (Pulsed) *	I_{DM}	4	A	
Single pulsed avalanche energy ^(Note 2)	E_{AS}	35	mJ	
Repetitive avalanche current ^(Note 1)	I_{AR}	1	A	
Repetitive avalanche energy ^(Note 1)	E_{AR}	0.18	mJ	
Power dissipation	P_D	1.8	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. 69	°C/W

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

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu\text{A}$, $V_{DS}=V_{GS}$	1	-	2.5	V
Drain-source cut-off current	I_{DSS}	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$	-	-	1	μA
Gate leakage current	I_{GSS}	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$	-	-	± 10	μA
Drain-source on-resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}$, $I_D=0.5\text{A}$	-	90	135	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=0.5\text{A}$	-	109	165	$\text{m}\Omega$
Forward transfer conductance (Note 3)	g_{fs}	$V_{DS}=10\text{V}$, $I_D=0.5\text{A}$	-	3	-	S
Input capacitance	C_{iss}	$V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1\text{MHz}$	-	314	-	pF
Output capacitance	C_{oss}		-	28	-	
Reverse transfer capacitance	C_{rss}		-	21	-	
Turn-on delay time (Note 3,4)	$t_{d(on)}$	$V_{DS}=30\text{V}$, $I_D=1\text{A}$, $R_G=25\Omega$	-	4.7	-	ns
Rise time (Note 3,4)	t_r		-	6.9	-	
Turn-off delay time (Note 3,4)	$t_{d(off)}$		-	22.1	-	
Fall time (Note 3,4)	t_f		-	6.1	-	
Total gate charge (Note 3,4)	Q_g	$V_{DS}=48\text{V}$, $V_{GS}=10\text{V}$, $I_D=1\text{A}$	-	8	10	nC
Gate-source charge (Note 3,4)	Q_{gs}		-	1.1	-	
Gate-drain charge (Note 3,4)	Q_{gd}		-	1.7	-	

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	-	-	1	A
Source current (Pulsed)	I_{SM}		-	-	4	A
Forward voltage	V_{SD}	$V_{GS}=0\text{V}$, $I_S=1\text{A}$	-	-	1.2	V
Reverse recovery time (Note 3,4)	t_{rr}	$I_S=1\text{A}$, $V_{GS}=0\text{V}$ $di_S/dt=-100\text{A}/\mu\text{s}$	-	25	-	ns
Reverse recovery charge (Note 3,4)	Q_{rr}		-	18.8	-	μC

Note:

1. Repeated rating: Pulse width limited by safe operating area
2. $L=35\text{mH}$, $I_{AS}=1\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
3. Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty cycles $\leq 2\%$
4. Essentially independent of operating temperature typical characteristics

Electrical Characteristics Curves

Fig. 1 $I_D - V_{DS}$

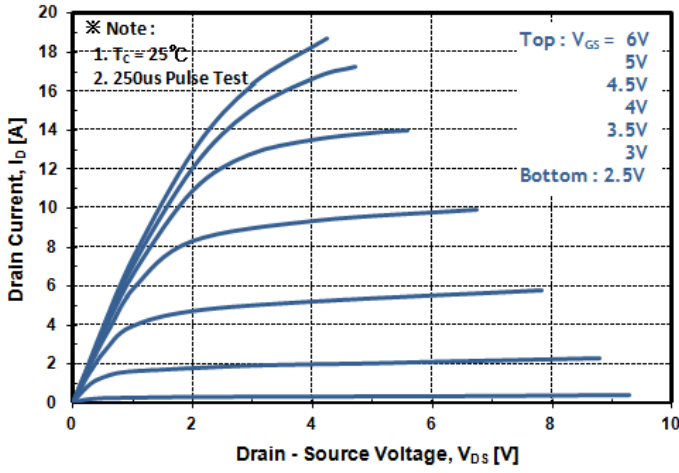


Fig. 2 $I_D - V_{GS}$

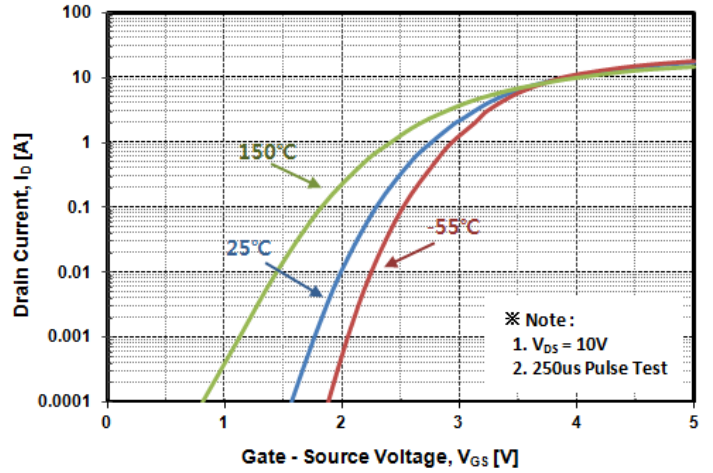


Fig. 3 $R_{DS(ON)} - I_D$

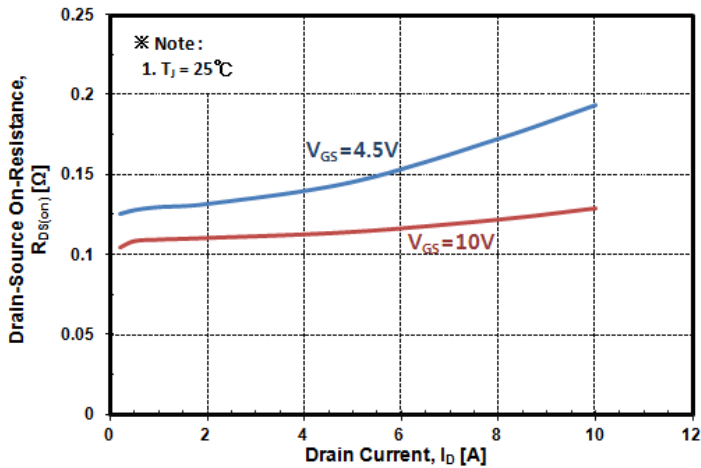


Fig. 4 $I_S - V_{SD}$

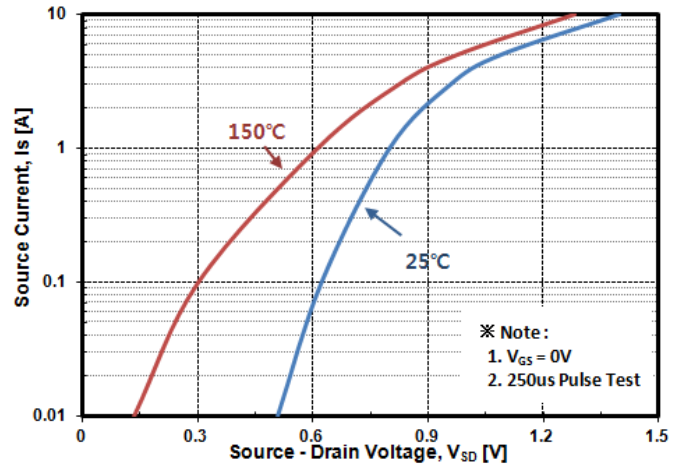


Fig. 5 Capacitance - V_{DS}

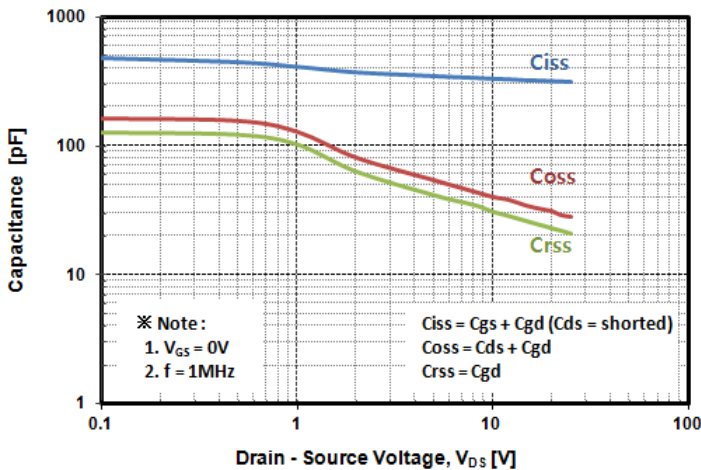


Fig. 6 $V_{GS} - Q_G$

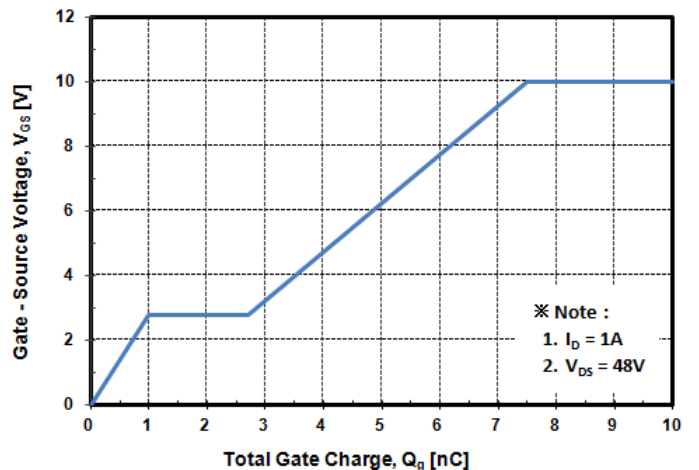


Fig. 7 $BV_{DSS} - T_J$

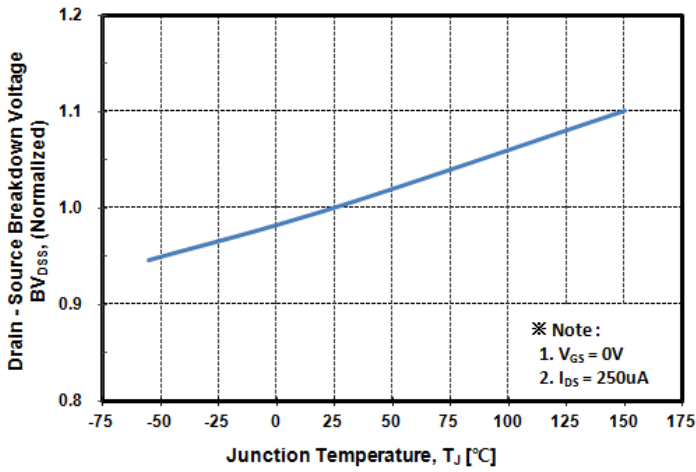


Fig. 8 $R_{DS(on)} - T_J$

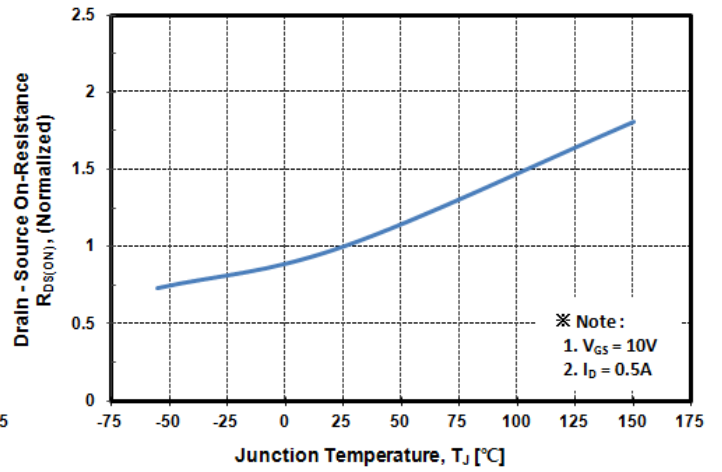


Fig. 9 $I_D - T_C$

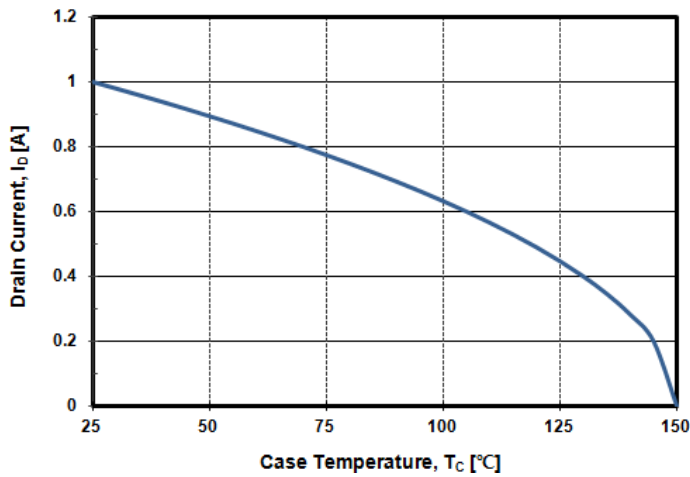


Fig. 10 Safe Operating Area

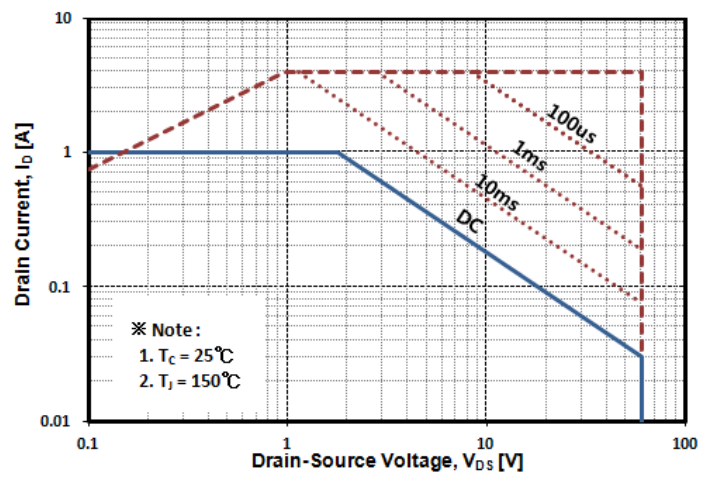


Fig. 11 Transient Thermal Impedance

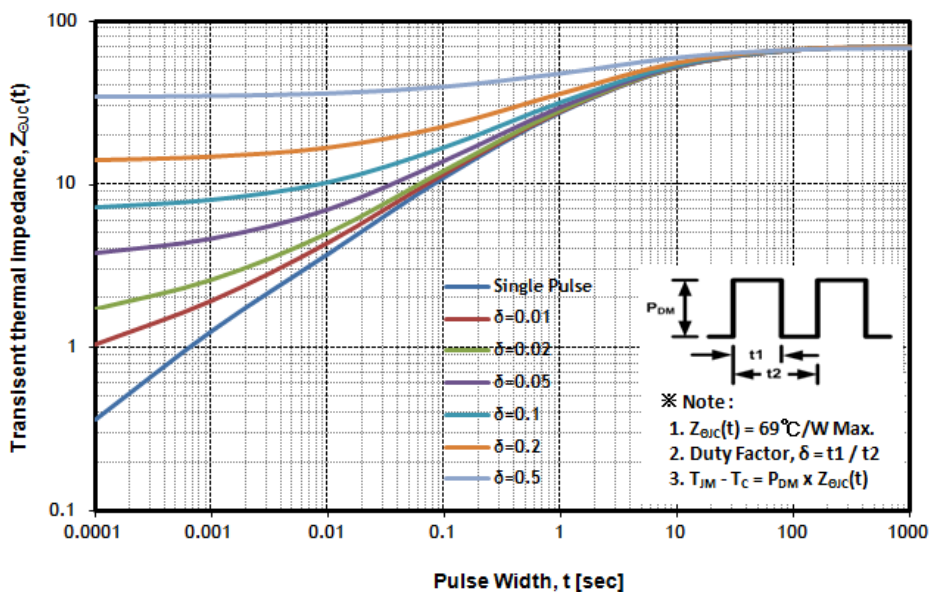


Fig. 12 Gate Charge Test Circuit & Waveform

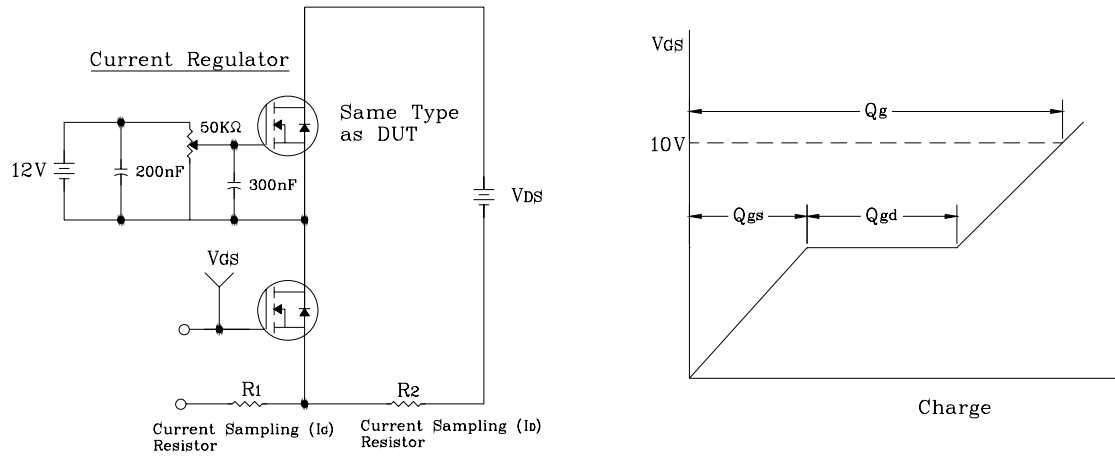


Fig. 13 Resistive Switching Test Circuit & Waveform

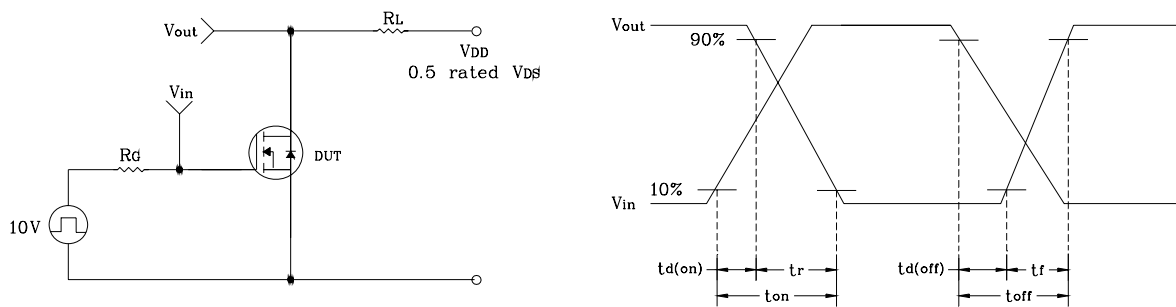


Fig. 14 E_{AS} Test Circuit & Waveform

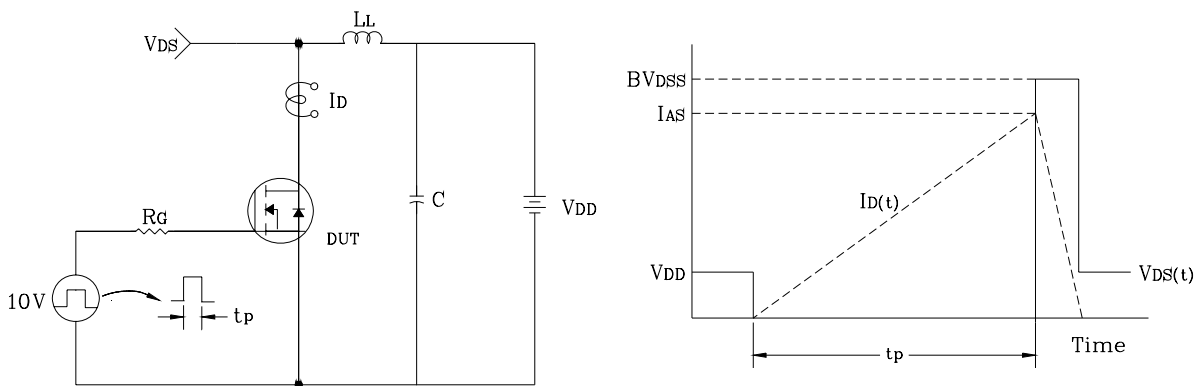
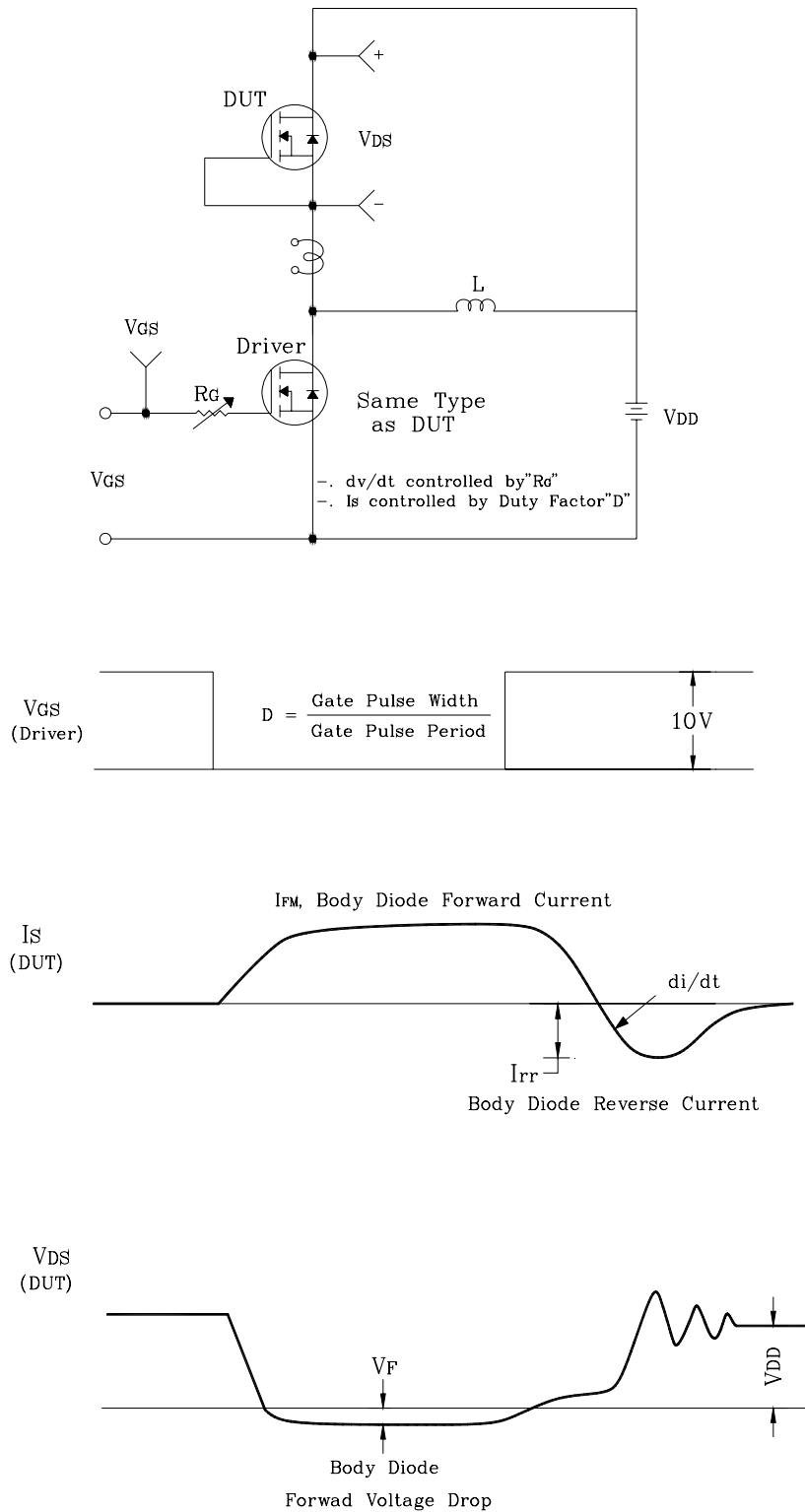
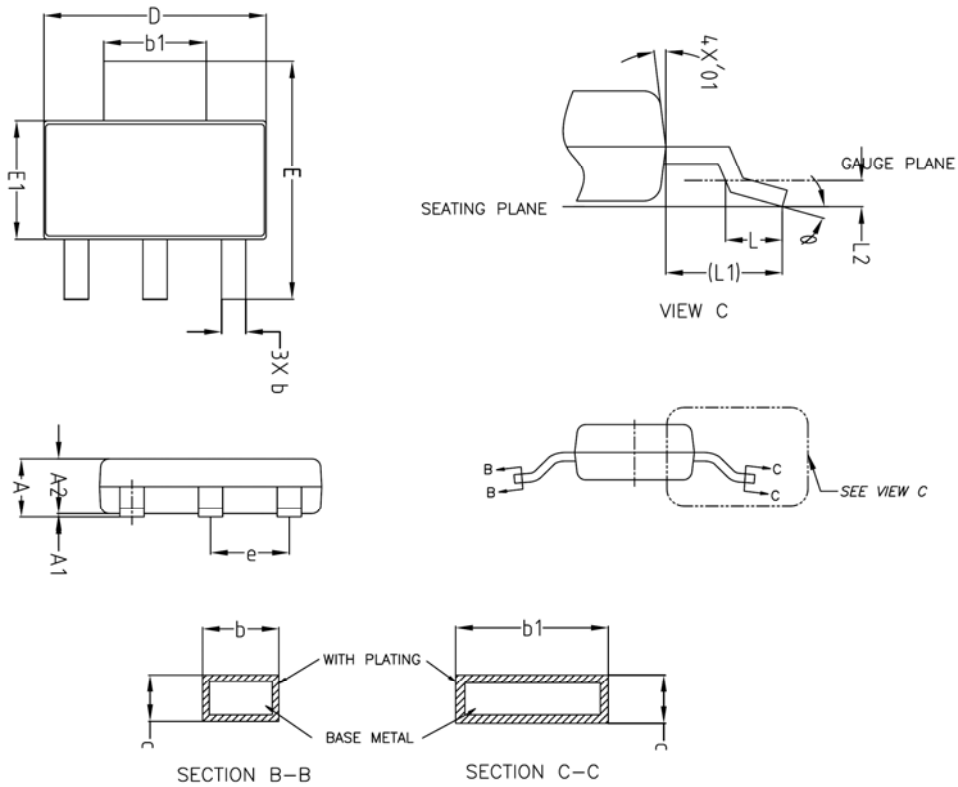


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform

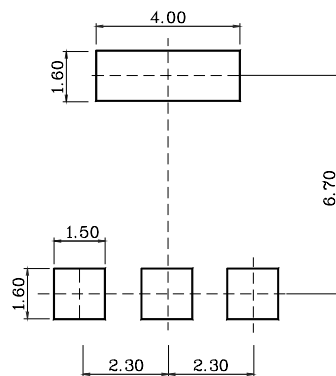


Package Outline Dimensions



SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	—	—	1.80	
A1	0.00	—	0.10	
A2	1.60	1.65	1.70	
b	0.68	—	0.76	
b1	2.95	—	3.07	
c	0.23	—	0.28	
D	6.40	6.50	6.60	
E	6.80	7.00	7.20	
E1	3.40	3.50	3.60	
e	2.30 BSC			
L	0.45	—	0.65	
L1	1.75 REF			
L2	0.10 BSC			
θ	0°	—	10°	
$\theta 1$	5°	—	10°	

※ Recommended Land Pattern (unit: mm)



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