

PORTABLE EQUIPMENT APPLICATION

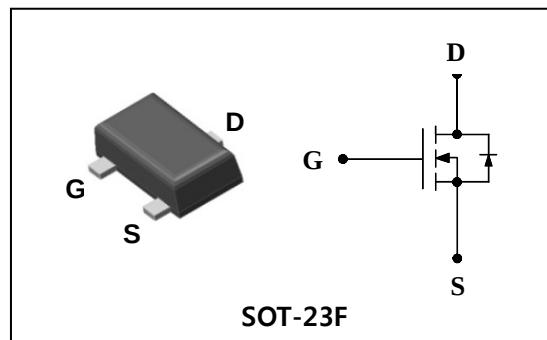
Features

- Low Voltage : $BV_{DSS}=20V(\text{Min.})$
- Low $V_{GS(th)}$: $V_{GS(th)}=0.6\sim1.2V$
- Small footprint due to small package
- Low $R_{DS(on)}$: $R_{DS(on)}=33m\Omega(\text{Typ.})$

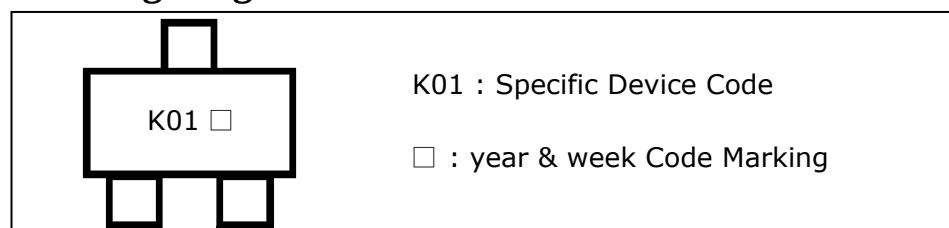
Ordering Information

Type No.	Marking	Package Code
STK001SF	<u>K01</u> □ ① ②	SOT-23F

PIN Connection



Marking Diagram



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

Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	20	V
Gate-source voltage	V_{GSS}	± 12	V
Drain current (DC) *	I_D	3.2	A
Drain current (Pulsed) *	I_{DM}	12.8	A
Power dissipation **	P_D	0.35	W
Avalanche current (Single) ②	I_{AS}	3.2	A
Single pulsed avalanche energy ②	E_{AS}	30	mJ
Avalanche current (Repetitive) ①	I_{AR}	3.2	A
Repetitive avalanche energy ①	E_{AR}	2.5	mJ
Junction temperature	T_J	150	$^{\circ}C$
Storage temperature range	T_{stg}	-55~150	

* Limited by maximum junction temperature

** Device mounted on a glass-epoxy board

Characteristic	Symbol	Typ.	Max.	Unit
Thermal resistance Junction-ambient	$R_{th(J-A)}$	-	357	$^{\circ}C/W$

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}	$I_D=250\mu\text{A}$, $V_{GS}=0$	20	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu\text{A}$, $V_{DS}=V_{GS}$	0.6	-	1.2	V
Drain-source cut-off current	I_{DSS}	$V_{DS}=20\text{V}$, $V_{GS}=0\text{V}$	-	-	1	μA
Gate leakage current	I_{GSS}	$V_{DS}=0\text{V}$, $V_{GS}=\pm 12\text{V}$	-	-	± 10	μA
Drain-source on-resistance ④	$R_{DS(on)}$	$V_{GS}=4.5\text{V}$, $I_D=1.6\text{A}$	-	33	50	$\text{m}\Omega$
		$V_{GS}=2.5\text{V}$, $I_D=1.6\text{A}$	-	46	70	
Forward transfer conductance ④	g_{fs}	$V_{DS}=5\text{V}$, $I_D=3.2\text{A}$	-	10.5	-	S
Input capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=10\text{V}$, $f=1\text{MHz}$	-	395	-	pF
Output capacitance	C_{oss}		-	97	-	
Reverse transfer capacitance	C_{rss}		-	44	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=10\text{V}$, $I_D=3.2\text{A}$ $R_G=10\Omega$ ③④	-	3.2	-	ns
Rise time	t_r		-	2.8	-	
Turn-off delay time	$t_{d(off)}$		-	20	-	
Fall time	t_f		-	2.8	-	
Total gate charge	Q_g	$V_{DD}=10\text{V}$, $V_{GS}=4.5\text{V}$ $I_D=3.2\text{A}$ ③④	-	6.8	10	nC
Gate-source charge	Q_{gs}		-	0.8	1.2	
Gate-drain charge	Q_{gd}		-	0.9	1.1	

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Continuous source current	I_S	Integral reverse diode in the MOSFET	-	-	0.5	A
Source current (Pulsed) ①	I_{SM}		-	-	2.0	
Forward voltage ④	V_{SD}	$V_{GS}=0\text{V}$, $I_S=0.5\text{A}$	-	0.7	1.2	V
Reverse recovery time	t_{rr}	$I_S=3.2\text{A}$, $V_{DD}=10\text{V}$ $dI_S/dt=70\text{A}/\mu\text{s}$	-	24	-	ns
Reverse recovery charge	Q_{rr}		-	120	-	μC

Note ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② $L=3.0\text{mH}$, $I_{AS}=3.8\text{A}$, $V_{DD}=10\text{V}$, $R_G=25\Omega$
- ③ Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
- ④ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1 $I_D - V_{DS}$

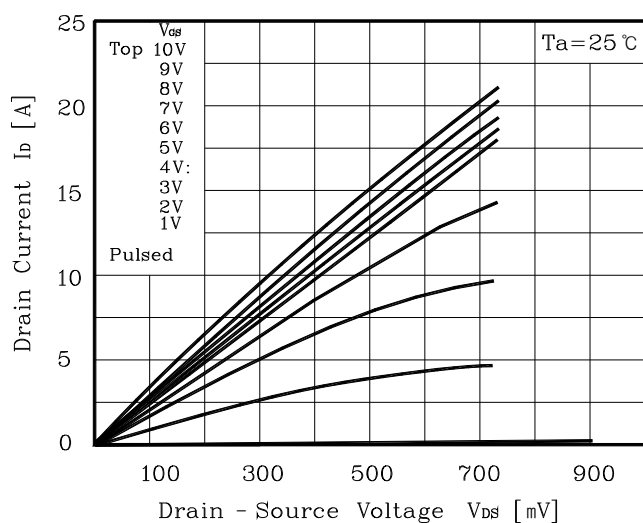


Fig. 2 $I_D - V_{GS}$

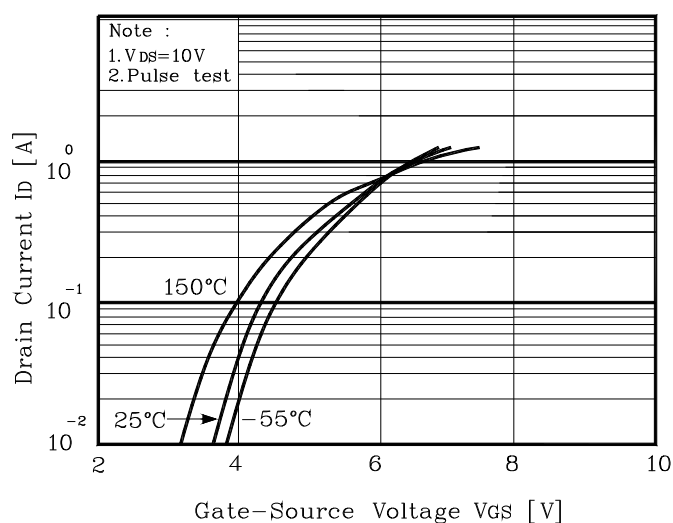


Fig. 3 $R_{DS(on)} - I_D$

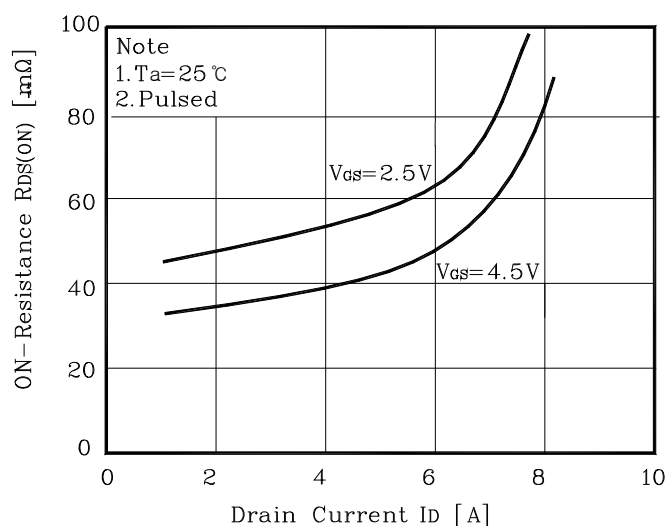


Fig. 4 $I_S - V_{SD}$

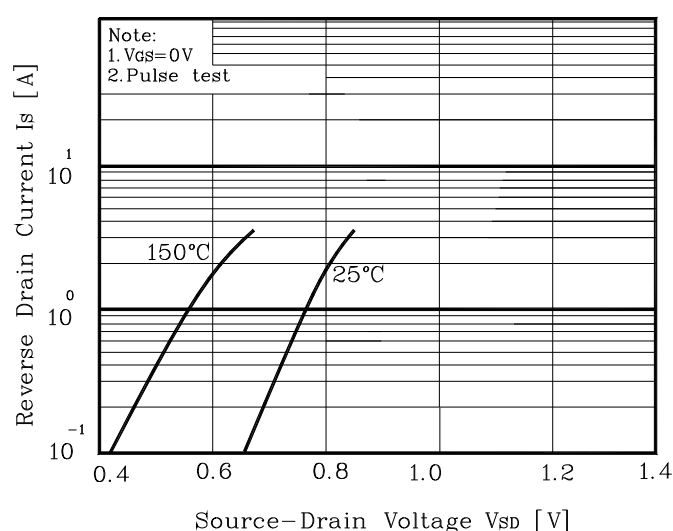


Fig. 5 Capacitance - V_{DS}

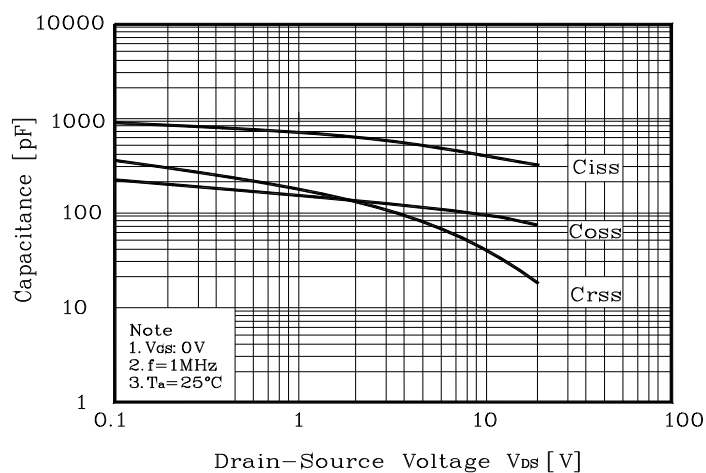


Fig. 6 $V_{GS} - Q_G$

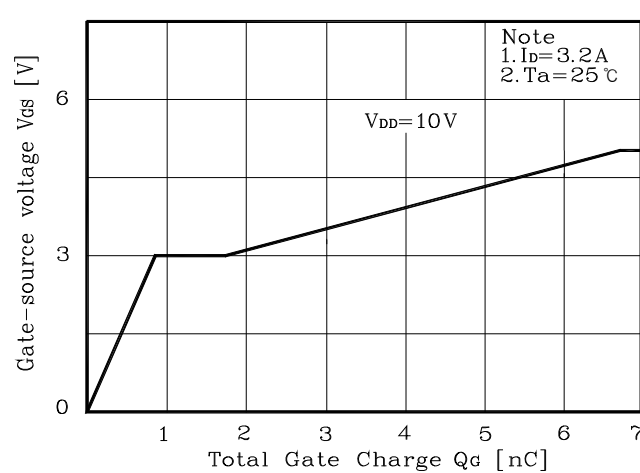


Fig. 7 $V_{DS} - T_J$

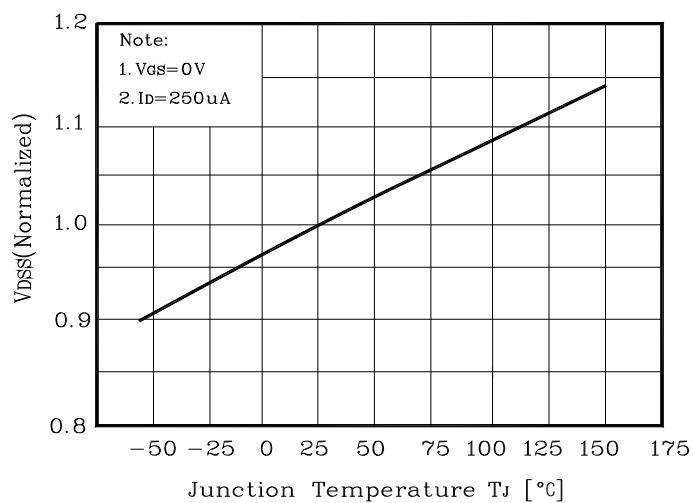


Fig. 8 $R_{DS(on)} - T_J$

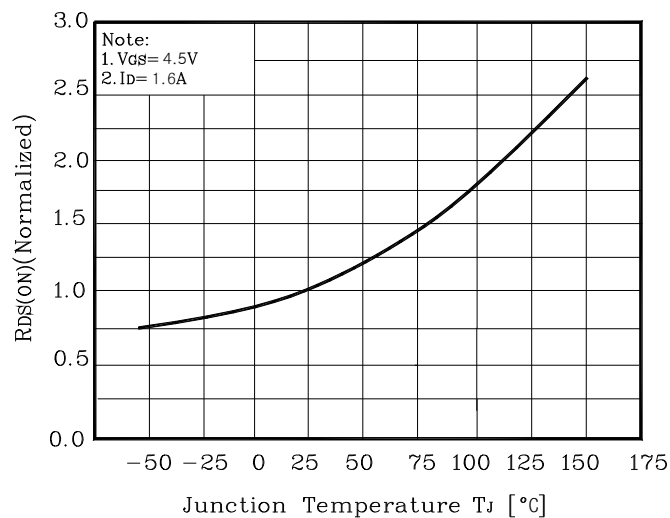


Fig. 9 $I_D - T_a$

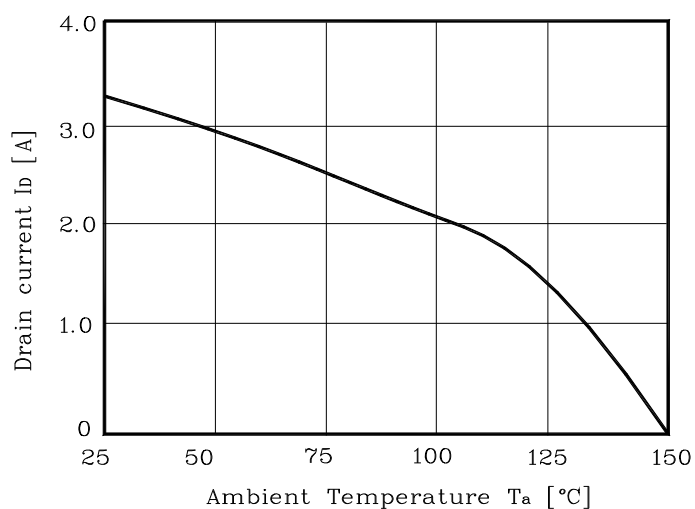


Fig. 10 Safe Operating Area

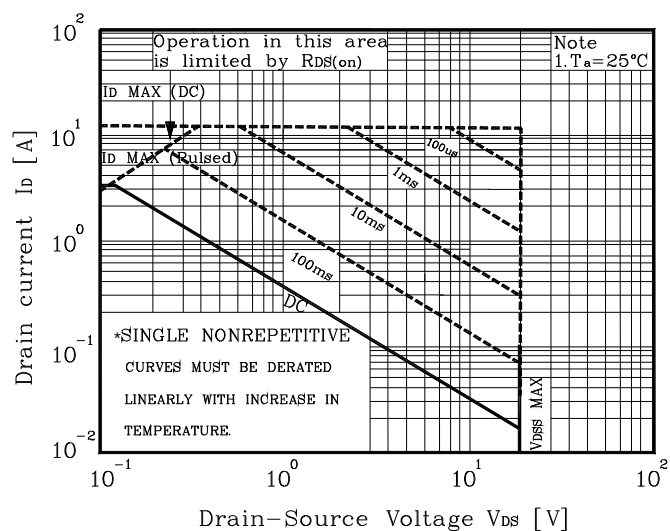


Fig. 11 Gate Charge Test Circuit & Waveform

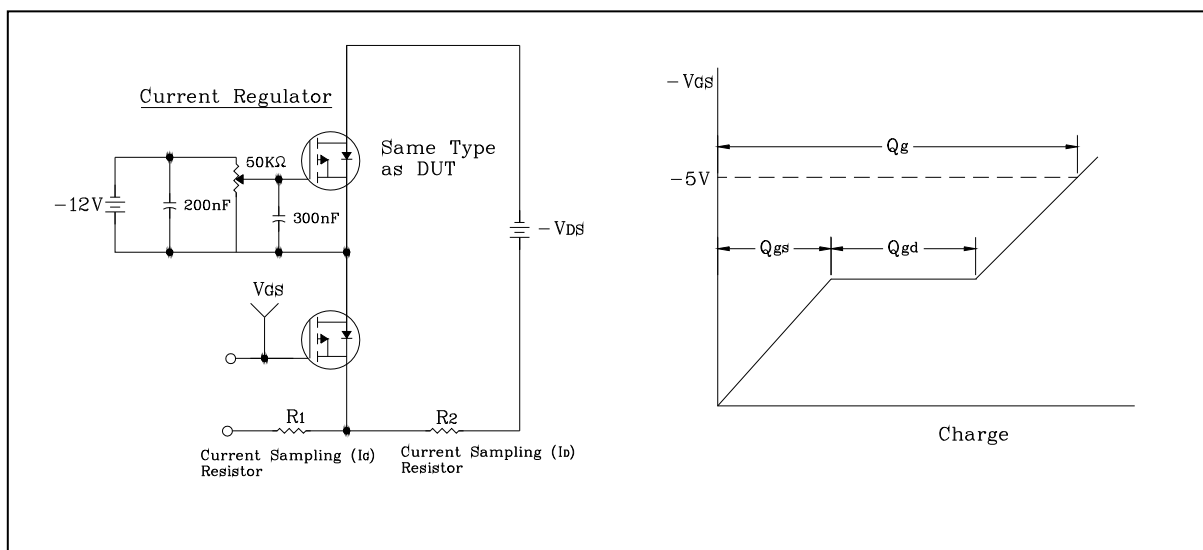


Fig. 12 Resistive Switching Test Circuit & Waveform

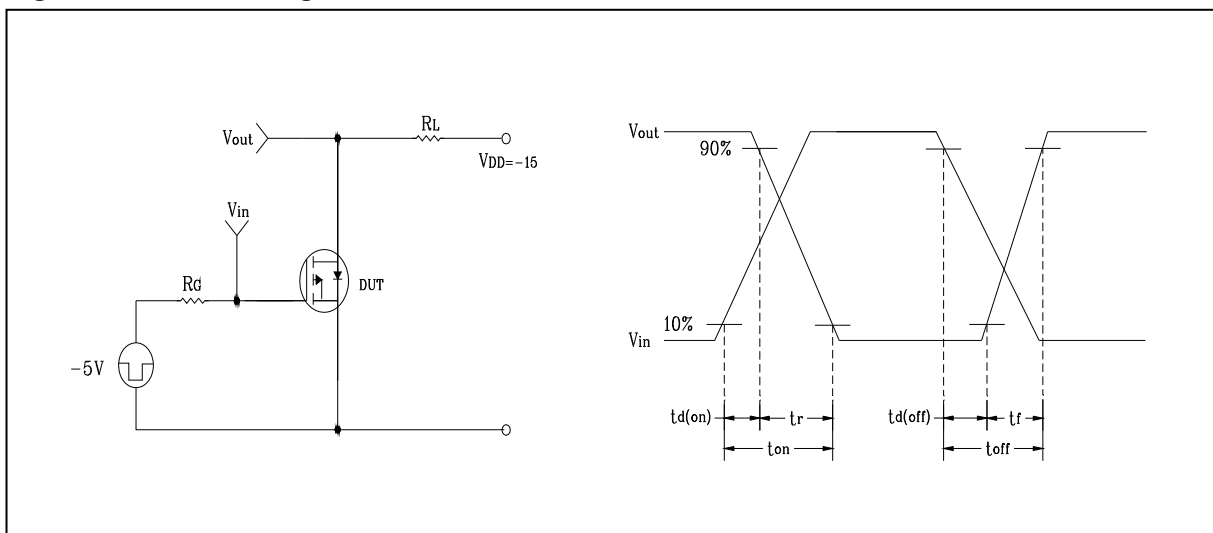


Fig. 13 E_{AS} Test Circuit & Waveform

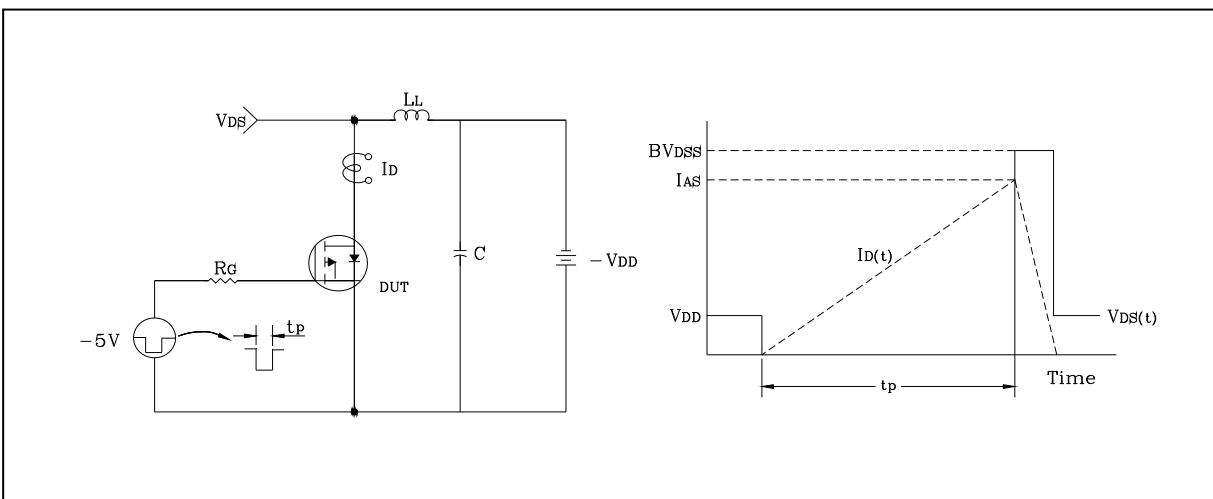
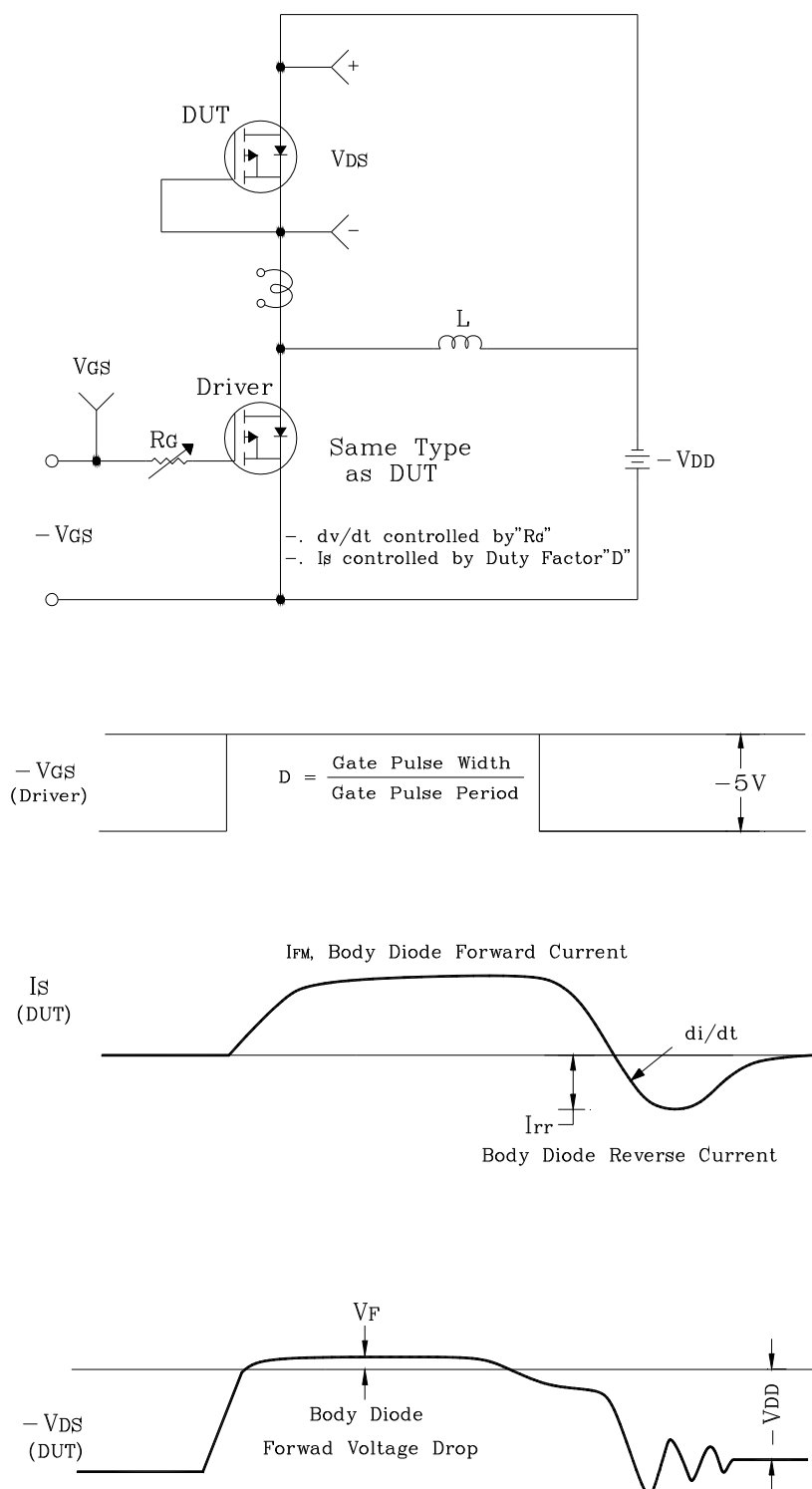
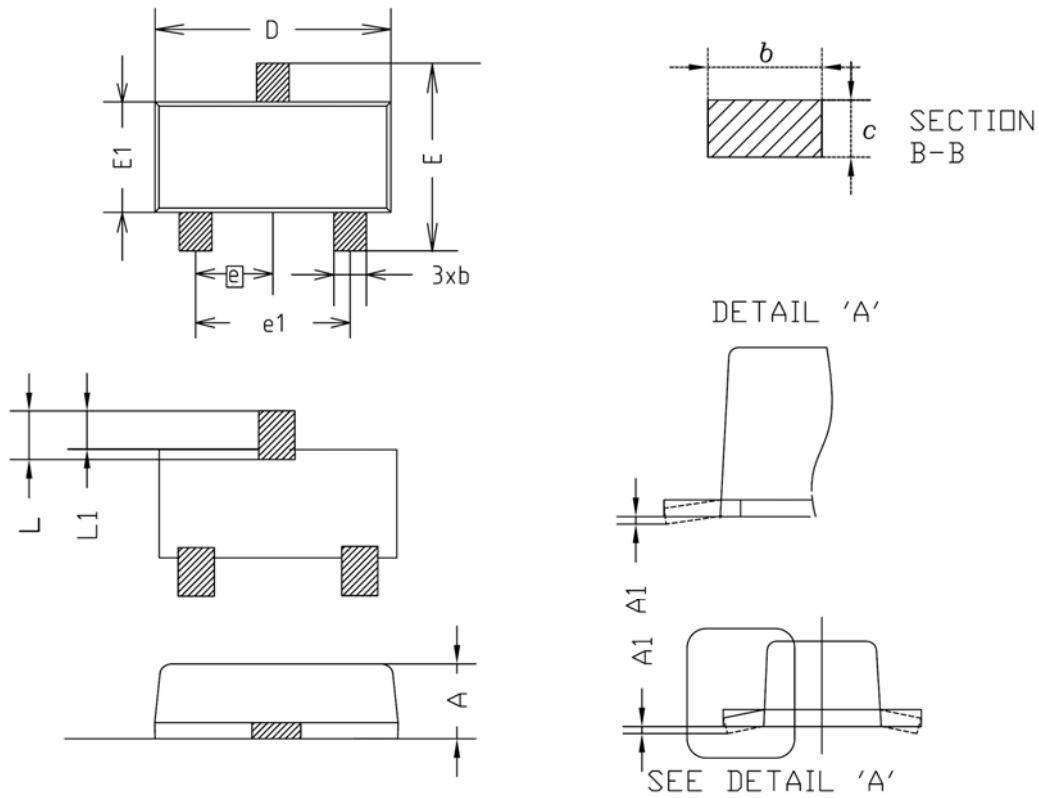


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



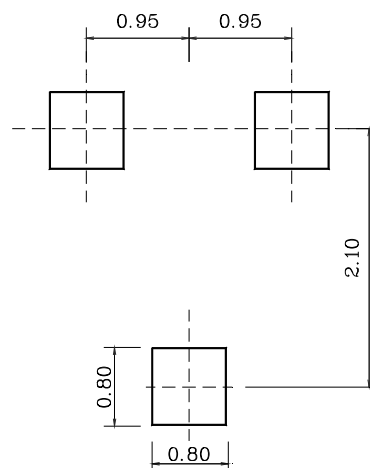
Outline Dimension

unit: mm



SYMBOL	MILLIMETER(mm)			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	0.80	0.90	1.00	
A1	0.00	-	0.10	
b	0.35	0.40	0.45	
c	0.10	0.15	0.20	
D	2.80	2.90	3.00	
E	2.30	2.40	2.50	
E1	1.50	1.60	1.70	
e	0.95BSC			
e1	1.80	1.90	2.00	
L	0.48	0.58	0.68	
L1	0.30	-	0.50	

※ Recommended Land Pattern [unit: mm]



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