

PORTABLE EQUIPMENT APPLICATION

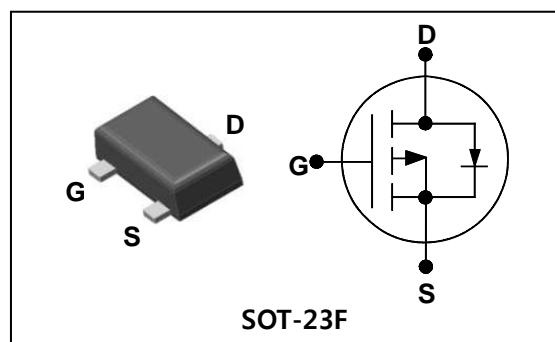
Features

- Low Voltage : $BV_{DSS}=-30V$ (Min.)
- Low $V_{GS(th)}$: $V_{GS(th)}=-0.7\sim-1.4V$
- Small footprint due to small package
- Low $R_{DS(on)}$: $R_{DS(on)}=91m\Omega$ (Max.)

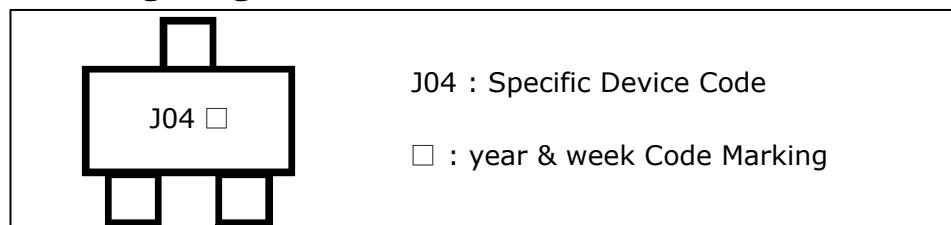
Ordering Information

Type No.	Marking	Package Code
STJ004SF	J04  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}	-30	V
Gate-source voltage	V_{GSS}	± 12	V
Drain current (DC) *	I_D	-2.4	A
Drain current (Pulsed) *	I_{DM}	-9.6	A
Power dissipation **	P_D	0.35	W
Avalanche current (Single) ②	I_{AS}	-2.4	A
Single pulsed avalanche energy ②	E_{AS}	13	mJ
Avalanche current (Repetitive) ①	I_{AR}	-2.4	A
Repetitive avalanche energy ①	E_{AR}	1.1	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	$R_{th(J-A)}$	-	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}	$I_D=-250\mu\text{A}, V_{GS}=0$	-30	-	-	V
Gate threshold voltage	$V_{GS(\text{th})}$	$I_D=-250\mu\text{A}, V_{DS}=V_{GS}$	-0.7	-	-1.4	V
Drain-source cut-off current	I_{DSS}	$V_{DS}=-20\text{V}, V_{GS}=0$	-	-	1	μA
Gate leakage current	I_{GSS}	$V_{DS}=0\text{V}, V_{GS}=\pm 12\text{V}$	-	-	± 100	nA
Drain-source on-resistance ⁽⁴⁾	$R_{\text{DS(ON)}}$	$V_{GS}=-4.5\text{V}, I_D=-1.2\text{A}$ $V_{GS}=-2.5\text{V}, I_D=-1.2\text{A}$	-	61	91	$\text{m}\Omega$
Forward transfer conductance ⁽⁴⁾	g_{fs}	$V_{DS}=-5\text{V}, I_D=-2.4\text{A}$	-	13.2	-	S
Input capacitance	C_{iss}	$V_{GS}=0\text{V}, V_{DS}=-10\text{V}, f=1\text{MHz}$	-	398	-	pF
Output capacitance	C_{oss}		-	82	-	
Reverse transfer capacitance	C_{rss}		-	46	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-10\text{V}, I_D=-2.4\text{A}$ $V_{GS}=-5\text{V}, R_G=25\Omega$	-	11	-	ns
Rise time	t_r		-	5.3	-	
Turn-off delay time	$t_{d(off)}$		-	7.6	-	
Fall time	t_f		-	5.3	-	
Total gate charge	Q_g	$V_{DD}=-10\text{V}, V_{GS}=-5\text{V}$ $I_D=-2.4\text{A}$	-	6.4	9.6	nC
Gate-source charge	Q_{gs}		-	2.8	4.2	
Gate-drain charge	Q_{gd}		(2)(4)	-	1.7	2.6

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}	$I_s=-2.4\text{A}, V_{GS}=0\text{V}$ $dI_F/dt=10\text{A}/\mu\text{s}$	-	29	-	ns
Reverse recovery charge	Q_{rr}		-	130	-	μC

Note :

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② $L=2.0\text{mH}, I_{AS}=-2.9\text{A}, V_{DD}=-15\text{V}, R_G=25\Omega$
- ③ Pulse Test : Pulse width $\leq 300\text{us}$, Duty cycle $\leq 2\%$
- ④ Essentially independent of operating temperature

P-CH Electrical Characteristic Curves

Fig. 1 I_D - V_{DS}

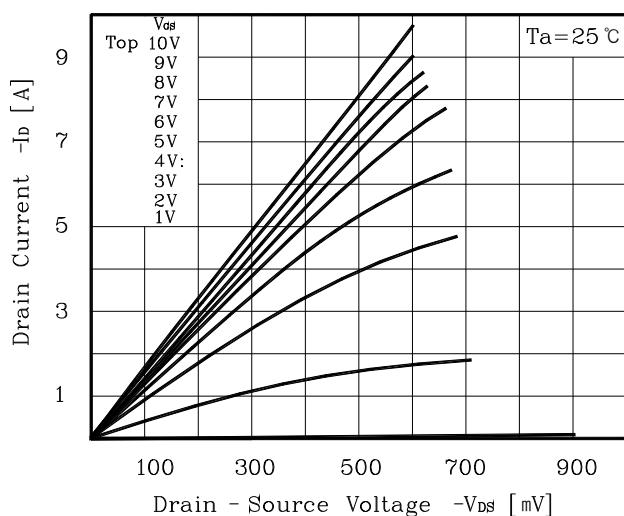


Fig. 2 I_D - V_{GS}

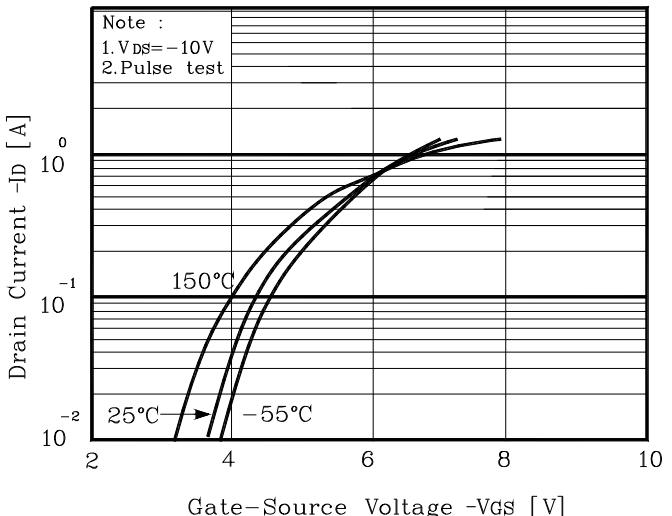


Fig. 3 $R_{DS(on)}$ - I_D

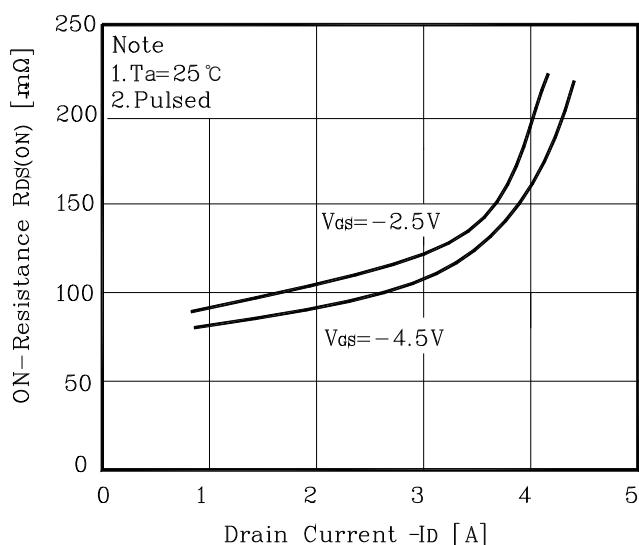


Fig. 4 I_S - V_{SD}

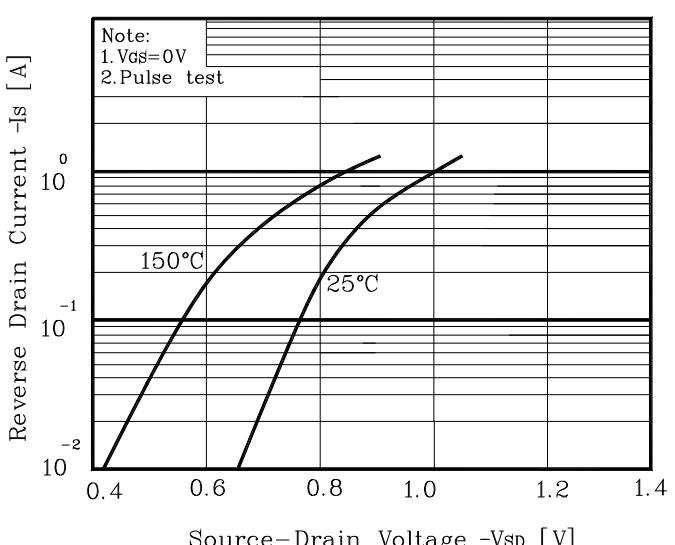


Fig. 5 Capacitance - V_{DS}

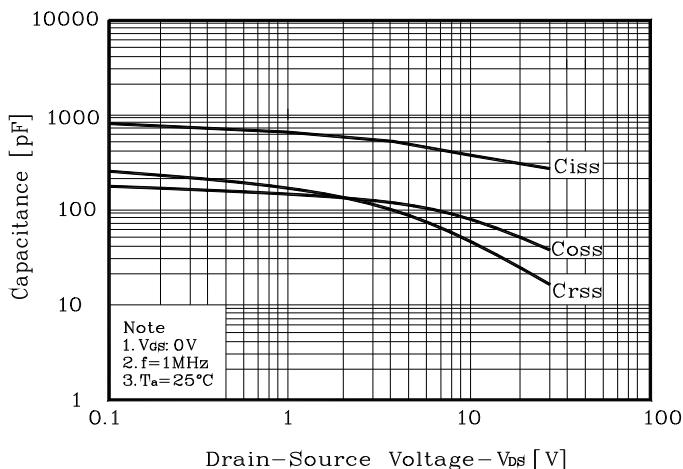


Fig. 6 V_{GS} - Q_G

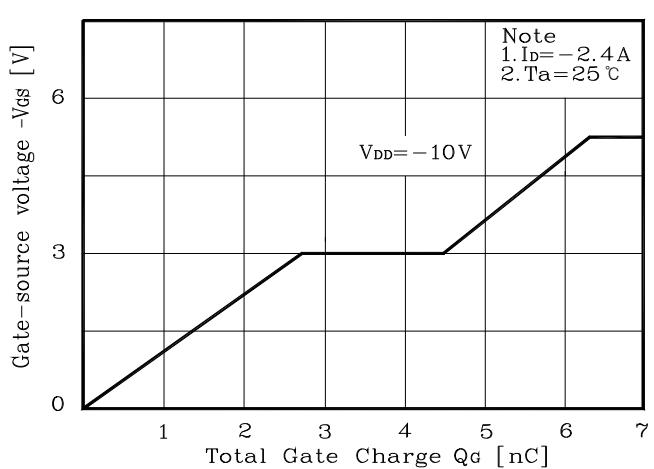


Fig. 7 V_{DSS} - T_J

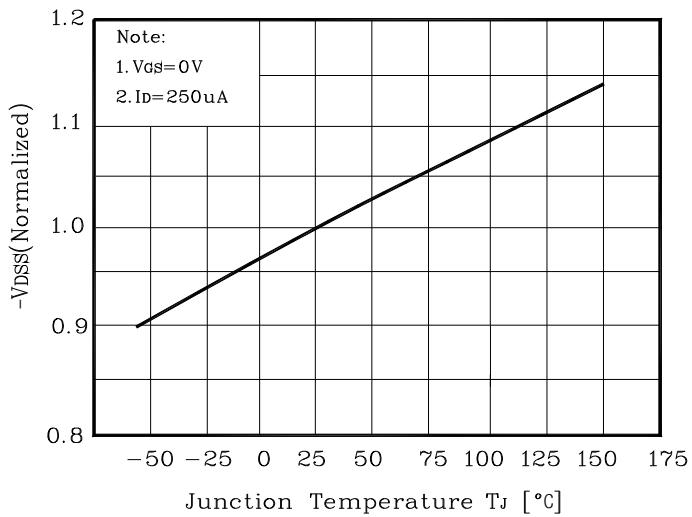


Fig. 8 $R_{DS(on)}$ - T_J

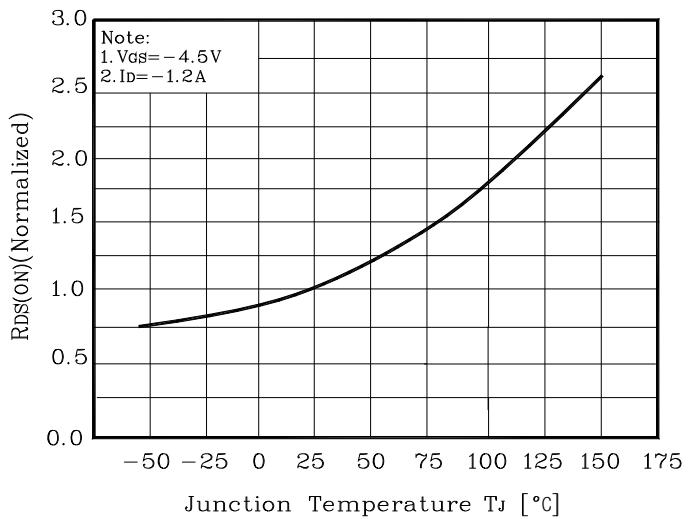


Fig. 9 I_D - T_a

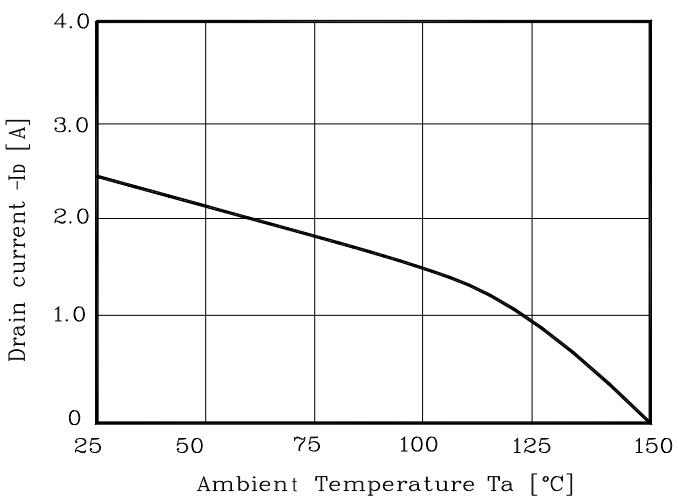


Fig. 10 Safe Operating Area

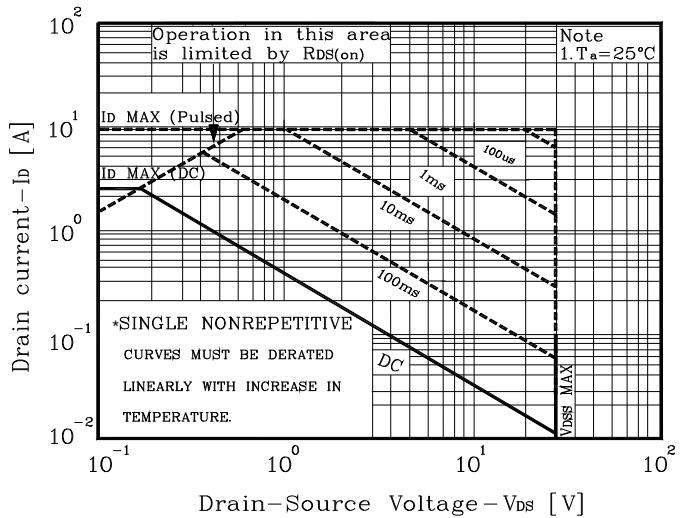


Fig. 11 Gate Charge Test Circuit & Waveform

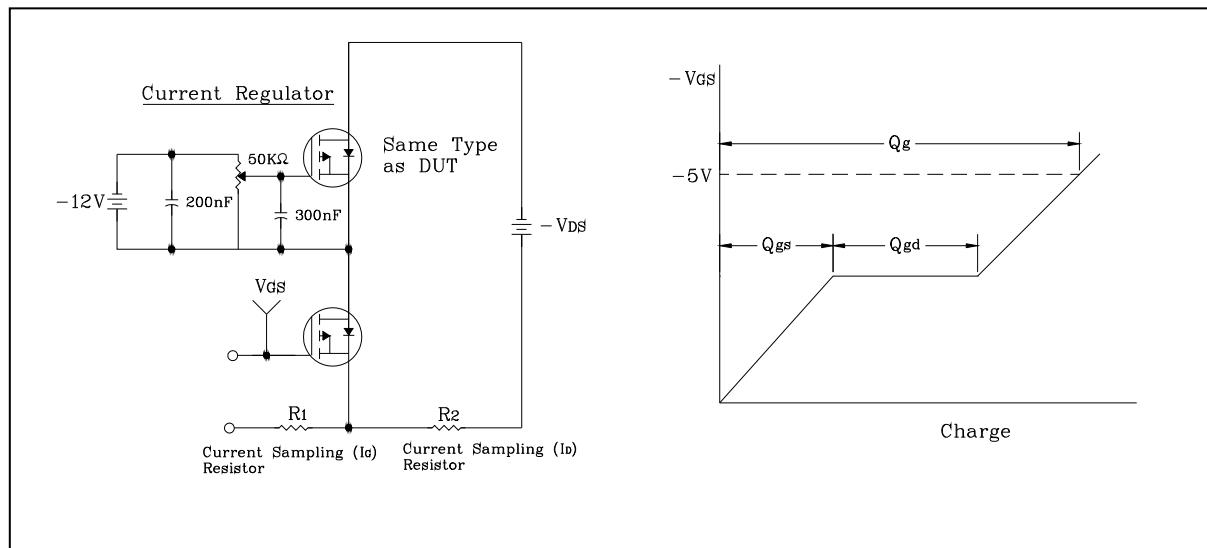


Fig. 12 Resistive Switching Test Circuit & Waveform

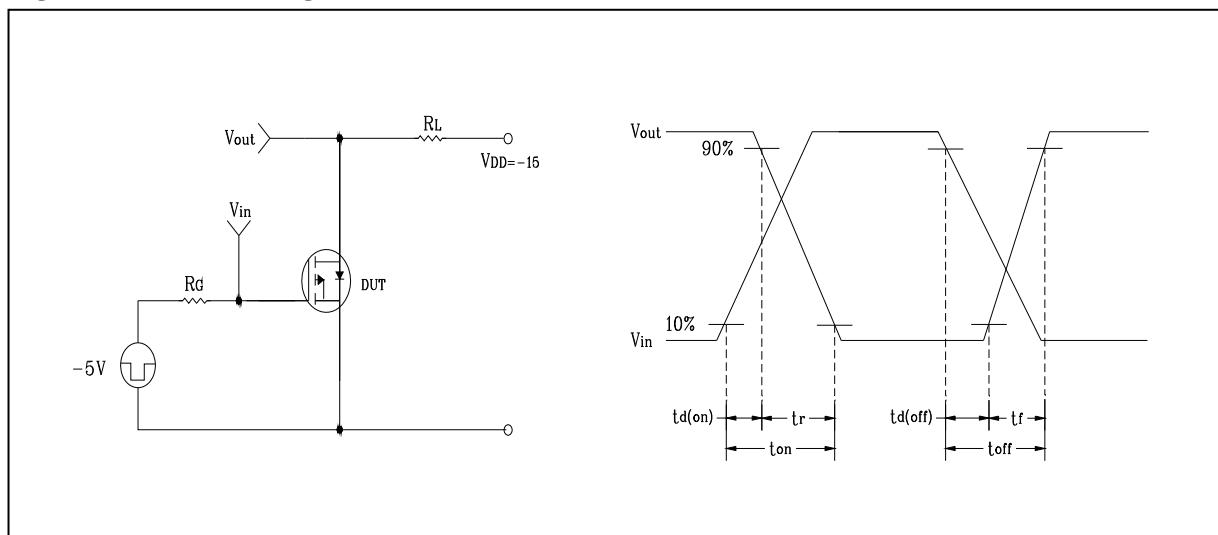


Fig. 13 E_{AS} Test Circuit & Waveform

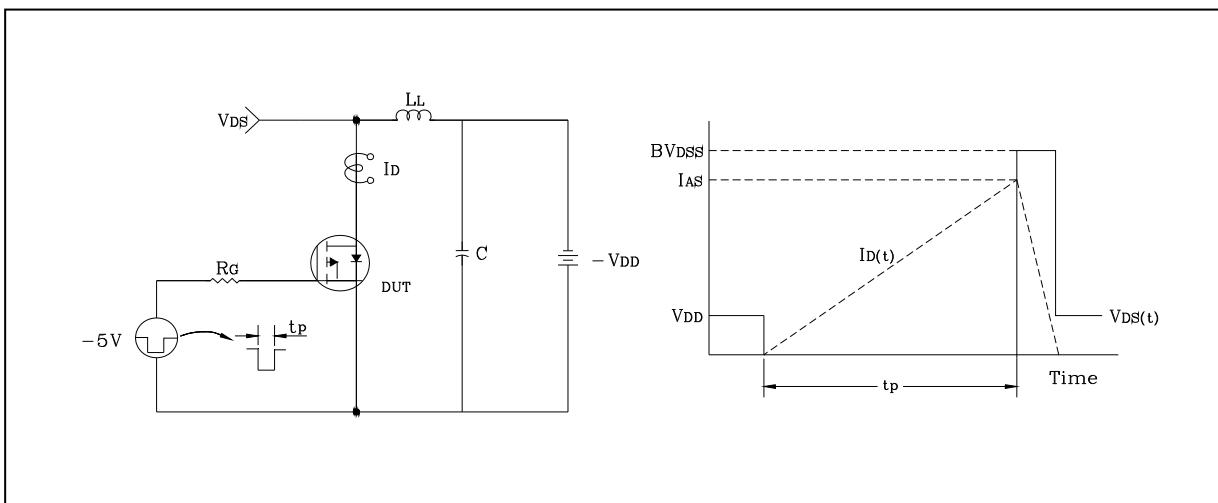
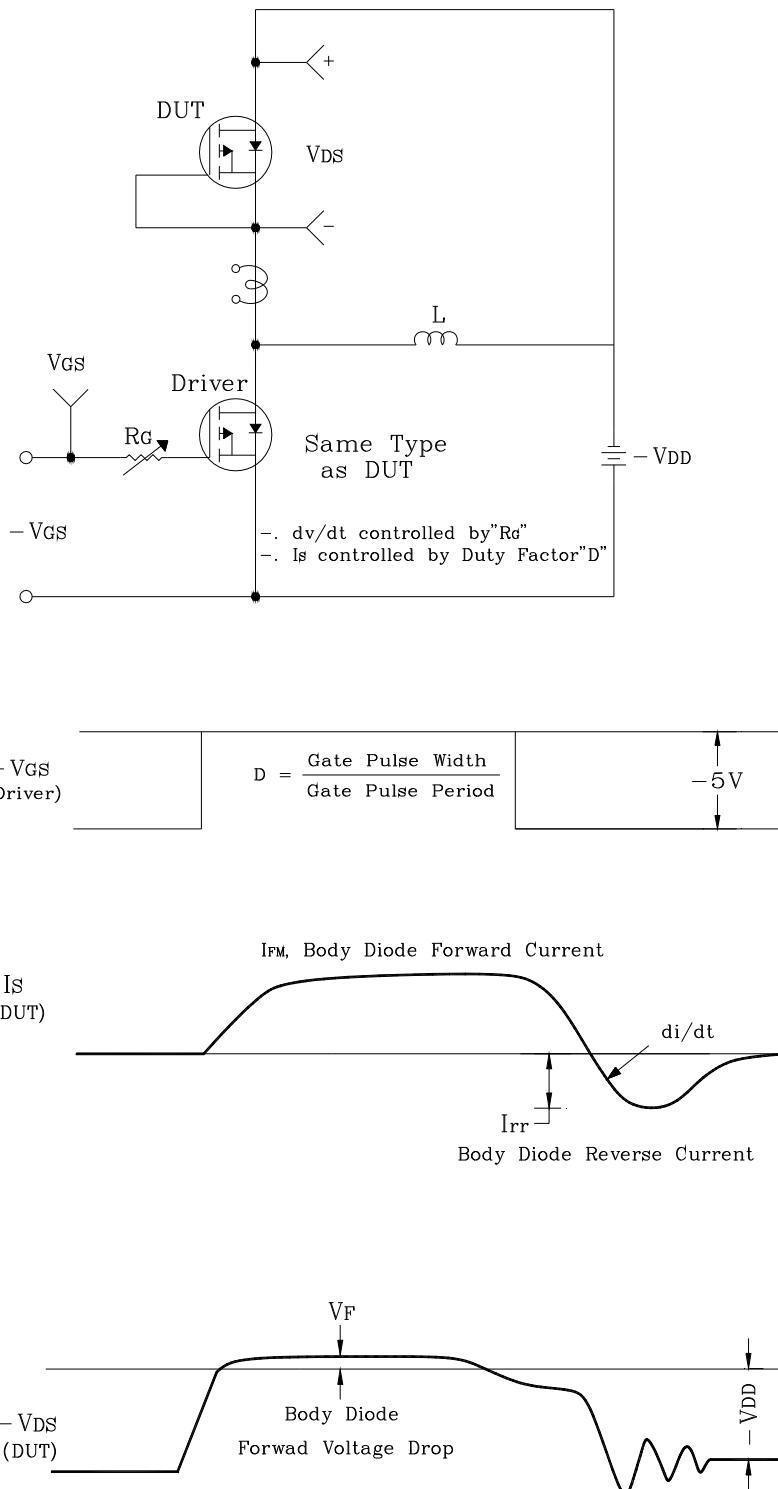
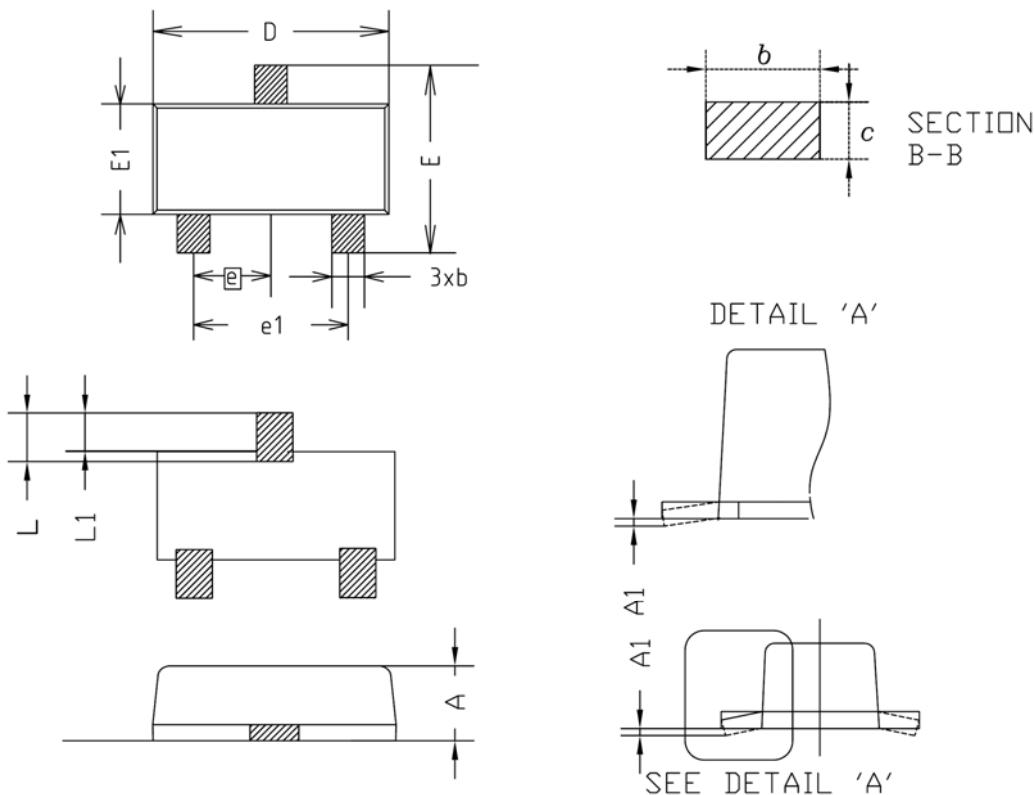


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform

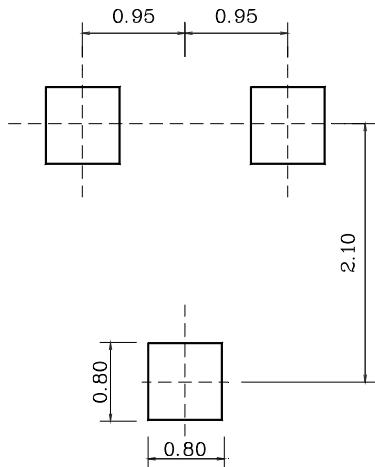


Outline Dimension

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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