

PORTABLE EQUIPMENT APPLICATION

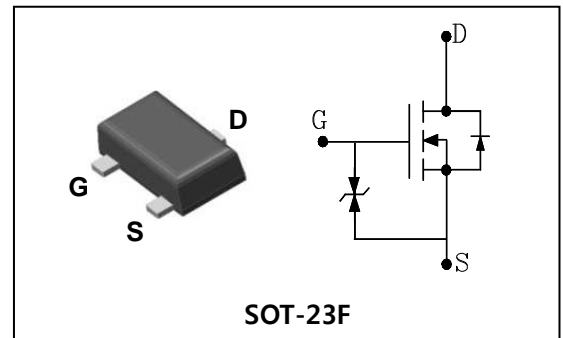
Features

- Low Voltage : $BV_{DSS}=20V(\text{Min.})$
- Low $V_{GS(th)}$: $V_{GS(th)}=0.6\sim 1.2V$
- Small footprint due to small package
- Low $R_{DS(on)}$: $R_{DS(on)}=40m\Omega(\text{Max.})$

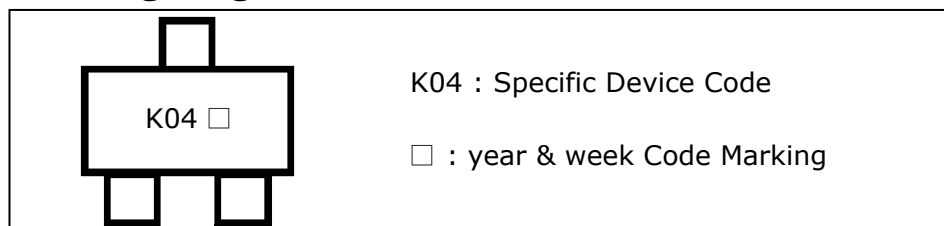
Ordering Information

Type No.	Marking	Package Code
STK004SF	K04 □ ① ②	SOT-23F

PIN Connection



Marking Diagram



Absolute maximum ratings ($T_A=25^\circ\text{C}$ 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	4.2	A
Drain current (Pulsed) *	I_{DM}	16.8	A
Power dissipation **	P_D	0.35	W
Avalanche current (Single) ②	I_{AS}	4.2	A
Single pulsed avalanche energy ②	E_{AS}	27	mJ
Avalanche current (Repetitive) ①	I_{AR}	4.2	A
Repetitive avalanche energy ①	E_{AR}	2.5	mJ
Junction temperature	T_J	150	°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	°C/W

Electrical Characteristics (T_A=25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit	
Drain-source breakdown voltage	BV _{DSS}	I _D =250uA, V _{GS} =0	20	-	-	V	
Gate threshold voltage	V _{GS(th)}	I _D =250uA, V _{DS} =V _{GS}	0.6	-	1.2	V	
Drain-source cut-off current	I _{DSS}	V _{DS} =20V, V _{GS} =0	-	-	1	uA	
Gate leakage current	I _{GSS}	V _{DS} =0V, V _{GS} =±12V	-	-	±10	uA	
Drain-source on-resistance ④	R _{DS(ON)}	V _{GS} =4.5V, I _D =2.1A	-	19	40	mΩ	
		V _{GS} =2.5V, I _D =2.1A	-	27	45		
Forward transfer conductance ④	g _{fs}	V _{DS} =2V, I _D =4.2A	-	22	-	S	
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =10V, f=1MHz	-	390	590	pF	
Output capacitance	C _{oss}		-	90	135		
Reverse transfer capacitance	C _{rss}		-	40	60		
Turn-on delay time	t _{d(on)}	V _{DD} =10V, I _D =4.2A R _G =10Ω	-	2.0	-	ns	
Rise time	t _r		-	1.9	-		
Turn-off delay time	t _{d(off)}		③④	-	2.8		-
Fall time	t _f		-	1.9	-		
Total gate charge	Q _g	V _{DD} =10V, V _{GS} =4.5V I _D =4.2A	-	4.0	6.0	nC	
Gate-source charge	Q _{gs}		-	1.0	1.5		
Gate-drain charge	Q _{gd}		③④	-	1.6		2.4

Source-Drain Diode Ratings and Characteristics (T_A=25°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} =0V, I _S =0.5A	-	0.7	1.2	V
Reverse recovery time	t _{rr}	I _S =0.5A, V _{GS} =0V dI _F /dt=10A/us	-	57	-	ns
Reverse recovery charge	Q _{rr}		-	240	-	uC

Note ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② L=2.0mH, I_{AS}=4.2A, V_{DD}=10V, R_G=25Ω
- ③ Pulse Test : Pulse width≤300us, Duty cycle≤2%
- ④ Essentially independent of operating temperature

N-CH Electrical Characteristic Curves

Fig. 1 $I_D - V_{DS}$

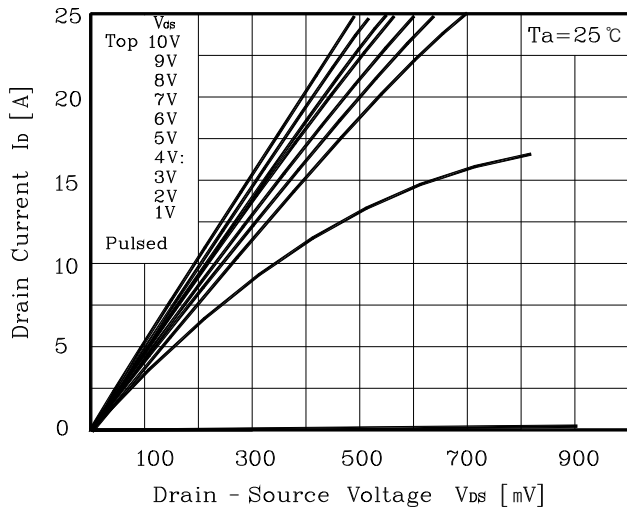


Fig. 2 $I_D - V_{GS}$

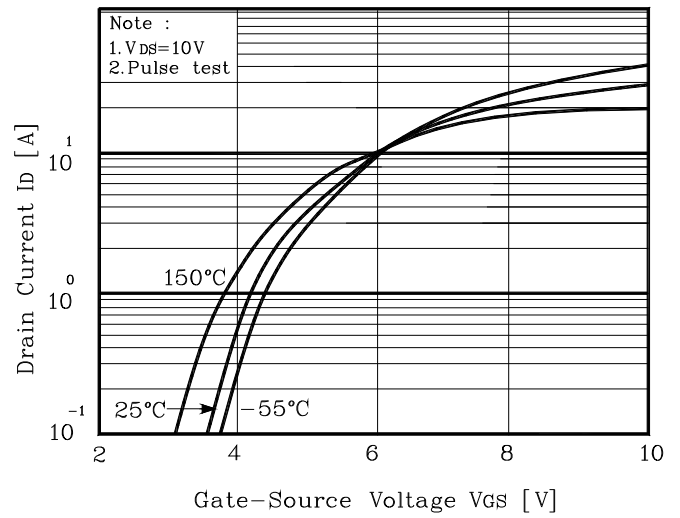


Fig. 3 $R_{DS(on)} - I_D$

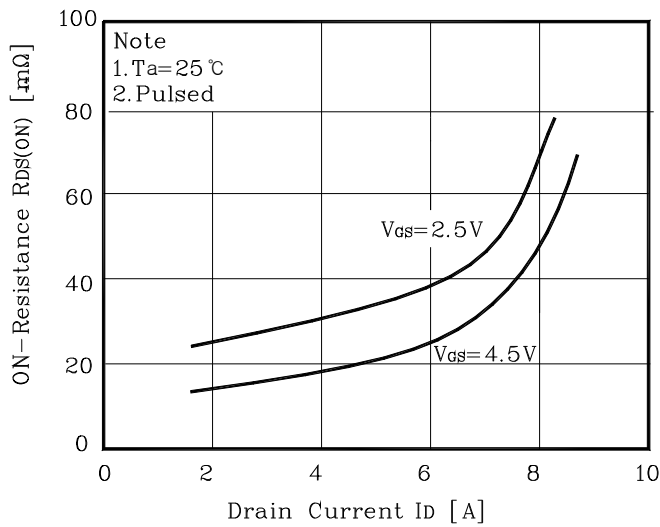


Fig. 4 $I_S - V_{SD}$

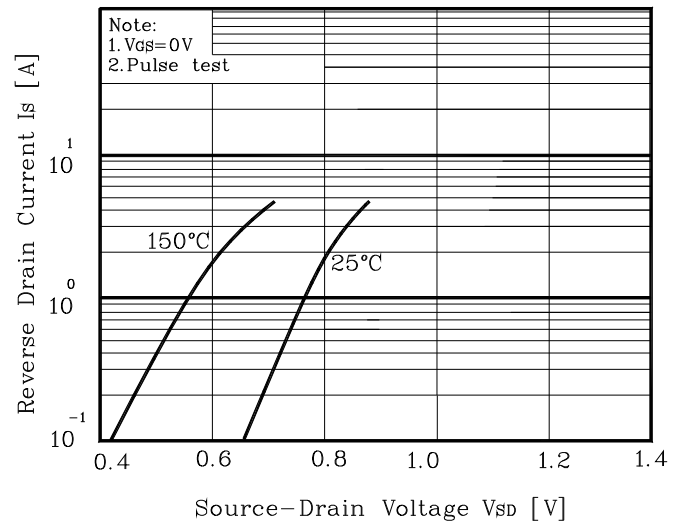


Fig. 5 Capacitance - V_{DS}

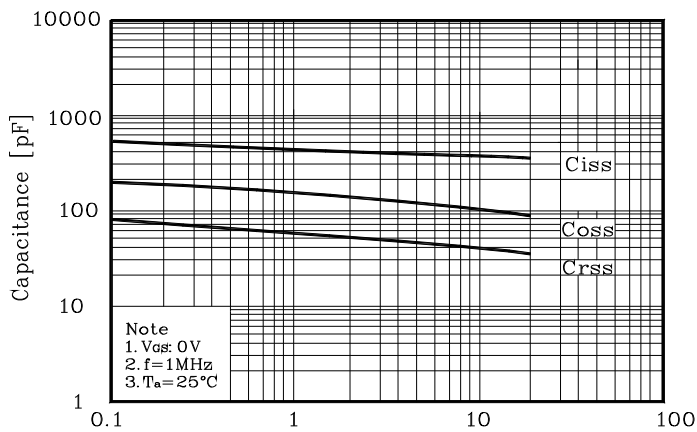


Fig. 6 $V_{GS} - Q_G$

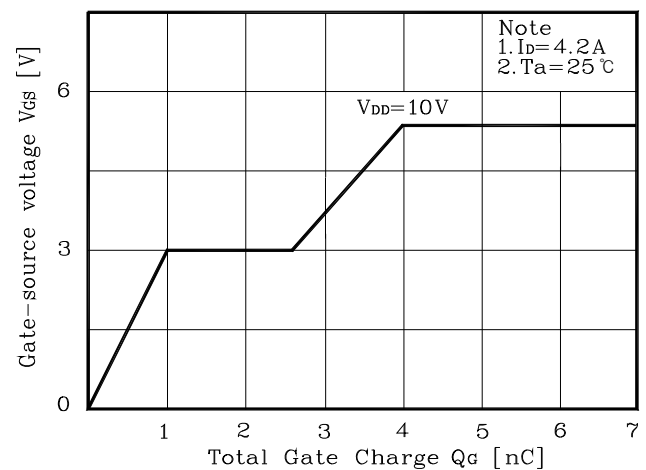


Fig. 7 $V_{DSS} - T_J$

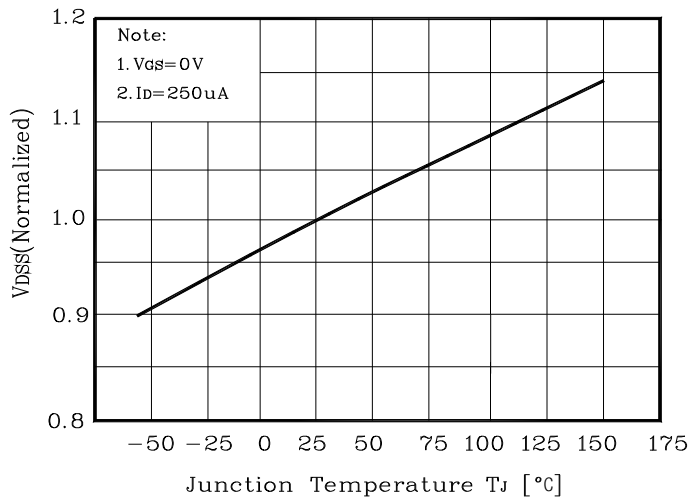


Fig. 8 $R_{DS(on)} - T_J$

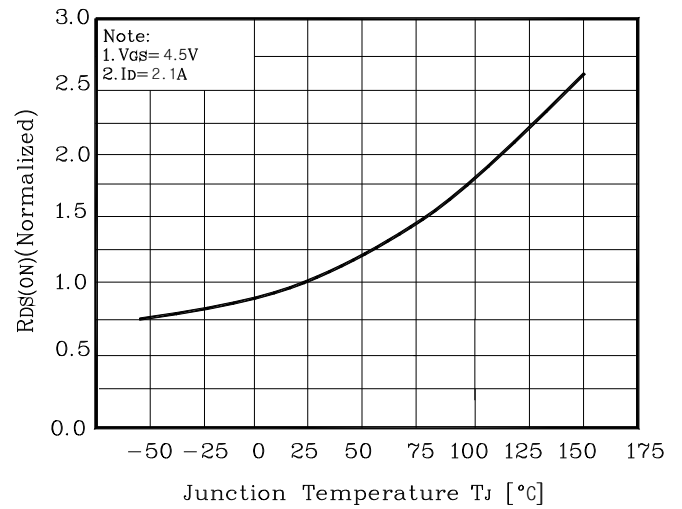


Fig. 9 $I_D - T_a$

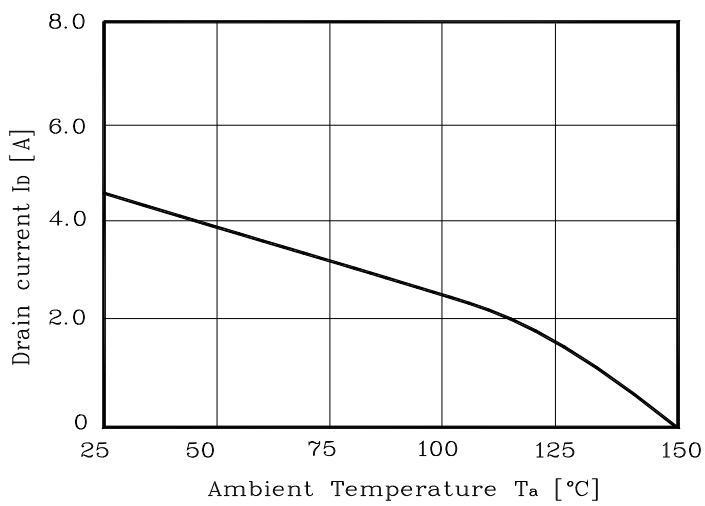


Fig. 10 Safe Operating Area

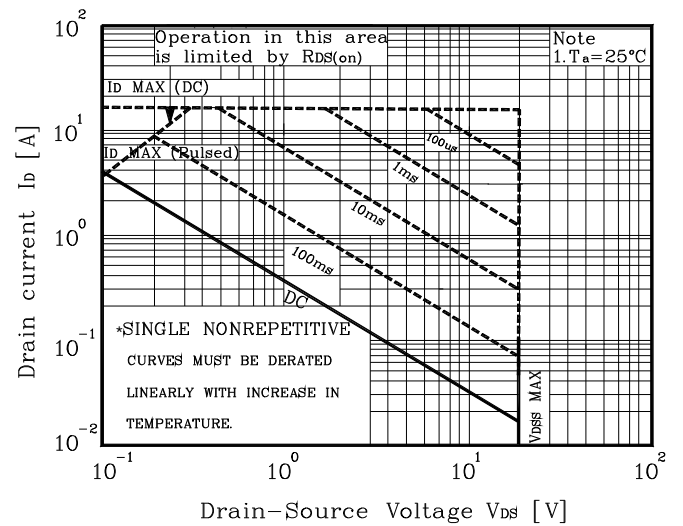


Fig. 11 Gate Charge Test Circuit & Waveform

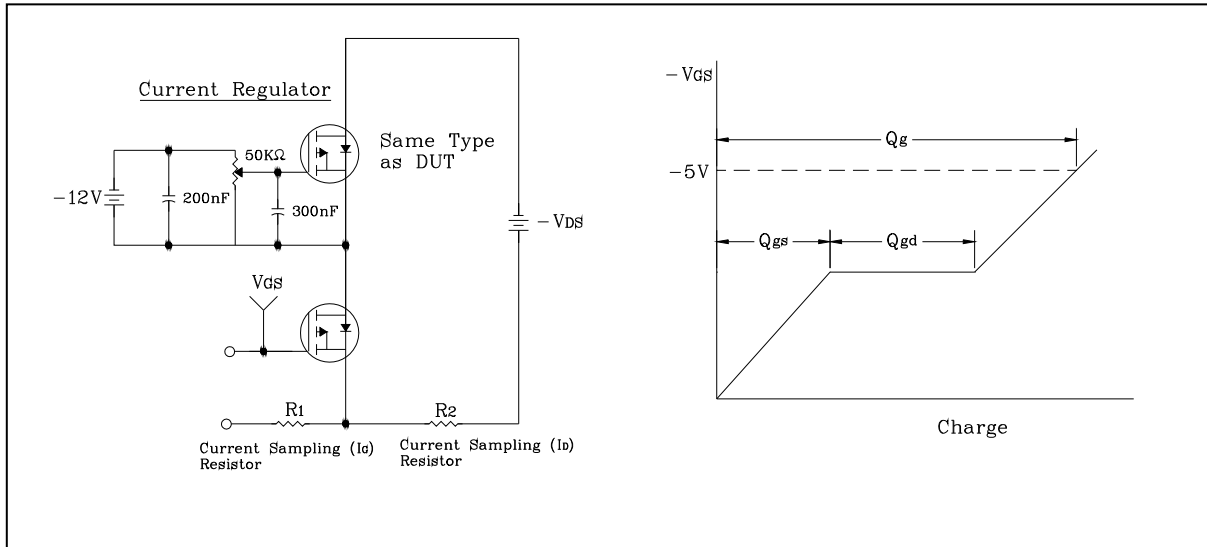


Fig. 12 Resistive Switching Test Circuit & Waveform

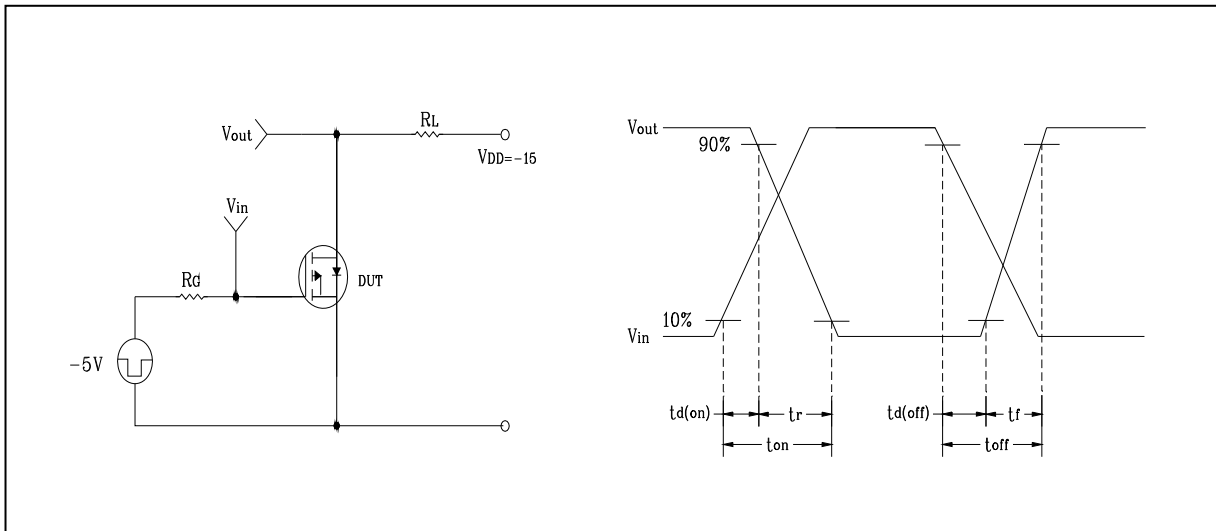


Fig. 13 E_{AS} Test Circuit & Waveform

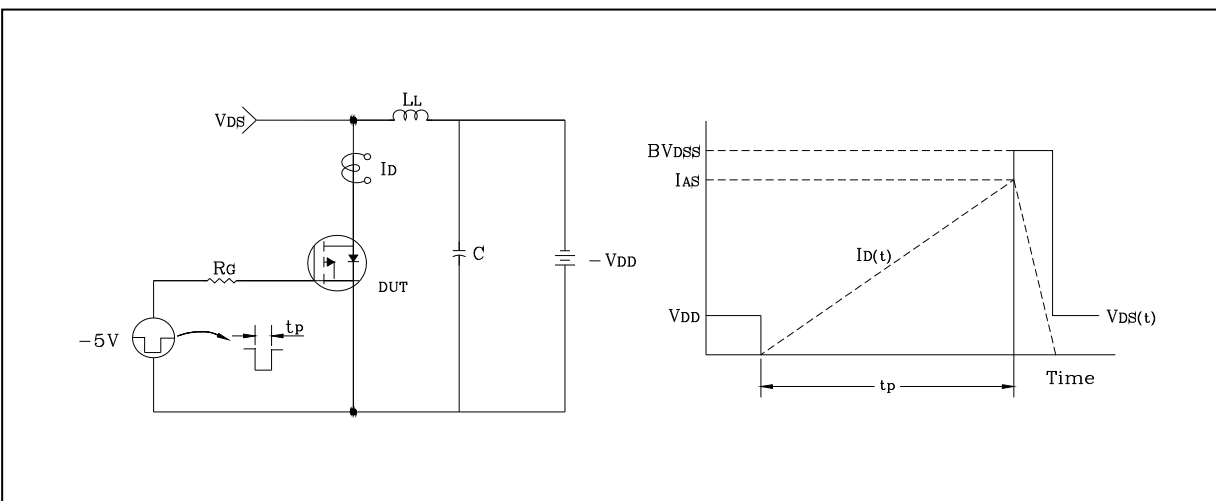
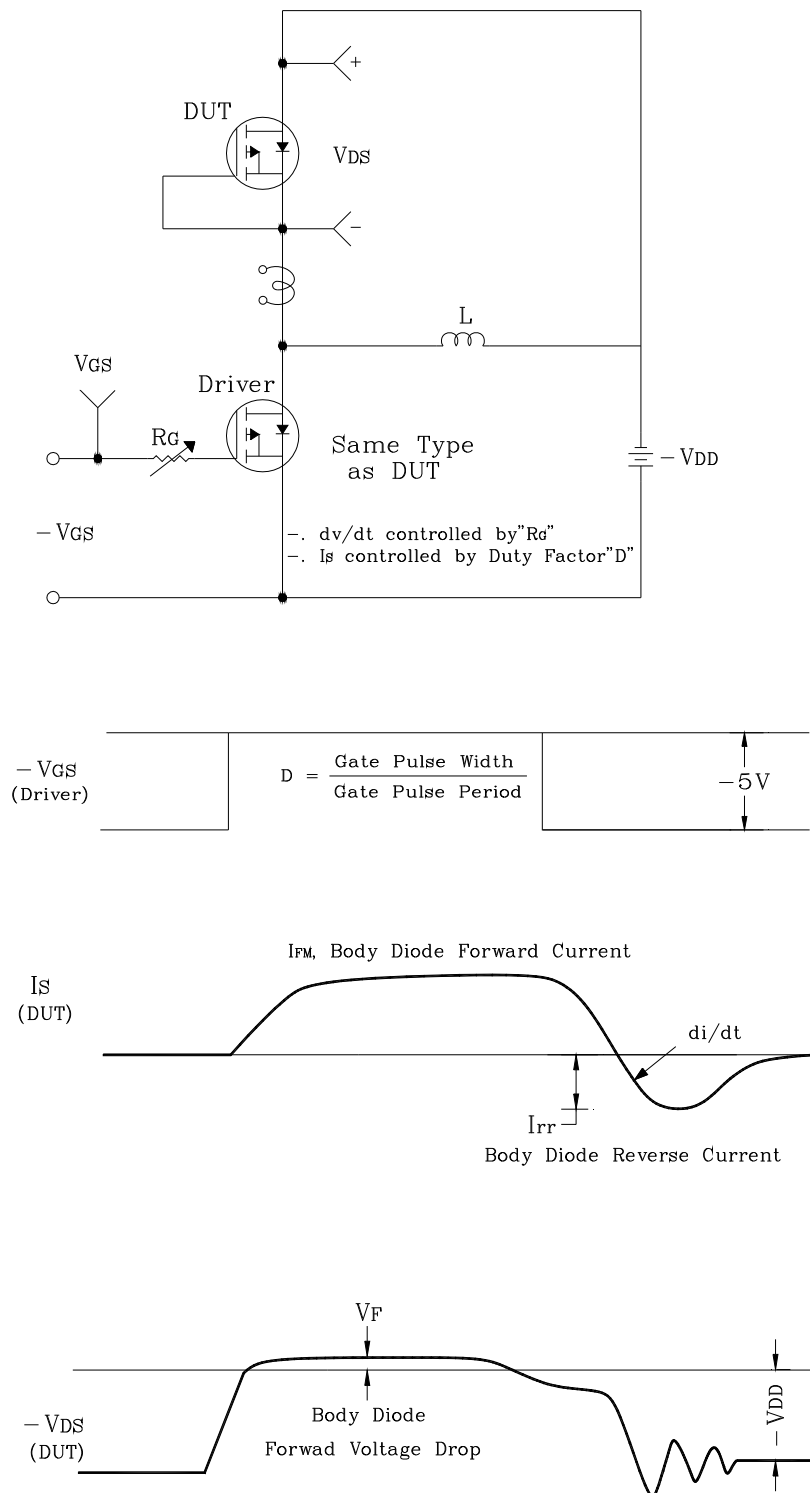
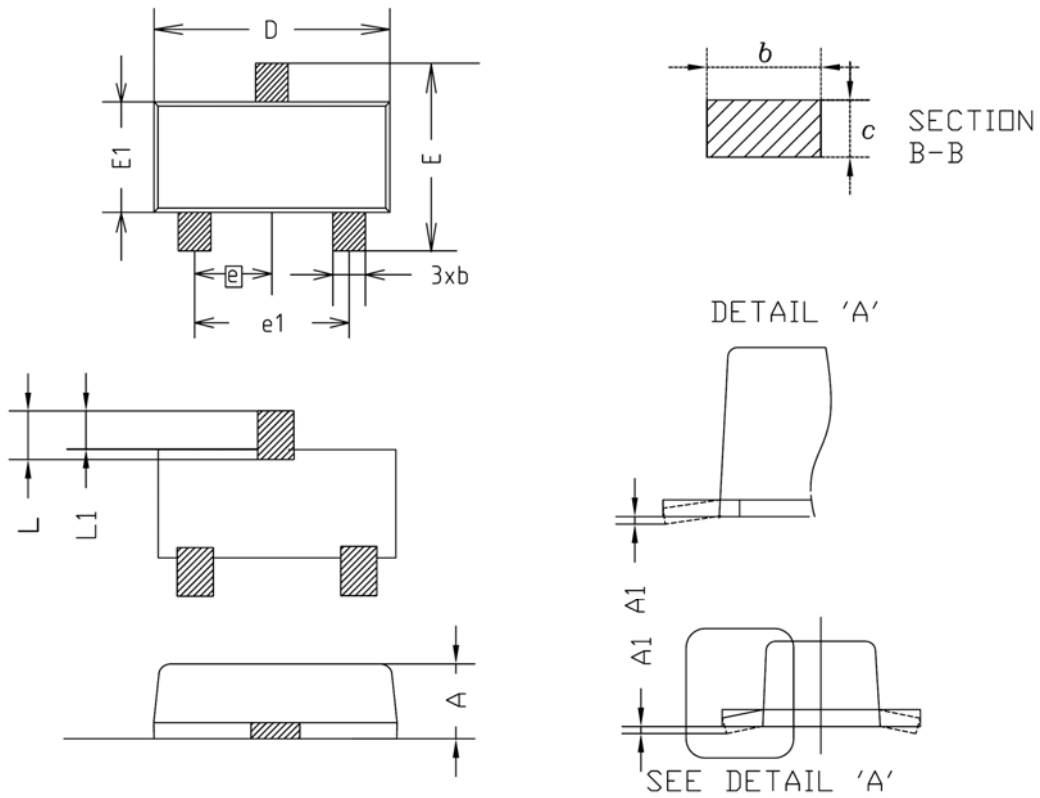


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



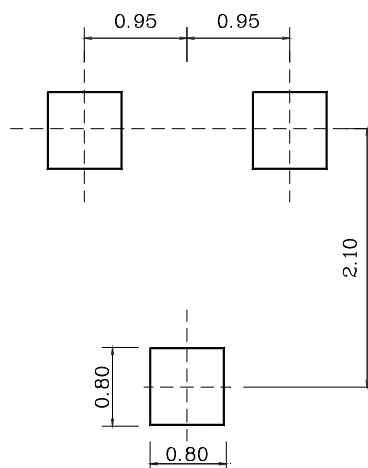
Outline Dimension

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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