

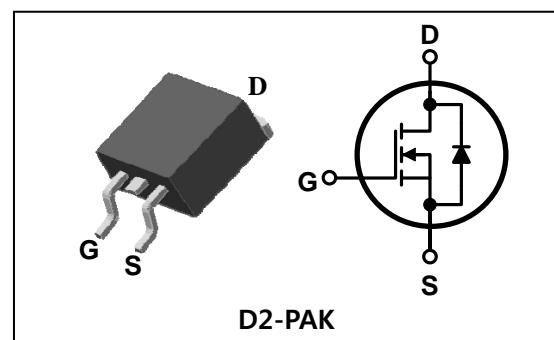
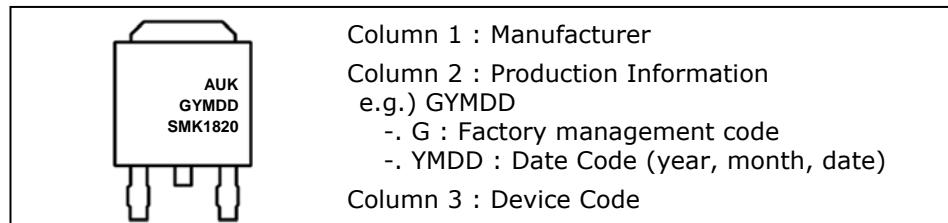
HIGH VOLTAGE SWITCHING APPLICATIONS

Features

- High Voltage : $BV_{DSS}=200V$ (Min.)
- Low C_{rss} : $C_{rss}=55pF$ (Typ.)
- Low gate charge : $Q_g=22nC$ (Typ.)
- Low $R_{DS(on)}$: $R_{DS(on)}=0.17\Omega$ (Max.)

Ordering Information

Type No.	Marking	Package Code
SMK1820D2	SMK1820	D2-PAK

PIN Connection

Marking Diagram

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

Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	200	V
Gate-source voltage	V_{GSS}	± 30	V
Drain current (DC) *	I_D	$T_c=25^\circ C$	A
		$T_c=100^\circ C$	A
Drain current (Pulsed) *	I_{DM}	72	A
Power dissipation	P_D	100	W
Avalanche current (Single) ②	I_{AS}	18	A
Single pulsed avalanche energy ②	E_{AS}	453	mJ
Avalanche current (Repetitive) ①	I_{AR}	18	A
Repetitive avalanche energy ①	E_{AR}	13.9	mJ
Junction temperature	T_J	150	$^\circ C$
Storage temperature range	T_{stg}	-55~150	

* Limited by maximum junction temperature

Characteristic	Symbol	Typ.	Max.	Unit
Thermal resistance	$R_{th(J-C)}$	-	1.25	$^\circ C/W$
	$R_{th(J-A)}$	-	62.5	

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	200	-	-	V
Gate threshold voltage	$V_{GS(\text{th})}$	$I_D=250\mu\text{A}, V_{DS}=V_{GS}$	2.0	-	4.0	V
Drain-source cut-off current	I_{DSS}	$V_{DS}=200\text{V}, V_{GS}=0\text{V}$	-	-	1	uA
		$V_{DS}=160\text{V}, T_C=125^\circ\text{C}$	-	-	10	
Gate leakage current	I_{GSS}	$V_{DS}=0\text{V}, V_{GS}=\pm 30\text{V}$	-	-	± 100	nA
Drain-source on-resistance ④	$R_{DS(\text{on})}$	$V_{GS}=10\text{V}, I_D=9.0\text{A}$	-	0.14	0.17	Ω
Forward transfer conductance ④	g_{fs}	$V_{DS}=10\text{V}, I_D=9.0\text{A}$	-	10.5	-	S
Input capacitance	C_{iss}	$V_{GS}=0\text{V}, V_{DS}=25\text{V}$ $f=1 \text{ MHz}$	-	942	1240	pF
Output capacitance	C_{oss}		-	227	310	
Reverse transfer capacitance	C_{rss}		-	55	71	
Turn-on delay time	$t_{d(\text{on})}$	$V_{DD}=100\text{V}, I_D=18\text{A}$ $R_G=25\Omega$	-	15	-	ns
Rise time	t_r		-	130	-	
Turn-off delay time	$t_{d(\text{off})}$		-	135	-	
Fall time	t_f		-	105	-	
Total gate charge	Q_g	$V_{DS}=160\text{V}, V_{GS}=10\text{V}$ $I_D=18\text{A}$	-	22	28	nC
Gate-source charge	Q_{gs}		-	6.6	-	
Gate-drain charge	Q_{gd}		-	7.2	-	

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	-	-	18	A
Source current (Pulsed) ①	I_{SM}		-	-	72	
Forward voltage ④	V_{SD}	$V_{GS}=0\text{V}, I_S=18\text{A}$	-	-	1.4	V
Reverse recovery time	t_{rr}	$I_S=18\text{A}, V_{GS}=0\text{V}$ $dI_F/dt=100\text{A}/\mu\text{s}$	-	208	-	ns
Reverse recovery charge	Q_{rr}		-	1.63	-	uC

Note :

- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ② $L=2.1\text{mH}, I_{AS}=18\text{A}, V_{DD}=50\text{V}, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
- ③ Pulse Test : Pulse width $\leq 300\text{us}$, Duty cycle $\leq 2\%$
- ④ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1 I_D - V_{DS}

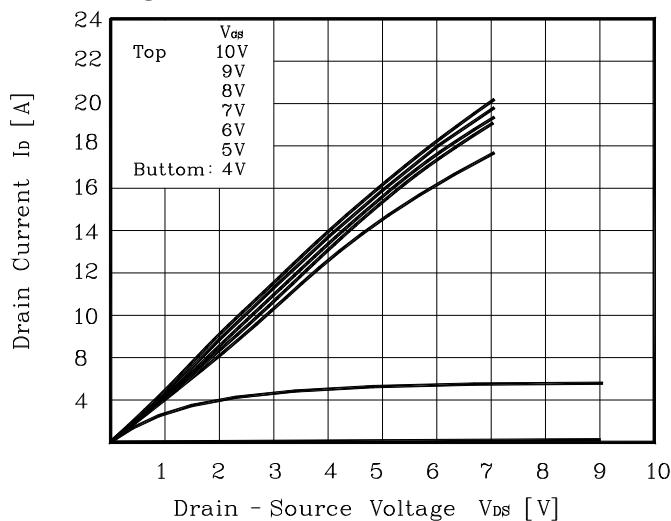


Fig. 2 I_D - V_{GS}

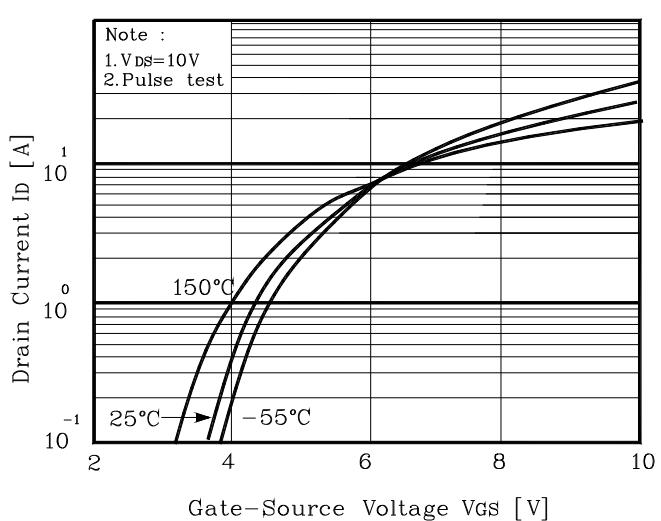


Fig. 3 $R_{DS(on)}$ - I_D

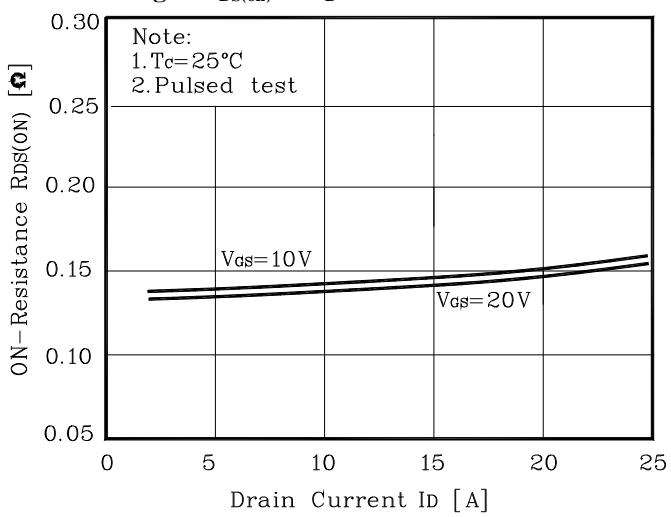


Fig. 4 I_S - V_{SD}

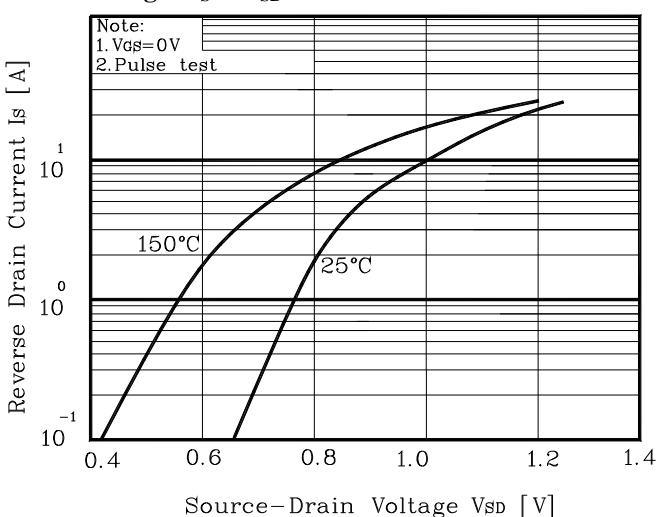


Fig. 5 Capacitance - V_{DS}

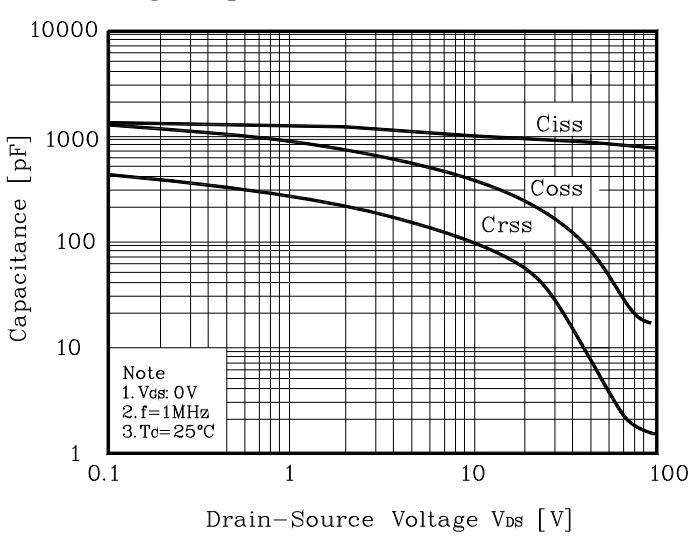


Fig. 6 V_{GS} - Q_G

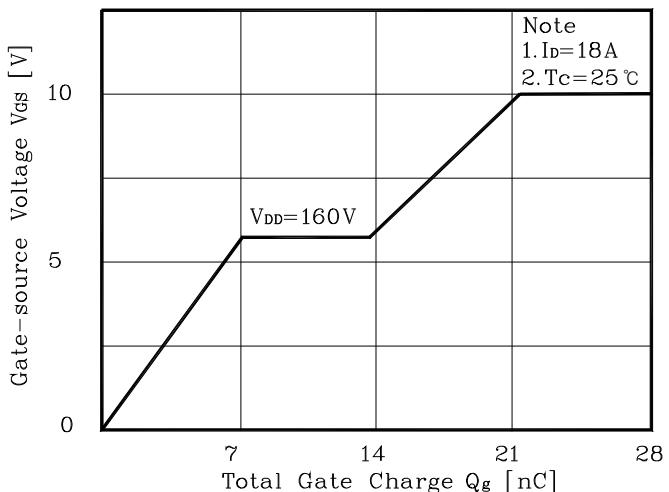


Fig. 7 V_{DSS} - T_J

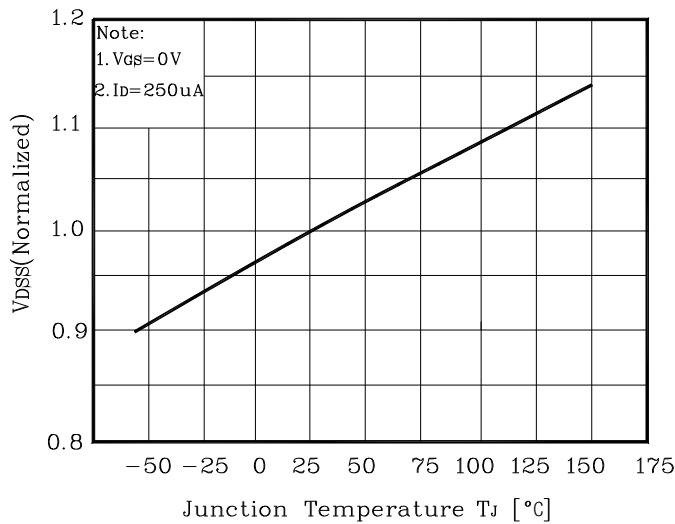


Fig. 8 $R_{DS(on)}$ - T_J

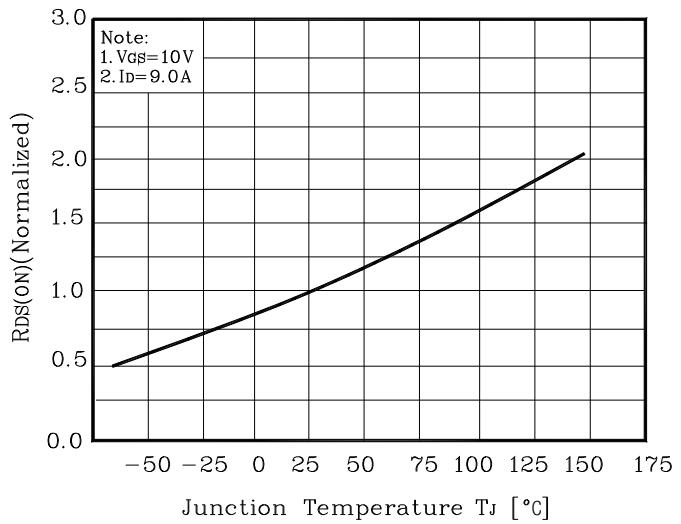


Fig. 9 I_D - T_C

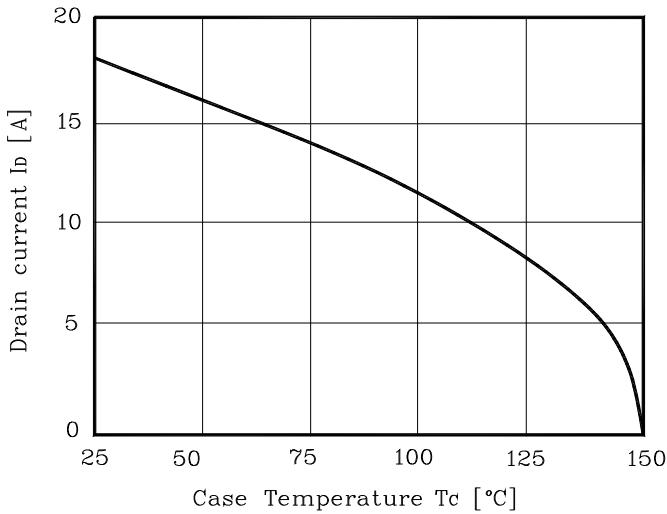


Fig. 10 Safe Operating Area

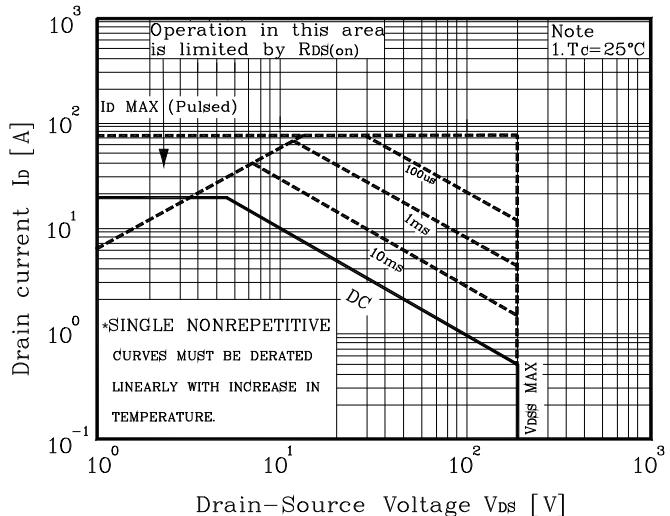


Fig. 11 Gate Charge Test Circuit & Waveform

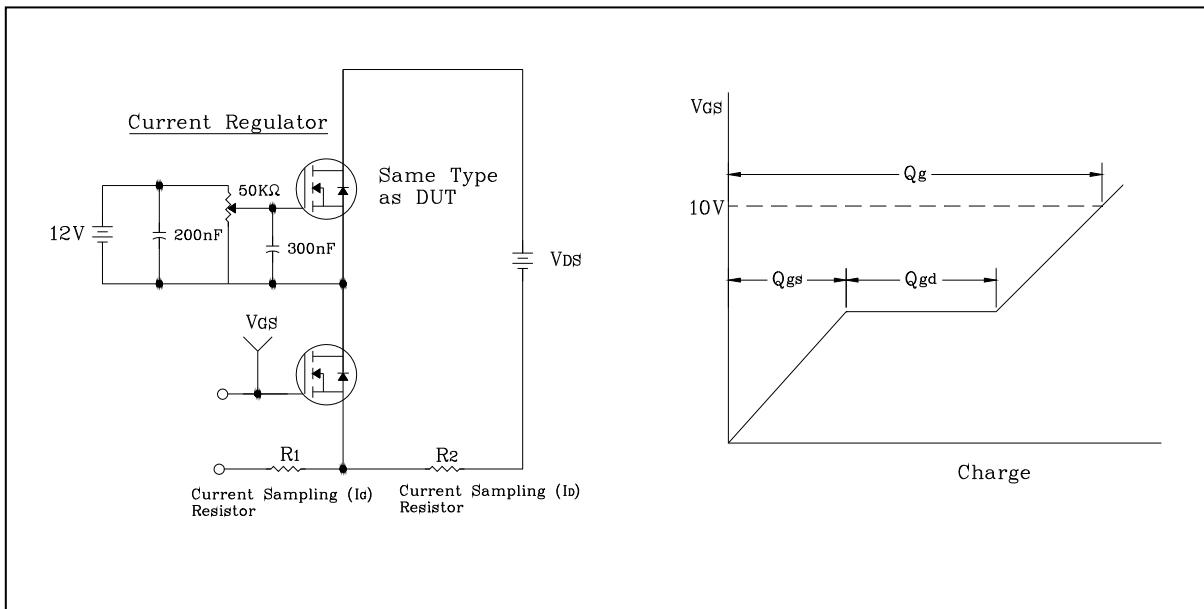


Fig. 12 Resistive Switching Test Circuit & Waveform

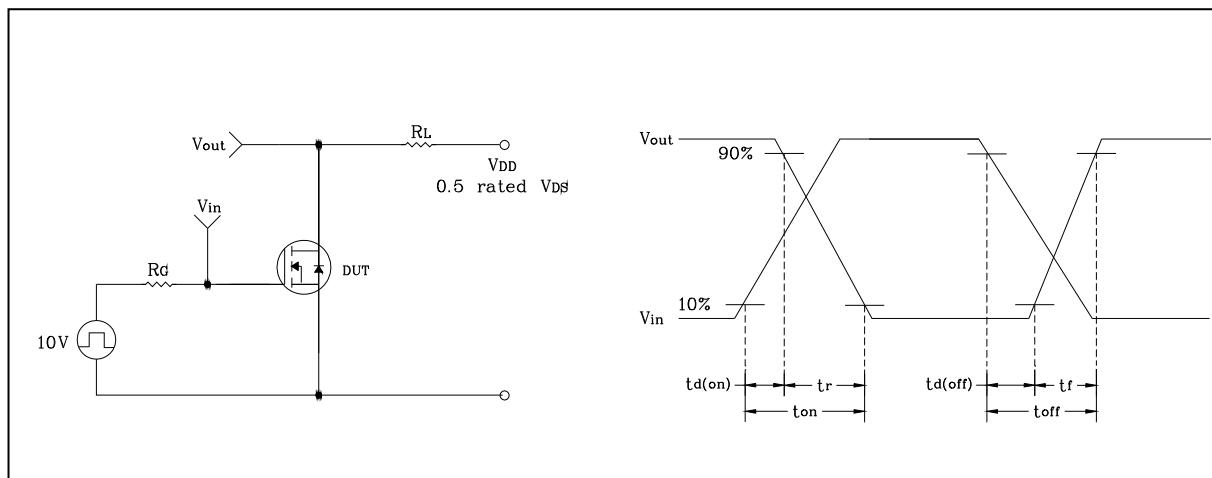


Fig. 13 E_{AS} Test Circuit & Waveform

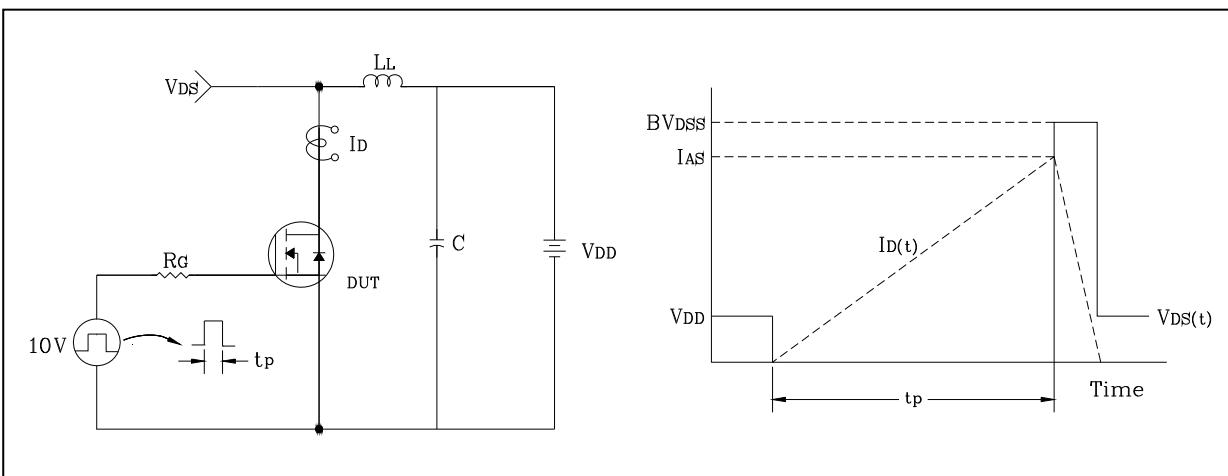
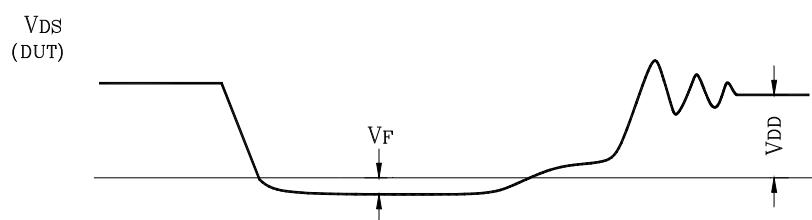
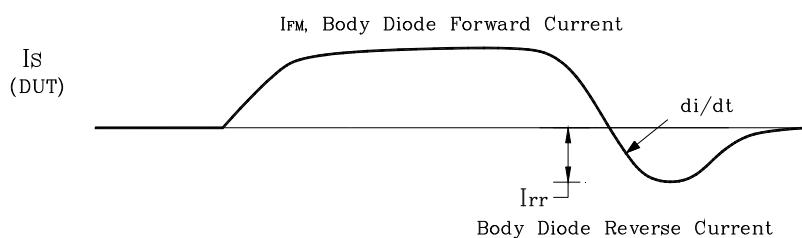
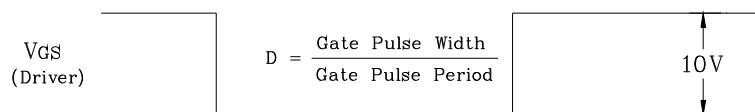
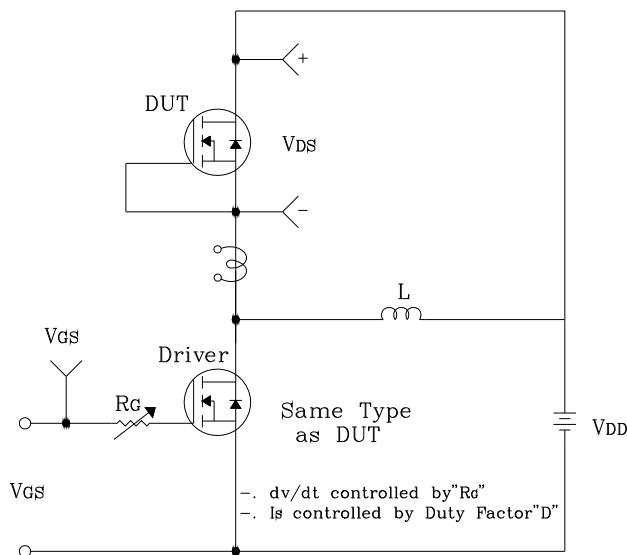
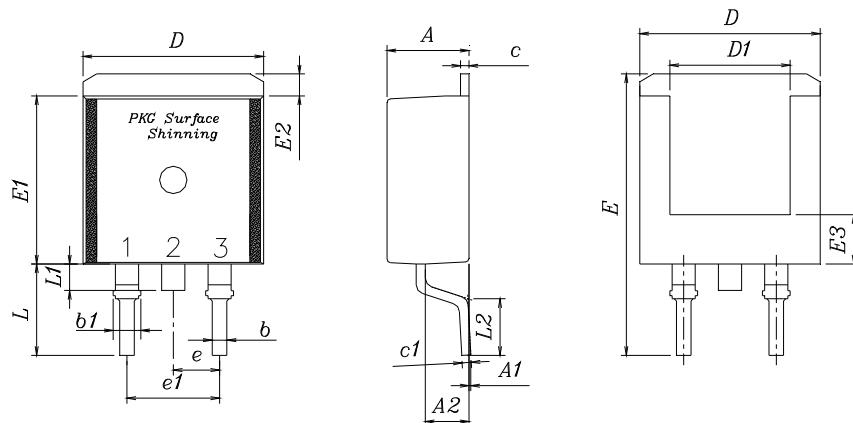


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform

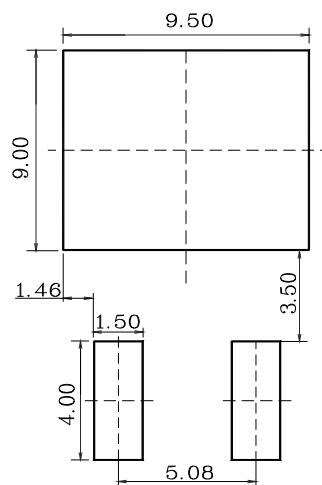


Outline Dimension

unit: mm



SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	4.35	4.50	4.65	
A1	—	—	0.15	
A2	2.20	2.40	2.60	
b	0.70	0.80	0.90	
b1	1.17	1.27	1.37	
c	0.40	0.50	0.60	
c1	0.40	0.50	0.60	
D	9.80	10.00	10.20	
D1	6.40	6.60	6.80	
E	15.00	15.40	15.80	
E1	9.05	9.20	9.35	
E2	1.00	1.20	1.40	
E3	2.50	2.70	2.90	
e	2.34	2.54	2.74	
e1	4.88	5.08	5.28	
L	4.60	5.00	5.40	
L1	1.40	1.45	1.50	
L2	2.50	—	—	

※ Recommended Land Pattern [unit: mm]

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