KODENSHI AUK

SMK2050CI

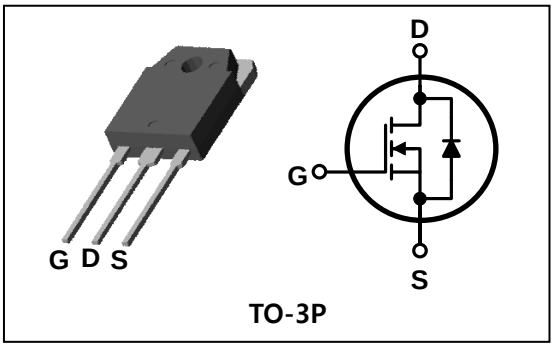
Advanced N-Ch Power MOSFET

SWITCHING REGULATOR APPLICATIONS

Features

- High Voltage : BV_{DSS}=500V(Min.)
- Low C_{rss} : C_{rss}=27pF(Typ.)
- Low gate charge : Qg=65nC(Typ.)
- Low $R_{DS(on)}$: $R_{DS(on)}$=0.26Ω(Max.)

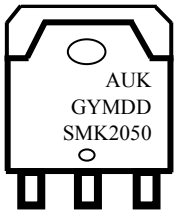
PIN Connection



Ordering Information

Type No.	Marking	Package Code
SMK2050CI	SMK2050	TO-3P

Marking Diagram



Column 1 : Manufacturer

Column 2 : Production Information
e.g.) GYMDD
-. G : Factory management code
-. YMDD : Date Code (year, month, date)

Column 3 : Device Code

Absolute maximum ratings (T_C=25°C unless otherwise noted)

Characteristic	Symbol		Rating	Unit
Drain-source voltage	V_{DSS}		500	V
Gate-source voltage	V_{GSS}		±30	V
Drain current (DC) *	I_D	(Tc=25℃)	20	A
		(Tc=100℃)	12.6	A
Drain current (Pulsed) *	I_{DM}		80	A
Drain power dissipation	P_D		150	W
Avalanche current (Single) ②	I_{AS}		20	A
Single pulsed avalanche energy ②	E_{AS}		1000	mJ
Avalanche current (Repetitive) ①	I_{AR}		20	A
Repetitive avalanche energy ①	E_{AR}		28	mJ
Junction temperature	T_J		150	°C
Storage temperature range	T_{stg}		-55~150	

* Limited by maximum junction temperature

Characteristic		Symbol	Typ.	Max.	Unit
Thermal resistance	Junction-case	$R_{th(J-C)}$	-	0.83	°C/W
	Junction-ambient	$R_{th(J-A)}$	-	40	

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	I_D=250μA, V_{GS}=0	500	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D=250μA, V_{DS}=V_{GS}	2	-	4	V
Drain-source cut-off current	I_{DSS}	V_{DS}=500V, V_{GS}=0V	-	-	1	uA
		V_{DS}=400V, V_{GS}=0V T_C=125℃	-	-	100	
Gate leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±30V	-	-	±100	nA
Drain-source on-resistance ④	$R_{DS(ON)}$	V_{GS}=10V, I_D=10A	-	0.21	0.26	Ω
Forward transfer conductance ④	g_{fs}	V_{DS}=10V, I_D=10A	-	24.6	-	S
Input capacitance	Ciss	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	3120	-	pF
Output capacitance	Coss		-	355	-	
Reverse transfer capacitance	Crss		-	27	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=250V, I_D=20A R_G=25Ω ③④	-	95	-	ns
Rise time	t_r		-	375	-	
Turn-off delay time	$t_{d(off)}$		-	100	-	
Fall time	t_f		-	105	-	
Total gate charge	Q_g	V_{DS}=400V, V_{GS}=10V I_D=20A ③④	-	65	85	nC
Gate-source charge	Q_{gs}		-	17.6	-	
Gate-drain charge	Q_{gd}		-	18.4	-	

Source-Drain Diode Ratings and Characteristics (T_C=25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Source current (DC)	I_S	Integral reverse diode in the MOSFET	-	-	20	A
Source current (Pulsed) ①	I_{SP}		-	-	80	
Forward voltage ④	V_{SD}	V_{GS}=0V, I_S=20A	-	-	1.4	V
Reverse recovery time	t_{rr}	I_S=20A, V_{GS}=0V dI_S/dt=100A/us	-	507	-	ns
Reverse recovery charge	Q_{rr}		-	7.2	-	uC

Note ;

① Repetitive rating : Pulse width limited by maximum junction temperature

② L=4.5mH, I_{AS}=20A, V_{DD}=50V, R_G=25Ω, Starting T_J=25℃

③ Pulse Test : Pulse width≤300us, Duty cycle≤2%

④ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1 I_D - V_{DS}

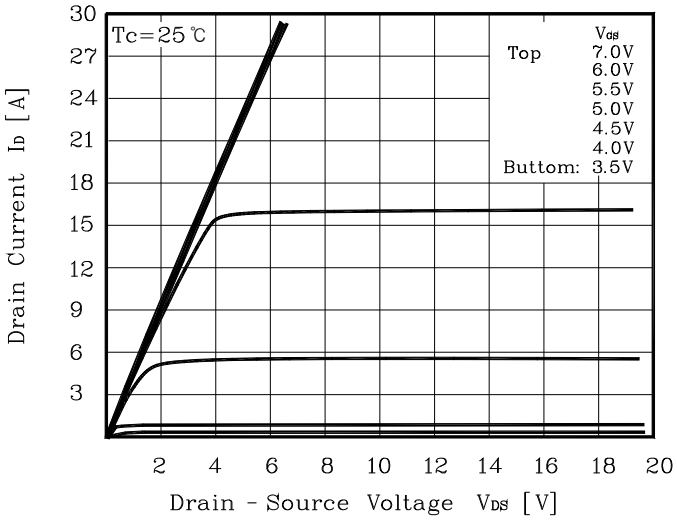


Fig. 2 I_D - V_{GS}

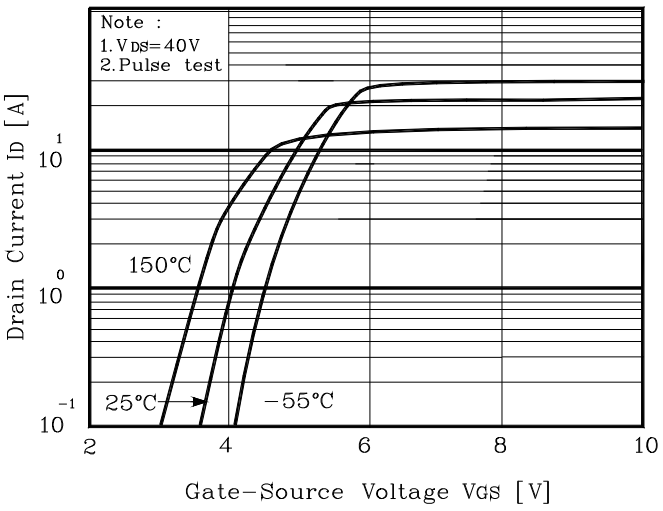


Fig. 3 $R_{DS(on)}$ - I_D

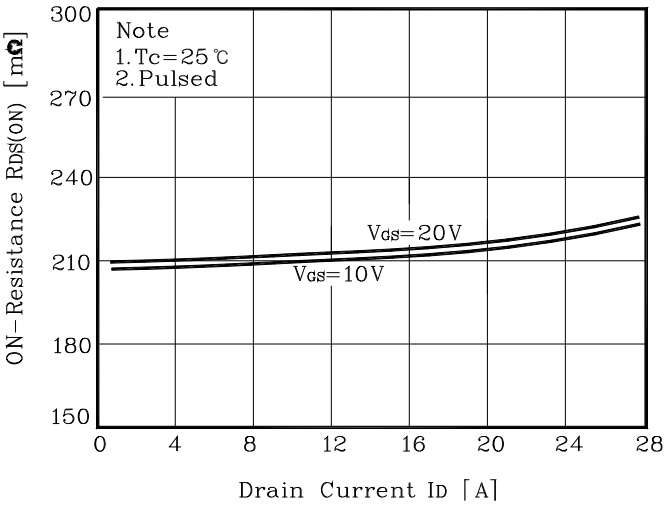


Fig. 4 I_S - V_{SD}

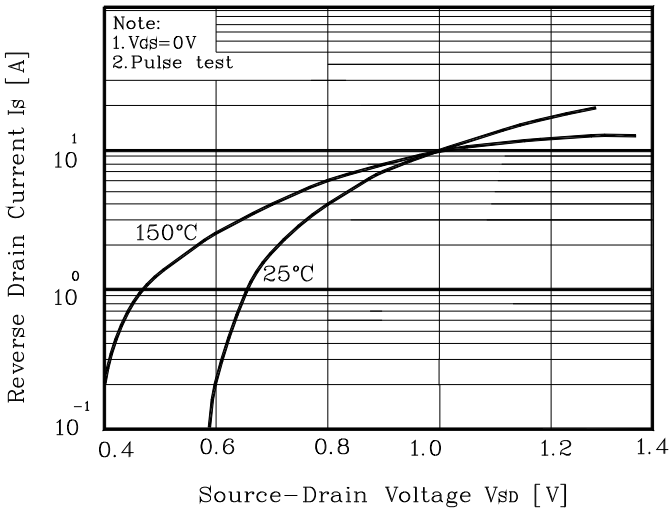


Fig. 5 Capacitance - V_{DS}

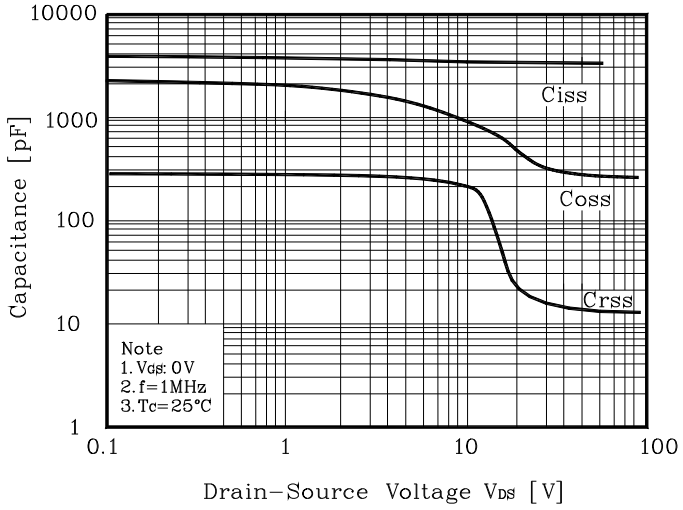
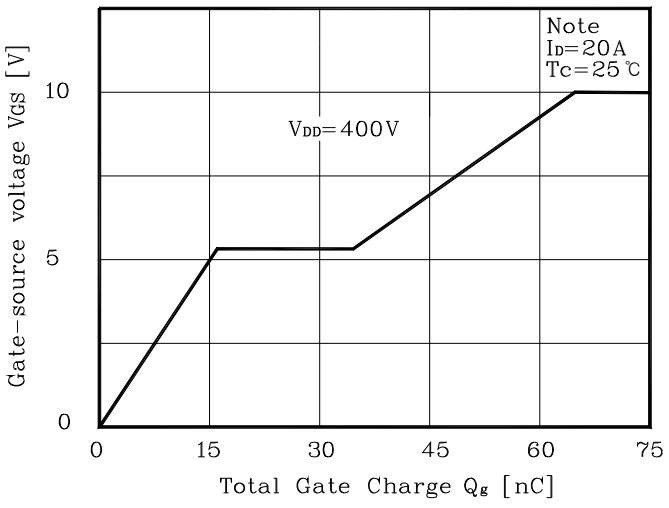


Fig.6 V_{GS} - Q_G



Electrical Characteristic Curves

Fig. 7 V_{DSS} - T_J

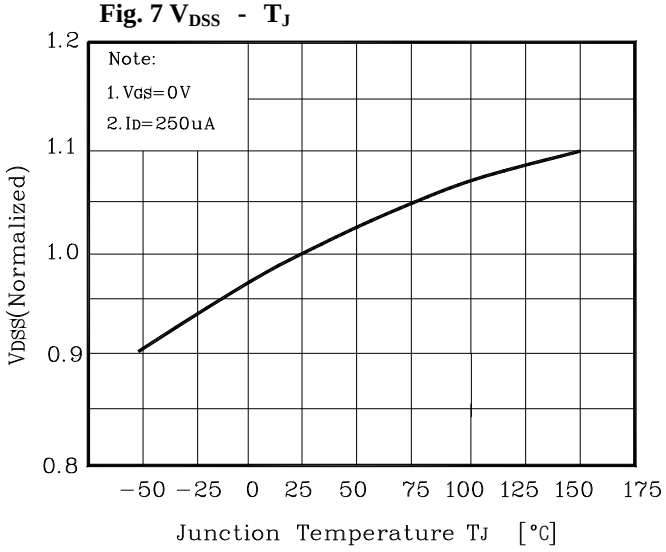


Fig.8 $R_{DS(on)}$ - T_J

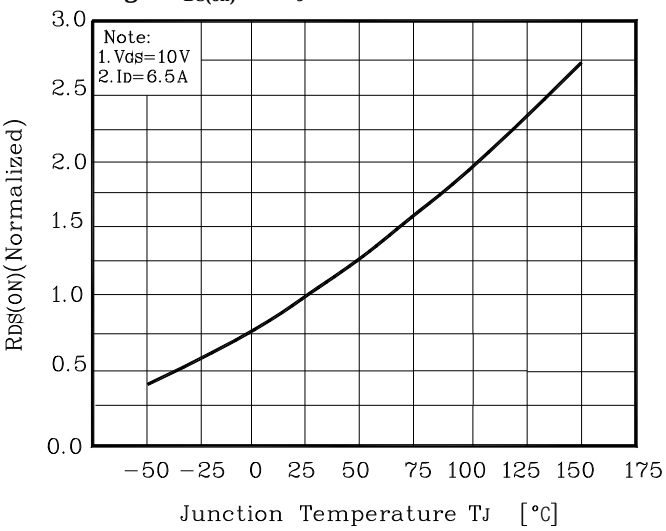


Fig. 9 I_D - T_C

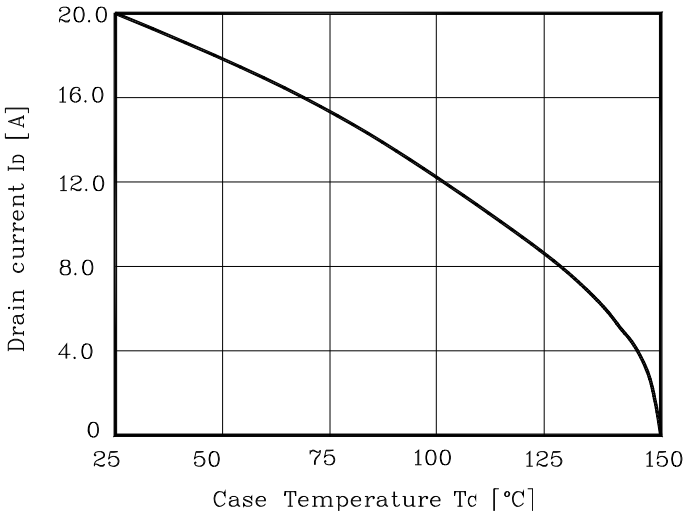


Fig. 10 Safe Operating Area

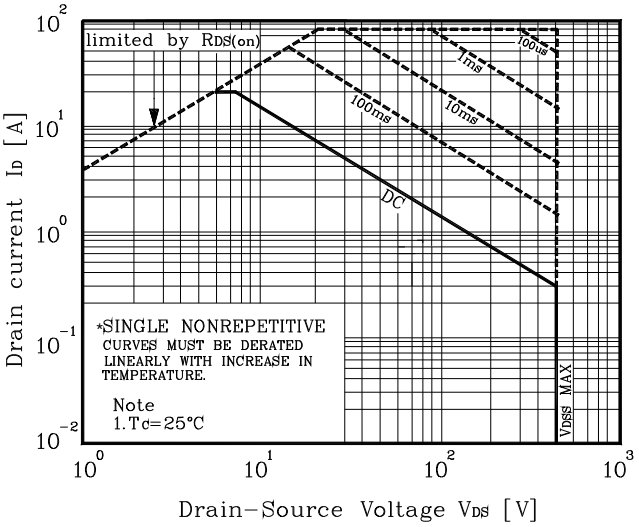


Fig. 11 Gate Charge Test Circuit & Waveform

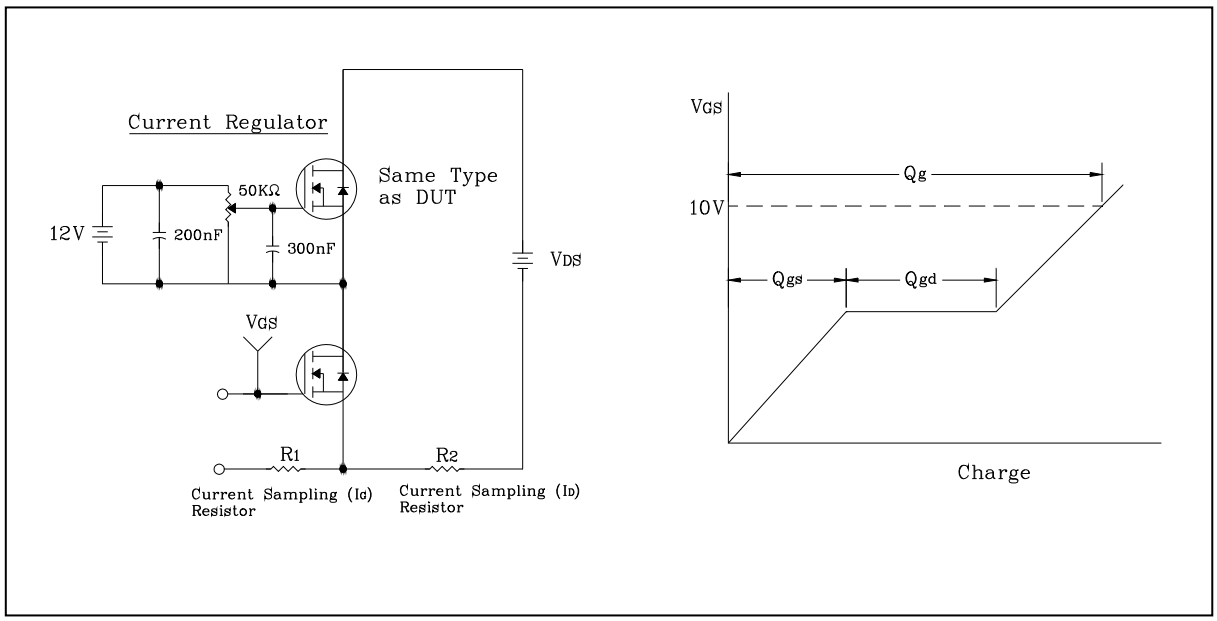


Fig. 12 Resistive Switching Test Circuit & Waveform

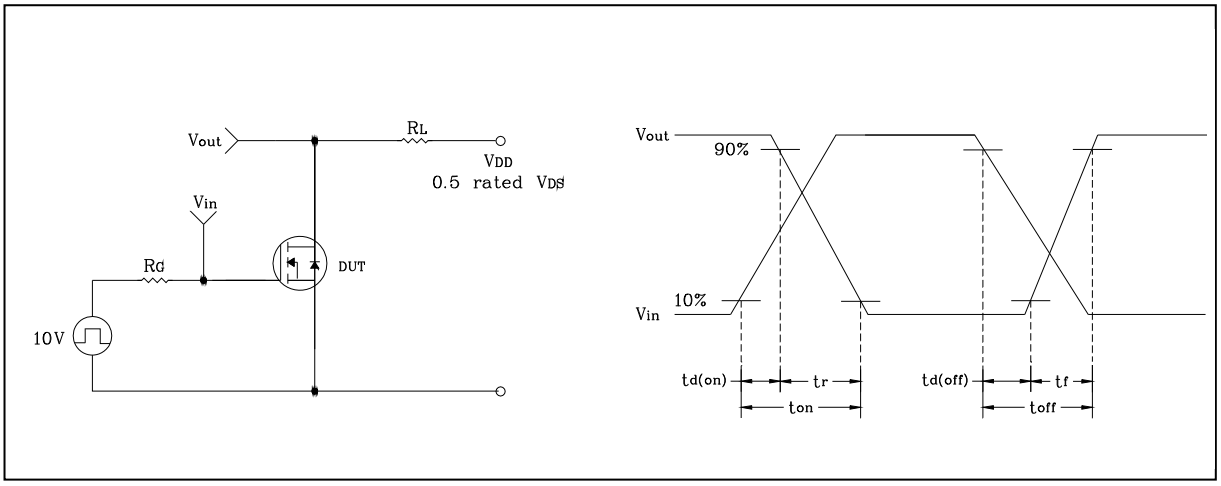


Fig. 13 E_{AS} Test Circuit & Waveform

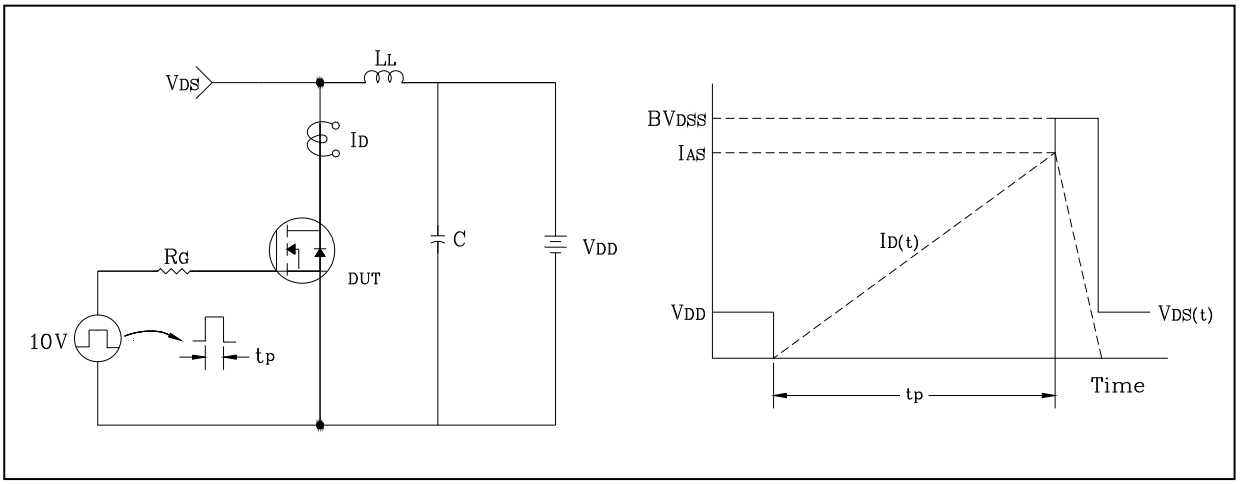
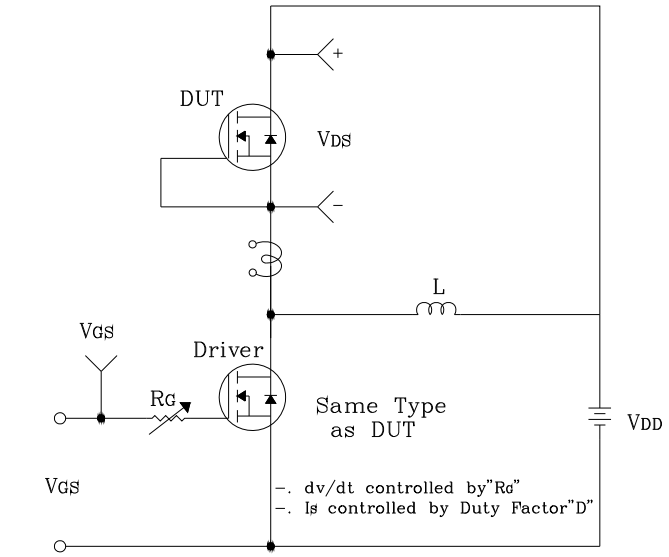
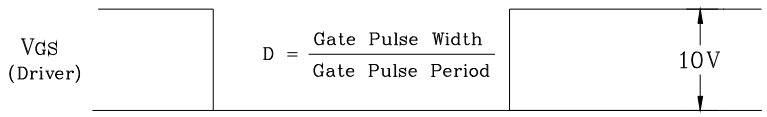
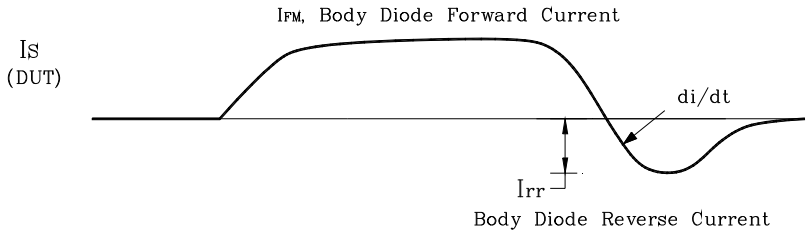
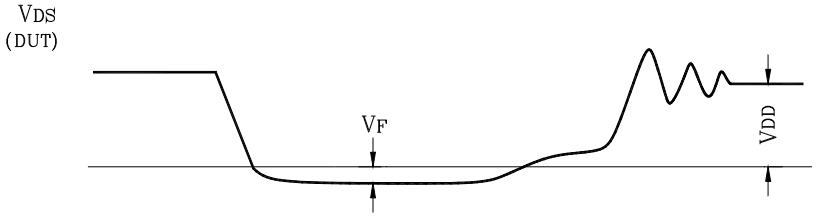


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



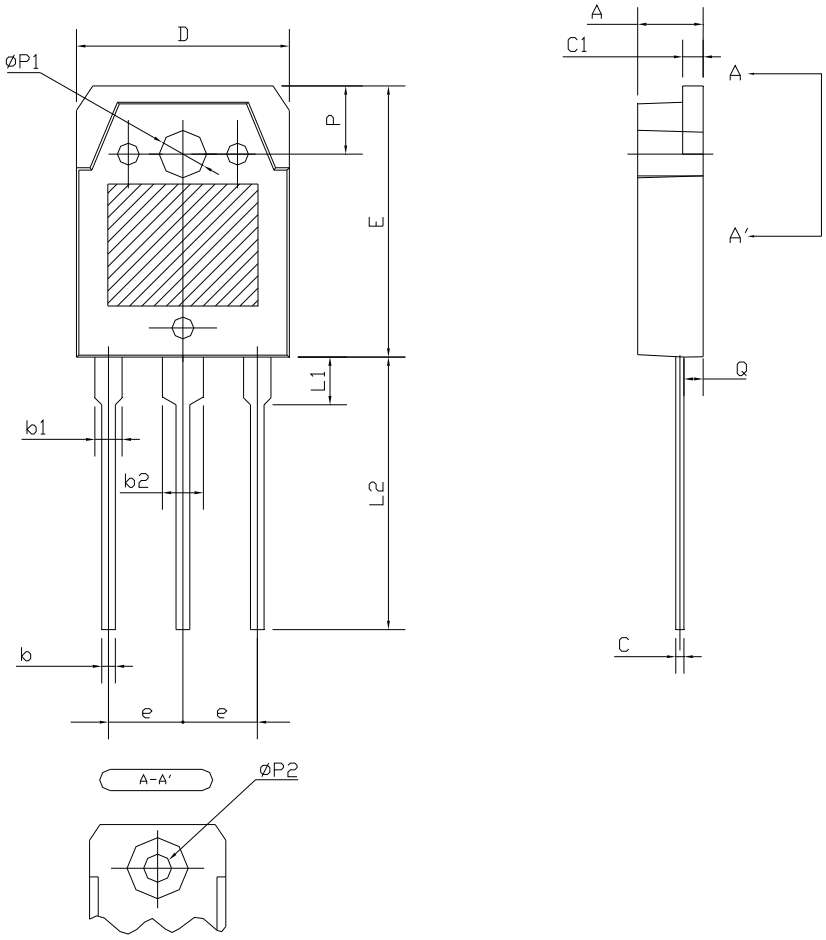






Outline Dimension

unit: mm



SYMBOL	MIN	NOM	MAX
A	4.60	4.80	5.00
b	0.80	1.00	1.20
b1	1.80	2.00	2.20
b2	2.80	3.00	3.20
C	0.55	0.60	0.75
C1	1.45	1.50	1.65
D	15.40	15.60	15.80
E	19.70	19.90	20.10
e	5.15	5.45	5.75
L1	3.30	3.50	3.70
L2	19.80	20.00	20.20
P	4.80	5.00	5.20
øP1	3.30	3.40	3.50
øP2		(3.20)	
Q	1.20	1.40	1.60

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