KODENSHI AUK

SMK630F

**Advanced N-Ch Power MOSFET**

DC-DC CONVERTER APPLICATION

HIGH VOLTAGE SWITCHING APPLICATIONS

Features

- High Voltage : BV_{DSS}=200V(Min.)
- Low C_{rss} : C_{rss}=24pF(Typ.)
- Low gate charge : Qg=12nC(Typ.)
- Low $R_{DS(on)}$: $R_{DS(on)}$=0.4Ω(Max.)

Ordering Information

Type No.	Marking	Package Code
SMK630F	SMK630	TO-220F-3L

PIN Connection

TO-220F-3L

Marking Diagram

AUK
GYMDD
SMK630

Column 1 : Manufacturer
Column 2 : Production Information
  e.g.) GYMDD
  -. G : Factory management code
  -. YMDD : Date Code (year, month, date)
Column 3 : Device Code
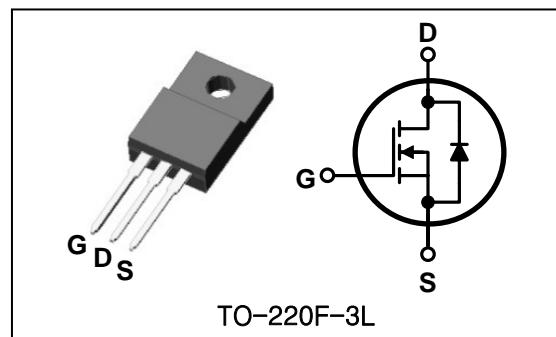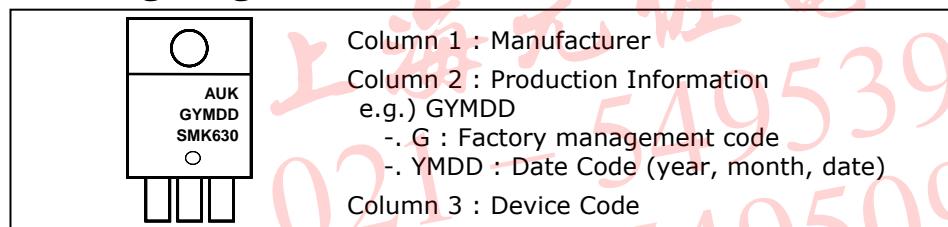
Absolute maximum ratings (T_C=25°C unless otherwise noted)

Characteristic	Symbol		Rating	Unit
Drain-source voltage	V_{DSS}		200	V
Gate-source voltage	V_{GSS}		±30	V
Drain current (DC) *	I_D	(Tc=25℃)	9	A
		(Tc=100℃)	5.4	A
Drain current (Pulsed) *	I_{DM}		36	A
Power dissipation	P_D		30	W
Avalanche current (Single) ②	I_{AS}		9	A
Single pulsed avalanche energy ②	E_{AS}		232	mJ
Avalanche current (Repetitive) ①	I_{AR}		9	A
Repetitive avalanche energy ①	E_{AR}		9.5	mJ
Junction temperature	T_J		150	°C
Storage temperature range	T_{stg}		-55~150	°C

* Limited by maximum junction temperature

Characteristic		Symbol	Typ.	Max.	Unit
Thermal resistance	Junction-case	$R_{th(J-C)}$	-	4.16	°C/W
	Junction-ambient	$R_{th(J-A)}$	-	62.5	

Electrical Characteristics (T$_C$=25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV$_{DSS}$	I$_D$=250uA, V$_{GS}$=0	200	-	-	V
Gate threshold voltage	V$_{GS(th)}$	I$_D$=250uA, V$_{DS}$=V$_{GS}$	2.0	-	4.0	V
Drain-source cut-off current	I$_{DSS}$	V$_{DS}$=200V, V$_{GS}$=0V	-	-	1	uA
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$_D$=4.5A	-	0.34	0.40	Ω
Forward transfer conductance ④	g$_{fs}$	V$_{DS}$=10V, I$_D$=4.5A	-	5.5	-	S
Input capacitance	Ciss	V$_{GS}$=0V, V$_{DS}$=25V, f=1MHz	-	420	525	pF
Output capacitance	Coss		-	99	128	
Reverse transfer capacitance	Crss		-	24	28	
Turn-on delay time	t$_{d(on)}$	V$_{DD}$=100V, I$_D$=9A R$_G$=25Ω ③④	-	11	-	ns
Rise time	t$_r$		-	92	-	
Turn-off delay time	t$_{d(off)}$		-	70	-	
Fall time	t$_f$		-	72	-	
Total gate charge	Q$_g$	V$_{DS}$=160V, V$_{GS}$=10V I$_D$=9A ③④	-	12	17	nC
Gate-source charge	Q$_{gs}$		-	2.4	-	
Gate-drain charge	Q$_{gd}$		-	3.5	-	

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	-	-	9	A
Source current (Pulsed) ①	I$_{SM}$		-	-	36	
Forward voltage ④	V$_{SD}$	V$_{GS}$=0V, I$_S$=9A	-	-	1.4	V
Reverse recovery time	t$_{rr}$	I$_S$=9A, V$_{GS}$=0V dI$_F$/dt=100A/us	-	158	-	ns
Reverse recovery charge	Q$_{rr}$		-	0.97	-	uC

Note ;

① Repetitive rating : Pulse width limited by maximum junction temperature

② L=4.3mH, I$_{AS}$=9A, 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

Fig. 7 V_{DSS} - T_J

Note:
1. $V_{GS}=0V$
2. $I_D=250uA$

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

Note:
1. $V_{GS}=10V$
2. $I_D=4.5A$
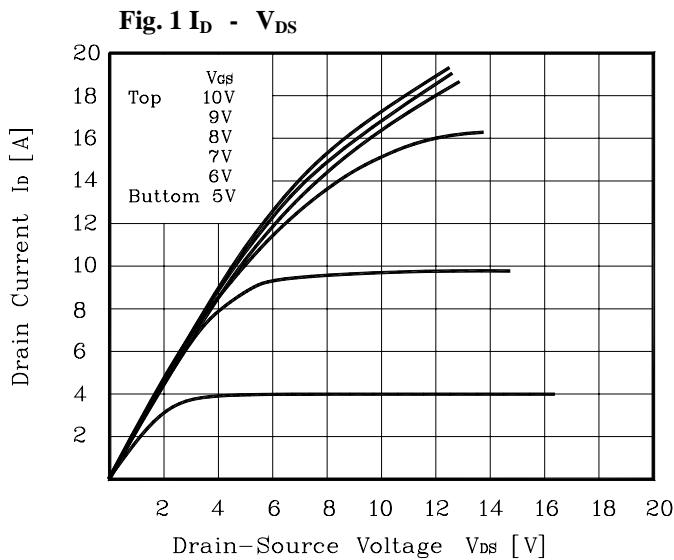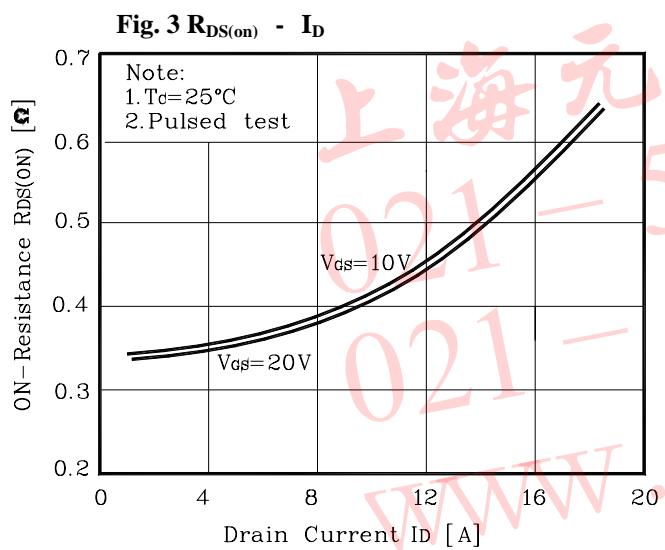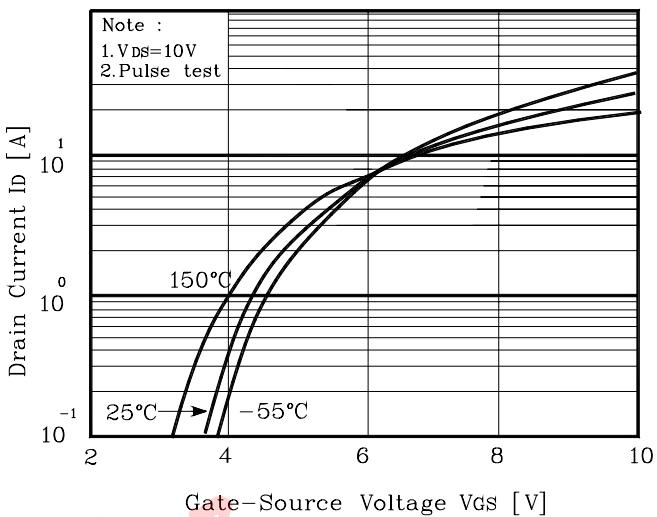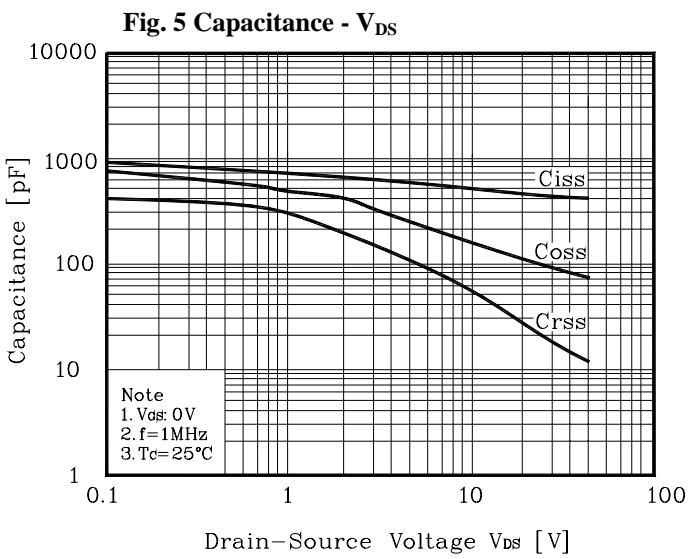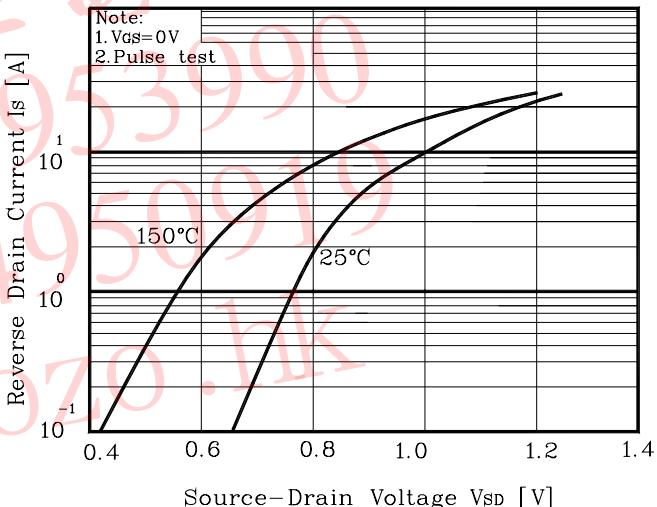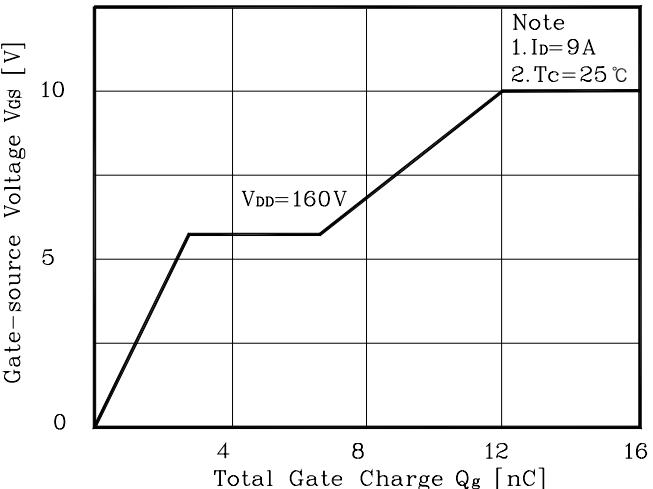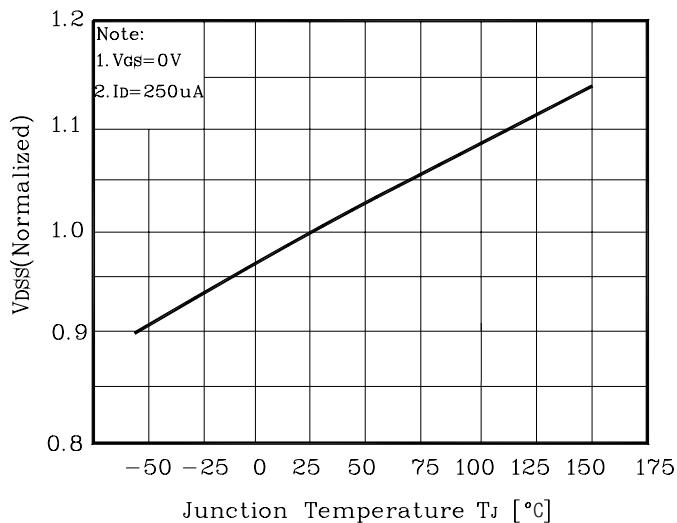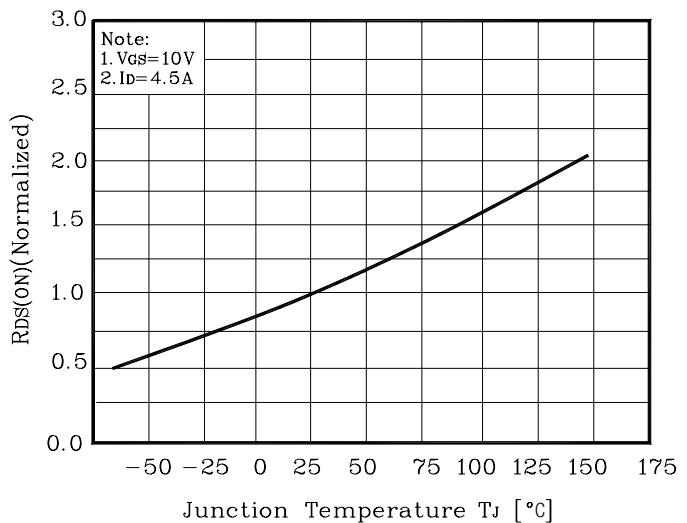
Fig. 9 I_D - T_C
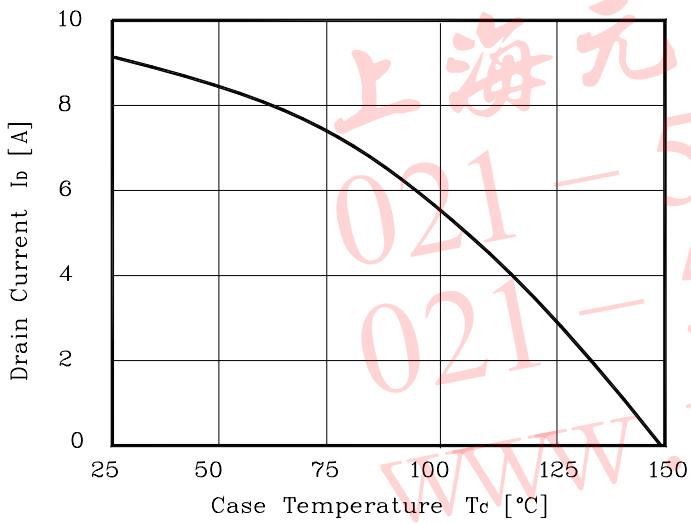
Fig. 10 Safe Operating Area

I_D(pusle) max.

I_D(DC) max.

100us
1ms
10ms
100ms
DC

V_{DSS}(max.)

Note
1. Tc=25℃
2. Single pulse
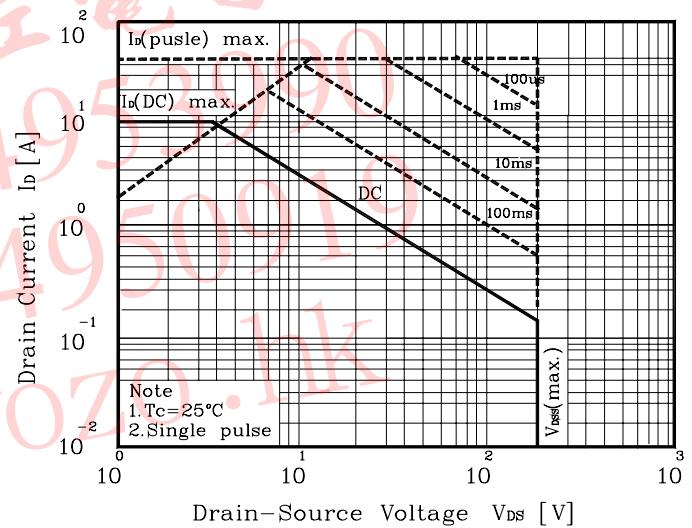
**Fig. 11 Gate Charge Test Circuit & Waveform**
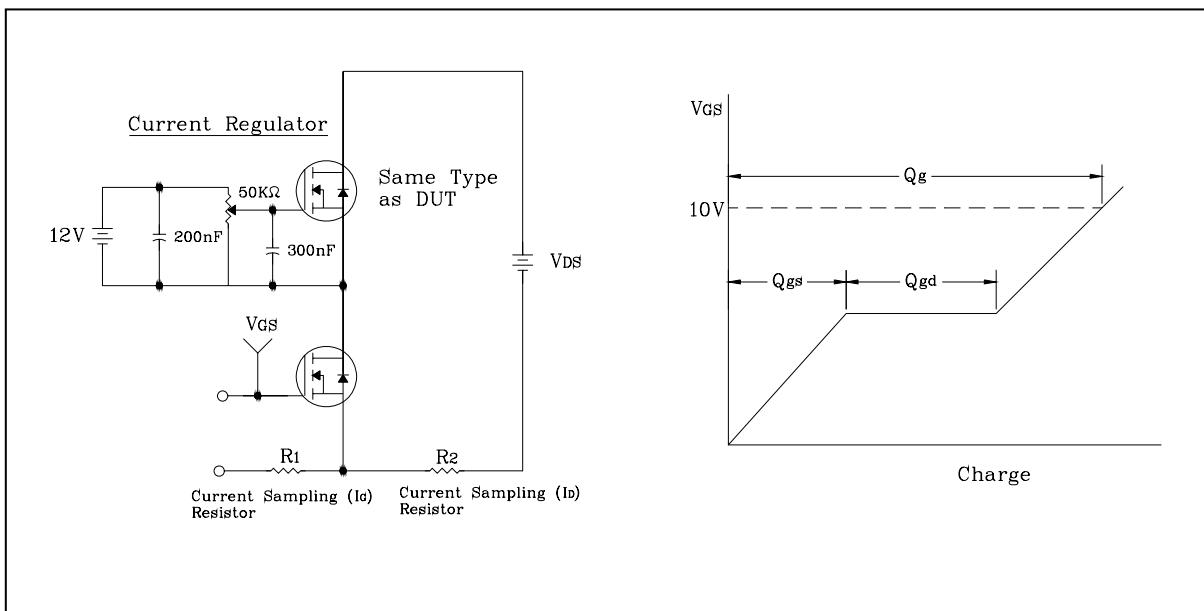
**Fig. 12 Resistive Switching Test Circuit & Waveform**
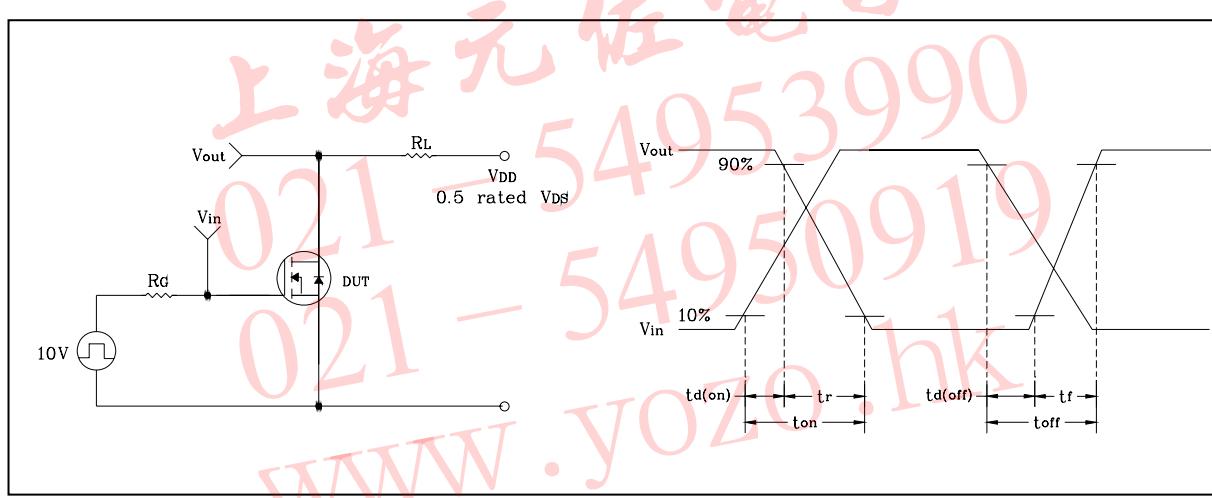

Fig. 13 E$_{AS}$ Test Circuit & Waveform
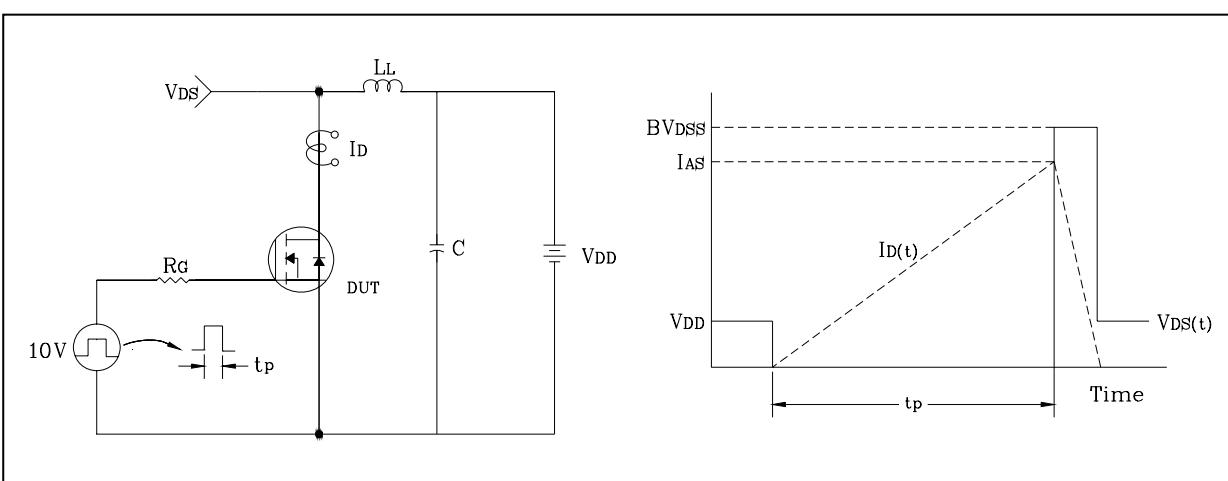
Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform
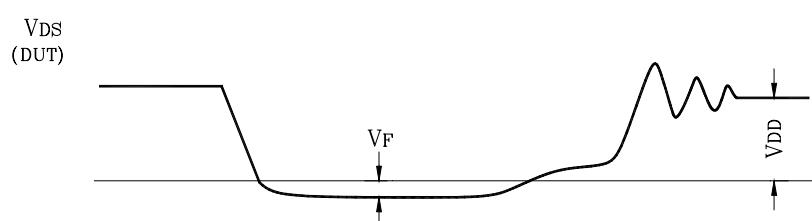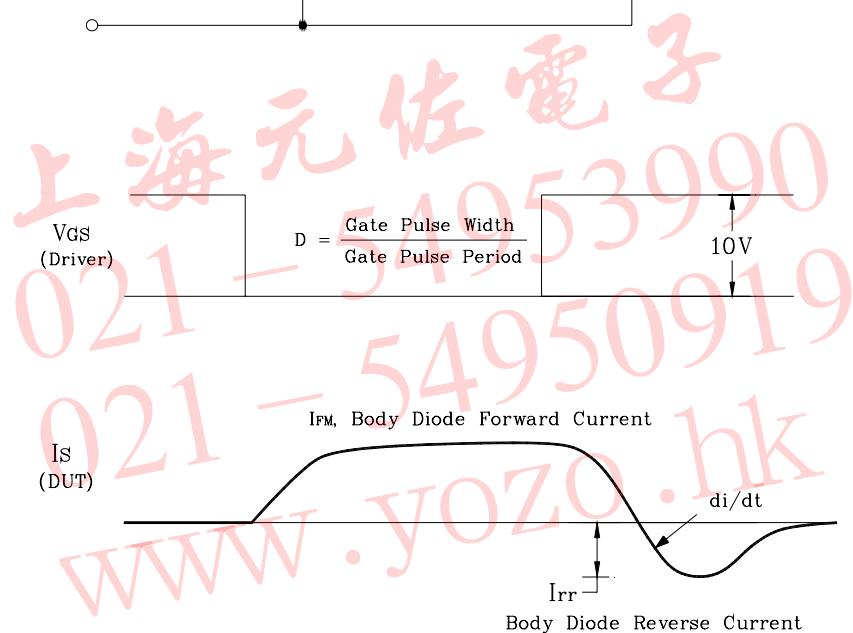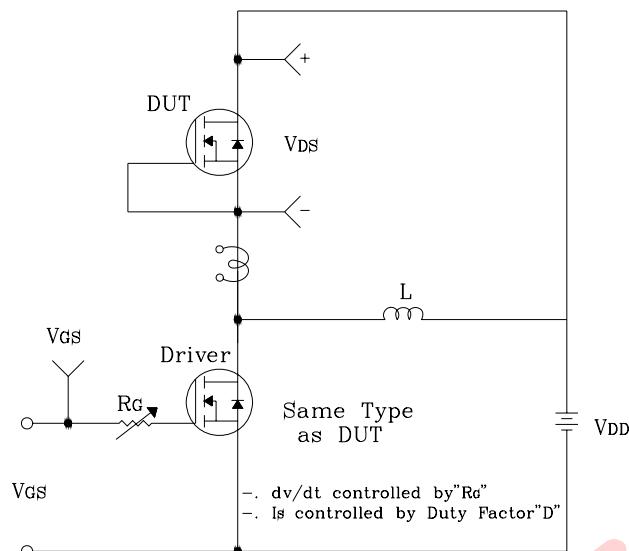
Outline Dimension

unit: mm
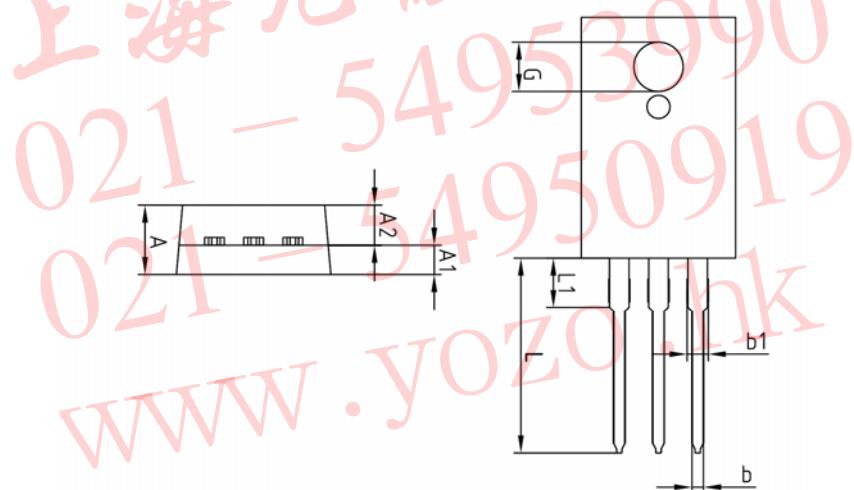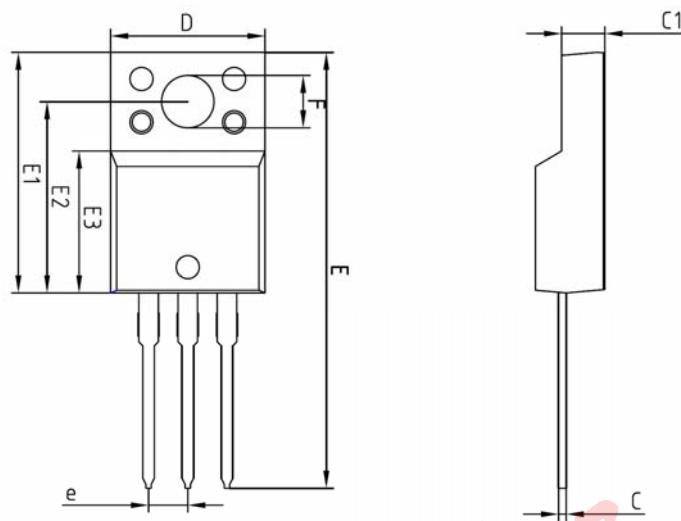
SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	–	–	4.60	
A1	2.45	2.50	2.55	
A2	1.95	2.00	2.05	
b	0.65	0.75	0.85	
b1	1.07	1.27	1.47	
C	0.40	0.50	0.60	
C1	2.70	2.80	2.90	
D	9.90	10.00	10.10	
E	28.00	–	28.60	
E1	15.50	15.60	15.70	
E2	12.30	12.40	12.50	
E3	9.15	9.20	9.25	
F	3.30	3.40	3.50	
G	3.10	3.20	3.30	
e	2.54 BSC			
L	12.40	–	13.00	
L1	3.46 BSC			