

DC-DC CONVERTER APPLICATION

HIGH VOLTAGE SWITCHING APPLICATIONS

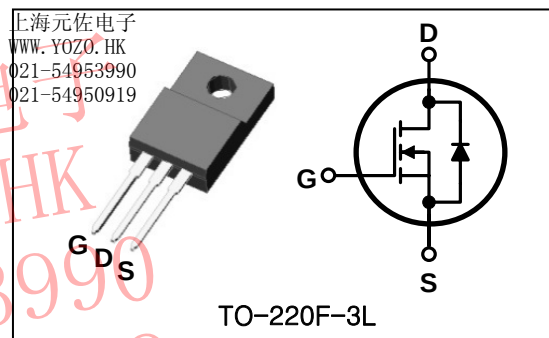
Features

- High Voltage : $BV_{DSS}=400V(\text{Min.})$
- Low C_{rss} : $C_{rss}=14pF(\text{Typ.})$
- Low gate charge : $Q_g=16nC(\text{Typ.})$
- Low $R_{DS(on)}$: $R_{DS(on)}=1.0\Omega(\text{Max.})$

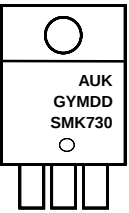
Ordering Information

Type No.	Marking	Package Code
SMK730F	SMK730	TO-220F-3L

PIN Connection



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

Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	400	V
Gate-source voltage	V_{GSS}	± 30	V
Drain current (DC) *	I_D	($T_c=25^\circ\text{C}$)	5.5
		($T_c=100^\circ\text{C}$)	3.46
Drain current (Pulsed) *	I_{DM}	22	A
Power dissipation	P_D	30	W
Avalanche current (Single) ②	I_{AS}	5.5	A
Single pulsed avalanche energy ②	E_{AS}	449	mJ
Avalanche current (Repetitive) ①	I_{AR}	5.5	A
Repetitive avalanche energy ①	E_{AR}	8.5	mJ
Junction temperature	T_J	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55~150	

* Limited by maximum junction temperature

Characteristic	Symbol	Typ.	Max.	Unit
Thermal resistance	Junction-case	$R_{th(J-C)}$	-	4.16
	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	400	-	-	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} =400V, 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 =2.75A	-	0.8	1.0	Ω
Forward transfer conductance ④	g _{fs}	V _{DS} =10V, I _D =2.75A	-	3.8	-	S
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =25V, f=1MHz	-	732	915	pF
Output capacitance	C _{oss}		-	91	114	
Reverse transfer capacitance	C _{rss}		-	14.0	17.5	
Turn-on delay time	t _{d(on)}	V _{DD} =250V, I _D =5.5A R _G =25Ω	-	12	-	ns
Rise time	t _r		-	46	-	
Turn-off delay time	t _{d(off)}		-	50	-	
Fall time	t _f		-	48	-	
Total gate charge	Q _g	V _{DS} =320V, V _{GS} =10V I _D =5.5A	-	16	20	nC
Gate-source charge	Q _{gs}		-	5.1	-	
Gate-drain charge	Q _{gd}		-	3.7	-	

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	-	-	5.5	A
Source current (Pulsed) ①	I _{SM}		-	-	22	
Forward voltage ④	V _{SD}	V _{GS} =0V, I _S =5.5A	-	-	1.4	V
Reverse recovery time	t _{rr}	I _S =5.5A, V _{GS} =0V dI _F /dt=100A/us	-	270	-	ns
Reverse recovery charge	Q _{rr}		-	1.9	-	uC

Note ;

- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ② L=26mH, I_{AS}=5.5A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
- ③ Pulse Test : Pulse width≤300us, Duty cycle≤2%
- ④ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1 $I_D - V_{DS}$

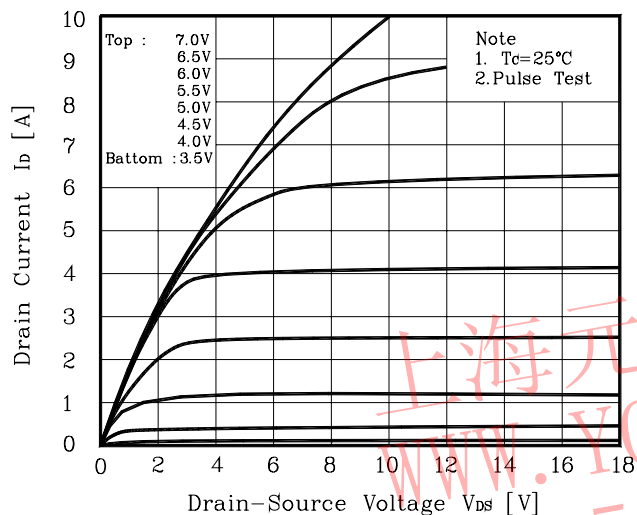


Fig. 2 $I_D - V_{GS}$

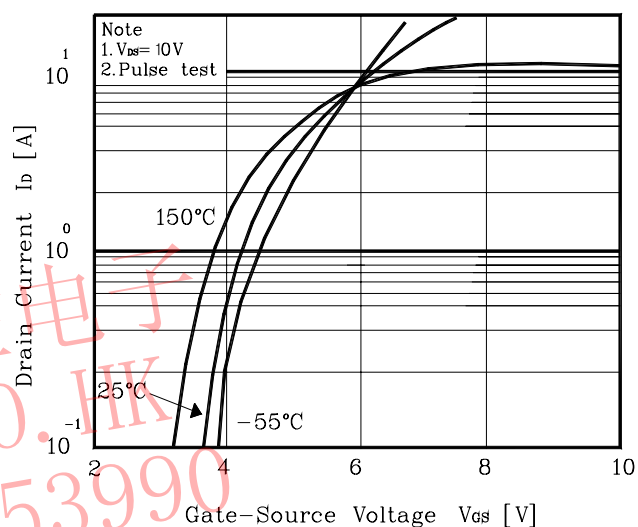


Fig. 3 $R_{DS(on)} - I_D$

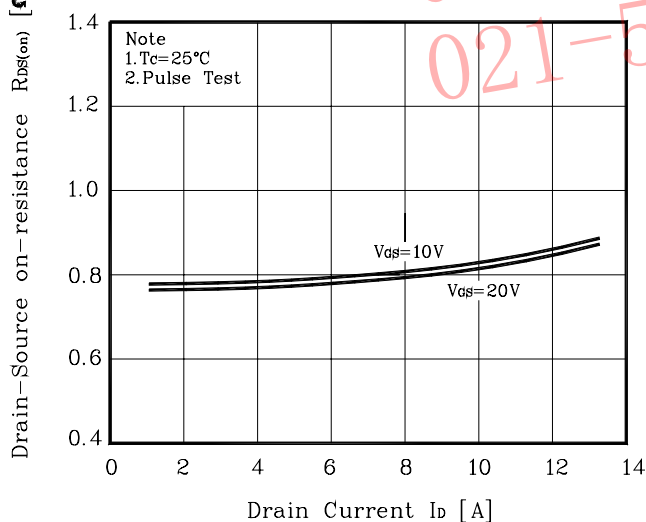


Fig. 4 $I_S - V_{SD}$

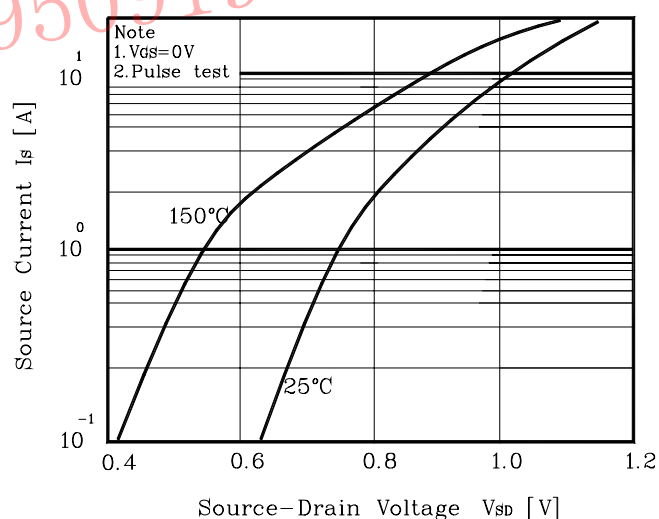


Fig. 5 Capacitance - V_{DS}

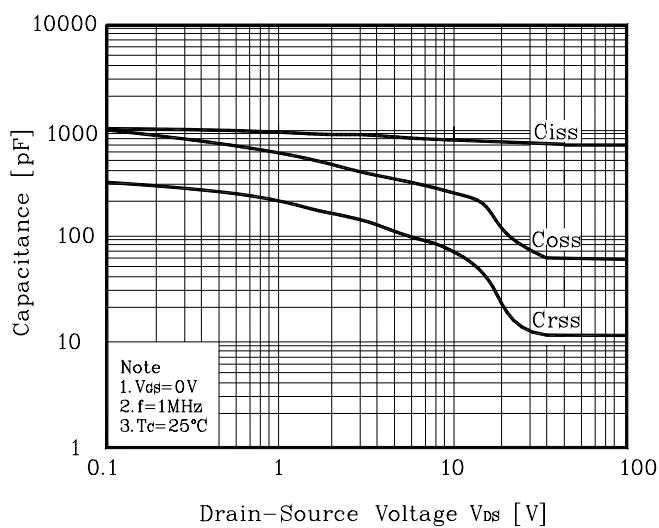


Fig. 6 $V_{GS} - Q_G$

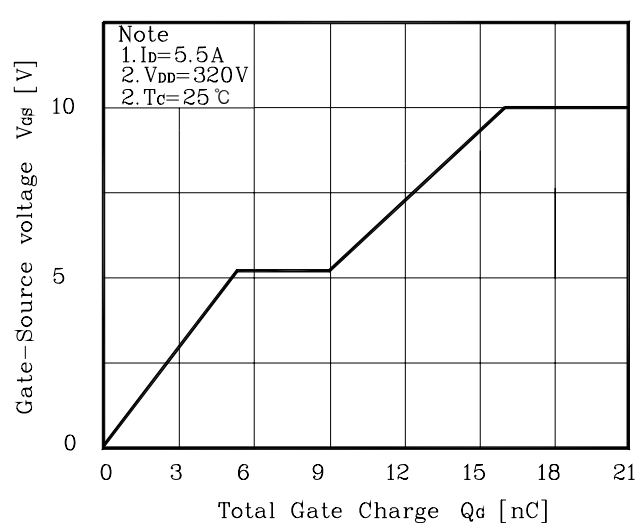


Fig. 7 $V_{(BR)DSS} - T_J$

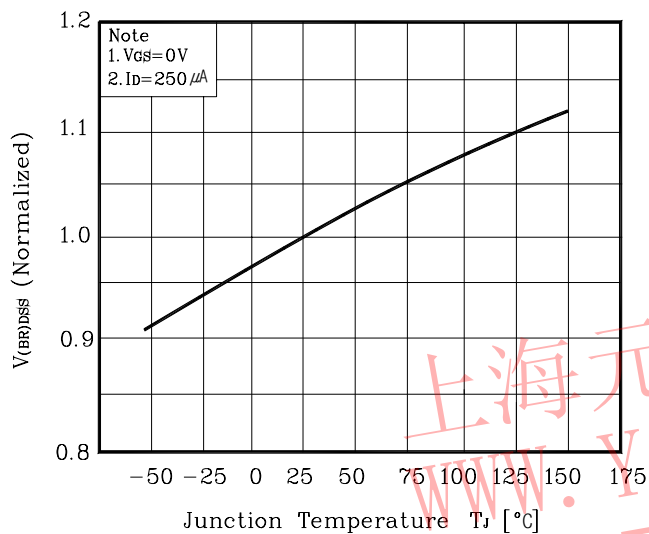


Fig. 8 $R_{DS(on)} - T_J$

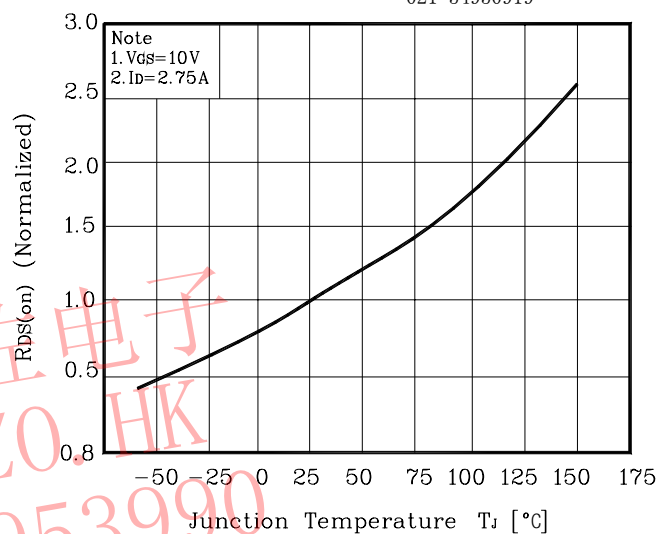


Fig. 9 $I_D - T_C$

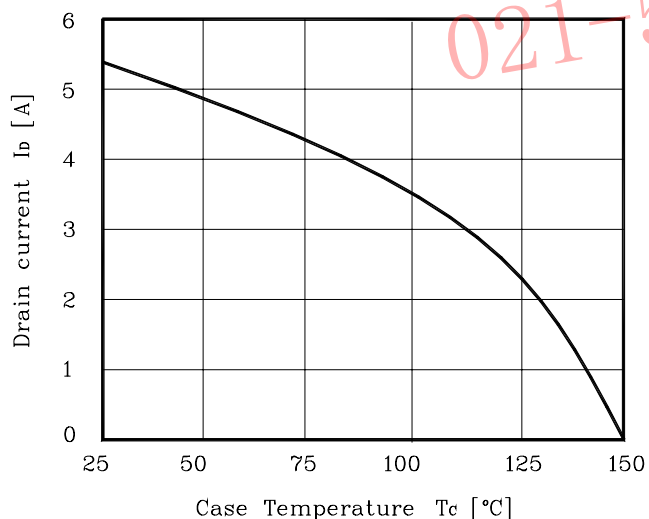


Fig. 10 Safe Operating Area

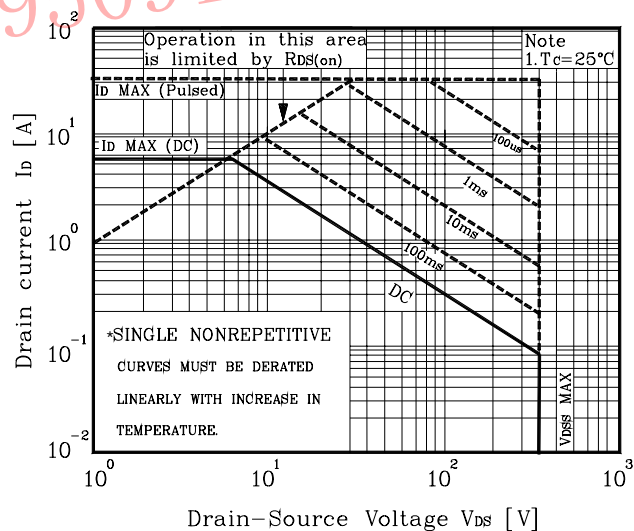


Fig. 11 Gate Charge Test Circuit & Waveform

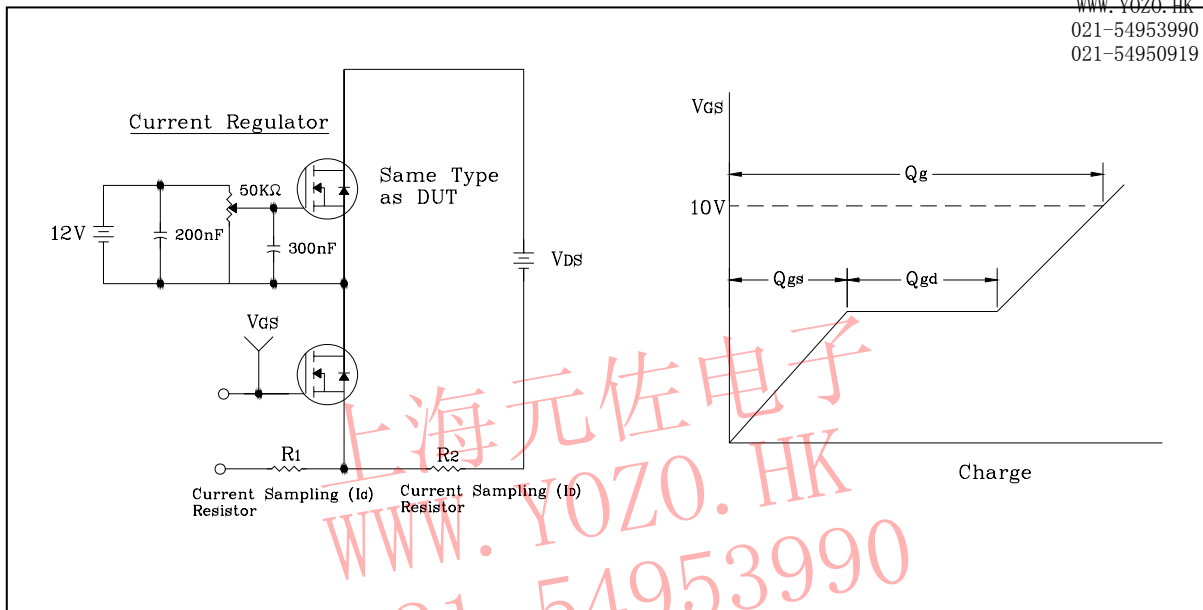


Fig. 12 Resistive Switching Test Circuit & Waveform

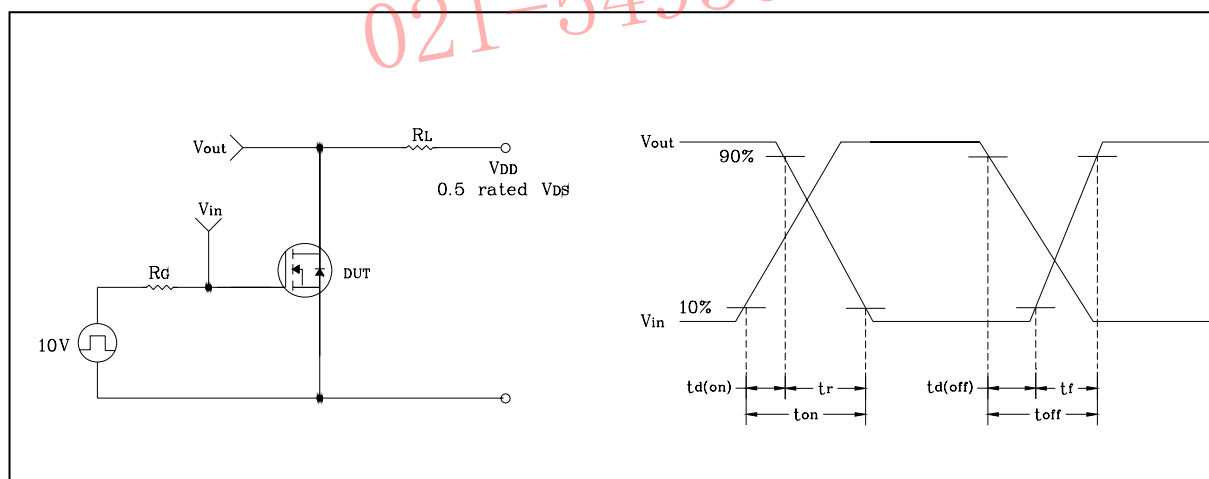


Fig. 13 E_{AS} Test Circuit & Waveform

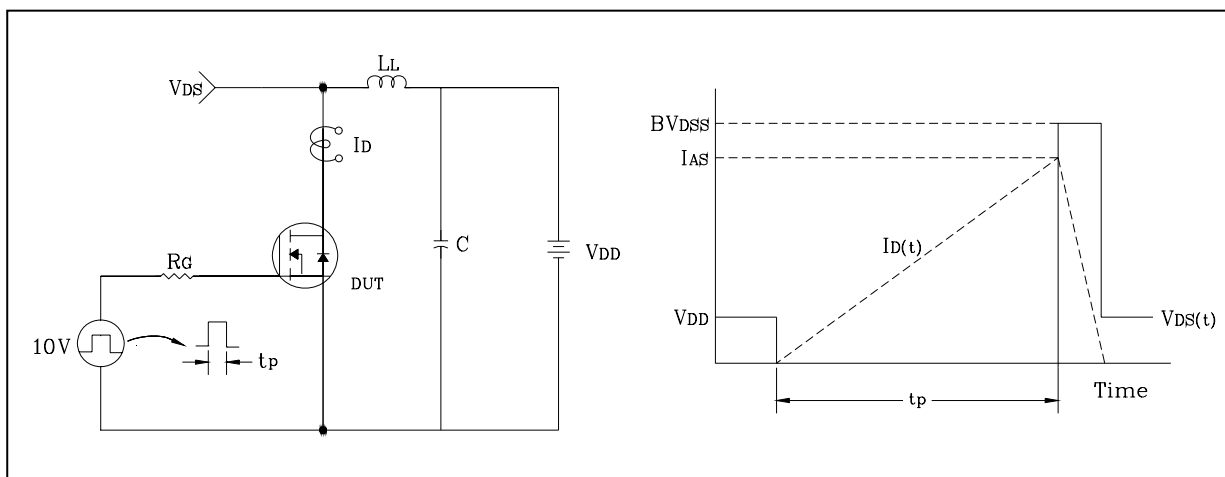
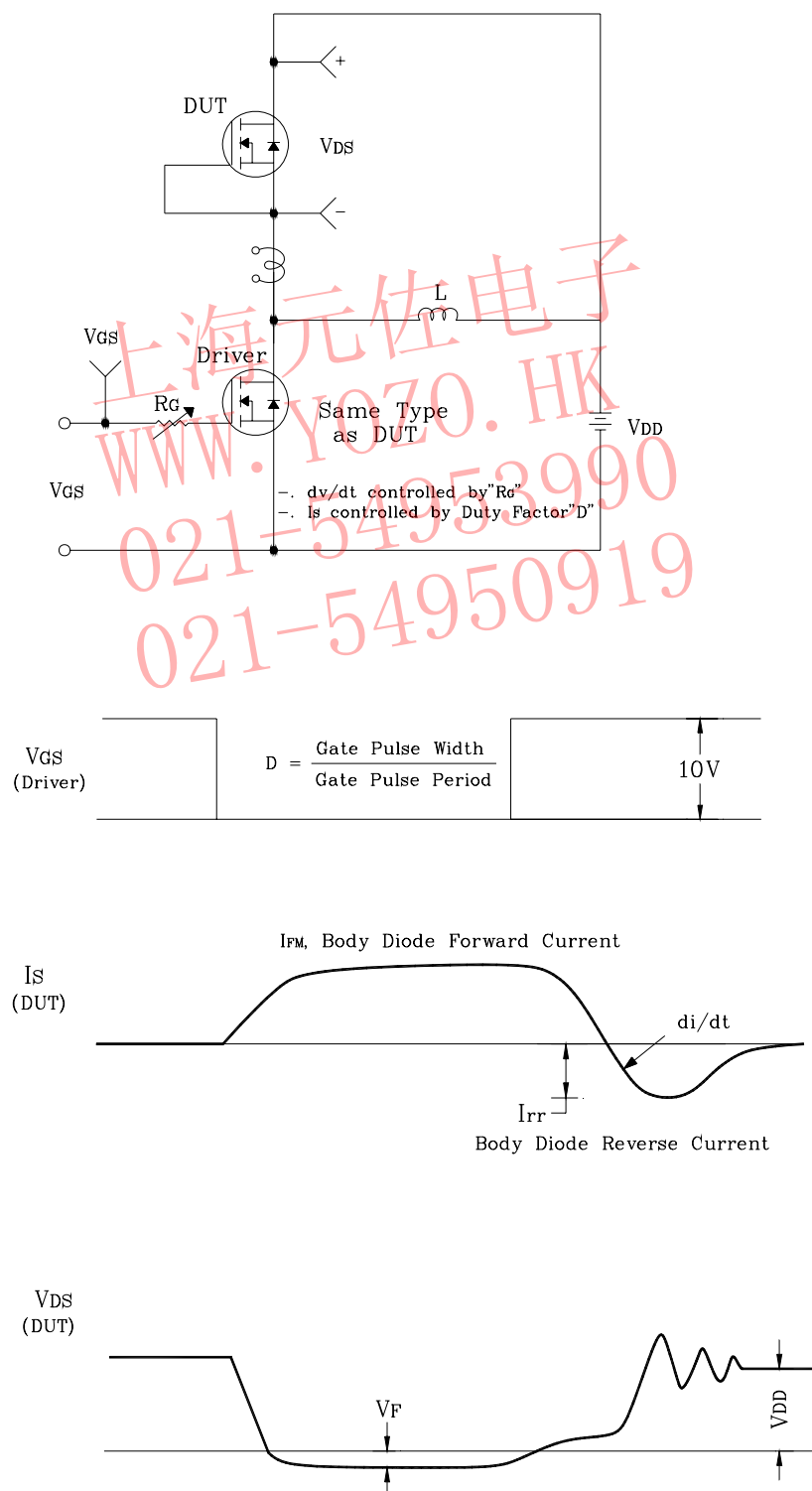
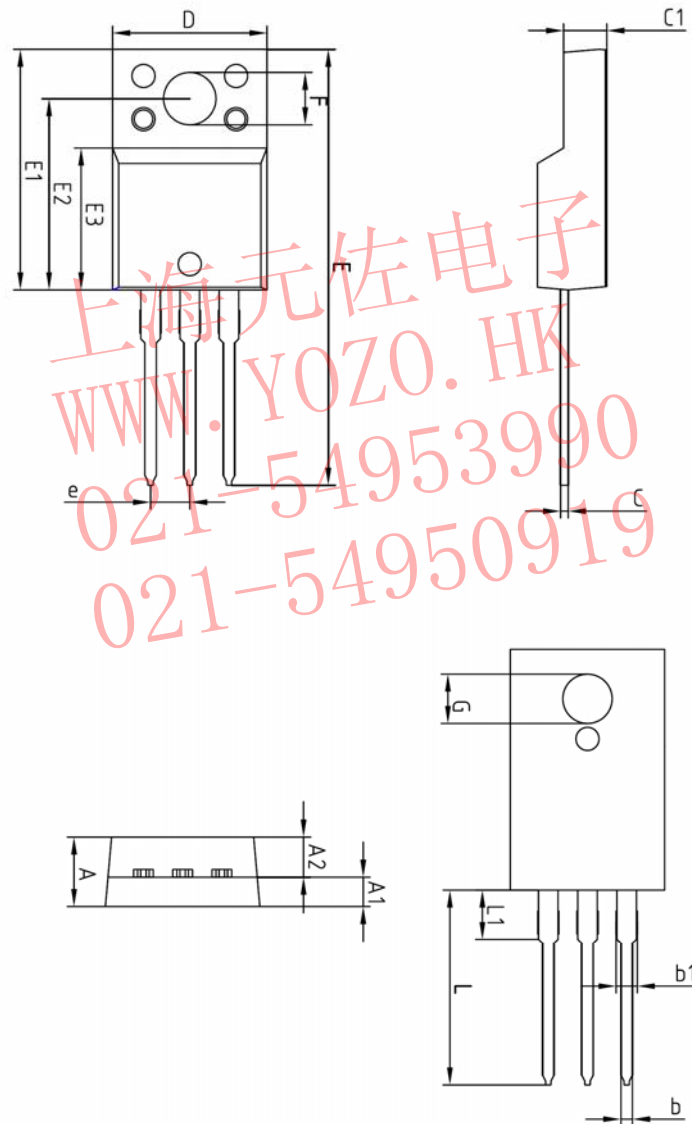


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



Outline Dimension



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	—	