

SWITCHING REGULATOR APPLICATIONS

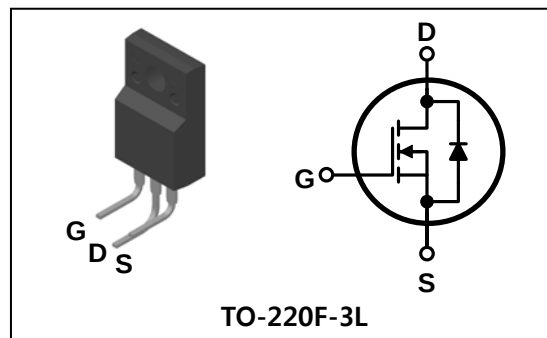
Features

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

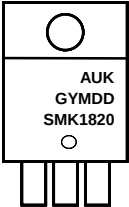
Ordering Information

Type No.	Marking	Package Code
SMK1820FJ	SMK1820	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}		200	V
Gate-source voltage	V _{GSS}		±30	V
Drain current (DC) *	I _D	T _C =25°C	18	A
		T _C =100°C	9.1	A
Drain current (Pulsed) *	I _{DM}		72	A
Power dissipation	P _D		35	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	°C
Storage temperature range	T _{stg}		-55~150	

* Limited by maximum junction temperature

Characteristic		Symbol	Typ.	Max.	Unit
Thermal resistance	Junction-case	$R_{th(J-C)}$	-	3.57	$^{\circ}\text{C/W}$
	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} =0V	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 =9.0A	-	0.14	0.17	Ω
Forward transfer conductance ④	g _{fs}	V _{DS} =10V, I _D =9.0A	-	10.5	-	S
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =25V f=1 MHz	-	942	1240	pF
Output capacitance	C _{oss}		-	227	310	
Reverse transfer capacitance	C _{rss}		-	55	71	
Turn-on delay time	t _{d(on)}	V _{DD} =100V, I _D =18A R _G =25Ω ③④	-	15	-	ns
Rise time	t _r		-	130	-	
Turn-off delay time	t _{d(off)}		-	135	-	
Fall time	t _f		-	105	-	
Total gate charge	Q _g	V _{DS} =160V, V _{GS} =10V I _D =18A ③④	-	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°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} =0V, I _S =18A	-	-	1.4	V
Reverse recovery time	t _{rr}	I _S =18A, V _{GS} =0V dI _F /dt=100A/us	-	208	-	ns
Reverse recovery charge	Q _{rr}		-	1.63	-	uC

Note ;

- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ② L=2.1mH, I_{AS}=18A, 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 $I_D - V_{DS}$

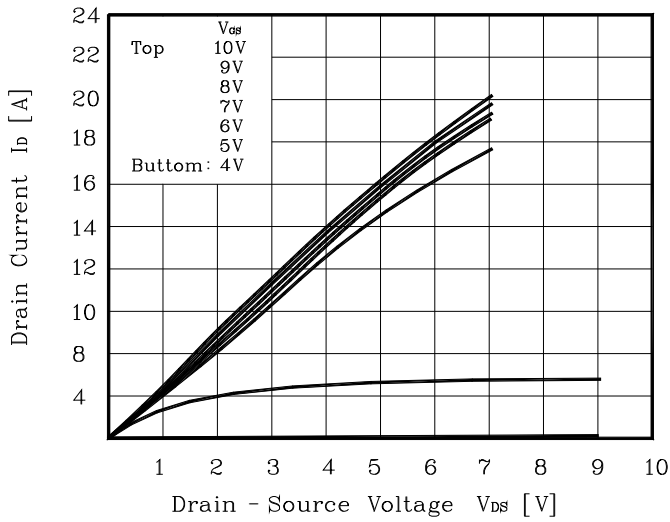


Fig. 2 $I_D - V_{GS}$

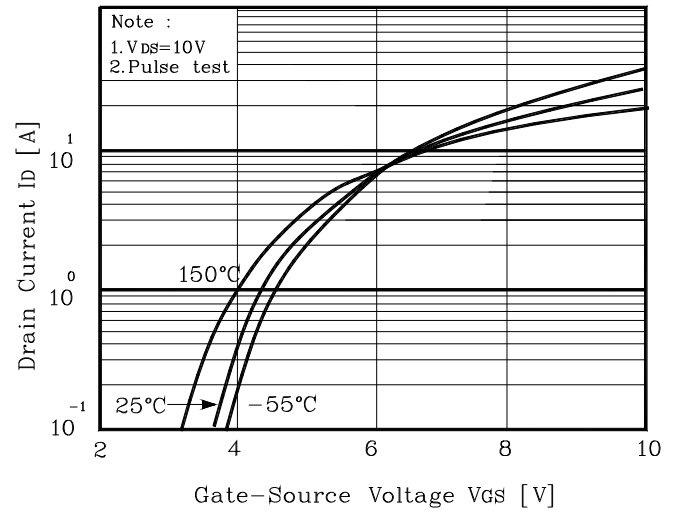


Fig. 3 $R_{DS(on)} - I_D$

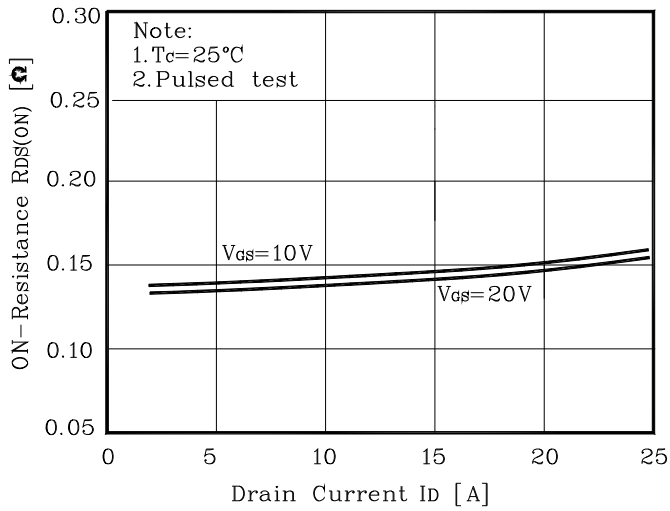


Fig. 4 $I_S - V_{SD}$

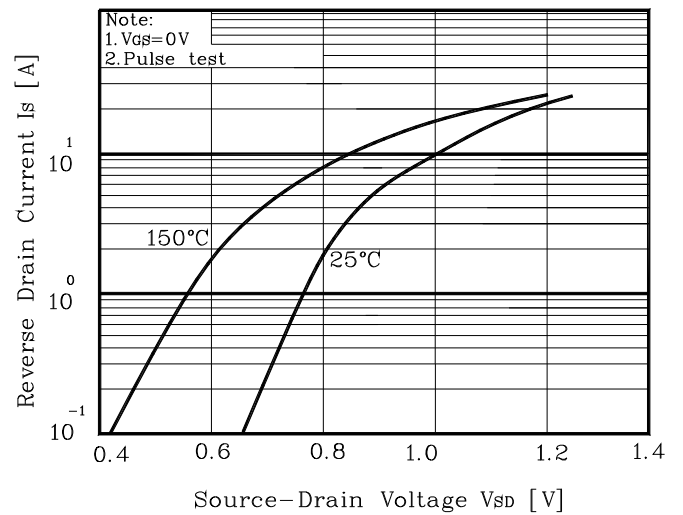


Fig. 5 Capacitance - V_{DS}

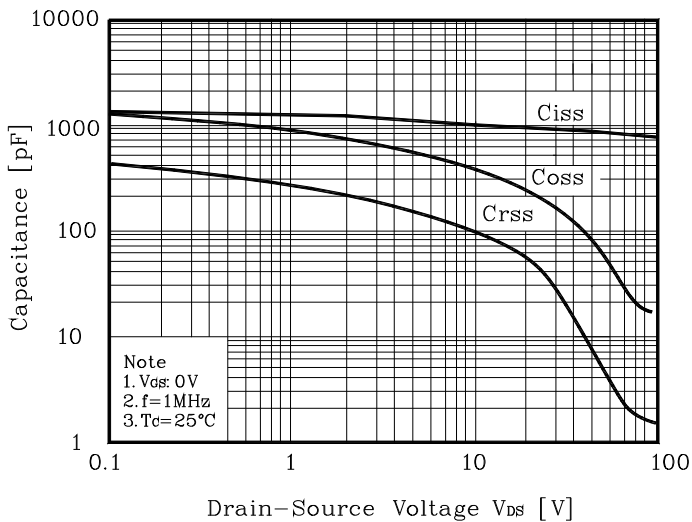


Fig. 6 $V_{GS} - Q_G$

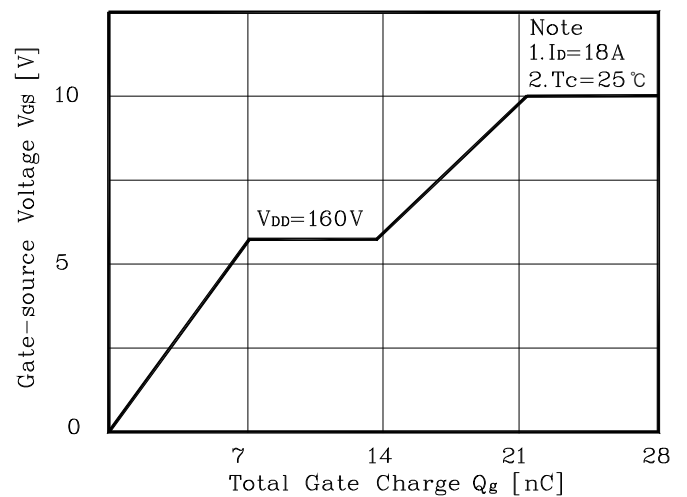


Fig. 7 $V_{DS} - T_J$

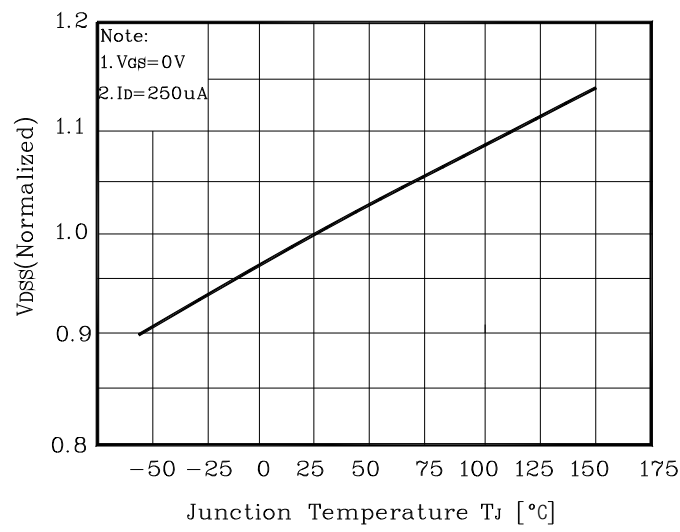


Fig. 8 $R_{DS(on)} - T_J$

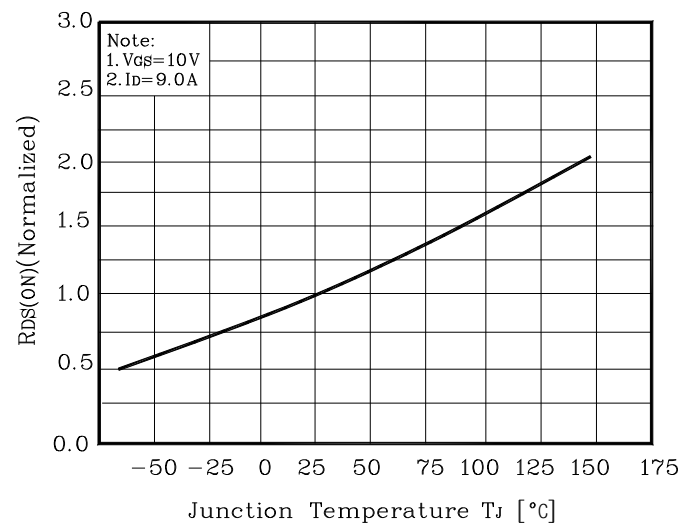


Fig. 9 $I_D - T_C$

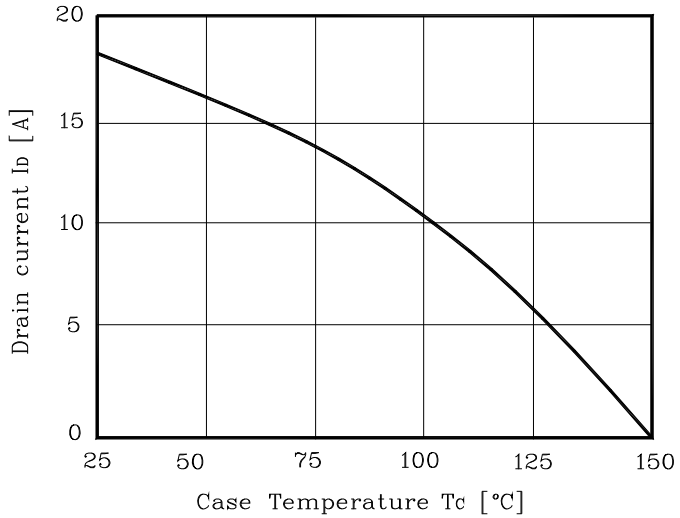


Fig. 10 Safe Operating Area

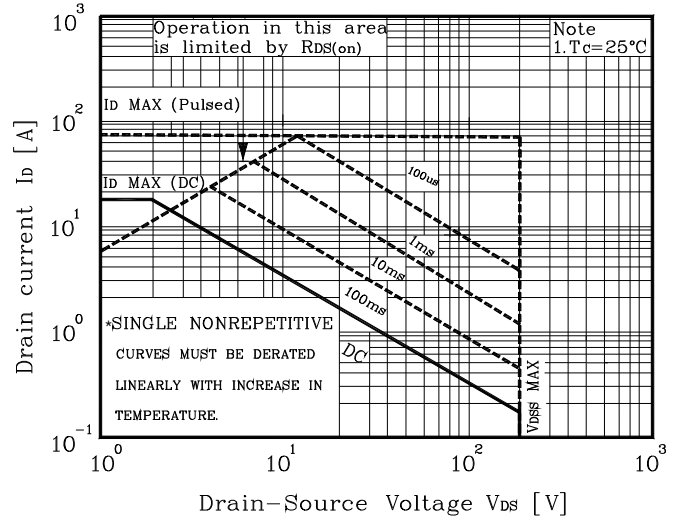


Fig. 11 Gate Charge Test Circuit & Waveform

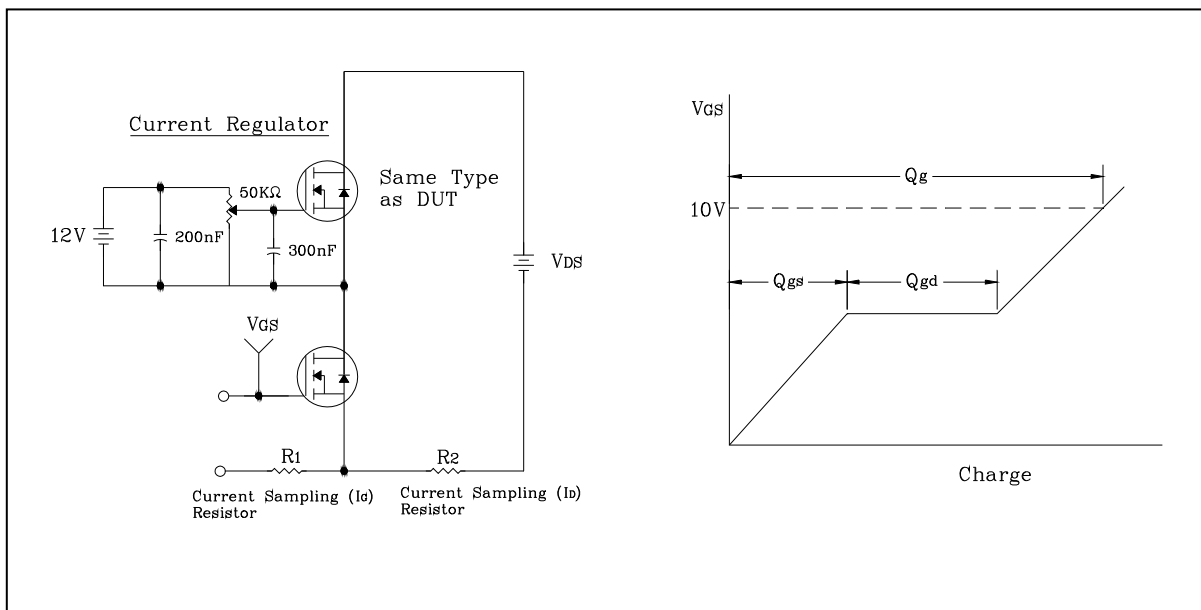


Fig. 12 Resistive Switching Test Circuit & Waveform

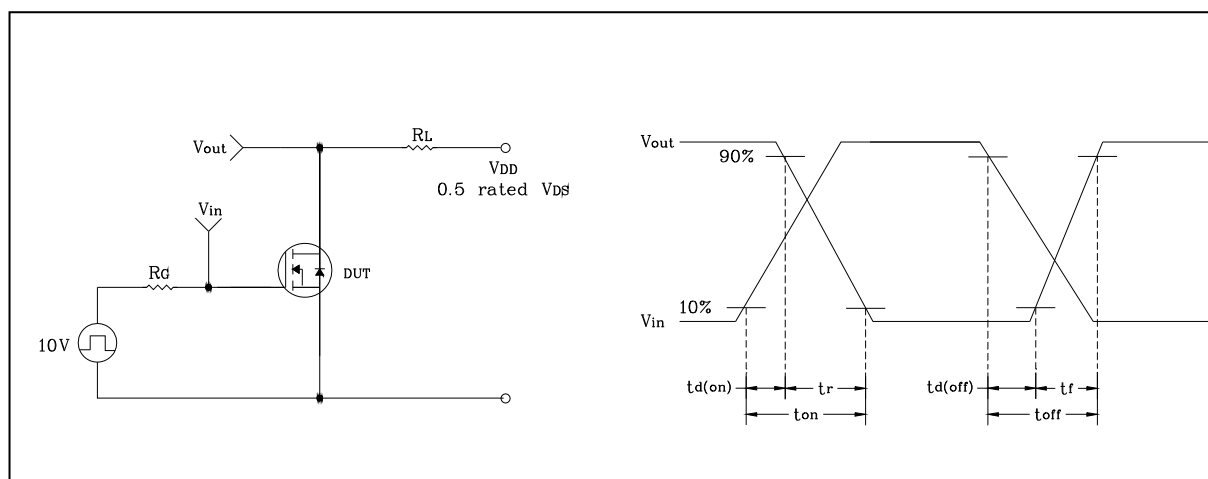


Fig. 13 E_{AS} Test Circuit & Waveform

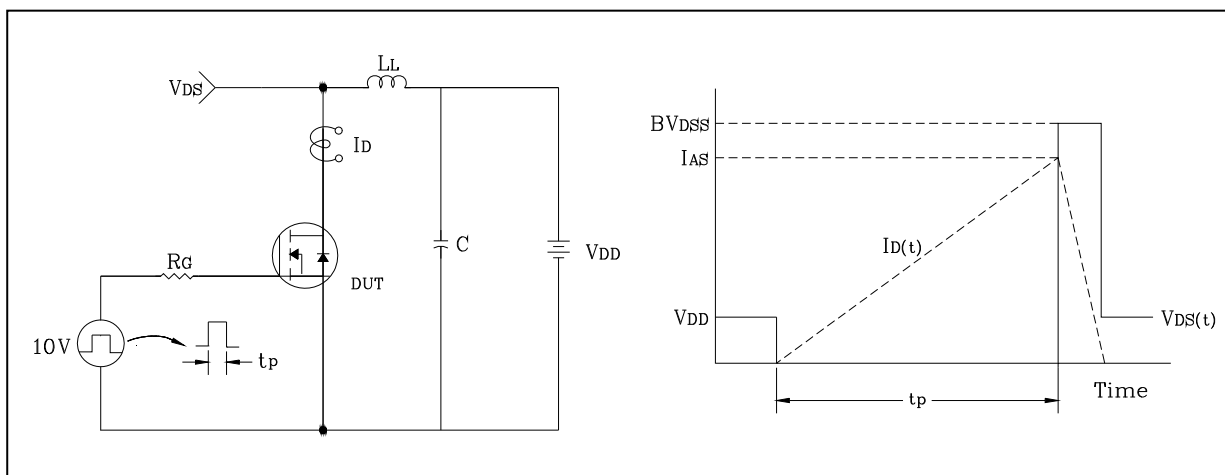
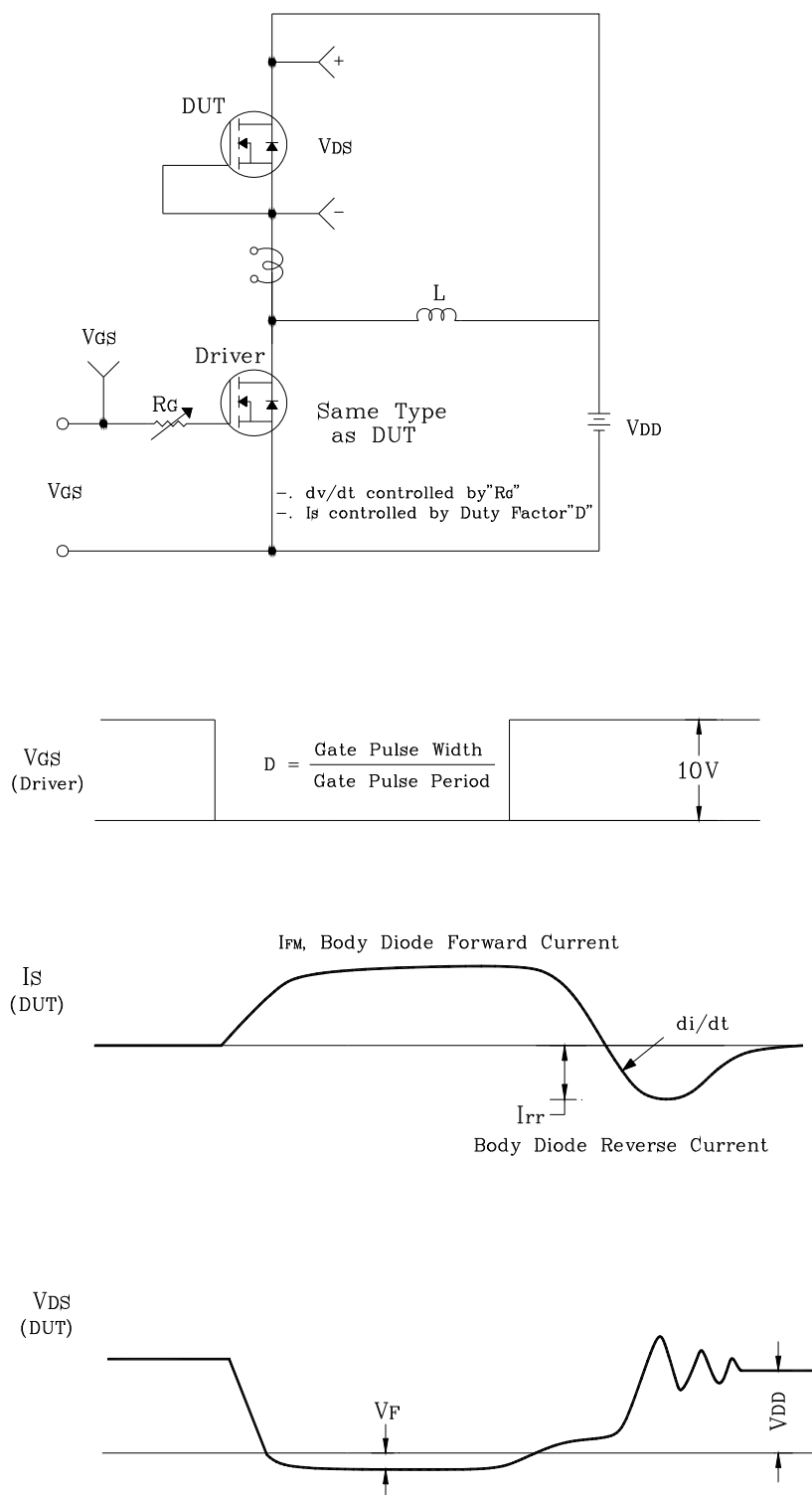
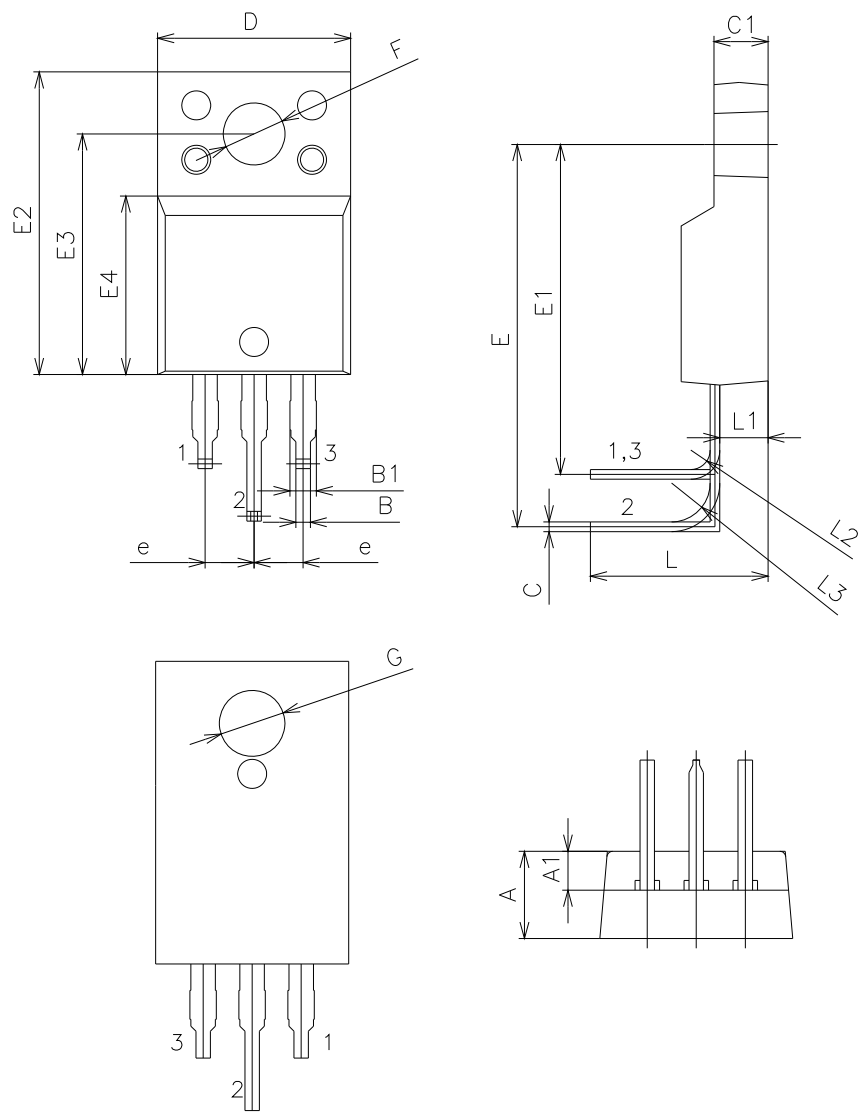


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



Outline Dimension

unit: mm



SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	4.40	4.50	4.60	
A1	1.90	2.00	2.10	
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	9.80	10.00	10.20	
E	19.20	19.70	20.20	
E1	16.50	17.00	17.50	
E2	15.40	15.60	15.80	
E3	12.20	12.40	12.60	
E4	9.00	9.20	9.40	
F	3.10	3.20	3.30	
G	3.30	3.40	3.50	
e	2.54 BSC			
L	9.00	9.20	9.40	
L1	—	2.50	—	
L2	—	1.00	—	
L3	—	2.00	—	

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