

SWITCHING REGULATOR APPLICATIONS

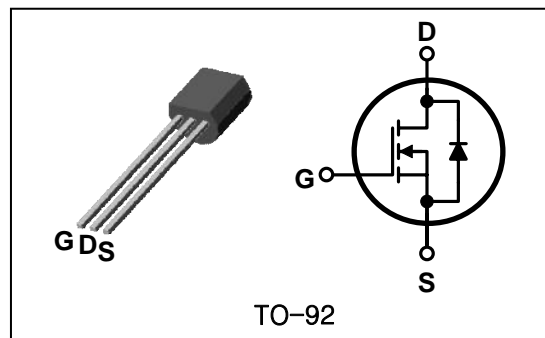
Features

- High Voltage : $BV_{DSS}=600V(\text{Min.})$
- Low C_{RSS} : $C_{RSS}=3.4pF(\text{Typ.})$
- Low gate charge : $Qg=3.9nC(\text{Typ.})$
- Low $R_{DS(on)}$: $R_{DS(on)}=11.5\Omega(\text{Max.})$

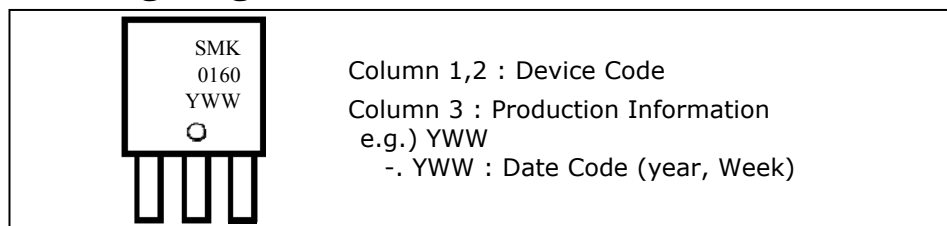
Ordering Information

Type No.	Marking	Package Code
SMK0160	SMK0160	TO-92

PIN Connection



Marking Diagram



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

Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	600	V
Gate-source voltage	V_{GSS}	± 30	V
Drain current (DC) *	I_D	($T_C=25^\circ\text{C}$)	0.3
		($T_C=100^\circ\text{C}$)	0.18
Drain current (Pulsed) *	I_{DM}	1.2	A
Power dissipation	P_D	625	mW
Avalanche current (Single) ②	I_{AS}	0.3	A
Single pulsed avalanche energy ②	E_{AS}	53	mJ
Avalanche current (Repetitive) ①	I_{AR}	0.3	A
Repetitive avalanche energy ①	E_{AR}	1.1	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-ambient	$R_{th(J-A)}$ **	-	200	$^\circ\text{C/W}$

** Limited by maximum junction temperature

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	600	-	-	V	
Gate threshold voltage	V _{GS(th)}	I _D =250μA, V _{DS} =V _{GS}	2.0	-	4.0	V	
Drain-source cut-off current	I _{DSS}	V _{DS} =600V, V _{GS} =0V	-	-	1	μA	
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 =150mA	-	9.3	11.5	Ω	
Forward transfer conductance ④	g _{fs}	V _{DS} =10V, I _D =150mA	-	0.32	-	S	
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =25V, f=1MHz	-	131	164	pF	
Output capacitance	C _{oss}		-	19.4	24.3		
Reverse transfer capacitance	C _{rss}		-	3.4	4.3		
Turn-on delay time	t _{d(on)}	V _{DD} =300V, I _D =0.3A R _G =25Ω	-	5.5	-	ns	
Rise time	t _r		-	5	-		
Turn-off delay time	t _{d(off)}		③④	-	13		-
Fall time	t _f		-	-	28		-
Total gate charge	Q _g	V _{DS} =480V, V _{GS} =10V I _D =0.3A	-	3.9	4.9	nC	
Gate-source charge	Q _{gs}		-	1.7	-		
Gate-drain charge	Q _{gd}		③④	-	0.85		-

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	-	-	0.3	A
Source current (Pulsed) ①	I _{SM}		-	-	1.2	
Forward voltage ④	V _{SD}	V _{GS} =0V, I _S =0.3A	-	-	1.4	V
Reverse recovery time	t _{rr}	I _S =0.3A, V _{GS} =0V dI _F /dt=100A/μs	-	190	-	ns
Reverse recovery charge	Q _{rr}		-	0.53	-	μC

Note ;

- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ② L=1080mH, I_{AS}=0.3A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
- ③ Pulse Test : Pulse width≤300μs, Duty cycle≤2%
- ④ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1 $I_D - V_{DS}$

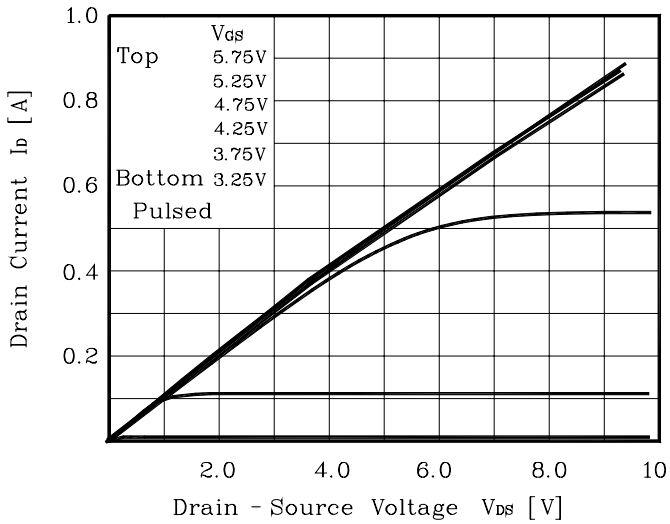


Fig. 2 $I_D - V_{GS}$

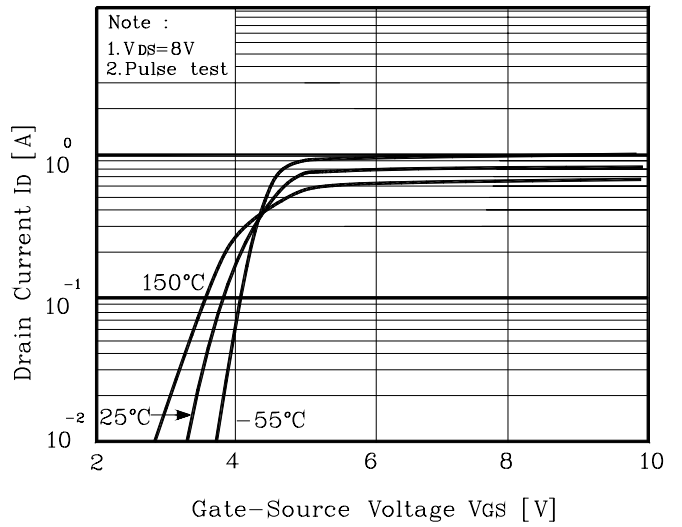


Fig. 3 $R_{DS(on)} - I_D$

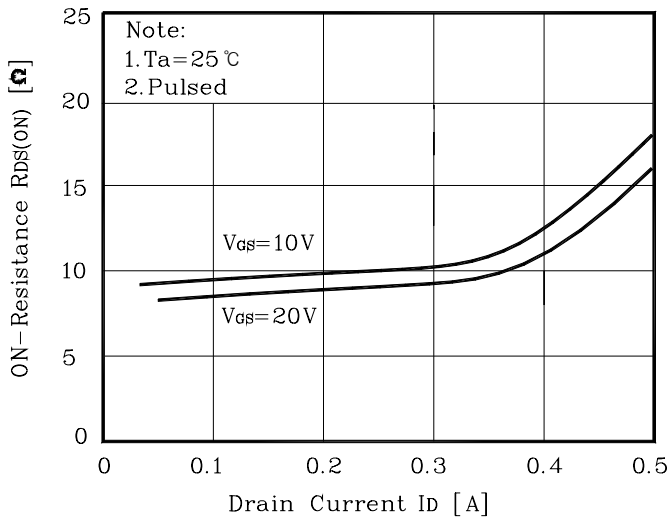


Fig. 4 $I_S - V_{SD}$

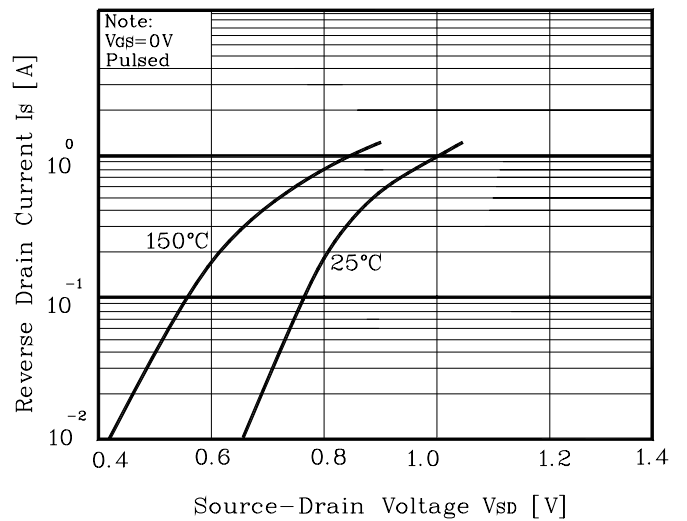


Fig. 5 Capacitance - V_{DS}

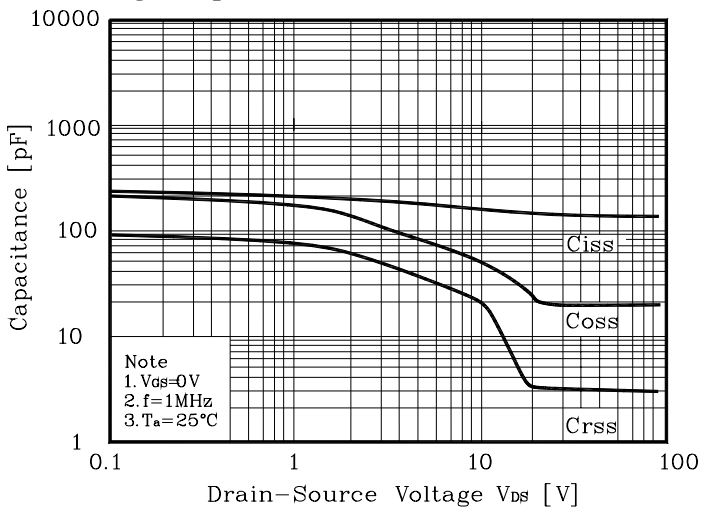


Fig. 6 $V_{GS} - Q_G$

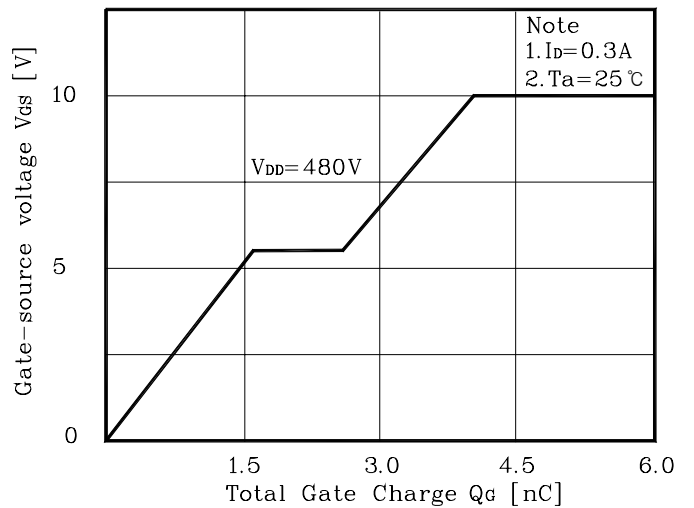


Fig. 7 $V_{DSS} - T_J$

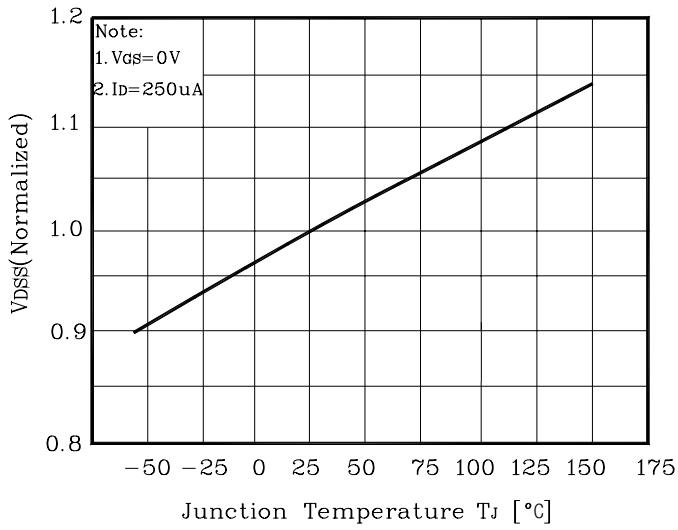


Fig. 8 $R_{DS(on)} - T_J$

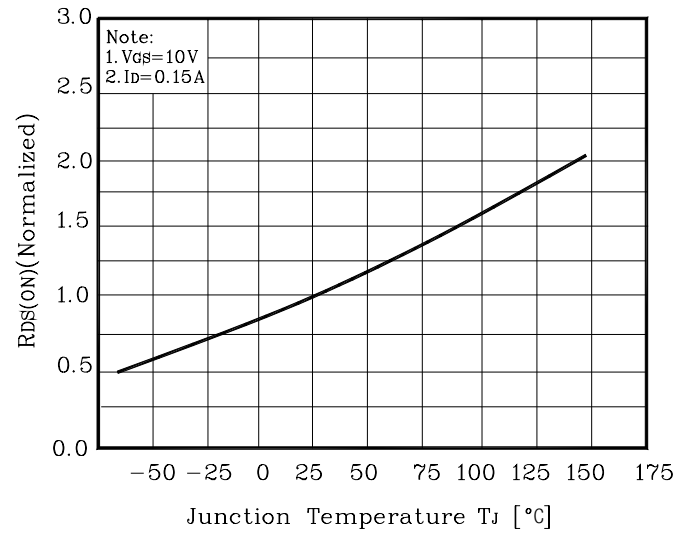


Fig. 9 $I_D - T_a$

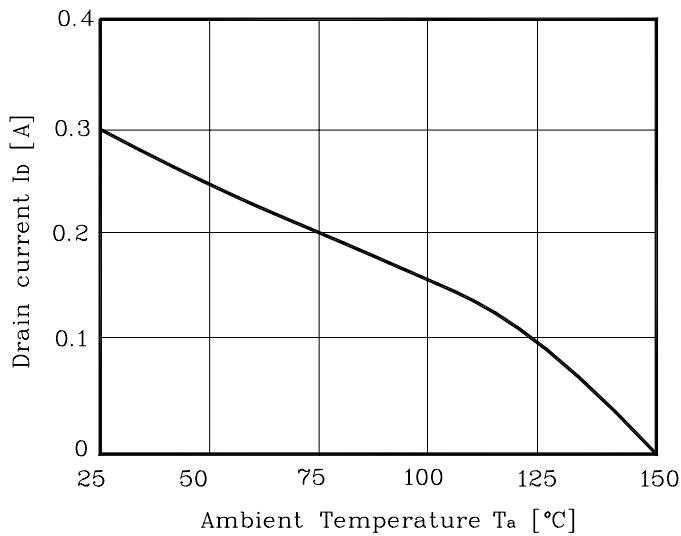


Fig. 10 Safe Operating Area

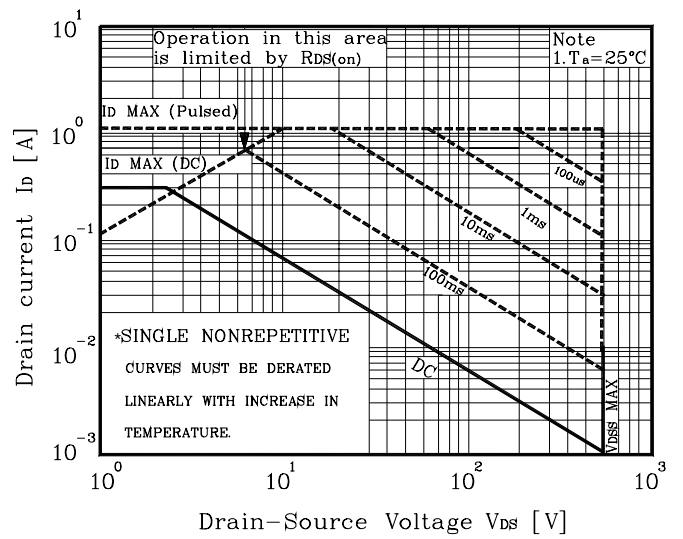


Fig. 11 Gate Charge Test Circuit & Waveform

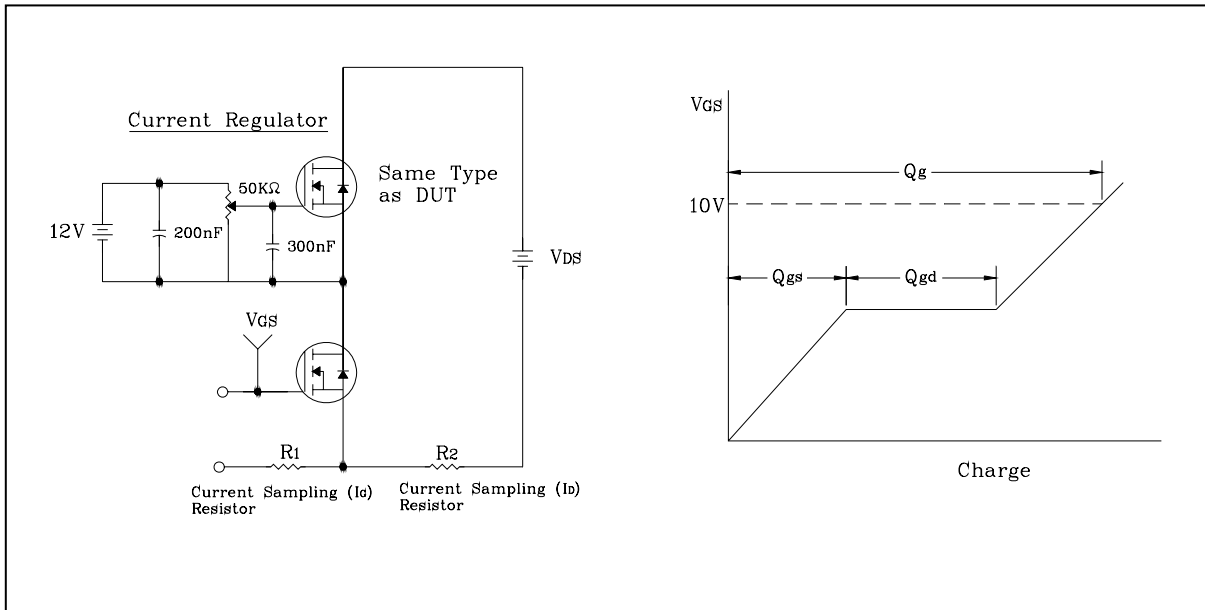


Fig. 12 Resistive Switching Test Circuit & Waveform

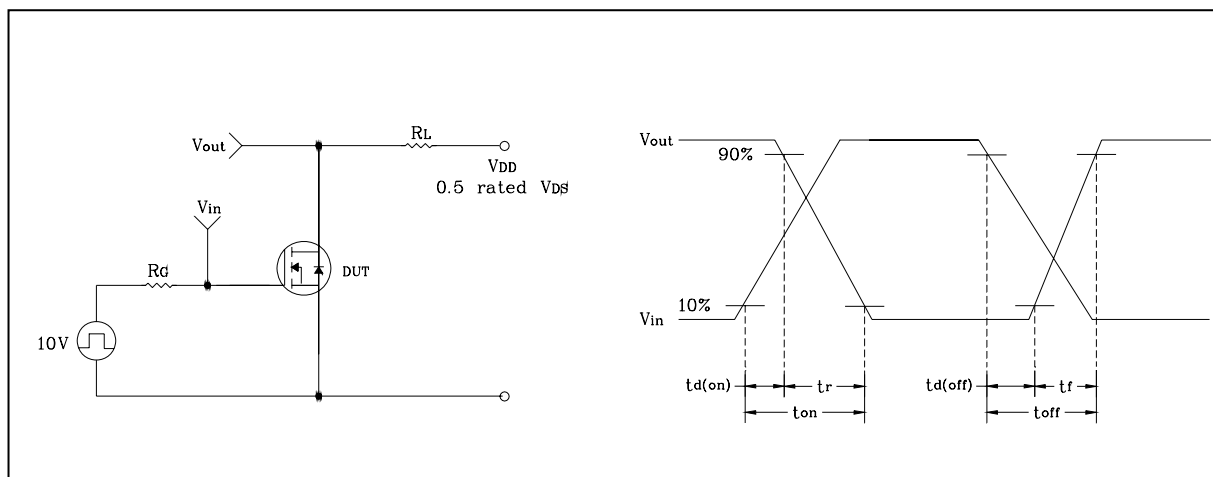


Fig. 13 E_{AS} Test Circuit & Waveform

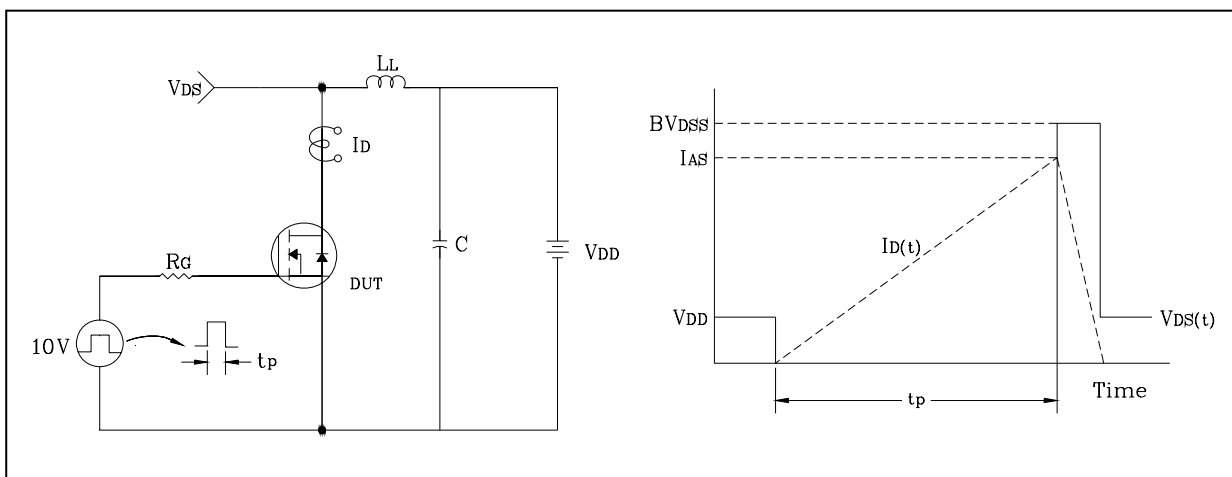
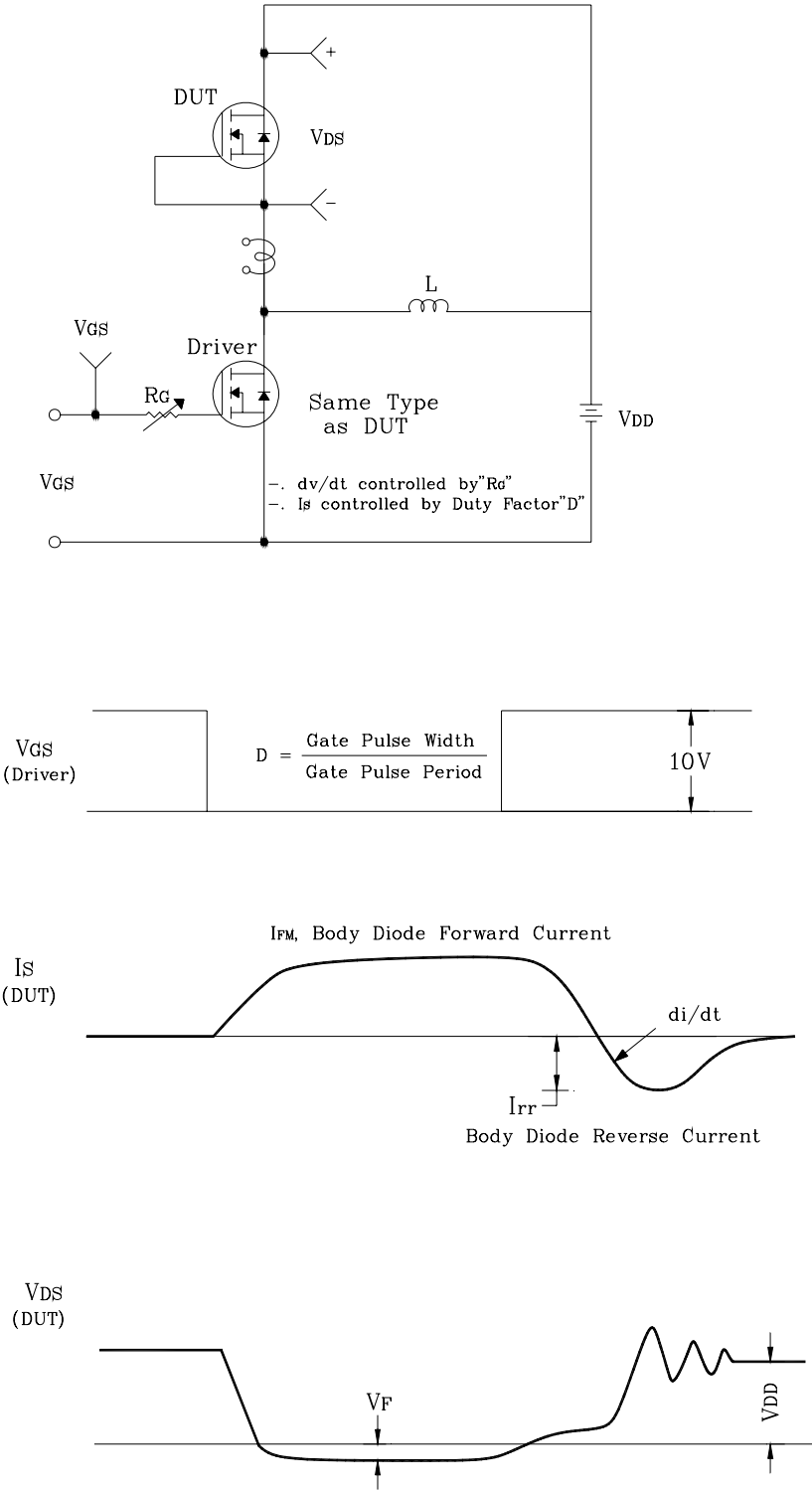
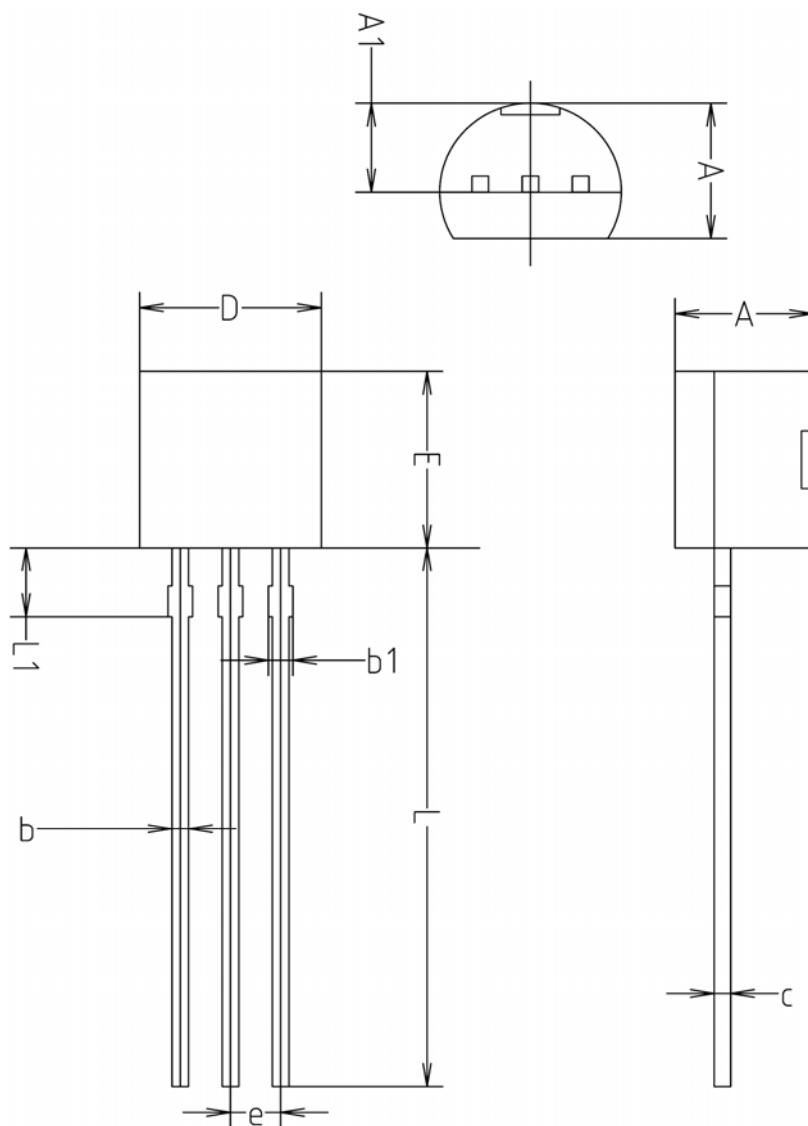


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



Outline Dimension

unit: mm



SYMBOL	MILLIMETERS(mm)		
	MINIMUM	NOMINAL	MAXIMUM
A	3.40	3.50	3.66
A1	2.46	2.51	2.59
b	0.39	0.44	0.53
b1	0.39	—	0.63
c	0.35	0.42	0.47
D	4.48	4.60	4.70
E	4.48	4.60	4.70
e	1.17	1.27	1.37
L	13.70	14.00	14.77
L1	1.55	1.70	2.15

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