

SWITCHING REGULATOR APPLICATIONS

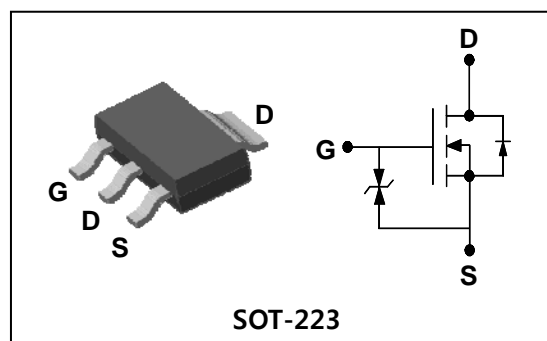
Features

- High Voltage : $BV_{DSS}=300V(\text{Min.})$
- Low C_{RSS} : $C_{RSS}=3.2pF(\text{Typ.})$
- Low gate charge : $Q_g=2.9nC(\text{Typ.})$
- Low $R_{DS(on)}$: $R_{DS(on)}=8\Omega(\text{Max.})$

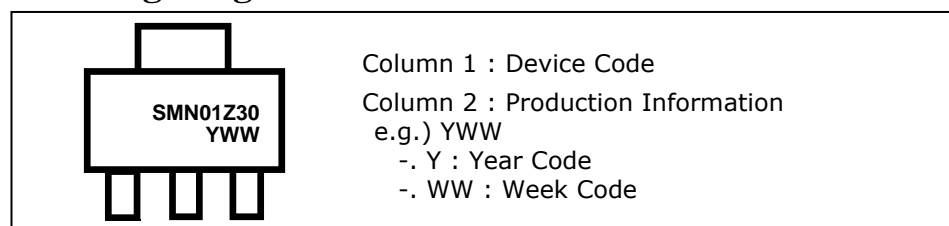
Ordering Information

Type No.	Marking	Package Code
SMN01Z30Q	SMN01Z30	SOT-223

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}	300	V	
Gate-source voltage	V_{GSS}	± 20	V	
Drain current (DC) *	I_D	$T_C=25^\circ\text{C}$	1.3	A
		$T_C=100^\circ\text{C}$	0.78	A
Drain current (Pulsed) *	I_{DM}	5.2	A	
Power dissipation	P_D	2.1	W	
Avalanche current (Single) ②	I_{AS}	1.3	A	
Single pulsed avalanche energy ②	E_{AS}	182.6	mJ	
Avalanche current (Repetitive) ①	I_{AR}	1.3	A	
Repetitive avalanche energy ①	E_{AR}	0.2	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	$R_{th(J-A)}$	-	60	$^\circ\text{C/W}$

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} =0V	300	-	-	V
Gate threshold voltage	V _{GS(th)}	I _D =250μA, V _{DS} =V _{GS}	1.5	2.0	2.5	V
Drain-source cut-off current	I _{DSS}	V _{DS} =300V, V _{GS} =0V	-	-	1	μA
Gate leakage current	I _{GSS}	V _{DS} =0V, V _{GS} =±15V	-	-	±10	μA
Drain-source on-resistance ④	R _{DS(on)}	V _{GS} =10V, I _D =650mA	-	6.9	8	Ω
Forward transfer conductance ④	g _{fs}	V _{DS} =10V, I _D =650mA	-	0.4	-	S
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =25V f=1 MHz	-	101	130	pF
Output capacitance	C _{oss}		-	15	20	
Reverse transfer capacitance	C _{rss}		-	3.2	5.0	
Turn-on delay time	t _{d(on)}	V _{DD} =150V, I _D =1.3A R _G =25Ω	-	5	20	ns
Rise time	t _r		-	17	44	
Turn-off delay time	t _{d(off)}		-	21	52	
Fall time	t _f		-	35	80	
Total gate charge	Q _g	V _{DS} =240V, V _{GS} =10V I _D =1.3A	-	2.9	4.5	nC
Gate-source charge	Q _{gs}		-	0.4	-	
Gate-drain charge	Q _{gd}		-	0.7	-	

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	-	-	1.3	A
Source current (Pulsed) ①	I _{SM}		-	-	5.2	
Forward voltage ④	V _{SD}	V _{GS} =0V, I _S =1.3A	-	-	1.4	V
Reverse recovery time	t _{rr}	I _S =1.3A, V _{GS} =0V dI _F /dt=100A/μs	-	270	-	ns
Reverse recovery charge	Q _{rr}		-	0.27	-	μC

Gate to Source Zener Diode (T_C=25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Gate-Source Breakdown Voltage	±BV _{GSO}	I _G =±1mA, V _{DS} =0V	±20	±24	-	V

Note ;

- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ② L=180mH, I_{AS}=1.3A, 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 $I_D - V_{DS}$

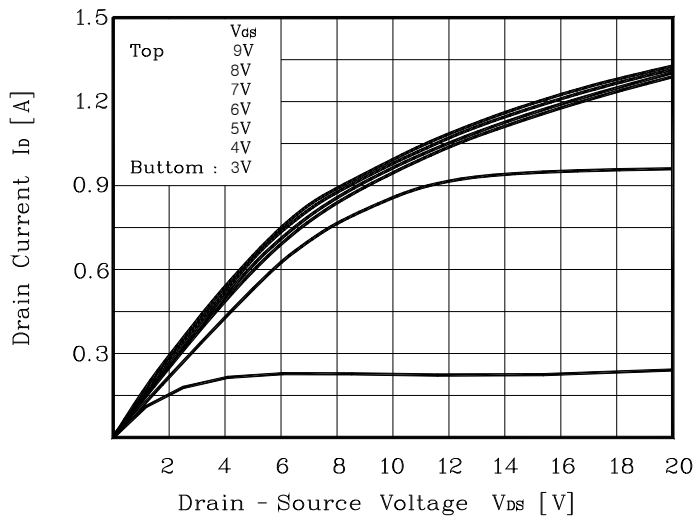


Fig. 2 $I_D - V_{GS}$

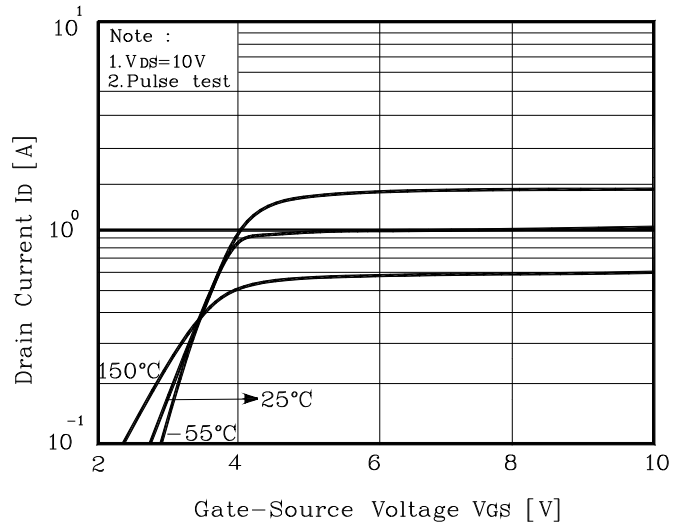


Fig. 3 $R_{DS(on)} - I_D$

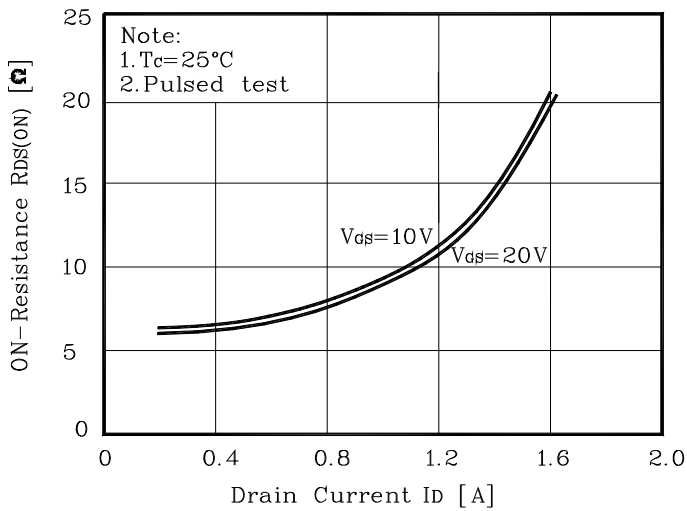


Fig. 4 $I_S - V_{SD}$

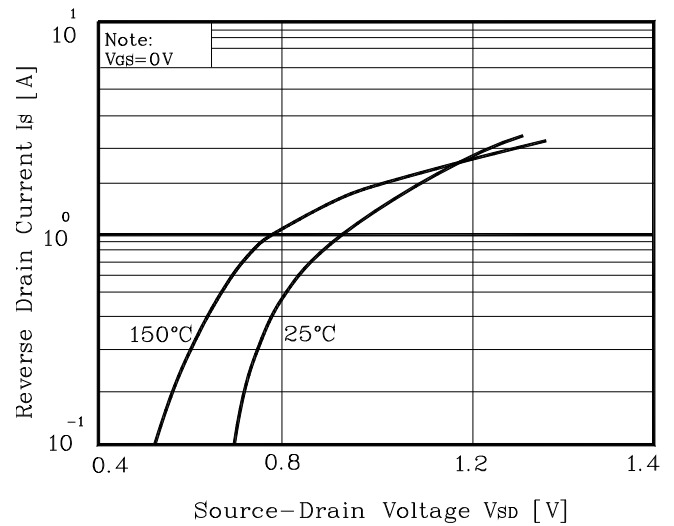


Fig. 5 Capacitance - V_{DS}

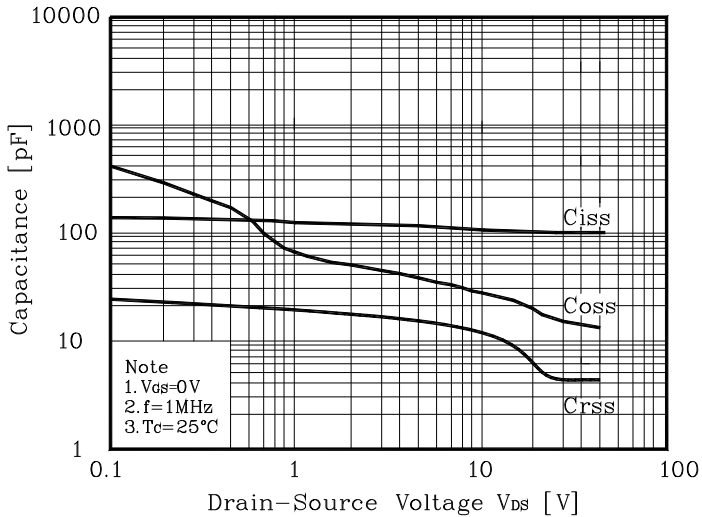
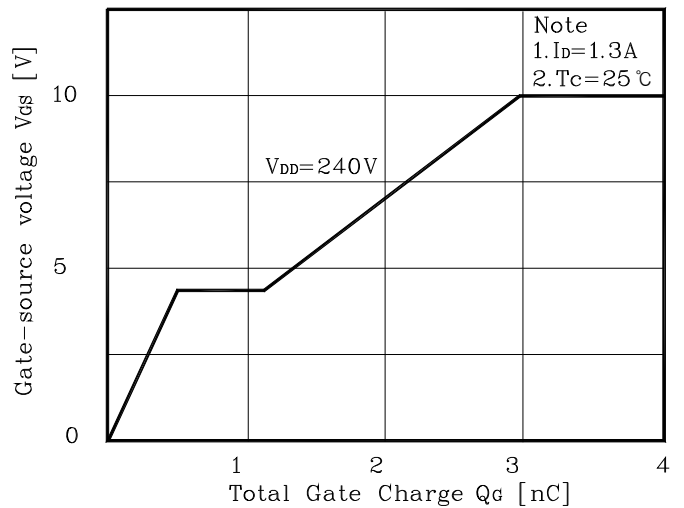


Fig. 6 $V_{GS} - Q_G$



Electrical Characteristic Curves

Fig. 7 $V_{DSS} - T_J$

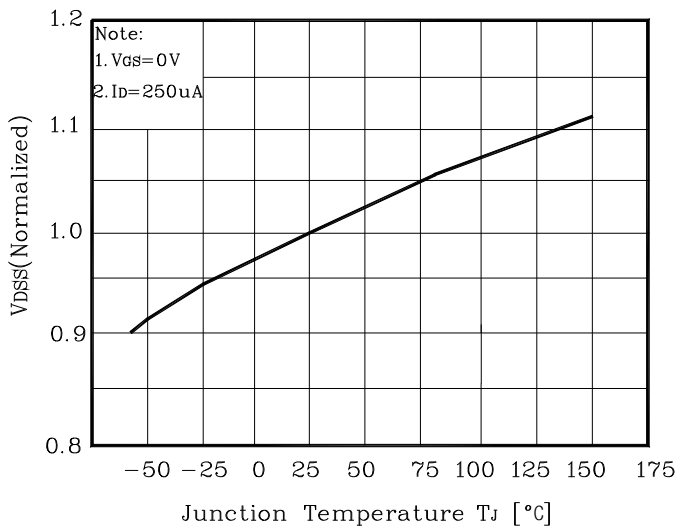


Fig. 8 $R_{DS(on)} - T_J$

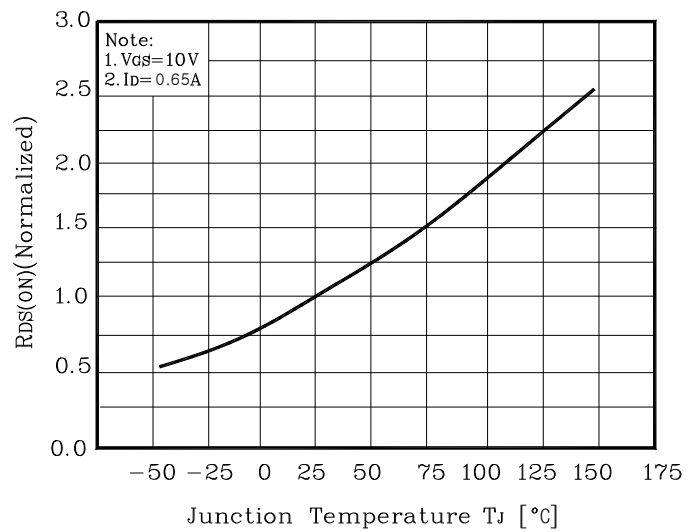


Fig. 9 $I_D - T_C$

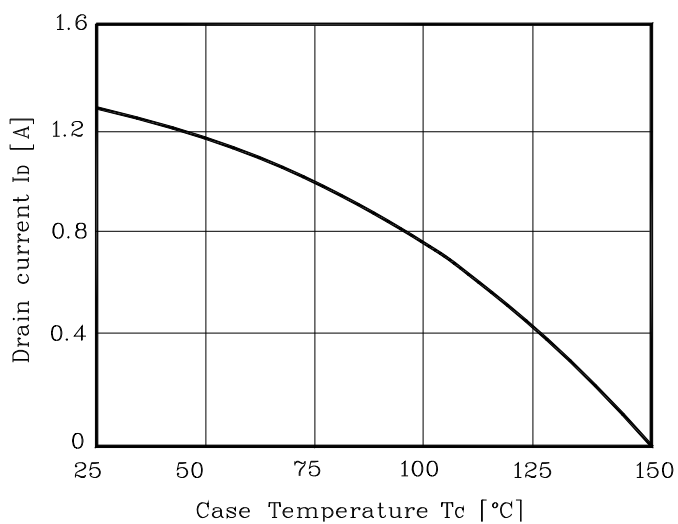


Fig. 10 Safe Operating Area

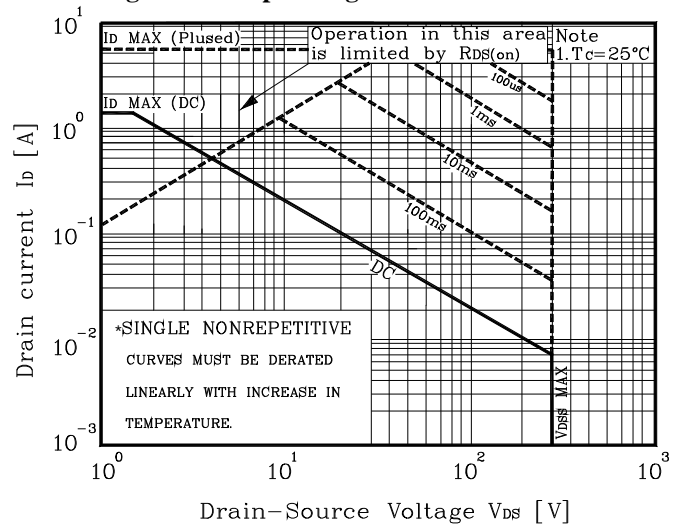


Fig. 11 Gate Charge Test Circuit & Waveform

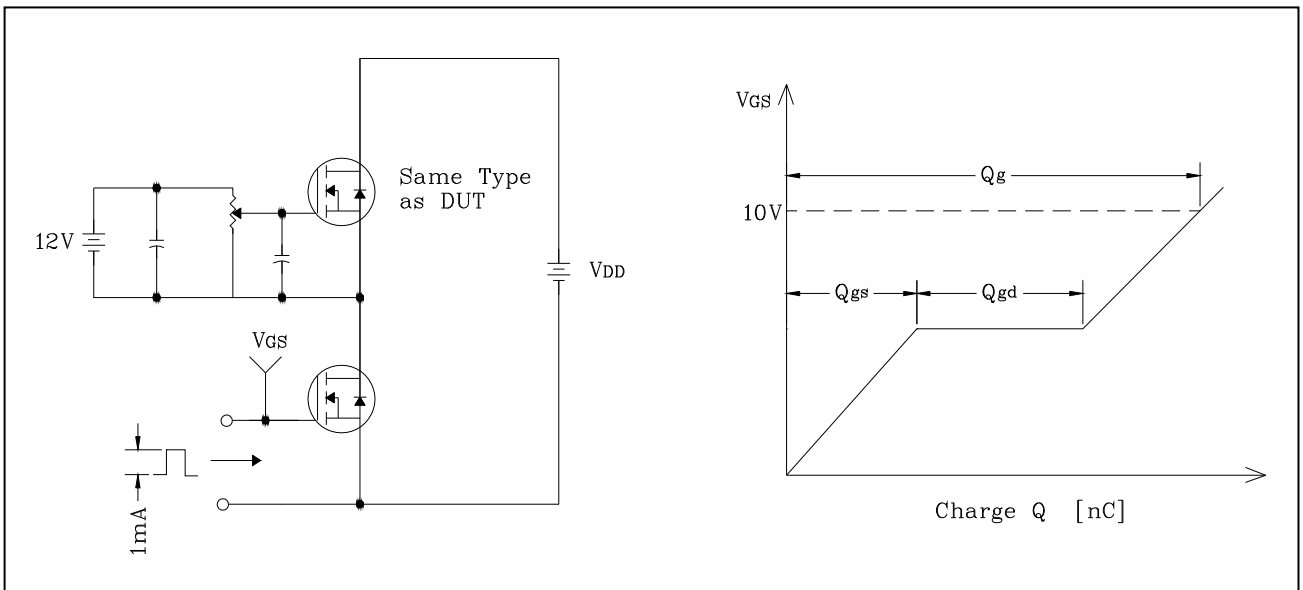


Fig. 12 Switching Time Test Circuit & Waveform

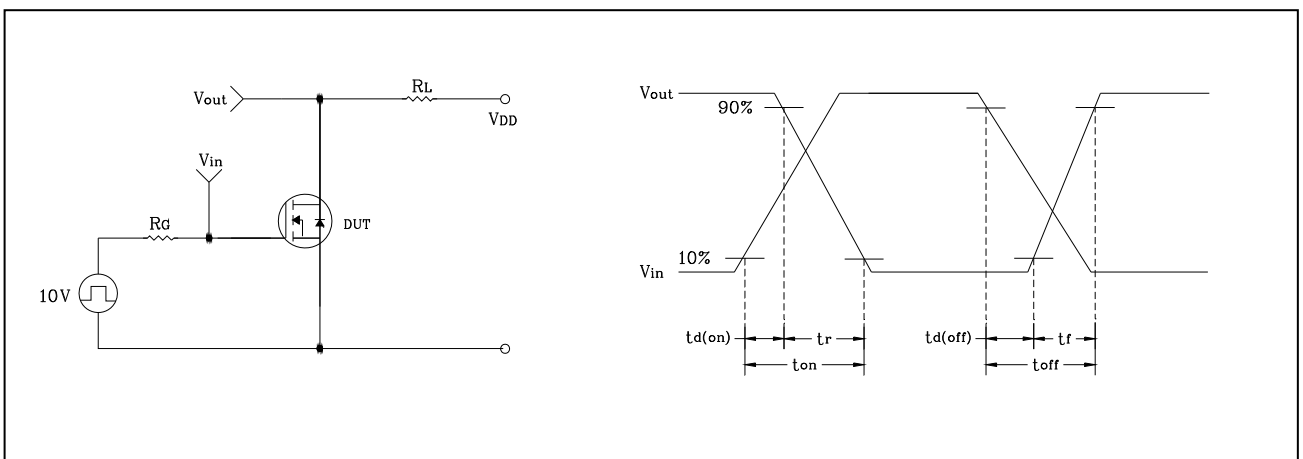


Fig. 13 E_{AS} Test Circuit & Waveform

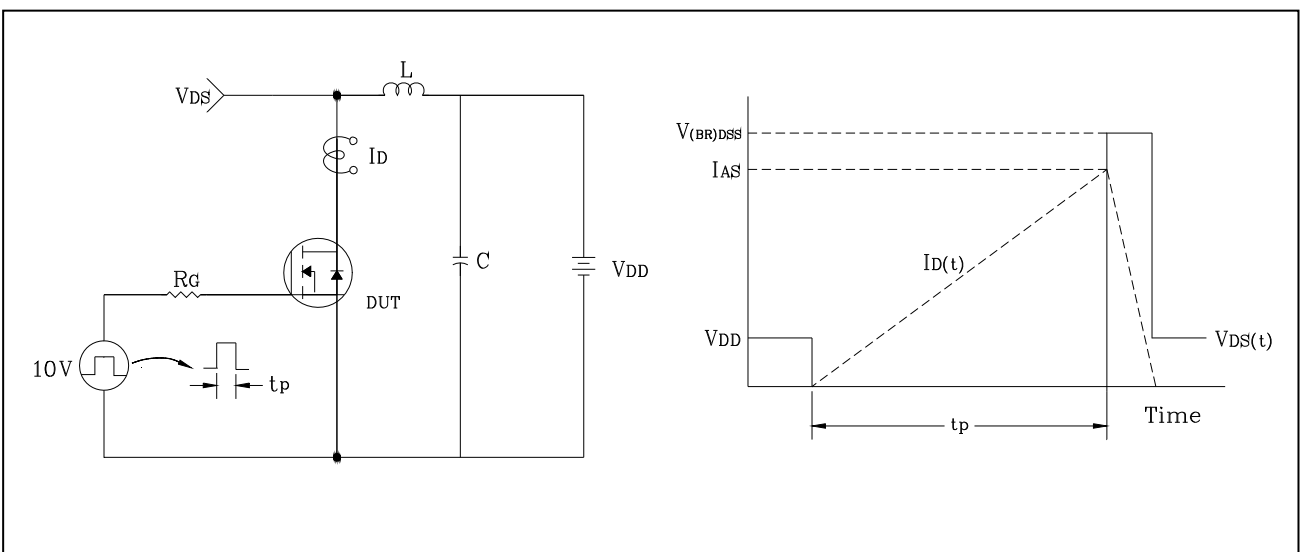
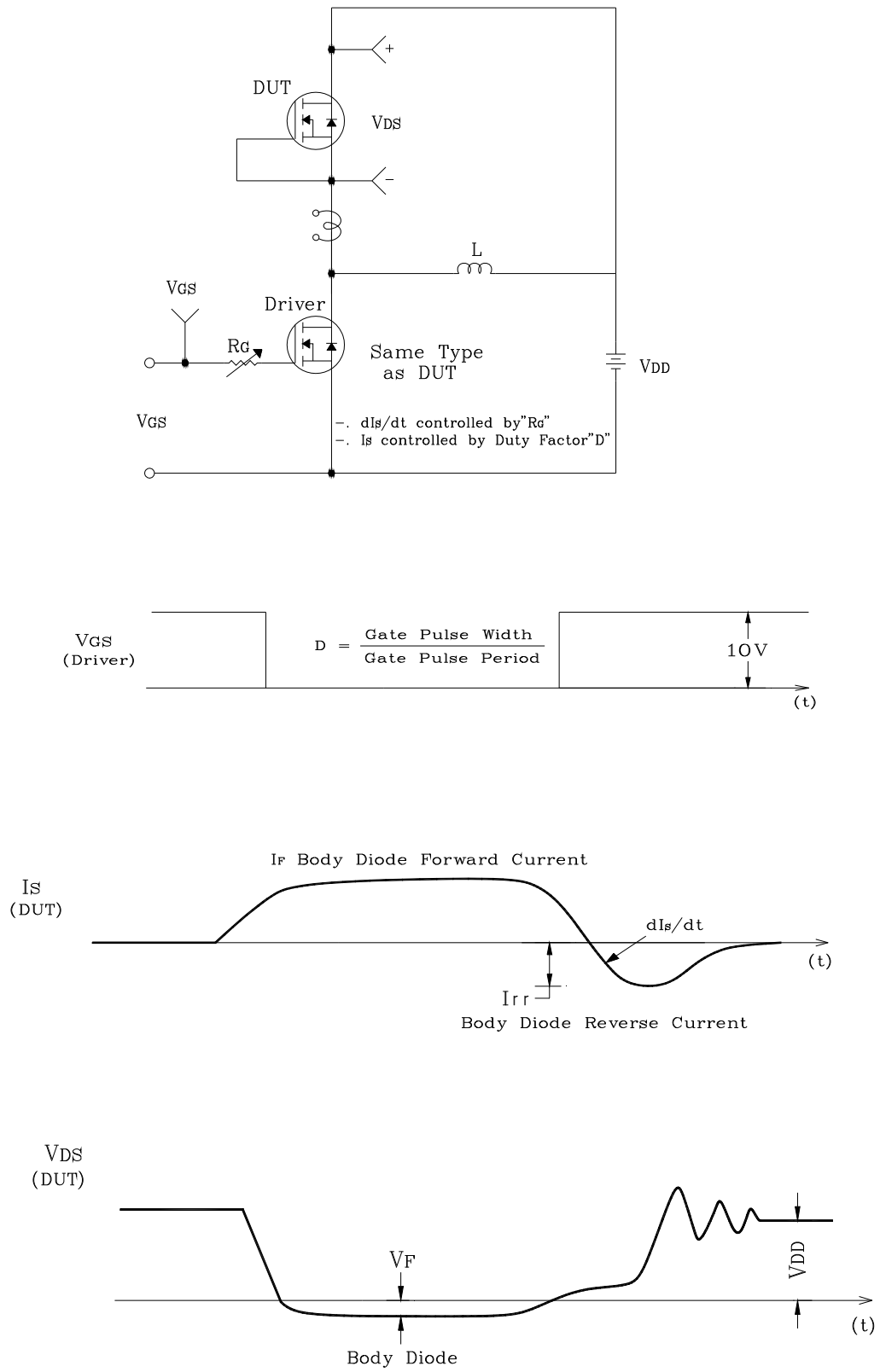
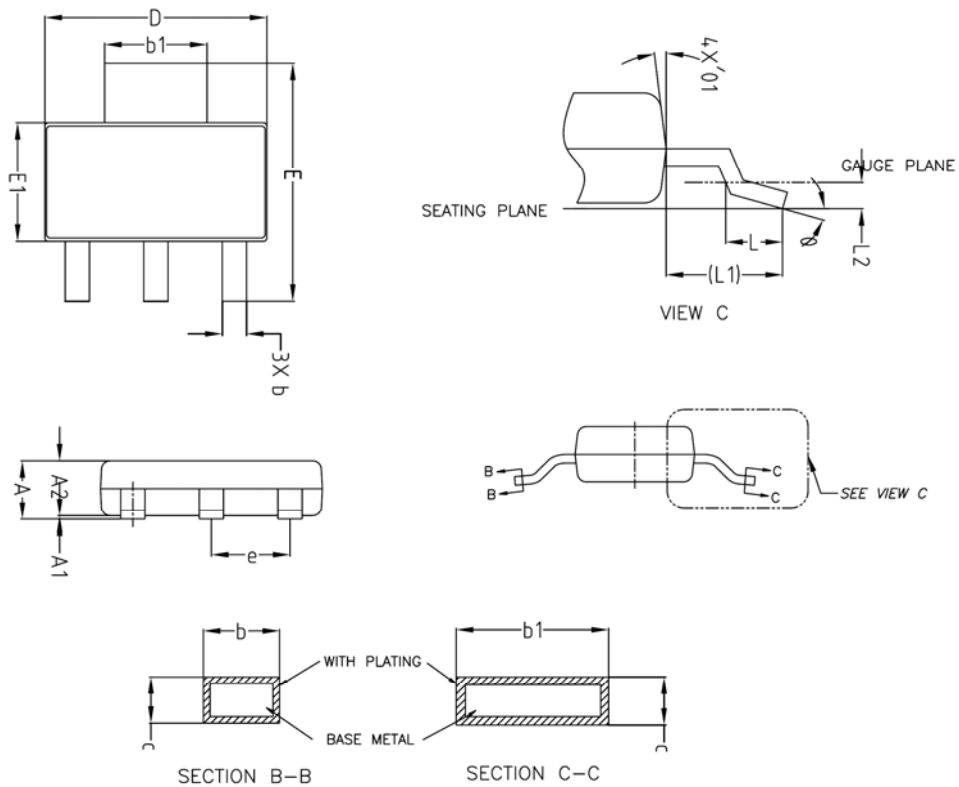


Fig. 14 Peak Diode Recovery dv/dt Test Circuit & Waveform



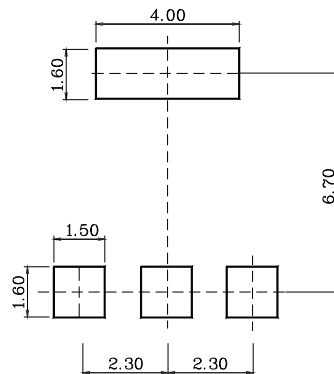
Outline Dimension

unit : mm



SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	—	—	1.80	
A1	0.00	—	0.10	
A2	1.60	1.65	1.70	
b	0.68	—	0.76	
b1	2.95	—	3.07	
c	0.23	—	0.28	
D	6.40	6.50	6.60	
E	6.80	7.00	7.20	
E1	3.40	3.50	3.60	
e	2.30 BSC			
L	0.45	—	0.65	
L1	1.75 REF			
L2	0.10 BSC			
θ	0°	—	10°	
θ1	5°	—	10°	

※ Recommended Land Pattern [unit: mm]



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