SUF2001

Dual N and P-channel Trench MOSFET

Portable Equipment Application.
Notebook Application.
Features

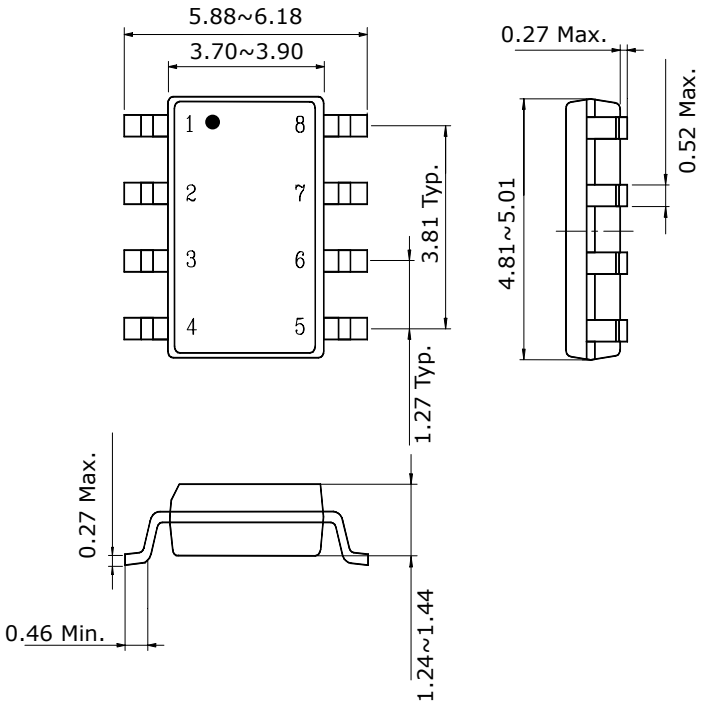
- Low $V_{GS(th)}$: $V_{GS(th)}$=1.0~3.0V
- Small footprint due to small package
- Low $R_{DS\ (ON)}$: Low $R_{DS(ON)}$=N-ch:24mΩ , P-ch:66mΩ

Ordering Information

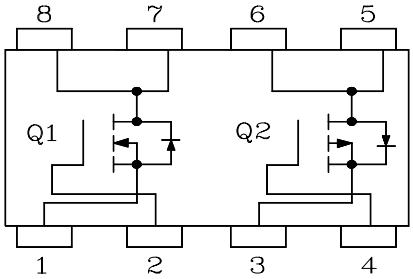
Type NO.	Marking	Package Code
SUF2001	SUF2001	SOP-8

Outline Dimensions

unit : mm



Block Diagram



PIN Connections

1. Source 1
2. Gate 1
3. Source 2
4. Gate 2
5. Drain 2
6. Drain 2
7. Drain 1
8. Drain 1

Absolute maximum ratings (Ta=25°C)

Characteristic	Symbol	Rating		Unit
		N-Ch	P-Ch	
Drain-source voltage	V_{DSS}	30	-30	V
Gate-source voltage	V_{GSS}	±20		V
Drain current (DC)	I_D	5.8	-5.3	A
Drain current (Pulsed) *	I_{DP}	23.2	-21.2	A
Total Power dissipation **	P_D	2.0		W
Avalanche current (Single)	I_{AS}	②5.8	⑥-5.3	A
Single pulsed avalanche energy	E_{AS}	②72	⑥33	mJ
Avalanche current (Repetitive) ①	I_{AR}	5.8	-5.3	A
Repetitive avalanche energy ①	E_{AR}	3.4	1.6	mJ
Junction temperature	T_J	150		°C
Storage temperature range	T_{stg}	-55~150		

* Limited by maximum junction temperature

** Device mounted on a glass-epoxy board

Characteristic		Symbol	Typ.	Max	Unit
Thermal resistance	Junction-ambient	$R_{th(J-a)}$	62.5	-	℃/W

N-CH Electrical Characteristics (Ta=25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	I_D=250μA, V_{GS}=0	30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D=250μA, V_{DS}= V_{GS}	1.0	-	3.0	V
Drain-source cut-off current	I_{DSS}	V_{DS}=30V, V_{GS}=0V	-	-	1	μA
Gate leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
Drain-source on-resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=2.9A	-	24	30	mΩ
		V_{GS}=5.0V, I_D=2.9A	-	28	34	mΩ
Forward transfer conductance ④	g_{fs}	V_{DS}=5V, I_D=5.8A	-	12	-	S
Input capacitance	Ciss	V_{GS}=0V, V_{DD}=10V, f=1MHz	-	370	560	pF
Output capacitance	Coss		-	60	90	
Reverse transfer capacitance	Crss		-	36	54	
Turn-on delay time	$t_{d(on)}$	V_{DD}=15V, I_D=5.8A R_G=10Ω ③④	-	1.2	-	ns
Rise time	t_r		-	1.1	-	
Turn-off delay time	$t_{d(off)}$		-	2.5	-	
Fall time	t_f		-	1.1	-	
Total gate charge	Q_g	V_{DD}=15V, V_{GS}=5V I_D=5.8A ③④	-	4.2	6.3	nC
Gate-source charge	Q_{gs}		-	0.9	1.4	
Gate-drain charge	Q_{gd}		-	1.4	2.1	

Source-Drain Diode Ratings and Characteristics (Ta=25°C)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Source current	I_S	Integral reverse diode in the MOSFET	-	-	1.5	A
Source current(Plused) ①	I_{SM}		-	-	6.0	
Forward voltage ④	V_{SD}	V_{GS}=0V, I_S=1.5A	-	-	1.2	V
Reverse recovery time	t_{rr}	I_s=1.5A di_S/dt=100A/us	-	90	-	ns
Reverse recovery charge	Q_{rr}		-	0.5	-	uC

Note ;

① Repetitive Rating : Pulse width limited by maximum junction temperature

② L=3.4mH, I_{AS}=5.8A, V_{DD}=15V, R_G=25Ω

③ Pulse Test : Pulse Width < 300us, Duty cycle≤ 2%

④ Essentially independent of operating temperature

P-CH Electrical Characteristics

(Ta=25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	I_D=250μA, V_{GS}=0	-30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D=250μA, V_{DS}=V_{GS}	-1.0	-	-3.0	V
Drain-source cut-off current	I_{DSS}	V_{DS}=-30V, V_{GS}=0V	-	-	1	μA
Gate leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
Drain-source on-resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-2.7A	-	66	72	mΩ
		V_{GS}=-5.0V, I_D=-2.7A	-	77	83	mΩ
Forward transfer conductance ⑧	g_{fs}	V_{DS}=-5V, I_D=-5.3A	-	11	-	S
Input capacitance	Ciss	V_{GS}=0V, V_{DD}=-10V, f=1MHz	-	390	590	pF
Output capacitance	Coss		-	97	150	
Reverse transfer capacitance	Crss		-	37	60	
Turn-on delay time	$t_{d(on)}$	V_{DD}=-15V, I_D=-5.3A R_G=10Ω ⑦⑧	-	1.2	-	ns
Rise time	t_r		-	1.1	-	
Turn-off delay time	$t_{d(off)}$		-	2.5	-	
Fall time	t_f		-	1.1	-	
Total gate charge	Q_g	V_{DD}=-15V, V_{GS}=-5V I_D=-5.3A ⑦⑧	-	4.7	7.0	nC
Gate-source charge	Q_{gs}		-	1.4	2.1	
Gate-drain charge	Q_{gd}		-	1.7	2.5	

Source-Drain Diode Ratings and Characteristics

(Ta=25°C)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Source current	I_S	Integral reverse diode in the MOSFET	-	-	-1.5	A
Source current(Plused) ⑤	I_{SM}		-	-	-6.0	
Forward voltage ⑧	V_{SD}	V_{GS}=0V, I_S=-1.5A	-	-	-1.2	V
Reverse recovery time	t_{rr}	I_s=-1.5A di_S/dt=100A/us	-	90	-	ns
Reverse recovery charge	Q_{rr}		-	0.5	-	uC

Note ;

⑤ Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature

⑥ L=2.0mH, I_{AS}=-5.0A, V_{DD}=-15V, R_G=25Ω

⑦ Pulse Test : Pulse Width < 300us, Duty cycle≤ 2%

⑧ Essentially independent of operating temperature

N-CH Electrical Characteristic Curves

Fig. 1 I_D - V_{DS}

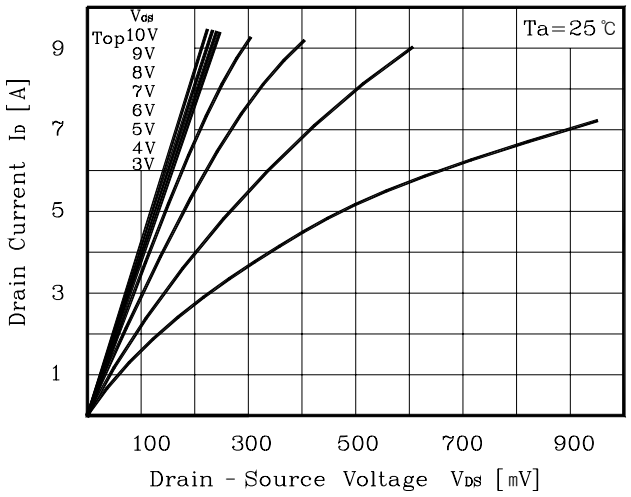


Fig. 2 I_D - V_{GS}

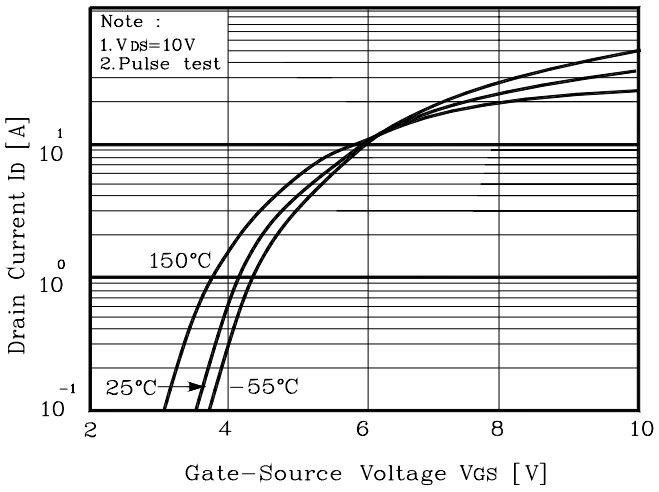


Fig. 3 $R_{DS(on)}$ - I_D

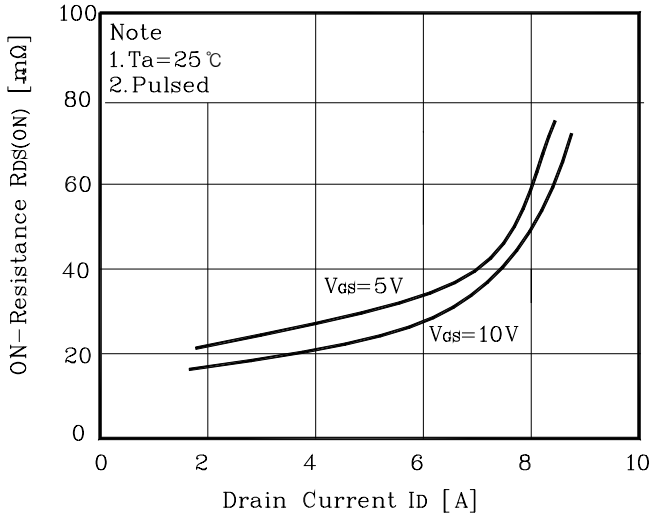


Fig. 4 I_S - V_{SD}

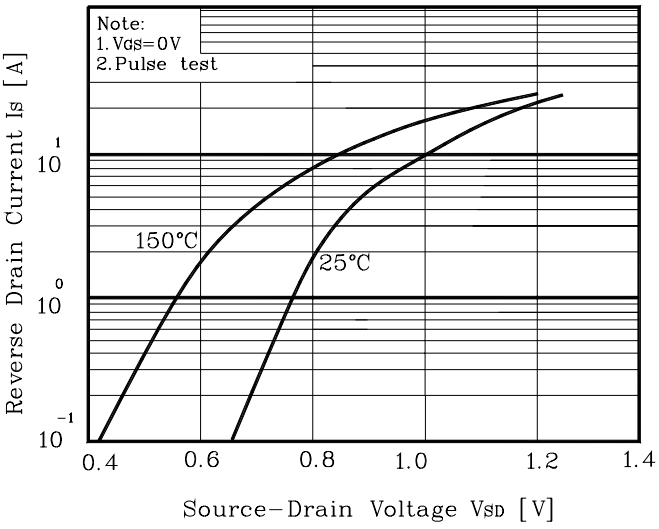


Fig. 5 Capacitance - V_{DS}

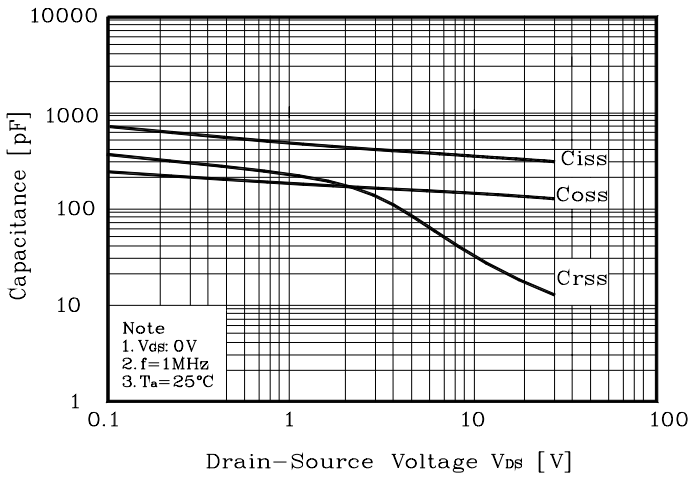


Fig. 6 V_{GS} - Q_G

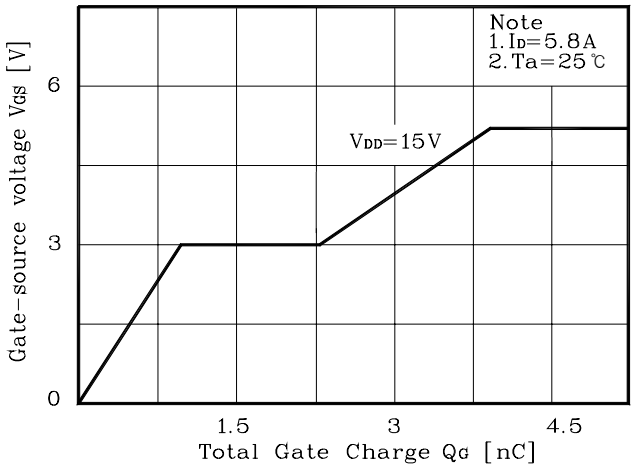


Fig. 7 V_{DSS} - T_J

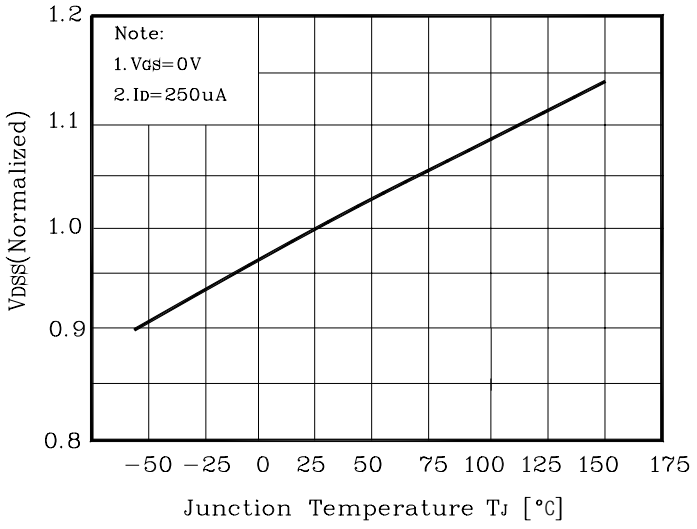


Fig. 8 $R_{DS(on)}$ - T_J

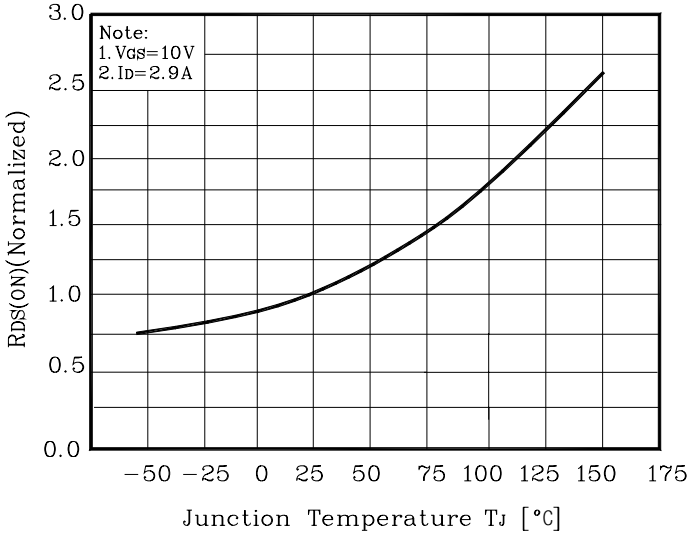


Fig. 9 I_D - T_a

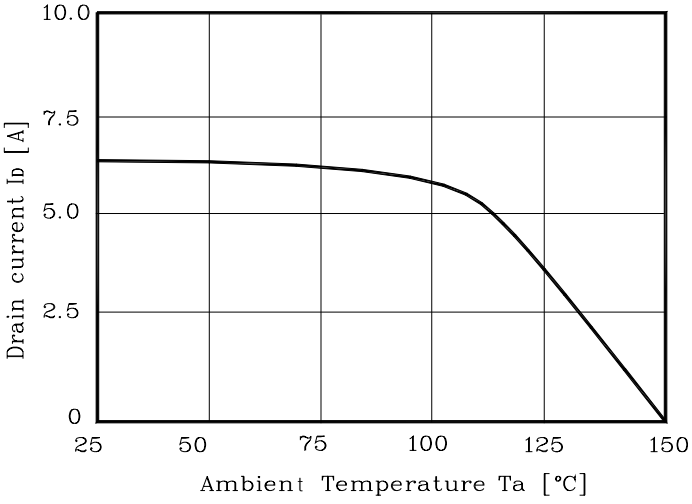


Fig. 10 Safe Operating Area

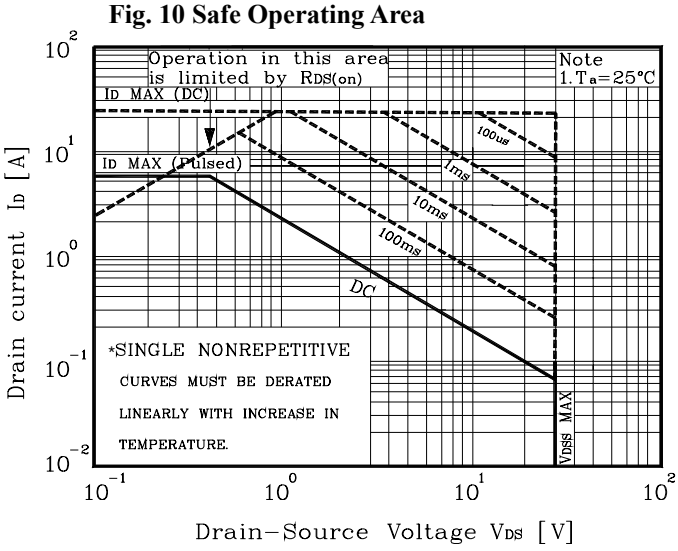


Fig. 11 Gate Charge Test Circuit & Waveform

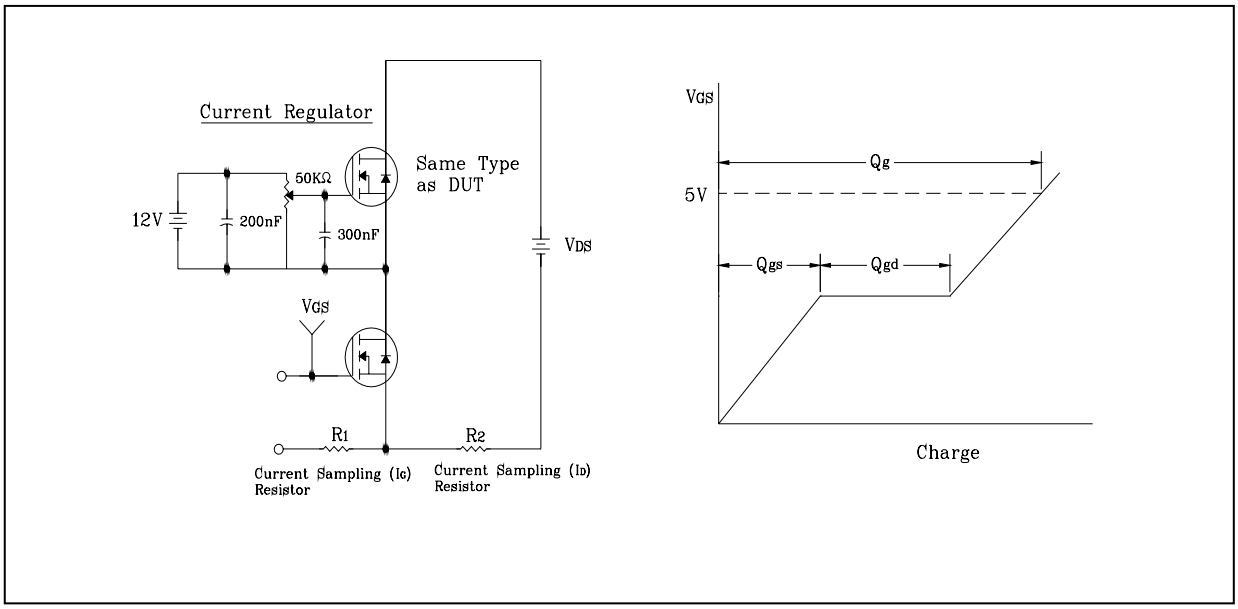


Fig. 12 Resistive Switching Test Circuit & Waveform

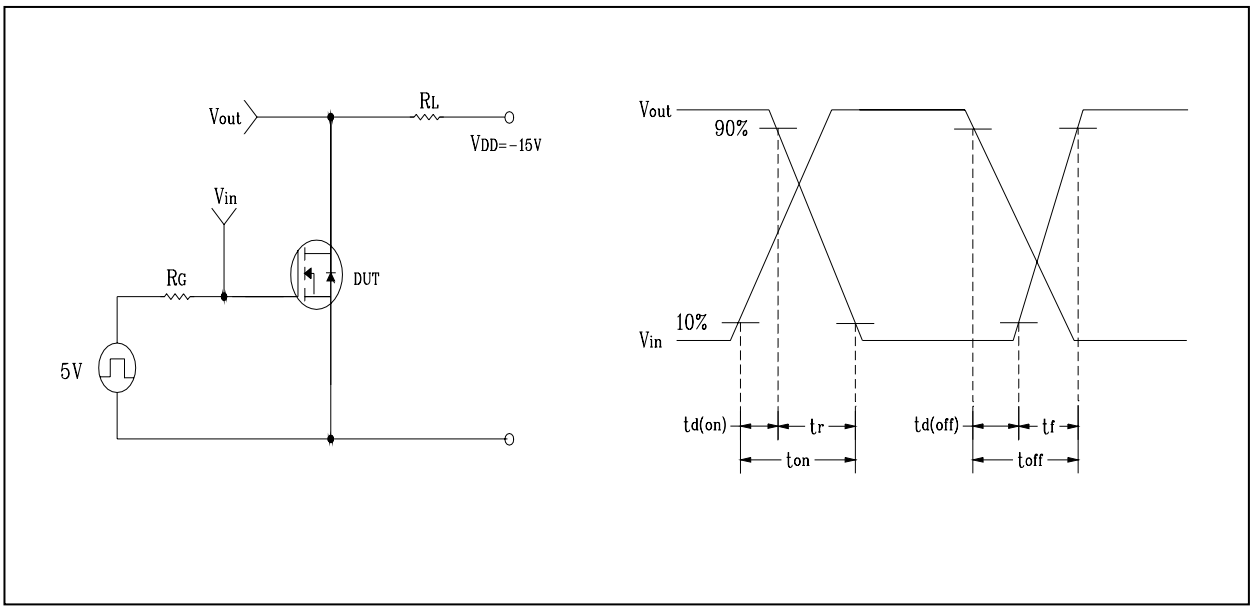


Fig. 13 E_{AS} Test Circuit & Waveform

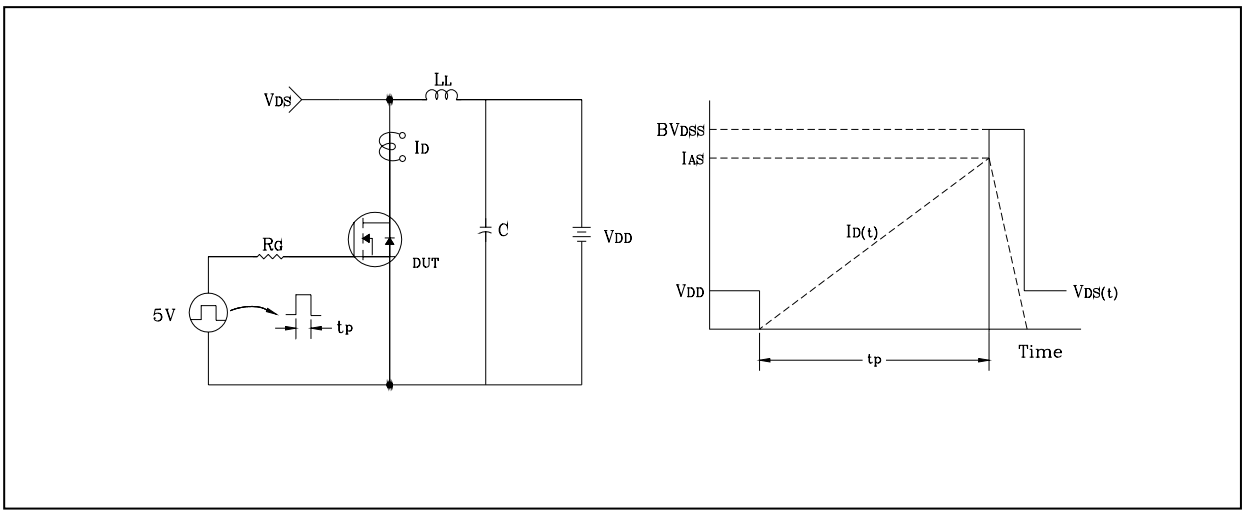
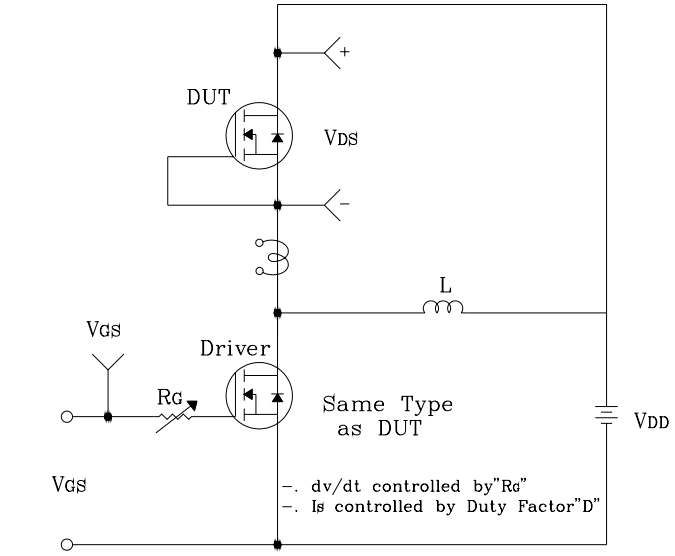
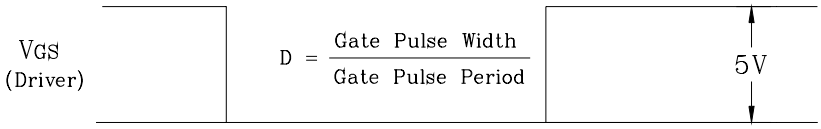
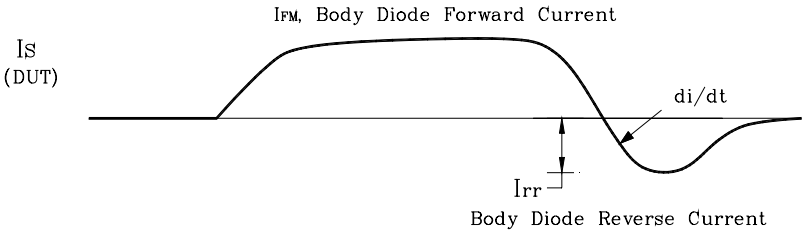
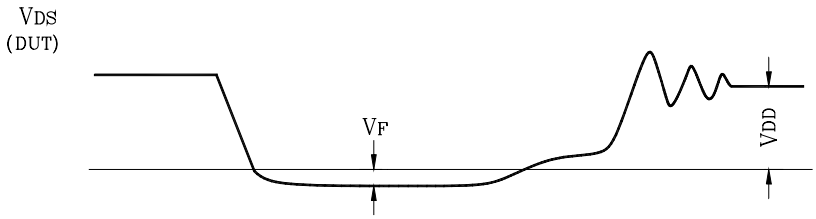


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform









P-CH Electrical Characteristic Curves

Fig. 1 I_D - V_{DS}

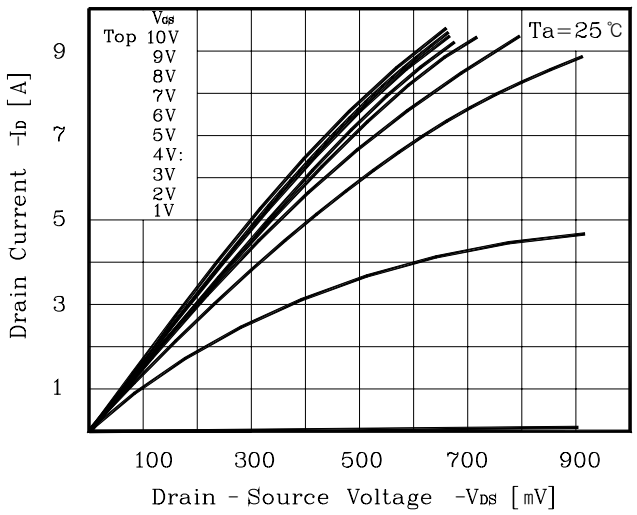


Fig. 2 I_D - V_{GS}

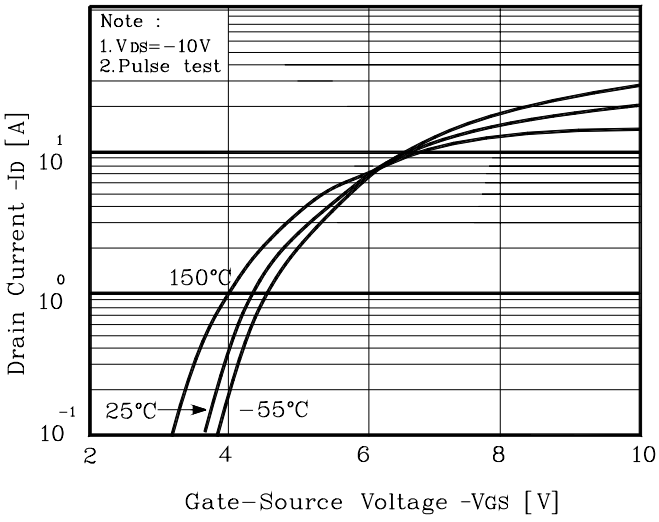


Fig. 3 $R_{DS(on)}$ - I_D

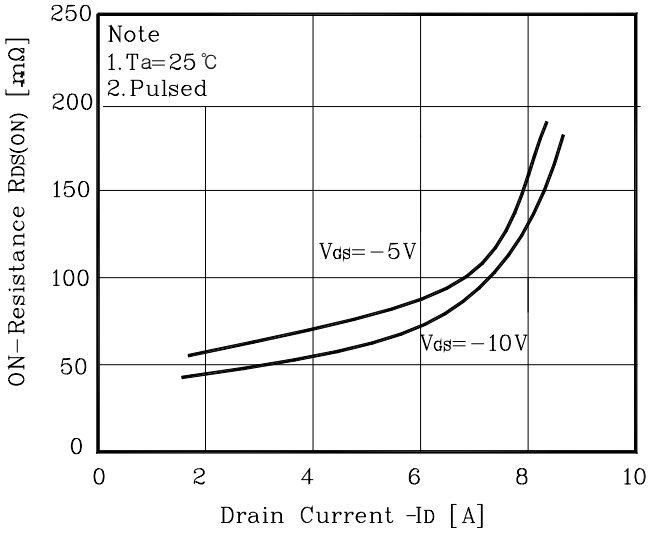


Fig. 4 I_S - V_{SD}

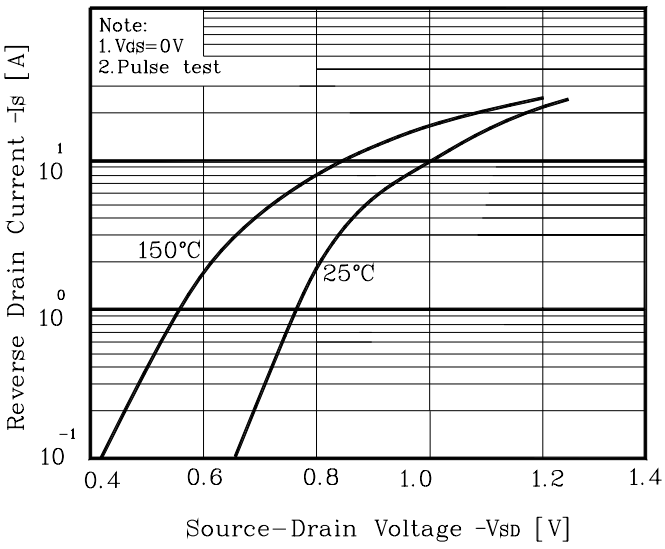


Fig. 5 Capacitance - V_{DS}

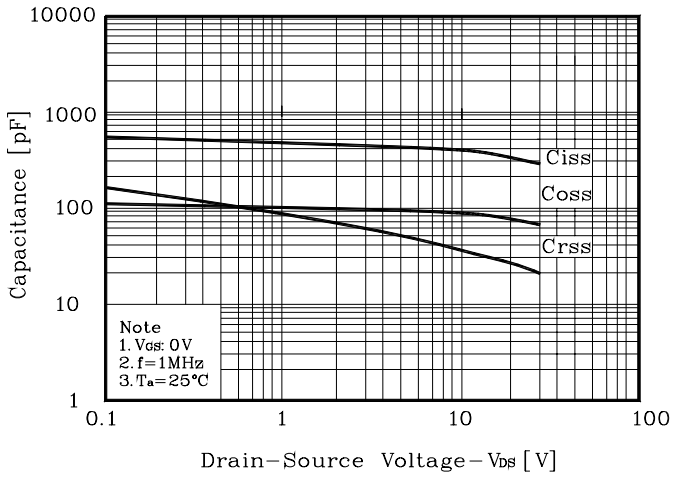


Fig. 6 V_{GS} - Q_G

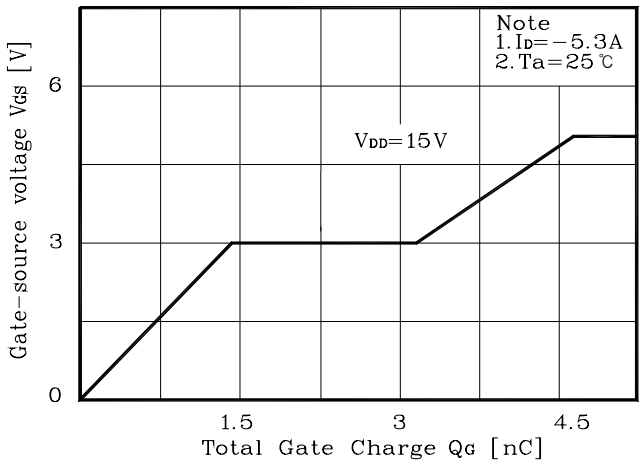


Fig. 7 V_{DSS} - T_J

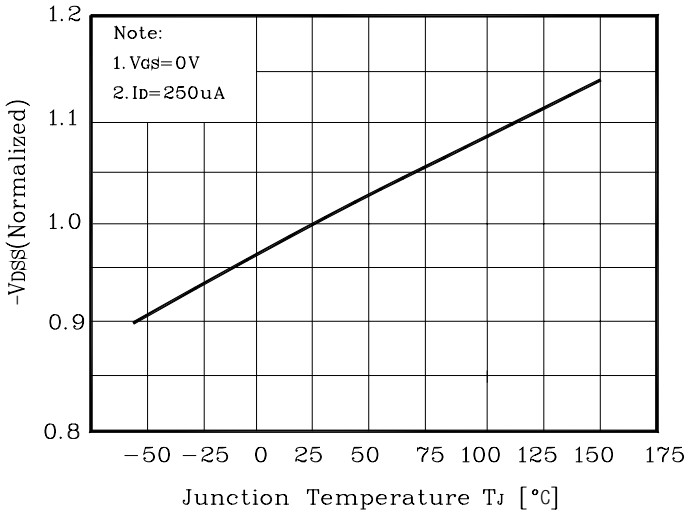


Fig. 8 $R_{DS(on)}$ - T_J

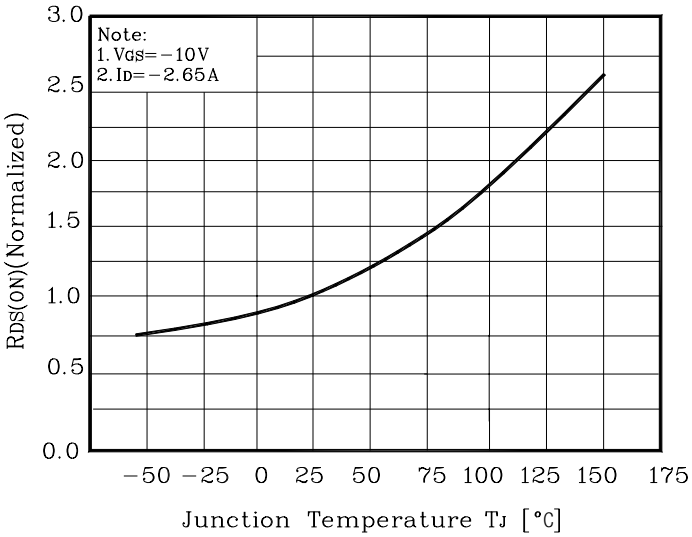


Fig. 9 I_D - T_a

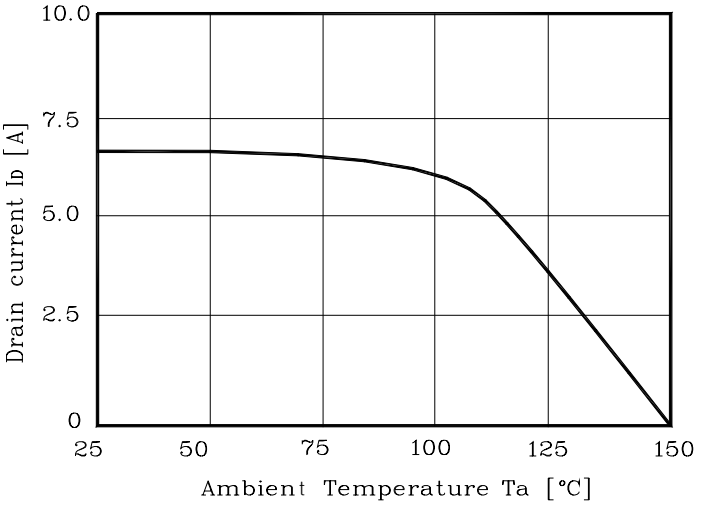


Fig. 10 Safe Operating Area

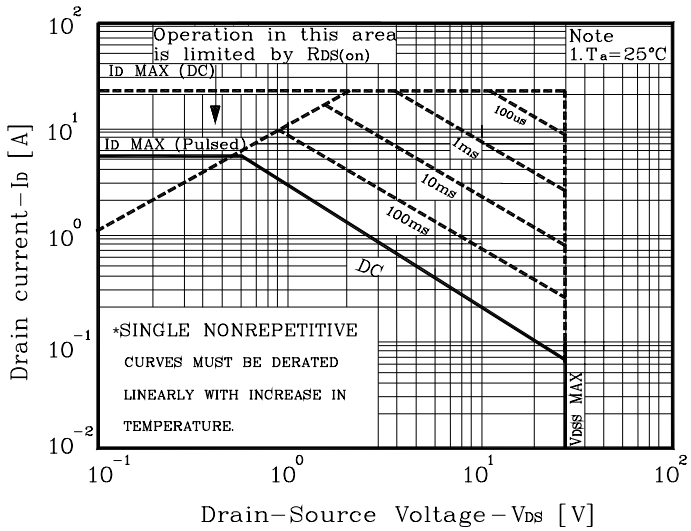


Fig. 11 Gate Charge Test Circuit & Waveform

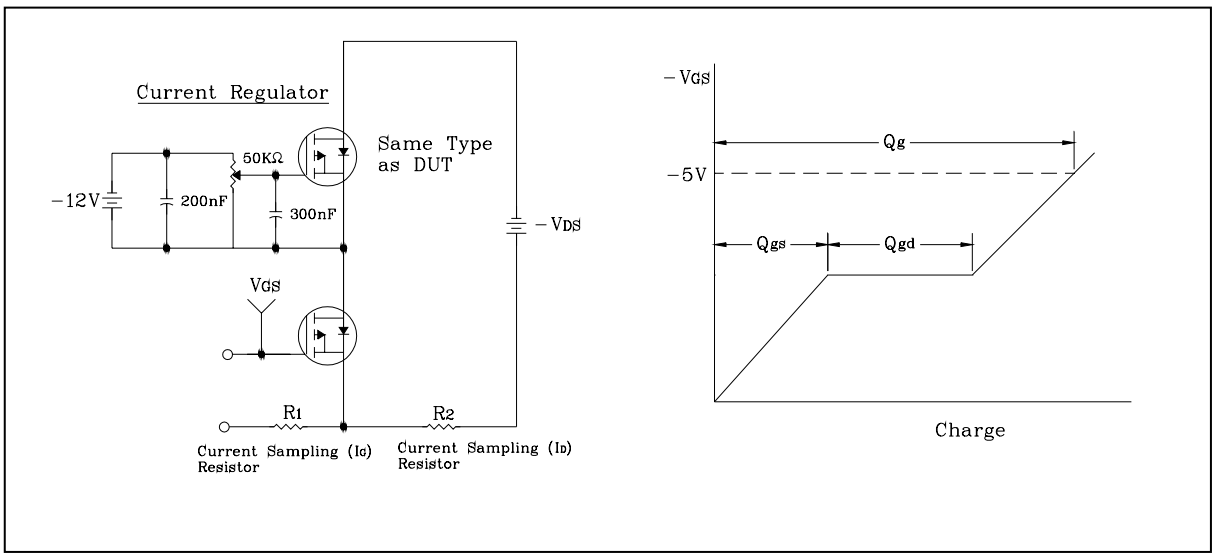


Fig. 12 Resistive Switching Test Circuit & Waveform

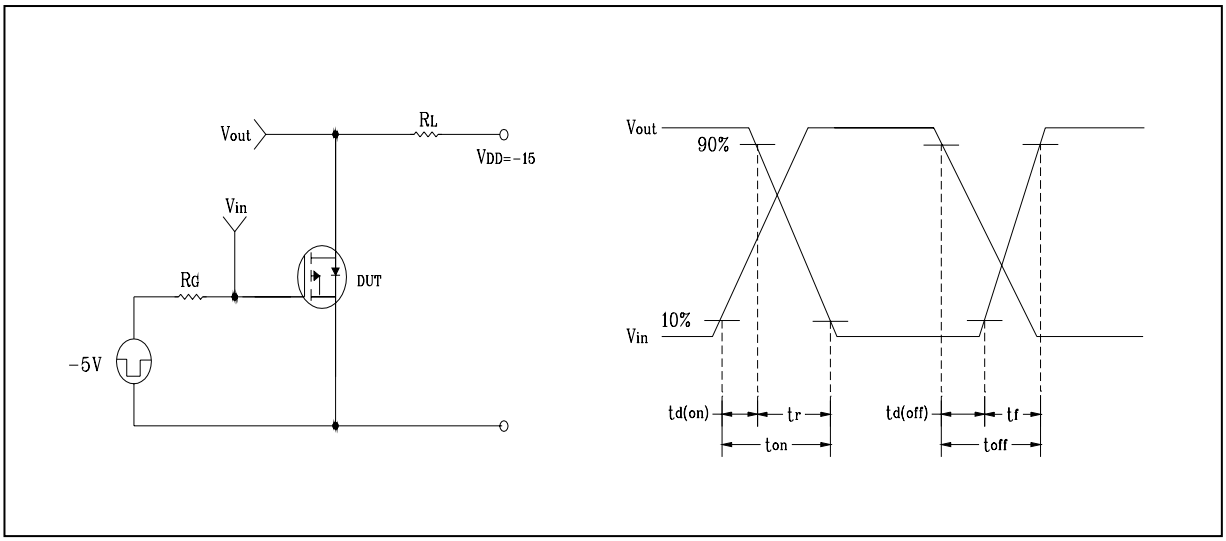


Fig. 13 E_{AS} Test Circuit & Waveform

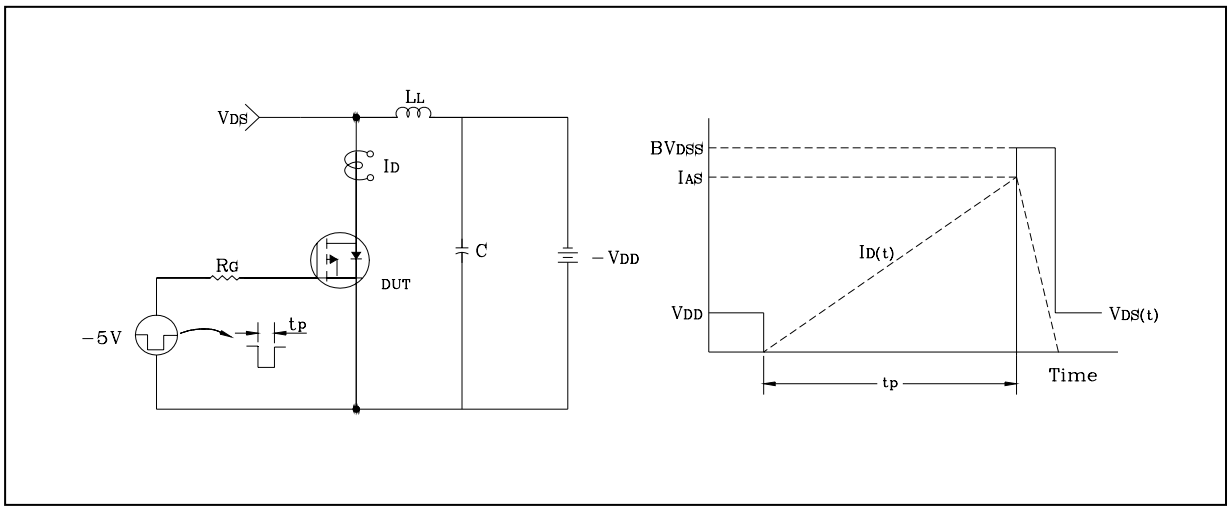
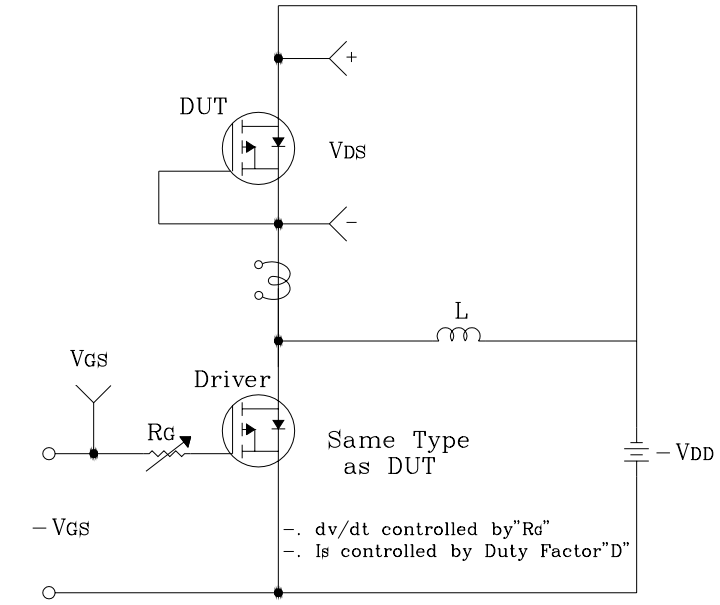
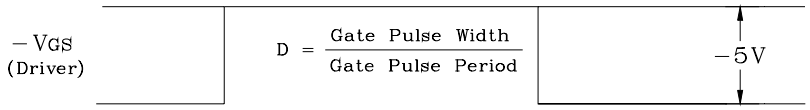
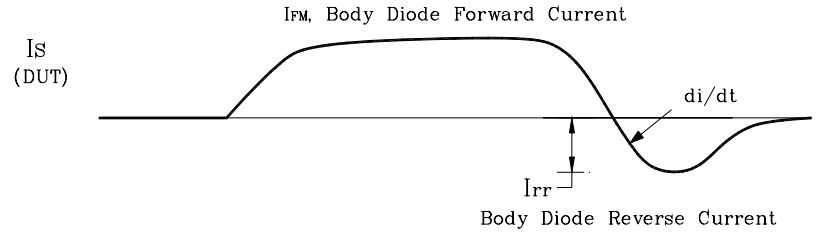
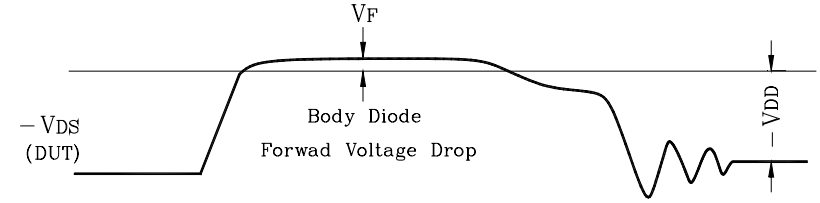


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform









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