AUK Semiconductor

STK004SF

N-channel Trench MOSFET

Portable Equipment Application.
Notebook Application.
Features

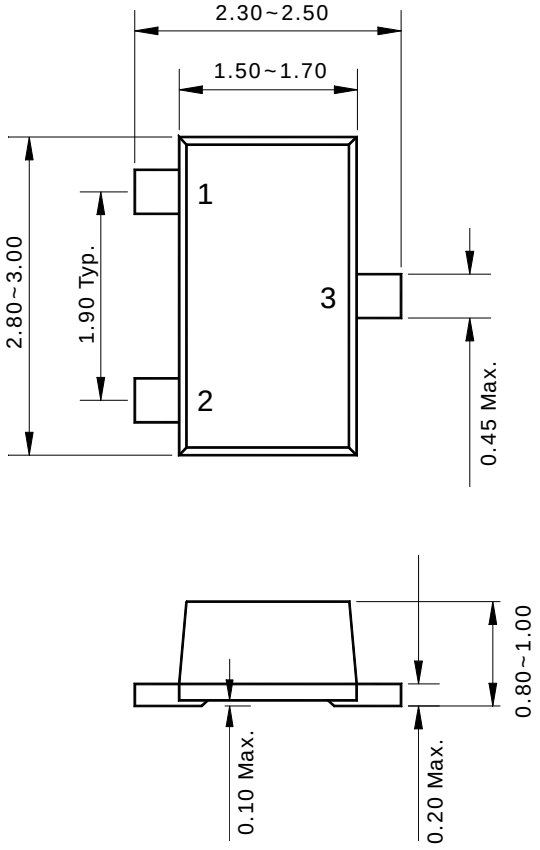
- Low $V_{GS(th)}$: $V_{GS(th)}$=0.6~1.2V
- Small footprint due to small package
- Low $R_{DS\ (ON)}$: $R_{DS\ (ON)}$= 19mΩ (Typ.)

Ordering Information

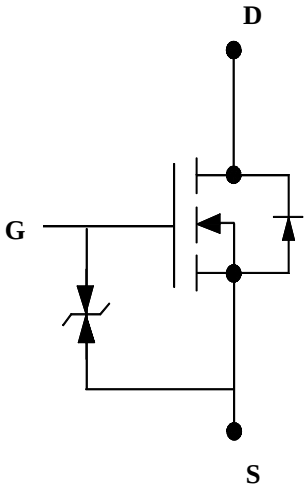
Type NO.	Marking	Package Code
STK004SF	K04	SOT-23F

Outline Dimensions

unit : mm



Block Diagram



PIN Connections

1. Gate
2. Source
3. Drain

Absolute maximum ratings (Ta=25°C)

Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	20	V
Gate-source voltage	V_{GSS}	±12	V
Drain current (DC) **	I_D	4.2	A
Drain current (Pulsed) *	I_{DP}	16.8	A
Total Power dissipation **	P_D	0.35	W
Avalanche current (Single) ②	I_{AS}	4.2	A
Single pulsed avalanche energy ②	E_{AS}	27	mJ
Avalanche current (Repetitive) ①	I_{AR}	4.2	A
Repetitive avalanche energy ①	E_{AR}	2.5	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	$R_{th(J-a)}$ **	-	357	℃/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	20	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D=250μA, V_{DS}=V_{GS}	0.6	-	1.2	V
Drain-source cut-off current	I_{DSS}	V_{DS}=20V, V_{GS}=0V	-	-	1	μA
Gate leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±12V	-	-	±10	μA
Drain-source on-resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=2.1A	-	19	40	mΩ
		V_{GS}=2.5V, I_D=2.1A	-	27	45	mΩ
Forward transfer conductance ④	g_{fs}	V_{DS}=2V, I_D=4.2A	-	22	-	S
Input capacitance	Ciss	V_{GS}=0V, V_{DS}=10V, f=1MHz	-	390	590	pF
Output capacitance	Coss		-	90	135	
Reverse transfer capacitance	Crss		-	40	60	
Turn-on delay time	$t_{d(on)}$	V_{DD}=10V, I_D=4.2A R_G=10Ω ③④	-	2.0	-	ns
Rise time	t_r		-	1.9	-	
Turn-off delay time	$t_{d(off)}$		-	2.8	-	
Fall time	t_f		-	1.9	-	
Total gate charge	Q_g	V_{DD}=10V, V_{GS}=4.5V I_D=4.2A ③④	-	4.0	6.0	nC
Gate-source charge	Q_{gs}		-	1.0	1.5	
Gate-drain charge	Q_{gd}		-	1.6	2.4	

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	-	-	0.5	A
Sourcecurrent(Plused) ①	I_{SM}		-	-	2.0	
Forward voltage ④	V_{SD}	V_{GS}=0V, I_S=0.5A	-	0.7	1.2	V
Reverse recovery time	t_{rr}	I_S=0.5A, V_{DD}=10V di_S/dt=100A/us	-	57	-	ns
Reverse recovery charge	Q_{rr}		-	240	-	uC

Note ;

① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature

② L=2.0mH, I_{AS}=4.2A, V_{DD}=10V, R_G=25Ω

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

④ Essentially independent of operating temperature

N-CH Electrical Characteristic Curves

Fig. 1 I_D - V_{DS}

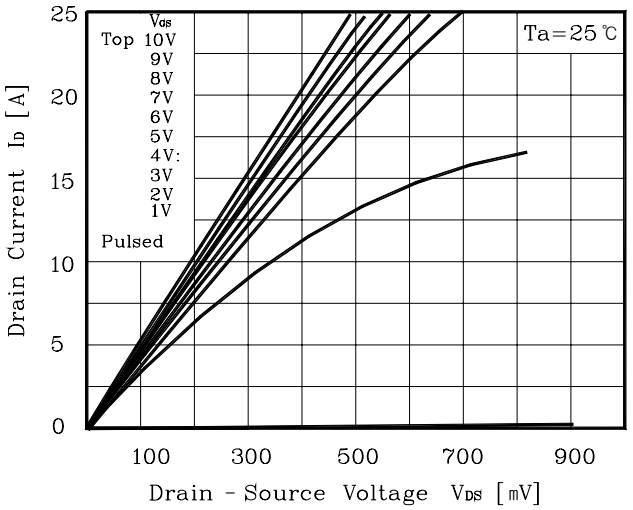


Fig. 2 I_D - V_{GS}

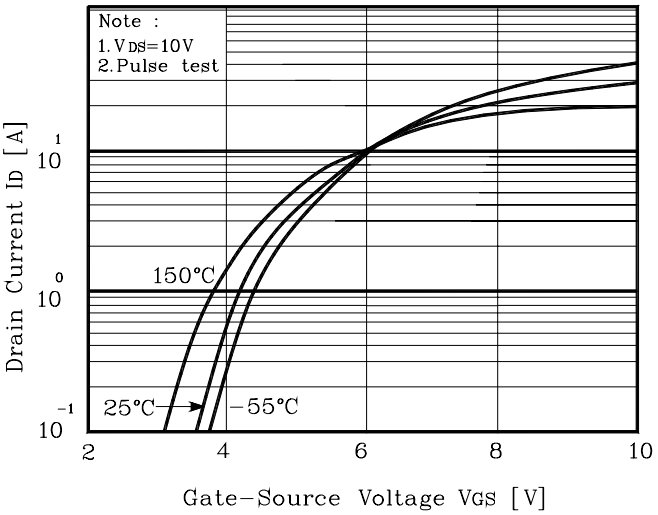


Fig. 3 $R_{DS(on)}$ - I_D

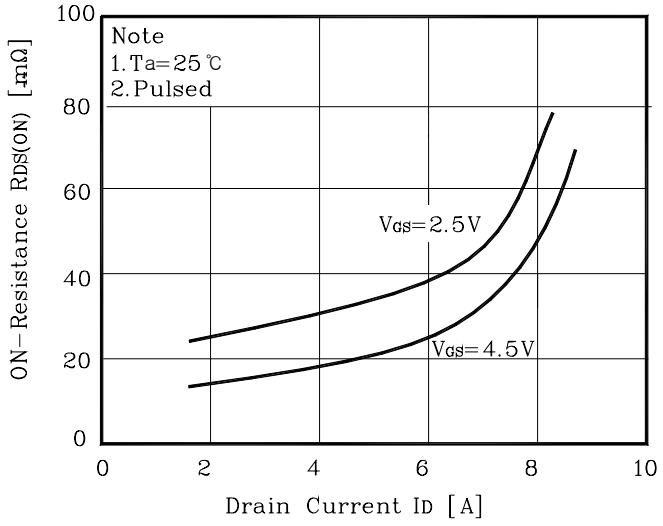


Fig. 4 I_S - V_{SD}

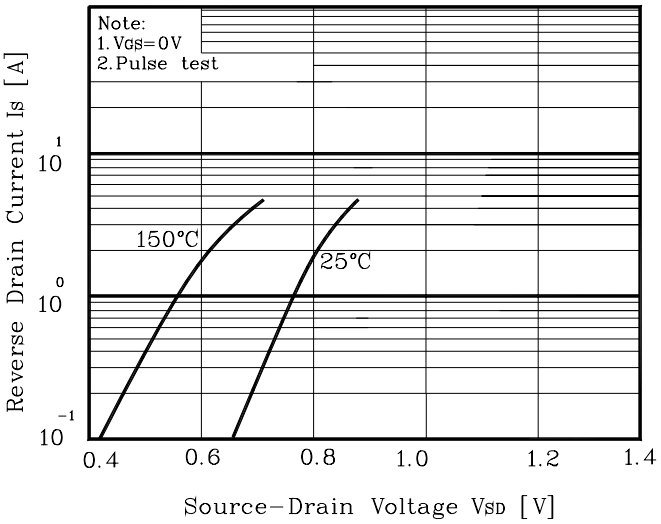


Fig. 5 Capacitance - V_{DS}

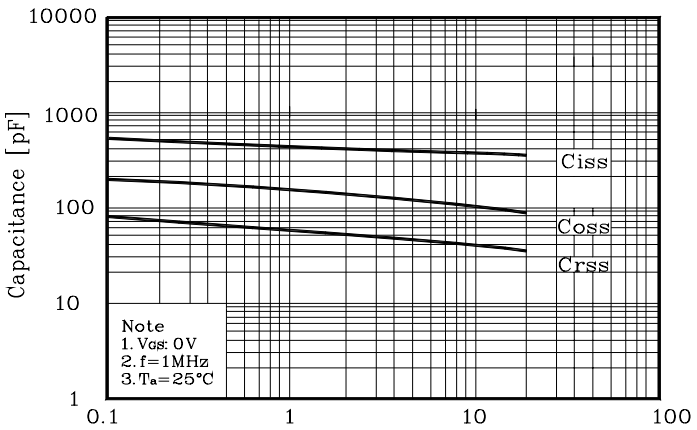


Fig. 6 V_{GS} - Q_G

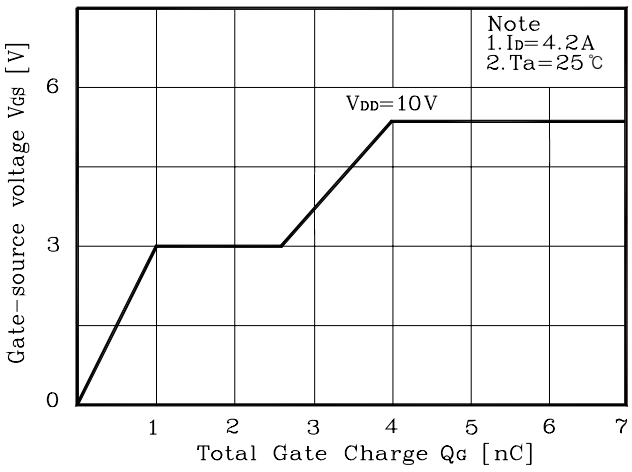


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Fig. 7 V_{DSS} - T_J

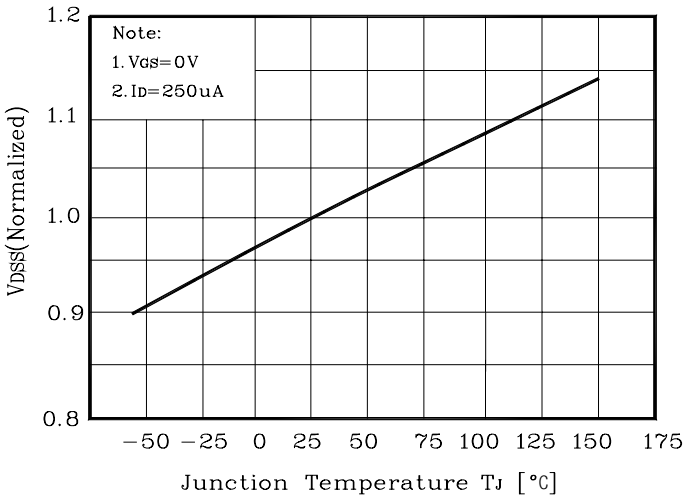


Fig. 8 $R_{DS(on)}$ - T_J

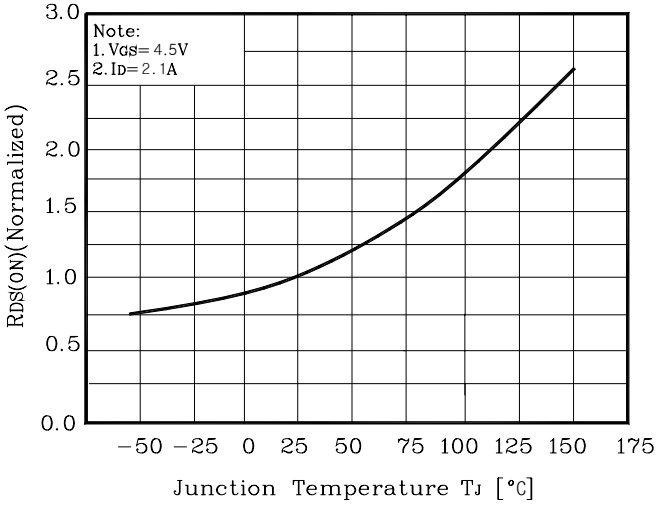


Fig. 9 I_D - T_a

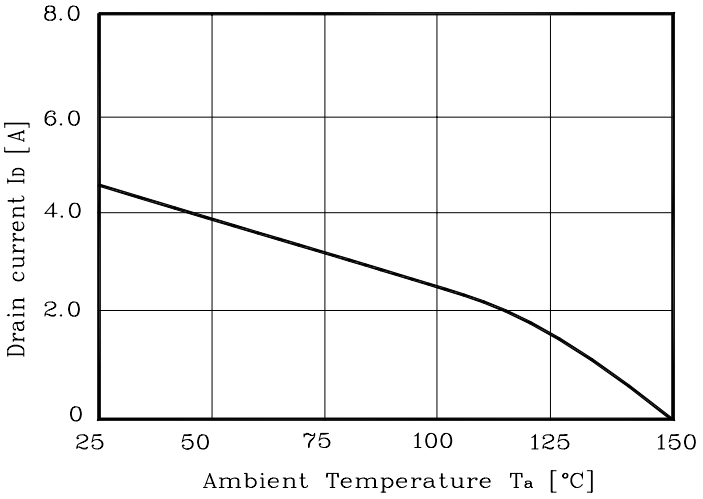


Fig. 10 Safe Operating Area

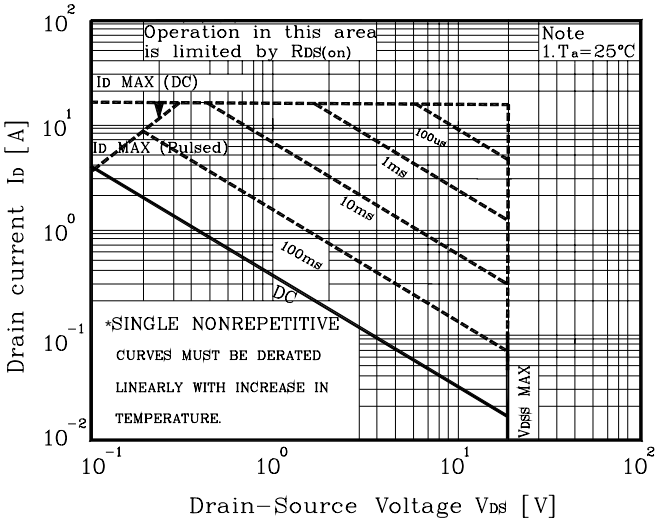


Fig. 11 Gate Charge Test Circuit & Waveform

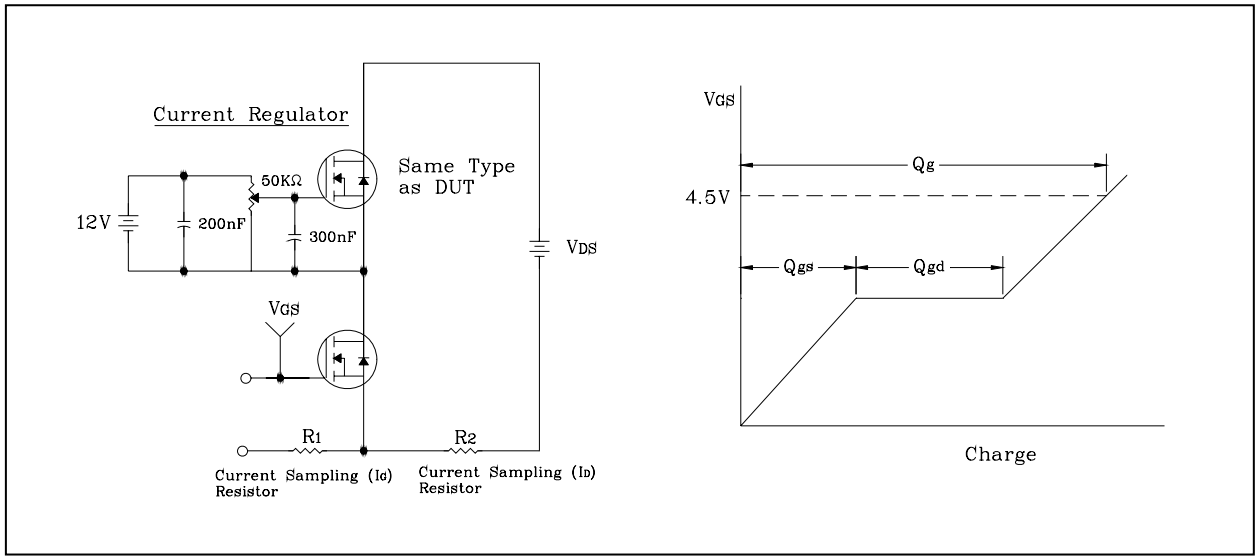


Fig. 12 Resistive Switching Test Circuit & Waveform

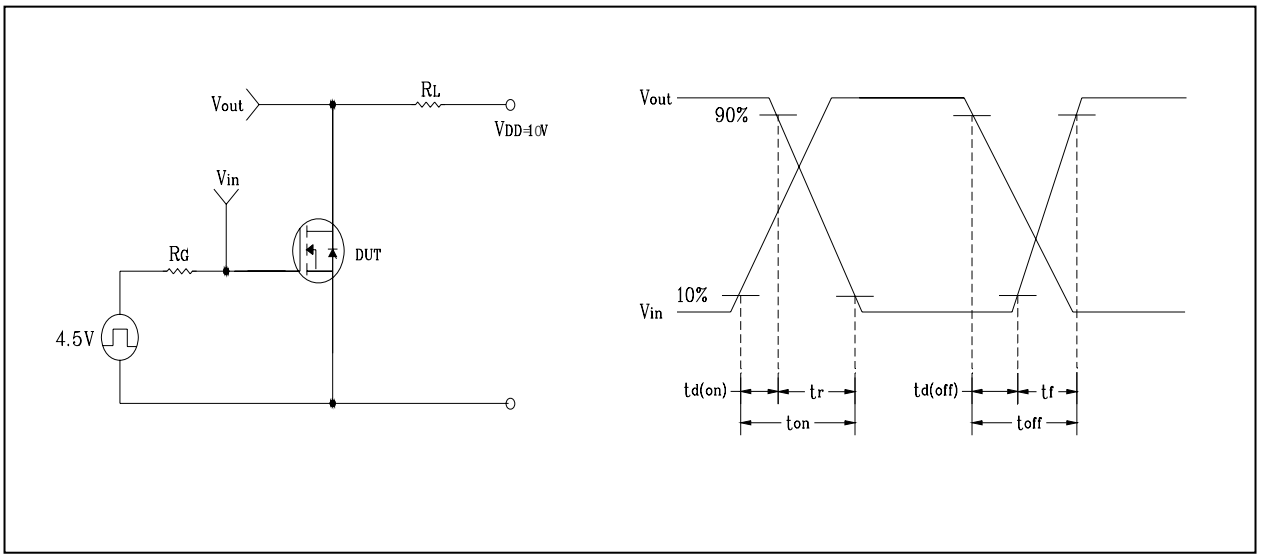


Fig. 13 E_{AS} Test Circuit & Waveform

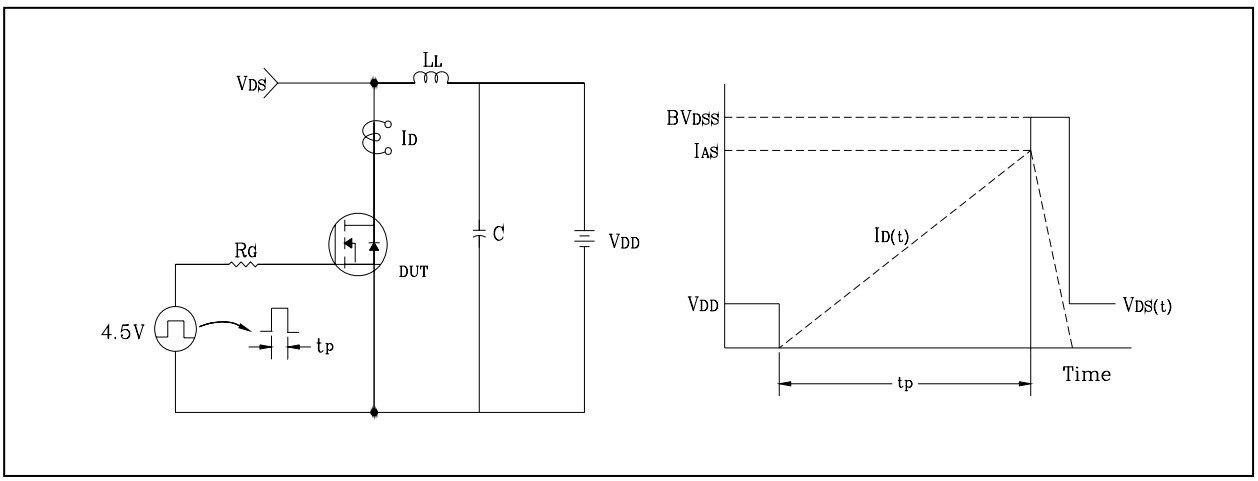
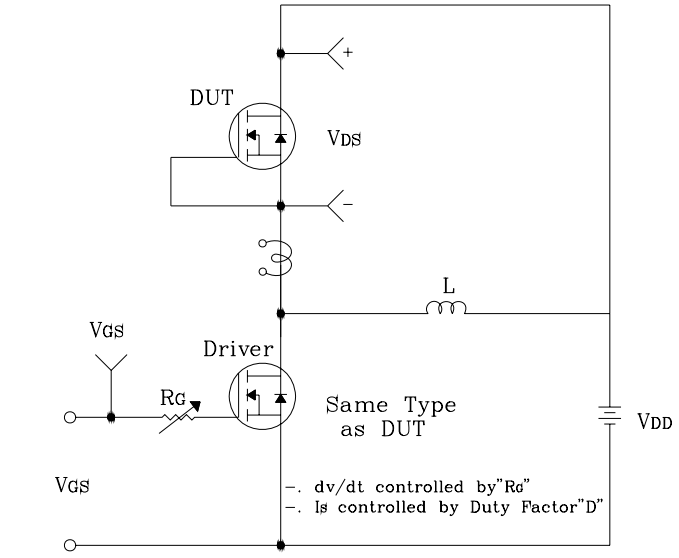
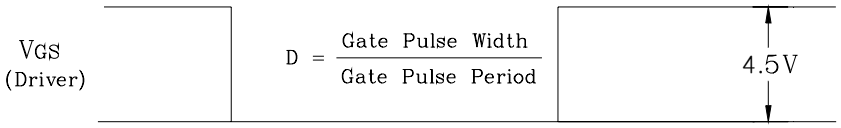
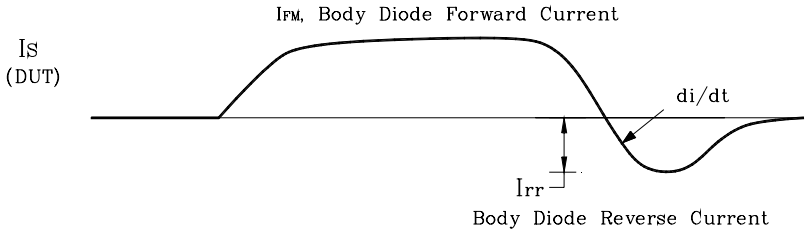
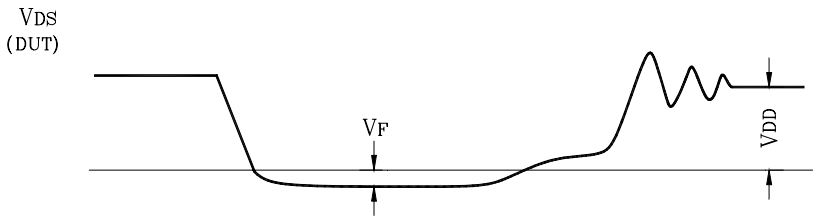


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform









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