

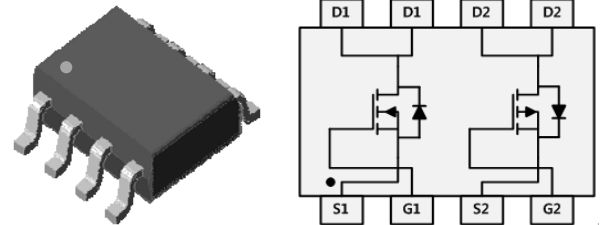
30V Dual N- and P-channel Trench MOSFET

Features

- Low $V_{GS(th)}$: $V_{GS(th)}=1.0\sim 3.0V$
- Small footprint due to small package
- Low $R_{GDS(on)}$: N-ch, $R_{DS(on)}=24m\Omega$ (@ $V_{GS}=10V, I_D=2.9A$)
P-ch, $R_{DS(on)}=66m\Omega$ (@ $V_{GS}=-10V, I_D=-2.7A$)

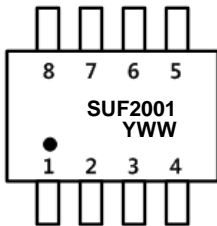
Ordering Information

Part Number	Marking Code	Package
SUF2001	SUF2001	SOP-8



SOP-8

Marking Information



Column 1: Device Code
 Column 2: Production Information
 -. Y: Year Code
 -. WW: Week Code

Absolute maximum ratings ($T_A=25^\circ C$ unless otherwise noted)

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		W
Avalanche current (Single)	I_{AS}	5.8 ^②	-5.3 ^⑥	A
Single pulsed avalanche energy	E_{AS}	72 ^②	33 ^⑥	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		
Thermal resistance junction to ambient	$R_{th(J-A)}$	62.5		°C/W

* Limited by maximum junction temperature

** Device mounted on a glass-epoxy board

N-channel MOSFET Electrical Characteristics

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

Source-Drain Diode Ratings and Characteristics

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Source current	I_S	Integral reverse diode in the MOSFET	-	-	1.5	A
Source current(Pulsed) ^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	-	μC

Note ;

- ① Repetitive Rating : Pulse width limited by maximum junction temperature
- ② $L=3.4mH, I_{AS}=5.8A, V_{DD}=15V, R_G=25\Omega$
- ③ Pulse Test : Pulse Width < 300us, Duty cycle \leq 2%
- ④ Essentially independent of operating temperature

P-channel MOSFET Electrical Characteristics

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

Source-Drain Diode Ratings and Characteristics

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Source current	I_S	Integral reverse diode in the MOSFET	-	-	-1.5	A
Source current (Pulsed) ^⑤	I_{SM}		-	-	-6.0	
Forward voltage ^⑥	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	-	μC

Note ;

- ⑤ Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ⑥ $L=2.0mH, I_{AS}=-5.0A, V_{DD}=-15V, R_G=25\Omega$
- ⑦ Pulse Test : Pulse Width < 300us, Duty cycle \leq 2%
- ⑧ Essentially independent of operating temperature

N-CH Electrical Characteristic Curves

Fig. 1 $I_D - V_{DS}$

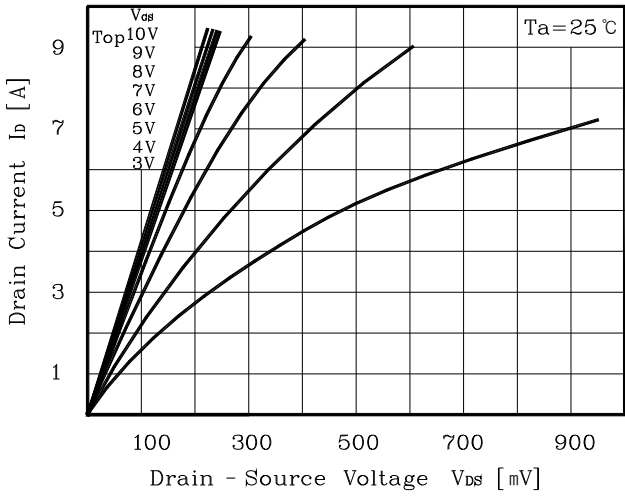


Fig. 2 $I_D - V_{GS}$

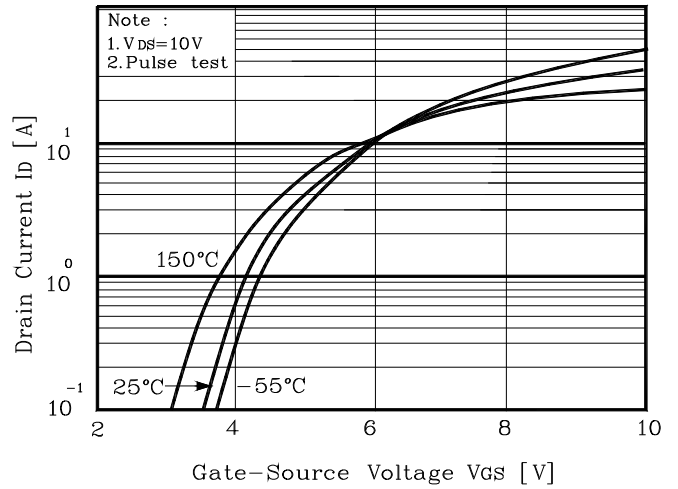


Fig. 3 $R_{DS(on)} - I_D$

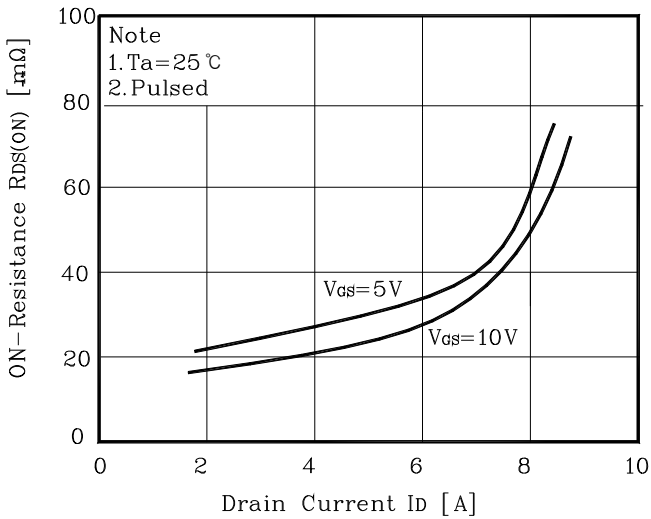


Fig. 4 $I_S - V_{SD}$

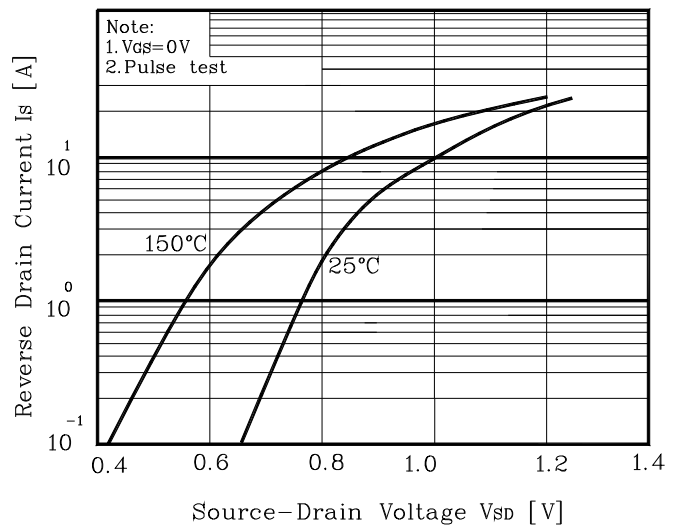


Fig. 5 Capacitance - V_{DS}

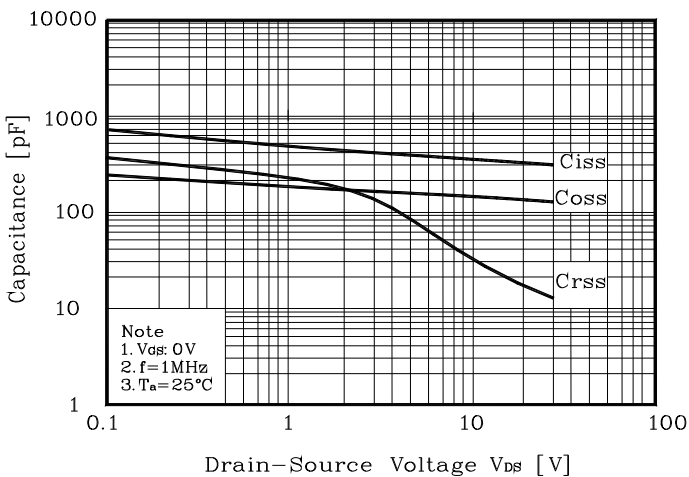


Fig. 6 $V_{GS} - Q_G$

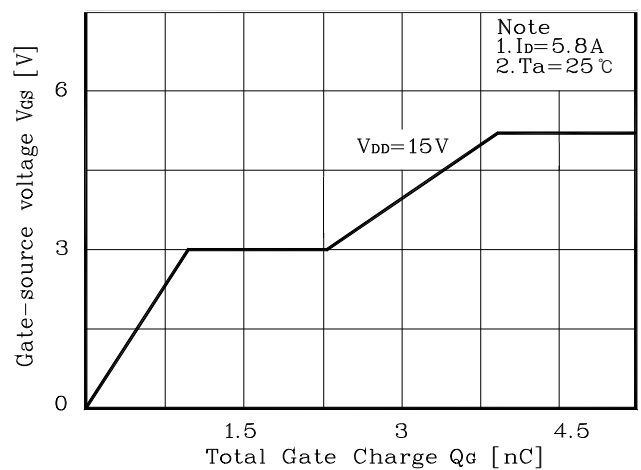


Fig. 7 $V_{DSS} - T_J$

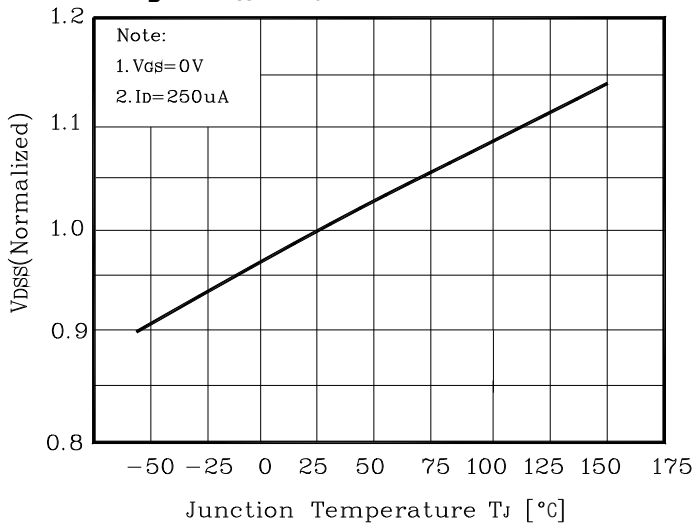


Fig. 8 $R_{DS(on)} - T_J$

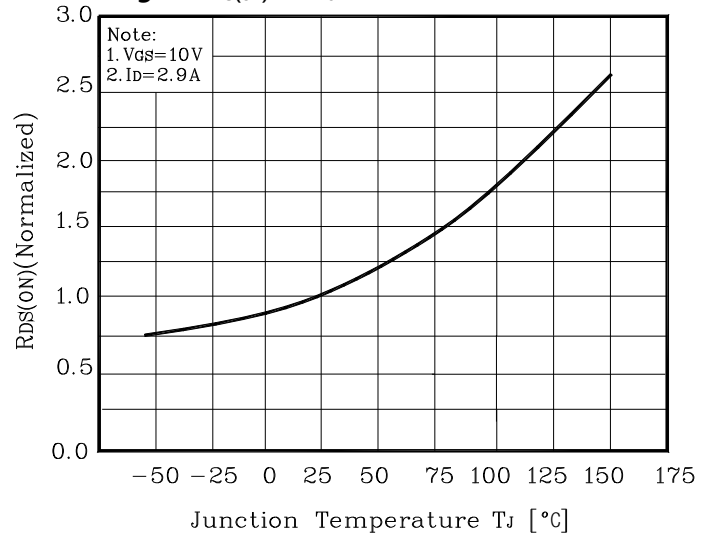


Fig. 9 $I_D - T_a$

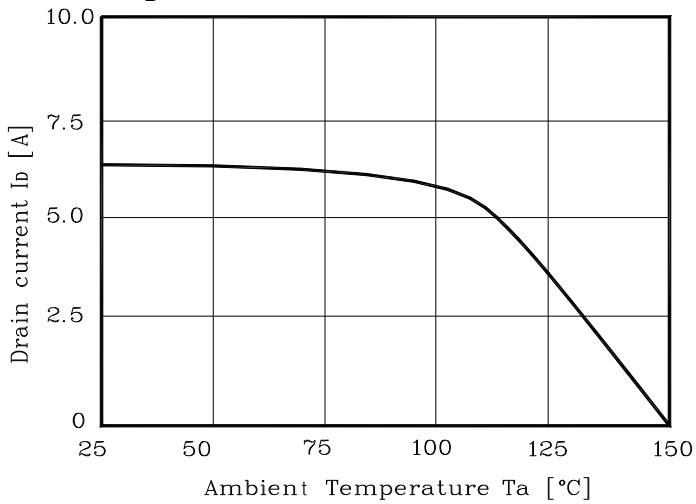


Fig. 10 Safe Operating Area

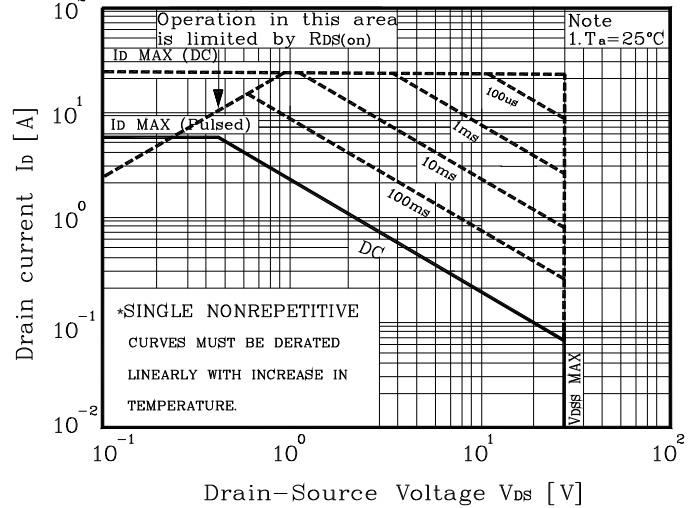


Fig. 11 Gate Charge Test Circuit & Waveform

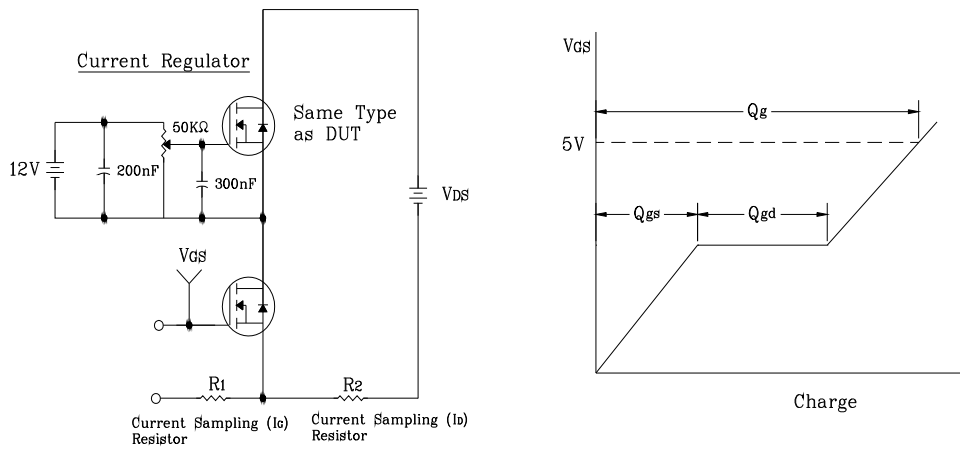


Fig. 12 Resistive Switching Test Circuit & Waveform

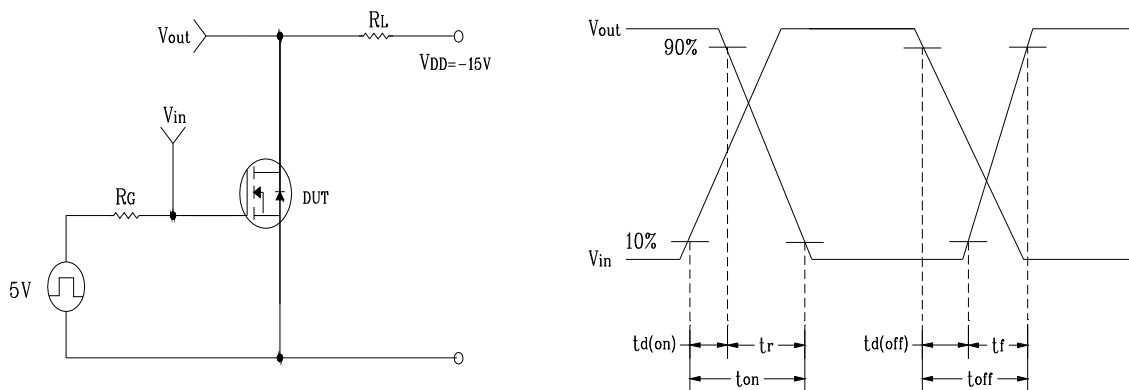


Fig. 13 EAS Test Circuit & Waveform

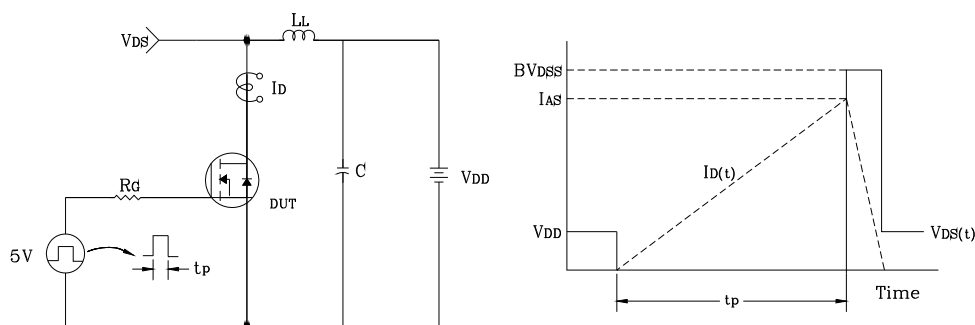
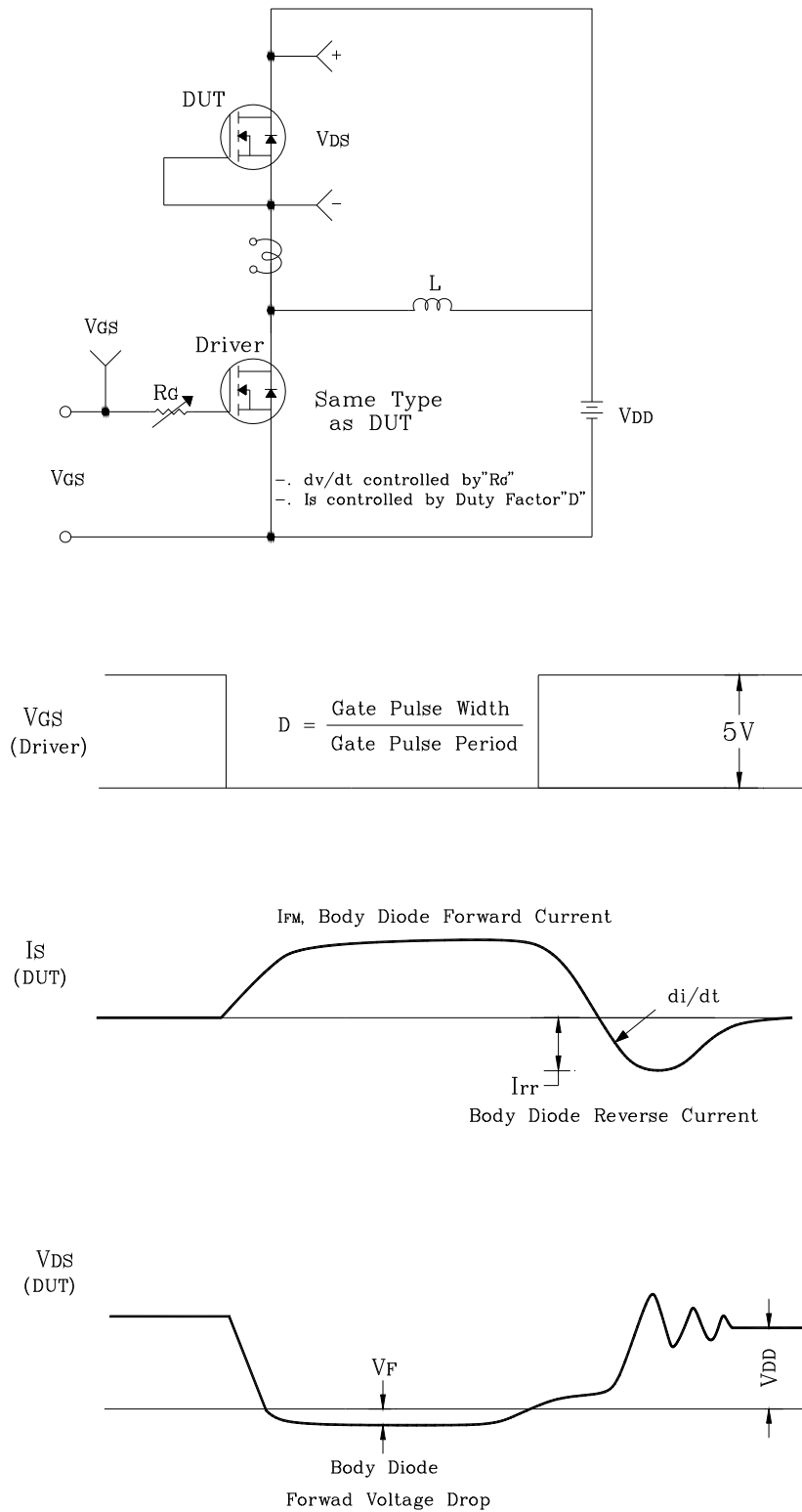


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



P-CH Electrical Characteristic Curves

Fig. 1 $I_D - V_{DS}$

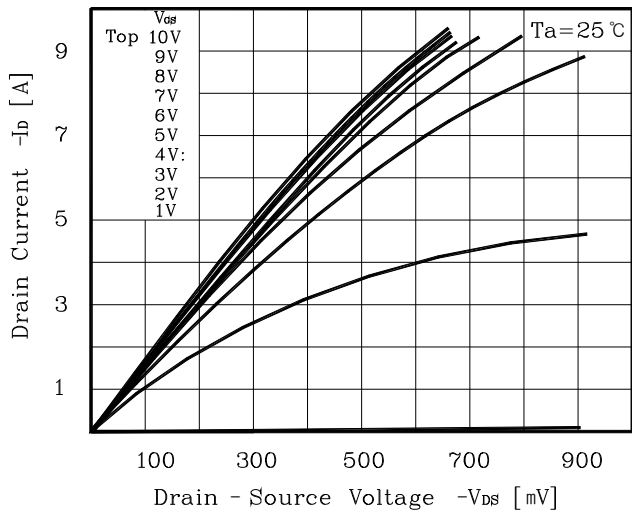


Fig. 2 $I_D - V_{GS}$

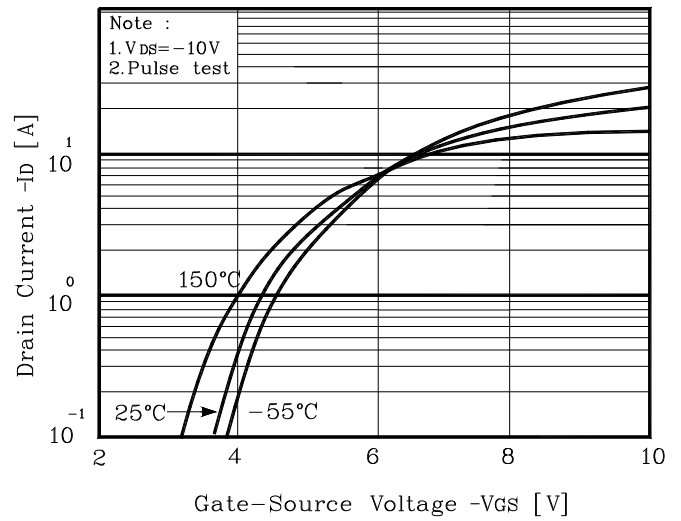


Fig. 3 $R_{DS(on)} - I_D$

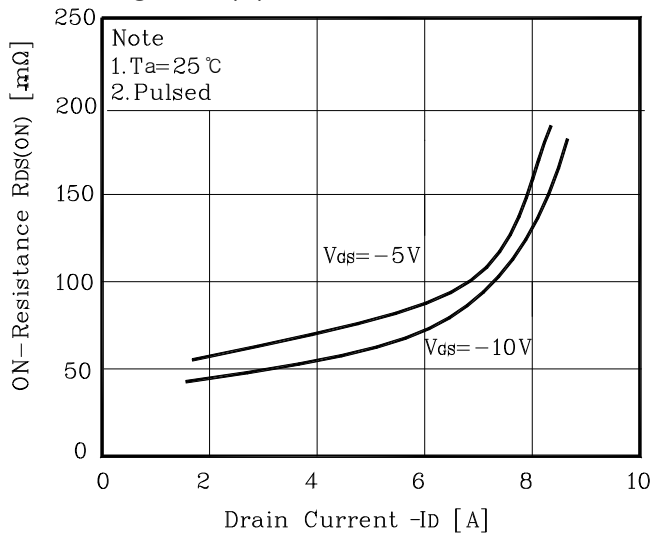


Fig. 4 $I_S - V_{SD}$

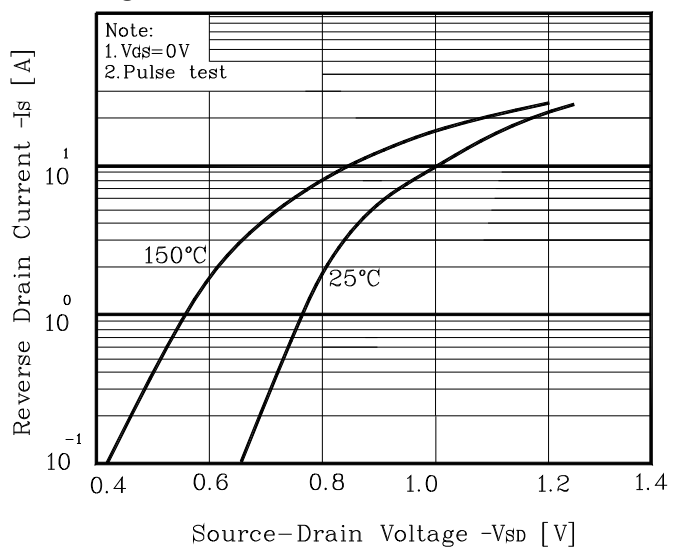


Fig. 5 Capacitance - V_{DS}

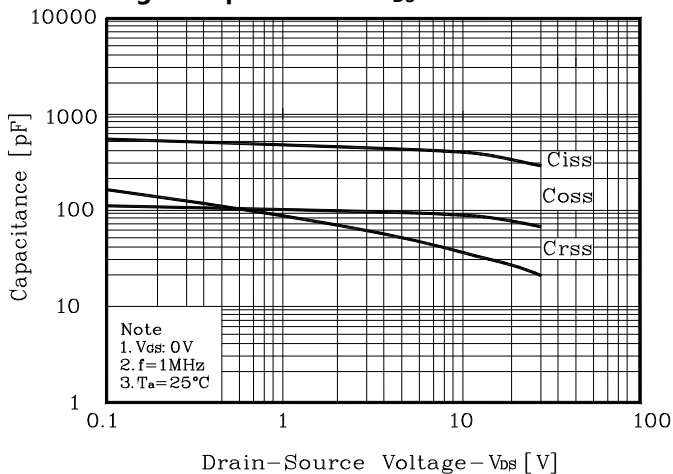


Fig. 6 $V_{GS} - Q_G$

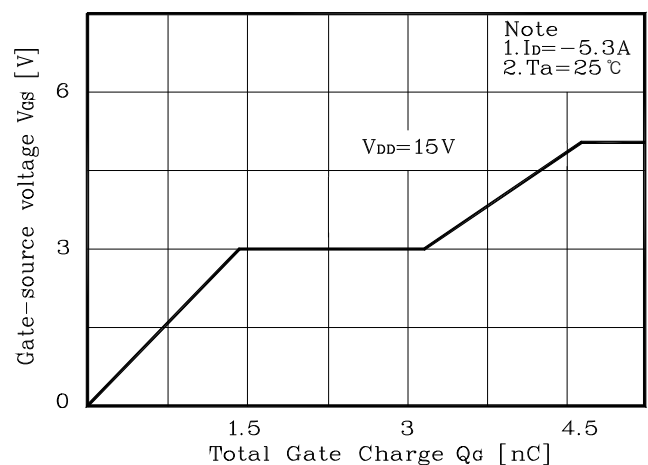


Fig. 7 $V_{DSS} - T_J$

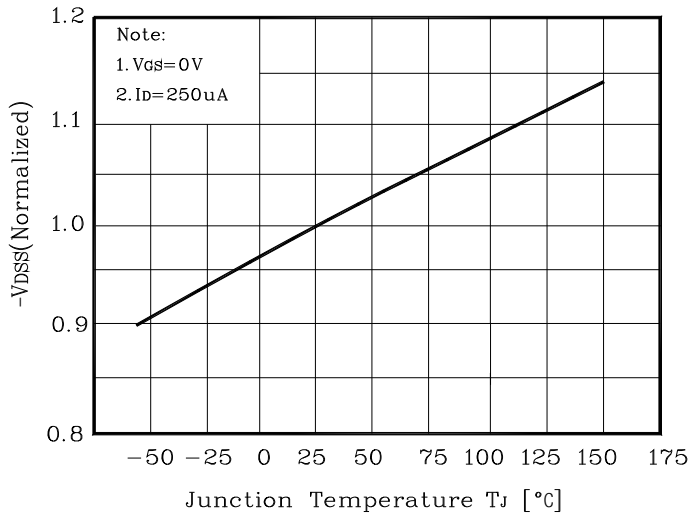


Fig. 8 $R_{DS(on)} - T_J$

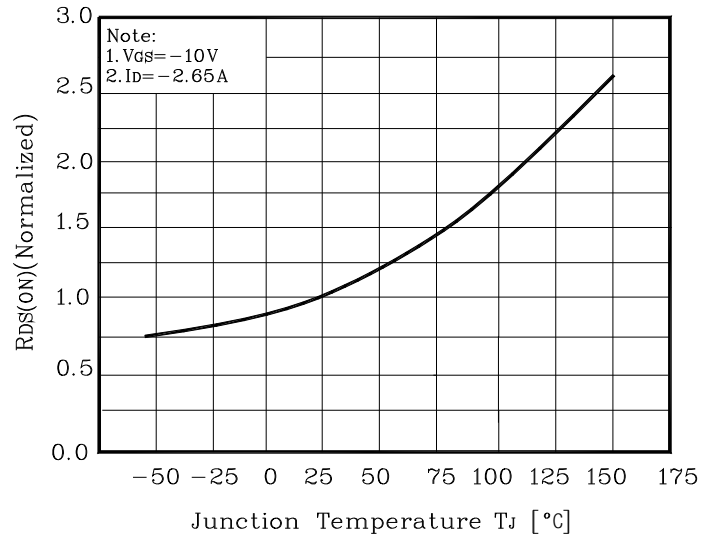


Fig. 9 $I_D - T_a$

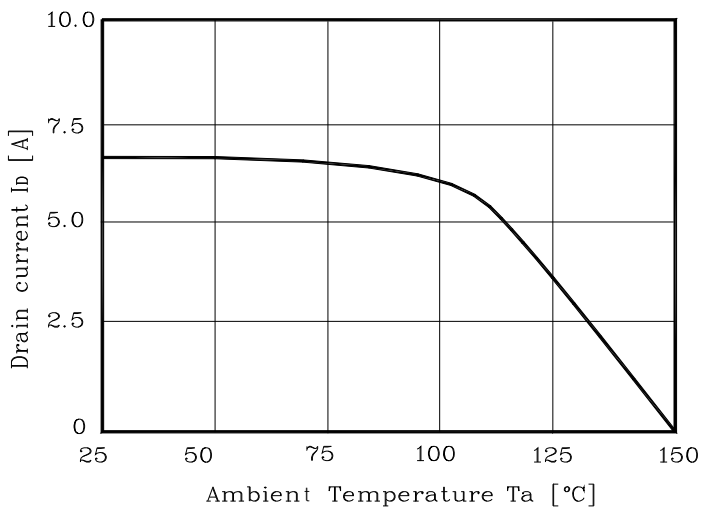


Fig. 10 Safe Operating Area

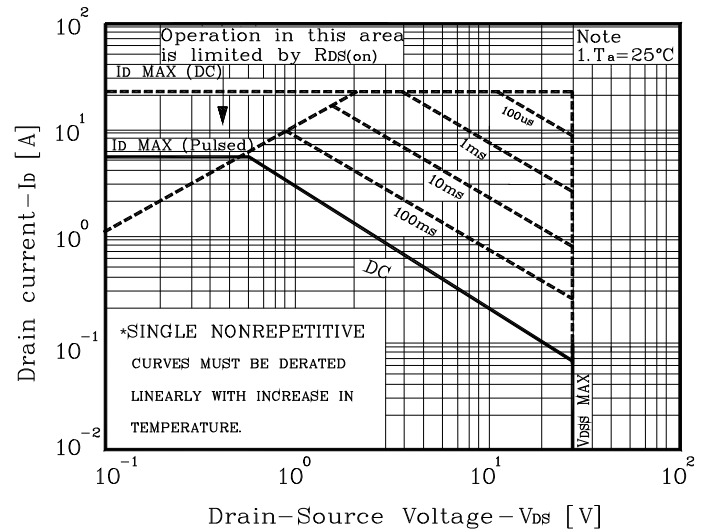


Fig. 11 Gate Charge Test Circuit & Waveform

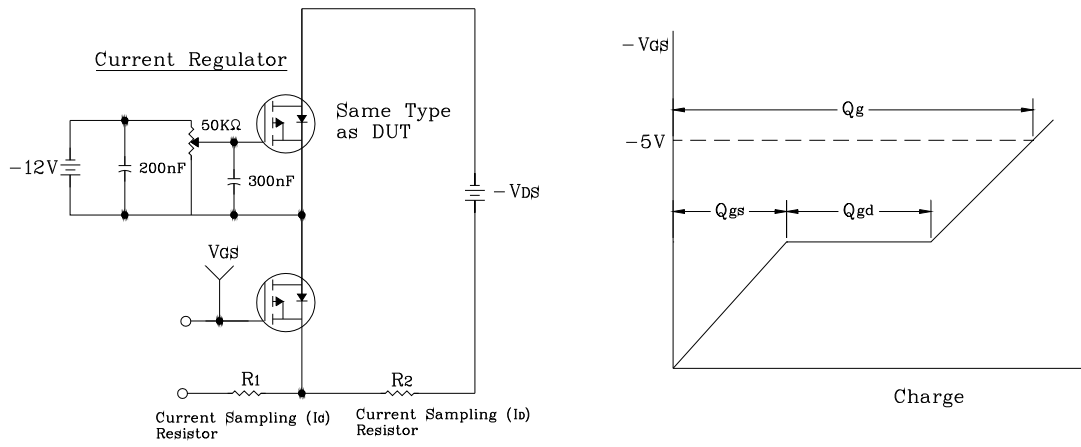


Fig. 12 Resistive Switching Test Circuit & Waveform

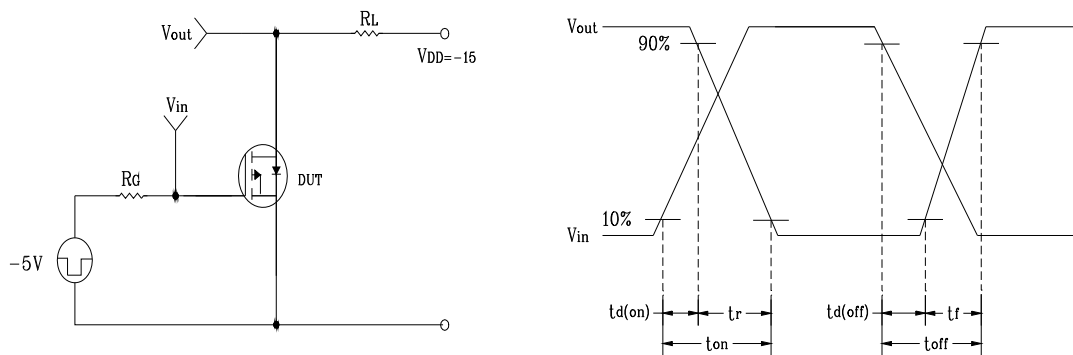


Fig. 13 EAS Test Circuit & Waveform

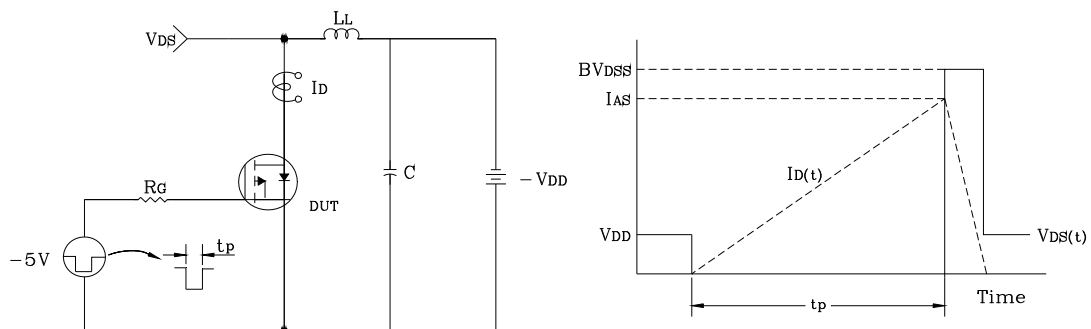
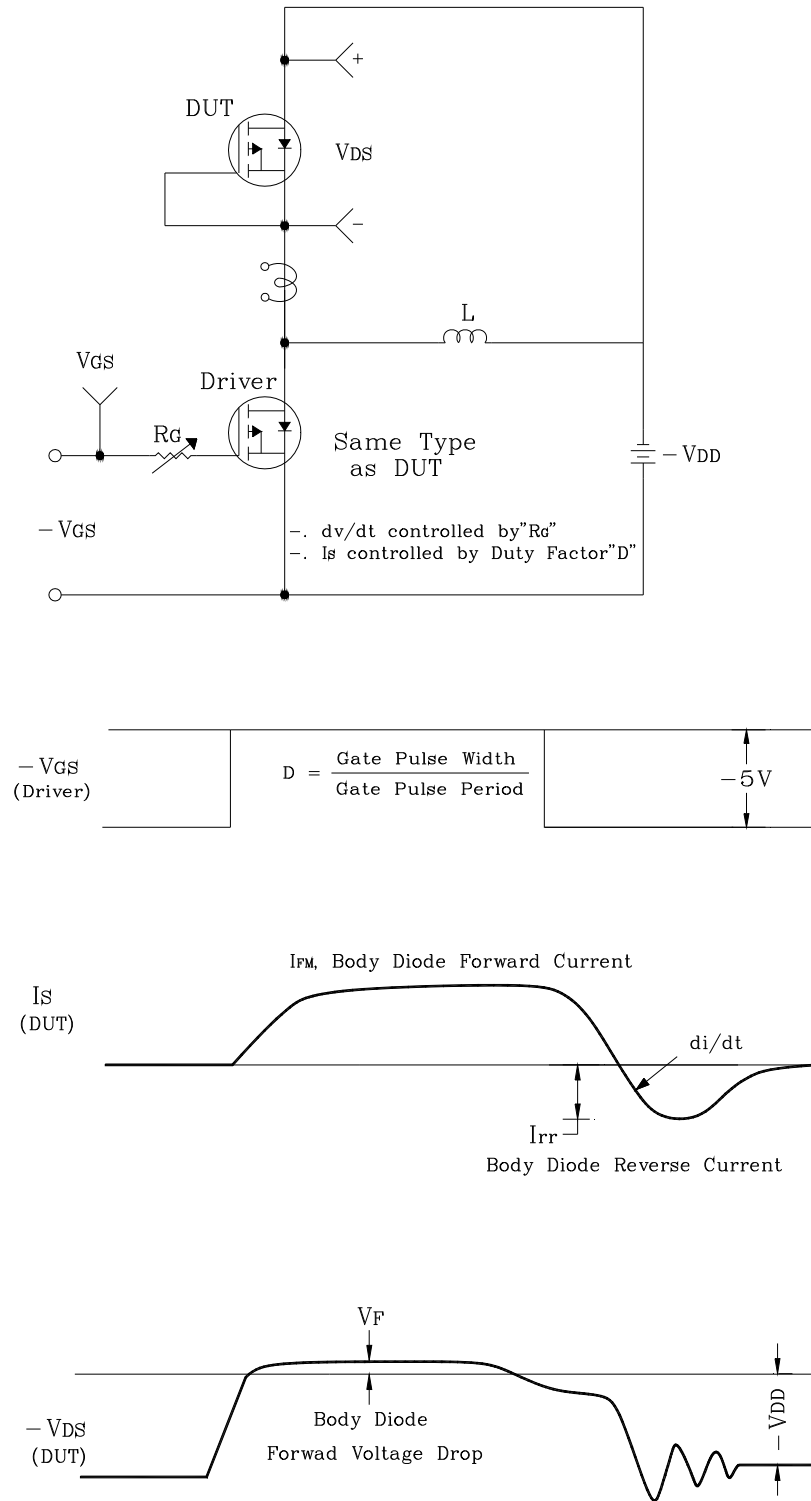
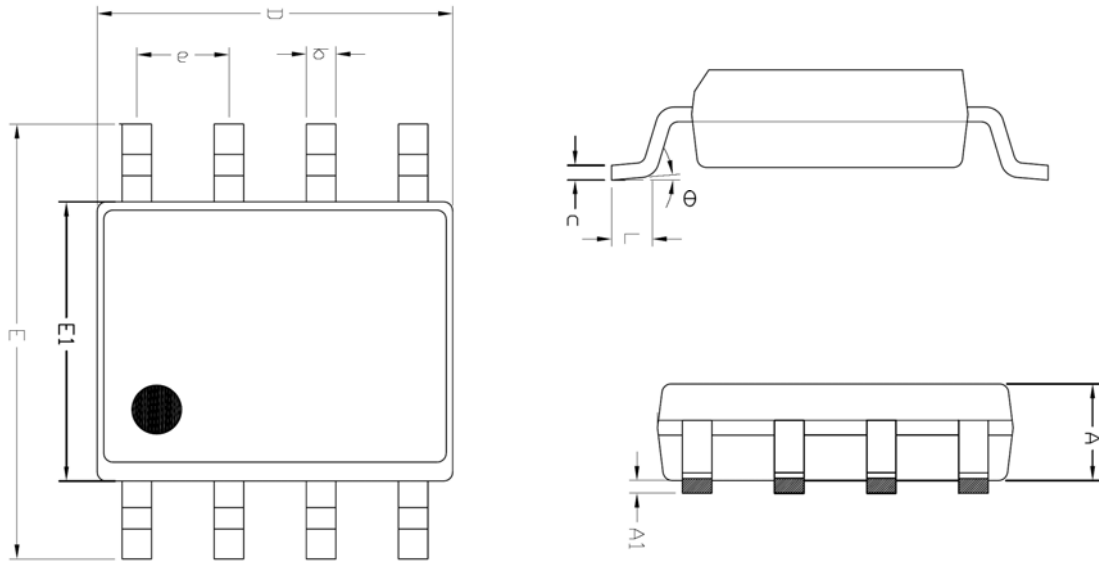


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform

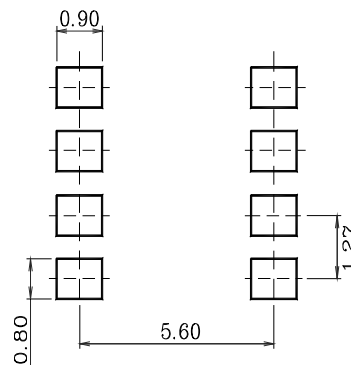


Package Outline Dimensions



SYMBOL	MILLIMETER(mm)			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	1.245	—	1.445	
A1	0.125	0.175	0.275	
b	0.320	0.420	0.520	
c	0.170	0.220	0.270	
D	4.802	4.902	5.002	
E	5.870	6.020	6.170	
E1	3.761	3.861	3.961	
e	1.270 BSC			
L	0.462	0.562	0.662	
theta	0 °	—	8 °	

※ Recommended Land Pattern [unit: mm]



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