KODENSHI AUK

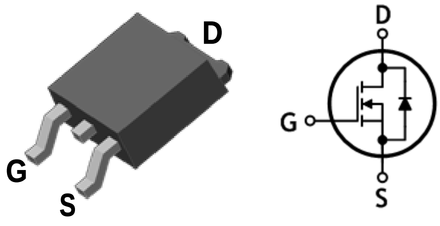
SMK0460D

Advanced N-Ch Power MOSFET

SWITCHING REGULATOR APPLICATION

Features

- High voltage: BV_{DSS}=600V (Min.)
- Low gate charge: Q_g=12nC (Typ.)
- Low drain-source On resistance: $R_{DS(on)}$=2.5Ω (Max.)
- RoHS compliant device
- Halogen free package

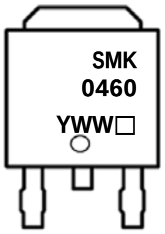


TO-252

Ordering Information

Part Number	Marking	Package
SMK0460D	SMK0460	TO-252

Marking Information



Column 1, 2: Device Code
Column 3: Production Information

e.g.) YWW□

-. YWW: Date Code (year, week)

-. □: Factory Code (‘A’: AUK, ‘S’: SP Semi.)

Absolute maximum ratings (T_C=25°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°C	4	A
		T_c=100°C	2.53	A
Drain current (Pulsed) *	I_{DM}		16	A
Avalanche current (Note 2)	I_{AS}		4	A
Single pulsed avalanche energy (Note 2)	E_{AS}		225	mJ
Repetitive avalanche current (Note 1)	I_{AR}		4	A
Repetitive avalanche energy (Note 1)	E_{AR}		10	mJ
Power dissipation	P_D		48	W
Junction temperature	T_J		150	°C
Storage temperature range	T_{stg}		-55~150	°C

* Limited only maximum junction temperature

Thermal Characteristics

Characteristic	Symbol	Rating	Unit
Thermal resistance, junction to case	$R_{th(j-c)}$	Max. 2.6	°C/W
Thermal resistance, junction to ambient	$R_{th(j-a)}$	Max. 62.5	

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=250uA, V_{GS}=0	600	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D=250uA, V_{DS}=V_{GS}	2.0	-	4.0	V
Drain-source cut-off current	I_{DSS}	V_{DS}=600V, V_{GS}=0V	-	-	1	uA
Gate leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±30V	-	-	±100	nA
Drain-source on-resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=2A	-	2.1	2.5	Ω
Internal gate resistance	R_G	f=1MHz, V_{DS}=0V	-	1.25	6.25	Ω
Forward transfer conductance (Note 3)	g_{fs}	V_{DS}=10V, I_D=2A	-	4.0	-	S
Input capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1MHz	-	670	848	pF
Output capacitance	C_{oss}		-	57	71	
Reverse transfer capacitance	C_{rss}		-	9.8	12.2	
Turn-on delay time (Note 3,4)	$t_{d(on)}$	V_{DD}=300V, I_D=4A R_G=25Ω	12	25	38	ns
Rise time (Note 3,4)	t_r		14	28	42	
Turn-off delay time (Note 3,4)	$t_{d(off)}$		55	110	165	
Fall time (Note 3,4)	t_f		18	36	54	
Total gate charge (Note 3,4)	Q_g	V_{DS}=480V, V_{GS}=10V I_D=4A	-	12	15	nC
Gate-source charge (Note 3,4)	Q_{gs}		-	4	-	
Gate-drain charge (Note 3,4)	Q_{gd}		-	3	-	

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	-	-	4	A
Source current (Pulsed)	I_{SM}		-	-	16	A
Forward voltage	V_{SD}	V_{GS}=0V, I_S=4A	-	-	1.4	V
Reverse recovery time (Note 3,4)	t_{rr}	I_S=4A, V_{GS}=0V dI_S/dt=-100A/us	-	300	-	ns
Reverse recovery charge (Note 3,4)	Q_{rr}		-	2.2	-	uC

Note:

1. Repeated rating: Pulse width limited by safe operating area
2. L=25.9mH, I_{AS}=4A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
3. Pulse test: Pulse width≤300us, Duty cycle≤2%
4. Essentially independent of operating temperature typical characteristics

Electrical Characteristic Curves

Fig. 1 I_D - V_{DS}

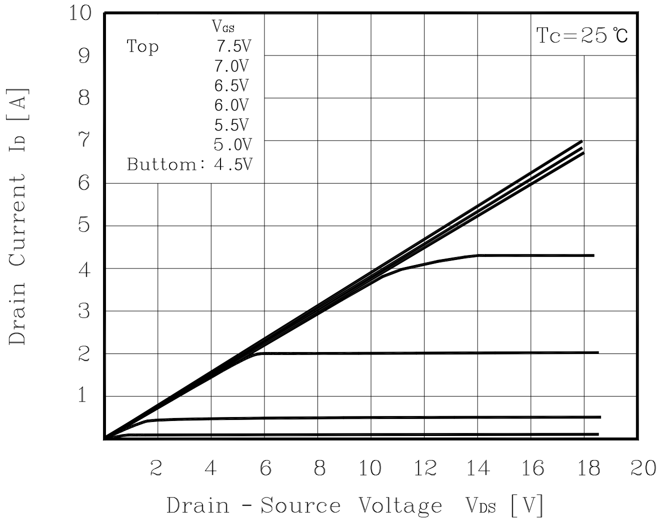


Fig. 2 I_D – V_{GS}

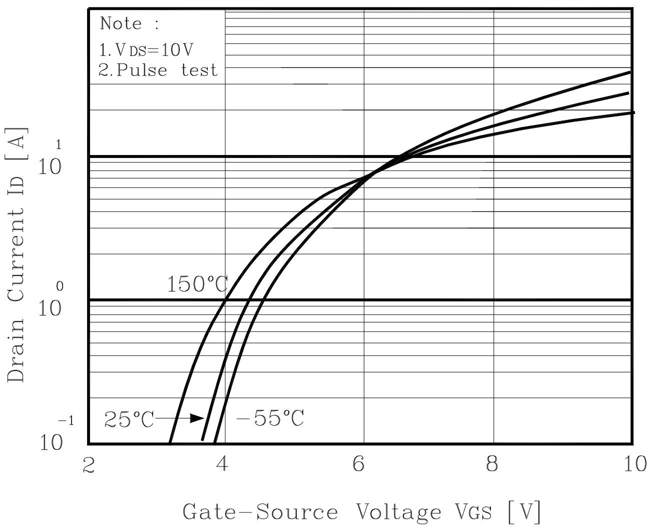


Fig. 3 $R_{DS(ON)}$ - I_D

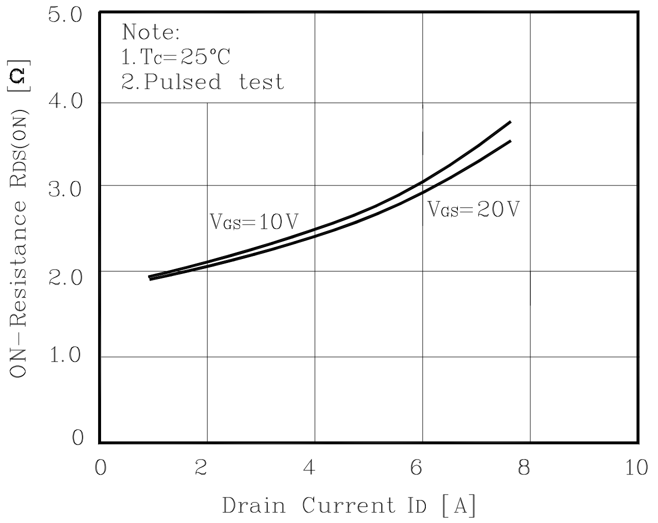


Fig. 4 I_S - V_{SD}

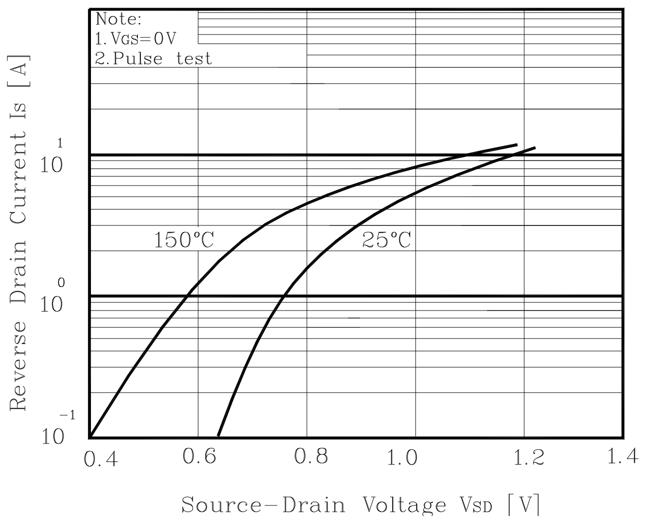


Fig. 5 Capacitance - V_{DS}

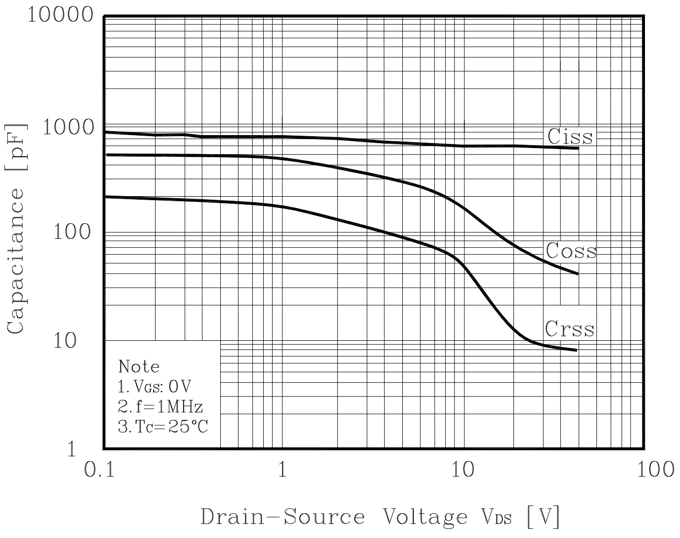
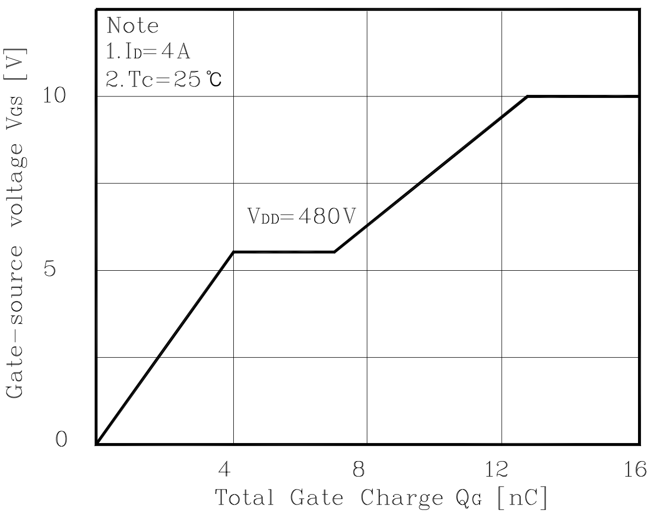


Fig. 6 V_{GS} - Q_G



Electrical Characteristic Curves (Continue)

Fig. 7 BV_{DSS} - T_J

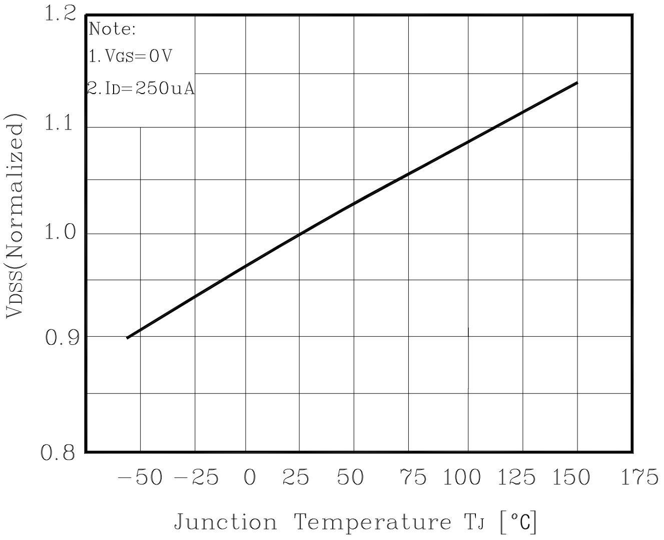


Fig. 8 $R_{DS(ON)}$ - T_J

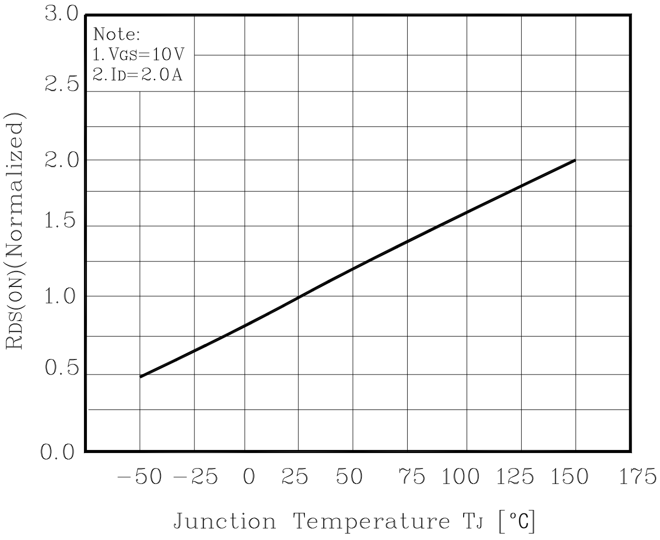


Fig. 9 I_D - T_C

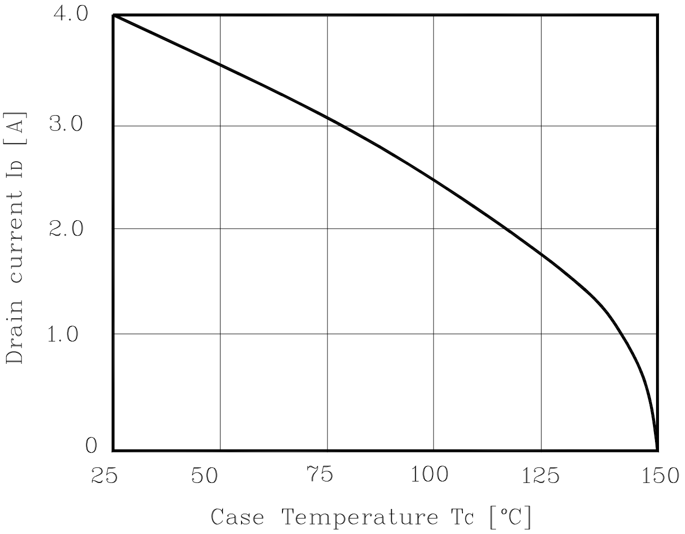


Fig. 10 Safe Operating Area

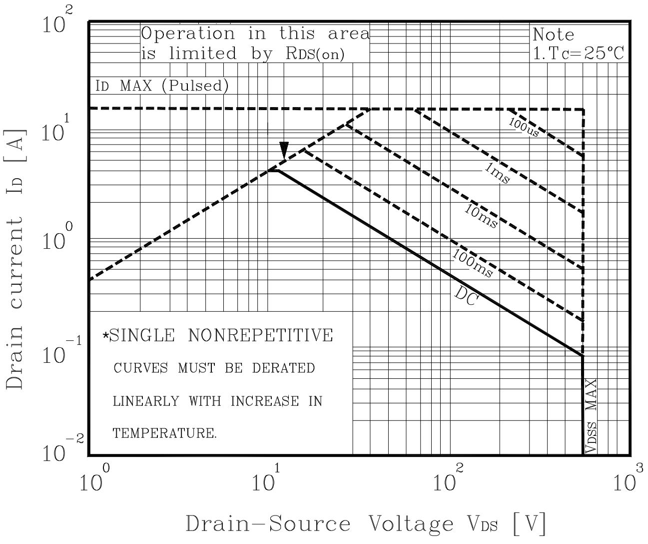


Fig. 11 Gate Charge Test Circuit & Waveform

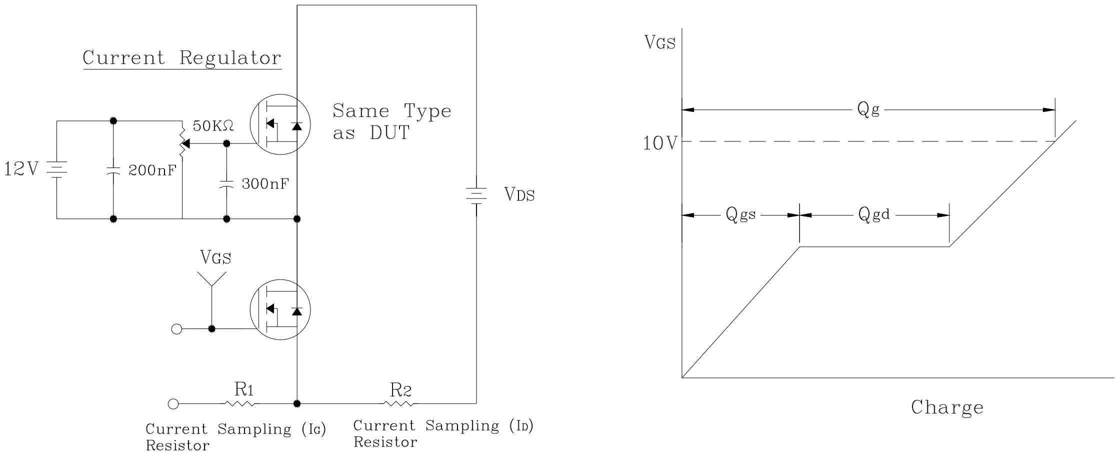


Fig. 12 Resistive Switching Test Circuit & Waveform

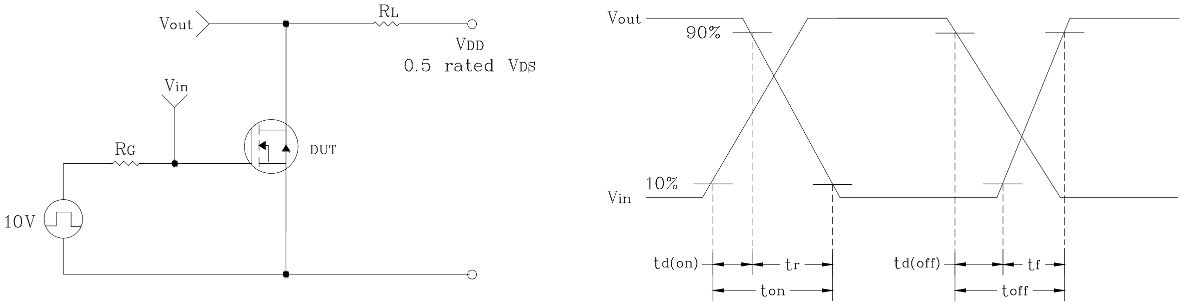


Fig. 13 E_{AS} Test Circuit & Waveform

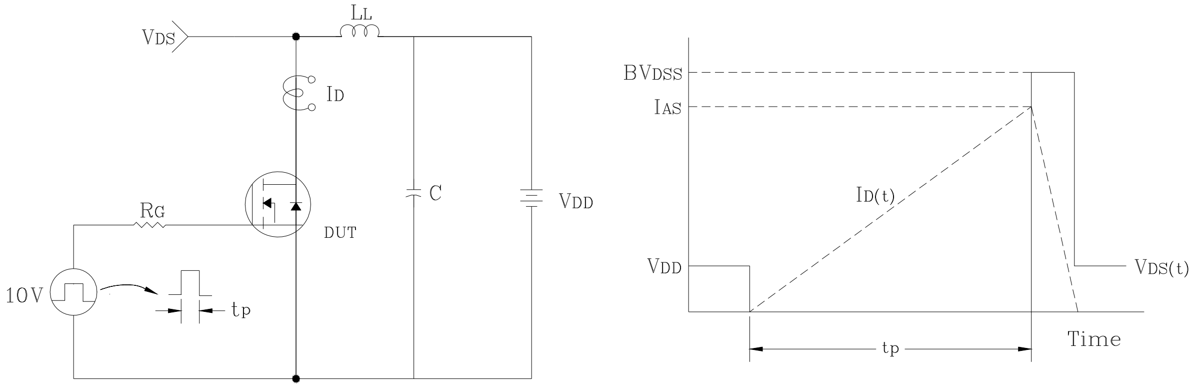
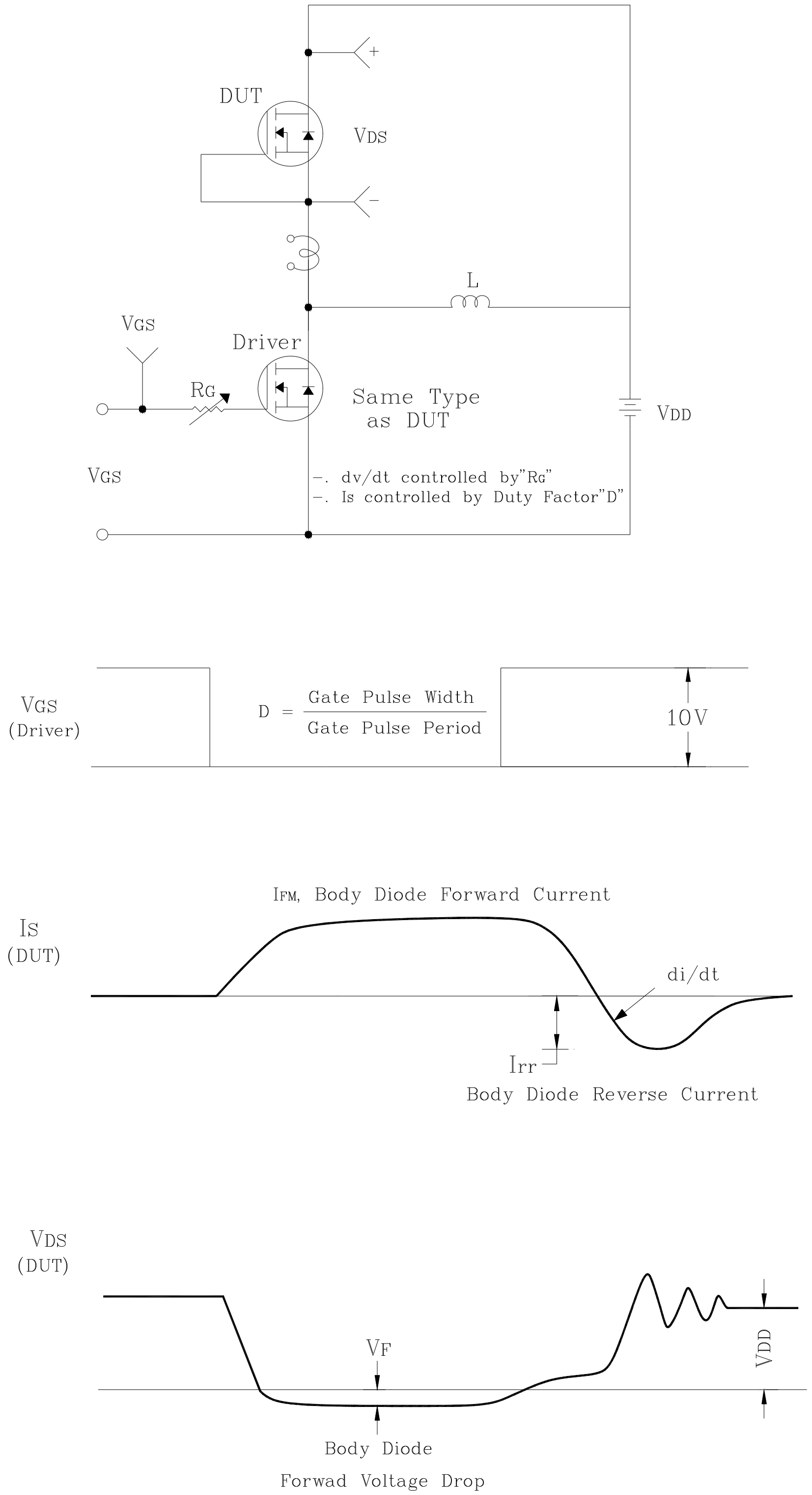
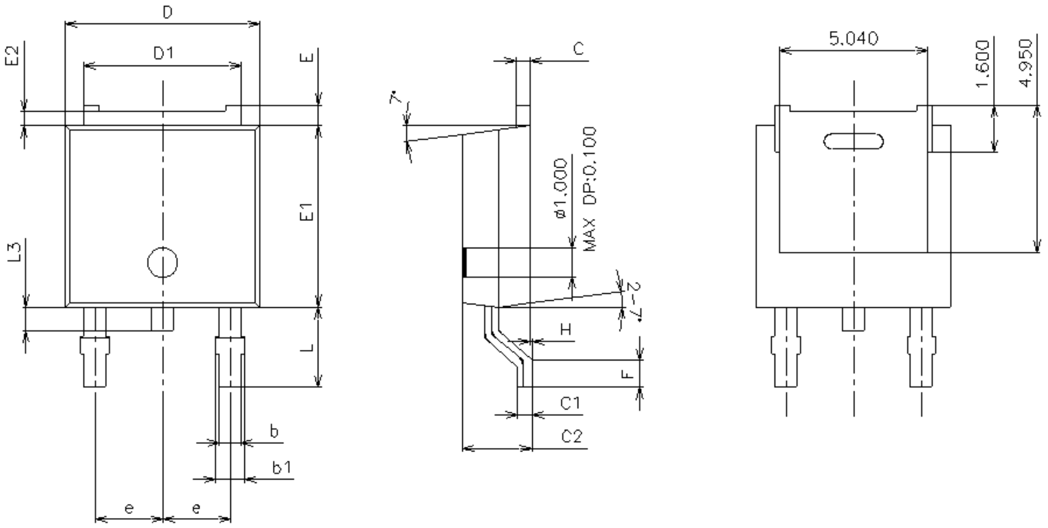
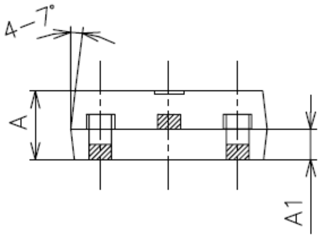


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



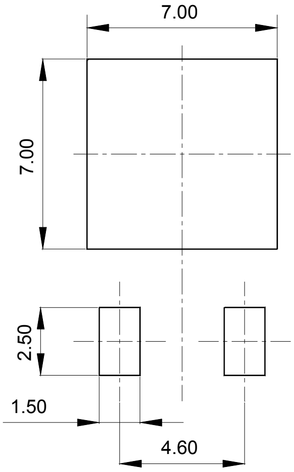
Package Outline Dimensions





SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
D	6.40	6.60	6.80	
D1	5.14	5.34	5.54	
E	0.50	0.70	0.90	
E1	5.90	6.10	6.30	
E2	0.50 TYP			
A	2.20	2.30	2.40	
A1	0.87	1.07	1.27	
C	0.40	0.50	0.60	
C1	0.40	0.50	0.60	
C2	2.10	2.30	2.50	
L	2.50	2.70	2.90	
L3	0.60	0.80	1.00	
b	0.66	0.76	0.86	
b1	0.96 MAX			
e	2.10	2.30	2.50	
F	0.80 MIN			
H	0.00	-	0.10	

Recommended Land Pattern [unit: mm]



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