KODENSHI AUK

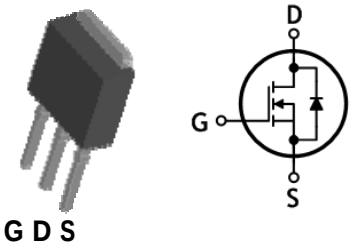
SMN04L20IS

Logic Level N-Ch Power MOSFET

200V LOGIC N-Channel MOSFET

Features

- Drain-Source breakdown voltage: BV_{DSS}=200V (Min.)
- Low gate charge: Q_g=4nC (Typ.)
- Low drain-source On-Resistance: $R_{DS(on)}$=1.35Ω (Max.)
- 100% avalanche tested
- RoHS compliant device

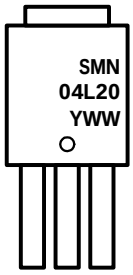


I-PAK

Ordering Information

Part Number	Marking	Package
SMN04L20IS	SMN04L20	I-PAK (Short Lead)

Marking Information



Column 1, 2: Device Code
Column 3: Production Information
e.g.) YWW
-. Y: Year Code
-. WW: Week Code

Absolute maximum ratings (T_C=25°C unless otherwise noted)

Characteristic	Symbol		Rating	Unit
Drain-source voltage	V_{DSS}		200	V
Gate-source voltage	V_{GSS}		±20	V
Drain current (DC) *	I_D	T_c=25°C	3.2	A
		T_c=100°C	2.02	A
Drain current (Pulsed) *	I_{DM}		12.8	A
Avalanche current (Note 2)	I_{AS}		2.5	A
Single pulsed avalanche energy (Note 2)	E_{AS}		52	mJ
Repetitive avalanche current (Note 1)	I_{AR}		2.5	A
Repetitive avalanche energy (Note 1)	E_{AR}		3.3	mJ
Power dissipation	P_D		33	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. 3.78	°C/W
Thermal resistance, junction to ambient	$R_{th(j-a)}$	Max. 50	

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	200	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D=250uA, V_{DS}=V_{GS}	1	1.75	2.25	V
Drain-source cut-off current	I_{DSS}	V_{DS}=200V, V_{GS}=0V	-	-	1	uA
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=1.6A	-	1.1	1.35	Ω
		V_{GS}=5V, I_D=1.6A	-	1.13	1.4	Ω
Forward transfer conductance (Note 3)	g_{fs}	V_{DS}=10V, I_D=1.6A	-	3	-	S
Input capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1MHz	-	224	302	pF
Output capacitance	C_{oss}		-	38	51	
Reverse transfer capacitance	C_{rss}		-	6.2	10	
Turn-on delay time (Note 3,4)	$t_{d(on)}$	V_{DD}=100V, I_D=3.2A R_G=25Ω	-	23	51	ns
Rise time (Note 3,4)	t_r		-	85	177	
Turn-off delay time (Note 3,4)	$t_{d(off)}$		-	80	169	
Fall time (Note 3,4)	t_f		-	32	68	
Total gate charge (Note 3,4)	Q_g	V_{DS}=160V, V_{GS}=10V I_D=3.2A	-	4	5	nC
Gate-source charge (Note 3,4)	Q_{gs}		-	1.4	-	
Gate-drain charge (Note 3,4)	Q_{gd}		-	0.6	-	

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	-	-	3.2	A
Source current (Pulsed)	I_{SM}		-	-	12.8	A
Forward voltage	V_{SD}	V_{GS}=0V, I_S=3.2A	-	-	1.5	V
Reverse recovery time (Note 3,4)	t_{rr}	I_S=3.2A, V_{GS}=0V dI_F/dt=100A/us	-	90	-	ns
Reverse recovery charge (Note 3,4)	Q_{rr}		-	0.29	-	uC

Note:
1. Repeated rating: Pulse width limited by safe operating area
2. L=7.6mH, I_{AS}=3.2A, 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

Typical Electrical Characteristics Curves

Fig. 1 I_D - V_{DS}

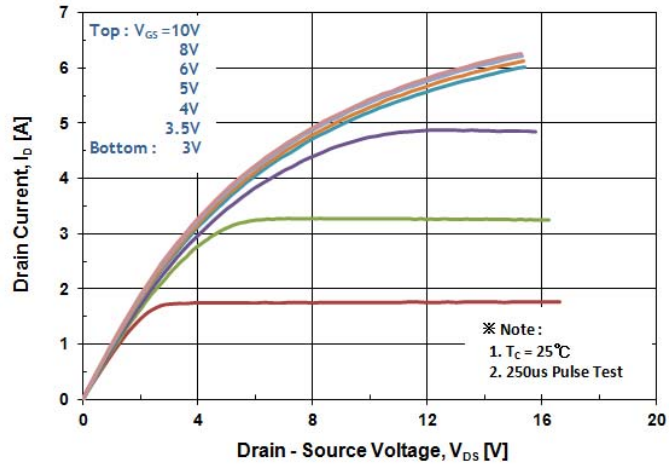


Fig. 2 I_D - V_{GS}

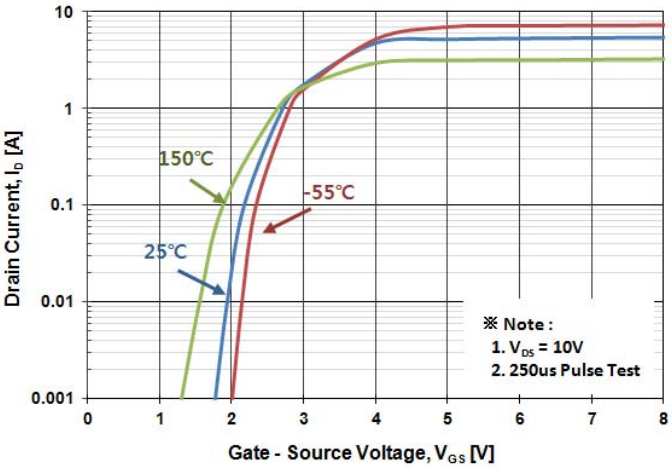


Fig. 3 $R_{DS(ON)}$ - I_D

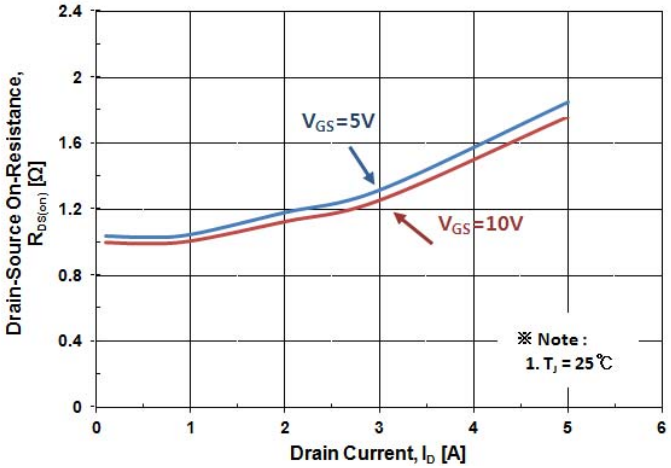


Fig. 4 I_S - V_{SD}

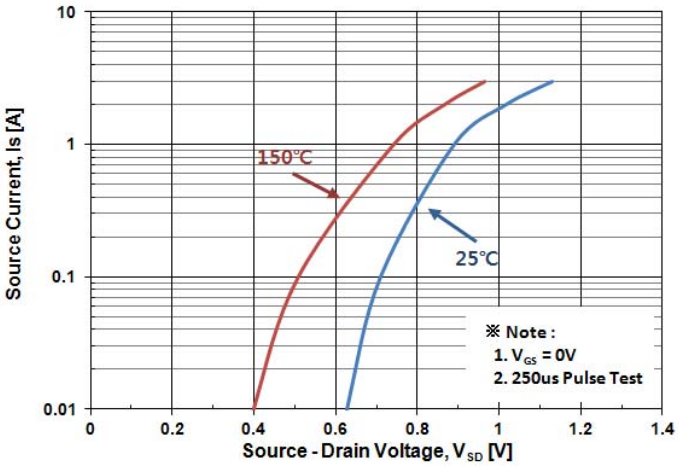


Fig. 5 Capacitance - V_{DS}

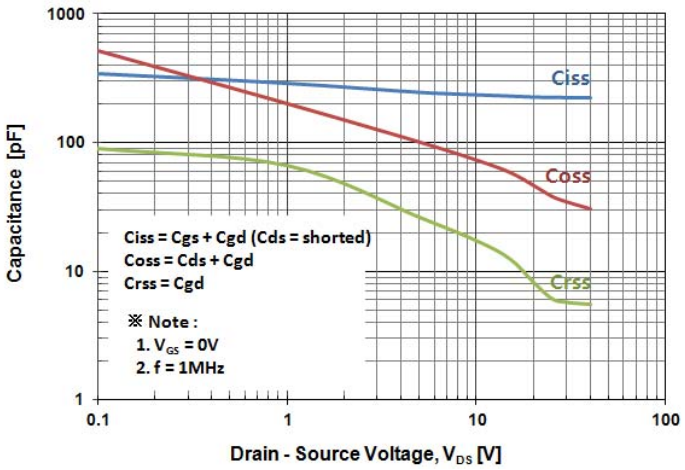


Fig. 6 V_{GS} - Q_G

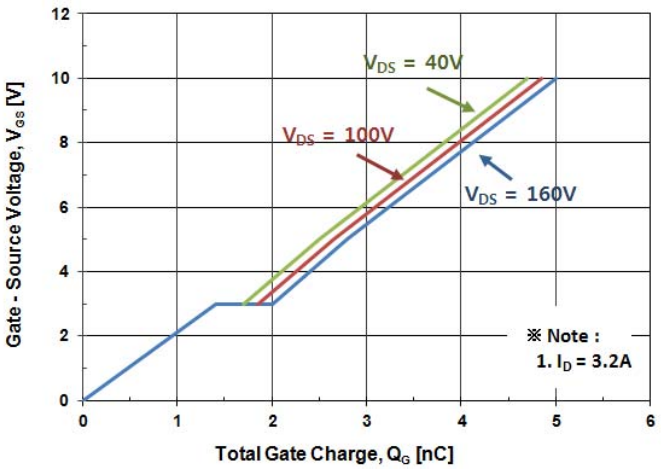


Fig. 7 BV_{DSS} - T_J

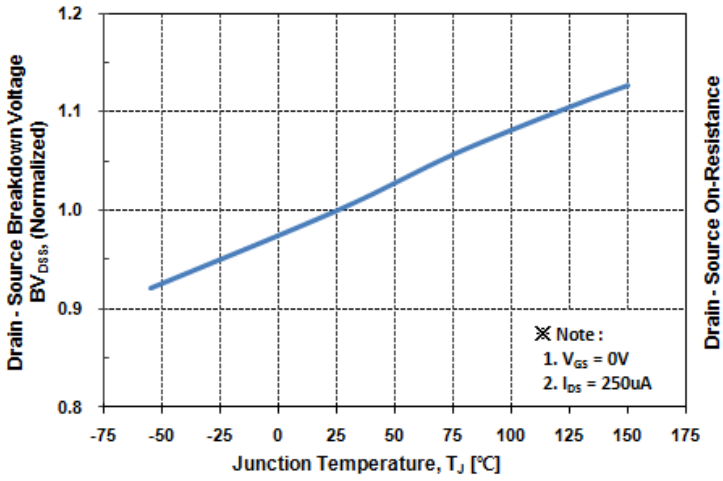


Fig. 8 $R_{DS(on)}$ - T_J

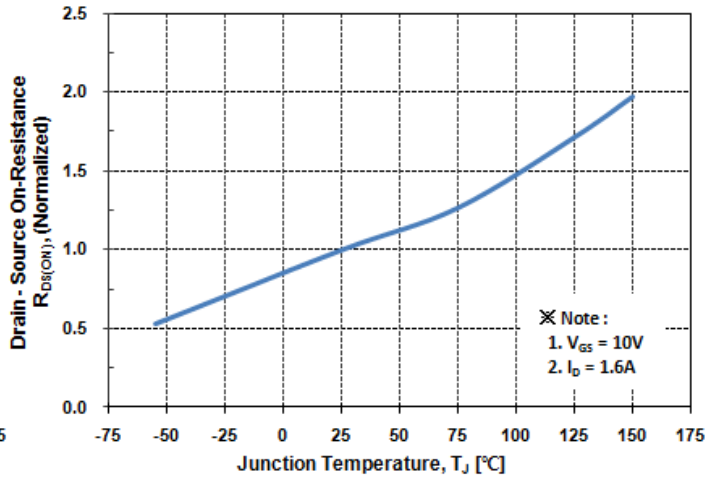


Fig. 9 I_D - T_C

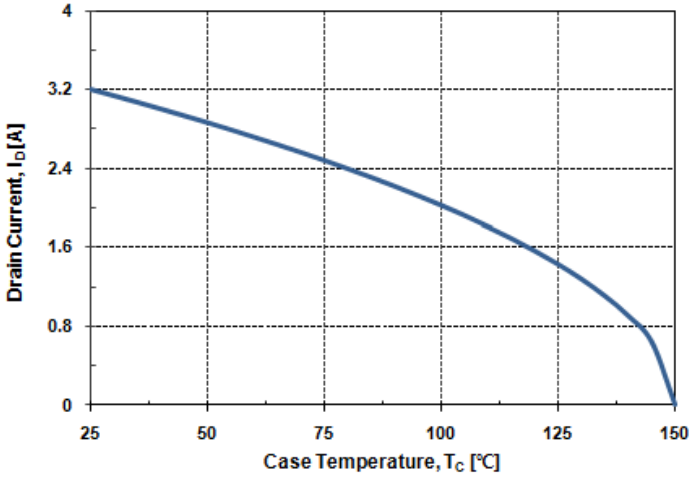


Fig. 10 Safe Operating Area

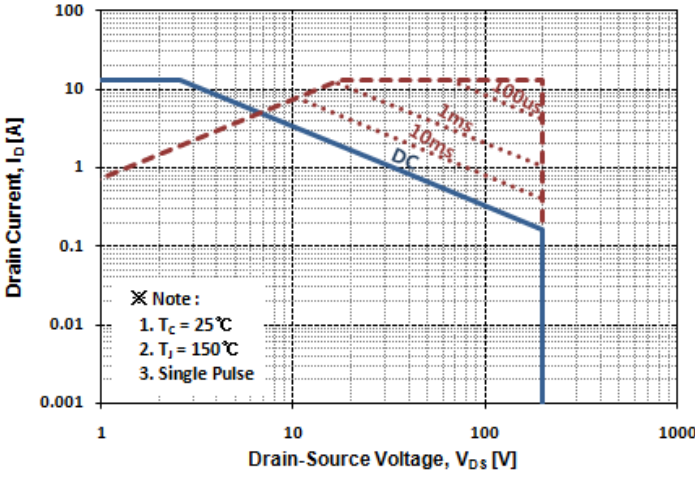


Fig. 11 Transient Thermal Impedance

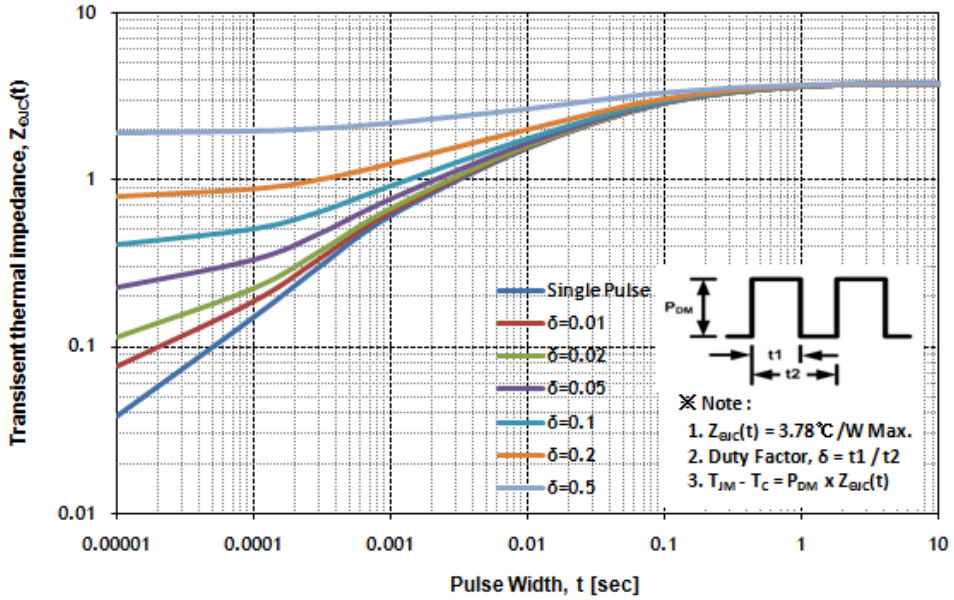
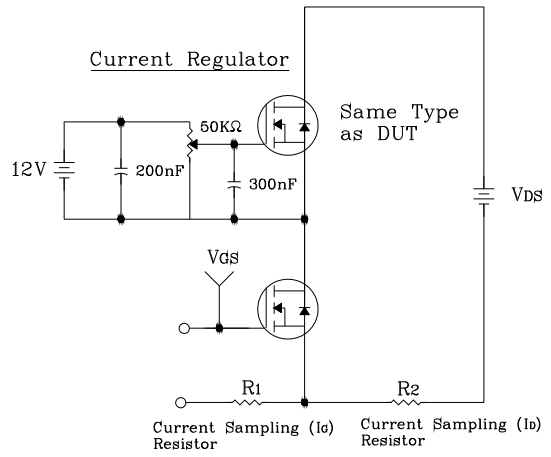


Fig. 12 Gate Charge Test Circuit & Waveform



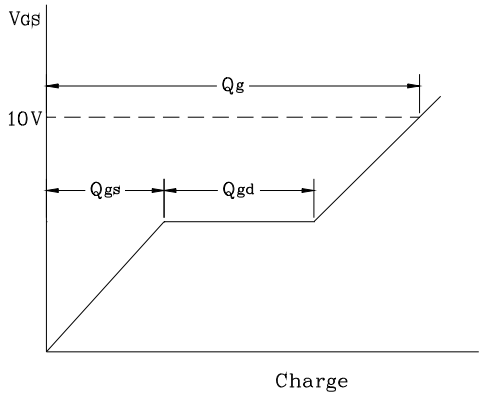
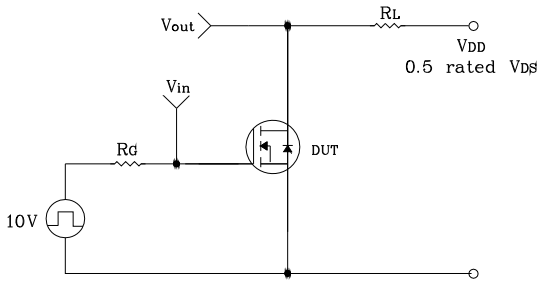


Fig. 13 Resistive Switching Test Circuit & Waveform



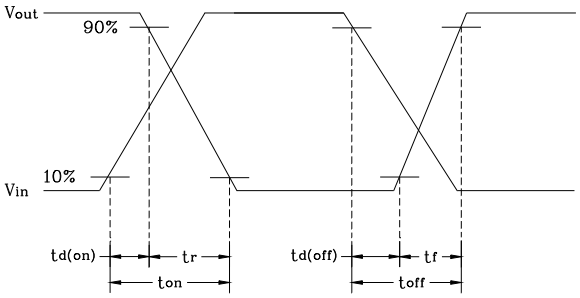
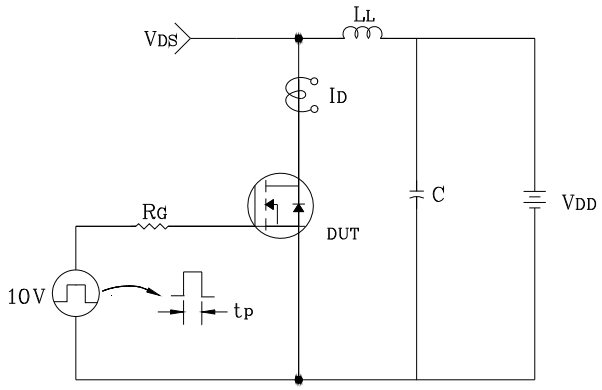


Fig. 14 E_{AS} Test Circuit & Waveform



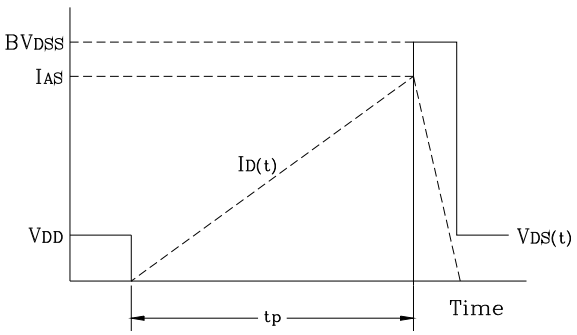
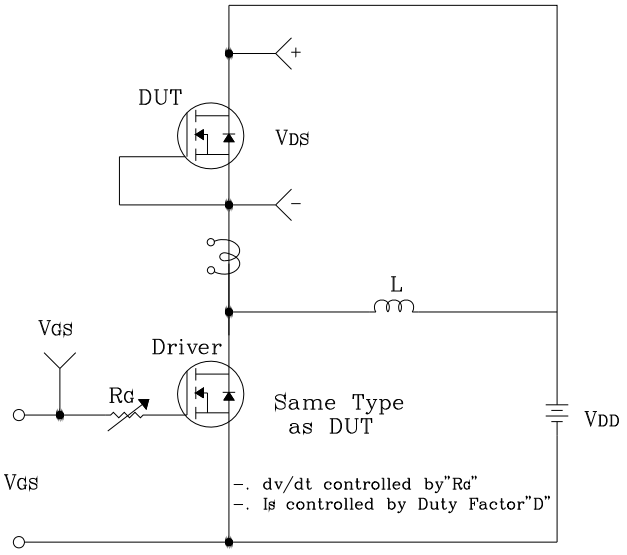
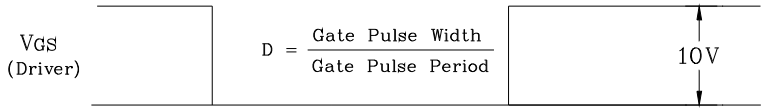
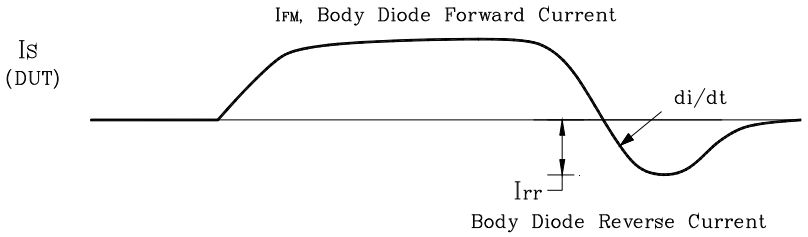
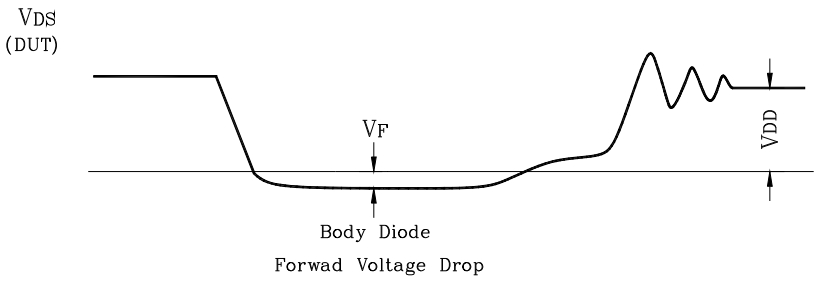


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform

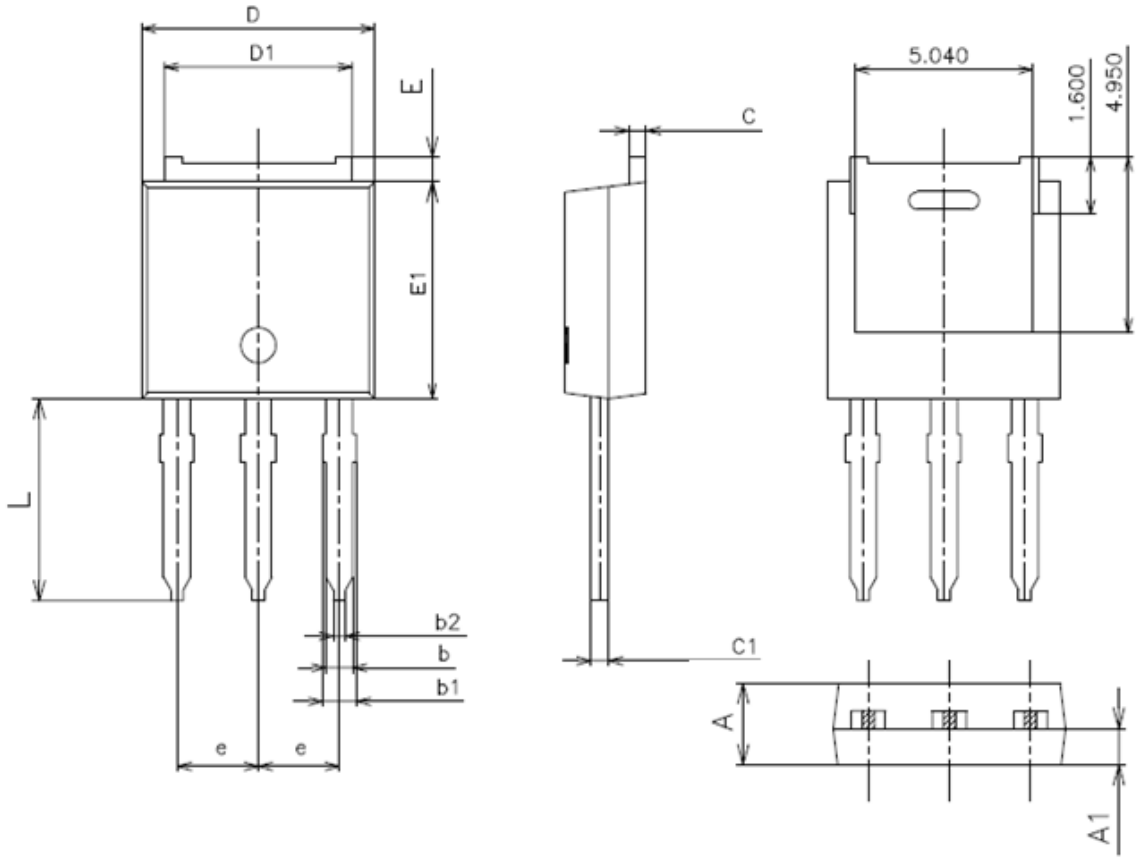








Package Outline Dimensions



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	
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	
L	5.50	5.70	5.90	
b	0.66	0.76	0.86	
b1	0.82	1.02	1.22	
b2	0.25	0.35	0.45	
e	2.10	2.30	2.50	

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