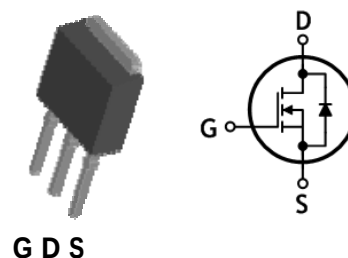


HIGH SPEED SWITCHING APPLICATION

Features

- Low drain-source On resistance: $R_{DS(on)}=2.4\Omega$ (Typ.)
- Low gate charge: $Q_g=12nC$ (Typ.)
- Low reverse transfer capacitance: $C_{rss}=6pF$ (Typ.)
- Lower EMI noise
- RoHS compliant device
- 100% avalanche tested

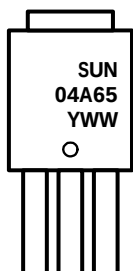


I-PAK (Short Lead)

Ordering Information

Part Number	Marking	Package
SUN04A65IS	SUN04A65	I-PAK (Short Lead)

Marking Information



Column 1, 2: Device Code
Column 3: Production Information
e.g.) YWW
-. YWW: Date Code (year, week)

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

Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DS}	650	V
Gate-source voltage	V_{GS}	± 30	V
Drain current (DC) *	I_D	$T_c=25^\circ C$	4
		$T_c=100^\circ C$	2.53
Drain current (Pulsed) *	I_{DM}	16	A
Single avalanche energy (Note 2)	E_{AS}	86.7	mJ
Repetitive avalanche current (Note 1)	I_{AR}	4	A
Repetitive avalanche energy (Note 1)	E_{AR}	5.2	mJ
Power dissipation	P_D	52	W
Junction temperature	T_J	150	$^\circ C$
Storage temperature range	T_{stg}	-55-150	$^\circ C$

* Limited only maximum junction temperature

Thermal Characteristics

Characteristic	Symbol	Rating	Unit
Thermal resistance, junction to case	$R_{th(j-c)}$	Max. 2.4	°C/W
Thermal resistance, junction to ambient	$R_{th(j-a)}$	Max. 83	

Electrical Characteristics ($T_c=25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0$	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu\text{A}$, $V_{DS}=V_{GS}$	3	-	5	V
Drain-source cut-off current	I_{DSS}	$V_{DS}=650\text{V}$, $V_{GS}=0\text{V}$	-	-	1	μA
		$V_{DS}=650\text{V}$, $T_c=150^\circ\text{C}$	-	-	100	μA
Gate leakage current	I_{GSS}	$V_{DS}=0\text{V}$, $V_{GS}=\pm 30\text{V}$	-	-	± 100	nA
Drain-source on-resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=2\text{A}$	-	2.4	3	Ω
Forward transfer conductance (Note 3)	g_{fs}	$V_{DS}=10\text{V}$, $I_D=2\text{A}$	-	4.4	-	S
Input capacitance	C_{iss}	$V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$	-	725	-	pF
Output capacitance	C_{oss}		-	52	-	
Reverse transfer capacitance	C_{rss}		-	6	-	
Turn-on delay time (Note 3,4)	$t_{d(on)}$	$V_{DS}=325\text{V}$, $I_D=4\text{A}$, $R_G=25\Omega$	-	48	-	ns
Rise time (Note 3,4)	t_r		-	32	-	
Turn-off delay time (Note 3,4)	$t_{d(off)}$		-	79	-	
Fall time (Note 3,4)	t_f		-	25	-	
Total gate charge (Note 3,4)	Q_g	$V_{DS}=520\text{V}$, $V_{GS}=10\text{V}$, $I_D=4\text{A}$	-	12	16	nC
Gate-source charge (Note 3,4)	Q_{gs}		-	5	-	
Gate-drain charge (Note 3,4)	Q_{gd}		-	2.5	-	

Source-Drain Diode Ratings and Characteristics ($T_c=25^\circ\text{C}$ 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}	$V_{GS}=0\text{V}$, $I_{SD}=4\text{A}$	-	-	1.4	V
Reverse recovery time (Note 3,4)	t_{rr}	$I_{SD}=4\text{A}$, $V_{GS}=0\text{V}$ $di_F/dt=100\text{A}/\mu\text{s}$	-	498	-	ns
Reverse recovery charge (Note 3,4)	Q_{rr}		-	0.98	-	μC

Note:

1. Repeated rating: Pulse width limited by safe operating area
2. $L=10\text{mH}$, $I_{AS}=4\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
3. Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature typical characteristics

Typical Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

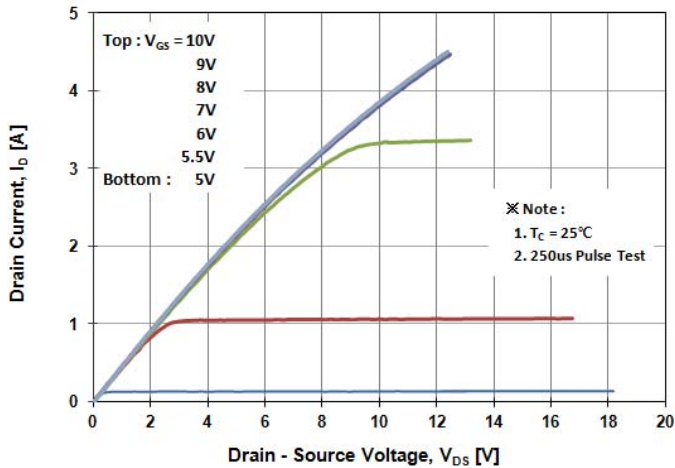


Fig. 2 Typical Output Characteristics

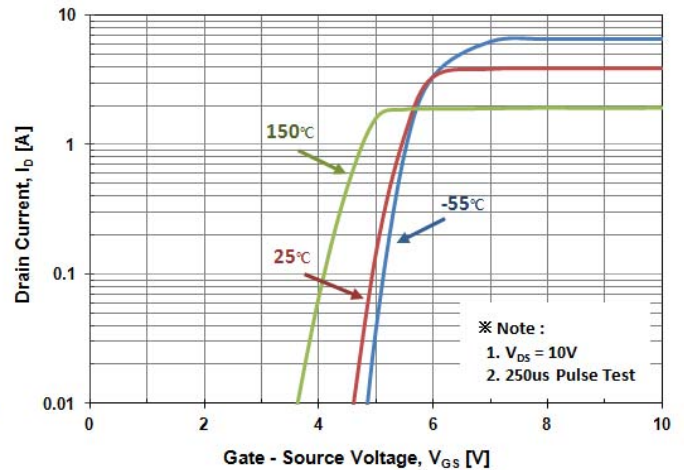


Fig.3 On-Resistance Variation with Drain Current and Gate Voltage

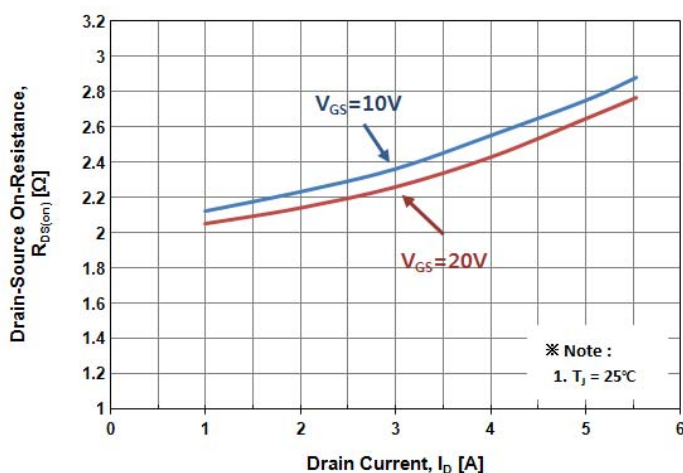


Fig. 4 Body Diode Forward Voltage Variation with Source Current

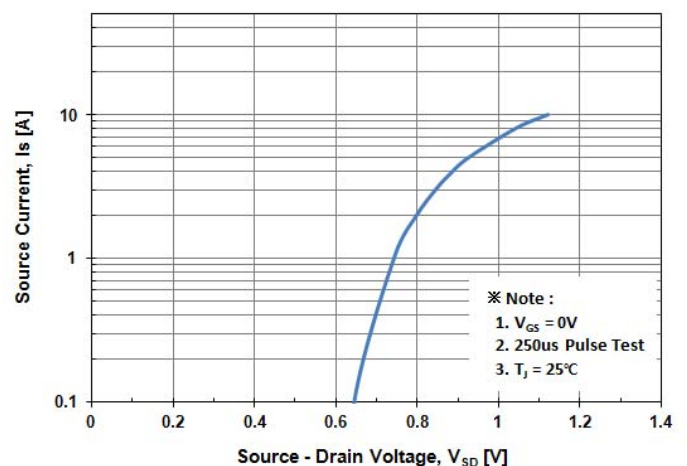


Fig. 5 Typical Capacitance Characteristics

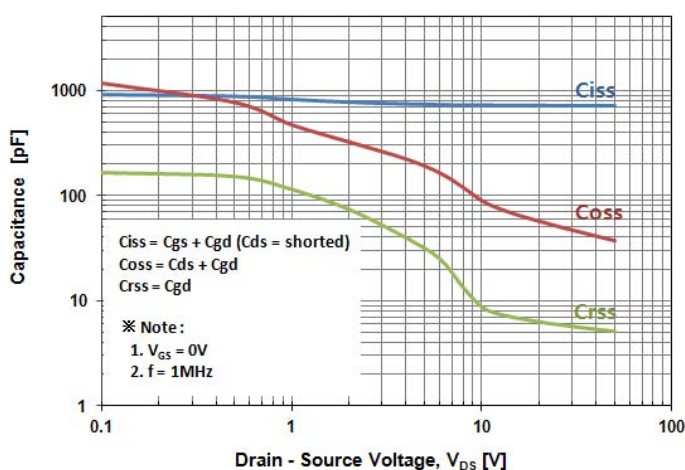


Fig. 6 Typical Total Gate Charge Characteristics

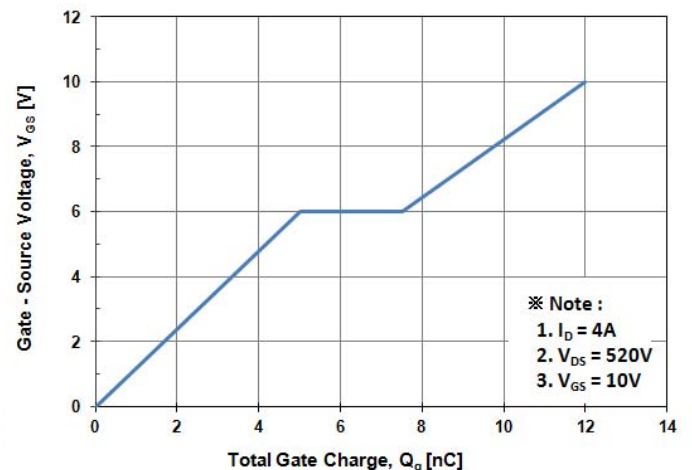


Fig. 7 Breakdown Voltage Variation vs. Temperature

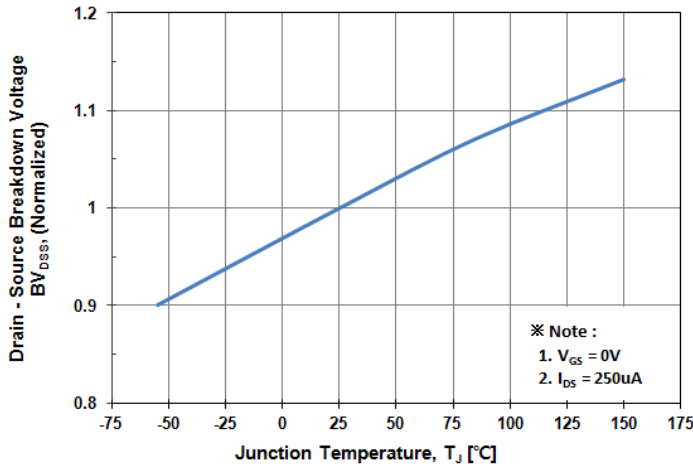


Fig. 8 On-Resistance Variation vs. Temperature

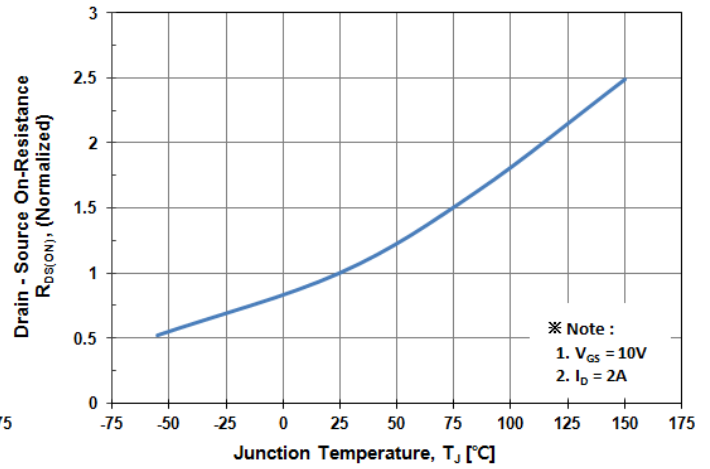


Fig. 9 Maximum Drain Current vs. Case Temperature

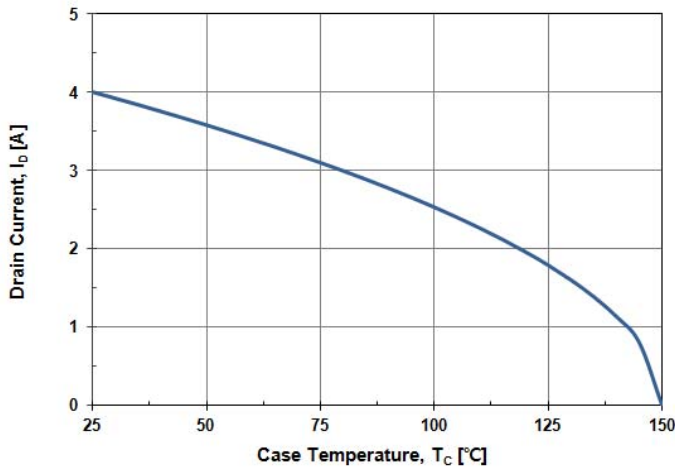


Fig. 10 Maximum Safe Operating Area

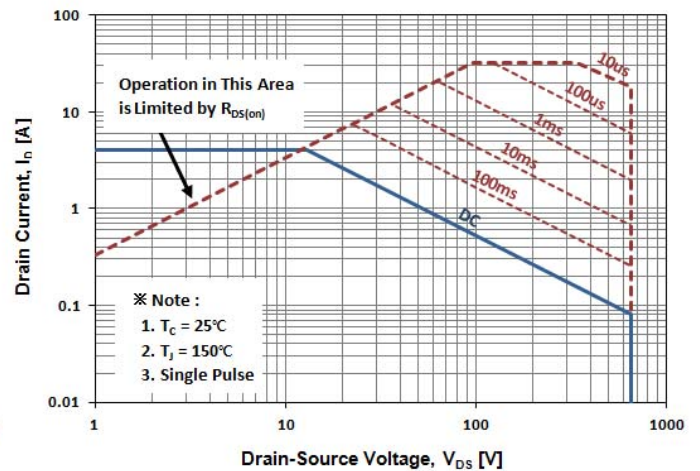


Fig. 11 Transient Thermal Impedance

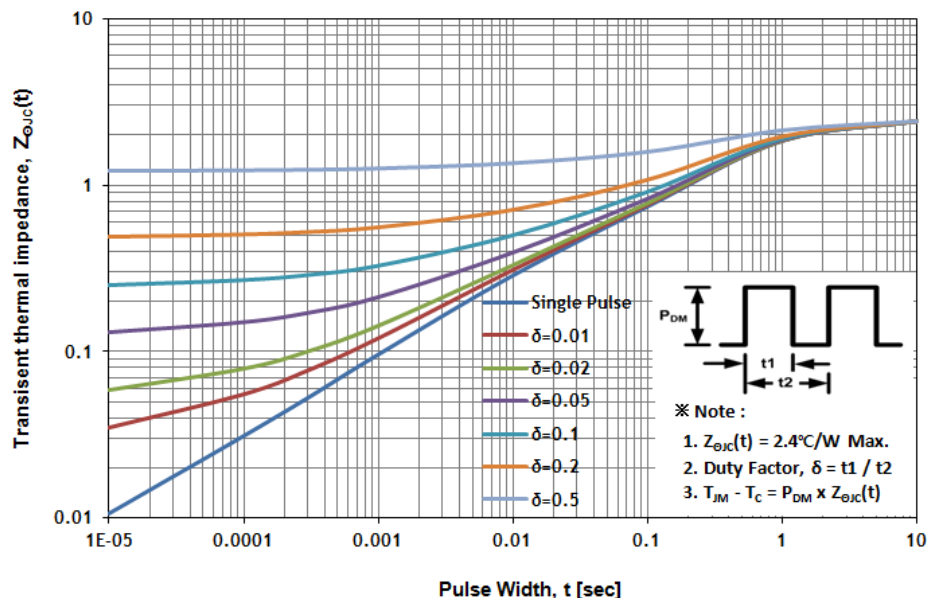


Fig. 12 Gate Charge Test Circuit & Waveform

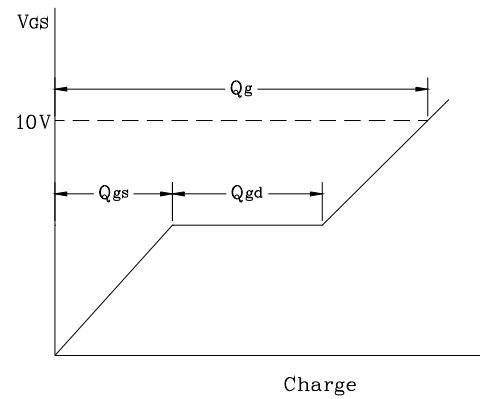
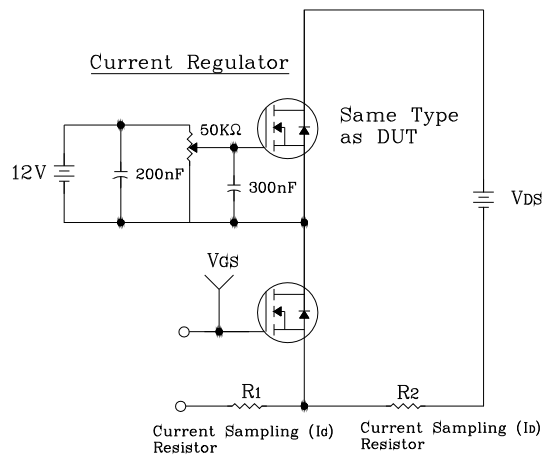


Fig. 13 Resistive Switching Test Circuit & Waveform

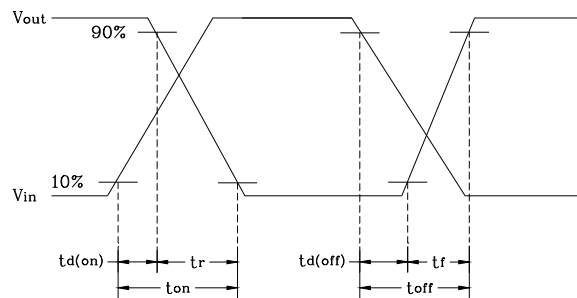
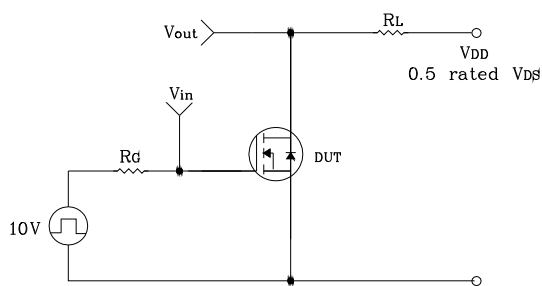


Fig. 14 E_{AS} Test Circuit & Waveform

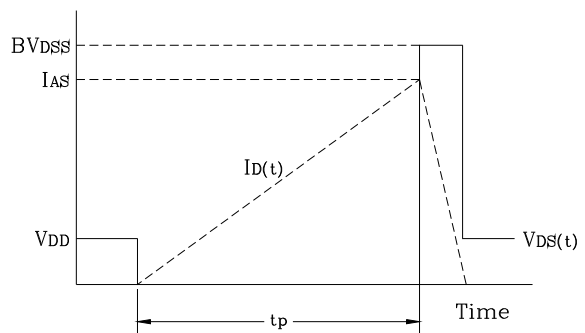
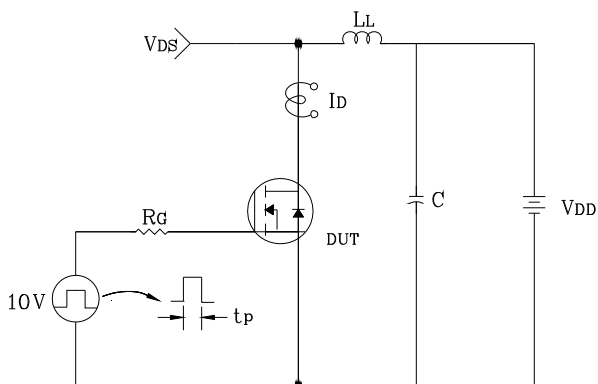
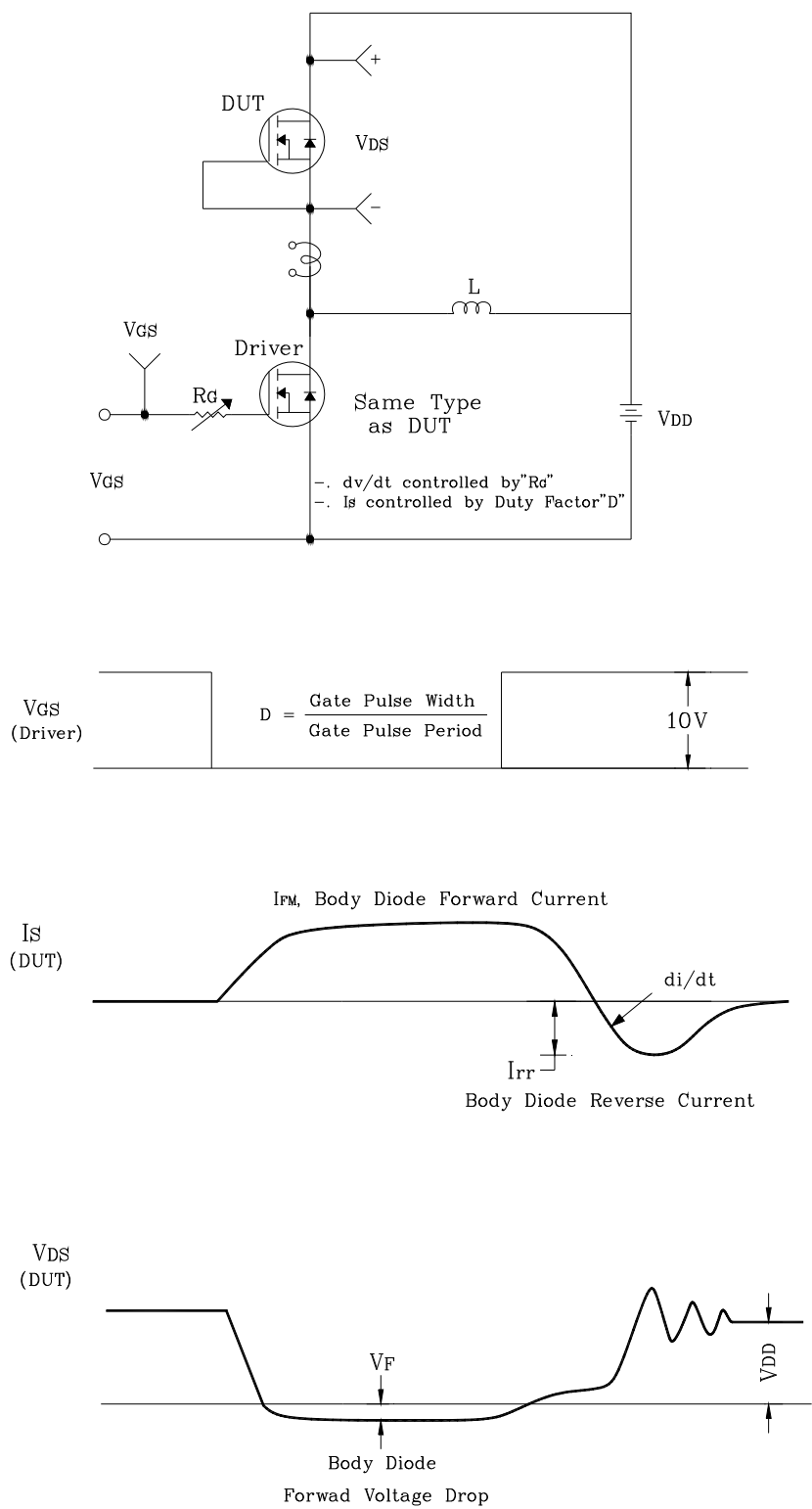
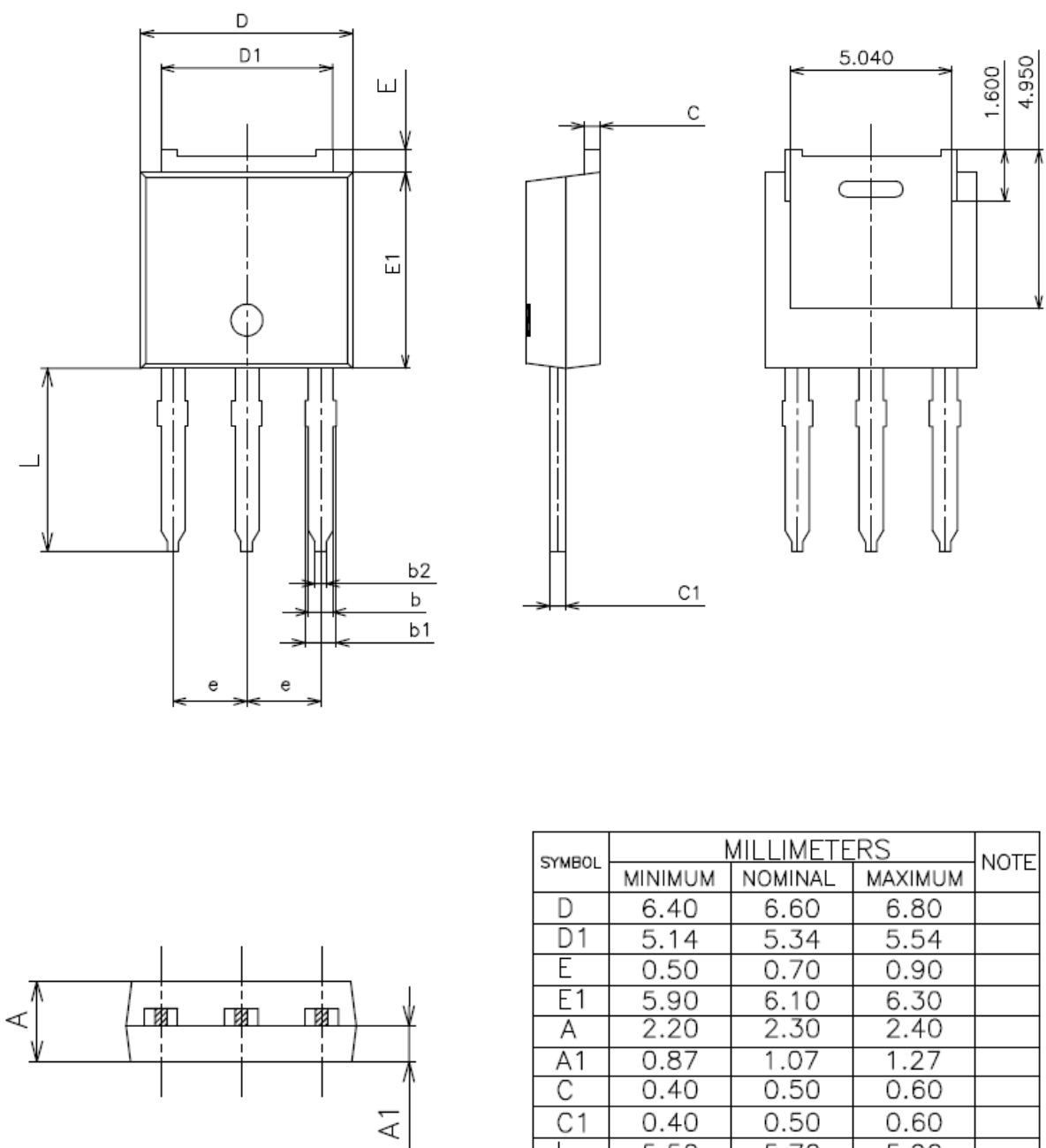


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform



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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