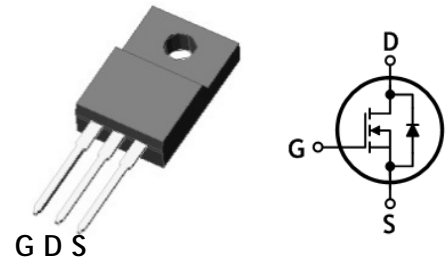


HIGH SPEED SWITCHING APPLICATION

Features

- Low drain-source On resistance: $R_{DS(on)}=0.72\Omega$ (Typ.)
- Low gate charge: $Q_g=35nC$ (Typ.)
- Low reverse transfer capacitance: $C_{rss}=16pF$ (Typ.)
- RoHS compliant device
- 100% avalanche tested

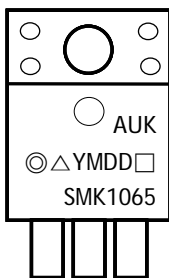


Ordering Information

Part Number	Marking	Package
SMK1065F	SMK1065	TO-220F-3L

TO-220F-3L

Marking Information



AUK = Manufacture Logo
 ◎ = Management Code
 △ = Machine Code
 YMDD = Date Code Marking
 -. YMDD = Date Code (year, week, daily)
 □ = Factory Management Code
 SMK1065 = Specific Device Code

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

Characteristic	Symbol	Rating	Unit	
Drain-source voltage	V_{DSS}	650	V	
Gate-source voltage	V_{GSS}	± 30	V	
Drain current (DC) *	I_D	$T_C=25^\circ C$	10	A
		$T_C=100^\circ C$	6.32	A
Drain current (Pulsed) *	I_{DM}	40	A	
Single avalanche energy (Note 2)	E_{AS}	250	mJ	
Repetitive avalanche current (Note 1)	I_{AR}	9	A	
Repetitive avalanche energy (Note 1)	E_{AR}	3.2	mJ	
Power dissipation	P_D	32	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. 3.9	°C/W
Thermal resistance, junction to ambient	$R_{th(j-a)}$	Max. 62.5	

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	$V_{GS(th)}$	$V_{DS}=10\text{V}, I_D=250\mu\text{A}$	2	-	4	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	$R_{DS(ON)}$	$V_{GS}=10\text{V}, I_D=4.5\text{A}$	-	0.72	0.85	Ω
Forward transfer conductance (Note 3)	g_{fs}	$V_{DS}=10\text{V}, I_D=4.5\text{A}$	-	11	-	S
Input capacitance	C_{iss}	$V_{DS}=25\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$	-	2040	2550	pF
Output capacitance	C_{oss}		-	153	192	
Reverse transfer capacitance	C_{rss}		-	16	20	
Turn-on delay time (Note 3,4)	$t_{d(on)}$	$V_{DS}=300\text{V}, I_D=9\text{A}, R_G=25\Omega$	-	23	-	ns
Rise time (Note 3,4)	t_r		-	69	-	
Turn-off delay time (Note 3,4)	$t_{d(off)}$		-	144	-	
Fall time (Note 3,4)	t_f		-	77	-	
Total gate charge (Note 3,4)	Q_g	$V_{DS}=520\text{V}, V_{GS}=10\text{V}, I_D=9\text{A}$	-	35	57	nC
Gate-source charge (Note 3,4)	Q_{gs}		-	10	-	
Gate-drain charge (Note 3,4)	Q_{gd}		-	9	-	

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	-	-	9	A
Source current (Pulsed)	I_{SM}		-	-	36	A
Forward voltage	V_{SD}	$V_{GS}=0\text{V}, I_{SD}=9\text{A}$	-	-	1.4	V
Reverse recovery time (Note 3,4)	t_{rr}	$I_{SD}=9\text{A}, V_{GS}=0\text{V}$	-	420	-	ns
Reverse recovery charge (Note 3,4)	Q_{rr}	$dI_F/dt=100\text{A}/\mu\text{s}$	-	4.2	-	μC

Note:

1. Repeated rating: Pulse width limited by safe operating area
2. $L=5.7\text{mH}, I_{AS}=9\text{A}, V_{DD}=50\text{V}, R_G=25\Omega$, 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

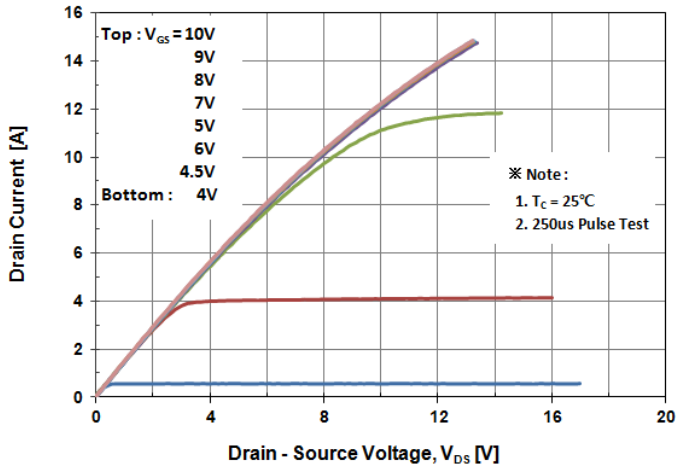


Fig. 2 Typical Output Characteristics

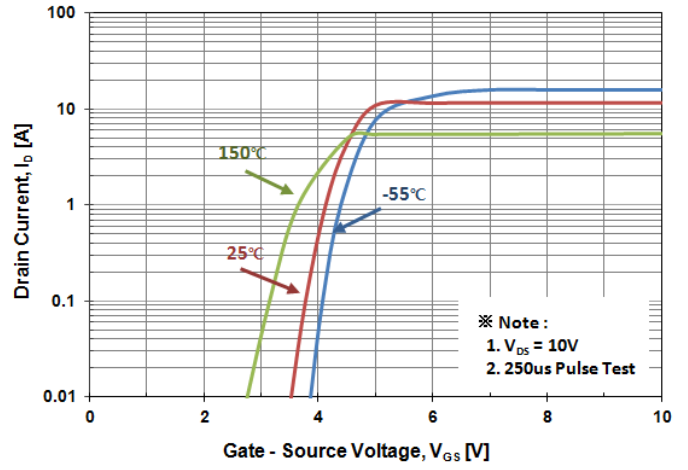


Fig.3 On-Resistance Variation with Drain Current and Gate Voltage

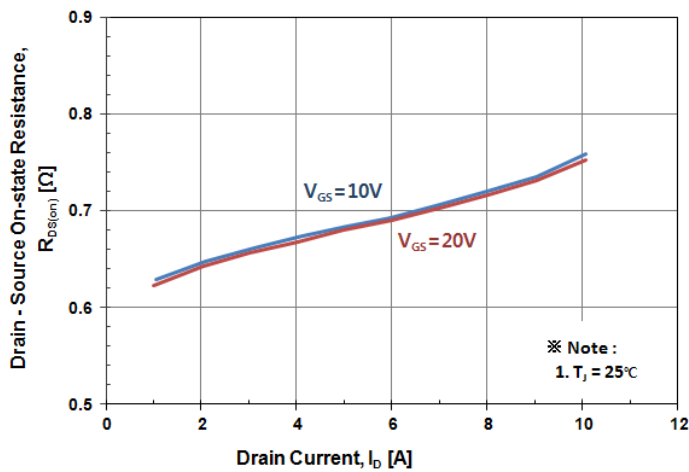


Fig. 4 Body Diode Forward Voltage Variation with Source Current

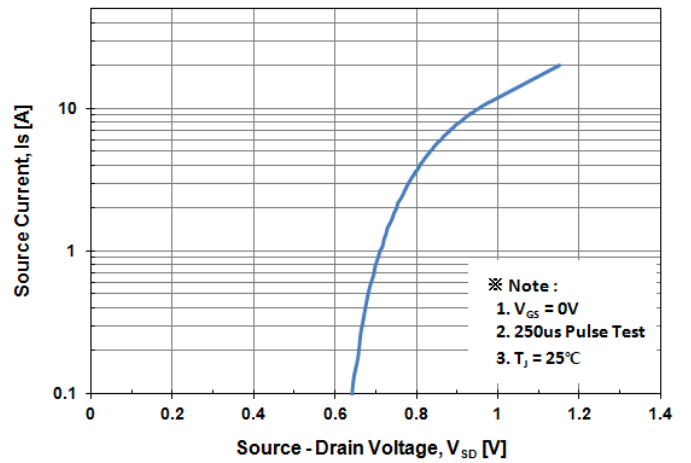


Fig. 5 Typical Capacitance Characteristics

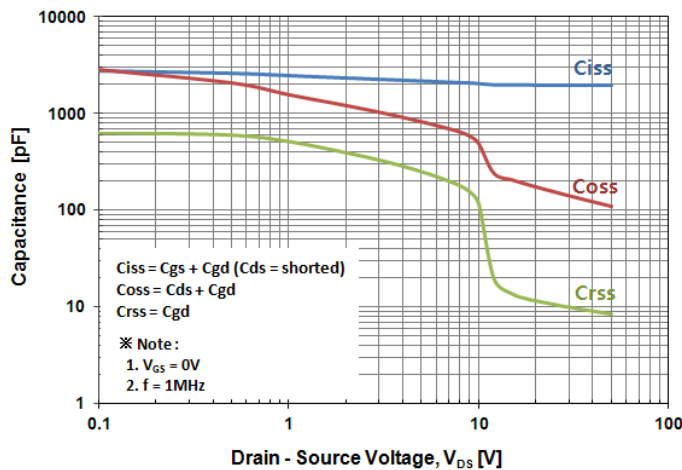


Fig. 6 Typical Total Gate Charge Characteristics

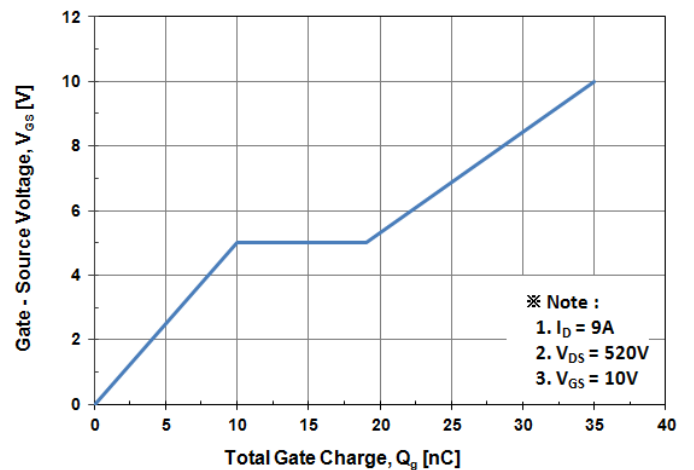


Fig. 7 Breakdown Voltage Variation vs. Temperature

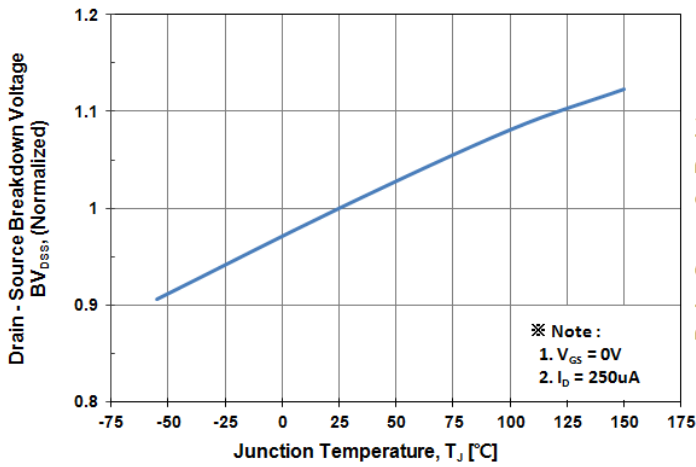


Fig. 8 On-Resistance Variation vs. Temperature

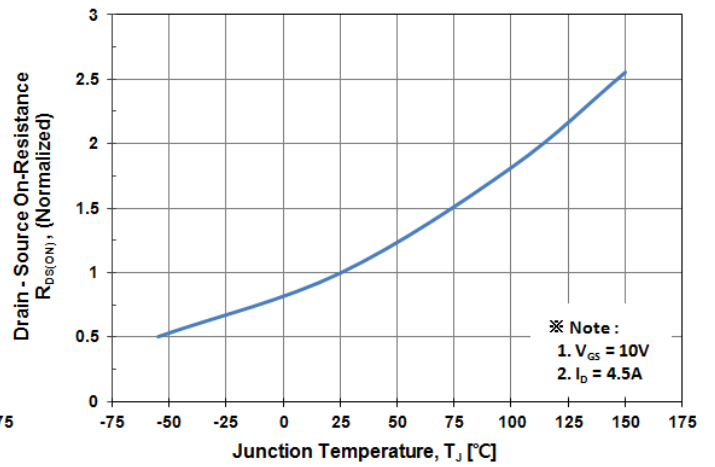


Fig. 9 Maximum Drain Current vs. Case Temperature

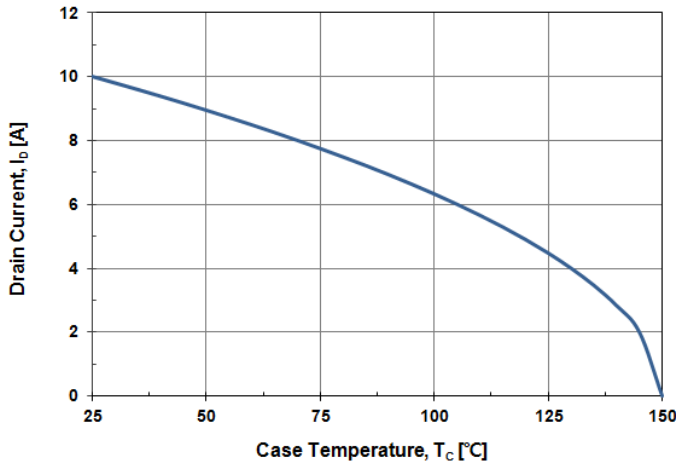


Fig. 10 Maximum Safe Operating Area

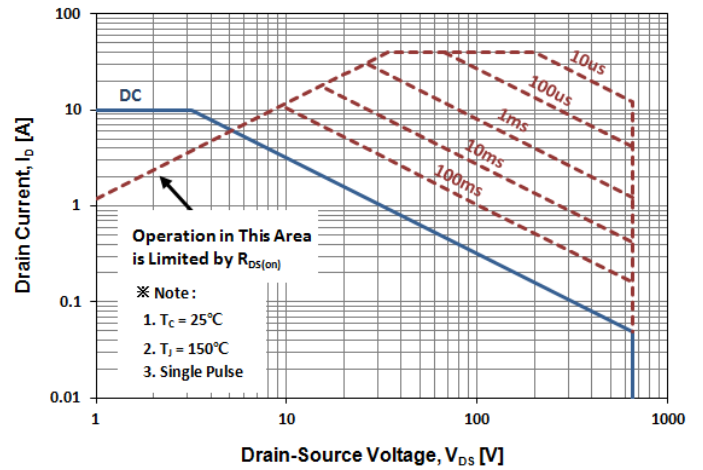


Fig. 11 Transient Thermal Impedance

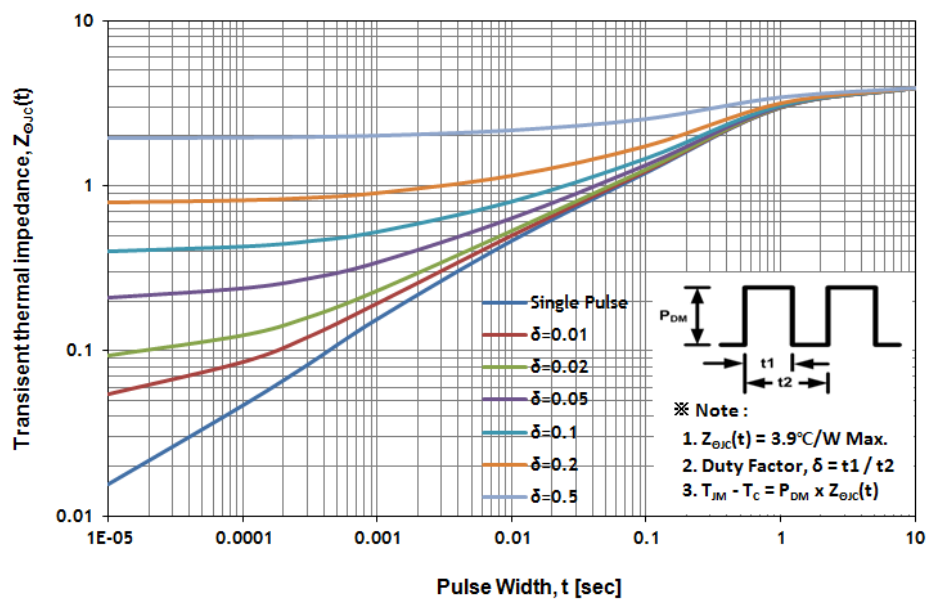


Fig. 12 Gate Charge Test Circuit & Waveform

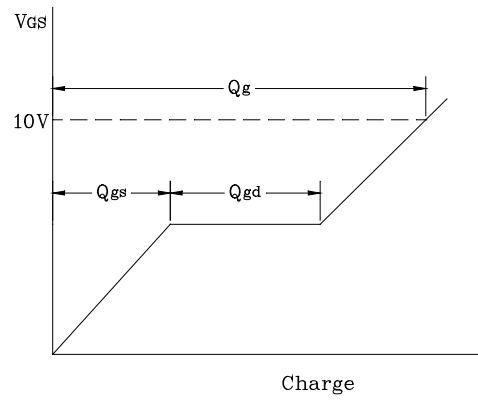
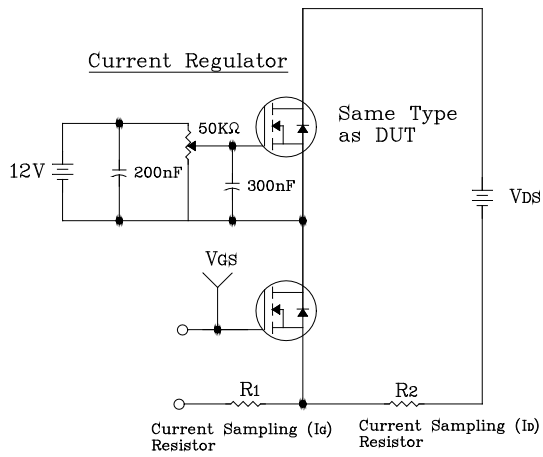


Fig. 13 Resistive Switching Test Circuit & Waveform

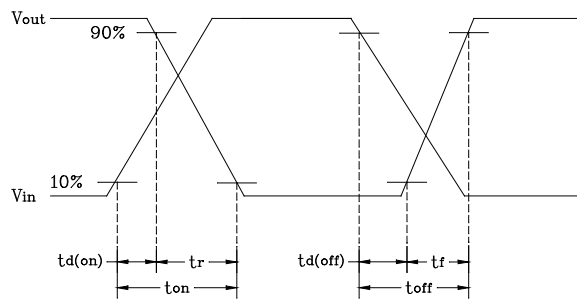
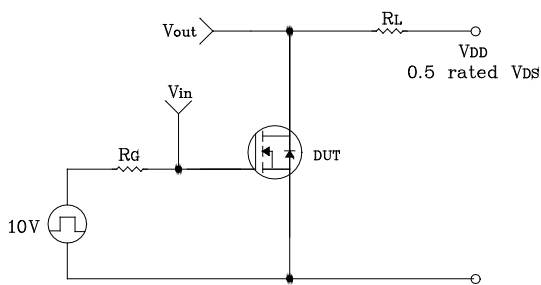


Fig. 14 E_{AS} Test Circuit & Waveform

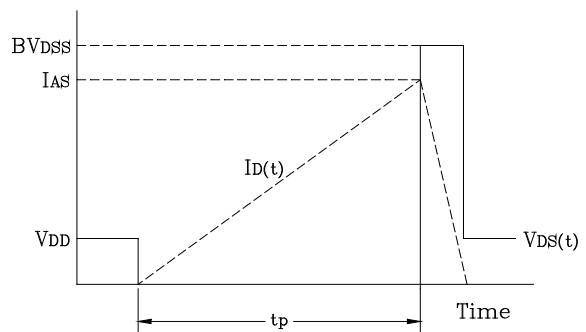
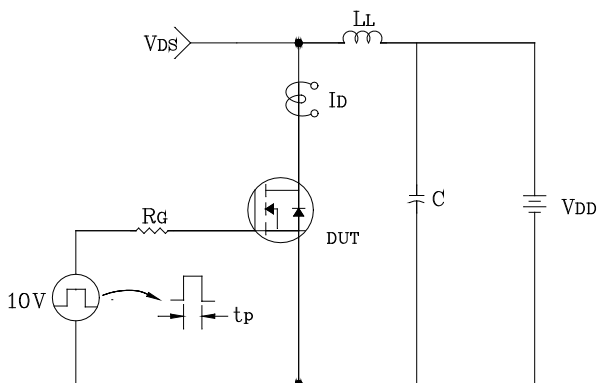
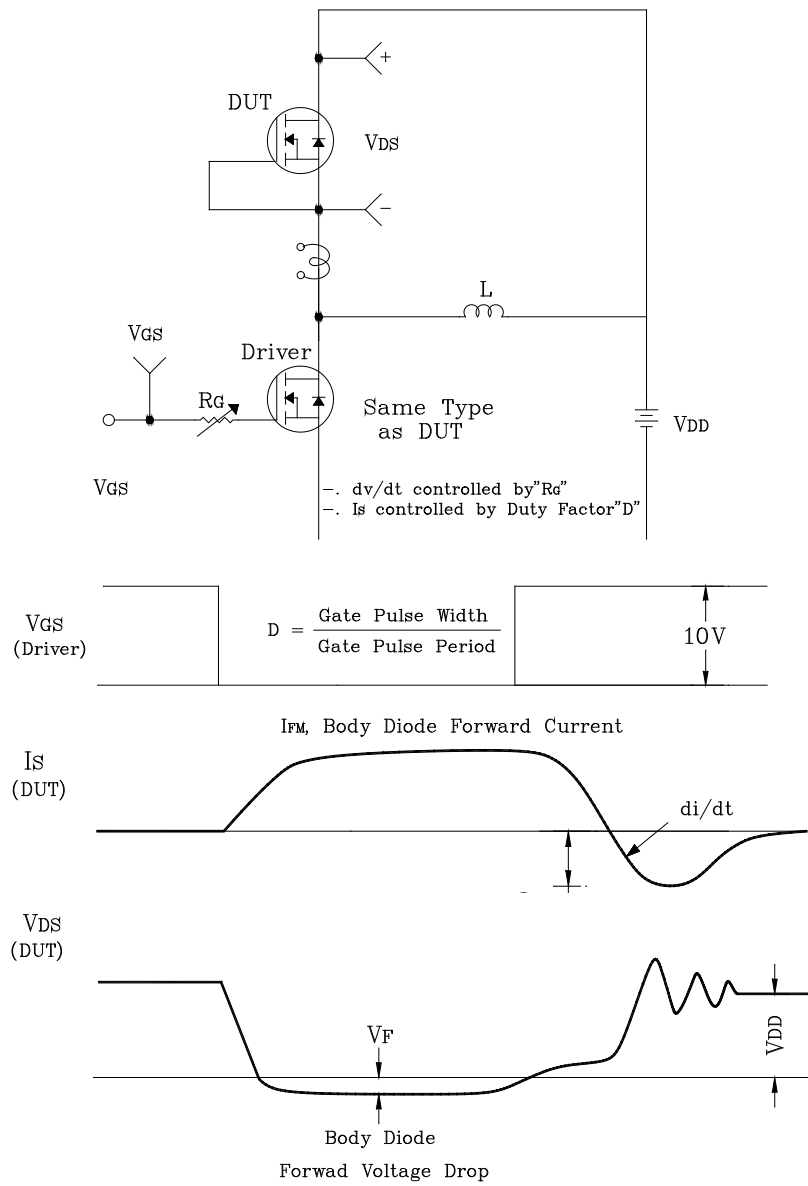
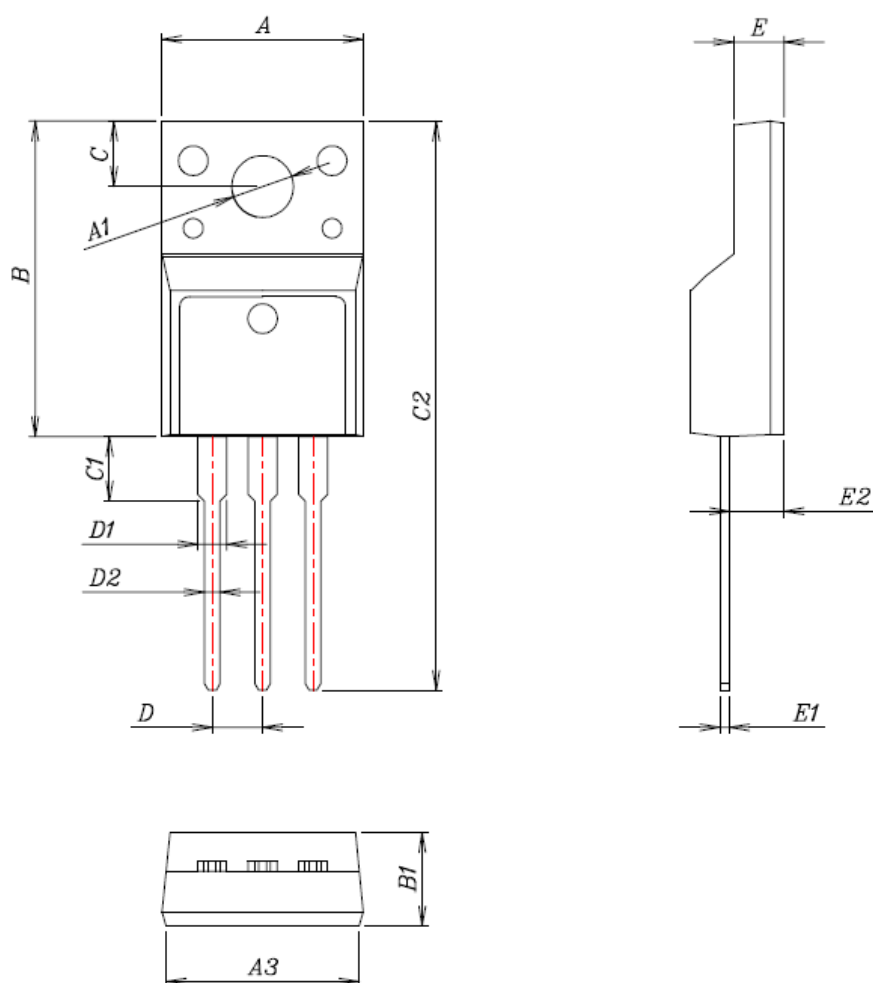


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform



SMK1065F

Package Outline Dimensions



SYMBOL	MILLIMETERS
A	10.16 ± 0.30
A1	3.12 ± 0.20
B	15.90 ± 0.50
B1	4.70 ± 0.30
C	3.30 ± 0.25
C1	3.25 ± 0.30
C2	28.70 ± 0.50
D	Typical 2.54
D1	1.47(MAX)
D2	0.80 ± 0.20
E	2.55 ± 0.25
E1	0.50 ± 0.20
E2	2.75 ± 0.30

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