KODENSHI AUK

SMK0965F

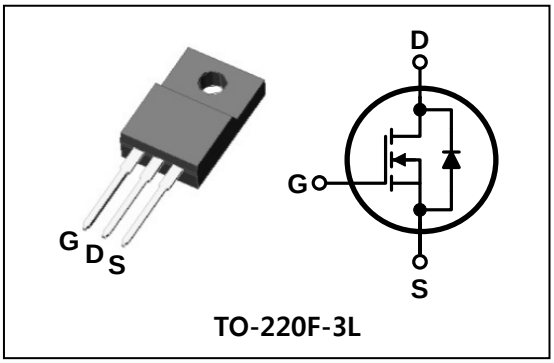
Advanced N-Ch Power MOSFET

SWITCHING REGULATOR APPLICATIONS

Features

- High Voltage : BV_{DSS}=650V(Min.)
- Low C_{rss} : C_{rss}=16pF(Typ.)
- Low gate charge : Qg=35nC(Typ.)
- Low $R_{DS(on)}$: $R_{DS(on)}$=0.85Ω(Max.)

PIN Connection

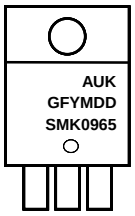


Ordering Information

Type No.	Marking	Package Code
SMK0965F	SMK0965	TO-220F-3L
SMK0965F (HF)	SMK0965	TO-220F-3L

* SMK0965F : Pb Free Product
* SMK0965F (HF) : Halogen Free Product

Marking Diagram



Column 1 : Manufacturer

Column 2 : Production Information
e.g.) GFYMDD
-. G : Option Code (H : Halogen Free)
-. F : Factory Management Code
-. YMDD : Date Code (Year, Month, Date)

Column 3 : Device Code

Absolute maximum ratings (T_C=25°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°C	9	A
			T_C=100°C	5.5	A
Drain current (Pulsed) *		I_{DM}		36	A
Power dissipation		P_D		40	W
Avalanche current (Single)	②	I_{AS}		9	A
Single pulsed avalanche energy	②	E_{AS}		250	mJ
Avalanche current (Repetitive)	①	I_{AR}		9	A
Repetitive avalanche energy	①	E_{AR}		11.6	mJ
Junction temperature		T_J		150	°C
Storage temperature range		T_{stg}		-55~150	

* Limited by maximum junction temperature

Characteristic		Symbol	Typ.	Max.	Unit
Thermal resistance	Junction-case	$R_{th(J-C)}$	-	3.1	°C/W
	Junction-ambient	$R_{th(J-A)}$	-	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}=0V	650	-	-	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}=650V, V_{GS}=0V	-	-	1	uA
Gate leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±30V	-	-	±100	nA
Drain-source on-resistance ④	$R_{DS(on)}$	V_{GS}=10V, I_D=4.5A	-	0.72	0.85	Ω
Forward transfer conductance ④	g_{fs}	V_{DS}=10V, I_D=4.5A	-	11	-	S
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V f=1 MHz	-	2040	2550	pF
Output capacitance	C_{oss}		-	153	192	
Reverse transfer capacitance	C_{rss}		-	16	20	
Turn-on delay time	$t_{d(on)}$	V_{DD}=300V, I_D=9A R_G=25Ω ③④	-	23	-	ns
Rise time	t_r		-	69	-	
Turn-off delay time	$t_{d(off)}$		-	144	-	
Fall time	t_f		-	77	-	
Total gate charge	Q_g	V_{DS}=520V, V_{GS}=10V I_D=9A ③④	-	35	57	nC
Gate-source charge	Q_{gs}		-	10	-	
Gate-drain charge	Q_{gd}		-	9	-	

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	-	-	9	A
Source current (Pulsed) ①	I_{SM}		-	-	36	
Forward voltage ④	V_{SD}	V_{GS}=0V, I_S=9A	-	-	1.4	V
Reverse recovery time	t_{rr}	I_S=9A, V_{GS}=0V dI_F/dt=100A/us	-	420	-	ns
Reverse recovery charge	Q_{rr}		-	4.2	-	uC

Note ;

① Repetitive rating : Pulse width limited by maximum junction temperature

② L=5.7mH, I_{AS}=9A, 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

Electrical Characteristic Curves

Fig. 1 I_D - V_{DS}

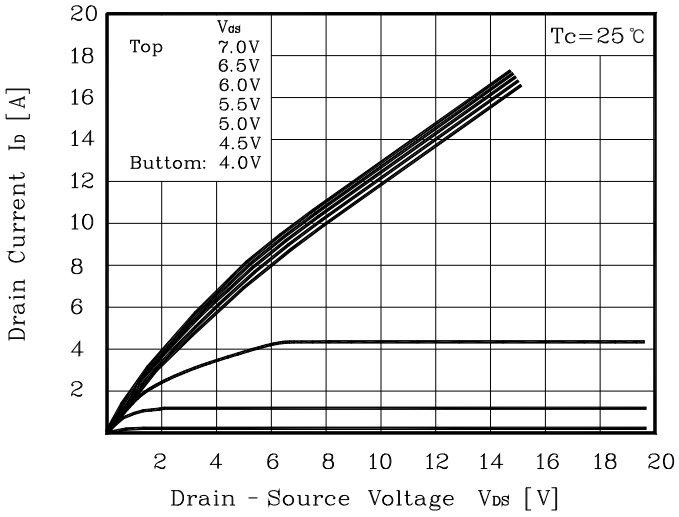


Fig. 2 I_D - V_{GS}

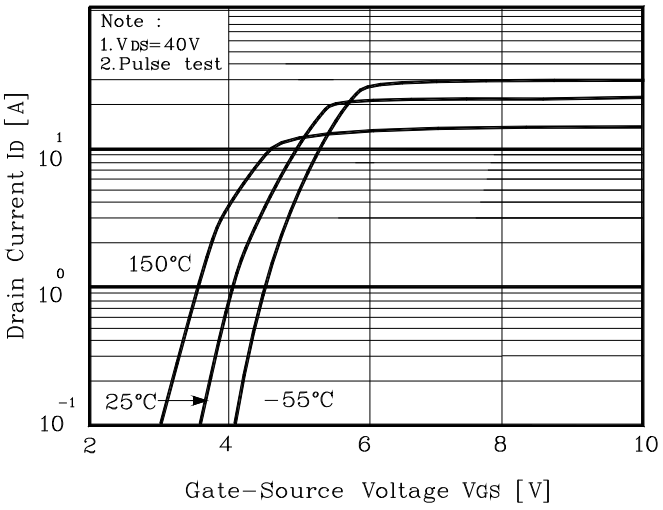


Fig. 3 $R_{DS(on)}$ - I_D

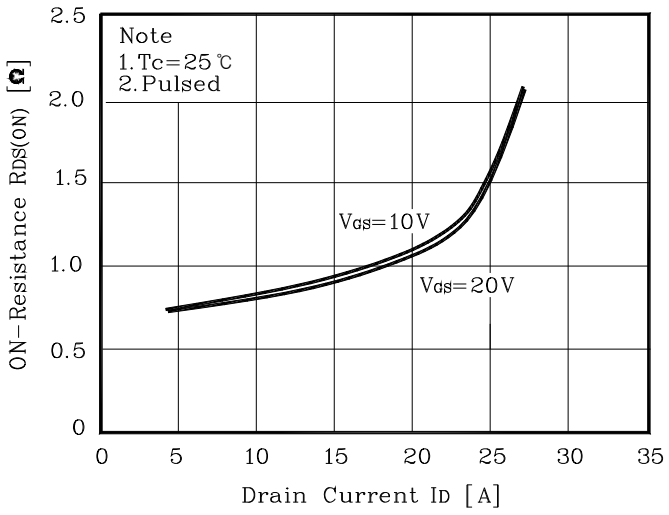


Fig. 4 I_S - V_{SD}

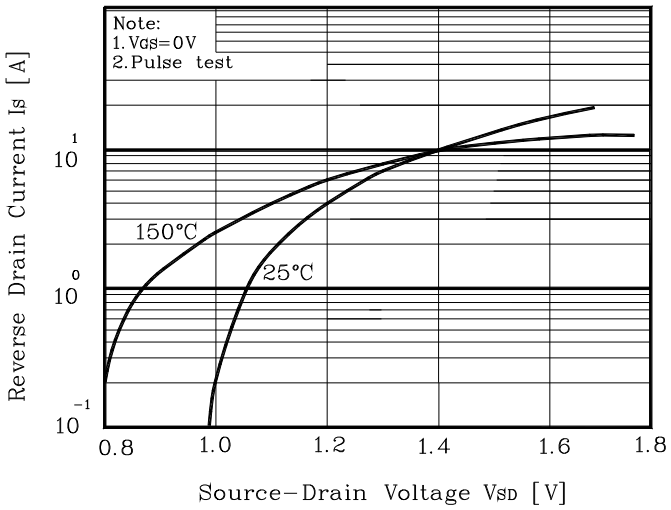


Fig. 5 Capacitance - V_{DS}

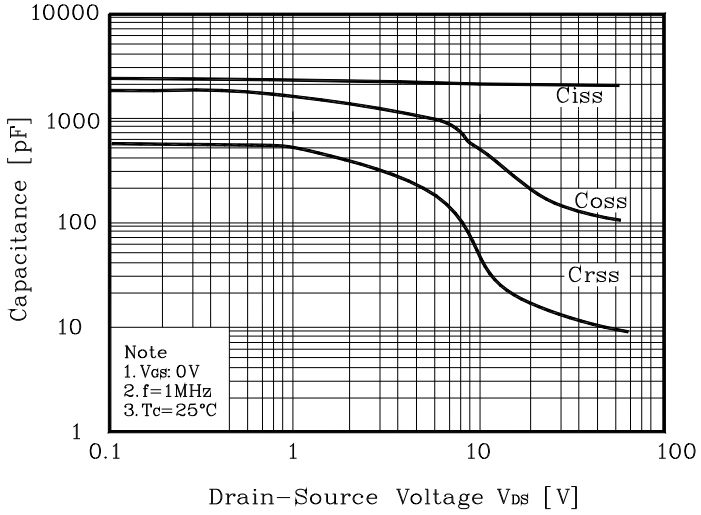
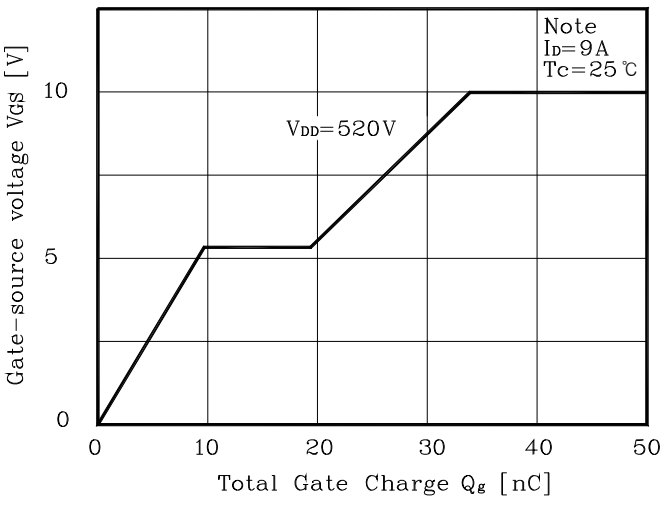


Fig.6 V_{GS} - Q_G



Electrical Characteristic Curves

Fig. 7 V_{DSS} - T_J

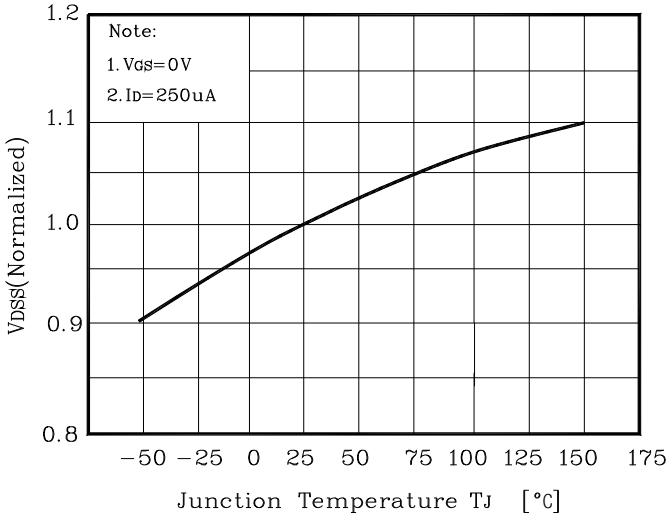


Fig.8 $R_{DS(on)}$ - T_J

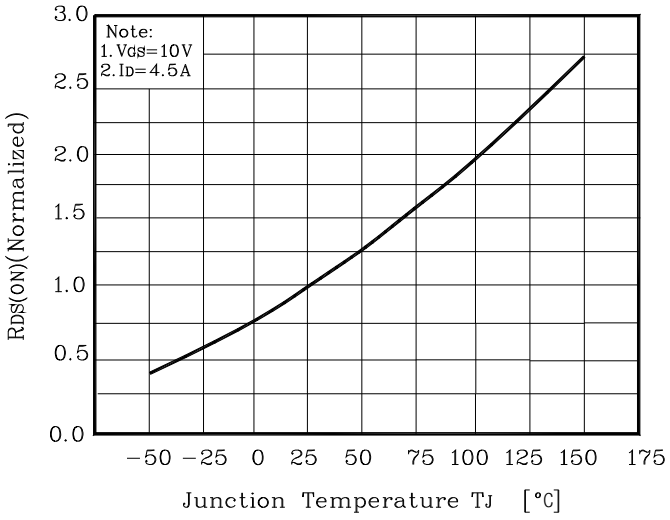


Fig. 9 I_D - T_C

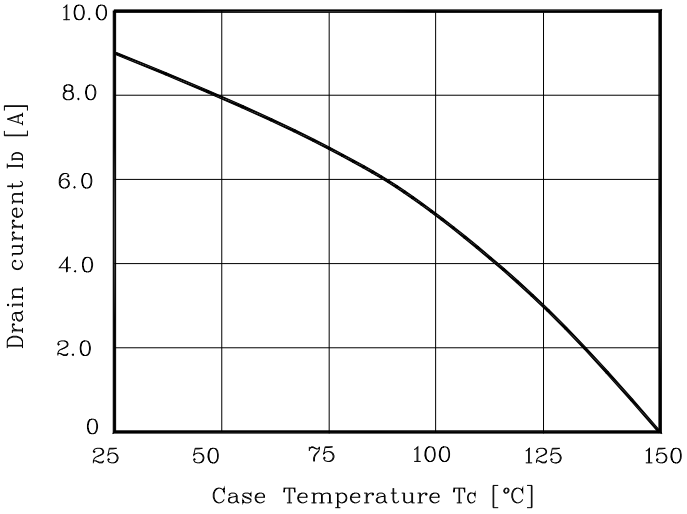


Fig. 10 Safe Operating Area

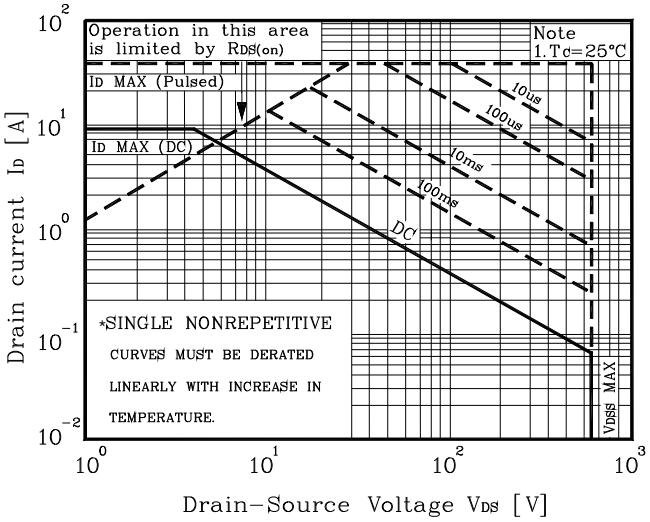


Fig. 11 Gate Charge Test Circuit & Waveform

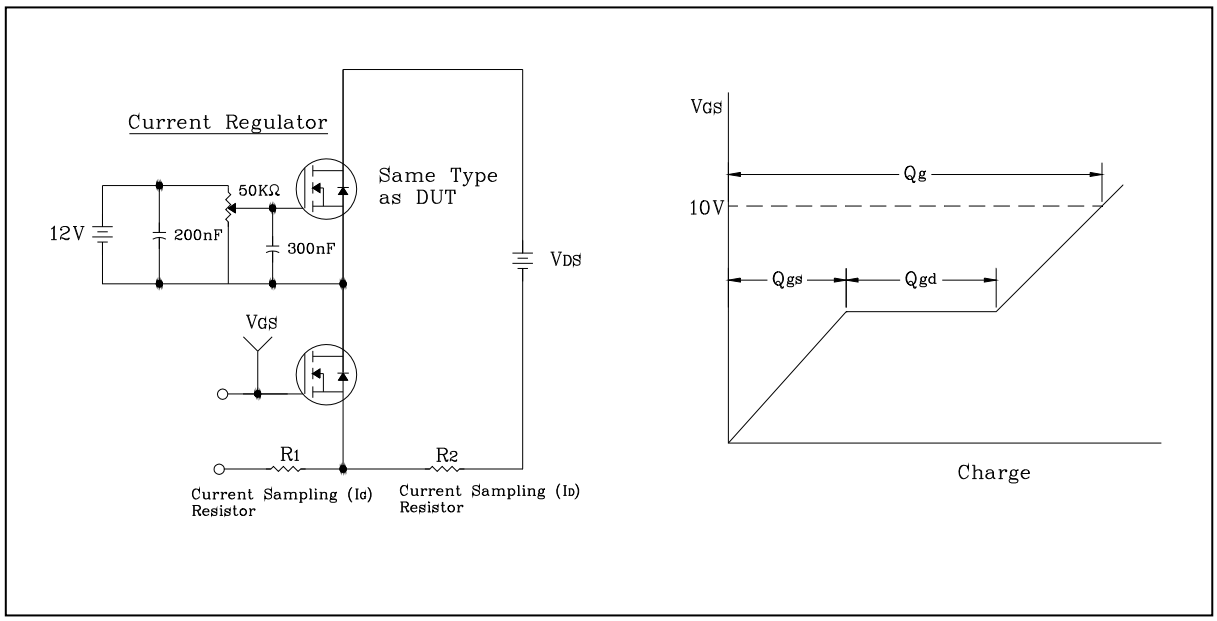


Fig. 12 Resistive Switching Test Circuit & Waveform

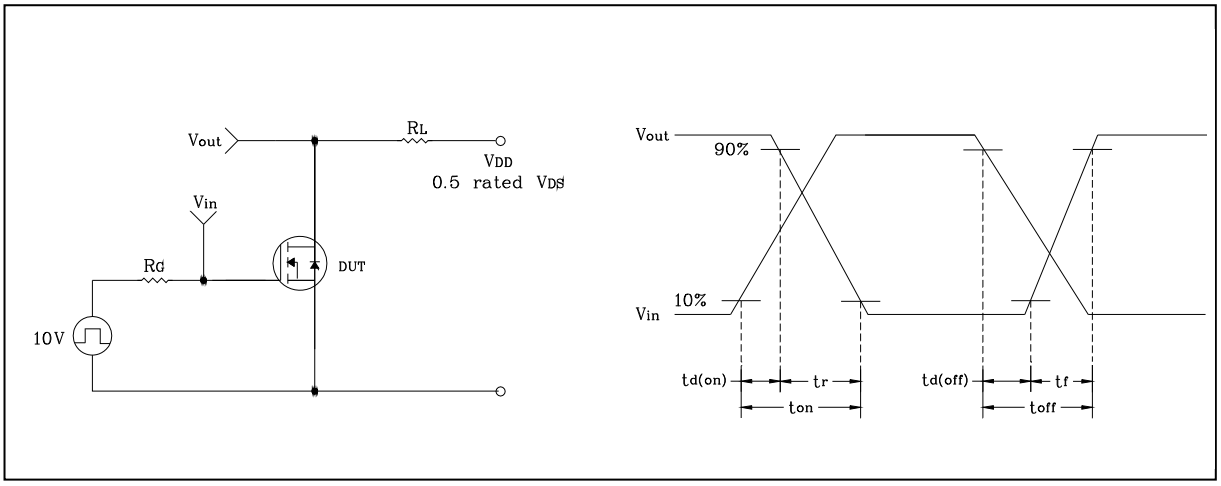


Fig. 13 E_{AS} Test Circuit & Waveform

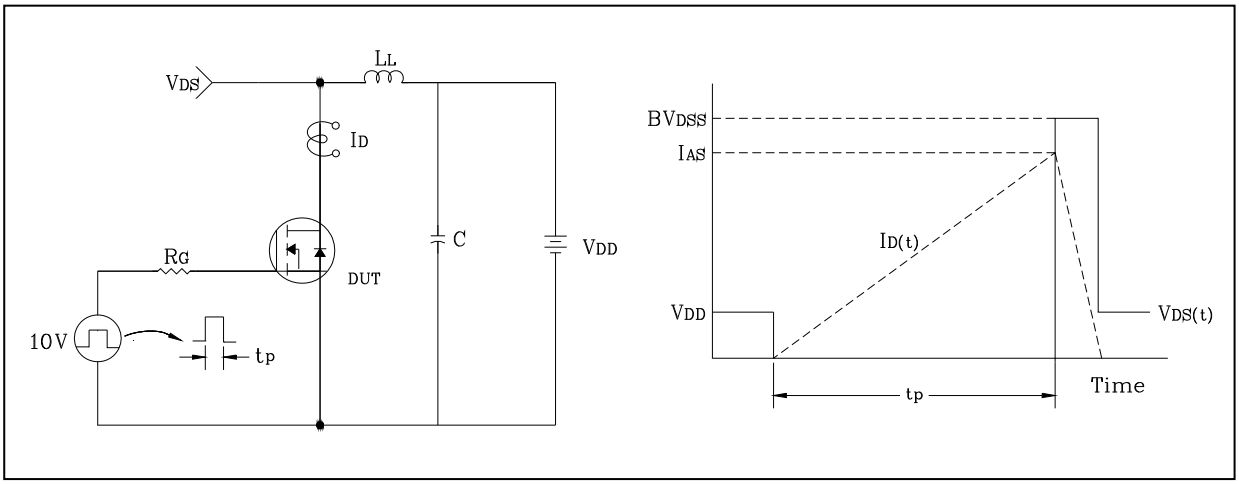
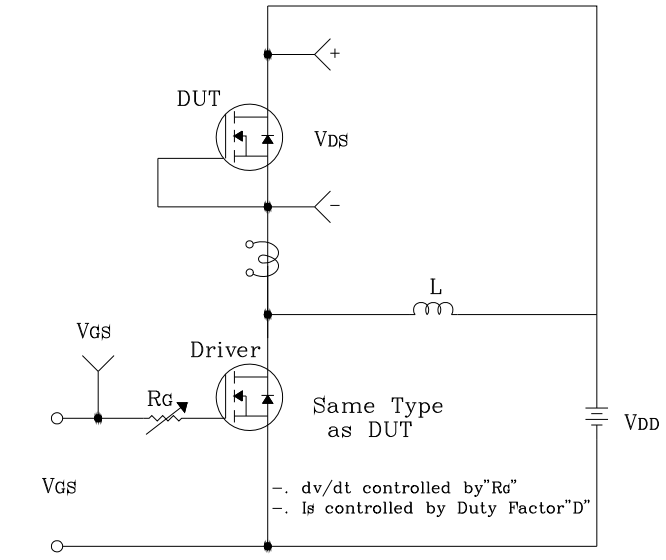
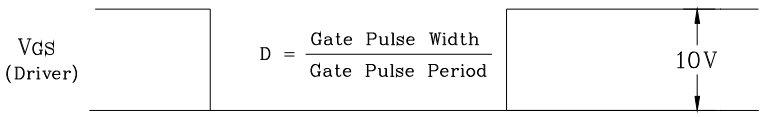
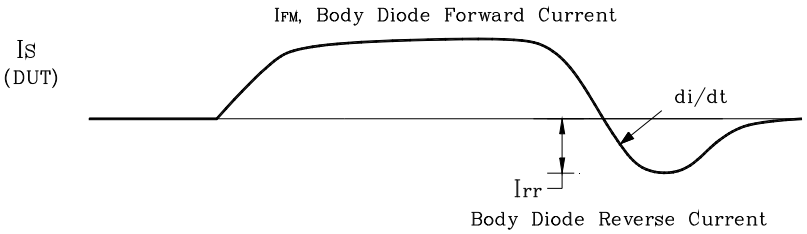
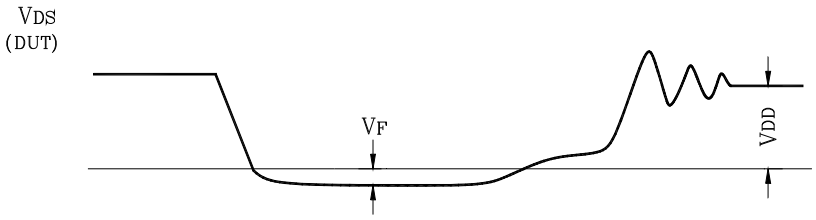


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



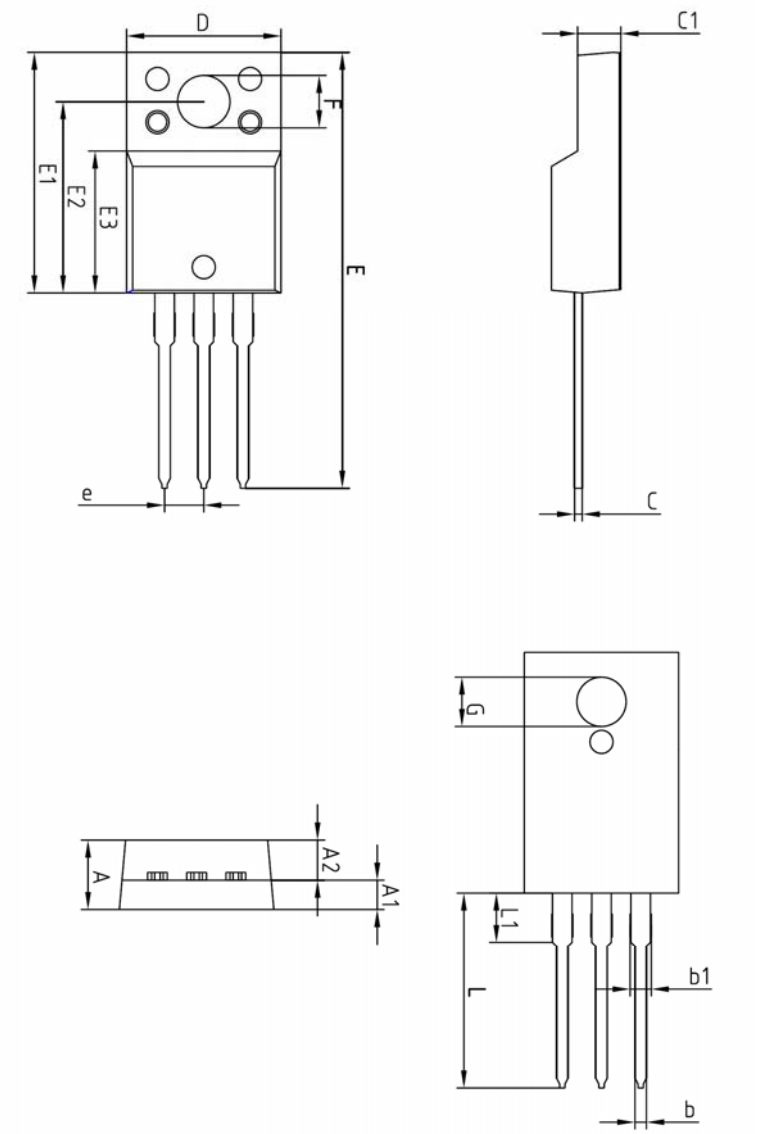






Outline Dimension

unit: mm



SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	–	–	4.60	
A1	2.45	2.50	2.55	
A2	1.95	2.00	2.05	
b	0.65	0.75	0.85	
b1	1.07	1.27	1.47	
C	0.40	0.50	0.60	
C1	2.70	2.80	2.90	
D	9.90	10.00	10.10	
E	28.00	–	28.60	
E1	15.50	15.60	15.70	
E2	12.30	12.40	12.50	
E3	9.15	9.20	9.25	
F	3.30	3.40	3.50	
G	3.10	3.20	3.30	
e	2.54 BSC			
L	12.40	–	13.00	
L1	3.46 BSC			

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