

SWITCHING REGULATOR APPLICATIONS

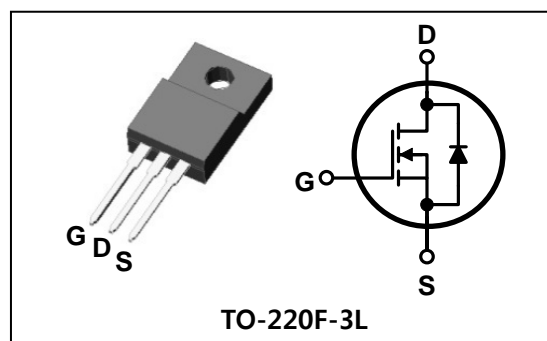
Features

- High Voltage : $BV_{DSS}=650V(\text{Min.})$
- Low C_{RSS} : $C_{RSS}=14.6pF(\text{Typ.})$
- Low gate charge : $Qg=41nC(\text{Typ.})$
- Low $R_{DS(on)}$: $R_{DS(on)}=0.8\Omega(\text{Max.})$

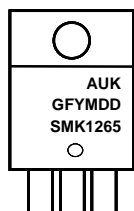
Ordering Information

Type No.	Marking	Package Code
SMK1265FD	SMK1265	TO-220F-3L

PIN Connection



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 ($T_C=25^\circ\text{C}$ 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	$T_C=25^\circ\text{C}$	12	A
		$T_C=100^\circ\text{C}$	7.58	A
Drain current (Pulsed) *	I_{DM}	48	A	
Power dissipation	P_D	48	W	
Avalanche current (Single) ②	I_{AS}	12	A	
Single pulsed avalanche energy ②	E_{AS}	140	mJ	
Avalanche current (Repetitive) ①	I_{AR}	12	A	
Repetitive avalanche energy ①	E_{AR}	7.6	mJ	
Junction temperature	T_J	150	$^\circ\text{C}$	
Storage temperature range	T_{stg}	-55~150		

* Limited by maximum junction temperature

Characteristic	Symbol	Typ.	Max.	Unit
Thermal resistance	Junction-case	-	2.6	$^\circ\text{C}/\text{W}$
	Junction-ambient	-	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 =250μA, V _{GS} =0V	650	-	-	V	
Gate threshold voltage	V _{GS(th)}	I _D =250μA, V _{DS} =V _{GS}	2.0	-	4.0	V	
Drain-source cut-off current	I _{DSS}	V _{DS} =650V, V _{GS} =0V	-	-	1	μA	
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 =6.0A	-	0.68	0.80	Ω	
Forward transfer conductance ④	g _{fs}	V _{DS} =10V, I _D =6.0A	-	10	-	S	
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =25V f=1 MHz	-	2162	2882	pF	
Output capacitance	C _{oss}		-	183	244		
Reverse transfer capacitance	C _{rss}		-	14.6	19.4		
Turn-on delay time	t _{d(on)}	V _{DD} =300V, I _D =12A R _G =25Ω	-	30	-	ns	
Rise time	t _r		-	85	-		
Turn-off delay time	t _{d(off)}		③④	-	140		-
Fall time	t _f		-	90	-		
Total gate charge	Q _g	V _{DS} =520V, V _{GS} =10V I _D =12A	-	43	65	nC	
Gate-source charge	Q _{gs}		③④	-	13		-
Gate-drain charge	Q _{gd}		-	10.5	-		

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	-	-	12	A
Source current (Pulsed) ①	I _{SM}		-	-	48	
Forward voltage ④	V _{SD}	V _{GS} =0V, I _S =12A	-	-	1.4	V
Reverse recovery time	t _{rr}	I _S =12A, V _{GS} =0V dI _F /dt=100A/μs	-	500	-	ns
Reverse recovery charge	Q _{rr}		-	4.3	-	μC

Note ;

- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ② L=1.8mH, I_{AS}=12A, V_{DD}=50V, R_G=25Ω, Starting T_J=25 °C
- ③ Pulse Test : Pulse width≤300μs, Duty cycle≤2%
- ④ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1 $I_D - V_{DS}$

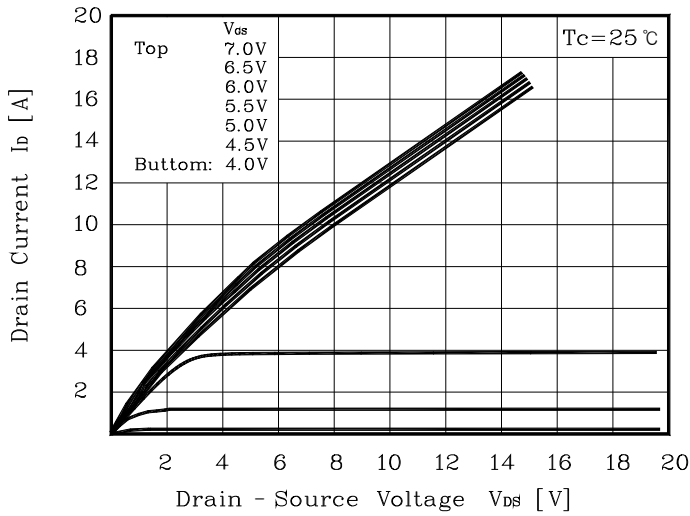


Fig. 2 $I_D - V_{GS}$

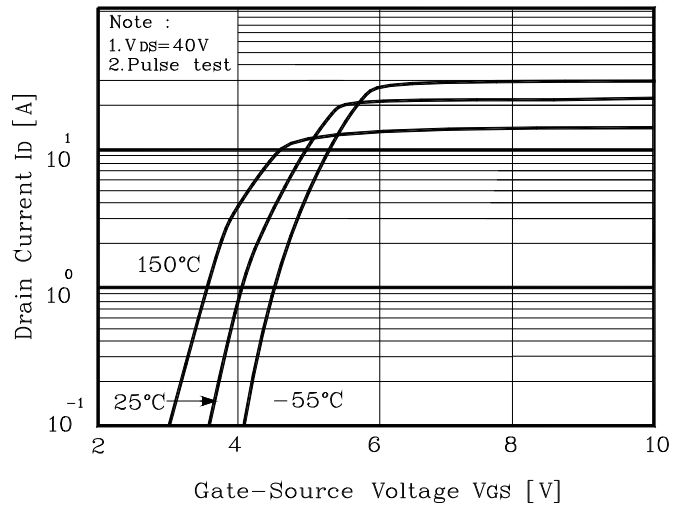


Fig. 3 $R_{DS(on)} - I_D$

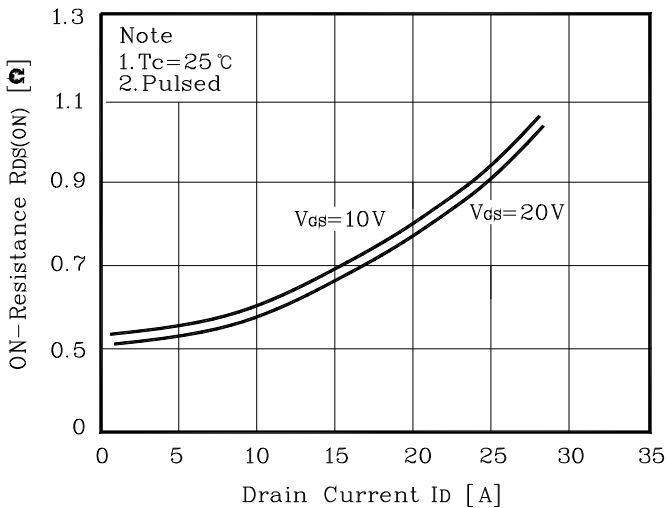


Fig. 4 $I_S - V_{SD}$

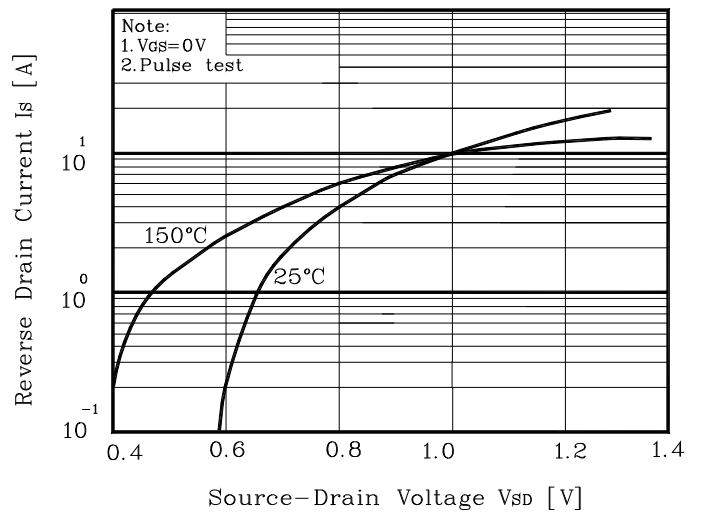


Fig. 5 Capacitance - V_{DS}

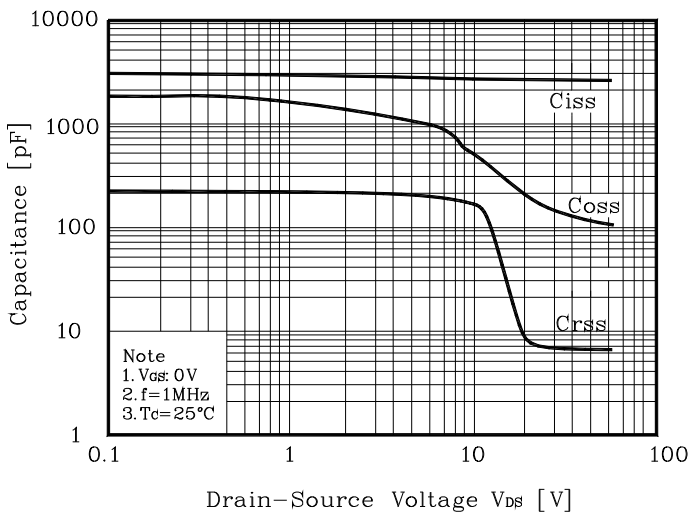
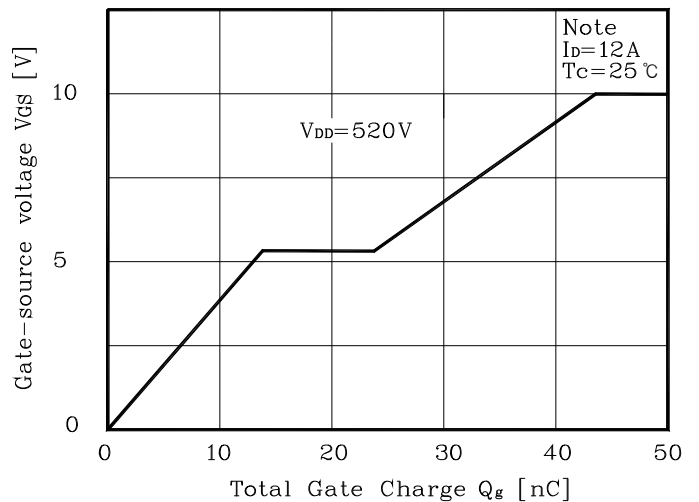


Fig. 6 $V_{GS} - Q_g$



Electrical Characteristic Curves

Fig. 7 $V_{DSS} - T_J$

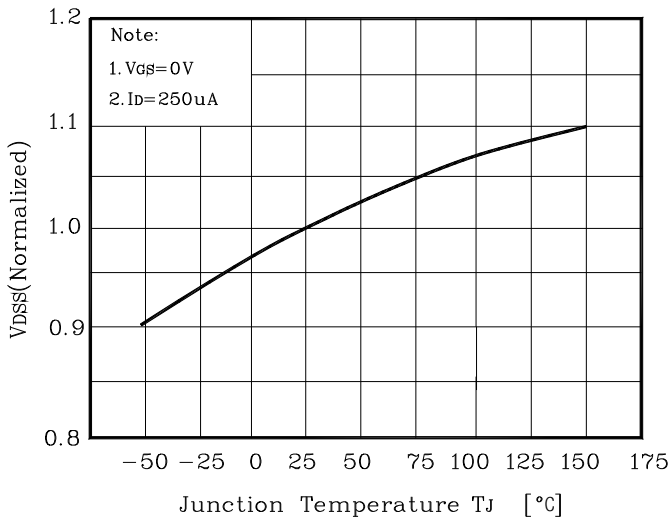


Fig.8 $R_{DS(on)} - T_J$

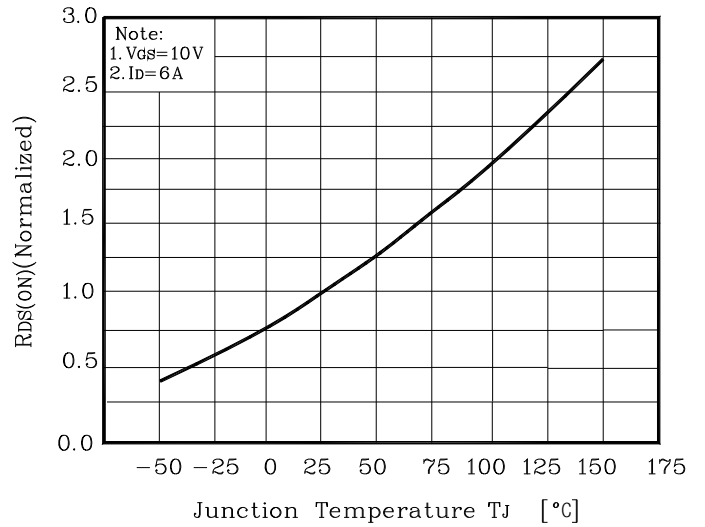


Fig. 9 $I_D - T_C$

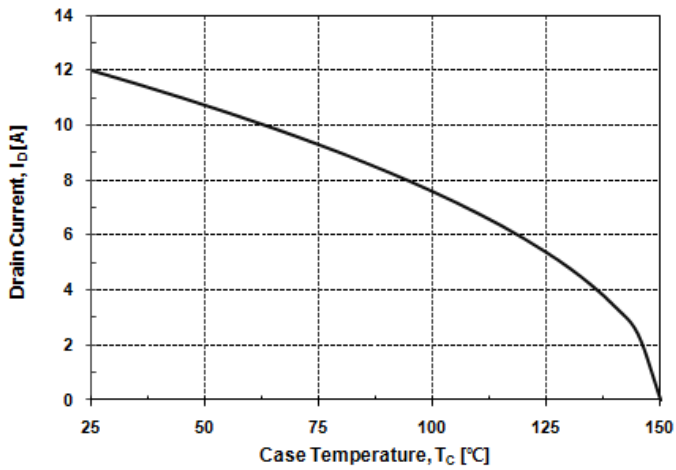


Fig. 10 Safe Operating Area

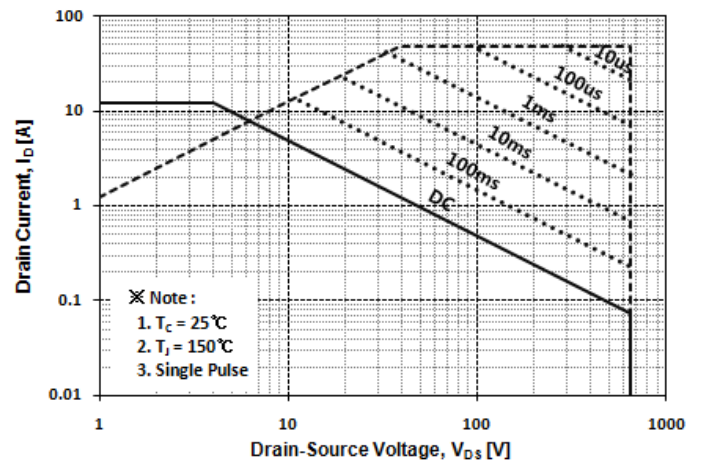


Fig. 11 Gate Charge Test Circuit & Waveform

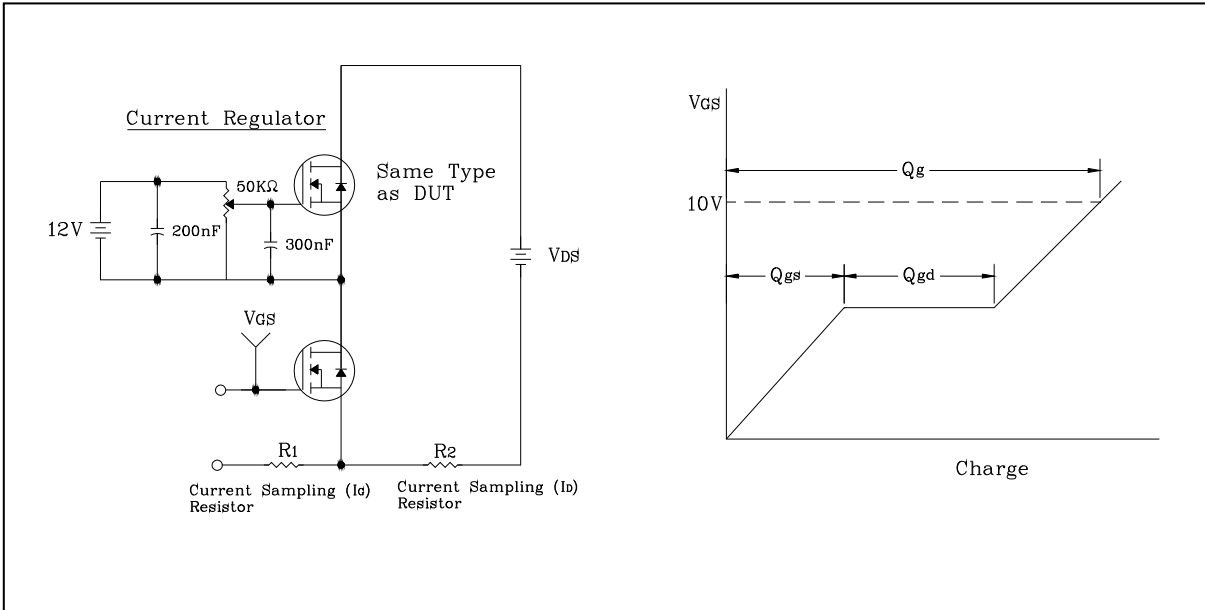


Fig. 12 Resistive Switching Test Circuit & Waveform

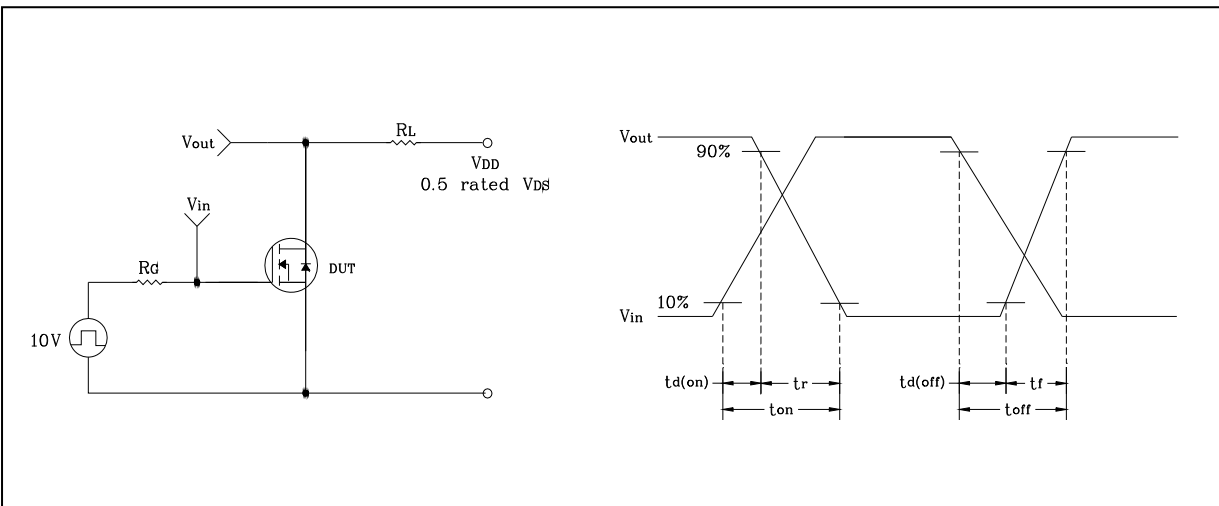


Fig. 13 E_{AS} Test Circuit & Waveform

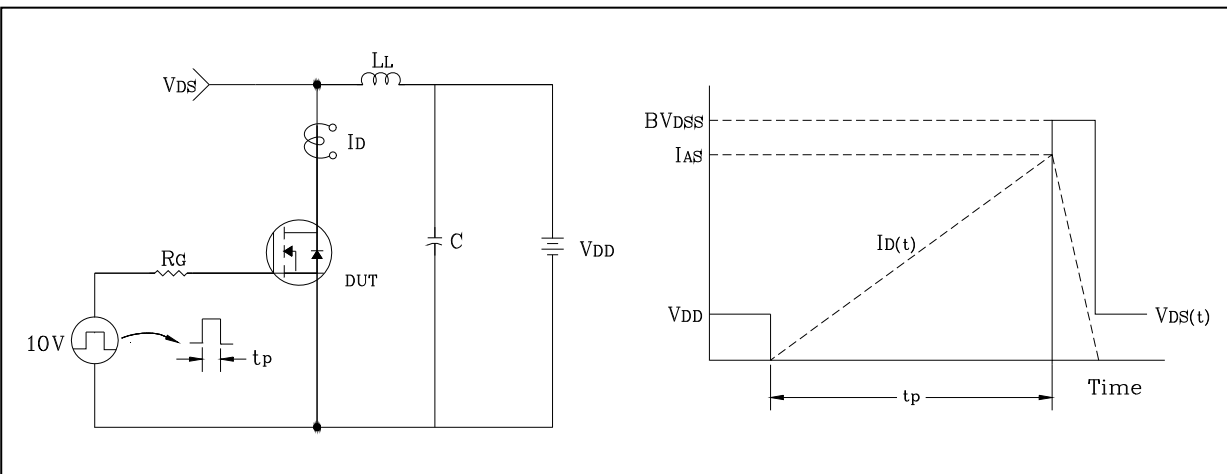
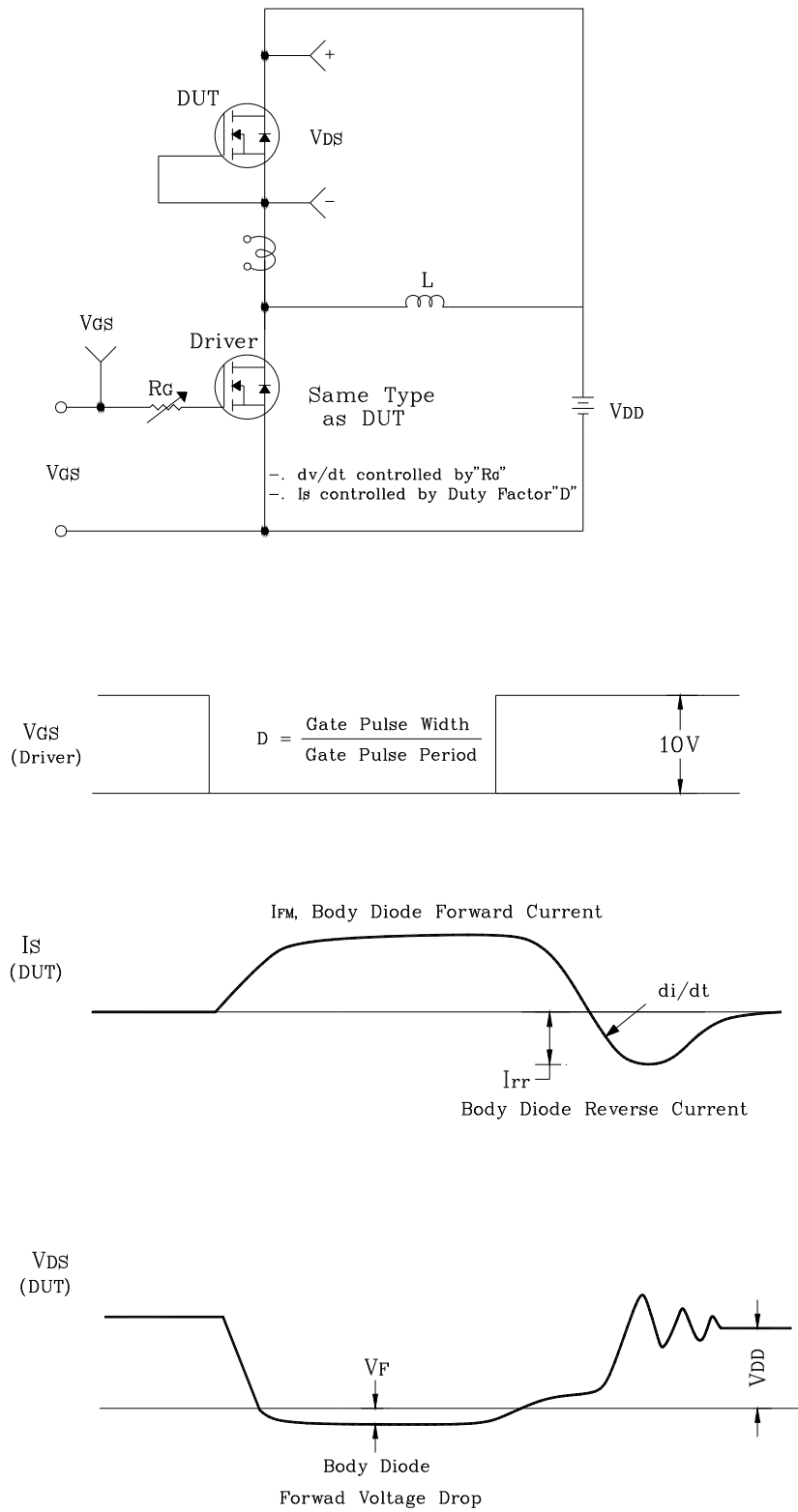
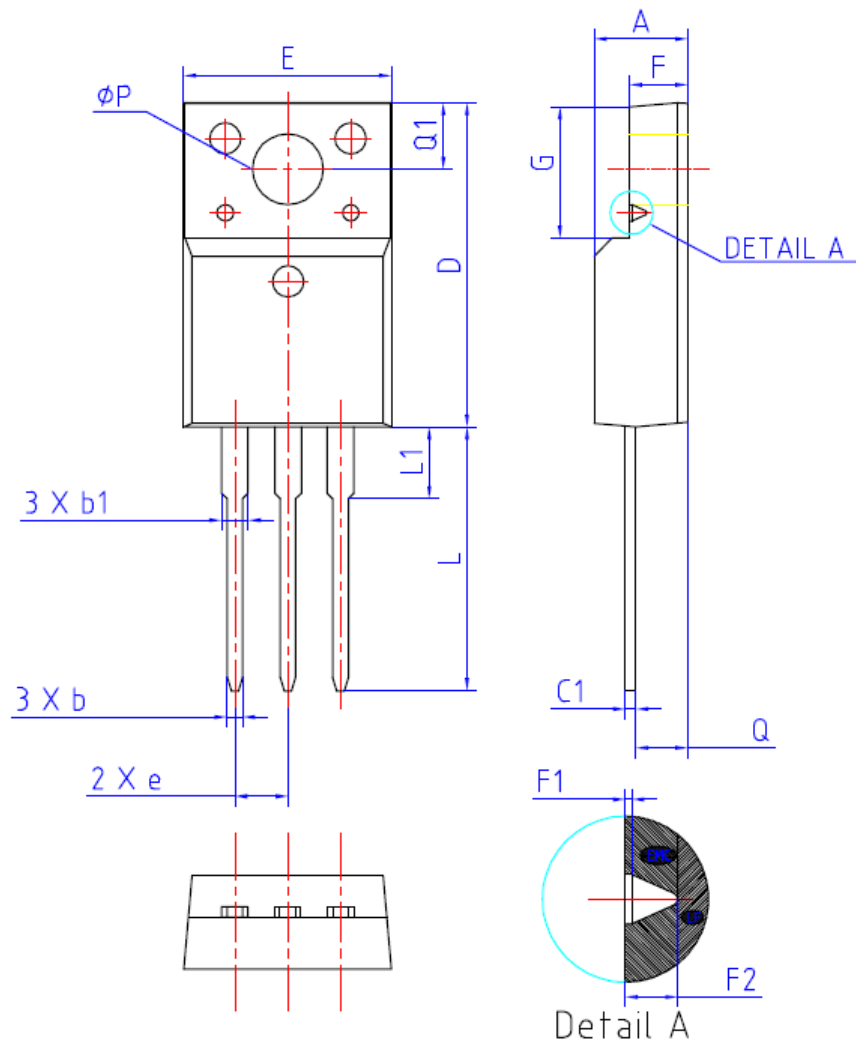


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



Outline Dimension

unit: mm



SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	4.50	4.70	4.90	
b	0.70	0.80	0.90	
b1	1.33	1.40	1.47	
C1	0.45	0.50	0.60	
D	15.67	15.87	16.07	
E	9.96	10.16	10.36	
e	2.54BSC			
F	2.34	2.54	2.74	
F1	(0.10 REF)			
F2	(0.84 REF)			
G	6.48	6.68	6.88	
L	12.78	12.98	13.18	
L1	3.03	3.23	3.43	
Q	2.56	2.76	2.96	
Q1	3.10	3.30	3.50	
ϕP	3.08	3.18	3.28	

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