

## SWITCHING REGULATOR APPLICATIONS

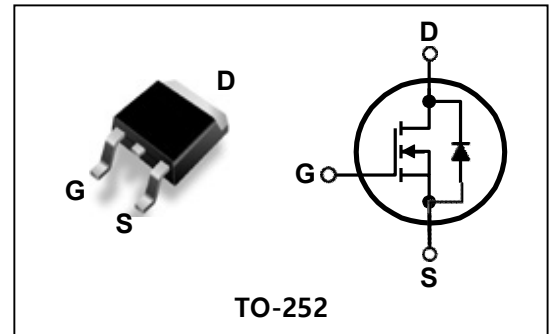
### Features

- High Voltage :  $BV_{DSS}=650V(\text{Min.})$
- Low  $C_{rss}$  :  $C_{rss}=5.6pF(\text{Typ.})$
- Low gate charge :  $Q_g=11.2nC(\text{Typ.})$
- Low  $R_{DS(on)}$  :  $R_{DS(on)}=3.0\Omega(\text{Max.})$

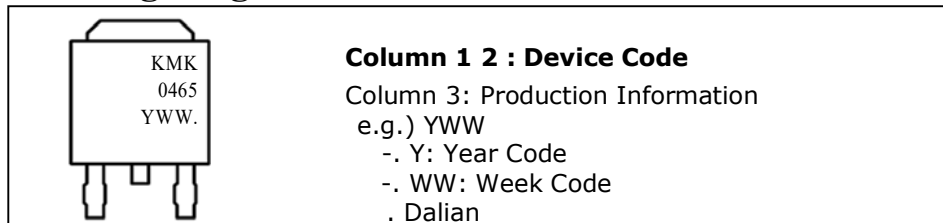
### Ordering Information

Type No.	Marking	Package Code
KMK0465D	KMK0465	TO-252

### PIN Connection



### Marking Diagram



### 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	$V_{GSS}$	$\pm 30$	V	
Drain current (DC)	$I_D$	( $T_C=25^\circ\text{C}$ )	4.0	A
		( $T_C=100^\circ\text{C}$ )	2.53	A
Drain current (Pulsed) *	$I_{DM}$	16	A	
Drain Power dissipation	$P_D$	48	W	
Avalanche current (Single) ②	$I_{AS}$	4	A	
Single pulsed avalanche energy ②	$E_{AS}$	81.5	mJ	
Avalanche current (Repetitive) ①	$I_{AR}$	4	A	
Repetitive avalanche energy ①	$E_{AR}$	3.4	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	$R_{th(J-C)}$	-	2.6	$^\circ\text{C}/\text{W}$
	Junction-ambient	$R_{th(J-a)}$	-	62.5	

## Electrical Characteristics (T<sub>C</sub>=25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit	
Drain-source breakdown voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0	650	-	-	V	
Gate-threshold voltage	V <sub>GS(th)</sub>	I <sub>D</sub> =250μA, V <sub>DS</sub> =V <sub>GS</sub>	2.0	-	4.0	V	
Drain-source leakage current	I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V	-	-	1	μA	
Gate-source leakage	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±30V	-	-	±100	nA	
Drain-Source on-resistance ④	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =2.0A	-	2.4	3.0	Ω	
Forward transfer admittance ④	g <sub>fs</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =2.0A	-	4.0	-	S	
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz	-	703	878	pF	
Output capacitance	C <sub>oss</sub>		-	54.6	68.2		
Reverse transfer capacitance	C <sub>rss</sub>		-	5.6	7.0		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =300V, I <sub>D</sub> =4A R <sub>G</sub> =25Ω	-	10	-	ns	
Rise time	t <sub>r</sub>		-	42	-		
Turn-off delay time	t <sub>d(off)</sub>		③④	-	38		-
Fall time	t <sub>f</sub>		-	46	-		
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> =520V, V <sub>GS</sub> =10V I <sub>D</sub> =4A	-	11.2	14.0	nC	
Gate-source charge	Q <sub>gs</sub>		-	3.9	-		
Gate-drain charge	Q <sub>gd</sub>		③④	-	2.5		-

## Source-Drain Diode Ratings and Characteristics (T<sub>C</sub>=25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Continuous source current	I <sub>S</sub>	Integral reverse diode in the MOSFET	-	-	4	A
Source current (Pulsed) ①	I <sub>SM</sub>		-	-	16	
Forward voltage ④	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =4A	-	-	1.4	V
Reverse recovery time	t <sub>rr</sub>	I <sub>S</sub> =4A di <sub>s</sub> /dt=100A/us	-	300	-	ns
Reverse recovery charge	Q <sub>rr</sub>		-	2.2	-	uC

Note ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② L=9.4mH, I<sub>AS</sub>=4A, V<sub>DD</sub>=50V, R<sub>G</sub>=27Ω , Starting T<sub>J</sub> = 25°C
- ③ Pulse Test : Pulse Width < 300us, Duty cycle≤ 2%
- ④ Essentially independent of operating temperature

## Electrical Characteristic Curves

Fig. 1  $I_D - V_{DS}$

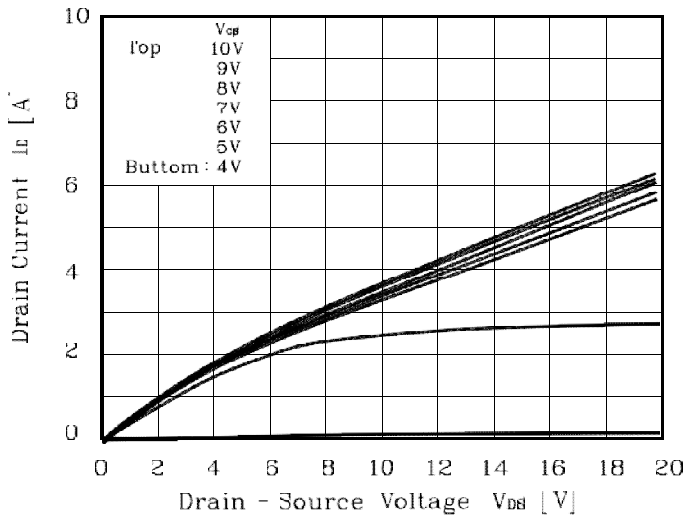


Fig. 2  $I_D - V_{GS}$

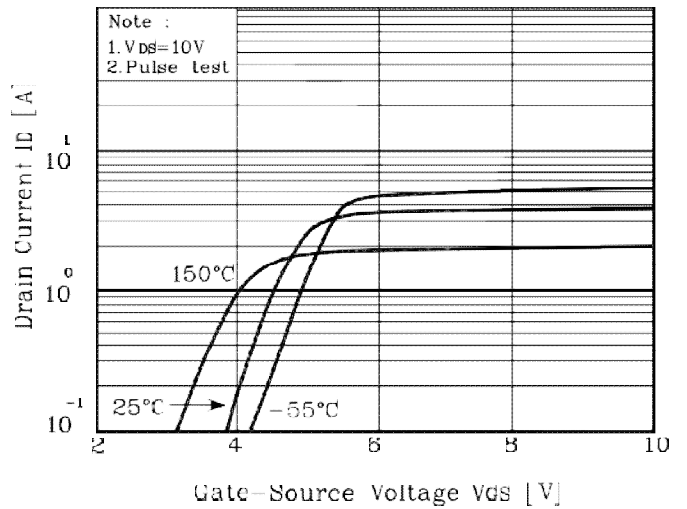


Fig. 3  $R_{DS(on)} - I_D$

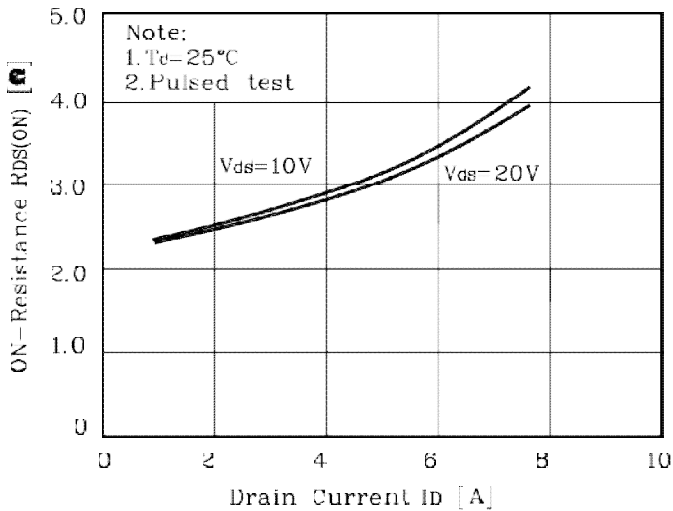


Fig. 4  $I_S - V_{SD}$

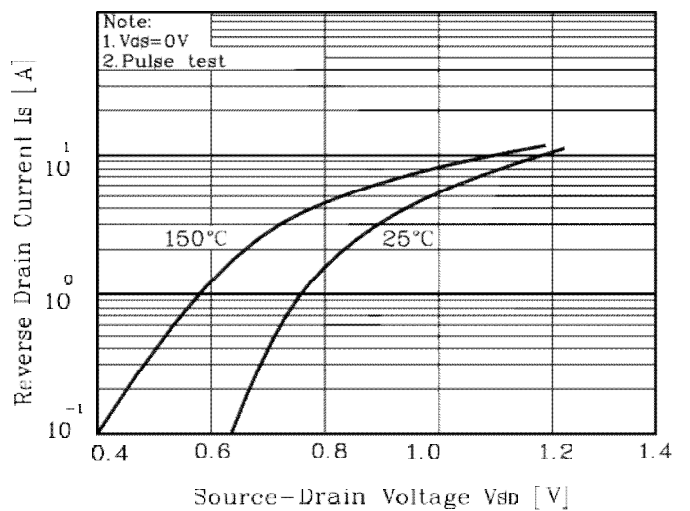


Fig. 5 Capacitance -  $V_{DS}$

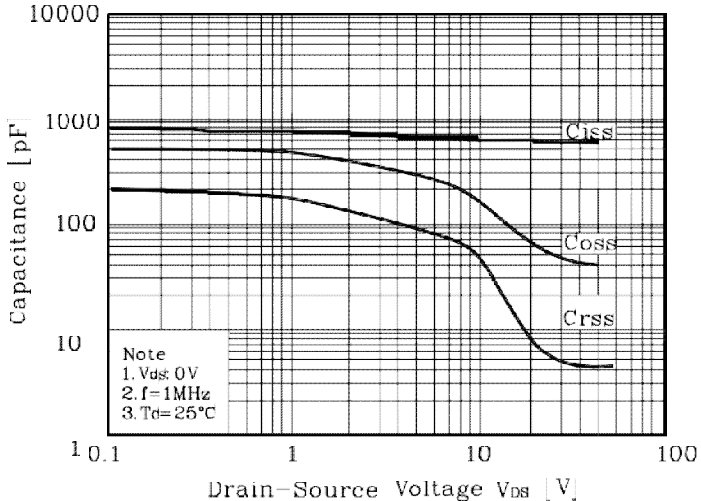
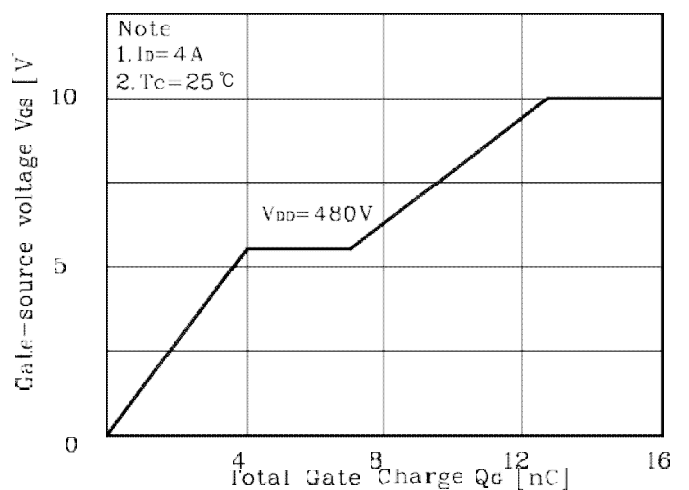
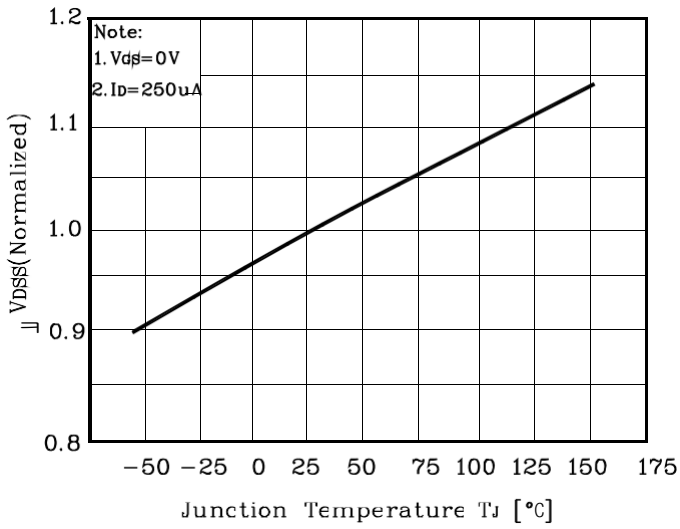


Fig. 6  $V_{GS} - Q_G$

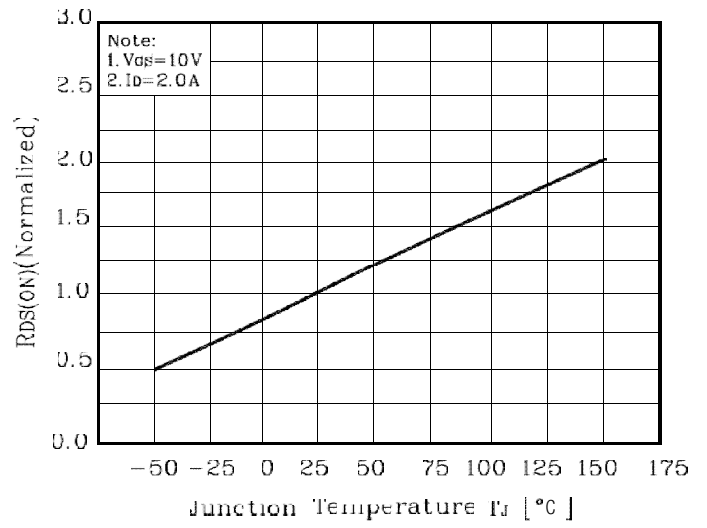


## Electrical Characteristic Curves

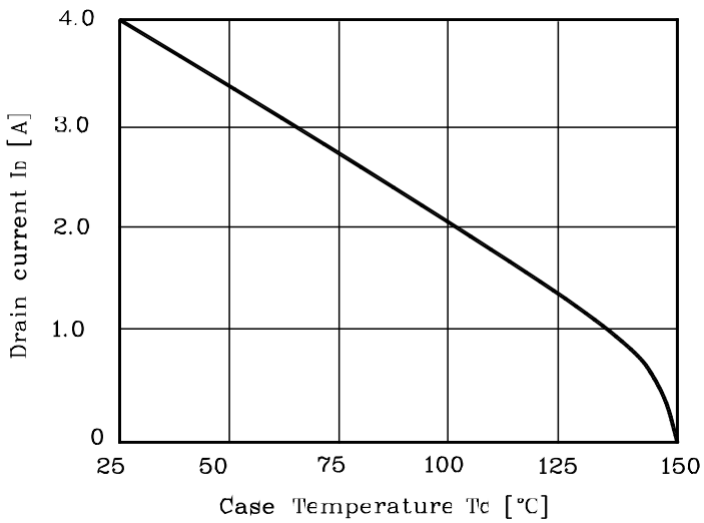
**Fig. 7  $V_{DSS} - T_J$**



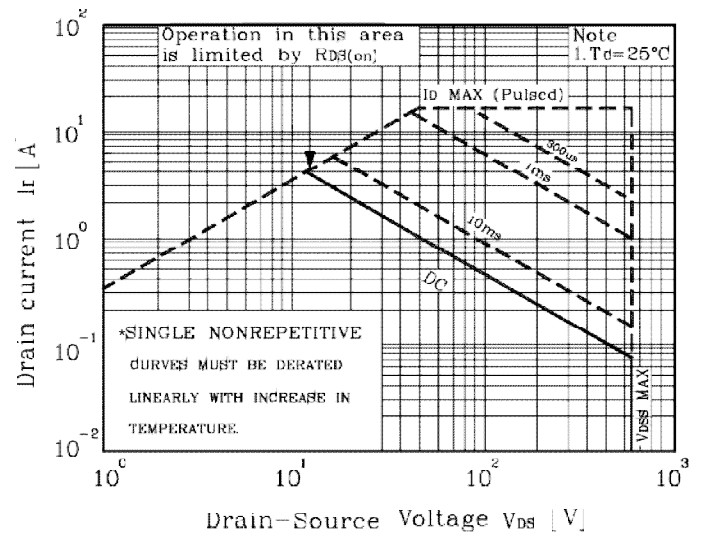
**Fig. 8  $R_{DS(on)} - T_J$**



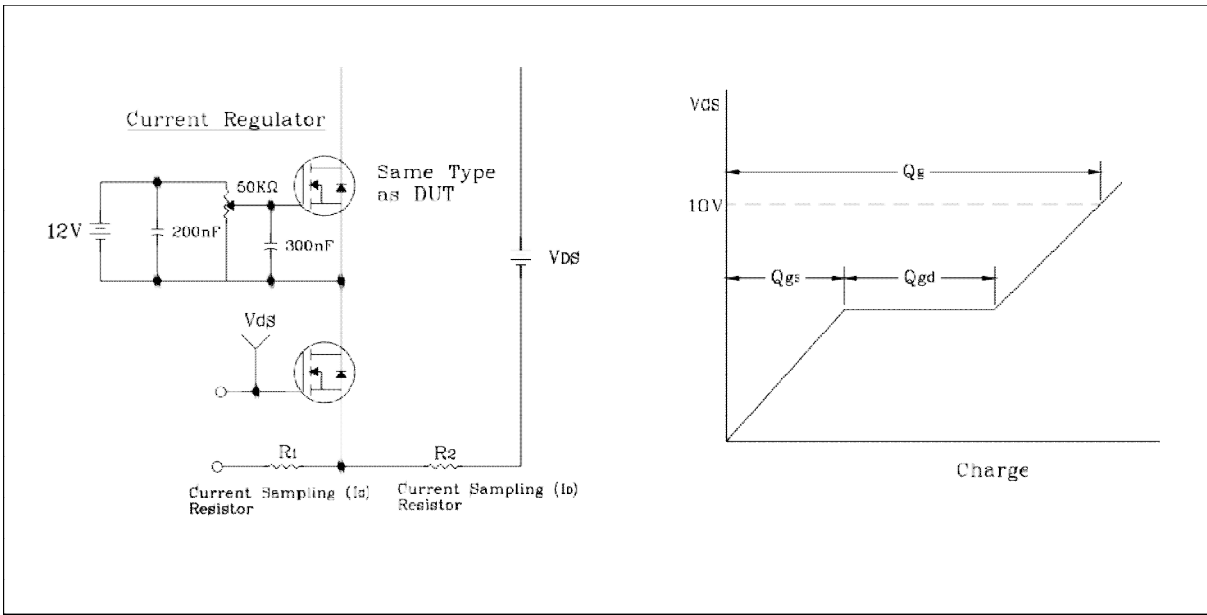
**Fig. 9  $I_D - T_C$**



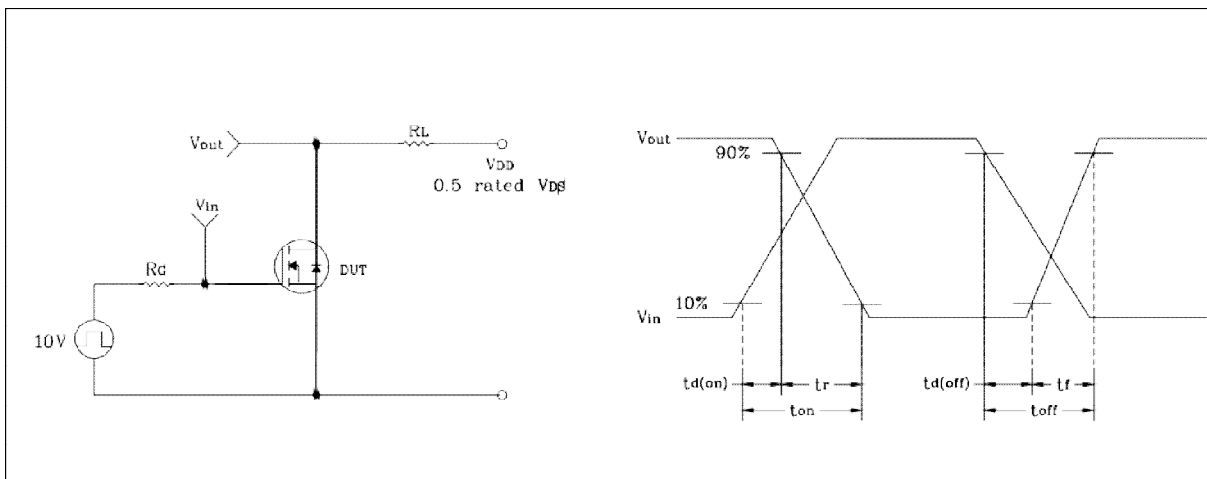
**Fig. 10 Safe Operating Area**



**Fig. 11 Gate Charge Test Circuit & Waveform**



**Fig. 12 Resistive Switching Test Circuit & Waveform**



**Fig. 13  $E_{AS}$  Test Circuit & Waveform**

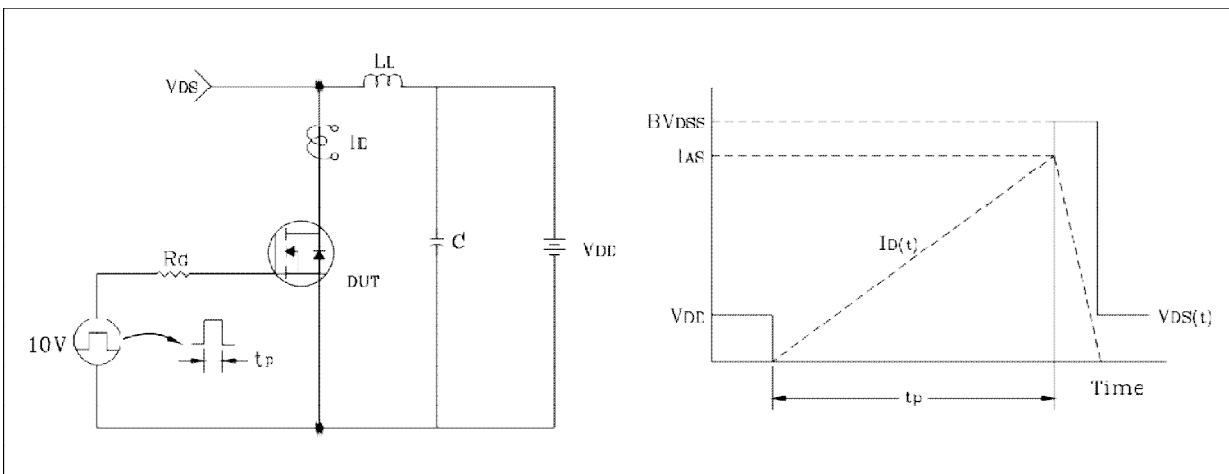
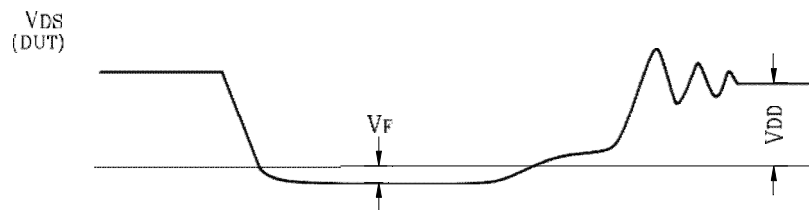
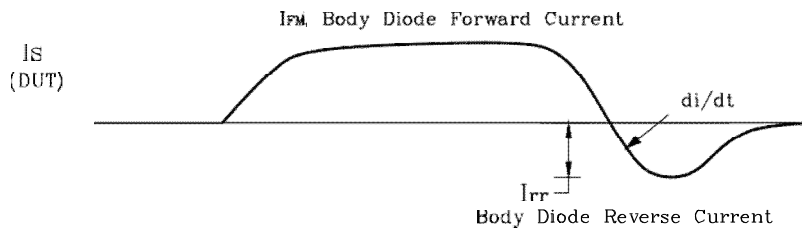
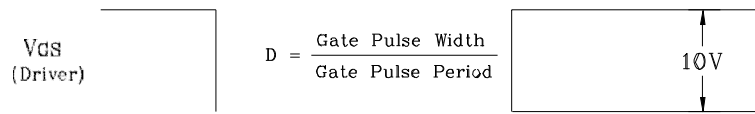
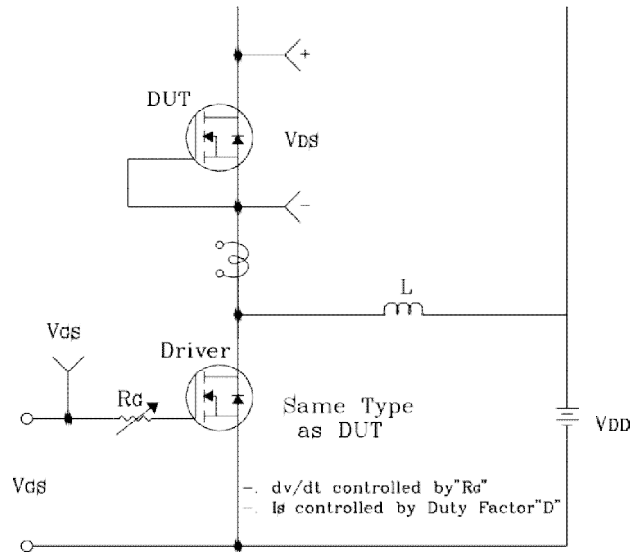
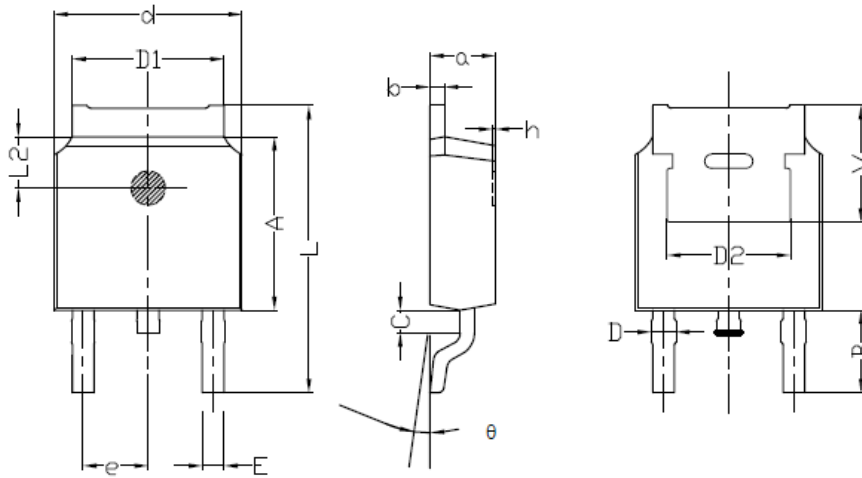


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



## Outline Dimension

unit: mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
a	2.20	2.40	0.087	0.095
b	0.46	0.58	0.018	0.023
c	0.70	0.90	0.028	0.035
D	0.80	1.00	0.032	0.039
d	6.30	6.70	0.248	0.264
D1	5.00	5.50	0.197	0.217
D2	TYP 4.83		TYP 0.190	
A	5.80	6.20	0.228	0.244
e	2.19	2.39	0.086	0.094
L	9.40	10.40	0.370	0.409
B	2.6	3.2	0.102	0.126
L2	1.5	1.8	0.059	0.071
theta	0	8	0	8
h	0	0.3	0	0.012
V	5.25	5.85	0.207	0.230
E	0.6	0.8	0.024	0.032

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