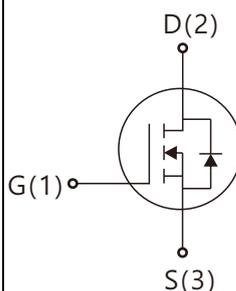
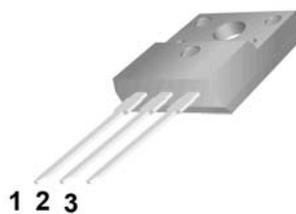


## TKF4N65SE

### Features:

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge :Q<sub>g</sub>=14nC (Typ.).
- BV<sub>DSS</sub>=650 V,I<sub>D</sub>=4A
- R<sub>DS(on)</sub> : 2.50Ω (Max) @V<sub>G</sub>=10V
- 100% Avalanche Tested

## TO-220F



- 1.Gate (G)
- 2.Drain (D)
- 3.Source (S)

## Absolute Maximum Ratings (Ta=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V <sub>DSS</sub>	Drain-Source Voltage	650	V
I <sub>D</sub>	Drain Current	T <sub>j</sub> =25°C	4.0
		T <sub>j</sub> =100°C	2.7
V <sub>GS(TH)</sub>	Gate Threshold Voltage	30	V
E <sub>AS</sub>	Single Pulse Avalanche Energy (note1)	120	mJ
I <sub>AR</sub>	Avalanche Current (note2)	4.0	A
P <sub>D</sub>	Power Dissipation (T <sub>j</sub> =25 °C )	50	W
T <sub>j</sub>	Junction Temperature(Max)	150	°C
T <sub>stg</sub>	Storage Temperature	-55~+150	°C
TL	Maximum lead temperature for soldering purpose,1/8' from case for 5 seconds	300	°C

## Thermal Characteristics

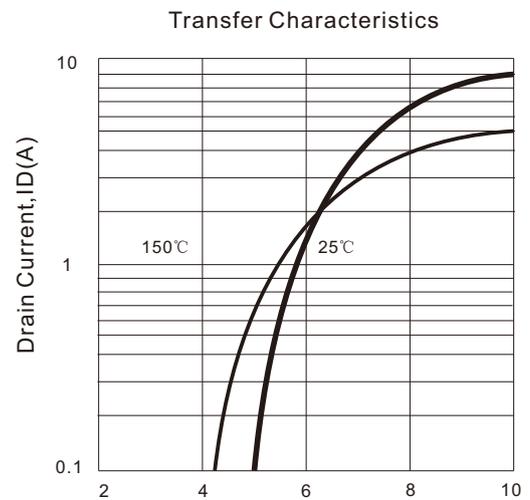
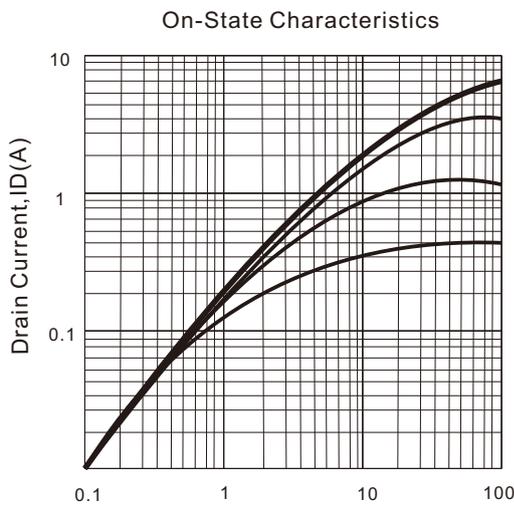
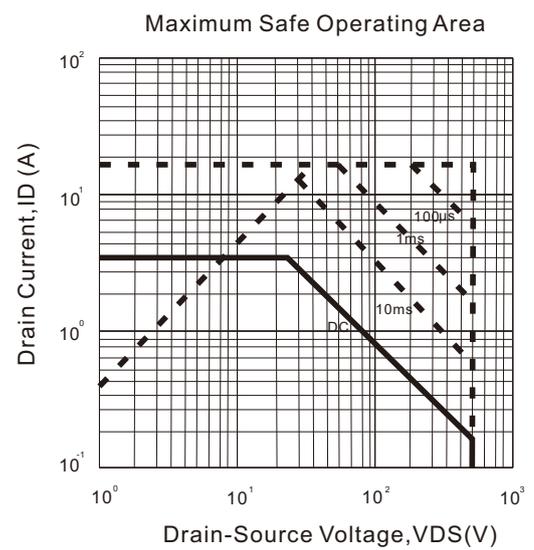
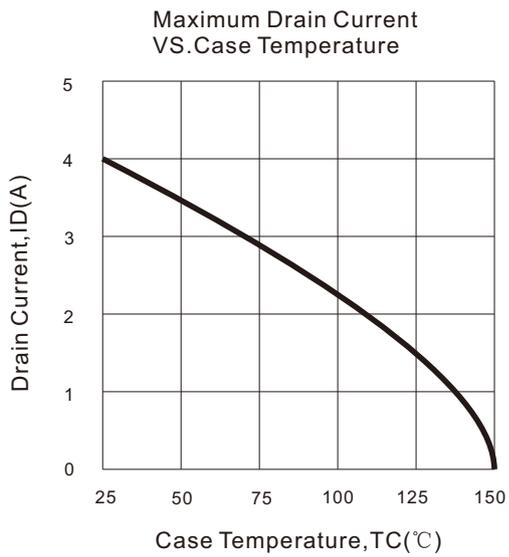
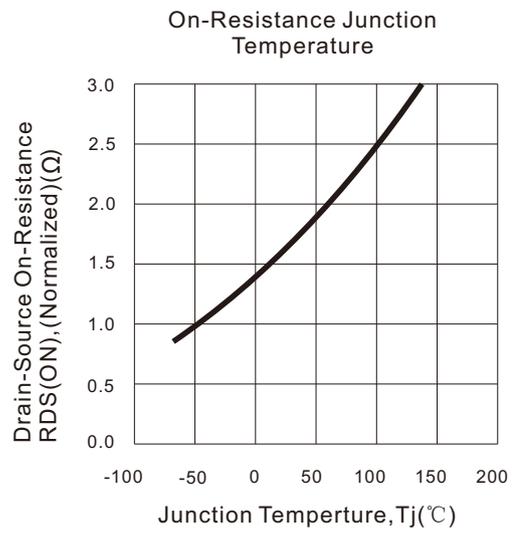
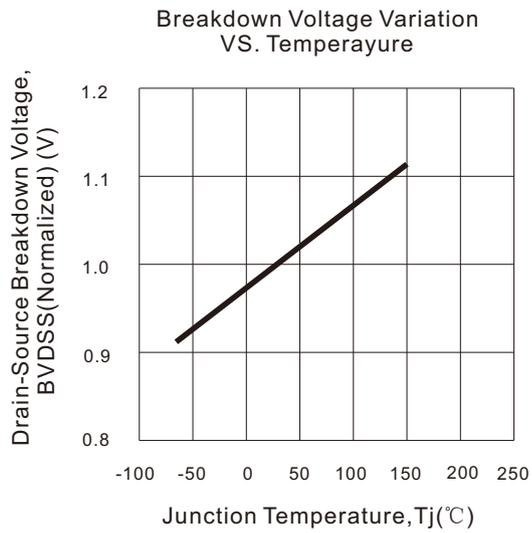
Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJC</sub>	Thermal Resistance,Junction to Case	-	2.4	°C/W
R <sub>θJA</sub>	Thermal Resistance,Junction to Ambient		62.5	°C/W

Electrical Characteristics (Ta=25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=250\mu A, V_{GS}=0$	650	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D=250\mu A$ , Reference to 25°C	-	0.67	-	V/°C
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V$	-	-	10	$\mu A$
		$V_{DS}=520V, T_J=125^\circ C$	-	-	100	
$I_{GSSF}$	Gate-body leakage Current, Forward	$V_{GS}=+30V, V_{DS}=0V$	-	-	100	nA
$I_{GSSR}$	Gate-body leakage Current, Reverse	$V_{GS}=-30V, V_{DS}=0V$	-	-	-100	
On Characteristics						
$V_{GS(TH)}$	Gate Threshold Voltage	$I_D=250\mu A, V_{DS}=V_{GS}$	2	-	4	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$I_D=2.0A, V_{GS}=10V$	-	-	2.5	$\Omega$
Dynamic Characteristics						
$C_{iss}$	Input Capacitance	$V_{DS}=25V, V_{GS}=0, f=1.0MHz$	-	560	-	pF
$C_{oss}$	Output Capacitance		-	48	-	
$C_{rss}$	Reverse Transfer Capacitance		-	5.4	-	
Switching Characteristics						
$T_d(on)$	Turn-On Delay Time	$V_{DD}=325V, I_D=4A, R_G=25\Omega$ (Note 3,4)	-	25	-	nS
$T_r$	Turn-On Rise Time		-	45	-	
$T_d(off)$	Turn-Off Delay Time		-	25	-	
$T_f$	Turn-Off Rise Time		-	35	-	
$Q_g$	Total Gate Charge	$V_{DS}=520V, V_{GS}=10V, I_D=4A$ (Note3,4)	-	14.3	-	nC
$Q_{gs}$	Gate-Source Charge		-	2.8	-	
$Q_{gd}$	Gate-Drain Charge		-	4.5	-	
Drain-Source Diode Characteristics and Maximum Ratings						
$I_S$	Max. Diode Forward Current	-	-	-	4	A
$I_{SM}$	Max. Pulsed Forward Current	-	-	-	16	
$V_{SD}$	Diode Forward Voltage	$I_D=4A$	-	-	1.4	V
$T_{rr}$	Reverse Recovery Time	$I_S=4A, V_{GS}=0V, diF/dt=100A/\mu s$ (Note3)	-	393	-	nS
$Q_{rr}$	Reverse Recovery Charge		-	1.5	-	$\mu C$

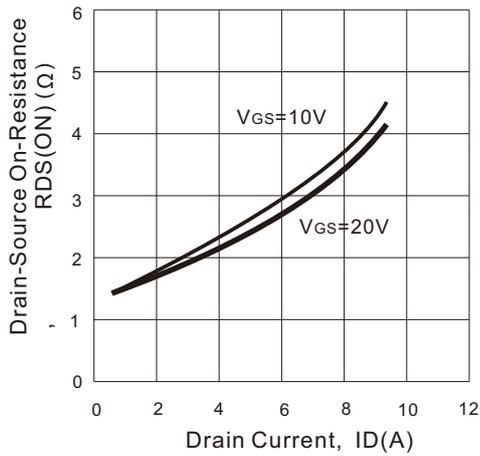
- Notes : 1, L=0.5mH, IAS= 4A, VDD=50V, RG=25 $\Omega$ , Starting T<sub>J</sub> =25°C  
 2, Repetitive Rating : Pulse width limited by maximum junction temperature  
 3, Pulse Test : Pulse Width  $\leq$  300 $\mu s$ , Duty Cycle  $\leq$  2%  
 4, Essentially Independent of Operating Temperature

### Typical Characteristics

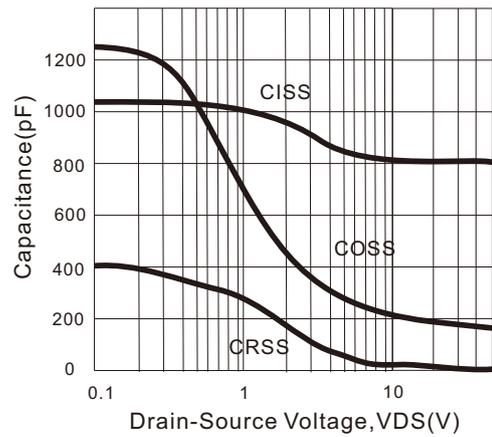


### Typical Characteristics (Continued)

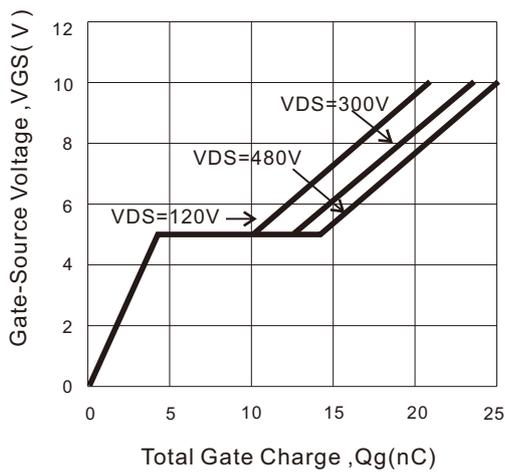
On-Resistance Variation vs. Drain Current and Gate Voltage



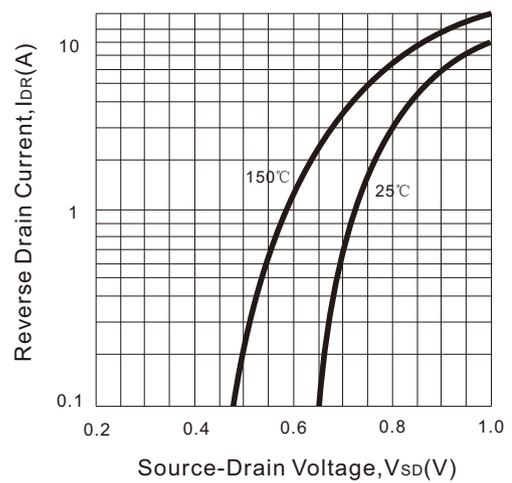
Capacitance Characteristics (Non-Repetitive)



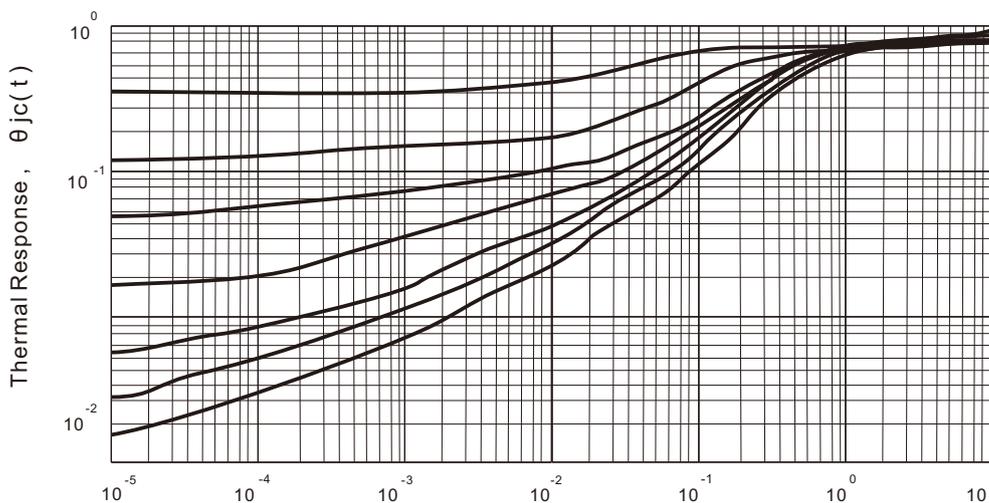
Gate Charge Characteristics



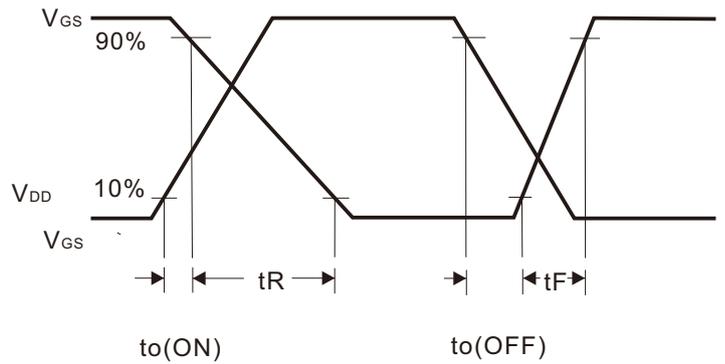
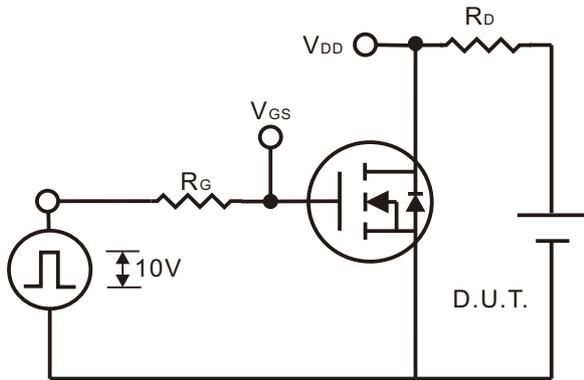
Body Diode Forward Voltage Variation With Source Current and Temperature



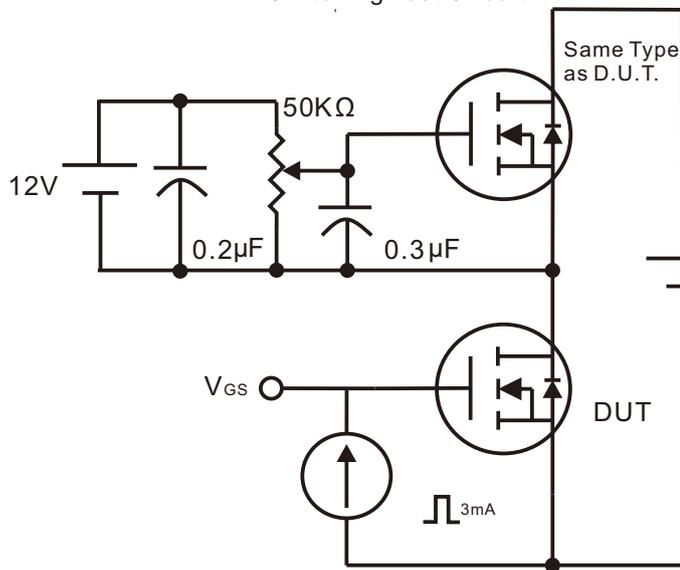
Transient Thermal Response Curve



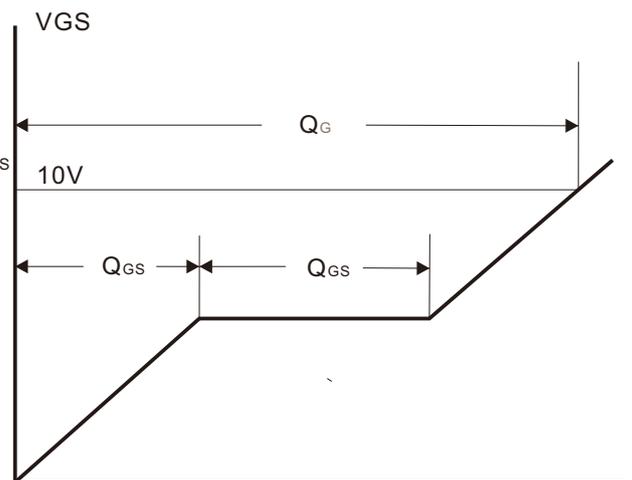
## Gate Charge Test Circuit & Waveform



## Switching Test Circuit

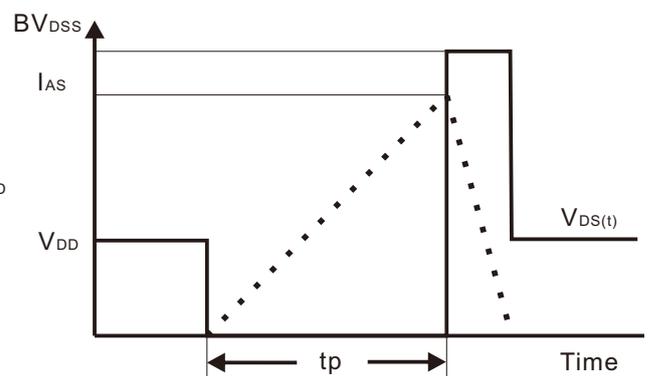
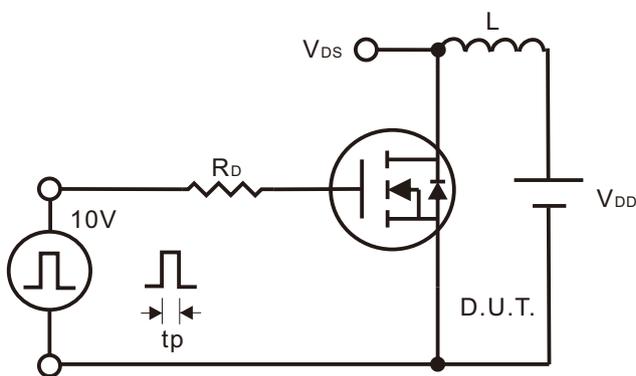


## Switching Waveforms



## Gate Charge Test Circuit

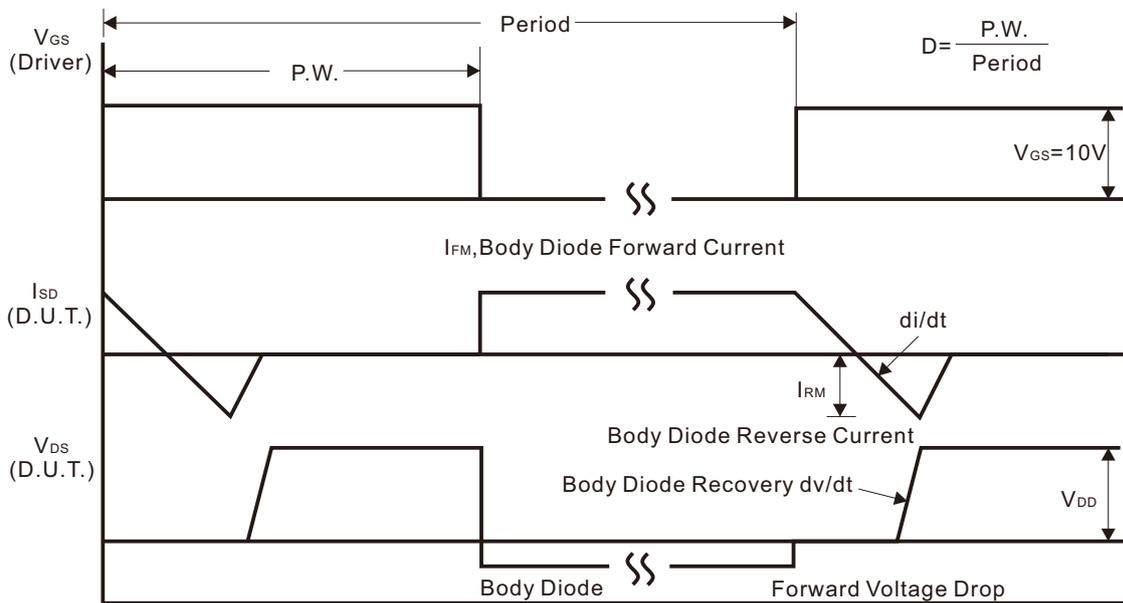
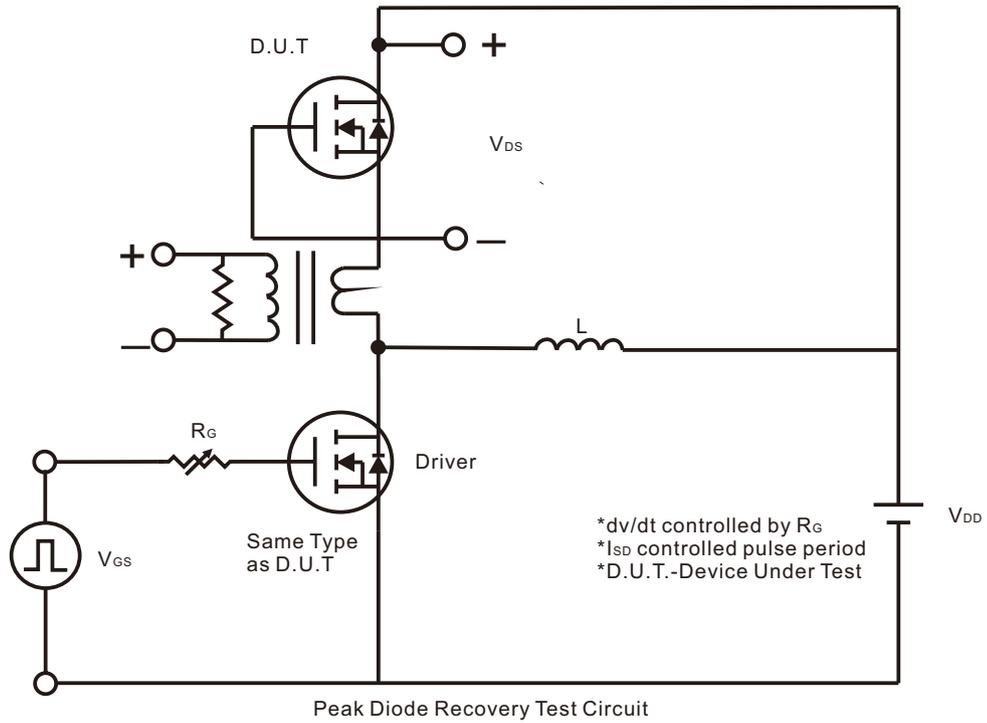
## Gate Charge Waveform



## Unclamped Inductive Switching Test Circuit

## Unclamped Inductive Switching Waveforms

## Peak Diode Recovery dv/dt Test Circuit & Waveform



Peak Diode Recovery dv/dt Waveforms

## Package Dimension

Unit: mm

