

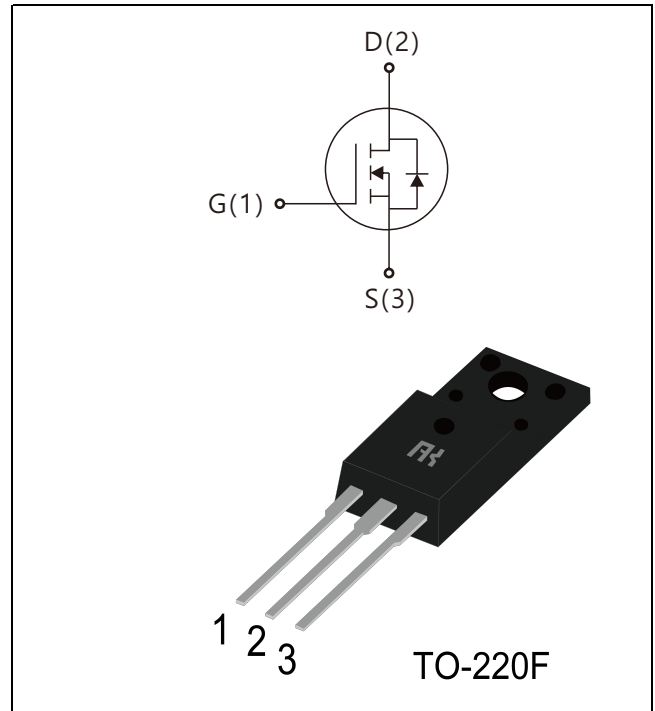
**650V,10A N-CHANNEL POWER MOSFET**

**GENERAL DESCRIPTION**

The AKF10N65P is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics .

**Features:**

- ◆ Low Intrinsic Capacitances.
- ◆ Excellent Switching Characteristics.
- ◆ Extended Safe Operating Area.
- ◆ Unrivalled Gate Charge :Qg=35nC (Typ.).
- ◆ BVDSS=650 V,I<sub>D</sub>=10A
- ◆ R<sub>DS(on)</sub> : 0.9 Ω (Max) @V<sub>G</sub>=10V
- ◆ 100% Avalanche Tested



**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	10
		T <sub>j</sub> =100°C	6.7
V <sub>GSS</sub>	Gate-Source Voltage	30	V
E <sub>AS</sub>	Single Pulse Avalanche Energy (note1)	380	mJ
I <sub>AR</sub>	Avalanche Current (note2)	10	A
P <sub>D</sub>	Power Dissipation (T <sub>j</sub> =25°C)	65	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

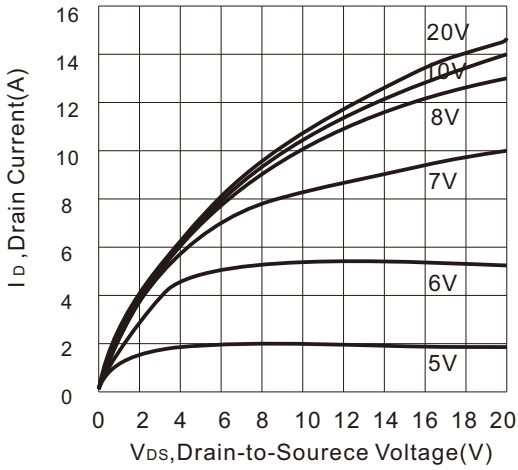
**Electrical Characteristics (Ta=25°C unless otherwise noted)**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
$BV_{DSS}$	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	
<b>On Characteristics</b>						
$V_{GS(TH)}$	Date Threshold Voltage	$I_D=250\mu A, V_{DS}=V_{GS}$	2	-	4	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$I_D=5.0A, V_{GS}=10V$	-	0.8	0.9	$\Omega$
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=25V, V_{GS}=0, f=1.0MHz$	-	1500	-	$\mu F$
$C_{oss}$	Output Capacitance		-	194	-	
$C_{rss}$	Reverse Transfer Capacitance		-	18	-	
<b>Switching Characteristics</b>						
$T_d(on)$	Turn-On Delay Time	$V_{DD}=325V, I_D=10A, R_G=25\Omega$ (Note 3,4)	-	23		nS
$T_r$	Turn-On Rise Time			15		
$T_d(off)$	Turn-Off Delay Time			90		
$T_f$	Turn-Off Rise Time			30		
$Q_g$	Total Gate Charge	$V_{DS}=520V, V_{GS}=10V, I_D=10A$ (Note3,4)	-	35		nC
$Q_{gs}$	Gate-Source Charge			7	-	
$Q_{gd}$	Gate-Drain Charge			18	-	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Max. Diode Forward Current	-		-	10	A
$I_{SM}$	Max. Pulsed Forward Current	-		-	40	
$V_{SD}$	Diode Forward Voltage	$I_D=10A$	-	-	1.4	V
$T_{rr}$	Reverse Recovery Time	$I_S=10A, V_{GS}=0V, diF/dt=100A/\mu s$ (Note3)	-	320	-	nS
$Q_{rr}$	Reverse Recovery Charge		-	4.2	-	$\mu C$

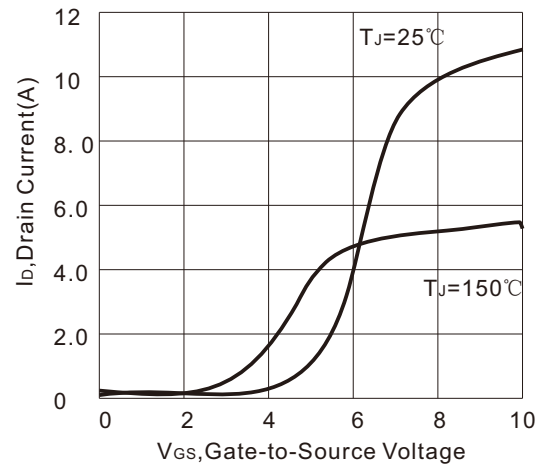
- Notes : 1, L=0.5mH, IAS= 10A, VDD=50V, RG=25 $\Omega$  , Starting T<sub>J</sub> =25°C  
 2, Repetitive Rating : Pulse width limited by maximum junction temperature  
 3, Pulse Test : Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$   
 4, Essentially Independent of Operating Temperature

Typical Characteristics

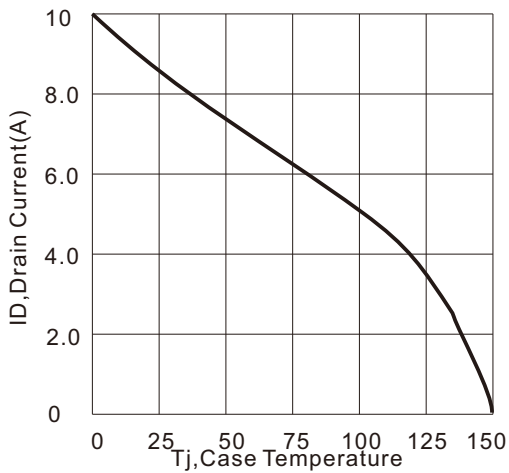
Output Characteristics



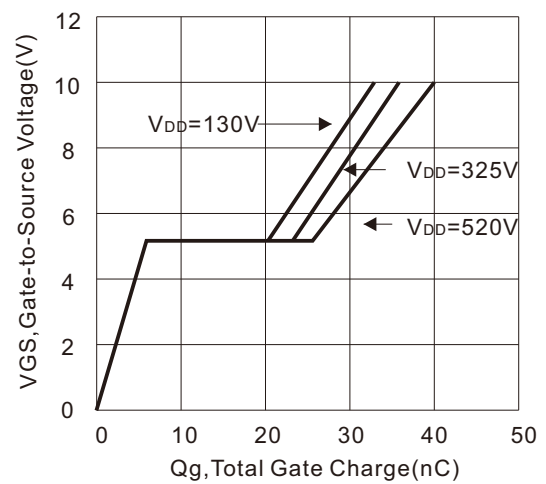
Transfer Characteristics



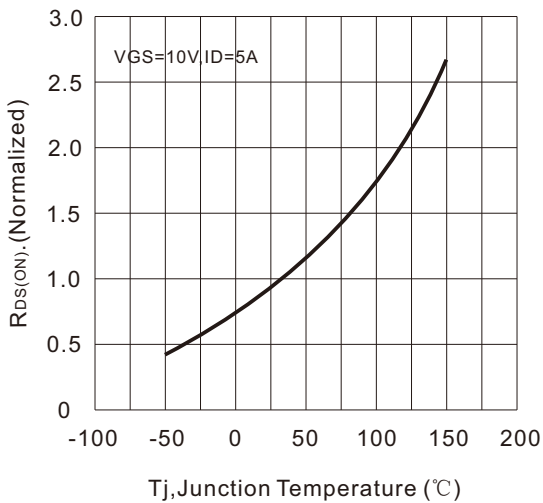
Drain Current VS. Temperature



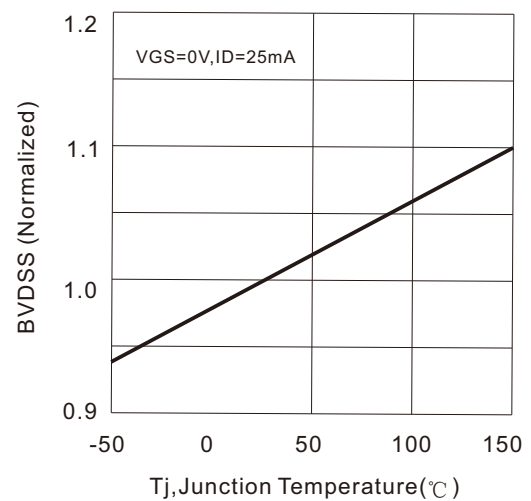
Gate Charge



On-Resistance vs. Junction Temperature

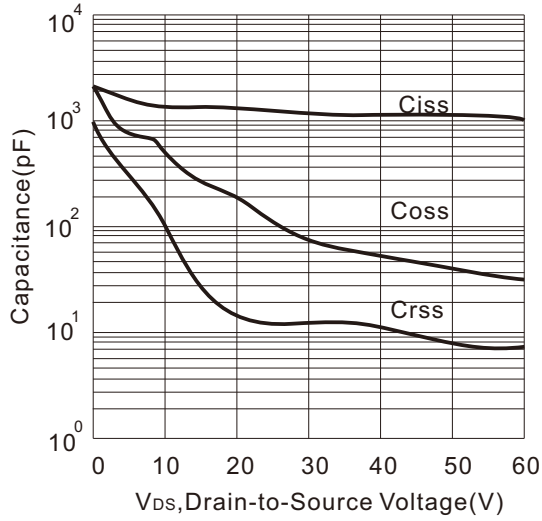


BVDSS Variation VS. Temperature

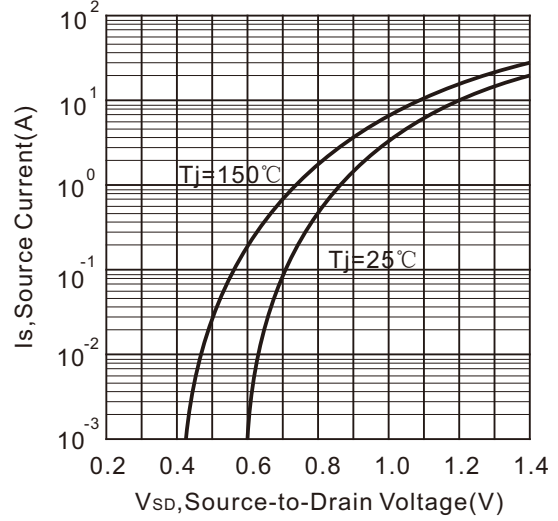


Typical Characteristics (Continued)

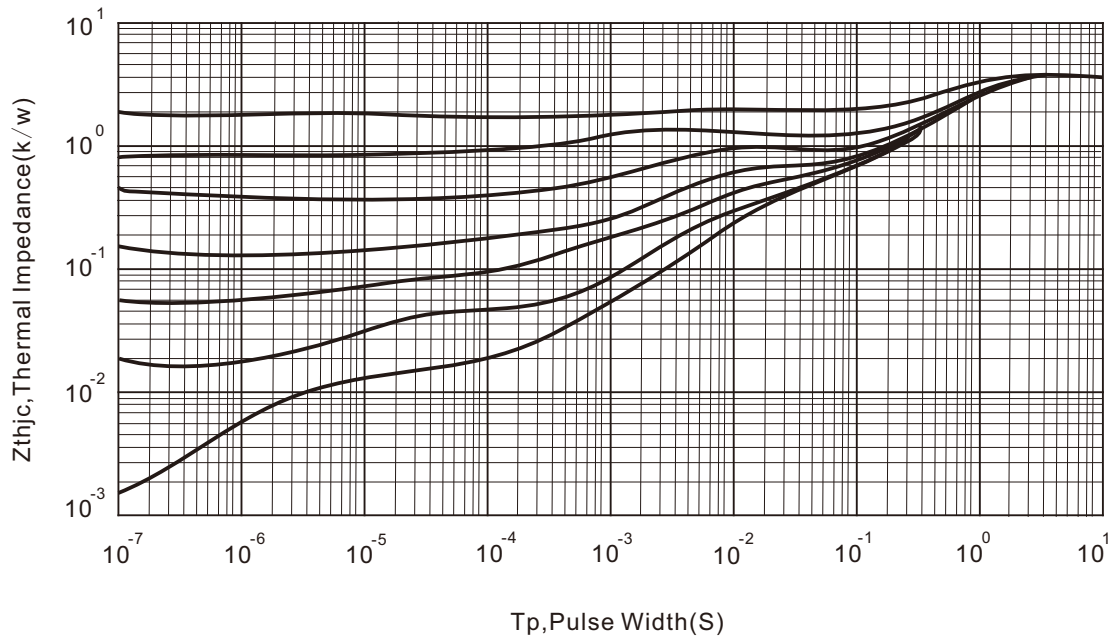
Capacitance



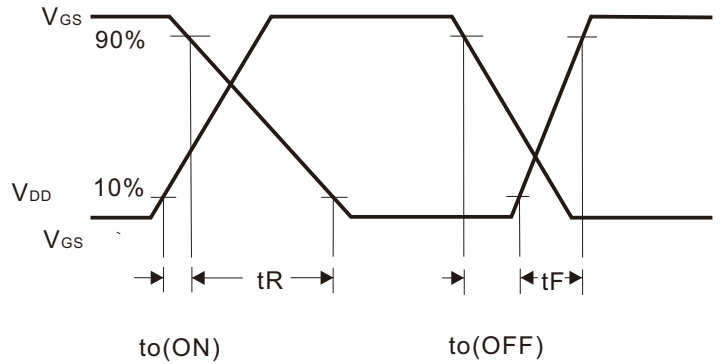
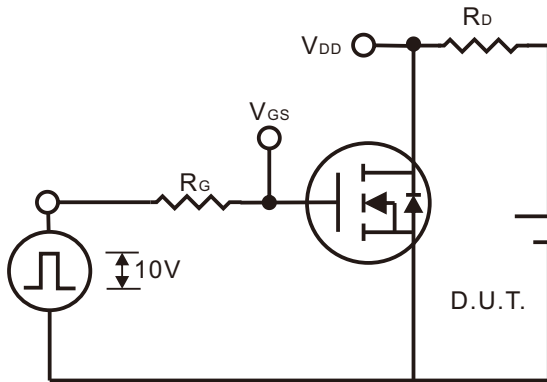
Body Diode Forward Voltage



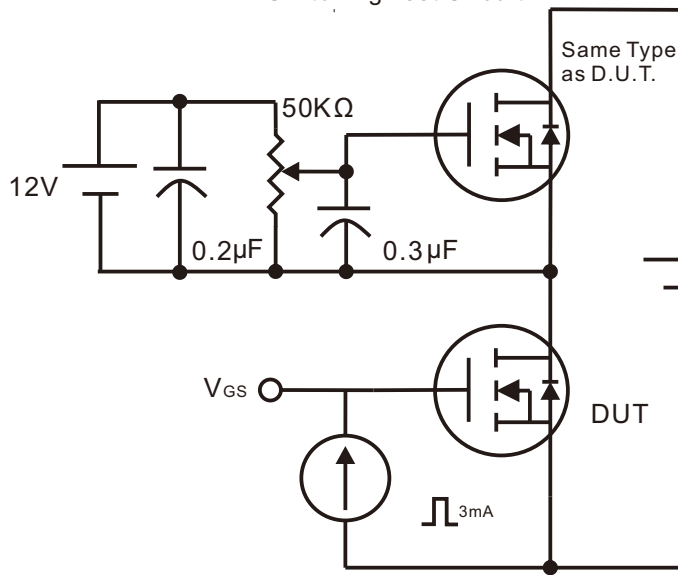
Transient Thermal Impedance



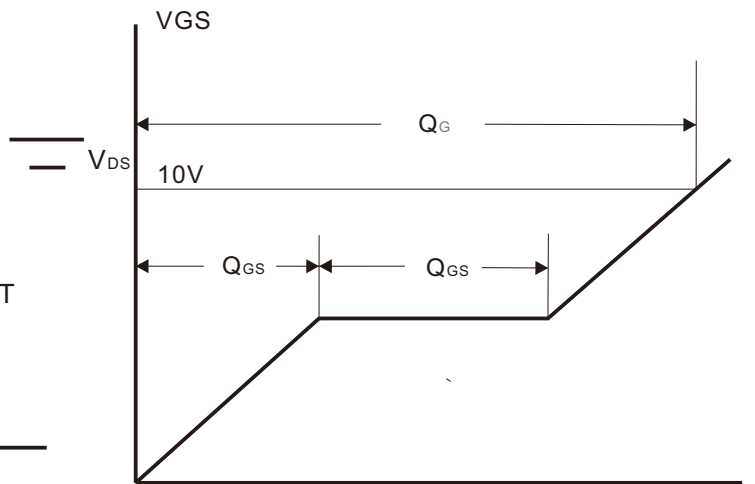
**Gate Charge Test Circuit & Waveform**



**Switching Test Circuit**

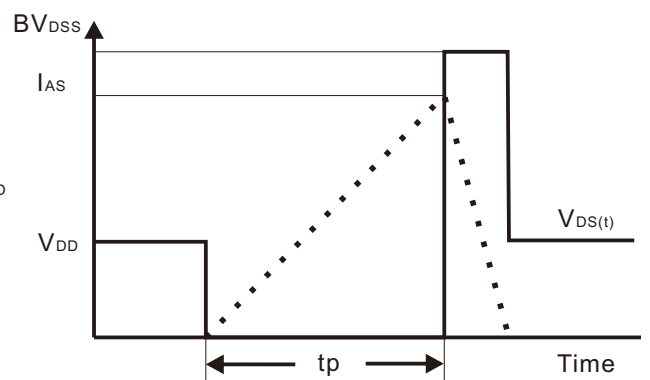
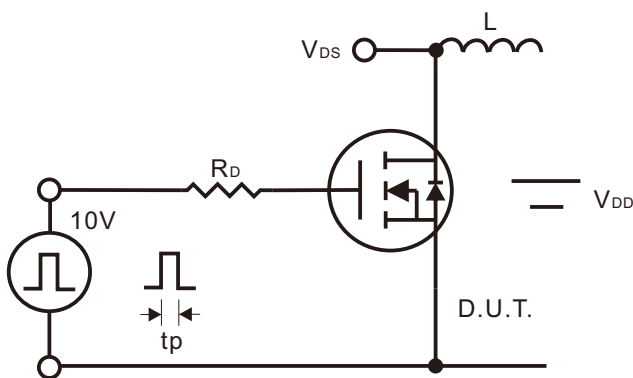


**Switching Waveforms**



**Gate Charge Test Circuit**

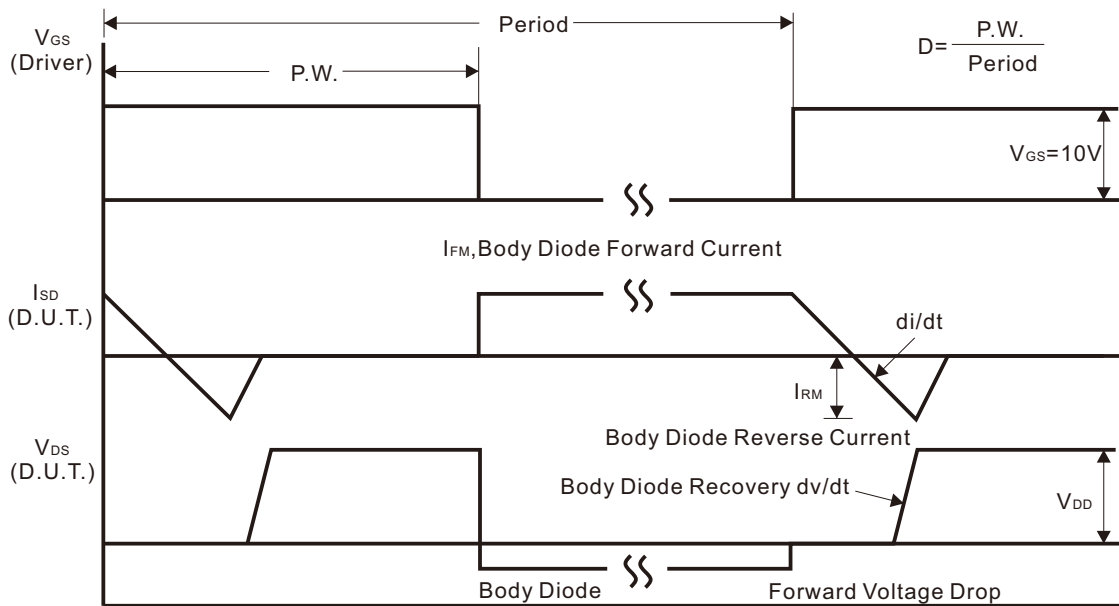
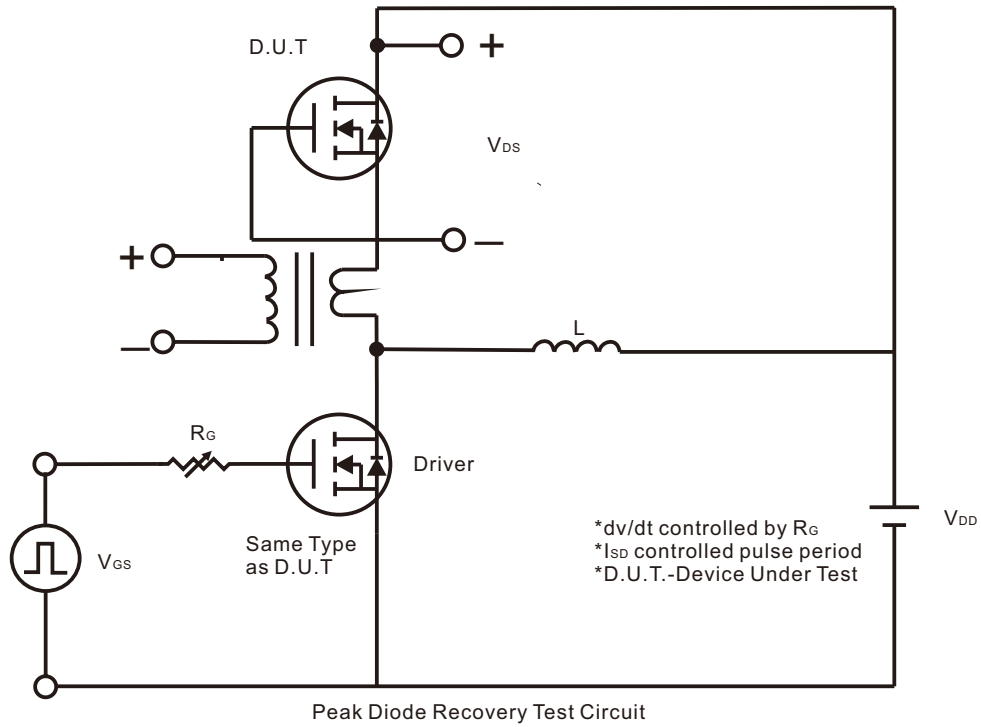
**Gate Charge Waveform**



**Unclamped Inductive Switching Test Circuit**

**Unclamped Inductive Switching Waveforms**

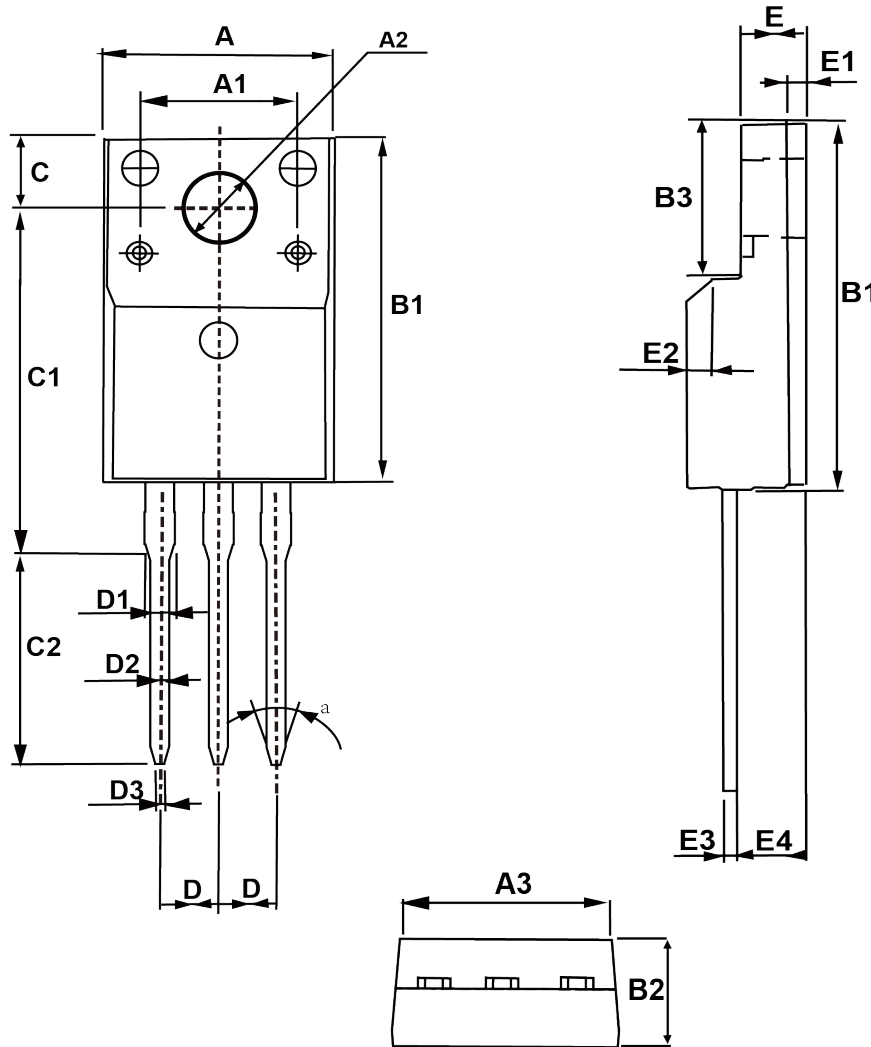
Peak Diode Recovery dv/dt Test Circuit & Waveform



Peak Diode Recovery dv/dt Waveforms

**Package Dimension of TO-220F**

Unit: mm



Symbol	Min	Max	Symbol	Min	Max
A	9.96	10.36	D	2.54	
A1	7.00		D1	1.15	1.35
A2	3.08	3.28	D2	0.70	0.90
A3	9.25	9.65	D3	0.28	0.48
B1	15.70	16.10	E	2.34	2.74
B2	4.50	4.90	E1	0.70	
B3	6.20	6.80	E2	1.0×45°	
C	3.20	3.40	E3	0.36	0.65
C1	15.20	16.00	E4	2.55	2.95
C2	9.75	10.15	a (angle)	30°	