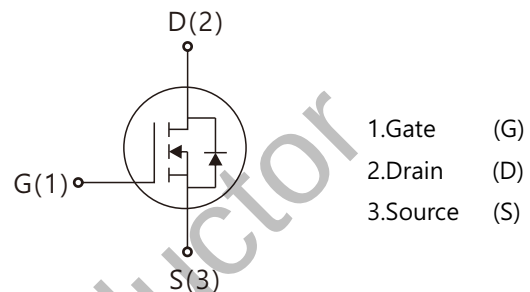
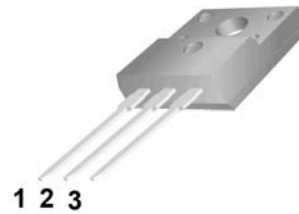


FQPF4N60SE**Features:**

- ☐ Low Intrinsic Capacitances.
- ☐ Excellent Switching Characteristics.
- ☐ Extended Safe Operating Area.
- ☐ Unrivalled Gate Charge :Qg=14nC (Typ.).
- ☐ BVDSS=600 V, I_D=4A
- ☐ R_{DS(on)} : 2.50Ω (Max) @V_G=10V
- ☐ 100% Avalanche Tested

TO-220F

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

Symbol	Parameter	Value	Unit
V _{DSS}	Drain-Source Voltage	600	V
I _D	Drain Current	T _j =25°C	A
		T _j =100°C	
V _{GS(TH)}	Gate Threshold Voltage	30	V
E _{AS}	Single Pulse Avalanche Energy (note1)	120	mJ
I _{AR}	Avalanche Current (note2)	4.0	A
P _D	Power Dissipation (T _j =25 °C)	50	W
T _j	Junction Temperature(Max)	150	°C
T _{stg}	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 _{θJC}	Thermal Resistance,Junction to Case	-	2.4	°C/W
R _{θJA}	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 μA , V _{GS} =0	650	-	-	V
△BVDSS/ △T _J	Breakdown Voltage Temperature Coefficient	I _D =250 μA ,Reference to 25 °C	-	0.67	-	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =650V, V _{GS} =0V	-	-	10	μA
		V _{DS} =520V, T _j =125°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)}	Date Threshold Voltage	I _D =250μA,V _{DS} =V _{GS}	2	-	4	V
R _{DS(ON)}	Static Drain-Source On-Resistance	I _D =2.0A,V _{GS} =10V	-	2.1	2.5	Ω
Dynamic Characteristics						
Ciss	Input Capacitance	V _{DS} =25V , V _{GS} =0 , f=1.0MHz	-	560	-	pF
Coss	Output Capacitance		-	48	-	
Crss	Reverse Transfer Capacitance		-	5.4	-	
Sw itching Characteristics						
Td(on)	Turn-On Delay Time	V _{DD} =325V , I _D =4A R _G =25Ω (Note 3,4)	-	25		nS
Tr	Turn-On Rise Time		-	45		
Td(off)	Turn-Off Delay Time		-	25		
Tf	Turn-Off Rise Time		-	35		
Qg	Total Gate Charge	V _{DS} =520V,V _{GS} =10V , I _D =4A (Note3,4)	-	14 .3		nC
Qgs	Gate-Source Charge		-	2.8	-	
Qgd	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
Trr	Reverse Recovery Time	I _S =4A,V _{GS} =0V diF/dt=100A/μs	-	393	-	nS
Qrr	Reverse Recovery Charge	(Note3)	-	1.5	-	μC

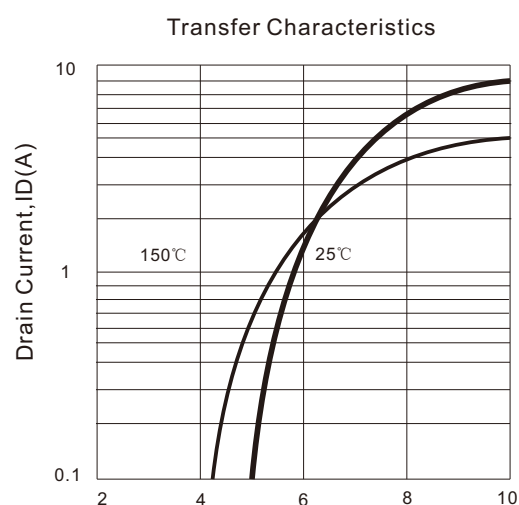
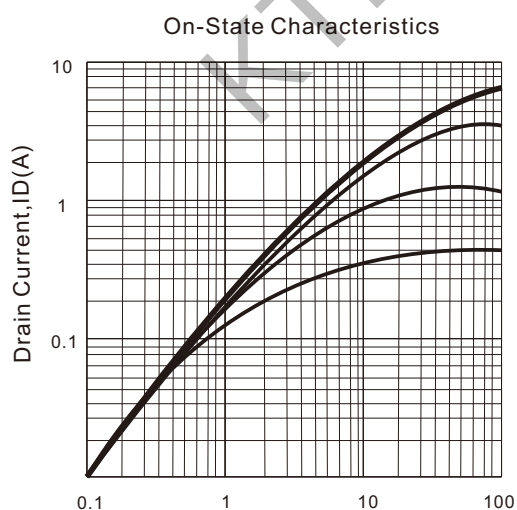
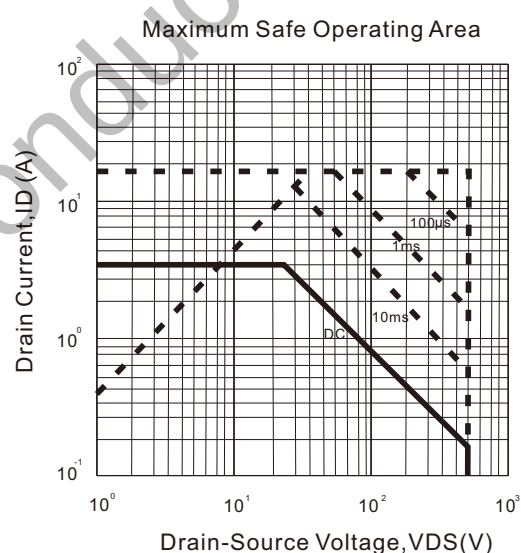
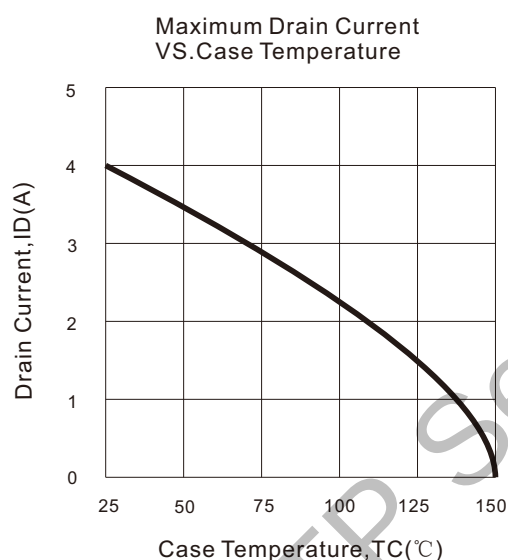
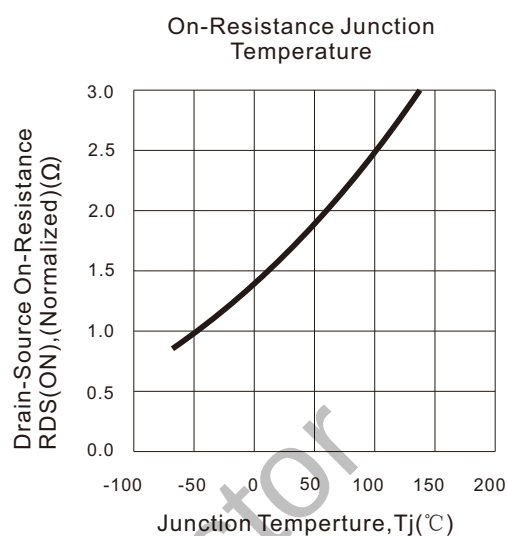
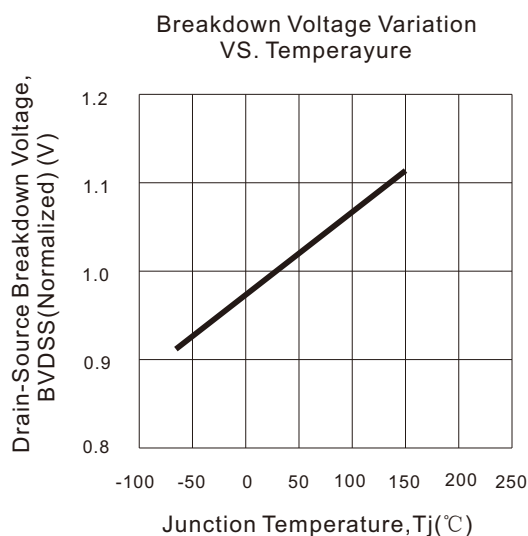
Notes : 1, L=0.5mH, IAS= 4A, VDD=50V, RG=25 Ω , Starting T_J =25°C

2, Repetitive Rating : Pulse width limited by maximum junction temperature

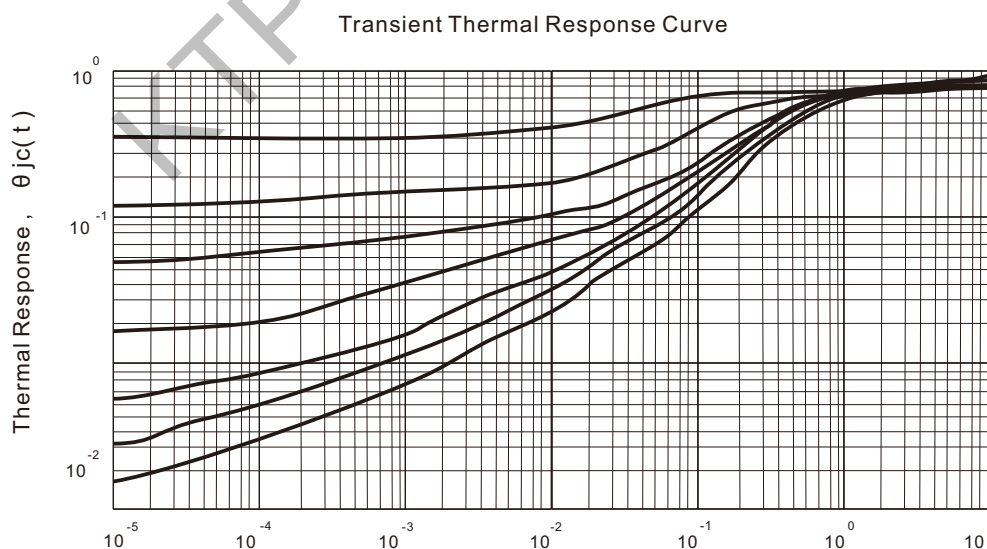
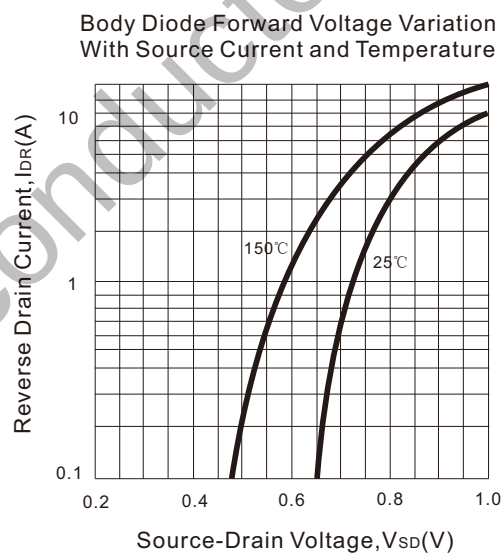
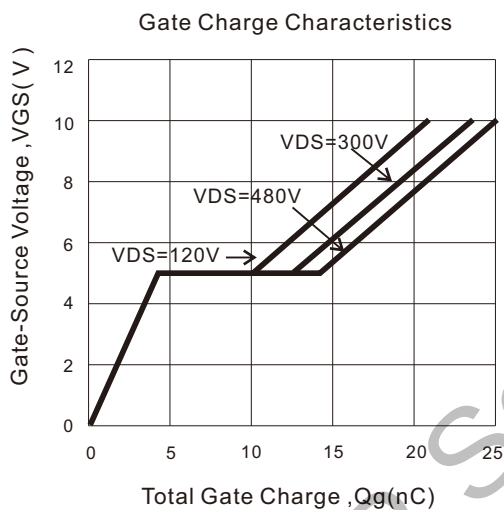
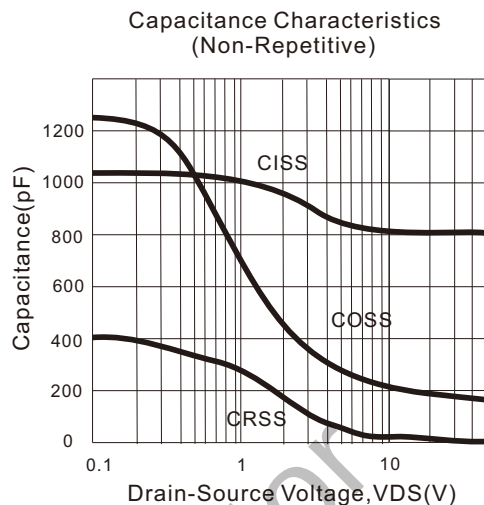
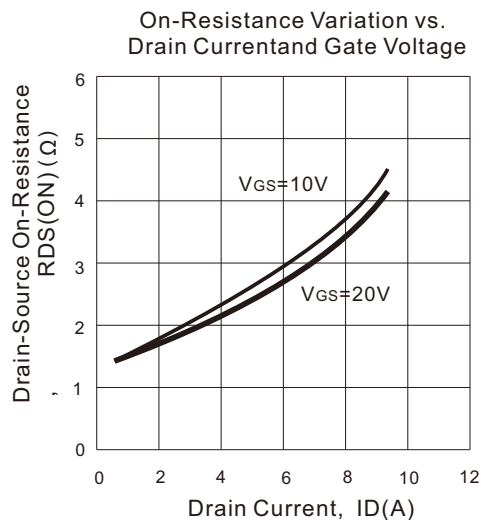
3, Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

4, Essentially Independent of Operating Temperature

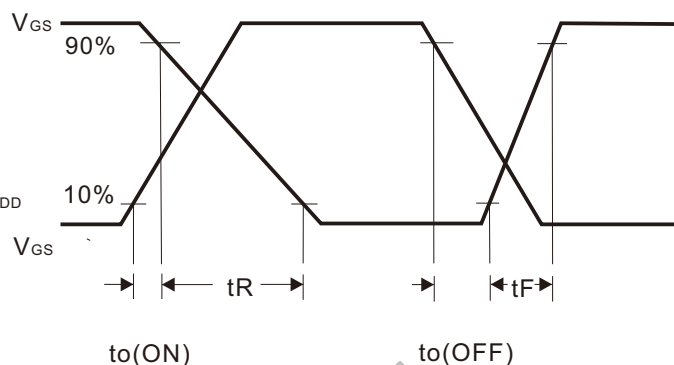
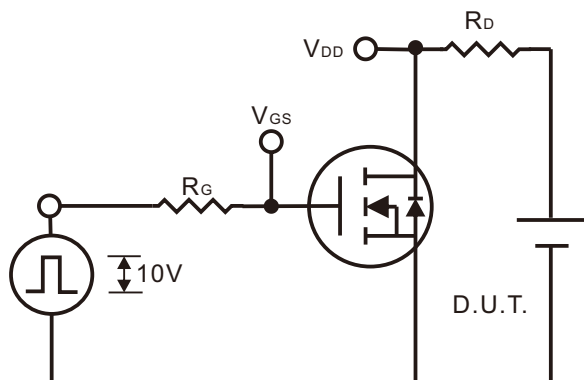
Typical Characteristics



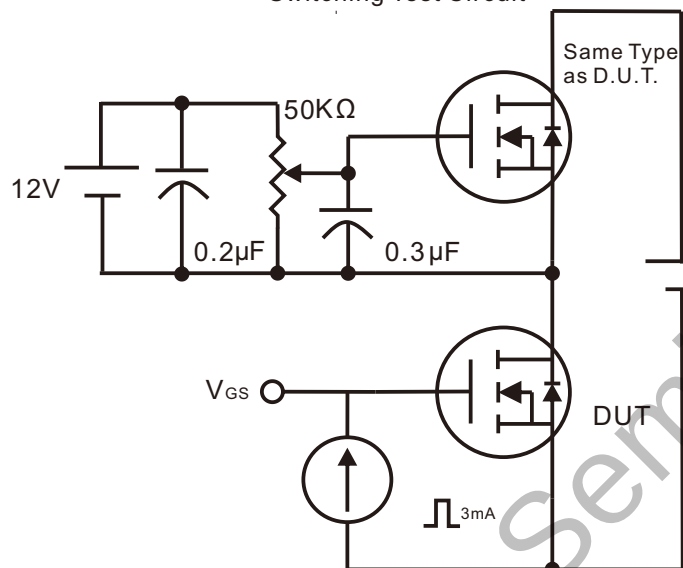
Typical Characteristics (Continued)



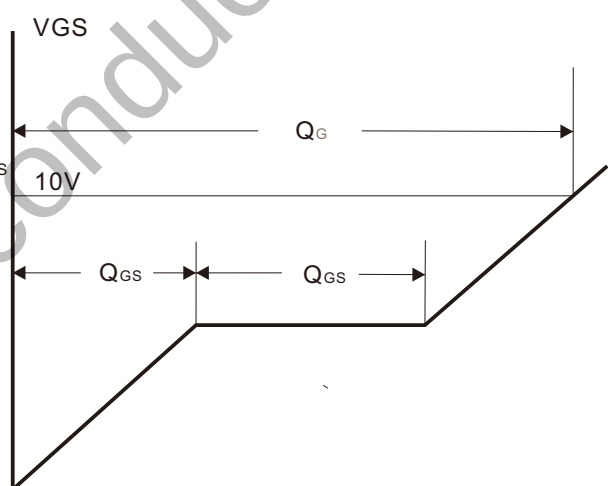
Gate Charge Test Circuit & Waveform



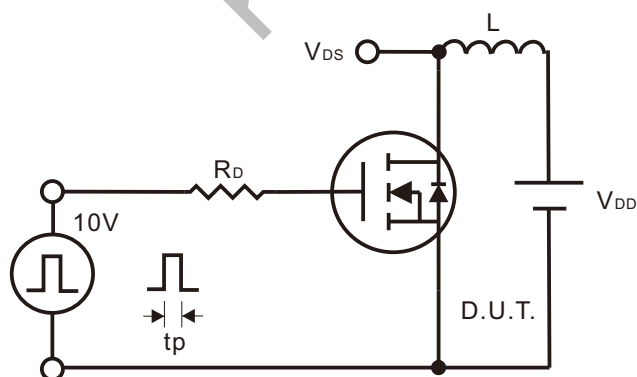
Switching Test Circuit



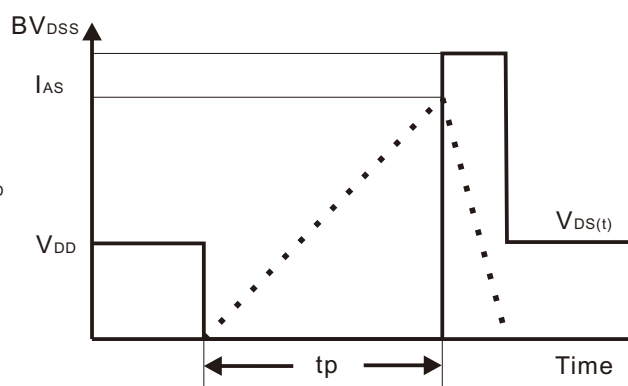
Switching Waveforms



Gate Charge Test Circuit



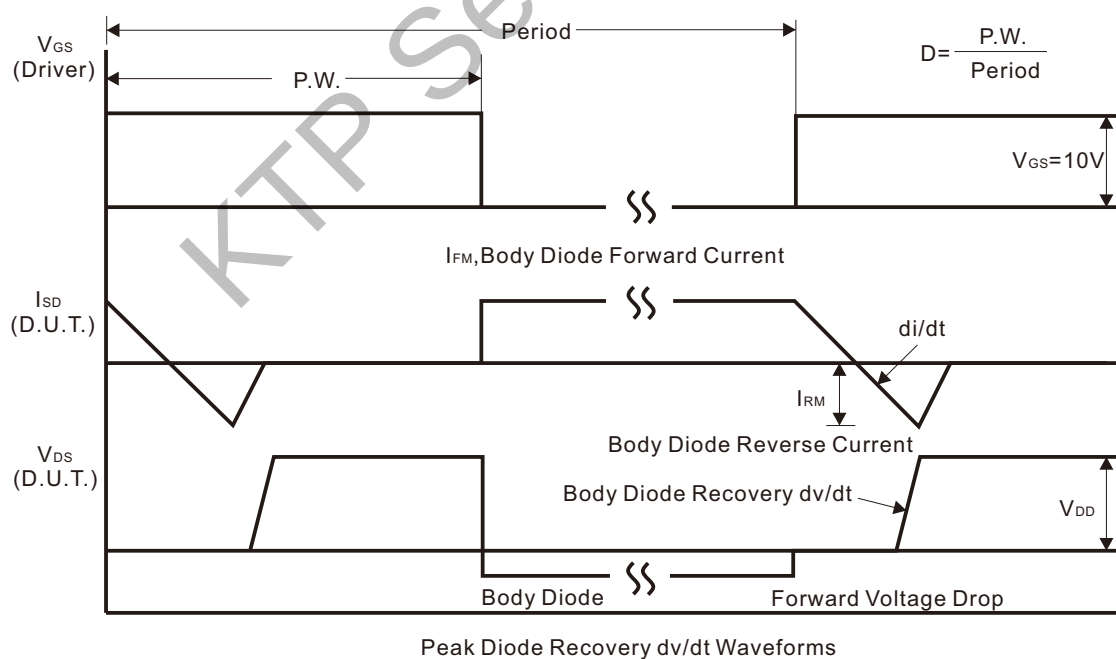
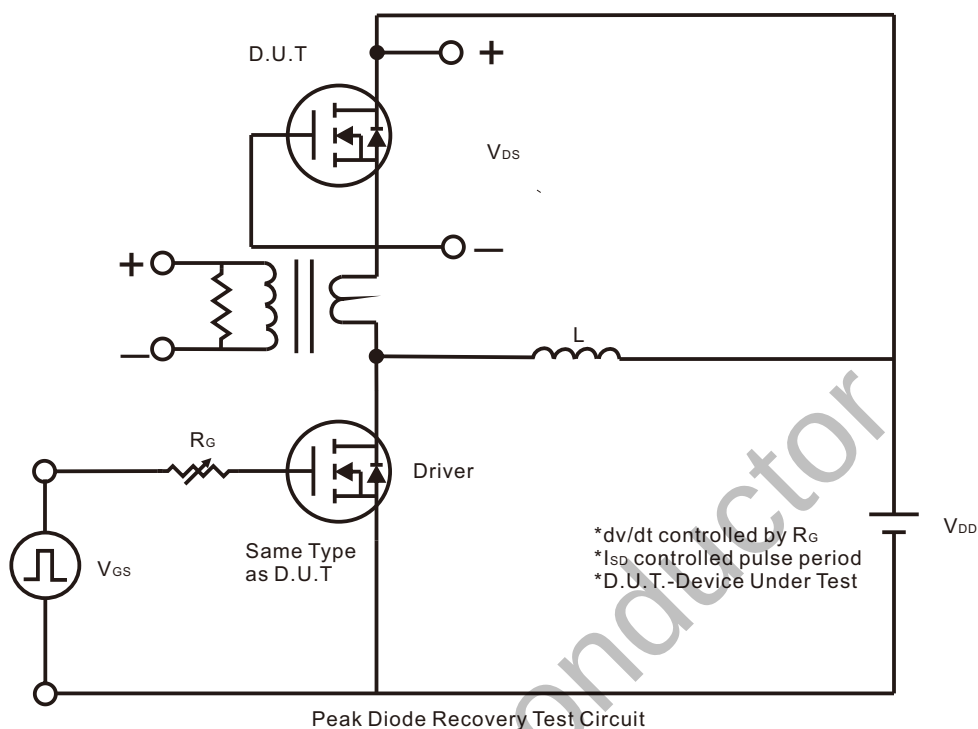
Gate Charge Waveform



Unclamped Inductive Switching Test Circuit

Unclamped Inductive Switching Waveforms

Peak Diode Recovery dv/dt Test Circuit & Waveform



Package Dimension

TO-220F

Unit: mm

