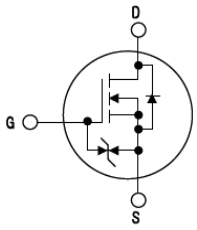
LH65R210

650V Super-Junction MOSFET

•General Description

The SJ MOSFET LH65R210 has the low $R_{DS(on)}$, low gate charge,fast switching and excellent avalanche characteristics.This device offers extremely fast and robust body diode,and is suitable for telecom and power supplies.



VDS =650V

$R_{DS(ON)}$ =210mΩ

ID =16.8A

TO-220F

TO-220

■ RoHS COMPLIANT

•Features

■Extremely Low Switching loss
■Build-in ESD Diode

•Application

■LED/LCD/PDP TV and monitor Lighting
■Solar/Renewable/UPS-Micro Inverter System
■Power Supplies

•Ordering Information:

Part number	LH65R210	LH65R210
Package	TO-220F	TO-220
Basic ordering unit (pcs)	1000	1000
Normal Package Material Ordering Code	LH65R210F-TO220F-TU	LH65R210T-TO220-TU
Halogen Free Ordering Code	LH65R210F-TO220F-TU-HF	LH65R210T-TO220-TU-HF

•Absolute Maximum Ratings（TC =25℃）

PARAMETER		SYMBOL	Value		UNIT
Drain-Source Breakdown Voltage		BV_{DSS}	650		V
Gate-Source Voltage		V_{GS}	±30		V
Continuous Drain Current	TC = 25°C	I_D	16.8		A
	TC = 100°C		10.6		
Pulsed drain current (TC = 25°C, tp limited by Tjmax)[1]		I_D pulse	50		A
Single Pulse Avalanche Energy[1]		I_{AR}	2.4		A
Single Pulse Avalanche Energy[2]		E_{AS}	250		mJ
Gate Source ESD(HBM-C=100pF,R=1.5KΩ		$V_{ESD(G-S)}$	2000		V
Power Dissipation(TC=25℃)		P_D	TO-220:150	TO-220F:33	W
Operating Temperature and Storage Temperature Range		T_J/T_{STG}	-55~+150		℃
MOSFET dv/dt ruggedness, V_{DS}=0…400V		dv/dt	50		V/ns
Reverse diode dv/dt, V_{DS}=0…480V,I_{SD}≤I_D		dv/dt	15		V/ns

●Electronic Characteristics

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D=250uA	650	--	--	V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=VGS,I_D=250uA	2.5	--	4.5	V
Drain-source On Resistance[3]	$R_{DS(ON)}$	V_{GS}=10V, I_D=6A	--	185	210	mΩ
Drain-Source Leakage Current	I_{DSS}	V_{DS}=650V,V_{GS}=0V,T_J=25℃	--	--	1	uA
		V_{DS}=650V,V_{GS}=0V,T_J=125℃	--	--	100	
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V	--	--	±1	uA
Forward Transconductance[3]	R_G	f=1.0MHz open drain	--	--	12	Ω
Input Capacitance	Ciss	V_{GS}=0V, V_{DS}=400V f 1.0MHz	--	1750	--	pF
Output Capacitance	Coss		--	39	--	
Reverse transfer Capacitance	Crss		--	3.4	--	
Turn-on delay time	Td(on)	I_D=8.7A, V_{DS}=325V R_G=25Ω	--	39	--	nS
Rise time	Tr		--	21	--	
Turn -Off Delay Time	Td(off)		--	171	--	
Fall time	Tf		--	18	--	
Total Gate Charge	Qg	I_D=8.7A, V_{DS}=520V V_{GS}=10V	--	40	---	nC
Gate-to-Source Charge	Qgs		--	8	--	
Gate-to-Drain Charge	Qgd		--	12	---	
Continuous Diode Forward Current	I_S		--	--	16.8	A
Pulsed Diode Forward Current	I_{SM}		--	--	50	A
Diode Forward Voltage	V_{SD}	Tj=25°C, Is=8.7A V_{GS} =0V	--	--	1.3	V
Reverse Recovery Time	trr	V_{RR}=400V, If=Is di_F/dt=100A/μs	--	340	--	ns
Reverse Recovery Charge	Qrr		--	4.7	--	uC

●Thermal Characteristics

PARAMETER	SYMBOL	MAX		UNIT
		TO-220F	TO-220	
Thermal Resistance Junction-case	Rth_{JC}	3.7	0.83	℃/W
Thermal Resistance Junction-ambient	Rth_{JA}	80	62	℃/W

Notes:

1.Repetitive Rating: Pulse width limited by maximum junction temperature.

2. I_{AS} = 2.4A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C

3. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%

●Typical Characteristics T_J=25ºC,unless otherwise noted

Figure 1. On Region Characteristics

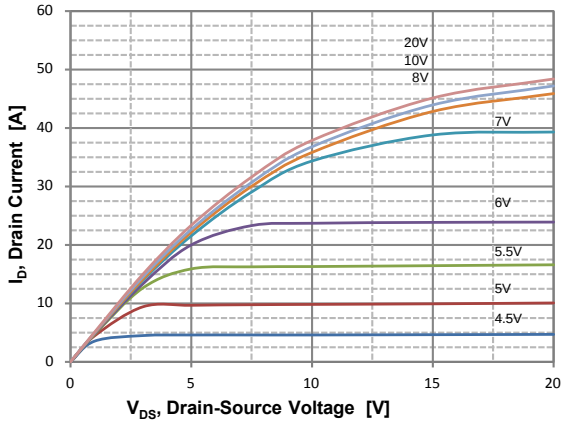


Figure 2. Transfer Characteristics

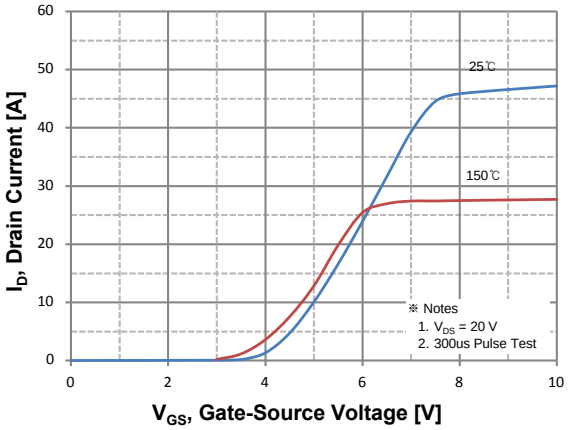


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

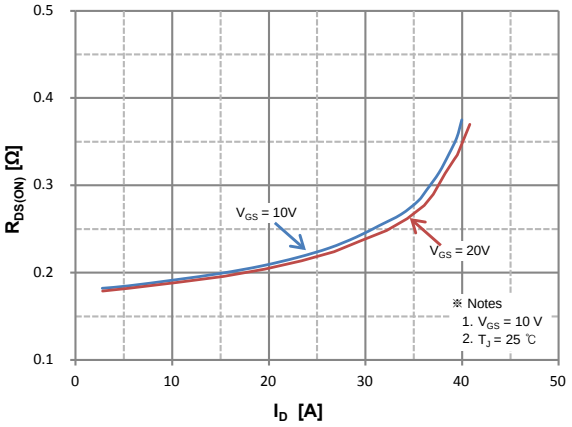


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

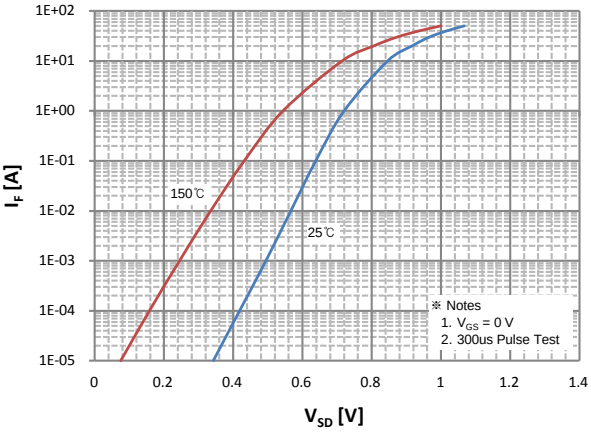


Figure 5. Capacitance Characteristics

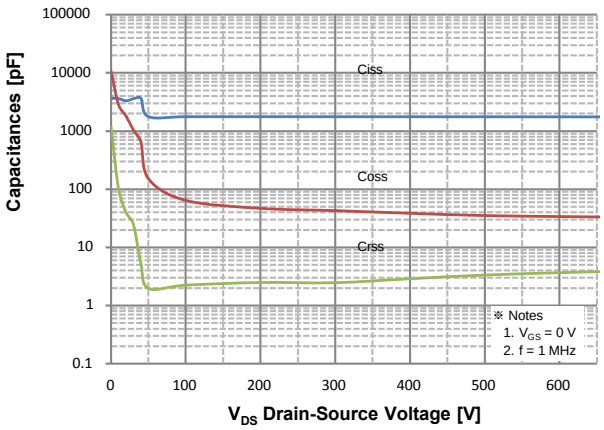
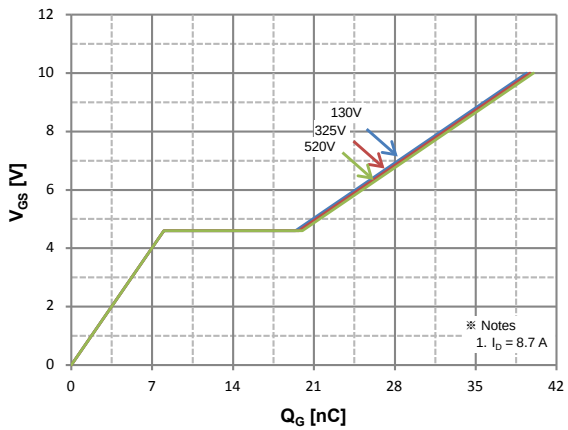


Figure 6. Gate Charge Characteristics



●Typical Characteristics(Cont.)

Figure 7. Breakdown Voltage Variation vs. Temperature

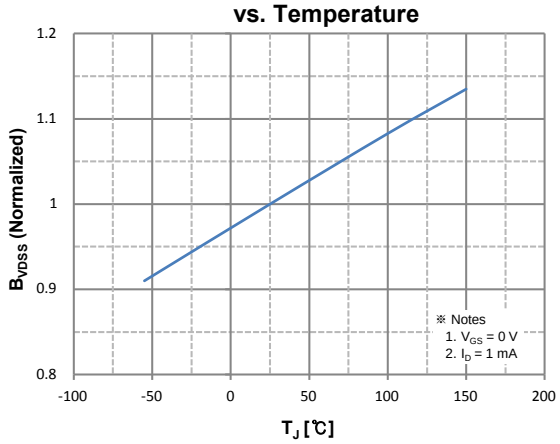


Figure 8. On-Resistance Variation vs. Temperature

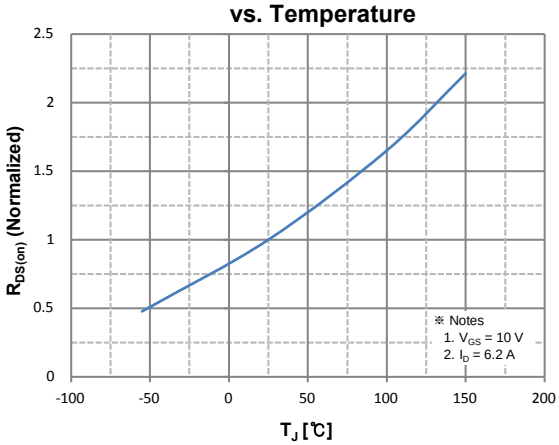


Figure 9. Maximum Safe Operating Area

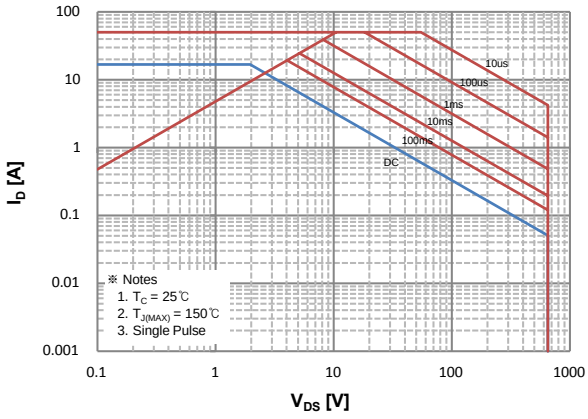


Figure 10. Maximum Drain Current vs. Case Temperature

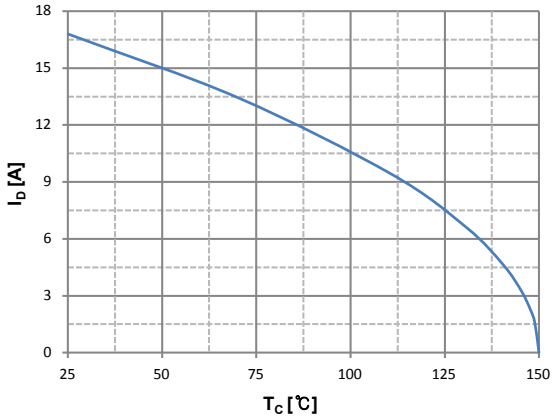
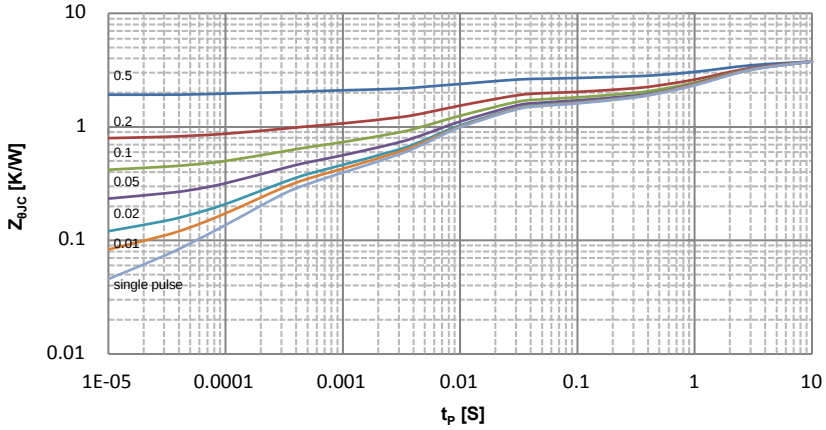


Figure 11. Transient Thermal Response Curve



●Test Circuits and Waveforms

Fig 1. Gate Charge Test Circuit & Waveform

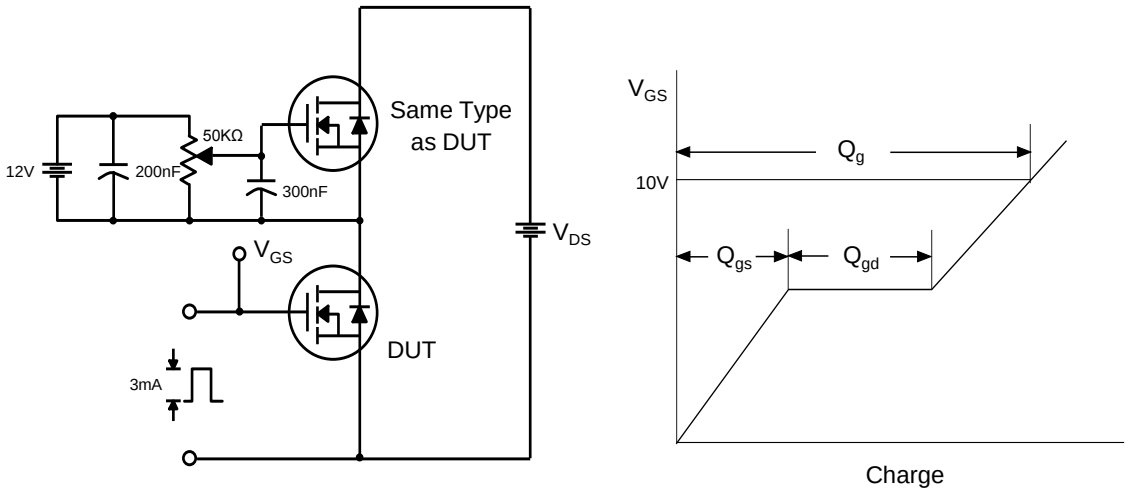


Fig 2. Resistive Switching Test Circuit & Waveforms

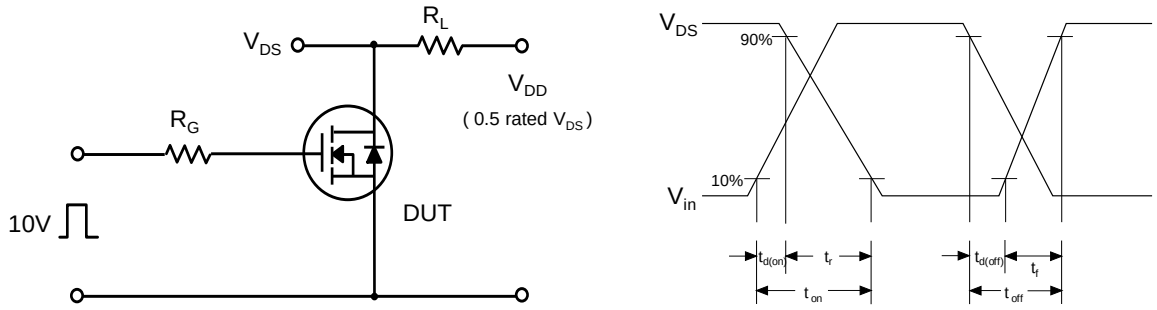
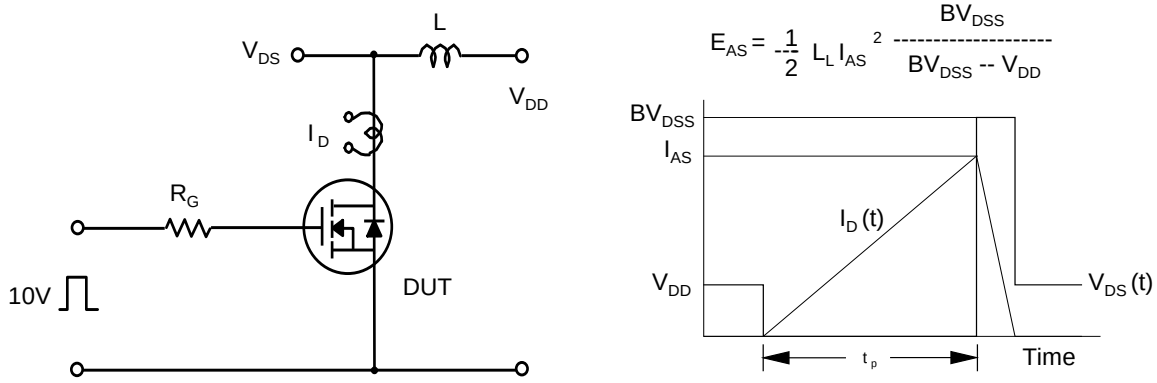
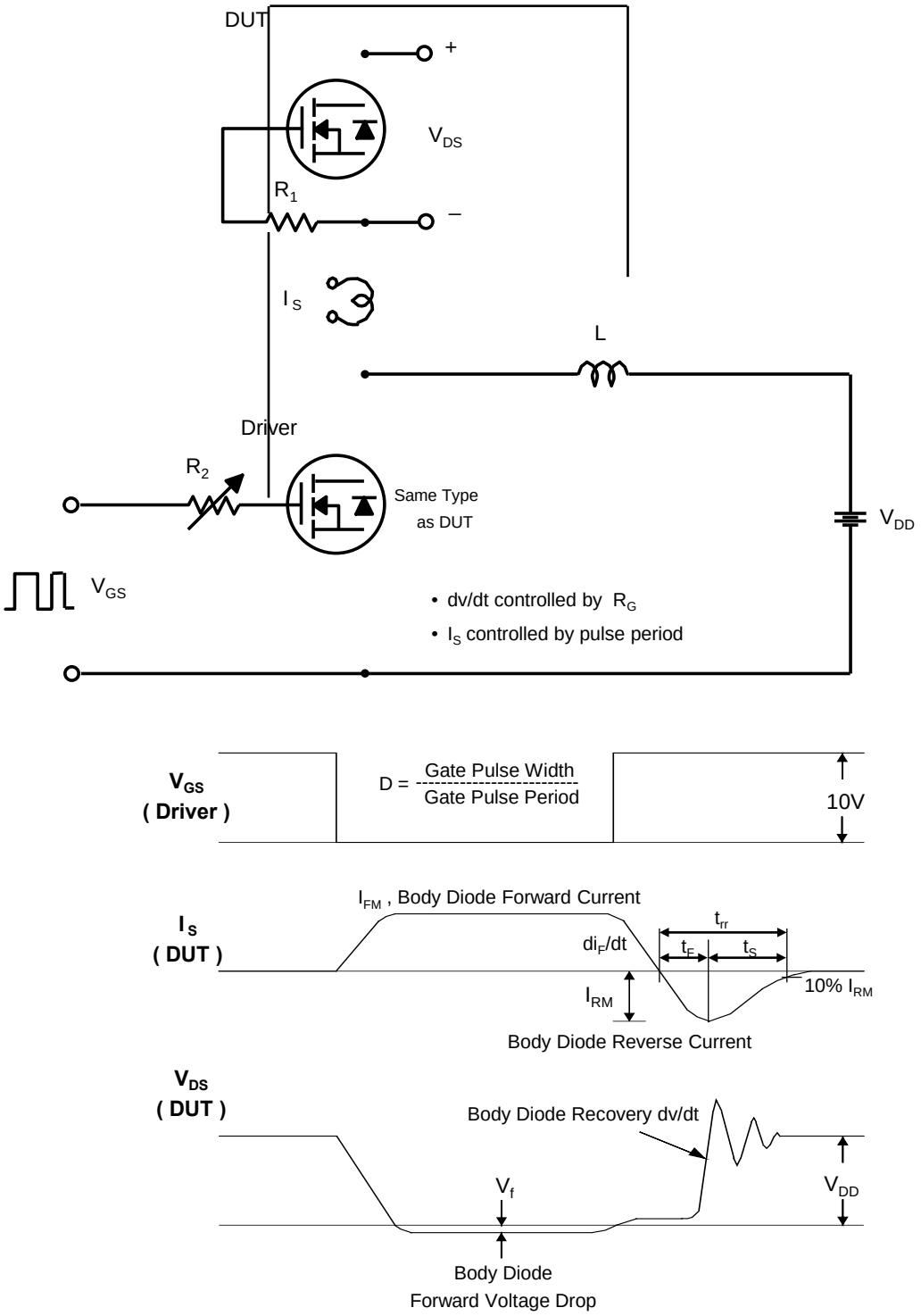


Fig 3. Unclamped Inductive Switching Test Circuit & Waveforms



●Test Circuits and Waveforms(cont.)

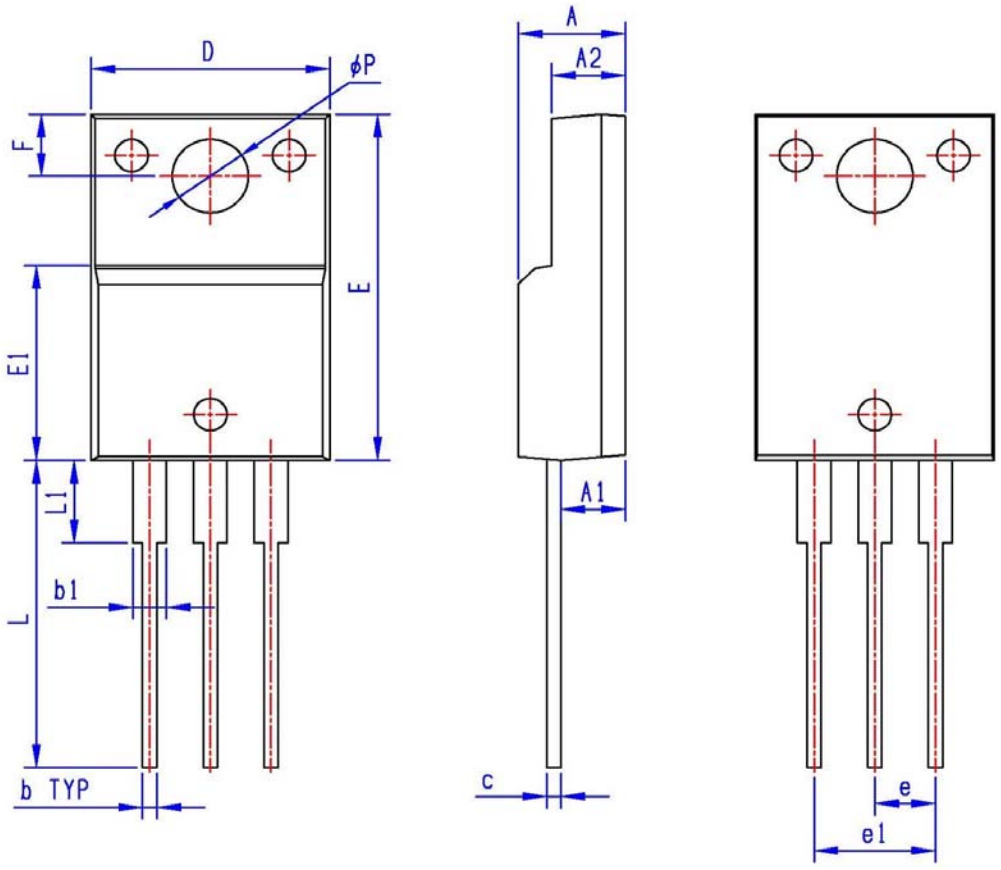
Fig 4. Peak Diode Recovery dv/dt Test Circuit & Waveforms



●Dimensions（TO-220F)

UNIT:mm

SYMBOL	min	max	SYMBOL	min	max
A	4.20	4.80	E1	8.30	8.70
A1	2.50	2.90	e	2.40	2.70
A2	2.90	3.30	e1	4.95	5.25
b	0.40	0.80	F	2.50	2.90
b1	1.10	1.50	L	13.00	14.00
c	0.50	0.70	L1	3.00	4.00
D	9.80	10.60	⌀P	2.90	3.50
E	14.60	15.60			



●Dimensions（TO-220)

UNIT:mm

`SYMBOL	min	max	SYMBOL	min	max
A	4.25	4.85	B1	2.60	3.00
A1	2.30	3.00	e	2.40	2.70
A2	1.20	1.40	e1	4.95	5.25
b	0.60	0.90	L	12.60	14.40
b1	1.10	1.70	L1	2.40	4.00
c	0.40	0.70	⌀P	3.50	3.90
D	9.80	10.60			
B	15.20	16.20