

•General Description

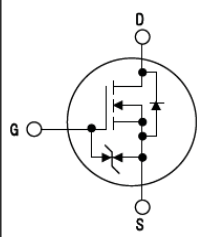


The SJ MOSFET LH65R210 has the low $R_{DS(on)}$, low gate charge, fast switching and excellent avalanche characteristics. This device offers extremely fast and robust body diode, and is suitable for telecom and power supplies.

•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

	VDS = 650V $R_{DS(ON)} = 210m\Omega$ ID = 16.8A
 TO-220F	 TO-220

■ RoHS COMPLIANT

•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°C)

PARAMETER	SYMBOL	Value	UNIT
Drain-Source Breakdown Voltage	BV_{DSS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current	I_D	TC = 25°C	16.8
		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°C)	P_D	TO-220:150	TO-220F:33
Operating Temperature and Storage Temperature Range	T_J/T_{STG}	-55~+150	°C
MOSFET dv/dt ruggedness, $V_{DS}=0\dots 400V$	dv/dt	50	V/ns
Reverse diode dv/dt, $V_{DS}=0\dots 480V, I_{SD}\leq I_D$	dv/dt	15	V/ns

●Electronic Characteristics

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650	--	--	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	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}	$V_{DS}=650V, V_{GS}=0V, T_J=25^\circ C$	--	--	1	μA
		$V_{DS}=650V, V_{GS}=0V, T_J=125^\circ C$	--	--	100	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V$	--	--	±1	μA
Forward Transconductance ³	R_G	f=1.0MHz open drain	--	--	12	Ω
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=400V, f=1.0MHz$	--	1750	--	pF
Output Capacitance	C_{oss}		--	39	--	
Reverse transfer Capacitance	C_{rss}		--	3.4	--	
Turn-on delay time	$T_d(on)$	$I_D=8.7A, V_{DS}=325V, R_G=25\Omega$	--	39	--	nS
Rise time	T_r		--	21	--	
Turn -Off Delay Time	$T_d(off)$		--	171	--	
Fall time	T_f		--	18	--	
Total Gate Charge	Q_g	$I_D=8.7A, V_{DS}=520V, V_{GS}=10V$	--	40	---	nC
Gate-to-Source Charge	Q_{gs}		--	8	--	
Gate-to-Drain Charge	Q_{gd}		--	12	---	
Continuous Diode Forward Current	I_S		--	--	16.8	A
Pulsed Diode Forward Current	I_{SM}		--	--	50	A
Diode Forward Voltage	V_{SD}	$T_J=25^\circ C, I_S=8.7A, V_{GS}=0V$	--	--	1.3	V
Reverse Recovery Time	t_{rr}	$V_{RR}=400V, I_f=I_S, di_f/dt=100A/\mu s$	--	340	--	ns
Reverse Recovery Charge	Q_{rr}		--	4.7	--	μC

●Thermal Characteristics

PARAMETER	SYMBOL	MAX		UNIT
		TO-220F	TO-220	
Thermal Resistance Junction-case	R_{thJC}	3.7	0.83	°C/W
Thermal Resistance Junction-ambient	R_{thJA}	80	62	°C/W

Notes:

- 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
2. $I_{AS} = 2.4A, V_{DD} = 50V, R_G = 25\Omega, \text{Starting } T_J = 25^\circ C$
3. Pulse Test : Pulse width $\leq 300\mu s, \text{Duty cycle } \leq 2\%$

● **Typical Characteristics** $T_J=25^{\circ}\text{C}$, unless otherwise noted

Figure 1. On Region Characteristics

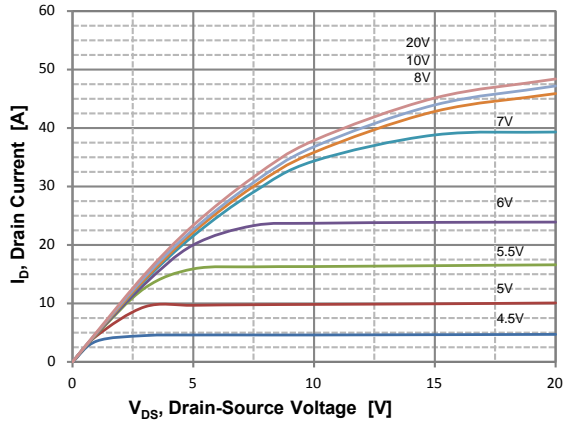


Figure 2. Transfer Characteristics

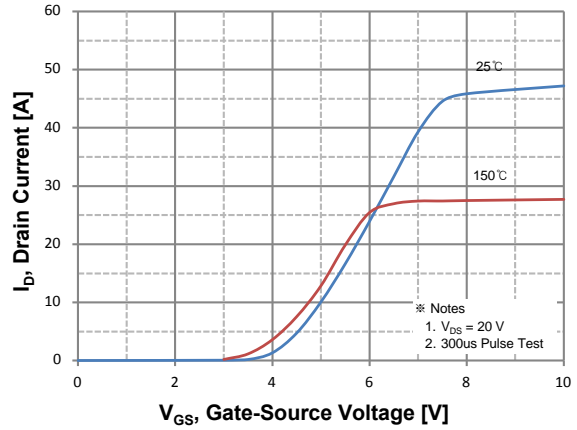


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

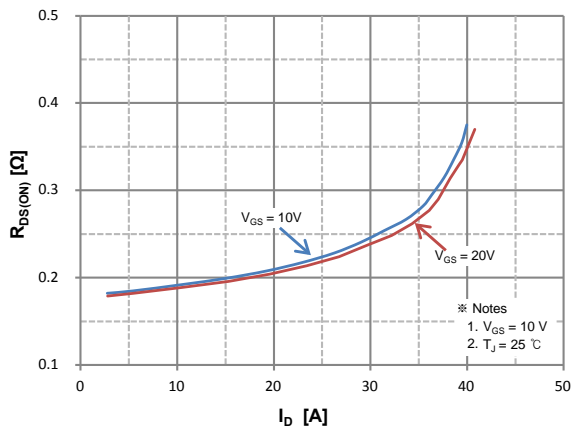


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

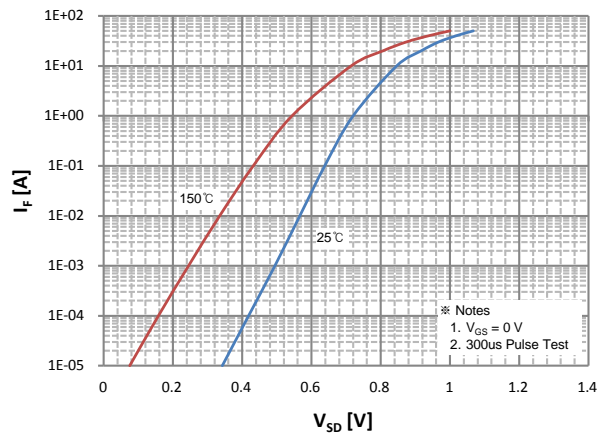


Figure 5. Capacitance Characteristics

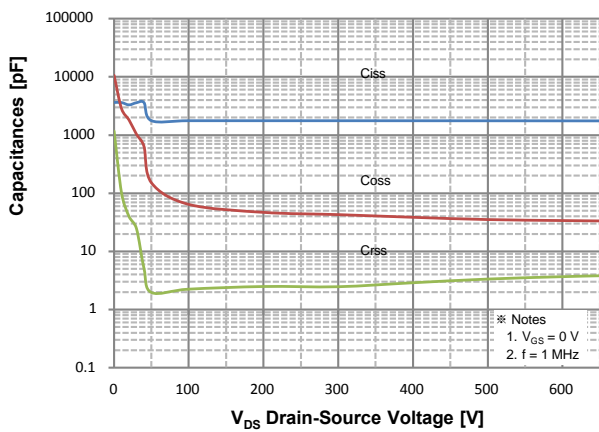
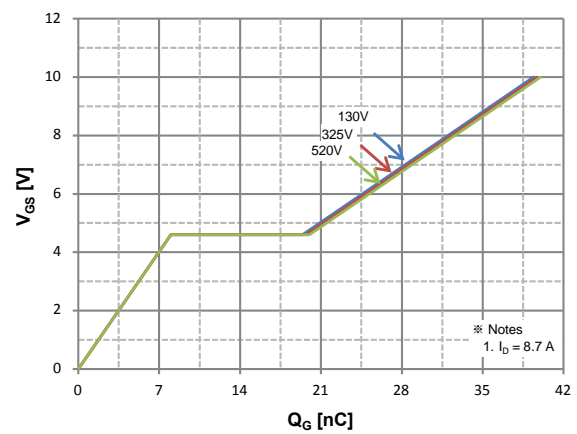


Figure 6. Gate Charge Characteristics



• **Typical Characteristics(Cont.)**

Figure 7. Breakdown Voltage Variation vs. Temperature

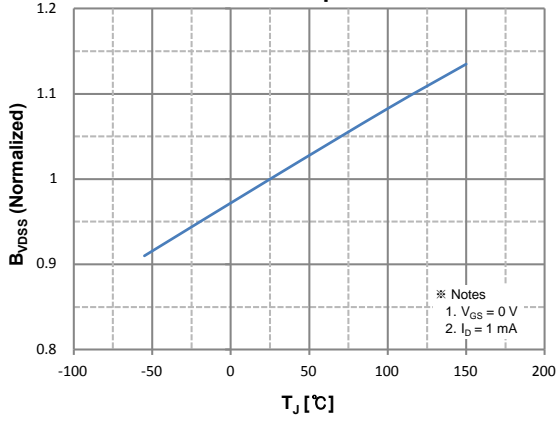


Figure 8. On-Resistance Variation vs. Temperature

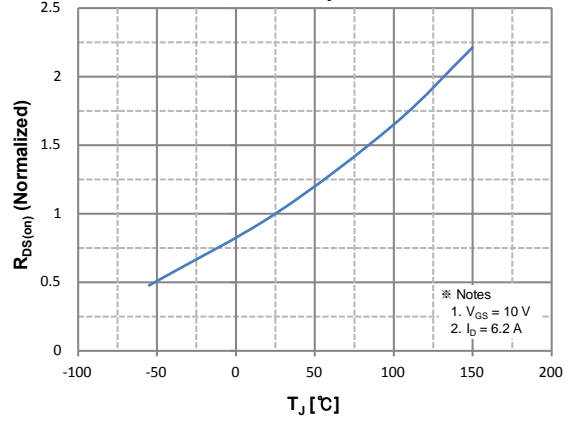


Figure 9. Maximum Safe Operating Area

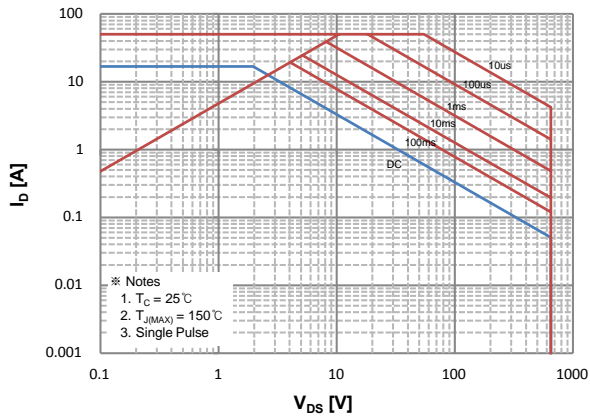


Figure 10. Maximum Drain Current vs. Case Temperature

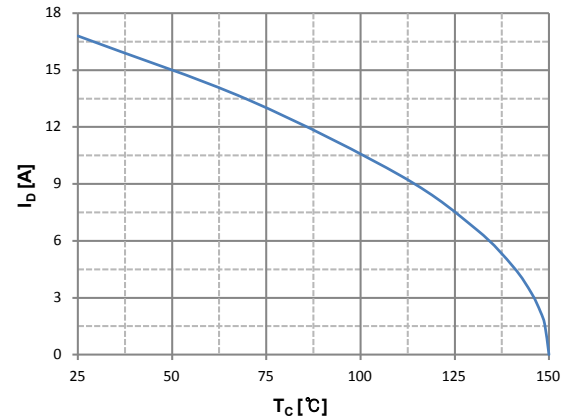
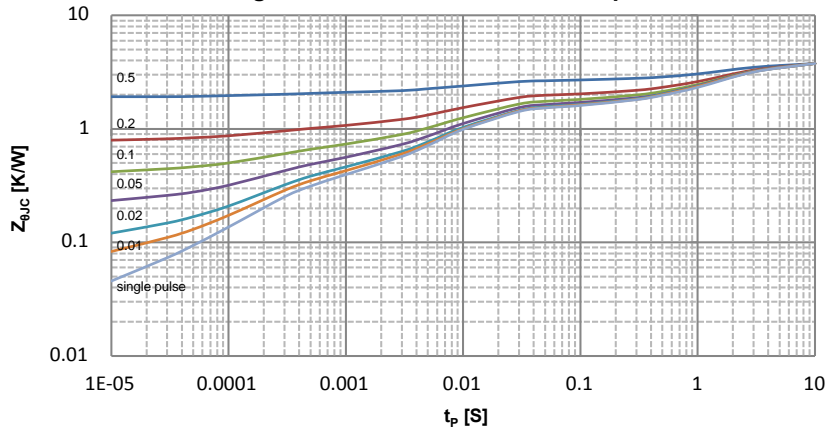


Figure 11. Transient Thermal Response Curve



● Test Circuits and Waveforms

Fig 1. Gate Charge Test Circuit & Waveform

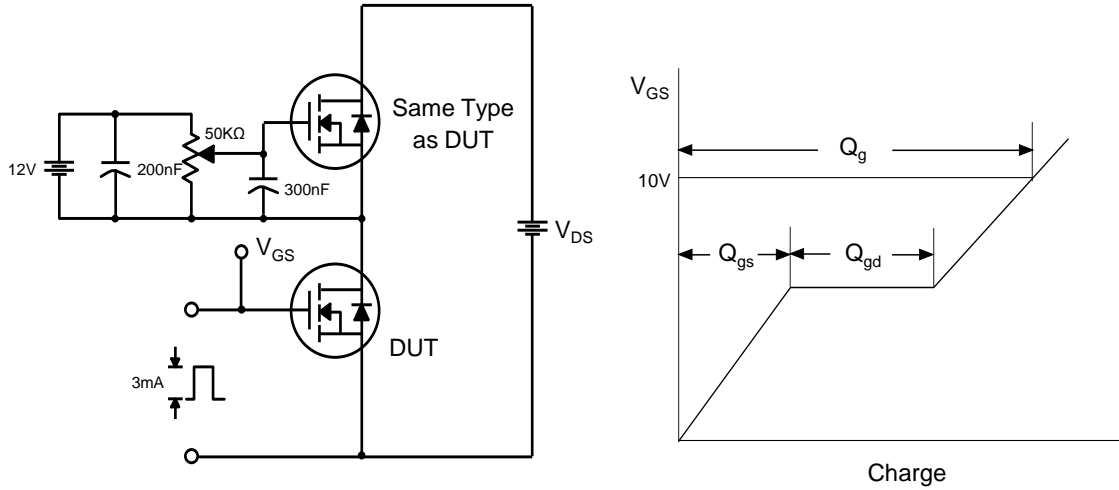


Fig 2. Resistive Switching Test Circuit & Waveforms

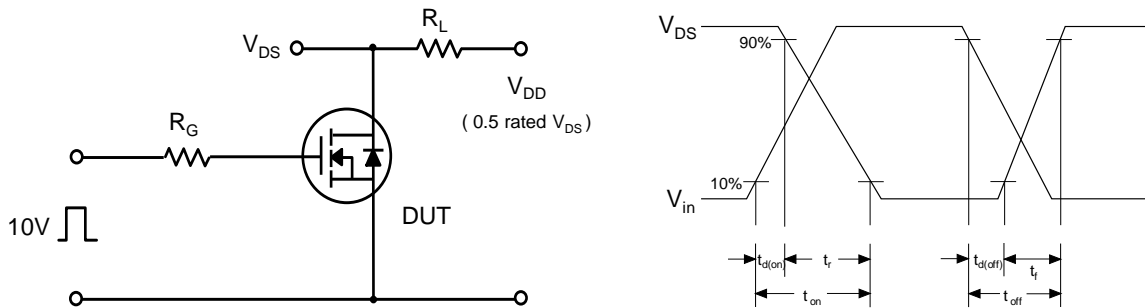
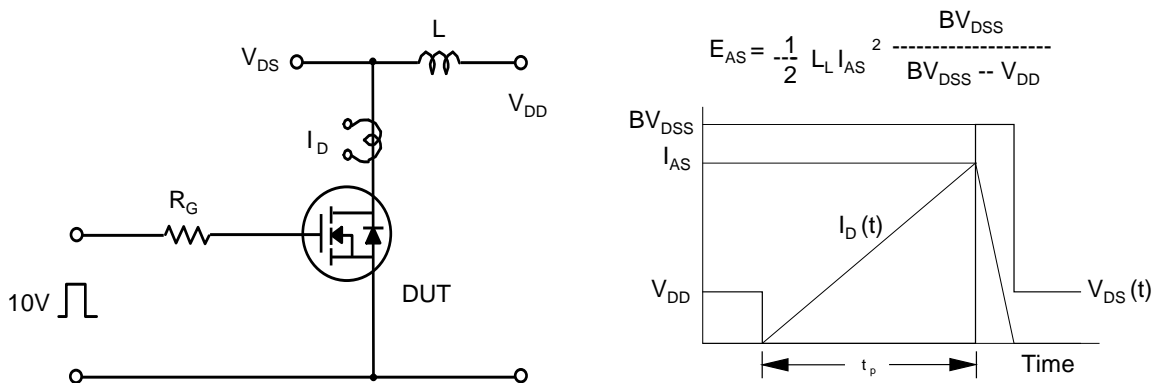
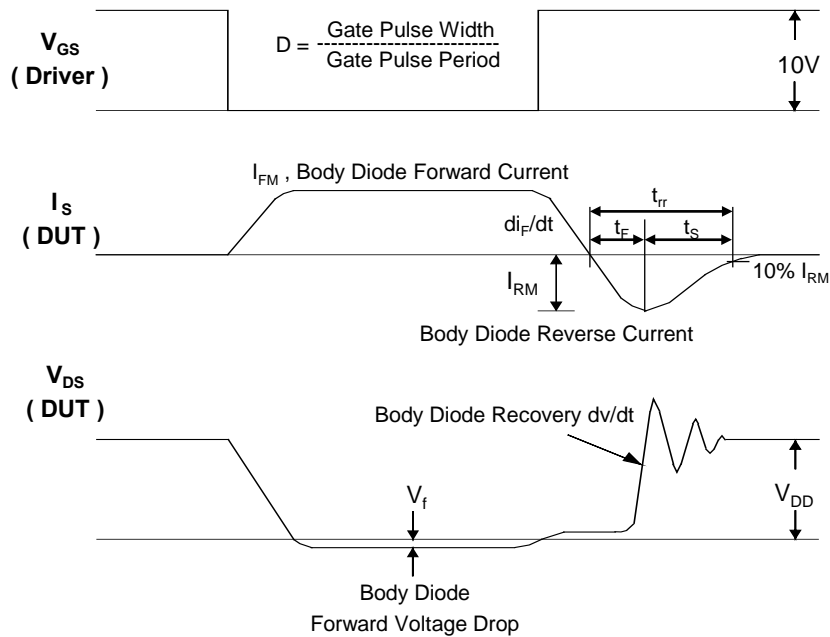
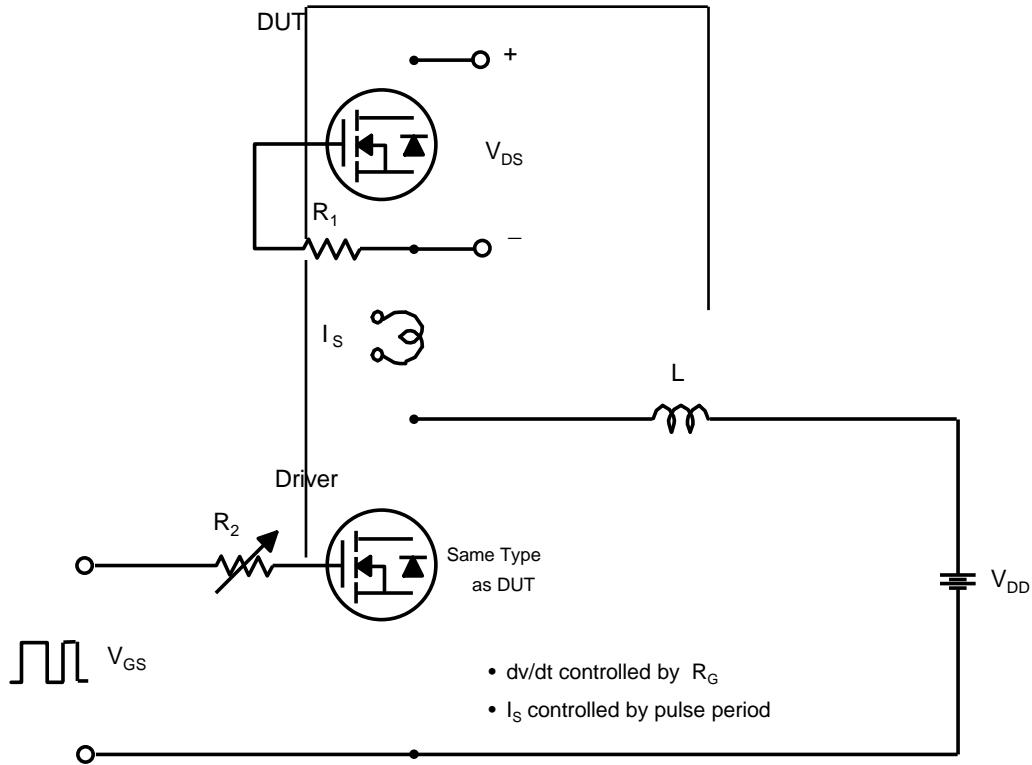


Fig 3. Unclamped Inductive Switching Test Circuit & Waveforms



• Test Circuits and Waveforms(cont.)

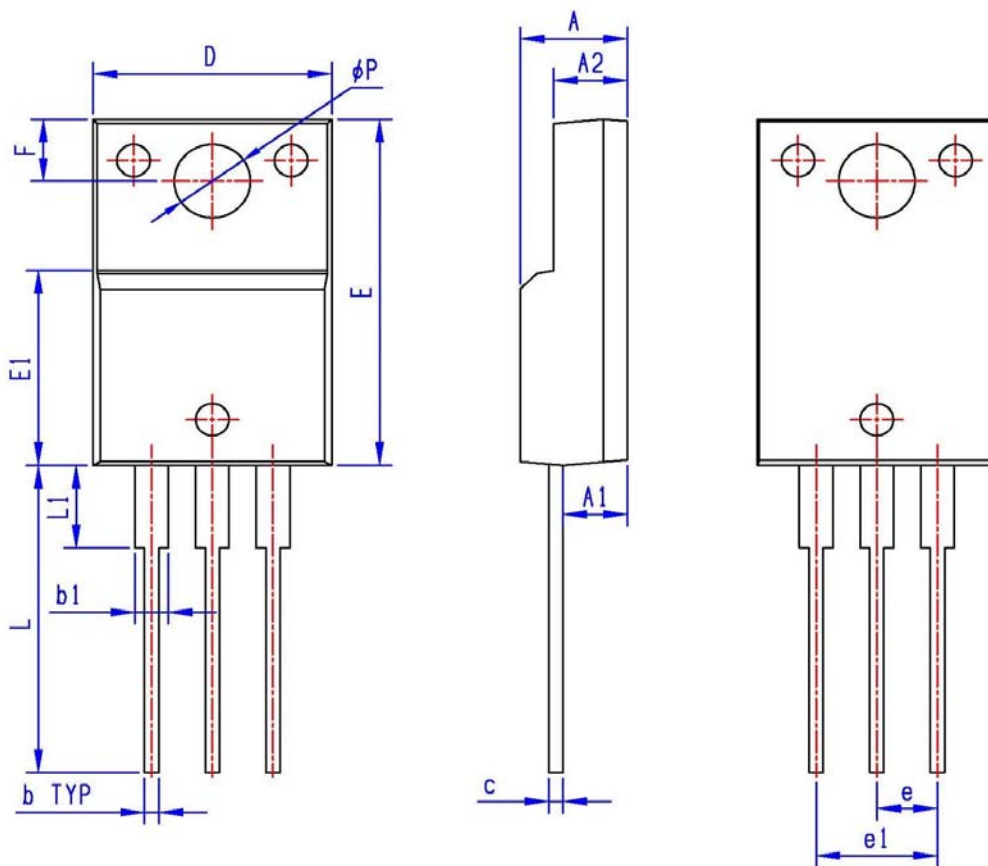
Fig 4. Peak Diode Recovery dv/dt Test Circuit & Waveforms



•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			

