XYD8290

82V N-channel enhancement mode MOSFET

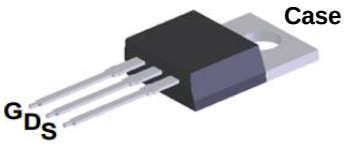
Features

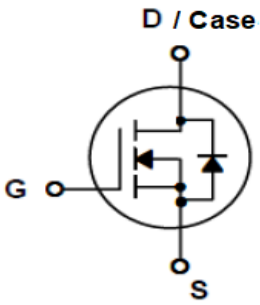
- Extremely Low RDS(on):
  Typ.RDS(on) = 6.5mΩ @V_{GS}=10 V,Id=40 A
- Low gate charge (typical 106 nC)
- Fast switching
- 100% avalanche tested

General Description

The XYD8290 uses advanced trench technology to provide excellent RDS(ON), low gate charge and operation with gate voltages as low as 3V. This device is suitable for use as a Battery protection or in other Switching application.

TO-220-3L Package





Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	82	V
I_D	Drain Current - Continuous (TC= 25°C)	90	A
	- Continuous (TC= 100°C)	70*	A
I_{DM}	Drain Current - Pulsed (Note 1)	320*	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	602	mJ
E_{AR}	Repetive Avalanche Energy (Note 1)	50	mJ
dv/dt	Peak diode recovery dv/dt (note 3)	5	V/ns
P_D	Power Dissipation (TC = 25°C)	255	W
	- Derate above 25°C	2.0	W/°C
T_j , T_{stg}	Operating and Storage Temperature Range	-55 to +150	°C
T_L	Maximum lead temperature for soldering purpose, 1/8 from case for 5 seconds	300	°C

* Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.49	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	57.6	°C/W

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	82	88		V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C		75.8		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 802V, V_{GS} = 0 V			1	μA
		V_{DS} = 64 V, T_C = 125°C			10	μA
I_{GSSF}	Gate Leakage Current, Forward	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate Leakage Current, Reverse	V_{GS} = -20 V, V_{DS} = 0 V			-100	nA
On Characteristics						
$V_{GS(TH)}$	Gate Threshold voltage	V_{DS} = V_{GS}, I_D = 250 uA	2	3	4	V
$R_{DS(On)}$	Drain-Source on-state resistance	V_{GS} = 10 V, I_D = 40 A		6.5	7.5	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 40 A (Note 3)		37.5		S
Dynamic Characteristics						
C_{iss}	Input capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz		6700		pF
C_{oss}	Output capacitance			381		pF
C_{rss}	Reverse transfer capacitance			284		pF
Switching Characteristics						
$t_{d(on)}$	Turn On Delay Time	V_{DD} = 40 V, ID = 40 A, V_{GS} = 10 V, R_G = 4.7 Ω (Note 3, 4)		28		ns
t_r	Rising Time			55		ns
$t_{d(off)}$	Turn Off Delay Time			69		ns
t_f	Fall Time			27		ns
Q_g	Total Gate Charge	V_{DS} = 40 V, ID = 40 A, V_{GS} = 10 V (Note 3, 4)		106		nC
Q_{gs}	Gate-Source Charge			35		nC
Q_{gd}	Gate-Drain Charge			25.5		nC
R_g	Gate Resistance	V_{DS} = 0 V, Scan F mode		0.74		Ω
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current				90	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current				320	A
V_{SD}	Diode Forward Voltage	V_{GS}= 0 V, I_S = 40 A			1.2	V
I_{rrm}	Reverse recovery current	I_S= 40A, V_{GS} = 0V, dI_F/dt = 100A/us		-2.8		A
T_{rr}	Reverse recovery time			37		ns
Q_{rr}	Reverse recovery charge			52		nC

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 1.54 mH, IAS = 28 A, V_{DD} = 10V, R_G = 25 Ω, Starting T_j = 25°C
3. I_{SD} ≤ 40A, di/dt = 100A/us, V_{DD} ≤ BV_{DSS}, Staring T_j =25°C
4. Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

Typical Characteristics

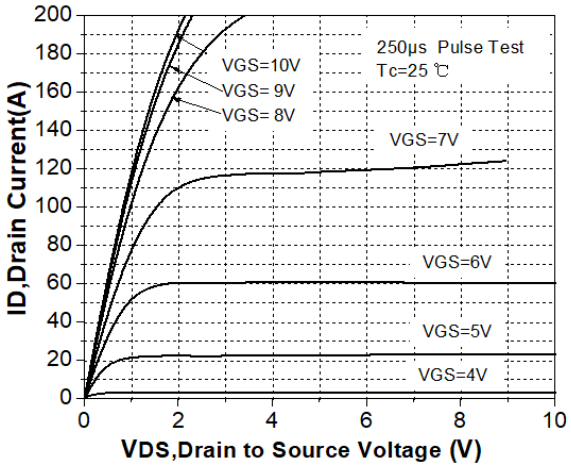


Figure 1. On-Region Characteristics

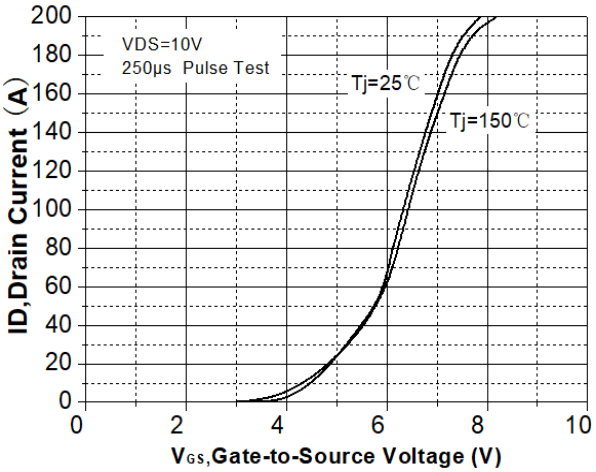


Figure 2. Transfer Characteristics

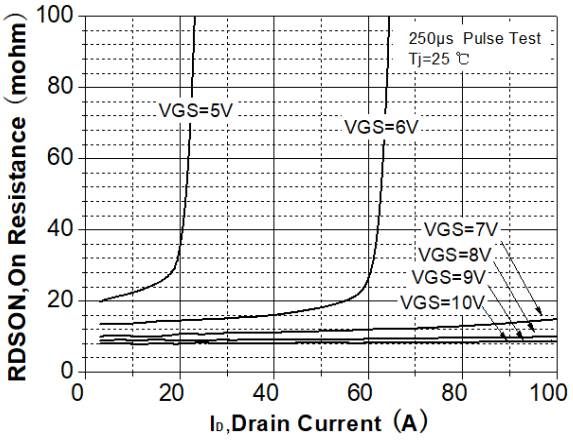


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

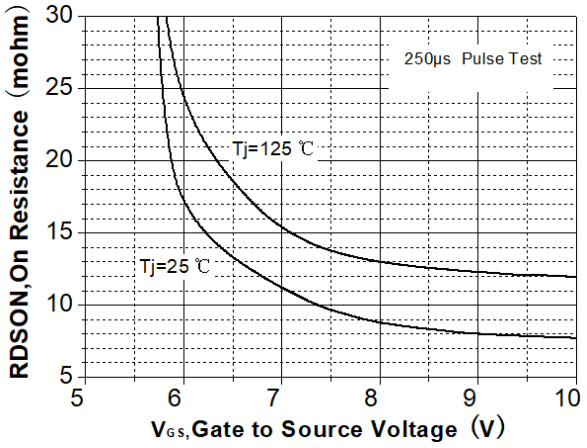


Figure 4. On-Resistance vs. Gate to Source Voltage

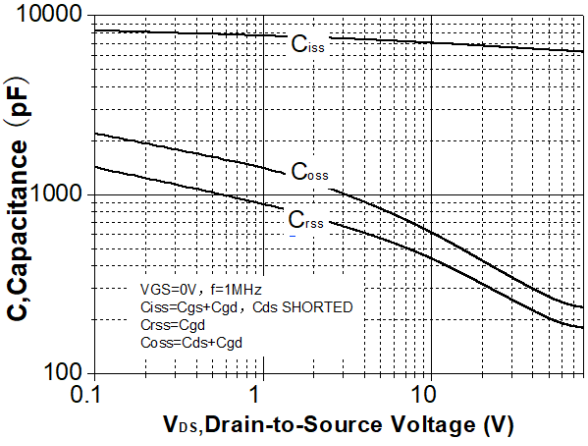


Figure 5. Capacitance Characteristics

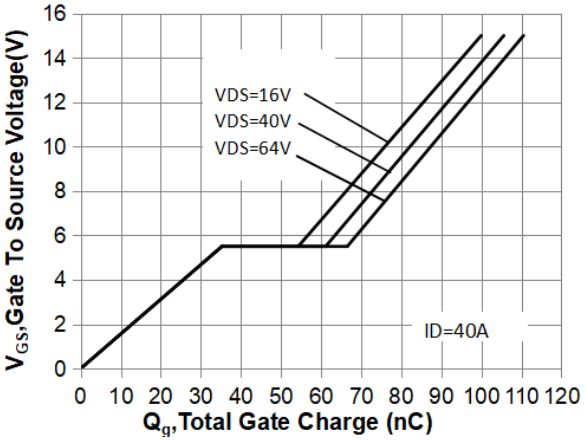


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

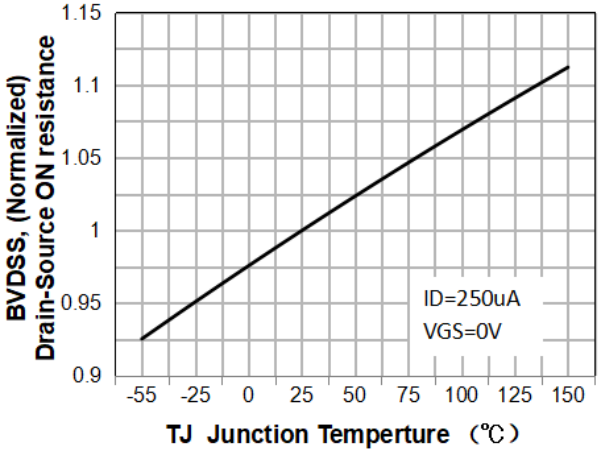


Figure 7. Breakdown Voltage Variation vs Temperature

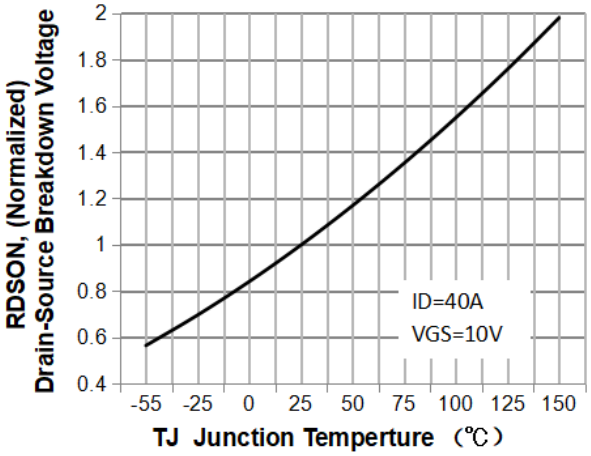


Figure 8. On-Resistance Variation vs Temperature

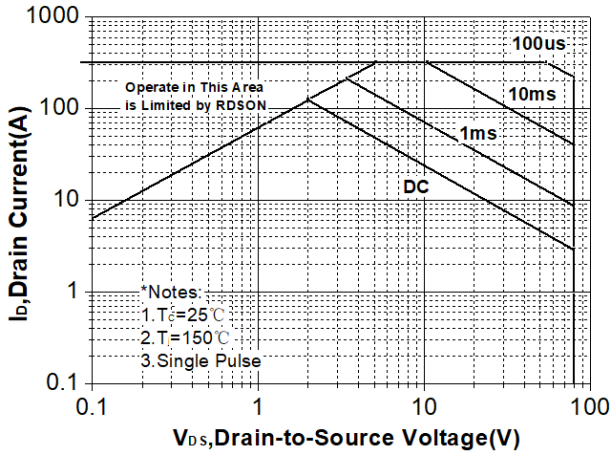


Figure 9. Maximum Safe Operating Area

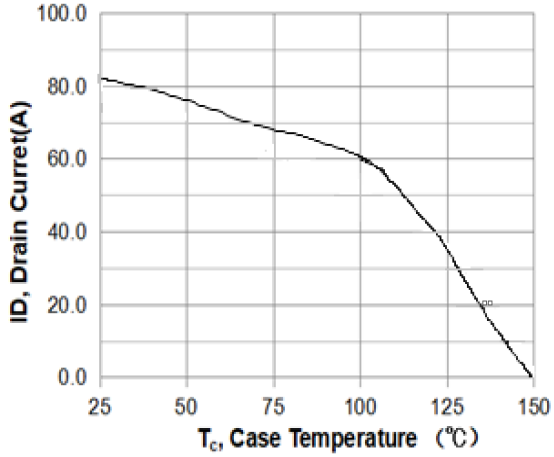


Figure 10. Maximum Drain Current vs Case Temperature

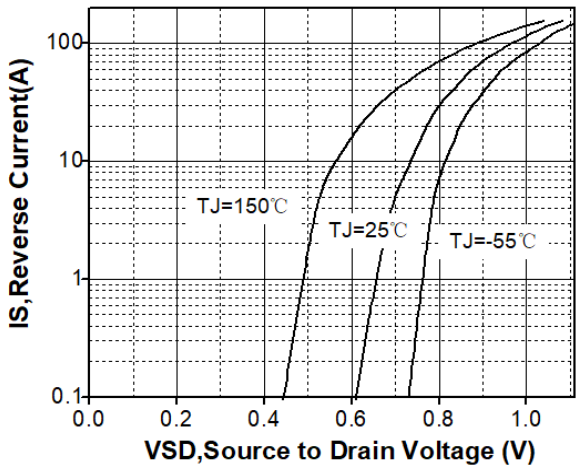


Figure 11. Body Diode Forward Voltage Vs Reverse Drain Current

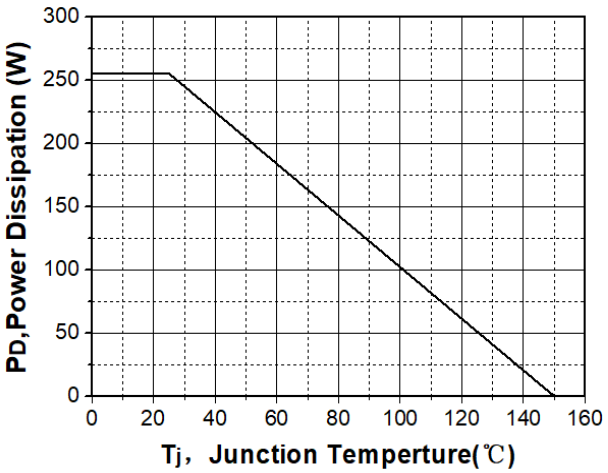


Figure 12. Power Dissipation vs Junction Temperature

Typical Characteristics (Continued)

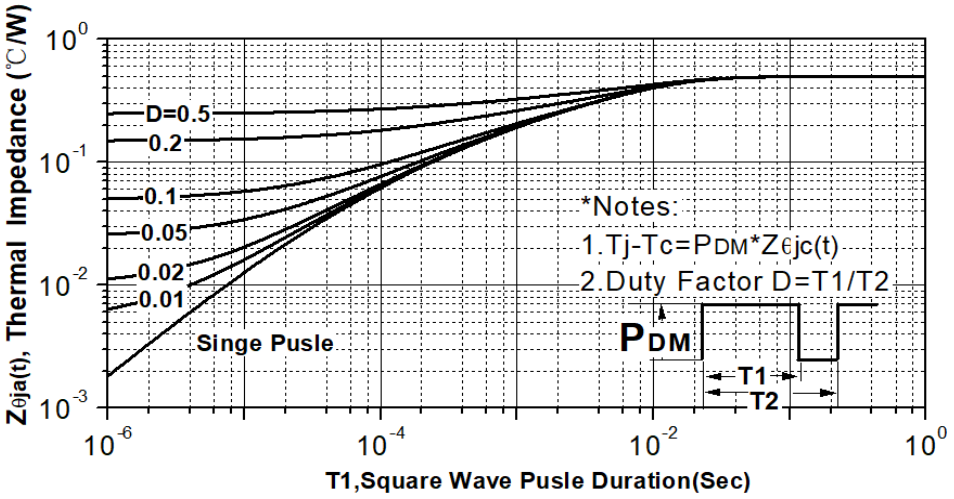


Figure 13. Transient Thermal Response Curve

Test Circurt&Waveform

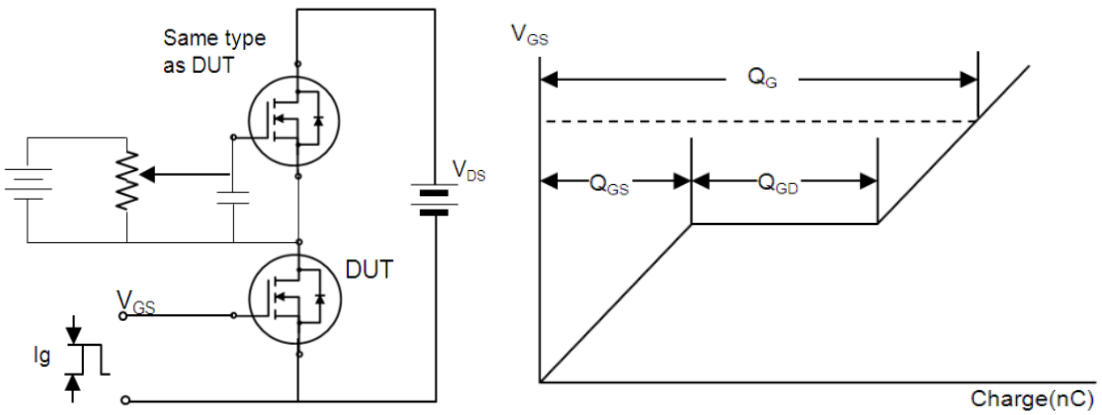


Figure 14. Gate charge test circuit & waveform

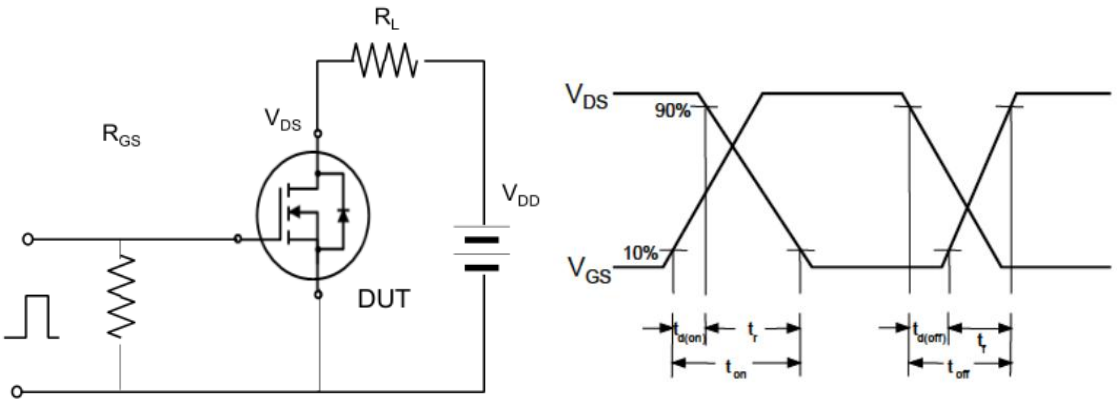


Figure 15. Switching time test circuit & waveform

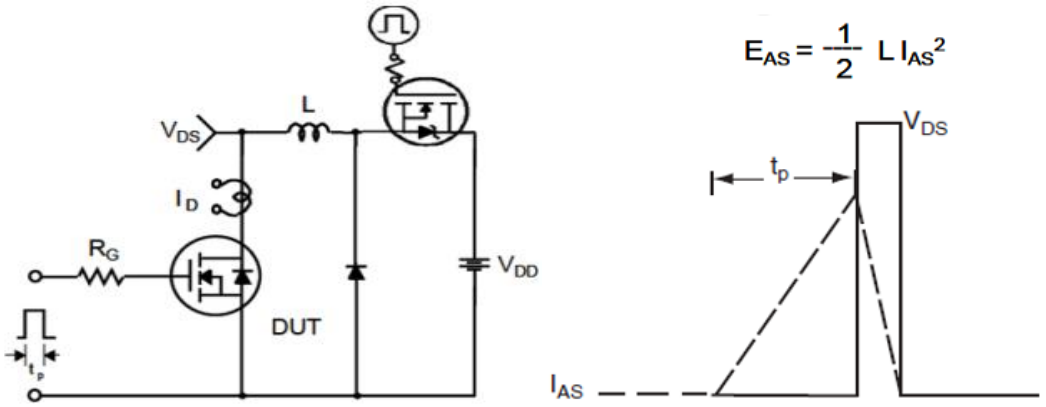


Figure 16. Unclamped Inductive switching test circuit & waveform

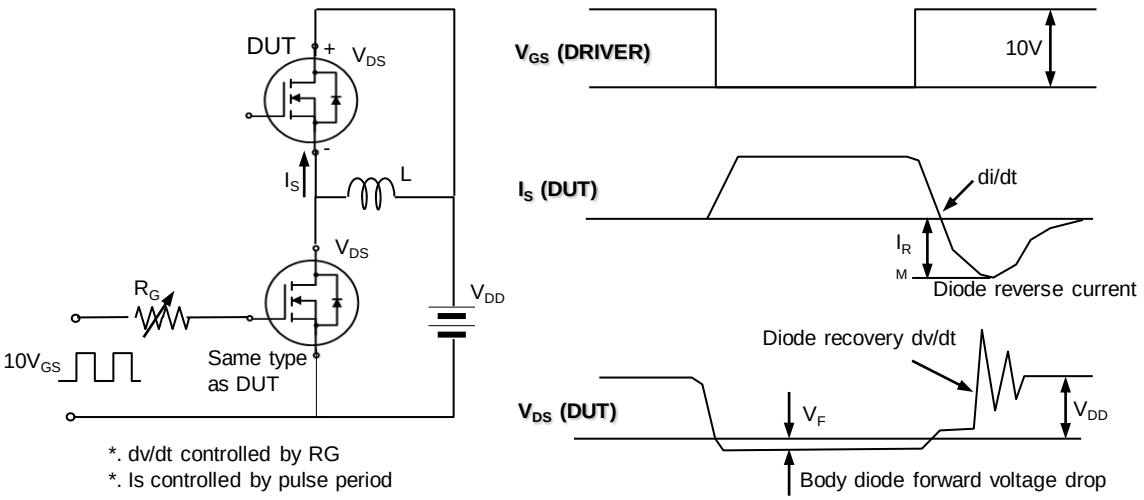
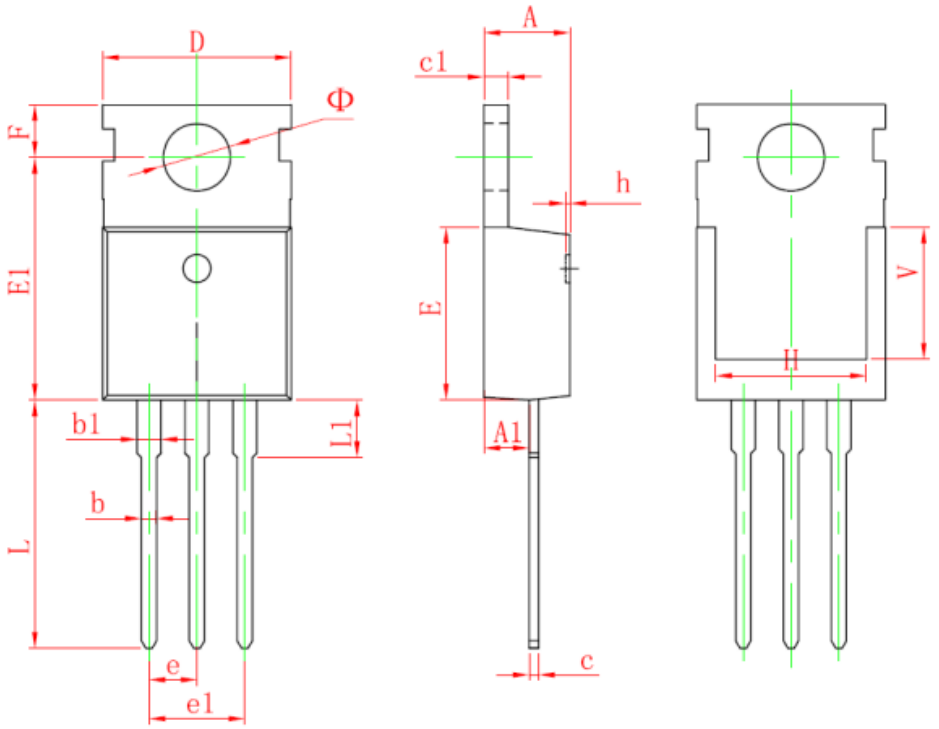


Figure 17. Peak diode recovery dv/dt test circuit & waveform

Package Dimensions ： TO-220-3L(T0.5mm) PACKAGE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	13.050	0.498	0.514
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150