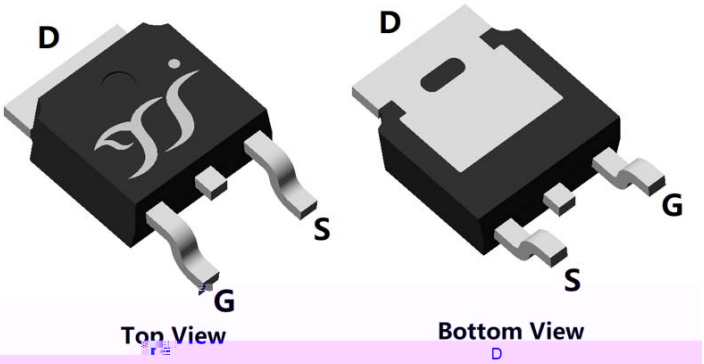
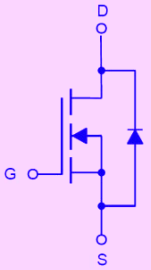
N-Channel Enhancement Mode Field Effect Transistor



TO-252



Product Summary

- V_{DS} 100V
- I_D 45A
- $R_{DS(ON)}$(at V_{GS}=10V) 17mΩ
- $R_{DS(ON)}$(at V_{GS}=4.5V) 21.5mΩ
- 100% UIS Tested
- 100% V_{DS} Tested

General Description

- Low $R_{DS(on)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Fast switching and soft recovery
- Part no. with suffix “Q” means AEC-Q101 qualified

Applications

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply
- DC-DC convertor

■ Absolute Maximum Ratings (T_A=25 unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-source Voltage		V_{DS}	100	V
Gate-source Voltage		V_{GS}	±20	V
Drain Current	T_A=25℃	I_D	7	A
	T_A=100℃		4.5	
	T_C=25℃		45	
	T_C =100℃		28	
Pulsed Drain Current [A]		I_{DM}	180	A
Avalanche energy [B]		EAS	90	mJ
Total Power Dissipation [C]	T_A=25℃	P_D	2.5	W
	T_A=100℃		1	
	T_C=25℃		73	
	T_C =100℃		29	
Junction and Storage Temperature Range		T_J ,T_{STG}	-55 +150	℃

■Thermal resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient [D]	Steady-State	$R_{\theta JA}$	40	50	℃/W
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	1.4	1.7	

■ **Ordering Information** (Example)

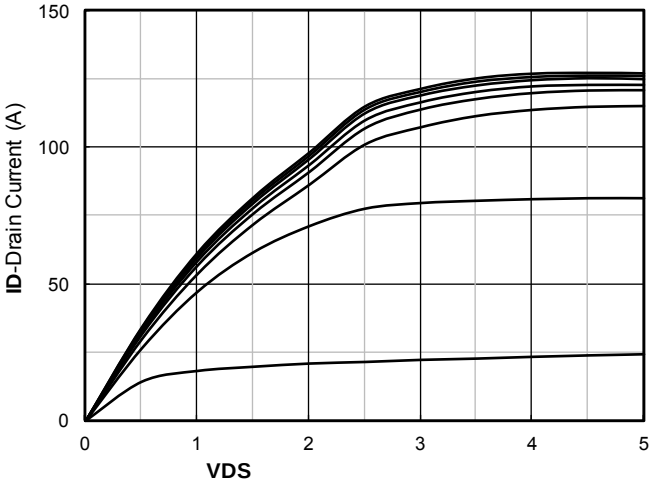
PREFERED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJD45G10AQ	F1	YJD45G10A	2500	/	25000	13”Reel

■ Electrical Characteristics (T_J=25 unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}= 0V, I_D=250μA	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V, V_{GS}=0V	-	-	1	μA
		V_{DS}=100V, V_{GS}=0V, Tj=150℃	-	-	100	
Gate-Body Leakage Current	I_{GSS}	V_{GS}= ±20V, V_{DS}=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}= V_{GS}, I_D=250μA	1.0	1.8	2.5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=22.5A	-	14	17	mΩ
		V_{GS}=4.5V, I_D=20A	-	17	21.5	
Diode Forward Voltage	V_{SD}	I_S=22.5A, V_{GS}=0V	-	0.9	1.2	V
Maximum Body-Diode Continuous Current	I_S		-	-	45	A
Gate resistance	R_G	f=1MHz, Open drain	-	1.4	-	Ω
Dynamic Parameters						
Input Capacitance	C_{iss}	V_{DS}=50V, V_{GS}=0V, f=1MHz	-	1165	-	pF
Output Capacitance	C_{oss}		-	265	-	
Reverse Transfer Capacitance	C_{rss}		-	8	-	
Switching Parameters						
Total Gate Charge	Q_g	V_{GS}=10V, V_{DS}=50V, I_D=22.5A	-	19	-	nC
Gate-Source Charge	Q_{gs}		-	6	-	
Gate-Drain Charge	Q_{gd}		-	3	-	
Reverse Recovery Charge	Q_{rr}	I_F=22.5A, di/dt=100A/us	-	45	-	nC
Reverse Recovery Time	t_{rr}		-	40	-	ns
Turn-on Delay Time	$t_{D(on)}$	V_{GS}=10V, V_{DD}=50V, I_D=22.5A R_{GEN}=2.2Ω	-	40	-	ns
Turn-on Rise Time	t_r		-	12	-	
Turn-off Delay Time	$t_{D(off)}$		-	55	-	
Turn-off fall Time	t_f		-	16	-	

A. Repetitive rating; pulse width limited by max. junction temperature.
B. T_J=25℃, V_{DD}=50V, V_G=10V, R_G=25Ω, L=0.5mH, IAS=19A.
C. P_d is based on max. junction temperature, using junction-case thermal resistance.
D. The value of $R_{\theta JA}$ is measured with the device mounted on the minimum recommend pad size, in the still air environment with T_A =25℃. The maximum allowed junction temperature of 150℃. The value in any given application depends on the user's specific board design.

■Typical Electrical and Thermal Characteristics Diagrams



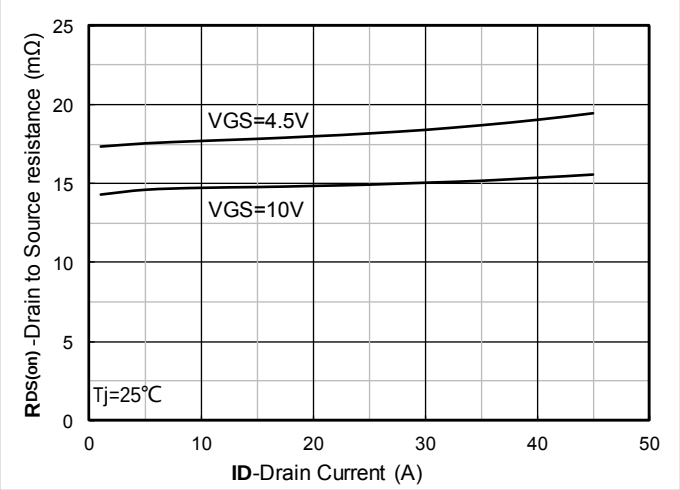


Figure 7. $R_{DS(on)}$ VS Drain Current

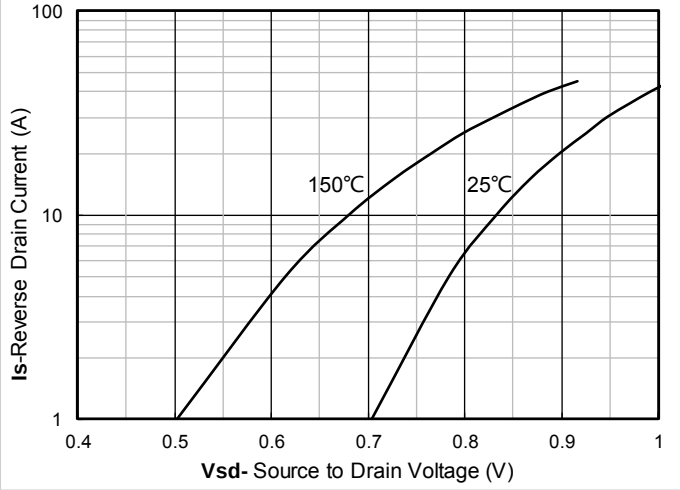


Figure 8.

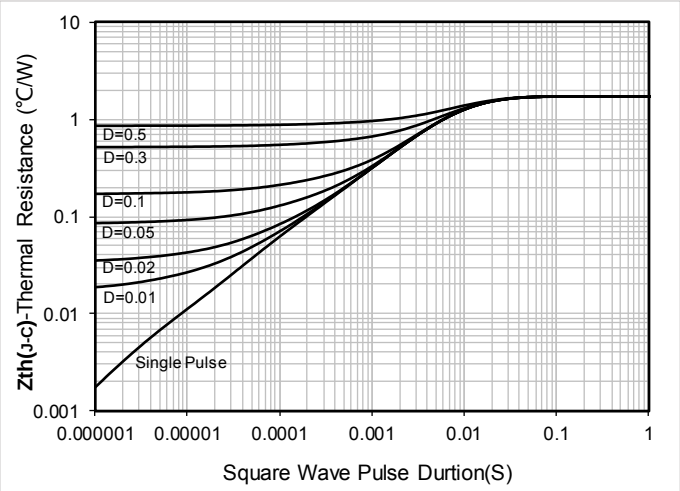


Figure 13. Maximum Transient Thermal Impedance

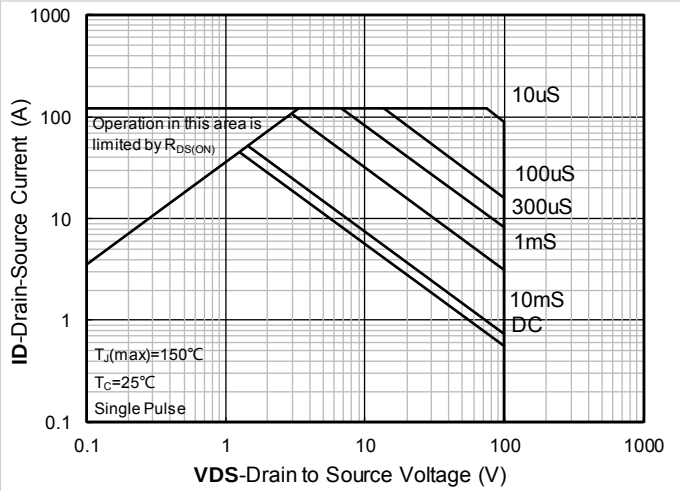


Figure 14. Safe Operation Area

■ Test Circuits & Waveforms

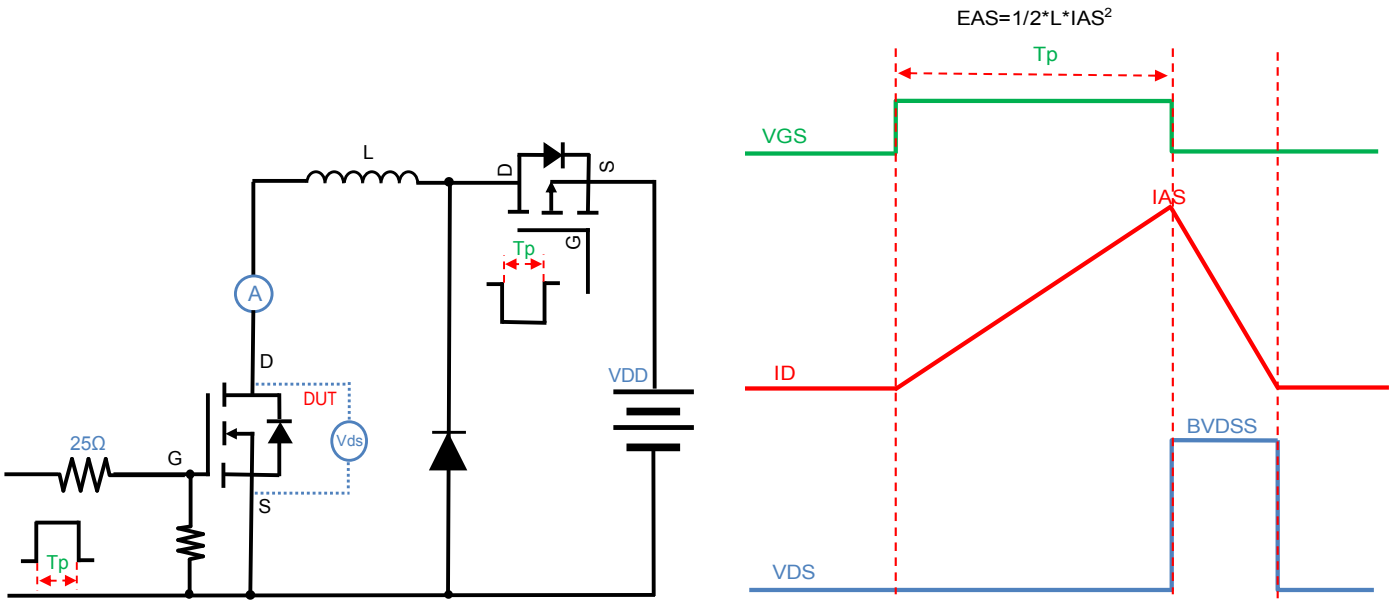


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

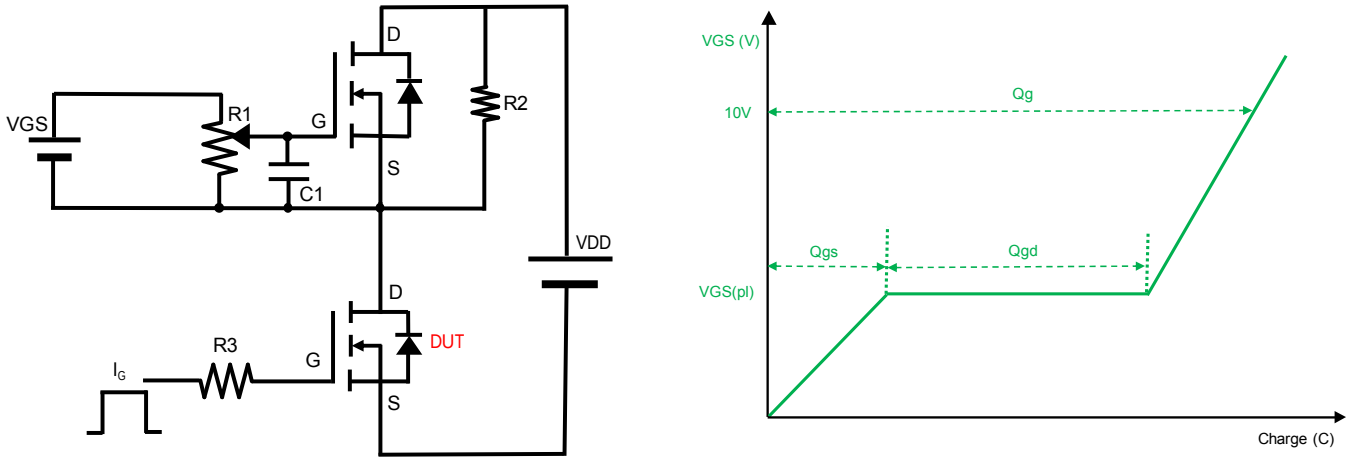


Figure B. Gate Charge Test Circuit & Waveform

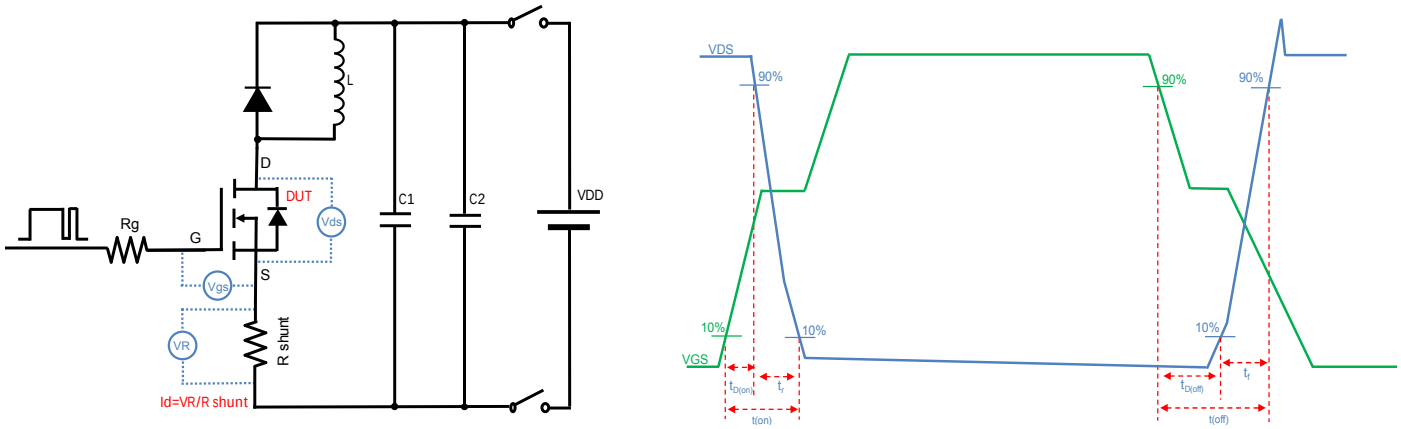


Figure C. Resistive Switching Test Circuit & Waveform

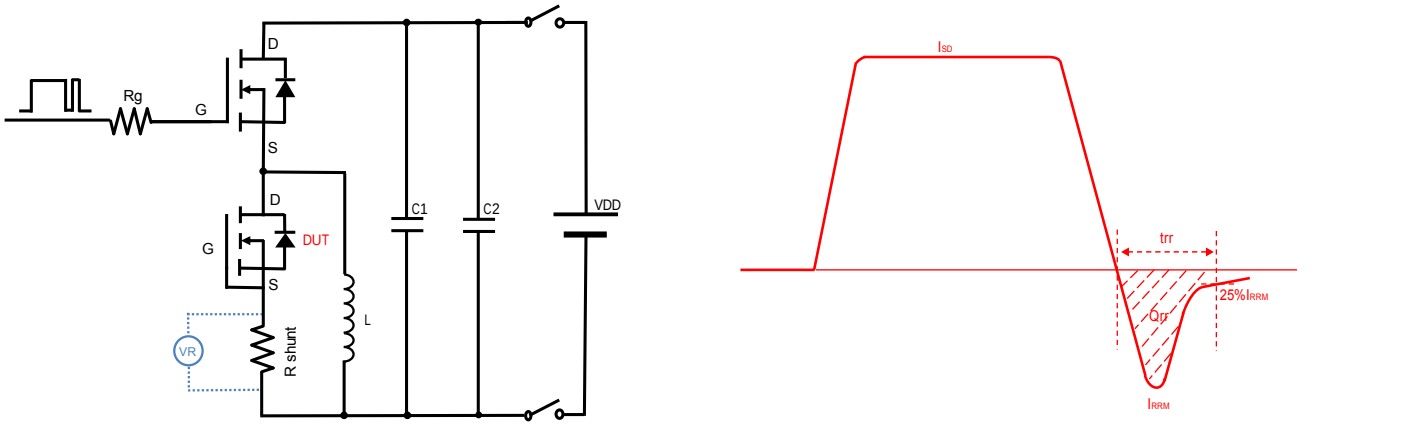
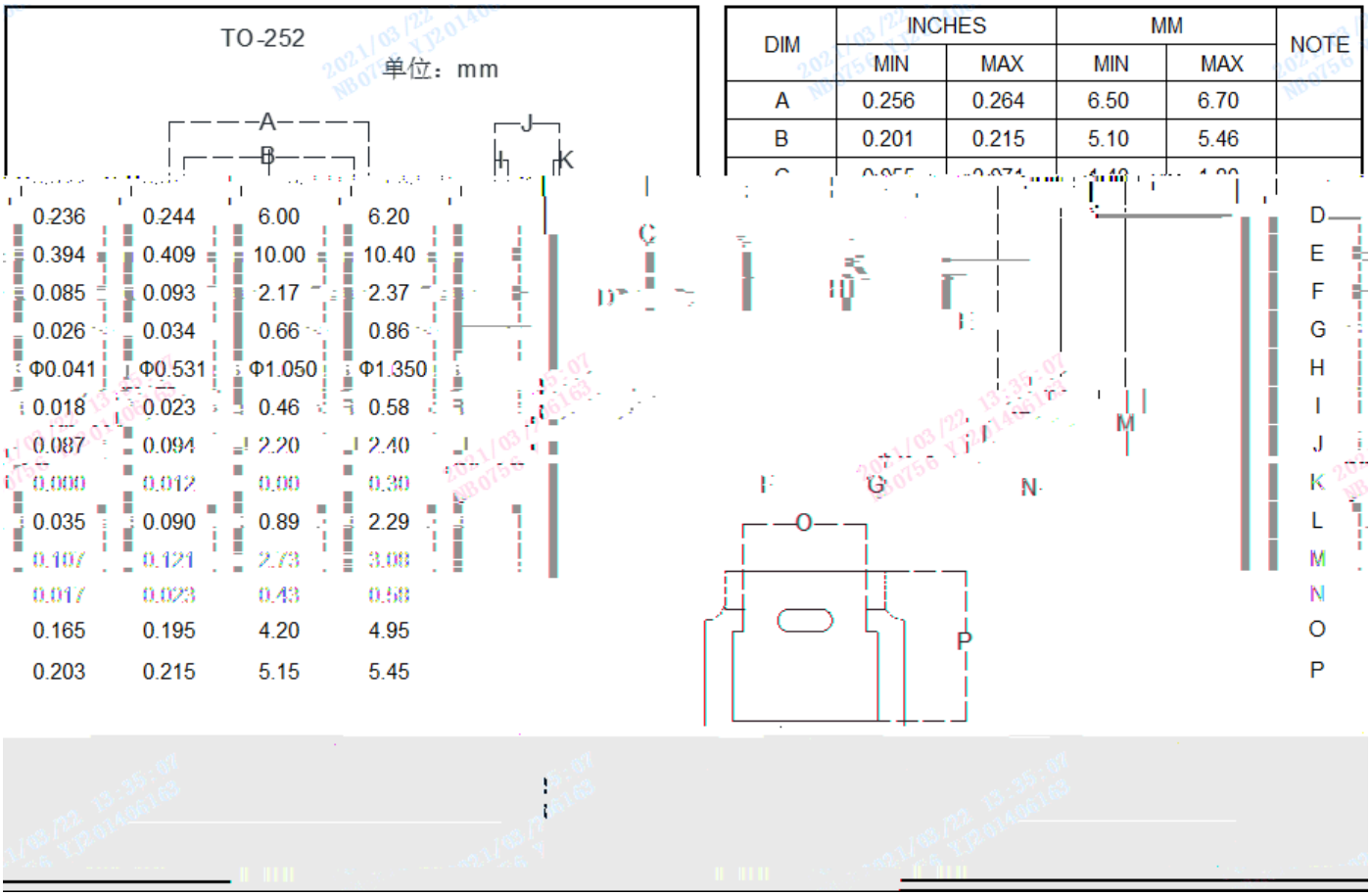


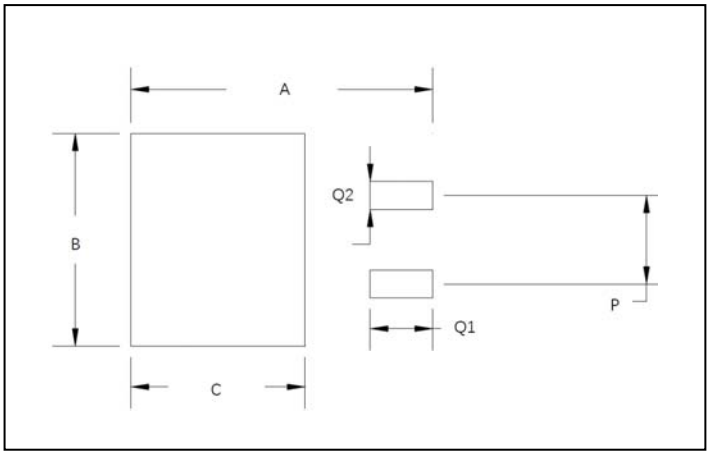
Figure D. Diode Recovery Test Circuit & Waveform

■ TO-252 Package information



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.256	0.264	6.50	6.70	
B	0.201	0.215	5.10	5.46	
C	0.236	0.244	6.00	6.20	
D	0.394	0.409	10.00	10.40	
E	0.085	0.093	2.17	2.37	
F	0.026	0.034	0.66	0.86	
G	Φ0.041	Φ0.531	Φ1.050	Φ1.350	
H	0.018	0.023	0.46	0.58	
I	0.087	0.094	2.20	2.40	
J	0.000	0.012	0.00	0.30	
K	0.035	0.090	0.89	2.29	
L	0.107	0.121	2.73	3.08	
M	0.017	0.023	0.43	0.58	
N	0.165	0.195	4.20	4.95	
O	0.203	0.215	5.15	5.45	
P					

■ Suggested Pad Layout



Dim	Millimeters
A	11.4
B	6.74
C	6.23
P	4.56
Q1	2.28
Q2	1.52