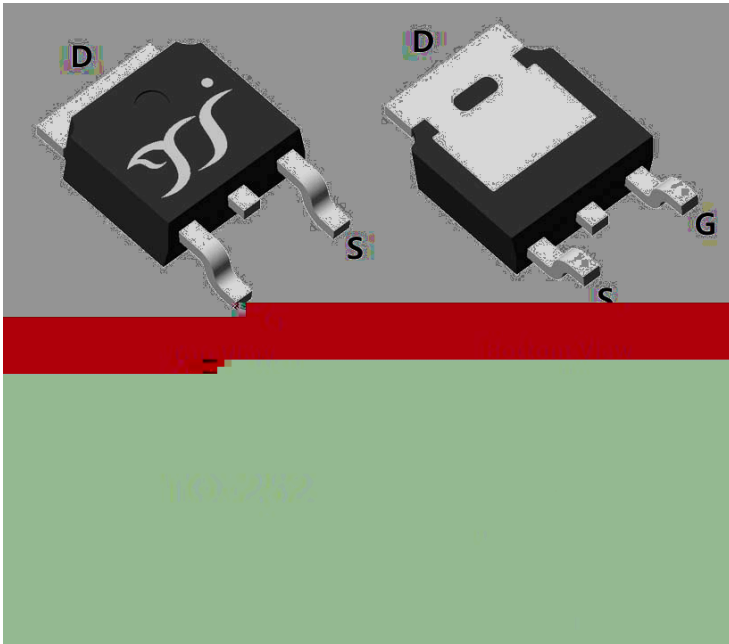


## N-Channel Enhancement Mode Field Effect Transistor



### Product Summary

- $V_{DS}$  100V
- $I_D$  45A
- $R_{DS(ON)}$ ( at  $V_{GS}=10V$ ) 17m $\Omega$
- $R_{DS(ON)}$ ( at  $V_{GS}=4.5V$ ) 21.5m $\Omega$
- 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		$V_{GS}$	$\pm 20$	V
Drain Current	$T_A=25^\circ\text{C}$	$I_D$	7	A
	$T_A=100^\circ\text{C}$		4.5	
	$T_C=25^\circ\text{C}$		45	
	$T_C=100^\circ\text{C}$		28	
Pulsed Drain Current <sup>A</sup>		$I_{DM}$	180	A
Avalanche energy <sup>B</sup>		EAS	90	mJ
Total Power Dissipation <sup>C</sup>	$T_A=25^\circ\text{C}$	$P_D$	2.5	W
	$T_A=100^\circ\text{C}$		1	
	$T_C=25^\circ\text{C}$		73	
	$T_C=100^\circ\text{C}$		29	
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55 +150	$^\circ\text{C}$



## YJD45G10AQ

### ■ Thermal resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient <sup>D</sup>	Steady-State	$R_{\theta JA}$	40	50	°C/W
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	1.4	1.7	

### ■ Ordering Information (Example)

PREFERRED 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



# YJD45G10AQ

## ■ Electrical Characteristics (T<sub>J</sub>=25 unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	100	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V	-	-	1	μA
		V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C	-	-	100	
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V	-	-	±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.8	2.5	V
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =22.5A	-	14	17	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	-	17	21.5	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =22.5A, V <sub>GS</sub> =0V	-	0.9	1.2	V
Maximum Body-Diode Continuous Current	I <sub>S</sub>		-	-	45	A
Gate resistance	R <sub>G</sub>	f=1MHz, Open drain	-	1.4	-	Ω
<b>Dynamic Parameters</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	-	1165	-	pF
Output Capacitance	C <sub>oss</sub>		-	265	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	8	-	
<b>Switching Parameters</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, I <sub>D</sub> =22.5A	-	19	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	6	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	3	-	
Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> =22.5A, di/dt=100A/us	-	45	-	nC
Reverse Recovery Time	t <sub>rr</sub>		-	40	-	ns
Turn-on Delay Time	t <sub>D(on)</sub>	V <sub>GS</sub> =10V, V <sub>DD</sub> =50V, I <sub>D</sub> =22.5A R <sub>GEN</sub> =2.2Ω	-	40	-	ns
Turn-on Rise Time	t <sub>r</sub>		-	12	-	
Turn-off Delay Time	t <sub>D(off)</sub>		-	55	-	
Turn-off fall Time	t <sub>f</sub>		-	16	-	

A. Repetitive rating; pulse width limited by max. junction temperature.

B. T<sub>J</sub>=25°C, V<sub>DD</sub>=50V, V<sub>G</sub>=10V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>=19A.

C. P<sub>d</sub> is based on max. junction temperature, using junction-case thermal resistance.

D. The value of R<sub>θJA</sub> is measured with the device mounted on the minimum recommend pad size, in the still air environment with T<sub>A</sub>=25°C. The maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.



# YJD45G10AQ

## Typical Electrical and Thermal Characteristics Diagrams

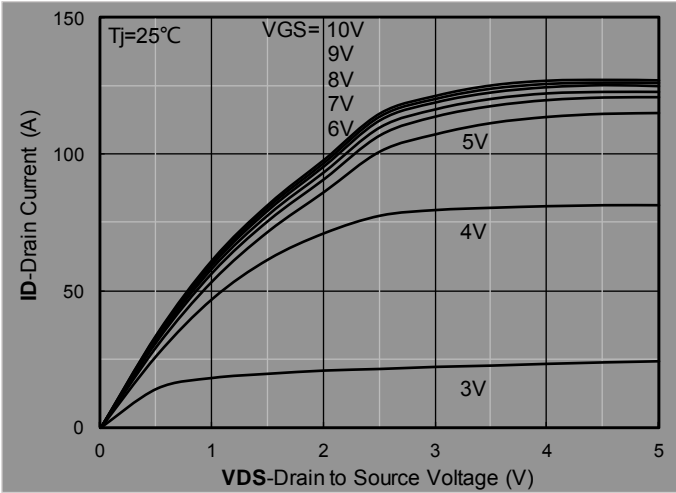


Figure 1. Output Characteristics

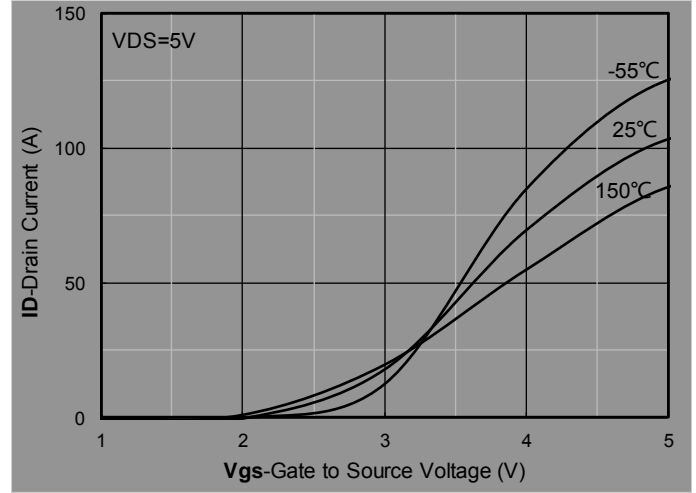


Figure 2. Transfer Characteristics

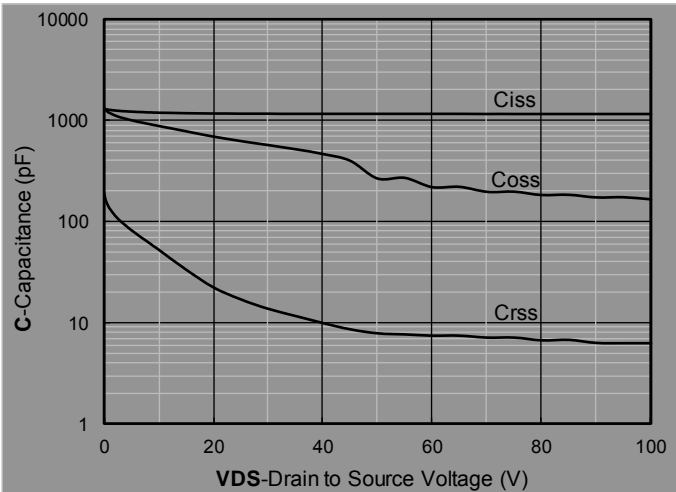


Figure 3. Capacitance Characteristics

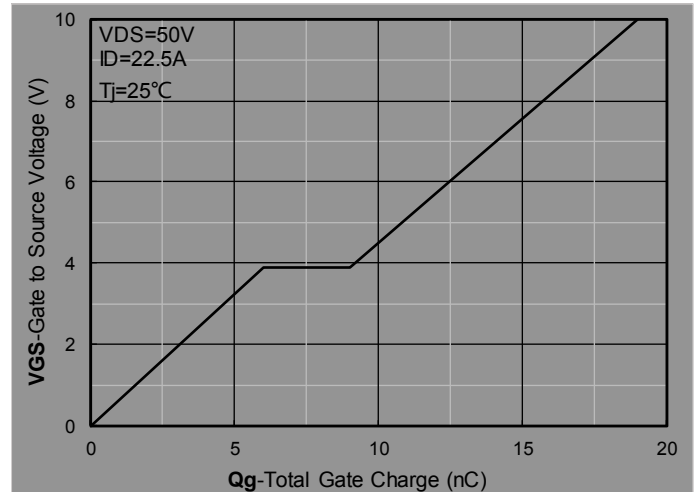


Figure 4. Gate Charge

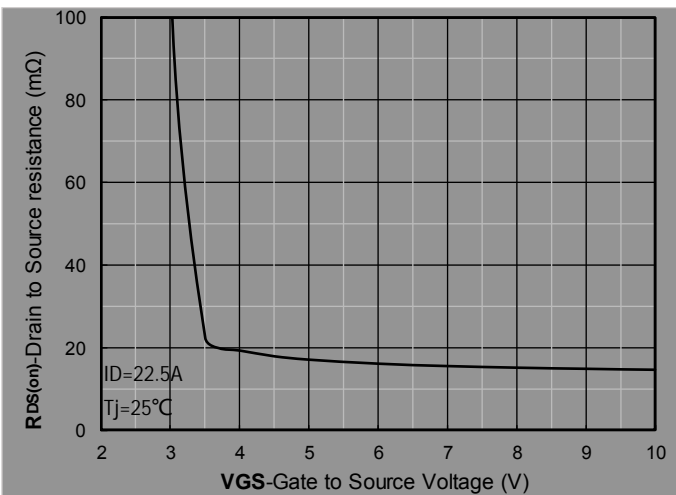


Figure 5. On-Resistance vs Gate to Source Voltage

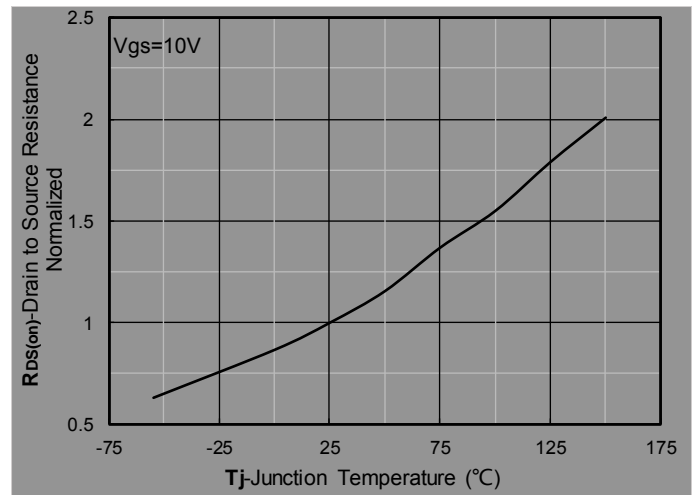


Figure 6. Normalized On-Resistance



# YJD45G10AQ

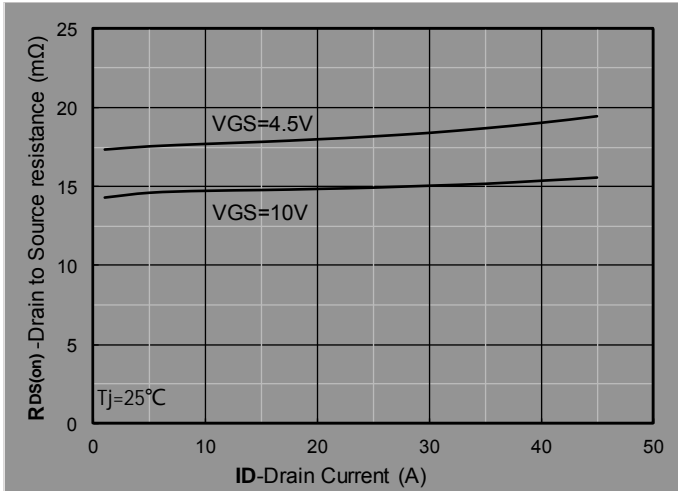


Figure 7.  $R_{DS(on)}$  VS Drain Current

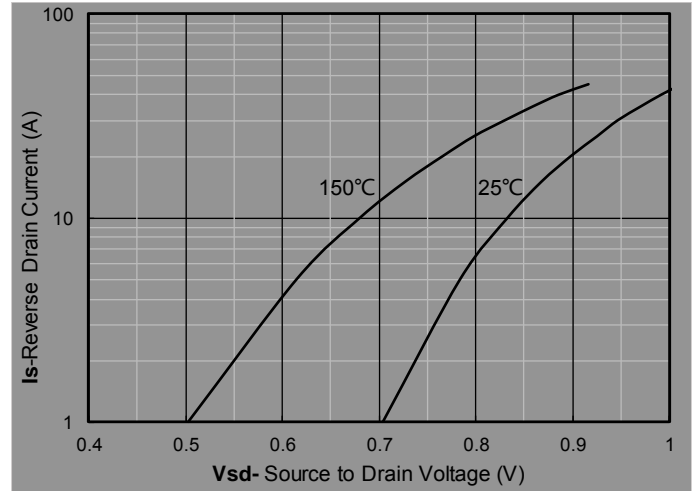


Figure 8.



# YJD45G10AQ

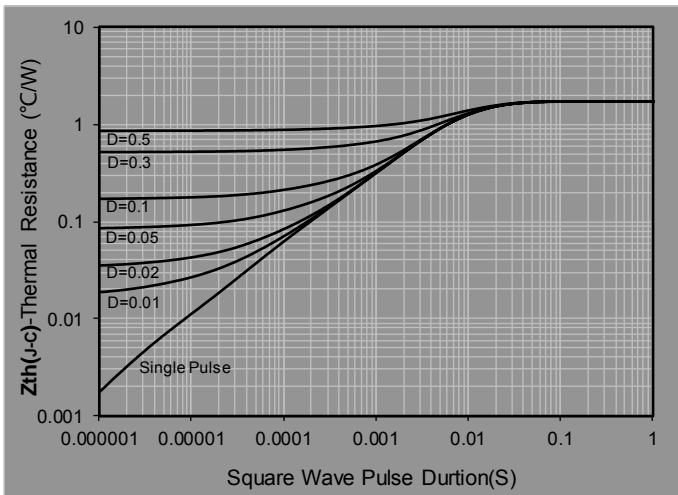


Figure 13. Maximum Transient Thermal Impedance

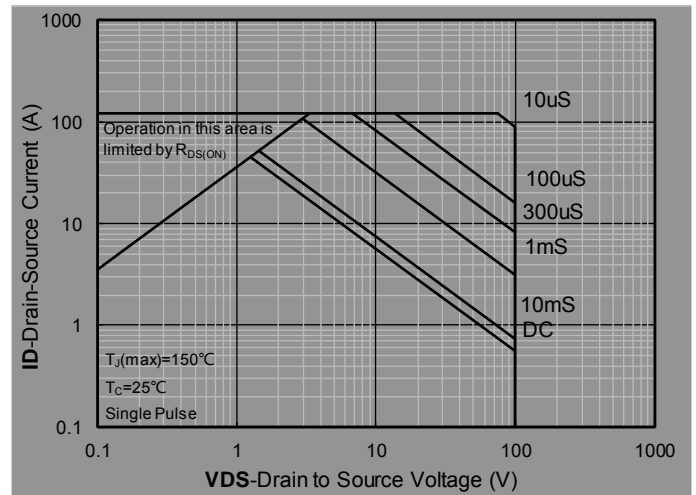


Figure 14. Safe Operation Area

## ■ Test Circuits & Waveforms

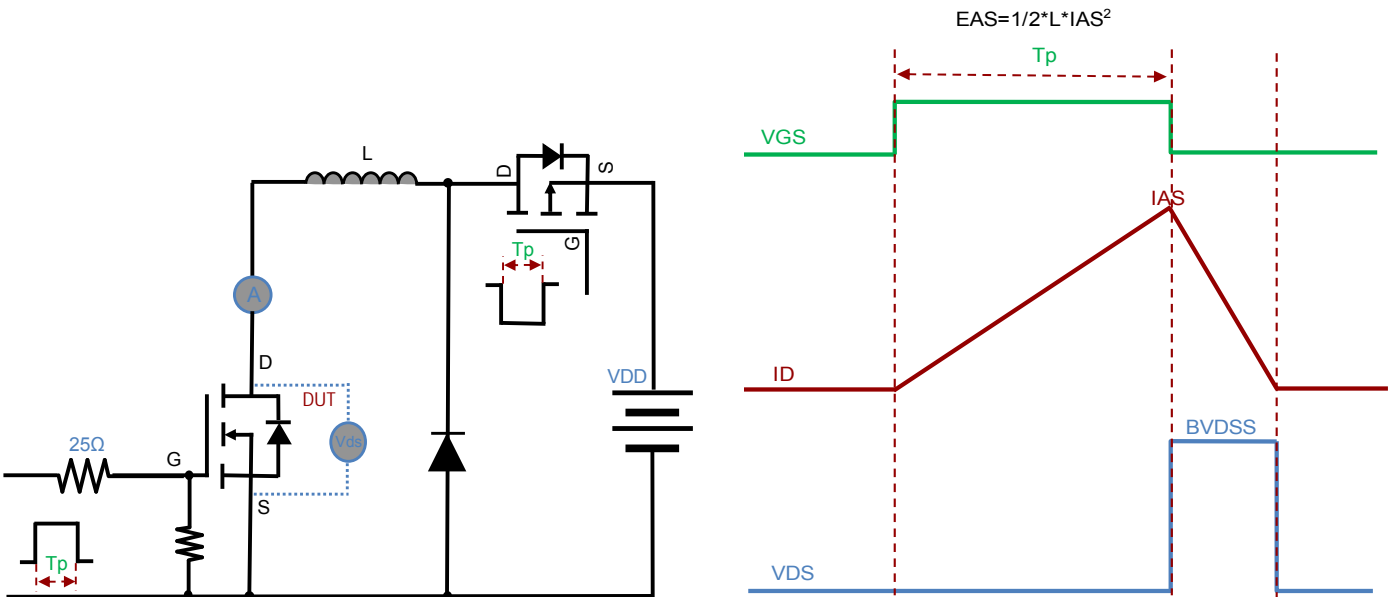


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

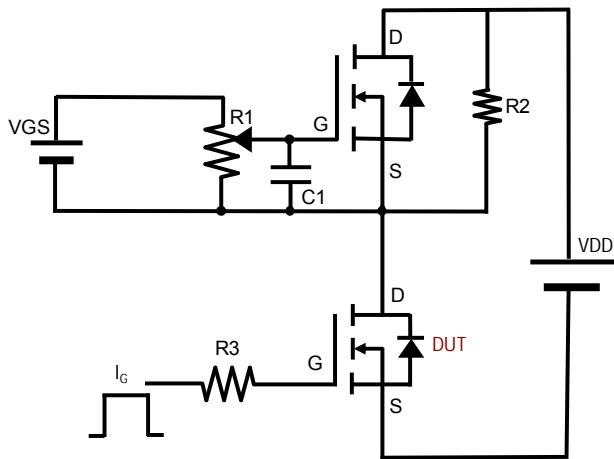


Figure B. Gate Charge Test Circuit & Waveform

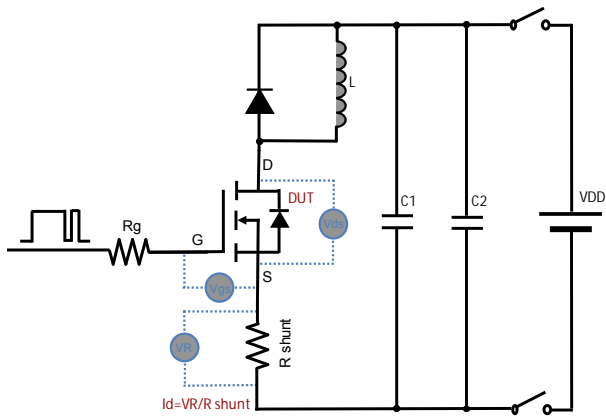


Figure C. Resistive Switching Test Circuit & Waveform

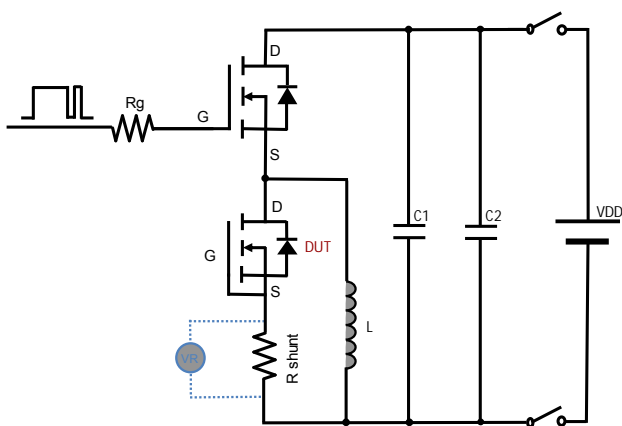
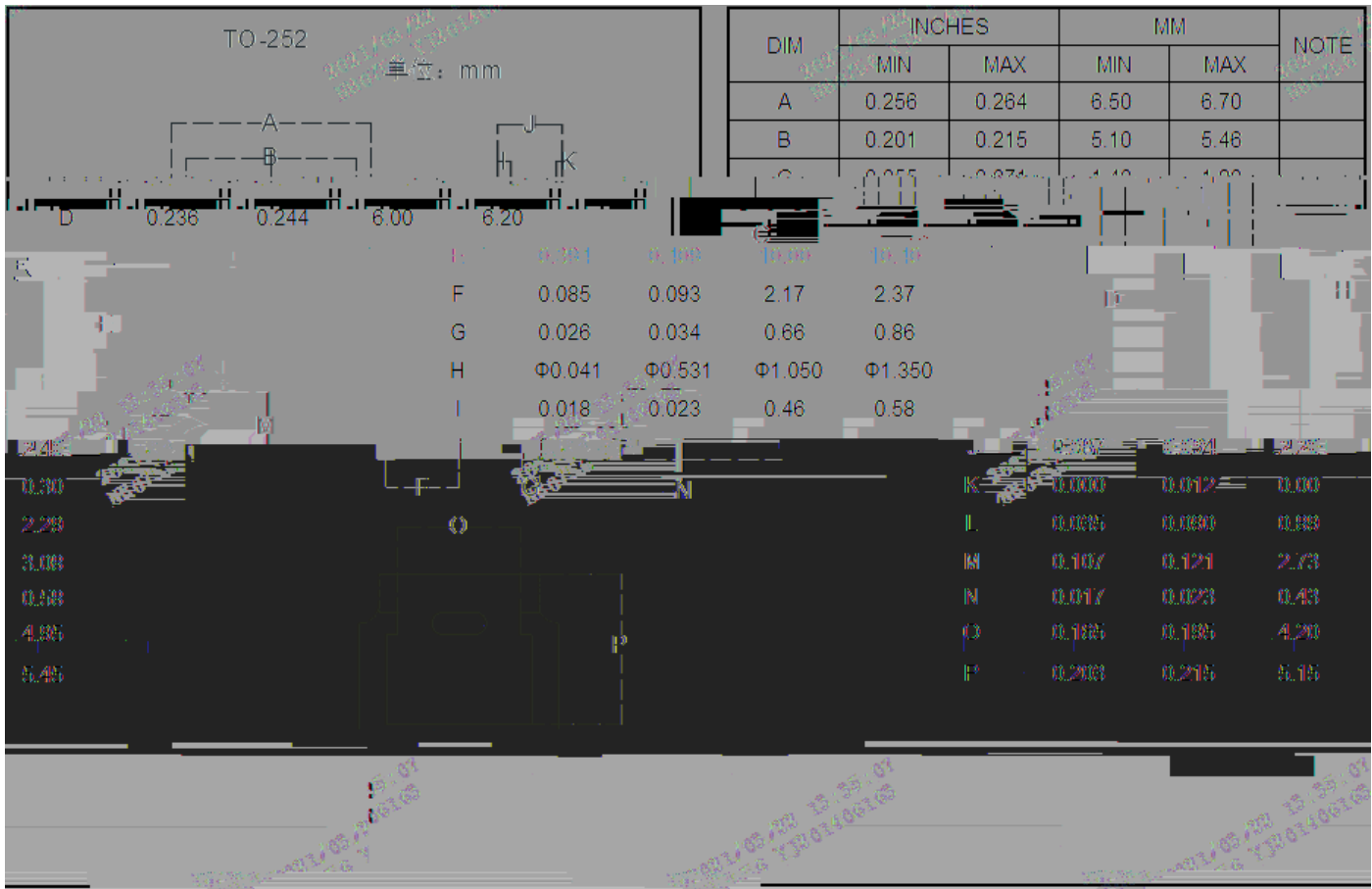


Figure D. Diode Recovery Test Circuit & Waveform

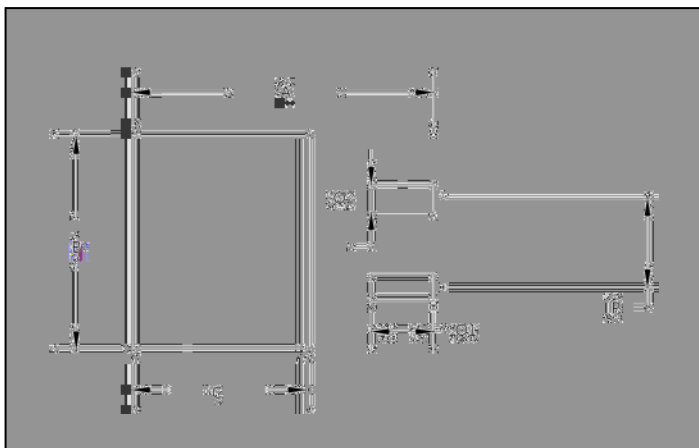


# YJD45G10AQ

## TO-252 Package information



## Suggested Pad Layout



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