



## Description

The RJK5003DPD-00#J2 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS} = 500V$   $I_D = 5A$

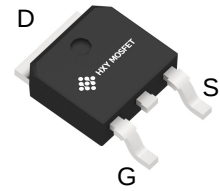
$R_{DS(ON)} < 1.3 \Omega$  @  $V_{GS}=10V$

## Application

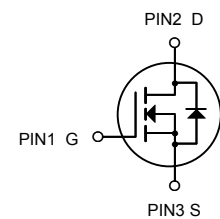
PWM Application

Load switch

Power Management



TO-252-2L  
(DPAK)



N-Channel MOSFET

## Ordering Information

| Product ID       | Pack             | Brand      | Qty(PCS) |
|------------------|------------------|------------|----------|
| RJK5003DPD-00#J2 | TO-252-2L (DPAK) | HXY MOSFET | 2500     |

## Absolute Maximum Ratings ( $T_c=25^\circ C$ unless otherwise noted)

| Symbol                | Parameter                                             | Rating     | Units        |
|-----------------------|-------------------------------------------------------|------------|--------------|
| $V_{DS}$              | Drain-Source Voltage                                  | 500        | V            |
| $V_{GS}$              | Gate-Source Voltage                                   | $\pm 30$   | V            |
| $I_D@T_c=25^\circ C$  | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup> | 5          | A            |
| $I_D@T_c=100^\circ C$ | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup> | 3          | A            |
| $I_{DM}$              | Pulsed Drain Current <sup>2</sup>                     | 20         | A            |
| EAS                   | Single Pulse Avalanche Energy <sup>3</sup>            | 137        | mJ           |
| $P_D@T_c=25^\circ C$  | Total Power Dissipation <sup>4</sup>                  | 83         | W            |
| $T_{STG}$             | Storage Temperature Range                             | -55 to 150 | $^\circ C$   |
| $T_J$                 | Operating Junction Temperature Range                  | -55 to 150 | $^\circ C$   |
| $R_{\theta JA}$       | Thermal Resistance Junction-Ambient <sup>1</sup>      | 33         | $^\circ C/W$ |
| $R_{\theta JC}$       | Thermal Resistance Junction-Case <sup>1</sup>         | 1.5        | $^\circ C/W$ |



**Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)**

| Symbol                                             | Parameter                                                | Conditions                                                                                   | Min. | Typ. | Max. | Unit |
|----------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------|------|------|------|------|
| Off Characteristics                                |                                                          |                                                                                              |      |      |      |      |
| V <sub>(BR)DSS</sub>                               | Drain-Source Breakdown Voltage                           | I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V                                                 | 500  | -    | -    | V    |
| I <sub>DSS</sub>                                   | Zero Gate Voltage Drain Current                          | V <sub>DS</sub> = 500V, V <sub>GS</sub> = 0V                                                 | -    | -    | 1.0  | μA   |
| I <sub>GSS</sub>                                   | Gate-Body Leakage Current                                | V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±30V                                                 | -    | -    | ±100 | nA   |
| On Characteristics                                 |                                                          |                                                                                              |      |      |      |      |
| V <sub>GS(th)</sub>                                | Gate Threshold Voltage                                   | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                   | 2    | 3.4  | 3.6  | V    |
| R <sub>DS(ON)</sub>                                | Static Drain-Source ON-Resistance <sup>(4)</sup>         | V <sub>GS</sub> = 10V, I <sub>D</sub> = 2.5A                                                 | -    | 1.30 | 1.50 | Ω    |
| Dynamic Characteristics                            |                                                          |                                                                                              |      |      |      |      |
| C <sub>iss</sub>                                   | Input Capacitance                                        | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 25V, f = 1MHz                                        | -    | 582  | -    | pF   |
| C <sub>oss</sub>                                   | Output Capacitance                                       |                                                                                              | -    | 42   | -    | pF   |
| C <sub>rss</sub>                                   | Reverse Transfer Capacitance                             |                                                                                              | -    | 4    | -    | pF   |
| Q <sub>g</sub>                                     | Total Gate Charge                                        | V <sub>GS</sub> = 0 to 10V<br>V <sub>DS</sub> = 250V, I <sub>D</sub> = 2A                    | -    | 14   | -    | nC   |
| Q <sub>gs</sub>                                    | Gate Source Charge                                       |                                                                                              | -    | 3.3  | -    | nC   |
| Q <sub>gd</sub>                                    | Gate Drain("Miller") Charge                              |                                                                                              | -    | 4    | -    | nC   |
|                                                    |                                                          |                                                                                              |      |      |      |      |
| Switching Characteristics                          |                                                          |                                                                                              |      |      |      |      |
| t <sub>d(on)</sub>                                 | Turn-On DelayTime                                        | V <sub>GS</sub> = 10V, V <sub>DD</sub> = 240V<br>I <sub>D</sub> = 2A, R <sub>GEN</sub> = 24Ω | -    | 12   | -    | ns   |
| t <sub>r</sub>                                     | Turn-On Rise Time                                        |                                                                                              | -    | 17   | -    | ns   |
| t <sub>d(off)</sub>                                | Turn-Off DelayTime                                       |                                                                                              | -    | 45   | -    | ns   |
| t <sub>f</sub>                                     | Turn-Off Fall Time                                       |                                                                                              | -    | 25   | -    | ns   |
| Drain-Source Diode Characteristics and Max Ratings |                                                          |                                                                                              |      |      |      |      |
| I <sub>S</sub>                                     | Maximum Continuous Drain to Source Diode Forward Current |                                                                                              | -    | -    | 5    | A    |
| I <sub>SM</sub>                                    | Maximum Pulsed Drain to Source Diode Forward Current     |                                                                                              | -    | -    | 20   | A    |
| V <sub>SD</sub>                                    | Drain to Source Diode Forward Voltage                    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 5A                                                    | -    | -    | 1.2  | V    |
| trr                                                | Body Diode Reverse Recovery Time                         | I <sub>F</sub> = 5A, di/dt = 100A/us                                                         | -    | 340  | -    | ns   |
| Qrr                                                | Body Diode Reverse Recovery Charge                       |                                                                                              | -    | 2.9  | -    | μC   |

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
  2. E<sub>AS</sub> condition: Starting T<sub>J</sub>=25°C, V<sub>DD</sub>=50V, V<sub>G</sub>=10V, R<sub>G</sub>=25ohm, L=10mH, I<sub>AS</sub>=5.3A
  3. R<sub>θJA</sub> is measured with the device mounted on a minimum recommended pad of 2oz copper FR4 PCB
  4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.



## Typical Characteristics

Figure 1: Output Characteristics

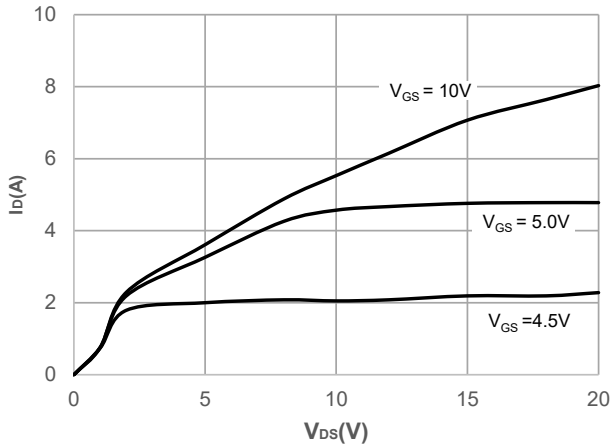


Figure 2: Typical Transfer Characteristics

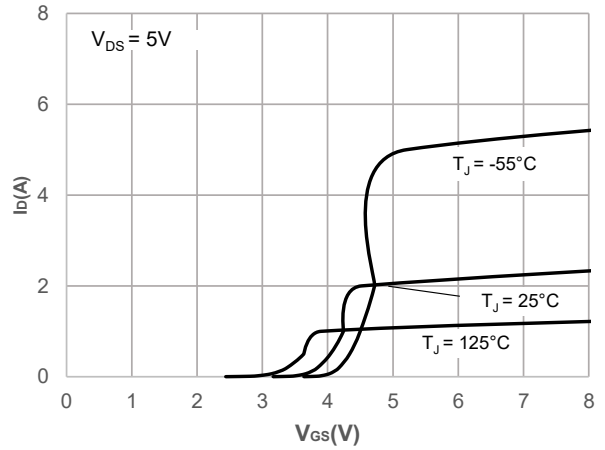


Figure 3: On-resistance vs. Drain Current

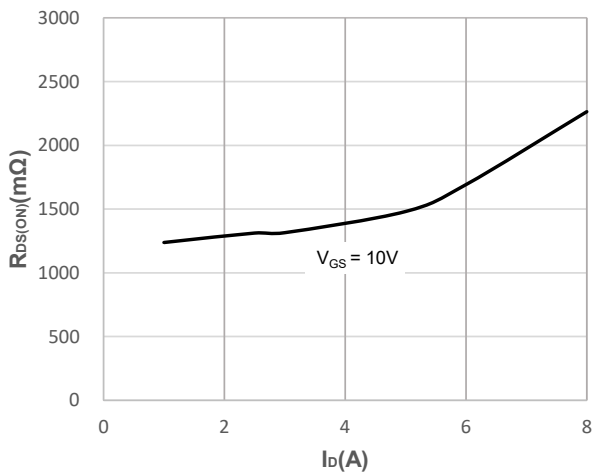


Figure 4: Body Diode Characteristics

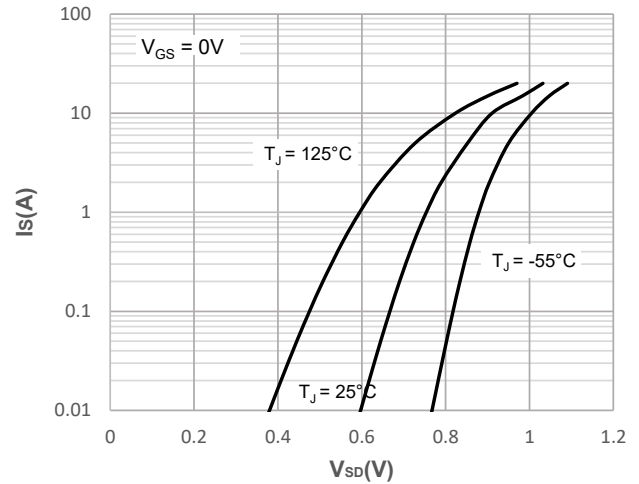


Figure 5: Gate Charge Characteristics

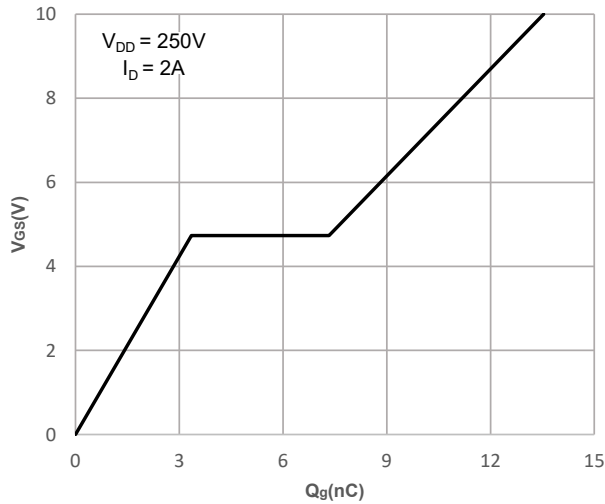


Figure 6: Capacitance Characteristics

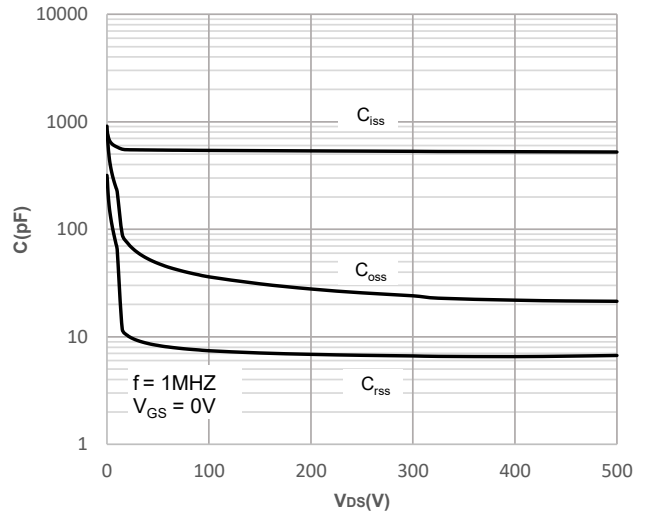




Figure 7: Normalized Breakdown voltage vs. Junction Temperature

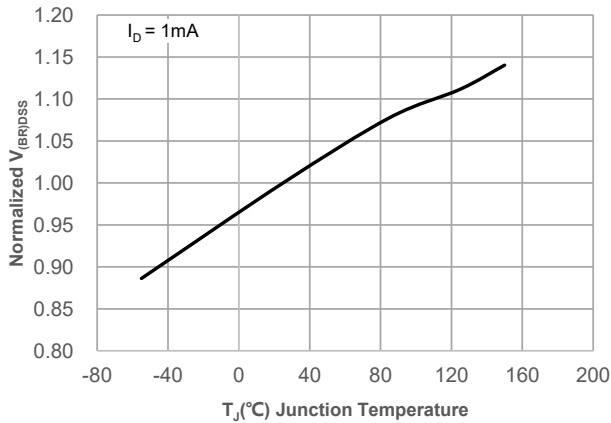


Figure 8: Normalized on Resistance vs. Junction Temperature

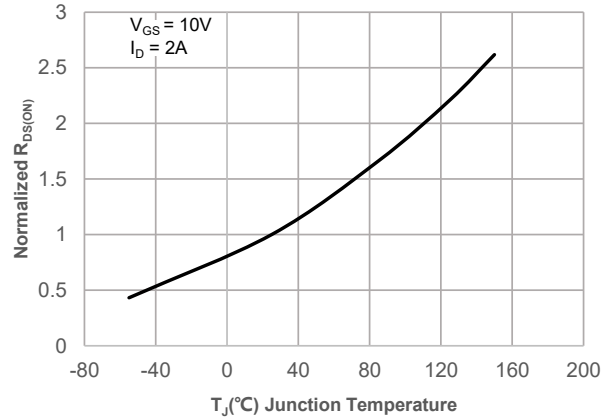


Figure 9: Maximum Safe Operating Area

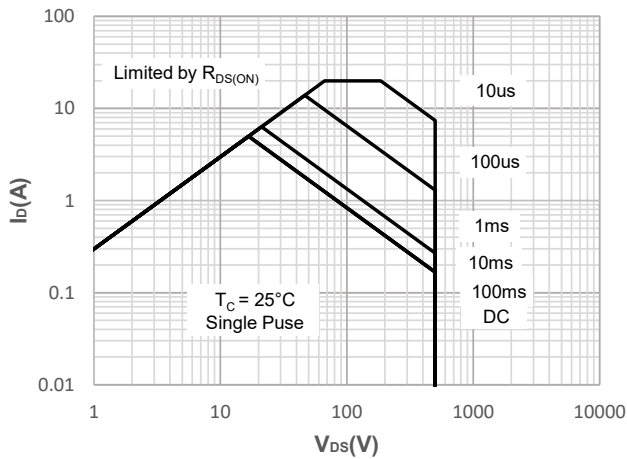


Figure 10: Maximum Continuous Drian Current vs. Case Temperature

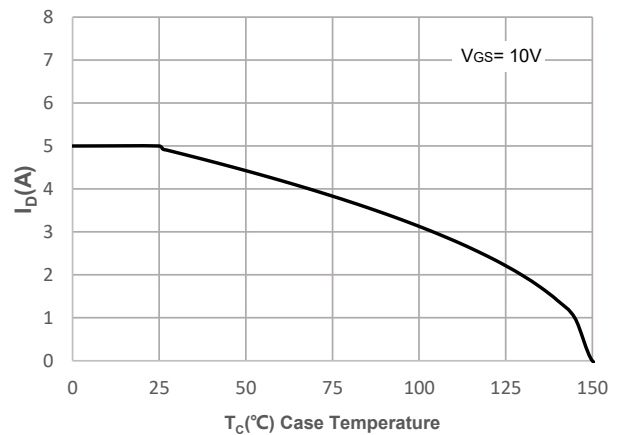


Figure 11: Normalized Maximum Transient Thermal Impedance

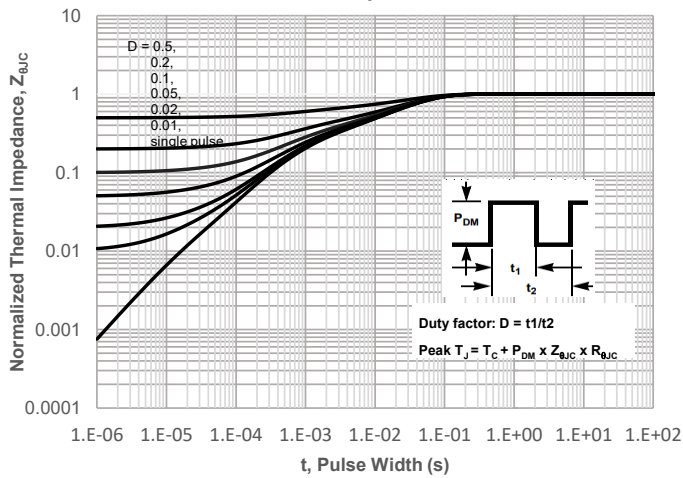
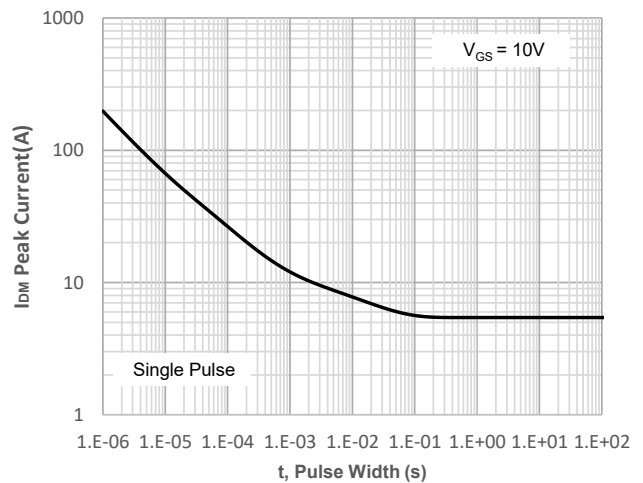


Figure 12: Peak Current Capacity





## Test Circuit

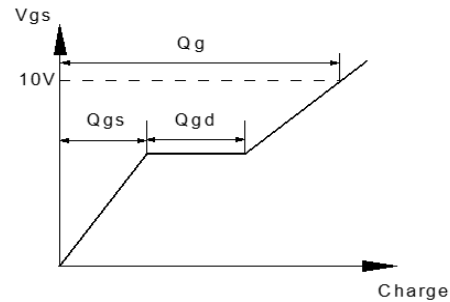
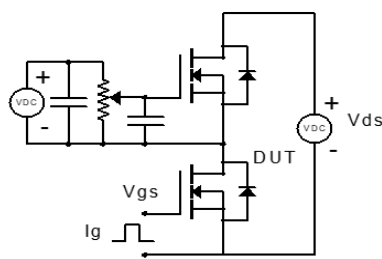


Figure 1: Gate Charge Test Circuit & Waveform

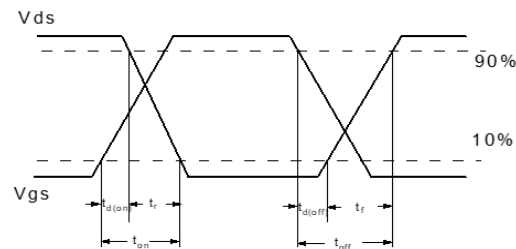
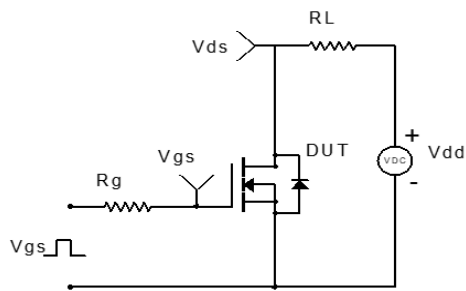


Figure 2: Resistive Switching Test Circuit & Waveform

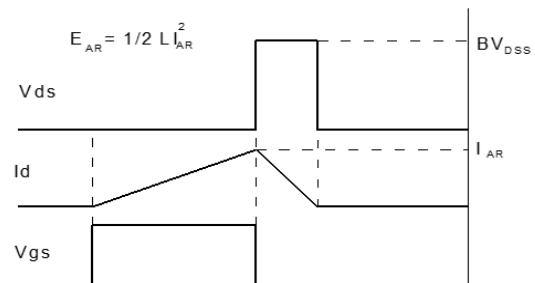
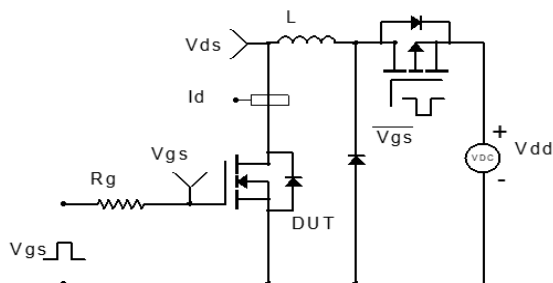


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

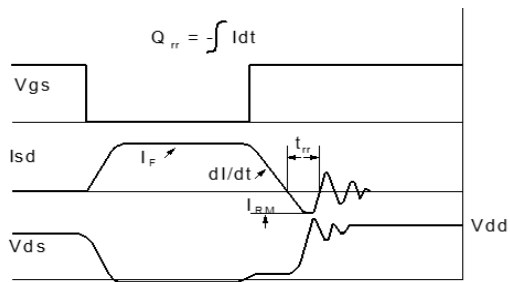
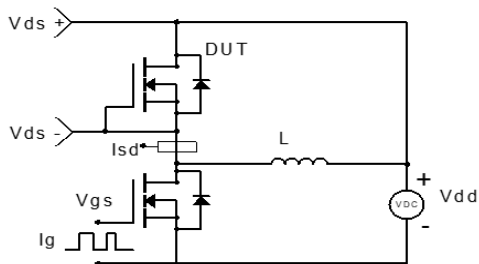
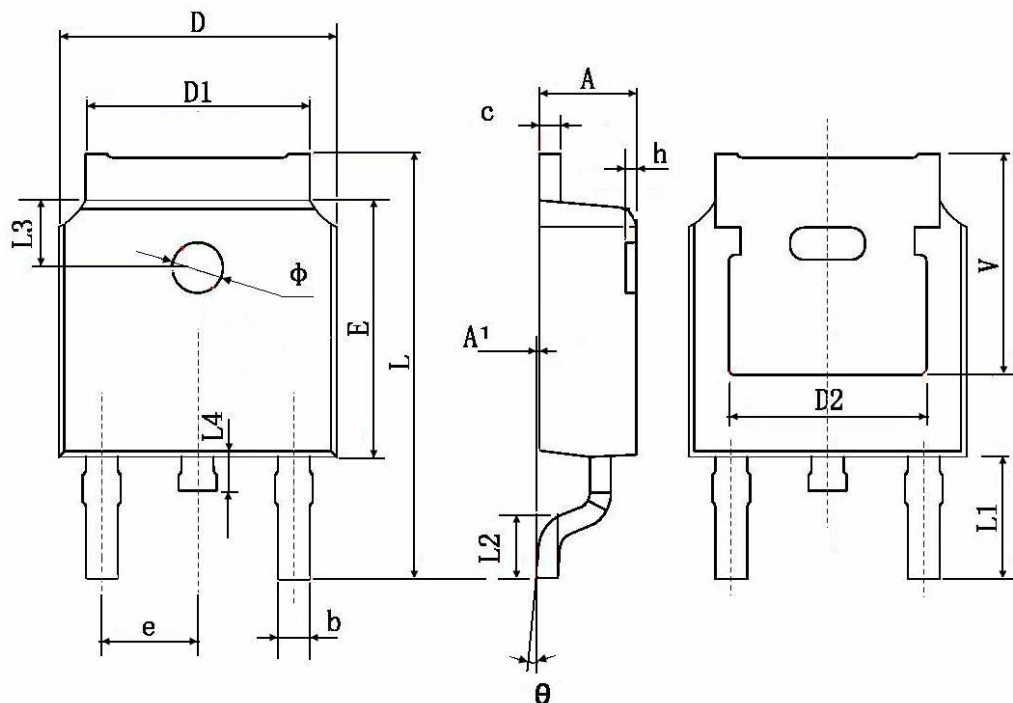


Figure 4: Diode Recovery Test Circuit & Waveform



## TO-252-2L(DPAK) Package Information



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 2.200                     | 2.400  | 0.087                | 0.094 |
| A1     | 0.000                     | 0.127  | 0.000                | 0.005 |
| b      | 0.660                     | 0.860  | 0.026                | 0.034 |
| c      | 0.460                     | 0.580  | 0.018                | 0.023 |
| D      | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1     | 5.100                     | 5.460  | 0.201                | 0.215 |
| D2     | 0.483 TYP.                |        | 0.190 TYP.           |       |
| E      | 6.000                     | 6.200  | 0.236                | 0.244 |
| e      | 2.186                     | 2.386  | 0.086                | 0.094 |
| L      | 9.800                     | 10.400 | 0.386                | 0.409 |
| L1     | 2.900 TYP.                |        | 0.114 TYP.           |       |
| L2     | 1.400                     | 1.700  | 0.055                | 0.067 |
| L3     | 1.600 TYP.                |        | 0.063 TYP.           |       |
| L4     | 0.600                     | 1.000  | 0.024                | 0.039 |
| Φ      | 1.100                     | 1.300  | 0.043                | 0.051 |
| θ      | 0°                        | 8°     | 0°                   | 8°    |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| V      | 5.350 TYP.                |        | 0.211 TYP.           |       |



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