

## Data Sheet

### Description

APDS-9102 is a low cost, fast switching speed reflective proximity sensor that incorporates an infrared LED and a phototransistor in a single integrated package. APDS-9102 supports the detection distance of near 0 to approx 8mm, enabling to support a wide range of applications.

### Application Support Information

The Application Engineering Group is available to assist you with the application design associated with APDS-9102. You can contact them through your local sales representatives for additional details

### Ordering Information

| Part Number   | Package     | Quantity |
|---------------|-------------|----------|
| APDS-9102-L22 | 4 pin leads | 1600     |

### Features

- Detection distance of near 0mm to 8mm
- Fast Switching Speed
- Package size
  - Height – 15.2 mm
  - Width – 5 mm
  - Depth – 17.8 mm
- Operating temperature : -35°C to 65°C
- Lead-free and RoHS Compliant

### Applications

APDS-9102 is widely suitable to provide reflective object or proximity sensing suitable for various applications in industrial, office automation and consumer markets.

- Industrial – Automatic vending machines, amusement/gaming machines, coin/bill validators etc
- Office automation – Printers, Copiers etc
- Consumer – Coffee machines, beverage dispensing machines etc

## Absolute Maximum Ratings (Ta=25°C)

| Parameter                                               | Symbol           | Max Rating | Unit                |
|---------------------------------------------------------|------------------|------------|---------------------|
| <b>Infrared Diode</b>                                   |                  |            |                     |
| Power Dissipation <sup>[1]</sup>                        | P <sub>D</sub>   | 75         | mW                  |
| Peak Forward Current<br>(300pps, 10 μs pulse)           | I <sub>CP</sub>  | 3          | A                   |
| Continuous Forward Current                              | I <sub>F</sub>   | 50         | mA                  |
| Reverse Voltage                                         | V <sub>R</sub>   | 5          | V                   |
| <b>Phototransistor</b>                                  |                  |            |                     |
| Power Dissipation <sup>[1]</sup>                        | P <sub>C</sub>   | 100        | mW                  |
| Collector-Emitter Voltage                               | V <sub>CEO</sub> | 30         | V                   |
| Emitter-Collector Voltage                               | V <sub>ECO</sub> | 5          | V                   |
| Collector Current                                       | I <sub>C</sub>   | 20         | mA                  |
| Operating Temperature Range                             | T <sub>OP</sub>  |            | -35°C to +65°C      |
| Storage Temperature Range                               | T <sub>STG</sub> |            | -40°C to +100°C     |
| Lead Soldering Temperature<br>(1.6mm(0.063") From Case) | T <sub>S</sub>   |            | 260°C for 5 seconds |

Note:

1. Derate Linearly 1.33mW/°C from 25°C

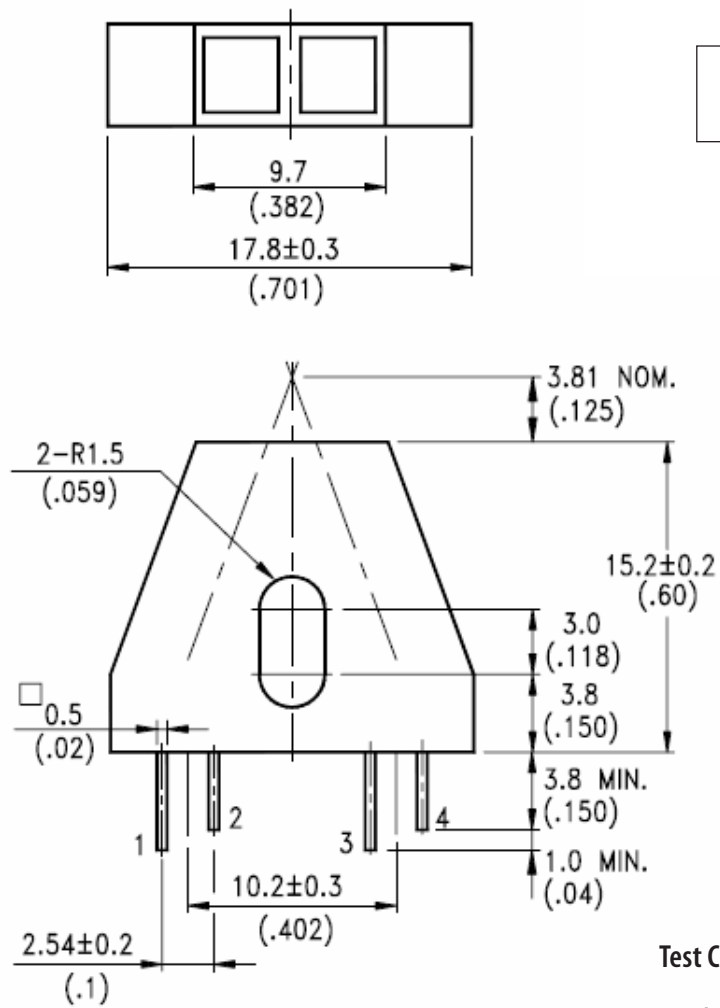
## Electrical / Optical Characteristics (Ta=25°C)

| Parameter                                 | Symbol               | Min. | Typ. | Max. | Unit | Test Condition                                 |
|-------------------------------------------|----------------------|------|------|------|------|------------------------------------------------|
| <b>Input Diode</b>                        |                      |      |      |      |      |                                                |
| Forward Voltage                           | V <sub>F</sub>       |      | 1.2  | 1.6  | V    | I <sub>F</sub> =20mA                           |
| Reverse Current                           | I <sub>R</sub>       |      |      | 100  | μA   | V <sub>R</sub> = 5V                            |
| <b>Output Phototransistor</b>             |                      |      |      |      |      |                                                |
| Collector-Emitter Breakdown Voltage       | V <sub>(BR)CEO</sub> | 30   |      |      | V    | I <sub>C</sub> = 1mA                           |
| Emitter-Collector Breakdown Voltage       | V <sub>(BR)ECO</sub> | 5    |      |      | V    | I <sub>E</sub> = 0.1mA                         |
| Collector-Emitter Dark Current            | I <sub>CEO</sub>     |      |      | 100  | nA   | V <sub>CE</sub> = 10V                          |
| <b>Coupler</b>                            |                      |      |      |      |      |                                                |
| Collector-Emitter Saturation Voltage      | V <sub>CE(SAT)</sub> |      |      | 0.4  | V    | I <sub>C</sub> = 0.08mA, I <sub>F</sub> = 20mA |
| On State Collector Current <sup>[2]</sup> | I <sub>C(ON)</sub>   | 0.16 |      |      | mA   | V <sub>CE</sub> = 5V, I <sub>F</sub> = 20mA    |

Note:

2. Reflective surface is Eastman Kodak(or equivalent) neutral white paper with 90% diffused reflectance placed at 3.81mm(0.15") from read head.

## APDS-9102 Package Outline



### NOTES:

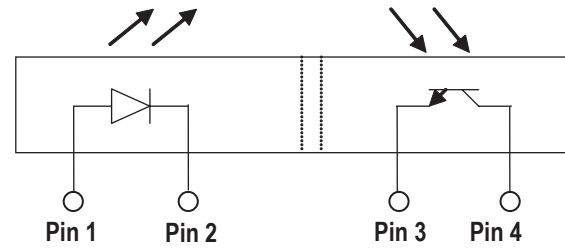
1. All dimensions are in millimeters(inches)
2. Tolerance is  $\pm 0.25\text{mm}(0.010")$  unless otherwise noted
3. Specifications are subjected to change specifications without prior notice.

## I/O Pins Configuration Table

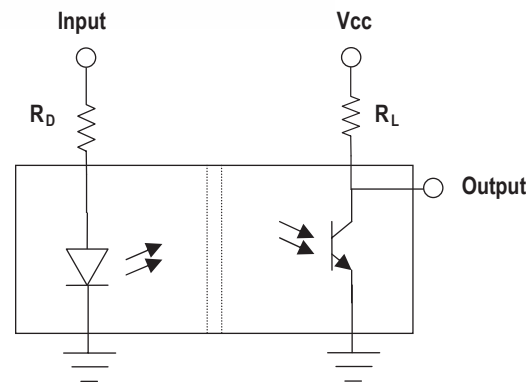
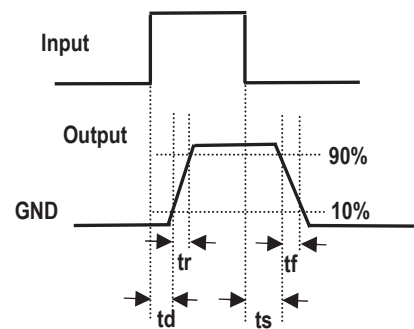
The electrical pin assignments are depicted in the below table.

| Pin | Function  | Description               |
|-----|-----------|---------------------------|
| 1   | Anode     | LED Anode                 |
| 2   | Cathode   | LED Cathode               |
| 3   | Emitter   | Phototransistor Emitter   |
| 4   | Collector | Phototransistor Collector |

## APDS-9102 Block Diagram



## Test Circuit for Response Time



## APDS-9102 Performance Charts

Typical Electrical/Optical Characteristics Curves ( $T_a=25^\circ\text{C}$  unless otherwise indicated)

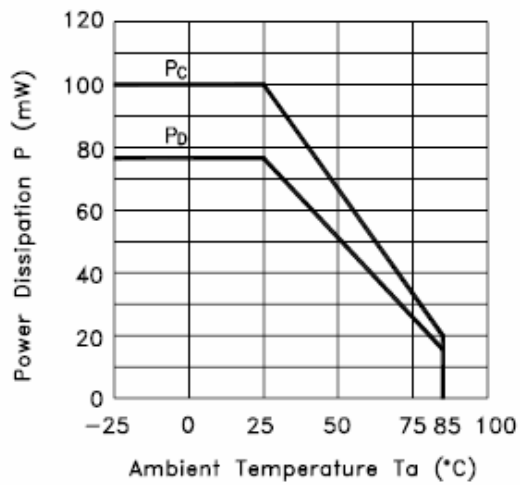


Figure 1. Power Dissipation vs. Ambient Temperature

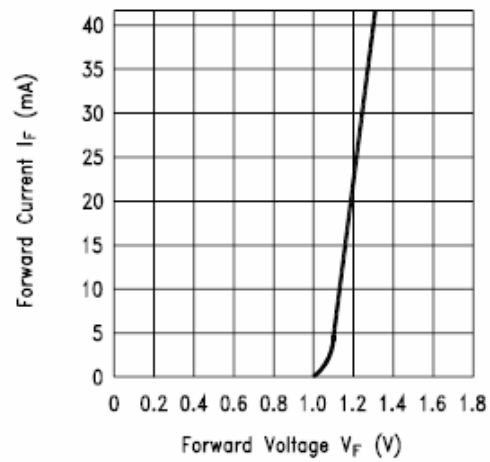


Figure 2. Forward Current vs. Forward Voltage

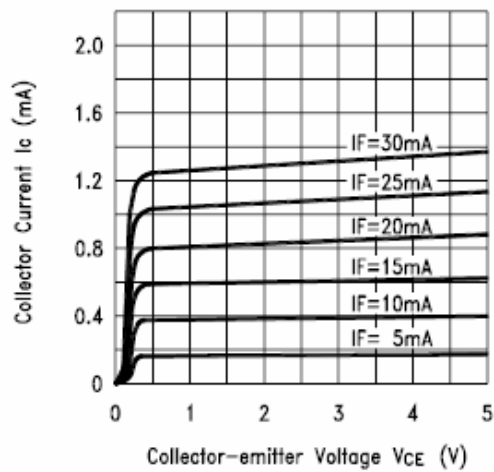


Figure 3. Collector Current vs. Collector-emitter Voltage

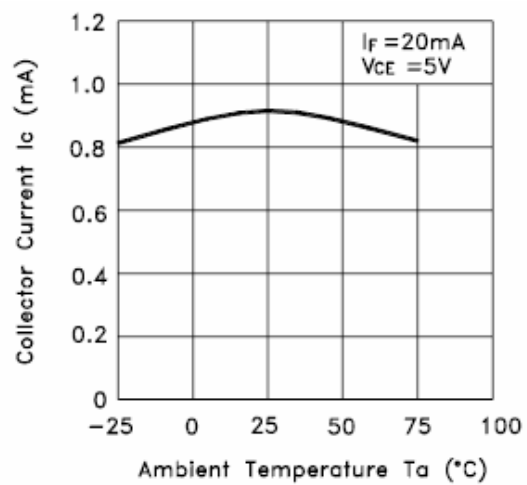


Figure 4. Collector Current vs. Ambient Temperature

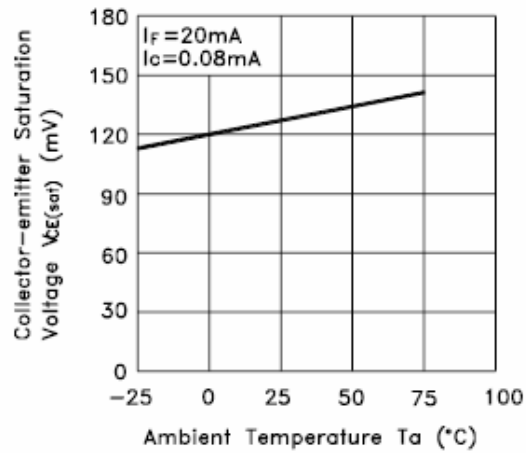


Figure 5. Collector-emitter Saturation Voltage vs. Ambient Temperature

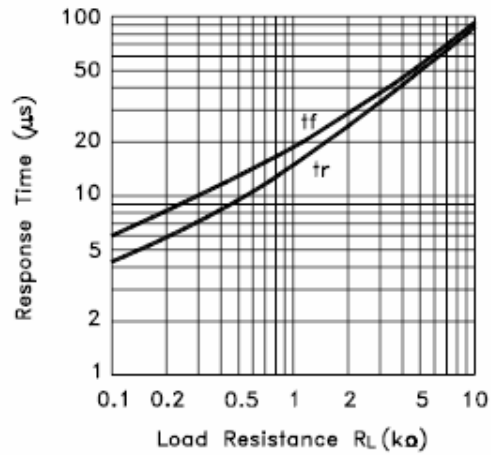


Figure 6. Response Time vs. Load Resistance

For product information and a complete list of distributors, please go to our web site: [www.avagotech.com](http://www.avagotech.com)

Avago, Avago Technologies, and the A logo are trademarks of Avago Technologies, Limited in the United States and other countries.  
Data subject to change. Copyright © 2007 Avago Technologies Limited. All rights reserved.  
AV02-0030EN - January 23, 2007

**AVAGO**  
TECHNOLOGIES