

## Data Sheet

### Description

APDS-9101 is a low cost, integrated reflective sensor that is designed to provide high switching speed for object detection or proximity sensing applications. It is an integrated module that specially incorporates an infrared LED and a phototransistor in a single integrated module.

### Application Support Information

The Application Engineering Group is available to assist you with the application design associated with APDS-9101. You can contact them through your local sales representatives for additional details

### Ordering Information

| Part Number   | Packaging Type | Package            | Quantity |
|---------------|----------------|--------------------|----------|
| APDS-9101-L21 | Tape and Reel  | 4-pins SMD package | 8000     |

### Features

- Fast Switching Speed
- Detection distance from near zero to 12mm
- Low cost and 4 pin SMD package
  - Height – 6.3 mm
  - Width – 4.5 mm
  - Depth – 8.7 mm
- Operating temperature : -25°C to 85°C
- Lead-free and RoHS Compliant

### Applications

APDS-9101 is widely suitable to provide reflective object/ position detection or high speed non-contact switching applications in industrial, consumer and other markets.

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

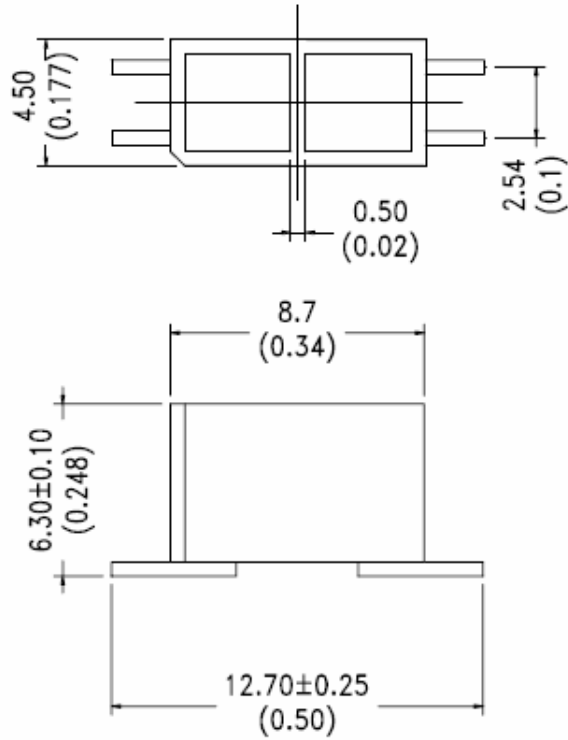
## Absolute Maximum Ratings (Ta=25°C)

| Parameter                                               | Symbol           | Max Rating | Unit                |
|---------------------------------------------------------|------------------|------------|---------------------|
| <b>Input Diode</b>                                      |                  |            |                     |
| Power Dissipation                                       | P <sub>D</sub>   | 90         | mW                  |
| Peak Forward Current<br>(300pps, 10 μs pulse)           | I <sub>CP</sub>  | 1          | A                   |
| Continuous Forward Current                              | I <sub>F</sub>   | 60         | mA                  |
| Reverse Voltage                                         | V <sub>R</sub>   | 5          | V                   |
| <b>Output Phototransistor</b>                           |                  |            |                     |
| Power Dissipation                                       | 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>  |            | -25°C to +85°C      |
| Storage Temperature Range                               | T <sub>STG</sub> |            | -40°C to 100°C      |
| Lead Soldering Temperature<br>(1.6mm(0.063") Form Case) | T <sub>S</sub>   |            | 260°C for 5 seconds |

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

| Parameter                            | Symbol               | Min. | Typ. | Max. | Unit | Test Condition                                  |       |
|--------------------------------------|----------------------|------|------|------|------|-------------------------------------------------|-------|
| Input Diode                          |                      |      |      |      |      |                                                 |       |
| 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                             |       |
| Output Phototransistor               |                      |      |      |      |      |                                                 |       |
| Collector-Emitter Dark Current       | I <sub>CEO</sub>     |      |      | 100  | nA   | V <sub>CE</sub> = 10V                           |       |
| Coupler                              |                      |      |      |      |      |                                                 |       |
| Collector-Emitter Saturation Voltage | V <sub>CE(SAT)</sub> |      |      | 0.4  | V    | I <sub>C</sub> = 0.5mA<br>I <sub>F</sub> = 20mA |       |
| On State Collector Current           | I <sub>C(ON)</sub>   | 750  |      | 1150 | μA   | V <sub>CE</sub> = 5V, I <sub>F</sub> = 20mA     | BIN A |
|                                      | I <sub>C(ON)</sub>   | 1090 |      | 1430 | μA   | D = 3.5mm                                       | BIN B |
|                                      | I <sub>C(ON)</sub>   | 1370 |      | 1770 | μA   | (90% Reflective White Paper)                    | BIN C |
| Response Time (Rise Time)            | T <sub>R</sub>       |      | 3    | 15   | μs   | V <sub>CE</sub> = 5V, I <sub>C</sub> = 2mA      |       |
| Response Time(Fall Time)             | T <sub>F</sub>       |      | 4    | 20   | μs   | R <sub>L</sub> = 100Ω                           |       |

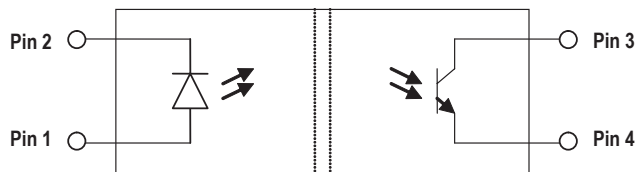
## APDS-9101 Package Outline



### NOTES:

1. All dimensions are in millimeters(inches)
2. Tolerance is  $\pm 0.25\text{mm}(0.010")$  unless otherwise noted

## APDS-9101 Block Diagram

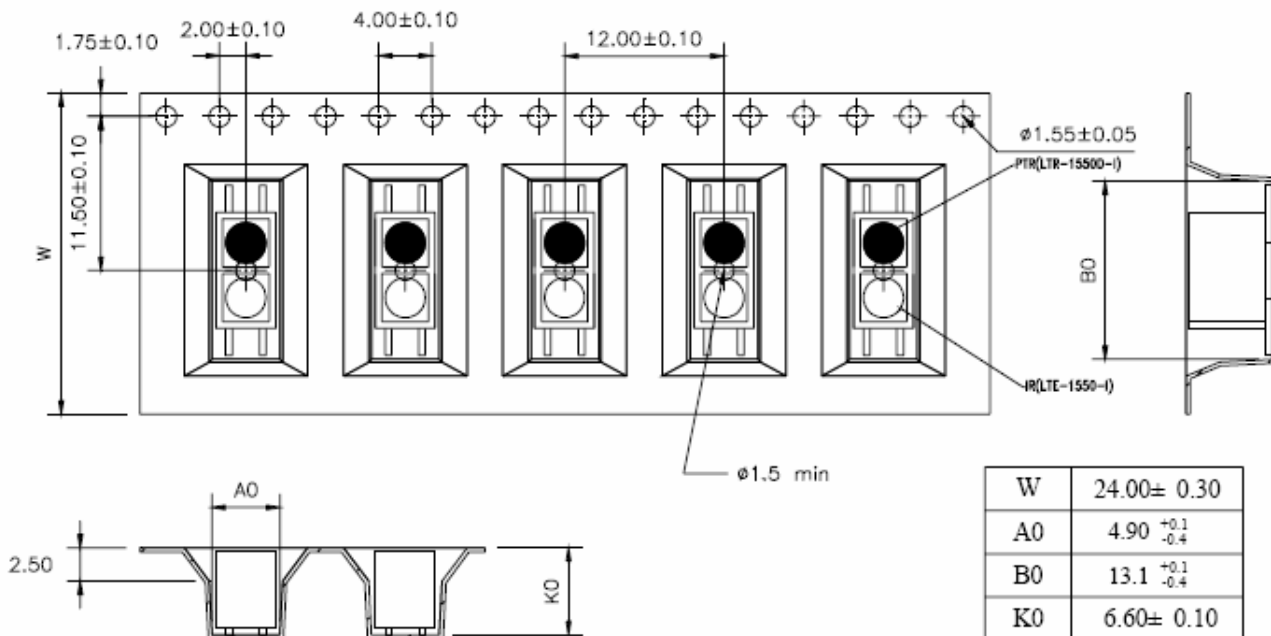


## I/O Pins Configuration Table

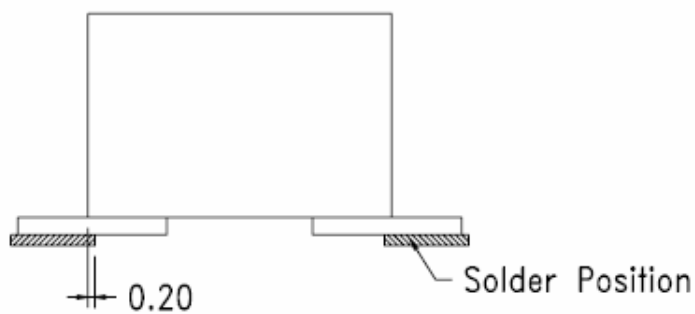
The electrical pin assignments are depicted in the below table.

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

### APDS-9101 Taping Dimensions

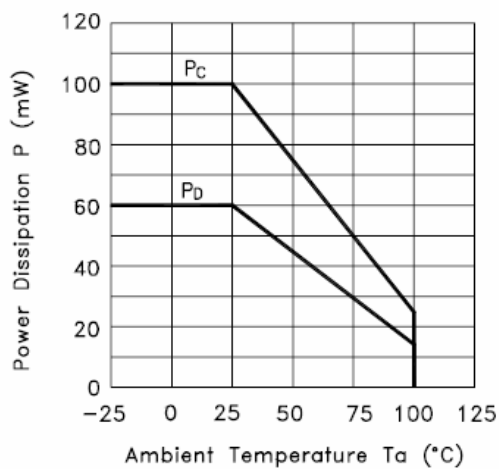


## Soldering Area

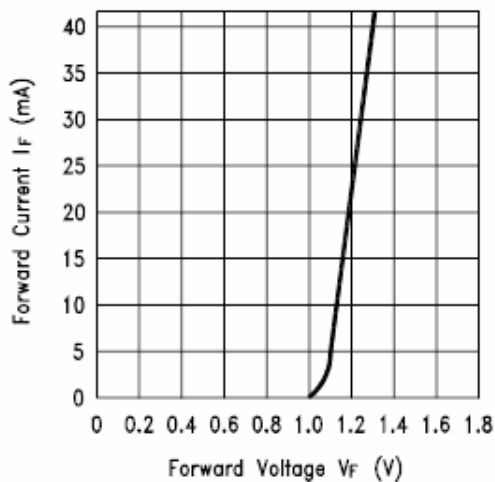


## APDS-9101 Performance Charts

**Typical Electrical/Optical Characteristics Curves (Ta=25°C unless otherwise indicated)**



**Figure 1. Power Dissipation vs. Ambient Temperature**



**Figure 2. Forward Current vs. Forward Voltage**

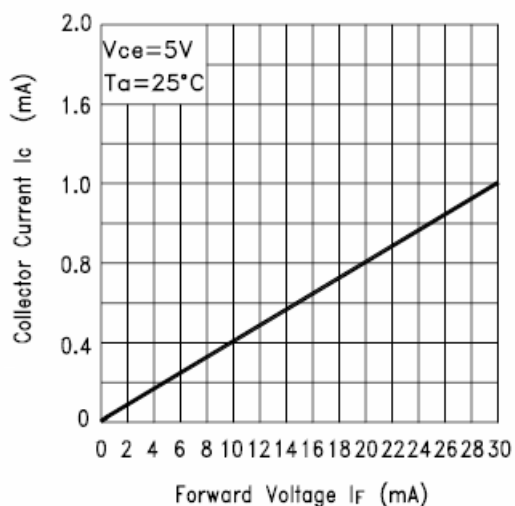


Figure 3. Collector Current vs. Forward Voltage

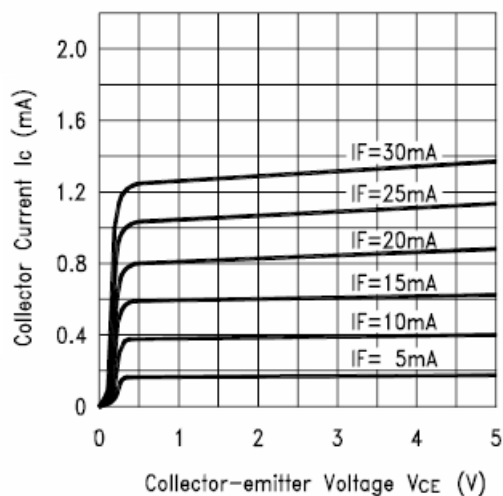


Figure 4. Collector Current vs. Collector-emitter Voltage

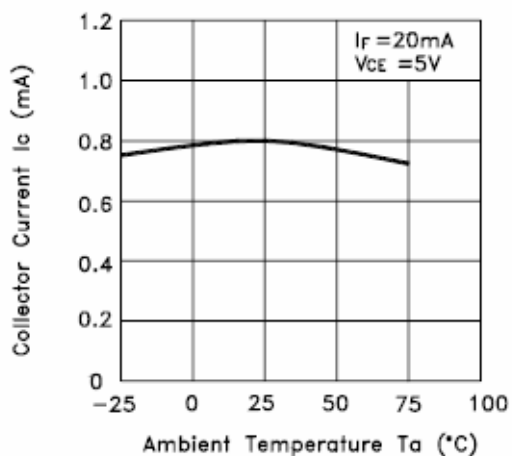


Figure 5. Collector Current vs. Ambient Temperature

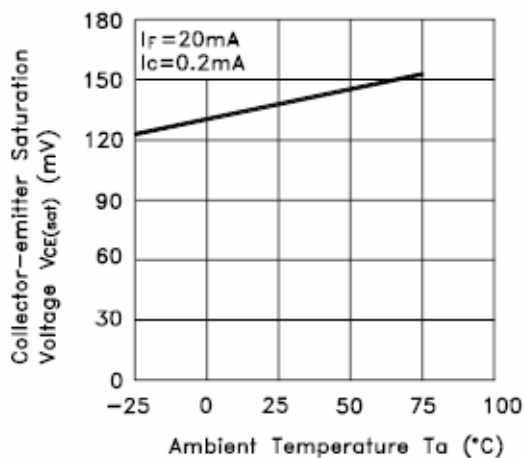


Figure 6. Collector-emitter Saturation Voltage vs. Ambient Temperature

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

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