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## APDS-9102

Integrated Reflective Sensor

### 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

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#### 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 (300ppps, 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 (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

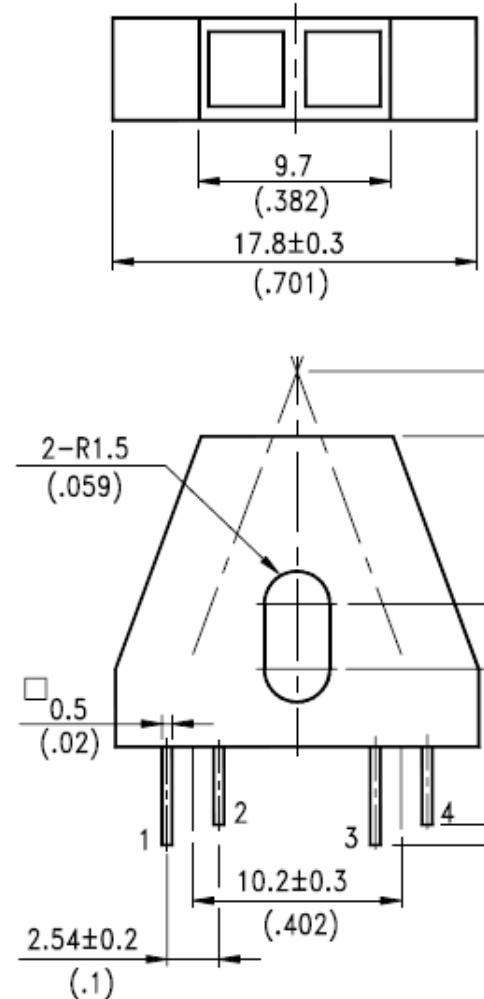
## Electrical / Optical Characteristics (Ta=25°C)

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	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	100	nA		V <sub>CE</sub> = 10V
<b>Coupler</b>						
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	0.4	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	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:

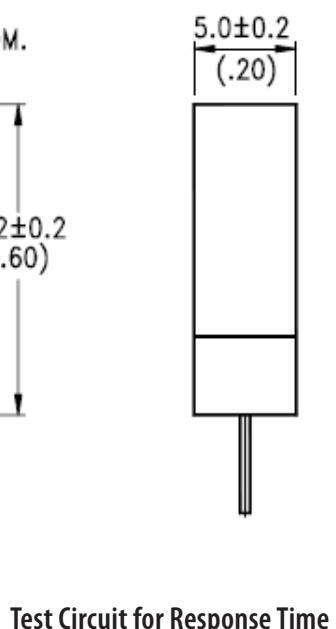
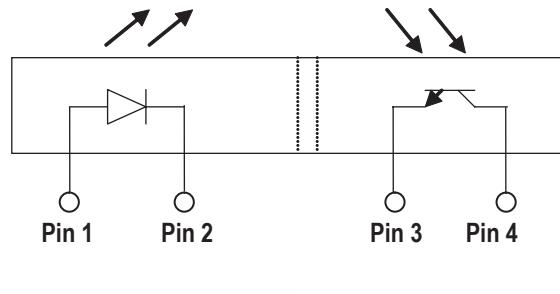
1. All dimensions are in millimeters (inches)
2. Tolerance is  $\pm 0.25\text{mm}(0.010")$  unless otherwise noted
3. Specifications are subjected to change specifications without prior notice.

I/O Pins Configuration Table

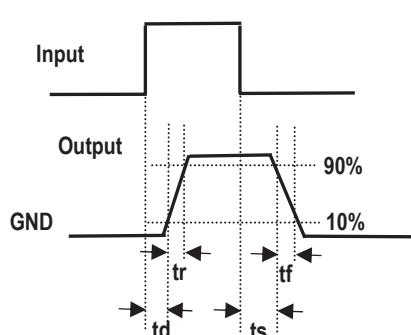
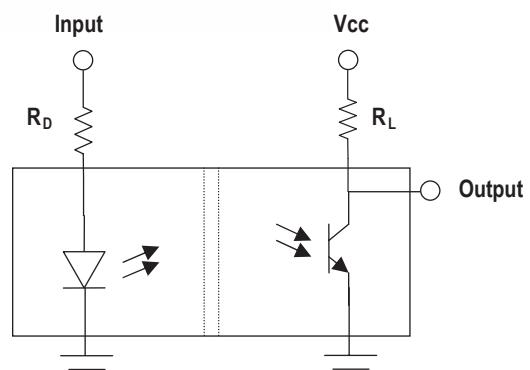
The electrical pin assignments are depicted in the below table.

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 (Ta=25°C unless otherwise indicated)

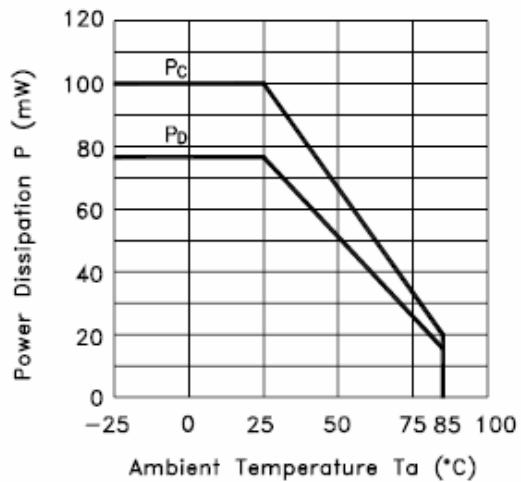


Figure 1. Power Dissipation vs. Ambient Temperature

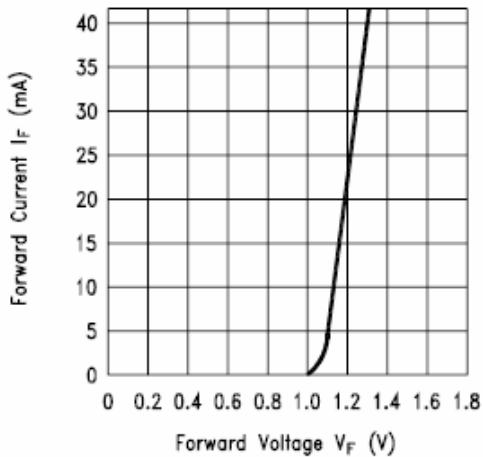


Figure 2. Forward Current vs. Forward Voltage

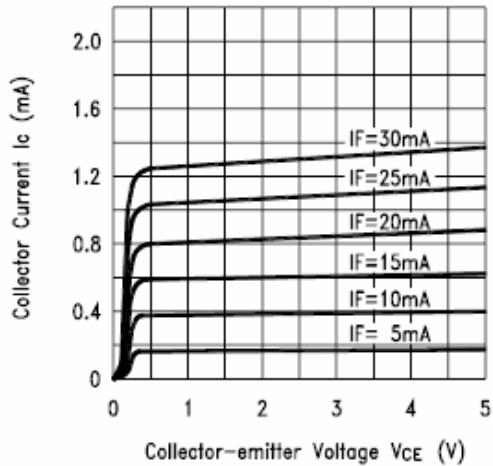


Figure 3. Collector Current vs. Collector-emitter Voltage

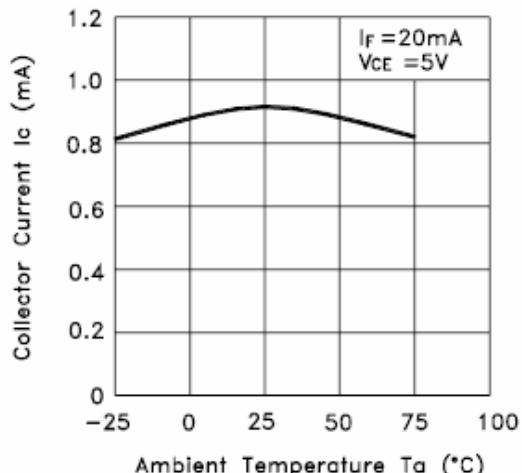


Figure 4. Collector Current vs. Ambient Temperature

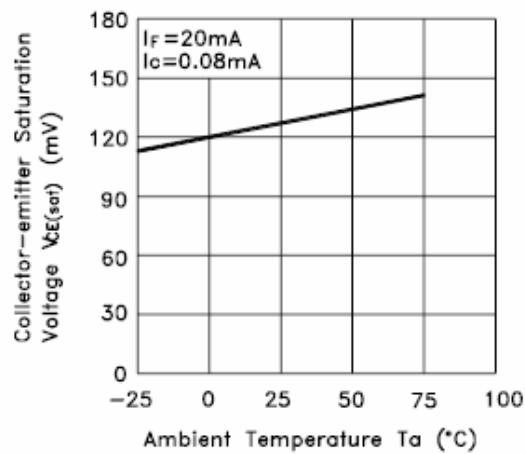


Figure 5. Collector-emitter Saturation Voltage vs. Ambient Temperature

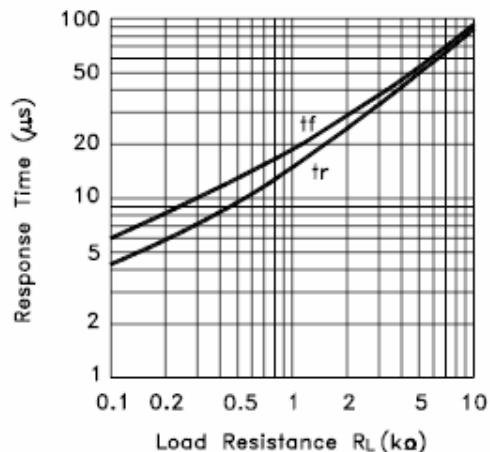


Figure 6. Response Time vs. Load Resistance

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