

Application Note 5320

Introduction

Avago Technologies has introduced a new sensor, the ADNB-3532 and ADNB-3552 low-power sensor with integrated Red Light Emitting Diode (LED). The bundle consists of an integrated chip-on-board (COB) LED mouse sensor ADNS-3530 and a small form factor (SFF) lens ADNS-3150-001. The ADNS-3530 and ADNS-3550 sensors are designed for surface mounting on a PCB. Avago Technologies provides an IGES file that defines the features of the mouse's bottom casing to accommodate the ADNS-3150-001 lens. Once the lens is in place, the sensor package will self-align to the features on the lens.

ADNS-3530 Sensor

A diagram of the ADNS-3530 sensor is shown in Figure 1.

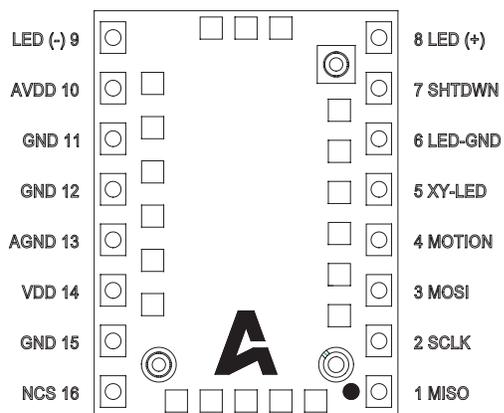


Figure 1. ADNS-3530 sensor

ADNS-3532 and ADNS-3552 Sensor PCB

Avago Technologies introduces the ADNS-3530 and ADNS-3550 Printed Circuit Board (PCB) sensor in order to facilitate ease of manufacturing. Designers are advised to review this design guide for proper customization of the Printed Circuit Board (PCB) where the ADNS-3530 or the ADNS-3550 sensor is mounted. See Figure 1 for the ADNS-3530 sensor and Figure 4a, 4b for the ADNS-3550 sensor.

As noted in Figure 1 and 4, the Chip-on-board (COB) sensors are mounted on miniature rectangular PCBs. The customer designed PCB to mount these sensors is discussed below. The recommended PCB design to accommodate the ADNS-3530 sensor and the ADNS-3550 sensor are shown in Figure 2 and Figure 5 respectively. The differences between the customer PCB design is also shown in Figure 3 and 6 where the ADNS-3550 solution offers lower system height compared to ADNS-3530.

Note the recommended pad size for the sensor pad is 1.06mm by 0.90mm for all 16 pads.

The customer designed PCB for ADNS-3530 sensor is shown in Figure 2. Note that the sensor is mounted on the bottom of the PCB. The optical mouse system assembly is shown in Figure 3.

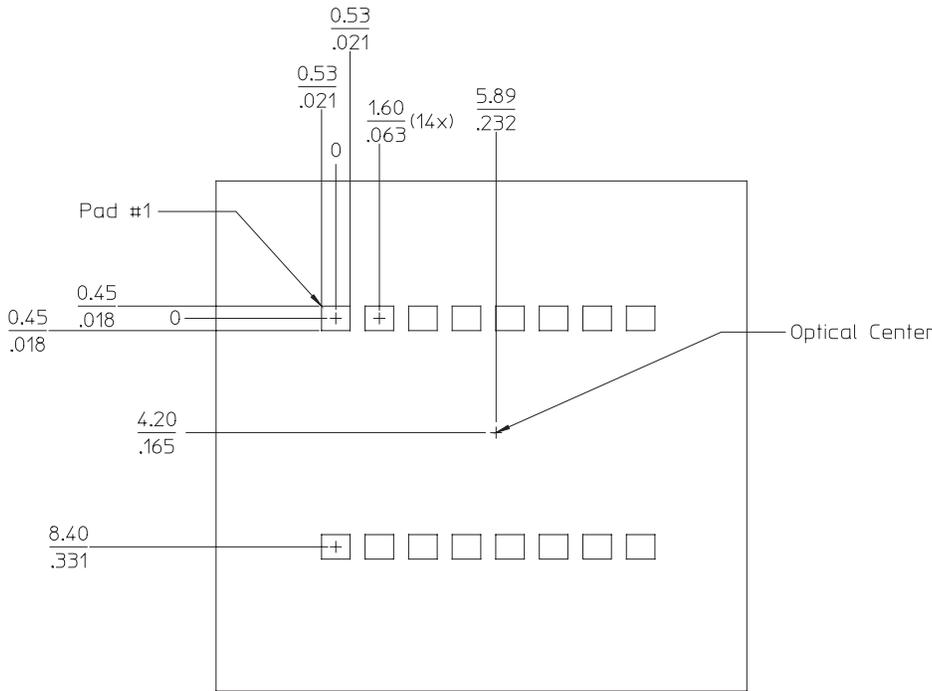


Figure 2. Customer PCB design for ADNS-3530 sensor (without cut-out)

As seen in Figure 3 below, the sensor ADNS-3530 is located below the customer PCB. The bottom of the PCB to the navigation surface 3.25mm is added with assumed PCB thickness of 1mm, therefore the total solution height is 4.25mm.

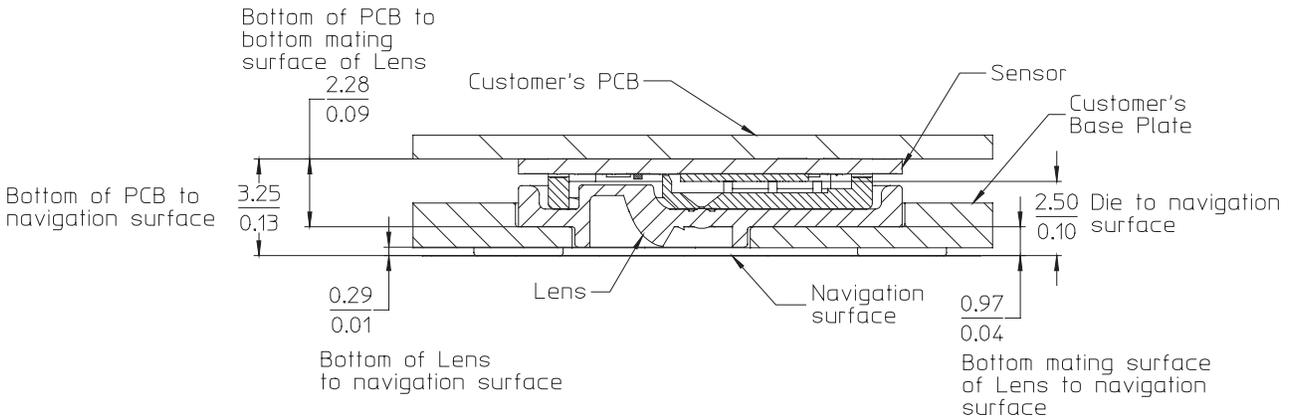


Figure 3. ADNS-3530 assembly cross section view (PCB without cut-out)

ADNS-3550 Sensor

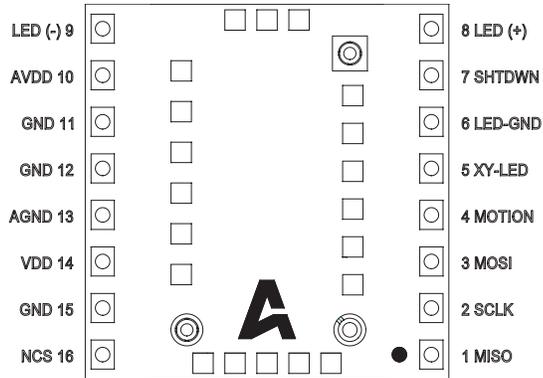


Figure 4a. ADNS-3550 sensor (top view)

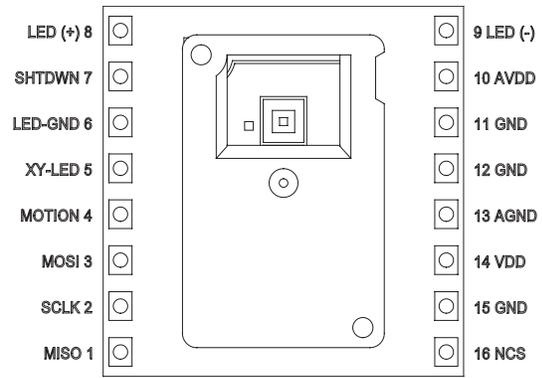


Figure 4b. ADNS-3550 sensor (bottom view)

The ADNS-3550 can be mounted on top of the PCB. The PCB must have a cut-out as shown in Figure 5 for the ADNS-3550 sensor being mounted on top of the PCB. The exposed pads are located on the top side of the PCB. The cross section view of the assembly is shown in Figure 6.

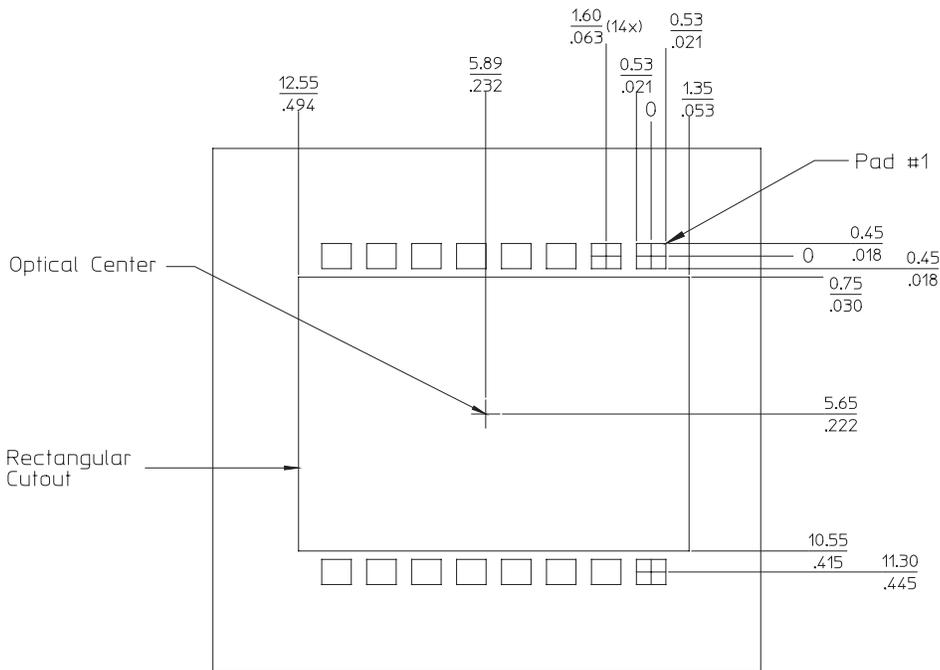


Figure 5. Customer PCB design for ADNS-3550 sensor (PCB with cut-out)

As seen in Figure 6 below, the sensor ADNS-3550 is located above the customer PCB. The total solution height is 3.25mm, the bottom of customer PCB to the navigation surface.

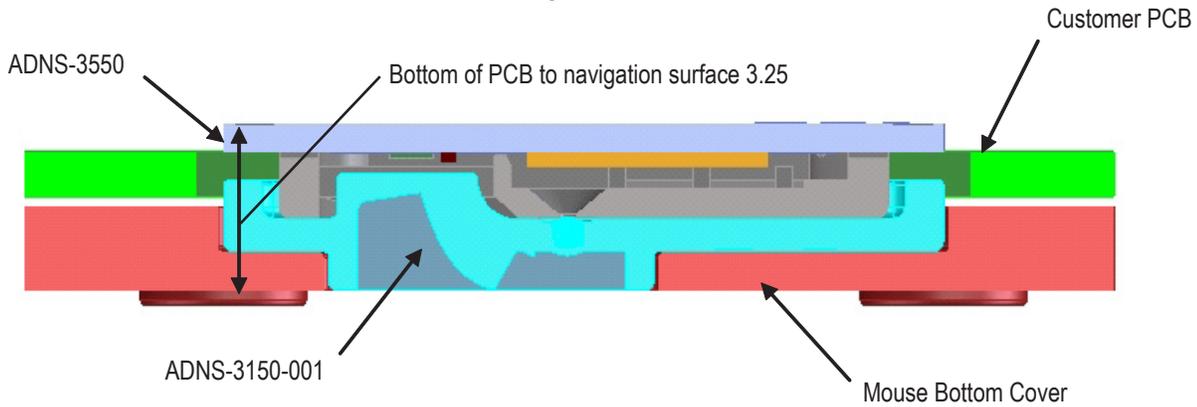


Figure 6. ADNS-3550 assembly cross section view (PCB with cut-out)

Process reflow profile

Pick and place is the recommended method to mount the ADNS-3530 and the ADNS-3550 onto the customer PCB. The whole assembly is then reflowed either through hot air or Infra Red (IR) for proper solder joints to form. Figure 7 below illustrates the reflow process profile. This reflow profile is applicable for both hot air and IR reflow.

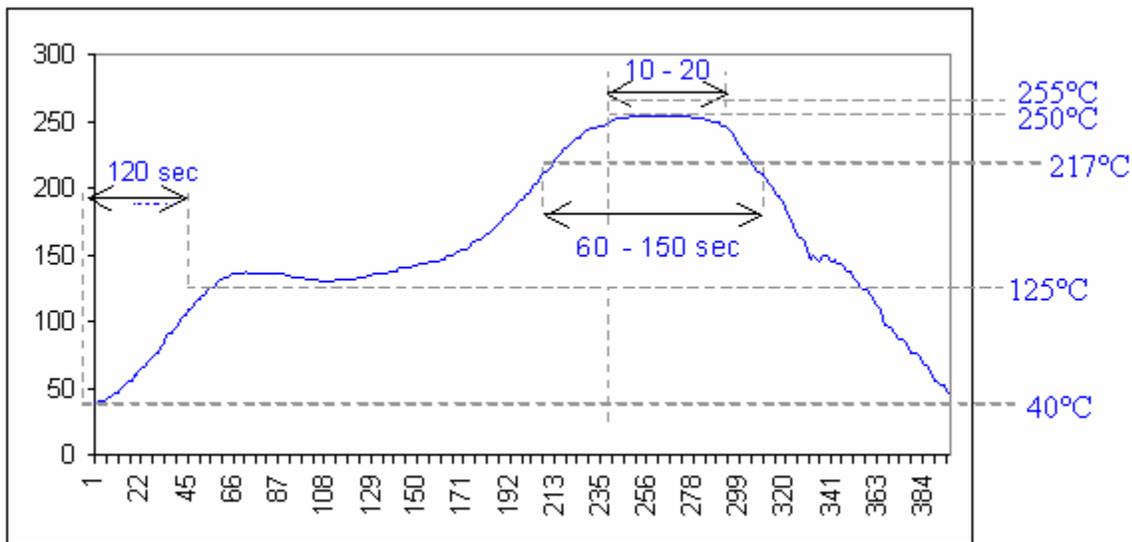


Figure 7. ADNS-35xx reflow profile

Rework procedure

A method to remove the sensor from the PCB is proposed here. The entire assembly can be reworked by using hot air blower or using solder nozzle fixture. The recommended soldering tools are Hakko 701 or Hakko FR803. The individually designed solder nozzle fixture can be attached to the end of the hot air blower to guide the hot air onto the sensor solder pads. The recommended temperature is 300degC up to 20seconds.

The individually designed solder nozzle fixtures are illustrated in Figure 8 and 9. The solder nozzle fixture is connected to the Hakko 701 or Hakko FR803 soldering tool. The heated solder nozzle is then be placed on the sensor and PCB to desolder the sensor. Once the solder is melted, the sensor can then be lifted from the PCB. Note that the kapton tape must be applied to the sensor aperture before the desoldering process begins. This is to prevent the sensor from contamination.

Due to high temperatures on the PCB during soldering, Flame Resistant-4 or FR-4 PCB material is recommended. FR-4 PCBs are Ultra-violet stabilized with resin epoxy reinforced with a woven fiberglass material. FR-4 PCBs absorbs less moisture, has good strength and stiffness properties. It is also highly flame resistant compared to FR-2 PCBs. The use of FR-4 PCBs is widely found in high-end consumer, industrial and military electronic equipment.

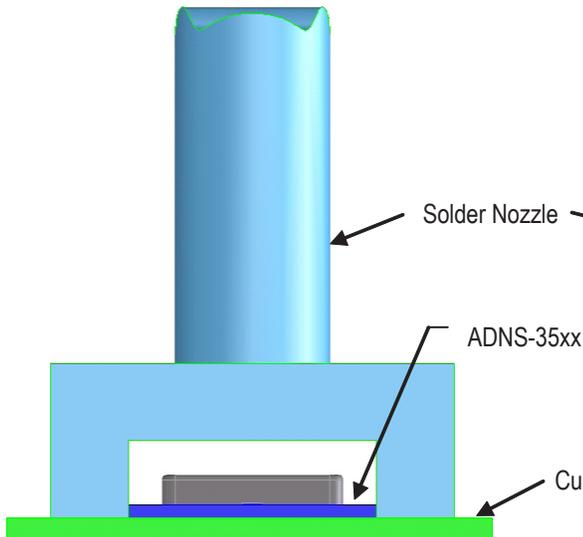


Figure 8. Solder nozzle fixture side view

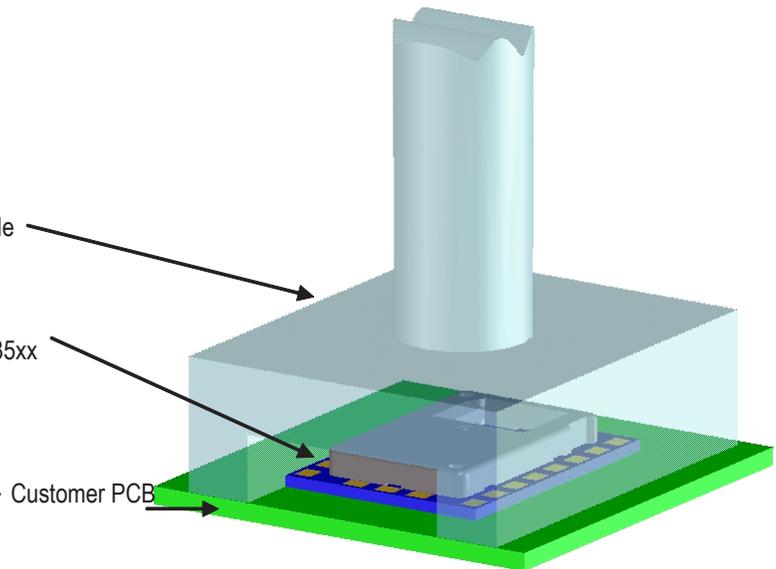


Figure 9. 3D view

Conclusion

Avago Technologies has introduced a small form factor LED integrated slim mouse sensor. This sensor requires reflow soldering process. This application note discussed the reflow process and rework method necessary for manufacturing to adopt this sensor.

More information about Avago's LED and laser optical navigation sensors is available at www.avagotech.com/opticalnavigation

For product information and a complete list of distributors, please go to our web site: www.avagotech.com

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