Atmel AVR4019: Light and Proximity One (ATAVRSBLP1) Hardware Users Guide

8-bit Atmel Microcontrollers

Application Note

Features

- **Compatible with the Atmel® AVR® Xplain MCU boards**
- **Sensor drivers available within Atmel AVR Studio® 5**
- **Ambient light sensing**
- **Proximity sensing**
- **Directional gesture recognition**

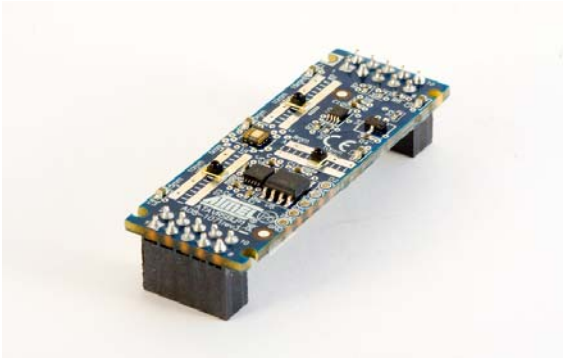
1 Introduction

The Atmel AVR Sensors Xplained series of development boards and software from Atmel are designed to be plug in compatible with the Atmel AVR Xplained series of MCU boards for the Atmel AVR microcontroller family, providing you access to a wide range of microcontroller performance depending on the needs of your application.

We have partnered with leading suppliers of accelerometer, gyroscope, compass, pressure and light sensors to bring you a variety of sensor boards that enable easy evaluation and development with a wide range of Atmel controller solutions.

To accelerate your development with these sensor based solutions, we have worked with our partners to make the necessary sensor drivers available as part of the Atmel AVR Studio development environment and the Atmel AVR Software Framework. The drivers are available directly from the Atmel website, and provide basic interface functionality with both raw data and calibrated engineering units outputs integrated into a standard API.

The Atmel Light and Proximity One sensor board incorporates the OSRAM SFH 7770 Ambient Light and Proximity Sensor and three SFH4059 IR emitters. Applications include mobile phones, PDAs, notebooks and non-contact motion sensing.



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2 Related items

Application notes:

- Sensors Xplained – Software Users Guide (Atmel AVR4016)
- Sensors Xplained – Atmel Data Visualizer (Atmel AVR4017)
- Sensors Xplained – Sensor Top Board Design Notes (Atmel AVR4014)

3 Description

The Atmel Light and Proximity One sensor board incorporates the OSRAM SFH 7770 which is a compact device designed for simultaneous detection of ambient light, proximity of reflecting objects. This sensor also controls three IR emitters mounted on the sensor board which allows gesture recognition to be achieved. The device communicates to the host microcontroller through an I^2C interface.

The board includes the following features:

- Ambient Light Sensor (ALS)
    - 3lx - 55000lx- High linearity
    - Spectral sensitivity well matched to the human eye
- Proximity Sensor (PS)
    - Detection-range up to 100mm
    - Three SFH4059 IR emitters
    - Gesture recognition possible
    - Negligible influence from ambient light
- Three programmable measurement modes
    - (STAND-BY, TRIGGERED, FREE-RUNNING)

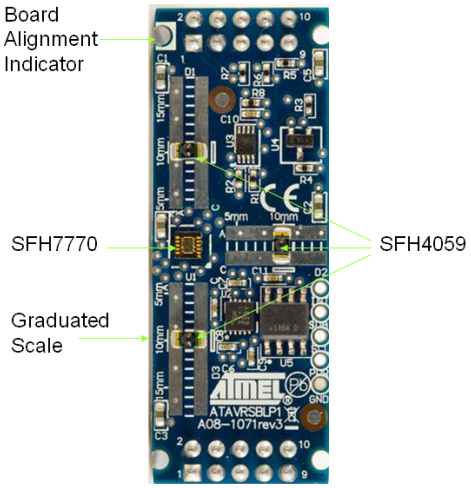
WARNING

The IR emitters on the sensor board are capable of producing high levels of Infra Red that is not visible to the human eye and so should not be viewed directly or with optical instruments. Refer to manufacturers data sheets for safe operating guidelines.

4 Hardware layout

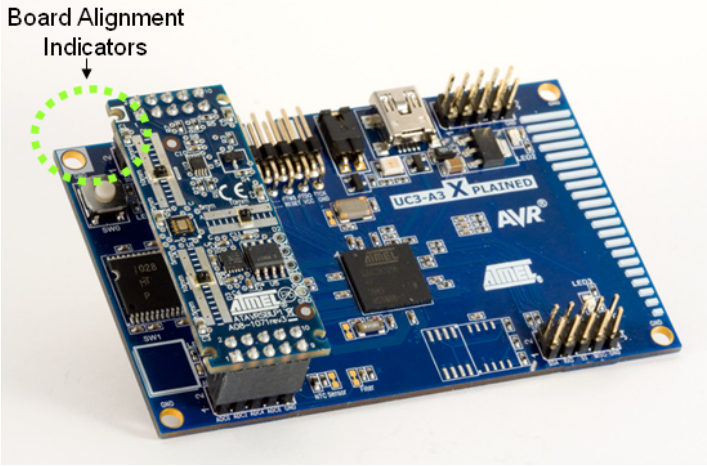
Figure 4-1 shows the physical arrangement of the Atmel Light and Proximity One Sensors Xplained development board. The IR emitters are mounted onto elongated tracks with a graduated scale. This is to allow the user to experiment with the relative placement of the emitters and sensor. There are also four mounting holes for mounting different cover glass to evaluate the effect of tint and reflection.

Figure 4-1. Sensor arrangement.



The Light and Proximity One Sensors Xplained development board must be connected to the pin headers on the Atmel AVR Xplained MCU board correctly to ensure proper operation. All the Sensors Xplained development boards attach to pin headers J1 and J2 on the MCU boards, and a board alignment indicator is provided to aid correct alignment. As an example, Figure 4-2 shows the orientation of the Light and Proximity One Sensors Xplained development board when attached to the Atmel AVR UC3-A3 Xplained MCU board.

Figure 4-2. Board attachment orientation.



5 Schematic

Figure 5-1 shows the schematic for the Atmel Light and Proximity One Sensors Xplained development board and Table 5-1 gives the I^2C address for the SFH7770 Sensor.

NOTE

The I^2C pull up resistors are included on the Light and Proximity One Sensors Xplained board.

Figure 5-1. Light and proximity one schematic.

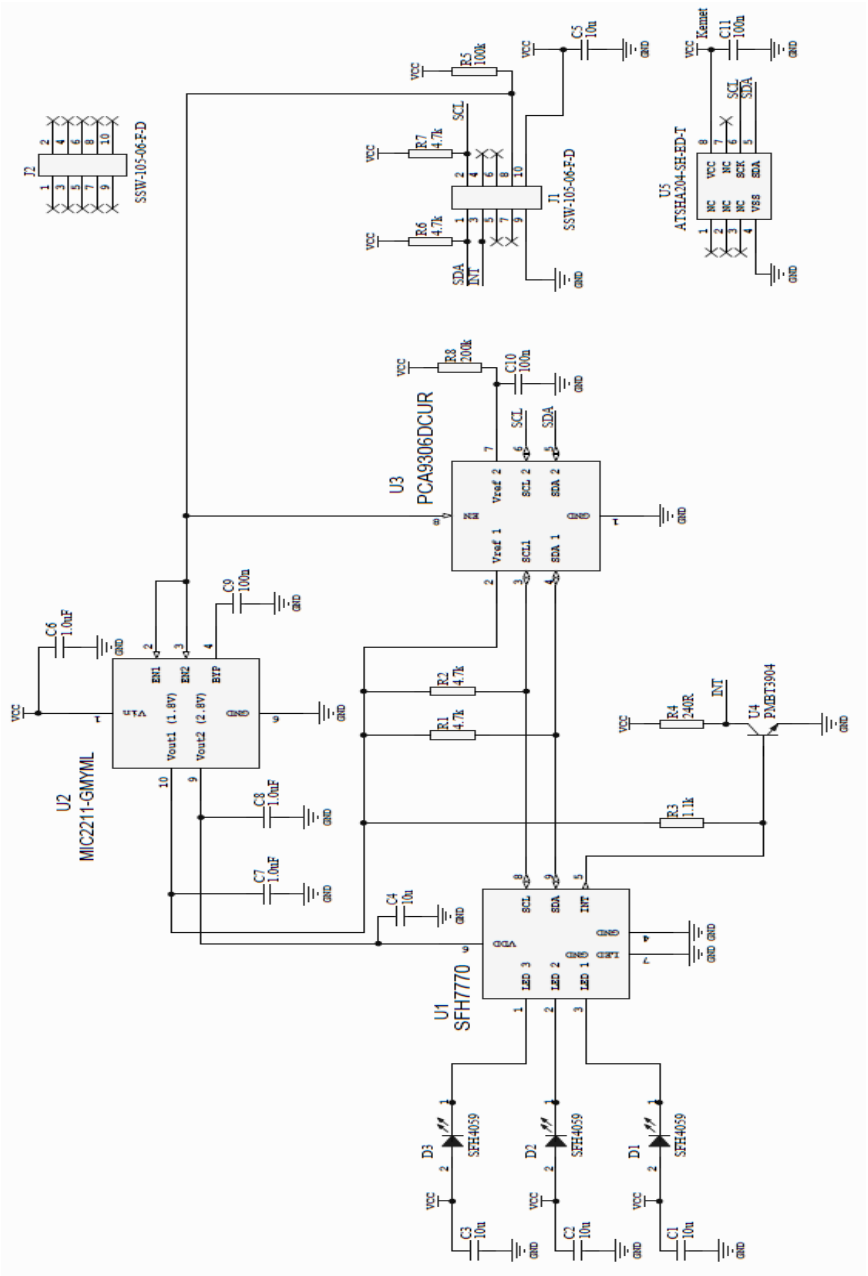


Table 5-1. Sensor I²C addresses.

Sensor	I²C address
SFH7770	Ox38

5.1 Circuit configuration options

There are a number of hardware options are available on the Atmel Light and Proximity One Sensors Xplained development boards to allow investigation of the function of the sensors. Theses options are described below.

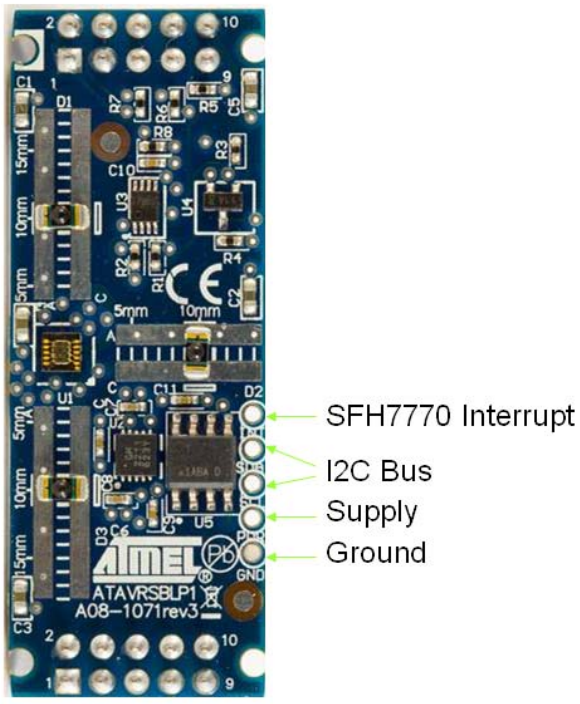
5.1.1 IR emitters

The IR emitters are mounted onto elongated tracks. This is to allow the user to experiment with the relative placement of the emitters and sensor. There is a graduated scale that indicates the distance in mm from the centre of the SFH7770 to the SFH4059 IR emitter. As supplied, the emitters are 10mm from the sensor. There are also four mounting holes for mounting different cover glass to evaluate the effect of tint and reflection.

5.1.2 Test points

A number of test points that can be used with an oscilloscope for investigating the function of the sensors. Figure 5-2 shows the physical location of the test points on the board.

Figure 5-2. Location of test points.



6 EVALUATION BOARD/KIT IMPORTANT NOTICE

This evaluation board/kit is intended for use for **FURTHER ENGINEERING, DEVELOPMENT, DEMONSTRATION, OR EVALUATION PURPOSES ONLY**. It is not a finished product and may not (yet) comply with some or any technical or legal requirements that are applicable to finished products, including, without limitation, directives regarding electromagnetic compatibility, recycling (WEEE), FCC, CE or UL (except as may be otherwise noted on the board/kit). Atmel supplied this board/kit "AS IS," without any warranties, with all faults, at the buyer's and further users' sole risk. The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies Atmel from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge and any other technical or legal concerns.

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