UV Sensor (B)
User Manual

OVERVIEW

UV Sensor (B) is an optical measurement module, mainly used to measure UV. This module use Si1145 as sensor. User don't need data convert or calibration, Si1145 can output 100 times of the UV index values measured. Si1145 also support to measure intensity of ambient light.

FEATURES

- Integrates Si1145 chip with embedded ADC, detects not only ultraviolet, but also ambient light intensity

- Directly output UV index value via the I2C interface, needs no calculation

- Supports interrupt output, programmable upper/lower threshold

- Onboard voltage translator, compatible with 3.3V/5V operating voltages
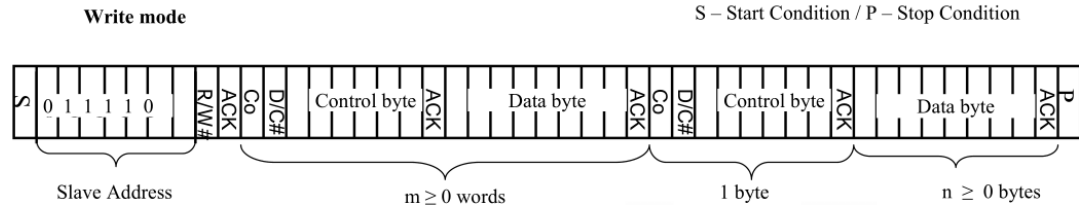
PINOUTS

PIN	Description
VCC	3.3V~5V
GND	Ground
SDA	I2C data pin
SCL	I2C clock pin
INT	Interrupt output

WORKIGN PRINCIPLE

Si1145 use I2C interface and has programmable-event interrupt output. Master devices read/write registers of Si1145 via I2C bus to set chip and get measurement data.

I2C

Note:
- Co – Continuation bit
- D/C# – Data / Command Selection bit
- ACK – Acknowledgement
- SA0 – Slave address bit
- R/W# – Read / Write Selection bit
- S – Start Condition / P – Stop Condition

Write mode

| S | 0 1 1 1 1 0 | R/W# | ACK | Co | D/C# | Control byte | ACK | Data byte | ACK | Co | D/C# | Control byte | ACK | Data byte | ACK | P |

Slave Address $m \geq 0$ words   1 byte $n \geq 0$ bytes

Master device sends an 8-bit data to slave device (the sensor). The first 7 bits is device address of slaver and 1 bit read-write bit.

After receiving the 8-bit data, slave device will response an ACK to master device. Then master device sends a control byte to slaver, this byte defines the data following are command or data.

Slaver response the control byte, then master device sends the corresponding data/

HOW TO USE

We provide demo codes for this sensor, which are based in STM32, Arduino, RaspberryPi separately. Interrupt is not be used in the demo code, so INT pin could not be connected.

STM32

1. Hardware connection
   Development board：XNUCLEO-F103RB

PIN	XNUCLEO-F103RB
VCC	3V3/5V
GND	GND
SDA	SDA/D14/PB8
SCL	SCL/D15/PB9

2. Projects
   Demo code is based in MDK-ARM V5，generated by STM32CubeMX。

/Src：
 si1145.c : bottom driver codes of si114。
 /Inc：
 Si1145.h：header file
3. Expected result

Connect sensor to XNUCLEO-F103RB and connect the UART interface of XNUCLEO to your PC. Download the demo codes. Data will be printed to UART interface.

ARDUINOD

1. Hardware connection
 Development board：UNO_PLUS

PIN	UNO PLUS
VCC	3V3/5V
GND	GND
SDA	SDA
SCL	SCL

2. Files
 Si1145.cpp：Driver codes of Si1145
 Si1145.h：Header file
 UV_Sensor_demo.ino：project file of Arduino, the main codes.
3. Expected result:

Connect UNO PLUS to your PC, download the codes. Open Serial monitor, the data measured will be printed.

RASPBERRY PI

1. Hardware connection
 Development board：Raspberry Pi

PIN	Raspberry Pi
VCC	3V3/5V
GND	GND
SDA	SDA
SCL	SCL

2. Enable I2C interface
 sudo raspi-config
 choose **Interface Options** -> **I2C** -> **yes** to enable I2C interface
3. Libraries Installation

About how to install libraries for Raspberry Pi, you can refer to this page：
https://www.waveshare.com/wiki/Libraries_Installation_for_RPi

4. Using

4.1 Download demo code from Waveshare Wiki, extract and copy the Raspberry Pi code to your Raspberry Pi.

4.2 BCM2835

(1)   Install bcm2835libraries

(2)   List file with command ls:

```
pi@raspberrypi:~/UV_Sensor_demo/bcm2835 $ ls
main.c  main.o  Makefile  Si1145.c  Si1145.h  Si1145.o  UV_demo
```

mian.c： Main function

Si1145.c： Driver codes of si1145

Si1145.h： Header file

Makefile： Codes compilation

UV_demo： Executable file.

(3)   Running codes： sudo ./UV_demo

(4)   Expected result：Data will be printed to console, you can press Ctrl+C to stop the code.

4.3 wiringPi

(1)   Install wiringPi library

(2)   List files with command ls

```
pi@raspberrypi:~/UV_Sensor_demo/wiringpi $ ls
main.c  main.o  Makefile  Si1145.c  Si1145.h  Si1145.o  UV_demo
```

mian.c： Main function

Si1145.c： Driver codes of si1145

Si1145.h： Header file

Makefile： Code compilation

UV_demo： Executable file

(3)   Running code： sudo ./UV_demo

(4)   Expected result：Data will be printed to console. you can press Ctrl+C to stop the code

4.4 Python

(1)   Install python library

(2)   List file with command ls

```
pi@raspberrypi:~/UV_Sensor_demo/python $ ls
main.py  Si1145.py
```

mian.py： Main function

Si1145.py： Driver codes of Si1145

(3)   Running code： sudo python main.py

(4)   Expected result：Data will be printed to console. you can press Ctrl+C to stop the code