AS1170 EVK – setup with ESP32 board

Application Note

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AS1170 EVK – setup with ESP32 board

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Abstract

This application note provides detailed instructions on setting up and running an Arduino code for an ESP32 microcontroller. The code demonstrates how to interface with I²C devices, use PWM for LED control, and read/write to registers.

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1 Introduction

This application note provides detailed instructions on setting up and running an Arduino code for an ESP32 microcontroller. The code demonstrates how to interface with I²C devices, use PWM for LED control, and read/write to registers.

2 Preliminary setup

2.1 Installing the USB to UART driver

To communicate with the ESP32 S2 DevKit M1, you need to install the USB to UART driver. Follow these steps:

- Download the Driver: Visit the Silicon Labs website CP210x USB to UART Bridge VCP Drivers - Silicon Labs (silabs.com) and download the appropriate driver for your operating system.
- Install the Driver: Follow the installation instructions provided on the website to install the driver on your computer.

2.2 Setting up the Arduino IDE

To program the ESP32 S2 DevKit M1, you need to set up the Arduino IDE with the appropriate board support package. Follow these steps:

- Install the Arduino IDE: If you haven't already, download and install the Arduino IDE from the Arduino website.
- Open the Arduino IDE: Launch the Arduino IDE on your computer.
- Add the ESP32 Board Manager URL:
  - Go to File > Preferences.
  - In the Additional Board Manager URLs field, add the following URL:

    https://raw.githubusercontent.com/espressif/arduino-esp32/gh-pages/package_esp32_index.json
  - Click OK to save the changes.
- Install the ESP32 Board Package:
  - Go to Tools > Board > Boards Manager.
  - In the Boards Manager window, search for esp32.
  - Find the package titled esp32 by Espressif Systems and click Install.
  - Ensure you install version 2.0.17.
- Select the ESP32 S2 DevKit M1 Board:
  - Go to Tools > Board > esp32.
  - Select ESP32S2 Dev Module from the list.

3 Hardware setup

3.1 Components required

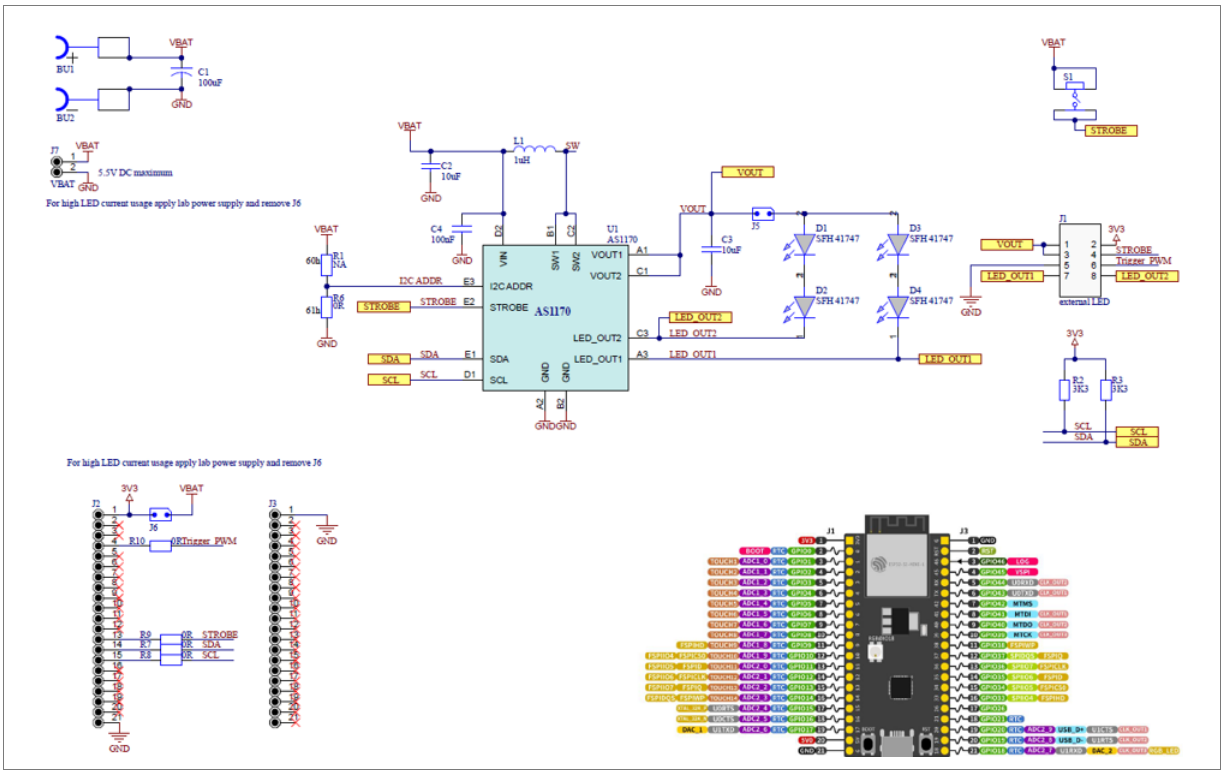
- ESP32 Development Board
- AS1170 EVK
- PU/PD resistors/jumpers
- Connecting Wires

3.2 Circuit diagram

Connect the components as follows:

- SDA (I²C Data): GPIO 14
- SCL (I²C Clock): GPIO 15
- PWM Output: GPIO 5

Figure 1: Circuit diagram



4 Software setup

4.1 Libraries required

Ensure the following libraries are installed in your Arduino IDE:

- Wire.h
- SD.h
- HardwareSerial.h
- Arduino.h
- Driver/ledc.h

4.2 Installing libraries

To install the libraries, go to Sketch > Include Library > Manage Libraries and search for the required libraries.

5 Code explanation

5.1 Constants and defines

- I²C Address: _slaveaddress is set to 0x30.
- Pins: SDA_PIN and SCL_PIN are set to GPIO 14 and 15 respectively.
- PWM Settings: Frequency is set to 5000 Hz, channel to 0, resolution to 8 bits, and output pin to GPIO 5

5.2 Register structure and field map

A Register structure is defined to hold register information including name, address, default value, and fields.

The following table resumes the whole register map and fields.

Figure 2: Register map and fields

Register definition	Addr	Default	Access	<b7>	<b6>	<b5>	<b4>	<b3>	<b2>	<b1>	<b0>
ChipID	0h	B4h	R	fixed_id	fixed_id	fixed_id	fixed_id	fixed_id	version	version	version
Current set LED1	1h	9Ch	R/W	led_current1	led_current1	led_current1	led_current1	led_current1	led_current1	led_current1	led_current1
Current set LED2	2h	9Ch	R/W	led_current2	led_current2	led_current2	led_current2	led_current2	led_current2	led_current2	led_current2
Low voltage	4h	2Ch	R/W	const_v_mode	vin_low_v_shutdown	vin_low_v	vin_low_v	vin_low_v	vin_low_v_run	vin_low_v_run	vin_low_v_run
Flash timer	5h	23h	R/W	flash_timeout	flash_timeout	flash_timeout	flash_timeout	flash_timeout	flash_timeout	flash_timeout	flash_timeout
Control	6h	00h	R/W				auto_strobe	out_on	reserved	mode_setting	mode_setting
Strobe signaling	7h	C0h	R/W	strobe_on	strobe_type						
Fault	8h	00h	R/Sc	fault_ovp	fault_led_short	fault_overtemp	fault_timeout	fault_tx mask	reserved	reserved	fault_uvlo
PWM and Indicator	9h	00h	R/W			load_balance_on	led_out2above1	led_out1above2	freq_switch_on	inct_pwm	inct_pwm
Minimum LED current	Eh	00h	R	led_current_min	led_current_min	led_current_min	led_current_min	led_current_min	led_current_min	led_current_min	led_current_min
Actual LED current	Fh	00h	R	led_current_actual	led_current_actual	led_current_actual	led_current_actual	led_current_actual	led_current_actual	led_current_actual	led_current_actual
Password register	80h	00h	W	password	password	password	password	password	password	password	password
Current boost	81h	00h	R/W								current boost

5.3 Functions

- readRegister: Reads a byte or specific bit from a register.
- writeRegister: Writes a byte to a register.
- loadRegisters: Loads register information from a CSV file.
- printRegisterValue: Prints the value of a register.
- pollserial: Polls the serial port for incoming data.

5.4 Setup section

- Initializes I²C communication.
- Sets up serial communication at 115200 baud.
- Configures the PWM channel and attaches it to the GPIO pin.
- Loads registers from a CSV file.
- Reads and prints initial register values.

5.5 Loop section

- Continuously polls the serial port for commands.
- Handles commands to read, write, and reset registers, and control PWM output.

6 Running the code

- Upload the Code: Connect your ESP32 to the computer and upload the code using the Arduino IDE.
- Open Serial Monitor: Open the Serial Monitor to view register values and send commands.
- Send Commands: Use the Serial Monitor to send commands such as read, write, and reset.

7 Troubleshooting

- No Output on Serial Monitor: Ensure the baud rate is set to 115200.
- I²C Communication Issues: Check the connections and ensure the correct I²C address is used.
- PWM Not Working: Verify the PWM pin and settings.

8 Summary / results

This guide provided a comprehensive overview of setting up and running an Arduino code for an ESP32. The code demonstrates I²C communication, PWM control, and register manipulation.

9 Revision information

Changes to current revision v1-00	Page
Initial production version	

- Page and figure numbers for the previous version may differ from page and figure numbers in the current revision.
- Correction of typographical errors is not explicitly mentioned.

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