

DESCRIPTION DOCUMENT FOR I2C GPIO EXPANDER BOARD

HARDWARE REVISION 0.1

| Department | Name | Signature | Date |
|------------|------|-----------|------|
| Author | | | |
| Reviewer | | | |
| Approver | | | |

Revision History

| Rev | Description of Change | Effective Date |
|-----|-----------------------|----------------|
| A | Initial Release | |

ABSTRACT:

This document is a detailed product description that describes the effective features of the product. It includes a functional hardware description of the product with its internal block diagram and product images.

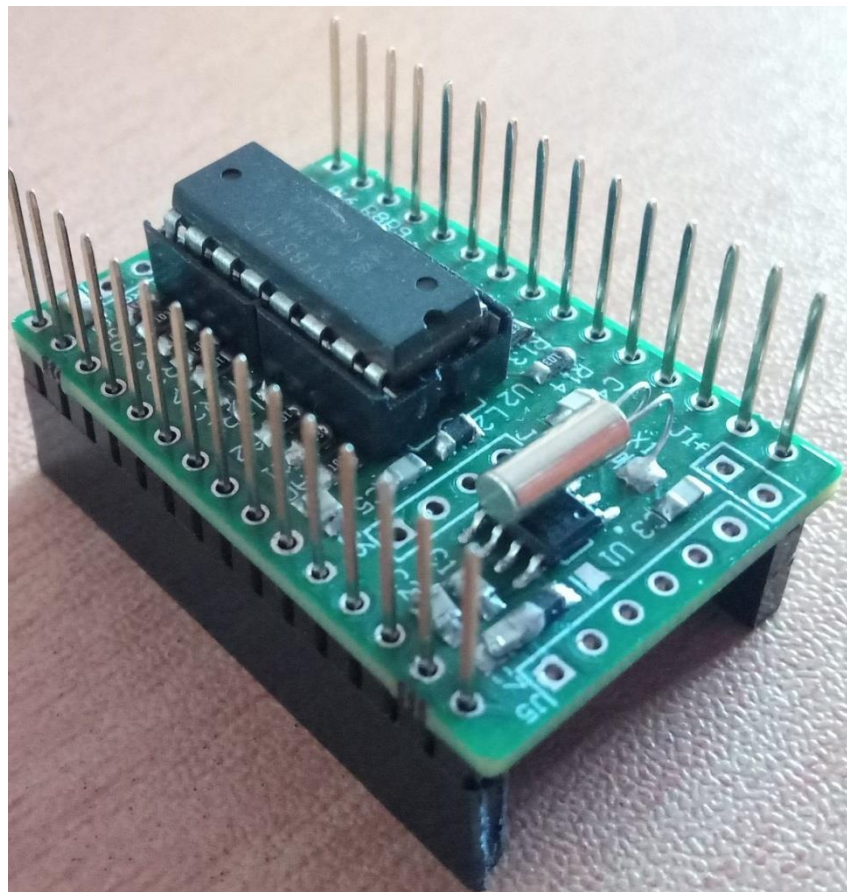


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1. ABBREVIATIONS

| Term | Description |
|------|------------------------------|
| DC | Direct Current |
| DGND | Digital Ground (DC) |
| GPIO | General Purpose Input Output |
| I2C | Inter integrated Circuit |
| MCU | Microcontroller Uni |
| PCB | Printed Circuit Board |
| RTC | Real Time Clock |
| SCL | Serial Clock |
| SDA | Serial Data |

2. REFERENCES

| | |
|------------------------|---|
| Company Website link | https://www.armtronix.net |
| Instructable's Weblink | |
| Github's Weblink | - |

3. PURPOSE

The purpose of this document is to outline the design description for the I2C GPIO Expansion Board. It provides a high level summary of the product.

4. SCOPE

This document describes system architecture which includes I2C Expander IC and RTC.

5. SAFETY AND WARNING

If you are working with DC power or batteries, please take necessary precautions. Do not short the positive and negative terminals of the power supply, as it may damage the Hardware and may create hazardous to your health. Do not bring AC power in contact with this board, which will damage the hardware and may create hazardous to your health. Please consider disconnecting power supply from the board if you would like to make any changes in connections. Working without safety towards hardware is not advisable.

Fire Hazard: Making wrong connections, drawing more than rated power, contact with water or other conducting material, and other types of misuse/overuse/malfunction can all cause overheating and risk starting a fire. Test your circuit and the environment in which it is deployed thoroughly before leaving it switched on and unsupervised. Always follow all fire safety precautions.

6. PRODUCT FEATURES

- Operates with standard DC power 3.3V DC -5V DC.
- Works with standard I2C protocol
- Provide 8 GPIOs
- Provides I2C based RTC with coin cell (wired) connector.

7. PRODUCT DESCRIPTION

a. PHYSICAL DESCRIPTION

- I2C Expander
- RTC

b. FUNCTIONAL DESCRIPTION

Block Diagram

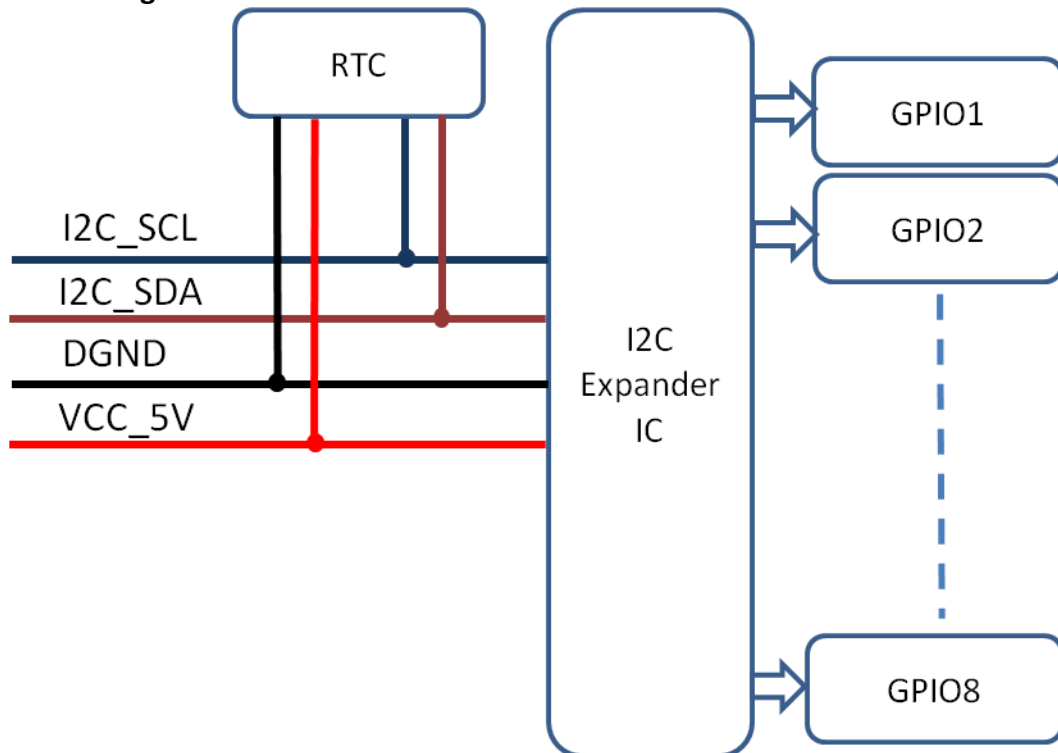


Figure 1: Block Diagram

I2C GPIO expander board is ESP12 Node MCU header compatible plug in addon board to increase number of GPIO for user application. This board has the total eight numbers of GPIO, which can be configured as input/output and controlled through I2C protocol with unique device address.

8. SYSTEM OVERVIEW

1. I2C Expander

I2C expander provides general purpose input output expansion with an I2C interface to our other products compatible with ESP12 Node MCU header.

I2c Device Default address is 0x27

This I2C address can configured with help of resistors A0, A1 and A2 combination. It helps you to stack up multiple GPIO expander boards up to 8 numbers on top of one another, with different I2C address.

2. RTC

Real Time Clock DS1307 which is commonly used I2C based RTC for real time to schedule an operation in our board for home automation or any other automation application.

I2c Device Default address is 0x68

9. TECHNICAL SPECIFICATION

a. ELECTRICAL SPECIFICATION

| Input Specifications | | | | |
|----------------------|-----|-----|-----|-------|
| Description | Min | Typ | Max | Unit |
| Voltage DC | 3.3 | 5 | 5.5 | Volts |
| Current DC (Standby) | - | 10 | - | uAmps |

| GPIO Specifications (Maximum) | | | | |
|-------------------------------|-----|-----|-------|-------|
| Description | Min | Typ | Max | Unit |
| Voltage DC | 3.3 | 5 | 5.5 | Volts |
| Current DC | - | - | 0.025 | Amps |

b. MECHANICAL SPECIFICATION

- Mechanical Dimensions of PCB are 26 x 40 x 12 mm (Length x Width x Height)
- For more details on dimension of the board shown in figure 2.

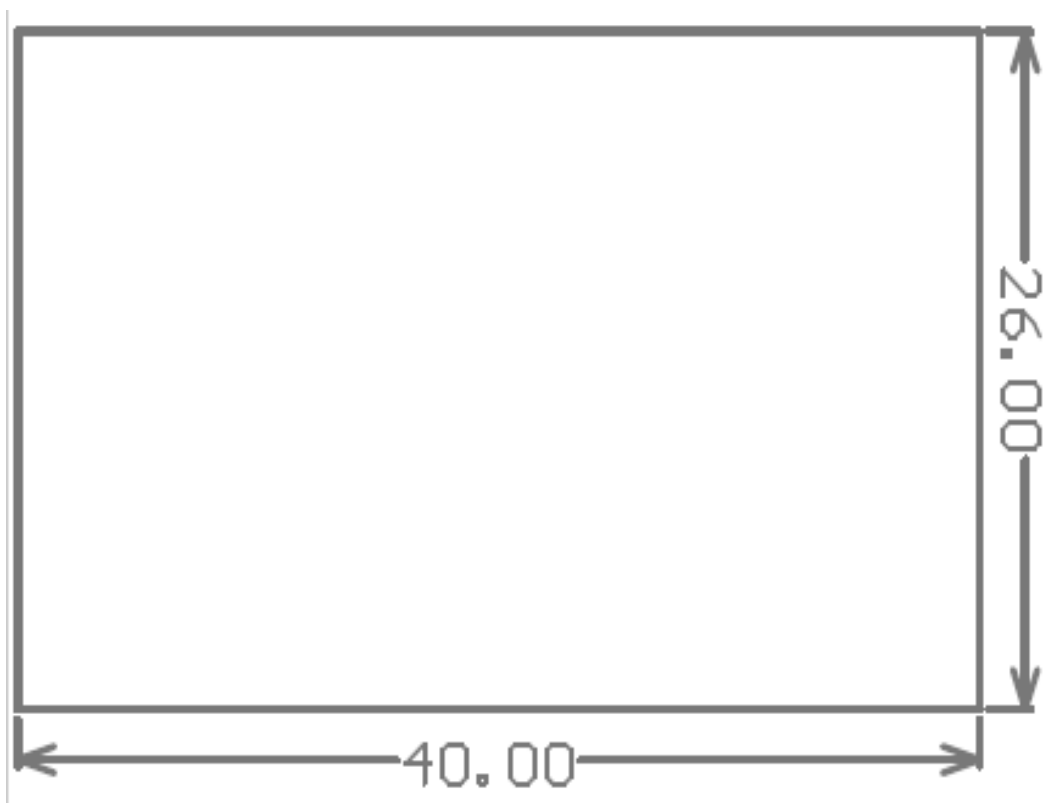


Figure 2: Board Dimensions

10. ELECTRICAL CONNECTIONS

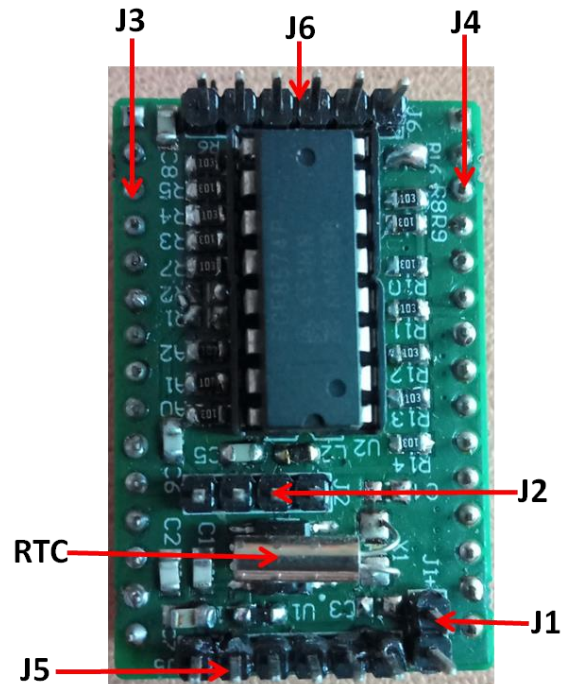


Figure 3: Header Details

Description of Headers shown in Figure 3:

1. J1 RTC Battery connector
2. J2 I2C Connector
3. J3 Node MCU header LHS (considering Antenna of ESP12 pointing towards top)
4. J4 Node MCU header RHS (considering Antenna of ESP12 pointing towards top)
5. J5 GPIO0 - GPIO3
6. J6 GPIO4 – GPIO7

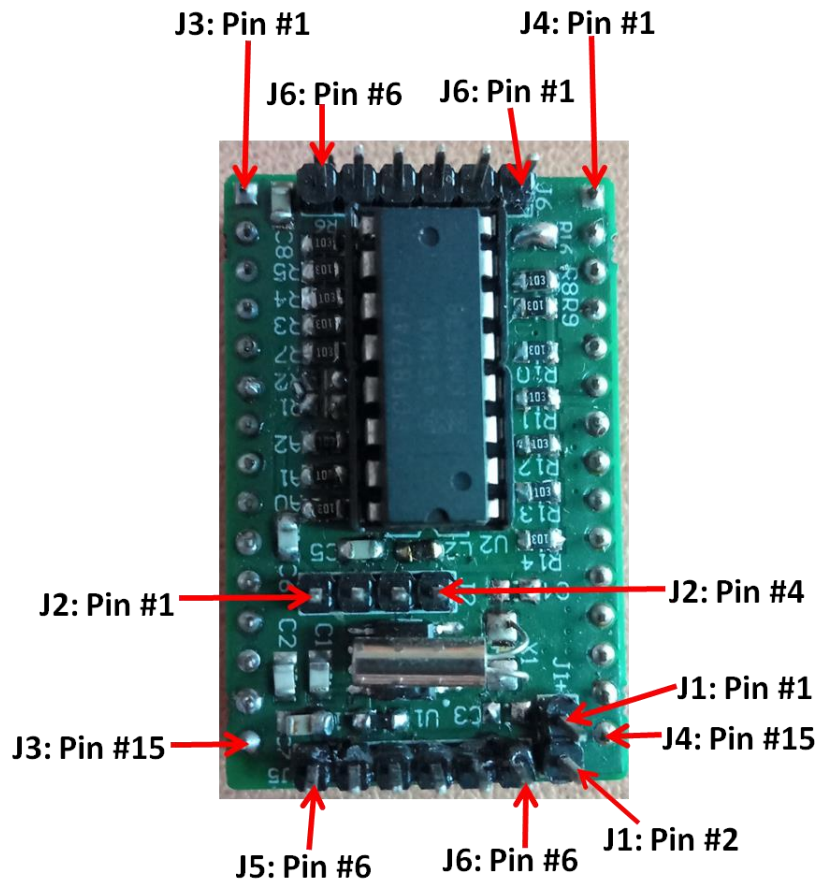


Figure 4: Header Pin number references

a. HEADER PIN CONFIGURATION

i. HEADER J1

| Header Pin | Pin Name |
|------------|----------|
| 1 | +ve |
| 2 | -ve |

Table 1: Battery Connector

ii. HEADER J2

| Header Pin Number | Pin Name |
|-------------------|-----------------|
| 1 | VCC_3V3 |
| 2 | DGND |
| 3 | GPIO2 / I2C_SCL |
| 4 | GPIO0 / I2C_SDA |

Table 2: Header J2 Pin Configuration

iii. HEADER J3

| Header Pin | Pin Name |
|------------|----------|
| 1 | - |
| 2 | - |
| 3 | - |
| 4 | - |
| 5 | - |
| 6 | - |
| 7 | - |
| 8 | - |
| 9 | - |
| 10 | DGND |
| 11 | VCC_3V3 |
| 12 | - |
| 13 | - |
| 14 | DGND |
| 15 | VCC_5V |

Table 3: Header J3 Pin Configuration

iv. HEADER J4

| Header Pin | Pin Name |
|------------|-----------------|
| 1 | - |
| 2 | GPIO5 |
| 3 | - |
| 4 | GPIO0 / I2C_SDA |
| 5 | GPIO2 / I2C_SCL |
| 6 | VCC_3V3 |
| 7 | DGND |
| 8 | - |
| 9 | - |
| 10 | - |
| 11 | - |
| 12 | - |
| 13 | - |
| 14 | DGND |
| 15 | VCC_3V3 |

Table 4: Header J4 Pin Configuration

b. GPIO HADERS OF I2C EXPANDER IC

i. HEADER J5

| Header Pin | Pin Name | Application |
|------------|----------|-------------|
| 1 | VCC_5V | - |
| 2 | P0 | GPIO |
| 3 | P1 | GPIO |
| 4 | P2 | GPIO |
| 5 | P3 | GPIO |
| 6 | DGND | - |

Table 5: Header J2 Pin Configuration

i. HEADER J6

| Header Pin | Pin Name | Application |
|------------|----------|-------------|
| 1 | VCC_5V | - |
| 2 | P4 | GPIO |
| 3 | P5 | GPIO |
| 4 | P6 | GPIO |
| 5 | P7 | GPIO |
| 6 | DGND | - |

Table 6: Header J6 Pin Configuration



DOCUMENT #: BA010

DOCUMENT REV: A

DOCUMENT NAME: DESIGN DESCRIPTION, I2C GPIO EXPANDER BOARD.

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