MB02A1 Hardware Requirements Specification

GOS2022

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Main Board Version 02, Revision A1

Version history

Version	Date	Author	Change	Released
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Chapter 1
Introduction

1. Purpose

The purpose of the development of Main Board 02 is to

- fix the known issues of MB01A1
- remove components that proved unnecessary to reduce cost and size
- add new features to the existing design
- improve already existing design

MB01A1 is obsolete (was a first prototype), therefore compatibility is not required. Components can be added and removed without restriction, however, re-use of already existing parts is highly recommended to save development time and effort, as well as to reduce the risk of design failures.

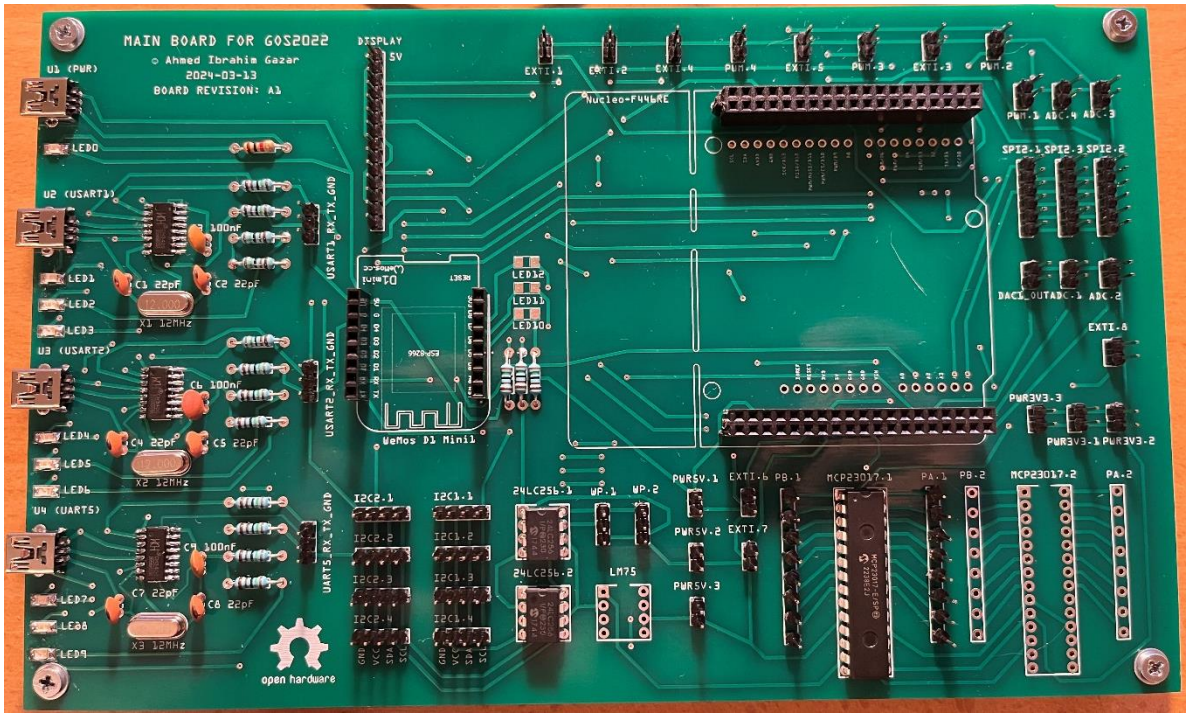

Figure 1: Half-assembled MB01A1 board

Chapter 2
Requirements

HWREQ.0001	Compatibility with Nucleo-64 boards

MB02A1 shall offer a Nucleo-64 compatible pin header connection for a processor board.

HWREQ.0002	Compatibility with WeMos D1 mini

MB02A1 shall offer a WeMos D1 mini compatible pin header connection for a WiFi board.

HWREQ.0003	Power supply

MB02A1 shall have a separate USB connector to have an external +5V (nominal) power input.

HWREQ.0004	Over-voltage protection

MB02A1 shall have an on-board over-voltage protection circuit that is activated at around +5.3V and shuts down the power line in case of over-voltage.

HWREQ.0005	Short-circuit protection

MB02A1 shall have a short-circuit protection on the power line that is activated at around 1A.

HWREQ.0006	Feedback LEDs

MB02A1 shall feature 3 LEDs:

- One green LED that indicates that the board is powered without any problems
- One red LED that indicates an over-voltage error
- One red LED that indicates a short-circuit error

HWREQ.0007	On-board UART-USB converters

MB02A1 shall feature 3 on-board UART-USB converter circuits that are connected to certain UART lines of the processor board. The USB lines shall be available via USB connectors on the board.

HWREQ.0008	On-board I/O extender

MB02A1 shall feature 2 on-board I/O extender circuits. One shall be for internal use of the board, and one shall be user-accessible (via pin headers).

HWREQ.0009	On-board EEPROM

MB02A1 shall have an on-board EEPROM memory chip with at least 32KB storage.

HWREQ.0010	On-board I2C bus connection

MB02A1 shall have 4-4 pin headers for two separate I2C lines to allow for user-connection.

(VCC, GND, SCL, SDA).

HWREQ.0011	On-board SPI bus connection

MB02A1 shall have 3 pin headers for one SPI line to allow for user-connection.

(VCC, GND, CS, MOSI, MISO, SCK).

HWREQ.0012	On-board EXTI connection

MB02A1 shall have 4 pin headers for external interrupts (EXTI, GND).

HWREQ.0013	On-board ADC connection
MB02A1 shall have 4 pin headers for analogue input connection (ADC, GND).	

HWREQ.0014	On-board PWM connection
MB02A1 shall have 4 pin headers for PWM output connections (PWM, GND).	

HWREQ.0015	On-board DAC connection
MB02A1 shall have 1 pin header for DAC output connection (DAC, GND).	

HWREQ.0016	On-board +5V connection
MB02A1 shall have 2 pin headers for +5V output connection (5V, GND).	

HWREQ.0017	On-board +3.3V connection
MB02A1 shall have 2 pin headers for +3.3V output connection (3V3, GND).	

HWREQ.0018	On-board display connection
MB02A1 shall have 1 pin header to allow for TFT display connection (VCC, GND, SPI_CS, DISPL_RST, DISPL_DC, SPI_MOSI, SPI_SCK, DISPL_BLIGHT, DISPL_TCS, DISPL_IRQ).	

HWREQ.0019	Connection between processor board and WiFi board
The processor board and the WiFi board shall be connected via USB.	

HWREQ.0020	Periphery power line control

The power line shall be controllable (on/off) by the processor board through switch circuits for the following peripheries:

- On-board I/O extender via an MCU I/O pin directly (1)
- Each I2C connector pin header via the I/O extender (8)
- Each SPI connector pin header via the I/O extender (3)
- WiFi board via the I/O extender (1)
- Display connector pin header via the I/O extender (1)
- Both +5V power outputs (2)
- One of the +3V3 power outputs (1)

Note: Therefore, the total number of controlled power lines is 17 out of which 1 is controlled directly by the MCU and 16 are controlled through the I/O extender chip.

HWREQ.0021	Use of SMD components

Except for connectors, all components shall be surface mounted (except if the given part only has a through-hole variant).

HWREQ.0022	Labels on the PCB

The final PCB shall contain meaningful labels for each LED and connector pin. Labels for integrated circuits can be hidden under the parts (only to help assembling) or left out.

The PCB shall display the following information:

- Name of the board (MB02A1)
- Names of designers (including everyone that participated from requirement level to PCB design at any stage)
- Date of PCB design (date when the final gerber files are generated in yyyy-MM-dd format)
- Open hardware logo

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