ESP32-SBC-FabGL

User Manual

olimex.com

Rev.2.0   April 2024

Table of Contents

Introduction to ESP32-SBC-FabGL

ESP32-SBC-FabGL is Open Source Hardware board designed to work with FabGL library.
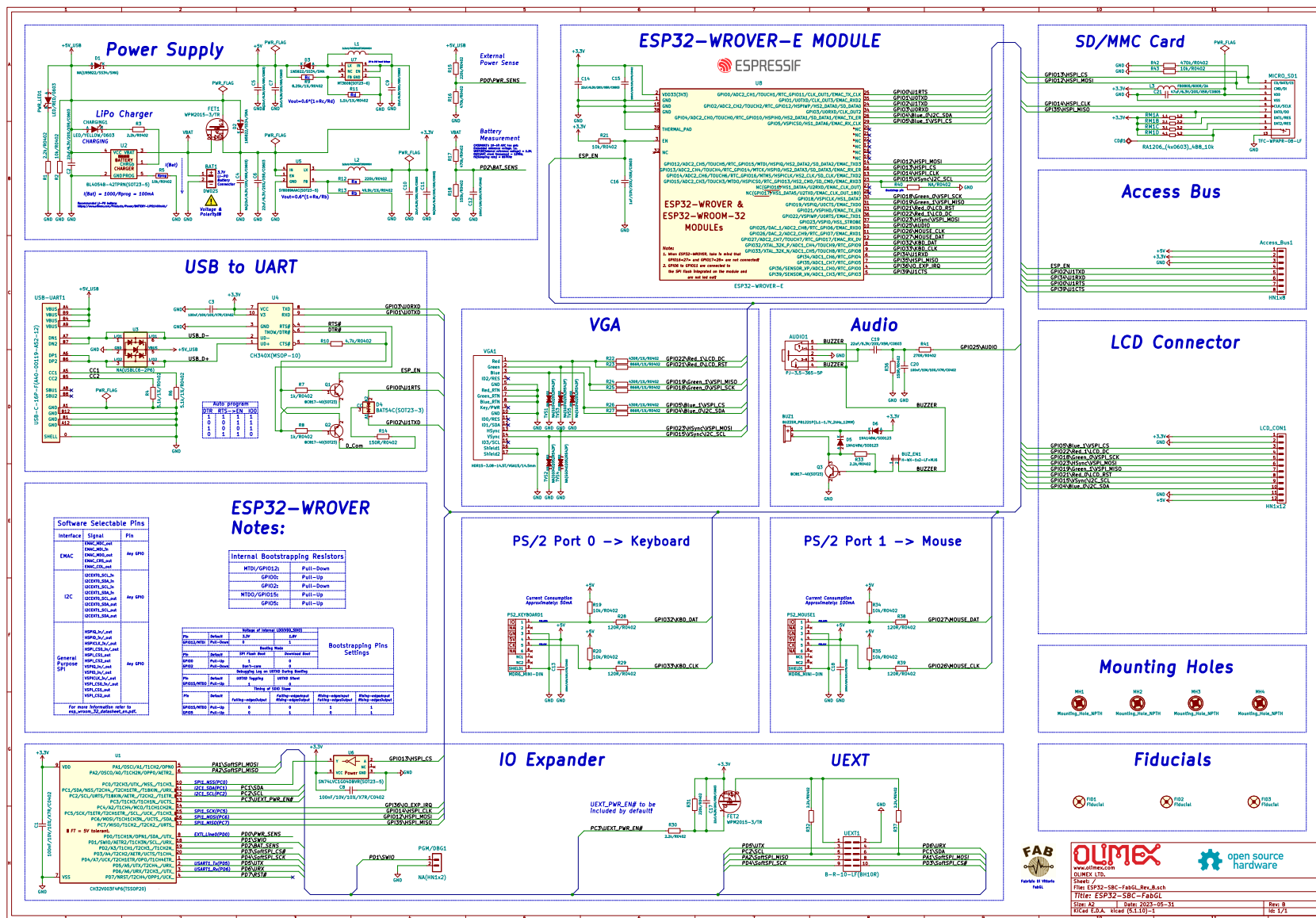
It has these features:

- ESP32-WROVER-E module

- VGA connector

- PS2 keyboard connector

- PS2 mouse connector

- Buzzer

- Audio 3.5mm connector

- AccessBus connector for Serial port master processor

- LCD connector (FabGL support LCD or VGA output)

- CH32V003 co-processor for UEXT port handling

- USB-C power and programming/debug connector

- SY8089A 3.3V 2A (3A peak) DCDC power supply

- Lipo charger and battery connector

- UEXT connector (pUEXT 1.0 mm step connector)

- Dimensions: (104 x 68)mm

Order codes for ESP32-SBC-FabGL and accessories

ESP32-SBC-FabGL   FabGL board with VGA keyboard mouse

BOX-ESP32-FabGL   Custom plastic box

CABLE-USB-A-C-1M   USB-C cable 1 meter

BATTERY-LIPO1400mAh   Lipo battery 3.7V 1400mAh

UEXT modules   There are temperature, humidity, pressure, magnetic field, light sensors. Modules with LCDs, LED matrix, Relays, Bluetooth, Zigbee, WiFi, GSM, GPS, RFID, RTC, EKG, sensors and etc.

HARDWARE

Power Supply

LiPo Charger

USB to UART

ESP32-WROVER-E MODULE

ESPRESSIF

ESP32-WROVER & ESP32-WROOM-32 MODULEs

ESP32-WROVER Notes:

SD/MMC Card

Access Bus

LCD Connector

VGA

Audio

PS/2 Port 0 -> Keyboard

PS/2 Port 1 -> Mouse

Mounting Holes

IO Expander

UEXT

Fiducials

ESP32-SBC-FabGL layout

VGA   Buzzer   Audio   PS2 keyboard   PS2 mouse

LiPo battery

ESP32-WROVER
4MB Flash
8MB PSRAM

LCD hat
connector

Access bus
Power and
UART with
flow control

ESP32-SBC-FabGL
Rev.A   (C) 2023

Buzzer enable

micro SD card   USB-C power and programming

UEXT with I2C SPI SERIAL

ESP32-SBC-FabGL schematic sources

ESP32-SBC-FabGL latest schematic is on GitHub

UEXT connector:

UEXT connector stands for Universal EXTension connector and contain +3.3V, GND, I2C, SPI, UART signals. UEXT connector can be in different shapes and sizes but the original UEXT connector is 0.1" 2.54mm step boxed plastic connector. All signals are at 3.3V levels.
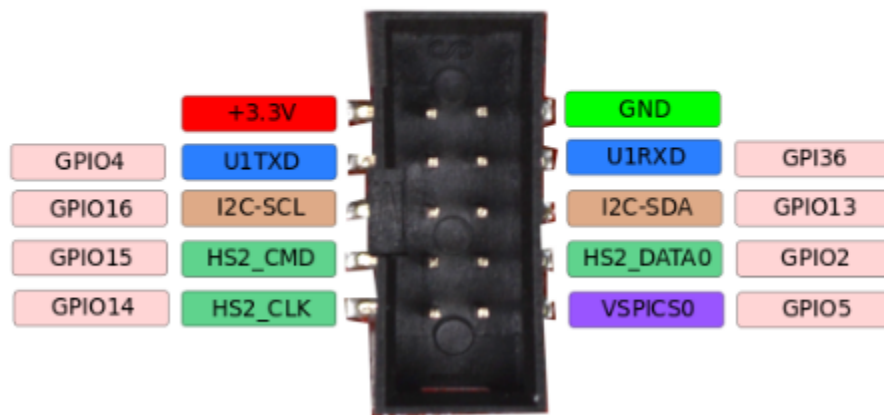
As the boards become smaller and smaller some smaller packages were introduced too beside the original UEXT connector

- mUEXT is 1.27 mm step boxed header connector which is with same layout as UEXT

- pUEXT is 1.0 mm single row connector (this is the connector used in RP2040-PICO30)

Olimex has developed number of MODULES with this connector. There are temperature, humidity, pressure, magnetic field, light sensors. Modules with LCDs, LED matrix, Relays, Bluetooth, Zigbee, WiFi, GSM, GPS, RFID, RTC, EKG, sensors and etc.

AccessBus connector:

Access Bus

```
                                                    Access_Bus1
                                          +5V ←        1
                                        +3.3V ←        2
                                          GND ◁        3
ESP_EN                                                 4
GPIO2\U1TXD                                            5
GPI34\U1RXD                                            6
GPIO0\U1RTS                                            7
GPI39\U1CTS                                            8
                                                    HN1x8
```
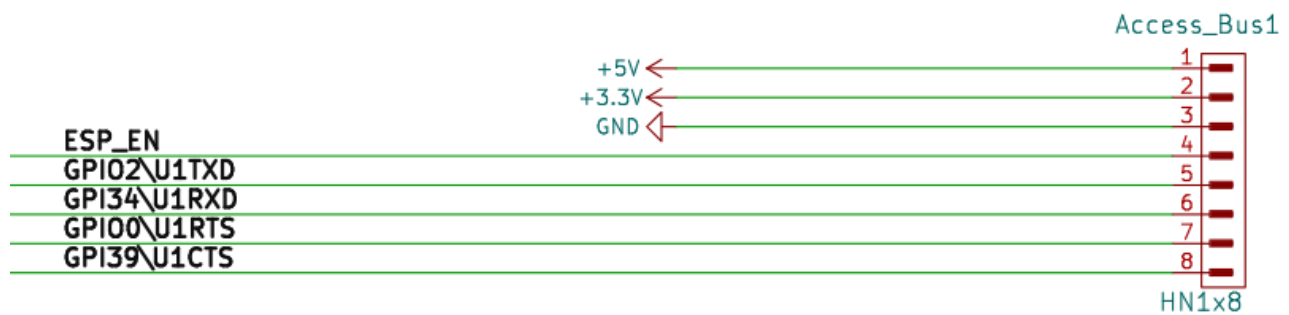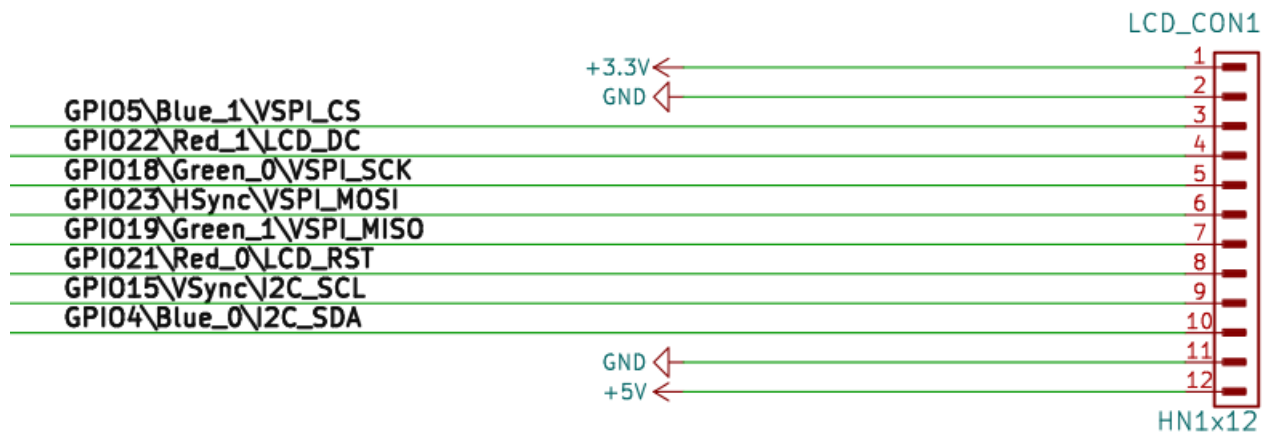
Pin1. is marked with a square pad, all others are round pads.

LCD hat connector:

LCD Connector

```
                                                              LCD_CON1
                                                                 1
                                             +3.3V ←              2
                                              GND  ←              3
          GPIO5\Blue_1\VSPI_CS                                    4
          GPIO22\Red_1\LCD_DC                                     5
          GPIO18\Green_0\VSPI_SCK                                 6
          GPIO23\HSync\VSPI_MOSI                                  7
          GPIO19\Green_1\VSPI_MISO                                8
          GPIO21\Red_0\LCD_RST                                    9
          GPIO15\VSync\I2C_SCL                                   10
          GPIO4\Blue_0\I2C_SDA                                   11
                                               GND ←             12
                                               +5V ←
                                                              HN1x12
```

Pin1. is marked with a square pad, all others are round pads.

SOFTWARE

ESP32-SBC-FabGL is tested and works with many projects, start with the Olimex fork of FabGL project: https://github.com/OLIMEX/FabGL

Also make sure to check these FabGL articles at our wordpress:

https://olimex.wordpress.com/2023/06/27/esp32-sbc-fabgl-update-now-you-can-play-invaders-with-wii-nunchuck-via-the-uext-port/

https://olimex.wordpress.com/2023/08/01/esp32-sbc-fabgl-how-to-work-with-the-expander-module-gpios-from-fabgl-library-and-apps/

https://olimex.wordpress.com/2023/05/31/zx-espectrum-emulator-tested-with-esp32-sbc-fabgl-the-mensch-computer-with-w65c256-got-vga-display-and-keyboard/

https://olimex.wordpress.com/2023/05/25/new-open-source-hardware-design-is-verified-esp32-sbc-fabgl-single-board-computer-based-on-fabgl-library-with-ps2-keyboard-mouse-and-vga-display-with-many-retro-computer-emulators/

Other projects that we haven't tested fully but should work:

https://github.com/uho/ESP32forthStation

https://github.com/OulanB/OricVGA32

https://github.com/guidol70/RunCPM_VGA32

https://github.com/EremusOne/ZX-ESPectrum-IDF

https://github.com/rpsubc8/ESP32TinyMCUMEesp81

https://github.com/rpsubc8/ESP32TinyNesMaster

https://github.com/rpsubc8/ESP32TinyZXSpectrum

https://github.com/rpsubc8/ESP32TinyFairChild

https://github.com/rpsubc8/ESP32TinyChip8

https://github.com/rpsubc8/ESP32TinyFake86

https://github.com/rpsubc8/ESP32TinyCPC

https://github.com/rpsubc8/ESP32TinyC64

Document revision History

Revision 1.0 May 2023

Revision 2.0 April 2024