

STMP15x-SOM

User's Manual

Document revision 1.3 April 2024

www.olimex.com

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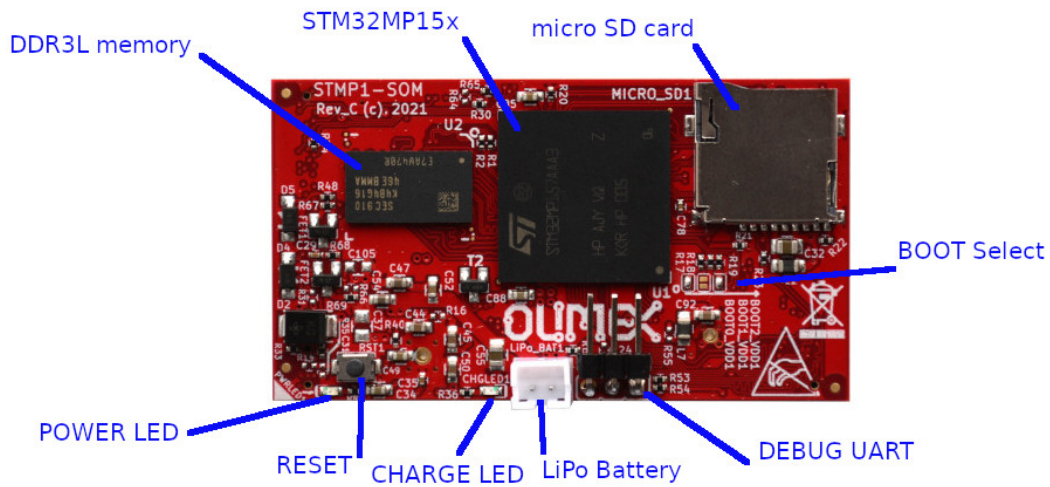
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Overview

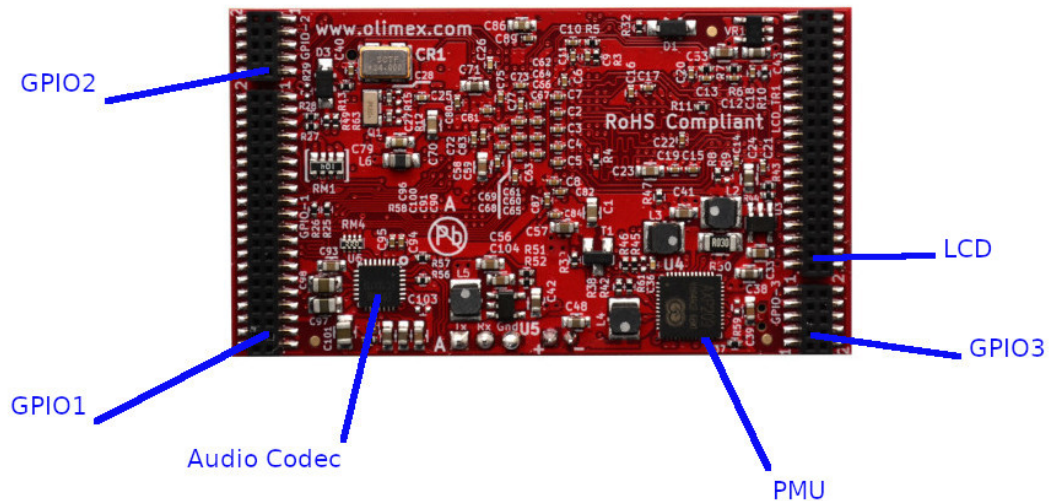
[STMP15x-SOM](#) is System On Module running Linux mainline Kernel and Uboot on ST Microelectronics industrial grade Dual Core Cortex-A7 ARM SOC.

It's pin to pin compatible to our [A13-SOM](#) System On Module.

Top view:



Bottom view:



General information

[STM32MP15X](#) SOC are Dual-core Arm Cortex-A7 running up to 800 MHz and Cortex-M4 at 209 MHz combined with a LCD interface, dedicated 3D graphics processing unit (GPU).

The system on modules are produced in:

- Commercial 0-70C temperature
- Extended (-EXT) -20+85C temperature with SOC working on 800Mhz
- Industrial (-IND) -45+85C temperature with SOC working on 650Mhz.

Order codes

[STMP151-SOM-256](#) commercial grade 0-70C SOM with STM32MP151 @650Mhz and 256MB of DDR3L RAM;

[STMP151-SOM-512-IND](#) industrial grade -40+85C SOM with STM32MP151 @650Mhz and 512MB of DDR3L RAM;

[STMP153-SOM-512-IND](#) industrial grade -40+85C SOM with STM32MP153 @650Mhz and 512MB of DDR3L RAM;

[STMP157-SOM-512-IND](#) industrial grade -40+85C SOM with STM32MP157 @650Mhz and 512MB of DDR3L RAM;

[STMP157-SOM-512-EXT](#) extended temp grade -20+85C SOM with STM32MP157 @800Mhz and 512MB of DDR3L RAM

STMP15x-SOM Features

- [STM32MP151/153/157](#) Dual Core Cortex-A7 @650-800Mhz + Cortex-M4 @209Mhz
- DDRL memory 256 or 512 MB
- Industrial grade -40+85C or Extended temperature -20+85C
- Power supply 5VDC
- AXP209 Power Management Unit (PMU) and LiPo battery charger
- Li-Po battery acts like UPS and keep SOC, Memory and PMU powered during 5V power failure protecting SD card and allowing safe power off if needed.
- High Speed USB 2.0 Host
- High Speed USB 2.0 OTG
- RESET button
- Debug UART console
- Audio Codec
- RGB LCD 40 pin connector compatible with LCD-OLinuXino displays
- GPIO-1 40 pin connector with 39 GPIOs, 3x UARTs, 1x QuadSPI, 2x I2C, 2x eMMC
- GPIO-2 10 pin connector with USB host, USB OTG, Audio mic, Audio HP, ADC
- GPIO-3 10 pin USB-OTG, SPI

Software

Olimex provides Linux images for STMP15x-SOM with mainline U-boot and Kernel.

With the presence of mainline Uboot and Linux Kernel any Linux distribution is possible to be build, but we decided to pre-build only Debian images (currently Debian 11 bullseye).

The pre-built images are hosted at:

<https://images.olimex.com/release/stm32-som/>

These images are extensively tested for all available variants of the boards. Most of the hardware is confirmed working with the official Linux images. The images use quite new kernels. You can also build your own Linux image, but please also make sure to first test on your own builds. We will provide technical support and work on reports for bugs only for our officially released images. If you build your own Linux image or distribution and something stopped working you are on your own to debug and fix the problem.

We recommend the official images to be written to SD card with minimum 16GB Class10 speed like:

<https://www.olimex.com/Products/Components/Storage/MICRO-SD-CLASS10/>

To write the images we recommend using balenaEtcher:

<https://www.balena.io/etcher/>

To build the mainline Uboot, Linux Kernel and the Linux images we use Buildroot script which is available on GitHub:

<https://github.com/OLIMEX/olimage>

Power supply

STMP15x-SOM requires +5V DC, 1A to operate.

Do not apply more than 5V, doing so would damage the STMP15x-SOM.

The power supply is provided on pin.1 of the LCD connector.

Power consumption is:

- around 0.2 A during boot
- around 0.4A when working at full speed
- around 1.0A when working at full speed and charge the LiPo battery

The boards might hang on power up if there is no delay between power down and power up. There should be at least a two-second gap before power up so the capacitors can discharge. If you expect sequences of power down and almost immediate followed up by a power up consider adding some external delay on the power circuit, or use a Li-Po battery as a back-up (to ensure the board never fully powers down).

Hardware components

In GitHub software folder there are 6 examples how to use the GPIOs, I2C, SPI (we add new library for this as otherwise you couldn't use the micro SD card as original Arduino library support just one SPI), CAN, UART, SD-card, LCD3310.

SOC

[STM32MP151](#) is Single core Cortex-A7 ARM running @650 Mhz with Cortex-M4 running @209Mhz

[STM32MP153](#) is Dual core Cortex-A7 ARM running @650 Mhz with Cortex-M4 running @209Mhz

[STM32MP157](#) is Dual core Cortex-A7 ARM running @650/800 Mhz with Cortex-M4 running @209Mhz

Memory

STMP15x-SOM can have 256 or 512MB DDR3L memory, powered with 1.35V, with 16 bit data bus width and running at 1066Mhz (533Mhz clock).

PMU

STMP15x-SOM have Power Management Unit based on AXP209 IC. It allow the power voltage to SOC core, peripherals, DDR3L memory and etc to be programmable via I2C. Special driver in Linux takes care for the different power modes.

USB

High Speed USB 2.0 Host and High Speed USB 2.0 OTG.

Display

RGB LCD display on LCD 40 pin connector, compatible with LCD-OLinuXino displays.

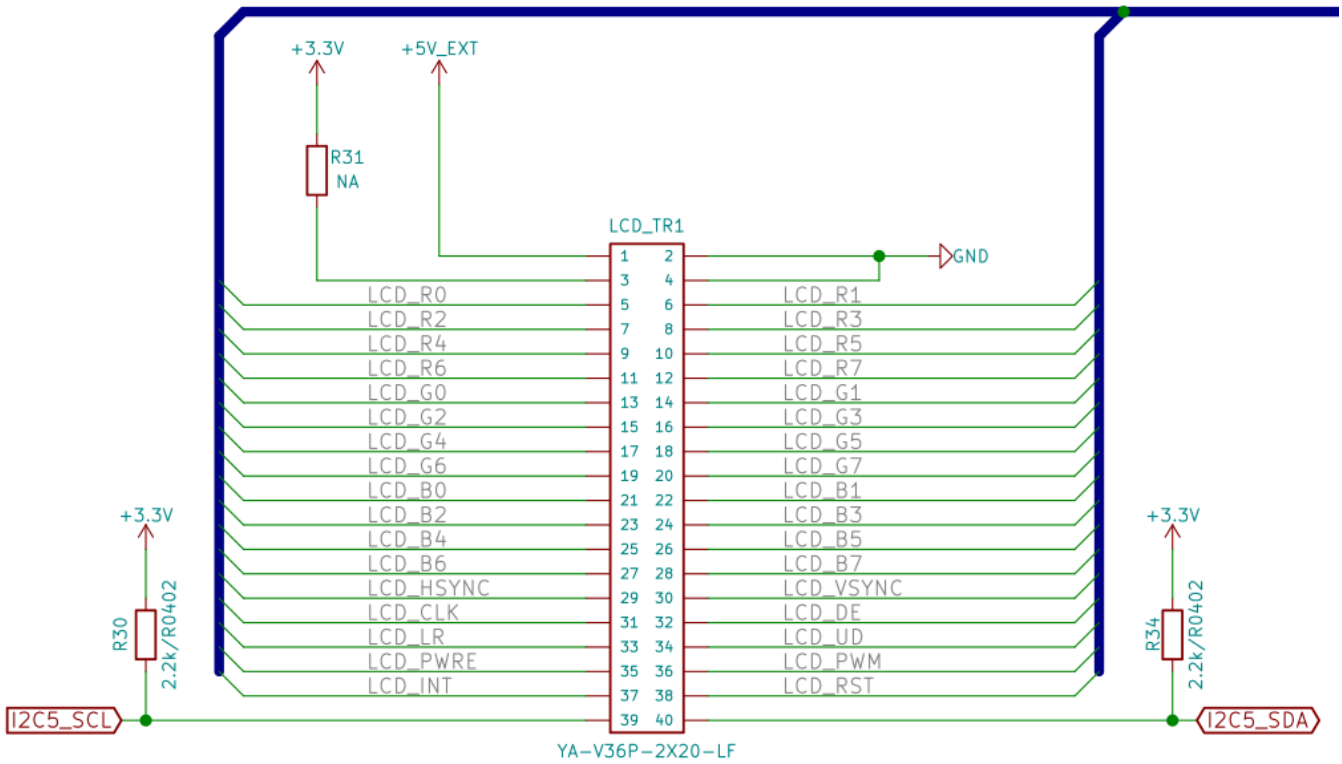
Audio

ES8388 Stereo Audio codec generates the audio output and takes care for microphone input.

Connectors

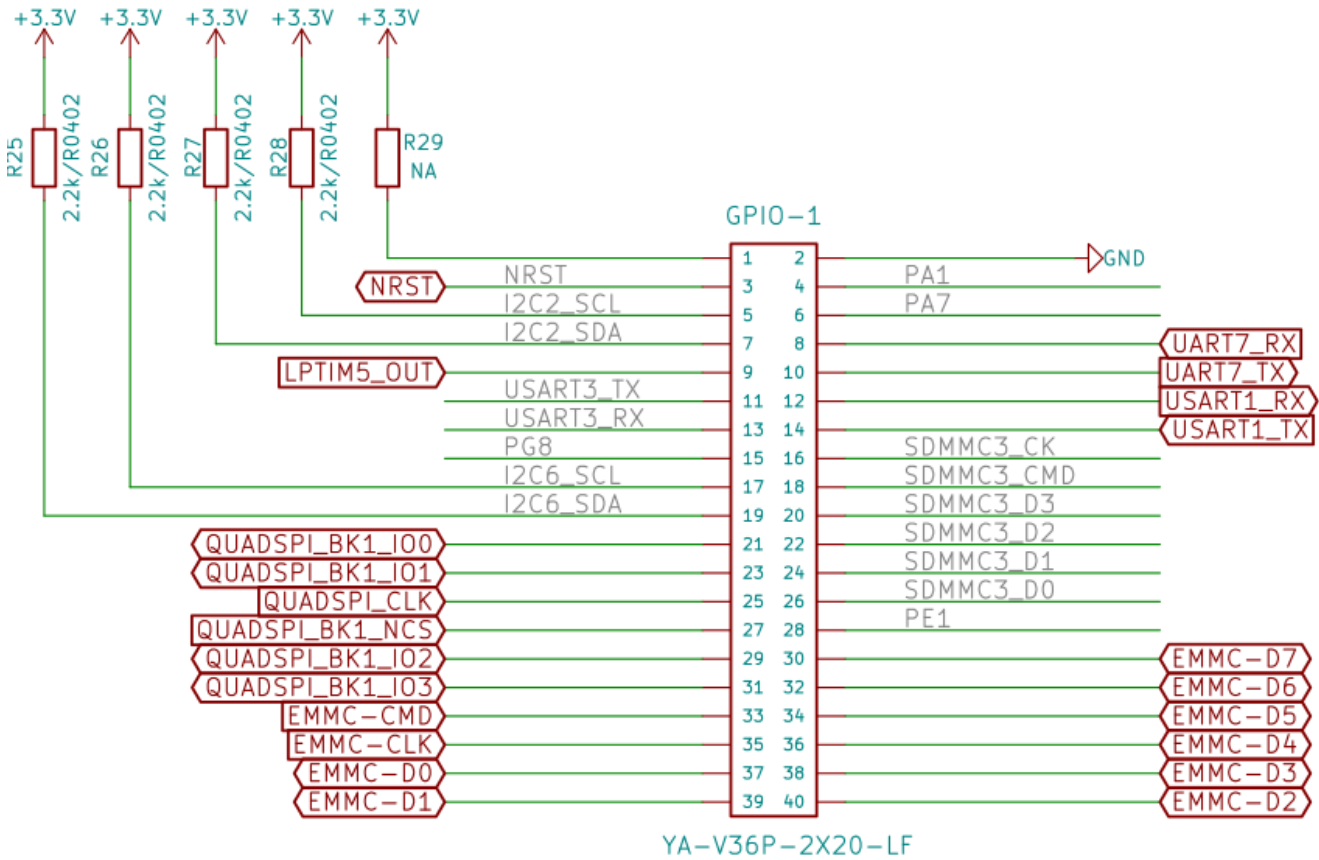
LCD

This connector is used to power supply the STM15x-SOM module with +5V, also it provides RGB LCD signals and I2C connector to digital touch panel interface.



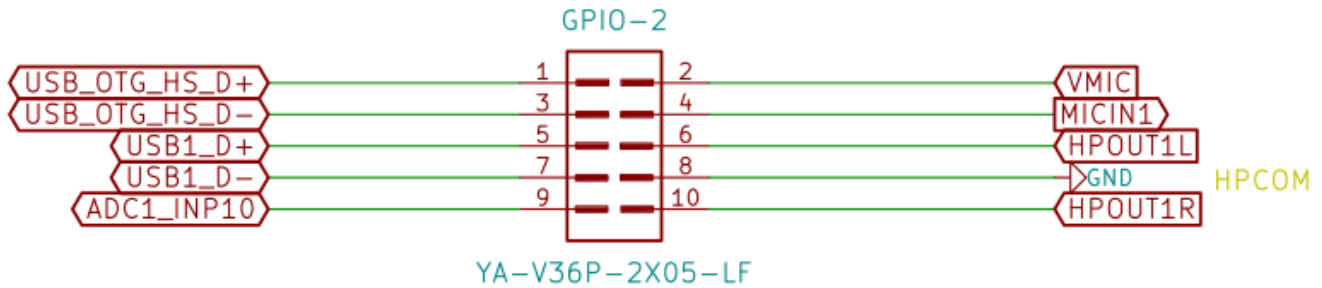
GPIO1

On GPIO1 connector are available NRST signal, 2x I2C interfaces, 3x UARTs, Quad SPI, eMMC memory, SDMMC card interface, 4x GPIOs:



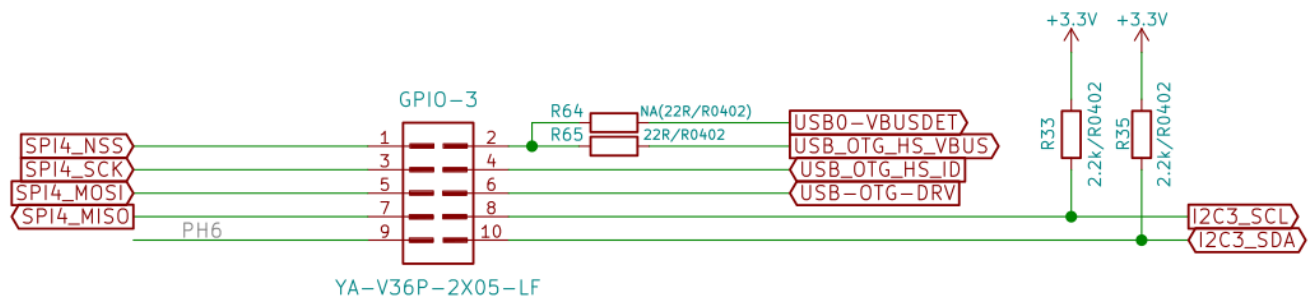
GPIO2

GPIO2 connector provides High Speed USB 2.0 Host, High Speed USB 2.0 OTG signals, Headphones, Microphone and ADC:



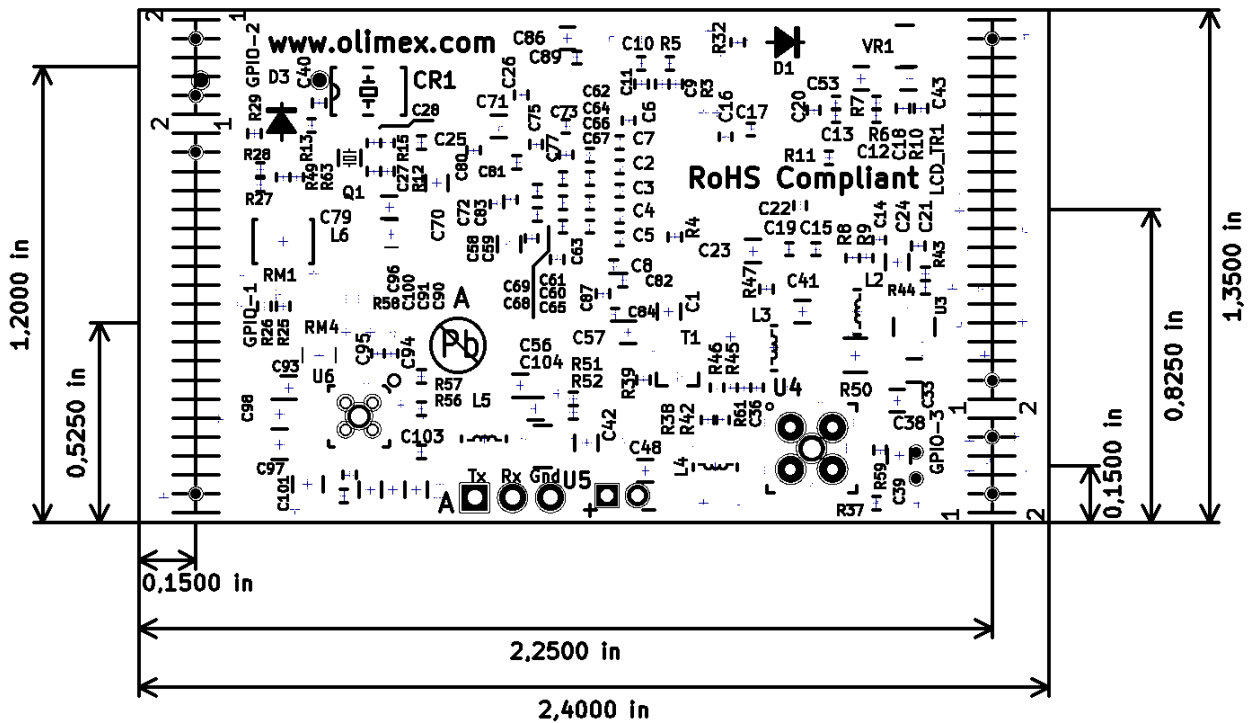
GPIO3

GPIO3 provide High Speed USB 2.0 OTG connector I2C and SPI signals:



Mechanical drawings

Bottom view:



Board dimensions are: 2.4 inch (60.96 mm) x 1.35 inch (34.29 mm).

The distance between the connectors is 2.1 inch (53.34 mm).

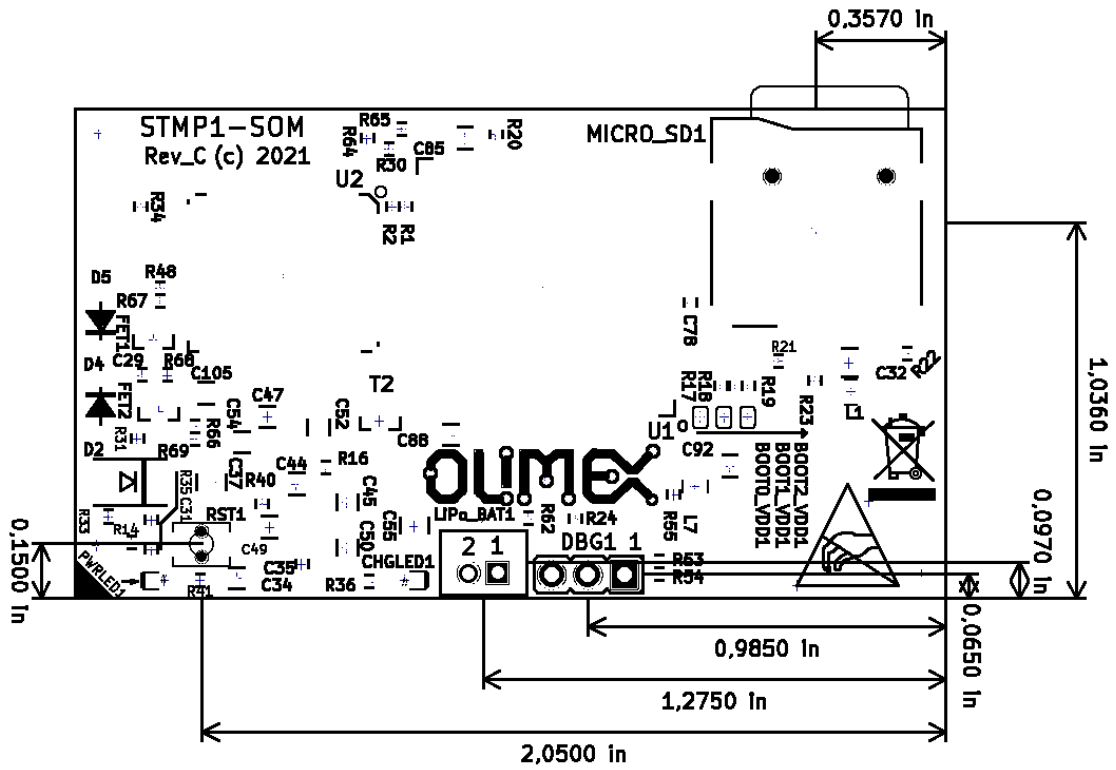
Connectors used for carrier board are 0.05 inch (1.27mm) step connectors:

[MALE-PAV16X-2x05-HIGH](#)

and

[MALE-PAV16X-2x20-HIGH](#)

Top view:



Document revision history

Revision 1.3 April 2024

- Added notice about the need of delay between power-ups

Revision 1.2 April 2023

- Fixed erroneous claims about Olimex-made Linux images

Revision 1.1 March 2023

- Fixed dimensions, fixed wrong download location link, improved document formatting

Revision 1.0 May 2021

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