

# 1.44inch LCD HAT for Raspberry Pi

## Specification

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- Operating voltage: 3.3V
- Interface: SPI
- LCD type: TFT
- Controller: ST7735S
- Resolution: 128\*128 (Pixel)
- Display size: 25.5\*26.5 (mm)
- Pixel size: 0.129 (W) \*0.219 (H) (MM)
- Dimension: 65 x 30.2(mm)

## Pinout

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| PIN            | Raspberry Pi Interface (BCM) | Description                        |
|----------------|------------------------------|------------------------------------|
| KEY1           | P21                          | KEY1GPIO                           |
| KEY2           | P20                          | KEY2GPIO                           |
| KEY3           | P16                          | KEY3GPIO                           |
| Joystick UP    | P6                           | Upward direction of the Joystick   |
| Joystick Down  | P19                          | Downward direction of the Joystick |
| Joystick Left  | P5                           | Left direction of the Joystick     |
| Joystick Right | P26                          | Right direction of the Joystick    |
| Joystick Press | P13                          | Press the Joystick                 |
| SCLK           | P11/SCLK                     | SPI clock line                     |
| MOSI           | P10/MOS                      | SPI data line                      |
| CS             | P8/CE0                       | Chip selection                     |
| DC             | P25                          | Data/Command control               |
| RST            | P27                          | Reset                              |
| BL             | P24                          | Backlight                          |

## LCD and the controller

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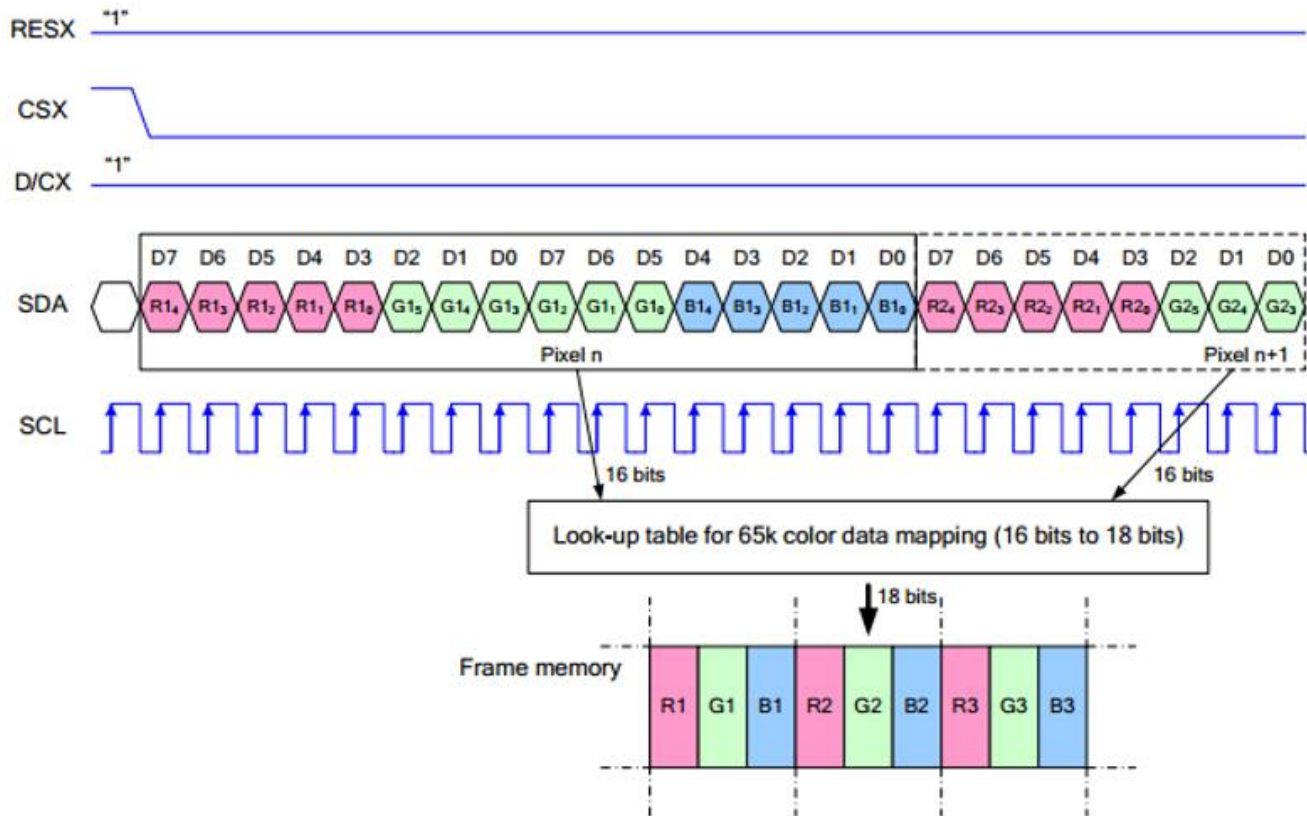
The ST7735S is a 132\*162 pixel LCD controller, but the pixel of the 1.44inch LCD HAT is 128\*128. So we have made some processing on the display: the horizontal direction starts from the second pixel, so that to guarantee the location of RAM in the LCD is consistent with the actual location at the same time.

This LCD accepts 8-bits/9-bits/16-bits/18-bits parallel interface, that are RGB444, RGB565, RGB666. The color format used in demo codes is RGB565.

This LCD use 4-lines SPI interface for reducing GPIO and fast speed.LCD

## Working Protocol

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Note: Different from the traditional SPI protocol, the data line from the slave to the master is hidden since the device only has display requirement.

RESX is the reset pin, it should be low when powering the module and be higher at other times; ;

CSX is slave chip select, when CS is low, the chip is enabled.

D/CX is data/command control pin, when DC = 0, write command, when DC = 1, write data

SDA is the data pin for transmitting RGB data, it works as the MOSI pin of SPI interface;

SCL works as the SCLK pins of SPI interface.

SPI communication has data transfer timing, which is combined by CPHA and CPOL.

CPOL determines the level of the serial synchronous clock at idle state. When CPOL = 0, the level is Low. However, CPOL has little effect to the transmission.

CPHA determines whether data is collected at the first clock edge or at the second clock edge of serial synchronous clock; when CPHL = 0, data is collected at the first clock edge.

There are 4 SPI communication modes. SPI0 is commonly used, in which CPHL = 0, CPOL = 0.

## Enable SPI interface

- Open terminal, use command to enter the configuration page

```
sudo raspi-config
Choose Interfacing Options -> SPI -> Yes to enable SPI interface
```

## Resources

- [User Manual](#)
- [Schematic](#)

- [Display Desktop of Pi Study Manual](#)

## Demo

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- [Raspberry code](#)
- [Demo code](#)

## Datasheet

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- [ST7735S](#)