Senzooe 2.4 inch IPS LCD module 240 x 320 interface SPI drive ST7789

Senzooe 2.4 inch IPS LCD Module 240x320 SPI ST7789 User Manual

Model: 2.4 inch IPS LCD module 240 x 320 interface SPI drive ST7789

1. Introduction

This manual provides detailed instructions for the Senzooe 2.4 inch IPS LCD module, featuring a 240x320 resolution and an SPI interface driven by the ST7789 controller. This module is designed for integration into various embedded systems and DIY projects, offering a compact and vibrant display solution. Please read this manual thoroughly before installation and operation to ensure proper usage and optimal performance.

2. Features

- **Display Size:** 2.4 inch diagonal
- **Resolution:** 240 x 320 pixels
- **Display Type:** IPS LCD for wide viewing angles and consistent color reproduction
- **Interface:** Serial Peripheral Interface (SPI) for efficient data transfer
- **Driver IC:** ST7789
- **Compact Design:** Suitable for space-constrained applications

3. Package Contents

Please verify that all items are present and in good condition upon opening the package.

- 1 x Senzooe 2.4 inch IPS LCD Module (240x320, SPI, ST7789)
- *(Additional components such as connecting cables or documentation may vary by supplier)*

4. Pinout Description

Understanding the pin assignments is crucial for correct connection to your microcontroller or development board. Refer to the image below for pin identification.

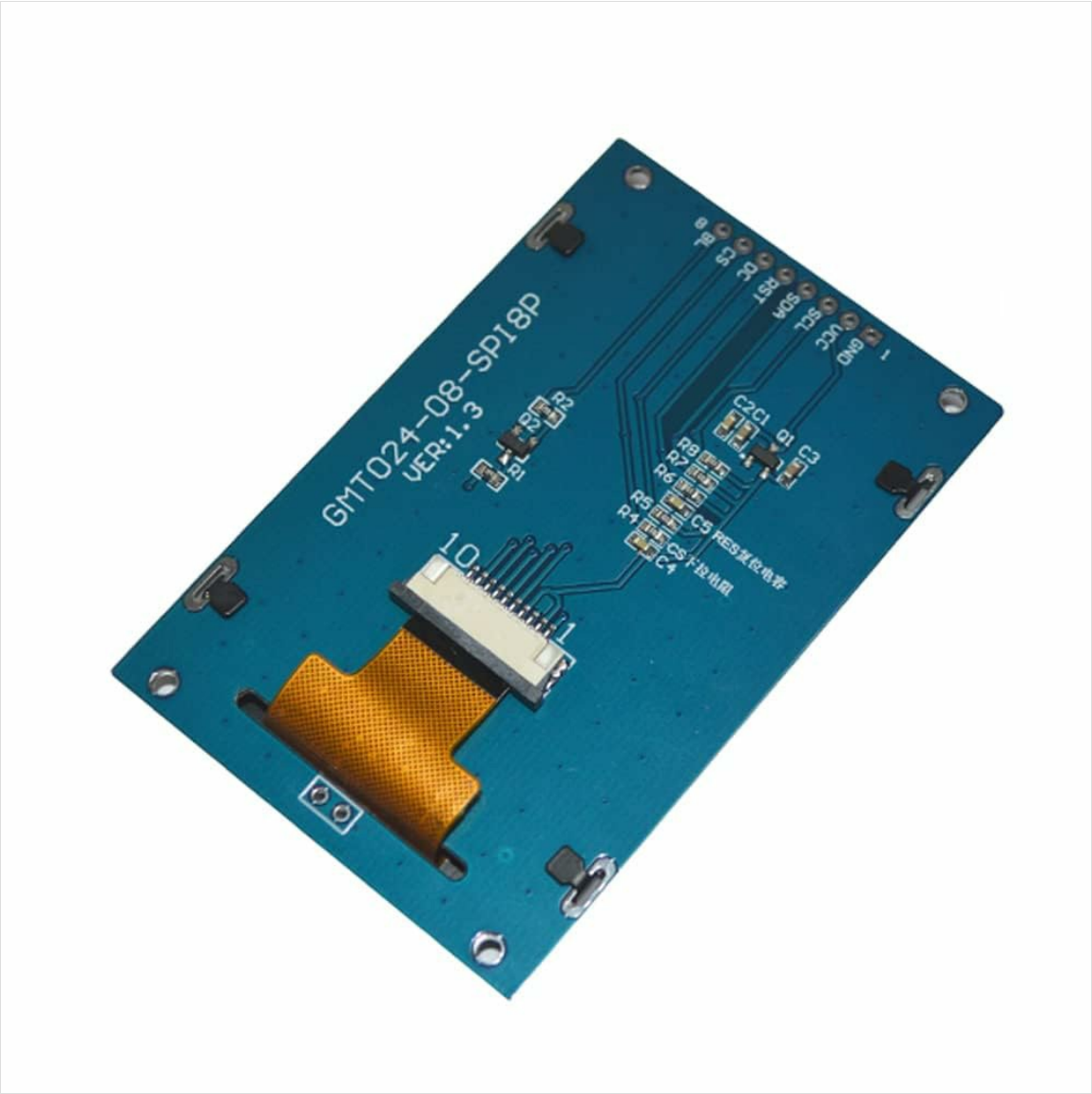

Figure 4.1: Rear view of the Senzooe 2.4 inch IPS LCD module, highlighting the pin header for electrical connections and the integrated circuit board.

Pin No.	Pin Name	Description
1	GND	Ground connection
2	VCC	Power supply (typically 3.3V or 5V, refer to specific module documentation)
3	SCL	SPI Clock Line
4	SDA	SPI Data Line (MOSI)
5	RES	Reset Pin (active low)
6	DC	Data/Command Selection Pin (High for Data, Low for Command)
7	CS	Chip Select Pin (active low)
8	BL	Backlight Control Pin (often PWM controllable)

Note: The exact voltage for VCC should be confirmed with the module's specific datasheet or supplier information. Incorrect voltage can damage the module.

5. Setup and Connection

This section outlines the general steps for connecting the LCD module to a microcontroller. Specific wiring may vary based on your chosen microcontroller and development board.

5.1. Required Materials

- Senzooe 2.4 inch IPS LCD Module
- Compatible Microcontroller (e.g., Arduino, ESP32, Raspberry Pi)
- Jumper Wires
- Breadboard (optional, for prototyping)
- Power Supply (matching VCC requirements of the module and microcontroller)

5.2. Wiring Instructions

1. **Power Connection:** Connect the **VCC** pin of the LCD module to the 3.3V or 5V output of your microcontroller (verify module's voltage requirement). Connect the **GND** pin to the ground of your microcontroller.
2. **SPI Connection:**
    - Connect LCD **SCL** to Microcontroller SPI Clock (SCK/CLK) pin.
    - Connect LCD **SDA** to Microcontroller SPI Data Out (MOSI) pin.
    - *Note: This module typically uses 4-wire SPI, so MISO is not usually connected unless reading data back from the display controller.*
3. **Control Pins:**
    - Connect LCD **RES** to a digital output pin on your microcontroller.
    - Connect LCD **DC** to a digital output pin on your microcontroller.
    - Connect LCD **CS** to a digital output pin on your microcontroller.
4. **Backlight Control:** Connect LCD **BL** to a digital output pin on your microcontroller. This pin can be connected to a PWM-capable pin for brightness control.

Always double-check your wiring before applying power to prevent damage to the module or microcontroller.

6. Operating Instructions

Operating the ST7789-based LCD module involves sending commands and data via the SPI interface. This typically requires a suitable library for your chosen microcontroller.

Figure 6.1: Front view of the Senzooe 2.4 inch IPS LCD module, showing the active display area rendering a sample image.

6.1. Software Setup

1. **Install Libraries:** For Arduino, popular libraries like Adafruit_GFX and Adafruit_ST7735/ST7789 are commonly used. For other platforms, search for ST7789 SPI display libraries.
2. **Initialize Display:** In your code, initialize the display by specifying the connected pins (CS, DC, RES, BL) and the SPI bus.
3. **Send Commands:** Use library functions to send initialization commands to the ST7789 controller. This typically involves setting display orientation, color mode, and other parameters.
4. **Draw Graphics:** Utilize the library's drawing functions (e.g., `drawPixel()`, `drawLine()`, `fillRect()`, `print()`) to render text, shapes, and images on the display.
5. **Update Display:** Some libraries buffer drawing operations and require a `display()` or `update()` call to push changes to the physical screen.

6.2. Basic Operations

- **Power On/Off:** Control the VCC line or use the software power-down commands if supported by the library.
- **Reset:** Toggle the RES pin low then high to reset the display controller. This is often part of the initialization sequence.
- **Backlight Control:** Adjust the brightness by sending a PWM signal to the BL pin.
- **Orientation:** Most libraries allow setting display orientation (portrait, landscape) through a simple

function call.

7. Maintenance and Care

Proper care and maintenance will extend the lifespan of your LCD module.

- **Handling:** Always handle the module by its edges. Avoid touching the display surface or the flexible flat cable (FPC) directly.
- **Cleaning:** Use a soft, lint-free cloth, slightly dampened with distilled water or an LCD-specific cleaning solution, to gently wipe the display surface. Do not use harsh chemicals, abrasive cleaners, or excessive pressure.
- **Storage:** Store the module in an anti-static bag in a cool, dry environment, away from direct sunlight and extreme temperatures.
- **Static Electricity:** Take precautions against electrostatic discharge (ESD) when handling the module. Use an ESD wrist strap and work on an ESD-safe surface.
- **Power Supply:** Ensure the power supply voltage is within the specified range to prevent damage.

8. Troubleshooting

If you encounter issues with your LCD module, refer to the following common problems and solutions.

- **No Display/Blank Screen:**
  - Check all power connections (VCC, GND) and ensure correct voltage.
  - Verify all SPI and control pin connections (SCL, SDA, RES, DC, CS) are correct and secure.
  - Ensure the backlight (BL) pin is correctly connected and receiving power or a control signal.
  - Confirm that the display initialization code is running correctly and without errors.
  - Try a different set of jumper wires or a different microcontroller if available.
- **Garbled or Incorrect Display:**
  - Check for correct SPI wiring, especially SDA (MOSI).
  - Ensure the correct display library for the ST7789 controller is being used.
  - Verify the display resolution and color mode settings in your code match the module's specifications.
  - Confirm that the DC (Data/Command) pin is correctly toggled for commands and data.
- **Display Not Responding:**
  - Ensure the CS (Chip Select) pin is correctly controlled (active low).
  - Check the RES (Reset) pin connection and ensure it's being properly pulsed during initialization.
  - Verify that the SPI clock speed is compatible with the module.
- **Backlight Not Working:**
  - Check the BL pin connection.
  - Ensure the BL pin is receiving a high signal or a PWM signal if brightness control is desired.

9. Specifications

Parameter	Value

Parameter	Value
Display Size	2.4 inches (diagonal)
Resolution	240 x 320 pixels
Display Type	IPS LCD
Driver IC	ST7789
Interface	4-wire SPI
Operating Voltage (VCC)	Typically 3.3V (*Refer to specific module datasheet for exact range*)
Viewing Angle	Wide (due to IPS technology)
Manufacturer	Senzooe

10. Warranty and Support

10.1. Limited Warranty

This Senzooe product is covered by a limited warranty against defects in materials and workmanship for a period of *[e.g., one year]* from the date of purchase. This warranty does not cover damage caused by improper installation, misuse, unauthorized modification, or natural disasters. Proof of purchase is required for all warranty claims.

10.2. Technical Support

For technical assistance, troubleshooting, or inquiries regarding this product, please contact your retailer or the manufacturer directly. When contacting support, please provide your product model number and a detailed description of the issue.