ESK32-A2A31 2.8 Inch TFT LCD Module User Manual

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1 Introduction

The ESK32-A2A31 TFT LCD Module is designed for the HT32 series expansion board. It supports SPI and EBI communication interfaces. The ESK32-A2A31 hardware and software can be used with the ESK32-20001/ESK32-21001 and the HT32 firmware library, providing users with a complete development environment with which to learn how to use the EBI and SPI interfaces.

Specifications:

- Use Himax's TFT LCD driver IC: HX8347-I (T)
- 2.8 inch TFT LCD with 65 K colours and 320×240 resolutions
- Supports SPI and EBI interfaces

2 Hardware Layout

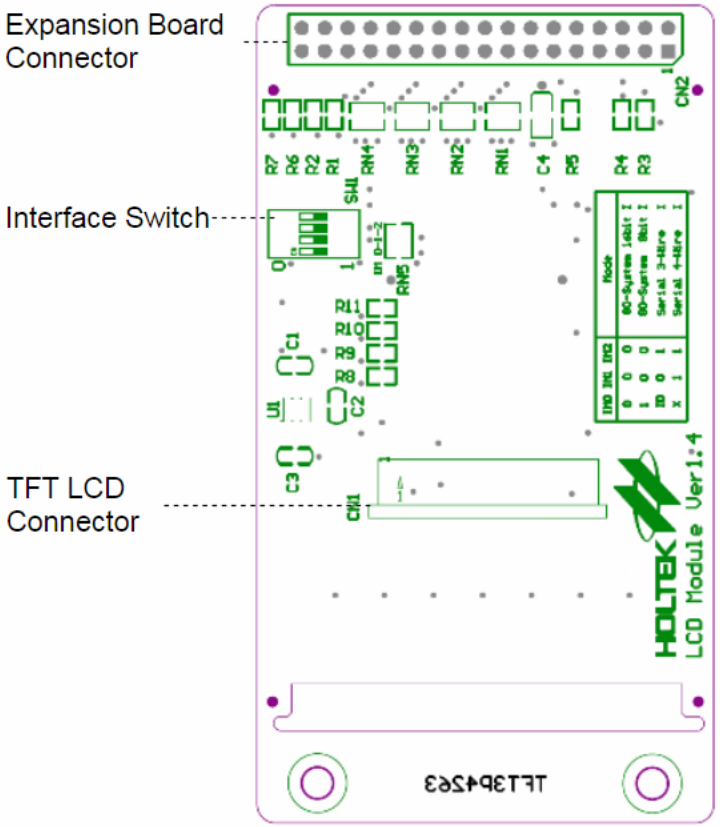


Figure 1. TFT LCD Module Layout

Communication Interface Switch – SW1

Table 1. Communication Interface Switch SW1

Switch No.				Description
1	2	3	4	
0	0	0	x	8080 MCU 16-bit parallel
1	0	0	x	8080 MCU 8-bit parallel
ID	0	1	x	3-wire serial interface
x	1	1	x	4-wire serial interface

x: Don't care

Extension Connector – CN2

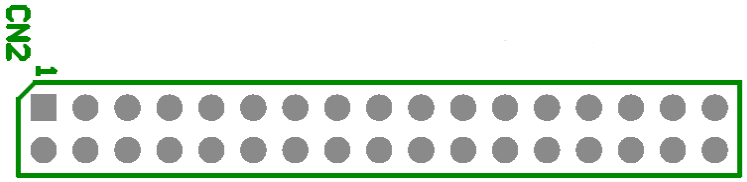


Figure 2. Extension Connector CN2

Table 2. Extension Connector CN2

Pin No.	Description	Pin No.	Description
1	VDD5	2	GND
3	BL_EN	4	NC
5	NC	6	WR/SCL
7	MISO	8	MOSI
9	/CS	10	NC
11	NC	12	/Reset
13	GND	14	VDD33
15	PD0	16	PD1
17	PD2	18	PD3
19	PD4	20	PD5
21	PD6	22	PD7
23	PD8	24	PD9
25	PD10	26	PD11
27	PD12	28	PD13
29	PD14	30	PD15
31	PD16	32	PD17
33	/RD	34	RS

3 Using the Module

Tool Preparation

Users need to prepare the HT32 Series expansion board (ESK32-2x001) and the Starter Kit (ESK32-30xxx)

LCD Module Setting

Before adjusting the communication interface using SW1, refer to the following descriptions and figure 3 for the LCD module setting details.

If the MCU uses the EBI interface to drive the LCD module, the LCD module should be selected to be in the EBI mode by switching SW1 of the LCD module to “0000” (default setting).

If the MCU uses the SPI interface to drive the LCD module, the LCD module should be selected to be in the SPI mode by switching SW1 of the LCD module to “0010”.

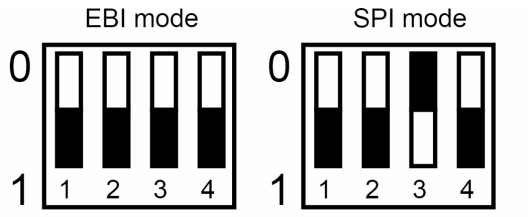


Figure 3. LCD Module Communication Interface Setting

Expansion Board Setting

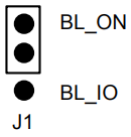
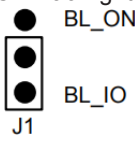
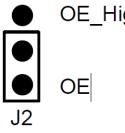
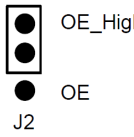
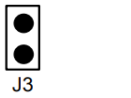
The expansion board settings, J1, J2 and J3 are associated with the LCD module, refer to table 3 for more details. Refer to the “ESK32-2x001 Expansion Board User Manual” for details on using this expansion board.

J1: This is used to select whether the LCD Backlight is controlled by the MCU I/O pins or not. When the MCU I/O pins are insufficient, J1 can be switched to the BL_ON position, ensuring that the LCD Backlight is always on.

J2: This is used for the EBI interface read operation and determines the MCU EBI OE pin is connected to the nRD pin of the LCD module or not. When the LCD module needs to read back the registers or display the RAM, J2 should be switched to OE.

J3: If the MCU supports the EBI interface, then J3 should be open, otherwise J3 should be shorted.

Table 3. Expansion Board EBI Interface Switches

Jumpers	Descriptions
J1	LCD Backlight will always be on 
	LCD Backlight controlled by I/O pin 
J2	The LCD module nRD pin is switched to the EBI OE pin 
	The LCD module nRD pin is switched to a fixed pull high 
J3	Short: LCD SPI mode 
	Open: LCD EBI mode 

Board Assembly

The HT32 series expansion board (ESK32-2x001) is connected to the Starter Kit and the 2.8 inch LCD module, as shown in figure 4.

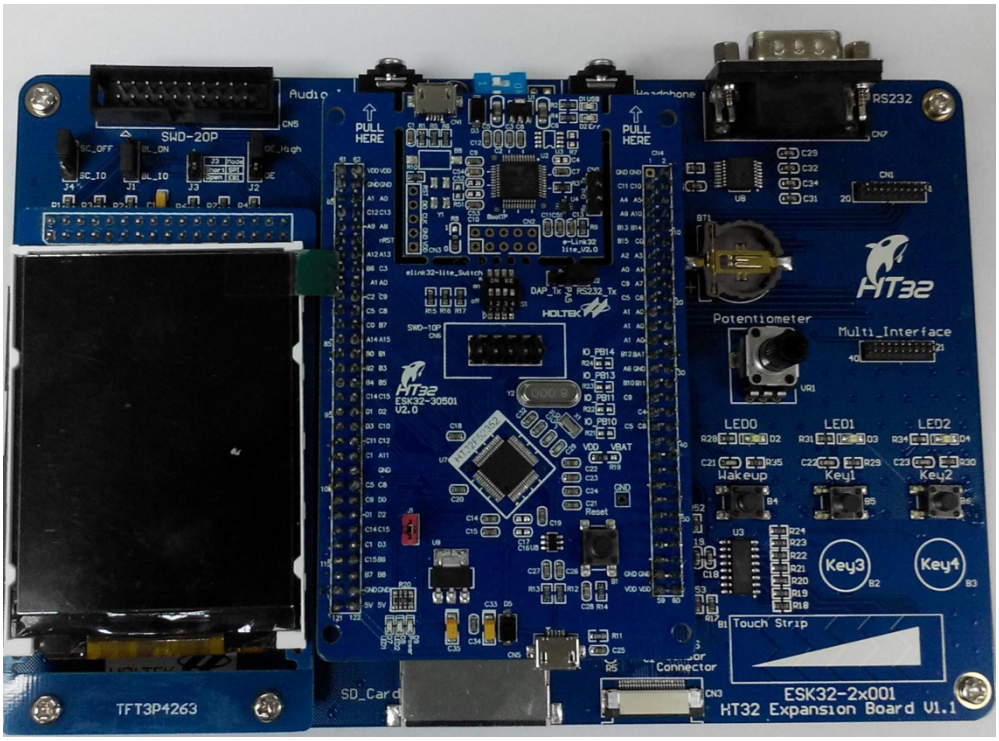


Figure 4. LCD Module + Expansion Board + Starter Kit

Obtain the Example Program

Download the latest Holtek HT32 Firmware Library. The download web link is shown in figure 5. Unzip the HT32 Firmware Library after downloading.

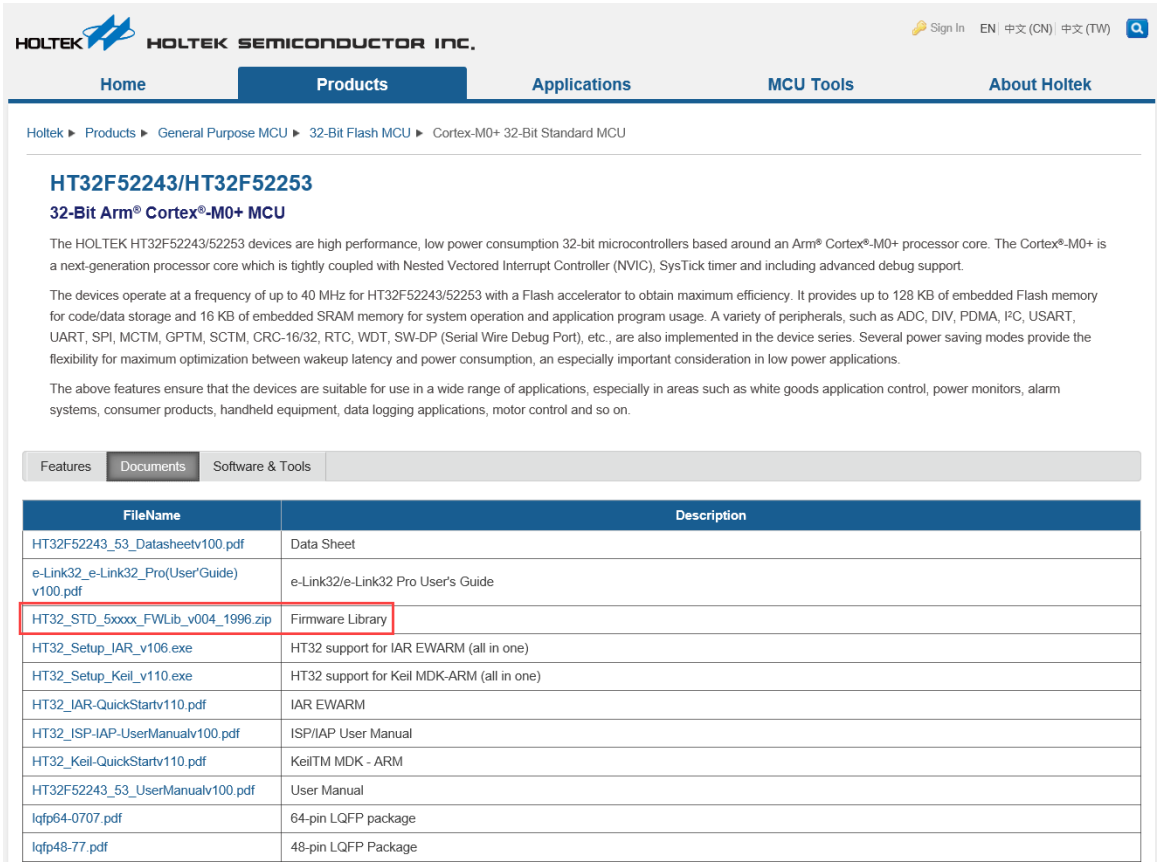


Figure 5. HT32 Firmware Library Download Web Link

Compile and Execute the Program

Open the LCD example project:

Keil: \example\LCD\LCD28\MDK_ARMvx\Project_xxxxx.uvprojx

IAR: \example\LCD\LCD28\EWARMvx\Project_xxxxx.eww

Compile and execute the LCD example program after which, “Holtek HT32 Series LCD Example” will appear on the LCD.

4 Schematics

This section shows the LCD module circuitry.

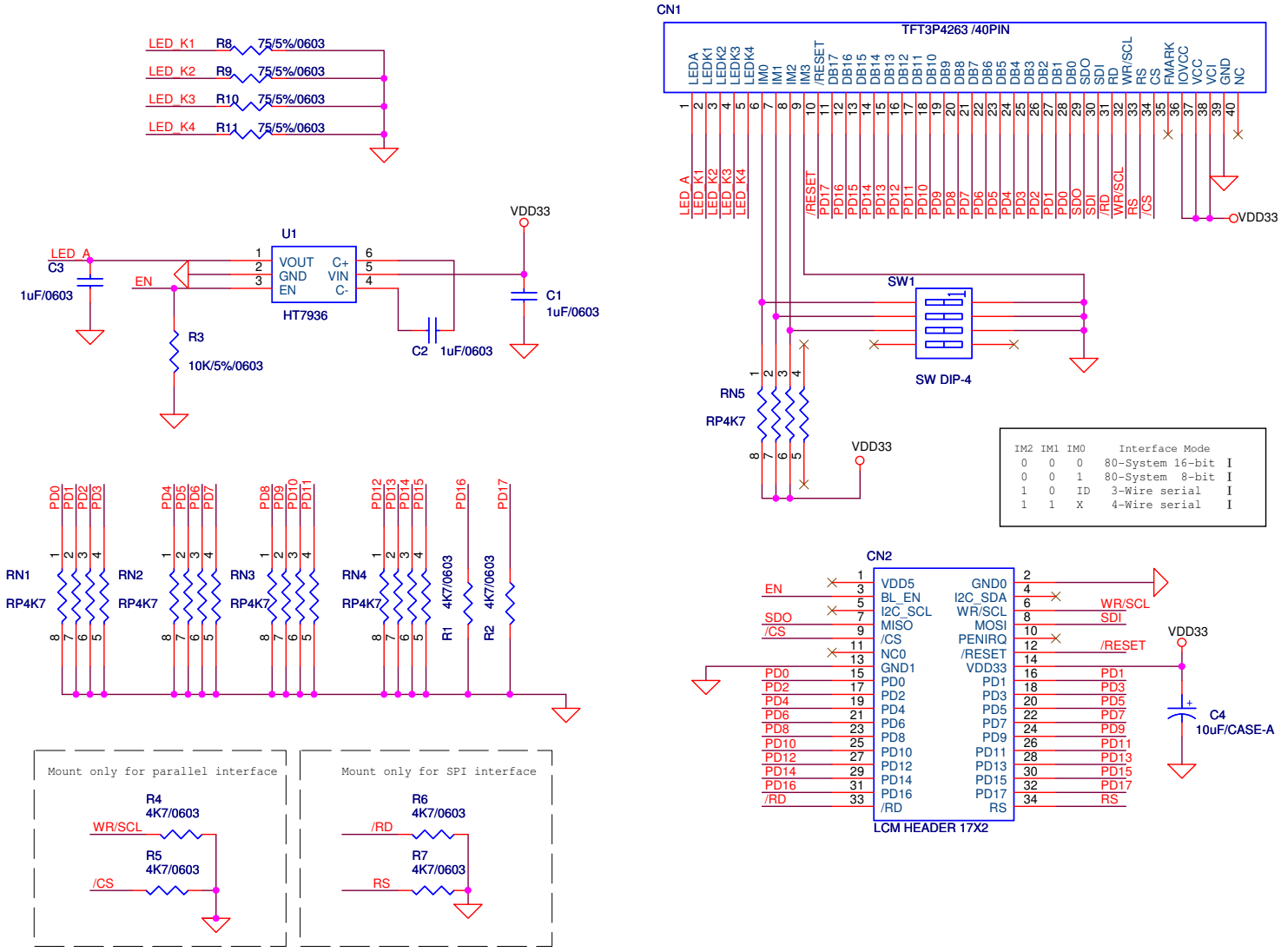


Figure 6. 2.8 Inches TFT LCD Module (ESK32-A2A31) Schematic