



ESK32-A2A31 2.8 Inch TFT LCD Module User Manual

Revision: V1.00 Date: February 02, 2018

www.holtek.com

Table of Contents

| | |
|----------------------------------------------|-----------|
| 1 Introduction | 5 |
| 2 Hardware Layout | 5 |
| Communication Interface Switch – SW1 | 6 |
| Extension Connector – CN2 | 6 |
| 3 Using the Module | 7 |
| Tool Preparation..... | 7 |
| LCD Module Setting..... | 7 |
| Expansion Board Setting | 7 |
| Board Assembly..... | 9 |
| Obtain the Example Program | 9 |
| Compile and Execute the Program..... | 10 |
| 4 Schematics | 10 |
| 2.8 Inches TFT LCD Module – ESK32-A2A31..... | 11 |

List of Tables

| | |
|------------------------------------------------------|---|
| Table 1. Communication Interface Switch SW1 | 6 |
| Table 2. Extension Connector CN2..... | 6 |
| Table 3. Expansion Board EBI Interface Switches..... | 8 |

List of Figures

- Figure 1. TFT LCD Module Layout 5
- Figure 2. Extension Connector CN2 6
- Figure 3. LCD Module Communication Interface Setting 7
- Figure 4. LCD Module + Expansion Board + Starter Kit 9
- Figure 5. HT32 Firmware Library Download Web Link 10
- Figure 6. 2.8 Inches TFT LCD Module (ESK32-A2A31) Schematic 11

List of Figures

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

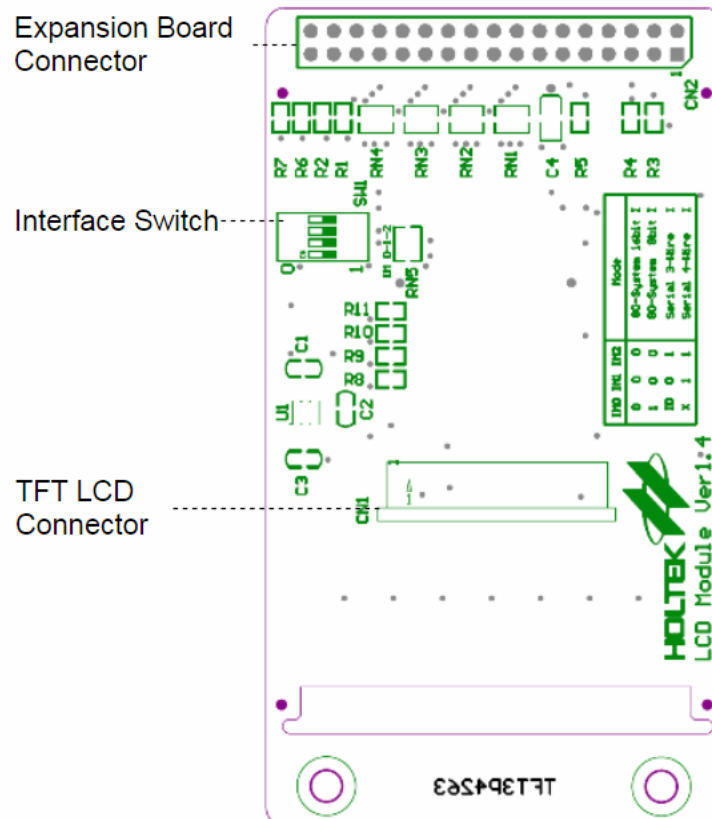


Figure 1. TFT LCD Module Layout

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

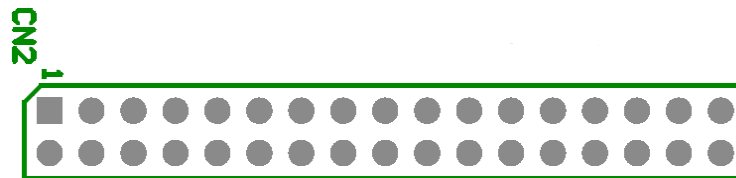


Figure 2. Extension Connector CN2

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”.

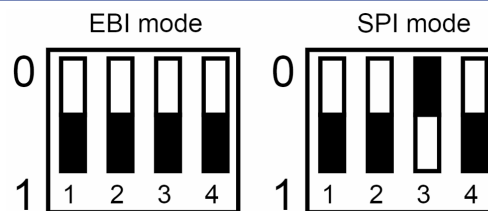


Figure 3. LCD Module Communication Interface Setting

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.

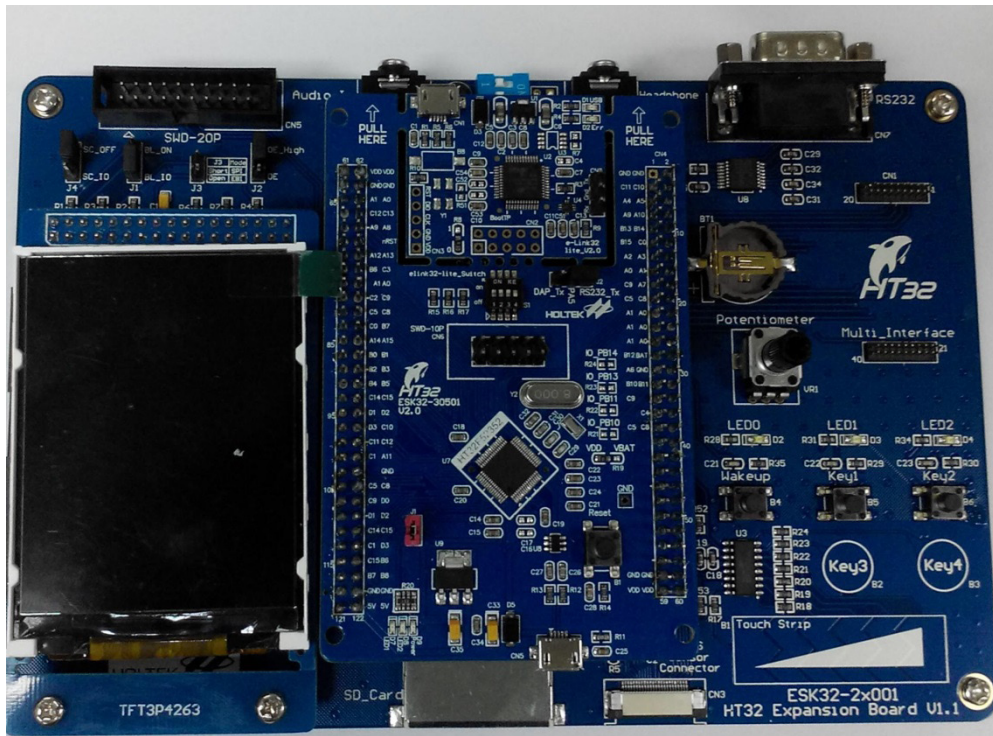
Table 3. Expansion Board EBI Interface Switches

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

Using the Module

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.

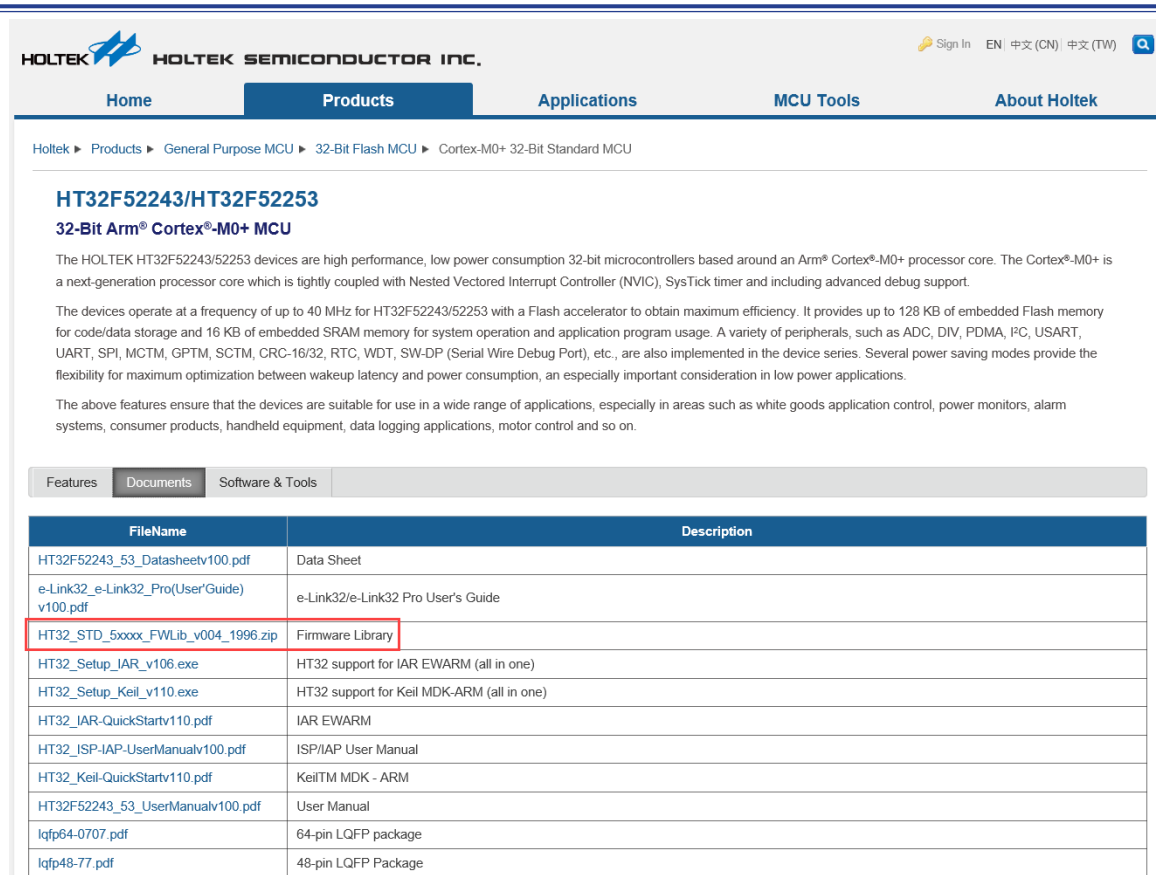


Using the Module

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.



HOLTEK SEMICONDUCTOR INC. Sign In EN 中文 (CN) 中文 (TW)

Home Products Applications MCU Tools About Holtek

Holtek > Products > General Purpose MCU > 32-Bit Flash MCU > Cortex-M0+ 32-Bit Standard MCU

HT32F52243/HT32F52253

32-Bit Arm® Cortex®-M0+ MCU

The HOLTEK HT32F52243/52253 devices are high performance, low power consumption 32-bit microcontrollers based around an Arm® Cortex®-M0+ processor core. The Cortex®-M0+ is a next-generation processor core which is tightly coupled with Nested Vectored Interrupt Controller (NVIC), SysTick timer and including advanced debug support.

The devices operate at a frequency of up to 40 MHz for HT32F52243/52253 with a Flash accelerator to obtain maximum efficiency. It provides up to 128 KB of embedded Flash memory for code/data storage and 16 KB of embedded SRAM memory for system operation and application program usage. A variety of peripherals, such as ADC, DIV, PDMA, PC, USART, UART, SPI, MCTM, GPTM, SCTM, CRC-16/32, RTC, WDT, SW-DP (Serial Wire Debug Port), etc., are also implemented in the device series. Several power saving modes provide the flexibility for maximum optimization between wakeup latency and power consumption, an especially important consideration in low power applications.

The above features ensure that the devices are suitable for use in a wide range of applications, especially in areas such as white goods application control, power monitors, alarm systems, consumer products, handheld equipment, data logging applications, motor control and so on.

Features Documents Software & Tools

| FileName | Description |
|---------------------------------------------|--------------------------------------------|
| HT32F52243_53_Datasheetv100.pdf | Data Sheet |
| e-Link32_e-Link32_Pro(User's Guide)v100.pdf | e-Link32/e-Link32 Pro User's Guide |
| HT32_STD_5xxxx_FWLib_v004_1996.zip | Firmware Library |
| HT32_Setup_IAR_v106.exe | HT32 support for IAR EWARM (all in one) |
| HT32_Setup_Keil_v110.exe | HT32 support for Keil MDK-ARM (all in one) |
| HT32_IAR-QuickStartv110.pdf | IAR EWARM |
| HT32_ISP-IAP-UserManualv100.pdf | ISP/IAP User Manual |
| HT32_Keil-QuickStartv110.pdf | KeilTM MDK - ARM |
| HT32F52243_53_UserManualv100.pdf | User Manual |
| lqfp64-0707.pdf | 64-pin LQFP package |
| lqfp48-77.pdf | 48-pin LQFP Package |

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.

2.8 Inches TFT LCD Module – ESK32-A2A31

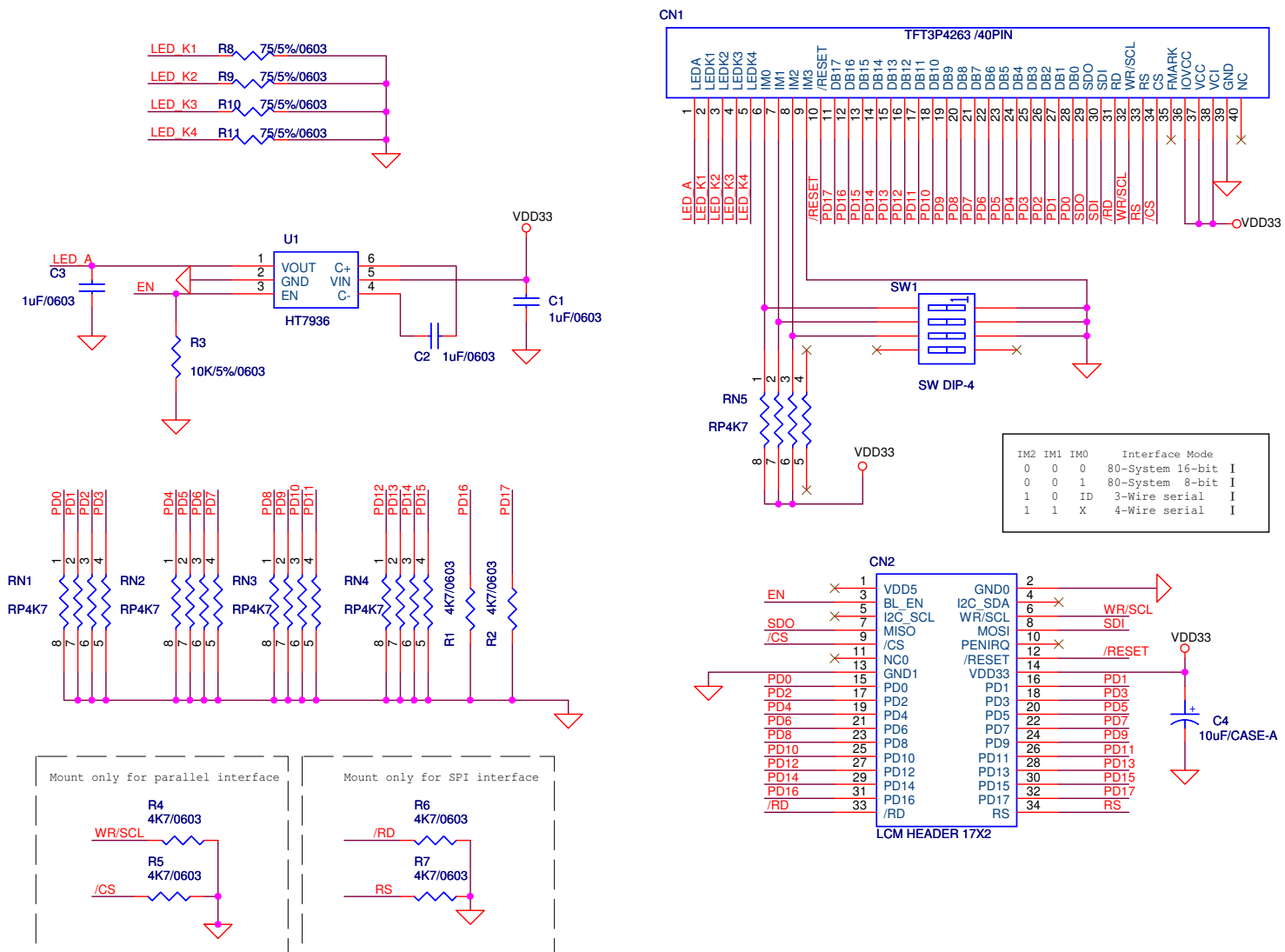


Figure 6. 2.8 Inches TFT LCD Module (ESK32-A2A31) Schematic

Copyright© 2018 by HOLTEK SEMICONDUCTOR INC.

The information appearing in this Data Sheet is believed to be accurate at the time of publication. However, Holtek assumes no responsibility arising from the use of the specifications described. The applications mentioned herein are used solely for the purpose of illustration and Holtek makes no warranty or representation that such applications will be suitable without further modification, nor recommends the use of its products for application that may present a risk to human life due to malfunction or otherwise. Holtek's products are not authorized for use as critical components in life support devices or systems. Holtek reserves the right to alter its products without prior notification. For the most up-to-date information, please visit our web site at <http://www.holtek.com/en/>.