XTX-ES-XT32H0

User manual

Rev 1.0.3

Original Release Date : 24-July-2024
Revised :

Revision History

Release	Date	Author	Summary of Change
V0.0.0	24/07/2024	Lori Liu	Initial version
V1.0.3	30/11/2024	Lori Liu	Updated demo

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1 Introduction

The XTX-ES-XT32H0xx provide an affordable and flexible way for users to try out new concepts and build prototypes with the XT32H0 series microcontrollers in the LQFP64 package.
The boards examples available with the XT32H0xx SDK.

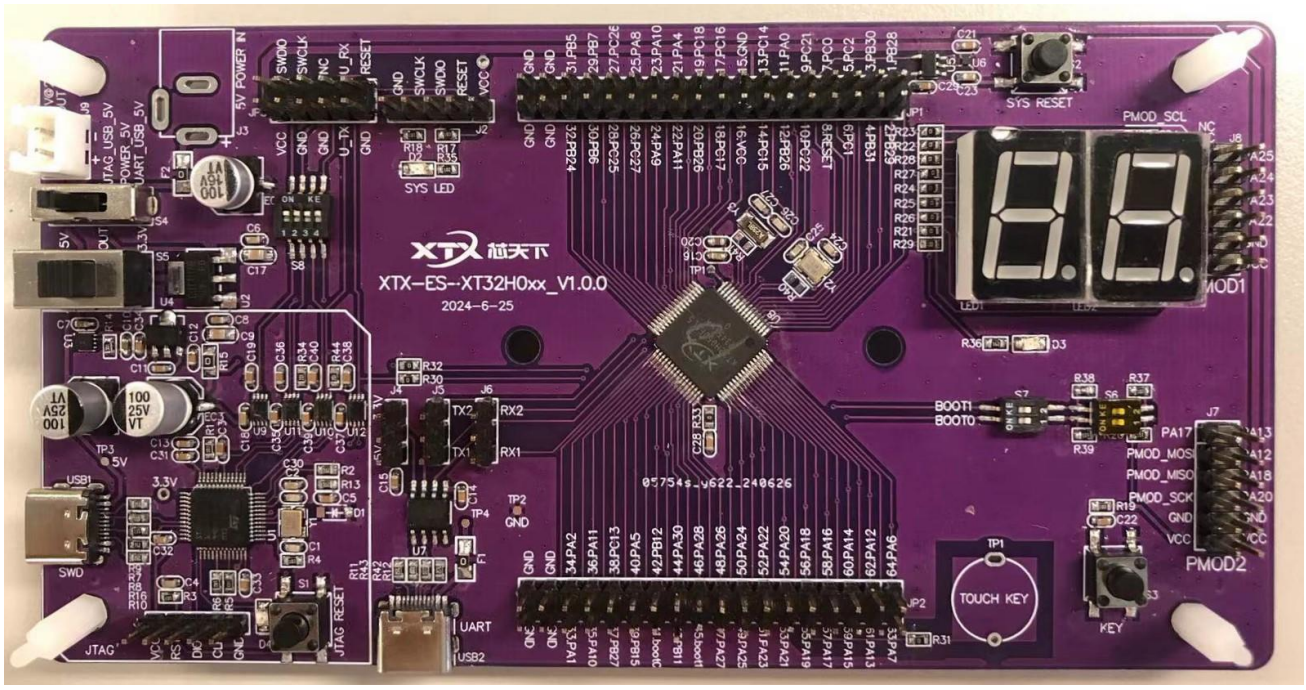


Figure 1. XTX-ES-XT32H0 board

2 Features

The XTX-ES-XT32H0 board offers the following features:

- XT32H0xx microcontroller in LQFP64 package
- Two LEDs:
  - Power LED (D2)
  - User LED (D3)
- Two push-buttons:
  - USER Key (S3)
  - System Reset (S2)
- Touch button (TP1)
- 64 pins extension
- Flexible power supply:
  - SWD debug USB
  - UART USB
  - External source (3.3v, 5v, 1.8-5.5v)
- On-Board XT-LINK debugger and programming with SWD connector
- USB virtual COM port
- Boot selection
  - Boot from flash, ROM, SRAM
- Two Pmod ports:
  - Pmod interface type 6A expanded I2C (PMOD1)
  - Pmod interface type 2A expanded SPI (PMOD2)
- Digital segment LED display

3 Development environment

3.1 System requirements

- Windows® OS (10 and 11), Linux® 64-bit
- USB Type-C cable

3.2 Development toolchains

- Keil®: MDK-ARM
- IAR System
- PlatformIO
- GCC-based IDEs

4 Quick start

4.1 Getting started

Follow the steps to configure the XTX-ES-XT32H0 board and launch the demo software:

1. Check switches on board, S4 for power source and S5 for power level (3.3v or 5V);
2. Connect power to board, the SYS LED turns on and digital LED loop display number from 1 to 0;
3. Press button (Key), digital loop display form ‘A’ to ‘F’;
4. Touch TP1, USER LED (D3) turns on;
5. Press button (Key), back to step 2.

5 Hardware configuration

Figure 2 shows the location of the features on XTX-ES-XT32H0 board.

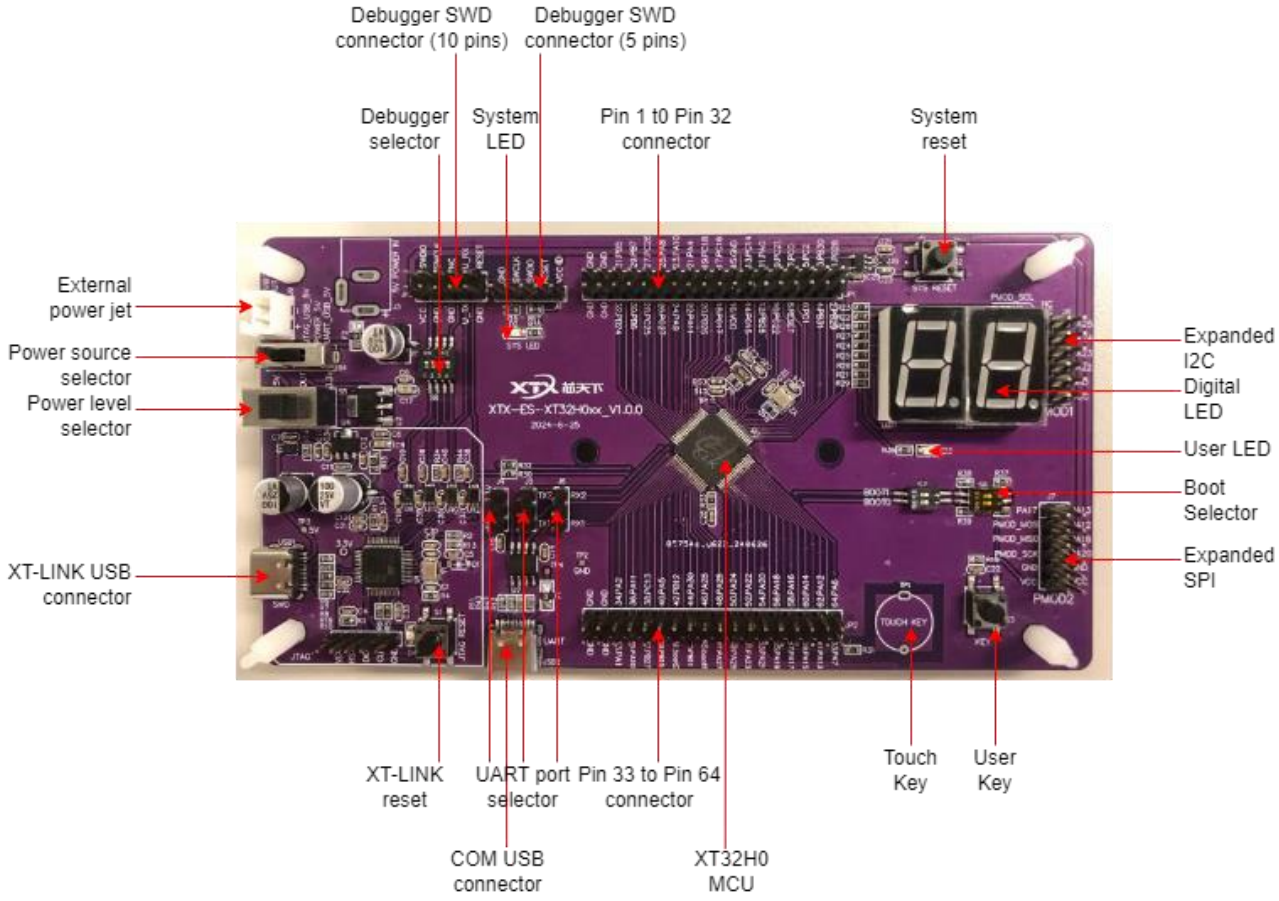


Figure 2 XTX-ES-XT32H0 layout

5.1 On-board XT-LINK

The XT-LINK programming and debugging tool is integrated into XTX-ES-XT32H0 board. The features of the OB-XT-LINK are listed below.

- USB power for XTX-ES-XT32H0 board
- Programming XT32 MCU flash
- Debugging XT32 MCU
- Downloading firmware to XT32 MCU by copying files using drag-and-drop
- Virtual com port

When using OB-XT-LINK, the debugger selector (S8) should be selected to ON.

Table 1. Debugger selector

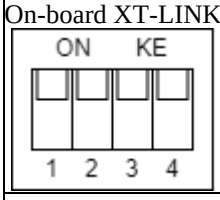
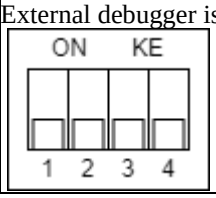
Switch	Description
S8	On-board XT-LINK is used when debugger selector is set to shown below. 
	External debugger is used when debugger selector is set to shown below. 

Figure 3 and Figure 4 show debugging and flash programming option in KEIL.

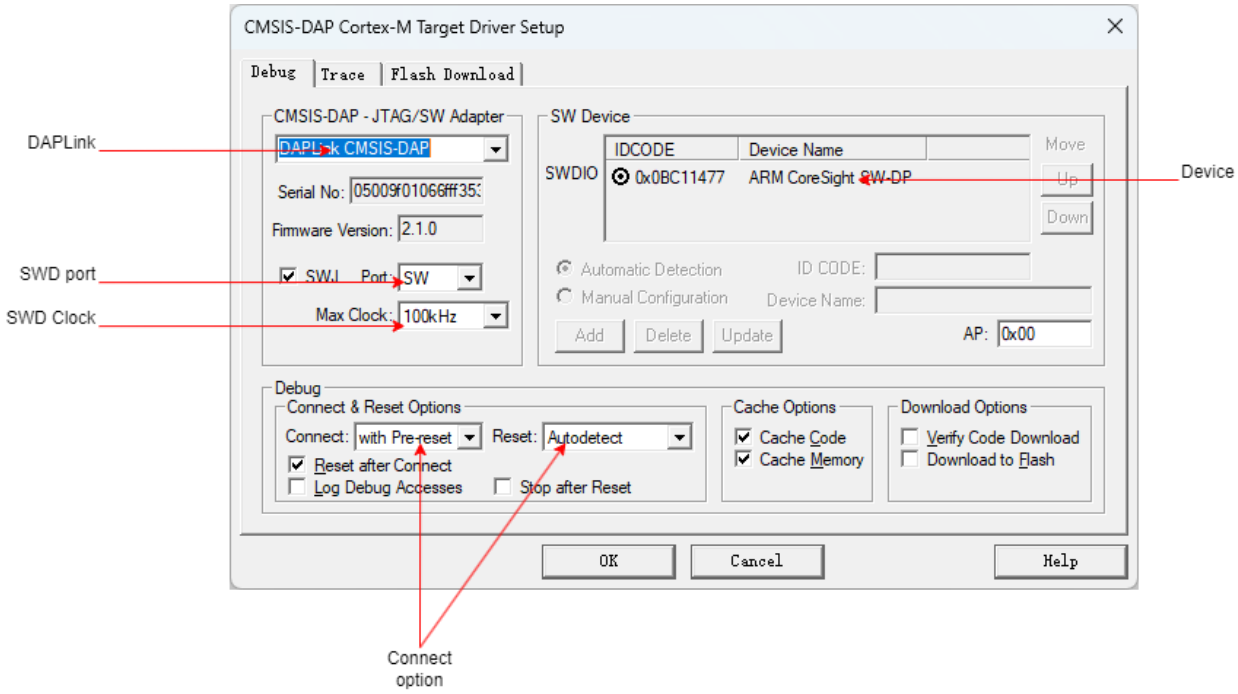


Figure 3 XT-LINK debugging option

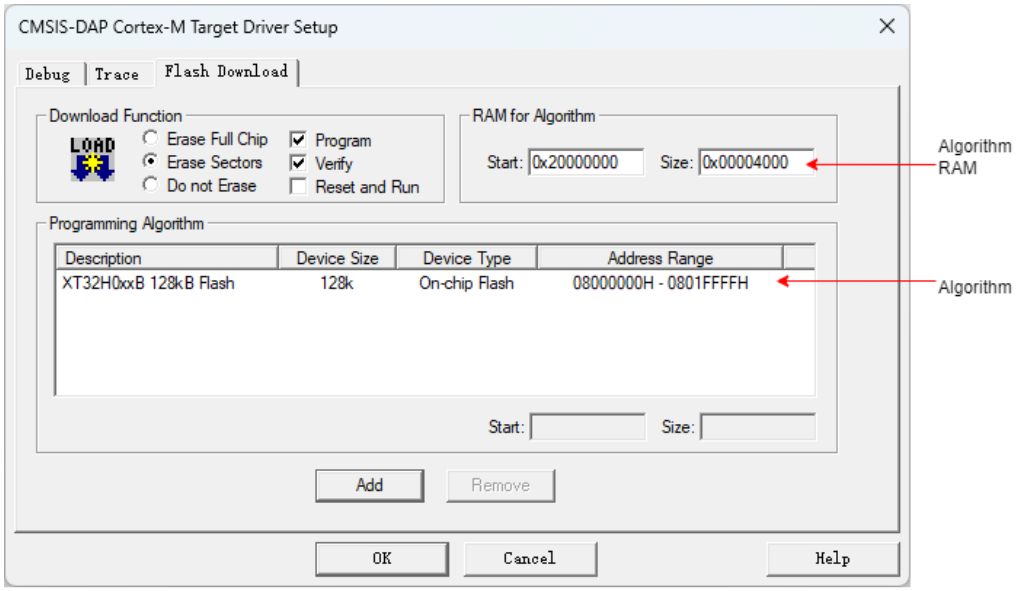


Figure 4 XT-LINK flash download option

5.2 Power supply

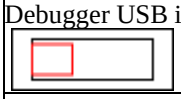
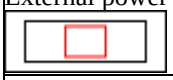
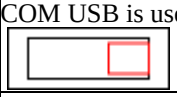
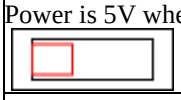
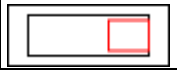
The power supply is provided by

OB-XT-LINK USB

COM USB

External power jet

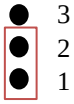
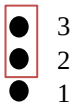
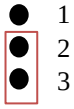
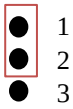
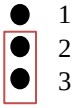
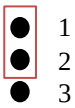
Table 2. Power related switch

Switch	Description
S4	Debugger USB is used as a power source when S4 is set to shown below. 
	External power jet is used as a power source when S4 is set to shown below. 
	COM USB is used as a power source when S4 is set to shown below. 
S5	Power is 5V when S5 is set to shown below. 
	Power is 3.3V when S5 is set to shown below. 

5.3 Virtual com port

The COM USB is used as a virtual com port and select to connect the different UART port of MCU by jumpers

Table 3. COM port related jumper

Jumper	Description
J4	J4 is set as shown below when MCU power is 5V. 
	J4 is set as shown below when MCU power is 3.3V. 
J5	Virtual com port connect to UART1 TX pin 3 when J5 is set as shown below. 
	Virtual com port connect to UART2 TX pin 23 when J5 is set as shown below.  .
J6	Virtual com port connect to UART1 RX pin 7 when J6 is set as shown below. 
	Virtual com port connect to UART2 RX pin 22 when J6 is set as shown below. 

5.4 External debugger in

The XTX-ES-XT32H0 board use external debugger, for example JLINK, by SWD port when S8 is set to off that shown in Table 1.

Figure 5 and figure 6 shows the debugger port J2 and JP3.

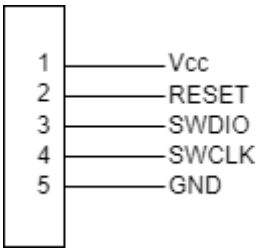


Figure 5 Debugger SWD port (5 pin)

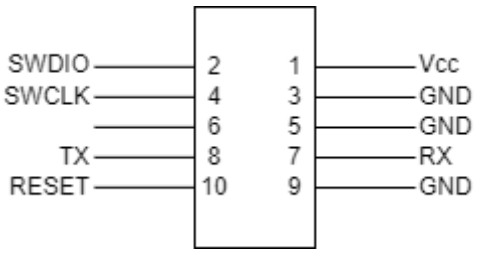


Figure 6 Debugger SWD port (10 pin)

Table 4. SWD pin assignment

SWD interface	Pin #	Signal	Direct	MCU Pin #
5 pin SWD port	1	Vcc	Out	
	2	RESET	In	
	3	SWDIO	In/Out	44
	4	SWCLK	In	41
	5	GND		
10 pin SWD port	1	Vcc	Out	
	2	SWDIO	In/Out	44
	3	GND		
	4	SWCLK	In	41
	5	GND		
	6	NC		
	7	RX	In	40
	8	TX	Out	39
	9	GND		
	10	RESET	In	

5.5 MCU pin connector

JP1 is connected to XT32H0 MCU pin 1 to pin 32 and 4 ground.
JP2 is connected to XT32H0 MCU pin 33 to pin 64 and 4 ground.

5.6 LEDs

Two LEDs provide information of XTX-ES-XT32H0 board.

SYS LED: the LED indicates that the XT32H0 MCU is powered.
USER LED: the LED connect to the XT32H0 MCU pin 4. The LED turn on when MCU pin 4 output high.

5.7 Buttons

SYS Key: this push button is used RESET the XT32H0 MCU.
USER Key: the push button is connect to XT32H0 MCU pin 64.

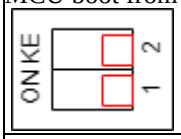
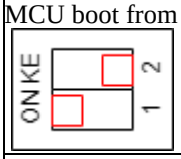
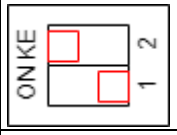
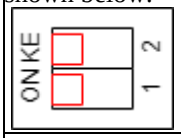
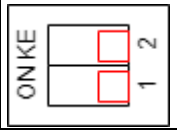
5.8 Touch button

Touch Key: the touch button is connect to XT32H0 MCU pin 47 that is touch channel 8.

5.9 Boot switches

The XTX-ES-XT32H0 board is set boot mode used switch S6 and S7.

Table 5. Boot related switch

Switch	Description
S6	MCU boot from flash (0x08000000) when S6 is set to shown below. 
	MCU boot from ROM (0x1FFF0000) when S6 is set to shown below. 
	MCU boot from SRAM (0x20000000) when S6 is set to shown below. 
S7	Boot is connected to MCU pin 41 (boot0) and pin 45 (boot1) when S7 is set to shown below. 
	Boot is disconnected to MCU pin 41 (boot0) and pin 45 (boot1) when S7 is set to shown below. 

Change system boot mode follow the below sequence:

1. Turn off power.
2. S7 is set to on, connect boot to MCU pin 41 and pin 45.
3. Configure S6 to select boot mode.
4. Press and hold RESET button.
5. Turn on power
6. Release RESET button.
7. S7 is set to off, disconnect boot to MCU pin 41 and pin 45.

5.10 PMOD port

The XTX-ES-XT32H0 board provides two PMOD interface. Figure 7 shows the interface.

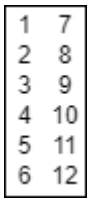


Figure 7 Pmod interface Spec D.

PMOD1 is expanded I2C

Table 6. Expanded I2C (Pmod interface type6A)

Pmod Pin #	Signal	Direct	MCU Pin #
1	NC		
2	NC		
3	SCL	In/Out	42
4	SDA	In/Out	43
5	GND		
6	VCC		
7	GPIO	In/Out	49
8	GPIO	In/Out	50
9	GPIO	In/Out	51
10	GPIO	In/Out	52
11	GND		
12	VCC		

PMOD2 is expanded SPI

Table 7. Expanded SPI (Pmod interface type2A)

Pmod Pin #	Signal	Direct	MCU Pin #
1	CS	Out	57
2	MOSI	Out	60
3	MISO	In	59
4	SCK	Out	58
5	GND		
6	VCC		
7	GPIO	In/Out	61
8	GPIO	In/Out	62
9	GPIO	In/Out	56
10	GPIO	In/Out	54
11	GND		
12	VCC		

5.11 Digital segment LED display

The XTX-ES-XT32H0 board provides two digital segment LED display which are LED1 and LED2. Figure 8 shows the LED.

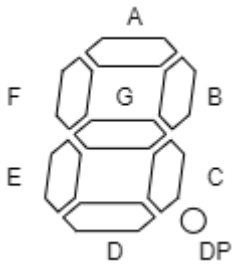


Figure 8 Digital segment LED display

Table 8. Digital segment LED connection

LED	Signal	MCU Pin #
LED1	COM	3
	A	7
	B	11
	C	12
	D	17
	E	18
	F	19
	G	21
	DP	29
LED2	COM	7
	A	3
	B	11
	C	12
	D	17
	E	18
	F	19
	G	21
	DP	29