



# **HT32F490x1 Series MCU Starter Kit User Guide**

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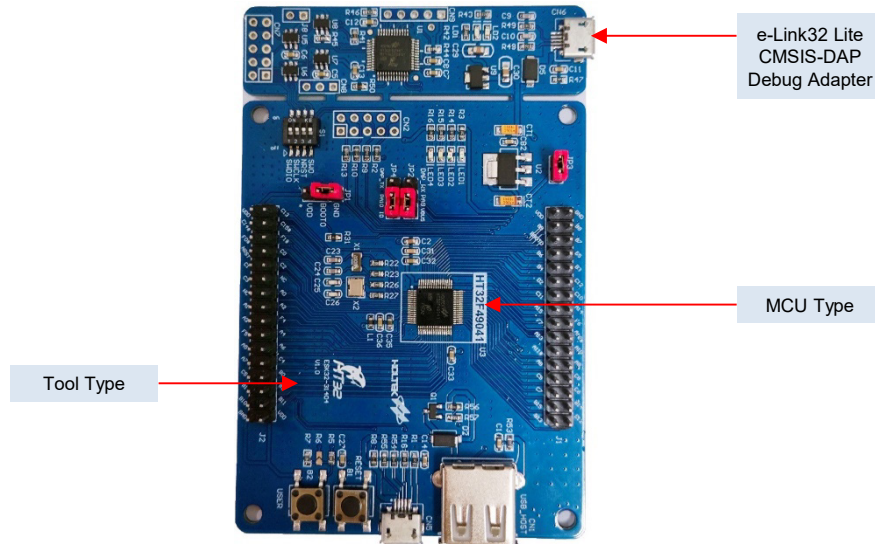
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## 1. Introduction

The HT32F490x1 Series Starter Kit is based around the 32-bit Arm® Cortex®-M4 high performance microcontroller and is designed to assist users to get up and running with the Holtek 32-bit device range as quickly as possible.

Standard C language programs can be developed using the integrated development environment from Keil µVision and IAR EWARM. Using this foundation, Holtek also provides a comprehensive function library to avoid complicated lower level function development in order to allow designers to focus their time on their specific application development. Using a simple USB cable connection, users only have to connect their PC to the integrated hardware debug interface (e-Link32 Lite Serial-Wire Debugger) to automatically download the programs and immediately commence debug operations.



### Features

- Uses the HT32 high performance microcontrollers  
Integrated Timer, I<sup>2</sup>C, SPI, USART, 12-bit A/D converter, USB and I<sup>2</sup>S etc. Refer to the datasheet of the corresponding MCU for details
- Comprises Target Board and e-Link32 Lite Serial-Wire Debugger
- Used for the testing and development of many external devices
- Use either the Target Board USB connector or the e-Link32 Lite USB connector to supply power

### Start

Configure the ESK32-31404 board according in the following sequence to start the application:

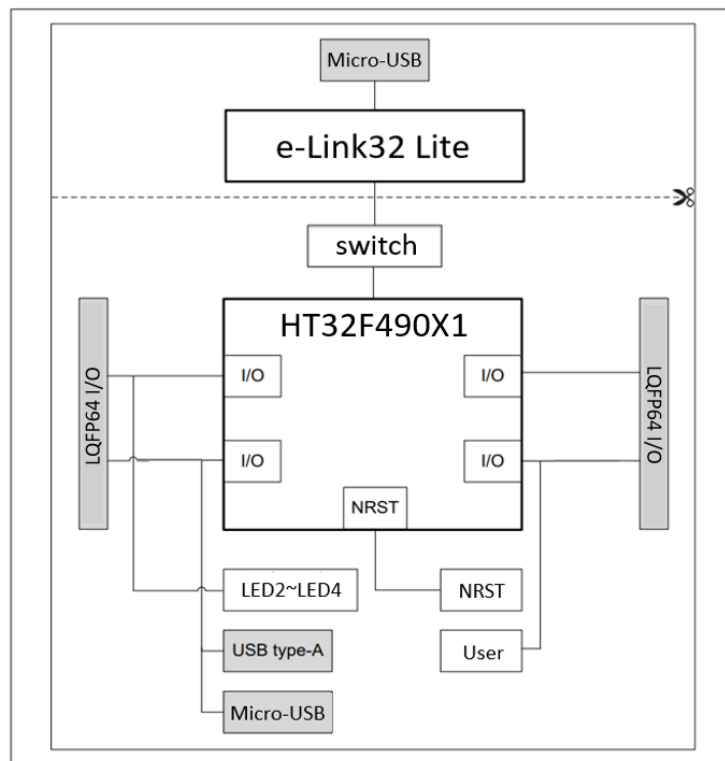
1. Check the position of the jumper on the board:  
JP1 selects GND (BOOT0 is 0);
2. Connect the board to the PC using a USB cable and use the USB connector CN6 to supply power.

## 2. Hardware Layout

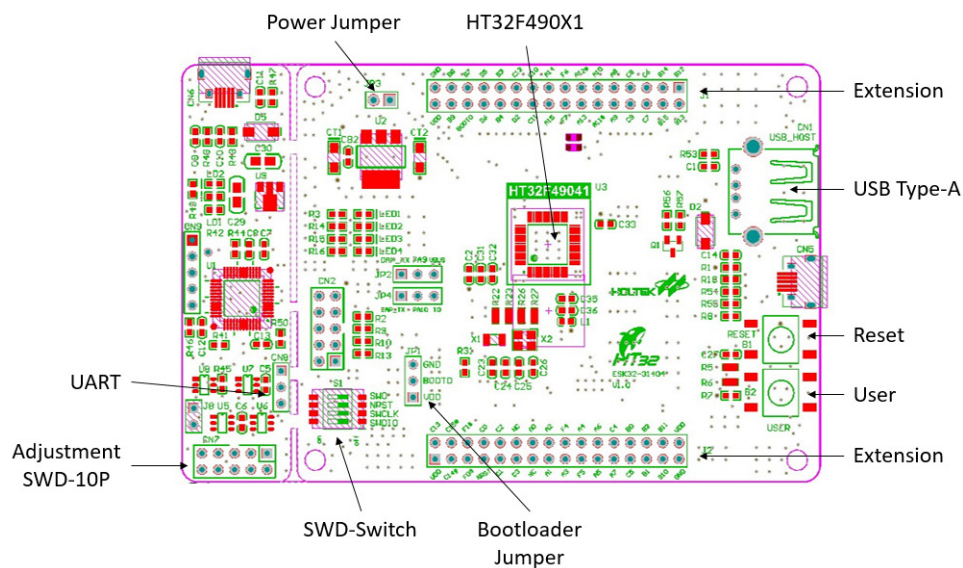
The ESK32-31404 is designed around the HT32F490x1 microcontroller in the 64-pin LQFP.

The following hardware block diagram shows the connections between the e-Link32 Lite, the HT32F490x1 and their peripherals, such as buttons, LEDs, USB and extension interfaces.

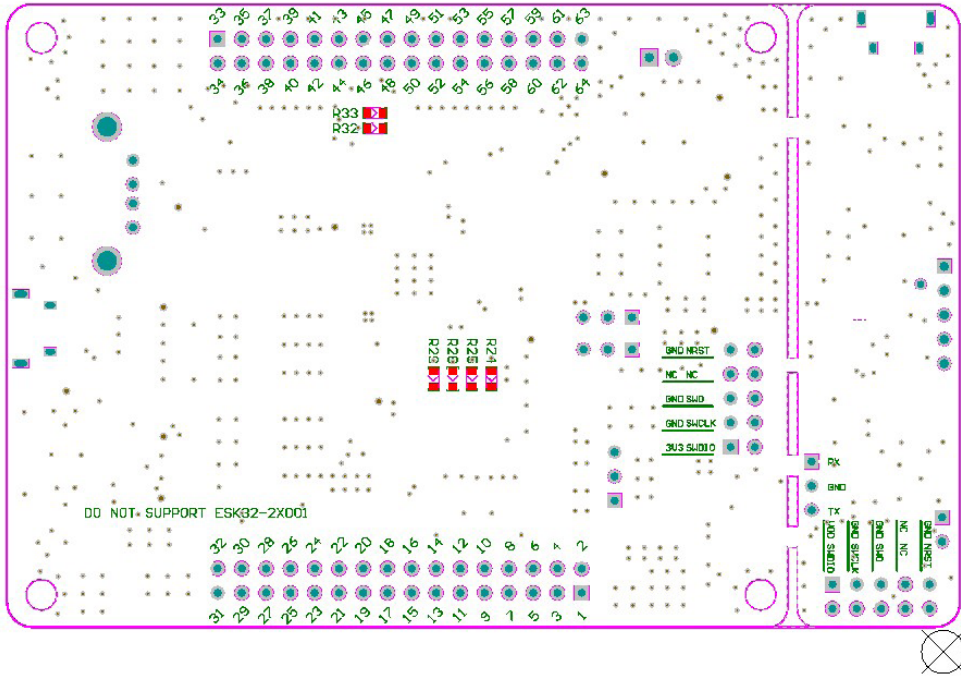
The PCB front and back diagrams show where these features are located on the e-Link32 Lite and the ESK32-31404.



**Hardware Block Diagram**





**PCB Front**



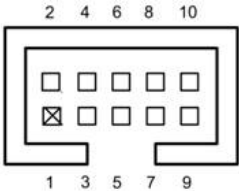
PCB Back

Serial Wire Debug Interface Switch – S1

S1	Description
	Connect the SWD interface between the e-Link32 Lite and the Target MCU – default setting
	Disconnect the SWD interface between the e-Link32 Lite and the Target MCU

SWD-10P Connector – CN2, CN7



- CN7 is the SWD connector of the e-Link32 Lite and CN2 is the SWD connector of the Target Board.
- If the e-Link32 Lite is not separated, there is already a PCB line connection on the board, so switching S1 to the ON position can connect the Target Board without an additional flying line connection.
  - If the e-Link32 Lite is not separated and S1 is switched to the OFF position, CN7 can be connected to the user’s own board through a flying line.
  - When the e-Link32 Lite is separated, CN7 can be connected to the Target Board CN2 or the user’s own board through a flying line.





## SWD-10P Connector

Pin No.	Description	Pin No.	Description
1	VDD	2	SWDIO
3	GND	4	SWCLK
5	GND	6	SWO
7	NC	8	NC
9	GND	10	Reset

## e-Link32 Lite Power Option – J8

J8	Description
	Pin 1 of the CN7 connector on the e-Link32 Lite side is used as the input. The reference voltage is supplied through this pin to the voltage conversion chip – default setting
	Pin 1 of the CN7 connector on the e-Link32 Lite side is used as the output. Here the e-Link32 Lite voltage conversion chip is fixed using the 3.3V as the reference voltage

## MCU Power Jumper – JP3

JP3	Description
	The MCU VDD pin is connected to the 3.3V power – default setting
	The MCU VDD pin is disconnected from the 3.3V power

The jumper is useful when it is required to measure the MCU power consumption.



## Boot Mode Option – JP1

When booting, users can select either one of three boot modes by configuring the BOOT0 pin and the nBOOT1 bit of the User System Data.

Jumper	Description
JP1 connected to GND or OFF nBOOT1 = 0/1	nBOOT1 is X, BOOT0 is 0 Boot from the user Flash memory – factory default setting
JP1 connected to VDD nBOOT1 = 1	nBOOT1 is 1, BOOT0 is 1 Boot from the Boot program code
JP1 connected to VDD nBOOT1 = 0	BOOT1 is 0, BOOT0 is 1 Boot from the internal SRAM



## OTGFS Option Jumper – JP2

When the PA9 pin of the HT32F490x1 is used as the OTG\_FS\_VBUS function, connect JP2 to VBUS, in which case the PA9 pin will be connected to the USB VBUS pin, disconnecting from the e-Link32 Lite UART RX.

JP2	Description
	The PA9 is connected to the USB VBUS pin and used as the OTG_FS_VBUS function
	The MCU UART TX is connected to the e-Link32 UART RX


### OTGFS Option Jumper – JP4

When the PA10 pin of the HT32F490x1 is used as the OTG\_FS\_ID function, connect JP4 to ID, in which case the PA10 pin will be connected to the USB ID pin, disconnecting from the e-Link32 Lite UART TX.

JP4	Description
 <p>DAP-TX PA10 ID</p>	The PA10 is connected to the USB ID pin and used as the OTG_FS_ID function
 <p>DAP-TX PA10 ID</p>	The MCU UART RX is connected to the e-Link32 UART TX

### e-Link32 UART Connector – CN8

This is the e-Link32 integrated USB to UART function, which is called the “Virtual COM port”, CN8 is the e-Link32 UART side connector.

CN8	Description
 <p>TX GND RX</p>	Three UART connector pins: TX, GND and RX The e-Link32 will send data on the TX pin while data will be received on the RX pin

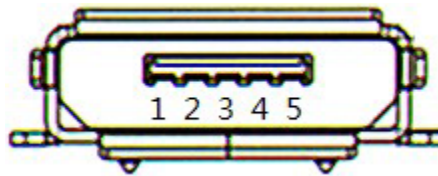
- If the e-Link32 Lite is not separated, users can use the e-Link32 “Virtual COM Port” functions by connecting the J9 to DAP\_TX or JP2 to DAP\_RX.
- If the e-Link32 Lite is not separated, and users wish to connect the e-Link32 RX to their board, the JP2 needs to be connected to the VBUS.
- When the e-Link32 Lite is separated, CN8 can be connected to the Target Board or the user’s own board through a flying line.

### Extension Connector J1

Pin No.	Description	Pin No.	Description
33	PB12	34	PB13
35	PB14	36	PB15
37	PC6	38	PC7
39	PC8	40	PC9
41	PA8	42	PA9
43	PA10	44	PA11#
45	PA12#	46	PA13
47	PF6	48	PF7
49	PA14	50	PA15
51	PC10	52	PC11
53	PC12	54	PD2
55	PB3	56	PB4
57	PB5	58	PB6
59	PB7	60	BOOT0
61	PB8	62	PB9
63	GND	64	VDD

**Extension Connector J2**

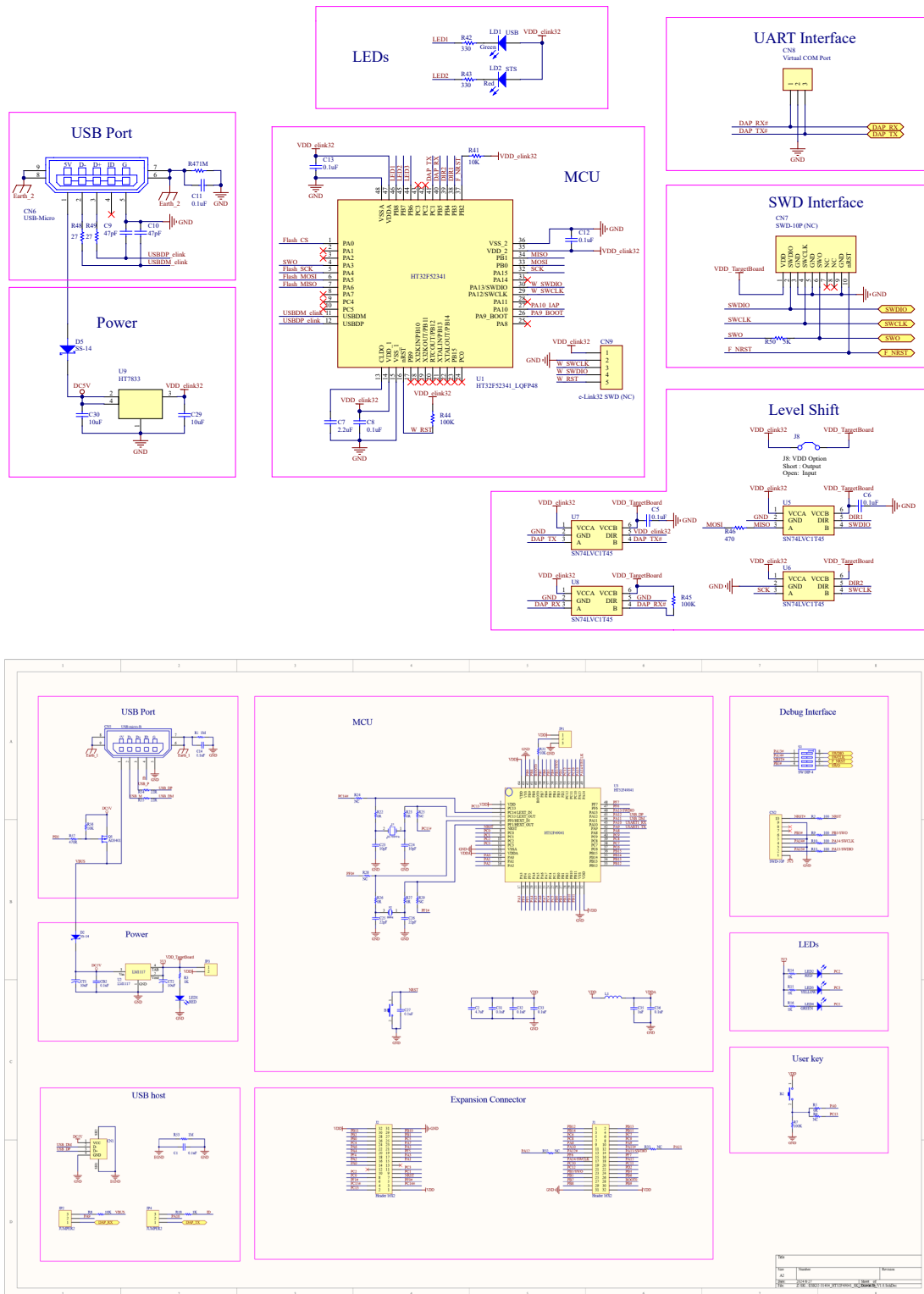
Pin No.	Description	Pin No.	Description
1	VDD	2	PC13
3	PC14#	4	PC15#
5	PF0#	6	PF1#
7	NRST	8	PC0
9	PC1	10	PC2
11	PC3	12	NC
13	NC	14	PA0
15	PA1	16	PA2
17	PA3	18	PF4
19	PF5	20	PA4
21	PA5	22	PA6
23	PA7	24	PC4
25	PC5	26	PB0
27	PB1	28	PB2
29	PB10	30	PB11
31	GND	32	VDD

**Micro USB Type B Connector – CN5/CN6**

**Micro USB Type B Connector**

Pin No.	Description	Pin No.	Description
1	USB_5V	2	D-
3	D+	4	ID
5	GND		



### 3. Schematics



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