



e-Link32 Pro Commander User's Guide

Revision: V1.20 Date: September 14, 2021

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Introduction

The Holtek e-Link32 Pro/Lite is an In-Circuit Emulator (ICE) developed for the HT32 series which can be used for programming or debugging using in-circuit programming, also known as ICP.

The e-Link32 Pro Commander is PC software developed for the e-Link32 Pro/Lite. Using the e-Link32 Pro Commander, Clear, Program, Verify, Lock IC and other functions can be implemented through command lines.

Functional Description

- Update firmware
- Read/write memory
- Memory protection
- Image files are compatible with HEX and Binary formats
- Instructions and parameters are case-compatible
- Parameters are compatible with hexadecimal and decimal numbers
- Supports multi-instruction functions

Direction for Use

Installation

The following steps describe how to install the e-Link32 Pro Commander.

- Step 1. Obtain the latest version of the e-Link32 Pro Commander from the Holtek official website.
The installation file name is “HT32_e-Link32ProCommander_vnnnn.exe”, where nnn stands for the version number.
- Step 2. Double-click “HT32_e-Link32ProCommander_vnnnn.exe”, the default installation path is “C:\Program Files (x86)\Holtek HT32 Series\HT32 e-Link32 Pro Commander”. To change the installation path, click the “Browse” button to select the desired path and press the “Next” button to continue.

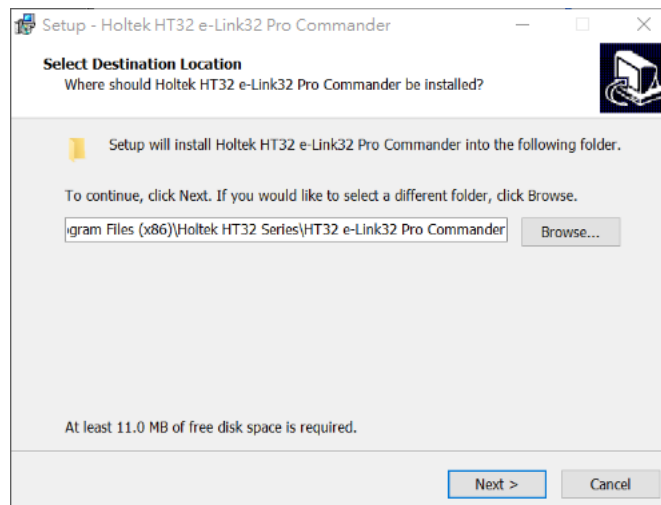


Figure 1. e-Link32 Pro Commander Installation – Select the Installation Path

Step 3. Select whether to add environmental variables, and whether to add the right-click programming function. After completion, click the “Next” button to continue the installation. It is important to note that if environmental variables are added, this function will not take effect until the computer is manually rebooted after installation.

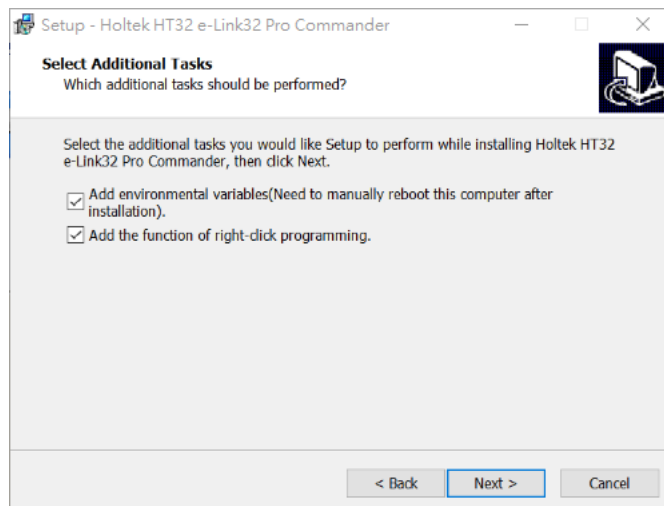


Figure 2. e-Link32 Pro Commander installation – Select Add Environmental Variables

After the right-click programming function has been installed, right-click the target image file in Binary or HEX format and select “Programming by e-Link32 Pro” to program the target image to the MCU.

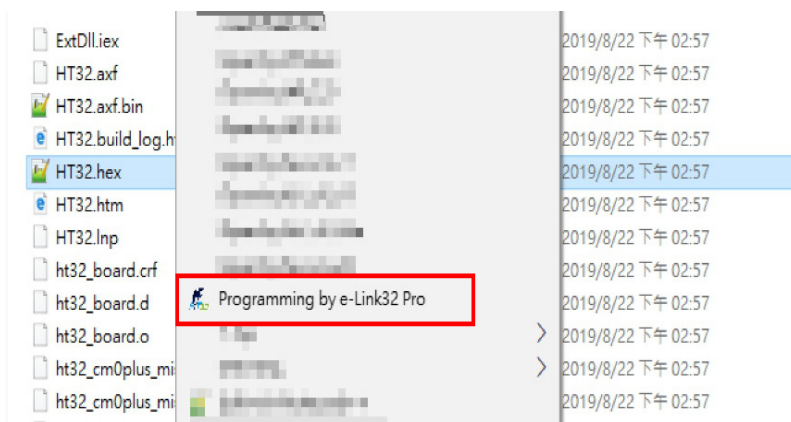


Figure 3. Right-click Programming Function

Step 4. When the “Ready to Install” screen appears, click the “Install” button to start the installation.

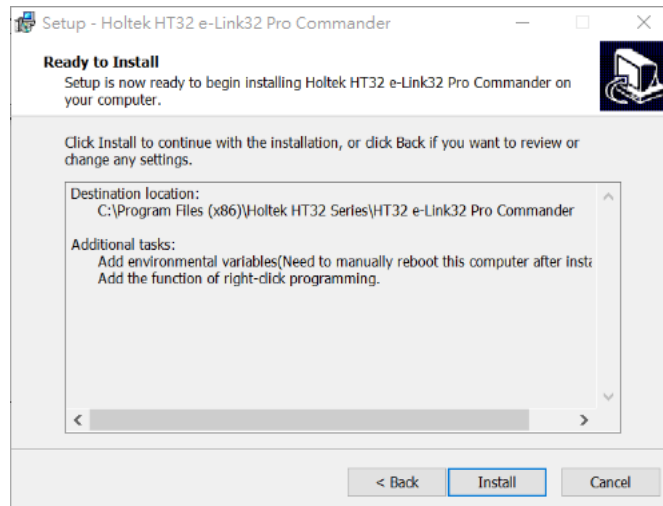


Figure 4. e-Link32 Pro Commander Installation – Ready to Install Page

Step 5. Once the installation has finished, a completion screen will appear. Select whether to open the User's Guide and whether to launch “e-Link32 Pro Commander”. Click the “Finish” button to complete the installation.

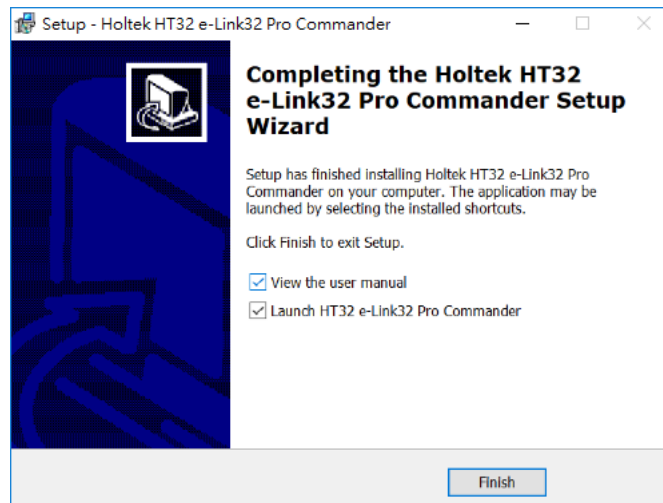


Figure 5. e-Link32 Pro Commander Installation – Installation Completed Page

Hardware Connection

The e-Link32 Pro/Lite supports a Serial Wire Mode interface. There are only two pins, SWCLK (Serial Wire Clock) and SWDIO (Serial Wire Debug Data Input/Output), which are used for programming and debugging. However, there are another two USB Virtual COM Ports, VCOM_RXD and VCOM_TXD, for serial communication. The following illustration shows the debug connector. When used with the e-Link32 Pro Commander, the 3.3V, SWDIO, SWCLK, Reset and GND pins must be connected.

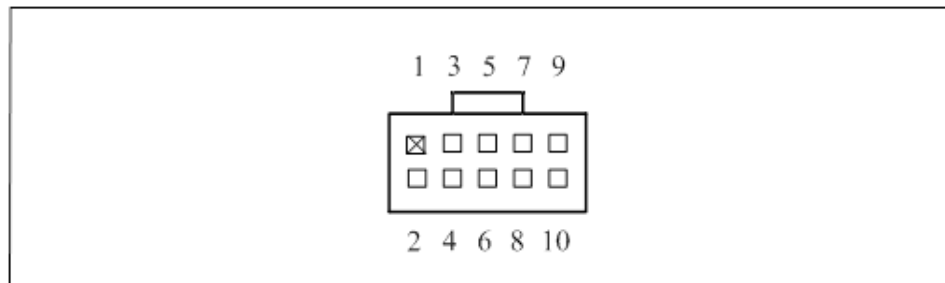


Figure 6. SWD 10-pin Connector

Pin#	Description	Pin#	Description
1	3.3V	2	SWDIO
3	GND	4	SWCLK
5	GND	6	Reserved
7	VCOM_RXD	8	VCOM_TXD
9	GND	10	Reset

Test

Complete the installation and connect to the e-Link32 Pro/Lite, the following tests can now be implemented.

- Step 1. Enable the command prompt in the installation directory or check “Launch HT32 e-Link32 Pro Commander” when the installation is complete.
- Step 2. Enter the “eLink32pro.exe -list” instruction to determine whether the e-Link32 Pro/Lite is connected. If yes, ID\SN and “Operation success” will appear.

```
C:\Program Files (x86)\Holtek HT32 Series\HT32 e-Link32 Pro Commander>eLink32pro.exe -list
ID:0, SN:04000007.
Result: Operation success
```

Figure 7. Instruction -list

- Step 3. Enter the “eLink32pro.exe -me” instruction to clear the memory. When completed, “Operation success” will appear.

```
C:\Program Files (x86)\Holtek HT32 Series\HT32 e-Link32 Pro Commander>eLink32pro.exe -me
This e-Link32 Pro/Lite Ver: 0.06, ID=0 (Setting comes from default value).
Result: Operation success.
C:\Program Files (x86)\Holtek HT32 Series\HT32 e-Link32 Pro Commander>
```

Figure 8. Instruction -me

Instruction Description

Instruction syntax:

"eLink32pro.exe [Cmd0 <Para0> <Para1> ...] [Cmd1 <Para0> <Para1> ...] ..."

Note: Replace the blank key with " " for more observable identification.

Parameters	Description
eLink32pro.exe	Execution file name.
Cmdn (n=0, 1, 2, ...)	The system will complete the corresponding command in order according to the user Cmd.
Paran (n=0, 1, 2, ...)	Para is a parameter, the usage and format of which vary with the Cmd. Users should fill in the correct Para content according to the Cmd.

Command Table

Setting Commands		
Commands and Parameters	Description	Examples
-id <ID>	Specify the e-Link32 Pro/Lite ID	C:\eLink32pro.exe -id 0
-sn <SN>	Specify the e-Link32 Pro/Lite SN	C:\eLink32pro.exe -sn 12345678
-q	Quiet mode	C:\eLink32pro.exe -q
-list	Display all e-Link32 Pro/Lite	C:\eLink32pro.exe -list
-pdev <id=ID sn=SN>	Display the specified e-Link32 Pro/Lite	C:\eLink32pro.exe -pdev id=0 C:\eLink32pro.exe -pdev sn=12345
-sdev <id=ID sn=SN NULL>	Store the specified ID/SN into the INI file	C:\eLink32pro.exe -pdev id=0 C:\eLink32pro.exe -pdev sn=12345 C:\eLink32pro.exe -pdev NULL
Core Commands		
-rst	Reset the system by software	C:\eLink32pro.exe -rst
-hrst	Reset the system by hardware	C:\eLink32pro.exe -hrst
-hrsts	Reset the system by hardware and stop the core	C:\eLink32pro.exe -hrsts
-halt	Stop the core	C:\eLink32pro.exe -halt
-run	Execute	C:\eLink32pro.exe -run
Programming Commands		
-se <Start_Sector> <End_Sector>	Clear memory in Sectors	C:\eLink32pro.exe -se 0 C:\eLink32pro.exe -se 10 20
-me	Clear the entire MCU memory.	C:\eLink32pro.exe -me
-a <Filename>	Auto program (reset, erase the full chip, program)	C:\eLink32pro.exe -a HT32.axf.bin C:\eLink32pro.exe -a HT32.hex
-ap <Filename>	Auto program (reset, erase the necessary memory, program)	C:\eLink32pro.exe -ap HT32.axf.bin C:\eLink32pro.exe -ap HT32.hex
-v <Filename>	Verify the programmed result	C:\eLink32pro.exe -v HT32.axf.bin C:\eLink32pro.exe -v HT32.hex
-ob <cp0=CP0> <cp1=CP1> <pp0=PP0> <pp1=PP1> <pp2=PP2> <pp3=PP3>	Set memory protection	C:\eLink32pro.exe -ob cp0=1 C:\eLink32pro.exe -ob cp1=1 C:\eLink32pro.exe -ob cp0=1 pp0=123 pp1=0x5a5a5a
-rob	Display the memory protection settings	C:\eLink32pro.exe -rob
Memory Read/Write Commands		
-r32 <Address> <NumWords>	Read memory	C:\eLink32pro.exe -r32 0 200 C:\eLink32pro.exe -r32 0x100 0x200
-w32 <Address> <data>	Write data into memory	C:\eLink32pro.exe -w32 0x2000 123
-dump <Address> <NumWords> <Filename>	Read memory and write the result into the specified file	C:\eLink32pro.exe -dump 0 200 Mem.bin

Commands

Setting Commands

1. -id<ID>: This command is used to specify an e-Link32 Pro/Lite through ID for multiple e-Link32 Pro/Lite connections. ID is the USB enumerated e-Link32 Pro/Lite sequence, the number starts from 0. Note that the system can only specify one ID, but cannot set the SN at the same time.
2. -sn<SN>: This command is used to specify an e-Link32 Pro/Lite through the SN (Serial Number) for multiple e-Link32 Pro/Lite connections. The SN is the unique number for e-Link32 Pro/Lite. Users can obtain the SN using the “-list” command. Note that the system can only specify one SN, but cannot set ID at the same time.
3. -q: Quiet mode, the system will not display any information when executing each instruction.
4. -list: List all e-Link32 Pro/Lite connected to the computer. If the same SN is found in the INI file, it will be marked by “*”, such as 04000072 shown below.

```
C:\>eLink32pro.exe -list
ID:0, SN:04000072(*).
ID:1, SN:04000007.
operation success
```

5. -pdev<id=ID | sn=SN>: Once this parameter specifies an ID or an SN, the corresponding e-Link32 Pro/Lite will display. The specified e-Link32 Pro/Lite flashes the LED and displays the SN.
6. -sdev<id=ID | sn=SN | NULL>: This command is used to store the specified ID or SN into the INI file. When users do not specify an ID or an SN using the “-id” or “-sn” command, the system will refer to the SN specified in the INI file. If the corresponding e-Link32 Pro/Lite cannot be found, the system will display an error. If the SN specified in the INI file needs to be cleared, issue the “NULL” parameter, after which the SN in the INI file will be not referred to during the next connection. Note that this command will not take effect until the next execution.

Core Commands

1. -rst: Reset the system by software.
2. -hrst: Reset the system by hardware.
3. -hrsts: Reset the system by hardware and stop the core.
4. -halt: Stop the core.
5. -run: Execute.

Programming Commands

1. -se<Start_Sector>[<End_Sector>]: Clear part of memory in Sectors (Pages), from Start_Sector to End_Sector. If the End_Sector parameter is omitted, the system will clear a Sector starting from Start_Sector. Note that Sectors vary with the MCU.
2. -me: Clear the entire MCU memory.
3. -a<Filename>: Complete the entire programming procedure, which includes (1) reset the MCU and stop the core, (2) clear the entire MCU and (3) program programs. Binary or Hex file formats are supported.
4. -ap<Filename>: It likes the “-a” command. The difference is that it will erase the necessary memory according to the <Filename> size.
5. -v<Filename>: Verifies the programmed result. Binary or Hex file formats are supported.
6. -ob[<cp0=CP0>][<cp1=CP1>][<pp0=PP0>][<pp1=PP1>][<pp2=PP2>][<pp3=PP3>]: Set memory protection. This command does not retain the original settings, the system will clear the settings first and then reconfigure when executing the “-ob” command.

cp0=CP0, CP0 is 0 or 1.

0: Disable memory protection

1: Enable memory protection

cp1=CP1, CP1 is 0 or 1.

0: Disable Option Byte programming/clearing protection

1: Enable Option Byte programming/cleanup protection

pp0=PP0, <value> ranges from 0 to 0xFFFFFFFF.

pp1=PP1, <value> ranges from 0 to 0xFFFFFFFF.

pp2=PP2, <value> ranges from 0 to 0xFFFFFFFF.

pp3=PP3, <value> ranges from 0 to 0xFFFFFFFF.

pp0~pp3 have 128 bits, which can be represented as pp[127:0] bits.

pp[n]=0: Sector n, disable programming/clearing protection.

pp[n]=1: Sector n, enable programming/clearing protection.

7. -rob: Display the memory protection settings.

Memory Read/Write Commands

1. -r32□<Address>□<NumWords>: Read memory. Take <Address> as the start location and <NumWords> as the read amount, the data length is 32 bits.
2. -w32□<Address>□<data>: Write memory. Take <Address> as the written memory location and <data> as the target data to be written into memory. <data> ranges from 0 to 0xFFFFFFFF. Note that if the written location is the MCU internal Flash memory, clear it first using the “-se” or “-me” command before writing to ensure the data is correct.
3. -dump□<Address>□<NumWords>□<Filename>: Read memory and write the result into the specified file. Take <Address> as the start location and <NumWords> as the read amount, the data length is 32 bits. Write the read result into the file <Filename> after completion.

Return Value

Use the environmental variable “%ERRORLEVEL%” to get the Return Code. 0 stands for success, other codes stand for error.

Return Code	Support Command	Description
0	all	Operation success.
1	all	Invalid command parameter. Enter “eLink32pro.exe” to understand the rules for each command.
2	all	Error occurred when connecting to the target MCU. Possible reasons are: 1. Target MCU is not powered on. 2. SWDIO/SWCLK is not connected. 3. Target MCU has entered the power save mode.
3	all	The command does not apply to the Commander. Confirm that the command is correct.
4	-w32	Data cannot be written to the specified memory address.
5	-r32, -dump	Data cannot be read from the specified memory address.
6	-rst, -hrst, -hrsts	Target MCU cannot be reset.
11	-me, -se	Flash memory cannot be erased.
12	-a, -ap, -v	Programing or verification fail.
13	-ob	Option Byte setting error.

Return Code	Support Command	Description
14	-w32, -r32, -se, -ap, -v, -ob, -rob, -dump	Target MCU has been securely locked.
20	-a, -ap, -v, -dump	Error in file access. Confirm that the file path is correct and that the file exists.
21	-sdev, -pdev	The ID specified by this parameter cannot be found.
30	all	The computer cannot enumerate the e-Link32 Pro/Lite. Ensure that the computer has indeed been connected to the e-Link32 Pro/Lite.
31	all	The corresponding e-Link32 Pro/Lite cannot be found by the target ID/SN, which can be in an INI file or specified by users.
32	-ap	The command isn't supported on this version. Update this e-link32 Pro/Lite version by the ICP tool.

Examples of Use

Case1: Execute after programming:

```
eLink32pro.exe -a test.bin -v test.bin -run
```

Case2: Memory protection after programming:

```
eLink32pro.exe -a test.bin -v test.bin -ob cp0=1 cp1=1
```

Case3: Specify ID=0 and program:

```
eLink32pro.exe -id 0 -a test.bin -v test.bin
```

Case4: Specify SN=12345678 and program:

```
eLink32pro.exe -sn 12345678 -a test.bin -v test.bin
```

Case5: Store SN of ID=0 into INI file and program:

```
eLink32pro.exe -sdev id=0
```

```
eLink32pro.exe -a test.bin -v test.bin
```

Case6: Clear the SN settings in INI file and program:

```
eLink32pro.exe -sdev NULL
```

```
eLink32pro.exe -a test.bin -v test.bin
```

Case7: Write data to the internal Flash memory:

```
eLink32pro.exe -halt -r32 4096 2 -se 4 -w32 4096 0x01234567 -w32 4100 0x89ABCDEF -run
```

This example is described as follows:

1. Stop the core - this step is not necessary.
2. Read two words of data from the location "4096" and display.
3. Clear the fourth Sector (Page). The example is illustrated with a Sector Size of 1024 bytes. If the Sector Size is 512 bytes, the relevant parameters should be modified to 8, such as "-se 8".
4. Write the data "0x01234567" to the memory location "4096".
5. Write the data "0x89ABCDEF" to the memory location "4100".
6. Run the program - this step is not necessary.

Troubleshooting

1. When the return value is 1 or 3, confirm whether the instructions and parameters are incorrectly formatted or incorrectly written.
2. When the return value is 2, confirm whether the MCU is powered on, then execute “-me” to clear the memory and try again.
3. When the return value is 21 or 30, confirm whether the e-Link32 Pro/Lite has been connected to the computer and enumerated by the USB.
4. When the return value is 31, clear the SN settings in the current INI file using the “-sdev NULL” instruction and try again.

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