e-Link32/e-Link32 Pro User's Guide

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1 Overview

The purpose of this user's guide is to familiarise users with the Holtek e-Link32/e-Link32 Pro Debug Adapter. The guide includes information on how to setup and use the e-Link32/e-Link32 Pro with the Keil MDK-ARM and IAR EWARM.

Introduction

The Holtek e-Link32/e-Link32 Pro connects the target board (via Serial Wire) to the PC's USB port. Users can then program and debug their embedded programs on the target board.

The e-Link32/e-Link32 Pro provides the following key features.

- Supports HT32 Series MCUs
- Serial Wire Debug interface
- Integrates with Keil & IAR IDE
- USB powered
- 10-pin Cortex Debug Connector
- Three LEDs used to display the USB, ERROR and RUN status
- Single RESET button
- Serial communication with the target MCU (for e-Link32 Pro only)

Figure 1. e-Link32/e-Link32 Pro Debug Adapter Appearance

Hardware Description

The e-Link32/e-Link32 Pro 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 for the e-Link32 Pro Serial Communication (Note). The following illustration shows the debug connector.

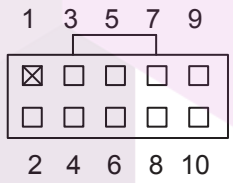

Figure 2. SWD 10-Pin Connector

Table 1. SWD 10-Pin Connector Pins

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

Note: The serial communication function is only available for the e-Link32 Pro, Pin7 and Pin8 are NC pins for the e-Link32.

Hardware Configuration

As the MCU has a wide operating voltage range, the SWD and other interface IO voltages of the MCU may be different from the e-Link32/e-Link32 Pro which both operate at 3.3V. To accommodate this problem a Level Shifter is integrated within the e-Link32/e-Link32 Pro to handle different voltage level situations. However, users can also use different power supply modes according to their various target board circuits and application purposes. For example:

- SWD/RESET/UART interface voltage determined by the target board power supply (hardware factory default value):
  The VDD power supply on the SWD interface is supplied by the target board. The SWD, RESET and UART interface IO voltages of the e-Link32/e-Link32 Pro will be processed by the Level Shifter to ensure that their voltage level is the same as the target board.
- MCU with independent IO power supply:
  The SWD interface voltage is different from the RESET signal. For example, the SWD interface operates at 1.8V while the RESET signal operates at 3.3V.
- Target board power supply provided by the e-Link32/e-Link32 Pro:
  The VDD power supply on the SWD interface is supplied with 3.3V by the e-Link32/e-Link32 Pro. In this case, the e-Link32/e-Link32 Pro and the target board MCU will both operate at 3.3V. Users must take care to ensure that the target board can operate at 3.3V and that the current

does not exceed the e-Link32/e-Link32 Pro allowed current. This configuration is usually used to simplify the power supply mode during programming. Therefore, the target board does not require an additional power supply.

The following content describes how to adjust the e-Link32 or e-Link32 Pro resistance jumper to meet different power requirements.

■ SWD/RESET/UART interface voltage determined by target board power supply (hardware factory default value):

The VDD (Pin 1) power supply on the SWD interface is supplied by the target board. The SWD, RESET and serial communication (1) logic voltages refer to the target board V_{DD} voltage.

Table 2. Power Configuration – SWD/RESET/UART Interface Voltage determined by the Target Board Power Supply

Jumper (2)	State	Description
R19	Short	Factory default, 10kΩ resistor
R11	Short	Factory default, 0Ω resistor
R12	NC	Factory default

Note: 1. The serial communication function is only available for the e-Link32 Pro.
2. The R11 and R12 cannot add a 0Ω resistor at the same time.

■ MCU with independent IO power supply - for e-Link32 Pro only:

Similar to the previous configuration mode, the only difference is that the RESET IO voltage level is determined by the pull-high resistor of the target board nRST.

Table 3. Power Configuration – MCU with Independent IO Power Supply

Jumper (Note)	State	Description
R19	NC	Remove R19
R11	Short	Factory default, 0Ω resistor
R12	NC	Factory default

Note: The R11 and R12 resistors cannot both be 0Ω resistors at the same time.

■ Target board power supply provided by the e-Link32/e-Link32 Pro:

The VDD (Pin 1) power supply on the SWD interface is provided with 3.3V by the e-Link32/e-Link32 Pro. The SWD, RESET and serial interface (1) communication logic voltages refer to the e-Link32/e-Link32 Pro voltage.

Table 4. Power Configuration – Target Board Power Supply Provided by e-Link32/e-Link32 Pro

Jumper (2)	State	Description
R19	Short	Factory default, 10kΩ resistor
R11	NC	Remove R11
R12	Short	Add a 0Ω resistor

Note: 1. The serial communication function is only available for the e-Link32 Pro.
2. The R11 and R12 resistors cannot both be 0Ω resistors at the same time.

Dynamically Switching Power Configuration

Users can remove both the R11 and R12 resistors and then connect a switch on J4 to dynamically select the following power configurations.

- SWD/RESET/UART interface voltage determined by the target board power supply
- Target board power supply provided by the e-Link32/e-Link32 Pro

e-Link32/e-Link32 Pro Schematic Diagram

This section shows the entire e-Link32 and e-Link32 Pro circuit diagrams.

- e-Link32 v1.0
- e-Link32 Pro v1.0

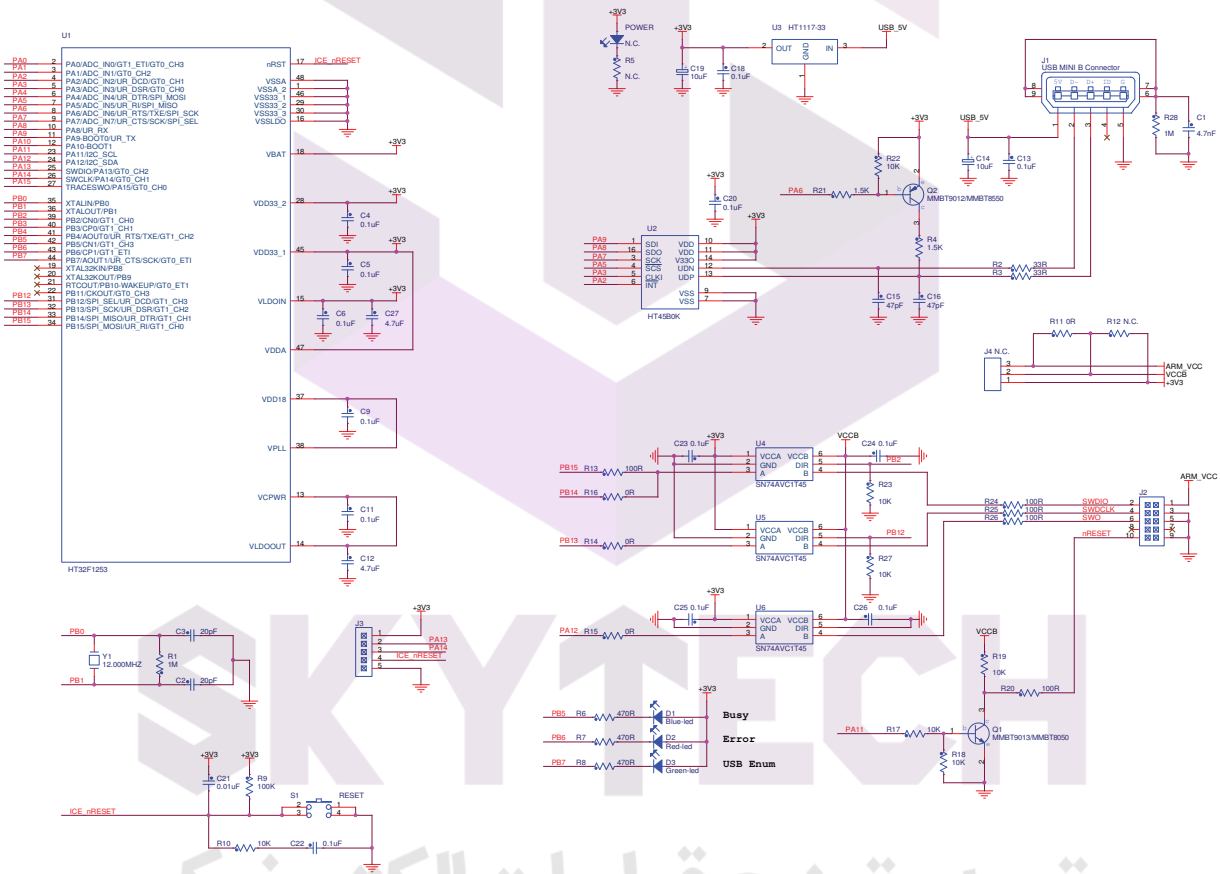

Figure 3. e-Link32 v1.0

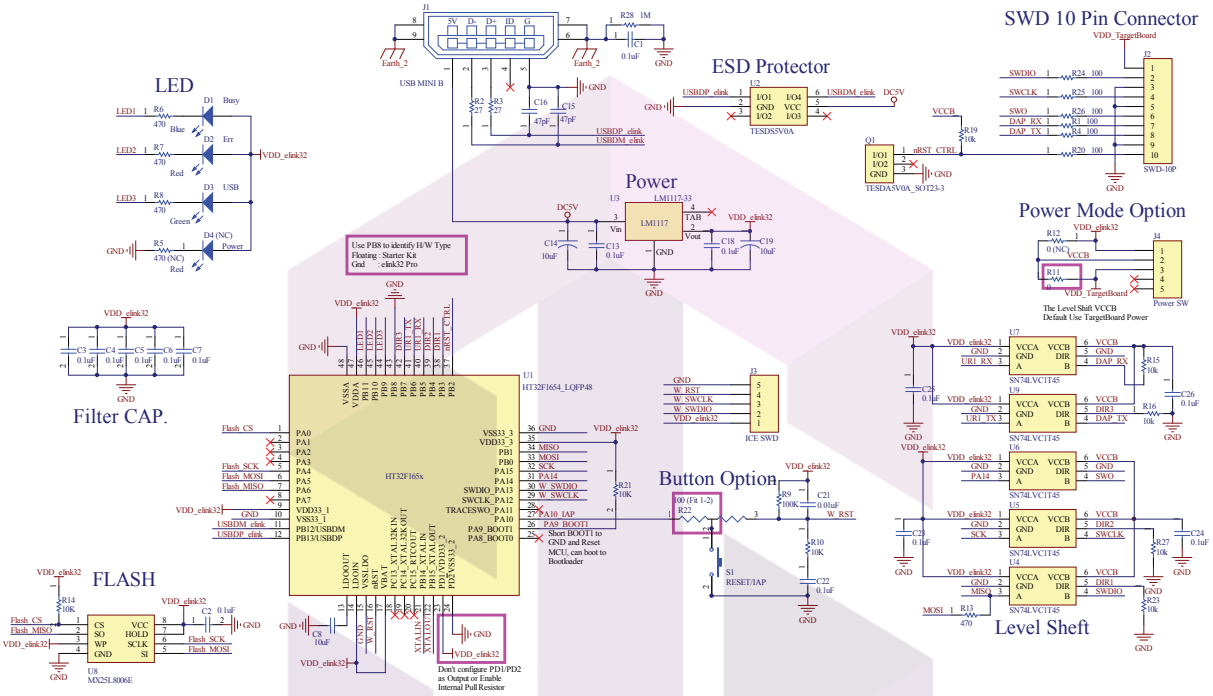

Figure 4. e-Link32 Pro v1.0

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2 MDK_ARM (KEIL) Setup and Use

e-Link32/e-Link32 Pro for Keil Installation

The following steps show how to install the e-Link32/e-Link32 Pro for Keil:

- Double-click "HT32_Setup_Keil_vxx.exe" to open the Keil Boot program and press the "Yes" button to continue.

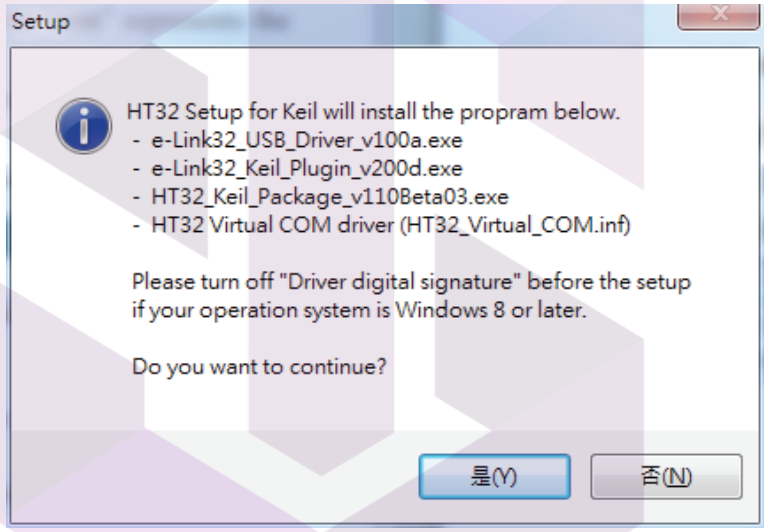

Figure 5. HT32_Setup_Keil_vxx.exe Installation Introduction

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■ The default installation path of the Keil Boot program is "C:\Program Files (x86)\HT32_Setup_Keil". Select the desired installation path and press the "Next" button to continue.

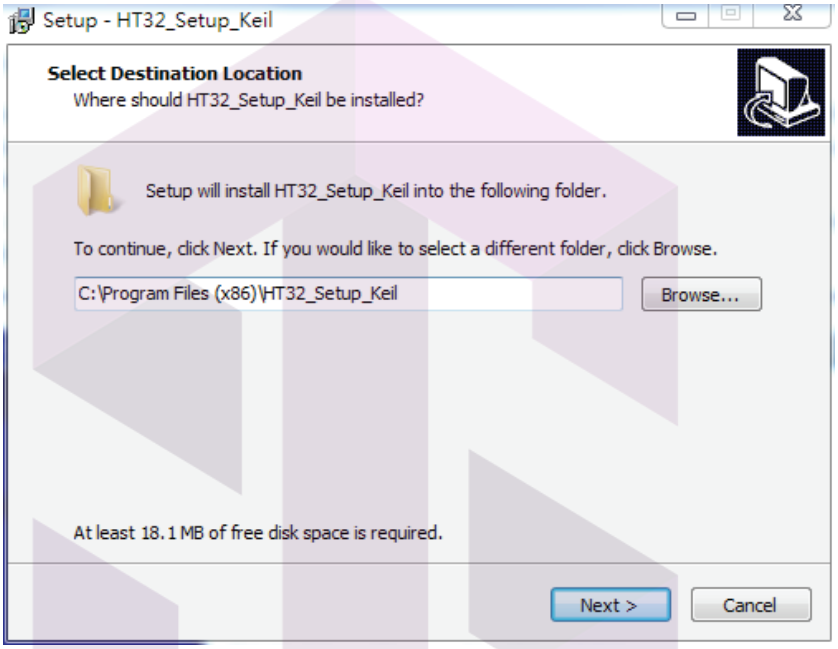

Figure 6. HT32_Setup_Keil_vxx.exe Installation Path

■ Press the "Install" button to start the installation.

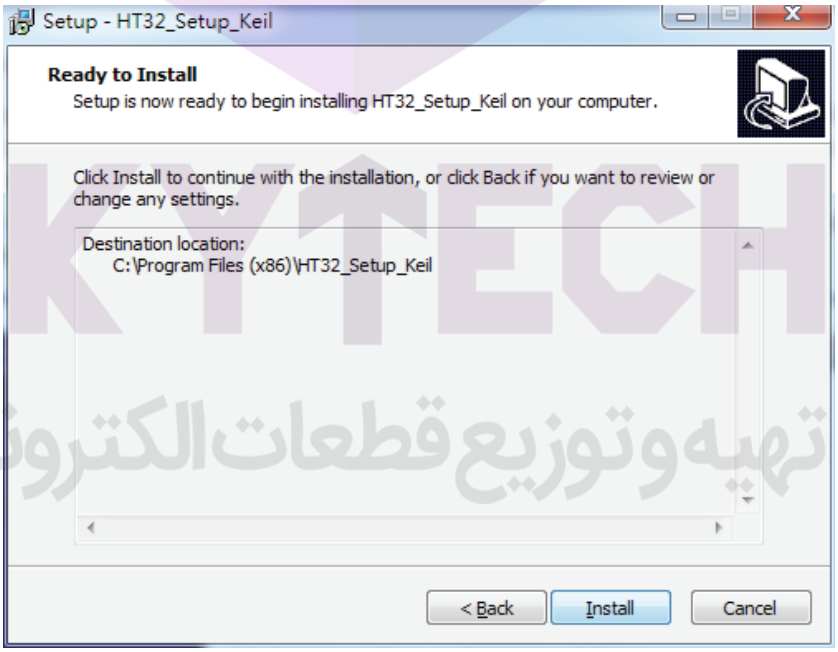

Figure 7. HT32_Setup_Keil_vxx.exe Installation Process

■ Once the installation has finished, the following screen will appear. Press the "Next" button to install the "Holtek e-Link32 USB Driver".

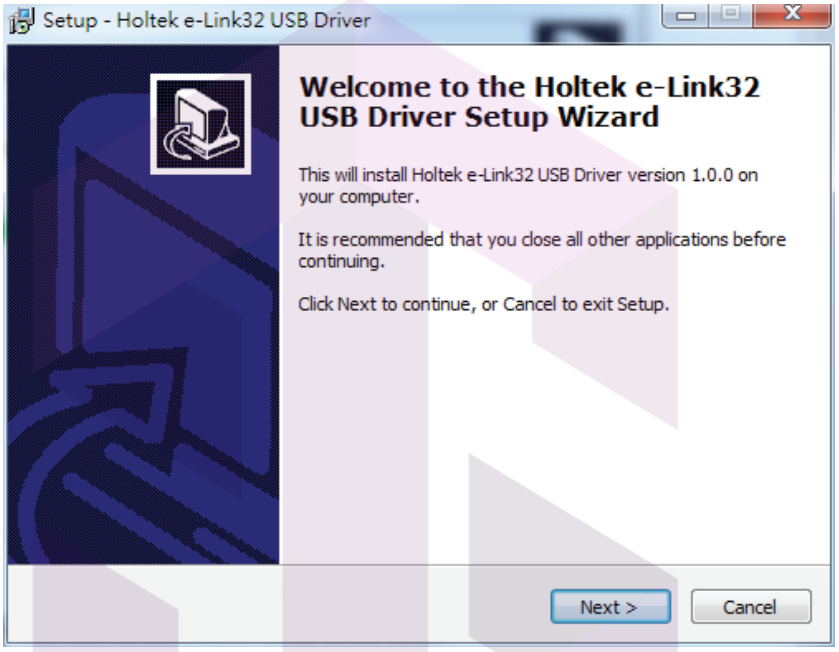

Figure 8. Holtek e-Link32 USB Driver Installation Introduction

■ The default installation path of the Holtek e-Link32 USB Driver is "C:\Program Files (x86)\Holtek HT32 Series\e-Link32 USB Driver". Select the desired installation path and press the "Next" button to install.

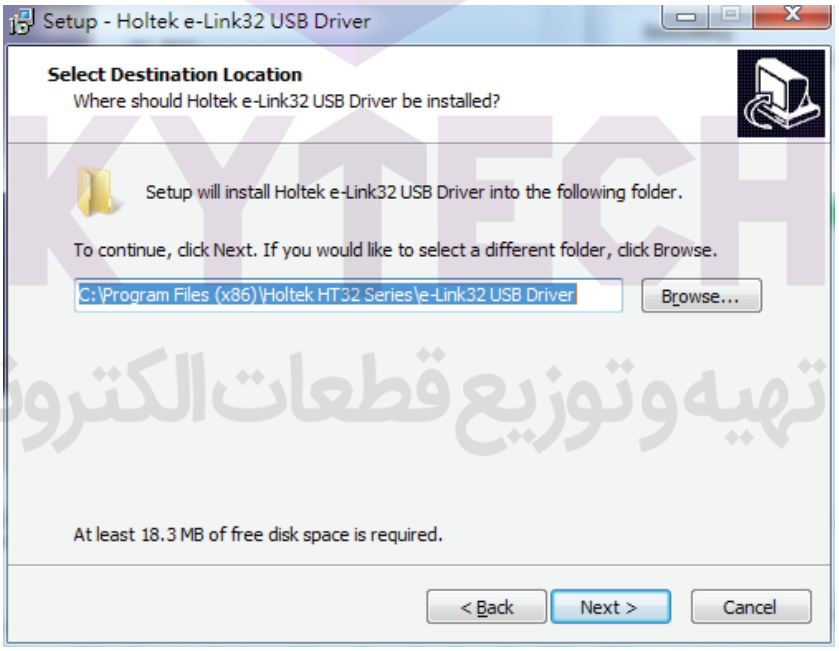

Figure 9. Holtek e-Link32 USB Driver Installation Path

■ Once the installation has finished, the following screen will appear. Press the "Finish" button to enter the next Keil Plugin installation process.

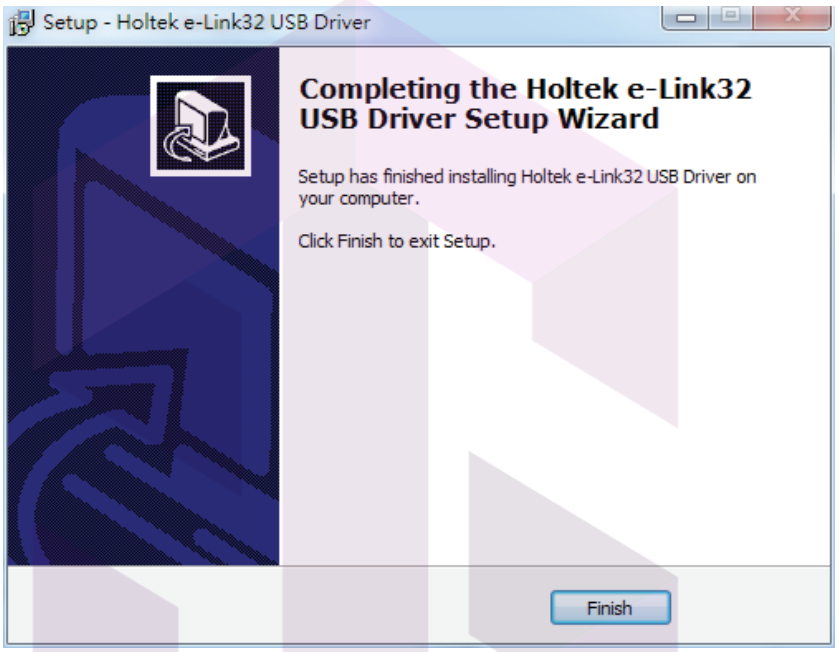

Figure 10. Holtek e-Link32 USB Driver Installation Completion

■ If the Holtek e-Link32 Keil Plugin has already been installed, users will be prompted to uninstall any older versions. Press the "Yes" button to continue.

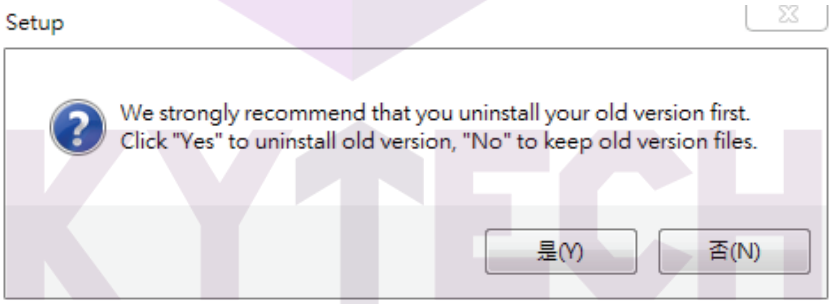

Figure 11. Holtek e-Link32 Keil Plugin Old Version Uninstallation

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■ Once the uninstallation has finished in the previous step, a Holtek e-Link32 Keil Plugin installation window will appear. Press the "Next" button to continue.

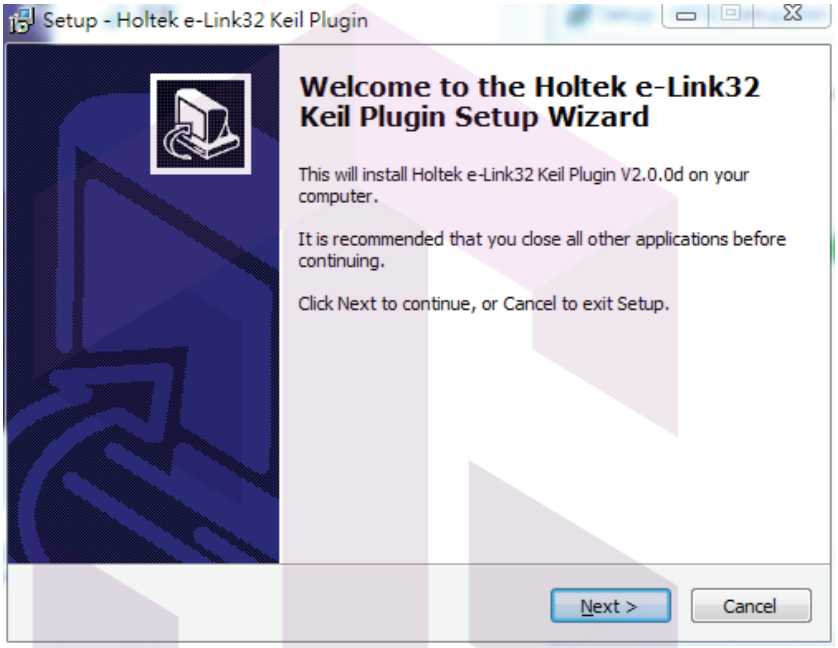

Figure 12. Holtek e-Link32 Keil Plugin Installation Introduction

■ The Keil Plugin installation path is subject according to that of Keil4/Keil5. The default installation path of the Keil4/Keil5 is "C:\Keil_xx". Select the desired installation path and press the "Next" button to install.

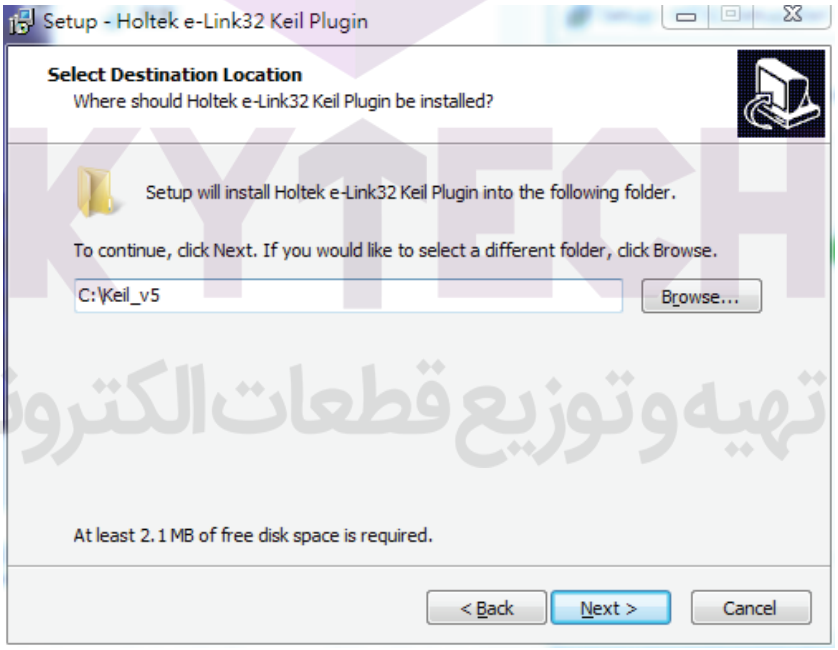

Figure 13. Holtek e-Link32 Keil Plugin Installation Path

■ Once the installation has finished, press the "Finish" button to enter the next Holtek HT32 Keil Support Package installation process, then press the "Next" button to continue.

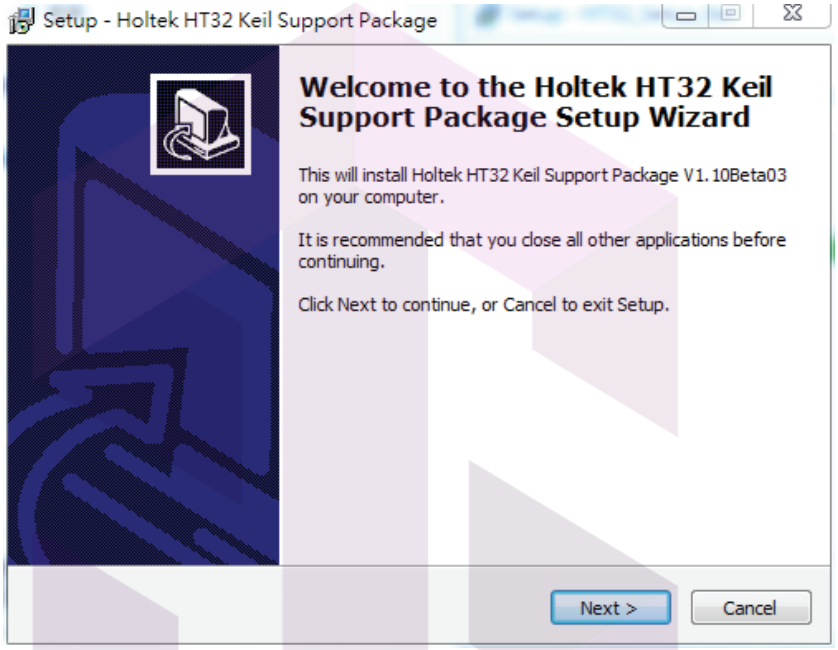

Figure 14. Holtek HT32 Keil Support Package Installation Introduction

■ The Keil Support Package installation path is subject to that of the Keil4/Keil5. The default installation path of the Keil4/Keil5 is "C:\Keil_xx". Select the desired installation path and press the "Next" button to install.

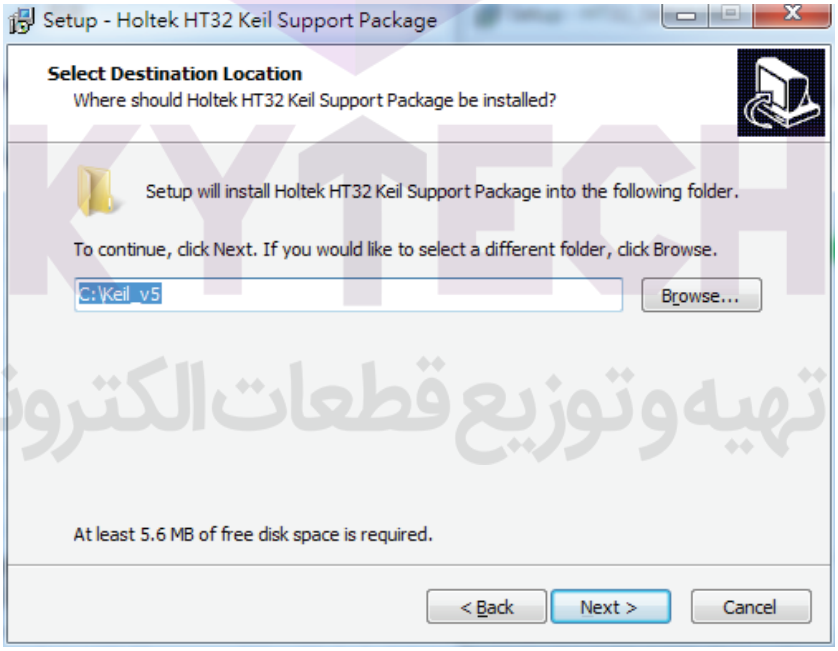

Figure 15. Holtek HT32 Keil Support Package Installation Path

■ Once the installation has finished, press the "Finish" button to enter. The completed window will be displayed after which the "Finish" button should be selected to restart the computer.

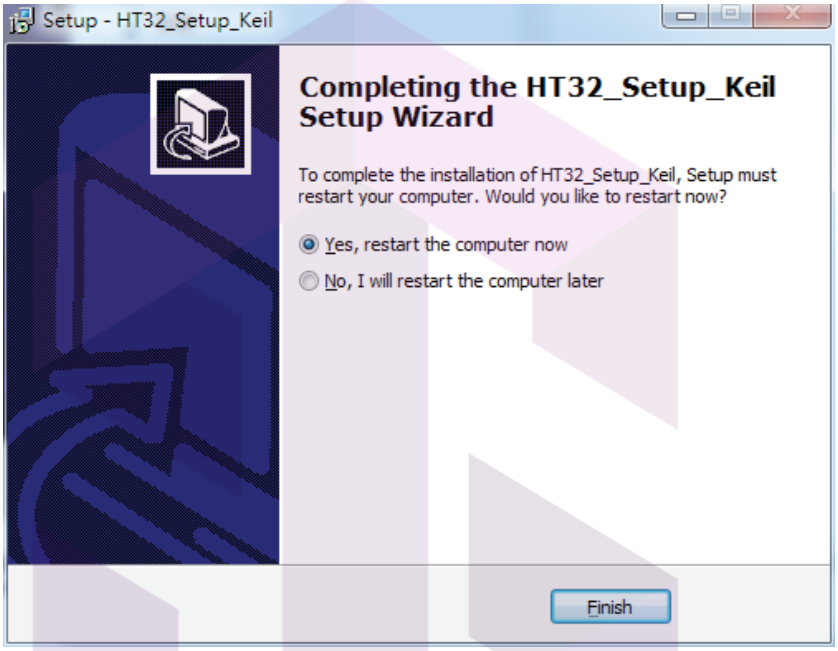

Figure 16. Keil Installation Completion

■ Connect the e-Link32/e-Link32 Pro to the PC's USB port.

■ Open the PC's "Device Manager" to check the connection status of the e-Link32/e-Link32 Pro.

■ If the e-Link32 is connected, a connection device named "Holtek e-Link32 Debug Interface" will appear on the "Device Manager" window. This will confirm that the installation has been successful.

Figure 17. e-Link32 Device Name

■ If the e-Link32 Pro is connected, a connection device named "HID-compliant device" will appear on the "Device Manager" window, and the corresponding Virtual COM Port will also be found, confirming that the installation was successful.

Figure 18. e-Link32 Pro Device Name

e-Link32/e-Link32 Pro with Keil4 Setup and Use

■ Open the Keil uVision4 project, click "Options for Target", then click the "Debug" option to select "Holtek e-Link32 Debugger" for e-Link32 or select "CMSIS-DAP Debugger" for e-Link32 Pro.

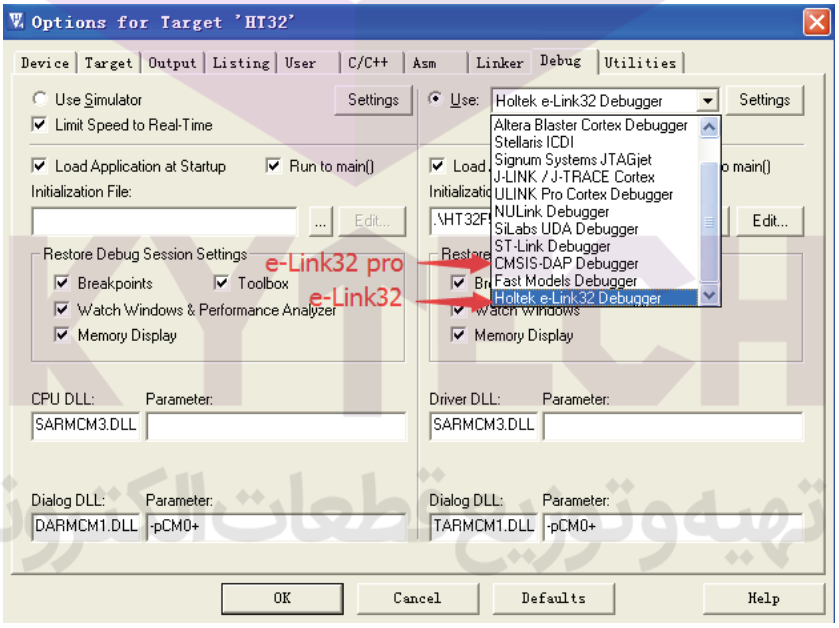

Figure 19. Keil4 Debugger Selection

■ After the bebugger is selected, click the "Settings" button on the right side to open the corresponding setting window. Confirm that the setting is successful when the device ID is read. The e-Link32 setting window is shown below:

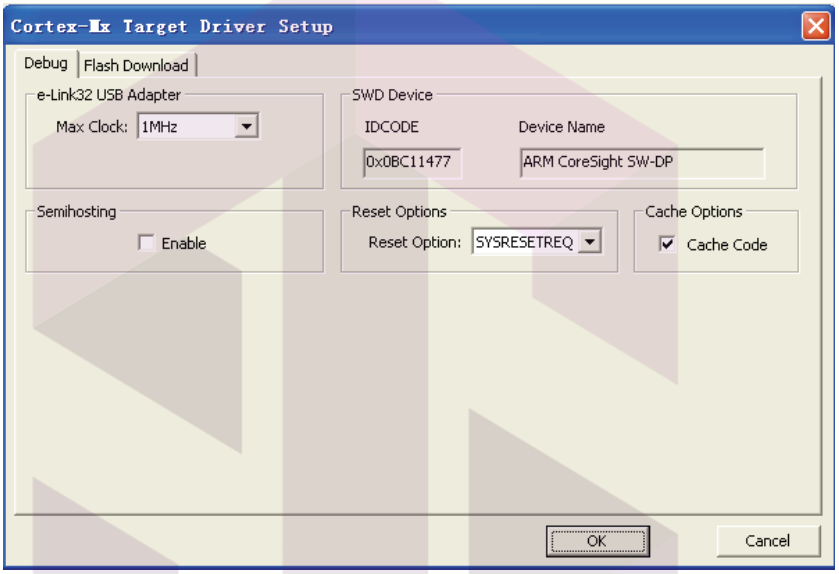

Figure 20. Keil4 e-Link32 Setting Window

The e-Link32 Pro setting window is shown below:
Select SW mode as the Port type.

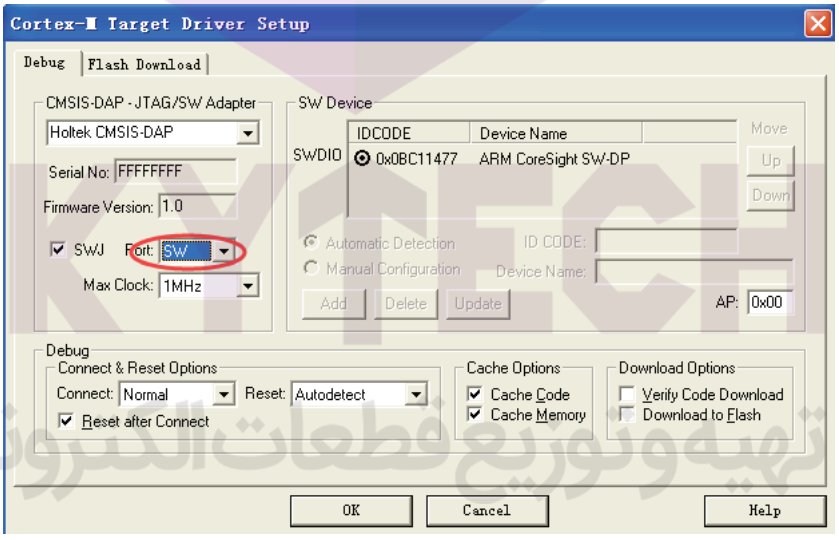

Figure 21. Keil4 e-Link32 Pro Setting Window

■ Click "Flash Download" to check the "Programming Algorithm", if there is no content or the content is not correct, then press the "Add" button.

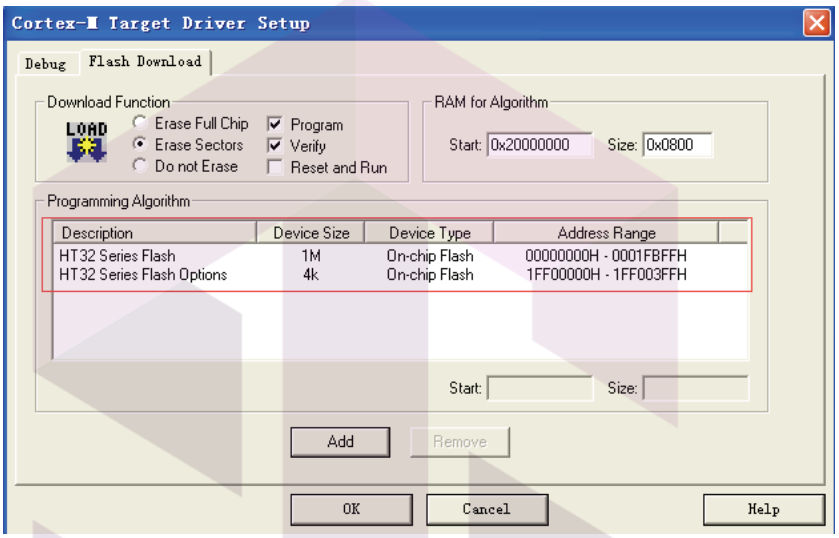

Figure 22. Keil4 - Flash Download Setup

e-Link32 Pro with Keil5 Setup and Use (No Support e-Link32)

■ Open the Keil uVision5 project, click "Options for Target", and select "CMSIS-DAP Debugger" in the "Debug" option.

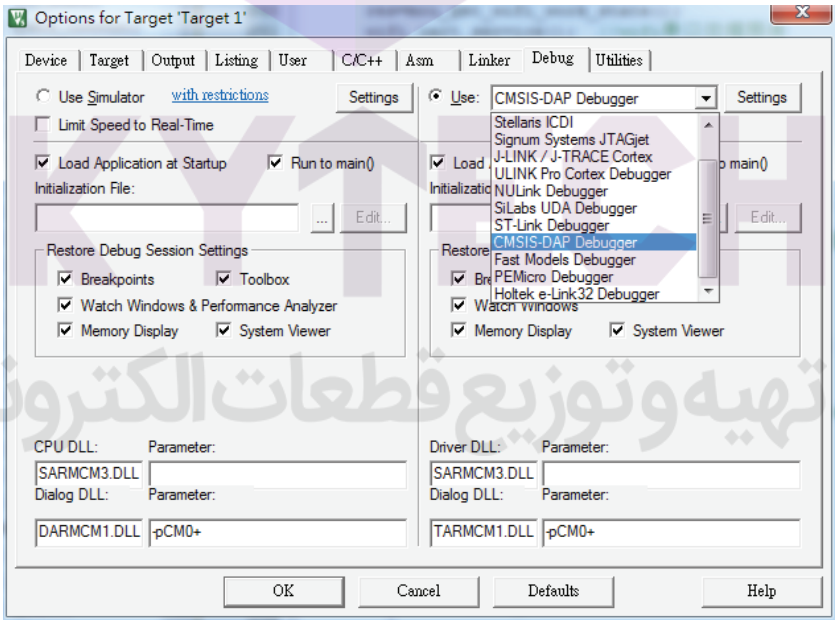

Figure 23. Keil5 Debugger Selection

■ After the bebugger is selected, click the "Settings" button on the right side to select the SW options. Confirm that the setting is successful when the device ID is read.

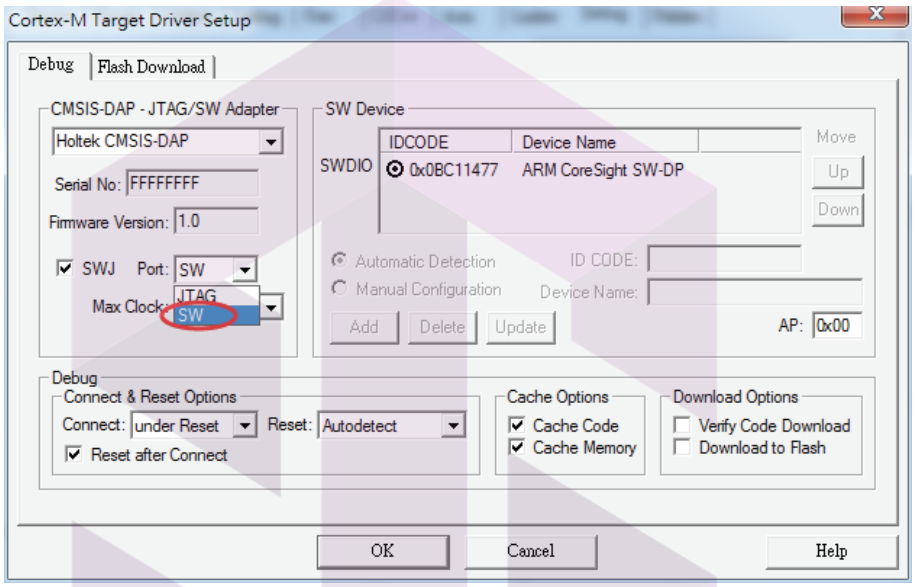

Figure 24. Keil5 Debugger Setup

■ Click "Flash Download" to check "Programming Algorithm", if there is no content or the content is not correct, then press the "Add" button.

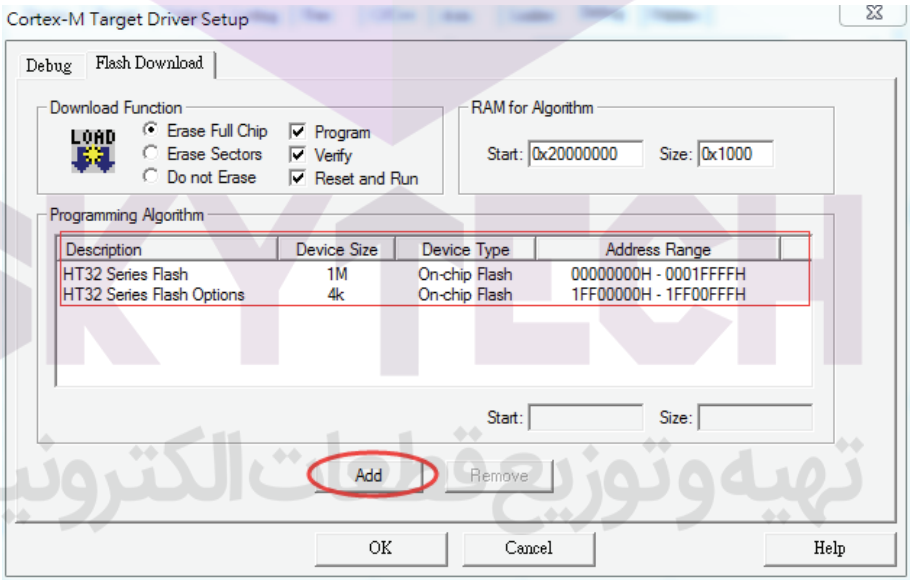

Figure 25. Keil5 – Flash Download Setup

3 IAR Setup and Use

e-Link32/e-Link32 Pro for IAR Installation

The following steps show how to install the e-Link32/e-Link32 Pro for IAR:

- Double-click "HT32_Setup_IAR_vxx.exe" to open the IAR Boot program and press the "Yes" button to continue.

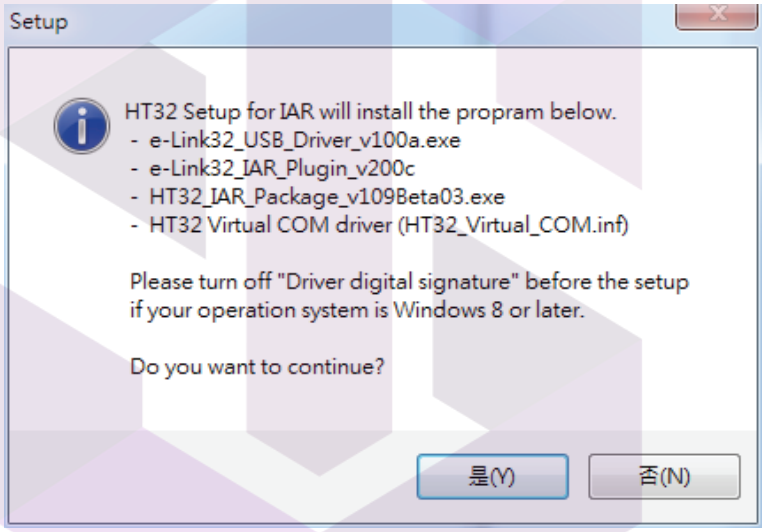

Figure 26. HT32_Setup_IAR_vxx.exe Installation Introduction

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■ The default installation path of the IAR Boot program is "C:\Program Files (x86)\HT32_Setup_IAR". Select the desired installation path and press the "Next" button to continue.

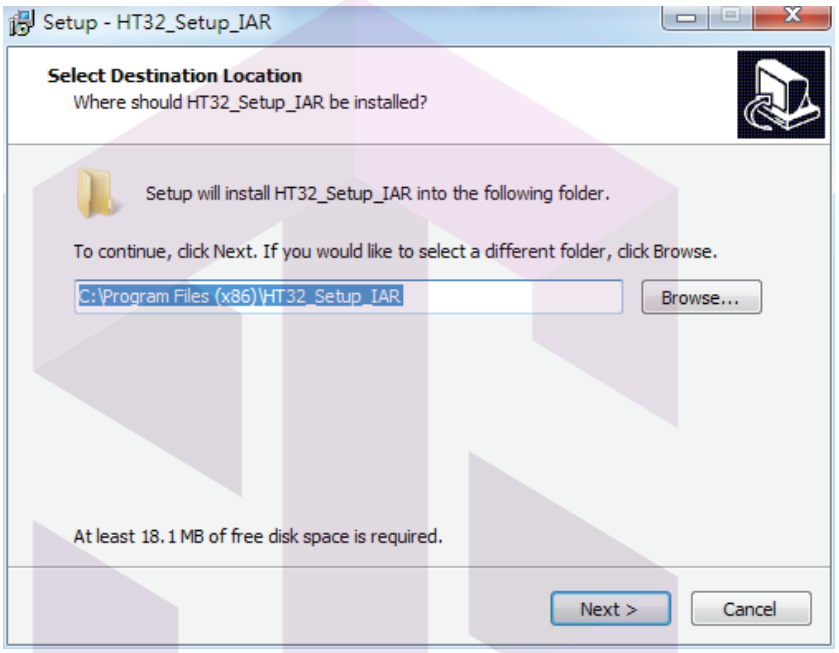

Figure 27. HT32_Setup_IAR_vxx.exe Installation Path

■ Press the "Install" button to start the installation.

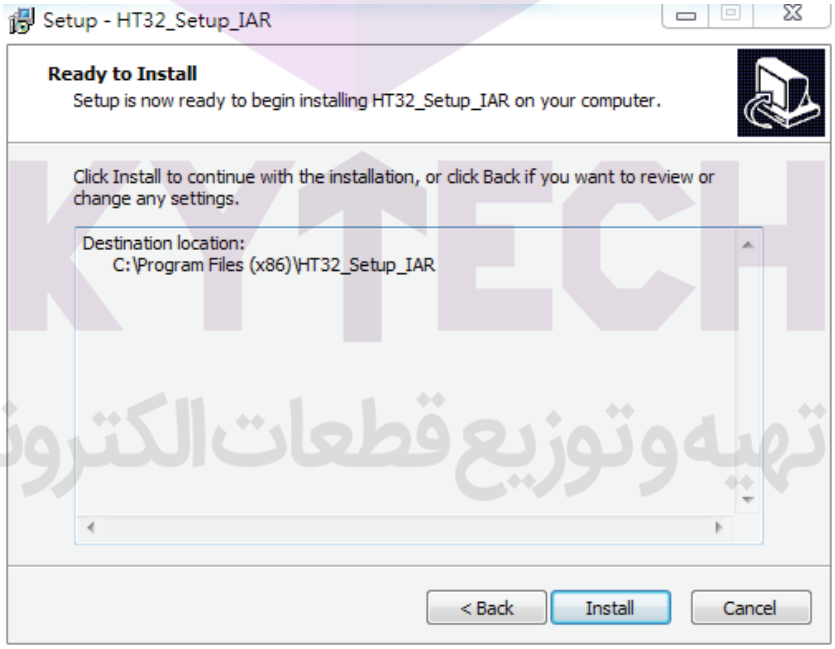

Figure 28. HT32_Setup_IAR_vxx.exe Installation Process

■ Once the installation has finished, the following screen will appear. Press the "Next" button to install the "Holtek e-Link32 USB Driver".

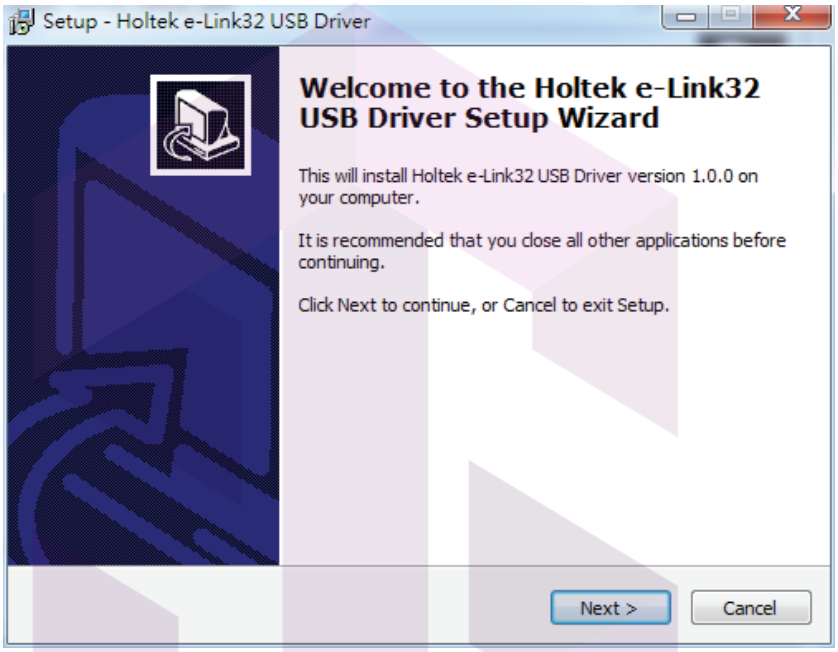

Figure 29. Holtek e-Link32 USB Driver Installation Introduction

■ The default installation path of the Holtek e-Link32 USB Driver is "C:\Program Files (x86)\Holtek HT32 Series\e-Link32 USB Driver". Select the desired installation path and press the "Next" button to install.

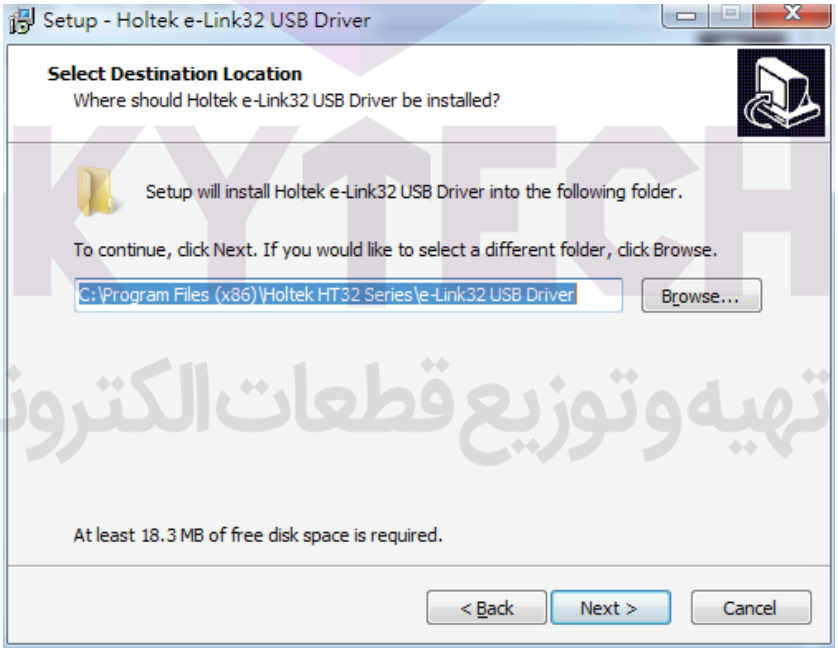

Figure 30. Holtek e-Link32 USB Drive Installation Path

■ Once the installation has finished, the following screen will appear. Press the "Finish" button to enter the next IAR Plugin installation process.

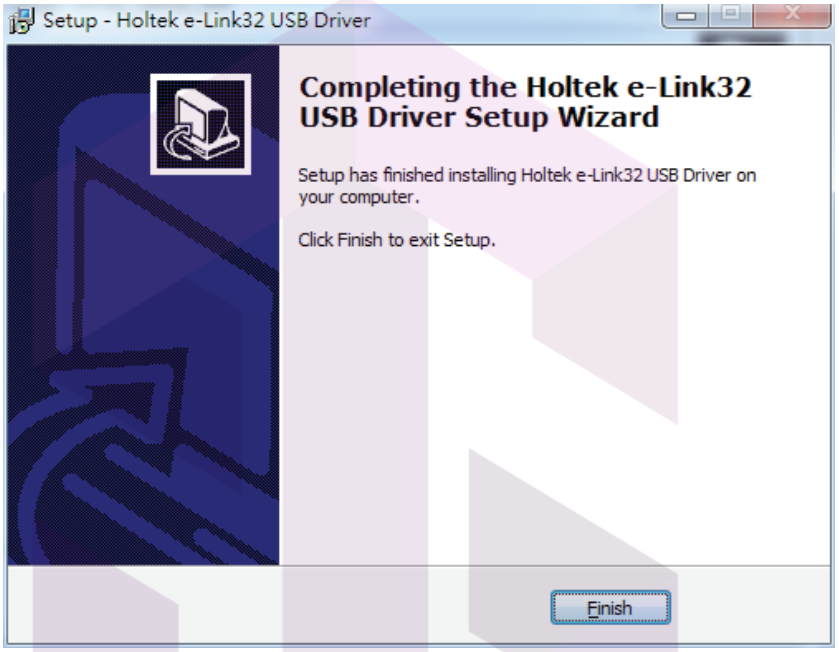

Figure 31. Holtek e-Link32 USB Driver Installation Completion

■ If the Holtek e-Link32 IAR Plugin has already been installed, users are prompted to uninstall any older versions. Press the "Yes" button to continue.

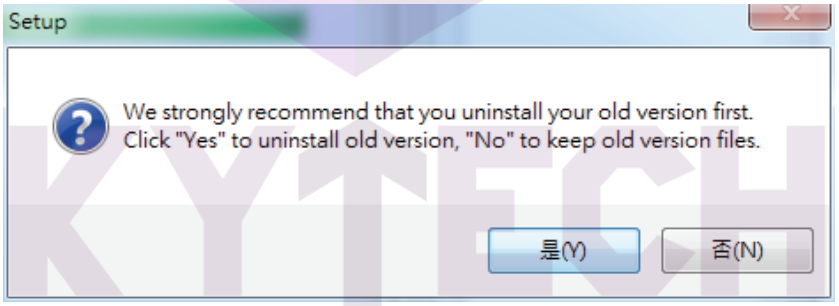

Figure 32. Holtek e-Link32 IAR Plugin Old Version Uninstallation

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■ Once the uninstallation has finished in the previous step, a Holtek e-Link32 IAR Plugin installation window will appear. Press the "Next" button to continue.

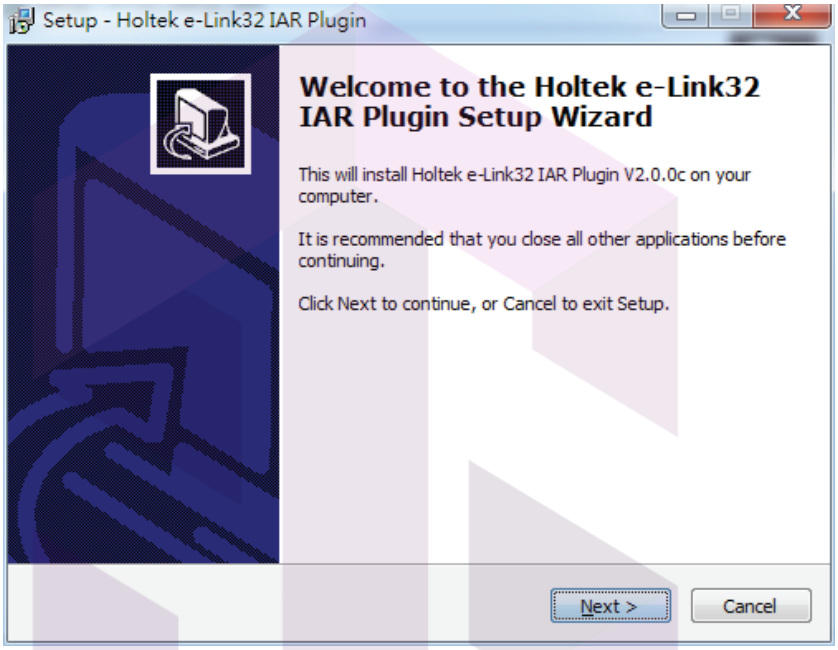

Figure 33. Holtek e-Link32 IAR Plugin Installation Introduction

■ The default installation path of the IAR Plugin is "C:\Program Files\Holtek HT32 Series\e-Link32 IAR Plugin". Select the desired installation path and press the "Next" button to install.

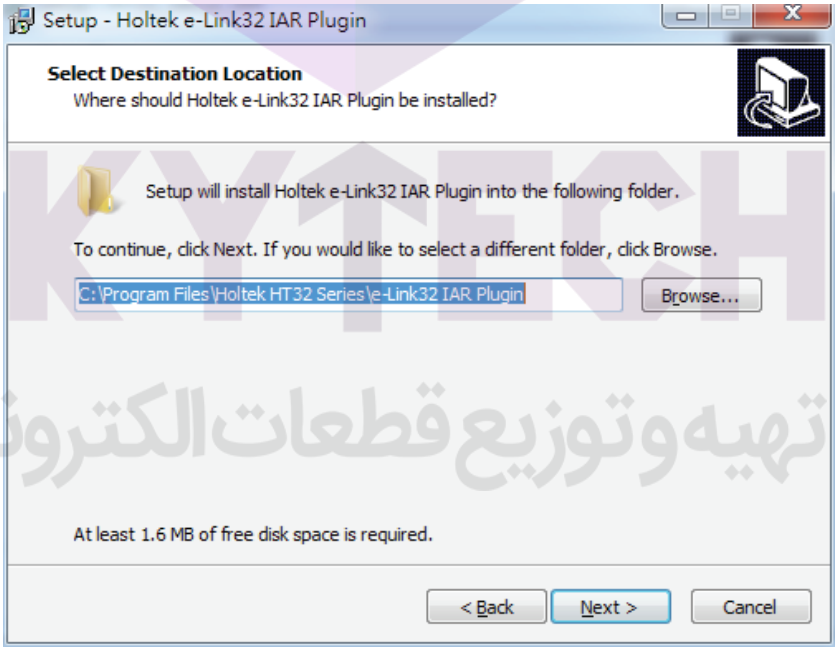

Figure 34. Holtek e-Link32 IAR Plugin Installation Path

- Once the installation has finished, press the "Finish" button to enter the next Holtek HT32 IAR Support Package installation process, then press the "Next" button to continue.

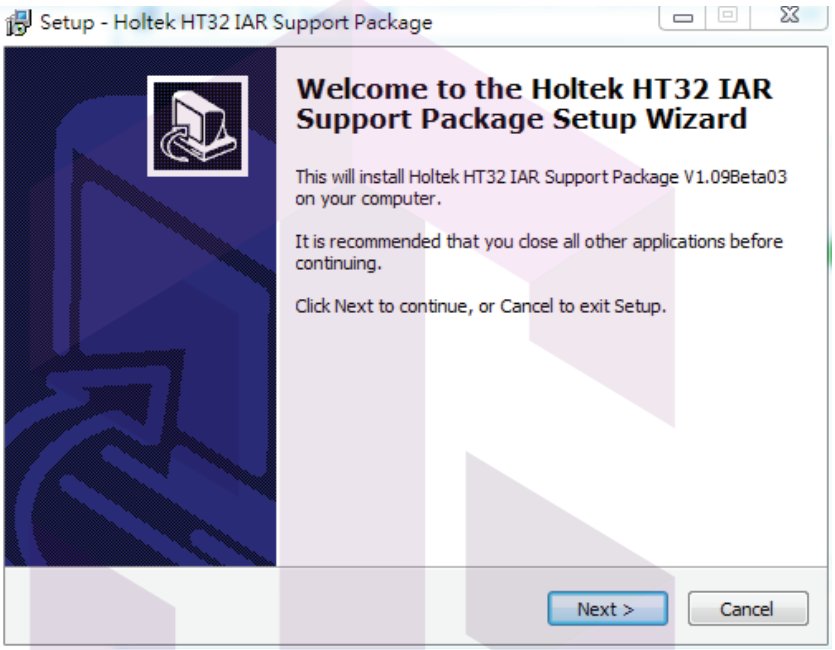

Figure 35. Holtek HT32 IAR Support Package Installation Introduction

- Once the installation has finished, press the "Finish" button.
- Connect the e-Link32/e-Link32 Pro to the PC's USB port.
- Open the PC's "Device Manager" to check the connection status of the e-Link32/e-Link32 Pro.
- If the e-Link32 is connected, a connection device named "Holtek e-Link32 Debug Interface" will appear on the "Device Manager" window, confirmting that the installation has been successful.

Figure 36. e-Link32 Device Name

■ If the e-Link32 Pro is connected, a connection device named "HID-compliant device" will appear on the "Device Manager" window, and the corresponding Virtual COM Port will also be found, confirming that the installation has been successful.

Figure 37. e-Link32 Pro Device Name

e-Link32/e-Link32 Pro with IAR EWARM Setup and Use

■ Open the IAR EWARM project, and then open "Options".

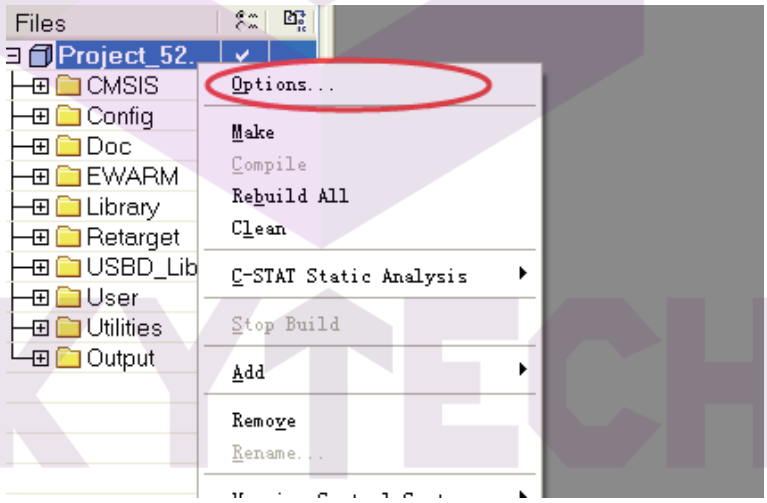

Figure 38. IAR Options

■ Click "Debugger" to select "RDI" for e-Link32 or select "CMSIS DAP" for e-Link32 Pro.

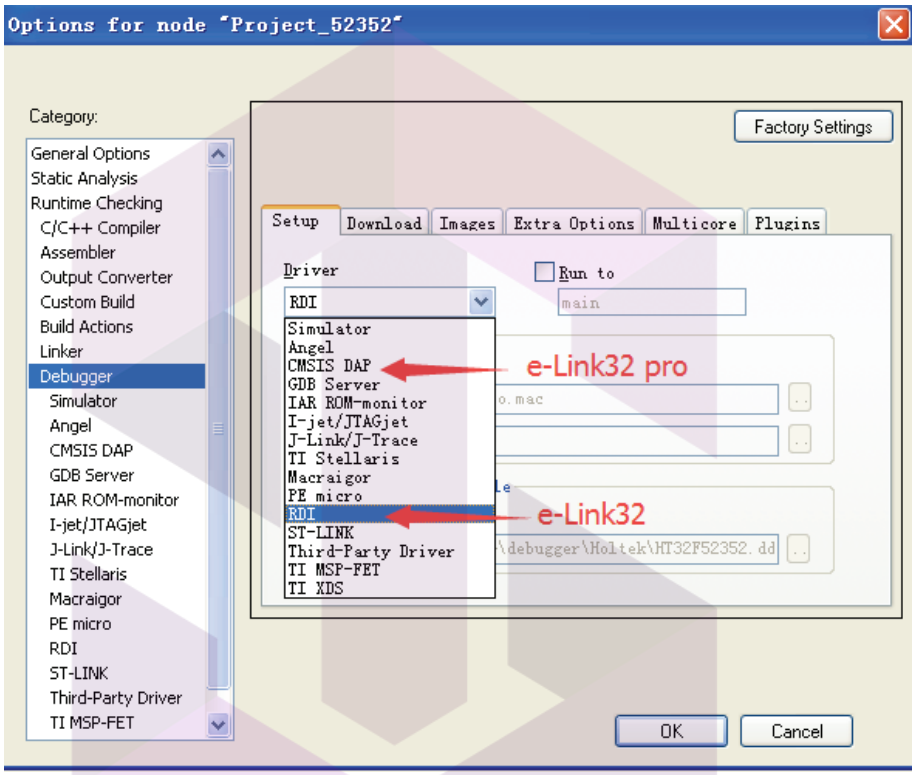

Figure 39. IAR Debugger Selection

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■ Setting the selected debugger.
Check wheather "e-Link32_rdi.dll" is selected in "Manufacturer RDI driver" for e-Link32 RDI.

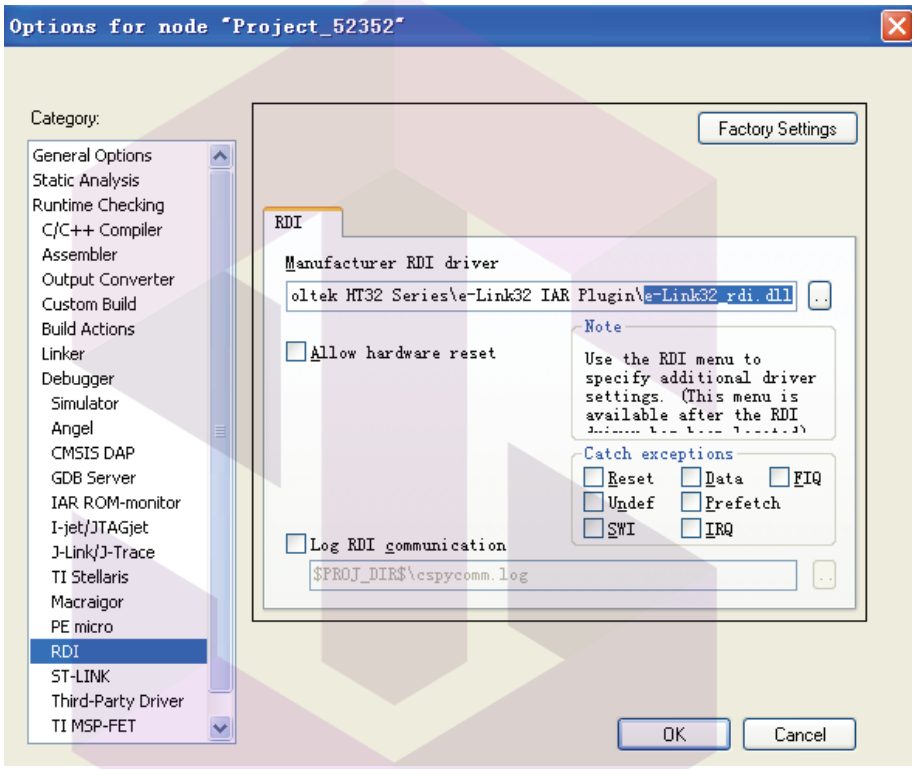

Figure 40. IAR e-Link32 Debugger Setup

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Switch Interface option to SWD mode for e-Link32 Pro CMSIS DAP.

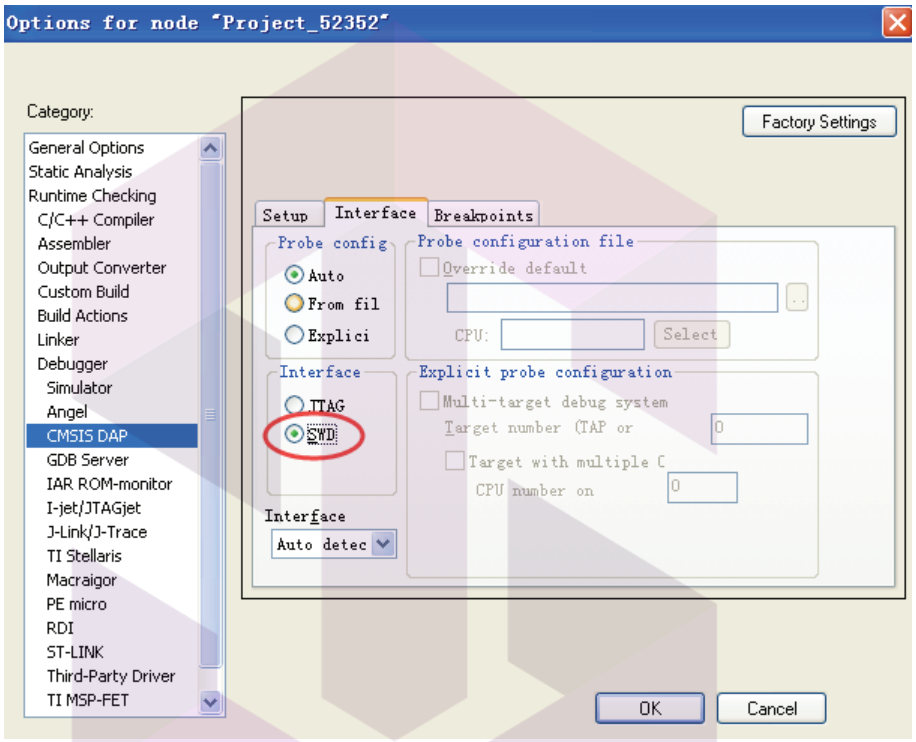

Figure 41. IAR e-Link32 Pro Debugger Setup

- Once the settings have finished, the corresponding debugger options will appear on the function table.

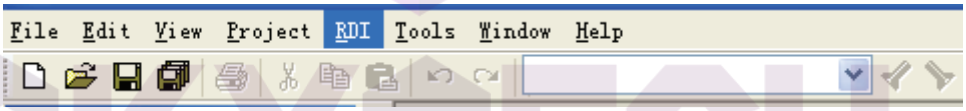

Figure 42. IAR e-Link32 Debugger Function Table

Figure 43. IAR e-Link32 Pro Debugger Function Table

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