

# N9H26 Non-OS BSP User Guide

Usage Introduction for 32-bit MPU Family

## Document Information

<b>Abstract</b>	Introduce the usage of Keil and Eclipse development environment and Non-OS BSP content for the N9H26 series microprocessor (MPU).
<b>Apply to</b>	N9H26 series MPU.

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## 1 Introduction to N9H26 Non-OS BSP

This BSP supports Nuvoton N9H26 series HMI-application 32-bit microprocessor (MPU) embedded with an outstanding CPU core ARM926EJ-S. The N9H26 series runs up to 240 MHz, with 8 KB I-cache, 8 KB D-cache and MMU, 8 KB embedded SRAM and 16 KB IBR (Internal Boot ROM) for booting from NAND, SD and SPI Flash.

The N9H26 series is integrated with video codec (H.264), JPEG codec, 32-channel SPU (Sound Processing Unit), AAC accelerator, SDIO host controller, USB2.0 HS Host/Device, ADC, DAC and TV encoder for meeting various kinds of application needs.

This non-OS BSP contains IPs sample code with Keil and Eclipse project for getting started easily.

### 1.1 Keil Development Environment

The Non-OS BSP supports using Keil as the development environment, and uses J-Link ICE for debugging. The IDE does not belong to the content of this document. Please refer to official Keil website <http://www.keil.com/> for the user manual of Keil IDE.

The N9H26 supports J-TAG debug interface. This interface can be used to download programs to DRAM and debug. It is recommended to boot on recovery mode for ICE debugging.

### 1.2 Eclipse Development Environment

This section introduces the installation steps of Eclipse development environment. First, download Eclipse IDE for C/C++ Developers Tool from Eclipse official website <https://www.eclipse.org/downloads/>, and select proper version according to your operating system. Since Eclipse is a Java based application, please download JRE from Java website and install it.

The cross compile - GNU ARM Embedded Toolchain can be downloaded from <https://gnu-mcu-eclipse.github.io/plugins/install/>.

1. After installing the software packages mentioned above, execute Eclipse and select **Help** -> **Eclipse Marketplace**.

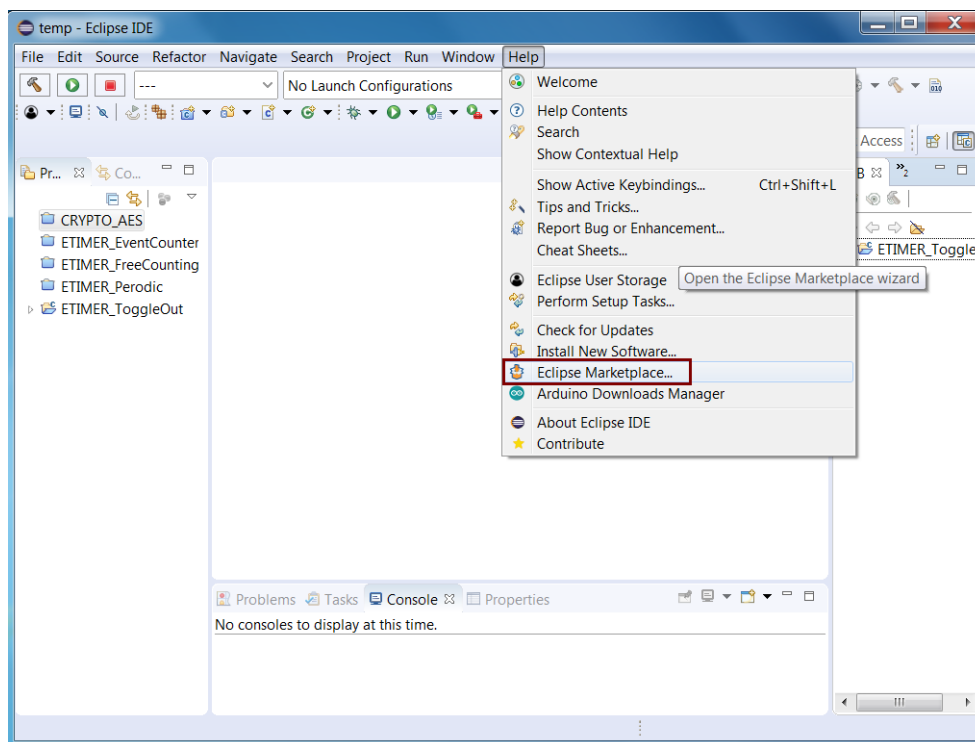


Figure 1-1 Select Eclipse Marketplace

2. Input gnu mcu exlipse in the Find field, and then the search result will be shown as Figure 1-2. Select latest version and click the **Install** button to install the required plug-in.

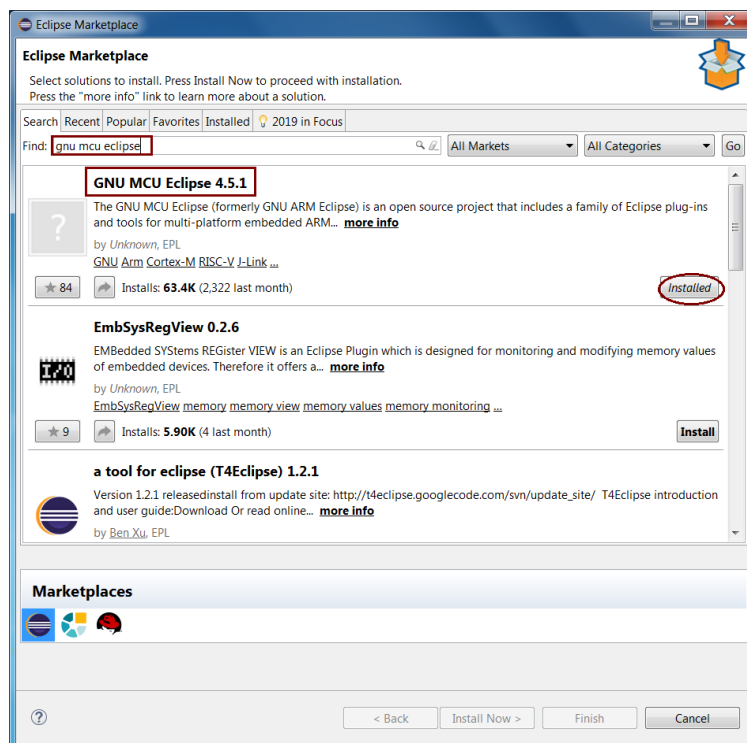


Figure 1-2 Install Plug-in

3. Click **Help -> Install New Software** to install CDT to support C/C++ development.

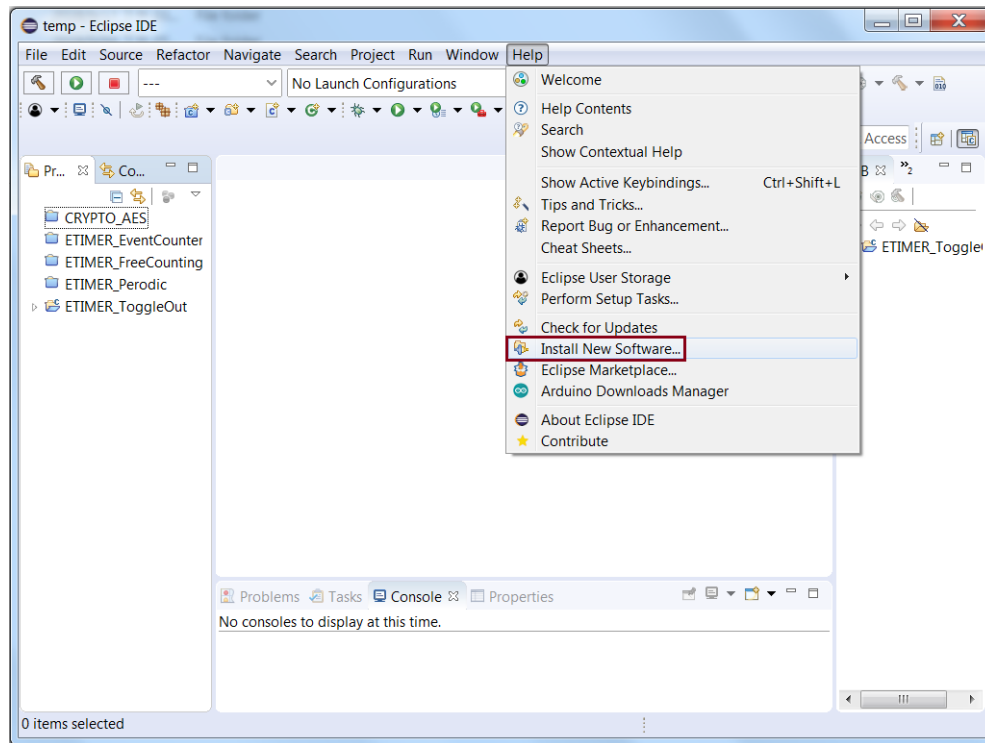


Figure 1-3 Install New Software

4. Input CDT in the Work with field.

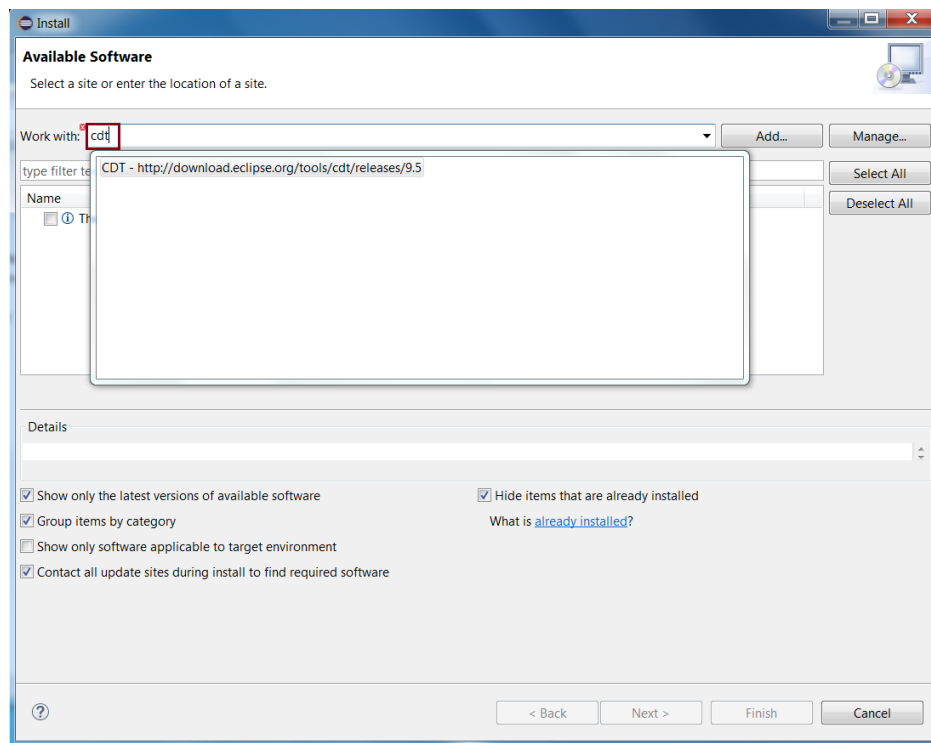


Figure 1-4 Search for CDT

5. Select **CDT Main Features** and **CDT Optional Features** as shown in Figure 1-5. Also select other packages if necessary.

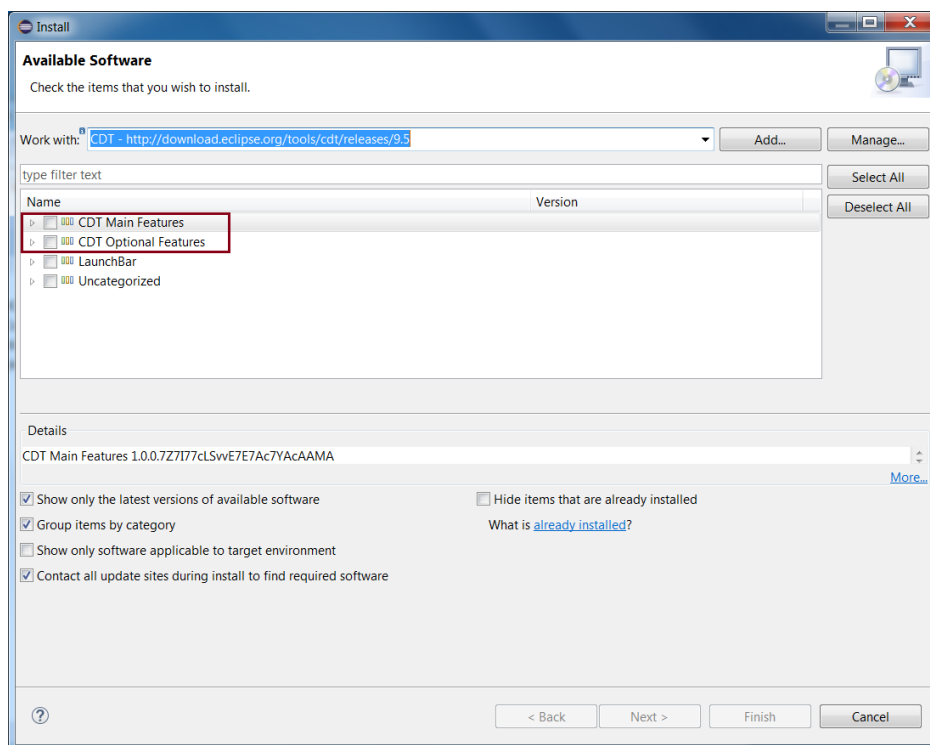


Figure 1-5 Select CDT

6. After installing CDT, re-start Eclipse to import Eclipse project.

The Eclipse supports debugging using J-Link ICE. Download and install J-Link plug-in from the website <http://gnuarmclipse.github.io/plugins/install/> before starting debugging. After installation, set J-Link path in **Preference->MCU-> Global SEGGER J-Link**, and then click **Apply** button.

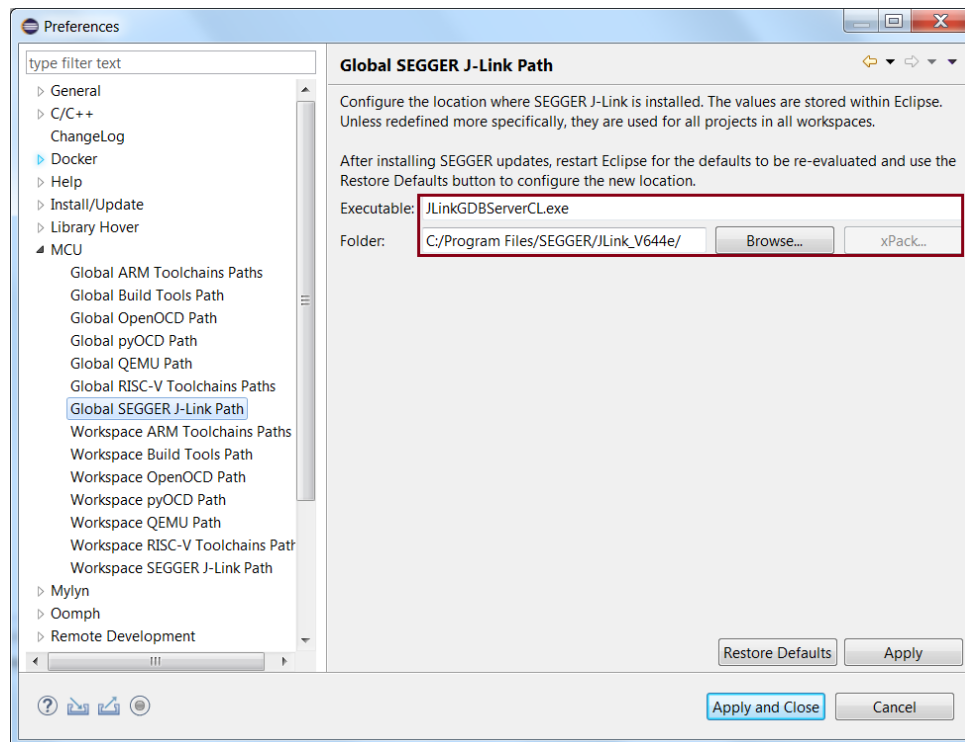


Figure 1-6 Global SEGGER J-Link Path Setting

7. The next step is to set GDB SEGGER J-Link Debugging options. Click **Run-> Debug Configurations** and then expand **GDB SEGGER J-Link Debugging** configuration.

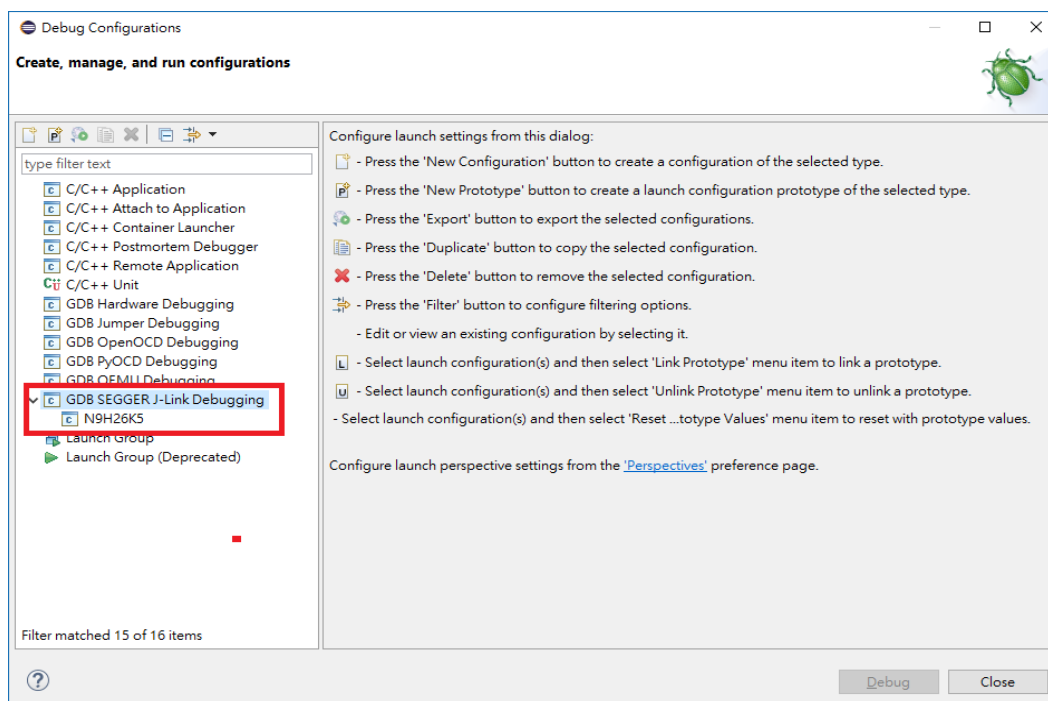


Figure 1-7 GDB SEGGER J-Link Debug

8. Select the corresponding configuration matched with your device. Go to **Debugger** tab, as shown in Figure 1-8.

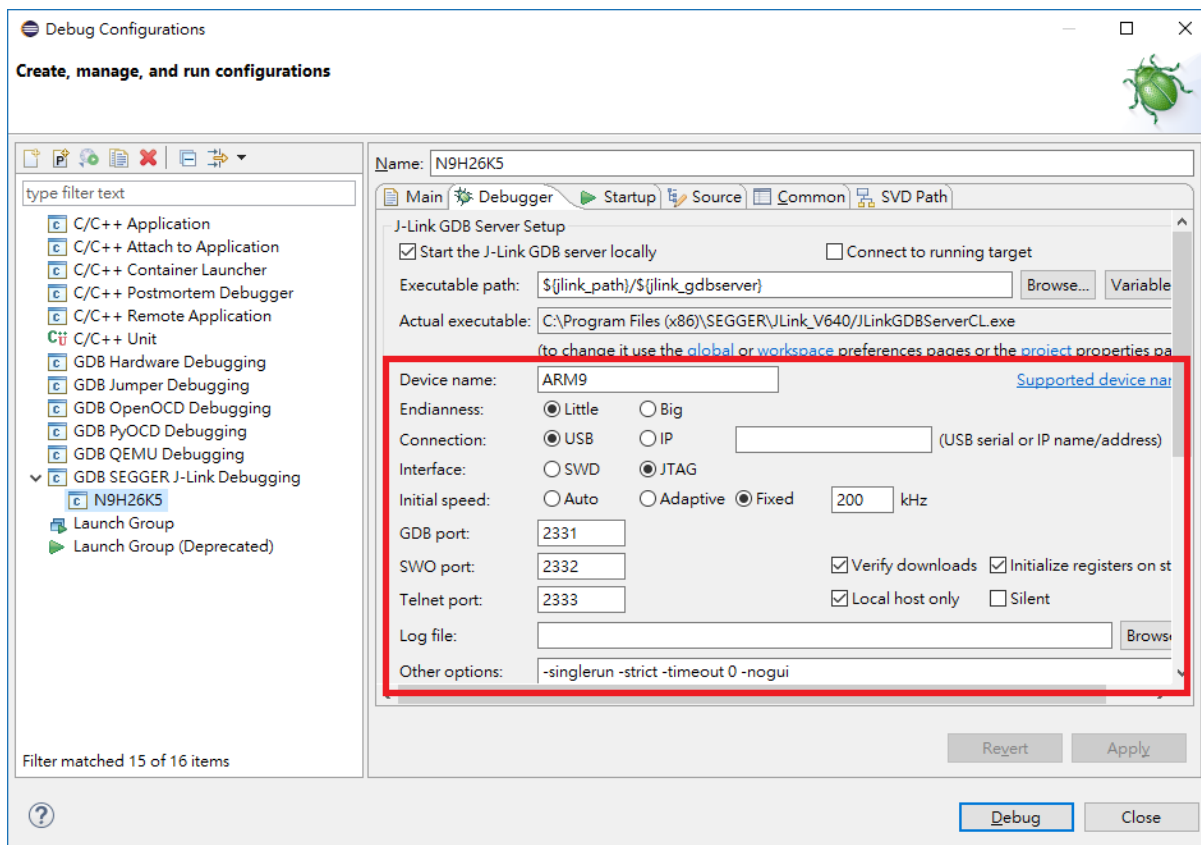


Figure 1-8 J-Link Debugger Setting



- Go to **Startup** tab, as shown in Figure 1-9.

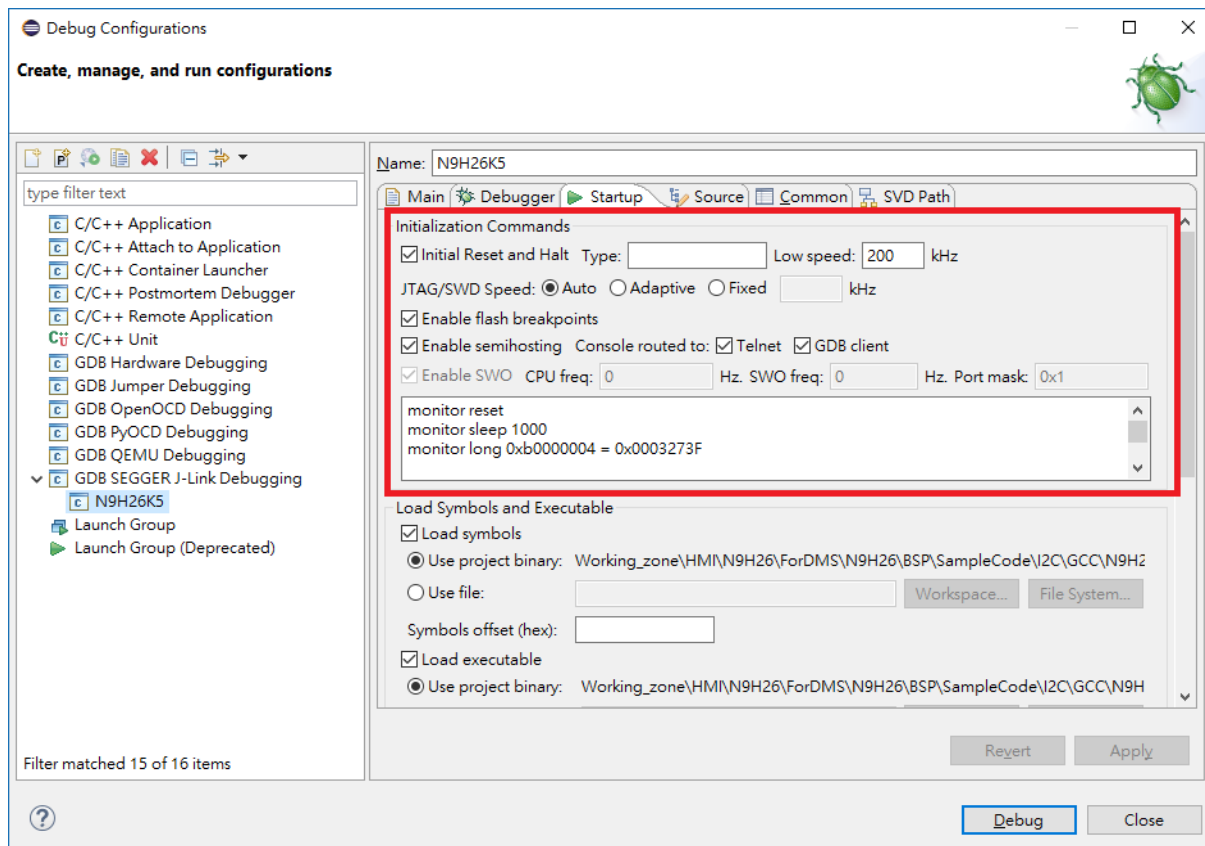


Figure 1-9 J-Link Startup Setting

- After the setting is complete, click **Debug** button to start debugging with J-Link.

## 2 BSP Content

### 2.1 Non-OS BSP Directory Structure

The Non-OS BSP contains four directories. The content of each directory is listed below.

Directory Name	Content
BSP	Folder contains Non-OS driver, third party software and sample applications.
Documents	BSP related documents.
Loader	Contain source code and binary file for different loader in booting path.
Tools	Tools include PC tools and the Mass production tools.

### 2.2 BSP Content

The content of each BSP directory is listed below.

Directory Name	Content
Driver	N9H26 peripheral drivers. Please refer to N9H26 Non-OS Library Reference Guide.pdf under Documents directory for the usage of driver APIs.
Library	N9H26 Keil libraries, including IP, AVI, GNAND, NVTFAT and USB Hos. The IP library source code can be found in <i>Driver\Source</i> folder.
Library_GCC	N9H26 GCC libraries, including IP, AVI, GNAND, NVTFAT and USB Hos. The IP library source code can be found in <i>Driver\Source</i> folder.
SampleCode	Driver sample application.
Script	<p>Link script and debug initialization file for Keil.</p> <p>Below is the setting for 240/360 MHz.</p> <ul style="list-style-type: none"> <li>● N9H26K5.ini and N9H26K6.ini for IP usage example, which are executed at the address 0x0.</li> <li>● N9H26K5_loader.ini and N9H26K6_loader.ini for NandLoader, SDLoader and SPILoader under Loaders folder, which are executed at the address 0x900000.</li> <li>● N9H26K5_NVTloader.ini and N9H26K6_NVTloader.ini for NVTLOADER, which are executed at the address 0x800000</li> </ul>

	address. <b>Note:</b> If the postfix of file is “_264MHz”, it is for 264/396 MHz setting. Since USBH needs 48 MHz clock as the clock source, please do not use 264/396 MHz setting if USBH is required for the application.
ThirdParty	Third party software, including emWin and FreeRTOS.

## 2.3 Loader Content

The booting sequence is **IBR → Loader → NVTLoader (option)**. These folders provide the reference sample code for these Loaders. In most cases, this code does not need to be modified.

Directory Name	Content
Binary	Contains the pre-build binary file for NandLoader, SDLoader, SPILoader and NVTLoader.
NANDLoader	Source code of NandLoader. Please refer to N9H26 NAND Loader Reference Guide.pdf under Documents directory for the usage.
NVTLoader	Source code of NVTLoader. Please refer to N9H26 NVTLoader Reference Guide.pdf under Documents directory for the usage.
SDLoader	Source code of SDLoader. Please refer to N9H26 SD Loader Reference Guide.pdf under Documents directory for the usage.
SPILoader	Source code of SPI Loader. Please refer to N9H26 SPI Loader Reference Guide.pdf under Documents directory for the usage.
SPILoader_gzip	Source code of SPI Loader with gzip. Please refer to N9H26 SPI Loader Reference Guide.pdf under Documents directory for the usage.

## 2.4 Tools Content

This directory contains PC\_tools and MassProduction\_tools.

### PC\_tools:

Directory Name	Description
AutoWriter V3.xx.xxx_N9H26K6	Please refer to the AutoWriter User Guide.pdf for details.
TurboWriter V2.xx.xxx_N9H26K6	Please refer to the TurboWriter Tool User Guide.pdf for details.

**MassProduction\_tool:**

Prepare the content you want to program on storage on SDx in advance. This tool can copy the prepared data to NAND/SD/SPI through SD booting.

Directory Name	Description
NandWriter	Please refer to NandWriter User Guide.pdf under <i>NandWriter\Doc</i> folder for details.
SDWriter	Please refer to SDWriter User Guide.pdf under <i>SDWriter\Doc</i> folder for details.
SPIWriter	Please refer to SPIWriter User Guide.pdf under <i>SPIWriter\Doc</i> folder for details.

**Revision History**

Date	Revision	Description
2018.05.04	1.00.000	Initially issued.
2018.08.17	1.00.001	Minor update.
2019.09.30	1.01.000	Added Eclipse IDE description.
2020.09.15	1.02.000	Added Library_GCC folder.

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