GigaDevice Semiconductor Inc.

GD32 MCU Eclipse development environment setup tutorial for Windows

Application Note AN068



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1. Introduction

This guide introduces how to set up the GD32 Eclipse development environment. Applicable to all GD32 MCUs.



2.

Development environment preparation

- Operating system: WIN7 / WIN10 64-bit OS
- IDE: Eclipse IDE for GNU ARM & RISC-V C/C++ Developers
- Cross toolchains: arm-none-eabi-gcc / riscv-none-embed-gcc
- Build Tools: GNU MCU Eclipse build tools
- GDB server: OpenOCD / J-Link GDB Server



3. Tool installation instructions

3.1. Cross toolchains installation

3.1.1. ARM cross toolchains installation

Download the xpack-arm-none-eabi-gcc-10.2.1-1.1-win32-x64.zip

Visit <u>https://github.com/xpack-dev-tools/arm-none-eabi-gcc-xpack/releases/</u> to choose to download different versions of the ARM cross toolchains.

In this guide, choose to download xpack-arm-none-eabi-gcc-10.2.1-1.1-win32-x64.zip and the download address is : <u>https://github.com/xpack-dev-tools/arm-none-eabi-gcc-xpack/tags</u>

Figure 3-1. Download ARM cross toolchains

xpack-arm-none-eabi-gcc-10.2.1-1.1-darwin-x64.tar.gz
xpack-arm-none-eabi-gcc-10.2.1-1.1-darwin-x64.tar.gz.sha
𝔅 xpack-arm-none-eabi-gcc-10.2.1-1.1-linux-arm.tar.gz
𝔅 xpack-arm-none-eabi-gcc-10.2.1-1.1-linux-arm.tar.gz.sha
𝔅 xpack-arm-none-eabi-gcc-10.2.1-1.1-linux-arm64.tar.gz
𝔅 xpack-arm-none-eabi-gcc-10.2.1-1.1-linux-arm64.tar.gz.sha
𝔅 xpack-arm-none-eabi-gcc-10.2.1-1.1-linux-ia32.tar.gz
𝔅 xpack-arm-none-eabi-gcc-10.2.1-1.1-linux-ia32.tar.gz.sha
𝔅 xpack-arm-none-eabi-gcc-10.2.1-1.1-linux-x64.tar.gz
🕅 xpack-arm-none-eabi-gcc-10.2.1-1.1-linux-x64.tar.gz.sha
𝔅 xpack-arm-none-eabi-gcc-10.2.1-1.1-win32-ia32.zip
𝔅 xpack-arm-none-eabi-gcc-10.2.1-1.1-win32-ia32.zip.sha
🕸 xpack-arm-none-eabi-gcc-10.2.1-1.1-win32-x64.zip
🕅 xpack-arm-none-eabi-gcc-10.2.1-1.1-win32-x64.zip.sha
Source code (zip)
Source code (tar.gz)

3.1.2. RISC-V cross toolchains installation

Download the xpack-riscv-none-embed-gcc-10.1.0-1.1-win32-x64.zip

Visit <u>https://xpack.github.io/riscv-none-embed-gcc/releases/</u> to choose to download different versions of the RISC-V cross toolchains.

GD32 MCU Eclipse development environment setup tutorial for Windows

In this guide, choose to download xpack-riscv-none-embed-gcc-10.1.0-1.1-win32-x64.zip and the download address is : <u>https://github.com/xpack-dev-tools/riscv-none-embed-gcc-xpack/releases/tag/v10.1.0-1.1/</u>

Figure 3-2. Download RISC-V cross toolchains-1

The xPack GNU RISC-V Embedded GCC releases
 xPack GNU RISC-V Embedded GCC v10.1.0-1.1 release (download) xPack GNU RISC-V Embedded GCC v8.3.0-2.3 released (download) xPack GNU RISC-V Embedded GCC v8.3.0-2.2 released (download) xPack GNU RISC-V Embedded GCC v8.3.0-1.2 released (download) xPack GNU RISC-V Embedded GCC v8.3.0-1.2 released (download) xPack GNU RISC-V Embedded GCC v8.3.0-1.1 released (download) xPack GNU RISC-V Embedded GCC v8.2.0-3.1 released (download) xPack GNU RISC-V Embedded GCC v8.2.0-3.1 released (download) xPack GNU RISC-V Embedded GCC v8.2.0-3.2 released (download)
 GNU MCU Eclipse RISC-V Embedded GCC v8.2.0-2.1 20190425 released (download) GNU MCU Eclipse RISC-V Embedded GCC v8.1.0-2-20181019 released (download) GNU MCU Eclipse RISC-V Embedded GCC v7.2.0-4-20180606 released (download) GNU MCU Eclipse RISC-V Embedded GCC v7.2.0-3-20180506 released (download) GNU MCU Eclipse RISC-V Embedded GCC v7.2.0-2-20180111 released (download) GNU MCU Eclipse RISC-V Embedded GCC v7.2.0-1-20171109 released (download) GNU MCU Eclipse RISC-V Embedded GCC v7.1.1-2-20170912-* released (download) GNU MCU Eclipse RISC-V Embedded GCC v7.1.1-20170702-* released (download)

Figure 3-3. Download RISC-V cross toolchains-2

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𝔅 xpack-riscv-none-embed-gcc-10.1.0-1.1-linux-arm64.tar.gz.sha
𝔅 xpack-riscv-none-embed-gcc-10.1.0-1.1-linux-ia32.tar.gz
😚 xpack-riscv-none-embed-gcc-10.1.0-1.1-linux-ia32.tar.gz.sha
𝔅 xpack-riscv-none-embed-gcc-10.1.0-1.1-linux-x64.tar.gz
Start
𝔅 xpack-riscv-none-embed-gcc-10.1.0-1.1-win32-ia32.zip
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Structure content of the second secon
Source code (zip)
Source code (tar.gz)

3.2. Build Tools installation

Download the xpack-windows-build-tools-4.2.1.2-win32-x64.zip

Visit <u>https://xpack.github.io/windows-build-tools/releases/</u> to choose to download different versions of the Build tools.



In this guide, choose to download xpack-windows-build-tools-4.2.1.2-win32-x64.zip and the download address is : <u>https://github.com/xpack-dev-tools/windows-build-tools-xpack/releases/tag/v4.2.1-2/</u>





Figure 3-5. Download Build Tools-2

Assets 6	
xpack-windows-build-tools-4.2.1-2-win32-ia32.zip	2.23 MB
Sxpack-windows-build-tools-4.2.1-2-win32-ia32.zip.sha	115 Bytes
🛇 xpack-windows-build-tools-4.2.1-2-win32-x64.zip	2.5 MB
xpack-windows-build-tools-4.2.1-2-win32-x64.zip.sha	114 Bytes
Source code (zip)	
Source code (tar.gz)	

3.3. Eclipse IDE installation

3.3.1. JDK installation

■ Download the *jdk-8u202-windows-x64.exe*

Eclipse needs to run in Java environment, so user need to install JDK before inst alling Eclipse. Visit_<u>http://www.oracle.com/technetwork/java/javase/downloads/java-a</u> <u>rchive-javase8-2177648.html</u> to choose to download different versions of JDK tools.

In this guide, choose to download and install jdk-8u202-windows-x64.exe.



Figure 3-6. Download JDK-1

Before the file can be downloaded, user must accept the license agreement.

Figure 3-7. Download JDK-2

iou must accept in	e Oracle Binary Code License Agreement for the Java SE Platform Products to download this softwar
I reviewed and Required	accept the Oracle Binary Code License Agreement for the Java SE Platform Products
	You will be redirected to the login screen in order to download the file.
	Download jdk-8u202-windows-x64.exe

■ Install the jdk-8u202-windows-x64.exe

Open the CMD window and type java -version to test whether the JDK is installed correctly. If the JDK has been installed correctly, user can get similar output as shown in *Figure 3-8. JDK version test*.

Figure 3-8. JDK version test

```
C:\Users\_____java -version
java version "1.8.0_202"
Java(TM) SE Runtime Environment (build 1.8.0_202-b08)
Java HotSpot(TM) 64-Bit Server VM (build 25.202-b08, mixed mode)
```

3.3.2. Eclipse IDE for GNU ARM & RISC-V C/C++ Developers installation

Download the eclipse-embedcpp-2021-03-R-win32-x86_64.zip

Visit <u>https://eclipse-embed-cdt.github.io/packages/releases/</u> to download different v ersions of Eclipse IDE.

In this guide, choose to download and install eclipse-embedcpp-2021-03-R-win32-x86_64.zip.

The download address is:

https://www.eclipse.org/downloads/download.php?file=/technology/epp/downloads/r elease/2021-03/R/eclipse-embedcpp-2021-03-R-win32-x86_64.zip



Figure 3-9. Download Eclipse-1



Figure 3-10. Download Eclipse-2



Figure 3-11. Download Eclipse-3



3.4. Debug Tools driver installation

3.4.1. OpenOCD installation

■ Download the OpenOCD.exe

OpenOCD software does not need to be installed, just open and use. The OpenOCD software for GD32 MCU can be obtained from the original GD factory.

3.4.2. Segger J-Link installation

Download the J-Link software

Visit <u>https://www.segger.com/downloads/jlink#Documentation</u> to download differe nt versions of J-Link drivers.



In this guide, choose to download and install J-LinkV7.54b.

Figure 3-12. Download J-Link driver

J-Link Software and Documentation F	Pack	Ξ
	Version	*
 J-Link Software and Documentation pack All-in-one debugging solution Can be downloaded and used free of charge by any owner of a SEGGER J-Link, J-Trace or Flasher model. Not all features of it may be available on all J-Link / J-Trace / Flasher models. Updated frequently. Release Notes More information 	<u>√7.54b</u> ∽ [2021-09-14]	Windows

After the download is completed, just install it directly.



4. Eclipse startup and configurations

4.1. Create worksapce

The Eclipse software itself is a green software and does not need to be installed. Just doubleclick the eclipse.exe in the eclipse folder to start Eclipse, as shown in *Figure 4-1. Eclipse IDE Launcher*.

Figure 4-1. Eclipse IDE Launcher

Eclipse IDE Launcher	A family on a	X	
Select a directory as workspace Eclipse IDE uses the workspace directory to store its preferences and development artifacts.			
Workspac : ⁹ F:\eclipse-workspace	•	Browse	
Use this as the default and do not ask	again	Cancel	

As shown in *Figure 4-1. Eclipse IDE Launcher*, select the local English path to create a workspace. Click Launch. (Note: the path depth can not be too deep)

After entering the welcome interface, user can choose to close the welcome in the upper left corner or open the workbench icon in the upper right corner to enter the main interface.



Figure 4-2. Eclipse workspace



Multiple projects can be contained in the same workspace.

4.2. Set Build Tools path

Create an eclipse_toolchain folder under the eclipse installation path. Decompress the ARM/RISCV cross-compilation chain, Build tool and OpenOCD downloaded in <u>Tool</u> <u>installation instructions</u> and place them in this folder.

Figure 4-3. eclipse_toolchain folder

新加卷 (E:) > eclipse > eclipse_toolchain			
^	名称	~	
	OpenOCD		
xpack-arm-none-eabi-gcc-10.2.1-1.1			
	xpack-riscv-none-embed-gcc-10.1.0-1.1		
	xpack-windows-build-tools-4.2.1-2		

Open "Winodow->Preferences" option.



Figure 4-4. Eclipse Window Perferences option

eclipse-workspace - Eclipse IDE					
File Edit Source Refactor Navigat		Window	Help Window	6	2
	U	Edi	tor	- + [[*]	
Project Explorer 🛛 📃 🗖			pearance w View		
There are no projects in your			spective		
workspace. To add a project:		Na	vigation	•	
Create a new Makefile project in a directory containing existing code		Pre	ferences		
Create a new C or C++ project					
Create a project Import projects					

Select "MCU->Global Build Tools Path" option to set the global build tool path : \${eclipse_home}\eclipse_toolchain\xpack-windows-build-tools-4.2.1-2\bin

Figure 4-5. Set Build Tools path

Preferences						_		Х
type filter text		Global Build Tool	s Path			¢	- 🔿	→ 00
ChangeLog	^	The locations when	e various Eclipse Embedded	d CDT build tools	are installed. (Jnless	defined	d mo
> Docker		workspaces.						
> Help		Puild tools foldors	\${eclipse home}\eclipse to	olebain\waaele wi	adours build to	ole 4.1	21216	
> Install/Update		Build tools folder:	alectipse_nome//ectipse_to	oichain xpack-wir	luows-build-to	015-4.2	2,1-2\0	
> Library Hover								
✓ MCU								
Global Arm Toolchains Paths Global Build Tools Path Global OpenOCD Path Global pyOCD Path Global QEMU Path	;							
Clabel Dicc V Taalabaian Da	×	<						
? 눱 🖆 🔘				Арр	ly and Close	(Cancel	

Note: The path configured here is configured as a relative path.

4.3. Set ARM Toolchains path

Select "MCU->Global Arm Toolchains Path" option to set the Arm Toolchains path : \${eclipse_home}\eclipse_toolchain\xpack-arm-none-eabi-gcc-10.2.1-1.1\bin



Figure 4-6. Set ARM Toolchains path

Preferences	C BET LET ANDER . ME . I	
type filter text	Global Arm Toolchains Paths	← → ⇒ %
ChangeLog ▷ Docker ▷ Help ▷ Install/Update	Configure the locations where various GNU Arm toolchains are installed. The values are stored within Eclipse more specifically, they are used for all projects in all workspaces. Default toolchain: xPack GNU Arm Embedded GCC	e. Unless redefined
▷ Library Hover	Toolchain name: xPack GNU Arm Embedded GCC	
MCU Global Arm Toolchains Paths Global Build Tools Path Global OpenOCD Path Global QEMU Path Global RISC-V Toolchains Paths Global SEGGER J-Link Path Workspace QenOCD Path Workspace OpenOCD Path Workspace OpenOCD Path Workspace QEMU Path Workspace QEMU Path Workspace QEMU Path Workspace QEMU Path Workspace SGGER J-Link Path	Toolchain folder: \${eclipse_home}\eclipse_toolchain\xpack-arm-none-eabi-gcc-10.2.1-1.1\bin Brow	se
Nulun T	Restore D	efaults Apply
? 🗠 🚄 😑	Apply and Cic	se Cancel

Note: The path configured here is configured as a relative path.

4.4. Set RISC-V Toolchains path

Select "MCU->Global RISC-V Toolchains Path" option to set the RISC-V Toolchains path : \${eclipse_home}\eclipse_toolchain\xpack-riscv-none-embed-gcc-10.1.0-1.1\bin

Figure 4-7	. Set RISC-V	Toolchains path
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Preferences	Path non n.h.	
type filter text	Global RISC-V Toolchains Paths 🗘	╞╺╶╤╺
▷ C/C++ ChangeLog	Configure the locations where various GNU RISC-V toolchains are installed. The values are stored within Eclipse. Unless more specifically, they are used for all projects in all workspaces.	redefined
> Docker	Default toolchain: xPack GNU RISC-V Embedded GCC	
⊳ Help	Toolchain name: xPack GNU RISC-V Embedded GCC	
Install/Update	Toolchain name: xPack GNU KISC-V Embedded GCC	
▷ Library Hover	Toolchain folder: \${eclipse_home}\eclipse_toolchain\xpack-riscv-none-embed-gcc-10.1.0-1.1\bin Browse	xPack
▲ MCU		
Global Arm Toolchains Paths		
Global Build Tools Path		
Global OpenOCD Path		
Global pyOCD Path		
Global QEMU Path		
Global RISC-V Toolchains Paths		
Global SEGGER J-Link Path		
Workspace Arm Toolchains Paths		
Workspace Build Tools Path		
Workspace OpenOCD Path		
Workspace pyOCD Path		
Workspace QEMU Path		
Workspace RISC-V Toolchains Paths		
Workspace SEGGER I-Link Path	Restore Defaults	Apply
, <u> </u>		
? 🚵 🖾 🔘	Apply and Close	Cancel
	Apply and close	cancer

Note: The path configured here is configured as a relative path.



4.5. Set OpenOCD path

Select "MCU->Global OpenOCD Path" option to set the OpenOCD path : \${eclipse_home}\eclipse_toolchain\OpenOCD\bin

Figure 4-8. Set OpenOCD path

Preferences		
type filter text	Global OpenOCD Path	┝ ▾ ◻े ▾ १
ChangeLog Docker Help Install/Update Library Hover	Configure the location where xPack OpenOCD is installed. The values are stored with Unless redefined more specifically, they are used for all projects in all workspaces. After installing OpenOCD updates, restart Eclipse for the defaults to be re-evaluated Restore Defaults button to configure the new location.	
 MCU 	Executable: openocd.exe	
Global Arm Toolchains Paths Global Build Tools Path Global OpenOCD Path Global pyOCD Path Global QEMU Path Global RISC-V Toolchains Paths	Folder: \${eclipse_home}\eclipse_toolchain\OpenOCD\bin Browse	xPack
Global SEGGER J-Link Path Workspace Arm Toolchains Path Workspace Build Tools Path Workspace OpenOCD Path Workspace pyOCD Path		
Workspace QEMU Path Workspace RISC-V Toolchains P Workspace SEGGER J-Link Path	Restore Defaults	Apply
? è z	Apply and Close	Cancel

Note: The path configured here is configured as a relative path.

4.6. Set SEGGER J-Link path

Select "MCU->Global SEGGER J-Link Path" option to set the SEGGER J-Link path. Here select the local absolute path, in this paper the path is D:\Program Files\SEGGER\JLink.



Figure 4-9. Set SEGGER J-Link Path

Preferences	
type filter text	Global SEGGER J-Link Path 🗢 🔻 😚
 Install/Update Library Hover MCU Global Arm Toolchains Paths Global Build Tools Path 	Configure the location where SEGGER J-Link is installed. The values are stored within Eclipse. Unless redefined more specifically, they are used for all projects in all workspaces. After installing SEGGER updates, restart Eclipse for the defaults to be re-evaluated and use the Restore Defaults button to configure the new location.
Global OpenOCD Path Global pyOCD Path	Executable: JLinkGDBServerCL.exe
Global QEMU Path Global RISC-V Toolchains Paths Global SEGGER J-Link Path Workspace Arm Toolchains Paths Workspace Build Tools Path Workspace OpenOCD Path Workspace pyOCD Path Workspace QEMU Path Workspace RISC-V Toolchains Paths	Folder: D:\Program Files\SEGGER\JLink Browse xPack
Workspace SEGGER J-Link Path ▷ Mylyn ▷ Oomph	
Compile Compile Remote Development BRDM	Restore Defaults Apply
? 🎽 🖌 🔘	Apply and Close Cancel

At this point, all the configurations of Eclipse IDE have been completed, and user can use the configured Eclipse to develop GD32 ARM/RISC-V projects.



5. Revision history

Table 5-1. Revision history

Revision No.	Description	Date
1.0	Initial Release	May.30 2022



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