

AN0033 Application Note

Eclipse with GCC

Introduction

As a popular integrated development environment (IDE), Eclipse supports various computer languages including C/C++ through a wide range of plug-ins, adding to the flexibility of Eclipse platform, on which the user is able to conduct software IDE.

This Application Note describes how to use Eclipse plug-ins to debug AT32 series chips.

Applicable products:

Part number

AT32F series

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1 Overview

This Application Note gives a detailed description of how to debug AT32 series chips using Eclipse, ARM-GCC compiler, GNU-ARM plug-ins, JLink and ATLink.

It mainly covers the following contents:

- Eclipse debug environment preparation
- Eclipse template project
- Eclipse compile configuration
- Eclipse debug configuration

Note: This installation manual is based on WINDOWS 7 x64 system, and projects in

AT32Fxx_Firmware_Library\project\at_start_xx\templates\eclipse_gcc are used for illustration.

All the software kits in this document can be found in AT32_Eclipse_Packet.zip, which is unzipped to install and run.

AT32_Eclipse_Packet.zip contains the following files:

Figure 1. Files in AT32_Eclipse_Packet.zip

📜 eclipse-cpp-2019-06-R-win32-x86_64.zip

- 🌐 gcc-arm-none-eabi-8-2019-q3-update-win32-sha2.exe
- gnuarmeclipse-build-tools-win32-2.6-201507152002-setup.exe

🔢 gnuarmeclipse-build-tools-win64-2.6-201507152002-setup.exe

ilg.gnumcueclipse.repository-4.5.1-201901011632.zip



2 Eclipse debug environment preparation

First of all, the following software needs to be installed:

- Eclipse IDE for C/C++ Developers
- GNU ARM Eclipse plug-ins
- GCC ARM compiler
- GNU ARM Eclipse Build Tools (make, rm and others)

The subsequent sections introduce how to install these software.

2.1 Eclipse IDE for C/C++ Developers

Download the latest version of Eclipse IDE (for C/C++ developers). There is one version available in AT32_Eclipse_Packet.zip, that is, eclipse-cpp-2019-06-R-win32-x86_64.zip.

Download link: http://www.eclipse.org/downloads/eclipse-packages/

Figure 2 Eclipse download page

©.	Eclipse IDE for C/C++ Developers 235 MB 335,559 DOWNLOADS An DE for C/C++ developers with Mylyn Integration.	*	Windows 64-bit Mac Cocoa 64-bit Linux 64-bit
۲	Eclipse IDE for Enterprise Java Developers 346 MB 303,007 DOWNLARDS Tools for Java developers or carding Enterprise Java and Web applications, Including a Java IDE, tools for Enterprise Java, IPA, JSF, Milyn, Maven, Git and more Click here to Bit a bug against Eclipse Web Tools Planform. Click here to Bit abug against Eclipse Planform. Click here to Bit abug against Eclipse Planform.	٨	Windows 64-bit Mac Cocoa 64-bit Linux 64-bit
V	Eclipse IDE for Java Developers 195 MB 183 855 DOWNLOADS The essential tools for any have developer, including a Java IDE, a Git client, XML Editor, MML Aware and Grade integration	*	Windows 64-bit Mac Cocoa 64-bit Linux 64-bit

Download and unzip the eclipse-cpp-2019-06-R-win32-x86_64.zip. Click "eclipse.exe" to run Eclipse. Note that users need to install plug-ins before debugging code.

2.2 GNU ARM Eclipse plug-ins installation

Download and unzip the latest version of GNU ARM Eclipse plug-ins: ilg.gnumcueclipse.repository-4.5.1-201901011632.zip.

AT32_Eclipse_Packet.zip contains an available version of ilg.gnumcueclipse.repository-4.5.1-201901011632.zip.

Download link: <u>https://github.com/gnu-mcu-eclipse/eclipse-plugins/releases</u> Installation steps:

1. Go to Eclipse Help->Install New Software.



 eclips 	se-cpp-2019-06-R-win32-x86_64 - Eclipse IDE		
File Ed	dit Source Refactor Navigate Search Project Run Window	Help	A A A A A MAR
	eclipse Welcome to the Ecli	 Welcome Help Contents Search Show Contextual Help 	Workbench
	= Tutorial: Import an existing project	Show Active Keybindings Ctrl+Shift+L	
	A guided walk-through how to import an exis project	i Seclipse User Storage Perform Setup Tasks	
	Review IDE configuration settings Review the IDE's most fiercely contested preferences	Check for Updates Install New Software Eclipse Marketplace Arduing Downloads Manager	E
	Create a new C/C++ project Create a new Eclipse project for C/C++ source	About Eclipse IDE Contribute	
	Import a project with a working M. Open the New item wizard	kefile What's New Find out what is new	

Figure 2. Click on Install New Software

2. Click on "Add..."

|--|

Variable Software Select a site or enter the location of a site. Work with: type or select a site Type filter text Select All Details Details Show only the latest versions of available software Ø finde intems by category What is <u>already installed</u> ? Show only software applicable to target environment Ø Concip items during install to find required software
Work with type or select a site AddManage
Type filter text Select All Name Version Obscience All Deselect All Obscience All Deselect All Details Image: Show only the latest versions of available software If Group items by catagory What is already installed If Group items by catagory What is already installed? Show only software applicable to target environment Image: Contact all update sites during install to find required software
Name Version Deselect All Image: There is no site selected. Details Details Image: There is no site selected. Im
Show only the latest versions of available software Show only the latest versions of available software Group items by category What is <u>already installed</u> ? Show only software applicable to target environment Contact all update sites during install to find required software
Show only the latest versions of available software If the items that are already installed Group items by category What is <u>already.installed</u> ? Show only software applicable to target environment Contact all update sites during install to find required software
(?)

3. Add a local plug-in, or automatically download and install through an Internet path.

Figure 4. Add Repository

	dd Repository	×	
Name	ne:	ی Local	
Locati	tion: http://	Archive	
(?))	Add Cancel	

4. Select a local plug-in directory, and click on "Add".



Figure 5. Select plug-in directory

	5 1 5	-
(Add Repository	×
	Name:	Local
	Location: 4/ilg.gnumcueclipse.repository-4.5.1-201901011632/	Archive
	? Add	Cancel
L		

5. Tick all plug-ins, and click on "Next".

Figure 6. Lick plug-ins	Figure	6.	Tick	plug-ins
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Install			
Available Software			
Check the items that you wish to install.			()
Work with: file:/D:/Jun.T/\$2#/eclipse/eclipse-cpp-2019-06-R-win32-x8	6_64/ilg.gnumcueclipse.repository-4.5.1 🔹	Add	Manage
type filter text			Select All
Name	Version	^	Deselect All
	1.1.5.201901011652 2.6.4.20190101652 1.1.2.20190101652 1.1.2.20190101452 2.8.20190011452 1.4.4.20190101452 4.3.4.201901011652	8	
Show only the latest variant of available software	10 Mide items that are already installed		
Show only the jatest versions of available software	What is already installed?		
Show only software applicable to target environment			
Contact all update sites during install to find required software			

6. Installation is completed, and click on "Next".

Install Details		
Review the items to be installed.		() E
Name	Version	Id
GNU MCU C/C++ ADX/MS0 Project Template GNU MCU C/C++ ADX Cross Complain GNU MCU C/C++ CodeRd Debug Perspective GNU MCU C/C++ Documentation (Discholder) GNU MCU C/C++ Documentation (Discholder) GNU MCU C/C++ Generic Cotrate. Mroject Template GNU MCU C/C++ Joint AD bebugging GNU MCU C/C++ Adx (Espectimental) GNU MCU C/C++ Packa (Especimental) GNU MCU C/C++ Packa (Especimental) GNU MCU C/C++ Strive REXC+ Mroject Templates GNU MCU C/C++ Strive REXC+ Mroject Templates GNU MCU C/C++ StrivEREXC+ Mroject Templates GNU MCU C/C++ StrivEREXC+ Mroject Templates	1.1.5.201900.01.092 2.6.4.201900.01.092 1.1.2.201900.01.092 2.2.5.201900.01.092 2.4.4.201900.01.092 4.1.4.201900.01.092 4.1.1.201900.01.092 4.1.3.201900.01.092 2.3.3.201900.01.092 2.8.5.201900.01.092 2.6.5.201900.01.092	ig grunnovefipet emplates ad- ig grunnovefipet endragetball. ig grunnovefipet endragetball. ig grunnovefipet docuser (set.) ig grunnovefipet et mplates (se- ing grunnovefipet et mplates (se- ing grunnovefipet et mplates co- ing grunnovefipet et mplates (se- ing grunnovefipet et debug gdbl). ig grunnovefipet et debug gdbl, ig gdbl, i
Size: 10,520 KB		
Uetaris		
	< <u>B</u> ack	Next > Einish Cancel

Figure 7. Installation completed

Linese muits the invitement and a secrepted before the software state installed. Linese muits the invitement and a secrepted before the software state installed. Linese Tour Adjournment. A Edipter Foundation Software State (Secrepter 11.3.2009/001182) ONU MOU CC++ Add Obass Compler 2.4.2009/001182) ONU MOU CC++ and Obass Compler 2.4.2009/001182) ONU MOU CC++ and Coass Compler 2.4.2009/001182 ONU MOU CC++ and Coass Compler 2.4.2009/001182 ONU MOU CC++ and Coass Compler 2.4.2009/001182 ONU MOU CC++ and Coass Compler 2.4.2.2009/001182 ONU MOU CC++ BISC+V Project Templer 1.2.2.2009/001182 ONU MOU CC++ BISC+V Project Templer 1.2.2.2009/001182 ONU MOU CC++ STM2He Project Templer 2.4.3.2009/001182 ONU MOU CC++ STM2He Project Tem	O Install		
Lorense must be reviewed and accepted before the suftware can be installed. Lorense Loren	Review Licenses		
License ph: License p	Licenses must be reviewed and accepted before the software can be installed.	(c))	010
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-	L Eligies Foundation Schere Use Agreement E GNU MCU CC++ AGX/MB (Negit Tenglate 1.3.5.30100111512 U GNU MCU CC++ AGX/MB (Negit Tenglate 1.3.5.30100111512 U GNU MCU CC++ AGX/MB (Negit Tenglate 1.3.5.30100111512 U GNU MCU CC++ GoldWell Moley Perspection 1.1.30100111512 U GNU MCU CC++ Tenscels Prijot Tenglate 2.3.5.30100115152 U GNU MCU CC++ Tenscels Prijot Tenglate 2.3.5.301011512 GNU MCU CC++ Julk Debegging 4.3.1.2010101132 GNU MCU CC++ Julk Cbeloging 4.3.1.2010101132 GNU MCU CC++ Julk Cbeloging 4.3.1.2010101132 GNU MCU CC++ GHW CDebegging 4.3.1.2010101132 GNU MCU CC++ GHW CDebegging 4.3.1.2010101132 GNU MCU CC++ GHW CDebegging 4.3.2.3010011323 GNU MCU CC++ STM (STR Prijot Tenglate 1.3.2010011323 GNU MCU CC++ STM (STR Prijot Tenglate 1.3.2010011323 GNU MCU CC++ STM STR Prijot Tenglate 1.3.2010011323 GNU MCU CC++ STM STR Prijot Tenglate 1.3.2010011323 T	NI MARTS AVAILURE SOTTWARE, SKATTON MANDOR OVEN SOURCE SPORTS IT, OSCIENCE DE THE TERMS AND THE TERMS AND CONCITIONS OF REFERENCES BELOW, BY USING ST REFERENCES BELOW, BY USING DI CONCIDENT OF NOT ADMENSION OF REFERENCES SECON, BY USING OR REFERENCES DELOW, BY USING OR REFERENCES DELOW, BY USING OR REFERENCES DELOW, BY USING OR REFERENCES DELOW, BY USING OR DI THIS ADMENSION TO THE S REFERENCES DE THIS ADMENSION TO THE S	E E ID F IG 2 BY 2U HE S
e 1 accept the terms of the license agreement • 01 glo not accept the terms of the license agreement	×	he license agreement ms of the license agreement	

Figure 8. Accept the license agreement

7. Go to "Install anyway".

Figure 9. Install anyway

Warning: You are installing software that a authenticity or validity of this software car continue with the installation?	contains unsigned content. The not be established. Do you want to
Install anyu	vay Cancel Details >>

8. Restart Eclipse.

Software Updates
Would you like to restart Eclipse IDE to apply the changes?
Restart Now No

2.3 ARM GCC compiler tool chains installation

Download the latest compiler tool chain: gcc-arm-none-eabi-8-2019-q3-update-win32-sha2.exe.

AT32_Eclipse_Packet.zip contains an available version of gcc-arm-none-eabi-8-2019-q3-updatewin32-sha2.exe.

Download link: <u>https://launchpad.net/gcc-arm-embedded/+download</u> Installation steps:

1. Select a language.



Figure 11. Installer language

Installer	anguage	
	Please select a language.	
	English	
	OK Cancel	

2. Go to Setup wizard, and click on "Next".

Figure 12. Setup wizard

Welcome to the GNU Tools for ARM Embedded Processors 8-2019-q3-update 8 2019 Setup
This wizard will guide you through the installation of GNU Tools for ARM Embedded Processors 8-2019-q3-update 8 2019. It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer. Click Next to continue.
Next > Cancel

3. Click on "Accept" for the license agreement.

Figure 13. Accept license agreement

💮 GNU Tools for ARM Embedded Processors 8-2019-q3-update 📃 💷 🗮 🌉
License Agreement Please review the license terms before installing GNU Tools for ARM Embedded Processors 8-2019-q3-update 8 2019.
Press Page Down to see the rest of the agreement. Contains code from project GNU Binutils (<u>https://www.anu.org/software/binutils/</u>), GNU Debugger (<u>https://www.anu.org/software/gdb</u>) under the following license(s).
GNU GENERAL PUBLIC LICENSE Version 3, 29 June 2007 Copyright (C) 2007 Free Software Foundation, Inc. < <u>http://fsf.org/</u> > Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.
If you accept the terms of the agreement, click I Agree to continue. You must accept the agreement to install GNU Tools for ARM Embedded Processors 8-2019-q3-update 8 2019.
Nullsoft Install System v2.51-1 Cancel

4. Select the default installation location, and click on "Install".

Figure 14. Installation progress

GNU Tools for AKM Embedded Processors 8-2019-q3-update	
Installing Please will while GNU Tools for ARM Embedded Processors 8-2019-q3-update 8 2019 is being installed.	
Extract: c++config.h 100%	
Show details	
Nullsoft Install System v2.51-1	
< Back Next > Cancel	

5. In the pop-up installation window, tick "Add path to environment variable" for auto add, or else, you need to do so by manual operation.



Figure 15. Tick "Add path to environment variable"

6. After the installation is completed, enter "arm-none-eabi-gcc –v" in the pop-up command window, and some information including version code will be displayed, indicating that it is a successful installation.



Figure 16. Installation result displayed



2.4 GNU ARM Eclipse Build Tools installation

This section provides information about the setup of such commands as "make" and "rm".

Download link: https://sourceforge.net/projects/gnuarmeclipse/files/Build Tools/

AT32_Eclipse_Packet.zip contains an available version of gnuarmeclipse-build-tools-win64-2.6-201507152002-setup.exe, or you may download other applicable versions.

1. Run the installation package.



Figure 17. Run installation package

2. Select destination folder.

II GNU ARM Eclipse Build Tools Setup	
Choose Install Location Choose the folder in which to install GNU ARM Edgese Build Tools.	
Setup will install GNU ARM Edopse Build Tools in the following folder. To install in a different folder, click Browse and select another folder. Click Install to start the installation.	
Destination Folder El Program Files (eNULARIM Eclipse) Suid Toxils (2.6-20150715200) Browse	
Space required: 3.7MB Space available: 31.7GB	
Nullsoft Install System v2.46-10	

Figure 18. Select destination folder

3. Restart Eclipse after finishing installation.

Figure 19. Installation completed

GNU ARM Eclipse Build To	pols Setup
	Completing the GNU ARM Eclipse Build Tools Setup Wizard
	GNU ARM Edipse Build Tools has been installed on your computer.
THAT IS THE	Click Finish to close this wizard.
	Visit the GNU ARM Eclipse site!
	< Back Finish Cancel
<u> </u>	



2.5 Install JLink

It is necessary to copy AT32 series chips to JLink directory through ICP.

1. JLink installation (omitted)

Download and install the latest version of JLink.

2. Copy algorithm file

To recognize and download program to AT32 series chips through JLink, the AT32 algorithm file should be downloaded to JLink directory through ICP tool (run ICP directly, and the corresponding AT32 algorithm will be copied to JLink directory).





3 Template project configuration and compiling

This section demonstrates how to use template projects.

Project path: AT32Fxx_Firmware_Library\project\at_start_xx\templates\eclipse_gcc.

This section takes AT32F437 as an example to illustrate the project configuration and compilation.

3.1 Open template project

1. Click on File \rightarrow Open Projects from File System.

work_base -	Eclipse IDE				
File Edit So	urce Refactor	Navigate	Search	Project	Run Window Help
New			Alt+Sh	ift+N ►	
Open File					
Copen Pro	ects from File	System			a the Eclipse IDE for C/C++ Developers
Recent Fil	rs			•	
Close			C	trl+W	
Close All			Ctrl+Shi	ift+W	

2. Select a path in "Import source", and click on "Finish". AT32F437xx template path: xxx\AT32F435_437_Firmware_Library\project\at_start_f437\templates\eclipse_gcc\template (similar paths for other series).

Import source: D:\BSP\AT32F435_437_Firmware_Library\p	roject\at_start_f437\templates\eclipse_gcc\template 👻	Directory Archive
type filter text		Select All
Folder	Import as	Deselect All
✓ template	Eclipse project	
Working sets		New

3. Open the project, and you will see the following template.





3.2 Compile

During the compiling process, the following configurations should be completed.

- Chip configuration
- Header file path configuration
- Macro configuration
- Script file configuration (Id files of different series)

1. Right click on "Template" and select "Build Project".

⊳ ﷺ, Bi ⊳ ∭ In		New Go Into	*	92
⊳ <mark>69⇒</mark> bs ⊳ (20⊂ cn ⊳ (20⊂ De		Open in New Window Show in Local Terminal	,	2e **
⊳ 😝 fir		Сору	Ctrl+C	s
Þ 🔁 us	ß	Paste	Ctrl+V	гу
	×	Delete	Delete	el
	<u>.</u>	Remove from Context	Ctrl+Alt+Shift+Down	ju
		Source Move	•	ed RO
		Rename	F2	ES EN
	2	Import		h I
		Export		IC
		Build Project		**
		Clean Project		

2. After completion of compiling, the "template.elf" is generated.

CDT Build Console [template]
arm-none-eabi-gcc -mcpu=cortex-m4 -mthumb -00 -ffunction-sections -g -DAT_START_F437_V1 -DAT32F437ZMT7 -DUSE_STDPERIPH_DRIV Finished building: D:/BSP/AT32F435_437_Firmware_Library/libraries/cmsis/cm4/device_support/system_at32f435_437.c
Building file: D:/BSP/AT32F435_437_Firmware_Library/project/at32f435_437_board/at32f435_437_board.c Invoking: GNU ARM Cross C Compiler
arm-none-eabi-gcc -mcpu=cortex-m4 -mthumb -00 -ffunction-sections -g -DAT_START_F437_V1 -DAT32F437ZMT7 -DUSE_STDPERIPH_DRIV Finished building: D:/BSP/AT32F435_437_Firmware_Library/project/at32f435_437_board/at32f435_437_board.c
Building target: template.elf Invoking: GNU ARM Cross C Linker
arm-none-eabi-gcc -mcpu=cortex-m4 -mthumb -00 -ffunction-sections -g -T "D:\BSP\AT32F435_437_Firmware_Library\project\at_st Finished building target: template.elf
15:09:24 Build Finished 0 errors 0 warnings, (took 11s,303ms)



3. For configurations of different models (of the same series), you only need to modify ld files in "Settings" as shown below. You can also modify other settings such as header file path in "Settings" if necessary.





Properties for template	
type filter text	OpenOCD Path
 Resource Builders C/C++ Build C/C++ General Linux Tools Path MCU ARM Toolchains Paths 	Configure the location where GNU MCU Eclipse OpenOCD is installed. The values are stored in the workspace (not in the project). They are used for all build configurations of this project, and override the workspace or global paths. After installing OpenOCD updates, restart Eclipse for the defaults to be re-evaluated and use the Restore Defaults button to configure the new location.
Build Tools Path Jumper Path OpenOCD Path pyOCD Path QEMU Path SEGGER J-Link Path Project Natures Project References Run/Debug Settings > Task Repository Task Tags > Validation	Executable: Folder: D:\OpenOCD\bin Browse xPack
WikiText	Restore Defaults Apply
?	Apply and Close Cancel

<u>175-77</u>



4 Debug

This chapter contains JLink debug and ATLink debug of AT32 series chips.

4.1 JLink debug

The following configurations are needed for JLink debug.

- JLink configuration
- GDB configuration
- SVD peripheral register configuration

4.1.1 Debug configuration

 Go to "Run" → "Debug Configurations" → "GDB SEGGER J-Link Debugging" → "New Configuration". Create a new Debug configuration, configure JlinkGDBServerCL, and fill in device name, such as AT32F437ZMT7, AT32F413RCT7 or AT32F415RCT7.

📑 😰 闷 📑 🗙 📄 📑 👻	Name: template Deb	ug (1)				
type filter text	📄 Main (参 Debugg	er 🕨 🕨 St	artup) 🤤 Source) 🔲 Com	nmon 🕂 SVD Path		
C/C++ Application C/C++ Attach to Application	J-Link GDB Server	Setup GDB server	locally	Connect to running ta	rget	Î
C/C++ Container Launcher	Executable path:	\${jlink_pat	h}/\${jlink_gdbserver}		Browse Variables	
C/C++ Remote Application	Actual executable:	C:/Program	n Files (x86)/SEGGER/JLink	v_V620c//JLinkGDBServerCL.ex page preferences pages or the page page page page pages or the page page page page pages or the page page page page page page page pages or the page page page page page page page page	e project properties page)	_
GDB Hardware Debugging GDB Jumper Debugging	Device name:	AT32F4377	MT7	preferences pages of a	Supported device names	-
GDB OpenOCD Debugging	Endianness:	Little	© Big			
GDB PyOCD Debugging	Connection: Interface:	OSB SWD	© IP © JTAG	(USB serial c	or IP name/address)	
GDB QEMU Debugging GDB SEGGER J-Link Debugging	Initial speed:	Auto	O Adaptive Fixed	1000 kHz		
c template Debug (1)	GDB port:	2331				
Launch Group	SWO port:	2332]	🔽 Verify downloads 🗹	Initialize registers on start	
- caultan ereap (pepretated)	Telnet port:	2333]	Local host only	Silent	
Launch Group (Deprecated)	Telnet port:	2332		Verify downloads	Silent	

- 2. To set up GDB, select arm-none-eabi-gdb.exe under GCC directory.
- 3. Select SVD Path for debug register description. You can use the svd file in keil. When AT32 keil Packet is installed, the svd file can be automatically copied to keil directory.

🗋 🖻 🧔 🗎 🗶 🕒 🎠 🗸	Name: template Debug (1)
type filter text	B Main 🕸 Debugger 🕨 Startup 🧤 Source 🔲 Common 🚼 SVD Path
C/C++ Application	SVD file (used by the peripheral registers viewer)
C/C++ Attach to Application C/C++ Container Launcher C/C++ Container Launcher C/C++ Remote Application C/C++ Remote Application C/C++ Remote Application C/C++ Network C/C++ Unit C/Debugging C/DB Augeore Debugging C/DB Augeore C/Link Debugging C/DB SciEGR Z-Link Debugging C/DB Z-Link Debugging	File path: Keil_v\$\ARMI\Pack ArteryTek\AT32F435_437_DFP\2.0.4\SVD\AT32F437xz_v2.svd Browse Variables



4. Debug configuration is done, then go to "Apply" \rightarrow "Debug".

🌣 Debug 10 🔥 Project Explorer 🐘 🕨 🔍 🗍	0x0 🕼 maine 23		- D	🕫 Varia 🍫 Brea 🛒 Espr	🛋 Mod 🚟 Dis	
Et template Debug (1) [GDB SEGGER J-Unk Debugging]	1000 wold EXINT0_IRQHandler(wold)					2 🔤 🖻 🔍
4 🔐 template.elf	101 { 102 button (rn())			Peripheral	Address	Description *
# 🕐 Thread #1 57005 (Suspended Breakpoint)	103 }			FI S. DMA1	0x80026400	DMA controller
main() at main.c112 0x80003ea	104			E % DMA2	0x40026600	DMA controller
	1050 /**			ET S. DVP	0/50050000	Digital video parallel inter
	107 * Sparan none			EDMA	0x60026000	EDMA controller
	106 * <u>Bretval</u> none			IT T FRIC	0x0002800	Real-time clock
	100 fat main(unid)			THE STHERNET DMA	0x00029000	Ethernet: DMA controller
	111 (THE STHERNET MAC	0x40028000	Ethernet media access cc
	112 uint32_t 1 = 0, 1 = 0;			11 % ETHERNET MMC	0x00028100	Ethemeti MAC manageme
	115 system_clock_contig();			THE STHERNET PTP	0x80028700	Ethernet: Precision time o
	115 at32_board_init();			III % EXINT	0x40013C00	EXINT
	116			E S FLASH	0x40023C00	Flash memory controler
	110 Button_exint_init();			V S GPIOA	0x60020000	General purpose I/Os
	<pre>110 for(i = 0; i < BUFFER_LEN; i ++)</pre>			R 2 GPIOB	0x40020400	General purpose I/Os
	120 {			E % GPIOC	0x40020800	General purpose I/Os
	122 }			E % GPIOD	0x40020C00	General purpose I/Os
	125			E S GPIOE	0x40021000	General purpose I/Os
	124 1f(1 -= 0)		- m	m a caros	0+00033.400	General numbers 100r
	126 at32 led toggle(if02);			* []		
	127 }		-			^
	128 129 -bile(1)		4			
	130 (
	<pre>131 at32_led_toggle(LED2);</pre>					
	132 delay_ms(g_speed = DELAY)] 133 at32 led toesle(LED3):		1.0			
	134 delay_ms(g_speed * DELAY);					
	<pre>135 at32_led_toggle(LED4);</pre>					
	delay wilk speed * peckyll			4		
	Console III Registers 🕐 Problems 🙃 Everytables 🖽 De	human Consola D Memory 12				11 1 1 1 1 1 1 1
M	lonitors 🔶 🗶 🕷	GRIOB: 0x40020400 E + New Renderings				
	GPICA	Remister	Addre		Value	
	GPIOB	4 % GPI08	0x400	120400		
		> 100 CEGR	0v400	120400	0+0000280	
		D DE OMODE	0x400	20404	0x00000280	
		> #* 006v8	0x400	120408	0x00000280	
		N PLAL	0v400	120400	0+00000280	
		P and POLL	0.400	20410	0-00000380	-
		NET ODT	0x400	120414	0+00000280	
		- INF 6/8	0-400	20418	0+00000280	
		L HE WOR	0x400	120410	0+00000280	
		> 101 AU(2)	0-400	120420	0-00000380	
		N MILLION	0,400	100424	0+00000280	
		- 100 C12	0.400	100438	0-00000280	
		7 22 Con	000400	and the second se	000000280	

4.2 ATLink debug

This section demonstrates how to debug AT32 using OpenOCD + Eclipse + ATLink. For details on ATLink, please refer to AT-Link_User_Manual_SC.pdf.

This section contains the following contents:

- Eclipse Openocd configuration
- GDB configuration
- SVD peripheral register configuration

Unzip the OpenOCD package file <<OpenOCD_V2.x.x.zip>>.

It includes five directories. The bin file is executable, and the scripts is for configuration files.

OpenOCD includes the following directories.





4.2.1 Debug configuration

1. To configure OpenOCD path, go to Project \rightarrow Properties \rightarrow MCU \rightarrow OpenOCD Path.

	OpenOCD P	Path			$\langle \rangle$	• •
 Resource Builders C/C++ Build C/C++ General Linux Tools Path MCU ARM Toolchains Paths Build Tools Path 	Configure th The values a used for all workspace of After installin re-evaluated location.	e location where re stored in the v build configuratio or global paths. ng OpenOCD upo l and use the Res	GNU MC vorkspace ons of this lates, rest tore Defa	U Eclipse Open(e (not in the proj ; project, and ov art Eclipse for ti ults button to co	OCD is insta ject). They a verride the he defaults to onfigure the	lled. are to be new
Jumper Path	Executable:	bin\openocd.ex	e			
OpenOCD Path pyOCD Path QEMU Path SEGGER J-Link Path Project Natures Project References Run/Debug Settings Task Repository Task Tags Validation WikiText	Folder:	D:\OpenOCD		<u>B</u> rowse	xPack	
			R	estore <u>D</u> efaults		y

 To configure Debug, go to "Run" → " Debug Configurations" → "GDB OpenOCD Debugging" → "New Configuration".

The configuration items are as follows:

Openocd executable path: D:\OpenOCD\bin\openocd.exe.

Config options: -s \${openocd_path}\scripts -f ./interface/atlink.cfg -f ./target/at32f437xM.cfg.

The "atlink.cfg" refers to ATLink debug tool, and the "at32f437xM.cfg" means that AT32F437 has a 4032 KB FLASH (for other AT32F437 Flash sizes, use at32f437xx.cfg). For other series such as AT32F403A and AT32F415, the "target/xxx.cfg" should be modified accordingly.



Create, manage, and run configura	ations		T.
Image: Second state of the second	Name: template De Main StoppenOCD Setup Start OpenOCD Executable path: Actual executable:	bug ger Startup Source Common Store SVD Path locally \${openocd_path}\\${openocd_executable} D:\OpenOCD\bin\openocd.exe	Browse) Variables
 C GDB Hardware Debuggini C GDB Jumper Debuggini C GDB OpenOCD Debuggin C template Debug C GDB PyOCD Debugging C GDB QEMU Debugging C GDB SEGGER J-Link Debu Launch Group 	GDB port: Telnet port: Tcl port: Config options:	(to change it use the <u>global</u> or <u>workspace</u> preferences pages or 3333 4444 6666 -s \${openocd_path}\scripts -f ./interface/atlink.cfg -f ./target/at3	the project properties page)
Launch Group (Deprecate	 ✓ Allocate console GDB Client Setup ✓ Start GDB sessie Executable name: 	for OpenOCD Allocate console for the on \$(cross_prefix)gdb\$(cross_suffix)	telnet connection Browse Variables
Filter matched 15 of 15 items	•	m	Revert Apply

3. Configure SVD files

Download corresponding SVD files for Debug.

Image: C/C++ Application C/C++ Attach to Application C/C++ Container Launcher C/C++ Postmortem Debugger C/C++ Remote Application C/C++ Unit GDB Hardware Debugging	Name: template Debug Image: Main image: Image: Main image: SVD file (used by the peripheral registers viewer) File path: C:\Keil_v5\ARM\Pack\ArteryTek\AT32F435_437_DFP\2.0.4\SVD\AT32F437xx	Browse



4. After completing Debug configuration, go to "Apply" \rightarrow "Debug" to start debugging.





5 Revision history

Date	Version	Revision note
2021.12.13	2.0.0	Initial release

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