# 1. Version

v0.1	Initial version
v0.2	More details added to Project Import & Compilation
v0.3	Typos corrections.
v1.0	Release with AmbiqSuite SDK

# 2. **Scope**

The open source Eclipse IDE is not formally supported in AmbiqSuite SDK and only limited tests are performed. AmbiqSuite does support GCC makefiles and all examples compiled and tested in the environment. This application note provides a step-by-step procedure to setup Eclipse development and debugging environment on machines running Windows operating systems. In this document, Windows 10 64-bit is used an example. It outlines the open source tools that need to be downloaded, but the user should keep in mind that these tools change quite rapidly and some research may be required to get the latest versions.

# 3. Installation

- 1. Java Runtime Environment (JRE) or Java Development Kit (JDK)
  - JRE is sufficient for our usage.
  - https://www.oracle.com/technetwork/java/javase/downloads/jre8-downloads-2133155.html
  - Make sure JRE is in Windows environment variable *Path*.
- 2. GNU MCU Eclipse ARM Embedded GCC
  - Download from <a href="https://github.com/gnu-mcu-eclipse/arm-none-eabi-gcc/releases/">https://github.com/gnu-mcu-eclipse/arm-none-eabi-gcc/releases/</a>
  - Extract and place it to a proper location and add this path to Windows environment variable Path.
- 3. GNU MCU Eclipse Windows Build Tools
  - Download from https://github.com/gnu-mcu-eclipse/windows-build-tools/releases
  - Extract and place it to a proper location.
- \*\* For example:



- 4. GNU MCU Eclipse IDE for C/C++ Developers
  - Download from <a href="https://github.com/gnu-mcu-eclipse/org.eclipse.epp.packages/releases">https://github.com/gnu-mcu-eclipse/org.eclipse.epp.packages/releases</a>. Make sure the version matches the installed JRE, both 32-bit version or 64-bit.
  - Extract and place it to a proper location.
- 5. J-Link Software and Documentation pack for Windows
  - Download from <u>https://www.segger.com/downloads/jlink/#J-LinkSoftwareAndDocumentationPack</u> and install it.



#### 4. Eclipse Setup

- 1. Launch Eclipse and you will be asked to setup a workspace which can be anywhere.
- 2. In Eclipse, navigate to Window>Preferences. In the left panel, unfold MCU and configure Global ARM Toolchains Paths, Global Build Tools Path and Global SEGGER J-Link Path.

Preferences	_	$\Box$ ×
type filter text	Global ARM Toolchains Paths	> ▼ ⇔ ▼ ▼
<ul> <li>MCU</li> <li>Global ARM Toolchains Paths</li> <li>Global Build Tools Path</li> <li>Global Jumper Path</li> <li>Global OpenOCD Path</li> <li>Global QEMU Path</li> <li>Global QEMU Path</li> <li>Global SEGGER J-Link Path</li> <li>Workspace ARM Toolchains Paths</li> <li>Workspace ARM Tools Path</li> <li>Workspace ARM Tools Path</li> <li>Workspace QEMU Path</li> <li>Workspace QEMU Path</li> <li>Workspace QEMU Path</li> <li>Workspace RISC-V Toolchains Paths</li> <li>Workspace QEMU Path</li> <li>Workspace RISC-V Toolchains Paths</li> <li>Workspace SEGGER J-Link Path</li> <li>Workspace SEGGER J-Link Path</li> <li>Workspace SEGGER J-Link Path</li> <li>Mylyn</li> <li>Remote Development</li> <li>RPM</li> </ul>	Configure the locations where various GNU ARM toolchains are installed. The values are stored within Eclipse. Unless redefin specifically, they are used for all projects in all workspaces. Default toolchain: GNU MCU Eclipse ARM Embedded GCC Toolchain name: GNU MCU Eclipse ARM Embedded GCC Toolchain folder: C:\GNU MCU Eclipse\ARM Embedded GCC\7.3.1-1.1-20180724-0637\bin Browse	ved more
> Run/Debug	Restore Defaults	Apply
2 🗠 🖆 🖲	Apply and Close	Cancel

Preferences				$\times$
type filter text	Global Build Tools Path		⇔ ▼ ⇒	▼ ▼
<ul> <li>MCU</li> <li>Global ARM Toolchains Paths</li> <li>Global Build Tools Path</li> <li>Global Jumper Path</li> <li>Global OpenOCD Path</li> <li>Global QEMU Path</li> <li>Global QEMU Path</li> <li>Global RISC-V Toolchains Paths</li> <li>Global SEGGER J-Link Path</li> <li>Workspace ARM Toolchains Paths</li> <li>Workspace Jumper Path</li> <li>Workspace QuenoCD Path</li> <li>Workspace QEMU Path</li> <li>Workspace RISC-V Toolchains Paths</li> <li>Workspace RISC-V Toolchains Paths</li> <li>Workspace RISC-V Toolchains Paths</li> <li>Workspace SEGGER J-Link Path</li> <li>Mylyn</li> <li>Oomph</li> <li>Remote Development</li> <li>&gt; SPM</li> </ul>	The locations where various GNU MCU Eclipse build tools are installed. Unless defined more specific all workspaces. Build tools folder: C:\GNU MCU Eclipse\Build Tools\2.11-20180428-1604\bin	aliy, they are used t Browse	for all projec	ts in
> Run/Debug		Restore Defaults	Apply	
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Preferences				
type filter text	Global SE	GGER J-Link Path		⇔ ▼ ⇔ ▼ ▼
<ul> <li>MCU</li> <li>Global ARM Toolchains Paths</li> <li>Global Build Tools Path</li> <li>Global Jumper Path</li> <li>Global OpenOCD Path</li> </ul>	<ul> <li>Configure the used for all</li> <li>After installing new location</li> </ul>	he location where SEGGER J-Link is installed. The values are stored within Edipse. Unle projects in all workspaces. ing SEGGER updates, restart Eclipse for the defaults to be re-evaluated and use the Re n.	ss redefined more spe estore Defaults button	ecifically, they are to configure the
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 Jumper Path Workspace OpenOCD Path Workspace QEMU Path Workspace RISC-V Toolchains Paths	Folder:	C:/Program Files (x86)/SEGGER/JLink_V640/	<u>₿</u> rowse	xPack
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kun/Debug	~		Restore <u>D</u> efaults	Apply
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# 5. Project Import & Compilation

 In Eclipse, navigate to File>Import. Select C/C++>Existing Code as Makefile Project. Click Next. For projects which are to be imported for the first time use this option. For those projects which have previously been imported to Eclipse (check if the files, .project and .cproject, and the folder .settings exist in <project>/gcc,) select General>Existing Projects into Workspace.

Import		$\times$
<b>Select</b> Creates a new Makefile project in a directory containing existing code		Ľ
Select an import wizard:		
type filter text		
<ul> <li>&gt; See General</li> <li>&gt; C/C++</li> <li>C/C++ Executable</li> <li>C/C++ Project Settings</li> <li>Existing code as Autotools project</li> <li>Existing Code as Makefile Project</li> <li>&gt; Git</li> <li>&gt; Install</li> <li>&gt; Oomph</li> <li>&gt; RPM</li> <li>&gt; Run/Debug</li> <li>&gt; Tasks</li> <li>&gt; Team</li> <li>&gt; TextMate</li> <li>&gt; Tracing</li> <li>&gt; XML</li> </ul>		
? < Back Next > Finish	Canc	el

- 2. Select the targeting project. Take the project clkout of R2.0 for Apollo3 as an example.
  - [Optional] Change the project name.
  - Select ARM Cross GCC in Toolchain for Indexer Settings.



Import Existing Code Create a new Makefile project from existing code in that same directory			
Create a new Makefile project from existing code in that same directory			
Project Name			
clkout_eclipse_gcc			
Existing Code Location			
pace\ambiqsuite-rel1.2.12\boards\apollo2_evb\example	es\clkout\	gcd Bro	wse
Languages ✓ C ✓ C++ Toolchain for Indexer Settings <none> ARM Cross GCC Cross GCC Cygwin GCC GNU Autotools Toolchain RISC-V Cross GCC</none>			
Show only available toolchains that support this platform		Cancol	

3. After the project is imported, the project explorer shows the project like the following screenshot.



4. Right click on the project and go to Properties>C/C++ Builds>Build Variables. Add two variables as highlighted in below. Click Apply and Close.



Properties for clout_eclip	ose_gcc					
type filter text	Build Variable	es				↓ ↓ ↓ ↓ ↓
<ul> <li>Resource</li> <li>Builders</li> <li>C/C++ Build</li> <li>Build Variables</li> </ul>	Configuration:	Default	[ Active ]		<ul> <li>✓ Manage 0</li> </ul>	Configurations
Environment	Name	Type	Value			Add
Settings	cross make	String	make			
Tool Chain Editor	cross_prefix	String	arm-none-eabi-			Ealt
> C/C++ General						Delete
Git						
Linux Tools Path						
> MCU						
Project Natures Project References						
Run/Debug Settings						
<ul> <li>Task Repository</li> <li>Task Tags</li> </ul>	Show syste	m variable	S			
Validation WikiText	Build Variables such as enviror	are IDE on Iment varia	ly variables, which can be use able value or command line p	d for string substitution when de arameter in form of \${VAR}, inter	fining external builder nal builder may use the	configuration, em directly.
					Restore Defaults	Apply
0	1			[	Apply and Close	Cancel

#### 5. Right click on the project and select Clean Project.

Problems 🧔 Tasks 📮 Console 🛛 🗆 Properties

```
CDT Build Console [clout_eclipse_gcc]
```

```
17:14:13 **** Clean-only build of configuration Default for project clout_eclipse_gcc ****
make clean
Cleaning...
```

```
17:14:13 Build Finished. 0 errors, 0 warnings. (took 317ms)
```

6. Right click on the project and select Build Project.

```
🖹 Problems 🧔 Tasks 🖳 Console 🖾 🔲 Properties
```

```
CDT Build Console [clout_eclipse_gcc]

17:22:10 **** Build of configuration Default for project clout_eclipse_gcc ****

make all

Compiling gcc ../src/clkout.c

Compiling gcc ../../../../utils/am_util_delay.c

Compiling gcc ../../../../utils/am_util_faultisr.c

Compiling gcc ../../../../utils/am_util_stdio.c

Compiling gcc ../../../../devices/am_devices_led.c

Compiling gcc startup_gcc.c

Linking gcc bin/clkout.axf

Copying gcc bin/clkout.bin...

17:22:11 Build Finished. 0 errors, 0 warnings. (took 1s.376ms)
```

# **ambiq** micro

Application Note – Eclipse Environment Setup

# 6. Project Debugging

1. Navigate to Run>Del	bug Configurations		
Debug Configurations			$\times$
Create, manage, and run configur	ations		Ś
Y → W → Y → Y type filter text C/C++ Application C/C++ Attach to Application C/C++ Container Launcher C/C++ Postmortem Debugger C/C++ Remote Application Ci C/C++ Unit GDB Hardware Debugging GDB Jumper Debugging GDB Jumper Debugging GDB AppOCD Debugging GDB QEMU Debugging GDB SEGGER J-Link Debugging Launch Group Launch Group (Deprecated)	<ul> <li>Configure launch settings from this dialog:</li> <li>Press the 'New Configuration' button to create a configuration of the selected type.</li> <li>Press the 'New Prototype' button to create a launch configuration prototype of the selected type.</li> <li>Press the 'Export' button to export the selected configurations.</li> <li>Press the 'Duplicate' button to copy the selected configuration.</li> <li>Press the 'Delete' button to remove the selected configuration.</li> <li>Press the 'Filter' button to configuration by selecting options.</li> <li>Edit or view an existing configuration by selecting it.</li> <li>Select launch configuration(s) and then select 'Link Prototype' menu item to link a prototype.</li> <li>Select launch configuration(s) and then select 'Reset with Prototype Values' menu item to reset with prototype values</li> <li>Configure launch perspective settings from the 'Perspectives' preference page.</li> </ul>		
Filter matched 14 of 14 items			
0	Debug	Clos	e

- 2. Right click on GDB SEGGER J-Link Debugging and select New Configuration.
- 3. In Main page, make sure Project has the name identical to the one set in project import and C/C++ Application pointed to the corresponding .axf file.



reter, manage, and run configurations	Debug Configurations				
Image: Source Interview       Name: dout_eclipse.gcc Default         Image: Source Interview       Image: Source Interview         Image: C/C++ Application       Project:         Image: C/C++ Application       Image: Source Interview         Image: C/C++ Application       C/C++ Application         Image: C/C++ Application       Image: C/C++ App	Create, manage, and run confi	gurations			Ň
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ype liter text I G/C++ Application I C/C++ Application I C/C++ Application I C/C++ Romote Appli		<u>N</u> ame: clout_eclipse_gcc Default			
2 (C++ Application         C/C++ Atto to Application         C/C++ Restmanter Debugging         C/C++ Nestmanter Debugging         C/C++ Nunt         C/C++ Nunt         C/DB Jampe Debugging         DB Value Debugging         DB Value Debugging         Build (if required) before launching         Build Configuration:         Dir/C++ Nestmanter Debugging         DB StGGR /-Ink Debugging         DB StGGR /-Ink Debugging         Cost edpse_gcc Default         Build Configuration:         Seerch Project         Build Configuration:         Seerch Project <tr< td=""><td>type filter text</td><td>🗎 Main 🔅 Debugger 🕨 Startup 🦻 Source</td><td>e 🗆 <u>C</u>ommon 🔀 SVD Path</td><td></td><td></td></tr<>	type filter text	🗎 Main 🔅 Debugger 🕨 Startup 🦻 Source	e 🗆 <u>C</u> ommon 🔀 SVD Path		
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C/C++ Postmortem Debuggr C/C++ Application: C/C++ Application: DCB Aumper Debugging DCB Aumper Debugging DCB ApoCD Debugging DCB ACMD Debugging DCB SEMU Debugging DCB SEMU Debugging DCB SEMU Debugging DCB SEGGER - Link Debugging Cob actions are consistent of the second secon	C/C++ Container Launcher	clout eclipse gcc			<u>B</u> rowse
C/C++ Remote Application       bin/ckout.axf         C/C++ Unit       Variables         Search Project       Browse         Build (if required) before launching       Build Configuration:         Select Automatically       >         C BB StGKR 1-Link Debugging       Build Configuration:         C Bunch Group       E Launch Group (Deprecated)         L Launch Group (Deprecated)       Person         E term matched 15 of 15 items       Reyert         2)       Debug	C/C++ Postmortem Debugge	C/C++ Application:			
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	?			<u>D</u> ebug	Close

4. In Debugger page, make sure Actual executable is correctly interpreted and Device name is added.



Debug Configurations		—		
Create, manage, and run confi	gurations			
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: 🖻 🎨 🗎 🗮 🖻 🔆 🔻	Name: clout_eclipse	e_gcc Default		
ype filter text	🗎 Main 🏇 Debugge	er Startup 💱 Source 🗉 Common 🗟 SVD Path		
C/C++ Application	J-Link GDB Server S	Setup		
C/C++ Attach to Application	Start the J-Link	CDB server locally		
C/C++ Container Launcher	Executable path:	\${ilink path}/\${ilink qdbserver} Browse Variables		
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<sup>c</sup> ü C/C++ Unit	Actual executable.	(to change it use the global or workspace preferences pages or the project properties page)		
🗉 GDB Hardware Debugging	Dovico namo:	(to change it use the <u>global</u> of <u>workspace</u> preferences pages of the <u>project</u> properties page)		
GDB Jumper Debugging	Endiappassi			
GDB OpenOCD Debugging	Connection:			
CDB SEGGER Link Debugging				
clout eclipse gcc Default	initial speed:			
Launch Group	GDB port:	2331		
Launch Group (Deprecated)	SWO port:	2332   ✓ Verify downloads ✓ Initialize registers on start		
	Telnet port:	2333 🗸 Local host only 🗌 Silent		
	Log file:	Browse		
	Other options:	-singlerun -strict -timeout 0 -nogui		
	Allocate consol	Je for the GDB server Allocate console for semihosting and SWO		
	GDB Client Setup			
	Executable name:	\${cross prefix}adb\${cross suffix}		
	A stud sus sutables			
	Actual executable:	arm-none-eabi-gdb		
	Other options:			
	Commands:	set mem inaccessible-by-default off		
	Remote Target			
	Host name or IP a	address: localhost		
	Port number	2221		
		231		
	Force thread list	update on suspend Restore defaul		
>				
lter matched 15 of 15 items		Re <u>v</u> ert Appl <u>y</u>		
0				
Ð		Debug Close		

5. In SVD page, add the path to the targeting board SVD file located in <SDK>/pack. Click Apply and Debug.



# Eclipse Environment AmbiqSuite SDK

# Application Note – Eclipse Environment Setup

Debug Configurations				Х
Create, manage, and run config	gurations			TO.
				5
	Name: clout_eclipse_gcc Default			
type filter text	Alan Main Debugger Startup Source Common S SVD Path			
C/C++ Application	SVD file (used by the peripheral registers viewer)			
C/C++ Attach to Application	File :space\ambiqsuite-rel1.2.12\pack\SVD\apollo2.svd	Browse	Variabl	es
C/C++ Postmortem Debugge				
C/C++ Remote Application				
GDB Hardware Debugging				
GDB Jumper Debugging				
GDB OpenOCD Debugging				
GDB PyOCD Debugging				
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clout_eclipse_gcc Default				
🕏 Launch Group				
Launch Group (Deprecated)				
Filter matched 15 of 15 items	Revert		Apply	
?	Debug		Close	

6. After the debugger is launched, the program stops at the main function. Click the run icon highlighted in the red frame below. The LEDs on EVB shall start to blink.



eclipse_workspace_ambiqsuite-rel1.2.12 - C:\Users\LTie	n\Documents\workspace\ambiqsuite-rel1.2.12\boards\apollo2_evb\examples\clkout\src\clkout.c - Eclipse IDE		- 🗆 X
File Edit Source Refactor Navigate Search Project R	in Window Help		
🐔 🌞 🔳 🏶 Debug 🗸 🖸 clout_eclipse_gcc De	a × ∲ [1] ▼ 🗟 @   🗟 @ ▼   @   🗙 🕨   = M スクル   🗠 등 🗶   🍪   巻 ▼ 0 ▼ 9. ▼   @ @ # ▼   Ø @ @ # ▼   Ø @ @ #   Ø @ @ @ #   Ø @ @ #   Ø @ @ #   Ø @ @ #   Ø @ @ #   Ø @ @ #   Ø @ @ #   Ø @ @ #   Ø @ @ #   Ø @ @ #   Ø @ @ #   Ø @ @ #   Ø @ @ #   Ø @ @ #   Ø @ @	• 🕅 • ¢> ¢ • ¢ • Q	uick Access 🗄 😰   🗟 😎
🏶 Debug 😫 💁 Project Explorer 🛛 🐐 💌 🖻 🗖	🛍 clkout.c 🕮 👘 🗇	🕬 Variables 🍨 Breakpoints 🎕 Expressions 🛋 Modules 💈	Peripherals 🛛 🗖 🗖
♥ Debug III & Project Explorer III III III COB SEGGER J-Link Debug ♥ @ clout.ad ♥ @ Thread #157005 (supended: Breakpoint) ■ main) at klout.c/25 0x166 ■ ULinkCDBServerCLeve ■ arm-none-eabi-gdb ■ Semihosting and SWV	<pre>© doubt # 69 int32_t iRisingCount, iLEDcount; 79 bool bNewClkout, bOldClkout; 71 73 // Set the clock frequency. 74 // 75 am_hal_clkgen_sysclk_select(AM_HAL_CLKGEN_SYSCLK_MAX); 76 // 77 // 78 // Set the default cache configuration 77 // 78 am_hal_cachectrl_enable(&amp;am_hal_cachectrl_defaults); 81 82 // 83 am_hal_cachectrl_enable(&amp;am_hal_cachectrl_defaults); 83 84 // Configure the board for low power operation. 85 am_bsp_low_power_init(); 85 // Initialize the printf interface for ITM/SWO output. 86 am_util_stdio_printf_init((am_util_stdio_print_char_t) am_bsp_itm_string 77 // 78 Console # Registers 12 Problems O Executables @ Debugger Console ® Memory 79 CMU MCU Eclipse Packs console 2018-11-23 17:34:05 Parsing SVD file "C:\Users\LTien\Documents\workspace\ambigsuite-rel1.2.12\pack\SVD\appCompleted in 81ms.</pre>	Variables ** Breakpoints ** Expressions #* Modules   Peripheral Address Description 3.4 ADC 0.50010 Analog Digital Converter C 3.4 CACHECI 0x40018 Fash Cache Controller 3.4 COMEN 0x40004 Clock Generator 3.4 COMEN 0x40004 Clock Generator 3.4 COMSTR 0x50004 [2C/SPI Master 3.4 IOMSTR 0x50005 [2C/SPI Master 3.4 IOMSTR 0x50005 [2C/SPI Master 3.4 IOMSTR 0x50006 [2C/SPI Master 3.4 IOMSTR 0x5006 [2C/SPI Master 3.4 IOMSTR 0x5066 [2C/SPI Master	I Peripherals II II II I III IIII IIIIIIIIIIIIIIIII
4			~



# 7. Trouble Shooting

- 1. Make sure Windows Environment variable *Path* is configured correctly. For Windows 10, right click on This PC and navigate to Properties>Advanced system settings>Environment Variables.... Check the variable *Path*.
- 2. Please contact regional Ambiq Micro FAEs if you encounter further questions.



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