

CodeWarrior Development Studio for QorIQ LS-Series, ARMv7 ISA version 10.0.9

1. Revision History

The following modifications to this release note have been made relative to the note provided with the CodeWarrior for QorIQ LS-Series, ARMv7 ISA v10.0.9 installation:

Date	Description
Nov 29, 2019	Fix DTBPDBG-233
Jan 29, 2019	OS Updates
Jun 30, 2016	Updated for v10.0.9
Jan 06, 2016	Initial revision for v10.0.8

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2. About this release

2.1. Version information

The v10.0.9 release is a minor update to v10.0.8 bringing compatibility with QorIQ Linux SDK v2.0, kernel debug support for Linux kernel version 4.1 and stability improvements. Build 190131 is delivered as a stand-alone installer for ARMv7 only and incorporates support for MT29F4G16ABBDA and MT25QU01G BBB flash devices.

Unless otherwise noted, all references to v10.0.8 in sections below are also applicable to v10.0.9.

The v10.0.8 release was an incremental update to v10.0.7 ensuring compatibility with LS102xA TWR rev. 2 board and Freescale LS1021A Linux SDK v0.4 BSP, along with minor feature enhancements.

This release note provides important information for users of CodeWarrior Development Studio for ARMv7 ISA. You are encouraged to read this document to become familiar with this release's supported targets, new features, errata with workarounds, and other useful information.

2.2. Download information

CodeWarrior installer builds for Windows and Linux host OSes can be downloaded from the product web page on nxp.com ([link](#)). Note that v10.0.9 is delivered as an installable update over the base v10.0.8 release; go to Help/Install New Software in order to access the components updated as of v10.0.9.

Although not required, it is recommended that the installation of the Linux hosted product should be made with administrative privileges.

2.3. Getting help

If you have questions, issues, or want to provide feedback, please use the Freescale online support web page. To use this page, follow these steps:

1. In a web browser, go to <http://www.nxp.com/TechSupport>.
NXP's **Technical Support** web page appears.
2. On this page, click the Submit a service request online link.
The **New Service Request — Category/Topic** page appears.
3. From the Category dropdown menu, select Technical Request.
4. From the Topic dropdown menu, select CodeWarrior (or other appropriate topic).
5. Click **Next**.
The **New Service Request — SR Details** page appears.
6. In this page, enter the requested information.
At a minimum, enter information in each field marked by an *.
7. Click **Submit**.
If you are already logged in, the **Service Request Confirmation** page appears. Go to the last step.
If you are not already logged in, the **Log-in** page appears.
8. If you are a registered member, login with your user name and password.
The **Service Request Confirmation** page appears. Go to the last step.
9. If you have not yet registered,
 - a. If you want to become registered member, click **Register Now** and complete the registration process.
The **Service Request Confirmation** page appears.
 - b. If you do not want to register, supply your contact information in the **I do not want to register - Provide contact information** form and click **Submit**.
The **Service Request Confirmation** page appears.
10. Click **Done**.
Your service request is submitted.

3. System Requirements

Hardware

- *Windows® OS*: Intel® Pentium® 4 processor, 2 GHz or faster, Intel® Xeon™, Intel® Core™, AMD Athlon™ 64, AMD Opteron™, or later
- *Linux® OS*: 1.8 GHz Intel® Pentium® class processor (or better), **64-bit host OS required.**
- At least 2 GB of RAM.
- At least 3 GB of free disk space.
- Internet connectivity for web downloads and update access.

Operating System

This table reflects the set of operating systems the final build has been verified with. Other Windows versions or Linux distributions can be used, but official support for items other than listed will be provided after they are tested.

Windows			
Host OS	SP Level	32-bit	64-bit
Windows 10	1803		X
Windows 7	SP1	X	X
Linux			
Host OS	Version	64-bit	
Ubuntu	16.04, 18.04	X	
Fedora	21	X	
Mint	19.1	X	
RedHat Enterprise Linux / CentOS	6.10, 7.6	X	

NOTE CodeWarrior installation on 64-bit Linux hosts requires presence of dependent 32-bit libraries in the system. For supported distributions the installer detects missing dependencies and provides options to install them automatically.

Starting with v10.0.7 hosts running Windows XP, Windows Vista, as well as non-LTS versions of Ubuntu are no longer supported.

4. New in this release

4.1. What's New

v10.0.9 release highlights include:

- Compatibility with Linux kernel 4.1 and QorIQ Linux SDK 2.0
- QorIQ Configuration and Validation Suite v4.6
- GCC Linaro toolchain 4.9.3 (2015.05 rel + additional patches)
- MT29F4G16ABBDA and MT25QU01GBBB flash support
- Delivered as a stand-alone installer

v10.0.8 release highlights included:

- Bare-metal debug support for LS1021A revision 2 on LS1021A-TWR boards
- Linux debug compatibility with Linux SDK for LS1021A Rev2 v0.4
- eMMC flash programmer on LS102xA-QDS
- SD flash programmer on LS102xA-QDS/TWR/IOT
- Documentation updates
- Enabled Linux trace and profiling for LS102xA rev 2 and LS1024
- GCC Linaro toolchain 4.9.3

All CodeWarrior components including CW-ARMv7 are delivered by means of a single installer named CW4NET. Users are advised to install all packages in order to get full visibility and control over the target device (simulated, emulated, or real hardware).

LS102xA rev. 1 users should be aware of a [breaking change](#) introduced by this release requiring user action. Additional details at the end of the debugger section (chapter 8.3 JTAG chain configuration for LS102xA rev. 1).

4.2. Licensing

CodeWarrior for ARMv7 ISA is a licensed product. When used for evaluation purposes CodeWarrior will generate a temporary license valid for 15 days from installation date. Please note that the generated license certificate is node-locked to the machine running the installer; evaluation on multiple machines requires separate installs.

Past expiry, external users can solicit an evaluation extension by opening a licensing SR – please see section 2.4. The license certificate (license.dat) needs to be placed in the CW4NET_<version>/Common/ folder.

Additional information regarding license registration and activation is available here: [register](#), or via FSL support: [service request](#) with Category = “Software Product and Topic = “License Issue”.

4.3. Device and Board Support Matrix

No new devices/boards have been added as of v10.0.9. The current support matrix is depicted below:

Device Name	Core Type	Device Revision	Board Name	Build Tools	Bare Metal	Linux debug	Trace	Scenario Tools	QCVS
LS1020A/AE	ARM Cortex-A7	1	QDS X2	Yes	Yes	Yes	Yes	Yes	Yes
LS1020A/AE	ARM Cortex-A7	2	QDS X2	Yes	Yes	No	Yes	Yes	Yes
LS1021A/AE	ARM Cortex-A7	1	QDS X2	Yes	Yes	Yes	Yes	Yes	Yes
LS1021A/AE	ARM Cortex-A7	2	QDS X2	Yes	Yes	No	Yes	Yes	Yes
LS1022A/AE	ARM Cortex-A7	1	QDS X2	Yes	Yes	Yes	Yes	Yes	Yes
LS1022A/AE	ARM Cortex-A7	2	QDS X2	Yes	Yes	No	Yes	Yes	Yes
LS1020A/AE	ARM Cortex-A7	1	TWR X3	Yes	Yes	Yes	Yes	Yes	Yes
LS1020A/AE	ARM Cortex-A7	2	TWR X3	Yes	Yes	Yes	Yes	Yes	Yes
LS1021A/AE	ARM Cortex-A7	1	TWR X3	Yes	Yes	Yes	Yes	Yes	Yes
LS1021A/AE	ARM Cortex-A7	2	TWR X3	Yes	Yes	Yes	Yes	Yes	Yes
LS1022A/AE	ARM Cortex-A7	1	TWR X3	Yes	Yes	Yes	Yes	Yes	Yes
LS1022A/AE	ARM Cortex-A7	2	TWR X3	Yes	Yes	Yes	Yes	Yes	Yes
LS1021A	ARM Cortex-A7	1	IOT X1	Yes	Yes	Yes	Yes	Yes	Yes
LS1024A	ARM Cortex-A9	1	RDB	No	Yes	Yes	Yes	No	No
LS102MA	ARM11	1	RDB	No	Yes	Yes	N/A	No	No

NOTE In the above table “Bare Metal” refers to board initialization, target access, register and memory access, run control, flash programming and u-boot debug scenarios from NOR flash. Linux Debug designates Linux kernel, module and application debug.

5. Build Tools

5.1. LS1021A build tools

The 10.0.9 release includes Linaro GNU binary toolchain release version 2015.05 (gcc 4.9.3) and associated runtimes, compatible with QorIQ Linux SDK v2.0. Versions listed below; for details about their contents please consult the Linaro releases site.

- Gcc-linaro-4.9-2015.05
- Gdb-7.10 ef5fa52ac9ab68b505b52acb2d2068b366ba8bf2
- Linux sysroot 4.0-rc4-2015.03
- Glibc 2.20-2014.11
- Newlib 136b66e404df41435bdec4630c0787b0bc7e7580 + errata for CMPGCCARM-55

Users intending to develop Linux user space applications with CodeWarrior are recommended to use the toolchain supplied with the Linux SDK.

5.2. No LS1024/2MA build tools

Support for LS1024A and LS102MA in this release is limited to debug only. Build tools and runtimes tailored for Cortex-A9 and ARM11 are not included with the product.

Users wishing to develop applications using CodeWarrior and LS1024A/2MA Linux BSPs are recommended to use the toolchain supplied by the Linux SDK with CodeWarrior. Please consult AN5048 for instructions on integrating an external GNU toolchain with CodeWarrior.

6. Documentation

Documentation for the QorIQ Configuration and Validation Suite has been updated with the component contents.

In addition to these documentation updates, the following application note for CodeWarrior Development Studio for QorIQ LS series for ARM v7 ISA has been added on the [ARMv7 Product Summary Page](#):

- **AN5227:** Setting Up LS1 Processors for Secure Boot and Secure Debug using CodeWarrior for ARMv7 Application Note
- **AN5184:** Programming eMMC/SD card using CodeWarrior for ARMv7 Application Note
- **AN5048:** Using an External GCC Toolchain with CodeWarrior for ARMv7 Application Note

Additionally, latest documentation for each of the following optional components of CodeWarrior Development Studio for QorIQ LS series for ARM v7 ISA is included with the respective component:

- QorIQ Configuration and Validation Suite
- Scenarios Tool

7. IDE and Product Independent Debugger

CodeWarrior for ARMv7 builds upon a common set of architecturally independent components used by all CodeWarrior product lines. The general look & feel, configuration and debug flows should resemble CodeWarrior for Power Architecture in particular.

This release is based on Eclipse 3.7.1 (Indigo). The list of new improvements and fixes made by the community is available [here](#).

The following extensions to the Eclipse IDE are included with the product:

- CodeWarrior Welcome screen.
- CodeWarrior Projects view, an enhanced version of the CDT C/C++ Projects view.
- Referenced projects feature, allowing for creation of build dependencies across projects.
- Multiple compiler versions support. Choice of build tools can be made at project level.
- Concurrent compilation support, allowing parallel builds with customization options.
- Command-line builder (ecd) with portable makefile generation support.
- Added support to Disassemble/Preprocess single/multiple files.
- Commander View, which provides a quick access to some of the common and basic CodeWarrior operations.
- CodeWarrior Console view, displays the output from the build (standard out and standard error) as generated by the build process.
- Remote System Explorer operates with remote system entities. The CodeWarrior uses two types of remote systems for describing Freescale hardware with respect to debug process: Target Configuration and Connection Configuration. RSE systems are cached in the project directory in a meaningful fashion.
- Extract the configuration details of the currently installed CodeWarrior features and associated plug-ins.
- Diagnostic Information Export, allowing export of error log information for use by FSL support group.
- Improved Problems view which also displays the information, such as description, resource, path, location, and type for build errors and warnings.
- Improvements to the Find & Open dialog.
- Ability to view the currently installed CodeWarrior features and the associated plug-ins.
- Ability to import files into the Workbench using CodeWarrior Drag and Drop support or Import Wizard.
- Ability to create, open, and save files located outside the current workspace.
- Support for response files in compiler and linker invocations, working around command line length limitations
- Changes in linker command files now mark the project as dirty, and causing the project to be rebuilt as a result of a build operation
- Toolchain uses the bundled make utility instead of the system one

The following general features are applicable to the Core Debugger engine:

- Debugging C/C++/ASM programs with symbolic support

- Breakpoints support: line/function/address breakpoints
- Support for per-core and multi-core commands: suspend, resume and terminate
- Reset and multi-core reset functions
- Instruction mode stepping function
- Debug and target settings management via Remote System Explorer
- Integrated Flash Programmer : erase/blank check, program/verify, checksum and diagnostics operations
- Dedicated tools for import, export and fill memory
- Possibility to debug externally built binaries (elf files)
- Possibility to load and use symbols from multiple binaries (elf files)
- Support for manual and automatic path mappings
- Support for automatic refresh memory, variables and registers views during runtime
- Command-line interface to debugger features with integrated TCL scripting engine.
- Detailed views for core and peripheral registers.

The New Project Wizard generates sample projects meant to be used as a basis for building and debugging applications for the devices/boards listed under Device Support section.

The following options are available for bare-metal project generation:

- Device, board and probe selection
- Application or Static Library project type
- Predefined debug configurations for Download/Connect/Attach
- C/C++/ASM project types
- Console I/O over UART or CW console
- Build tool selection
- Floating point mode
- Single- or multi-core debug configuration
- On-chip RAM support
- ROM support

The Linux application wizard provides choices for:

- Application or Static Library
- C/C++ project types
- AppTRK connectivity

All wizard generated projects include a readme documenting additional H/W configuration required for use.

8. Target Debugger

8.1. Debug Probe

The following debug probes are supported in this release:

Target Debugger

- CodeWarrior TAP / USB interface
- CodeWarrior TAP / Ethernet interface
- On-board CMSIS-DAP probe for the LS102xA TWR and LS102xA IoT

CodeWarrior TAP user guide is available at this [link](#).

Existing CodeWarrior TAP for Power Architecture units can be reused with LS102x QDS by exchanging the probe tip with a 10-pin ARM-mini connector. A compatible probe tip can be ordered from freescale.com with the part number [CWH-CTP-CTX10-YE](#).

NOTE Board recovery scenarios involving a blank/corrupted flash require the external CodeWarrior TAP probe. Reset Configuration Word override is explicitly not supported for CMSIS-DAP.

8.2. Target Debugger

The list of devices/personalities supported by the debugger is listed in section 4.2. The following features are available:

- Bare-metal debug (LS1021/20/22A QDS, TWR, IoT, LS1024A/2MA RDB)
 - Board initialization files including DDR (1600 MHz supported for QDS/TWR/IOT)
 - SoC reset with workaround for reset skid
 - Single- and multi- core run control
 - Support for debug with caches enabled
 - C and ASM level stepping
 - Core and SoC memory visibility
 - Register visibility and details
 - ARM11 and Cortex-A7/A9 core registers + modes
 - CP15, CP14
 - ETM for Cortex-A7
 - SoC Peripherals for Cortex-A7
 - Full ARM/Thumb2 disassembler support including VFP/NEON
 - Exception modes and secure state visualization
 - Software/Hardware breakpoints and data watch points
 - Debug support in exception modes (full stack-crawl for FIQ, IRQ)
 - Semi-hosted and UART I/O
 - U-boot debugging support in NOR flash
 - Secure/Non-Secure World Visibility (ARM TrustZone support)
 - RCW override for LS1021A QDS/TWR Rev 2.0
 - Secure debug for LS1021A QDS Rev 1.0 and 2.0
 - Source level debug from entry point
 - On-chip RAM debug
 - ROM debug
- Flash Programmer

- QDS: Flash Programmer for NOR (S29GL01GS), NAND (MT29F4G08ABBDA), QSPI (S25FL128S), SD (SDSP16GB) and eMMC (MMCP1xxx) flash devices
- TWR: Flash Programmer for NOR (JS28F00AM29EWHA), QSPI (N25Q128A) and SD (SDSP16GB) flash devices
- IoT: Flash Programmer for QSPI (S25FL512S) and SD (SDSP16GB) flash devices
- LS102MA RDB: Flash Programmer for NOR (S29GL256P)
- LS1024A RDB: Flash Programmer for NOR (MX29GL512F)
- Linux Kernel/Module debug (QDS, TWR and RDB)
 - Compatibility with **QorIQ LS102xA SDK v2.0** (QDS/TWR), IoT EAR and Linux SDK for LS1021A Rev2 v0.4
 - **Linux kernel v4.1** debug compatibility
 - Full Linux kernel debug using attach launch configurations
 - SMP support
 - Ability to debug the kernel starting from the entry point by attaching to u-boot and then starting linux from u-boot (tftp/flash)
 - Linux kernel modules debug with insertion/removal detection
- Linux Application debug (QDS, TWR and RDB)
 - Ability to debug target-side Linux applications using a remote debug agent (AppTRK)
 - Support for multi-process / multi-thread applications
 - Shared library support
 - Automatic fork/exec detection
 - Precompiled AppTRK debug agent compatible with LS102x BSP EAR images. See note under Build Tools regarding use of a toolchain compatible with the SDK.
 - Example projects (Fork, Exec, Threads and SharedLibrary)
 - Thumb and Thumb2 support

8.3. JTAG chain configuration for LS102xA rev. 1

Starting with the v10.0.7 release the debugger and new project wizard artifacts assume a LS102xA revision 2 device by default. The JTAG chain exposed by rev. 2 devices differs from rev. 1, thus rev. 1 users need to perform additional steps in order to connect to the target.

- Open the Remote Systems View (Ctrl+3, type Remote, pick from the list)
- Right-click the entry corresponding to your project (ie. proj0-core0_RAM_LS1021A_QDS_ **Download Target**) and choose Properties
- Click Edit near Target Type
- Click Import and browse to {CW_Root}/ARMv7/ARM_Support/Configuration_Files/jtag_chains/LS102xA_Rev1_ConfigChain.cfg
- Click OK to close all configuration windows

9. QorIQ Configuration and Validation Suite

This release incorporates the QorIQ Configuration and Validation Suite version 4.6. Additional details about its contents can be found in the QCVS release notes document shipping in the product layout.

QCVS is a collection of graphical tools assisting with configuration of various software or hardware modules, generation and validation of configuration data provided in a variety of formats.

This release includes support for the LS1020/21/22A personalities with the following feature set:

- PBL/RCW configuration
- DDR3/4 configuration
- DDR Validation

General (non-NPI specific) feature highlights include:

- Support for running multiple validation scenarios without pausing in-between
- Turning PBL on/off depending on external conditions
- Support for header preprocessing in Device Tree

10. Software Analysis

This release supports configuration, extraction and decoding for the ARM Cortex-A7 core program trace. The following features are available:

- Support for single- and multi-core
- Trace configuration for one-buffer or overwrite modes
- Trace collection from either the internal ETF buffer or DDR
- Trace extraction via the debug probe, with output to a file
- Trace Viewer – shows all program events decoded from off-line trace files
- Multi-core trace support
- Tracing the Linux kernel, Linux modules, and Linux user space applications
 - Hierarchical profiler
 - Code Coverage
 - Call Tree for program call flow
 - Linux trace collection using RSE Connection management
- Profiling views for Linux kernel/modules/apps
- Profile Results – a new view for trace results management
- Debug Print: instrumentation trace with minimal intrusiveness

Enabled baremetal trace and profiling for i.MX6Q and i.MX6S.

Software Analysis components support trace extraction over both CWTAP and CMSIS-DAP (TWR and IoT boards).

Known limitation for LS1024:

- One buffer mode tracing is disabled.
- Scatter-gather module isn't supported for ls1024
- Satrace is dependent on linux kernel config CONFIG_PID_IN_CONTEXTIDR which is not available yet in official SDK release but can be found on master branch of DN CPE Software.

NOTE A known issue exists where the SDK 1.8 does not build required CodeWarrior Software Analysis components out of the box. In order to resolve please issue the following command in the root folder of the SDK before building the image:

```
mv meta-fsl-ppc/recipes-kernel/scatter-gather meta-fsl-arm/recipes-kernel/
```

11. Scenarios Tool

This release incorporates Optimization Suite - Scenarios Tool version 2.15 with full support for LS1020/21/22A personalities, and their encryption capable flavors (LS102xAE). Scenarios Tool is an advanced performance measurement tool that configures, collects and analyzes platform counters and presents them in a graphical fashion.

Following general improvements have been made to the Scenarios Tool:

- Improve UI responsiveness of scenario configuration editor with remote license servers.
- Updated documentation.

The following scenarios are available for the LS102xA family:

- CPU Utilization
 - Core Performance
 - Branches
 - Bus accesses
 - L1 D/I-cache
 - L2 D-cache
 - Prefetch
 - Load/Store
 - Exceptions
- DDR Controller Events
- GDI
 - CCI400, CAAM, QDMA, VeTSEC and Cortex-A7 events through GDI mux
- SEC Performance Counters and Events (LS102xAE flavors)

12. Errata

12.1. Fixed Issues

The following errata have been addressed by the v10.0.8/v10.0.9 releases:

ID	Headline
CMPGCCARM-55	Printf forcing minus sign when printing double variables
DTCCS-6	Linux kernel crash when a kernel module under debug is removed. Applicable to LS1024A target only.
DTCCS-12	The debugger may occasionally fail to insert or remove S/W breakpoints when performing a module debug session on LS102xA.
ENGR00361537	QSPI Flash Programmer fails on QDS board. Only noticed when using rev. 1 parts.
DTBPDBG-233	DE crashes on CW-ARMv7 when using flash programmer

12.2. Known Issues

ID	Component	Headline
QCS-5806	QCVS	Issue: QCVS doesn't work when anything else starts on port 15000 Workaround: Kill the process which is on port 15000 and restart Armv7. How to find the port: - Windows: Resource Monitor -> Network -> Listening Ports - Ubuntu: netstat -nlpt (in terminal)
ENGR00341491	Debugger	Issue: Linux application debugger may get stuck when step over several times in a loop Workaround: When this happens, use a breakpoint to stop the application in the right place and press continue.
ENGR00342274	Debugger	Issue: Occasional failures encountered attempting to debug a Linux application for the first time. Workaround: Retry the operation.
CORBA_initialization_err or	Debugger	User might experience the next error while trying to start a debug session on Linux: <i>"Error creating session: Failed to initialize the CORBA framework or could not connect to the CodeWarrior debugger-engine CORBA server"</i> Fix: cat on /etc/hosts and check you have the following line: 127.0.1.1 <your_hostname>
DTINST-1093		Issue: CMSISDAP is not working on RHEL 7.2 and Fedora 21 because libusb is not found Workaround: The CMSISDAP support is using a library from ARM - librddi-dap_cmsis-dap.so.2. This library requires libusb-0.1.so.4 to be present on the Linux system. The library is added in the dependency's installation list It seems there is an access permissions issue when libusb-0.1.so.4 tries to enumerate the USB devices (not only the CMSISDAP).

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Errata

	<p>Workaround 1: start CCS with sudo sudo ./ccs configure CW to use the CCS instance already started</p> <p>Workaround 2: add read/write permissions for everyone for all USB devices ("/dev/bus/usb/<num>/*"), if it is not done already. run CW/CCS as usual</p> <p>CW/CCS CMSISDAP is working fine on RedHat 7.2, after doing the following settings: sudo chmod 666 /dev/bus/usb/002/* sudo chmod 666 /dev/bus/usb/003/* sudo chmod 666 /dev/bus/usb/004/*</p>
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