Atmel Studio

Atmel Studio Release Note

Introduction

Atmel Studio is a integrated development platform from Microchip®. It provides a modern and powerful environment for doing AVR® and ARM development.

Get started by exploring the included example projects. Run your solution on a starter or evaluation kit. Program and debug your project with the included simulator, or use one of the powerful on-chip debugging and programming tools from Microchip. Get productive with the various navigate, refactor and intellisense features in the included editor.

With strong extension possibilities and online gallery, it is possible for both designers and 3rd party to provide plug-ins and customize the environment for best use and productivity.

Atmel Studio carries and integrates Atmel Start, the GCC toolchains for both AVR and ARM, Atmel Software Framework, AVR Assembler and Simulator. All newest Atmel tools are supported including Power Debugger, Atmel-ICE, Embedded Debugger, AVR ONE!, JTAGICE mkII, JTAGICE3, STK500, STK600, AVRISP mkII, AVR Dragon™, and SAM-ICE™.

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1. New and Noteworthy

New features available.

1.1 Atmel Studio 7.0

Atmel Studio 7.0.1931
Atmel Studio 7.0.1931 contains:

- Advanced Software Framework 3.40.0
- New Microchip Gallery extension
- Atmel Start extension provides improved feedback on required device pack dependencies
- Support for ARM® Cortex®-M23 architecture with TrustZone®
- Support for kits with the new nEDBG debugger platform
- Support for devices:
  - ATSAMHA1E[14|15|16]AB
  - ATSAML10[D|E][14|15|16]A
  - ATSAML11[D|E][14|15|16]A
  - ATtiny202, ATtiny204, ATtiny402, ATtiny404, ATtiny406, ATtiny804, ATtiny806, ATtiny807, ATtiny1604, ATtiny1606, ATtiny1607
- AVR 8-bit GCC Toolchain 3.6.1
- ARM GCC Toolchain 6.3.1 with upstream versions: gcc (ARM/embedded-6-branch revision 249437), GNU ARM Embedded Toolchain: 6-2017-q2-update
- Atmel Studio 7.0.1931 contains fixes for the following issues that were present in 7.0.1645:
  - AVRSV-8001: Tool firmware upgrade instability.
  - AVRSV-8063: ELF production file programming did not support fuses for ATtiny817 family.
  - AVRSV-8075: Launch of debugging with ATSAM4L unstable in some cases.
  - AVRSV-7895: Solution with links between projects compiles wrong file.
  - AVRSV-7745: Linked files in subfolder causes build failure.
  - AVRSV-7939: Function breakpoint fails for AVR devices.
  - AVRSV-8005: Writing fuses and memory fails in some cases on M0+ devices.

Atmel Studio 7.0.1645
Atmel Studio 7.0.1645 contains:

- Advanced Software Framework 3.35.1.898
- Support for devices:
  - ATmega4808, ATmega4809
  - ATtiny1614, ATtiny3214, ATtiny3216, ATtiny3217
  - ATSAMC[20|21][J|N][15|17|18]A
  - ATSAMD20[E|G|J][14|15|16]B
  - ATSAMD51[G|J|N|P][18|19|20]A
  - ATSAME[51|53|54][J|N][18|19|20]
  - ATSAME70[N|Q][19|20|21]B

  - ATSAMS70[J|N|Q][19|20|21]B
- AVR 8-bit GCC Toolchain 3.6.1
- ARM GCC Toolchain 6.3.1 with upstream versions: gcc (ARM/embedded-6-branch revision 249437), GNU ARM Embedded Toolchain: 6-2017-q2-update
- Atmel Studio 7.0.1645 contains fixes for the following issues that were present in 7.0.1417:
  - AVRSV-7798: ATtiny817 fuse programming from ELF issue fixed.
  - AVRSV-7742: Compiling an imported Arduino sketch for Arduino zero shows error.
  - AVRSV-7903: Studio automatically sets GPNVM bits [7:8] thereby enabling TCM.
  - AVRSV-7892: Writing SAML22 RWW flash fails.
  - AVRSV-7889: Skewed debug info for AVR 8-bit in AS 7.0.1417.
  - AVRSV-7883: Incorrect warning message for KB2978092 during installation of AS 7.0.1417.
  - AVRSV-7106: Hex parser fails on UNIX® line endings.
  - AVRSV-4914: Add support for new avr-gcc __int24 and __uint24 types.
  - AVRSV-7877: Devices with external SRAM fails to calculate available SRAM.
  - AVRSV-7845: Crash in _ReallyTerminateAfterLaunchFinished.
  - AVRSV-7834: Pack manager fails to download CMSIS DFPs.
  - AVRSV-7876: Add checksum fields to http header for KitsDatabase.xml.
  - AVRSV-7854: NaN values not handled by atprogram.
  - AVRSV-7911: Problems reading device ID on ATmega4809.
  - AVRSV-7202: Arduino Library Grouping can have better representation.
  - AVRSV-7927: Security Bit Window in Device Programming should not always be available depending on the MCUs.
  - AVRSV-7973: Chip erase outside prog session fails on SAM4L.
  - AVRSV-7961: FUSE configuration warning for BOD(BODCFG.LVL) is incorrect in Atmel Studio.

Note: QTouch® Composer extension must be updated to version 5.9.122 or later to work with Atmel Studio 7.0.1645.

Atmel Studio 7.0.1417

Atmel Studio 7.0.1417 contains a fix for the following issue that was present in 7.0.1416:

- AVRSV-7827: New WinUSB driver fails to install on 32-bit Windows

Atmel Studio 7.0.1416

The following changes are done in Atmel Studio 7.0.1416:

- Changed driver to WinUSB for AVR Dragon™, AVRISP mkII, JTAGICE mkII, JTAGICE3, AVR ONE!, STK®600, and QT600
- Installer improvements
- Improved support for installing older device family packs
- AVR 8-bit GCC Toolchain 3.6.0 with upstream versions:
  - gcc 5.4.0
  - Binutils 2.26.20160125
  - avr-libc 2.0.0
  - gdb 7.8

- ARM GCC Toolchain 6.2.1 with upstream versions:
  - gcc (ARM/embedded-6-branch revision 243739), GNU ARM Embedded Toolchain: 6-2016-q4-major
  - Binutils 2.27
  - gdb 7.12
- Advanced Software Framework 3.34.1

Atmel Studio 7.0.1416 contains a fix for the following issues that were present in 7.0.1188:

- AVRSV-7492: Illegal PC value after a few resume-suspend cycles on SAMD10.
- AVRSV-7486: Debugging may fail in Cortex®-M0+ SAM devices at high clock.
- AVRSV-7693: Go to source from Watch window crashes studio.
- AVRSV-7741: Writing Flash or EEPROM with size of 0x100 or 0x1000 fails on ISP/SPI programming.

Atmel Studio 7.0.1188

The following changes are done in Atmel Studio 7.0.1188:

- Added support for new AVR8X architecture
- Installer improvements
- Improved Arduino import
- Change how fuses are listed in the programming dialog
- AVR 8-bit GCC Toolchain 3.5.4 with upstream versions:
  - gcc 4.9.2
  - Binutils 2.26
  - avr-libc 2.0.0
  - gdb 7.8

Atmel Studio 7.0.1188 contains a fix for the following issues that were present in 7.0.1006:

- AVRSV-7149: When writing EEPROM, bytes that are 0xFF are wrongly skipped.
- AVRSV-7393: Atmel Studio backend crashes when debugging a COFF object file.
- AVRSV-7564: Atmel Studio installation is hanging.
- AVRSV-7580: Atmel Studio not handling DCACHE properly on SAM Cortex®-M7 devices.
- AVRSV-7582: Remove white spaces while saving file does not show the anticipated effect.
- AVRSV-7594: Atmel Studio crashes in some cases when you stop debugging.
- AVRSV-7602: Cannot find bounds of the current function.
- AVRSV-7607: Invalid MTB buffer start address for SAML2x and SAMC2x devices.

Atmel Studio 7.0.1006

The following changes are done in Atmel Studio 7.0.1006:

- New Atmel START extension that allows the user to create and configure Atmel START projects within Atmel Studio
- Ability to load multiple modules in a debug session (experimental)
- AVR 8-bit GCC Toolchain 3.5.3 with upstream versions:
  - gcc 4.9.2
  - Binutils 2.26
  - avr-libc 2.0.0

  - gdb 7.8
- ARM GCC Toolchain 5.3.1 with upstream versions:
  - gcc (ARM/embedded-5-branch revision 234589)
  - Binutils 2.26
  - gdb 7.10

Atmel Studio 7.0.1006 contains a fix for the following issues that were present in 7.0.943:

- AVRSV-6878: Atmel Studio write the write-once wdt registers on some SAM devices.
- AVRSV-7470: SAM Cortex®-M7 devices fails launch occasionally.
- AVRSV-7471: Devices with external and internal RAM lists all the RAM as available.
- AVRSV-7473: Atmel Studio hangs during startup.
- AVRSV-7474: Kits connected to Atmel Studio are not getting enumerated in the QTouch Start Page.
- AVRSV-7477: Show all files does not work from solution explorer.
- AVRSV-7482: Exception when adding a breakpoint on SAM4L.
- AVRSV-7486: Debugging may fail in Cortex®-M0+ SAM devices at high clock speeds.

Atmel Studio 7.0.943

Atmel Studio 7.0.943 contains a fix for the following issue:

- AVRSV-7459: Projects containing files with uppercase file names can fail to build. Saving files with uppercase file names convert file names to lower case.

Atmel Studio 7.0.934

The following changes are done in Atmel Studio 7.0.934:

- AVR 8-bit GCC Toolchain 3.5.2 with upstream versions:
  - gcc 4.9.2
  - Binutils 2.26
  - avr-libc 2.0.0
  - gdb 7.8
- AVR 32-bit GCC Toolchain 3.4.3 with upstream versions:
  - gcc 4.4.7
  - Binutils 2.23.1
  - Newlib 1.16.0
- ARM GCC Toolchain 4.9.3 with upstream versions:
  - gcc (ARM/embedded-4_9-branch revision 224288)
  - Binutils 2.24
  - gdb 7.8.0.20150304-cvs

Atmel Studio 7.0.934 resolves the following issues present in Atmel Studio 7.0.790:

- AVRSV-7376: Atmel-ICE slow programming.
- AVRSV-7379: Unhandled exception when writing fuses or lock bits when Auto Read is turned off.
- AVRSV-7396: Some machines shows an error regarding 'Exception in MemoryPressureReliever'.
- AVRSV-7400: When in Standard mode, **Disable debugWire and Close** are not visible in the Debug menu.

- AVRSV-7408: When using Atmel Studio in Standard mode, the **Set Startup Project** menu is missing.

Atmel Studio 7.0.790

The following features are added in Atmel Studio 7.0.790:

- Support for mass storage mode in embedded debugger (EDBG), enabling drag and drop programming
- Introduction of user interface profiles. The user can choose an interface where some of the toolbar buttons and menu items are removed.
- Support for importing libraries to previously imported sketches. Added support for Arduino Zero and Zero Pro.
- Parallel build turned on by default

Atmel Studio 7.0.790 resolves the following issues present in Atmel Studio 7.0.634:

- AVRSV-7084: Persist user settings during the upgrade.
- AVRSV-7014: Some ATmega and ATtiny devices failed to start debugging with the Simulator.
- AVRSV-7230: 'Show all files' in Solution Explorer not consistent.
- AVRSV-7062: Firmware upgrade of Xplained Mini kits not detected.
- AVRSV-7164: Reading flash to .bin file created incorrect .bin file.
- AVRSV-7106: Hex files with UNIX or mixed file endings fail to load.
- AVRSV-7126: Data breakpoints for ARM should not be limited to RAM.

Atmel Studio 7.0.634

This release adds device support for the SAM B11 device family.

Atmel Studio 7.0.634 resolves the following issues present in Atmel Studio 7.0.594:

- AVRSV-6873: Jungo Driver issue with Windows 10.
- AVRSV-6676: Launching debugging fails due to an issue with Intel graphics driver.

Atmel Studio 7.0.594

Atmel Studio 7.0.594 resolves the following issues present in Atmel Studio 7.0.582:

- AVRSV-7008: Opening a 6.2 project in Atmel Studio 7.0.582 persists Debug configuration settings for all the other configurations.
- AVRSV-6983: Uninstalling Studio extensions does not work in some cases.
- AVRSV-7018: Project Creation fails with some culture-specific user-names.
- AVRSV-7019: Help Viewer does not work on 32-bit machines.
- Issues with getting tools/debuggers recognized or visible see section 2.4 in ‘Atmel Studio 7.0.594-readme.pdf’ for workarounds.

Atmel Studio 7.0.582

- Updated to Visual Studio Isolated Shell 2015
- Integration with Atmel START
  - This tool will help you select and configure software components, drivers, middle-ware, and example projects to tailor your embedded application in a usable and optimized manner
- New device support system, CMSIS Pack compliant

- Data Visualizer, used for processing and visualizing data
- Updated help system, improved context-sensitive help
- Advanced Software Framework version 3.27.3. ASF is an extensive software library of software stacks and examples.
- A major upgrade of the Visual Assist extension to Atmel Studio that assists with reading, writing, re-factoring, navigating code fast
- Import Arduino Sketch projects into Atmel Studio
- Support for Flip-compatible bootloaders in atprogram and programming dialogue. The connected device appears as a tool.
- AVR 8-bit GCC Toolchain 3.5.0 with upstream versions[1]:
  - gcc 4.9.2
  - Binutils 2.25
  - avr-libc 1.8.0svn
  - gdb 7.8
- AVR 32-bit GCC Toolchain 3.4.3 with upstream versions[1]:
  - gcc 4.4.7
  - Binutils 2.23.1
  - Newlib 1.16.0
- ARM GCC Toolchain 4.9.3 with upstream versions[1]:
  - gcc 4.9 (revision 221220)
  - Binutils 2.24
  - gdb 7.8.0.20150304-cvs

1.2 Atmel Studio 6.2 Service Pack 2

- Advanced Software Framework 3.21.0
- Added support for the ATSAML21 device family
- Added support for the ATSAMV7 device family, based on the ATM Cortex-M7 core

1.3 Atmel Studio 6.2 Service Pack 1

- Advanced Software Framework 3.19.0
- AVR 8-bit Toolchain 3.4.5 with upstream versions:
  - GCC 4.8.1
  - Binutils 2.41
  - avr-libc 1.8.0svn
  - gdb 7.8
- AVR 32-bit Toolchain 3.4.2 with upstream versions:
  - GCC 4.4.7
  - Binutils 2.23.1

[1] For more information, see the readme that is installed as part of the toolchain.

- ARM GCC Toolchain 4.8.4 with upstream versions:
  - GCC 4.8.4
  - Binutils 2.23.1
  - gdb 7.8
- Support for trace buffers for ARM (MTB) and 32-bit AVR UC3 (NanoTrace)
- Support for attaching to targets

1.4 Atmel Studio 6.2

- Advanced Software Framework 3.17.0
- AVR 8-bit Toolchain 3.4.4 (with upstream GCC 4.8.1)
- AVR 32-bit Toolchain 3.4.2 (with upstream GCC 4.4.7)
- ARM GCC Toolchain 4.8.3
- Support for Atmel-ICE
- Support for Xplained Mini
- Support for data breakpoints
- Read OSCCAL calibration for tinyAVR® and megaAVR®
- Create ELF production files for AVR 8-bit using the programming dialogue
- Live Watch
- Non-intrusive trace support for SAM3 and SAM4 family of devices including
  - Interrupt trace and monitoring
  - Data trace
  - FreeRTOS™ awareness
  - Statistical code profiling
- Polled Data trace support for Cortex M0+
- Default debugger for SAM devices is now GDB. GDB does in some scenarios handle debugging of optimized code better.
- Support to create a GCC Board project (Atmel board\User board) for ALL the installed versions of ASF
- New ASF Board Wizard, to Add or Remove Board Project Template
- Improved loading time of New Example Project dialog, by loading only one ASF version by default
- IDR events now gets displayed in a separate pane in the output window
- LSS file syntax highlighting

1.5 Atmel Studio 6.1 Update 2

- Support for SAM D20 devices on the JTAGICE3
- Advanced Software Framework 3.11.0

[2] For more information, see the readme that is installed as part of the toolchain.

1.6 Atmel Studio 6.1 Update 1.1

- Fix programming of boot section for XMEGA® devices introduced in 6.1 update 1
- Fix SAM4LSP32 bare-bone project setup

1.7 Atmel Studio 6.1 Update 1

- Advanced Software Framework 3.9.1
- Extension Development Kit (XDK). Support for packaging an Embedded Application project into an Atmel Gallery Extension.
- Support for SAM D20 and SAM4N devices
- ARM GCC Toolchain 4.7.3 with experimental newlib-nano and multilibs

1.8 Atmel Studio 6.1

- Support for Embedded Debugger platform
- Support for Xplained Pro kits
- Advanced Software Framework 3.8.0
- AVR 8-bit Toolchain 3.4.2 (with upstream GCC 4.7.2)
- AVR 32-bit Toolchain 3.4.2 (with upstream GCC 4.4.7)
- ARM GCC Toolchain 4.7.3
- CMSIS 3.20
- Updated Visual Assist
- Command line utility for firmware upgrade
- Stimulus for simulator. Create a stimuli file to write register values while executing simulation.

1.9 Atmel Studio 6.0

- Support for ARM-based MCUs with SAM-ICE™
- Advanced Software Framework 3.1.3
- AVR Toolchain 3.4.0
- ARM Toolchain 3.3.1
- Advanced Software Framework Explorer
- Support for QTouch Composer as extension
- Updated Visual Assist
- New extension gallery

1.10 AVR Studio 5.1

- New version of AVR Software Framework (ASF)
- Availability and installation of new ASF versions through extension manager, without having to upgrade Studio 5
- Support for side by side versioning of ASF, with the ability to upgrade projects
- Syntax highlighting and better debugging support for C++ projects

- Support for importing AVR 32 Studio C++ projects
- New version of AVR Toolchain
- New command line utility (atprogram) with support for all Microchip AVR tools and devices
- Enhancements to programming dialog including support for ELF programming
- New version of Visual Assist with several enhancements and bugfixes

2. Frequently Asked Questions

Frequently asked questions about Atmel Studio.

What is the Atmel USB Driver?	The Atmel USB Driver is a cumulative installer that bundles the required USB drivers for all tools.
I get an error during installation of the Atmel USB Driver Package.	During installation of the Atmel USB Driver Package, you might get the error *0x800b010a - A certificate chain could not be built to a trusted root authority.* This means that the certificate that signs the installer could not be validated using the certificate authority built into Windows. The reason for not being able to validate the certificate is because the certificate chain needs to be updated through Windows Update. Make sure that you have received all updates so that Windows is able to validate the certificate. If you are not able to update your computer due to the computer being offline or restricted in some way, then the root certificate update can be downloaded from http://support2.microsoft.com/kb/931125.
Will Atmel Studio work in parallel with older versions of Atmel Studio, AVR Studio, and AVR32 Studio?	Yes, it will work side-by-side between major and minor versions. Side-by-side installation with different build numbers is not possible. If you are uninstalling AVR Studio 4.0 or AVR32 Studio be careful when you manually delete folders or registry entries after uninstall, as there might be other keys and folders deployed by Atmel Studio inside the Atmel folder and registry paths. Note that drivers may be incompatible between versions.
Atmel Studio cannot find any debuggers or programmers when Norton AntiVirus is running.	Atmel Studio might not show any connected tools if Norton AntiVirus is running. To make it work make sure Norton AntiVirus allows `atprogram.exe` to communicate with Atmel Studio by adding `atbackend.exe` as an exception in the Norton AntiVirus allowed programs. This is the same with any anti-virus program that by default blocks ports.
Windows shows a message box with the following message when attempting to run Atmel Studio installer: 'Windows cannot access the specified device, path or file. You may not have the appropriate permissions to access the item.	This might be caused by an anti-virus program blocking the installation of the Atmel Studio. We have seen this with the Sophos antivirus package. Temporarily disable the Sophos service running on the machine (or any corresponding anti-virus service), and attempt installation.
Atmel Studio takes a very long time to start but runs well in a VM environment.	The Visual Studio shell (and thus Atmel Studio) does a considerable amount of processing during start-up. Parts of the operations are WPF operations which benefit greatly from updated graphics libraries and drivers. Installing the latest graphics driver may give a performance boost both during normal operation and during start-up.

Verification and programming often fail with a serial port buffer overrun error message when using STK500.	This is a known issue. Due to DPC latency, serial communication can have buffer overruns on the UART chipset. A workaround which works for most systems is to use a USB to serial adapter.
When launching from a guest account, the following error is displayed when starting Atmel Studio: 'Exception has been thrown by the target of an invocation'.	Atmel Studio neither installs under a guest account nor runs under it.
Can install and run Atmel Studio from within a Virtual Machine?	Yes, with simulator there should be no issues. However, with physical devices like debuggers and programmers, the VM must offer support for physical USB and Serial port connections.
How can I reduce the start-up time of Atmel Studio?	• Make sure you have uninstalled unwanted extensions • Disable *Allow Add-in components to load*: 2.1. Go to *Tools, Options, Add-in/Macro Security*. 2.2. Then, uncheck the Allow Add-in components to load option. • Disable the start-up page: 3.1. Go to *Tools, Options, Environment, Startup, At Startup*. 3.2. Select the *Show empty environment* option.
How to improve studio performance for any supported version of Windows?	• Make sure your system has the latest version of the Windows Automation API • Exclude the following directories and files from your antivirus scanner: – The Atmel Studio installation directory, and all files and folders inside it – *%AppData%\Roaming\Atmel* directory, and all files and folders inside it – *%AppData%\Local\Atmel* directory, and all files and folders inside it – Your project directories • Visual Studio Shell requires a lot of swap space. Increase the paging file. Also, put the system to maximize performance. Both options are found in the *System, Properties, Performance, Settings* menu.
Should I install the latest Windows Automation API 3.0?	Yes, if your OS is any of the following: • Windows Server 2008
How can I make sure my system has the latest	Your system has the latest Windows Automation API if you have Windows 7 or Windows 8. Only Windows XP, Windows Vista, Windows Server 2003, and Windows Server 2008 have the old version

Windows Automation API 3.0?	of the API. Find the *UIAutomationCore.dll* file in your system (normally found in the windows folder) and compare the version number of that file. The version should be 7.X.X.X. for the new API. The latest API can be found at http://support.microsoft.com/kb/971513.
My Project is large and it takes a long time to open. Is there any option to avoid this delay?	Visual Assist X parses all the files when we open the existing project. You could disable this option: 1. Go to *VAssistX, Visual Assist X Options, Performance*. 2. Uncheck the *Parse all files when opening the project*.
I have a limited RAM size in my system and I work long hours in the same instance of Atmel Studio. After some time, Atmel Studio becomes slow on my system.	Press *Ctrl+Shift+Alt+F12* twice to force Atmel Studio to garbage collect.
How can I make my projects build faster?	You can enable parallel build Option from *Tools, Options, Builder, GNU Make, Make Parallel Execution Of Build*. This option will enable the parallel execution feature in the GNU make utility. This option may cause the build log to be displayed unordered.

2.1 Compatibility with Legacy AVR Software and Third-party Products

2.1.1 How do I Import External ELF Files for Debugging?

Use the **File → Open object file for debugging**.

2.1.2 How do I Reuse My AVR Studio 4 Projects with the New Atmel Studio?

1. Click the menu **File→Import AVR Studio 4 project**.
2. An '**Import AVR Studio 4 Project**' dialog will appear.
3. Type in the name of your project or browse to the project location by clicking the **Browse** button of the **APFS File location** Tab.
4. Name the new solution resulting from the conversion of your project in the **Solution Folder** Tab.
5. Click **Next**.
6. Atmel Studio will proceed with conversion. Depending on the complexity and specificity of your project there might be some warnings and errors. They will be shown in the **Summary** window.
7. Click **Finish** to access your newly converted project.

2.2 Atmel Studio Interface

2.2.1 How can I Start Debugging My Code? What is the Keyboard Shortcut for Debugging?

Unlike the AVR Studio 4 to build your project, without starting debugging, you should press F7.

If you need to rebuild your project after a change to the source files, press Ctrl+Alt+F7.

To Start debugging - press F5.

To open the Debugging Interface without running directly, press the **Debug→Start Debugging and Break** menu button, or press F11.

To start a line-by-line debugging press F10, to start an instruction by instruction debugging session - press F11.

To run your project without debugging, press the **Debug→Start Without Debugging** menu button.

2.2.2 What is a Solution?

A solution is a structure for organizing projects in Atmel Studio. The solution maintains the state information for projects in .sln (text-based, shared) and .suo (binary, user-specific solution options) files.

2.2.3 What is a Project

A project is a logic folder that contains references to all the source files contained in your project, all the included libraries and all the built executables. Projects allow seamless reuse of code and easy automation of the build process for complex applications.

2.2.4 How can I use an External Makefile for my Project?

The usage of external makefiles and other project options can be configured in the project properties.

Remember that an external makefile has to contain the rules needed by Atmel Studio to work.

2.2.5 When Watching a Variable, the Debugger says `Optimized away`

Most compilers today are what is known as an optimizing compiler. This means that the compiler will employ a number of tricks to reduce the size of your program or speed it up.
Note: This behavior is usually controlled by the `-On` switches.

The cause of this error is usually trying to debug parts of the code that does nothing. Trying to watch the variable `a` in the following example may cause this behavior.

```
int main() {
   int a = 0;
   while (a < 42) {
       a += 2;
   }
}
```

The reason for `a` to be optimized away is obvious as the incrementation of `a` does not affect any other part of our code. This example of a busy wait loop is a prime example of unexpected behavior if you are unaware of this fact.

To fix this, either lower the optimization level used during compilation or preferably declare `a` as `volatile`. Other situations where a variable should be declared volatile is if some variable is shared between the code and an ISR[3].

For a thorough walkthrough of this issue, have a look at Cliff Lawsons excellent tutorial on this issue.

2.2.6 When Starting a Debug Session, I get an Error Stating that Debug Tool is not Set

The reason for this message is that there is no tool capable to debug that is selected for your project. Go to the Tool project pane and change the to a supported tool *(Project Properties > Tool > Select debugger/ programmer)*.

If the tool you have selected does support debug, then check that the correct interface is chosen and that the frequency is according to the specification. If the issue persists, try to lower the frequency to a

[3] Interrupt Service Routine

frequency where programming is stable, and then slowly increase the frequency as long as it keeps stable.

2.3 Performance Issues

2.3.1 Atmel Studio Takes a Very Long Time to Start on My PC but Runs Well in a VM Environment. Is there Something I Can Do With This?

Visual Studio shell (and thus Atmel Studio) uses WPF as a graphics library and does a lot of processing in the GUI thread. WPF has support for hardware acceleration. Some graphics card drivers does not utilize this well and spend time in kernel space even when no graphics update is required. Installing the latest graphics driver may give a performance boost.

2.3.2 Verification and Programming often Fails with a Serial Port Buffer Overrun Error Message when using STK500

This is a known issue. Interrupt DPC latency for serial communication may be disrupted by other drivers, thus causing buffer overruns on the UART chipset. A workaround which works for most systems is to use a USB to serial adapter.

2.3.3 I've connected my Tool through a USB Hub, and now I get Error Messages and Inconsistent Results while Programming and Debugging

Tools and devices should be connected directly to a USB port on your debugging PC. If this is not an option, you may reduce/eliminate problems by:

- Disconnect any other USB devices connected to the hub
- Switch ports on the USB hub
- Set the tool clock frequency low. *E.g. Set JTAG Clock < 600 kHz.*
- If *Use external reset* is an option for your tool/device combination, enable this

Note: The AVR Dragon should be connected through a powered USB hub. This because the power supply on the Dragon can be too weak if the motherboard does not provide enough power. If the Dragon times out or freezes, then the hub might be of too low quality.

2.4 Driver and USB Issues

2.4.1 How do I get my Tool to be recognized by Atmel Studio?

This should happen automatically, but sometimes the Windows driver does not recognize the tool correctly. To correct this, you have to check that the tool is listed under the **Atmel** node in the device manager in Windows. If your tool is not listed, try to find it under **Unknown devices**. If it is located there, try to reinstall the driver by double-clicking the tool, click the **Driver** tab and choose **Update Driver**. Let Windows search for the driver. The driver should be reinstalled and the tool should be displayed under **Atmel**. Now, the tool should be usable from Atmel Studio.

2.4.2 The Firmware upgrade Process fails or is Unstable on a Virtualized Machine

Most tools will perform a reset when asked to switch from normal operation mode to firmware upgrade mode. This forces the tool to re-enumerate on the USB bus, and the virtualization software may not reattach to it making your virtualized system with a disconnected tool.

Normal virtualization software supports the idea of USB filters where you set a collection of USB devices you want to automatically attach to a given guest operating system. Check the manual for your virtualization solution to see how this is done, or see the 2.4.4 Firmware Upgrade Fails on VirtualBox.

2.4.3 Debugging never Breaks under a Virtualized Machine

Some virtualization solutions have a limit on how many USB endpoints it supports. This may become an issue if the number of endpoints is lower than the required number for the tool. Usually, this causes programming to work as expected but debug not to work as debug events are transmitted on a higher endpoint number.

Check with your virtualization software how many endpoints are available and on other endpoint-specific issues with your virtualization software regarding this.

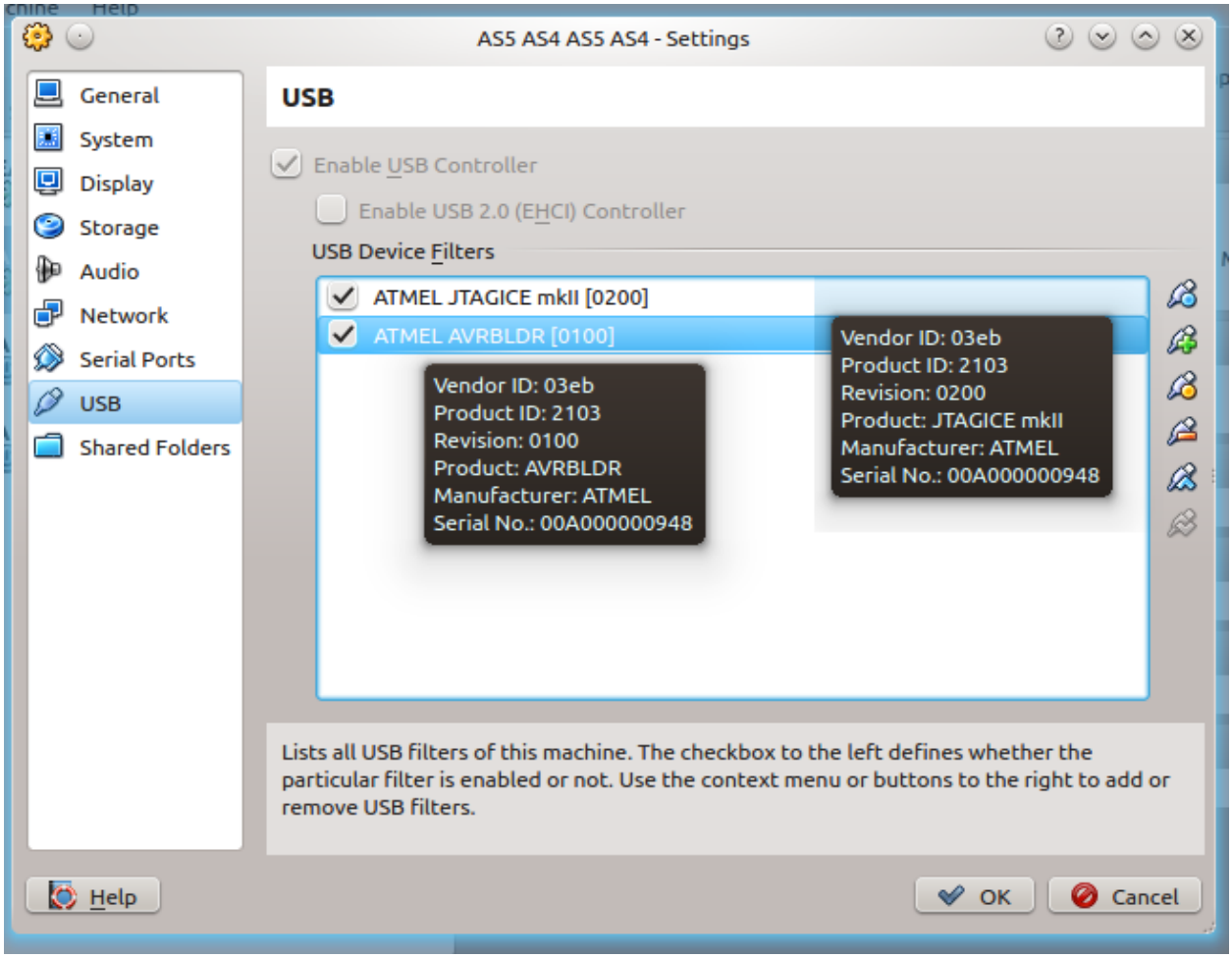
2.4.4 Firmware Upgrade Fails on VirtualBox

When doing a firmware upgrade on any tool, the tool needs to be reconnected in another mode than the one used during regular operation. This causes the tool to be re-enumerated and can cause the tool to be disconnected from the VirtualBox instance and returned to the host operating system.

To make the tool connect automatically to the VirtualBox instance, you need to set up a couple of USB filters. More information on USB filters can be found in the VirtualBox documentation.

Make two filters that are similar to the two shown in the figure below.

Figure 2-1. VirtualBox USB Filter



Note that the example in the figure above is specific for the JTAGICE mkII. There is one entry for the tool, here the JTAGICE mkII, and one for *AVRBLDR*, which is the firmware upgrade mode for the tool. The name, serial, Vendor ID, and Product ID may be different for your tool, so change those values accordingly.

Note: This section contains specifics to VirtualBox. The same logic applies to other virtualization software, but the steps may differ.

2.4.5 Issues with ARM Compatible Tools

In some rare instances, all ARM compatible tools disappear from Atmel Studio. This has been tracked down to different dll load strategies used in different versions of Windows.

To check that it is a dll load error, try to read out the chip information using `atprogram`. This can be done by opening the Atmel Studio command prompt from the **Tools** menu inside Atmel Studio or from the start menu. In the command prompt, enter the following command and check that it does not fail.

```
atprogram -t <tool> -i <interface> -d <device> info
```

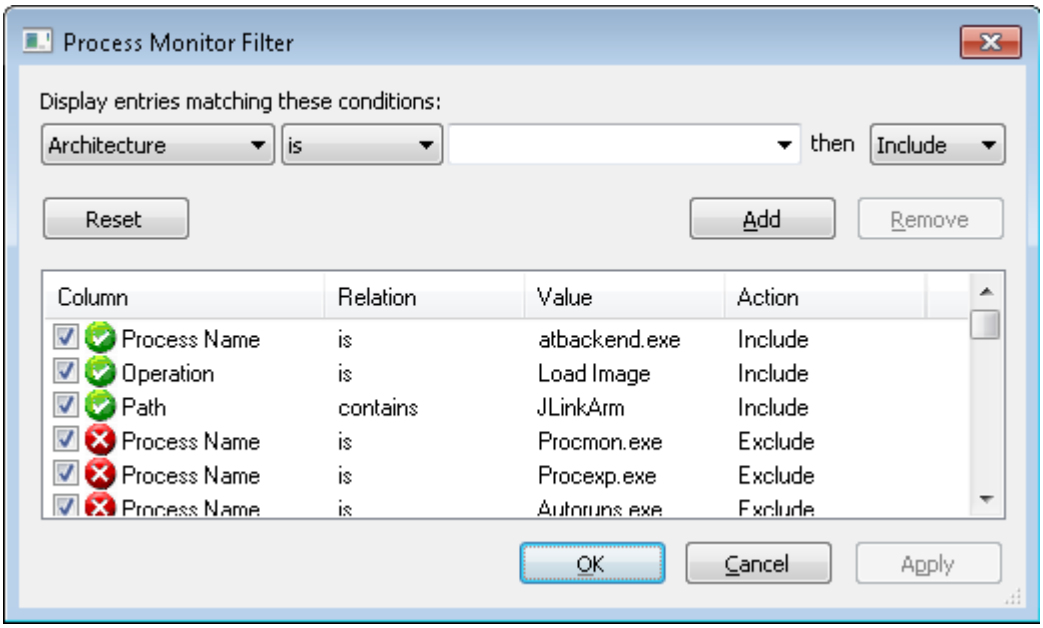
In the snippet above, replace `<tool>` with the tool name, e.g. `atmelice`, `samice`, or `edbg`. Likewise, replace `interface` with the used interface and the `device` with the full device name, e.g. `atsam3s4c`.

Invoking the above command should output information about the memory layout, the supply voltage for the chip, and the fuse settings. If it fails it is likely a driver issue, which is covered by 2.4 Driver and USB Issues.

If `atprogram` is able to communicate with the device it means that the issue is most likely a wrong version of `JLinkArm.dll` being loaded due to loader precedence. To check this, use the Procmon tool to check what dll is being loaded.

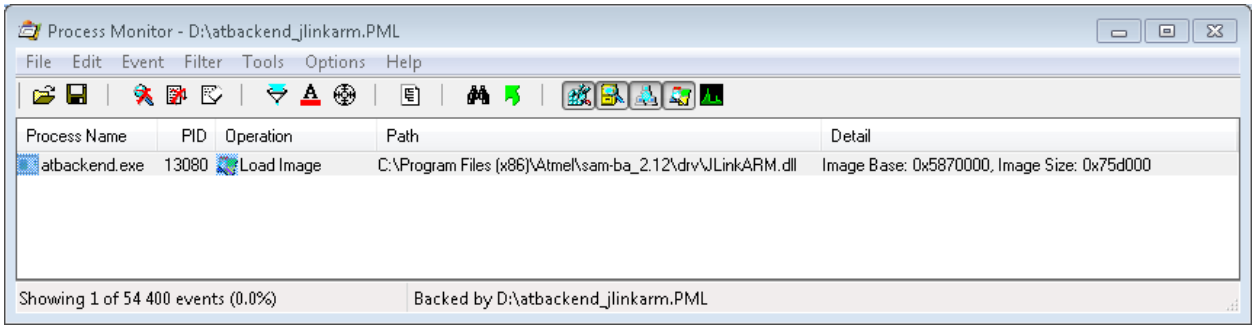
Download the Procmon tool, open it, and configure the filter shown in the figure below. Then start Atmel Studio. A couple of seconds after Atmel Studio has started, one line should become visible showing the path to where the dll is being loaded from. It should be loaded from the `atbackend` folder inside the Atmel Studio installation directory.

Figure 2-2. Procmon Filter Configuration



If the path of the dll is different it means that Atmel Studio has picked up the wrong dll, and this dll is incompatible with the dll shipped with Atmel Studio. An example of this is shown in the figure below.

Figure 2-3. Procmon Filter Configuration



To solve the above issue, we recommend backing up the dll that is being loaded and then replacing it with the `JLinkARM.dll` found in the `atbackend` directory inside the Atmel Studio installation directory. This can be done given the assumption that the dll bundled with Atmel Studio is newer than the one that is being loaded, and the dll is backward compatible.

Note: Remember to back up the offending `JLinkARM.dll` before replacing it, as it is not given that it will be compatible with the program that deployed it.

3. Installation

Installation instructions.

Supported Operating Systems

- Windows 7 Service Pack 1 or higher
- Windows Server 2008 R2 Service Pack 1 or higher
- Windows 8/8.1
- Windows Server 2012 and Windows Server 2012 R2
- Windows 10

Supported Architectures

- 32-bit (x86)
- 64-bit (x64)

Hardware Requirements

- Computer that has a 1.6 GHz or faster processor
- RAM
  - 1 GB RAM for x86
  - 2 GB RAM for x64
  - An additional 512 MB RAM if running in a Virtual Machine
- 6 GB of available hard disk space

Downloading and Installing

- Download the latest Atmel Studio installer
- Atmel Studio can be run side-by-side with older versions of Atmel Studio and AVR Studio. Uninstallation of previous versions is not required.
- Verify the hardware and software requirements from the 'System Requirements' section
- Make sure your user has local administrator privileges
- Save all your work before starting. The installation might prompt you to restart if required.
- Disconnect all USB/Serial hardware devices
- Double-click the installer executable file and follow the installation wizard
- Once finished, the installer displays an option to **Start Atmel Studio after completion**. If you choose to open, then note that Atmel Studio will launch with administrative privileges, since the installer was either launched as administrator or with elevated privileges.

4. Extensions

Short information about the Extension Manager and the extension ecosystem.

Extensions and updates to Atmel Studio are available through the Atmel Gallery. Access it through http://gallery.atmel.com or use the extension manager in Atmel Studio under the Tools menu.

The set of extensions supporting a given Atmel Studio version may vary. Visit http://gallery.atmel.com to see which extensions are available for a given version of Atmel Studio. Note that at the time of the release of a new version of Atmel Studio not all extensions have been ported from the previous version.

Atmel Studio does not automatically reinstall extensions installed on previous versions of Atmel Studio.

5. Features and Bugs

New Features

Notable Bugs Fixed

Known Issues

AVRSV-283: webproperties.tlb file missing.	A message saying "webproperties.tlb could not be located" can be displayed on some systems. A workaround for this problem is to make a copy of a file named "webproperties???.tlb" in "C:\Program Files (x86)\Common Files\microsoft shared\MSEnv" (on the same location) and rename it to "webproperties.tlb".
AVRSV-414: Handle Power toggle and external reset for all emulators and architectures/families.	Power toggle and external reset is not handled gracefully in all situations.
AVRSV-546: .NET Framework install might not work if there is limited network connectivity.	The .NET Framework installer might not work properly if network connectivity is limited. If connectivity is limited disconnect from the network or disable all active network adapters before starting installation of Atmel Studio.
AVRSV-628: Scrolling memory view does not work properly.	Scrolling memory view does not work properly. It is not possible to use the slider in the memory view to scroll it. Only the up and down arrows works.
AVRSV-680: Breakpoint is not updating in the Disassembly and Code view.	Sometimes breakpoints that are set in the Source Editor are not reflected correctly in the Disassembly Window while debugging.
AVRSV-831: .NET install fail because Windows Imaging Component WIC is not installed.	Atmel Studio installation may fail on XP systems if the Microsoft Windows Imaging Component (32-bit) is not installed. Install this component, downloadable from Microsoft.
AVRSV-966: Installer crashes when trying to install from "runas" option.	Running the Atmel Studio installer using the "run as" option on Windows XP may crash the installer.
AVRSV-1192: Internet Explorer 6 does not show user documentation correctly.	Internet Explorer 6 will not render the navigation menu in the user documentation correctly.
AVRSV-1254: The asf.h header file is not included in all examples.	The asf.h header file is not included in all examples. Workaround: Include this file manually if you add additional drivers using the "Select Drivers from AVR Software Framework" dialog.
AVRSV-1533: Microsoft Visual Studio 2010 Shell --> Error: Cannot publish	Visual Studio 2010 RC/Beta version has conflict with RTM version of Microsoft Visual Studio 2010 Isolated Shell. The workaround is to

because a project failed to build.	uninstall Microsoft Visual Studio 2010 isolated Shell that is installed with Atmel Studio.
AVRSV-1557: Mapped network drives do not appear in Project Location window.	Mapped network drives do not appear in the Project Location window when creating a new project.
AVRSV-1603: shared register access not possible?.	When debugging on ATmega16[A] or ATmega32[A] devices it is not possible to read out the value of UBRRH using the debugger.
AVRSV-1675: Tool marked as available even though OS driver is not installed.	If a driver for a tool has not been installed (first time it's plugged in) and the user plugs the tool into the PC when Atmel Studio is running then it will be shown in the "Available Tools" view but not have access to the tool as a OS driver for the tool does not exist. Any operation on the tool initiated will fail. Restart Atmel Studio to access the tool.
AVRSV-1733: Single step over SW reset on Xmega does not work.	Stepping in the source view over a software reset may leave the target running on ATxmega devices.
AVRSV-1758: Non-Latin characters in project paths are not supported.	Projects which include paths or files with non-Latin characters are not supported.
AVRSV-1760: Issues with AVR Studio 5 installed alongside Visual Studio 2010 SP1.	Service Pack 1 of Visual Studio 2010 installed on a PC where Atmel Studio 6 is installed, may initiate a need for reapplying the SP1 installer. A dialog box will then appear during startup of Atmel Studio, and detail the steps that must be taken.
AVRSV-1883: PORT registers in IO view behaves incorrectly.	The IO window does not fully support registers like e.g. DIRSET, DIRTGL, and DIRCLR for the XMEGA family (used to manipulate a corresponding DIR register). Toggling the value of bits in these registers have undefined result on DIR.
AVRSV-1888: Detect m103c compatibility fuse setting on atmega128.	Debugging ATmega128 in ATmega103 compatibility mode is not supported.
AVRSV-1895: VAssistX: Alt + G does not open file <avr/io.h>.	'Alt + G' does not open the file <avr/io.h>. This file is not parsed by Visual Assist.
AVRSV-1901: Solution with two projects does not work.	Creating two projects in the same solution which have different devices is not supported. Create two different solutions instead.
AVRSV-2022: Conflicts with Folding@Home.	Running Folding@home together with Atmel Studio may cause unresponsive user interface. We recommend to disable the Folding@home when running Atmel Studio.
AVRSV-2163: File/Folder names with spaces are not built property.	Files or folders with more than one consequent spaces are not supported as part of AVRStudio 5 projects.

AVRSV-2558: HVPP for ATtiny2313A does not work on STK500.	HVPP for ATtiny2313A does not work on STK500.
AVRSV-2601: VS6 incompatibillity with AS5.	During installation of Atmel Studio, the Visual Studio 2010 Shell installation will re-register the 'vsjitdebugger'. This might make Visual Studio 2008 and Visual Studio 2005 unable to debug a crashed application reported by Windows. Workaround: Run repair of Visual Studio on top of the Atmel Studio installation. This should re-enable the capability of Visual Studio to get a chance to handle crashed applications.
AVRSV-2884: AVR Studio cannot create a project from template with a deep file architecture.	Project creation may fail when file/folder name of the project or its sub-items name exceeds 256 characters limit.
AVRSV-3296: Visual assist inserts the c++ keywords, functions in C project.	Autocompletion and snippets provided by Visual Assist can generate invalid embedded C++, and it might also try to insert C++ in a C project. This includes exceptions, classes and namespace declarations.
AVRSV-3313: In Atmel Studio 6.1 compilation fails for ASF Projects created with AVR Studio 5.1.	If you encounter the error : variable 'xxxx' must be const in order to be put into read-only section by means of '_attribute_((progmem))', then this description applies. The problem is due to the incompatibility of the ASF source code with the AVR GCC compiler. The GCC 4.6 Release document (http://gcc.gnu.org/gcc-4.6/changes.html) mentions that the error is expected and to use the ASF projects created in 5.1 (i.e ASF 2.9.0) we have to use avr gcc toolchain verison 3.3.1 and for later ASF versions use 3.4.0. Alternatively you could manually add the const qualifier to the variable(s) that are reported, when compiling ASF 2.9.0 projects with AVR GCC toolchain 3.4.0 or later.
AVRSV-3672: Can't use network path in "New Example Project from ASF"-dialog.	ASF projects cannot be created in UNC paths. To create the ASF project, map the UNC path to a network drive.
AVRSV-3993: JTAGICE3 event endpoint is not registered on virtual machines.	On virtual machines like VirtualBox, the event endpoint may not work properly and no events will be propagated from the tool to Atmel Studio. This mainly impacts debugging.
AVRSV-4005: Setting lockbits for SAM4LC4C have no effect.	Setting flash region lockbits when using SEGGER may have no effect, as the SEGGER tool may unlock the flash region before it writes to it at a later stage.
AVRSV-4050: User signature on RFR parts can only be accessed by JTAG or parallel programming.	User signature on RFR parts can only be accessed by JTAG or parallel programming.

AVRSV-4079: Unable to launch using an ELF file containing LOCKBITS.	Launching debug with an ELF file containing non-0xFF lockbits may fail. Lockbits should not be set for debugging.
AVRSV-4337: After Installing AtmelStudio 6.1, the old projects does not build in earlier versions of AtmelStudio.	Build abruptly fails in Atmel studio without proper error message and the error window shows no error. Tail of the Build Output: Task "RunCompilerTask" ========== Build: 0 succeeded or up-to-date, 1 failed, 0 skipped ========== Reason: Project file was upgraded from 6.0 to 6.1. Steps to Restore back the project to working condition: Scenario 1: (With Backup) Check whether there is a back up project in the projectfolder with the name ProjectName_6_0 (For Example the backup project is GccApplication1_6_0.cproj if the actual project name is GccApplication1.cproj) * Project with the name GccApplication1.cproj is the upgraded project to confirm edit the project file in editor you should be able to see <ProjectVersion>6.1</ProjectVersion>. * Open the project GccApplication1_6_0.cproj in Atmel Studio 6.0. It should prompt you to save the solution file. Save and build it should work fine. Scenario 2: (Without Backup) If the backup project is not found in the project folder chances are that you would have upgraded the project from 6.0 to 6.1 without opting for the backup. * Edit the project file modify <ProjectVersion> tag and set the version to 6.0 and also modify the <ToolchainName> tag by removing .C or .CPP from the tag (For example com.Atmel.AVRGCC32.C must be renamed as com.Atmel.AVRGCC32) build the project now.
AVRSV-4380: No error or warning is displayed when number of characters in command line arguments exceeds microsoft limitation. .	When building a project in Atmel Studio, and if you get an error like the one as follows <some file>.o: No such file or directory during the linking stage, then it could be because of the number of characters in the command line. Windows expects that the command line be less than 8192 characters. To workaround the issue, reduce the name of the folder so that the command line becomes shorter.
AVRSV-4440: Breaking changes in SAM header files going from 6.0 to 6.1.	The SAM header files have been updated and due to this there are breaking changes when upgrading from 6.0 to 6.1. Bare bone SAM projects created with Atmel Studio 6.0 can get compilation errors due to changes in defines. You can continue to use the old headers by keeping Atmel Studio 6.0 and 6.1 installed in parallel and use the toolchain from 6.0. ASF projects are not affected.
AVRSV-4501: Path of toolchain's native libraries are wrong.	Toolchain libraries "Full Path" property will display the base path of the current toolchain.
AVRSV-4521: Expanding / collapsing node does not refresh the files in solution explorer.	If a library is removed, the Library list in the solution explorer may not update. Double click the "Libraries" node to refresh the status of Libraries presence.
AVRSV-4576: Modifying EEPROM contents in the memory view causes data corruption on XMEGA E5.	Modifying EEPROM data values in the memory view during debugging of XMEGAE5 devices causes the EEPROM data to be corrupted.

AVRSV-4659: SAM4L and UC3-kilogram programming fails with core voltage at >1.9V.	Programming SAM4L and some UC3 devices may fail when core voltage is raised above 1.9 V.
AVRSV-4693: Struct type is not displayed correctly for composite types in a COFF project.	For COFF object file debugging, elements in the "type" field of a watch on a composite data type might contain the object/variable name instead of the type name.
AVRSV-4753: SAM D20 Xplained Pro shows incorrect chip ID.	In the information window for Xplained Pro kits, the revision is not the actual chip revision, but the revision coded into the Xplained Pro itself. Use the Programming Dialog to read the correct revision from the device.
AVRSV-4899: In External Interrupt controller example, stepping through NMI debugging is not working.	Debugging inside the NMI handler on UC3 does not work. This is probably due to the fact that the NMI interrupt has a higher interrupt priority than breakpoints.
AVRSV-5029: Not able to set CLKPR bits while debugging in Xplained Pro Mega256rfr2.	Writing bitfields that needs to be written in a timed sequence from the I/O view will not work. This is the case for CLKPR, IVSEL and WDTEN, to mention some bitfields.
AVRSV-5050: Studio should warn if BOOTPROT is set when programming target.	If the BOOTPROT fuse is set in the device, flash memory may not get programmed correctly and no error will be displayed. If debugging, the program will not get uploaded, but debug will proceed with the wrong image.
AVRSV-5324: SAM D20 - IO View - OUTSET / OUTCLR improperly updated.	Modifying SAMD20 port registers like OUTSET, OUTCLR and OUTTGL will not have the expected result unless the full register value is taken into consideration. The mentioned registers reflects the current value of OUT when read by the user application and Atmel Studio. Clicking a single bit in one of these registers in the IO View will write back the full register with only the clicked bit toggled from its existing value, causing a set, clear or toggle action also on other set bits in that register. These considerations can be avoided by directly setting and clearing bits in the OUT (or corresponding) register.
AVRSV-5339: Live Watch is not updated when single stepping on UC3.	Variables in Live Watch are not updated when single stepping on UC3 devices.
AVRSV-5378: Debugger on SAM4L-EK is clearing the interrupt flags.	SAM devices: Interrupt flags that are cleared by reading a register, can unexpectedly be cleared by the debugger if the register is monitored in the IO view or the Memory view in Atmel Studio. An example is the RXRDY flag for USART0 in SAM4LC4C, which might be cleared if the debugger breaks and reads the RHR register in order to display its value.
AVRSV-5450: It is not possible to get trace from multicore device.	During trace activation, Atmel Studio can silently fail to enable trace on multi-core devices where the TRACESWO pin is shared by the cores through a mux that does not switch automatically to the active core. To

	be able to get trace on these devices, the mux for the TRACESWO signal needs to be set correctly by the users application.
AVRSV-5527: Live Watch : Value of complex expression not computed.	The Live Watch feature in Atmel Studio does not work well with expressions as the variable. Since the watch in this case is on a memory address, the Live Watch implicitly adds a ampersand (&) before the variable being watched to extract the address of the variable. This means that expressions will be evaluated to the wrong value.
AVRSV-5635: Unable to debug when assigning fuse bits through .elf.	Care should be taken when debugging a project with embedded fuse information. The debugging session might misbehave if the fuses overwrites settings that Atmel Studio assumes to have control over.
AVRSV-5711: Cannot debug SAM D code with Atmel Studio if .text section is relocated.	Relocating the .text segment may cause the debugger to fail in certain conditions. This results in 'Start debugging and break' to stop at a high address in the disassembly view. To make the debugger break the application entry, tick the 'Override VTOR' option in the project properties, and ensure that the text box contains the address of the interrupt vector. This is usually 'exception_table' or '&exception_table', depending on the startup code in the project. The difference between these is that '&exception_table' is a struct, while 'exception_table' is a function pointer array.
AVRSV-5792: Installing 6.2 public after 6.2 ServicePack1 corrupts the Service pack installation.	Installation of Atmel Studio 6.2.1153 after Atmel Studio 6.2 Service Pack 1 corrupts the installation of Atmel Studio 6.2 Service Pack. The installations cannot co-exist so always uninstall Atmel Studio 6.2 Service Pack 1 before installing Atmel Studio 6.2.1153.
AVRSV-5837: Backend times out if "USE GDB" is selected for UC3 devices.	Trying to enable GDB for AVR32 projects will probably fail in even the simplest debugging, such as Halt, Step, and Go. It is not recommended to ignore the warning shown when this option is enabled for a project.
AVRSV-5854: Installation of USB Driver package fails on clean Win 7 (64-bit) machine.	The Atmel USB Driver Package may fail during installation with error '0x800b010a - A certificate chain could not be built to a trusted root authority'. The reason for this is that the built in certificate in Windows is out of date and needs to be updated through Windows Update. If you are unable to perform a update, then the update can be manually downloaded from KB931125 from Microsoft.
AVRSV-5952: Firmware upgrade fails from jtagice3v2.15 to jtagice3+.	Upgrading JTAGICE3 from major version 1 or 2 to major version 3 can fail. The first firmware upgrade attempt will only put the JTAGICE3 into boot mode, and not do an actual upgrade. Running a second firmware upgrade without toggling power to the tool should work. The simplest workaround is to use atfw found in '<Atmel Studio installation folder> \atbackend\'. From a command prompt (inside Atmel Studio, go to Tools|Command Prompt) run"atfw.exe -t jtagice3 -a "<Atmel Studio installation folder>\tools\jtagice3\jtagice3_fw.zip", which would normally be atfw -t jtagice3 -a "C:\Program Files (x86)\Atmel\Atmel Studio 6.2\tools\jtagice3\jtagice3_fw.zip". The first attempt will fail, but when running the command again without toggling power on the JTAGICE3 it should pass. Note that as soon as the JTAGICE3 has been upgraded

	to a firmware with major version 3 or higher, firmware upgrade should work on first attempt also from Atmel Studio 6.2 SP1.
AVRSV-5987: Cannot chip erase SAM4L in backup mode on SAMICE.	Atmel Studio would not be able to erase a SAM4L part if the part was put into a sleep mode immediately after startup. Note that a POR may be required after programming to be able to establish contact.
AVRSV-6364: ARP entry added into the control panel even if one of the packages get installed by the bootstrapper.	Atmel Studio 7.0 entry will be visible in Add Remove programs even if the installation is unsuccessful or partial. Please remove the entry and try installing again.
AVRSV-6372: Installing Atmel Studio Extensions does not seem to detect Atmel Studio 7.0.	If VSIX (Atmel Studio extensions) are installed manually, there might be conflicts between Atmel Studio and Visual Studio due to issues in the Microsoft Visual Studio Version Selector (VSLauncher.exe) executable. To fix this, change the file association for VSIX files from VSLauncher.exe to C:\Program Files (x86)\Microsoft Visual Studio 12.0\Common7\IDE\VSIXInstaller.exe (D:\Program Files\Microsoft Visual Studio 12.0\Common7\IDE\VSIXInstaller.exe on 32-bit systems). Changing the file association is done by Shift-Right Click the VSIX, choose 'Open With...' and browse to the VSIXInstaller.exe in the path shown above.
AVRSV-6405: Device disconnected error comes after updating firmware. But allows to debug program.	Tools may fail to re-enumerate after a firmware upgrade, causing the tool to be listed as disconnected. If this happens, reconnect the tool and it should re-enumerate and become connected again.
AVRSV-6427: Abort of Uninstall sequence leaves the system in intermediate state.	If the system goes into an intermediate state after abort of uninstall sequence (forceful exit of installation process) the state could be recovered by repairing Atmel Studio 7.0 from control panel.
AVRSV-6664: Atmel Studio crashes when I search in the options dialog.	Atmel Studio may crash when searching in the Options page. The issue lies in the Visual Studio shell, and is fixed in version 2013.4 and newer. To apply the fix, download Visual Studio 2014 Update 4 or newer from https://www.visualstudio.com/news/vs2013-update4-rtm-vs or from https://www.microsoft.com/en-us/download/details.aspx?id=44921 .
AVRSV-6677: Issues with graphics driver can cause rendering glitches.	Atmel Studio tries to offload as much of the graphics rendering of the user interfaces as possible to the graphics card to free up CPU resources. If the graphics driver does not support hardware rendering, Atmel Studio will fall back to using software rendering. However, in some cases, this fallback does not work for some reasons, causing rendering glitches in the user interface. The best way to solve this issue is to make sure that the latest graphics driver is installed from your graphics card vendor.
AVRSV-6848: Upgrading JTAGICE3v1 and v2 to v3	Atmel Studio fails to connect to JTAGICE3 after upgrading from firmware version 1 or version 2. To be able to connect, Atmel Studio needs to be restarted.

works, but studio needs to be restarted.	
AVRSV-7003: Current measurements does not work when running debugging or programming at low baud.	Running current measurements in Data Visualizer while programming or debugging at low interface frequencies/baud rates might result in Data Visualizer disconnecting from the Power Debugger. The lower limit of the interface speed varies depending on target type, flash size and interface type but is typically in the range 100-300kHz.
AVRSV-7154: Studio upgrade breaks functionality for other users on the same computer.	If a USER is using an Atmel Studio installed by another user ADMIN (USER!=ADMIN), and Atmel Studio is updated by ADMIN, Atmel Studio will still be using the old extensions that were copied to the %appdata% folders. To correct, the USER must delete the %appdata%/Atmel (roaming and local) folders so that they are reinitialized by the new version of Atmel Studio on the next start.
AVRSV-7163: Installing AVR8 Toolchain 7.0: 'An error occured: The specified account already exists'.	Run 'Microsoft Fix' it and uninstall 'AVR8 Toolchain 7.0'. After this, run the Atmel Studio installer and choose repair.
AVRSV-7235: Atmel Studio crashes when searching in the Solution Explorer.	On some machines, Atmel Studio can crash when searching for files in the Solution Explorer. Currently, only workaround is to install Visual Studio 2015 Update 2 or newer on the machine.
AVRSV-7309: Multiple Windows security dialog boxes during driver install on Windows 7.	Some Windows 7 machines can experience multiple security dialog boxes during the driver installation. Clicking the Trust this publisher checkbox does not work. This is related to KB2921916, this hotfix can be downloaded from https://support.microsoft.com/en-us/kb/2921916.
AVRSV-7828: Error during driver installation on Windows 7 32-bit.	The drivers may fail during upgrade on Windows 7 32-bit. A workaround is to unistall Atmel Studio and the Atmel Driver from Add/ Remove programs before installing again.
AVRSV-7931: Arduino sketch project with custom libraries fails to compile in studio.	To fix this compilation error, After project creation, navigate to ArduinoCore/Src/Libraries/Adafruit-GFX-Library-master/fontconvert/ fontconvert.c Exclude fconvert.c from compilation by setting Build Action for this file to None

Other Issues Fixed

6. Device Support

Device support in Atmel Studio is done using the concept of device family packs. The format is inspired by the Keil CMSIS-Pack specification, and packs containing ARM devices are fully compatible with the Keil CMSIS-Pack specification. For AVR and AVR32 packs, some Atmel specific extensions to the format have been implemented.

CMSIS-Pack describes a couple of use cases, and the packs used in Atmel Studio to provide device support is part of the Device Family Pack (DFP) use case. This pack contains all needed files to support compilation, programming and debugging of a device. More information about the CMSIS-Pack specification, visit http://www.keil.com/pack/doc/CMSIS/Pack/html/index.html.

Atmel Studio includes a tool to manage packs, called Pack Manager. It is available in the **Tools** menu in Atmel Studio and gives the ability to install, remove, and list information related to packs.

6.1 Packs

Abbreviations:

D	Debugging is supported on the listed interfaces
P	Programming is supported on the listed interfaces
dW	debugWIRE
aW	aWire

Table 6-1. Atmel ATautomotive DFP (1.1.84) - Atmel ATautomotive Series Device Support.

ATautomotive	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATA5272	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATA5505	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATA5702M322	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	
ATA5781	dW	ISP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP	ISP	
ATA5782	dW	ISP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP	ISP	
ATA5783	dW	ISP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP	ISP	
ATA5790	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATA5790N	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATA5791	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATA5795	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATA5831	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	
ATA5832	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	
ATA5833	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	
ATA6285	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATA6286	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATA6612C	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATA6613C	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes

ATautomotive	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATA6614Q	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATA6616C	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATA6617C	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATA664251	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATA8210	dW	ISP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP	ISP	
ATA8215	dW	ISP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP	ISP	
ATA8510	dW	ISP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP	ISP	
ATA8515	dW	ISP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP	ISP	

Table 6-2. Atmel ATmega DFP (1.0.98) - Atmel ATmega Series Device Support.

ATmega	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
AT90CAN128	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	
AT90CAN32	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	
AT90CAN64	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	
AT90PWM1	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
AT90PWM161	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
AT90PWM216	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
AT90PWM2B	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
AT90PWM316	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
AT90PWM3B	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
AT90PWM81	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
AT90USB1286	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	
AT90USB1287	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	
AT90USB162	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	

ATmega	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500		STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P		P	
AT90USB646	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	
AT90USB647	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	
AT90USB82	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP	
ATmega128	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega1280	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega1281	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega1284	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega1284P	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega1284RFR2	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	
ATmega128A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega128RFA1	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	

ATmega	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500		STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	P	
ATmega128RFR2	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	
ATmega16	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega162	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	
ATmega164A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega164P	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega164PA	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega165A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega165P	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega165PA	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega168	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP	Yes
ATmega168A	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP	Yes
ATmega168P	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP	Yes

ATmega	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500		STK600		Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P		P	
ATmega168PA	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP		Yes
ATmega168PB	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP		Yes
ATmega169A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega169P	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega169PA	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega16A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega16HVA	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP		ISP, HVSP		
ATmega16HVB	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP		Yes
ATmega16HVBrevB	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP		
ATmega16M1	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP		
ATmega16U2	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP		
ATmega16U4	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		
ATmega2560	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes

ATmega	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500		STK600		Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P		P	
ATmega2561	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega2564RFR2	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		
ATmega256RFR2	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		
ATmega32	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega324A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega324P	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega324PA	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega324PB	JTAG	JTAG, ISP, HVPP, HVSP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP, HVSP		JTAG, ISP, HVPP, HVSP		Yes
ATmega325	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega3250	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes

ATmega	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500		STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P		P	
ATmega3250A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega3250P	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega3250PA	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega325A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega325P	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega325PA	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega328	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP	Yes
ATmega328P	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP	Yes
ATmega328PB	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP	Yes
ATmega329	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega3290	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes
ATmega3290A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP	Yes

ATmega	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500		STK600		Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P		P	
ATmega3290P	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega3290PA	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega329A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega329P	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega329PA	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega32A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega32C1	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP		
ATmega32HVB	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP		Yes
ATmega32HVBrevB	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP		
ATmega32M1	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP		
ATmega32U2	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP		ISP, HVPP		
ATmega32U4	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		
ATmega406	JTAG	JTAG, HVPP	JTAG	JTAG		JTAG		JTAG		JTAG		JTAG		JTAG			HVPP		JTAG, HVPP		

ATmega	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATmega48	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATmega48A	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATmega48P	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATmega48PA	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATmega48PB	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATmega64	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG, ISP	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	Yes
ATmega640	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG, ISP	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	Yes
ATmega644	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG, ISP	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	Yes
ATmega644A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG, ISP	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	Yes
ATmega644P	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG, ISP	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	Yes
ATmega644PA	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG, ISP	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	Yes
ATmega644RFR2	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG, ISP	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	

ATmega	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500		STK600		Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P		P	
ATmega645	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega6450	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega6450A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega6450P	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega645A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega645P	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega649	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega6490	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega6490A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega6490P	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes
ATmega649A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP		JTAG, ISP, HVPP		Yes

ATmega	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATmega649P	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	Yes
ATmega64A	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	Yes
ATmega64C1	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATmega64HVE2	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	
ATmega64M1	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATmega64RFR2	JTAG	JTAG, ISP, HVPP	JTAG	JTAG, ISP	ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	JTAG, ISP	JTAG	ISP, JTAG	JTAG, ISP			ISP, HVPP	JTAG, ISP, HVPP	
ATmega8		ISP, HVPP		ISP	ISP		ISP		ISP		ISP			ISP			ISP, HVPP	ISP, HVPP	Yes
ATmega8515		ISP, HVPP		ISP	ISP		ISP		ISP		ISP			ISP			ISP, HVPP	ISP, HVPP	
ATmega8535		ISP, HVPP		ISP	ISP		ISP		ISP		ISP			ISP			ISP, HVPP	ISP, HVPP	
ATmega88	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATmega88A	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATmega88P	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATmega88PA	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATmega88PB	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes

ATmega	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600		Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P		
ATmega8A		ISP, HVPP		ISP	ISP		ISP		ISP		ISP		ISP	ISP			ISP, HVPP	ISP, HVPP		Yes
ATmega8HVA	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP		
ATmega8U2	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP		

Table 6-3. Atmel ATtiny DFP (1.0.78) - Atmel ATtiny Series Device Support.

ATtiny	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATtiny10		TPI			TPI		TPI						TPI					TPI	Yes
ATtiny102		TPI			TPI		TPI						TPI					TPI	Yes
ATtiny104		TPI			TPI		TPI						TPI					TPI	Yes
ATtiny11		HVSP															HVSP	HVSP	
ATtiny12		ISP, HVSP		ISP	ISP		ISP		ISP		ISP		ISP	ISP			ISP, HVSP	ISP, HVSP	
ATtiny13	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes
ATtiny13A	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes
ATtiny15		ISP, HVSP		ISP	ISP		ISP		ISP		ISP		ISP	ISP			ISP, HVSP	ISP, HVSP	
ATtiny1634	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATtiny167	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATtiny20		TPI			TPI		TPI						TPI					TPI	Yes
ATtiny2313	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATtiny2313A	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATtiny24	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes
ATtiny24A	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes
ATtiny25	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes
ATtiny26		ISP, HVPP		ISP	ISP		ISP		ISP		ISP		ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATtiny261	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes

ATtiny	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATtiny261A	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATtiny4		TPI			TPI		TPI						TPI					TPI	Yes
ATtiny40		TPI			TPI		TPI						TPI					TPI	Yes
ATtiny4313	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATtiny43U	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATtiny44	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes
ATtiny441	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes
ATtiny44A	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes
ATtiny45	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes
ATtiny461	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATtiny461A	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATtiny48	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATtiny5		TPI			TPI		TPI						TPI					TPI	Yes
ATtiny80	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes
ATtiny828	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATtiny84	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes
ATtiny840	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes

ATtiny	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATtiny841	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes
ATtiny84A	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes
ATtiny85	dW	ISP, HVSP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVSP	ISP, HVSP	Yes
ATtiny861	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATtiny861A	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATtiny87	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	
ATtiny88	dW	ISP, HVPP	dW	ISP	ISP	dW	ISP	dW	ISP	dW	ISP	dW	ISP	ISP			ISP, HVPP	ISP, HVPP	Yes
ATtiny9		TPI			TPI		TPI						TPI					TPI	Yes

Table 6-4. Atmel SAM3A DFP (1.0.34) - Atmel SAM3A Series Device Support.

SAM3A	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500		STK600		Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	P	P	
ATSAM3A4C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD						
ATSAM3A8C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD						

Table 6-5. Atmel SAM3N DFP (1.0.43) - Atmel SAM3N Series Device Support.

SAM3N	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAM3N00A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3N00B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3N0A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3N0B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3N0C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3N1A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3N1B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3N1C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3N2A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3N2B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3N2C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3N4A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3N4B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3N4C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				

Table 6-6. Atmel SAM3S DFP (1.0.54) - Atmel SAM3S Series Device Support.

SAM3S	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAM3S1A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3S1B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3S1C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3S2A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3S2B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3S2C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3S4A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3S4B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3S4C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3S8B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3S8C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3SD8B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3SD8C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				

Table 6-7. Atmel SAM3U DFP (1.0.34) - Atmel SAM3U Series Device Support.

SAM3U	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAM3U1C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3U1E						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3U2C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3U2E						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3U4C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM3U4E						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				

Table 6-8. Atmel SAM3X DFP (1.0.35) - Atmel SAM3X Series Device Support.

SAM3X	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500		STK600		Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	P		
ATSAM3X4C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD						
ATSAM3X4E						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD						
ATSAM3X8C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD						
ATSAM3X8E						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD						
ATSAM3X8H						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD						

Table 6-9. Atmel SAM4C DFP (1.0.59) - Atmel SAM4C Series Device Support.

SAM4C	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAM4C16C:0						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4C16C:1						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4C32C:0						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4C32C:1						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4C32E:0						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4C32E:1						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4C4C:0						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4C4C:1						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4C8C:0						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4C8C:1						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4CMP16C:0						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4CMP16C:1						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4CMP32C:0						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4CMP32C:1						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4CMP8C:0						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				

SAM4C	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600		Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P		
ATSAM4CMP8C:1						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD					
ATSAM4CMS16C:0						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD					
ATSAM4CMS16C:1						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD					
ATSAM4CMS32C:0						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD					
ATSAM4CMS32C:1						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD					
ATSAM4CMS4C:0						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD					
ATSAM4CMS4C:1						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD					
ATSAM4CMS8C:0						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD					
ATSAM4CMS8C:1						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD					

Table 6-10. Atmel SAM4E DFP (1.1.30) - Atmel SAM4E Series Device Support.

SAM4E	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAM4E16C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4E16CB						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4E16E						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4E8C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4E8CB						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4E8E						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				

Table 6-11. Atmel SAM4L DFP (1.0.27) - Atmel SAM4L Series Device Support.

SAM4L	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAM4LC2A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LC2B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LC2C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LC4A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LC4B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LC4C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LC8A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LC8B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LC8C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LS2A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LS2B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LS2C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LS4A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LS4B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LS4C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LS8A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LS8B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4LS8C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				

Table 6-12. Atmel SAM4N DFP (1.0.33) - Atmel SAM4N Series Device Support.

SAM4N	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAM4N16B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4N16C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4N8A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4N8B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4N8C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				

Table 6-13. Atmel SAM4S DFP (1.0.37) - Atmel SAM4S Series Device Support.

SAM4S	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAM4S16B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4S16C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4S2A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4S2B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4S2C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4S4A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4S4B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4S4C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4S8B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4S8C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4SA16B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4SA16C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4SD16B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4SD16C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4SD32B						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4SD32C						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAM4SP32A						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				

Table 6-14. Atmel SAMB11 DFP (2.1.157) - Atmel SAMB11 Series Device Support.

SAMB11	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500		STK600		Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	P	P	
ATBTLC1000WLCSP						SWD				SWD		SWD			SWD						
ATSAMB11G18A						SWD				SWD		SWD			SWD						
ATSAMB11ZR						SWD				SWD		SWD			SWD						

Table 6-15. Atmel SAMC20 DFP (1.0.46) - Atmel SAMC20 Series Device Support.

SAMC20	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAMC20E15A						SWD				SWD		SWD			SWD				
ATSAMC20E16A						SWD				SWD		SWD			SWD				
ATSAMC20E17A						SWD				SWD		SWD			SWD				
ATSAMC20E18A						SWD				SWD		SWD			SWD				
ATSAMC20G15A						SWD				SWD		SWD			SWD				
ATSAMC20G16A						SWD				SWD		SWD			SWD				
ATSAMC20G17A						SWD				SWD		SWD			SWD				
ATSAMC20G18A						SWD				SWD		SWD			SWD				
ATSAMC20J16A						SWD				SWD		SWD			SWD				
ATSAMC20J17A						SWD				SWD		SWD			SWD				
ATSAMC20J18A						SWD				SWD		SWD			SWD				

Table 6-16. Atmel SAMC21 DFP (1.0.44) - Atmel SAMC21 Series Device Support.

SAMC21	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAMC21E15A						SWD				SWD		SWD			SWD				
ATSAMC21E16A						SWD				SWD		SWD			SWD				
ATSAMC21E17A						SWD				SWD		SWD			SWD				
ATSAMC21E18A						SWD				SWD		SWD			SWD				
ATSAMC21G15A						SWD				SWD		SWD			SWD				
ATSAMC21G16A						SWD				SWD		SWD			SWD				
ATSAMC21G17A						SWD				SWD		SWD			SWD				
ATSAMC21G18A						SWD				SWD		SWD			SWD				
ATSAMC21J16A						SWD				SWD		SWD			SWD				
ATSAMC21J17A						SWD				SWD		SWD			SWD				
ATSAMC21J18A						SWD				SWD		SWD			SWD				

Table 6-17. Atmel SAMD09 DFP (1.0.25) - Atmel SAMD09 Series Device Support.

SAMD09	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600		Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P		
ATSAMD09C13A						SWD				SWD		SWD			SWD					
ATSAMD09D14A						SWD				SWD		SWD			SWD					

Table 6-18. Atmel SAMD10 DFP (1.0.31) - Atmel SAMD10 Series Device Support.

SAMD10	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAMD10C13A						SWD				SWD		SWD			SWD				
ATSAMD10C14A						SWD				SWD		SWD			SWD				
ATSAMD10D13AM						SWD				SWD		SWD			SWD				
ATSAMD10D13AS						SWD				SWD		SWD			SWD				
ATSAMD10D14AM						SWD				SWD		SWD			SWD				
ATSAMD10D14AS						SWD				SWD		SWD			SWD				
ATSAMD10D14AU						SWD				SWD		SWD			SWD				

Table 6-19. Atmel SAMD11 DFP (1.0.30) - Atmel SAMD11 Series Device Support.

SAMD11	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600		Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P		
ATSAMD11C14A						SWD				SWD		SWD			SWD					
ATSAMD11D14AM						SWD				SWD		SWD			SWD					
ATSAMD11D14AS						SWD				SWD		SWD			SWD					
ATSAMD11D14AU						SWD				SWD		SWD			SWD					

Table 6-20. Atmel SAMD20 DFP (1.0.41) - Atmel SAMD20 Series Device Support.

SAMD20	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAMD20E14						SWD				SWD		SWD			SWD				
ATSAMD20E15						SWD				SWD		SWD			SWD				
ATSAMD20E16						SWD				SWD		SWD			SWD				
ATSAMD20E17						SWD				SWD		SWD			SWD				
ATSAMD20E18						SWD				SWD		SWD			SWD				
ATSAMD20G14						SWD				SWD		SWD			SWD				
ATSAMD20G15						SWD				SWD		SWD			SWD				
ATSAMD20G16						SWD				SWD		SWD			SWD				
ATSAMD20G17						SWD				SWD		SWD			SWD				
ATSAMD20G17U						SWD				SWD		SWD			SWD				
ATSAMD20G18						SWD				SWD		SWD			SWD				
ATSAMD20G18U						SWD				SWD		SWD			SWD				
ATSAMD20J14						SWD				SWD		SWD			SWD				
ATSAMD20J15						SWD				SWD		SWD			SWD				
ATSAMD20J16						SWD				SWD		SWD			SWD				
ATSAMD20J17						SWD				SWD		SWD			SWD				
ATSAMD20J18						SWD				SWD		SWD			SWD				

Table 6-21. Atmel SAMD21 DFP (1.0.231) - Atmel SAMD21 Series Device Support.

SAMD21	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAMD21E15A						SWD				SWD		SWD			SWD				
ATSAMD21E15B						SWD				SWD		SWD			SWD				
ATSAMD21E15BU						SWD				SWD		SWD			SWD				
ATSAMD21E15L						SWD				SWD		SWD			SWD				
ATSAMD21E16A						SWD				SWD		SWD			SWD				
ATSAMD21E16B						SWD				SWD		SWD			SWD				
ATSAMD21E16BU						SWD				SWD		SWD			SWD				
ATSAMD21E16L						SWD				SWD		SWD			SWD				
ATSAMD21E17A						SWD				SWD		SWD			SWD				
ATSAMD21E18A						SWD				SWD		SWD			SWD				
ATSAMD21G15A						SWD				SWD		SWD			SWD				
ATSAMD21G15B						SWD				SWD		SWD			SWD				
ATSAMD21G15L						SWD				SWD		SWD			SWD				
ATSAMD21G16A						SWD				SWD		SWD			SWD				
ATSAMD21G16B						SWD				SWD		SWD			SWD				
ATSAMD21G16L						SWD				SWD		SWD			SWD				
ATSAMD21G17A						SWD				SWD		SWD			SWD				
ATSAMD21G17AU						SWD				SWD		SWD			SWD				
ATSAMD21G18A						SWD				SWD		SWD			SWD				
ATSAMD21G18AU						SWD				SWD		SWD			SWD				
ATSAMD21J15A						SWD				SWD		SWD			SWD				
ATSAMD21J15B						SWD				SWD		SWD			SWD				
ATSAMD21J16A						SWD				SWD		SWD			SWD				
ATSAMD21J16B						SWD				SWD		SWD			SWD				
ATSAMD21J17A						SWD				SWD		SWD			SWD				
ATSAMD21J18A						SWD				SWD		SWD			SWD				

Table 6-22. Atmel SAMDA1 DFP (1.0.12) - Atmel SAMDA1 Series Device Support.

SAMDA1	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAMDA1E14A						SWD				SWD		SWD			SWD				
ATSAMDA1E15A						SWD				SWD		SWD			SWD				
ATSAMDA1E16A						SWD				SWD		SWD			SWD				
ATSAMDA1G14A						SWD				SWD		SWD			SWD				
ATSAMDA1G15A						SWD				SWD		SWD			SWD				
ATSAMDA1G16A						SWD				SWD		SWD			SWD				
ATSAMDA1J14A						SWD				SWD		SWD			SWD				
ATSAMDA1J15A						SWD				SWD		SWD			SWD				
ATSAMDA1J16A						SWD				SWD		SWD			SWD				

Table 6-23. Atmel SAME70 DFP (1.0.27) - Atmel SAME70 Series Device Support.

SAME70	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAME70J19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAME70J20						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAME70J21						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAME70N19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAME70N20						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAME70N21						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAME70Q19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAME70Q20						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAME70Q21						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				

Table 6-24. Atmel SAMG DFP (1.0.32) - Atmel SAMG Series Device Support.

SAMG	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAMG51G18						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMG51N18						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMG53G19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMG53N19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMG54G19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMG54J19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMG54N19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMG55G19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMG55J19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				

Table 6-25. Atmel SAML21 DFP (1.0.65) - Atmel SAML21 Series Device Support.

SAML21	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAML21E15B						SWD				SWD		SWD			SWD				
ATSAML21E16B						SWD				SWD		SWD			SWD				
ATSAML21E17B						SWD				SWD		SWD			SWD				
ATSAML21E18A						SWD				SWD		SWD			SWD				
ATSAML21E18B						SWD				SWD		SWD			SWD				
ATSAML21G16B						SWD				SWD		SWD			SWD				
ATSAML21G17B						SWD				SWD		SWD			SWD				
ATSAML21G18A						SWD				SWD		SWD			SWD				
ATSAML21G18B						SWD				SWD		SWD			SWD				
ATSAML21J16B						SWD				SWD		SWD			SWD				
ATSAML21J17B						SWD				SWD		SWD			SWD				
ATSAML21J18A						SWD				SWD		SWD			SWD				
ATSAML21J18B						SWD				SWD		SWD			SWD				
ATSAML21J18BU						SWD				SWD		SWD			SWD				

Table 6-26. Atmel SAMR21 DFP (1.0.34) - Atmel SAMR21 Series Device Support.

SAMR21	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAMR21E16A						SWD				SWD		SWD			SWD				
ATSAMR21E17A						SWD				SWD		SWD			SWD				
ATSAMR21E18A						SWD				SWD		SWD			SWD				
ATSAMR21E19A						SWD				SWD		SWD			SWD				
ATSAMR21G16A						SWD				SWD		SWD			SWD				
ATSAMR21G17A						SWD				SWD		SWD			SWD				
ATSAMR21G18A						SWD				SWD		SWD			SWD				

Table 6-27. Atmel SAMS70 DFP (1.0.32) - Atmel SAMS70 Series Device Support.

SAMS70	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAMS70J19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMS70J20						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMS70J21						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMS70N19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMS70N20						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMS70N21						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMS70Q19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMS70Q20						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMS70Q21						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				

Table 6-28. Atmel SAMV70 DFP (1.0.28) - Atmel SAMV70 Series Device Support.

SAMV70	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAMV70J19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMV70J20						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMV70N19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMV70N20						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMV70Q19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMV70Q20						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				

Table 6-29. Atmel SAMV71 DFP (1.0.32) - Atmel SAMV71 Series Device Support.

SAMV71	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATSAMV71J19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMV71J20						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMV71J21						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMV71N19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMV71N20						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMV71N21						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMV71Q19						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMV71Q20						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				
ATSAMV71Q21						JTAG, SWD				JTAG, SWD		JTAG, SWD			JTAG, SWD				

Table 6-30. Atmel UC3A DFP (1.0.51) - Atmel UC3A Series Device Support.

UC3A	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
AT32UC3A0128	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	Yes
AT32UC3A0256	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	Yes
AT32UC3A0512	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	Yes
AT32UC3A1128	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	Yes
AT32UC3A1256	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	Yes
AT32UC3A1512	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	Yes
AT32UC3A3128	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3A3128S	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3A3256	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3A3256S	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3A364	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3A364S	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3A4128	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3A4128S	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3A4256	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3A4256S	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3A464	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3A464S	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	

Table 6-31. Atmel UC3B DFP (1.0.29) - Atmel UC3B Series Device Support.

UC3B	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
AT32UC3B0128	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3B0256	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3B0512	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3B064	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3B1128	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3B1256	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3B1512	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	
AT32UC3B164	JTAG		JTAG			JTAG		JTAG		JTAG		JTAG						JTAG	

Table 6-32. Atmel UC3C DFP (1.0.49) - Atmel UC3C Series Device Support.

UC3C	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
AT32UC3C0128C	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
AT32UC3C0256C	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
AT32UC3C0512C	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
AT32UC3C064C	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
AT32UC3C1128C	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
AT32UC3C1256C	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
AT32UC3C1512C	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
AT32UC3C164C	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
AT32UC3C2128C	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
AT32UC3C2256C	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
AT32UC3C2512C	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
AT32UC3C264C	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	

Table 6-33. Atmel UC3D DFP (1.0.31) - Atmel UC3D Series Device Support.

UC3D	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATUC128D3	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
ATUC128D4	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
ATUC64D3	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
ATUC64D4	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	

Table 6-34. Atmel UC3L DFP (1.0.44) - Atmel UC3L Series Device Support.

UC3L	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
AT32UC3L0128	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
AT32UC3L016	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	Yes
AT32UC3L0256	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
AT32UC3L032	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	Yes
AT32UC3L064	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	Yes
ATUC128L3U	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
ATUC128L4U	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
ATUC256L3U	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
ATUC256L4U	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
ATUC64L3U	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	
ATUC64L4U	JTAG, aW		JTAG, aW			JTAG, aW		JTAG, aW		JTAG, aW		JTAG, aW		aW				JTAG, aW	

Table 6-35. Atmel XMEGAA DFP (1.0.38) - Atmel XMEGAA Series Device Support.

XMEGAA	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATxmega128A1	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega128A1U	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega128A3	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega128A3U	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega128A4U	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega16A4	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega16A4U	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega192A3	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega192A3U	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega256A3	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega256A3B	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega256A3BU	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega256A3U	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega32A4	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega32A4U	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega64A1	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega64A1U	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega64A3	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes

XMEGAA	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500		STK600		Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P		P	
ATxmega64A3U	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG					JTAG, PDI		Yes
ATxmega64A4U	PDI		PDI		PDI	PDI		PDI		PDI		PDI							PDI		Yes

Table 6-36. Atmel XMEGAB DFP (1.0.31) - Atmel XMEGAB Series Device Support.

XMEGAB	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATxmega128B1	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega128B3	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega64B1	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes
ATxmega64B3	JTAG, PDI		JTAG, PDI		PDI	JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG, PDI		JTAG				JTAG, PDI	Yes

Table 6-37. Atmel XMEGAC DFP (1.0.29) - Atmel XMEGAC Series Device Support.

XMEGAC	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATxmega128C3	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega16C4	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega192C3	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega256C3	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega32C3	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega32C4	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega384C3	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega64C3	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes

Table 6-38. Atmel XMEGAD DFP (1.0.32) - Atmel XMEGAD Series Device Support.

XMEGAD	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500	STK600	Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P	P	
ATxmega128D3	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega128D4	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega16D4	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega192D3	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega256D3	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega32D3	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega32D4	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega384D3	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega64D3	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes
ATxmega64D4	PDI		PDI		PDI	PDI		PDI		PDI		PDI						PDI	Yes

Table 6-39. Atmel XMEGAE DFP (1.0.30) - Atmel XMEGAE Series Device Support.

XMEGAE	AVR Dragon		AVR ONE!		AVRISP mkII	Atmel-ICE		JTAGICE mkII		JTAGICE3		Power-debugger		QT600	SAM-ICE		STK500		STK600		Simulator
	D	P	D	P	P	D	P	D	P	D	P	D	P	P	D	P	P		P	
ATxmega16E5	PDI		PDI		PDI	PDI		PDI		PDI		PDI							PDI		Yes
ATxmega32E5	PDI		PDI		PDI	PDI		PDI		PDI		PDI							PDI		Yes
ATxmega8E5	PDI		PDI		PDI	PDI		PDI		PDI		PDI							PDI		Yes

6.2 Device Notes

Information about mature devices.

The following mature devices are not recommended for new designs:

- ATtiny11
- ATtiny12
- ATtiny15
- ATtiny22
- AT90S1200
- AT90S2313
- AT90S2323
- AT90S2343
- AT90S4433
- AT90S8515
- AT90S8535
- ATmega323
- ATmega161
- ATmega163
- ATmega103
- ATmega165
- ATmega169
- ATmega64HVE
- ATmega32U6
- AT90PWM2
- AT90PWM3
- AT90SCR100
- AT86RF401

See http://www.atmel.comfor replacements.

7. Revision History

Revision	Changes
K	Adding June 2018 release of Atmel Studio
J	Adding October 2017 release of Atmel Studio
I	Adding March 2017 USB driver update of Atmel Studio
H	Adding March 2017 release of Atmel Studio
G	Adding September 2016 release of Atmel Studio
F	Adding June 2016 release of Atmel Studio
E	Adding May 2016 release of Atmel Studio, released as revision D
D	Adding February 2016 release of Atmel Studio
C	Never released
B	Initial document for version 7.0 of Atmel Studio
A	Never released