
Atmel Studio 6: Release 6.0 beta

Welcome to the Atmel Studio

Atmel Studio is the new integrated development environment from Atmel. It provides you 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 Atmel. Get productive with the various navigate, refactor and intellisense features in the included editor. Experience seamless integration with various Atmel WEB services like Atmel Video Lounge, Atmel Store and datasheets to keep you updated and help you to design your solutions.

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 the GCC toolchain for both AVR and ARM, Atmel Software framework, AVR assembler and simulator. All newest Atmel tools are supported including AVR ONE!, JTAGICE mkII, JTAGICE3, STK500, STK600, QT600, AVRISP mkII, AVR Dragon and SAM-ICE.

For a detailed list of supported devices and tools please see the *Supported Devices* chapter.



8/32-bit AVR[®]
Microcontrollers

Release 6.0 beta



Installation Instructions

System Requirements

Supported Operating Systems

- Windows XP (x86) with Service Pack 3 - all editions except Starter Edition
- Windows Vista (x86 & x64) with Service Pack 1 - all editions except Starter Edition
- Windows 7 (x86 and x64)
- Windows Server 2003 (x86 & x64) with Service Pack 2
- Windows Server 2003 R2 (x86 and x64)
- Windows Server 2008 (x86 and x64) with Service Pack 2
- Windows Server 2008 R2 (x64)

Supported Architectures:

- 32-Bit (x86)
- 64-Bit (x64)

Hardware Requirements:

- Computer that has a 1.6GHz 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
- 4GB of available hard disk space
- A minimum display resolution of 1024 x 768 or higher is recommended.

Downloading and installing

- Download the latest Atmel Studio 6.0 installer.
- Atmel Studio 6.0 can be ran side by side with AVR Studio 5.0, 5.1. So uninstallation of AVR Studio 5.0, or 5.1 is not required.
- Verify the hardware and software requirements from "System Requirements" section.
- Make sure you are logged on with Administrative privileges.
- Please save all your work before starting, because the installation might prompt you for a restart if required.
- Please disconnect all Atmel USB/Serial hardware devices.
- Windows XP users are urged to stay connected to the internet during installation to allow for automatic certificate updates. See FAQ for more information.
- Double click the installer executable file. Please note that this might take some time to extract depending on H/W configuration.
- AVR Studio Prerequisites installation will start. NOTE : If you have all the prerequisites already installed then this dialog will not be shown.
 - If .NET Framework 4.0 is not already installed, the installer will start the .NET Framework setup, Note that this does not include SP1.
 - Accept the licence agreement and proceed through the installation. If the installer prompts for restart please do so. After restart the installation will start automatically.
- If Visual Studio Isolated shell 2010 is not installed, the installer will start the Microsoft Visual Studio Isolated Shell (2010) Setup.
 - Accept the licence agreement and proceed through the installation.

- The Atmel USB Driver will install/upgrade the existing Jungo USB driver, and will also keep the existing hardware to work.
 - Accept the licence agreement and proceed through the installation.
 - NOTE : If you have previous versions of Jungo USB driver then the installer will update them. The Atmel USB driver (Jungo USB Driver + SAM USB Driver) is fully compatible with its previous versions. So AVR Studio 4, Studio 32 and AVR Studio 5.0, 5.1 should continue to work with the updated driver without any issues.
- After this , Atmel Studio installation should start.
- Click "Next" to continue.
- Accept the licence agreement and continue.
- Choose the "Destination Directory to Install" and click "Next".
- Review the summary and click "Install".
- The installation will copy all files and prompt to click "Finish".
- At the end, the installer will display options to associate files with AVR Studio. Please choose them if you prefer to open files with the mentioned file extensions in Atmel Studio 6.0.
- The installer also displays an option to "Start Atmel Studio after completion". If you choose to open, then please note that Atmel Studio 6.0 will launch with administrative privileges, since the installer was either launched as administrator or with elevated privileges (in Windows Vista or later).

FAQ

- 1. What is the Atmel USB Driver ?**
 - The Atmel USB Driver is a cumulative installer that bundles the Jungo USB driver for the AVR tools and the Segger USB Driver for SAM tools
- 2. Will Atmel Studio 6.0 work in parallel with AVR Studio 5.0, 5.1, AVR Studio 4.0 and AVR32 Studio?**
 - Yes, it will work. Note: When you are uninstalling AVR Studio 4.0 or AVR32 Studio please be careful when you manually delete folders or registry entries after uninstall, as there might be other keys and folders deployed by Atmel Studio 6.0 inside Atmel folder and registry paths.
- 3. I have AVR Studio 4 in my PC. When installing Atmel Studio 6.0 it updated the Jungo USB driver. Will AVR Studio 4 still work?**
 - Yes, it will work. If Jungo driver is already present and its version is anything less than the new one, then the installer will update the Jungo driver you already have. The updated Jungo driver is fully compatible with its previous versions. So AVR Studio 4 and Studio 32 should continue to work with the updated driver without any issues.
- 4. During installation the installer hangs more than 20 minutes while displaying: "Atmel Studio requires the following items to be installed on your computer." A progress bar is running but there is no indication about real progress**
 - If you have network connectivity that is limited (no internet connectivity), please disconnect the network or disable all the active network adapters and start installation of Atmel Studio 6.0. This happens only on Windows XP and Windows 2003 based machines.
- 5. The Atmel Studio installer crashes when installing using the "run as" option in Windows XP (any architecture) with "Protect my computer ..." option enabled.**
 - Don't use the "run as" option with the "Protect my computer ..." option enabled. The installer will have only read-only access to some of the registry hives and system folders, causing it to malfunction. This is due to the DEP option enabled by windows in this mode. Refer to http://blogs.msdn.com/b/aaron_margosis/archive/2004/09/10/227727.aspx for more information.
- 6. Atmel Studio 6.0 and Visual Studio 2010 SP1 conflicts**
 - If Atmel Studio 6.0 is installed on a machine with Visual Studio 2010 SP1, the following message might be displayed when starting up Atmel Studio or Visual Studio: "Only some of the Microsoft Visual Studio 2010 products on this computer have been upgraded to Service Pack 1. None will work correctly until all have been upgraded".
 - Follow the instructions in the error message dialog to resolve the problem.



7. **Atmel Studio 6.0 cannot find any debuggers or programmers after uninstalling AVR Studio 4.**
 - The AVR Studio 4 installer uninstalls the Jungo USB Driver which is shared by Atmel Studio 6.0. Repairing the Atmel Studio 6.0 installation might not install Jungo USB Driver. So Download the Jungo Driver installer from the Atmel web and install it.
8. **Atmel Studio 6.0 cannot find any debuggers or programmers when Norton Antivirus is running**
 - Atmel Studio 6.0 might not show any connected tools if Norton Antivirus is running. To make it work make sure Norton allows avrdbg.exe to communicate with the Atmel Studio front-end by adding avrdbg.exe as an exception in the Norton antivirus allowed programs. This is the same with any antivirus program that by default blocks ports.
9. **Windows shows a message box with the following message when attempting to run Atmel Studio 6.0 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 antivirus program blocking the installation of the Atmel Studio 6.0. We have seen this with the Sophos antivirus package. Temporarily disable the Sophos service running on the machine (or any corresponding antivirus service), and attempt installation.
10. **After installing and starting Atmel Studio 6.0 in Windows XP, the following error is displayed. "This application has failed to start because MSVCR100.dll was not found. Re-installing the application may fix this problem."**
 - This probably means that your PC doesn't have Service Pack 3 for Windows XP installed. Please install SP3 and then install Atmel Studio 6.0 again.
11. **Atmel Studio takes a very long time to start on my PC, but runs well in a VM environment**
 - The Visual Studio shell (and thus Atmel Studio 6) does a considerable amount of processing during start-up. Parts of the operations are WPF operations which benefits greatly by updated graphics libraries and drivers. Installing the latest graphics driver may give a performance boost both during normal operation and during start-up.
12. **Verification and programming often fails 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. E.g. other drivers , thus causing A workaround which works for most systems is to use an USB to serial adapter.
13. **Internet Explorer 6 does not display user documentation correctly**
 - This is a known issue, primarily due to the incompatibility of the version of HTML used to prepare the help content and the IE6 rendering engine. Please update your browser to a later version of IE to resolve the issue. This problem is only observed with Windows XP and Windows Server 2003.
14. **Help Registration failed with error code 401.**
 - One of the common reasons for this failure is because of an corrupted Help Store location. The help store location is usually %SYSTEMDRIVE%\ProgramData\Microsoft\HelpLibrary for Vista or later machines and it is %SystemDrive%\Documents and Settings\All Users\Application Data for Windows XP and Windows Server 2003 based machines. Please clean up this location and try running the installer again.
15. **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 guest account and nor runs under it.
16. **Can we install and run Atmel Studio 6.0 from within a Virtual Machine**
 - Yes, with simulator there should be no issues. However with physical devices like debuggers and programmers, the VM must offers support for physical USB and Serial port connections.

New and Noteworthy

Atmel Studio 6.0 beta

- Support for Atmel ARM-based MCUs with Atmel SAM-ICE
- New version of Atmel Software Framework (3.0.1)
- Atmel Software Framework Explorer
- Support for QTouch Composer as extension

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 Atmel AVR tools and devices
- Enhancements to programming dialog including support for ELF programming
- New version of Visual Assist with several enhancements and bugfixes
- Support for 55 new devices

Notable bugs fixed

- **AVRSV-2703:**

Default option to preserve EEPROM prohibits chip erase from AVR Programming.

- **AVRSV-2688:**

Fail to start debugging if there is a custom SRAM section in object file.

- **AVRSV-2643:**

Artifact name from Project Properties 'Build' section is not passed correct to the linker.

- **AVRSV-2621:**

Disassembler is incapable of decoding the unique 1-word 'lds' and 'sts' instructions found in the ATtiny10/9/5/4/20/40 devices.

- **AVRSV-2618:**

Inconsistent behavior when single stepping using the AVR Dragon and JTAGICE mkII.

- **AVRSV-2617:**

Fail to program an elf-file using AVR Programming if the elf-file does not contain a 'main' entry.

- **AVRSV-2609:**

Memory segment settings is not copied when opening an existing 5.0 bootloader project in 5.1.



- **AVRSV-2605:**

Memory directives is not handled correctly.

- **AVRSV-2598:**

Link files inside sub directories are not compiled.

- **AVRSV-2595:**

StudioCommandPrompt.exe crash on unhandled exception.

- **AVRSV-2561:**

Linker option '-nodefault' is not supported.

- **AVRSV-2533:**

Dependencies folder is not getting populated for C++ projects when the project is built.

- **AVRSV-1530:**

Code size summary should be a part of the output when building a project.

- **AVRSV-1770:**

An installation of Visual Studio may be broken after AVR Studio 5 is installed on the same machine. A workaround for this is to: Call regsvr32 msdbg2.dll in both "C:\Program Files\Common Files\Microsoft Shared\VS7Debug" (and "C:\Program Files (x86)\Common Files\Microsoft Shared\VS7Debug." if you are running Vista x64).

- **AVRSV-1901:**

Creating two projects in the same solution which have different devices is not supported. Create two different solutions instead.

- **AVRSV-1909:**

Creating a new project gives the user the option to select if a directory should be created for the solution. Deselecting this option is not supported and a directory will still be created.

Known issues

- **Issue #TSD-965:**

Some links in the help for Atmel Software Framework are broken. Refer to the online help for the same info: <http://asf.atmel.com/>.

- **Issue #12417:**

Power toggle and external reset is not handled gracefully in all situations.

- **Issue #12382:**

Conditional and Hit count breakpoints works only for simulator

- **Issue #12611:**

If you have network connectivity that is limited (no internet connectivity), please disconnect the network or disable all the active network adapters and before starting installation of AVR Studio 5.0.

- **Issue #12765:**

Breakpoint is not updating in the Disassembly and Code view. Set breakpoint in disassembly view and verify from code view, this is working. But random switching between the windows some time and erasing the breakpoint from the disassembly view is not working correctly.

- **Issue #12875:**

The following ASF modules are not available as standalone in the "Select Drivers from the ASF" menu, but only as examples: XMEGA Sleep Manager and ADC driver, AVR UC3 USB Stack from ASF v1, ECC Hamming, TLV320AIC23B codec, FAT file system with play list support, Joystick interface (5- way), MEMORY - EBI SDRAM Controller, MEMORY - MCI - MultiMedia Card Interface, MEMORY - SD/MMC card access using MCI, MEMORY - SD/MMC card access using SPI, MEMORY - NAND Flash on EBI, MEMORY - AT45DBX DataFlash, TOUCH - AT42QT1060 QTouch 6-channel sensor, MEMS Sensors - Accelerometer LIS3L06AL, TIMING - CS2200 Clock Synthesizer, LodePNG, FreeRTOS minimal, lwIP, Micrium uC/OSII, H&D Wi-Fi SPB Firmware Download.

- **Issue #13162:**

Windows XP: Right clicking and choose "run as" may crash the installer.

- **Issue #13226:**

Incorrect number of GPIO ports may be displayed for UC3 devices in I/O view.

- **Issue #13517:**

The asf.h header file is not included in all examples.

- **Issue #13834:**

XMEGA PDI mode on AVR Dragon does not work for the following XMEGA devices": A3/D3 - rev B

- **Issue #13856:**

Code completion doesn't work if tilde (~) precedes the symbol that should be completed.

- **Issue #13858:**

Using Chinese letters in file path in programming dialog is not fully supported.

- **Issue #13888:**

The programming dialog in AVR Studio 5 does not support readout of OSCCAL and programming of a user-specified value into a specific flash or EEPROM location.

- **Issue #13899:**

Mapped network drives do not appear in Project Location window when creating a new project.

- **Issue #14101:**

The interface settings has to be verified through "Debugging" project properties page before debug launch, otherwise debug session might fail with incompatible device, tool and interface settings.

- **Issue #14106:**

While debugging code on AT90CAN32, AT90CAN64, AT90CAN128 devices it is not possible to view or modify the contents of the CAN mailbox.

- **Issue #14150:**

Single stepping code which includes software reset is not supported for Xmega devices.

- **Issue #14186:**

Displaying the call stack during debugging is not supported for 8-bit AVR devices.

- **Issue #14193:**

Projects which include paths with non-Latin characters are not supported.

- **Issue #14355:**

Debugging ATmega128 in ATmega103 compatibility mode is not supported.

- **Issue #14361:**

Starting a debug sessions results in a page saying "No source available" in some situations. Program counter is at reset vector. This happens very rarely. To proceed with the debug session, press F5.

- **Issue #14363:**

'Alt + G' does not open the file <avr/io.h>. This file is not parsed by Visual Assist.

- **Issue #14546:**

IAR Embedded Workbench projects that are compiled with the normal DLIB option are not supported. Debugging the resulting d90/dbg file in AVR Studio 5 will fail and show "No source available".

- **Issue #15013:**

Values of register variables are always evaluated in the context of the most recent call frame. Evaluating register variables in call frames other than the most recent one will therefore display wrong values.

- **Issue #15030:**

When debugging optimized code, some variables cannot be evaluated. An example of this is variables whose values are spread across non-consecutive memory locations.

- **Issue #15406:**

When using the "start without debugging" function in Studio with the JTAGICE mkII with UC3L or UC3C devices, the device may be halted unintentionally after programming if the RESET line is connected. Toggle power on the target board to resume execution.

- **Issue #15476:**

AVRISP mkII: firmware upgrade may fail with the error message "Connection lost, please check and retry".

- **Issue #15492:**

Some mega devices have mapped IO displayed as read-only in the memory view when debugging using JTAG. The memory can be written using the I/O View or the immediate window.

- **Issue #12155:**

"webproperties.tlb could not be located" message is displayed on some systems. workaround": copy a webproperties???.tlb file from "C:\Program Files (x86)\Common Files\microsoft shared\MSEnv" to the same folder and rename it to webproperties.tlb

- **Issue #15509:**

HVPP for ATtiny2313A does not work on STK500

- **Issue #9879:**

The installer does not respond to canceling

- **Issue #13275:**

The assembler project types and editor only applies to the 8-bit devices.

- **Issue #13646:**

UC3A-ES and UC3B-ES devices are code incompatible with later revisions (non ES) of the same device. AVR Studio 5 is not able to detect that such a device is attached, and thus not able to provide a warning to the user.

- **Issue #AVRSV-2983:**

Support for C++ with ARM devices missing.



Supported Devices

The following tables lists all supported tools and devices.

Required firmware versions

| Debugger/programmer | Firmware version |
|---------------------|------------------|
| AVR Dragon | 7.21 |
| AVRISP mkII | 1.17 |
| AVR ONE! | 6.0 |
| JTAGICE3 | 1.34 |
| JTAGICE mkII | 7.20 |
| QT600 | 1.10 |
| STK500 | 2.10 |
| STK600 | 2.25 |

AVR Mega

| | AVR Dragon | AVRISP mkII | AVR ONE! | JTAGICE3 | JTAGICE mkII | QT600 | SAM-ICE | Simulator | STK500 | STK600 |
|---------------|------------|-------------|----------|----------|--------------|-------|---------|-----------|--------|--------|
| AT90CAN128 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| AT90CAN32 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| AT90CAN64 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| AT90PWM1 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| AT90PWM161 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT90PWM216 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| AT90PWM2B | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| AT90PWM316 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| AT90PWM3B | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| AT90PWM81 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| AT90USB1286 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| AT90USB1287 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| AT90USB162 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| AT90USB646 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| AT90USB647 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| AT90USB82 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| ATmega128 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega1280 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega1281 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega1284 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega1284P | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega128A | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega128RFA1 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| ATmega16 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega162 | Yes | Yes | Yes | Yes | Yes | | | | Yes | Yes |
| ATmega164A | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |

| | AVR Dragon | AVRISP mkII | AVR ONE! | JTAGICE3 | JTAGICE mkII | QT600 | SAM-ICE | Simulator | STK500 | STK600 |
|--------------|------------|-------------|----------|----------|--------------|-------|---------|-----------|--------|--------|
| ATmega164P | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega164PA | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega165A | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega165P | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega165PA | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega168 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega168A | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega168P | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega168PA | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega169A | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega169P | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega169PA | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega16A | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega16HVB | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega16M1 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| ATmega16U2 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| ATmega16U4 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| ATmega2560 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega2561 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega32 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega324A | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega324P | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega324PA | Yes | Yes | Yes | Yes | Yes | Yes | | Yes | Yes | Yes |
| ATmega325 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega3250 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega3250A | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega3250P | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega3250PA | Yes | | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega325A | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega325P | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega325PA | Yes | | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega328 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega328P | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega329 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega3290 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega3290A | Yes | | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega3290P | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega3290PA | Yes | | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega329A | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega329P | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |



| | AVR Dragon | AVRISP mkII | AVR ONE! | JTAGICE3 | JTAGICE mkII | QT600 | SAM-ICE | Simulator | STK500 | STK600 |
|-------------|------------|-------------|----------|----------|--------------|-------|---------|-----------|--------|--------|
| ATmega329PA | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega32A | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega32C1 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| ATmega32HVB | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega32M1 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| ATmega32U2 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| ATmega32U4 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| ATmega406 | Yes | | Yes | Yes | Yes | | | | | Yes |
| ATmega48 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega48A | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega48P | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega48PA | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega64 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega640 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega644 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega644A | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega644P | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega644PA | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega645 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega6450 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega6450A | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega6450P | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega645A | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega645P | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega649 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega6490 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega6490A | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega6490P | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega649A | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega649P | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega64A | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATmega64C1 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| ATmega64M1 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| ATmega8 | | Yes | | | | | | Yes | Yes | Yes |
| ATmega8515 | | Yes | | | | | | | Yes | Yes |
| ATmega8535 | | Yes | | | | | | | | Yes |
| ATmega88 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega88A | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega88P | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATmega88PA | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |

| | AVR Dragon | AVRISP mkII | AVR ONE! | JTAGICE3 | JTAGICE mkII | QT600 | SAM-ICE | Simulator | STK500 | STK600 |
|-----------|------------|-------------|----------|----------|--------------|-------|---------|-----------|--------|--------|
| ATmega8A | | Yes | | | | | | Yes | Yes | Yes |
| ATmega8U2 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |

AVR Tiny

| | AVR Dragon | AVRISP mkII | AVR ONE! | JTAGICE3 | JTAGICE mkII | QT600 | SAM-ICE | Simulator | STK500 | STK600 |
|-------------|------------|-------------|----------|----------|--------------|-------|---------|-----------|--------|--------|
| ATtiny10 | | Yes | | | | | | Yes | | Yes |
| ATtiny13 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATtiny13A | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATtiny1634 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATtiny167 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| ATtiny20 | | Yes | | | | | | Yes | | Yes |
| ATtiny2313 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATtiny2313A | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATtiny24 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATtiny24A | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATtiny25 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATtiny26 | Yes | Yes | | | | | | Yes | Yes | Yes |
| ATtiny261 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATtiny261A | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATtiny28 | Yes | | | | | | | | Yes | Yes |
| ATtiny4 | | Yes | | | | | | Yes | | Yes |
| ATtiny40 | | Yes | | | | | | Yes | | Yes |
| ATtiny4313 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATtiny43U | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATtiny44 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATtiny44A | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATtiny45 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATtiny461 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATtiny461A | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATtiny48 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATtiny5 | | Yes | | | | | | Yes | | Yes |
| ATtiny80 | Yes | Yes | Yes | Yes | Yes | Yes | | Yes | | Yes |
| ATtiny84 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATtiny84A | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATtiny85 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATtiny861 | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATtiny861A | Yes | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes |
| ATtiny87 | Yes | Yes | Yes | Yes | Yes | | | | | Yes |
| ATtiny88 | Yes | Yes | Yes | Yes | Yes | Yes | | Yes | Yes | Yes |
| ATtiny9 | | Yes | | | | | | Yes | | Yes |



AVR UC3

| | AVR Dragon | AVRISP mkII | AVR ONE! | JTAGICE3 | JTAGICE mkII | QT600 | SAM-ICE | Simulator | STK500 | STK600 |
|---------------|------------|-------------|----------|----------|--------------|-------|---------|-----------|--------|--------|
| AT32UC3A0128 | Yes | | Yes | Yes | Yes | | | Yes | | Yes |
| AT32UC3A0256 | Yes | | Yes | Yes | Yes | | | Yes | | Yes |
| AT32UC3A0512 | Yes | | Yes | Yes | Yes | | | Yes | | Yes |
| AT32UC3A1128 | Yes | | Yes | Yes | Yes | | | Yes | | Yes |
| AT32UC3A1256 | Yes | | Yes | Yes | Yes | | | Yes | | Yes |
| AT32UC3A1512 | Yes | | Yes | Yes | Yes | | | Yes | | Yes |
| AT32UC3A3128 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3A3128S | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3A3256 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3A3256S | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3A364 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3A364S | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3A4128 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3A4128S | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3A4256 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3A4256S | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3A464 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3A464S | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3B0128 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3B0256 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3B0512 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3B064 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3B1128 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3B1256 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3B1512 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3B164 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3C0128C | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3C0256C | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3C0512C | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3C064C | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3C1128C | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3C1256C | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3C1512C | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3C164C | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3C2128C | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3C2256C | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3C2512C | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3C264C | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3L0128 | Yes | | Yes | Yes | Yes | | | | | Yes |

| | AVR Dragon | AVRISP mkII | AVR ONE! | JTAGICE3 | JTAGICE mkII | QT600 | SAM-ICE | Simulator | STK500 | STK600 |
|--------------|------------|-------------|----------|----------|--------------|-------|---------|-----------|--------|--------|
| AT32UC3L016 | Yes | | Yes | Yes | Yes | | | Yes | | Yes |
| AT32UC3L0256 | Yes | | Yes | Yes | Yes | | | | | Yes |
| AT32UC3L032 | Yes | | Yes | Yes | Yes | | | Yes | | Yes |
| AT32UC3L064 | Yes | | Yes | Yes | Yes | Yes | | Yes | | Yes |
| ATUC128D3 | Yes | | Yes | Yes | Yes | | | | | Yes |
| ATUC128D4 | Yes | | Yes | Yes | Yes | | | | | Yes |
| ATUC128L3U | Yes | | Yes | Yes | Yes | | | | | Yes |
| ATUC128L4U | Yes | | Yes | Yes | Yes | | | | | Yes |
| ATUC256L3U | Yes | | Yes | Yes | Yes | | | | | Yes |
| ATUC256L4U | Yes | | Yes | Yes | Yes | | | | | Yes |
| ATUC64D3 | Yes | | Yes | Yes | Yes | | | | | Yes |
| ATUC64D4 | Yes | | Yes | Yes | Yes | | | | | Yes |
| ATUC64L3U | Yes | | Yes | Yes | Yes | | | | | Yes |
| ATUC64L4U | Yes | | Yes | Yes | Yes | | | | | Yes |

AVR Xmega

| | AVR Dragon | AVRISP mkII | AVR ONE! | JTAGICE3 | JTAGICE mkII | QT600 | SAM-ICE | Simulator | STK500 | STK600 |
|----------------|------------|-------------|----------|----------|--------------|-------|---------|-----------|--------|--------|
| ATxmega128A1 | Yes | Yes | Yes | Yes | Yes | Yes | | Yes | | Yes |
| ATxmega128A1U | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega128A3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega128A3U | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega128A4U | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega128B1 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega128B3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega128C3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega128D3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega128D4 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega16A4 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega16A4U | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega16C4 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega16D4 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega192A3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega192A3U | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega192C3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega192D3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega256A3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega256A3B | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega256A3BU | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega256A3U | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega256C3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |



| | AVR Dragon | AVRISP mkII | AVR ONE! | JTAGICE3 | JTAGICE mkII | QT600 | SAM-ICE | Simulator | STK500 | STK600 |
|--------------|------------|-------------|----------|----------|--------------|-------|---------|-----------|--------|--------|
| ATxmega256D3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega32A4 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega32A4U | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega32C4 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega32D4 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega384C3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega384D3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega64A1 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega64A1U | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega64A3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega64A3U | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega64A4U | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega64B1 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega64B3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega64C3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega64D3 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |
| ATxmega64D4 | Yes | Yes | Yes | Yes | Yes | | | Yes | | Yes |

SAM

| | AVR Dragon | AVRISP mkII | AVR ONE! | JTAGICE3 | JTAGICE mkII | QT600 | SAM-ICE | Simulator | STK500 | STK600 |
|------------|------------|-------------|----------|----------|--------------|-------|---------|-----------|--------|--------|
| ATSAM3A4C | | | | | | | Yes | | | |
| ATSAM3A8C | | | | | | | Yes | | | |
| ATSAM3N00A | | | | | | | Yes | | | |
| ATSAM3N00B | | | | | | | Yes | | | |
| ATSAM3N0A | | | | | | | Yes | | | |
| ATSAM3N0B | | | | | | | Yes | | | |
| ATSAM3N0C | | | | | | | Yes | | | |
| ATSAM3N1A | | | | | | | Yes | | | |
| ATSAM3N1B | | | | | | | Yes | | | |
| ATSAM3N1C | | | | | | | Yes | | | |
| ATSAM3N2A | | | | | | | Yes | | | |
| ATSAM3N2B | | | | | | | Yes | | | |
| ATSAM3N2C | | | | | | | Yes | | | |
| ATSAM3N4A | | | | | | | Yes | | | |
| ATSAM3N4B | | | | | | | Yes | | | |
| ATSAM3N4C | | | | | | | Yes | | | |
| ATSAM3S1A | | | | | | | Yes | | | |
| ATSAM3S1B | | | | | | | Yes | | | |
| ATSAM3S1C | | | | | | | Yes | | | |
| ATSAM3S2A | | | | | | | Yes | | | |

| | AVR Dragon | AVRISP mkII | AVR ONE! | JTAGICE3 | JTAGICE mkII | QT600 | SAM-ICE | Simulator | STK500 | STK600 |
|------------|---------------|----------------|-------------|----------|-----------------|-------|---------|-----------|--------|--------|
| ATSAM3S2B | | | | | | | Yes | | | |
| ATSAM3S2C | | | | | | | Yes | | | |
| ATSAM3S4A | | | | | | | Yes | | | |
| ATSAM3S4B | | | | | | | Yes | | | |
| ATSAM3S4C | | | | | | | Yes | | | |
| ATSAM3S8B | | | | | | | Yes | | | |
| ATSAM3S8C | | | | | | | Yes | | | |
| ATSAM3SD8B | | | | | | | Yes | | | |
| ATSAM3SD8C | | | | | | | Yes | | | |
| ATSAM3U1C | | | | | | | Yes | | | |
| ATSAM3U1E | | | | | | | Yes | | | |
| ATSAM3U2C | | | | | | | Yes | | | |
| ATSAM3U2E | | | | | | | Yes | | | |
| ATSAM3U4C | | | | | | | Yes | | | |
| ATSAM3U4E | | | | | | | Yes | | | |
| ATSAM3X4C | | | | | | | Yes | | | |
| ATSAM3X4E | | | | | | | Yes | | | |
| ATSAM3X8C | | | | | | | Yes | | | |
| ATSAM3X8E | | | | | | | Yes | | | |
| ATSAM3X8H | | | | | | | Yes | | | |
| ATSAM4S16B | | | | | | | Yes | | | |
| ATSAM4S16C | | | | | | | Yes | | | |
| ATSAM4S8B | | | | | | | Yes | | | |
| ATSAM4S8C | | | | | | | Yes | | | |

Device Notes

Mature devices not recommended for new designs

ATtiny11, ATtiny12, ATtiny15, ATtiny22, AT90S1200, AT90S2313, AT90S2323, AT90S2343, AT90S4433, AT90S8515, AT90S8535, ATmega323, ATmega161, ATmega163, ATmega103, ATmega165, ATmega169, ATmega16HVA, ATmega16HVA2, ATmega64HVE, ATmega32U6, AT90PWM2, AT90PWM3, AT90SCR100, AT86RF401

See www.atmel.com for replacements.





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