Production Programming of Microchip AVR® and SAM Microcontrollers

Description

This application note covers both AVR® and SAM microcontrollers, but not PIC® microcontrollers.

AVR and SAM microcontrollers are Flash-based, therefore, the program memory needs to be programmed with a firmware image for the end-product to operate as desired. During development it is recommended to use the combined programming and debugging tools from Microchip, which integrate directly in the Atmel Studio IDE. However, for production programming, it is recommended to use third-party programming tools that are intended for industrial environments. Another option is to order the microcontrollers preprogrammed from Microchip or from a programming house.

Features

- Microchip Technology Inc. Programming Solutions
- Third-Party Programming Solutions
- Programming Services
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1. **Microchip Development and Programming Tools**

   To identify the correct programming and debugging tool for a microcontroller from Microchip, go to the microcontroller product webpage and from the quick access links above the product name, click the development tools icon (See Figure 1.1). This will show a list of development tools for the product. The **SAM-ICE™** supports programming and debugging of all SAM microcontrollers. SAM devices can also be programmed using the **SAM-BA®** bootloader (with various interface options). The **Atmel-ICE** is a programming and debugging tool that supports all of the AVR and SAM microcontrollers. AVR microcontrollers can also be programmed using the **AVRISP mkII**. However, note that the **AVRISP mkII** does not support debugging.

   **Note:** The above mentioned programming tools are not recommended for production programming as they are designed for development environments. SAM-BA can be considered as an exception, as it does not depend on a physical tool, but the software only.


   **Figure 1-1. Development Tools Icon**

![Development Tools Icon](http://www.microchip.com/images/appnotes/1.png)
2. **Preprogrammed Microcontrollers**
Microchip and many Microchip distributors offer preprogrammed microcontrollers. In this case, the binary image is provided to Microchip or the distributor. This solution is obviously less flexible if changes are made frequently to the preprogrammed firmware and does have MOQ implications, but can have advantages related to reduced production time for the end-product.

To request preprogramming of Microchip microcontrollers contact microchipDIRECT, your local Microchip sales office, or your distributor.

microchipDIRECT: [https://www.microchipdirect.com/programming/](https://www.microchipdirect.com/programming/)
3. **Third-Party Programming Tools**

For production programming and, e.g., to perform in-system calibration or parameter customization for the end-product, it is recommended to use professional third-party programming tools.

The list of third-party programming tools in the following table includes programming solutions for use in both development and production. Gang programmers in this context refer to single and multi-site programmers, where devices are inserted into the programming fixture to be programmed. This is in contrast to in-system programming, where the device to program is mounted on the PCB while being programmed. Both kinds of programmers can thus be used in production environments, while in-system programmers are usually preferred for development purposes.

**Table 3-1. Third-Party Vendors of Programming Tools in Alphabetic Order**

<table>
<thead>
<tr>
<th>Company Name</th>
<th>ARM® Support</th>
<th>AVR® Support</th>
<th>Programmer Intended for</th>
<th>Gang</th>
<th>In-system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advantech Equipment Corp.</td>
<td>Yes</td>
<td>Yes</td>
<td>Production (and development)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Taiwan ROC</td>
<td><a href="http://www.aec.com.tw/">http://www.aec.com.tw/</a></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>ASIX s.r.o.</td>
<td>Yes</td>
<td>Yes</td>
<td>Development and production</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Czech Republic</td>
<td><a href="http://tools.asix.net/index.htm">http://tools.asix.net/index.htm</a></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>BPM Microsystems</td>
<td>Yes</td>
<td>Yes</td>
<td>Production and development</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>USA</td>
<td><a href="http://www.bpmmicro.com/">http://www.bpmmicro.com/</a></td>
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</tr>
<tr>
<td>Data I/O, Corporation</td>
<td>Yes</td>
<td>Yes</td>
<td>Production and development</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>USA</td>
<td><a href="http://dataio.com">http://dataio.com</a></td>
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<tr>
<td>Dataman Ltd.</td>
<td>Yes</td>
<td>Yes</td>
<td>Production (and development)</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>UK</td>
<td><a href="http://www.dataman.com">www.dataman.com</a></td>
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<tr>
<td>EE Tools, Inc.</td>
<td>Information missing: contact vendor</td>
<td></td>
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<tr>
<td>USA</td>
<td><a href="http://www.eetools.com">www.eetools.com</a></td>
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</tr>
<tr>
<td>ELNEC s.r.o.</td>
<td>Yes</td>
<td>Yes</td>
<td>Production (and development)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td><a href="http://www.elnec.com/">http://www.elnec.com/</a></td>
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<tr>
<td>Company Name</td>
<td>ARM® Support</td>
<td>AVR® Support</td>
<td>Programmer Intended for</td>
<td>Gang</td>
<td>In-system</td>
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<tr>
<td>Elprotronic Inc.</td>
<td>Yes</td>
<td>Yes</td>
<td>Production</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td></td>
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<tr>
<td><a href="https://www.elprotronic.com/">https://www.elprotronic.com/</a></td>
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<tr>
<td>Equinox Technologies Ltd.</td>
<td>Yes</td>
<td>Yes</td>
<td>Production, field-service, and development</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>United Kingdom</td>
<td></td>
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<tr>
<td><a href="http://www.equinox-tech.com/">http://www.equinox-tech.com/</a></td>
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<tr>
<td>HI-LO System Research Co. Ltd.</td>
<td>Yes</td>
<td>Yes</td>
<td>Production (and development)</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Taiwan ROC</td>
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<td><a href="http://www.hilosystems.com.tw/">http://www.hilosystems.com.tw/</a></td>
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<tr>
<td>Leap Electronic Co., Ltd.</td>
<td>Yes</td>
<td>Yes</td>
<td>Production (and development)</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Taiwan ROC</td>
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<td><a href="http://www.leap.com.tw/">http://www.leap.com.tw/</a></td>
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<tr>
<td>MikroElektronika d.o.o.</td>
<td>No</td>
<td>Yes</td>
<td>Development</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>Serbia</td>
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<tr>
<td><a href="http://www.mikroe.com/">http://www.mikroe.com/</a></td>
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<tr>
<td>Opteeq Technologies Ltd.</td>
<td>Yes</td>
<td>Yes</td>
<td>Production (and development)</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>China</td>
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</tr>
<tr>
<td>Phyton™, Inc.</td>
<td>Yes</td>
<td>Yes</td>
<td>Production and development</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>USA</td>
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<td><a href="http://www.phyton.com">http://www.phyton.com</a></td>
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<tr>
<td>Ronetix GmbH</td>
<td>Yes</td>
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<td>Production and development</td>
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<td>Austria</td>
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<tr>
<td>RPM Systems Corporation</td>
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<td>Yes</td>
<td>Production and development</td>
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<tr>
<td>USA</td>
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<td><a href="http://www.rpmsys.com/">http://www.rpmsys.com/</a></td>
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<td>SMH Technologies™</td>
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<td>Production and development</td>
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<td>Yes</td>
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<td><a href="http://www.smh-tech.com">http://www.smh-tech.com</a></td>
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</table>
A general list of third-party vendors for Microchip products can be found at the pages below (not limited to programming tools). It is recommended to refer to this list for the most recent information about third-party tools.
4. **Introduction of Listed Third-Party Programming Offerings**

The descriptions below are provided by the third-party vendors listed in the previous section’s table and contain additional information related to the programming products and the services these vendors offer. The third-party vendors are listed in alphabetic order.

**Note:** The descriptions below do not reflect any recommendations by Microchip.

4.1 **Advantech Equipment**

The **Labtool-48UXP** is a universal programmer for development and low-volume production. It supports most of the Microchip AVR 8-bit MCUs, up to 64 pins, in various packages including PLCC, SOIC, TSSOP, SOT23, TQFP, QFN, and QFP. In addition, through adapters with up to 64 pins, it also supports the Microchip ARM7TDMI MCU in 64/48 pins in TQFP package, as well as the complete line of Microchip 8951-C1 and 51-C12 MCUs.

The **Labtool-848XP** is a production gang programmer for high density NOR Flash and Flash-based MCUs with EEPROM. It supports parts of the AVR 8-bit family as well as the 89C51-1C and -2C MCUs from Microchip. The **Labtool-848UXP** can also be customized with additional chip support upon customer request. In addition, if the default chip support is not sufficient, Advantech Equipment can be contacted to add the chip support with custom software.


4.2 **ASIX**

ASIX s.r.o. founded in 1991 has entered the development tools business in the mid-’90s. Since 2004, ASIX has been offering an In-System USB Programmer, **PRESTO**, which supports many Microchip devices including AVR, ’51, and ARM7TDMI MCUs, as well as Serial EEPROM and Flash memories. In 2012, ASIX introduced a **FORTE** programmer, which offers more features and higher speed. Both programmers are primarily intended for development and service purposes, but many of them are also used for small and medium volume production (up to a couple of thousand units/day), typically with multiple programmers working in production lines. User-friendly and highly configurable software, called **UP**, supports production programming (serial number generator, remote control from command-line, Windows® messages, DLL library, etc.). Updates of **UP** and other software tools for **PRESTO** and **FORTE** are freely available. ASIX offers fast and effective technical support including new device implementation at customer request.

Company webpage: [http://www.asix.net/](http://www.asix.net/)

4.3 **BPM Microsystems**

BPM Microsystems is the leading global provider of device programming systems for test and measurement systems, factory integration software, and solutions for the semiconductor and electronics industries.

Founded in 1985, BPM Microsystems serves more than 2,000 companies in over 40 countries, including tier 1 Automotive suppliers, programming centers, original equipment manufacturers (OEM), contract manufactures and semiconductor manufacturers. BPM programmers offer high-performance device handling, advanced serialization, and quality control, meeting the highest programming and cyber-
security standards for automotive, aerospace, medical, industrial and mobile device applications. BPM's intelligently designed systems deliver the lowest programming cost per device. From low-volume first articles to high-volume production, BPM Microsystems has a solution to meet customers' needs today and into the future.

BPM Microsystems full-line of programmers and support includes:

The BPM 3910, the latest Automated Programming System (APS). Its combination of speed, throughput, ease-of-use, and small footprint makes the 3910 a value-packed programmer in a class by itself.

https://bpmmicro.com/programmers/automated-programmers/3910-2/

The flagship product, the BPM 4900, is the most universal production programmer with the highest throughput and is configurable with a variety of input/output options, 3D inspection and advanced laser marking.


When quality is critical, and volumes are smaller, BPM has two manual programming solutions. The BPM 2900L features four socket card receptacles with an integrated lever socket actuator and universal pressure plate. Up to eleven 2900L can be connected to one computer for up to 44 devices programmed simultaneously.


The BPM 1900 is the first article programming system of BPM Microsystems with a single socket receptacle and is upgradeable to the 2900L.


BPM Microsystems supports 50,000+ devices from over 200 semiconductor manufacturers. New socket cards and algorithms are continually added and can be developed quickly to meet future programming needs.

For more information, please visit the company's website at www.bpmmicro.com

4.4 Data I/O

Data I/O is the world’s leading provider of manual and automated device programming systems for Flash, Microcontroller, and Logic devices. They serve electronics manufacturers around the world including OEM, ODM, EMS, and programming centers. Programming systems and value-added software solutions enable the customers to:

- Streamline programming - with their production processes
- Meet their specific quality requirements
- Ensure that the devices are programmed at maximum speed and with the highest quality

Data I/O creates best-in-class production solutions including:

**PSV7000** Automated high-speed automated handler: www.dataio.com/PSV7000

**RoadRunner3** Inline automated just-in-time programmer: http://www.dataio.com/Solutions/RoadRunner-Family

**FlashPAK III** Manual programmer: http://www.dataio.com/Solutions/FlashPAK-Family
4.5 **Dataman**

With over 30 years of experience, Dataman is a world-leading provider of device programmers.

Dataman designs and sells products that stand out from the crowd and continue to provide market-leading solutions. Dataman offers a comprehensive range of programming solutions suitable for every requirement from design and development to large-scale production.

Dataman currently supports over 80,000 devices (Nov. 2013), with updates every 3-4 weeks adding 200-300 new chips. Support can be added for missing devices quickly and typically free of charge. Their universal programmers come as standard with a 3-year warranty, free life-time technical support, and software updates.

Company webpage: [https://www.dataman.com/](https://www.dataman.com/)

4.6 **EE Tools, Inc.**

In 1992, EE Tools, Inc. started manufacturing a line of low-cost device programmers with an emphasis on MOS programming. EE Tools later developed a series of bipolar memory and logic programmers to complement the earlier products, and have since then grown to become one of the most well-known universal device programmer manufacturers worldwide. From their headquarter in San Jose, through a network of distributors around the globe, they are able to stay on top of the expanding device programmer market and provide customers with the best performance products and support. All products are backed with full technical support and free software updates for the product’s lifetime.

Stand-alone and Production Programmer: **MultiMax-8G+**

PC-driven Production Programmer via USB Interface: **ProMax-4G**

PC-driven Development Programmer via USB Interface: **TopMax2, ChipMax2**

EPROM Eraser: **Model 10, Chip-20**

EPROM Emulator via USB Interface: **EEROM-8U**

For more information, please visit the company's website at [http://www.eetools.com/](http://www.eetools.com/)

4.7 **Elnec**

Elnec is a leading provider of solutions for programming memories, microcontrollers, and other programmable devices in Europe. Elnec is committed to set a new standard in the industry by providing universal, highly reliable, and cost-effective programming solutions for devices in any package, whether programmed in a socket or through ISP on a circuit board. Elnec offers programming adapters; more than 800 models of universal, specialized, and BGA adapters.

Their product range includes support for Microchip AVR 8-bit, AVR 32-bit, ARM-based, and 8051 microcontroller: **Production programmers** with multi-site concurrent programming for high-volume manufacturers, and **Universal programmers** with single-site programming for developers and low-volume manufacturers.


4.8 Elprotronic Inc.

Elprotronic Inc. is an engineering company dedicated to supplying its customers with innovative and reliable hardware and software solutions, especially production programming tools. Elprotronic offers FlashPro and GangPro (6x) programmers available in three adapters: USB-FPA-6.1, XStream-Iso, and XStreamPro-Iso. With programming speed ranging from ~65KB/s for the USB-FPA-6.1, to 1 MB/s in the XStream adapters, all adapters are supported with a GUI and DLL or shared library API. All adapters are Windows® compatible, but additionally the XStream adapters are Debian® and Raspbian® Linux® compatible as well. The XStream-Iso adapter provides galvanic isolation and real-time current measurement down to 20 µA, whereas the XStreamPro-Iso adapter is more sensitive with measurement down to 50 nA (Deep Sleep mode currents). All Eprotronic adapters are USB compatible, whereas the XStreamPro-Iso also has Ethernet (and Power over Ethernet) support and Stand-Alone mode.


4.9 Equinox Technologies

Equinox Technologies offers a comprehensive range of development, field-service, and production programming tools, which support In-System Programming (ISP) of Microchip AVR and ARM microcontrollers. The EPSILON5-MK4 and FS2009USB portable programmers operate in Stand-Alone mode and are therefore ideally suited to low-throughput production programming and field-service applications. The ISPnano - Series 3/Series 4 GANG and MUX families of ISP programmers offer scalable, high-speed production programming solutions from 1 to 32 channels (Gang mode) and 2-256 channels (Multiplexed mode). All programmers offer comprehensive ESD and overvoltage protection.


4.10 HI-LO Systems

HI-LO has been devoted to providing device programmers and programming/testing solutions, with reliable quality at a reasonable price for over 30 years. Their product range covers engineering, production programmers, automated device programming systems, and 3D lead/marking inspection systems. HI-LO is one of the market leaders regarding to Device Programming Equipment and Programming services in Pan Asia. (Hong Kong, Taiwan, China, Japan, etc.)

4.11 **Leap Electronic Co., Ltd.**

Leap Electronic is deeply involved in the field of IC testing and programming equipment, supplying many series of products such as programmers, automation systems, and logic analyzers. The range of programmers varies from universal to gang programmers, all of which can support both AVR and ARM. Moreover, Leap Electronic also has the capability of providing programming services. Four branches are established in China, in order to provide customers well-organized and professional services. Email: overseas1@leap.com.tw.

- **Leaper-56** (Single-site programmers): https://sites.google.com/site/leapleaptronixen/programmer_series/LEAPER-56
- **AH-160** (Gang programmer series): https://sites.google.com/site/leapleaptronixen/automated_system/ah-160
- **AH-480** (Gang programmer series): https://sites.google.com/site/leapleaptronixen/automated_system/ah-480

4.12 **MikroElektronika**

mikroProg™ for AVR is a fast USB programmer supporting numerous AVR microcontrollers. It is supported with mikroC™, mikroBasic™, and mikroPascal™ compilers for AVR, but may also be used as a stand-alone programming tool. Outstanding performance, easy operation, and low price are its top features. Elegant minimalistic design, clean matte white plastic finish, and color indicator LEDs make mikroProg for AVR the first of its kind.

mikroProg for AVR webpage: http://www.mikroe.com/mikroprog/avr/
mikroElektronika AVR compilers: https://www.mikroe.com/compilers/compilers-avr

4.13 **Opteeq Technologies Ltd.**

Opteeq S-Series is an ultra-fast, industrial grade, In-System Programmer. It universally supports different types of programming interfaces and silicon architectures. Thanks to its compact size and software library, **S-Series** can be easily integrated into other production equipment, e.g., functional or circuit testing machines, testing fixtures, etc. Additionally, **S-Series** can also be used as a desktop programmer. To satisfy various output volumes, **S-Series** offers models with one, four, or eight physical programming channels. Its capability to work stable and the protection of target circuit make the S-Series an excellent choice for mass production of automotive, industrial, and consumer electronics.


4.14 **Phyton, Inc.**

Phyton ChipProg line of device programmers for both development and production include single-site, gang parallel, and In-System Programmers. They provide extremely fast Flash programming for Microchip SAM D20, SAM3, SAM4, AVR, C51, and AT89LP microcontrollers, memory devices, and PLDs. Multiple Phyton programmers can be controlled from one computer for concurrent programming, from a friendly GUI, remotely from ATE via DLL, or in Command Line mode. The ChipProg software
features script language and other tools for programming automation, allowing the writing of serial numbers and signatures into the chips. Adapters are available (BGA, QFN, QFP, TSOP, SOIC, PLCC, etc.).

**ChipProg-ISP** webpage: [http://phyton.com/categories/product/chipprog-isp](http://phyton.com/categories/product/chipprog-isp)

**ChipProg-G41** webpage: [http://phyton.com/categories/product/chipprog-g41](http://phyton.com/categories/product/chipprog-g41)

**ChipProg-481** webpage: [http://phyton.com/categories/product/chipprog-481](http://phyton.com/categories/product/chipprog-481)

**Device Finder** webpage: [http://phyton.com/device-search](http://phyton.com/device-search)

### 4.15 Ronetix

Ronetix is an Austrian manufacturer of high-quality software tool kits, debug probes, and programmers for wide-range CPUs and cores. Ronetix’s JTAG Flash programmer **PEEDI** is a production and development solution for high-speed programming on-board and on-chip Flash devices on all ARM and AVR based MCUs.

- Programming of over 1000 NOR Flash chips, NAND Flash, OneNAND Flash
- Programming of Data Flash, SPI Flash devices
- Programming of a JFFS2 image to a NAND Flash
- Working in Stand-Alone mode in the production line (with an MMC/SD card)
- Multicore programming; upgrade to **PEEDI** JTAG Emulator

For more information, see: [http://www.ronetix.at/flash-programmer.html](http://www.ronetix.at/flash-programmer.html)

### 4.16 RPM Systems

**RPM Systems Corporation** with **MPQ** Four-port In-Circuit Gang Programmers provide programming support with:

- One image on up to four devices in parallel
- Up to 16 MPQs can be interconnected to provide programming of up to 64 devices in parallel
- Up to four separate program images can be stored on the programmer, allowing optional stand-alone operation, and making programming fast and efficient
- Stand-alone, ATE-controlled, or PC-controlled operation
- Device Serialization feature allows automatic serialization of programmed devices
- Secure Image Management feature provides code security and allows restrictions on the number of parts programmed from each image
- Support for Microchip AVR, AVR32, and ARM devices
- Support for SPI, PDI, TPI, JTAG, and SWD Microchip programming interfaces


### 4.17 SMH Technologies

SMH Technologies is a global, independent, high-tech company leader in Silicon Device In-System Programming and related services for the electronic boards manufacturing industry. **FlashRunner** series, the company’s professional Silicon Device In-System Programming platform, is the result of the decennial experience in micro-code encoding for 8-, 16-, and 32-bit processors. **FlashRunner** helps customers enhance quality, save time, and optimize manufacturing cycles. SMH continuously improve their offer by
releasing new programming algorithms weekly. Thanks to FlashRunner flexible and modular design, the same algorithms are to be used on all of the models.

**FlashRunner I series**: A range of high-performance In-System Programmers for Flash-based microcontrollers and serial memories. Targets production environments and works in full Stand-Alone mode or controlled by a host system.

**FlashRunner Quattro** is a high-integration In-System Gang Programmer based on the FlashRunner technology, designed for programming multi-PCB panel assemblies.

**FlashRunner FRPXIA3** is a PXI module for Gang In-System Programming. First in the world programming solution for PXI system, it has full hardware and software ATE integration and multtarget parallel programming channels.

### 4.18 Softlog Systems

Softlog Systems specializes in In-Circuit Serial Programming™ for Microchip microcontrollers. The ICP product line comprises several high-speed, production-grade in-circuit programmers, each of which offers a set of robust features and flexible options that can be adapted to each customer’s specific production requirements.

The following products have support for AVR and SAM devices:

1. ICP2(G3)
2. ICP2GANG(G3)
3. ICP2COMBO(G3)
4. ICP2PORT(G3)

Softlog products are available for sale through microchipDIRECT: [https://www.microchiredirect.com/](https://www.microchiredirect.com/)


### 4.19 System General

In response to increasing customer demands for programming IC devices, System General provides total solutions in terms of manual and automated equipment primarily used for mass production. Currently, System General supports more than 22,000 ICs from major IC manufacturers, including the Microchip AVR and ARM-based families. The supported IC list can be found in one of the links below. As for automated solutions, the **AP710** is intended for handling small and fragile CSP packages and serves as the universal programming platform, while the **AP720** is optimized for high-volume production, carrying four nozzles and is able to run with four programmers simultaneously. In addition, programming solutions support eMMC/NAND/NOR/MCU and CPLD devices and software updates are free of charge throughout the product life of the programming equipment.


### 4.20 Xeltec Inc.

Xeltek Inc. offers professional high-speed programming solutions for in-system production programming of AVR microcontrollers. **SuperPro IS01** is intended for small to medium-scale production. **SuperPro**
IS03 and SuperPro XPS01 are for large-scale production and multiple SuperPro IS03 units can be set up to program multiple microcontrollers in parallel, to save production time. All programming tools are controlled through the SuperPro software, and some can also be controlled by command line and LabVIEW. The SuperPro software has multilingual support including English, Chinese, German, French, and other languages.

SuperPro IS01 webpage: http://www.xeltek.com/isp-programmers/in-system-programmers-superpro-is01/

SuperPro IS03 webpage: http://www.xeltek.com/isp-programmers/superpro-is03-in-system-isp-programmer/

SuperPro XPS01 webpage: http://www.xeltek.com/isp-programmers/superpro-xps01-isp-production-workstation/

SuperPro software webpage: http://www.xeltek.com/SuperPro-Software-Download-Center/
5. Programming Houses

Programming services are also available from distributors. Contact your distributor for more information about programming services.

Table 5-1. Other Programming Houses in Alphabetic Order (not limited to)

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Products Supported</th>
<th>Other Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>A&amp;J Programming</td>
<td>AVR®, ARM®</td>
<td>Ink and laser marking, coplanarity check and inspection, dry pack.</td>
</tr>
<tr>
<td>USA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.ajprogram.com/">http://www.ajprogram.com/</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Falcon Denshi K.K.</td>
<td>SAM3, SAM4, SAMA5, SAM9</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.falcon-denshi.co.jp/en">http://www.falcon-denshi.co.jp/en</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HI-LO Electronics AB</td>
<td>AVR®, ARM®</td>
<td>Laser and ink marking. Repacking according to the customer’s needs.</td>
</tr>
<tr>
<td>Sweden</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.hilo.nu">www.hilo.nu</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HI-LO Systems Research Co., Ltd.</td>
<td>AVR®, ARM®</td>
<td>Programming of NAND, NOR Flash, etc.</td>
</tr>
<tr>
<td>Taipei, Taiwan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minato Holdings, Inc.</td>
<td>SAM3, SAM4</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.minato.co.jp/en">http://www.minato.co.jp/en</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prochild International, Incorporated</td>
<td>AVR®, ARM®</td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.prochild.com">http://www.prochild.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program Automation Inc.</td>
<td>AVR®, ARM®</td>
<td>Programming of memories and FPGA.</td>
</tr>
<tr>
<td>USA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.progauto.com/">http://www.progauto.com/</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xeltek Co., Ltd.</td>
<td>AT89C51, AVR, SAM7, SAM3, SAM4, SAM D20</td>
<td>Programming of PLD, GAL.</td>
</tr>
<tr>
<td>China</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.xeltek.com.cn/">http://www.xeltek.com.cn/</a></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. How to Register as a Third-Party Design Partner

Microchip's Worldwide Design Partner network provides a channel between our authorized Design Partners and customers in need of technical expertise and cost-effective solutions in a timely manner. If you are interested in joining, e.g. registering programming tools for Microchip microcontroller products, send us an email: designpartners@microchip.com. See also our Design Partner Program webpage for more information.

For additional tool recommendations, please see the recommended third party tools list on Microchip's website.
## Revision History

<table>
<thead>
<tr>
<th>Doc. Rev.</th>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
</table>
| D         | 10/2018 | 1. Table 3-1, updated Third-Party vendors of programming tools:  
1.1. Updated Elprotronic and BPM Microsystems information.  
1.3. Added website link for System General Corporation.  
2. Section 4.3 BPM Microsystems, added description.  
3. Section 4.5 Dataman, added company webpage link.  
4. Section 4.6 EE Tools, Inc., added company webpage link.  
5. Added section 4.8 Elprotronic Inc. and adjusted subsequent section numbers.  
6. Section 4.9, fixed company name.  
7. Section 4.11, added trademarks.  
8. Section 4.12, fixed company name.  
9. Table 5-1, added trademarks and fixed company name capitalization.  
10. Section 6, added link to recommended Third-Party tools list on Microchip's website.  
11. Other minor editorial changes. |
| C         | 03/2017 | Updated with Softlog information.  
1. Updated Table 3-1 Third-Party Vendors of Programming Tools in Alphabetic Order.  
| B         | 12/2017 | 1. In Chapter 1, link for Atmel-ICE for AVR® is added.  
2. Some minor editorial updates. |
| A         | 06/2017 | 1. Converted to Microchip format and replaced the Atmel document number 42215.  
2. Opteeq added.  
3. New documentation template. |
| 42215D    | 10/2016 | A complete update with several changes in the application note. |
### Revision History

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>42215C</td>
<td>01/2015</td>
<td>SMH details added.</td>
</tr>
<tr>
<td>42215B</td>
<td>01/2014</td>
<td>EE Tools, Dataman, and Segger added.</td>
</tr>
</tbody>
</table>
The Microchip Web Site

Microchip provides online support via our web site at http://www.microchip.com/. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user’s guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQ), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

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Microchip’s customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.


Customer Support

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or Field Application Engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: http://www.microchip.com/support

Microchip Devices Code Protection Feature

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- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip’s Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
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