

USB Programming (with Bootloader) PICado Mega

Programming over USB direct from: AtmelStudio Arduino IDE



PICado Mega

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1. Installation

1.1. Arduino IDE

Download the current Arduino IDE from the Official Arduino website. https://www.arduino.cc/en/Main/Software

When the download finishes, proceed with the installation and please allow the driver installation process when you get a warning from the operating system.



Choose the components to install

| 🥯 Arduino Setup: Installation Folder | — | | × |
|--|----------------------------|---------------------------------|---|
| Setup will install Arduino in the following folder. T folder, click Browse and select another folder. Cl installation. | īo install i ick Instal | n a different I to start the | : |
| Destination Folder | | | |
| C:\Program Files (x86)\Arduino\ | | Browse | |
| | | | |
| | | | |
| | | | |
| Space required: 392.7MB | | | |
| Space available: 24.6GB | | | |
| Cancel Nullsoft Install System v2.46 | < <u>B</u> ack | <u>I</u> nsta | |
| | | | |



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| Choose the installation directory (we suggest to | keep the | e default | one) |
|--|----------------|-----------|----------|
| 💿 Arduino Setup: Installing | — | | \times |
| Extract: c++.exe | | | _ |
| Show details | | | |
| | | | |
| | | | |
| | | | |
| Cancel Nullsoft Install System v2,46 | < <u>B</u> ack | ⊆los | ie - |

The process will extract and install all the required files to execute properly the Arduino Software (IDE)

1.2. PICado / Arduino IDE modification

Copy all files from the *PICado Modification* folder to the Arduino IDE installation directory. Confirm the replacement of the existing files with OK.

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1.3. AtmelStudio

Download the current AtmelStudio from the Official Microchip website. http://www.microchip.com/development-tools/atmel-studio-7

For installation instructions, please use the official user guide of the AtmelStudio. <u>http://ww1.microchip.com/downloads/en/DeviceDoc/Atmel-42167-Atmel-</u>

Studio_User%20Guide.pdf

1.4. Arduino for AtmelStudio (Plugin)



Navigate to >Available Downloads and install Arduino IDE for AtmelStudio 7.



An AtmelStudio account is required for the installation!



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2. Bootloader

Program the bootloader (* .hex file) using the programmer of your choice. Here as an example with the Atmel JTAG ICE.

Open the Atmel Studio and click *>Tools >Device Programming >Memories*. Select the * .hex file of the bootloader for the flash memory. Then press *Program*.

| Fool | Device | | Interface | Device signature | | Target Voltage | | |
|--|-------------------|--|---|------------------|------|----------------|--------|-----------|
| Atmel-ICE 🔹 | ATmega2560 | • | ISP | 0x1E9801 | Read | 4.9 V Read | | |
| Interface settin Tool informati Device informa | gs on ation | Device Erase C Flash (2 | Chip |] | | | | |
| Oscillator calib | ration | PICado_Mega_Bootloader.hex 🔹 🛄 | | | | | | |
| Memories | | Erase | e device before progra | imming | | Program | Verify | Read |
| Fuses Lock bits Production file | | Adv EEPRON Verif Verif Adv | у неян олсе рюдний м (4 КВ) fy EEPROM after progr vanced | amming | | 2. Program | Verify | • Read |
| Reading device I | DOK device IDO | K | | | | | | |
| | | | | | | | | |



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3. Fuses- / Lock-Bits

After the Bootloader programming set the fuses and lock bits as follow.

Fuse Register:

- EXTENDED = 0xFD
- HIGH = 0xD8
- LOW = 0xFF

Lock Bit Register:

| Tool Device Atmel-ICE ATmega | 2560 • ISF | erface • • Appl | Device signature 0x1E9801 | Read | Target Voltage 4.9 V Read | | |
|---|--|--|------------------------------|-----------------------|------------------------------|----------------|--------------|
| Interface settings Tool information Device information Oscillator calibration | Fuse N Fuse N | Jame D.BODLEVEL (DEN [GEN [N] | Brown-out detection a | Value at VCC=2.7 \ | • | | |
| Memories Fuses | V HIGH.WDTON | | 3 | | | | |
| Production file | Fuse Register EXTENDED HIGH LOW | Value 0xFD 0xD8 0xFF | Boot Flash size=4096 | words start | address=\$1F000 | • | |
| | ✓ Auto read ✓ Verify after | r programming | | | Program | Copy Verify | to clipboard |
| arting operation read reg ading register EXTENDEE ading register HIGHOK ading register LOWOK ad registersOK | isters DOK | | | | | | |

| Tool | Device | | Interface | 2 | Device signature | | Target Vo | ltage | |
|---|--------------------------------------|-------------------------|------------|---------------|----------------------|-------------|-----------|-------|-------------------|
| Atmel-ICE • | ATmega25 | •60 • | ISP | Apply | 0x1E9801 | Read | 4.9 V | Read | \$ |
| Interface setti | ings | Lock | Bit | | Value | | | | |
| Tool informa | tion | V LOCK | BIT.LB | No memor | ry lock features ena | bled 🔻 | | | |
| Device information Oscillator calibration | | COCKBIT.BLB0 No lock on | | | SPM and LPM in | Application | Section • | l l | |
| | | C LOCK | BIT.BLB1 | I PM and S | PM prohibited in F | oot Section | • | | |
| Memories | | | | | in promotion of | | | | |
| uses | | | | | | | | | |
| ock hits | | | | | | | | | |
| | | | | | | | | | |
| roduction fi | le | | | | | | | | |
| | | Lock Bit R | egister | Value | | | | | |
| | | LOCKBIT | | 0xCF | | | | | |
| | | | | | | | | | Copy to clipboard |
| | | Auto r | ead | 220 | | | Dura | | Viet. Devid |
| | | Verify | after pro | gramming | | | Progr | am | verity |
| | | To clear le | ockbits, u | se Erase Chip | on the Memories | bage. | | | |
| irting operati ading registe ad registers | ion read regist r LOCKBITC .OK | ters IK | | | | | | | |
| Read reg | gistersOK | | | | | | | | |
| _ | | | | | | | | | |



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4. USB Programming

4.1. Arduino IDE

To program from the Arduino IDE, connect the PICado Mega Board to the PC via USB. Start the Arduino IDE and navigate to *>Tools*, select *PICado Mega* and the port you are using.

| sketch_aug18: | Auto Format Archive Sketch Fix Encoding & Reload | Ctrl+T | | Q • |
|---|--|------------------------------|---|--------------|
| roid setup() // put your | Serial Monitor Serial Plotter | Ctrl+Shift+M Ctrl+Shift+L | | |
| | WiFi101 Firmware Updater | | | |
| <pre>void loop() { // put your </pre> | Board: "PICado Mega" | 1 | | |
| // [| Port: "COM7" | | | Serial ports |
| | Programmer: "USBtinyISP" Burn Bootloader | 5 I | • | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

In the next step, open a project and then press the Upload button.

| File Edit Sketch Tools Help Upload Blink § modified 18 Aug 2017 by Jan Ritschard */ // the setup function runs once when you void setup() { // initialize digital pin LED_BULTIN playted LED_BULTIN_OUTPUT. | ou pre | 33 re | set or pov | | * |
|--|--------|-------|-------------|---------|----|
| <pre>Def Def Def Def Def Def Def Def Def Def</pre> | ou pre | 33 Te | eset or pow | | |
| Blink § modified 18 Aug 2017 by Jan Ritschard */ // the setup function runs once when yr void setup() { // initialize digital pin LED_BUILTIN pinWod LED_BUILTIN_OUTPUT- | ou pre | ss re | eset or pow | | * |
| <pre>modified 18 Aug 2017 by Jan Ritschard */ // the setup function runs once when y void setup() { // initialize digital pin LED_BULTIN pinWod LED_BULTIN outputs.</pre> | ou pre | 33 Te | eset or pow | | * |
| <pre>// the setup function runs once when yy void setup() { // initialize digital pin LED_BUILTIN pinWed(LED_BUILTIN OUTBUTN </pre> | ou pre | ss re | set or pow | | |
| } | N as a | n out | put. | ver the | 1 |
| <pre>// the loop function runs over and ove: void loop() {</pre> | r agai | n for | ever | | |
| digitalWrite(LED_BUILTIN, HIGH); /. | / turn | the | LED on (H) | GH is | t |
| delay(1000); // | / wait | for | a second | | |
| <pre>digitalWrite(LED_BUILTIN, LOW); /,</pre> | / turn | the | LED off by | / makir | īČ |
| delay(1000); /. | / wait | for | a second | | |
| } | | | | | - |
| * | | | | • | |



```
Users Guide
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PICado Mega

4.2. Atmel Studio with Arduino Plug-in

To program in Atmel Studio, first navigate to >File >New >Arduino Project.



Then enter a name for your project.



Write a program which you want to download.

To download select "PICado Mega" and the port you are using and then press the *Build and Upload* button.



*It is recommended to switch from *Debug* to *Release* in the *Solution Configurations*.



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4.3. Atmel Studio with Script

In order to program the Plcado Mega without an Arduino project, a script must be used. This offers the advantage that normal AtmelStudio projects can be used and it is programmed in ANSI-C.

To set up the script, navigate to> Tools> External Tools. Enter the following commands:

"-C "D:\Program Files (x86)\Arduino\hardware\tools\avr\etc\avrdude.conf" -patmega2560 - cwiring -P\\.\COM7 -b115200 -D -Uflash:w:"\$(ProjectDir)Debug\\$(TargetName).hex":I

Select "Use Output window"

Set the COM port in Arguments used at you PC! Edit file directory to your Arduino IDE installation directory!

| PICado Mega Progra | mming | Add |
|--------------------|------------------------------|----------------------|
| | | Delete |
| | | Move Up |
| | | Move Down |
| litle: | PICado Mega Programming | |
| Command: | D:\Program Files (x86)\Ardui | no\hardware\tools\ |
| Arguments: | -C "D:\Program Files (x86)\A | rduino\hardware\to 🕨 |
| initial directory: | 1 | |
| Use Output windo | w 🕅 Prompt for | arguments |
| Treat output as Un | icode 🗸 Close on ex | it |

Compile the current project with the F7 key.

To download a program, navigate to >Tools> PICado Mega Programming.