
AVR UPDI Hardware Manual

The AVRISP UPDI Programmer has 3 programming interfaces

- ISP
- JTAG
- UPDI

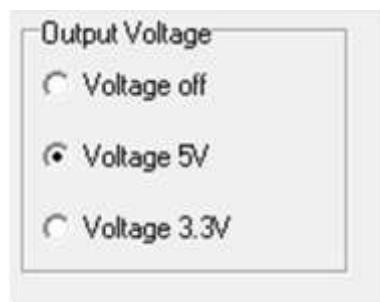
This manual describes the hardware requirements of each interface. Additionally, common features like power, firmware update, USB are described.

Use **SETUP button** on top right of screen to access these features.

Power

The programmer can supply power to the target in all interfaces at 3.3V or 5V or it can be off. Default is OFF.

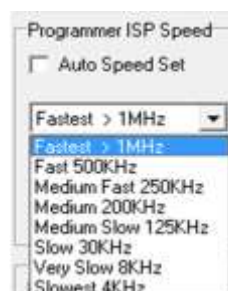
Change Power Setting – click Setup button (on top right) and select power option:



Maximum current output is 150mA. Exceeding this will cause programmer to trip and give errors.

Programming Speed.

ISP. Maximum ISP clock is set by target clock speed. New AVR devices are factory set to 1MHz Internal RC (or 8MHz RC with Clock/8 fuse set), so max. ISP clock is 250KHz. There is a Detect Fastest Speed Option in Setup screen that will select best ISP clock setting.

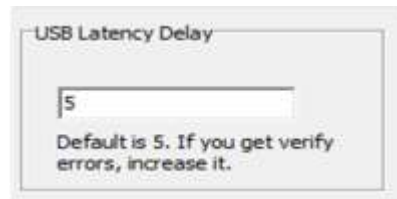


JTAG. JTAG programmer speed is independent of target clock and always uses fixed clock speed.

UPDI. UPDI Clock is mostly target voltage dependent. 500KHz is the default and most devices will work at 1MHz at 5V but not 3.3V. 200KHz and 100KHz can be selected if it will not connect due to lower voltage.

USB Latency

This is the time that USB waits for a full buffer before sending data. Default is 5. Increase it if you get verify errors. Decreasing it may improve read speed but may cause verify errors.



ISP and JTAG Setup Screen

This is described in full in Help File, select Help -> Help Topics or press F1 key.

Firmware Update.

If the programmer needs a firmware update, a message box will inform you that a firmware update is required. If this message appears, click OK and Firmware Updater will run.

Firmware update will only be necessary if there is a new firmware version and should not normally just be done on its own. Firmware Update is in Help menu.

TARGET Connection -ISP

1) Connect the programmer to the target system using the short ribbon cable.

- Target Layout – not end of lead view
- Header is 0.1" (2.54mm) box header in 5 x 2 format, with polarising notch - 10-way IDC header
- See section below for *6 Way, 1.27mm or 2.0mm adapters*
- GND* These pins must be connected to target ground
- GND One or both must be connected to Target ground

TARGET CONNECTOR FOR AVR PROGRAMMERS

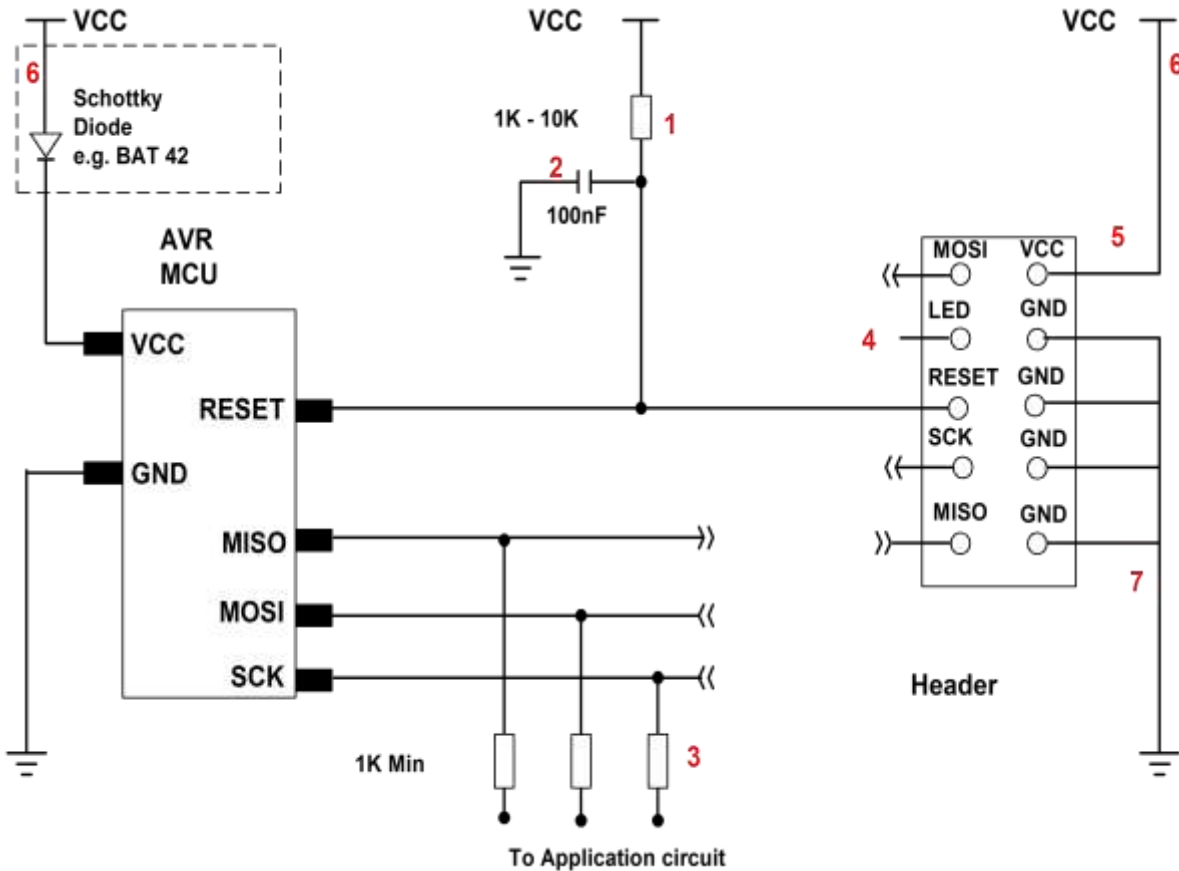


TOP VIEW OF THE CONNECTOR ON THE TARGET SYSTEM

0.1" PITCH 2*5 BOXHEADER WITH POLARISING NOTCH

Recommended ISP Circuit

This diagram shows a typical ISP circuit that will work with the Handheld Programmer. Please read the notes for more detail.



- 1) This resistor should be fitted. It can be larger than 10K if required, but not smaller than 1K
- 2) Again 100nF is a typical value. We suggest a minimum of 10nF.
- 3) Programming lines should be isolated from application circuit with series resistors, especially if application circuits force the state of the AVR pins. In exceptional cases, a multiplexer may be needed to isolate these lines. Capacitors on these lines may mean that a slower programming speed should be selected. AVR's that use RX/TX pins for programming eg ATmega128 need at least a 1K resistor for RX line if UART is used.
- 4) Optional LED line. This can be connected to an indicator LED if desired, or used to drive a multiplexer. It is LOW during programming
- 5) If Vcc is not connected to header, see **Power Options** section for programmer setup.
- 6) If the programmer is powering the target, it is current limited to 150mA. If the rest of your circuit draws too much current, then fit this diode, and connect VCC to header and AVR through it.

7) GND pins. We recommend that all GND pins are connected. If not, then either pin 4 or pin 10 MUST be connected – these are programmer Ground. Pin 6 is connected to programmer battery but can be omitted.

Note: The 10-way lead is not wired Pin 1 to Pin 1, so the connector on the programmer shown below is NOT the end of the 10-way lead.

10-way Connector on Programmer

HAND HELD PROGRAMMER
CONNECTOR (AVR)



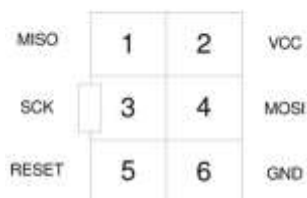
TOP VIEW OF THE CONNECTOR ON
THE PROGRAMMER

0.1" PITCH 2*5 BOXHEADER
WITH POLARISING NOTCH

SIX WAY ADAPTER

Because of the need to connect more than 1 GND pin on the programmer, the adapter should connect GND pins together. So, the adapter is not as straight forward as it first appears. Supplied with programmer for ISP and UPDI programming.

TARGET CONNECTOR FOR AVR
PROGRAMMERS (ATMEL 6WAY)



TOP VIEW OF THE CONNECTOR ON
THE TARGET SYSTEM

0.1" PITCH 2*3 BOXHEADER
WITH POLARISING NOTCH

JTAG Programming

Everything is the same for JTAG programming except the programmer needs a JTAG adapter. These are included with the programmer.

Order Code: AVRUSB-JTAG

<https://www.kanda.com/products/Kanda/AVRUSB-JTAG.html>



If you want to make your own JTAG adapter, the pin outs on the programmer are shown below

Note: These are NOT the same as the end of the 10-way lead, which is not wired pin 1 to pin 1. We recommend that you make up your own lead and use the 10-way connector on the programmer.

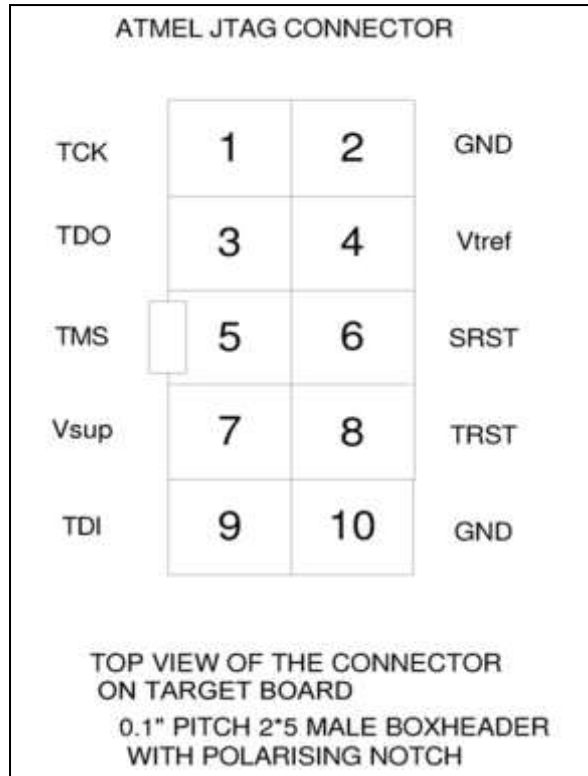
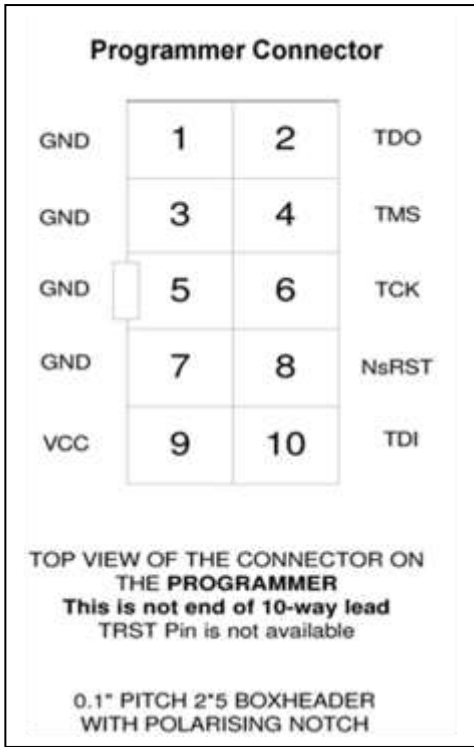
All the GND pins on this connector must be wired to ground.

The first column is an Atmel JTAG layout usually used on target PCBs.

Atmel JTAG Header	AVR Programmer
1: TCK	6 : TCK
2: GND	1,3,5,7: GND
3 TDO	2: TD0
4: Vtref	9: VCC
5: TMS	4: TMS
6:SRST	8 : NsRST
7: Vsup	9: VCC
8: TRST	N/C
9: TDI	10: TDI
10: GND	1,3,5,7 : GND

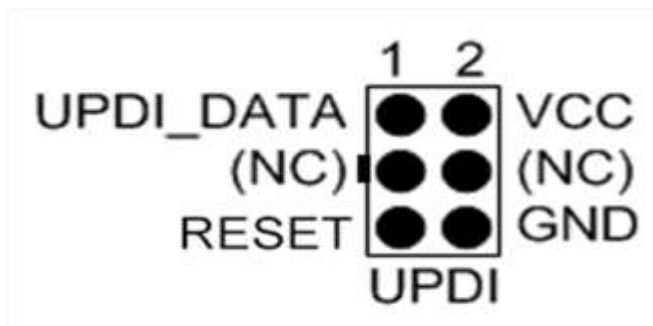
- 1) TRST is not available
- 2) VCC pin 9 on programmer needs connecting to both Pin 4 AND Pin 7 on target end (Vtref and Vsup)
- 3) All 4 GND pins on programmer must be connected to either Pin 2 or Pin 10 or both, depending on which are connected to Ground on your target.
- 4) Misconnection (to JTAG without adapter or ISP with adapter) will NOT damage programmer, you will get solid red over-current LED. It may damage your target.

JTAGEN fuse must be set on target device or JTAG programming will fail - 2 red flashes.



AVR UPDI Programming

Microchip recommend the following layout for ISP header on your target circuit. Only 3 wires need connecting (UPD_DATA, VCC and GND) but Kanda have added RESET to 6-way UPDI adapter to allow latest AVRxxDD/EA devices to have 12V UPDI restore applied to Reset pin – see 12V pulse below. Reset pin 5 matches AVR ISP 6-way pin-out.



Connect the 10DIL6 adapter to the end of the 10-way lead for UPDI. If your target has a different pin-out, then 10FLEX6 flying lead adapter can be purchased instead.

Microchip recommend that no other circuitry is connected to UPDI_DATA especially if 12V pulse is applied.

Locked UPDI Devices

If a UPDI device has its security lockbits set, trying to connect will give Device is Locked message.

Use **Erase** to erase device and clear lockbits. Erase does not clear Fuses.

Enabling UPDI Interface

AVR UPDI devices have evolved over time and there are now 3 types with different UPDI interfaces.

- **ATtiny** : UPDI pin is also Reset or GPIO. Pin behaviour is set by Fuse RSTPINCFG[1:0]. A 12V pulse is needed on this pin to restore UPDI function. This is not 100% reliable!
- **ATmega** : Dedicated UPDI pin cannot be reconfigured so 12V entry is never needed. Reset is a separate pin that can be configured as GPIO by RSTPINCFG fuse.
- **AVRxxDA** and **AVRxxDB** : Dedicated UPDI pin cannot be reconfigured so 12V entry is never needed. Reset is a separate pin that can be configured as GPIO by RSTPINCFG[1:0] fuse
- **AVRxxDD** and **AVRxxEA** : UPDI pin can be reconfigured as GPIO by UPDIPINCFG fuse and RESET can be reconfigured as GPIO by RSTPINCFG fuse. If UPDI pin is set to GPIO, a 12V pulse is needed on RESET to re-enter UPDI.

12V Pulse

This programmer does not currently support 12V pulse but we will have a module available soon that can be retro-fitted to programmer. Contact support@kanda.com for details.

Available Adapters

The programmer comes with **10DIL6 adapter** for 6-way ISP and UPDI connection and **AVRJTAG-USB** for JTAG interface.

Kanda supply a range of other adapters from the standard 10-way programming lead for 6-way ISP, Micromatch, JTAG and connectors with 2mm pitch or 1.27mm (0.05") pitch.

These connectors and spare 10-way leads are available from Kanda website.

<https://www.kanda.com/Adapters--Connectors.188.html>

Some order Codes are:

10FLEX6



UPDI-12V



10MICR6



10ISP1-27



10JTAG2-0



10ISP2-0



10JTAG1-27



TROUBLESHOOTING

Windows driver problems

If you get a driver error or FTDIxx.DLL not found, make sure that you have run the installer software, then plugged in programmer and then run AVRUPDI software NOT the other way round.

The driver should appear as a "USB Serial Converter" in USB section of Device Manager. Windows should do this automatically. If it does not, please follow this procedure.

- Plugin Programmer and ideally unplug other USB devices
- Go to Control Panel
- Click on Device Manager button
- Open USB section and select "USB Serial Converter"
- Right click on it, and select Update Driver
- Driver location is (default install path)
C:\Program Files(x86)\Kanda\AVRUPDI\driver

Random Verify Failures on UPDI AVR Devices

This is caused by setting CLKSEL fuse to Internal 32.768KHz Oscillator in FUSE 02 : OSCCFG. The solution is to reprogram it to Internal HS Oscillator until programming is finished.

No More USB Devices Available

If the programmer display is empty and you get error message of "No more USB devices available", try

1. Click Reset a few times
2. Close and reopen software

3. Swap USB cable to a different port
4. Close other open software that uses USB

FURTHER INFORMATION

Please contact support@kanda.com for technical support or go to our website support pages for latest software.

<https://www.kanda.com/software>

Contact details

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