

Introduction

Thank you for buying our JTAGcable II emulator. We hope that the great power it offers will allow you to appreciate fully the virtues of debugging and programming in the system provided by Atmel microcontrollers.

JTAGcable II constitutes a tool for programming, real-time emulation in the target circuit and debugging of processors of the AVR family of Atmel microprocessors equipped with a JTAG interface. It is fully compatible with the original AVR JTAG ICE from Atmel. It forms, together with AVRStudio software, an up-to-date and professional environment for the start-up of programs written both in low-level (Assembler) and high-level (C) languages.

JTAG is a four-wire interface permitting takeover of control of the processor's core and its internal peripherals. The possibilities offered by this interface are, among others, stepped operation, operation at full speed, circuit and software traps, monitoring and modification of register contents and data memories. Moreover, functions offered by ISP programmers are available, such as: programming and read-out of Flash memories, EEPROM, fuse-and-lock bits.

JTAGcable II can co-operate with microcontrollers supplied with voltages from 1.8 to 6 V. Such a broad range of supply voltages was achieved through buffering of signals on the JTAG line, additionally enhancing the immunity of the circuit to interference. The set is provided with AVRStudio software from Atmel, working in the Windows system.

A detailed operating instruction of the emulator and of the AVRStudio program can be found at the website of Atmel: <http://www.atmel.com>

Let us wish you nothing but success and a lot of satisfaction in designing and putting new microprocessor devices to work.

Features

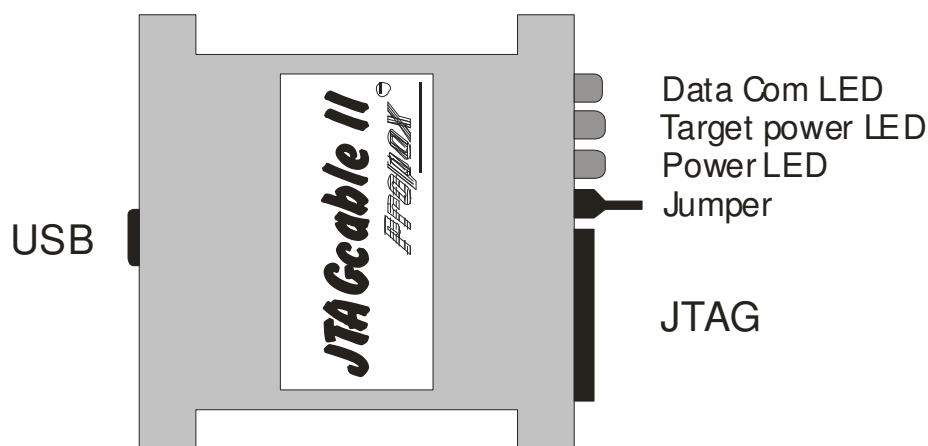
- Compatible with AVR JTAG ICE
- Co-operates with Atmel AVRStudio software
- Allows emulation and programming in AVR microprocessor systems equipped with a JTAG interface
- Allows debugging of a code written both in Assembler- and C-language
- Connected to the USB port
- Supports software up-dating from the AVRStudio level
- Operates with target voltages in the range of 1.8 – 6 V
- Buffering of the JTAG bus, allowing proper operation with systems powered from a broad range of supply voltages and enhancing immunity to external interference
- Standard 10-pin connector to the target circuit in the Atmel standard
- Operation of the emulator signalled by three built-in LED indicators
- No need for external power supply, power is taken from USB port
- The programmer can supply power to target circuit
- Small dimensions

Supported devices

Below is a list of devices supported by the emulator. As new devices appear, the list is going to be modified. The current list is always available in the AVRStudio program.

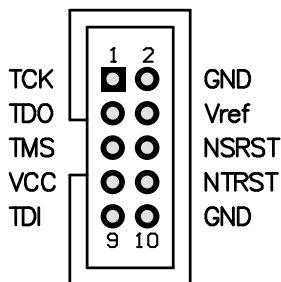
- ATmega128, ATmega128L, AT90CAN128
- ATmega64, ATmega64L
- ATmega32, ATmega32L
- ATmega323, ATmega323L
- ATmega16, ATmega16L
- ATmega162, ATmega162L, ATmega162V
- ATmega165, ATmega165V
- ATmega169, ATmega169L, ATmega169V

Description of the emulator



USB	- USB mini B connector for connection with the PC
Power LED	- Signalling the application of supply voltage to emulator
Target Power LED	- Signalling the application of supply voltage to the target device
Data Com LED	- Signalling communication with the target device
Jumper	- Jumper closed when supplying target from emulator
JTAG	- 10-pin JTAG connector to the target device

DESCRIPTION OF TERMINALS



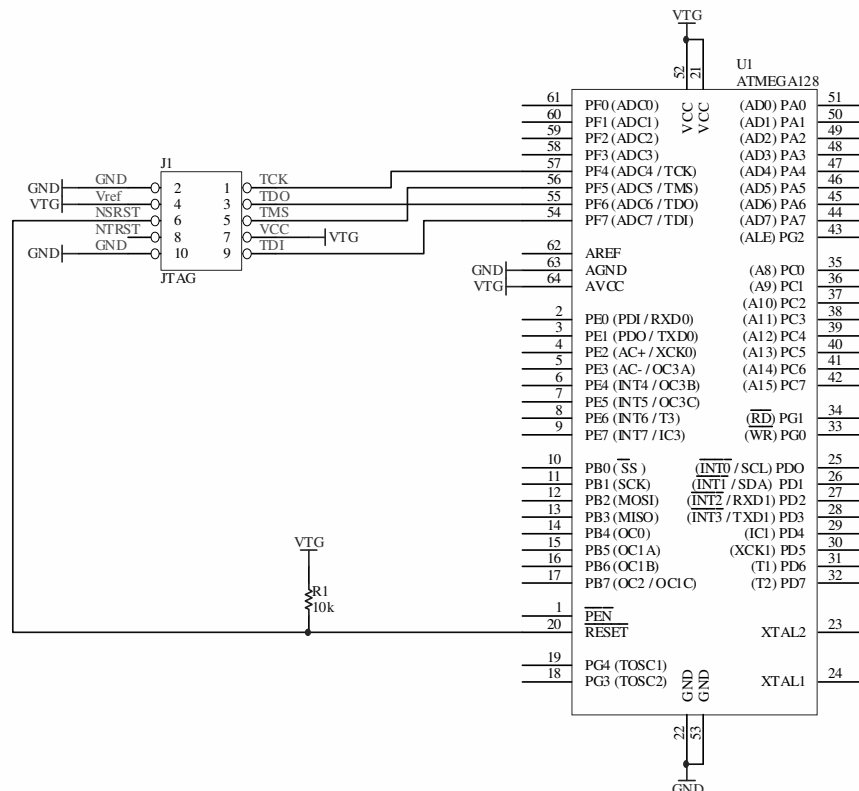
Emulator JTAG connector

TCK	Test Clock – clock signal for the target circuit
TDO	Test Data Output – data signal for the target circuit
TMS	Test Mode Select – switching signal for the target circuit
VCC	Power supply from target circuit
TDI	Test Data Input – data signal from the target circuit
Vref	Line signalling the presence of supply voltage in the target circuit
NSRST	Reset input/output of target circuit
NTRST	Not used
GND	Programmer ground

The JTAG connector is compatible with the 10-pin standard from Atmel.

Connection with the target circuit

The connection to the target circuit should be realized through the attached 10-lead ribbon cable, terminated with standard IDC plugs with 2.54 mm raster. In case of using another cable it should be kept in mind that it should not be longer than 30 cm (~12 inches). The target device should be equipped with a JTAG connector with lead-out identical to that of the emulator JTAG connector. We connect the JTAG bus lines with their corresponding JTAG bus lines of the microcontroller as shown in the figure below.



Connection with the ATmega128 microcontroller

It is necessary to make a suitable adapter, when connecting the JTAGcable II emulator to a target device having a JTAG connector in another standard.

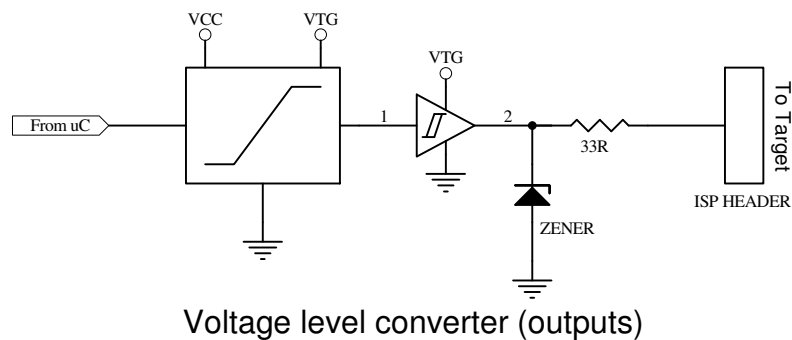
Level converter of JTAG signals

In order to assure proper operation of the emulator when the supply voltages of the target circuit differ from the emulator's supply voltage, level converters of JTAG signals come into use. The conversion circuits have been designed for operation with a target circuit supplied from a voltage between 1.8 and 6 V.

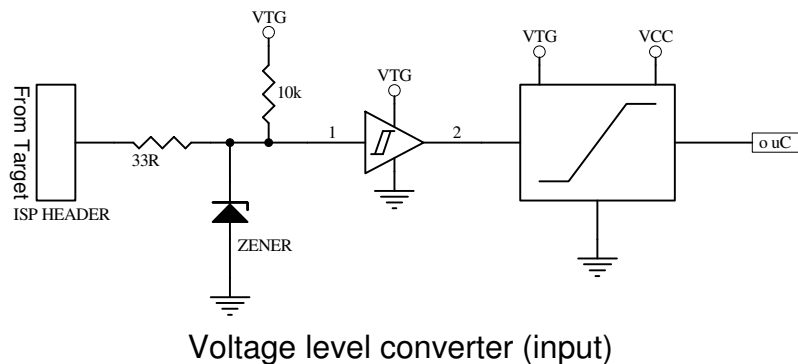
The JTAGcable II can be supplied from an external source or directly from the target circuit. In the last case, the supply voltage should have a value between 4.5 and 5.5 V.

Signals between the programmer and the target circuit can be divided into three groups: input signals (TDO), output (TCK, TMS, TDI) and input/output (NSRST). Besides regenerating JTAG bus

signals, the signal level converter buffers limit the input and output currents. Buffering has been applied on all signal lines of the emulator. The implementation of a signal level converter for output lines has been shown in the figure below.



The implementation of a signal level converter in the input line of the MISO programmer is shown below.



The implementation of a bi-directional level converter is a combination of solutions shown above.

Supplying the emulator

Emulator is powered from USB bus and do not need external power supply. Additionally, after closing jumper, power to the target circuit can be supplied. In this case you should remember that accordingly to the USB bus standard, supplied voltage can be between 4.3 and 5.25V. Current drawn by the target circuit shouldn't exceed 100mA.

Technical data

Dimensions	: 55 x 53 x 16 mm
Weight	: about 0.1 kg
Connection to the PC	: Serial port 9-pin SUB, female
Transmission speed	: max. 115200 bps
Programming cable	: length 30 cm
JTAG clock frequency	: max. 250 kHz
Target circuit supply voltage	: VTG 1.8 – 6.0 V
Power for the target circuit	: VTG 4.5 – 5.5 V I_s max. 50 mA
Supply current from USB	: I_s max. 50 mA

Contents of delivery package

- JTAGcable II emulator
- Cable terminated with IDC 10 plugs for connection of the emulator with the target circuit
- USB cable for connection of the emulator with a PC
- CD with documentation and software

Technical assistance

In order to obtain technical assistance, please contact support@propox.com

Please provide the following data:

- Clock frequency and type of processor in the PC
- Version of the operating system
- Processor type (complete number of the device) and oscillator's frequency
- Detailed description of the problem