



JTAG Isolator



Rev. 20240206084129

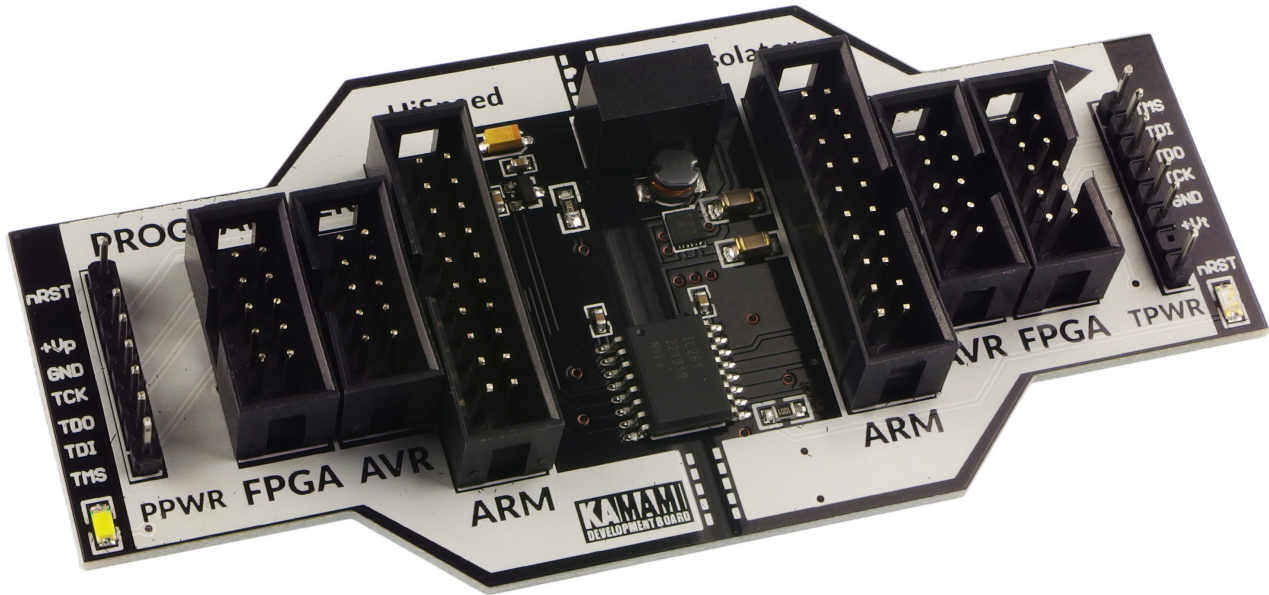
Źródło: https://wiki.kamamilabs.com/index.php/JTAG_Isolator

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Description

JTAG Isolator is a galvanic isolator of JTAG interface, which protects from electrical damage of device. Cause of damage can be differences in reference potentials in together connected devices (e.g. computer and development board) with JTAG interface.



Basic parameters

- Galvanic isolation of 5-lines JTAG interface
- Max frequency TCK: 110 MHz(*)
- Power supply from target device (3...5 V)
- Compatibility with all JTAG interfaces powered by voltage 3...5 V
- Logical levels on Programmer: TTL/TTL-LV
- Logical levels on Target: TTL-LV
- Max current consumption: 50 mA
- Isolation voltage: 750 VAC/1 kVDC
- Optical signalization of power supply connection
- Optical signalization of galvanic battery power supply
- Embedded connectors:
 - IDC10 - JTAG for PLD (FPGA and CPLD) - complies with programmer Altera ByteBlaster, IDC10 ** JTAG for AVR microcontrollers,
 - IDC20 - JTAG for ARM microcontrollers and microprocessors,
 - SIP8 - JTAG for PLD (FPGA and CPLD) - complies with programmer Digilent JTAG HS1.
- Current consumption from +Vp line for programmer: max 10 mA

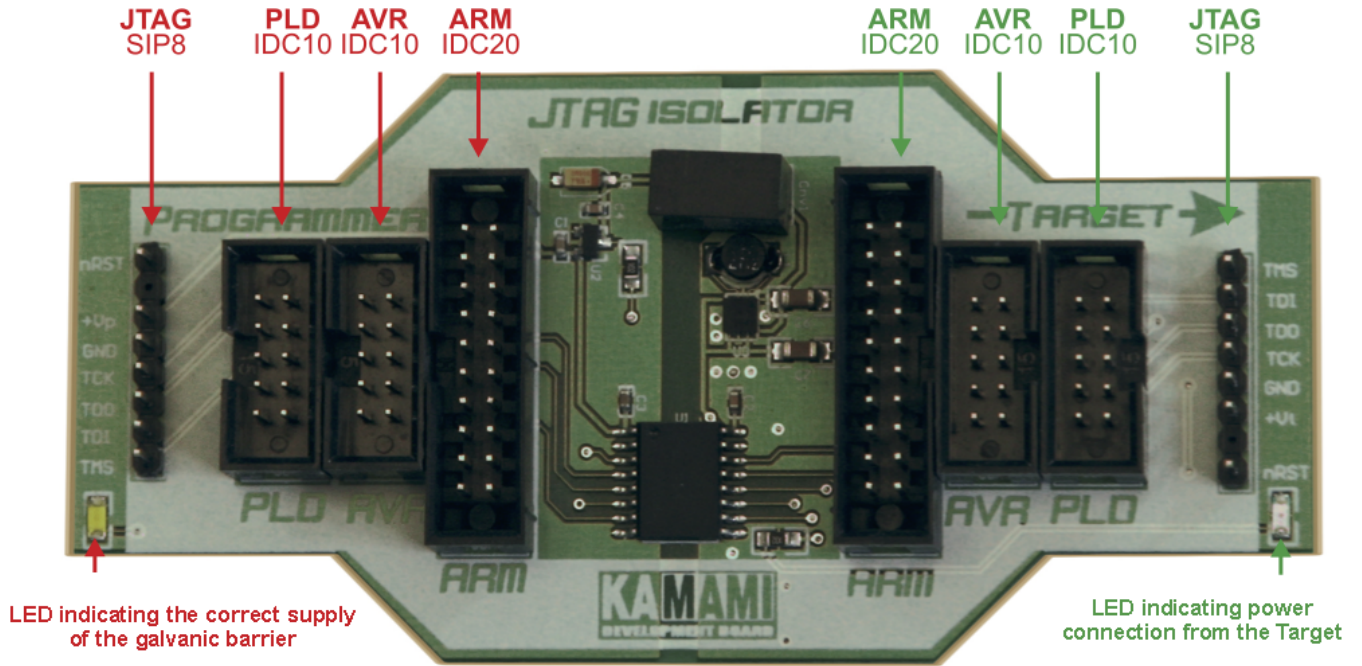
(*) *It depends on length of connection cables*

Output on Separator and Target area can't be connected together or touched at the same time - they can be in different potentials which may result in electric shock or damage of the device.

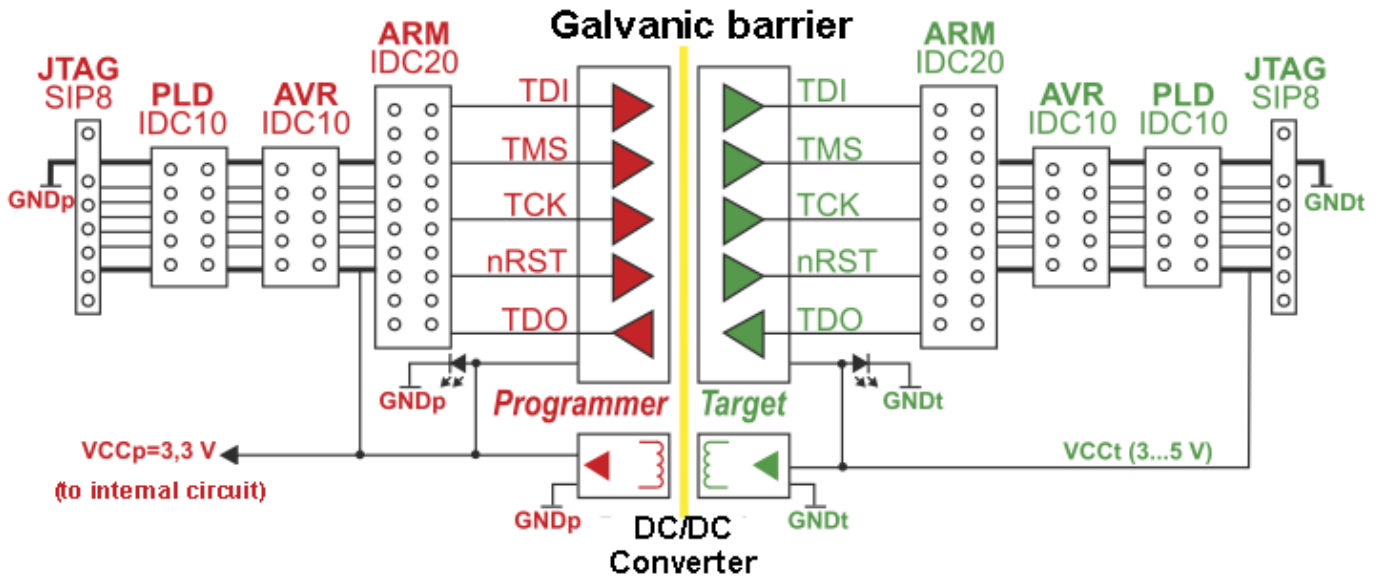
Standard equipment

Code	Description
JTAG Isolator	• Assembled and launched device, IDC10-IDC10 cable (15 cm) and IDC20-IDC20 cable (15 cm)

Placement of the most important components



Block schematic



Power supply of separator

Both electric area (*Target* i *Programmer*) of separator are powered from *Target* side. Electric energy for *Programmer* side are provided from embedded in device, galvanic isolated DC/DC converter. For this reason, it is necessary to provide an additional current supplying of the separator, the value of which depends on the supply voltage (as in the table below). The programmer connected on the "Programmer" side should be powered from a separate source, it is allowed to supply only the I/O buffers from the + Vp line of the separator. The maximum load capacity of the + Vp line is 10 mA @ 3.3 V.

Current consumption by separator on *Target* side

Voltage +Vt [V]	Current consumption on +Vt [mA]
3	<50
3,3	<45
4	<30
5	<35

Allowed logical levels

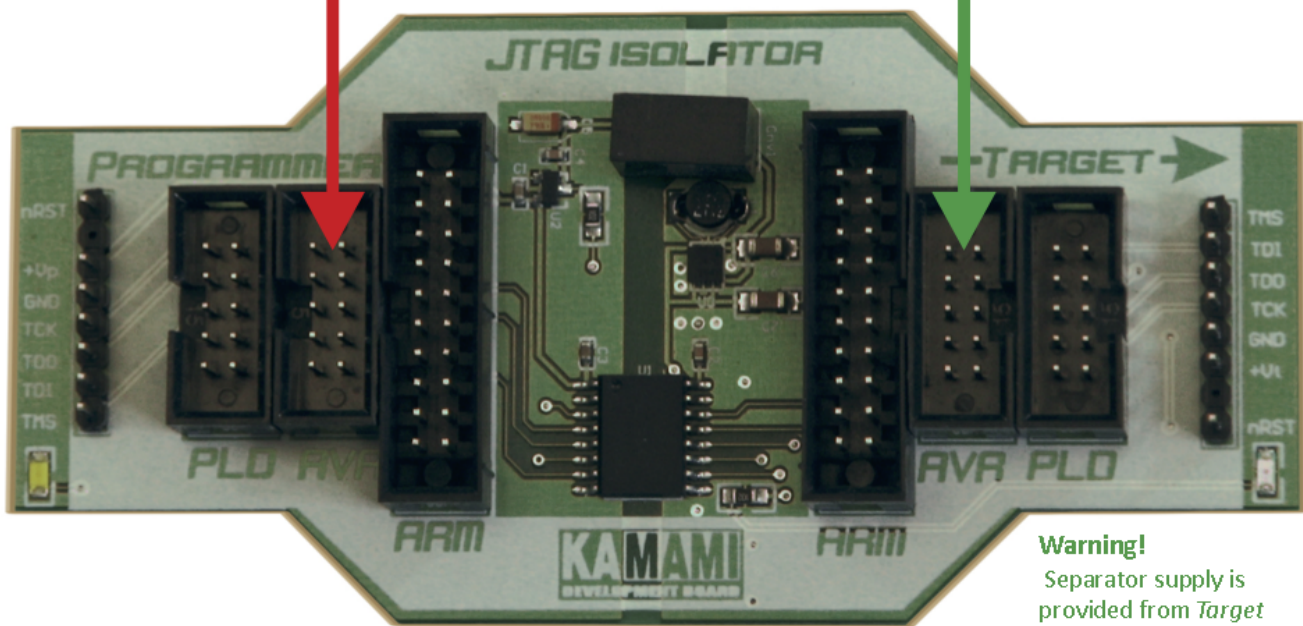
Separator from *Target* side can be powered by voltage from $V_t = 3$ to $V_t = 5$ V. Levels acceptable voltages on output and input lines are from 0 V to V_t , wherein low level voltage „0” are from 0 to 0,8 V, and for „1” are 2,4... V_t . On *Programmer* side it is recommended to include programming interfaces with buffers I/O powered by voltage $V_p = 3,3$ V. Range of logical „0” are 0...0,8 V, and for „1” are 2,4... V_p . Exceeding the voltage level on Programmer side on I/O lines over V_p can damage a separator.

Connection for AVR

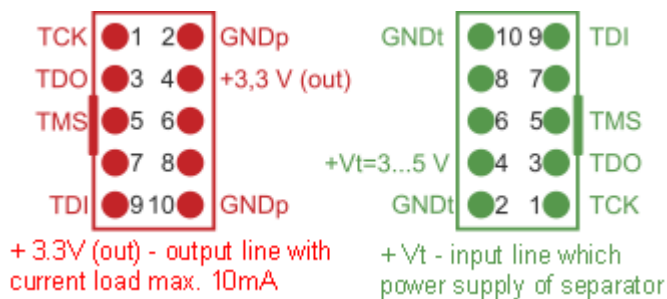
Separator from Target can be powered by voltage from $V_t = 3$ do $V_t = 5$ V. Levels acceptable voltages on output and input lines are from 0 V to V_t , wherein low level voltage „0“ are from 0 to 0,8 V, and for „1“ are 2,4... V_t . On *Programmer* side it is recommended to include programming interfaces with buffers I/O powered by voltage $V_p = 3,3$ V. Range of logical „0“ are 0...0,8 V, and for „1“ are 2,4... V_p . Exceeding the voltage level on *Programmer* side on I/O lines over V_p can damage a separator.

Cable terminated on both sides with IDC10 connectors, on one side connected to the IDC10 interface of the JTAG for AVR

Cable is terminated on both sides with IDC10 connectors, on one side connected to the IDC10 connector on the target PCB with a AVR microcontroller



Maximum frequency of TCK can be 110 MHz. It depends on length of connection cables and PCB wires (the longer it is, the lower is f_{TCKmax}) and kind of load on each I/O lines on *Target* side.

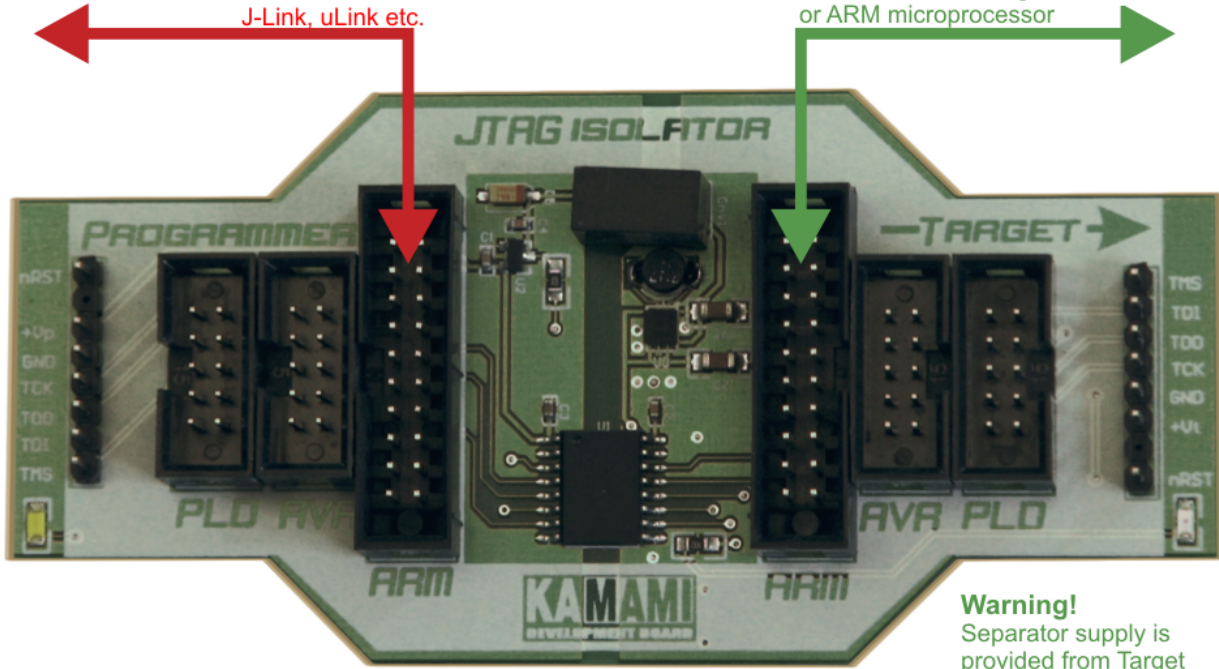


Description of signals for AVR connector on *Programmer* side (red) and *Target* (green).

Connection for ARM

Cable is terminated from two sides with IDC20 connector, on one side it is connected to the IDC20 interface of the J-Link, uLink etc.

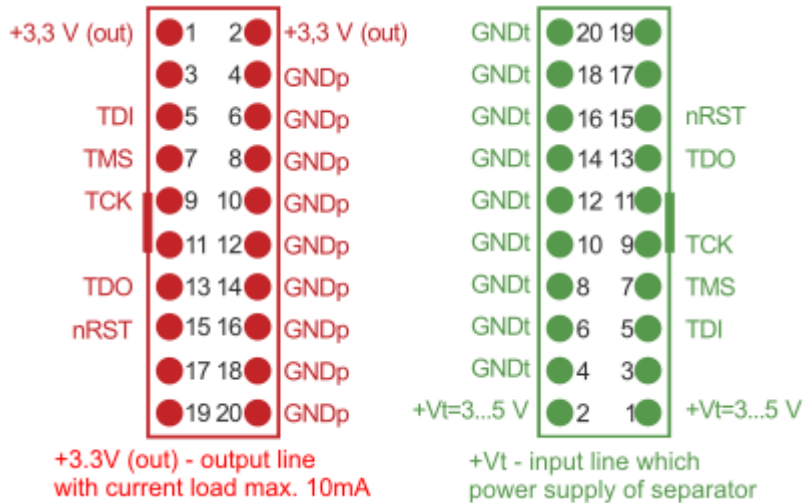
Cable is terminated on both sides with IDC20 connector, on one side connected to the IDC20 connector on the target PCB with a microcontroller or ARM microprocessor



Warning!
Separator supply is provided from Target

The way of using the JTAG separator Isolator for programming/debugging system with ARM microcontroller.

Maximum frequency of TCK can be 110 MHz. It depends on length of connection cables and PCB wires (the longer it is, the lower is fTCKmax) and kind of load on each I/O lines on Target side.

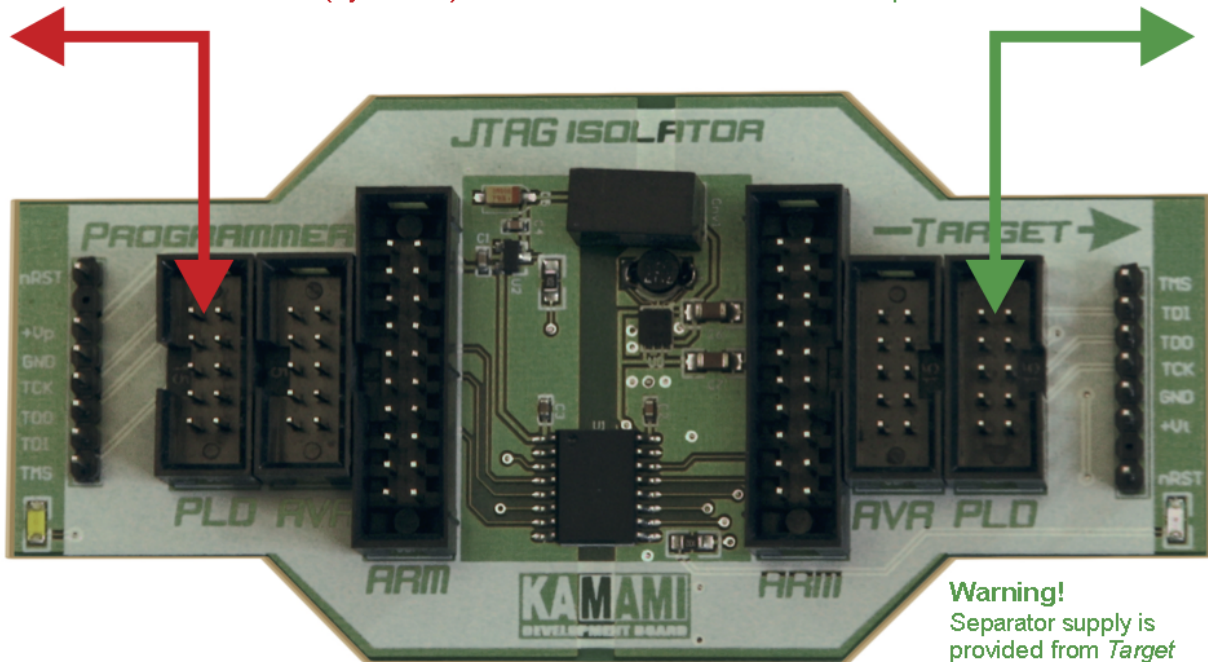


Description of signals for ARM connector on Programmer side (red) and Target (green).

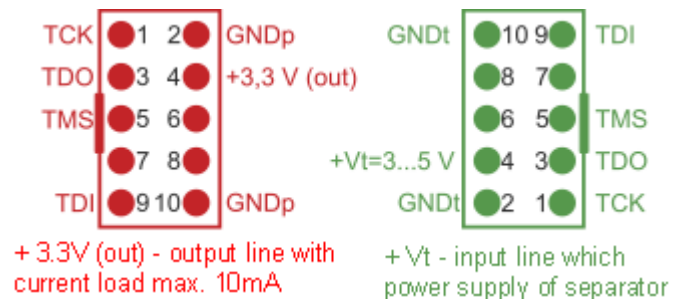
Connection for PLD (CPLD/FPGA)

Cable terminated on both sides with IDC10 connectors, on one side connected to the IDC10 JTAG interface for PLD (ByteBlaster)

Cable terminated on both sides with IDC10 connectors, on one side connected to the IDC10 to the target board with PLD chip



Maximum frequency of TCK can be 110 MHz. It depends on length of connection cables and PCB wires (the longer it is, the lower is f_{TCKmax}) and kind of load on each I/O lines on *Target* side.



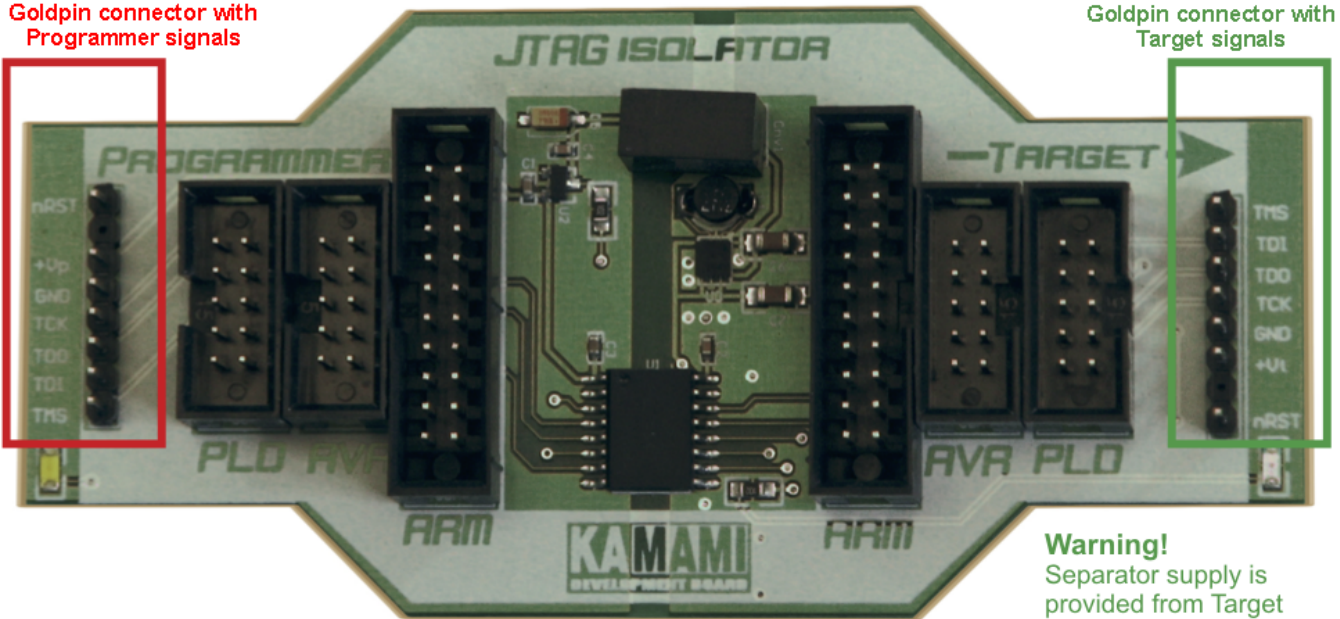
Description of signals for PLD (compatible with ByteBlaster) connector on *Programmer* side (red) and *Target* (green).

Connection for any JTAG

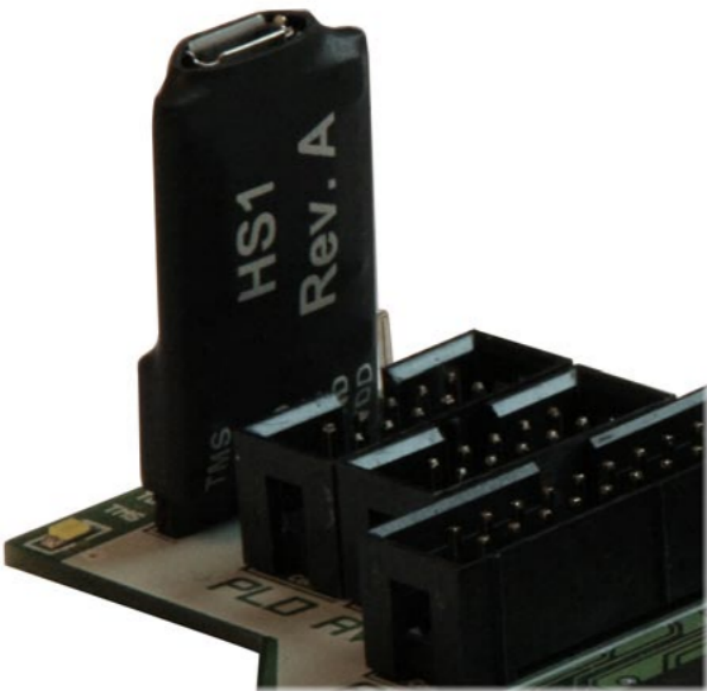
Separator is equipped with SIP8 goldpin connector with pins 2,54 mm, to which you can attach any JTAG interfaces or other ones that require galvanic separation.

Goldpin connector with Programmer signals

Goldpin connector with Target signals



The placement of signals on the pin connectors make possible to install on them the Digilent JTAG HS1 programmer-configurator (see photo below).





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