



XJTAG[®]

ICT Relay Board

User Guide

Version 1

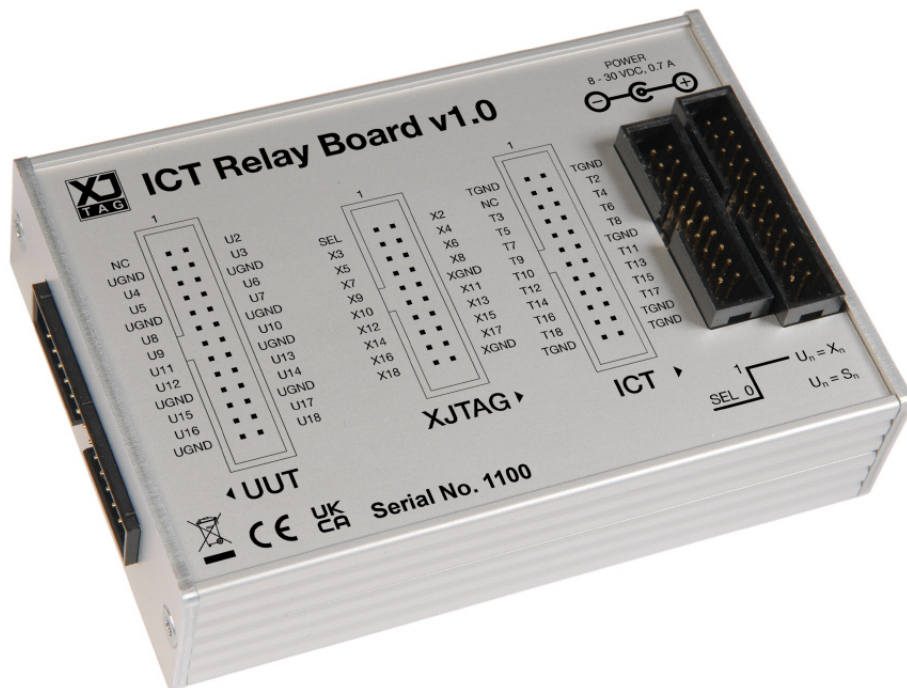


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1. Introduction

The ICT Relay Board is XJTAG's recommended solution when there is a requirement to allow multiple instruments to be connected to the TAP control signals on a Unit Under Test (UUT). It allows both an XJTAG XJLink2 JTAG controller and another piece of test/programming equipment access to the TAP control signals, while ensuring the UUT is fully isolated from the other instrument.

2. System Overview

Figure 1 shows a block diagram of the Relay Board containing the following marked connectors:

- UUT – 26 way connector with 17 active signals and 8 ground pins.
- Instrument connector 1 – 24 way connector with 17 active signals and 6 ground pins.
- Instrument connector 2 – 20 way (XJTAG) connector with 17 active signals, 2 ground pins and the relay control signal.
- Power – DC power connector (centre positive) 8 V to 30 V.

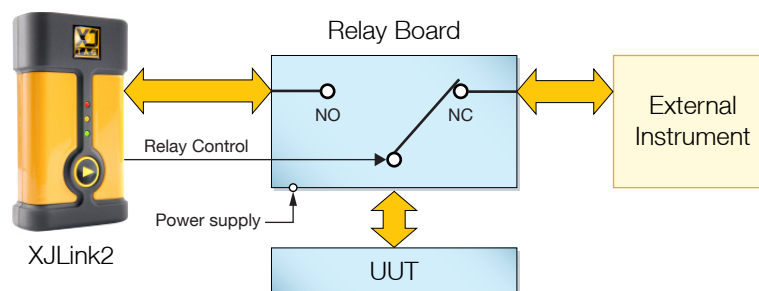


Figure 1 – Relay Board Block Diagram

By having different sized connectors, each of the instruments and the UUT can only be connected to the correct header on the Relay Board.

In its default state (either unpowered or powered but not being actively controlled) the Relay Board connects Instrument 1 to the UUT. The connection is switched using a setting in the XJTAG project, connecting Instrument 2 (the XJLink2) to the UUT. This setting uses pin 1 on the XJLink2 – this is why there are only 17 active signals rather than the 18 active signals normally available on the XJLink2.

At the end of XJTAG testing the relays revert to their default state, connecting Instrument 1 to the UUT. This ensures the UUT is isolated from the XJTAG system during bed-of-nails testing or other operation.

The Relay Board provides full isolation. As well as isolating the active signals used for the TAP control signals, it also switches the UUT ground between the connected instruments.

3. UUT Connection

When fabricating the connections from the UUT to the Relay Board it is strongly recommended to use twisted pair cables. Each active UUT signal is located near to a ground signal on the connector to make this easy to implement. To ensure optimum signal integrity, all of the ground wires from the twisted pairs should be connected to ground pins or test points as close to the active signals as possible on the UUT.

If this is not done, signal integrity issues caused by large loop areas can occur – see Signal Integrity article https://www.xjtag.com/wp-content/uploads/news_smt-may14-pp50-57.pdf for more details.

4. XJTAG Project Requirements / Relay Control

The relay connection is, by default, controlled using pin 1 on the connector for Instrument 2, the XJLink2 connector.

The Relay Board switches from connecting Instrument 1 to the UUT to connecting Instrument 2 to the UUT when pin 1 on the Instrument 2 connector is driven high.

Within the XJDeveloper project this can be achieved in one of three ways:

- Set the function of pin 1 to be Power On
- Set the function of pin 1 to High
- Set the function of pin 1 to be PIO and then control the pin at the start of the Test Reset Sequence to be high.

The function of pin 1 is configured on the Pin Mapping screen in XJDeveloper.

5. Default Operation

With no XJLink2 connected.

The relays are in their default (normally closed) position which means that Instrument 1 is connected to the UUT and fully isolated from the connector for Instrument 2.

With the XJLink2 connected but no control signal applied (XJLink2 pin 1 tri-state or low)

The relays are in their default (normally closed) position which means that Instrument 1 is connected to the UUT and fully isolated from the Instrument 2 (XJLink2) connector.

With the XJLink2 connected and the control signal applied (XJLink2 pin 1 set to power or driven high)

The relays are in their switched (normally open) position which means that Instrument 2 (the XJLink2) is connected to the UUT and fully isolated from the Instrument 1 connector.

6. Pin Assignment

Instrument 2 (XJLink2) (20 way 0.1") Default - isolated from UUT		Instrument 1 (24 way 0.1") Default - connected to UUT		UUT (26 way 0.1") Default - connected to Instrument 1	
Pin	Function	Pin	Function	Pin	Function
		1	I1 Ground	1	Reserved – Do Not Connect*
		2	I1 Ground	2	Signal 2
1	Relay Control*	3	Reserved - Do Not Connect*	3	UUT Ground
2	Signal 2	4	Signal 2	4	Signal 3
3	Signal 3	5	Signal 3	5	Signal 4
4	Signal 4	6	Signal 4	6	UUT Ground
5	Signal 5	7	Signal 5	7	Signal 5
6	Signal 6	8	Signal 6	8	Signal 6
7	Signal 7	9	Signal 7	9	UUT Ground
8	Signal 8	10	Signal 8	10	Signal 7
9	Signal 9	11	Signal 9	11	Signal 8
10	I2 Ground	12	I1 Ground	12	UUT Ground
11	Signal 10	13	Signal 10	13	Signal 9
12	Signal 11	14	Signal 11	14	Signal 10
13	Signal 12	15	Signal 12	15	Signal 11
14	Signal 13	16	Signal 13	16	UUT Ground
15	Signal 14	17	Signal 14	17	Signal 12
16	Signal 15	18	Signal 15	18	Signal 13
17	Signal 16	19	Signal 16	19	UUT Ground
18	Signal 17	20	Signal 17	20	Signal 14
19	Signal 18	21	Signal 18	21	Signal 15
20	I2 Ground	22	I1 Ground	22	UUT Ground
		23	I1 Ground	23	Signal 16
		24	I1 Ground	24	Signal 17
				25	UUT Ground
				26	Signal 18

*The Relay Control signal is also switched through to the output connector.

7. Alternative Relay Control

The Relay Board, as supplied, uses pin 1 on the Instrument 2 connector (XJLink2) to control which instrument connector is isolated from/connected to the UUT.

It is possible to modify the Relay Board to allow the Control Pin to be located on any of the connectors. The required resistor settings are shown in the table below:

Control Pin	R4	R5	R6	R7	R8	R9	R10	R11	R12
Instrument 2 Pin 1	0R	X	X	X	X	X	0R	X	X
Instrument 2 Pin 11	X	X	X	0R	X	X	0R	X	X
Instrument 1 Pin 3	X	0R	X	X	X	X	X	0R	X
Instrument 1 Pin 13	X	X	X	X	0R	X	X	0R	X
UUT Pin 1	X	X	0R	X	X	X	X	X	0R
UUT Pin 14	X	X	X	X	X	0R	X	X	0R

The locations of these resistors are shown in Figures 2 & 3 below:

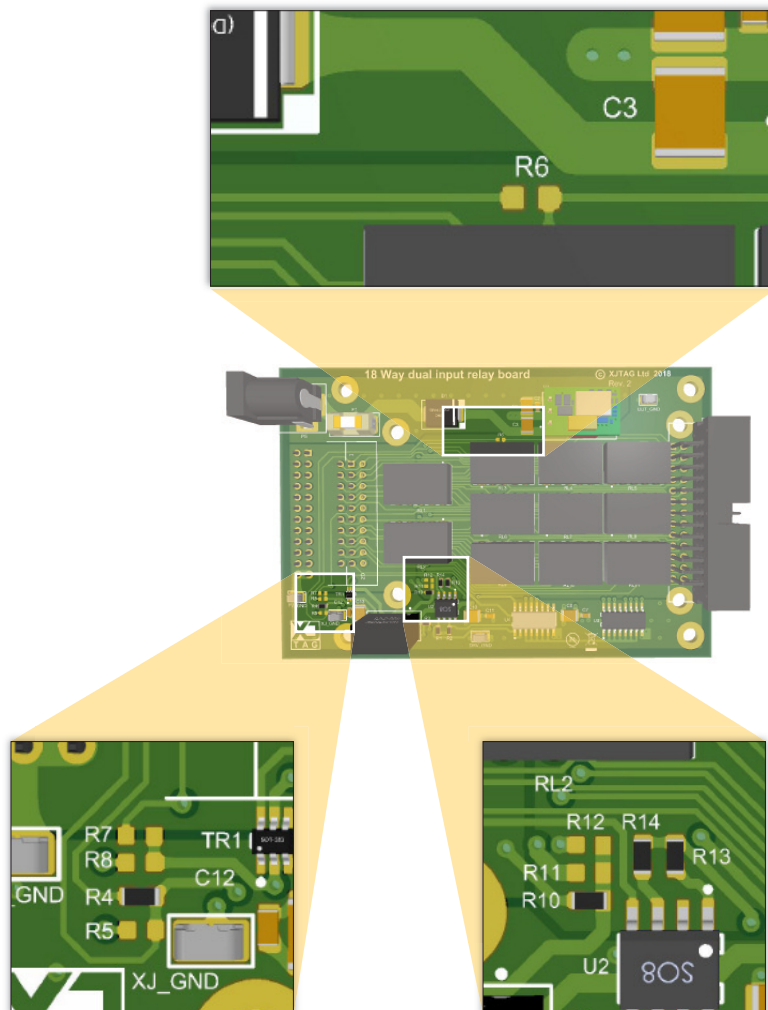


Figure 2 – Location of the control pin selection resistors (Top side of PCB)

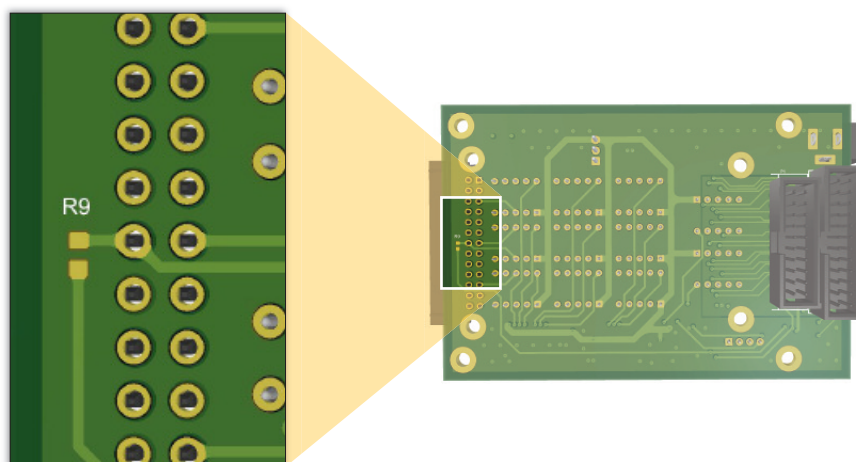


Figure 3 – Location of the control pin selection resistor R9 (Bottom side of PCB)

In order to make these modifications a qualified engineer should follow the steps below:

1. Disconnect power and all connectors from the Relay Board.
2. Remove the two screws from the Instrument connectors end of the Relay Board.
3. Carefully remove the circuit board from the enclosure.
4. Remove the existing configuration resistors and then fit the resistors required for the desired Control Pin.
5. Replace the PCB in the enclosure box.
6. Replace the screws.

Note: The selected control signal will also be switched through to the UUT connector.

It is possible to separate control of the ground relays from the control of the signal relays. If this is required R3 must be removed and then control of the signal relays is configured by R4, R6 and R6 while control of the ground relays is configured by R7, R8 and R9.

Only one connector should be configured to control both signal and ground relays – this will define which of the resistors R10, R11 and R12 must be fitted. For example if separate signal and ground control is required from the XJLink (Instrument 2 connector) then R4, R7 and R10 should be fitted.

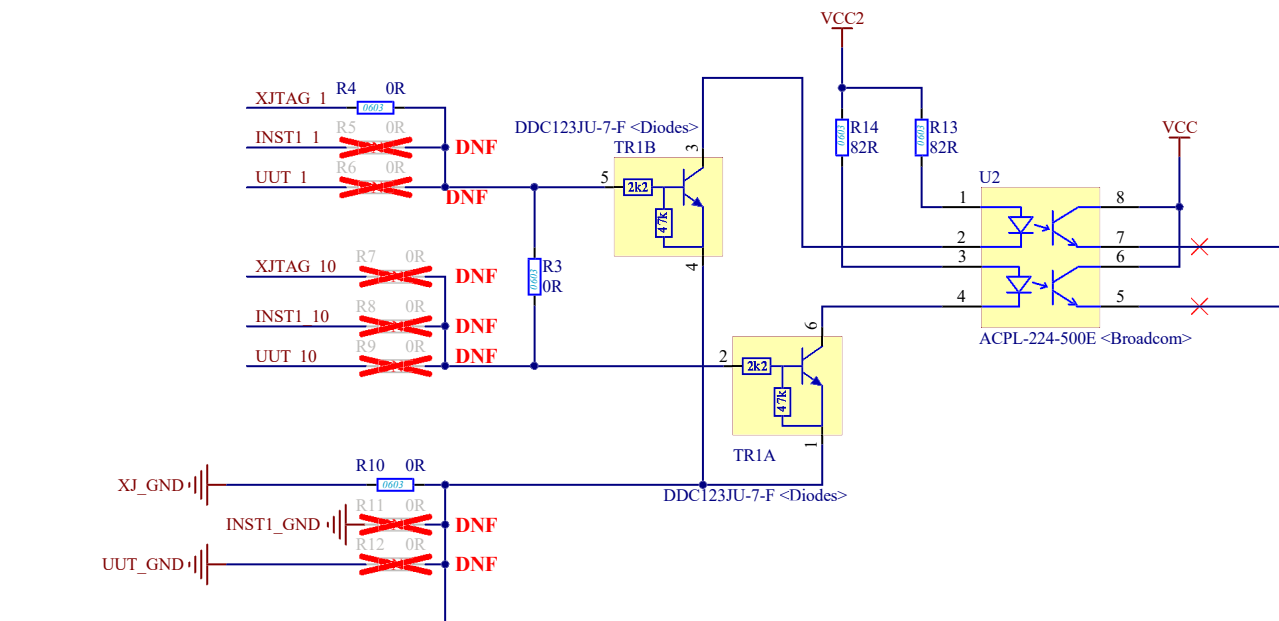


Figure 4 – Schematic of the control pin selection resistors.

8. Electrical and Operational Specification

Outer dimensions (including connectors)	108 mm length x 73 mm width x 28 mm height
Power Supply Requirement	2.1 mm Jack Plug (Centre pin positive). 7 to 30 VDC @ > 700mA
P1 Connector (20 pin)	Wurth Elektronik Part No. 61202021621
P2 Connector (24 pin)	Wurth Elektronik Part No. 61202421621
P3 Connector (26 pin)	Wurth Elektronik Part No. 61202621721
Temperature range	0 °C to +85 °C (operational)
Humidity	< 85% (non-condensing)
Relay Specification	2 Form C, 1A @ 30 VDC, 30 Watts maximum
Manufacturer	Panasonic
Manufacturers Part No.	TQ2-5V
Static Contact Resistance	50 milliohms maximum
Relay switching time	3ms
Life Expectancy	1 x 10 ⁷ Operations