# AZ442

# [SWD ADAPTER]
# Instruction Manual

**DTS INSIGHT CORPORATION.**

AZ442: SWD ADAPTER

Instruction Manual

No. M2390DC-03


# Publication History

| Edition | Date of Issue | Description |
|---|---|---|
| First Edition | April 8, 2009 | Initial publication |
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| Third Edition | June 6,2018 | Addition of EU directives |

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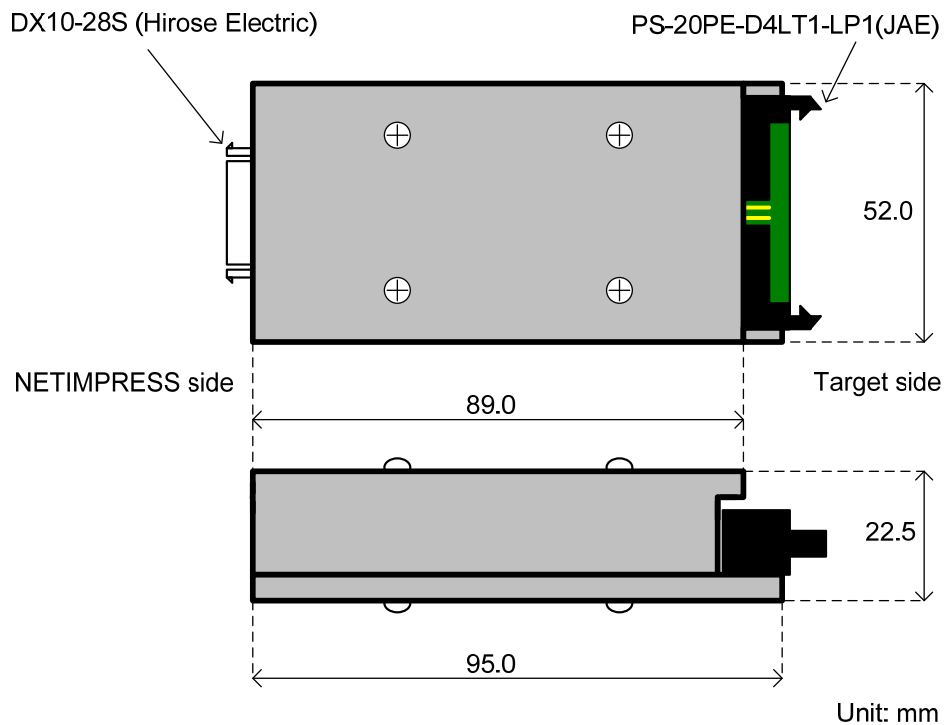
# Contents

# 1 Overview

AZ442 SWD adapter converts the standard signal output by the flash microcomputer programmer NET IMPRESS series to the SWD signal

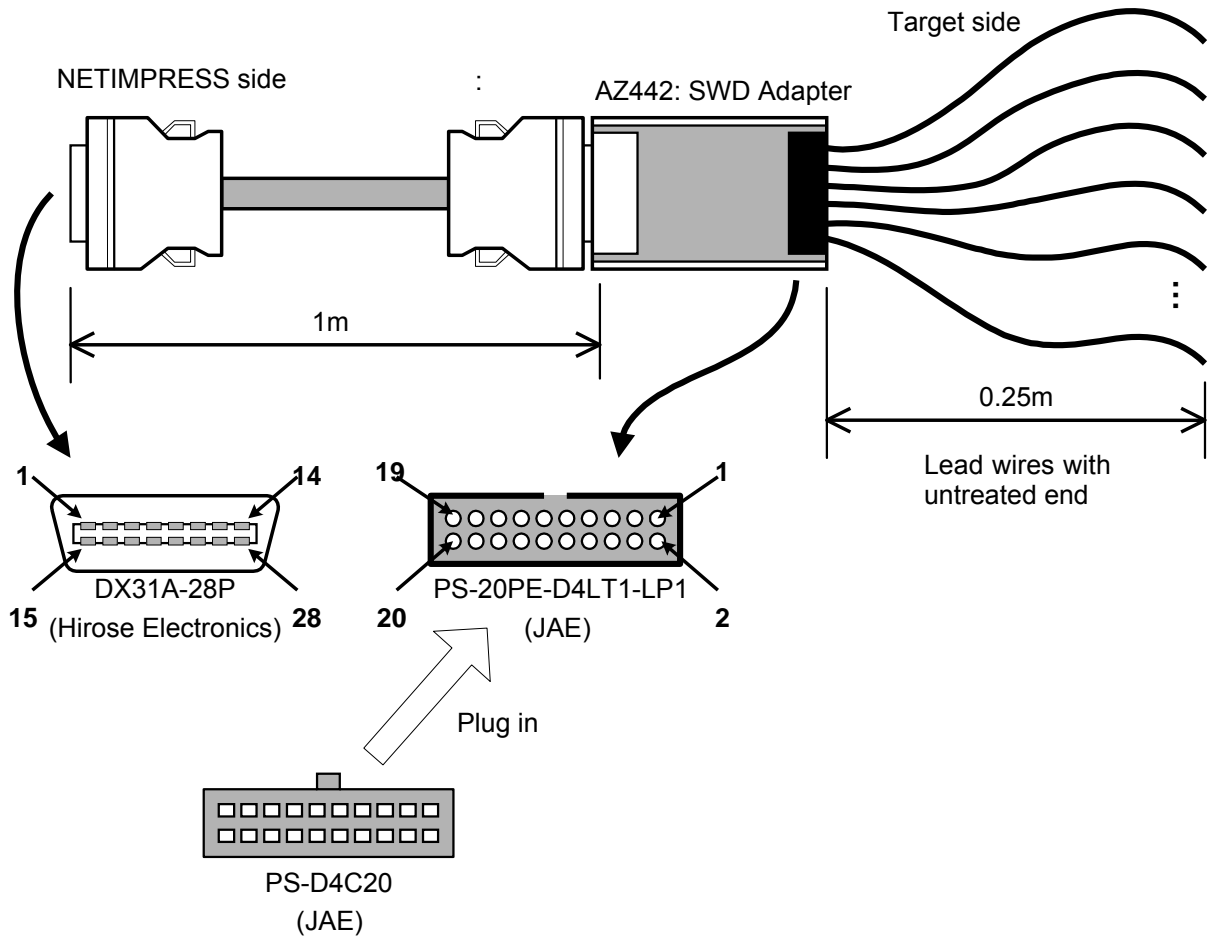AZ442 supports programming flash ROM of a microcomputer on a user system using SWD protocol.

## 1.1 External configuration & dimensions of the Adapter area

The figure below illustrates external configuration and dimensions of the adapter area of AZ442.

DX10-28S (Hirose Electric)　　　　PS-20PE-D4LT1-LP1(JAE)

NETIMPRESS side　　　　　　　　　　　Target side

89.0

52.0

22.5

95.0

Unit: mm

## 1.2　Target Probe

Pin layout of each connector is numbered as viewed from the mating side.



NETIMPRESS side

:

AZ442: SWD Adapter

Target side

1m

0.25m

Lead wires with
untreated end

1　　　　14

DX31A-28P
15　(Hirose Electronics)　28

19　　　　1

PS-20PE-D4LT1-LP1
20　　　(JAE)　　　2

Plug in

PS-D4C20
(JAE)

# 2    Target Interface

## 2.1    Signal and pin assignment

The table below lists signals of AZ442 at user target side.

I/O (Input and Output) information is for AZ442.

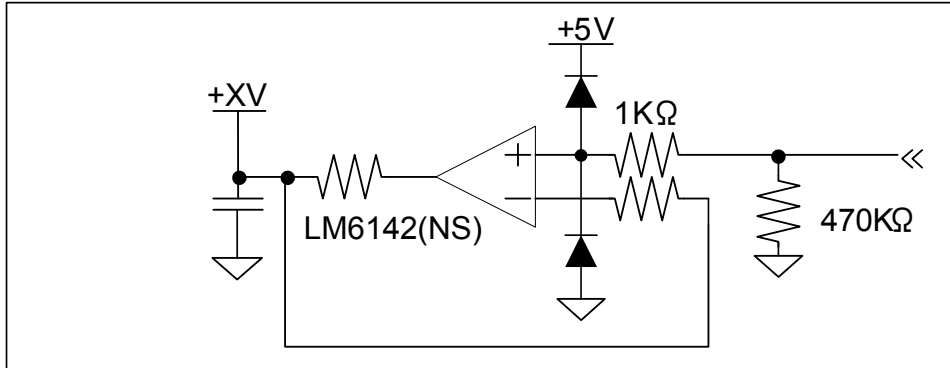| Signal Name | Definition | I/O | Type |
|---|---|---|---|
| TVPP1 | TVPP1 output from NETIMPRESS<br>(Output terminal to target microcomputer for programming voltage. It may not be necessary depending on microcomputer.) | O | J |
| VCC | VCC output from NETIMPRESS<br>(+ 5V fixed, maximum 30 mA) | O | － |
| TVccd | Power input from user target to AZ442<br>Used as buffer power source for I/O signals of AZ442 | I | A |
| SWCLK | SWD CLK output | O | B |
| SWDIO | SWD data input / output | I/O | F |
| /TRES | Hardware reset output | O | H |
| /TICS0 | /TICS output from NET IMPRESS<br>(+ 5V output) | O | I |
| /TICS1 | /TICS output from NET IMPRESS, which is converted to the voltage level of TVccd by buffer in AZ442 | O | C |
| WDT | WDT output from NET IMPRESS, which is converted to the voltage level of TVccd | O | G |
| TAUX3 | Reserved output terminal. Connect as needed only. | O | E |
| TAUX4 | Reserved output terminal. Connect as needed only. | O | E |
| TMODE | Reserved output terminal. Connect as needed only. | O | D |
| 7Reserved | Reserved terminal. Do not connect any signal at target side. | － | － |
| GND | Connect with GND at target side. | － | － |

For details of the standard I/O signals of NET IMPRESS series, see the NET IMPRESS Instruction Manual.

Definitions of signals may vary depending on Control Modules. See the instruction manual for the Control module for details.
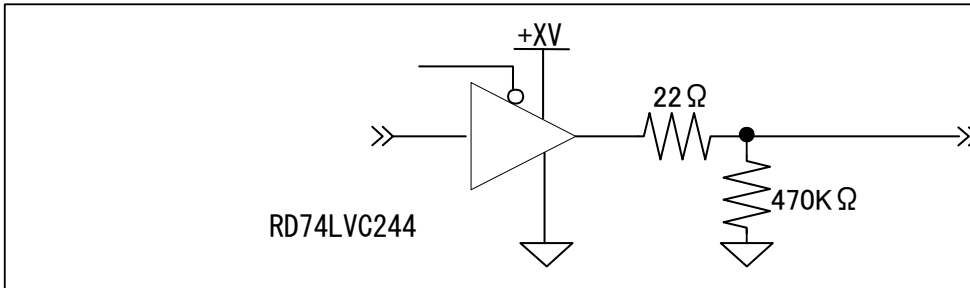
## 2.2    Circuit Specification

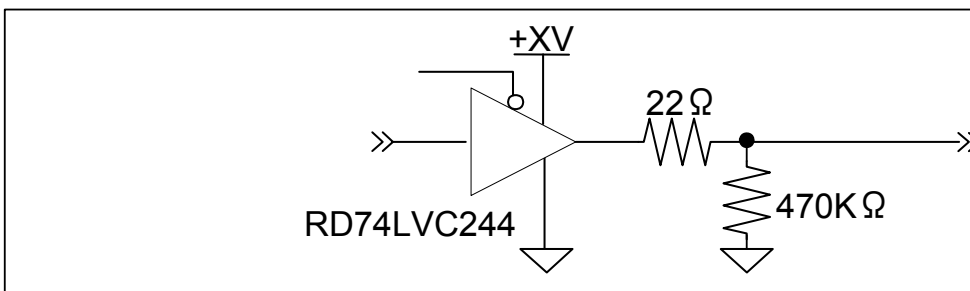NET IMPRESS side <<--    AZ442    -->> Target system side
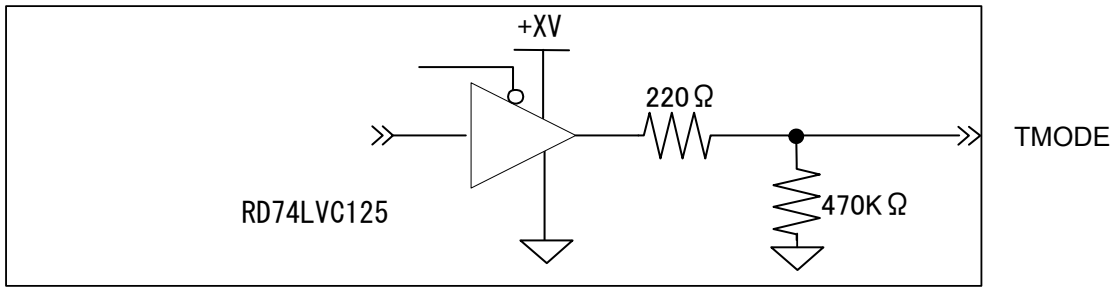
**Type A**



TVccd

**Type B**



SWCLK

**Type C**



/TICS1

**Type D**



+XV

220 Ω

RD74LVC125

470K Ω

TMODE

**Type E**



+XV

220 Ω

RD74LVC125

470K Ω

TAUX3
TAUX4

+5V  +XV

220 Ω

SN74LVC8T245

**Type F**



+XV  +XV

22 Ω  1K Ω

RD74LVC125

SWDIO

+5V  +XV

SN74LVC8T245

**Type G**

+XV

4.7KΩ

>> ———————————————————————→>> WDT

**Type H**

+XV

2.7KΩ

>> ———————————————————————→>> /TRES

**Type I**

+5V

4.7KΩ
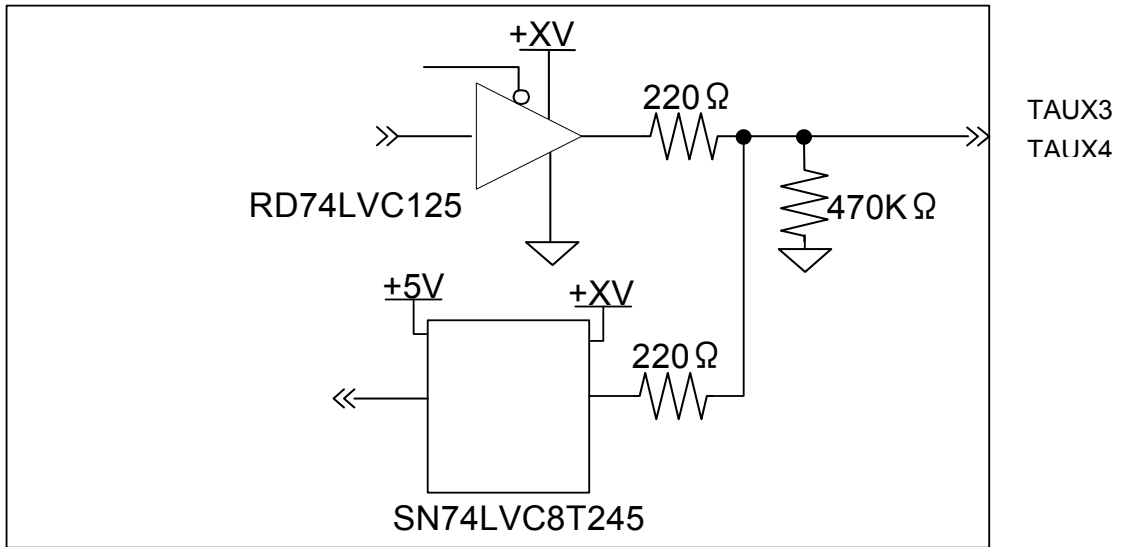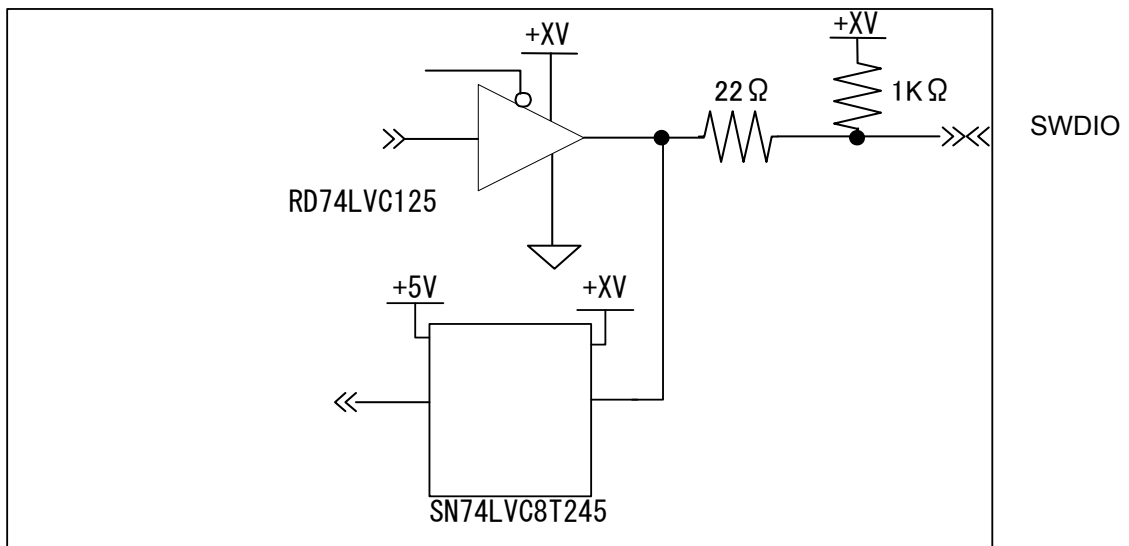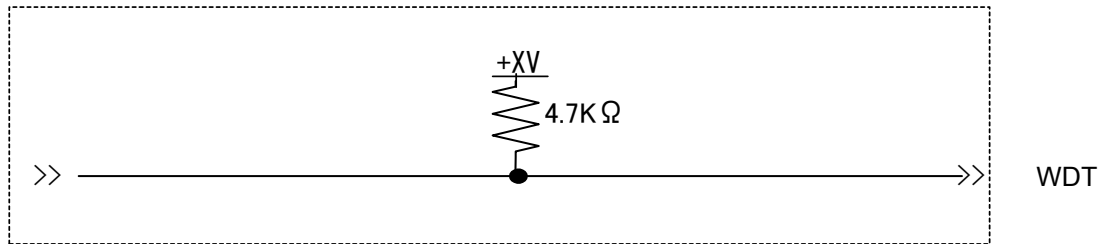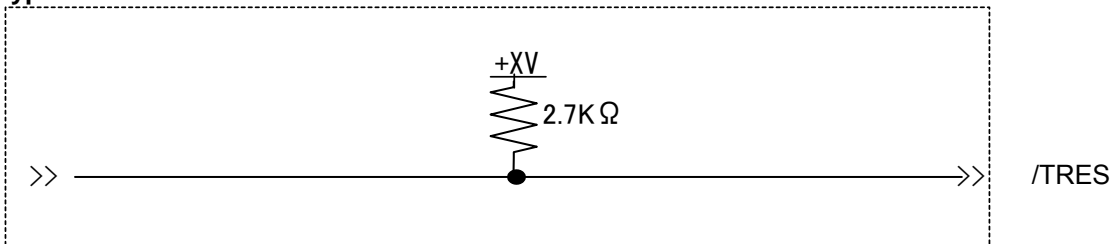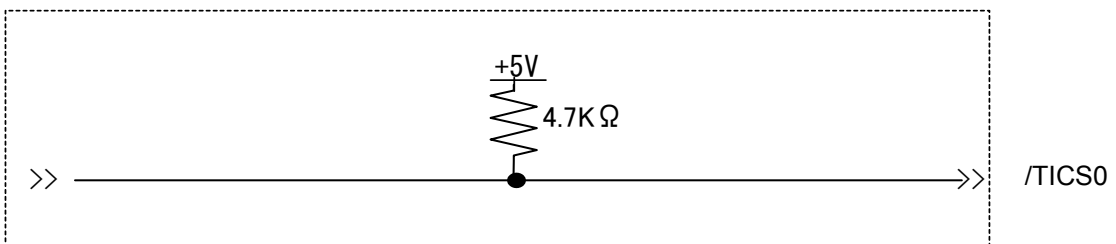
>> ———————————————————————→>> /TICS0

**Type J**
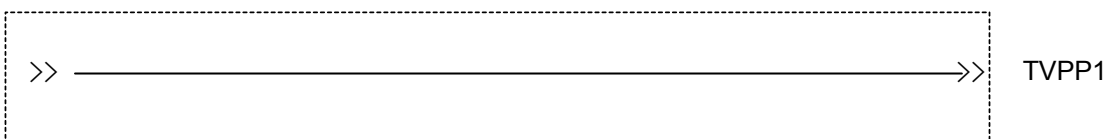
>> ———————————————————————→>> TVPP1

* When TAUX3, TAUX4, and TMODE are pulled up on the target system, resistances less than 10 KΩ are recommended.

* +XV can be used as an interface power supply to equal the signal level with target system.

* VCC, TVPP1, /TICS0, WDT, /TRES are output from NETIMPRESS through AZ442 as it is without conversion. (/TICS0, WDT, and /TRES are pulled up in AZ442. For the output circuit, please refer to the instruction manual of NETIMPRESS.

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## 2.3 Pin assignment of the target side

The table below lists pin assignment of the connector of AZ442 at the target side.
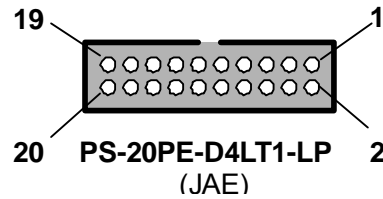


| Pin No. | Lead Color | NET IMPRESS Signal Name | I/O |
|---------|------------|-------------------------|-----|
| 1 | Brown | TVpp1 | O |
| 2 | Red | Vcc | O |
| 3 | Orange | TMODE | O |
| 4 | Yellow | TVccd | I |
| 5 | Green | GND | - |
| 6 | Blue | SCLOCK | O |
| 7 | Violet | GND | - |
| 8 | Gray | Reserved | - |
| 9 | White | GND | - |
| 10 | White & Black | SDATA | I/O |
| 11 | White & Brown | Reserved | - |
| 12 | White & Red | /TRES | O |
| 13 | White & Orange | /TICS0 | O |
| 14 | White & Yellow | /TICS1 | O |
| 15 | White & Green | WDT | O |
| 16 | White & Blue | TAUX3 | O |
| 17 | White & Violet | TAUX4 | O |
| 18 | White & Gray | Reserved | - |
| 19 | Light blue | Reserved | - |
| 20 | Yellow & Green | GND | - |

* I/O listed in the table above indicates input and output from the adapter to a target system.

* The above listed GNDs (5, 7, 9, and 20) are common with each other in the adapter. Connect as many GNDs as possible to a target system for stable electric connection.

* Be sure that untreated signal wires at the target side do not short out with other signal wires or metal parts of test pins, for example.

# 3    DC Characteristics

Listed +XV below are power supply voltage for I/O buffer, which are generated from TVccd.

Output voltages vary affected by voltage drop by serial resistances in the adapter and input circuit on a target system.

| Signal | Item | | | | Min | Max | Unit |
|---|---|---|---|---|---|---|---|
| TVccd | Input voltage | Vin | | Absolute rating | -0.3 | 5.25 | V |
| | | | | Operate range | 2.0 | 5.0 | |
| | Input current | Iin | | — | — | 526 | nA |
| SCK | Output voltage | VoH | IoH = ±100 uA | — | +XV -0.2 | — | V |
| | | VoL | | — | — | 0.2 | |
| | Output current | Iout | | +XV = 3.0 V | — | ± 24 | mA |
| | | | | +XV = 5.0 V | — | ± 24 | |
| SDATA | Output voltage | VoH | IoH = ±100 uA | — | +XV -0.2 | — | V |
| | | VoL | | — | — | 0.2 | |
| | Output current | Iout | | +XV = 3.0 V | — | ± 24 | mA |
| | | | | +XV = 5.0 V | — | ± 24 | |
| | Input voltage | ViH | | +XV = 3.0 V | 2.0 | — | V |
| | | | | +XV = 4.5 V | 3.15 | — | |
| | | ViL | | +XV = 3.0 V | — | 0.8 | |
| | | | | +XV = 4.5 V | — | 1.35 | |
| | Input current | Iin | | — | — | 15 | uA |
| /TRES *1 | Output voltage | VoH | | — | — | +XV | V |

*1    Open collector output from NETIMPRESS is pulled up to +XV in the adapter.

For the specification of /TRES, refer to the instruction manual of NETIMPRESS.

# 4    AC Characteristics

## 4.1    Clock Timing

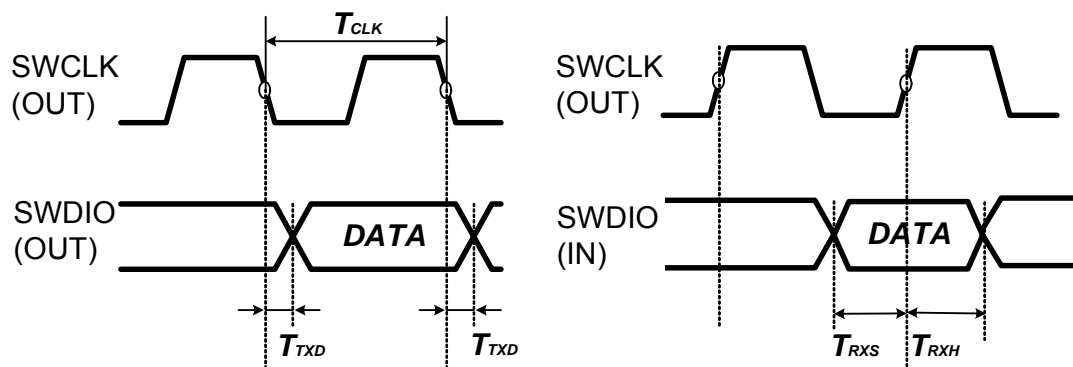| Signal name | Item | Min | Max | Unit |
|---|---|---|---|---|
| SWCLK | Communication baud rate | 62.5K | 5.0M | bps |

## 4.2    Signal Timing (as seen from the adapter side)

This section describes AC timings under conditions below.

TVccd input (Voltage of target system): 3.3 V

Cable between NETIMPRESS and AZ442: AZ410 (1 m) *Our standard

Cable between AZ442 and a target system: 0.25 m long untreated wires *Our standard
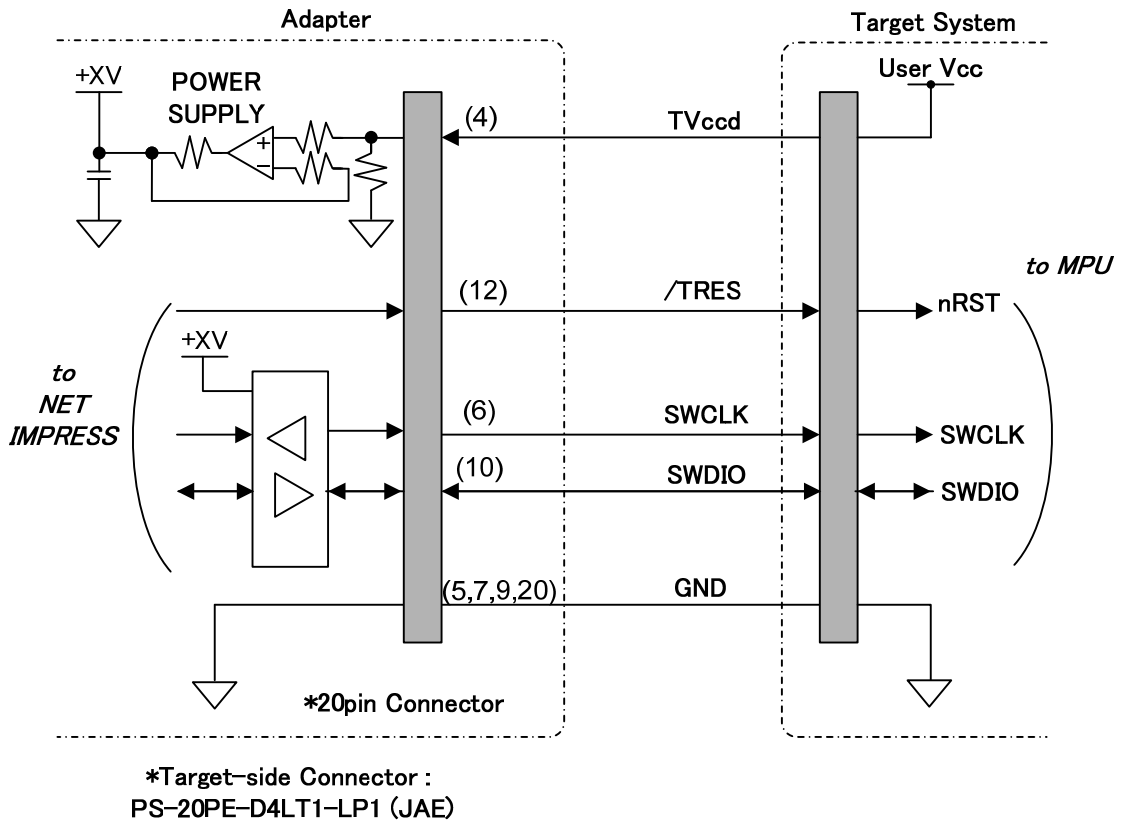


| Symbol | Item | Characteristic | Condition |
|---|---|---|---|
| $T_{TXD}$ | Delay time from the falling edge of SWCLK to SWDIO output | Max. 40 ns | Independent on SWD clock frequency |
| $T_{CLK}$ | SWCLK cycle time | Min. 200 ns | SWCLK = 5 MHz |
| $T_{RXS}$ | Setup time for SWDIO to the rising edge of SWCLK | Min. 70 ns | Independent on SWD clock frequency |
| $T_{RXH}$ | SWDIO hold time after the rising edge of SWCLK | Min. 0 ns | Independent on SWD clock frequency |

# 5    Connecting AZ442 and a Target System

The figure below illustrates how NET IMPRESS, AZ442 and a user target system are connected.

STANDARD PROBE
(1m)

AC ADAPTER

ADAPTER

NET IMPRESS

FJxxx:
Control Module

USER TARGET SYSTEM
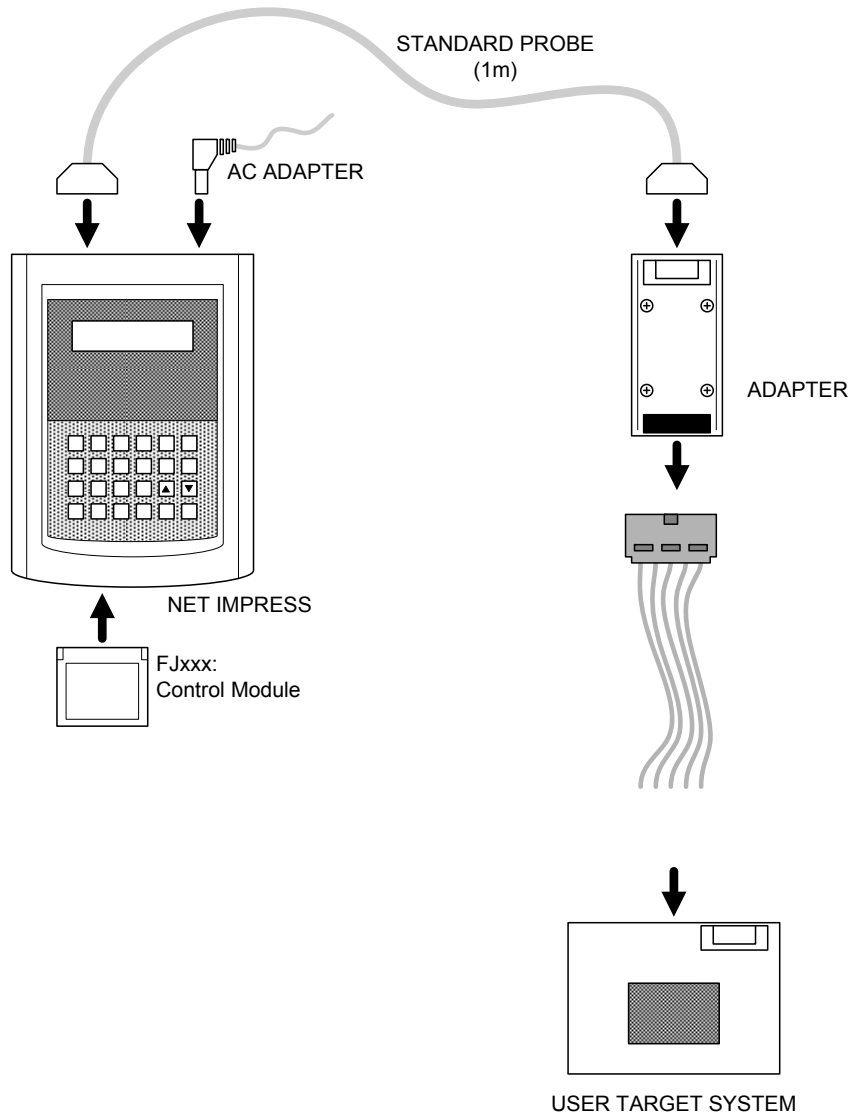
The figure below illustrates the example of connection on a circuit.



*Target-side Connector :
PS-20PE-D4LT1-LP1 (JAE)

The numbers in parentheses are the pin numbers of the connector PS-20PE-D4LT1-LP1.

In this adapter, power supply (+XV) is generated from TVccd to equal signal level with a target system.

See the NETIMPRESS Instruction Manual when connecting NETIMPRESS' original signals other than signals commonly used in SWD communication.

For the signal lines not used, you can leave them open unless otherwise specified in the Control Module Instruction Manual.

# 6　EU Directive

## 6.1　CE marking

| Item | Compliant standards |
|---|---|
| CE Marking *1  CE | [EMC Directive]<br>　Emissions :EN61326-1 Class A<br>　Immunity :EN61326-1 Table 2(For use in industrial locations)<br>[RoHS Directive]<br>　EN50581:2012 |

　*1 The product in which CE Marking is indicated on the product serial label is an target.

⚠ **CAUTION**　This instrument is a Class A product, and it is designed for use in the industrial environment. Please use this instrument in the industrial environment only.

## 6.2　WEEE marking

### WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT DIRECTIVE (2012/19/EC)

(Waste Electrical and Electronic Equipment Directive (WEEE) is for EU countries)
AZ442 SWD Adapter complies with WEEE Directive (2012/19/EC). Electric/electronic products carrying this mark must be disposed of separately from normal household wastes.

Product category:
With reference to the equipment types in the WEEE directive Annex 1, this product is classified as a "Monitoring and Control instrumentation" product. When disposing products in the EU, contact your local distributor. Do not dispose in domestic household waste.