# ISA Baseboard 14a
Hardware Reference

Release 1.2 (October 16, 2017)

Purpose:

Passive platform providing three legacy ISA bus card connectors (slots) and one set of PC/104 connectors, supplemented by an optional auxiliarx connector. All ISA connectors are wired according to the complete ISA industry standard, including 24-bit addressing and 16-bit data transmission (AT bus). Thus the board accepts all kinds of ISA host modules, SBC cards, and I/O units. However, its particular purpose is to complement the ISA Host Adapter 15a, a microcontroller-based PC/104 host platform. When operated with this module, the baseboard can be configured to support geographic addressing of all bus slots.
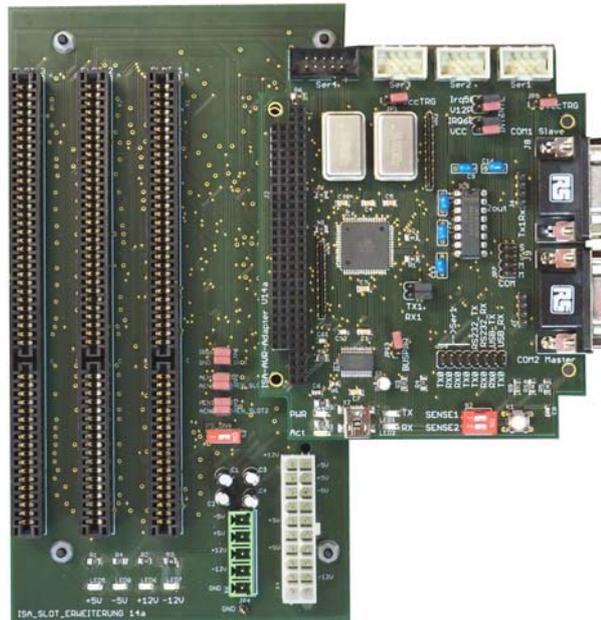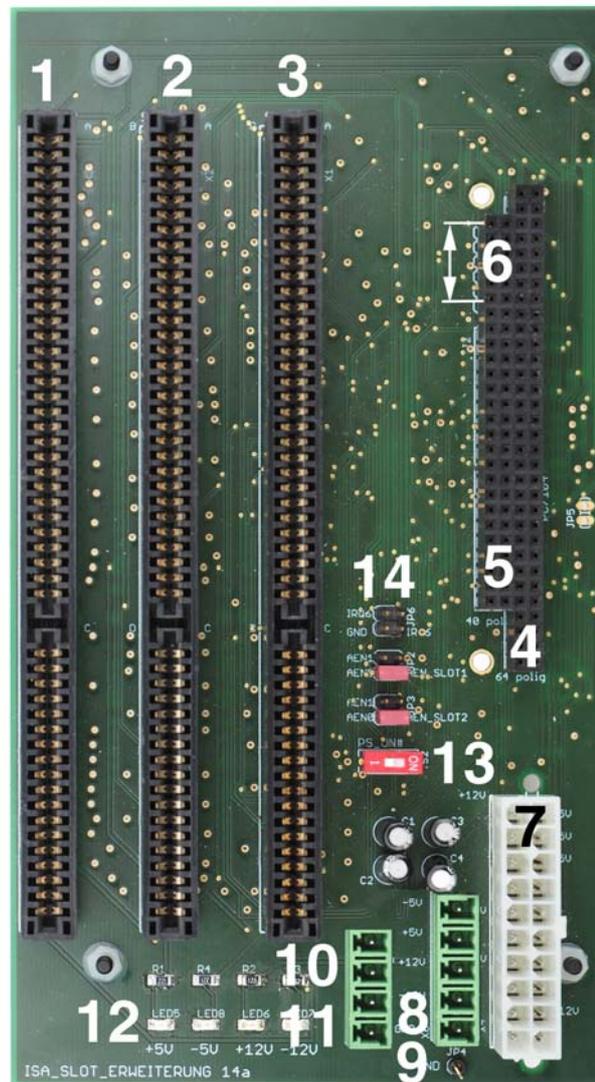
1	ISA slot 1	8	Power supply terminals
2	ISA slot 2	9	Ground test point
3	ISA slot 3	10	VBATT terminals
4	PC/104 connector, 64 pins (XT bus)	11	ATX power switch terminals
5	PC/104 connector, 40 pins (AT bus extension)	12	Power LEDs
6	Auxiliary connector, 8 or 12 pins	13	Internal ATX power switch
7	ATX power supply connector	14	Configuration pin headers

ISA slots (1), (2), (3)
The board can be populated with AT or XT compatible slot connectors.

**PC/104 connector, 64 pins (XT bus) (4)**
All ISA signals of the 8-bit ISA bus are attached to this connector.

PC/104 connector, 40 pins (AT bus extension) (5)
This connector allows extending the ISA bus to 16 data bits and 24 address bits.

Auxiliary connector, 8 or 12 pins (6)
This connector is only effective if certain PC/104 modules are plugged on. An 8-pin or 12-pin connector can be fitted. 8 pins are used to supply the host controller. Contact assignment and physical position of the 8-pin connector correspond to some kind of industry standard, to the additional connector of the so-called MOPS single board computers, manufactured by Kontron. These contacts are used to supply the operating voltages to the PC/104 module. The standard operating voltages are accompanied by an optional battery voltage VBATT. The extension to 12 contacts is used to provide three additional address enable (AEN) signals to the slots of the baseboard (geographical addressing). 8-pin connectors may be available from appropriate manufacturers. 12-pin connectors must be manufactured purposefully (by sawing off an appropriate piece of a standard PC/104 connector).
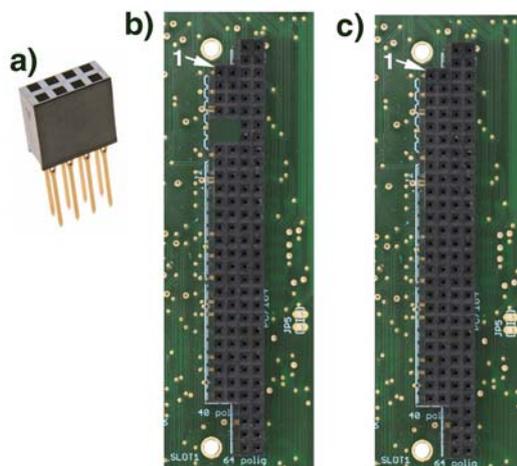
a) 8-pin connector (Harwin)
b) 8-pin connector inserted
c) 12-pin connector.

ATX power supply connector (7)
This 20-pin connector allows employing power supply units manufactured primarily for use in personal computers.

Power supply terminals (8)
This terminal block has a pin pitch of 150 mils = 3.81 mm. Any connector type with appropriate footprint may be inserted. It allows attaching power supply units, which have no ATX-type connector.

Ground test point (9)
A ground test point can be inserted to support oscilloscope attachment and the like.

Battery voltage (VBATT) terminals (10)
Via these terminals, an external battery can be connected. This provision is only of use if the auxiliary connector (4) is inserted and an appropriate PC/104 module is plugged on.

ATX power switch terminals (11)
ATX power supplies require a switch to connect the signal PS_ON# to ground. These terminals allow attaching an external switch, relay contact or the like.

Power LEDs (12)
A light-emitting diode is provided for each operating voltage (+ 5 V, + 12 V, – 12 V, – 5 V).

Internal AT power switch (13)
This switch allows switching ATX-type power supply units in and off without the need to rely on an external switch.

Configuration pin headers (14)
In each of pin headers JP1, JP2, and JP3, one jumper must be inserted to select between bus addressing and geographic addressing. Geographic addressing is only effective if a 12-pin auxiliary connector (4) is inserted and an appropriate PC/104 module is plugged on.

Power Supply

Power must be supplied from outside. A 20-pin connector allows for attaching an ATX-type power supply unit. The board provides a local on/off-switch as well as a terminal block connected to the signal PS_ON#. Additional terminals facilitate connecting arbitrary power sources, including a battery for standby power (VBATT).

All ISA supply voltages are supported: + 5 V, + 12 V, – 12 V, and – 5 V.
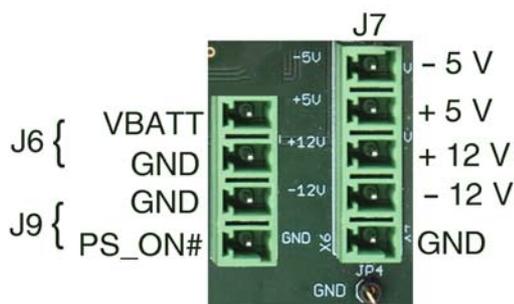
Bus addressing and geographic addressing

Bus addressing
A particular advantage of the bus principle is that each device can be addressed independently of its physical position. To ensure proper operation, each of the devices must have different addresses. Otherwise, an address conflict will occur.

Geographic addressing
Alternatively, each physical position, e.g., each card slot, can be selected by dedicated signals. This principle avoids address conflicts. Cards addressed geographically may occupy the same range of addresses, or addresses may overlap. However, each card will be bound to its particular slot; they cannot be swapped arbitrarily.

Geographic addressing support
The ISA baseboard 14a supports geographic addressing for I/O cycles, provided the host controller is a particular PC/104 module, delivering additional address enable (AEN) signals via the 12-pin auxiliary connector (6). In I/O cycles, a device will claim the bus only if AEN is de-asserted (Low). The PC/104 address enable signal is AEN104. Stacked modules see only this signal. On the baseboard, however, each bus slot can have its own AEN signal. Additional signals AEN1 to AEN3 are delivered via the auxiliary connector.

The addressing of the bus slots is configurable via pin headers JP1, JP2, and JP3:

1. Bus addressing: Insert jumpers so, that all AEN signals are connected to AEN104.

2. Geographic addressing: Insert jumpers so, that the AEN signal of the card slot is connected to the appropriate AENx signal from the auxiliary connector.