

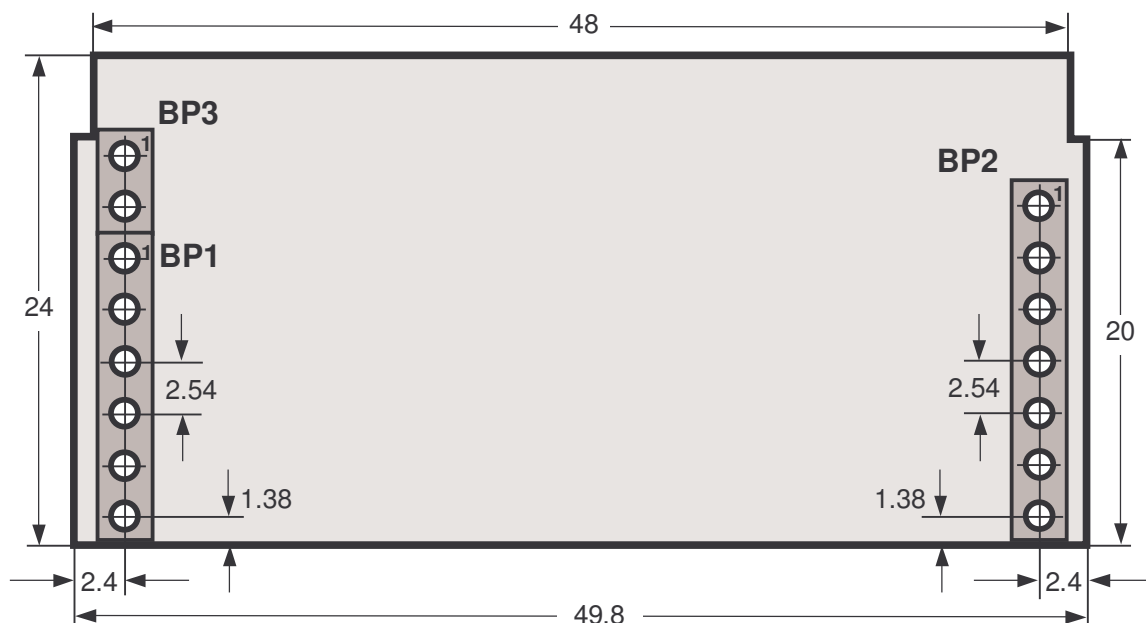
AmbiComp

Sandwich Modules – General Information



Sandwich modules are the basis of an AmbiComp System. They are hardware modules that provide a rich set of functions. Many sandwich modules carry a microcontroller with corresponding BIOS. The necessary software, usually an AmbiComp Virtual Machine (ACVM) and appropriate applications, can be stored in the microcontroller's memory.

This data sheet describes the properties that are common to all sandwich modules.



all measurements in mm

Specification

Types

In general, there are two types of sandwich modules: intelligent ones and those without intelligence.

Intelligent sandwich modules are equipped with at least one microcontroller, which hosts not only a BIOS, but also additional software, either an AmbiComp Virtual Machine (ACVM) and/or other applications. All intelligent sandwich modules have at least two LEDs for status indication.

Connections

The modules are interconnected via a 6-pin pin header connector (BP1) and a 7-pin pin header connector (BP2). An extension foresees another 2-pin connector (BP3).

The usage of the connectors can be grouped into:

- power supply
- AICU bus
- JTAG

The following tables show the meaning of the back plane connectors. The last column indicates which signals belong to the AICU bus.

All logical levels refer to the signal ground. A logical "0" corresponds to the signal ground, a logical "1" corresponds to 3.3 V.

The 4 signals of the AICU bus have to be terminated by a resistor towards + 3.3 V. This task is performed by a primary power supply (see below). The value of this resistor depends on the length of the bus (and with this on the number of sandwich modules connected).

Other connectors, e.g. for applications, are located at the shorter end of the long side of the sandwich module.

Back Plane BP1

Pin	Name	Function	AICU Bus
1	VCC_ALT	Alternative power supply pin of 5 V. This voltage can be fed by a secondary power supply module. A downstream primary power supply module is then fed by this VCC_ALT	-
2	NC	not connected (reserved for future applications).	-
3	/I2C_INT	Interrupt pin for bus events. With a logical 0, an interrupt is requested. Several sandwich modules may use the pin. After interrupt processing, the requester must release the pin (set to logical 1) for new interrupts.	X
4	/RESET	Low active master reset. All intelligent sandwich modules must connect this pin to the reset pin of their controller(s).	X
5	+5 V	5V supply voltage, fed by a primary power supply module.	-
6	+3.3 V	3.3V supply voltage, fed by a primary power supply module.	-

Back Plane BP2

Pin	Name	Function	AICU Bus
1	JTAG_TCK	JTAG Clock (test pin)	-
2	JTAG_TMS	JTAG Test Mode Select (test- pin)	-
3	JTAG_TDO	JTAG Test Data Out (test pin)	-
4	JTAG_TDI	JTAG Test Data In (test pin)	-
5	I2C_SDA	I2C Data (input and output)	X
6	GND	Signal ground	X
7	I2C_SCL	I2C Clock	X

Back Plane BP3

Pin	Name	Function	AICU-Bus
1	0 V	Ground potential of an alternative power supply. This potential is not mandatorily connected with the signal ground.	-
2	VCC_EXT	Optional external power supply pin, supplying a primary power supply module.	-

* I2C is a registered trademark of NXP Semiconductors, Netherlands B.V.

Communication

Communication between the sandwich modules takes place via the AICU bus, which is located on BP1 and BP2.

The physical layer of this bus is based on the I2C-Bus*. Data are exchanged via the link I2C_SDA; a central clock is distributed via I2C_SCL. The maximum clock frequency here is 400 kHz.

In addition, an interrupt (/I2C_INT) and a reset (/RESET) belong to the AICU bus. Both signals are active low.

In cases the AICU bus has to be provided to the external world, an RJ11 connector is defined:

RJ12 Pin	Function
1	I2C_SDA
2	GND
3	I2C_SCL
4	/I2C_INT
5	/RESET
6	AICU

The signal "AICU" (pin 6) indicates to the external world that an AICU is connected and supplied with power (the pin is connected to +3.3 V, otherwise un-

defined). Depending on the case, this pin is used as output, input, or just as an interconnection.

For programming the modules and for debugging, BP2 holds the JTAG signals. During the normal mode of operation, these signals are meaningless. However, to increase mechanical stability, the pin headers can be interconnected between all sandwich modules.

Power Supply

A set of specialized modules is available to supply the sandwich modules with the necessary power. A so-called "primary" power supply supplies the necessary voltages of 3.3 V and 5 V. Both are protected against short circuiting. In an AmbiComp system, only one primary power supply is allowed.

The following sources of power exist:

- an external power connector
- +5 V on the back plane (VCC_ALT)

- supply via the extended back plane (VCC_EXT on BP3)

All primary supply modules have a red LED for status indication.

Form Factor

The size of all modules is 49.8 mm in length and 24 mm in width. For 4 mm of the width, the length is reduced to 48 mm. The height of the modules depends on the components and ranges from 4 mm to 17 mm.

The printed circuit board is 1.5 mm thick. Thus, it can be pushed into a common enclosure.

On page 1, a detailed mechanical layout is shown.

Environmental Conditions

The sandwich modules are usually designed for usage in a dry environment. The range of the temperature is -10 ... +70°C.

The modules are conformant to the RoHS requirements.

Further details can be found in the data sheets of the various sandwich modules.