



# Sam460ex User Guide

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## **ACube Systems S.r.l.**

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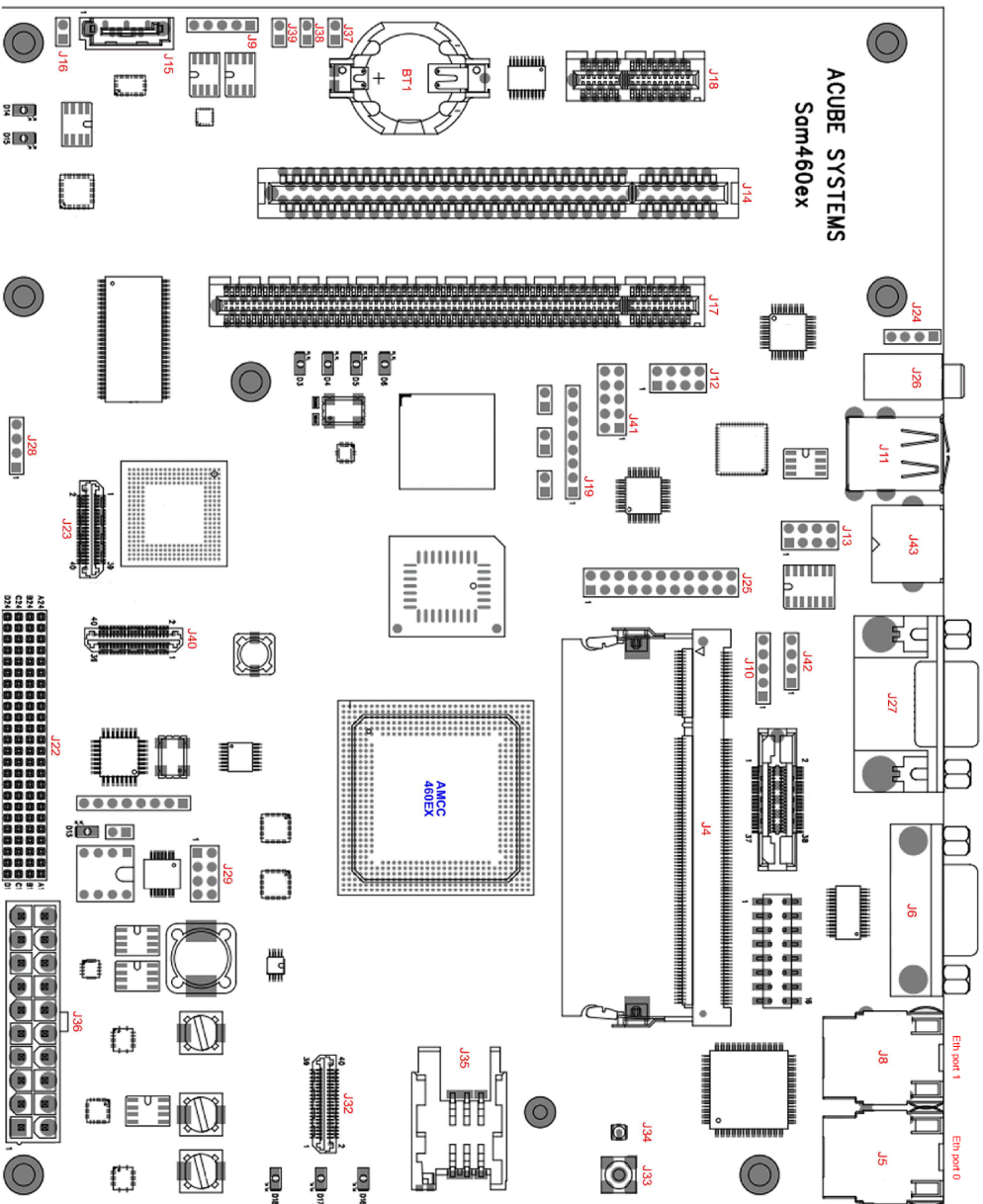
[www.acube-systems.biz](http://www.acube-systems.biz) - [www.sam4x0.com](http://www.sam4x0.com)

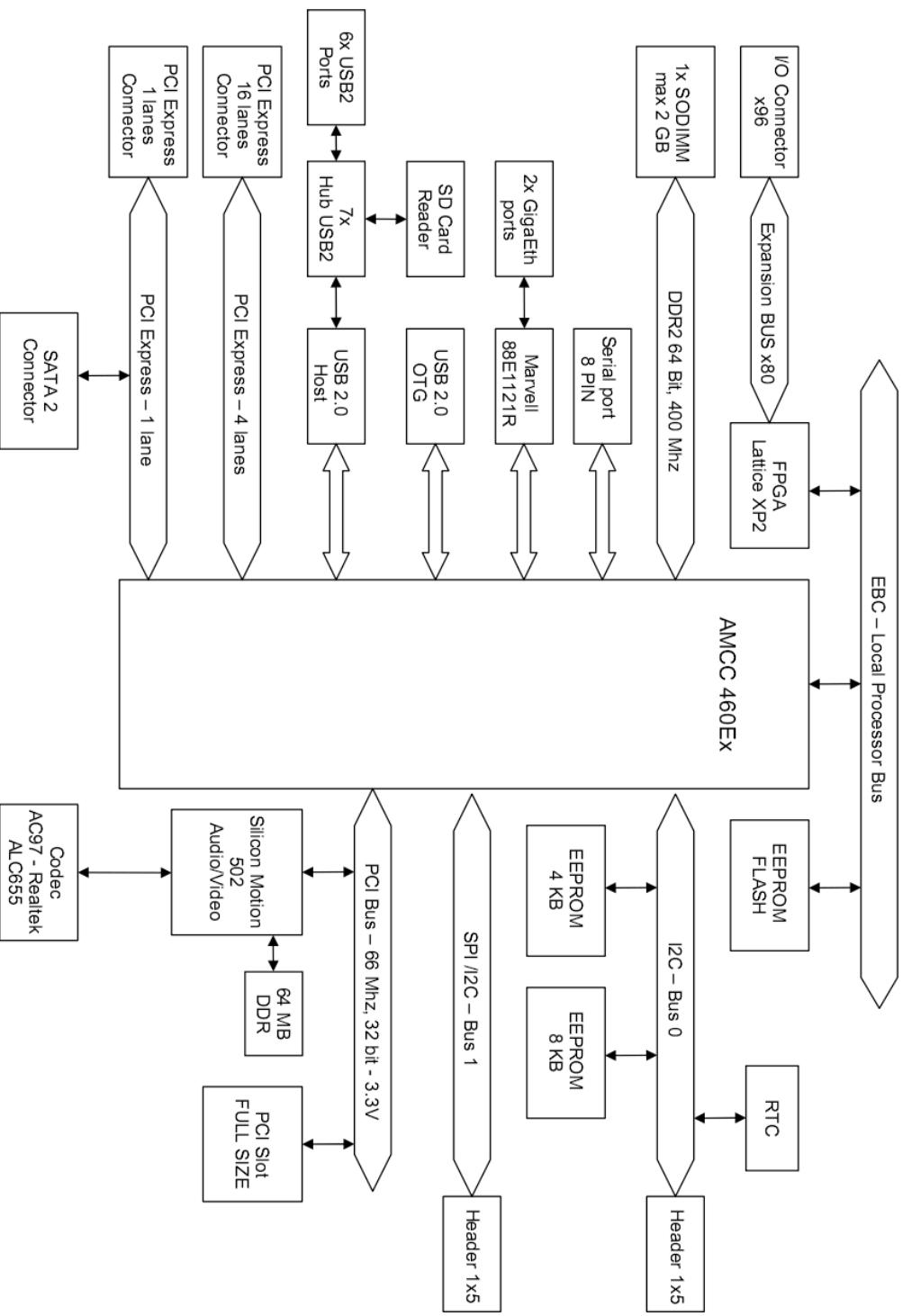
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# ACUBE SYSTEMS Sam460ex





## Introduction

Your Sam460ex board is ready to go.

Just connect a hard drive, monitor, mouse and keyboard, and switch it on!

It can be housed into a flex-ATX, micro-ATX or full ATX computer case.

The use of a good quality ATX power supply is strongly advised for a correct operation of the board.

## Sam460ex Hardware Specifications

- flex-ATX form factor (21.6 x 17 cm)
- 8 layers PCB
- AMCC 460ex SoC – upto 1.150 Ghz
- max 2 GB DDR2 Ram – 200-pin SODIMM
- Silicon Motion SM502 embedded MoC (audio/video) max 64MB Gfx RAM
- Audio 5.1 Realtek ALC655 codec
- PCI-express 4x lanes slot (16x mechanical connector)
- PCI-express 1x lane slot (\* check notes)
- PCI slot, 32 bits, 33/66 Mhz, 3.3V
- 1x SATA2 port (\* check notes)
- 6x USB2 EHCI/OHCI ports + 1 USB1.1 port
- 1x 10/100/1000 Ethernet port (another 10/100/1000 Ethernet port is optional)
- Lattice XP2 FPGA with 80 I/O pins expansion connector (connector is optional)
- UMTS/GSM module (optional requires add-on card)
- 512 MB NAND Flash (optional)
- integrated SD card reader
- RTC clock
- Serial port, 8-wires
- I2C and SPI/I2C buses
- passive cooling
- U-Boot 2010.06

## Connectors

**Case panel connector** (near the ATX Power connector) - J29

1-2 HD led  
3-4 Power led  
5-6 Power Switch  
7-8 Reset Switch

**Note:** on computer cases with a single switch off/reset button, connect the button to pins 5-6 on J29. To reset the board, press shortly the button. To switch it off, keep pressed the button for 2-3 seconds.

**ATX Power connector** - J36

**RAM** (DDR2 - 200-pin SODIMM) max 2 GB – J4 (we suggest the use of a 667/800 Mhz module)

USB

- J11 - External USB ports (EHCI/OHCI)
- J12, J13 - Internal USB ports (EHCI/OHCI)
- J28 - Internal USB Port (OHCI)

J12a (port 3)	1 – VCC	J12b (port 4)	2 – VCC	J13a (port 5)	1 – VCC	J13b (port 6)	2 – VCC	J28 (port 7)	1 – VCC
	3 – D-		4 – D-		3 – D-		4 – D-		2 – D-
	5 – D+		6 – D+		5 – D+		6 – D+		3 – D+
	7 – GND		8 – GND		7 – GND		8 – GND		4 – GND

Video

- J23 - LVDS
- J27 - VGA
- J40 - Zoom Video port
- J42 - add-on card
- J43 - SVideo in-out (requires add-on card)

Audio

- J24 - Audio in (DVD/CD)
- J25 - Audio expansion port

1 – 3.3 V	2 – 5 V
3 – SPDIFI	4 – SPDIFO
5 – MIC1	6 – LINE_IN_L
7 – JD0	8 – JD2
9 – MIC2	10 – LINE_IN_R
11 – SURR_L	12 – PCIM_OUT
13 – SURR_R	14 – PCIM_IN
15 – AUX_L	16 – CEN_OUT
17 – AUX_R	18 – LFE_OUT
19 – FMIC	20 – VREFOUT
21 – GND	22 – GND

- J26 - Audio out (stereo jack)
- J41 - Audio front panel AC97

1 - Mic	2 - GND
3 - VREF OUT	4 - NC
5 - Right	6 - Line in L
7 - NC	8 - NC
9 - Left	10 - Line in R

Ethernet

- J5, J8 - Dual 10/100/1000 Ethernet ports

SATA2

- J15 - SATA2 port
- J16 - SATA2 or PCI-e 1x selector

Miscellaneous

- J6 - Serial port (8-wires)
- J9 – I2C bus port
- J10 - SPI/I2C bus port

1 – SCLK	1 – I2C SCLK / SPI SCL
2 – 3.3V	2 – 3.3V
3 – SDATA	3 – I2C SDATA / SPI SDA
4 – GND	4 – GND
5 – NC	5 – SPI SDO

J19 - Lattice XP2 FPGA JTAG

J22 - Lattice XP2 FPGA expansion connector (80 I/O pins available)

J31 - SD card: (solder side)

J32 - UMTS module

J33, J34 - Antenna (UMTS)

J35 - SIM socket (UMTS)

J37 - service (factory setting: open)

J38 - service (factory setting: closed)

J39 - service (factory setting: closed)

## Boot

The current U-Boot version supports booting from the following devices:

- SATA hard disk connected on the onboard SATA2 controller port J15 (\* check notes)
- PATA hard disk and/or DVD connected to a Silicon Image 0680 controller on PCI slot (\*)
- SATA hard disk and/or DVD connected to a Silicon Image 3512 controller on PCI slot (\*)
- SATA hard disk and/or DVD connected to a Silicon Image 3114 controller on PCI slot (\*)
- USB mass storage
- internal SD card reader J31
- Network

(\*) check page 7 on how to recognize a suitable PCI card for your Sam460ex

## Video output

The current U-Boot version supports video output from:

- onboard SM502 VGA port
- Radeon card on PCI slot
- Radeon card on PCI-Express slot

To change the preferred video output, select it from the “Video Option” U-Boot menu.

To suppress most of the boot messages, select “Silent” in the “Console” U-Boot menu.

## Notes

**1** - the SATA2 port and the PCI-e 1x slot are mutually exclusive, only one of them can be used at a time:

- to use the SATA2 port, close **J16** with a jumper, and select the corresponding entry in the "PCI-E 1x / SATA-2" U-Boot menu.
- to use the PCI-e 1x slot, remove the **J16** jumper, and select the corresponding entry in the "PCI-E 1x / SATA-2" U-Boot menu.

**A reboot is required.**

**2** - the Sam460ex board is built to work standalone in a fanless environment but particular care must be taken when housing the board in a closed metallic cabinet with other electronic devices (such as hard drives, CD/DVD, DC-DC converter etc..)

In these cases, ensure to have free circulation of fresh air inside the cabinet, via holes or a small fan.

**3** - when using a PCI-Express graphic card, we suggest to use a Radeon HD2400 or newer models. Older models like X600, X800 are not fully compatible with the Sam460ex and may not work. Some X1550 cards are reported to work OK.

**4** – after switching OFF the board, it's **strongly advised** to wait at least **15 seconds** before switching it ON again, otherwise the onboard devices may not work correctly. The current firmware doesn't allow to switch on the board again after 3 seconds.

**5** – the onboard graphic card has a maximum resolution of 1280x1024 pixels (4:3) or 1440x900 pixels (16:9).

Supports DDC, 2D hardware acceleration, hardware sprites (3 colors) and PIP.

There is no support for 3D or compositing.

Some operating systems may limit the color resolution to 8 and 16 bits.



## Frequently Asked Questions

### **How to use more than one SATA drive?**

The Sam460ex is made both for embedded and consumer markets. It can be adapted to different needs. As an example, a customer who wants a board for home use will probably choose to add a SATA controller on a PCI card. This will allow up to four SATA drives. ACube may provide such expansion boards.

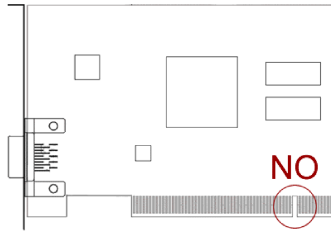
### **How can the operating system be loaded?**

It is possible to load the operating system from a PATA/SATA harddisk, a CDROM connected on PATA/SATA, an USB key, a SD card or from the network.

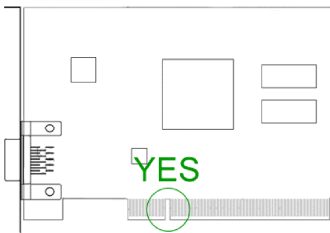
### **How to enable DMA for SATA devices?**

Check the documentation which comes with the operating system on how to enable DMA for SATA devices. By default, all devices are set to PIO mode (slow).

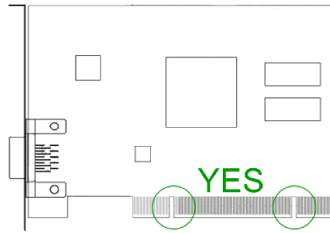
**Warning:** the PCI slot is compatible with 3.3V PCI card **only**. Inserting a 5.0V PCI card will damage the Sam460ex board !!  
Do not try to reverse a 5.0V PCI board to fit it into the 3.3V PCI slot, it will damage your board !!



5V compatible PCI card – DON'T use it



3,3V compatible PCI card – OK



3,3V and 5V compatible PCI card – OK



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