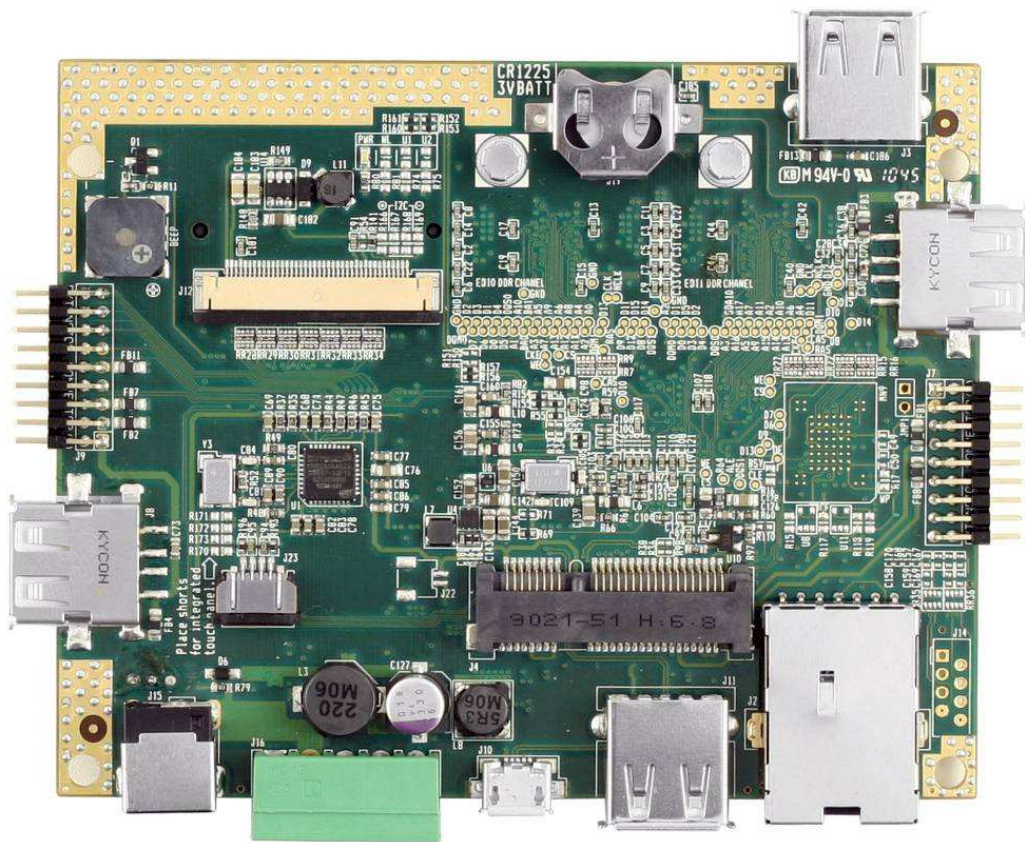


pico-SAM9G45

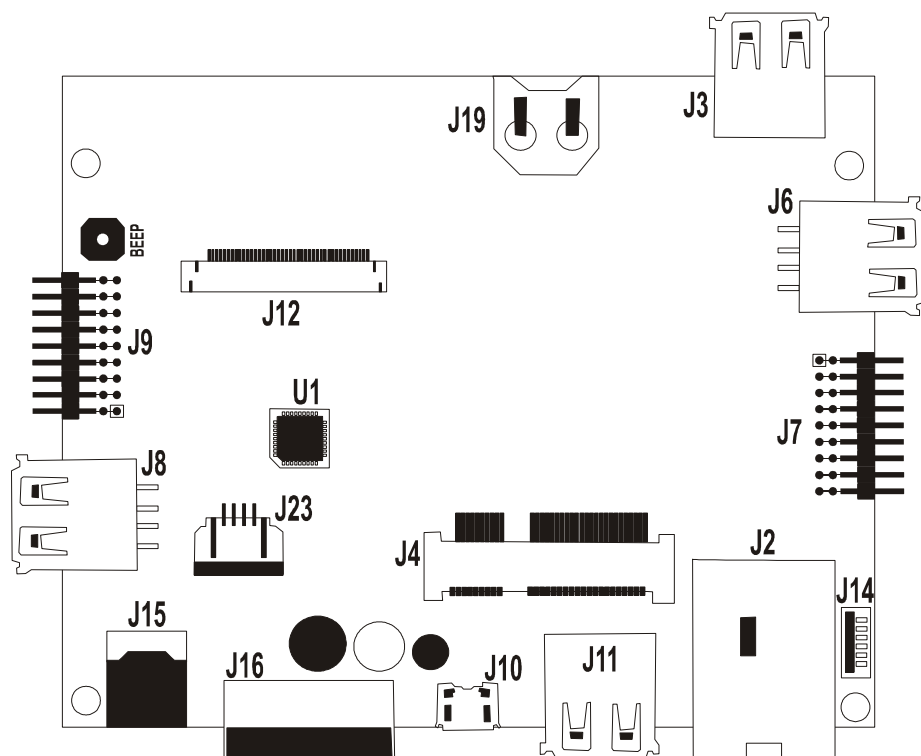
System board



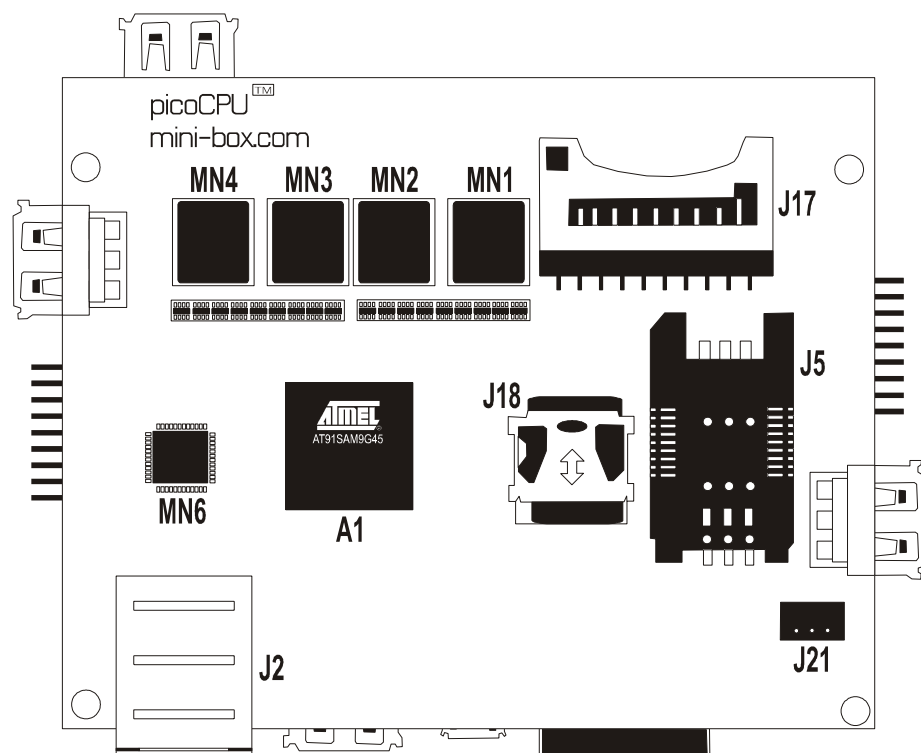
Reference manual
Rev. 1.j

Layout Views

Layout top view



Layout bottom view



Legend:

J2 – Ethernet port	J12 – ZIF connector for the LCD	U1 – USB HUB SMSC chip
J3 – USB 2.0	J14 – Keypad connector	BEEP – PWM driven Beeper
J4 – miniPCI-e slot	J15 – DC IN 5V	MN1 to MN4 – DDR2 memory modules
J5 – SIM card slot	J17 – SD Card slot	MN6 – 10/100 Fast Ethernet chip
J6 – USB 2.0	J16 – Analog input ports	
J7 – I/O interface connector	J18 – microSD card slot	
J8 – USB 2.0	J19 – RTC battery	
J9 – I/O interface connector	J21 – Power	
J10 – microAB USB OTG	J23 – Touch panel connector	
J11 – USB 2.0	A1 – ATMEL AT91SAM9G45 CPU	

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1. Description

pico-SAM9G45 is highly extensible and permits adding many features and interfaces.

This system board is at the core of a series of small, low cost systems with touch screen displays, oriented towards modular hardware I/O configurations.

2. Features

- ARM9, 400Mhz, ARM926EJ-S, 32/32K
- 256Mb DDR2-667MHz
- 4 USB 2.0 ports 480Mbps
- 1 microAB USB OTG port
- 10/100 Mbps Ethernet
- 1 bootable microSD card slot
- 1 SD card slot
- 1 SIM card slot
- Buzzer
- Power: 5V DC from via microUSB connector
- Power ranging from 6-40V via barrel power connector
- Operating temperature: -10 to 65 Degrees C
- High endurance ceramic and SP capacitor power design
- Expansion header for SPI, I2C, RS232
- Native support 480 x 272 LCD (higher resolutions possible)
- WIFI support via miniPCI-e with USB
- pico-ITX screw mount compatible (100x80mm)
- Plastic enclosure with multiple mounting options (sold separately)
- Ideal for development or OEM use.
- Linux and Android OS support.

2.1 Processor

The pico-SAM9G45 system board has Atmel's SAM9G45 that integrates many hardware peripherals such as High Speed (480 Mbps) USB Device and Host with transceivers, a 10/100 Mbps Ethernet controller, an LCD controller, a camera interface and several communication peripherals such as USART, Serial Synchronous Controllers and Two Wire Interface. All these peripherals are DMA oriented, reducing the CPU overload.

2.2 Memory

The pico-SAM9G45 board has 4x64Mb DDR2-667MHz memory chips soldered on-board.

2.3 USB and micro-USB

The pico-SAM9G45 features multiple USB communication ports. Consult schematic, view the USB/Mini-PCI section for more detail. Please note that all ports share the same 480Mbps USB bus.

- Four Host Ports: Full speed OHCI and High speed EHCI
- miniPCI-e connector (only with USB support)
- One USB Host/Device interface micro AB connector

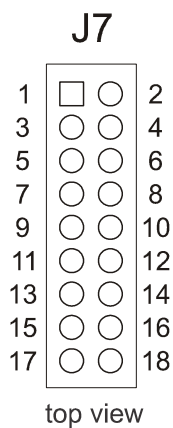
2.4 Power

The pico-SAM9G45 dev. board can be powered from a DC 6-40V power supply via the external Power supply capable of mating a 5/2.5mm barrel connector. Alternatively the board can be powered via a 5V USB-OTG cable, plugged into the micro AB USB connector.

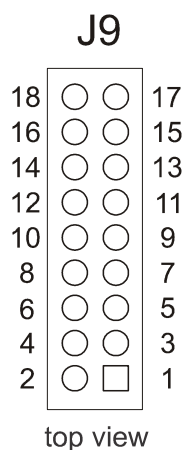
NOTE: A laptop or desktop USB connector might not be able to power the pico-SAM9G45 board.

2.5 Extensions pin-out

I/O interface connectors



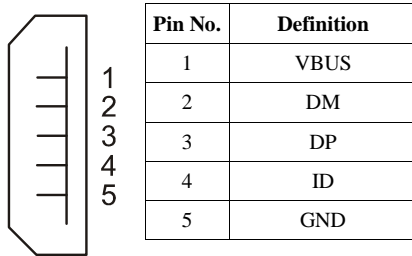
Pin No.	Definition	Pin No.	Definition
1	5V_FB_J7	2	RXD0
3	5V_FB_J7	4	TXD0
5	GND_FB_J7	6	GND_FB_J7
7	TWD0	8	TWCK0
9	3.3V_FB_J7	10	3.3V_FB_J7
11	TXD1	12	SPI0_SCLK
13	RXD1	14	SPI0_MOSI
15	CTS1	16	SPI0_MISO
17	RTS1	18	SPI0_CS0



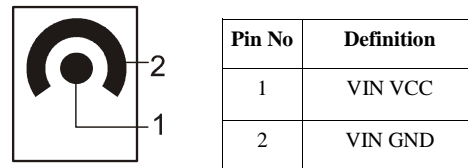
Pin No.	Definition	Pin No.	Definition
1	5V_FB_J9	2	X
3	5V_FB_J9	4	X
5	GND_FB_J9	6	GND_FB_J9
7	TWD1	8	TWCK1
9	3.3V_FB_J9	10	3.3V_FB_J9
11	TXD2	12	SPI1_SCLK
13	RXD2	14	SPI1_MOSI
15	CTS2	16	SPI1_MISO
17	RTS2	18	SPI1_CS0

NOTE: The right side I/O interface connector (**J7**) can be used for attaching debugging boards.

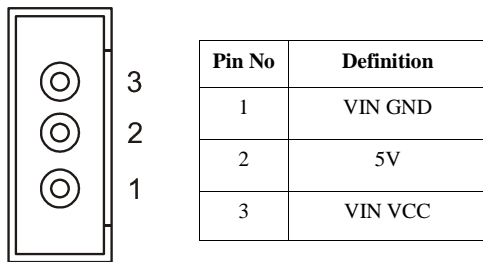
microAB USB header (**J10**)



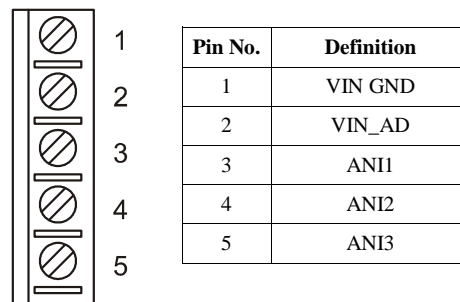
DC Jack (**J15**)



Back Power (**J21**)



VIN/ANI (**J16**)



Please consult the [schematics](#) for detailed pin-out information.

2.5.1 How to connect pico-SAM9G45 to a computer serial port.

Connect a serial Cross Cable (Female-Female) from your computer serial port to a TTL to RS232 converter, which will be inserted in the **J7** connector on the pico-SAM9G45 board.

Open a serial terminal emulator, like [HyperTerminal](#) (on Windows OS), [minicom](#) (on Linux OS) and set the following serial communication parameters:

Bits per second: 115200

Data bits: 8

Parity: None

Stop bits: 1

Flow Control: None

An example of TTL to RS232 converter is:

[TTL-232R-5V-PCB](#)

2.6 miniPCI-express

The miniPCI express card accepts only USB based devices. It is fully compatible with USB-only devices such as WIFI cards, Bluetooth or 3G modem cards. The SIM card is connected to this miniPCI connector.

2.7 SIM card

The SIM card slot has integrated UART and USB signals. Customer can attach 3G module, GPRS module and other mini-PCI devices to this interface.

2.8 microSD and SD

The both microSD and SD card slots are positioned on the back side of the pico-SAM9G45 board.

NOTE: Only the microSD card can be used for booting the operating system, such as Armstrong Linux distribution. See [chapter 3](#).

2.9 microSD card installation instructions

The microSD card needs special attention when installing the 1st time. Please follow these 3 simple steps in order to insert a microSD card.

- 1) Lift hinge (if hinge is locked you need to unlock it by moving the hinge right/left)
- 2) Insert microSD into the hinge with gold-contacts facing the PCB.
- 3) Close hinge and lock.

2.10 Ethernet

The Ethernet interface integrates an RJ45 connector with an embedded transformer, and three status LEDs. The Ethernet interface provides two selectable modes, MII or RMII (Reduced MII), for 100Base-Tx or 10Base-Tx. The MII and RMII interfaces are capable of both 10Mb/s and 100Mb/s data rates as described in the IEEE 802.3u standard

2.11 Battery and RTC

The pico-SAM9G45 works with 3V 50mah CR1225 Lithium Coin Cell Batteries

This battery is not required for the board to start up. If you need RTC you need to use this battery.

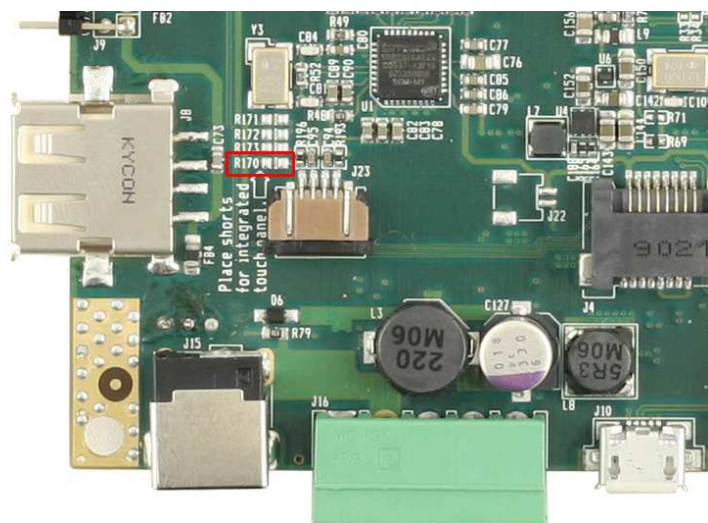
2.12 ZIF connector for LCD

Setup solutions:

a) The default setup is for a LCD connected to 40 pin ZIF connector (**J12**) and a separate touch panel. The touch panel will be connected through the 4 pin ZIF connector (**J23**).

b) There is also possible to use a standard 4.3" LCD with integrated resistive touch panel. Enabling this solution needs to soldering four 00Ohm, 0603 sized, SMD resistors (R170, R171, R172, R173) at exact positions indicated in the figure. This operation may need some soldering skills and a very fine soldering iron to be used.

NOTE: the two different setup solutions (separate touch panel - default, and integrated touch panel - optional) are EXCLUSIVE to each other.



3. Linux and Android OS

In addition, the board supports Linux and Android OS and offers plenty of example applications, making it easy to develop your project based on the Atmel AT91SAM9G45 processor.

A basic Linux image containing Angstrom distribution can be downloaded from [here](#). Minimum 256Mb microSD card and a compatible card reader are required for Angstrom installation.

Android image for pico-SAM9G45 based on 2.1 Eclair Android release, includes support for Ethernet, USB WiFi, USB Bluetooth, can be downloaded from [here](#). Minimum 256Mb microSD card and a compatible card reader are required for Android installation.

How to write the system image to the microSD card:

- 1) Mount the SD card on your computer using a Card Reader.
- 2) If you're on a UNIX operating system use "[dd](#)" command to unzip the linux image on you SD card, or you can use [WinImage](#) to do the same thing on Windows OS.
- 3) Plug the SD card in the pico-SAM9G45 dev board slot and power up the board.

WIFI chipset compatibility

The following WIFI chipsets have been tested and found to be working on our Android OS release build:

- RALINK: RT25671(W), RT2572, RT2573, RT2671
- REALTEK: RTL8712U (RTL8192SU), RTL8187(L)

Examples of WIFI USB dongles using this compatible chipsets:

- D-Link DWA-131 WIRELESS N NANO USB ADAPTER
- TP-LINK 54Mbps/TL-WN321G
- Premiartek PT-H5D-L 54 Mbps 802.11g Wireless LAN USB 2.0 Adapter

4. Support

Shipping and storage: Temperature -40 to +85 degree centigrade.
Relative humidity 5 to 95 percent, non-condensing.

Warranty

1 Year Limited Warranty statement

Support

Web Site: <http://www.mini-box.com/pico-SAM9G45-X>

Email: support@mini-box.com

Wiki page: <http://arm.mini-box.com>