# Hardware Documentation

## *PicoCOMA9X*

Version 1.3
(2018-03-13)



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# History

| Date | V | Platform | A,M,R | Chapter | Description | Au |
|---|---|---|---|---|---|---|
| 2016-12-14 | 1.0 | PicoCOMA9X | | * | New document | KW |
| 2017-02-02 | 1.1 | PicoCOMA9X | A | *3.3, 4.5 | Add comments for VBUS pin USB CNX | KW |
| 2017-03-24 | 1.2 | PicoCOMA9X | M | 4.1 | Added two notes for 18Bit mode. | HF |
| 2018-03-13 | 1.3 | PicoCOMA9X | M<br>R<br>A | 3.3<br>4.11<br>4.14, 4.15 | Correct some PU<br>Remove mounting option<br>Add NAND, RTC | KW |

| | |
|---|---|
| V | Version |
| A,M,R | Added, Modified, Removed |
| Au | Author |

# Table of Contents

# 1 Dimension

| | |
|---|---|
| Board thickness: | 1.6 mm ±10% |
| Max. Height of parts on top side: | 3.0 mm |
| Max. Height of parts on bottom side (without connectors): | 2.0 mm |
| Pin pitch of connector: | 0.8 mm |
| Mounting hole diameter | 2.8 mm |

Mounting holes are isolated from signal ground

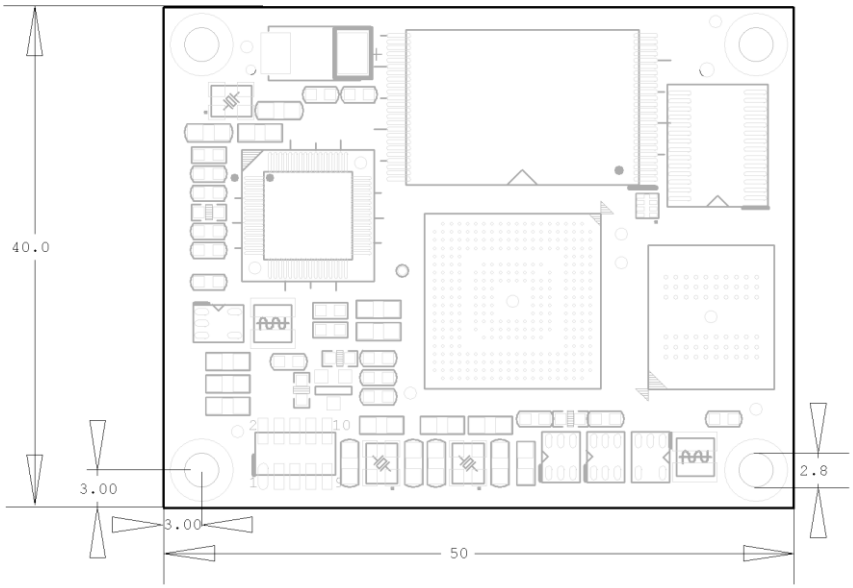



Figure 1: Top view

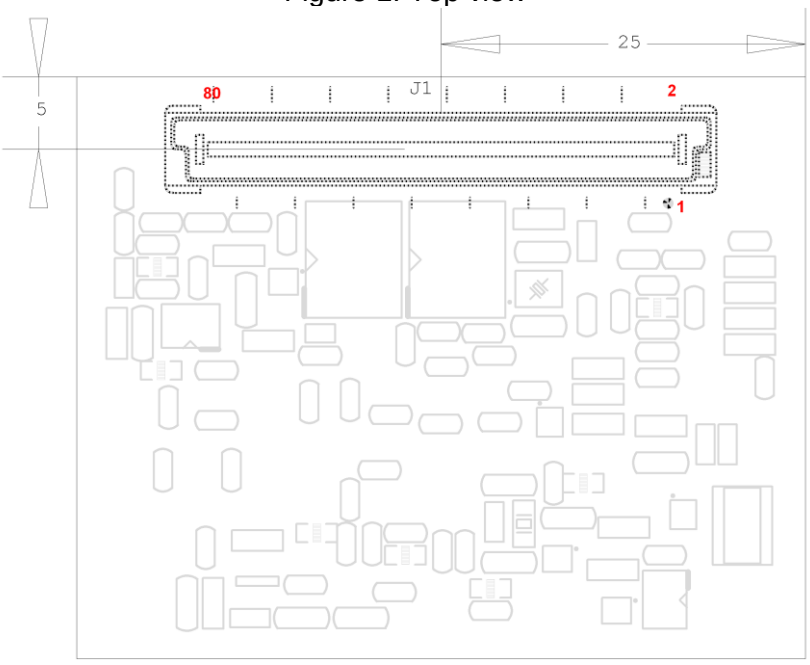



Figure 2: Bottom view

# 2 Technical Data

## 2.1 Interface connector

The PicoCOM is equipped with a
TycoElectronics 5177984-3 (80 pin, 0.8mm)
Connector from '0.8mm Free Height (FH) Connectors' series.

Matching connectors are:

| | | |
|---|---|---|
| 5mm stacking height: | TycoElectronics | 5177983-3 |
| 9mm stacking height: | TycoElectronics | 5-5179009-3 |
| 13mm stacking height: | TycoElectronics | 5-5179010-3 |

## 2.2 Feature list

| | |
|---|---|
| Power Supply: | +3.3V DC / ±5% |
| Inputs/Outputs: | max. 48 I/O<br>(alternative with interfaces allocated) |
| Interfaces: | 1x Ethernet 10/100Mbit (opt. 2x, mounting option)<br>2x Serial (optional 3x; for RS232/RS485 with 3.3V-level)<br>1x USB2.0 Host HS (High Speed 480Mbit/s)<br>1x USB2.0 Device HS (High Speed 480Mbit/s)<br>1x I2C (opt. 3x)<br>1x SPI<br>1x CAN2.0 (opt. 2x)<br>1x SD-Card-Slot Interface<br>1x Audio (Line in/out, analogue)<br>1x 4 wire touch input, resistive |
| LCD-interface: | TFT up to 1024x768 pixel, 16/18 bit |
| RAM: | 512 MByte DDR3 SDRAM |
| Flash: | 256 MByte Flash |
| CPU: | Freescale iMX6SX CPU |
| Operating Temperature: | 0°C ... +70°C<br>(optional –25°C … +85°C) |
| Dimensions: | 40 x 50 x 10 mm (l x w x h) |
| Weight: | 15 gr. |

# 3 Connectors

## 3.1 Counting of the connector pins

The connector plug of PicoCOM will be treated as follows.

**Pin 1 is muaarked on chapter 1**

Dimension. The row with pin1 contains all odd-numbered pins (1, 3, 5, 7 etc.), and corresponding to this, the row without pin 1 contains all even-numbered pins (2, 4, 6, 8 etc.).

## 3.2 IO-Pin limitations

PicoCOMA9X is equipped with 48 pins that can be used as digital-IO. Most of these pins are multiplexed, so you have to make sure that these pins are used for one purpose only. For example, if you intend to use IO0 to IO3 you have to make sure that the COM2 is disabled.
Additionally there are some IO-Pins which are used internally and whose primary function can't be disabled completely. These pins may carry active signals while the device is booting, which must be kept in mind when connecting external hardware. For example even if you want to use IO14 to IO19 in your application these pins are configured for SD/MMC usage for a short period of time by the boot program to enable booting from SD-Card. Pins that could toggle during boot are tagged in the following table.

## 3.3 Connector J1

| J1 | | | | |
|---|---|---|---|---|
| **Pin** | **Signal** | **PU/PD on module [6)]** | **Default Interface** | **Starter-Kit Interface** |
| 1 | LAN0_TX- | | Ethernet0 TX- | Ethernet0 TX- |
| 2 | LAN0_RX- | | Ethernet0 RX- | Ethernet0 RX- |
| 3 | LAN0_TX+ | | Ethernet0 TX+ | Ethernet0 TX+ |
| 4 | LAN0_RX+ | | Ethernet0 RX+ | Ethernet0 RX+ |
| 5 | V33 | | +3.3V +-5% DC | +3.3V +-5% DC |
| 6 | V33 | | +3.3V +-5% DC | +3.3V +-5% DC |
| 7 | GND | | Ground | Ground |
| 8 | GND | | Ground | Ground |
| 9 | VBAT | | +3..+3.6V DC<br>(RTC backup battery) | +3..+3.6V DC<br>(RTC backup battery) |
| 10 | nRES | PU 10k | Reset In (open drain) | Reset In (open drain) |
| 11 | IO47 [2)] | | IO47 | IO47/ CTS1 |
| 12 | IO48 [2)] | | IO48/SDHC_CDn | IO48 |
| 13 | IO0 [2)] | | IO0 | TxD2 |
| 14 | IO1 [2)] | | IO1 | RxD2 |
| 15 | IO2 [2)] | | IO2 | RTS2/ TxD3 |
| 16 | IO3 [2)] | | IO3 | CTS2/ RxD3 |
| 17 | IO4 [1)] | | COM1 TXD | TxD1 (standard debug port) |
| 18 | IO5 [1)] | | COM1 RXD | RxD1 (standard debug port) |
| 19 | HDPA | | USB Host 1 + | USB Host 1 + |
| 20 | HDMA | | USB Host 1 - | USB Host 1 - |
| 21 | DDP | | USB Device + | USB Device + |
| 22 | DDM | | USB Device - | USB Device - |

| J1 | | | | |
|---|---|---|---|---|
| **Pin** | **Signal** | **PU/PD on module [6]** | **Default Interface** | **Starter-Kit Interface** |
| 23 | IO6 [9] | | USB CNX (input 5V) | USB CNX (detection, input 5V) |
| 24 | IO7 | | USB PWR (output) | USB PWR (output) |
| 25 | GND | | Ground | Ground |
| 26 | IO8 | | SPI MISO | SPI MISO |
| 27 | IO9 [2] [8] | | SPI MOSI | SPI MOSI |
| 28 | IO10 [2] | | SPI SPCK | SPI SPCK |
| 29 | IO11 [2] [8] | | SPI PCS0 | SPI PCS0 |
| 30 | IO49 [2]<br>CAN0_TX<br>I2C1_SDA [7] | | CAN0_TX | CAN_TX |
| 31 | IO50 [2]<br>CAN0_RX<br>I2C1_SCL [7] | | CAN0_RX | CAN_RX |
| 32 | IO12 [2]<br>I2C4_SDA<br>CAN1_TX [7] | | I2C1 SDA | I2C1 SDA |
| 33 | IO13 [2]<br>I2C4_SCL<br>CAN1_RX [7] | | I2C1 SCL | I2C1 SCL |
| 34 | IO14 [2] | | SD DAT0 | SD DAT0 |
| 35 | IO15 [2] | | SD DAT1 | SD DAT1 |
| 36 | IO16 [2] | | SD DAT2 | SD DAT2 |
| 37 | IO17 [2] | | SD DAT3 | SD DAT3 |
| 38 | IO18 [2] | | SD CLK | SD CLK |
| 39 | IO19 [2] | | SD CMD | SD CMD |
| 40 | IO20 [2] | | IRQ0 | IRQ0 |
| 41 | IO21 [2]<br>ELED1 [5] | | PWM1<br>LINKLED Ethernet1 | IO21 |
| 42 | GND | | Ground | Ground |
| 43 | IO22 [3] | | LCD0 (R1) | LCD-R0 |
| 44 | IO23 [3] | | LCD1 (R2) | LCD-R1 |
| 45 | IO24 [3] | | LCD2 (R3) | LCD-R2 |
| 46 | IO25 [3] | | LCD3 (R4) | LCD-R3 |
| 47 | IO26 [3] | | LCD4 (R5) | LCD-R4 |
| 48 | IO27 [3] | | LCD5 (G0) | LCD-G0 |
| 49 | IO28 [3] | | LCD6 (G1) | LCD-G1 |

| J1 | | | | |
|---|---|---|---|---|
| **Pin** | **Signal** | **PU/PD on module [6)]** | **Default Interface** | **Starter-Kit Interface** |
| 50 | IO29 [3)] | | LCD7 (G2) | LCD-G2 |
| 51 | IO30 [3)] | | LCD8 (G3) | LCD-G3 |
| 52 | IO31 [3)] | | LCD9 (G4) | LCD-G4 |
| 53 | IO32 [3)] | | LCD10 (G5) | LCD-G5 |
| 54 | IO33 [3)] | | LCD11 (B1) | LCD-B0 |
| 55 | IO34 [3)] | | LCD12 (B2) | LCD-B1 |
| 56 | IO35 [3)] | | LCD13 (B3) | LCD-B2 |
| 57 | IO36 [3)] | | LCD14 (B4) | LCD-B3 |
| 58 | IO37 [3)] | | LCD15 (B5) | LCD-B4 |
| 59 | IO38 [3)] | | LCDCLK | LCD-SHIFT |
| 60 | IO39 [3)] | | LCDDEN | LCD-M |
| 61 | GND | | Ground | Ground |
| 62 | GND | | Ground | Ground |
| 63 | IO40 [3)] | PD 100k | LCD16 (HSYNC/B0) | LCD-LINE |
| 64 | IO41 [3)] | PD 100k | LCD17 (VSYNC/R0) | LCD-FRAME |
| 65 | IO42 [2)] | | LCDCC (PWM) | VEEK |
| 66 | IO43 [2)] | PU 10k [8)] | LCDPOWn | LCD Power on (low active) |
| 67 | IO44 [2)] | PU 10k [8)] | BLPOWn | Backlight Power on (low active) |
| 68 | IO45 [2)] | | LCDENA | LCD Enable (not used on TFT) |
| 69 | IO46 [2)] | | COM1 RTS | RTS1 |
| 70 | ELED0 | | LINKLED Ethernet0 | Ethernet LED0 |
| 71 | TSPX | | Touch X+ | TSPX |
| 72 | GND | | Ground | Ground |
| 73 | GND | | Ground | Ground |
| 74 | TSMX | | Touch X- | TSMX |
| 75 | TSPY | | Touch Y+ | TSPY |
| 76 | TSMY | | Touch Y- | TSMY |
| 77 | LOUT<br>*LAN1_TX-* [5)] | | Line Out Left<br>*Ethernet1 TX-* | Line Out Left |
| 78 | ROUT<br>*LAN1_RX-* [5)] | | Line Out Right<br>*Ethernet1 RX-* | Line Out Right |
| 79 | LIN<br>*LAN1_TX+* [5)] | | Line In Left<br>*Ethernet1 TX+* | Line In Left |
| 80 | RIN<br>*LAN1_RX+* [5)] | | Line In Right<br>*Ethernet1 RX+* | Line In Right |

*Table 1: J1 - main connector*

[1] These IO-Pins are active signals during boot. Don't drive during boot process.
[2] These IO-Pins can be reconfigured as GPIO.
[3] If display is not used all these IO-Pins can be reconfigure as GPIO together
[5] Mounting option for 2nd LAN instead Audio
[6] Mounted on HW. Some additional PU/PD can be switched on by software. Please refer SW manual or ask our support team.
[7] Alternate pin configuration function in software. Please refer the software manual or ask our technical support. I2C0 can only used on one pair of pins at the same time (identical hardware block), I2C1 also. There is no compatibility to other picoCOM using this alternative function.
[8] From HW version 1.2 on.IO9 and IO11 are exchanged on HW Rev 1.1
please refer chapter 4.6 SPI Interface
[9] connect directly to VCC pin of USB device connector without serial resistor!
All digital signals does have 3.3V logic compliant level.
See starterkit documentation for connection examples.

# 4 Interface and signal description

## 4.1 LCD-Connection

All signals are working with 3.3V logic pegel. For all LCD signals we strictly recommend serial resistors or filter nearby the module connector to reduce EMI.

| | TFT | | | | |
|---|---|---|---|---|---|
| **Pin** (80 Pin, J1) | **Signal** | **18 bit (without HSYNC/VSYNC)[1]** | **18 bit (with HSYNC/VSYNC)[2]** | **16 bit** | **15 bit** |
| 43 | LCD0 | R1 | R1 | R0(LSB) | R0(LSB) |
| 44 | LCD1 | R2 | R2 | R1 | R1 |
| 45 | LCD2 | R3 | R3 | R2 | R2 |
| 46 | LCD3 | R4 | R4 | R3 | R3 |
| 47 | LCD4 | R5(MSB) | R5(MSB), R0(LSB) | R4(MSB) | R4(MSB) |
| 48 | LCD5 | G0(LSB) | G0(LSB) | G0(LSB) | --- |
| 49 | LCD6 | G1 | G1 | G1 | G0(LSB) |
| 50 | LCD7 | G2 | G2 | G2 | G1 |
| 51 | LCD8 | G3 | G3 | G3 | G2 |
| 52 | LCD9 | G4 | G4 | G4 | G3 |
| 53 | LCD10 | G5(MSB) | G5(MSB) | G5(MSB) | G4(MSB) |
| 54 | LCD11 | B1 | B1 | B0(LSB) | B0(LSB) |
| 55 | LCD12 | B2 | B2 | B1 | B1 |
| 56 | LCD13 | B3 | B3 | B2 | B2 |
| 57 | LCD14 | B4 | B4 | B3 | B3 |
| 58 | LCD15 | B5(MSB) | B5(MSB), B0(LSB) | B4(MSB) | B4(MSB) |
| 59 | LCDCLK | DCLK | | | |
| 63 | LCD16 | B0(LSB) | HSYNC | HSYNC | HSYNC |
| 64 | LCD17 | R0(LSB) | VSYNC | VSYNC | VSYNC |
| 60 | LCDDEN | DE | DE | DE | DE |
| 68 | LCDENA | --- | --- | --- | --- |
| 65 | LCDCC | PWM Backlight | | | |
| 66 | LCDPOWn | LCD Power On (active low) | | | |
| 67 | CFLPOWn | Backlight Power On (active low) | | | |

*Table 2: LCD Pins – TFT*

[1] This mode PicoCOMA9X outputs 18 data bits. Please also configure your display driver in the same way. HSYNC/VSYNC mode is not possible in this configuration. You must enable DE mode.

[2] This mode PicoCOMA9X outputs 16 data bits. Please also configure your display driver in the same way.

Note: Most displays support HSYNC/VSYNC **or** DE mode. Please be sure just connect only useful signals at same time. The 18bit w/o HSYNC/VSYNC mode needs a special configuration made by software. Please refer the SW manual for this configuration.

## 4.2 Ethernet connection

Ethernet TX+/- and LAN RX+/- are 100 ±20% Ohm differential pairs to a 1:1/1:1 transformer. We recommend a connector with integrated transformer in short distance (less then 1 inch = 25.4 mm) to the module connector. The RX pair should have a 0.1 inch min. distance to TX pair to avoid crosstalk. The intra pair mismatch of each differential pair should be <10 mil (0.254mm).

The transformer midpoint should be connected to the 3.3V power supply.

LED signal is able to drive a 3.3V powered LED with 5mA directly to GND.

If ethernet is not used please leave signals unconnected.

## 4.3 Serial port (UART)

The module provides a maximum of three different serial ports with 3.3V TTL signals. These signals are not 5V compliant. Please use a transceiver with 3.3V power supply.
If you don't need the serial port this pins can be used optional as GPIOs.

| PicoCOMA9X UART Interfaces | | | |
|---|---|---|---|
| J1 Pin | UART | Standard | Option |
| 11 [2)] | SCI1_CTS | IO47 | IO47, SCI1_CTS |
| 69 [2)] | SCI1_RTS | IO46 | IO46, SCI1_RTS |
| 13 [2)] | SCI2_TX | SCI2_TX | IO0 |
| 14 [2)] | SCI2_RX | SCI2_RX | IO1 |
| 15 [2)] | SCI3_TX | SCI2_RTS | IO2, SCI3_TX |
| 16 [2)] | SCI3_RX | SCI2_CTS | IO3, SCI3_RX |
| 17 [2)] | SCI1_TX | SCI1_TX | IO4 |
| 18 [2)] | SCI1_RX | SCI1_RX | IO5 |

*Table 3: UART Interfaces*

[1)] These IO-Pins are active signals during boot. Don't drive during boot process.
[2)] These IO-Pins can be reconfigured as GPIO.

*Table 4: UART FIFO depth*

## 4.4 USB Host

The 90 Ohm differential pair of USB signals doesn't need any termination. For external ports EMV protection is required nearby the USB connector.

With the USB_PWR signal you could switch on the USB power on your current limiting IC.

The usb.org webpage provides "High Speed USB Platform Design Guidelines" with highly recommended informations for a proper working USB design.
ESD and EMV protection is required on baseboard.

If the USB port is not used please leave open.

## 4.5 USB device

The 90 Ohm differential pair of USB signals doesn't need any termination. For external ports ESD and EMV protection is required nearby the USB connector.

The USB_CNX signal does detect a connected host by detecting the voltage. This signal is 5V tolerant and needs a level above 3.7V. Do not use a voltage divider or serial resistor.

ESD and EMV protection is required on baseboard.

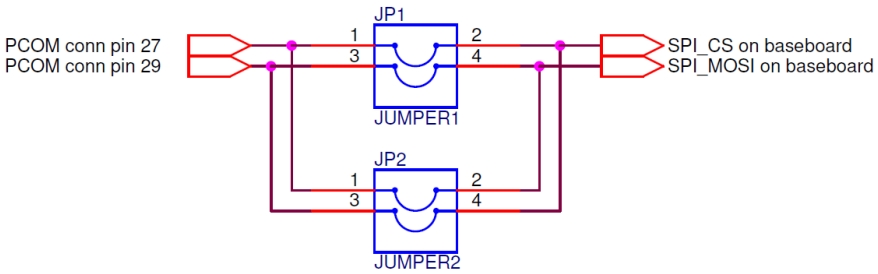
If the USB device port is not used please leave open.

## 4.6 SPI Interface

The module supports one HS SPI (Serial Peripheral Interface) with one chip select. Signals are 3.3V compliant.

At HW Rev. 1.1 is a failure (will be fixed on Rev 1.2). SPI is not backward compatible to other modules in PicoCOM formfactor. The signals SPI_CS on pin 29 and SPI_MOSI on pin 27 are interchanged. For full support on customers system it needs jumper:

close Jumper 1 for
PCOMA9X HW Rev 1.1




close Jumper 2 for
PCOMA9X HW Rev 1.2 and
all other PCOM

Both pins are configurable as GPIO. In this case this interchange can be handled in SW.

## 4.7 I2C Interface

The module supports a maxiumum of three I2C interfaces. One is compatible with PicoCOM standard. Signals are 3.3V compliant and don't have pullups on module. So please add 2.2 kOhm pullups to 3.3V on baseboard. 5V devices on baseboard need a level shifter.

| PicoCOMA9X I2C Interfaces | | | | |
|---|---|---|---|---|
| J1 Pin | | I2C | Standard | Optional |
| 30 [2)] | | I2C0_SDA | CAN0_TX | IO49, I2C0_SDA |
| 31 [2)] | | I2C0_SCL | CAN0_RX | IO50, I2C0_SCL |
| 32 [2)] | | I2C1_SDA | I2C1_SDA | IO12, CAN1_TX |
| 33 [2)] | | I2C1_SCL | I2C1_SCL | IO13, CAN1_RX |

*Table 5: I2C Interfaces*

[1)] These IO-Pins are active signals during boot. Don't drive during boot process. Baseboard pullups are not allowed during RESET (malfunction!). We strictly recommend schematic review on our support.
[2)] These IO-Pins can be reconfigured as GPIO.

## 4.8 CAN Interface

PicoCOMA9X provides up-to two CAN interfaces. One is compatible with the PicoCOM standard. The second shares pins with the I2C interface. The Vybrid SoC is used for the CAN function. PicoCOMA9X provide the CAN bus transmit and receive 3.3V TTL signal without any termination.

Needs a 3.3V transceiver like SN65HVD230 to the CAN bus.

Signals can be optional used as GPIO or I2C.

| PicoCOMA9X CAN Interfaces | | | |
|---|---|---|---|
| J1 Pin | CAN | Standard | Option |
| 30 [2)] | CAN0_TX | CAN0_TX | IO49, I2C0_SDA |
| 31 [2)] | CAN0_RX | CAN0_RX | IO50, I2C0_SCL |
| 32 [2)] | CAN1_TX | I2C1_SDA | IO12, CAN1_TX |
| 33 [2)] | CAN1_RX | I2C1_SCL | IO13, CAN1_RX |

*Table 6: CAN Interfaces*

[1)] These IO-Pins are active signals during boot. Don't drive during boot process.
[2)] These IO-Pins can be reconfigured as GPIO.

## 4.9 SDcard

The interface is supporting a SD card channel. For specificiation and licensing please refer the website of the SD Association http://www.sdcard.org. Pullups are integrated on the module. Card detection and write protection are not supported by the PicoCOM standard.

Unused signals should be left unconnected.

Signals can be optional used as GPIO.

| PicoCOMA9X SD Card Interface | | |
|---|---|---|
| J1 Pin | Standard | Option |
| 12 | IO48 | SDHC_CDn [2] (low active) |
| 34 | SD DAT0 | IO14 [2] |
| 35 | SD DAT1 | IO15 [2] |
| 36 | SD DAT2 | IO16 [2] |
| 37 | SD DAT3 | IO17 [2] |
| 38 | SD CLK | IO18 [2] |
| 39 | SD CMD | IO19 [2] |

*Table 7: SD card Interface*

[1] These IO-Pins are active signals during boot. Don't drive during boot process.
[2] These IO-Pins can be reconfigured as GPIO.

## 4.10 Touch Interface

The integrated resistive touch controller will support 4 wire analog resistive touch panels without any additional circuit.

## 4.11 Audio I/F

The onboard soundcodec does support a stereo analog input and a stereo analog output for 1Vpp audio signals. This signals needs serial capacitors. ESD and EMV protection is required on baseboard.

## 4.12 IO/ IRQ

Multiple purpose pins with 3.3V logic signal level.

## 4.13 nRES

Reset input to drive with open drain or open collector 3.3V compliant from baseboard. We recommend to pull low this pin with a VCC voltage supervisor on power up with the power-good signal from power supply or using a voltage supervisor.
There is now voltage supervisor on the module.

## 4.14 NAND Flash

By default, boot mode of efusA7UL is configured for NAND boot.
efusA7UL implements the following to get reliable boot over long time:

- Use of SLC NAND flash memory
- Boot loader stored two times in flash memory
- Flash data protected by 32 bit ECC
- Algorithm for block refresh
- Operating system Linux uses UBI as file system
- Operating system Windows can use F3S to be robust against power failures

### 4.14.1 NAND Flash Data Retention

The NAND Flash is based on “single level cell” (SLC) technology. This technology is ten times more robust compared to “multi level cell” (MLC) technology. It is important to know, that high temperature impacts data retention of SLC or MLC flash. Independent if the device is powered or not. Please contact us, if your device is constantly in an environment where temperature is higher than 50°C.

## 4.15 RTC

There is a NXP PCF8563TS or compatible implemented on board. The accuracy is limited because the warming of the crystal on the board in operation. The RTC could drift some seconds per day. For better accuracy F&S does support a mounting option with XTCO. Please ask your sales contact for pricing and minimal order quantity, if you have enhanced requirements.

# 5 Electrical Data

## 5.1 Power supply

Power supply: 3.3V +/- 5%
maximum power consumption with 1x LAN: 2.85 Watt
maximum power consumption with 2x LAN: 3.1 Watt
(theoretical value, Summary of max. datasheet value all chips on module w/o SD card, LCD, USB, backplane logic & transceiver)
Capacitor charge current on power on: 2 A

Power supply RTC battery: 2.0 … 3.6 V
Power consumption @25°C: typ. 3µA
max. 10µA@25°C

Power consumption of connected devices like display, USB devices, SD card has to be added for power calculation.
Real power consumption could be much lower depends CPU workload, used graphic interfaces and features and the workload on I/O interfaces.

## 5.2 Absolute maximum ratings

| Description | Condition | Min | Max | Unit |
|---|---|---|---|---|
| Input Voltage range 3.3V IO pins | | -0.3 | OVDD+0.3 | V |
| USB VBUS (goldfinger pin 217) | | -0.3 | 5.25 | V |

*Table 8: maximum ratings*

## 5.3 DC electrical characteristics for 3.3V IO pins

VDD= 3.3V +/- 5%

| Parameter | Description | Condition | Min | Max | Unit |
|---|---|---|---|---|---|
| Vih | High Level Input Voltage | | 0.7*VDD | VDD | V |
| Vil | Low Level Input Voltage | | 0 | 0.3*VDD | V |
| Voh | High Level Output Voltage | Ioh=-1mA | VDD-0.15 | | V |
| Vol | Low Level Output Voltage | Ioh=1mA | | 0.15 | V |
| $R_{DRV}$ | Output driver impedance | VDD=3.3V | *1) | 150 | Ω |

*Table 9: electrical characteristic 3.3V IO pin*

*1) Some IO pins are able to drive stronger by software configuration. Stronger driving does increase EMC radiation. Please refer software manual to increase or decrease impedance or ask our support.

# 6 Review service

F&S provide a schematic review service for your baseboard implementation. Please send your schematic as searchable PDF to support@fs-net.de.

# 7 ESD and EMI implementing on COM

Because there is no connector to „out of case“ there is no ESD protection for any interface. ESD protection hast to place as near as possible to the ESD source - this is the connector with external access on the COM baseboard. A good guide is available from TI; just search for slva680 at ti.com.
To reduce EMI the PicoCOMA9X supports Spread spectrum. This will normally reduce EMI between 9 and 12 dB and so this decrease your shielding requirements. We strictly recommend having your baseboard with controlled impedance and wires as short as possible.

# 8 Storage conditions

Maximum storage on room temperature with non condensing humidity: 6 months
Maximum storage on controlled conditions 25 ±5 °C, max. 60% humidity: 12 months
For longer storage we recommend vacuum dry packs.

# 9 ROHS and REACH statement

All F&S designs are created from lead-free components and are completely ROHS compliant.
The products we supply do not contain any substance on the latest candidate list published by the European Chemicals Agency according to Article 59(1,10) of Regulation (EC) 1907/2006 (REACH) in a concentration above 0.1 mass %.
Consequently, the obligations in No. 1 and 2 paragraphs in Annex are not relevant here.
Please understand that F&S is not performing any chemical analysis on its products to testify REACH compliance and is therefore not able to fill out any detailed inquiry forms.

# 10 Packaging

All F&S ESD-sensitive products are shipped either in trays or bags. PicoCOM modules are shipped in trays. One tray can hold 10 boards. An empty tray is used as top cover.

# 11 Matrix Code Sticker

All F&S hardware is shipped with a matrix code sticker including the serial number.
Enter your serial number here https://www.fs-net.de/en/support/serial-number-info-and-rma/ to get information on shipping date and type of board.

# 12 Appendix

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