

Hardware Documentation

PicoMOD1.2

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Preliminary

This document is subject to change without notice



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About This Document

This document describes the hardware of the PicoMOD1.2
The latest version of this document can be found at <http://www.fs-net.de>.

History

Date	V	Platform	A,M,R	Chapter	Description	Au
20/01/2014		PicoMOD1.2	A	-	Hardware documentation, preliminary	KW
23/09/2014	0.2	PicoMOD1.2	M	1	Changed technical data of connector.	HF
			M	3	Correct several points and add notes for PicoMOD1 compatibility	KW
			M	5	Add power consumptions	KW
			A	5 , 6 , 3	Add points	KW
			M	1	Correct dimensions	KW
17/12/2014	0.3	PicoMOD1.2	A	3.3, 3.4	Add note for termination	KW

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

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1 Technical Data Connectors

The PicoMOD1.2 is equipped with a Tyco Electronics 5177984-3 (80 pin, 0.8mm) connector from '0.8mm Free Height (FH) Connectors' series. For position and orientation please look chapter "[4 Dimensions](#)".

Matching connectors are:

5mm stacking height:	Tyco Electronics 5177983-3
9mm stacking height:	Tyco Electronics 5-5179009-3
13mm stacking height:	Tyco Electronics 5-5179010-3

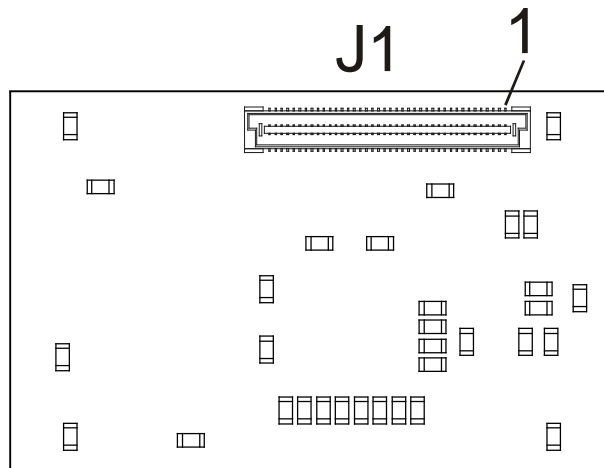


Figure 1: Bottom View

2 Connectors

2.1 Counting of the connector pins

The connector plug of PicoMOD1.2 will be treated as follows:

Pin 1 is marked in Figure 1. The row with pin 1 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.).

2.2 IO-Pin limitations

PicoMOD1.2 is equipped with 53 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.

2.3 Connector J1 (main connector)

J1			
Pin	Signal	Default Interface	Alternative Function
1	TX-	Ethernet TX-	
2	RX-	Ethernet RX-	
3	TX+	Ethernet TX+	
4	RX+	Ethernet RX+	
5	V33	+3,3V \pm 5% DC	
6	V33	+3,3V \pm 5% DC	
7	GND	GND	
8	GND	GND	
9	VBAT	+3V ... +3,6V DC (Battery buffering RTC) (*)	
10	/PONRES	CPU Reset (active low)	
11	IO0	COM2 RxD	I/O-Pin 0
12	IO1	COM2 TxD	I/O-Pin 1
13	IO2	COM2 CTS	I/O-Pin 2
14	IO3	COM2 RTS	I/O-Pin 3
15	IO4	COM1 RxD	
16	IO5	COM1 TxD	
17	IO6	COM3 RxD	I/O-Pin 6
18	IO7	COM3 TxD	I/O-Pin 7
19	USBDN	USB2.0 Host -	
20	OTGDM	USB2.0 OTG Dev./Host -	
21	USBDP	USB2.0 Host +	
22	OTGDP	USB2.0 OTG Dev./Host +	
23	IO8	USB Host Power On	I/O-Pin 8
24	IO9	I/O-Pin 9 / GPIO5	
25	IO10	USB Device Detect. Low active	I/O-Pin 10
26	IO11	I2C SDA	I/O-Pin 11
27	IO12	I2C SCL	I/O-Pin 12
28		NC (do not use)	
29		NC (do not use)	

J1			
Pin	Signal	Default Interface	Alternative Function
30		NC (do not use)	
31		NC (do not use)	
32		NC (do not use)	
33	GND	GND	
34	GND	GND	
35	IO13	I/O-Pin 13 / GPIO0	
36	IO14	I/O-Pin 14 / GPIO1	
37	IO15	I/O-Pin 15 / GPIO2	
38	IO16	I/O-Pin 16 / GPIO3	
39	IO17	I/O-Pin 17 / GPIO4	
40	IO18	SD-Card CLK	I/O-Pin 18
41	IO19	SD-Card CMD	I/O-Pin 19
42	IO20	SD-Card DAT0	I/O-Pin 20
43	IO21	SD-Card DAT1	I/O-Pin 21
44	IO22	SD-Card DAT2	I/O-Pin 22
45	IO23	SD-Card DAT3	I/O-Pin 23
46	IO24	SD-Card Detect	I/O-Pin 24
47	IO25	SD-Card Power Enable	I/O-Pin 25
48	IO26	SD-Card Write Protect	I/O-Pin 26
49	IO27	LCD Enable	I/O-Pin 27
50	IO28	LCD DEN (Display enable)	I/O-Pin 28
51	IO29	LCD VLCD On	I/O-Pin 29
52	IO30	LCD VCFL On	I/O-Pin 30
53	IO31	LCD VEEK	I/O-Pin 31
54	GND	GND	
55	GND	GND	
56	VIO0	LCD VD0	I/O-Pin 32
57	VIO1	LCD VD1	I/O-Pin 33
58	VIO2	LCD VD2	I/O-Pin 34
59	VIO3	LCD VD3	I/O-Pin 35
60	VIO4	LCD VD4	I/O-Pin 36
61	VIO5	LCD VD5	I/O-Pin 37
62	VIO6	LCD VD6	I/O-Pin 38
63	VIO7	LCD VD7	I/O-Pin 39
64	VIO8	LCD VD12	I/O-Pin 40
65	VIO9	LCD VD13	I/O-Pin 41
66	VIO10	LCD VD14	I/O-Pin 42
67	VIO11	LCD VD15	I/O-Pin 43
68	VIO12	LCD VD18	I/O-Pin 44
69	VIO13	LCD VD19	I/O-Pin 45
70	VIO14	LCD VD20	I/O-Pin 46
71	VIO15	LCD VD21	I/O-Pin 47
72	VIO16	LCD VD22	I/O-Pin 48
73	VIO17	LCD VD23	I/O-Pin 49
74	VIO18	LCD VLINE	I/O-Pin 50
75	VIO19	LCD VFRAME	I/O-Pin 51
76	VIO20	LCD VM	I/O-Pin 52
77	GND	GND	
78	GND	GND	
79	VIO21	LCD VCLK	I/O-Pin 53
80	GND	GND	

See PicoMOD1.2 Starter kit documentation for connection examples.
See software documentation for configuration of alternative functions.



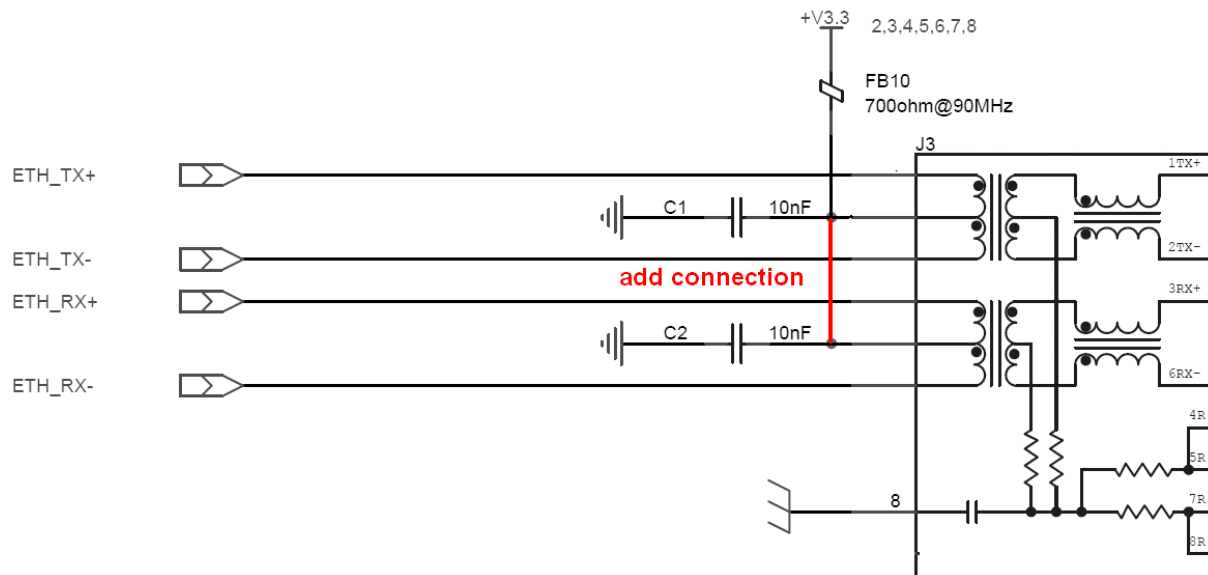
3 Interface and Signal description

3.1 Ethernet connection

LAN TX+/- and RX+/- are 100 \pm 20% Ohm differential pairs to a 1:1/1:1 transformer. We recommend a connector with integrated transformer in short distance (less than 4 inch = 100 mm) to the module connector. The RX pair should have a 0.2 inch min. distance to TX pair to avoid crosstalk. The intra pair mismatch of each differential pair should be <50 mil (1.27mm). Please also refer our “Ethernet Routing Guidelines” on our web download area and refer the comments at our forum.

The transformer center tap of RX and TX channel on the baseboard has to be connected with 3.3V.

Note: PicoMOD1 has 3.3V on transformer center tap only on TX channel.



The LED signals are low active to drive a 3.3V powered LED with 5mA. Serial resistor is needed on baseboard to limit the current.

If Ethernet is not used please leave signals unconnected.

3.2 Serial port

Serial ports are provided 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.

3.3 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.

Please check USB2.0 high speed compatibility of routing and protection on baseboard by using USB2.0 devices on this port.

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

From the usb.org webpage you can download "[High Speed USB Platform Design Guidelines](#)" which provides highly recommended information for a proper working USB design.

If the USB port is not used please leave open.

Note: PicoMOD1 has USB 1.1 on the board. Termination on baseboard has to be removed from USB lines.

3.4 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.

Please check USB2.0 high speed compatibility of routing and protection on baseboard by using USB2.0 hosts on this port.

The USB_CNX signal is for detecting a connection to a host. The device power input signal should be connected with an inverter or transistor to this pin. 3.3V level should be used.

From the usb.org webpage you can download "[High Speed USB Platform Design Guidelines](#)" which provide highly recommended information for a proper working USB design.

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

Note: PicoMOD1 has USB 1.1 on the board. Termination on baseboard has to be removed from USB lines.

If the USB device port is used as a host by software configuration, the USB_CNX signal must be connected to ground.

3.5 I2C

The module supports an I2C interface. Signals are 3.3V compliant and don't have pull-ups on module. Please add 2.2 kOhm pull-ups to 3.3V on baseboard. 5V devices on baseboard need a level shifter.

3.6 SD card

The interface is supporting a SD card channel. For specification and licensing please refer the website of the SD Association <http://www.sdcard.org>. Signals are 3.3V compliant.

Unused signals should be left unconnected.

Signals can be optionally used as GPIO.

3.7 IO/IRQ

Multiple general purpose pins with 3.3V logic signal level.

3.8 /PONRES

Reset input. Drive with open drain or open collector 3.3V compliant signal. We recommend to pull low this pin with the power good signal from power supply or using a voltage supervisor. For proper function this signal must be connected.



4 Dimensions

Board thickness:	1.6 mm
Height of parts on top side:	3.0 mm
Height of parts on bottom side (without connectors):	2.0 mm
Pin pitch of connector:	0.8 mm
Mounting hole diameter:	2.8 mm

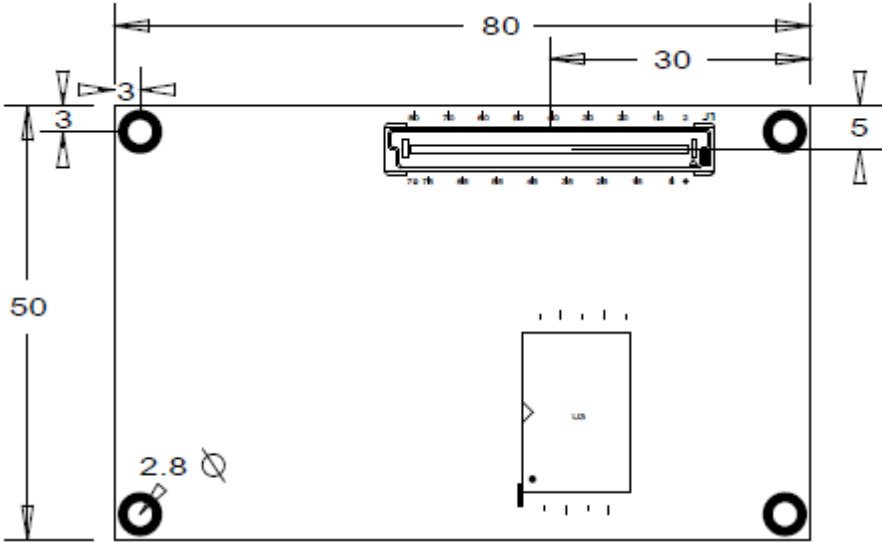


Figure 2: Bottom view – dimension

All values can have tolerances of $\pm 0,5\text{mm}$.
To avoid EMC and ripple pickup the mounting holes are isolated and not connected to any voltage.

5 Technical Data

Power Supply:	+3.3V DC / $\pm 5\%$
Power supply VBAT	2.0 ... 3.6 V
Inputs/Outputs:	max. 53 I/O lines (shared with dedicated interfaces)
Interfaces:	1x Ethernet 10/100Mbit 3x Serial with 3,3V-level (1x with RTS/CTS) 1x USB2.0 Device or USB2.0Host (high speed 480Mbit/s) 1x USB2.0 Host (high speed 480Mbit/s) 1x I2C 1x microSD slot on-board (optional) 1x SD-Card (external)
TFT LCD-interface:	1x 18bit RGB STN not supported
RAM:	256 MByte DDR3-RAM (optional 1GByte)
Flash:	128 MByte Flash (optional 1GByte)
CPU:	Freescale Vybrid
Operating Temperature:	0°C ... +85°C
Dimensions (l x w x h):	80 x 50 x 8 mm
Weight:	20 gr.

5.1 Power

Power supply:	3.3V +/- 5%
Maximum power consumption ¹⁾ :	1 A
Capacitor charge current on power on:	1.5 A
Typical Current Consumption @25°C	
• Desktop Idle:	290 mA
• CPU full load:	370 mA
Power supply RTC battery:	2.0 ... 3.6 V
Power consumption @25°C:	typ. 10µA max. 45µA

1) Theoretical value, Summary of max. datasheet value all chips on module w/o SD card, LCD, USB, backplane logic & transceiver.

Power consumption of connected devices like display, USB devices, SD card has to be added for power calculation.

F&S doesn't guarantee the above values. They are only presented for informational use. Customer has to check power requirement in customer's application.

5.2 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+0.3	V
Vil	Low Level Input Voltage		-0.3	0.3*VDD	V
Voh	High Level Output Voltage	Ioh=-100µA	VDD-0.2		V
Vol	Low Level Output Voltage	Ioh=100µA		0.2	V
Io	Output current	VDD=3.3V		2.6	mA

5.3 ESD and EMI requirements

Because there is no connector to „out of case“ there is no ESD protection for any interface. It needs ESD protection on every connector out of the case on your baseboard.

To reduce EMI the PicoMOD1.2 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.

6 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.

7 Appendix

Important Notice

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