

i-PAN M7 Baseboard

Documentation version 1.3

This document applies to i-PAN M7 V1R3 and V1R4.

Introduction

The i-PAN M7 Baseboard is designed for a direct installation on touch displays including most peripherals needed by today's typical industrial panel-applications. Using a suitable touch display it is an ideal basis for customized flat panel PC solutions. The unit is based on Myon I SOM with Qualcomm Snapdragon 410E processor and is available with Microsoft Windows 10 IoT Core, Linux and Android OS.

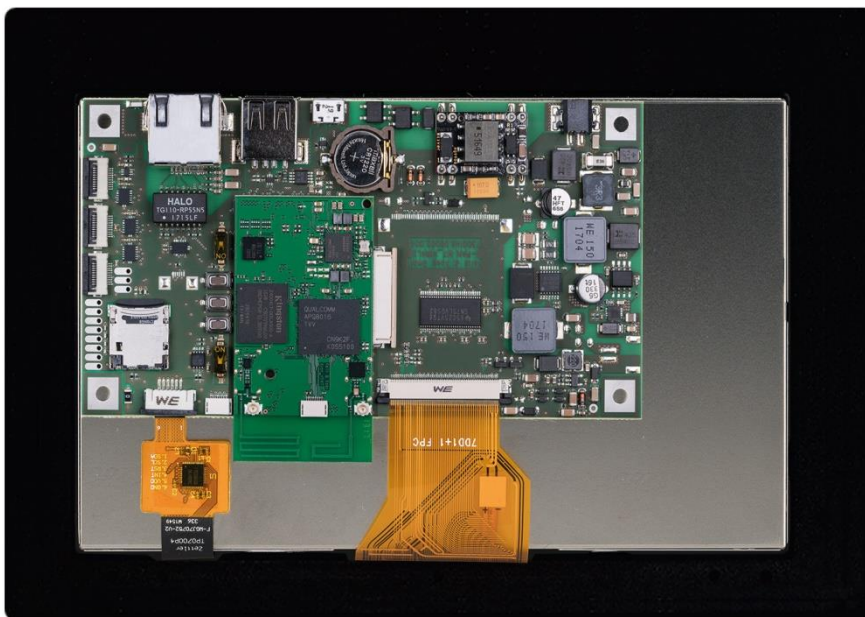


Figure 1: i-PAN M7 Baseboard V1R4 assembled on 7" touch display with cover lens



Figure 2:
Starter Kit i-PAN M7 Coverlens

Block Diagram

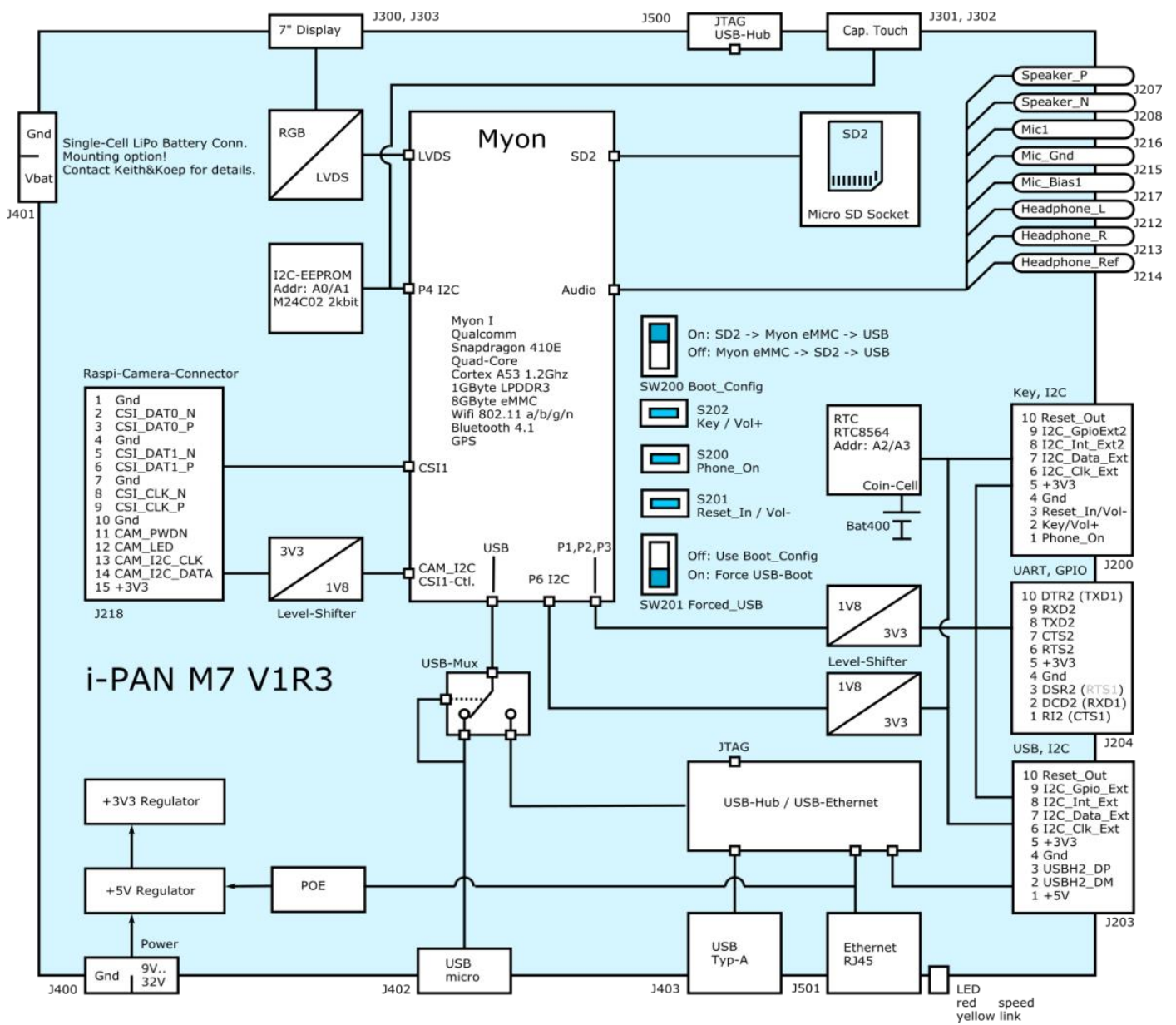


Figure 3: Simplified Block Diagram of i-PAN M7 V1R3 Baseboard

Revision Differences:

V1R3 to V1R4:

1. Power to display switchable.
2. Power-Fail detection circuit.
3. Options for LiPo battery operation and (external) UPS-feature.

1. Connector positions

Interfaces and connectors of i-PAN M7 Baseboard.

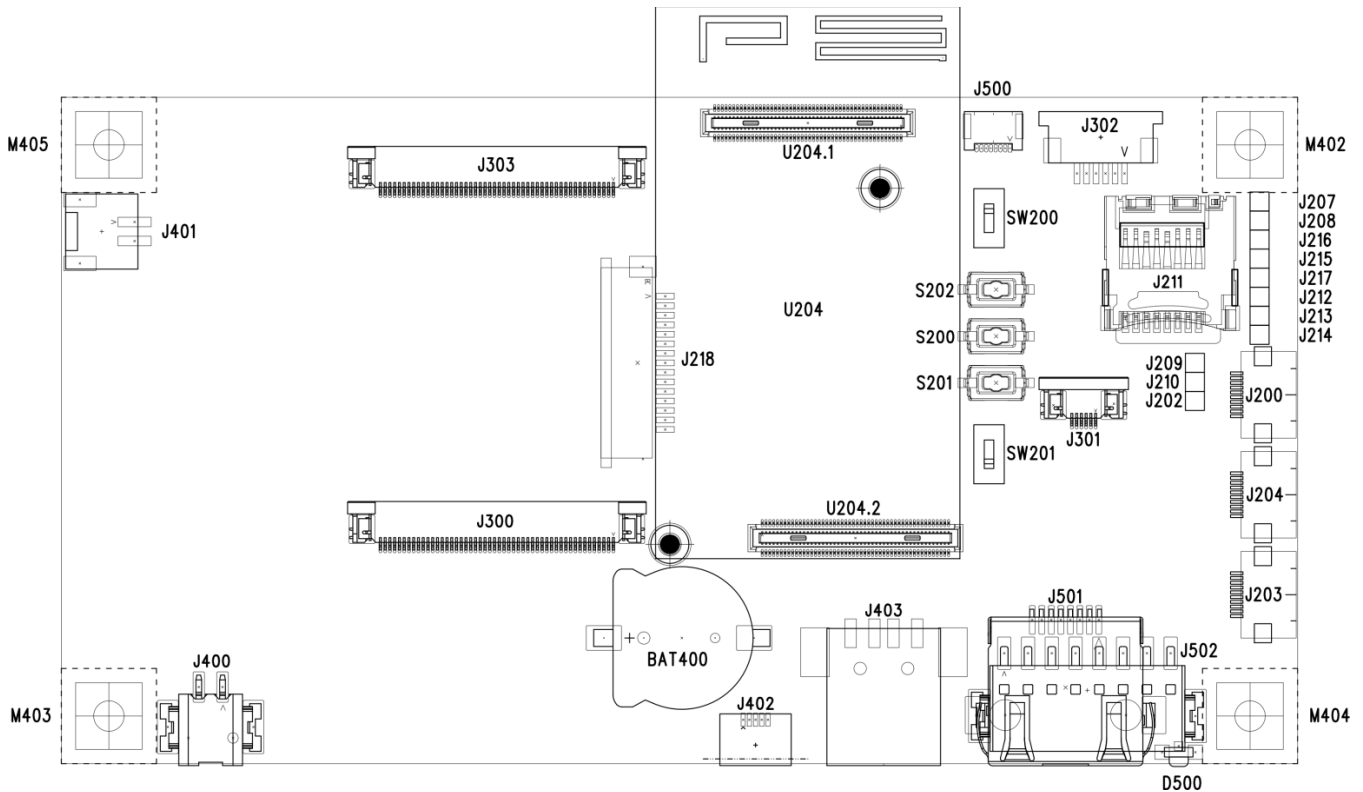


Figure 4: Connectors of i-PAN M7 Baseboard

Connectors:

J200: iMod Button/I2C connector
 J203: iMod USB/I2C connector
 J204: iMod UART connector
 J211: μ SD-Card connector
 J218: Raspberry Pi compatible camera connector
 J300: Display connector (HT-Display)
 J301: Touch connector (HT-Display)
 J302: Touch connector (AZ-Display)
 J303: Display connector (AZ-Display)
 J400: Power connector
 J401: LiPo Battery connector
 J402: μ USB connector
 J403: USB A connector
 J501: Ethernet connector
 J502: PCB terminal block for Ethernet (opt.)

U204: Myon module
 U204.1+2: Myon connector

Battery:

BATT200: Battery Connector (CR1220)

Soldering Pads:

J202: GROUND
 J207: SPEAKER_P
 J208: SPEAKER_N
 J209: +1V8_IO
 J210: +3V3
 J212: HEADPHONE_L
 J213: HEADPHONE_R
 J214: HEADPHONE_REF
 J215: GND_CFLT
 J216: MIC1_P
 J217: MIC_BIAS1

Switches:

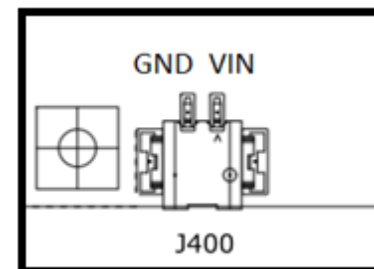
S200: PHONE_ON
 S201: RESET_IN / VOL. DOWN
 S202: KEY / VOL. UP
 SW200: BOOT_CONFIG
 SW201: FORCED_USB_BOOT

LED:

D500: DUO LED (Link and Activity)

2. User Connectors

J400: Power connector



Pin	Signal
1	VIN (+9V up to +24V)
2	GND

Connector:

PTSM 0,5/2-HH-2,5-SMD by Phoenix Contact (1778764)

Mating Connector:

PTSM 0,5/2-P-2,5 by Phoenix Contact (1778832)

PTSM 0,5/2-PL-2,5 by Phoenix Contact (1709457) (incl. locking)

The panel can be either powered by this connector or optional through POE (Power-Over-Ethernet, J501,J502) or through a LiPo battery connected to J401.

Note that different power-supply scenarios might need differently configured i-PAN M7 baseboards.

Voltage polarity protection is achieved through a diode.

A Nanofuse (near to J400) is used for current protection.

J402: μ USB connector

Connector: SD-47346-001 by Molex

The USB2.0 Micro-USB connector is routed to the USB-port of the Myon module through a USB-Mux. The +5V signal of the Micro-USB connector is used to select if either the Micro-USB-connector or the on-board USB-Hub is routed to the USB-port of the Myon module.

If SW201 is set to **on**, than this USB-port is used to download the firmware/operating system

J403: USB A connector

Connector: USB-A-S-S-B-SM2-R by Samtec

The signals of the USB2.0 Typ-A connector are routed to the on-board USB-Hub.

The +5V supply to the USB-port are short-circuit protected and current-limited (0.75A-1.25A) by a power-switch.

Note that this port is without function if a cable is plugged to the Micro-USB connector J402.

J501: Ethernet connector

An USB to 10/100Mbit Ethernet chip is used to add an Ethernet-interface to the i-PAN M7 baseboard.

Note that this interface is without function if a cable is plugged to the Micro-USB connector J402.

An IEEE 802.3af compatible POE (Power-Over-Ethernet) option with max. 12W output to the panel and its peripherals is available.

On standard a RJ45 connector is used.

Optionally a PCB terminal block for easy push-in spring connection is mountable. Note that the PCB terminal block uses reverse pin-numbering compared to RJ45:

Pin	Signal
1	NC4
2	NC3
3	RX-
4	NC2
5	NC1
6	RX+
7	TX-
8	TX+

J502: PCB terminal block connector: 1771088 by Phoenix

D500: DUO LED (Link and Activity)

The LED next to the ethernet connector shows the status of the ethernet-connection:

- red - link-speed
- yellow - link-activity

J211: μ SD-Card connector

The signals of this μ SD-Card slot are connected to the SD/SDIO port of the Myon module.

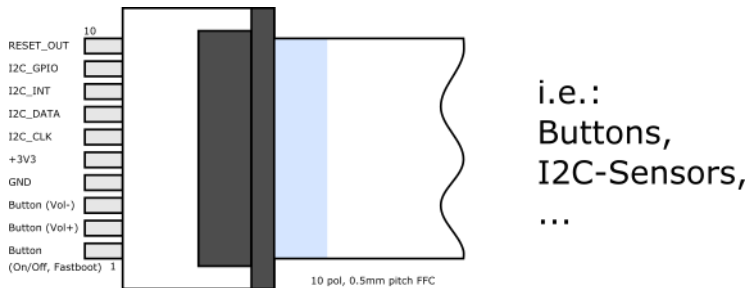
It may be used to extend the storage memory of the panel or it can serve as boot-media if SW200 is set to **on** and SW201 is set to **off**.

3. Internal Connectors

J200: iMod Button/I2C connector

The iMod connectors are standard connectors defined by Keith&Koep to allow customers to easily add functions to a baseboard.

The connector got 3 pins for buttons and an I2C-interface for sensors etc. Level-shifters are used to translate between the 1.8V IO-voltage of the Myon to the 3.3V IO-voltage of the iMod standard.



Pin	Signal	Function
1	\PHONE_ON	On/Off, Key, ... (OS-specific)
2	Key/Vol+	Generic Button, i.e. Volume+
3	Reset_In/Vol-	Generic Button, i.e. Volume-, Reset_In
4	GND	Power
5	+3V3	Power
6	I2C_CLK_EXT	I2C Clock signal
7	I2C_DATA_EXT	I2C Data signal
8	I2C_INT_EXT2	Input; Mainly used as interrupt input pin by attached boards.
9	I2C_GPIO_EXT2	GPIO-Output.
10	\RESET_OUT	Reset output of the Myon module: Low during reset and suspend. High when running.

Connector: 687110149022 by Wuerth

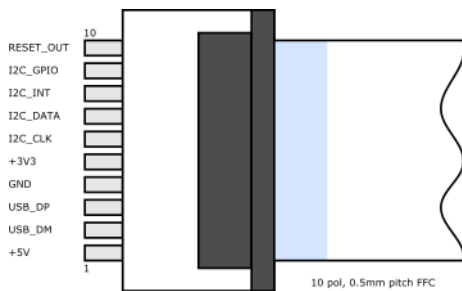
Note that the button-signals (Pin1..3) are used by the on-board buttons S200, S201, S202. The buttons simply switch the signal to GND.

J203: iMod USB/I2C connector

The iMod USB/I2C connector is a standard connector defined by Keith&Koep to allow customers to easily add functions to a baseboard.

Keith&Koep offers different extension boards ranging from a simple breakout board or an additional USB-type A connector to current-, voltage-, TOF-, NFC- sensors or IO-expander boards.

Customers may design their own peripherals which can be connected through a 10pol FFC cable.



i.e.:
I2C-Sensors,
IO-Expanders,
USB-Port.

Pin	Signal	Function
1	+5V	Power
2	USB_DM	USB D- signal
3	USB_DP	USB D+ signal
4	GND	Power
5	+3V3	Power
6	I2C_CLK_EXT	I2C Clock signal
7	I2C_DATA_EXT	I2C Data signal
8	I2C_INT_EXT	GPIO-Input; Mainly used as interrupt input pin by attached boards.
9	I2C_GPIO_EXT	GPIO-Output.
10	\RESET_OUT	Reset output of the Myon module: Low during reset and suspend. High when running.

Connector: 687110149022 by Wuerth

The USB signals are routed to the internal USB-hub and are without function if a cable is plugged into the Micro-USB connector J402.

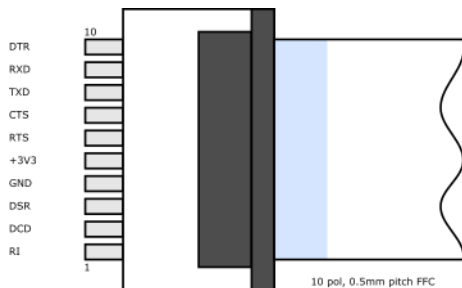
The +5V power-supply-pin is not over-current protected.

J204: iMod UART connector

The iMod UART connector is a standard connector defined by Keith&Koep to allow customers to easily add functions to a baseboard.

Keith&Koep offers different extension boards ranging from a simple breakout board to RS232/RS485/RS422 transceiver boards.

Customers may design their own peripherals which can be connected through a 10pol FFC cable.



i.e.:
 UART,
 RS232,RS485
 GPS, Modem,
 GPIOs, ...

Pin	Signal	Function
1	UART2_RI (UART1_CTS)	RI input
2	UART2_DCD (UART1_RXD)	DCD input
3	UART2_DSR (UART1_RTS)	DSR input
4	GND	Power
5	+3V3	Power
6	UART2_RTS	RTS output
7	UART2_CTS	CTS input
8	UART2_TXD	TXD output
9	UART2_RXD	RXD input
10	UART2_DTR (UART1_TXD)	DTR output

Connector: 687110149022 by Wuerth

Level-shifters are used to translate between the 1.8V IO-voltage of the Myon to the 3.3V IO-voltage of the iMod standard.

Besides used as normal serial-port, it may also serve as debug-output or linux command shell.

Note that the Myon-module does not have a full-function UART that includes RI,DCD,DSR and DTR signals. These pin-functions could be emulated with software by using those pins as GPIO.

These 4 pins can be configured as UART1 signals and would than allow to have 2 UARTs on J204.

But note that because of level-translation from 3,3V to 1,8V, UART2_DSR is an input-only pin and cannot be used as RTS pin of UART1!

J218: Raspberry Pi compatible camera connector

The iPAN-M7 got a Raspberry Pi compatible connector to attach 2 channel MIPI cameras through a flex-cable.

Pin	Signal	Type
1	GND	
2	CSI1_DAT0_N	
3	CSI1_DAT0_P	
4	GND	
5	CSI1_DAT1_N	
6	CSI1_DAT1_P	
7	GND	
8	CSI1_CLK_N	
9	CSI1_CLK_P	
10	GND	
11	CSI1_PWDN	
12	CSI1_RESET <i>CSI1_MCLK (opt.)</i>	
13	CAM_I2C_SCL	
14	CAM_I2C_SDA	
15	+3V3	

Connector: 52271-1579 by Molex

Level-shifters are used to translate between the 1.8V IO-voltage of the Myon to the 3.3V IO-voltage of the Raspberry Pi camera connector.

U204.1+2: 2x200 pin Myon connector

Connector: 2 x DF40HC(3.0)-100DS-0.4V by Hirose

The Myon connector allows to populate different Myon-modules onto the i-PAN M7 baseboard.

For the actual pinning of this connector refer to the Myon datasheet.

J300/J303: Display connector

Keith & Koep has qualified three different 7" displays for the i-PAN M7. Please contact us, if you need to attach another display.

J301/J302: Touch connector

See "J300/J303: Display connector".

J401: LiPo Battery connector

Connector: S2B-PH-SM4-TB by JST

The i-PAN M7 got multiple power-supply options.

The LiPo battery connector may be connected to different power-supply signals and may serve as power source or sink.

1. LiPo-Battery. For mobile devices.
2. +3V3 or +5V.
3. VIN. Could be used to add an UPS (uninterruptable power supply) to the i-PAN M7.

Pin	Signal
1	GND
2	VBAT (LiPo battery, VIN, +5V or +3V3)

Soldering pads

Pad	Signal	
J202	GND	Power
J207	SPEAKER_P	Speaker output of Myon
J208	SPEAKER_N	Speaker output of Myon
J209	+1V8_IO	Power
J210	+3V3	Power
J212	HEADPHONE_L	Stereo Headphone Left
J213	HEADPHONE_R	Stereo Headphone Right
J214	HEADPHONE_REF	Headphone Ground
J215	GND_CFILT	Filtered AudioGround
J216	MIC1_P	Microphone input
J217	MIC_BIAS1	Microphone bias

4. Miscellaneous

Batt400: Battery connector

The battery (CR1220) supplies the Realtime clock.

4.1 Switches

S200: \PHONE_ON

Use depends on operating system.

S201: \RESET_IN / VOL. DOWN

Use depends on operating system.

S202: KEY / VOL. UP

Use depends on operating system.

SW200: BOOT_CONFIG

BOOT_CONFIG sets the boot order of the device if SW201 is not set.

SW200	Setting
On	Micro-SD-card -> Myon eMMC -> USB
Off	Myon eMMC -> Micro-SD-Card -> USB

SW201: FORCED_USB_BOOT

Use boot configuration or force USB boot.

SW201	Setting
On	Force boot through Micro-USB port
Off	Boot determined by SW200 setting.

5. Electrical Pin-Information

PI: Power Input
 PO: Power Output
 CO: Charger Output

AI: Analog Input
 AO: Analog Output

DI: Digital Input
 DO: Digital Output
 DIO: Digital Input/Output

DIFI: Differential Input
 DIFO: Differential Output
 DIFIO: Differential Input/Output

PD: Pull-Down (PDn: Pull-Down, Pull-behavior can be changed by software)
 PU: Pull-Up (PU_n: Pull-Up, Pull-behavior can be changed by software)

J400: Power connector

PIN	Name	Type	Voltage	Connected To
J400-1	VIN	PI	9 ... 24V	
J400-2	GND			

J401: LiPo Battery connector

PIN	Name	Type	Voltage	Connected To
J401-1	GND	PI		
J401-2	VBAT (LiPo option)	PI,PO	3.0V ... 4.5V	U204-1...8

J204: iMod UART connector

PIN	Name	Type	Voltage	Connected To
J204-1	RI	DI	+3V3	U204-67
J204-2	DCD	DI	+3V3	U204-63
J204-3	DSR	DI	+3V3	U204-65
J204-4	GND			
J204-5	+3V3	PO		
J204-6	RTS	DO	+3V3	U204-73
J204-7	CTS	DI	+3V3	U204-75
J204-8	TXD	DO	+3V3	U204-69
J204-9	RXD	DI	+3V3	U204-71
J204-10	DTR	DO	+3V3	U204-61

J203: iMod USB/I2C connector

PIN	Name	Type	Voltage	Connected To
J203-1	+5V	PO		
J203-2	USBH2_DM	DIFIO	+3V3	U204-27
J203-3	USBH2_DP	DIFIO	+3V3	U204-29
J203-4	GND			
J203-5	+3V3	PO		
J203-6	I2C_CLK_EXT	DO	+3V3	U204-119
J203-7	I2C_DATA_EXT	DIO	+3V3	U204-121
J203-8	I2C_INT_EXT	DI	+3V3	U204-117
J203-9	I2C_GPIO_EXT	DO	+3V3	U204-115
J203-10	\RESET_OUT	DO	+3V3	U204-32

J200: iMod Button/I2C connector

PIN	Name	Type	Voltage	Connected To
J200-1	\PHONE_ON	DI *1)	+1V8	U204-28
J200-2	KYPD_SNS0	DI *1)	+1V8	U204-106
J200-3	\RESET_IN	DI *1)	+1V8	U204-30
J200-4	GND			
J200-5	+3V3	PO		
J200-6	I2C_CLK_EXT	DO	+3V3	U204-119
J200-7	I2C_DATA_EXT	DIO	+3V3	U204-121
J200-8	I2C_INT_EXT2	DI	+3V3	U204-56
J200-9	I2C_GPIO_EXT2	DO	+3V3	U204-54
J200-10	\RESET_OUT	DO	+3V3	U204-32

*1) Connect to Open-Drain/Collector output.

J218: Raspberry Pi compatible camera connector

PIN	Name	Type	Voltage	Connected To
J502-1	GND			
J502-2	CSI1_DAT0_N	DIFI	MIPI	U204.147
J502-3	CSI1_DAT0_P	DIFI	MIPI	U204.149
J502-4	GND			
J502-5	CSI1_DAT1_N	DIFI	MIPI	U204.151
J502-6	CSI1_DAT1_P	DIFI	MIPI	U204.153
J502-7	GND			
J502-8	CSI1_CLK_N	DIFO	MIPI	U204.143
J502-9	CSI1_CLK_P	DIFO	MIPI	U204.145
J502-10	GND			
J502-11	CSI1_PWDN	DO	+3V3	U204.159
J502-12	CSI1_RESET	DO	+3V3	U204.157
	CSI1_MCLK (opt.)	DO	+3V3	U204.161
J502-13	CAM_I2C_SCL	DO	+3V3	U204.167
J502-14	CAM_I2C_SDA	DIO	+3V3	U204.169
J502-15	+3V3	PO		

6 Specifications

6.1 Absolute Maximum Ratings

Absolute maximum ratings reflect conditions that the module may be exposed outside of the operating limits, without experiencing immediate functional failure. Functional operation is only expected during the conditions indicated under "Recommended Operating Conditions". Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the module. Exposure to absolute-maximum rated conditions for extended periods may affect device reliability.

	Pin	Min	Max	Unit
Supply Voltage	+Vin	0	36	V
Storage Temperature	T _{Storage}	-30	+80	°C

6.2 Recommended Operating Conditions

	Pin	Min	Typ	Max	Unit
Supply Voltage	+Vin	8	12/24	32	V
Supply current @12V with Myon and 7" display. Note that the supply current heavily depends on the used Myon module and the application use-case. A min. 12V 1A power-supply is recommended	Android idle Android using Android suspend *1)		250 400 120		mA
Operating temperature		0	25	70	°C
	(-20°C on request)	-20	25	70	°C

Note: Operating conditions will differ depending on used Myon module and display.

*1) Above measurements have been done on i-PAN V1R3. We expect to have a lower suspend current with i-PAN V1R4. The scenario "Android using" is max. current seen when starting some apps, webbrowser etc. Applications with high CPU-load or graphic performance will consume more power.

7. Mechanical Specification

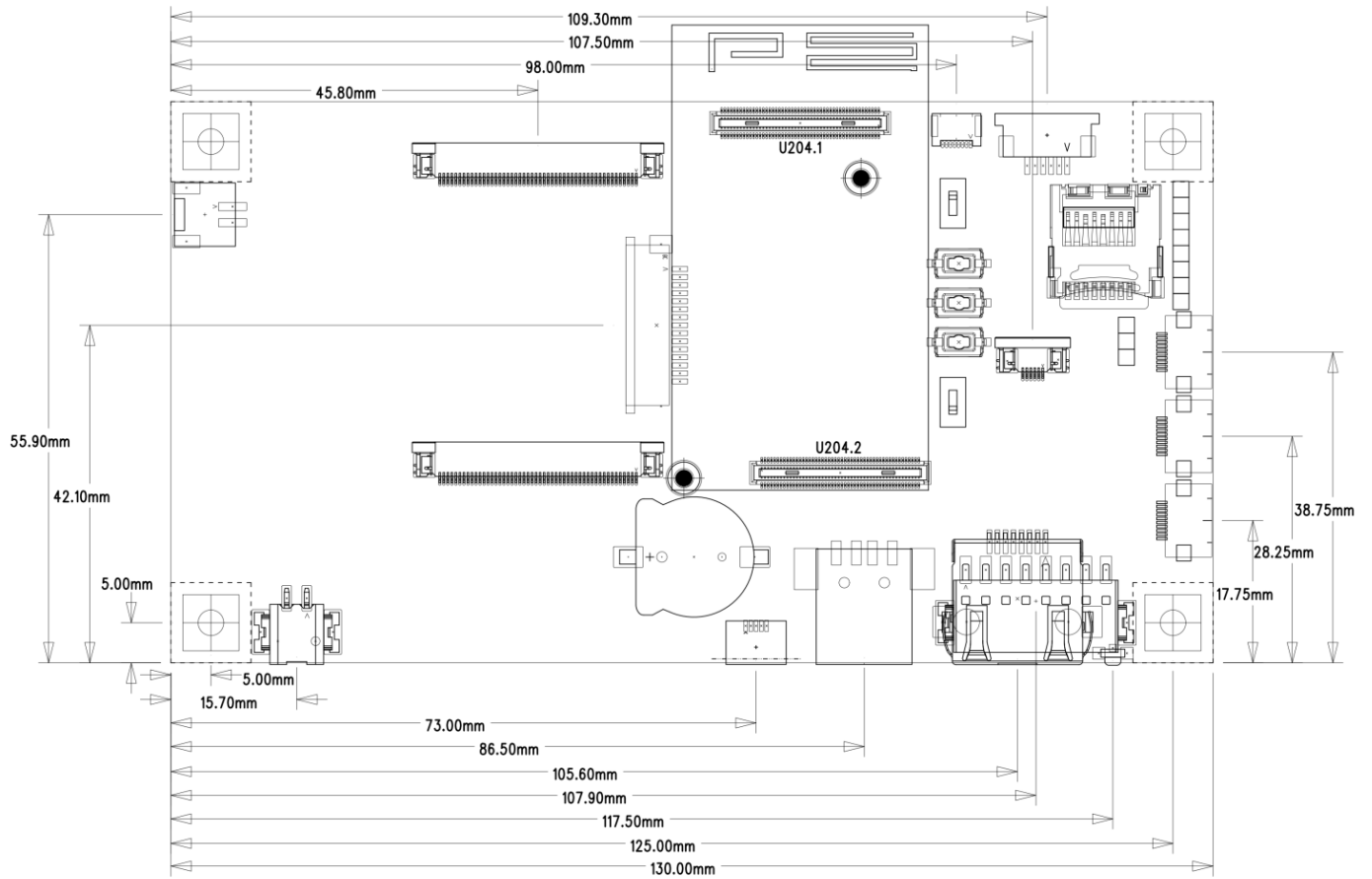


Figure 3-3-1: Top-View on i-PAN M7 Baseboard V1R3

Dimensions i-PAN M7 Baseboard: 130.0 x 70.0 x 17.0 mm (W x H x D)

8. Ordercodes for i-PAN M7

46 100.CL: i-PAN M7 CoverLens LC (Low Cost), incl. 7.0 inch Touch-Display with cover lens, i-PAN M7 Baseboard LC (without Myon I)

46 400.CL: i-PAN M7 CoverLens FF (Full Function), incl. 7.0 inch Touch-Display with cover lens, i-PAN M7 Baseboard FF (without Myon I)

9. Important Notice

This datasheet might contain errors.

Product-specification may change without further notice.

If you need to rely on a feature or specification, please contact Keith&Koep GmbH before placing an order.

This product is sold in multiple configurations and housing options.

Customers must check whether their configuration fulfills legal rules and regulations incl. RED (Radio Equipment Directive), CE, FCC and others.

Certificates of the products are usually uploaded to the Keith&Koep support website:

<http://support.keith-koep.com/service/doku.php>

10. Document History

Rev.	Date	Author	Changes
0.9	13.04.2017	JP	Initial Version.
1.0	15.05.2017	SH	Complete rework.
1.1	21.07.2017	SH	Reduced VIN ratings.
1.2	10.08.2017	CT	Update Photos, Figures 1, 2
1.3	22.01.2019	SH	Note that -20°C operating-temperature minimum is on request.