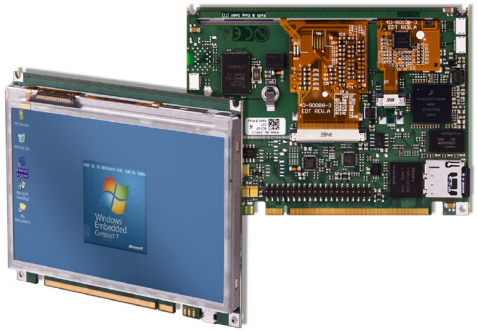
i-PAN4

Documentation ver. 1.2 (Preliminary)



1.0 Introduction

The i-PAN4 is a new type of a „DOM“ (Display On Module) device. The intelligent Touchpanel is ready to run operating systems like Microsoft Windows Embedded CE 6 or Windows Embedded Compact 7.

The board is based on the Freescale i.MX28 processor and comes with different connectivity options combined with a TFT-display (480 x 272 pixel) optionally with capacitive or resistive touch. The panel is designed for a quick and simple integration in customized equipments. Easy expandability is possible through a 40 pin header or 230 pin MXM edge connector.

Features of i-PAN4

Freescale i.MX28 CPU 454MHz	
128 MByte DDR2 RAM	µSD Card connector
µUSB2.0 OTG connector	USB 2.0 Host
Dedicated Debug-UART and JTAG	4x UART
2x CAN	2x SPI
I²C	12bit HS ADC
Ethernet	SPDIF
Li-Ion Battery Charger	expandable through edge connectors

Optional Features of i-PAN4

2 GByte eMMC storage	2nd Ethernet
802.11bg WLAN	Stereo Audio
Micro In	Barcode Scanner
RTC with backup capacitor	Bluetooth 4.0 & RF (ANT^{TM})

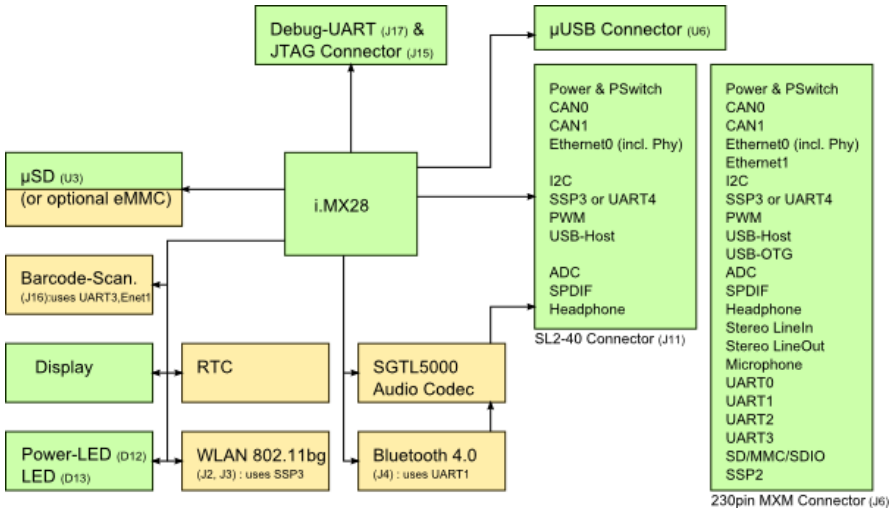
2.0 Functional description of the i-PAN4 DOM

In the following you'll find special information about the i-PAN4 DOM. For more information concerning the i.MX28 processor, the SGTL5000 audio-codec, or the LAN8710 ethernet phy please refer to the manufacturers original manuals:

i.MX28 http://www.freescale.com/imx28
SGTL5000 http://www.freescale.com
LAN8710 http://www.smsc.com/lan8710

Components of the i-PAN4 DOM

Figure 1. i-PAN4 Display On Module



Components of the i-PAN4 DOM:

1. Freescale i.MX28 (microprocessor).
2. DDR2-400 RAM, 16bit wide.
3. 4.3“ TFT-Display (480x272 with resistive or capacitive touch) .
4. SMSC LAN8710 Ethernet Phy.
5. uSD socket.
6. eMMC storage. [optional]
7. Freescale SGTL5000 (a single chip, stereo audio codec). [optional]
8. Philips 802.11 b/g WLAN-chip. [optional]
9. Panasonic Bluetooth-Module. [optional]
10. CAN Transceivers. [optional]
11. RTC PCF8563. [optional]
12. Reset generator.

2.1 Functional Groups

The i.MX28 interfaces are described in 2.2 Interfaces of the i.MX28 on page 6.

This chapter describes i-PAN4 specific peripherals and interfaces.

2.1.1 Power

The i-PAN4 is supplied through one of the following supply-pins:

- VCC_EXT (5V).
- USB-OTG connector (5V).
- VCC_BATTERY (3.3V .. 4.2V).

All other required voltages are generated by the i.MX28 from this power-supply. There is an auxiliary +3V3 voltage regulator option to allow more current drawn from external customer-specific peripherals.

Note that some interfaces need +5V, which is sourced from either VCC_EXT or the USB-OTG connector. For battery-only operation a small circuit on your baseboard or a mounting option on the i-PAN4 may be needed.

Please contact Keith & Koep for your specific power-scenario needs.

2.1.2 Battery

The Li-Ion battery may be connected to the VCC_BATTERY pins of the extension connectors or to the dedicated J12 battery-connector.

The battery is charged, whenever a +5V supply is attached to the i-PAN4.

TABLE 1. J12 Battery Connector

Pin	Name	Description
1	VCC_BATTERY	Positive Li-Ion battery pin.
2	BATT_TEMP	ADC-pin for battery temperature measurement. Typically battery-packs got a thermistor with one side connected to ground and the other availlable at the connector.
3	GND	Ground (0V).

2.1.3 Display

The default i-PAN4 is delivered with two display options, which only differ in a resistive or capacitive touch.

Technical information:

- 4.3 inch.
- 480x272 pixels.
- 16,7 million colors.

The DOM is prepared to carry other displays too. Please ask Keith & Koep if you have special display requirements.

2.1.4 LEDs

The board has two LEDs.

1. Green Power LED D12.

   This LED is switched on by the +3.3V supply-voltage.

2. Yellow Customer LED D13.

   This LED is either switched by signal PWM3 (GPIO3_28) or LED (GPIO2_5). The default mounting option uses PWM3.

2.1.5 uSD, eMMC

The i-PAN4 has one on-board uSD-slot and an optional eMMC mounting option.

Using a uSD-card is an easy way to deploy the operating system or application software to the system. Currently uSD-cards are availlable with a maximum capacity of up to 32GByte.

An eMMC is a flash-store, which can be soldered onto the i-PAN4. It uses the same interface and protocol like normal SD-cards, but has the benefit -- or disadvantage depending on the point of view -- of not beeing removable.

If the i-PAN4 is equipped with an eMMC, than this will be used as default boot-device. The eMMC will use interface SDIO1 and the uSD card-slot will be connected to SDIO0. In this case the external SD-card interface shares the same pins with the internal uSD card-slot!

If no eMMC is mounted, than SDIO1 will be routed to the internal uSD card-slot and SDIO0 will be connected to the external SD-card interface.

2.1.6 Ethernet

The i.MX28 has two RMII ethernet ports.

The first port is connected to a SMSC LAN8710 transceiver chip, which features:

- High-Performance 10/100MBit Ethernet Transceiver.
- HP Auto-MDIX support.
- flexPWR^{TM} -Technology.

The media device interface from the LAN8710 ethernet-phy is routed to both pin-connectors (J6 and J11) and must be connected to magnetics before going to a standard RJ45-ethernet-connector.

The second RMII ethernet port is only availlable through the 230-pin MXM-connector J6.

Please see Keith & Koep and SMSC reference designs for sample schematics.

2.1.7 CAN-Bus

The i.MX28 has two CAN-Bus ports. (Controller Area Network)

Both are routed to the pin-connectors J6 and J11.

Two mounting options exist:

1. If the CAN-transceivers are mounted, than differential CAN-Bus signals are used on the pin-connectors: CAN_L, CAN_H. These signals are not galvanically isolated!
2. Otherwise single ended CAN-Bus signals are used: CAN_TX, CAN_RX. This allows to select an own transceiver-chip on the customer specific extension board, which may also do a galvanic isolation.

2.1.8 RTC

The i.MX28-processor got a built-in realtime clock, which is supplied as long the panel is powered by VCC_EXT or VCC_BATTERY.

As an option, an additional RTC (PCF8563) can be mounted. This is supplied by a GoldCap, which is charged within 66 seconds while the device is powered. The power stored within the GoldCap is able to supply the RTC for 1 to 2 weeks.

2.1.9 Audio-Codec

The i-PAN4 can be equipped with a Fresscale SGTL5000 audio-codec. This is connected through a I2S-interface to the i.MX28 processor.

Features:

- Stereo Line In
- Stereo Line Out
- Microphone Input
- Headphone Output (45mW max. into 16 ohm load)
- Integrated Digital Processing (Freescale surround, bass, tone control/parametic equalizer/graphic equalizer Clocking/Control)

Please see Freescale SGTL5000 datasheet for details.

2.1.10 WLAN

The i-PAN4 can be equipped with a Philips' BGW211 wireless LAN controller according to the 802.11b/g standard. The controller is internally connected to the i.MX28 via the SSP3 interface. Two UFL-connectors on the module itself allow to use two antennas with support of antenna diversity mode. Up to 54MBit/s transfer rate can be reached.

- J3 - Main antenna connector.
- J2 - Auxiliary antenna connector.

For debug and regularity testing purpose test-connector J1 can be used.

TABLE 2. WLAN Test Connector J1

Pin	Name	Description
1	+3V3	Supply-voltage.
2	GND	Ground (0V).
3	WL_E_BOOT	Connect with 3V3 on your adapter.
4	n.c.	not connected
5	n.c.	not connected
6	WL_UART_TX	Connect to RX (pin 2) of your serial connector (level-shifter needed; i.e. MAX232)
7	WL_UART_RX	Connect to TX (pin 3) of your serial connector (level-shifter needed, i.e. MAX232)
8	WL_E_RESET	Connect to DTR (pin 4) of your serial connector (level-shifter needed, i.e. MAX232)

USB to J1 adapter and test-software is availlable from Keith & Koep.

2.1.11 Bluetooth

The i-PAN4 can be equipped with a Panasonic Bluetooth v4.0 module.

Different bluetooth-modules, including some that also support ANT^{TM} protocol are availlable.

If you wish to use bluetooth, please contact Keith & Koep for more information.

2.1.12 Barcode Scanner

The barcode-scanner feature is no standard option.

Some mounting options exist to support several different barcode scanners (i.e. EV15, SE-955, IS4920)

TABLE 3. Barcode Scanner Connector J16 (Pin-Mux)

Pin	EV15	SE-955	IS4920
Scan1	+3V3	GND	GND
Scan2	RXD	+3V3	+3V3
Scan3	$\overline{\text{SCAN\_TRIGGER}}$	GND	GND
Scan4	$\overline{\text{SCAN\_POWER\_EN}}$	RXD	RXD
Scan5	TXD	TXD	TXD
Scan6	RTS	CTS	CTS
Scan7	GND	RTS	RTS
Scan8	Pin11	$\overline{\text{SCAN\_POWER\_EN}}$	$\overline{\text{SCAN\_POWER\_EN}}$
Scan9	SCAN_LED	SCAN_BEEPER	SCAN_BEEPER
Scan10	CTS	SCAN_LED	SCAN_LED
Scan11	SCAN_BEEPER	$\overline{\text{SCAN\_WAKE}}$	$\overline{\text{SCAN\_WAKE}}$
Scan12	GND	$\overline{\text{SCAN\_TRIGGER}}$	$\overline{\text{SCAN\_TRIGGER}}$

2.2 Interfaces of the i.MX28

Following interfaces of the i.MX28 are routed to the pin-connectors:

2.2.1 Boot Options

The i.MX28 can boot from different interfaces. The default for the i-PAN4 is to boot from SDIO1. Which device is connected to SDIO1 differs depending on the i-PAN4 configuration; see 2.1.5 uSD, eMMC on page 4 .

This default behaviour can be overriden by solder-bridges on the i-PAN4 (SB0,SB1,SB3) or by using three pins of the 230-pin MXM-connector J6 (LCD00, LCD01, LCD03). LCDxx are boot-strap pins which should be tied to +3V3 or Gnd (0V).

TABLE 4. Boot Options

Boot	LCD00 / SB0	LCD01 / SB1	LCD03 / SB3
SDIO0	+3V3 / closed	0V / open	+3V3 / closed
SDIO1 (default)	0V / open	+3V3 / open	+3V3 / open
USB0-OTG	0V / open	0V / closed	0V / closed

The signal PSWITCH_E, which is routed to the 230-pin MXM connector J6, is a special Power-Switch pin. See the i.MX28 reference manual for details.

If this pin is pulled to +3V3 for 5 seconds during power up, than USB recovery-mode is entered. This can also be accomplished by pressing switch S1.

2.2.2 General Purpose Input/Output Pins (GPIO)

Most pins routed to the MXM-connector (TABLE 10. Pinout information of the connector J6 of the i-PAN4 DOM (230pin MXM-connector). on page 14) are GPIOs.

GPIOs are pins that may be configured to different functions. This function could be a simple input, interrupt or output pin, or a special interface pin like UART_TXD.

If a pin is a GPIO, its number and commonly used alternate functions is noted in the pinout table.

2.2.3 Universal Asynchronous Receiver / Transmitter (UART) serial ports

The i.MX28 has got 4 UART and 1 Debug-UART port.

Only one UART is routed to the 2x20pin connector J11. (UART4).

All four UARTs are routed to the 230-pin MXM-connector J6.

The dedicated Debug-UART port is routed to J17.

TABLE 5. Debug UART Connector J17

Pin	Name	Description
1	+3V3	Supply-voltage.
2	GND	Ground (0V).
3	n.c.	not connected.
4	n.c.	not connected.
5	DUART_TXD	Connect to RX (pin 2) of your serial connector (level-shifter needed; i.e. MAX232)
6	DUART_RXD	Connect to TX (pin 3) of your serial connector (level-shifter needed, i.e. MAX232)
7	n.c.	not connected.
8	n.c.	not connected.

USB to J17 adapter is availlable from Keith & Koep.

2.2.4 Universal Serial Bus (USB)

The i-PAN4 has got two instances of the high-speed Universal Serial Bus (USB, speed up to 480 Mb/s) with a fully integrated high/full/low-speed PHY (Physical Layer Protocol).

1. One USB 2.0 on-the-go (OTG) device/host.
2. One USB 2.0 host.

The USB-OTG interface can function as host or slave and is used during USB-recovery-mode to deploy firmware onto the device.

Please view AN4215 „i.MX28 Layout and Design Guidelines“ for USB routing guidelines of the USB-signals.

2.2.5 I²C Bus Interface Unit

The I²C bus was created by the Phillips Corporation and is a serial bus with a two-pin interface. The SDA data pin is used for input and output functions and the SCL clock pin is used to control and reference the I²C bus. The I²C bus unit allows the i.MX28 to serve as a master and slave device that resides on the I²C bus.

Refer to *The I²C-Bus Specification* for complete details on I²C bus operation.

2.2.6 Synchronous Serial Port (SSP)

The i.MX28 has got four Synchronous Serial Ports, from which three are availlable on the pin connectors. The SSP can be configured to support several different protocols & interfaces: SPI, MMC, SDIO, Triflash.

Features:

• Up to 52 MHz external SSP clock for SD/MMC mode

• 1-bit, 4-bit and 8-bit MMC/SD/SDIO modes

• Compliant with SDIO Rev. 2.0

• Support eMMC4.3 and eMMC4.4

• SPI with single, dual and quad modes

The suggested usage of SSP0 on the MXM-connector is as MMC/SD/SDIO port.

2.2.7 ADC

The i.MX28 got seven external Low-Resolution Analog-to-Digital-Converter-pins (LRADC) and one High-Speed ADC (HSADC). All ADCs have a resolution of 12bit and the HSADC is capable of 2Msps.

One usage example of the HSADC would be to drive a linear image scanner sensor (for example, TOSHIBA TCD1304DG linear image scanner sensor).

One of the 7 LRADC is routed to the external pin-connector.

TABLE 6. LRADC Usage on the i-PAN4

LRADC	Description
0	Routed to both pin-connectors for customer use.
1	Routed to J2 for battery-temperature measurement.
2	Used internally for touch-screen (XR).
3	Used internally for touch-screen (YU).
4	Used internally for touch-screen (XL).
5	Used internally for touch-screen (YD).
6	Measures voltage of VCC_EXT_DETECT.

2.2.8 JTAG / Debug Port

The JTAG / Debug port consists of several shift registers, with the destination controlled by the TMS pin and data I/O with TDI / TDO. The JTAG / Debug port provides two different functionalities:

- JTAG Debugger
- Hardware-testing using boundary scan interface according to IEEE 1149.1

TABLE 7. JTAG Connector J15

Pin	Name	Description
1	+3V3	Supply-voltage.
2	GND	Ground (0V).
3	JTAG_TMS	JTAG Test Mode Select
4	JTAG_TRST	JTAG Reset
5	JTAG_TCK	JTAG Clock
6	JTAG_TDO	JTAG Serial Data Out
7	JTAG_TDI	JTAG Serial Data In
8	$\overline{\text{RESET\_IN}}$	Reset-Input (active low).

3.0 DC operating conditions

TABLE 8. Operating Conditions

Parameter	Min	Typ	Max	Unit
VCC_EXT	4.75	5	5.25	V
VCC_BATTERY	3.3	-	4.242	V
GPIO-Pins (Input, high)	2	-	3.3	V
GPIO-Pins (Input, low)	0	-	0.8	V
GPIO-Pins (Output, high)	2.5	-	3.4	V
GPIO-Pins (Output, low)	0	-	0.4	V
GPIO-Pins (Output source current)	3.8	-	20.4	mA
GPIO-Pins (Output sink current)	4	-	24.5	mA
+5V supply-output	t.b.d		2	A [1)]
+3V3Aux supply-output, without &	t.b.d		100	mA
with extra regulator option			1000	[1)]
Operating Temperature	0		70	°C
Operating Temperature (on request)	-20		70	°C
Storage Temperature	-40		125	°C
Power Dissipation		t.b.d	3	W

1) The maximum possible output current depends on the selected i-PAN4 mounting options. Expect the availlable current to be lower.

4.0 Ordering Information

The i-PAN4 is orderable in different configurations. Options, i.e. the barcode-scanner option or different RAM-sizes can be delivered on request.

All standard i-PAN4 DOMs are configured to have:

- i.MX287 processor.
- 128 MByte RAM.
- EDT 4,3“ with capacitive or resistive touch.
- Ethernet0 transceiver.

Optional Features:

- i.MX283 processor.
- 256 MByte RAM.
- 2 GByte eMMC.
- WLAN 802.11 b/g.
- Other displays: Ampire/Sharp 4,3“, EDT-Family-Concept with 3,5“ - 7“.
- Connector for different barcode-scanners.

Product description	Ordering number
1. i-PAN4 LC SL2 TPR/TPC Boot through uSD. (No eMMC) SL2-connector. CAN0 & CAN1 transceiver. No extra 3V3Aux-regulator, RTC, Audio-Codec, WLAN & Bluetooth. Instead of RTC i.MX28 Realtime-Clock can be used.	32 100.TPR (resistive touch) 32 100.TPC (capacitive touch)
2. i-PAN4 FF Boot through eMMC. Extra 3V3Aux-regulator. Audio-Codec. Processor independant Realtime-Clock. No SL2-connector, CAN-transceivers, WLAN & Bluetooth. Singe Ended CAN-signals can be used.	t.b.d
3. i-PAN4 WL Boot through eMMC. Extra 3V3Aux-regulator. Audio-Codec. Processor independant Realtime-Clock. WLAN & Bluetooth. No SL2-connector, CAN-transceiver. Singe Ended CAN-signals can be used.	t.b.d

5.0 Pinout information and description

Most pins are accessible via the 230-pin MXM socket connector J6. For easy integration, most important interface pins are also availlable on the 2x20-pin connector J11.

TABLE 9. Pinout information of the connector J11 of the i-PAN4 DOM (2x20-pin, 2,00mm pitch)

Pin	Name	Description
1	VCC_EXT	External +5V power-supply input.
2	VCC_BATTERY	Positive LiPo-battery pin.
3	VCC_EXT	External +5V power-supply input.
4	VCC_BATTERY	Positive LiPo-battery pin.
5	+5V	+5V power-supply output.
6	GND	Ground (0V)
7	+3V3Aux	+3V3 power-supply output
8	GND	Ground (0V)
9	CAN0_H CAN0_TX	CAN0: HIGH-level CAN bus line. CAN0: Transmit data ouput. see note 1)
10	CAN0_L CAN0_RX	CAN0: LOW-level CAN bus line. CAN0: Receive data input. see note 1)
11	GND	Ground (0V)
12	GND	Ground (0V)
13	CAN1_H CAN1_TX	CAN1: HIGH-level CAN bus line. CAN1: Transmit data ouput. see note 1)
14	CAN1_L CAN1_RX	CAN1: LOW-level CAN bus line. CAN1: Receive data input. see note 1)
15	ENET0_TXn	Ethernet0: negative/postive Transmit/Receive. The on-board Ethernet-Phy supports Auto-MDIX and can automatically detect if the signal-pair is TX or RX. Connect to an external magnetics.
16	ENET0_TXp	
17	ENET0_RXn	
18	ENET0_RXp	
19	ENET0_GND	Ethernet0 Analog Ground (0V).
20	ENET0_SPEED	Link Speed Indication LED (10/100MBit).
21	ENET0_LINK	Link activity LED Indication. (active high polarity)
22	HEADPHONE_R	[Audio-Codec] Right headphone output
23	HEADPHONE_L	[Audio-Codec] Left headphone output
24	HEADPHONE_GND	[Audio-Codec] Headphone virtual ground.
25	I2C_CLK	I2C Serial Clock Output
26	GND	Ground (0V)
27	I2C_DATA	I2C Serial Clock Input/Output
28	PWM3 GPIO3_28	Pulse-Width-Modulated output. This pin is a GPIO, which can be set to different functions. Pin E09 of processor.

TABLE 9. Pinout information of the connector J11 of the i-PAN4 DOM (2x20-pin, 2,00mm pitch)

Pin	Name	Description
29	USBH_DM	USB-Host data minus pin (D-).
30	USBH_VBUS	USB-Host +5V power-supply output.
31	USBH_DP	USB-Host data plus pin (D+).
32	USBH_GND	USB-Host ground (0V).
33	LRADC0	12bit ADC input. (channel0)
34	PSWITCH_E	Power-Switch.
35	HSADC	High-Speed 12Bit ADC with up to 2Msps.
36	SPDIF	SPDIF audio output.
37	SSP3_MOSI UART4_RXD GPIO2_25	Synchronous Serial Port 3: Master Out, Slave In. Serial Port 4: Receive input. This pin is a GPIO, which can be set to different functions. Pin C02 of processor. see note 2)
38	SSP3_SCK UART4_TXD GPIO2_24	Synchronous Serial Port 3: Clock. Serial Port 4: Transmit output. This pin is a GPIO, which can be set to different functions. Pin A02 of processor. see note 2)
39	SSP3_MISO UART4_RTS GPIO2_26	Synchronous Serial Port 3: Master In, Slave Out. Serial Port 4: Request To Send output. This pin is a GPIO, which can be set to different functions. Pin B02 of processor. see note 2)
40	SSP3_SS0 UART4_CTS GPIO2_27	Synchronous Serial Port 3: Slave Select 0. Serial Port 4: Clear To Send input. This pin is a GPIO, which can be set to different functions. Pin D02 of processor. see note 2)

1) This is a mounting option. If the CAN-transceiver is not mounted, the single-ended CAN_TX and CAN_RX signals are routed to the connector.

2) If the i.MX283 processor is used, these pins are not connected or optionally connected to other processor pins.

TABLE 10. Pinout information of the connector J6 of the i-PAN4 DOM (230pin MXM-connector).

Pin	Name	Description
1	VCC_BATTERY	Positive LiPo-battery pin.
2	VCC_BATTERY	
3	VCC_EXT	External +5V power-supply input.
4	VCC_EXT	
5	VCC_EXT	
6	VCC_EXT	
7	VCC_EXT	
8	GND	Ground (0V)
9	GND	
10	GND	
11	GND	
12	GND	
13	CAN0_L CAN0_RX	CAN0: LOW-level CAN bus line. CAN0: Receive data input. see note 1)
14	CAN0_H CAN0_TX	CAN0: HIGH-level CAN bus line. CAN0: Transmit data ouput. see note 1)
15	GND	Ground (0V)
16	+5V	+5V power-supply output.
17	+5V	
18	GND	Ground (0V)
19	CAN1_L CAN1_RX	CAN1: LOW-level CAN bus line. CAN1: Receive data input. see note 1)
20	CAN1_H CAN1_TX	CAN1: HIGH-level CAN bus line. CAN1: Transmit data ouput. see note 1)
21	+3V3Aux	+3V3 power-supply output
22	+3V3Aux	
23	ENET0_TXn	Ethernet0: negative/postive Transmit/Receive. The on-board Ethernet-Phy supports Auto-MDIX and can automatically detect if the signal-pair is TX or RX. Connect to an external magnetics.
24	ENET0_TXp	
25	ENET0_RXn	
26	ENET0_RXp	
27	ENET0_GND	Ethernet0 Analog Ground (0V).
28	ENET0_SPEED	Link Speed Indication LED (10/100MBit).
29	ENET0_LINK	Link activity LED Indication. (active high polarity)
30	GND	Ground (0V)

Pin	Name	Description
31	ENET1_RXD0 GPIO4_9 (J01)	Ethernet1: RMII interface. An external PHY is needed to connect this port to a wired ethernet network. See Ethernet chapter in this datasheet for more information. These pins are GPIOs, which can be set to different functions. The name of the processor-pins to which these signals are connected to are put in braces. ENET_CLK, ENET_RESET, ENET_INT, ENET_MDIO and ENET_MDC are also GPIOs, but are shared with the on-board ethernet-phy! see note 2)
32	ENET1_RXD1 GPIO4_10 (J02)	
33	ENET1_TXD0 GPIO4_11 (G01)	
34	ENET1_TXD1 GPIO4_12 (G02)	
35	ENET1_RX_EN GPIO4_15 (J03)	
36	ENET1_TX_EN GPIO4_14 (J04)	
37	ENET_CLK	
38	ENET_RESET	
39	ENET_INT	
40	ENET_MDIO	
41	ENET_MDC	
42	LCD00	These display signals serve the processor as boot-strap pins. In standard, the iPAN4 is configured to boot from the internal uSD or eMMC memory. To change this, pull these pins to +3V3 or to Ground (0V): 0 1 2 Boot-Device 1 0 1 SDIO0 (external SD-card port) 0 1 1 SDIO1 (internal SD-card port) 0 0 0 USB0-OTG
43	LCD01	
44	LCD03	
45	HEADPHONE_R	[Audio-Codec] Right headphone output
46	HEADPHONE_GND	[Audio-Codec] Headphone virtual ground.
47	HEADPHONE_L	[Audio-Codec] Left headphone output
48	VCC_EXT_DETECT	This signal is VCC_EXT divided by 1,56 through a resistor divider (100K and 56K). This signal is routed to LRADC6 of the processor.
49	I2C_CLK	I2C Serial Clock Output
50	I2C_DATA	I2C Serial Clock Input/Output
51	USBH_VBUS	USB-Host +5V power-supply output.
52	USBH_DM	USB-Host data minus pin (D-).
53	USBH_DP	USB-Host data plus pin (D+).
54	USBH_GND	USB-Host ground (0V).
55	PWM3 GPIO3_28	Pulse-Width-Modulated output. This pin is a GPIO, which can be set to different functions. Pin E09 of processor.
56	LRADC0	12bit ADC input. (channel0)
57	PSWITCH_E	Power-Switch.
58	HSADC	High-Speed 12Bit ADC with up to 2Msps.

Pin	Name	Description
59	SPDIF	SPDIF audio output.
60	SSP3_MOSI UART4_RXD GPIO2_25	Synchronous Serial Port 3: Master Out, Slave In. Serial Port 4: Receive input. This pin is a GPIO, which can be set to different functions. Pin C02 of processor. see note 2)
61	SSP3_SCK UART4_TXD GPIO2_24	Synchronous Serial Port 3: Clock. Serial Port 4: Transmit output. This pin is a GPIO, which can be set to different functions. Pin A02 of processor. see note 2)
62	SSP3_MISO UART4_RTS GPIO2_26	Synchronous Serial Port 3: Master In, Slave Out. Serial Port 4: Request To Send output. This pin is a GPIO, which can be set to different functions. Pin B02 of processor. see note 2)
63	SSP3_SS0 UART4_CTS GPIO2_27	Synchronous Serial Port 3: Slave Select 0. Serial Port 4: Clear To Send input. This pin is a GPIO, which can be set to different functions. Pin D02 of processor. see note 2)
64	UART1_RXD GPIO3_4 (PWM0)	Serial Port 1: Receive input. This pin is a GPIO, which can be set to different functions. Pin L04 of processor.
65	UART1_TXD GPIO3_5 (PWM1)	Serial Port 1: Transmit output. This pin is a GPIO, which can be set to different functions. Pin K04 of processor.
66	UART1_RTS GPIO3_7 (ROTARY_B)	Serial Port 1: Request to Send output. This pin is a GPIO, which can be set to different functions. Pin J05 of processor. see note 2)
67	UART1_CTS GPIO3_6 (ROTARY_A)	Serial Port 1: Clear to Send input. This pin is a GPIO, which can be set to different functions. Pin K05 of processor. see note 2)
68	UART2_RXD GPIO3_8 (SSP3_D1/4)	Serial Port 2: Receive input. This pin is a GPIO, which can be set to different functions. Pin F06 of processor. see note 2)
69	UART2_TXD GPIO3_9 (SSP3_D2/5)	Serial Port 2: Transmit output. This pin is a GPIO, which can be set to different functions. Pin F05 of processor. see note 2)
70	UART2_RTS GPIO3_11 (I2C1_SDA)	Serial Port 2: Request to Send output. This pin is a GPIO, which can be set to different functions. Pin H07 of processor. see note 2)
71	UART2_CTS GPIO3_10 (I2C1_SCL)	Serial Port 2: Clear to Send input. This pin is a GPIO, which can be set to different functions. Pin H06 of processor. see note 2)

Pin	Name	Description
72	UART3_RXD GPIO3_12 (ENET0_1588EV0O)	Serial Port 3: Receive input. This pin is a GPIO, which can be set to different functions. Pin M05 of processor. see note 2)
73	UART3_TXD GPIO3_13 (ENET0_1588EV0I)	Serial Port 3: Transmit output. This pin is a GPIO, which can be set to different functions. Pin L05 of processor. see note 2)
74	UART3_RTS GPIO3_15 (ENET0_1588EV1I)	Serial Port 3: Request to Send output. This pin is a GPIO, which can be set to different functions. Pin K06 of processor. see note 2)
75	UART3_CTS GPIO3_14 (ENET0_1588EV1O)	Serial Port 3: Clear to Send input. This pin is a GPIO, which can be set to different functions. Pin L06 of processor. see note 2)
76	USBOTG_GND	USB-OTG ground (0V).
77	USBOTG_ID	USB-OTG ID-pin.
78	USBOTG_DP	USB-OTG data plus pin (D+).
79	USBOTG_DM	USB-OTG data minus pin (D-).
80	USBOTG_VBUS	USB-OTG +5V power-supply input/output.
81	SD_DATA3 SSP0_D3 GPIO2_3	SDIO0 Data-line 3. This pin is a GPIO, which can be set to different functions. Pin A05 of processor.
82	SD_DATA2 SSP0_D2 GPIO2_2	SDIO0 Data-line 2. This pin is a GPIO, which can be set to different functions. Pin D06 of processor.
83	SD_DATA1 SSP0_D1 GPIO2_1	SDIO0 Data-line 1. This pin is a GPIO, which can be set to different functions. Pin C06 of processor.
84	SD_DATA0 SSP0_D0 GPIO2_0	SDIO0 Data-line 0. This pin is a GPIO, which can be set to different functions. Pin B06 of processor.
85	SD_CD SSP0_DETECT GPIO2_9	SDIO0 Card-Detect. This pin is a GPIO, which can be set to different functions. Pin D10 of processor.
86	SD_CMD SSP0_CMD GPIO2_8	SDIO0 Command. This pin is a GPIO, which can be set to different functions. Pin A04 of processor.
87	SD_CLK SSP0_SCK GPIO2_10	SDIO0 Clock. This pin is a GPIO, which can be set to different functions. Pin A06 of processor.
88	SD_WP GPIO1_29	SDIO0 Write-Protect This pin is a GPIO, which can be set to different functions. Pin M01 of processor.

Pin	Name	Description
89	UART0_RXD GPIO3_0	Serial Port 0: Receive input. This pin is a GPIO, which can be set to different functions. Pin G05 of processor.
90	UART0_TXD GPIO3_1	Serial Port0: Transmit output. This pin is a GPIO, which can be set to different functions. Pin H05 of processor.
91	UART0_RTS GPIO3_3	Serial Port0: Request to Send output. This pin is a GPIO, which can be set to different functions. Pin J07 of processor.
92	UART0_CTS GPIO3_2	Serial Port0: Clear to Send input. This pin is a GPIO, which can be set to different functions. Pin J06 of processor.
93	GND	Ground (0V)
94	VSSA_AUDIO	Analog Audio Ground (0V)
95	VDDA_AUDIO	Analog Audio +3V3 output.
96	LINEOUT_R	[Audio-Codec] Right line out.
97	LINEOUT_L	[Audio-Codec] Left line out.
98	LINEIN_R	[Audio-Codec] Right line in.
99	LINEIN_L	[Audio-Codec] Left line in.
100	MIC_OUT	[Audio-Codec] Microphone input.
101	MIC_GND	[Audio-Codec] Microphone Ground.
102	SSP2_MOSI GPIO2_17	Synchronous Serial Port 2: Master Out, Slave In. This pin is a GPIO, which can be set to different functions. Pin C03 of processor.
103	SSP2_MISO GPIO2_18	Synchronous Serial Port 2: Master In, Slave Out. This pin is a GPIO, which can be set to different functions. Pin B03 of processor.
104	SSP2_SCK GPIO2_16	Synchronous Serial Port 2: Clock. This pin is a GPIO, which can be set to different functions. Pin A03 of processor.
105	SSP2_SS0 GPIO2_19	Synchronous Serial Port 2: Slave Select 0. This pin is a GPIO, which can be set to different functions. Pin C04 of processor.
106	$\overline{\text{RESET\_OUT}}$	Active low reset output. This signal is asserted on power-up, brown-out and if $\overline{\text{RESET\_IN}}$ is pulled low.
107	$\overline{\text{RESET\_OUT\_MX28}}$ GPIO2_13	Active low reset output of the processor. This pin is a GPIO, which can be set to different functions. Pin C01 of processor. see note 2)
108	$\overline{\text{RESET\_IN}}$	Active low reset input.
109	GND	Ground (0V)
110	GND	Ground (0V)
111	VCC_BATTERY	Positive LiPo-battery pin.
112	VCC_BATTERY	

Pin	Name	Description
113	+3V3	Internal +3V3 power. Not intended to supply external components.
114	+3V3Aux	+3V3 power-supply output.
115	+5V	+5V power-supply output.

1) This is a mounting option. If the CAN-transceiver is not mounted, the single-ended CAN_TX and CAN_RX signals are routed to the connector.

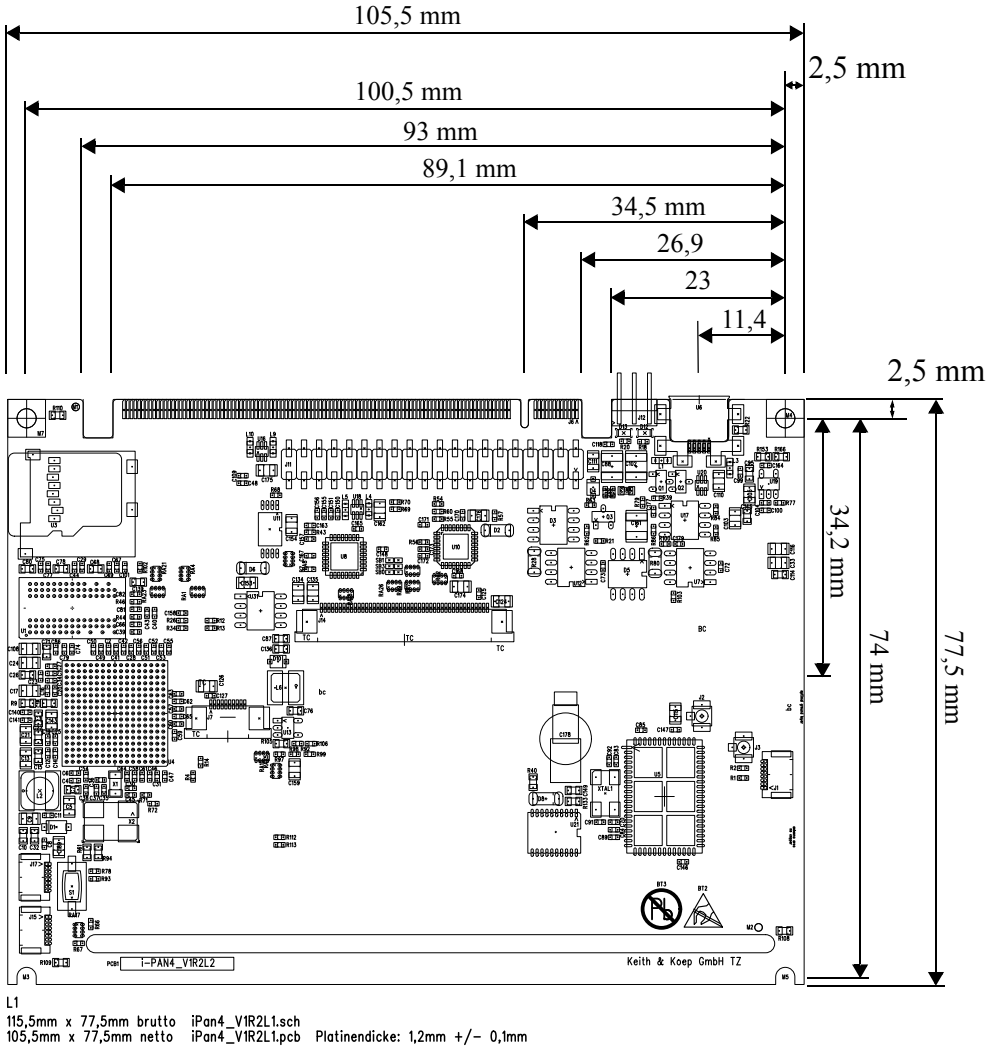
2) If the i.MX283 processor is used, these pins are not connected or optionally connected to other processor pins.

Only the bottom-side of the MXM-Connector is used. All pins on the top-side are connected to either ground (0V) or chassis-ground. Chassis-ground is used for the pins on the smaller side of the notch.

Appendix

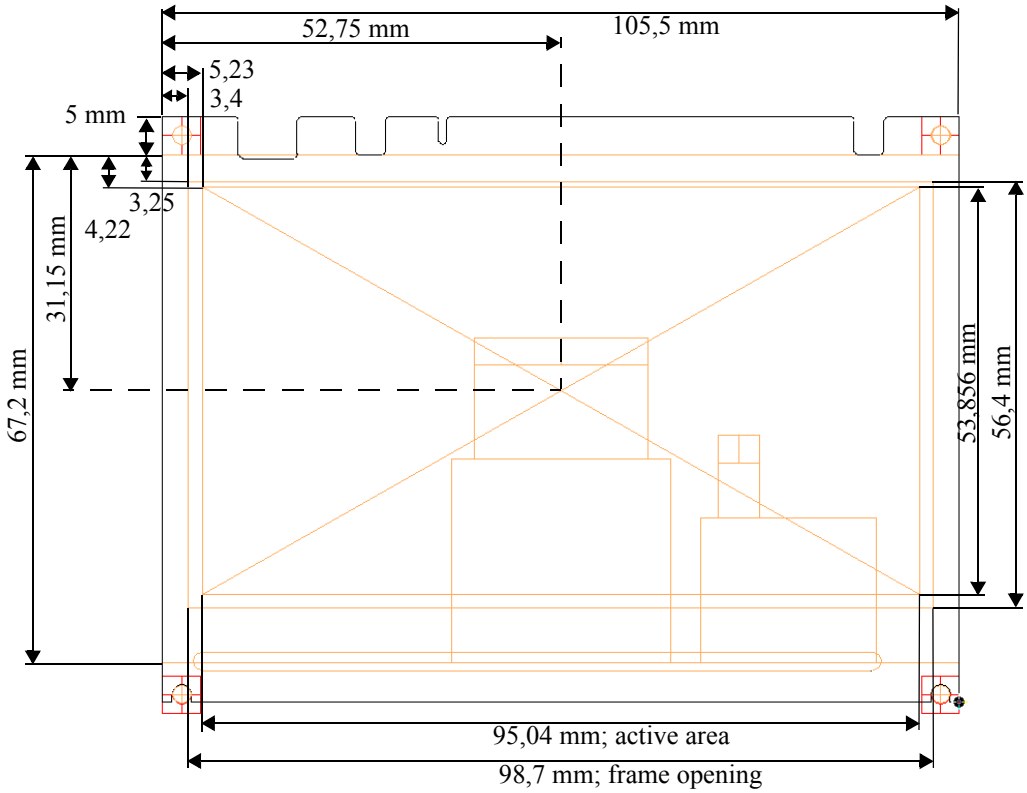
6.0 Assembly-Drawing & Dimensions of the i-PAN4

Figure 2. Assembly-Drawing & Dimensions of the i-PAN4 (bottom)



Scale 1:1

Figure 3. Assembly-Drawing & Dimensions of the i-PAN4 (top)



Display-dimensions are possible to change in future. Contact Keith & Koep to get information on display delivery situation.

Revision

Board: i-PAN4

Revision	PCB no.	Date		Changes
1.0		23.08.2012	SH	Initial Version
1.1		27.08.2012	SH	Added Figure 3 „Assembly-Drawing & Dimensions of the i-PAN4 (top)“