MicroSys

User's Manual

CRX02 Rev. 2

1st edition

Declaration of Conformity

We, Manufacturer
MicroSys Electronics GmbH
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Germany

declare that the product

CRX02

is in conformity with:

EN 50081-1 Generic emission standard
EN 50082-1 Generic immunity standard

in accordance with **89/336 EEC-EMC** Directive.

We also declare the conformity of the above-mentioned product with the actual required safety standards in accordance with Low Voltage Directive **73/23 EEC**.

Date:

Signature:

Position: General Manager

Edition

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1 Introduction

1.1 Features

1.1.1 CRX02

The CRX02 is a carrier board designed especially for the MPX5200 and MPX5200G modules.

- Power supply (9V – 30V input)
- Network connectivity (one 100MBit RJ-45 socket usable with MPX5200G)
- 2 serial ports
- 2 CAN ports
- 2 USB port, USB 1.1 connector (Typ A)
- Compact Flash Slot

1.1.2 MPE06

The MPE06 is an add-on board, to be used in conjunction with CRX02 and the graphics-enabled module MPX5200G. It offers:

- 2 Video In channels (video capture) via Philips SAA7113 Video DAC (Cinch)
- Wrap header for flat panel display connection, or LVDS adapter
- Wrap header for SPI interface
- Wrap header for Touch Screen interface
- Display connector for 2 LVDS displays
- 2 DAC for display control
- 2 Output ports for display control

1.1.3 MPX5200(G)

The MPX5200 (G) is a processor module featuring the Freescale MPC5200 MCU.
For details on these modules, please refer to their respective manuals.

1.2 Power Supply Specification

The CRX02 operates at an input voltage range of 9 - 30 V DC.
This voltage is first converted on-board to 3,3 V DC, from which all other supply voltages are then derived.

Power Requirement with mounted MPX5200G module and MPE06:

+3,3V (+5% / -2,5%) 1.5 A

Note: Power consumption of CF Card and USB devices have to be added!
The efficiency of the on board 3,3V to 5V DC/DC is better than 85%.
(1A drawn at the 5V USB results in additional 1,7A@3,3V supply current)

2 Delivery

The CRX02 board may come alone, with no extra parts, or as part of a pre-built assembly with MPX5200, or MPX5200G plus MPE06 (as well as possible future boards),
Please check for completeness and integrity on arrival, and contact your dealer and/or transport company in case of damage.

3 Installation and usage

The Carrier CRX02 does not do anything by itself, but serves as a carrier for MPX(5200/5200G, currently) modules. So you need to have an adequate module installed.

IMPORTANT:
WATCH THE CORRECT ORIENTATION OF THE MODULE WHEN MOUNTING! MATCH THE CORNERS WITH THE BIG COPPER AREA (SUPPLY PADS) ON THE CARRIER AND ON THE MODULE!
OTHERWISE THE MODULE AND/OR THE CARRIER WILL BE SERIOUSLY DAMAGED!

- Fix the MPX5200(G) module properly to the Carrier CRX02, using six bolts M2.5 x 12 (or longer, if you are stacking more modules) and nuts.

NOTE: As long as MPE06 is not to be used, processor modules MPX5200(G) can be mounted above as well as below the carrier CRX02. However, watch the correct orientation (match the connected power supply pads on module and carrier).

- If using MPE06 and MPX5200G, mount MPE06 properly on top of the assembly of MPX5200G and CRX02. See pictures in the Appendix for correct positioning.

- Connect power supply to the Power socket of CRX02. **Check for correct polarity!**

- Connect a RS-232 serial terminal to the RJ-12 socket. If adapting to DSUB-9 is required, use the adapter cable 833 from MicroSys, or equivalent.

- Connect network to the RJ-45 network socket.

- Start your serial terminal, e.g. HyperTerminal on a Windows PC, or 'kermit' on a Linux/Unix machine.
Default serial parameters on delivery: 9600 Bd, 8 data bits, no parity, 1 stop bit

- Switch power on.
  The board will start with the U-Boot messages:

```
U-Boot 1.2.0 (Feb 27 2007 - 10:07:01)

CPU:   MPC5200 v2.2, Core v1.4 at 396 MHz
       Bus 132 MHz, IPB 132 MHz, PCI 33 MHz
Board: MicroSys MPX5200/CRX02
I2C:   85 kHz, ready
DRAM:  64 MB
FLASH: 16 MB
PCI:   Bus Dev VenId DevId Class Int
        00  0a  1057  5809  0680  00
In:    serial
Out:   serial
Err:   serial
Net:   FEC ETHERNET
IDE:   Bus 0: OK
  Device 0: not available
  Device 1: not available

Type "run flash_nfs" to mount root filesystem over NFS

Hit any key to stop autoboot:  0

=>
```

4 Lists

4.1 Connectors

Position	Function	Manufacturer	Article	Note
ST1	Module Connector	MSC	EXM32BT-4	on CRX02
ST2	Module Connector	MSC	EXM32BT-4	on CRX02
ST3	Module Connector	MSC	EXM32BT-2	on MPE06
DBG	CPU Debug Port	n/a	Wrap header, 2x10pin, 180°	BDM-Tools
CF1	CF Card	Yamaichi		
CAN1		Phoenix		
CAN2		Phoenix		
SIO A	Serial line A			
USB1..2	USB connectors			
SIO B	Serial line B			
LAN	Ethernet 10/100 Mbps			
PWR		Phoenix		
VIN-1	FBAS in port 1		Mini-DIN female	Pins 8-5
VIN-2	FBAS in port 2		Mini-DIN female	Pins 6-3
Display			50 pin wrap 2.54 mm	
SPI/I2C	SPI/I2C Interface Connector	n/a	Wrap header, 2x14pin 180°	on MPE06

4.2 I2C devices

The CRX02 itself has no I2C devices:
I2C devices listed here for reference are those **on MPE06 only.**
Devices on MPX5200(G) are not listed here, but in the respective manual.

Device:	Function	8 bit Hex	7 bit Hex	binary I^2C address							r/w
SAA7113	Video In	4A/4B	24..25	0	1	0	0	1	0	1	1/0
DAC5571	Dac 0	98/99	4C	1	0	0	1	1	0	0	1/0
DAC5571	Dac 1	9A/9B	4D	1	0	0	1	1	0	1	1/0
PFC8574	8bit Port	70/71	38	0	1	1	1	0	0	0	1/0

4.3 Chip selects

Signal	Function	Bus width	Mode	Size	Description
CS4	ST1 b26	16 Bit	GPCM	32 MByte	CF Card
CS5	ST1 b28	16 Bit	GPCM	32 MByte	CF Card

4.4 Address Map

Type	Base	End	Select	Bus	Size
CF Card	no default	no default	CS4		16Bit
CF Card	no default	no default	CS5		16Bit

4.5 Interrupt distribution

The available interrupt lines of the MPX5200G module are connected to the following sources. All interrupts are low active.

MPX-Module	Source
IRQ0#	not connected
IRQ1#	reserved for Lime graphic controller
IRQ2#	MII-Int from LAN (CRX02)
IRQ3#	Touch controller (MPE06)

4.6 Overview on usage of MPC5200 units

For easier cross-reference, the usage of the MPC5200 MCU sub-units is listed here.
This is the same for both MPX5200 and MPX5200G modules.

PSC1	UART
PSC2	CAN1 & CAN2
PSC3	USB
USB	USB
ETH	ETH with MII-INT on IRQ2#
PSC6	UART
I2C	not used
TIMER	SPI & TMR(0:1) = SPI-CS, TMR(7) = LED
ATA	True-IDE CF-Card with Card-Detect on TMR(6)

4.7 Usage of Processor Ports

Pin		**used**	
K1	ETH - 0	ETH - 0	Ethernet interface (LAN)
K2	ETH - 1	ETH - 1	LAN
K3	ETH - 2	ETH - 2	LAN
J1	ETH - 3	ETH - 3	LAN
J2	ETH - 4	ETH - 4	LAN
L3	ETH - 5	ETH - 5	LAN
N2	ETH - 6	ETH - 6	LAN
N1	ETH - 7	ETH - 7	LAN
M3	ETH - 8	ETH - 8	LAN
L1	ETH - 9	ETH - 9	LAN
J3	ETH - 10	ETH - 10	LAN
L4	ETH - 11	ETH - 11	LAN
M2	ETH - 12	ETH - 12	LAN
M1	ETH - 13	ETH - 13	LAN
N4	ETH - 14	ETH - 14	LAN
N3	ETH - 15	ETH - 15	LAN
L2	ETH - 16	ETH - 16	LAN
J4	ETH - 17	ETH - 17	LAN
B11	PSC1- 0	TXD1	Serial line ttyS0, TX
A11	PSC1- 1	RXD1	Serial line ttyS0, RX
C10	PSC1- 2	RTS1	Serial line ttyS0, RTS
B10	PSC1- 3	CTS1	Serial line ttyS0, CTS
A10	PSC1- 4	DCD1	Serial line ttyS0, DCD

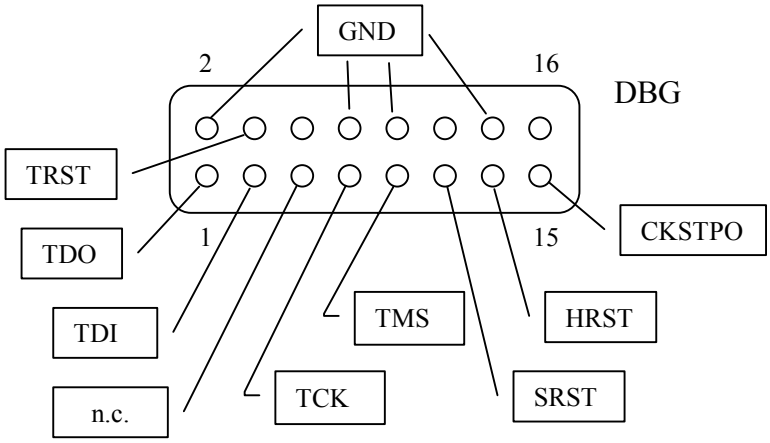
C9	PSC2- 0	CAN1-TX	CAN1-TX
B9	PSC2- 1	CAN1-RX	CAN1-RX
A9	PSC2- 2	CAN2-TX	CAN2-TX
B8	PSC2- 3	CAN2-RX	CAN2-RX
A8	PSC2- 4		
C7	PSC3- 0	USB2-0	USB2-0
B7	PSC3- 1	USB2-1	USB2-1
A7	PSC3- 2	USB2-2	USB2-2
C6	PSC3- 3	USB2-3	USB2-3
B6	PSC3- 4	USB2-4	USB2-4
A6	PSC3- 5	USB2-5	USB2-5
C5	PSC3- 6		
B5	PSC3- 7	USB2-7	USB2-7
A5	PSC3- 8	USB2-8	USB2-8
C4	PSC3- 9	USB2-9	USB2-9
B12	PSC6- 0	RXD6	Serial Line ttyS2, RX 2
C11	PSC6- 1	CTS6	Serial Line ttyS2, CTS 2
A12	PSC6- 2	TXD6	Serial Line ttyS2, TX 2
C13	PSC6- 3	RTS6	Serial Line ttyS2, RTS 2
Y20	TMR- 0		External CS for SPI
V18	TMR- 1		CS for Touch SPI on MPE06
D3	TMR- 2		SPI-MOSI
D2	TMR- 3		SPI-MISO
D1	TMR- 4		SPI-SS
E3	TMR- 5		SPI-CLK
E2	TMR- 6		Card detect from CF
E1	TMR- 7		LED on reset button
H1	USB1- 0	USB1-0	USB Interface
H2	USB1- 1	USB1-1	
H3	USB1- 2	USB1-2	
G1	USB1- 3	USB1-3	
G2	USB1- 4	USB1-4	
G3	USB1- 5	USB1-5	
G4	USB1- 6		
F1	USB1- 7	USB1-7	
F2	USB1- 8	USB1-8	
F3	USB1- 9	USB1-9	

4.8 BDI Connector

The background debug port of the MPC5200 MCU can be accessed via the connector DBG.

NOTE: The BDI connector is located on the solder side of CRX02, and is usually NOT POPULATED.

4.8.1 BDI Connector on CRX02



4.8.2 BDI Connector Pin-out table

DBG	Signal		Signal	DBG
Pin 1	TDO		GND	Pin 2
Pin 3	TDI		TRST#	Pin 4
Pin 5	n.c.		1K pull-up	Pin 6
Pin 7	TCK		n.c.	Pin 8
Pin 9	TMS		GND	Pin 10
Pin 11	SRST#		GND	Pin 12
Pin 13	HRST#		n.c.	Pin 14
Pin 15	CKSTPO#		GND	Pin 16

4.9 Backup Battery for RTC

There is a Lithium battery type CR2032 for RTC back up, on CRX02.

4.10 Module Connector ST1 - Pin-out

Location marked

b1	ST2	b52
a1	ST2	a52

d1	ST2	d52
c1	ST2	c52

b1	ST1	b52
a1	ST1	a52

d1	ST1	d52
c1	ST1	c52

gray shaded pins are not connected

GND	a1	a2	LAD8
GND	a3	a4	LAD9
LAD0	a5	a6	LAD10
LAD1	a7	a8	LAD11
LAD2	a9	a10	LAD12
LAD3	a11	a12	LAD13
LAD4	a13	a14	LAD14
LAD5	a15	a16	LAD15
LAD6	a17	a18	GND
LAD7	a19	a20	GND
LAD16	a21	a22	LAD24
LAD17	a23	a24	LAD25
LAD18	a25	a26	LAD26
LAD19	a27	a28	LAD27
LAD20	a29	a30	LAD28
LAD21	a31	a32	LAD29
LAD22	a33	a34	LAD30
LAD23	a35	a36	LAD31
GND	a37	a38	ATA-ISOLATE
GND	a39	a40	ATA-DRQ
ATA-INTRQ	a41	a42	ATA-DACK#
B-REQ0	a43	a44	B-GNT0
B-REQ1	a45	a46	B-GNT1
B-REQ2	a47	a48	B-GNT2
B-RST	a49	a50	GND
B-PCICLK	a51	a52	GND

GND	b1	b2	LDP2
GND	b3	b4	LDP3
LDP0	b5	b6	LA30
LDP1	b7	b8	LA31
LA27	b9	b10	LWE0
LA28	b11	b12	LWE1
LA29	b13	b14	LWE2
LALE	b15	b16	LWE3
LGPL0	b17	b18	LCS0
LGPL1	b19	b20	LCS1
LGPL2	b21	b22	LCS2
LGPL3	b23	b24	LCS3
LGPL4	b25	b26	LCS4
LGPL5	b27	b28	LCS5
LCLKE	b29	b30	LBCTL
LCLK0	b31	b32	GND
ATA-IOR#	b33	b34	GND
ATA-IOW#	b35	b36	ATA-IOCHRDY
A-M66EN	b37	b38	A-INTA
A-REQ0	b39	b40	A-GNT0
A-REQ1	b41	b42	A-GNT1
A-REQ2	b43	b44	A-GNT2
A-REQ3	b45	b46	A-GNT3
A-REQ4	b47	b48	A-GNT4
GND	b49	b50	A-RST
GND	b52	b51	A-PCICLK

Module Connector ST1 - Pin-out continued:

location marked

b1	ST2	b52
a1	ST2	a52

d1	ST2	d52
c1	ST2	c52

b1	ST1	b52
a1	ST1	a52

d1	ST1	d52
c1	ST1	c52

gray shaded pins are not connected

GND	c1	c2	B-AD8/A-AD40
GND	c3	c4	B-AD9/A-AD41
B-AD0/A-AD32	c5	c6	B-AD10/A-AD42
B-AD1/A-AD33	c7	c8	B-AD11/A-AD43
B-AD2/A-AD34	c9	c10	B-AD12/A-AD44
B-AD3/A-AD35	c11	c12	B-AD13/A-AD45
B-AD4/A-AD36	c13	c14	B-AD14/A-AD46
B-AD5/A-AD37	c15	c16	B-AD15/A-AD47
B-AD6/A-AD38	c17	c18	GND
B-AD7/A-AD39	c19	c20	GND
B-CBE0/A-CBE4	c21	c22	B-CBE1/A-CBE5
B-FRME	c23	c24	B-DVSL
B-IRDY	c25	c26	B-PERR/A-REQ64
B-TRDY	c27	c28	B-SERR/A-ACK64
B-STOP	c29	c30	B-PAR/A-PAR64
B-CBE2/A-CBE6	c31	c32	B-CBE3/A-CBE7
GND	c33	c34	B-AD24/A-AD56
GND	c35	c36	B-AD25/A-AD57
B-AD16/A-AD48	c37	c38	B-AD26/A-AD58
B-AD17/A-AD49	c39	c40	B-AD27/A-AD59
B-AD18/A-AD50	c41	c42	B-AD28/A-AD60
B-AD19/A-AD51	c43	c44	B-AD29/A-AD61
B-AD20/A-AD52	c45	c46	B-AD30/A-AD62
B-AD21/A-AD53	c47	c48	B-AD31/A-AD63
B-AD22/A-AD54	c49	c50	GND
B-AD23/A-AD55	c51	c52	GND

GND	d1	d2	A-AD8
GND	d3	d4	A-AD9
A-AD0	d5	d6	A-AD10
A-AD1	d7	d8	A-AD11
A-AD2	d9	d10	A-AD12
A-AD3	d11	d12	A-AD13
A-AD4	d13	d14	A-AD14
A-AD5	d15	d16	A-AD15
A-AD6	d17	d18	GND
A-AD7	d19	d20	GND
A-CBE0	d21	d22	A-CBE1
A-FRME	d23	d24	A-DVSL
A-IRDY	d25	d26	A-PERR
A-TRDY	d27	d28	A-SERR
A-STOP	d29	d30	A-PAR
A-CBE2	d31	d32	A-CBE3
GND	d33	d34	A-AD24
GND	d35	d36	A-AD25
A-AD16	d37	d38	A-AD26
A-AD17	d39	d40	A-AD27
A-AD18	d41	d42	A-AD28
A-AD19	d43	d44	A-AD29
A-AD20	d45	d46	A-AD30
A-AD21	d47	d48	A-AD31
A-AD22	d49	d50	GND
A-AD23	d51	d52	GND

4.11 Module Connector ST2 - Pin-out

location marked

b1	ST2	b52
a1	ST2	a52

d1	ST2	d52
c1	ST2	c52

b1	ST1	b52
a1	ST1	a52

d1	ST1	d52
c1	ST1	c52

gray shaded pins are not connected

GND	a1	a2	MII-GTXCKI
GND	a3	a4	MII1-TXEN
MII1-TXD0	a5	a6	MII1-TXD1
MII1-TXD2	a7	a8	MII1-TXD3
MII1-GXCK	a9	a10	MII1-RXD0
MII1-RXD1	a11	a12	MII1-RXD2
MII1-RXD3	a13	a14	MII1-RXCK
MII1-RXDV	a15	a16	MII1-CRS
MII1-TXD4	a17	a18	MII1-TXD5
MII1-TXD7	a19	a20	MII1-TXD6
MII1-TXER	a21	a22	MII1-RXD7
MII1-RXD6	a23	a24	MII1-RXD5
MII1-RXD4	a25	a26	MII1-RXER
MII1-COL	a27	a28	MII1-TXCK
MII-MDCK	a29	a30	GND
MII-MDIO	a31	a32	GND
JTMS	a33	a34	CKSTI
JTDI	a35	a36	CKSTO
JTDO	a37	a38	KRST
JTCK	a39	a40	HRST
JTRST	a41	a42	SRST
IRQ0	a43	a44	IRQ3
IRQ1	a45	a46	IRQ4
IRQ2	a47	a48	IRQ5
GND	a49	a50	IRQ6
GND	a51	a52	IRQ7

GND	b1	b2	spare
GND	b3	b4	MII2-TXEN
MII2-TXD0	b5	b6	MII2-TXD1
MII2-TXD2	b7	b8	MII2-TXD3
MII2-GXCK	b9	b10	MII2-RXD0
MII2-RXD1	b11	b12	MII2-RXD2
MII2-RXD3	b13	b14	MII2-RXCK
MII2-RXDV	b15	b16	MII2-CRS
MII2-TXD4	b17	b18	MII2-TXD5
MII2-TXD7	b19	b20	MII2-TXD6
MII2-TXER	b21	b22	MII2-RXD7
MII2-RXD6	b23	b24	MII2-RXD5
MII2-RXD4	b25	b26	MII2-RXER
MII2-COL	b27	b28	MII2-TXCK
CFGE	b29	b30	GND
PRST	b31	b32	GND
GTM-IO0/TMR-0	b33	b34	GTM-IO8
GTM-IO1/TMR-1	b35	b36	GTM-IO9
GTM-IO2/TMR-2	b37	b38	GTM-IO10
GTM-IO3/TMR-3	b39	b40	GTM-IO11
GTM-IO4/TMR-4	b41	b42	GTM-IO12
GTM-IO5/TMR-5	b43	b44	GTM-IO13
GTM-IO6/TMR-6	b45	b46	GTM-IO14/GPIO-WKUP6
GTM-IO7/TMR-7	b47	b48	GTM-IO15/GPIO-WKUP7
GND	b49	b50	spare
GND	b52	b51	spare

Module Connector ST2 - Pin-out continued:

location marked

b1	ST2	b52	d1	ST2	d52
a1	ST2	a52	c1	ST2	c52

b1	ST1	b52	d1	ST1	d52
a1	ST1	a52	c1	ST1	c52

gray shaded pins are not connected

GND	c1	c2	VEE Core
GND	c3	c4	VFF RAM
MPH0-D0	c5	c6	MPH1-D0
MPH0-D1	c7	c8	MPH1-D1
MPH0-D2	c9	c10	MPH1-D2
MPH0-D3	c11	c12	MPH1-D3
MPH0-D4	c13	c14	MPH1-D4
MPH0-D5	c15	c16	MPH1-D5
MPH0-D6	c17	c18	MPH1-D6
MPH0-D7	c19	c20	MPH1-D7
MPH0-NXT	c21	c22	MPH1-NXT
MPH0-DIR	c23	c24	MPH1-DIR
MPH0-STP	c25	c26	MPH1-STP
MPH0-PWFLT	c27	c28	MPH1-PWFLT
MPH0-PCTL0	c29	c30	MPH1-PCTL0
MPH0-PCTL1	c31	c32	MPH1-PCTL1
MPH0-CLK	c33	c34	MPH1-CLK
GND	c35	c36	GND
GND	c37	c38	GND
STDBY	c39	c40	CS0E
VDD	c41	c42	VDD
VDD	c43	c44	VDD
VDD	c45	c46	VDD
VDD	c47	c48	VDD
VDD	c49	c50	VDD
VDD	c51	c52	VDD

GND	d1	d2	USB1-0
GND	d3	d4	USB1-1
PSC3-0	d5	d6	USB1-2
PSC3-1	d7	d8	USB1-3
PSC3-2	d9	d10	USB1-4
PSC3-3	d11	d12	USB1-5
PSC3-4	d13	d14	USB1-6
PSC3-5	d15	d16	USB1-7
PSC3-6	d17	d18	USB1-8
PSC3-7	d19	d20	USB1-9
PSC3-8	d21	d22	GND
PSC3-9	d23	d24	GND
spare	d25	d26	spare
spare	d27	d28	spare
spare	d29	d30	spare
spare	d31	d32	spare
I2C1-SDA	d33	d34	UTXD1
I2C1-SCL	d35	d36	URXD1
I2C2-SDA	d37	d38	URTS1
I2C2-SCL	d39	d40	UCTS1
UTXD3	d41	d42	UDCD1
URXD3	d43	d44	UTXD2
URTS3	d45	d46	URXD2
UCTS3	d47	d48	URTS2
GND	d49	d50	UCTS2
GND	d51	d52	UDCD2

4.12 Module ST3-Connector Pin-out (MPX5200G only)

location marked

b1	ST2	b52
a1	ST2	a52

gray shaded pins are not connected

VDD	a1	a2	GND
VDD	a3	a4	GND
	a5	a6	SPI-CLK
	a7	a8	SPI-SS
	a9	a10	SPI-MISO
	a11	a12	SPI-MOSI
	a13	a14	TMR-1
	a15	a16	TMR-0
GND	a17	a18	
GND	a19	a20	IRQ3
	a21	a22	VGRA6
	a23	a24	VGRA7
	a25	a26	
	a27	a28	
	a29	a30	
	a31	a32	
GND	a33	a34	
GND	a35	a36	VGRACLK
VGRA0	a37	a38	
VGRA1	a39	a40	
VGRA2	a41	a42	I2C2-SCL
VGRA3	a43	a44	I2C2-SDA
VGRA4	a45	a46	I2C3-SDA
VGRA5	a47	a48	I2C3-SCL
VDD	a49	a50	GND
VDD	a51	a52	GND

	b1	b2	GND
	b3	b4	GND
	b5	b6	BO7
	b7	b8	BO6
	b9	b10	BO5
	b11	b12	BO4
	b13	b14	BO3
	b15	b16	BO2
DISPE	b17	b18	BO1
	b19	b20	BO0
VSYNC	b21	b22	GO7
HSYNC	b23	b24	GO6
	b25	b26	GO5
DCLKO	b27	b28	GO4
GND	b29	b30	GO3
GND	b31	b32	GO2
	b33	b34	GO1
	b35	b36	GO0
	b37	b38	RO7
	b39	b40	RO6
	b41	b42	RO5
	b43	b44	RO4
	b45	b46	RO3
	b47	b48	RO2
RO0	b49	b50	GND
RO1	b52	b51	GND

5 Interfaces on CRX02

5.1 Power Supply Connector

For Power there is one Phoenix connector type MSTB2,5 with 2 pins on the right hand side.

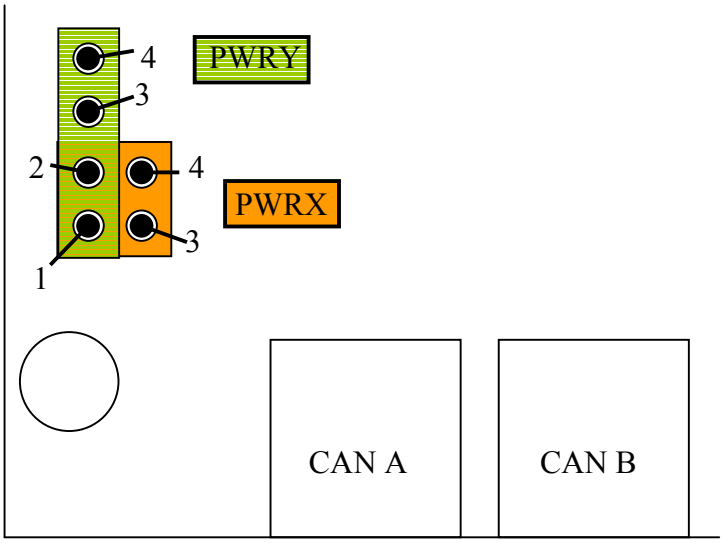
PWR	
Pin 1	Pin 2
+ 9V to +30V	- (GND)

Additionally there is a Wrap connector.

PWRE	
Pin 1	Pin 2
+ 9V to +30V	- (GND)

On the left hand side there are two additional connectors to supply external boards.
PWRX is used to supply power to the MPE06.

PWX / PWY			
Pin 1	Pin 2	Pin 3	Pin 4
VCC (5V)	GND	GND	VDD (3,3V)



5.2 Reset

The push button switch on the front panel of the CRX02 generates a hard reset to the board.

5.3 CAN Interfaces

5.3.1 CAN 1 + CAN 2 Interconnection

Signal	MPX5200 Signal name	ST2 pin
CAN1-TXD	PSC2-0	D44
CAN1-RXD	PSC2-1	D46
CAN2-TXD	PSC2-2	D48
CAN2-RXD	PSC2-3	D50

For CAN there are two Phoenix connectors type MSTB2,5 with 2 pins each on the left hand side.

CAN1			CAN2	
Pin 1	Pin 2		Pin 1	Pin 2
CAN1-L	CAN1-H		CAN2-L	CAN2.H

Additional there are 2 Wrap pins each.

Wrap CANX			Wrap CANY	
Pin 1	Pin 2		Pin 1	Pin 2
CAN1-L	CAN1-H		CAN2-L	CAN2.H

5.4 Serial Interfaces

There are two RS232 serial interfaces onboard the CRX02, which are connected to the UART signals of module connector ST2-d. Both interfaces contain RTS and CTS handshake lines and are able to handle transfer rates up to 250kbps.

5.4.1 SIOA Interconnection

RJ12-SIOA			Port		ST2	
Pin:	**RS232**				**Signal**	**Pin:**
1	n.c.				---	---
2	RTS-1		PSC1-2		URTS1	d38
3	GND				---	---
4	TXD-1		PSC1-0		UTXD1	d34
5	RXD-1		PSC1-1		URXD1	d36
6	n.c.				---	---
7	CTS-1		PSC1-3		UCTS1	d40
8	n.c.				---	---

Wrap Connector SIOX :

SIOX					
Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
RTS	GND	TXD	RXD	DCD	CTS

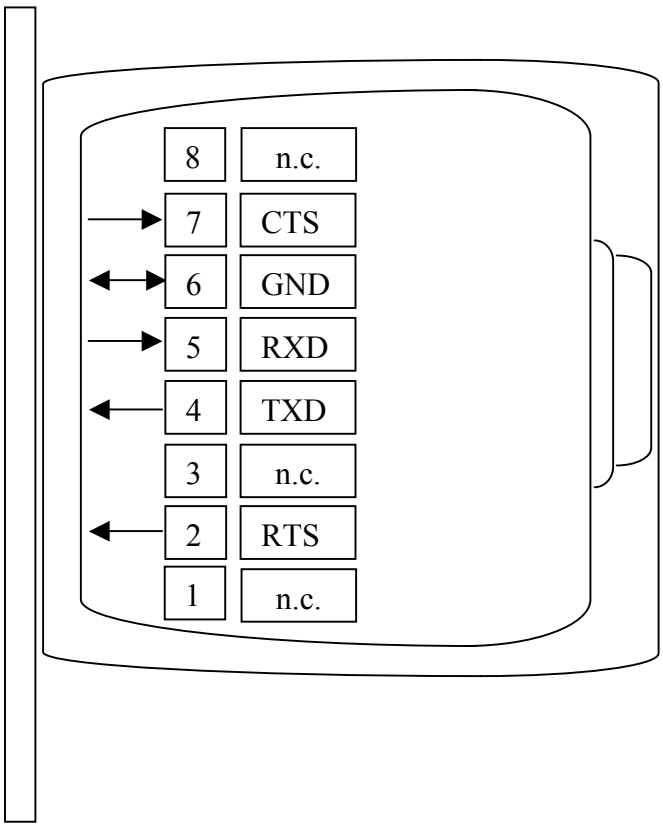
5.4.2 SIOB Interconnection:

RJ12-SIOB			Port		ST2	
Pin:	**RS232**				**Signal**	**Pin:**
1	n.c.				---	---
2	RTS-1		PSC6-3		URTS2	d47
3	GND				---	---
4	TXD-1		PSC6-2		UTXD2	d45
5	RXD-1		PSC6-0		URXD2	d41
6	n.c.				---	---
7	CTS-1		PSC6-1		UCTS2	d43
8	n.c.				---	---

Wrap Connector SIOY :

SIOY					
Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
RTS	GND	TXD	RXD	DCD	CTS

5.4.3 RJ12 Connector - Front view (SIOA, SIOB)

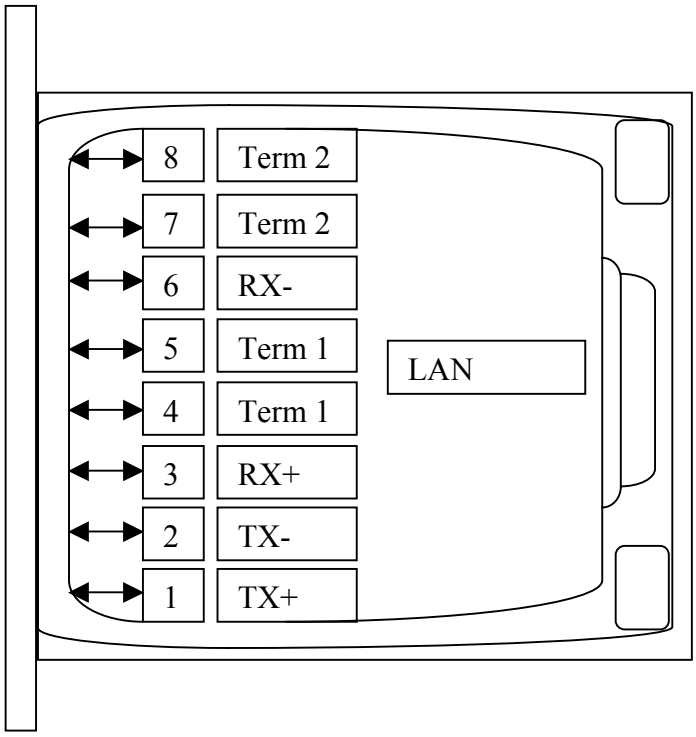


5.5 Ethernet LAN interface

The MPC5200's Network interface (ETH-0 to ETH-17) is connected to MII1 on the Carrier CRX02.
LAN interface is based on Intel 10/100 Mbps Ethernet PHY LXT971A.
The PHY is being controlled via the MII interface of the MPC5200 processor.
The MII interrupt occupies interrupt line IRQ1 on the MPC5200.

LXT971 Signal	Source	Description
REFCLK	25 MHz	NET-PHY Clock
RESET	HRST	CPU Reset Signal
TXSLEW0	1	4,3ns Slew Rate
TXSLEW1	1	
ADDR0	1	Device Address 1
ADDR1	0	
ADDR2	0	
ADDR3	0	
ADDR4	0	
SLEEP	0	Sleep Mode off
PAUSE	1	Pause during Auto-Negotiation
TEST0	0	
TEST1	0	
PWRDWN	0	Power Down Mode off
MDDIS	0	Management Port active
MDINT	MPC5200-IRQ1	Management Interrupt
MDC	MPC5200-ETH-6	Management Data Clock
MDIO	MPC5200-ETH-7	Management Data I/O
RXCK	MPC5200-ETH-9	Receive Clock
TXCK	MPC5200-ETH-11	Transmit Clock
RXD3	MPC5200-ETH-15	Receive Data Bit 3
RXD2	MPC5200-ETH-14	Receive Data Bit 2
RXD1	MPC5200-ETH-13	Receive Data Bit 1
RXD0	MPC5200-ETH-12	Receive Data Bit 0
TXD0	MPC5200-ETH-1	Transmit Data Bit 0
TXD1	MPC5200-ETH-2	Transmit Data Bit 1
TXD2	MPC5200-ETH-3	Transmit Data Bit 2
TXD3	MPC5200-ETH-4	Transmit Data Bit 3
RXER	MPC5200-ETH-16	Receive Error
RXDV	MPC5200-ETH-8	Receive Data Valid
TXEN	MPC5200-ETH-0	Transmit Enable
TXER	MPC5200-ETH-5	Transmit Error
CRS	MPC5200-ETH-17	Carrier Sense
COL	MPC5200-ETH-10	Collision Detected

5.6 RJ45 LAN Connector - Front view



LAN Wrap Connector

LANA			LANB		
Pin 1	Pin 2	Pin 3	Pin 1	Pin 2	Pin 3
TX-	Term 1	TX+	RX-	Term 2	RX+

5.7 USB Interfaces

The CRX02 offers 2 USB ports specification Rev.1.1.

Signals Port 1	MPX5200 Signal name	ST2 pin
USB1-OE	USB1-0	d2
USB1-TXN	USB1-1	d4
USB1-TXP	USB1-2	d6
USB1-RXD	USB1-3	d8
USB1-RXP	USB1-4	d10
USB1-RXN	USB1-5	d12
	USB1-6	d14
USB1-SPD	USB1-7	d16
USB1-SUS	USB1-8	d18
USB1-OVR	USB1-9	d20

Signals Port 2	MPX5200 Signal name	ST2 pin
USB2-OE	PSC3-0	d5
USB2-TXN	PSC3-1	d7
USB2-TXP	PSC3-2	d9
USB2-RXD	PSC3-3	d11
USB2-RXP	PSC3-4	d13
USB2-RXN	PSC3-5	d15
	PSC3-6	d17
USB2-SPD	PSC3-7	d19
USB2-SUS	PSC3-8	d21
USB2-OVR	PSC3-9	d23

5.7.1 USB-A / USB-B Connector Pin out:

Pin:	USB-A	USB-B
1	Vbus+	Vbus+
2	D-	D-
3	D+	D+
4	GND	GND

Wrap Connectors USBX, USBY:

USBX / USBY			
Pin 1	Pin 2	Pin 3	Pin 4
Vbus+	D-	D+	GND

5.8 CompactFlash Card Interface

The CF Card interface of the CRX02 works in True-IDE mode only with a 3.3V supply. The card slot works with the MPX5200 module in GPCM mode by the following signals.

5.8.1 CF Card - Interconnect mapping

CF-Card		MPX5200
CE1	IDE Task File & Data	LCS3/LA27=0
CE2	IDE Control & Status	LCS3/LA27=1
IOR	IDE read	LGPL2
IOW	IDE write	LWE0#/LWE1#
A0	LSB Address	LA30
A1	Address	LA29
A2	MSB Address	LA28
IRQ	interrupt	IRQ3#
IORDY	not used, fixed timing	(LGPL4)
D0-D7	even byte	AD7-AD0
D8-D15	odd byte	AD15-AD8

5.8.2 CF Card Connector - Pin-out

CF ST1 Pin	Signal	Signal	CF ST1 Pin
1	GND	---	26
2	D3	D11	27
3	D4	D12	28
4	D5	D13	29
5	D6	D14	30
6	D7	D15	31
7	CE1#	CE2#	32
8	GND	---	33
9	GND	IOR#	34
10	GND	IOW#	35
11	GND	+3V3	36
12	GND	IRQ	37
13	+3V3	+3V3	38
14	GND	GND	39
15	GND	---	40
16	GND	RST#	41
17	GND	WAIT#	42
18	A2	---	43
19	A1	+3V3	44
20	A0	---	45
21	D0	---	46
22	D1	D8	47
23	D2	D9	48
24	---	D10	49
25	---	GND	50

6 Interfaces on MPE06

6.1 Video In

For Video capture the SAA7113 from Philips (NXP) is used. Inputs AI11 and AI21 are connected to a 4-pin Mini-DIN (SVGA) socket.

For more details about the chip refer to manufacturers manual.

Signal	SAA7113 Signal name	SAA7113 pin
VIN1	AI11	4
VIN2	AI21	43

NOTE: Video In 3 and 4 are not externally available.

6.2 Display

Display connector offers the capability to connect one or two LVDS displays with following features:

	LVDS A	LVDS B
Standard assembly	3x 8 Bit	3x 6 Bit or 3x 8 Bit compatibility mode
Alternate assembly	3x 6 Bit or 3x 8 Bit compatibility mode	3x 6 Bit or 3x 8 Bit compatibility mode

WARNING: SEE SECTION 6.6.4!

For dual head applications both displays may be used for resolution up to 800 x 600 visible pixel.

Please check manual of your display to find correct interconnection for LVDS-signals.
Usage of multiplexing is different for displays of different manufacturers, as described in the following paragraphs.

6.2.1 LVDS-A mux scheme for 8 bit LG displays

This is standard on LVDS-A. Please check if your display input requires this scheme. As LVDS-transmitter National DS90C385AMT chip is used.

Out	Input Data							Comment
TxOUT3	TxIn23	TxIn17	TxIn16	TxIn11	TxIn10	TxIn5	TxIn27	Not used for 6 bit
	HIGH	BO7	BO6	GO7	GO6	RO7	RO6	
TxOUT2	TxIn26	TxIn25	TxIn24	TxIn22	TxIn21	TxIn20	TxIn19	
	DISPE	VSYN	HSYN	BO5	BO4	BO3	BO2	
TxOUT1	TxIn18	TxIn15	TxIn14	TxIn13	TxIn12	TxIn9	TxIn8	
	BO1	BO0	GO5	GO4	GO3	GO2	GO1	
TxOUT0	TxIn7	TxIn6	TxIn4	TxIn3	TxIn2	TxIn1	TxIn0	
	GO0	RO5	RO4	RO3	RO2	RO1	RO0	

6.2.2 LVDS-B mux scheme for 6 / 8 bit compatibility displays

This is standard on LVDS-B. Please check if your display input requires this scheme. As LVDS-transmitter National DS90C385AMT chip is used.

Out	Input Data							Comment
TxOUT3	TxIn23	TxIn17	TxIn16	TxIn11	TxIn10	TxIn5	TxIn27	Not used for 6 bit
	HIGH	BO1	BO0	GO1	GO0	RO1	RO0	
TxOUT2	TxIn26	TxIn25	TxIn24	TxIn22	TxIn21	TxIn20	TxIn19	
	DISPE	VSYN	HSYN	BO7	BO6	BO5	BO4	
TxOUT1	TxIn18	TxIn15	TxIn14	TxIn13	TxIn12	TxIn9	TxIn8	
	BO3	GO2	GO7	GO6	GO5	GO4	GO3	
TxOUT0	TxIn7	TxIn6	TxIn4	TxIn3	TxIn2	TxIn1	TxIn0	
	GO2	RO7	RO6	RO5	RO4	RO3	RO2	

This scheme may be made available on LVDS-A also with different assembly version. Please ask if required.

6.3 Touch Controller

There are two different versions of touch controller assembled:
- ADS7845E for 5-wire touch screens
- ADS7846E for 4-wire touch screens

Both chips communicate via SPI Bus to the MPX5200. The SPI Bus is located on TMR-2,3,4,5. For interrupt IRQ3# is used.

6.4 DACs

6.4.1 Analog Out 1 (DAC1, DAC5571, Addr = 4DH)

The analog voltage is generated by I2C-DAC type DAC5571. For details of programming refer to manufacturers manual (Texas Instruments).
I2C-Address for this DAC is 4DH.
The DAC is working with 3,3V Vdd. The output voltage for the brightness control is adapted to the necessary voltage range of 0 to 5V.

Digital value programmed to the DAC	Voltage at TSCRA pin 3
000h	0V
080h	2,5V
0FFh	5V

For inverters with different control voltages the output may be transformed to nearly any range by assembling different resistors. Voltage may also use 0 to 12V if necessary.

6.4.2 Analog Out 2 (DAC2, DAC5571, Addr = 4CH)

The analog voltage is generated by I2C-DAC type DAC5571. For details of programming refer to manufacturers manual (Texas Instruments).

I2C-Address for this DAC is 0CH.
The DAC is working with 3,3V Vdd. The output voltage for the brightness control is adapted to the necessary voltage range of 0 to 5V.

Digital value programmed to the DAC	Voltage at TSCRA pin 7
000h	0V
080h	2,5V
0FFh	5V

For inverters with different control voltages the output may be transformed to nearly any range by assembling different resistors. Voltage may also use 0 to 12V if necessary.

6.5 Digital Ports (PF8574AT, Addr 38H)

The PF8574AT (NXP, Philips) is an 8-bit I/O expansion device. In this application it is used to control the display. For programming refer to manufacturers manual.

The outputs for display control are buffered by open drain transistors.

	Digital value written to PC8574AT	**TSCRA, TSCRB pin 1**	**TSCRA, TSCRB pin 9**
	After reset	0	0
	000h	0	0
	001h	3,3V (VDD)	0
	002h	0	3,3V (VDD)
	003h	3,3V (VDD)	3,3V (VDD)

6.6 Interface Connectors

6.6.1 Video In

	Signal	SAA7113 signal name	SAA7113 pin
	VIN2	AI11	4
	VIN3	AI21	43
	VIN1 (Wrap header only)	AI12	7
	VIN4 (Wrap header only)	AI22	44

6.6.2 SPI Connector (Wrap)

Pin	Signal name	MPX5200 Port	Function
1	VDD	Power 3,3 V	
2	VDD	Power 3,3 V	
3	I2C2-SCL	I2C2-SCL	
4	SPI-CLK	TMR-5	SPI Clock
5	I2C2-SDA	I2C2-SDA	
6	TMR-1	TMR-1	CS for external SPI
7	I2C3-SCL	Not supported	
8	SPI-MISO	TMR-3	SPI Input to CPU
9	I2C3-SDA	Not supported	
10	SPI-MOSI	TMR-2	SPI Output from CPU
11			
12	SPI-SS	TMR-5	SPI standard CS
13	GND	Ground	
14	GND	Ground	

6.6.3 PVDO

PVDO-connector offers all signals to connect custom specific displays.

Attention: signals are not buffered, directly from Lime MB86276 display controller.

Signal	Pin	Pin	Signal
GND	1	2	DCLKO
HSYNC	3	4	VSYNC
GND	5	6	RO2
RO3	7	8	RO4
RO5	9	10	RO6
RO7	11	12	GND
GO2	13	14	GO3
GO4	15	16	GO5
GO6	17	18	GO7
GND	19	20	BO2
BO3	21	22	BO4
BO5	23	24	BO6
BO7	25	26	GND
DISPE	27	28	VDD
VDD	29	30	DPSH
DPSV	31	32	VDD via 0R
GND	33	34	
RO0	35	36	RO1
GO0	37	38	GO1
BO0	39	40	BO1
nc	41	42	nc
PIO2	43	44	PIO7
PIO3	45	46	PIO6
PIO4	47	48	PIO5
GND	49	50	GND

6.6.4 Display Connector

WARNING:
The usage of the D3+ and D3- lines (LVDS pins 17 and 18) depends on the respective display in use! Please check the display's manual FIRST!
On some displays, these pins are marked as "no connect", which in this case may mean "DO NOT CONNECT"! If something is then connected to these pins, these displays may fail to work, or probably even get damaged.
If you use a display that points out LVDS pins 17 and 18 as "no connect" and does not work when plugged into the MPE06 "as is", you may have to cut these two connections physically!

Pin on Display connector	Pin on Split connector	Name	Function
	LVDS-A		**Display A**
1	1	+ 3,3V	
2	2	+ 3,3V	
3	3	GND	
4	4	GND	
5	5	DO -	
6	6	D0 +	
7	7	GND	
8	8	D1 -	
9	9	D1 +	
10	10	GND	
11	11	D2 -	
12	12	D2 +	
13	13	GND	
14	14	CLK -	
15	15	CLK +	
16	16	GND	
17	17	D3 - **(SEE WARNING ABOVE!)**	
18	18	D3 + **(SEE WARNING ABOVE!)**	
19	19	GND	
20	20	GND	

	TSCRA		Touch Interface
21	1	P0	Port 0 Out
22	2	LR / Y-	Touch Y-, lower right
23	3	DAC1	Analog Out 1
24	4	LL / X-	Touch X-, lower left
25	5	GND	
26	6	Wiper	Touch (Referenz 5 wire only)
27	7	DAC2	Analog Out 2
28	8	UL / X+	Touch X+, upper left
29	9	P1	Port 1 Out
30	10	UR / Y+	Touch Y+, upper right
	LVDS-B		**Display B**
31	1	+ 3,3V	
32	2	+ 3,3V	
33	3	GND	
34	4	GND	
35	5	D0 -	
36	6	D0 +	
37	7	GND	
38	8	D1 -	
39	9	D1 +	
40	10	GND	
41	11	D2 -	
42	12	D2 +	
43	13	GND	
44	14	CLK -	
45	15	CLK +	
46	16	GND	
47	17	D3 - **(SEE WARNING ABOVE!)**	
48	18	D3 + **(SEE WARNING ABOVE!)**	
49	19	GND	
50	20	GND	

For Dual Head Applications two LVDS displays may be connected to the display connectors.

Applications:

1. 8 Bit LVDS
    a. Position for display connector = LVDS-A
        i. Suitable for LG-Philips Monitors
        ii. For NEC Monitors different assembly on MPE06 is necessary
2. 6 Bit LVDS
    a. Position for display connector = LVDS-B
        i. Suitable for all (most) display manufacturers

3. 2 x 6 Bit LVDS (Dual Head)
    a. different assembly on MPE06 is necessary
    b. LVDS-A = Display 1
    c. LVDS-B = Display 2

Please check for LVDS multiplex schemes in sections 6.2.1 and 6.2.2, which one matches your display.

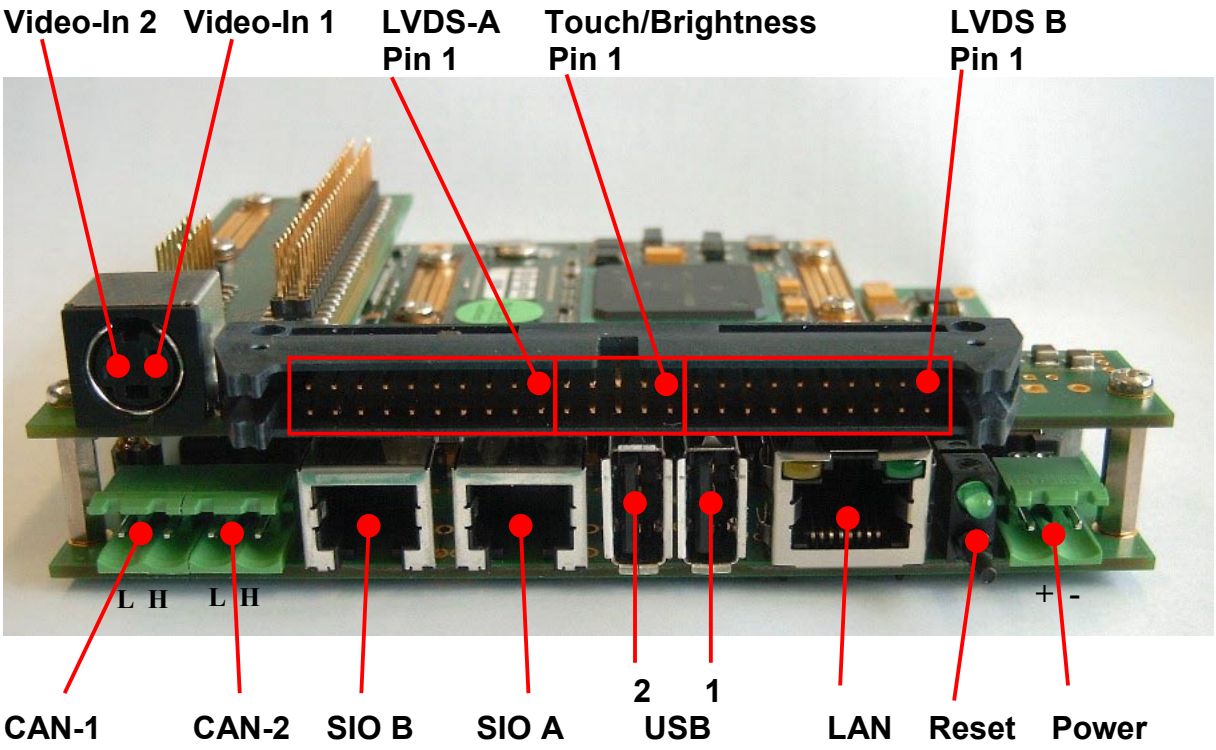
6.6.5 Touch Connector TSCRB (normally not assembled)

Sort on Connector TSCR

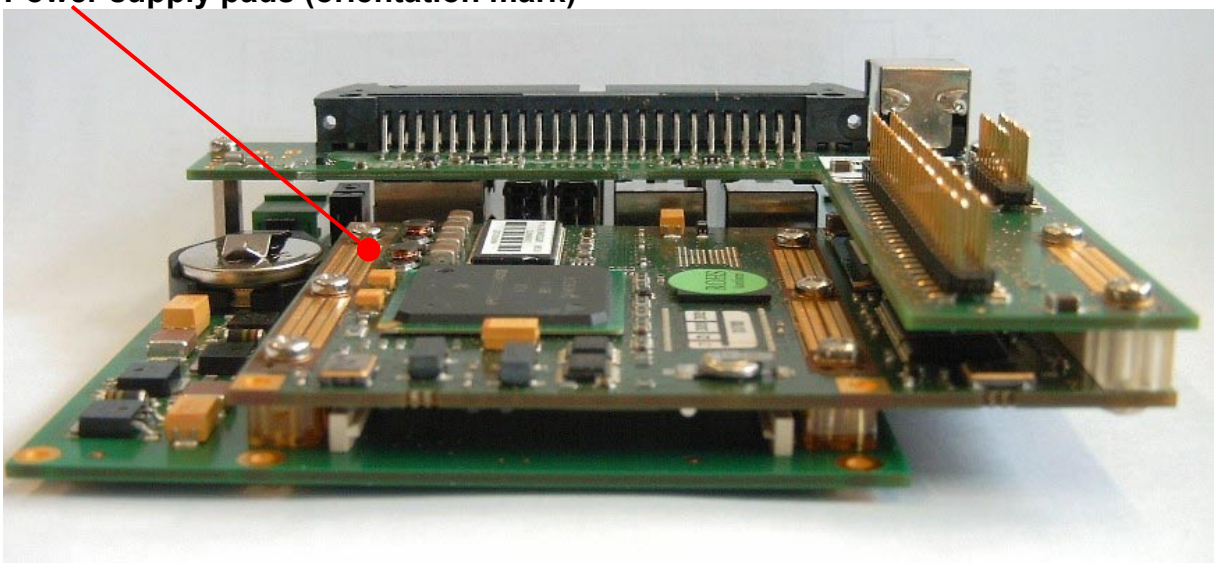
Pin TSCRB	**Signal name 4-wire (ADS7846)**	**Signal name 5 wire (ADS7845)**	**Function**
1	LR	Y-	Touch Y-, lower right
2	P0	P0	Port 0 Out
3	LL	X-	Touch X-, lower left
4	DAC1	DAC1	Analog Out 1
5	Wiper	---	Touch (Referenz 5 wire only)
6	GND	GND	
7	UL	X+	Touch X+, upper left
8	DAC2	DAC2	Analog Out 2
9	UR	Y+	Touch Y+, upper right
10	P1	P1	Port 1 Out

7 Appendix

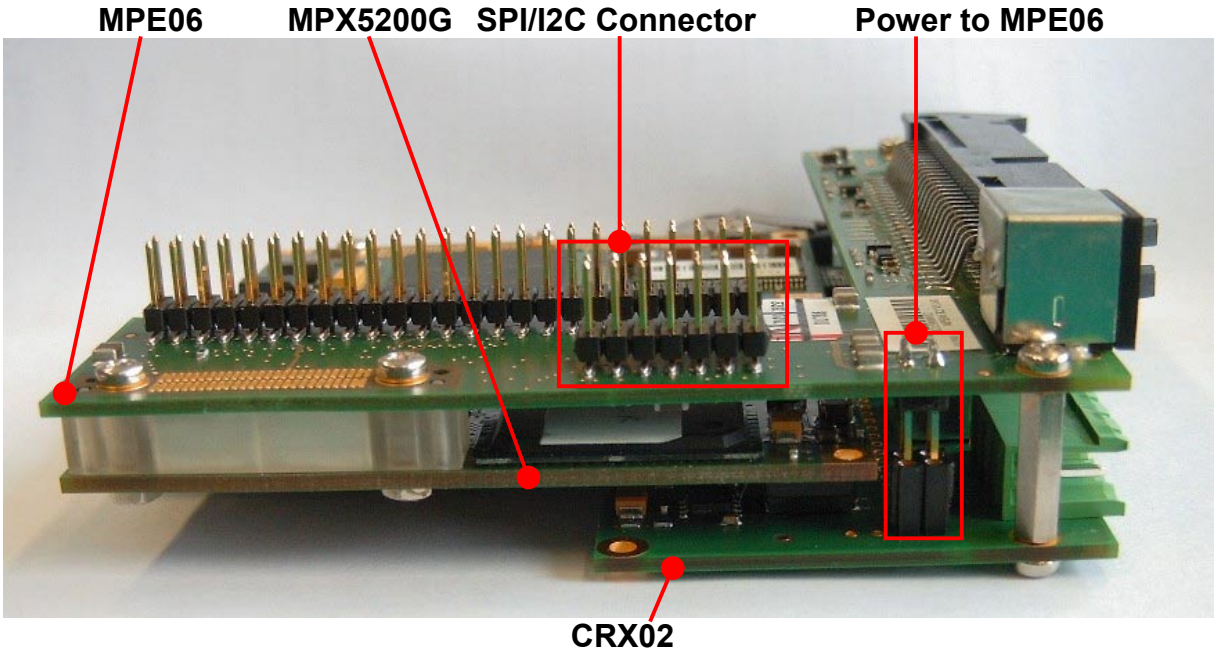
7.1 Front View - Connectors



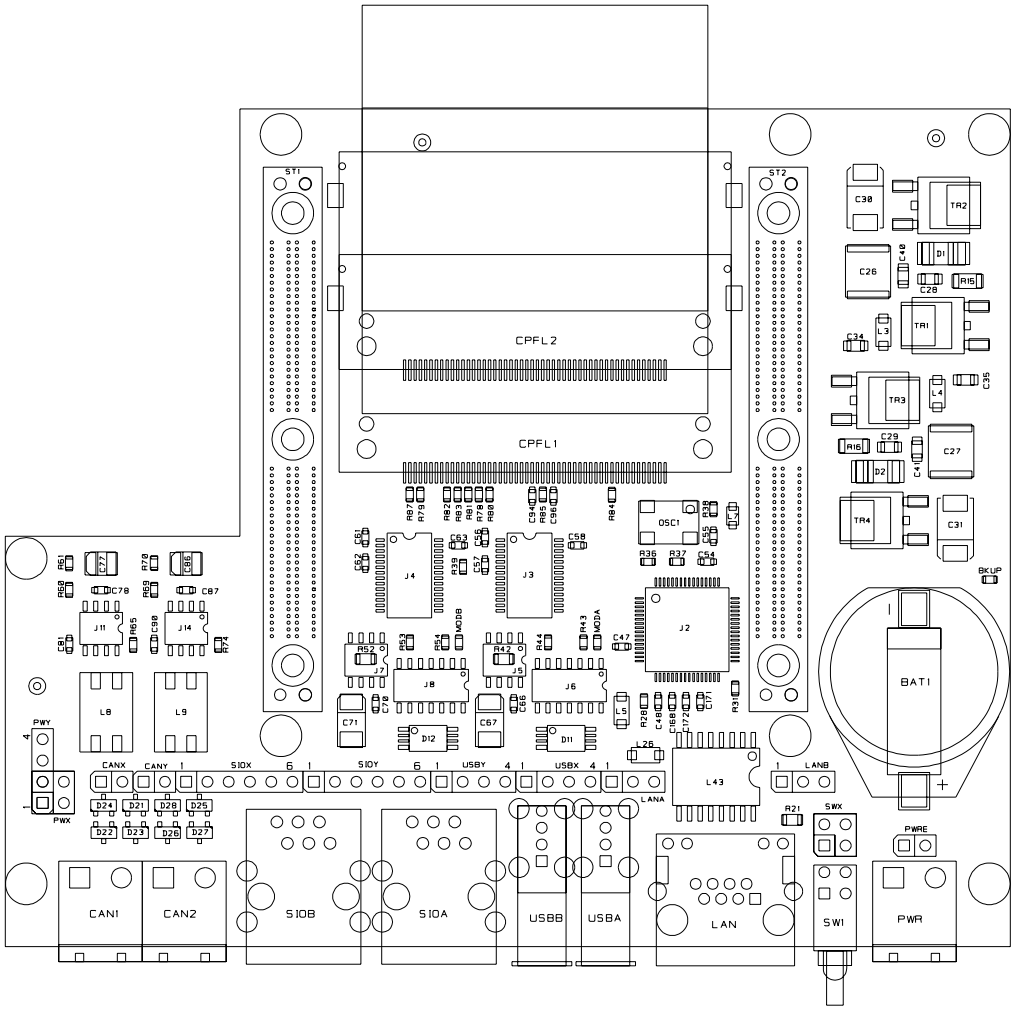
7.2 Rear View - Assembly



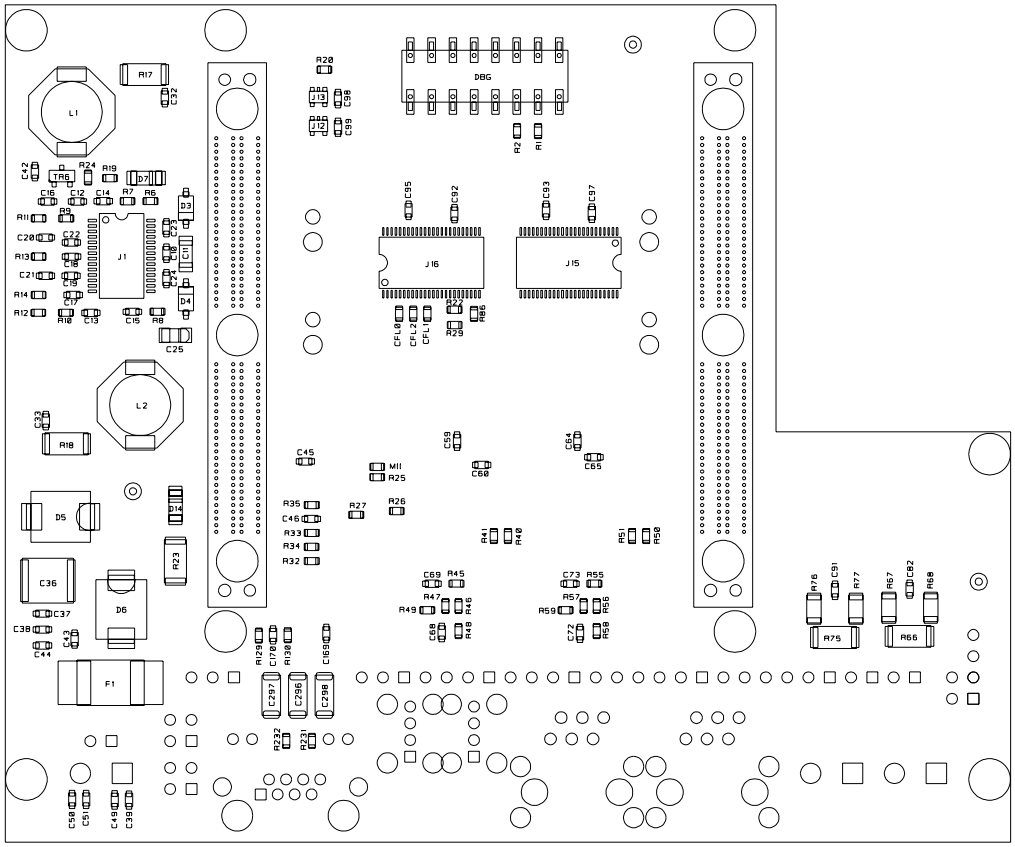
7.3 Left View - Assembly



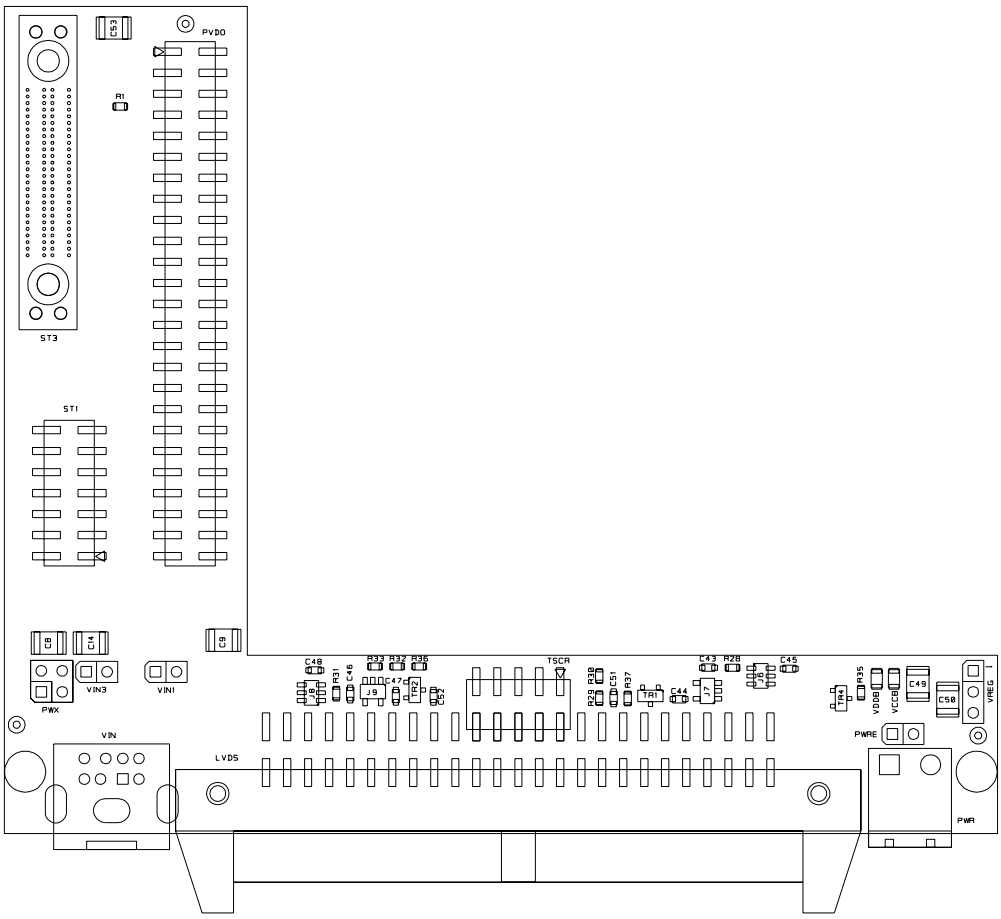
7.4 CRX02 Layout - Top View



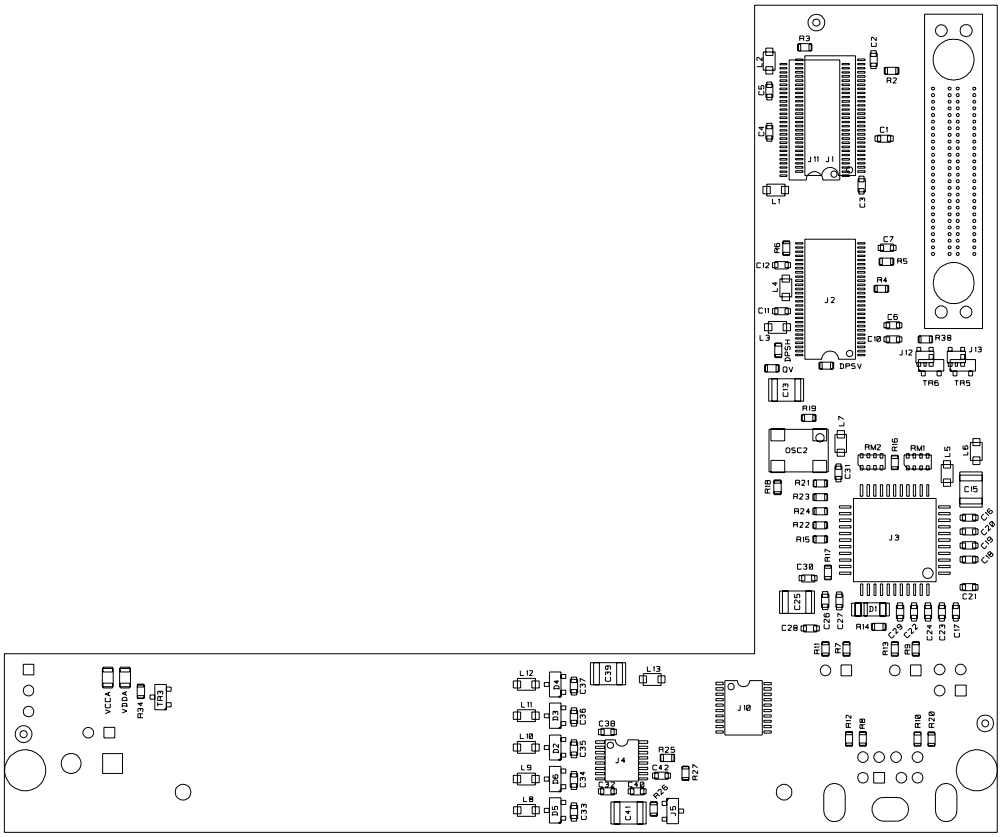
7.5 CRX02 Layout Bottom View



7.6 MPE06 Layout Top View



7.7 MPE06 Layout Bottom View



7.8 Mounting MPX5200G on CRX02

See picture in section 7.2 for correct orientation.
Use 6 bolts M2.5 x 12 and nuts for mounting. Fix properly.

7.9 Mounting MPE06 on MPX5200G

Refer to the pictures in the previous sections for correct mounting.
Have the two-spacer nuts mounted on the left and right side of the CRX02 first.
Put the short MSC connector loosely in place on the corresponding pads of the MPX5200G.
Then plug the MPE06 properly in the power supply holes of the CRX02, and watch for correct contact with the short MSC connector.
Fix the short MSC connector with 2 bolts M2.5x12 and nuts.