

Microsys

User's Manual

CR250 Rev. 2

2nd edition

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Edition

	Date:	Ident-Nr.:	Released:
Manual Chapter 3 "Getting Started" added	27.02.2004	EW291MA-02AB	<input type="text"/>
Schematics	31.07.2003	EW291SL-02AA	<input type="text"/>

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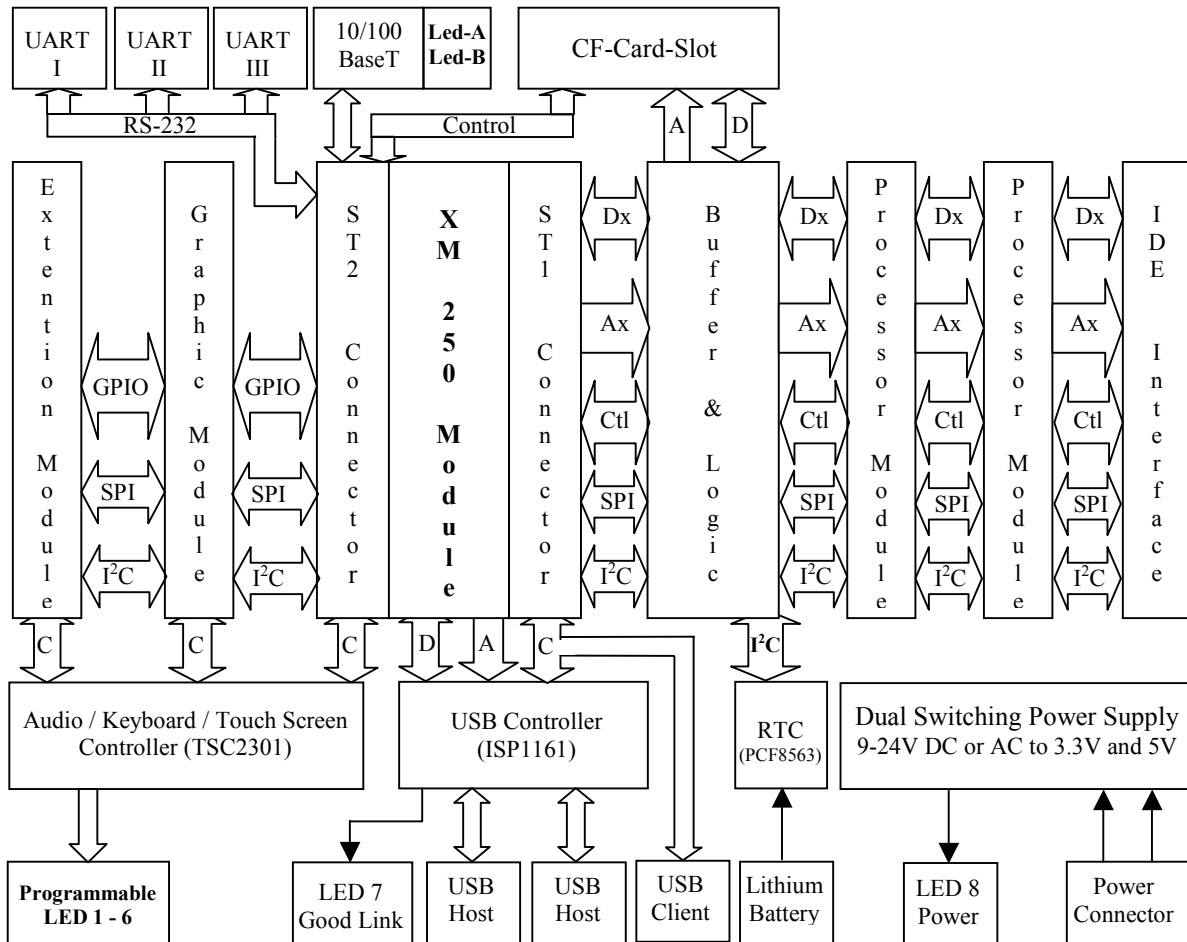
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1. The CR250 Carrier Block Diagram



2. Address Map CR250

	Device	Base	End	Select	Data Size
XM250	Flash Bank	\$0000 0000	\$03FF FFFF	CS0	32Bit
XM250	LAN91C111	\$0400 0000	\$07FF FFFF	CS1	32Bit
CR250	USB-ISP1161	\$0800 0000	\$0BFF FFFF	CS2	16Bit
CR250	ST3 Slot Select Line	\$0C00 0000	\$0C1F FFFF	CS3	32Bit
CR250	ST5 Slot Select Line	\$0C20 0000	\$0C3F FFFF	CS3	32Bit
CR250	IDE-CS0 Range	\$1000 0000	\$1000 001F	CS4	16Bit
CR250	IDE-CS1 Range	\$1000 0020	\$1000 003F	CS4	16Bit
CR250	IDE-DMA Range	\$1020 0020	\$1020 003F	CS4	16Bit
CR250	Systembuffer	\$1400 0000	\$1400 001F	CS5	8Bit
CR250	Watchdog Retrigger Port	\$1420 0020	\$1420 003F	CS5	write only
	PXA255 reserved	\$1800 0000	\$1FFF FFFF	---	---
CR250	CF-Card Slot	\$2000 0000	\$2FFF FFFF	PCMCIA	16Bit
CR250	PXA255 Registers	\$4000 0000	\$4BFF FFFF	XSCALE	32Bit
	PXA255 reserved	\$4C00 0000	\$9FFF FFFF	---	---
XM250	SDRAM	\$A000 0000	\$A3FF FFFF	SDCS0	32Bit
not used	nothing connected	\$A400 0000	\$A7FF FFFF	SDCS1	---
not used	connected to ST1.71	\$A800 0000	\$ABFF FFFF	SDCS2	---
not used	nothing connected	\$AC00 0000	\$AFF FFFF	SDCS3	---
	PXA255 reserved	\$B000 0000	\$FFFF FFFF	---	---

The address map is PXA255 specific and cannot be modified !

Location	I²C controlled devices	write	read
XM250	24C164 EEPROM	\$B0-\$BE	\$B1-\$BF
CR250	PCF8563 Real Time Clock	\$A2	\$A3

3. Getting Started

3.1 Items shipped with this unit

- User's Manual CR250 Hardware
- MicroSys shipping carton



ATTENTION: STATIC DISCHARGE CAN DESTROY UNIT

3.2 Hints for unpacking, handling and storing

- Avoid touching areas of integrated circuitry.
- Unit should only be placed on a static-free conductive surface
- Unit must only be transported using anti-static bags or MicroSys shipping carton
- Packing should be saved if unit needs to be reshipped or returned
- When the unit needs to be stored, it should be placed in a moisture free, dust free environment.

3.3 Items required for CR250 installation

For installation of the CR250, the following items are required.

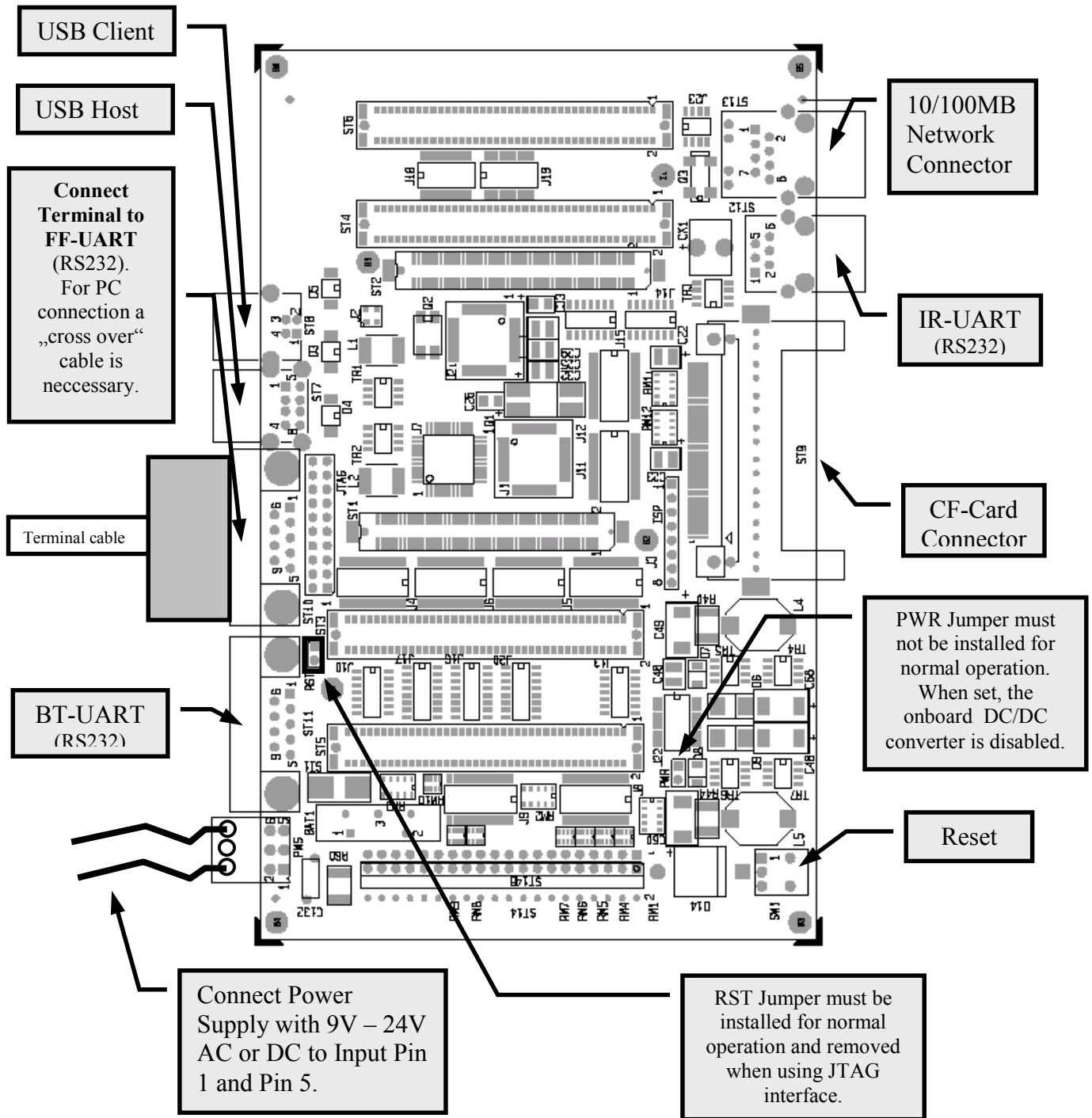
- Adequate rated power supply (min. 5W)
- XM250 *miriac*TM module
- Terminal or PC with terminal emulation

3.4 Related Documentation

The following manuals are applicable to the CR250:

- PXA255 Microprocessor User's Manual
- Philips ISP1161 USB Controller Manual
- Texas Instruments TSC2301 Manual
- PCF8563 Real-Time-Clock User's Manual

3.5 Connecting Power Supply and Terminal



4. I/O Devices of the CR250

4.1 The USB Interface ISP1161

The ISP1161 contains a dual host and a single device controller, but only the two host ports are used onboard the CR250. The chip operates at a 5V supply and the internal over current sense functions are used. The NDP input is set to high, i.e. two downstream ports are enabled. The H-SUSPEND line is left open and the H-WAKEUP line is connected to bit 12 of the system buffer. The ISP1161 internal pull down resistors for both downstream ports must be activated, because there are no external resistors. The controller interrupt lines INT1 and INT2 use the GPIO lines 2 and 3, however only INT1 is used as host controller interrupt line. The processor interface of the ISP1161 works with XScale CS2 line in 16 bit mode with variable I/O timing. The register address offset is aligned to 16 bit word boundaries. The processor interface works without DMA support.

The host connector ST7 contains channel 1 at the upper location and channel 2 at the lower location.

USB-Host	
ST7-A	
1	Power
2	USB-D-
3	USB-D+
4	GND

USB-Host	
ST7-B	
1	Power
2	USB-D-
3	USB-D+
4	GND

USB-Device	
ST8	
1	Power
2	USB-D-
3	USB-D+
4	GND

The device controller function is handled by the XScale internal USB controller via ST8. The power sensing input is debounced and connected to GPIO line 0, i.e. a logical low indicates an unconnected USB device port.

4.2 The PXA255 SPI Interface

The XSCALE processor of the XM250 module features a standard SPI interface, which is split into 8 device addresses via three bits of the system buffer. After a reset, the system buffer is cleared and the device address is set to 0b000, i.e. no device is connected. The remaining seven devices are accessible according to following table:

2.4.1 SPI Select Map

cpu select line	System Buffer					description
GPIO24 / SSP-SFRM	SYS10	SYS9	SYS8			
	0	0	0	SPI-SEL0		not used / reset state
	0	0	1	SPI-SEL1		TSC2301
	0	1	0	SPI-SEL2		ST3 Bus Module
	0	1	1	SPI-SEL3		ST3 Bus Module
	1	0	0	SPI-SEL4		ST5 Bus Module
	1	0	1	SPI-SEL5		ST5 Bus Module
	1	1	0	SPI-SEL6		ST6 GPIO Module
	1	1	1	SPI-SEL7		ST4 GPIO Module

The interface uses the alternate function of the PXA255 GPIO lines 23 to 27. The SSPEXTCLK function on GPIO27 is available, but not used by the onboard devices. All I/O signals must be limited to 3.3 volts, i.e. the interface is NOT 5 VOLT tolerant.

4.3 The Multifunction I/O Chip TSC2301

The TSC2301 contains a programmable touch screen controller and a stereo audio codec. The audio codec uses an I²S interface, which is connected to the alternate function pins GPIO28 to GPIO32 of the XM250 module. The ACRESET# line is not used by the TSC2301. The register set is accessible by the host through the standard SPI serial interface with the device address set to 0b001 according to following table.

3.4.1 SPI Select Line Overview

cpu select line	System Buffer					description
GPIO24 / SSP-SFRM	SYS10	SYS9	SYS8			
	0	0	0	SPI-SEL0		not used / reset state
	0	0	1	SPI-SEL1		TSC2301
	0	1	0	SPI-SEL2		ST3 Bus Module
	0	1	1	SPI-SEL3		ST3 Bus Module
	1	0	0	SPI-SEL4		ST5 Bus Module
	1	0	1	SPI-SEL5		ST5 Bus Module
	1	1	0	SPI-SEL6		ST6 GPIO Module
	1	1	1	SPI-SEL7		ST4 GPIO Module

3.4.2 Functional pin assignment of the TSC2301

TSC2301 pin	connected to:	comment:
VBAT1	VDD	3.3V main supply
VBAT2	backup voltage	Lithium battery and/or Goldcap used for RTC
GPIO0	LED-0	low = led on / high = led off
GPIO1	LED-1	low = led on / high = led off
GPIO2	LED-2	low = led on / high = led off
GPIO3	LED-3	low = led on / high = led off
GPIO4	LED-4	low = led on / high = led off
GPIO5/CLKO	LED-5	low = led on / high = led off
KBIRQ#	PXA255-GPIO6	low active keyboard interrupt line
PENIRQ#	not connected	DAV# is used instead
DAV#	PXA255-GPIO5	low active touch screen interrupt line
POL	VDD	SPI clock polarity select
VREF	not connected	internal reference used
KBR(1-4)	ST4	keyboard row 1-4
KBC(1-4)	ST4	keyboard column 1-4
TSX/TSY(+/-)	ST4	touch screen lines
MON+/MON-	ST6	capacitive not isolated audio output
RHPO/LHPO	ST6	capacitive not isolated headphone output
ROUT/LOUT	ST6	capacitive not isolated audio line output
RLIN/LLIN	ST6	capacitive not isolated audio line input
MCIN/MCBS	ST6	capacitive not isolated microphone input

4.4 The PCF8563T Real Time Clock

The mounted PCF8563 RTC features a clock function with a calendar and an universal timer with alarm. The interrupt function of the RTC is not used. The RTC is protected against data loss by a backup circuitry. The backup power is supplied by a **service free gold capacitor** as well as by a **CR 2032 lithium cell**. In case the cell must be replaced, the goldcap will avoid data loss of the connected device.

The RTC device responds on the I²C bus at address \$A3 for read and \$A2 for write accesses.

4.4.1 The PCF8563T Address Map

Address	Register Name	D7	D6	D5	D4	D3	D2	D1	D0
\$00	Control/Status 1	TEST1	0	STOP	0	TESTC	0	0	0
\$01	Control/Status 2	0	0	0	TI/TP	AF	TF	AIE	TIE
\$0D	CLKOUT frequency	FE	--	--	--	--	--	FD1	FD0
\$0E	Timer control	TE	--	--	--	--	--	TD1	TD0
\$0F	Timer countdown value	<timer countdown value>							
Address	Register Name	D7	D6	D5	D4	D3	D2	D1	D0
		BCD format tens nibble				BCD format units nibble			
\$02	Seconds	VL	<seconds 00 to 59 coded in BCD>						
\$03	Minutes	--	<minutes 00 to 59 coded in BCD>						
\$04	Hours	--	--	<hours 00 to 23 coded in BCD>					
\$05	Days	--	--	<days 01 to 31 coded in BCD>					
\$06	Weekdays	--	--	--	--	--	<weekday 0 to 6>		
\$07	Month/Century	C	--	--	<month 01 to 12 coded in BCD>				
\$08	Years	<years 00 to 99 coded in BCD>							
\$09	Minute alarm	AE	<minute alarm 00 to 59 coded in BCD>						
\$0A	Hour alarm	AE	--	<hour alarm 00 to 23 coded in BCD>					
\$0B	Day alarm	AE	--	<day alarm 01 to 31 coded in BCD>					
\$0C	Weekday alarm	AE	--	--	--	--	<weekday alarm 0 to 6>		



**For detailed programming information and chip description,
please refer to Philips PCF8563 Data Sheet !**

The CR250 carrier board is designed for the XM250 CPU module. It contains various I/O interfaces and several slots for additional functionality extension.



Attention !

All XM250 devices are connected as variable latency I/O types !

Any write cycle of all devices and slots is controlled by the GPIO49 line of the PXA255. So the 'asynchronous static memory control registers' (**MSCx**), which are used for devices onboard the CR250, must be enabled for the **VLIO** mode. The processor **WE#** signal is not used for any device onboard the CR250. The signal is only available on the ST1 connector, pin 63, which is not connected onboard the CR250.



Attention !

All ST3-ST5 slot signals must be limited to 3.3 volts
The slot interfaces are NOT 5 VOLT tolerant !

5. XM250 Function Support

XM250 Device	Function	CR250 Interface	Features
LAN 91C111	10/100BaseT	RJ45 Jack	two programmable LEDs
PXA255	FF-UART	DSUB 9 Pin	8 I/O RS232 EIA standard
PXA255	BT-UART	DSUB 9 Pin	4 I/O RS232 EIA standard
PXA255	IR-UART	RJ12 Jack	2 I/O RS232 EIA standard
PXA255	I ² S / SPI	TSC2301	6 programmable LEDs
PXA255	I ² S / SPI	TSC2301	4x4-Keybaord via ST4 slot
PXA255	I ² S / SPI	TSC2301	Touch screen via ST4 slot
PXA255	I ² S / SPI	TSC2301	Audio In via ST6 module slot
PXA255	I ² S / SPI	TSC2301	Audio Out via ST6 module slot
PXA255	I ² S / SPI	TSC2301	Headphone via ST6 module slot
PXA255	I ² S / SPI	TSC2301	Microphone via ST6 module slot
PXA255	CF-Card	CF Card Header	3.3V only
PXA255	IDE-Bus	40 Pin IDE Header	5 Volt tolerant IDE Interface
PXA255	CPU Bus	Slot ST3	I ² C / SPI / A17-D32 extension module
PXA255	CPU Bus	Slot ST5	I ² C / SPI / A17-D32 extension module
PXA255	GPIOx	Slot ST4	I ² C / SPI / GPIOx extension module
PXA255	GPIOx	Slot ST6	I ² C / SPI / GPIOx extension module
PXA255	I ² C-Bus	RTC-PCF8563	Real time clock with battery backup
PXA255	CPU Bus	ISP1161	USB dual master single slave interface
PXA255	JTAG	Wrap 2x10	JTAG & Debug Interface
PXA255	Reset	Switch	power on hard reset

6. CR250 Power Supply

The power supply of the CR250 consists of a dual step down switching regulator with an input voltage range from **9 to 24 volts AC or DC**. The regulator works at 300kHz and supplies 3.3V and 5V with a maximum current of 2.5A. The input voltage is bridge rectified, which allows for any input polarity or even AC input. A suppressor diode protects the board against over voltage above 24 volts. The input current is limited by a 3A fuse. It depends on the input voltage, the regulator efficiency and the voltage drop at the input rectifier. The power converter can be shut down by inserting jumper PWR.

		3.3V	5V
XM250 Module	1	150mA	---
USB-ISP1161	1	50mA	x
MACH-4A3	1	30mA	---
74LVT16245	4		---
RTC-PCF8563	1	1mA	---
IDE-Interface	1		
CF-Card-Interface	1		---
Codec TSC2301	1	15mA	---
RS232	2	14mA	---
LEDs	10	100mA	---
Module ST3	1	x	x
Module ST4	1	x	x
Module ST5	1	x	x
Module ST6	1	x	x

total			
-------	--	--	--

7. CR250 LEDs and Connectors

7.1 The Board LEDs

Source	State	Led1	Led2	Led3	Led4	Led5	Led6	Led7	Led8
TSC2301 GPIO-0	low	on							
TSC2301 GPIO-1	low		on						
TSC2301 GPIO-2	low			on					
TSC2301 GPIO-3	low				on				
TSC2301 GPIO-4	low					on			
TSC2301 GPIO-5	low						on		
not used	---							---	
VDD	high								on

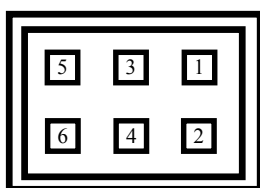
7.2 The Power Connector Pin out

9-24V DC or AC max. 3A					
PWS					
5	Line-B	3	Shield	1	Line-A
6	Line-B	4	Shield	2	Line-A



Attach Power Supply to pin 1 and pin 5, or alternatively pin 2 and pin 6.
Any input voltage between 9V and 24V, AC or DC is accepted.

Power connector type: Weidmüller B2L 3.5/6 SN SW (delivered with CR250)



View on cable entry side

Note! Pins 1 and 2, 3 and 4, 5 and 6 are connected together.

7.3 The USB Connector Pin out

USB-Host	
ST7-A	
1	Power
2	USB-D-
3	USB-D+
4	GND

USB-Host	
ST7-B	
1	Power
2	USB-D-
3	USB-D+
4	GND

USB-Device	
ST8	
1	Power
2	USB-D-
3	USB-D+
4	GND

7.4 The LAN Connector Pin out

10/100BaseT	
ST13	
1	TX+
2	TX-
3	RX+
4	shield
5	shield
6	RX-
7	shield
8	shield

7.5 The UART Connector Pin out

FF-UART	
ST10 / DSUB-9	
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

BT-UART	
ST11 / DSUB-9	
1	
2	RXD
3	TXD
4	DTR
5	GND
6	
7	
8	CTS
9	

IR-UART	
ST12 / RJ12	
1	
2	
3	RXD
4	GND
5	TXD
6	
7	
8	

7.6 The IDE Connector Pin out (optional)

IDE-Port	
ST14	
1	RESET#
3	D7
5	D6
7	D5
9	D4
11	D3
13	D2
15	D1
17	D0
19	GND
21	DRQ
23	IOW#
25	IOR#
27	IRDY
29	DMA#
31	IRQ
33	A1
35	A0
37	CS0#
39	n.c.

IDE-Port	
ST14	
2	GND
4	D8
6	D9
8	D10
10	D11
12	D12
14	D13
16	D14
18	D15
20	n.c.
22	GND
24	GND
26	GND
28	n.c.
30	GND
32	n.c.
34	n.c.
36	A2
38	CS1#
40	GND

7.7 The CF-Card Connector Pin out

CF-Card	
ST9	
1	GND
2	D3
3	D4
4	D5
5	D6
6	D7
7	CE1#
8	A10
9	OE#
10	A9
11	A8
12	A7
13	VDD
14	A6
15	A5
16	A4
17	A3
18	A2
19	A1
20	A0
21	D0
22	D1
23	D2
24	WP
25	CD2#

CF-Card	
ST9	
26	CD1#
27	D11
28	D12
29	D13
30	D14
31	D15
32	CE2#
33	VS1#
34	IORD#
35	IOWR#
36	WE#
37	RDY
38	VDD
39	CSEL#
40	VS2
41	RESET
42	WAIT#
43	INPAC#
44	REG#
45	BVD2
46	BVD1
47	D8
48	D9
49	D10
50	GND

7.8 The Debug Connector Pin out

BDM	
JTAG	
1	VDD
3	TRST#
5	TDI
7	TMS
9	TCK
11	GND
13	TDO
15	Reset#
17	n.c.
19	n.c.

BDM	
JTAG	
2	VDD
4	GND
6	GND
8	GND
10	GND
12	GND
14	GND
16	GND
18	GND
20	GND

7.9 The ispMACH Connector Pin out

JTAG	
ISP	
1	VDD
2	TDO
3	TDI
4	n.c.
(5)	(keyed)
6	TMS
7	GND
8	TCK

7.10 The Pin out of XM250 Module Connector ST1

Signal	function	ST1	ST1	function	Signal
GND	ground	1	2	3.3V	VDD
MD15	data byte 1	3	4	data byte 0	MD0
MD14		5	6		MD1
MD13		7	8		MD2
MD12		9	10		MD3
MD11		11	12		MD4
MD10		13	14		MD5
MD9		15	16		MD6
MD8		17	18		MD7
GND	ground	19	20	ground	GND
SDQM1	byte enable 1	21	22	byte enable 0	SDQM0
GND	ground	23	24	ground	GND
SDA	I ² C	25	26	ST3 & ST5 module address bus	MA0
SCL	I ² C	27	28		MA1
USBP	USB Client +	29	30		MA2
USBN	USB Client -	31	32		MA3
GND	ground	33	34		MA4
TDI	JTAG/BDM	35	36		MA5
TDO	JTAG/BDM	37	38		MA6
TMS	JTAG/BDM	39	40		MA7
TCK	JTAG/BDM	41	42		MA8
TRST#	not used	43	44		MA9
SRST#	reset	45	46		MA10
GND	ground	47	48		MA11
CS1#	not used	49	50		MA12
CS2#	ST3/5 select	51	52		MA13
CS3#	IDE select	53	54		MA14
CS4#	system buffer	55	56		MA15
CS5#	watchdog	57	58		MA16
RDY	ready	59	60	MA17	
OE#	read	61	62	not used	MA18
WE#	write	63	64	not used	MA19
RW#	read/write	65	66	not used	MA20
GND	ground	67	68	mach device	MA21
SDCLK2	mach device	69	70	not used	MA22
SDCS2#	not used	71	72	not used	MA23
SDRAS#	not used	73	74	not used	MA24
SDCAS#	not used	75	76	not used	MA25
GND	ground	77	78	ground	GND
SDQM3	byte enable 2	79	80	byte enable 3	SDQM2
GND	ground	81	82	ground	GND
MD23	data byte 2	83	84	data byte 3	MD24
MD22		85	86		MD25
MD21		87	88		MD26
MD20		89	90		MD27
MD19		91	92		MD28
MD18		93	94		MD29
MD17		95	96		MD30
MD16		97	98		MD31
GND	ground	99	100	3.3V	VDD

7.11 The Pin out of Module Connector ST3

Signal	function	ST2	ST2	function	Signal
GND	ground	1	2	5V	VCC
PD0		3	4		PD15
PD1		5	6		PD14
PD2		7	8		PD13
PD3		9	10		PD12
PD4		11	12		PD11
PD5		13	14		PD10
PD6		15	16		PD9
PD7		17	18		PD8
PDQM0	byte enable 0	19	20	byte enable 1	PDQM1
GND	ground	21	22	3.3V	VDD
PRW#	read/write	23	24	I ² C	SDA
PA1	lsb / 16bit	25	26	I ² C	SCL
PA2	lsb / 32bit	27	28	SPI-RXD	GPIO26
PA3		29	30	SPI-TXD	GPIO25
PA4		31	32	SPI-SEL	SPISEL2#
PA5		33	34	SPI-SEL	SPISEL3#
PA6		35	36	SPI-CLK	GPIO23
PA7		37	38	reset	SRST#
PA8		39	40	GPIOx	GPIO9
PA9		41	42	GPIOx	GPIO11
PA10		43	44	slot select	PCSA#
PA11		45	46	ready	PRDY
PA12		47	48	read enable	POE#
PA13		49	50	write enable	PWR#
PA14		51	52	write enable	PWE#
PA15		53	54	DREQ0/GPIOx	GPIO20
PA16		55	56	GPIOx	GPIO22
PA17	msb	57	58	clock	PDCLK
GND	ground	59	60	3.3V	VDD
PDQM2	byte enable 2	61	62	byte enable 3	PDQM3
PD24		63	64		PD23
PD25		65	66		PD22
PD26		67	68		PD21
PD27		69	70		PD20
PD28		71	72		PD19
PD29		73	74		PD18
PD30		75	76		PD17
PD31		77	78		PD16
GND	ground	79	80	3.3V	VDD

7.12 The Pin out of Module Connector ST5

Signal	function	ST2	ST2	function	Signal
GND	ground	1	2	5V	VCC
PD0		3	4		PD15
PD1		5	6		PD14
PD2		7	8		PD13
PD3		9	10		PD12
PD4		11	12		PD11
PD5		13	14		PD10
PD6		15	16		PD9
PD7		17	18		PD8
PDQM0	byte enable 0	19	20	byte enable 1	PDQM1
GND	ground	21	22	3.3V	VDD
PRW#	read/write	23	24	I ² C	SDA
PA1	lsb / 16bit	25	26	I ² C	SCL
PA2	lsb / 32bit	27	28	SPI-RXD	GPIO26
PA3		29	30	SPI-TXD	GPIO25
PA4		31	32	SPI-SEL	SPISEL4#
PA5		33	34	SPI-SEL	SPISEL5#
PA6		35	36	SPI-CLK	GPIO23
PA7		37	38	reset	SRST#
PA8		39	40	GPIOx	GPIO10
PA9		41	42	GPIOx	GPIO12
PA10		43	44	slot select	PCSB#
PA11		45	46	ready	PRDY
PA12		47	48	read enable	POE#
PA13		49	50	write enable	PWR#
PA14		51	52	write enable	PWE#
PA15		53	54	DREQ1/GPIOx	GPIO19
PA16		55	56	GPIOx	GPIO21
PA17	msb	57	58	clock	PDCLK
GND	ground	59	60	3.3V	VDD
PDQM2	byte enable 2	61	62	byte enable 3	PDQM3
PD24		63	64		PD23
PD25		65	66		PD22
PD26		67	68		PD21
PD27		69	70		PD20
PD28		71	72		PD19
PD29		73	74		PD18
PD30		75	76		PD17
PD31		77	78		PD16
GND	ground	79	80	3.3V	VDD

7.13 The Pin out of XM250 Module Connector ST2

Signal	prim. function	slot	ST2	ST2	slot	prim. function	Signal
GND	ground		1	2		3.3V	VDD
ACRESET#	not used		3	4		key reset	KRST#
GPIO57	CF-IOIS16#		5	6		10/100BaseT	LEDA#
GPIO56	CF-PWAIT#		7	8		10/100BaseT	LEDB#
GPIO55	CF-PREG#		9	10		10/100BaseT	TPOP
GPIO54	CF-PSKTSEL#		11	12		10/100BaseT	TPON
GPIO53	CF-PCE2#		13	14		10/100BaseT	TPIP
GPIO52	CF-PCE1#		15	16		10/100BaseT	TPIN
GPIO51	CF-PIOW#		17	18	ST4/ST6		BATFLT#
GPIO50	CF-PIOR#		19	20	ST4		VDDFLT#
GND	ground		21	22		ground	GND
GPIO49	CF-PWE#		23	24		watchdog enable	WDGE#
GPIO48	CF-POE#		25	26	ST3/ST4/ST6	---	GPIO22
GPIO17		ST4/ST6	27	28	ST4/ST5/ST6	---	GPIO21
GPIO16		ST4/ST6	29	30	ST3/ST4/ST6	IDE-DREQ	GPIO20
GPIO14		ST4/ST6	31	32	ST4/ST5/ST6	---	GPIO19
GPIO13	IDE-IRQ	ST4/ST6	33	34	ST4/ST5/ST6	---	GPIO12
GPIO11		ST3/ST4/ST6	35	36	ST4/ST5/ST6	---	GPIO10
GPIO9	CF BVD1	ST3/ST4/ST6	37	38	ST4/ST6	CF rdy/bsy IRQ	GPIO8
GPIO7	CF card detect	ST4/ST6	39	40	ST4/ST6	keyboard-IRQ	GPIO6
GND	ground		41	42		3.3V	VDD
GPIO5	pen-IRQ	ST4/ST6	43	44	ST4/ST6	---	GPIO4
GPIO3	USB-IRQ	ST4/ST6	45	46	ST4/ST6	USB-IRQ (host)	GPIO2
GPIO1	GP-RST#	ST4/ST6	47	48	ST4/ST6	USB-IRQ (clientt)	GPIO0
MMCDAT	not used		49	50		not used	MMCCMD
GPIO46	IR-RXD	ST4/ST6	51	52	ST4/ST6	IR-TXD	GPIO47
GPIO44	BT-CTS	ST4/ST6	53	54	ST4/ST6	BT-RTS	GPIO45
GPIO42	BT-RXD	ST4/ST6	55	56	ST4/ST6	BT-TXD	GPIO43
GPIO40	FF-DTR		57	58		FF-RTS	GPIO41
GND	ground		59	60		3.3V	VDD
GPIO38	FF-RI		61	62		FF-TXD	GPIO39
GPIO36	FF-DCD		63	64		FF-DSR	GPIO37
GPIO34	FF-RXD		65	66		FF-CTS	GPIO35
GPIO31	SYNC		67	68		SDATA-IN1	GPIO32
GPIO29	SDATA-IN0		69	70		SDATA-OUT	GPIO30
GPIO27	SSP-EXTCLK		71	72		BITCLK	GPIO28
GPIO25	SSP-TXD	ST3/4-ST5/6	73	74	ST3/4-ST5/6	SSP-RXD	GPIO26
GPIO23	SSP-SCLK	ST3/4-ST5/6	75	76	SPI-SEL[1-7]	SSP-SFRM	GPIO24
GPIO59	L-DD1	ST4/ST6	77	78	ST4/ST6	L-DD0	GPIO58
GND	ground		79	80		ground	GND
GPIO61	L-DD3	ST4/ST6	81	82	ST4/ST6	L-DD2	GPIO60
GPIO63	L-DD5	ST4/ST6	83	84	ST4/ST6	L-DD4	GPIO62
GPIO65	L-DD7	ST4/ST6	85	86	ST4/ST6	L-DD6	GPIO64
GPIO67	L-DD9	ST4/ST6	87	88	ST4/ST6	L-DD8	GPIO66
GPIO69	L-DD11	ST4/ST6	89	90	ST4/ST6	L-DD10	GPIO68
GPIO71	L-DD13	ST4/ST6	91	92	ST4/ST6	L-DD12	GPIO70
GPIO73	L-DD15	ST4/ST6	93	94	ST4/ST6	L-DD14	GPIO72
GPIO75	L-LCLK	ST4/ST6	95	96	ST4/ST6	L-FCLK	GPIO74
GPIO77	L-BIAS	ST4/ST6	97	98	ST4/ST6	L-PCLK	GPIO76
GND	ground		99	100		3.3V	VDD

7.14 The Pin out of Module Connector ST4

Signal	function	ST2	ST2	function	Signal
GND	ground	1	2	5V	VCC
VDDFLT#	status to cpu	3	4	reset	SRST#
BATFLT#	status to cpu	5	6	analog out	AOUT
SDA	I ² C data	7	8	TSC2301-GPIO	IO5
SCL	I ² C clock	9	10	standby battery	STDBY
IO4	TSC2301-GPIO	11	12		GPIO22
GPIO17		13	14		GPIO21
GPIO16		15	16	IDE-DREQ	GPIO20
GPIO14		17	18		GPIO19
GPIO13	IDE-IRQ	19	20		GPIO12
GPIO11		21	22		GPIO10
GPIO9	CF BVD1	23	24	CF rdy/bsy IRQ	GPIO8
GPIO7	CF card detect	25	26	keyboard-IRQ	GPIO6
GPIO5	pen-IRQ	27	28		GPIO4
GPIO3	USB-IRQ	29	30	USB-IRQ	GPIO2
GPIO1		31	32		GPIO0
GPIO46	IR-RXD	33	34	IR-TXD	GPIO47
GPIO44	BT	35	36	BT	GPIO45
GPIO42	BT	37	38	BT	GPIO43
GND	ground	39	40	3.3V	VDD
TSY-	touch screen	41	42	touch screen	TSY+
TSX-	touch screen	43	44	touch screen	TSX+
KBR1	key board	45	46	key board	KBC1
KBR2	key board	47	48	key board	KBC2
KBR3	key board	49	50	key board	KBC3
KBR4	key board	51	52	key board	KBC4
GPIO27	SPI	53	54		not connected
GPIO25	SPI	55	56	SPI	GPIO26
GPIO23	SPI	57	58	SPI	SPISEL7#
GPIO59	LCD-DD1	59	60	LCD-DD0	GPIO58
GPIO61	LCD-DD3	61	62	LCD-DD2	GPIO60
GPIO63	LCD-DD5	63	64	LCD-DD4	GPIO62
GPIO65	LCD-DD7	65	66	LCD-DD6	GPIO64
GPIO67	LCD-DD9	67	68	LCD-DD8	GPIO66
GPIO69	LCD-DD11	69	70	LCD-DD10	GPIO68
GPIO71	LCD-DD13	71	72	LCD-DD12	GPIO70
GPIO73	LCD-DD15	73	74	LCD-DD14	GPIO72
GPIO75	LCD-LCLK	75	76	LCD-FCLK	GPIO74
GPIO77	LCD-BIAS	77	78	LCD-PCLK	GPIO76
GND	ground	79	80	3.3V	VDD

7.15 The Pin out of Module Connector ST6

Signal	function	ST2	ST2	function	Signal
GND	ground	1	2	5V	VCC
VDDFLT#	status to cpu	3	4	reset	SRST#
BATFLT#	status to cpu	5	6	analog out	AOUT
SDA	I ² C data	7	8	TSC2301-GPIO	IO5
SCL	I ² C clock	9	10	standby battery	STDBY
IO4	TSC2301-GPIO	11	12		GPIO22
GPIO17		13	14		GPIO21
GPIO16		15	16	IDE-DREQ	GPIO20
GPIO14		17	18		GPIO19
GPIO13	IDE-IRQ	19	20		GPIO12
GPIO11		21	22		GPIO10
GPIO9	CF BVD1	23	24	CF rdy/bsy IRQ	GPIO8
GPIO7	CF card detect	25	26	keyboard-IRQ	GPIO6
GPIO5	pen-IRQ	27	28		GPIO4
GPIO3	USB-IRQ	29	30	USB-IRQ	GPIO2
GPIO1		31	32		GPIO0
GPIO46	IR-RXD	33	34	IR-TXD	GPIO47
GPIO44	BT-CTS	35	36	BT-RTS	GPIO45
GPIO42	BT-RXD	37	38	BT-TXD	GPIO43
GND	ground	39	40	3.3V	VDD
MCIN	mic in	41	42	mic bias	MCBS
LLIN	line in left	43	44	line in right	RLIN
MON+	mono +	45	46	mono -	MON-
LOUT	line out left	47	48	line out right	ROUT
LHPO	headphone-L	49	50	headphone-R	RHPO
IO0	TSC2301	51	52	TSC2301	IO1
GPIO27	SPI-EXCLK	53	54		not connected
GPIO25	SPI-TXD	55	56	SPI-RXD	GPIO26
GPIO23	SPI-SCLK	57	58	SPI-SEL	SPISEL7#
GPIO59	LCD-DD1	59	60	LCD-DD0	GPIO58
GPIO61	LCD-DD3	61	62	LCD-DD2	GPIO60
GPIO63	LCD-DD5	63	64	LCD-DD4	GPIO62
GPIO65	LCD-DD7	65	66	LCD-DD6	GPIO64
GPIO67	LCD-DD9	67	68	LCD-DD8	GPIO66
GPIO69	LCD-DD11	69	70	LCD-DD10	GPIO68
GPIO71	LCD-DD13	71	72	LCD-DD12	GPIO70
GPIO73	LCD-DD15	73	74	LCD-DD14	GPIO72
GPIO75	LCD-LCLK	75	76	LCD-FCLK	GPIO74
GPIO77	LCD-BIAS	77	78	LCD-PCLK	GPIO76
GND	ground	79	80	3.3V	VDD

8. The GPIO Assignment of the XM250 Module

Signal	description	direction	board device	ST3	ST4	ST5	ST6
GPIO0	CF-Reset	output	CF-Card		X		X
GPIO1	GP-RST	---	non		X		X
GPIO2	USB-IRQ1	input	ISP1161		X		X
GPIO3	USB-IRQ2	input	ISP1161		X		X
GPIO4	LAN-IRQ	input	---		X		X
GPIO5	Touch Screen IRQ	input	TSC2301		X		X
GPIO6	Keyboard IRQ	input	TSC2301		X		X
GPIO7	CF-Card Detect	input	CF-Card		X		X
GPIO8	CF-RDY/BSY IRQ	input	CF-Card		X		X
GPIO9	CF-BVD1	input	CF-Card	X	X		X
GPIO10	RTC-CLK OUT	---	non		X	X	X
GPIO11	3.6MHZ OUT	---	non	X	X		X
GPIO12	32KHZ OUT	---	non		X	X	X
GPIO13	IDE-IRQ	input	IDE		X		X
GPIO14	MBREQ	---	non		X		X
GPIO15	CS1	output	non				
GPIO16	PWM0	---	non		X		X
GPIO17	PWM1	---	non		X		X
GPIO18	RDY	input	iM4A3				
GPIO19	DREQ1	---	non		X	X	X
GPIO20	DREQ0	input	IDE-DREQ	X	X		X
GPIO21		---	non		X	X	X
GPIO22		---	non	X	X		X
GPIO23	SSP-SCLK	output	TSC2301	X	X4	X	X
GPIO24	SSP-SFRM	output	SEL1	SEL2/3	SEL7	SEL4/5	SEL6
GPIO25	SSP-TXD	output	TSC2301	X	X	X	X
GPIO26	SSP-RXD	input	TSC2301	X	X	X	X
GPIO27	SSP-EXTCLK	---	TSC2301		X		X
GPIO28	BITCLK	output	TSC2301				
GPIO29	SDATA-IN0	input	TSC2301				
GPIO30	SDATA-OUT	output	TSC2301				
GPIO31	SYNC	output	TSC2301				
GPIO32	SDATA-IN1	output	TSC2301				
GPIO33	CS5	output	iM4A3				
GPIO34	FF-RXD	input	RS232 / ST11				
GPIO35	FF-CTS	input	RS232 / ST11				
GPIO36	FF-DCD	input	RS232 / ST12				
GPIO37	FF-DSR	input	RS232 / ST12				
GPIO38	FF-RI	input	RS232 / ST11				
GPIO39	FF-TXD	output	RS232 / ST11				
GPIO40	FF-DTR	output	RS232 / ST12				
GPIO41	FF-RTS	output	RS232 / ST12				
GPIO42	BT-RXD	input	RS232 / ST11		X		X
GPIO43	BT-TXD	output	RS232 / ST11		X		X
GPIO44	BT-CTS	input	RS232 / ST12		X		X
GPIO45	BT-RTS	output	RS232 / ST11		X		X
GPIO46	IR-RXD	input	RS232 / ST12		X		X
GPIO47	IR-TXD	output	RS232 / ST12		X		X

The GPIO Assignment of the XM250 Module (continued)

Signal	description	direction	board device	ST3	ST4	ST5	ST6
GPIO48	POE	output	CF / iM4A3				
GPIO49	PWE	output	CF-Card				
GPIO50	PIOR	output	CF / iM4A3				
GPIO51	PIOW	output	CF-Card				
GPIO52	PCE1	output	CF / iM4A3				
GPIO53	PCE1	output	CF / iM4A3				
GPIO54	PSKTSEL	output	CF-Card				
GPIO55	PREG	output	CF-Card				
GPIO56	PWAIT	input	CF-Card				
GPIO57	IOIS16	input	CF-Card				
GPIO58	L-DD0	output	LCD		X		X
GPIO59	L-DD1	output	LCD		X		X
GPIO60	L-DD2	output	LCD		X		X
GPIO61	L-DD3	output	LCD		X		X
GPIO62	L-DD4	output	LCD		X		X
GPIO63	L-DD5	output	LCD		X		X
GPIO64	L-DD6	output	LCD		X		X
GPIO65	L-DD7	output	LCD		X		X
GPIO66	L-DD8/MBREQ	output	LCD		X		X
GPIO67	L-DD9/MMC-CS0	output	LCD		X		X
GPIO68	L-DD10/MMC-CS1	output	LCD		X		X
GPIO69	L-DD11/MMC-CLK	output	LCD		X		X
GPIO70	L-DD12/RTC-CLK	output	LCD		X		X
GPIO71	L-DD13/3.6MHZ	output	LCD		X		X
GPIO72	L-DD14/32KHZ	output	LCD		X		X
GPIO73	L-DD15/MBGNT	output	LCD		X		X
GPIO74	L-FCLK	output	LCD		X		X
GPIO75	L-LCLK	output	LCD		X		X
GPIO76	L-PCLK	output	LCD		X		X
GPIO77	L-BIAS	output	LCD		X		X
GPIO78	CS2	output	iM4A3				
GPIO79	CS3	output	iM4A3				
GPIO80	CS4	output	iM4A3				

8.1 PXA255 Select Line Overview

cpu select line	type	data	address	start	end	description
SDCS0	SDRAM	D[0-31]	A[10-24]			XM250 SDRAM memory
SDCS1	---	---	---	---	---	not connected
SDCS2	SDRAM					not used on CR250
SDCS3	---	---	---	---	---	not connected
CS0	Flash-Memory	D[0-31]	A[2-25]			XM250 Flash memory
CS1	LAN91C111	D[0-31]	A[2-15]			XM250 LAN controller
CS2	ISP1161	D[0-15]	A[1-2]			USB Controller
CS3 * /A21	iM4A3	D[0-31]	A[0-17]			ST3 Bus Module
CS3 * A21	iM4A3	D[0-31]	A[0-17]			ST5 Bus Module
CS4 * /A5	iM4A3	D[0-15]	A[2-4]			IDE-CS0 access
CS4 * A5	iM4A3	D[0-15]	A[2-4]			IDE-CS1 access
CS4 * A5 * A21	iM4A3	D[0-15]	A[2-4]			IDE-DMA access
CS5 * /A5 * /A21	iM4A3	D[0-15]	A2			Systembuffer
CS5 * A5 * A21	iM4A3	---	---			Watchdog

8.2 SPI Select Line Overview

cpu select line	System Buffer					description
	GPIO24 / SSP-SFRM	SYS8	SYS9			
		0	0	0	SPI-SEL0	not used / reset state
		1	0	0	SPI-SEL1	TSC2301
		0	1	0	SPI-SEL2	ST3 Bus Module
		1	1	0	SPI-SEL3	ST3 Bus Module
		0	0	1	SPI-SEL4	ST5 Bus Module
		1	0	1	SPI-SEL5	ST5 Bus Module
		0	1	1	SPI-SEL6	ST6 GPIO Module
		1	1	1	SPI-SEL7	ST4 GPIO Module

9. System Buffer

RWSYS	D15	D14	D13	D12	D11	D10	D9	D8
r/w	Power-On	Reset	---	HWKUP	DMAEN	SPI-A2	SPI-A1	SPI-A0
	CF-Card		---	USB	IDE	SPI-Select-Interface		

RSYS	D7	D6	D5	D4	D3	D2	D1	D0
read	---	---	---	---	INPACK	VS2	VS1	BVD2
	not used				CF-Card-Interface			

Appendices

Appendix B: Layout Solder Side

