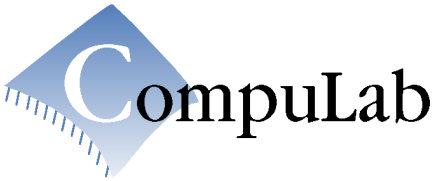


Mini ATX baseboard

For CompuLab's Computer-On-Module's

Table of Contents

1. Revision Notes

Date	Description
07-Dec-2003	▪ First release
17-Jun-2004	▪ Added detailed description of RS-422/485 modes
24-May-2005	▪ Added jumper settings for iVCF support
14-Jun-2005	▪ Added clarifications regarding orientation of inserted PCI cards.
05-Sep-2005	▪ Added numeration for PXA255 GPIO's (for CM-X255)
27-Feb-2006	▪ Manual significantly changed to match rev 2 of ATX baseboard ▪ Added notes specific for CM-X270, CM-F82 ▪ Added Video Input Processor description

2. Introduction

2.1. Highlights

- **Mini-ATX Single Board Computer implemented by an ATX baseboard and a Computer-On-Module**
- **Works with all CompuLab's CoM's: X255, X270, F82, i686, iGLX, iVCF**
- **PCI slot**
- **COM1 - 4 with RS232 / RS485 / RS422 / TTL driver options**
- **LPT, GPIO, PS/2 keyboard and mouse interfaces**
- **Host USB ports**
- **Hard Disk Interface**
- **Connectors for an LCD panel and CRT monitor**
- **One to three 10/100BaseT Ethernet ports**
- **Single or Dual PCMCIA / CardBus slots**
- **Video input processor**

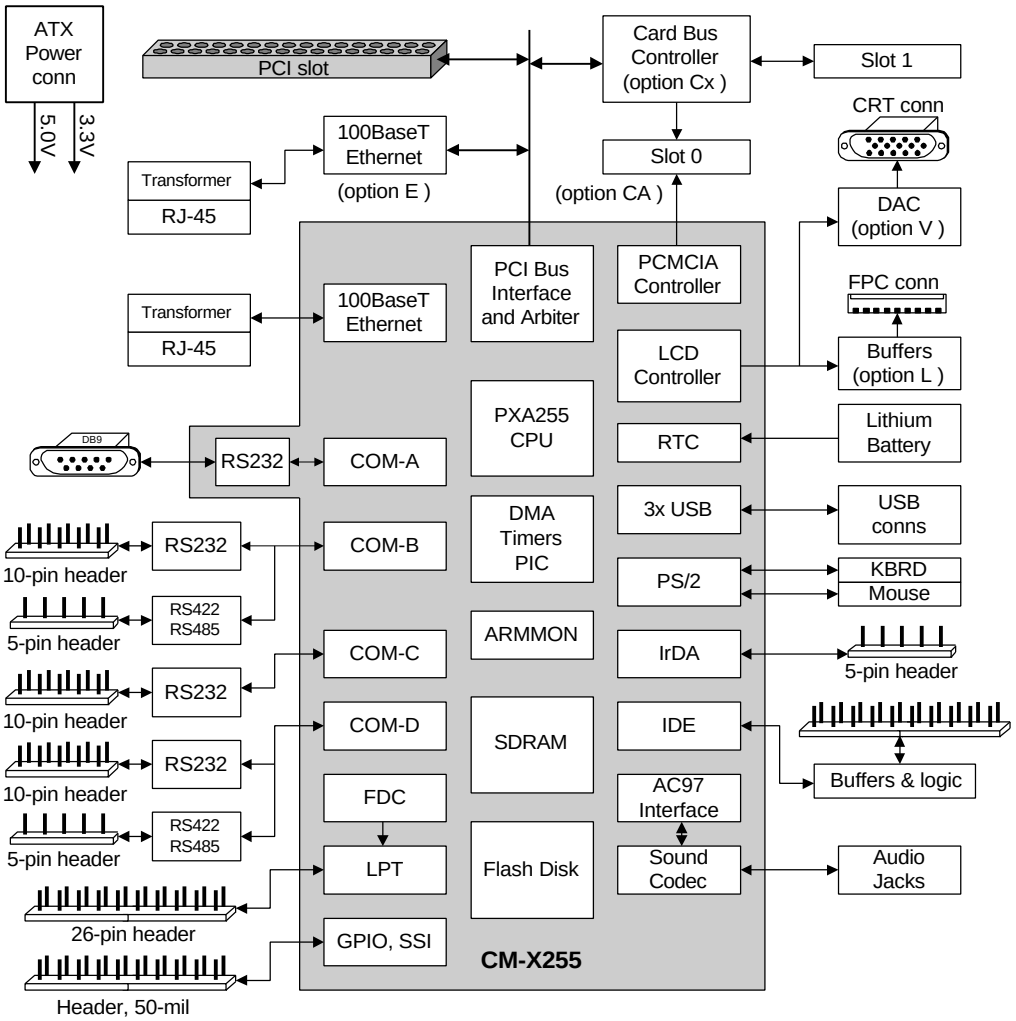
The **ATX baseboard** is a small single board computer having industry standard Mini-ATX form factor. Single Board Computer functionality is implemented by a combination of a Computer-On-Module and an ATX baseboard.

The ATX baseboard can use any CoM (Computer-On-Module) available from CompuLab. Several additional functions are implemented on the ATX board itself. Functional content provided by the ATX baseboard varies according to the module selected, enabling the flexibility required in a dynamic market where application requirements can change rapidly.

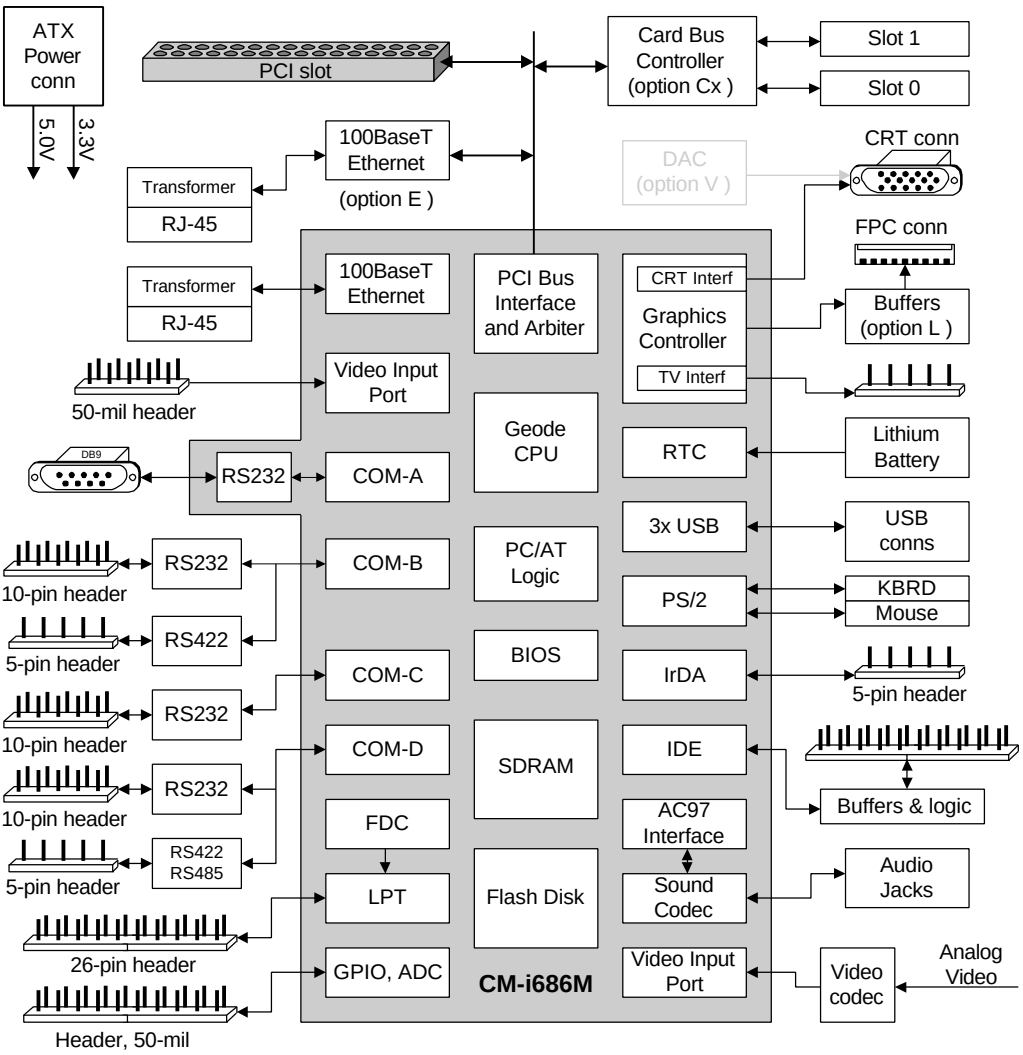
2.2. Block Diagrams

The ATX baseboard feature set depends on the module used.

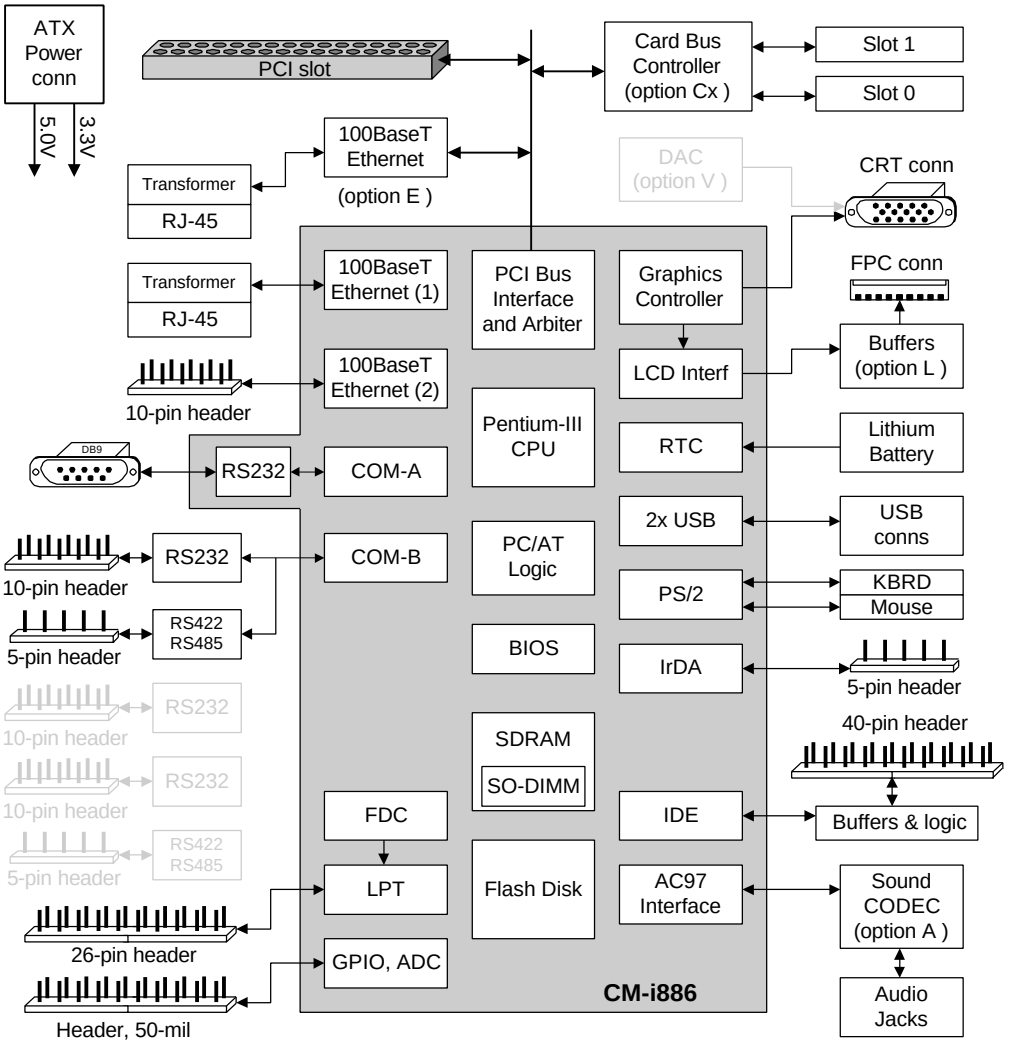
ATX baseboard with CM-X255



ATX baseboard with CM-i686



ATX baseboard with CM-i886



3. Connector Description

The ATX baseboard uses the attached Computer-On-Module to implement most of the provided functions. For these functions, the ATX baseboard routes the signals from the module's miniature connectors to standard connectors. Functional descriptions are therefore provided in the module's Reference Guide. The section below provides only a description of the external interface connectors. Section 4 provides the specifications of additional functions implemented on the ATX baseboard itself.

3.1. PC Card - CardBus / PCMCIA slots (P4, P5)

These 68-pin PC Card slots conform to the CardBus and PCMCIA standards. They include card guides. The ATX baseboard can be assembled with either none, one or two PC Card slots.
Signal names below are specified for both P4 and P5 slots; however, they are physically connected to separate signal groups of the controller.
The selection of PCMCIA versus CardBus mode is performed automatically under driver control, according to the inserted card type.

Pin	PCMCIA Name	CardBus Name	Pin	PCMCIA Name	CardBus Name
1	GND	GND	35	GND	GND
2	D3	CAD0	36	CD1#	CCD1#
3	D4	CAD1	37	D11	CAD2
4	D5	CAD3	38	D12	CAD4
5	D6	CAD5	39	D13	CAD6
6	D7	CAD7	40	D14	RFU
7	CE1#	CCBE0#	41	D15	CAD8
8	A10	CAD9	42	CE2#	CAD10
9	OE#	CAD11	43	VS1#	CVS1
10	A11	CAD12	44	IOR#	CAD13
11	A9	CAD14	45	IOW#	CAD15
12	A8	CCBE1#	46	A17	CAD16
13	A13	CPAR	47	A18	RFU
14	A14	CPERR#	48	A19	CBLOCK#
15	WE#	CGNT#	49	A20	CSTOP#
16	RDY#/IREQ#	CINT#	50	A21	CDEVSEL#
17	VCC	VCC	51	VCC	VCC
18	VPP1	VPP1	52	VPP2	VPP2
19	A16	CCLK	53	A22	CTRDY#

20	A15	CIRDY#	54	A23	CFRAME#
21	A12	CCBE2#	55	A24	CAD17
22	A7	CAD18	56	A25	CAD19
23	A6	CAD20	57	VS2#	CVS2
24	A5	CAD21	58	RESET	CRST#
25	A4	CAD22	59	WAIT	CSERR#
26	A3	CAD23	60	INPACK#	CREQ#
27	A2	CAD24	61	REG#	CCBE3#
28	A1	CAD25	62	BVD2/SPK	CAUDIO
29	A0	CAD26	63	BVD1/STS	CSTSCHG
30	D0	CAD27	64	D8	CAD28
31	D1	CAD29	65	D9	CAD30
32	D2	RFU	66	D10	CAD31
33	WP/IOIS#	CCLKRUN#	67	CD2#	CCD2#
34	GND	GND	68	GND	GND

PCMCIA slot types: the slots can accommodate all types of PC Cards - Type I, II or III.

3.2. COM1 Connector (P22B)

Standard DB9 connector, RS-232 levels

Pin	Name	Pin	Name
S1	COM1-DCD	S6	COM1-DSR
S2	COM1-RXD	S7	COM1-RTS
S3	COM1-TXD	S8	COM1-CTS
S4	COM1-DTR	S9	COM1-RI
S5	GND		

Note
COM1-RI (Ring Indicator) input is not available if a CM-i686 is used, because it is not supported by the Geode chipset. This input is tied to GND in the CM-i686.

3.3. PS/2 Keyboard and Mouse Connector (P23)

Standard 2x 6-pin Mini-Din

Pin (PS/2)	Pin (Connector)	Name
1	M1	PS2_MDAT
2	M2	-
3	M3	GND
4	M5	VCC
5	M6	PS2_MCLK
6	M8	-
1	K1	PS2_KDAT
2	K2	-
3	K3	GND
4	K5	VCC
5	K6	PS2_KCLK
6	K8	-

3.4. GPIO, Special Functions and Video Input Header (P18)

High-density connector, 60-pin, 50 mil pitch, 100 mil width

Pin	Name	PXA255 GPIO #	Pin	Name	PXA255 GPIO #
01	GPIO0	[45]	02	GPIO1	[44]
03	GPIO2	[20]	04	GPIO3	[19]
05	GPIO4		06	GPIO5	
07	GPIO6		08	GPIO7	
09	GPIO8		10	GPIO9	
11	GPIO10		12	GPIO11	
13	GPIO12		14	GPIO13	
15	GPIO14		16	GPIO15	
17	GPIO16		18	GPIO17	
19	GPIO18		20	GPIO19	
21	GND		22	CLK-OUT	
23	GND		24	SPARE10	
25	-		26	SPARE20	
27	-		28	-	
29	-		30	-	

31	-		32	-	
33	SPARE34		34	SPARE35	
35	SPARE36		36	SPARE37	
37	SPARE38		38	GND	
39	SSI-DIN	[84]	40	SSI-DOUT	[83]
41	SSI-DCLK	[81]	42	GND	
43	VIP-D0		44	VIP-D1	
45	VIP-D2		46	VIP-D3	
47	VIP-D4		48	VIP-D5	
49	VIP-D6		50	VIP-D7	
51	VIP-CS		52	VIP-ODD-EVEN	
53	GND		54	VIP-CLK	
55	GND		56	SPDIF	
57	N/C		58	VCC3-3	
59	N/C		60	N/C	

Notes:

- If CM-X255 used: up to 7 GPIO pins are available - 4 pins are available through standard positions and another 3 shared with SSI. Other GPIO pins are not connected, because CM-X255 doesn't have 3rd CAMI connector. GPIO numeration as documented in Intel's PXA255 manual is specified in brackets.
- Specifications of the mating connector for this header is found in CompuLab's website, following the [Developer] >> [CM-i586] >> [SB-i586 - Mating Connectors Specifications] links.

3.5. LPT / FDC Header (P25)

2x13, 100 mil header, directly compatible with standard LPT cable/connector. This header is used for two different functions:

1. LPT - Parallel Port
2. FDD - Floppy Disk Drive interface

Selection between these two functions is performed in the BIOS setup. Pin functions change according to the mode selected.

When used as an LPT, the connector's pin-out is:

Pin	Name	Pin	Name
1	STROBE	2	AUTOFD
3	DATA0	4	ERROR
5	DATA1	6	INIT
7	DATA2	8	SLCTIN
9	DATA3	10	GND
11	DATA4	12	GND
13	DATA5	14	GND
15	DATA6	16	GND
17	DATA7	18	GND
19	ACK	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	-

When used as an FDC, the header's pin-out is:

Pin	Name	Pin	Name
1	(DS0)	2	DENSEL
3	INDEX	4	HDSEL
5	TRK0	6	DIR
7	WP	8	STEP
9	RDATA	10	GND
11	DSKCHG	12	GND
13	MEDIA-ID0	14	GND
15	(MTR0)	16	GND
17	MEDIA-ID1	18	GND
19	DS1	20	GND
21	MTR1	22	GND
23	WDATA	24	GND
25	WGATE	26	-

A ready to use adapter from LPT (26-pin) to FDD (34-pin) connector format is available from CompuLab. Adapter design is published in CompuLab's website in [Developer]>> [CM-i586] >> [LPT to FDD Adapter Design].

3.6. Hard Disk Interface For X86 Modules (P8)

A standard 40-pin header, directly compatible with an IDE flat cable. This header is used for hard disk interface when ATX baseboard is assembled with x86-compatible modules,

such as CM-i686 or CM-iVCF . With the ARM / PowerPC modules, another header (P9) should be used.

Pin	Name	Pin	Name
1	RESET#	2	GND
3	DATA7	4	DATA8
5	DATA6	6	DATA9
7	DATA5	8	DATA10
9	DATA4	10	DATA11
11	DATA3	12	DATA12
13	DATA2	14	DATA13
15	DATA1	16	DATA14
17	DATA0	18	DATA15
19	GND	20	-
21	-	22	GND
23	IOW#	24	GND
25	IOR#	26	GND
27	IOCHRDY	28	GND
29	DMAACK#	30	GND
31	IRQ	32	-
33	ADDR1	34	SPARE21
35	ADDR0	36	ADDR2
37	CS0#	38	CS1#
39	DASP#	40	GND

3.7. Hard Disk Interface For ARM / PowerPC Modules (P9)

A standard 40-pin header, directly compatible with an IDE flat cable. This header is used for hard disk interface when an ATX baseboard is assembled with an ARM and PowerPC modules, such as CM-X255 /X270 / F82. With X86 modules, another header (P8) should be used.

Pin	Name	Pin	Name
1	RESET#	2	GND
3	DATA7	4	DATA8
5	DATA6	6	DATA9
7	DATA5	8	DATA10
9	DATA4	10	DATA11
11	DATA3	12	DATA12
13	DATA2	14	DATA13
15	DATA1	16	DATA14
17	DATA0	18	DATA15
19	GND	20	-
21	-	22	GND
23	IOW#	24	GND
25	IOR#	26	GND
27	IOCHRDY	28	GND
29	-	30	GND
31	IRQ	32	-
33	ADDR1	34	-
35	ADDR0	36	ADDR2
37	CS0#	38	CS1#
39	DASP#	40	GND

The ATX baseboard implements a separate IDE interface for the CM- X255/X270/F82, using module's local bus. Buffering of data lines is done by PCMCIA logic and chipselects are formed by address decoding of local bus addresses. Only PIO (rather than DMA) mode is available.

3.8. Ethernet Port 1 (P10A)

A standard RJ45 connector in an Ethernet/USB combo module. This connector provides an interface for the first Ethernet port available in a module.

Pin	Name
1	TXD+
2	TXD-
3	RXD+

4	-
5	-
6	RXD-
7	-
8	-

3.9. Ethernet Port 2 (P11A)

A standard RJ45 connector in an Ethernet/USB combo module. This connector provides an interface for an Ethernet port implemented on the ATX board.

Pin	Name
1	TXD+
2	TXD-
3	RXD+
4	-
5	-
6	RXD-
7	-
8	-

3.10. Ethernet Port 3 (P36A)

A standard RJ45 connector in an Ethernet/USB combo module. This connector provides an interface for the second Ethernet port (if) provided by the module.

Pin	Name
1	TXD+
2	TXD-
3	RXD+
4	-
5	-
6	RXD-
7	-
8	-

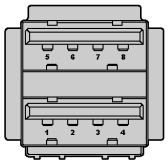
Routing of Ethernet ports to connectors

ATX baseboard connector	Ethernet port source
Connector P10A	Module's Ethernet port 1
Connector P11A	ATX baseboard on-board Ethernet port

Connector P36A	Module's Ethernet port 2 (if supported by the module)

3.11. USB Connector (P10B, P11B)

A standard dual USB Type-A stacked connector. P10B is used for USB1 and USB2 interfaces, P11B is used for USB3 and USB4 interfaces. Refer to the module datasheet in order to see the availability of USB ports, according to the module type used.



USB interface 1,3		USB interface 2,4	
Pin	**Name**	**Pin**	**Name**
1	VBUS	5	VBUS
2	DN	6	DN
3	DP	7	DP
4	GND	8	GND

3.12. COM3 Header (P13)

A 2x5, 100-mil header compatible with a standard, "flat-cable to DB-9" adapter. RS-232 or TTL levels.

Pin	Name	Pin	Name
1	COM3-DCD	2	COM3-RXD
3	COM3-TXD	4	COM3-DTR
5	GND	6	COM3-DSR
7	COM3-RTS	8	COM3-CTS
9	COM3-RI	10	N/C

3.13. COM2 Header (P14)

A 2x5, 100-mil header compatible with a standard "flat-cable to DB-9" adapter. RS-232 levels.

Pin	Name	Pin	Name
1	COM2-DCD	2	COM2-RXD
3	COM2-TXD	4	COM2-DTR

5	GND	6	COM2-DSR
7	COM2-RTS	8	COM2-CTS
9	COM2-RI	10	N/C

3.14. COM4 Header (P15)

A 2x5, 100-mil header compatible with a standard "flat-cable to DB-9" adapter. RS-232 levels.

Pin	Name	Pin	Name
1	COM4-DCD	2	COM4-RXD
3	COM4-TXD	4	COM4-DTR
5	GND	6	COM4-DSR
7	COM4-RTS	8	COM4-CTS
9	COM4-RI	10	N/C

3.15. COM2 and COM4 RS-422/485 Header (P16)

A 2x5, 100-mil header. RS-422/485 levels.

Pin	Name	Pin	Name
1	COM2-TXP	2	COM4-TXP
3	COM2-TXN	4	COM4-TXN
5	COM2-RXP	6	COM4-RXP
7	COM2-RXN	8	COM4-RXN
9	GND	10	GND

3.16. PCI Slot (P17)

A standard PCI slot, 3.3V type.
All non-obvious connections and unsupported signals are mentioned in notes.

WARNING: Please pay attention that voltage key location is for 3.3-volt cards. Ensure proper orientation of the inserted card - its interface panel should be in the same direction as ATX board connectors. Note that many standard PCI cards have 5-volt interface and therefore aren't compatible with ATX baseboard.

Pin	Name	Notes	Pin	Name	Notes
B1	-12V	-12V of ATX power supply	A1	TRST#	Pullup
B2	TCK	Pulldown	A2	+12V	+12V of ATX power supply
B3	GND		A3	TMS	Pullup
B4	TDO	N/C	A4	TDI	Pullup
B5	+5V		A5	+5V	
B6	+5V		A6	INTA#	
B7	INTB#		A7	INTC#	
B8	INTD#		A8	+5V	
B9	PRSNT#1	N/C	A9	RESERVED	N/C
B10	RESERVED	N/C	A10	VIO	3.3V
B11	PRSNT#2	N/C	A11	RESERVED	N/C
B12	key		A12	key	
B13	key		A13	key	
B14	RESERVED	N/C	A14	3.3Vaux	3.3V
B15	GND		A15	RST#	
B16	CLK		A16	VIO	3.3V
B17	GND		A17	GNT	
B18	REQ#		A18	GND	
B19	VIO	3.3V	A19	PME#	N/C
B20	AD31		A20	AD30	
B21	AD29		A21	+3.3V	
B22	GND		A22	AD28	
B23	AD27		A23	AD26	
B24	AD25		A24	GND	
B25	+3.3V		A25	AD24	
B26	C/BE#3		A26	IDSEL	AD18
B27	AD23		A27	+3.3V	

B28	GND		A28	AD22	
B29	AD21		A29	AD20	
B30	AD19		A30	GND	
B31	+3.3V		A31	AD18	
B32	AD17		A32	AD16	
B33	C/BE#2		A33	+3.3V	
B34	GND		A34	FRAME#	
B35	IRDY#		A35	GND	
B36	+3.3V		A36	TRDY#	
B37	DEVSEL#		A37	GND	
B38	GND		A38	STOP#	
B39	LOCK#	Pullup	A39	+3.3V	
B40	PERR#		A40	SDONE	Pullup
B41	+3.3V		A41	SBO#	Pullup
B42	SERR#		A42	GND	
B43	+3.3V		A43	PAR	
B44	C/BE#1		A44	AD15	
B45	AD14		A45	+3.3V	
B46	GND		A46	AD13	
B47	AD12		A47	AD11	
B48	AD10		A48	GND	
B49	M66EN	GND	A49	AD9	
B50	GND	5V key	A50	GND	5V key
B51	GND	5V key	A51	GND	5V key
B52	AD8		A52	C/BE#0	
B53	AD7		A53	+3.3V	
B54	+3.3V		A54	AD6	
B55	AD5		A55	AD4	
B56	AD3		A56	GND	
B57	GND		A57	AD2	
B58	AD1		A58	AD0	
B59	VIO	+3.3V	A59	VIO	+3.3V
B60	ACK64#	Pullup	A60	REQ64#	
B61	+5V		A61	+5V	
B62	+5V		A62	+5V	

3.17. CRT VGA Connector (P22A)

An HDB15 standard CRT connector

Pin	Name
V1	RED
V2	GREEN
V3	BLUE
V4	N/C
V5	GND
V6	GND
V7	GND
V8	GND
V9	VCC3
V10	GND
V11	N/C
V12	N/C
V13	HSYNC
V14	VSYNC
V15	N/C

3.18. TFT Panel Connector (P19)

A 51-pos FPC connector. Direct interface for certain 640 x 480 TFT panels (such as LP064V1)

Pin	Name
01	LCD-VDD
02	LCD-VDD
03	LCD-R0
04	LCD-R1
05	GND
06	LCD-R2
07	LCD-R3
08	GND
09	LCD-R4
10	LCD-R5
11	GND
12	-
13	-
14	GND

Pin	Name
27	LCD-VDD
28	LCD-VDD
29	LCD-B0
30	LCD-B1
31	GND
32	LCD-B2
33	LCD-B3
34	GND
35	LCD-B4
36	LCD-B5
37	GND
38	-
39	-
40	GND

15	GND
16	LCD-G0
17	LCD-G1
18	GND
19	LCD-G2
20	LCD-G3
21	GND
22	LCD-G4
23	LCD-G5
24	GND
25	-
26	-

41	GND
42	LCD-HSYNC
43	LCD-VSYNC
44	LCD-DE
45	GND
46	LCD-CLK
47	GND
48	LCD-ENVEE
49	LCD-ENVDD
50	LCD-VDD
51	LCD-VDD

3.19. Touchscreen, IR and Audio Interface Header (P28)

A 1x26, 100 mil header containing interfaces of several separate functions. Signal pinouts are compatible with standard cables/connectors.

Pin	Name	Description
01	LINE_IN_R	Audio Input
02	GND	
03	GND	
04	LINE_IN_L	
05	-	Reserved
06	-	
07	-	
08	TSMY	Touchscreen interface
09	TSMX	
10	TSPX	
11	TSPY	
12	GND	
13	RST_IN	Reset Input
14	GND	
15	VBAT	RTC supply

Pin	Name	Description
16	GND	
17	ATX-PWR	ATX power ctl.
18	SSI_CLK	CM-i686 FailSafe boot
19	SSI_DOUT	
20	GND	
21	DEBUG0	CM-i886 FailSafe boot
22	VCC5	IR module interface
23	-	
24	IRDA_RX	
25	GND	
26	IRDA_TX	

Note
VCC_USBx pins have overcurrent protection as required by USB standard specifications.

3.20. PCI Extension (P32)

A standard PCI slot capable of handling only one device. For connecting more than one PCI device to the ATX baseboard, PCI Extension signals must be used.

Pin	Name	Notes	Pin	Name	Notes
B1	GND		A1	PCI_GNT1	
B2	PCI_CLK1		A2	GND	
B3	GND		A3	PCI_GNT2	
B4	PCI_REQ#1		A4	GND	
B5	GND		A5	PCI_CLK3	
B6	PCI_CLK2		A6	RISER_ID1	GPIO4
B7	GND		A7	RESERVED	N/C
B8	PCI_REQ#2		A8	RISER_ID2	GPIO5
B9	GND		A9	NOGO	N/C
B10	PC/PCI_DREQ#	N/C	A10	+12V	
B11	PC/PCI_DGNT#	Pullup	A11	+SERIRQ	

3.21. ATX Power Supply Connector (P24)

A standard ATX power connector.

Pin	Name	Pin	Name
1	+3.3V	11	+3.3V
2	+3.3V	12	–12V
3	GND	13	PS_ON
4	+5.0V	14	+3.3V
5	GND	15	GND
6	+5.0V	16	GND
7	GND	17	GND
8	PWROK	18	–5.0V
9	VCC5ATX	19	+5.0V
10	+12V	20	+5.0V

3.22. Audio Jack (P21)

A standard 2x3.5mm stereo jack. A green jack is used for stereo headphone/speaker output. A magenta jack is used for microphone input.

Headphone/speaker output jack pinout

Pin	Description	Name
1	Body	GND
2	Tip	L-OUT
3	Ring	R-OUT

Microphone input jack pinout

Pin	Description	Name
1	Body	GND
2	Tip	MIC-IN
3	Ring	MIC-VCC

Note: In the schematics, the 3x3.5mm stereo jack is used. The assembled boards, in most cases, will have only 2x3.5mm stereo connector as documented here.

3.23. Power entry header (P34)

A 1x3, 100-mil shrouded header. This header can be used as power supply entry if a low power modules such as CM-X255, CM-X270, CM-F82, CM-i686 or CM-iGLX. For the CM-iPM, the ATX power entry must be used.

Pin	Name
1	VCC5
2	VCC3_3
3	GND

3.24. TVOUT header (P26)

A 1x2, 100-mil header.

Pin	Name
1	TVOUT
2	GND

3.26. LVDS connector (P27)

A 1x12, 100 mil header containing LVDS interface signals routed via CAMI, high bits of local bus address.

Pin	Name	Pin	Name
1	LVDS-N2	2	LVDS-P2
3	LVDS-N1	4	LVDS-P1
5	GND	6	LVDS-NCLK
7	LVDS-PCLK	8	GND
9	LVDS-N0	10	LVDS-P0
11	LVDS-P3	12	LVDS-N3

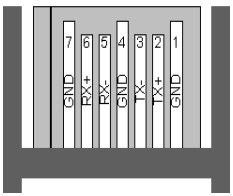
3.27. Analog video input (P37)

A 1x3, 100 mil header provided for connecting analog video input to Video Input Processor.

Pin	Name
1	VID-IN1
2	GND
3	VID-IN2

3.28. SATA connector (P39)

A standard Serial ATA connector.



Pin	Name
1	GND
2	SATA-TXP
3	SATA-TXN
4	GND
5	SATA-RXN
6	SATA-RXP
7	GND

4. Functions Implemented on the ATX baseboard

Most of the ATX baseboard functions are implemented by the attached Computer-On-Module, while the ATX baseboard provides standard connectors and headers. Several additional functions are implemented on the ATX baseboard itself. This section describes those functions.

4.1. RS-232 and RS-422/485 Serial Port Drivers

The modules have on-board RS-232 drivers for the COM1 serial port. Other serial ports of the modules have TTL level interface. The ATX baseboard adds several driver options for some of the serial ports as specified in the table below. Driver support includes modem control lines.

Port	Level options		
	RS-232	RS-422/485	TTL
COM1	+	-	-
COM2	+	+	-
COM3	+	-	+
COM4	+	+	-
COM5	-	-	+

Notes

1. COM5 is shared with the IR port.
2. RIN (Ring Indicator) is not available for COM1 if a CM-i686 is used.
3. With CM-i686, COM2 supports RS-422 but not RS-485.

The interface type of the COM2 and COM4 ports can be selected either individually to the RS-232 or RS-422/485 standard by assembling the appropriate drivers or automatically. If both drivers are assembled, the level selection is done automatically by hardware. If the driver senses a valid RS-232 voltage level on any pin of the RS-232 interface, the RS-232 interface is selected. Otherwise, the RS-422/RS-485 interface is selected.

RS-422 and RS-485 modes

In RS-422/485 modes, TXD outputs of the COM2/4 ports are enabled by RTS2/4 signals. RTS "1" level enables TX output, RTS "0" disables it.

In RS-485 (half duplex) mode, transmit and receive operations are performed on TX lines. To achieve this, user have physically connect RX and TX lines of the serial driver, i.e.

RX+ to TX+ and RX- to TX-. In this case selection between receive and transmit operations is performed by RTS.

In RS-422 (full duplex) mode, transmit and receive operations are performed on separate line pairs. TX output can be always enabled, though qualifying it by RTS has no practical effect on system operation. RX and TX lines should not be connected together as in case of RS-485.

For better understanding of RS-422/485 drivers operation, please refer to SB-X270 design schematics, available following [developer] >> [CM-X270] >> [Hardware] links in CompuLab's web-site.

4.2. Power Supply Options

The ATX baseboard has an optional on-board 5V-to-3.3V linear converter. Supply voltage options are:

1. **3.3V only**
   In this case, the converter is not assembled. This option can be used only if the selected module doesn't require 5V power supply.

2. **3.3V and 5.0V**
   This option is the same as (1), but it supports all types of low power modules including features which require 5V supply.

3. **5.0V only**
   In this case, a 5V-to-3.3V linear converter is assembled on the ATX baseboard. Supports all types of low power modules.

4. **ATX power**
   In this case, power is supplied from a standard ATX power supply connected to P24. Supports all types of modules. For the modules requiring high power, such as iVCF, this is the only valid option.

Bypassing the on-board converter
If 3.3V is applied on the power entry connector, the on-board 5V-to-3.3V converter is disabled automatically to avoid interference with externally applied power.

Power output specifications
5V to 3.3V converter maximum output current: 3 A
Power entry specifications when the power is supplied via the P34 connector:

Power entry pins	Maximum allowed input current	Input tolerance
5.0V	3 A	5 %
3.3V	3 A	5 %

Converter and power entry specifications are designed in excess of CoM and ATX board requirements. The spare power can be used by attached PCI or PCMCIA / CardBus cards.

The following table summarizes the power connection options for the ATX baseboard with different modules:

Module Type	3.3V only P34	3.3V and 5.0V P34	5.0V only P34	ATX power supply P24
CM-X255	w/o Audio and SIO	+	+	+
CM-i686	w/o Audio and SIO	+	+	+
CM-iVCF	-	-	-	+
CM-iPM	-	-	-	+
CM-F82	?	+	+	+
CM-X270	+	+	+	+
CM-iGLX	+	+	+	+

Note: For the 5.0V-only option, a 5V to 3.3V Converter is required on the ATX baseboard.

4.3. Dual PC Card Controller and PCMCIA Glue Logic

The ATX baseboard implements two different methods of PC Card interface. For modules which do not have an integrated PC Card controller, the ATX baseboard provides a controller on-board. For the CM-X255 and CM-X270 modules, which does have an integrated PCMCIA controller, the ATX baseboard provides only simple glue logic required to achieve standard PCMCIA functionality. However, an on-board PC Card controller can be used with the CM-X255 / CM-X270 as well.

4.3.1. Dual PC Card Controller

The ATX baseboard implements a dual PC Card interface using a TI PCI1420 controller. The PC Card controller and slots are optional, according to the ATX baseboard's configuration. The PCI1420 is a high-performance PCI-to-CardBus bridge that supports two independent card sockets compliant with the PC Card standard. The PC Card standard retains the 16-bit PC Card specification (PCMCIA) and defines the new 32-bit PC Card - the CardBus, capable of full 32-bit data transfers at 33 MHz. The ATX baseboard supports any combination of PCMCIA and CardBus PC Cards in the two sockets, powered by 5 V or 3.3 V as required.
The controller is compliant with the PCI Local Bus Specification and its PCI interface can act as either a PCI master or slave device. PCI bus mastering is initiated during 16-bit PC Card DMA transfers or CardBus PC Card bridging transactions. The controller is also compliant with the latest PCI Bus Power Management Interface Specification.

All PC Card signals are internally buffered to allow hot insertion and removal. The PCI1420 is register-compatible with the Intel 82365SL controller in 16-bit PCMCIA mode. The controller's internal data path logic allows the host to access 8-, 16-, and 32-bit cards using full 32-bit PCI cycles for maximum performance.

The PC Card controller can be disabled in order to allow the functionality of the CM-X255 / CM-X270's integrated PCMCIA controller. See the "Jumpers" section for more information.

Features

- Mix-and-match 5-V/3.3-V 16-bit PC Cards and 3.3-V CardBus Cards
- Two PC Card or CardBus slots with hot insertion and removal
- Dual-slot PC Card power switch
- Burst transfers, 130 MB/s throughput
- Five PCI memory windows and two I/O windows available for each socket
- Two I/O windows and two memory windows available by each CardBus socket
- Intel 82365SL register compatible
- Distributed DMA (DDMA) and PC/PCI DMA
- 16-Bit DMA on both PC Card sockets

The controller is initialized by CoM's BIOS/Monitor and supported by all operating system packages.

4.3.2. PCMCIA logic for CM-X255 / CM-X270

PCMCIA interface logic on the ATX baseboard is designed to support single socket 8/16-bit PC-Card functionality, as provided by the PCMCIA controller integrated in the CM-X255 / CM-X270. This is a low-cost option supported only by the CM-X255/ CM-X270.

The PCMCIA interface logic can be disabled in order to allow the functionality of a Dual PC Card controller as mentioned in the previous section. See the "Jumpers" section for more information.

Features

- 5-V/3.3-V 16-bit PC Cards
- Single slot with hot insertion and removal
- Manually selectable supply voltage. See the "Jumpers" section for more information.
- IO and memory transactions supported

4.4. 10/100 Mbit Ethernet Port

The ATX baseboard contains one optional 10/100 Mbit Ethernet port. This is in addition to the optional Ethernet port(s) contained in the module. Depending on module type, the user can therefore order the ATX baseboard + Module system with none, one, two or three Ethernet ports. The Ethernet interface implemented in the ATX baseboard is based on the Realtek RTL8139 MAC/PHY component. In functional terms, it is identical to the Ethernet port available on the CM-i686. Refer to the CM-i686 Reference Guide for details.

The Ethernet port's interface to the external world is through a standard RJ45 interface.

Note: When a CM-i686 is used with the ATX baseboard, the operating system assigns the CM-i686's Ethernet as Port1 and the ATX Ethernet, Port0.

4.5. LCD Power Switch

The graphics controller is located on the module. The ATX baseboard adds one feature for LCD panel support - the power switch. Most LCD panels require proper power sequencing in order to avoid panel damage. The graphics controller of the module provides the LCD_VDDEN signal indicating when power should be applied. The LCD power switch circuit of the ATX baseboard applies a VDD on LCD interface connector under the control of LCD_VDDEN.

LCD Supply selection: The user can select 3.3V or 5V supply by placing a jumper on [P29.15 — P30.15] for 3.3V or [P30.15 — P31.15] for 5V.

4.6. Video Input Processor

The ATX baseboard implements a 9-bit video input processor that receives analog video input (composite) and converts it to CCIR656/601 format in order to transfer the video data to module's Video Input Port. The video input processor is Philips SAA7113H.

The 9-bit video input processor is a combination of a two-channel analog preprocessing circuit including source selection, anti-aliasing filter and ADC, an automatic clamp and gain control, a Clock Generation Circuit (CGC), a digital multistandard decoder (PAL BGHI, PAL M, PAL N, combination PAL N, NTSC M, NTSC-Japan, NTSC N and SECAM), a brightness, contrast and saturation control circuit, a multistandard VBI data slicer and a 27 MHz VBI data bypass.

The decoder is based on the principle of line-locked clock decoding and is able to decode the color of PAL, SECAM and NTSC signals into ITU-R BT 601 compatible color

component values. It accepts an analog CVBS input from TV or VTR sources. The circuit is I2C-bus controlled.

Key features of the Video Input Processor:

- Two analog preprocessing channels in differential CMOS style for best S/N-performance
- Fully programmable static gain or automatic gain control for the selected CVBS channel
- Switchable white peak control
- Two built-in analog anti-aliasing filters
- Two 9-bit video CMOS Analog-to-Digital Converters (ADCs), digitized CVBS signal are available on the VPO-port via I2C-bus control
- Line-locked system clock frequencies
- Digital PLL for horizontal sync processing and clock generation, horizontal and vertical sync detection
- Automatic detection of 50 Hz and 60 Hz field frequency and automatic switching
- between PAL and NTSC standards
- Luminance and chrominance signal processing for PAL BGHI, PAL N, combination PAL N, PAL M, NTSC M, NTSC N, NTSC 4.43, NTSC-Japan and SECAM
- User programmable luminance peaking or aperture correction
- Cross-color reduction for NTSC by chrominance comb filtering
- PAL delay line for correcting PAL phase errors
- Brightness Contrast Saturation (BCS) and hue control on-chip
- Multistandard VBI data slicer decoding World Standard Teletext (WST), North-American Broadcast Text System (NABTS), closed caption, Wide Screen Signalling (WSS), Video Programming System (VPS), Vertical Interval Time Code, (VITC) variants (EBU/SMPTE), etc.
- Standard ITU-R BT 656 YUV 4 : 2 : 2 format (8-bit) on VPO output bus
- Enhanced ITU-R BT 656 output format on VPO output bus containing:
  - Active video
  - Raw CVBS data for Intercast applications (27 MHz data rate)
  - Decoded VBI data
- Detection of copy protected input signals according to the Macrovision standard; can be used to prevent unauthorized recording of pay-TV or video tape signals.

In order to connect an external source of video in CCIR656/601 format, the video input processor must be disabled. It is done by closing jumper 40.

5. Jumpers

The ATX baseboard is designed to operate with several different types of modules. Some of the modules' functions are not fully compatible; therefore, configuration jumpers are required. Jumpers are implemented by 4 rows of 2mm headers, named P29, P30, P31 and P38 and one standard 100-mil jumper P35.

5.1. Jumper Summary

Jumper number	Location (header pins)	Description	Complimentary requirements from other jumpers
1	P29-1 P30-1	If assembled, select 3.3V as V_CORE supply. Required by X255, X270, i686 and iGLX modules.	Jumpers 5,6,7,8 are off Jumpers 36, 37, 38, 39 are off
2	P29-2 P30-2		
3	P29-3 P30-3		
4	P29-4 P30-4		
5	P30-1 P31-1	If assembled, select 5.0V as V_CORE supply. Required by iPM, iVCF modules.	Jumpers 1,2,3,4 are off Jumpers 36, 37, 38, 39 are off
6	P30-2 P31-2		
7	P30-3 P31-3		
8	P30-4 P31-4		
9	P29-5 P30-5	3.3V PCMCIA VCC select. If the jumpers are assembled, the VCC supplied to PCMCIA socket A is 3.3V	Relevant only if jumper 11 is on
10	P30-5 P31-5	5V PCMCIA VCC select. If the jumpers are assembled, the VCC supplied to PCMCIA socket A is 5V	Relevant only if jumper 11 is on
11	P29-6 P30-6	Manually controlled VCC for PCMCIA socket A select. Used for the CM-X255/X270 PCMCIA controller	Either jumper 10 or jumper 9 must be on
12	P30-6 P31-6	Software controlled VCC for PCMCIA socket A select. Used for the ATX baseboard PC-Card controller	
13	P29-7 P30-7	Manually set VPP = 5V for PCMCIA socket A. Used for the CM-X255/X270 PCMCIA controller	

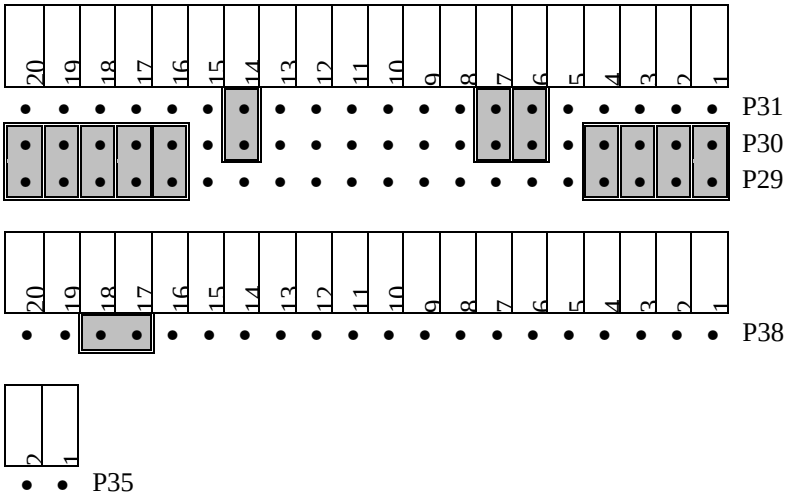
14	P30-7 P31-7	Software controlled VPP for PCMCIA socket A select. Used for the ATX baseboard PC-Card controller	
15	P30-9 P31-9	Use ATX baseboard audio codec. If the jumpers are assembled, ATX baseboard codec will be used.	These jumpers must be off if the module has on-board codec.
16	P30-10 P31-10		
17	P29-10 P29-11		
18	P29-12 P29-13		
19	P30-11 P31-11	PCMCIA logic enable. If the jumpers are off – PCMCIA logic is disabled.	If the jumpers are assembled, jumper 22 must be on also.
20	P30-12 P31-12		
21	P30-13 P31-13		
22	P29-14 P30-14	ATX baseboard PC-Card controller disable	
23	P30-14 P31-14	ATX baseboard PC-Card controller enable	If the jumper is on, jumpers 19, 20, and 21 must be off.
24	P29-15 P30-15	3.3V VCC_LCD select. If the jumpers are assembled, LCD supply voltage is 3.3V	
25	P30-15 P31-15	5V VCC_LCD select. If the jumpers are assembled, LCD supply voltage is 5V	
26	P29-16 P30-16	Module CRT interface select. The jumpers must be on for the i686, iPM, iGLX and iVCF modules.	
27	P29-17 P30-17		
28	P29-18 P30-18		
29	P29-19 P30-19		
30	P29-20 P30-20		
31	P30-16 P31-16	ATX baseboard DAC CRT interface select. The jumpers must be on for the CM-X255/X270.	
32	P30-17 P31-17		
33	P30-18 P31-18		
34	P30-19 P31-19		
35	P30-20 P31-20		
36	P38-1 P38-2	If assembled, select 12V as V_CORE supply. Required for future compatibility.	Jumpers 1,2,3,4,5,6,7,8 are off
37	P38-3 P38-4		
38	P38-5 P38-6		
39	P38-7 P38-8		
40	P38-18 P38-19	Video input processor disable. Put the jumper here in order to ensure disabling of video input processor.	If the jumper is on , jumper 41 must be off
41	P38-17 P38-18	Video input processor enable. Put the jumper here in order to ensure enabling of video input processor.	If the jumper is on , jumper 40 must be off

42	P35-1 P35-2	Module's Ethernet analog power supply	If the jumper is on, 3.3V is supplied to the module's Ethernet TX output. Required for CM-X255, CM-X270, CM-F82

5.2. Sample configurations

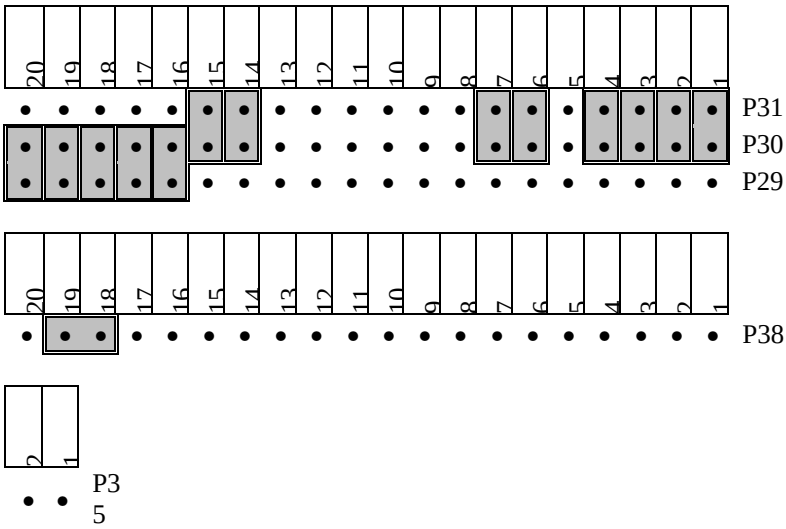
5.2.1. CM-i686, CM-iGLX

- V_CORE = 3.3V
- On-module CRT interface is used
- CardBus controller is enabled
- PCMCIA logic is disabled
- No LCD connected.
- Video Input Processor is enabled
- Power is not connected to module's Ethernet output



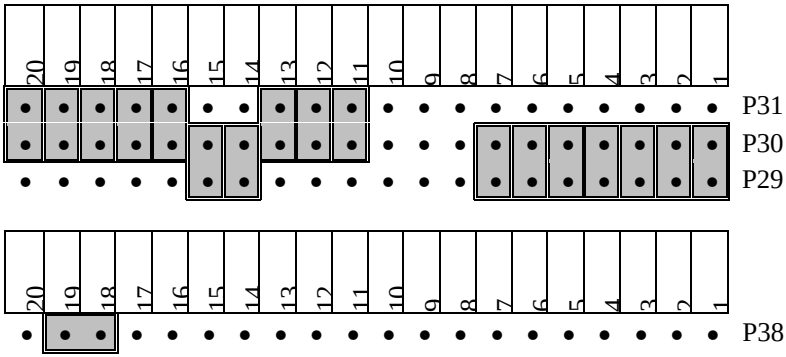
5.2.2. CM-iVCF

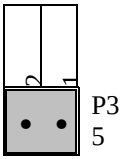
- V_CORE = 5.0V
- On-module CRT interface is used
- CardBus controller is enabled
- PCMCIA logic is disabled
- 5V LCD is connected.
- Video Input Processor is disabled
- Power is not connected to module's Ethernet output



5.2.3. CM-X255, CM-X270

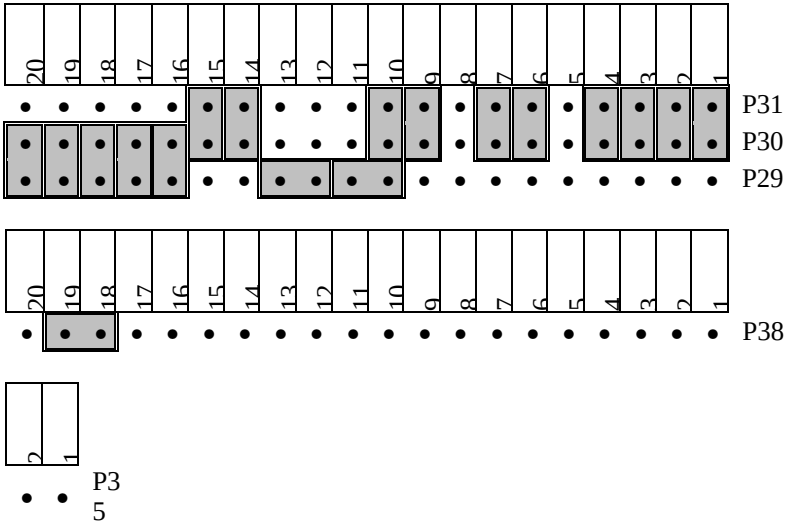
- V_CORE = 3.3V
- CardBus controller is disabled
- PCMCIA logic is enabled, for CM-X255/X270 on-board controller
- CRT DAC interface of ATX baseboard is enabled
- 3.3V PCMCIA card is used
- 5V VPP is required for PCMCIA card
- 3.3V LCD connected
- Video Input Processor is disabled
- Power is connected to module's Ethernet output





5.2.4. CM-i886

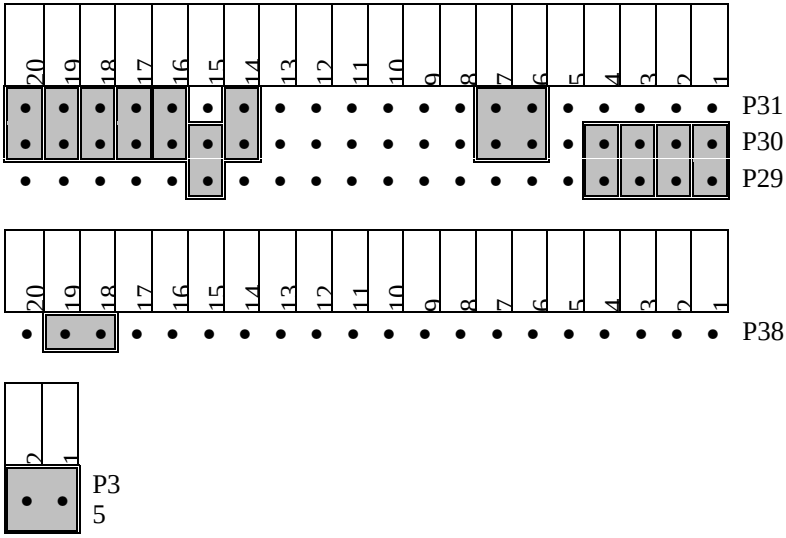
- V_CORE = 5V
- CM-i886 doesn't have audio – audio codec of ATX baseboard is used
- CM-i886 CRT interface is selected
- CardBus controller is enabled
- PCMCIA logic is disabled
- 5V LCD connected
- Video Input Processor is disabled
- Power is not connected to module's Ethernet output



5.2.5. CM-F82

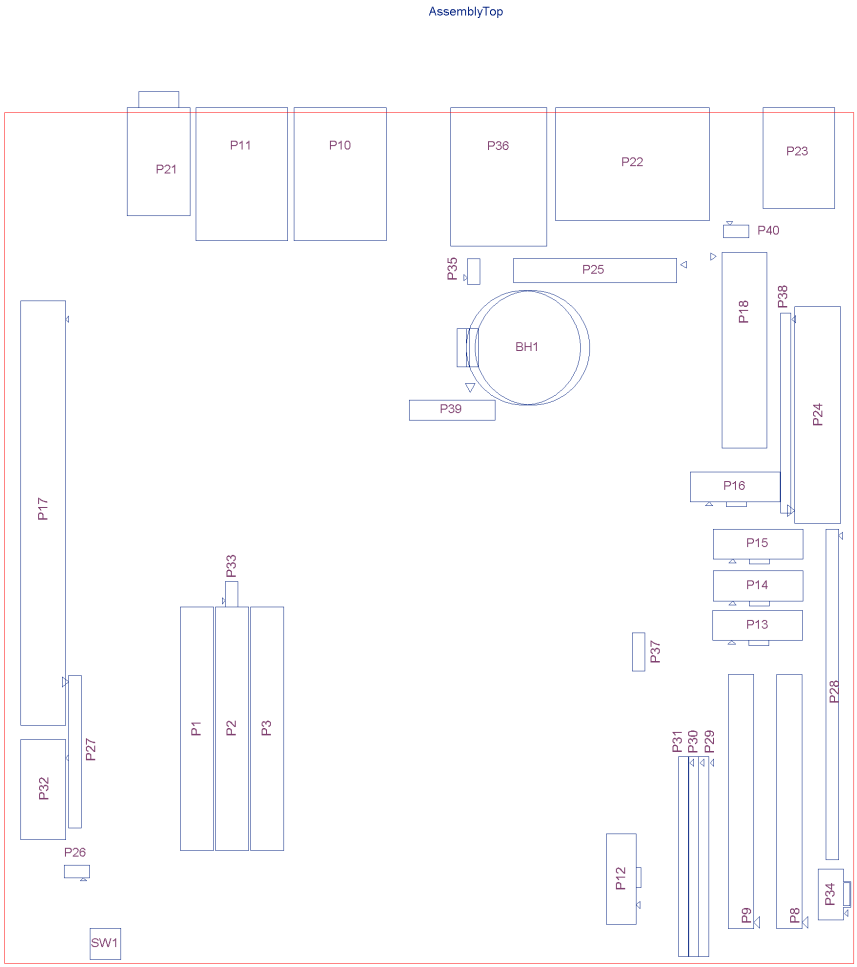
- V_CORE = 3.3V
- CardBus controller is enabled
- PCMCIA logic is disabled.
- CRT DAC interface of ATX baseboard is enabled

- 3.3V LCD connected
- Video Input Processor is disabled
- Power is connected to CORE Ethernet output

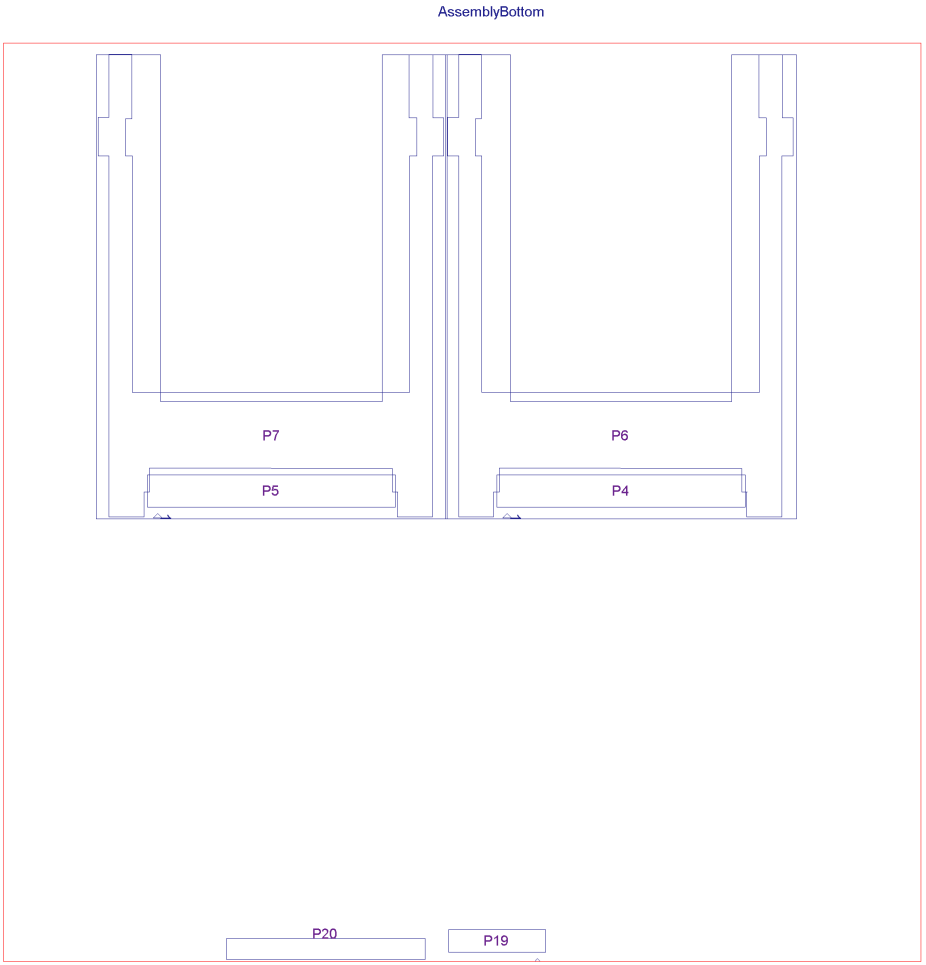


6. Connector Locations

ATX baseboard Top side



ATX baseboard Bottom side, top view



Reference

P1, P2, P3	CAMI connectors for module interface
P4+P6	PC-Card socket A
P5+P7	PC-Card socket B
P8	IDE interface for X86 modules
P9	IDE interface for ARM / PowerPC modules
P10	Module's Ethernet + USB01 and USB02
P11	ATX baseboard Ethernet + USB03 and USB04
P14	COM2 RS-232 header
P13	COM3 RS-232 / TTL header
P15	COM4 RS-232 header
P16	COM2 and COM4 RS-422/485 header
P17	PCI slot
P18	GPIO / Video Input Port header
P19	51-pin LCD connector
P21	Audio jack
P22A	CRT connector
P22B	COM1 RS-232 connector
P23	PS/2 keyboard and mouse connector
P24	ATX power supply connector
P25	Parallel port header
P26	TVOUT header
P27	LVDS panel connector
P28	Touchscreen, IR and audio interface header
P32	PCI extension
P34	Power entry for low-power modules
P36	Module's second Ethernet
P37	Analog video input
P39	SATA connector
SW1	Reset button

7. Operating Temperature Ranges

The ATX baseboard is available with three options for operating temperature range:

Commercial	0^o to 70^o C
Extended	-20^o to 70^o C
Industrial	-40^o to 85^o C

The mating module should be ordered for the same or better temperature range. For example, it is useless to have an ATX baseboard manufactured for the industrial temp range with a module manufactured for commercial temp range. Such a combination is practically limited to the commercial temp range.