SB-iGLX
PC/104+ Single Board Computer

Reference Guide

Table of Contents

1. Revision Notes

Date	Description
26-Dec-2006	▪ Preliminary release
26-Dec-2007	▪ Added WiFi mentioning
11-Nov-2008	▪ Added errata regarding to CAN bus

2. Introduction

2.1. Highlights

- **Single Board Computer implemented by the combination of a CM-iGLX module and SB-iGLX baseboard**
- **Available in two form-factors:**
  - Standard PC/104+
  - PC/104+ with front panel
- **AMD Geode LX CPU @ 500 MHz**, **256 MB SDRAM, 512 MB Flash Disk**
- **SXGA graphics controller with connectors for a LCD panel and CRT monitor**
- **WLAN / WiFi 802.11g Interface**
- **Video input and encoder**
- **PCI and ISA bus expansions in PC/104+ format**
- **Two serial ports with RS232 / RS485 / RS422 / TTL driver options**
- **Host USB ports, including keyboard & mouse support**
- **Touchscreen interface**
- **Hard disk interface**
- **Sound I/O**
- **Single or dual 100 Mbps Ethernet ports**
- **CardBus slots**
- **CANbus interface**
- **RTC with lithium battery**
- **Switched power supply for telecom and automotive applications, 3.3V to 48V operating range**

Note: some of above specified features are optional

The SBC-iGLX is a standard PC/104+ compliant, single board computer. It is implemented by a CM-iGLX module providing most of the functions, and a SB-iGLX carrier board providing connectors and several additional functions. The rich feature set of the SBC-iGLX is customizable according to the price / performance targets of the user's application.

The unique mechanical design of the SBC-iGLX allows selecting between two popular form factors: either the standard PC/104+ with headers, or an extended PC/104+ with front panel connectors.

The SBC-iGLX contains PC/104+ expansion connectors which open it to the wide range of standard peripheral cards. Furthermore, the SBC-iGLX contains an electrical interface and slots for CardBus extension cards, which may be inserted and secured in the slot with no additional mechanical means, extending the system with capabilities such as a larger solid state disk, GPS or GSM modem.

2.2. Block Diagram

2.3.   Features

The "SB Option" column specifies the P/N code of SB-iGLX required for the particular feature. The "CM Option" column specifies the P/N code of CM-iGLX required for the particular feature. SB-iGLX content is the combination of features provided by the attached CM-iGLX and the features implemented on the SB-iGLX itself. To have the particular feature, both the CM and SB options of that feature must be implemented. "+" means that the feature is always available, regardless of P/N code.

Feature	Specification	SB Option	CM Option
CPU SDRAM Flash Disk	See Feature List of CM-iGLX module		
COM-A	Rx/Tx only, RS-232 levels, RJ11 or DB9 connector	+	+
COM-B	Rx/Tx only, RS-232/422/485 levels, 100-mil header	X	+
IDE	UDMA ATA-100 interface. 40-pin FPC connector.	+	+
Ethernet	One or two 10/100 Mb Ethernet ports, using Realtek RTL8139: - 1st port from CoM - 2nd port from the baseboard RJ-45 connector and activity LED's provided in two options: - From baseboard's front panel - Through FPC and optional extension module	+ E2 F1 +	E E
TFT Panel	TFT (digital RGB) panel interface. 40-pos FPC connector for direct interface to certain TFT panels	+	+
LVDS Panel	LVDS panel interface, through 100-mil header	L	+
CRT Monitor	Analog RGB interface for CRT and FP monitors, through DB15 on the front panel or through FPC and optional module	+	+
Video Input	Using SAA7113 video input processor	V	+
GPIO	up to 8 lines, on common 100-mil header	+	+
PCMCIA & CardBus	Slots with card guides, based on PCI1520 controller. Supports PCMCIA (16-bit) or CardBus (32-bit) standards, and card types I, II and III	C1 C2	+ +
Host USB	Three USB Host ports, 480 Mbps. Header for Type-A cable/connector. Two ports on front panel	+	+

Sound I/O Touch Panel	Wolfson WM9715L controller supporting distinct audio and touchscreen functions. Header for standard cable/connectors for Microphone (mono), Line input and Speakers (stereo). Touchscreen controller for resistive panels, pins on 100-mil header.	+	AT
PC104	Standard PC/104 connector and signals. Implemented using IT8888 PCI-ISA bridge	P	+
PC104+	PCI bus through standard PC/104+ connector	R	+
RTC Battery	Real time clock operated from on-board lithium battery	+	+
CAN Bus	CAN Bus controller and driver with galvanic isolation and DC separation	W	+

Electrical, Mechanical and Environmental Specifications

|	
Supply Voltage	High efficiency switched power supply. Support of sleep mode. Two supply options: - Regulated 3.3V or 5.0V (3.3V-only is applicable only if module doesn't contain "A" option) - Unregulated 12V to 48V, for telecom and automotive applications
Power Consumption	3W to 6W in full activity, depending on CPU speed and selected features. Below 200 mW in sleep mode
Dimensions	Without front panel - 96 x 91 mm With front panel - 111 x 91 mm Height ranges from 10 mm to 22 mm, depending on the connectors assembled. The height specified includes the CM-iGLX module.
Operation temp. (case)	Commercial : 0° to 70° C
	Extended : -20° to 70° C
	Industrial : -40° to 85° C
Storage temp.	-40° to 85° C
Relative humidity	10% to 90% (operation) 05% to 95% (storage)
Shock	50G / 20 ms
Vibration	20G / 0 - 600 Hz
MTBF	> 100,000 hours

3. Connector Description

The SB-iGLX uses the attached CM-iGLX module to implement most of the provided functions. For these functions, the SB-iGLX routes the signals from the CM-iGLX's miniature connectors to the standard connectors. Each function's description is therefore provided in the CM-iGLX Reference Guide. The section below describes only the external interface connectors. The subsequent section provides the specifications of those functions implemented on the SB-iGLX itself.

3.1. COM1 Connector (P15)

RJ-11 6-pin connector, compatible with a standard RJ-11-DB9 cable, provided by CompuLab. RS-232 levels. Rx/Tx only, other modem control lines are not available. This connector is available only with the front panel option.

Pin	Name	Pin	Name
1	NC	2	GND
3	COM1-TX	4	COM1-RX
5	GND	6	NC
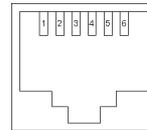
3.2. COM2 Header (P25)

2x5, 100 mil header, compatible with a standard DB9 cable/connector. RS-232/TTL levels. This connector is available only with the front panel option, as at physically resides on front panel part of the PCB.

Pin	Name	Pin	Name
1	NC	2	COM2-RX
3	COM2-TX	4	NC
5	GND	6	NC
7	NC	8	NC
9	NC	10	NC

3.3. CAN, USB, RS485/422 & GPIO Header (P21)

1x26, 100 mil header. USB pin assignment is directly compatible with standard cables/connectors.

Pin	Name	Pin	Name
01	VCC-USB4	14	CAN-L
02	USB4-N	15	CAN-GND-IN
03	USB4-P	16	GND
04	GND	17	COM2-4-TXP
05	PME-GPIO	18	COM2-4-TXN
06	TMR-OUT-GPIO	19	GND
07	LPC-DRQ-GPIO	20	COM2-4-RXP
08	PWRBTN	21	COM2-4-RXN
09	GND	22	DEBUG0*
10	VCC-RTC	23	GND
11	VCC5	24	SMB-DATA
12	CAN-VCC	25	SMB-CLK
13	CAN-H	26	GND

Notes

- DEBUG0 is used for fail-safe boot
- LPC-DRQ-GPIO is used for RS485/422 driver control. This signal can be used as a user GPIO if the RS485/RS422 driver isn't assembled or its functionality isn't needed in the particular application.
- There is bug fix for CAN interface. In schematics, page 7: signal TXD_INA should be connected to the U7-6 (instead U7-7) and signal RXD_OUTB – to the U7-7 (instead U7-6). Currently this bug must be manually fixed in every SB-iGLX card, in order to use CAN bus interface.

3.4. Audio, Touchscreen, VIP and Reset Header (P24)

1x18 100 mil header

Pin	Name	Pin	Name
1	IN-L*	10	TX-YM
2	GND	11	TX-XP
3	GND	12	TX-XM
4	IN-R	13	GND
5	OUT-L	14	VIP1
6	GND	15	GND

7	GND	16	VIP2
8	OUT-R	17	GND
9	TX-YP	18	RST-IN#

MIC-IN and IN-L signals are connected together; consequently, microphone recording and line-in recording can't be done simultaneously.

3.5. IDE – Hard Disk Interface (P23)

40-pin FPC connector, for IDE interface module available from CompuLab.

Pin	IDE signal	Pin	IDE signal
1	IDE-D8	21	IDE-D2
2	VCC5	22	IDE-D1
3	IDE-D9	23	GND
4	IDE-D10	24	IDE-D0
5	VCC5	25	IDE-CS0#
6	IDE-D11	26	GND
7	IDE-D12	27	IDE-IORDY
8	GND	28	IDE-IRQ
9	IDE-D13	29	IDE-IOW#
10	IDE-D14	30	GND
11	GND	31	IDE-A0
12	IDE-D15	32	IDE-IOR#
13	IDE-D7	33	GND
14	GND	34	IDE-CS1#
15	IDE-D6	35	IDE-DACK#
16	IDE-D5	36	IDE-A2
17	GND	37	GND
18	IDE-D4	38	IDE-A1
19	IDE-D3	39	IDE-DRQ
20	GND	40	PCI-RST#

3.6. CardBus / PCMCIA slots (P6, P7 and P5, P8)

These 68-pin PC Card slots conform to the CardBus and PCMCIA standards. They include card guides. The SB-iGLX can be assembled with either none, one or two PC Card slots. The 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	CardBus	Pin	PCMCIA	CardBus

	Name	Name		Name	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

PC-Card slot types:

- In single slot assembly, the slot can accommodate all types of PC-Cards - Type I, II or III.

- In dual slot assembly, the inner slot can accommodate Type I and II cards only, due to height limitations, while the outer slot can accommodate all types.

3.7. CRT / FPM Connector (P12)

A standard DB-15 connector is used to connect the CRT display directly. This connector is available only with the front panel option.

Pin	Name
1	RED
2	GREEN
3	BLUE
4	N/C
5	GND
6	GND
7	GND
8	GND
9	VCC3
10	GND
11	N/C
12	N/C
13	HSYNC
14	VSYNC
15	N/C

3.8. LCD Panel Connector (P16)

40-pin FPC connector for TFT panels

Pin	Name	Pin	Name
01	NC	21	VCC3
02	LCD-VDD-EN	22	NC
03	GND	23	NC
04	LCD-R0	24	GND
05	LCD-R1	25	NC
06	VCC3	26	LCD-B0
07	LCD-R2	27	VCC3
08	LCD-R3	28	LCD-B1
09	GND	29	LCD-B2
10	LCD-R4	30	GND
11	LCD-R5	31	LCD-B3
12	VCC3	32	LCD-B4

13	LCD-G5	33	GND
14	LCD-G4	34	LCD-B5
15	GND	35	LCD-DE
16	LCD-G3	36	VCC3
17	LCD-G2	37	LCD-LP
18	VCC3	38	LCD-FRM
19	LCD-G1	39	GND
20	LCD-G0	40	LCD-SCK

LCD-VDD-EN is an active low ENAVDD signal to be used in conjunction with the CONLCD-GEN-V2 adapter module, also available from CompuLab.

3.9. PC/104 connector (P10)

A PC/104 (ISA bus type) stackthrough connector. Provides full ISA functionality with minor exceptions. A PCI-to-ISA bridge is used to form an ISA interface.

Pin	PC/104 Signal	Pin	PC/104 Signal
A01	IOCHCHK#	B01	GND
A02	SD7	B02	RESETDRV
A03	SD6	B03	+5V
A04	SD5	B04	IRQ9
A05	SD4	B05	-5V
A06	SD3	B06	DRQ2
A07	SD2	B07	-12V
A08	SD1	B08	0WS#
A09	SD0	B09	+12V
A10	IOCHRDY	B10	KEY
A11	AEN	B11	SMEMW#
A12	SA19	B12	SMEMR#
A13	SA18	B13	IOW#
A14	SA17	B14	IOR#
A15	SA16	B15	DACK3#
A16	SA15	B16	DRQ3
A17	SA14	B17	DACK1#
A18	SA13	B18	DRQ1
A19	SA12	B19	REFRESH
A20	SA11	B20	SYSCLK
A21	SA10	B21	IRQ7
A22	SA9	B22	IRQ6
A23	SA8	B23	IRQ5
A24	SA7	B24	IRQ4

A25	SA6	B25	IRQ3
A26	SA5	B26	DACK2#
A27	SA4	B27	TC
A28	SA3	B28	BALE
A29	SA2	B29	+5V
A30	SA1	B30	OSC
A31	SA0	B31	GND
A32	GND	B32	GND

Pin	PC/104 Signal	Pin	PC/104 Signal
C00	GND	D00	GND
C01	SBHE#	D01	MEMCS16#
C02	LA23	D02	IOCS16#
C03	LA22	D03	IRQ10
C04	LA21	D04	IRQ11
C05	LA20	D05	IRQ12
C06	LA19	D06	IRQ15
C07	LA18	D07	IRQ14
C08	LA17	D08	DACK0#
C09	MEMR#	D09	DRQ0
C10	MEMW#	D10	DACK5#
C11	SD8	D11	DRQ5
C12	SD9	D12	DACK6#
C13	SD10	D13	DRQ6
C14	SD11	D14	DACK7#
C15	SD12	D15	DRQ7
C16	SD13	D16	+5V
C17	SD14	D17	MASTER#
C18	SD15	D18	GND
C19	KEY	D19	GND

Signals marked in [GRAY] are not supported
The functionality of the SB-iGLX's PC/104 bus has the following limitations:
- DMA is not supported, no software support for now.
- Supporting multiple bus masters is not enabled, no software support for now.
- Only the following inputs are supported: IRQ1, IRQ3, IRQ4, IRQ6, IRQ7, IRQ12.

3.10. PC/104+ PCI bus connector (P9)

A standard PC/104+ (PCI bus) connector. The CM-iGLX PCI bus lines are directly connected to the PC/104+ connector. All non-obvious connections are mentioned in notes.

Pin	Name	Notes	Pin	Name	Notes
A01	KEY2	N/C	B01	(reserved)	
A02	V I/O	3.3V	B02	AD02	
A03	AD05		B03	GND	
A04	CBE0#		B04	AD07	
A05	GND		B05	AD09	
A06	AD11		B06	V I/O	3.3V
A07	AD14		B07	AD13	
A08	+3.3V		B08	CBE1#	
A09	SERR#		B09	GND	
A10	GND		B10	PERR#	
A11	STOP#		B11	+3.3V	
A12	+3.3V		B12	TRDY#	
A13	FRAME#		B13	GND	
A14	GND		B14	AD16	
A15	AD18		B15	+3.3V	
A16	AD21		B16	AD20	
A17	+3.3V		B17	AD23	
A18	IDSEL0	AD15 via 150R	B18	GND	
A19	AD24		B19	CBE3#	
A20	GND		B20	AD26	
A21	AD29		B21	+5.0V	
A22	+5.0V		B22	AD30	
A23	REQ0#	PCI-REQ2_A#	B23	GND	
A24	GND		B24	REQ2#	N/C
A25	GNT1#	N/C	B25	V I/O	3.3V
A26	+5.0V		B26	CLK0	
A27	CLK2		B27	+5.0V	
A28	GND		B28	INTD#	PCI-INTA#
A29	+12V		B29	INTA#	PCI-INTB#
A30	-12V	N/C	B30	(reserved)	

| Pin	Name	Notes	Pin	Name	Notes
C01	+5.0V		D01	AD00	
C02	AD01		D02	+5.0V	
C03	AD04		D03	AD03	
C04	GND		D04	AD06	
C05	AD08		D05	GND	
C06	AD10		D06	M66EN	GND
C07	GND		D07	AD12	
C08	AD15		D08	+3.3V	
C09	SB0#	Pullup	D09	PAR	
C10	+3.3V		D10	SDONE	Pullup
C11	LOCK#	Pullup	D11	GND	
C12	GND		D12	DEVSEL#	
C13	IRDY#		D13	+3.3V	
C14	+3.3V		D14	CBE2#	
C15	AD17		D15	GND	
C16	GND		D16	AD19	
C17	AD22		D17	+3.3V	
C18	IDSEL1	AD16 via 150R	D18	IDSEL2	AD17 via 150R
C19	V I/O		D19	IDSEL3	AD18 via 150R
C20	AD25		D20	GND	
C21	AD28		D21	AD27	
C22	GND		D22	AD31	
C23	REQ1#	N/C	D23	V I/O	
C24	+5.0V		D24	GNT0#	PCI-GNT2_A#
C25	GNT2#	N/C	D25	GND	
C26	GND		D26	CLK1	
C27	CLK3		D27	GND	
C28	+5.0V		D28	RST#	
C29	INTB#	PCI-INTC#	D29	INTC#	PCI-INTD#
C30	(reserved)		D30	KEY2	N/C

Note

PCI-REQ2_A# / PCI-GNT2_A# are shared with the ISA bridge. Since the ISA bridge almost never uses these signals – they are always available except in cases in which the ISA bridge is specially programmed to be PCI bus-master. There is a resistor that prevents hardware contention on the REQ signal; therefore, these signals can be used on the PC/104+ interface even when the ISA bridge is assembled.

3.11. USB Connector (U11)

A standard dual USB Type-A stacked connector. It is used for USB01 and USB02 interfaces.

USB interface 1		USB interface 2	
Pin	Name	Pin	Name
1	VBUS	5	VBUS
2	USB1-N	6	USB1-N
3	USB1-P	7	USB1-P
4	GND	8	GND
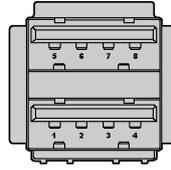
3.12. LVDS & GPIO (P17,P18)

2x5, 100 mil headers for LVDS and GPIO signals. These two connectors form together one 2x10 100mil header.

P17

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

P18

Pin	Name	Pin	Name
1	LVDS-N3	2	LVDS-P3
3	RESERVED	4	GPIO3
5	RESERVED	6	GPIO2
7	RESERVED	8	GPIO1
9	RESERVED	10	GPIO0

Notes:

- LVDS-N3, LVDS-P3 reserved for 24-bit mode, currently not used.
- Pins 3,5,7,9 must be left unconnected.

3.13. Ethernet Port 1 & 2 (P13 & P14)

A standard RJ45 connectors. P13 provides an interface for the first Ethernet port available in the CM-iGLX module, while P14 connector provides an interface for an Ethernet port implemented on the SB-iGLX board.

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

3.14. Ethernet Interface FPC Connector (P11)

The Ethernet interface FPC connector substitutes for the front panel Ethernet connectors when the front panel is not available. It can be used only if the front panel connectors are not assembled. It provides two separate groups of signals, one per Ethernet port available in the CM-iGLX / SB-iGLX system. The first port (ETH1) is implemented on the CM-iGLX and the second, on the SB-iGLX.

| Pin	Name	Pin	Name
1	ETH1-LINK10#	11	NC
2	ETH1-RDP	12	ETH2-TDP
3	ETH1-RDN	13	ETH2-TDN
4	ETH1-LINK10#	14	NC
5	ETH1-LINK100#	15	ETH2-ACT#
6	ETH1-ACT#	16	ETH2-LINK100#
7	NC	17	ETH2-LINK10#
8	ETH1-TDN	18	ETH2-RDN
9	ETH1-TDP	19	ETH2-RDP
10	NC	20	ETH2-LINK10#

The connector is designed for the connection of 20-wire FPC cable. The FPC connects it to the RJ-45 interface module, which includes one or two RJ-45 connectors, transformers and activity LED's. The module with one or two RJ-45 connectors is available from CompuLab.

The default settings of activity LED's for both interfaces are specified in the table below. Settings can be changed by software.

LED0	RX/TX
LED1	Link 100
LED2	Link 10

Note: LED signal wires in the flat cable are also used as secondary shielding, so their locations on the header may appear non-obvious.

The LED signal connections as implemented in CompuLab's RJ-45 interface module are:
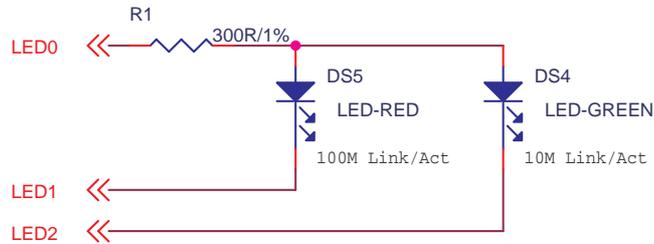
This connection supplies complete information about speed / link / activity.

LED-RED: 100 Mbps activity indicator
LED-GREEN: 10 Mbps activity indicator

Activity	LED (Red/Green)
none	off
Link (only)	on
Tx / Rx (and Link)	blink

3.15. VGA & COM1 FPC Connector (P19)

The VGA & COM1 FPC connector provides two separate groups of signals, one for the COM1 port and another for the VGA (analog RGB) output provided by the CM-iGLX. Due to relatively low noise sensitivity of signals provided by this connector, it can be used both when the front panel is available and when it is not.

Pin	Name	Pin	Name
1	NC	11	HSYNC
2	COM1-RX	12	GND
3	COM1-TX	13	VSYNC
4	NC	14	GND
5	GND	15	BLUE
6	NC	16	GND
7	NC	17	GREEN
8	NC	18	GND
9	NC	19	RED
10	GND	20	GND

The connector is designed for the connection of 20-wire FPC cables. The FPC connects it to the DB9/DB15 interface module, which includes a COM port standard DB9 connector and a standard VGA DB15 connector. A DB9/DB15 interface module is available from CompuLab. Individual modules with separate DB9 and DB15 connectors are also available.
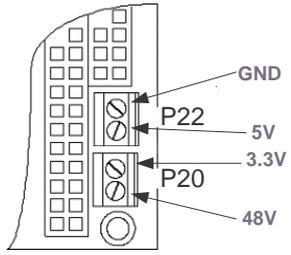
3.16. Power Connector (P22 & P20)

P22: The 2-node terminal block is used as a main power connector.

Pin	Name
1	VCC5
2	GND

P20: The 2-node terminal block is used as a low and high voltage power connector.

Pin	Name
1	12V-48V
2	3.3V

4. Functions Implemented on the SB-iGLX

Most of the functions are implemented by the attached CM-iGLX module, while the SB-iGLX board provides relevant connectors or headers. Several additional functions are implemented on the SB-iGLX itself and are described in this section.

4.1. PC/104 Interface and PCI to ISA Bridge

The SB-iGLX provides PC/104 support with almost full ISA functionality, including 8/16 bit I/O and memory access cycles, wait state insertion for slow devices, automatic configuration of bus width (IOCS16#/MEMCS16#), system memory access while accessing memory in the low 1MB of address space (SMEMR#/SMEMW#) and ISA interrupts. The ISA interface has some limitations:

- No ISA DMA support
- No ISA bus mastering support
- Only the following interrupts are supported: IRQ1,IRQ3, IRQ4, IRQ6, IRQ7, IRQ12

In order to implement an ISA interface, the PCI-to-ISA bridge (IT8888G) is used. The bridge is optional and is assembled always together with PC/104 connector assembling.

The PCI-to-ISA bridge maps part of the PCI access ranges to the ISA bus. The default configuration is performed by CM-iGLX's BIOS. Default ISA IO ranges: 0x300-0x31F & 0x8000-0x80FF. The default ISA memory range is mapped at system address range 20000000-200FFFFF and is reflected on the PC/104 bus as address range 0x000000-0x0FFFFF.

The customer can change the existing ranges and add new ones by software. Up to six independent IO ranges and four independent memory ranges are available.

4.2. Dual PC-Card Controller

The SB-iGLX implements a dual PC Card interface using a Texas Instruments PCI1520 controller. The PC Card controller and slots are optional, according to the SB-iGLX configuration. The PCI1520 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 32-bit data transfers at 33 MHz. The SB-iGLX supports any combination of PCMCIA and CardBus PC Cards in the two sockets, powered by 5V or 3.3V as required.
The controller is compliant with the PCI 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 PCI1520 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.

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 the CM-iGLX module's BIOS and is supported by all operating system packages. Booting from a PCMCIA ATA card or Compact Flash card with CF-PCMCIA adapter is also supported. In this case, the card is configured to emulate master HDD on the secondary IDE interface.

4.3. 10/100 Mbit Ethernet Port

The SB-iGLX contains one full-featured, optional 10/100 Mbit Ethernet port. This is in addition to the optional Ethernet port contained in the CM-iGLX module. The user can therefore order the iGLX CM/SB system with none, one or two Ethernet port(s). The Ethernet interface is based on the Realtek RTL8139 MAC/PHY component. In functional terms, it is identical to the Ethernet port available on the CM-iGLX. Please refer to the CM-iGLX Reference Guide for details.

The Ethernet port's interface to the external world is through the standard RJ-45 connector if the front panel is assembled. When the front panel is not available – it interfaces via 20-pin FPC connector P11. The appropriate FPC cable and RJ-45 module are available from CompuLab.

Note: the operating system assigns the CM-iGLX's Ethernet to be Port0 and the SB-iGLX's Ethernet, Port1.

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

The CM-iGLX module has on-board RS-232 drivers for COM1 port. COM2 port of the CM-iGLX have TTL level interface. The SB-iGLX adds two driver options for the COM2 port. The interface of the COM2 port can be either RS-232 or RS-422/485 or both, controlled by assembling the appropriate driver chips. Assembling is done according to SB-iGLX's configuration code: [none] - drivers are not assembled, "X2" - only RS-232 drivers assembled, "X4" - only RS422/485 drivers assembled, "X6" - both RS-232 and RS-422/485 drivers assembled. The RS-232 option is available only with the front panel, because interface header is located there.

RS-422 and RS-485 modes of COM2

The SB-iGLX contains RS-422/485 drivers when its configuration code includes the "X4" or "X6" option. In the case of the "X6" option, when both RS-232 and RS422/485 drivers are present, the SB-iGLX will automatically switch into RS-232 mode on the presence of valid voltage levels on the RS-232 RX input. In the absence of valid input, the card will switch to RS-422/485 mode.

In RS-422/485 modes, TXD outputs of the COM2 port are enabled by the LPC-DRQ-GPIO signal. LPC-DRQ-GPIO "1" level enables TX output, LPC-DRQ-GPIO "0" disables it.

In RS-485 (half duplex) mode, both transmit and receive operations are performed on TX lines. To achieve this, the user must physically connect the 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 LPC-DRQ-GPIO.

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 LPC-DRQ-GPIO has no practical effect on system operation. RX and TX lines should not be connected together as in the case of RS-485.

4.5. CAN bus interface

The SB-iGLX implements a CAN bus interface consisting of a Phillips SJA1000 CAN controller with CAN2.0B and PeliCAN support in addition to the BasicCAN standard interface, dual channel digital isolator and physical driver. CAN bus signals are available on P21 connector.

Key features of the CAN bus interface:

- PCA82C200 mode (BasicCAN mode is the default)
    - Extended receive buffer (64-byte FIFO)
- CAN 2.0B protocol compatibility (extended frame passive in PCA82C200 compatibility mode)
- Supports 11-bit identifier as well as 29-bit identifier
- Bit rates up to 1 Mbits/s
- PeliCAN mode extensions:
    - Error counters with read/write access
    - Programmable error warning limit
    - Last error code register
    - Error interrupt for each CAN-bus error
    - Arbitration lost interrupt with detailed bit position
    - Single-shot transmission (no re-transmission)
    - Listen only mode (no acknowledge, no active error flags)
    - Hot plugging support (software driven bit rate detection)
    - Acceptance filter extension (4-byte code, 4-byte mask)
    - Reception of its 'own' messages (self-reception request)
- Fully compatible with the "ISO 11898" standard
- High speed (up to 1 Mbaud)
- Very low ElectroMagnetic Emission (EME)
- Differential receiver with wide common-mode range for high ElectroMagnetic Immunity (EMI)
- An unpowered node does not disturb the bus lines
- Transmit Data (TXD) dominant time-out function
- Silent mode in which the transmitter is disabled
- Bus pins protected against transients in an automotive environment
- Input levels compatible with 3.3 V and 5 V devices
- Thermally protected

- Short-circuit proof to battery and to ground
- At least 110 nodes can be connected

A DC-DC converter isn't implemented, but the user can supply his own CAN-VCC (P21-12) in range 3.3V-5V, and CAN-GND-IN (P21-15) in case of full electrical isolation, or a simple jumper connect of CAN-VCC (P21-12) to the VCC5 (P21-11) and CAN-GND-IN (P21-15) to the GND (P21-16) if your CAN bus does not carry its own isolated supply voltage.

4.6. Power Supply Options

Supply voltage options are:

Regulated 3.3V and 5.0V
3.3V and 5V can be supplied via the power connectors or the PC/104+ connector, directly to board's components, bypassing on-board converters.

Regulated 5V only
In this case, 3.3V is generated on-board, by a step-down converter. The 5V (if required on-board) is routed directly to relevant components. On-board converter has excessive current capability, to supply extender cards, like PC/104+ or PCMCIA. These are allowed to draw up to 3A from 3.3V.

Unregulated 12V-48V
Card can be powered by unregulated voltage in 12V to 48V range. The "S" option in card's part number controls the assembly of a versatile step-down switching converter. The converter delivers a regulated 5V supply to the system, which is then passed to the second 5V-3.3V converter. Connector P20 should be used for high-voltage DC input.

4.7. Video Input Processor

The SB-iGLX baseboard contains a Philips SAA7113H - 9-bit video input processor which receives analog video input (composite) and converts it to CCIR656/601 format in order to transfer the video data to the module's Video Input Port.
The video input processor is a combination of a two-channel analog preprocessing circuit including a source selecting, anti-aliasing filter and ADC, an automatic clamp and gain control, a Clock Generation Circuit (CGC), a digital multi-standard 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 multi-standard 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 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 (ADC's), 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 videotape signals.

4.8. Front Panel

The SB-iGLX contains the extension with standard PC connectors such as Ethernet, COM port, USB and VGA. This extension is called the Front Panel. It can be removed from the SB-iGLX before or after the SB-iGLX is fully assembled. When the front panel is removed, the SB-iGLX remains fully functional and the functions that were available via the final connectors on the front panel will remain available on 20-pin FPC connectors P11 and P19. The one exception is the COM2 port RS-232 interface. It is available only on the front panel.

Without front panel, the SB-iGLX is fully compatible with the PC/104+ form factor.

5. Connector Location

SB-iGLX Top side

P5

▽

P6

▽

P10

P9

P19
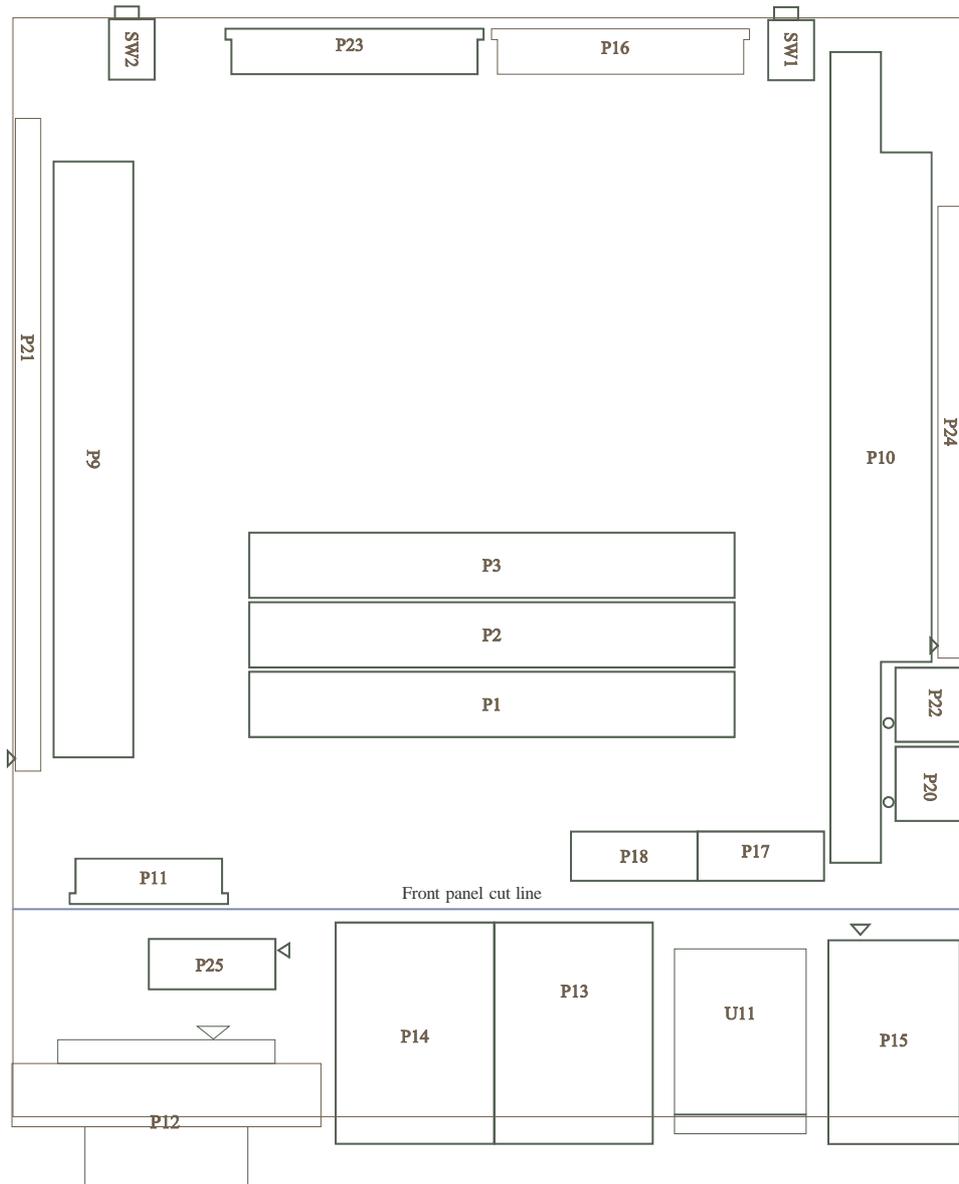
Front panel cut line
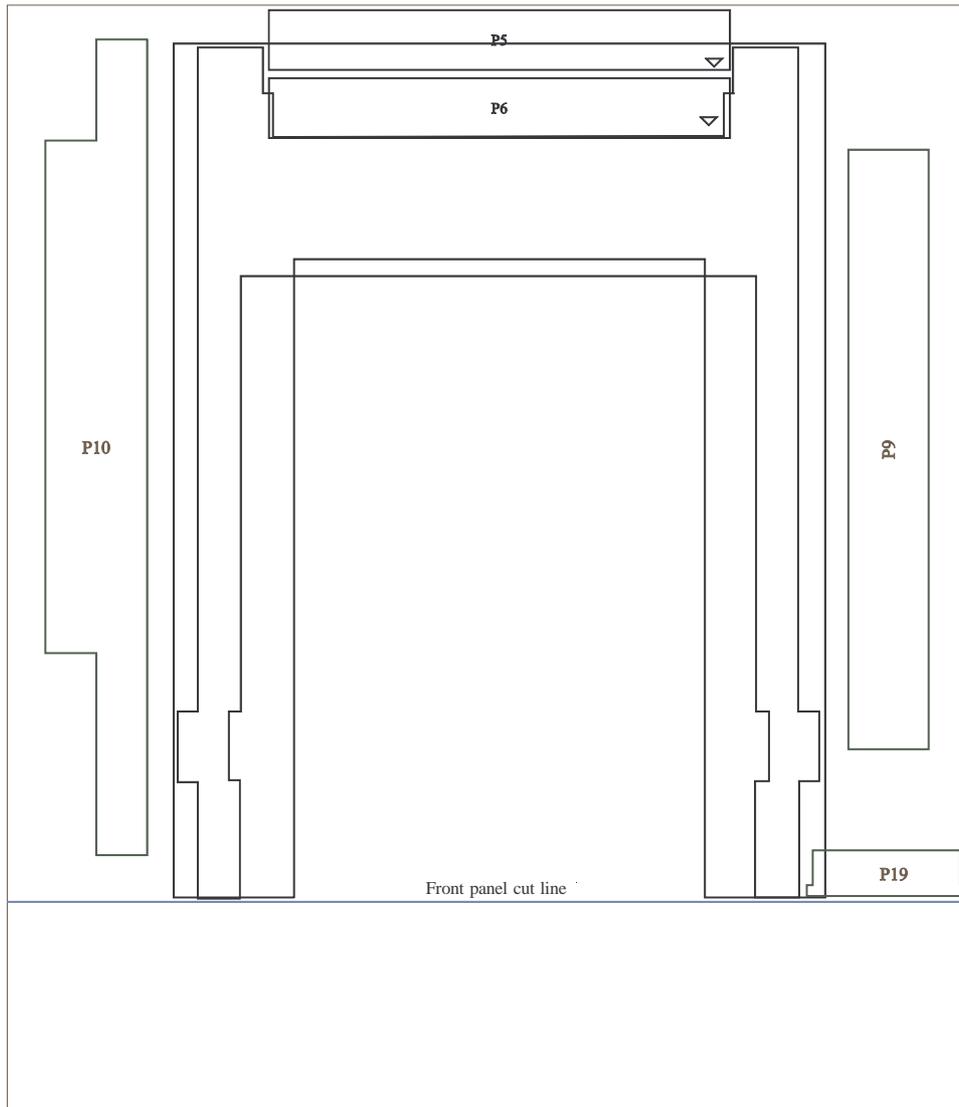
SB-iGLX Bottom side (bottom view)

<u>**Reference**</u>

P1, P2, P3	CM-iGLX CAMI mating connectors
P6+P7	PC-Card socket A
P5+P8	PC-Card socket B
P9	PC/104+ PCI bus connector
P10	PC/104 (Sub-ISA) connector
P11	Ethernet Interface FPC connector
P12	CRT connector
P13	CM-iGLX Ethernet
P14	SB-iGLX Ethernet
P15	COM1 connector
P16	LCD connector
P17	LVDS connector (Pair 0,1,2 & clock)
P18	LVDS connector(pair 3) +GPIO(0,1,2,3)
P19	COM1 + CRT interfaces FPC connector
P20	High voltage power connector
P21	USB, COM2 RS-422/485 , GPIO, VBAT , CAN, Power button , SMB
P22	5V Power connector
P23	IDE FPC connector
P24	Audio, Touchscreen, VIP, Reset
P25	COM2 RS-232 Header
U11	USB connector
DS5	Power LED
DS6	Standby LED
SW1	Reset Switch
SW2	Power button

6. Operating Temperature Ranges

The SB-iGLX is available with three options of operating temperature range:

Commercial	0° to 70° C
Extended	-20° to 70° C
Industrial	-40° to 85° C

The cards' manufacturing and certification method for each option is explained in the "Operating Temperature Ranges" section of the CM-iGLX Reference Guide.

The mating CM-iGLX module should be ordered for the same as or better temperature range as of the SB-iGLX. For example, it has no value to use a SB-iGLX manufactured for industrial temp range with a CM-iGLX manufactured for commercial temp range. Such a combination is practically limited to the commercial temp range.