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# CL9

Celeron® M / Pentium® M
3U CompactPCI® SBC

Hardware User's Manual
Edition 1.5

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CL9 Hardware User's Manual

This manual applies to the CL9 Celeron PC/AT Compatible 3U CompactPCI® Single Board Computer hardware revision 1.0 and above until supersede by a higher revision.

| Revision | Date | By | Chapter | Comments |
|---|---|---|---|---|
| 0.1 | 15. Nov. 2004 | EH | All | First release |
| 1.0 | 27. Jan. 2005 | EH | Introduction<br>Appendix A Connectors | Add Audio<br>Insert warning |
| 1.1 | 1. Sept. 2005 | EH | Connectors | \PRST renamed into \RST_BUT<br>Missing GPIO7 added |
| 1.2 | 21. Oct. 2005 | EH | USB Interfaces P2005, P1680 and P1681 | P2005: USB 2 and 3 removed (not longer available with CL9-IO V1.x). USB 1 added depending on the version of CL9 |
| 1.3 | 3. April 2006 | HHS | All | Update style and spelling<br>New logo, disclaimers, support warranty<br>add chapters C & D, C is now E<br>add Chinese address in Chinese characters<br>exchange some pictures<br>edit corrections<br>add note on altitude |
| 1.4 | 10. May 2006 | MF | All | Minor cosmetic changes |
| 1.5 | 17. May 2006 | HHS | | Correct China address<br>Checked GPIO7 on J7002 |
| 1.5 | 23. May 2007 | HHS | | Inser changes from 'Korrektur Format' |
| | | HHS | Support | Updated list of web site addresses |
| | | HHS | Title | Change title, header and footer |
| | | HHS | All | Cosmetic changes & changes from 'Korrektur Formular' |
| | | HHS | All | Cosmetic changes |
| | | HHS | Page 5 | Insert Waste Disposal (WEEE) info |
| | | HHS | Update | Unpacking & Installation chapters |
| | | HHS | Chapter 3 | Remove last paragraph in chapter 3 and in 'General Advisories' |
| | | MF | Chapter 7 | Temperature diagrams updated |
| | | HHS | J7002 & P1800 | Add info about USB_P1 & cosmetic changes |
| | | HHS | All | Cosmetic changes for PDF release<br>insert odd page breaks |
| | | HHS | All | Change Revision to Edition, otherwise same as previous could not save (write-protected) |
| | | | Chapter 7 | Inserted heat sink diagram |
| | | HHS | Chapter 4 | Inserted DVO connector |



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| | | |
|---|---|---|
| MF | Intro | Insert CE conformance text |



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Any operational system with cables for I/O signals, connectivity or peripheral devices provides an entry point for ESD and EMI. If SBS does not manufacture the complete system, including enclosure and cables, it is the responsibility of the system integrator and end user to protect their system against potential problems. Filtering, optical isolation, ESD gaskets and other measures might be required at the physical point of entry (enclosure wall of box or rack). For example it is state-of-the-art that protection can not be done at the internal



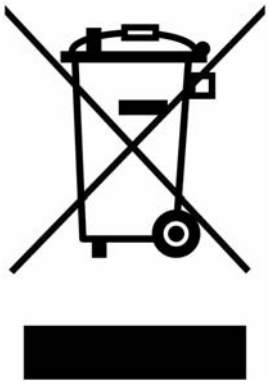
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connector of an RTM if a cable is attached and routed outside the enclosure. It has to be done at the physical entry point as specified above.

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SBS have tested their boards using their own card cages (chassis). Test results of these tests are available upon request.

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# . Welcome

The CL9 CompactPCI Single Board Computer is a fully IBM-AT compatible stand-alone PC equipped with numerous functions and add-on features on a minimum board size. This technical manual is designed to provide information regarding the general usage and application of the CL9 CompactPCI Single Board Computer. The hardware design is also outlined.

Chapter 1 gives a brief overview of the functions, features and devices of the CL9.
Chapter 2 and 3 illustrate unpacking and installation procedures.
Chapter 4 describes all onboard and panel interfaces with pin assignments.
Chapter 5 contains notes on system resources.
Chapter 6 lists details of function blocks.
Chapter 7 outlines electrical, mechanical and environmental specifications.

A number of expansion and add-on products are available for the CL9. The CL9-IO extension card and CTM15 transition modules as well as the TMDS3 and SBP4 modules are described in appendices to this manual.
Please observe all safety instructions when handling SBS products as given in the unpacking and installation chapters.

The following documents also cover items relevant to the CL9 CompactPCI Single Board Computer. All documents will be included as files on the Technical Product Information CD-ROM.

- AMI-BIOS for CL9 User's Manual
- CL9 Board Specific Hardware Programmer's Manual
- AMI-BIOS errors & beep codes



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### Typographic Conventions

This manual uses the following notation conventions:

- *Italics* (sometimes additional in *blue* color) emphasize words in text or documentation or chapter titles or web addresses if underlined.
- Hexadecimal values (base 16) are represented as digits followed by “h”, for example: 0C**h**.
- Hexadecimal values (base 16) are represented as digits preceded by “H”, for example: **H**0C.
- Hexadecimal values (base 16) are represented as digits preceded by “$”, for example: **$**0C.
- Binary values (base 2) are represented as digits followed by “b”, for example 01**b**
- The use of a “#” (hash) suffix to a signal name indicates an active low signal. The signal is either true when it is at a logic zero level (voltage close to 0 V) or the signal initiates actions on a high-to-low transition.
- The use of a “\” (backslash) prefix to a signal name indicates an active low signal. The signal is either true when it is at a logic zero level (voltage close to 0 V) or the signal initiates actions on a high-to-low transition.
- Text in `Courier` font indicates a command entry or output from an SBS embedded PC product using the built-in character set.
- Notes, warning symbols and cautions call attention to essential information.

## Product Properties

### Certification

The product or products described in this technical manual cannot be operated by themselves. They are components for integration into operational systems or add-ons to such systems. The products have been designed to meet relevant regulatory standards like FCC and CE. As mandated by these standards conformance to these standards can only be certified for complete operational systems. This has to be done by the end-user or by the systems integrator in their operational systems. SBS Technologies have tested some products in their own systems. Upon request information is available which products have been tested and about the specific environment under which SBS has tested these components.

### Altitude

Altitude, air pressure and ambient temperature influence the thermal operation of the components described in this manual. They have been developed and tested at about 500 m (1650 ft.) above sea level at a typical ambient temperature of 20 °C (68 °F). Because of only marginal variations within a limited range of altitudes these products operate as specified within altitudes from sea level to 1000 m (3300 ft.). SBS Technologies can assist the user of these components in planning operation outside this altitude range upon request.



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### Options

This manual describes the basic product plus all options. Your product may not have all options implemented. Please verify with your purchase contract which options are implemented. Descriptions of options which are not implemented obviously do not apply to your product.

## Support, Service and Warranty

The manufacturer grants the original purchaser of SBS products a warranty of 24 months from the date of delivery. For details regarding this warranty refer to Terms & Conditions of the initial sale.

Please see chapter ‘Support, Service, and Warranty Information’ on page 96 for further details on repairs and product support.

For support on the web and product information, visit our website at http://www.sbs.com



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# Contents


| | | |
|---|---|---|
| | **Legal Information** | **4** |
| | Legal Disclaimers | 4 |
| | Regulatory compliance | 5 |
| | ESD/EMI issues | 5 |
| | Waste Disposal | 6 |
| | **Corporate addresses** | **7** |
| . | **WELCOME** | **9** |
| | Typographic Conventions | 10 |
| | **Product Properties** | **10** |
| | Certification | 10 |
| | Altitude | 10 |
| | Options | 11 |
| | **Support, Service and Warranty** | **11** |
| . | **CONTENTS** | **13** |
| CHAPTER 1 | **INTRODUCTION** | **21** |
| | Board Design | 22 |
| | Design Features | 24 |
| CHAPTER 2 | **UNPACKING AND INSPECTION** | **26** |
| | **Delivery Volume** | **26** |




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**Available Accessories** **26**

**ESD** **27**

**Warning** **28**

**Initial Inspection** **28**

**Unpacking and Handling** **28**

CHAPTER 3 **INSTALLATION** **30**

**Installation** **30**

**General advisories** **30**

Advice on CompactPCI products 30

Batteries 31

Advice on Batteries 32

**Initial Power-On Operation** **32**

**Entering the BIOS SETUP** **32**

**Minimum System Requirements** **33**

CHAPTER 4 **INTERFACES** **34**

**Front Panel Interfaces** **35**

**CL9 Connectors** **37**

CPCI connector reference 37

CompactPCI bus Connector J7001 and J7002 38

Extension Connector P1800 39

Ethernet Interface U5600 and U5610 40

VGA Interface P4000 42

Digital Video Output (DVO) to DVI-D Connector 43

USB Interfaces P1680 45

Serial Port COM1/2 46

CHAPTER 5 **RESOURCES** **48**

**Memory Map** **48**

**Register Set** **48**

Standard Register Set 49



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**Interrupts** **50**

**APIC Controller** **50**

CHAPTER 6 **FUNCTION BLOCKS** **52**

**Processor** **52**

**Memory Controller** **52**

**Standard AT Devices** **52**

**Interrupt Controller** **53**

**Timer** **53**

**Real Time Clock** **54**

**EIDE Interface** **54**

**Serial ATA Interface** **54**

**Serial Interface** **54**

**USB Interface** **55**

**Graphics Controller** **55**

Software Installation 55

**Ethernet Interface** **55**

Software Installation 55

**Additional devices** **56**

SMBus devices 56

Temperature Sensor LM83 56

Serial EEPROM 56

Power Management Event 56

ENUM# 57

General Purpose IO 0-7 57

Watchdog, Power fail Monitor 57

LEDs 58

Reset Button 60

Speaker 60

CHAPTER 7 **SPECIFICATIONS** **61**



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**Power Consumption** **61**

**Onboard Lithium Battery** **62**

**External Battery Input** **63**

**Environment Conditions** **63**

Heat sink **Error! Bookmark not defined.**

**Electrical Characteristics** **64**

FUSE_VCC 64

General Purpose IO 0-7 64

Isolation 65

**Placement Plan Component Side CL9 V1** **66**

**Placement Plan Solder Side CL9 V1** **67**

**Electrical Characteristics** **68**

Audio Line Input (SPB4 Audio Module, P2901) 68

Audio Line Output (SPB4 Audio Module, P2902) 68

APPENDIX A **EXTENSION CARD CL9-IO** **69**

**CL9-IO Interfaces** **70**

Extension Connector P1800 70

USB Interfaces P1680 72

Serial Port COM1/2 P2200/P2001/P2002/P2003 73

2.5” Hard Disk Connectors P1900 74

Compact Flash Connectors P1802, P1803 75

Speaker 76

**Placement Plan CL9-IO** **77**

APPENDIX B **TRANSITION MODULE CTM15** **78**

**CTM15 Interfaces** **79**

USB Interfaces P2005, P1680 and P1681 79

Serial Interfaces COM1 (P2200) and COM2 (P2201/P2203) 81

VGA Interface P4001 82

Misc. connector P8100 84

Serial ATA Connectors P8000, P8001 84

Power connectors P1100, P1101, P1102 85



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**Placement Plan CTM15** **86**

APPENDIX C **DVO TO DVI CONVERTER TMDS3** **87**

TMDS3 Interfaces 88

DVO interface (P1000) 88

DVI-D interface (P1001) 89

**Placement Plan TMDS3** **90**

APPENDIX D **AUDIO MODULE SPB4** **91**

SPB4 Interfaces 92

AC97 link interface (P2900) 92

Audio in-/outputs (analogue in-/outputs only, P2904) 92

Line Input (P2901) 93

Line Output (P2902) 93

S/PDIF Output (P2903) 94

**Placement Plan SPB4** **94**

APPENDIX E **SUPPORT, SERVICE** **95**

**Technical Support** **95**

**Support on the Web** **96**

**Warranty** **96**

**Repairs** **97**

Warranty Repairs 97

Non-Warranty Repairs 97

Procedure 97

Obtaining an RMA Number 98

Shipping the Product 98

**Error Report Form** **100**



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# LIST OF FIGURES


FIGURE 1: DOUBLE WIDTH CL9 BOARD ..... 21
FIGURE 2: SINGLE WIDTH CL9 BOARD ..... 22
FIGURE 3: BLOCK DIAGRAM OF CL9 ..... 23
FIGURE 4: PACKAGING MATERIAL ..... 29
FIGURE 5: BOARD HANDLING ..... 29
FIGURE 6: BOARD IN CARD CAGE ..... 32
FIGURE 7: BOARD PHOTO SHOWING CONNECTORS ..... 34
FIGURE 8: SINGLE WIDTH FRONT PANEL ..... 35
FIGURE 9: DOUBLE WIDTH FRONT PANELS ..... 36
FIGURE 10: EXTENSION CONNECTOR P1800 ..... 39
FIGURE 11: ETHERNET CONNECTORS ..... 41
FIGURE 12: ETHERNET CONNECTOR LAYOUT ..... 41
FIGURE 13: VGA CONNECTOR ..... 42
FIGURE 14: DVO CONNECTOR ..... 43
FIGURE 15: USB CONNECTOR ..... 45
FIGURE 16: USB CONNECTOR LAYOUT ..... 46
FIGURE 17: SERIAL PORTS ..... 46
FIGURE 18: LEDS ..... 58
FIGURE 19: RESET BUTTON ..... 60
FIGURE 20: HEAT SINK DIAGRAM ..... 64
FIGURE 21: PLACEMENT DIAGRAM COMPONENT SIDE ..... 66
FIGURE 22: PLACEMENT DIAGRAM SOLDER SIDE ..... 67
FIGURE 23: CL9-IO INTERFACES ..... 70
FIGURE 24: USB AT EXTENSION BOARD ..... 72
FIGURE 25: USB CONNECTOR LAYOUT ..... 72
FIGURE 26: SERIAL PORTS ..... 73
FIGURE 27: PLACEMENT PLAN CL9-IO ..... 77
FIGURE 28: TRANSITION MODULE CTM15 ..... 78
FIGURE 29: LAYOUT OF TRANSITION MODULE ..... 79
FIGURE 30: USB AT TRANSITION MODULE ..... 80
FIGURE 31: USB CONNECTOR LAYOUT ..... 81
FIGURE 32: COM AT TRANSITION MODULE ..... 81
FIGURE 33: VGA AT TRANSITION MODULE ..... 83
FIGURE 34: PLACEMENT PLAN CTM15 ..... 86
FIGURE 35: PHOTO OF DVO TO DVI CONVERTER TMDS3 ..... 87
FIGURE 36: DVO TO DVI CONVERTER TMDS3 INTERFACES ..... 88
FIGURE 37: DVI CONNECTOR ..... 89
FIGURE 38: PLACEMENT PLAN TMDS3 ..... 90
FIGURE 39: PHOTO OF AUDIO MODULE SPB4 ..... 91
FIGURE 40: AUDIO MODULE SPB4 INTERFACES ..... 92
FIGURE 41: LINE INPUT CONNECTOR ..... 93
FIGURE 42: LINE OUTPUT CONNECTOR ..... 93
FIGURE 43: FRONT PANEL AUDIO CONNECTORS ..... 94
FIGURE 44: PLACEMENT PLAN SPB4 ..... 94




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# LIST OF TABLES


TABLE 1: BOARD STYLES ..... 25
TABLE 2: DELIVERY VOLUME ..... 26
TABLE 3: ACCESSORY OPTIONS FOR CL9 ..... 27
TABLE 4: CL9 CONNECTORS ..... 37
TABLE 5: CPCI CONNECTORS J7001 AND J7002 ..... 38
TABLE 6: SIGNAL GROUPS ..... 39
TABLE 7: EXTENSION CONNECTOR P1800 ..... 40
TABLE 8: ETHERNET PIN ASSIGNMENTS ..... 41
TABLE 9: LED FUNCTIONS ..... 42
TABLE 10: CONNECTOR VGA P4000 ..... 42
TABLE 11: CONNECTOR P1300 ..... 44
TABLE 12: DVI CONNECTOR ..... 45
TABLE 13: USB CONNECTOR ..... 46
TABLE 14: MEMORY MAP ..... 48
TABLE 15: REGISTER ADDRESS RANGES ..... 49
TABLE 16: INTERRUPT ASSIGNMENTS ..... 50
TABLE 17: TIMER 8254 FUNCTIONS ..... 53
TABLE 18: AVAILABLE OPERATING SYSTEMS ..... 55
TABLE 19: SMBUS DEVICES ..... 56
TABLE 20: POWER MANAGEMENT EVENTS ..... 57
TABLE 21: BIOS STATUS LED INDICATION ..... 59
TABLE 22: REAR I/O LED INDICATION ..... 59
TABLE 23: USER LED INDICATION ..... 60
TABLE 24: POWER CONSUMPTION ..... 62
TABLE 25: ESTIMATED LIFE TIME ..... 62
TABLE 26: TEMPERATURE AND HUMIDITY CONDITIONS ..... 63
TABLE 27: SHOCK AND VIBRATION CONDITIONS ..... 63
TABLE 28: CURRENT PROTECTION FUSE ..... 64
TABLE 29: GPIO INPUT SIGNAL VOLTAGES ..... 65
TABLE 30: GPIO OUTPUT VOLTAGE SIGNAL LEVELS ..... 65
TABLE 31: LINE INPUT CHARACTERISTICS ..... 68
TABLE 32: LINE OUTPUT CHARACTERISTICS ..... 68
TABLE 33: EXTENSION CONNECTOR P1800 ..... 71
TABLE 34: USB CONNECTOR P 1680 AT EXTENSION BOARD ..... 72
TABLE 35: RS232 SERIAL PORTS ..... 73
TABLE 36: SERIAL PORTS P2200 AND P2202 CONNECTORS ..... 74
TABLE 37: HARD DISK CONNECTOR P1900 ..... 75
TABLE 38: CONNECTORS P1802 AND P1803 ..... 76
TABLE 39: USB INTERFACES P2005, P1680 AND P1681 ..... 80
TABLE 40: USB AT TRANSITION MODULE ..... 80
TABLE 41: COM AT TRANSITION MODULE ..... 82
TABLE 42: VGA INTERFACE P4001 ..... 82
TABLE 43: VGA INTERFACE AT P4000 ..... 83
TABLE 44: MISCELLANEOUS CONNECTOR P8100 ..... 84
TABLE 45: STATUS LED AT CTM15 ..... 84
TABLE 46: SERIAL ATA CONNECTORS P8000 AND P8001 ..... 85
TABLE 47: DVO INTERFACE CONNECTOR P1000 ..... 88
TABLE 48: DVI-D CONNECTOR ..... 89
TABLE 49: AC97 LINK INTERFACE CONNECTOR P2900 ..... 92
TABLE 50: AUDIO IN-/OUTPUTS CONNECTOR P2904 ..... 93
TABLE 51: LINE INPUT CONNECTOR P2901 ..... 93




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TABLE 52: LINE OUTPUT CONNECTOR P2902 ..... 93



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# CHAPTER 1 Introduction



**Figure 1: Double width CL9 board**



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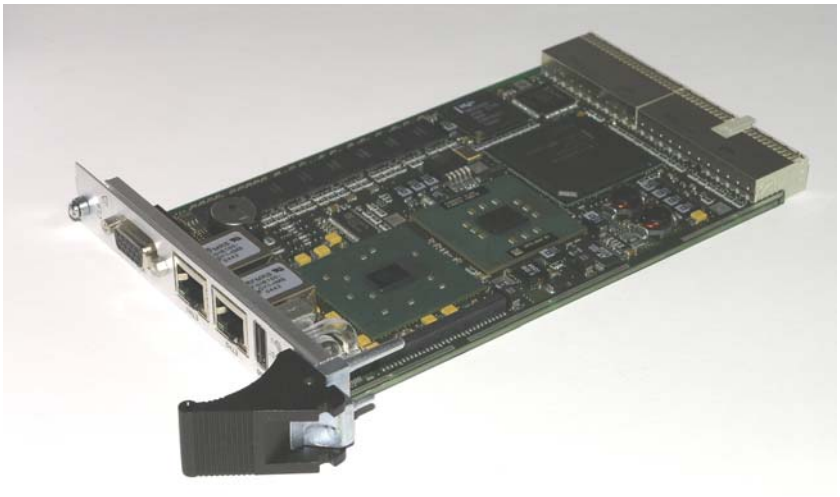


**Figure 2: Single width CL9 board**

### Board Design

The CL9 is a fully IBM-AT compatible stand-alone PC. It is equipped with many functions a conventional Personal Computer can only offer with several add-on cards. Extension boards can be connected via the CPCI interface. The minimized board size and the large number of interfaces and functions allow the CL9 to be used in many applications. See the following block diagram for the board design.



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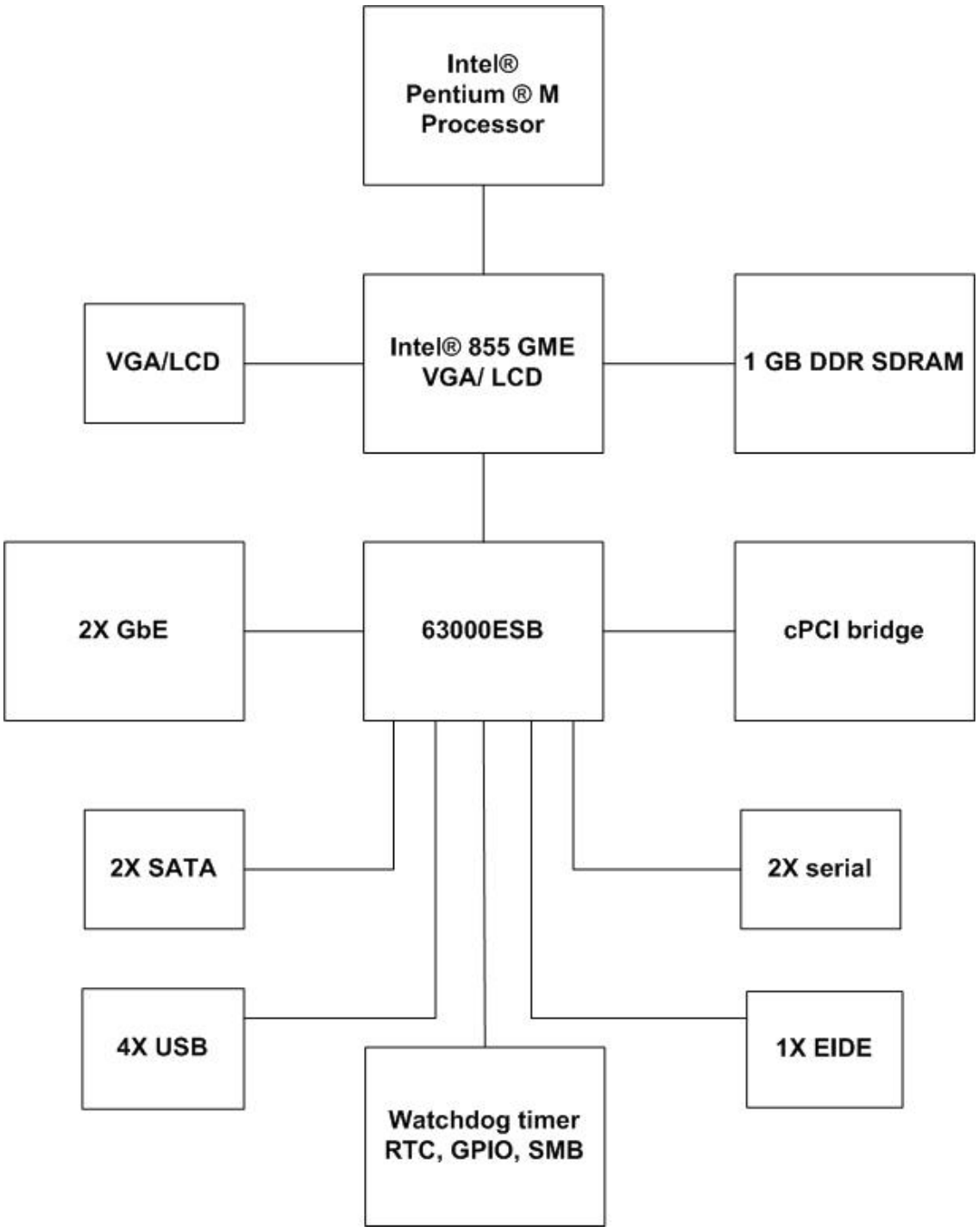



**Figure 3: Block diagram of CL9**



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## Design Features

The CL9 CompactPCI Single Board Computer features:

Microprocessor
Intel® Celeron® processor 600 MHz to 1.8 GHz and higher. Front Side Bus with 400 MHz (100 MHz quad pumped)

Chipset
Intel 855GME Graphics and Memory Controller Hub with
Intel 6300ESB I/O Controller Hub

DRAM
256 MB to 1 GB DDR 333 MHz (PC2700)

CMOS RAM
242 byte non-volatile RAM reserved for BIOS
MC146818 compatible RTC with onboard Lithium battery

EEPROM (Serial)
128 KBytes for user information

Flash BIOS
Easy updating, in-system programmable AMI BIOS
Intel Ethernet BOOT module

Hard/Flash Disk
With extension boards IFLASH3 or CL9-IO mountable CF Flash or 2.5” IDE hard disk

Temperature Sensor
Measures temperature of CPU-die and onboard location. The sensor is software readable in 1 °C increments from -55 °C to +125 °C.

Watchdog
Watchdog implemented in chipset

High Precision Event Timer (HPET)
Allows ‘Real Time Functions’ implemented in chipset

LCD/VGA
855GME chipset integrated graphics controller with shared memory technology.
VGA at front I/O and/or rear I/O. DVO 12-bit interface available at on-board header connector. With extension card DVI-D support possible.

USB
One front (two with CL9-IO) and two rear USB 2.0 ports, all legacy components (Keyboard, Mouse, Floppy connected via USB)

Gigabit Ethernet
Two 10/100/1000BaseT high speed Ethernet channels at front I/O with Intel 82546GB Ethernet controller



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EIDE/ATAPI
UDMA 100 EIDE/ATAPI interface with one IDE channel to extension boards IFLASH3 or CL9-IO. Transfer rate up to 90 MB/s.

Serial ATA
Two Serial ATA interfaces at rear I/O. Transfer rate up to 150 MB/s.

Serial I/O
Two asynchronous 16550 compatible channels with 16 byte FIFO
Transfer rates up to 115.2 K baud with RS232 drivers to rear I/O and extension board CL9-IO.

Audio
The CL9 has an AC97 V2.2 compliant interface to the CL9-IO header. On the CL9-IO there are provisions to connect an audio CODEC via an extension card SPB4.

CPCI System slot
Up to seven peripheral slots 32 Bit CPCI/33 MHz with Texas Instrument PCI2050B bridge. Standard 3U backplanes can be used. Onboard Pull-up resistors are optimized for 3.3 V I/O voltage, but 5 V I/O can also be used. Busless operation is supported.

Front panel I/O
2 x Ethernet, VGA, USB, 2xLED and Reset button. On extension board CL9-IO additional USB, COM1 or Audio and COM2 or DVI available.

Back panel I/O
VGA, COM1/2, USB3/4, 2xSerial ATA, speaker, reset, General Purpose I/O [0...7]. LED.
Transition module CTM15 with 1:1 PC compatible connectors available.

Power supply
+12 V, +5 V and +3.3 V board supply required

Approval
Designed to meet UL (PCB has 94V-0, Self-extinguishing within 10 seconds, no flame drips which ignite)

Styles overview

**Table 1: Board styles**

| CL9 | C | D | I | H |
|---|---|---|---|---|
| Front panel | x | x | x | x |
| Extended temperature | | | x | x |
| Conformal coating | | x | | x |
| Onboard battery | x | x | x | x |



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# CHAPTER 2 Unpacking and Inspection

### Chapter Scope

This chapter covers the suggested inspection and preparation considerations and background information necessary prior to using the CL9. Unpacking, initial inspection and first-time operation of the CL9 are covered. Following the procedures given in this chapter is recommended, since they will verify proper operation after shipping and before the product is integrated into your system.

## Delivery Volume

Please check that the delivered package contains the following items:

**Table 2: Delivery volume**

| Qty. | Item | Purpose |
|---|---|---|
| 1 | CL9 | CompactPCI Single Board Computer optional with a mounted IFLASH3 or CL9-IO extension board. |
| 1 | CDROM | Technical Product Information<br>with driver software and manuals in Adobe Acrobat (PDF) format |

The manual files are also available through the World Wide Web from our Web-Server:
http://www.sbs.com

## Available Accessories

The following table lists accessory options which are available for the CL9:



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**Table 3: Accessory options for CL9**

| Item | Purpose |
|---|---|
| CL9-IO | Extension Board, 3U x 8HP |
| CTM15 | Transition module, 4U x 4HP |
| TMDS3 | DVO to DVI converter |
| SPB3 | RS232/RS422 conversion boards |
| SPB4 | Audio CODEC board with line in/out and SPDIF out |
| IFLASH3 | Compact Flash Carrier |

Please contact the sales department or your sales representative for latest information on options and accessories.

Accessories are subject to change without notice.

## ESD

### Electrostatic Discharge Notice

The discharge of static electricity, known as Electro Static Discharge or ESD, is a major cause of electronic component failure. The CL9 has been packed in a static-safe bag which protects the board from ESD while the board is in the bag. Before removing the CL9 or any other electronic product from its static-safe bag, be prepared to handle it in a static-safe environment.




You should wear a properly functioning anti static strap and ensure you are fully grounded. Any surface upon which you place the unprotected CL9 should be static-safe, usually facilitated by the use of anti static mats. From the time the board is removed from the anti static bag until it is in the card cage and functioning properly, extreme care should be taken to avoid ‘zapping’ the board with ESD. You should be aware that you could ‘zap’ the board without you knowing it; a small discharge, imperceptible to the eye and touch, can often be enough to damage electronic components. Extra caution should be taken in cold and dry weather when static easily builds up.

Only after ensuring that both you and the surrounding area are protected from ESD, carefully remove the board or module from the shipping carton by grasping it by the front panel and the connectors. Place the board, in its antistatic bag, flat down on a suitable surface. You may then remove the board from the anti static bag by tearing the ESD warning labels.



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## Warning

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

**Notes:**
Drain static electricity before you install or remove any parts. Installing or removing modules without observing this precaution could result in damage to this and/or other modules in your system.

## Initial Inspection

After unpacking the CL9, you should inspect it for visible damage that could have occurred during shipping or unpacking. If damage is observed (usually in the form of bent component leads or loose socketed components), contact SBS Technologies for additional instructions. Depending on the severity of the damage, it may need to be returned to the factory for repair**. DO NOT apply power to the board if it has visible damage.** Doing so may cause further, possibly irreparable damage, as well as introduce a fire or shock hazard.

**Attention:**

**Do not insert a CL9 board in a 6U/64-bit Backplane because this will destroy the Serial ATA Interface of the CL9.**

## Unpacking and Handling

Please read the manual carefully before unpacking the board or module or fitting the device into your system. Also adhere to the following:

- Please read this manual carefully before unpacking the module or fitting it into your system. This will certainly save time and avoid trouble.
- Observe all precautions for electrostatic sensitive modules
- If the product contains batteries, please do not place the board on conductive surfaces, antistatic plastic, or sponge, which can cause shocks and lead to battery or board trace damage.
- Please do not exceed the specified operational temperatures. Note that batteries and storage devices might also have temperature restrictions.
- Keep all original packaging material for future storage or warranty shipments of the board.

Although the CL9 is carefully packaged against the rigors of shipping, it is still possible that shipping damages can occur. Careful inspection of the shipping carton should reveal some information about how the package was handled by the shipping service. If evidence of damage or rough handling is found, you should notify the shipping service and SBS Technologies as soon as possible.

Retain all packing material in case of future need.

**Note**
Before installing or removing any board, please ensure that the system power and external supplies have been turned off.



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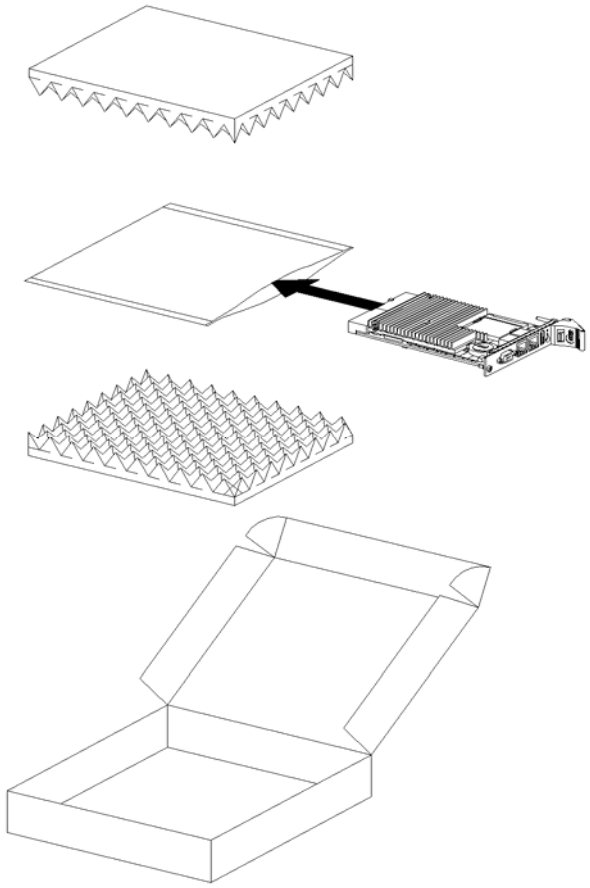


**Figure 4: Packaging Material**

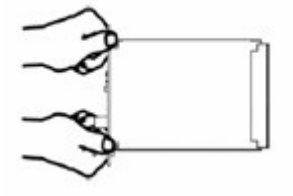


**Figure 5: Board handling**

Only after ensuring that both you and the surrounding area are protected from ESD, carefully remove the CL9 from the shipping carton by grasping it by the front panel and the connectors. Place the board, in its anti static bag, flat down on a suitable surface. You may then remove the board from the anti static bag by tearing the ESD warning labels.

Proper handling of the CL9 is critical to ensure proper operation and long-term reliability. When unpacking the board, and whenever handling it thereafter, be sure to hold the board by the front panel or the card ejectors as shown in the drawing on the left. Do not hold the board by the circuit card edges, the heat sink, or the connectors.



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# CHAPTER 3 Installation

### Chapter Scope

This chapter covers the installation of the CL9 CompactPCI Single Board Computer in a CompactPCI backplane and initial power-on operations.

## Installation

Use the following steps to install your SBS Technologies hardware.

- Before installing or removing any board, please ensure that the system power and external supplies have been turned off.
- Check that the jumpers and piggybacks are correctly configured for your application.
- Mount the board/piggyback/transition module very carefully. See also additional advisories for VMEbus and CompactPCI products below.
- Connect all IO cables.
- Once you are certain that all modules are correctly fitted into the system and all connections have been made properly, restore the power.

## General advisories

Please observe all safety procedures to avoid damaging system and protect operators and users.

Check that jumpers and piggybacks are correctly configured for your application. Mount the board, piggyback, or transition module very carefully. See also sections on additional advisories below.

Do not restore power until you are sure that all modules are fitted correctly and all connections have been made properly.

### Advice on CompactPCI products

Mount the CPU board carefully on the first CPCI bus slot (called system slot). Note that on some boards connectors are used for IO purposes which must not



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be inserted into a CPCI bus backplane. A transition module must be used instead.

**Note:**
Make sure that the card ejectors are closed and the Hot Swap LED (blue) is OFF.

The following items are required to start the Cx9 in a standard configuration:

### Backplane and Power Supply

You will need a standard CompactPCI backplane wired into a regulated power supply capable of providing stable low noise +12 V, +5 V and +3.3 V sources. Make sure that the supply is capable of meeting the total power requirements of the CL9. Please refer to chapter ‘Specifications’ on page 61 for details.

Initially, you have to plug the CL9 into your 3U system slot of your CPCI system. Please make sure that you do not have the power supply turned ON when the CL9 is plugged into your backplane.

### Keyboard and Mouse

You should have a USB compatible keyboard for initial system operation. The USB connector is located on the front panel.

For connecting a USB mouse you have to use another USB channel or use an USB Hub for connecting mouse and keyboard.

### Video Monitor

Any VGA-compatible video monitor can be used initially for display output. The CL9 offers front and rear video access. In order to get access to these pins it is necessary to use a transition module.
It is not recommended to connect a monitor to both the front and rear at the same time, because the VGA signal quality will drop significant and DDC data corruption will prevent monitor detection.

The CTM15 is a 3U x 80 mm rear I/O module which has to be plugged into the CL9 with the backplane between. This transition module has a VGA connector which is fully compatible with the VGA standard connector and pin out. Make sure that your selected chassis supports this type of rear I/O transition module.

Plug your video monitor into one of these connectors

### Batteries

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by SBS Technologies.
Dispose of used batteries according to instructions of SBS Technologies and applicable local regulations.



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### Advice on Batteries

There is a danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by SBS Technologies. Dispose of used batteries according to instructions of SBS Technologies and applicable local regulations.

## Attention:

**Do not insert a CL9 board in a 3U/64-bit Backplane because this will destroy the Serial ATA Interface of the CL9.**

After making sure that you have installed the CL9 properly into your CPCI backplane, apply power to your video monitor and then the CPCI supply. When the board is completely reset, the processor should begin executing initial BIOS-resident routines indicated by the front LED blinking red.

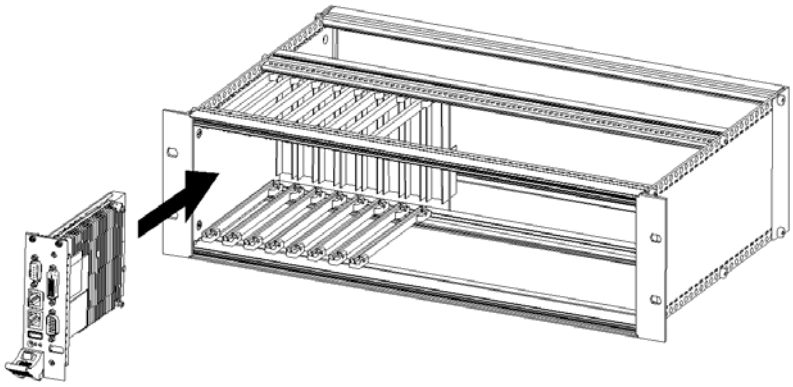


**Figure 6: Board in card cage**

Please see chapter ‘Interfaces’ for details on onboard interfaces.

## Initial Power-On Operation

After a few seconds, the CL9 system BIOS banner will appear on the monitor and the front LED stop blinking and switch to green.

If you have seen all the messages so far, you can be confident that the board is running properly and is ready to be installed and setup for your application.

## Entering the BIOS SETUP

To enter SETUP during the initial power-on sequence press the key DELETE during the boot up sequence. Also see the applicable message on the screen. It tells you when you can enter the BIOS by pressing the DELETE key. If this message does not appear on your monitor, just press the DELETE key when you hear short beeps indicating the keyboard was initialized.



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Consult the 'AMI-BIOS for CL9 User's Manual' for further information on how to change settings and configurations.

If the board does not perform as described above, some damage may have occurred in shipping or the board is not installed or setup properly. Contact SBS technical support as described in chapter 'Support, Service, and Warranty Information' for further instructions.

If the BIOS setup is wrong in the CMOS SRAM, please press the '1/End' key or the 'End' key during boot up. This reverts the BIOS the default settings.

## Minimum System Requirements

As shipped, the CL9 has been thoroughly tested, and is nearly ready for use in your system. In order to verify CL9 operation for the first time, it is suggested that you only configure a minimal system. It is not necessary to have disk drives, a Flash disk or other accessories connected in order to perform the CL9 POST test.

THE POST TEST
Each time the computer boots up it must pass the POST (Power-On Self Test). The following is the procedure of the POST

** The first step of POST is the testing of the Power Supply to ensure that it is turned on and that it releases its reset signal.
** CPU must exit the reset status mode and thereafter be able to execute instructions
** BIOS was readable
** BIOS checksum must be valid, meaning that it must be readable.
** CMOS is readable
** CMOS checksum must be valid, meaning that it must be readable
** CPU must be able to read all forms of memory such as the memory controller, memory bus, and memory module
** The first 64KB of memory must be operational and have the capability to be read and written to and from, and capable of containing the POST code
** I/O bus / controller must be accessible
** I/O bus must be able to write / read from the video subsystem and be able to read all video RAM.

If the computer does not pass any of the above tests, the CL9 will receive an irregular POST. An irregular POST is a beep code which is different from the standard situation which can be either no beeps at all or a combination of different beeps indicating what is causing the computer not to past the POST.

Beep codes can only be heard if the user has a speaker which is either at the CL9-IO or CTM15 transition module!



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# CHAPTER 4 Interfaces

### Chapter Scope

This chapter describes the interfaces of the CL9 CompactPCI Single Board Computer located on the board and on the front panel. Each section on a particular interface includes a graphics illustration of the connector and a pin assignment table as well as notes on certain signal line characteristics, if necessary.

For interfaces of the transition module, please refer to the appropriate chapters found in the ‘Appendices’ to this manual.



**Figure 7: Board photo showing connectors**



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## Front Panel Interfaces

Refer to figure 8 to locate the interfaces on the front panel of the CL9 single slot board.

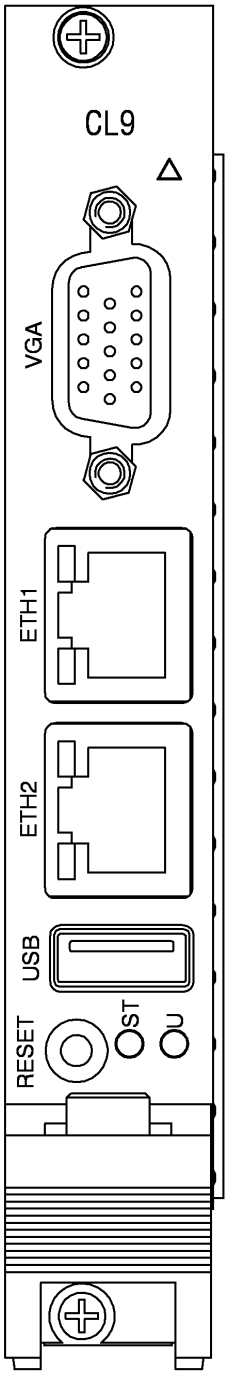



**Figure 8: Single width front panel**



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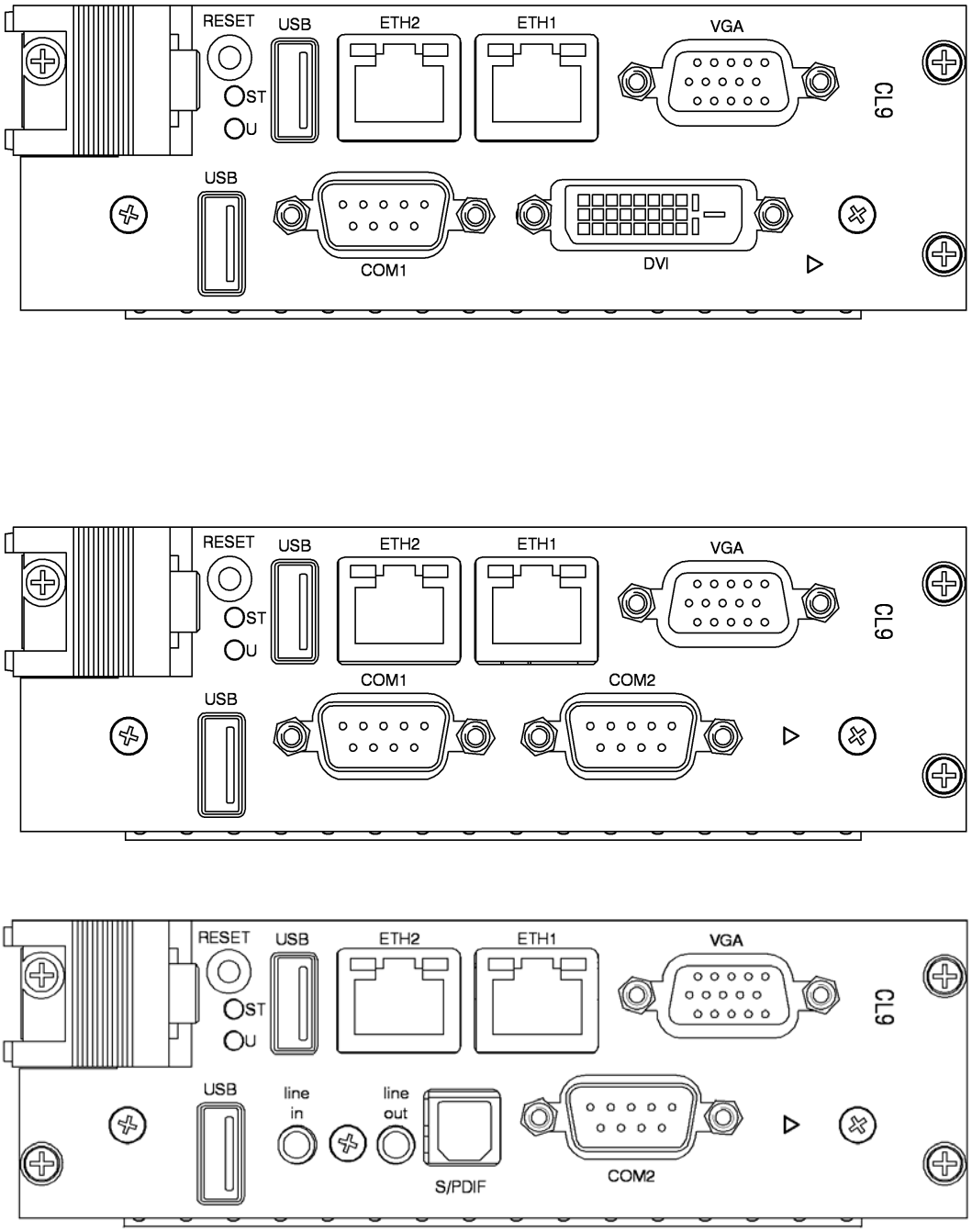



**Figure 9: Double width front panels**

Figure 9 indicates the location of interfaces on the front panel of the CL9 dual slot board in three variations.



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## CL9 Connectors

This chapter describes connector pinouts on the CL9. A pin out description for available I/O extension modules and transition module can be found in the corresponding appendix chapters.

### CPCI connector reference

The CPCI specification numbers the CPCI connectors from bottom to top J1, J2. The CPCI connectors on the CL9 are J7001and J7001 respectively.

**Table 4: CL9 connectors**

| Signal groups | Pin description |
|---|---|
| Serial ATA controller signals | SATA.... |
| COM1, COM2 signals | C1....., C2..... |
| VGA signals | VGA… |
| Universal Serial Bus | USB… |
| General Purpose I/O | GPIO… |
| Output for external speaker | \SPEAKER |
| External Reset Input | \RST_BUT |
| NC | not connected |

## Attention:

**Do not insert a CL9 board in a 6U/64-bit Backplane because this will destroy the Serial ATA Interface of the CL9.**



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### CompactPCI bus Connector J7001 and J7002

This interface is used for connection to a standard CPCI backplane.

**Table 5: CPCI connectors J7001 and J7002**

| J7002 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 22 | Reserved | Reserved | Reserved | Reserved | Reserved | GND |
| 21 | CLK6 | GND | USB_P3+ | USB_P2+ | NC, USB_P1+ [c] | GND |
| 20 | CLK5 | GND | USB_P3- | USB_P2- | NC, USB_P1- [c] | GND |
| 19 | GND | GND | Reserved | Reserved | Reserved | GND |
| 18 | GPIO0 | GPIO5 | \SPEAKER | STATUS_\LED | FUSE_VCC | GND |
| 17 | GPIO1 | NC | \RST_BUT | \REQ6 | \GNT6 | GND |
| 16 | GPIO2 | GPIO6 | \DEG [a] | GND | ATA_\LED | GND |
| 15 | GPIO3 | NC | \FAL [a] | \REQ5 | \GNT5 | GND |
| 14 | GPIO4 | VGA_RED | GPIO7 | NC | Reserved | GND |
| 13 | C1_RI | NC | NC | VGA_VSYNC | C2_RI | GND |
| 12 | C1_DTR | VGA_GREEN | NC | NC | C2_DTR | GND |
| 11 | C1_CTS | NC | NC | VGA_HSYNC | C2_CTS | GND |
| 10 | C1_TXD | VGA_BLUE | NC | NC | C2_TXD | GND |
| 9 | C1_RTS | NC | SATA_RX0+ | SATA_TX0+ | C2_RTS | GND |
| 8 | C1_RXD | NC | SATA_RX0- | NC | C2_RXD | GND |
| 7 | C1_DSR | NC | NC | SATA_TX0- | C2_DSR | GND |
| 6 | C1_DCD | VGA_DDCC | SATA_TX1+ | SATA_RX1+ | C2_DCD | GND |
| 5 | NC | NC | NC | SATA_RX1- | NC | GND |
| 4 | VIO [b] | VGA_DDCD | SATA_TX1- | NC | NC | GND |
| 3 | CLK4 | GND | \GNT3 | \REQ4 | \GNT4 | GND |
| 2 | CLK2 | CLK3 | GND | \GNT2 | \REQ3 | GND |
| 1 | CLK1 | GND | \REQ1 | \GNT1 | \REQ2 | GND |
| J7001 | A | B | C | D | E | F |
| 25 | +5 V | \REQ64 [a] | \ENUM | +3.3 V | +5 V | GND |
| 24 | AD01 | +5 V | VIO [b] | AD00 | \ACK64 [a] | GND |
| 23 | +3.3 V | AD04 | AD03 | +5 V | AD02 | GND |
| 22 | AD07 | GND | +3.3 V | AD06 | AD05 | GND |
| 21 | +3.3 V | AD09 | AD08 | GND | C/\BE0 | GND |
| 20 | AD12 | GND | VIO [b] | AD11 | AD10 | GND |
| 19 | +3.3 V | AD15 | AD14 | GND | AD13 | GND |
| 18 | \SERR | GND | +3.3V | PAR | C/\BE1 | GND |
| 17 | +3.3 V | NC | NC | GND | \PERR | GND |
| 16 | \DEVSEL | GND | VIO [b] | \STOP | \LOCK | GND |
| 15 | +3.3 V | \FRAME | \IRDY | GND | \TRDY | GND |
| 12-14 | KEY | KEY | KEY | KEY | KEY | KEY |
| 11 | AD18 | AD17 | AD16 | GND | C/\BE2 | GND |
| 10 | AD21 | GND | +3.3 V | AD20 | AD19 | GND |
| 9 | C/\BE3 | GND | AD23 | GND | AD22 | GND |
| 8 | AD26 | GND | VIO [b] | AD25 | AD24 | GND |
| 7 | AD30 | AD29 | AD28 | GND | AD27 | GND |
| 6 | \REQ0 | \PCIPRESENT | +3.3 V | CLK0 | AD31 | GND |
| 5 | Reserved | Reserved | \RST | GND | \GNT0 | GND |
| 4 | Reserved | GND | VIO [b] | Reserved | INTS | GND |
| 3 | \INTA | \INTB | \INTC | +5 V | \INTD | GND |
| 2 | Reserved | +5 V | Reserved | Reserved | Reserved | GND |
| 1 | +5 V | Reserved | Reserved | Reserved | +5 V | GND |

[a] These signals are not used on the CL9, but have a pull-up to VIO



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[b] The VIO signals are either 5 V or 3.3 V, depending on backplane
Reserved – Pin is reserved in the PICMG 2.0 specification. It is not used on the CL9 board
[c] USB_P1 only available on a single-slot board if this is a special board produced under a W-… number.

### Extension Connector P1800

The extension connector provides IDE, COM1/2 and USB signals to optional extension boards. It is a 64-pin female connector using a 1,27 mm pitch. Possible extension boards are the IFLASH3 or the CL9-IO board.

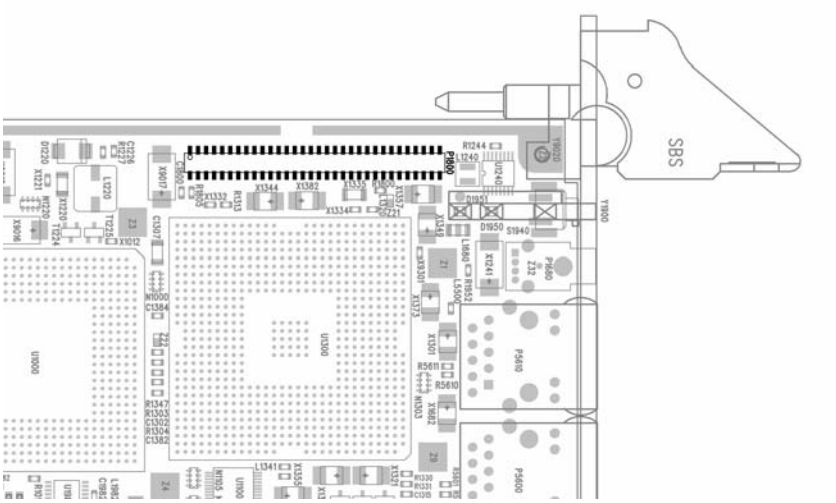



**Figure 10: Extension connector P1800**

**Table 6: Signal groups**

| Signal groups | Pin description |
|---|---|
| IDE hard disk signals | HD_.... |
| COM1, COM2 signals | C1....., C2..... |
| Audio Controller Signals | AC_… |
| Universal Serial Bus | USB… |
| Output for internal speaker | \SPEAKER |
| NC | not connected |



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**Table 7: Extension connector P1800**

| Name | P1800 | | Name |
|---|---|---|---|
| \HD_RST | 1 | 2 | GND |
| HD_D7 | 3 | 4 | HD_D15 |
| HD_D6 | 5 | 6 | HD_D14 |
| HD_D5 | 7 | 8 | HD_D13 |
| HD_D4 | 9 | 10 | HD_D12 |
| HD_D3 | 11 | 12 | HD_D11 |
| HD_D2 | 13 | 14 | HD_D10 |
| HD_D1 | 15 | 16 | HD_D9 |
| HD_D0 | 17 | 18 | HD_D8 |
| \HD_IOW | 19 | 20 | HD_DRQ |
| \HD_IOR | 21 | 22 | GND |
| HD_RDY | 23 | 24 | GND |
| \HD_DACK | 25 | 26 | GND |
| HD_IRQ | 27 | 28 | N.C. |
| HD_A1 | 29 | 30 | HD_CDET |
| HD_A0 | 31 | 32 | HD_A2 |
| \HD_CS1 | 33 | 34 | \HD_CS3 |
| HD_DASP | 35 | 36 | GND |
| +5V | 37 | 38 | +5V |
| AC_BCLK | 39 | 40 | \SPEAKER |
| AC_\RST | 41 | 42 | AC_SDO |
| AC_SYNC | 43 | 44 | USB_P1+ [b] |
| AC_SDI2 | 45 | 46 | USB_P1- [b] |
| C2_DTR | 47 | 48 | C2_RI |
| C2_TXD | 49 | 50 | C2_CTS |
| C2_RXD | 51 | 52 | C2_RTS |
| C2_DCD | 53 | 54 | C2_DSR |
| GND | 55 | 56 | FUSE_VCC [a] |
| C1_DTR | 57 | 58 | C1_RI |
| C1_TXD | 59 | 60 | C1_CTS |
| C1_RXD | 61 | 62 | C1_RTS |
| C1_DCD | 63 | 64 | C1_DSR |

[a] Fused +5 V pin with a 2 A fuse and used for USB voltage supply. For normal operation don't exceed 100 mA current. The used fuse does automatically recover if the over current is resolved. An over current condition is indicated at the USB engine and disables USB operation.
[b] If special version (W- number) single-slot version then USB_P1 is routed to RTM.

### Ethernet Interface U5600 and U5610

The 8pin RJ-45 Gigabit Ethernet connectors are located at the front I/O.



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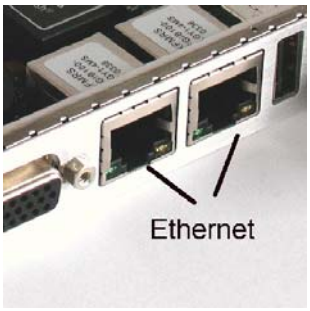



**Figure 11: Ethernet connectors**

**Table 8: Ethernet pin assignments**

| Name 10/100base | Name 1000base | Ethernet1, 2 |
|---|---|---|
| TxD+ | LP_DA+ | 1 |
| TxD- | LP_DA- | 2 |
| RxD+ | LP_DB+ | 3 |
| NC | LP_DC+ | 4 |
| NC | LP_DC- | 5 |
| RxD- | LP_DB- | 6 |
| NC | LP_DD+ | 7 |
| NC | LP_DD- | 8 |

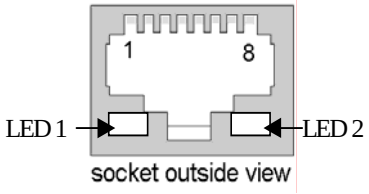



**Figure 12: Ethernet connector layout**

Two LEDs (LED1-green and LED2-yellow) are integrated in each of the RJ45 connector. These LEDs indicates the link status of the interface.



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**Table 9: LED functions**

| LED1 green | Function |
|---|---|
| green | General link |
| **LED2 yellow** | **Function** |
| yellow | Rx/Tx activity |

### VGA Interface P4000

The monitor signals are available at the front panel on a standard 15-pin female D-Sub connector.




**Figure 13: VGA connector**

**Table 10: Connector VGA P4000**

| Name | P4000 |
|---|---|
| RED | 1 |
| GREEN | 2 |
| BLUE | 3 |
| HSYNC | 13 |
| VSYNC | 14 |
| DDC-Data | 12 |
| DDC-Clock | 15 |
| Fused +5 V [a] | 9 |
| GND | 5, 6, 7, 8, 10 |
| NC | 4, 11 |



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[a] Fused +5 V pin is fused with a 2 A fuse. For normal operation don't exceed 100 mA current. The used fuse does automatically recover if the over current is resolved.

### Digital Video Output (DVO) to DVI-D Connector

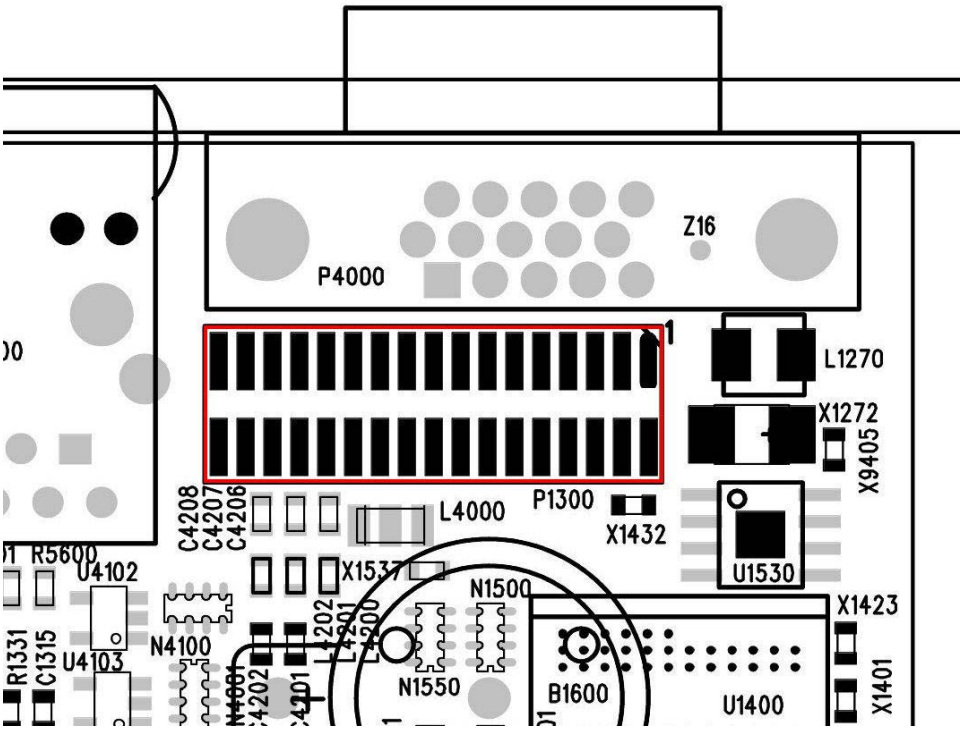



**Figure 14: DVO connector**

A 12-bit Digital Video Output interface is available at the board on a 34-pin header.



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**Table 11: Connector P1300**

| Signal name | P1300 | | Signal name |
|---|---|---|---|
| GND | 1 | 2 | GND |
| GND | 3 | 4 | GND |
| DVO8CLKINT | 5 | 6 | \DV08CINTR |
| DVO8000 | 7 | 8 | MOVID5 |
| DVO8001 | 9 | 10 | MOVIC5 |
| DVO8002 | 11 | 12 | DDCPC3 |
| DVO8003 | 13 | 14 | DDCPD3 |
| DVO8004 | 15 | 16 | GND |
| DVO8005 | 17 | 18 | GND |
| DVO8006 | 19 | 20 | VCC3 |
| DVO8007 | 21 | 22 | VCC3 |
| DVO8008 | 23 | 24 | GND |
| DVO8009 | 25 | 26 | GND |
| DVO8010 | 27 | 28 | DVO8VSYNC |
| DVO8011 | 29 | 30 | DVO8HSYNC |
| \DVO8BLANK | 31 | 32 | FUSE_VCC |
| DVO8CLK | 33 | 34 | \DVO8CLK |

This connector is used to connect an external board called TMDS3. This board provides a Digital Visual Interface (DVI) with TMDS (Transmission Minimized Differential Signaling) outputs. The DVI-D connector is a 'Digital-Only' version available at the front panel (see figure 14).



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**Table 12: DVI connector**

| Signal name | DVI-D | | Signal name |
|---|---|---|---|
| TX2- (TMDS Data2–) | 1 | 13 | NC |
| TX2+ (TMDS Data2+) | 2 | 14 | FUSE_VCC |
| GND | 3 | 15 | GND |
| NC | 4 | 16 | NC |
| NC | 5 | 17 | TX0- (TMDS Data0–) |
| DDC CLK | 6 | 18 | TX0+ (TMDS Data0+) |
| DDC DAT | 7 | 19 | GND |
| VSYNC | 8 | 20 | NC |
| TX1- (TMDS Data1–) | 9 | 21 | NC |
| TX1+ (TMDS Data1+) | 10 | 22 | GND |
| GND | 11 | 23 | TXC+ (TMDS Clock+) |
| NC | 12 | 24 | TXC- (TMDS Clock–) |

### USB Interfaces P1680

The CL9 has four USB 2.0 channels. One USB channel is available at the front panel of the CL9, a second USB is available via the CL9-IO Extension board and the other two USB devices are available on rear IO.

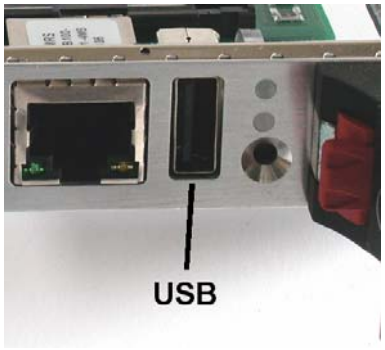



**Figure 15: USB connector**



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**Table 13: USB connector**

| Name | P1680 |
|---|---|
| Fused +5 V [a] | 1 |
| USB- | 2 |
| USB+ | 3 |
| GND | 4 |

[a] Fused +5 V pin with a 2 A fuse. For normal operation don't exceed 100 mA current. The used fuse does automatically recover if the over current is resolved. An over current condition is indicated at the USB engine and disables USB operation.

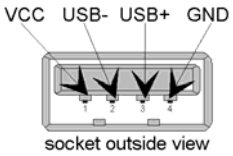



**Figure 16: USB connector layout**

### Serial Port COM1/2

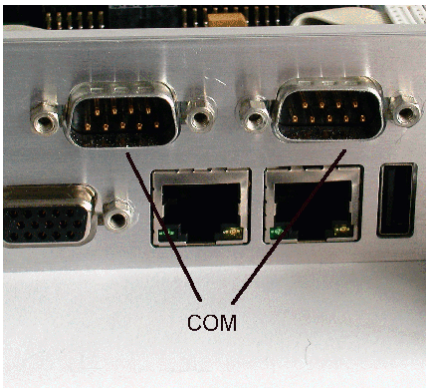



**Figure 17: Serial ports**

The CL9 offers two RS232 serial ports. All COM ports are accessible via the transition module CTM15, but also accessible via the CL9-IO Extension board. On the CL9-IO there are provisions to connect add-on boards from SBS Technologies (SPB3) to convert the RS232 input level to RS422/485/232 output level with and without optical separation. The RS422/485 driver can be enabled/disabled with the DTR signal.

### Extension Board

Please refer to the appendix chapters for interface location and connector pin-outs for the optional extension board CL9-IO.



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### Transition Module

Please refer to the appendix chapters for interface location and connector pin-outs for the optional transition module CTM15 (Appendix B).

For TMDS3 see Appendix C.
For SBP4 see Appendix D



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# CHAPTER 5 Resources

## Chapter Scope

This chapter describes system resources, such as memory mapping, register set and default interrupt request assignments.

## Memory Map

Table 13 shows the memory address area used by the CL9.

**Table 14: Memory map**

| Address | | Size | Used by |
|---|---|---|---|
| $00000 - | $9FFFF | 640 KBytes | System RAM |
| $A0000 - | $BFFFF | 128 KBytes | Video RAM (if enabled) |
| $C0000 - | $DFFFF | 128 KBytes | Used by PCI ROMs: VGA, SCSI, Ethernet |
| $E0000 - | $FFFFF | 128 KBytes | System BIOS |
| $100000 - | $3FFFFFFF | Depends on avail. DRAM | Extended RAM |
| $4000000 - | $FFFBFFFF | Depends on avail. DRAM | Dynamically used by PCI and system core devices |
| $FFF80000 - | $FFFFFFFF | 512 KBytes | System BIOS |

## Register Set

The following section provides an overview of the registers located in the I/O address area of the CL9.

**Note:**
The address location of PCI devices such as PCI bridge or Ethernet are not described in the following tables because the System BIOS automatically



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configures (PnP, Plug and Play) each PCI device to avoid address conflicts. Many device drivers show the assigned address locations after installation and loading.

### Standard Register Set

The standard register set is equal to all standard PC/AT systems. The table below provides an overview of the address ranges occupied by these registers.

**Table 15: Register address ranges**

| I/O Address Range (Hex) | Function |
|---|---|
| 0000 - 000F | DMA Controller 1 |
| 0020 - 0021 | Interrupt Controller 1 |
| 0040 - 0043 | Counter / Timer |
| 0060 | Keyboard Controller (emulated) |
| 0061 | NMI Status and Control |
| 0064 | Keyboard Controller (emulated) |
| 0070 - 0071 | RTC, NMI Mask |
| 0080 - 008F | DMA Page register |
| 00A0 - 00A1 | Interrupt Controller 2 |
| 00B2 - 00B3 | Power Management |
| 00C0 - 00DE | DMA Controller 2 |
| 00F0 - 00F1 | Coprocessor |
| 0160 - 0163 | Reserved [b] |
| 0170 - 0177 | Secondary IDE [c] |
| 01F0 - 01F7 | Primary IDE [c] |
| 02E8 - 02EF | COM port [a] |
| 02F8 - 02FF | COM port [a] |
| 03E8 - 03EF | COM port [a] |
| 03F8 - 03FF | COM port [a] |

[a] Via setup four address ranges can be defined for the serial interfaces.
[b] Board specific registers located in PLD for reset control and BIOS post codes. See ‘CL9 Board Specific Hardware Programmer’s Manual’
[c] Actual assignment of PATA and SATA ports to legacy I/O addresses are defined through BIOS setup.

### Plug and Play Devices

See ‘CL9 Board Specific Hardware Programmer’s Manual’.



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## Interrupts

The interrupt routing for standard components e.g. COM1/2, LPT1 is in compliance with standard PC/AT systems. Unused interrupts can be used for add-on cards or other board specific PCI devices.

**Table 16: Interrupt assignments**

| Hardware IRQ | IRQ Source |
|---|---|
| **INTC1** | |
| IRQ00 | System Timer |
| IRQ01 | Keyboard (emulated) |
| IRQ02 | Cascade from INTC2 |
| IRQ03 | COM2 / COM1 |
| IRQ04 | COM1 / COM2 |
| IRQ05 | PnP/PCI [b] |
| IRQ06 | PnP/PCI [b] |
| IRQ07 | PnP/PCI [b] |
| **INTC2** | |
| IRQ08 | Real Time Clock |
| IRQ09 | Power Management Contr./PCI [b] |
| IRQ10 | PnP/PCI [b] |
| IRQ11 | PnP/PCI [b] |
| IRQ12 | Keyboard (emulated) |
| IRQ13 | Numeric Coprocessor |
| IRQ14 | Primary IDE [a] |
| IRQ15 | Secondary IDE [a] |
| NMI | System Error |

[a] This interrupt is available when device is disabled in BIOS setup
[b] Interrupts are available for Plug and Play PCI devices

## APIC Controller

The CL9 supports also the Interrupt handlings with APIC (Advanced Interrupt Controller). This handling of APIC interrupts must be supported by the operating system. The I/O APIC handles interrupts very differently from the 8259. Briefly, these differences are:

• **Method of Interrupt Transmission.** The I/O APIC transmits interrupts through the processor FSB (Front-Side Bus), and interrupts are handled without the need for the processor to run an interrupt acknowledge cycle.



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• **Interrupt Priority.** The priority of interrupts in the I/O APIC is independent of the interrupt number. For example, interrupt 10 may be given a higher priority than interrupt 3.

• **More Interrupts.** The I/O APIC in the Intel 6300ESB ICH supports a total of 26 interrupts.

For complete operation description please refer to the ‘Intel 6300ESB I/O Controller Hub’ datasheet.



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# CHAPTER 6 Function Blocks

### Chapter Scope

This section gives a brief overview over the software interfaces of onboard devices on the CL9 CompactPCI Single Board Computer.

## Processor

The Intel Celeron processor family provides high performance with low power and features Enhanced Intel SpeedStep technology which provides the ability to dynamically adjust the power and performance of the processor based on CPU demand. This results in optimal performance without compromising the power performance of the CL9.
The processor die is thermally protected by two thermal monitor features. When reaching a maximum safe operating temperature the programmable Thermal Control Circuit in the processor activates a throttling feature and reduces the voltage and frequency dynamically. If this feature is active the CL9 will indicate it with a blinking red Status LED and with short beeps at the speaker. In case of a catastrophic die overheating (above 125 °C) the CL9 switches off the processor core voltage. Recovery from this catastrophic event is only with a power on cycle possible.

## Memory Controller

The memory controller in the CL9 supports double data rate synchronous DRAM (DDR SDRAM) with a speed of up to 166 MHz and a data bus width of 64 bits, this is equivalent to the PC2700 specification. One or two banks are provided by the CL9 with a size of either 256 MByte or 512 MByte this results in a minimum memory size of 256 MByte (one bank) or a maximum size of 1 GByte (two banks with 512 MByte).

## Standard AT Devices

Please refer to interface specifications laid down in industry standards and hardware reference documents for standard AT devices. DMA Controller is standard AT compatible but unused in CL9.



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## Interrupt Controller

The Interrupt controller on a standard PC consists of two 82C59A devices with eight interrupt request lines each. The two controllers are cascaded so that 14 external and two internal interrupt sources are available. The master interrupt controller provides IRQ [7...1], the slave interrupt controller provides IRQ [15...8]. IRQ2 is used to cascade the two controllers, IRQ0 is used as a system timer interrupt and is tied to interval timer 1, counter 0. The remaining 14 interrupt lines are mapped to various onboard devices. Each 82C59A provides several internal registers. The interrupts at the IRQ input lines are handled by two registers, the interrupt request register IRR and the in-service register ISR. For programming details see the 82C59A data sheet.

Alternatively the complete Interrupt handling can be managed by an Advanced Interrupt Controller (APIC). For complete description please refer to the ‘Intel 6300ESB I/O Controller Hub’ datasheet.

## Timer

Standard PCs like the CL9 are equipped with an 8254 compatible timer. This timer contains three counters. Each counter output provides a key system function. Counter 0 is connected to interrupt controller input IRQ0 and provides a system timer interrupt for time-of-day, floppy disk timeout and other system timing functions. Counter 1 generates a refresh request signal and Counter 2 generates the sound for the speaker.

Table 16 gives an overview over the 8254 functions.

**Table 17: Timer 8254 functions**

| Interval Timer Functions | |
|---|---|
| Function | Counter 0 (System Timer) |
| Gate | Always on |
| Clock In | 1.193 MHz (OSC/12) |
| Out | IRQ0 (INT1) |
| Function | Counter 1 (Refresh Request) |
| Gate | Always on |
| Clock In | 1.193 MHz (OSC/12) |
| Out | Refresh Request |
| Function | Counter 2 (Speaker Tone) |
| Gate | Programmable via Port $061 |
| Clock In | 1.193 MHz (OSC/12) |
| Out | Speaker |



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The counter/timers are programmed by I/O accesses. A single control word register controls the operation of all three counters. For more information on programming and a detailed register description see the 8254 data sheet.

## Real Time Clock

The RTC is a low-power clock that provides a time-of day clock and a 100-year calendar with alarm features and battery buffered operation. The time-of-day function includes 14 control registers. Other features are maskable interrupt sources and 242 bytes of general purpose CMOS RAM used by system BIOS. Valid RAM data and time can be maintained after power down through the use of an external battery source. The RTC is software compatible to the Dallas DS1287 and the Motorola MC146818.

## EIDE Interface

The CL9 offers one EIDE/ATAPI interface. This interface can achieve up to 90 MByte/s. The signals of the primary EIDE interface are available at the extension connector only. With a single slot solution one Compact Flash on the IFLASH3 card is usable. The CL9-IO extension board is a two slot solution with either a 2.5” Hard disk or two Compact Flash bays. The signals of the secondary EIDE interface are not used. The CL9 System BIOS automatically detects a connected EIDE HDD or flash disk and enters the corresponding drive parameters into the BIOS setup. This feature allows faster and easier handling of varying types of EIDE hard disks. At the EIDE interface two disk devices can be connected. In this case one HDD must be configured as master and the other one as slave. The strapping is automatically performed at the extension card.
IDE interfaces can be configured for legacy IDE or native PCI operation in BIOS setup.

## Serial ATA Interface

The CL9 offers two independent Serial ATA interfaces. These interfaces can achieve up to 150 Mbyte/s transfer rate and have alternate device ID and RAID Class Code option for support of Soft RAID. The signals of both Serial ATA channels are available at the backpanel I/O.
IDE interfaces can be configured for legacy IDE or native PCI operation in BIOS setup.

## Serial Interface

The CL9 serial ports are fully compatible with the NS16450 and NS16550. This means that each serial interface provides a 16 byte FIFO and therefore offers a higher performance than earlier used standard serial interfaces. The UARTs have programmable baud rate generators capable of 50 Baud to 115200 Baud. There are four address locations defined for serial interfaces on standard PCs. The two serial interfaces are I/O mapped and can occupy four address ranges.



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## USB Interface

The CL9 has four USB 2.0 channels, one EHCI USB2 host controller with a total of four ports (shared with the UHCI ports) and two UHCI controllers for a total of four ports (shared with EHCI ports). The USB host controller supports legacy Keyboard/Mouse software with USB-based keyboard and mouse software.

## Graphics Controller

The Graphics Controller is integrated in the Intel 855GME chipset and has the following features:

- 2D & 3D graphics engine
- Up to 64 MB of dynamic video memory allocation
- Integrated 350 MHz 24-bit RAMDAC for analog VGA monitors up to 1600x1200 @ 85 Hz / 2048x1536 @ 75 Hz
- Integrated Digital Video Output (DVO port interface with 165 MHz dot clock on 12-bit interface
- Display core frequency at 133 MHz or 200 MHz

### Software Installation

Since the Intel graphics engine is used on a large number of computers, many operating systems like Windows 2000 and Windows XP already include high resolution drivers. The Technical Product Information CD-ROM supplied with the CL9 includes the most commonly used software drivers and utilities.

## Ethernet Interface

The Ethernet controller 82546GB from Intel used with the CL9 is a high performance dual Gigabit Ethernet 10/100/1000 Mbit PCI controller. Both Gigabit channels are available at the CL9 front.
For registration and identification of a workstation in a LAN, a unique ID number is required. Each network card is assigned a unique ID number, which resides in an Ethernet address ROM on the CL9. An Ethernet boot option can be enabled in BIOS setup.

### Software Installation

The drivers available for the Ethernet controller 82546GB support a large number of operating systems. Table 17 shows operating systems supported by available software:

**Table 18: Available operating systems**

| Type | System |
|---|---|
| ODI | DOS |
| NDIS | DOS |
| NDIS | Windows 2000, XP |



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The Technical Product Information CD-ROM supplied with the CL9 includes the most commonly used software drivers and utilities.

## Additional devices

### SMBus devices

The CL9 uses a serial two-wire $I^2C$ bus controlled by the ICH (Intel 6300ESB I/O controller hub) to communicate with several onboard devices:

**Table 19: SMBus devices**

| Device | Designator | SMBus address |
|---|---|---|
| Clock synthesizer * | U1000 | 1101 001Xb |
| SPD EEprom * | U1981 | 1010 000Xb |
| Factory EEprom * | U1981 | 1010 001Xb |
| User EEprom | U1983 | 1010 01nXb |
| Temperature sensor LM83 | U1982 | 0011 001Xb |

Devices marked by * are handled by BIOS. It is strongly recommended not to access these devices under user software.
An 'X' at bit 0 represents the R/#W bit and 'n' a random address bit.

### Temperature Sensor LM83

A National Semiconductor® LM83 temperature sensor is implemented on the CL9 board. The sensor is located close to the CPU and shows the die-temperature of the CPU and the local onboard temperature. The sensor has an over-temperature output integrated, which can be used to take actions like reducing the CPU speed. For programming information please see the 'AMI-BIOS for CL9 Programmer's Manual'.
More information on the LM83 can be found in the data sheet from National Semiconductors.

### Serial EEPROM

For storage of SPD and factory user data a serial EEPROM is implemented on the CL9 board. It is a standard 24C04 type EEPROM with 512 bytes. The user EEPROM is a 24C1024 type with 128 KByte. More information about reading and writing the contents can be found in the data sheets from the manufacturer (e.g. ST Microelectronics, Atmel, Catalyst and many others).

### Power Management Event

A Power Management Event can be initiated on CL9 by one of the following events:



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**Table 20: Power management events**

| Event | Description |
|---|---|
| ENUM | Wake CL9 if a non-system board is removed or inserted |
| Wake on LAN | Wake CL9 by Ethernet event |
| Wake on IO | Wake CL9 by IO-device i.e. Modem |

### ENUM#

ENUM (PICMG 2.0, open-collector) is available on J7001_C25. This signal is driven by hot swap compatible boards after insertion and prior to removal. For CL9 in System Slot, the input ENUM is able to generate an ACPI event to force the software to interrogate all boards within the system for resource allocation regarding I/O, memory and interrupt usage.

### General Purpose IO 0-7

Eight GPIO pins are available on J7002. These Pins can be used for I/O functions with 3.3 V signals input/output levels. See Chapter 7 for electrical specification.
For more information please see the ‘CL9 Board Specific Hardware Programmer’s Manual’.

### Watchdog, Power fail Monitor

For security of application software, the CL9 offers a software controlled hardware two stage watchdog with independent count values for each stage. First stage generates an INT or SMI. The second stage issuing a reset signal if its time-out interval expires. The configurable granularity reaches from 1µs to 10min.
For more information please see the ‘Intel 6300ESB I/O Controller Hub’ datasheet and the ‘CL9 Board Specific Hardware Programmer’s Manual’.



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### LEDs

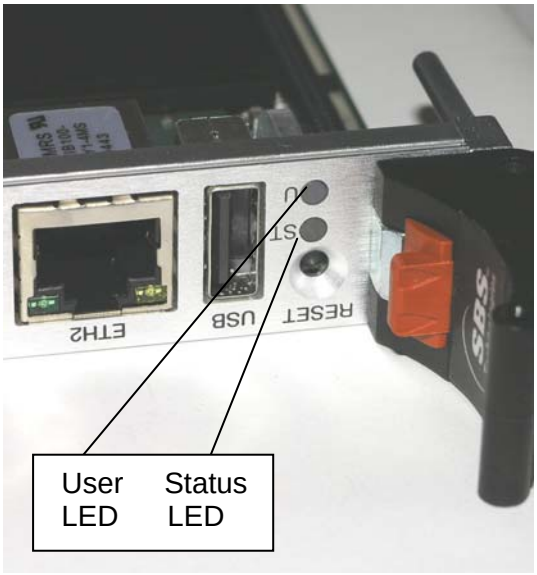



**Figure 18: LEDs**

Two LEDs (see figure 18) are available at the front panel:
The Status LED (see table 20) is green/red bi-color for BIOS power-up status indication, after boot loading the user software is free to use this LED for any purpose. The User LED (see table 22) is also green/red bi-color and may be programmed by the customer. In addition the green user LED is blinking during IDE and Serial ATA disk activity. For programming see ‘CL9 Board Specific Hardware Programmer’s Manual’.



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BIOS Power-up status:

**Table 21: BIOS Status LED indication**

| Status | LED color |
|---|---|
| +3.3 V stable but other voltage missing | Red on |
| Power-up, still Reset state | Amber on |
| BIOS early init | Blink red 1 Hz |
| RAM initialized and working | Blink amber 1 Hz |
| BIOS POST started | Blink green 1 Hz |
| Entering OS boot sequence | Green on |
| PCI bus error, uncorrectable memory error | Red on |
| System Status - Running | Green on |
| System Status - Sleeping | Amber on |
| System Status – Shut Down | Off |

**Note:**
- CPU overtemperature Red flashing

One more single-color Status LED signal (red only) is available at the rear I/O with following functions:

BIOS Power-up status:

**Table 22: Rear I/O LED indication**

| Status | LED color |
|---|---|
| Power-up, still Reset state | Red on |
| BIOS Power-Up | Blink red |
| OS boot | Led off |
| System halted or reset | Red on |
| CPU overtemperature | Blinking red |
| User (same as green front LED) | Red on or off |



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**Table 23: User LED indication**

| User LED | LED color |
|---|---|
| User defined status | Green on or off |
| User defined status | Red on or off |
| IDE and Serial ATA accesses | Green blinking (inverts the current status) |

### Reset Button

There is an onboard Reset Button (see Fig. 19). An external Reset button may be connected between the appropriate I/O connector at the back side and GND. The PRST# on J7002_C42 (PICMG2.0) is used as Reset input and compatible to the onboard button. The push button will issue a hard power on reset. The reset signal is active for all subsystems of the CL9.

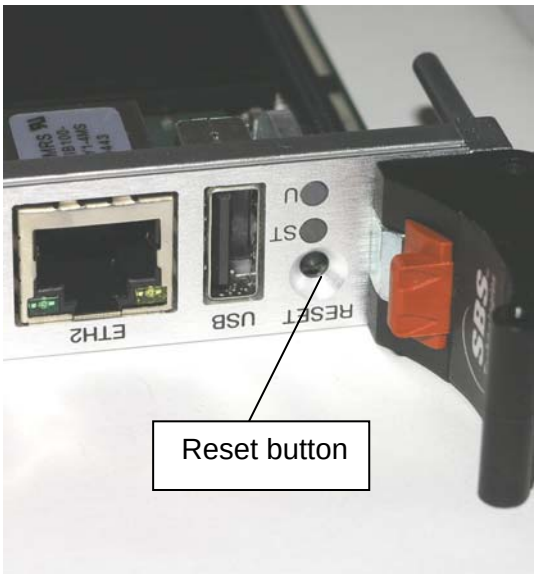



**Figure 19: Reset button**

### Speaker

A standard PC compatible speaker is available at the CL9-IO board. Additionally, an external standard PC compatible speaker with an amplifier circuit may be connected between the appropriate I/O connector at the back and voltage supply.
Short periodic beeps indicate a CPU overtemperature.



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# CHAPTER 7 Specifications

**PCB**

FR4 Multilayer

**Size**

Total board size: 3U, 4 HP
Total size with optional extension board 8HP (CL9 and CL9-IO)

**Dimensions**

PCB: 100 mm x 178 mm x 20 mm (CL9 single slot)
PCB: 100 mm x 178 mm x 40 mm (CL9 and CL9-IO dual slot)

**Weight**

Approx. 350 g single slot with heat sink, IFLASH3 and CompactFlash
Approx. 600 g dual slot with heat sink, CL9-IO and HDD

## Power Consumption

Table 23 is intended to help you calculate the power consumption of a CL9 system without CL9-IO. For measurement, the CL9 board is mounted on a CPCI backplane. During measurement, the power consumption of the backplane, keyboard and the hard disk drive are withdrawn from the results. The values are typical measured**.**



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**Table 24: Power consumption**

| CL9 | DOS prompt without power management, no Ethernet connections, mid-range temperature | | Windows XP, max VGA resolution, both Gigabit Ethernet channels linked, CPU running a maximum power consumption instruction mix at max. operating temperature | |
|---|---|---|---|---|
| | +5 V | +3.3 V | +5 V | +3.3 V |
| CL9 I6Axxxxx * @ 600 MHz, 1GB | 0.65 A | 2.4 A | 1.0 A | 3.8 A |
| CL9 MAAxxxxx * @ 1 GHz, 1GB | 0.65 A | 2.4 A | 1.0 A | 3.8 A |
| CL9 BB8xxxxx @ 1.1 GHz, 512 MB | 1.45 A | 2.2 A | 2.3 A | 3.7 A |
| CL9 GDAxxxxx * @1.3 GHz, 1 GB | 3.7 A | 2.4 A | 6.0 A | 3.8 A |
| CL9 EE8xxxxx * @ 1.4 GHz, 512 MB | 1.45 A | 2.2 A | 2.3 A | 3.7 A |
| CL9 AGAxxxxx @1.6 GHz, 1 GB | 3.7 A | 2.4 A | 6.0 A | 3.8 A |
| CL9 DI7xxxxx @ 1.8 GHz, 256 MB | 2.9 A | 2.1 A | 5.7 A | 4.0 A |

— Configurations marked with * show estimated values
— For a USB keyboard connected add 100 mA (typical)
— For each Gigabit Link add 0.4 A at 3.3 V

## Onboard Lithium Battery

BR1225 (50 mAh), estimated life time depending on temperature and power status, typ. 4 µA @ 20 °C:

**Table 25: Estimated life time**

| Temperature | CL9 powered | CL9 power off |
|---|---|---|
| <-35 °C | 120 months | 24 months |
| +50 °C | 100 months | 12 months |
| +70 °C | 80 months | 6 months |
| +60 °C | 60 months | 3.5 months |

With the values from the table above, it should be possible to calculate the battery lifetime based on the used power on/off ratio.



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## External Battery Input

External EXTBATT input usable with EXTBATT input ranges 2.4 V to 3.3 V, max. current (@ 3.0 V, 35 °C) 5 µA.

## Environment Conditions

Ambient temperatures and humidity values for the CL9:

**Table 26: Temperature and humidity conditions**

| | C, D -Style | I, H-Style |
|---|---|---|
| High Temperature | | |
| - Storage | +85 °C | +85 °C |
| - Operating (see diagram below) | | |
| Low Temperature | | |
| - Storage | -40 °C | -40 °C |
| - Operating | 0 °C | -40 °C |
| Temperature Shock | | |
| - Storage | +/-10 °C/min | +/-20 °C/min |
| - Operating | +/-5 °C/min | +/-10 °C/min |
| Relative Humidity | | |
| - Storage, Operating | Up to 95 %, non-condensing | |

Shock and vibration (see table 26) values for the CL9:

**Table 27: Shock and vibration conditions**

| | C-, D-, I-, H-Style |
|---|---|
| Vibration | |
| - Spectrum | 5 to 100 Hz |
| - Acceleration | 2 grms |
| Shock | |
| - Amplitude | 12 g |
| - Duration | 6 ms |

For highest operating temperatures (C-, I-Style) please refer to the following diagram.



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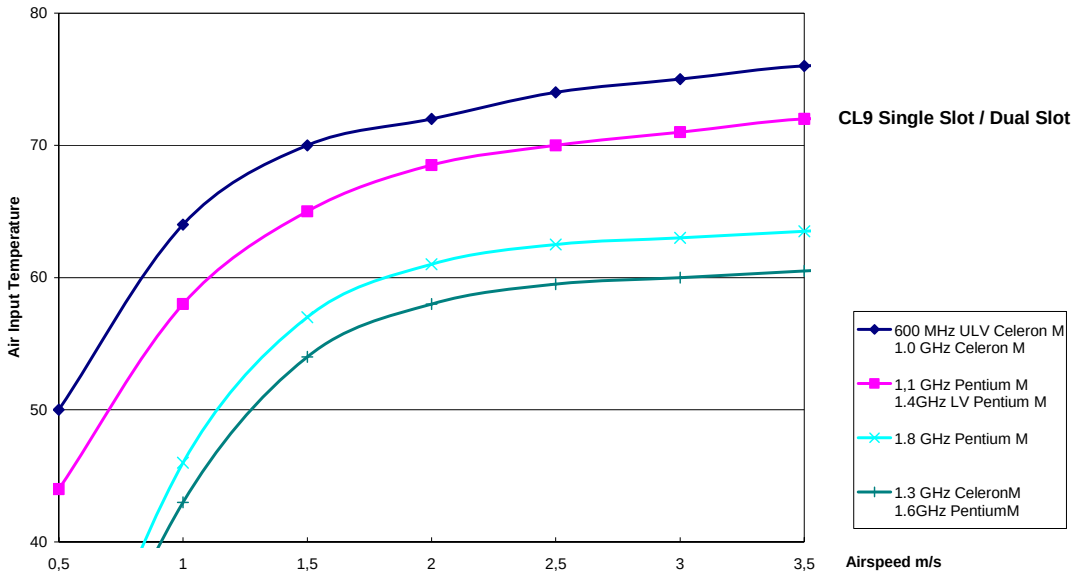



**Figure 20: Operating temperature diagram**

- 0 m/s airflow means convection cooled only.
- The core temperature of the CPU can be read out via the onboard temperature sensor. The value must be kept below 100 °C for all operating conditions. This value is already included in the airspeed diagram above.

## Electrical Characteristics

### FUSE_VCC

The CL9 supplies +5 V for several interfaces. This voltage has an over current protection. The maximum current for the voltage is shown below:

**Table 28: Current protection fuse**

| Name | V | Imax | Description | Fuse |
|---|---|---|---|---|
| FUSE_VCC | 5 V | 2 A | Supply for all USB, CRT-DCD | F9001[a] |

[a] TPS2034D (Texas Instruments)

### General Purpose IO 0-7

The general purpose I/O pins can be programmed as inputs, with following signal input voltages (see table 28):



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**Table 29: GPIO input signal voltages**

| signal | V |
|---|---|
| low | -0.5 V ... +0.8 V |
| high | +2.0 V ... VCC3 + 0.5 V |

VCC3 is the +3.3 V voltage from the backplane

When programmed as outputs, the following signal levels are supplied (see table 29):

**Table 30: GPIO output voltage signal levels**

| signal | V |
|---|---|
| low | max. 0.4 V at 4 mA sinking |
| high | min. VCC3-0.5 V at -2 mA sourcing |

VCC3 is the +3.3 V voltage from the backplane

The GPIOs are default outputs after reset and GPIO0-GPIO6 drive low level until driven other value or reprogrammed to input. GPIO7 is default output after reset but drives a high level until driven to another value or reprogrammed to input. On the CL9 board no pull-up or serial resistors are implemented at the GPIOs.

### Isolation

The Isolation of the Ethernet outputs is limited to 500 V peak against logic ground (GND) and any other supply voltage.
By itself the onboard logic ground (GND) and the front panel/chassis frame ground (FGND) are isolated on the CL9 with a layout distance of more than 0.3 mm in all PCB layers. However most standard devices (USB and monitor) except Ethernet will connect FGND and GND directly in the device. Also standard racks (our starter cage too) connect both grounds at the power supply for safety reasons.



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## Placement Plan Component Side CL9 V1

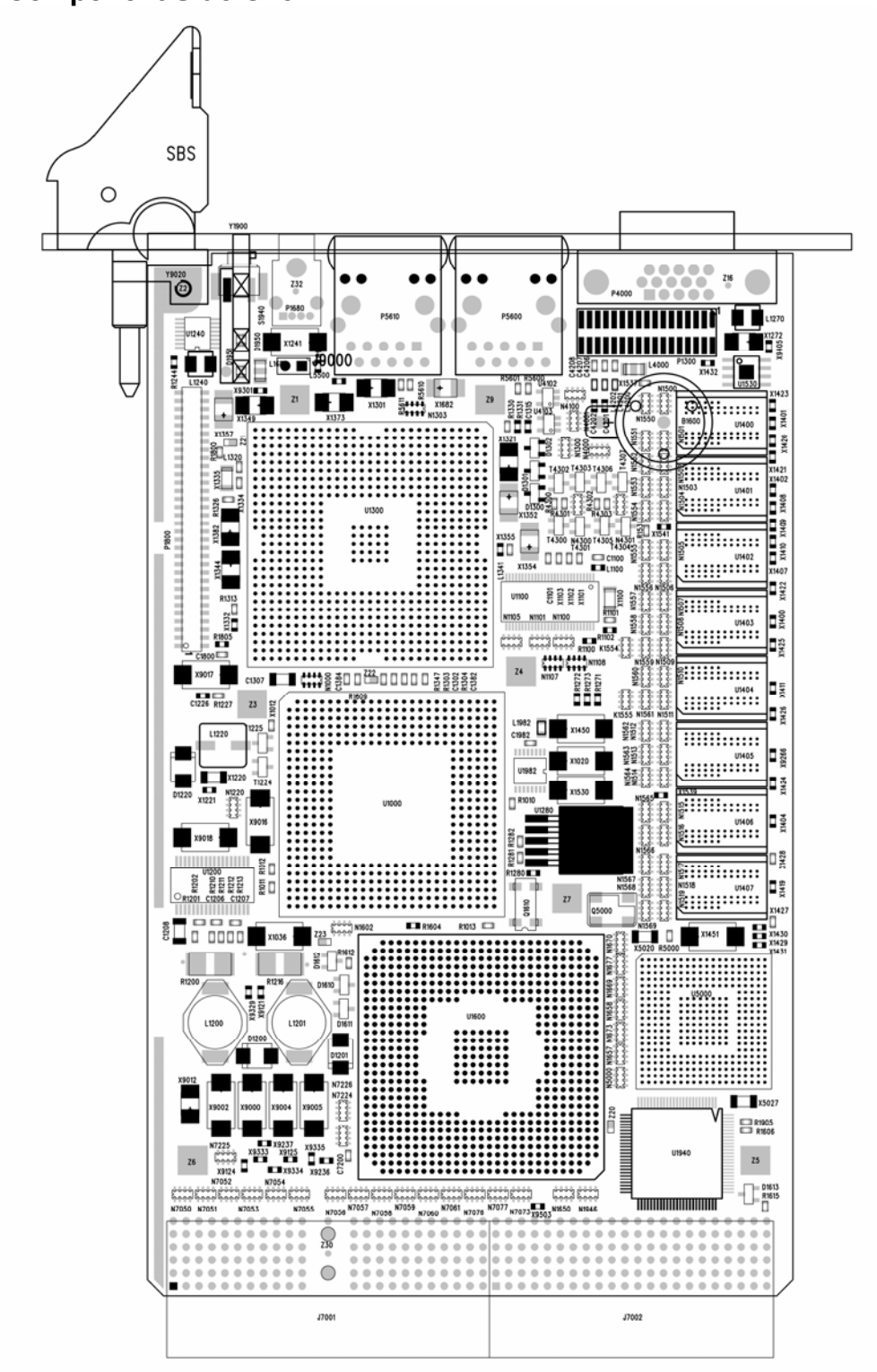



**Figure 21: Placement diagram component side**



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## Placement Plan Solder Side CL9 V1

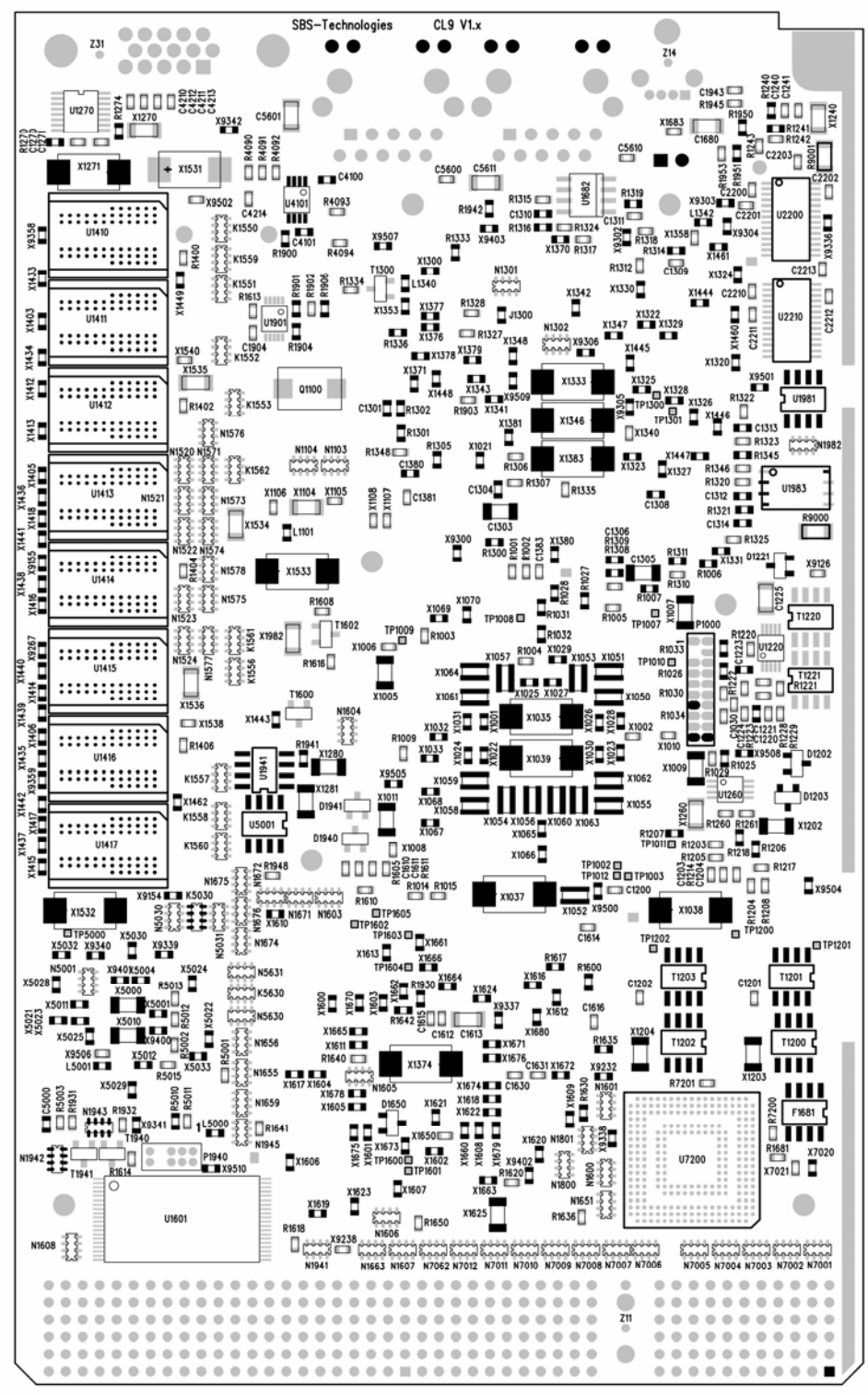



**Figure 22: Placement diagram solder side**



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## Electrical Characteristics

### Audio Line Input (SPB4 Audio Module, P2901)

The Line Input is characterized by the following parameter set (see table 31):

**Table 31: Line Input characteristics**

| Signal Name | Input voltage (typ.) | Input Impedance (min.) |
|---|---|---|
| Left channel | 1.414 $V_{rms}$ (4.0 Vp-p) | 20 kOhm |
| Right channel | 1.414 $V_{rms}$ (4.0 Vp-p) | 20 kOhm |

### Audio Line Output (SPB4 Audio Module, P2902)

The Line Output is characterized by the following parameter set (see table 32):

**Table 32: Line Output characteristics**

| Signal Name | Output voltage (typ.) | Load Impedance |
|---|---|---|
| Left channel | 0.707 $V_{rms}$ (2.0 Vp-p) | 32 Ohm to 10 kOhm |
| Right channel | 0.707 $V_{rms}$ (2.0 Vp-p) | 32 Ohm to 10 kOhm |



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# Appendix A Extension Card CL9-IO

The CL9-IO is a unique extension card for the CL9. It is mainly a carrier card for additional front interfaces and Compact Flash respectively Hard Disk. The combination CL9 and CL9-IO uses the space of two slots (8 HP).



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Please refer to the drawing for the location of available interfaces:

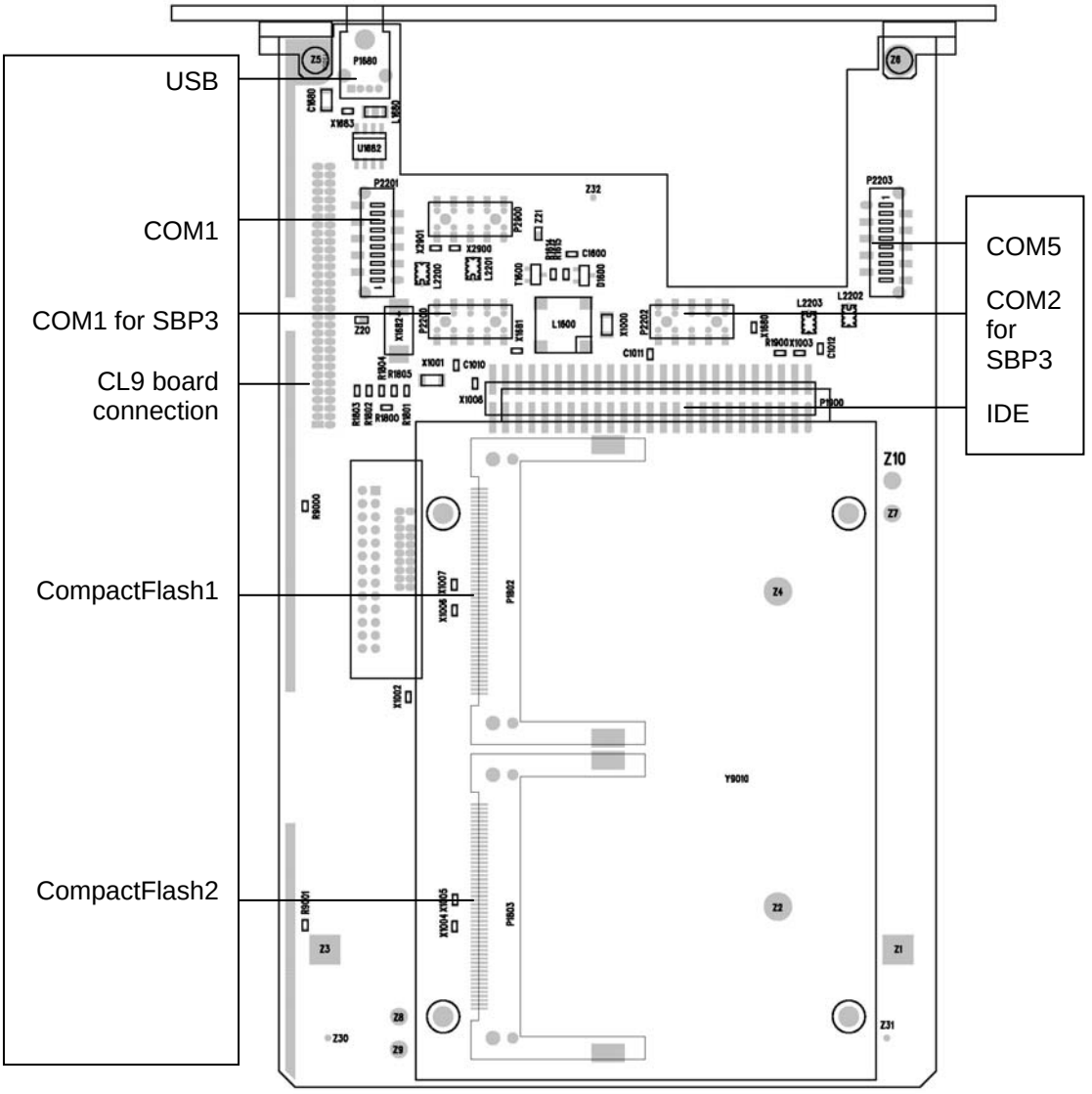



**Figure 23: CL9-IO interfaces**

## CL9-IO Interfaces

### Extension Connector P1800

The extension connector provides the IDE AC97, COM1/2 and USB signals from the CL9 to the CL9-IO board. It is a 64 pin male connector with a 1.27 mm pitch.



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**Table 33: Extension connector P1800**

| Name | P1800 | | Name |
|---|---|---|---|
| \HD_RST | 1 | 2 | GND |
| HD_D7 | 3 | 4 | HD_D15 |
| HD_D6 | 5 | 6 | HD_D14 |
| HD_D5 | 7 | 8 | HD_D13 |
| HD_D4 | 9 | 10 | HD_D12 |
| HD_D3 | 11 | 12 | HD_D11 |
| HD_D2 | 13 | 14 | HD_D10 |
| HD_D1 | 15 | 16 | HD_D9 |
| HD_D0 | 17 | 18 | HD_D8 |
| \HD_IOW | 19 | 20 | HD_DRQ |
| \HD_IOR | 21 | 22 | GND |
| HD_RDY | 23 | 24 | GND |
| \HD_DACK | 25 | 26 | GND |
| HD_IRQ | 27 | 28 | N.C. |
| HD_A1 | 29 | 30 | HD_CDET |
| HD_A0 | 31 | 32 | HD_A2 |
| \HD_CS1 | 33 | 34 | \HD_CS3 |
| HD_DASP | 35 | 36 | GND |
| +5 V | 37 | 38 | +5V |
| AC_BCLK | 39 | 40 | \SPEAKER |
| AC_\RST | 41 | 42 | AC_SDO |
| AC_SYNC | 43 | 44 | USB_P1 |
| AC_SDI2 | 45 | 46 | USB_P1- |
| C2_DTR | 47 | 48 | C2_RI |
| C2_TXD | 49 | 50 | C2_CTS |
| C2_RXD | 51 | 52 | C2_RTS |
| C2_DCD | 53 | 54 | C2_DSR |
| GND | 55 | 56 | FUSE_VCC [a] |
| C1_DTR | 57 | 58 | C1_RI |
| C1_TXD | 59 | 60 | C1_CTS |
| C1_RXD | 61 | 62 | C1_RTS |
| C1_DCD | 63 | 64 | C1_DSR |

[a] Fused +5 V pin with a 2 A fuse and used for USB voltage supply. For normal operation don't exceed 100 mA current. The used fuse does automatically recover if the over current is resolved. An over current condition is indicated at the USB engine.



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### USB Interfaces P1680

The CL9 has four USB 2.0 channels. One of these USB channels is available at the CL9-IO Extension board (see fig. 25).




**Figure 24: USB at extension board**

**Table 34: USB connector P 1680 at extension board**

| Name | P1680 |
|---|---|
| Fused +5 V [a] | 1 |
| USB- | 2 |
| USB+ | 3 |
| GND | 4 |

[a] Fused +5 V pin with a 2 A fuse. For normal operation don't exceed 100 mA current. The used fuse does automatically recover if the over current is resolved.

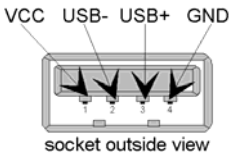



**Figure 25: USB connector layout**



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### Serial Port COM1/2 P2200/P2001/P2002/P2003

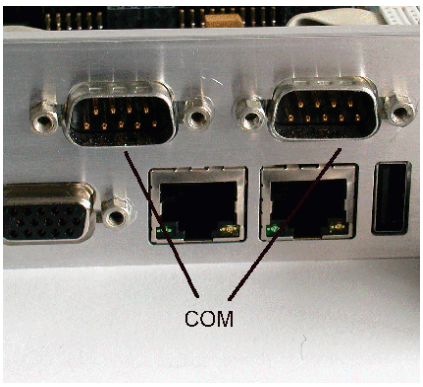



**Figure 26: Serial ports**

The CL9-IO offers two RS232 serial ports with connectors and headers for several configurations at the front panel.

P2201 und P2203 are 10 pin headers to connect the COM ports with cables and D-SUB connectors at the front panel.

**Table 35: RS232 serial ports**

| Name RS232 | COM1/2<br>9 pin D-Sub | P2201,2203 pin<br>header |
|---|---|---|
| DCD | 1 | 1 |
| DSR | 6 | 2 |
| RXD | 2 | 3 |
| RTS | 7 | 4 |
| TXD | 3 | 5 |
| CTS | 8 | 6 |
| DTR | 4 | 7 |
| RI | 9 | 8 |
| GND | 5 | 9 |
| NC | - | 10 |

P2200 and P2202 are female connectors placed where SBP3 boards may be mounted. The SPB3 boards provide conversion from RS232 to RS232 with galvanic isolation and RS422/485 with and without galvanic isolation.



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**Table 36: Serial ports P2200 and P2202 connectors**

| Name RS232 | P2200,P2202 Pin Header |
|---|---|
| DCD | 1 |
| DSR | 2 |
| RXD | 3 |
| RTS | 4 |
| TXD | 5 |
| CTS | 6 |
| DTR | 7 |
| RI | 8 |
| GND | 9 |
| Fused +5 V [a] | 10 |

[a] Fused +5 V pin with a 2 A fuse. For normal operation don't exceed 100 mA current. The used fuse does automatically recover if the over current is resolved.

### 2.5" Hard Disk Connectors P1900

One 2.5" Hard Disk can be mounted on the CL9-IO. The connection is provided by P1900. The hard disk is always set as a master disk. The IDE interface is designed as a 50-pin 2 mm pitch female onboard connector. P1900 fits directly to a 2.5-inch IDE hard drive.



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**Table 37: Hard disk connector P1900**

| Name | P1900 | | Name |
|---|---|---|---|
| NC | 49 | 50 | NC |
| NC | 47 | 48 | NC |
| NC | 45 | 46 | NC |
| GND | 43 | 44 | \RST_DRV |
| HD_D8 | 41 | 42 | HD_D7 |
| HD_D9 | 39 | 40 | HD_D6 |
| HD_D10 | 37 | 38 | HD_D5 |
| HD_D11 | 35 | 36 | HD_D4 |
| HD_D12 | 33 | 34 | HD_D3 |
| HD_D13 | 31 | 32 | HD_D2 |
| HD_D14 | 29 | 30 | HD_D1 |
| HD_D15 | 27 | 28 | HD_D0 |
| NC | 25 | 26 | GND |
| GND | 23 | 24 | HD_DRQ0 |
| GND | 21 | 22 | \HD_IOW |
| GND | 19 | 20 | \HD_IOR |
| NC | 17 | 18 | HD_RDY |
| GND | 15 | 16 | HD_DAK0 |
| NC | 13 | 14 | HD_IRQ14 |
| HD_CDET | 11 | 12 | HD_A1 |
| HD_A2 | 9 | 10 | HD_A0 |
| \HD_CS3 | 7 | 8 | \HD_CS1 |
| GND | 5 | 6 | \HD_ACT |
| +5 V | 3 | 4 | +5 V |
| NC | 1 | 2 | GND |

### Compact Flash Connectors P1802, P1803

If the 2.5” Hard Disk Connector (P1900) is not mounted two Compact Flash connectors can be mounted on the CL9-IO card. P1802 is strapped as the master disk; P1803 is strapped as a slave disk. The CompactFlash interfaces are designed as a 50-pin connector to fit directly to a CompactFlash Module.



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**Table 38: connectors P1802 and P1803**

| Name | P1802/P1803 | | Name |
|---|---|---|---|
| HD_D3 | 2 | 1 | GND |
| HD_D5 | 4 | 3 | HD_D4 |
| HD_D7 | 6 | 5 | HD_D6 |
| GND | 8 | 7 | \HD_CS0 |
| GND | 10 | 9 | GND |
| GND | 12 | 11 | GND |
| GND | 14 | 13 | +5 V |
| GND | 16 | 15 | GND |
| HD_A2 | 18 | 17 | GND |
| HD_A0 | 20 | 19 | HD_A1 |
| HD_D1 | 22 | 21 | HD_D0 |
| NC | 24 | 23 | HD_D2 |
| NC | 26 | 25 | NC |
| HD_D12 | 28 | 27 | HD_D11 |
| HD_D14 | 30 | 29 | HD_D13 |
| \HD_CS1 | 32 | 31 | HD_D15 |
| \HD_IOR | 34 | 33 | NC |
| +5 V | 36 | 35 | \HD_IOW |
| +5 V | 38 | 37 | HD_IRQ |
| NC | 40 | 39 | \MASTER/SLAVE |
| HD_RDY | 42 | 41 | \RST_DRV |
| \HD_DACK | 44 | 43 | HD_DRQ |
| HD_CDET | 46 | 45 | \HD_ACT |
| HD_D9 | 48 | 47 | HD_D8 |
| GND | 50 | 49 | HD_D10 |

### Speaker

On the CL9-IO is a speaker circuit for PC compatible speaker output but also to indicate Post Code with short and long beeps. Post Codes are transferred to the speaker if they have another value than ‘00hex’ and longer stable than two seconds. A long beep is a 1; short beep is 0 starting with bit seven of the actual Post Code. For interpretation the Post Codes see the 'AMI-BIOS Errors and Beep Codes’ manual.

Short periodic beeps indicate a CPU over temperature.



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## Placement Plan CL9-IO

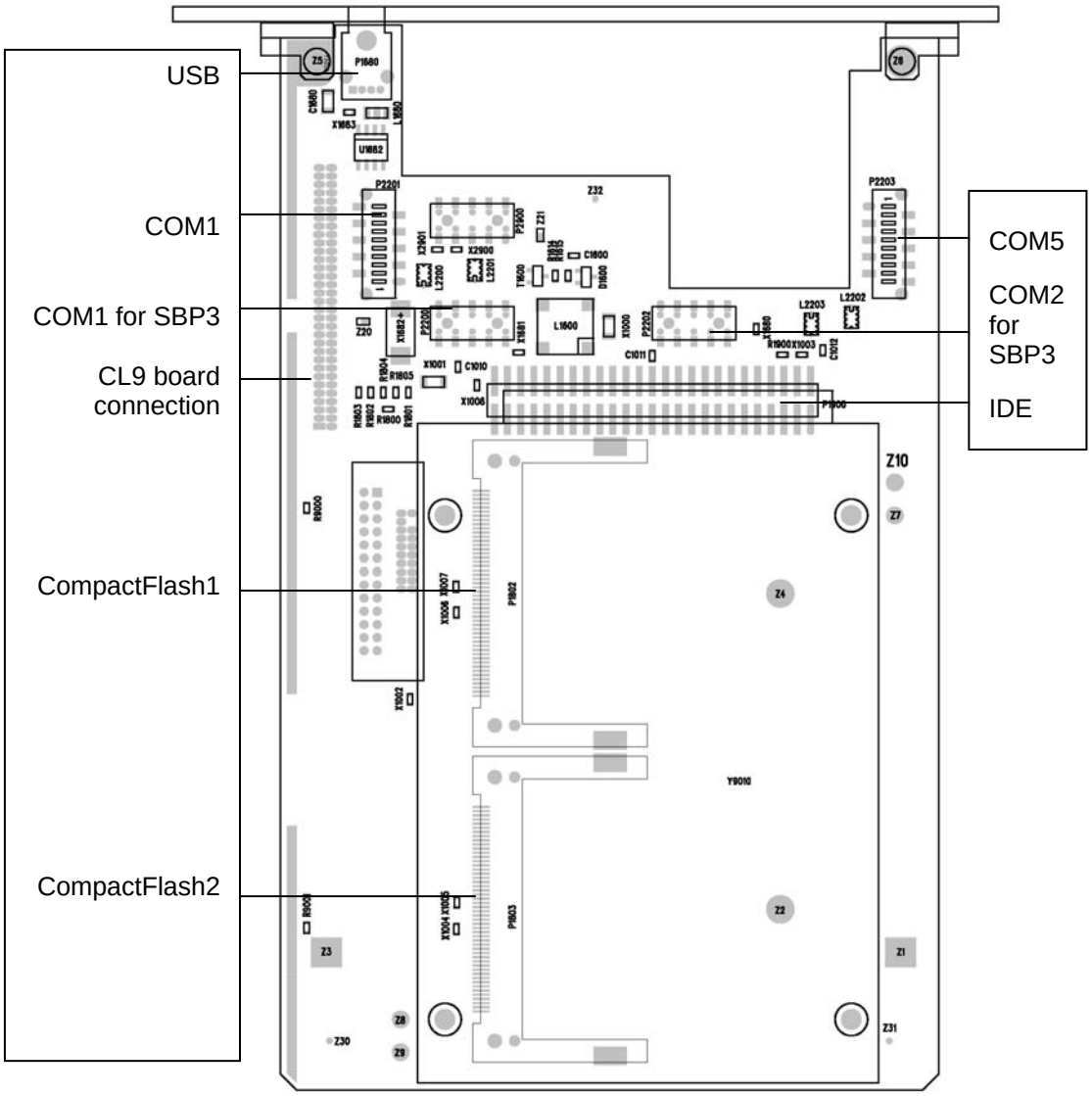



**Figure 27: Placement plan CL9-IO**



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# Appendix B Transition Module CTM15

The CTM15 transition module is used for easy connection of I/O signals to standard connectors.

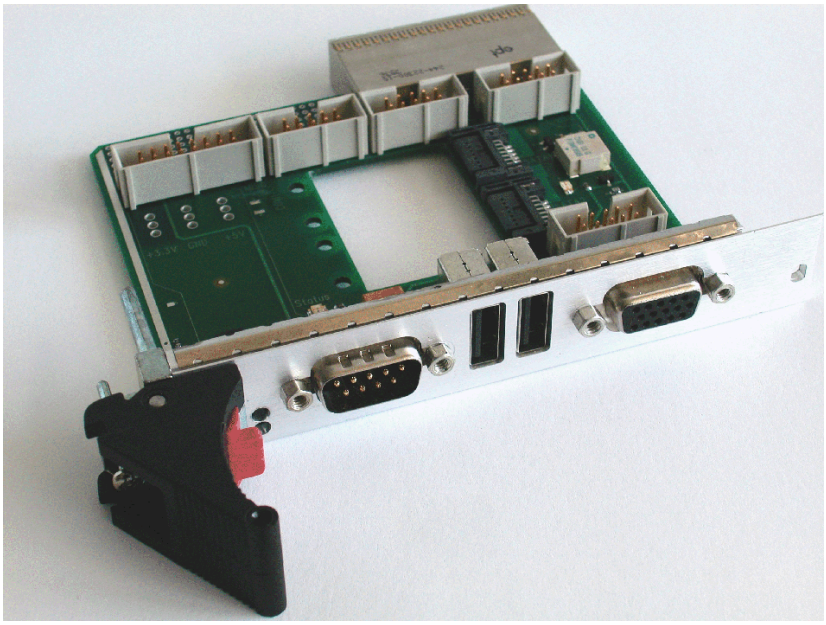


**Figure 28: Transition Module CTM15**

Please refer to the drawing for the location of available interfaces:



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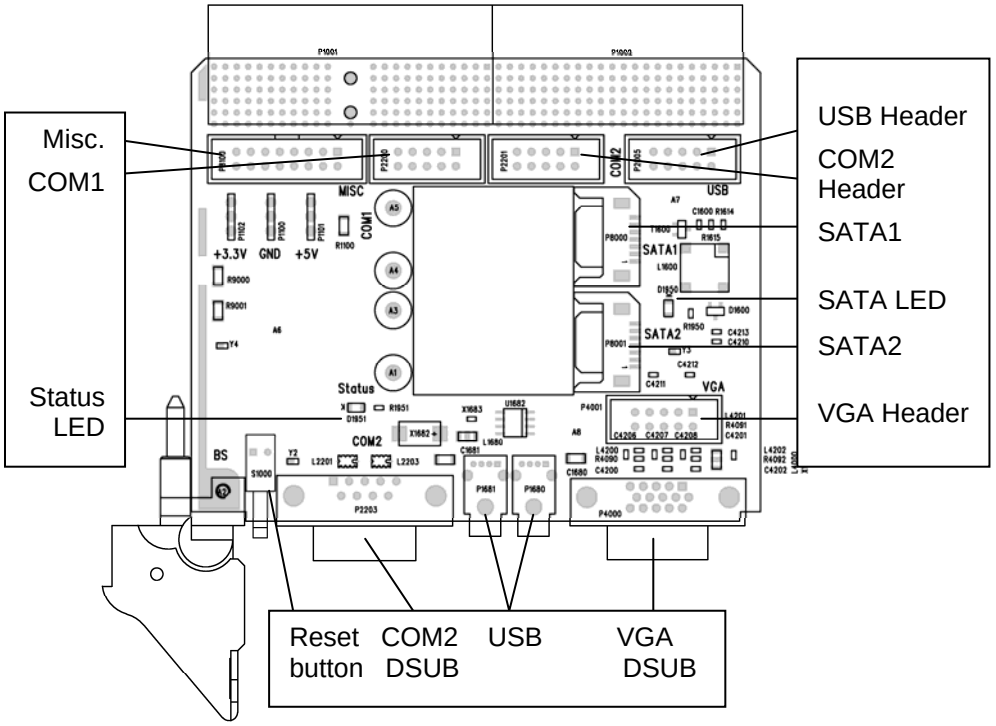



**Figure 29: Layout of Transition Module**

## CTM15 Interfaces

This chapter describes all connector pinouts on the CTM15 transition module.

### USB Interfaces P2005, P1680 and P1681

The CL9 has four USB 2.0 channels.
USB 2 / 3 channels are available at the transition module.
USB1 is available at a 10-pin header only if this is special single-slot version (W- number) of CL9.



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**Table 39: USB interfaces P2005, P1680 and P1681**

| Name | P2005 |
|---|---|
| NC | 1 |
| NC | 2 |
| USB 1 - | 3 |
| USB 1 + | 4 |
| NC | 5 |
| NC | 6 |
| NC | 7 |
| NC | 8 |
| GND | 9 |
| Fused +5 V | 10 |

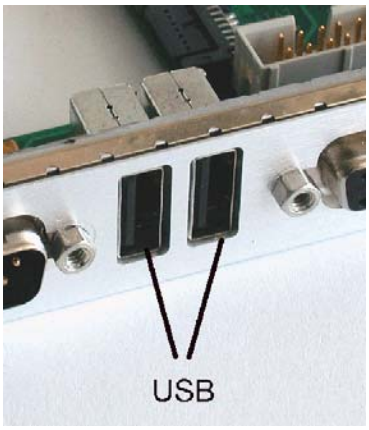



**Figure 30: USB at Transition Module**

**Table 40: USB at Transition Module**

| Name | P1680 | P1681 |
|---|---|---|
| Fused +5 V [a] | 1 | 1 |
| USB 2/3 - | 2 | 2 |
| USB 2/3 + | 3 | 3 |
| GND | 4 | 4 |



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[a] Fused +5 V pin with a 2 A fuse. For normal operation don't exceed 100 mA current. The used fuse does automatically recover if the over current is resolved.

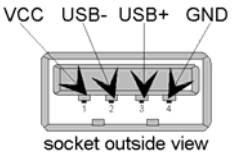



**Figure 31: USB connector layout**

### Serial Interfaces COM1 (P2200) and COM2 (P2201/P2203)

The CL9 offers two RS232 serial ports. All COM ports are accessible via the transition module on 10-pin headers. COM2 is also available at the rear panel with a 9-pin D-sub connector.

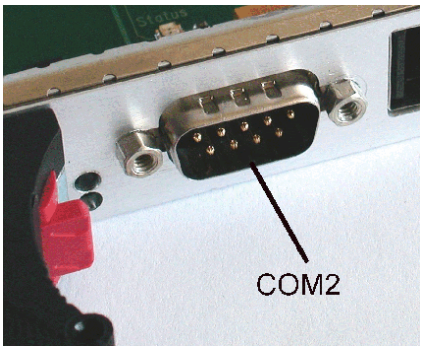



**Figure 32: COM at Transition Module**



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**Table 41: COM at Transition Module**

| Name RS232 | COM2 P2203 9 pin D-Sub | P2200,2201 pin header |
|---|---|---|
| DCD | 1 | 1 |
| DSR | 6 | 2 |
| RXD | 2 | 3 |
| RTS | 7 | 4 |
| TXD | 3 | 5 |
| CTS | 8 | 6 |
| DTR | 4 | 7 |
| RI | 9 | 8 |
| GND | 5 | 9 |
| +5 V unfused [a] | - | 10 |

[a] +5 V supply via P1101 of the CTM15

### VGA Interface P4001

The VGA monitor signals are available on P4001 a 10-pin male header and a standard 15-pin D-Sub P4000 connector.

**Table 42: VGA interface P4001**

| **Name** | P4001 |
|---|---|
| RED | 2 |
| GREEN | 4 |
| BLUE | 6 |
| HSYNC | 8 |
| VSYNC | 10 |
| GND | 1, 3, 5, 7, 9 |



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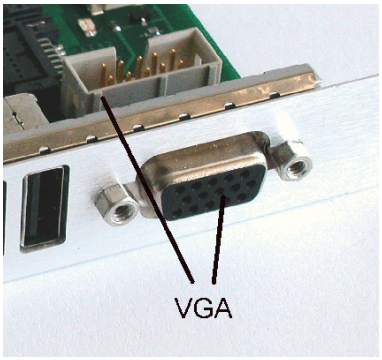



**Figure 33: VGA at Transition Module**

**Table 43: VGA interface at P4000**

| Name | P4000 |
|---|---|
| RED | 1 |
| GREEN | 2 |
| BLUE | 3 |
| HSYNC | 13 |
| VSYNC | 14 |
| DDC-Data | 12 |
| DDC-Clock | 15 |
| Fused +5 V [a] | 9 |
| GND | 5, 6, 7, 8, 10 |
| NC | 4, 11 |

[a] Fused +5 V pin with a 2 A fuse. For normal operation don't exceed 100 mA current. The used fuse does automatically recover if the over current is resolved.



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### Misc. connector P8100

P2000 a 16 pin header contains miscellaneous signals:

**Table 44: Miscellaneous connector P8100**

| Name | P8100 | | Name |
|---|---|---|---|
| GPIO0 | 1 | 2 | GPIO1 |
| GPIO2 | 3 | 4 | GPIO3 |
| GPIO4 | 5 | 6 | GPIO5 |
| GPIO6 | 7 | 8 | GPIO7 |
| \SPEAKER [e] | 9 | 10 | \RSTBUT [d] |
| EXTBATT | 11 | 12 | \STATUS_LED [b] |
| \ATA_LED [c] | 13 | 14 | GND |
| GND | 15 | 16 | FUSE_VCC [a] |

[a] Fused +5 V pin with a 2 A fuse. For normal operation don't exceed 100 mA current. The used fuse does automatically recover if the over current is resolved.

[b] The status LED is also used at CTM15 and drives a red LED with following meaning:

**Table 45: Status LED at CTM15**

| Status | LED color |
|---|---|
| Power-up, still Reset state | Red on |
| BIOS Power-Up | Blink red |
| OS boot | Led off |
| System halted or reset | Red on |
| CPU overtemperature | Blinking red |
| User (same as green front LED) | Red on or off |

[c] The ATA_LED signal is also used on the CTM15 and indicates activity at one of the Serial ATA interfaces.

[d] RST_BUT is also wired to a reset button accessible at the front panel of the CTM15.

[e] The SPEAKER signal drives also a speaker which is already on the CTM15.

### Serial ATA Connectors P8000, P8001

P8000 and P8001 provide two serial ATA connections for direct connection of SATA drives. The maximal cable length is 1m.



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**Table 46: Serial ATA connectors P8000 and P8001**

| **Name** | P8000, P8001 |
|---|---|
| GND | 1 |
| TX+ | 2 |
| TX- | 3 |
| GND | 4 |
| RX+ | 5 |
| RX- | 6 |
| GND | 7 |

### Power connectors P1100, P1101, P1102

These power connectors are only optionally mounted (ask factory) to power the CL9 without a backplane.

P1100 GND
P1101 +5 V
P1102 +3.3 V



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## Placement Plan CTM15

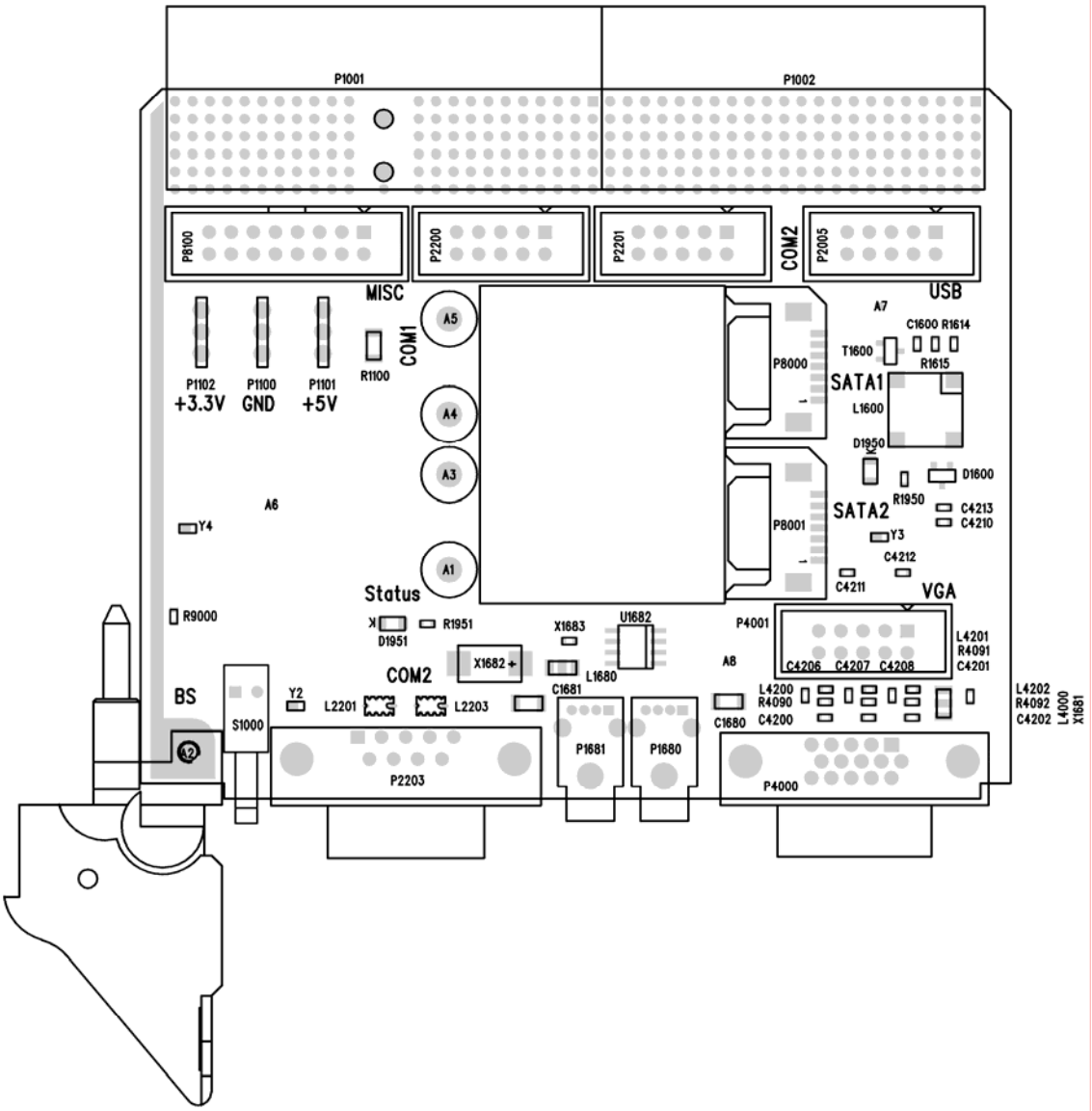



**Figure 34: Placement plan CTM15**



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# Appendix C DVO to DVI Converter TMDS3

The DVO to DVI converter board TMDS3 (see figure 36) provides a Digital Visual Interface (DVI) with TMDS (Transmission Minimized Differential Signaling) outputs. The DVI-D connector is as ‘Digital-Only’ version optionally available at the front panel.



**Figure 35: Photo of DVO to DVI converter TMDS3**



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Please refer to figure 37 to locate available interfaces:

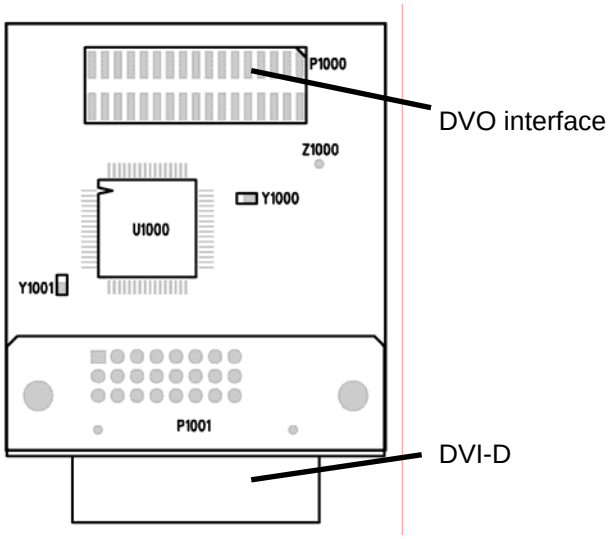



**Figure 36: DVO to DVI converter TMDS3 interfaces**

### TMDS3 Interfaces

This chapter describes all connector pinouts on the TMDS3 DVO to DVI converter.

### DVO interface (P1000)

The 12-bit Digital Video Output interface is available at the TMDS3 board on a 34-pin header. This pin header is used to connect the TMDS3 board via cable to the CL9 Single Board Computer.

**Table 47: DVO interface connector P1000**

| Signal Name | P1000 | | Signal Name |
|---|---|---|---|
| GND | 1 | 2 | GND |
| GND | 3 | 4 | GND |
| DVOB_CLKINT | 5 | 6 | DVOBC_\INTR |
| DVOB_DATA00 | 7 | 8 | MDVI_DATA |
| DVOB_DATA01 | 9 | 10 | MDVI_CLK |
| DVOB_DATA02 | 11 | 12 | DDC_CLK |
| DVOB_DATA03 | 13 | 14 | DDC_DATA |
| DVOB_DATA04 | 15 | 16 | GND |
| DVOB_DATA05 | 17 | 18 | GND |
| DVOB_DATA06 | 19 | 20 | +3.3 V |
| DVOB_DATA07 | 21 | 22 | +3.3 V |
| DVOB_DATA08 | 23 | 24 | GND |
| DVOB_DATA09 | 25 | 26 | GND |
| DVOB_DATA10 | 27 | 28 | DVOB_VSYNC |
| DVOB_DATA11 | 29 | 30 | DVOB_HSYNC |
| DVOB_\BLANK | 31 | 32 | Fused +5V [a] |
| DVOB_CLK | 33 | 34 | DVOB_\CLK |



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[a] +5 V supply voltage with 2 A fuse. For normal operation don't exceed 100 mA current. The used fuse does automatically recover if the over current is resolved.

### DVI-D interface (P1001)

The TMDS3 board provides a Digital Visual Interface (DVI) with TMDS (Transmission Minimized Differential Signaling) outputs (see table 48). The DVI-D connector is as 'Digital-Only' version optionally available at the front panel (see figure 38).

**Table 48: DVI-D connector**

| Signal name | DVI-D | | Signal name |
|---|---|---|---|
| TX2- (TMDS Data2–) | 1 | 13 | NC |
| TX2+ (TMDS Data2+) | 2 | 14 | Fused +5V [a] |
| GND | 3 | 15 | GND |
| NC | 4 | 16 | NC |
| NC | 5 | 17 | TX0- (TMDS Data0–) |
| DDC CLK | 6 | 18 | TX0+ (TMDS Data0+) |
| DDC DAT | 7 | 19 | GND |
| VSYNC | 8 | 20 | NC |
| TX1- (TMDS Data1–) | 9 | 21 | NC |
| TX1+ (TMDS Data1+) | 10 | 22 | GND |
| GND | 11 | 23 | TXC+ (TMDS Clock+) |
| NC | 12 | 24 | TXC- (TMDS Clock–) |

[a] +5 V supply voltage with 2 A fuse. For normal operation don't exceed 100 mA current. The used fuse does automatically recover if the over current is resolved.

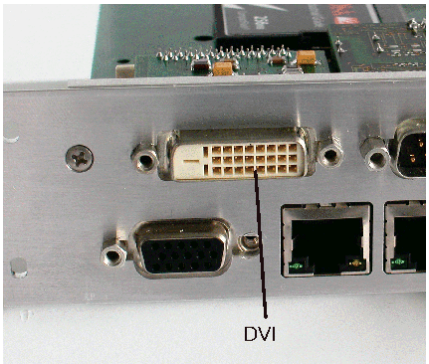



**Figure 37: DVI connector**



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## Placement Plan TMDS3

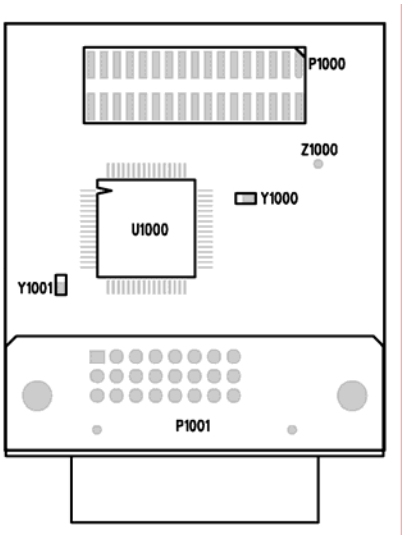



**Figure 38: Placement plan TMDS3**



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# Appendix D Audio Module SPB4

The Audio Module SPB4 (see figure 40) provides two analogue interfaces Line-Input and Line-Output, as well as one optical digital interface S/PDIF-Output. All audio connectors are optionally available in the 8HP front panel version of the CL9 Single Board Computer.

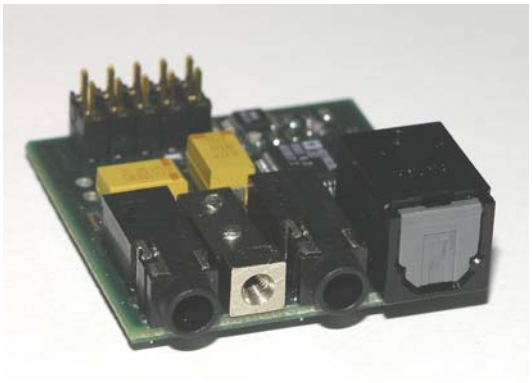


**Figure 39: Photo of Audio Module SPB4**



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Please refer to figure 41 to locate available SPB4 interfaces:

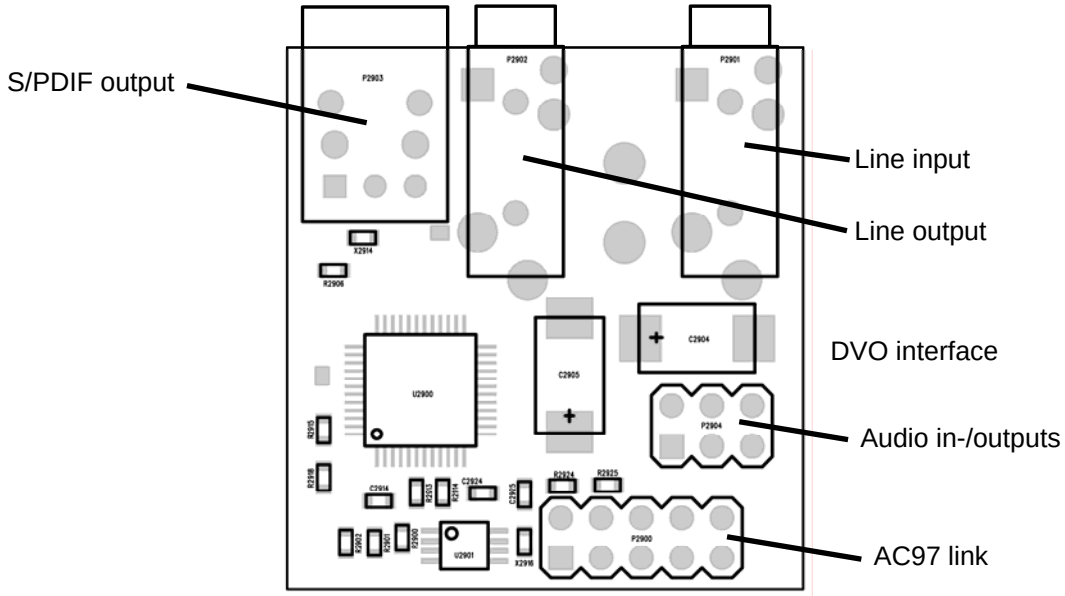



**Figure 40: Audio Module SPB4 interfaces**

### SPB4 Interfaces

This chapter describes all connector pinouts on the SPB4 Audio Module:

### AC97 link interface (P2900)

Basically, the SPB4 Audio Module uses the AC97 link as connection to the Intel 6300ESB I/O Controller Hub of the CL9 Single Board Computer. On SPB4 side this connection is realized with a 10-pin header (see table 49). This pin header connects the SPB4 board as piggyback to the CL9-IO Extension board.

**Table 49: AC97 link interface connector P2900**

| Signal Name | P2900 | | Signal Name |
|---|---|---|---|
| AC_BCLK | 1 | 2 | AC_SDO |
| AC_SYNC | 3 | 4 | AC_SDI |
| AC_\RST | 5 | 6 | GND |
| +5 V | 7 | 8 | GND |
| +5 V | 9 | 10 | GND |

### Audio in-/outputs (analogue in-/outputs only, P2904)

The analogue input signal (CD input or alternative the line input) and in addition the analogue output signal (line output) are available on a 6-pin header. This connector isn't used in combination with the CL9 Single Board Computer.



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**Table 50: Audio in-/outputs connector P2904**

| Signal Name | P2900 | | Signal Name |
|---|---|---|---|
| CD_IN_R | 1 | 2 | CD_IN_L |
| CD_GND | 3 | 4 | Analog GND |
| LINE_OUT_R | 5 | 6 | LINE_OUT_L |

### Line Input (P2901)

The SPB4 Audio Module provides one analogue Line Input for recording of mono/stereo signals. The used 3.5 mm stereo jack is optionally available in the 8HP front panel version of the CL9 Single Board Computer (see figure 42).

**Table 51: Line Input connector P2901**

| Signal Name | Signal Name |
|---|---|
| 1 | Analog GND |
| 2 | Left Channel |
| 3 | Right Channel |
| 4 | Analog GND |
| 5 | Analog GND |

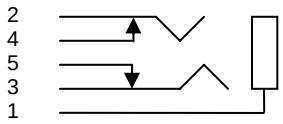



**Figure 41: Line Input connector**

### Line Output (P2902)

The SPB4 Audio Module provides one analogue Line Output for playback of mono/stereo signals. The used 3.5mm stereo jack is optionally available in the 8HP front panel version of the CL9 Single Board Computer (see figure 43).

**Table 52: Line Output connector P2902**

| Signal Name | Signal Name |
|---|---|
| 1 | Analog GND |
| 2 | Left Channel |
| 3 | Right Channel |
| 4 | NC |
| 5 | NC |

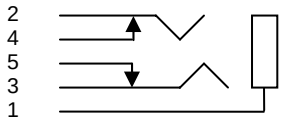



**Figure 42: Line Output connector**



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**S/PDIF Output (P2903)**

The SPB4 Audio Module provides one optical digital S/PDIF (Sony/Philips-Digital Interface) output for audio playback up to 6 channels. The used TOSLINK connector is optionally available in the 8HP front panel version of the CL9 Single Board Computer (see figure 44).

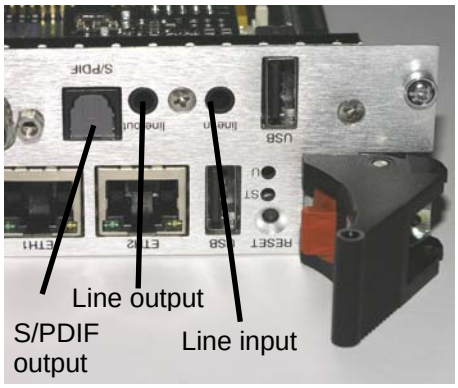



**Figure 43: Front panel audio connectors**

## Placement Plan SPB4

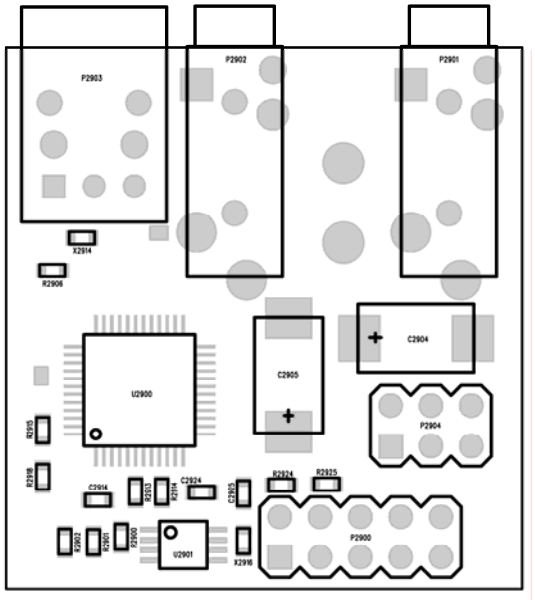


**Figure 44: Placement plan SPB4**



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# Appendix E Support, Service And Warranty Information

### Chapter Scope

The following sections describes SBS Technologies' product support program. It states our product warranty terms and provides details about what action to take if you experience a problem with the product.

### Geographical Regions

World-wide headquarter of SBS Technologies, Inc. is at

SBS Technologies Inc.
7401 Snaproll St., NE
Albuquerque, NM 87109
U.S.A.

SBS Technologies, Inc. uses two regional headquarters for the purpose of support, service, RMA returns and other functions.

Regional areas:

| | |
|---|---|
| WW | world-wide |
| EU | Europe, Russia, Near East, India, Africa |
| US | Americas & Pacific Rim (Japan, Korea, China, Philippines, AUS, NZ) |

## Technical Support

If you should have a problem with a SBS product: Free technical support is available by phone, fax or email. Telephone support is available during the hours indicated at main locations or at the regional center where the product was bought.



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| EU | US |
|---|---|
| Monday through Thursday<br>8:00 – 17:00 (CET)<br>Friday<br>8:00 – 16:00 (CET)<br>Phone +49-821-5034-170<br>Fax +49-821-5034-119<br>E-Mail Aug-support@sbs.com | Monday through Friday<br>8:30 AM – 5:30 PM (Eastern Time)<br><br>Phone +1-505-875-0600<br>Fax +1-505-875-0400<br>E-Mail<br>support.government@sbs.com |

## Support on the Web

For support and information, visit our website at
http://www.sbs.com/

Information for components, corresponding driver software, etc. can also be found at the following locations:

| | |
|---|---|
| AMD Corp. | www.amd.com |
| American Megatrends | www.ami.com |
| Fedora | www.fedora.redhat.com |
| IBM Corp. | www.ibm.com |
| Intel Corp. | www.intel.com |
| Linear Technology | www.linear-tech.com |
| Microsoft Corp. | www.microsoft.com |
| Freescale Corp. | www.freescale.com |
| Novell | www.novell.com |
| NVIDIA | www.nvidia.com |
| PCI Industrial Computer Manufacturing Group | www.picmg.org |
| PLX Technology | www.plxtech.com |
| QNX Software Systems | www.qnx.com |
| Red Hat | www.redhat.com |
| Smybios Logic | www.lsilogic.com |
| VITA | www.vita.com |
| Wind River Systems | www.windriver.com |

## Warranty

SBS Technologies' products come with a 'return-to-factory' warranty which covers defects in materials and workmanship for a period of **two years in the case of board-level products and one year in the case of system-level products** from the date of product shipment to the customer (original purchaser), provided the product is unmodified and has been subject to normal and proper use.

For details refer to the 'Terms and Conditions' of your purchase contract



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## Repairs

### Warranty Repairs

Any product returned and found to be under warranty will be repaired or replaced at the discretion of SBS. The return shipping freight is paid by SBS.

### Non-Warranty Repairs

If a product is found not to be under warranty, SBS will:

- Repair the product without notice of the customer when the cost is below Euro/US$250.
- Notify the customer of the non-warranty situation and provide a cost estimate to the customer, if the cost of the repair is equal to or greater than Euro/US$250. Non-warranty repairs above Euro/US$250 generally require that a purchase order be issued to SBS Technologies for the amount of the repair before repairs are undertaken.

The customer in addition to repair cost pays the shipping freight.

### Procedure

In the event of repair, please return the product together with additional information. Please use the error report at the end of this manual and fill in:

- Description of the type of defect.
- Is the defect restricted to certain environmental conditions?
- What was the hardware environment before the defect appeared?
- Where there input signals? If yes, which?
- Please specify ‘warranty’ or ‘non-warranty’ repair.

You may use the report form at the end of this manual for this purpose.

Please use the original packing material for shipping to avoid damage. Otherwise warranty may be lost.

To expedite assistance for problems, also provide the following:

- Your name, phone and company.
- Product with which you are having trouble.
- Serial Number, Part Number and Revision.
- Hardware environment the product is used.
- Operating system you are running.
- Detailed description of your problem and any error messages that have appeared on the screen.
- The name of a technically qualified individual at your company familiar with the product failure.

Depending on the circumstances of the problem, it may be deemed necessary to return the product to SBS Technologies for repair. In order to return the product for repair, the following steps are necessary:

- Obtain a Return Material Authorization number (RMA#) from SBS Customer Support.
- Ship the product prepaid to the designated repair point.
- Provide a written description of the claimed defect with the product.



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### Obtaining an RMA Number

To obtain a product Return Material Authorization number (RMA#), you should call our Customer Service department through our main number.

### Shipping the Product

Any product returned to SBS should be in its original shipping carton if possible. Otherwise the product should be carefully packed in a conductive (ESD) packing material and placed in a cushioned corrugated carton suitable for shipping.

Please mark the shipping label with the RMA number and return it to:

| **EU** | **US** |
|---|---|
| SBS Technologies GmbH & Co. KG<br>RMA# (*put RMA here*)<br><br>Memminger Strasse 14<br>86159 Augsburg<br>Germany | Customer Service Dept.<br>ATTN: RMA# (*put RMA here*)<br>SBS Technologies, Inc.<br>7401 Snaproll St., NE<br>Albuquerque, NM 87109<br>U.S.A. |

**Note:**
Returns in the US and associated regions should be sent to the office where products were bought. See separate address list of office, support and RMA addresses.



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| | **Support addresses** | |
|---|---|---|
| Albuquerque, USA (Corporate) | SBS Technologies Inc.<br>7401 Snaproll St., NE<br>Albuquerque, NM 87109<br>U.S.A. | Phone: +1-505-875-0600<br>Fax: +1-505-875-0400<br>Email: sbssales@sbs.com |
| Augsburg, D | SBS Technologies GmbH & Co. KG<br>Memminger Str. 14<br>86159 Augsburg<br>Germany | Phone: +49-821-5034-170<br>Fax: +49-821-5034-119<br>Email: aug-support@sbs.com |
| Mansfield, USA | SBS Technologies Inc.<br>603 West Street<br>Mansfield, MA 02048<br>USA | Phone: +1-508-261-7007<br>Fax: +1-508-261-1420<br>Email: sales.communications@sbs.com |
| Newark, USA | SBS Technologies Inc.<br>8371-C Central Avenue<br>Newark, CA 94560<br>USA | Phone: +1-510-742-2500<br>Fax: +1-510-742-2501<br>Email: info.commercial@sbs.com |
| Raleigh, USA | SBS Technologies Inc.<br>6301 Chapel Hill Road<br>Raleigh, NC 27607<br>USA | Phone: +1-919-851-1101<br>Fax: +1-919-851-2844<br>Email: sales.ec@sbs.com |
| Shenzhen, CN | SBS Technologies<br>Room 501-502<br>Cyber Times Tower B<br>Tianan Cyber Park<br>Futian District<br>Shenzhen 518041<br>P.R. China | Phone: +86-755-8347-5668<br>Fax: +86-755-8347-6535<br>Phone 800-830-9165 (China only)<br>Email: china-sales@sbs.com<br>Web: http://china.sbs.com |
| St. Paul, USA | SBS Technologies Inc.<br>1284 Corporate Center Drive<br>St. Paul, MN 55121-1245<br>USA | Phone: +1-651-905-4700<br>Fax: +1-651-905-4701<br>Email: info.commercial@sbs.com |
| Waterloo, CDN | SBS Technologies Inc.<br>101 Randall Drive<br>Waterloo, ON N2V 1C5<br>CDN | Phone: +1-519-880-8228<br>Fax: +1-519-880-8118<br>Email: support.fpga@sbs.com |



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## Error Report Form

When you are returning a product for repair, it is very important to include a written report which details the nature of the problem in order to expedite the repair. Please always use the Error Report Form attached at the end of this manual or include the following information:

- RMA Number, if applicable
- Product & Serial Number
- Part Number
- Version
- Bios built date [a]
- Contact: Name & Phone Number
- Detailed Description of the Problem/Defect

[a] The Bios built date can be found on the BIOS boot up summary. Please get into BIOS SETUP and deselect the quick boot option in the BOOT menu.

Example/coding of the ID line:

| 62 – | 0102 – | 004199 – | 00101111 – | 071595 - | E7501 – | VR9 - | Y2KC-0 |
|---|---|---|---|---|---|---|---|
| | | | | | | | year 2000 compliant |
| | | | | | | project ID | |
| | | | | | chip set | | |
| | | | | AMIBIOS core copyright date | | | |
| | | | BIOS features | | | | |
| | | supplier ID | | | | | |
| | major & minor BIOS revisions | | | | | | |
| processor, flash ROM size | | | | | | | |

You can stop the video output for proper reading the three information lines as described: Simply press the ‘0 / Enter’ key during the start-up sequence. This key is located on the numeric keypad of your keyboard.



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**Error Report Form (EU)**

| | |
|---|---|
| SBS Technologies GmbH & Co. KG | Company Name |
| Memminger Str. 14 | Department |
| 86159 Augsburg | Contact Person |
| Germany | Mailing Address |
| Phone Number +49 821 5034-170 | Phone Number |
| Fax Number +49 821 5034-119 | Fax Number |
| RMA# _____ | Email Address |

Part. No. _____ Version __ . __ Date __ __ __ Serial No. _____

Error Description:

Hardware Environment:

Operating System/Software:

Warranty repair: ❑ YES ❑ NO (Please see section 'Warranty')

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**Error Report Form (US)**

| | |
|---|---|
| SBS Technologies, Inc. | Company Name |
| | Department |
| | Contact Person |
| | Mailing Address |
| Phone Number + | Phone Number |
| Fax Number + | Fax Number |
| RMA# _____ | Email Address |

Part. No. _____ Version __ . __ Date __ __ __ Serial No. _____

| |
|---|
| Error Description: |
| |
| |
| |
| |
| |
| Hardware Environment: |
| |
| |
| |
| |
| |
| Operating System/Software: |
| |
| |
| |
| |
| |
| Warranty repair: ❑ YES ❑ NO (Please see section 'Warranty') |

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