

Hardware Reference Manual

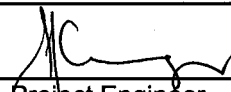


for the

Gigabit Ethernet Adapter

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Abbreviations and Acronyms

ACT	Activity
BMU	Buffer Management Unit
CCPMC	Conduction-Cooled PMC
CMC	Common Mezzanine Card
CPU	Central Processing Unit
C ² I ² Systems	CCII Systems (Pty) Ltd
EEPROM	Electrically Erasable Programmable Read Only Memory
FP	Front Panel
GE	Gigabit Ethernet
GMAC	Gigabit MAC
GPHY	Gigabit PHY
I/O	Input/Output
IC	Integrated Circuit
LED	Light Emitting Diode
MAC	Media Access Control
N/A	Not Applicable
N/C	Not Connected
PCI	Peripheral Component Interconnect
PHY	Physical Interface
PMC	PCI Mezzanine Card
RAM	Random Address Memory
SFF/LC	Small Formfactor/Lucent Connector
SPI	Serial Peripheral Interface
VPD	Vital Product Data

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1. **Scope**

1.1 Identification

This document is the Hardware Reference Manual for the C2I2 Systems Dual Channel Gigabit Ethernet (GE) Adapter, hereinafter named the GE Adapter.

1.2 System Overview

The GE Adapter attaches computers to 10 Mbps, 100 Mbps and 1 Gbps Ethernet networks using copper or fibre optic cabling.

The GE Adapter is currently available in Air-Cooled PMC, Conduction-Cooled PMC (CCPMC) and PC-104 formfactors.

Applicable Part Numbers are :

PMC

CCII/GNET/PMC/2P/RJ/FP/COM	UTP Commercial Grade Adapter
CCII/GNET/PMC/2P/RJ/FP/IND	UTP Industrial Grade Adapter
CCII/GNET/PMC/2P/SX/FP/COM	Multimode Fibre Commercial Grade Adapter
CCII/GNET/PMC/2P/SX/FP/IND	Multimode Fibre Industrial Grade Adapter
CCII/GNET/PMC/2P/LX/FP/COM	Singlemode Fibre Commercial Grade Adapter
CCII/GNET/PMC/2P/LX/FP/IND	Singlemode Fibre Industrial Grade Adapter

CCPMC

CCII/GNET/PMC/2P/BP/CC	UTP, Backplane I/O, Conduction-Cooled Adapter
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PC-104

CCII/GNET/PC104/2P/RJ/COM	UTP Commercial Grade Adapter
CCII/GNET/PC104/2P/RJ/IND	UTP Industrial Grade Adapter
CCII/GNET/PC104/2P/SX/COM	Multimode Fibre Commercial Grade Adapter
CCII/GNET/PC104/2P/SX/IND	Multimode Fibre Industrial Grade Adapter
CCII/GNET/PC104/2P/LX/COM	Singlemode Mode Fibre Commercial Grade Adapter
CCII/GNET/PC104/2P/LX/IND	Singlemode Fibre Industrial Grade Adapter

This Hardware Reference Manual applies to all versions.

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2. **Applicable and Reference Documents**

2.1 Applicable Documents

- 2.2.1 IEEE Std 1386-2001, *IEEE Standard for a Common Mezzanine Card (CMC) Family*, dated 2001-06-14.
- 2.2.2 PCI Special Interest Group, *PCI Local Bus Specification*, Rev. 2.2, dated 1998-12-18.
- 2.2.3 PCI Special Interest Group, *PCI-X Addendum to the PCI Local Bus Specification, Rev 1.0a*, dated 2000-07-24.
- 2.2.4 *PC/104-Plus Specification Version 2.0*, dated November 2003.
- 2.2.5 ANSI/Vita Std 20-2001, *American National Standard for Conduction-Cooled PMC*, dated 2001-08-31.
- 2.2.6 IEEE STD 802.3ab-1999, *Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications-Physical Layer Parameters and Specification-for 1000 Mb/s Operation over 4-pair of Category 5 Balanced Copper Cabling, Type 1000 BASE-T*.

2.2 Reference Documents

None.

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3. **Architecture**

3.1 Overview

The GE Adapter is functionally identical to the Sysconnect SK-9S22 Peripheral Component Interconnect (PCI) Dual Channel Gigabit Ethernet Server Adapter. It is however modified into the PMC and PC-104 formfactors and is consequently substantially more physically robust and environmentally resilient than an adapter in the PCI formfactor.

Software drivers for the SK-9S22, in respect of MS-DOS, Windows, Linux, FreeBSD, Solaris and other operating systems, will also work with the GE Adapter. In addition to this, software drivers for VxWorks and other embedded operating systems are available from C²I² Systems.

The GE Adapter supports a variety of physical media. In addition to the standard copper (/RJ), multimode fibre (/SX) and singlemode fibre (/LX), longhaul options using high power optical transceivers are also available as special order items (e.g. /LH).

3.2 Functional Block Diagram

The GE Adapter consists of the following functional elements :

- PMC or PCI-104 Interface
- Integrated GMAC/GPHY Gigabit Ethernet Controller (Yukon 88E8022ES1)
- SPI Serial Flash Memory (2 Mbit)
- Serial EEPROM (8 Kbit)
- Indicators (LEDs to display connection speed and status)
- System Hardware Monitor
- Two Gigabit Ethernet Physical Interfaces (PHY)

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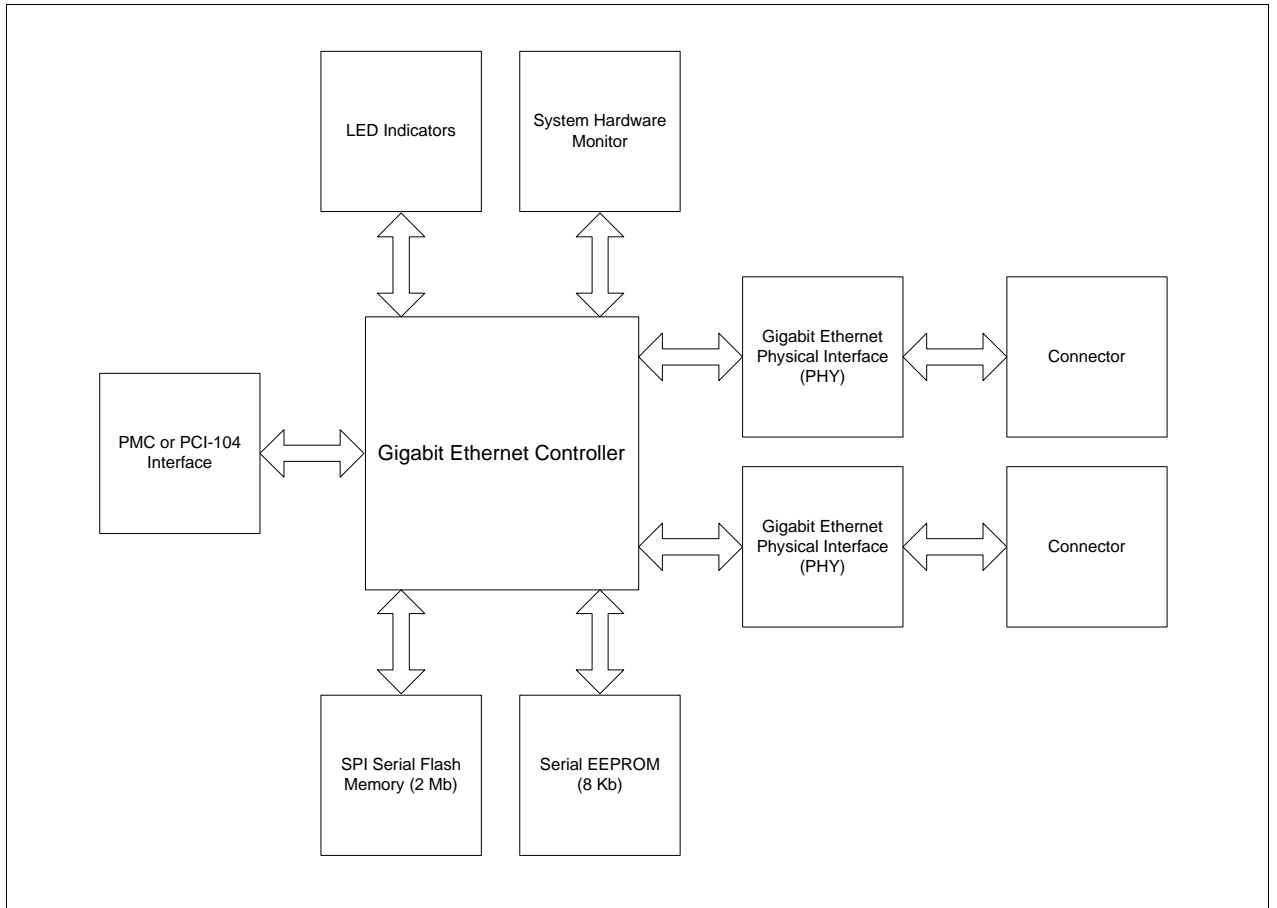


Figure 1 : Functional Block Diagram for the GE Adapter

3.3 PMC Interface

The PMC interface allows the PMC GE Adapter to be fitted on any host carrier card conforming to the PMC specification and supporting 3,3 V or 5,0 V PCI signalling, as well as 32-bit and 64-bit PCI access.

The PMC GE Adapter supports PCI bus speeds of 33 MHz for conventional PCI.

Refer to the PCI specification [2.2.2] for a complete description of the PCI interface signals and to the CMC specification [2.2.1] for information on bus-mode signalling and connector pin-outs.

3.4 PC-104 Interface

The PC-104 interface allows the PCI-104 GE Adapter to be fitted on any PC/104 host conforming to the PC/104-Plus specification and supporting 3,3 V or 5,0 V PCI signalling. PC-104 supports 32-bit signalling only.

Refer to the PC/104-Plus [2.2.4] for a complete description of the PCI-104 interface signals and formfactor specification.

3.5 Gigabit Ethernet Controller

The GE Adapter uses the Sysconnect Yukon 88E8022 Gigabit Ethernet Controller. The PCI Vendor ID for this device is 1148 and the PCI Device ID is 9000.

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3.6 SPI Serial Flash Memory

The SPI Flash Memory stores the firmware for the built-in microcontroller, as well as startup configuration data, which is read after Power On Reset.

The Configuration Data can be accessed by using the diagnostic software for the GE Adapter.

3.7 Serial EEPROM

The Vital Product Data (VPD) for the adapter is stored within the EEPROM. This includes information such as product part number and serial number.

This information can be accessed by using the diagnostic software for the GE Adapter.

3.8 LED Indicators

The GE Adapter provides several LED indicators for indicating connection speed status. Refer to Figures 2, 3, 4, 5, 6, 7 and 8 for LED locations.

3.9 System Hardware Monitor

The GE Adapter makes use of the LM80 device from National Semiconductor to monitor the various voltages present on the adapter as well as the temperature of the adapter.

These values of these parameters can be accessed by using the diagnostic software for the GE Adapter.

3.10 Gigabit Ethernet Physical Interfaces (PHY) and Connectors

The CCPMC GE Adapter connects to the network via the Pn4 connector on the PMC. The pin-outs and signal descriptions are given in Table 1.

The PMC and PCI-104 GE Adapters connect to the network using either RJ45 connectors for copper I/O or Small Formfactor/Lucent Connector (SFF/LC) for fibre I/O.

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4. Connector Pin Assignments and LED Locations

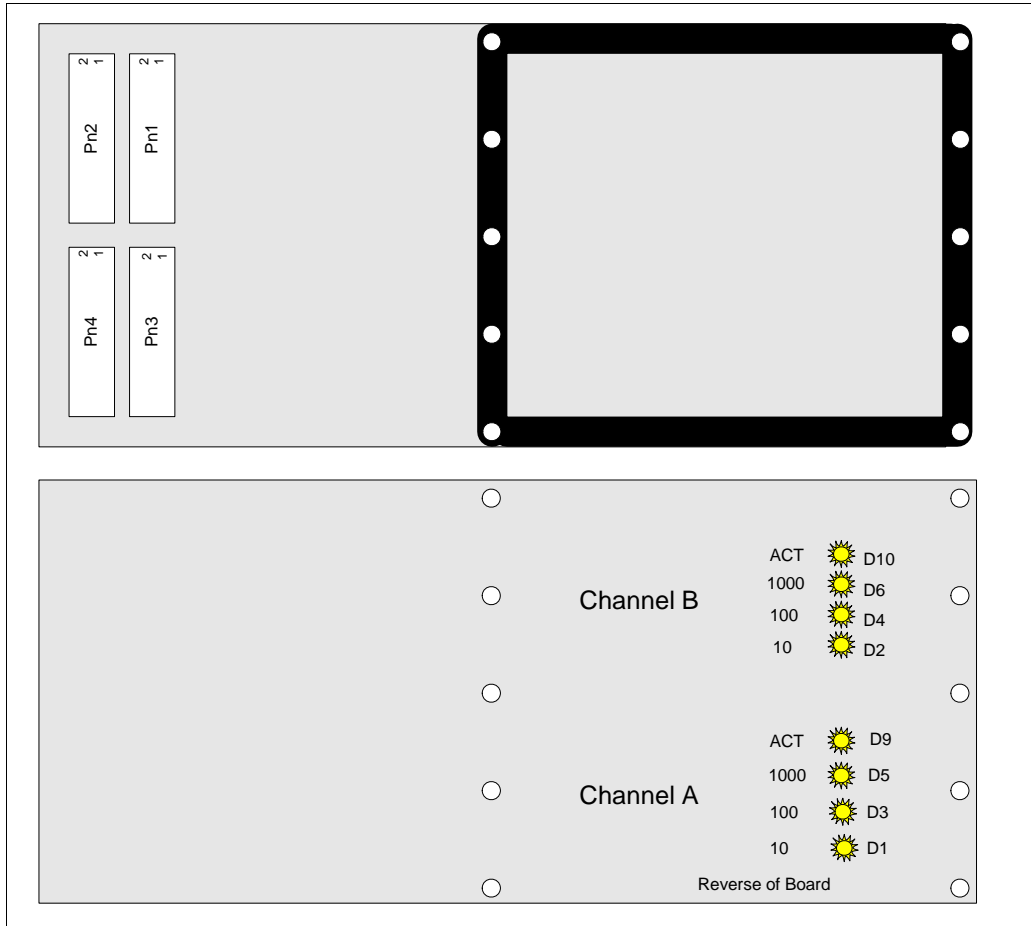


Figure 2 : Connector and LED Locations for the CCPMC Adapter



Figure 3 : Connector and LED Locations for the Copper FP PMC GE Adapter

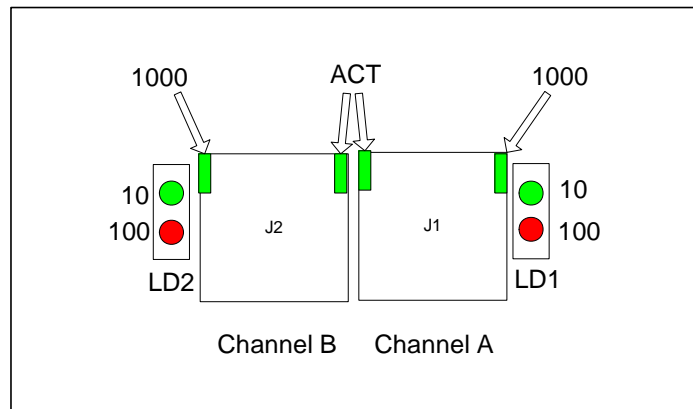


Figure 4 : Front View of CCII/GNET/PMC/2P/RJ/FP/

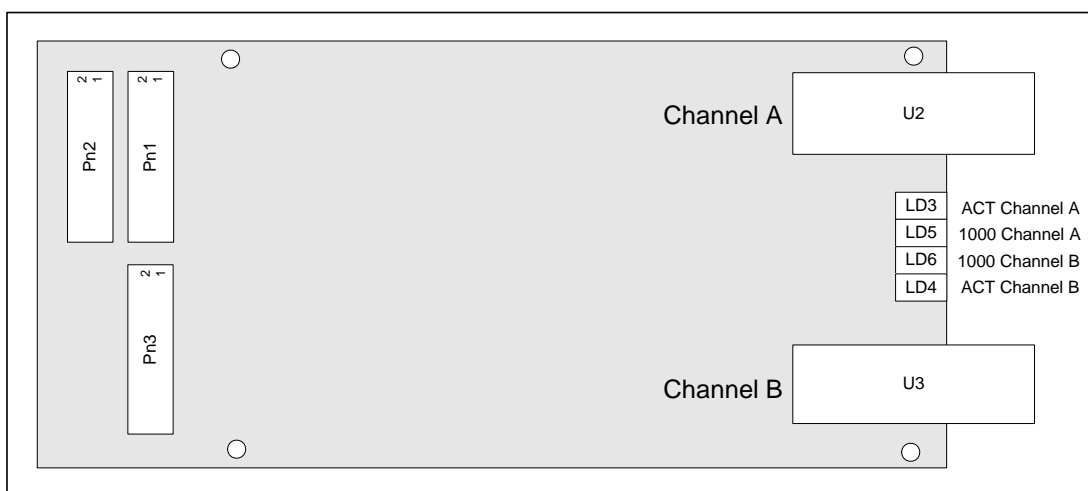


Figure 5 : Connector and LED Locations for the Fibre FP PMC GE Adapter

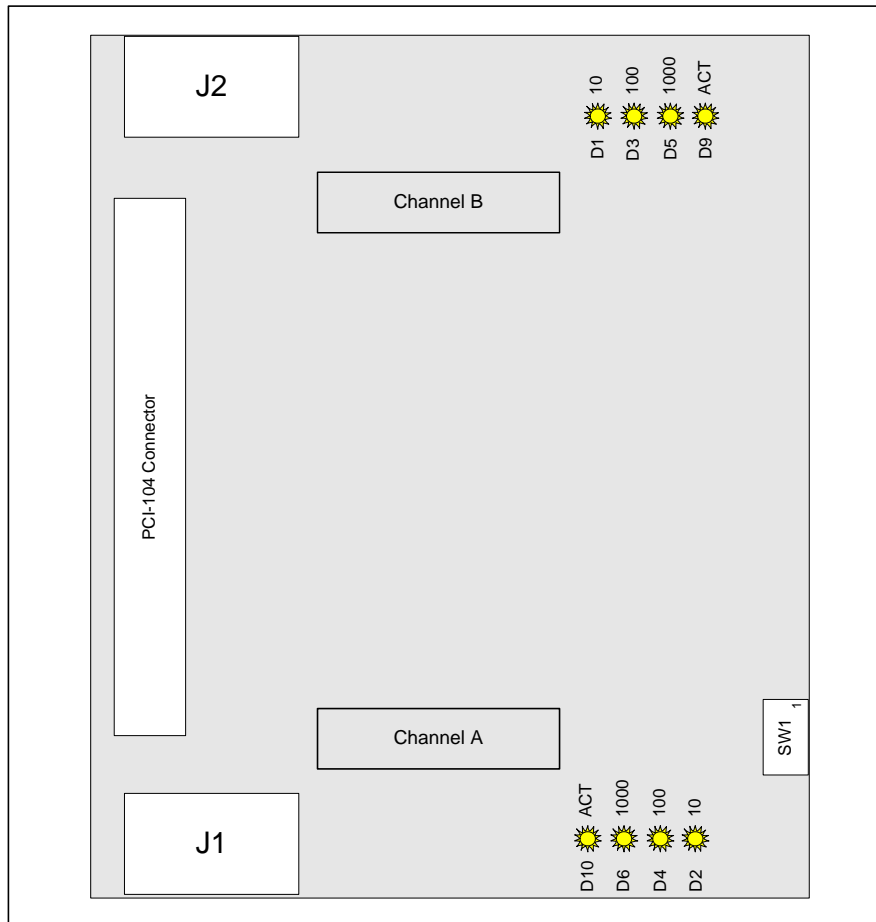


Figure 6 : Connector and LED Locations for the Copper PC-104 GE Adapter

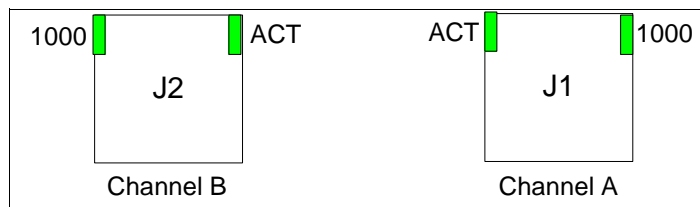


Figure 7 : Front View of J1 and J2

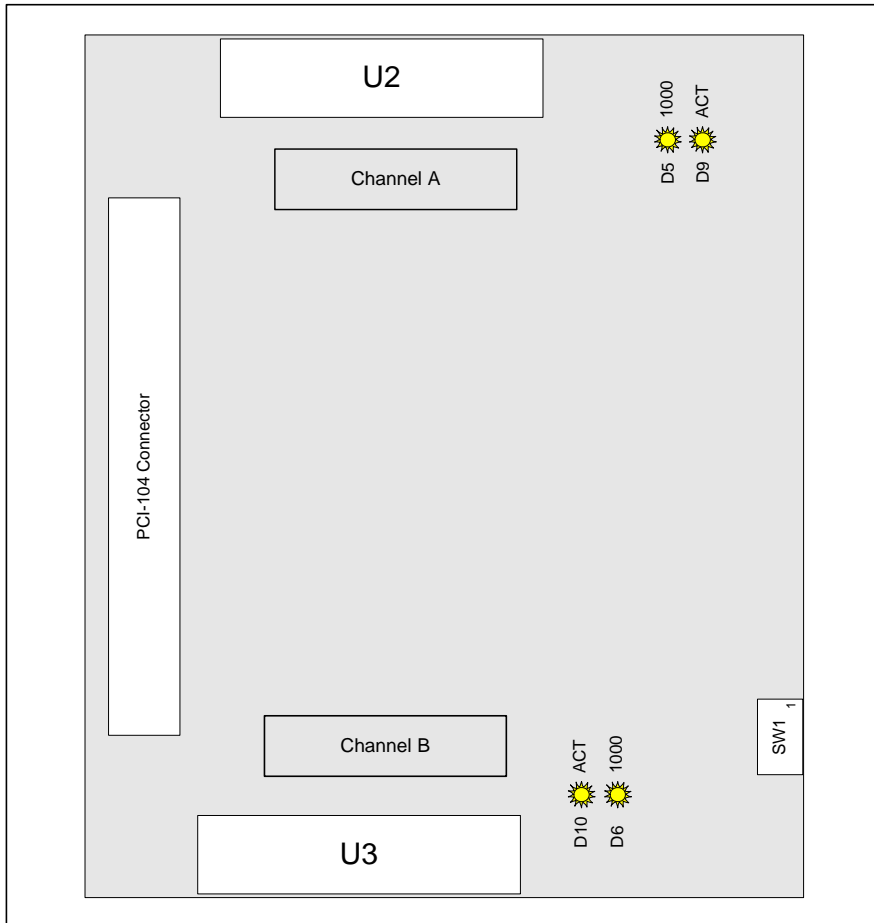


Figure 8 : Connector and LED Locations for the Fibre PC-104 GE Adapter

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5. Pin Mapping for CCPMC GE Adapter

Pn4 Pin No.	CCII/GE/PMC/2P/BP/CC	DY4 SVME/DMV 178/179 pin mapping		CCII/GE/PMC/2P/BP/CC	DY4 SVME/DMV 178/179 Pin Mapping		Pn4 Pin No.
	PCB 1548A Rev. A	P0 Pin No. (Site 1)	P2 Pin No. (Site 2)	PCB 1548A Rev. A	P0 Pin No. (Site 1)	P2 Pin No. (Site 2)	
1	Channel 1 D+	E4	C1	Channel 1 A+	D4	A1	2
3	Channel 1 D-	C4	C2	Channel 1 A-	B4	A2	4
5	Channel 1 C+	A4	C3	Channel 1 B+	E5	A3	6
7	Channel 1 C-	D5	C4	Channel 1 B-	C5	A4	8
9		B5	C5		A5	A5	10
11		E6	C6		D6	A6	12
13		C6	C7		B6	A7	14
15		A6	C8		E7	A8	16
17		D7	C9		C7	A9	18
19		B7	C10		A7	A10	20
21		E8	C11		D8	A11	22
23		C8	C12		B8	A12	24
25		A8	C13		E12	A13	26
27		D12	C14		C12	A14	28
29		B12	C15		A12	A15	30
31		E13	C16		D13	A16	32
33		C13	C17		B13	A17	34
35		A13	C18		E14	A18	36
37		D14	C19		C14	A19	38
39		B14	C20		A14	A20	40
41		E15	C21		D15	A21	42
43		C15	C22		B15	A22	44
45		A15	C23		E16	A23	46
47		D16	C24		C16	A24	48
49		B16	C25		A16	A25	50
51		E17	C26		D17	A26	52
53		C17	C27		B17	A27	54
55		A17	C28		E18	A28	56
57	Channel 2 C-	D18	C29	Channel 2 A-	C18	A29	58
59	Channel 2 C+	B18	C30	Channel 2 A+	A18	A30	60
61	Channel 2 D-	E19	C31	Channel 2 B-	D19	A31	62
63	Channel 2 D+	C19	C32	Channel 2 B+	B19	A32	64

Table 1 : CCPMC Pn4 Connector Pinouts

Annexure A

Specifications

A.1 Functional Specifications

Bus Interface	64-bit, 33 MHz PCI-bus (32-bit compatible) Electrically : +3,3 V and +5,0 V signalling, PCI Rev. 2.2			
LAN Controller	Marvell Yukon 88E8022ES1			
I/O Addresses	Automatic assigned to the slot by PCI Rev. 2.2 Plug-and-Play			
I/O Options	CCPMC Pn4 Connector, RJ45 (Copper) or SFF/LC (Fibre)			
Interrupts	User Programmable Interrupts			
DMA	Automatic, depending on PCI slot			
Dimensions	Conduction-Cooled PMC	143,65 mm x 74,00 mm (VITA 20) with envelope according to VITA 20 specification		
	Air-Cooled PMC	149,00 mm x 74,00 mm x 13,50 mm (VITA 20)		
	PC-104	95,89 mm x 90,17 mm x 23,80 mm (PC/104-Plus V2.0)		
Mass	90 g \pm 10 g			
Power Requirements	Copper I/O : 5,0 V \pm 5%, 1,32 A (typical), 1,55 A (maximum) Fibre I/O : 5,0 V \pm 5%, 1,56 A (typical), 1,85 A (maximum)			
MTBF	Figures according to MIL-HDBK-217F, Parts Count Method			
	Ground Mobile	$T_j = 65$ C	$T_a = 45$ C	25 000 hours
	Naval, Sheltered	$T_j = 60$ C	$T_a = 40$ C	35 000 hours
	Airborne, Inhabited Cargo	$T_j = 75$ C	$T_a = 55$ C	25 000 hours
Protocols	<ul style="list-style-type: none"> • MAC • IP • TCP/IP • UDP/IP 			

A.2 **Environmental Specifications**

	Air-Cooled			Conduction-Cooled
Grade	Commercial	Industrial	Ruggedised	Ruggedised
Temperature -Operating -Storage	0 C to +55 C -40 C to +85 C	-15 C to +75 C -40 C to +85 C	-40 C to + 85 C -55 C to +125 C	-40 C to + 85 C -55 C to +125 C
Humidity	0% - 90%	0% - 95%	0% - 95%	0% - 95%
Shock	not specified	30 g peak for 11 ms	40 g peak for 11 ms	40 g peak for 11 ms
Vibration -Sine -Random	2 g (peak) 10 Hz to 100 Hz 0,04 g ² /Hz at 15 Hz to 2 kHz	10 g (peak) 5 kHz 0,1 g ² /Hz at 15 Hz to 2 kHz	10 g (peak) 5 Hz to 2 kHz 0,1 g ² /Hz at 15 Hz to 2 kHz	10 g (peak) 5 Hz to 2 kHz 0,1 g ² /Hz at 15 Hz to 2 kHz