User Manual

G302 – 3U CompactPCI® Serial Industrial Ethernet Switch

Configuration example

G302 – 3U CompactPCI® Serial Industrial Ethernet Switch

The G302 is a managed 3U Ethernet switch implemented as a CompactPCI® Serial board. It occupies one system slot or one peripheral slot, using a 4 HP front panel with 3 Gigabit Ethernet ports on RJ45 or M12 connectors and one service interface via M12.

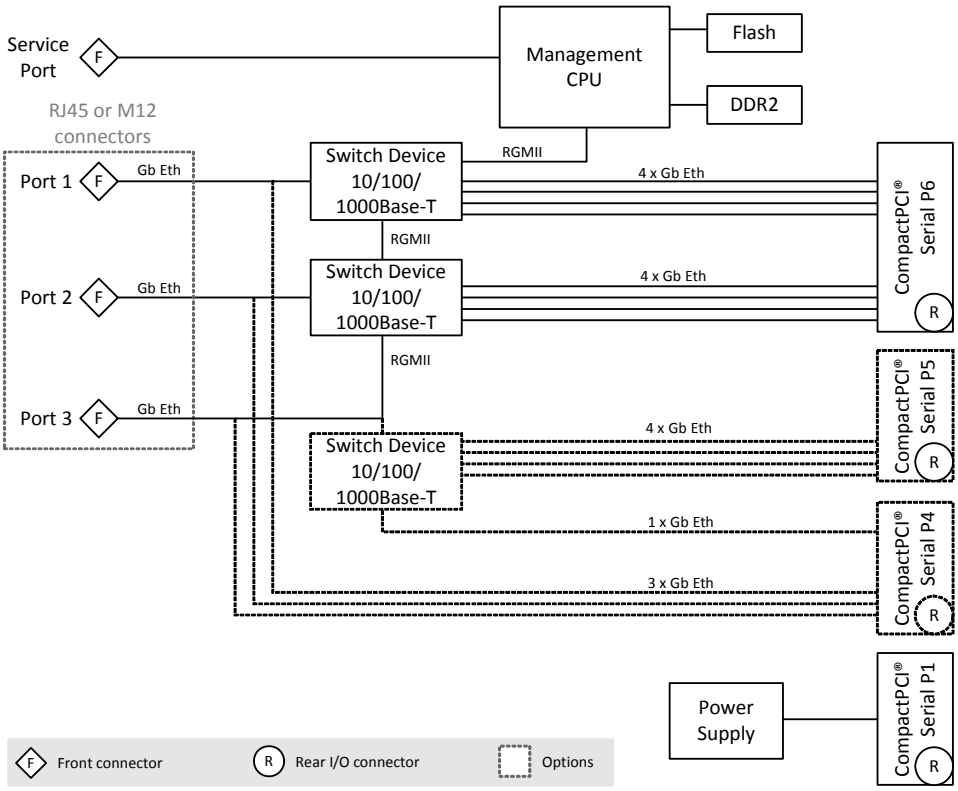
The G302 either features three Ethernet ports on the front and up to 13 Ethernet ports on the rear or alternatively all 16 Ethernet ports on the rear, which is the ideal solution for conduction cooling.

The G302 supports full-duplex and half-duplex operation with auto-negotiation, high-speed non-blocking store-and-forward switching, Quality of Service (QoS) support with four traffic classes IEEE 802.1p and three-level 802.1x security.

The switch is fault tolerant and restores itself on its own: If a link is temporarily unavailable, frames can be sent via backup/redundant links (spanning tree protocol/ link aggregation) and no data loss occurs. Its built-in test mechanisms make the G302 an even more reliable component in the communication system.

The railway Ethernet switch is specifically designed for rugged mobile communication systems and fully compliant with the EN 50155 railway standard, qualified for a -40 to +85°C operation temperature and ready for coating.

Diagram


Service Port
F
Management CPU
Flash
DDR2
RJ45 or M12 connectors
Port 1
Port 2
Port 3
Gb Eth
Switch Device 10/100/ 1000Base-T
RGMII
4 x Gb Eth
CompactPCI® Serial P6
CompactPCI® Serial P5
CompactPCI® Serial P4
CompactPCI® Serial P1
R
1 x Gb Eth
3 x Gb Eth
Power Supply
Front connector
Rear I/O connector
Options

Technical Data

Key Features

- Simple Switch replacement: configuration can be done via external dongle without any tools
- High-speed non-blocking, store-and-forward switching
- Up to three 10/100/1000Base-T ports at front panel (Electrical isolation: 1500 Vrms)
- Up to sixteen 10/100/1000Base-T ports at rear connector (Electrical isolation: 100 Vrms)
- Port configuration: copper, 10/100 and 1000 Mbit/s
- Auto-negotiation / Auto MDI/MDIX crossover on all ports / manual configuration possible
- Layer2-based Policy Control List
- 8K MAC address lookup table with automatic learning and aging
- Up to 4096 VLANs
- Rapid Spanning Tree Protocol and Multiple Spanning Tree Protocol to ensure loop free topology formation
- Reducing multicast traffic in the network through multicast snooping – IGS (IPv4) and MLDS (IPv6)

Management CPU

- Freescale™ PowerPC® MPC8314
  - 266 MHz maximum processor core frequency
- 512 MB SDRAM
  - DDR2 Management CPU memory
- 32 MB Flash
  - Management CPU Flash

Management Firmware System Features

- Saving and restoring user configurations
- Software upgrades through TFTP
- System logs (syslog) and e-mail alerts for critical events
- Remote monitoring (RMON) and alarm generation
- Displaying the running configuration in the form of CLI commands
- Management interfaces through
  - CLI (RS232 console, Telnet, SSH)
  - SNMP v3
- Switch configuration can be loaded from external dongle

Management Firmware Security Features

- User authentication using 802.1x
- Controlling management access through SNMP and CLI only from authorized managers
- MAC based access list (ACL) for traffic filtering
- Rate-limiting and storm control to prevent packet flooding from malicious peers

Supported Protocols and Standards

- DHCP client / server / relay (IEEE 1394)
- Energy Efficient Ethernet (IEEE 802.3az)
- Ethernet flow control (IEEE 802.3x)
- GARP (VLAN-aware bridging)
- GVRP/GMRP support (IEEE 802.1D, 2004)
- Hypertext Transport Protocol (HTTP) Server for Remote Management and Monitoring (RFC2626)
- HTTP Secure (HTTPS) – HTTP-based Remote Management over encrypted data channel (RFC2818)
- IGMP snooping / IGMP proxy / IGMP Querier / MLD Discovery (RFC 4541)
- Link aggregation LACP / EtherChannel (IEEE 802.3ad, 2005)
- Link Layer Discovery Protocol LLDP (IEEE 802.1ab, 2005)
- Multiple Spanning Tree (MSTP) (IEEE 802.1s)
- Path MTU Discovery Protocol (PMTUD) (RFC 1984)
- Priority-based switching, Quality of Service/DiffServ, tagged frames, Layer2-based 801.1Q VLAN-ID packet routing (IEEE 802.1p)
- Port-based authentication with EAP (IEEE 802.1x – REV2004/RFC3748)
- Rapid Spanning Tree Protocol (RSTP IEEE 802.1w)
- Remote Network Monitoring Information Base v1 (RFC2819)
- Secure Shell (SSH) for Remote Configuration (CLI) over secure channel
- SNMP v1, v2c, v3 management
- Syslog (RFC 5424)
- TCP/IP v4
- TFTP (RFC 1350)
- VLAN/port-based VLANs GVRP/MVRP (IEEE 802.1Q Rev D5.0, 2005)

Service Interface

- 8-pin M12 connector
- RS232
- I2C interface for external dongle

Front I/O

- Three Ethernet ports on RJ45 or M12 connectors
- One M12 service connector
- Six link and activity Ethernet status LEDs (2 per channel)

Rear I/O

- Up to 16 Ethernet links

CompactPCI® Serial

- Compliance with CompactPCI® Serial PICMG CPCI-S.0 Specification
- System or peripheral slot

Electrical Specifications

- Supply voltage/power consumption
  - +12 V (+/-10%), 15 W max.

Mechanical Specifications

- Dimensions: conforming to CompactPCI® Serial specification for 3U boards
- Front panel: 4HP with ejector
- Weight: 170 g (with RJ45 connectors)/tbd g (with M12 connectors)

Environmental Specifications

- Temperature range (operation):
  - -40..+85°C (qualified)
  - Airflow: 1.0 m/s
- Temperature range (storage): -40..+85°C
- Relative humidity (operation): max. 95% non-condensing
- Relative humidity (storage): max. 95% non-condensing
- Altitude: -300 m to +3000 m
- Shock: 50 m/s², 30 ms (EN 61373)
- Vibration (function): 1 m/s², 5 Hz – 150 Hz (EN 61373)
- Vibration (lifetime): 7.9 m/s², 5 Hz – 150 Hz (EN 61373)
- Conformal coating on request
- Climatic tests according to EN 68068
- Fully EN 50155-compliant (Power Interruption Class 2, Temperature Class Tx)

MTBF

- 612 519 h @ 40°C according to IEC/TR 62380 (RDF 2000)

Safety

- Flammability
  - PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers

EMC Conformity

- EN 55022 (radio disturbance)
- EN61000-4-2 (ESD Immunity)
- IEC 61000-4-4 (burst)

Software Support

- Firmware for configuration and management

Configuration Options

Ethernet Switch

- Unmanaged version G303

Front Connectors

- RJ45 connectors or M12 connectors

Front I/O, Rear I/O

- Flexible combination of front and rear ports
  - Three ports on front and up to 13 ports on rear
  - Up to 16 ports on rear (suitable for conduction cooled version)
  - Service port on rear for the conduction cooled version

Environmental specifications

- Conformal coating

Cooling Concept

- Also available with conduction cooling in MEN CCA frame

Please note that some of these options may only be available for large volumes. Please ask our sales staff for more information.

For available standard configurations see online data sheet.

Product Safety

Electrostatic Discharge (ESD)

Computer boards and components contain electrostatic sensitive devices. Electrostatic discharge (ESD) can damage components. To protect the board and other components against damage from static electricity, you should follow some precautions whenever you work on your computer.

- Power down and unplug your computer system when working on the inside.
- Hold components by the edges and try not to touch the IC chips, leads, or circuitry.
- Use a grounded wrist strap before handling computer components.
- Place components on a grounded antistatic pad or on the bag that came with the component whenever the components are separated from the system.
- Store the board only in its original ESD-protected packaging. Retain the original packaging in case you need to return the board to MEN for repair.

About this Document

This user manual is intended only for system developers and integrators, it is not intended for end users.

It describes the hardware functions of the board, connection of peripheral devices and integration into a system. It also provides additional information for special applications and configurations of the board.

The manual does not include detailed information on individual components (data sheets etc.). A list of literature is given in the appendix.

History

Issue	Comments	Date
E1	First issue	2012-10-06
E2	General update	2013-12-12

Conventions

This sign marks important notes or warnings concerning the use of voltages which can lead to serious damage to your health and also cause damage or destruction of the component.

This sign marks important notes or warnings concerning proper functionality of the product described in this document. You should read them in any case.

italics — Folder, file and function names are printed in *italics*.

bold — **Bold** type is used for emphasis.

`monospace` — A `monospaced` font type is used for hexadecimal numbers, listings, C function descriptions or wherever appropriate. Hexadecimal numbers are preceded by "0x".

comment — Comments embedded into coding examples are shown in green color.

hyperlink — Hyperlinks are printed in blue color.

The globe will show you where hyperlinks lead directly to the Internet, so you can look for the latest information online.

IRQ# /IRQ — Signal names followed by "#" or preceded by a slash ("/") indicate that this signal is either active low or that it becomes active at a falling edge.

in/out — Signal directions in signal mnemonics tables generally refer to the corresponding board or component, "in" meaning "to the board or component", "out" meaning "coming from it".

Vertical lines on the outer margin signal technical changes to the previous issue of the document.

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Since July 1, 2006 all MEN standard products comply with RoHS legislation.

Since January 2005 the SMD and manual soldering processes at MEN have already been completely lead-free. Between June 2004 and June 30, 2006 MEN's selected component suppliers have changed delivery to RoHS-compliant parts. During this period any change and status was traceable through the MEN ERP system and the boards gradually became RoHS-compliant.

WEEE Application

The WEEE directive does not apply to fixed industrial plants and tools. The compliance is the responsibility of the company which puts the product on the market, as defined in the directive; components and sub-assemblies are not subject to product compliance.

In other words: Since MEN does not deliver ready-made products to end users, the WEEE directive is not applicable for MEN. Users are nevertheless recommended to properly recycle all electronic boards which have passed their life cycle.

Nevertheless, MEN is registered as a manufacturer in Germany. The registration number can be provided on request.

Germany
MEN Mikro Elektronik GmbH
Neuwieder Straße 3-7
90411 Nuremberg
Phone +49-911-99 33 5-0
Fax +49-911-99 33 5-901
E-mail info@men.de
www.men.de

France
MEN Mikro Elektronik SA
18, rue René Cassin
ZA de la Châtelaine
74240 Gaillard
Phone +33 (0) 450-955-312
Fax +33 (0) 450-955-211
E-mail info@men-france.fr
www.men-france.fr

USA
MEN Micro Inc.
860 Penllyn Blue Bell Pike
Blue Bell, PA 19422
Phone (215) 542-9575
Fax (215) 542-9577
E-mail sales@menmicro.com
www.menmicro.com

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1 Getting Started

This chapter gives an overview of the board and some hints for first installation in a system.

1.1 Map of the Board

Two types of front panels are available, either with three RJ45 Ethernet connectors or with three M12 Ethernet connectors.

Figure 1. *Map of the board – front panels with RJ45 ports (left) or M12 ports (right)*

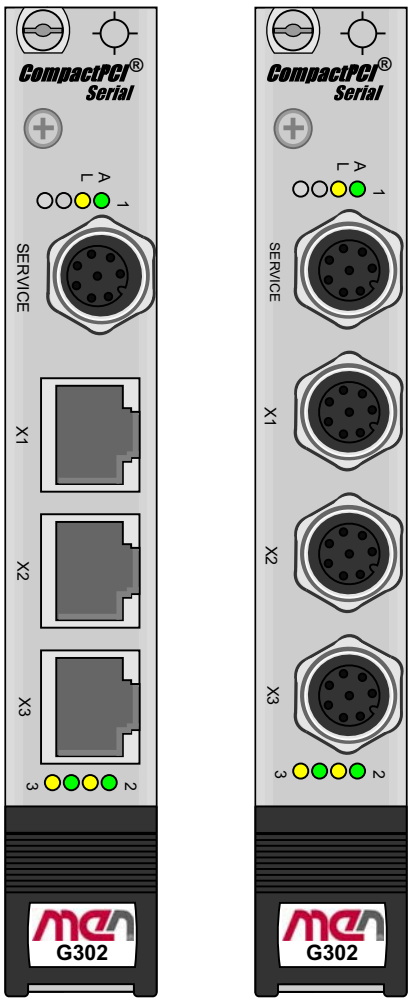
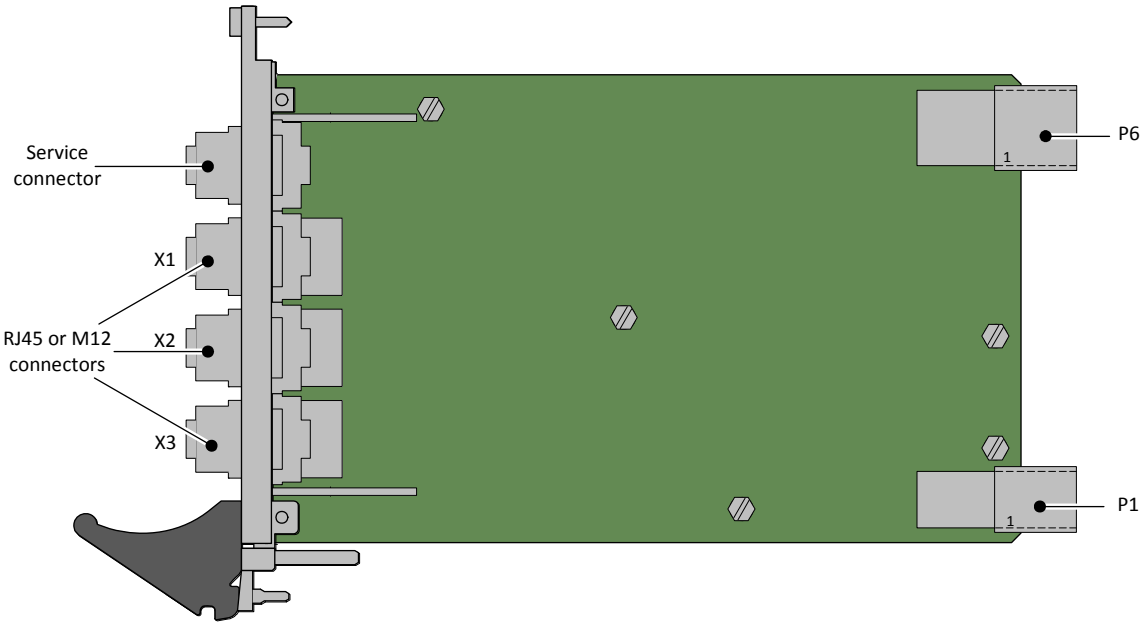


Figure 2. *Map of the board – top view*



1.2 Integrating the Board into a System

You can use the following check list when installing the board in a system for the first time and with minimum configuration.

System Slot

The G302 can act as the switching hub of a CompactPCI Serial system when inserting it into the system slot.

☑ Power down the system.

☑ Insert the G302 into the system slot of your CompactPCI Serial system, making sure that the CompactPCI Serial connectors are properly aligned.

Note:The system slot of every CompactPCI Serial system is marked by a triangle △ on the backplane and/or at the front panel. It also has red guide rails.

☑ Power up the system.

Peripheral Slot

☑ Power down the system.

☑ Insert the G302 into a peripheral slot of your CompactPCI Serial system, making sure that the CompactPCI Serial connectors are properly aligned.

Note: The peripheral slots of every CompactPCI Serial system are marked by a circle with a plus sign behind it ⌖ on the backplane and/or at the front panel.

☑ Power up the system.

1.3 Installing Driver Software

For a detailed description on how to install driver software please refer to the respective documentation.

You can find any driver software available for download in the G302 pages on MEN's website.

2 Functional Description

2.1 Power Supply

The G302 is supplied with +12V (-10%/+10%) via CompactPCI Serial connector P1.

2.2 Thermal Considerations

A suitable heat sink is provided to meet thermal requirements.

Please note that if you use any other heat sink than that supplied by MEN, or no heat sink at all, warranty on functionality and reliability of the G302 may cease. If you have any questions or problems regarding thermal behavior, please contact MEN.

2.3 Ethernet Interface

Depending on the configuration the G302 has up to 16 Gigabit Ethernet interfaces. It is either possible to have three Ethernet interfaces at the front and up to 13 Ethernet interfaces on the rear or to have up to 16 Ethernet interfaces on the rear. The G302 standard model provides three Ethernet ports on the front and eight on the rear. All channels support 10/100/1000Base-T physical layers, and half-duplex and full-duplex operation complying with IEEE802.3x.

The unique MAC addresses are set at the factory and should not be changed. Any attempt to change these addresses may create node or bus contention and thereby render the board inoperable.

2.3.1 Front-Panel Connection

The G302 is available in two versions: one provides three standard RJ45 connectors (standard version) and one three 8-pin M12 connectors at the front panel.

The pin assignments correspond to the Ethernet specification IEEE802.3

Table 1. *Signal mnemonics of Ethernet front-panel connectors*

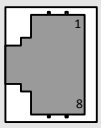
Signal	Direction	Function
BI_Dx+/-	in/out	Differential pairs of data lines for 1000Base-T

RJ45 Connectors

Connector types:

- Modular 8/8-pin mounting jack according to FCC68
- Mating connector:
  Modular 8/8-pin plug according to FCC68

Table 2. *Pin assignment of RJ45 Ethernet front-panel connectors*

		1000Base-T
	1	BI_DA+
	2	BI_DA-
	3	BI_DB+
	4	BI_DC+
	5	BI_DC-
	6	BI_DB-
	7	BI_DD+
	8	BI_DD-

M12 Connectors

Connector types:

- 8-pin M12 receptacle A-coded 90°
- Mating connector:
  8-pin M12 plug A-coded 90°

Table 3. *Pin assignment of M12 Ethernet front-panel connectors*

		1000Base-T
	1	BI_DC-
	2	BI_DD+
	3	BI_DD-
	4	BI_DA-
	5	BI_DB+
	6	BI_DA+
	7	BI_DC+
	8	BI_DB-

2.3.2 Front Panel Status LEDs

The front panel features two LEDs for each of the three Ethernet ports to display their status (*LNK* and *ACT*). The LEDs act as described in the following table.

Table 4. *Ethernet ports status LEDs*

LED	Description
L	Ethernet link status (on = link established)
A	Ethernet traffic activity status (blink = Ethernet traffic running)

2.3.3 Ethernet Switch

The G302 uses two 7-port 10/100/1000Base-T switch components Marvell 88E6176. The switch provides 10/100/1000 Mbits/s configuration possibility on each port. It is possible to configure each port in half-duplex or full-duplex mode.

The device characteristics are:

- Three front ports and up to 13 ports on the rear or up to 16 ports on the rear
- RGMII interface
- High-speed non-blocking
- Store-and-forward switching
- Auto-negotiation
- Quality of Service (QoS) support
- Port mirroring
- Port monitoring
- Flow control
- VLAN support
- Automatic MDI/MDI-X crossover (all ports)
- Port-based frame priorization

2.3.4 Configuration of the Switch

The G302 loads the following standard configuration at startup:

Table 5. *Default switch configuration at startup*

Setting	Default
Duplex mode	Full Duplex
Port speed	Auto-Negotiate
VLAN (port-based)	Off
QoS (Quality of Service)	Off
Port mirroring and port monitoring	Off
Port trunking	Off

All of the ports are individually configurable using an external dongle, a Telnet or Secure Shell (SSH) command line interface via the M12 service connector or over Ethernet via SNMP (Version 3). For further information about configuration options please refer to the documentation of the G302 firmware.

2.4 Service Connector

The service connector provides an RS-232 COM interface for direct access to the management CPU and an I2C interface for reading a configuration from an external dongle (available from MEN), which can be connected to this interface.

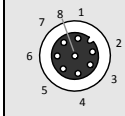
Connector type:

- 8-pin M12 receptacle A-coded 90°

Table 6. *Signal mnemonics of front-panel service connector*

Signal	Direction	Function
+3.3V	out	Power supply for external dongle
GND	-	Ground
RXD	in	RS232 receive data
TXD	out	RS232 transmit data
SDA	in/out	I2C serial data input/output
SCL	-	I2C data clock
GPIO[1:2]	in/out	General purpose I/O 1/2

Table 7. *Pin assignment of front-panel service connector*



1	+3.3V
2	RXD
3	TXD
4	GND
5	SDA
6	GPIO1
7	SCL
8	GPIO2

Note: Do not connect a standard null modem cable directly to the service interface as it blocks the I2C bus and prevents the switch from correct booting. You always need a 9-pin D-Sub to 9-pin 2xD-Sub cable (MEN article number 6080-0366) for splitting the service interface into a serial interface and a dongle interface.
In case of an M12 service interface you need an 8-pin M12 to 9-pin D-Sub adapter (MEN article number 6080-0377).
Both the adapter and the cable are included in the MEN cable set 05RS01-03.
Please contact MEN's sales team for further information.

2.5 CompactPCI Serial Interface

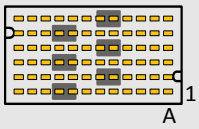
The G302 uses the rear connectors P1 and P6 according to the CompactPCI Serial specification (PICMG CPCI-S.0). Optionally the G302 can be supplied with connector P5 if up to 15 Ethernet ports are required or with connectors P5 and P4 if 16 Ethernet ports are required or if more than 12 ports are required on the rear.

Pin Assignment of Connector P1

Connector type of P1:

- 72-pin Airmax VS 4 pair, right angle header, 6 IMLA with end walls

Table 8. *Pin assignment of CompactPCI Serial P1 connector*



PE_ Rx03-	PE_ Rx03+	GND	PE_ Tx03-	PE_ Tx03+	GND	PE_ Rx02-	PE_ Rx02+	GND	PE_ Tx02-	PE_ Tx02+	GND	6
GND	PE_ Rx01-	PE_ Rx01+	GND	PE_ Tx01-	PE_ Tx01+	GND	PE_ Rx00-	PE_ Rx00+	GND	PE_ Tx00-	PE_ Tx00+	5
1_SATA_ Rx-	1_SATA_ Rx+	GND	1_SATA_ Tx-	1_SATA _Tx+	GND	PE_ REFCLK-	PE_ REFCLK+	GND	1_USB2-	1_USB2 +	GND	4
GA3	SATA_S L	SATA_ SCL	GA2	SATA_S DO	SATA_ SDI	GA1	1_USB3_ Rx-	1_USB3_ Rx+	GA0	1_USB3 _Tx-	1_USB3 _Tx+	3
SYSEN#	PCIE_ EN#	GND	PE_ WAKE#	RST_ IN#	GND	RST_ OUT#	PS_ON#	GND	IPMB_S DA	IPMB_ SCL	GND	2
GND	+12V	+12V	GND	+12V	+12V	GND	+12V	+12V	GND	STNDBY	+12V	1
L	K	J	I	H	G	F	E	D	C	B	A	

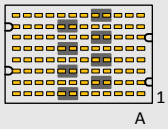
Note: The signals in gray font are specified in the CompactPCI Serial specification but not supported on this board.

Pin Assignment of Connector P6

Connector type of P6:

96-pin Airmax VS 4 pair, right angle header, 8 rows, 4 walls

Table 9. *Pin assignment of CompactPCI Serial P6 connector*



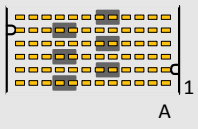
8_ETH_ D-	8_ETH_ D+	GND	8_ETH_ C-	8_ETH_ C+	GND	8_ETH_ B-	8_ETH_ B+	GND	8_ETH_ A-	8_ETH_ A+	GND	8
GND	7_ETH_ D-	7_ETH_ D+	GND	7_ETH_ C-	7_ETH_ C+	GND	7_ETH_ B-	7_ETH_ B+	GND	7_ETH_ A-	7_ETH_ A+	7
6_ETH_ D-	6_ETH_ D+	GND	6_ETH_ C-	6_ETH_ C+	GND	6_ETH_ B-	6_ETH_ B+	GND	6_ETH_ A-	6_ETH_ A+	GND	6
GND	5_ETH_ D-	5_ETH_ D+	GND	5_ETH_ C-	5_ETH_ C+	GND	5_ETH_ B-	5_ETH_ B+	GND	5_ETH_ A-	5_ETH_ A+	5
4_ETH_ D-	4_ETH_ D+	GND	4_ETH_ C-	4_ETH_ C+	GND	4_ETH_ B-	4_ETH_ B+	GND	4_ETH_ A-	4_ETH_ A+	GND	4
GND	3_ETH_ D-	3_ETH_ D+	GND	3_ETH_ C-	3_ETH_ C+	GND	3_ETH_ B-	3_ETH_ B+	GND	3_ETH_ A-	3_ETH_ A+	3
2_ETH_ D-	2_ETH_ D+	GND	2_ETH_ C-	2_ETH_ C+	GND	2_ETH_ B-	2_ETH_ B+	GND	2_ETH_ A-	2_ETH_ A+	GND	2
GND	1_ETH_ D-	1_ETH_ D+	GND	1_ETH_ C-	1_ETH_ C+	GND	1_ETH_ B-	1_ETH_ B+	GND	1_ETH_ A-	1_ETH_ A+	1
L	K	J	I	H	G	F	E	D	C	B	A	

Pin Assignment of Connector P5

Connector type of P5:

96-pin Airmax VS 4 pair, right angle header, 6 rows, 2 walls

Table 10. *Pin assignment of CompactPCI Serial P5 connector*



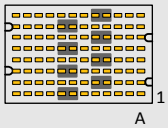
9_ETH_ D-	9_ETH_ D+	GND	9_ETH_ C-	9_ETH_ C+	GND	9_ETH_ B-	9_ETH_ B+	GND	9_ETH_ A-	9_ETH_ A+	GND	6
GND	10_ETH_ D-	10_ETH_ D+	GND	10_ETH_ C-	10_ETH_ C+	GND	10_ETH_ B-	10_ETH_ B+	GND	10_ETH_ A-	10_ETH_ A+	5
11_ETH_ D-	11_ETH_ D+	GND	11_ETH_ C-	11_ETH_ C+	GND	11_ETH_ B-	11_ETH_ B+	GND	11_ETH_ A-	11_ETH_ A+	GND	4
GND	12_ETH_ D-	12_ETH_ D+	GND	12_ETH_ C-	12_ETH_ C+	GND	12_ETH_ B-	12_ETH_ B+	GND	12_ETH_ A-	12_ETH_ A+	3
-	-	GND	-	-	GND	-	-	GND	-	-	GND	2
GND	GPIO2	+3.3V	GND	I2C_SCL	I2C_SDA	GND	COM_RX	COM_TX	GND	+3.3V	GPIO1	1
L	K	J	I	H	G	F	E	D	C	B	A	

Pin Assignment of Connector P4

Connector type of P4:

96-pin Airmax VS 4 pair, right angle header, 8 rows, 4 walls

Table 11. *Pin assignment of CompactPCI Serial P4 connector*



13_ETH_D-	13_ETH_D+	GND	13_ETH_C-	13_ETH_C+	GND	13_ETH_B-	13_ETH_B+	GND	13_ETH_A-	13_ETH_A+	GND	8
GND	14_ETH_D-	14_ETH_D+	GND	14_ETH_C-	14_ETH_C+	GND	14_ETH_B-	14_ETH_B+	GND	14_ETH_A-	14_ETH_A+	7
15_ETH_D-	15_ETH_D+	GND	15_ETH_C-	15_ETH_C+	GND	15_ETH_B-	15_ETH_B+	GND	15_ETH_A-	15_ETH_A+	GND	6
GND	16_ETH_D-	16_ETH_D+	GND	16_ETH_C-	16_ETH_C+	GND	16_ETH_B-	16_ETH_B+	GND	16_ETH_A-	16_ETH_A+	5
-	-	GND	-	-	GND	-	-	GND	-	-	GND	4
GND	-	-	GND	-	-	GND	-	-	GND	-	-	3
-	-	GND	-	-	GND	-	-	GND	-	-	GND	2
GND	-	-	GND	-	-	GND	-	-	GND	-	-	1
L	K	J	I	H	G	F	E	D	C	B	A	

3 Appendix

3.1 Literature and Web Resources

- G302 data sheet with up-to-date information and documentation:
  www.men.de/products/02G302-.html

3.1.1 Ethernet

- ANSI/IEEE 802.3-1996, Information Technology - Telecommunications and Information Exchange between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications; 1996; IEEE
  www.ieee.org
- Charles Spurgeon's Ethernet Web Site
  Extensive information about Ethernet (IEEE 802.3) local area network (LAN) technology.
  www.ethermanage.com/ethernet/
- InterOperability Laboratory, University of New Hampshire
  This page covers general Ethernet technology.
  www.iol.unh.edu/services/testing/ethernet/training/

3.1.2 CompactPCI Serial

- CompactPCI Serial Specification PICMG CPCI-S.0 Revision 1.0: 2011; PCI Industrial Computers Manufacturers Group (PICMG)
  www.picmg.org
- Introduction to CompactPCI Serial on Wikipedia:
  en.wikipedia.org/wiki/CompactPCI_Serial

3.2 Finding out the Product's Article Number, Revision and Serial Number

MEN user documentation may describe several different models and/or design revisions of the G302. You can find information on the article number, the design revision and the serial number on two labels attached to the board.

- **Article number:** Gives the product's family and model. This is also MEN's ordering number. To be complete it must have 9 characters.
- **Revision number:** Gives the design revision of the product.
- **Serial number:** Unique identification assigned during production.

If you need support, you should communicate these numbers to MEN.

Figure 3. *Labels giving the product's article number, revision and serial number*