

HiCO.ETH

PC/104 Ethernet Controller

**HiCO.ETH-DOC
User Manual**

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emtrion

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1. Overview

1.1. Introduction

HiCO.ETH is a communications module with Ethernet controller in accordance with IEEE 802.3. The connection to the Ethernet network is either directly via 10Base-T or via an AUI (attachment unit interface) with external MAU (media access unit). In addition, a 32-pin socket is mounted to accommodate a boot PROM or silicon disk. This manual is addressed to Original Equipment Manufacturers (OEM) who wish to customize the HiCO.ETH module for their particular projects. It provides information and tips on both installation and configuration of the module.

1.2. Key Features of the HiCO.ETH Module

Feature	Function
Ethernet controller	RTL8019AS
Data rate	10 Mbps
Compatibility	NE2000, IEEE 802.3
Interface	10Base-T, AUI
Remote boot	possible via 32-pin socket
Socket	Boot PROM or silicon disk
Bus interface	PC/104, 8 or 16 bits
Power supply	+5V, 0.2A
Operating temperature	0°C to +70°C
Storage temperature	-40°C to +125°C
Dimensions	96 mm x 90 mm x 20 mm

2. Installing HiCO.ETH

Please read the following notes prior to installing the HiCO.ETH module. They apply to all ESD (electrostatic discharge) components:

- Before installing the module, it is recommended that you discharge yourself by touching a grounded object.
- Be sure all tools required for installation are electrostatically discharged as well.
- Before installing (or removing) the board, remove the power cable from your mains supply.
- Handle the board with care and try to avoid touching its components or tracks.

HiCO.ETH is a CPU PC/104 module which may only be operated in a PC/104 environment along with a PC. When installing the board, care must be taken of the following:

- Make sure all jumpers are properly set.
- Connect HiCO.ETH to the other components via the 104-contact J1 connector. Four fastening screws are provided to fix the board.
- HiCO.ETH requires only +5V when using the 10Base-T connection. Additional +12 volts are required if you wish to connect an MAU to the AUI interface J5.
- HiCO.ETH is shipped in a conductive packaging. The soldered battery is protected with scotch tape against discharge during shipping. This tape can now be removed.

3. Ethernet Controller

3.1. General Information

HiCO.ETH is based on the powerful Realtek RTL8019AS Ethernet controller. This controller complies with the Ethernet standard IEEE 802.3 with CSMA/CD protocol at a transfer rate of 10 Mbps.

Both hardware and drivers are fully compatible with the Novell NE2000 standard. The controller provides a 16-Kbyte SRAM as message buffer.

The controller may be operated with an 8-bit or 16-bit ISA bus. The data width is recognized automatically. The bus interface may either be used as a Plug and Play interface or configured via software.

The module provides a 10Base-T connector via an RJ-45 jack and a 16-pin AUI connector for the connection of an external MAU. The two interfaces are electrically isolated from the controller. For easy mounting, the signals of the RJ-45 jack are additionally applied to a 10-pin connector, allowing for front panel connection.

Two LEDs indicate that a cable has been connected to the RJ-45 jack and that data transfer takes place on a connected Ethernet cable.

A 32-pin socket serves to accommodate a boot PROM, which allows for booting a PC without mass storage via the Ethernet.

3.2. Configuring the Ethernet Controller

The supplied CD-ROM contains a DOS program called RSET8019.EXE. This program serves to configure and test the Ethernet controller.

RSET8019.EXE provides the following:

- Display of the current configuration
- Definition of a new configuration
- Functional test of the Ethernet controller

The connection should always be set to "Auto Detect". The module will then automatically detect the connection in use.

The settings for the boot ROM are of no significance. The socket installed in the HiCO.ETH is not selected by the Ethernet controller. The entry for Boot ROM should always be set to "No Boot ROM"; otherwise the Ethernet controller uses the memory region entered.

3.3. Programming the EEPROM

The Ethernet controller's setup data are contained within an EEPROM. If these contents are lost, new default data may be programmed into the EEPROM using the PG8019.EXE program. For this, PG8019.EXE enters the data of the 8019AS.CFG file into the EEPROM.

Note

When programming the EEPROM, a dummy network board number is entered. This number is not unambiguous and should only be used in a company's internal LAN. If you wish to program a permitted board number, contact us.

3.4. Diagnostic LEDs

To indicate the status of the Ethernet connection, HiCO.ETH provides two LEDs.

The green LED goes on to indicate that data are being transferred. During normal operation, this green LED blinks at irregular intervals.

The red LED goes on to indicate data collisions on the cable. During normal operation, the red LED does not light up.

3.5. Drivers

HiCO.ETH is fully NE2000 compatible. This standard is used by most operating systems as a generic configuration without drivers.

In addition, we provides several drivers for the following:

- Netware ODI
- NDIS 2.x
- Windows 9x
- Windows CE 5.0
- Windows NT 3.5, 4.0
- OS/2
- Lantastic 4.x, 5.x, 6.x
- Packet driver
- SCO Unix
- Linux

The current drivers can be found on the internet at:

<http://www.realtek.com.tw>

3.6. Ethernet Cable

The following cables are specified for a data rate of 10 Mbps:




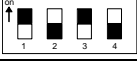
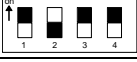
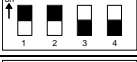
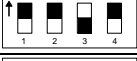


Ethernet type	Topology	Cable type	Segment length
10Base-2	Bus	Coax 50 Ω , Ethernet thin, RG-58	max. 185 m
10Base-5	Bus	Coax 50 Ω , Ethernet thick, RG-11	max. 500 m
10Base-T	Star	Unshielded Twisted Pair, 100 Ω	max. 100 m

For the 10Base-2 and 10Base-5 connection, an external MAU is required.

4. Boot-PROM Socket

The 32-pin socket serves to accommodate a Boot PROM or a flash disk DiskOnChip® 2000 from M-Systems [4].

The socket's address space is 16KB, the base address can be set via the S5 switches in steps of 16KB. If switch 1 of S5 is set to "off", the socket is not activated. The following address setting applies:

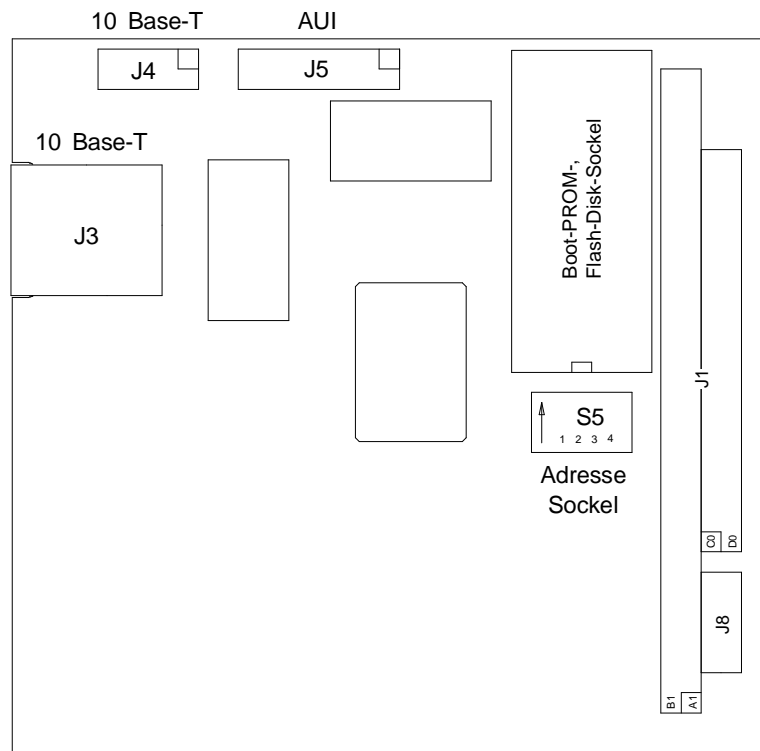
DIP Switch	Address region
	disabled
	DC000 – DFFFF
	D8000 – DBFFF
	D4000 – D7FFF
	D0000 – D3FFF
	CC000 – CFFFF
	C8000 – CBFFF
	C4000 – C7FFF
	C0000 – C3FFF

The black square indicates the respective position of the switch.

You are able to install the EPROM types 27C512 or 27C010 in the socket. However, only the lower 16K bytes of the PROM are accessed. For a remote boot via Ethernet, the necessary binary files for boot PROM are also available. These files can be found on the supplied CD in the drivers directory.

The socket may also accommodate an integrated flash disk DiskOnChip® 2000 from M-Systems. Bootable flash disks with a capacity from 2 MB to 144 MB can be ordered at emtrion (ordering code: HiCO486-Fxx).

5. Position of the Connectors



6. Pin Assignment of the Connectors

6.1. J1, PC/104

Type 64-pin + 40-pin header with long pins, 2.54 mm

	Row A	Row B	Row C	Row D	
1	-	GND			
2	D7	RESET			
3	D6	+5 V			
4	D5	IRQ9			
5	D4	-			
6	D3	-			
7	D2	-			
8	D1	-			
9	D0	+12 V	GND	GND	0
10	IOCHRDY	-	-	-	1
11	AEN	SMEMW#	-	IOCS16#	2
12	A19	SMEMR#	-	IRQ10	3
13	A18	IOW#	-	IRQ11	4
14	A17	IOR#	-	IRQ12	5
15	A16	-	-	IRQ15	6
16	A15	-	-	-	7
17	A14	-	-	-	8
18	A13	-	-	-	9
19	A12	-	-	-	10
20	A11	-	D8	-	11
21	A10	-	D9	-	12
22	A9	-	D10	-	13
23	A8	IRQ5	D11	-	14
24	A7	IRQ4	D12	-	15
25	A6	IRQ3	D13	+5 V	16
26	A5	-	D14	-	17
27	A4	-	D15	GND	18
28	A3	-	-	GND	19
29	A2	+5 V			
30	A1	-			
31	A0	GND			
32	GND	GND			

6.2. J3, Ethernet 10 Base-T

Type RJ45

Pin	Signal
1	TD+
2	TD-
3	RD+
4	-
5	-
6	RD-
7	-
8	-

6.3. J4, Ethernet 10 Base-T

Type 10-pin connector, 2.54 mm

Pin	Signal	Pin	Signal
1	AUI +5V	2	LED2-
3	RD+	4	RD-
5	LED1-	6	GND
7	-	8	GND
9	TD+	10	TD-

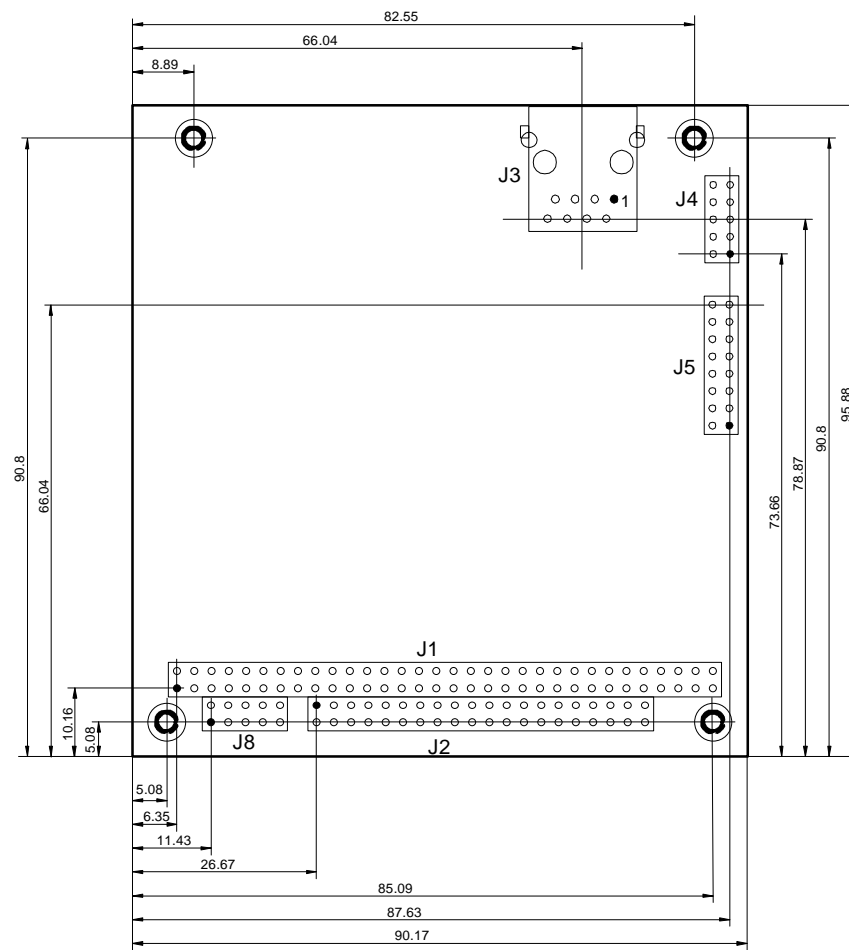
You are able to connect low-current LEDs, which draw 2 mA from +5V to the signals LED1- and LED2-. LED1- indicates the data transfer. LED2- indicates data collisions.

6.4. J5, Ethernet AUI

Type 16-pin connector, 2.54 mm

Pin	Signal	Pin	Signal
1	GND	2	CD-
3	CD+	4	TX-
5	TX+	6	GND
7	GND	8	RX-
9	RX+	10	AUI +12V
11	GND	12	GND
13	-	14	-
15	-	16	AUI +5V

7. Dimensional Drawing



8. Technical Data

8.1. Mechanical Data

Weight	73 g
Board	Glasepoxi FR-4, UL listed, 10 layers
Dimensions	96 mm x 90 mm x 22 mm

8.2. Electrical Data

8.2.1. Supply Voltage

Supply voltage	5V, +/-5%
Power consumption	0.2 A typ.

8.3. Environmental Conditions

Temperature	0 ... +70°C during operation -40 ... +125°C storage
Rel. humidity	0 ... 95 %, non-condensing

9. Web Reference

- [1] RTL8019
Relate Full-Duplex Ethernet Controller with Plug and Play Function
Advance Information, April 1995
Relate Seem-Conductor Co., LTD.
<http://www.realtek.com.tw>

- [3] DiskOnChip®2000
Product Manual, Revision 2.0
M-Systems Inc.,
<http://www.m-sys.com/>

- [4] PC/104 Specification
Version 2.3, June 1996
<http://www.controlled.com/pc104/techp1.html>