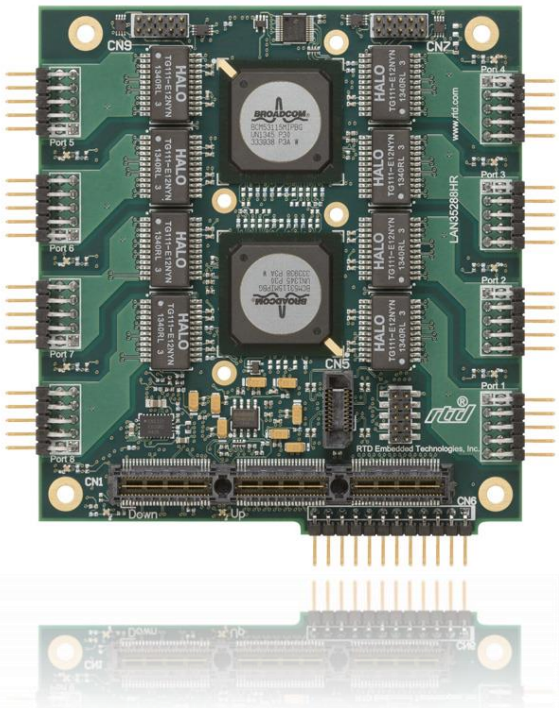
LAN35H08HR-D & LAN35E08HR-D, LAN35H08HR-RJ & LAN35E08HR-RJ, IDAN-LAN35H08HR & IDAN-LAN35E08HR

Gigabit Ethernet Unmanaged Switches

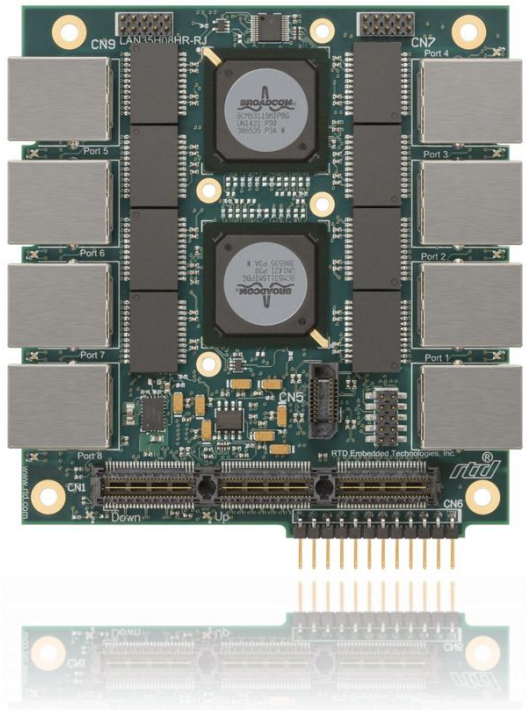
User's Manual

BDM-610020116 Rev. A

LAN35x08HR-D



LAN35x08HR-RJ



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Revision History

Rev A	Initial Release	10/20/2014

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1 Introduction

1.1 Product Overview

The LAN35H08HR and LAN35E08HR are stackable 10-port unmanaged Gigabit Ethernet switches for expanding the networking capabilities of any system. The boards can be used either in a PCIe/104 system or as a standalone module. In a stack the LAN35H08HR has a host interface x1 PCI Express link for an onboard Gigabit Ethernet controller that is connected to one port of the switch. The LAN35E08HR does not have an Ethernet controller and is designed to stack above an LAN35H08HR or another LAN35E08HR to provide additional switch ports. As a standalone modules they each provides eight Ethernet ports any one of which can be the upstream port and the remaining seven will be downstream ports. This board is compatible with all PCI Express cpuModules and has only the PCIe/104 connector. The boards are available in IDAN frames with two 37-pin "D" connectors.

1.2 Board Features

- Two BroadCom BCM53115 Gigabit Ethernet Switches:
  - 10 Full Duplex Unmanaged Gigabit Ethernet Ports
  - Any port can be the uplink, remaining links will be downlinks.
  - Ports have automatic MDI crossover to eliminate the need for crossover cables
  - Supports Jumbo frames up to 9720 bytes
  - Industrial Temperature rated: -40 to +85 C with supplied passive heatsink
- LAN35H08HR with host interface
  - PCIe/104 PCI Express x1 link to onboard WG82574IT Gigabit Ethernet controller connects to one switch port
  - 8 ports brought to 10-pin DIL I/O connectors
  - 1 port for up stacking switch expansion with LAN35E08HR modules
- LAN35E08HR switch expansion
  - PCIe/104 stack through connector for power only
  - 1 port for stack down expansion connector
    - Note: The stackdown connector is not PC/104 compliant, so exercise care if placing it above something other than a LAN35H08HR or another LAN35E08HR.
  - 8 ports brought to 10-pin DIL I/O connectors
  - 1 port for up stacking switch expansion with LAN35E08HR modules
- I/O Connector Options
  - –D has eight 10-pin 0.1" dual-inline connectors
  - –RJ has eight RJ-45 connectors
  - IDAN version has two 37-pin "D" connectors
- PCIe/104 Universal interface operates on Type 1 and Type 2 PCIe/104 buses
- PCI Express Bus:
  - Provides 2.5 Gbps in each direction
  - Single lane and single Virtual Channel operation
    - Compatible with multi-Virtual Channel chipsets
  - Packetized serial traffic with PCI Express Split Completion protocol
  - Data Link Layer Cyclic Redundancy Check (CRC) generator and checker
  - Automatic Retry of bad packets
  - In-band interrupts and messages
  - Message Signaled Interrupt (MSI) support

1.3 Ordering Information

The LAN35H08HR & LAN35E08HR are available with the following options:

Table 1: Ordering Options

Part Number	Description
LAN35H08HR-RJ	8-port Gigabit Ethernet Switch with host interface, PCIe/104 bus, and RJ-45 connectors
LAN35H08HR-D	8-port Gigabit Ethernet Switch with host interface, PCIe/104 bus, and 10-pin DIL connectors
IDAN-LAN35H08HR	8-port Gigabit Ethernet Switch with host interface in IDAN enclosure with two 37-pin "D" connectors and PCIe/104 bus

Table 1: Ordering Options

Part Number	Description
LAN35E08HR-RJ	8-port Gigabit Ethernet Switch expansion, PCIe/104 bus, and RJ-45 connectors
LAN35E08HR-D	8-port Gigabit Ethernet Switch expansion, PCIe/104 bus, and 10-pin DIL connectors
IDAN-LAN35E08HR	8-port Gigabit Ethernet Switch expansion in IDAN enclosure with two 37-pin "D" connectors and PCIe/104 bus

The Intelligent Data Acquisition Node (IDAN™) building block can be used in just about any combination with other IDAN building blocks to create a simple but rugged 104™ stack. This module can also be incorporated in a custom-built RTD HiDAN™ or HiDANplus High Reliability Intelligent Data Acquisition Node. Contact RTD sales for more information on our high reliability systems.

1.4 Contact Information

1.4.1 Sales Support

For sales inquiries, you can contact RTD Embedded Technologies sales via the following methods:

Phone: 1-814-234-8087 Monday through Friday, 8:00am to 5:00pm (EST).
E-Mail: sales@rtd.com

1.4.2 Technical Support

If you are having problems with you system, please try the steps in the Troubleshooting section of this manual.

For help with this product, or any other product made by RTD, you can contact RTD Embedded Technologies technical support via the following methods:

Phone: 1-814-234-8087 Monday through Friday, 8:00am to 5:00pm (EST).
E-Mail: techsupport@rtd.com

2 Specifications

2.1 Operating Conditions

Table 2: Operating Conditions

Symbol	Parameter	Test Condition	Min	Max	Unit
V_{cc5}	5V Supply Voltage		4.75	5.25	V
T_a	Operating Temperature	With supplied passive heatsink	-40	+85	C
T_s	Storage Temperature		-55	+125	C
RH	Relative Humidity	Non-Condensing	0	90%	%
MTBF	Mean Time Before Failure	30C	TBD		Hours

2.2 Electrical Characteristics

Table 3: Electrical Characteristics

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
Power +5V	LAN35H08HR Power Consumption	MAC/Phy linked at 1Gbps MAC/Phy plus 1 port linked at 1Gbps MAC/Phy plus 2 ports linked at 1Gbps MAC/Phy plus 3 ports linked at 1Gbps MAC/Phy plus 4 ports linked at 1Gbps MAC/Phy plus 5 ports linked at 1Gbps MAC/Phy plus 6 ports linked at 1Gbps MAC/Phy plus 7 ports linked at 1Gbps MAC/Phy plus 8 ports linked at 1Gbps MAC/Phy , up stacking, plus 8 ports linked at 1Gbps		3.2 3.6 3.9 4.3 4.7 5.0 5.4 5.8 6.2 6.6		W
Power +5V	LAN35E08HR Power Consumption	No ports linked at 1Gbps Down stacking port linked at 1Gbps Down stacking plus 1 ports linked at 1Gbps Down stacking plus 2 ports linked at 1Gbps Down stacking plus 3 ports linked at 1Gbps Down stacking plus 4 ports linked at 1Gbps Down stacking plus 5 ports linked at 1Gbps Down stacking plus 6 ports linked at 1Gbps Down stacking plus 7 ports linked at 1Gbps Down stacking plus 8 ports linked at 1Gbps Down and Up stacking plus 8 ports linked at 1Gbps		1.9 2.2 2.6 3.0 3.3 3.7 4.1 4.5 4.9 5.2 5.6		W
	PCIe/104 Bus					
	Differential Output Voltage		0.8		1.2	V
	DC Differential TX Impedance		95.2		116.9	Ω
	Differential Input Voltage		0.175		3.3	V
	DC Differential RX Impedance		92.7		115.8	Ω
	Electrical Idle Detect Threshold		61		173	mV

3 Board Connection

3.1 Board Handling Precautions

To prevent damage due to Electrostatic Discharge (ESD), keep your board in its antistatic bag until you are ready to install it into your system. When removing it from the bag, hold the board at the edges, and do not touch the components or connectors. Handle the board in an antistatic environment, and use a grounded workbench for testing and handling of your hardware.

3.2 Physical Characteristics

- Weight: Approximately 55 g (0.12 lbs.)
- Dimensions: 90.17 mm L x 95.89 mm W (3.550 in L x 3.775 in W)

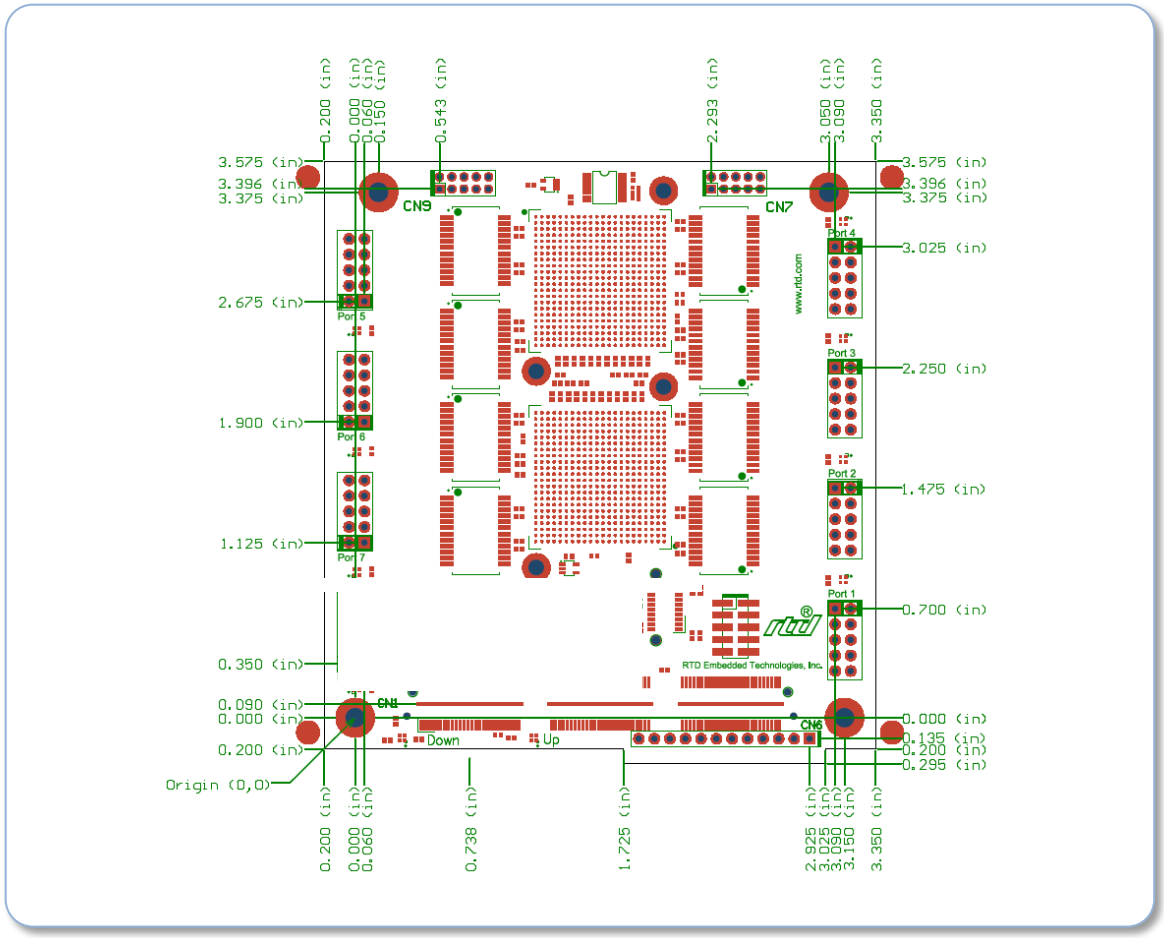

Figure 1: LAN35H08HR-D & LAN35E08HR-D Board Dimensions

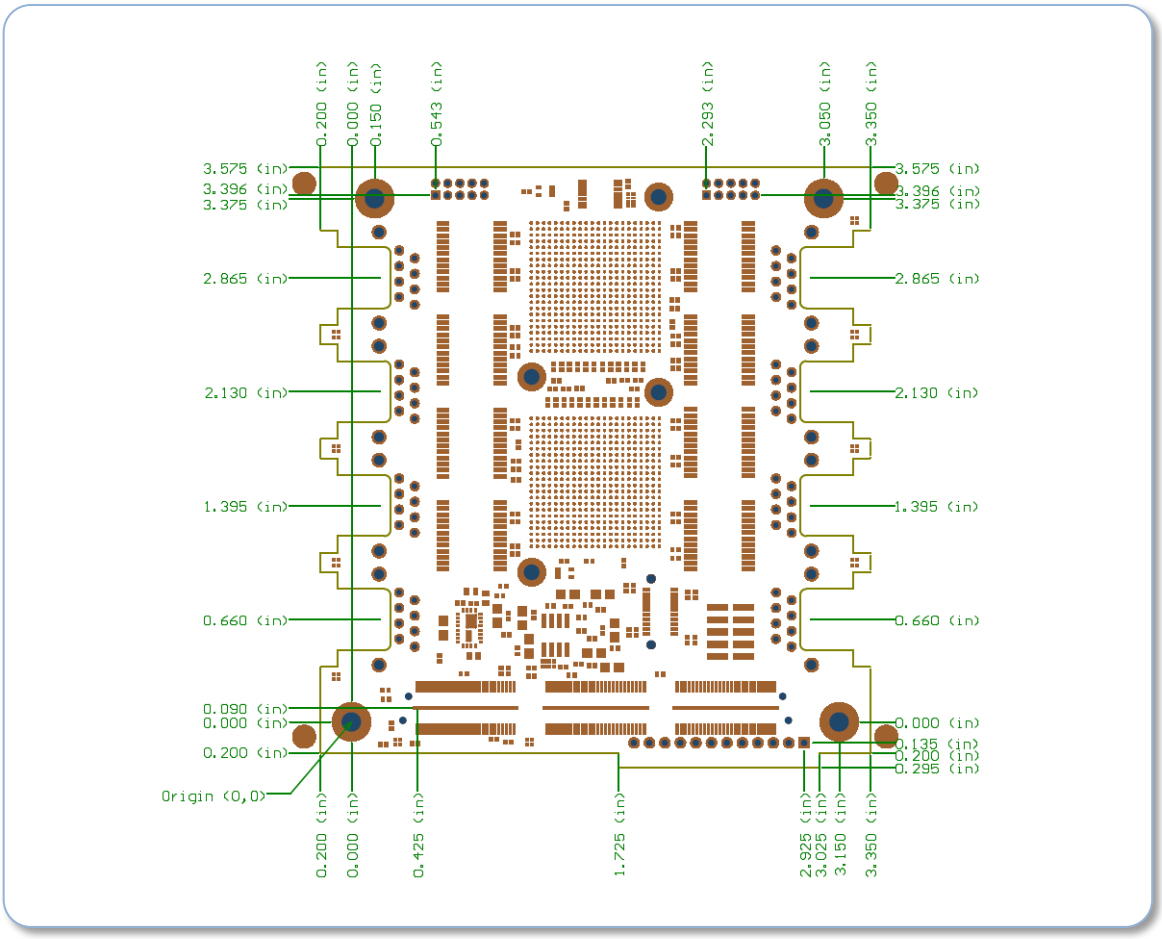

Figure 2: LAN35H08HR-RJ & LAN35E08HR-RJ Board Dimensions

3.3 Connectors

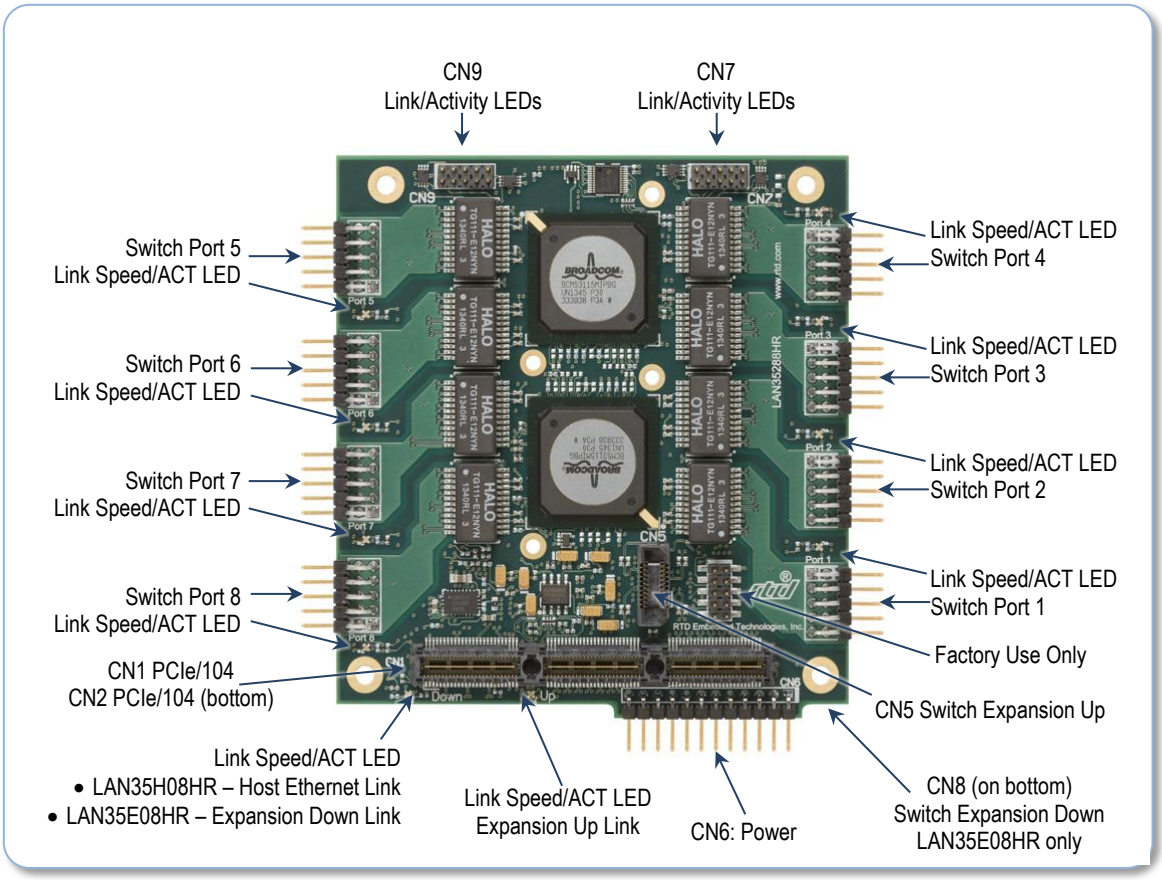

Figure 3: LAN35H08HR-D & LAN35E08HR-D Board Connections

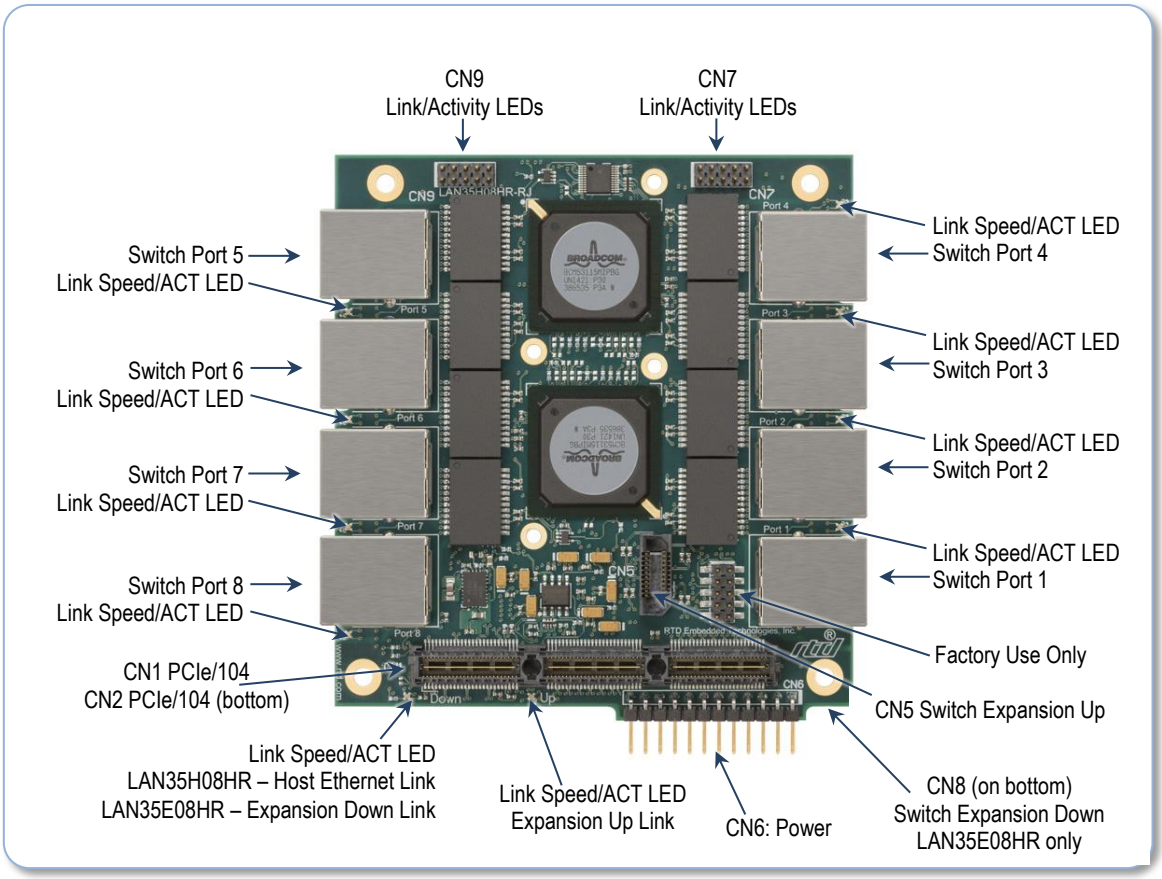

Figure 4: LAN35H08HR-RJ & LAN35E08HR-RJ Board Connections

3.3.1 External I/O Connectors

- Port 1 – 8: 10-pin DIL connectors for Ethernet
- CN7/9: External LED connectors
- CN5: Switch Expansion Up Link
- CN8: Switch Expansion Down Link (LAN35E08HR only)
- CN6: Power Input

3.3.2 10-pin DIL Twisted Pair Ethernet, Port 1 – Port 8 (LANx08HR-D only)

Port 1 – Port 8 are the Ethernet I/O connectors. The pin out of all eight connector is the same and is listed in the table below.

Pin	1000 Function	10/100 Function	RJ-45 Pin
1	MDI_B+	Receive +	3
2	MDI_B-	Receive -	6
3	MDI_C+	Not Used	4
4	MDI_C-	Not Used	5
5	MDI_A+	Transmit +	1
6	MDI_A-	Transmit -	2
7	MDI_D+	Not Used	7
8	MDI_D-	Not Used	8
9	Shield Ground		
10	Shield Ground		

Table 4: Ethernet Signal Assignments

3.3.3 RJ45 Twisted Pair Ethernet, Port 1 – Port 8 (LANx08HR-RJ only)

Port 1 – Port 8 are UTP (Unshielded Twisted Pair) wiring normally used for 10/100/1000 Base-T Ethernet. The following table gives the pin out of Port 1 – Port 8.

Pin	1000 Function	10/100 Function
1	MDI_A+	Transmit +
2	MDI_A-	Transmit -
3	MDI_B+	Receive +
4	MDI_C+	Not Used
5	MDI_C-	Not Used
6	MDI_B-	Receive -
7	MDI_D+	Not Used
8	MDI_D-	Not Used

Table 5: RJ45 Signal Assignments

Port 1 – Port 8 are standard female RJ-45 connectors. The figure below shows the pin numbering when **looking into the connector**:

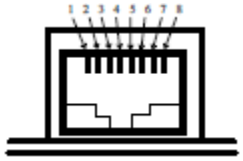

Figure 5: RJ-45 Jack Connector

3.3.1 12-pin SIL Power, CN6

CN6 is a power connector to allow use in a standalone system. The board only requires +5V and ground, however if +12V is supplied it will power the PCIe/104 bus connectors. The pin out is listed in the table below.

Pin	Function
1	Ground
2	+5V
3	+5V
4	Ground
5	Ground
6	+12V
7	+12V
8	Ground
9	Ground
10	+5V
11	+5V
12	Ground

Table 6: Power Signal Assignments

3.3.2 Status LEDs

The tri-color LEDs on the board are used to indicate the status of the Ethernet ports.

LED Color	Description
Off	No Link
Green	Link at 1000 Mbps, flash with activity
Blue	Link at 100 Mbps, flash with activity
Red	Link at 10 Mbps, flash with activity

Table 7: Status LEDs

3.3.3 External Status LED Connectors CN7 and CN9

CN7 and CN9 are the status LED signals that are buffered and able to source or sink 24 mA. The pin out is in the tables below.

CN7 Pin	Function	Description
1	Port 1 Link/activity	Low when linked, goes tri-state with activity
3	Port 2 Link/activity	Low when linked, goes tri-state with activity
5	Port 3 Link/activity	Low when linked, goes tri-state with activity
7	Port 4 Link/activity	Low when linked, goes tri-state with activity
9	LAN35H08HR – Host Ethernet Link LAN35E08HR – Expansion Down Link	Low when linked, goes tri-state with activity
2, 4, 6, 8, 10	+5V volts	Power for LEDs

Table 8: CN7 External LED Drive

CN9 Pin	Function	Description
1	Port 5 Link/activity	Low when linked, goes tri-state with activity
3	Port 6 Link/activity	Low when linked, goes tri-state with activity
5	Port 7 Link/activity	Low when linked, goes tri-state with activity
7	Port 8 Link/activity	Low when linked, goes tri-state with activity
9	Expansion Port Up Link/activity	Low when linked, goes tri-state with activity
2, 4, 6, 8, 10	+5V volts	Power for LEDs

Table 9: CN8 External LED Drive

3.3.4 CN1 (TOP) & CN2 (BOTTOM) BUS CONNECTORS

The PCIe connector is the connection to the system CPU. The position and pin assignments are compliant with the *PCI/104-Express Specification*. (See PC/104 Specifications on page 26)

The LAN35H08HR is an "Universal" board and can connect to either a Type 1 or Type 2 PCIe/104 connector.

3.4 Steps for Installing

1. Always work at an ESD protected workstation, and wear a grounded wrist-strap.
2. Turn off power to the PC/104 system or stack.
3. Select and install stand-offs to properly position the module on the stack.
4. Remove the module from its anti-static bag.
5. Check that pins of the bus connector are properly positioned.
6. Check the stacking order; make sure all of the busses used by the peripheral cards are connected to the cpuModule.
7. Hold the module by its edges and orient it so the bus connector pins line up with the matching connector on the stack.
8. Gently and evenly press the module onto the PC/104 stack.
9. If any boards are to be stacked above this module, install them.
10. Attach any necessary cables to the PC/104 stack.
11. Re-connect the power cord and apply power to the stack.
12. Boot the system and verify that all of the hardware is working properly.

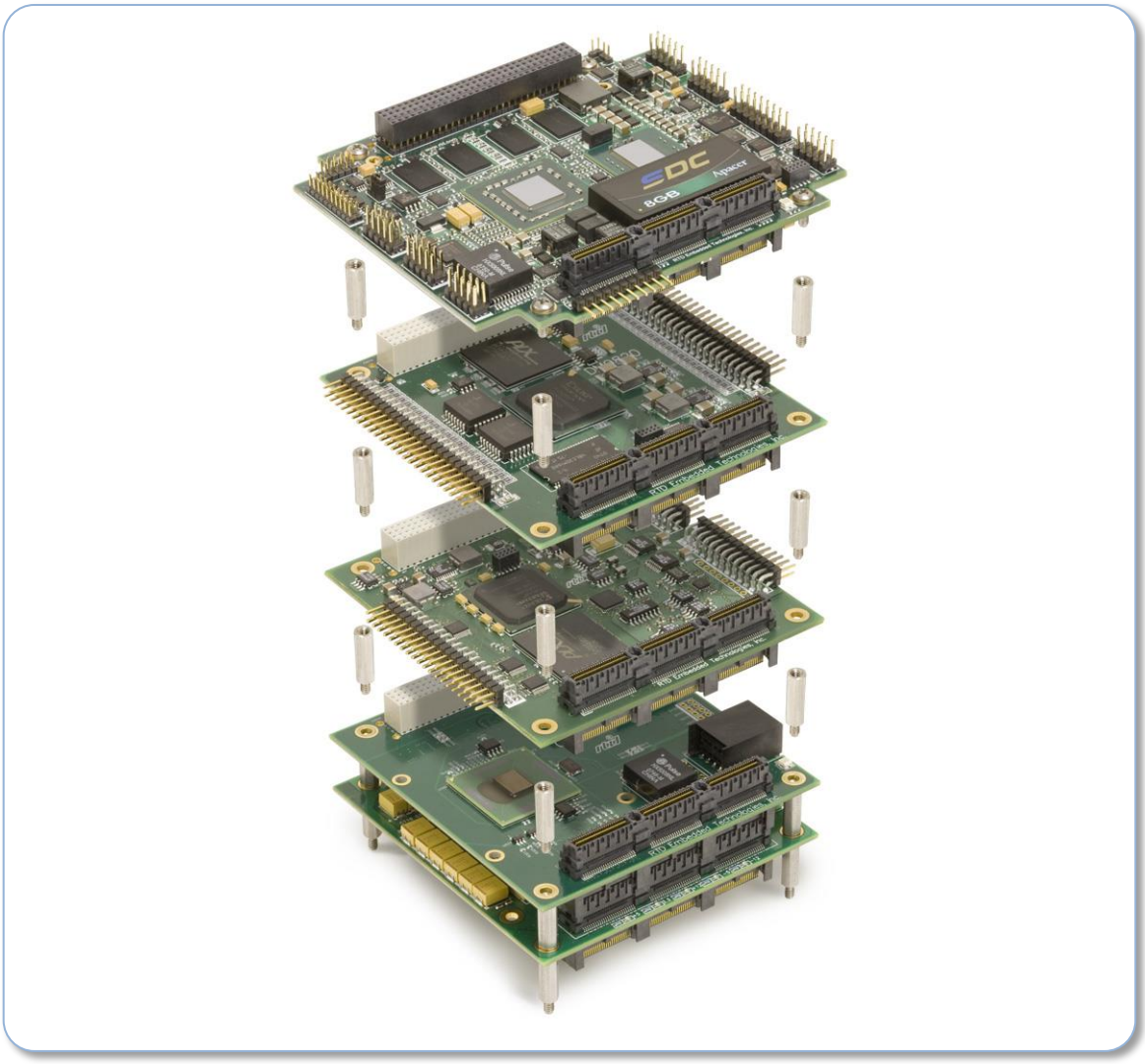

Figure 6: Example 104™ Stack

4 Functional Description

4.1 Block Diagrams

The Figures below shows the functional block diagram of the LAN35H08HR and IDAN-LAN35H08HR. The various parts of the block diagram are discussed in the following sections.

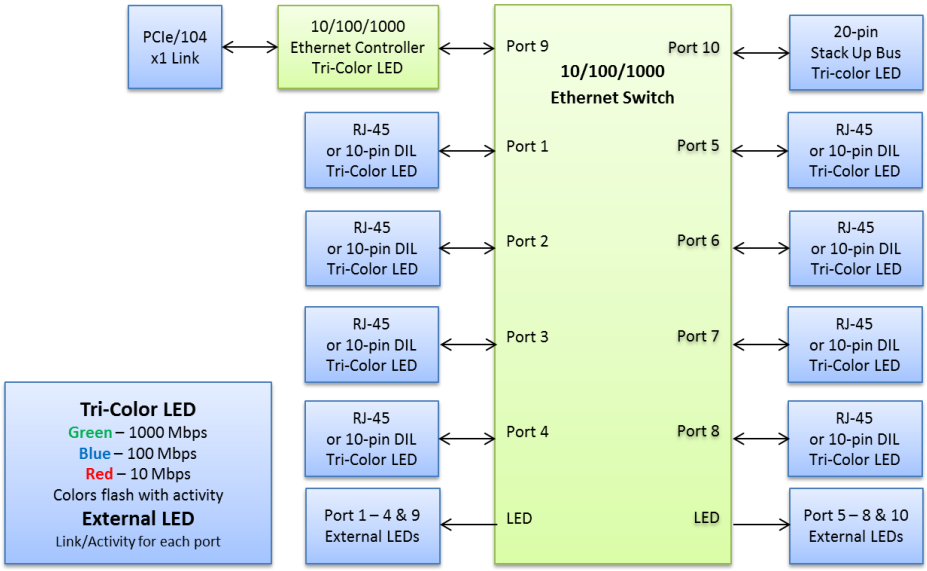

Figure 7: LAN35H08HR Block Diagram

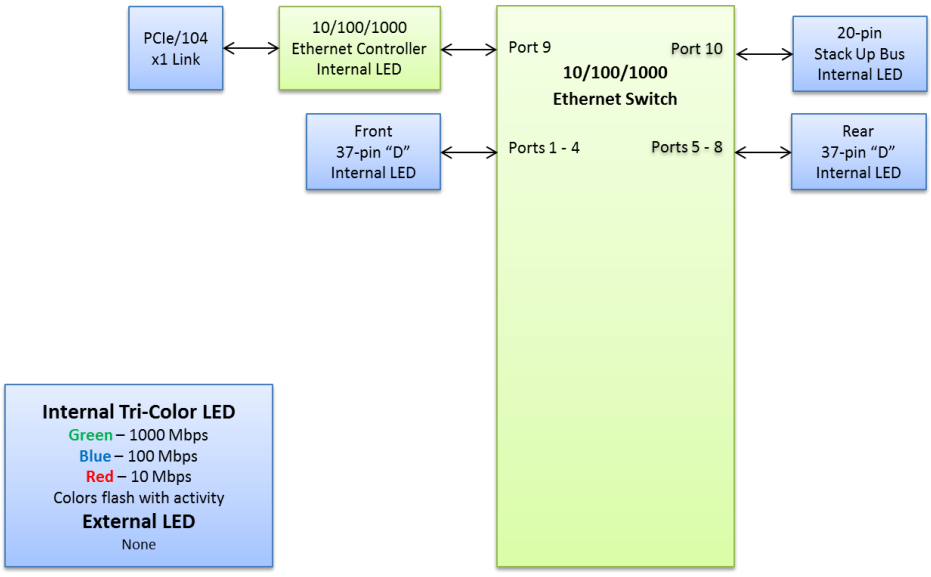

Figure 8: IDAN-LAN35H08HR Block Diagram

The Figures below shows the functional block diagram of the LAN35E08HR and IDAN-LAN35E08HR. The various parts of the block diagram are discussed in the following sections.

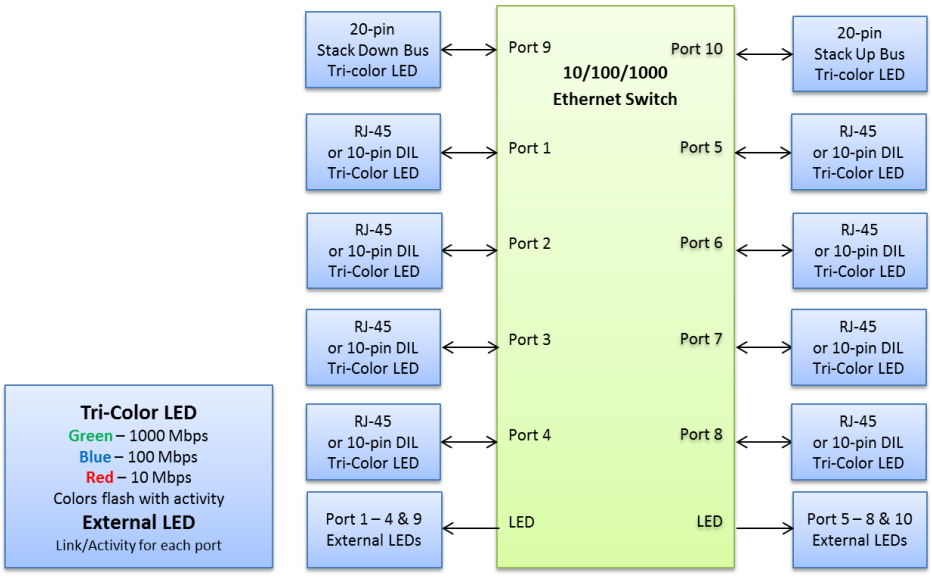

Figure 9: LAN35E08HR Block Diagram

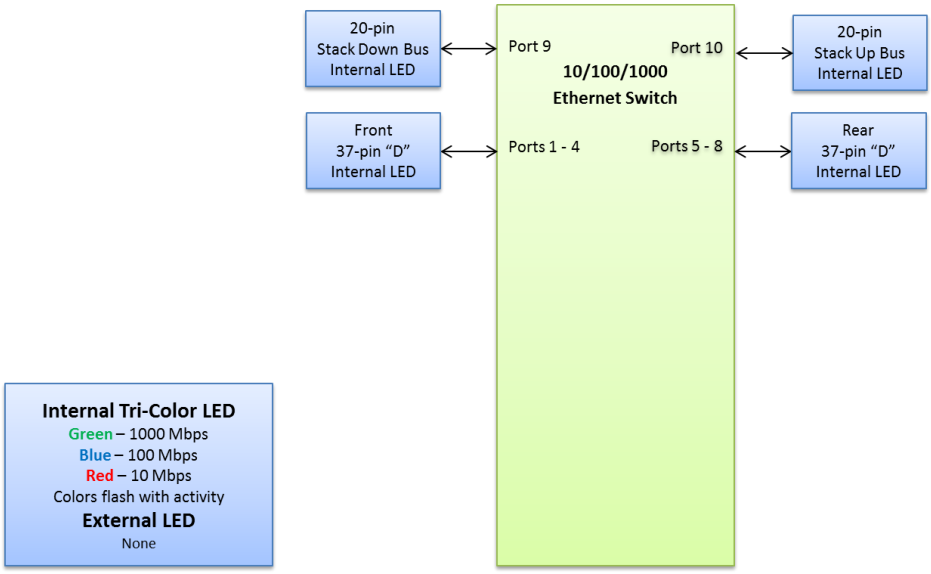

Figure 10: IDAN-LAN35E08HR Block Diagram

4.2 BroadCom Gig-Ethernet Switch

The main components of the LAN35H08HR are the two BroadCom BCM53115 Gigabit Ethernet switch. They are industrial temperature rated, 5 port Gigabit Ethernet switches that are connected together to make a 10 port switch. This switch contains 10 full-duplex 10/100/1000 BASE-TX Ethernet transceivers for network interfacing. One of these ports is used in conjunction with the WG82574IT for a host port. This allows the LAN35H08HR to work as its own mini-server in a stacked system. In a stand-alone system the BroadCom switch acts as a basic Ethernet switch. Any port can be used as an upstream port to supply a connection to the other ports.

4.3 Jumbo Frame Support

The Broadcom Ethernet switch is capable of forwarding Ethernet frames up to 9720 bytes. The maximum frame size supported by the Intel Ethernet controller is 9014 bytes. To use Jumbo frames, it must be enabled in the Ethernet Controller driver settings (e.g. via the Device Manager in Windows). Until this is enabled, the Intel controller will drop any Jumbo frames it receives. Note that to use Jumbo frames effectively, all devices connected to the network must have Jumbo frames enabled, AND must agree on the frame size (mismatched frame sizes will result in dropped packets).

4.4 Intel WG82574IT Gigabit Ethernet Controller

The LAN35H08HR has an onboard Gigabit Ethernet controller, the Intel WG82574IT. The Intel WG82574IT is an industrial rated Gigabit Ethernet controller which features Auto-Crossover for MDI/MDI-X, 9014 bytes Jumbo Frame support, 40KB packet buffer size and IPv4/6 support. This controller connects to the host CPU through a x1 PCI Express link on the PCIe/104 connector and interfaces through the fifth port of the Ethernet switch to provide a host port for stacked systems.

4.5 Onboard LEDs and External LED Connectors

The LAN35H08HR has onboard tri-color LEDs for each of the ten Ethernet ports on the board. The setting for the onboard LEDs is to show link, activity, and speed at 10/100/1000M. There are two 0.1 inch DIL connectors (CN7 & CN8) that can be wired to external LED circuitry. They carry a link/activity signal for each port.

5 IDAN Connections

5.1 Module Handling Precautions

To prevent damage due to Electrostatic Discharge (ESD), keep your module in its antistatic bag until you are ready to install it into your system. When removing it from the bag, hold the module by the aluminum enclosure, and do not touch the components or connectors. Handle the module in an antistatic environment, and use a grounded workbench for testing and handling of your hardware.

5.2 Physical Characteristics

- Weight: Approximately 0.21 Kg (0.46 lbs.)
- Dimensions: 151.972 mm L x 129.978 mm W x 16.993 mm H (5.983 in L x 5.117 in W x 0.669 in H)

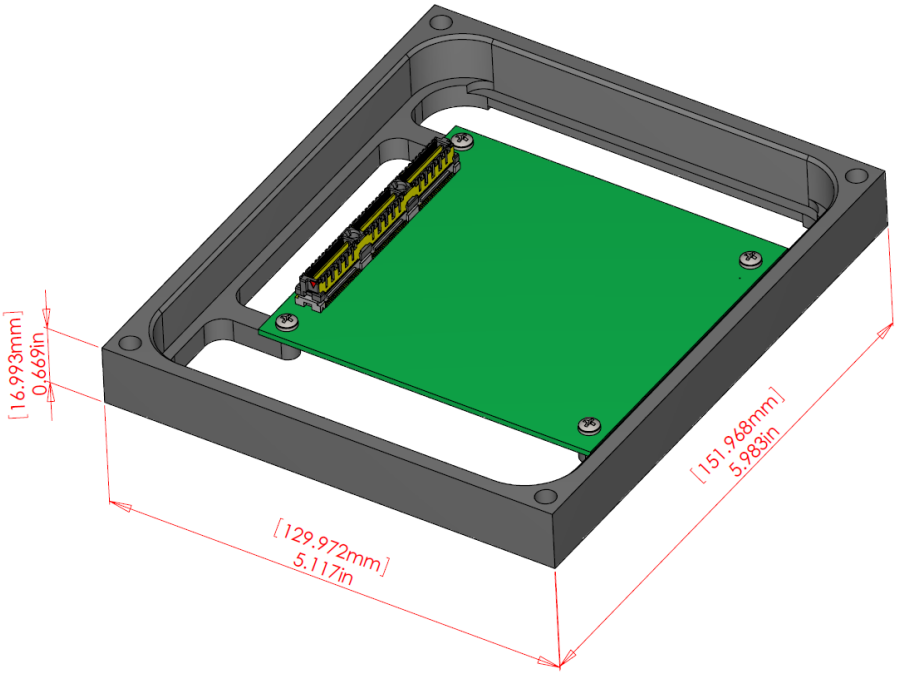

Figure 11: IDAN Dimensions

5.3 IDAN Versions

The Ethernet switch module is available in an IDAN version. The IDAN-LAN35H08HR and LAN35E08HR both feature rugged 37-pin "D" connectors.

5.3.1 IDAN-LAN35H08HR & IDAN-LAN35E08HR

These utilityModules are an IDAN configuration with two 37-pin "D" connectors with four Ethernet ports in each. The modules come with two breakout cables that have a 37-pin "D" on one end and four 9-pin "D" on the other end and eight 9-pin "D" to RJ45 adapters.

Figure 12: IDAN-LAN35H08HR or IDAN-LAN38E08HR Front View

IDAN	Signal		LAN35H08HR or LAN35E08HR		IDAN-XKCM33 Cable Kit
Pin	1000 Function	10/100 Function	Port	Pin	9 Pin "D" Connector (Male)
1	MDI_B+	Receive +	4	1	PORT 4-1
20	MDI_B-	Receive -		2	PORT 4-6
2	MDI_C+	Not Used		3	PORT 4-2
21	MDI_C-	Not Used		4	PORT 4-7
3	MDI_A+	Transmit +		5	PORT 4-3
22	MDI_A-	Transmit -		6	PORT 4-8
4	MDI_D+	Not Used		7	PORT 4-4
23	MDI_D-	Not Used		8	PORT 4-9
5	Shield Ground	Shield Ground		9	PORT 4-5
N/C	N/C	N/C		10	N/C
24	MDI_B+	Receive +	3	1	PORT 3-1
6	MDI_B-	Receive -		2	PORT 3-6
25	MDI_C+	Not Used		3	PORT 3-2
7	MDI_C-	Not Used		4	PORT 3-7
26	MDI_A+	Transmit +		5	PORT 3-3
8	MDI_A-	Transmit -		6	PORT 3-8
27	MDI_D+	Not Used		7	PORT 3-4
9	MDI_D-	Not Used		8	PORT 3-9
28	Shield Ground	Shield Ground		9	PORT 3-5
N/C	N/C	N/C		10	N/C
10	MDI_B+	Receive +	2	1	PORT 2-1
29	MDI_B-	Receive -		2	PORT 2-6
11	MDI_C+	Not Used		3	PORT 2-2
30	MDI_C-	Not Used		4	PORT 2-7
12	MDI_A+	Transmit +		5	PORT 2-3
31	MDI_A-	Transmit -		6	PORT 2-8
13	MDI_D+	Not Used		7	PORT 2-4
32	MDI_D-	Not Used		8	PORT 2-9
14	Shield Ground	Shield Ground		9	PORT 2-5
N/C	N/C	N/C		10	N/C
33	MDI_B+	Receive +	1	1	PORT 1-1
15	MDI_B-	Receive -		2	PORT 1-6
34	MDI_C+	Not Used		3	PORT 1-2
16	MDI_C-	Not Used		4	PORT 1-7
35	MDI_A+	Transmit +		5	PORT 1-3
17	MDI_A-	Transmit -		6	PORT 1-8
36	MDI_D+	Not Used		7	PORT 1-4
18	MDI_D-	Not Used		8	PORT 1-9
37	Shield Ground	Shield Ground		9	PORT 1-5
19	N/C	N/C		10	N/C

Table 10: IDAN-LAN35H08HR and IDAN-LAN35E08HR Front Connector Pin Out

Figure 13: IDAN-LAN35H08HR or IDAN-LAN38E08HR Rear View

IDAN	Signal		LAN35H08HR or LAN35E08HR		IDAN-XKCM33 Cable Kit
Pin	1000 Function	10/100 Function	Port	Pin	9 Pin "D" Connector (Male)
1	MDI_B+	Receive +	8	1	PORT 8-1
20	MDI_B-	Receive -		2	PORT 8-6
2	MDI_C+	Not Used		3	PORT 8-2
21	MDI_C-	Not Used		4	PORT 8-7
3	MDI_A+	Transmit +		5	PORT 8-3
22	MDI_A-	Transmit -		6	PORT 8-8
4	MDI_D+	Not Used		7	PORT 8-4
23	MDI_D-	Not Used		8	PORT 8-9
5	Shield Ground	Shield Ground		9	PORT 8-5
N/C	N/C	N/C		10	N/C
24	MDI_B+	Receive +	7	1	PORT 7-1
6	MDI_B-	Receive -		2	PORT 7-6
25	MDI_C+	Not Used		3	PORT 7-2
7	MDI_C-	Not Used		4	PORT 7-7
26	MDI_A+	Transmit +		5	PORT 7-3
8	MDI_A-	Transmit -		6	PORT 7-8
27	MDI_D+	Not Used		7	PORT 7-4
9	MDI_D-	Not Used		8	PORT 7-9
28	Shield Ground	Shield Ground		9	PORT 7-5
N/C	N/C	N/C		10	N/C
10	MDI_B+	Receive +	6	1	PORT 6-1
29	MDI_B-	Receive -		2	PORT 6-6
11	MDI_C+	Not Used		3	PORT 6-2
30	MDI_C-	Not Used		4	PORT 6-7
12	MDI_A+	Transmit +		5	PORT 6-3
31	MDI_A-	Transmit -		6	PORT 6-8
13	MDI_D+	Not Used		7	PORT 6-4
32	MDI_D-	Not Used		8	PORT 6-9
14	Shield Ground	Shield Ground		9	PORT 6-5
N/C	N/C	N/C		10	N/C
33	MDI_B+	Receive +	5	1	PORT 5-1
15	MDI_B-	Receive -		2	PORT 5-6
34	MDI_C+	Not Used		3	PORT 5-2
16	MDI_C-	Not Used		4	PORT 5-7
35	MDI_A+	Transmit +		5	PORT 5-3
17	MDI_A-	Transmit -		6	PORT 5-8
36	MDI_D+	Not Used		7	PORT 5-4
18	MDI_D-	Not Used		8	PORT 5-9
37	Shield Ground	Shield Ground		9	PORT 5-5
19	N/C	N/C		10	N/C

Table 11: IDAN-LAN35H08HR and IDAN-LAN35E08HR Rear Connector Pin Out

5.4 Steps for Installing

1. Always work at an ESD protected workstation, and wear a grounded wrist-strap.
2. Turn off power to the IDAN system.
3. Remove the module from its anti-static bag.
4. Check that pins of the bus connector are properly positioned.
5. Check the stacking order; make sure all of the busses used by the peripheral cards are connected to the cpuModule.
6. Hold the module by its edges and orient it so the bus connector pins line up with the matching connector on the stack.
7. Gently and evenly press the module onto the IDAN system.
8. If any boards are to be stacked above this module, install them.
9. Finish assembling the IDAN stack by installing screws of an appropriate length.
10. Attach any necessary cables to the IDAN system.
11. Re-connect the power cord and apply power to the stack.
12. Boot the system and verify that all of the hardware is working properly.

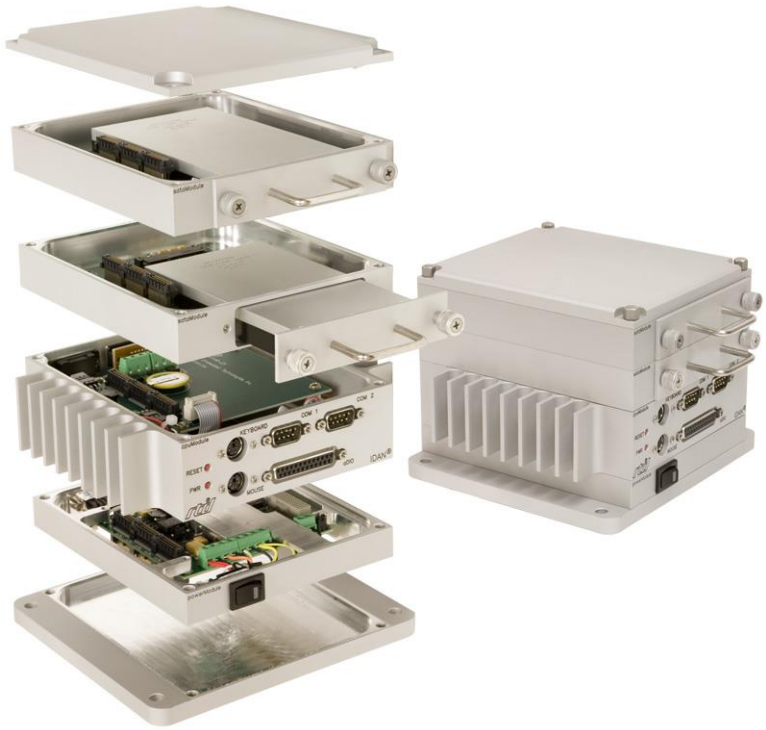

Figure 14: Example IDAN System

6 Troubleshooting

If you are having problems with your system, please try the following initial steps:

- **Simplify the System** – Remove modules one at a time from your system to see if there is a specific module that is causing a problem. Perform you troubleshooting with the least number of modules in the system possible.

- **Swap Components** – Try replacing parts in the system one at a time with similar parts to determine if a part is faulty or if a type of part is configured incorrectly.

If problems persist, or you have questions about configuring this product, contact RTD Embedded Technologies via the following methods:

Phone: +1-814-234-8087
E-Mail: techsupport@rtd.com

Be sure to check the RTD web site (http://www.rtd.com) frequently for product updates, including newer versions of the board manual and application software.

7 Additional Information

7.1 PC/104 Specifications

A copy of the latest PC/104 specifications can be found on the webpage for the PC/104 Embedded Consortium:

www.pc104.org

7.2 PCI and PCI Express Specification

A copy of the latest PCI and PCI Express specifications can be found on the webpage for the PCI Special Interest Group:

www.pcisig.com

8 Limited Warranty

RTD Embedded Technologies, Inc. warrants the hardware and software products it manufactures and produces to be free from defects in materials and workmanship for one year following the date of shipment from RTD Embedded Technologies, Inc. This warranty is limited to the original purchaser of product and is not transferable.

During the one year warranty period, RTD Embedded Technologies will repair or replace, at its option, any defective products or parts at no additional charge, provided that the product is returned, shipping prepaid, to RTD Embedded Technologies. All replaced parts and products become the property of RTD Embedded Technologies. Before returning any product for repair, customers are required to contact the factory for a Return Material Authorization (RMA) number.

This limited warranty does not extend to any products which have been damaged as a result of accident, misuse, abuse (such as: use of incorrect input voltages, improper or insufficient ventilation, failure to follow the operating instructions that are provided by RTD Embedded Technologies, “acts of God” or other contingencies beyond the control of RTD Embedded Technologies), or as a result of service or modification by anyone other than RTD Embedded Technologies. Except as expressly set forth above, no other warranties are expressed or implied, including, but not limited to, any implied warranties of merchantability and fitness for a particular purpose, and RTD Embedded Technologies expressly disclaims all warranties not stated herein. All implied warranties, including implied warranties for merchantability and fitness for a particular purpose, are limited to the duration of this warranty. In the event the product is not free from defects as warranted above, the purchaser's sole remedy shall be repair or replacement as provided above. Under no circumstances will RTD Embedded Technologies be liable to the purchaser or any user for any damages, including any incidental or consequential damages, expenses, lost profits, lost savings, or other damages arising out of the use or inability to use the product.

Some states do not allow the exclusion or limitation of incidental or consequential damages for consumer products, and some states do not allow limitations on how long an implied warranty lasts, so the above limitations or exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

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