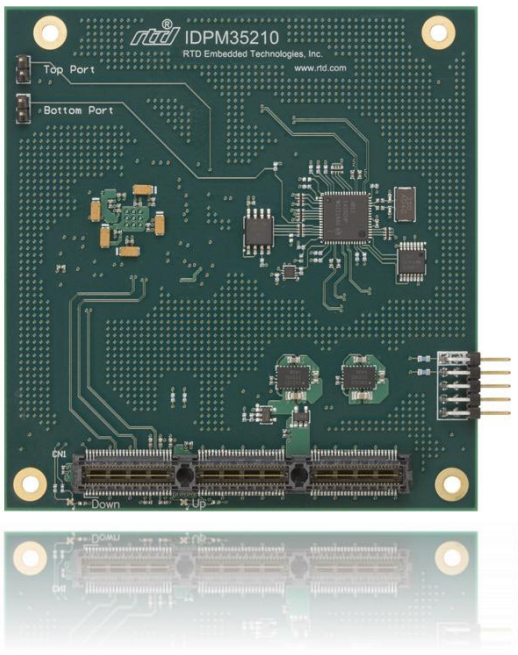
IDPM35210HR & DPM35210HR

Dual-processor Interface

User's Manual

BDM-610020128 Rev. B

IDPM35210HR



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1 Introduction

1.1 Product Overview

The IDPM35210HR and DPM35210HR are dual processor modules that allows two CPUs to be in a single PCIe/104 stack. The PCIe/104 bus connectors on the top and to bottom of the board have isolated signals. but share a common ground. The IDPM35210HT has isolated power and the DPM35210HR shares common power. They both have two Intel i210 Gigabit Ethernet controllers configured in a backplane connection to provide communications between the two processor modules.

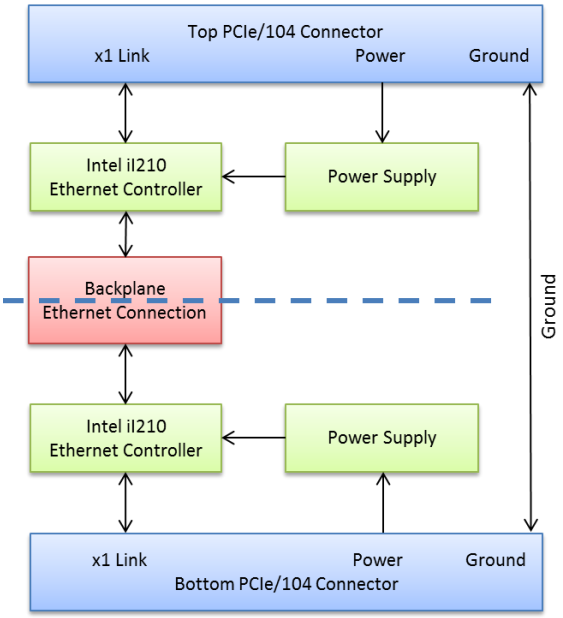

Figure 1: IDPM35210HR Block Diagram

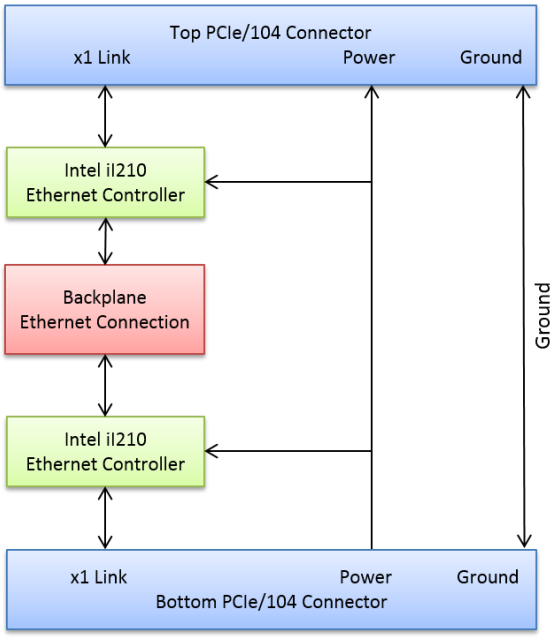

Figure 2: DPM35210HT Block Diagram

1.2 Board Features

- IDPM35210HR and DPM35210HR
  - Top PCIe/104 PCI Express x1 link to onboard i210 Gigabit Ethernet controller
  - Bottom PCIe/104 PCI Express x1 link to onboard i210 Gigabit Ethernet controller
  - Ethernet controllers connected with a 1 Gbps backplane Ethernet link
  - Uses +5V standby power for wake on Ethernet functions supported by the CPUs
  - Industrial Temperature rated: -40 to +85 C
- IDPM35210HR only
  - Isolated bus signals and power between top and bottom connectors with a common ground
- DPM35210HR only
  - Isolated bus signals between top and bottom connectors with a common power and ground
- I/O Connector
  - 10-pin 0.1" dual-inline connectors for Link/Activity
- PCIe/104 Universal interface operates on Type 1 and Type 2 PCIe/104 buses
  - Top connector uses a x1 link from the CPU above
  - Bottom connector uses a x1 link from the CPU below
- 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

Table 1: Ordering Options

Part Number	Description
IDPM35210HR	PCIe/104 Isolated Dual Processor Module
DPM35210HR	PCIe/104 Dual Processor Module
IDAN-IDPM35210HRS	PCIe/104 Isolated Dual Processor Module in IDAN enclosure
IDAN-DPM35210HRS	PCIe/104 Dual Processor Module in IDAN enclosure

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		-40	+85	C
T_s	Storage Temperature		-55	+125	C
RH	Relative Humidity	Non-Condensing	0	90%	%
MTBF	Mean Time Before Failure	30C	4,857,134		Hours

2.2 Electrical Characteristics

Table 3: Electrical Characteristics

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
Top Bus +5V	Power Consumption	Linked at 1Gb		0.45		W
Bottom bus +5V	Power Consumption	Linked at 1Gb		0.45		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)

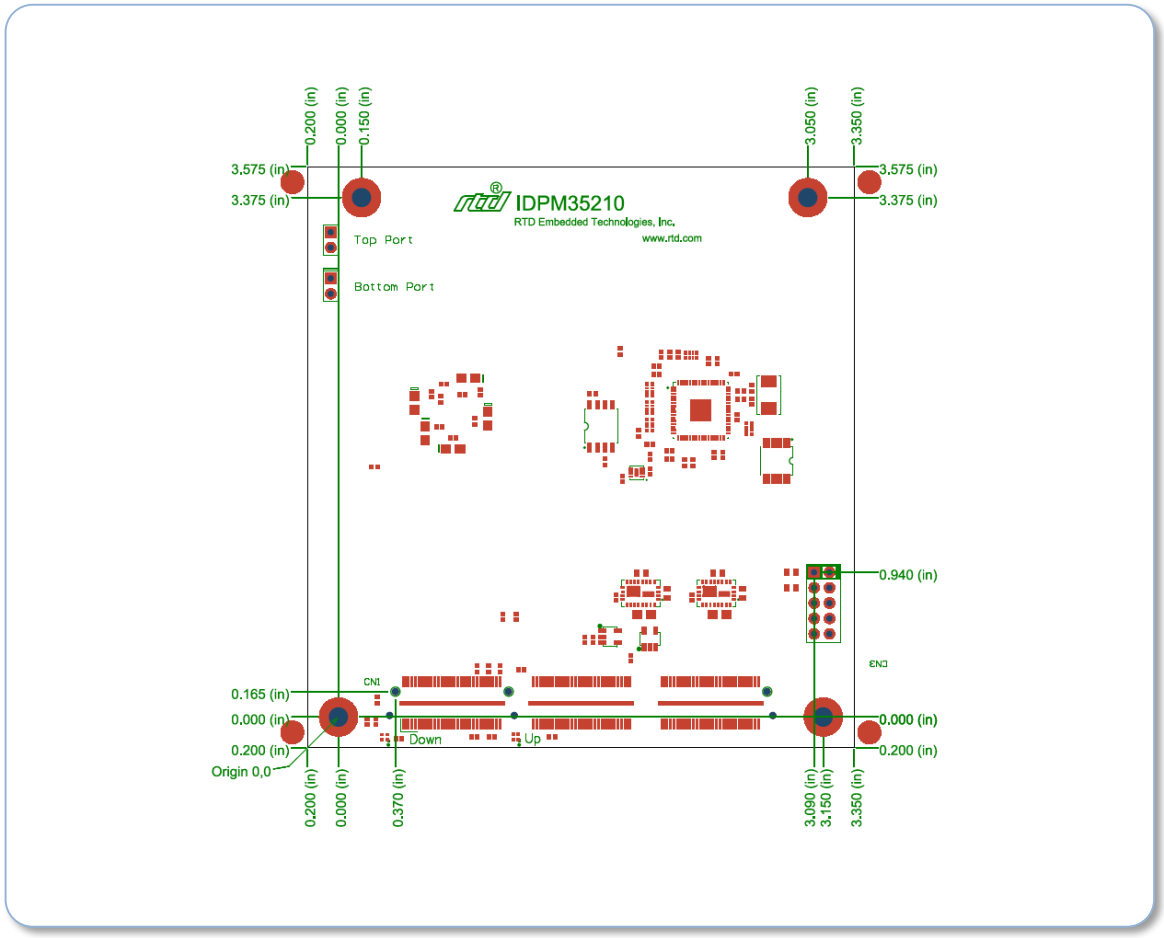

Figure 3: IDPM35210HR and DPM35210HR Board Dimensions

3.3 Connectors

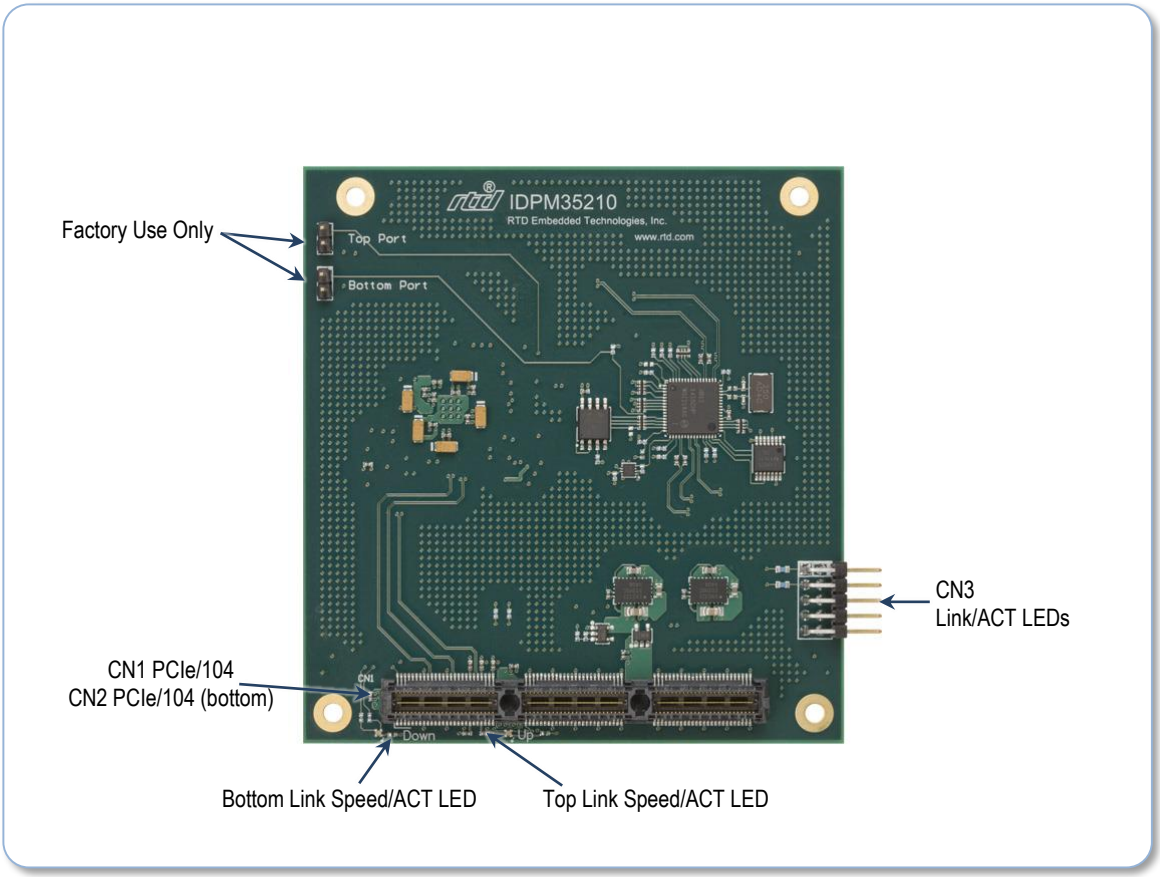

Figure 4: IDPM35210HR and DPM35210HR Board Connections

3.3.1 External I/O Connectors

- CN3: External LED connectors

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 4: Status LEDs

3.3.3 External Status LED Connector CN3

CN3 is the status LED signals that are buffered and able to sink 24 mA. Each signal is driven low when active and tri-stated when inactive, has a 374 Ohm current limiting resistor, and supports being pulled up to +5 volts. The drive circuit is shown below:

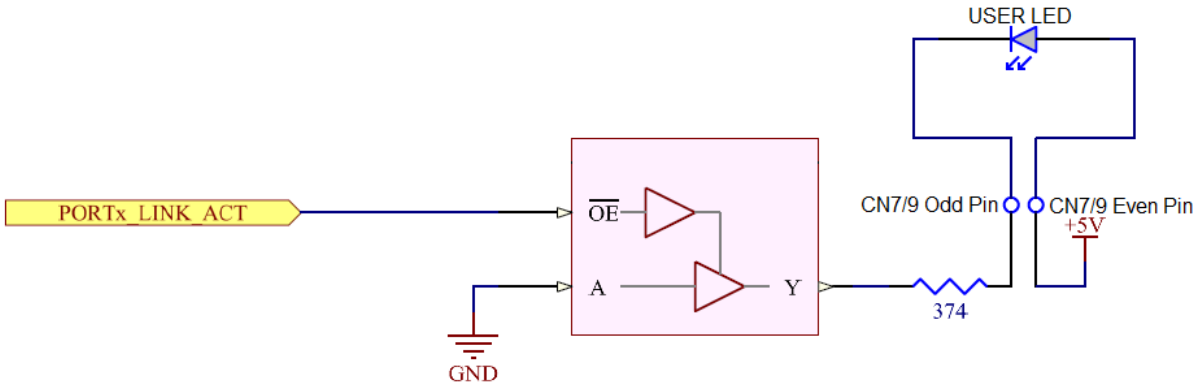

Figure 5: External LED Drive Circuit

The pin out is in the tables below.

CN7 Pin	Function	Description
1	Top CPU Link/activity	Low when linked, goes tri-state with activity
2	Top CPU +5V	Power for top CPU LED
3	Bottom CPU Link/activity	Low when linked, goes tri-state with activity
4	Bottom CPU +5V	Power for bottom CPU LED
5 - 10	No connection	

Table 5: CN3 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 20)

The IDPM35210HR and DPM35210HR are "Universal" boards 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.

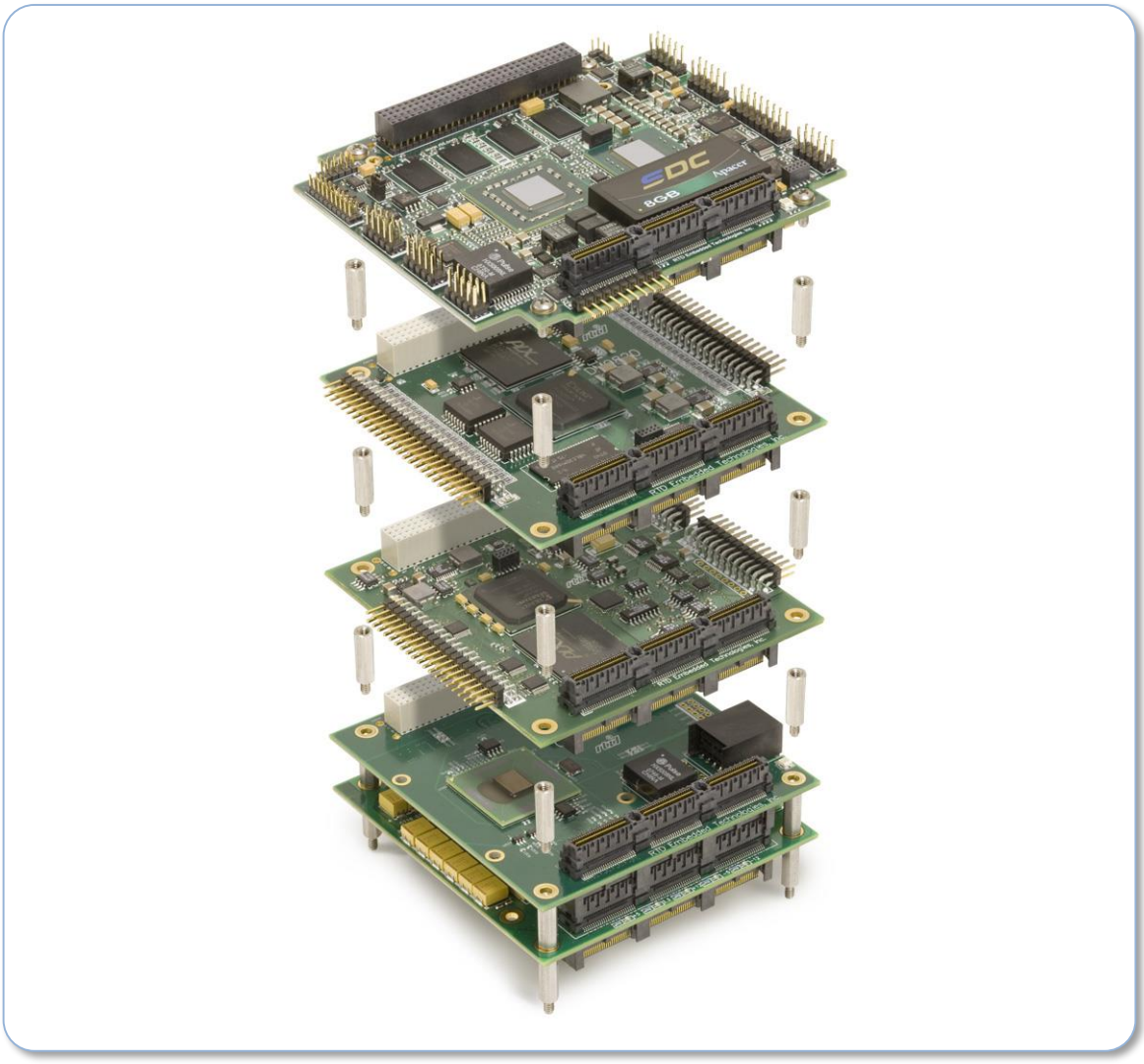

Figure 6: Example 104™ Stack

4 Functional Description

4.1 Block Diagrams

The Figure below shows the functional block diagram of the IDPM210HR. The various parts of the block diagram are discussed in the following sections.

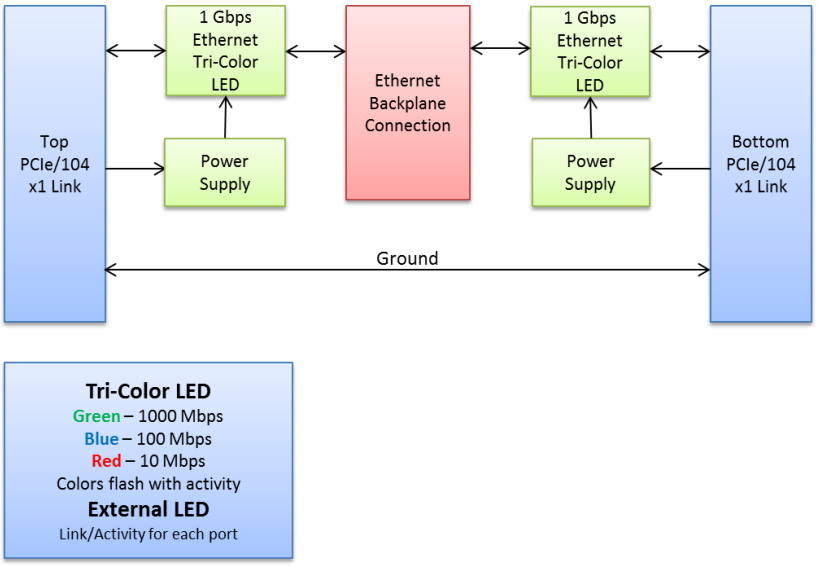

Figure 7: IDPM35210HR Block Diagram

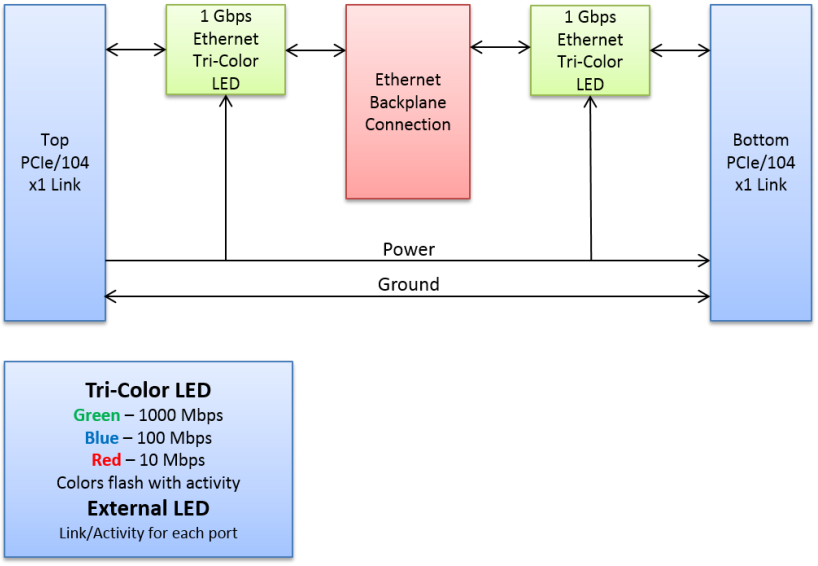

Figure 8: DPM35210HR Block Diagram

4.2 Intel i210-IS Gigabit Ethernet Controller

The IDPM35210HR and DPM35210HR have two Intel i210 Gigabit Ethernet controllers configured as a backplane connection. The Intel i210 is an industrial rated Gigabit Ethernet controller which features 9,728 bytes Jumbo Frame support and IPv4/6 support. One controller connects to

the top CPU through a x1 PCI Express link on the top PCIe/104 connector and the other controller connectors to the bottom CPU through a x1 PCI Express link on the bottom PCIe/104 connector.

4.3 Onboard LEDs and External LED Connector

The IDPM35210HR and DPM35210HR have onboard tri-color LEDs. The LED shows link, activity, and speed at 10/100/1000M between the top and bottom Ethernet controller. CN3 is a 0.1 inch DIL connector that can be wired to external LED circuitry. It carries link/activity signals.

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)

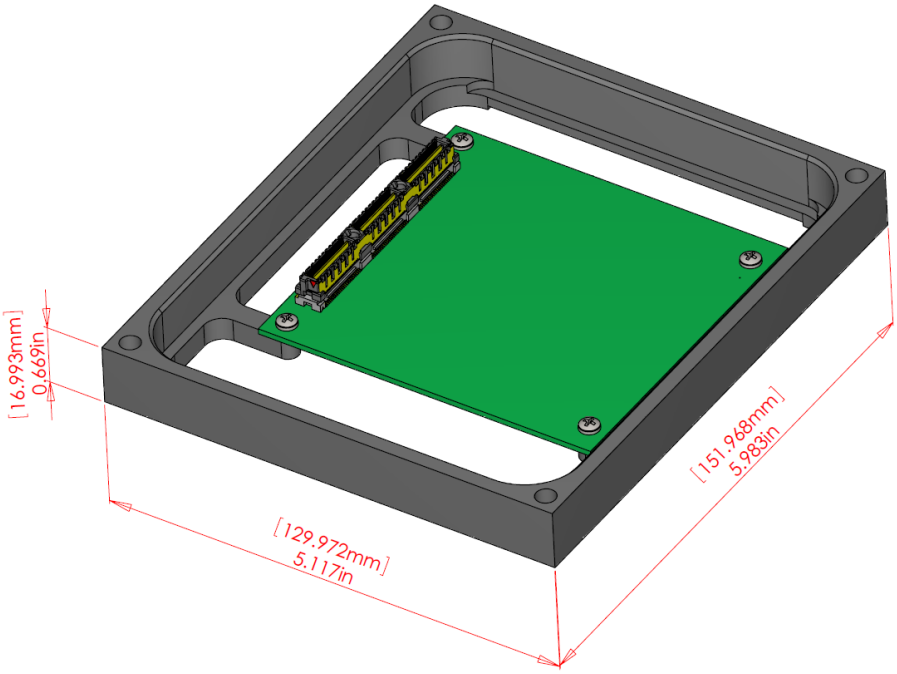

Figure 9: IDAN Dimensions

5.3 IDAN Version

5.3.1 IDAN-IDPM35210HRS

This utilityModule is an IDAN configuration with no I/O connectors that allows two IDAN CPUs to be configured in one stack. One is installed above the IDPM35210 and the other below. Each CPU will need its own power source as the power signal as isolated between the top and bottom PCIe/104 connectors, although they do share a common ground.

5.3.2 IDAN-DPM35210HRS

This utilityModule is an IDAN configuration with no I/O connectors that allows two IDAN CPUs to be configured in one stack. One is installed above the IDPM35210 and the other below. A single power supply powers both CPUs.

Figure 10: IDAN-IDPM35210HRS or IDAN-DPM35210HR

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.

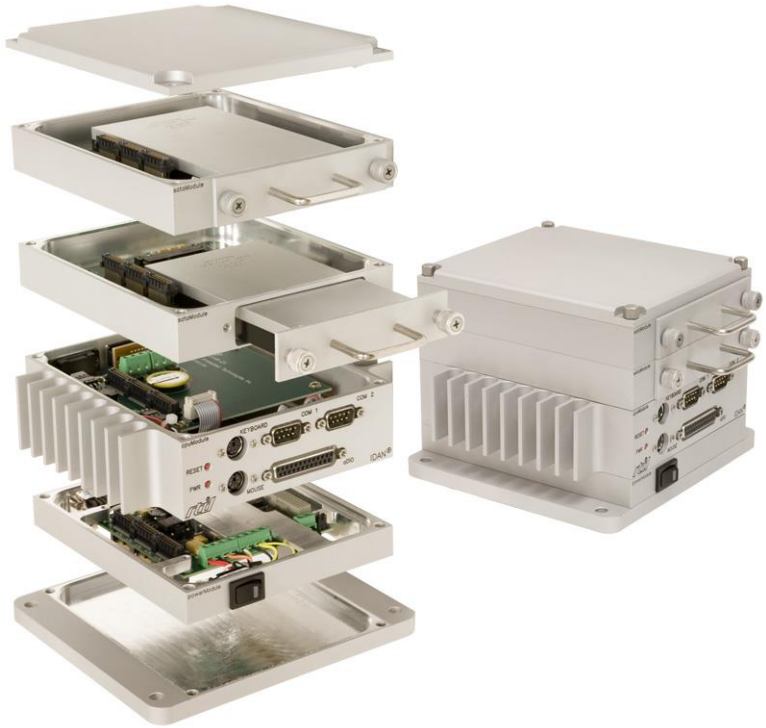

Figure 11: Example IDAN System

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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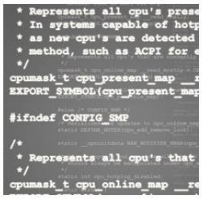

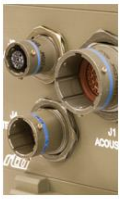
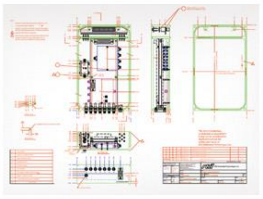

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