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CAN25414HR / CAN35414HR

CAN25412HR / CAN35412HR

CAN25410HR / CAN35410HR

Quad-Channel PCI Express CAN Bus Module

User's Manual

BDM-610020129 Rev. B



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AS9100 and ISO 9001 Certified

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Revision History

Rev A	3/23/2015	Initial Release
Rev B	4/19/2017	Update photo, dimensional drawing, connector tables, functional diagram, and all associated text to reflect that the 2x5 2mm Mini PCIe breakout connectors have changed to 1x10 Molex PicoBlade™ connectors Add note to indicate that the board does not support the Mini PCIe specification's Coexistence Pins or Tunable Antenna Pins Update IDAN isometric drawing to show connector cutouts Update IDAN front panel drawings to show pin 1 locations Correct IDAN dimensions

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1 Introduction

1.1 Product Overview

RTD's CAN25410HR and CAN35410HR modules offer dual Mini PCI Express sockets, designed to permit integration of third party Mini PCI Express CAN bus modules into rugged PCIe/104 and PCI/104-Express systems and enclosures. Mini PCI Express (also referred to as PCI Express Mini Card, Mini PCIe, mPCIe, and PEM) is a form factor for devices which supports both PCI Express and USB 2.0 connectivity.

The CAN25414HR and CAN35414HR are built with two PEAK-System PCAN-miniPCIe dual-channel CAN bus controller modules installed in the two Mini PCI Express sockets, permitting a total of four CAN bus channels per board. The CAN25412HR and CAN25412HR are built using one PEAK-System PCAN-miniPCIe dual-channel CAN bus controller module, permitting a total of two CAN bus channels per board, and leaving the second Mini PCI Express socket available for a third party module selected by the user.

An onboard PCIe Gen 2 switch provides a x1 PCI Express connection to each of the dual sockets on the CAN25410HR and CAN35410HR, using only one upstream x1 PCI Express link from the bus. Similarly, an onboard USB 2.0 hub generates a USB 2.0 link for each of the dual sockets using only one USB 2.0 link from the bus. Additional links on the PCIe Gen2 switch and USB 2.0 hub are utilized to repopulate the x1 PCI Express link and USB link these devices use from the host, making these links available to the next x1 PCI Express or USB peripheral in the system.

For devices installed in the dual mini PCI Express sockets of the CAN25410HR or CAN35410HR-- referred to as Sockets A and B throughout this hardware manual (or designators CN3 and CN4, respectively) – a pair of 1x10 10-pin connectors is available per socket, permitting breakout of additional I/O on third party modules that do not use the socket interface (e.g. CAN bus). Such connections may be easily wired to these 1x10 headers, and accessed by external devices via a corresponding set of 0.1" 10-pin I/O connectors on the board edge.

The dual sockets on the CAN25410HR and CAN35410HR permit mounting of full and half-length Mini PCI Express modules, allowing maximum flexibility with the specification.

1.2 Board Features

- PCI Express Universal Connector
  - Permits compatibility with PCIe/104 Type 1 and Type 2 cpuModules
  - CPU_DIR pin permits stacking above or below the CPU
  - +5V-only operation
- Pass-through PCI Connector (CAN2541xHR only)
- Onboard PCIe Gen 2 Switch and USB 2.0 hub
  - Dual sockets require only one x1 PCI Express link and/or one USB 2.0 link for operation
  - Full x1 PCI Express link and USB 2.0 link repopulation
- Dual Mini PCI Express Card Sockets
  - Each socket supports three modes of operation
    - Single x1 PCIe link **and** single USB 2.0 link
    - Single x1 PCIe link
    - Single USB 2.0 link
  - Mounting holes permit installation of Full-Mini and Half-Mini sized Mini PCI Express modules
  - LED connector provide external access to the LED signals on both Mini PCI Express sockets
- Atheros AR9590 WLAN Mini PCI-Express Card
  - Drivers provided for Windows XP and Windows 7 (32-bit and 64-bit)
  - Natively supported in Linux via open source ath9k driver (kernel 3.2.0 or later)
- PEAK PCAN-miniPCIe Mini PCI Express Card *(CANx5414HR and CANx5412HR only)*
  - Dual Channel CAN Bus interfaces per Mini PCI Express module
    - Four total CAN bus channels on CAN25414HR and CAN35414HR
    - Two total CAN bus channels on CAN25412HR and CAN35412HR
  - Bit rates from 5kbit/s up to 1 Mbit/s
  - Compliant with CAN specifications 2.0A (11-Bit-ID) and 2.0B (29-Bit-ID)
  - SJA1000 compatible
  - NXP PCA82C251 CAN transceiver
  - Galvanic isolation on the CAN connection up to 300 V, separate for each CAN channel
  - Operating Temp range: -40 to +85ºC
  - Drivers available for several common operating systems, including:
    - Windows XP
    - Windows 7 (32/64-bit)
    - Linux 2.4 through 3.x
  - Refer to the PEAK-System web site for a current list



NOTE: This board does not support Coexistence Pins or Tunable Antenna Pins

1.3 Ordering Information

The CAN2541xHR and CAN3541xHR are available with one or two dual-channel PEAK-System PCAN-miniPCIe CAN bus modules pre-installed in the Mini PCI Express sockets, permitting up to four CAN bus channels on one PCIe/104 or PCI/104-Express module. The CAN25410HR and CAN35410HR optionally provide a "CAN bus ready" solution, allowing the user to install a third party module of their choice.

A full array of ordering options for the CAN2541xHR and CAN3541xHR are shown in the following table:

Table 1: Ordering Options

Standard Ordering Option	Ordering Option In IDAN Enclosure	Form Factor	No. CAN Bus Channels
CAN25414HR	IDAN-CAN25414HR	PCI/104-Express	4
CAN25412HR	IDAN-CAN25412HR	PCI/104-Express	2
CAN25410HR	IDAN-CAN25410HR	PCI/104-Express	0
CAN35414HR	IDAN-CAN35414HR	PCIe/104	4
CAN35412HR	IDAN-CAN35412HR	PCIe/104	2
CAN35410HR	IDAN-CAN35410HR	PCIe/104	0

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.

For Mini PCI Express modules that require connectivity to small coaxial connectors (i.e. GPS, wireless LAN, Bluetooth, and other wireless communication protocols), RTD offers additional modules utilizing Mini PCI Express which allow breakout of small coaxial connectors to external MCX jacks. For more information on these products, contact RTD sales or refer to the RTD website.



NOTE: The CAN25410HR is a PCI/104-Express module, and includes a pass-through PCI connector. The CAN35410HR is PCIe/104, and does not include a pass-through PCI connector. Throughout the remainder of this manual, "CAN2541xHR" refers to both boards unless otherwise noted.

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 Board Operating Conditions

Table 2: Operating Environment and Storage Conditions

Symbol	Parameter	Test Condition	Min	Max	Unit
T_a	Operating Temperature		-40	+85	C
T_s	Storage Temperature		-55	+125	C
RH	Relative Humidity	Non-Condensing	0	90%	%

NOTE: The Operating Environment and Storage Conditions listed in Table 2 apply to the CAN2541xHR and CAN3541xHR board only. For recommended operating conditions of third party Mini PCI Express modules, refer to documentation from the manufacturer.

2.2 Board Electrical Characteristics

The bus connectors on the CAN2541xHR and CAN3541xHR offer several voltage inputs. Only +5V is required for operation, and is used to generate the voltage requirements for both Mini PCI Express sockets. All other bus connector supply voltages are pass-through and unused by the CAN2541xHR and CAN3541xHR.

Table 3: Supply Voltage Requirements

Symbol	Parameter	Note	Min	Max	Unit
V_{cc5}	5 V Supply Voltage		4.75	5.25	V
$V_{cc5\text{-}STBY}$	5 V Stand-by Supply Voltage		n/a	n/a	V
V_{cc3}	3.3 V Supply Voltage		n/a	n/a	V
V_{cc12}	12 V Supply Voltage		n/a	n/a	V
$V_{cc\text{-}12}$	-12 V Supply Voltage	CAN2541xHR only	n/a	n/a	V

Supply current and power consumption for the CAN2541xHR and CAN3541xHR are listed in the table below.

Table 4: Power Ratings

Symbol	Parameter	Test Condition	Min	Max	Unit
P	Power Consumption	V_{cc5} = 5.0 V, Typical		2.45	W
I_{cc5}	5 V Input Supply Current	Active		490	mA
Mini PCI Express – Peak Current per Socket					
$I_{cc3.3\text{-}AB\text{-}PK}$	3.3 V Input Supply Current	Peak current; Socket A or B		2.750	A
$I_{cc1.5\text{-}AB\text{-}PK}$	1.5 V Input Supply Current	Peak current; Socket A or B		0.500	A
Mini PCI Express – Combined Current (Sockets A and B)					
$I_{cc3.3}$	3.3 V Input Supply Current	Combined current; Socket A + B		4.000	A
$I_{cc1.5}$	1.5 V Input Supply Current	Combined current; Socket A + B		1.000	A

NOTE: Power measurements were recorded with no devices installed in the Mini PCI Express sockets.

2.3 Mini PCI Express Operating Conditions

Each Mini PCI Express module has its own individual operating conditions which will vary from one manufacturer's device to another. Installing third party Mini PCI Express modules on the CAN2541xHR can affect the overall operating temperature of the system. Make sure to verify the operating conditions of third party Mini PCI Express modules before using the CAN2541xHR in extreme conditions.

2.4 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)

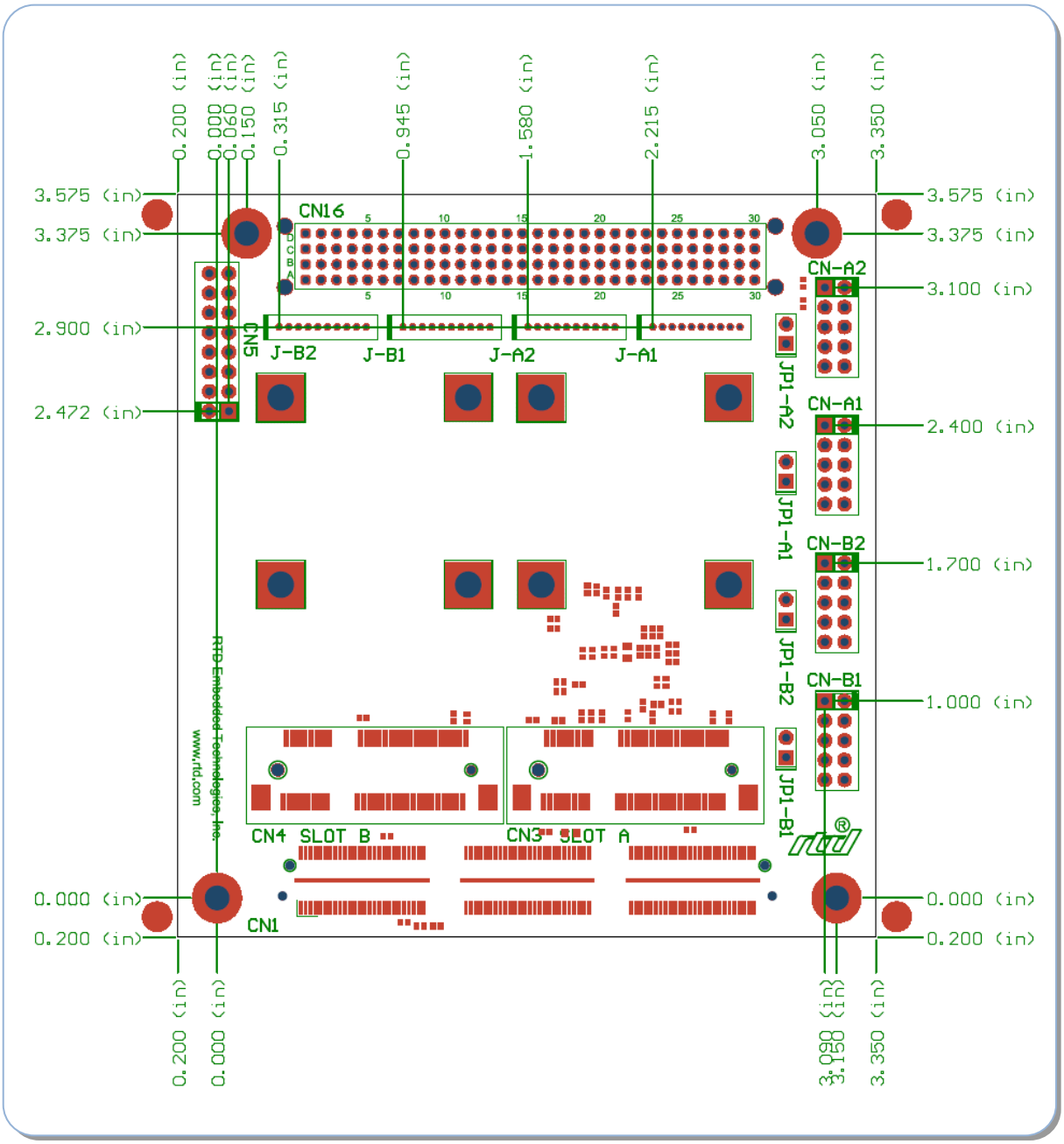


Figure 1: CAN2541xHR Board Dimensions

3 Board Connections and Functionality

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 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 2: Example 104™ Stack

3.3 Connector and Jumper Locations

The following top-side photo of the CAN35414HR provides a reference for designators of the bus connectors, I/O connectors, and jumpers as well as their locations.

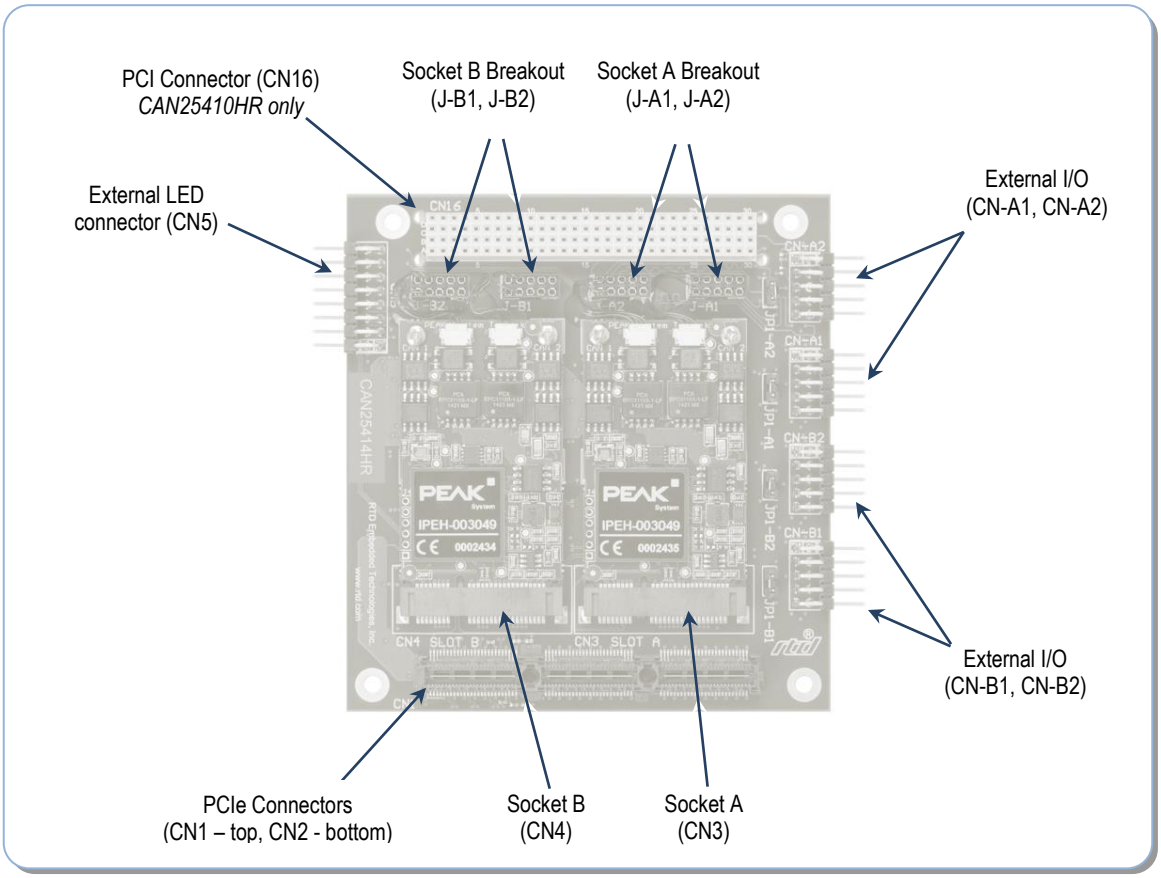


Figure 3: CAN25414HR (Top View)

3.4 Functional Diagram

The Figure below shows the functional block diagram of the CAN2541xHR's dual Mini PCI Express sockets and their respective breakout and I/O connectors. The various parts of the block diagram are discussed in the following sections.

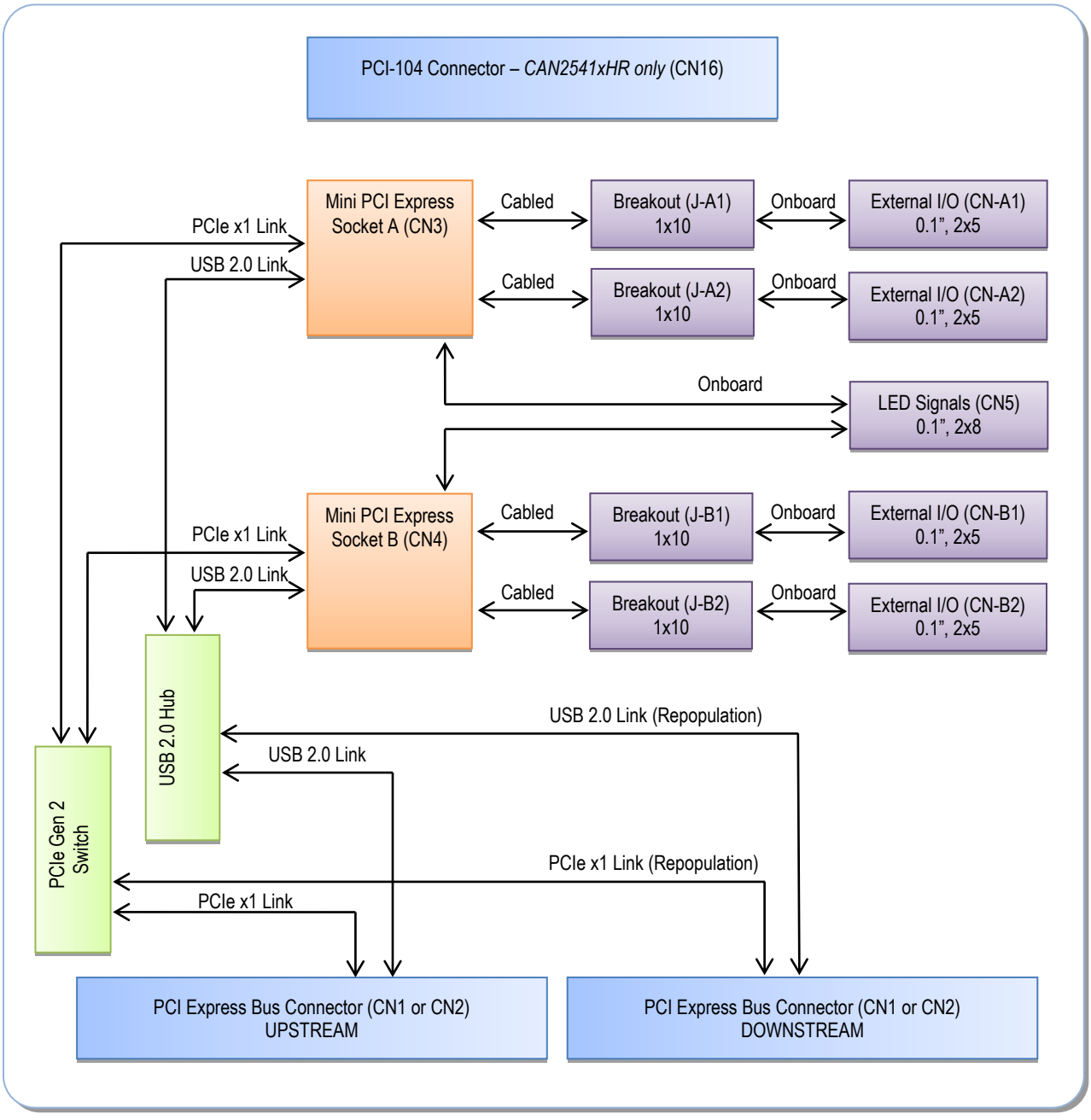


Figure 4: CAN2541xHR Block Diagram

3.5 Connector and Jumper Functionality

3.5.1 Bus Connectors

Table 5: CAN2541xHR Bus Connectors

Connector	Function	Size and Pitch	Mating Connector
CN1	PCIe/104 Universal Bus (Top)	156-pin, 0.635mm	Samtec ASP-129646-03
CN2	PCIe/104 Universal Bus (Bottom)	156-pin, 0.635mm	Samtec ASP-129637-03
CN16	PCI-104 (PCI) Bus *(CAN2541xHR only)*	120-pin, 2mm	Samtec ESQT-130-02-G-Q-368

PCIe Connectors (CN1 – Top, CN2 – Bottom)

The CAN2541xHR is a "Universal" board, and can connect to either a Type 1 or Type 2 connector of a PCIe/104 or PCI-104 Express system. The position and pin assignments are compliant with the *PCI/104-Express Specification*. (See PC/104 Specifications on page 27)

PCI Connector – *CAN2541xHR only* (CN16)

The PCI connector is the connection to PCI peripheral modules. This connector is used on this board as a pass-through connector only.

3.5.2 Internal and External I/O Connectors

The CAN25410HR and CAN35410HR offer two sockets for installing a third party mini PCI Express module, Socket A (CN3) and Socket B (CN4). For each module, an onboard 10-pin 1x10 header is offered to easily bring any connections from the module to the CAN2541xHR, allowing the user to easily interface to these connections using a rugged 10-pin 0.1" header.

The CAN25414HR and CAN35414HR are built with dual-channel PEAK PCAN-miniPCIe Mini PCI Express cards installed in Socket A (CN3) and B (CN4), for a total of four CAN bus channels.

The CAN25412HR and CAN35412HR are built with one dual-channel PEAK PCAN-miniPCIe Mini PCI Express card installed in Socket A (CN3), leaving Socket B (CN4) available for the user to install a third party module of their choice.

Table 6: CAN2541xHR I/O Connectors

Socket A	Function	Size and Pitch	Mating Connector
CN3	Mini PCI Express, Socket A	*(Refer to PCI Express Mini Card Electromechanical Specification)*	
J-A1	Socket A: channel 1 of 2 breakout	Molex PicoBlade™ 1x10 vertical shrouded receptacle	Molex PicoBlade™ 1x10 plug (51021-xxxx)
J-A2	Socket A: channel 2 of 2 breakout	Molex PicoBlade™ 1x10 vertical shrouded receptacle	Molex PicoBlade™ 1x10 plug (51021-xxxx)
CN-A1	Socket A: channel 1 of 2 interface	2x5, 0.1", right angle	3M 89110-0001
CN-A2	Socket A: channel 2 of 2 interface	2x5, 0.1", right angle	3M 89110-0001
Socket B	**Function**	**Size and Pitch**	**Mating Connector**
CN4	Mini PCI Express, Socket B	*(Refer to PCI Express Mini Card Electromechanical Specification)*	
J-B1	Socket B: channel 1 of 2 breakout	Molex PicoBlade™ 1x10 vertical shrouded receptacle	Molex PicoBlade™ 1x10 plug (51021-xxxx)
J-B2	Socket B: channel 2 of 2 breakout	Molex PicoBlade™ 1x10 vertical shrouded receptacle	Molex PicoBlade™ 1x10 plug (51021-xxxx)
CN-B1	Socket B: channel 1 of 2 interface	2x5, 0.1", right angle	3M 89110-0001
CN-B2	Socket B: channel 2 of 2 interface	2x5, 0.1", right angle	3M 89110-0001
Socket A / B	**Function**	**Size and Pitch**	**Mating Connector**
CN5	Socket A & Socket B LED signals	2x8, 0.1", right angle	AMP 1-87456-2



NOTE: Communication busses on some Mini PCI Express modules may have bit rate requirements that are dependent on the bus length. When considering bus length, there are up to 5" of trace on the CAN2541xHR between the 2mm breakout connectors and 0.1" external

Mini PCI Express Sockets A and B (CN3, CN4)

The CAN2541xHR offers two soldered-down connectors that support third party Mini PCI Express modules.

While the CAN25/35414HR and CAN25/35412HR are built with dual-channel PEAK-System PCAN-miniPCIe Mini PCI Express cards installed, not all signals on the connectors are used by the modules. This section describes the pins available on the board, especially for the case of the CAN25/35412HR and CAN25/35410HR where one or both sockets may be available for the user to integrate a third party module CAN bus module of their choice.

Sockets A and B on the CAN2541xHR (or designators CN3 and CN4) each offer one downstream x1 PCI Express Gen 2 link and one downstream USB 2.0 link from the host cpuModule to the Mini PCI Express device installed in the socket. For maximum flexibility, the CAN2541xHR provides mounting holes for cards designed to both the Full-Mini and Half-Mini card Mini PCI Express form factors.

The pinout for each Mini PCIe Express connector is shown below.

Table 7: CN3 and CN4 Pin Assignments

Pin Name	#	#	Pin Name
(Reserved)	51	52	3.3 V
(Reserved)	49	50	GND
(Reserved)	47	48	1.5 V
(Reserved)	45	46	LED_WPAN#
GND	43	44	LED_WLAN#
3.3 V	41	42	LED_WWAN#
3.3 V	39	40	GND
GND	37	38	USB_D_P
GND	35	36	USB_D_N
PET0_P	33	34	GND
PET0_N	31	32	SMB_DATA
GND	29	30	SMB_CLK
GND	27	28	1.5 V
PER0_P	25	26	GND
PER0_N	23	24	3.3 V
GND	21	22	PERST#
(Reserved)	19	20	W_DISABLE#
(Reserved)	17	18	GND
Pin Name	**#**	**#**	**Pin Name**
GND	15	16	*(Not Connected)*
REFCLK_P	13	14	*(Not Connected)*
REFCLK_N	11	12	*(Not Connected)*
GND	9	10	*(Not Connected)*
CLKREQ#	7	8	*(Not Connected)*
(Not Connected)	5	6	1.5 V
(Not Connected)	3	4	GND
(Reserved)	1	2	3.3 V

LED Status Indicators and Socket W_DISABLE# Inputs (CN5)

Connector CN5 brings out the LED_WPAN#, LED_WLAN#, and LED_WWAN# signals on the Mini PCI Express sockets and also provides access to the socket W_DISABLE# inputs.

Each LED signal on the Mini PCI Express sockets CN3 and CN4 is current limited with a 110 ohm (1%) resistor. Connect the LED cathode to the odd pins, and the LED anode to the signal's corresponding even pin.

Table 8: Pinout of LED Status and W_DISABLE# Connector (CN5)

CN5 Pin #	**Function**	Slot A (CN3) **Pin Number**	**Slot B (CN4) Pin Number**
1	Ground	–	–
2	Slot B, W_DISABLE#	–	20
3	Ground	–	–
4	Slot A, W_DISABLE#	20	–
5	Slot B, LED_WWAN#	–	42
6	+3.3V	–	–
7	Slot B, LED_WLAN#	–	44
8	+3.3V	–	–
9	Slot B, LED_WPAN#	–	46
10	+3.3V	–	–
11	Slot A, LED_WWAN#	42	–
12	+3.3V	–	–
13	Slot A, LED_WLAN#	44	–
14	+3.3V	–	–
15	Slot A, LED_WPAN#	46	–
16	+3.3V	–	–

The LED signals and W_DISABLE# inputs are directly connected to the Mini PCI Express slots. The behavior of these signals will depend on the card installed. For more information, refer to the PCI Express Mini Card Electromechanical specification.

CN5 is a 2x8 0.1" DIL connector. Pin 1 is indicated with a square solder pad. Pins are numbered as follows.

16	15
14	13
12	11
10	9
8	7
6	5
4	3
2	1

Breakout and I/O Connectors for Sockets A and B

Sockets A and B on the CAN2541xHR (CN3 and CN4, respectively) offer dual 1x10 breakout connectors (J-A1, J-A2, J-B1, J-B2) for signals on Mini PCI Express modules that are made available on the module but are not accessible as signals on the Mini PCI Express connectors (e.g. CAN bus). Such connections may easily be wired to these 1x10 breakout headers and accessed via corresponding sets of 0.1" 10-pin I/O connectors on the board edge. Each 1x10 breakout connector is wired directly to its corresponding 0.1" I/O connector using a 1-to-1 pin assignment, which provides convenient accessibility to the outside world.

The following table shows the pin mapping for each of the four 1x10 and 0.1" connector pairs on the CAN2541xHR. Pin 1 of the 1x10 connector is indicated by a thick silkscreen stripe on the top side of the PCB.

Table 9: Breakout and I/O Connector Pin Assignments

Pin Number	Pin Name
1	Signal 1
2	Signal 2
3	Signal 3
4	Signal 4
5	Signal 5
6	Signal 5
7	Signal 5
8	Signal 5
9	Signal 5
10	Signal 5

A 9-pin DSUB connector provides a convenient way to breakout the on board 0.1" I/O connectors. The following table shows the pin mapping from an onboard I/O connector to a 9-pin DSUB connector, and holds true for each of the four 0.1" I/O connectors on the CAN2541xHR.

Table 10: Common DSUB Connector Mapping

Pin Name	0.1" I/O Connector Pin Number	9-Pin DSUB Connector Pin Number	PEAK-System PCAN-miniPCIe[1]	User Socket (CANx5412 only)[2]
Signal 1	1	1	*(Not Connected)*	Signal 1
Signal 2[1]	2	6	GND[1]	Signal 2
Signal 3	3	2	CAN_L	Signal 3
Signal 4	4	7	CAN_H	Signal 4
Signal 5[1]	5	3	GND[1]	Signal 5
Signal 6	6	8	*(Not Connected)*	Signal 6
Signal 7	7	4	*(Not Connected)*	Signal 7
Signal 8	8	9	*(Not Connected)*	Signal 8
Signal 9	9	5	*(Not Connected)*	Signal 9
Signal 10	10	*(Not Connected)*	*(Not Connected)*	*(Not Connected)*

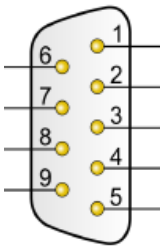


Figure 5: 9-pin DSUB Connector Pinout

[1] The 10-pin connectors corresponding to the PEAK-System PCAN-miniPCIe modules on the CANx5412HR and CANx5414HR are configured to be "CAN ready", with Signal 2 and Signal 5 connected to GND. The sockets on the CANx5410HR also follow this "CAN ready" configuration.
[2] The 10-pin connector corresponding to the unused user socket on the CANx5412HR does not define any of the 10-pins.

For each channel's connectors, signals 3 and 4 offer a corresponding jumper which may be populated to connect the signals with a 120 ohm resistor. This is especially useful for some third party CAN bus Mini PCI Express modules, which may require 120 ohm termination at the transmitter and/or receiver, but do not include termination on the module. For more information, refer to section 0.

3.5.3 JUMPERS

For Mini PCI Express cards that require 120-ohm termination (some Mini PCI Express CAN bus modules), both channels on each socket offer a jumper which may be installed to enable 120-ohm termination across signals 3 and 4 of the jumper's corresponding I/O connectors.

To enable the termination, install the jumper. *(As a rugged alternative to the jumper-enabled termination, a resistor option may be configured to permanently enable the termination. Contact RTD for more information.)*

Table 11: CAN2541xHR Termination-Enable Jumpers

Socket A Jumpers	Function	Default	Size and Pitch
JP1-A1	Close to enable 120-ohm termination on Socket A, channel 1	Closed	1x2, 0.1", vertical
JP1-A2	Close to enable 120-ohm termination on Socket A, channel 2	Closed	1x2, 0.1", vertical
Socket B Jumpers	**Function**	**Default**	**Size and Pitch**
JP1-B1	Close to enable 120-ohm termination on Socket B, channel 1	Closed	1x2, 0.1", vertical
JP1-B2	Close to enable 120-ohm termination on Socket B, channel 2	Closed	1x2, 0.1", vertical

3.6 Repopulation of PCI Express and USB Links

The Mini PCI Express sockets on the CAN2541xHR each operate using a x1 PCI Express link and/or USB 2.0 link. To relieve some of the stress on the system, the CAN2541xHR has an onboard PCI-Express Gen 2 switch and a USB 2.0 hub to generate these links, reducing the number of resources needed from the host cpuModule for the CAN2541xHR to operate.

These components are also used to generate one PCI Express Gen 2 link and one USB 2.0 link on the "downstream" side of the CAN2541xHR, repopulating the used links making them available for other peripherals up or down the stack. This allows each Mini PCI Express socket on CAN2541xHR to operate without consuming any PCI Express link or USB link on the bus.

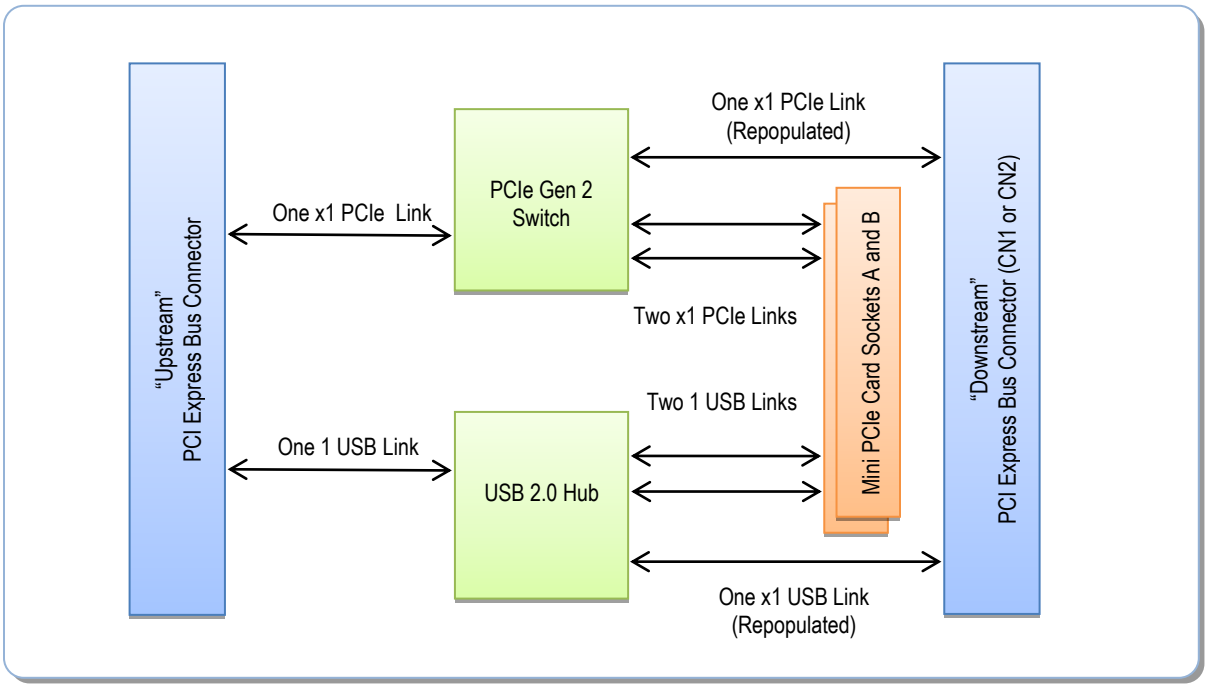


Figure 6: CAN2541xHR Link Repopulation Diagram (I/O Connectors Not Shown)

4 IDAN Connections

4.1 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.

4.2 Physical Characteristics

- Weight: Approximately 0.21 Kg (0.46 lbs.)
- Dimensions: 151.8 mm L x 129.8 mm W x 17.0 mm H (5.98 in L x 5.12 in W x 0.67 in H)

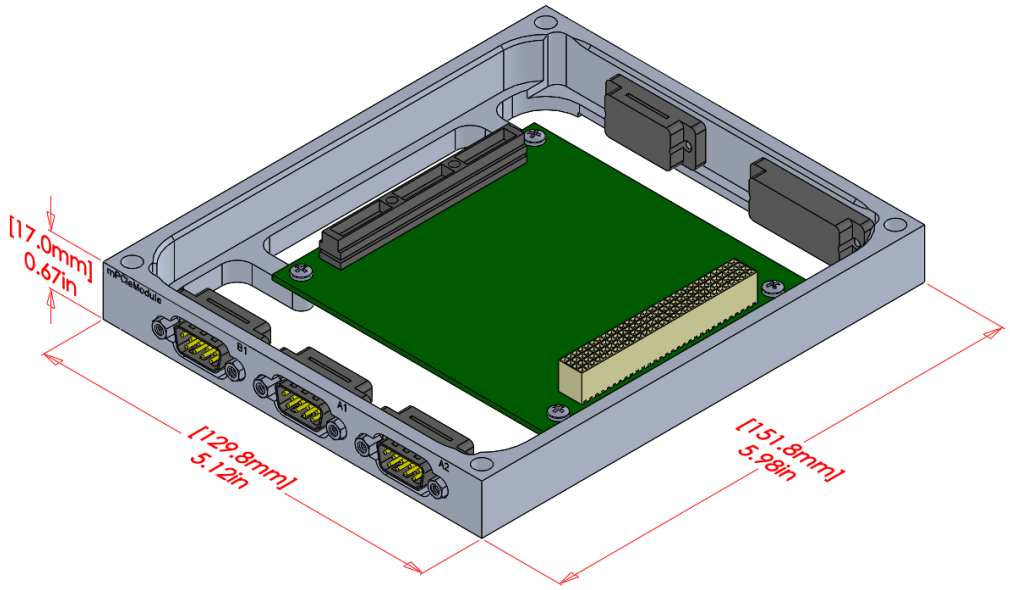


Figure 7: IDAN Dimensions – L x W x H

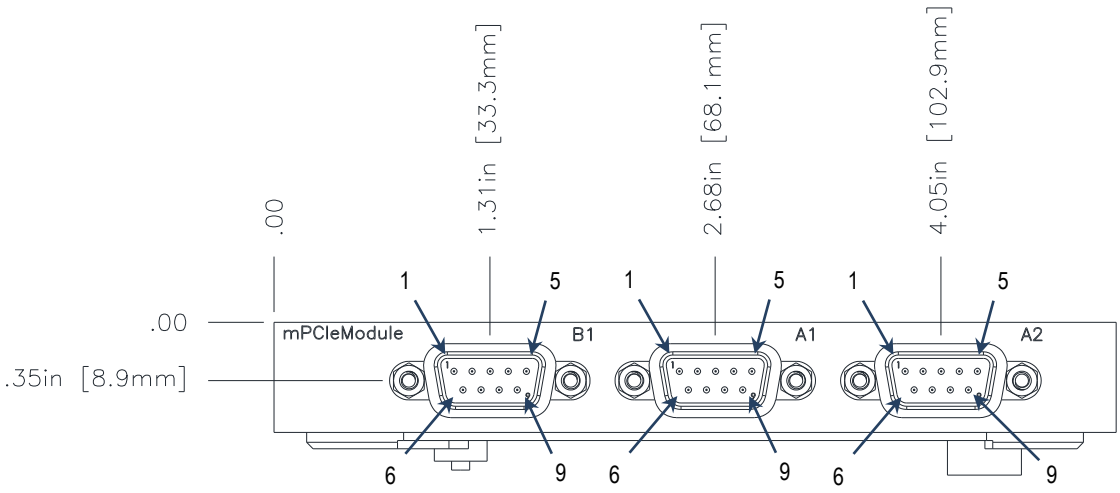


Figure 8: IDAN Front Panel Drawing

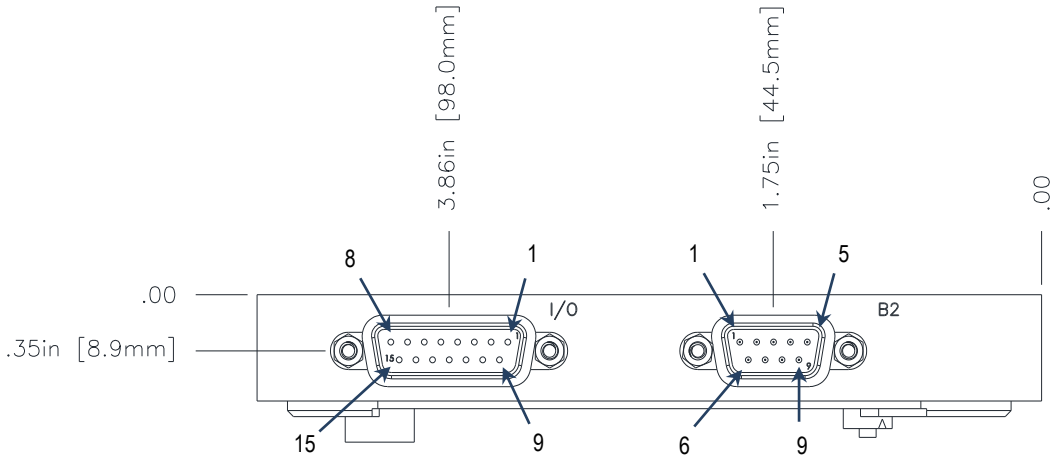


Figure 9: IDAN Back Panel Drawing

4.3 External I/O Connectors

This section describes the pinout for each connector on the IDAN-CAN2541xHR, and shows how the IDAN connector pins correspond to the pins of each I/O header on the CAN2541xHR.

The following table lists all connectors on the IDAN-CAN2541xHR frame as well as their mating connectors.

Table 12: IDAN Connectors and Mating Connectors

IDAN Designator	IDAN Connector Type	Function	Module Part Number	Mating Part Number
A1	9 pin "D", male	I/O breakout	Adam Tech, DE09PD	Adam Tech, DE09SD
A2	9 pin "D", male	I/O breakout	Adam Tech, DE09PD	Adam Tech, DE09SD
B1	9 pin "D", male	I/O breakout	Adam Tech, DE09PD	Adam Tech, DE09SD
B2	9 pin "D", male	I/O breakout	Adam Tech, DE09PD	Adam Tech, DE09SD
I/O	15 pin "D", female	LED Status	AMP, 747052-3	AMP, 747043-3

4.3.1.1 I/O Connectors for Sockets A and B (A1, A2, B1, B2)

Four 9-pin male DSUB connectors on the IDAN frame connect directly to the 0.1" onboard I/O connectors (CN-A1, CN-A2, CN-B1, CN-B2). The pin mapping of each 9-pin DSUB connector to the corresponding 0.1" I/O connector is shown in the following table:

Table 13: IDAN Pinout: 9-pin Male DSUB Connectors (A1, A2, B1, B2)

9-pin male DSUB Connector Pin Number	0.1" I/O Connector Pin Number	Pin Name	Available Connector (CANx5410HR, CANx5412HR only)	PEAK-System PCAN-miniPCIe
1	1	Signal 1	Signal 1	*(Not Connected)*
2	3	Signal 3	Signal 3	CAN_L
3	5	Signal 5	GND	GND
4	7	Signal 7	Signal 7	*(Not Connected)*
5	9	Signal 9	Signal 9	*(Not Connected)*
6	2	Signal 2	GND	GND
7	4	Signal 4	Signal 4	CAN_H
8	6	Signal 6	Signal 6	*(Not Connected)*
9	8	Signal 8	Signal 8	*(Not Connected)*
Not Connected	10	Signal 10	Signal 10	*(Not Connected)*

For a detailed explanation of the onboard I/O signals, refer to section 3.5.2.

4.3.1.2 LED STATUS INDICATORS AND SOCKET W_DISABLE# INPUTS (I/O)

A 15-pin female DSUB connector labeled "I/O" allows access to LED status indicators on the Mini PCI Express cards installed on the CAN2541xHR, and also provides access to the W_DISABLE# input of each socket. For more information on the LED status indicators and socket W_DISABLE# inputs, see section 3.5.2.

The pin mapping of the 15-pin DSUB connector to connector CN5 on the CAN2541xHR is shown in the following table:

Table 14: IDAN Pinout: LED Status and W_DISABLE# Connector (I/O)

15-pin female DSUB Pin Number	CN5 Pin Number	Function
1	*1*	*Ground*
2	*3*	Ground
3	5	Slot B LED_WWAN#
4	7	Slot B LED_WLAN#
5	9	Slot B LED_WPAN#
6	11	Slot A LED_WWAN#
7	13	Slot A LED_WLAN#
8	15	Slot A LED_WPAN#
9	*2*	Slot B, W_DISABLE#
10	*4*	Slot A, W_DISABLE#
11	6	+3.3V
12	8	+3.3V
13	10	+3.3V
14	12	+3.3V
15	6	+3.3V
--	16	+3.3V

The LED signals and W_DISABLE# inputs are directly connected to the Mini PCI Express slots. The behavior of these signals will depend on the card installed. For more information, refer to the PCI Express Mini Card Electromechanical specification.

4.4 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.

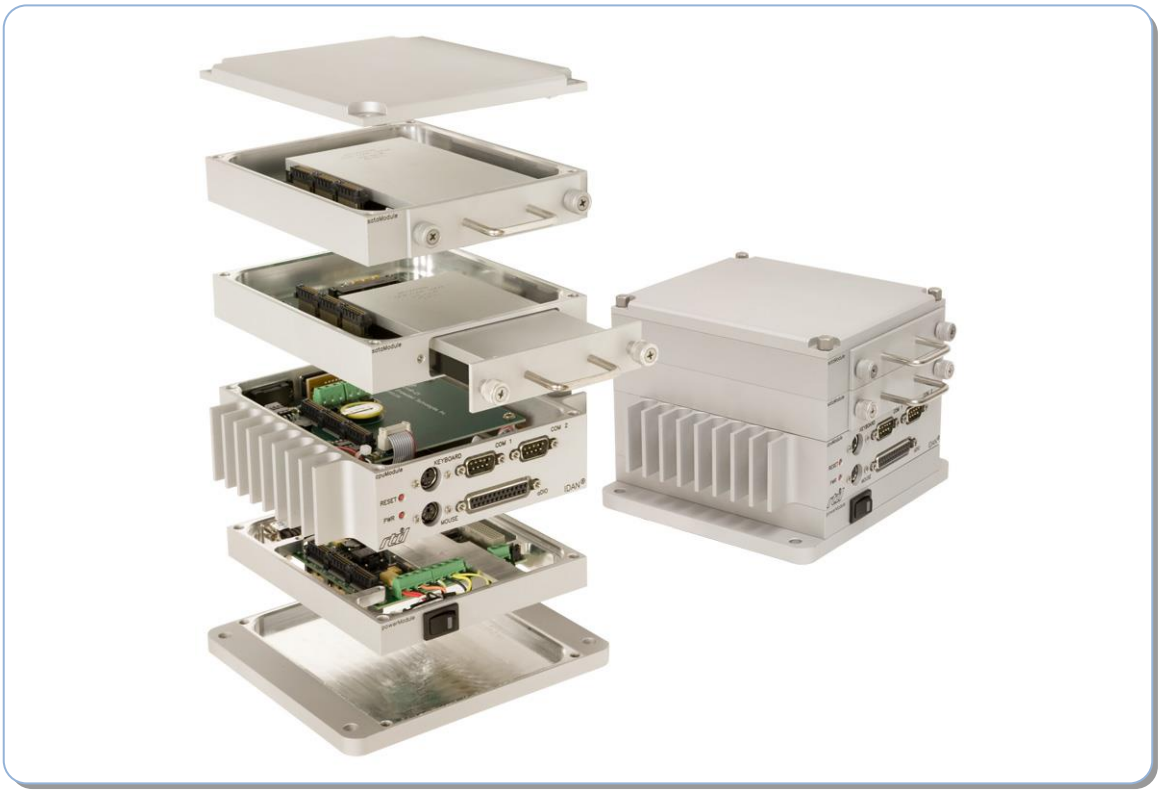


Figure 10: Example IDAN System

5 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.

6 Additional Information

6.1 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

6.2 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

6.3 PCI Express Mini Card Electromechanical Specification

A copy of the latest PCI Express Mini Card Electromechanical Specification can also be found on the webpage for the PCI Special Interest Group:

www.pcisig.com

6.4 PEAK-System Website

For detailed information on the PEAK PCAN-miniPCIe Mini PCI Express modules on the CAN2541xHR and CAN3541xHR, refer to the PEAK-System website:

www.peak-system.com

7 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.

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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.

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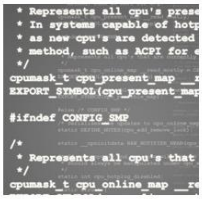
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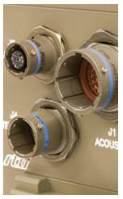
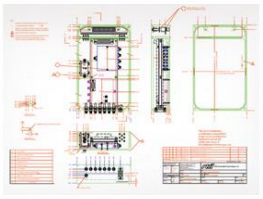
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