



# **ConnectX<sup>®</sup>-2 VPI Dual Port Adapter Card User Manual**

P/N: MHGH29B-XTR, MHGH29B-XSR

Rev 1.1.5

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ConnectX-2 VPI Card User Manual

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# Revision History

This document was printed on 7/1/10.

**Table 1 - Revision History Table**

Date	Rev	Comments/Changes
July 1st, 2010	1.1.5	Added link to card table,
June 28th, 2010	1.1.4	Removed single card graphic,
June 22nd, 2010	1.1.3	Removed Gen 1 cards
June 03th, 2010	1.1.2	Added Safety Warnings in Spanish
May 13th, 2009	1.1.1	Minor formatting
April 2009	1.1	New power numbers
Oct. 2009	1.0	Initial Release

## About this Manual

This *User Manual* describes Mellanox Technologies ConnectX<sup>®</sup>-2 Dual Port VPI InfiniBand and Ethernet PCI Express x8 adapter cards. It provides details as to the interfaces of the board, specifications, required software and firmware for operating the board, and relevant documentation.

## Intended Audience

This manual is intended for the installer and user of these cards.

The manual assumes basic familiarity with InfiniBand<sup>®</sup> and Ethernet networks and architecture specifications.

## Related Documentation

**Table 2 - Documents List**

<i>Mellanox Firmware Tools (MFT) User Manual</i> Document no. 2204UG	User Manual describing the set of MFT firmware management tools for a single node. See <a href="http://www.mellanox.com">http://www.mellanox.com</a> => Downloads => Firmware Tools
<i>IBTA Specification Release 1.2.1</i>	InfiniBand Architecture Specification
<i>IEEE Std 802.3 Specification</i>	This is the IEEE Ethernet specification <a href="http://standards.ieee.org/getieee802">http://standards.ieee.org/getieee802</a>
<i>PCI Express 2.0 Specifications</i>	Industry Standard PCI Express 2.0 Card Electromechanical Specification, Rev 1.3.

## Online Resources

- Mellanox Technologies Web pages: <http://www.mellanox.com>
- Mellanox Technologies Firmware download Web page:  
<http://www.mellanox.com> => Downloads => Firmware

## Document Conventions

When discussing memory sizes, MB and MBytes are used in this document to mean size in mega bytes. The use of Mb or Mbits (small b) indicates size in mega bits.

# 1 Overview

This document is a *User Manual* for Mellanox Technologies VPI adapter cards based on the MT25408, ConnectX<sup>®</sup>-2 VPI integrated circuit device. The cards described in this manual have the following main features:

- IEEE Std 802.3 compliant
- PCI Express 2.0 (1.1 compatible) through an x8 edge connector up to 5GT/s
- CPU offload of transport operations
- CORE-Direct application offload
- End-to-end QoS and congestion control
- Hardware-based I/O virtualization
- TCP/UDP/IP stateless offload
- Fibre Channel encapsulation (FCoIB or FCoE)
- RoHS-R6
- Two bracket heights: short and tall
- CX4 ports for connecting InfiniBand and Ethernet traffic (4X connectors)



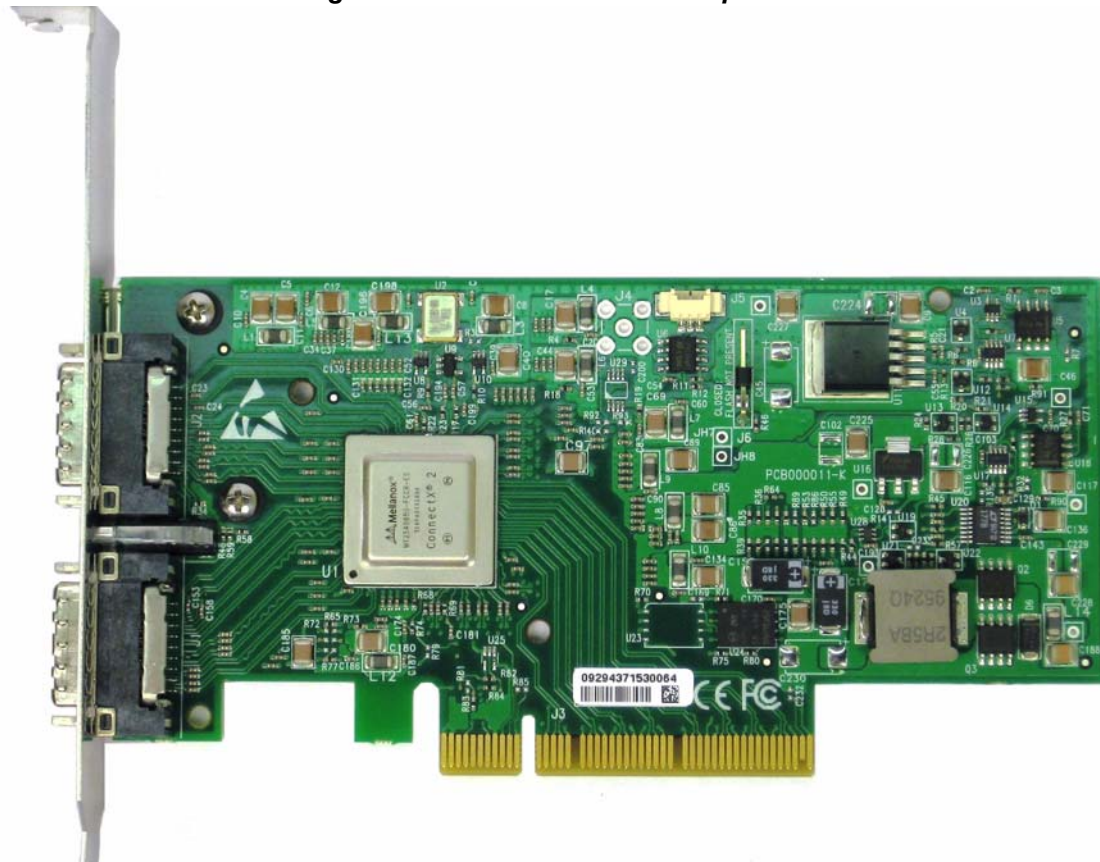
## 1.1 Adapter Cards Covered in this Manual

Table 3 lists the VPI adapter cards described in this manual.

**Table 3 - Adapter Cards**

Ordering Part Number (OPN)	PCI Express SERDES Speed	IB SDR / DDR / QDR	ETH Speed	Short / Tall Bracket	IC Part Number
MHGH29B-XTR	5.0 GT/s	DDR	1/10 Gb/s	Tall	MT25408B0-FCCR-GI
MHGH29B-XSR	5.0 GT/s	DDR	1/10 Gb/s	Short	MT25408B0-FCCR-GI

**Figure 1: CX4 InfiniBand VPI Adapter Card<sup>1</sup>**



1. The cards have a similar form and fit. The main visible difference is in the bracket height. All of these cards are RoHS-R6 compliant (lead free)

## 1.2 Mellanox Part Numbering Legend

Table 4 describes the Mellanox Technologies adapter cards part numbering legend.

**Table 4 - Mellanox Cards Part Numbering Key**

Adapter Card OPN MHTS#I-XBR	Field	Decoder
M	Mellanox Technologies	
H	Adapter Type	H = InfiniBand Host Channel Adapter, N = Ethernet Network Interface Card
T	Media	E = CX4 SDR, G = CX4 DDR, P = SFP+, T = UTP, Z = one SFP+ connector and one QSFP connector
S	Adapter Architecture	T = InfiniHost <sup>®</sup> , A = InfiniHost <sup>®</sup> III Ex, S = InfiniHost <sup>®</sup> III Lx, H = ConnectX <sup>®</sup>
#	# ports	1 = 1, 2 = 2
I	Host Interface	X = PCI-X, 4 = PCIe x4, 8 = PCIe x8, 9 = PCIe (SerDes @ 5.0 GT/s)
G	Generation	<blank> = Initial product generation
-	Separator	
X	Memory Size	X = MemFree, 1=128MB, 2=256MB, 3=512MB
B	Bracket	S = Short, T = Tall, N = None
R	RoHS	<blank> = non RoHS, C = RoHS R-5 w/ Exemption, R = RoHS R-6 Lead-Free

For example, the part number MHGH28B-XSR describes Mellanox Technologies' ConnectX<sup>®</sup>-2 VPI card with dual CX4 ports, a PCIe2.0 x8 2.5GT/s interface, no on-board memory (mem-free), a short PCI bracket, and RoHS R6 compliance. Using the legend,

- field M = M to indicate a Mellanox Technologies product,
- field H = H to indicate an InfiniBand Adapter Card,
- field T = G to indicate CX4 DDR,
- field S = H to indicate the ConnectX family,
- field # = 2 to indicate two ports,
- field I = 8 to indicate PCI Express 2.0 x8 running at 2.5GT/s,
- field G = B to indicate Generation B ConnectX-2
- field X = X to indicate no on-board memory,
- field B = S to indicate a short bracket, and
- field R = R to indicate RoHS R6 (lead free) compliance

## 1.3 Finding the GUID/MAC and Serial Number on the Adapter Cards

All Mellanox adapter cards have a label on the printed side of the adapter card that has the card serial number, the card MAC for Ethernet protocol, and the card GUID for InfiniBand protocol. VPI Cards have both a MAC and a GUID. For VPI cards the MAC is derived from the GUID.

**Figure 2: Card Product Label**



## 1.4 Safety Warnings

For safety warnings in French see “Avertissements de sécurité d’installation (Warnings in French)” on page 34. For safety warnings in German see “Sicherheitshinweise (Warnings in German)” on page 35. For safety warnings in Spanish see “Advertencias de seguridad para la instalación (Warnings in Spanish)” on page 36.

### 1. Installation Instructions



Read all installation instructions before connecting the equipment to the power source.

### 2. Over-temperature



This equipment should not be operated in an area with an ambient temperature exceeding the maximum recommended: 55°C (131°F). To guarantee proper air flow, allow at least 8cm (3 inches) of clearance around the ventilation openings.

### 3. During Lightning - Electrical Hazard



During periods of lightning activity, do not work on the equipment or connect or disconnect cables.

### 4. Copper Cable Connecting/Disconnecting



Some copper cables are heavy and not flexible, as such they should be carefully attached to or detached from the connectors. Refer to the cable manufacturer for special warnings and instructions.

### 5. Equipment Installation



This equipment should be installed, replaced, or serviced only by trained and qualified personnel.

### 6. Equipment Disposal



Disposal of this equipment should be in accordance to all national laws and regulations.

### 7. Local and National Electrical Codes



This equipment should be installed in compliance with local and national electrical codes.

## 2 Adapter Card Interfaces

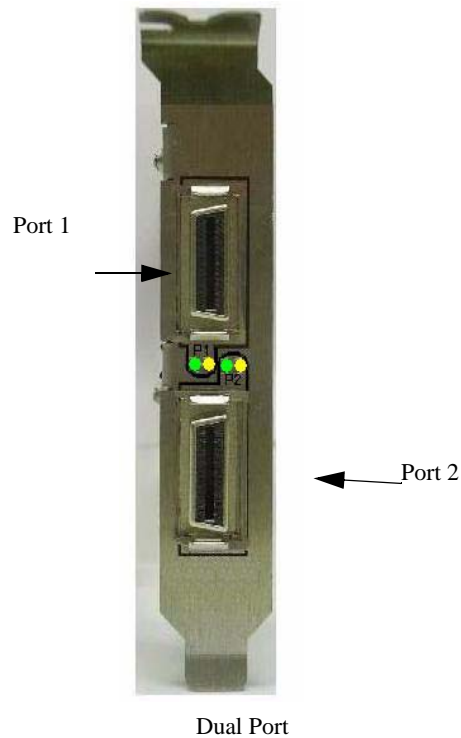
### 2.1 I/O Interfaces

Each adapter card includes the following interfaces:

- 4X InfiniBand/Ethernet Copper ports
- PCI Express x8 edge connector
- I/O panel LEDs
- I<sup>2</sup>C compatible connector (for debug)

For dual port cards, port 1 connects to connector 1 of the device, while port 2 connects to connector 2 of the device.

**Figure 3: Port Numbering**



#### 2.1.1 InfiniBand Interface

The ConnectX<sup>®</sup>-2 device (MT25408B0) is compliant with the *InfiniBand Architecture Specification, Release 1.2.1*. It has compliant 4X ports, with four Tx/Rx pairs of SerDes. VPI adapter cards (listed in Table 3 on page 9) based on this device provide access to its ports by means of CX4 connectors.

These ports utilize a ‘media detect circuit’ that applies power to active copper cables and fiber solutions connected to the port connectors.

## 2.1.2 Ethernet Interface

The ConnectX<sup>®</sup>-2 device (MT25408B0) is compliant with the *IEEE Std 802.3*. VPI adapter cards (listed in Table 3 on page 9 ) based on this device provide access to the Ethernet ports by means of CX4 connectors.

## 2.1.3 VPI Port Configuration

VPI ports are auto-sensing but can be manually configured using a script.

### Port type management:

By default both ConnectX<sup>®</sup> -2 ports are initialized as Infiniband ports. If you wish to change the port type use the `connectx_port_config` script after the driver is loaded.

The script is installed as part of the Mellanox OFED for Linux package (under `/sbin`). See the Mellanox OFED for Linux User’s Manual available at [http://www.mellanox.com/content/pages.php?pg=products\\_dyn&product\\_family=26&menu\\_section=34](http://www.mellanox.com/content/pages.php?pg=products_dyn&product_family=26&menu_section=34).

Running `"/sbin/connectx_port_config -s"` will show the current port configuration for all ConnectX<sup>®</sup> -2 devices.

Port configuration is saved in the file: `/etc/infiniband/connectx.conf`. This saved configuration is restored at driver restart only if done via `"/etc/init.d/openibd restart"`.

Possible port types are:

- "eth" - Always Ethernet
- "ib" - Always Infiniband
- "auto" - Link sensing mode - detect port type based on the attached network type. If no link is detected, the driver retries link sensing every few seconds.

Each port link type can be configured for each device in the system at run time using the `"/sbin/connectx_port_config"` script. This utility will prompt for the PCI device to be modified (if there is only one it will be selected automatically). At the next stage the user will be prompted for the desired mode for each port.

The desired port configuration will then be set for the selected device. Note: This utility also has a non interactive mode:

```
"/sbin/connectx_port_config [[-d|--device <PCI device ID>] -c|--conf <port1,port2>]"
```

The following configurations are supported by VPI:

**Table 5 - Supported Port configurations**

Port 1	Port 2
Ethernet	Ethernet
IB	IB
auto-sensing	auto-sensing
IB	Ethernet
IB	auto-sensing
auto-sensing	Ethernet

The following options are not supported:

**Table 6 - Unsupported Port Configurations**

Port 1	Port 2
Ethernet	IB
Ethernet	auto-sensing
auto-sensing	IB

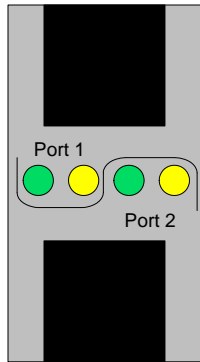
## 2.1.4 PCI Express Interface

The ConnectX<sup>®</sup>-2 adapter cards support PCI Express 2.0 (1.1 compatible) through an x8 edge connector. The device can be either a master initiating the PCI Express bus operations or a slave responding to PCI bus operations.

## 2.1.5 LED Assignment

The board has I/O LEDs located on the I/O panel- 2 LEDs per port. The green LED, when lit, indicates that the driver is running and a valid physical connection between nodes exists. If the green LED is blinking, it indicates a problem with the physical link. The yellow LED when lit, indicates a valid data activity link, this is the logical link. The yellow LED lights up when the network is discovered over the physical link. A valid data activity link without data transfer is designated by a constant yellow LED indication. A valid data activity link with data transfer is designated by a blinking yellow LED indication. If the LEDs are not active, either the physical link or the logical link (or both) connections have not been established.

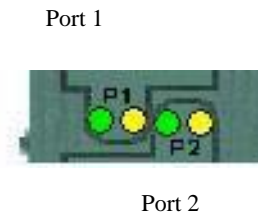
**Figure 4: LED - Port Association**



**Figure 5: Physical and Logical Link Indications**

**Table 7 - LEDs**

Port Number	LED Name
Port 1	Physical Link - Green Constant on indicates a good physical link Blinking indicates a problem with the Physical link
	Data Activity - Yellow Blinking indicates Data Transfer Constant on indicates no Data Transfer
Port 2	Physical Link - Green Constant on indicates a good physical link Blinking indicates a problem with the Physical link
	Data Activity - Yellow Blinking indicates Data Transfer Constant on indicates no Data Transfer



The short bracket has the same port and LED footprint as the tall bracket.

### 2.1.6 I<sup>2</sup>C Compatible Interface

A three-pin header on the adapter card is provided as the I<sup>2</sup>C compatible interface. See Figure 8 on page 23 for the location on the board.

**Figure 6: I<sup>2</sup>C Connector**





## 2.2 Power

All adapter cards receive 12V and 3.3V power from the PCI Express Edge connector. All other required power voltages are generated by on-board switch mode regulators. See “Specifications” on page 23.

## 2.3 Memory

The adapter cards support multiple memory devices through the PCI Flash, and I2C compatible interfaces.

### 2.3.1 System Memory


The adapter card utilizes the PCI Express interface to store and access IB fabric and/or Ethernet fabric connection information and packet data on the system memory.

### 2.3.2 Flash

Each of the adapter cards include one 16MB SPI Flash device (M25P16-VME6G device by ST Microelectronics) accessible via the Flash interface of the MT25408B0 ConnectX<sup>®</sup>-2 VPI device.

There is a jumper on each adapter card that indicates to the device whether an on-board Flash device is to be used. Table 8 provides information on this jumper. See the schematic in Figure 8 on page 23 for the jumper location.

**Table 8 - Jumper Configuration**

Description	Option	Card Default Configuration	Comments
Flash present/ not present	connection open – Flash present connection shorted – Flash not present  <b>Figure 7: Flash Jumper</b> 	connection open – Flash present	Header 1x2

### 2.3.3 EEPROM

Each board incorporates an EEPROM that is accessible through the I2C compatible interface. The EEPROM is used for storing the Vital Product Data (VPD). The EEPROM capacity is 4Kb.

## 2.4 VPD Layout

The PCI VPD (Vital Product Data) layout, for each of the described Mellanox Technologies ConnectX<sup>®</sup>-2 VPI adapter cards complies with the format defined in the *PCI 2.3 Specification, Appendix I*. All ConnectX-2<sup>®</sup> adapter cards have the same PCI VPD layout.

## 2.4.1 PCI VPD Layout

**Table 9 - VPD Layout for MHGH29B-X[ST]R**

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length [7:0] LSB	0x9		
2	Length [15:8] MSB	0x0		
3	Data	Eagle DDR	STR	
12	Large Resource Type VPD-R Tag (0x10)	0x90		
13	Length [7:0] LSB	0x4F		
14	Length [15:8] MSB	0x00		
15	VPD Keyword	PN	STR	Add in Card Part Number
17	Length	0x15		
18	PN	PN	%STR_SPC	
39	VPD Keyword	EC	STR	Engineering Change Level of the card (rev)
41	Length	0x2		
42	Revision	A1	%STR	PCB revision
44	VPD Keyword	SN	STR	Serial Number
46	Length	0x18		
47	SerialNumber		%STR_SPC	“00..00XXXX..XX”
71	VPD Keyword	V0	STR	Misc Information
73	Length	0x10		
74	Data	PCIe Gen2 x8	STR_SPC	
90	VPD Keyword	RV	STR	
92	Length	0x1		
93	Data	0,92	%CS0	
94	Large Resource Type VPD-W Tag (0x11)	0x91		
95	Length [7:0] LSB	0x9E		
96	Length [15:8] MSB	0x00		
97	VPD Keyword	V1	STR	EFI Driver version
99	Length	0x6		
100	Data	N/A	STR_SPC	
106	VPD Keyword	YA	STR	Asset Tag
108	Length	0x20		
109	Data	N/A	STR_SPC	“N/A”
141	VPD Keyword	RW	STR	Remaining read/write area
143	Length	0x6F		
144	Data		STR_ZERO	Reserved (0x00)
255	Small Resource Type END Tag (0x11)	0x78		

## 3 Driver Software and Firmware

### 3.1 Driver Software

#### 3.1.1 Linux

For Linux, download and install the latest OpenFabrics Enterprise Distribution (OFED) software package available via the Mellanox Web site at:

<http://www.mellanox.com> => Downloads => InfiniBand/VPI SW/Drivers. Follow the installation instructions included in the download package.

#### 3.1.2 Windows

For Windows, there are currently two distinct packages:

- MLNX EN – Ethernet driver
- MLNX WinOF – IB driver

These packages cannot co-exist (you need to uninstall one of them before installing the other).

- Download these two packages from the Mellanox Web site at:  
For IB: <http://www.mellanox.com> => Downloads => InfiniBand/VPI SW/Drivers
- For Eth: <http://www.mellanox.com> => Downloads => Ethernet SW/Drivers

Follow the installation instructions included in the download package.

### 3.2 Updating Adapter Card Firmware

Each card is shipped with the latest version of qualified firmware at the time of manufacturing. Firmware is updated occasionally, and the most recent firmware can be obtained from:

<http://www.mellanox.com> => Downloads => Firmware.

Firmware can be updated on the stand alone single card using the **flint** tool of the *Mellanox Firmware Tools (MFT)* package. This package is available for download, along with its user manual, from the Mellanox Firmware Tools page. See <http://www.mellanox.com> => Downloads => Firmware Tools.

A firmware binaries table lists a binary file per adapter card. The file name of each such binary is composed by combining the firmware name, the firmware release version, and the card part number. Please contact Mellanox or your assigned Field Application Engineer if you cannot find the firmware binary for your adapter card.

### 3.3 FlexBoot

FlexBoot enables remote boot over Ethernet or InfiniBand using Boot over InfiniBand (BoIB), Boot over Ethernet (BoE), or Boot over iSCSI (Bo-iSCSI). This technology is based on the Pre-boot Execution Environment (PXE) standard specification, and FlexBoot software is based on the

open source EtherBoot/gPXE project (see [www.etherboot.org](http://www.etherboot.org)). For more information go to <http://www.mellanox.com> > Products > InfiniBand/VPI SW/Drivers > FlexBoot.

## 4 VPI Adapter Card Installation

### 4.1 Hardware and Software Requirements

Before installing the adapter card, please make sure that the system meets the hardware and software requirements listed in Table 10. Refer to Chapter 3, “Driver Software and Firmware” on page 19 for download and installation instructions.

**Table 10 - Hardware and Software Requirements**

Requirement	Description
Hardware	<ul style="list-style-type: none"> <li>Minimum 3 GB of memory</li> <li>PCI Express x8 or x16 slots</li> </ul>
Software Operating Systems/Distributions	<ul style="list-style-type: none"> <li>For Windows, both the InfiniBand and Ethernet drivers are in the Mellanox WinOF for Windows software package available via Mellanox Web site <a href="http://www.mellanox.com">http://www.mellanox.com</a> =&gt; Downloads =&gt; Mellanox WinOF VPI for Windows</li> <li>For Linux, both the InfiniBand and Ethernet drivers are in the Mellanox OpenFabrics Enterprise Distribution (OFED) software package available via the Mellanox Web site <a href="http://www.mellanox.com">http://www.mellanox.com</a> =&gt; Downloads =&gt; InfiniBand/VPI SW/ Linux Drivers</li> </ul>

### 4.2 Installation Instructions

To change a tall bracket to a short bracket see Replacing a Tall Bracket With a Short Bracket on page 29.

Read all installation instructions before connecting the equipment to the power source.

The adapter cards listed in Table 3 on page 9 are standard PCI Express cards, each with a standard x8 edge connector. Please consult the host machine documentation for instructions on how to install a PCI Express card.



When more than one PCI slot is available make sure to use the PCI slot with the proper configuration.

Any PCI slot with the proper configuration is acceptable for connection. If the card is installed in a PCI slot with less lanes than the card requires then the adapter card will not provide the optimum data transfer.

### 4.3 Cables and Modules

The CX4 ports can connect to InfiniBand passive copper and active copper cables.

See [www.mellanox.com](http://www.mellanox.com) => Products => Cables for certified and approved cable recommendations.

### 4.3.1 Cable Installation

All cables can be inserted or removed with the unit powered on. To insert a cable, press the connector into the port receptacle until the connector is firmly seated. The GREEN LED indicator will light when the physical connection is established (that is, when the unit is powered on and a cable is plugged into the port with the other end of the connector plugged into a functioning port). After plugging in a cable, lock the connector using the latching mechanism particular to the cable vendor. When a logical connection is made the YELLOW LED will come on. When data is being transferred the yellow led will blink.



When installing cables make sure that the latches engage.



Always install and remove cables by pushing or pulling the cable and connector in a straight line with the card.

Care should be taken not to impede the air exhaust flow through the ventilation holes. Cable lengths should be used which allow for routing horizontally around to the side of the chassis before bending upward or downward in the rack.

To remove a cable, disengage the locks and slowly pull the connector away from the port receptacle. Both LED indicators will turn off when the cable is unseated.



Cables, especially long copper cables, can weigh a substantial amount. Make sure that the weight of the cable is supported on its own and is not hanging from the card.

# Appendix A: Specifications

## A.1 Board Mechanical Drawing and Dimensions

All of the cards covered in this *User Manual* have the same mechanical drawing and share the same dimensions as depicted in Figure 8.

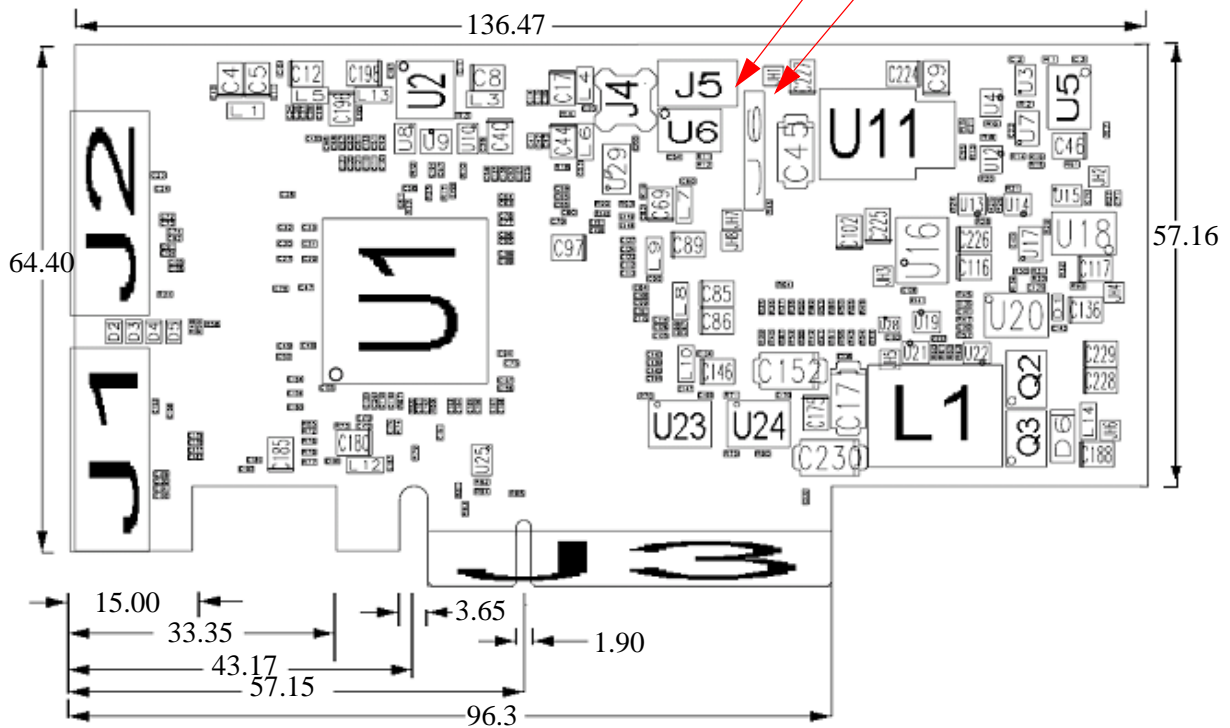


All dimensions are in millimeters.

**Figure 8: Schematic of the ConnectX-2 VPI Adapter Card with CX4 Connectors**

J5 – I2C Connector







J6 – Flash Jumper



## A.2 EMC Certification Statements

Table 11 lists the approved certification status per card in different regions of the world.

**Table 11 - Adapter Cards Certification Status**

Card P/N	FCC Class (USA)	EN Class (Europe)	ICES Class (Canada)	VCCI (Japan)	IEC/EN	cTUVus	CB
MHGH29B-XTR	A	A	A	A			
MHGH29B-XSR	A	A	A	A			

## A.2.1 FCC Statements (USA)

### Class A Statements:

§ 15.21

Statement

#### Warning!

Changes or modifications to this equipment not expressly approved by the party responsible for compliance (Mellanox Technologies) could void the user's authority to operate the equipment.

§15.105(a)

Statement

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

## A.2.2 EN Statements (Europe)

### EN55022 Class A Statement:

Warning

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.



### A.2.3 ICES Statements (Canada)

#### Class A Statement:

“This Class A digital apparatus complies with Canadian ICES-003.  
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.”

### A.2.4 VCCI Statements (Japan)

#### Class A Statement:

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

(Translation - "This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.")

## A.3 MHGH29B-X[ST]R Specifications

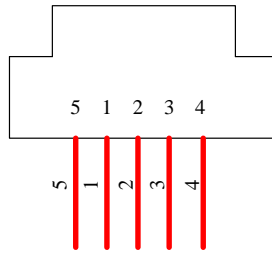
**Table 12 - Specifications for MHGH29B-X[ST]R**

Physical		Power and Environmental	
Size:	2.54in. x 5.37in. (64.4mm x 136.47mm)	Voltage:	12V, 3.3V
Air Flow: 4X 20Gb/s Connector:	200LFM @55°C  InfiniBand (Copper, current rating: 0.5A max) with active media adapter support	Typ. Power:	Passive cables 8.15W Active cables 10.15W
		Maximum Power:	Passive cables 8.80W Active cables 10.80W
		Temperature:	0°C to 55°C
Protocol Support		Regulatory	
InfiniBand:	IBTA v1.2.1, Auto-Negotiation (20Gb/s, 2.5Gb/s)	EMC:	FCC 47 CFR part 15:2005, subpart B, class A ICES-003:2004 Issue 4, class A VCCI V-3/2005.04, class A KCC/ BCC class A EN 55022:1998+A1:2000+A2:2003 class A, EN 61000-3-2:2000+A2:2005, EN61000-3-3:1995+A1:2001, EN 55024:1998 + A1:2001+A2:2003 standards, harmonized under EMC Directive 89/336/EEC; AS/NZS 3548
QoS:	8 InfiniBand Virtual Lanes	Safety:	IEC/EN 60950-1:2006 ETSI EN 300 019-2-2
RDMA Support:	Yes	Environmental:	IEC 60068-2- 64, 29, 32
Data Rate:	DDR	RoHS:	RoHS-R6
PCI Express	2.0 SERDES @ 5.0GT/s		
Ethernet:	IEEE Std 802.3ae 10 Gigabit Ethernet IEEE Std 802.3ak 10GBASE CX4 IEEE Std 802.3aq 10GBASE LRM Multicast and Jumbo Frame Support		

## Appendix B: Interface Connectors Pinout

### B.1 I<sup>2</sup>C-Compatible Connector Pinout

*Figure 9: Compatible Connector Plug and Pinout*



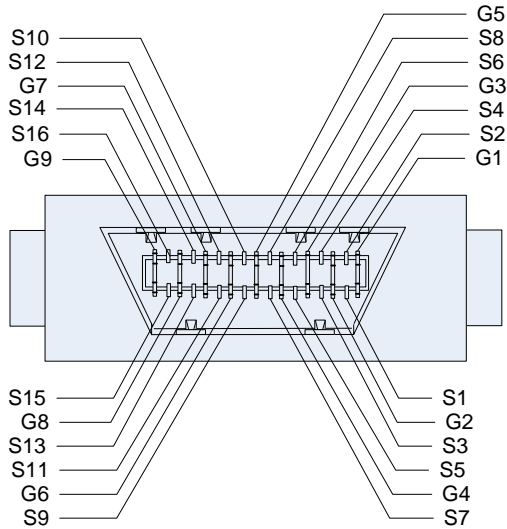
*Table 13 - I<sup>2</sup>C-Compatible Connector*

Connector Pin Number	Signal Name
1	SPSDA
2	SPSCL
3	GND
4	NC
5	NC

## B.2 CX4 Connector Pinout

Figure 10: CX4 Connector Pinout

Table 14 - InfiniBand 4X Connector Pinout



Connector Pin Number	Connector Pin Name	IB Port A Signal Name	IB Port B Signal Name
S1	IBtxIp(0)	Rx_A1	Rx_B1
S2	IBtxIn(0)	Rx_A0	Rx_B0
S3	IBtxIp(1)	Rx_A3	Rx_B3
S4	IBtxIn(1)	Rx_A2	Rx_B2
S5	IBtxIp(2)	Rx_A5	Rx_B5
S6	IBtxIn(2)	Rx_A4	Rx_B4
S7	IBtxIp(3)	Rx_A7	Rx_B7
S8	IBtxIn(3)	Rx_A6	Rx_B6
S9	IBtxOn(3)	Tx_A6	Tx_B6
S10	IBtxOp(3)	Tx_A7	Tx_B7
S11	IBtxOn(2)	Tx_A4	Tx_B4
S12	IBtxOp(2)	Tx_A5	Tx_B5
S13	IBtxOn(1)	Tx_A2	Tx_B2
S14	IBtxOp(1)	Tx_A3	Tx_B3
S15	IBtxOn(0)	Tx_A0	Tx_B0
S16	IBtxOp(0)	Tx_A1	Tx_B1
G1-G6, G9, H1-H2	Signal Ground	GND	GND
G7 <sup>a</sup>	Sense-3.3V	SENSE_P1	SENSE_P2
G8	Vcc	MC_POWER_P1	MC_POWER_P2

a. The Sense-3.3V signal is used to enable the Vcc power supply pin (G8) used to provide power to the active media adapter.

## B.3 PCI Express x8 Connector Pinout

These cards use a standard PCI Express x8 edge connector and the PCI Express x8 standard pinout according to the PCI Express 2.0 specification.

## Appendix C: Replacing a Tall Bracket With a Short Bracket

This section provides instructions on how to remove the tall bracket of a standard Mellanox Technologies adapter card and replace it with a short one. It includes the following sections:

- Removing a bracket
- Installing a new bracket

Figure 11 shows the bracket-side view of a card.

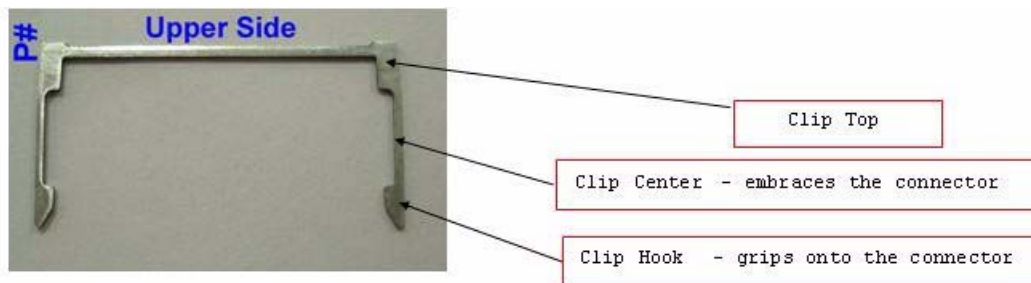
**Figure 11: Tall Bracket of a Dual IB Port Card**



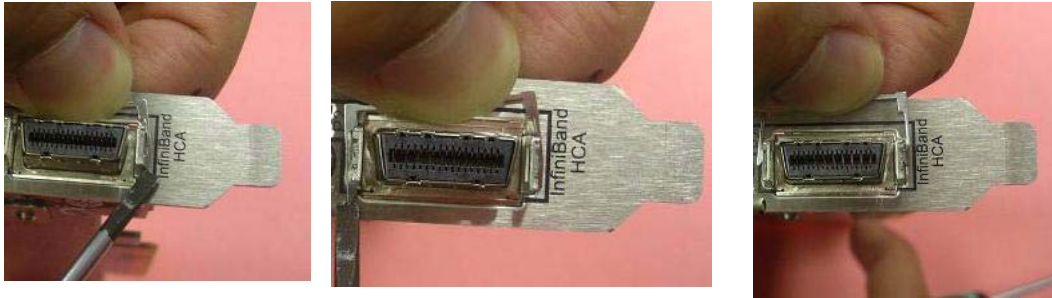
### C.1 Removing Tall Bracket

Figure 12 shows a connector retention clip and the designated names of its sections.

**Figure 12: Connector Retention Clip**



1. Using a small flat head screwdriver, gently push up one hook of a connector's clip toward the connector's top side as shown in Figure 13 on page 30 (a).
2. Then push the other hook. With both hooks unlatched push the clip towards the connector's top side - see Figure 13 (b). Finally, pull the clip away from the bracket - see Figure 13 (c).

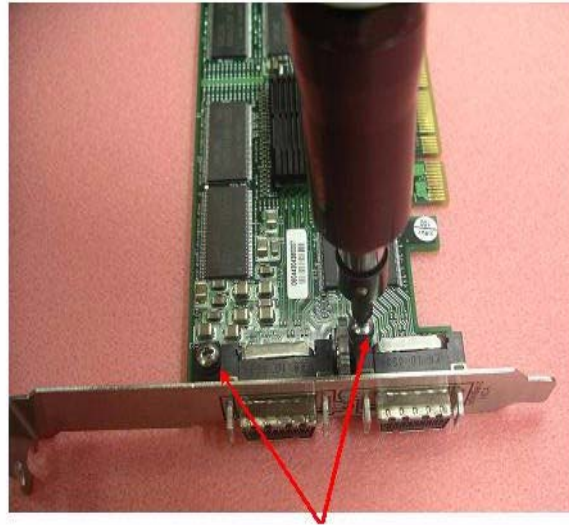
**Figure 13: Extracting Connector Clip**

(a) Gently Push One Hook of

(b) Gently Push Other Hook of Clip

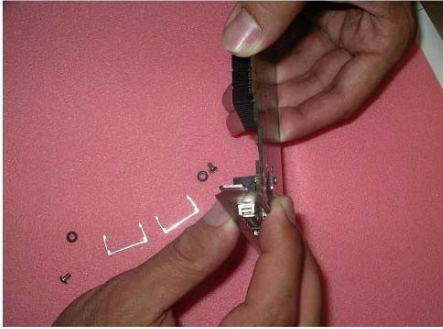
(c) Pull Clip Away

3. Repeat the above actions for the second connector's clip.
4. Unscrew both screws from the card using a torque screwdriver as shown in Figure 15. Grip the bracket as shown in Figure 15, placing your thumb on the LED component. In a rotating move

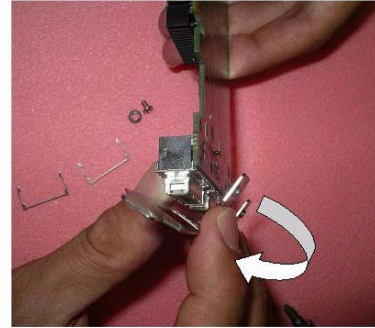
**Figure 14: Bracket Screws**

These two screws hold on  
the bracket

- toward the component side of the card, slide the bracket out of the connector (Figure 15 (b)).
5. Gently hold your thumb on the LED component.
  6. At the same time extract the bracket as shown in Figure 15 b, (Make sure to protect the LED while extracting the bracket).

**Figure 15: Rotate the Bracket to Detach it**

(a) Grip the Card in preparation for Detachment.



(b) Rotate the bracket toward the Component Side.

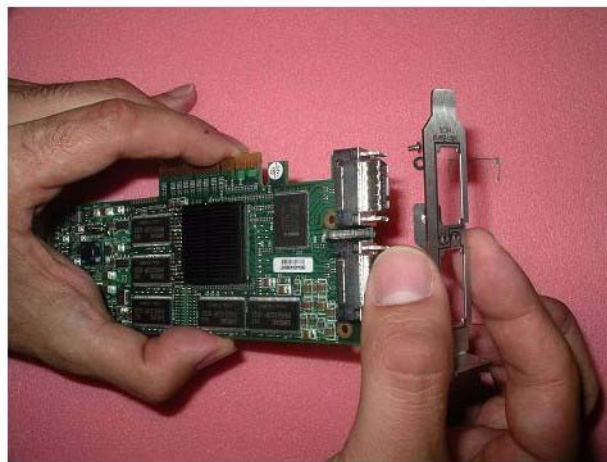


(c) Bracket Separated From Clips and Screws.

## C.2 Replacing a Bracket

The short bracket can now be assembled onto the card.

1. Gently place the bracket onto the card fitting the connectors through the bracket connector holes. The tab on the bracket should be pointing in the same direction as the PCI connector. Make sure the LEDs are aligned into their intended bracket holes.

**Figure 16: Place Short Bracket onto Card**

LED Holes



Do not force the bracket onto the card. You may have to gently push the LEDs using a small screwdriver to align the LEDs with the holes in the bracket.

Be careful not to break the LED pipes.

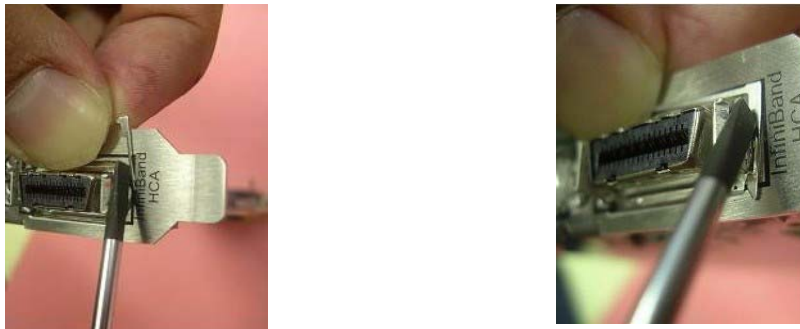
2. Insert a screw along with a washer into each of the two holes on the card, intended for holding the bracket.
3. Use a torque screwdriver to apply up to 2 lbs-in torque on each screw.

**Figure 17: Attach Bracket onto Card using Screws**



4. Gently push the clip onto the connector. Make sure to slide both clip hooks (sides) around the connector evenly as shown in Figure 18.

**Figure 18: Sliding Connector Clip Evenly**



5. Use a small flat head screwdriver to gently slide the clip hooks towards the connector's base side as shown in Figure 18.
6. Repeat this step for the second clip.



**Figure 19: Assembled Short Bracket**



## Appendix D: Avertissements de sécurité d'installation (Warnings in French)

### 1. Instructions d'installation



Lisez toutes les instructions d'installation avant de brancher le matériel à la source d'alimentation électrique.

### 2. Température excessive



Ce matériel ne doit pas fonctionner dans une zone avec une température ambiante dépassant le maximum recommandé de 55°C (131°F). Un flux d'air de 200LFM à cette température ambiante maximale est nécessaire. En outre, pour garantir un bon écoulement de l'air, laissez au moins 8 cm (3 pouces) d'espace libre autour des ouvertures de ventilation.

### 3. Orages – dangers électriques



Pendant un orage, il ne faut pas utiliser le matériel et il ne faut pas brancher ou débrancher les câbles.

### 4. Branchement/débranchement des câbles InfiniBand en cuivre



Les câbles InfiniBand en cuivre sont lourds et ne sont pas flexibles, il faut donc faire très attention en les branchant et en les débranchant des connecteurs. Consultez le fabricant des câbles pour connaître les mises en garde et les instructions spéciales.

### 5. Installation du matériel



Ce matériel ne doit être installé, remplacé ou entretenu que par du personnel formé et qualifié.

### 6. Élimination du matériel



L'élimination de ce matériel doit s'effectuer dans le respect de toutes les législations et réglementations nationales en vigueur.

### 7. Codes électriques locaux et nationaux



Ce matériel doit être installé dans le respect des codes électriques locaux et nationaux.

## Appendix E: Sicherheitshinweise (Warnings in German)

### 1. Installationsanleitungen



Lesen Sie alle Installationsanleitungen, bevor Sie das Gerät an die Stromversorgung anschließen.

### 2. Übertemperatur



Dieses Gerät sollte nicht in einem Bereich mit einer Umgebungstemperatur über der maximal empfohlenen Temperatur von °C (°F) betrieben werden. Es ist ein Luftstrom von 200 LFM bei maximaler Umgebungstemperatur erforderlich. Außerdem sollten mindestens 8 cm (3 in.) Freiraum um die Belüftungsöffnungen sein, um einen einwandfreien Luftstrom zu gewährleisten.

### 3. Bei Gewitter - Elektrische Gefahr



Arbeiten Sie während eines Gewitters und Blitzschlag nicht am Gerät, schließen Sie keine Kabel an oder ab.

### 4. Anschließen/Trennen von InfiniBand-Kupferkabel



InfiniBand-Kupferkabel sind schwer und nicht flexible. Deshalb müssen sie vorsichtig an die Anschlüsse angebracht bzw. davon getrennt werden. Lesen Sie die speziellen Warnungen und Anleitungen des Kabelherstellers.

### 5. Geräteinstallation



Diese Gerät sollte nur von geschultem und qualifiziertem Personal installiert, ausgetauscht oder gewartet werden.

### 6. Geräteentsorgung



Die Entsorgung dieses Geräts sollte unter Beachtung aller nationalen Gesetze Bestimmungen erfolgen.

### 7. Regionale und nationale elektrische Bestimmungen



Dieses Gerät sollte unter Beachtung der regionalen und nationalen elektrischen Bestimmungen installiert werden.

## Appendix F: Advertencias de seguridad para la instalación (Warnings in Spanish)

### 1. Instrucciones de instalación



Antes de conectar el equipo a la fuente de alimentación, leer todas las instrucciones de instalación.

### 2. Sobre calentamiento



No se debe utilizar el equipo en un área con una temperatura ambiente superior a la máxima recomendada: 45°C. Además, para garantizar una circulación de aire adecuada, se debe dejar como mínimo un espacio de 8 cm (3 pulgadas) alrededor de las aberturas de ventilación.

### 3. Cuando hay rayos: peligro de descarga eléctrica



No utilizar el equipo ni conectar o desconectar cables durante períodos de actividad de rayos.

### 4. Conexión y desconexión del cable Copper InfiniBand



Dado que los cables de cobre InfiniBand son pesados y no son flexibles, su conexión a los conectores y su desconexión se deben efectuar con mucho cuidado. Para ver advertencias o instrucciones especiales, consultar al fabricante del cable.

### 5. Instalación de equipos



La instalación, el reemplazo y el mantenimiento de este equipo estarán a cargo únicamente de personal capacitado y competente.

### 6. Eliminación de equipos



La eliminación definitiva de este equipo se debe efectuar conforme a todas las leyes y reglamentaciones nacionales.

### 7. Códigos eléctricos locales y nacionales



Este equipo se debe instalar conforme a los códigos eléctricos locales y nacionales.