



ConnectX[®] IB HCA Adapter Card with QSFP Connectors User Manual

P/N: MHRH19-XTC, MHRH19-XSC, MHRH29-XSC, MHRH29-XTC,
MHQH19-XTC, MHQH19-XSC, MHQH29-XSC, MHQH29-XTC

Rev 1.5

NOTE:

THIS HARDWARE, SOFTWARE OR TEST SUITE PRODUCT (“PRODUCT(S)”) AND ITS RELATED DOCUMENTATION ARE PROVIDED BY MELLANOX TECHNOLOGIES “AS-IS” WITH ALL FAULTS OF ANY KIND AND SOLELY FOR THE PURPOSE OF AIDING THE CUSTOMER IN TESTING APPLICATIONS THAT USE THE PRODUCTS IN DESIGNATED SOLUTIONS. THE CUSTOMER'S MANUFACTURING TEST ENVIRONMENT HAS NOT MET THE STANDARDS SET BY MELLANOX TECHNOLOGIES TO FULLY QUALIFY THE PRODUCT(S) AND/OR THE SYSTEM USING IT. THEREFORE, MELLANOX TECHNOLOGIES CANNOT AND DOES NOT GUARANTEE OR WARRANT THAT THE PRODUCTS WILL OPERATE WITH THE HIGHEST QUALITY. ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT ARE DISCLAIMED. IN NO EVENT SHALL MELLANOX BE LIABLE TO CUSTOMER OR ANY THIRD PARTIES FOR ANY DIRECT, INDIRECT, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES OF ANY KIND (INCLUDING, BUT NOT LIMITED TO, PAYMENT FOR PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY FROM THE USE OF THE PRODUCT(S) AND RELATED DOCUMENTATION EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.



Mellanox Technologies
350 Oakmead Parkway Suite 100
Sunnyvale, CA 94085
U.S.A.
www.mellanox.com
Tel: (408) 970-3400
Fax: (408) 970-3403

Mellanox Technologies, Ltd.
PO Box 586 Hermon Building
Yokneam 20692
Israel
Tel: +972-4-909-7200
Fax: +972-4-959-3245

© Copyright 2011. Mellanox Technologies. All rights reserved.

Mellanox®, BridgeX®, ConnectX®, InfiniBlast®, InfiniBridge®, InfiniHost®, InfiniRISC®, InfiniScale®, InfiniPCI®, PhyX® and Virtual Protocol Interconnect® are registered trademarks of Mellanox Technologies, Ltd. CORE-Direct and FabricIT are trademarks of Mellanox Technologies, Ltd. All other marks and names mentioned herein may be trademarks of their respective companies.

Table of Contents

Table of Contents	3
List of Figures	5
List of Tables	6
Revision History	7
About this Manual	8
Intended Audience	8
Related Documentation	8
Online Resources	8
Document Conventions	8
Technical Support	8
Firmware and Software Updates	9
Chapter 1 Overview	10
1.1 Adapter Cards Covered in this Manual	11
1.2 Mellanox Part Numbering Legend	13
1.3 Finding the and Serial Number on the Adapter Cards	14
1.4 Safety Warnings	14
Chapter 2 Adapter Card Interfaces	16
2.1 I/O Interfaces	16
2.2 Power	18
2.3 Memory	18
2.4 VPD Layout	18
Chapter 3 Driver Software and Firmware	23
3.1 Driver Software	23
3.2 FlexBoot	23
3.3 NVIDIA GPUDirect Support	23
3.4 Updating HCA Adapter Card Firmware	24
Chapter 4 HCA InfiniBand Card Installation	26
4.1 Hardware and Software Requirements	26
4.2 Installation Instructions	26
4.3 Set Up	26
4.4 Cables and Modules	32
Appendix A Specifications	34
A.1 MHRH19-X[ST]C Specifications	34
A.2 MHQH19-X[ST]C Specifications	35
A.3 MHRH29-X[ST]C Specifications	35
A.4 MHQH29-X[ST]C Specifications	37
A.5 Board Mechanical Drawing and Dimensions	37
A.6 EMC Certification Statements	38
Appendix B Interface Connectors Pinout	42
B.1 I2C-Compatible Connector Pinout	42
B.2 PCI Express x8 Connector Pinout	42
B.3 PCI Express Connector Pinout	43
B.4 QSFP Connector Pinout	43
Appendix C Replacing a Tall Bracket With a Short Bracket	45
C.1 Replacing a Bracket	45
C.2 Remove the Existing Bracket from the Adapter Card	45

C.3 Installing the New Bracket	45
Appendix D Avertissements de sécurité d'installation (Warnings in French)	47
Appendix E Sicherheitshinweise (Warnings in German)	48
Appendix F Advertencias de seguridad para la instalación (Warnings in Spanish)	49

List of Figures

Figure 1:	MH[RQ]H29-XTC Card	12
Figure 2:	Card Product Label	14
Figure 3:	Port Numbering	16
Figure 4:	Physical and Logical Link Indications	17
Figure 5:	I2C Connector	17
Figure 6:	Flash Jumper	18
Figure 7:	Support Download Assistant	25
Figure 8:	Hardware Devices	28
Figure 9:	PCI Device	29
Figure 10:	Schematic of the Dual Port Adapter Card MH[RQ]H29B-X[ST]R	38
Figure 11:	Compatible Connector Plug and Pinout	42
Figure 12:	Connector and Cage Views	43
Figure 13:	Remove the Bracket	45
Figure 14:	Gasket Installation	46
Figure 15:	Placing the Bracket on the Card	46

List of Tables

Table 1:	Revision History Table	7
Table 2:	Documents List	8
Table 3:	HCA Cards List	11
Table 4:	Mellanox Cards Part Numbering Key	13
Table 5:	LEDs	17
Table 6:	Jumper Configuration	18
Table 7:	VPD Layout for MHRH[12]9-X[ST]C	19
Table 8:	VPD Layout for MHQH[12]9-X[ST]C	21
Table 9:	Hardware and Software Requirements	26
Table 10:	Specifications for MHRH19-X[ST]C	34
Table 11:	Specifications for MHQH19-X[ST]C	35
Table 12:	Specifications for MHRH29-XSC/-XTC	35
Table 13:	Specifications for MHQH29-XSC/-XTC	37
Table 14:	HCA Cards Certification Status	38
Table 15:	I2C-Compatible Connector Pinout	42
Table 16:	Connector Pin Name and Number to Signal Name Correspondence	43

Revision History

This document was printed on 2/14/11.

Table 1 - Revision History Table

Date	Rev	Comments/Changes
February 2011	1.5	Added Set up section.
August 2009	1.4	Added MH[QR]H 19 Short cards Added gaskets to bracket installation moved Bracket installation from Appendix to Chapter 5
December 2008	1.3	Fixed links to website Added single port cards
August 2008	1.05	Added French Translation of Safety Warnings Removed Watermark
April 2008	0.20	Added MHRH Changed Link from OFED to Mellanox ODFED Removed Confidential
March 2008	0.10	Initial Release

About this Manual

This *User Manual* describes Mellanox Technologies MH[RQ]H[12]9-X[ST]C ConnectX IB PCI Express x8 HCA Adapter cards. HCAIt 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® and 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 http://www.mellanox.com => Firmware & Downloads => Download Firmware Tools Or http://www.mellanox.com => Support => Download Firmware Tools
<i>IBTA Specification Release 1.2.1</i>	InfiniBand Architecture Specification
<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> =>

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.

Technical Support

Customers who purchased Mellanox products directly from Mellanox are invited to contact us through the following methods.

- URL: <http://www.mellanox.com> => Support
- E-mail: support@mellanox.com

- Tel: +1.408.916.0055

Customers who purchased Mellanox M-1 Global Support Services, please see your contract for details regarding Technical Support.

Customers who purchased Mellanox products through a Mellanox approved reseller should first seek assistance through their reseller.

Firmware and Software Updates

The Mellanox support downloader contains software, firmware and knowledge database information for Mellanox products. Access the data base from the Mellanox Support Web page,

<http://www.mellanox.com=>Support>

or use the following link to go directly to the Mellanox Support Download Assistant page,

[http://www.mellanox.com/supportdownloader/.](http://www.mellanox.com/supportdownloader/)

1 Overview

This document is a *User Manual* for Mellanox Technologies host channel adapter (HCA) cards based on MT25408 , ConnectX[®] IBthe ConnectXintegrated circuit device. The cards described in this manual have the following main features:

- QSFP ports for connecting InfiniBand traffic at 10Gb/s (SDR), 20Gb/s (DDR), 40Gb/s (QDR)
- InfiniBand speeds: SDR/DDR/QDR: IB10Gb/s (SDR) or 20Gb/s (DDR) or 40Gb/s (QDR) (Fiber solutions run at SDR only)
- Two bracket heights: short and tall

1.1 Adapter Cards Covered in this Manual

Table 3 lists the InfiniBandHCA cards described in this manual.

Table 3 - HCA Cards List



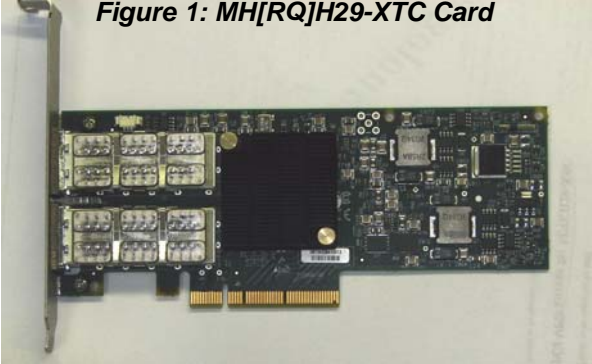


Ordering Part Number (OPN)	IB Port Speed	On-board Memory Size	Short / Tall Bracket	HCA Card with Brackets
MHRH19-XTC	20Gb/s (DDR) Single port	No Mem	Tall	 
MHRH19-XSC	20Gb/s (DDR) Single port	No Mem	Short	
MHQH19-XTC	40Gb/s (QDR) Single port	No Mem	Tall	
MHQH19-XSC	40Gb/s (QDR) Single port	No Mem	Short	

Table 3 - HCA Cards List

Ordering Part Number (OPN)	IB Port Speed	On-board Memory Size	Short / Tall Bracket	HCA Card with Brackets
MHRH29-XTC	20Gb/s (DDR) Dual port	No Mem	Tall	 <p>Figure 1: MH[RQ]H29-XTC Card</p>
MHRH29-XSC			Short	
MHQH29-XTC	40Gb/s (QDR) Dual port	No Mem	Tall	
MHQH29-XSC			Short	



Short Bracket



Tall Bracket

These cards are RoHS-R5 Compliant.

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	
S	Adapter Architecture	H = ConnectX [®] or ConnectX-2
#	# ports	1 = 1, 2 = 2
I	Host Interface	X = PCI-X, 4 = PCIe x4, 8 = PCIe Gen1 x8, 9 = PCIe (Gen2 x8),
G	Generation	<blank> = Initial product generation, B= generation B, C= generation C
-	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 MHQH29-XSC describes Mellanox Technologies' ConnectX[®] IB HCA card with dual QSFP ports, a PCIe2.0 x8 5.0GT/s interface, no on-board memory (mem-free), a short PCI bracket, and RoHS R5 compliance. Using the legend,

- field M = M to indicate a Mellanox Technologies product,
- field H = H to indicate an InfiniBand Adapter Card,
- field T = Q to indicate QSFP QDR,
- field S = H to indicate the ConnectX family,
- field # = 2 to indicate two ports,
- field I = 9 to indicate PCI Express 2.0 x8 running at 5.0GT/s,
- field X = X to indicate no on-board memory,
- field B = S to indicate a short bracket, and
- field R = C to indicate RoHS R5 (w/ Exemptions) compliance

1.3 Finding the 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 and the card GUID for InfiniBand protocol .

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 47. For safety warnings in German see “Sicherheitshinweise (Warnings in German)” on page 48. For safety warnings in Spanish see “Advertencias de seguridad para la instalación (Warnings in Spanish)” on page 49.

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

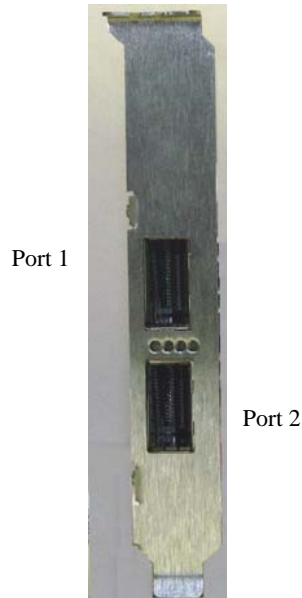
2.1 I/O Interfaces

Each HCA Adapter card includes the following interfaces:

- QSFP ports
- PCI Express x8 edge connector
- I/O panel LEDs
- I²C 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 device is compliant with the *InfiniBand Architecture Specification, Release 1.2.1*. It has compliant 4X InfiniBandports, with four Tx/Rx pairs of SerDes. HCA adapter cards (listed in Table 3) based on this device provide access to its ports by means of QSFP connectors.

2.1.2 PCI Express Interface

The ConnectX-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.

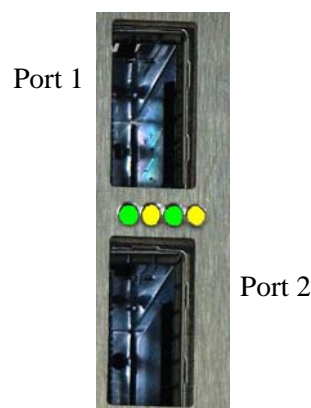
2.1.3 LED Assignment

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: Physical and Logical Link Indications

Table 5 - 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.

2.1.4 I²C Compatible Interface

A three-pin header on the HCA Adapter card is provided as the I²C compatible interface. See Appendix A, “Specifications,” on page 34 for the location on the board.

Figure 5: I²C Connector



2.2 Power

2.3 Memory

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

2.3.1 System Memory


The HCA Adapter card utilizes the PCI Express interface to store and access connection information and packet data on the system memory.

2.3.2 Flash

Each of the HCA Adapter cards include one 2MB SPI Flash device (M25P80 device by ST Microelectronics) accessible via the Flash interface of the ConnectX-IB 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 6 provides information on this jumper. See the schematic in Appendix A, “Specifications,” on page 34 for the jumper location.

Table 6 - Jumper Configuration

Description	Option	Card Default Configuration	Comments
Flash present/ not present	connection open – Flash present connection shorted – Flash not present Figure 6: Flash Jumper 	connection open – Flash present	Header 1x2

2.3.3 EEPROM

Each board incorporates an EEPROM that is accessible through the I2C. The EEPROM is used for storing the Vital Product Data (VPD). The EEPROM capacity is 512 bytes.

2.4 VPD Layout

The PCI VPD (Vital Product Data) layout, for each of the described Mellanox Technologies ConnectX[®]-HCA Adapter adapter cards complies with the format defined in the *PCI 2.3 Specification, Appendix I*. All ConnectX-adapter cards have the same PCI VPD layout. “A1” was used as the HCA card (PCB) revision. Later revisions of the HCA card will have the same format.

2.4.1 PCI VPD Layout

Table 7 - VPD Layout for MHRH[12]9-X[ST]C

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length [7:0] LSB	0xD		
2	Length [15:8] MSB	0x0		
3	Data	FALCON IB QDR	STR	
16	Large Resource Type VPD-R Tag (0x10)	0x90		
17	Length [7:0] LSB	0x4F		
18	Length [15:8] MSB	0x00		
19	VPD Keyword	PN	STR	Add in Card Part Number
21	Length	0x15		
22	PN	PN	%STR_SPC	
43	VPD Keyword	EC	STR	Engineering Change Level of the card (rev)
45	Length	0x2		
46	Revision	A1	%STR	PCB revision
48	VPD Keyword	SN	STR	Serial Number
50	Length	0x18		
51	SerialNumber		%STR_SPC	“00..00XXXX..XX”
75	VPD Keyword	V0	STR	Misc Information
77	Length	0x10		
78	Data	PCIe Gen2 x8	STR_SPC	
94	VPD Keyword	RV	STR	
96	Length	0x1		
97	Data	0,96	%CS0	
98	Large Resource Type VPD-W Tag (0x11)	0x91		
99	Length [7:0] LSB	0x9A		
100	Length [15:8] MSB	0x00		
101	VPD Keyword	V1	STR	EFI Driver version
103	Length	0x6		
104	Data	N/A	STR_SPC	
110	VPD Keyword	YA	STR	Asset Tag
112	Length	0x20		
113	Data	N/A	STR_SPC	“N/A”
145	VPD Keyword	RW	STR	Remaining read/write area
147	Length	0x6b		
148	Data		STR_ZERO	Reserved (0x00)

Table 7 - VPD Layout for MHRH[12]9-X[ST]C

Offset (Decimal)	Item	Value	Format	Description
255	Small Resource Type END Tag (0x11)	0x78		

2.4.2 PCI VPD Layout

Table 8 - VPD Layout for MHQH[12]9-X[ST]C

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length [7:0] LSB	0xD		
2	Length [15:8] MSB	0x0		
3	Data	FALCON IB QDR	STR	
16	Large Resource Type VPD-R Tag (0x10)	0x90		
17	Length [7:0] LSB	0x4F		
18	Length [15:8] MSB	0x00		
19	VPD Keyword	PN	STR	Add in Card Part Number
21	Length	0x15		
22	PN	PN	%STR_SPC	
43	VPD Keyword	EC	STR	Engineering Change Level of the card (rev)
45	Length	0x2		
46	Revision	A1	%STR	PCB revision
48	VPD Keyword	SN	STR	Serial Number
50	Length	0x18		
51	SerialNumber		%STR_SPC	“00..00XXXX..XX”
75	VPD Keyword	V0	STR	Misc. Information
77	Length	0x10		
78	Data	PCIe Gen2 x8	STR_SPC	
94	VPD Keyword	RV	STR	
96	Length	0x1		
97	Data	0,96	%CS0	
98	Large Resource Type VPD-W Tag (0x11)	0x91		
99	Length [7:0] LSB	0x9A		
100	Length [15:8] MSB	0x00		
101	VPD Keyword	V1	STR	EFI Driver version
103	Length	0x6		
104	Data	N/A	STR_SPC	
110	VPD Keyword	YA	STR	Asset Tag
112	Length	0x20		
113	Data	N/A	STR_SPC	“N/A”
145	VPD Keyword	RW	STR	Remaining read/write area
147	Length	0x6b		
148	Data		STR_ZERO	Reserved (0x00)

Table 8 - VPD Layout for MHQH[12]9-X[ST]C

Offset (Decimal)	Item	Value	Format	Description
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> => Support > Download Center. Follow the installation instructions included in the download package.

3.1.2 Windows

For Windows, download and install the latest Mellanox WinOF VPI for Windows software package available via the Mellanox Web site at: <http://www.mellanox.com> => Support > Download Center. Follow the installation instructions included in the download package.

3.2 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). For more information go to <http://www.mellanox.com> => Support > Download Center.

3.3 NVIDIA GPUDirect Support

Utilizing the high computational power of the Graphics Processing Unit (GPU), the GPU-to-GPU method has proven valuable in various areas of science and technology. Mellanox ConnectX-2 based HCA provides the required high throughput and low latency for GPU-to-GPU communications.

3.3.1 Hardware and Software Requirements

Software:

Operating Systems:

- RHEL5.4 2.6.18-164.el5 x86_64 or later
- Mellanox OFED with GPUDirect support
- NVIDIA Development Driver for Linux version 195.36.15 or later

Hardware:

- Mellanox ConnectX-2 HCA card
- NVIDIA Tesla series

3.3.2 Installation

For installation instructions visit: www.mellanox.com => Support => VPI SW/Driver.

3.3.2.1 Kernel Installation:

Use Red Hat Package Manager (RPM) to install the Kernel RPM files:

- Install the required RPMs, for example, run:
rpm --force -ivh *.rpm
- Modify the boot loader configuration file if needed
(e.g., edit /etc/grub.conf)
- Reboot the machine with the new kernel
reboot

3.3.2.2 MLNX OFED Drivers Installation:

The MLNX driver is called MLNX_OFED_LINUX-Nvidia-1.5.1.

- Mount the ISO file:

- # mount -o ro, loop MLNX_OFED_<version>.iso /mnt
- Run the installation script:
/mnt/mlnxofed install
- Restart the driver:
/etc/init.d/openibd restart
- To make sure that GPUDirect is enabled, run:
cat /sys/module/ib_core/parameters/gpu_direct_enable => 1

The number of shared pages by GPUDirect is reported under:

- # cat /sys/module/ib_core/parameters/gpu_direct_shares

3.3.2.3 NVIDIA Driver Installation:

Install NVIDIA Development Driver for Linux x86_64, available under:

http://developer.nvidia.com/object/cuda_3_0_downloads.html

For example:

- Run: devdriver_3.0_linux_64_195.36.15.run
- Follow the installation wizard instructions

To make sure that the NVIDIA driver was installed successfully:

- Load nvidia driver:
modprobe nvidia
- Check the driver version, for example:
cat /proc/driver/nvidia/version => version 195.36.15 (or later)

3.4 Updating HCA 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> =>Support > Download Center. Check that the firmware on your card is

the latest found on the Mellanox site, if not update to the latest version found on the Mellanox website.

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> => Support > Download Center.

A firmware binaries table lists a binary file HCA Adapter per adaptercard. 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 system support if you cannot find the firmware binary for your adapter card.

To check the latest firmware:

1. Go to Mellanox web site to check current firmware version.
Go to: <http://www.mellanox.com/supportdownloader>
2. Enter your card PSID and compare the firmware versions.

Figure 7: Support Download Assistant

Mellanox - Support Download Assistant

Support Index | Documentation Login | Customer Support | Returns | Home

CLEAR PSID or OPN

ConnectX EN, ConnectX® EN network interface card, dual-port, 10GBASE SFP+, PCIe2.0 x8 2.5GT/s, mem-free, tall bracket, RoHS R5

Firmware
[\(Rev X1/X2/A1: MT_0BD0110004\).fw-25408-2_7_000-MNPH28B-XTC_A1-A2.bin.zip](#)
[How to use Mellanox Yum/YaST repository](#)

Documentation
[Release Notes](#)
[User Manual](#)

Downloads
[Mellanox EN Software Stack](#)
[Mellanox Firmware Tools \(MFT\)](#)

Browse for Product Support

Select a Family	Select a Line	Select an OPN	Select a PSID (Rev)	Product Support Information
Adapter Cards	Select an item from previous column			
Switches				
Gateways				

4 HCA InfiniBand Card Installation

4.1 Hardware and Software Requirements

Before installing the HCA adapter card, please make sure that the system meets the hardware and software requirements listed in Table 9. Refer to Chapter 3, “Driver Software and Firmware” on page 23 for download and installation instructions.

Table 9 - Hardware and Software Requirements

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

4.2 Installation Instructions

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

The adapter cards listed in Table 3 on page 11 are standard PCI Express cards, each with a standard x 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 Set Up



This section is valid for InfiniBand, Ethernet and VPI cards. Disregard sections that are not relevant to your card.

The basic steps to embed Mellanox cards in your computer are:

1. Identify the card in your system.
2. Verify the computer is recognizing the new adapter.
3. Install the adapter drivers.
4. Update the adapter firmware if needed.

The configuration of the card is dependant upon your choice to use InfiniBand or Ethernet.

4.3.1 Identify the Card in Your System

For instructions to identify your adapter card using specific tools see http://www.mellanox.com/content/pages.php?pg=firmware_HCA_FW_identification

Otherwise, use the instructions below relevant to your particular card and OS.

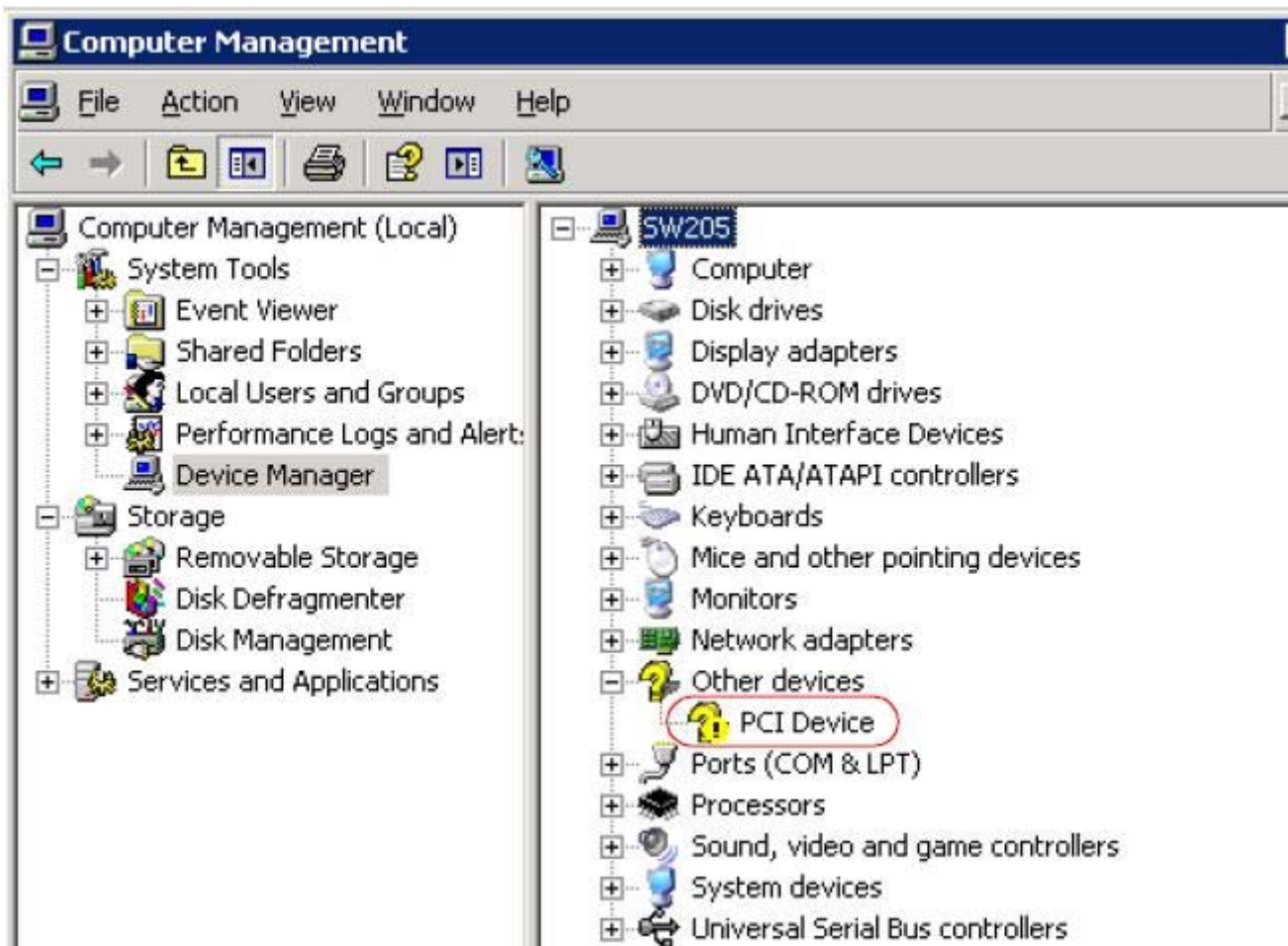
4.3.1.1 Windows

1. Open Device Manager. Click start--> Run, and then enter “devmgmt.msc”.
2. Check the Device Manager under “Other devices” for “PCI Device” (Windows 2003) or “InfiniBand Controller” (Windows 2008/R2).



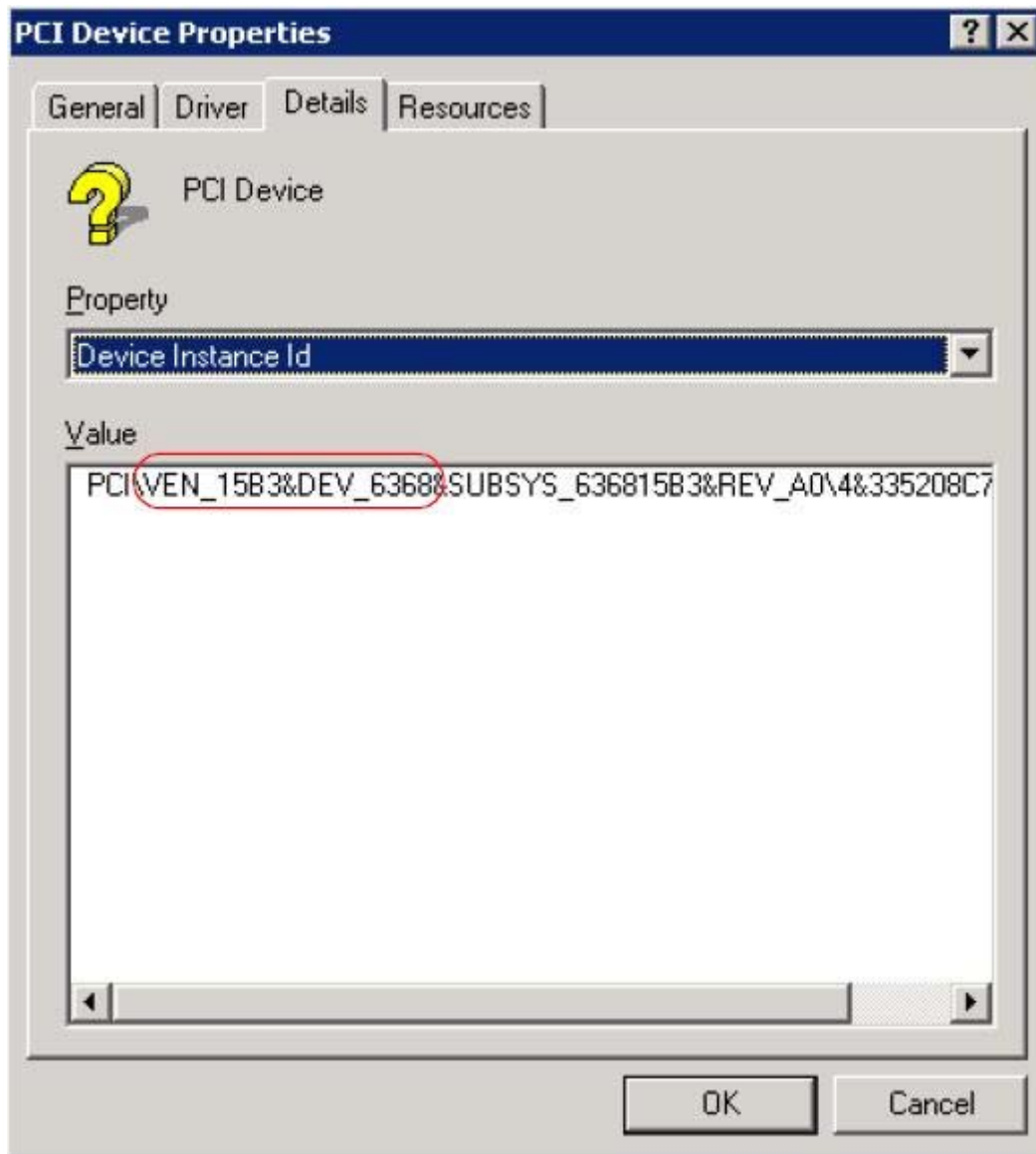
If you cannot find any PCI device, click Action --> Scan for hardware changes. If no PCI devices are detected, check that the network adapter card(s) is correctly installed in the PCI slot or try installing the adapter card into a different PCI slot.

Figure 8: Hardware Devices



3. Select a PCI Device / InfiniBand Controller entry.
4. Right-click.
5. Select “**Properties to display the PCI Device Properties**” window.
6. Click the Details tab and select **Device Instance Id** (Windows 2003) or **Hardware Ids** (Windows 2008/R2) from the Property pull-down menu.

Figure 9: PCI Device



7. In the Value display box, check the fields VEN and DEV (fields are separated by '&'). In the display example above, notice the sub-string “PCI\VEN_15B3&DEV_6368”: VEN is equal to 0x15B3 – this is the Vendor ID of Mellanox Technologies; and DEV is equal to 0x6368 – this is a valid Mellanox Technologies PCI Device ID.



The list of Mellanox Technologies PCI Device IDs can be found in the PCI ID repository at <http://pci-ids.ucw.cz/read/PC/15b3>.

8. If the PCI device does not have a Mellanox adapter ID, return to Step 3 to check another device.

4.3.1.2 Linux

Get the device location on the PCI bus by running `lspci` and locating lines with the string “Mellanox Technologies”:

```
> lspci | grep Mellanox

                2:00.0 InfiniBand: Mellanox Technologies MT26428 [ConnectX VPI PCIe
2.0 5GT/s - IB QDR / 10GigE] (rev b0)
```

Make sure that either the `MLNX_OFED` driver or the `MLNX_EN` driver is loaded and configured.

Check the link status

First check the network interface name by running the “`ifconfig -a`” command.

To check the Ethernet link status, for EN only and VPI cards, run: `ethtool <interface>`

```
Host# ethtool eth1
Supported ports: [ TP ]
Supported link modes:   10baseT/Half 10baseT/Full
                       100baseT/Half 100baseT/Full
                       1000baseT/Half 1000baseT/Full
Supports auto-negotiation: Yes
Advertised link modes:  10baseT/Half 10baseT/Full
                       100baseT/Half 100baseT/Full
                       1000baseT/Half 1000baseT/Full
Advertised auto-negotiation: Yes
Speed: Unknown! (0)
Duplex: Half
Port: Twisted Pair
PHYAD: 1
Transceiver: internal
Auto-negotiation: on
Supports Wake-on: g
Wake-on: d
Current message level: 0x000000ff (255)
Link detected: yes
```

To check the IB link status, for IB and VPI cards, run “`ibstat`” and focus on the Physical state attributes.

Example:

```
Host# ibstat
CA 'mlx4_0'
  CA type: MT26428
  Number of ports: 1
  Firmware version: 2.7.616
  Hardware version: b0
  Node GUID: 0x0002c903000c8710
  System image GUID: 0x0002c903000c8713
  Port 1:
    State: Down
    Physical state: Polling
```

```

Rate: 10
Base lid: 6
LMC: 0
SM lid: 3
Capability mask: 0x0251086a
Port GUID: 0x0002c903000c8711
Link layer: IB

```

Check the OFED version

To get the version of the running Mellanox OFED/BXOFED, run the following command:

```

Host# ofed_info | head -1
BXOFED-1.5.1-1.3.7-rc19:

```

Troubleshooting MLNX_OFED Installation

For troubleshooting driver installation, please check Mellanox OFED driver user manual: <http://www.mellanox.com> => Support > Adapter IB/VPI SW.

If you need to update your card firmware, download the new firmware.

Unzip the downloaded file and run flint/mstflint command:

```

flint -d <device> -i <fw-file> [-guid <GUID> | -guids <4 GUIDS> | -mac <MAC> | -macs <2 MACs>] burn

```

Check VPI setup – Ethernet / InfiniBand configuration

For Example:

```

flint -d /dev/mst/mt26428_pci_cr0 -i fw-25408-2_7_000-MNPH28B-XTC_A1-A2.bin burn

```

Loading the Ethernet Driver

By default, the Mellanox OFED stack loads mlx4_en. Run 'lsmod' to verify that the module is listed.

Example:

```

Host# lsmod | grep mlx4_en
mlx4_en                109708  0
mlx4_core               136804  2 mlx4_en,mlx4_ib

```

If you don't see the mlx4_en driver, run: ' modprobe mlx4_en'

Another option is to use the command below to see which modules are active.

Edit "/etc/infiniband/openib.conf" which modules needs to loaded from a service.

For example:

```

# Load MLX4_EN module
MLX4_EN_LOAD=yes

```

The “Usage: openibd {start|stop|restart|status}” command to modify this file and thereby control the drivers.

Ethernet Driver Usage and Configuration

To assign an IP address to the interface run:

```
#> ifconfig eth<n> <ip>
```

where 'n' is the OS assigned interface number.

- To check driver and device information run:

```
#> ethtool -i eth<n>
```

Example:

```
#> ethtool -i eth2
driver: mlx4_en (MT_04A0140005)
version: 1.5.1 (March 2010)
firmware-version: 2.7.000
bus-info: 0000:13:00.0
```

- The `mlx4_en` parameters can be found under `/sys/module/mlx4_en` (or `/sys/module/mlx4_en/parameters`, depending on the OS) and can be listed using the command:

```
#> modinfo mlx4_en
```

To set non-default values to module parameters, the following line should be added to the file `/etc/modprobe.conf`:

```
"options mlx4_en <param_name>=<value> <param_name>=<value> ..."
```

Ethernet Network Tuning

To improve network performance by tuning your network see the Mellanox Performance Tuning Guide located at:

http://www.mellanox.com/related-docs/prod_software/Performance_Tuning_Guide_for_Mellanox_Network_Adapters_rev_1_0.pdf

4.4 Cables and Modules

See www.mellanox.com => Products => Cables for certified and approved cable recommendations.

4.4.1 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 HCA card.

4.4.1.1 Inserting a Cable into the Adapter Card

1. Support the weight of the cable before connecting the cable to the adapter card. Do this by using a cable holder or tying the cable to the rack.
2. Determine the correct orientation of the connector to the card before inserting the connector. Do not try and insert the connector up side down. This may damage the adapter card.
3. Insert the connector into the adapter card. Be careful to insert the connector straight into the cage. Do not apply any torque, up or down, to the connector cage in the adapter card.
4. Make sure that the connector locks in place.

4.4.1.2 Removing a Cable from the Adapter Card

1. Pull on the latch release mechanism thereby unlatching the connector and pull the connector out of the cage.
2. Do not apply torque to the connector when removing it from the adapter card.
3. Remove any cable supports that were used to support the cable's weight.

Appendix A: Specifications

A.1 MHRH19-X[ST]C Specifications

Table 10 - Specifications for MHRH19-X[ST]C

Physical		Power and Environmental	
Size:	2.71in. x6.60in. (68.90mm x 167.65mm)	Voltage:	12V, 3.3V
Air Flow:	200LFM ^a	Typ Power:	8W for passive cables only 10W for active optic modules
QSFP 20Gb/s Connector:	InfiniBand (Copper and optical) Max power per port 2.0 W. Cable power budget class 2	Maximum Power:	11.3W for passive cables only 14.8W for active optic modules
		Temperature:	0°C to 55°C
Protocol Support		Regulatory	
InfiniBand:	IBTA v1.2, Auto-Negotiation ^b (20Gb/s, 5Gb/s) or (10Gb/s, 2.5Gb/s)	EMC:	FCC 47 CFR part 15:2006, subpart B, class A ICES-003:2004 Issue 4, class A VCCI V-3/2007.04, class A EN 55022:1998+A1:2000+A2:2003 class A, EN 61000-3-2:2000+A2:2005, EN61000-3-3:1995+A2:2005, EN 55024:1998 + A1:2001+A2:2003 standards, harmonized under EMC Directive 2004/108/EC Article 6(2); AS/NZS 3548
QoS:	4 InfiniBand Virtual Lanes for each port		
RDMA Support:	Yes, All Ports		
Data Rate:	DDR		
PCI Express	2.0 SERDES @ 5.0 GT/s		
		Safety:	IEC/EN 60950-1:2006 ETSI EN 300 019-2-2 IEC 60068-2- 64, 29, 32
		Environmental:	RoHS: RoHS-R5

a. Air flow is measured ~1" from the heat sink between the heat sink and the cooling air inlet.

b. The auto-negotiation protocol is proprietary of Mellanox Technologies and compliant with the *InfiniBand Architecture Specification, Release 1.2*.

A.2 MHQH19-X[ST]C Specifications

Table 11 - Specifications for MHQH19-X[ST]C

Physical		Power and Environmental	
Size:	2.71in. x6.60in. (68.90mm x 167.65mm)	Voltage:	12V, 3.3V
Air Flow:	200LFM ^a	Typ Power:	8.5W for passive cables only 10.5W for active optic modules
QSFP 40Gb/s Connector:	InfiniBand (Copper and optical) Max power per port 2.0 W. Cable power budget class 2	Maximum Power:	12.W max. for passive cables only 15.5W max. for active optic modules
		Temperature:	0°C to 55°C
Protocol Support		Regulatory	
InfiniBand:	IBTA v1.2, Auto-Negotiation ^b (20Gb/s, 5Gb/s) or (10Gb/s, 2.5Gb/s)	EMC:	FCC 47 CFR part 15:2006, subpart B, class A ICES-003:2004 Issue 4, class A VCCI V-3/2007.04, class A EN 55022:1998+A1:2000+A2:2003 class A, EN 61000-3-2:2000+A2:2005, EN61000-3-3:1995+A2:2005, EN 55024:1998 + A1:2001+A2:2003 standards, harmonized under EMC Directive 2004/108/EC Article 6(2); AS/NZS 3548
QoS:	4 InfiniBand Virtual Lanes for each port	Safety:	IEC/EN 60950-1:2006 ETSI EN 300 019-2-2 IEC 60068-2- 64, 29, 32
RDMA Support:	Yes, All Ports	Environmental:	
Data Rate:	QDR	RoHS:	RoHS-R5
PCI Express	2.0 SERDES @5.0 GT/s		

a. Air flow is measured ~1” from the heat sink between the heat sink and the cooling air inlet.

b. The auto-negotiation protocol is proprietary of Mellanox Technologies and compliant with the *InfiniBand Architecture Specification, Release 1.2*.

A.3 MHRH29-X[ST]C Specifications

Table 12 - Specifications for MHRH29-XSC/-XTC

Physical		Power and Environmental	
Size:	2.71in. x6.60in. (68.90mm x 167.65mm)	Voltage:	12V, 3.3V
Air Flow:	200LFM ^a	Typ Power:	8.5W for passive cables only 12.5W for active optic modules
QSFP 20Gb/s Connector:	InfiniBand (Copper and optical) Max power per port 2.0 W. Cable power budget class 2	Maximum Power:	12W for passive cables only 19W for active optic modules
		Temperature:	0°C to 55°C

Table 12 - Specifications for MHRH29-XSC/-XTC

Physical		Power and Environmental	
Protocol Support		Regulatory	
InfiniBand:	IBTA v1.2, Auto-Negotiation ^b (20Gb/s, 5Gb/s) or (10Gb/s, 2.5Gb/s)	EMC:	FCC 47 CFR part 15:2006, subpart B, class A ICES-003:2004 Issue 4, class A VCCI V-3/2007.04, class A EN 55022:1998+A1:2000+A2:2003 class A, EN 61000-3-2:2000+A2:2005, EN61000-3-3:1995+A2:2005, EN 55024:1998 + A1:2001+A2:2003 standards, harmonized under EMC Directive 2004/108/EC Article 6(2); AS/NZS 3548
QoS:	8 InfiniBand Virtual Lanes for each port	Safety:	IEC/EN 60950-1:2006 ETSI EN 300 019-2-2 IEC 60068-2- 64, 29, 32
RDMA Support:	Yes, All Ports	Environmental:	
Data Rate:	DDR	RoHS:	RoHS-R5
PCI Express	2.0 SERDES @ 5.0 GT/s		

- a. Air flow is measured ~1” from the heat sink between the heat sink and the cooling air inlet.
- b. The auto-negotiation protocol is proprietary of Mellanox Technologies and compliant with the *InfiniBand Architecture Specification, Release 1.2*.

A.4 MHQH29-X[ST]C Specifications

Table 13 - Specifications for MHQH29-XSC/-XTC

Physical		Power and Environmental	
Size:	2.71in. x6.60in. (68.90mm x 167.65mm)	Voltage:	12V, 3.3V
Air Flow:	200LFM ^a	Typ Power:	9W for passive cables only 11W for active optic modules
QSFP 40Gb/s Connector:	InfiniBand (Copper and optical) Max power per port 2.0 W. Cable power budget class 2	Maximum Power:	12.8W for passive cables only 19.8W for active optic modules
		Temperature:	0°C to 55°C
Protocol Support		Regulatory	
InfiniBand:	IBTA v1.2, Auto-Negotiation ^b (20Gb/s, 5Gb/s) or (10Gb/s, 2.5Gb/s)	EMC:	FCC 47 CFR part 15:2006, subpart B, class A ICES-003:2004 Issue 4, class A VCCI V-3/2007.04, class A EN 55022:1998+A1:2000+A2:2003 class A, EN 61000-3-2:2000+A2:2005, EN61000-3-3:1995+A2:2005, EN 55024:1998 + A1:2001+A2:2003 standards, harmonized under EMC Directive 2004/108/EC Article 6(2); AS/NZS 3548
QoS:	8 InfiniBand Virtual Lanes for each port	Safety:	IEC/EN 60950-1:2006 ETSI EN 300 019-2-2 IEC 60068-2- 64, 29, 32
RDMA Support:	Yes, All Ports	Environmental:	
Data Rate:	QDR	RoHS:	RoHS-R5
PCI Express	2.0 SERDES @ 5.0GT/s		

a. Air flow is measured ~1” from the heat sink between the heat sink and the cooling air inlet.

b. The auto-negotiation protocol is proprietary of Mellanox Technologies and compliant with the *InfiniBand Architecture Specification, Release 1.2*.

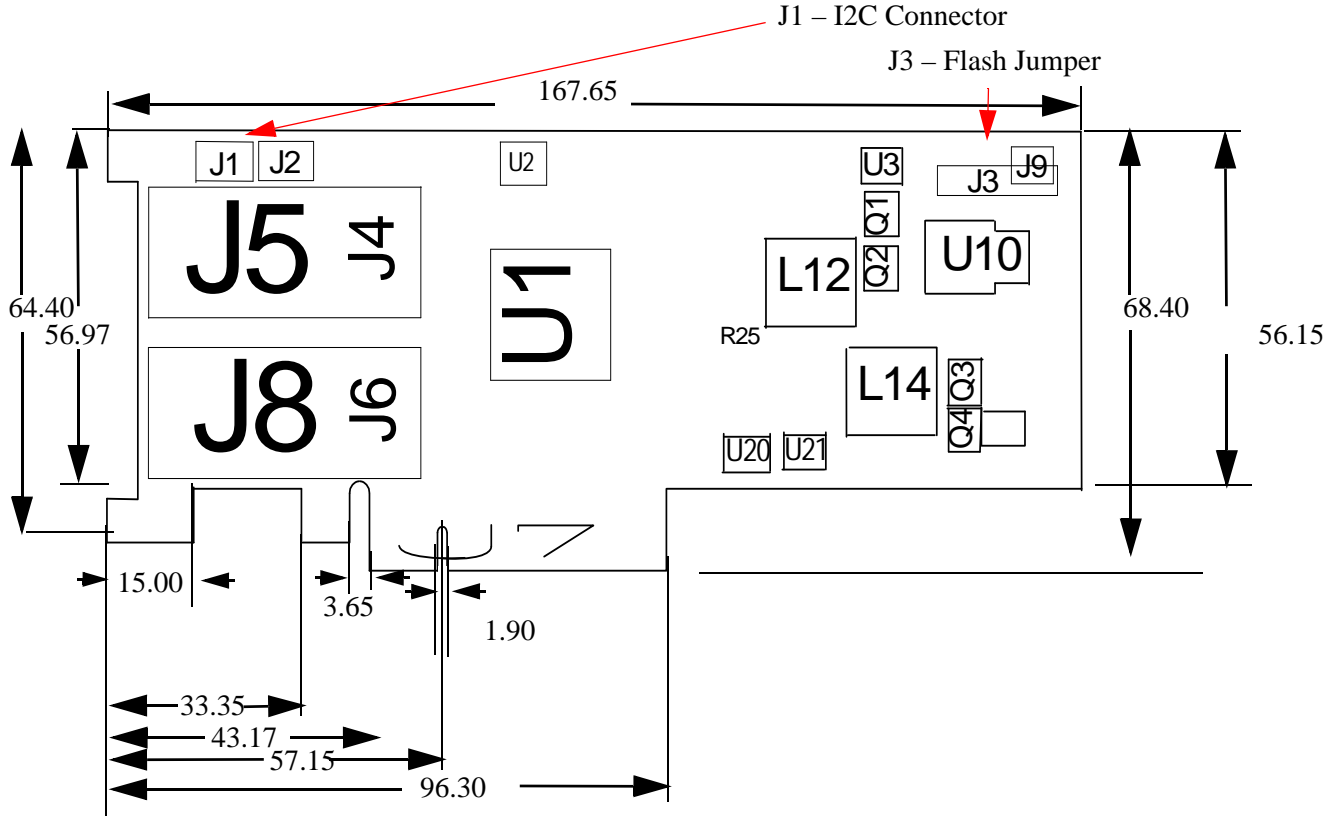
A.5 Board Mechanical Drawing and Dimensions

All of the cards covered in this *User Manual* have the same mechanical drawing and share the same dimensions as depicted in Figure 10.



All dimensions are in millimeters.
 All the mechanical tolerances are +/-0.1mm

Figure 10: Schematic of the Dual Port Adapter Card MH[RQ]H29B-X[ST]R



A.6 EMC Certification Statements

the approved certification status per HCAcard in different regions of the world.

Table 14 - HCA Cards Certification Status

HCA Card P/N	FCC Class (USA)	EN Class (Europe)	ICES Class (Canada)	VCCI (Japan)	KCC/BCC (Korea)	C-Tick
MHRH19-XSC	YES	YES	YES	YES		
MHRH19-XTC	YES	YES	YES	YES	YES	
MHQH19-XSC	YES	YES	YES	YES		
MHQH19-XTC	YES	YES	YES	YES	YES	YES

Table 14 - HCA Cards Certification Status

HCA Card P/N	FCC Class (USA)	EN Class (Europe)	ICES Class (Canada)	VCCI (Japan)	KCC/BCC (Korea)	C-Tick
MHRH29-XSC	YES	YES	YES	YES		
MHRH29-XTC	YES	YES	YES	YES		
MHQH29-XSC	YES	YES	YES	YES	YES	
MHQH29-XTC	YES	YES	YES	YES	YES	YES

A.6.1 FCC Statements (USA)

Class A Statements:

§ 15.19(a)(4)

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

§ 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.6.2 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.6.3 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.6.4 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.6.5 KCC Certification (Korea)

English Translation

Device	User's information
<p>A급 기기 (업무용 방송통신기기)</p>	<p>이 기기는 업무용(A급)으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.</p>

CLASS A device

(commercial broadcasting and communication equipment)

This device has been approved by EMC registration. Distributors or users pay attention to this point. This device is usually aimed to be used in other area except at home.

- Remark

Class A device: operated in a commercial area.

Appendix B: Interface Connectors Pinout

B.1 I²C-Compatible Connector Pinout

Figure 11: Compatible Connector Plug and Pinout

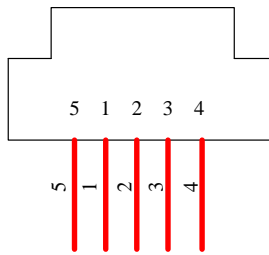


Table 15 - I2C-Compatible Connector

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

B.2 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.

B.3 PCI Express Connector Pinout

B.4 QSFP Connector Pinout

Figure 12: Connector and Cage Views

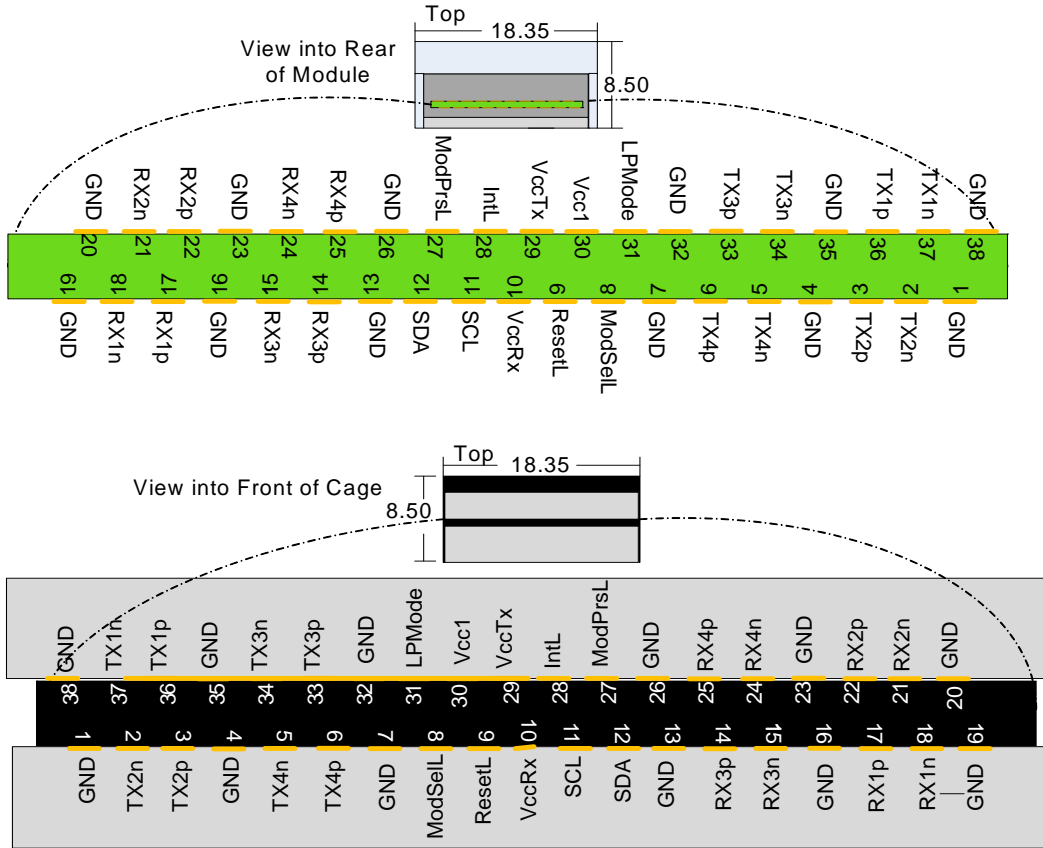


Table 16 - Connector Pin Name and Number to Signal Name Correspondence

Connector Pin Number	Connector Pin Name	Port A Signal Name
1	GND	GND
2	TXN_2	Tx2n
3	TXP_2	Tx2p
4	GND	GND
5	TXN_4	Tx4n
6	TXP_4	Tx4p
7	GND	GND
8	ModSelL_Port0	ModSelL
9	ResetL_Port0	ResetL
10		VccRx
11	SCL	SCL
12	SDA	SDA

Table 16 - Connector Pin Name and Number to Signal Name Correspondence

Connector Pin Number	Connector Pin Name	Port A Signal Name
13	GND	GND
14	RXP_3	Rx3p
15	RXN_3	Rx3n
16	GND	GND
17	RXP_1	Rx1p
18	RXN_1	Rx1n
19	GND	GND
20	GND	GND
21	RXN_2	Rx2n
22	RXP_2	Rx2p
23	GND	GND
24	RXN_4	Rx4n
25	RXP_4	Rx4p
26	GND	GND
27	ModPrsl_Port0	Mod PrsL
28	IntL	IntL
29		VccTx
30		Vcc1
31	LPMode_Port0	LPMode
32	GND	GND
33	TXP_3	Tx3p
34	TXN_3	Tx3n
35	GND	GND
36	TXP_1	Tx1p
37	TXN_1	Tx1n
38	GND	GND

Appendix C: Replacing a Tall Bracket With a Short Bracket

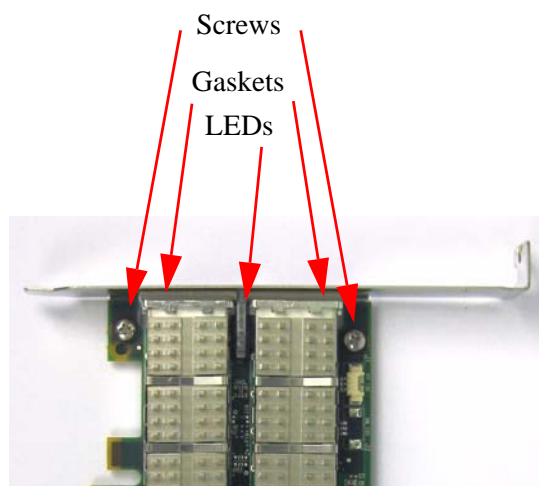
C.1 Replacing a Bracket

To replace the bracket you will need the following parts:

- the new bracket of the proper height
- one new square gasket for each of the ports
- the 2 screws saved from the removal of the bracket
- the 2 fiber washers saved from the removal of the bracket

C.2 Remove the Existing Bracket from the Adapter Card

Figure 13: Remove the Bracket



1. Remove the two screws holding the bracket in place.
2. The bracket comes loose from the card.



Be careful not to put stress on the LEDs.

3. Save the two screws and the two fiber washers.

C.3 Installing the New Bracket

1. Remove the paper to expose the adhesive on the gasket.
2. Place the gasket for each port onto the new bracket. Make sure to correctly align the gasket with the hole in the bracket.
3. If the old gaskets are still on the card, remove them before installing the new bracket. Make sure that only one gasket per port is used.

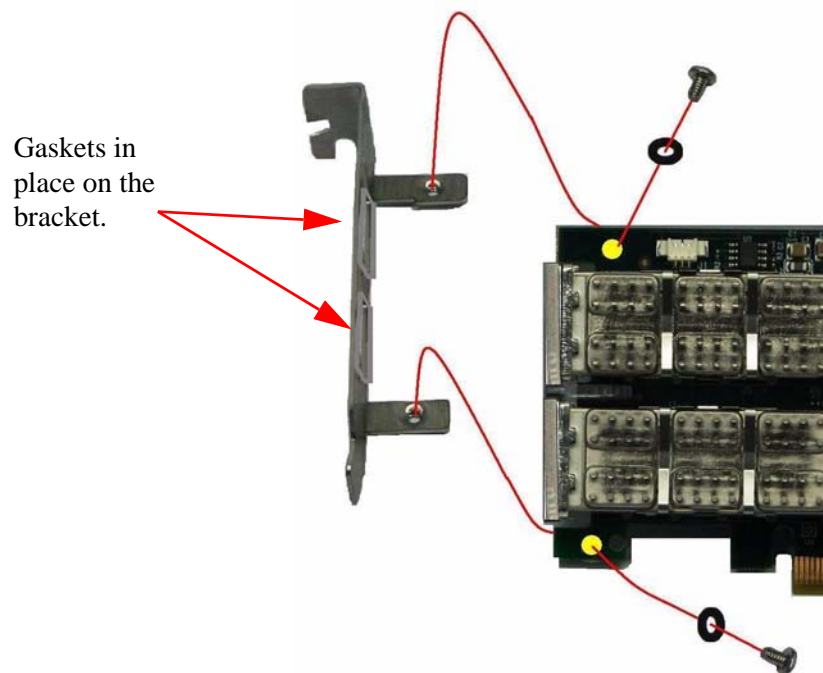
Figure 14: Gasket Installation

4. Place the bracket onto the card until the screw holes line up.



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.

5. Screw on the bracket using the screws and washers saved from the procedure above step 1.

Figure 15: Placing the Bracket on the Card

6. Make sure that the LEDs are aligned onto the bracket holes.
7. Use a torque driver to apply up to 2 lbs-in torque on the screws.

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 55°C (131°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. Sobrecalentamiento



No se debe utilizar el equipo en un área con una temperatura ambiente superior a la máxima recomendada: 55°C(131°F). 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.

Códigos eléctricos locales y nacionales



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