



# InfiniHost<sup>®</sup> III Lx PCI Express x4 Adapter Card User's Manual

P/N: MHES14-XTC, MHES14-XSC  
Rev 1.05

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MHES14-X[TS]C InfiniHost<sup>®</sup> III Lx PCI Express x4

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# Revision History

This document was printed on August 13, 2008 3:21 pm.

Table 1 - Revision History Table

<b>Date</b>	<b>Rev</b>	<b>Comments/Changes</b>
August 2008	1.05	Added French Translation of Safety Warnings Removed Watermark and Confidential from footer.
February 2008	0.70	Updated the document for the XTC and XSC versions of the Tiger.
July 2005	0.60	Updated the power number in Appendix A Specifications
April 2005	0.50	First published version

# About this Manual

This *User's Manual* describes Mellanox Technologies MHES14-X[TS]C InfiniHost III Lx PCI Express x4 HCA Adapter card. 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® networks and architecture specifications.

## Related Documentation

Table 2 - Documents List

<i>InfiniHost III Programmer's Reference Manual</i> Document no. 2248PM	A reference describing the interface used by developers to write a driver for MemFree Mellanox InfiniHost III devices.
<i>InfiniHost III Lx MT25204 Hardware Reference Manual</i> Document no. 2131HM	Reference for hardware engineers responsible for designing systems and boards incorporating InfiniHost III Lx components.
<i>Mellanox Firmware Tools (MFT) User's Manual</i> Document no. 2204UG	User's Manual describing the set of MFT firmware management tools for a single InfiniBand node. See <a href="http://www.mellanox.com">http://www.mellanox.com</a> under 'Firmware' downloads.
<i>Mellanox MST User's Manual</i> Document no. 2125SM	This manual describes various tools and utilities, included in the Mellanox Software Tools (MST) package, for accessing, burning firmware, and tracing Mellanox silicon devices.
<i>InfiniBand Administration (IBADM) Package User's Manual</i> Document no. 2130UM	User's Manual describing the utilities included in the IBADM tools package for system administration of an InfiniBand cluster. See <a href="http://www.mellanox.com">http://www.mellanox.com</a> under 'Management Tools'.
<i>VAPI HCA Device Driver Release Notes</i> Version 4.0.0 or later	InfiniHost III device driver release notes
<i>IB Specifications Release 1.0.a</i>	Infiniband Architecture Specifications
<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/> under Firmware downloads
- Mellanox Technologies Document Distribution System (DDS): <http://docs.mellanox.com> (requires a customer login account)

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## 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's Manual* for Mellanox Technologies host channel adapter (HCA) cards based on the MT25408 InfiniHost® III Lx HCA integrated circuit device. The cards described in this manual have the following main features:

- IBTA v1.2 compliant
- Single 4X InfiniBand copper ports for connecting InfiniBand traffic (4X IB connectors)
- PCI Express expansion board with a x4 edge connector compatible to the PCI Express 1.0a specification
- 'Media detect circuit' with powered connectors supporting the use of active cables and external PHY fiber solutions
- EU Restriction of Hazardous Substances (RoHS) compliant
- Two bracket heights: short or tall


The MHES14-X[ST]C is a single CX4 port (10Gb/s) InfiniBand PCI Express x4 adapter card based on the InfiniHost III Lx MT25204 third generation InfiniBand Host Channel Adapter (HCA). InfiniHost III Lx features include a PCI Express x4 interface, hardware transport, advanced per queue pair (QP) QoS services and support for up to 16 million QPs and completion queues (CQs). The MHES14-X[ST]C host channel adapter is a PCI Express Revision 1.0a compatible card, with a single 4X InfiniBand compliant connector for copper cables. In addition, the HCA utilizes media detect circuitry enabling external fiber media adapter modules (such as the Emcore QTR3400), allowing for fiber channel communication across up to 300m.

The card features MemFree technology which removes the requirement for local memory on the PCI Express adapter card. The card can be inserted into PCI Express x4 or higher slots of standard server, blade server, storage, and communications platforms to enable InfiniBand system area networks. The InfiniHost III Lx core features a full hardware implementation of the InfiniBand architecture memory protection and translation tables, as well as hardware transport. This drastically reduces CPU overhead to enable the host processor to spend its cycles on applications and not on communications. This advanced third generation design achieves industry leading bandwidth performance coupled with low latency for technical compute clusters, data centers and storage applications.

## 1.1 Adapter Cards

Table 3 lists the InfiniBand HCA cards described in this manual.

Table 3- HCA Cards

Ordering Part Number (OPN)	PCI Express SERDES Speed	IB SDR / DDR	Short / Tall Bracket	RoHS Compliance	HCA IC Part Number	HCA Card Photo <sup>(1)</sup>
MHES14-XSC	2.5 GT/s	SDR	Short	RoHS coc	MT25204 Third Generation	
MHES14-XTC	2.5 GT/s	SDR	Tall	RoHS coc	MT25204 Third Generation	

1. The HCA cards have a similar form and fit. The main visible difference is in the bracket height.

## 1.2 Product Features

- PCI Express x4 version 1.0a compatible card
- MHES14-X[ST]C single 4X InfiniBand port Version 1.2 compatible Host Channel Adapter
- InfiniBand Compatible Verbs API interface for both Linux and Windows 2003 operating systems
- 4X (10Gbit/s) InfiniBand port with standard copper connector
- Hardware support for up to 16 million QPs, EEs and CQs
- Memory Protection and Translation Tables fully implemented in hardware
- IB Native layer 4 DMA hardware acceleration
- Multicast support Adapter Cards
- Programmable MTU size from 256 to 2K bytes
- Four Virtual Lanes supported plus Management Lane
- Support for InfiniBand transport mechanisms (UC, UD, RC, RAW)
- EEPROM used for storing Vital Product Data (VPD)

## 1.3 Key Mellanox Features

- Embedded InfiniRISC Processors for Management and Subnet Management Agent (SMA)
- Integrated Physical Layer SerDes

- Integrated GSA (General Service Agents)
- Low-Latency Communication Technology
- Flexible Completion Mechanism Support (Completion Queue, Event, or Polled operation)

## 1.4 Operating Systems Support

MHES14-X[ST]C can operate in Linux and Windows 2003 operating system environments. See “Driver Software and Firmware” on page 16 to obtain device drivers.

The card comes with the latest version of the firmware available at the time of manufacturing. Firmware updates are periodically provided, and the most recent firmware can be obtained from the ‘Firmware Downloads’ page reached from [www.mellanox.com](http://www.mellanox.com). The firmware can be updated using the `ibfwmg` tool of the IBADM package (see “Driver Software and Firmware” on page 16).

The MHES14-X[ST]C low profile HCA card includes verbs interface and basic device drivers for both Windows 2003 and Linux operating systems. In addition, the card includes internal Subnet Management Agent (SMA) and General Service Agents, eliminating the requirement for an external management agent CPU. The HCA is fully compatible with the open source OpenIB software suite.

The OpenIB software is available through the OFED Distribution which includes software for database clustering, high performance computing, communications, and storage applications. This collection consists of drivers, protocols, and management applications in a simple to install package. To download the package go to [www.mellanox.com](http://www.mellanox.com). The board is also supported by open source applications and management package. Complete initialization, diagnostic and management utilities are also provided to facilitate quick system bring up.

Alternatively, it is possible to download the HCA driver and other software from Products / HCA Board Products / MemFree InfiniHost III Lx PCI Express Adapter Card as well as from Code Releases / InfiniHost III Lx / in Mellanox's Document Distribution System (DDS) at [docs.mellanox.com](http://docs.mellanox.com) (requires a customer login account).

## 1.5 Mellanox Part Numbering Legend

[Table 4](#) describes the Mellanox Technologies adapter cards part numbering legend.

Table 4- Mellanox HCA Cards Part Numbering Key

HCA Card OPN MHTS#I-XBR	Field	Decoder
M	Mellanox Technologies	
H	Adapter Type	H = InfiniBand Host Channel Adapter, N = Ethernet Network Interface Card, S = Express Module
T	Media	E=CX4 SDR, G=CX4 DDR, J=CX4 QDR, K=XFP SR, M=SFP+ SR, N=SFP+ LRM, O=SFP+ LR, Q=QSFP QDR, R=QSFP DDR, T=UTP
S	Silicon	H = ConnectX, S = InfiniHost III Lx <sup>®</sup> , T= InfiniHost <sup>®</sup> , A = InfiniHost III Ex (Arbel), S = Infini-Host III Lx (Sinai), T = InfiniHost (Tavor)
#	# 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	

Table 4- Mellanox HCA Cards Part Numbering Key

HCA Card OPN MHTS#I-XBR	Field	Decoder
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 w/ Exemption, R = RoHS Lead-Free

For example, the part number MHES14-XSC describes Mellanox Technologies' InfiniHost III™ IB HCA card with single CX4 port, a PCIe2.0 x4 2.5GT/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 = E to indicate 10GBASE-CX4,
- field S = S to indicate InfiniHostIII
- field # = 1 to indicate one port,
- field I = 4 to indicate PCI Express 1.0a x4 running at 2.5GT/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

## 1.6 Finding the GUID and Serial Number on the Adapter Cards

All Mellanox HCA adapter cards have a label on the printed side of the adapter card that has the card serial number and the card GUID.

Figure 1: Card Product Label



# 2 HCA Card Installation

## 2.1 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 5.

Table 5- Hardware and Software Requirements

Requirement	Description
Hardware	PCI Express x8 slot or x4 slot with x8 connector
Software Operating Systems/Distributions	<ul style="list-style-type: none"> <li>• For Windows see <a href="https://docs.mellanox.com/dm/WinIB/ReadMe.html">WinIB ReadMe</a> at <a href="https://docs.mellanox.com/dm/WinIB/ReadMe.html">https://docs.mellanox.com/dm/WinIB/ReadMe.html</a></li> <li>• For Linux see Mellanox OpenFabrics Enterprise Distribution (OFED) software package available via the Mellanox OpenFabrics Web site <a href="http://www.mellanox.com/products/ofed.php">http://www.mellanox.com/products/ofed.php</a></li> </ul>

## 2.2 Installation Instructions

Read all installation instructions before connecting the equipment to the power source. Please consult the host machine documentation for instructions on how to install a PCI Express card.

### 2.2.1 Installation Instructions as per Host Machine

The adapter cards listed in Table 3 on page 10 are standard PCI Express 4 cards each with a standard x4 edge connector. Please consult the host machine documentation for instructions on how to install a PCI Express card.

## 2.3 Safety Warnings

### 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). Moreover, 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 InfiniBand Cable Connecting/Disconnecting



Copper InfiniBand 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.

# 3 Driver Software and Firmware

## 3.1 Driver Software

For Linux, download and install the latest OpenFabrics Enterprise Distribution (OFED) software package available via the Mellanox OpenFabrics Web site at <http://www.mellanox.com/products/ofed.php>. Follow the installation instructions included in the download package.

For Windows, download the appropriate software from <https://docs.mellanox.com/dm/WinIB/ReadMe.html>.

## 3.2 Updating HCA Card Firmware

Each HCA 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> through the 'Firmware' downloads link.

## 3.3 Single HCA Card Firmware Update

Firmware can be updated on the standalone single card using the **flint** tool of the *Mellanox Firmware Tools (MFT)* package. This package is available for download, along with its user's manual, from the single HCA card firmware update page. See <http://www.mellanox.com> under 'Firmware' downloads.

A firmware binaries table lists a binary file per HCA 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 your assigned Field Application Engineer if you cannot find the firmware binary for your adapter card. This may happen if the product is not yet available for general distribution.

## 3.4 HCA Card Firmware Update as Part of a Cluster Firmware Update

If the HCA card is part of an InfiniBand cluster, its firmware can be updated as part of the entire cluster firmware update, using the **ibfwmgr** tool of the IB administration (IBADM) tools package. IBADM is available for download as part of IB stack distributions such as IB Gold and OFED<sup>1</sup> available via <http://www.mellanox.com>. See 'Firmware Downloads' under the same webpage for cluster update instructions.

---

1. Currently, only the Linux distributions support updating firmware for an entire InfiniBand cluster.



# 4 Adapter Card Interfaces

## 4.1 I/O Interfaces

Each HCA card includes the following interfaces:

- One 4X InfiniBand copper connector
- PCI Express x4 edge connector
- I/O panel LEDs
- I<sup>2</sup>C compatible connector (for debug)

### 4.1.1 InfiniBand Interface

The InfiniHost III<sup>®</sup>LX (MT25204 Third Generation) device is compliant with the *InfiniBand Architecture Specification, Release 1.2*. It has one compliant 4X InfiniBand port, having four Tx/Rx pairs of SerDes. Each of the HCA cards (listed in Table 3 on page 10) based on this device provides access to this port by means of an InfiniBand connector for external InfiniBand copper cables. These cards are also compliant with the IBTA specification 1.2.

Figure 2: InfiniHost III CX4 interface



Each of the HCA cards is embedded with a ‘media detect circuit’ that supports active cables and external InfiniBand fiber solutions to be connected to the InfiniBand port connectors. Fiber Solutions require the use of active media converters.

The ConnectX InfiniHost III<sup>®</sup> IB HCA adapter cards support the PCI Express 1.0a x4 interface, 1.0a compatible. The cards can be either a master initiating the PCI Express bus operations or a slave responding to PCI bus operations.

### 4.1.2 PCI Express Interface

The InfiniHost III Lx (MT25204) device has eight Tx/Rx pairs of SerDes providing for a PCI Express x8 interface, version 1.0a compatible. The device can be either a master initiating the PCI Express bus operations or a slave responding to PCI bus operations. The PCI Express bus can connect to either a host CPU in an HCA application or to an I/O device (such as Gigabit Ethernet) when used as a Target Channel Adapter.

### 4.1.3 LED Assignment

The board has two LEDs located on the I/O panel. The green LED, when lit, indicates that the InfiniBand 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 illuminates when the InfiniBand 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 3: Physical and Logical Link Indications

Table 6- 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



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

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

A three-pin header on the HCA card is provided as the I<sup>2</sup>C compatible interface. See Figure 6 on page 22 for the location on the board.

Figure 4: I<sup>2</sup>C Connector



## 4.2 Power

All adapter cards receive power from the PCI Express Edge connector. All other required power voltages are generated by on-board switch mode regulators. See “Specifications” on page 22.

## 4.3 Memory

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

### 4.3.1 System Memory

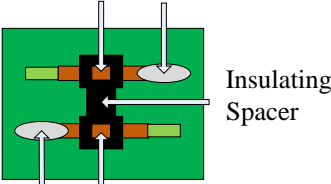
Each of the HCA cards utilizes the PCI Express interface to store and access IB fabric connection information and packet data on the system memory.

### 4.3.2 Flash

Each of the HCA cards includes one 2MB SPI Flash device accessible via the Flash interface of the MT25408 Infini-Host III Lx device.

There is a jumper on each adapter card that indicates to the device whether an on-board Flash device exists (or is to be used). Table 7 provides information on this jumper. See Figure 6 on page 22 for the jumper location.

Table 7- Jumper Configuration

Description	Option	Card Default Configuration	Comments
Flash present/ not present	connection open – Flash present connection shorted – Flash not present  Figure 5: Flash Jumper Metal Soldered lead Connection   Insulating Spacer  Soldered Metal Connection lead	connection open – Flash present	Header 1x2

### 4.3.3 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 VPD format adheres to the *PCI Local Bus specification rev 2.3 VPD* definition. The EEPROM capacity is 512 bytes.

## 4.4 VPDs

The PCI VPD (Vital Product Data) layout, for each of the described Mellanox Technologies InfiniHost III<sup>®</sup> Lx cards, complies with the format defined in the *PCI 2.3 Specification, Appendix I*. All InfiniHost III Lx cards share the same PCI VPD layout.

Table 8- MHES14X[ST]C VPD Layout

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length	0x5		
3	Data	"Tiger"	Alphanumeric	
8	Large Resource Type VPD-R Tag (0x10)	0x90		
9	Length	0x4F		
11	VPD Keyword	"PN"	Numbers	Add in Card Part Number
13	Length	0x15		
14	Data	"MHES14-XTC"		
35	VPD Keyword	"EC"	Alphanumeric	Engineering Change Level of the card (rev)
37	Length	0x2		
38	Data	"A3"		PCB revision
40	VPD Keyword	"SN"	Alphanumeric	Serial Number
42	Length	0x18		
43	Data	"MTYYW-WPSSSSS"		according to the board label
67	VPD Keyword	"V0"		Misc. Information
69	Length	0x10		
70	Data	"PCIe x4"		
86	VPD Keyword	"RV"		
88	Length	0x1		
89	Data	Checksum		
90	Large Resource Type VPD-W Tag (0x11)	0x91		
91	Length	0xA2		
93	VPD Keyword	"V1"		EFI Driver version
95	Length	0x6		
96	Data	"N/A"	Number	
102	VPD Keyword	"YA"		Asset Tag
104	Length	0x20		
105	Data	"N/A"	Alphanumeric	"N/A"
137	VPD Keyword	"RW"		Remaining read/write area
139	Length	0x73		
140	Data	Reserved (0x00)		
255	Small Resource Type END Tag (0x11)	0x78		
256	Mellanox Read Only Mask	0x0...0	Numbers	

Table 8- MHES14X[ST]C VPD Layout

Offset (Decimal)	Item	Value	Format	Description
349	Mellanox Read/Write Mask	0x1...1	Numbers	
511	Mellanox Read Only Mask	0x0	Numbers	

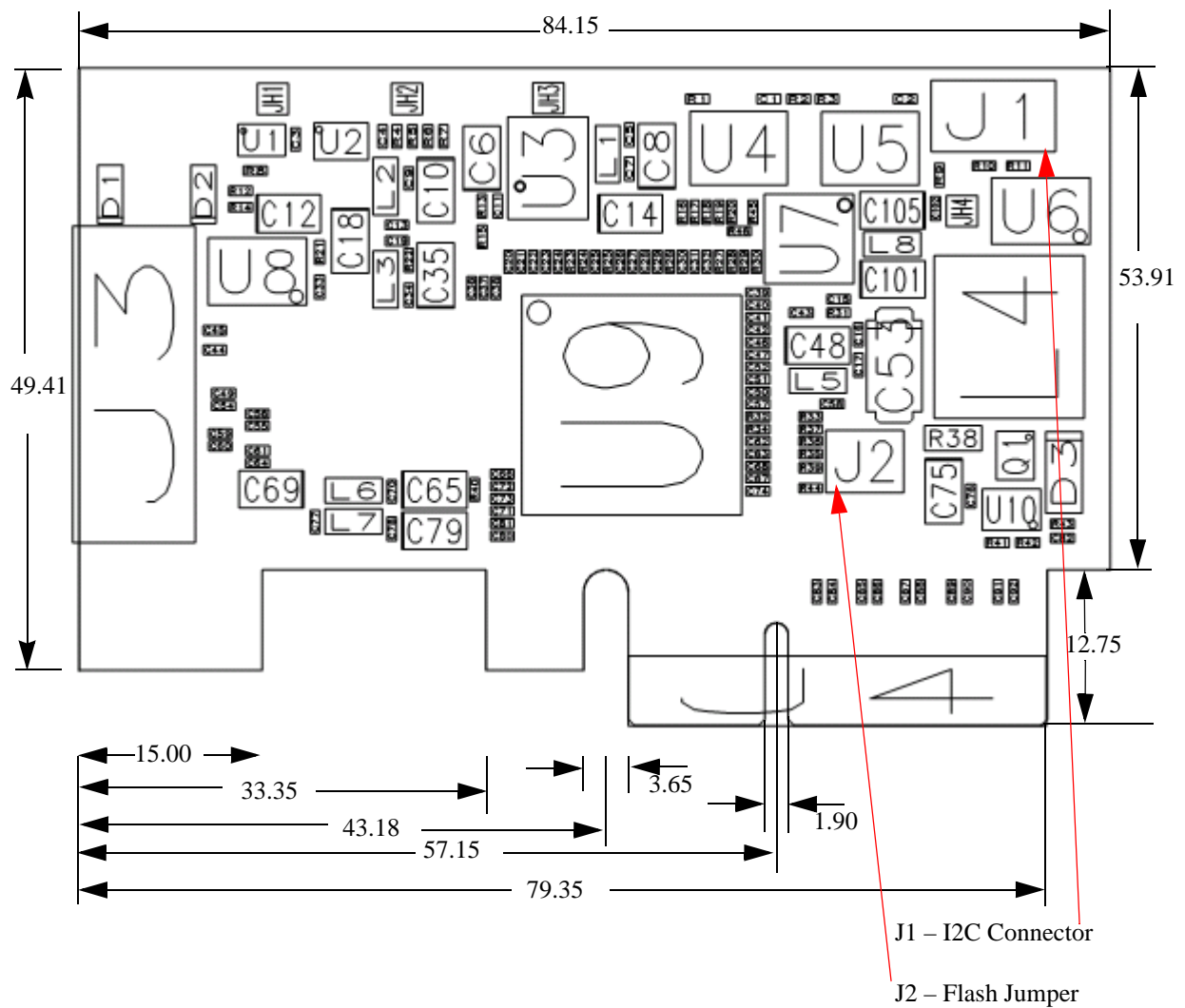
# Appendix A: Specifications

## A.1 Board Mechanical Drawing and Dimensions

All of the HCA cards covered in this *User's Manual* have the same mechanical drawing and share the same dimensions as depicted in Figure 6.

Note: All dimensions are in millimeters.







Figure 6: Schematic of the MHES14-X[ST]C HCA Cards



## A.2 EMC Certification Statements

Table 9 lists the approved certification status per HCA card in different regions of the world .

Table 9 - HCA Cards Certification Status

HCA Card P/N	FCC Class (USA)	EN Class (Europe)	ICES Class (Canada)	VCCI (Japan)	C-Tick (Australia New Zealand)	MIC/BCC (Korea)	CB report	CTUVUS
MHES14-XSC	A	A	A	A		NA		
MHES14-XTC	A	A	A	A		NA		

### 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 MHES14-XSC and MHES14-XTC Specifications

Table 10 - Specifications for MHES14-XSC/-XTC

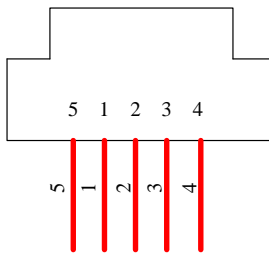
Physical		Power and Environmental	
Size:	51 mm x 87 mm (2 in. X 3.4 in.)	Voltage:	12V, 3.3V
Air Flow:	200LFM @55°C	Typ. Power:	3.3W
10Gb/s Connector:	InfiniBand MicroGigaCN (Copper) Emcore (Fiber Channel)	Maximum Power:	4.2 W
		Temperature:	0°C to 55°C
Protocol Support		Regulatory	
InfiniBand:	Auto-Negotiation 10Gb/s, 2.5Gb/s 4 InfiniBand Virtual Lanes for the 4X port	EMC:	EN55022:1998 + A1:2000 + A2:2003 class A, EN61000-3-2:2000 + A2:2005, EN61000-3-3:1995 + A1:2001, EN55024:1998 + A1:2001 + A2:2003 standards harmonized under EMC Direc- tive 89/336/EEC;
QoS:	Yes		FCC47 CFR part 15:2005, subpart B, class A; ICES-003:2004 issue 4, class A; VCCI V-3/2005.04 class A. AS/NZS 3548
RDMA Support:	Yes		
SDR/DDR:	SDR	Safety:	IEC/EN60950-1:2001
PCI Express	x4 (10 +10Gb/s Full Duplex) Interface	Environmental:	RoHS 2002/95/EC Directive
		RoHS:	

# Appendix B: Interface Connectors Pinout

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

Figure 7: I2C-Compatible Connector Plug and Pinout

Table 11 - I2C-compatible Connector Pinout



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

## B.2 InfiniBand Connector Pinout

Figure 8: InfiniBand CX4 Connector Pinout

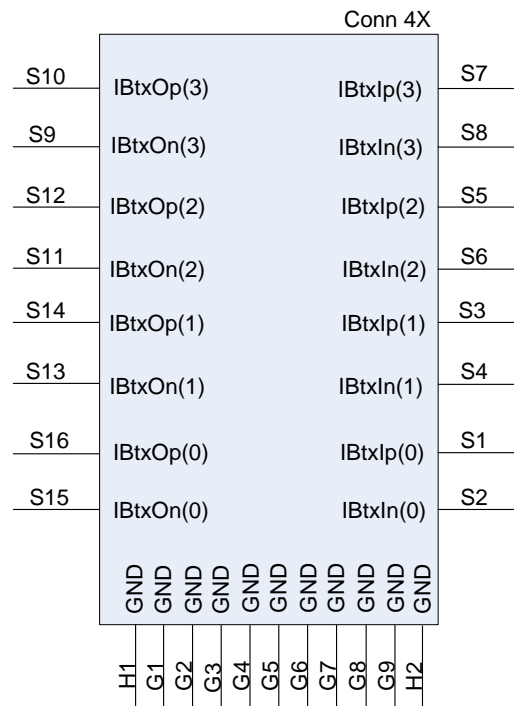


Table 12 - Connector Pin Name and Number to Signal Name Correspondence

Connector Pin Number	Connector Pin Name	IB Port A Signal Name
S1	IBtxIp(0)	Rx_A1
S2	IBtxIn(0)	Rx_A0
S3	IBtxIp(1)	Rx_A3
S4	IBtxIn(1)	Rx_A2
S5	IBtxIp(2)	Rx_A5
S6	IBtxIn(2)	Rx_A4
S7	IBtxIp(3)	Rx_A7
S8	IBtxIn(3)	Rx_A6
S9	IBtxOn(3)	Tx_A6
S10	IBtxOp(3)	Tx_A7
S11	IBtxOn(2)	Tx_A4
S12	IBtxOp(2)	Tx_A5
S13	IBtxOn(1)	Tx_A2
S14	IBtxOp(1)	Tx_A3
S15	IBtxOn(0)	Tx_A0
S16	IBtxOp(0)	Tx_A1
G1-G6, G9, H1-H2	Signal Ground	GND
G7 <sup>1</sup>	Sense-3.3V	SENSE_P1
G8	Vcc	MC_POWER_P1

1. 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 x4 Connector Pinout

These cards use a standard PCI Express x4 edge connector and the PCI Express x4 standard pinout according to the PCI Express 1.0a specification.

## *Appendix C: Replacing a Tall Bracket With a Short Bracket on HCA Cards*

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

- Removing a bracket
- Installing a new bracket

Figure 10 shows the bracket-side view of an HCA card.

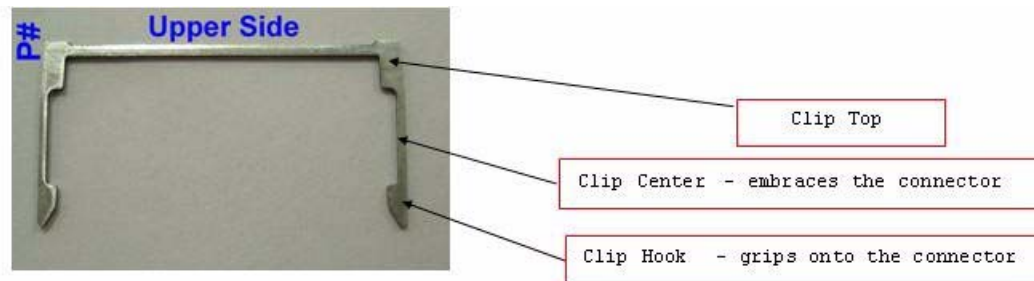
Figure 9: CX4 Connector in a Tall Bracket



### **C.1 Removing Tall Bracket**

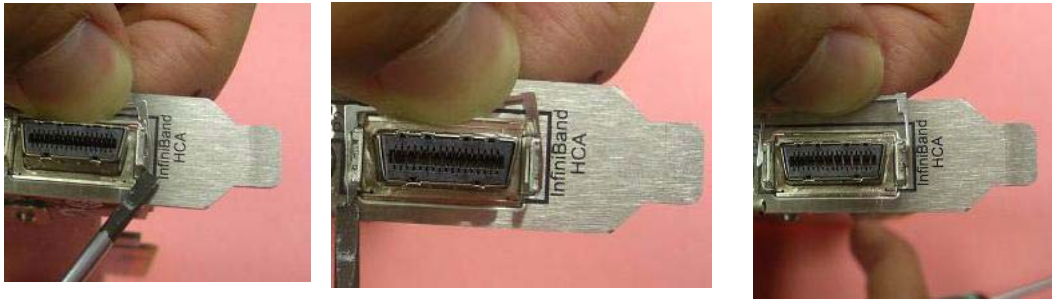
Figure 10 shows a connector retention clip and the designated names of its sections.

Figure 10: 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 11 on page 29 (a).
- 2 Then push the other hook. With both hooks unlatched push the clip towards the connector's top side - see Figure 11 (b). Finally, pull the clip away from the bracket - see Figure 11 (c).

Figure 11: Extracting Connector Clip



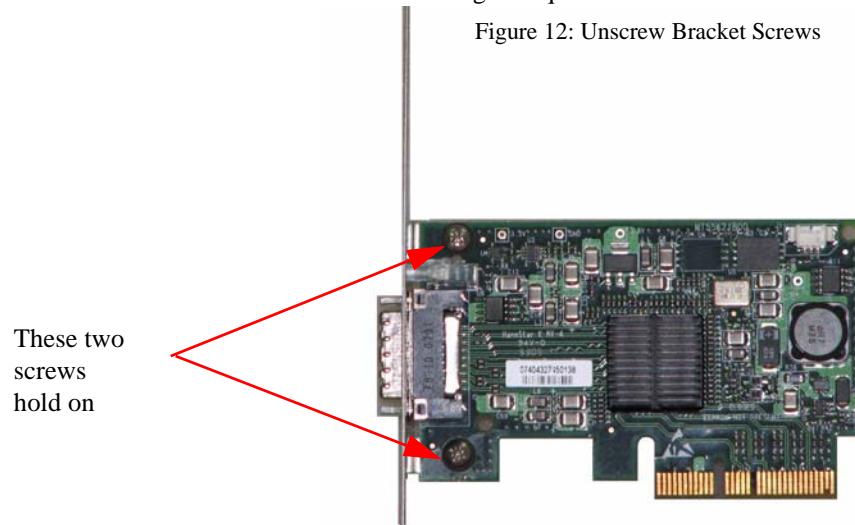
(a) Gently Push One Hook of Clip

(b) Gently Push Other Hook of Clip

(c) Pull Clip Away

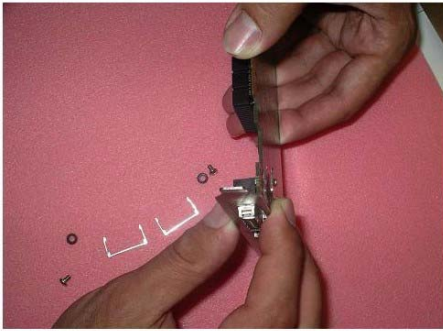
3. Unscrew both screws from the card using a torque screwdriver as shown in Figure 13.

Figure 12: Unscrew Bracket Screws

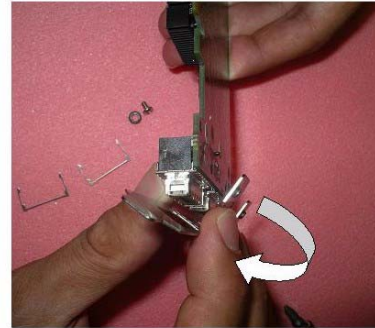


4. Grip the bracket as shown in Figure 13, placing your thumb on the LED component.
5. In a rotating move toward the component side of the card, slide the bracket out of the connector (Figure 13 (b)).
6. Gently hold your thumb on the LED component.
7. At the same time extract the bracket as shown in Figure 13 b, (Make sure to protect the LED while extracting the bracket).

Figure 13: Rotate the Bracket to Detach it From the Card



(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 HCA 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.

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.
4. Gently push the clip onto the connector. Make sure to slide both clip hooks (sides) around the connector evenly as shown in Figure 14.

Figure 14: 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 14.

Figure 15: Assembled Short Bracket View



# Appendix D: Avertissements de sécurité d'installation

## 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 45°C (113°F). 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.