ConnectX™ IB Dual Port InfiniBandAdapter Cards User's Manual

P/N: MHEH28-XSC, MHEH28-XTC, MHGH28-XSC, MHGH28-XTC, MHGH29-XTC

Rev 0.11

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ConnectX IBDual Port InfiniBandAdapter Cards With PCI Express User's Manual

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Revision History

This document was printed on 2/4/08.

Table 1 - Revision History Table

Date	Rev	Comments/Changes
May 2007	0.10	Preliminary first revision

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About this Manual

This *User's Manual* describes Mellanox Technologies ConnectX™ IB 10GBase-CX4 Ethernet PCI Express HCA cards. It provides details as to the interfaces of the card, specifications, required software and firmware for operating the card, 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.

Related Documentation

Table 2 - Documents List

ConnectX™ IB Programmer's Reference Manual Document no. 2623PM	Reference describing the interface used by developers to write a device driver.
ConnectX™ IB MT25208 Hardware Reference Manual Document no. 2715HM	Reference for hardware engineers responsible for designing systems and boards incorporating ConnectX™ IB components.
Mellanox Firmware Tools (MFT) User's Manual Document no. 2204UG	User's Manual describing the set of MFT firmware management tools- for a single InfiniBand node. See http://www.mellanox.com under 'Firmware' downloads.
InfiniBand Administration (IBADM) Package User's Manual Document no. 2130UM	User's Manual describing the utilities included in the IBADM tools package for system administration of an InfiniBand cluster. See http://www.mellanox.com under 'Management Tools'.
IB Specifications Release 1.0.a	Infiniband Architecture Specifications
PCI Express 2.0 Specifications	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)

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.

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1 Overview

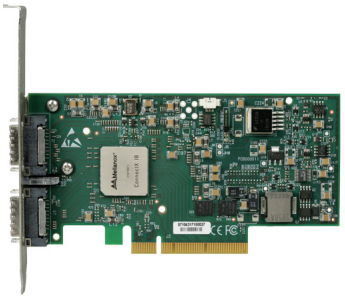
This document is a *User's Manual* for Mellanox Technologies host channel adapter (HCA) Cards based on the MT25408 ConnectX™ IB integrated circuit device. The cards described in this manual have the following main features:

- IBTA v1.2 compliant
- Two 4X InfiniBand copper ports for connecting InfiniBand traffic (4X IB connectors)
- Two 10GBASE-CX4 copper ports for connecting Ethernet traffic
- PCI Express 2.0 (1.1 compatible) through an x8 edge connector up to 5GT/s
- 'Media detect circuit' with powered connectors supporting the use of active cables and external PHY fiber solutions
- EU Restriction of Hazardous Substances (RoHS) compliant
- The cards differ in::IB10Gb/s (SDR) or 20Gb/s (DDR) Bracket height: short or tall
- PCI Express 2.0 with SerDes speed: 2.5 GT/s or 5.0 GT/s

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 (1)
MHEH28-XSC	2.5 GT/s	SDR	Short	RoHS-R5 (with exemption)	MT25408A0-FCC-SI	Figure 1: MHGH28-XTC   Short Bracket (-XSC)  Tall Bracket (-XTC)
MHEH28-XTC	2.5 GT/s		Tall			
MHGH28-XSC	2.5 GT/s	DDR	Short	RoHS-R5 (with exemption)	MT25408A0-FCC-DI	
MHGH28-XTC	2.5 GT/s		Tall			
MHGH29-XTC	5.0 GT/s	DDR	Tall		MT25408A0-FCC-GI	

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

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1.2 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 = 10GBASE-CX4*, G = 10GBASE-CX4*, K = 10GBASE-SR (XFP), T = 10GBASE-T * = with powered connector
S	Silicon	H = ConnectX
#	# ports	1 = 1, 2 = 2,
I	Host Interface	8 = PCIe x8, 9 = PCIe (SerDes @ 5.0 GT/s)
G	Generation	<blank> = Initial product generation
-	Separator	
X	Memory Size	X = MemFree
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 MHGH28-XSC describes Mellanox Technologies' ConnectX™ IB HCA 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 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 = G to indicate Cu 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 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

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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 PCI Express x8 or x16 slots
Software Operating Systems/Distributions	• For Windows see WinIB ReadMe at https://docs.mellanox.com/dm/WinIB/ReadMe.html • For Linux see OpenFabrics Enterprise Distribution (OFED) software package available via the OpenFabrics Web site http://www.openfabrics.org •

2.2 Installation Instructions

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

2.2.1 Safety Warnings

Over-temperature

The HCA Adapter cardshould not be operated in an area with an ambient temperature exceeding the maximum recommended temperature of 55°C. Moreover, it requires an airflow velocity of 200LFM (linear feet per minute) at this maximum ambient temperature.

During Lightning

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

Copper InfiniBand Cable Connecting/Disconnecting

Copper InfiniB cables are heavy and not very flexible. As such they should be carefully attached to or detached from the connectors. Refer to the cable manufacturer for special warnings/instructions.

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Equipment Disposal

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

2.2.2 Installation Instructions

The adapter cards listed in Table 3 on page 8 are standard PCI Express x8 cards each with a standard x8 edge connector. Please consult the host machine documentation for instructions on how to install a PCI Express card.

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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 OpenFabrics Web site at http://www.openfabrics.org. 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. HCA InfiniBand cluster firmware update

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.

> Note: 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[1], using the ***ibfwmgr*** tool of the IB administration (IBADM) tools package. IBADM is available for download from http://www.mellanox.com, through the Management Tools download link. Check the 'Firmware' downloads link for cluster update instructions.

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

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4 Adapter Card Interfaces

4.1 I/O Interfaces

Each HCA card includes the following interfaces:

- Two 4X InfiniBand copper connectors
- PCI Express x8 edge connector
- I/O panel LEDs
- I^2C compatible connector (for debug)

4.1.1 InfiniBand CX4 Interface

The ConnectX™ IB (MT25408) device is compliant with the *InfiniBand Architecture Specification, Release 1.2*. It has two compliant 4X InfiniBand ports, 1 and 2, each having four Tx/Rx pairs of SerDes. Each of the HCA cards (listed in Table 3 on page 8) based on this device provides access to these ports by means of two 4X InfiniBand connectors for external InfiniBand copper cables, also compliant with the IBTA specification 1.2. Connector 1 connects to port 1 of the device, while connector 2 connects to port 2.

Figure 2: Port Numbering

4.1.2 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.

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4.1.3 PCI Express Interface

The ConnectX™ IB HCA Adapter cards support the PCI Express 2.0 x8 interface, 1.1 compatible. The card can be either a master initiating the PCI Express bus operations or a slave responding to PCI bus operations.

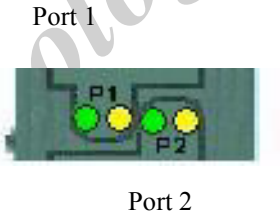
4.1.4 LED Assignment

The board has four LEDs located on the I/O panel - 2 LEDs per 4X port. The green LED, when lit, indicates that the InfiniBand driver is running and a valid physical connection between nodes exists. 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.

Table 6 - LEDs

Port Number	LED Name
Port 1	Physical Link - Green
	Data Activity - Yellow Blinking indicates Data Transfer Constant on indicates no Data Transfer
Port 2	Physical Link - Green
	Data Activity - Yellow Blinking indicates Data Transfer Constant on indicates no Data Transfer

Figure 3: Physical and Logical Link Indications



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

4.2 I²C Compatible Interface

A three-pin header on the HCA card is provided as the I²C compatible interface.See Figure 4 on page 22 for the location on the board.

Figure 3: I²C Connector

4.3 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. For power consumption see Specifications starting on page 22.

4.4 Memory

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

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4.4.1 System Memory

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

4.4.2 Flash

Each of theHCA adapter cards includes one 2MB SPI Flash device (P/N M25P16-VME6G by ST Microelectronics) accessible via the Flash interface of the MT25408 ConnectX IB 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 4 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 	connection open – Flash present	Header 1x2

4.4.3 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 (see "VPDs" on page 15). The EEPROM capacity is 512 bytes.

4.5 VPDs

- The PCI VPD (Vital Product Data) layout for each of the described Mellanox Technologies ConnectX™ IB HCA Adapter cardscomply with the format defined in the *PCI 2.3* "A1" was used as the HCA card (PCB) revision. Later revisions of the HCA card will have the same format.

Table 8 - VPD Layout for MHEH28-XSC

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 SDR	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	MHEH28-XSC	%STR_SPC	
39	VPD Keyword	EC	STR	Engineering Change Level of the card (rev)
41	Length	0x2		

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Table 8 - VPD Layout for MHEH28-XSC (Continued)

Offset (Decimal) (Continued)	Item	Value	Format	Description
42	Revision	A1	%STR	PCB revision
44	VPD Keyword	SN	STR	Serial Number
46	Length	0x18		
47	Serial Number		%STR_SPC	“00..00XXXX..XX”
71	VPD Keyword	V0	STR	Misc. Information
73	Length	0x10		
74	Data	PCIe 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		

Note: “A1” was used as the HCA card (PCB) revision. Later revisions of the HCA card will have the same format.

Table 9 - VPD Layout for MHEH28-XTC

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 SDR	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	MHEH28-XTC	%STR_SPC	

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Table 9 - VPD Layout for MHEH28-XTC (Continued)

Offset (Decimal) (Continued)	Item	Value	Format	Description
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	Serial Number		%STR_SPC	"00..00XXXX..XX"
71	VPD Keyword	V0	STR	Misc. Information
73	Length	0x10		
74	Data	PCIe 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		

Note: "A1" was used as the HCA card (PCB) revision. Later revisions of the HCA card will have the same format.

Table 10 - VPD Layout for MHGH28-XSC

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 SDR	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

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Table 10 - VPD Layout for MHGH28-XSC (Continued)

Offset (Decimal) (Continued)	Item	Value	Format	Description
17	Length	0x15		
18	PN	MHGH28-XSC	%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	Serial Number		%STR_SPC	“00..00XXXX..XX”
71	VPD Keyword	V0	STR	Misc. Information
73	Length	0x10		
74	Data	PCIe 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		

Note: “A1” was used as the HCA card (PCB) revision. Later revisions of the HCA card will have the same format.

Table 11 - VPD Layout for MHGH28-XTC

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 SDR	STR	
12	Large Resource Type VPD-R Tag (0x10)	0x90		
13	Length [7:0] LSB	0x4F		

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Table 11 - VPD Layout for MHGH28-XTC (Continued)

Offset (Decimal) (Continued)	Item	Value	Format	Description
14	Length [15:8] MSB	0x00		
15	VPD Keyword	PN	STR	Add in Card Part Number
17	Length	0x15		
18	PN	MHGH28-XTC	%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	Serial Number		%STR_SPC	"00..00XXXX..XX"
71	VPD Keyword	V0	STR	Misc. Information
73	Length	0x10		
74	Data	PCIe 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		

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Table 12 - VPD Layout for MHGH29-XTC

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		

Table 12 - VPD Layout for MHGH29-XTC (Continued)

Offset (Decimal)	Item	Value	Format	Description
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	MHGH29-XSC	%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	Serial Number		%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		

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5 Connectivity

This adapter card can be connected to switches and routers using 20 + meters of passive copper CX4 cables for SDR Adapter cards, and 10 + meters of passive copper CX4 cables for DDR Adapter cards. These lengths are greatly increased with active copper CX4 cables or with fiber cables with external adapters.

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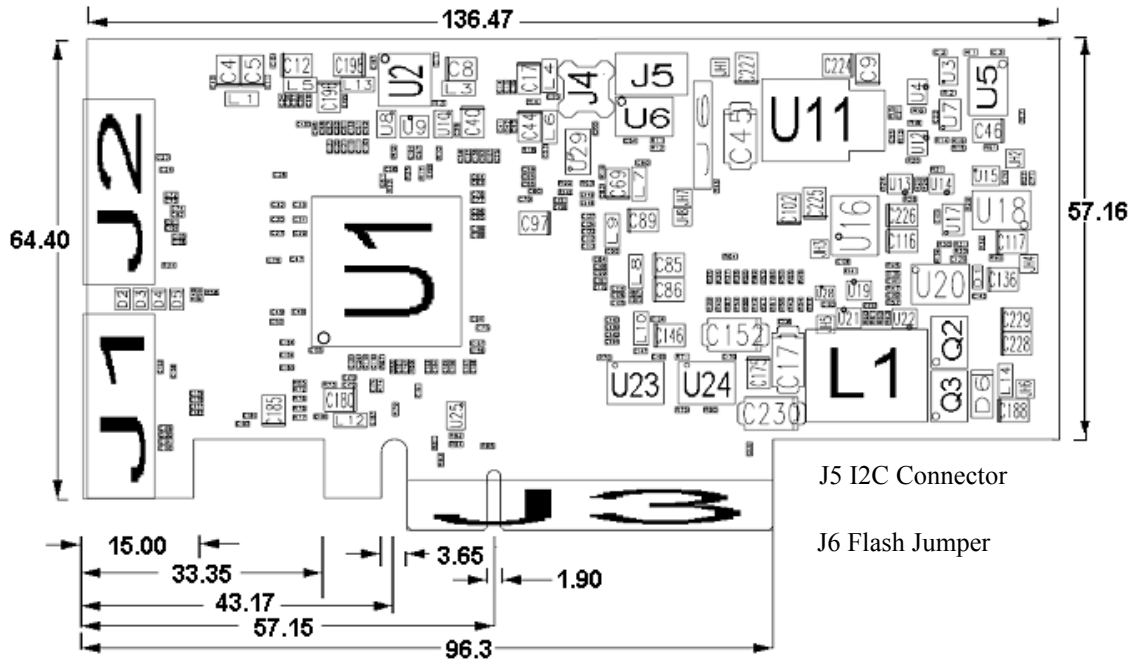
Appendix A: Specifications

A.1 Board Mechanical Drawing and Dimensions

All the HCA cards covered in this *User's Manual* have the same mechanical drawing and share the same dimensions as depicted in Figure 4.

Note: All dimensions are in millimeters.

Figure 4: Schematic of the InfiniBand Adapter Card With CX4 Connectors



A.2 EMC Certification Statements

Table 13 lists the approved EMC certification status per HCA card in different regions of the world. .

Table 13 - HCA Cards EMC Certification Status

HCA Card P/N	FCC Class (USA)	EN Class (Europe)	ICES Class (Canada)
MHEH28-XSC	A	A	A
MHEH28-XTC	A	A	A
MHGH28-XSC	A	A	A

Table 13 - HCA Cards EMC Certification Status

HCA Card P/N	FCC Class (USA)	EN Class (Europe)	ICES Class (Canada)
MHGH28-XTC	A	A	A
MHGH29-XTC	TBD	TBD	TBD

A.2.1 FCC

A.2.2 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.2.3 EN Statements (Europe)

EN55022 Class A Statement: RF Emissions Control

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.2.4 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."

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A.2.5 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.2.6 MIC Statement (Republic of Korea)

Korea's "Regulation for Certification of Information and Communication Equipment," requires EMC testing and certification for many electronic products. Korean EMC certifications are issued by Radio Research Laboratory (RRL), which is organized under the Ministry of Information and Communications (MIC). EMC testing includes electromagnetic emissions (EMI) and susceptibility (EMS). Certified equipment is labeled with the MIC mark and certification number.

Class A Statement:

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Translation:

Class A Device: This device is registered for EMC requirements for industrial use. The seller or buyer should be aware of this. If this type was sold or purchased by mistake, it should be replaced with a residential-use type.

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A.3 MHEH28-XSC and MHEH28-XTC Specifications

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Table 14 - Specifications for MHEH28-XSC/-XTC

Physical		**Power and Environmental**	
Size:	2.54in. x 5.37in. (64.4mm x 136.47mm)	Voltage:	12V, 3.3V
	200LFM @55°C	Typ. Power:	11.01W
Air Flow:	InfiniBand (Copper, current rating: 0.5A	Maximum Power:	12.62W
4X 10Gb/s Connector:	max) with active media adapter support	Temperature:	0°C to 55°C
Protocol Support		**Regulatory**	
InfiniBand:	IBTA v1.2, Auto-Negotiation 10Gb/s,		MIC Certification
	2.5Gb/s	Safety:	IEC/EN 60950-1:2001
QoS:	8 InfiniBand Virtual Lanes for each port		ETSI EN 300 019-2-2
RDMA Support:	Yes, All Ports		
Data Rate:	Single	Environmental:	IEC 60068-2- 64, 29, 32
PCI Express	2.0 SERDES @ 2.5 GT/s		
		RoHS:	RoHS-R5

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A.4 MHGH28-XSC and MHGH28-XTC Specifications

Table 15 - Specifications for MHGH28-XSC/-XTC

Physical		**Power and Environmental**	
Size: Air Flow: 4X 20Gb/s Connector:	2.54in. x 5.37in. (64.4mm x 136.47mm) 200LFM @55°C InfiniBand (Copper, current rating: 0.5A max) with active media adapter support	Voltage: Typ. Power: Maximum Power: Temperature:	12V, 3.3V 11.48W 13.09W 0°C to 55°C
Protocol Support		**Regulatory**	
InfiniBand: QoS: RDMA Support: Double Data Rate: PCI Express	IBTA v1.2, Auto-Negotiation[1] (20Gb/s, 5Gb/s) or (10Gb/s, 2.5Gb/s) 8 InfiniBand Virtual Lanes for each port Yes, All Ports 2.0 SERDES @ 2.5 GT/s	•EMC: • Safety: Environmental: RoHS:	FCC 47 CFR part 15:2005, subpart B, class A ICES-003:2004 Issue 4, class A VCCI V-3/2005.04, 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; MIC Certification IEC/EN 60950-1:2001 ETSI EN 300 019-2-2 IEC 60068-2- 64, 29, 32 RoHS-R5

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

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A.5 MHGH29-XTC Specifications

Table 16 - Specifications for MHGH29-XSC/-XTC

Physical		**Power and Environmental**	
Size: Air Flow: 4X 20Gb/s Connector:	2.54in. x 5.37in. (64.4mm x 136.47mm) 200LFM @55°C InfiniBand (Copper, current rating: 0.5A max) with active media adapter support	Voltage: Typ. Power: Maximum Power: Temperature:	12V, 3.3V 12.6W TBD W 0°C to 55°C
Protocol Support		**Regulatory**	
InfiniBand: QoS: RDMA Support: Double Data Rate: PCI Express	IBTA v1.2, Auto-Negotiation[1] (20Gb/s, 5Gb/s) or (10Gb/s, 2.5Gb/s) 8 InfiniBand Virtual Lanes for each port Yes, All Ports 2.0 SERDES @ 5.0 GT/s	•EMC: • Safety: Environmental: RoHS:	TBD

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

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Appendix B: Interface Connectors Pinout

B.1 I²C-compatible Connector Pinout

Figure 5: I2C-compatible Connector

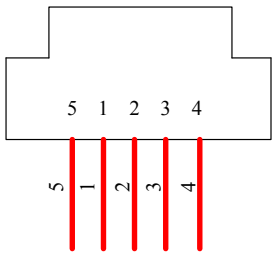

Table 1 - I2C-compatible Connector Pinout

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

B.2 InfiniBand Connector Pinout

Figure 6: ConnectX CX4 Copper Connector Pinout

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Table 2 - Connector Pin To Port Signal Name

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[1]	Sense-3.3V	SENSE_P1	SENSE_P2
G8	Vcc	MC_POWER_P1	MC_POWER_P2

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.

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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.

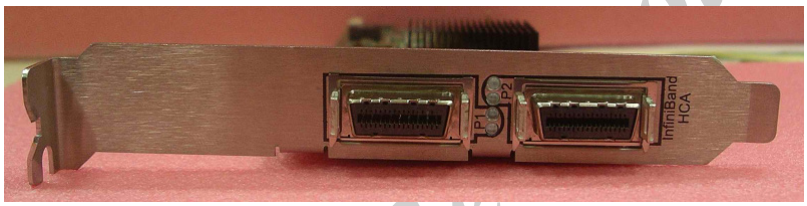
Appendix C: Replacing a Tall Bracket with a Short Bracket on HCA Cards

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

- "Removing Tall Bracket"
- "Placing a Kapton® Polyimide Label"
- "Assembling Short Bracket"

Figure 7 shows the bracket-side view of a dual-port HCA card.

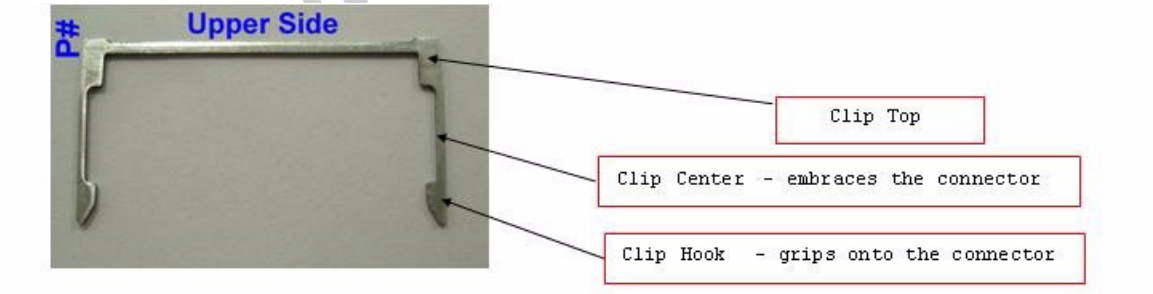
Figure 7: Tall Bracket of a Dual IB Port HCA Card



C.1 Removing Tall Bracket

Step 1 - Remove connector clips Figure 8 shows a connector retention clip and the designated names of its sections.

Figure 8: 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 9 (a) on page 30.
2. Then push the other hook each of the two clip's hook towards the connector's top side - see Figure 9 (b). Finally, pull the clip away from its center - see Figure 9 (c).

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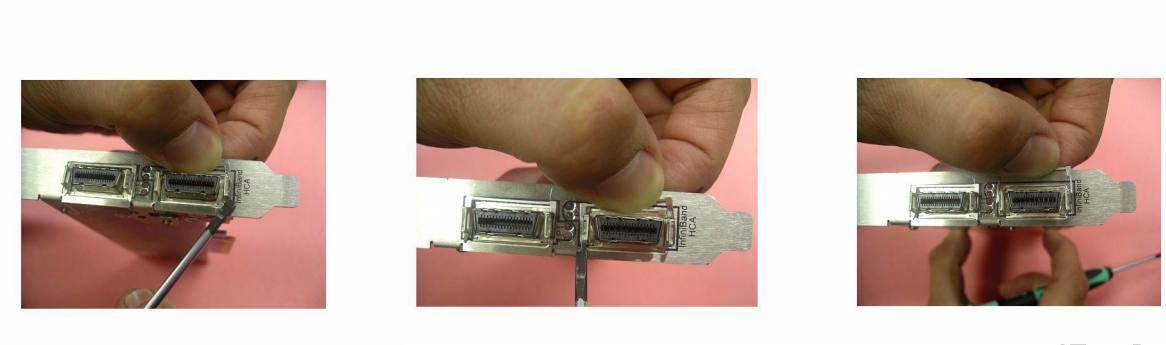
Figure 9: Extracting Connector Clip



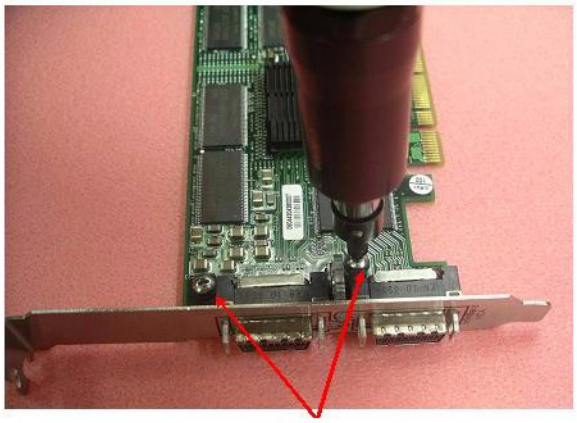
(a) Gently Push One Hook of Clip (b) Gently Push Other Hook of Clip (c) Pull Clip Away

3. Repeat the above actions for the second connector's clip.

Step 2 - Unscrew bracket screws

1. Unscrew both screws from the card using a torque screwdriver as shown in Figure 10.

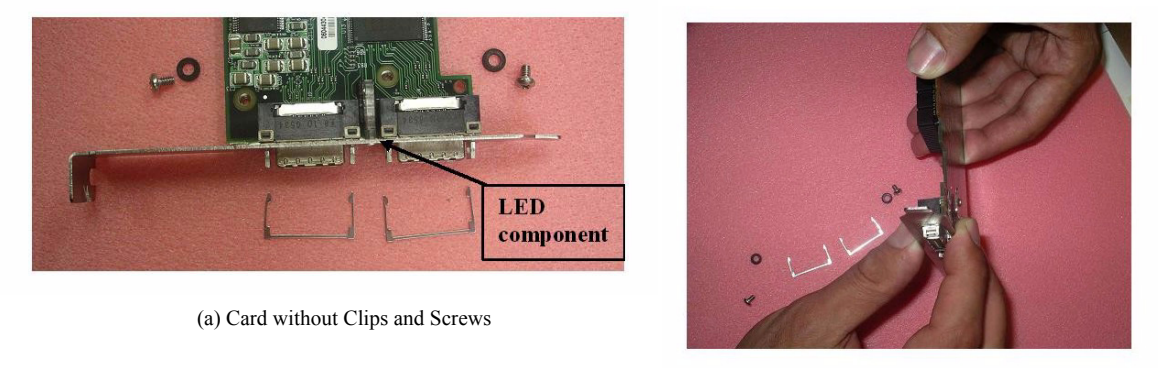
Figure 10: Unscrew Bracket Screws



Step 3 - Detach bracket

1. Grip the bracket as shown in Figure 11, placing your thumb on the LED component.
2. In a rotating move toward the component side of the card, slide the bracket out of the connectors (Figure 11 (c)).
3. Gently hold your thumb on the LED component.
4. At the same time extract the bracket as shown in Figure 11 c, (Make sure to protect the LED while extracting the bracket).

Figure 11: Rotate the Bracket to Detach it From the Card



(a) Card without Clips and Screws

(b) Grip the Card in preparation for Detachment

(c) Rotate the bracket toward the Component Side.

C.2 Placing a Kapton® Polyimide Label

Prior to assembling the short bracket, you need to apply a Kapton® polyimide round label on the board's Print Side.

Note: Check to see if the label is already installed as this label may have been installed at the factory.

Note: The label can be provided by Mellanox Technologies (P/N: MEC000821).

The following steps are instructions for placing the polyimide label:

1. Make sure your working area is ESD protected.
2. Hold the label with light pincers. See Figure 12.

Figure 12: Hold Kapton Label With Pincers

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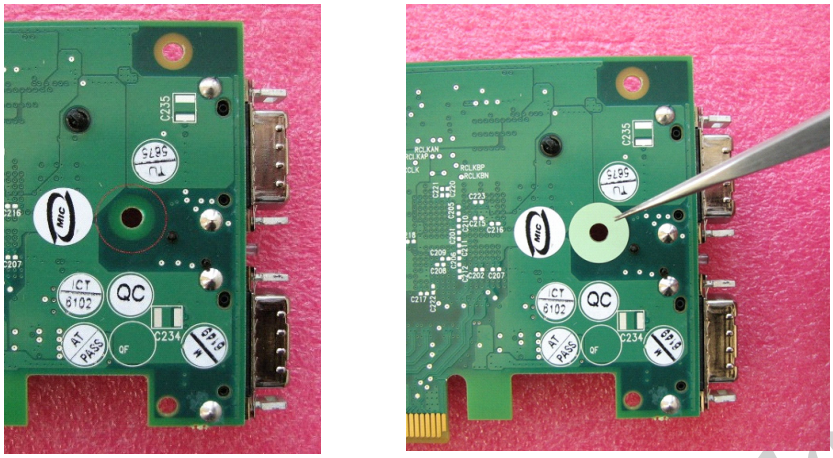
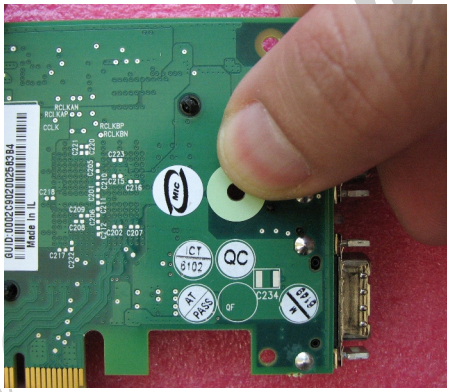
3. Gently place the label as shown in Figure 13. Make sure to align the center hole of the label with the drilled hole in the board.

Figure 13: Place Label on Print Side With Label's and Card's Holes Aligned



4. After placing the label, complete the process by (gently) sweeping your thumb on the label to assure the label is well-attached onto board. See Figure 14.

Figure 14: Ensure That Label is Well-attached



See also Figure 22, "Print Side View After Short Bracket Assembly With Kapton Label," on page 36.

Now your card is ready for a short bracket assembly.

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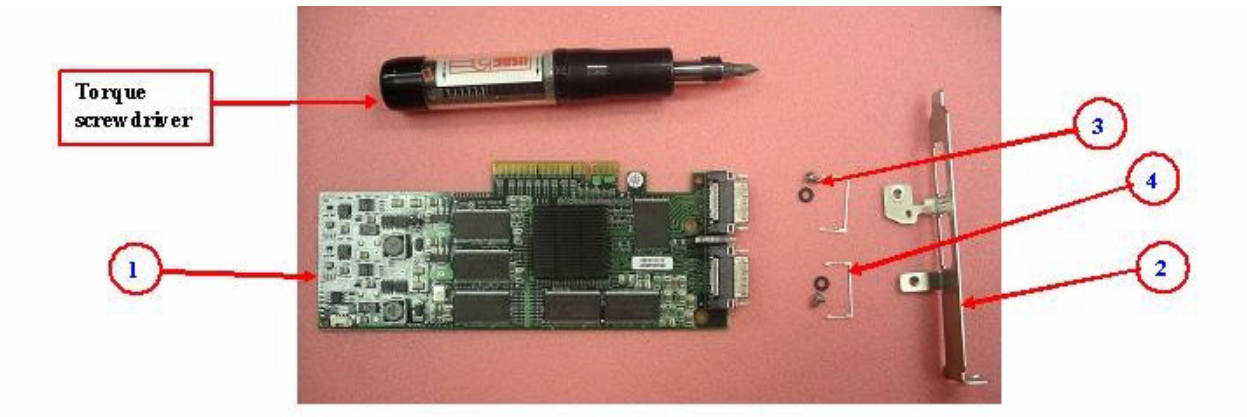
C.3 Assembling Short Bracket

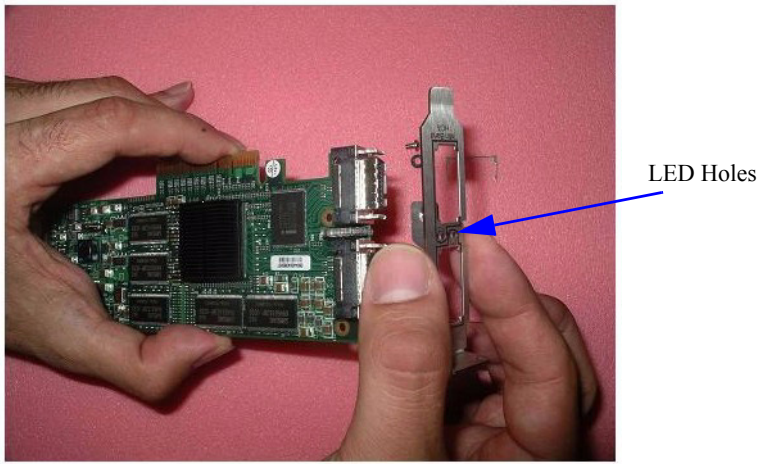
The short bracket can now be assembled onto the HCA card. See Figure 15.

Figure 15: HCA Card Ready for Short Bracket



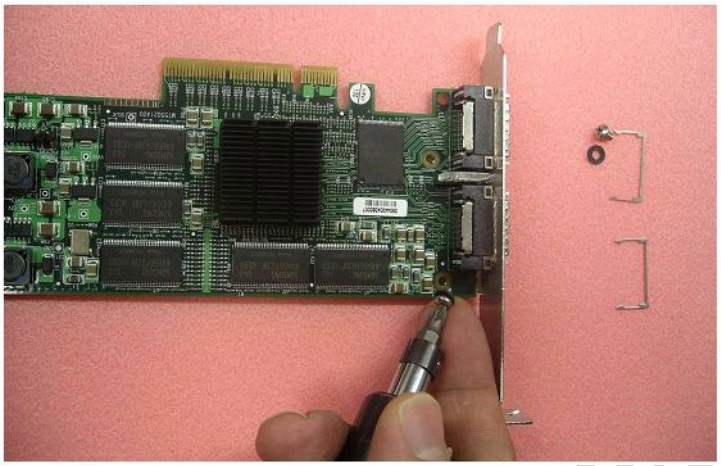
Step 1 - Place short bracket onto card 5. Gently place the bracket onto the card fitting the connectors through the bracket connector holes. Make sure the LEDs are aligned into their intended bracket holes.**Step 2 - Attach**

Figure 16: Place Short Bracket onto Card



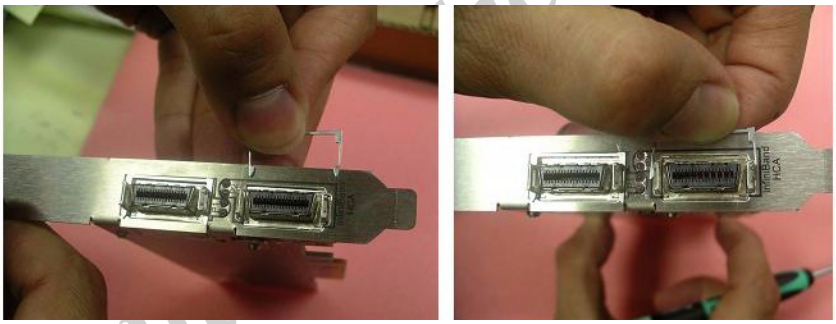
short bracket to card Insert a screw along with a washer into each of the two holes on the card intended for holding the bracket. Use a torque screwdriver to apply up to 2 lbs-in torque on each screw.

Figure 17: Attach Bracket onto Card using Screws



Step 3 - Install Connector Clips 1.Gently push one 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



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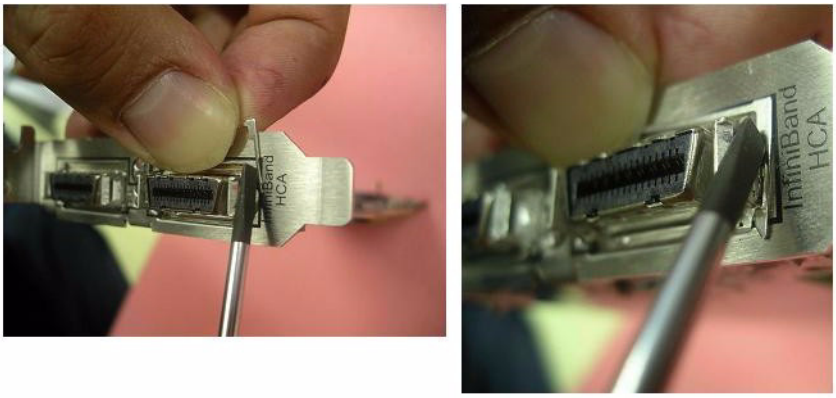
2. Use a small flat head screwdriver to gently slide the clip's hook towards the connector's base side as shown in Figure 19.

Figure 19: Fix Clip Hooks into Place Using Screwdriver

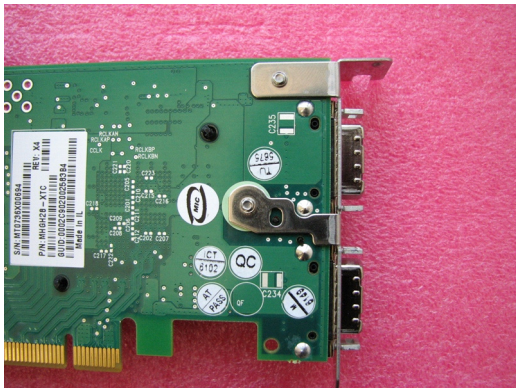


3. Repeat this step for the second clip. See Figure 21 for the assembled short bracket (side) view, and Figure 22 for the Print Side view showing the Kapton label.

Figure 20: Assembled Short Bracket View

Figure 21: Assembled Short Bracket View

Figure 22: Print Side View After Short Bracket Assembly With Kapton Label



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