InfiniHost™ III Lx PCI Express x8 MemFree RoHS HCA Adapter Cards User's Manual

P/N: MHES18-XSC, MHES18-XTC, MHGS18-XSC, MHGS18-XTC

Rev 1.02

InfiniHost III Lx PCI Express x8 MemFree RoHS HCA Adapter Cards User's Manual

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Revision History

Table 1 - Revision History

Rev	Date	Comments/Changes
1.02	June 2007	Corrected the Maximum Power number for MHES18-XSC in Section A.2, "MHES18-XSC (IB SDR Short Bracket) Specifications," on page 31 as follows: Old Maximum Power: 4.2[W] New Maximum Power: 3.5[W]
1.01	December 2006	Added EMC VCCI statements to Appendix A,"Specifications," on page 29
1.00	November 2006	First revision

About This Manual

This *User's Manual* describes Mellanox Technologies InfiniHost™ III Lx PCI Express x8 RoHS-compliant HCA cards. It provides details as to the interfaces of the board, specifications, required software and firmware for operating the board, and relevant documentation.

Intended Audience

This manual is intended for the installer and user of the PCI Express x8 HCA cards listed in Table 3, "HCA Cards," on page 14.

The manual assumes basic familiarity with the InfiniBand™ architecture specification.

Related Documentation

Table 2 - Documents List

InfiniHost™ III Programmer's Reference Manual Document no. 2248PM	Reference describing the interface used by developers to write a driver for Mem-free Mellanox InfiniHost™ III devices
InfiniHost™ III Lx MT25204 Hardware Reference Manual (HRM) Document no. 2131HM	Reference for hardware engineers responsible for designing systems and boards incorporating InfiniHost™ III Lx 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

Online Resources

- Mellanox Technologies webpages: http://www.mellanox.com
- 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 (small b) indicates size in mega bits.

1 Overview

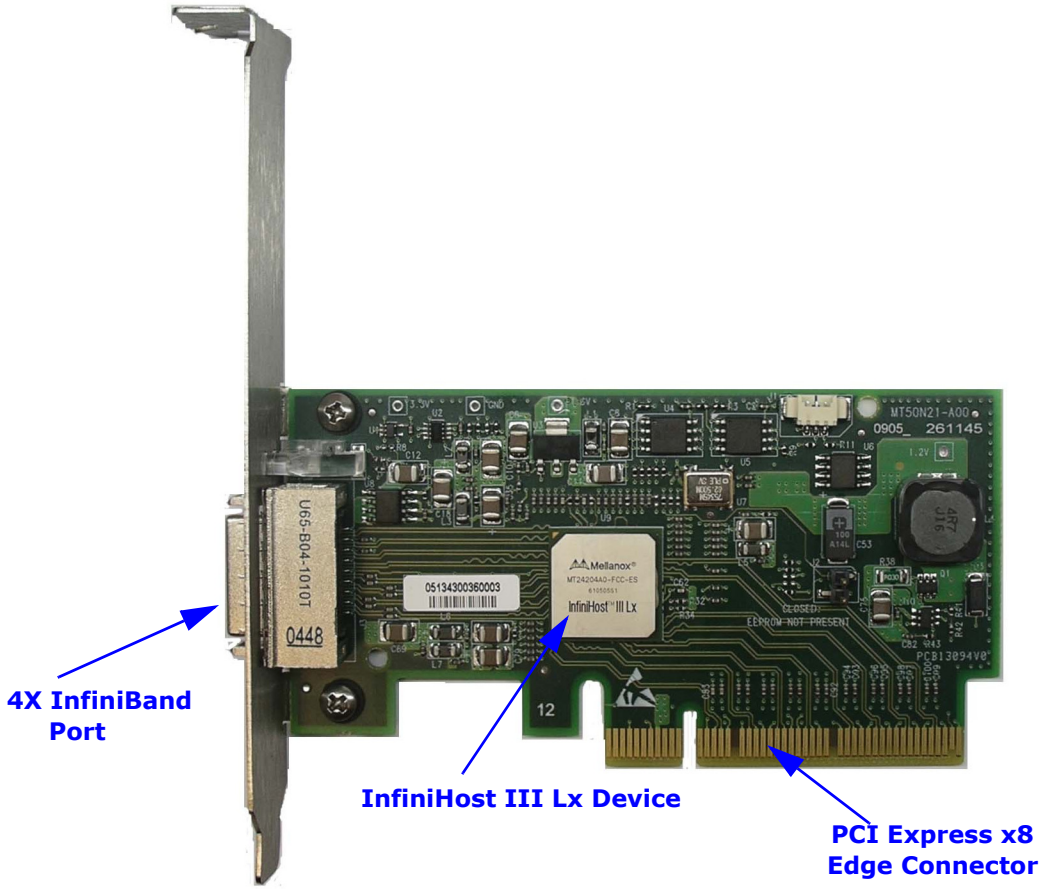
This document is a *User's Manual* for Mellanox Technologies host channel adapter (HCA) cards based on the MT25204 InfiniHost™ III Lx HCA IC device. The cards described in this manual (see Section 1.1 for part numbers) have the following main features:

- IBTA v1.2 compliant
- Single 4X InfiniBand copper ports for connecting InfiniBand traffic (4X IB connectors)
- PCI Express expansion board with an x8 edge connector compatible to the PCI Express 1.0a specification
- 'Media detect circuit' supporting external InfiniBand fiber solutions
- EU Restriction of Hazardous Substances (RoHS) compliant

The boards differ in

- 4X IB port speed support: 10Gb/s (SDR) or 20Gb/s (DDR) (Fiber solutions run at SDR only)
- Bracket height: short or tall

Figure 1: InfiniHost III Lx HCA Card (Tall Bracket)



1.1 List of HCA Cards

Table 3 lists the HCA cards described in this manual.

Table 3 - HCA Cards

Ordering Part Number (OPN)	IB SDR / DDR	Short / Tall Bracket	RoHS Compliance	HCA IC Part Number
MHES18-XSC	SDR	Short	RoHS-R5	MT25204A0-FCC
MHES18-XTC		Tall		
MHGS18-XSC	DDR	Short	RoHS-R5	MT25204A0-FCC-D
MHGS18-XTC		Tall		

1.2 Mellanox HCA Cards Part Numbering Key

Table 4 describes the Mellanox Technologies HCA cards part numbering key.

Table 4 - Mellanox HCA Cards Part Numbering Key

HCA Card OPN MHTS#I-XBR	Field	Decoder	Example: MHGS18-XTC
M	Mellanox Technologies		M
H	HCA	H=HCA Card, S= Express Card (SIOM)	H
T	Media	C=Cu SDR, E=Cu SDR + Fiber Adapter, G=Cu DDR + Fiber Adapter (currently SDR only), F=Fiber SDR	G
S	HCA IC	T= InfiniHost™, A= InfiniHost™ III Ex, S= InfiniHost™ III Lx	S
#	# IB ports	1=1, 2=2, … A=10, B=11, … <limit to one character>	1
I	Interface	X=PCI-X, 4=PCIe x4, 8=PCIe x8	8
-	Separator		-
X	Memory Size	X=MemFree, 1=128MB, 2=256MB, 3=512MB	X
B	Bracket	S=Short, T=Tall, N=None	T
R	RoHS	<blank> = non RoHS C=RoHS w/ Exemption, R=RoHS Lead-Free	C

2 HCA Card Installation

2.1 Installation Instructions

The HCA cards listed in Table 3 on page 14 are standard PCI Express x8 cards with a standard x8 edge connector. Please consult the host machine documentation for instructions on how to install a PCI Express card.

2.2 Safety Warnings

Installation Instructions:

Make sure you read all installation instructions before connecting the equipment to the power source.

Over-temperature:

The HCA card should not be operated in an area with an ambient temperature exceeding the maximum recommended temperature of 55°C. Moreover, it requires an air flow of 200LFM 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 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/instructions.

Equipment Disposal:

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

3 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. The HCA firmware download pages include the following firmware update options:

- Single HCA card firmware update
- InfiniBand cluster firmware update
- Customized firmware (.mlx, .ini) firmware update - OEMs Only

3.1 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. See Table 5.

Table 5 - Firmware Images for InfiniHost III Lx PCI Express HCA Cards

Type of HCA Card	PCI DevID (Decimal) & Firmware Image Name	Examples
Mem-free	PCI DevID: 25204 Firmware: fw-25204	***fw-25204-1_1_0-MHES18-XSC_A2.bin.zip*** is the firmware binary of firmware fw-25204 version 1.1.0, for the HCA card MHES18-XSC Rev A2

3.2 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[1] 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.

3.3 Customized HCA Card Firmware Update (OEM Only)

Note: The procedure described in this section is normally *not* needed and applies to OEMs only.

To create a customized firmware binary, the firmware image in MLX format needs to be downloaded along with the *MFT* tools package. See http://www.mellanox.com under 'Firmware Downloads' for customized firmware update instructions.

4 Adapter Card Interfaces

4.1 I/O Interfaces

Each HCA card includes the following interfaces:

- One 4X InfiniBand Copper Connector
- PCI Express x8 Edge Connector
- I/O Panel LEDs
- I^2C-compatible connector (for debug)

4.1.1 InfiniBand Interface

The InfiniHost III Lx (MT25204) 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 14) provides access to this device port by means of a 4X InfiniBand connector for an external InfiniBand copper cable, also compliant with the IBTA specification 1.2.

Furthermore, each of the HCA cards is embedded with a 'media detect circuit' that supports an external InfiniBand fiber solution to be connected to the InfiniBand port connector using active media converter such as Emcore's QTR3400 Smart Module or Fujitsu's FPD-010R008-0E o-microGiGaCN. Fiber solutions, however, can operate with the IB port running at SDR only.

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 for the 4X port (see Figure 3 on page 21). The physical link (Green) illuminates once the InfiniBand driver is started and a physical connection is made between two nodes. The data activity or logical link (Yellow) illuminates once the InfiniBand network is discovered over the physical link. The activity link is steady yellow when the link is discovered but there is no data transmission over it, and blinks while data is transmitted. If the LEDs are not active, either the physical or the logical (or both) connections have not been established.

Table 6 - LEDs

4X Port	LED Name
Port 1	Physical Link - Green
	Logical Link - Yellow

4.1.4 I2C-compatible Interface

A three-pin header is provided as the I^2C-compatible interface. Table 7 provides the reference designation information of the I^2C connector.

Table 7 - I^2C Connector Reference Designation

Card Part Number	Reference on Board
MHES18-XSC, MHES18-XTC, MHGS18-XSC, MHGS18-XTC	J1

For the I^2C connector location on the HCA cards see Figure 2 on page 20.

4.2 Power

Each of the HCA cards receives 3.3V power from the PCI Express Edge connector. All other required power is generated by on-board switch mode regulators. For power consumption see "Specifications" on page 29.

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 on the system memory.

4.3.2 Flash

Each of the HCA cards includes a single 2MB SPI Flash (P/N M25P16 by ST Microelectronics) accessible via the Flash interface of the MT25204 InfiniHost III Lx device.

4.3.2.1 Jumper Configuration

There is a jumper on each HCA card that indicates to the HCA IC whether an on-board Flash device exists (or is to be used). Table 8 provides information on this jumper. See also Figure 2 on page 20 for the jumper location.

Table 8 - Jumper Configuration

Ref. #	Description	Option	Card Default Configuration	Comments
J2	Flash present/ not present	No Shorting Block: Flash present Shorting Block present: Flash not present 	No Shorting Block	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 (see "Vital Product Data (VPD) Format" on page 22). The EEPROM capacity is 512 bytes.

5 Mechanical Information

5.1 Air Flow Requirement

Per the PCI/PCI-X specifications, all the HCA cards covered in this User's Manual require an airflow of 200 LFM at 55°C ambient temperature.

5.2 Board Mechanical Drawings 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 2, except for the bracket length: short or tall.

Figure 2: Mechanical Drawing and Dimensions [mm]

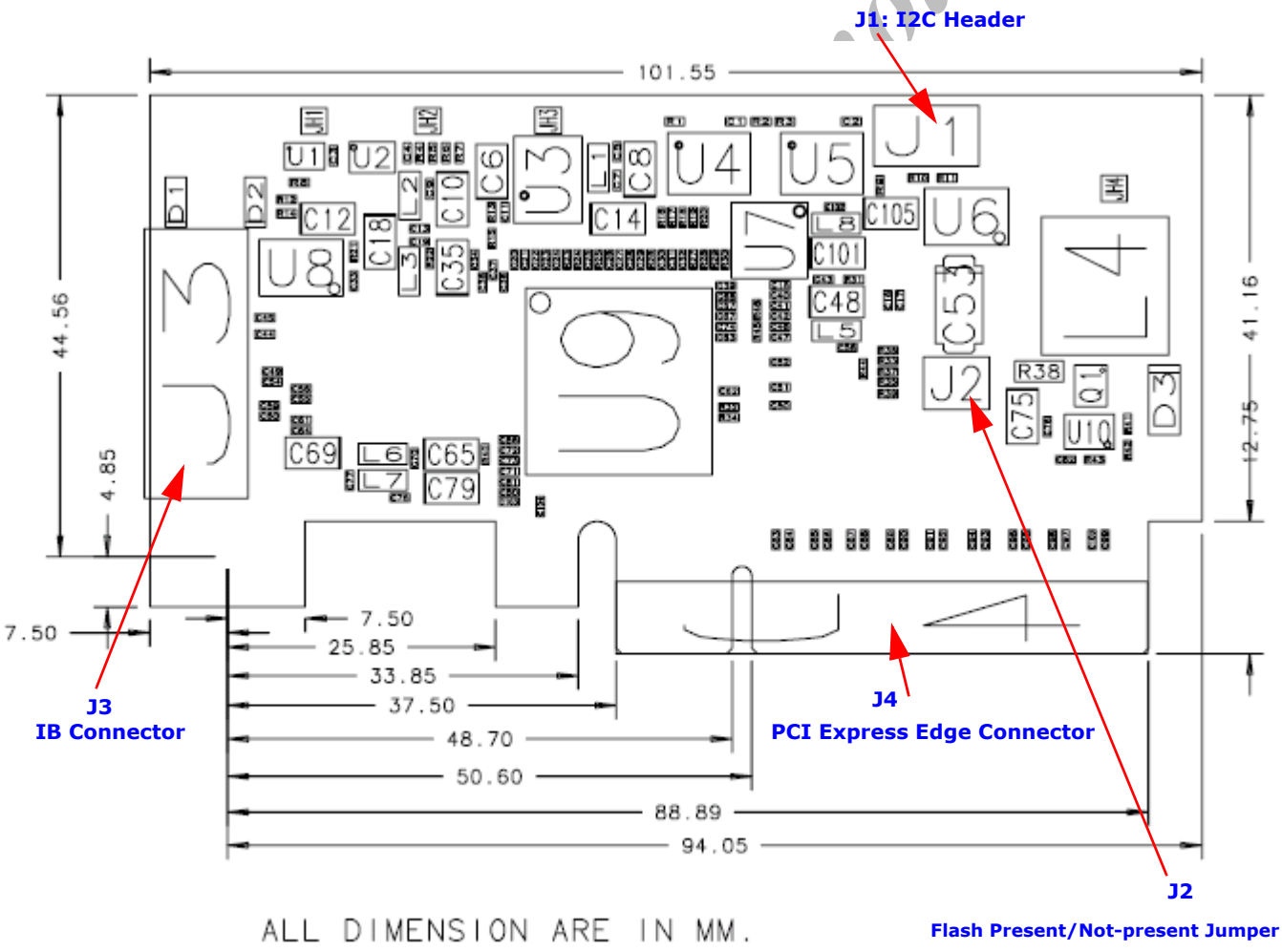
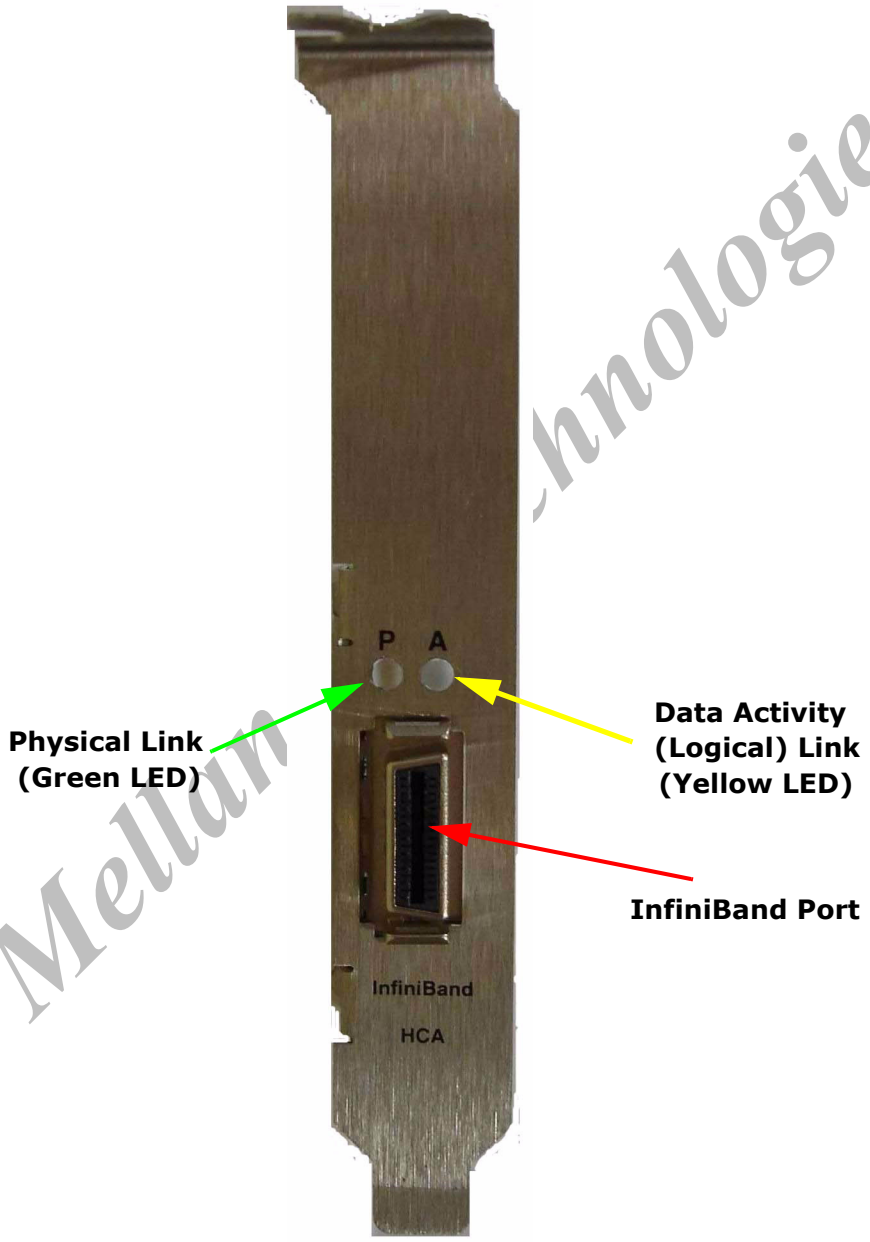


Figure 3 shows the common I/O panel of all the tall-bracket HCA cards covered in this *User's Manual*. Both IB ports are shown along with the physical and activity link LEDs.

Note: Short brackets have the same port and LED footprints as tall brackets. See "Instructions for Replacing a Tall Bracket with a Short Bracket on HCA Cards" on page 37.

Figure 3: I/O Panel with a Single 4X IB Port and LEDs (Tall Bracket)



6 Vital Product Data (VPD) Format

The PCI VPD (Vital Product Data) layout for each of the described Mellanox Technologies HCA cards complies with the format defined in the PCI 2.3 Specification, Appendix I. All HCA cards share the same PCI VPD layout (i.e., have the same items), however, the "Offset" of each item and/or its "Value" may be different from one card's VPD to another.

The PCI VPD layout for each HCA card is provided in the following sections:

6.1 VPD Format for MHES18-XSC

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

Table 9 - VPD Format for MHES18-XSC

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length	0x7		
3	Data	"Cheetah"	Alphanumeric	
10	Large Resource Type VPD-R Tag (0x10)	0x90		
11	Length	0x4F		
13	VPD Keyword	"PN"	Numbers	Add in Card Part Number
15	Length	0x15		
16	Data	"MHES18-XSC"		
37	VPD Keyword	"EC"	Alphanumeric	Engineering Change Level of the card (rev)
39	Length	0x2		
40	Data	"A1"		PCB revision
42	VPD Keyword	"SN"	Alphanumeric	Serial Number
44	Length	0x18		
45	Data	"MTYYWWPSSSSS"		according to the board label
69	VPD Keyword	"V0"		Misc Information
71	Length	0x10		

Table 9 - VPD Format for MHES18-XSC (Continued)

Offset (Decimal)	Item	Value	Format	Description
72	Data	"PCIe x8"		
88	VPD Keyword	"RV"		
90	Length	0x1		
91	Data	Checksum		
92	Large Resource Type VPD-W Tag (0x11)	0x91		
93	Length	0xA0		
95	VPD Keyword	"V1"		EFI Driver version
97	Length	0x6		
98	Data	"N/A"	Number	
104	VPD Keyword	"YA"		Asset Tag
106	Length	0x20		
107	Data	"N/A"	Alphanumeric	"N/A"
139	VPD Keyword	"RW"		Remaining read/write area
141	Length	0x71		
142	Data	Reserved (0x00)		
255	Small Resource Type END Tag (0x11)	0x78		
256	Mellanox Read Only Mask	0x0....0	Numbers	
351	Mellanox Read/Write Mask	0x1...1	Numbers	
511	Mellanox Read Only Mask	0x0	Numbers	

6.2 VPD Format for MHES18-XTC

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

Table 10 - VPD Format for MHES18-XTC

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length	0x7		
3	Data	"Cheetah"	Alphanumeric	
10	Large Resource Type VPD-R Tag (0x10)	0x90		
11	Length	0x4F		
13	VPD Keyword	"PN"	Numbers	Add in Card Part Number
15	Length	0x15		

Table 10 - VPD Format for MHES18-XTC (Continued)

Offset (Decimal)	Item	Value	Format	Description
16	Data	“MHES18-XTC”		
37	VPD Keyword	“EC”	Alphanumeric	Engineering Change Level of the card (rev)
39	Length	0x2		
40	Data	“A1”		PCB revision
42	VPD Keyword	“SN”	Alphanumeric	Serial Number
44	Length	0x18		
45	Data	“MTYYWWPSSSSS”		according to the board label
69	VPD Keyword	“V0”		Misc Information
71	Length	0x10		
72	Data	“PCIe x8”		
88	VPD Keyword	“RV”		
90	Length	0x1		
91	Data	Checksum		
92	Large Resource Type VPD-W Tag (0x11)	0x91		
93	Length	0xA0		
95	VPD Keyword	“V1”		EFI Driver version
97	Length	0x6		
98	Data	“N/A”	Number	
104	VPD Keyword	“YA”		Asset Tag
106	Length	0x20		
107	Data	“N/A”	Alphanumeric	“N/A”
139	VPD Keyword	“RW”		Remaining read/write area
141	Length	0x71		
142	Data	Reserved (0x00)		
255	Small Resource Type END Tag (0x11)	0x78		
256	Mellanox Read Only Mask	0x0....0	Numbers	
351	Mellanox Read/Write Mask	0x1...1	Numbers	
511	Mellanox Read Only Mask	0x0	Numbers	

6.3 VPD Format for MHGS18-XSC

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

Table 11 - VPD Format for MHGS18-XSC

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length	0x7		
3	Data	"Cheetah"	Alphanumeric	
10	Large Resource Type VPD-R Tag (0x10)	0x90		
11	Length	0x4F		
13	VPD Keyword	"PN"	Numbers	Add in Card Part Number
15	Length	0x15		
16	Data	"MHGS18-XSC"		
37	VPD Keyword	"EC"	Alphanumeric	Engineering Change Level of the card (rev)
39	Length	0x2		
40	Data	"A1"		PCB revision
42	VPD Keyword	"SN"	Alphanumeric	Serial Number
44	Length	0x18		
45	Data	"MTYYWWPSSSSS"		according to the board label
69	VPD Keyword	"V0"		Misc Information
71	Length	0x10		
72	Data	"PCIe x8"		
88	VPD Keyword	"RV"		
90	Length	0x1		
91	Data	Checksum		
92	Large Resource Type VPD-W Tag (0x11)	0x91		
93	Length	0xA0		
95	VPD Keyword	"V1"		EFI Driver version
97	Length	0x6		
98	Data	"N/A"	Number	
104	VPD Keyword	"YA"		Asset Tag
106	Length	0x20		
107	Data	"N/A"	Alphanumeric	"N/A"
139	VPD Keyword	"RW"		Remaining read/write area

Table 11 - VPD Format for MHGS18-XSC (Continued)

Offset (Decimal)	Item	Value	Format	Description
141	Length	0x71		
142	Data	Reserved (0x00)		
255	Small Resource Type END Tag (0x11)	0x78		
256	Mellanox Read Only Mask	0x0....0	Numbers	
351	Mellanox Read/Write Mask	0x1...1	Numbers	
511	Mellanox Read Only Mask	0x0	Numbers	

6.4 VPD Format for MHGS18-XTC

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

Table 12 - VPD Format for MHGS18-XTC

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length	0x7		
3	Data	“Cheetah”	Alphanumeric	
10	Large Resource Type VPD-R Tag (0x10)	0x90		
11	Length	0x4F		
13	VPD Keyword	“PN”	Numbers	Add in Card Part Number
15	Length	0x15		
16	Data	“MHGS18-XTC”		
37	VPD Keyword	“EC”	Alphanumeric	Engineering Change Level of the card (rev)
39	Length	0x2		
40	Data	“A1”		PCB revision
42	VPD Keyword	“SN”	Alphanumeric	Serial Number
44	Length	0x18		
45	Data	“MTYYWWPSSSSS”		according to the board label
69	VPD Keyword	“V0”		Misc Information
71	Length	0x10		
72	Data	“PCIe x8”		
88	VPD Keyword	“RV”		
90	Length	0x1		
91	Data	Checksum		

Table 12 - VPD Format for MHGS18-XTC (Continued)

Offset (Decimal)	Item	Value	Format	Description
92	Large Resource Type VPD-W Tag (0x11)	0x91		
93	Length	0xA0		
95	VPD Keyword	"V1"		EFI Driver version
97	Length	0x6		
98	Data	"N/A"	Number	
104	VPD Keyword	"YA"		Asset Tag
106	Length	0x20		
107	Data	"N/A"	Alphanumeric	"N/A"
139	VPD Keyword	"RW"		Remaining read/write area
141	Length	0x71		
142	Data	Reserved (0x00)		
255	Small Resource Type END Tag (0x11)	0x78		
256	Mellanox Read Only Mask	0x0....0	Numbers	
351	Mellanox Read/Write Mask	0x1...1	Numbers	
511	Mellanox Read Only Mask	0x0	Numbers	

Appendix A: Specifications

A.1 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)
MHES18-XSC	Class A	Class A	Class A
MHES18-XTC	Class B	Class B	Class B
MHGS18-XSC	Class B	Class B	Class B
MHGS18-XTC	Class B	Class B	Class B

A.1.1 FCC Statements (USA)

Class A Statements for MHES18-XSC:

§ 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.

Class B Statements for MHES18-XTC, MHGS18-XSC, and MHGS18-XTC:

§ 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

Statement

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

A.1.2 EN Statements (Europe)

EN55022 Class A Statement for MHES18-XSC:

> **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.

EN55022 Class B Statements for MHES18-XTC, MHGS18-XSC, and MHGS18-XTC:

No statement is required for Class B products.

A.1.3 ICES Statements (Canada)

Class A Statement for MHES18-XSC:

"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."

Class B Statement for MHES18-XTC, MHGS18-XSC, and MHGS18-XTC:

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

A.1.4 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.")

Class B 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Ｂ情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

(Translation - "This is a Class B product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to instruction manual.")

A.2 MHES18-XSC (IB SDR Short Bracket) Specifications

Physical		**Power and Environmental**	
Size:	54mm x 102mm (2.13 in. X 4 in.)	Voltage:	3.3V
Air Flow:	200LFM @55C	Maximum Power:	3.5W
		Temperature:	0 to 55 Celsius
10Gb/s Connector:	Amphenol InfiniBand MicroGigaCN / Emcore (Fiber Channel)		
Protocol Support		**Regulatory**	
InfiniBand:	Auto-Negotiation 10Gb/s, 2.5Gb/s	EMC:	FCC 47 CFR part 15:2005, subpart B, class A
QoS:	4 InfiniBand Virtual Lanes for the 4X port		ICES-003:2004 Issue 4, class A
RDMA Support:	Yes		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;
		Safety:	IEC/EN 60950-1:2001 ETSI EN 300 019-2-2
		Environmental:	IEC 60068-2- 64, 29, 32
		RoHS:	RoHS-R5

A.3 MHES18-XTC (IB SDR Tall Bracket) Specifications

Physical		**Power and Environmental**	
Size:	54mm x 102mm (2.13 in. X 4 in.)	Voltage:	3.3V
Air Flow:	200LFM @55C	Maximum Power:	3.5W
		Temperature:	0 to 55 Celsius
10Gb/s Connector:	Amphenol InfiniBand MicroGigaCN / Emcore (Fiber Channel)		
Protocol Support		**Regulatory**	
InfiniBand:	Auto-Negotiation 10Gb/s, 2.5Gb/s	EMC:	FCC 47 CFR part 15:2005, subpart B, class B
QoS:	4 InfiniBand Virtual Lanes for the 4X port		ICES-003:2004 Issue 4, class B
RDMA Support:	Yes		VCCI V-3/2005.04, class B
			EN 55022:1998+A1:2000+A2:2003 class B, EN 61000-3-2:2000+A2:2005, EN61000-3-3:1995+A1:2000, EN 55024:1998 + A1(2001)+A2(2003) standards, harmonized under EMC Directive 89/336/EEC;
		Safety:	IEC/EN 60950-1:2001 ETSI EN 300 019-2-2
		Environmental:	IEC 60068-2- 64, 29, 32
		RoHS:	RoHS-R5

A.4 MHGS18-XSC / MHGS18-XTC (IB DDR Cards) Specifications

Physical		**Power and Environmental**	
Size:	54mm x 102mm (2.13 in. X 4 in.)	Voltage:	3.3V
Air Flow:	200LFM @55C	Maximum Power:	4W
		Temperature:	0 to 55 Celsius
20Gb/s Connector:	Amphenol InfiniBand MicroGigaCN		
Protocol Support		**Regulatory**	
InfiniBand:	Auto-Negotiation (10Gb/s,2.5Gb/s) or (20Gb/s,5Gb/s)[1]	EMC:	FCC 47 CFR part 15:2005, subpart B, class B
QoS:	4 InfiniBand Virtual Lanes for the 4X port		ICES-003:2004 Issue 4, class B
RDMA Support:	Yes		VCCI V-3/2005.04, class B
			EN 55022:1998+A1:2000+A2:2003 class B, EN 61000-3-2:2000+A2:2005, EN61000-3-3:1995+A1:2000, EN 55024:1998 + A1:2001+A2:2003 standards, harmonized under EMC Directive 89/336/EEC;
		Safety:	IEC/EN 60950-1:2001 ETSI EN 300 019-2-2
		Environmental:	IEC 60068-2- 64, 29, 32
		RoHS:	RoHS-R5

1. (20Gb/s,5Gb/s) is not supported for fiber solutions.

Appendix B: Interface Connectors Pinout

B.1 I²C-compatible Connector Pinout

Figure 4: I2C-compatible Connector

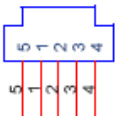


Table 14 - I2C-compatible Connector Pinout

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

B.2 InfiniBand Connector Pinout

Figure 5: InfiniBand 4X Port Connector

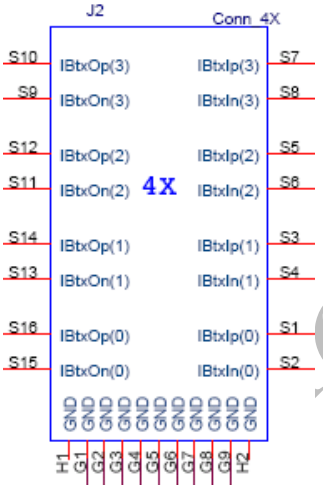


Table 15 - InfiniBand 4X Connector Pinout (Sheet 1 of 2)

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

Table 15 - InfiniBand 4X Connector Pinout (Sheet 2 of 2)

Connector Pin Number	Connector Pin Name	IB Port A Signal Name	IB Port B Signal Name
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.

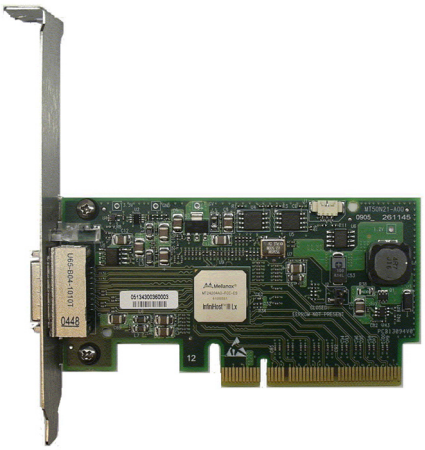
B.3 PCI Express x8 Connector Pinout

The HCA card uses a standard PCI Express x8 1.0a edge connector. See http://www.pcisig.com/specifications/.

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

This appendix provides instructions on how to remove a tall bracket of an HCA card such as the one shown in Figure 6 and replace it with a short one.

Figure 6: Tall Bracket of a Single IB Port HCA Card



C.1 Removing Tall Bracket

Step 1 - Remove connector clips

Figure 7 shows a connector retention clip and the designated names of its sections.

Using a small flat head screwdriver, gently push up one hook of a connector retention clip toward the connector's top side as shown in Figure 8(a). Then push the other hook toward the connector's top side - see Figure 8(b). Finally, pull the clip away from its center - see Figure 8(c).

Figure 7: Connector Retention Clip

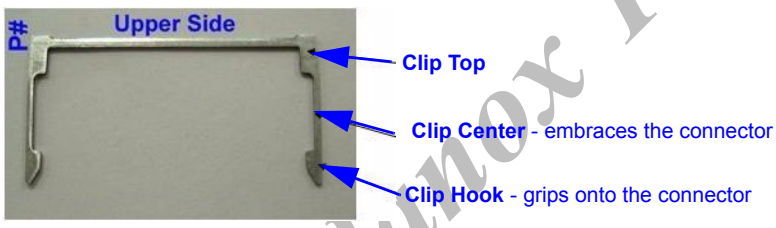
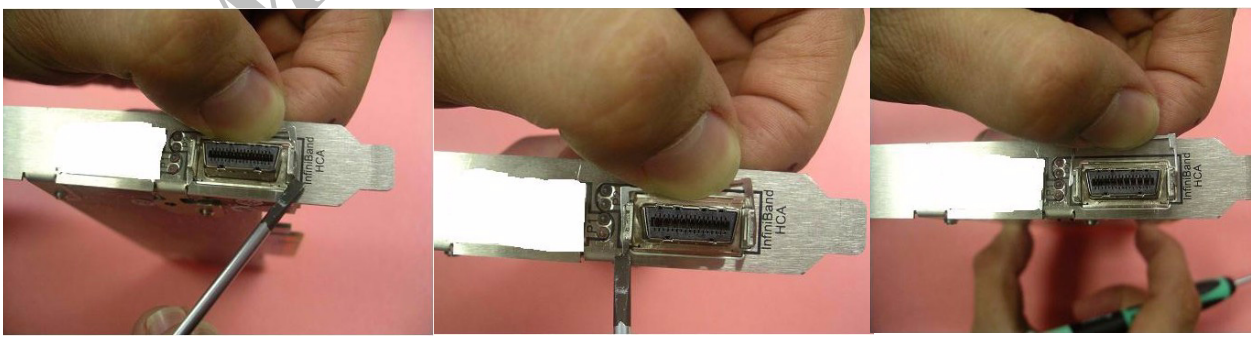


Figure 8: Extracting Connector Clip



(a) Gently Push One Hook of Clip

(b) Gently Push Other Hook of Clip

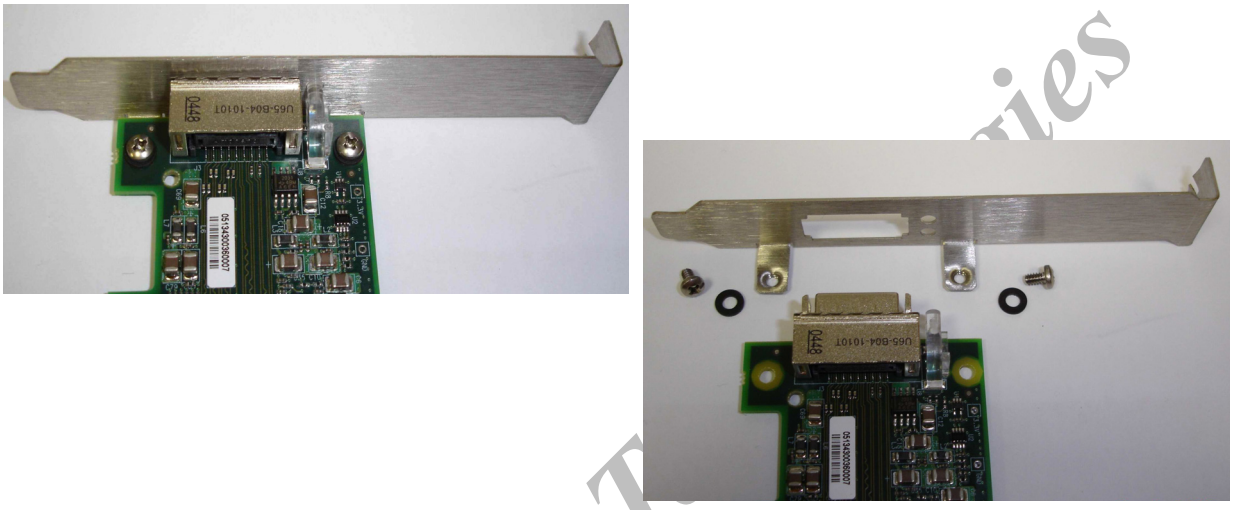
(c) Pull Clip Away

Note: The LED holes arrangement on the bracket photos appearing in this appendix may be different from their arrangement on the actual HCA cards brackets. Nevertheless, this difference bears no impact on the replacement instructions provided here.

Step 2 - Unscrew bracket screws

Unscrew both screws and washers from the card using a torque screwdriver as shown in Figure 9.

Figure 9: Removing Bracket Screws and Washers



Step 3 - Detach bracket. Grip the bracket as shown in Figure 10 placing your thumb on the LED component. In a rotating move toward the component side of the card, slide the bracket out of the connectors (Figure 10(b)).

- Gently hold your thumb on the LED component.
- At the same time extract the bracket.

Note: Make sure to protect the LED while extracting the bracket.

Figure 10: Detach the Bracket in a Rotating Move

(a) Grip the Card in Prep. for Detachment

(b) Detach the Bracket in Rotating Move toward Component Side

C.2 Assembling Short Bracket

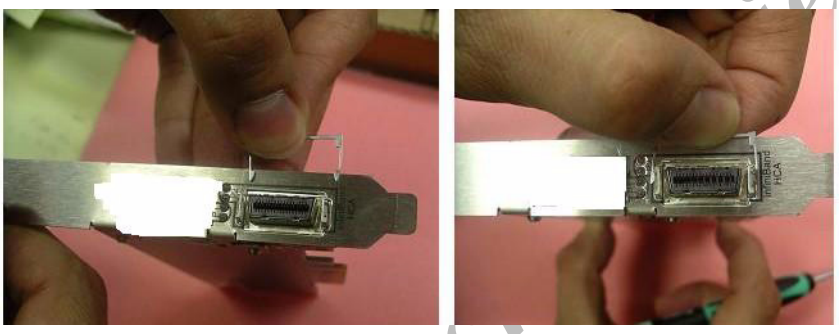
The short bracket can now be assembled onto the HCA card.

Step 1 - Place short bracket onto card. 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 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.

Step 3 - Install Connector Clips. Gently push one clip onto the connector. Make sure to slide both clip hooks (sides) around the connector evenly as shown in Figure 11.

Figure 11: Sliding Connector Clip Evenly



Use a small flat head screwdriver to gently slide the clip's hook towards the connector's base side as shown in Figure 12.

Figure 12: Fix Clip Hooks into Place Using Screwdriver

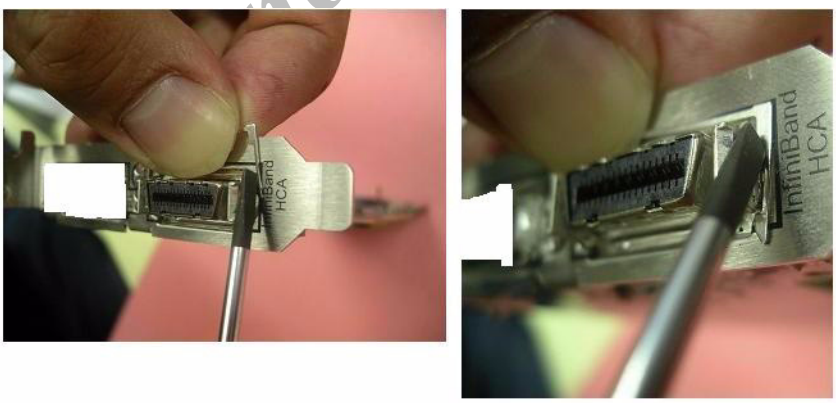


Figure 13 shows the HCA card after short bracket assembly.

Figure 13: Assembled Short Bracket View