ConnectX®-3 Ethernet Single and Dual SFP+ Ports Mezzanine Card User Manual for Open Compute Project

P/N:

MCX341A-XCAN, MCX341A-XCBN, MCX342A-XCAN

Rev 1.9

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Revision History

This document was printed on February 19, 2013.

Table 1 - Revision History Table

Date	Rev	Comments/Changes
February 2013	1.9	• Added Section 4.2, "VMware," on page 24 • Updated Figure 5, "PCI Device," on page 20 and Figure 6, "Device Manager," on page 23 • Updated all Web links
December 2012	1.8	• Updated labels in Figure 1, "MCX341A-XCAN Board Label," on page 11, Figure 2, "MCX341A-XCBN Board Label," on page 11 and Figure 3, "MCX342A-XCAN Board Label," on page 12 • Added "Cable Support" to Appendix A.1, "MCX342A-XCAN Specifications," on page 27 and Appendix A.2, "MCX341A-XC[AB]N Specifications," on page 28
October 2012	1.7	• Updated mechanical drawings removing unused components. See Appendix A.3, "Board Mechanical Drawing and Dimensions," on page 29
September 2012	1.6	• Fixed dimensions in Figure 8, "Mechanical Drawing of the Dual-port MCX342A-XCAN Mezzanine Card," on page 29 and Figure 9, "Mechanical Drawing of the Single-port MCX341A-XC[AB]N Mezzanine Card," on page 30
September 2012	1.5	• Added operational and non-operational temperature and humidity level to Table 7, "MCX342A-XCAN Specifications Table," on page 27 and Table 8, "MCX341A-XC[AB]N Specifications Table," on page 28
July 2012	1.4	• Added OPN MCX341A-XCBN to the following locations: • Chapter 1,"Overview" on page 10 • Table 3, "Single and Dual-port 10 Gigabit Ethernet Adapter Card," on page 10 • Figure 2, "MCX341A-XCBN Board Label," on page 11 • Table 6, "MCX341A-XC[AB]N VPD Layout," on page 17 • Appendix A.2, "MCX341A-XC[AB]N Specifications," on page 28 • Figure 9, "Mechanical Drawing of the Single-port MCX341A-XC[AB]N Mezzanine Card," on page 30 • Added new board label of the MCX341A-XCAN Mezz card. See Figure 1, "MCX341A-XCAN Board Label," on page 11. • Added Section 2.1.4, "Unified Extensible Firmware Interface (UEFI)," on page 14
May 2012	1.3	• Updated Figure 1, "MCX341A-XCAN Board Label," on page 11 to show board revision at A3

Date	Rev	Comments/Changes
April 2012	1.2	• Added note on SFP+ transceiver modules to Section 3.4, "Cables and Modules," on page 21 • Updated Figure 8, "Mechanical Drawing of the Dual-port MCX342A-XCAN Mezzanine Card," on page 29 • Added Figure 9, "Mechanical Drawing of the Single-port MCX341A-XC[AB]N Mezzanine Card," on page 30
March 2012	1.1	• Added Section 1.2, "Adapter Cards Covered in this Manual," on page 10 • Added new board labels to Section 1.3, "Finding the MAC and Serial Number on the Mezzanine Card," on page 11 • Updated Section 4.1.1, "Linux," on page 22
November 2011	1.0	First Release

About this Manual

This *User Manual* describes Mellanox Technologies ConnectX®-3 10 Gigabit Ethernet Single and Dual SFP+ Port PCI Express x4 Mezzanine cards. It provides details as to the interfaces of the board, specifications, required software and firmware for operating the board, and relevant documentation.

Intended Audience

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

The manual assumes basic familiarity with Ethernet networks and architecture specifications.

Related Documentation

Table 2 - Documents List

Mellanox Firmware Tools (MFT) User Manual Document no. 2204UG	User Manual describing the set of MFT firmware management tools for a single node. See http://www.mellanox.com => Support => Download Firmware Tools
IEEE Std 802.3 Specification	This is the IEEE Ethernet specification http://standards.ieee.org/getieee802
PCI Express 3.0 Specifications	Industry Standard PCI Express 3.0 Base and Card Electromechanical Specifications

Online Resources

• Mellanox Technologies web pages: http://www.mellanox.com

• Mellanox Technologies Firmware download web page:
  http://www.mellanox.com => Support => Download Center

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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• URL: http://www.mellanox.com => Support

• E-mail: support@mellanox.com

• Tel: +1.408.916.0055

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

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http://www.mellanox.com/supportdownloader/.

1   Overview

This document is a *User Manual* for Mellanox Technologies Ethernet Mezzanine cards based on the ConnectX®-3 EN integrated circuit device. The cards described in this manual have the following main features:

- IEEE Std. 802.3 compliant
- PCI Express 3.0 (1.1 and 2.0 compatible) through an x4 Mezzanine connector
- PCI Express 2.0 (1.1 compatible) through an x8 Mezzanine connector
- 10 Gb/s Ethernet
- Single and Dual SFP+ ports card
- RDMA over Converged Ethernet (RoCE)
- End-to-end QoS and congestion control
- Hardware-based I/O virtualization
- TCP/UDP/IP stateless off-load
- IPMI support
- Wake-on-LAN (WoL)
- Reset-on-LAN (RoL)
- RoHS-R6 compliant
- *For MCX341A-XCBN only*: Unified Extensible Firmware Interface (UEFI) support

1.1   Supported Network Protocol Standards

10 Gigabit Ethernet is an Ethernet network protocol standard for LANs specifying data transfer rate of 10Gb/s. Mellanox adapters comply with the following IEEE 802.3* standards:

- IEEE Std 802.3ae 10 Gigabit Ethernet
- IEEE Std 802.3ad Link Aggregation and Failover

1.2   Adapter Cards Covered in this Manual

Table 3 lists the single and dual port 10 Gigabit Ethernet adapter cards described in this manual.

Table 3 - Single and Dual-port 10 Gigabit Ethernet Adapter Card

Ordering Part Number (OPN)	PCI Express SERDES Speed	Data Transmis-sion Rate/ # of ports	RoHS	IC Part Number
MCX341A-XCAN	PCIe 3.0 x4 8GT/s PCIe 2.0 x8 5GT/s	10GigE single-port SFP+	R-6	MT27518A1-FCCR-XE
MCX341A-XCBN	PCIe 3.0 x4 8GT/s PCIe 2.0 x8 5GT/s	10GigE single-port SFP+	R-6	
MCX342A-XCAN	PCIe 3.0 x4 8GT/s PCIe 2.0 x8 5GT/s	10GigE dual-port SFP+	R-6	

1.3   Finding the MAC and Serial Number on the Mezzanine Card

Each Mellanox Mezzanine card has a label on the print side that shows the card serial number and the card MAC for Ethernet protocol.

Figure 1: MCX341A-XCAN Board Label

Figure 2: MCX341A-XCBN Board Label

Figure 3: MCX342A-XCAN Board Label

1.4   Safety Warnings

For safety warnings in French see "Avertissements de sécurité d'installation (Warnings in French)" on page 34. For safety warnings in German see "Sicherheitshinweise (Warnings in German)" on page 35. For safety warnings in Spanish see "Advertencias de seguridad para la instalación (Warnings in Spanish)" on page 37.

1.   **Installation Instructions**

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

2.   **Over-temperature**

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

3.   **During Lightning - Electrical Hazard**

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

4. Equipment Disposal

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

5. Local and National Electrical Codes

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

6. Hazardous Radiation Exposure

Caution – Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

CLASS 1 LASER PRODUCT and reference to the most recent laser standards: IEC 60 825-1:1993 + A1:1997 + A2:2001 and EN 60825-1:1994+A1:1996+ A2:2001

2 Mezzanine Card Interfaces

2.1 I/O Interfaces

Each Mezzanine card includes the following interfaces:

- PCI Express (PCIe) Mezzanine connector
- SFP+ empty cage
- I^2C-compatible connector (optional for debug purposes)
- *For MCX341A-XCBN only*: UEFI

2.1.1 Ethernet SFP+ Interface

The network ports of the ConnectX®-3 Mezzanine cards are compliant with the IEEE 802.3 Ethernet standards listed in Section 1.1, "Supported Network Protocol Standards," on page 10.

2.1.2 PCI Express Mezzanine Connector

The ConnectX®-3 Mezzanine card connects by means of one PCIe x8 Mezzanine card connector that holds the x8 PCIe signals from the motherboards. When connected to a PCIe Gen3 environment, firmware configures the card to use 4 lanes upon bring up.

2.1.3 I^2C-compatible Interface

A three-pin header on the Mezzanine cards is provided as the I^2C-compatible interface. See Figure 9, "Mechanical Drawing of the Single-port MCX341A-XC[AB]N Mezzanine Card," on page 30 for the location on the board.

Figure 4: I^2C-compatible Connector
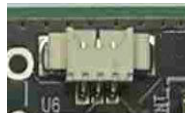
2.1.4 Unified Extensible Firmware Interface (UEFI)

The UEFI driver is located on the device option ROM and can be used for network boot (for example remote OS installation).

2.2 Power

All Mezzanine cards receive 5V and 3.3V power from the PCI Express Mezzanine connector. All other required power voltages are generated by on-board switch mode regulators. See "Specifications" on page 27.

2.3 Memory

The Mezzanine cards support multiple memory devices through the PCIe, SPI (Flash) and I^2C interfaces.

2.3.1   System Memory
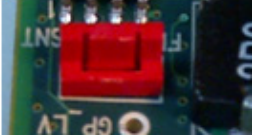
The Mezzanine cards utilize the PCI Express interface to store and access Ethernet fabric connection information and packet data on the system memory.

2.3.2   SPI

Each of the Mezzanine cards includes one 16MB SPI Flash device (M25PX16-VMN6P device by ST Microelectronics) accessible via the SPI interface of the ConnectX®-3 EN device.

There is a jumper on each Mezzanine card that indicates to the device whether an on-board Flash device is to be used or not. Table 4 provides information on this jumper.

Table 4 - Jumper Configuration

Description	Option	Card Default Configuration
Flash present/ not present	connection open – Flash present connection shorted – Flash not present 	connection open – Flash present

2.3.3   EEPROM

Each board incorporates an EEPROM that is accessible through the I^2C-compatible interface. The EEPROM capacity is 4Kb. The EEPROM is used for storing the Vital Product Data (VPD).

The PCI VPD (Vital Product Data) layout for each of the Mezzanine cards complies with the format defined in the *PCI 3.0 Specification, Appendix I.*

Table 5 - MCX342A-XCAN VPD Layout

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length [7:0] LSB	0x18		
2	Length [15:8] MSB	0x0		
3	Data	CX354A - ConnectX-3 QSFP	STR	
27	Large Resource Type VPD-R Tag (0x10)	0x90		
28	Length [7:0] LSB	0x4F		
29	Length [15:8] MSB	0x00		
30	VPD Keyword	PN	STR	Add in Card Part Number
32	Length	0x15		
33	Part Number	PN	%STR_SPC	

Table 5 - MCX342A-XCAN VPD Layout

Offset (Decimal)	Item	Value	Format	Description
54	VPD Keyword	EC	STR	Engineering Change Level of the card (rev)
56	Length	0x2		
57	Revision	RV	%STR	PCB revision
59	VPD Keyword	SN	STR	Serial Number
61	Length	0x18		
62	SerialNumber	SN	%STR_SPC	"00..00XXXX..XX"
86	VPD Keyword	V0	STR	Misc Information
88	Length	0x10		
89	Data	PCIe Gen3 x8	STR_SPC	
105	VPD Keyword	RV	STR	
107	Length	0x1		
108	Data	0,107	%CS0	
109	Large Resource Type VPD-W Tag (0x11)	0x91		
110	Length [7:0] LSB	0x8F		
111	Length [15:8] MSB	0xF		
112	VPD Keyword	V1	STR	EFI Driver version
114	Length	0x6		
115	Data	N/A	STR_SPC	
121	VPD Keyword	YA	STR	Asset Tag
123	Length	0x18		
124	Data	N/A	STR_SPC	"N/A"
148	VPD Keyword	RW	STR	Remaining read/write area
150	Length	0x69		
151	Data		STR_ZERO	Reserved (0x00)
256	VPD Keyword	RW	STR	Remaining read/write area
258	Length	0xfd		
259	Data		STR_ZERO	Reserved (0x00)
512	VPD Keyword	RW	STR	Remaining read/write area
514	Length	0xfd		
515	Data		STR_ZERO	Reserved (0x00)
768	VPD Keyword	RW	STR	Remaining read/write area
770	Length	0xfd		
771	Data		STR_ZERO	Reserved (0x00)
1024	VPD Keyword	RW	STR	Remaining read/write area
1026	Length	0xfd		
1027	Data		STR_ZERO	Reserved (0x00)
1280	VPD Keyword	RW	STR	Remaining read/write area
1282	Length	0xfd		
1283	Data		STR_ZERO	Reserved (0x00)
1536	VPD Keyword	RW	STR	Remaining read/write area
1538	Length	0xfd		

Table 5 - MCX342A-XCAN VPD Layout

Offset (Decimal)	Item	Value	Format	Description
1539	Data		STR_ZERO	Reserved (0x00)
1792	VPD Keyword	RW	STR	Remaining read/write area
1794	Length	0xfd		
1795	Data		STR_ZERO	Reserved (0x00)
2048	VPD Keyword	RW	STR	Remaining read/write area
2050	Length	0xfd		
2051	Data		STR_ZERO	Reserved (0x00)
2304	VPD Keyword	RW	STR	Remaining read/write area
2306	Length	0xfd		
2307	Data		STR_ZERO	Reserved (0x00)
2560	VPD Keyword	RW	STR	Remaining read/write area
2562	Length	0xfd		
2563	Data		STR_ZERO	Reserved (0x00)
2816	VPD Keyword	RW	STR	Remaining read/write area
2818	Length	0xfd		
2819	Data		STR_ZERO	Reserved (0x00)
3072	VPD Keyword	RW	STR	Remaining read/write area
3074	Length	0xfd		
3075	Data		STR_ZERO	Reserved (0x00)
3328	VPD Keyword	RW	STR	Remaining read/write area
3330	Length	0xfd		
3331	Data		STR_ZERO	Reserved (0x00)
3584	VPD Keyword	RW	STR	Remaining read/write area
3586	Length	0xfd		
3587	Data		STR_ZERO	Reserved (0x00)
3840	VPD Keyword	RW	STR	Remaining read/write area
3842	Length	0xfc		
3843	Data		STR_ZERO	Reserved (0x00)
4095	Small Resource Type END Tag (0x11)	0x78		

Table 6 - MCX341A-XC[AB]N VPD Layout

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length [7:0] LSB	0x18		
2	Length [15:8] MSB	0x0		
3	Data	CX341A - Con-nectX-3 SFP+	STR	
27	Large Resource Type VPD-R Tag (0x10)	0x90		
28	Length [7:0] LSB	0x4F		

Table 6 - MCX341A-XC[AB]N VPD Layout

Offset (Decimal)	Item	Value	Format	Description
29	Length [15:8] MSB	0x00		
30	VPD Keyword	PN	STR	Add in Card Part Number
32	Length	0x15		
33	Part Number	PN	%STR_SPC	
54	VPD Keyword	EC	STR	Engineering Change Level of the card (rev)
56	Length	0x2		
57	Revision	RV	%STR	PCB revision
59	VPD Keyword	SN	STR	Serial Number
61	Length	0x18		
62	SerialNumber	SN	%STR_SPC	"00..00XXXX..XX"
86	VPD Keyword	V0	STR	Misc Information
88	Length	0x10		
89	Data	PCIe Gen3 x8	STR_SPC	
105	VPD Keyword	RV	STR	
107	Length	0x1		
108	Data	0,107	%CS0	
109	Large Resource Type VPD-W Tag (0x11)	0x91		
110	Length [7:0] LSB	0x8F		
111	Length [15:8] MSB	0xF		
112	VPD Keyword	V1	STR	EFI Driver version
114	Length	0x6		
115	Data	N/A	STR_SPC	
121	VPD Keyword	YA	STR	Asset Tag
123	Length	0x18		
124	Data	N/A	STR_SPC	"N/A"
148	VPD Keyword	RW	STR	Remaining read/write area
150	Length	0x69		
151	Data		STR_ZERO	Reserved (0x00)
256	VPD Keyword	RW	STR	Remaining read/write area
258	Length	0xfd		
259	Data		STR_ZERO	Reserved (0x00)
512	VPD Keyword	RW	STR	Remaining read/write area
514	Length	0xfd		
515	Data		STR_ZERO	Reserved (0x00)
768	VPD Keyword	RW	STR	Remaining read/write area
770	Length	0xfd		
771	Data		STR_ZERO	Reserved (0x00)
1024	VPD Keyword	RW	STR	Remaining read/write area
1026	Length	0xfd		
1027	Data		STR_ZERO	Reserved (0x00)
1280	VPD Keyword	RW	STR	Remaining read/write area

Table 6 - MCX341A-XC[AB]N VPD Layout

Offset (Decimal)	Item	Value	Format	Description
1282	Length	0xfd		
1283	Data		STR_ZERO	Reserved (0x00)
1536	VPD Keyword	RW	STR	Remaining read/write area
1538	Length	0xfd		
1539	Data		STR_ZERO	Reserved (0x00)
1792	VPD Keyword	RW	STR	Remaining read/write area
1794	Length	0xfd		
1795	Data		STR_ZERO	Reserved (0x00)
2048	VPD Keyword	RW	STR	Remaining read/write area
2050	Length	0xfd		
2051	Data		STR_ZERO	Reserved (0x00)
2304	VPD Keyword	RW	STR	Remaining read/write area
2306	Length	0xfd		
2307	Data		STR_ZERO	Reserved (0x00)
2560	VPD Keyword	RW	STR	Remaining read/write area
2562	Length	0xfd		
2563	Data		STR_ZERO	Reserved (0x00)
2816	VPD Keyword	RW	STR	Remaining read/write area
2818	Length	0xfd		
2819	Data		STR_ZERO	Reserved (0x00)
3072	VPD Keyword	RW	STR	Remaining read/write area
3074	Length	0xfd		
3075	Data		STR_ZERO	Reserved (0x00)
3328	VPD Keyword	RW	STR	Remaining read/write area
3330	Length	0xfd		
3331	Data		STR_ZERO	Reserved (0x00)
3584	VPD Keyword	RW	STR	Remaining read/write area
3586	Length	0xfd		
3587	Data		STR_ZERO	Reserved (0x00)
3840	VPD Keyword	RW	STR	Remaining read/write area
3842	Length	0xfc		
3843	Data		STR_ZERO	Reserved (0x00)
4095	Small Resource Type END Tag (0x11)	0x78		

3   Ethernet Mezzanine Card Installation

3.1   Hardware Requirements

This card requires a PCI Express connector as specified in the Open Compute Project Intel Motherboard spec v2.0.

3.2   Installation Instructions

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

The cards require a PCI Express x4 or x8 Mezzanine connector. Please consult the host machine documentation for instructions on how to install a PCI Express Mezzanine connector.

> If the card is installed in a PCI Mezzanine connector with less lanes than the card requires then the Mezzanine card will not provide the optimum data transfer.

3.3   Identify the Card in Your System

3.3.1   On Windows

1. Open Device Manager on the server. Click start => Run, and then enter "devmgmt.msc".
2. Expand System Devices and locate your Mellanox ConnectX-3 Mezzanine card.
3. Select Properties to display the Mezzanine card properties window.
4. Click the Details tab and select **Device Instance Id** (Windows 2003) or **Hardware Ids** (Windows 2008/R2) from the Property pull-down menu.

Figure 5: PCI Device
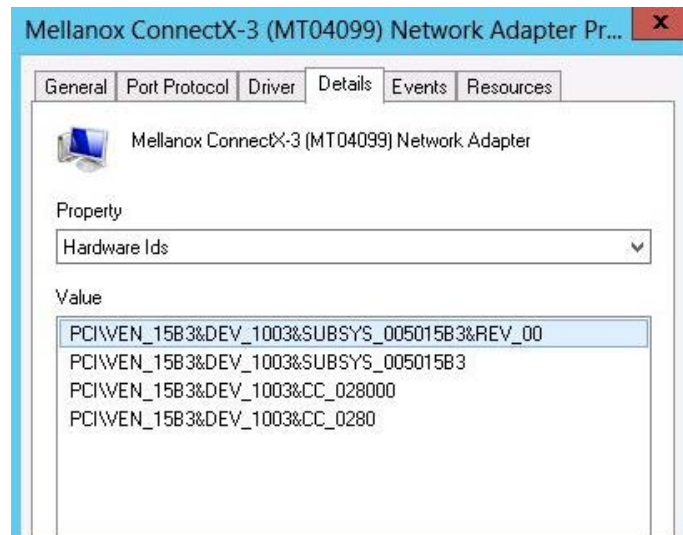
5. In the Value display box, check the fields VEN and DEV (fields are separated by '&'). In the display example above, notice the sub-string "PCI\VEN_15B3&DEV_1003": VEN is equal

to 0x15B3 – this is the Vendor ID of Mellanox Technologies; and DEV is equal to 1003 – this is a valid Mellanox Technologies PCI Device ID.

> If the PCI device does not have a Mellanox Mezzanine ID, return to Step 4 to check another device.

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

3.3.2 On Linux

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

```
> lspci |grep -i Mellanox
27:00.0 Network controller: Mellanox Technologies MT27500 Family [ConnectX-3]
```

3.4   Cables and Modules

The SFP+ port can connect to the Ethernet through both direct attach cables and stand alone transceivers with optical cables. SFP+ transceiver modules are available for both SR and LR protocols.

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

Note: In order to support SFP+ transceiver modules, the host must supply 3.3Vaux = 3.3V -3% / +5%, or use 3.3V -7% tolerant modules.

4   Driver Software and Firmware

4.1   Driver Software

4.1.1   Linux

For Linux, download and install the latest MLNX_EN driver software package available via the Mellanox web site at: http://www.mellanox.com => Products => Software => Ethernet Drivers => ConnectX® EN 10GigE Linux Driver => Download. Follow the installation instructions included in the download package (also available from the download page). To ensure that communication has been established follow the instructions below.

To assign an IP address to the interface run:

```
> ifconfig eth<x> <ip>
```

where 'x' is the OS assigned interface number.

To check driver and device information run:

```
> ethtool -i eth<x>
```

Example:

```
> ethtool -i eth2

driver: mlx4_en (MT_1020110019_CX-3)

version: 1.5.6.33 (Oct 2011)

firmware-version: 2.10.0000

bus-info: 0000:07:00.0
```

4.1.2   Windows

For Windows, download the MLNX EN – Ethernet driver. Download this package from the Mellanox web site at: http://www.mellanox.com => Products => Software => Ethernet Drivers => ConnectX® EN 10GigE Windows Driver => Download. Follow the installation instructions included in the download package (also available from the download page). To ensure that communication has been established follow the instructions below.

To display a summary of network Mezzanine software-, firmware- and hardware-related information such as driver version, firmware version, bus interface, Mezzanine identity, and network port link information, perform the following steps:

Step 1: Display the Device Manager

Figure 6: Device Manager
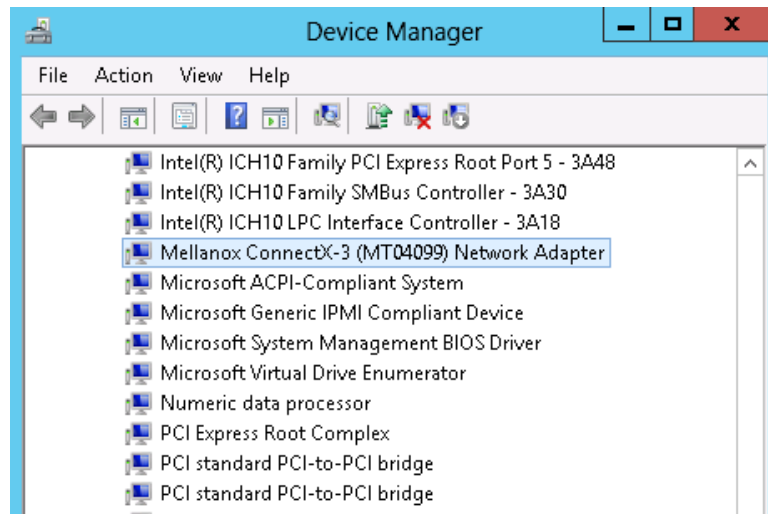
Step 2: Right-click a Mellanox ConnectX-3 Ethernet adapter (under "Network adapters list) and left-click Properties.

Step 3: Select the Information tab from the Properties sheet.
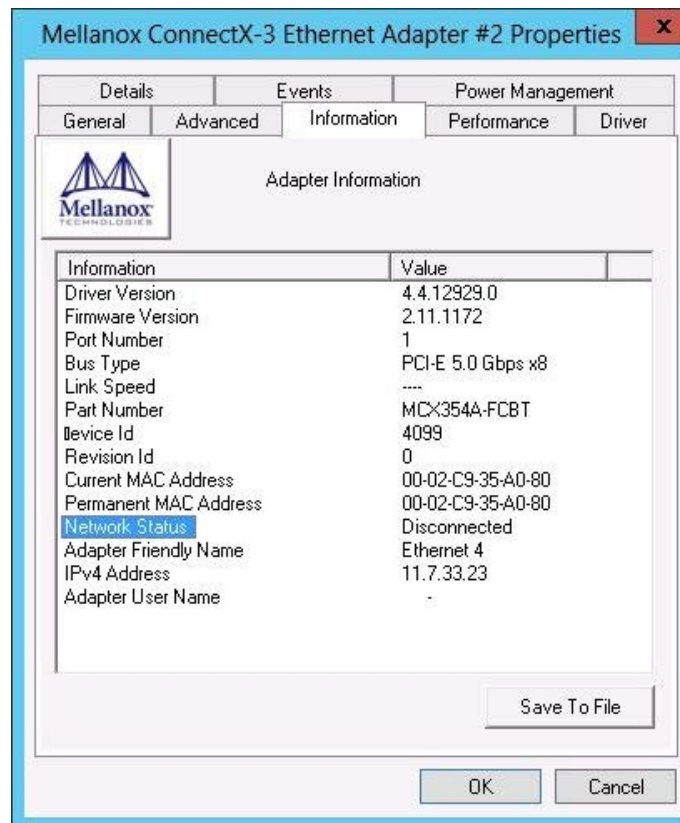
To save this information for debug purposes, click Save To File and provide the output file name.

4.2   VMware

For VMware download and install the latest Mellanox OFED Driver for VMware® ESXi Server-software package available via the Mellanox web site at: http://www.mellanox.com => Products => Software => Ethernet Drivers => ConnectX® EN 10GbE Driver for VMware® ESX Server => Download. Follow the installation instructions included in the download package (also available from the download page).

4.3   FlexBoot

Mellanox FlexBoot is a multiprotocol remote boot technology. FlexBoot supports remote Boot remote boot over Ethernet, Boot over Ethernet (BoE) or Boot over iSCSI (Bo-iSCSI). Using Mellanox Virtual Protocol Interconnect (VPI) technologies available in ConnectX® adapters, FlexBoot gives IT Managers' the choice to boot from a remote storage target (iSCSI target) or a LAN target (Ethernet Remote Boot Server) using a single ROM image on Mellanox ConnectX products.This technology is based on the Preboot Execution Environment (PXE) standard specification, and FlexBoot software is based on the open source iPXE project (see www.ipxe.org). For more information go to http://www.mellanox.com=> Products => Software => Ethernet Drivers => FlexBoot => Download.

4.4   RDMA over Converged Ethernet

ConnectX®-3 connected to an Ethernet fabric provides all of the basic NIC functionality plus RDMA over Converged Ethernet (RoCE). RoCE utilizes advances in Data Center Bridging (DCB) to enable efficient and low cost implementations of RDMA over Ethernet, supporting the entire breadth of RDMA and low latency features. This includes reliable connected service, datagram service, RDMA and send/receive semantics, atomic operations, user level multicast, user level I/O access, kernel bypass, and zero copy. This capability is enabled when using the Mellanox OFED or WinOF VPI drivers.

ConnectX®-3 EN with RoCE based network management is the same as that for any Ethernet and DCB-based network management, eliminating the need for IT managers to learn new technologies.

4.4.1   Hardware and Software Requirements

Software:

•   Mellanox OFED 1.5.3 or WinOF VPI 4.5or later

Hardware:

•   ConnectX®-3 Mezzanine card

4.5   Updating Mezzanine Card Firmware

Each card is shipped with the latest version of qualified firmware at the time of manufacturing. Firmware is updated occasionally, and the most recent firmware can be obtained from: http://www.mellanox.com => Support => Download Firmware. Check that the firmware on your card is the latest found on the Mellanox site, if not update to the latest version found on the Mellanox web site.

Firmware can be updated on the stand alone single card using the **flint** tool of the *Mellanox Firmware Tools (MFT)* package. This package is available for download, along with its user manual,

from the Mellanox Firmware Tools page. See http://www.mellanox.com => Products => Software => Ethernet Drivers => Firmware Tools.

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

The following steps describe how to retrieve the PSID (firmware identification) and programmed firmware version of your Mezzanine card. They also describe how to update the card with the latest firmware version available.

1. Retrieve the PSID and firmware version:

    a. Install the MFT package. The package is available at http://www.mellanox.com => Products Software => Ethernet Drivers => => Firmware Tools. Make sure to download the package corresponding to your computer's operating system.

   a. Enter: mst start.

   b. Get the Mellanox *mst device name* using the command "mst status". The mst device name will be of the form: /dev/mst/mt4099_pci_cr0.

   c. Get the PSID (firmware identification) and programmed firmware version using the command.

```
> flint -d /dev/mst/mt4099_pci_cr0  q
Image type:     ConnectX
FW Version:     2.9.4000
Device ID:       4099
Chip Revision:  0
Description:    Node              Port1              Port2
Sys image
GUIDs:              000002c900000200 000002c900000201 000002c900000202
000002c900000203
MACs:
000002c90200        000002c90201
Board ID:          (MT_1020110019)
VSD:
PSID:               MT_1020110019
```

2. Compare the programmed firmware version with the latest available.

    a. Go to Mellanox's web site: http://www.mellanox.com/supportdownloader. See Figure 7.

   d. Enter your card PSID to display the latest firmware.

Figure 7: Support Download Assistant

3. If a newer firmware version exists for your Mezzanine card, update the firmware as follows:

   a. Download the firmware image zip file from the Download Center (see Step 2a above).

   e. Unzip the firmware image.

   f. Burn the firmware image. Enter:

```
> flint -d /dev/mst/mt4099_pci_cr0 -i <binary image> burn
```

   g. Reboot the computer.

   h. Enter: mst start.

   i. Verify that the card firmware was updated successfully.

```
> flint -d /dev/mst/mt4099_pci_cr0  q
Image type:      ConnectX
FW Version:      2.9.4100
Device ID:       4099
...
```

Appendix A: Specifications

A.1 MCX342A-XCAN Specifications

Table 7 - MCX342A-XCAN Specifications Table

Physical	**Size:** 2.68in. x 4.3 in. (68mm x 110mm)
	Connector: SFP+ 10Gb/s
Protocol Support	**Ethernet:** 10GBASE-SR, 10GBASE-LR, and 10GBASE-CX
	Data Rate: 1/10Gb/s – Ethernet
	PCI Express Gen3: SERDES @ 8.0GT/s, 4 lanes (2.0 and 1.1 compatible) **PCI Express Gen2:** SERDES @ 5.0GT/s, 8 lanes (1.1 compatible)
Power and Environmental	**Voltage:** 5V, 3.3V
	Typ Power: PCIe x4 Gen3 Passive Cables 3.95W PCIe x8 Gen2 Passive Cables 4.97W
	Max Power: PCIe x4 Gen3 Passive Cables 5.33W PCIe x8 Gen2 Passive Cables 6.24W
	Temperature: Operational: 0°C to 45°C Non-operational: 0°C to 70°C
	Humidity: 90% relative humidity[a]
	Air Flow: 200LFM[b]
Regulatory	**EMC:** Refer to the following link: www.mellanox.com/related-docs/user_manuals/ Regulatory_and_Compliance_Guide.pdf
	Safety: IEC/EN 60950-1:2006 ETSI EN 300 019-2-2 IEC 60068-2- 64, 29, 32
	RoHS: RoHS-R6
Cable Support	Please refer to "Mellanox Products Approved Cable Lists" at: www.mellanox.com/related-docs/user_manuals/Mellanox_approved_cables.pdf

a. For both operational and non-operational states

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

A.2   MCX341A-XC[AB]N Specifications

Table 8 - MCX341A-XC[AB]N Specifications Table

Physical	**Size:** 2.68in. x 4.3 in. (68mm x 110mm)
	Connector: SFP+ 10Gb/s
Protocol Support	**Ethernet:** 10GBASE-SR, 10GBASE-LR, and 10GBASE-CX
	Data Rate: 1/10Gb/s – Ethernet
	PCI Express Gen3: SERDES @ 8.0GT/s, 4 lanes (2.0 and 1.1 compatible) **PCI Express Gen2:** SERDES @ 5.0GT/s, 8 lanes (1.1 compatible)
Power and Environmental	**Voltage:** 5V, 3.3V

	Typ Power: PCIe x4 Gen3
	        Passive Cables 3.72W
	
	        PCIe x8 Gen2
	        Passive Cables 4.79W

	Max Power: PCIe x4 Gen3
	        Passive Cables 5.10W
	
	        PCIe x8 Gen2
	        Passive Cables 5.91W

	Temperature: Operational: 0°C to 45°C Non-operational: 0°C to 70°C
	Humidity: 90% relative humidity[a]
	Air Flow: 200LFM[b]
Regulatory	**EMC:** Refer to the following link: www.mellanox.com/related-docs/user_manuals/ Regulatory_and_Compliance_Guide.pdf

	Safety: IEC/EN 60950-1:2006
	        ETSI EN 300 019-2-2
	        IEC 60068-2- 64, 29, 32

	RoHS: RoHS-R6
Cable Support	Please refer to "Mellanox Products Approved Cable Lists" at: www.mellanox.com/related-docs/user_manuals/Mellanox_approved_cables.pdf

a. For both operational and non-operational states

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

A.3   Board Mechanical Drawing and Dimensions

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

Figure 8: Mechanical Drawing of the Dual-port MCX342A-XCAN Mezzanine Card
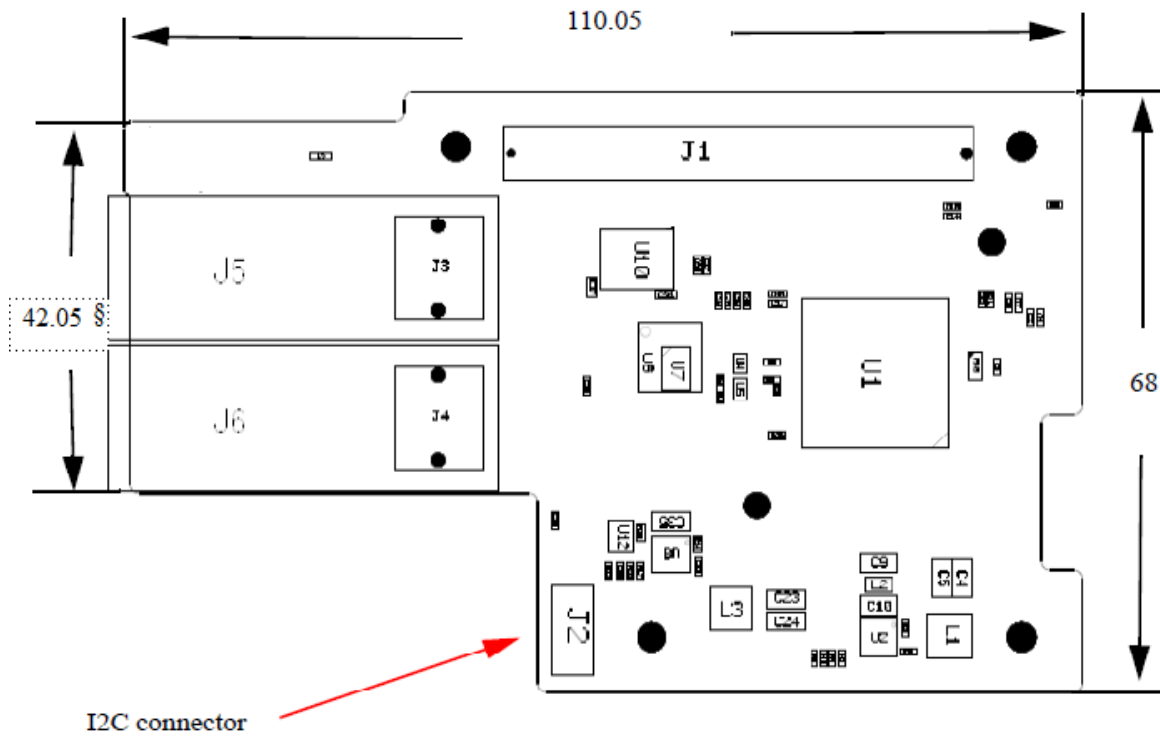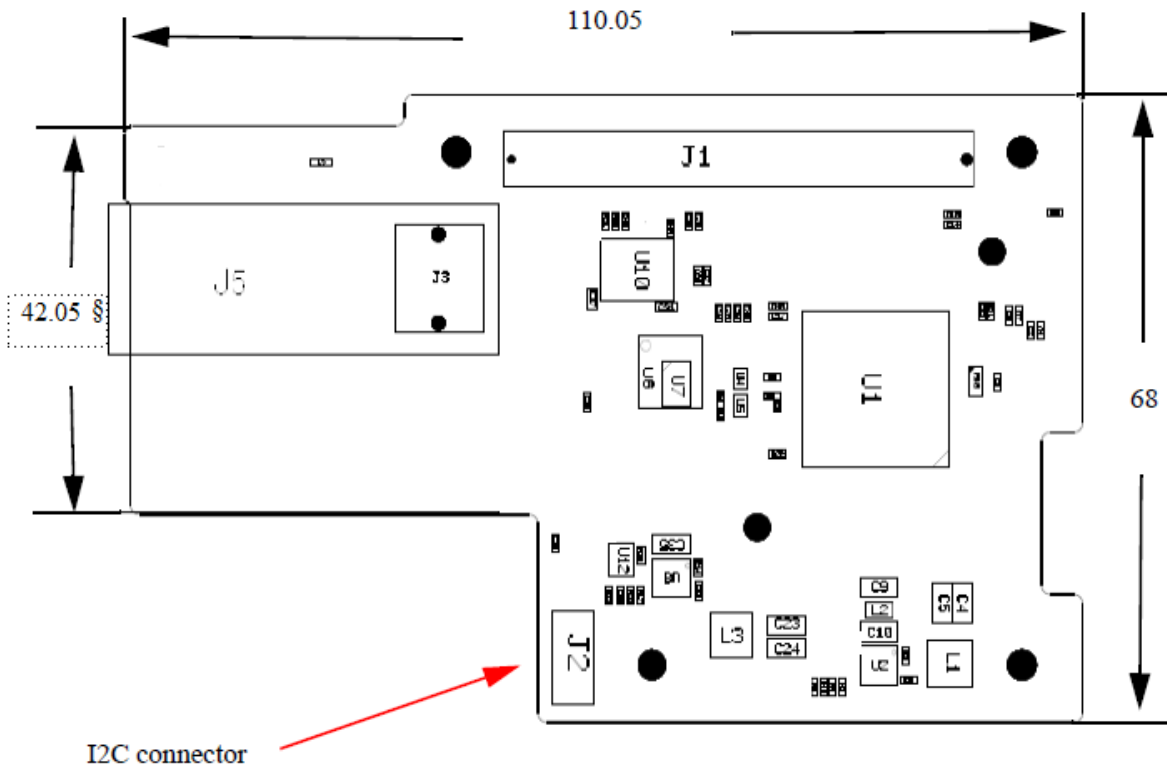

I2C connector

Figure 9: Mechanical Drawing of the Single-port MCX341A-XC[AB]N Mezzanine Card

A.4 Regulatory Statements

For regulatory statements for all ConnectX®-3 cards please refer to: http://www.mellanox.com/related-docs/user_manuals/Regulatory_and_Compliance_Guide.pdf

Appendix B: Interface Connectors Pinout

B.1   I^{2}C-compatible Connector Pinout

Figure 10: Compatible Connector Plug and Pinout
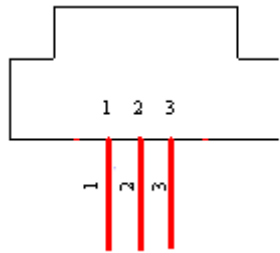
Table 9 - I2C-compatible Connector Pinout

Connector Pin Number	Signal Name
1	SPSDA
2	SPSCL
3	GND

B.2   PCI Express x4 Connector Pinout

The Mezzanine cards use a standard PCI Express x4 Mezzanine connector and the PCI Express x4 standard pinout according to the PCI Express 3.0 specification. The card also uses a standard PCI Express x8 Mezzanine connector and the PCI Express x8 standard pinout according to the PCI Express 2.0 specification.

Figure 11: PCIe Connector Pinout

| Pin	Signal		Signal	Pin
61	P12V-1		RSVD/MEZZ_PRSNT1_N	1
62	P12V-2		P5V_AUX-1	2
63	P12V-3		P5V_AUX-2	3
64	GND-26		P5V_AUX-3	4
65	GND-27		GND-1	5
66	P3V3_AUX-2		GND-2	6
67	GND-28		P3V3_AUX-1	7
68	GND-29		GND-3	8
69	P3V3-5		GND-4	9
70	P3V3-6		P3V3-1	10
71	P3V3-7		P3V3-2	11
72	P3V3-8		P3V3-3	12
73	GND-30		P3V3-4	13
74	LAN_3V3STB_ALERT_N		RSVD/MEZZ_CPRSNT1_N	14
75	SMB_LAN_3V3STB_CLK		RSVD/MEZZ_CPRSNT2_N	15
76	SMB_LAN_3V3STB_DAT		RSVD/SSD_PRSNT_N	16
77	PCIE_WAKE_N		RST_PLT_MEZZ_N	17
78	RSVD/DA_DSS		RSVD/MEZZ_SMCLK	18
79	GND-31		RSVD/MEZZ_SMDATA	19
80	RSVD/SATA_TX+		GND-5	20
81	RSVD/SATA_TX-		GND-6	21
82	GND-32		RSVD/SATA_RX+	22
83	GND-33		RSVD/SATA_RX-	23
84	CLK_100M_MEZZ2_DP		GND-7	24
85	CLK_100M_MEZZ2_DN		GND-8	25
86	GND-34		RSVD/CLK_100M_MEZZ1_DP	26
87	GND-35		RSVD/CLK_100M_MEZZ1_DN	27
88	MEZZ_TX_DP_C[0]		GND-9	28
89	MEZZ_TX_DN_C[0]		GND-10	29
90	GND-36		MEZZ_RX_DP[0]	30
91	GND-37		MEZZ_RX_DN[0]	31
92	MEZZ_TX_DP_C[1]		GND-11	32
93	MEZZ_TX_DN_C[1]		GND-12	33
94	GND-38		MEZZ_RX_DP[1]	34
95	GND-39		MEZZ_RX_DN[1]	35
96	MEZZ_TX_DP_C[2]		GND-13	36
97	MEZZ_TX_DN_C[2]		GND-14	37
98	GND-40		MEZZ_RX_DP[2]	38
99	GND-41		MEZZ_RX_DN[2]	39
100	MEZZ_TX_DP_C[3]		GND-15	40
101	MEZZ_TX_DN_C[3]		GND-16	41
102	GND-42		MEZZ_RX_DP[3]	42
103	GND-43		MEZZ_RX_DN[3]	43
104	MEZZ_TX_DP_C[4]		GND-17	44
105	MEZZ_TX_DN_C[4]		GND-18	45
106	GND-44		MEZZ_RX_DP[4]	46
107	GND-45		MEZZ_RX_DN[4]	47
108	MEZZ_TX_DP_C[5]		GND-19	48
109	MEZZ_TX_DN_C[5]		GND-20	49
110	GND-46		MEZZ_RX_DP[5]	50
111	GND-47		MEZZ_RX_DN[5]	51
112	MEZZ_TX_DP_C[6]		GND-21	52
113	MEZZ_TX_DN_C[6]		GND-22	53
114	GND-48		MEZZ_RX_DP[6]	54
115	GND-49		MEZZ_RX_DN[6]	55
116	MEZZ_TX_DP_C[7]		GND-23	56
117	MEZZ_TX_DN_C[7]		GND-24	57
118	GND-50		MEZZ_RX_DP[7]	58
119	GND-51		MEZZ_RX_DN[7]	59
120	GND-52/MEZZ_PRSNT2_N		GND-25	60

FCI PCIe Connector - Plug

B.3 SFP+ Pinout

Figure 12: SFP+ Cage Pinout
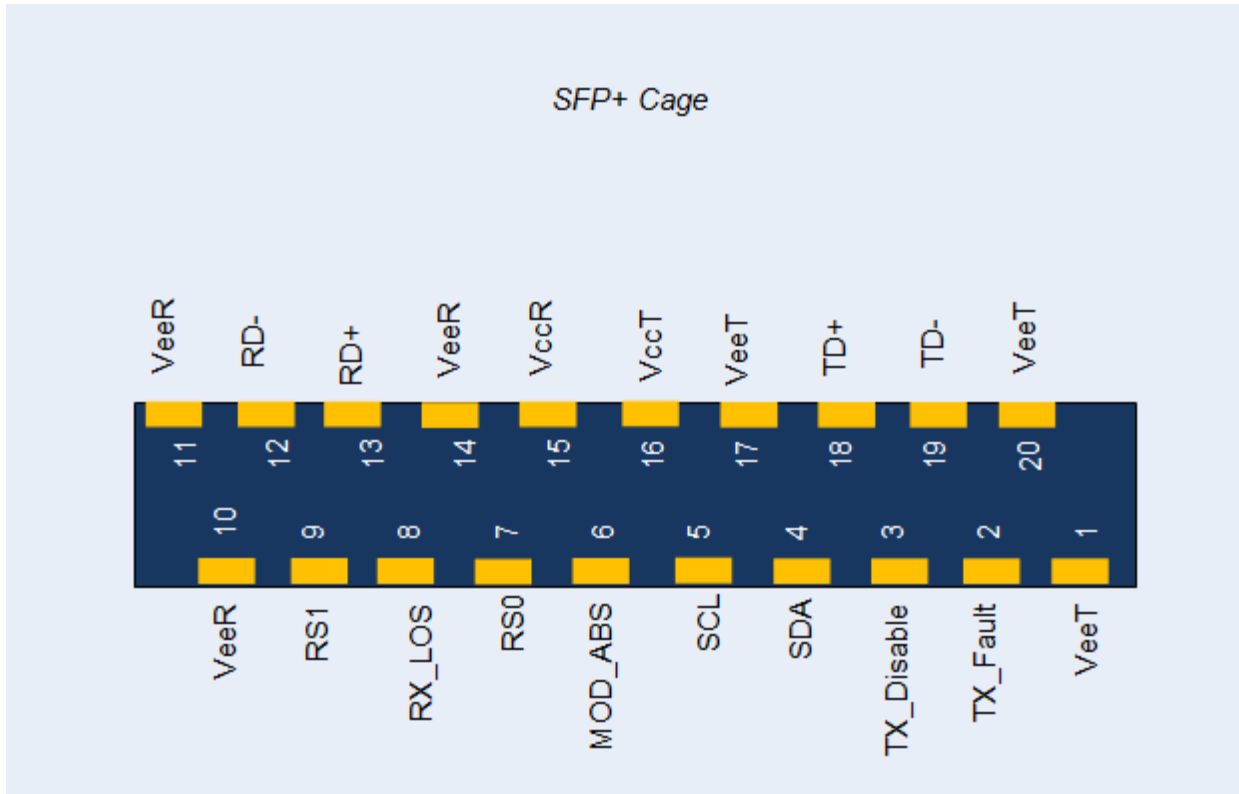
Appendix C: Avertissements de sécurité d'installation (Warnings in French)

1. Instructions d'installation

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

2. Température excessive

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

3. Orages – dangers électriques

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

4. Installation du matériel

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

5. Elimination du matériel

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

6. Codes électriques locaux et nationaux

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

7. Exposition au rayonnement grave

Mise en garde – l'utilisation de commandes ou de réglages ou l'exécution de procédures autres que ce qui est spécifié dans les présentes peut engendrer une exposition au rayonnement grave.

PRODUIT LASER DE CLASSE 1 » et références aux normes laser les plus récentes CEI 60 825-1:1993 + A1:1997 + A2:2001 et NE 60825-1:1994+A1:1996+ A2:2001

Appendix D: Sicherheitshinweise (Warnings in German)

1. Installationsanleitungen

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

2. Übertemperatur

Dieses Gerät sollte nicht in einem Bereich mit einer Umgebungstemperatur über der maximal empfohlenen Temperatur von 55°C (131°F) betrieben werden. Es ist ein Luftstrom von 200 LFM bei maximaler Umgebungstemperatur erforderlich. Außerdem sollten mindestens 8 cm (3 in.) Freiraum um die Belüftungsöffnungen sein, um einen einwandfreien Luftstrom zu gewährleisten.

3. Bei Gewitter - Elektrische Gefahr

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

4. Geräteinstallation

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

5. Geräteentsorgung

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

6. Regionale und nationale elektrische Bestimmungen t

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

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

7. Strahlenkontak

Achtung – Nutzung von Steuerungen oder Einstellungen oder Ausführung von Prozeduren, die hier nicht spezifiziert sind, kann zu gefährlichem Strahlenkontakt führen..

Klasse 1 Laserprodukt und Referenzen zu den aktuellsten Lasterstandards : ICE 60 825-1:1993 + A1:1997 + A2:2001 und EN 60825-1:1994+A1:1996+ A2:2001

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

1. Instrucciones de instalación

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

2. Sobrecalentamiento

No se debe utilizar el equipo en un área con una temperatura ambiente superior a la máxima recomendada: 55°C(131°F). Además, para garantizar una circulación de aire adecuada, se debe dejar como mínimo un espacio de 8 cm (3 pulgadas) alrededor de las aberturas de ventilación.

3. Cuando hay rayos: peligro de descarga eléctrica

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

4. Instalación de equipos

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

5. Eliminación de equipos

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

6. Códigos eléctricos locales y nacionales

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

7. Exposición a niveles de radiación peligrosos

Precaución: el uso de controles o ajustes o la realización de procedimientos distintos de los que aquí se especifican podrían causar exposición a niveles de radiación peligrosos.

PRODUCTO LÁSER DE CLASE 1 y referencia a las normas de láser más recientes: IEC 60825-1:2007/03 y EN 60825-1:2007