ConnectX® EN Dual Port Ethernet Network Interface Cards with SFP+ Connectors User's Manual

P/N: MNPH18-XTC, MNPH28B-XTC, MNPH28B-XSC, MNPH29B-XTC, MNPH29B-XSC

Rev 1.4

ConnectX® EN Dual Port Ethernet Adapter Cards with SFP+ Connectors User's Manual

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Revision History

This document was printed on 10/22/08.

Table 1 - Revision History Table

Date	Rev	Comments/Changes
October 2008	1.4	Fixed typo in Specifications tables
August 2008	1.3	Added EMC and Safety Certs for MNPH28-XSC, MNPH29-XTC, and MNPH29-XSC,
August 2008	1.2	Added EMC and Safety Certs
August 2008	1.1	Added Safety warnings in German added hazardous radiation warning Added Driver software and Firmware sections 3.2, 3.3, and 3.4
August 2008	1.0	Initial release

About this Manual

This *User's Manual* describes Mellanox Technologies Ethernet PCI Express Network Interface 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 Ethernet networks.

Related Documentation

Table 1 - Documents List

ConnectX®EN (MTNIC) PRM Document Number: DOC18348	Reference describing the interface used by developers to write a device driver.
ConnectX®EN Hardware Reference Manual Document Number: 2788HM	Reference for hardware engineers responsible for designing systems and boards.
Mellanox Firmware Tools (MFT) User's Manual Document Number: 2204UG	User's Manual describing the set of MFT firmware management tools. See http://www.mellanox.com under 'Firmware' downloads.
PCI Express 2.0 Specifications	Industry Standard PCI Express 2.0 Card Electromechanical Specification, Rev 1.3.
SFP+ Module Spec sheet Document Number: 2957	Reference for the Mellanox SFP + Module

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.

1 Overview

This document is a *User's Manual* for Mellanox Technologies Ethernet Network Interface Cards (NICs) based on the MT25408 ConnectX® EN integrated circuit device. The cards described in this manual have the following main features:

- IEEE 802.3ae compliant
- Two 10GBASE-SR or 10GBASE-LR optical ports for connecting Ethernet traffic
- Supports 10GBASE-CR Twinax copper cables
- PCI Express 2.0 (1.1 compatible) through an x8 edge connector up to 5GT/s
- EU Restriction of Hazardous Substances (RoHS) compliant

The cards differ in:

- 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 1 on page 9 lists the Ethernet NICs described in this manual.

Table 1 - Ethernet SFP+ Network Interface Cards

Ordering Part Number (OPN)	PCI Express SERDES Speed	Data Transmis-sion Rate/ # of ports	Short / Tall Bracket	RoHS Compliance	Adapter IC Part Number	NIC Photo
MNPH18B-XSC	2.5 PCIe Gen1	10 +10 Gb/s 1 ports	Short	RoHS-R5 (with exemption)	MT25408A0-FCC-SE	
MNPH28B-XSC	2.5 PCIe Gen1	10 +10 Gb/s 2 ports	Short	RoHS-R5 (with exemption)	MT25408A0-FCC-SE	
MNPH28B-XTC	2.5 PCIe Gen1	10 +10 Gb/s 2 ports	Tall	RoHS-R5 (with exemption)	MT25408A0-FCC-SE	
MNPH19B-XSC	5.0 PCIe Gen2	10 +10 Gb/s 1 ports	Short	RoHS-R5 (with exemption)	MT25408A0-FCC-TE	 Short
MNPH29B-XSC	5.0 PCIe Gen2	10 +10 Gb/s 2 ports	Short	RoHS-R5 (with exemption)	MT25408A0-FCC-TE	
MNPH29B-XTC	5.0 PCIe Gen2	10 +10 Gb/s 2 ports	Tall	RoHS-R5 (with exemption)	MT25408A0-FCC-TE	 Tall

The MNPH Ethernet adapter cards are not shipped with modules. These modules must be purchased separately from Mellanox Technologies. The Ordering Part Numbers for the Mellanox SFP+ optical modules are shown in the table below.

Figure 1: SFP+ Optical Module

Spec	Model number	Module
10GBASE-SR	MFM1T02A-SR	
10GBASE-LR	MFM1T02A-LRM	

Note: SR and LR modules not recommended by Mellanox may not work with the adapter.

1.2 Mellanox Part Numbering Legend

Table 2 describes the Mellanox Technologies adapter cards part numbering legend.

Table 2 - Mellanox Adapter Cards Part Numbering Key

Adapter Card OPN MHTS#I-XBR	Field	Decoder
M	Mellanox Technologies	
H	Adapter Type	H = InfiniBand Host Channel Adapter, N = Ethernet Network Interface Card, S = Express Module
T	Media	E = 10GBASE-CX4*, G = 10GBASE-CX4*, K = 10GBASE-SR (XFP), T = 10GBASE- UTP (Twisted Pair), P = 10GBASE-SR/LR (SFP+) Module-Less, M = 10GBASE-SR/LR (SFP+) Requiring Modules * = 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 B = 2nd Generation board
-	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

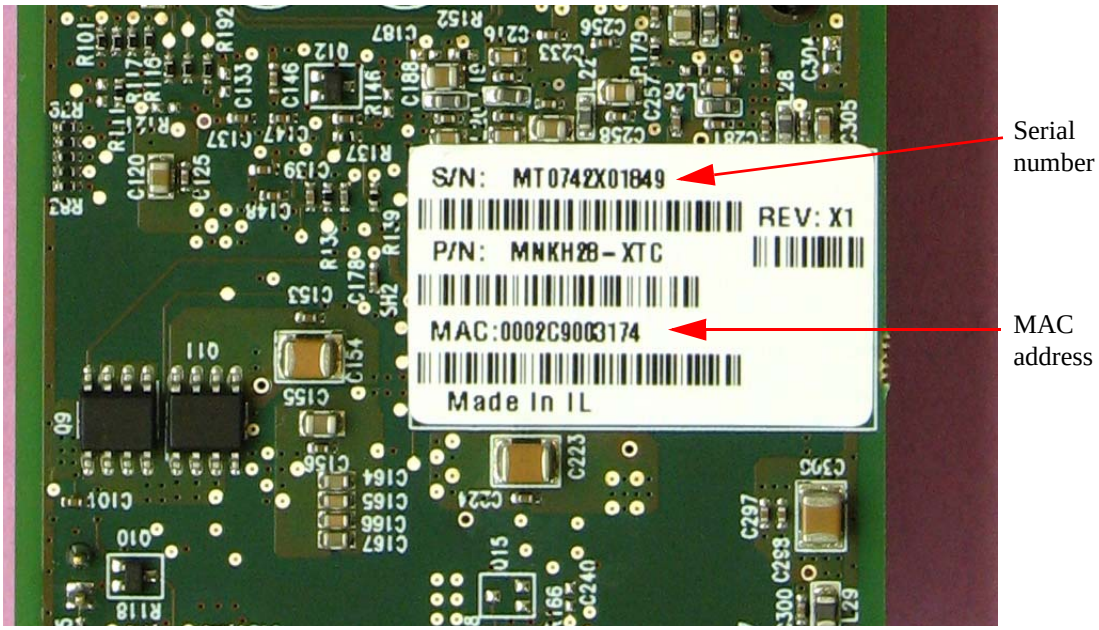
For example, the part number MNPH28-XTC describes Mellanox Technologies' ConnectX® EN NIC with dual 10GBASE-SR/LR ports, a PCIe2.0 x8 2.5GT/s interface, no on-board memory (mem-free), a tall PCI bracket, and RoHS R5 compliance. Using the legend,

field M = M to indicate a Mellanox Technologies product,
field H = N to indicate a Network Interface Card,
field T = P to indicate SFP+, Module-less Card,
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 G =B to indicate 2nd generation board,
field X = X to indicate no on-board memory,
field B = T to indicate a tall bracket, and
field R = C to indicate RoHS R5 (w/ Exemptions) compliance

1.3 Finding the Mac Address and Serial Number on the Adapter Card

All Mellanox Ethernet NICs have a label on the printed side of the adapter card that has the card serial number and the card MAC address.

Figure 2: Product Label



2 Adapter Card Installation

2.1 Hardware and Software Requirements

Before installing the NIC, please make sure that the system meets the hardware and software requirements listed in Table 3.

Table 3 - Hardware and Software Requirements

Requirement	Description
Hardware	• Minimum 3 GB of available space • PCI Express x8 or x16 slots
Firmware and Software Operating Systems/Distributions	For the latest firmware available please check http://www.mellanox.com/support/firmware_download.php Management Tools and Drivers Mellanox management tools can be found at: http://www.mellanox.com/products/management_tools.php • Linux Driver for ConnectX EN Based Network Interface Cards with 10GigE Support can be found at: http://www.mellanox.com/products/MLNX_Linux.php • Windows Driver for ConnectX EN Based Network Interface Cards with 10GigE. Support can be found at: http://www.mellanox.com/products/MTNIC%20_Windows.php • Mellanox Ethernet Driver for Citrix XenServer 4.1, Mellanox ConnectX EN 10GbE Dual port NIC Support can be found at: http://www.mellanox.com/products/XenServer.php • Novell SuSE Linux Enterprise server (SLES), Red Hat Enterprise Linux (RHEL), and other Linux distributions • Microsoft Windows Server2003/2008, Windows Compute Cluster Server 2003

2.2 Installation Instructions

2.2.1 Installation Instructions as per Host Machine

The adapter cards listed in Table 1 on page 9 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.

> Note: When more than one PCI Slot is available first make sure to use the PCI slot with the proper configuration.

Any PCI slot with the proper configuration is acceptable for connection. If the card is installed in a PCI slot with less lanes than the card requires then the adapter card will not provide the optimum data transfer.

2.3 Safety Warnings

1. **Installation Instructions**

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

2. **Over-temperature**

This equipment should not be operated in an area with an ambient temperature exceeding the maximum recommended:55°C (131°F). An air flow of 200LFM at this maximum ambient temperature is required. Moreover, to guarantee proper air flow, allow at least 8cm (3 inches) of clearance around the ventilation openings.

3. **During Lightning - Electrical Hazard**

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

4. **Equipment Installation**

This equipment should be installed, replaced, or serviced only by trained and qualified personnel.

5. **Equipment Disposal**

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

6. **Local and National Electrical Codes**

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

7. **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

3 Driver Software and Firmware

Drivers and Firmware can be downloaded and installed by using the Mellanox download site within the Mellanox Website.

Note: Make sure to open the Readme files and read them before you start the procedure.

Note: The installation requires administrator privileges on the target machine.

3.1 Driver Software

Mellanox Technologies supplies drivers for:

- CX EN Linux
- CX EN Windows
- VMware
- XEN

3.1.1 Driver Installation

1. Download the driver from Mellanox website
   http://www.mellanox.com/products/software.php
2. Install the driver:

   > tar xzf mlnx_en-X.X.tgz –

   > cd mlnx_en-X.X

   > ./install.sh

The driver installation procedure performs the following:

- Uninstalls previous version of mlnx_en or mtnic driver
- Builds and installs driver kernel modules
  - Copies all files to /tmp/mlnx_en/src
  - Applies backport patches for particular kernel/OS
  - Runs make to generate mlx4_core.ko, mlx4_en.ko
  - Copies them to /lib/modules/<kernel>/updates/kernel/drivers/net/mlx4/
  - Puts mlxnet script under /etc/init.d
  - Puts mlxnet.conf under /etc/mlxethernet
- Builds and installs mstflint FW burning tool
- Optimizes system settings for best network performance

3.1.2 Driver Loading

- Always use /etc/init.d/mlxnet script to load/unload the driver:

  > /etc/init.d/mlxnet start
- Automatic driver loading on boot.

Edit /etc/mlxethernet/mlxnet.conf

- Change driver default settings.

  Module parameters can be obtained with ‘modinfo’ command:
  Add custom parameter settings to /etc/modprobe.conf
  Parameter values are available in /sys/module/mlx4_en/parameters/

- Verify driver loaded successfully.

  Driver will create new eth<x> device(s) visible with ‘ifconfig –a’

3.1.3 Driver Information

- Dumped to system log (/var/log/messages, dmesg)
- Can also be queried by ‘ethtool –i eth<x>’

3.2 Firmware and Firmware Tools

For Linux or Windows, download and install the latest Mellanox Firmware Tool Kit for your OS at:
http://www.mellanox.com/products/management_tools.php

Within the tool kit is the mtsflint tool software package, which is also available at:
https://svn.openfabrics.org/svn/openib/gen2/branches/1.1/src/userspace/mstflint/.

You can download the latest firmware at:
http://www.mellanox.com/support/firmware_table_ConnectXEN.php

Follow the installation instructions included in the download package.

3.2.1 Updating Adapter Card Firmware

Each adapter 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, or you can download the latest firmware at:
http://www.mellanox.com/support/firmware_table_ConnectXEN.php.

3.2.2 Single Adapter Card Firmware Update

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’s manual, from the single adapter card firmware update page. See http://www.mellanox.com under ‘Firmware’ downloads.

A firmware binaries table lists a binary file per adapter 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.

3.2.3 Firmware Version Check and Update

1. Check current FW version and card type (MT_xxxxxxxxxx).
   ethtool -i eth<x> or
   mstflint –d `lspci | grep “Ethernet controller: Mellanox” | cut -f1 -d" “` q
   mstflint tool is provided in the driver package and is normally installed under /sbin
2. Obtain the latest FW image from Mellanox web site.
   http://www.mellanox.com/support/firmware_table_ConnectXEN.php

3. Choose FW image matching you card OPN/PSID.
4. Burn latest FW.
   mstflint –d `lspci | grep "Ethernet controller: Mellanox" | cut -f1 -d" "` -i <FW image> b

   Where FW image is a binary file, for example fw-25408-2_5_000-MNEH28-XTC_A1.bin
5. Reboot the server.

4 Adapter Card Interfaces

4.1 I/O Interfaces

Each adapter card includes the following interfaces:

- PCI Express x8 edge connector
- I/O panel LEDs
- I^2C compatible connector (for debug)

4.1.1 PCI Express Interface

The ConnectX®EN adapter cards support the PCI Express 2.0 x8 interface, 1.1 compatible. The NICs can be either a master initiating the PCI Express bus operations or a slave responding to PCI bus operations.

4.1.2 LED Assignment

The board has four LEDs located on the I/O panel - 2 LEDs per port. The green LED, when lit, indicates that the driver is running and a valid physical connection between nodes exists. The green LED, when blinking, indicates that the physical connection between nodes is problematic. The yellow LED when lit, indicates a valid data activity link, this is the logical link. The yellow LED illuminates when the network is discovered over the physical link. A valid data activity link without data transfer is designated by a constant yellow LED indication. A valid data activity link with data transfer is designated by a blinking yellow LED indication. If the LEDs are not active, either the physical link or the logical link (or both) connections have not been established.

Figure 3: Physical and Logical Link Indications

Port Number	LED Name
Port 1	Physical Link - Green Constant on indicates a good physical link Blinking indicates a problem with the Physical link
	Data Activity - Yellow Blinking indicates Data Transfer Constant on indicates no Data Transfer
Port 2	Physical Link - Green Constant on indicates a good physical link Blinking indicates a problem with the Physical link
	Data Activity - Yellow Blinking indicates Data Transfer Constant on indicates no Data Transfer

Port 1

Port 2

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

4.2 I^{2}C Compatible Interface

A three-pin header on the adapter card is provided as the I^{2}C compatible interface. See Figure 1 on page 23 for the location on the board.

Figure 4: I^{2}C 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 23.

4.4 Memory

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

4.4.1 System Memory

Each of the NICs utilize the PCI Express interface to store and access connection information and packet data on the system memory.

4.4.2 Flash

Each of the NICs includes one 2MB SPI Flash device (P/N M25P16-VME6G by ST Microelectronics) accessible via the Flash interface of the MT25408 ConnectX EN 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 4 provides information on this jumper. See Figure 1 on page 23 for the jumper location.

Table 4 - 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 20). The EEPROM capacity is 512 bytes.

4.5 VPDs

The PCI VPD (Vital Product Data) layout for each of the described Mellanox Technologies ConnectX® EN cards comply with the format defined in the *PCI 2.3*.

PCI VPD Layout for MNPH28B-X[ST]C

Table 5 - VPD layout for MNPH28B-X[ST]C

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length [7:0] LSB	0xE		
2	Length [15:8] MSB	0x0		
3	Data	Hawk Dual Port	STR	
17	Large Resource Type VPD-R Tag (0x10)	0x90		
18	Length [7:0] LSB	0x4F		
19	Length [15:8] MSB	0x00		
20	VPD Keyword	PN	STR	Add in Card Part Number
22	Length	0x15		
23	PN	PN	%STR_SPC	
44	VPD Keyword	EC	STR	Engineering Change Level of the card (rev)
46	Length	0x2		
47	Revision	RV	%STR	PCB revision
49	VPD Keyword	SN	STR	Serial Number
51	Length	0x18		
52	SerialNumber		%STR_SPC	“00..00XXXX..XX”
76	VPD Keyword	V0	STR	Misc. Information
78	Length	0x10		
79	Data	PCIe x8	STR_SPC	
95	VPD Keyword	RV	STR	
97	Length	0x1		
98	Data	0,97	%CS0	
99	Large Resource Type VPD-W Tag (0x11)	0x91		
100	Length [7:0] LSB	0x99		
101	Length [15:8] MSB	0x00		
102	VPD Keyword	V1	STR	EFI Driver version
104	Length	0x6		
105	Data	N/A	STR_SPC	
111	VPD Keyword	YA	STR	Asset Tag
113	Length	0x20		
114	Data	N/A	STR_SPC	“N/A”
146	VPD Keyword	RW	STR	Remaining read/write area
148	Length	0x6A		
149	Data		STR_ZERO	Reserved (0x00)
255	Small Resource Type END Tag (0x11)	0x78		

PCI VPD Layout for MNPH29B-X[ST]C

Table 6 - VPD Layout for MNPH29B-X[ST]C

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length [7:0] LSB	0xE		
2	Length [15:8] MSB	0x0		
3	Data	Hawk Dual Port	STR	
17	Large Resource Type VPD-R Tag (0x10)	0x90		
18	Length [7:0] LSB	0x4F		
19	Length [15:8] MSB	0x00		
20	VPD Keyword	PN	STR	Add in Card Part Number
22	Length	0x15		
23	PN	PN	%STR_SPC	
44	VPD Keyword	EC	STR	Engineering Change Level of the card (rev)
46	Length	0x2		
47	Revision	RV	%STR	PCB revision
49	VPD Keyword	SN	STR	Serial Number
51	Length	0x18		
52	SerialNumber		%STR_SPC	"00..00XXXX..XX"
76	VPD Keyword	V0	STR	Misc. Information
78	Length	0x10		
79	Data	PCIe Gen2 x8	STR_SPC	
95	VPD Keyword	RV	STR	
97	Length	0x1		
98	Data	0,97	%CS0	
99	Large Resource Type VPD-W Tag (0x11)	0x91		
100	Length [7:0] LSB	0x99		
101	Length [15:8] MSB	0x00		
102	VPD Keyword	V1	STR	EFI Driver version
104	Length	0x6		
105	Data	N/A	STR_SPC	
111	VPD Keyword	YA	STR	Asset Tag
113	Length	0x20		
114	Data	N/A	STR_SPC	"N/A"
146	VPD Keyword	RW	STR	Remaining read/write area
148	Length	0x6A		
149	Data		STR_ZERO	Reserved (0x00)
255	Small Resource Type END Tag (0x11)	0x78		

5 SFP+ Transceiver Module

The ConnectX®EN NICs MNPH series are shipped without the optical module. Approved Mellanox modules must be purchased from Mellanox. The OPNs for the approved Mellanox modules are MFM1T02A-SR and MFM1T02A-LRM.The figure below shows the Mellanox approved SFP+ module.

Figure 5: SFP+ Transceiver Module

6 Connectivity

This adapter card can be connected to switches and routers using cable lengths as specified in the table below. This adapter card can be connected to switches and routers using up to 100meters of OM-2 or 300meters of OM-3 multi-mode fiber cable with duplex LC connectors connected through XFP Transceiver modules. .

Table 7 - Max Cable Lengths

Cable	Max Length of Approved Cable
OM-2	100m
OM-3	300m

These cards are able to support Twinax cables. Check with your sales rep or your Mellanox FAE for recommended Twinax cables.

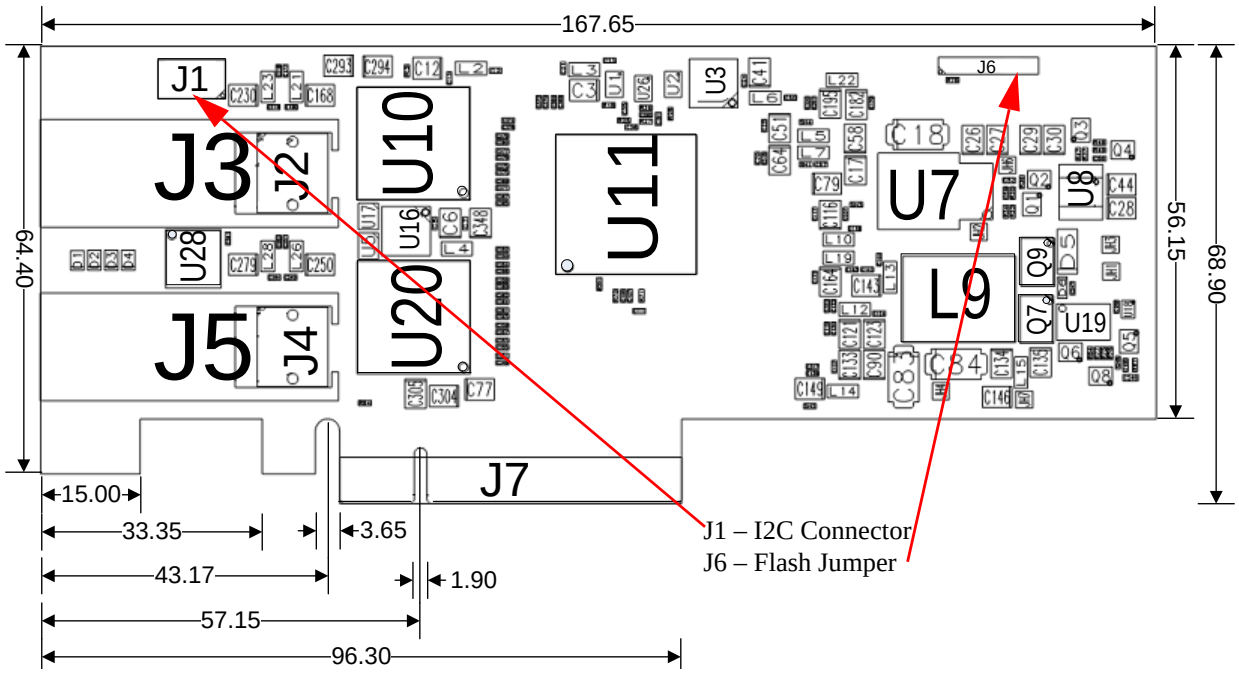
Appendix A: Specifications

A.1 Board Mechanical Drawing and Dimensions

All the NICs covered in this *User's Manual* have the same mechanical drawing and share the same dimensions as depicted in Figure 1.

Note: All dimensions are in millimeters.

Figure 1: Schematic of the Ethernet NIC With 10GBASE-SR SFP+ Connectors



A.2 EMC Certification Statements

Table 1 lists the approved EMC certification status per adapter card in different regions of the world.

Table 1 - Adapter Cards EMC Certification Status

Adapter Card P/N	FCC Class (USA)	EN Class (Europe)	ICES Class (Canada)	VCCI (Japan)	Australia New Zealand
MNPH28B-XSC	Class A	Class A	Class A	Class A	Class A
MNPH28B-XTC	Class A	Class A	Class A	Class A	Class A
MNPH29B-XSC	Class A	Class A	Class A	Class A	Class A
MNPH29B-XTC	Class A	Class A	Class A	Class A	Class A

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.”

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 CLASS 1 LASER PRODUCT

This product complies with all of the following standards:

- IEC 60 825-1:1993 + A1:1997 + A2:2001
- EN 60825-1:1994+A1:1996+ A2:2001"

A.3 MNPH28B-XTC Specifications

Table 2 - Specifications for MNPH28B-XTC

Physical		**Power and Environmental**	
Size:	2.54in x 6.60in (64.40mm x 167.65mm)	Voltage:	12V, 3.3V
		Typ. Power:	12.9W
Air Flow:	200LFM @55°C	Maximum Power:	20.5W
10Gb/s Connector:	SFP+	Temperature:	0°C to 55°C
Protocol Support		**Regulatory**	
Ethernet:	IEEE Std 802.3ae 10 Gigabit Ethernet IEEE Std 802.3ae 10 GBASE-SR Multicast and Jumbo Frame Support 4X 3.125Gb/s	EMC:	FCC 47 CFR part 15:2007, subpart B class A; ICES-003:2004 issue 4, class A; VCCI V-3/2008.04 class A; AS/NZ CISPR 22-2006, class A. EN 55022:1998 + A1:2000 + A2: 2003 class A, EN 55024:1998 + A1:2001 + A2: 2003 EN 61000-3-2: 2006, EN 61000-3-3: 1995+A1:2001+A2:2005 standards harmonized under EMC Directive 2004/108/EC Article 6(2);
QoS:	8 Virtual Lanes for each port		
Single or Dual Ports	Dual		
DMA Support:	Yes		
PCI Express	2.0 SerDes @ 2.5 GT/s		
		Safety:	EN60950-1:2001 +A11:2004
		EMI:	CLASS 1 LASER PRODUCT IEC 60 825-1:1993 + A1:1997 + A2:2001 EN 60825-1:1994+A1:1996+ A2:2001”
		Environmental:	
		RoHS:	RoHS 2002/95/EC

A.4 MNPH28B-XSC Specifications

Table 3 - Specifications for MNPH28B-XSC

Physical		**Power and Environmental**	
Size:	2.54in x 6.60in (64.40mm x 167.65mm)	Voltage:	12V, 3.3V
		Typ. Power:	12.9W
Air Flow:	200LFM @55°C	Maximum Power:	20.5W
10Gb/s Connector:	SFP+	Temperature:	0°C to 55°C
Protocol Support		**Regulatory**	
Ethernet:	IEEE Std 802.3ae 10 Gigabit Ethernet IEEE Std 802.3ae 10 GBASE-SR Multicast and Jumbo Frame Support 4X 3.125Gb/s	EMC:	FCC 47 CFR part 15:2007, subpart B class A; ICES-003:2004 issue 4, class A; VCCI V-3/2008.04 class A; AS/NZ CISPR 22-2006, class A. EN 55022:1998 + A1:2000 + A2: 2003 class A, EN 55024:1998 + A1:2001 + A2: 2003 EN 61000-3-2: 2006, EN 61000-3-3: 1995+A1:2001+A2:2005 standards harmonized under EMC Directive 2004/108/EC Article 6(2);
QoS:	8 Virtual Lanes for each port		
Single or Dual Ports	Dual		
DMA Support:	Yes		
PCI Express	2.0 SerDes @ 2.5 GT/s	Safety:	EN60950-1:2001 +A11:2004
		EMI:	CLASS 1 LASER PRODUCT IEC 60 825-1:1993 + A1:1997 + A2:2001 EN 60825-1:1994+A1:1996+ A2:2001"
		Environmental:	
		RoHS:	RoHS 2002/95/EC

A.5 MNPH29B-XTC Specifications

Table 4 - Specifications for MNPH29B-XTC

Physical		**Power and Environmental**	
Size:	2.54in x 6.60in (64.40mm x 167.65mm)	Voltage:	12V, 3.3V
		Typ. Power:	14.9 W
Air Flow:	200LFM @55°C	Maximum Power:	20.5 W
10Gb/s Connector:	SFP+	Temperature:	0°C to 55°C
Protocol Support		**Regulatory**	
Ethernet:	IEEE Std 802.3ae 10 Gigabit Ethernet IEEE Std 802.3ae 10 GBASE-SR Multicast and Jumbo Frame Support 4X 3.125Gb/s	EMC:	FCC 47 CFR part 15:2007, subpart B class A; ICES-003:2004 issue 4, class A; VCCI V-3/2008.04 class A; AS/NZ CISPR 22-2006, class A. EN 55022:1998 + A1:2000 + A2: 2003 class A, EN 55024:1998 + A1:2001 + A2: 2003 EN 61000-3-2: 2006, EN 61000-3-3: 1995+A1:2001+A2:2005 standards harmonized under EMC Directive 2004/108/EC Article 6(2);
QoS:	8 Virtual Lanes for each port		
Single or Dual Ports	Dual		
DMA Support:	Yes		
PCI Express	2.0 SerDes @ 2.5 GT/s		
		Safety:	EN60950-1:2001 +A11:2004
		EMI:	CLASS 1 LASER PRODUCT IEC 60 825-1:1993 + A1:1997 + A2:2001 EN 60825-1:1994+A1:1996+ A2:2001”
		Environmental:	
		RoHS:	RoHS 2002/95/EC

A.6 MNPH29B-XSC Specifications

Table 5 - Specifications for MNPH29B-XSC

Physical		**Power and Environmental**	
Size:	2.54in x 6.60in (64.40mm x 167.65mm)	Voltage:	12V, 3.3V
		Typ. Power:	14.9 W
Air Flow:	200LFM @55°C	Maximum Power:	20.5 W
10Gb/s Connector:	SFP+	Temperature:	0°C to 55°C
Protocol Support		**Regulatory**	
Ethernet:	IEEE Std 802.3ae 10 Gigabit Ethernet IEEE Std 802.3ae 10 GBASE-SR Multicast and Jumbo Frame Support 4X 3.125Gb/s	EMC:	FCC 47 CFR part 15:2007, subpart B class A; ICES-003:2004 issue 4, class A; VCCI V-3/2008.04 class A; AS/NZ CISPR 22-2006, class A. EN 55022:1998 + A1:2000 + A2: 2003 class A, EN 55024:1998 + A1:2001 + A2: 2003 EN 61000-3-2: 2006, EN 61000-3-3: 1995+A1:2001+A2:2005 standards harmonized under EMC Directive 2004/108/EC Article 6(2);
QoS:	8 Virtual Lanes for each port		
Single or Dual Ports	Dual		
DMA Support:	Yes		
PCI Express	2.0 SerDes @ 2.5 GT/s		
		Safety:	EN60950-1:2001 +A11:2004
		EMI:	CLASS 1 LASER PRODUCT IEC 60 825-1:1993 + A1:1997 + A2:2001 EN 60825-1:1994+A1:1996+ A2:2001"
		Environmental:	
		RoHS:	RoHS 2002/95/EC

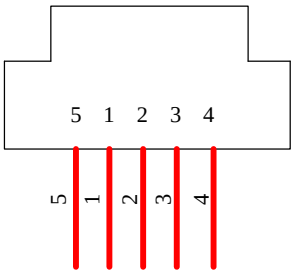
Appendix B: Interface Connectors Pinout

B.1 I2C-compatible Connector Pinout

Figure 1: I2C-Compatible Connector

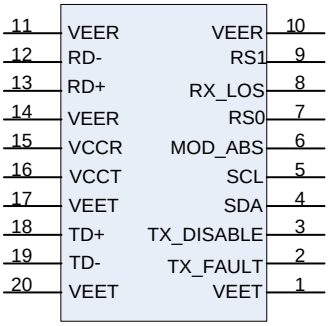
Table 1 - I2C-Compatible Connector Pinout

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



B.2 Ethernet Connector Pinout

Figure 2: SFP+ Connector Pinout



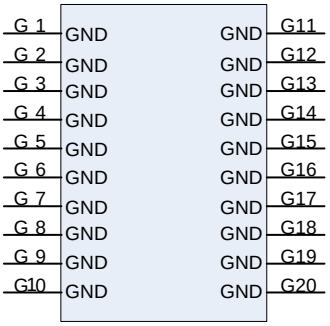


Figure 3: SFP+ Module and Cage Pinout Configuration

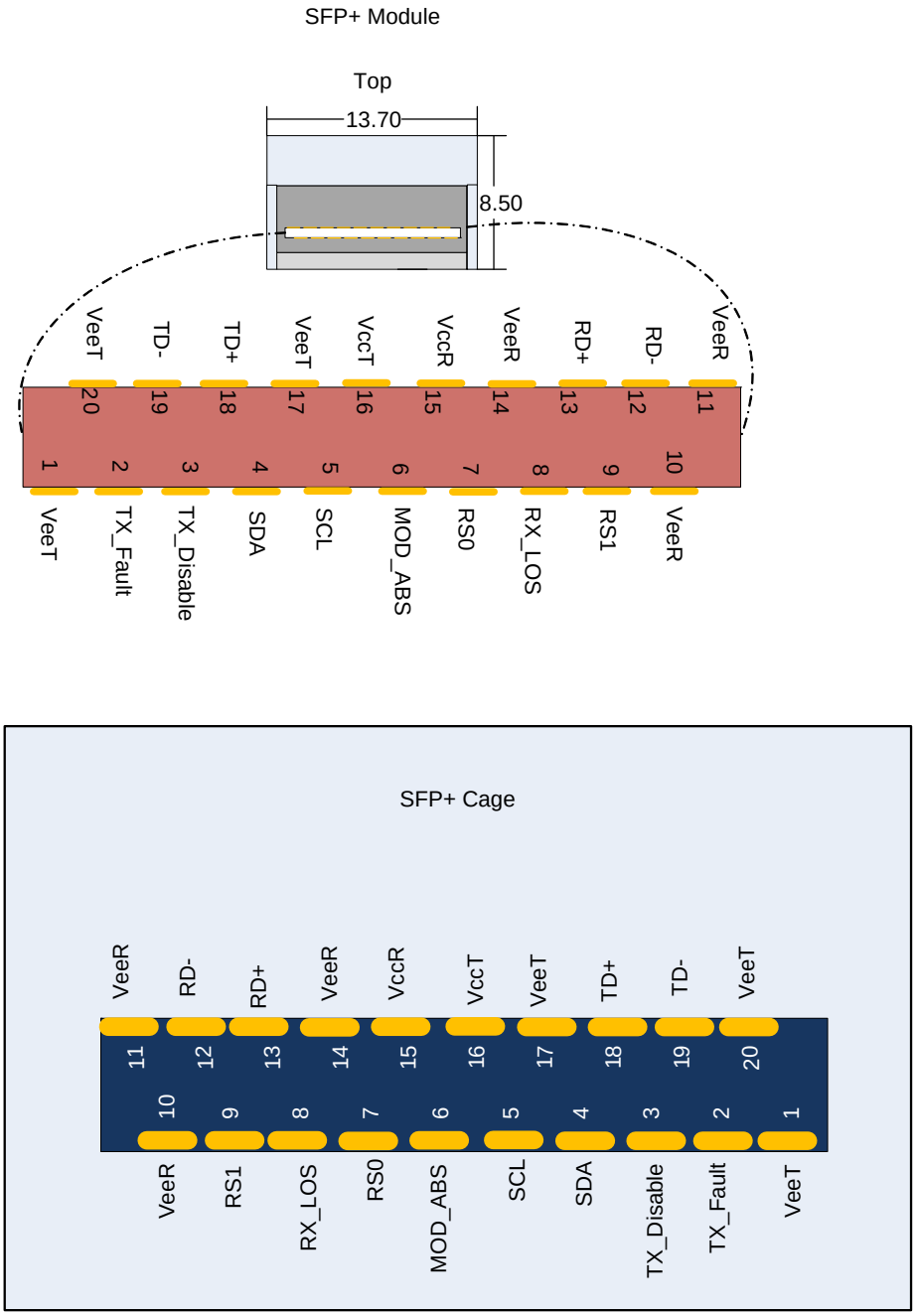


Table 2 - SFP+ Connector Pinout

Pin no.	Connector Pin Name	Signal Name Connector 1	Signal Name Connector 2
1	VEET	GND	GND
2	TX_FAULT	TX_FAULT_A	TX_FAULT_B
3	TX_DISABLE	TXDISABLE_A	TXDISABLE_B
4	SDA	SFP_SDA_A	SFP_SDA_B
5	SCL	SFP_SCL_A	SFP_SCL_B
6	MOD_ABS	MOD_DEF0_A	MOD_DEF0_B
7	RS0	RS0_A	RS0_B
8	RX_LOS	RXLOSB_I_A	RXLOSB_I_B
9	RS1	RS1_A	RS1_B
10	VEER	GND	GND
11	VEER	GND	GND
12	RD-	SFPA_RD-N	SFPB_RD-N
13	RD+	SFPA_RD-P	SFPB_RD-P
14	VEER	GND	GND
15	VCCR	SFPP_VCCR_A	SFPP_VCCR_B
16	VCCT	SFPP_VCCT_A	SFPP_VCCT_B
17	VEET	GND	GND
18	TD+	SFPA_TD-P	SFPB_TD-P
19	TD-	SFPA_TD-N	SFPB_TD-N
20	VEET	GND	GND

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 Existing Bracket on Adapter Cards

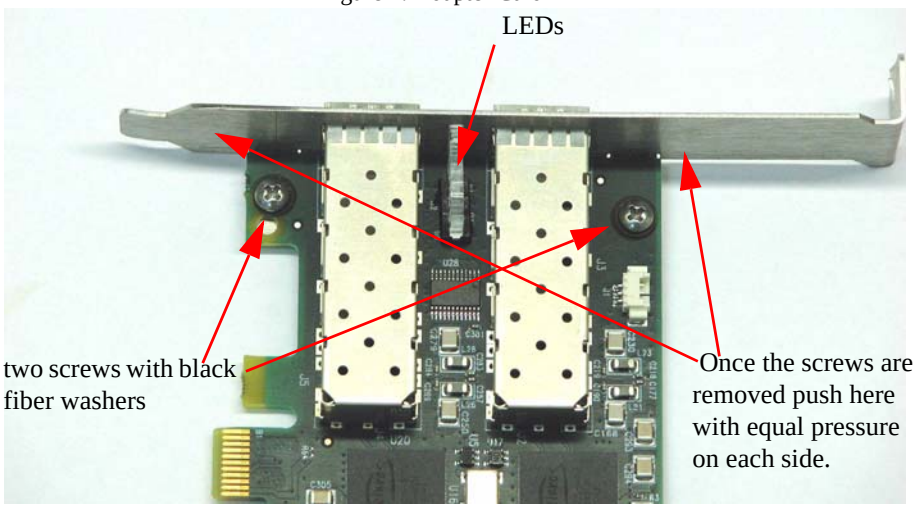
C.1 Bracket Replacement

To replace the bracket you will need the following parts:

- the new bracket of the proper height
- the 2 screws saved from the removal of the bracket
- the 2 fiber washers saved from the removal of the bracket

C.1.1 Remove the Existing Bracket from the Adapter Card

Figure 1: Adapter Card

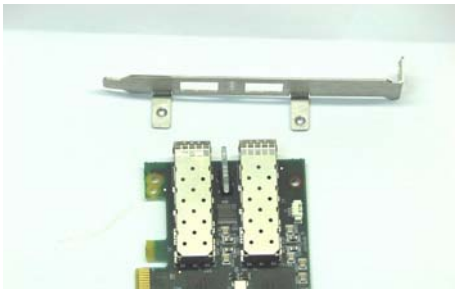


1. Remove the two screws holding the bracket in place.
2. Simultaneously push on both ends of the bracket until the bracket comes loose from the card.

   Note: Be careful not to put stress on the LEDs.

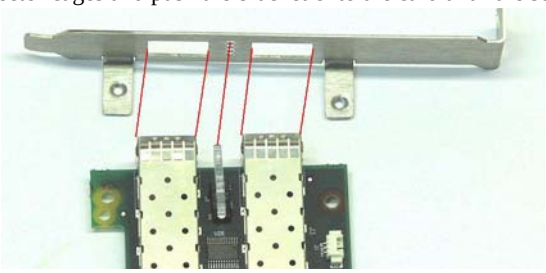
3. Save the two screws and the two fiber washers.

Figure 2: Adapter card With Bracket Removed



C.1.2 Installing the New Bracket

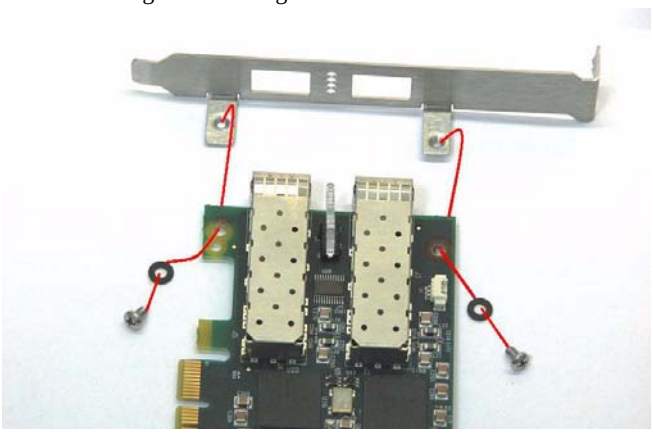
4. Place the bracket over the connector cages and push the bracket onto the card until the screw holes line up.



Note: Do not force the bracket onto the card. You may have to gently push the LEDs using a small screw-driver to align the LEDs with the holes in the bracket.

5. Take the screws and washers saved from Step 1. Place the screws and washers into the holes and screw them in snug.

Figure 3: Placing the Bracket on the Card



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

Appendix D: Inserting the Transceiver Module

To insert the module into the cage:

1. Take the module and open the locking mechanism.
2. Make sure that the male connectors on the module will align with the female connectors inside of the cage. Also check that there is no dirt or foreign matter in the module or in the cage.

Figure 4: Module With Locking Mechanism Closed

Figure 5: Module With Locking Mechanism Open

3. Insert the module into the Adapter card module cage.
4. Close the locking Mechanism.

To remove the module from the cage:

1. Unlock the locking mechanism by opening the handle.
2. Pull the module out of the cage

Appendix E: Ordering Transceiver Modules

The Ordering Part Numbers for the Mellanox SFP+ optical modules are shown in the table below.

Figure 6: XFP Optical Module

Spec	Model number	Module
10GBASE-SR	MFM1T02A-SR	
10GBASE-LR	MFM1T02A-LRM	

Note: SR and LR modules not recommended by Mellanox may not work with the adapter.

Appendix F: Avertissements de sécurité d'installation

1. **Instructions d'installation**

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

2. **Température excessive**

Ce matériel ne doit pas fonctionner dans une zone avec une température ambiante dépassant le maximum recommandé de 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 G: Installation - Sicherheitshinweise

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 °C (°F) betrieben werden. 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

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

7. Strahlenkontakt

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