

Warnings and Cautions

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

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  	Hereby, Nokia Corporation, declares that this Nokia InLite is in compliance with the essential requirements and other relevant provisions of Directive: 1999/5/EC. The product is marked with the CE marking and Notified Body number according to the Directive 1999/5/EC
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FCC

FCC §15.21 - Information to user - The Nokia InLite is used as an intentional radiated equipment and any changes or modifications on the equipment without any approval by Nokia could void the user's authority to operate the equipment.

FCC §15.27 b) - Special Accessories - If a device requiring special accessories is installed by or under the supervision of the party marketing the device, it is the responsibility of that party to install the equipment using the special accessories. For equipment requiring professional installation, it is not necessary for the responsible party to market the special accessories with the equipment. However, the need to use the special accessories must be detailed in the instruction manual, and it is the responsibility of the installer to provide and to install the required accessories.

FCC §15.105 - Information to user - 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.

History

Date	Version	Author	Details
9 - 05 - 2000	Draft 1	Norman T. Thomas	Initial compilation of document
24 - 10 - 2000	Draft 2	Tyrone Williams	Revised draft
09 - 01 - 2001	Draft 3	Indi Liepa	Revised after subject matter expert review
26 - 01 - 2001	Draft 4	Indi Liepa	Revised after Tekmar visit by Harri Vaananen.
29 - 01 - 2001	Draft 5	Indi Liepa	Updated after final review by Harri.
9 - 02 - 2001	Issue 1, Draft 6	Indi Liepa	Final review by Harri.
18 - 07 - 2001	Issue 2, Draft 1	Tom Dumic	Included US Type Approval information
22 - 08 - 2001	Issue 2	Tom Dumic	Release for Product v1.0.1
05 - 09 - 2001	Issue 2, Draft 1	Tom Dumic	Draft for Product v2
10 - 10 - 2001	Issue 3	Tom Dumic	Release for Product v2

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About this document

This document details the safety precautions to be followed when working with the Nokia InLite. Instructions in *Installation*, *Commissioning* and *Maintenance* must be followed when installing the Nokia InLite and performing any commissioning or maintenance on it. Failure to follow these instructions may be dangerous to the installation, commissioning and maintenance personnel.

1.1 Safety guidelines

The safety guidelines are designed as follows:

- Warnings alert the reader to dangers which may cause loss of life, physical injury or ill health in any form. The symbol denoting a warning is presented below.



WARNING

This is a warning!

- Cautions are used to denote possible damage to equipment but not dangers to personnel. The symbol denoting a caution is presented below.



Caution

This is a caution!

2 Warnings

2.1 Personnel

Installation, commissioning and maintenance measures concerning any Nokia equipment may be performed only by trained and authorized personnel. The Nokia InLite must be installed so that only the authorized personnel have access to its sensitive parts.



WARNING

Always prevent unauthorized personnel from accessing the Nokia InLite.

2.2 Dangerous voltage

Potentially lethal voltage is present within this system. For more information on grounding and on the power supply, refer to *System Requirements for Installation and Operation*.



WARNING

Disconnect the Main Unit (MU) from the mains power supply before removing the cable connection cover of the Power Supply Unit (PSU).

The warning label shown in Figure 1 is displayed on the power supply cover:

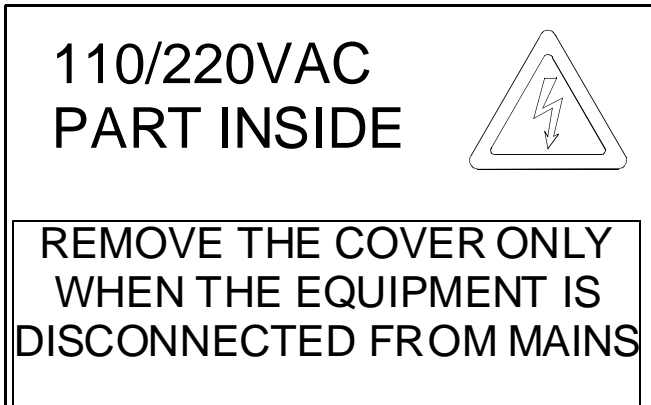


Figure 1. Power supply dangerous voltage warning label



WARNING

Make sure that applicable high voltage safety precautions are taken before attempting to work on the system with the power connected!



WARNING

Potentially lethal voltages can be induced if the equipment is not grounded correctly. Ensure that all ground connections are secure and non-removable!



WARNING

A current plug with ground connection is not sufficient as it can be pulled off. Therefore, the grounding should be fixed.



WARNING

Connect the MU to the main grounding busbar of the site! Electrical currents from power and communication cables is dangerous.



WARNING

Ensure that the ground connection is established before an AC power outlet is connected to the MU! Ensure that the ground connection is removed only

after the AC power outlet is disconnected!

**WARNING**

Do not rely on the power switch alone to isolate a supply. Unplug the power supply cable from the mains socket if possible.

2.3 Weight

**WARNING**

The MU weighs 16.5 kg (33 lb.) without the cover and mounting frame.

The three types of Remote Unit (RU) vary in weight between 1.7 kg (3.8 lb) and 11 kg (24.25 lb).

The Centralised Power Supply Unit (CPSU) weighs 12.5 kg (27.5 lb).

2.4 Safety and precautions for lasers

The optical transmitter used in the laser which is used in the Nokia InLite system contains an optical transmitter which has a power level classification of 3A as defined in EN 60825 (norm). This classification is not considered to be a health hazard.

When working with the optical connectors, check that the DL laser on the LU is switched off.

**WARNING**

Never look directly at the internal optic connector exit of the transmitter apparatus when it is switched on. The wavelength of the laser is not visible to the human eye, which means that long-term damage will not immediately be known.

The symbol shown in Figure 2 denotes an aperture which is the source of invisible radiation.



Figure 2. Source of invisible radiation warning label

The symbol shown in Figure 3 denotes a source of laser radiation.

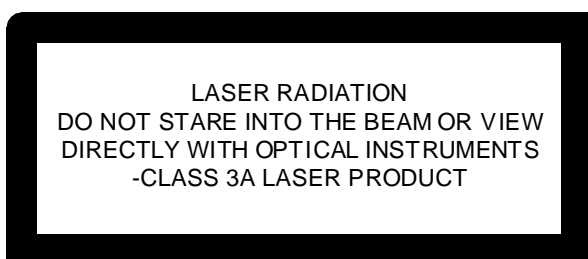


Figure 3. Laser radiation warning label (Class 3A)

Note

The LU is classified as a Class 1 laser product. The RU is classified as a Class 3A laser product.

2.5 Electromagnetic fields and RF power

The antenna connected to the RU generates electromagnetic radiation, which can exceed safety levels very close to the antennas. Observe the general guidelines presented in Section 2.5.1, and apply the minimum distance calculation formula presented in Section 2.5.2.

2.5.1 General guidelines



WARNING

The antenna generates electromagnetic radiation which can exceed safety levels when a person is working in very close proximity to the antennas. Observe the minimum distance precautions shown in Table 1 when working in close proximity to an antenna operating at full power.



WARNING

Do not install the MU, RUs or the antennas in areas where there is a potential risk for interference with inadequately shielded medical equipment such as hearing aids, life support devices or other electrically or magnetically sensitive devices.



WARNING

When installing the MU, RUs or its antennas, the emission of other antennas nearby has to be known beforehand so that ambient emissions can be managed properly.

2.5.2 Formula for minimum safety distances

This section presents the formula for calculating the minimum safety distances using the specifications of the particular antenna.

$$r_{\min} = \sqrt{\frac{10^{\frac{(G-L)}{10}} P}{4 \pi S}}$$

Figure 4. Formula for calculating minimum safety distance (r_{\min})

The equation in Figure 4 includes the following factors:

- G is the antenna gain (in dB) compared to isotropically radiating antenna
- P is the power measured at the antenna port of RU (W)
- L is the total loss (in dB) between the antenna port of RU and the antenna input
- S is the maximum allowed power density in air (W/m^2)

2.5.3 Safety distance calculation examples

Table describes how the minimum distances for controlled and uncontrolled environments are calculated.

Limit	Description
Minimum Distance in Controlled Environments*	The minimum distances are calculated using the reference levels for power density as presented in the CENELEC prestandard; $f/40 \text{ W/m}^2$, in the frequency range 400 to 2000 MHz, averaged over any 6 min. time interval. This is in agreement with other guidelines (IEEE/ANSI, IRPA, NCRP, FCC) or stricter.
Minimum Distance in Uncontrolled Environments*	The minimum distances are calculated using the reference levels for power density as presented in the CENELEC prestandard; $f/200 \text{ W/m}^2$, in the frequency range 400 to 2000 MHz, averaged over any 6 min. time interval. This is in agreement with other guidelines (IEEE/ANSI, IRPA, NCRP, FCC) or stricter.
* Controlled environments refer to locations where there is exposure to persons aware of the potential exposure. Uncontrolled environments refer to locations where there is exposure to persons not aware of the potential exposure and who have no control over it.	

Table 1. Description for distance calculations in controlled and uncontrolled environments

Using the formula for minimum safety distances and the appropriate information for each factor, safety distances can be calculated as in the following calculations (Table 2) related to a particular environment.

Note

Some of the sample distances in Table 2 are still not available, but will be available with the full release of the UM.

Factor	Unit	800	900	1800	1900
Frequency	f [MHz]	800	900	1800	1900
Maximum TX power	P _{out} [W]		0.015	0.015	
Minimum losses: cable	L [dB]		1	1	
Maximum antenna gain (dependent on user choices)	G [dB]		10	10	
Maximum number of TRXs/antenna (dependent on user choices)	N		2	2	
Power Density / Controlled environment*	S [W/m ²]		22.50	45	
Power Density / Uncontrolled environment*	S [W/m ²]		4.5	9	
<i>Controlled environment</i>	r _{min} [m]		0.02 m	0.014 m	
<i>Uncontrolled environment</i>	r _{min} [m]		0.04 m	0.03 m	
* CENELEC prestandard ENV50166-2					

Table 2. Safety distance calculation sample

2.6 Test equipment



WARNING

Before connecting test equipment to TRX ports or RU antenna ports, check that 5 VDC voltage does not damage the equipment.

If there is a risk of damage, use a Bias-T between the test equipment and the aforementioned ports to prevent damage.

The warning symbol shown in Figure 5 denotes a voltage warning.



Figure 5. Voltage warning symbol

2.7 TRX input power



WARNING

The power input from a BTS/TRX connected to the MU must not exceed 33 dBm (2 W).

The warning label shown in Figure 6 denotes the input power warning.

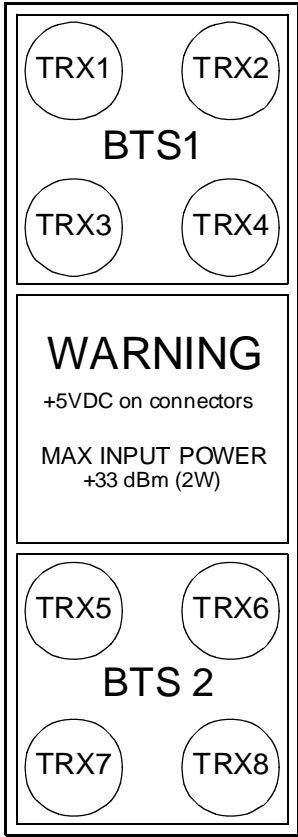



Figure 6. Input power warning symbol

3 Cautions


3.1 Handling of MU, RUs and the CPSU

3.1.1 Storage and transportation

 **Caution**


During storage and transportation, the MU, RUs and the CPSU (if used) must remain in the original packaging to:

- Avoid mechanical damage
 - Maintain traceability
 - Protect the units against static electricity (ESD precaution).
-

 **Caution**

Handle the MU, RUs and the CPSU (if used) with care. Do not drop the product or the package containing it.

3.1.2 Weight

 **Caution**

Persons in charge of the transportation and installation of the MU and RUs must note that a fully equipped MU (without the cover and mounting frame) weighs 16.5 kg (33 lb.) and the three types of RUs vary in weight between 1.7 kg (3.8 lb) and 11 kg (24.25 lb).

If a CPSU is used, its weight is 12.5 kg (27.5 lb).

3.1.3 Handling the MU



Caution

Do not lift the MU by the splice cassette box because the cassette or the cassette box may break.



Caution

Take care not to damage the door switch of the MU when lifting the MU.

3.1.4 Installation of the MU, CPSU and the RUs



Caution

Installation of the MU and CPSU above a height of 2 meters is not recommended due to the difficulties of installing and maintaining the units above this height.

Personnel who are installing the MU, CPSU and the RUs should be informed about the possible risks and safety measures when elevated. The use of an air platform for installations of RUs at height is recommended.

3.1.5 Grounding

The MU may receive damaging overvoltages through the RF jumper cable from the BTS or via power supply lines.



Caution

Sufficient protective grounding is required. A current power plug with ground connection is not sufficient: the grounding of the MU must be based on a fixed grounding cable.

3.1.6 Electrostatic discharge protection



Caution

Always wear a close-fitting antistatic wrist strap around your uncovered wrist when handling the plug-in units of the MU!

The MU contains Electrostatic Sensitive Devices (ESD) label and stud, which means that they may be permanently damaged by electrostatic discharges encountered in routine handling, testing and transportation. The MU is labelled with an electrostatic sensitive device symbol as shown in Figure 7.

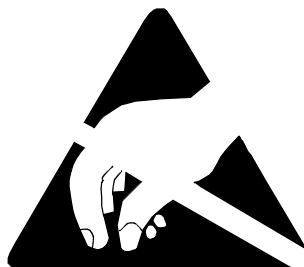


Figure 7. Electrostatic sensitive device label

Electrostatic discharges are caused by direct contact or by an electrostatic field. If a charged body approaches an electrically conducting surface, the acquired potential is discharged. An equalizing current can then flow in the associated circuitry and generate permanently damaging voltages by induction. The human body should be grounded at the same potential as the component or equipment being handled. A wrist strap creates an equipotential electrical connection between the object and the human.

The MU has a grounding point (ESD stud) to which a wrist strap must be connected, as seen in Figure 8.

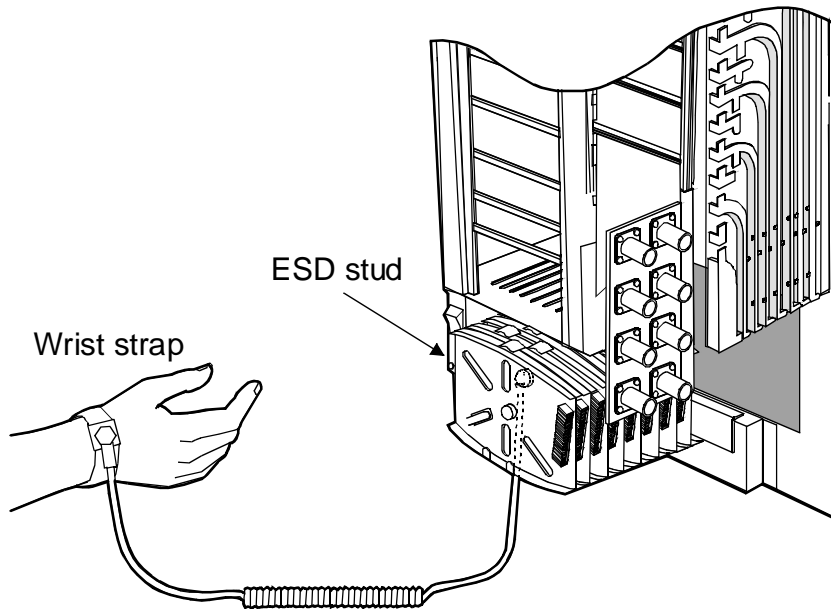


Figure 8. Wrist strap grounding connection

3.2 Nokia InLite power supply



Caution

To protect the MU, RU and CPSU from overvoltages, the use of a transient overvoltage circuit breaker is recommended.

3.2.1 MU

3.2.1.1 MU AC power supply



Caution

Ensure the correct polarity. Incorrect polarity causes damage to the equipment.



Caution

The MU power switch does not disconnect the equipment from the power network.

The separate main switch on the site is considered a disconnect device for safety and service purposes. Alternatively, the power supply cable can be unplugged from the mains socket.



Caution

Do not connect AC power until you have verified that the line voltage is correct! The correct power supply is 110 VAC or 220 VAC.

3.2.1.2 Grounding of MU AC power supply



Caution

Ensure that the MU is connected to a grounded power outlet!

3.2.1.3 PSU



Caution

Double pole/neutral fusing.

3.2.2 RU

RUs using -48 VDC require a CPSU.



Caution

RUs can be used with 110 VAC or 220 VAC or -48 VDC. However the 110/220 VAC and -48 VDC supplies are connected via different connectors. The required type of RU (110/220 VAC or -48 VDC) must be specified at the time of ordering.
