

Regulatory Compliance Statement

RRU3332

CE 06820

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1 Regulatory Compliance Statement

About This Chapter

1.1 Declaration of Conformity to European Directives

Declaration of Conformity to European Directives

Figure 1-1 Declaration of Conformity to European Directives

EU Declaration of Conformity

**according to the Radio Equipment and
Telecommunications Terminal Equipment (R&TTE)
Directive 1999/5/EC**

For the following equipment

Product Name : Remote Radio Unit of Distributed Base Station

Model/Trademark : RRU3332 / HUAWEI

Manufacturer's Name : Huawei Technologies Co., Ltd.

Manufacturer's Address : Administration Building, Headquarters of
Huawei Technologies Co., Ltd., Bantian,
Longgang District, Shenzhen, 518129, P.R.C

is herewith confirmed to comply with the requirements set out in the Council Directive 1999/5/EC for radio equipment and telecommunications terminal equipment. For the evaluation of the compliance with this Directive, the following standards were applied:

Health(R&TTE, Article3.1a)	Council Recommendation 1999/519/EC EN 50385:2002
Safety(R&TTE, Article3.1a)	EN 60950-1:2006+A11:2009+A1:2010+A12:2011 EN 60950-22:2006/A11:2008 IEC/EN 60215(1989) ed3 +A1:1992+A2:1994
EMC(R&TTE, Article3.1b)	ETSI EN 301 489-1 V1.9.2:2011 EN 55022:2010 ETSI EN 301 489-23 V1.5.1:2011 EN 55024:2010
Radio(R&TTE, Article3.2)	ETSI EN 301 908-1 V5.2.1 (2011-02) ETSI EN 301 908-14 V5.2.1 (2011-05) ETSI TS 136 141 V10.3.0 (3GPP TS 36.141)

Responsible for making this declaration is the:

Manufacturer **Authorised representative established within the EU**

Person responsible for making this declaration

Name/Title: Zhang Xing Wei **Regulation Compliance Manager**

Place/Date Shenzhen, China Jun 13, 2012

2 Regulatory Compliance Information

About This Chapter

- 2.1 Regulatory Compliance Standards
- 2.2 European Regulatory Compliance
- 2.3 U.S.A Regulatory Compliance
- 2.4 Japanese Regulatory Compliance
- 2.5 CISPR 22 Compliance

2.1 Regulatory Compliance Standards

The Product complies with the standards listed in Table 2-1.

Table 2-1 Regulatory compliance standards

Discipline	Standards
EMC	<ul style="list-style-type: none"> • CISPR22 Class B • CISPR24 • EN55022 Class B • EN50024 • ETSI EN 301 489 Class B • CFR 47 FCC Part 15 Class B • FCC Part 2 • FCC Part 27 • ICES 003 Class B • AS/NZS CISPR22 Class B • GB9254 Class B • VCCI Class B • CNS 13438 Class B • IEC/EN 61000-6-1 • IEC/EN 61000-6-2 • IEC/EN 61000-6-3 • IEC/EN 61000-6-4

Discipline	Standards
Safety	<ul style="list-style-type: none"> • IEC 60950-1 • IEC/EN60215 • IEC/EN41003 • EN 60950-1 • UL 60950-1 • UL 60950-22 • CSA C22.2 No 60950-1 • AS/NZS 60950.1 • BS EN 60950-1 • IS 13252 • GB4943 • GB8898
Laser safety	<ul style="list-style-type: none"> • FDA rules, 21 CFR 1040.10 and 1040.11 • IEC60825-1, IEC60825-2, EN60825-1, EN60825-2 • GB7247
RF	<ul style="list-style-type: none"> • ETSI EN 301 908-1 • ETSI EN 301 908-14 • ETSI TS 136 141
Health	<ul style="list-style-type: none"> • ICNIRP Guideline • 1999-519-EC • EN 50385 • OET Bulletin 65 • IEEE Std C95.1 • EN 60215
Environmental protection	<ul style="list-style-type: none"> • 2002/95/EC & 2011/65/EU (RoHS) • EC NO. 1907/2006 (REACH) • 2002/96/EC&2012/19/EU(WEEE)
Grounding	<ul style="list-style-type: none"> • ITU-T K.27 • ETSI EN 300 253

Discipline	Standards
<p>Note:</p> <p>EMC: electromagnetic compatibility</p> <p>NEBS: Network Equipment Build Standard</p> <p>RF: radio frequency</p> <p>CISPR: International Special Committee on Radio Interference</p> <p>EN: European Standard</p> <p>ETSI: European Telecommunications Standards Institute</p> <p>CFR: Code of Federal Regulations</p> <p>FCC: Federal Communication Commission</p> <p>IEC: International Electrotechnical Commission</p> <p>AS/NZS: Australian/New Zealand Standard</p> <p>VCCI: Voluntary Control Council for Interference</p> <p>CNS: Chinese National Standard</p> <p>UL: Underwriters Laboratories</p> <p>CSA: Canadian Standards Association</p> <p>BS: British Standard</p> <p>IS: Indian Standard</p> <p>GR: general requirement</p> <p>FDA: Food and Drug Administration</p> <p>BTS: base transceiver station</p> <p>GSM: Global System for Mobile communications</p> <p>WLAN: wireless local area network</p> <p>ICNIRP: International Commission on Non-Ionizing Radiation Protection</p> <p>OET: Office of Engineering Technology</p> <p>IEEE: Institute of Electrical and Electronics Engineers</p> <p>RoHS: restriction of the use of certain hazardous substances</p>	

2.2 European Regulatory Compliance

The Product complies with the following European directives and regulations.

- 2004/108/EC (EMC)
- 2006/95/EC (low voltage)
- 1999/5/EC (R&TTE)
- 2002/95/EC & 2011/65/EU (RoHS)
- EC NO. 1907/2006 (REACH)
- 2002/96/EC&2012/19/EU (WEEE)

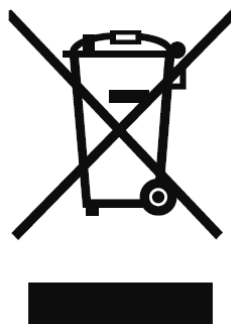
The Product complies with Directive 2002/95/EC, 2011/65/EU and other similar regulations from the countries outside the European Union, on the RoHS in electrical and electronic

equipment. The device does not contain lead, mercury, cadmium, and hexavalent chromium and brominated flame retardants (Polybrominated Biphenyls (PBB) or Polybrominated Diphenyl Ethers (PBDE)) except for those exempted applications allowed by RoHS directive for technical reasons.

Product complies with Regulation EC NO. 1907/2006 (REACH) and other similar regulations from the countries outside the European Union. Huawei will notify to the European Chemical Agency (ECHA) or the customer when necessary and regulation requires.

Product complies with Directive 2002/96/EC&2012/19/EU on waste electrical and electronic equipment (WEEE). Huawei is responsible for recycling its end-of-life devices, and please contact Huawei local service center when recycling is required. Huawei strictly complies with the EU Waste Electrical and Electronic Equipment Directive (WEEE Directive) and electronic waste management regulations enacted by different countries worldwide. In addition, Huawei has established a system for recycling and reuse of electronic wastes, and it can provide service of dismantling and recycling for WEEE. By Huawei recycling system, the waste can be handled environmentally and the resource can be recycled and reused fully, which is also Huawei WEEE stratagem in the word. Most of the materials in product are recyclable, and our packaging is designed to be recycled and should be handled in accordance with your local recycling policies.

In accordance with Article 11(2) in Directive 2002/96/EC&2012/19/EU (WEEE), products were marked with the following symbol: a cross-out wheeled waste bin with a bar beneath as below:



2.3 U.S.A Regulatory Compliance

2.3.1 FCC Part 15

2.3.1 FCC Part 15

The Product complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device does not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

If this device is modified without authorization from Huawei, the device may no longer comply with FCC requirements for Class B digital devices. In that a case, your right to use the device may be limited by FCC regulations. Moreover, you may be required to correct any interference to radio or television communications at your own expense.

This device 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 device generates, uses and radiates radio frequency energy. If it is not installed and used in accordance with the instructions, it may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this device does cause harmful interference to radio or television reception, which can be determined by turning the device off and on, the user may take one or more of the following measures:

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

2.4 Japanese Regulatory Compliance

2.4.1 VCCI

The Product complies with VCCI Class B by Information Technology Equipment (ITE).

この装置は、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。 VCCI-B

The preceding translates as follows:

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

2.5 CISPR 22 Compliance

The Product complies with CISPR 22 for Class B by the ITE.

2.6 China RoHS hazardous substance table

This product described in this guide complies with the Chinese RoHS

部件名称	产品中有害物质或元素的名称及含量					
	镉	铅	汞	六价铬	多溴联苯	多溴联苯醚
Frame	○	×	○	○	○	○
Alloy Parts	○	×	○	○	○	○
Power Adapter	○	×	○	○	○	○
Metal Fittings	○	○	○	○	○	○
PCBA	○	×	○	○	○	○
Capacitor	○	×	○	○	○	○
Other electronics	○	×	○	○	○	○
Screen	○	○	○	○	○	○
Solder	○	×	○	○	○	○
Cable	×	×	○	○	○	○
Plastic and Polymer	○	×	○	○	○	×
Label	○	○	○	○	○	○
Battery	○	○	○	○	○	○

2.7 India RoHS hazardous substance table

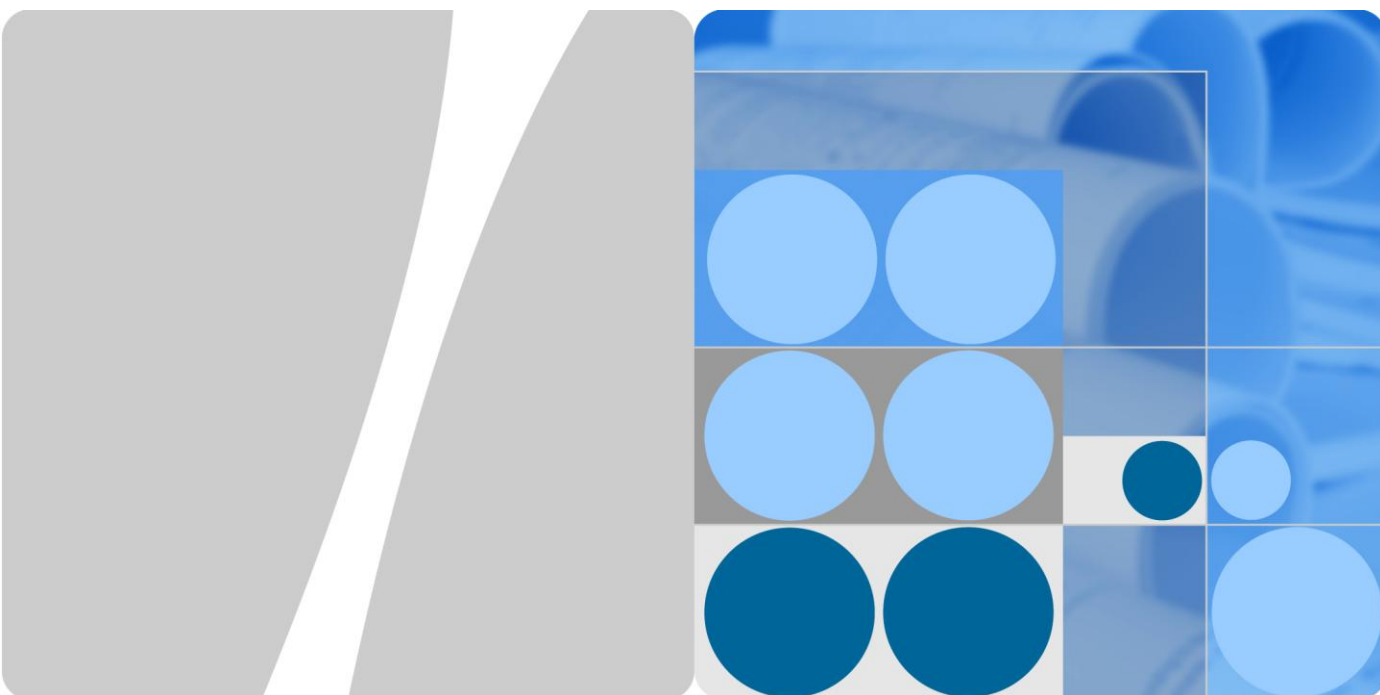
The Product described in this guide complies with the Chinese RoHS

Part Descriptions	Restricted Substances in Product					
	Cd	Pb	Hg	Cr(VI)	PBBs	PBDEs
Frame	○	×	○	○	○	○
Alloy Parts	○	×	○	○	○	○
Power Adapter	○	×	○	○	○	○
Metal Fittings	○	○	○	○	○	○
PCBA	○	×	○	○	○	○
Capacitor	○	×	○	○	○	○
Other electronics	○	×	○	○	○	○
Screen	○	○	○	○	○	○
Solder	○	×	○	○	○	○
Cable	×	×	○	○	○	○
Plastic and Polymer	○	×	○	○	○	×
Label	○	○	○	○	○	○
Battery	○	○	○	○	○	○

2.8 Other Markets

For relevant compliance information/documentation for markets not mentioned above, please contact Huawei representative

Doc. Code



RRU3332

Compliance and Safety Manual

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1 Regulatory Compliance Statement

1.1 About This Chapter

This chapter provides the certification details for RRU3332:

European Community CE Certification Declaration of Conformity (DoC)

1.2 European Community CE Certification DoC

CE Certification Doc is not attached because this Compliance is for the United States only,

2 Regulatory Compliance Information

2.1 About This Chapter

The following table lists the contents of this chapter.

Title	Description
2.2 Regulatory Compliance Standards	The regulatory compliance standards on EMC, safety, Laser Radiation, RF, health, and environmental protection.
2.3 European Directives Compliance	The compliance with European directives, including RoHS compliance and device recycling guide.
2.3 European Directives Compliance	The Japan regulatory compliance.
2.4 CISPR 22 Compliance	The CISPR 22 regulatory compliance.

2.2 Regulatory Compliance Standards

RRU3332 complies with the standards listed in Table 2-1.

Table 2-1 Regulatory compliance standards

Discipline	Standards
EMC	<ul style="list-style-type: none"> • CISPR22 <i>Class B</i> • CISPR24 • EN55022 <i>Class B</i> • EN55024 • ETSI EN 301 489 <i>Class B</i> • CFR 47 FCC Part 15 <i>Class B</i> • ICES 003 <i>Class B</i> • AS/NZS CISPR22 <i>Class B</i>

Discipline	Standards
	<ul style="list-style-type: none"> • GB9254 <i>Class B</i> • VCCI <i>Class B</i> • CNS 13438 <i>Class B</i>
Safety	<ul style="list-style-type: none"> • IEC 60950-1 • IEC60950-21 • IEC60950-22 • IEC60065 • IEC/EN60215 • IEC/EN41003 • EN 60950-1 • UL 60950-1 • CSA C22.2 No 60950-1 • AS/NZS 60950.1 • BS EN 60950-1 • IS 13252 • GB4943 • GB8898 • UL50 • UL60950-22
Laser safety	<ul style="list-style-type: none"> • FDA rules, 21 CFR 1040.10 and 1040.11 • IEC60825-1, IEC60825-2, EN60825-1, EN60825-2 • GB7247
RF	<ul style="list-style-type: none"> • CFR 47 FCC Part27 • CFR 47 FCC Part90 • IC RSS-Gen • IC RSS-192 • IC RSS-197 • ETSI EN 301 908-1 • ETSI EN 301 908-14 • ETSI EN 301 908-20 • ETSI EN 302 544-1 • TELECOM-T139
Health	<ul style="list-style-type: none"> • ICNIRP Guideline • 1999-519-EC • EN 50385 • OET Bulletin 65 • IEEE Std C95.1 • EN 60215

Discipline	Standards
Environmental protection	RoHS
Grounding	<ul style="list-style-type: none"> • ITU-T K.27 • ETSI EN 300 253
<p>Note:</p> <p>EMC: electromagnetic compatibility</p> <p>RF: radio frequency</p> <p>CISPR: International Special Committee on Radio Interference</p> <p>EN: European Standard</p> <p>ETSI: European Telecommunications Standards Institute</p> <p>CFR: Code of Federal Regulations</p> <p>FCC: Federal Communication Commission</p> <p>IEC: International Electrotechnical Commission</p> <p>AS/NZS: Australian/New Zealand Standard</p> <p>VCCI: Voluntary Control Council for Interference</p> <p>CNS: Chinese National Standard</p> <p>UL: Underwriters Laboratories</p> <p>CSA: Canadian Standards Association</p> <p>BS: British Standard</p> <p>IS: Indian Standard</p> <p>GR: general requirement</p> <p>FDA: Food and Drug Administration</p> <p>DBS: distribut transceiver station</p> <p>GSM: Global System for Mobile communications</p> <p>LTE: Long Term Evolution</p> <p>WiMAX: Worldwide interoperability Microwave Access</p> <p>WLAN: wireless local area network</p> <p>ICNIRP: International Commission on Non-Ionizing Radiation Protection</p> <p>OET: Office of Engineering Technology</p> <p>IEEE: Institute of Electrical and Electronics Engineers</p> <p>RoHS: restriction of the use of certain hazardous substances</p>	

2.3 European Directives Compliance

RRU3332 complies with the following European directives.

- 2004/108/EC (EMC)
- 2006/95/EC (low voltage)
- 1999/5/EC (R&TTE)

Refer to 错误! 未找到引用源。 for Huawei Declaration of Conformity.

RRU3332 complies with Directive 2002/95/EC, on the RoHS in electrical and electronic equipment. The device does not contain lead, mercury, cadmium, and hexavalent chromium and brominated flame retardants (polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE)) except for those exempted applications allowed by RoHS directive for technical reasons.

RRU3332 complies with Directive 2002/96/EC on waste electrical and electronic equipment. Huawei is responsible for recycling its end-of-life devices. Contact Huawei local service center when recycling is required.

The main materials in the device are steel, plastics, copper, and electronic components. Most of the materials are recyclable.

Table 2-2 lists the main materials used in the device.

Table 2-2 Main materials used in the device

Part	Material	Weight (kg)	Percentage (Based on Product Weight)	RoHS Substance
Shelf	Al	15.386	97.30%	No
	Fe	0.396	2.50%	No
	ABS	0.054	0.87%	No
Total	Typical configuration	15.836	100%	

Table 2-3 Main materials used in the RRU3332 shelf

Part	Material	Weight (kg)	Percentage (Based on Product Weight)	RoHS Substance
Shelf	Fe	2.6843	97.31%	No
	AL	0.0016	0.04%	No
	PC	0.016	0.35%	No
	ABS	0.024	0.84%	No
	Rubber	0.002	0.07%	No
	Foam	0.04	1.40%	No
Total	Typical configuration	2.7663	100%	

Comply with the following rules for recycling at the end of life of the device.

- Power off the RRU.
- Wear an ESD wrist strap or a pair of ESD gloves
- Loosen the screw for protecting the cabling cavity on the cover plate by using the M4 screwdriver, and then open the cabling cavity of the RRU by lifting the handle on the cover plate.
- Record all the cable connections on the panel of the board to be replaced.
- Disconnect the cables from the ports in the cabling cavity and on the bottom panel.

- Loosen the captive screws on the two contact pieces of the main bracket by using the M4 screwdriver
- Use an M6 screwdriver to tighten the screw on the adapting piece of the RRU. Using the screw only for removing the RRU, loosen the connection between the adapting piece and the main bracket, and then lift the bottom of the RRU to remove the RRU
- Install a new RRU, and then waterproof the RRU
- Insert all the cables to be connected to the RRU, and then check that the idle cables trough in the cabling cavity are fitted with waterproof fillers.
- Close the cover plate of the cabling cavity of the RRU, and then tighten the screw for protecting the cabling cavity on the cover plate until the tightening torque reaches 1.4 N m.
- Power on the RRU.

2.4 CISPR 22 Compliance

RRU3332 complies with CISPR 22 for *Class B* by the ITE.

Class A ITE is a category of all other ITE that satisfies only the Class A ITE regulations, and not the Class B ITE regulations. Such equipment should not be restricted in its sale but the following warning shall be included in the instructions for use:

3 Safety Information

3.1 About This Chapter

The following table lists the contents of this chapter.

Title	Description
3.2 Overview	Safety precautions to be taken before installing and maintaining the Huawei device.
3.3 Electricity Safety	Information about the electricity safety.
3.4 Electrostatic Discharge	Information about the electrostatic discharge safety.
3.5 Inflammable Environment	Information about the inflammable environment safety.
3.6 Radiation	Safety precautions on the Electromagnetic Field Exposure of the device and laser.
3.7 Working at Heights	Safety precautions to be taken before using the ladders or hoisting heavy objects.
3.8 Mechanical Safety	Safety precautions on drilling, on sharp objects, on handling fans, and on lifting heavy objects.
3.9 Miscellaneous	Safety precautions on inserting and removing boards, on bundling signal cables, and cabling requirements.

3.2 Overview

3.2.1 Safety Precautions

This section describes the safety precautions to be taken before installing and maintaining the Huawei device.

- Before performing an operation, read the operation instructions and precautions to be taken, and follow them to prevent accidents. The Caution, Warning and Danger items in other documents do not cover all the safety precautions that must be followed. They are

only supplementary information. The installation and maintenance personnel need to understand the basic safety precautions to be taken.

- When operating the device, obey the local safety regulations. The safety precautions provided in the documents are supplementary and shall be in compliance with the local safety regulations.
- When operating the Huawei device, in addition to the precautions, follow the specific safety instructions given by Huawei.
- The installation and maintenance personnel must receive training in safety precautions. Only qualified personnel can install or maintain the device.

3.2.2 General Requirements

To minimize the technically residual risk, it is imperative to obey the following rules. Read all the instructions before operation.

For DC model: Reinforce insulation or double insulation must be provided to isolate DC source from the AC mains supply.

Installation

- The device (or system) must be installed or used in the access restricted location.
- When installing the unit, always make the ground connection first and disconnect it at the end.
- The device must be fixed securely on the floor or other reliable objects, such as the walls and the mounting racks before opera.

Ground

- Do not damage the ground conductor or operate the device in the absence of well installed ground conductor. Conduct the appropriate electrical inspection.
- The device (or system) must be connected permanently to the protection ground before an operation. The cross sectional area of protective ground conductor shall be at least 16 mm²

Power Supply

- For DC supplied model: The device applies to DC power source that complies with the Safety Extra-Low Voltage (SELV) requirements in IEC 60950-1 based safety standards.
- Prepared conductors are connected to the terminal block, and only appropriate AWG/Type of wire is secured in the listed lug terminals.
- This device relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 80 VDC, 25 A for DC supplied model is used on the phase conductors (all current-carrying conductors).
- For this device, a readily accessible disconnect device shall be incorporated in the building installation wiring.
- To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord.

Human Safety

- Do not operate the device or cables at lightning strikes.
- To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telecommunication network voltage (TNV) circuits.

- Do not look directly into the optical port to prevent the laser radiation from injuring your eyes.
- Do not wear jewelry or watches when you operate the device.

Operator

- Only qualified and skilled personnel must install, configure, and disassemble the device.
- Only the personnel authorized must operate the device.
- Any replacement or change to the device or parts of the device (including the software) must be done by qualified or authorized personnel of Huawei.
- Any fault or error that might cause safety problems must be reported immediately to the person in charge.
- Only qualified personnel must remove or disable the safety facilities, or to troubleshoot and maintain the device.

Ensure that the instructions provided in this document are followed completely. The document also provides guidelines in selecting the measuring and testing device.

3.3 Electricity Safety

3.3.1 High Voltage



DANGER

The high voltage power supply offers power for the device operation. Direct or indirect contact (through damp objects) with high voltage and AC mains supply may result in fatal danger.

- During the installation of the AC power supply facility, follow the local safety regulations. The personnel who install the AC facility must be qualified to perform high voltage and AC operations.
- Do not wear conductive articles, such as watches, hand chains, bracelets and rings during the operation.
- When water is found in the rack or the rack is damp, switch off the power supply immediately.
- When the operation is performed in a damp environment, make sure that the device is dry.



WARNING

Non-standard and improper high voltage operations may result in fire and electric shock. Therefore, you must obey the local rules and regulations when bridging and wiring AC cables. Only qualified personnel must perform high voltage and AC operations.

3.3.2 Thunderstorm



DANGER

High voltage and AC operations, or operations on a steel tower and a mast are prohibited during thunderstorm.

During thunderstorm, the electromagnetic field generated in the thunderstorm area may damage the electronic parts. To prevent damage to the device during lightning, ground the device properly.

3.3.3 Tools



WARNING

Suggestion: Dedicated tools must be used during high voltage and AC operations. Avoid using ordinary tools.

3.3.4 High Electrical Leakage



WARNING

Ground the device before powering on the device. Otherwise, the personnel and device are in danger.

If the "high electrical leakage" flag is stuck to the power terminal of the device, you must ground the device before powering it on.

3.3.5 Power Cable



WARNING

Installation and removal of live line are prohibited. Transient contact between the core of the power cable and the conductor may generate electric arc or spark, which may cause fire or eye injury.

- Before installing or removing the power cable, turn off the power switch.
- Before connecting the power cable, confirm that the power cable and label comply with the requirements of the actual installation.

**CAUTION**

- For the DC power supplied device, use 1mm² or 16AWG minimum power supply cord.
 - Use the type H03VV-F or light PVC sheathed flexible cord based on IEC 60227.
-

3.4 Electrostatic Discharge

**CAUTION**

The static electricity generated by the human body may damage the electrostatic sensitive components on the circuit board, such as the large-scale integrated circuit (LSI).

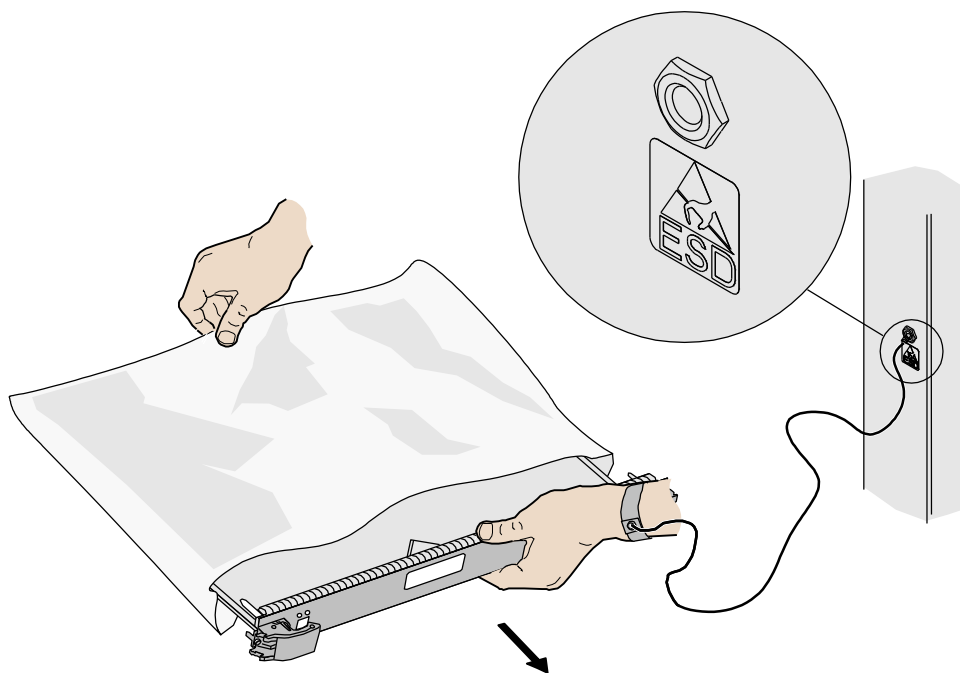
In the following situations, the human body will generate a static electromagnetic field:

- Human body moving
- Clothes friction
- Friction between shoes and the ground
- Holding ordinary plastic in hand

The static electromagnetic field will remain within the human body for a long time.

Before touching the device, hand-operating parts, circuit boards, or ASICs, wear a grounded electrostatic discharge (ESD) wrist strap. It can prevent the sensitive components from damage by the static electricity in the human body.

Figure 3-1 shows the wearing of an ESD wrist strap.

Figure 3-1 Wearing an ESD wrist strap

3.5 Inflammable Environment

Operating the electrical device in inflammable environment can be fatal.



DANGER

Do not place the device in the environment that has inflammable and explosive air or fog. Do not perform any operation in this environment.

3.6 Radiation

3.6.1 Electromagnetic Field Exposure



WARNING

Radio-frequency signals with high intensity are harmful to human body.

Before installing or maintaining an antenna in a steel tower or a mast with a large number of transmitter antennas, the operator should coordinate with the parties concerned to shut down the transmitter antennas.

Introduction

The BTS emits RF radiation (radiation hazard). Operators have to follow the related local regulations when erecting the BTS.

Operators of BTSs must also follow the related local regulations when erecting the BTS.

Limits and Guidelines on Exposure to Electromagnetic Fields

There are a number of international regulations, standards and guidelines for exposure to electromagnetic fields. Several European countries have adopted the recommendation of the council of the European Union. It was released on July 12, 1999 focusing on the harmful effects of exposure to electromagnetic fields (1999/519/EC). The recommendation is based on the guideline published by the ICNIRP.

Table 3-1 gives a comparison among regulations and reference levels applied in different countries.

Table 3-1 Different regulations and reference

Country	Limit 950 MHz E Electric Field Strength	Limit 950 MHz S Power Flux Density	Limit 1850 MHz E Electric Field Strength	Limit 1850 MHz S Power Flux Density
ICNIRP International	42 V/m	4.75 W/m ²	59 V/m	9.25 W/m ²
Europe (1999/519/EC)	42 V/m	4.75 W/m ²	59 V/m	9.25 W/m ²
Italy, Decreto No. 381, 1998	6 V/m	0.095 W/m ²	6 V/m	0.095 W/m ²
Switzerland Verord. 1999	4 V/m	0.043 W/m ²	6 V/m	0.096 W/m ²

Reference levels are provided for exposure assessment, that is to determine whether the basic limit of restriction on exposure of humans to electromagnetic fields is exceeded. The basic restriction on exposure to electromagnetic fields is based on established health effects and biological considerations.

Location of Base Station Antennas

Base station antennas, the source of the radiation, are usually mounted:

- On freestanding towers, with a height up to 30 m, or
- On a tower on the top of buildings, or
- On rare occasion, to the side of the building.

Generally, the height of the antenna position does not fall below 10 m. The power usually forms a horizontal main beam and is slightly tilted downward. The remaining power forms into the weaker beams on both sides of the main beam. The main beam, however, does not reach ground level until the distance from the antenna position is around 50–200 m.

The highest level of emission would be expected in close vicinity of the antenna and in line of sight to the antenna.

Exclusion Zones

The requirements for exclusion zones are as follows:

- Antenna location should be designed so that the public cannot access the area where the RF radiation exceeds the levels as described earlier.
- If areas, where the RF radiation exceeds the prescribed level, are accessible to the workers, make sure that workers know where these areas are, and that they can power off (or shut down) the transmitters before entering these areas. Such areas may not exist; but if they do, they will be confined to areas within 10 m of the antennas.
- Each exclusion zone should be defined by a physical barrier and by a recognizable sign warning the public or workers.

Guidelines on Arranging Antenna Sites

The guidelines on arranging the antenna sites are as follows:

- For roof-mounted antennas, raise the antennas above the height of the persons, who may have to work in the rooftop.
- For roof-mounted antennas, keep the transmitter antennas away from the areas where people are most likely to be, such as roof access points, telephone service points, and HVAC device.
- For roof-mounted directional antennas, place the antennas near the periphery, and do not make the antennas face to the building.
- Consider the trade-off between large aperture antennas (lower maximum RF) and small aperture antennas (lower visual impact).
- Pay special attention to keep higher-power antennas away from accessible areas.
- Keep the antennas in a site that is far away, though this may contradict the local zone requirements.
- Exercise extra caution when designing co-location sites, that is, where multiple antennas owned by different companies are located. This applies particularly to sites that include high-power broadcast (FM/TV) antennas. Local zone often favors co-location, but co-location may cause safety problems.
- Take special precautions for antenna sites near hospital and schools.

Location of Base Transceiver Station

The base transceiver station (BTS) is shielded from RF radiation hazards. The device has been tested to comply with the radioactive spurious emission requirements of EN 301 502. These limits fall below the limits for RF radiation hazard. Therefore, the BTS does not cause danger to the public and workers under normal operation condition. However, it is still possible that because of imperfect antenna cables or other faults the limits set out above can be exceeded.

- BTS sites shall not be accessible to the public. Only authorized and trained workers should access sites or rooms.

- Doors of the site or room shall be clearly marked. For example, mark a sign warning the workers that inside the site or room where the RF radiation might exceed limits for radiation exposure.
- BTS sites shall be regularly monitored and inspected after installation.

Prediction of the Exposure to Electromagnetic Fields

The section provides a theoretical approach to calculate possible exposure to electromagnetic radiation around a BTS antenna. Precise statements are possible either with measurements or complex calculations considering the complexity of the environment, such as soil conditions, nearby buildings and other obstacles. The complexity may cause reflections and deflection, scattering of electromagnetic fields.

The maximum output power (given in EIRP) of a BTS is usually limited by license conditions of the network operator.

RRU3332 supports the maximum output power of 20W (single channel)

A rough estimation of the expected exposure in power flux density on a given point can be made with the following equation:

$$S = \frac{P(W) * G_{numeric}}{4 * r^2(m) * \pi}$$

P = Maximum output power in W

G_{numeric} = Numeric gain (see below)

r = Distance between the antenna and the point of exposure in meters

For the calculation of the Gain numeric:

$$G_{numeric} = 10^{\frac{GdB}{10}}$$

$$GdB = G_{antenna}(dB) - B_{cable}(dB) - B_{vertical-attenuation}(dB) - B_{horizontal-attenuation}(dB)$$

B = attenuation in dB

3.6.2 Laser

The laser hazard level of this device is *Class 1*.



WARNING

When handling optical fibers, do not stand close to, or look at the optical fiber outlet directly with unaided eyes.

General Laser Information

Laser transceivers or transmitters are used in the optical transmission system and associated test tools. The wavelength of the laser is between 780 nm and 1600 nm. Because the laser is

transmitted through the optical fiber, it has very high power density and is invisible to human eyes. When a beam of light enters the eye, the retina may be damaged.

Laser of wavelengths used in telecommunications can cause thermal damage to the retina.

Lasers used in lightwave systems have a larger beam divergence, typically 10 to 20 degrees. Viewing an un-terminated fiber or damaged fiber with the unaided eye at distances greater than 150 mm (6 inches) will normally not cause eye injury. However, damage may occur if an optical tool such as a microscope, magnifying glass or eye loupe is used to view the energized fiber end.

In its normal operating mode, a lightwave system is totally enclosed and presents no risk of eye injury. Additional safety is achieved by an automatic laser shut-down (ALS) of the system. The ALS, however, can be applied for bi-directional transmission only. If the receiver side does not detect the laser from the transmission side, it will give the transmission side a signal. Upon receiving the signal, the ALS will shut down the laser emission within 100 ms.

Laser Safety Guidelines

Read the following guidelines to avoid laser radiation:

- Read the instructions before installing, operating and maintaining the device. Ignoring the instructions can cause exposure to dangerous laser radiation.
- Wear a pair of eye-protective glasses when you are handling lasers or fibers.
- All the operation shall be performed by personnel who have completed the approved training courses.
- Make sure that the optical source is switched off before disconnecting optical fiber connectors.
- Before opening the front door of an optical transmission system, make sure that you are not exposed to laser radiation.
- Do not look at the end of an exposed fiber or an open connector when you are not sure whether the optical source is switched off or not.
- Use an optical power meter to check and ensure that the optical source is switched off by measuring the optical power.
- Do not use an optical tool such as a microscope, a magnifying glass or an eye loupe to view the optical connector or fiber.

Handling Fibers

Read the instructions before handling fibers.

- Cutting and splicing fibers must be performed by the trained personnel only.
- Before cutting or splicing a fiber, ensure the fiber is disconnected from the optical source. After disconnecting the fiber, use protecting caps to protect all the optical connectors.

3.7 Working at Heights

**WARNING**

When working at heights, be careful to prevent objects from falling.

When working at heights, shall comply with the following requirements.

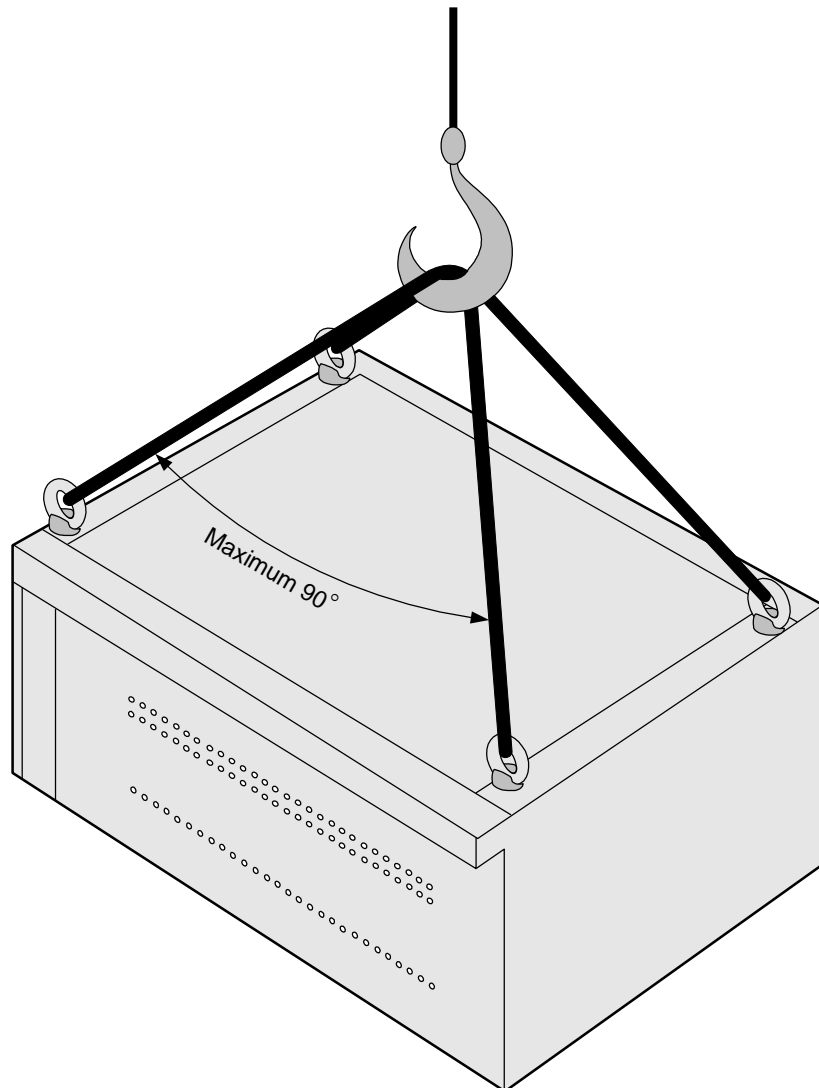
- The personnel who work at heights must be trained.
- The operating machines and tools shall be carried and handled safely to avoid falling.
- Safety protection measures, such as wearing a helmet and a safety belt, shall be taken.
- In cold regions, wear warm clothes when performing high-altitude operation.
- All lifting appliances must be thoroughly checked before the work is started.

3.7.1 Weight Lifting

**WARNING**

Do not access the areas under the jib arm and the goods in suspension when lifting weight.

- Ensure the operators have completed the related training and are qualified.
- Check the weight lifting tools and confirm that the tools are in good condition.
- Lift the weight only when the weight lifting tools are firmly fixed onto the weight-bearing object or the wall.
- Use a concise command to avoid incorrect operation.
- Ensure the angle between the two cables is less than or equal to 90 degrees during the lift. (see Figure 3-2).

Figure 3-2 Weight lifting

3.7.2 Safety Guide on Ladder Use

Checking the Ladder

Before using the ladder, first check if the ladder is in good condition. Make sure that you know the maximum weight that the ladder can support; overweight on the ladder is strictly prohibited.

Placing the Ladder

Slant angle is suggested to be 75 degrees. The slant can be measured with the angle square or with arms. When using a ladder, place the wider end of the ladder on the ground. Otherwise, take protective measures on the base part of the ladder to avoid skidding. Place the ladder on stable ground.

Climbing the Ladder

When climbing the ladder, note the following.

- Ensure the gravity center of your body does not deviate from the ladder edge.
- To lessen the danger and ensure the safety, hold your balance on the ladder before any operation.
- Do not climb higher than the fourth highest step of the ladder.
- If you are about to climb to the top, the length of the ladder shall be one meter higher than the eave.

3.8 Mechanical Safety

3.8.1 Drilling



WARNING

Drilling on the rack without permission is strictly prohibited. Drilling that does not satisfy the requirements concerned may damage the wires and cables inside the rack. If the metal shavings from the drilling fall into the rack, it may result in short circuit of the circuit boards.

- Before drilling a hole on the rack, wear insulation gloves, and remove the cables inside the rack.
- During the drilling, ensure that your eyes are well protected. The hot shavings may injure your eyes.
- Ensure that the metal shavings do not get into the rack.
- Non-standard drilling may damage the electromagnetic shielding performance of the rack.
- After drilling, clean the metal shavings in time.

3.8.2 Sharp Objects



WARNING

When carrying the device by hand, wear protection gloves to avoid injury by sharp objects.

3.8.3 Handling Fans

Ensure the following:

- When replacing a component, place the component, screw, and tool at a safe place to prevent them from falling into the running fan.

- When replacing the ambient equipment around the fan, do not place the finger or board into the running fan until the fan is switched off and stops running.

3.8.4 Lifting Heavy Objects



WARNING

When lifting heavy objects, do not stand or walk under the arm or the lifted object.

3.9 Miscellaneous

3.9.1 Inserting and Removing a Board

To insert or remove a board, abide by the following requirements:



CAUTION

When inserting a board, handle it gently to avoid distorting pins on the backplane.

- Insert the board along the slot guide.
- The two sides of one board should not contact another board to avoid short-circuit or scratch.
- When holding a board in hand, do not touch the board circuit, components, connectors, or connection slots.

3.9.2 Bundling Signal Cables



CAUTION

- Bundle the signal cables separately from the strong current cables or high voltage cables.
 - Maintain a minimum space of 150 mm between adjacent ties.
-

3.9.3 Cabling Requirements

At a very low temperature, movement of the cable may damage the plastic skin of the cable. To ensure the construction safety, comply with the following requirements:

- When installing cables, ensure that the environment temperature is above 0 °C.
- If cables are stored in the place below 0 °C, move the cables into a place at a room temperature and store the cables for more than 24 hours before installation.

- Move the cables with care, especially at a low temperature. Do not drop the cables directly from the vehicle.