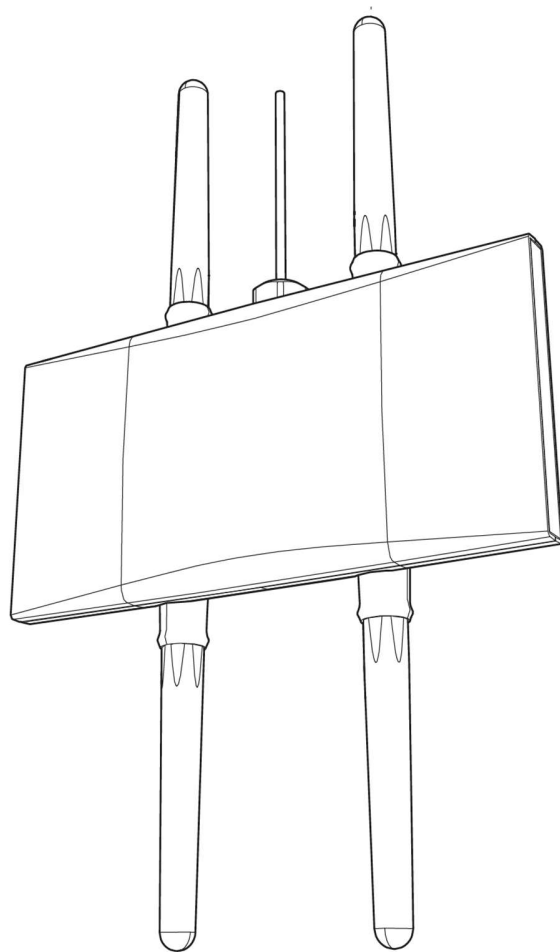




Meraki MR86-HW

Hardware Installation Guide

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Warranty

Meraki, Inc. provides a lifetime warranty on this product. Warranty details may be found at www.meraki.com/legal.

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1 Scope of Document and Related Publications

The MR86-HW Hardware Installation Guide describes the installation procedure for the MR86-HW Outdoor access point. Additional reference documents are available online at www.meraki.com/library/product.

2 MR86-HW Overview

The Meraki MR86-HW is an enterprise-class, dual-concurrent 4x4 MIMO 802.11ax outdoor access point designed for high-density deployments in offices, schools, hospitals and hotels. When connected to the Meraki Cloud Controller, the MR86-HW enables the creation of ultra-high speed, reliable outdoor wireless networks quickly, easily and cost-effectively.

2.1 Package Contents

The MR86-HW package contains the following:

- MR86-HW access point
- Wall screws
- Security screws
- Mounting Template

2.2 Understanding the MR86-HW

MR86-HW Operation Temperature:

-40 ° F to 131 ° F (-40 ° C to 55 ° C)

Your Meraki MR86-HW has the following features:

- Kensington lock hard point

- Mount plate attachment slots (2x)

- Cable access bay

- MR86-HW cable access bay

- Factory Reset Button

- Ethernet port Power supplied by PoE: 50-57Vdc 0.6A

Your MR86-HW mount plate has the following features:

- Access point mounting posts (2x)

- Various mounting holes

2.3 Security Features

The MR86-HW features multiple options for physically securing the access point after installation:

1. Security screw – The accessory kit includes screws that can be used to secure the access point to the mount plate. Engaging the security screw prevents accidental dislodging and theft.
2. Kensington lock – The access point contains a hard point that allows it to be secured to any nearby permanent structure using a standard Kensington lock.

2.4 Ethernet Ports

The MR86-HW features an Ethernet RJ45 port that accepts 802.3at power (labeled “PoE”). This port should be used for uplink to your WAN connection.

2.5 Power Source Options

The MR86-HW access point can be powered using the 802.3at PoE Injector (sold separately) or a third-party 802.3at PoE switch.

2.6 Factory Reset Button

If the button is pressed and held for at least five seconds and then released, the MR86-HW will reboot and be restored to its original factory settings by deleting all configuration information stored on the unit.

3 Pre-Install Preparation

You should complete the following steps before going on-site to perform an installation.

3.1 Configure Your Network in Dashboard

The following is a brief overview only of the steps required to add an MR86-HW to your network. For detailed instructions about creating, configuring and managing Meraki wireless networks, refer to the Meraki Cloud Controller Manual (meraki.com/library/product).

1. Login to <http://dashboard.meraki.com>. If this is your first time, create a new account.
2. Find the network to which you plan to add your APs or create a new network.
3. Add your APs to your network. You will need your Meraki order number (found on your invoice if you ordered directly from Meraki) or the serial number of each AP, which looks like Qxxx-xxxx-xxxx, and is found on the bottom of the unit. You will also need your Enterprise Cloud Controller license key, which you should have received via email from shipping@meraki.com.
4. Go to the map / floor plan view and place each AP on the map by clicking and dragging it to the location where you plan to mount it.

3.2 Check and Upgrade Firmware

To ensure your MR86-HW performs optimally immediately following installation, Meraki recommends that you facilitate a firmware upgrade prior to mounting your MR86-HW.

1. Attach your MR86-HW to power and a wired Internet connection. See p. 19 of this Hardware Installation Guide for details.
 2. The MR86-HW will turn on and the Power LED will glow solid orange. If the unit does not require a firmware upgrade, the Power LED will turn white within thirty seconds.
- * If the unit requires an upgrade, the Power LED will begin blinking orange until the upgrade is complete, at which point the Power LED will turn solid white. You should allow about an hour for the firmware upgrade to complete, depending on the speed of your internet connection.

3.3 Check and Configure Firewall Settings

If a firewall is in place, it must allow outgoing connections on particular ports to particular IP addresses. The most current list of outbound ports and IP addresses can be found here:

<http://tinyurl.com/y79une3>

3.4 Assigning IP Addresses to MR86-HWs

All gateway MR86-HWs (MR86-HWs with Ethernet connections to the LAN) must be assigned routable IP addresses. These IP addresses can be dynamically assigned via DHCP or statically assigned.

3.4.1 Dynamic Assignment

When using DHCP, the DHCP server should be configured to assign a static IP address for each MAC address belonging to a Meraki AP. Other features of the wireless network such as 802.1x authentication, may rely on the property that the APs have static IP addresses.

3.4.2 Static Assignment

Static IPs are assigned using the local web server on each AP. The following procedure describes how to set the static IP:

1. Using a client machine (e.g. a laptop), connect to the AP either wirelessly (by associating to any SSID broadcast by the AP) or over a wired connection.

If using a wired connection, connect the client machine to the MR86-HW either through a PoE switch or a Meraki PoE Injector. If using a PoE switch, plug an Ethernet cable into the MR86-HW's Ethernet jack, and the other end into a PoE switch. Then connect the client machine over Ethernet cable to the PoE switch. If using a Meraki PoE Injector, connect the MR86-HW to the "PoE" port of the Injector, and the client machine to the "LAN" port.

2. Using a web browser on the client machine, access the AP's built-in web server by browsing to <http://my.meraki.com>. Alternatively, browse to <http://10.128.128.128>.
3. Click on the "Static IP Configuration" tab. Log in. The default user name is "admin". The default password is the AP's serial number, with hyphens included
4. Configure the static IP address, net mask, gateway IP address and DNS servers that this AP will use on its wired connection.
5. If necessary, reconnect the AP to the LAN.

3.4.3 Static IP via DHCP Reservations

Instead of associating to each Meraki AP individually to configure static IP addresses, an administrator can assign static IP addresses on the upstream DHCP server. Through "DHCP reservations", IP addresses are "reserved" for the MAC addresses of the Meraki APs. Please consult the documentation for the DHCP server to configure DHCP reservations.

3.5 Collect Tools

You will need the following tools to perform an installation:



Phillips screwdriver

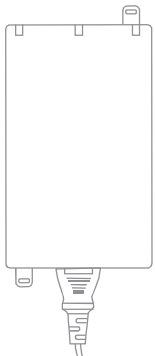


Hammer



Drill with 1/4" (6.3mm) bits

3.6 Collect Additional Hardware for Installation



802.3at PoE power source (either PoE switch or Meraki 802.3at PoE Injector)



Network cables with RJ45 connectors long enough for your particular mounting location

4 Installation Instructions

4.1 Choose Your Mounting Location

A good mounting location is important to getting the best performance out of your MR86-HW access point. Keep the following in mind:

1. The device should have unobstructed line of sight to most coverage areas. For example, if installing in an office filled with workspaces divided by mid-height cubicle walls, installing on a vertical pole or high on a wall would be ideal.
2. Power over Ethernet supports a maximum cable length of 300 ft (100 m).
3. If being used in a mesh deployment, the MR86-HW should have line of sight to at least two other Meraki devices. For more detailed instructions regarding access point location selection, reference the Meraki Network Design Guide (meraki.com/library/product).

4.2 Install the MR86-HW

For most mounting scenarios, the MR86-HW mount plate provides a quick, simple, and flexible means of mounting your device. The installation should be done in two steps. First, install the mount plate to your selected location. Then, attach the MR86-HW to the mount plate.

!!! This equipment is only suitable for mounting at heights ≤ 2 m !!!

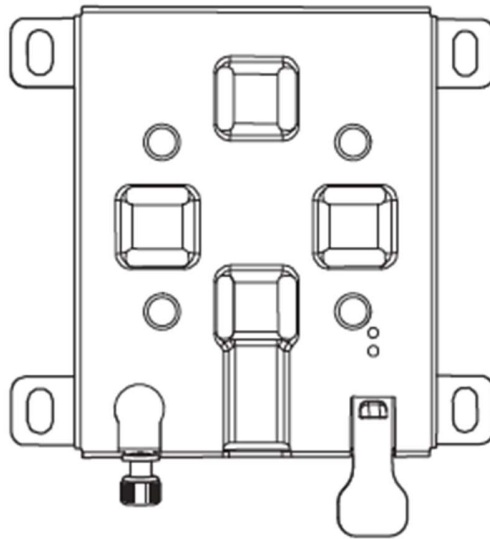
4.2.1 Attach the Mount Plate

The MR86-HW mount plate can be used to install your access point in a wide range of scenarios: wall, on various electrical junction boxes.

The mount plate contains a variety of hole patterns that are customized for each installation scenario. The mounting template (included in box with mount plate) should be used to drill holes for wall mounts and also to identify the correct hole patterns in the mount plate that should be used for each type of mount.

4.2.1.1 Wall or Mount Using Mount Plate

Using included screws, attach the mount plate to your mounting wall.



It is recommended that the MR86-HW be mounted to a wall using the mount plate for physical security reasons.



If mounting your MR86-HW to a wall, skip to “Power the MR86-HW” on P. 20

4.2.1.2 Electrical Junction Box Mount Using Mount Plate

The MR86-HW can be mounted to a 4” square cable junction box, a 3.5 or 4” round cable junction box, or various U.S. and European outlet boxes (mounting screws are not included).

4.2.2 Power the MR86-HW

If mounting to an electrical junction box, feed the Ethernet cable through the cable access hole in the Mount Plate.

If mounting to a wall, the Ethernet cable will feed through the cable slot on bottom of the MR86-HW.

4.2.2.1 Powering the MR86-HW with the Meraki POE Injector (sold separately)

1. Plug the power cord into the MR86-HW and the other end into a wall outlet.
2. Plug an Ethernet cable that is connected to an active Ethernet connection into the Etho port on the MR86-HW.

4.2.2.2 Powering the MR86-HW with the Meraki 802.3at Power over Ethernet Injector (sold separately)

1. Plug the power cord into the PoE Injector and the other end into wall power.
2. Plug an Ethernet cable that is connected to an active Ethernet connection into the “IN” port on the injector.
3. Route Ethernet cable from the “OUT” port on the injector to the Etho port in the cable bay of the MR86-HW.

4.2.2.3 Powering the MR86-HW with an 802.3at Power over Ethernet Switch Route Ethernet cable from a port on an active 802.3at PoE switch to the Etho port in the bay of the MR86-HW.



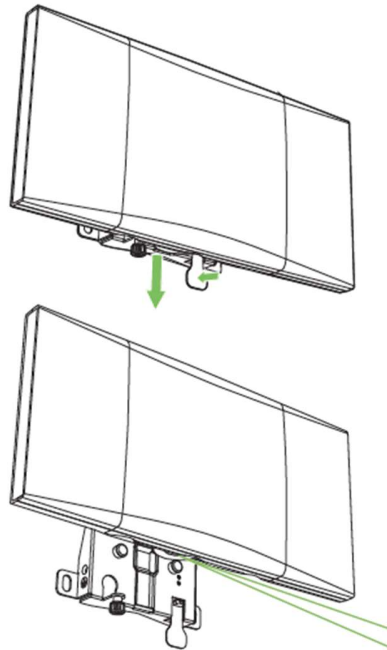
The MR86-HW is Gigabit Ethernet-capable. To maximize device performance, a Gigabit-capable switch should be used.

4.2.3 Mount the MR86-HW

4.2.3.1 Assemble MR86-HW to the Mount Plate

(This section applies to wall and or electrical junction box mount where you have already installed the mount plate.)

Insert the top latch on the mount plate into the top mount plate attachment slots on the back of the device. Rotate the bottom of the unit into the bottom mount plate attachment slot. The unit will click into place.



4.3 Secure the MR86-HW

Depending on your mounting environment, you may want to secure the MR86-HW to its mount location. Your MR86-HW can be secured in several ways. If the MR86-HW has been installed using the mount plate, it can be secured via security screw (Torx and Philips head security screws are included; choose one), and/or Kensington lock. If the mount plate was not used, the MR86-HW can still be secured using a Kensington lock.

4.3.1 Security Screw

Install the security screw in the lower mount plate tab.

4.3.2 Kensington Lock

Attach a Kensington lock cable to the access point at the hard point on the side of the device. Attach the other end of the cable to a secure location, such as a pipe or building fixture.

4.4 Verify Device Functionality and Test Network Coverage

1. Check LEDs

The LED should be solid white. If it is flashing orange, the firmware is automatically upgrading and the LED should turn green when the upgrade is completed (normally in under thirty minutes).

Note: Your MR86-HW must have an active route to the Internet to check and upgrade its firmware.

2. Verify access point connectivity

Use any 802.11 client device to connect to the MR86-HW and verify proper connectivity using the client's web browser.

3. Check network coverage

Confirm that you have good signal strength throughout your coverage area. You can use the signal strength meter on a laptop, smart phone, or other wireless device.

5 Troubleshooting

Reference the Meraki knowledge base at http://meraki.com/support/knowledge_base for additional information and troubleshooting tips.

6 Regulatory

FCC Compliance Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

FCC Interference Statement

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 correct the interference by one 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 which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

Any changes or modifications not expressly approved by Meraki could void the user's authority to operate this equipment. This Transmitter must not be co-located or operation in conjunction with any other antenna or transmitter.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 54 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Operation of this product in the USA is firmware-limited to channels 1 through 11.

This device meets all other requirements specified in Part 15E, Section 15.407 of the FCC Rules.

Industry Canada Statement

This device complies with RSS -247 of the Industry Canada Rules. Operation is subject to the following two conditions:

This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Ce dispositif est conforme à la norme CNR-247 d'Industrie Canada applicable aux appareils radio exempts de licence.

Son fonctionnement est sujet aux deux conditions suivantes: (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Industry Canada Radiation Exposure Statement

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 64 cm between the radiator & your body.

Déclaration d'exposition aux radiations

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 64 cm de distance entre la source de rayonnement et votre corps.

- (i) the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
- (ii) for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit;
- (iii) for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits as appropriate;
- (iv) where applicable, antenna type(s), antenna models(s), and worst-case tilt angle(s) necessary to remain compliant with the e.i.r.p. elevation mask requirement set forth in section 6.2.2.3 shall be clearly indicated.

Le guide d'utilisation des dispositifs pour réseaux locaux doit inclure des instructions précises sur les restrictions susmentionnées, notamment :

- (i) les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;
- (ii) pour les dispositifs munis d'antennes amovibles, le gain maximal d'antenne permis pour les dispositifs utilisant les bandes de 5 250 à 5 350 MHz et de 5 470 à 5 725 MHz doit être conforme à la limite de la p.i.r.e.;
- (iii) pour les dispositifs munis d'antennes amovibles, le gain maximal d'antenne permis (pour les dispositifs utilisant la bande de 5 725 à 5 850 MHz) doit être conforme à la limite de la p.i.r.e. spécifiée, selon le cas;
- (iv) lorsqu'il y a lieu, les types d'antennes (s'il y en a plusieurs), les numéros de modèle de l'antenne et les pires angles d'inclinaison nécessaires pour rester conforme à l'exigence de la p.i.r.e. applicable au masque d'élévation, énoncée à la section 6.2.2.3, doivent être clairement indiqués

This radio transmitter (IC: 6961A-60094010 / Model: MR86-HW V01) has been approved by ISED to operate with the antenna type listed below with maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Approved antenna(s) list

Antenna set	Chain No.	Brand & Manufacturer	Model	Antenna Gain (dBi)	Frequency Range (GHz)	Antenna Type
1	Chain 0/1 Chain 2/3	Cisco	AIR-ANT2513P4M-N	13	2.4~2.4835	Dual-Band Polarization Diverse Patch Array
				13	5.15~5.85	
2	Chain 0/1 Chain 2/3	Cisco	MA-ANT-20	4	2.4~2.4835	Omni-directional
				7	5.15~5.85	
3	Chain 0/1 Chain 2/3	Cisco	MA-ANT-25	8	2.4~2.4835	Patch Array
				6.5	5.15~5.85	
4	Chain 0/1 Chain 2/3	Cisco	MA-ANT-27	9	2.4~2.4835	Sector
				12	5.15~5.85	

Le présent émetteur radio (IC: 6961A-60094010 / Model: MR86-HW V01) a été approuvé par ISED pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Approved antenna(s) list

Antenna set	Chain No.	Brand & Manufacturer	Model	Antenna Gain (dBi)	Frequency Range (GHz)	Antenna Type
1	Chain 0/1 Chain 2/3	Cisco	AIR-ANT2513P4M-N	13	2.4~2.4835	Dual-Band Polarization Diverse Patch Array
				13	5.15~5.85	
2	Chain 0/1 Chain 2/3	Cisco	MA-ANT-20	4	2.4~2.4835	Omni-directional
				7	5.15~5.85	
3	Chain 0/1 Chain 2/3	Cisco	MA-ANT-25	8	2.4~2.4835	Patch Array
				6.5	5.15~5.85	
4	Chain 0/1 Chain 2/3	Cisco	MA-ANT-27	9	2.4~2.4835	Sector
				12	5.15~5.85	

Manufacturer	Model	Antenna Type	Max Gain (dBi)	Impedance (Ω)
Cisco	AIR-ANT2513P4M-N	Dual-Band Polarization Diverse Patch Array	13	5

7 Professional installation instruction

1. Installation personnel

This product is designed for specific application and needs to be installed by a qualified personal who has RF and related rule knowledge. The general user shall not attempt to install or change the setting.

2. Professional Installation Requirements

The following requirements for installation and operation of outdoor systems must be addressed:

Operation in the 5600-5650-MHz band is not authorized for 5-GHz WLAN systems, whether operating indoors or outdoors. This does not pose a problem for Cisco® WLAN since this band is not accessible for Cisco products. Use of indoor-only equipment outdoors can lead to FCC enforcement action, such as fines or requirements to disable the system. This includes installations where the access point is placed indoors and the antenna is placed outdoors, as well as installations involving retractable roofs (for example, football stadiums).

For **WLAN systems being installed outdoors**, the following requirements must be met.

- a) Systems must be **professionally installed** by a qualified engineer familiar with WLAN, including Cisco trained partners and resellers.
- b) Operation in the 5600-5650-MHz band is prohibited.
- c) It is recommended that the installer register the installation of their system in the Wireless Internet Service Providers Association (WISPA database). This is especially important for systems that are installed within 35 km of the FAA TDWR. (Please see the links later in this document to WISPA database with TDWR locations.)
- d) When within 35 km distance of a TDWR, the center frequency of the WLAN must be separated from the TDWR center frequency by 30 MHz.
 - a. If the radar is operating from 5600-5610 MHz, disable the use of channel 116 (5580 MHz).
 - b. If the radar is operating from 5630-5650 MHz, disable the use of channel 132 (5660 MHz).Note: Cisco will be disabling channels 116 and 132 for outdoor systems in the future, the instructions in (d) only applies to systems that currently have the channels enabled.
- e) Additional mitigation techniques can include first, not orienting the antennas in the main beam of the weather radar, and second, ensuring that the antenna is not positioned in line-of-sight of the FAA TDWR.
- f) Verify that the antennas used are approved for use with Cisco WLAN systems. Installers or operators using non-approved antennas or making any unauthorized changes may be subject to enforcement action.

Installers and operators shall consult the Wireless Internet Service Providers Association (WISPA) database to determine if they are within 35 km of the Terminal Doppler Weather Radar (TDWR), as well as to register the system if operating within this range of the TDWR.

For **outdoor operation of the AP in the 5150-5250 MHz band**, the maximum output power shall not exceed 1W. EIRP at any elevation angle above 30 degrees (as measured from the horizon) shall not exceed 125mW, per the FCC Part 15.407 rules. The highest antenna gains from the horizon above 30 degrees are as below:

And the following condition for maximum EIRP must apply:

$$EIRP = P_t - L_c + G_a$$

and shall not exceed 21 dBm above 30 degrees over the horizon. This is maintained through the Cisco Meraki Software Defined Radio implementation, limiting the power output at a given band, limiting the maximum EIRP for 5150-5250 MHz to 21 dBm when implemented outdoors. All power limits and band usage according to FCC rules are implemented through the SDR.

3. Installation location

The product shall be installed at a location where the radiating antenna can be kept 64 cm for IC, 54 cm for FCC from nearby person in normal operation condition to meet regulatory RF exposure requirement.

4. External antenna

Use only the antennas which have been approved by the applicant. The non-approved antenna(s) may produce unwanted spurious or excessive RF transmitting power which may lead to the violation of FCC limit and is prohibited.

5. Installation procedure

Please refer to user's manual for the detail.

6. Warning

Please carefully select the installation position and make sure that the final output power does not exceed the limit set force in relevant rules. The violation of the rule could lead to serious federal penalty.

Instructions d'installation professionnelle

1. Installation

Ce produit est destine a un usage specifique et doit etre installe par un personnel qualifie maitrisant les radiofrequences et les regles s'y rapportant. L'installation et les reglages ne doivent pas etre modifies par l'utilisateur final.

2. Emplacement d'installation

En usage normal, afin de respecter les exigences reglementaires concernant l'exposition aux radiofrequences, ce produit doit etre installe de facon a respecter une distance de 64 cm pour IC, 54 cm pour FCC entre l'antenne emettrice et les personnes.

3. Antenn externe.

Utiliser uniquement les antennes approuvees par le fabricant. L'utilisation d'autres antennes peut conduire a un niveau de rayonnement essentiel ou non essentiel depassant les niveaux limites definis par FCC, ce qui est interdit.

4. Procedure d'installation Consulter le manuel d'utilisation.

5. Avertissement

Choisir avec soin la position d'installation et s'assurer que la puissance de sortie ne depasse pas les limites en vigueur. La violation de cette regle peut conduire a de serieuses penalites federales.

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