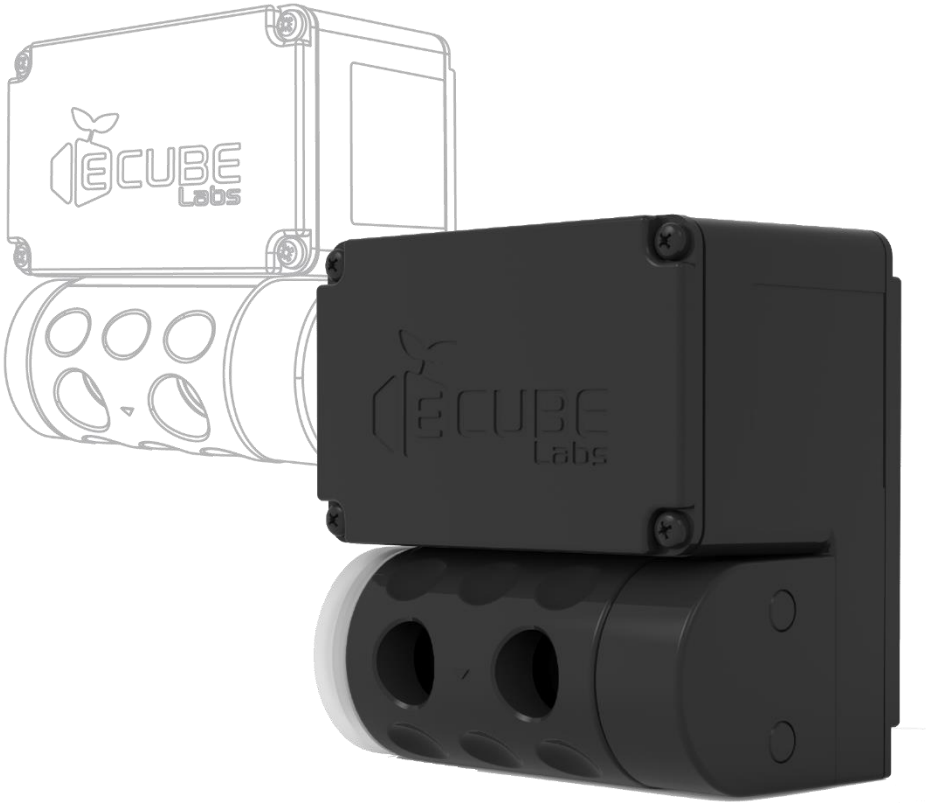
CleanFLEX

Installation and Activation

English v1.0.0



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1. Introduction to CleanFLEX

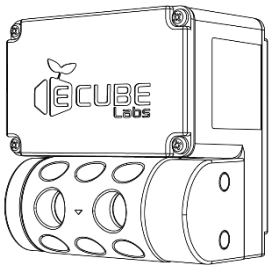
CleanFLEX is a smart ultrasonic fill-level sensor that can be easily installed on any type of container. It uses robust ultrasonic technology, allowing it to monitor any type of substance. CleanFLEX measures bin fill-level, monitors bin status, and sends real-time data to CleanCityNetworks (CCN). CleanFLEX telecommunicates with CCN through WCDMA networks. Obtaining real-time fill-level data of bins allows you to take action ahead of time.

1.1 CleanFLEX contents

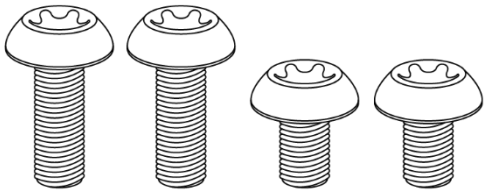
When you receive CleanFLEX, ensure that you have all items mentioned in this section.

1.1.1 Included in CleanFLEX box

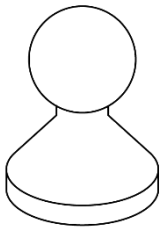
Each CleanFLEX box is shipped with the following items:



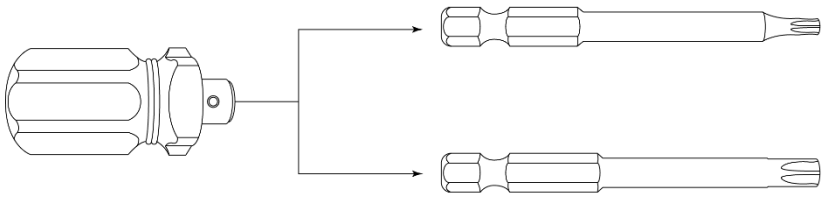
CleanFLEX (1 EA)



M6×12mm (2 EA), M6×8mm (2 EA)



Magnet (1 EA)



Torx driver (1 EA), Torx bit M3 (1 EA), Torx bit M6 (1 EA)

1.1.2 Optional with CleanFLEX

In certain cases, optional items (e.g. brackets) are required for installing CleanFLEX inside a waste container. These items are customized to fit your waste containers and must be ordered separately. Before ordering these items separately, you must provide information about height, width, volume, and material of your waste container. Based on information provided, Ecube Labs will calculate the exact height for installing CleanFLEX and will provide appropriate bracket and kit for installing CleanFLEX inside the waste containers.

1.2 Technical specification

The technical specifications of CleanFLEX are shown in the following table.

Specification		Description
Sensor parameter	Technology	Ultrasonic
	Range	2 – 400 cm (~1” - ~157”)
	Resolution	1 cm (0.4”)
Data management	Accessibility	24/7 access through CleanCityNetworks (CCN) mobile and web interface
	Types	Container fill-level, container internal temperature (optional), GPS coordinates
	Software	Settings are configurable remotely
Communication	WCDMA	850/1900 MHz
	Network	Internal SIM card
Dimensions	Size (L×W×H)	80×85×52 mm
	Weight	300 g
Power	Battery Type	Replaceable 3.6V high performance lithium battery[1]
	Battery Life	Approx. 5 years[2]
Physical Characteristics	Material	Shockproof ABS/Polycarbonate
	Additional installation parts	Mounting bracket, external antenna
Radio Spec	Frequency	USA/Canada: 1850 ~ 1910MHz, 824 ~

		849MHz
	RF Power	USA/Canada: 23.5dBm, 24dBm

[1]: Use of undesignated battery may affect product life, and performance.

[2]: Battery life assuming four transmissions per day with acceptable local network quality

1.3 Features

CleanFLEX provides the following features:

- Mountable to any type of bin or container.
- It is complementary to CleanCUBE and can be installed in areas not feasible for CleanCUBE installations.
- Data from CleanFLEX can be viewed on the same software solution that displays data from CleanCUBE.
- Provides accurate sensing with ultrasonic technology.
- Effectively monitors both solid materials and liquids.
- Allows you to configure sensors remotely.
- Provides real-time wireless transmission of bin fill-level and bin status data to CleanCityNetworks.
- Telecommunication on WCDMA networks are supported.
- Provides location information through GPS module.

2. Installing CleanFLEX

CleanFLEX can be installed on either under the lid or the inside of waste containers. If the installation is for a waste container with a lid, CleanFLEX should be mounted under the lid. If the installation is for a waste container without a lid, CleanFLEX should be mounted on the inside of the waste container.

CleanFLEX must be installed, connected, commissioned, operated, and maintained by suitably qualified personnel only.

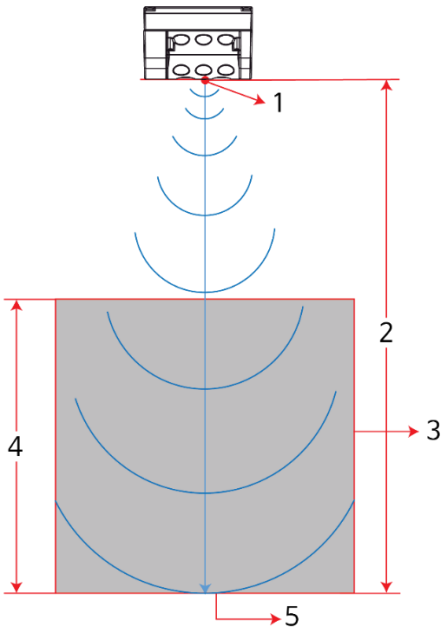
2.1 Installation prerequisites

Performance of CleanFLEX is affected by installation location and environment. It is recommended to install the bin with its base being perpendicular to the direction of ultrasonic wave emitted from the sensor. If necessary, rotate the ultrasonic sensor to adjust the measurement angle accordingly.

If the direction of the ultrasonic wave is not perpendicular to the base of the waste bin, the reflected ultrasonic wave may not be detected by the sensor and this may result in inaccurate measurements.

In order to receive accurate fill-level data, the user should enter the sensor and bin height dimensions (bin profile) into CleanCityNetworks. Refer to the diagram below for fill-level measurements.

Any substances between ultrasonic waves and base of the waste bin may affect measured values.



1. Sensor
2. Sensor height
3. Bin
4. Waste Height
5. Bin base

2.2 Installing CleanFLEX

Actual frequency range of a sensor depends on how well it is mounted on the container. Depending on container type, it may be necessary to seek advice on appropriate installation location and method of the installation.

Ensure you have the following items before beginning the installation:

- Stencil, marker
- M6 drill bit
- Power drill
- Torx driver
- M6 torx bolts (2 EA)
- CleanFLEX

Take the following steps to install CleanFLEX under the lid or inside the bin.

1. On the surface where CleanFLEX is to be installed, find the spot that is center of the bin base from where the measurements will be made. Use stencil to mark the location of the hole.

2. Using a power drill with M6 drill bit, drill holes on the marked spots.
3. Position CleanFLEX on the installation surface and tighten with screws from the other side.
4. Make sure the sensor is facing and centered on the base of the bin.
5. Adjust the angle of the ultrasonic sensor if necessary.
6. Make sure CleanFLEX is securely installed.

If the installing surface is too thick, use long M6 torx bolts to secure CleanFLEX.

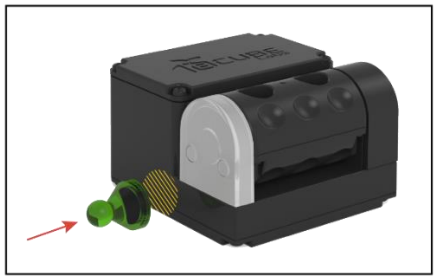
3. Activating CleanFLEX

After installing CleanFLEX, activate the device and check its operation. If you contact Ecube Labs or your point of purchase, you will be provided with more accurate activation confirmation.

3.1 Checking CleanFLEX ON/OFF status

Perform the following to check the ON/OFF status of CleanFLEX.

1. Refer to the diagram and place the magnet on the following location. The magnet is recognized only on this location.



   A. If the LED light **turns on for 1 second immediately** after magnet is placed on the indent: Power is OFF.

   B. If the LED light flashes 1 second after magnet is placed on the indent: Power is ON.

2. Remove the magnet after the LED light turns ON or flashes so that CleanFLEX returns to its current ON/OFF status.

3.2 Turning CleanFLEX ON

Once CleanFLEX is installed, turn CleanFLEX ON to ensure it is working. Before turning CleanFLEX ON, perform the tasks described in the following prerequisite section.

3.2.1 Prerequisites

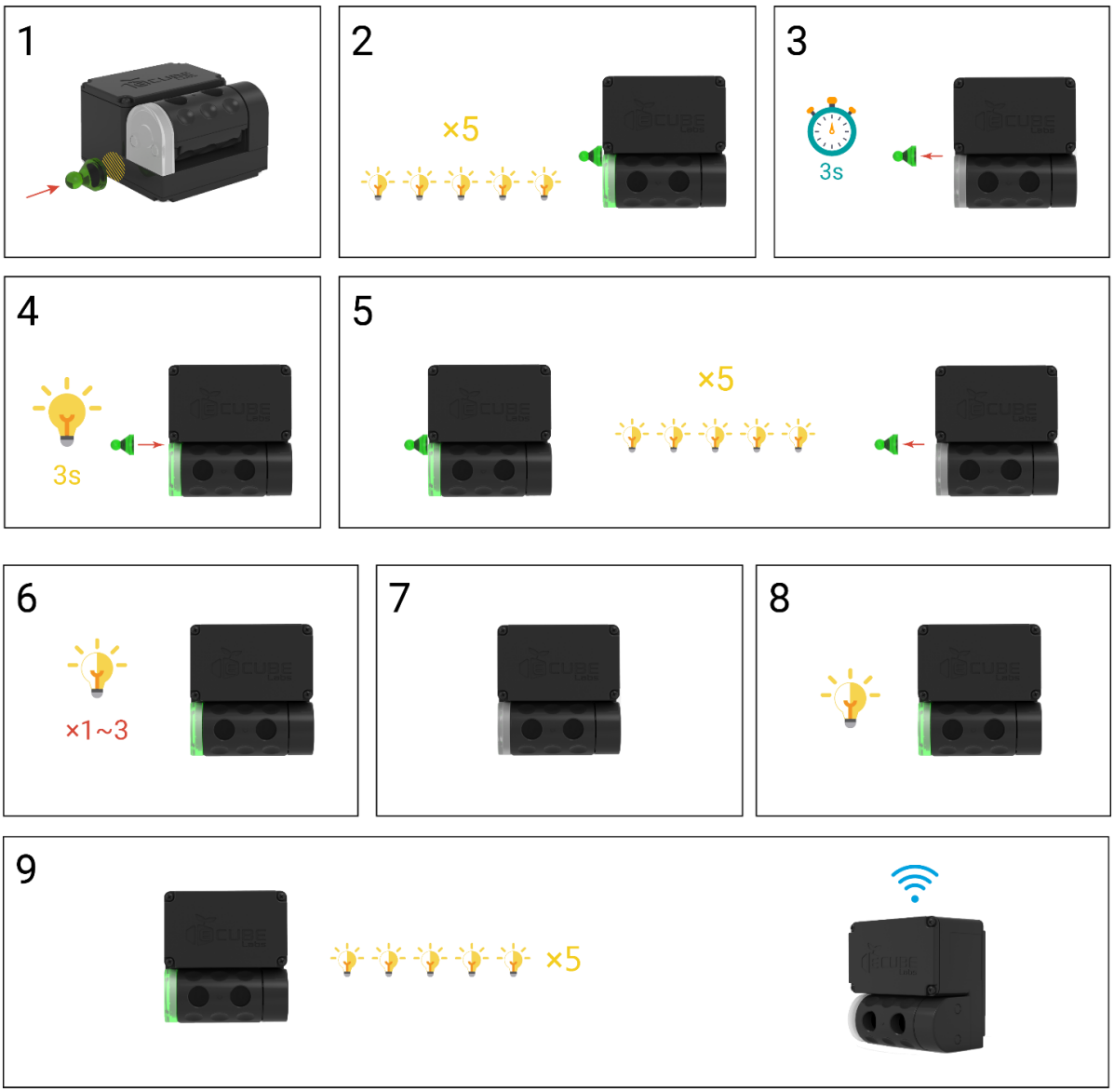
Before turning CleanFLEX ON, log in to the CCN web interface, select the respective CleanFLEX and click "**Request GPS Update**". This ensures accurate GPS location updates from CleanFLEX. Refer to the "*CleanCityNetworks Web User's Manual"* for instructions on

requesting GPS update.

For CleanFLEX installed underground, it is highly recommended to perform “Set Manual Location” as CleanFLEX installed underground does not provide accurate GPS location coordinates.

Take the following steps to turn CleanFLEX ON.

1. Place the magnet on the indent located on the side of CleanFLEX.
2. LED light will flash five times. Remove the magnet after 5 flashes.
3. Wait until LED light **flashes again**. This process will take approximately 3 seconds.
4. After LED light flashes, place the magnet on again within 3 seconds.
5. LED light will flash 5 times. Remove magnet after 5 flashes.
6. 5 seconds after the end of flashing, the LED light will flash 1~3 times again to indicate that CleanFLEX is ON.
7. For 1 minute, there will be no LED indication while CleanFLEX sets up communication.
8. After 1 minute, the LED light will flash once every 3 seconds until CleanFLEX is connected to the server.
9. LED light will flash rapidly 5 times if CleanFLEX is successfully connected.



3.3 Turning CleanFLEX OFF

Take the following steps to turn CleanFLEX OFF.

1. Place the magnet on the detector.

2-1. After placing the magnet on the detector for 1 second, the LED light will flash 1 time.

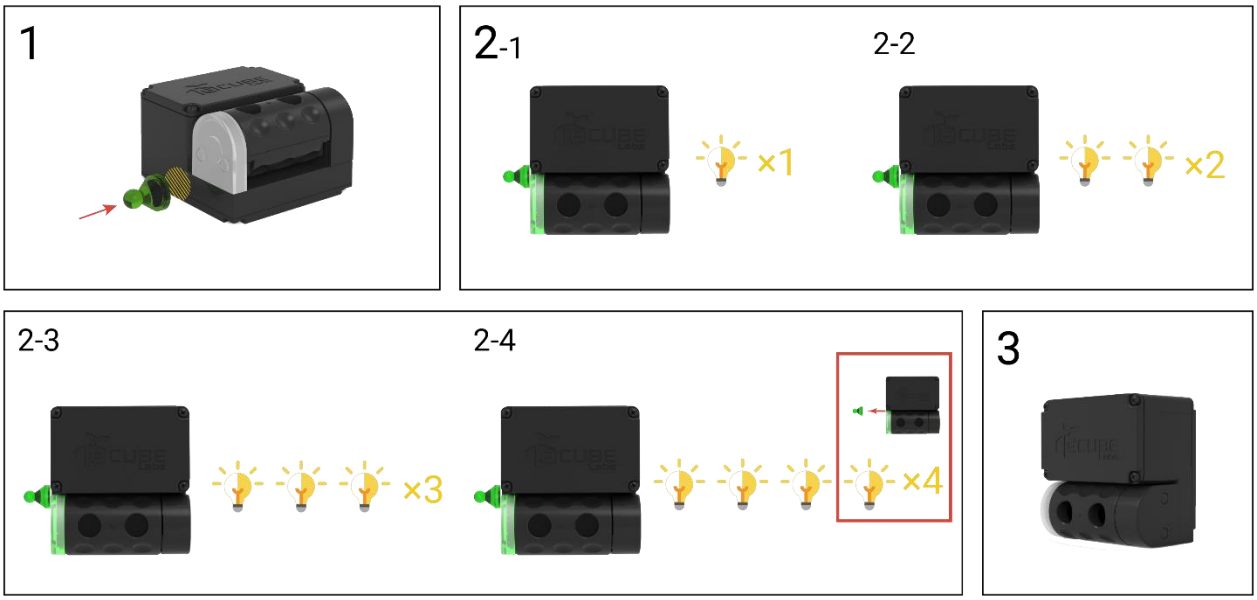
2-2. After another second, LED light will flash 2 times.

2-3. After another second, LED light will flash 3 times.

2-4. After another second, LED light will flash 4 times. Remove the magnet from the detector while the LED light is flashing.

3. Device is now turned OFF.

Avoid performing any procedures within ten minutes after turning CleanFLEX OFF. If the user fails to perform the correct procedure while turning CleanFLEX OFF, CleanFLEX will return to its previous ON status.

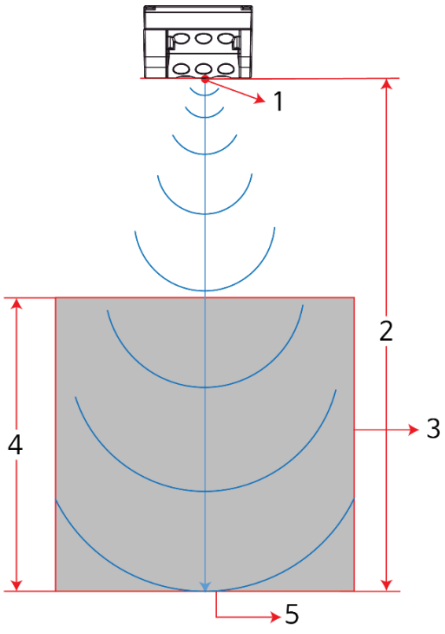


4. Bin profile

For accurate fill-level measurements, capture the following bin dimensions. If the direction of the ultrasonic wave emitted from the sensor is not perpendicular to the bin base, measurements for fill-level will not be accurate as they are based on travelled distance of the ultrasonic wave.

- Distance from the base of the bin to the sensor
- Bin width
- Bin height
- Bin volume

These dimensions are essential in creating bin profile for CleanFLEX on the CCN interface for receiving accurate sensor data from CleanFLEX. If you fail to create bin profile for CleanFLEX on CCN interface using these dimensions, then CleanFLEX is set to default bin profile, which may lead to inaccurate measurement data. Refer to the "*CleanCityNetworks User's Manual"* for creating bin profiles for CleanFLEX.



1. Sensor
2. Sensor height
3. Bin
4. Waste height
5. Bin base

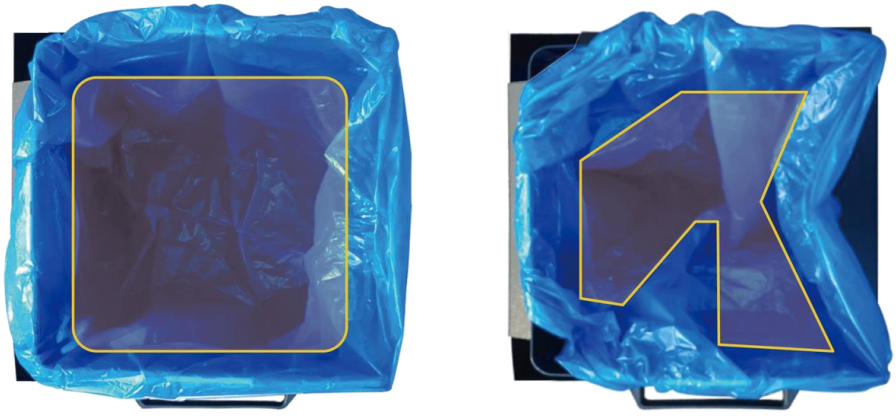
4.1 Placing liner bag inside the waste bin

If using bin liners, please ensure the following steps are followed. Failure to follow the

instructions may result in inaccurate fill-level readings.

1. Fill the bin liner with air before inserting it into the bin.
2. Fold the top of the bag over the top edge of the bin while pushing the bin liner against the inside of the bin to keep the bag away from the center of the bin.
3. Fold the excess length of the bag over the outside of the bin.

The liner bag must be pushed completely to the sides of the bin. If the liner bag is folded at the center of the bin, then it leads to inaccurate measurement data. After the liner bag is placed in the bin, ensure the inside of the bin looks as illustrated below.



O X

5. Customer support

If you experience network problems or operation issues after installing CleanFLEX, check the following.

5.1 Fill-level measurement issues

Visually inspect the installed CleanFLEX and:

- Check whether the ultrasonic sensor is surrounded by foreign substances
- Check the status of liner bag
- Check for damages on the ultrasonic sensor

If foreign substances are found around the ultrasonic sensor, remove them. If the liner bag is not placed properly, refer to "*4. Bin profile*" and place the bag correctly. Also check whether the ultrasonic sensor is physically damaged. In case of damage, contact Ecube Labs or point of purchase.

5.2 Telecommunication and Battery issues

Other things to confirm are as follows:

- Remaining Battery Life

If remaining battery life is too low, you may experience network quality issues. If remaining battery life is too low or if you have network connectivity issues related to low battery, contact Ecube Labs or point of purchase.

6. Regulatory Notices

User notification

This device has been tested for compliance with the intended use in a commercial environment. If the device is used in a domestic environment, it may cause radio interference.

FCC Part 15.19

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 Part 15.21

Any changes or modifications (including the antennas) to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment.

FCC RF Radiation Exposure Statement

This equipment complies with FCC RF Radiation exposure limits set forth for an uncontrolled environment.

This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

Industry Canada Statement:

This device complies with Industry Canada licence-exempt RSS standard(s).

Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes :
(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, mêmesi le brouillage est susceptible d'en compromettre le fonctionnement.