Home Hub 100 production specification & Startup Guide

Rev 2.0

Sep 2020

History

Version	Date	Description
V0.2	09/11/2018	Initial specification draft
V1.0	01/20/2020	Update with new photo
V2.0	09/4/2020	(1) Update the wireless characteristics (2) Update the guides (3) Update the figure

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1 Overview

- ASV1108(Ehong Smart Voice) is an intelligent voice suite with integrated voice triggering function. Use the Conexant CX20921 Platform, CX20921 is a high performance far field speech input processor on the chip system，support low system power Wakeon-Voice（WoV）function, support SSP output, noise suppression and full duplex Acoustic Echo Cancellation（AEC）.

  - Support multiple extension ports, speaker interface, headphone jack.
  - Support analog MIC and digital MIC.
  - Support USB2.0
  - Support Mute Button and Wake-up Button.
  - Carry Qualcomm WL501 board Development Board, used for building wireless smart audio, smart home appliances, internet of things and other devices.

1.1 Features

Cores

• C-programmable dual core 32-bit DSP (CAPE) with X and Y data, P memory spaces running at worstcase
200MHz, and yields 800MIPS
• Each core has dual Multiply-Accumulate (MAC) and dual memory
• Fixed point DSP with floating point assist
• Each MAC supports 32 x 24-bit and 64-bit accumulators
• Supports zero-overhead loop, circular buffers, and bit-reverse indexing
• 32-bit Arithmetic Logic Unit (ALU) that supports efficient bit manipulation
• Data memory access is 16-bit, 32-bit, and 64-bit
• Virtually all programming is done in C, using a very efficient C-compiler from Target
• Natively supported data types include: int, short, long, long long, Q15, Q23, Q8.23, and Q31
• Support two speakers, and two MIC.

• Power: Input 5V, 1A

On-Chip Memory

Integrated memory 747KB SRAM and 66KB ROM:

• ROM = 46KB (Data) and 20KB (Program)

• RAM = 522KB (Data) and 225KB (Program)

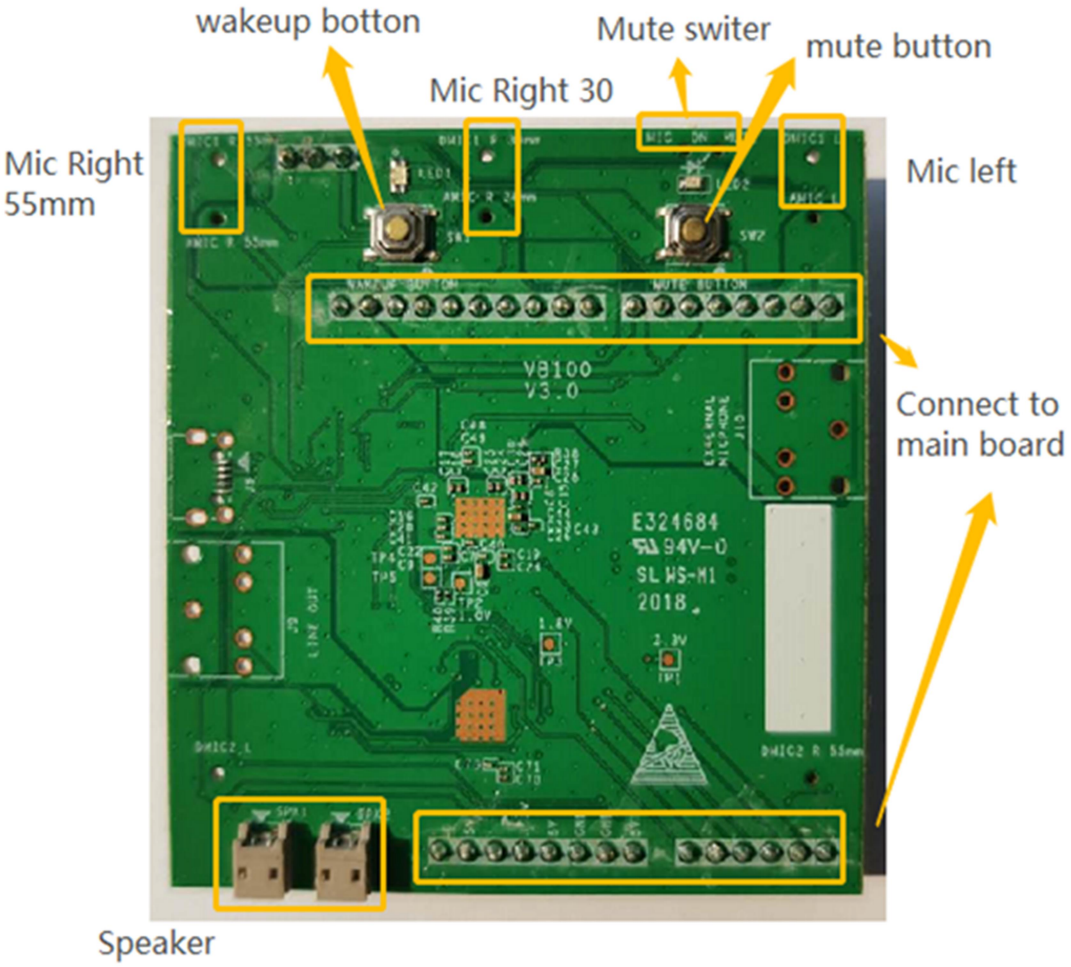
SERIAL FLASH MEMORY：32M bit

1.2 Application

- Voice control smart TV/set-top box
- Smart Bluetooth/WiFi Speakers
- Voice interactive smart device
- Internet of things (IOT) devices
- Car hands-free control/communication

2 ASV1108 Hardware description

2.1 ASV1108_ Top view



2.2 ASV1108_Bottom view

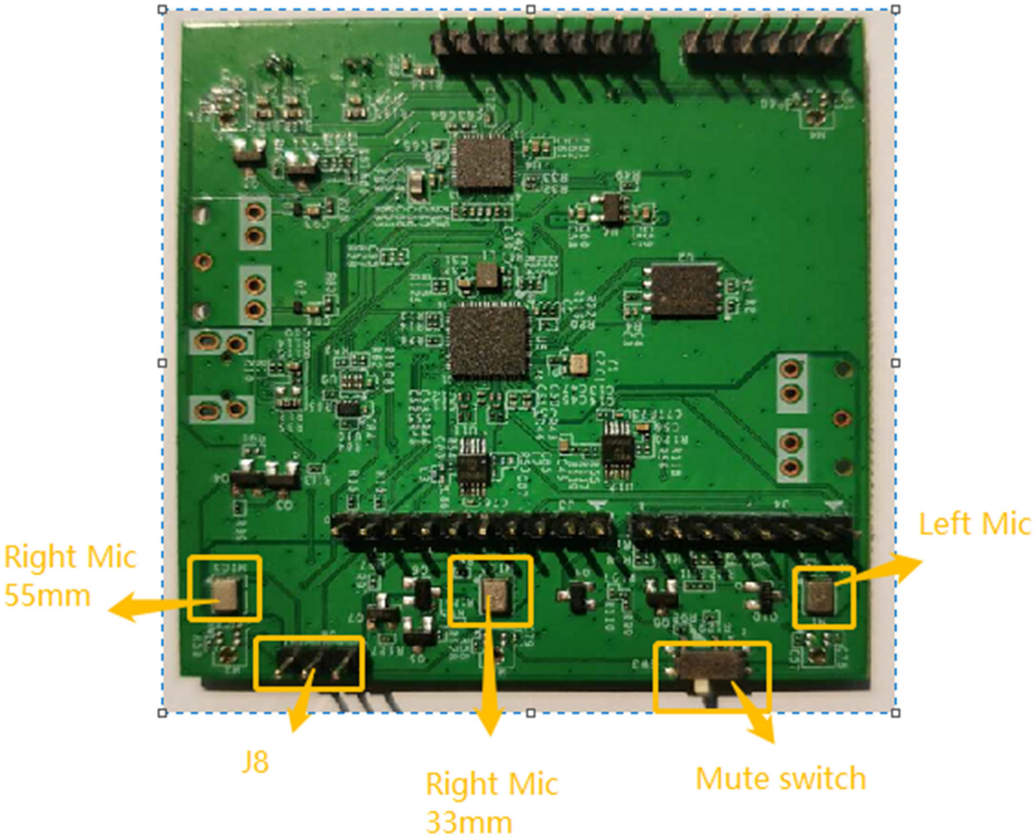


Figure 2 ASV1108_Bottom view

ASV1108 Evaluation Kit has three Microphones. One Left Microphone (MIC L) and two right Microphones (MIC R), you can adjust the MIC R switchover to control which one will be used.

When ASV1108 J8 pin1 and pin 2 are connected by Jumper, MIC R 55mm is activated

When ASV1108 J8 pin2 and pin 3 are connected by Jumper, MIC R 30mm is activated

2.3 ASV1108_structure diagram

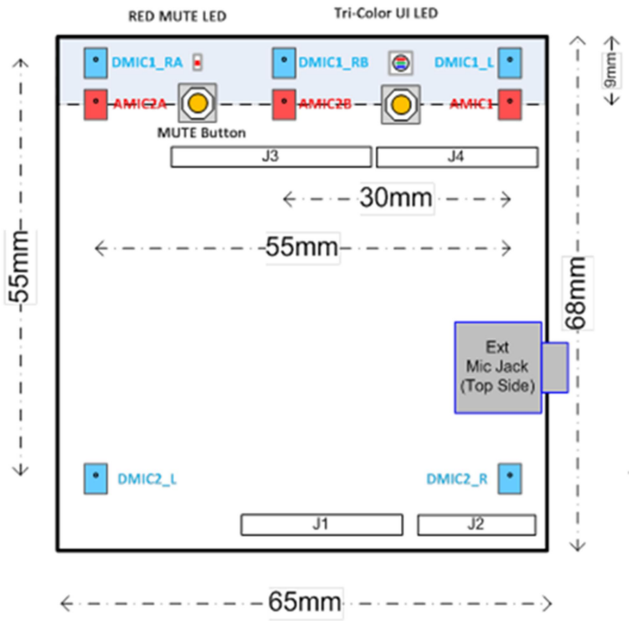


Figure 3 ASV1108_structure diagram

3 ASV1108 and WL501 board Sketch Map

3.1 WL501 board Interface Description

The WL501 board Product Development Kit is engineered to help developers and device manufacturers create unique IoT products that work in concert with a wide variety of other devices and cloud ecosystems. The kit is well suited for developing IoT applications such as smart cities, toys, home control and automation, appliances, networking and home entertainment.

The WL501 board kit is designed to provide interoperability among diverse IoT devices including most popular wireless standards, protocols and communication frameworks, and ease connectivity to various cloud and application services.

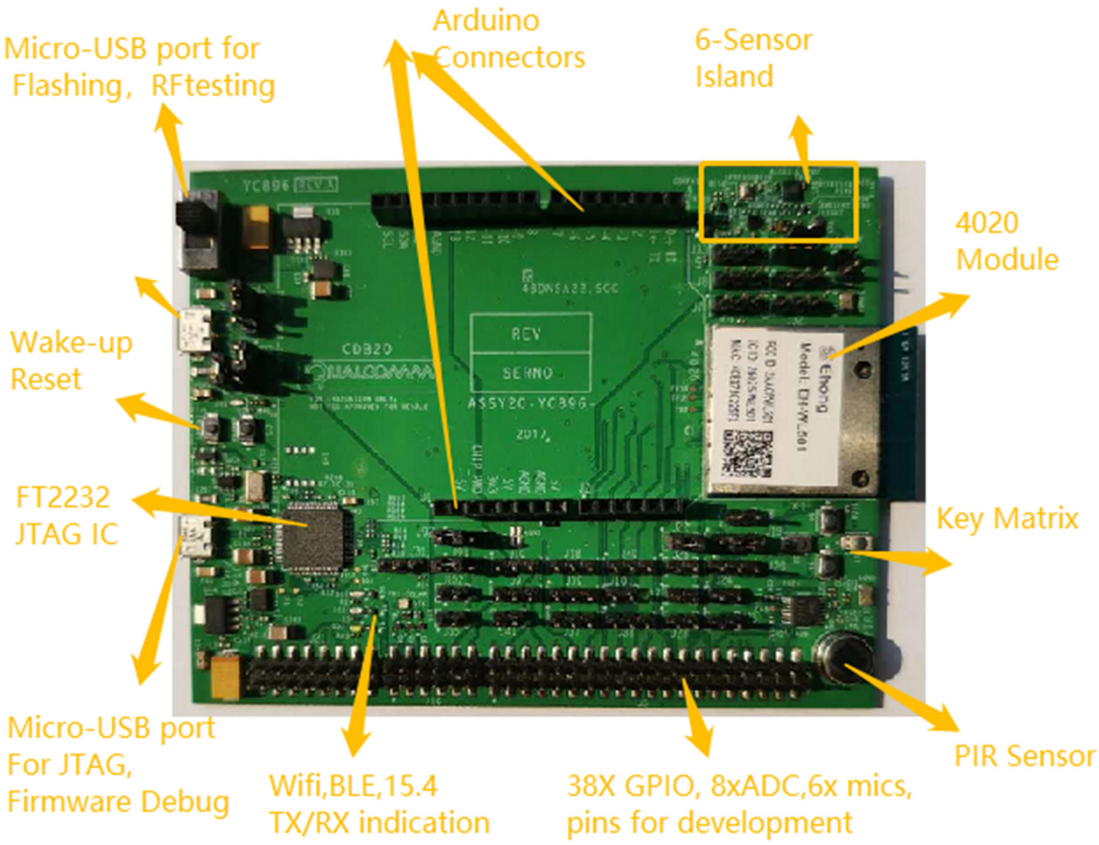


Figure 5 WL501 board Interface description

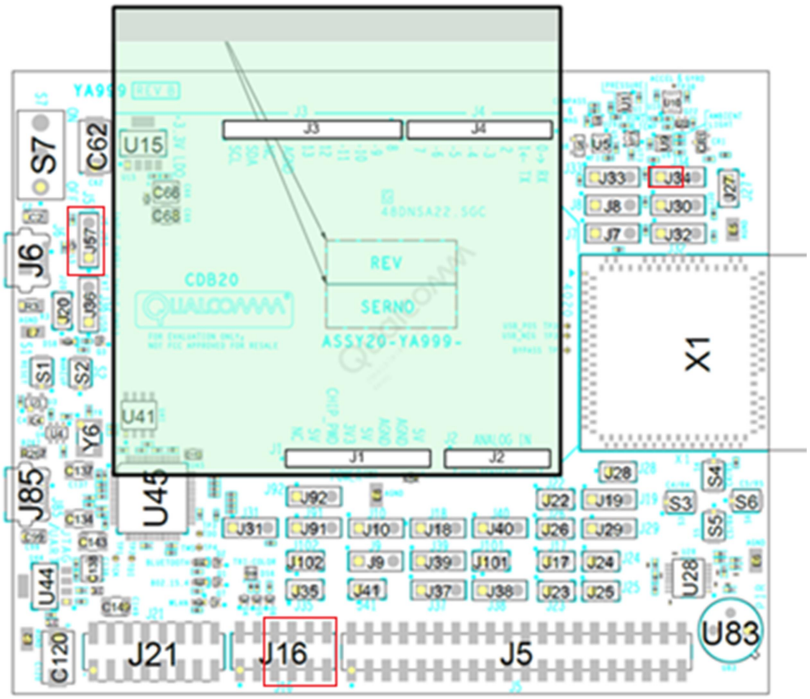


Figure 6 ASV1108 Connection view

3.2 WL501 board and ASV1108 Connection

4 Make connections to the ASV1108 board as shown in Figure 6 below. When FW Updating or RF testing, connect a Micro-USB cable between computer and WL501 board Micro-USB Port J6, other tests connect a Micro-USB cable to WL501 board Micro-USB Port J85.

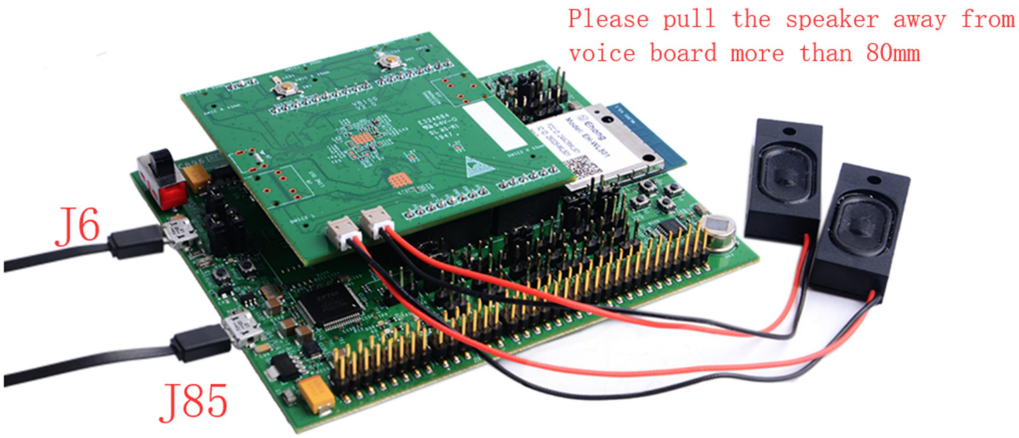


Figure 7

5 When the WL501 board is detected on USB, the USB devices needs to install the driver.

6 WL501 board Micro-USB Power interface description

When J57 pin1 and pin2 are connected by Jumper, Micro-USB Port J85 as a power interface.

4 Wireless characteristics

4.1 2.4GHz power measurements

Table 4-1 2.4 GHz power measurements at antenna port at 25 ° C, 5V nominal

Standard	Typical Tx Compliant	Rx Sensitivity	Unit
802.11b	22.88	-91.5	dBm
802.11g	23.63	-91.5	dBm
802.11n HT20	23.43	-92	dBm
802.11n HT40	21.72	-89.5	dBm

When J57 pin2 and pin3 are connected by Jumper, Micro-USB Port J6 as a power interface.

4.2 5 GHz power measurements

Table 4-2 5 GHz power measurements at antenna port at 25° C, 5V nominal

Standard	Typical Tx Compliant	Rx Sensitivity	Unit
802.11a	Band1:21.27	-89.5	dBm
	Band4:18.62	-72.5	dBm
802.11n HT20	Band1:21.95	-89.5	dBm
	Band4:18.53	-69.5	dBm
802.11n HT40	Band1:21.69	-86.5	dBm
	Band4:18.92	-65	dBm

4.3 BLE power measurements

Table 2-10 BLE power measurements at antenna port at 25° C, 3.3V nominal with internal PA

Parameter	Description	Maximum	Unit
Tx Power	BT LE 1M	2.14	dBm
	BT LE 2M	1.11	dBm
Rx Sensitivity	BT LE 1M	-93	dBm
	BT LE 2M	-93	dBm

4.4 802.15.4 power measurements

Table 2-11 802.15.4 power measurements at antenna port at 25° C, 3.3V nominal with external PA

Parameter	Description	Maximum	Unit
Tx power	O-QPSK DSSS	0.99	dBm
Rx Sensitivity	O-QPSK DSSS	-101	dBm

5 Sample application

5.1 Run the App:

The development kit comes pre-installed with the Alexa sample app. Following steps are designed to help developers run the app and see the development kit in action.
Latest version of the Home Hub 100 users guide can be found here:
https://www.qualcomm.com/products/qca4020/tools-software
Please refer to this users guide for more details.

- Setup the AWS account as described in the Home Hub 100 users guide.
- The development kit comes with the sample app pre-installed.
- Make the hardware connections,
  - On the QCA4020 development kit:

    Make sure the power switch is set to OFF before handling the board.
    Remove jumpers from J34 and J31. This will start the development kit in Autoboot mode and run the application that is pre-flashed on the board.

Connect the micro-USB connector J6 to power source.
Connect the micro-USB connector J85 to your host PC. This will setup the serial comm port to run the sample app.

  - On the ASV1108 Audio board:

    Connect the speaker to ASV1108 audio board.
    Make sure that the Mute button on the audio board is set to “Mic On” and not to “Mute”

- Once all the connections are made, Turn the power switch ON.

The sample app has a command line interface. On the host PC, open a serial console using a port setting of 115200, 8, n, 1, and a CLI menu appears

- WLAN connection

Use the following commands to connect the development kit to Wi-Fi
`wlan enable` or `3 5`
`wlan connect "WiFi Hotspot" password WPA2 CCMP CCMP`

```
//wait for handshake
//WLAN: 4 way handshake success for device=1
```

`net 4` or `4 4`

```
//wait for
//Net: DHCPv4c: IP=10.73.201.200  Subnet
Mask=255.255.254.0  Gateway=10.73.200.1
//Net: Resolving SNTP client...
//Net: Interface wlan1 initialized, DNS and SNTP started Successfully
```

- Use the following CLI commands to download and save AWS certs

```
Net cert get QCA4020_AIS_Thing1.pem.crt <ip-address> -s
client.bin -k QCA4020_AIS_Thing1.pri.key -t pem_cert

Net cert get root_ca.bin  <ip-address> -s aws_ca_list.bin -t
ca_list

Net cert get ais_config.json <ip-address> -s
/spinor/ais_configuration.json -t raw_file
```

- Reboot the board and run the demo using the following CLI commands
- `wlan enable` or `3 5`

```
wlan connect"WiFi Hotspot" ”password“ WPA2 CCMP CCMP
net 4
```

- Start AIS tasks

`alexa ais_init` or `5 4`

`alexa ais_run` or `5 5`

- You will see the following once the app registers to Alexa

```
> Resetting SYNA DSP
Resetting DSP Complete
Mute Button successfully registered
Wake Word interrupt registration successful
Wake up button registration successful
ais_client_id XXXXXX
Client ID already registered
Encryption key = 0xc9 ,0x53 ,0x39 ,0xxxxx
Shadow Initialization successful
Shadow Connection successful
Connection: 7763b63d-281a-5c4e-ccaa-xxxxxxxxxxxx
Connection ack: 0f7384fd-6fef-4c9b-a3a5-xxxxxxxxxxxx
Alexa Client is ready
```

When the application is run for the first time, it will ask the user to authenticate the device on AWS and use AWS IoT services.

```
Please go to URL = https:// https://amazon.com/us/code
```

```
Login using your Amazon account and enter this code = XXXXXX
```

Now you are ready to use the Alexa enabled development kit. You can use one of the following voice commands:

"Alexa, What is the time?"

"Alexa, Play some music."

To download and flash the latest version of the sample app, please refer to the Home Hub 100 Users Guide.

6 Appendix

6.1 Hardware included

Name	Function	Quantity
WL501	QCA4020 based module from Ehong Version 3.1	1
YC896	Demo board for testing Version A	1
AVS1108	Voice module based on Synaptics	1
Speaker	2 w	2

7 Related Documents

Visit website and download: https://www.ehonglink.com/en/WL501-Qualcomm-Alexa.html

Supports: Qualcomm-techsupport@ehlink.com.cn phone: +0086 021-54769993-201

Sales: sales@ehlink.com.cn

FCC Statement:
Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
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 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 20cm between the radiator& your body.

Note: 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.

ISED RSS Warning:
This device complies with Innovation, Science and Economic Development 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'ISED 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, même si le brouillage est susceptible d'en compromettre le fonctionnement.

ISED RF exposure statement:
This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator& your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Le rayonnement de la classe b repecte ISED fixaient un environnement non contrôlés.Installation et mise en œuvre de ce matériel devrait avec échangeur distance minimale entre 20 cm ton corps.Lanceurs ou ne peuvent pas coexister cette antenne ou capteurs avec d’autres.

For ISED,the device for operation in the band 5150–5250 MHz is only for indoor