



## APPENDIX G

### : USER'S MANUAL

**LGHA-WWW1301**  
**WLAN Dongle**  
**User Manual**

# 1 Information

## 1.1 Feature

LGHA-WWW1301 is WLAN Dongle support USB2.0 A type Interface.  
Because It support USB2.0 interface, Therefore you can connect to the host system it easily

LGHA-WWW1301 use MURATA MODULE(PARTNAME:LBWA17XQXZ-450)

MURATA MODULE use BCM4319(BroadCom)

LGHA-WWW1301 support IEEE802.11b/g/n and data rate 65Mbps

## 1.2 Module Summary

- 2.4GHz IEEE 802.11b/g/n Radio Technology
- On-board Antenna
- Transmit power : +18dBm @ 11b/11Mbps
- Max Receive Sensitivity : -92dBm
- MURATA Module applied ( RF CHIPSET : BCM4319 )
- USB2.0 A Type Interface
- Operating Temperature Range : -20°C to 70°C
- ROHS compliant

## 1.3 Block Diagram

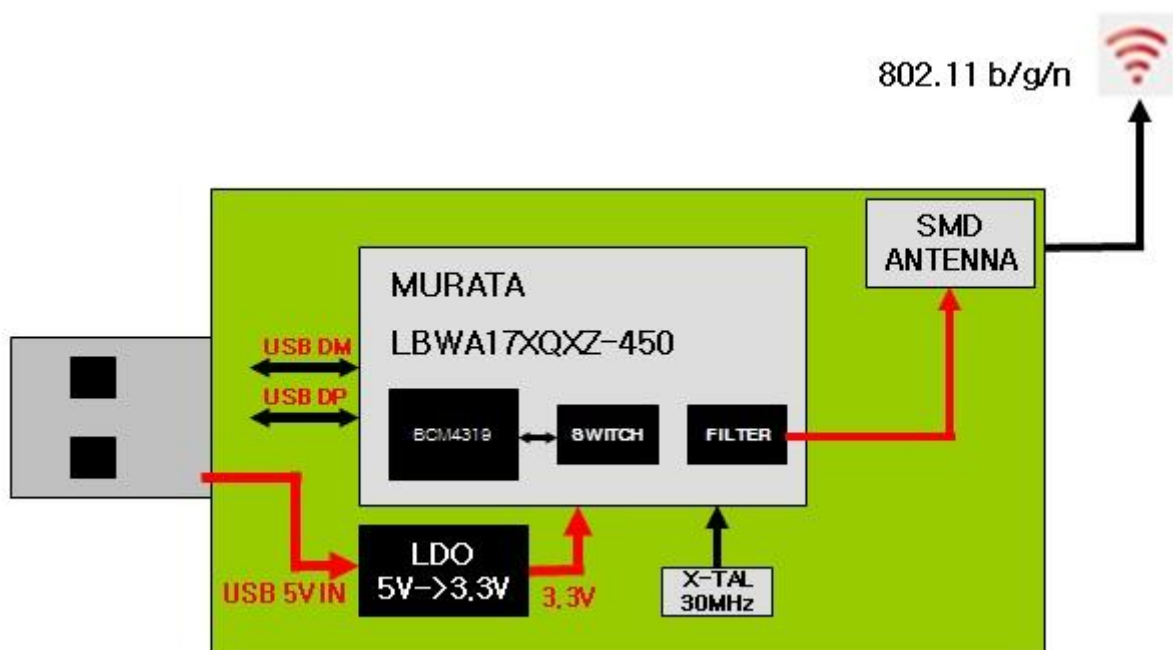


Fig.1 System Block Diagram

## 2 Module Outline

### 2.1 Module Dimension

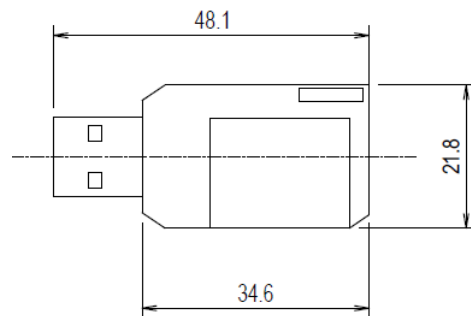


Fig. 2 LGHA-WWW1301 Dimension (Unit : mm)

### 2.2 Component Placement

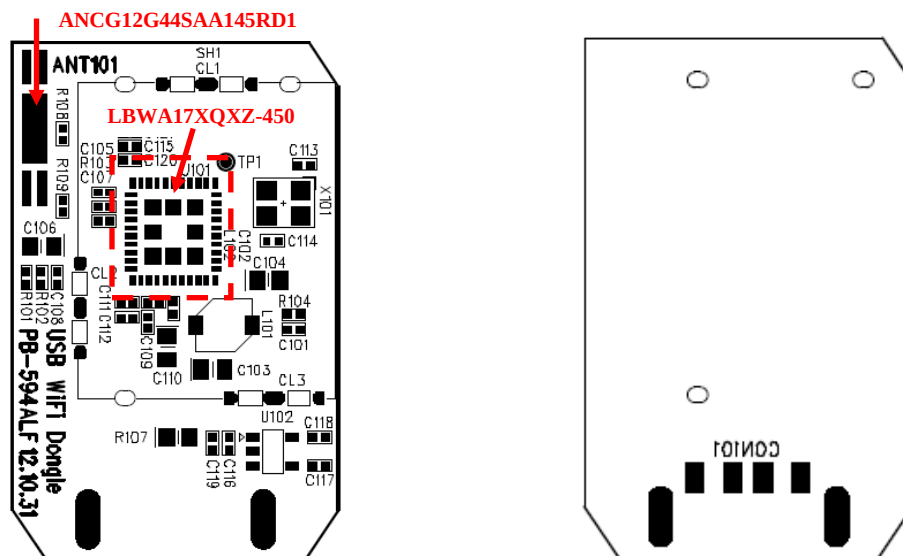


Fig.3 LGHA-WWW1301 Component Placement

### 3 MURATA LBWA17XQXZ-450

MURATA's WLAN Module LBWA17XQXZ-450 WLAN chipset, RF Switch, Filter, etc. are included. Broadcom's WLAN chipset bcm4319 was used. SDIO Interface and USB Interface is supported 30MHz external clock operation.

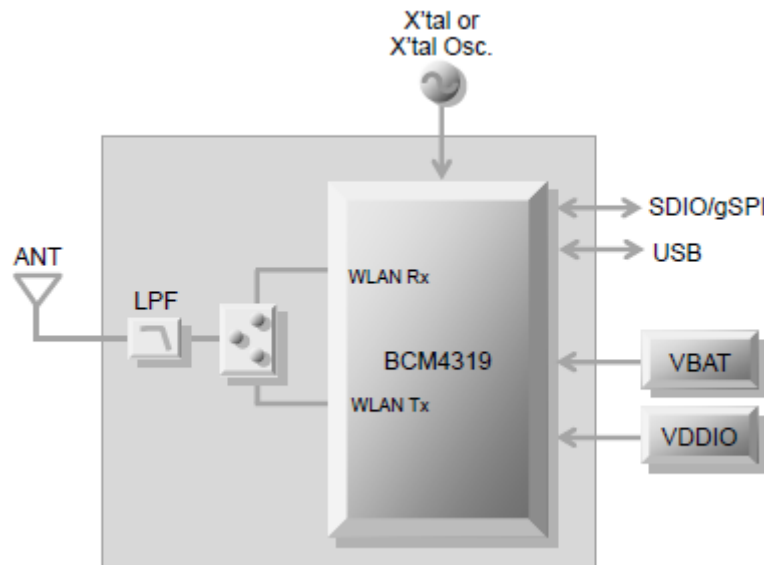


Fig.4 LBWA17XQXZ-450 Block Diagram

## 4 RF Specifications

### 4.1 RF Specifications Summary

| Items                          | Contents                                                                                                                          |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Support                        | IEEE802.11b/g/n, WLAN compliant                                                                                                   |
| Frequency Range                | 2400 ~ 2483.5 MHz                                                                                                                 |
| Modulation                     | DSSS, CCK, OFDM                                                                                                                   |
| Channel                        | 1~11ch (2412 ~ 2462 MHz)                                                                                                          |
| Data Rate                      | 802.11b = 1, 2, 5.5, 11 Mbps<br>802.11g = 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11n = 6.5, 13, 19.5, 26, 39, 52, 58.5, 65 Mbps |
| Target Max Output Power (Peak) | 802.11b = 18 dBm<br>802.11g = 19 dBm<br>802.11n = 17 dBm                                                                          |
| Antenna                        | On Board SMD Antenna, 50 ohm                                                                                                      |

Table.1 LGHA-WWW1301 RF Specification Summary

## 4.2 IEEE 802.11b Mode

| Items                                                    | Contents           |      |      |      |
|----------------------------------------------------------|--------------------|------|------|------|
| Specification                                            | IEEE802.11b        |      |      |      |
| Mode                                                     | DSSS / CCK         |      |      |      |
| Frequency                                                | 2400 – 2483.5 MHz  |      |      |      |
| Data rate                                                | 1, 2, 5.5, 11 Mbps |      |      |      |
| Target Max Output Power                                  | 18dBm              |      |      |      |
| DC Characteristics                                       | Min.               | Typ. | Max. | unit |
| 1. DC current                                            |                    |      |      |      |
| 1) Tx mode (1024byte, 20usec interval)                   |                    | 300  |      | mA   |
| 2) Rx mode                                               |                    | 77   |      | mA   |
| Tx Characteristics                                       | Min.               | Typ. | Max. | unit |
| 2. Power Levels                                          | 16                 | 18   | 20   | dBm  |
| 3. Spectrum Mask                                         |                    |      |      |      |
| 1) $F_c \pm 11\text{MHz}$                                |                    | -40  | -30  | dBr  |
| 2) $F_c \pm 20\text{MHz}$                                |                    | -54  | -50  | dBr  |
| 4. RF Carrier Suppression                                |                    |      | -15  | dB   |
| 5. Modulation Accuracy(EVM)                              |                    | 17   | 35   | %    |
| 6. OBW(Occupied Bandwidth)                               |                    | 20   |      | MHz  |
| 7. Outband Spurious Emissions                            |                    |      |      |      |
| 1) 30Mhz to 1 Ghz(BW=100kHz)                             |                    | tbd  |      | dBm  |
| 2) 1Ghz to 12.75 Ghz(BW=100kHz)                          |                    | tbd  |      | dBm  |
| 3) 1.8Ghz to 1.9 Ghz(BW=100kHz)                          |                    | tbd  |      | dBm  |
| 4) 5.5Ghz to 5.3 Ghz(BW=100kHz)                          |                    | tbd  |      | dBm  |
| Rx Characteristics                                       | Min.               | Typ. | Max. | unit |
| 8. Minimum input Level Sensitivity                       |                    |      |      |      |
| 1) 1Mbps ( $\text{FER} \leq 8\%$ )                       |                    | -92  | -80  | dBm  |
| 2) 11Mbps ( $\text{FER} \leq 8\%$ )                      |                    | -85  | -76  | dBm  |
| 9. Maximum Input Level ( $\text{FER} \leq 8\%$ )         | -10                |      |      | dBm  |
| 10. Adjacent Channel Rejection ( $\text{FER} \leq 8\%$ ) |                    | tbd  |      | dB   |

Table.2 IEEE 802.11b Mode Specification

### 4.3 IEEE 802.11g Mode

| Items                                          | Contents                          |      |      |      |
|------------------------------------------------|-----------------------------------|------|------|------|
| Specification                                  | IEEE802.11g                       |      |      |      |
| Mode                                           | OFDM                              |      |      |      |
| Frequency                                      | 2400 – 2483.5 MHz                 |      |      |      |
| Data rate                                      | 6, 9, 12, 18, 24, 36, 48, 54 Mbps |      |      |      |
| Target Max Output Power                        | 19dBm                             |      |      |      |
| DC Characteristics                             | Min.                              | Typ. | Max. | unit |
| 1. DC current                                  |                                   |      |      |      |
| 1) Tx mode (1024byte, 20usec interval)         |                                   | 237  |      | mA   |
| 2) Rx mode                                     |                                   | 77   |      | mA   |
| Tx Characteristics                             | Min.                              | Typ. | Max. | unit |
| 2. Power Levels                                | 17                                | 19   | 21   | dBm  |
| 3. Spectrum Mask                               |                                   |      |      |      |
| 1) $F_c \pm 11\text{MHz}$                      |                                   | -34  | -20  | dBr  |
| 2) $F_c \pm 20\text{MHz}$                      |                                   | -50  | -28  | dBr  |
| 3) $F_c \pm 30\text{MHz}$                      |                                   | -58  | -40  | dBr  |
| 4. Constellation Error (EVM)                   |                                   |      |      |      |
| 1) 6 Mbps                                      |                                   | -30  | -5   | dB   |
| 2) 24 Mbps                                     |                                   | -30  | -16  | dB   |
| 3) 54 Mbps                                     |                                   | -30  | -25  | dB   |
| 5. Modulation Accuracy(EVM)                    |                                   | 17   | 35   | %    |
| 6. OBW(Occupied Bandwidth)                     |                                   | 20   |      | MHz  |
| 7. Outband Spurious Emissions                  |                                   |      |      |      |
| 1) 30Mhz to 1 Ghz(BW=100kHz)                   |                                   | tbd  |      | dBm  |
| 2) 1Ghz to 12.75 Ghz(BW=100kHz)                |                                   | tbd  |      | dBm  |
| 3) 1.8Ghz to 1.9 Ghz(BW=100kHz)                |                                   | tbd  |      | dBm  |
| 4) 5.5Ghz to 5.3 Ghz(BW=100kHz)                |                                   | tbd  |      | dBm  |
| Rx Characteristics                             | Min.                              | Typ. | Max. | unit |
| 8. Minimum input Level Sensitivity             |                                   |      |      |      |
| 1) 6Mbps (FER $\leq$ 10%)                      |                                   | -85  | -82  | dBm  |
| 2) 24Mbps (FER $\leq$ 10%)                     |                                   | -82  | -74  | dBm  |
| 3) 54Mbps (FER $\leq$ 10%)                     |                                   | -72  | -65  |      |
| 9. Maximum Input Level (FER $\leq$ 10%)        | -10                               |      |      | dBm  |
| 10. Adjacent Channel Rejection (FER $\leq$ 8%) |                                   |      |      | dB   |

Table.3 IEEE 802.11g Mode Specification

## 4.4 IEEE 802.11n Mode

| Items                                                    | Contents                                 |      |      |      |
|----------------------------------------------------------|------------------------------------------|------|------|------|
| Specification                                            | IEEE802.11n                              |      |      |      |
| Mode                                                     | OFDM                                     |      |      |      |
| Frequency                                                | 2400 – 2483.5 MHz                        |      |      |      |
| Data rate                                                | 6.5, 13, 19.5, 26, 39, 52, 58.5, 65 Mbps |      |      |      |
| Target Max Output Power                                  | 17dBm                                    |      |      |      |
| DC Characteristics                                       | Min.                                     | Typ. | Max. | unit |
| 1. DC current                                            |                                          |      |      |      |
| 1) Tx mode (1024byte, 20usec interval)                   |                                          | 227  |      | mA   |
| 2) Rx mode                                               |                                          | 80   |      | mA   |
| Tx Characteristics                                       | Min.                                     | Typ. | Max. | unit |
| 2. Power Levels                                          | 15                                       | 17   | 19   | dBm  |
| 3. Spectrum Mask                                         |                                          |      |      |      |
| 1) $F_c \pm 11\text{MHz}$                                |                                          | -34  | -20  | dBr  |
| 2) $F_c \pm 20\text{MHz}$                                |                                          | -50  | -28  | dBr  |
| 3) $F_c \pm 30\text{MHz}$                                |                                          | -58  | -45  | dBr  |
| 4. Constellation Error (EVM)                             |                                          |      |      |      |
| 1) MCS0 (6.5Mbps)                                        |                                          | -29  | -5   | dB   |
| 2) MCS4 (39Mbps)                                         |                                          | -31  | -19  | dB   |
| 3) MCS7 (65Mbps)                                         |                                          | -31  | -28  | dB   |
| 5. OBW(Occupied Bandwidth)                               |                                          | 20   |      | MHz  |
| 6. Center Frequency Tolerance                            | -25                                      | -4.5 | 25   | ppm  |
| 7. Symbol clk freq Tolerance                             | -25                                      | -4.7 | 25   | ppm  |
| 8. Outband Spurious Emissions                            |                                          |      |      |      |
| 1) 30Mhz to 1 Ghz(BW=100kHz)                             |                                          | tbd  |      | dBm  |
| 2) 1Ghz to 12.75 Ghz(BW=100kHz)                          |                                          | tbd  |      | dBm  |
| 3) 1.8Ghz to 1.9 Ghz(BW=100kHz)                          |                                          | tbd  |      | dBm  |
| 4) 5.5Ghz to 5.3 Ghz(BW=100kHz)                          |                                          | tbd  |      | dBm  |
| Rx Characteristics                                       | Min.                                     | Typ. | Max. | unit |
| 9. Minimum input Level Sensitivity                       |                                          |      |      |      |
| 1) 6.5Mbps ( $\text{FER} \leq 10\%$ )                    |                                          | -87  | -82  | dBm  |
| 2) 39Mbps ( $\text{FER} \leq 10\%$ )                     |                                          | -79  | -70  | dBm  |
| 3) 62Mbps ( $\text{FER} \leq 10\%$ )                     |                                          | -70  | -64  |      |
| 10. Maximum Input Level ( $\text{FER} \leq 10\%$ )       | -20                                      |      |      | dBm  |
| 11. Adjacent Channel Rejection ( $\text{FER} \leq 8\%$ ) |                                          | tbd  |      | dB   |

Table.4 IEEE 802.11n Mode Specification



## 5 Antenna

LGHA-WWW1301 with omni directional characteristics in the 2.4GHz band, MURATA SMD's dielectric Antenna ANCG12G44SAA145 is applied.

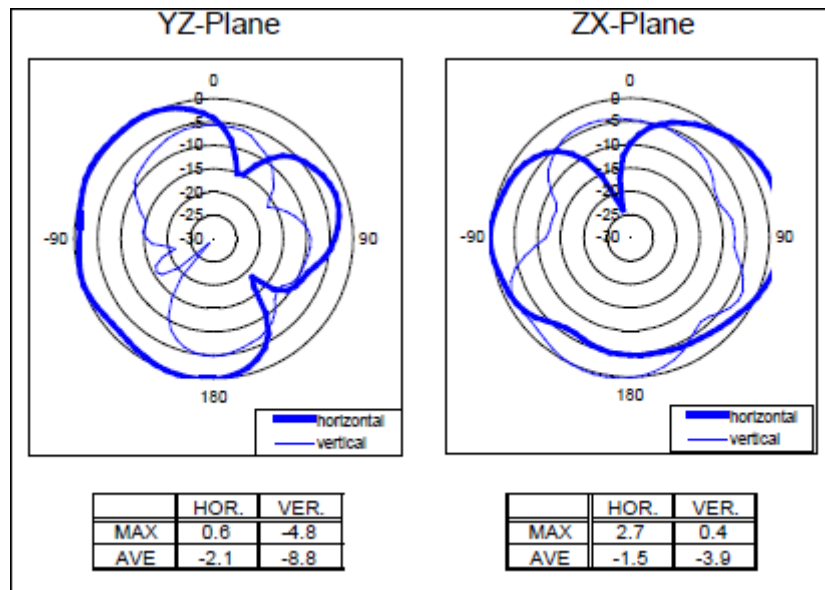


Fig.5 ANCG12G44SAA145 Radiation Pattern

## 6 Electrical Characteristics

| Parameter             | min  | typ | max  | Unit  |
|-----------------------|------|-----|------|-------|
| Operation Temperature | -20  | +25 | +70  | Deg.C |
| Operation Humidity    | 0    |     | 80   | %     |
| Supply Voltage        | 4.75 | 5   | 5.25 | V     |

Table.5 LGHA-WWW1301 Electrical Characteristics

## 7 User installation

This manual explains to set-up the WLAN MODULE (USB DONGLE TYPE) to the Smart Pad installed in the refrigerator only.

The WLAN MODULE is not available for regular laptops or any other portable devices.

### 7.1 USB WLAN installation requirements

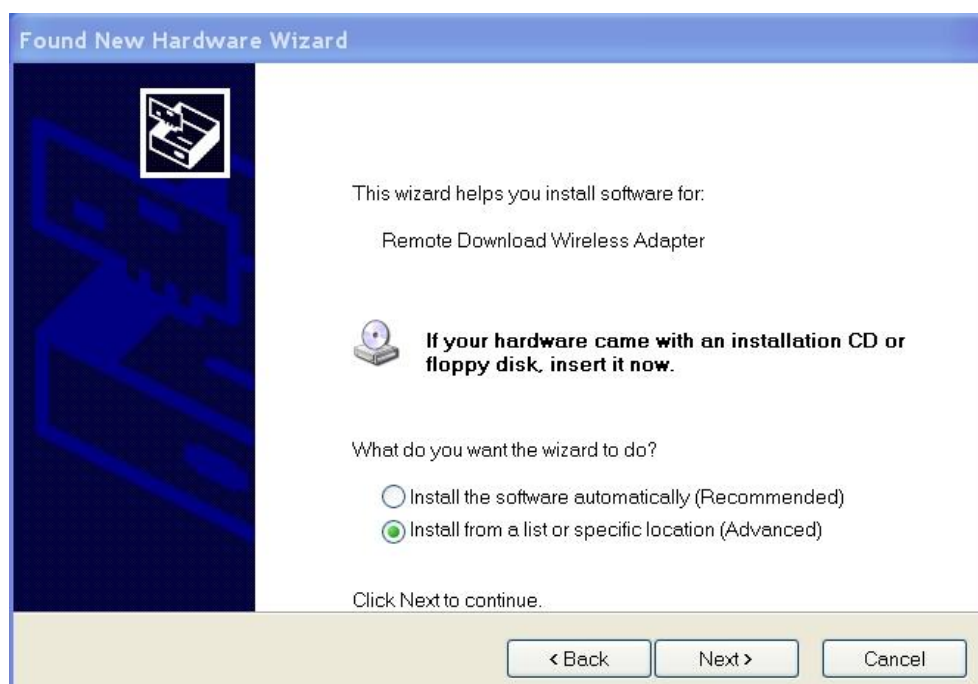
- (1) PC(WINDOWS XP, USB1.1/USB2.0 Support) 1EA
- (2) Wireless AP(802.11/b/g/n) : 1EA
- (3) USB WLAN DONGLE XP Driver

## 7.2 USB WLAN DONGLE Driver installation method

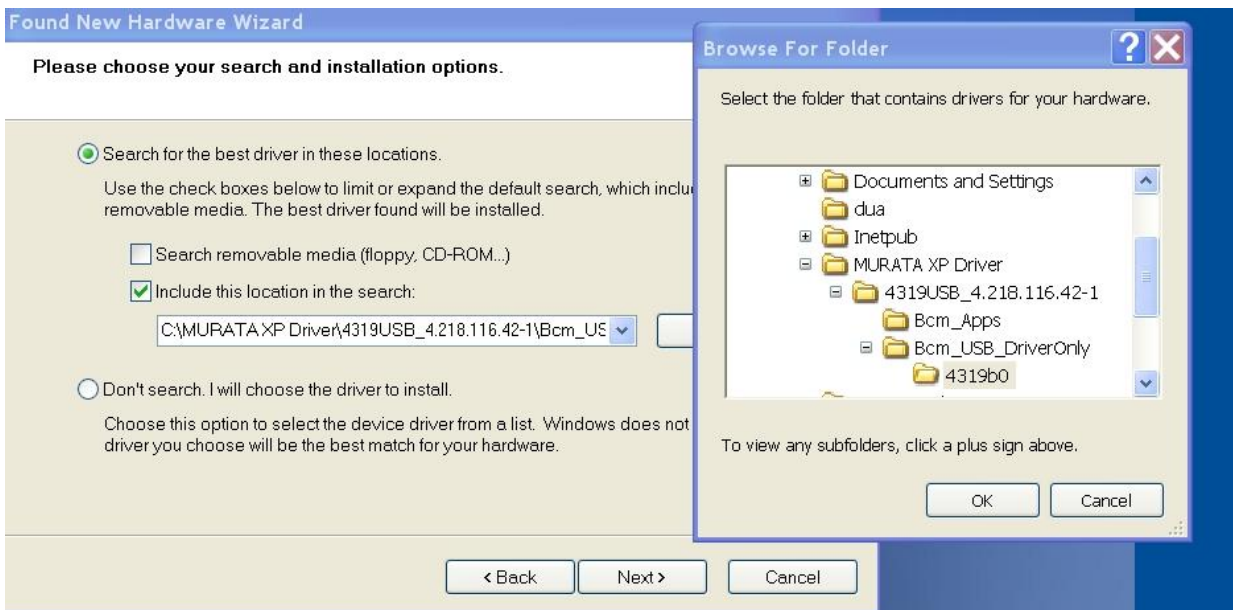
- (1) copy the 4319USB\_4.218.116.42.nvm to the  
“ C:/WINDOWS/system32/drivers”
- (2) copy the driver to the proper folder of PC
- (3) Insert USB WLAN DONGLE to PC
  - Pop up “ New Hardware Wizard”
  - Refer to below picture and click “ NEXT”



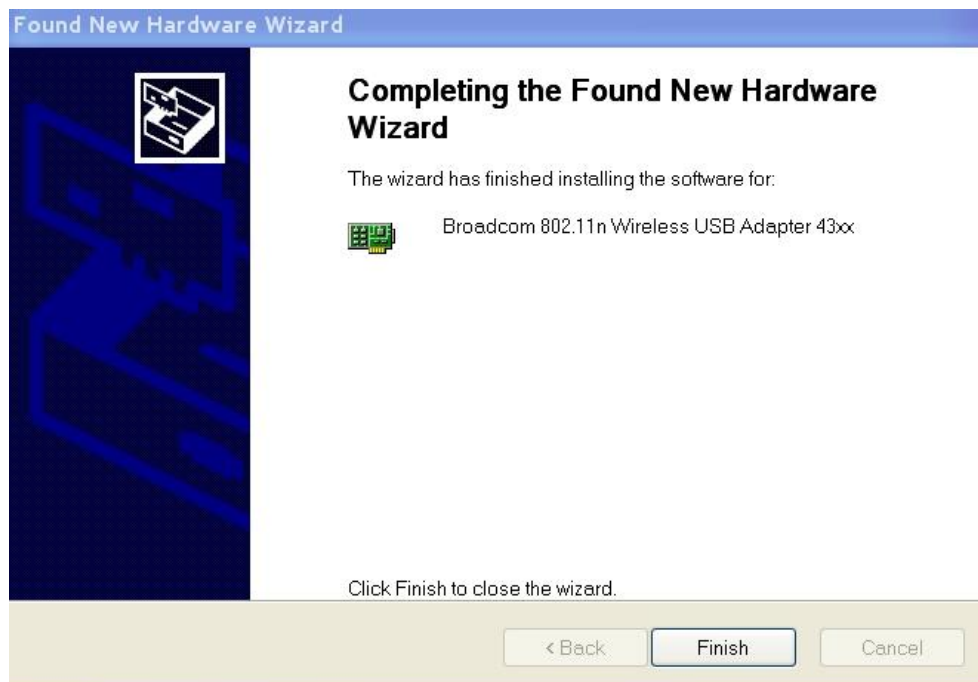
- (4) Refer to below picture and click “ NEXT”



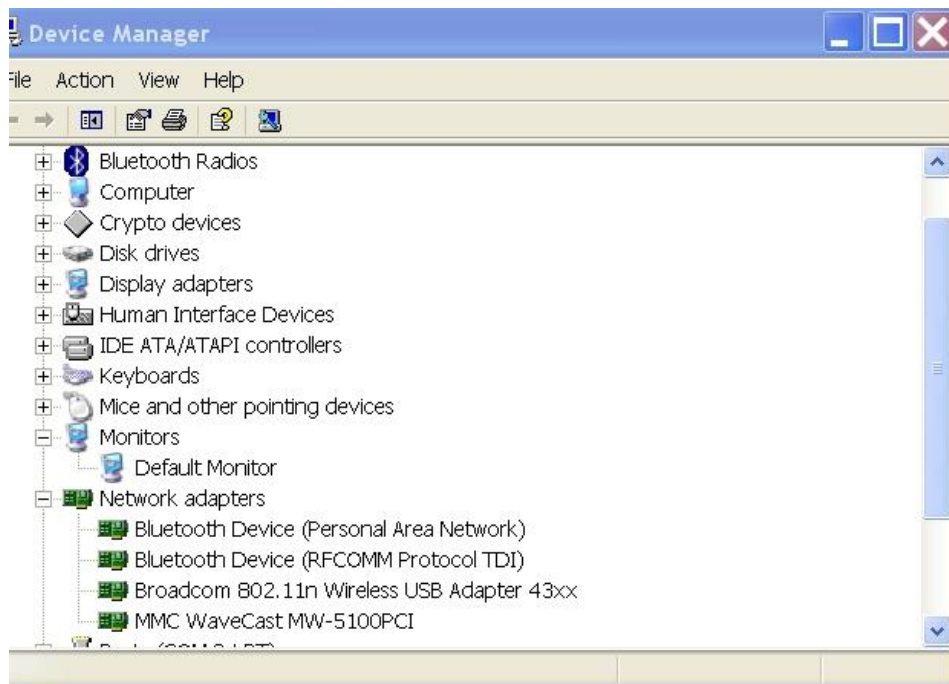
(5) Check where is the driver and click “ NEXT”



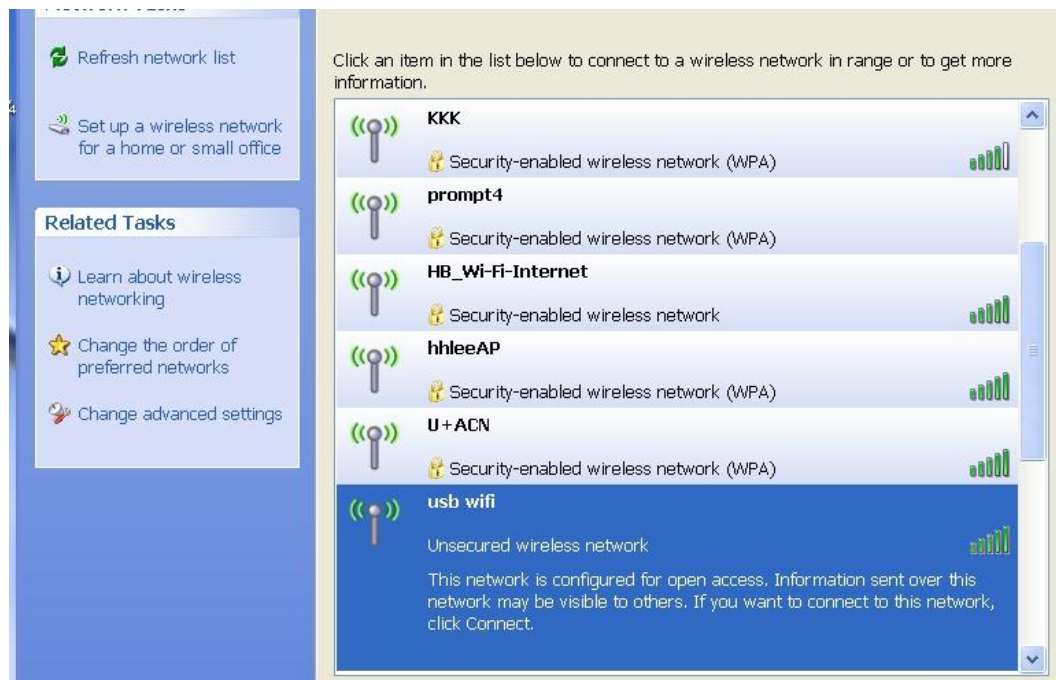
(6) Refer to below picture and click “ Finish”



- (7) After installation is finished correctly, you can find out “Broadcom 802.11n Wireless USB Adapter 43xx” is activated in the network adaptor



- (8) Click Start Menu/Network Connection, and then select wireless device  
Click right button of the mouse, scan AP and connect USB WLAN DONGLE to Target AP



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## 8 Notice

### WARNING

The WLAN MODULE (USB DONGLE TYPE) to the Smart Pad installed in the refrigerator only.  
The WLAN MODULE is not available for regular laptops or any other portable devices.

### 8.1 FCC(Certification)

#### FCC Notice

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 UNDERSIRED OPERATION.

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 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 Communication. 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 of an experienced radio/TV technician for help.

NOTE : The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

### End product labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and user. The final end product must be labeled in an visible area with the following “ Contain FCC ID: BEJ-LGHAWWW1301” . The grantee’ s FCC ID can be used only when all FCC compliance requirements are met.

#### IMPORTANT NOTE

- (1) Warning that this module is not approved to be operated simultaneously with other radios.  
Further certification requirement may required when installed and operated simultaneously with other radios.
- (2) Confirming of approved antenna, and advice that used other type of antenna or same type with higher gain will required additional certification.

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## 8.2 IC(Certification)

This device complies with RSS-210 of the Industry Canada Rules.

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

### IC Warning

This device complies with Industry Canada license-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, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

IC 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 20 cm between the radiator & your body.

NOTE: THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.