

# TEST REPORT

of

FCC CFR 47 part 1, 1.1307(b), 1.1310

FCC ID: YZP-RBHAT223A

Equipment Under Test : Wi-Fi + BT Combo module  
Model Name : RBHA-T223A  
Applicant : LG INNOTEK CO., LTD.  
Manufacturer : LG INNOTEK CO., LTD.  
Date of Test(s) : 2015.10.08 ~ 2015.11.24  
Date of Issue : 2015.11.30

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Jinhyoung Cho

Date:

2015.11.30

Approved By:



Denny Ham

Date:

2015.11.30

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SGS Korea Co., Ltd. (Gunpo Laboratory) 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807

<http://www.sgsgroup.kr>

RTT5041-20(2015.10.01)(3)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

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## 1. General Information

### 1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- Wireless Div. 2FL, 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>.

Telephone : +82 31 688 0901

FAX : +82 31 688 0921

### 1.2. Details of applicant

Applicant : LG INNOTEK CO., LTD.

Address : 26, Hanamsandan 5beon-ro, Gwangsan-gu, Gwangju, 62229, Korea

Contact Person : Jeong, In-Chang

Phone No. : +82 10 2326 9972

### 1.3. Description of EUT

|                       |                                                                                                                                       |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Kind of Product       | Wi-Fi + BT Combo module                                                                                                               |
| Model Name            | RBHA-T223A                                                                                                                            |
| Power Supply          | DC 3.3 V                                                                                                                              |
| Frequency Range       | 2 402 MHz ~ 2 480 MHz (Bluetooth, Bluetooth Low Energy),<br>2 412 MHz ~ 2 462 MHz (11b/g/n_HT20),<br>2 422 MHz ~ 2 452 MHz (11n_HT40) |
| Modulation Technique  | DSSS, OFDM, GFSK, $\pi/4$ DQPSK, 8DPSK                                                                                                |
| Number of Channels    | 79 channel (Bluetooth),<br>40 channel (Bluetooth Low Energy),<br>11 channel (11b/g/n_HT20),<br>7 channel (11n_HT40)                   |
| Operation Temperature | -40 °C ~ 85 °C                                                                                                                        |
| Antenna Type          | Dipole Antenna                                                                                                                        |
| Antenna Gain          | 1.82 dBi                                                                                                                              |

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#### 1.4. Test report revision

| Revision | Report number          | Date of Issue | Description                |
|----------|------------------------|---------------|----------------------------|
| 0        | F690501/RF-RTL009285   | 2015.11.25    | Initial                    |
| 1        | F690501/RF-RTL009285-1 | 2015.11.30    | Modified applicant address |

#### 1.5. Declaration by the manufacturer

- WLAN & BT do not transmit simultaneously.

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## 2. RF Exposure Evaluation

### 2.1. Environmental evaluation and exposure limit according to FCC CFR 47 part 1, 1.1307(b), 1.1310

#### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| Frequency Range<br>(MHz)                                | Electric Field<br>Strength(V/m) | Magnetic Field<br>Strength<br>(A/m) | Power Density<br>(mW/cm <sup>2</sup> ) | Average Time |
|---------------------------------------------------------|---------------------------------|-------------------------------------|----------------------------------------|--------------|
| (A) Limits for Occupational/Controlled Exposure         |                                 |                                     |                                        |              |
| 0.3 – 3.0                                               | 614                             | 1.63                                | *100                                   | 6            |
| 3.0 – 30                                                | 1842/f                          | 4.89/f                              | *900/f <sup>2</sup>                    | 6            |
| 30 - 300                                                | 61.4                            | 0.163                               | 1.0                                    | 6            |
| 300 – 1 500                                             | -                               | -                                   | f/300                                  | 6            |
| 1 500 – 100 000                                         | -                               | -                                   | 5                                      | 6            |
| (B) Limits for General Population/Uncontrolled Exposure |                                 |                                     |                                        |              |
| 0.3 – 1.34                                              | 614                             | 1.63                                | *100                                   | 30           |
| 1.34 – 30                                               | 824/f                           | 2.19/f                              | *180/f <sup>2</sup>                    | 30           |
| 30 - 300                                                | 27.5                            | 0.073                               | 0.2                                    | 30           |
| 300 – 1 500                                             | -                               | -                                   | f/1500                                 | 30           |
| <b>1 500 – 100 000</b>                                  | -                               | -                                   | <b>1.0</b>                             | <b>30</b>    |

#### 2.1.1. Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where  $P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

$R$  = distance between observation point and center of the radiator in cm

$P_d$  the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

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## 2.1.2. Test Result of RF Exposure Evaluation

Test Item : RF Exposure Evaluation Data

Test Mode : Normal Operation

## 2.1.3. Output Power into Antenna & RF Exposure Evaluation Distance

BT

- Maximum tune up tolerance

| Operating Frequency Range<br>(MHz) | Maximum Average Output<br>Power to Antenna<br>(dB m) | Antenna<br>Gain<br>(dB i) | Power<br>Density<br>at 20 cm (mW/cm <sup>2</sup> ) | Limits<br>(mW/cm <sup>2</sup> ) |
|------------------------------------|------------------------------------------------------|---------------------------|----------------------------------------------------|---------------------------------|
| 2 402 ~ 2 480                      | 4                                                    | 1.82                      | 0.000 760                                          | 1                               |

BT LE

- Maximum tune up tolerance

| Operating Frequency Range<br>(MHz) | Maximum Average Output<br>Power to Antenna<br>(dB m) | Antenna<br>Gain<br>(dB i) | Power<br>Density<br>at 20 cm (mW/cm <sup>2</sup> ) | Limits<br>(mW/cm <sup>2</sup> ) |
|------------------------------------|------------------------------------------------------|---------------------------|----------------------------------------------------|---------------------------------|
| 2 402 ~ 2 480                      | 11                                                   | 1.82                      | 0.003 808                                          | 1                               |

WLAN (2.4G)

- Maximum tune up tolerance

| Operating Frequency Range<br>(MHz) | Maximum Average Output<br>Power to Antenna<br>(dB m) | Antenna<br>Gain<br>(dB i) | Power<br>Density<br>at 20 cm (mW/cm <sup>2</sup> ) | Limits<br>(mW/cm <sup>2</sup> ) |
|------------------------------------|------------------------------------------------------|---------------------------|----------------------------------------------------|---------------------------------|
| 2 412 ~ 2 462                      | 19                                                   | 1.82                      | 0.024 029                                          | 1                               |

Note :

1. The power density Pd (5th column) at a distance of 20 cm calculated from the friis transmission formula is far below the limit of 1 mW/cm<sup>2</sup>.

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