# IEEE C95.1 2005
# KDB 447498 D03
# 47 C.F.R. Part 1, Subpart I, Section 1.1310
# 47 C.F.R. Part 2, Subpart J, Section 2.1091

# RF EXPOSURE REPORT

## For

## IOT BLE Mini Gateway

## Model: WG-1000DB

## Trade Name: CC&C

*Issued to*

**CC&C Technologies, Inc.**
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*Issued by*

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**Issue Date: October 21, 2019**

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# Revision History

| Rev. | Issue Date | Revisions | Effect Page | Revised By |
|---|---|---|---|---|
| 00 | October 21, 2019 | Initial Issue | ALL | May Lin |

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# 1. TEST RESULT CERTIFICATION

## We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULT** |
| IEEE C95.1 2005<br>KDB 447498 D03<br>47 C.F.R. Part 1, Subpart I, Section 1.1310<br>47 C.F.R. Part 2, Subpart J, Section 2.1091 | No non-compliance noted |
| **Statements of Conformity** | |
| Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty. | |

*Approved by:*

Kevin Tsai
Deputy Manager
Compliance Certification Services Inc.

*Reporter:*

May Lin
Report coordinator
Compliance Certification Services Inc.

## 2. LIMIT

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

# 3. EUT SPECIFICATION

| | |
|---|---|
| **EUT** | IOT BLE Mini Gateway |
| **Model** | WG-1000DB |
| **Frequency band (Operating)** | ☒ Bluetooth: 2402MHz-2480MHz<br>☒ 802.11b/g/n HT20: 2412MHz ~ 2462 MHz<br>☒ 802.11n HT40: 2422MHz ~ 2452MHz<br>☒ 802.11a/n HT20: 5180MHz ~ 5240MHz / 5745MHz ~ 5825MHz<br>802.11n HT40: 5190MHz ~ 5230MHz / 5755MHz ~ 5795MHz<br>☐ Others |
| **Device category** | ☐ Portable (<20cm separation)<br>☒ Mobile (>20cm separation)<br>☐ Others |
| **Exposure classification** | ☐ Occupational/Controlled exposure (S = 5mW/cm$^2$)<br>☒ General Population/Uncontrolled exposure (S=1mW/cm$^2$) |
| **Antenna Specification** | Bluetooth : Antenna Gain : 0.00 dBi (Numeric gain 1.00)<br>2.4GHz: Antenna Gain : 4.04 dBi (Numeric gain 2.53)<br>5GHz: Antenna Gain : -2.51 dBi (Numeric gain 0.56) |
| **Maximum Measurement Average Power** | Bluetooth: 10.45 dBm (11.092 mW)<br>2.4GHz:<br>IEEE 802.11b Mode: 18.95 dBm (78.524 mW)<br>IEEE 802.11g Mode: 16.82 dBm (48.084 mW)<br>IEEE 802.11n HT 20 Mode: 14.76 dBm (29.923 mW)<br>IEEE 802.11n HT 40 Mode: 14.87 dBm (30.690 mW)<br>5GHz:<br>IEEE 802.11a Mode: 17.08 dBm (51.050 mW)<br>IEEE 802.11n HT 20 Mode: 15.08 dBm (32.211 mW)<br>IEEE 802.11n HT 40 Mode: 15.06 dBm (32.063 mW) |
| **Maximum tune up power** | Bluetooth: 11.00 dBm (12.589 mW)<br>2.4GHz:<br>IEEE 802.11b Mode: 19.50 dBm (89.125 mW)<br>IEEE 802.11g Mode: 17.50 dBm (56.234 mW)<br>IEEE 802.11n HT 20 Mode: 15.50 dBm (35.481 mW)<br>IEEE 802.11n HT 40 Mode: 15.50 dBm (35.481 mW)<br>5GHz:<br>IEEE 802.11a Mode: 18.00 dBm (63.096 mW)<br>IEEE 802.11n HT 20 Mode: 16.00 dBm (39.811 mW)<br>IEEE 802.11n HT 40 Mode: 16.00 dBm (39.811 mW) |
| **Evaluation applied** | ☒ MPE Evaluation*<br>☐ SAR Evaluation<br>☐ N/A |

# 4. TEST RESULTS

**No non-compliance noted.**

**Calculation**

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

*Where E = Field strength in Volts / meter*
*P = Power in Watts*
*G = Numeric antenna gain*
*d = Distance in meters*
*S = Power density in milliwatts / square centimeter*

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

*P (mW) = P (W) / 1000 and*

*d (cm) = d(m) / 100*

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ ***Equation 1***

*Where d = Distance in cm*
*P = Power in mW*
*G = Numeric antenna gain*
*S = Power density in mW / cm²*

# 5. MAXIMUM PERMISSIBLE EXPOSURE

Substituting the MPE safe distance using d = 20 cm into Equation 1:

$$S = 0.000199 \times P \times G$$

*Where* *P = Power in mW*
*G = Numeric antenna gain*
*S = Power density in mW / cm²*

**Bluetooth:**

| Ch. | Frq.(MHz) | P (mW) | Gain (num.) | D (cm) | Power density in mW / cm² | Limit (mW/cm2) |
|---|---|---|---|---|---|---|
| 0 | 2402 | 12.589 | 1 | 20 | 0.0025 | 1 |

**WIFI 2.4G**

**IEEE 802.11b mode:**

| Ch. | Frq.(MHz) | P (mW) | Gain (num.) | D (cm) | Power density in mW / cm² | Limit (mW/cm2) |
|---|---|---|---|---|---|---|
| 6 | 2437 | 89.125 | 2.53 | 20 | 0.0449 | 1 |

**IEEE 802.11g mode:**

| Ch. | Frq.(MHz) | P (mW) | Gain (num.) | D (cm) | Power density in mW / cm² | Limit (mW/cm2) |
|---|---|---|---|---|---|---|
| 6 | 2437 | 56.234 | 2.53 | 20 | 0.0283 | 1 |

**IEEE 802.11n HT20 mode:**

| Ch. | Frq.(MHz) | P (mW) | Gain (num.) | D (cm) | Power density in mW / cm² | Limit (mW/cm2) |
|---|---|---|---|---|---|---|
| 6 | 2437 | 35.481 | 2.53 | 20 | 0.0179 | 1 |

**IEEE 802.11n HT40 mode:**

| Ch. | Frq.(MHz) | P (mW) | Gain (num.) | D (cm) | Power density in mW / cm² | Limit (mW/cm2) |
|---|---|---|---|---|---|---|
| 6 | 2437 | 35.481 | 2.53 | 20 | 0.0179 | 1 |

**WIFI 5G**

**IEEE 802.11a mode:**

| Ch. | Frq.(MHz) | P (mW) | Gain (num.) | D (cm) | Power density in mW / $cm^2$ | Limit (mW/cm2) |
|---|---|---|---|---|---|---|
| 44 | 5220 | 63.096 | 0.56 | 20 | 0.0070 | 1 |

**IEEE 802.11n HT 20 mode:**

| Ch. | Frq.(MHz) | P (mW) | Gain (num.) | D (cm) | Power density in mW / $cm^2$ | Limit (mW/cm2) |
|---|---|---|---|---|---|---|
| 157 | 5785 | 39.811 | 0.56 | 20 | 0.0044 | 1 |

**IEEE 802.11n HT 40 mode:**

| Ch. | Frq.(MHz) | P (mW) | Gain (num.) | D (cm) | Power density in mW / $cm^2$ | Limit (mW/cm2) |
|---|---|---|---|---|---|---|
| 159 | 5795 | 39.811 | 0.56 | 20 | 0.0044 | 1 |

**--End of Report--**