KDB 447498 D01
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

Wi-Fi & BLE M.2 Wireless Module

Model: TM51010

Trade Name: GOOD WAY

Issued to

GOOD WAY TECHNOLOGY CO., LTD.
3F, No. 135, Ln. 235, Baociao Rd., Sindian Dist., New Taipei City 231, Taiwan

Issued by

Compliance Certification Services Inc.
Wugu Laboratory
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New Taipei City, Taiwan. (R.O.C.)
Issue Date: May 19, 2022

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	May 16, 2022	Initial Issue	ALL	Doris Chu
01	May 19, 2022	See the following Note Rev. (01)	P.1, .P.4	Doris Chu

Rev. (01)
1. KDB 447498 D03 revised to KDB 447498 D01.

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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**
KDB 447498 D01 47 C.F.R. Part 1, Subpart I, Section 1.1310 47 C.F.R. Part 2, Subpart J, Section 2.1091	Compliance
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.

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.

§1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of FCC part 2.1093 of the chapter.

TABLE 1 - LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	* 100	6
3.0-30	1842/f	4.89/f	* $900/f^2$	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	* $180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

Note 1 to Table 1: Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

Note 2 to Table 2: General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

3. EUT SPECIFICATION

EUT	Wi-Fi & BLE M.2 Wireless Module
Model	TM51010
Trade Name	GOOD WAY
Model Discrepancy	N/A
Received Date	March 10, 2022
Frequency band (Operating)	☒ Bluetooth: 2402MHz-2480MHz ☒ 802.11b/g/n HT20: 2412MHz ~ 2462 MHz ☒ 802.11a/n HT20: 5180MHz ~ 5240MHz / 5745 ~ 5825MHz 802.11n HT40: 5190MHz ~ 5230MHz / 5755~ 5795MHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm^2) ☒ General Population/Uncontrolled exposure (S=1mW/cm^2)
Antenna Specification	PCB Antenna BT: Gain: 1.52 dBi WIFI 2.4GHz: Gain: 3.02 dBi WIFI 5GHz: 5150~5250: Gain: 2.98 dBi 5725~5850: Gain: 4.38 dBi BT: Gain : 1.52 dBi (Numeric gain: 1.42) Worst 2.4GHz: Gain : 3.02 dBi (Numeric gain: 2.00) Worst 5GHz: 5150~5250: Gain : 2.98 dBi (Numeric gain: 1.99) Worst 5725~5850: Gain: 4.38 dBi (Numeric gain: 2.74) Worst

<table>
<tr><td>Maximum Measurement Average Power</td><td>
<table>
<tr><td>BT</td><td>4.07 dBm</td><td>(2.553 mW)</td></tr>
<tr><td>2.4GHz</td><td></td><td></td></tr>
<tr><td>IEEE 802.11b Mode:</td><td>17.49 dBm</td><td>(56.105 mW)</td></tr>
<tr><td>IEEE 802.11g Mode:</td><td>15.47 dBm</td><td>(35.237 mW)</td></tr>
<tr><td>IEEE 802.11n HT 20 Mode:</td><td>13.49 dBm</td><td>(22.336 mW)</td></tr>
<tr><td>IEEE 802.11n HT 40 Mode:</td><td>13.48 dBm</td><td>(22.284 mW)</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>5GHz</td><td></td><td></td></tr>
<tr><td>IEEE 802.11a Mode:</td><td>19.59 dBm</td><td>(90.991 mW)</td></tr>
<tr><td>IEEE 802.11n HT 20 Mode:</td><td>19.40 dBm</td><td>(87.096 mW)</td></tr>
<tr><td>IEEE 802.11n HT 40 Mode:</td><td>19.63 dBm</td><td>(91.833 mW)</td></tr>
</table>
</td></tr>
<tr><td>Maximum tune up power</td><td>
<table>
<tr><td>BT</td><td>8.00 dBm</td><td>(6.310 mW)</td></tr>
<tr><td>2.4GHz</td><td></td><td></td></tr>
<tr><td>IEEE 802.11b Mode:</td><td>19.50 dBm</td><td>(89.125 mW)</td></tr>
<tr><td>IEEE 802.11g Mode:</td><td>17.50 dBm</td><td>(56.234 mW)</td></tr>
<tr><td>IEEE 802.11n HT 20 Mode:</td><td>15.50 dBm</td><td>(35.481 mW)</td></tr>
<tr><td>IEEE 802.11n HT 40 Mode:</td><td>15.50 dBm</td><td>(35.481 mW)</td></tr>
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<tr><td>IEEE 802.11n HT 40 Mode:</td><td>22.00 dBm</td><td>(158.489 mW)</td></tr>
</table>
</td></tr>
<tr><td>Evaluation applied</td><td>☒ MPE Evaluation*
☐ SAR Evaluation
☐ N/A</td></tr>
</table>

Remark:

1. For more details, please refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
3. The tune up power referred the AVG power of the test report TMWK2203000912KR, TMWK2203000913KR and TMWK2203000914KR for RF Exposure assessment purpose.

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 / cm^2

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 / cm^2

BT:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
1	2402	6.31	1.42	20	0.0018	1

2.4GHz:
IEEE 802.11b mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
11	2462	89.125	2	20	0.0355	1

IEEE 802.11g mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
6	2437	56.234	2	20	0.0224	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
6	2437	35.481	2	20	0.0141	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
6	2437	35.481	2	20	0.0141	1

5GHz:
IEEE 802.11a mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
149	5745	158.489	2.74	20	0.0864	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
149	5745	158.489	2.74	20	0.0864	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
151	5755	158.489	2.74	20	0.0864	1

6. SIMULTANEOUS TRANSMISSION SAR ANALYSIS

Both of the WiFi and Bluetooth can transmit simultaneously, the formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

WiFi + Bluetooth

Therefore, the worst-case situation is 0.0018 / 1 + 0.0864 / 1 = 0.0882, which is less than “1”.

--End of Report--