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

Communication Module

Model: LBEE5QD1ZM

Trade Name: muRata

Issued to

Murata Manufacturing Co., Ltd.
1-10-1, Higashikotari, Nagaokakyo-shi, Kyoto 617-8555 Japan

Issued by

Compliance Certification Services Inc.
Wugu Laboratory
No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City, Taiwan. (R.O.C.)
Issue Date: January 7, 2021

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	December 11, 2020	Initial Issue	ALL	Mita Wu
01	January 7, 2021	See the following Note Rev.(01)	ALL	Allison Chen

Note:
Rev.(01)
1. This test report is an addendum to the original test report T200915W04-MF, the EUTs represent the original and this test report are assessed as identical in hardware and software, measurement results in the original report are fully leveraged in this test report without further verification test.

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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 D03 47 C.F.R. Part 1, Subpart I, Section 1.1310 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.

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	Communication Module
Model	LBEE5QD1ZM
Model Discrepancy	N/A
Received Date	September 15, 2020
Frequency band (Operating)	☒ Bluetooth: 2402MHz-2480MHz ☒ 802.11b/g/n HT20 / ac20: 2412MHz ~ 2462 MHz ☐ 802.11n HT40 / ac40: 2422MHz ~ 2452MHz ☒ 802.11a/n HT20 / ac20: 5180MHz ~ 5240MHz / 5260 ~ 5320MHz 5500 ~ 5700MHz / 5745MHz ~ 5825MHz ☒ 802.11n HT40 / ac40: 5190MHz ~ 5230MHz / 5270 ~ 5310MHZ 5510 ~ 5670MHz / 5755MHz ~ 5795MHz ☒ 802.11ac VHT80: 5210MHz / 5290MHz / 5530 MHz~5610MHz / 5775MHz ☐ 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	BT & WIFI 2.4GHz: 3.6 dBi WIFI 5GHz: 4.75 dBi BT: Directional Gain : 3.60 dBi (Numeric gain: 2.29) Worst 2.4GHz: Directional Gain : 3.60 dBi (Numeric gain: 2.29) Worst 5GHz: Directional Gain : 4.75 dBi (Numeric gain: 2.99) Worst

<table>
<tr><td>Maximum Measurement Average Power</td><td>
<table>
<tr><td>BT</td><td>5.26 dBm</td><td>(3.357 mW)</td></tr>
<tr><td>2.4GHz</td><td></td><td></td></tr>
<tr><td>IEEE 802.11b Mode:</td><td>18.56 dBm</td><td>(71.779 mW)</td></tr>
<tr><td>IEEE 802.11g Mode:</td><td>18.76 dBm</td><td>(75.162 mW)</td></tr>
<tr><td>IEEE 802.11n HT 20 Mode:</td><td>17.89 dBm</td><td>(61.518 mW)</td></tr>
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<tr><td>IEEE 802.11n HT 20 Mode:</td><td>20.73 dBm</td><td>(118.304 mW)</td></tr>
<tr><td>IEEE 802.11n HT 40 Mode:</td><td>20.74 dBm</td><td>(118.577 mW)</td></tr>
<tr><td>IEEE 802.11ac VHT 80 Mode:</td><td>20.40 dBm</td><td>(109.648 mW)</td></tr>
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<tr><td>Maximum tune up power</td><td>
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<tr><td>Evaluation applied</td><td>☒ MPE Evaluation*
☐ SAR Evaluation
☐ N/A</td></tr>
<tr><td>Received Date</td><td>December 15, 2020</td></tr>
</table>

Remark:

1. For more details, 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 T201215W01-RP1, T201215W01-RP2, T201215W01-RP3, T201215W01-RP4 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)
39	2480	3.357	2.29	20	0.0015	1

IEEE 802.11b mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
11	2462	71.779	2.29	20	0.0327	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	75.162	2.29	20	0.0343	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	61.518	2.29	20	0.0280	1

IEEE 802.11a mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
140	5700	148.252	2.99	20	0.0882	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
116	5580	118.304	2.99	20	0.0704	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
46	5230	118.577	2.99	20	0.0706	1

IEEE 802.11ac VHT80 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
138	5690	109.648	2.99	20	0.0652	1

6. SIMULTANEOUS TRANSMISSION SAR ANALYSIS

Both of the WiFi 5GHz 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 5GHz + Bluetooth

Therefore, the worst-case situation is 0.0882 / 1 + 0.0015 / 1 = 0.0897, which is less than “1”.

--End of Report--