



## RF Exposure Evaluation Declaration

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**FCC ID:** VPYLB1PR

**APPLICANT:** Murata Manufacturing Co., Ltd.

**Application Type:** Certification

**Product:** Bluetooth mesh node

**Model No.:** LBCC2ZZ1PR

**FCC Classification:** Digital Transmission System (DTS)

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( Kevin Guo )

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( Marlin Chen )



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

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### Revision History

| Report No.    | Version | Description    | Issue Date | Note  |
|---------------|---------|----------------|------------|-------|
| 1803WSU012-U2 | Rev. 01 | Initial Report | 04-13-2018 | Valid |
|               |         |                |            |       |

## 1. PRODUCT INFORMATION

### 1.1. Equipment Description

|                          |                     |
|--------------------------|---------------------|
| Product Name:            | Bluetooth mesh node |
| Model No.:               | LBCC2ZZ1PR          |
| Bluetooth Specification: | V4.2 single mode    |
| Power Type:              | DC 12V              |

## 2. RF Exposure Evaluation

### 2.1. Limits

#### SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and $\leq 50$ mm

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table. The equation and threshold in Note 1 must be applied to determine SAR test exclusion.

| MHz  | 5   | 10  | 15  | 20  | 25  | mm                                         |
|------|-----|-----|-----|-----|-----|--------------------------------------------|
| 150  | 39  | 77  | 116 | 155 | 194 | SAR Test<br>Exclusion<br>Threshold<br>(mW) |
| 300  | 27  | 55  | 82  | 110 | 137 |                                            |
| 450  | 22  | 45  | 67  | 89  | 112 |                                            |
| 835  | 16  | 33  | 49  | 66  | 82  |                                            |
| 900  | 16  | 32  | 47  | 63  | 79  |                                            |
| 1500 | 12  | 24  | 37  | 49  | 61  |                                            |
| 1900 | 11  | 22  | 33  | 44  | 54  |                                            |
| 2450 | 10  | 19  | 29  | 38  | 48  |                                            |
| 3600 | 8   | 16  | 24  | 32  | 40  |                                            |
| 5200 | 7   | 13  | 20  | 26  | 33  |                                            |
| 5400 | 6   | 13  | 19  | 26  | 32  |                                            |
| 5800 | 6   | 12  | 19  | 25  | 31  |                                            |
| MHz  | 30  | 35  | 40  | 45  | 50  | mm                                         |
| 150  | 232 | 271 | 310 | 349 | 387 | SAR Test<br>Exclusion<br>Threshold<br>(mW) |
| 300  | 164 | 192 | 219 | 246 | 274 |                                            |
| 450  | 134 | 157 | 179 | 201 | 224 |                                            |
| 835  | 98  | 115 | 131 | 148 | 164 |                                            |
| 900  | 95  | 111 | 126 | 142 | 158 |                                            |
| 1500 | 73  | 86  | 98  | 110 | 122 |                                            |
| 1900 | 65  | 76  | 87  | 98  | 109 |                                            |
| 2450 | 57  | 67  | 77  | 86  | 96  |                                            |
| 3600 | 47  | 55  | 63  | 71  | 79  |                                            |
| 5200 | 39  | 46  | 53  | 59  | 66  |                                            |
| 5400 | 39  | 45  | 52  | 58  | 65  |                                            |
| 5800 | 37  | 44  | 50  | 56  | 62  |                                            |

Note: The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:

$$\left[ \frac{\text{max. power of channel, including tune-up tolerance, mW}}{\text{min. test separation distance, mm}} \right] * \sqrt{f(\text{GHz})} \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR, where}$$

- $f(\text{GHz})$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is  $\leq 50$  mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

## 2.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 20°C and 75% RH.

### 2.3. Test Result of RF Exposure Evaluation

|           |                        |
|-----------|------------------------|
| Product   | Bluetooth mesh node    |
| Test Item | RF Exposure Evaluation |

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 0dBi for Bluetooth in logarithm scale.

#### Output Power into Antenna:

| Test Mode | Frequency Band (MHz) | Maximum output power to antenna (mW) | SAR Test Exclusion Threshold (mW) |
|-----------|----------------------|--------------------------------------|-----------------------------------|
| Bluetooth | 2402 ~ 2480          | 3.0761                               | 10                                |

Per FCC KDB 447498 D01v06, the SAR exclusion threshold for distances<50mm is defined by the following equation:

$$\frac{\text{Max Power of Channel (mW)}}{\text{Test Separation Dist (mm)}} * \sqrt{\text{Frequency (GHz)}} \leq 3.0$$

Based on the maximum conducted power of Bluetooth and the antenna to use separation distance, Bluetooth SAR was not required;

$$[(3.0761 \text{ mW}/5) * \sqrt{2.402}] = 0.9535 < 3.0$$

The Max  $P_d = 0.9535 < 3.0$

Note: When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.