

## RF EXPOSURE REPORT

OF

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

**Product Name:** Communication Module

**Brand Name:** muRata

**FCC Model No.:** LBEE5XV1VA

**IC Model No.:** LBEE5XV1VA\_3ANT, LBEE5XV1VA\_2ANT

**Model Difference:** LBEE5XV1VA\_3ANT: Connect BT\_IN to BT\_OUT  
LBEE5XV1VA\_2ANT: Connect BT\_IN to 50 ohm termination resistor

**Report Number:** ER/2019/50023

**FCC ID** VPYLB1VA

**IC** 772C-LB1VA

**FCC Rule Part** Part 2.1091 & RSS-102

**IC Rule Part** RSS-102

**Issue Date:** May 31, 2019

**Date of Test:** May 07, 2019 ~ May 24, 2018

**Date of EUT Received:** May 07, 2019

**We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation in this report is in compliance with FCC Rules Part 2 & ISSED RSS-102.

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

**Tested By:**  
**Peter Weng / Engineer****Approved By:**  
**John Yeh / Assistant Manager**

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## Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
ER/2019/50023	Rev.00	Initial creation of document	All	May 31, 2019	Susan Lin

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# 1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

General:

Product Name:	Communication Module
Brand Name:	muRata
Model No.:	LBEE5XV1VA
Model Difference:	N/A
Product SW/HW version:	1.0 / 1.0
Radio SW/HW version:	1.0 / 1.0
Test SW Version:	N/A
RF power setting in TEST SW:	N/A
Power Supply:	3.6Vdc
Antenna Designation:	Dipole Antenna, Antenna Gain: 5.68dBi (2.4G) / 5.79dBi (5G)

## Bluetooth BR+EDR:

BT:	Freq. Range (MHz)	Channels	Modulation Technology	Rated Power (P-burst) (dBm)	Antenna Gain (dBi)	EIRP (dBm)
BR+EDR	2402-2480	79	GFSK + $\pi/4$ DQPSK + 8DPSK	10.98	5.68	16.66

## Bluetooth BLE:

BT:	Freq. Range (MHz)	Channels	Modulation Technology	Rated Power (P-burst) (dBm)	Antenna Gain (dBi)	EIRP (dBm)
LE	2402-2480	40	GFSK	0.76	5.68	6.44

## WLAN 2.4GHz:

802.11	Freq. Range (MHz)	Channels	Modulation Technology	Rated Power (P-burst) (dBm)	Antenna Gain (dBi)	EIRP (dBm)
b/g/n_HT20	2412-2462	11	DSSS & OFDM	18.94	5.68	24.62
Modulation type:	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM					

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## WLAN 5GHz:

Wi-Fi	Freq. Range (MHz)	Modulation Technology	Rated Power (P-burst) (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Worst Case
11a	5150~5250	OFDM	15.97	5.79	21.76	
	5250~5350		15.99	5.79	21.78	
	5470~5725		15.84	5.79	21.63	
	5725~5850		15.97	5.79	21.76	
11n HT20	5150~5250		13.74	8.80	22.54	
	5250~5350		18.93	8.80	27.73	V
	5470~5725		18.65	8.80	27.45	
	5725~5850		18.90	8.80	27.70	
11n HT40	5150~5250		14.01	8.80	22.81	
	5250~5350		17.89	8.80	26.69	
	5470~5725		17.90	8.80	26.70	
	5725~5850		17.96	8.80	26.76	
11ac VHT80	5150~5250		10.62	8.80	19.42	
	5250~5350		13.45	8.80	22.25	
	5470~5725		17.88	8.80	26.68	
	5725~5850		15.82	8.80	24.62	
Modulation type		256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM				

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## 2 FCC MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### 2.1 FCC Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
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
300-1500	/	/	f/1500	30
1500-15000	/	/	1.0	30

f = frequency in MHz

\* = Plane-wave equipment power density

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## 2.2 ISED Standard Applicable

This submittal(s) (test report) is intended to comply with RSS-102 issue 5 Radio frequency Radiation Exposure requirement.

This is a Mobile device, the MPE is required.

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field Strength (A/m rms)	Power Density (W/m <sup>2</sup> )	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

F = frequency in MHz

\* = Based on nerve stimulation (NS).

\*\* = Based on specific absorption rate (SAR)

Maximum Permissible Exposure (MPE) Evaluation

Prediction of MPE limit at a given distance

$$S = PG/4\pi R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

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## 2.3 Power Density Calculation (Worst Case)

FCC								ISED		
Operation Mode	Evaluation Frequency (MHz)	Operation Distance (cm)	Output Power EIRP (dBm)	Output Power EIRP (mW)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Pass / Fail	Power Density (W/cm <sup>2</sup> )	Limit (W/cm <sup>2</sup> )	Pass / Fail
BT	2402.00	20	16.66	46.34	0.009	1.000	Pass	0.092	5.351	Pass
BLE	2442.00	20	6.44	4.41	0.001	1.000	Pass	0.009	5.412	Pass
WLAN 2.4G	2462.00	20	24.62	289.73	0.058	1.000	Pass	0.577	5.442	Pass
WLAN 5G	5300.00	20	27.73	592.93	0.118	1.000	Pass	1.180	9.190	Pass

~ End of Report ~

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