

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

Model No.: LBEE6ZZ1PY

Model Difference: N/A

Report Number: ER/2019/30198

FCC ID VPYLB1PY

IC 772C-LB1PY

FCC Rule Part Part 2.1091 & RSS-102

IC Rule Part RSS-102

Issue Date: Apr. 15, 2019

Date of Test: Mar. 14, 2019 ~ Mar. 29, 2019

Date of EUT Received: Mar. 14, 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 & ISED RSS-102.

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

Peter Weng

Tested By: _____

Peter Weng / Engineer

John Teh

Approved By: _____

John Yeh / Assistant Manager



Testing Laboratory
0513

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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
ER/2019/30198	Rev.00	Initial creation of document	All	Apr. 15, 2019	Violetta Tang

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1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

General:

Product Name:	Communication Module
Brand Name:	muRata
Model No.:	LBEE6ZZ1PY
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:	3.3Vdc
Antenna Designation:	Inverted-F Antenna, Antenna Gain: 0.5dBi (BT) Monopole Antenna, Antenna Gain: 3.1dBi (Wifi 2.4GHz) Monopole Antenna, Antenna Gain: 5.2dBi (5GHz)

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	7.85	0.5	8.35

Bluetooth BLE:

BT:	Freq. Range (MHz)	Channels	Modulation Technology	Rated Power (P-burst) (dBm)	Antenna Gain (dBi)	EIRP (dBm)
LE	2402-2480	40	GFSK	7.44	0.5	7.94

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	18.04	3.1	21.14
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	10.93	5.2	16.13	
	5250~5350		10.90		16.10	
	5470~5725		11.03		16.23	
	5725~5850		10.93		16.13	
11n HT20	5150~5250		11.08		16.28	
	5250~5350		11.06		16.26	
	5470~5725		11.13		16.33	V
	5725~5850		11.06		16.26	
11n HT40	5150~5250		8.09		13.29	
	5250~5350		8.39		13.59	
	5470~5725		8.27		13.47	
	5725~5850		8.00		13.20	
11ac VHT80	5150~5250		8.55		13.75	
	5250~5350		8.74		13.94	
	5470~5725		8.77		13.97	
	5725~5850		8.37		13.57	
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 ²)	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 ²)	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 ²)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	0.73/ <i>f</i>	-	6**
1.1-10	87/ <i>f</i> ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ <i>f</i> ^{0.25}	0.1540/ <i>f</i> ^{0.25}	8.944/ <i>f</i> ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 <i>f</i> ^{0.3417}	0.008335 <i>f</i> ^{0.3417}	0.02619 <i>f</i> ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> ^{1.2}
150000-300000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616000/ <i>f</i> ^{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 ²)	Limit (mW/cm ²)	Pass / Fail	Power Density (W/cm ²)	Limit (W/cm ²)	Pass / Fail
BT	2402.00	20	8.35	6.84	0.001	1.000	Pass	0.014	5.351	Pass
BLE	2402.00	20	7.94	6.22	0.001	1.000	Pass	0.012	5.351	Pass
WLAN 2.4G	2462.00	20	21.14	130.02	0.026	1.000	Pass	0.259	5.442	Pass
WLAN 5G	5500.00	20	16.33	42.95	0.009	1.000	Pass	0.085	9.425	Pass

~ End of Report ~

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