

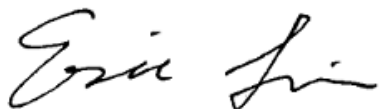
1 Cover Page

RF Exposure Evaluation Report

Application No.: KSCR2110000184AT
FCC ID: VPYLB2AB
IC: 772C-LB2AB
Applicant: Murata Manufacturing Co., Ltd.
Address of Applicant: 1-10-1, Higashikotari, Nagaokakyo-shi, Kyoto 617-8555 Japan
Manufacturer: Murata Manufacturing Co., Ltd.
Address of Manufacturer: 1-10-1, Higashikotari, Nagaokakyo-shi, Kyoto 617-8555 Japan
Factory: Shenzhen Murata Technology Co., Ltd.
Address of Factory: 15 Cuijing Road, Shenzhen Grand Industrial Zone, Pingshan District, Shenzhen 518118 China
Equipment Under Test (EUT):
EUT Name: UWB+BLE Combo Module
Model No.: LBUA5QJ2AB
Trade mark: Murata
Standard(s) : FCC Rules 47 CFR §2.1091
KDB447498 D01 General RF Exposure Guidance v06
RSS-102 Issue 5 Amendment 1 (February 2, 2021)
Date of Receipt: 2021-10-21
Date of Test: 2021-10-21 to 2021-12-24
Date of Issue: 2021-12-25

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.



Eric Lin
EMC Lab Manager



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Revision Record			
Version	Description	Date	Remark
00	Original	2021-12-25	/

Authorized for issue by:			
		Damon Zhou	
		Damon Zhou / Project Engineer	
		Eric Lin	
		Eric Lin / Reviewer	



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3 General Information

3.1 General Description of E.U.T.

Power supply:	DC 2.5~3.6V
---------------	-------------

3.2 Technical Specifications

BLE

Antenna Gain:	-4.7dBi (Provided by manufacturer)
Antenna Type:	PCB Antenna
Bluetooth Version:	V5.2 LE
Data Rate:	1Mbps & 2 Mbps
Channel Spacing:	2MHz
Modulation Type:	GFSK
Data Rate:	1Mbps, 2Mbps
Number of Channels:	40
Operation Frequency:	2402MHz to 2480MHz
Serial Number:	449160F719CF
Firmware Version:	Type2AB-DTM-FW-V0.1.0

UWB

Power supply:	DC 2.5V~3.6V
Test voltage:	DC 3V
Product category:	hand held
Antenna Gain:	Board 1: Antenna 1(RX): 1.7dBi for 6489.6MHz; -0.9dBi for 7987.2MHz(Provided by manufacturer) Antenna 2(TX/RX): 1.8dBi for 6489.6MHz; -1.5dBi for 7987.2MHz(Provided by manufacturer) Board 2: 3.9dBi for 6489.6MHz; 2.8dBi for 7987.2MHz(Provided by manufacturer)
Antenna Type:	Board 1: Antenna 1:PCB Antenna; Antenna 2:PCB Antenna Board 2:PCB Antenna
Modulation Type:	BPM+BPSK
Number of Channels:	2
Frequency range:	6489.6MHz to 7987.2MHz
Serial Number:	Board 1: 09411594 Board 2: 09425885



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Firmware Version:	Board 1: V1.0.0 Board 2: V1.0.0
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Compliance Certification Services (Kunshan) Inc.
EMC Laboratory

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3.3 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

3.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **CNAS (No. CNAS L4354)**

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 2541.01)**

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

• **FCC (Designation Number: CN1172)**

Compliance Certification Services Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

• **ISED (CAB identifier: CN0072)**

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. CAB Identifier: CN0072.

• **VCCI (Member No.: 1938)**

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.



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4 Test Standards and Limits

4.1 FCC Radiofrequency radiation exposure limits:

According to §1.1310, the limit for general population/uncontrolled exposures

Frequency	Power density(mW/cm ²)	Averaging time(minutes)
300MHz~1.5GHz	f/1500	30
1.5GHz~100GHz	1.0	30

4.2 IC Radiofrequency radiation exposure limits:

According to RSS-102 section 2.5.2, RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);

- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

For 2.4G device, the limit of worse case is 2.68 W

For UWB device above 6GHz, the limit is 5W.



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5 Measurement and Calculation

5.1 Maximum transmit power

The Power Data is based on the RF Test Report KSCR211000018401& KSCR211000018402.

BLE

Test Mode	Test Frequency (MHz)	Output Power (dBm)	Output Power (mW)
1M	2402	6.05	4.03
	2442	6.67	4.65
	2480	7.02	5.04
2M	2402	6.06	4.04
	2442	6.70	4.68
	2480	7.02	5.04

UWB

EUT	Test Frequency (MHz)	Field Strength@3m (dBuV/m) (F _{50M})	EIRP (dBm)	EIRP (mW)	Gain (dBi)	Output Power (dBm)	Output Power (mW)
Board 1	6489.6	92.83	-2.47	0.57	1.8	-4.27	0.37
	7987.2	93.57	-1.73	0.67	-1.5	-0.23	0.95
Board 2	6489.6	92.87	-2.43	0.57	3.9	-6.33	0.23
	7987.2	93.43	-1.87	0.65	2.8	-4.67	0.34

Remark:

- At a specified measurement distance of 3 m: $EIRP(dBm) = E(dBuV/m) - 95.3$
- $F_{50M} = F_{10M} + 20\log(50MHz/10MHz) = F_{10M} + 13.98$
- F_{50M} : Field Strength for fundamental @ RBW=50MHz
- F_{10M} : Field Strength for fundamental @ RBW=10MHz

5.2 MPE Calculation

For FCC:

According to the formula $S=P/4\pi R^2$, we can calculate S which is MPE.

Note:

- P (mW)
- R = distance to the center of radiation of antenna (in meter) = 20cm
- MPE limit = 1mW/cm²



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BLE

The max. antenna gain is		-4.7	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
5.04	0.339	20	0.00034	1	Pass

UWB

The max. antenna gain is		-1.5	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
0.95	0.708	20	0.00013	1	Pass

The BLE and UWB can simultaneous transmitting. The maximum rate of MPE is $0.00034/1.0 + 0.00013/1.0 = 0.00047 \leq 1.0$. according to the KDB447498 section 7.2 determine the device is exclusion from SAR test.

For IC:

BLE: Output power = $0.00504W < 2.68W$

UWB: Output power = $0.00095W < 5W$

The BLE and UWB can simultaneous transmitting. The maximum rate of MPE is $0.00504/2.68 + 0.00095/5 = 0.0021 \leq 1.0$. So the device is exclusion from SAR test.

--End of the Report--



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