

1 Cover Page

RF Exposure Evaluation Report

Application No.: SHCR2308001590AT
FCC ID: VPYLB2AB
IC: 772C-LB2AB
Applicant: Murata Manufacturing Co., Ltd.
Address of Applicant: 10-1, Higashikotari 1-chome, Nagaokakyo-shi Kyoto 617-8555 Japan
Manufacturer: Murata Manufacturing Co., Ltd.
Address of Manufacturer: 10-1, Higashikotari 1-chome, 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 plus 1055 ANT
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: 2023-07-01
Date of Test: 2023-07-01 to 2023-08-23
Date of Issue: 2023-08-24

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

Parlan Zhan

Parlam Zhan
Laboratory Manager



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Revision Record			
Version	Description	Date	Remark
00	Updated product name; Added new AoA/PDoA antenna for UWB; Updated BLE antenna	2023-08-24	Based on KSCR211000018403

Authorized for issue by:				
				
		Micheal Niu /Project Engineer		
				
		Parlam Zhan /Reviewer		



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3 General Information

3.1 General Description of E.U.T.

Power supply:	DC 2.5~3.6V
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3.2 Technical Specifications

BLE

Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.2 LE
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	PCB Antenna
Antenna Gain:	-3.8dBi(Provided by manufacturer)
Serial Number:	4A309935
Firmware Version:	V0.6.0

UWB

Product category:	Hand held
Operation Frequency:	Channel 5: 6489.6MHz Channel 9: 7987.2MHz
Number of Channels:	2
Modulation Type:	BPM+BPSK
Antenna Gain:	AoA/PDoA antenna I: 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) TWR/TDoA antenna: 3.9dBi for 6489.6MHz; 2.8dBi for 7987.2MHz(Provided by manufacturer) AoA/PDoA antenna II: Antenna 1(RX): 0.3dBi for 6489.6MHz; 2.7dBi for 7987.2MHz(Provided by manufacturer) Antenna 2(TX/RX): 0.9dBi for 6489.6MHz; 2.8dBi for 7987.2MHz(Provided by manufacturer)
Antenna Type:	AoA/PDoA antenna I: Antenna 1(RX): PCB Antenna; Antenna 2(TX/RX): PCB Antenna TWR/TDoA antenna: PCB Antenna



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	AoA/PDoA antenna II: Antenna 1(RX): PCB Antenna; Antenna 2(TX/RX): PCB Antenna
Serial Number:	4A309935
Firmware Version:	V0.6.0



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3.3 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab
588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China
Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

No tests were sub-contracted.

Note:

1. SGS is not responsible for wrong test results due to incorrect information (e.g., max. internal working frequency, antenna gain, cable loss, etc) is provided by the applicant. (If applicable).
2. SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (If applicable).

3.4 Test Facility

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

• **A2LA (Certificate No. 6332.01)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA).

• **FCC (Designation Number: CN1301)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

• **ISED (CAB Identifier: CN0020)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 8617A

• **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 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 2.4GHz BLE 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 SHCR230800159001 & SHCR230800159002.

BLE

Test Mode	Test Frequency (MHz)	Output Power (dBm)	Output Power (mW)
1M	2402	5.96	3.94
	2442	6.15	4.12
	2480	6.76	4.74
2M	2402	5.99	3.97
	2442	6.16	4.13
	2480	6.77	4.75

UWB

Test Frequency (MHz)	Field Strength@3m (dBuV/m) (F _{50M})	EIRP (dBm)	Output Power (mW)
6489.6	92.70	-2.60	0.55
7987.2	92.66	-2.64	0.54

Remark:

- At a specified measurement distance of 3 m: $EIRP(dBm) = E(dBuV/m) - 95.3$
- $F_{50M} = F_{8M} + 20\log(50MHz/8MHz) = F_{8M} + 15.92$
- F_{50M} : Field Strength for fundamental @ RBW=50MHz
- F_{8M} : Field Strength for fundamental @ RBW=8MHz

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		-3.8	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
4.75	0.417	20	0.00039	1	Pass

UWB

EIRP(mW)	Operation Distance R(cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
0.55	20	0.00011	1	Pass

The BLE and UWB can simultaneously transmit. The maximum rate of MPE is $0.00039/1.0+0.00011/1.0=0.0005\leq 1.0$.

So the device is exclusion from SAR test.

For IC:

BLE: Output power = $0.00475W < 2.68W$

UWB: Output power = $0.00055W < 5W$

The BLE and UWB can simultaneously transmit. The maximum rate of MPE is $0.00475/2.68+0.00055/5=0.002\leq 1.0$.

So the device is exclusion from SAR test.

--End of the Report--



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