

TEST REPORT

Product Name : Bluetooth Speakerphone
Brand Mark : Serene
Model No. : SA-40, SA-1001, BT-0JA3X
FCC ID : 2ATXW-SA-40
Report Number : BLA-EMC-202004-A2501
Date of Sample Receipt : 2020/4/14
Date of Test : 2020/4/14 to 2020/4/23
Date of Issue : 2020/4/23
Test Standard : 47 CFR Part 15, Subpart C 15.247
Test Result : Pass

Prepared for:

Serene Group, Inc.

14731 Carmenita Road, Norwalk, CA 90650 USA

Prepared by:

BlueAsia of Technical Services(Shenzhen) Co.,Ltd.

IOT Test Centre of BlueAsia

No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen,China

TEL: +86-755-28682673

FAX: +86-755-28682673

Compiled by:

Jozu.

Review by:

Sweet. Liang

Approved by:

Jmen li

Date:

2020/4/23



REPORT REVISE RECORD

Version No.	Date	Description
00	2020/4/23	Original

BlueAsia

TABLE OF CONTENTS

1	TEST SUMMARY	6
2	GENERAL INFORMATION	7
3	GENERAL DESCRIPTION OF E.U.T.	7
4	TEST ENVIRONMENT	8
5	TEST MODE	8
6	MEASUREMENT UNCERTAINTY	8
7	DESCRIPTION OF SUPPORT UNIT.....	9
8	LABORATORY LOCATION.....	9
9	TEST INSTRUMENTS LIST	10
	ANTENNA REQUIREMENT.....	14
	CONCLUSION.....	14
	CONDUCTED SPURIOUS EMISSIONS.....	15
	LIMITS.....	15
	BLOCK DIAGRAM OF TEST SETUP.....	15
	TEST DATA	16
	HOPPING CHANNEL NUMBER.....	17
	LIMITS.....	17
	BLOCK DIAGRAM OF TEST SETUP.....	17
	TEST DATA	17
	CARRIER FREQUENCIES SEPARATION	18
	LIMITS.....	18
	BLOCK DIAGRAM OF TEST SETUP.....	18
	TEST DATA	18
	20DB BANDWIDTH	19
	BLOCK DIAGRAM OF TEST SETUP.....	19
	TEST DATA	19
	CONDUCTED PEAK OUTPUT POWER	20
	LIMITS.....	20
	BLOCK DIAGRAM OF TEST SETUP.....	20

TEST DATA	21
CONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ)	22
LIMITS.....	22
BLOCK DIAGRAM OF TEST SETUP.....	22
PROCEDURE	22
TEST DATA	24
RADIATED SPURIOUS EMISSIONS	26
LIMITS.....	26
BLOCK DIAGRAM OF TEST SETUP.....	27
PROCEDURE	27
TEST DATA	29
RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS	33
LIMITS.....	33
BLOCK DIAGRAM OF TEST SETUP.....	34
PROCEDURE	34
TEST DATA	36
CONDUCTED BAND EDGES MEASUREMENT	37
LIMITS.....	37
BLOCK DIAGRAM OF TEST SETUP.....	38
TEST DATA	38
DWELL TIME.....	39
LIMITS.....	39
BLOCK DIAGRAM OF TEST SETUP.....	39
TEST DATA	40
10 APPENDIX.....	41
10.1 APPENDIX: 20DBEMISSION BANDWIDTH.....	41
<i>Test Result</i>	41
<i>Test Graphs</i>	42
10.2 APPENDIX: MAXIMUM CONDUCTED OUTPUT POWER	47
<i>Test Result</i>	47
<i>Test Graphs</i>	48
10.3 APPENDIX: CARRIER FREQUENCY SEPARATION	53
<i>Test Result</i>	53

<i>Test Graphs</i>	54
10.4 APPENDIX: DWELL TIME	56
<i>Test Result</i>	56
<i>Test Graphs</i>	57
10.5 APPENDIX: NUMBER OF HOPPING CHANNELS.....	60
<i>Test Result</i>	60
<i>Test Graphs</i>	61
10.6 APPENDIX: BAND EDGE MEASUREMENTS	63
<i>Test Result</i>	63
<i>Test Graphs</i>	64
10.7 APPENDIX: CONDUCTED SPURIOUS EMISSION.....	70
<i>Test Result</i>	70
<i>Test Graphs</i>	71
APPENDIX A: PHOTOGRAPHS OF TEST SETUP	85
APPENDIX B: PHOTOGRAPHS OF EUT	87

BlueAsia

1 TEST SUMMARY

Test item	Test Requirement	Test Method	Class/Severity	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6 & Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Hopping Channel Number	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Carrier Frequencies Separation	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Dwell Time	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass

2 GENERAL INFORMATION

Applicant	Serene Group, Inc.
Address	14731 Carmenita Road, Norwalk, CA 90650 USA
Manufacturer	Serene Group, Inc.
Address	14731 Carmenita Road, Norwalk, CA 90650 USA
Factory	MegaTrend Electronics Co., Ltd.
Address	No.8-1, Tong-Fu-Yu Ind., Ku-Keng Community, Guan-Lan Jie-Dao, Long-Hua District, Shenzhen 518110, China
Product Name	Bluetooth Speakerphone
Test Model No.	SA-40

3 GENERAL DESCRIPTION OF E.U.T.

Hardware Version	V0.3
Software Version	F0.3
Operation Frequency:	2402MH-2480MHz
Modulation Type:	GFSK, p/4DQPSK, 8DPSK
Channel Spacing:	1MHz
Number of Channels:	79
Antenna Type:	PCB Antenna
Antenna Gain:	2dBi

4 TEST ENVIRONMENT

Environment	Temperature	Voltage
Normal	25°C	DC3.7V

5 TEST MODE

TEST MODE	TEST MODE DESCRIPTION
Transmitting mode	Keep the EUT in continuously transmitting mode with modulation. (hopping or no hopping mode) non hopping mode is worse case of radiated emission
Remark: Full battery is used during all test except ac conducted emission, DH1, DH3, DH5 all have been tested, during the test, GFSK, Pi/4QPSK, 8-DPSK modulation were all pre-scanned only worse case is reported.	

6 MEASUREMENT UNCERTAINTY

Parameter	Expanded Uncertainty (Confidence of 95%)
Radiated Emission	±4.34dB
Radiated Emission	±4.24dB
Radiated Emission	±4.68dB
AC Power Line Conducted Emission	±3.45dB

Parameter	Expanded Uncertainty (Confidence of 95%)
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3.0 dB
Unwanted Emissions, conducted	±3.0 dB
Temperature	±3 °C
Supply voltages	±3 %
Time	±5 %
Radiated Emission (30MHz ~ 1000MHz)	±4.35 dB
Radiated Emission (1GHz ~ 18GHz)	±4.44 dB

7 DESCRIPTION OF SUPPORT UNIT

Device Type	Manufacturer	Model Name	Serial No.	Remark
PC	HASEE	K610D	N/A	N/A
AC Adapter	PISEN	TS-C051	N/A	N/A

8 LABORATORY LOCATION

All tests were performed at:
BlueAsia of Technical Services(Shenzhen) Co., Ltd.
IOT Test Centre of BlueAsia
No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen,China
Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673
No tests were sub-contracted.

9 TEST INSTRUMENTS LIST

Test Equipment Of Conducted Spurious Emissions					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
Spectrum	Agilent	N9020A	MY49100060	12/18/2019	12/17/2020
Signal Generator	Agilent	N5182A	MY49060650	12/18/2019	12/17/2020
Signal Generator	Agilent	E8257D	MY44320250	5/7/2019	5/6/2020

Test Equipment Of Hopping Channel Number					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
Spectrum	Agilent	N9020A	MY49100060	12/18/2019	12/17/2020
Signal Generator	Agilent	N5182A	MY49060650	12/18/2019	12/17/2020
Signal Generator	Agilent	E8257D	MY44320250	5/7/2019	5/6/2020

Test Equipment Of Carrier Frequencies Separation					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
Spectrum	Agilent	N9020A	MY49100060	12/18/2019	12/17/2020
Signal Generator	Agilent	N5182A	MY49060650	12/18/2019	12/17/2020
Signal Generator	Agilent	E8257D	MY44320250	5/7/2019	5/6/2020

Test Equipment Of 20dB Bandwidth					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due

Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
Spectrum	Agilent	N9020A	MY49100060	12/18/2019	12/17/2020
Signal Generator	Agilent	N5182A	MY49060650	12/18/2019	12/17/2020
Signal Generator	Agilent	E8257D	MY44320250	5/7/2019	5/6/2020

Test Equipment Of Conducted Peak Output Power

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
Spectrum	Agilent	N9020A	MY49100060	12/18/2019	12/17/2020
Signal Generator	Agilent	N5182A	MY49060650	12/18/2019	12/17/2020
Signal Generator	Agilent	E8257D	MY44320250	5/7/2019	5/6/2020

Test Equipment Of Conducted Emissions at AC Power Line (150kHz-30MHz)

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Shield room	SKET	833	N/A	6/10/2018	6/9/2021
Receiver	R&S	ESPI3	101082	5/7/2019	5/7/2020
LISN	R&S	ENV216	3560.6550.15	7/4/2019	7/3/2020
LISN	AT	AT166-2	AKK1806000003	12/18/2019	12/17/2020
EMI software	EZ	EZ-EMC	N/A	N/A	N/A

Test Equipment Of Radiated Spurious Emissions

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Chamber	SKET	966	N/A	5/8/2018	5/7/2021
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020

Receiver	R&S	ESR7	101199	5/7/2019	5/6/2020
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	7/14/2018	7/13/2020
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	7/14/2018	7/13/2020
Amplifier	SKET	LNPA-0118-45	N/A	7/4/2019	7/3/2020
EMI software	EZ	EZ-EMC	N/A	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2/14/2019	2/13/2020
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

Test Equipment Of Radiated Emissions which fall in the restricted bands

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Chamber	SKET	966	N/A	5/8/2018	5/7/2021
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
Receiver	R&S	ESR7	101199	5/7/2019	5/6/2020
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	7/14/2018	7/13/2020
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	7/14/2018	7/13/2020
Amplifier	SKET	LNPA-0118-45	N/A	7/4/2019	7/3/2020
EMI software	EZ	EZ-EMC	N/A	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2/14/2019	2/13/2020
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A

Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

Test Equipment Of Conducted Band Edges Measurement

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
Spectrum	Agilent	N9020A	MY49100060	12/18/2019	12/17/2020
Signal Generator	Agilent	N5182A	MY49060650	12/18/2019	12/17/2020
Signal Generator	Agilent	E8257D	MY44320250	5/7/2019	5/6/2020

Test Equipment Of Dwell Time

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
Spectrum	Agilent	N9020A	MY49100060	12/18/2019	12/17/2020
Signal Generator	Agilent	N5182A	MY49060650	12/18/2019	12/17/2020
Signal Generator	Agilent	E8257D	MY44320250	5/7/2019	5/6/2020

ANTENNA REQUIREMENT

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	N/A

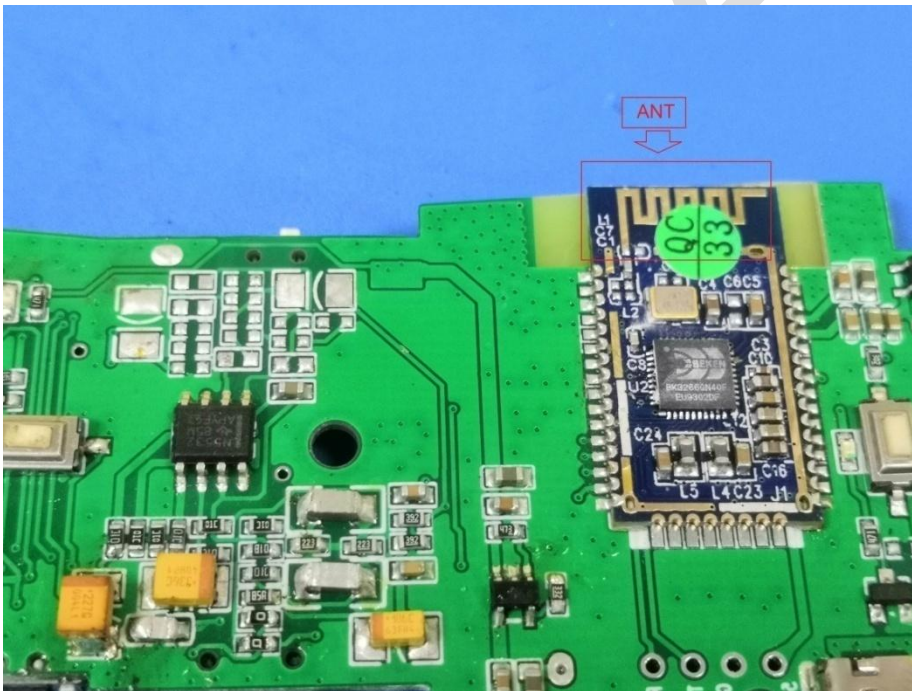
CONCLUSION

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2.0dBi.



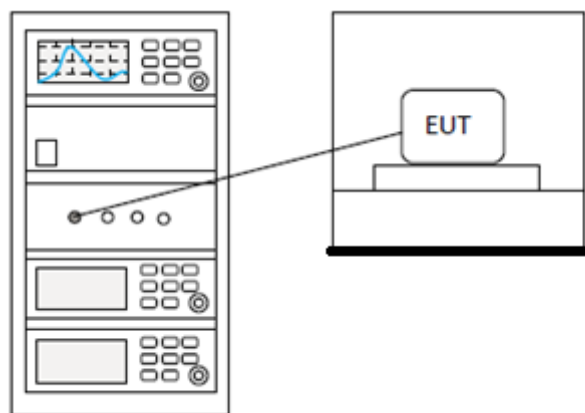
CONDUCTED SPURIOUS EMISSIONS

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.6 & Section 11.11
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	25°C
Humidity	58%

LIMITS

Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
---------------	--

BLOCK DIAGRAM OF TEST SETUP



TEST DATA

Pass: Please Refer To Appendix: Appendix1, Section 10.7

BlueAsia

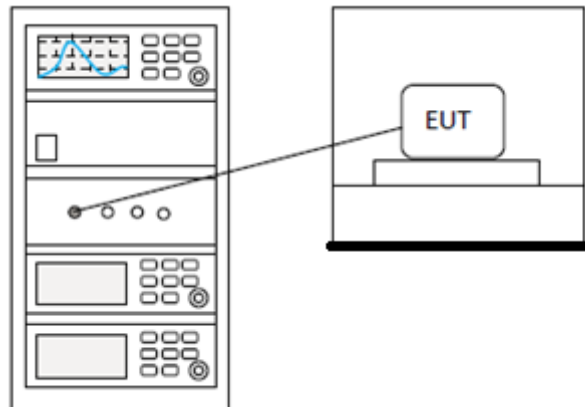
HOPPING CHANNEL NUMBER

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.3
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	25°C
Humidity	60%

LIMITS

Frequency range(MHz)	Number of hopping channels (minimum)
902-928	50 for 20dB bandwidth <250kHz
	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

BLOCK DIAGRAM OF TEST SETUP



TEST DATA

Pass: Please Refer To Appendix: Appendix1, Section 10.5

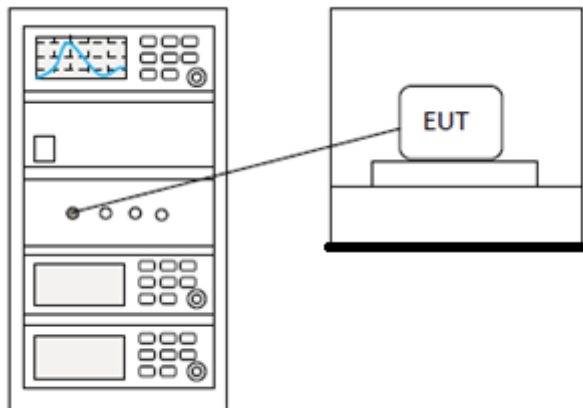
CARRIER FREQUENCIES SEPARATION

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	25°C
Humidity	60%

LIMITS

Limit:	2/3 of the 20dB bandwidth base on the transmission power is less than 0.125W
---------------	--

BLOCK DIAGRAM OF TEST SETUP



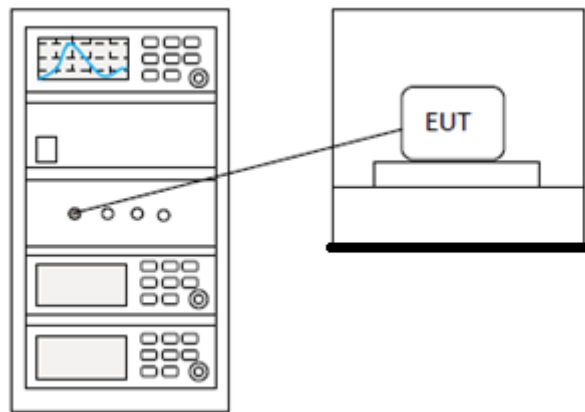
TEST DATA

Pass: Please Refer To Appendix: Appendix1,Section 10.3

20DB BANDWIDTH

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.7
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	25°C
Humidity	60%

BLOCK DIAGRAM OF TEST SETUP



TEST DATA

Pass: Please Refer To Appendix: Appendix1,Section 10.1

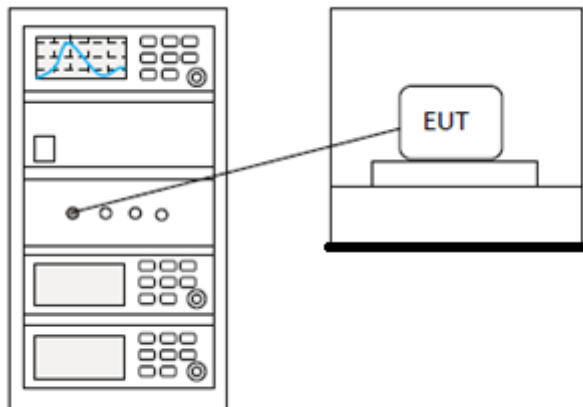
CONDUCTED PEAK OUTPUT POWER

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.5
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	25°C
Humidity	60%

LIMITS

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥ 50 hopping channels
	0.25 for $25 \leq$ hopping channels < 50
	1 for digital modulation
2400-2483.5	1 for ≥ 75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

BLOCK DIAGRAM OF TEST SETUP



TEST DATA

Pass: Please Refer To Appendix: Appendix1,Section 10.2

BlueAsia

CONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ)

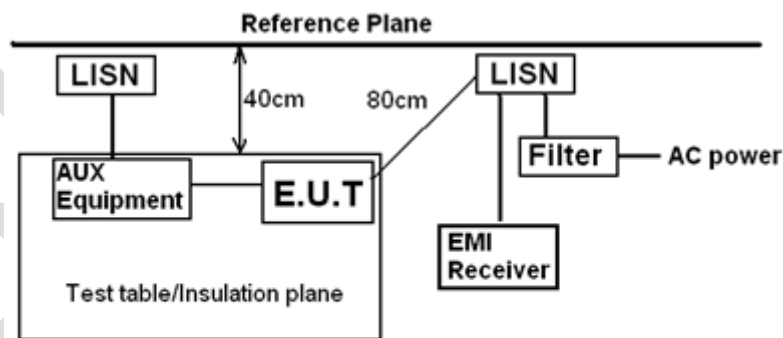
Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 6.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	25°C
Humidity	60%

LIMITS

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

BLOCK DIAGRAM OF TEST SETUP



Remark
E.U.T: Equipment Under Test
LISN: Line Impedance Stabilization Network
Test table height=0.8m

PROCEDURE

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50?H + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power

cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

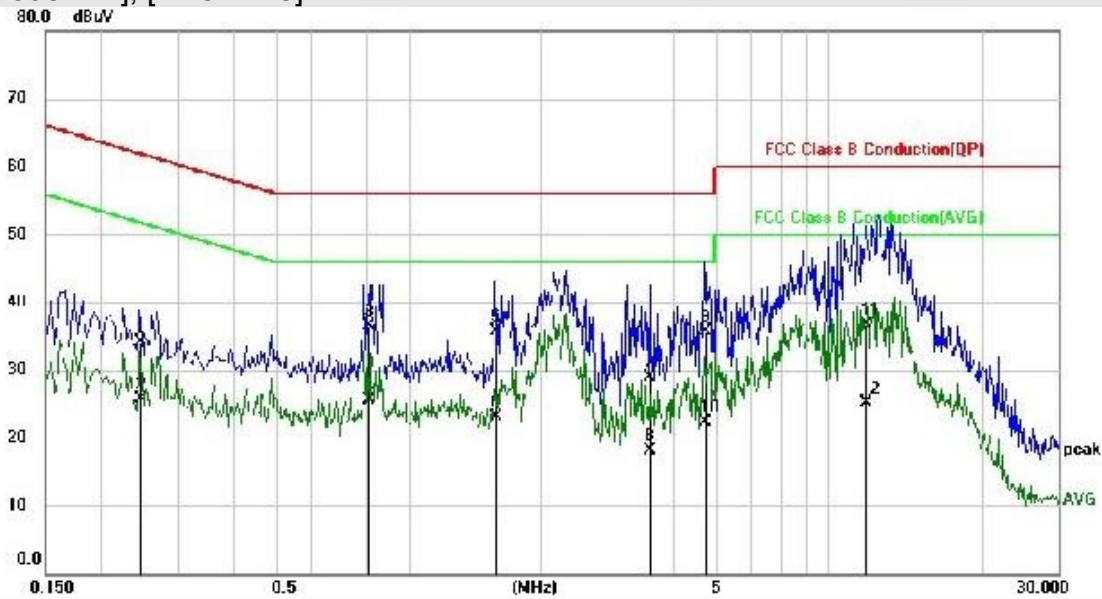
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor

BlueAsia

TEST DATA

[TestMode: TX]; [Line: Line]

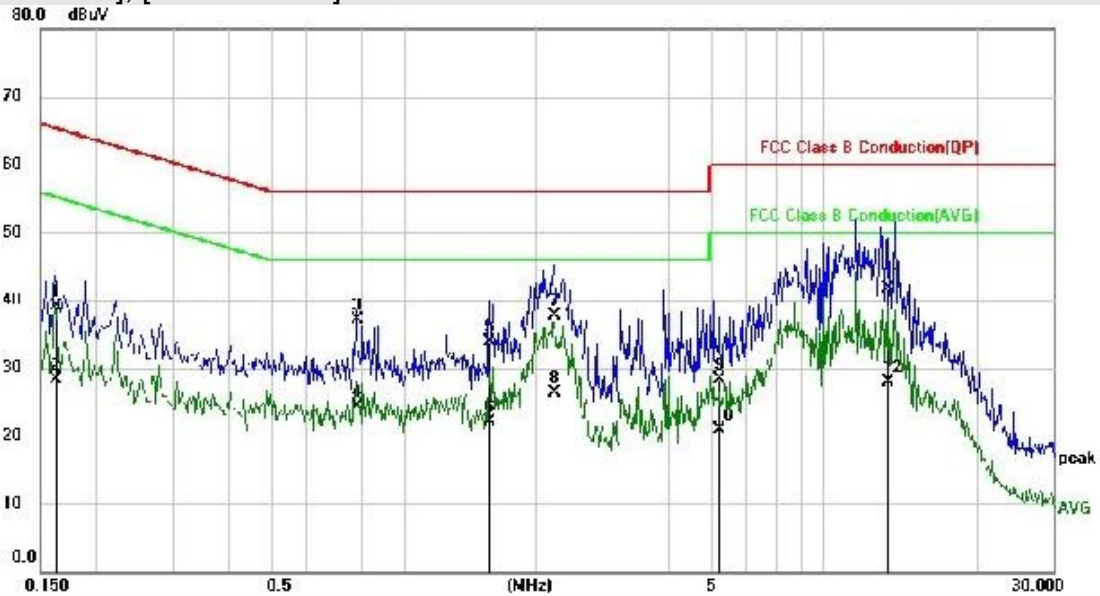


Site: Phase: **L1** Temperature: 26
 Limit: FCC Class B Conduction(QP) Power: AC 120V 60Hz Humidity: 60 %
 EUT: Bluetooth Speakerphone
 M/N: SA-40
 Mode: BT mode
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.2460	24.14	9.94	34.08	61.89	-27.81	QP	
2		0.2460	15.82	9.94	25.76	51.89	-26.13	AVG	
3	*	0.8100	26.88	9.72	36.60	56.00	-19.40	QP	
4		0.8100	15.73	9.72	25.45	46.00	-20.55	AVG	
5		1.5740	25.82	9.84	35.66	56.00	-20.34	QP	
6		1.5740	13.30	9.84	23.14	46.00	-22.86	AVG	
7		3.5420	19.11	9.85	28.96	56.00	-27.04	QP	
8		3.5420	8.33	9.85	18.18	46.00	-27.82	AVG	
9		4.7140	25.74	9.87	35.61	56.00	-20.39	QP	
10		4.7140	12.53	9.87	22.40	46.00	-23.60	AVG	
11		10.9460	26.72	9.94	36.66	60.00	-23.34	QP	
12		10.9460	15.23	9.94	25.17	50.00	-24.83	AVG	

Test Result: Pass

[TestMode: TX]; [Line: Neutral]



Site: _____ Phase: **N** Temperature: 26
 Limit: FCC Class B Conduction(QP) Power: AC 120V 60Hz Humidity: 60 %
 EUT: Bluetooth Speakerphone
 M/N: SA-40
 Mode: BT mode
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1620	29.26	9.87	39.13	65.36	-26.23	QP	
2		0.1620	18.49	9.87	28.36	55.36	-27.00	AVG	
3		0.7860	27.41	9.74	37.15	56.00	-18.85	QP	
4		0.7860	14.52	9.74	24.26	46.00	-21.74	AVG	
5		1.5660	24.14	9.83	33.97	56.00	-22.03	QP	
6		1.5660	12.29	9.83	22.12	46.00	-23.88	AVG	
7	*	2.1980	27.90	9.86	37.76	56.00	-18.24	QP	
8		2.1980	16.44	9.86	26.30	46.00	-19.70	AVG	
9		5.2020	18.39	9.90	28.29	60.00	-31.71	QP	
10		5.2020	11.06	9.90	20.96	50.00	-29.04	AVG	
11		12.5300	31.75	9.98	41.73	60.00	-18.27	QP	
12		12.5300	18.00	9.98	27.98	50.00	-22.02	AVG	

Test Result: Pass

RADIATED SPURIOUS EMISSIONS

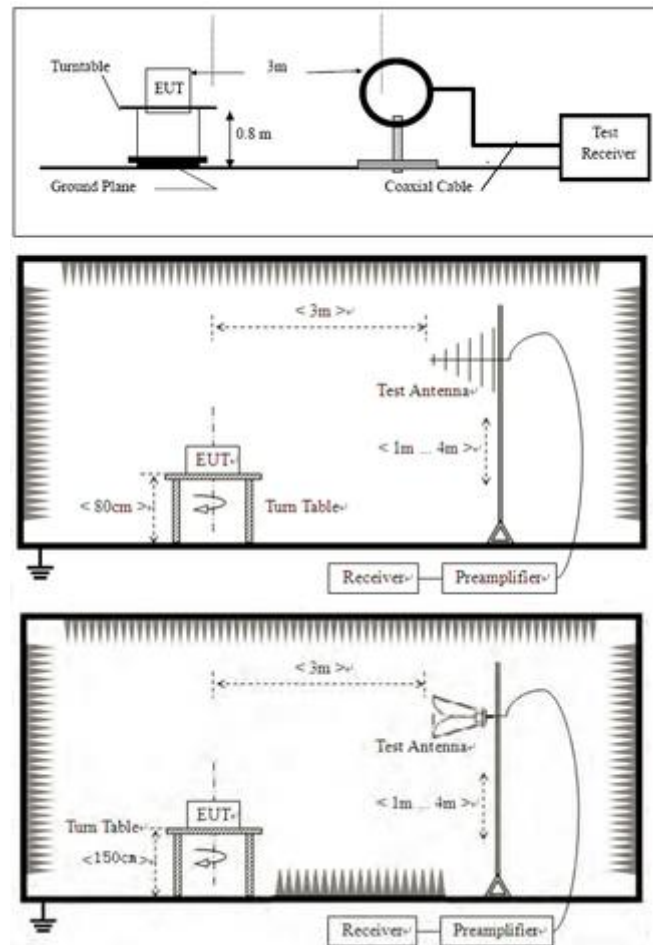
Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 6.4,6.5,6.6
Test Mode (Pre-Scan)	TX mode (above 1GHz);TX mode (below 1GHz)
Test Mode (Final Test)	TX mode (above 1GHz);TX mode (below 1GHz)
Tester	Jozu
Temperature	23℃
Humidity	56%

LIMITS

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

BLOCK DIAGRAM OF TEST SETUP



PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified

and then reported in a data sheet.

- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor + Preamplifier Factor
- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

TEST DATA

[TestMode: 8DPSK (above 1GHz)]

Remark: During the test, pre-scan the GFSK, Pi/4QPSK, 8-DPSK modulation, and found the 8-DPSK modulation which it is worse case.

Test channel:lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	46.47	2.38	48.85	74	-25.15	Vertical
7206.00	45.51	2.17	47.68	74	-26.32	Vertical
9608.00	45.88	2.06	47.94	74	-26.06	Vertical
12010.00	*			74		Vertical
14412.00	*			74		Vertical
4804.00	45.16	2.38	47.54	74	-26.46	Horizontal
7206.00	46.03	2.17	48.2	74	-25.8	Horizontal
9608.00	46.28	2.06	48.34	74	-25.66	Horizontal
12010.00	*			74		Horizontal
14412.00	*			74		Horizontal

Test channel:Middle

Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4882.00	45.94	0.17	46.11	74	-27.89	Vertical
7323.00	46.32	1.43	47.75	74	-26.25	Vertical
9764.00	46.71	1.26	47.97	74	-26.03	Vertical
12205.00	*			74		Vertical
14646.00	*			74		Vertical
4882.00	46.55	0.17	46.72	74	-27.28	Horizontal
7323.00	48.25	1.43	49.68	74	-24.32	Horizontal
9764.00	47.75	1.26	49.01	74	-24.99	Horizontal
12205.00	*			74		Horizontal
14646.00	*			74		Horizontal

Test channel:Highest

Peak value:

Frequency	Read Level	Correct	Level	Limit Line	Over Limit	Polarization
-----------	------------	---------	-------	------------	------------	--------------

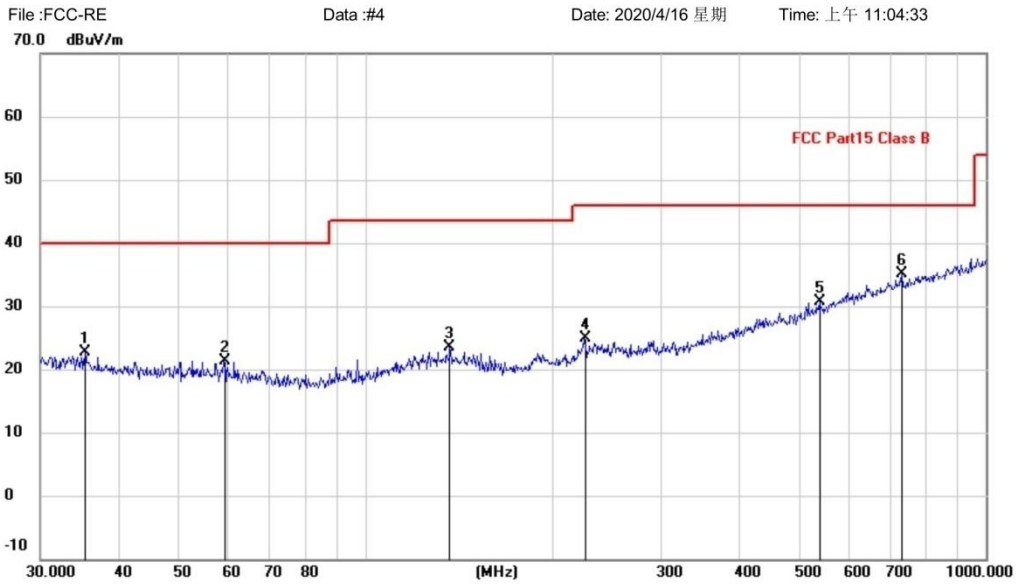
(MHz)	(dBuV)	factor	(dBuV/m)	(dBuV/m)	(dB)	n
4960.00	47.1	1.04	48.14	74	-25.86	Vertical
7440.00	46.83	2.59	49.42	74	-24.58	Vertical
9920.00	45.55	2.74	48.29	74	-25.71	Vertical
12400.00	*			74		Vertical
14880.00	*			74		Vertical
4960.00	47.93	1.04	48.97	74	-25.03	Horizontal
7440.00	46.61	2.59	49.2	74	-24.8	Horizontal
9920.00	45.79	2.74	48.53	74	-25.47	Horizontal
12400.00	*			74		Horizontal
14880.00	*			74		Horizontal

Test Result: Pass

BlueAsia

[TestMode: TX mode (below 1GHz)]; [Polarity: Horizontal]

Radiated Emission Measurement



Site	Polarization: Horizontal	Temperature:
Limit: FCC Part15 Class B	Power: DC3.7V	Humidity: %
EUT: Bluetooth Speakerphone	Distance: 3m	
M/N: SA-40		
Mode: BT mode		
Note:		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		35.3750	-0.52	23.27	22.75	40.00	-17.25	QP		
2		59.2325	-2.10	23.46	21.36	40.00	-18.64	QP		
3		136.9391	0.25	23.21	23.46	43.50	-20.04	QP		
4		225.3080	3.03	21.95	24.98	46.00	-21.02	QP		
5		539.4775	0.86	29.87	30.73	46.00	-15.27	QP		
6	*	731.9203	1.79	33.24	35.03	46.00	-10.97	QP		

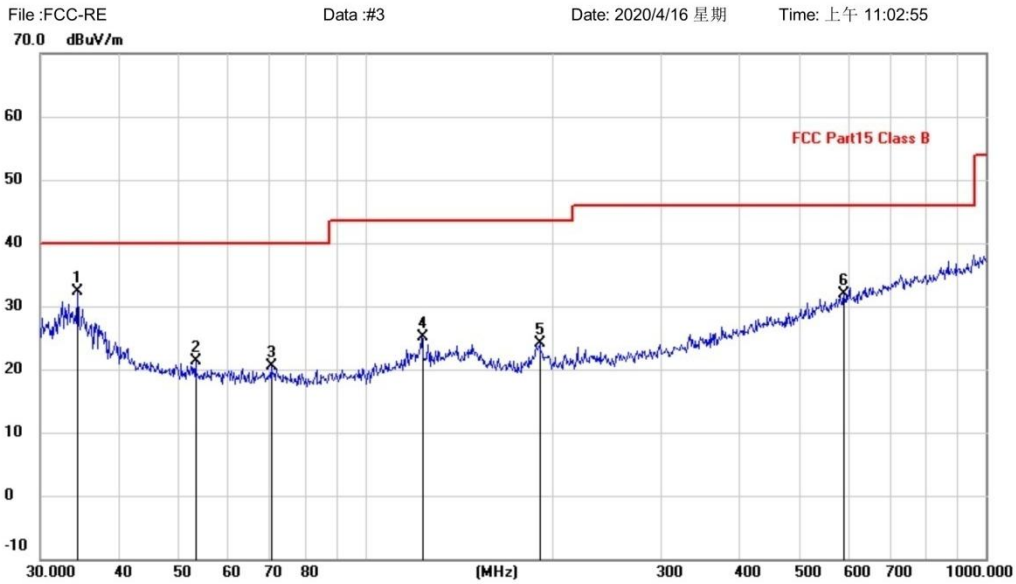
*:Maximum data x:Over limit !:over margin

⟨Reference Only

Test Result: Pass

[TestMode: TX mode (below 1GHz)]; [Polarity: Vertical]

Radiated Emission Measurement



Site	Polarization: Vertical	Temperature:
Limit: FCC Part15 Class B	Power: DC3.7V	Humidity: %
EUT: Bluetooth Speakerphone	Distance: 3m	
M/N: SA-40		
Mode: BT mode		
Note:		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	34.3964	9.17	23.11	32.28	40.00	-7.72	QP		
2		53.3179	-2.88	24.12	21.24	40.00	-18.76	QP		
3		70.5836	-0.56	21.06	20.50	40.00	-19.50	QP		
4		123.2655	2.30	22.79	25.09	43.50	-18.41	QP		
5		191.0738	3.69	20.47	24.16	43.50	-19.34	QP		
6		590.9737	0.80	31.02	31.82	46.00	-14.18	QP		

*:Maximum data x:Over limit !:over margin <Reference Only

Test Result: Pass

RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS

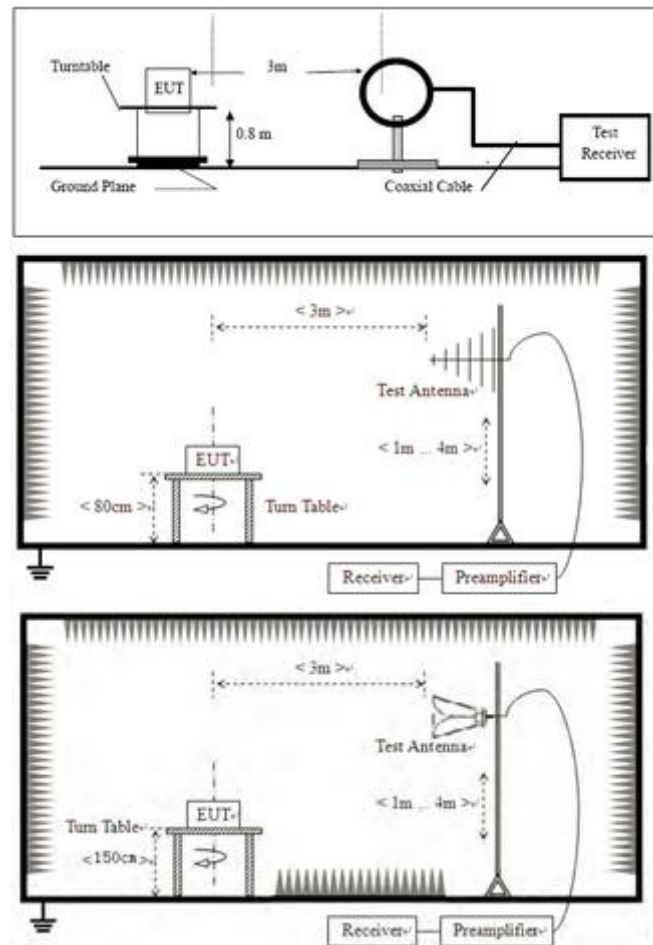
Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 6.10.5
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	24°C
Humidity	56%

LIMITS

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

BLOCK DIAGRAM OF TEST SETUP



PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified

and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark 1: $Level = Read\ Level + Cable\ Loss + Antenna\ Factor - Preamp\ Factor$

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

BlueAsia