FCC Part 15
EMI TEST REPORT

of

E.U.T. : Wireless Audio System
MODEL : INGSPT-1T
FCC ID : SPT-1T
Frequency Range : 2412MHz~2424MHz

for

APPLICANT : JTS Professional Co., Ltd.
ADDRESS : No. 148, Gongye 9th Rd., Dali Dist., Taichung City 41280, Taiwan

Test Performed by

Taiwan Testing and Certification Center
No.34, Dingfu, Linkou Dist., New Taipei City 244, Taiwan (R.O.C.)
TEL : (02)26023052 FAX: (02)26010910

http：// www.etc.org.tw; e-mail：emc@etc.org.tw

Report Number : 21-10-RBF-015-08

TEST REPORT CERTIFICATION

Applicant : JTS Professional Co., Ltd.
No. 148, Gongye 9th Rd., Dali Dist., Taichung City 41280
Taiwan, R.O.C.

Manufacturer : JTS Professional Co., Ltd.
No. 148, Gongye 9th Rd., Dali Dist., Taichung City 41280
Taiwan, R.O.C.

Description of EUT

a) Type of EUT : Wireless Audio System
b) Trade Name : JTS
c) Model No. : SPT-1T
d) Power Supply : Input:100~240VAC~50/60Hz 0.5A max.
e) Frequency Range : 2412MHz~2424MHz
f) Antenna Gain : 3.3 dBi (inverted F ANT)
g) Modulation Type : FSK

Regulation Applied : FCC Rules and Regulations Part 15 Subpart C

I HEREBY CERTIFY THAT: The data shown in this report were made in accordance with the procedures given in ANSI C63.10-2013, and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these data.

Note: 1. The result of the testing report relates only to the item tested.
2. The testing report shall not be reproduced expect in full, without the written approval of ETC.

Summary of Tests

Test	Results
Radiated Emission	**Pass**
Conducted Emission	**Pass**
Band Edge Requirement	**Pass**
Duty Cycle	**Pass**
20dB Bandwidth	**Pass**

Date Test Item Received	:	Oct. 18, 2022
Date Test Campaign Completed	:	Aug. 04, 2022
Date of Issue	:	Aug. 22, 2022

Test Engineer : Brian Huang

(Brian Huang, Engineer)

Approve & Authorized Signer : Kevin Lee

Kevin Lee

Section Manager of EMC Testing Department II

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1 GENERAL INFORMATION

1.1 Product Description

a) Type of EUT : Wireless Audio System
b) Trade Name : JTS
c) Model No. : SPT-1T
d) Power Supply : Input:100~240VAC~50/60Hz 0.5A max.
e) Frequency Range : 2412MHz~2424MHz
f) Antenna Gain : 3.3 dBi (inverted F ANT)
g) Modulation Type : FSK

1.2 Characteristics of Device

Dual-Channel UHF Transmission and True Diversity Reception
With UHF true diversity technology, receiver 36 MHz switching bandwidth and 6 preset groups of up to 1441 selectable channels, the SPT-1R/1T wireless audio system is your perfect partner for mission critical applications.

1.3 Test Methodology

Both conducted and radiated emissions were performed according to the procedures illustrated in ANSI C63.10-2013. Other required measurements were illustrated in separate sections of this test report for details.

Measurement Software

Software	Version	Note
e3	Version 6.100618f	Radiated Emission Test
e3	Version 6.100421	Conducted Emission Test

1.4 Test Facility

Location of the Test site: No.34, Lin 5, Dingfu Vil., Linkou Dist., New Taipei City, Taiwan 24442, R.O.C.
Designation Number: TW2628.

2 PROVISIONS APPLICABLE

2.1 Definition

Unintentional radiator:
A device that intentionally generates and radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

Class A Digital Device:
A digital device which is marketed for use in commercial or business environment; exclusive of a device which is market for use by the general public, or which is intended to be used in the home.

Class B Digital Device :
A digital device which is marketed for use in a residential environment notwithstanding use in a commercial, business of industrial environment. Example of such devices that are marketed for the general public.

Note : A manufacturer may also qualify a device intended to be marketed in a commercial, business, or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, Regardless of its intended use.

Intentional radiator:
A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Requirement for Compliance

(1) Conducted Emission Requirement

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50MH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency MHz	Quasi Peak dBμV	Average dBμV
0.15 - 0.5	66-56	56-46
0.5 - 5.0	56	46
5.0 - 30.0	60	50

(2) Radiated Emission Requirement

For unintentional device, according to §15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency MHz	**Distance Meters**	**Radiated dBμV/m**	**Radiated μV/m**
30 - 88	3	40.0	100
88 - 216	3	43.5	150
216 - 960	3	46.0	200
Above 960	3	54.0	500

For intentional device, according to §15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

For intentional radiator device, per §15.249(a), the field strength of emissions shall comply with the following :

Frequency	**Distance**	**Fundamental**		**Harmonic**	
MHz	**Meters**	**dBμV/m**	**mV/m**	**dBμV/m**	**μV/m**
902 - 928	3	94	50	54	500
2400 - 2483.5	3	94	50	54	500
5725 - 5875	3	94	50	54	500
24000 - 24250	3	108	250	68	2500

In accordance with §15.249(e), limits shown in above table are based on average limits for frequencies above 1000 MHz, and frequencies below 1000 MHz are based on quasi peak. However, the peak field strength of any emission shall not exceed the maximum permitted average limits by more than 20 dB.

(3) Spurious in Out Band Requirement

For intentional device, according to §15.249 (d), emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of fundamental or to the general radiated emission limits in §15.209.

(4) Antenna Requirement

For intentional device, according to §15.203, 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.

2.3 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.25
0.495 - 0.505 **	16.69475 - 16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425 - 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475 - 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3360-4400	Above 38.6
13.36-13.41			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2.4 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual.

The Federal Communications Commission Radio Frequency Interference Statement includes the following paragraph.

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio / TV technician for help.

2.6 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated fortests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Uncertainty
Conducted emissions	9kHz ~ 30MHz	±2.26dB (Mains)(LISN)
Radiated emissions	9kHz ~ 30MHz	±4.22dB
Radiated emissions / Effective Radiated Power (3m RF Chamber)	30MHz ~ 1GHz	±4.2dB (30MHz≦f≦300MHz)
		±4.44dB (300MHz＜f≦1GHz)
	Above 1GHz	±4.44dB (1GHz≦f≦18GHz)
		±3.02dB (18GHz≦f≦40GHz)
Conducted Measurement	9kHz ~ 40GHz	±0.88dB (9kHz≦f≦30MHz)
		±0.88dB (30MHz＜f≦1GHz)
		±1.04dB (1GHz≦f≦18GHz)
		±1.2dB (18GHz≦f≦40GHz)
Occupied Bandwidth	9kHz ~ 40GHz	±5%

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
The test result(s) does not consider the uncertainty of measurement when the test standard(s) and/or test method which refer by the labs has the limit or judgments for the test result(s).

3. SYSTEM TEST CONFIGURATION

3.1 Justification

For both radiated and conducted emissions, the system was configured for testing in a typical fashion as a customer would normally use it. The peripherals other than EUT were connected in normally standing by situation.

All measurement were intentional to maximum the emissions from EUT by varying the connection cables(if applicable), therefore, the test result is sure to meet the applicable requirement.

3.2 Devices for Tested System

Device	Manufacture	Model/FCC ID	Description
Wireless Audio System *	JTS Professional Co., Ltd.	SPT-1T / INGSPT-1T	1.8m unshielded AC power cord

Remark "*" means equipment under test.

4 RADIATED EMISSION MEASUREMENT

4.1 Applicable Standard

For intentional radiators, according to §15.249 (a), the fundamental field strength shall not exceed 94 dBμV/m and the harmonics shall not exceed 54 dBμV/m. For out band emission except for harmonics shall be comply with §15.209 or at least attenuated by 50 dB below the level of the fundamental.

4.2 Measurement Procedure

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively.

2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.

3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.

4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 ° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.

5. Repeat step 4 until all frequencies need to be measured were complete.

6. Repeat step 5 with search antenna in vertical polarized orientations.

7. Check the three frequencies of highest emission with varying the placement of cables associated with EUT to obtain the worse case and record the result.

Figure 1 : Frequencies measured below 1 GHz configuration

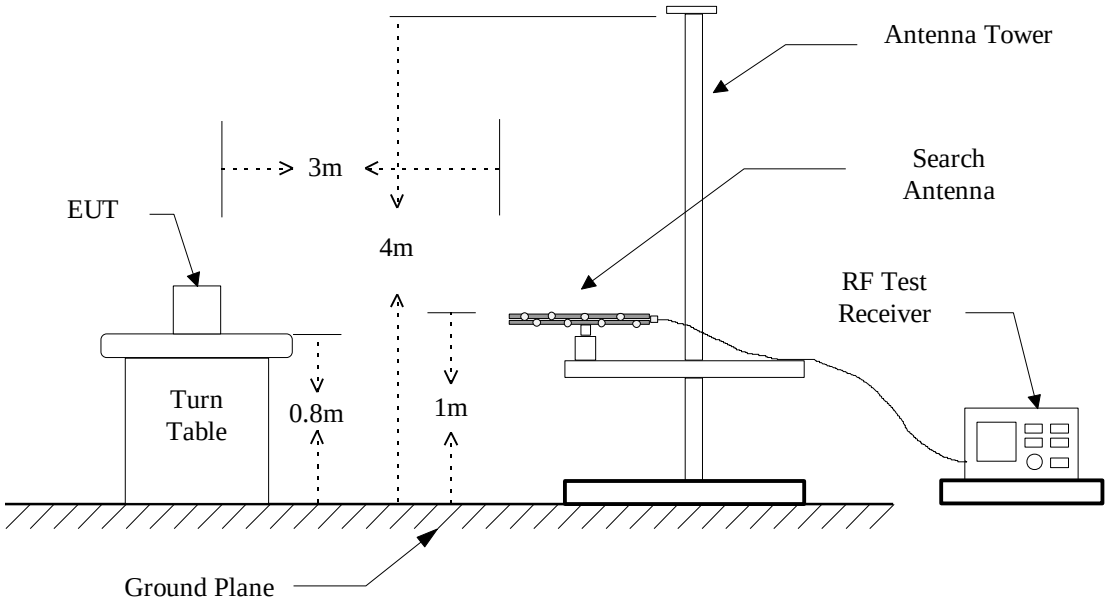
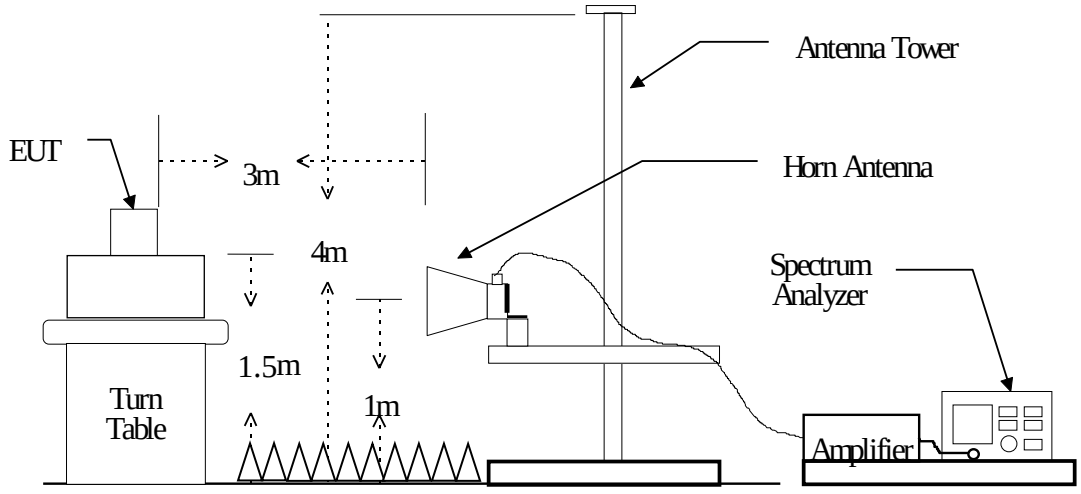


Figure 2 : Frequencies measured above 1 GHz configuration



4.3 Measuring Instrument

The following instrument are used for radiated emissions measurement:

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESU 40	2021/03/25	2022/03/24
Bi-Log Antenna (30MHz-1GHz)	ETC	MCTD 2786	2021/09/10	2022/09/09
Horn Antenna (1GHz-18GHz)	EMCO	3115	2021/11/25	2022/11/24
Horn Antenna (18GHz-40GHz)	EMCO	3116	2021/08/27	2022/08/26
Amplifier (100kHz-1.3GHz)	HP	8447D	2022/01/17	2023/01/16
Amplifier (1GHz-40GHz)	HP	83051A	2021/09/09	2022/09/08

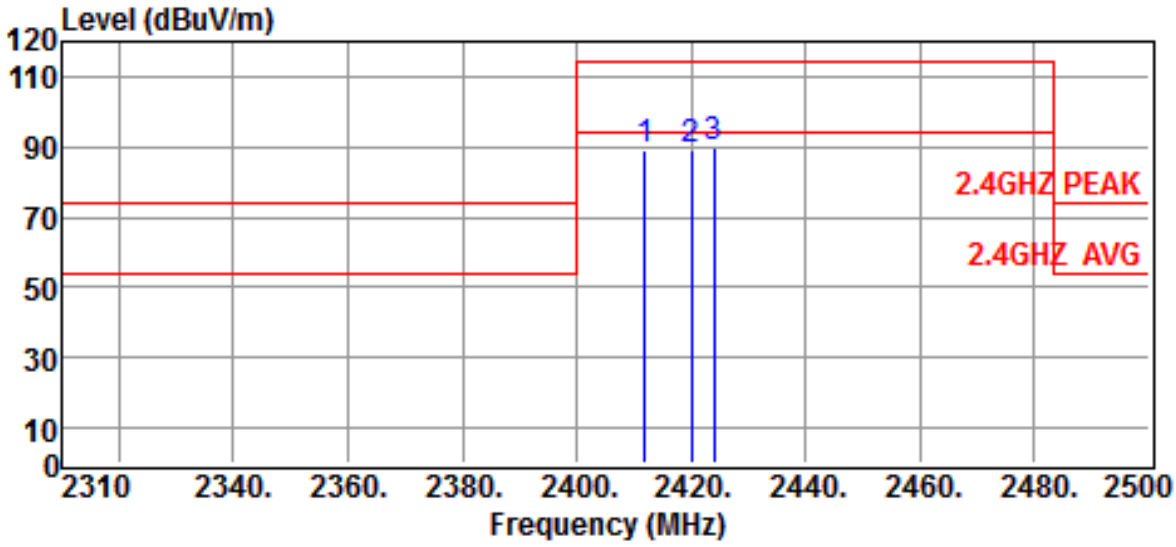
Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi-Peak	120 kHz	N/A
	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz
	Spectrum Analyzer	Average	1 MHz	10 Hz or ≥ 1/T (Note 1)

Note 1:
VBW = 10 Hz, when the duty cycle is no less than 98%.
VBW ≥ 1/T, when duty cycle is less than 98% where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

4.4 Radiated Emission Data

4.4.1 RF Portion

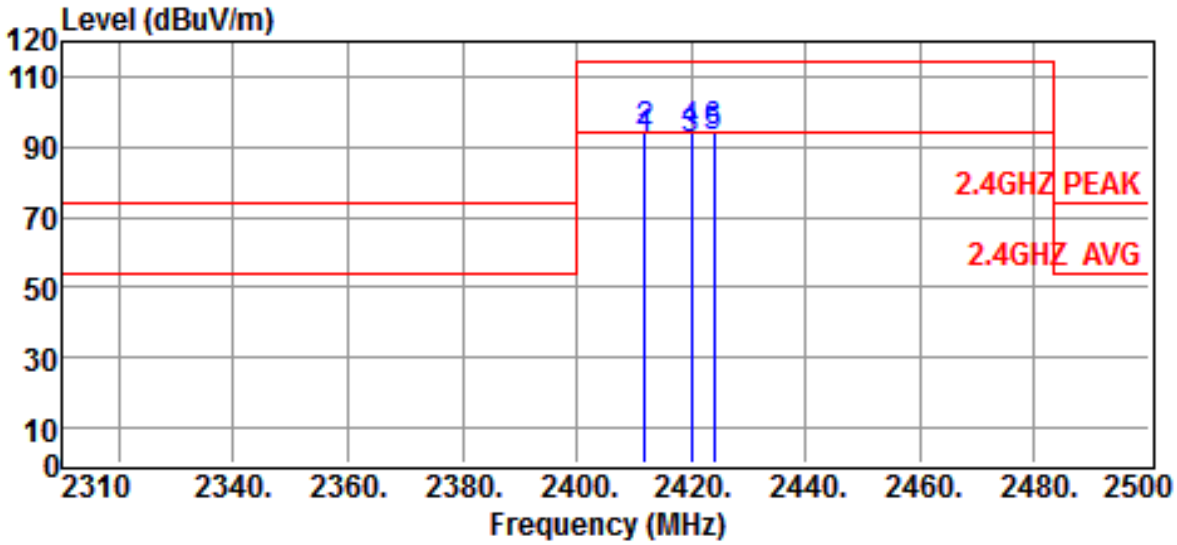


Site	:Chamber#2	Date	:2022-04-23
Limit	:2.4GHZ PEAK	Ant. Pol.	:HORIZONTAL
EUT	:Wireless Audio System	Model	:SPT-1T
Power Rating	:120Vac60Hz	Temp.	:22°C
Engineer	:Brian Huang	Humi.	:70 %
Test Mode	:TX Mode		

	Freq MHz	Reading dBuV	Correction Factor dB/m	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
	2412.0000	88.65	0.12	88.77	114.00	-25.23	Peak
	2420.0000	88.93	0.16	89.09	114.00	-24.91	Peak
*	2424.0000	89.46	0.18	89.64	114.00	-24.36	Peak

Note :

1. Result = Reading + Correction Factor
2. Average Result = Peak Result + Duty Factor ( )
3. Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
4. The margin value=Limit - Result
5. Above 1Ghz : Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.
6. ” * ” mean this data is the worst emission level.

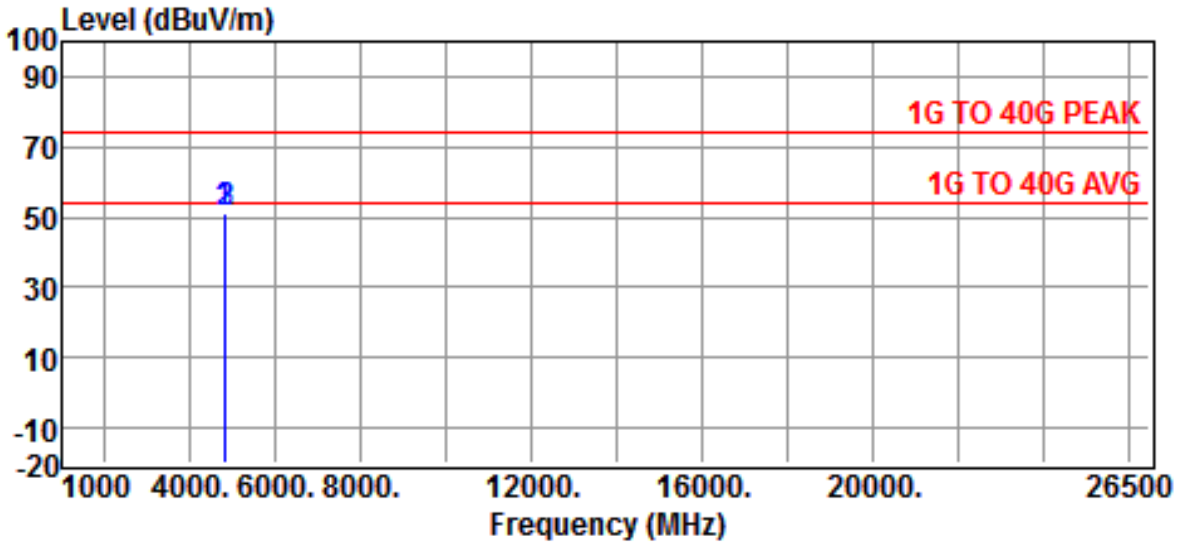


Site	:Chamber#2	Date	:2022-04-23
Limit	:2.4GHZ PEAK	Ant. Pol.	:VERTICAL
EUT	:Wireless Audio System	Model	:SPT-1T
Power Rating	:120Vac60Hz	Temp.	:22°C
Engineer	:Brian Huang	Humi.	:70 %
Test Mode	:TX Mode		

	Freq MHz	Reading dBuV	Correction Factor dB/m	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
	2412.0000	91.81	0.12	91.93	94.00	-2.07	Average
	2412.0000	93.72	0.12	93.84	114.00	-20.16	Peak
	2420.0000	91.82	0.16	91.98	94.00	-2.02	Average
	2420.0000	93.66	0.16	93.82	114.00	-20.18	Peak
*	2424.0000	92.24	0.18	92.42	94.00	-1.58	Average
	2424.0000	94.07	0.18	94.25	114.00	-19.75	Peak

Note :

1. Result = Reading + Correction Factor
2. Average Result = Peak Result + Duty Factor ( )
3. Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
4. The margin value=Limit - Result
5. Above 1Ghz : Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.
6. ” * ” mean this data is the worst emission level.

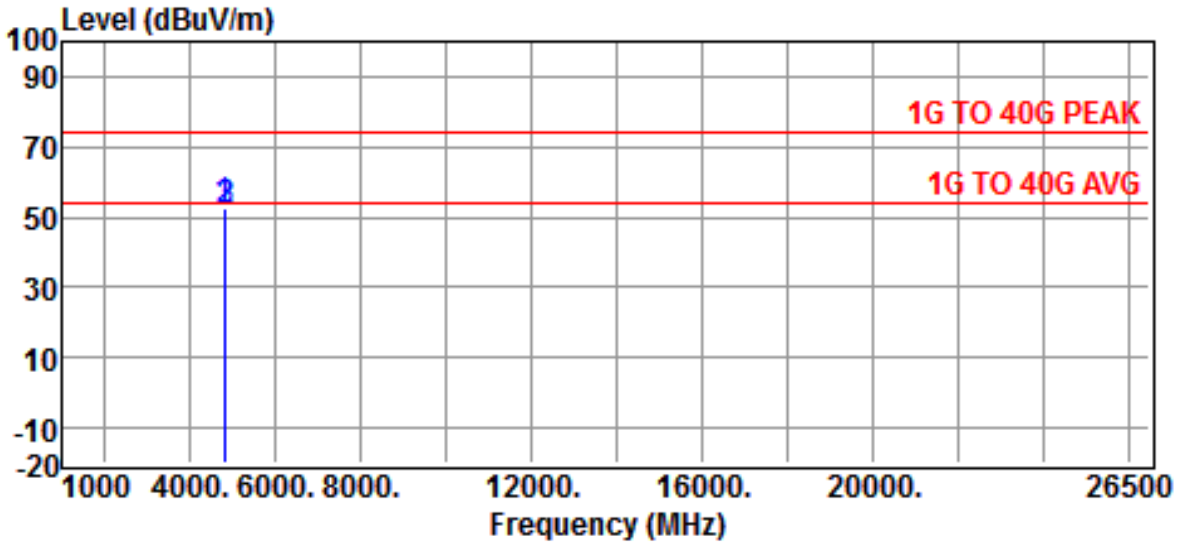


Site	:Chamber#2	Date	:2022-04-23
Limit	:1G TO 40G PEAK	Ant. Pol.	:HORIZONTAL
EUT	:Wireless Audio System	Model	:SPT-1T
Power Rating	:120Vac60Hz	Temp.	:22°C
Engineer	:Brian Huang	Humi.	:70 %
Test Mode	:TX Mode		

	Freq MHz	Reading dBuV	Correction Factor dB/m	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
	4824.0000	46.00	5.24	51.24	74.00	-22.76	Peak
	4840.0000	45.80	5.26	51.06	74.00	-22.94	Peak
*	4848.0000	46.01	5.27	51.28	74.00	-22.72	Peak

Note :

1. Result = Reading + Correction Factor
2. Average Result = Peak Result + Duty Factor ( )
3. Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
4. The margin value=Limit - Result
5. Above 1Ghz : Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.
6. ” * ” mean this data is the worst emission level.



Site	:Chamber#2	Date	:2022-04-23
Limit	:1G TO 40G PEAK	Ant. Pol.	:VERTICAL
EUT	:Wireless Audio System	Model	:SPT-1T
Power Rating	:120Vac60Hz	Temp.	:22°C
Engineer	:Brian Huang	Humi.	:70 %
Test Mode	:TX Mode		

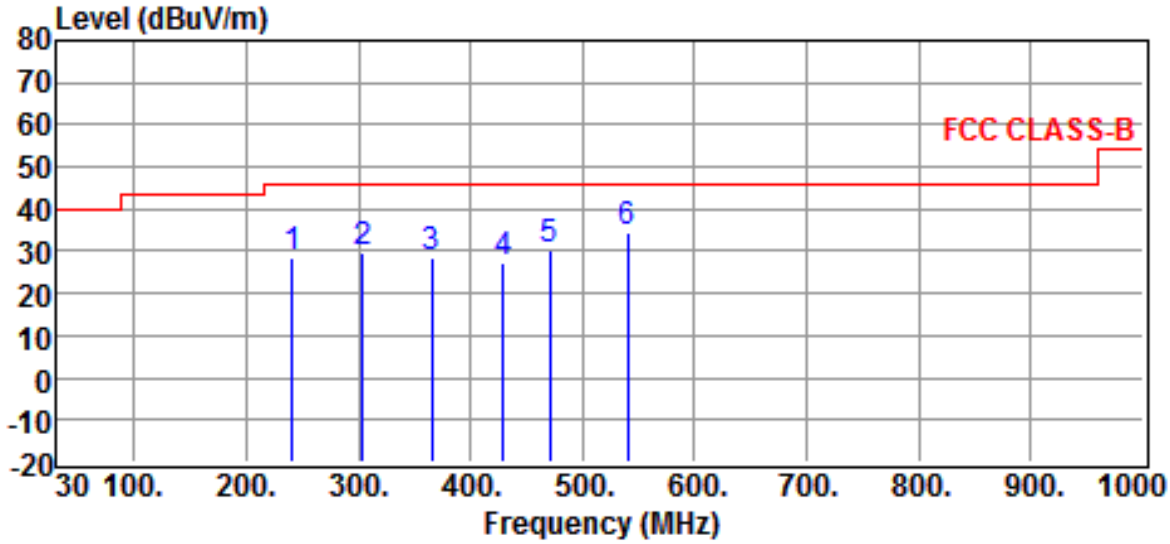
	Freq MHz	Reading dBuV	Correction Factor dB/m	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
*	4824.0000	46.98	5.24	52.22	74.00	-21.78	Peak
	4840.0000	46.58	5.26	51.84	74.00	-22.16	Peak
	4848.0000	46.74	5.27	52.01	74.00	-21.99	Peak

Note :

1. Result = Reading + Correction Factor
2. Average Result = Peak Result + Duty Factor ( )
3. Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
4. The margin value=Limit - Result
5. Above 1Ghz : Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.
6. ” * ” mean this data is the worst emission level.

4.4.2 Other Emissions

a) Emission frequencies below 1 GHz

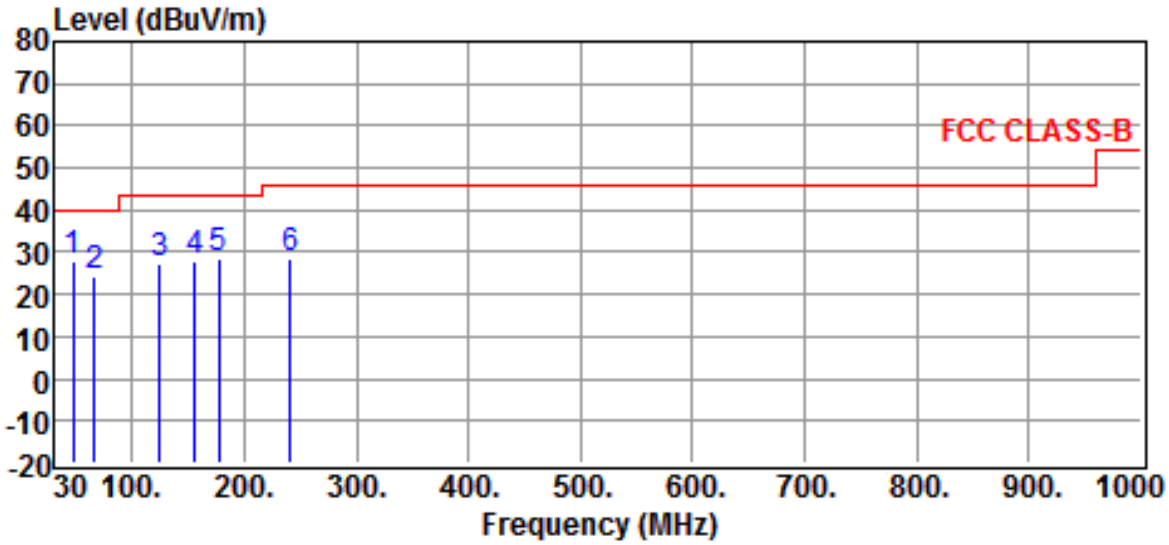


Site	:OPEN SITE	Date	:2022-08-03
Limit	:FCC CLASS-B	Ant. Pol.	:HORIZONTAL
EUT	:Wireless Audio System	Model	:SPT-1T
Power Rating	:120Vac60Hz	Temp.	:22°C
Engineer	:Brian Huang	Humi.	:60 %
Test Mode	:TX Mode		

	Freq MHz	Reading dBuV	Correction Factor dB/m	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
	241.4600	37.01	-8.33	28.68	46.00	-17.32	QP
	303.5400	34.59	-4.89	29.70	46.00	-16.30	QP
	365.6200	32.65	-3.91	28.74	46.00	-17.26	QP
	429.6400	30.29	-2.89	27.40	46.00	-18.60	QP
	470.3800	32.89	-2.33	30.56	46.00	-15.44	QP
*	540.2200	35.80	-1.28	34.52	46.00	-11.48	QP

Note :

1. Result = Reading + Correction Factor
2. Average Result = Peak Result + Duty Factor ( )
3. Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
4. The margin value=Limit - Result
5. Above 1Ghz : Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.
6. ” * ” mean this data is the worst emission level.



Site	:OPEN SITE	Date	:2022-08-03
Limit	:FCC CLASS-B	Ant. Pol.	:VERTICAL
EUT	:Wireless Audio System	Model	:SPT-1T
Power Rating	:120Vac60Hz	Temp.	:22°C
Engineer	:Brian Huang	Humi.	:60 %
Test Mode	:TX Mode		

	Freq MHz	Reading dBuV	Correction Factor dB/m	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
*	47.4600	39.59	-11.42	28.17	40.00	-11.83	QP
	66.8600	40.38	-16.09	24.29	40.00	-15.71	QP
	125.0600	36.66	-9.43	27.23	43.50	-16.27	QP
	156.1000	37.11	-9.32	27.79	43.50	-15.71	QP
	177.4400	39.39	-10.64	28.75	43.50	-14.75	QP
	241.4600	36.75	-8.33	28.42	46.00	-17.58	QP

Note :

1. Result = Reading + Correction Factor
2. Average Result = Peak Result + Duty Factor ( )
3. Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
4. The margin value=Limit - Result
5. Above 1Ghz : Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.
6. ” * ” mean this data is the worst emission level.

b) Emission frequencies above 1 GHz

Radiated emission frequencies above 1 GHz to 26.5 GHz were too low to be measured with a pre-amplifier of 35 dB.

c) Emission frequencies below 30MHz (9kHz - 30MHz)

According to exploratory test no any obvious emission were detected from 9kHz to 30MHz.

4.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, High Pass Filter Loss(if used) and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

where Corrected Factor

= Antenna FACTOR + Cable Loss + High Pass Filter Loss - Amplifier Gain

5 CONDUCTED EMISSION MEASUREMENT

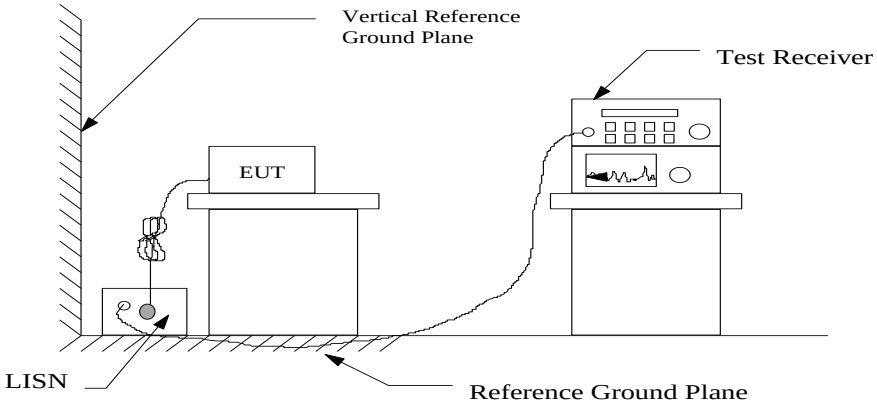
5.1 Standard Applicable

For unintentional and intentional device, Line Conducted Emission Limits are in accordance to §15.107(a) and §15.207(a) respectively. Both Limits are identical specification.

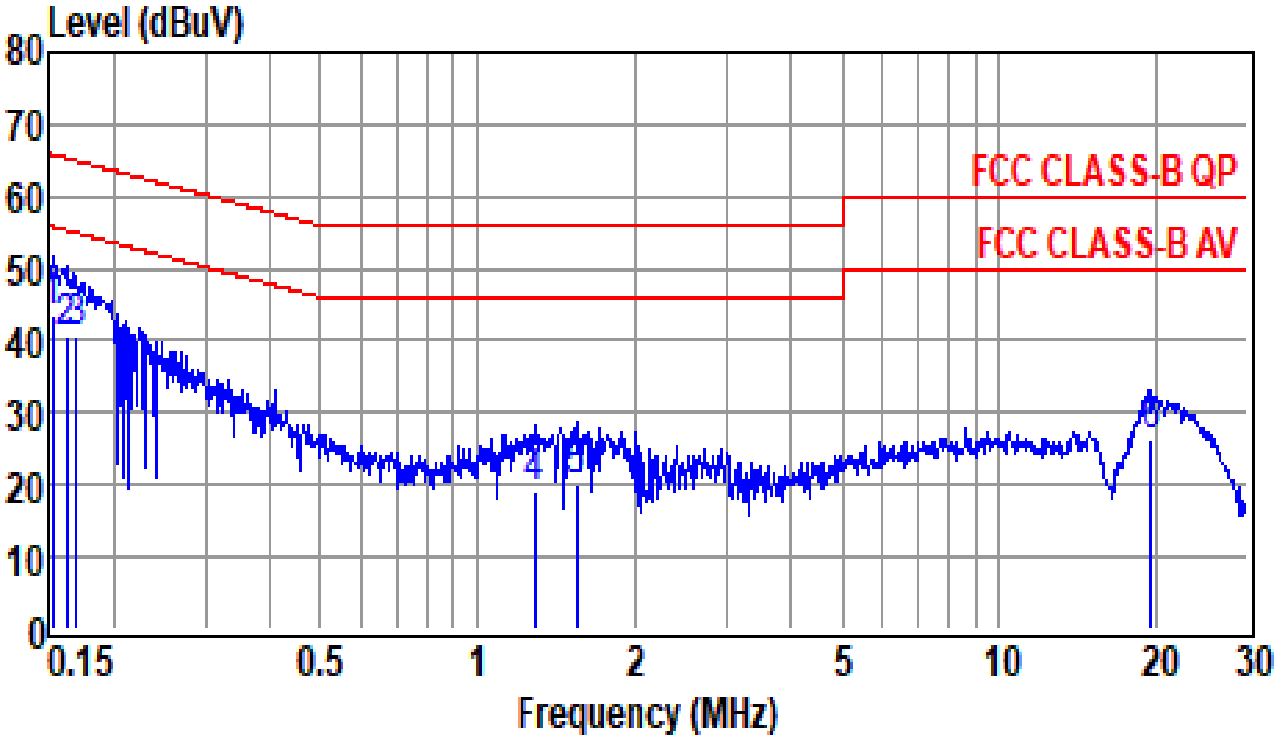
5.2 Measurement Procedure

1. Setup the configuration per figure 3.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 6 or 8 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then record the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest three emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

Figure 3 : Conducted emissions measurement configuration



5.3 Conducted Emission Data



Site	: conducted #1	Date	: 2022-08-03
Condition	: FCC CLASS-B QP	LISN	: NEUTRAL
Tem / Hum	: 24 ℃ / 60%	Test Mode	: TX mode
EUT	:Wireless Audio System	Power Rating	:

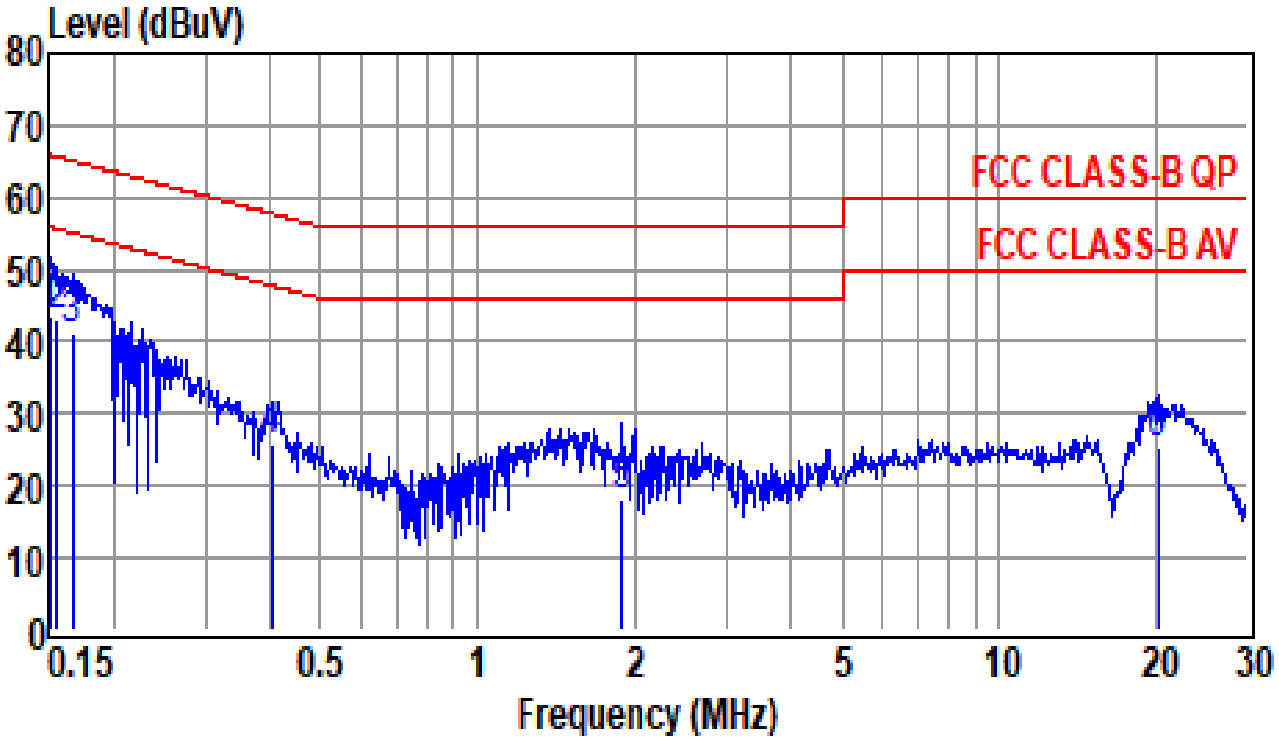
120Vac60Hz

Engineer	: Brian Huang	Model	: SPT-1T

	Freq (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Remark
*	0.1532	33.30	10.14	43.44	65.82	-22.38	QP
	0.1633	30.73	10.13	40.86	65.30	-24.44	QP
	0.1703	30.55	10.13	40.68	64.94	-24.26	QP
	1.2890	8.77	10.19	18.96	56.00	-37.04	QP
	1.5440	9.70	10.20	19.90	56.00	-36.10	QP
	19.6350	16.16	10.43	26.59	60.00	-33.41	QP

Note :

1. Result = Reading + Factor
2. Factor = LISN Factor + Cable Loss+ Pulse Limiter Factor
3. ” * ” mean this data is the worst emission level



Site	: conducted #1	Date	: 2022-08-03
Condition	: FCC CLASS-B QP	LISN	: LINE
Tem / Hum	: 24 ℃ / 60%	Test Mode	: TX mode
EUT	:Wireless Audio System	Power Rating	:

120Vac60Hz

Engineer	: Brian Huang	Model	: SPT-1T

	Freq (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Remark
*	0.1516	33.66	10.13	43.79	65.91	-22.12	QP
	0.1565	32.76	10.13	42.89	65.65	-22.76	QP
	0.1668	31.01	10.12	41.13	65.12	-23.99	QP
	0.4040	15.67	10.10	25.77	57.77	-32.00	QP
	1.8980	7.88	10.18	18.06	56.00	-37.94	QP
	20.2700	15.20	10.39	25.59	60.00	-34.41	QP

Note :

1. Result = Reading + Factor
2. Factor = LISN Factor + Cable Loss+ Pulse Limiter Factor
3. ” * ” mean this data is the worst emission level

5.4 Result Data Calculation

The result data is calculated by adding the LISN Factor to the measured reading. The basic equation with a sample calculation is as follows:

RESULT = READING + LISN FACTOR

Assume a receiver reading of 22.5 dBμV is obtained, and LISN Factor is 0.1 dB, then the total of disturbance voltage is 22.6 dBμV.

RESULT = 22.5 + 0.1 = 22.6 dBμV
Level in μV = Common Antilogarithm[(22.6 dBμV)/20]
= 13.48 μV

5.5 Conducted Measurement Equipment

The following test equipment are used during the conducted test.

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESCI	2021/10/18	2022/10/17
LISN	Schwarzbeck	NSLK 8127 PLC	2022/02/27	2023/02/26
LISN	Schwarzbeck	VTSD 9561 F-N	2022/04/13	2023/04/12

6 ANTENNA REQUIREMENT

6.1 Standard Applicable

According to §15.203, 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.

6.2 Antenna Construction

The device is equipped with the permanently attached on-board PCB antenna. No consideration of replacement. Please refer to the construction Photo for details.

7 BAND EDGES MEASUREMENT

7.1 Standard Applicable

According to 15.249(d), out band emission except for harmonics shall be comply with §15.209 or at least attenuated by 50 dB below the level of the fundamental.

7.2 Measurement Procedure

A) 50 dB attenuation method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
4. Repeat above procedures until all measured frequencies were complete.

B) Radiated Emission method

1. Following the measurement procedures in section 4.2 with the EUT set to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
2. Measure the highest amplitude appearing on spectral displayed.
3. Repeat above procedures until all measured frequencies were complete.

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi-Peak	120 kHz	N/A
	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz
	Spectrum Analyzer	Average	1 MHz	10 Hz or ≥ 1/T (Note 1)

Note 1:
VBW = 10 Hz, when the duty cycle is no less than 98%.
VBW ≥ 1/T, when duty cycle is less than 98% where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

7.3 Measurement Equipment

A) 50 dB attenuation method

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESU 40	2022/04/21	2023/04/20

B) Radiated Emission method

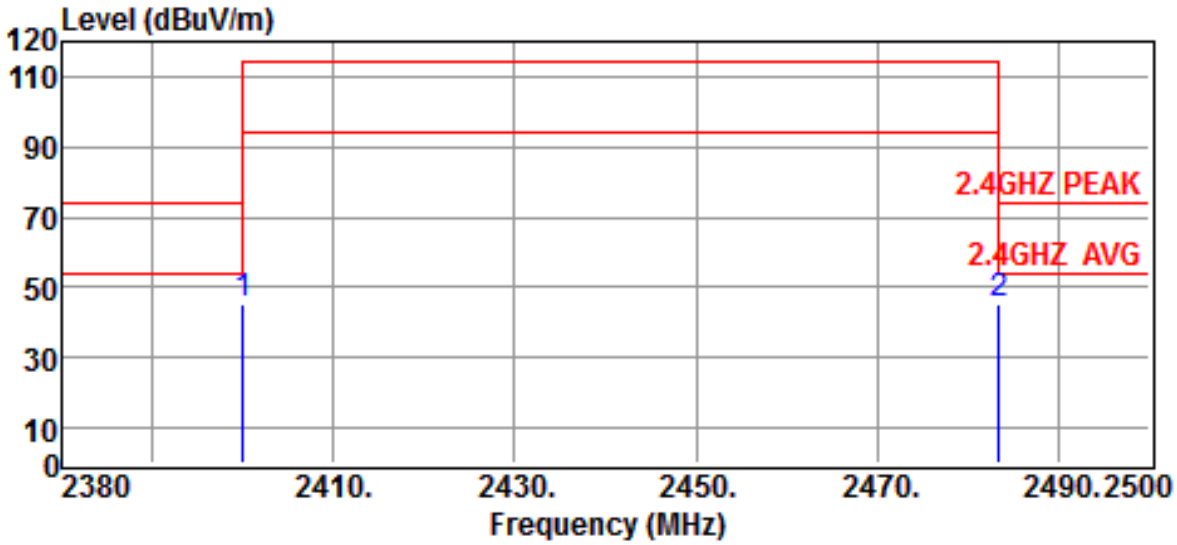
Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESU 40	2022/04/21	2023/04/20
Bi-Log Antenna	ETC	MCTD 2786	2021/09/10	2022/09/09
Horn Antenna	EMCO	3115	2021/11/25	2022/11/24
Horn Antenna	EMCO	3116	2021/08/27	2022/08/26
Amplifier	HP	8447D	2022/01/17	2023/01/16
Amplifier	HP	83051A	2021/09/09	2022/09/08

7.4 Measurement Data

Test Result: (Radiated Emission method)

The radiated emission test results of the lower and the upper band edges were comply with §15.209. Please refer to the following pages for test results.

Radiated Emission Test Results of the Band Edges

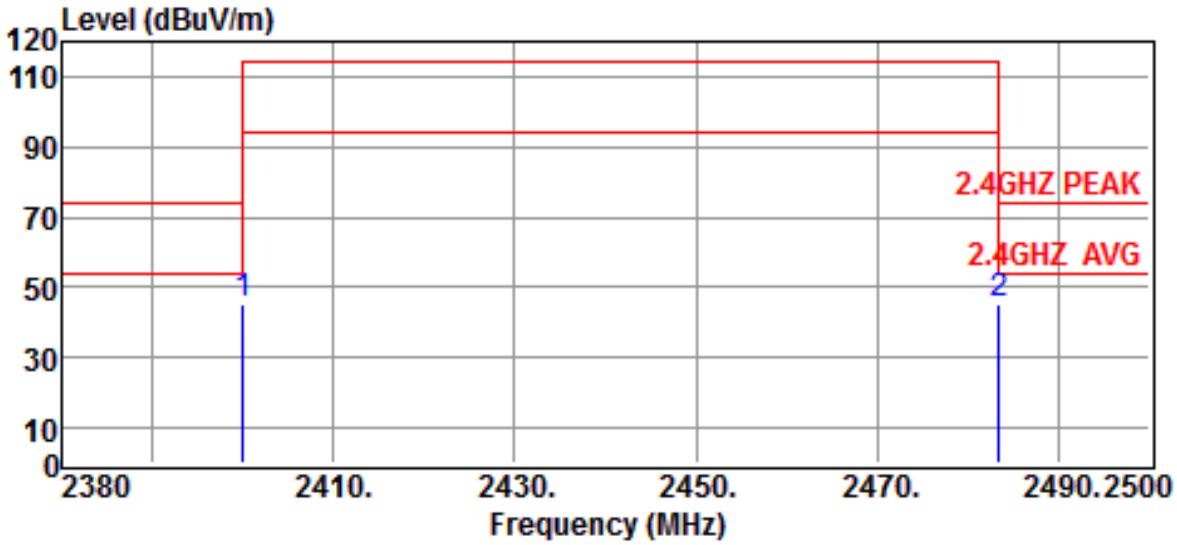


Site	:Chamber#2	Date	:2022-04-23
Limit	:2.4GHZ PEAK	Ant. Pol.	:HORIZONTAL
EUT	:Wireless Audio System	Model	:SPT-1T
Power Rating	:120Vac60Hz	Temp.	:22°C
Engineer	:Brian Huang	Humi.	:70 %
Test Mode	:TX Mode		

	Freq MHz	Reading dBuV	Correction Factor dB/m	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
*	2400.0000	45.48	0.05	45.53	74.00	-28.47	Peak
	2483.5000	45.17	0.30	45.47	74.00	-28.53	Peak

Note :

1. Result = Reading + Correction Factor
2. Average Result = Peak Result + Duty Factor ( )
3. Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
4. The margin value=Limit - Result
5. Above 1Ghz : Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.
6. ” * ” mean this data is the worst emission level.



Site	:Chamber#2	Date	:2022-04-23
Limit	:2.4GHZ PEAK	Ant. Pol.	:VERTICAL
EUT	:Wireless Audio System	Model	:SPT-1T
Power Rating	:120Vac60Hz	Temp.	:22°C
Engineer	:Brian Huang	Humi.	:70 %
Test Mode	:TX Mode		

	Freq MHz	Reading dBuV	Correction Factor dB/m	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
*	2400.0000	45.55	0.05	45.60	74.00	-28.40	Peak
	2483.5000	44.66	0.30	44.96	74.00	-29.04	Peak

Note :

1. Result = Reading + Correction Factor
2. Average Result = Peak Result + Duty Factor ( )
3. Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
4. The margin value=Limit - Result
5. Above 1Ghz : Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.
6. ” * ” mean this data is the worst emission level.

8. DYTY CYCLE

8.1 Standard Applicable

None. Reference only.

8.2 Measurement Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP 40	2022/06/22	2023/06/21

8.3 Measurement Data

Test Date : 2022-04-18 Temperature : 24 °C Humidity : 65 %

Duty Cycle Calculation

Period = 29.8ms
Transmission duration (T) = 29ms
Duty Cycle (%) = (29 / 29.8) * 100 % = 97.3 %

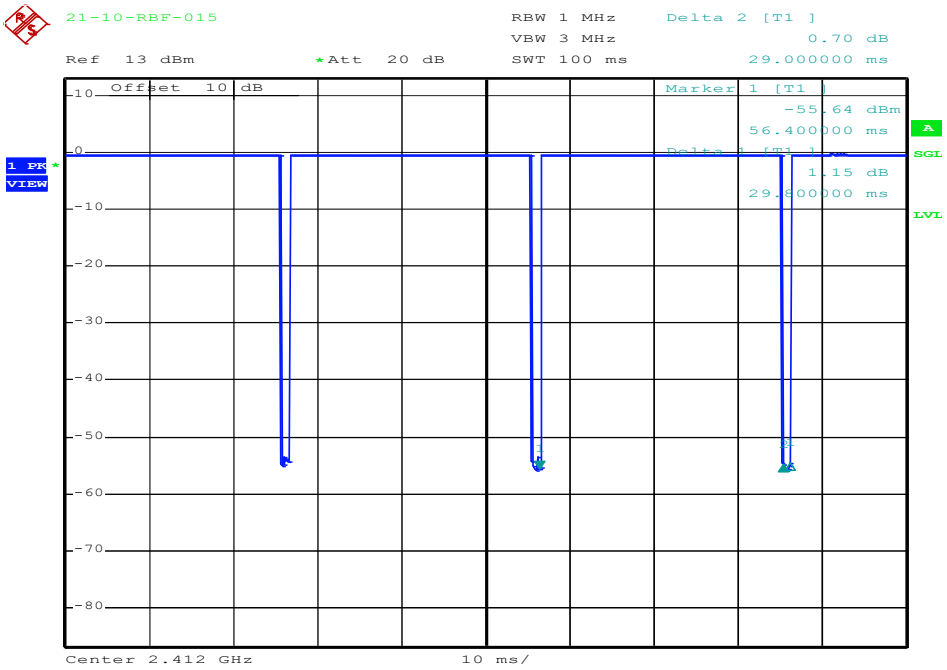
The duty cycle is less than 98%. For the average measurement of the radiated emission test, the VBW setting is >1/T where the T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

1/T = 0 .034 kHz

Hence the VBW setting for the average measurement is 0.1 kHz.

Refer to the following page for data plots.

Period



Date: 18.APR.2022 09:57:45

Transmission duration (T)

9. BANDWIDTH OF EMISSION

9.1 Applicable Standard

Per FCC rule §15.215(c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

9.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. The settings of spectrum analyzer is as followings.
    1) Set RBW in the range of 1% to 5% of the OBW.
    2) Set the video bandwidth (VBW) ≥ 3 x RBW.
    3) Detector = Peak.
    4) Trace mode = max hold.
    5) Sweep = auto couple.
    6) Allow the trace to stabilize.
    7) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission. Alternatively, use the -20 dB bandwidth function of the spectrum analyzer.
3. Repeat above procedures until all frequencies measured were complete.

Figure 4: Emission bandwidth measurement configuration.

9.3 Measurement Equipment

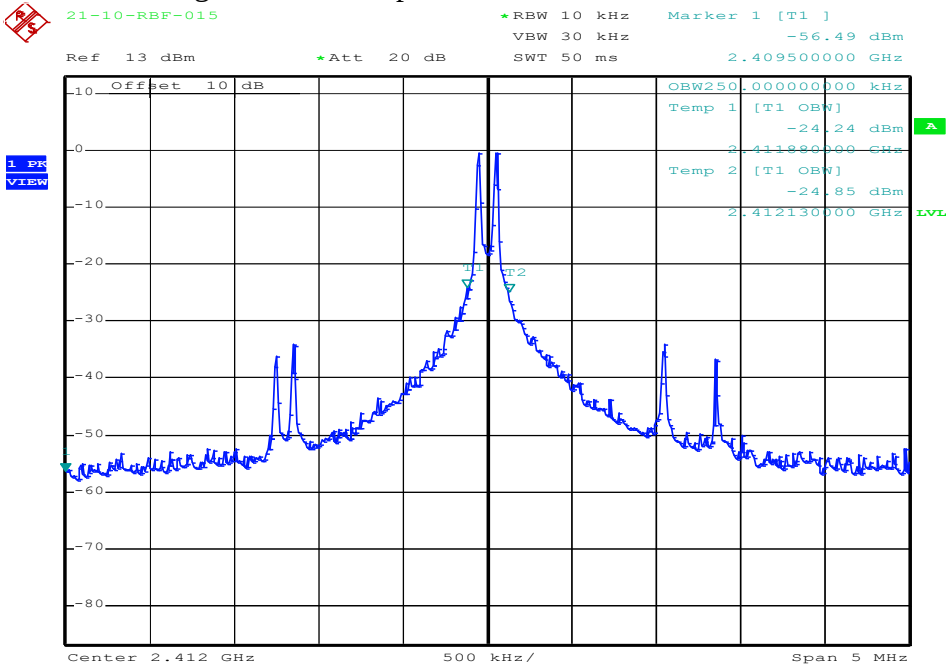
Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP 40	2022/06/22	2023/06/21

9.4 Measurement Data

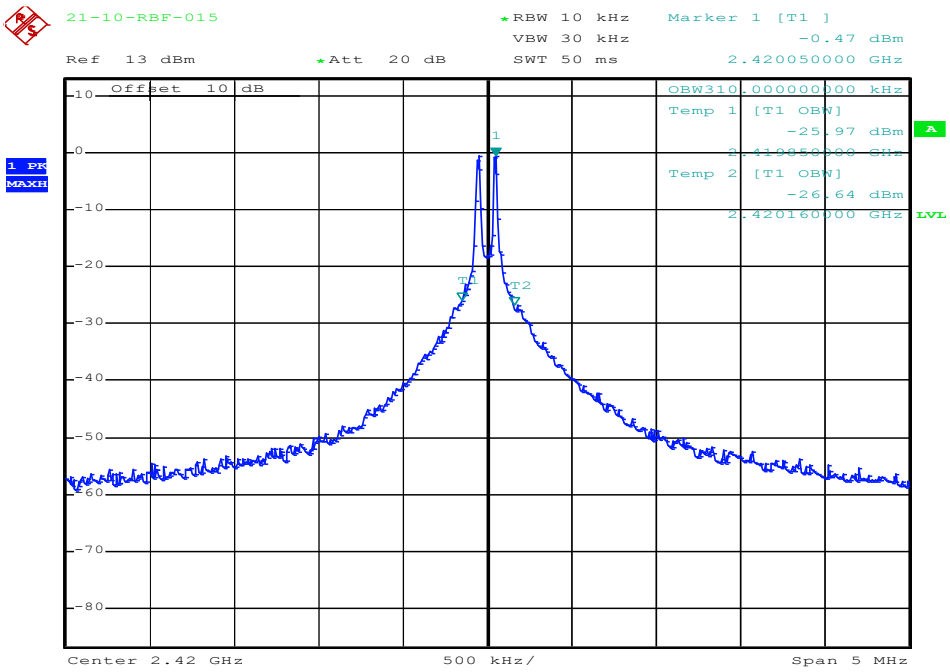
Test Date : 2022-04-18 Temperature : 24 °C Humidity : 65 %

a) Lower Band Edge : The 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section 15.249.
b) Upper Band Edge : The 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section 15.249.

Lower band edge / -20dB BW plot of the lowest channel



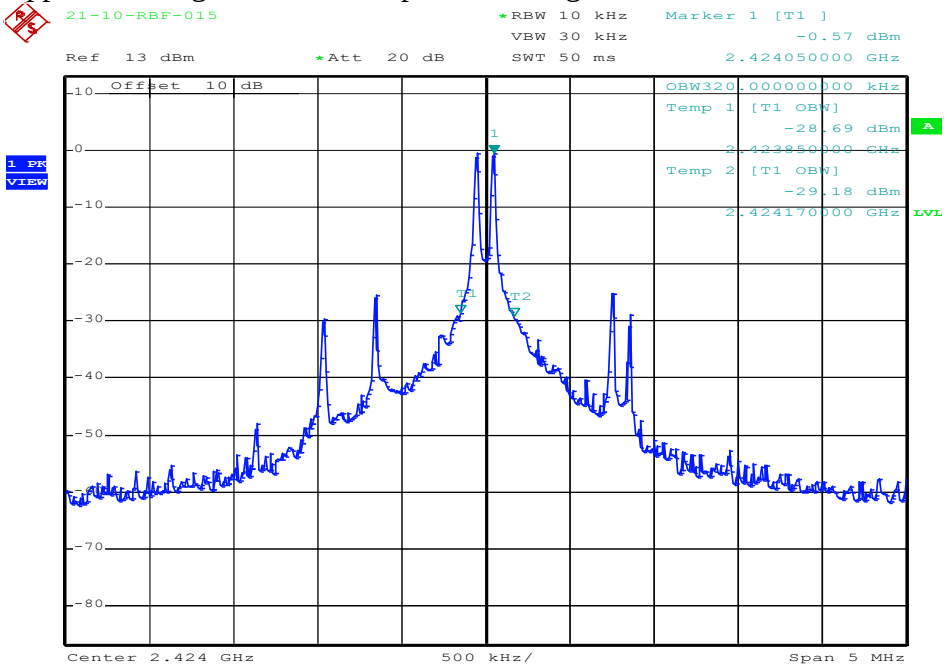
Date: 18.APR.2022 09:56:01



Date: 18.APR.2022 10:04:57

The 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section 15.249.

Upper band edge / -20dB BW plot of the highest channel



Date: 18.APR.2022 10:05:42

The 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section 15.249.