

APPLICATION CERTIFICATION
On Behalf of
Radiopaq Limited

Bayan Soundbook
Model No.: Bayan Soundbook X3, P3

FCC ID: ROF-SOUNDBOOKX3

Prepared for : Radiopaq Limited
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Date of Test : Nov 22-28, 2013
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Test Report Certification

Applicant : Radiopaq Limited
 Manufacturer : Musilab Electric (DongGuan) Co.,Ltd
 EUT Description : Bayan Soundbook
 (A) MODEL NO.: Bayan Soundbook X3,P3
 (B) SERIAL NO.: N/A
 (C) POWER SUPPLY: DC 3.7V *3(Battery) & DC 14V(Adapter)

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247
 ANSI C63.4- 2009

The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test : Nov 22-28, 2013

Prepared by : 
 (Engineer)

Approved & Authorized Signer : 
 (Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Bayan Soundbook
Model Number	:	Bayan Soundbook X3,P3
Frequency Band	:	2402MHz-2480MHz
Number of Channels	:	79
Modulation type	:	GFSK
Antenna Gain	:	0dBi
Antenna type	:	PCB Antenna
Power Supply	:	DC 3.7V *3(Battery) & DC 14V(Adapter)
Applicant	:	Radiopaq Limited
Address	:	5 The Pavilions, Brighton Road, Pease Pottage, West Sussex, RH11 9BJ UNITED KINGDOM
Manufacturer	:	Musilab Electric (DongGuan) Co., Ltd
Address	:	A2, LinDong 3 Road, LinCun, Tangxia Town, DongGuan City, Guangdong Province, China
Date of sample received	:	Nov 28, 2013
Date of Test	:	Nov 22-28, 2013

1.2.Description of Test Facility

EMC Lab : Accredited by TUV Rheinland Shenzhen

Listed by FCC
The Registration Number is 752051

Listed by Industry Canada
The Registration Number is 5077A-2

Accredited by China National Accreditation Committee
for Laboratories
The Certificate Registration Number is L3193

Name of Firm : ACCURATE TECHNOLOGY CO. LTD

Site Location : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.
Science & Industry Park, Nanshan, Shenzhen, Guangdong
P.R. China

1.3.Measurement Uncertainty

Conducted Emission Expanded Uncertainty = 2.23dB, k=2

Radiated emission expanded uncertainty = 3.08dB, k=2
(9kHz-30MHz)

Radiated emission expanded uncertainty = 4.42dB, k=2
(30MHz-1000MHz)

Radiated emission expanded uncertainty = 4.06dB, k=2
(Above 1GHz)

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 12, 2013	Jan. 11, 2014
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 12, 2013	Jan. 11, 2014
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 12, 2013	Jan. 11, 2014
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 12, 2013	Jan. 11, 2014
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Feb. 06, 2013	Feb. 05, 2014
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Feb. 06, 2013	Feb. 05, 2014
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Feb. 06, 2013	Feb. 05, 2014
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1067	Feb. 06, 2013	Feb. 05, 2014
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 12, 2013	Jan. 11, 2014
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 12, 2013	Jan. 11, 2014

3. OPERATION OF EUT DURING TESTING

3.1.Operating Mode

The mode is used: Transmitting mode

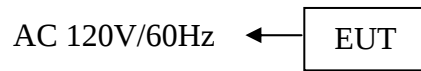
Low Channel: 2402MHz

Middle Channel: 2441MHz

High Channel: 2480MHz

Hopping

3.2.Configuration and peripherals



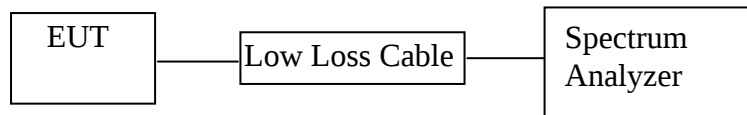
(EUT: Bayan Soundbook)

4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission Test	Compliant
Section 15.247(a)(1)	20dB Bandwidth Test	Compliant
Section 15.247(a)(1)	Carrier Frequency Separation Test	Compliant
Section 15.247(a)(1)(iii)	Number Of Hopping Frequency Test	Compliant
Section 15.247(a)(1)(iii)	Dwell Time Test	Compliant
Section 15.247(b)(1)	Maximum Peak Output Power Test	Compliant
Section 15.247(d) Section 15.209	Radiated Emission Test	Compliant
Section 15.247(d)	Band Edge Compliance Test	Compliant
Section 15.203	Antenna Requirement	Compliant

5. 20DB BANDWIDTH TEST

5.1. Block Diagram of Test Setup



(EUT: Bayan Soundbook)

5.2. The Requirement For Section 15.247(a)(1)

Section 15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

5.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.4. Operating Condition of EUT

5.4.1. Setup the EUT and simulator as shown as Section 5.1.

5.4.2. Turn on the power of all equipment.

5.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

5.5. Test Procedure

5.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

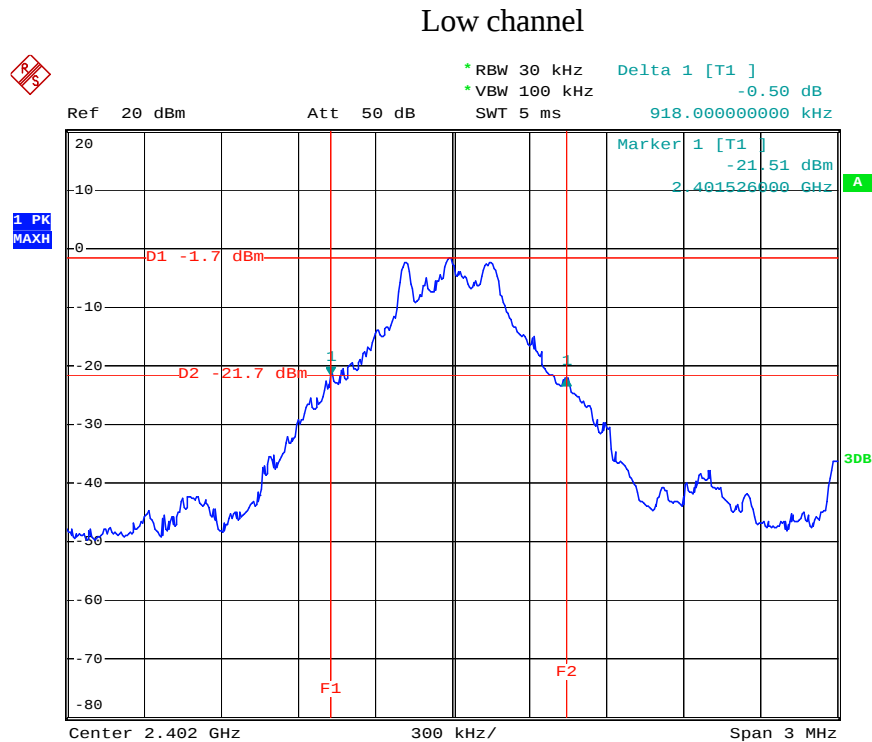
5.5.2. Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz.

5.5.3. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

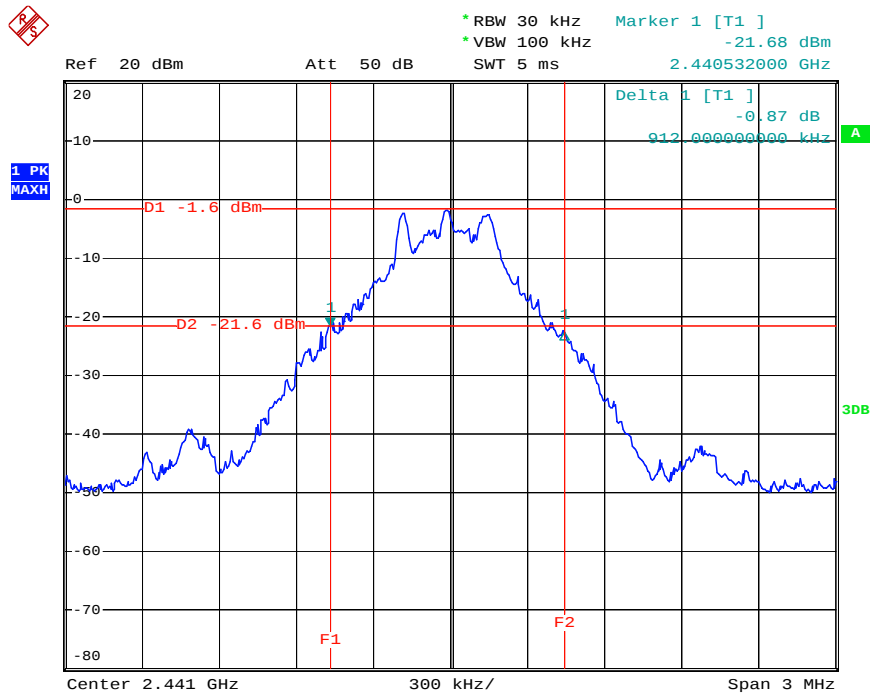
5.6. Test Result

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
Low	2402	0.918	Pass
Middle	2441	0.912	Pass
High	2480	0.900	Pass

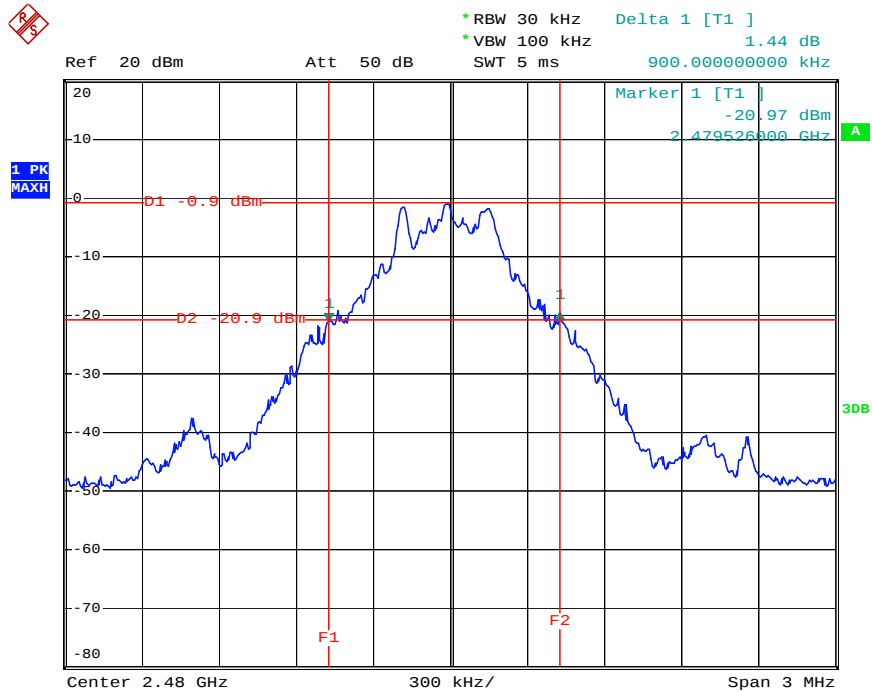
The spectrum analyzer plots are attached as below.



Middle channel

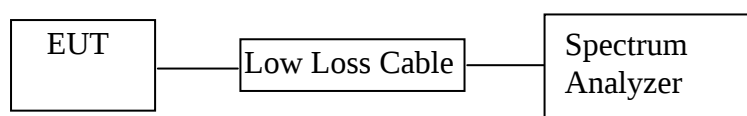


High channel



6. CARRIER FREQUENCY SEPARATION TEST

6.1. Block Diagram of Test Setup



(EUT: Bayan Soundbook)

6.2. The Requirement For Section 15.247(a)(1)

Section 15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

6.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4. Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

6.5. Test Procedure

6.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

6.5.2. Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz. Adjust Span to 2 MHz.

6.5.3. Set the adjacent channel of the EUT maxhold another trace.

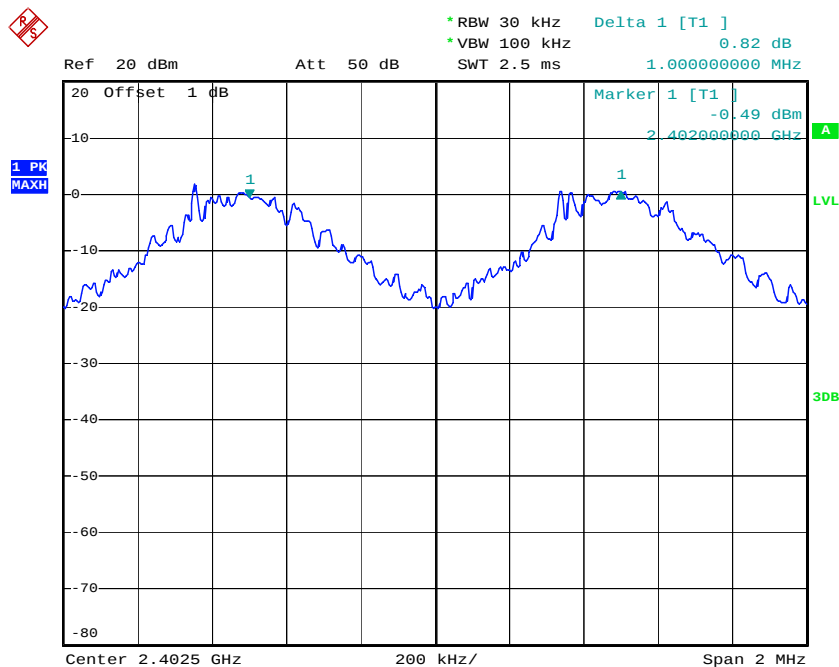
6.5.4. Measurement the channel separation

6.6. Test Result

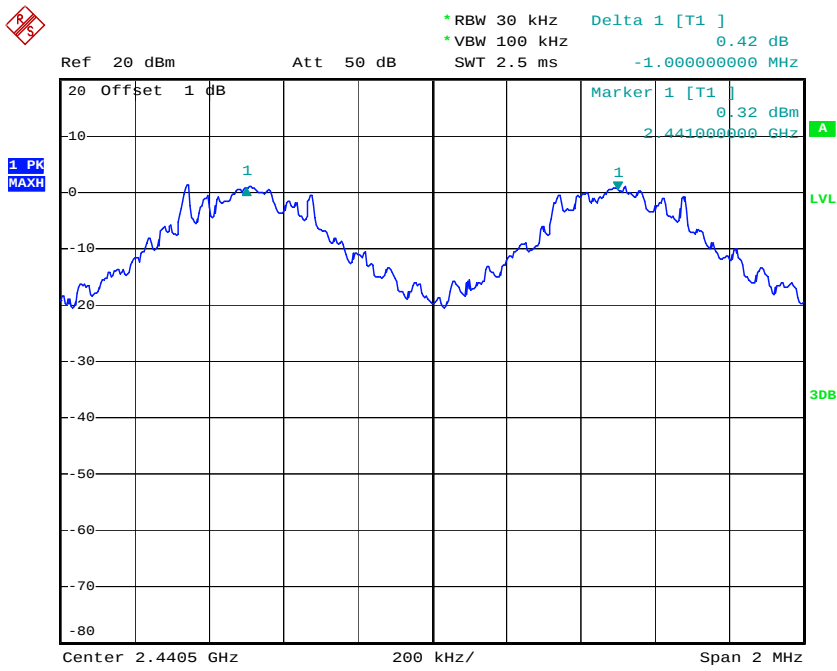
Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.000	25KHz or 20dB bandwidth	PASS
	2403			
Middle	2440	1.000	25KHz or 20dB bandwidth	PASS
	2441			
High	2479	1.000	25KHz or 20dB bandwidth	PASS
	2480			

The spectrum analyzer plots are attached as below.

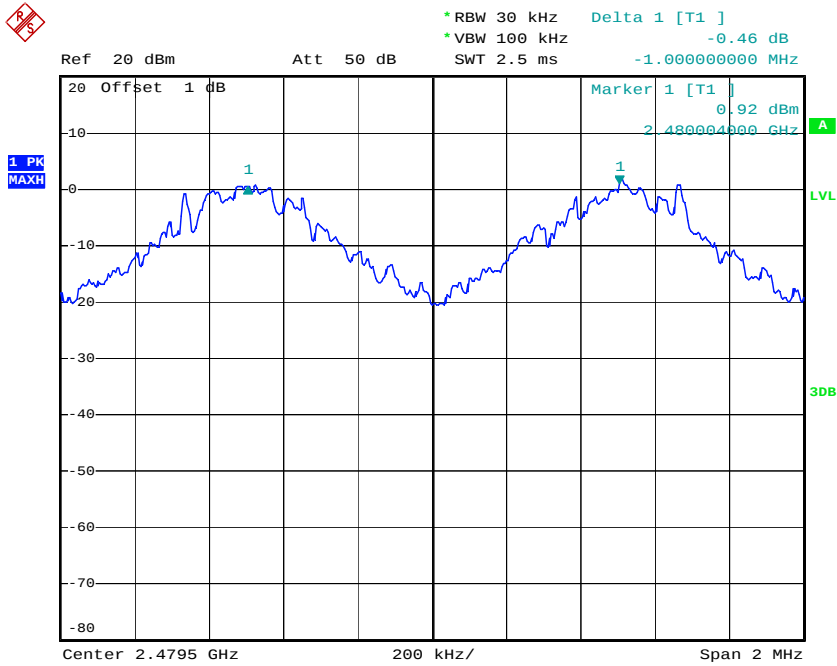
Low channel



Middle channel

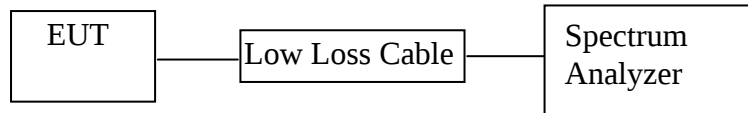


High channel



7. NUMBER OF HOPPING FREQUENCY TEST

7.1. Block Diagram of Test Setup



(EUT: Bayan Soundbook)

7.2. The Requirement For Section 15.247(a)(1)(iii)

Section 15.247(a)(1)(iii): Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

7.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4. Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 7.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in TX (Hopping on) modes measure it.

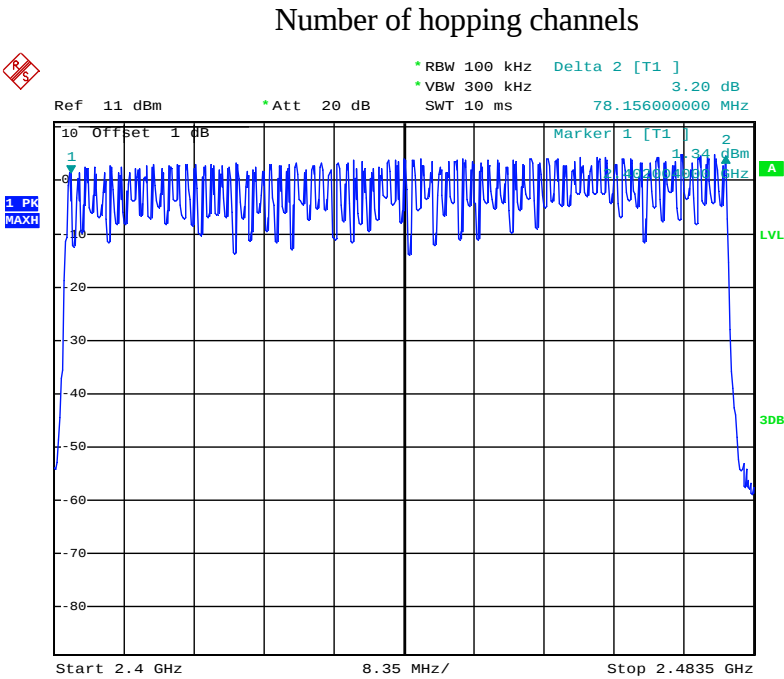
7.5. Test Procedure

- 7.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.
- 7.5.2. Set the spectrum analyzer as Span=83.5MHz, RBW=100 kHz, VBW=300 kHz.
- 7.5.3. Max hold, view and count how many channel in the band.

7.6. Test Result

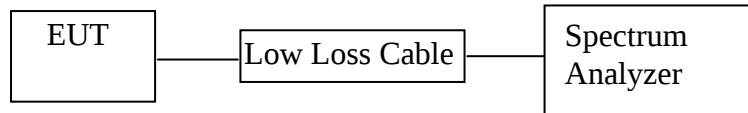
Total number of hopping channel	Measurement result(CH)	Limit(CH)
	79	≥ 15

The spectrum analyzer plots are attached as below.



8. DWELL TIME TEST

8.1. Block Diagram of Test Setup



(EUT: Bayan Soundbook)

8.2. The Requirement For Section 15.247(a)(1)(iii)

Section 15.247(a)(1)(iii): Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

8.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4. Operating Condition of EUT

8.4.1. Setup the EUT and simulator as shown as Section 8.1.

8.4.2. Turn on the power of all equipment.

8.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

8.5. Test Procedure

8.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

8.5.2. Set center frequency of spectrum analyzer = operating frequency.

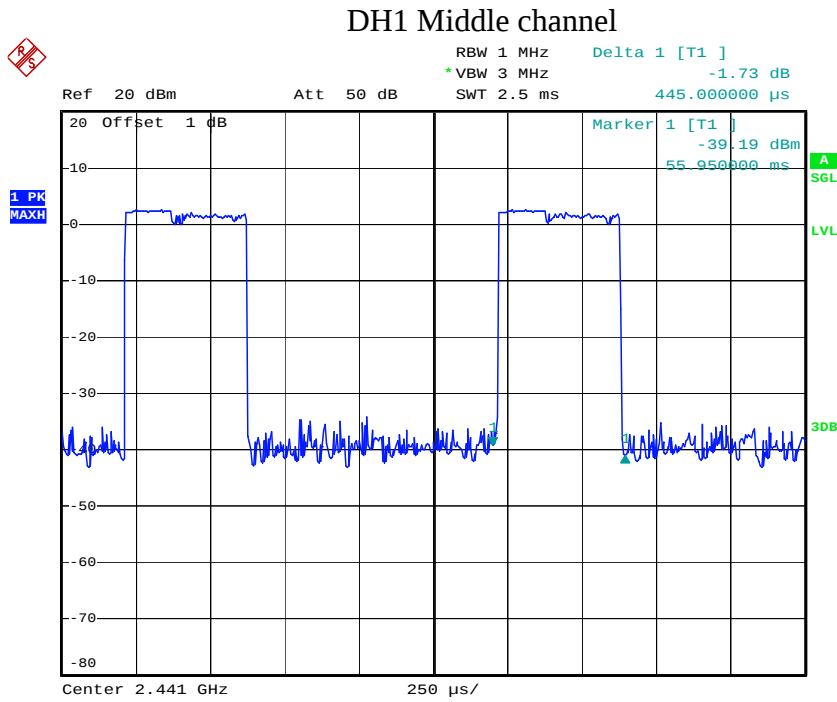
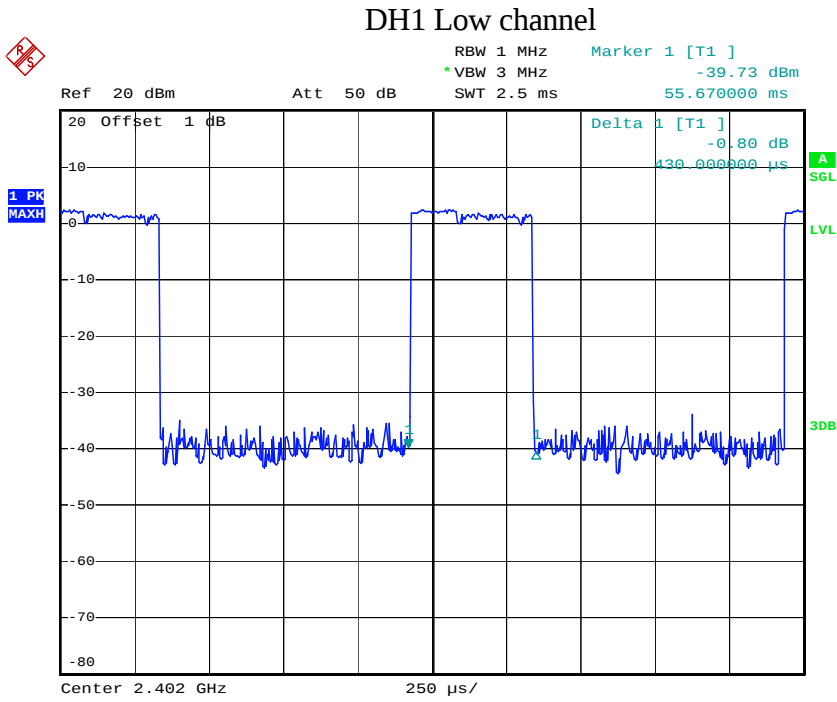
8.5.3. Set the spectrum analyzer as RBW=1MHz, VBW=3MHz, Span=0Hz, Get the pulse time.

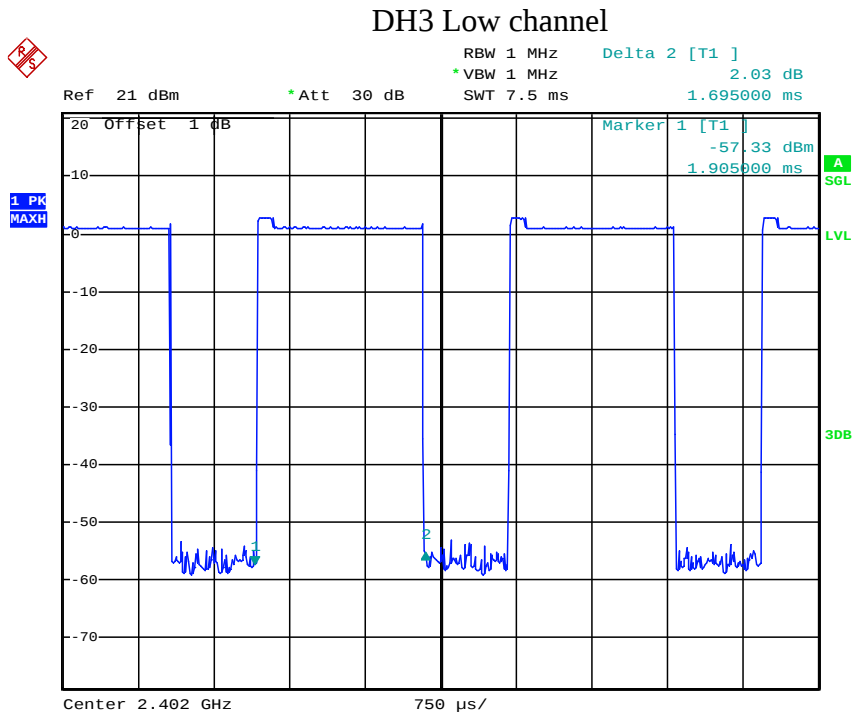
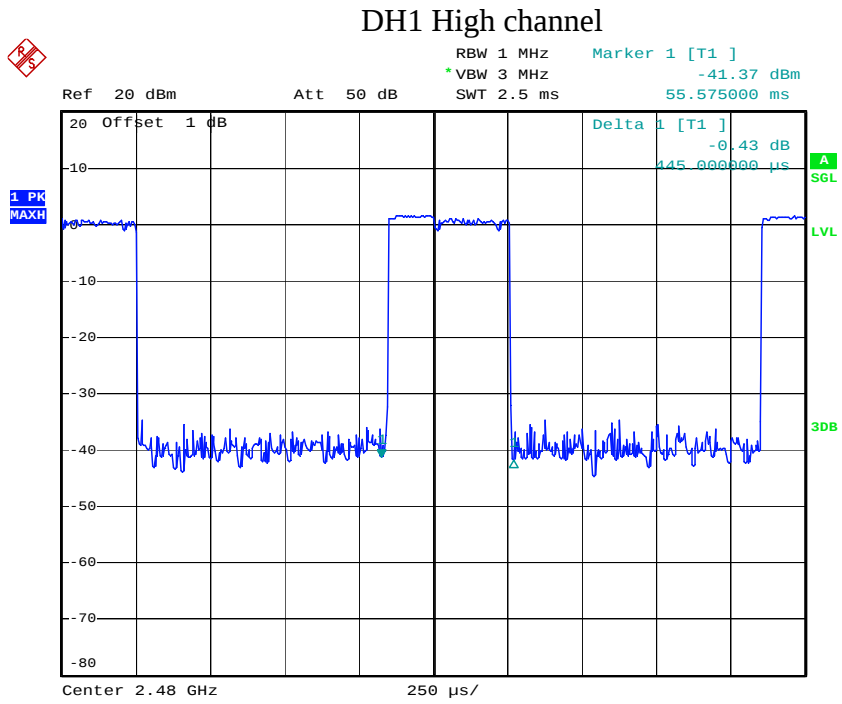
8.5.4. Repeat above procedures until all frequency measured were complete.

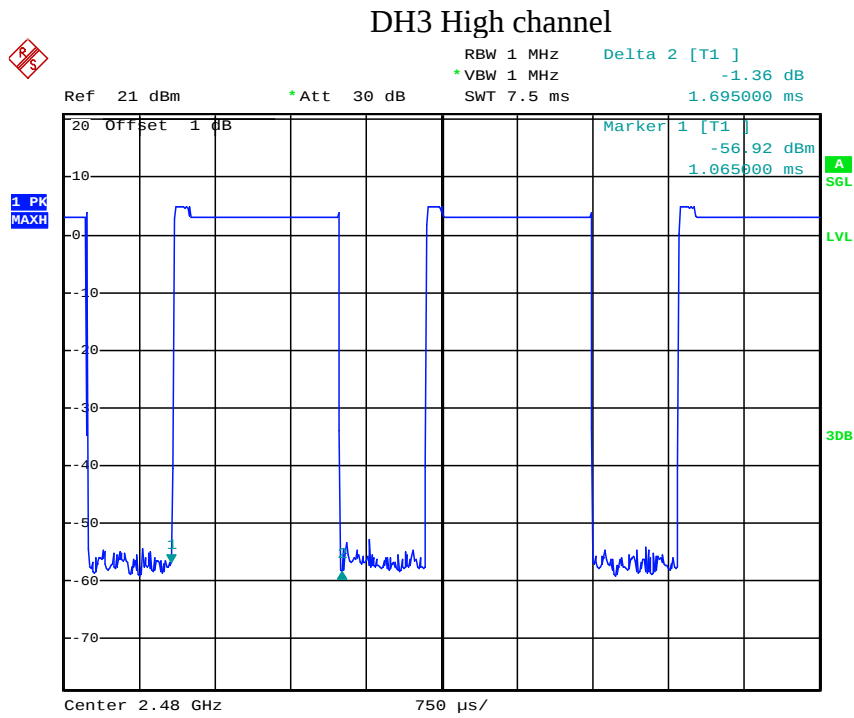
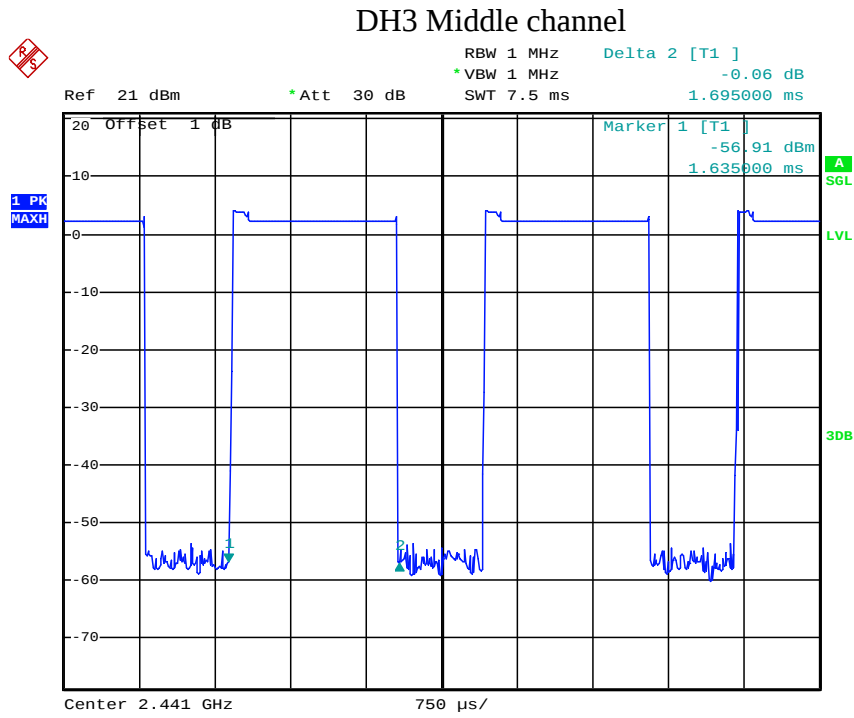
8.6. Test Result

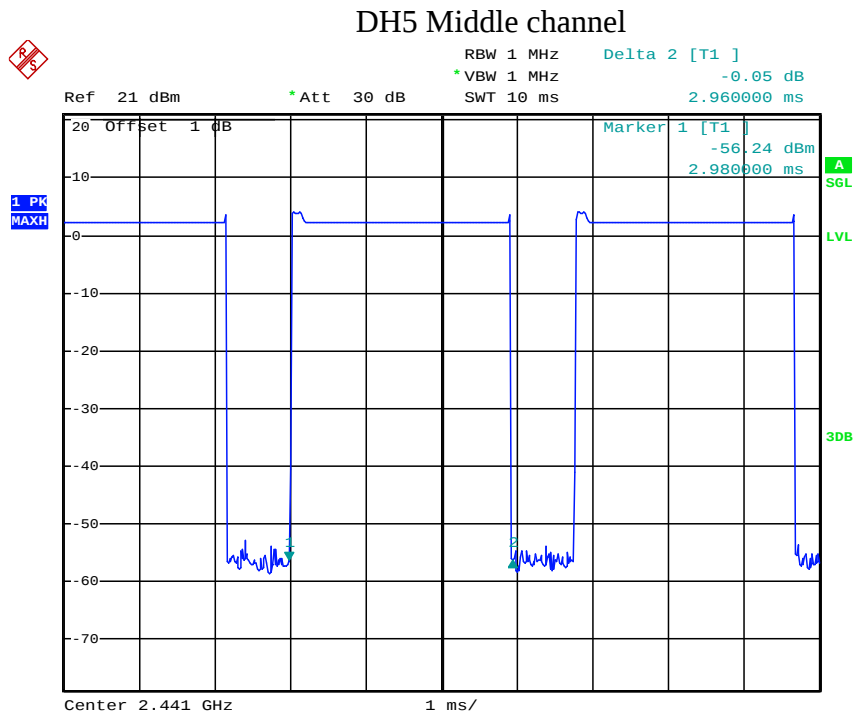
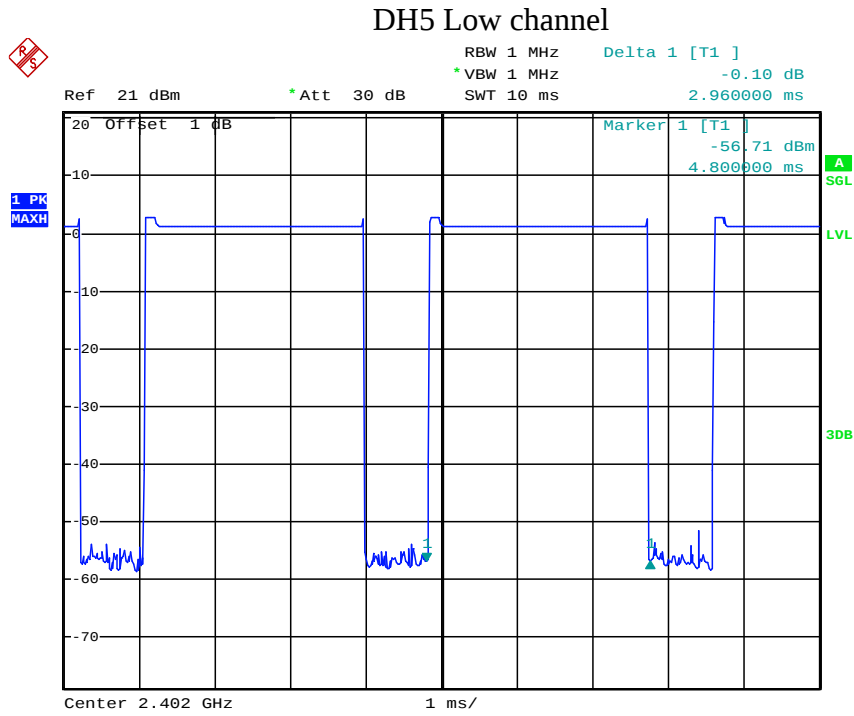
Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.430	137.60	400
	2441	0.445	142.40	400
	2480	0.445	142.40	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2 \times 79)) \times 31.6$				
DH3	2402	1.695	271.20	400
	2441	1.695	271.20	400
	2480	1.695	271.20	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4 \times 79)) \times 31.6$				
DH5	2402	2.960	315.73	400
	2441	2.960	315.73	400
	2480	2.960	315.73	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

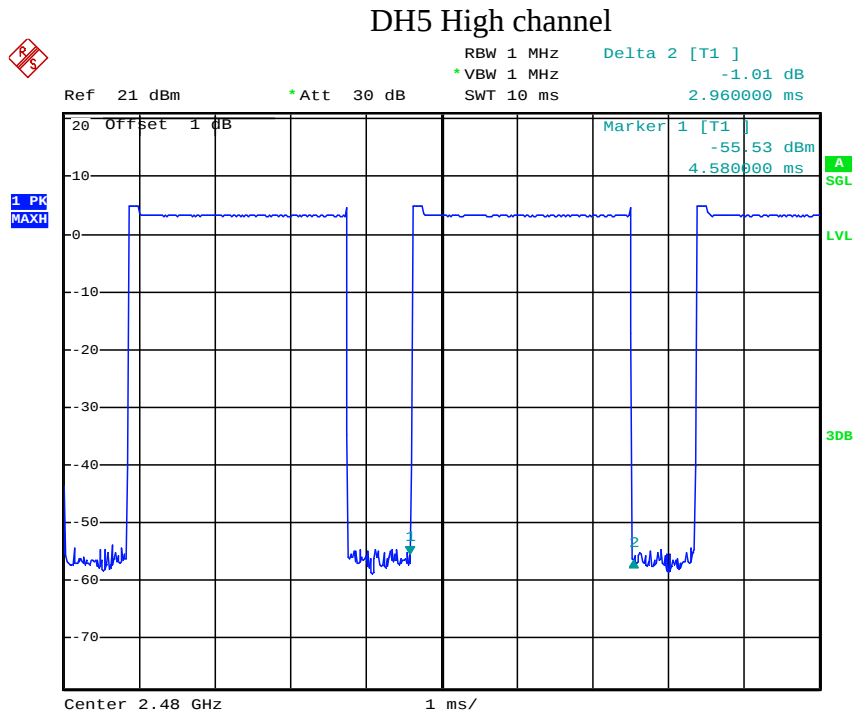
The spectrum analyzer plots are attached as below.





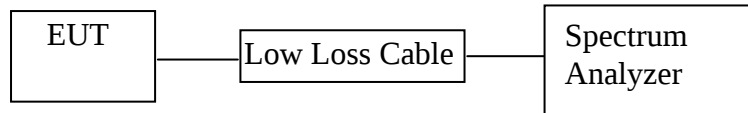






9. MAXIMUM PEAK OUTPUT POWER TEST

9.1. Block Diagram of Test Setup



(EUT: Bayan Soundbook)

9.2. The Requirement For Section 15.247(b)(1)

Section 15.247(b)(1): For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

9.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.4. Operating Condition of EUT

9.4.1. Setup the EUT and simulator as shown as Section 9.1.

9.4.2. Turn on the power of all equipment.

9.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

9.5. Test Procedure

9.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

9.5.2. Set RBW of spectrum analyzer to 1MHz and VBW to 3MHz

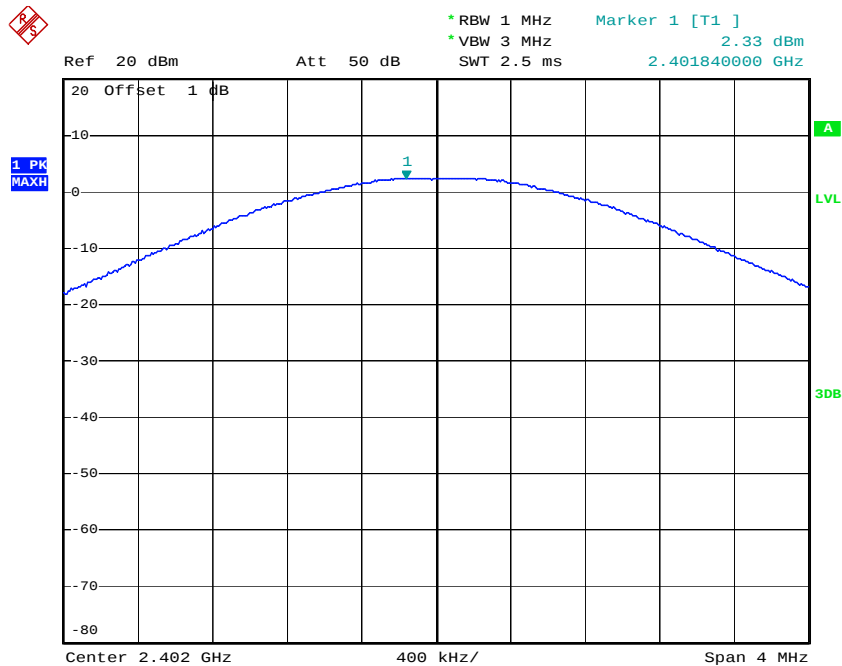
9.5.3. Measurement the maximum peak output power.

9.6. Test Result

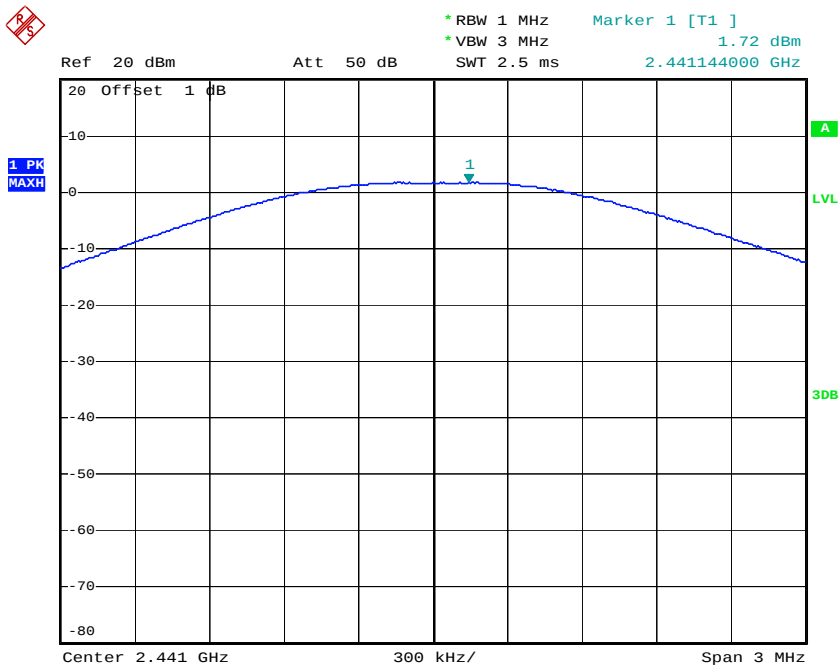
Channel	Frequency (MHz)	Peak Output Power (dBm/mW)	Limits (dBm/W)
Low	2402	2.33 / 1.71	30/1.0
Middle	2441	1.72 / 1.49	30/1.0
High	2480	2.43 / 1.75	30/1.0

The spectrum analyzer plots are attached as below.

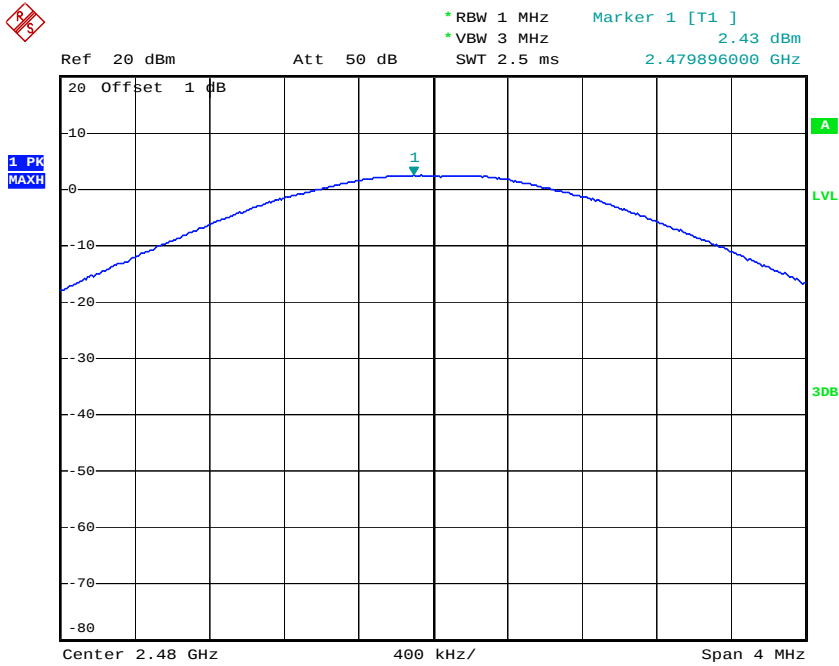
Low channel



Middle channel



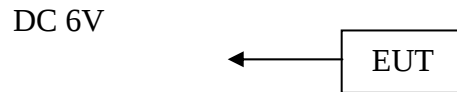
High channel



10.RADIATED EMISSION TEST

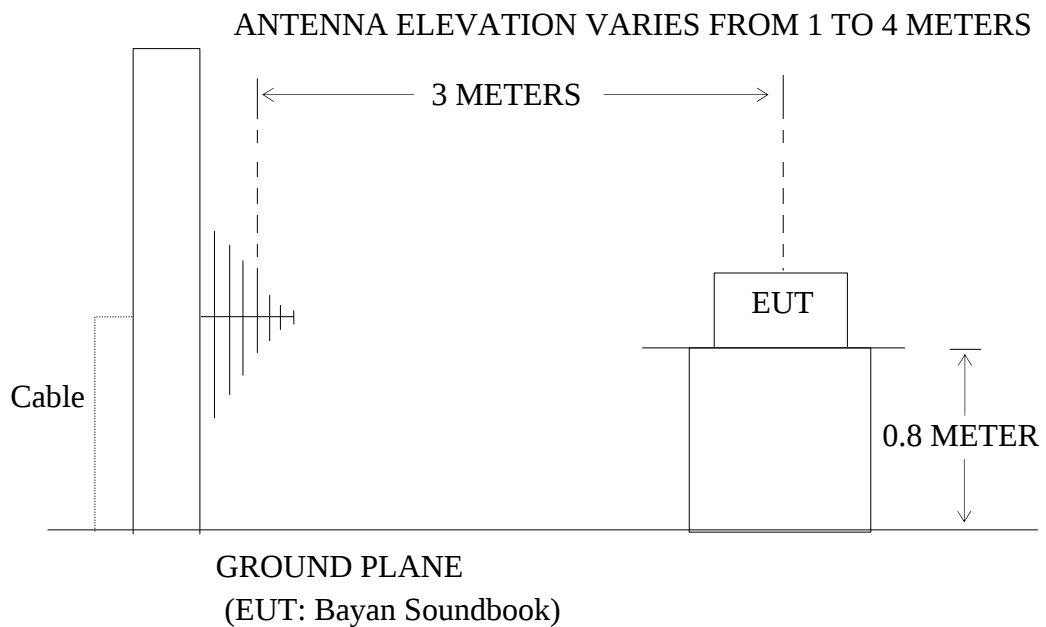
10.1.Block Diagram of Test Setup

10.1.1.Block diagram of connection between the EUT and simulators



(EUT: Bayan Soundbook)

10.1.2.Anechoic Chamber Test Setup Diagram



(EUT: Bayan Soundbook)

10.2.The Limit For Section 15.247(d)

Section 15.247(d): 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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

10.3.Restricted bands of operation

10.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, 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	4.5-5.15
¹ 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	2690-2900	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	3600-4400	(²)
13.36-13.41			

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

²Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

10.4.Configuration of EUT on Measurement

The equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

10.5. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4- 2009 on radiated emission measurement.

The bandwidth of test receiver (R&S ESI26) is set at 120 KHz in 30-1000MHz. and set at 1MHz in above 1000MHz.

The frequency range from 30MHz to 25000MHz is checked.

The final measurement in band 9-90 kHz, 110-490 kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

The field strength is calculated by adding the antenna factor, and cable loss, and subtracting the amplifier gain from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

10.6.The Field Strength of Radiation Emission Measurement Results

Note:

1. The fundamental radiated emissions were reduced by 2.4G Band Reject Filter in the attached plots.
2. The 18-25GHz emissions are not reported, because the levels are too low against the limit.



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Job No.: RICKY #104

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Bayan Soundbook

Mode: TX2402MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Vertical

Power Source: AC 120V/60Hz

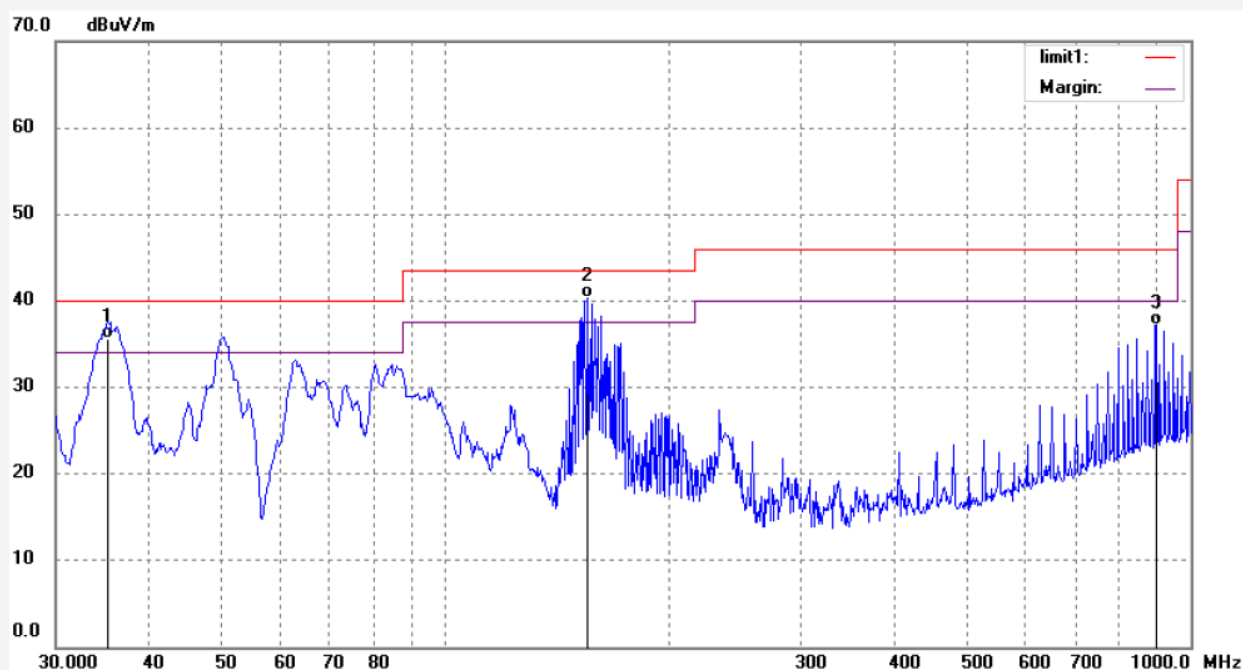
Date: 13/11/23/

Time: 8/47/06

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	35.2512	55.12	-19.53	35.59	40.00	-4.41	QP			
2	155.3644	63.60	-23.34	40.26	43.50	-3.24	QP			
3	900.1474	43.30	-6.11	37.19	46.00	-8.81	QP			



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Job No.: RICKY #105

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Bayan Soundbook

Mode: TX2402MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Horizontal

Power Source: AC 120V/60Hz

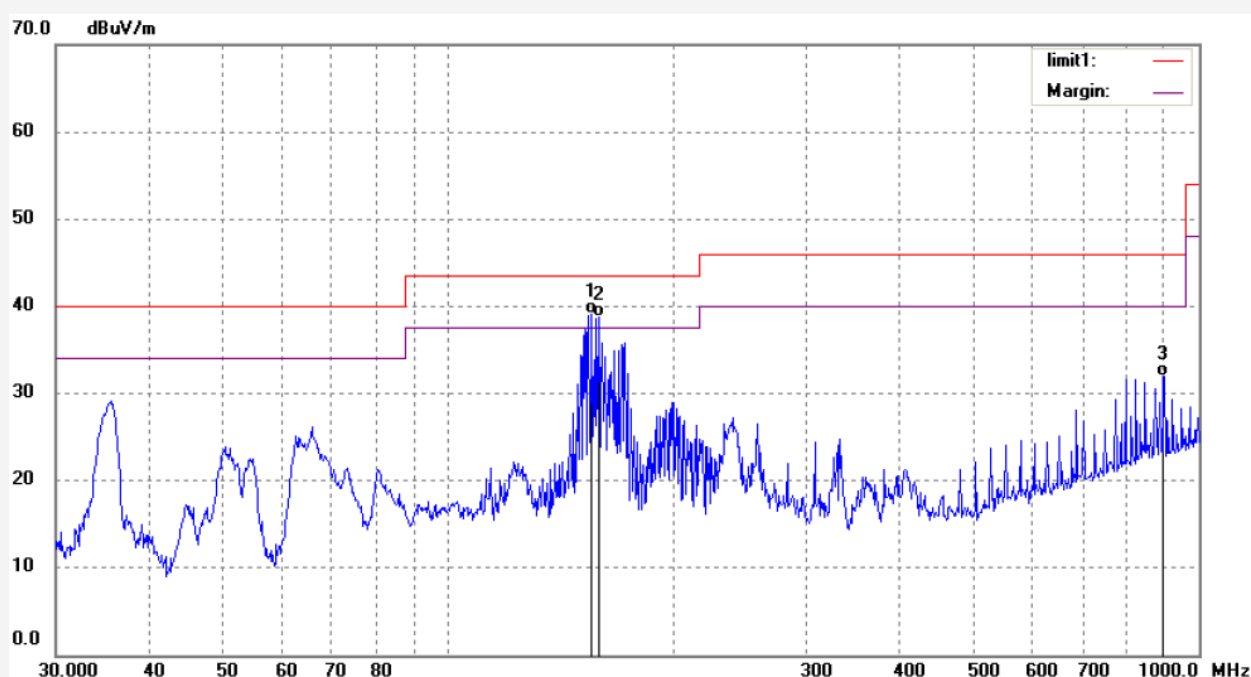
Date: 13/11/23/

Time: 8/49/45

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	155.3644	62.51	-23.34	39.17	43.50	-4.33	QP			
2	158.6677	61.73	-23.00	38.73	43.50	-4.77	QP			
3	896.9965	38.04	-6.15	31.89	46.00	-14.11	QP			



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Job No.: RICKY #106

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Bayan Soundbook

Mode: TX2441MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Horizontal

Power Source: AC 120V/60Hz

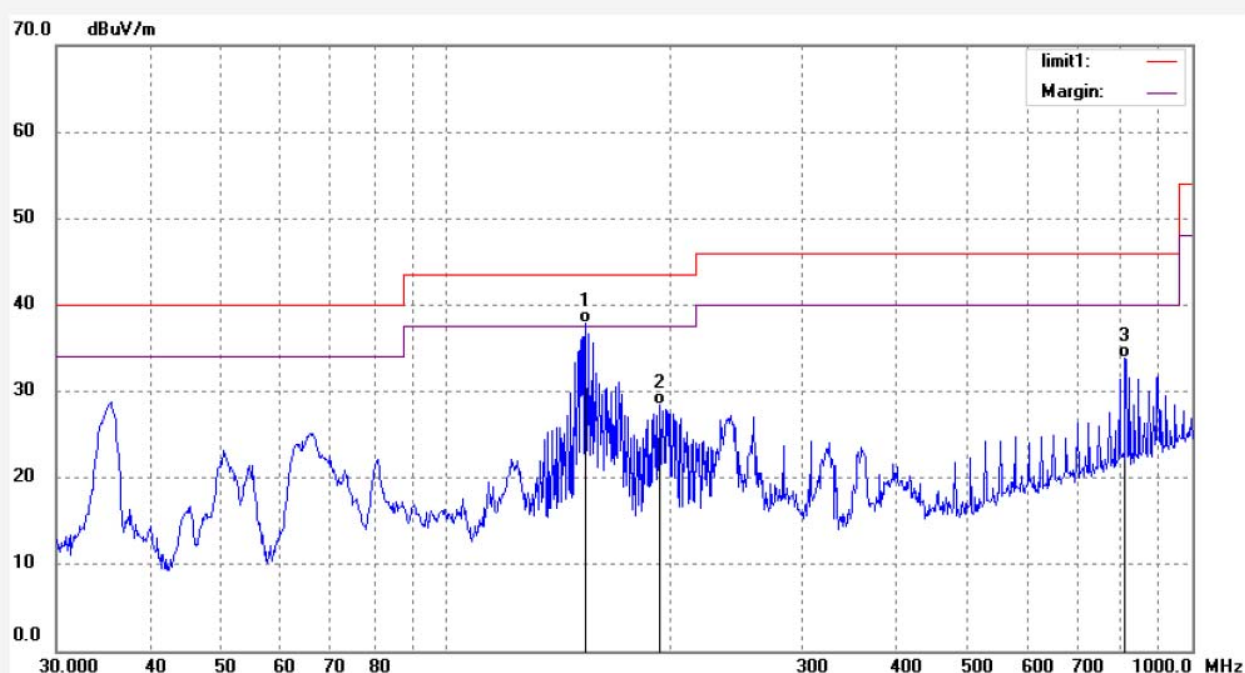
Date: 13/11/23/

Time: 8/53/23

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	153.7385	61.36	-23.49	37.87	43.50	-5.63	QP			
2	193.0945	49.09	-20.68	28.41	43.50	-15.09	QP			
3	813.1115	41.36	-7.55	33.81	46.00	-12.19	QP			



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Job No.: RICKY #107

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Bayan Soundbook

Mode: TX2441MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Vertical

Power Source: AC 120V/60Hz

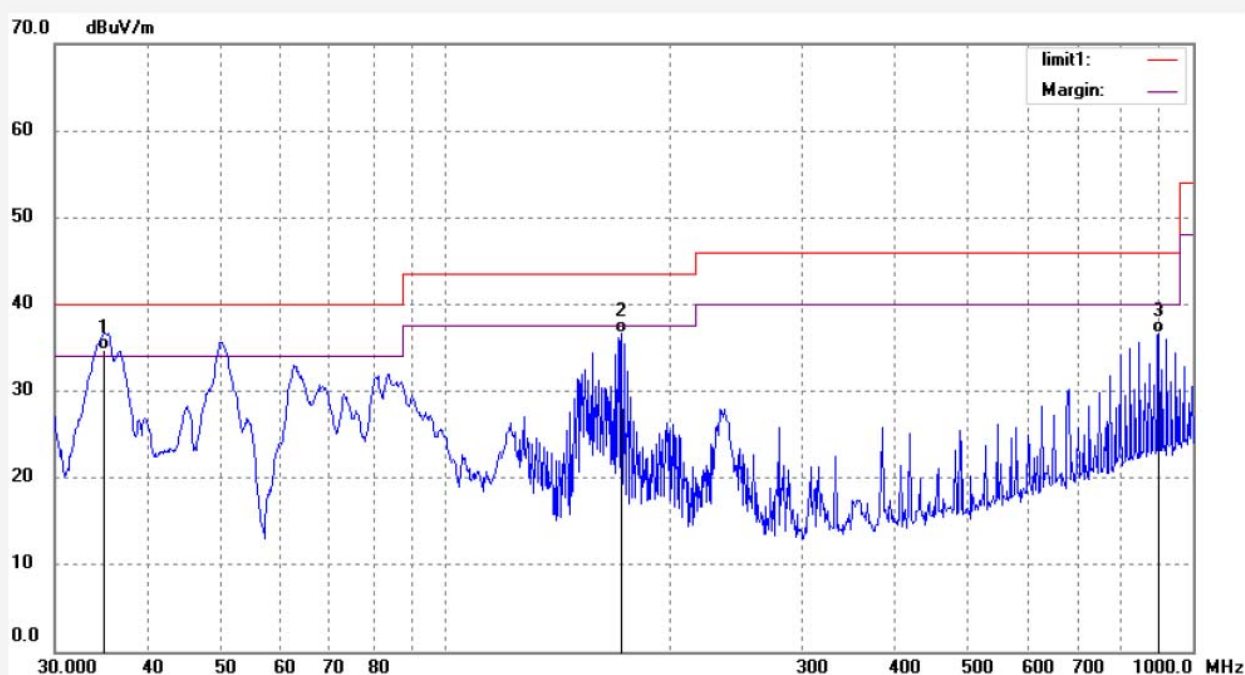
Date: 13/11/23/

Time: 8/54/35

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	34.8823	54.16	-19.47	34.69	40.00	-5.31	QP			
2	171.9946	58.71	-22.01	36.70	43.50	-6.80	QP			
3	900.1474	42.73	-6.11	36.62	46.00	-9.38	QP			



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Job No.: RICKY #108

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Bayan Soundbook

Mode: TX2480MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Vertical

Power Source: AC 120V/60Hz

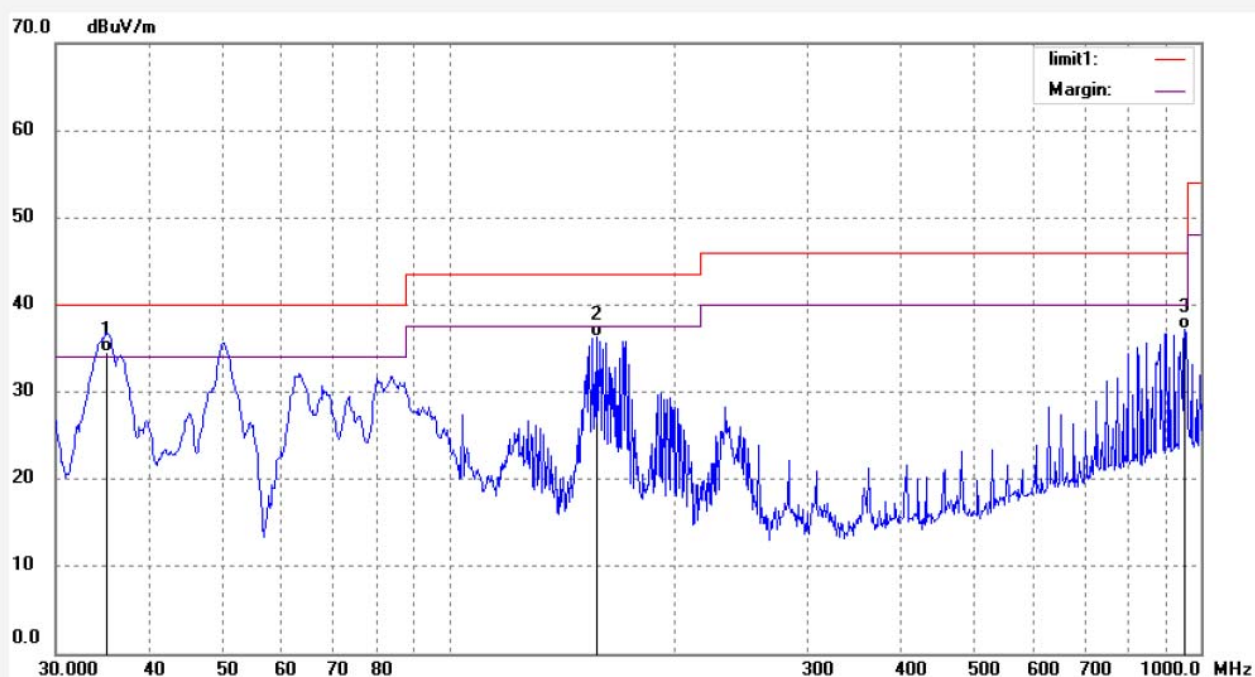
Date: 13/11/23/

Time: 8/55/55

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	35.1278	54.17	-19.52	34.65	40.00	-5.35	QP			
2	157.0074	59.44	-23.18	36.26	43.50	-7.24	QP			
3	952.0937	42.56	-5.37	37.19	46.00	-8.81	QP			



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Job No.: RICKY #109

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Bayan Soundbook

Mode: TX2480MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Horizontal

Power Source: AC 120V/60Hz

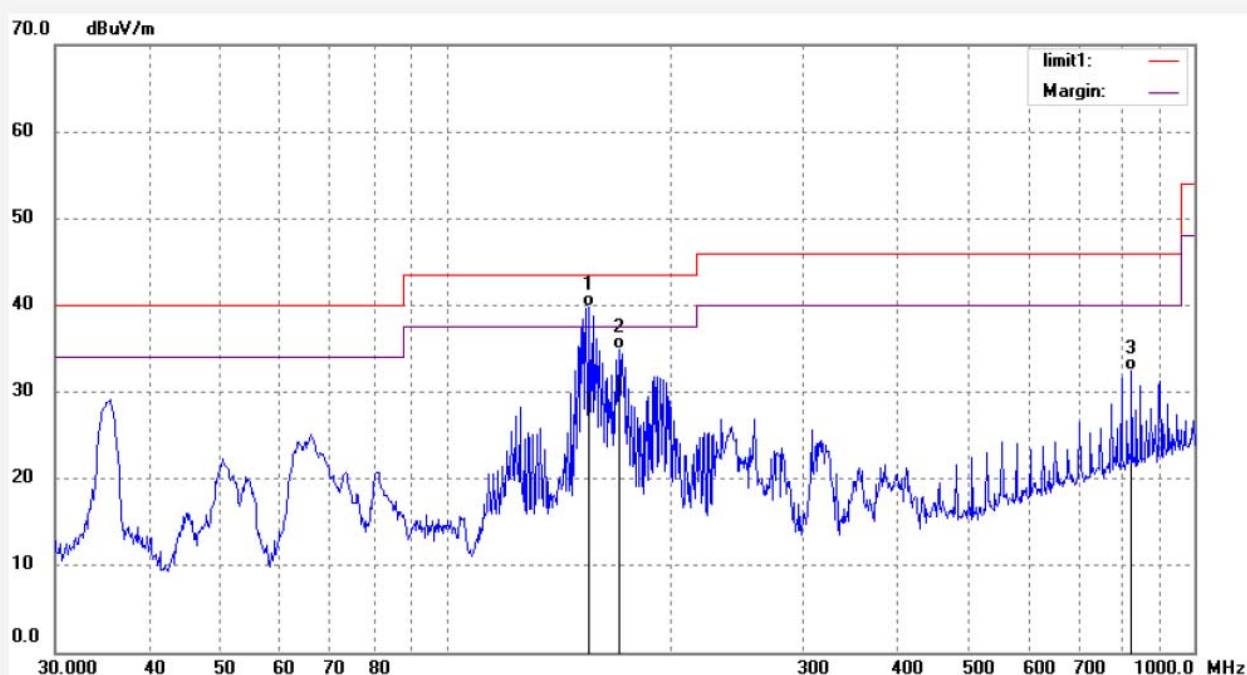
Date: 13/11/23/

Time: 8/57/32

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	155.3644	63.23	-23.34	39.89	43.50	-3.61	QP			
2	170.1948	56.72	-21.81	34.91	43.50	-8.59	QP			
3	824.5968	39.82	-7.39	32.43	46.00	-13.57	QP			



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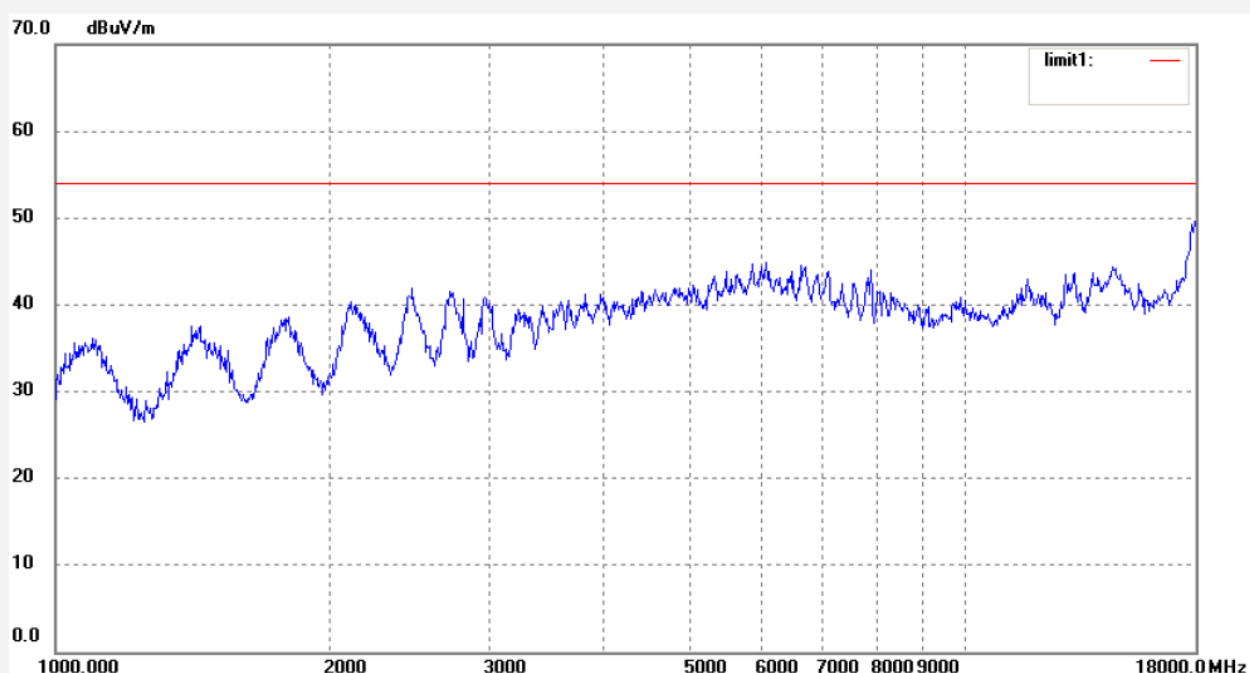
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Site: 1# Chamber
Tel:+86-0755-26503290
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Job No.: RICKY #119
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 51 %
EUT: Bayan Soundbook
Mode: TX 2402MHz
Model: Bayan Soundbook X3
Manufacturer: Musilab

Polarization: Vertical
Power Source: AC 120V/60Hz
Date: 13/11/23/
Time: 21/42/30
Engineer Signature: Ricky
Distance:

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
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Job No.: RICKY #118

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 51 %

EUT: Bayan Soundbook

Mode: TX 2402MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Horizontal

Power Source: AC 120V/60Hz

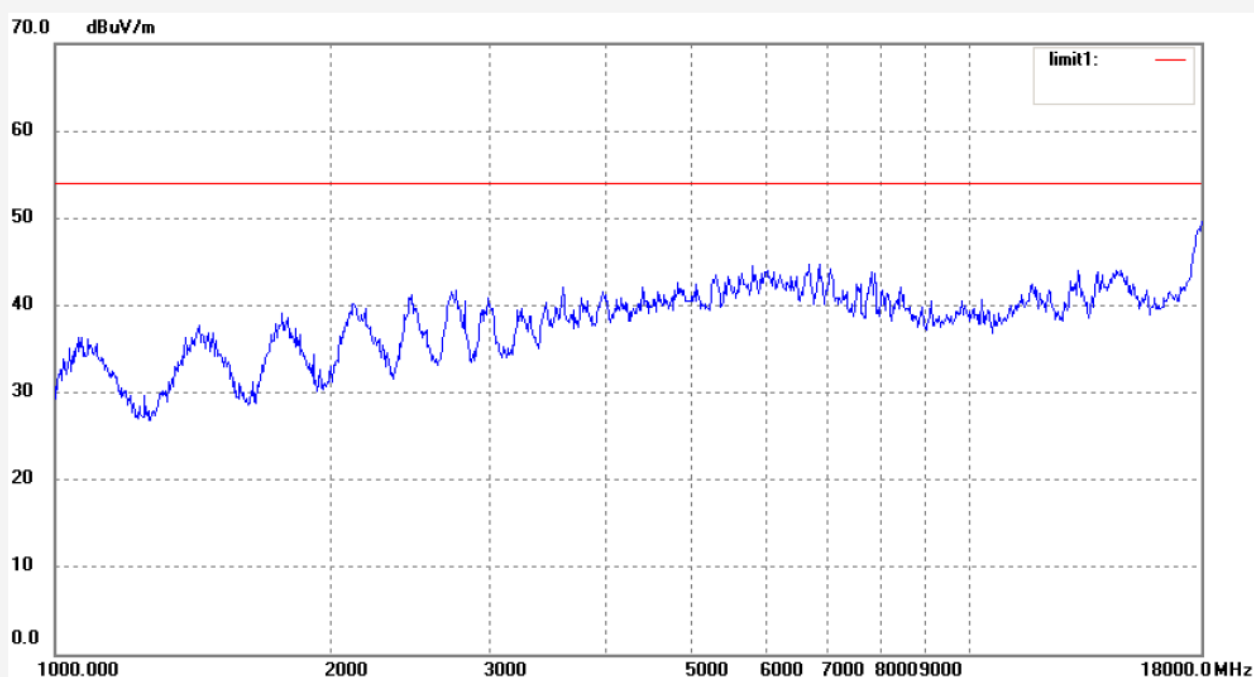
Date: 13/11/23/

Time: 21/41/09

Engineer Signature: Ricky

Distance:

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
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Job No.: RICKY #117

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 51 %

EUT: Bayan Soundbook

Mode: TX 2441MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Horizontal

Power Source: AC 120V/60Hz

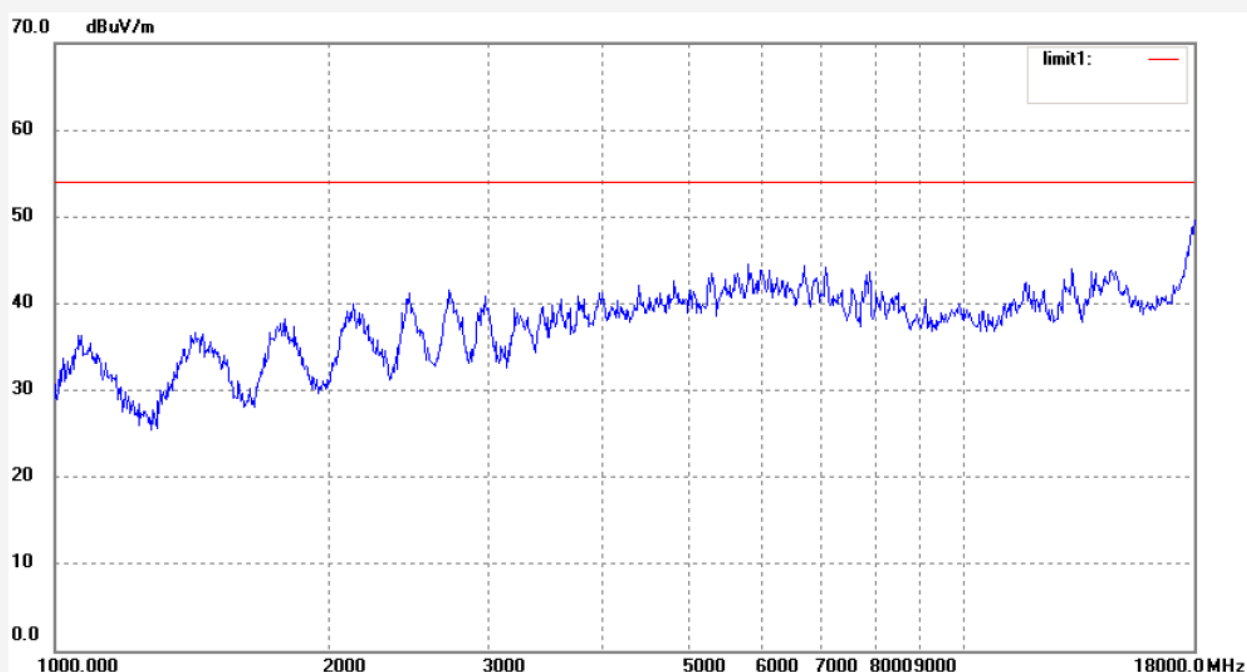
Date: 13/11/23/

Time: 21/40/16

Engineer Signature: Ricky

Distance:

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	----------------	---------------------	----------------	--------------------	-------------------	----------------	----------	----------------	------------------	--------



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Job No.: RICKY #116

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 51 %

EUT: Bayan Soundbook

Mode: TX 2441MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Vertical

Power Source: AC 120V/60Hz

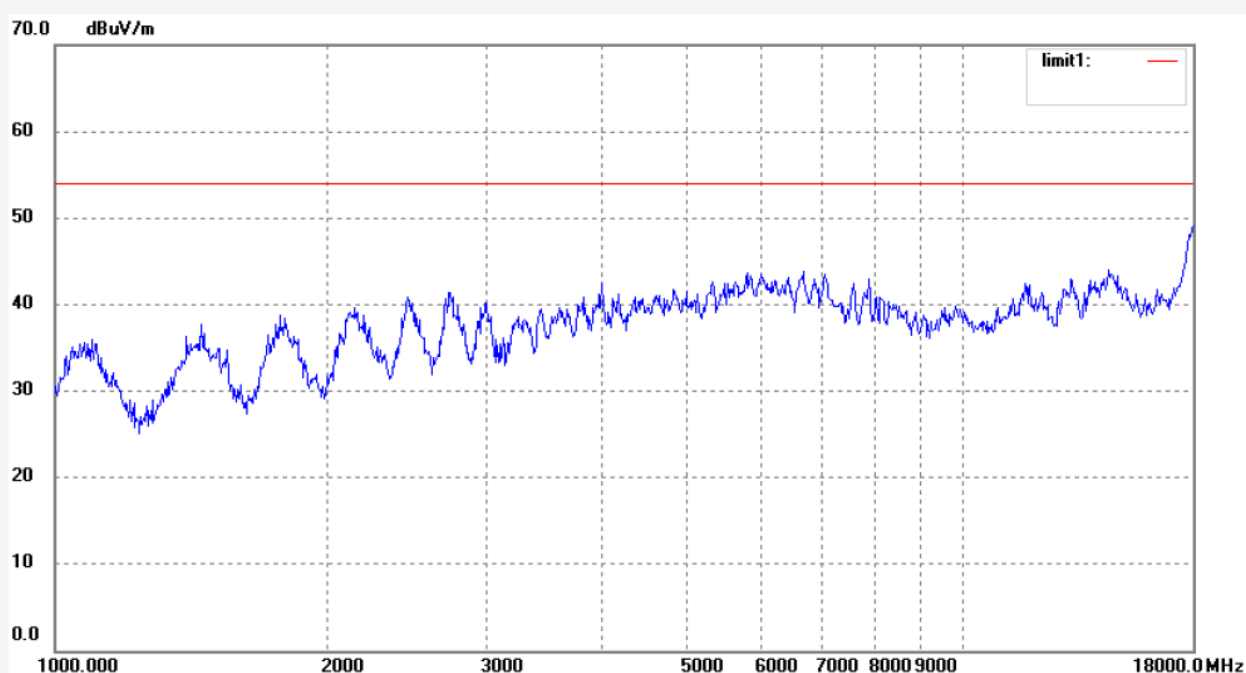
Date: 13/11/23/

Time: 21/39/24

Engineer Signature: Ricky

Distance:

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	----------------	---------------------	----------------	--------------------	-------------------	----------------	----------	----------------	------------------	--------



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Job No.: RICKY #115

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 51 %

EUT: Bayan Soundbook

Mode: TX 2480MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Vertical

Power Source: AC 120V/60Hz

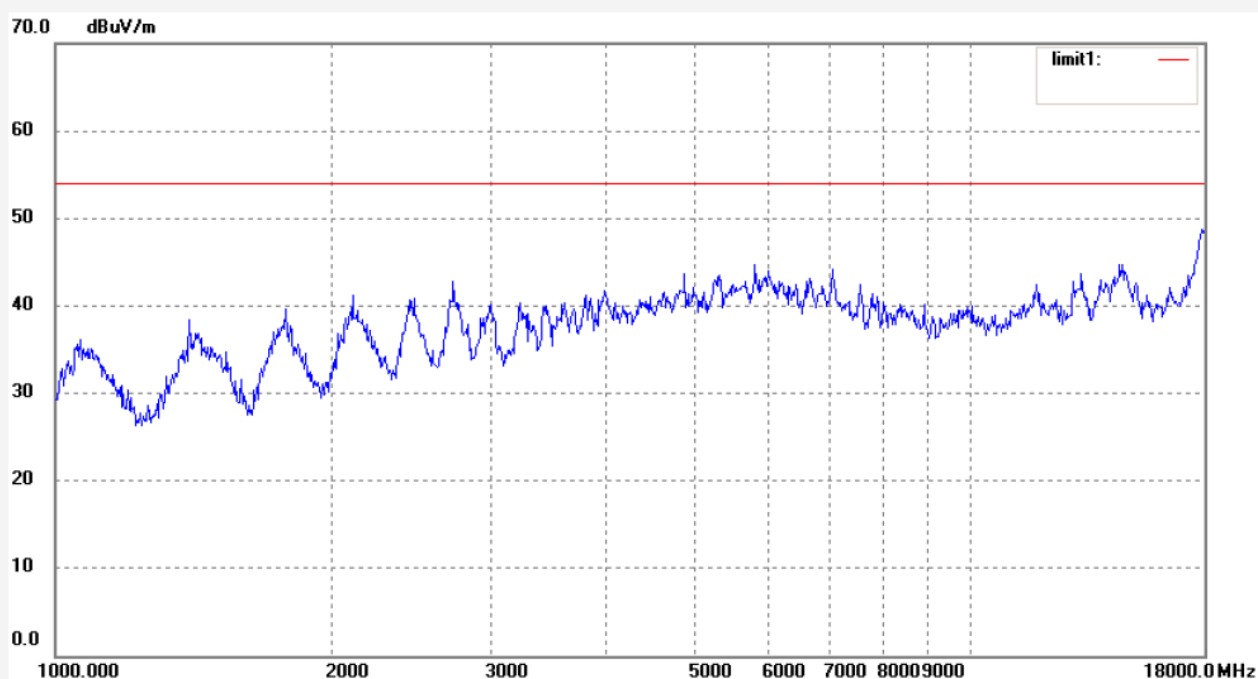
Date: 13/11/23/

Time: 21/37/00

Engineer Signature: Ricky

Distance:

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	----------------	---------------------	----------------	--------------------	-------------------	----------------	----------	----------------	------------------	--------



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Job No.: RICKY #114

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 51 %

EUT: Bayan Soundbook

Mode: TX 2480MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Horizontal

Power Source: AC 120V/60Hz

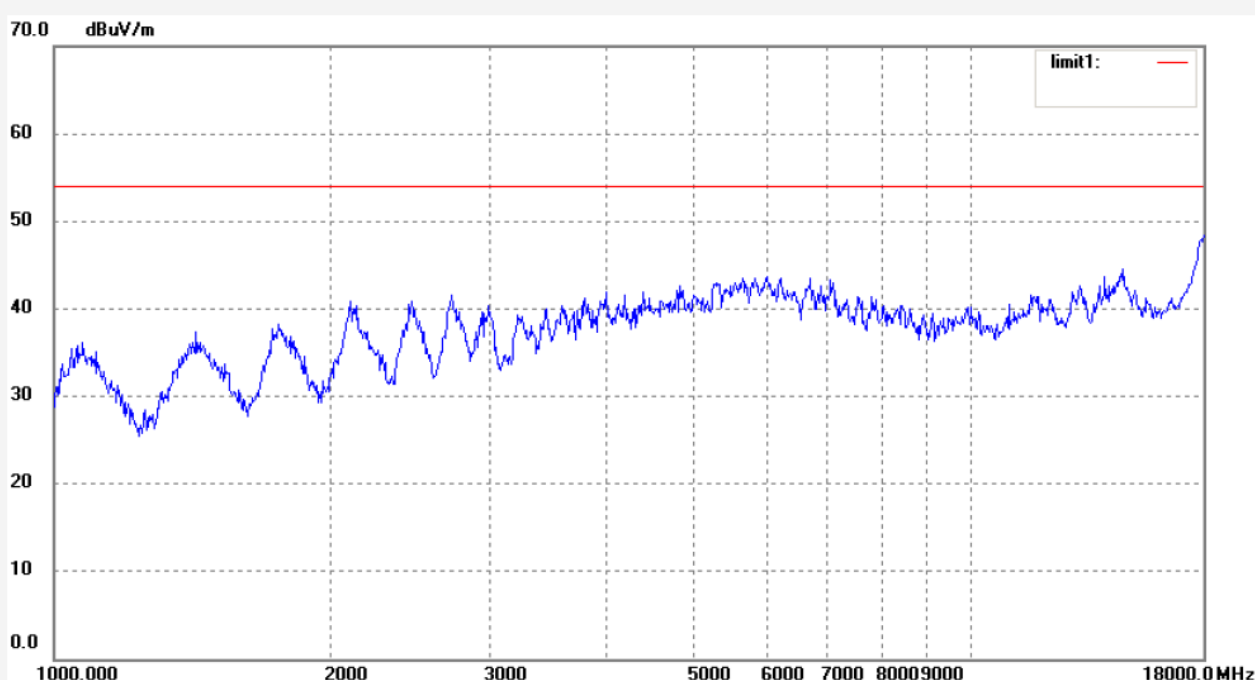
Date: 13/11/23/

Time: 21/35/43

Engineer Signature: Ricky

Distance:

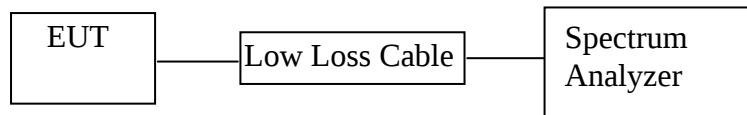
Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	----------------	---------------------	----------------	--------------------	-------------------	----------------	----------	----------------	------------------	--------

11.BAND EDGE COMPLIANCE TEST

11.1.Block Diagram of Test Setup



(EUT: Bayan Soundbook)

11.2.The Requirement For Section 15.247(d)

Section 15.247(d): 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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

11.3.EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

11.4.Operating Condition of EUT

11.4.1.Setup the EUT and simulator as shown as Section 11.1.

11.4.2.Turn on the power of all equipment.

11.4.3.Let the EUT work in TX (Hopping off, Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2480MHz TX frequency to transmit.

11.5. Test Procedure

11.5.1. The transmitter output was connected to the spectrum analyzer via a low loss cable.

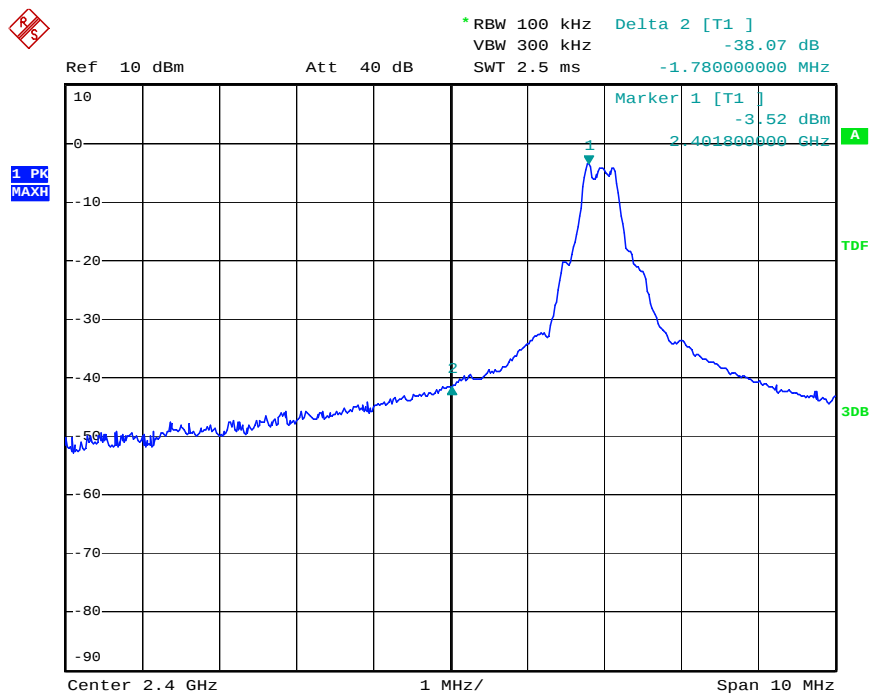
11.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz with convenient frequency span including 100 kHz bandwidth from band edge.

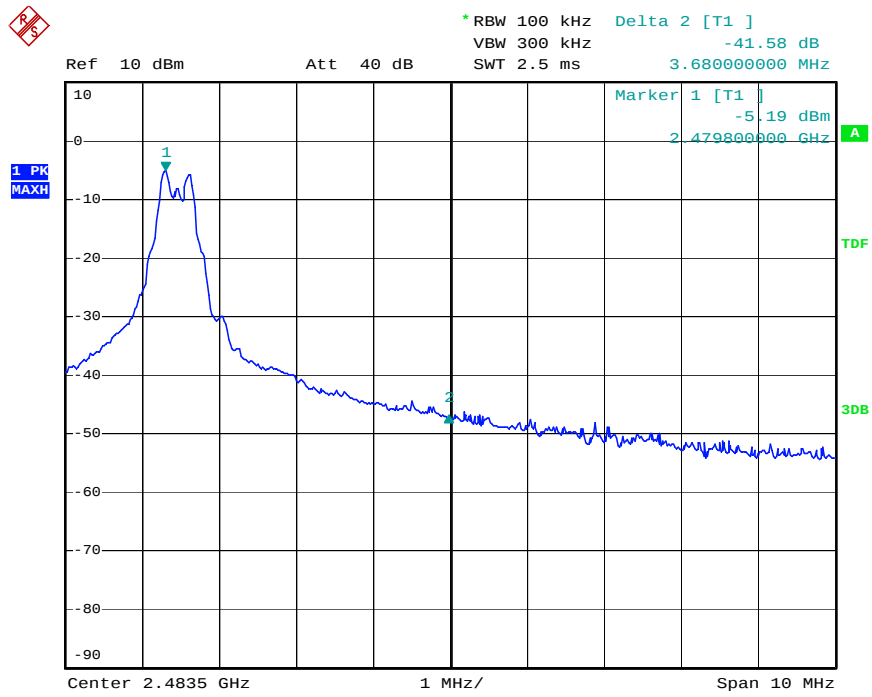
11.5.3. The band edges was measured and recorded.

11.6. Test Result

Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2402	38.07	> 20dBc
2480	41.58	> 20dBc

The spectrum analyzer plots are attached as below.





Radiated Band Edge Result

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. 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:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$

3. Display the measurement of peak values.

Non-hopping



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Job No.: RICKY #110

Standard: FCC 15C PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 49 %

EUT: Bayan Soundbook

Mode: TX 2402MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Vertical

Power Source: AC 120V/60Hz

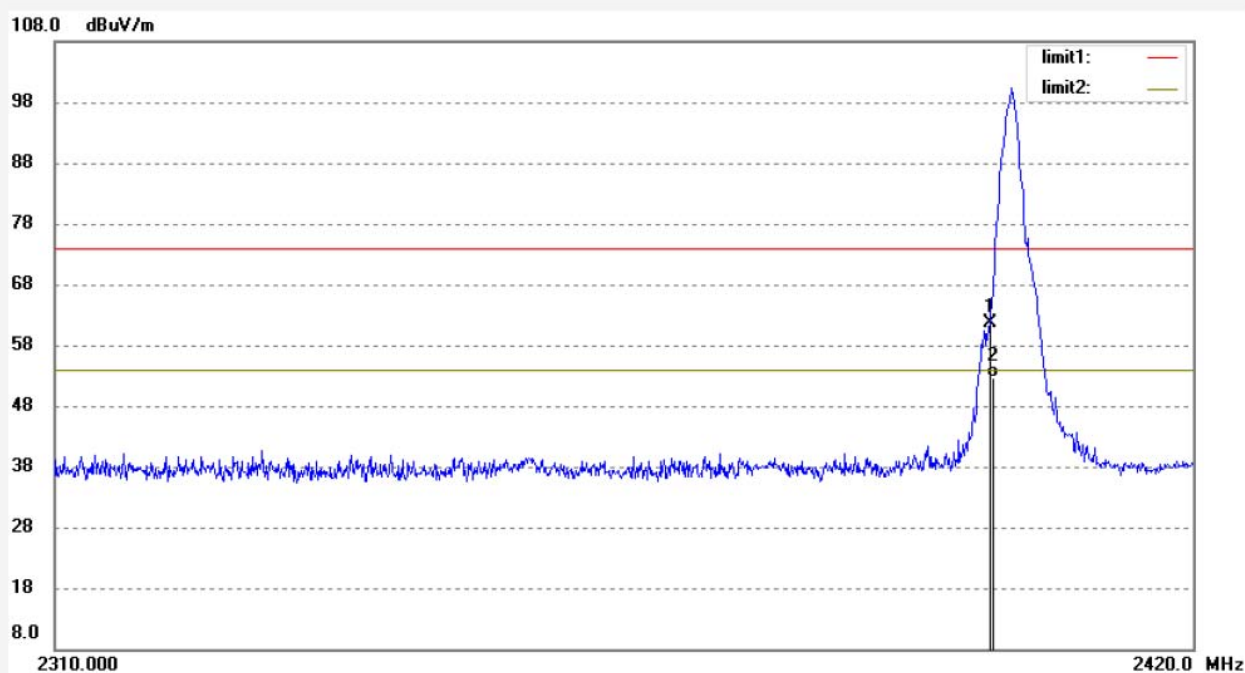
Date: 13/11/23/

Time: 20/58/01

Engineer Signature: Ricky

Distance: 3m

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2400.000	68.99	-7.46	61.53	74.00	-12.47	peak			
2	2400.000	60.10	-7.46	52.64	54.00	-1.36	AVG			



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Job No.: RICKY #111

Standard: FCC 15C PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 49 %

EUT: Bayan Soundbook

Mode: TX 2402MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Horizontal

Power Source: AC 120V/60Hz

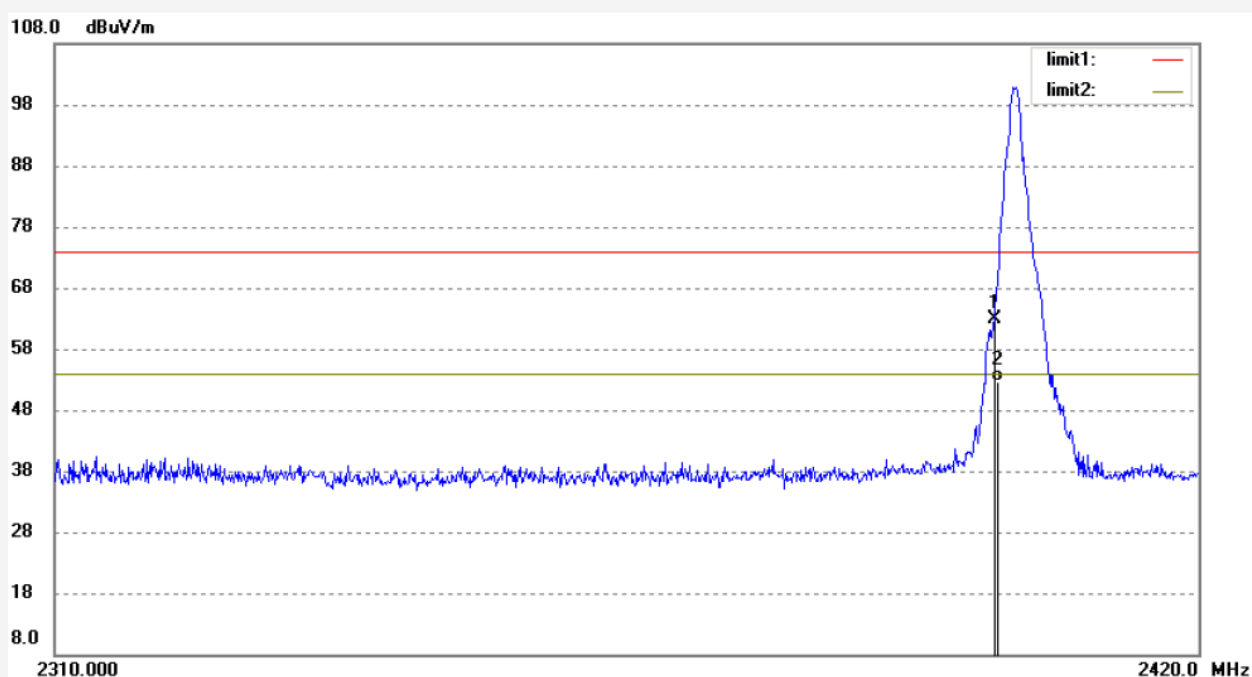
Date: 13/11/23/

Time: 20/59/33

Engineer Signature: Ricky

Distance: 3m

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2400.000	70.24	-7.46	62.78	74.00	-11.22	peak			
2	2400.000	60.00	-7.46	52.54	54.00	-1.46	AVG			


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Job No.: RICKY #112

Standard: FCC 15C PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 49 %

EUT: Bayan Soundbook

Mode: TX 2480MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Horizontal

Power Source: AC 120V/60Hz

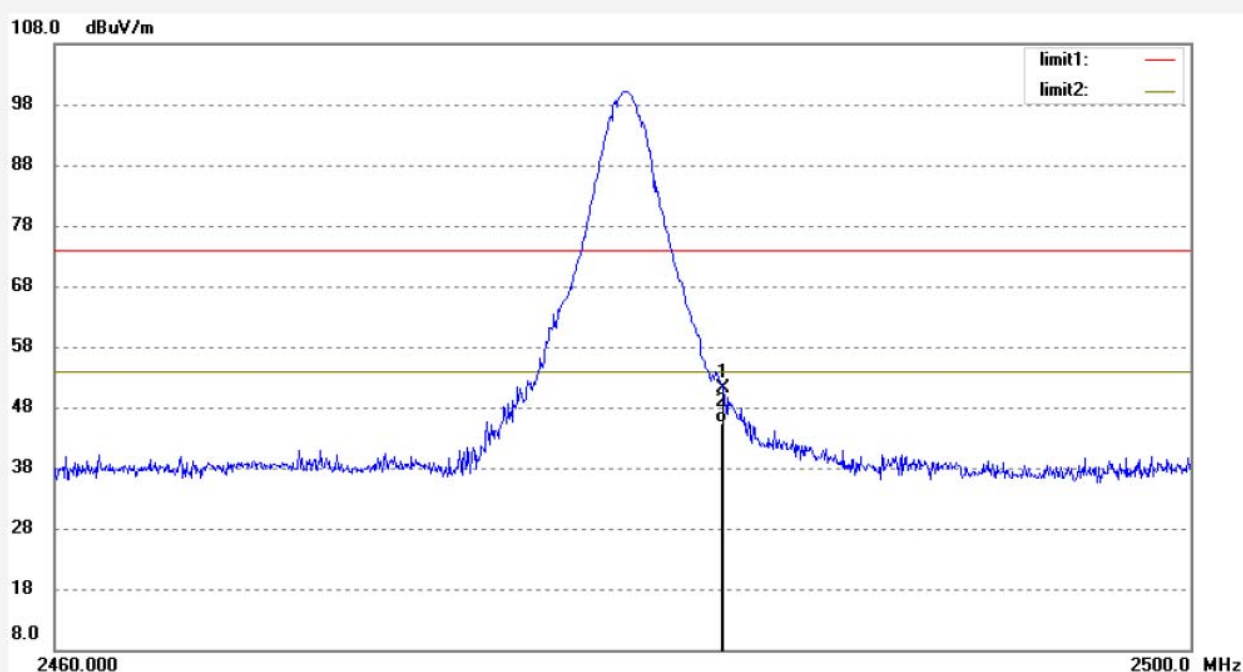
Date: 13/11/23/

Time: 21/14/32

Engineer Signature: Ricky

Distance: 3m

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.529	58.56	-7.37	51.19	74.00	-22.81	peak			
2	2483.529	52.68	-7.37	45.31	54.00	-8.69	AVG			



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Job No.: RICKY #113

Standard: FCC 15C PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 49 %

EUT: Bayan Soundbook

Mode: TX 2480MHz

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Vertical

Power Source: AC 120V/60Hz

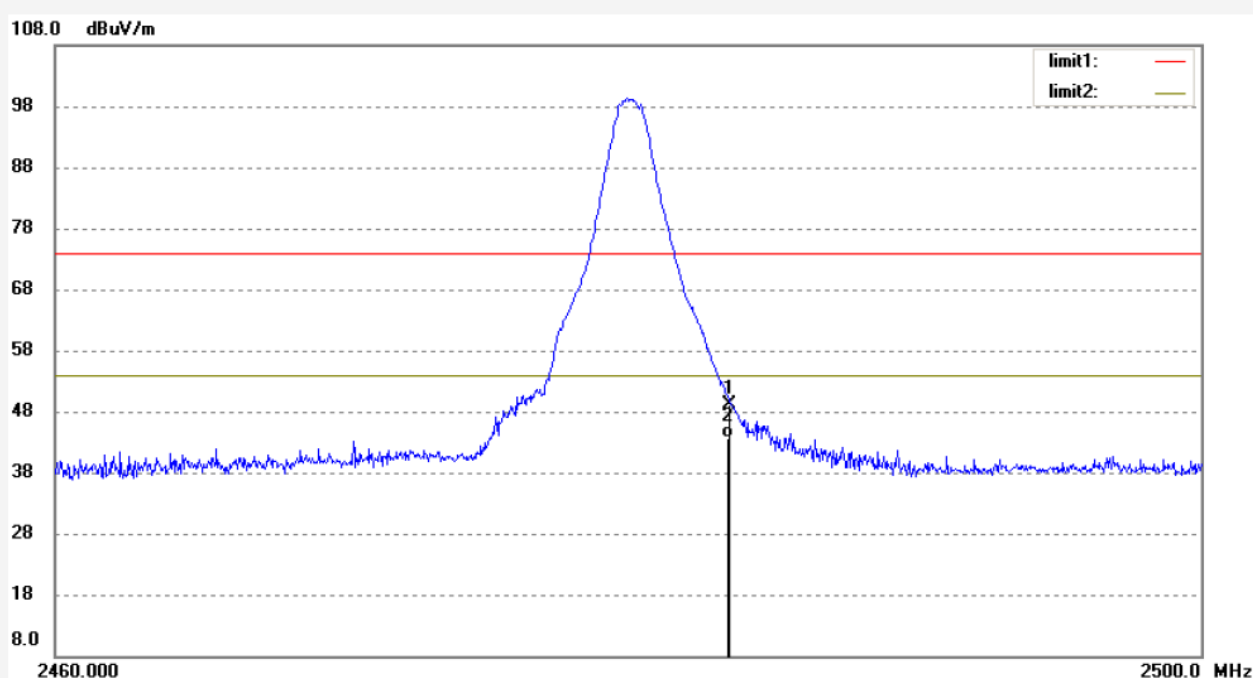
Date: 13/11/23/

Time: 21/17/24

Engineer Signature: Ricky

Distance: 3m

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.529	56.58	-7.37	49.21	74.00	-24.79	peak			
2	2483.529	50.89	-7.37	43.52	54.00	-10.48	AVG			

Hopping



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Job No.: STAR #3031

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Bayan Soundbook

Mode: HOPPING

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Horizontal

Power Source: AC 120V/60Hz

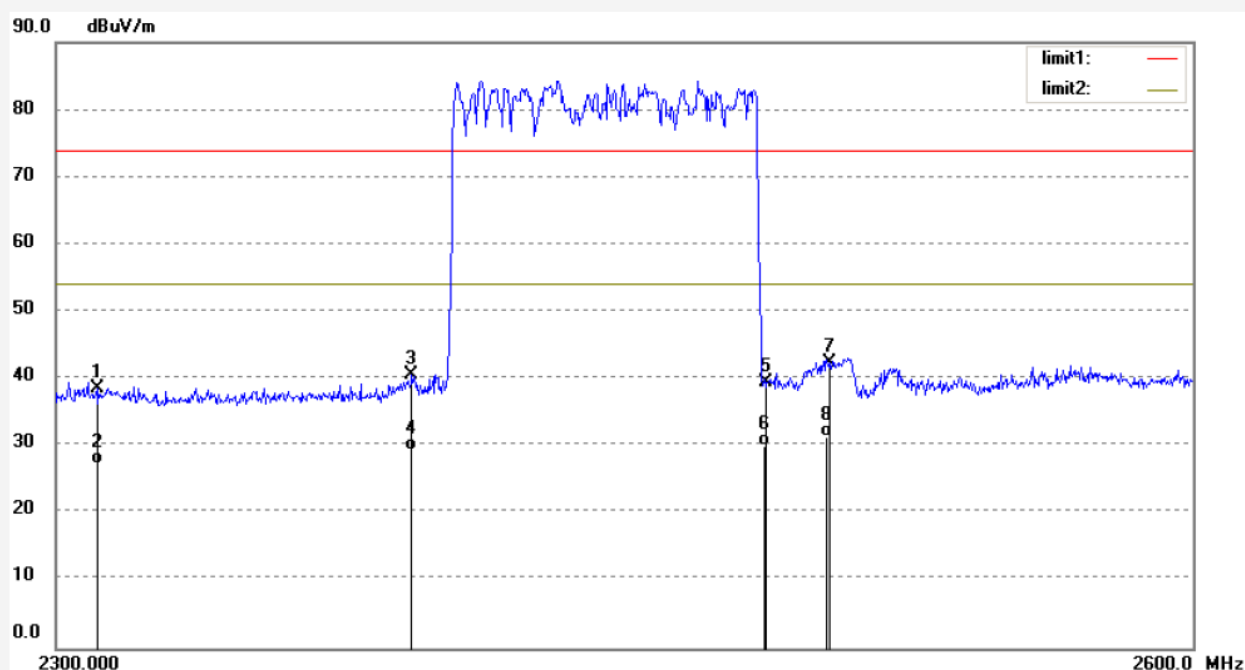
Date: 13/11/23/

Time: 11/36/34

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20132478



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	45.68	-6.99	38.69	74.00	-35.31	peak			
2	2310.000	34.29	-6.99	27.30	54.00	-26.70	AVG			
3	2390.000	47.42	-6.78	40.64	74.00	-33.36	peak			
4	2390.000	36.10	-6.78	29.32	54.00	-24.68	AVG			
5	2483.500	45.92	-6.54	39.38	74.00	-34.62	peak			
6	2483.500	36.61	-6.54	30.07	54.00	-23.93	AVG			
7	2500.000	48.96	-6.50	42.46	74.00	-31.54	peak			
8	2500.000	37.88	-6.50	31.38	54.00	-22.62	AVG			



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Job No.: STAR #3032

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Bayan Soundbook

Mode: HOPPING

Model: Bayan Soundbook X3

Manufacturer: Musilab

Polarization: Vertical

Power Source: AC 120V/60Hz

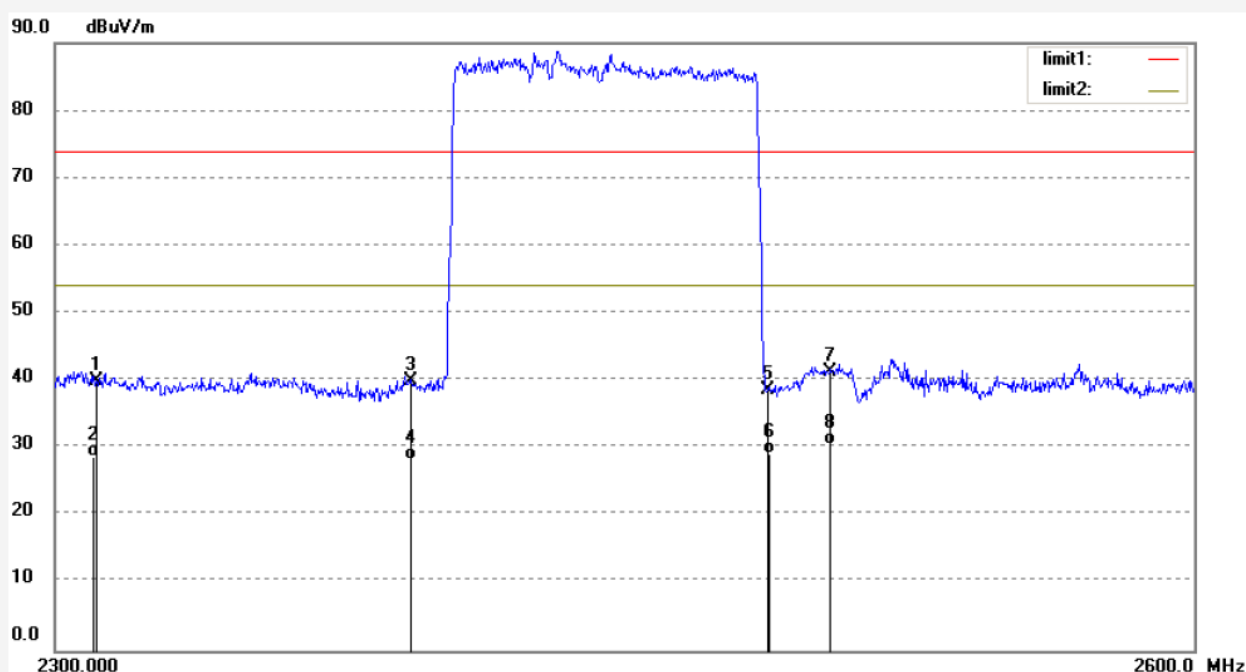
Date: 13/11/23/

Time: 11/39/37

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20132478



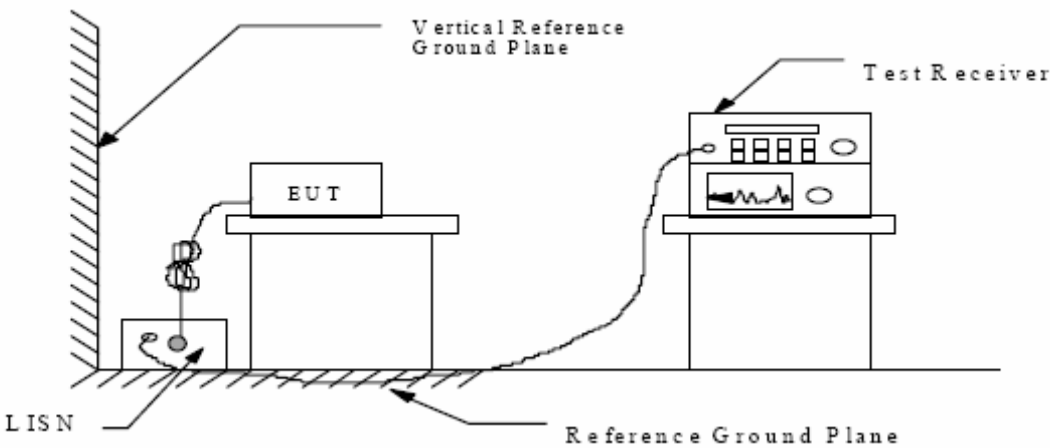
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	46.88	-6.99	39.89	74.00	-34.11	peak			
2	2310.000	35.60	-6.99	28.61	54.00	-25.39	AVG			
3	2390.000	46.74	-6.78	39.96	74.00	-34.04	peak			
4	2390.000	35.10	-6.78	28.32	54.00	-25.68	AVG			
5	2483.500	45.21	-6.54	38.67	74.00	-35.33	peak			
6	2483.500	35.66	-6.54	29.12	54.00	-24.88	AVG			
7	2500.000	47.76	-6.50	41.26	74.00	-32.74	peak			
8	2500.000	36.91	-6.50	30.41	54.00	-23.59	AVG			

12.AC POWER LINE CONDUCTED EMISSION FOR FCC PART 15 SECTION 15.207(A)

12.1.Block Diagram of Test Setup

12.1.1.Block diagram of connection between the EUT and simulators

12.1.2.Shielding Room Test Setup Diagram



(EUT: Bayan Soundbook)

12.2.The Emission Limit

12.2.1.Conducted Emission Measurement Limits According to Section 15.207(a)

Frequency (MHz)	Limit dB(μV)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0

* Decreases with the logarithm of the frequency.

12.3.Configuration of EUT on Measurement

The equipment are installed on the Conducted Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

12.4.Operating Condition of EUT

12.4.1.Setup the EUT and simulator as shown as Section 11.1.

12.4.2.Turn on the power of all equipment.

12.4.3.Let the EUT work in TX (Operation) mode measure it.

12.5.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4- 2009 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9 kHz.

The frequency range from 150 kHz to 30MHz is checked.

12.6.Power Line Conducted Emission Measurement Results

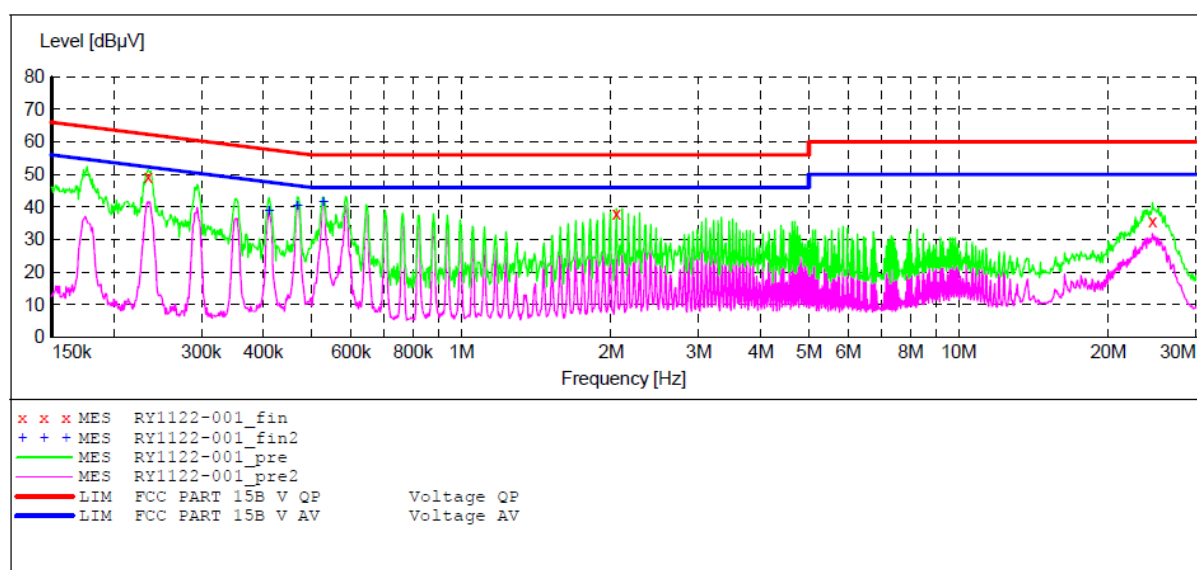
ACCURATE TECHNOLOGY CO., LTD**CONDUCTED EMISSION STANDARD FCC PART 15B**

EUT: Bayan Soundbook M/N:Bayan Soundbook X3
 Manufacturer: Musilab
 Operating Condition: Operation
 Test Site: 1#Shielding Room
 Operator: Ricky
 Test Specification: L 120V/60Hz
 Comment:

Report No.: ATE20132478

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average

**MEASUREMENT RESULT: "RY1122-001_fin"**

11/22/2013 3:29PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.234567	49.30	10.6	62	13.0	QP	L1	GND
2.049619	37.80	11.0	56	18.2	QP	L1	GND
24.549492	35.60	11.5	60	24.4	QP	L1	GND

MEASUREMENT RESULT: "RY1122-001_fin2"

11/22/2013 3:29PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.410192	38.60	10.7	48	9.0	AV	L1	GND
0.467950	40.10	10.7	47	6.5	AV	L1	GND
0.527486	41.50	10.7	46	4.5	AV	L1	GND

ACCURATE TECHNOLOGY CO., LTD**CONDUCTED EMISSION STANDARD FCC PART 15B**

EUT: Bayan Soundbook M/N:Bayan Soundbook X3
 Manufacturer: Musilab
 Operating Condition: Operation
 Test Site: 1#Shielding Room
 Operator: Ricky
 Test Specification: N 120V/60Hz
 Comment:

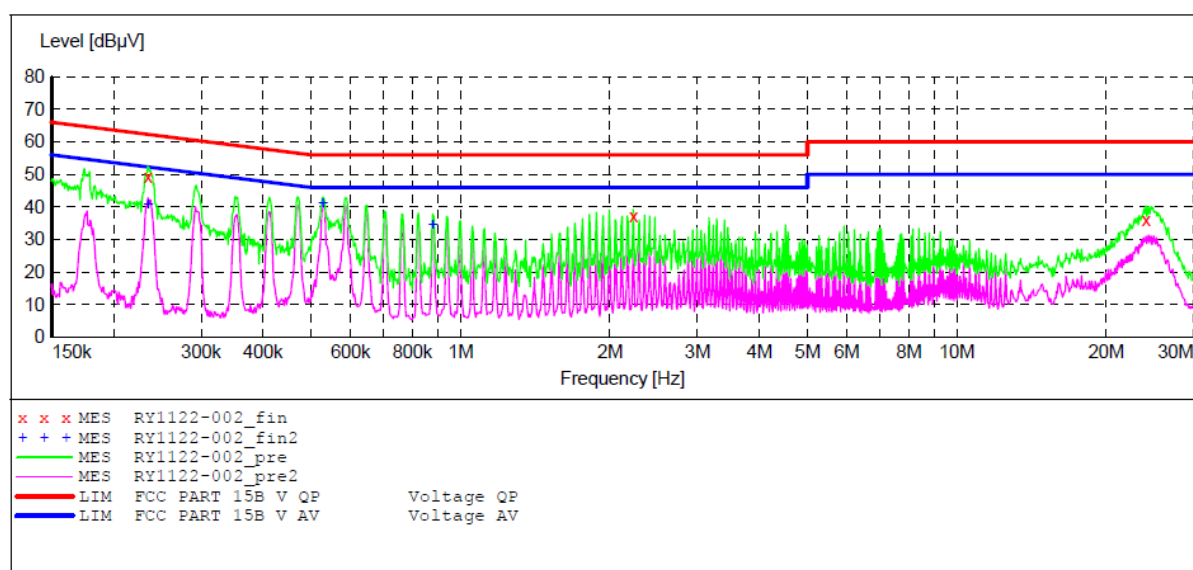
Report No.: ATE20132478

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70

Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency 150.0 kHz	Frequency 30.0 MHz	Width 4.5 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008

 Average

**MEASUREMENT RESULT: "RY1122-002_fin"**

11/22/2013 3:32PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.234567	49.30	10.6	62	13.0	QP	N	GND
2.228851	37.00	11.0	56	19.0	QP	N	GND
24.064340	35.90	11.5	60	24.1	QP	N	GND

MEASUREMENT RESULT: "RY1122-002_fin2"

11/22/2013 3:32PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.234567	40.70	10.6	52	11.6	AV	N	GND
0.527486	41.00	10.7	46	5.0	AV	N	GND
0.879278	34.40	10.8	46	11.6	AV	N	GND

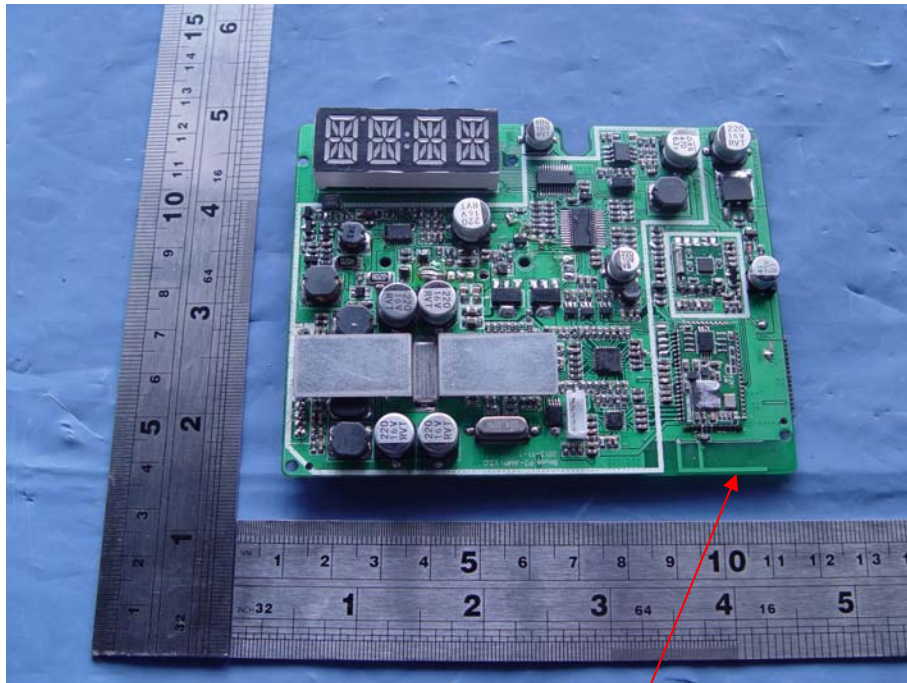
13.ANTENNA REQUIREMENT

13.1.The Requirement

According to Section 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.

13.2.Antenna Construction

The antenna is PCB Layout antenna, no consideration of replacement. Therefore, the equipment complies with the antenna requirement of Section 15.203.



Antenna