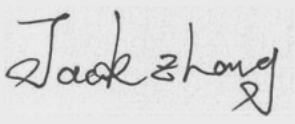
DEKRA Testing and Certification (Suzhou) Co., Ltd.
No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China
TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098

Test report No:
2140225R-RF-US-P06V01

FCC & ISED TEST REPORT

Product Name	Computer BOX
Trademark	Elo
Model and /or type reference	ESY00I4
FCC ID	RBWESY00I4
IC	10757B-ESY00I4
Applicant´s name / address	Elo Touch Solutions, Inc 670 N. McCarthy Blvd., Suite 100, Milpitas, CA 95035, USA.
Test method requested, standard	FCC CFR Title 47 Part 15 Subpart C Section 15.247 ANSI C63.10: 2013 KD558074 D01 15.247 Meas Guidance v05r02 RSS-Gen Issue 5 /RSS-247 Issue 2
Verdict Summary	IN COMPLIANCE
Tested by (name / position & signature)	Scott Shen/Project Engineer 
Approved by (name / position & signature)	Jack Zhang/ Supervisor 
Date of issue	2021-06-02
Report Version	V1.1
Report template No	Template_FCC 15.247-RF-V1.0

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COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.
In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

GENERAL CONDITIONS

Test Location	No. 99, Hongye Road, Suzhou Industrial Park Suzhou, 215006, P.R. China
Date(receive sample)	Apr. 09, 2021
Date (start test)	Apr. 10, 2021
Date (finish test)	May. 10, 2021

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.

ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT : Equipment Under Test
QP : Quasi-Peak
CAV : CISPR Average
AV : Average
CDN : Coupling Decoupling Network
SAC : Semi-Anechoic Chamber
OATS : Open Area Test Site
BW : Bandwidth
AM : Amplitude Modulation
PM : Pulse Modulation
HCP : Horizontal Coupling Plane
VCP : Vertical Coupling Plane
U_N : Nominal voltage
*T*x : Transmitter
*R*x : Receiver
N/A : Not Applicable
N/M : Not Measured

DOCUMENT HISTORY

Report No.	Version	Description	Issued Date
2140225R-RF-US-P06V01	V1.0	Initial issue of report.	2021-05-18
2140225R-RF-US-P06V01	V1.1	Modified some typos.	2021-06-02

REMARKS AND COMMENTS

1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
2. These test results on a sample of the device are for the purpose of demonstrating Compliance with Part 15 Subpart C Paragraph 15.247, RSS-Gen Issue 5, RSS-247 Issue 2.
3. The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to account the uncertainty associated with the measurement result.
4. The test results presented in this report relate only to the object tested.
5. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification (Suzhou) Co., Ltd.
6. This report will not be used for social proof function in China market.
7. DEKRA declines any responsibility with the following test data provided by customer that may affect the validity of result:
   - Chapter 1.1 General Description of the Item(s);
   - Chapter 1.2 Antenna Information;
   - Chapter 1.3Channel List.
8. Client claims the EUT has the same BT/WIFI module of DEKRA report No. 2140224R-RF-US-P06V01, so only conducted emission, band edge and radiated test items is re-evaluated.

USED EQUIPMENT

AC Power Line Conducted Emission / TR1

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMI Test Receiver	R&S	ESCI	100906	2021.04.28	2022.04.27
Two-Line V-Network	R&S	ENV216	101044	2021.03.20	2022.03.19
50ohm Termination	SHX	TF2	7081402	2020.09.23	2021.09.22
50ohm Termination	SHX	TF2	7081403	2020.09.23	2021.09.22
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	N/A	N/A
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2020.08.23	2021.08.22
Dekra test software	Dekra	-	-	-	-

Emissions in non-restricted frequency bands/ Occupied Bandwidth/ Fundamental emission output power/ Power Spectral Density/Band Edge/ TR8

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2020.08.15	2021.08.14
EXA Spectrum Analyzer	Keysight	N9010A	MY55370495	2021.03.20	2022.03.19
MXA Signal Anlyzer	Keysight	N9020A	MY56060147	2020.08.15	2021.08.14
4TX MIMO Power Sensor	Keysight	X8750A	MY59400102	2021.02.11	2022.02.10
Coaxial Cable	Woken	SFL402	F02-150410-044	2021.01.01	2021.12.31
Temperature/Humidity Meter	RTS	RTS-8S	RF08	2020.08.13	2021.08.12

Radiated Emission(30MHz-1GHz) / AC3

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMI Test Receiver	R&S	ESCI	100176	2020.08.15	2021.08.14
Loop Antenna	R&S	HFH2-Z2	833799/003	2021.03.04	2022.03.03
Bilog Antenna	Teseq GmbH	CBL6112D	27613	2020.08.19	2021.08.18
Coaxial Cable	Huber+Suhner	RG 214	AC3-C	2021.03.31	2022.03.30
Temperature/Humidity Meter	RTS	RTS-8S	AC3-TH	2020.08.13	2021.08.12
Dekra test software	Dekra	-	-	-	-

Radiated Emission(1GHz-40GHz) / AC5

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EXA Spectrum Analyzer	Keysight	N9010A	MY55370495	2021.03.20	2022.03.19
Amplifier	Keleto	LNPA	SK20190225	2020.09.25	2021.09.24
Preamplifier	EMCI	EMC184045SE	980263	2020.05.24	2021.05.23
DRG Horn Antenna	ETS-Lindgren	3117	00167055	2020.08.06	2021.08.05
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2021.04.14	2023.04.13
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2021.03.31	2022.03.30
Coaxial Cable	ROSENBERGER	LA1-C011-2000/3000	AC5-40G	2021.03.20	2022.03.19
Temperature/Humidity Meter	RTS	RTS-8S	AC5-TH	2020.08.13	2021.08.12
Dekra test software	Dekra	-	-	-	-

UNCERTAINTY

Uncertainties have been calculated according to the DEKRA internal document.The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.The Uncertainties is complice with standard required as below.

Test item	Uncertainty
Conducted Emission	± 2.02 dB
Emissions in restricted frequency bands	above 1G : ± 3.9 dB below 1G is :± 3.8 dB
20dB Bandwidth	± 1 kHz
Carrier Frequency Separation	± 1 kHz
Number of Hopping Frequencies	± 1 kHz
Time of Occupancy (Dwell Time)	± 0.1 us
Peak OutputPower	± 1.0 dB
Emissions in non-restricted frequency bands	± 1.0 dB
Radiated Emission Band Edge	above 1G : ± 3.9 dB below 1G : ± 3.8 dB

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Product Name ..... :	Computer BOX
Model No. ..... :	ESY00I4
Hardware Version ..... :	R04
Software Version ..... :	Android10
Firmware Version ..... :	9.87.51.11.45
FCC ID ..... :	RBWESY00I4
IC ..... :	10757B-ESY00I4
Manufacturer ..... :	Elo Touch Solutions, Inc
Manufacturer Address ..... :	670 N. McCarthy Blvd., Suite 100, Milpitas, CA 95035, USA.
Test Sample SN ..... :	B215A40105

Wireless specification..... :	Bluetooth					
Bluetooth Specification..... :	V3.0					
Operating frequency range(s) ..... :	2400~2483.5MHz					
Type of Modulation..... :	GFSK					
PHYs ..... :	☒	GFSK	☒	Pi/4 DQPSK	☒	8DPSK
Data Rate ..... :	☒	1Mbit/s	☒	2Mbit/s	☒	3Mbit/s
Number of channel..... :	79					
Operating Temperature Range ..... :	0℃~40℃					

Rated power supply ..... :	Voltage and Frequency	
	☐	AC: 220 – 240 V, 50/60 Hz
	☐	AC: 100 – 240 V, 50/60 Hz
	☒	DC: 19 Vdc
	☐	Battery: ……

1.2 Antenna Information

Antenna model / type number ..... :	N/A			
Antenna serial number ..... :	N/A			
Antenna Delivery ..... :	☒	1TX + 1RX		
	☐	2TX + 2RX		
	☐	Others:……		
Antenna technology ..... :	☒	SISO		
	☐	MIMO	☐	CDD
			☐	Beam-forming
Antenna Type ..... :	☒	External	☒	Dipole
			☐	Sectorized
	☐	Internal	☐	PIFA
			☐	PCB
			☐	Dipole
			☐	Others……..
Antenna Gain ..... :	2 dBi			

1.3 Channel List

Bluetooth Working Frequency of Each Channel: (For V3.0)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2403 MHz	02	2404 MHz	03	2405 MHz
04	2406 MHz	05	2407 MHz	06	2408 MHz	07	2409 MHz
08	2410 MHz	09	2411 MHz	10	2412 MHz	11	2413 MHz
12	2414 MHz	13	2415 MHz	14	2416 MHz	15	2417 MHz
16	2418 MHz	17	2419 MHz	18	2420 MHz	19	2421 MHz
20	2422 MHz	21	2423 MHz	22	2424 MHz	23	2425 MHz
24	2426 MHz	25	2427 MHz	26	2428 MHz	27	2429 MHz
28	2430 MHz	29	2431 MHz	30	2432 MHz	31	2433 MHz
32	2434 MHz	33	2435 MHz	34	2436 MHz	35	2437 MHz
36	2438 MHz	37	2439 MHz	38	2440 MHz	39	2441 MHz
40	2442 MHz	41	2443 MHz	42	2444 MHz	43	2445 MHz
44	2446 MHz	45	2447 MHz	46	2448 MHz	47	2449 MHz
48	2450 MHz	49	2451 MHz	50	2452 MHz	51	2453 MHz
52	2454 MHz	53	2455 MHz	54	2456 MHz	55	2457 MHz
56	2458 MHz	57	2459 MHz	58	2460 MHz	59	2461 MHz
60	2462 MHz	61	2463 MHz	62	2464 MHz	63	2465 MHz
64	2466 MHz	65	2467 MHz	66	2468 MHz	67	2469 MHz
68	2470 MHz	69	2471 MHz	70	2472 MHz	71	2473 MHz
72	2474 MHz	73	2475 MHz	74	2476 MHz	75	2477 MHz
76	2478 MHz	77	2479 MHz	78	2480 MHz	N/A	N/A

Note: The general description of the Item(s), antenna information and channel list in clause 1 are provided and confirmed by the client.

2 DESCRIPTION OF TEST SETUP

2.1 Operating mode(s) used for tests

During the tests the following operating mode(s) has(have) been used.

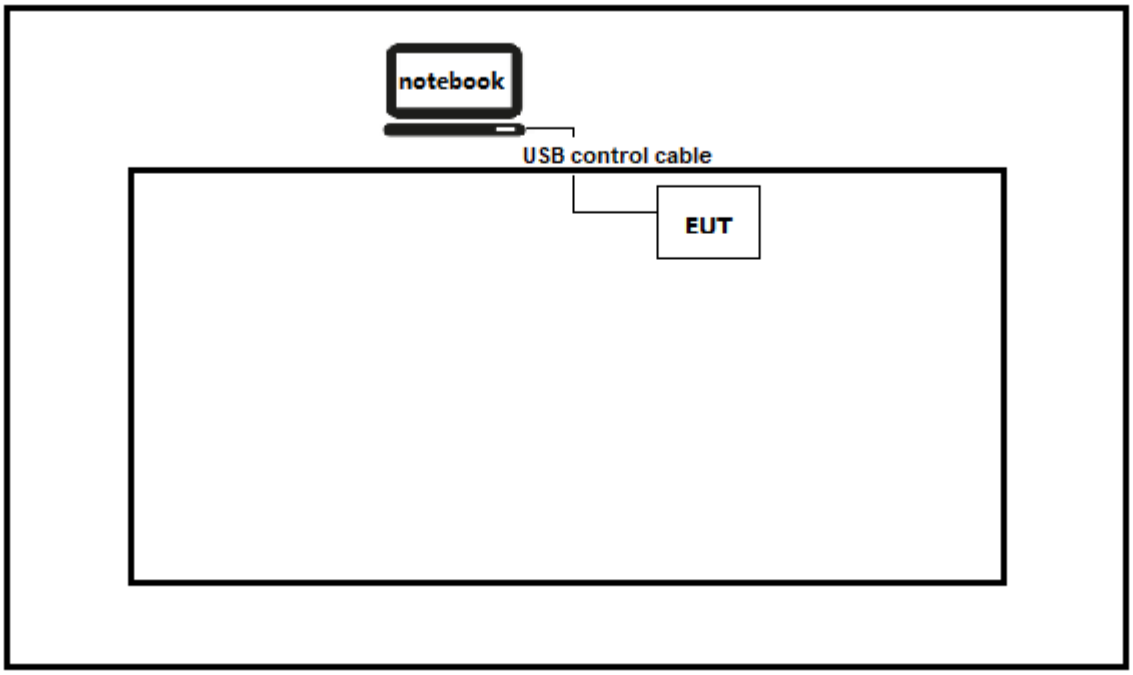
Test Mode For Bluetooth	Mode 1: Transmitter-1Mbps(GFSK_DH5)
	Mode 2: Transmitter-2Mbps(Pi/4 DQPSK_DH5)
	Mode 3: Transmitter-3Mbps(8DPSK_DH5)
	Mode 4: Transmitter-Hopping-1Mbps(GFSK_DH5)
	Mode 5: Transmitter-Hopping-2Mbps(Pi/4 DQPSK_DH5)
	Mode 6: Transmitter-Hopping-3Mbps(8DPSK_DH5)

2.2 Auxiliary equipment / Test software for the EUT

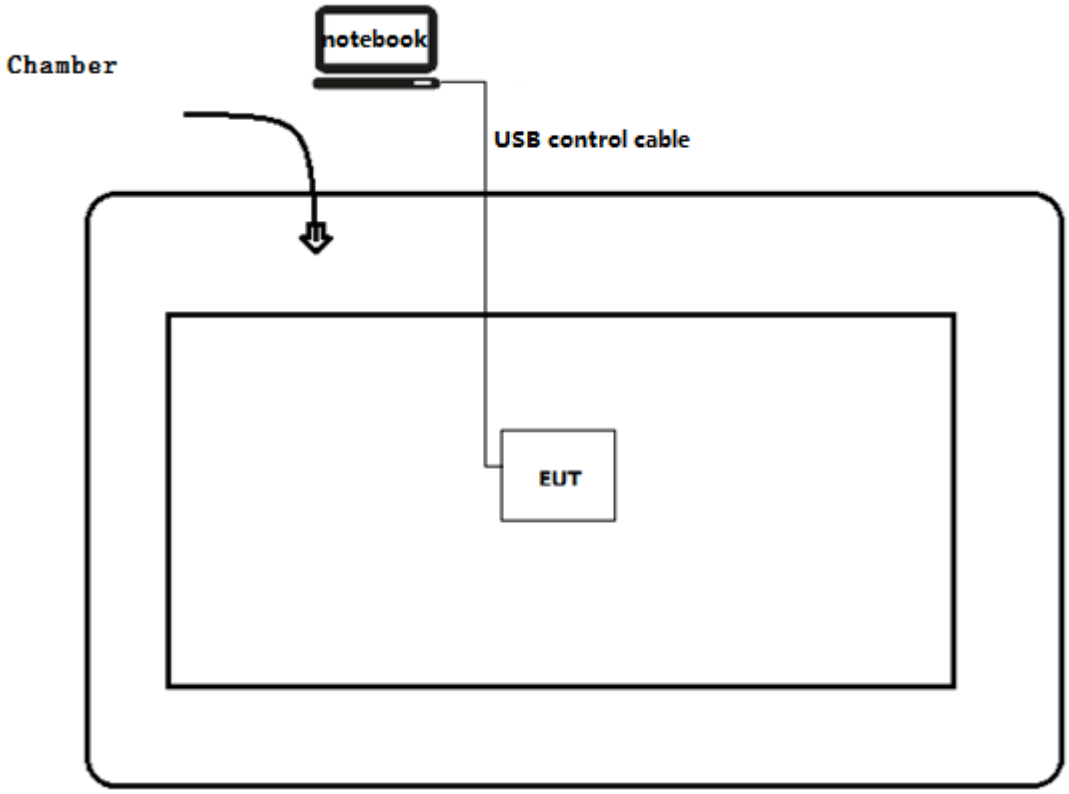
Auxiliary equipment	Type / Version	Manufacturer	Supplied by
Notebook	2526	Think Pad	N/A
Software	Type / Version	Manufacturer	Supplied by
Ampak RFTestTool	N/A	N/A	N/A

2.3 Test Configuration / Block diagram used for tests

Test setup Diagram- AC Line Conducted Emission Test



Test setup Diagram- Radiated Emission



2.4 Testing process

1	Setup the EUT as shown in Section 2.3
2	Execute the test program.
3	Configure the test mode and test channel.
4	Verify that the EUT works properly.

3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

3.1 Standards

Standard	Year	Description
FCC CFR Title 47 Part 15 Subpart C Section 15.247	2021	Operation within the bands902–928 MHz, 2400–2483.5 MHz, and5725–5850 MHz.
ANSI C63.10	2013	American National Standard ofProcedures for Compliance Testing ofUnlicensed Wireless Devices
KDB558074 D01 v05r02	2019	Guidance for performing compliance measurements on Digital Transmission System (DTS) operating under section 15.247
RSS-Gen Issue 5 Amendment 2	2021	General Requirements forCompliance of Radio Apparatus
RSS-247 Issue 2	2017	Digital Transmission Systems (DTSs),Frequency Hopping Systems (FHSs)and Licence-Exempt Local Area Network(LE-LAN) Devices

3.2 Deviation(s) from the Standard(s) / Test Specification(s)

The following deviation(s) was / were made from the published requirements of the listed standards: N/A.

(Please define the deviations from the standard(s) if applicable)

3.3 Overview of results

For FCC

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2015Section 15.207	Yes	No
Emissions in restricted frequency bands	FCC CFR Title 47 Part 15 Subpart C: 2015Section 15.209	Yes	No
20dB Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(1)	Yes	No
Carrier Frequency Separation	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(1)	Yes	No
Number of Hopping Frequencies	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(1)(iii)	Yes	No
Time of Occupancy (Dwell Time)	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(1)(iii)	Yes	No
Peak OutputPower	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(b)(1)	Yes	No
Emissions in non-restricted frequency bands	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.215(c), 15.247(d)	Yes	No
Band Edge	FCC CFR Title 47 Part 15 Subpart C: 2015 15.247(d)	Yes	No
Antenna Requirement	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.203	Yes	No

For ISED

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	RSS-Gen Issue 5Section 8.8	Yes	No
Radiated Emission	RSS-Gen Issue 5Section 8.9	Yes	No
20dB Bandwidth	RSS-247 Issue 2 Section 5.1	Yes	No
Carrier Frequency Separation	RSS-247 Issue 2 Section 5.1	Yes	No
Number of Hopping Frequencies	RSS-247 Issue 2 Section 5.1	Yes	No
Time of Occupancy (Dwell Time)	RSS-247 Issue 2 Section 5.1	Yes	No
Peak OutputPower	RSS-247 Issue 2 Section 5.4	Yes	No
Emissions in non-restricted frequency bands	RSS-247 Issue 2 Section 5.5	Yes	No
Band Edge	RSS-Gen Issue 5Section 8.10	Yes	No
Antenna Requirement	RSS-Gen Issue 5Section 8.3	Yes	No

3.4 Test Facility

USA	**:**	**FCC Designation Number: CN1199**
CA	**:**	**ISED CAB identifier: CN0040**

4 TEST RESULTS

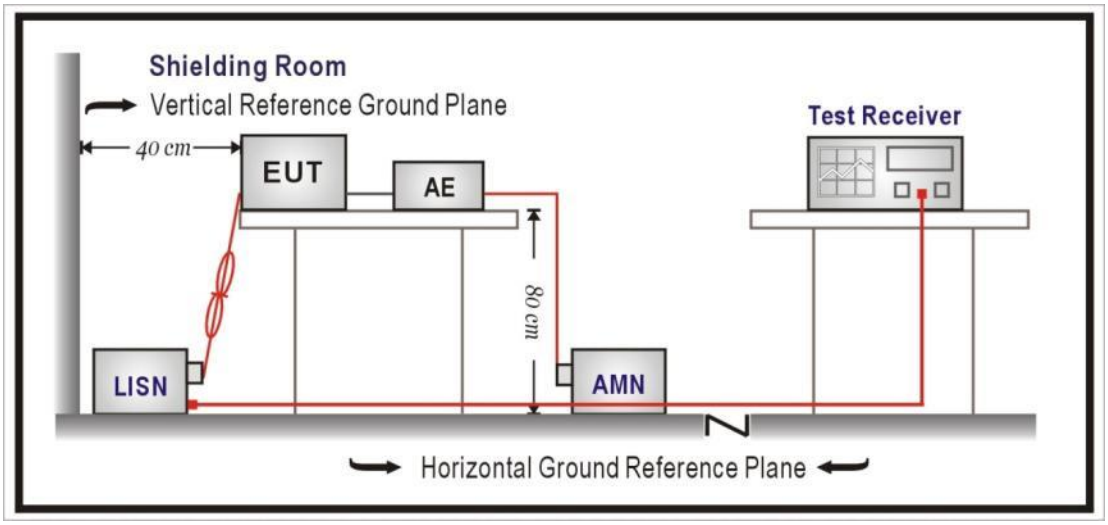
4.1 Conducted Emission	VERDICT: PASS

4.1.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.207	
Frequency range [MHz]	Limit: QP [dB(μV)[1)]]	Limit: AV [dB(μV) [1)]]
0,15 - 0,50	66 – 56 [2)]	56 - 46 [2)]
0,50 - 5,0	56	46
5,0 - 30	60	50

[1)] At the transition frequency, the lower limit applies.
[2)] The limit decreases linearly with the logarithm of the frequency.
NOTE 1: The exclusion band for transmitters shall be considered for transmitters operating at frequencies below 30 MHz.
NOTE 2: Where the AC output port is directly connected (or via a circuit breaker) to the AC power input port of the EUT the AC power output port need not to be tested.

4.1.2 Test Setup

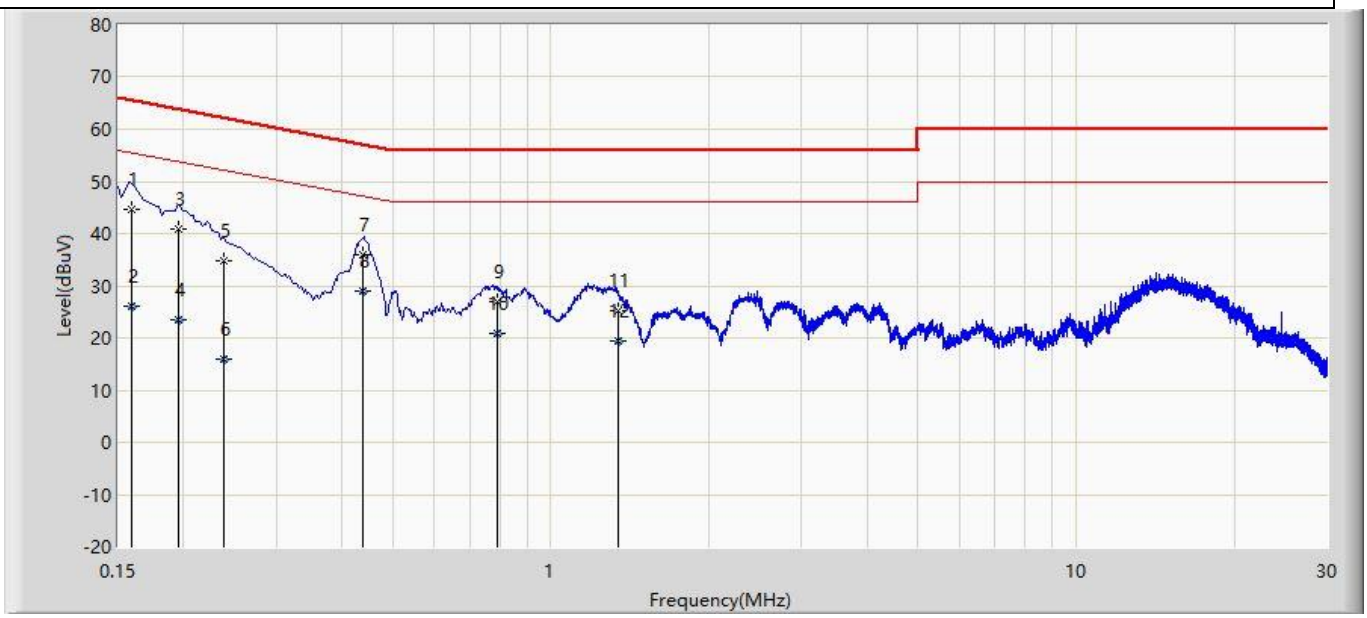


4.1.3 Test Procedure

	References Rule	Chapter	Item
☒	ANSI C63.10-2013	6.2	Standard test method for ac power-line conducted emissions from unlicensedwireless devices

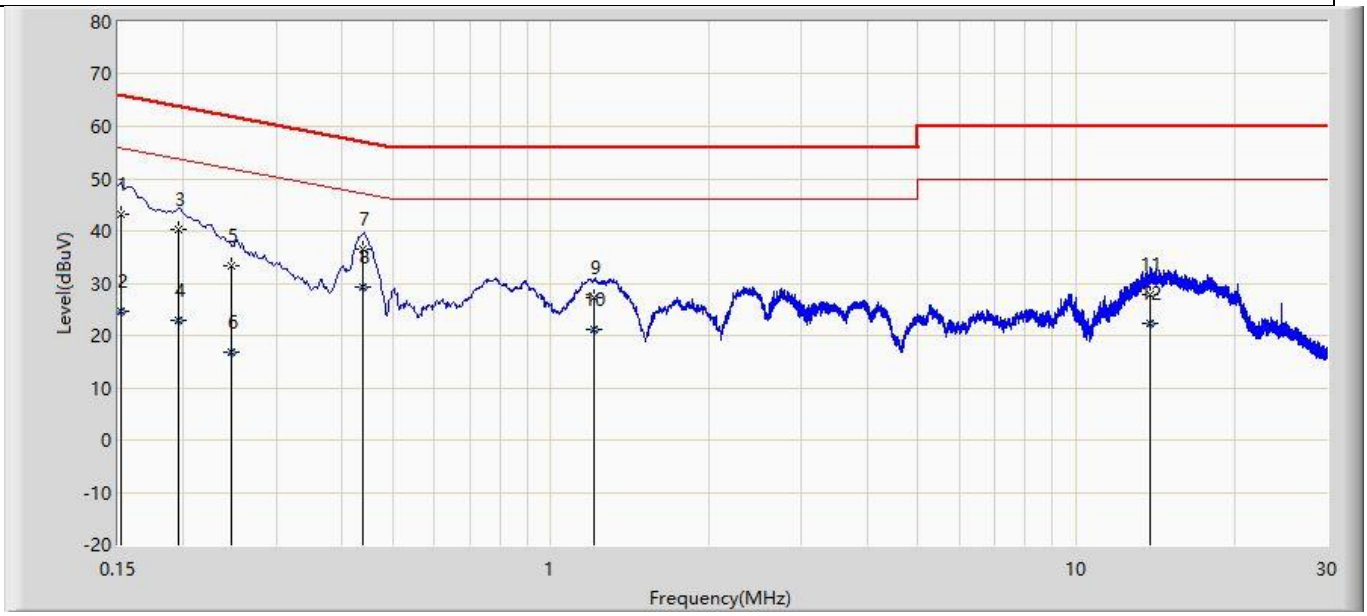
4.1.4 Test Data

Profile: 2140225R	Page No.: 16
Engineer: Juliuszhou	
Site: TR1	Time: 2021/04/28 - 19:35
Limit: FCC_Part15.207_CE_AC Power	Margin: 0
Probe: ENV216_101190(0.009-30MHz)	Polarity: Line
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		0.159	44.549	34.889	-20.967	65.516	9.660	QP
2		0.159	26.185	16.525	-29.331	55.516	9.660	AV
3		0.195	40.839	31.155	-22.982	63.821	9.684	QP
4		0.195	23.368	13.684	-30.453	53.821	9.684	AV
5		0.238	34.734	25.028	-27.441	62.174	9.705	QP
6		0.238	15.864	6.159	-36.310	52.174	9.705	AV
7		0.440	36.059	26.255	-20.998	57.057	9.804	QP
8	*	0.440	28.915	19.112	-18.142	47.057	9.804	AV
9		0.789	27.048	17.123	-28.952	56.000	9.925	QP
10		0.789	20.814	10.889	-25.186	46.000	9.925	AV
11		1.340	25.273	15.282	-30.727	56.000	9.991	QP
12		1.340	19.450	9.458	-26.550	46.000	9.991	AV

Profile: 2140225R	Page No.: 21
Engineer: Juliuszhou	
Site: TR1	Time: 2021/04/28 - 19:42
Limit: FCC_Part15.207_CE_AC Power	Margin: 0
Probe: ENV216_101190(0.009-30MHz)	Polarity: Neutral
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		0.152	43.133	33.397	-22.743	65.876	9.736	QP
2		0.152	24.588	14.851	-31.289	55.876	9.736	AV
3		0.195	40.209	30.446	-23.612	63.821	9.763	QP
4		0.195	22.988	13.225	-30.832	53.821	9.763	AV
5		0.247	33.401	23.621	-28.465	61.866	9.780	QP
6		0.247	16.699	6.920	-35.167	51.866	9.780	AV
7		0.440	36.595	26.767	-20.463	57.057	9.828	QP
8	*	0.440	29.221	19.393	-17.836	47.057	9.828	AV
9		1.210	27.332	17.384	-28.668	56.000	9.948	QP
10		1.210	21.123	11.176	-24.877	46.000	9.948	AV
11		13.855	27.956	17.564	-32.044	60.000	10.392	QP
12		13.855	22.333	11.941	-27.667	50.000	10.392	AV

4.2 Emissions in restricted frequency bands — VERDICT: PASS

4.2.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.209		
Restricted Bands of operation for FCC			
Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
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
8.81425 – 8.81475	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	
13.36 – 13.41			
Restricted Bands of operationfor ISED			
0.090 - 0.110	13.36 - 13.41	960 - 1427	9.0 - 9.2
0.495 - 0.505	16.42 - 16.423	1435 - 1626.5	9.3 - 9.5
2.1735 - 2.1905	16.69475 - 16.69525	1645.5 - 1646.5	10.6 - 12.7
3.020 - 3.026	16.80425 - 16.80475	1660 - 1710	13.25 - 13.4
4.125 - 4.128	25.5 - 25.67	1718.8 - 1722.2	14.47 - 14.5
4.17725 - 4.17775	37.5 - 38.25	2200 - 2300	15.35 - 16.2
4.20725 - 4.20775	73 - 74.6	2310 - 2390	17.7 - 21.4
5.677 - 5.683	74.8 - 75.2	2483.5 - 2500	22.01 - 23.12
6.215 - 6.218	108 - 138	2655 - 2900	23.6 - 24.0
6.26775 - 6.26825	149.9 - 150.05	3260 - 3267	31.2 - 31.8
6.31175 - 6.31225	156.52475 - 156.52525	3332 - 3339	36.43 - 36.5
8.291 - 8.294	156.7 - 156.9	3345.8 - 3358	Above 38.6
8.362 - 8.366	162.0125 - 167.17	3500 - 4400	
8.37625 - 8.38675	167.72 - 173.2	4500 - 5150	
8.41425 - 8.41475	240 - 285	5350 - 5460	
12.29 - 12.293	322 - 335.4	7250 - 7750	
12.51975 - 12.52025	399.9 - 410	8025 - 8500	
12.57675 - 12.57725	608 - 614	--	

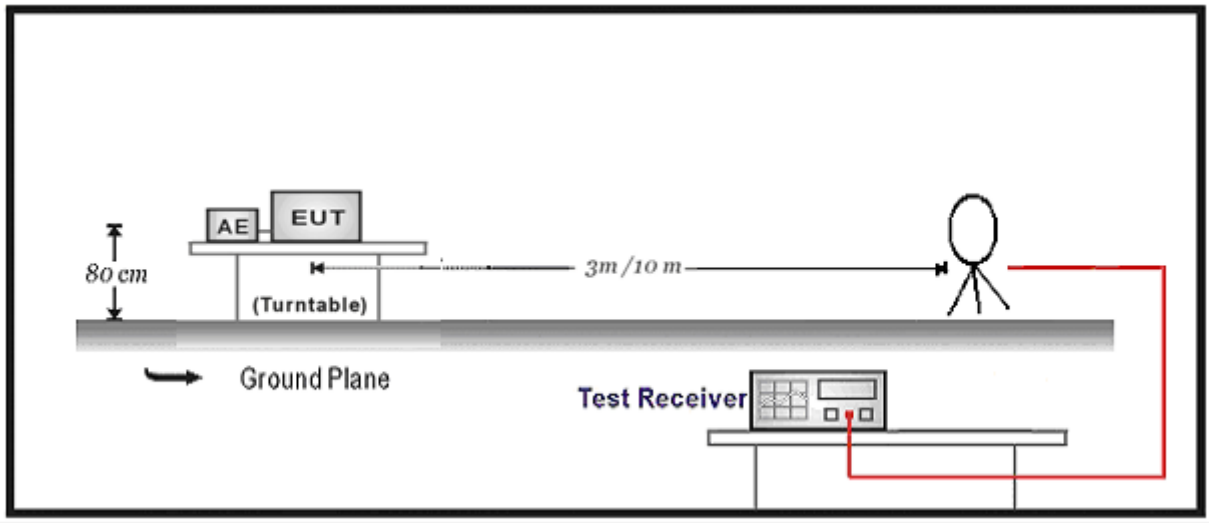
Restricted Band Emissions Limit			
Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30(Note 1)
1.705 - 30	30	29.5	30(Note 1)
30 -88	100	40	3(Note 2)
88-216	150	43.5	3(Note 2)
216 - 960	200	46	3(Note 2)
Above 960	500	54	3(Note 2)

Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

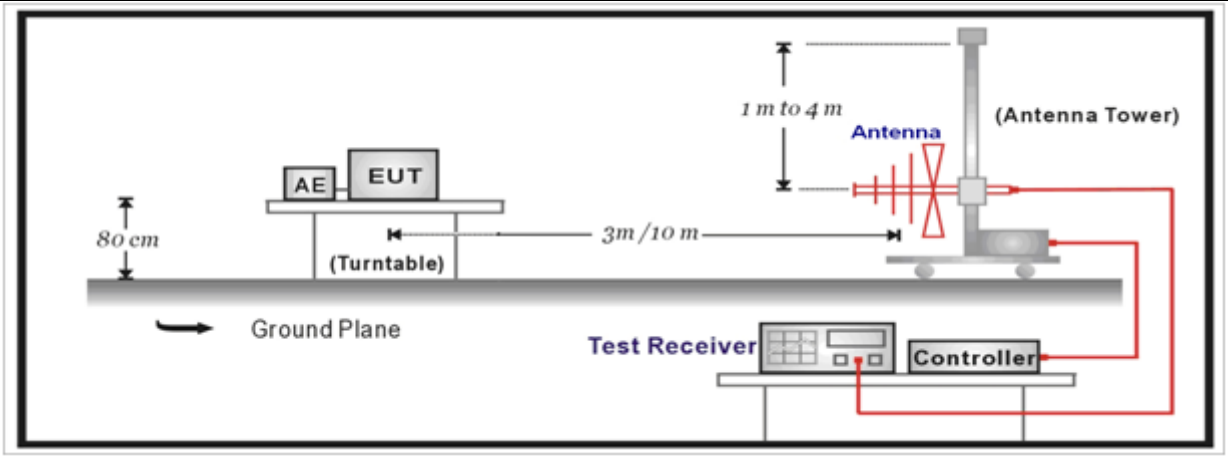
Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

4.2.2 Test Setup

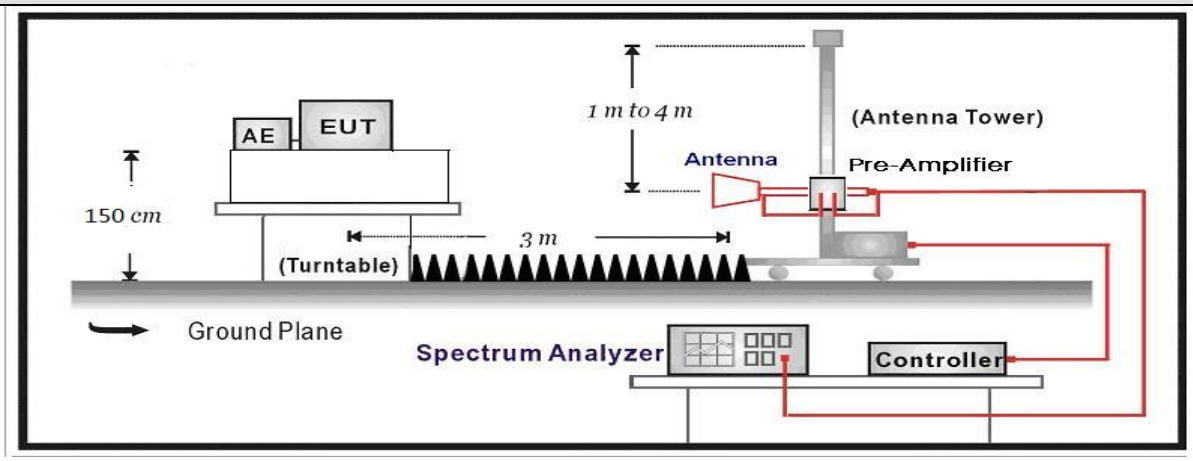
Below 30MHz Test Setup:



30MHz-1GHz Test Setup:



Above 1GHz Test Setup:

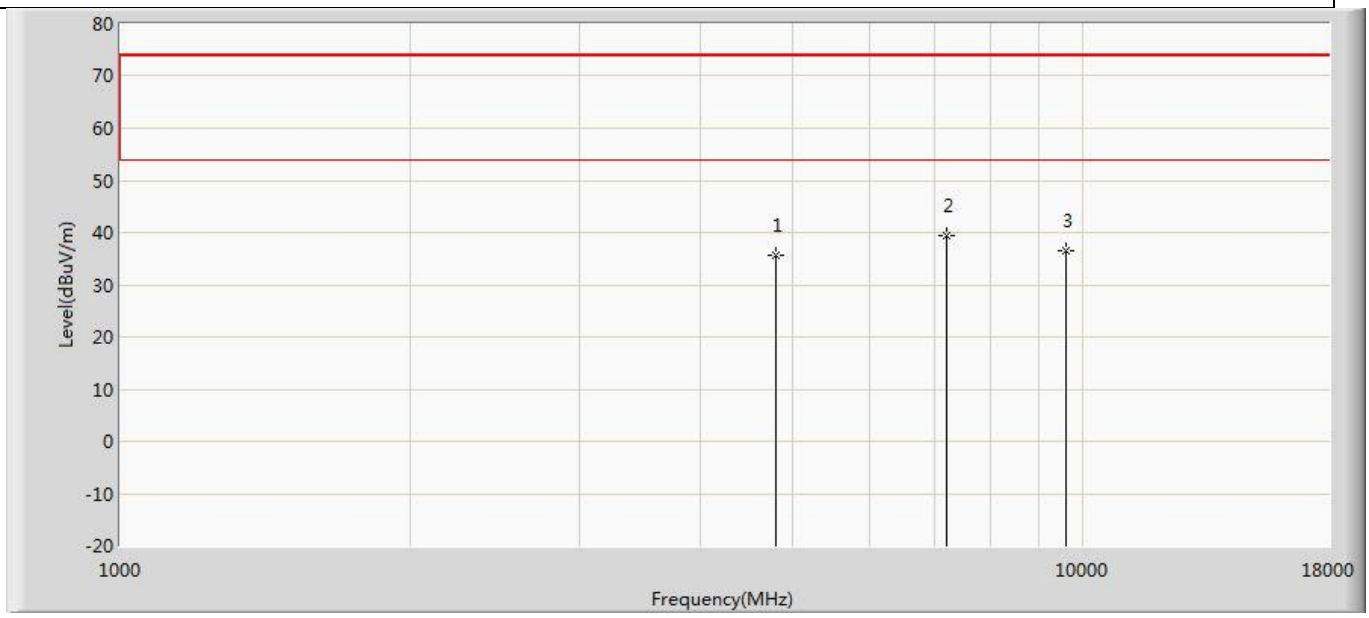


4.2.3 Test Procedure

	References Rule			Chapter	Description
☒	ANSI C63.10			11.12	Emissions in restricted frequency bands
	☒	ANSI C63.10		11.12.1	Radiated emission measurements
	☒	ANSI C63.10		11.12.2.7	Radiated spurious emission test
		☒	ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
		☒	ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
		☒	ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz

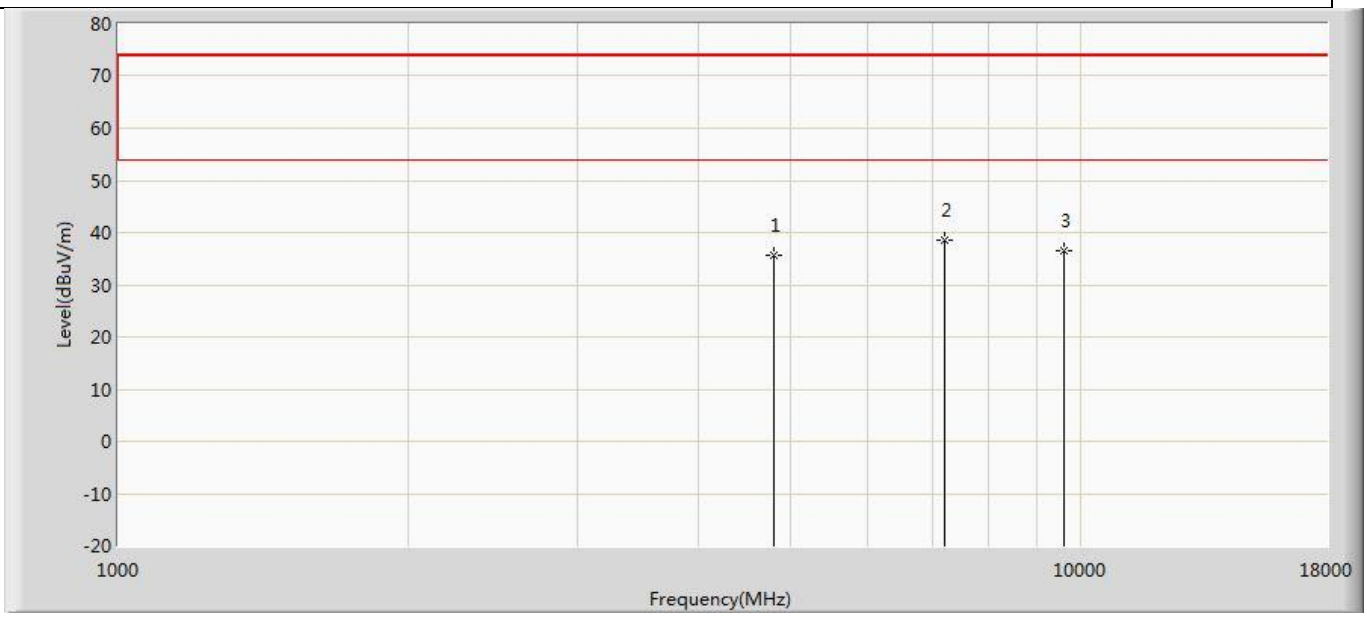
4.2.4 Test Data

Profile: 2140225R	Page No.: 43
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:52
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 2402MHz by DH5	



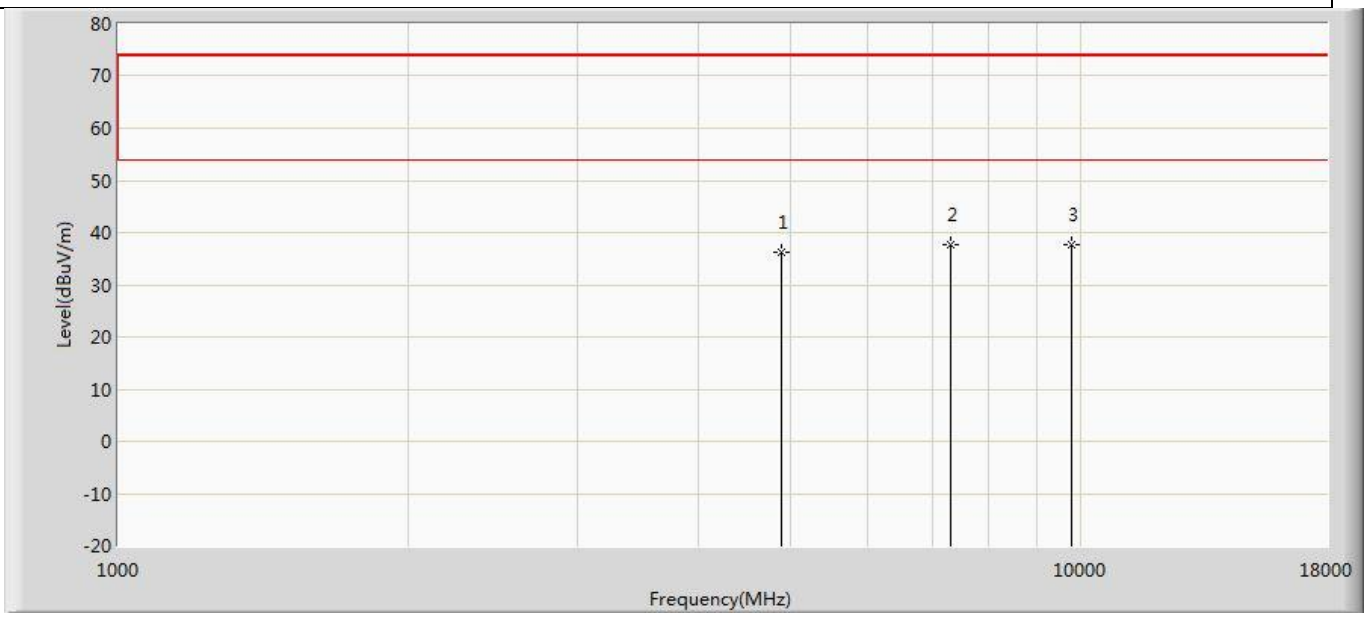
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	35.614	42.023	-38.386	74.000	-6.409	PK
2	*	7206.000	39.296	41.695	-34.704	74.000	-2.399	PK
3		9608.000	36.535	37.740	-37.465	74.000	-1.204	PK

Profile: 2140225R	Page No.: 44
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:53
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 2402MHz by DH5	



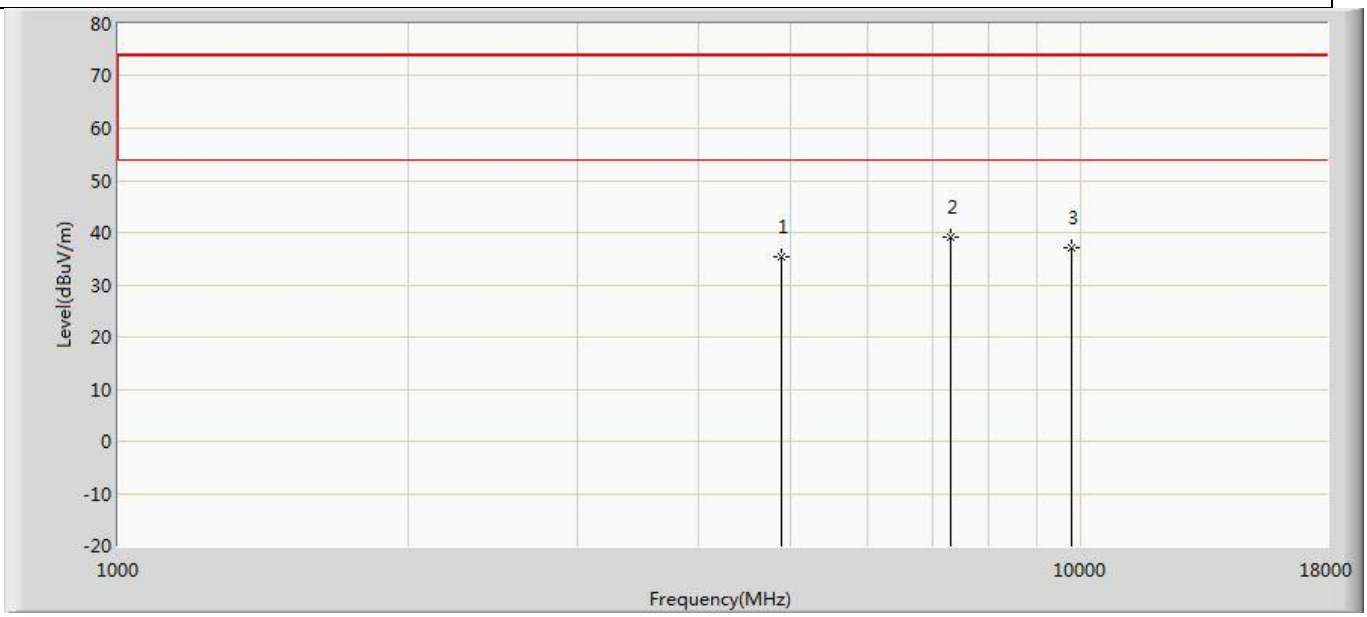
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	35.653	42.062	-38.347	74.000	-6.409	PK
2	*	7206.000	38.462	40.861	-35.538	74.000	-2.399	PK
3		9608.000	36.600	37.805	-37.400	74.000	-1.204	PK

Profile: 2140225R	Page No.: 45
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:53
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 2441MHz by DH5	



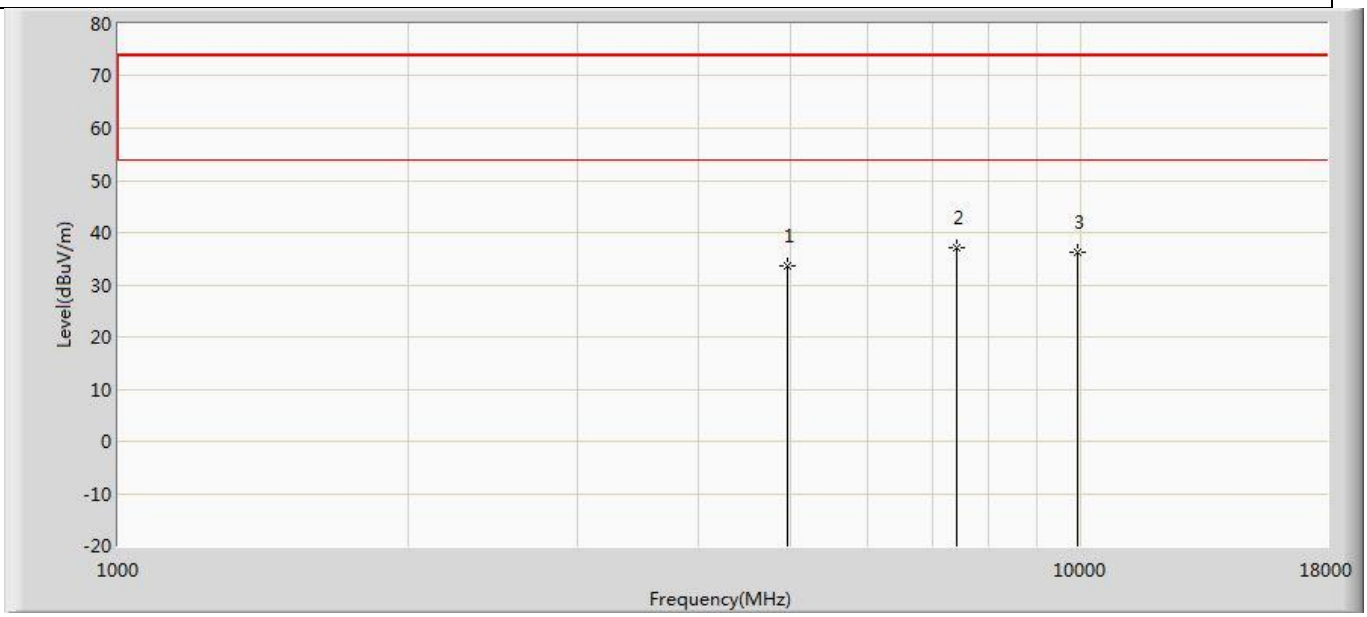
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4882.000	36.273	42.627	-37.727	74.000	-6.353	PK
2		7323.000	37.640	40.183	-36.360	74.000	-2.544	PK
3	*	9764.000	37.661	38.232	-36.339	74.000	-0.571	PK

Profile: 2140225R	Page No.: 46
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:53
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 2441MHz by DH5	



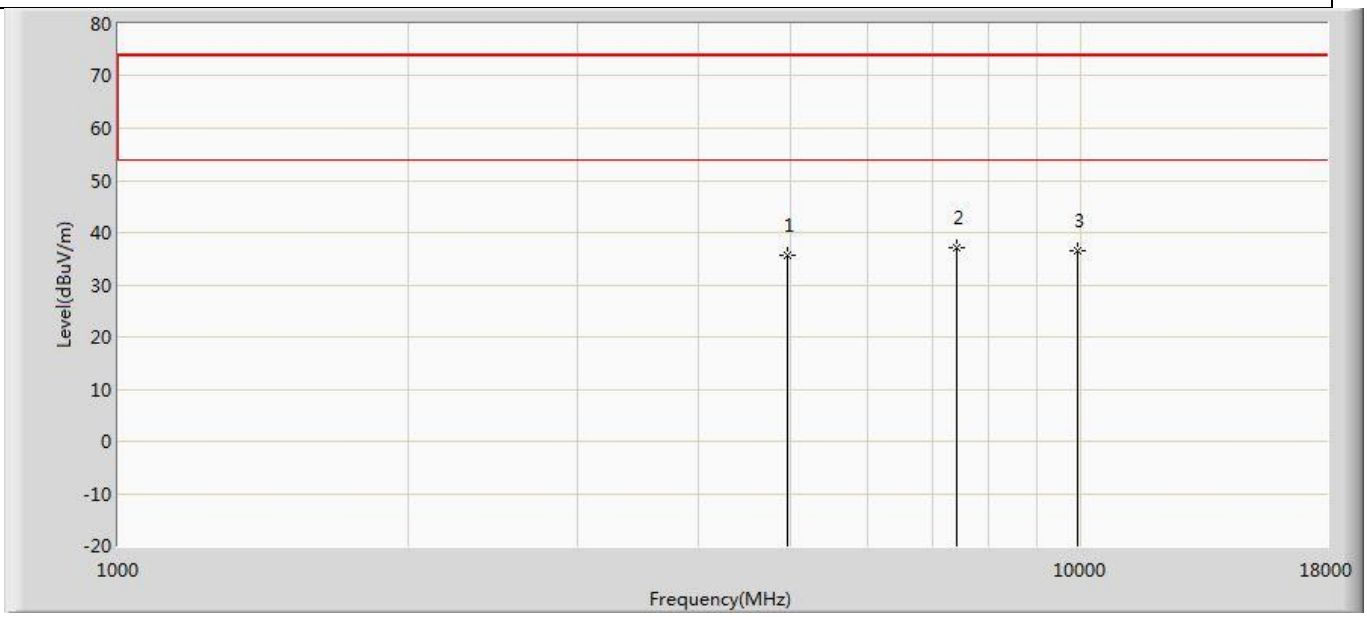
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4882.000	35.308	41.662	-38.692	74.000	-6.353	PK
2	*	7323.000	39.152	41.695	-34.848	74.000	-2.544	PK
3		9764.000	37.053	37.624	-36.947	74.000	-0.571	PK

Profile: 2140225R	Page No.: 47
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 2480MHz by DH5	



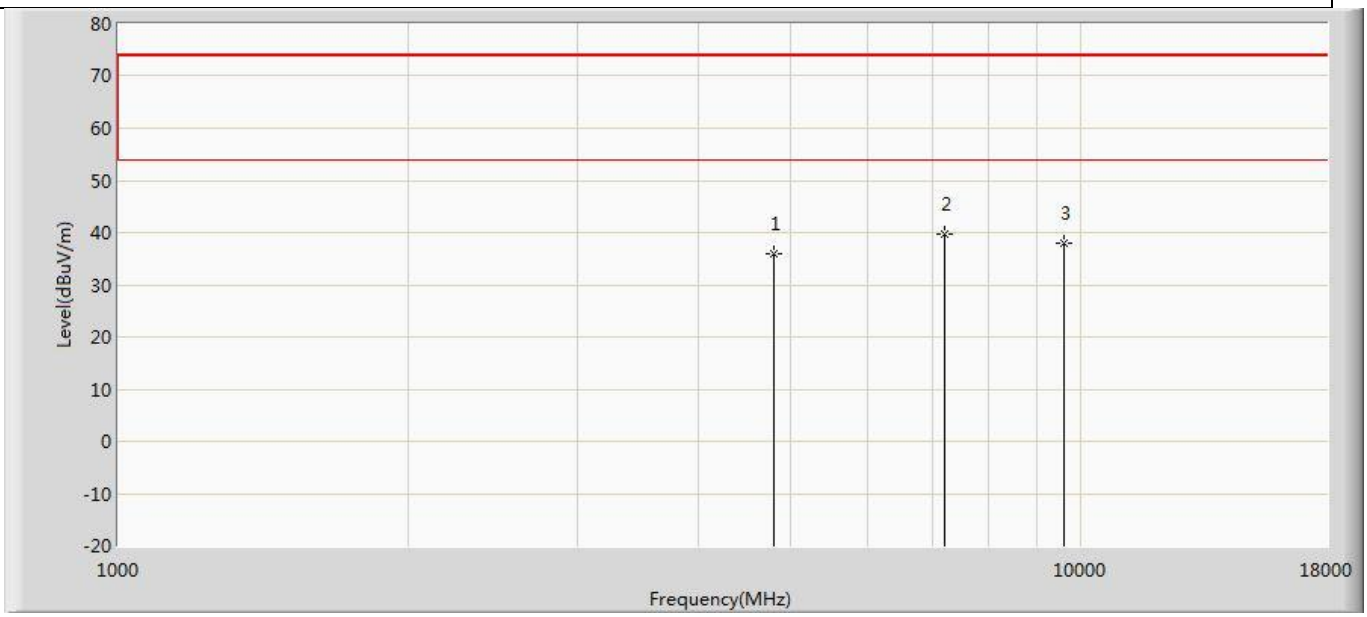
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	33.664	39.906	-40.336	74.000	-6.243	PK
2	*	7440.000	36.964	39.616	-37.036	74.000	-2.652	PK
3		9920.000	36.271	36.855	-37.729	74.000	-0.585	PK

Profile: 2140225R	Page No.: 48
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 1:Transmit at 2480MHz by DH5	



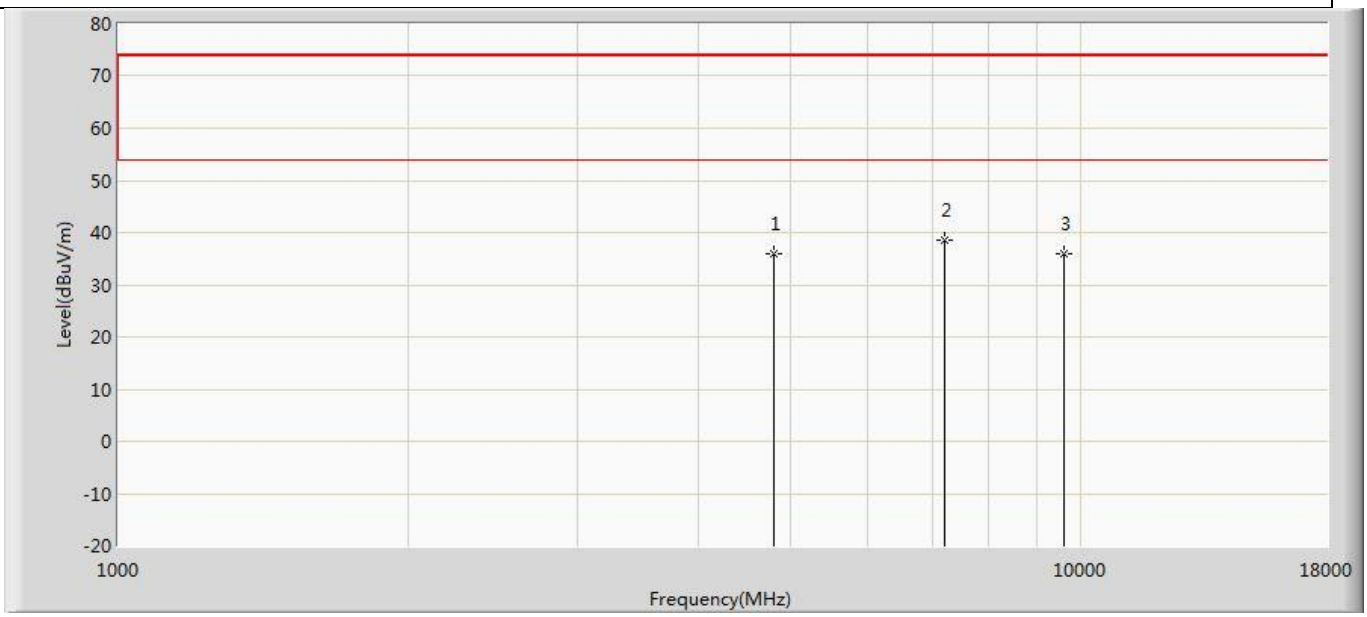
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	35.549	41.791	-38.451	74.000	-6.243	PK
2	*	7440.000	37.131	39.783	-36.869	74.000	-2.652	PK
3		9920.000	36.646	37.230	-37.354	74.000	-0.585	PK

Profile: 2140225R	Page No.: 49
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 2:Transmit at 2402MHz by 2DH5	



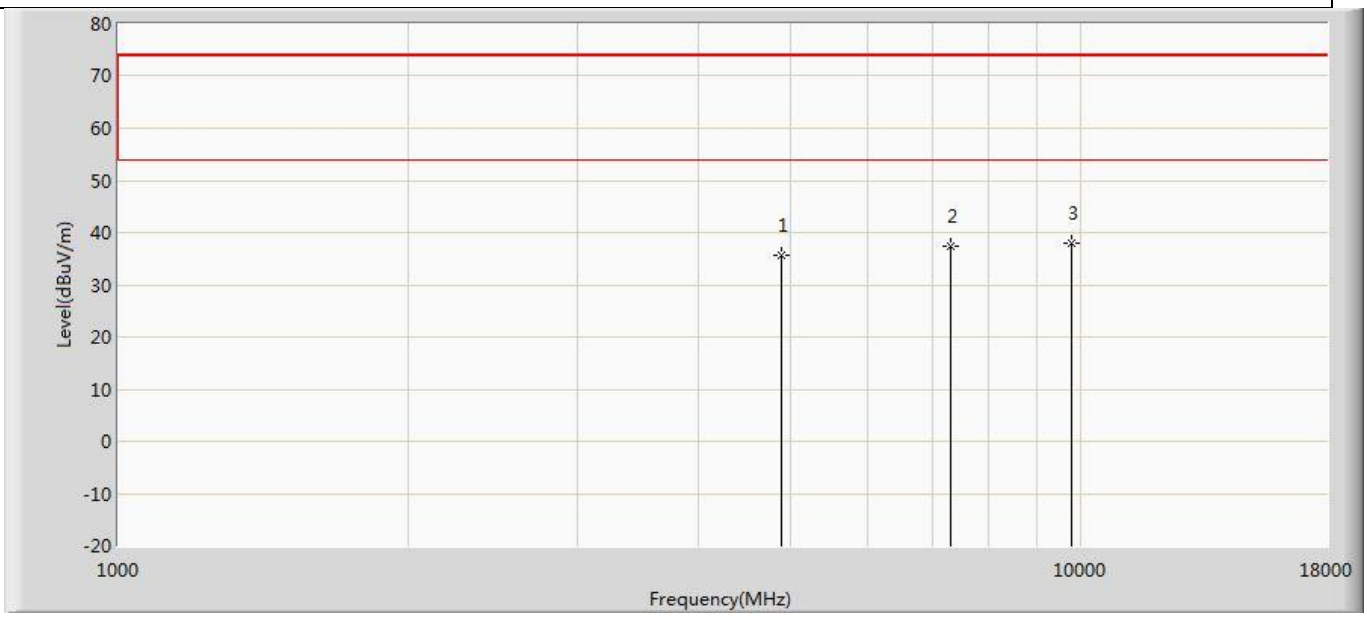
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	35.828	42.237	-38.172	74.000	-6.409	PK
2	*	7206.000	39.701	42.100	-34.299	74.000	-2.399	PK
3		9608.000	37.856	39.061	-36.144	74.000	-1.204	PK

Profile: 2140225R	Page No.: 50
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 2:Transmit at 2402MHz by 2DH5	



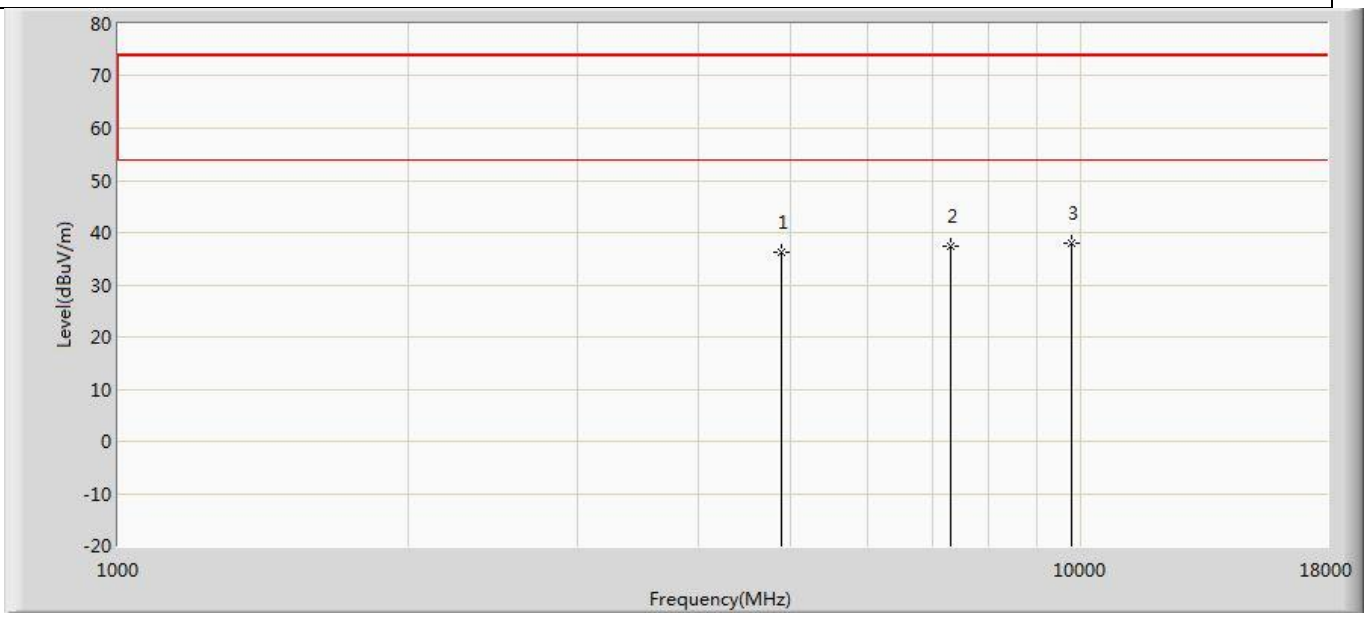
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	35.838	42.247	-38.162	74.000	-6.409	PK
2	*	7206.000	38.589	40.988	-35.411	74.000	-2.399	PK
3		9608.000	36.023	37.228	-37.977	74.000	-1.204	PK

Profile: 2140225R	Page No.: 51
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 2:Transmit at 2441MHz by 2DH5	



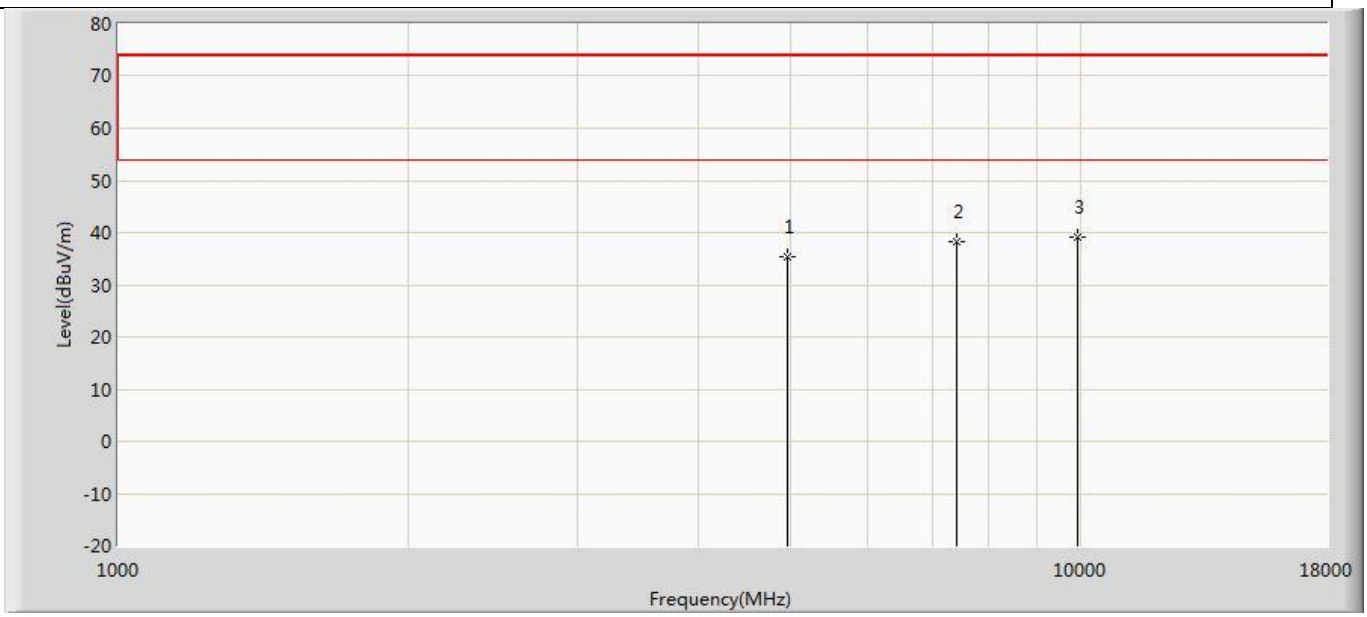
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4882.000	35.714	42.068	-38.286	74.000	-6.353	PK
2		7323.000	37.338	39.881	-36.662	74.000	-2.544	PK
3	*	9764.000	37.977	38.548	-36.023	74.000	-0.571	PK

Profile: 2140225R	Page No.: 52
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 2:Transmit at 2441MHz by 2DH5	



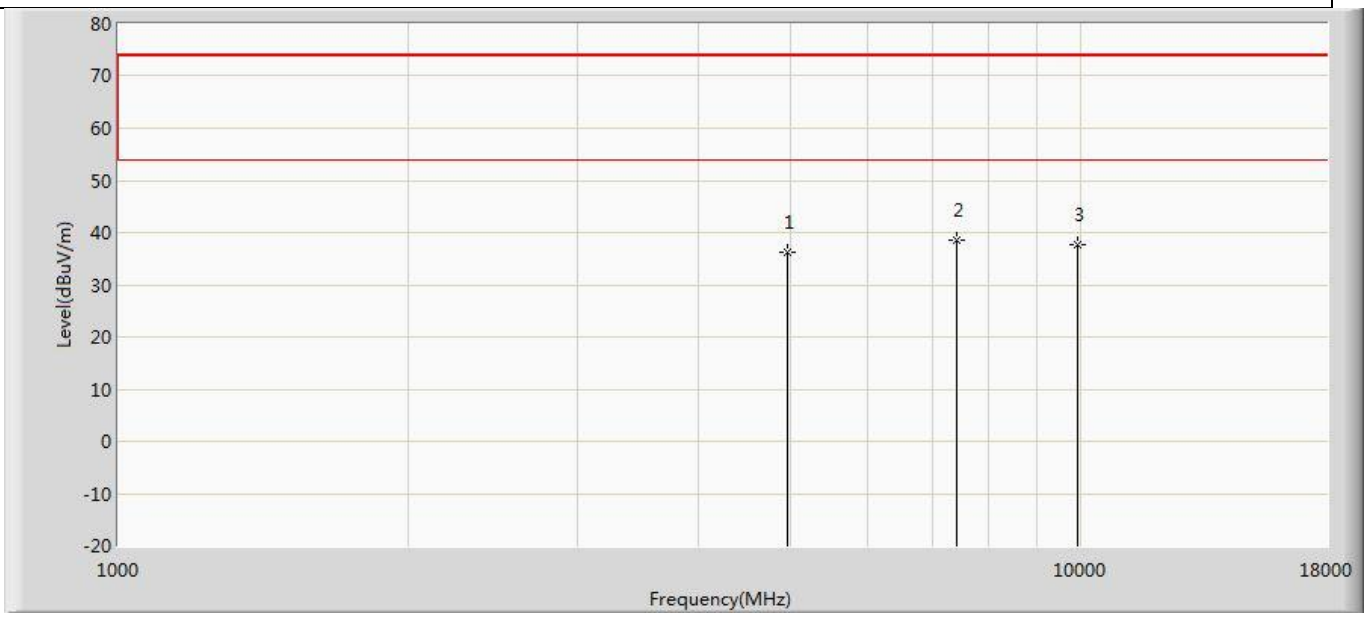
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4882.000	36.331	42.685	-37.669	74.000	-6.353	PK
2		7323.000	37.385	39.928	-36.615	74.000	-2.544	PK
3	*	9764.000	38.103	38.674	-35.897	74.000	-0.571	PK

Profile: 2140225R	Page No.: 53
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 2:Transmit at 2480MHz by 2DH5	



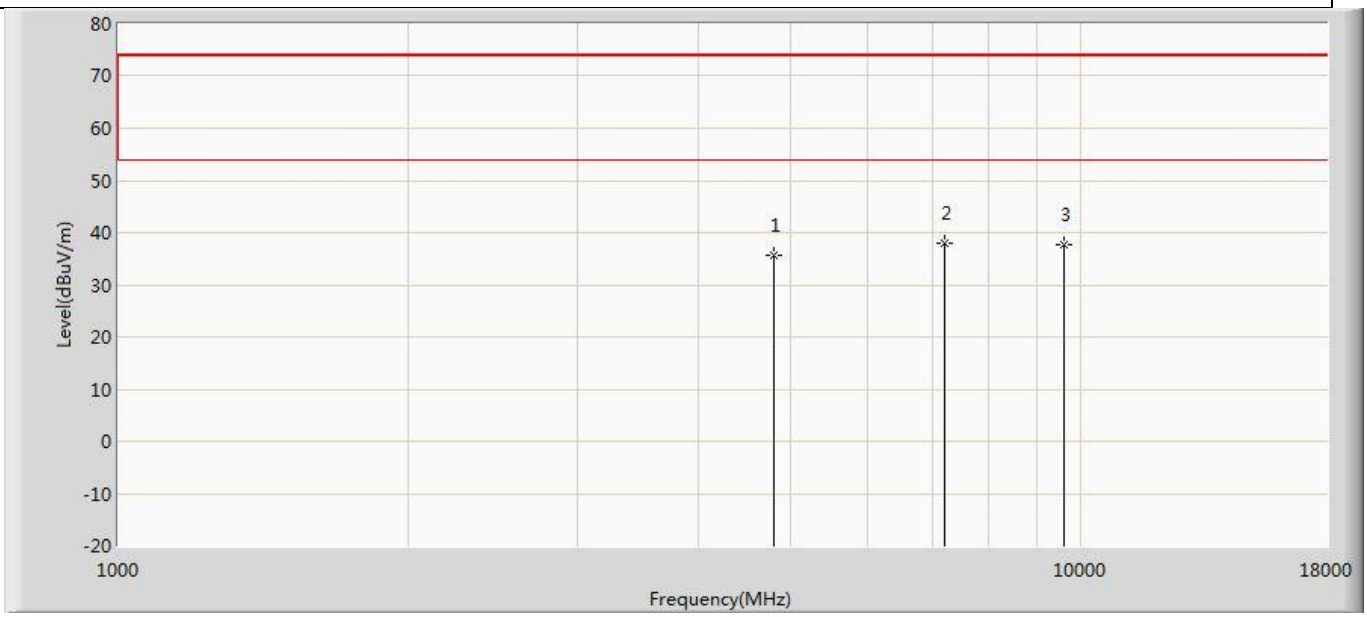
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	35.253	41.495	-38.747	74.000	-6.243	PK
2		7440.000	38.318	40.970	-35.682	74.000	-2.652	PK
3	*	9920.000	39.235	39.819	-34.765	74.000	-0.585	PK

Profile: 2140225R	Page No.: 54
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 2:Transmit at 2480MHz by 2DH5	



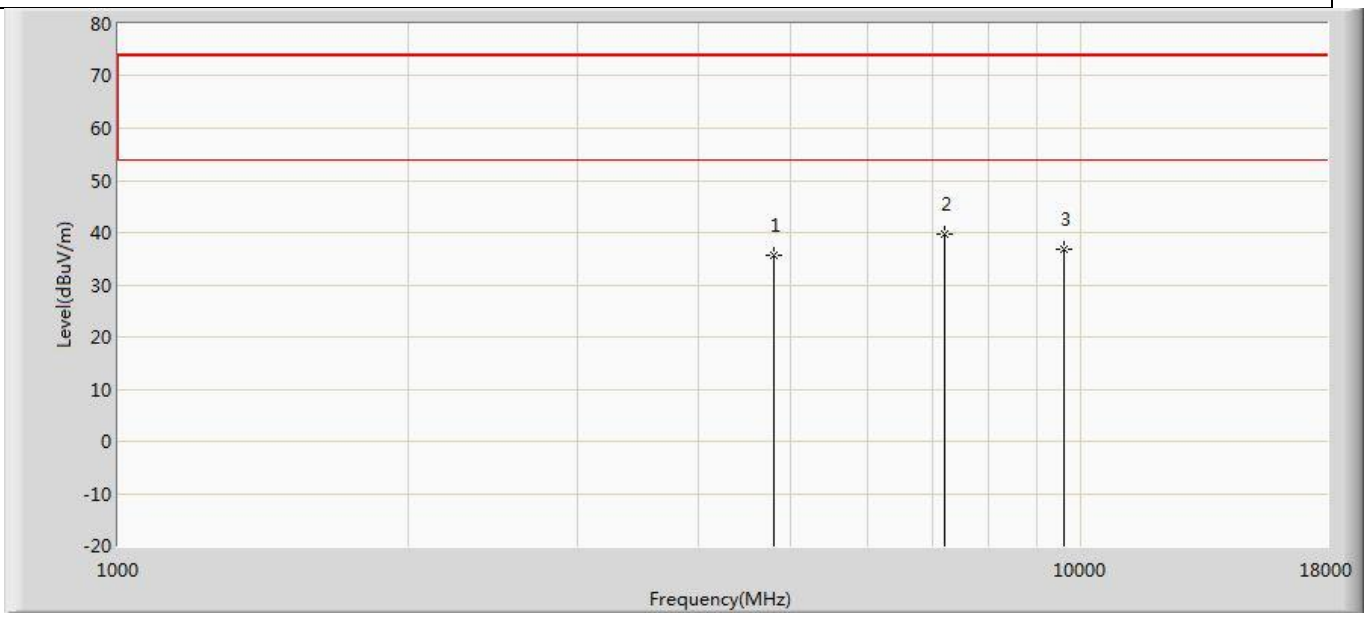
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	36.210	42.452	-37.790	74.000	-6.243	PK
2	*	7440.000	38.486	41.138	-35.514	74.000	-2.652	PK
3		9920.000	37.801	38.385	-36.199	74.000	-0.585	PK

Profile: 2140225R	Page No.: 55
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 3:Transmit at 2402MHz by 3DH5	



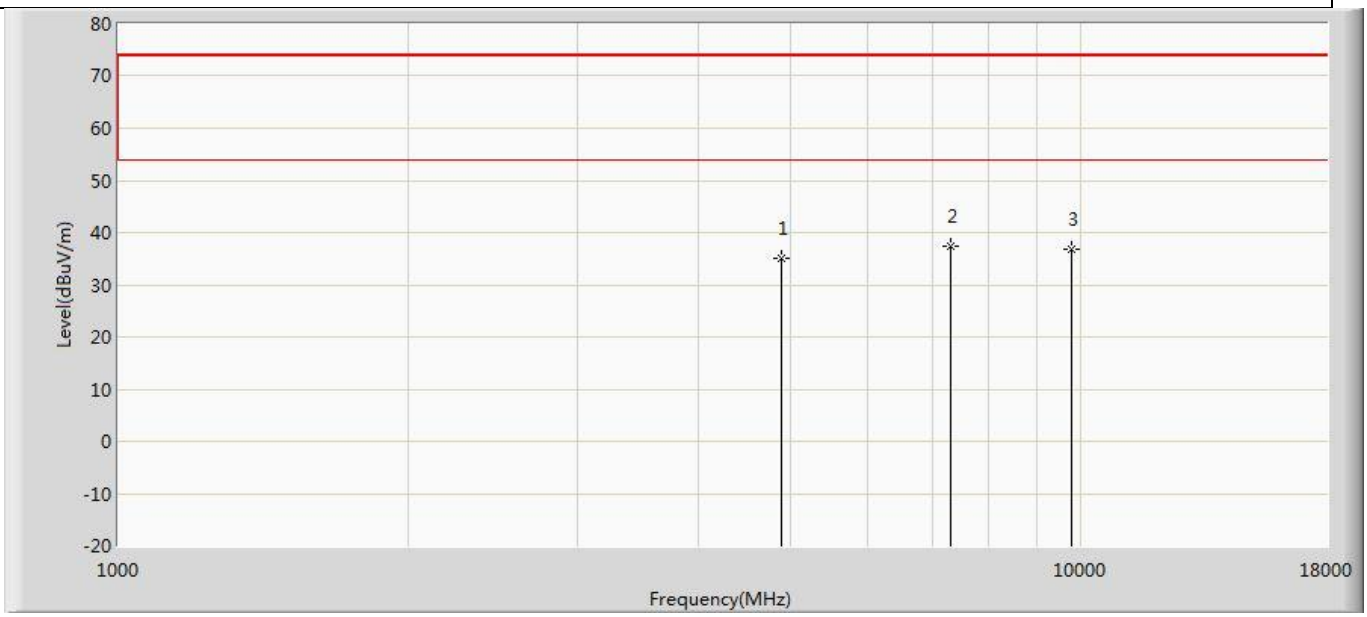
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	35.549	41.958	-38.451	74.000	-6.409	PK
2	*	7206.000	37.954	40.353	-36.046	74.000	-2.399	PK
3		9608.000	37.742	38.947	-36.258	74.000	-1.204	PK

Profile: 2140225R	Page No.: 56
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 3:Transmit at 2402MHz by 3DH5	



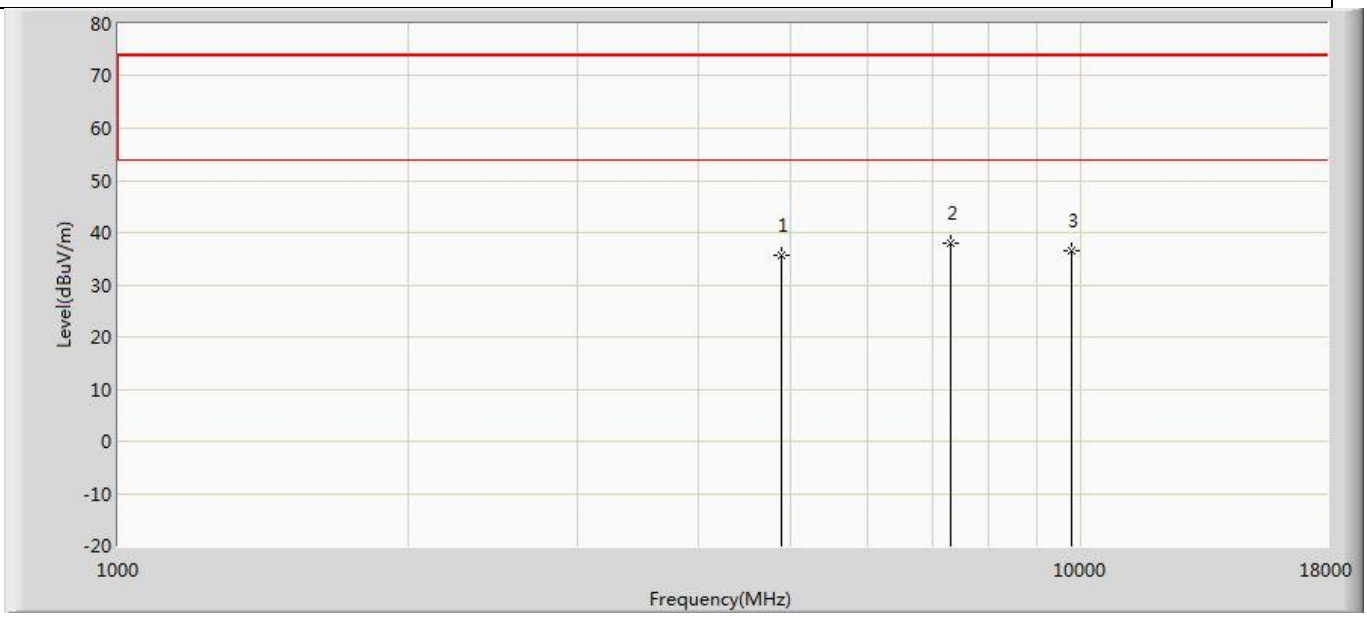
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	35.565	41.974	-38.435	74.000	-6.409	PK
2	*	7206.000	39.692	42.091	-34.308	74.000	-2.399	PK
3		9608.000	36.810	38.015	-37.190	74.000	-1.204	PK

Profile: 2140225R	Page No.: 57
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 3:Transmit at 2441MHz by 3DH5	



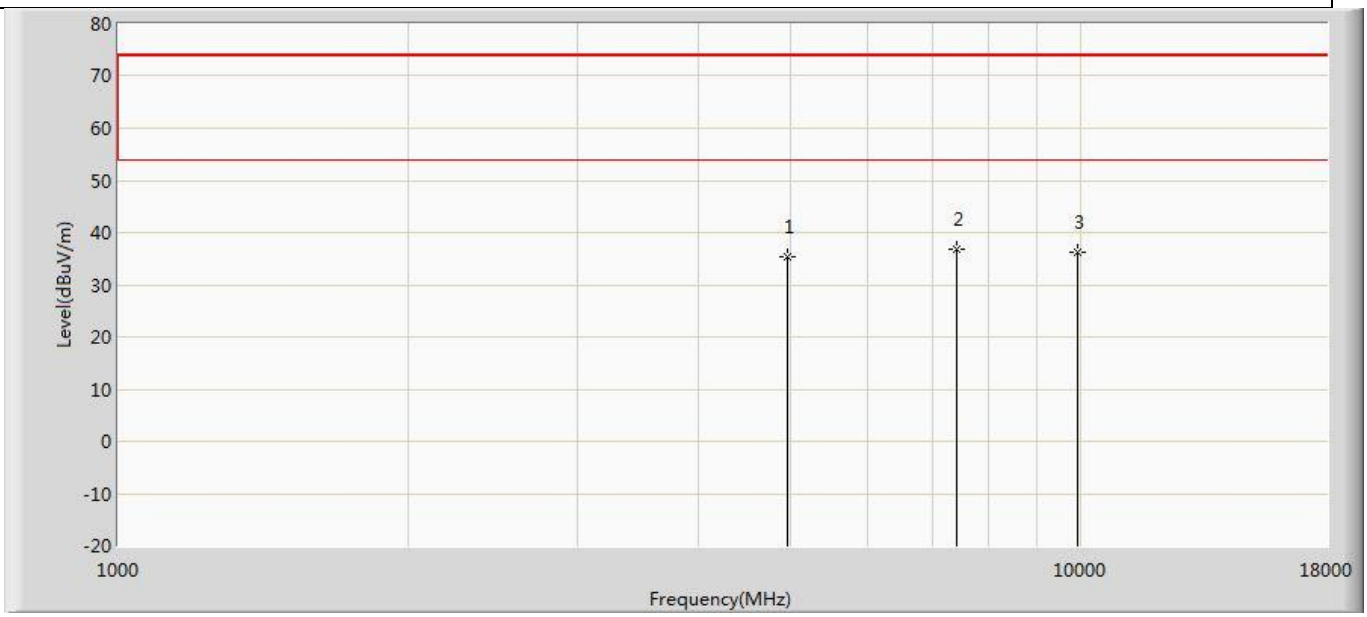
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4882.000	35.009	41.363	-38.991	74.000	-6.353	PK
2	*	7323.000	37.469	40.012	-36.531	74.000	-2.544	PK
3		9764.000	36.699	37.270	-37.301	74.000	-0.571	PK

Profile: 2140225R	Page No.: 58
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 3:Transmit at 2441MHz by 3DH5	



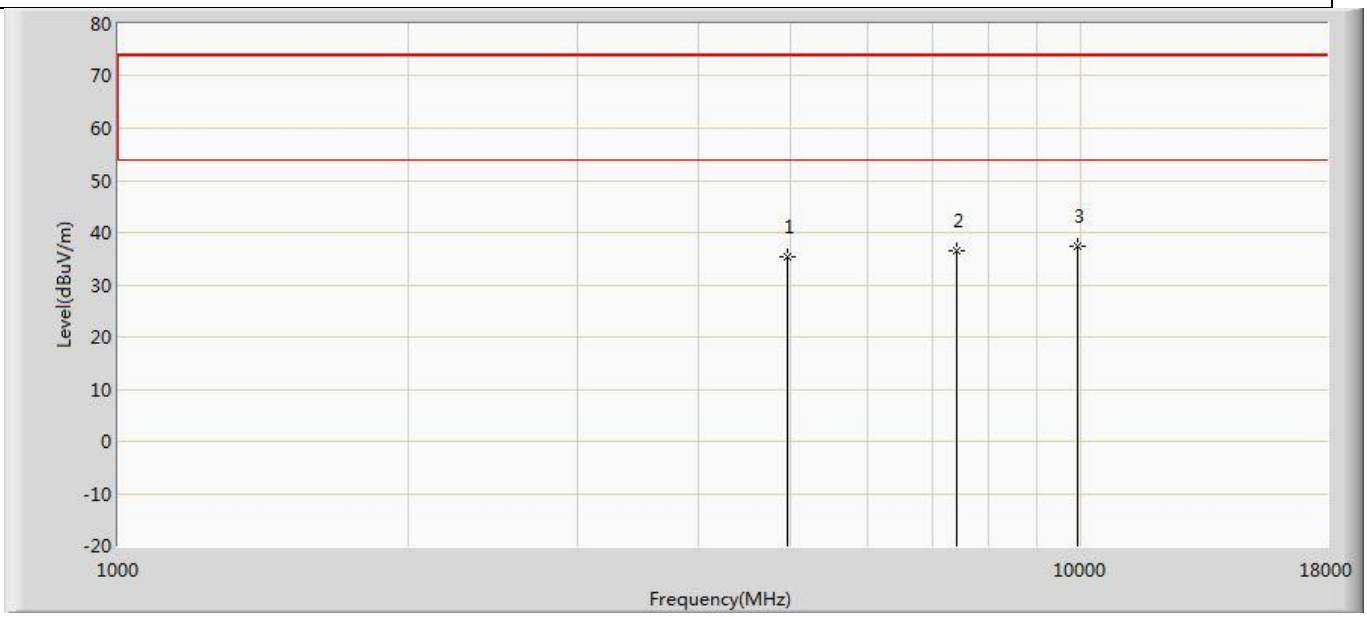
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4882.000	35.644	41.998	-38.356	74.000	-6.353	PK
2	*	7323.000	37.955	40.498	-36.045	74.000	-2.544	PK
3		9764.000	36.549	37.120	-37.451	74.000	-0.571	PK

Profile: 2140225R	Page No.: 59
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 3:Transmit at 2480MHz by 3DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	35.242	41.484	-38.758	74.000	-6.243	PK
2	*	7440.000	36.927	39.579	-37.073	74.000	-2.652	PK
3		9920.000	36.226	36.810	-37.774	74.000	-0.585	PK

Profile: 2140225R	Page No.: 60
Engineer: Juliuszhou	
Site: AC5	Time: 2021/04/27 - 20:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 3:Transmit at 2480MHz by 3DH5	

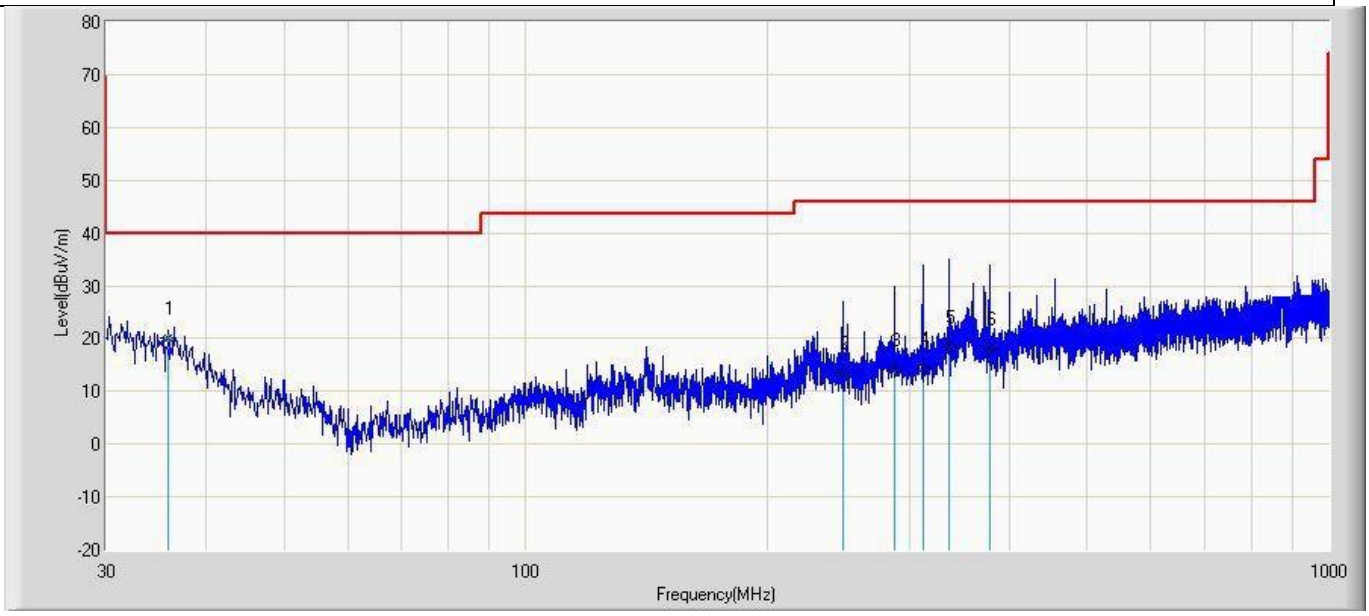


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	35.304	41.546	-38.696	74.000	-6.243	PK
2		7440.000	36.631	39.283	-37.369	74.000	-2.652	PK
3	*	9920.000	37.261	37.845	-36.739	74.000	-0.585	PK

Note:
1. Measured Level = Reading Level + Factor.
2. The test frequency range, 9kHz~30MHz, 18GHz~26GHz, both of the worst case are at least 20dB below the limits, therefore no data appear in the report.
3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.
4. As the radiated emission was performed, so conducted emission was not tested.

The worst case of Radiated Emission below 1GHz:

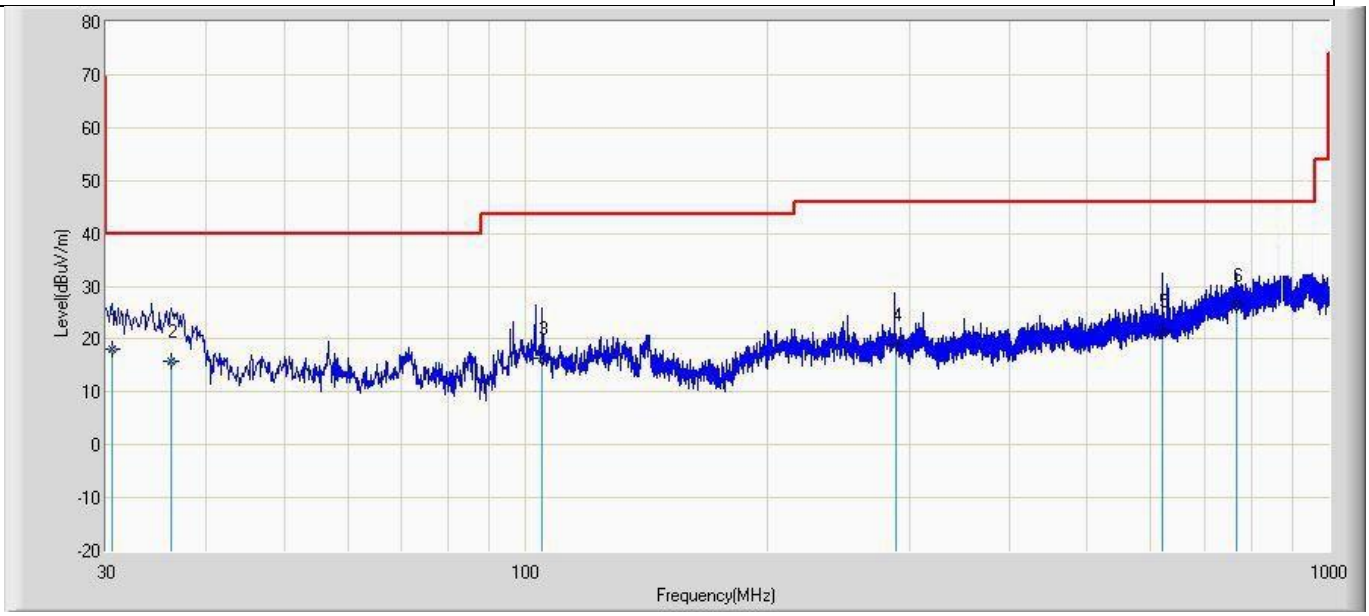
Profile: 2140225R	Page No.: 12
Engineer: Julius zhou	
Site: AC3	Time: 2021/04/27 - 22:24
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: AC3_3m (30-1000MHz)	Polarity: Horizontal
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1	*	35.800	20.006	-5.630	-19.994	40.000	25.636	100	52	QP
2		248.122	13.477	-4.520	-32.523	46.000	17.996	100	46	QP
3		288.021	14.180	-6.520	-31.820	46.000	20.700	100	72	QP
4		311.950	14.467	-6.520	-31.533	46.000	20.987	100	4	QP
5		335.988	18.452	-4.520	-27.548	46.000	22.971	100	73	QP
6		377.520	18.175	-5.520	-27.825	46.000	23.695	100	45	QP

Note:
1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Profile: 2140225R	Page No.: 17
Engineer: Julius zhou	
Site: AC3	Time: 2021/04/27 - 22:28
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: AC3_3m (30-1000MHz)	Polarity: Vertical
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Mode 1	

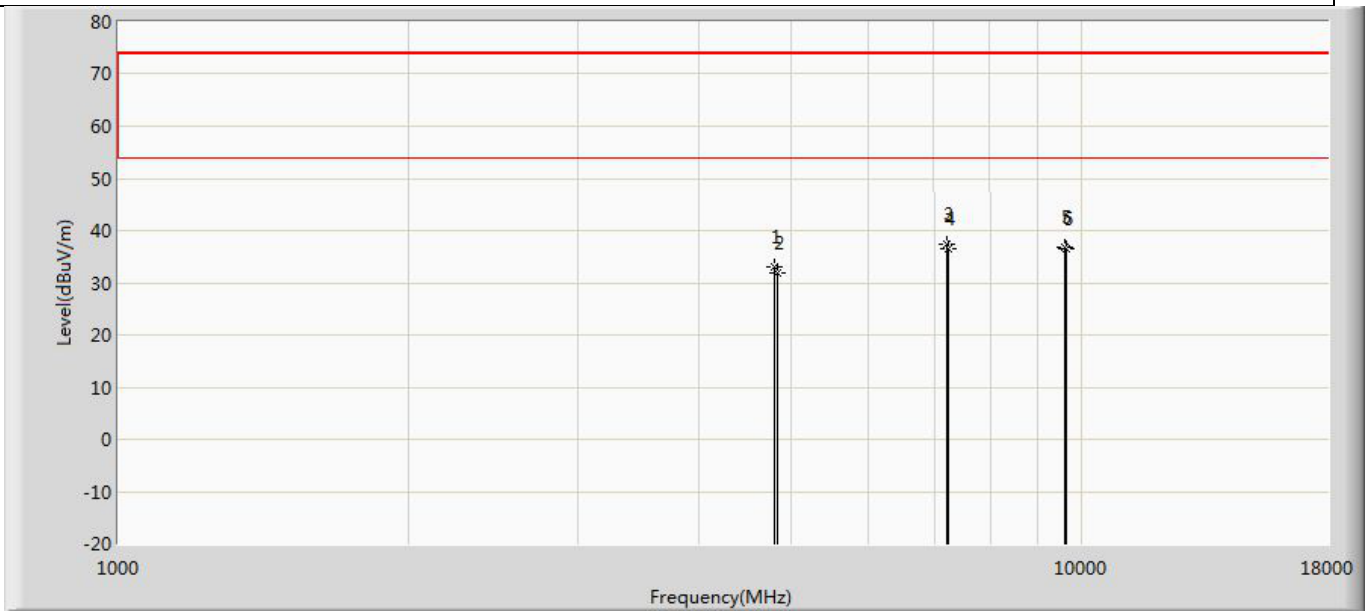


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1		30.488	18.217	-5.600	-21.783	40.000	23.817	100	73	QP
2		36.185	15.887	-5.900	-24.113	40.000	21.787	100	45	QP
3		104.711	16.299	-5.630	-27.201	43.500	21.929	100	15	QP
4		288.630	18.869	-5.630	-27.131	46.000	24.499	100	2	QP
5		620.152	21.653	-5.630	-24.347	46.000	27.283	100	7	QP
6	*	767.550	26.485	-5.630	-19.515	46.000	32.115	100	73	QP

Note:
1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

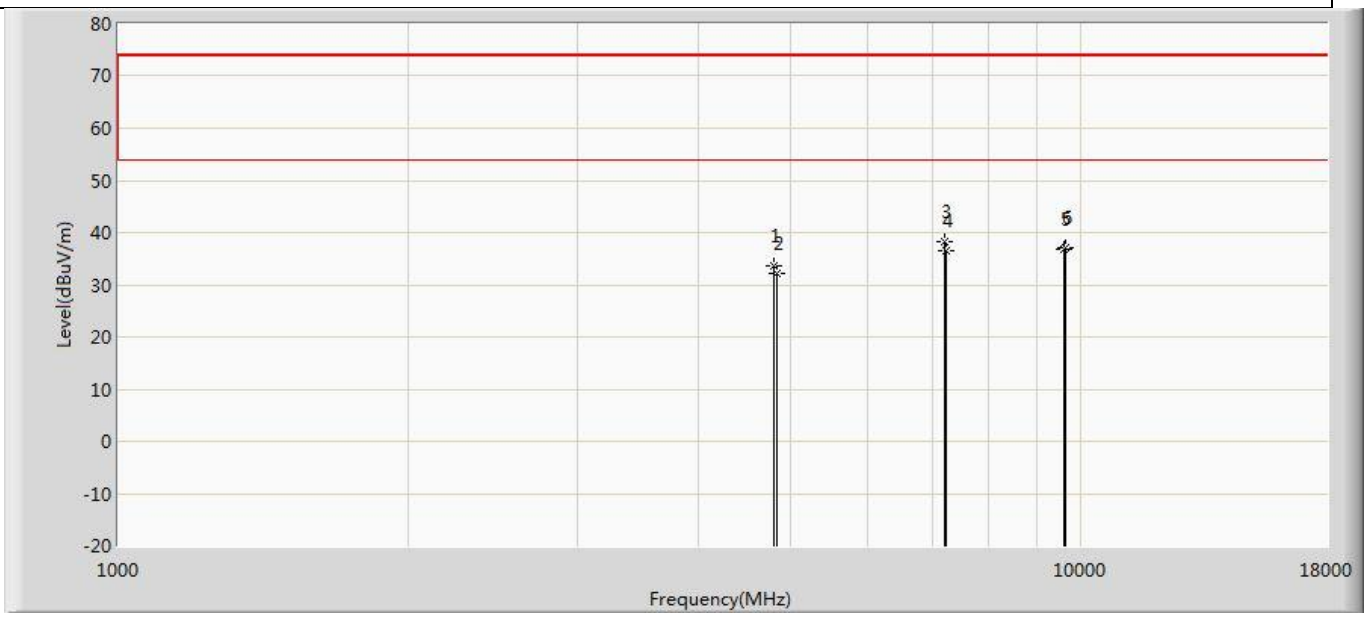
The worst case of Simultaneous Radiated Emission:

Profile: 2140225R	Page No.: 233
Engineer: Juliuszhou	
Site: AC5	Time: 2021/05/10 - 09:05
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Simultaneous transmission with BT + 2.4G WIFI	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	33.081	39.490	-40.919	74.000	-6.409	PK
2		4824.000	31.871	38.285	-42.129	74.000	-6.414	PK
3	*	7206.000	37.501	39.900	-36.499	74.000	-2.399	PK
4		7236.000	36.400	39.126	-37.600	74.000	-2.726	PK
5		9608.000	36.782	37.987	-37.218	74.000	-1.204	PK
6		9648.000	36.651	37.849	-37.349	74.000	-1.198	PK

Profile: 2140225R	Page No.: 234
Engineer: Juliuszhou	
Site: AC5	Time: 2021/05/10 - 09:05
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Computer BOX	Power: AC 120V/60Hz
Note: Simultaneous transmission with BT + 2.4G WIFI	



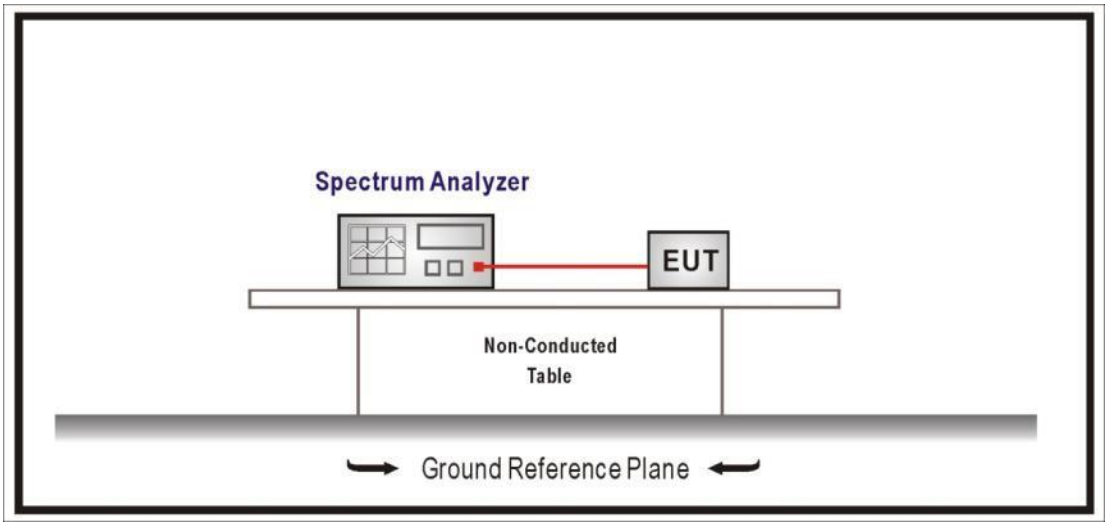
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	33.521	39.930	-40.479	74.000	-6.409	PK
2		4824.000	32.074	38.488	-41.926	74.000	-6.414	PK
3	*	7206.000	38.310	40.709	-35.690	74.000	-2.399	PK
4		7236.000	36.412	39.138	-37.588	74.000	-2.726	PK
5		9608.000	36.694	37.899	-37.306	74.000	-1.204	PK
6		9648.000	37.137	38.335	-36.863	74.000	-1.198	PK

4.3 20dB Bandwidth	VERDICT: PASS

4.3.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.247(a)
☒	For frequency hopping systems operating in 2400-2483.5 MHz band, within frequency range.
☐	For frequency hopping systems operating in 902-928 MHz band, the maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
☐	For frequency hopping systems operating in 5725-5850 MHz band, the maximum 20 dB bandwidth of the hopping channel is 1 MHz.

4.3.2 Test Setup



4.3.3 Test Procedure

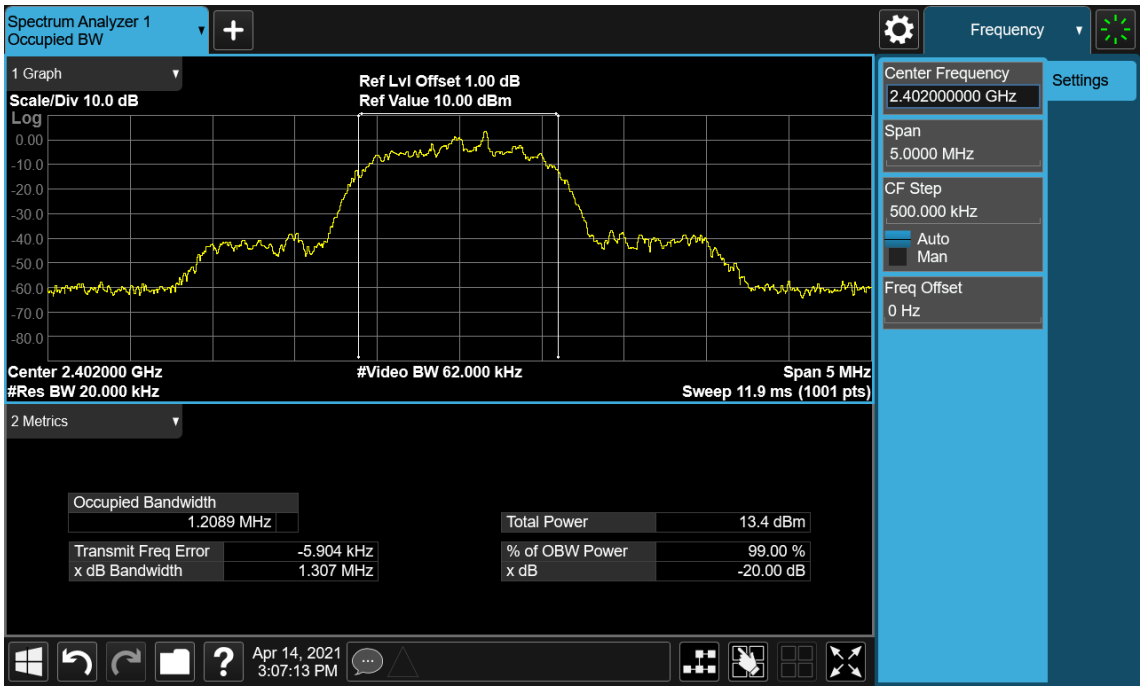
References Rule			Chapter	Description
☒	ANSI C63.10		6.9	Occupied bandwidth tests
	☒	ANSI C63.10	6.9.2	Occupied bandwidth—relative measurement procedure

4.3.4 Test Data

Mode	Channel	Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
1	00	2402	926.7	891.63
	39	2441	925.4	889.71
	79	2480	920.0	882.64
2	00	2402	1345	1206.0
	39	2441	1346	1212.2
	79	2480	1341	1211.7
3	00	2402	1307	1208.9
	39	2441	1309	1216.9
	79	2480	1341	1226.0

Note 1: The worst data plot as below:

Mode3/CH00/2402MHz

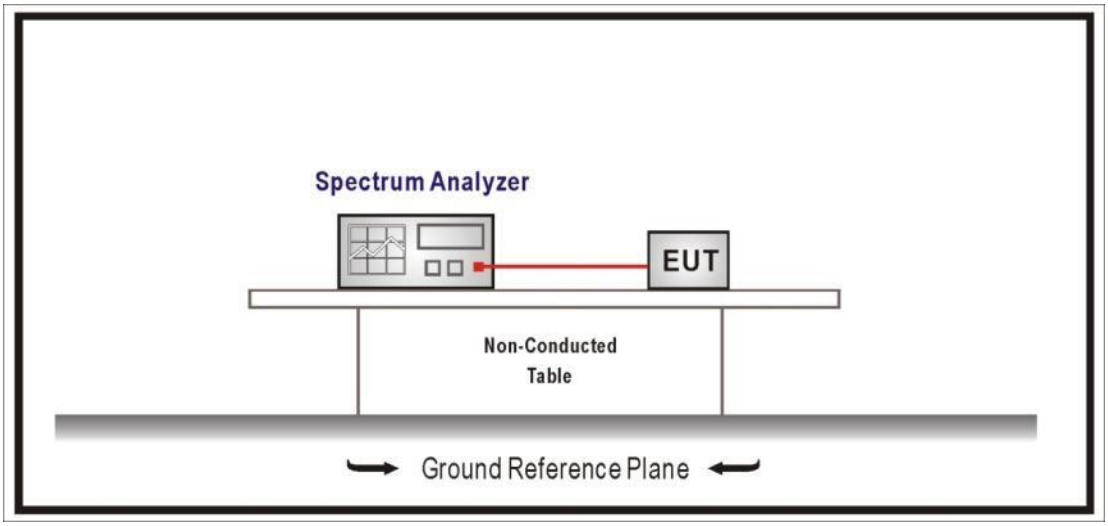


4.4 CarrierFrequencySeparation	VERDICT: PASS

4.4.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.247(a)
☐	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.
☒	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.
☐	The 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4
☐	The 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4
☐	Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz.

4.4.2 Test Setup



4.4.3 Test Procedure

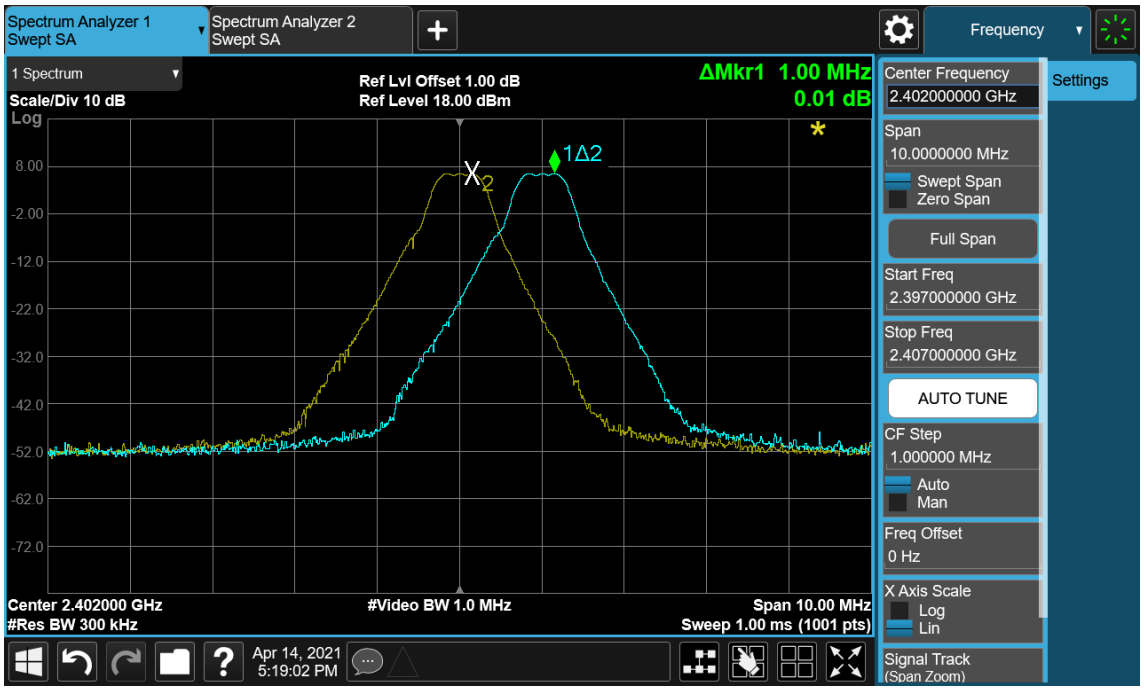
References Rule			Chapter	Description
☒	ANSI C63.10		7.8	Evaluation of frequency-hopping device parameters
	☒	ANSI C63.10	7.8.2	Carrier frequency separation

4.4.4 Test Data

Mode	Channel	Frequency (MHz)	Carrier Frequency Separation (kHz)	Limit (kHz)	Result
1	00	2402	1000	926.7	Pass
	39	2441	1000	925.4	Pass
	78	2480	1000	920.0	Pass
2	00	2402	1000	896.67	Pass
	39	2441	1000	897.33	Pass
	78	2480	1000	894.00	Pass
3	00	2402	1000	871.33	Pass
	39	2441	1000	872.67	Pass
	78	2480	1000	894.00	Pass

Note 1: The worst data plot as below:

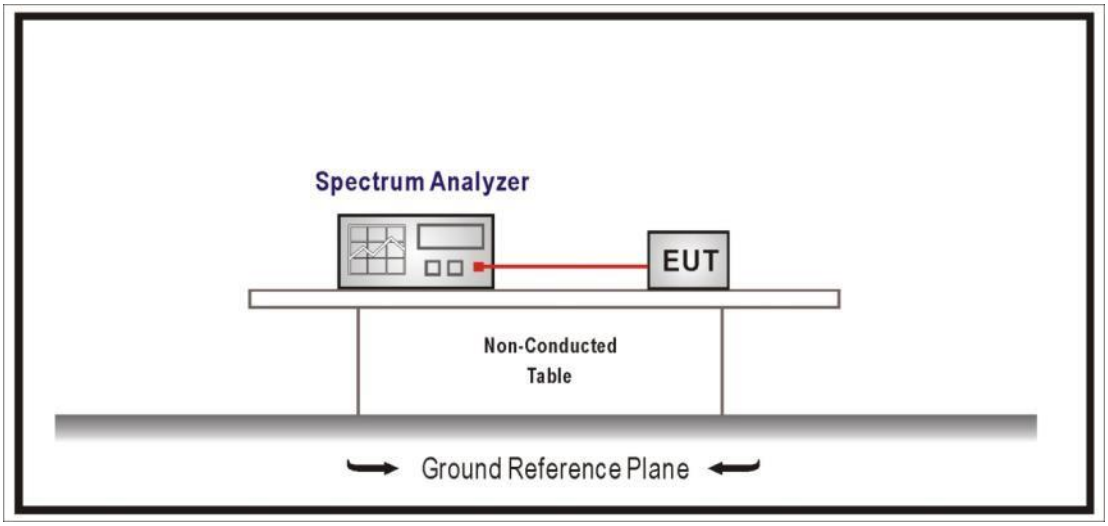
Mode1/CH00/2402MHz



4.5 Number of hopping Frequencies	VERDICT: PASS

4.5.1 Limit	
Standard	FCC Part 15 Subpart C Paragraph 15.247(a)
☒	For frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping frequencies.
☐	For frequency hopping systems operating in 902-928 MHz band, if the 20 dB bandwidth of the hopping channel is less than 250 kHz, shall use at least 50 hopping frequencies.
☐	For frequency hopping systems operating in 902-928 MHz band, if the 20 dB bandwidth of the hopping channel is higher than 250 kHz, shall use at least 25 hopping frequencies.
☐	For frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies.

4.5.2 Test Setup



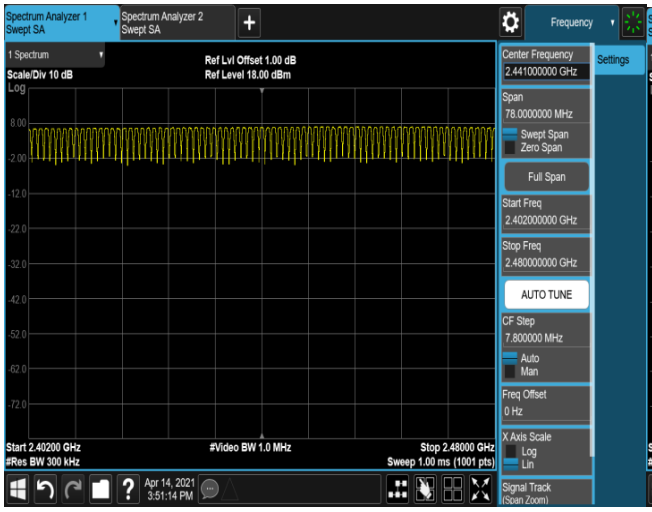
4.5.3 Test Procedure

References Rule			Chapter	Description
☒	ANSI C63.10		7.8.	Evaluation of frequency-hopping device parameters
	☒	ANSI C63.10	7.8.3	Number of Hopping Frequencies

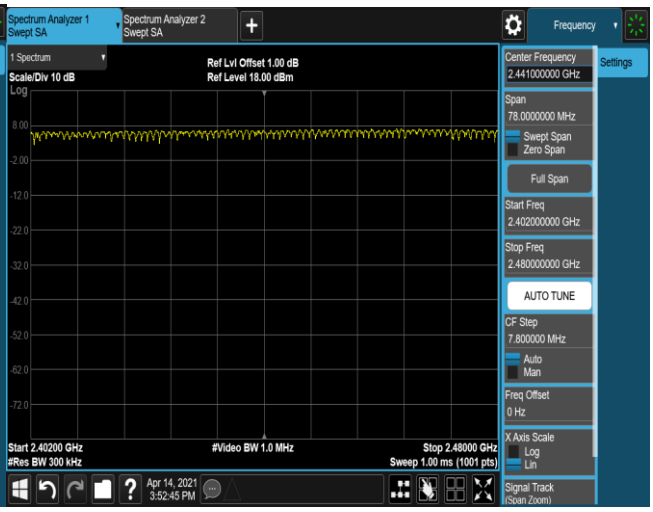
4.5.4 Test Data

Mode	Number of Hopping Frequencies	Limit	Result
1	79	>15	Pass
2	79	>15	Pass
3	79	>15	Pass

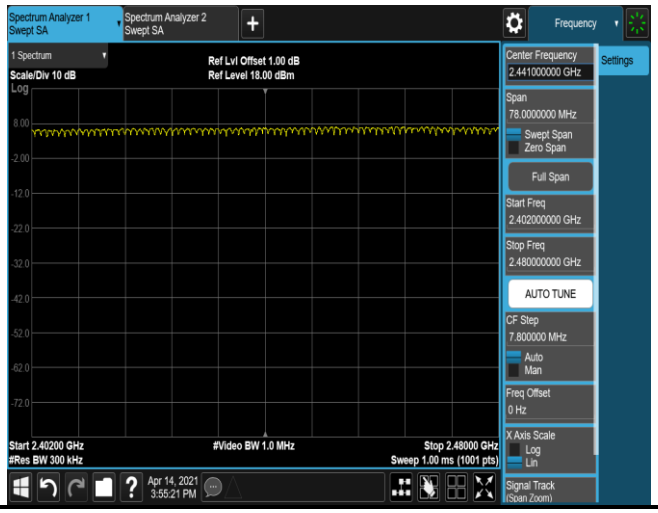
Mode 1



Mode2



Mode 3

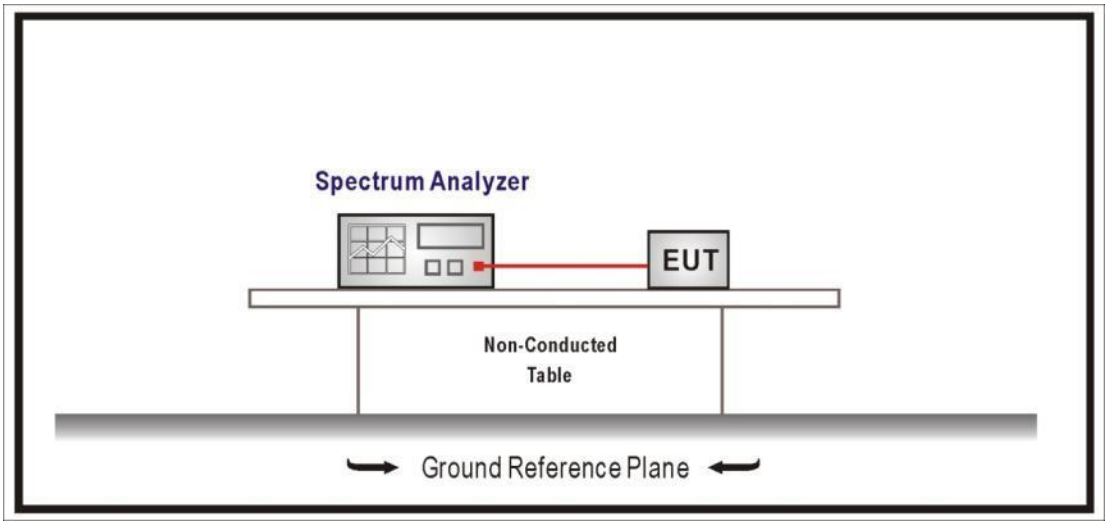


4.6 Time of Occupancy(Dwell Time)	VERDICT: PASS

4.6.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.247(a)
☒	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.
☐	For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period
☐	For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.
☐	Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

4.6.2 Test Setup



4.6.3 Test Procedure

References Rule			Chapter	Description
☒	ANSI C63.10		7.8	Evaluation of frequency-hopping device parameters
	☒	ANSI C63.10	7.8.4	Time of occupancy (dwell time)

4.6.4 Test Data

Mode	Channel	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
1	39	2441	114.15	< 400	Pass

Note1: Test Time Period: 0.4*79=31.6sec

Note2: Time of Occupancy=0.3805*30*31.6/3.16=114.15ms

Note3: We have evaluated different packet type, shown in the report is the worst data.

Channel 39 (2441MHz) - (DH1)

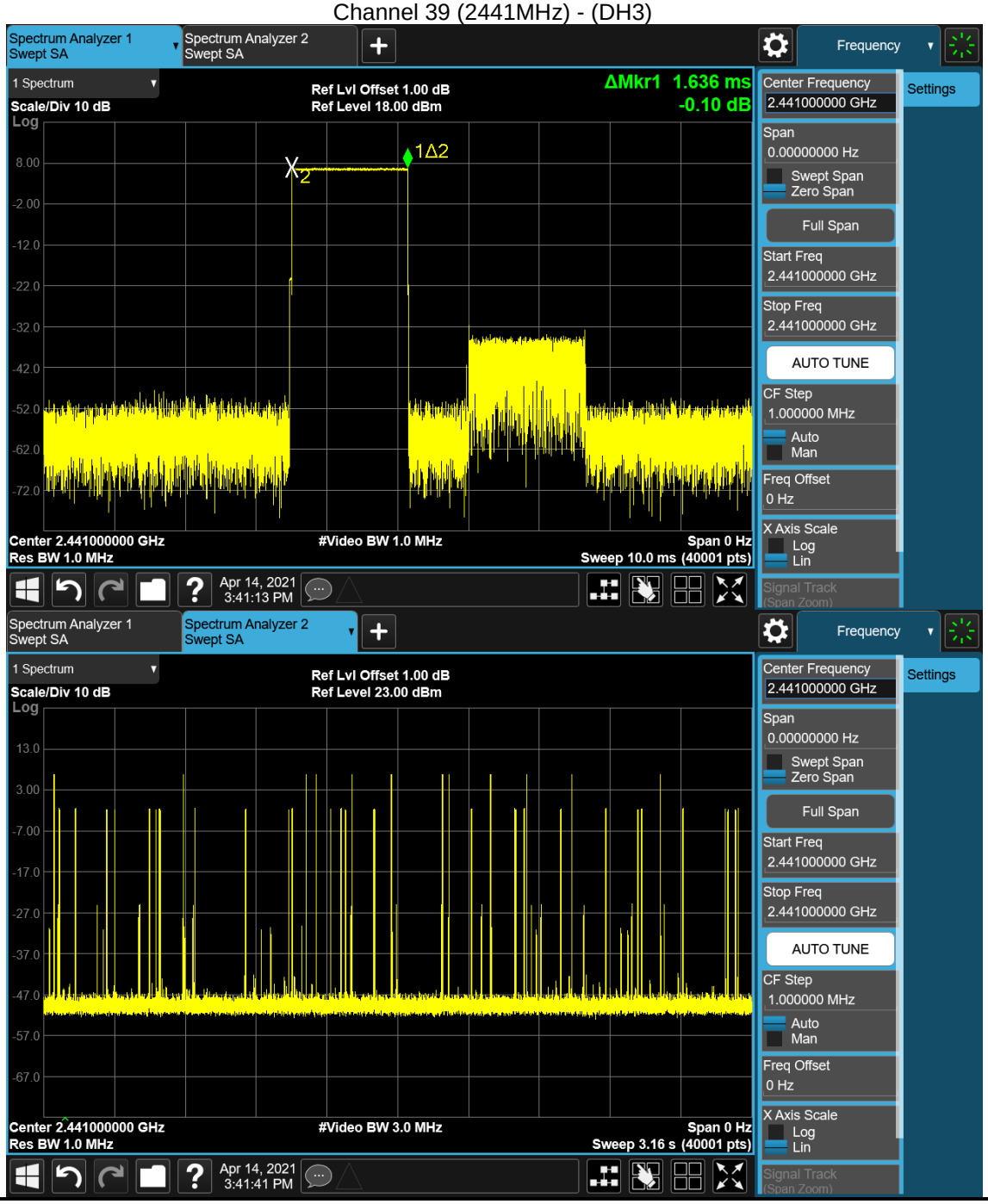
Mode	Channel	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
1	39	2441	196.32	< 400	Pass

Note1: Test Time Period: 0.4*79=31.6sec

Note2: Time of Occupancy=1.636*12*31.6/3.16=196.32ms

Note3: We have evaluated different packet type, shown in the report is the worst data.

Channel 39 (2441MHz) - (DH3)



Mode	Channel	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
1	39	2441	221.3	< 400	Pass

Note1: Test Time Period: 0.4*79=31.6sec

Note2: Time of Occupancy=2.213*10*31.6/3.16=221.3ms

Note3: We have evaluated different packet type, shown in the report is the worst data.

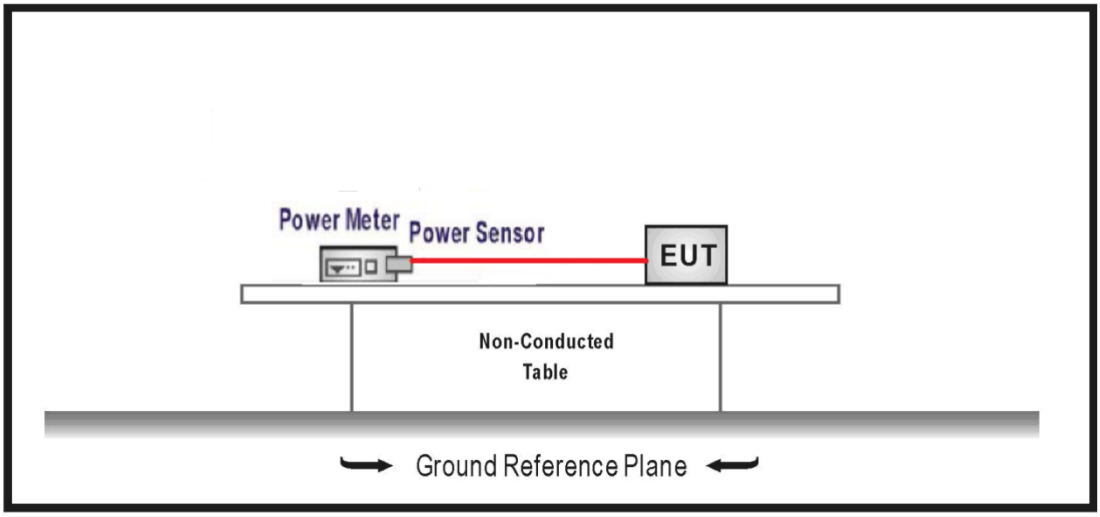
Channel 39 (2441MHz) - (DH5)

Note: The packet time of AFH mode is same as normal mode, due to the packet time of AFH mode multiply with lesser factor is dwell time of 0.4X20=8S, the dwell time of AFH mode comply with the limit.

4.7 Peak Output Power	VERDICT: PASS

4.7.1 Limit	
Standard	FCC Part 15 Subpart C Paragraph 15.247 (a)(1)
☒	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.
☒	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.
☐	For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels

4.7.2 Test Setup



4.7.3 Test Procedure

	References Rule		Chapter	Description
☒	ANSI C63.10		7.8	Evaluation of frequency-hopping device parameters
	☒	ANSI C63.10	7.8.5	Output power test procedure for frequency-hopping spread-spectrum (FHSS) devices

4.7.4 Test Data

Mode	Channel	Test Frequency (MHz)	Conducted Power (dBm)	Conducted Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
Mode 1	00	2402	6.45	⩽30	8.45	⩽36	Pass
	39	2441	7.03	⩽30	9.03	⩽36	Pass
	78	2480	6.94	⩽30	8.94	⩽36	Pass
Mode 2	00	2402	8.61	⩽21	10.61	⩽36	Pass
	39	2441	9.17	⩽21	11.17	⩽36	Pass
	78	2480	9.20	⩽21	11.2	⩽36	Pass
Mode 3	00	2402	8.68	⩽21	10.68	⩽36	Pass
	39	2441	9.32	⩽21	11.32	⩽36	Pass
	78	2480	9.31	⩽21	11.31	⩽36	Pass

4.8 Emissions in non-restricted frequency band	VERDICT: PASS

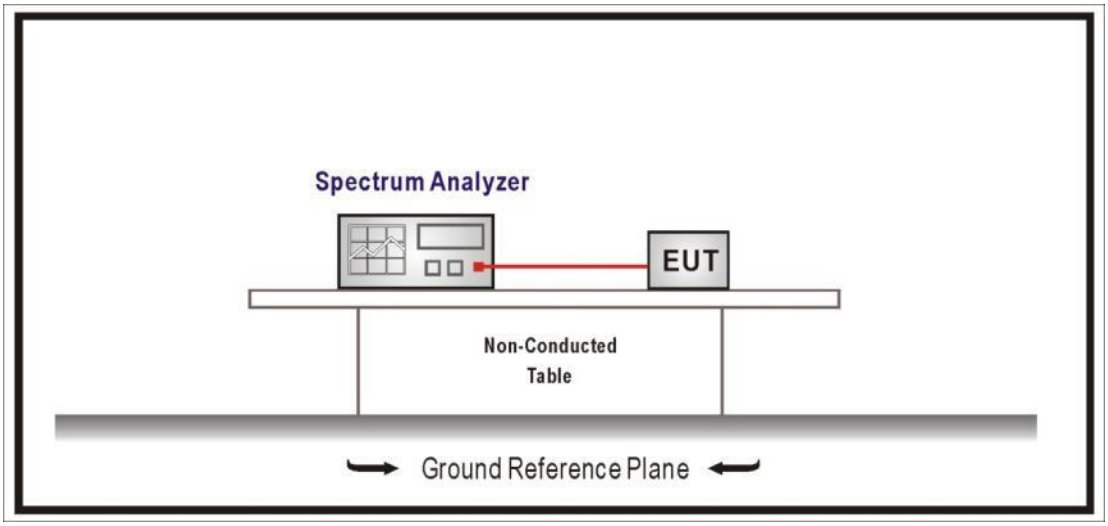
4.8.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.247(d)
RF Output power (Detection methods)	Limit(dB)
RF Output power(Average detector)	30dBc(Note1)
RF Output power(PK detector)	20dBc(Note2)

Note 1: If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).

Note 2: If the maximum peak conducted output power procedure was used, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).

4.8.2 Test Setup

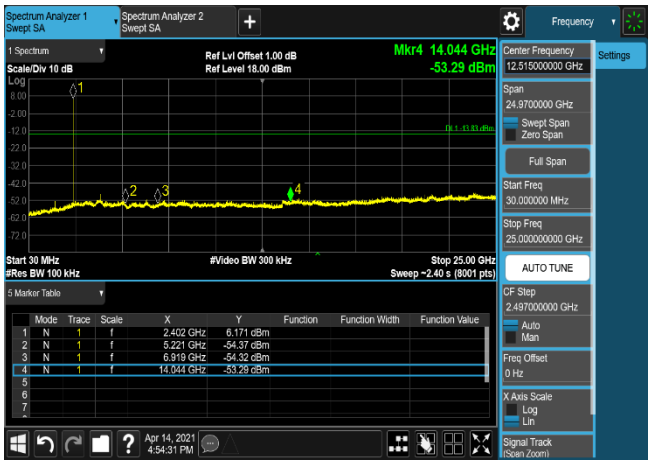


4.8.3 Test Procedure

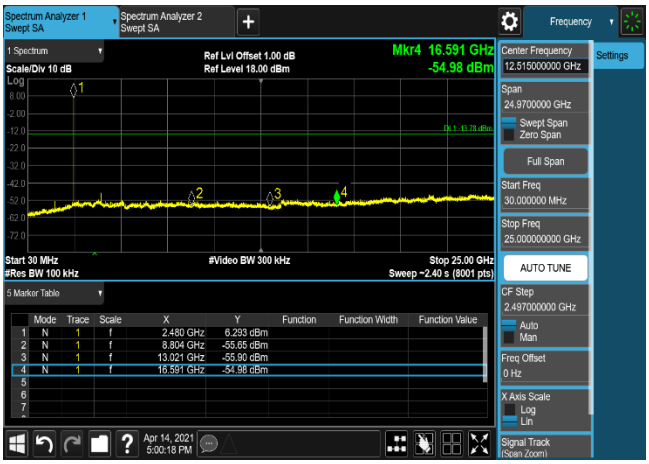
References Rule			Chapter	Description
☒	ANSI C63.10		7.8	Evaluation of frequency-hopping device parameters
	☒	ANSI C63.10	7.8.6	Band-edge measurements for RF conducted emissions

4.8.4 Test Data

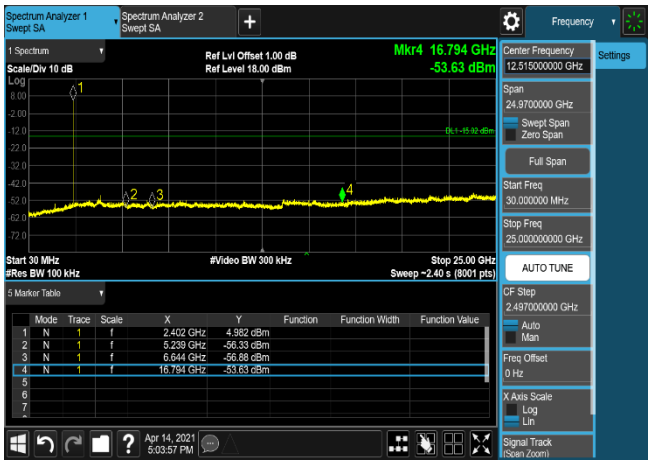
Mode 1 CH00(2402MHz)



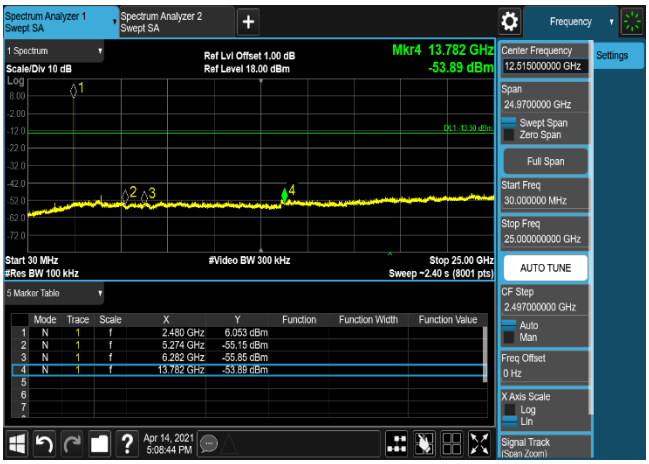
Mode 1 CH78(2480MHz)



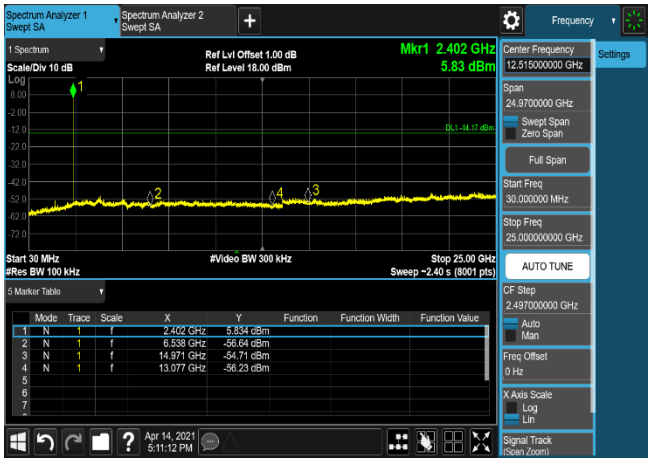
Mode 2 CH00(2402MHz)



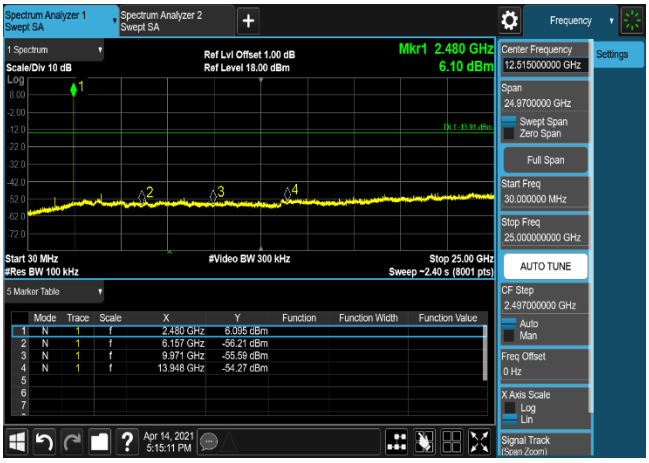
Mode 2 CH78(2480MHz)



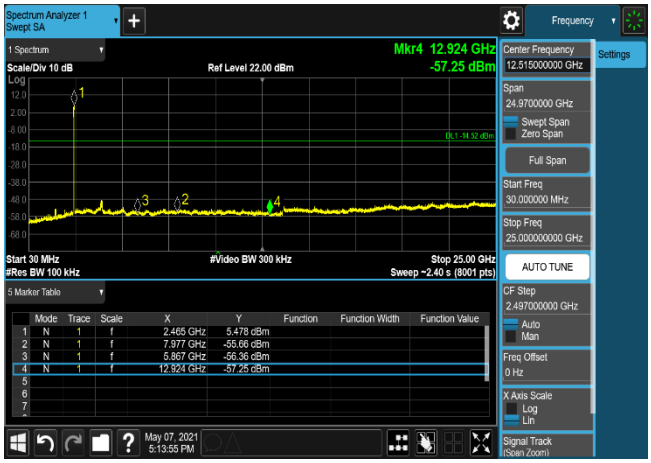
Mode 3 CH00(2402MHz)



Mode 3 CH78(2480MHz)

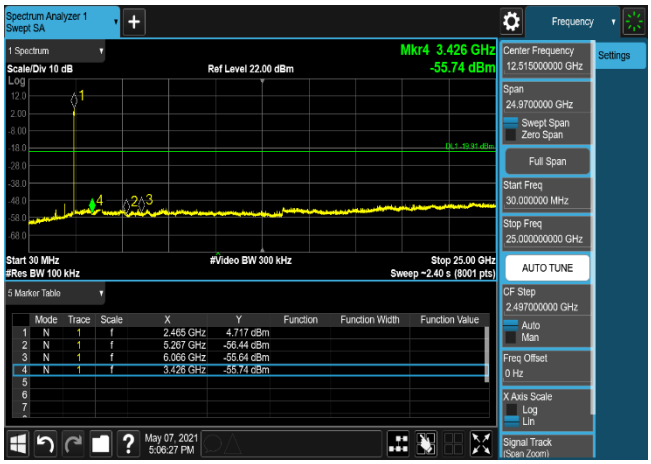


Mode 4



Mode 5

Mode 6

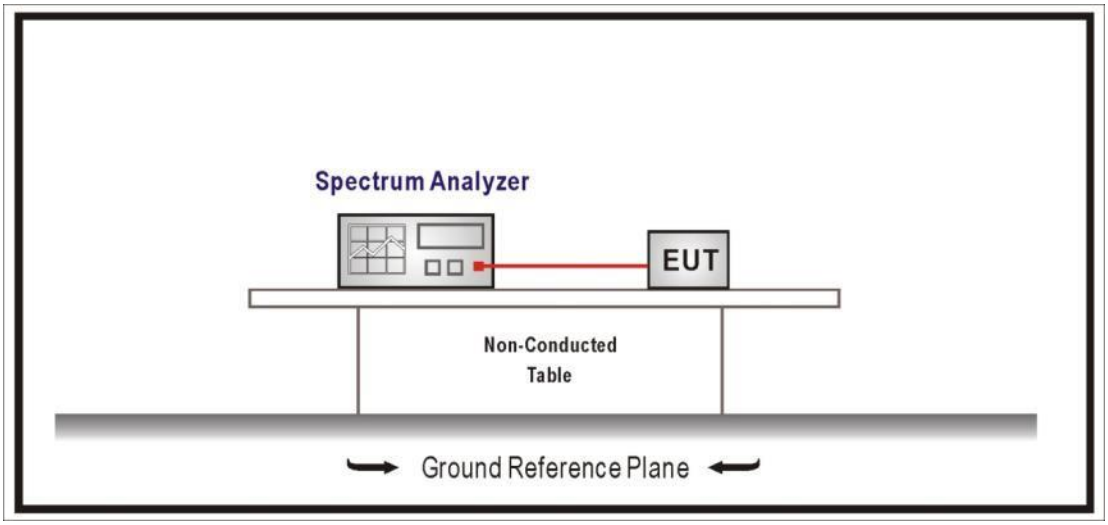


4.9 Duty cycle	VERDICT: PASS

4.9.1 Limit

N/A

4.9.2 Test Setup



4.9.3 Test Procedure

References Rule		Chapter	Description
☒	ANSI C63.10	11.6	Duty cycle (D), transmission duration (T), and maximum power control level

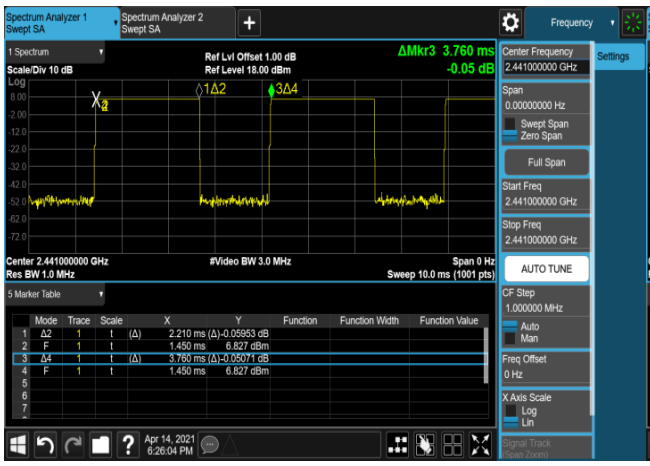
4.9.4 Test Data

Test Mode	Tx On (ms)	Tx Off (ms)	VBW (kHz)	Tx On + Tx Off (ms)	Duty Cycle (%)
Mode 1	2.21	1.55	0.47	3.76	58.78
Mode 2	1.2	2.55	0.91	3.75	32
Mode 3	0.84	2.92	1.2	3.76	22.34

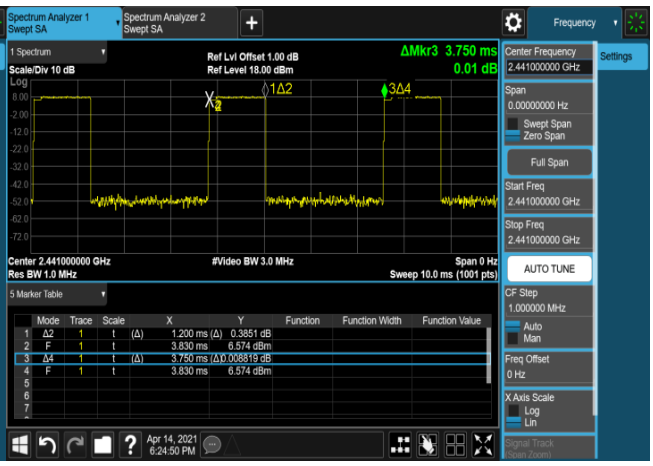
Note 1: T means the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Note 2: According to KDB 558074, when test for Radiated Emission Band Edge and Radiated Emission, for average detector set: VBW ⩾ 1/T will be used.

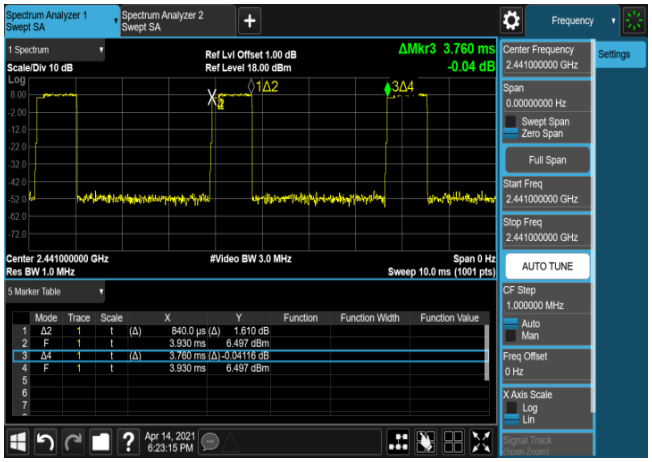
Mode 1 CH39 2441MHz



Mode 2 CH39 2441MHz



Mode 3 CH39 2441MHz

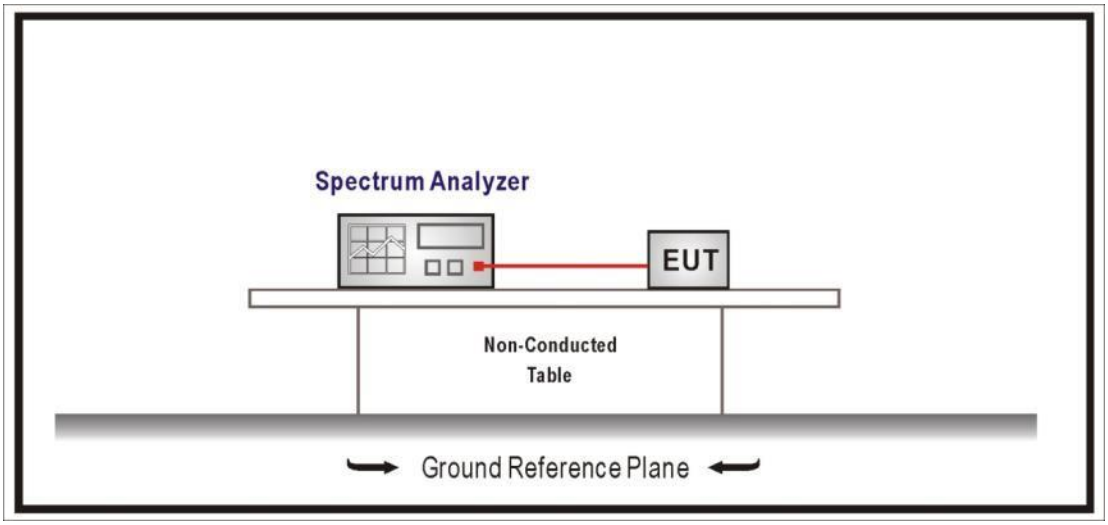


4.10 Band Edge — VERDICT: PASS

4.10.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.247(d) ,15.209			
Frequency bands (MHz)	Detector	Limit (dBµV/m)	RBW (MHz)	Distance (m)
2310-2390 2483.5-2500	PK	74	1	3
	AV	54	1	3
Note: The field strength of emissions appearing within these frequency bands shall not exceed the limits.				

4.10.2 Test Setup



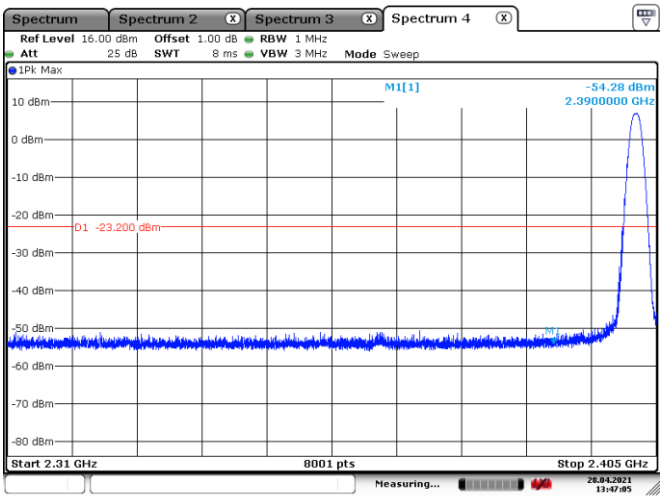
4.10.3 Test Procedure

Test Method

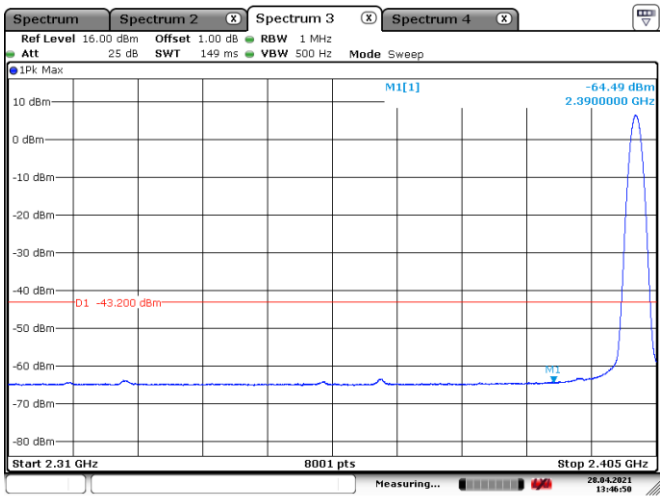
	References Rule		Chapter	Description
☐	DA 00-705		N/A	duty cycle correction factor
☒	ANSI C63.10		6.10	Band-edge testing
	☒	ANSI C63.10	6.10.5	Restricted-band band-edge measurements
	☐	ANSI C63.10	6.10.6	Marker-delta method
☐	ANSI C63.10		6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
☐	ANSI C63.10		6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
☐	ANSI C63.10		6.6	Radiated emissions from unlicensed wireless devices above 1 GHz

4.10.4 Test Data

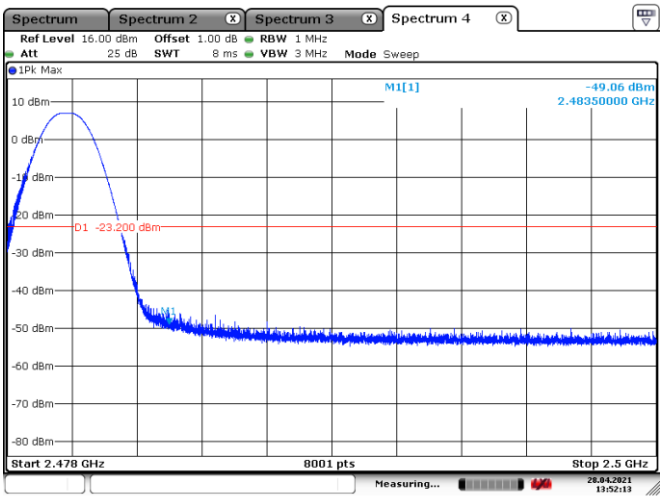
Mode 1 CH00 (2402MHz) PK



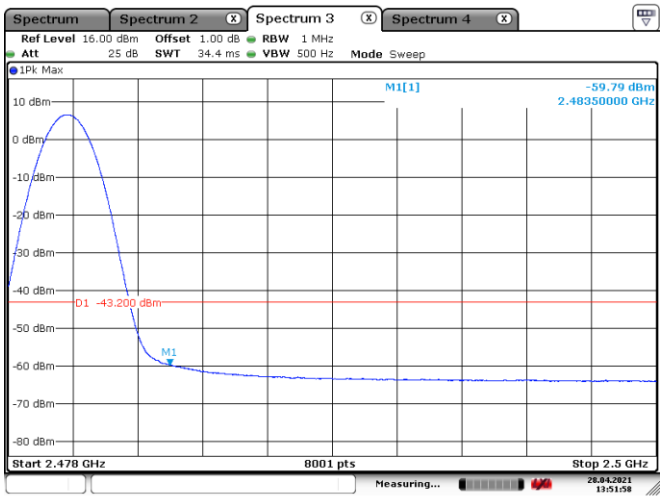
Mode 1 CH00 (2402MHz) AV



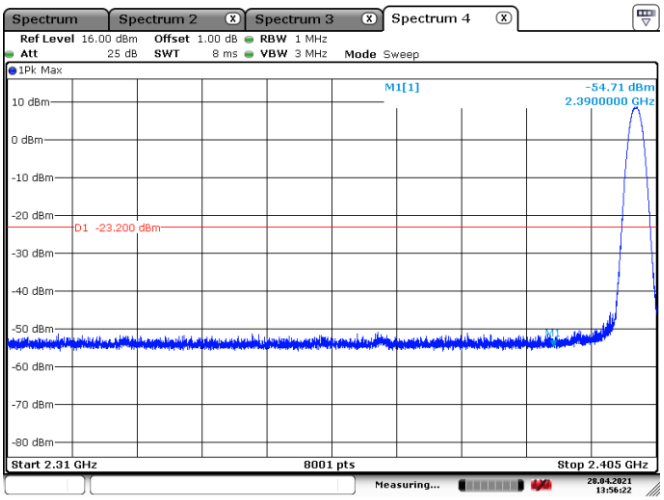
Mode 1 CH39 (2480MHz) PK



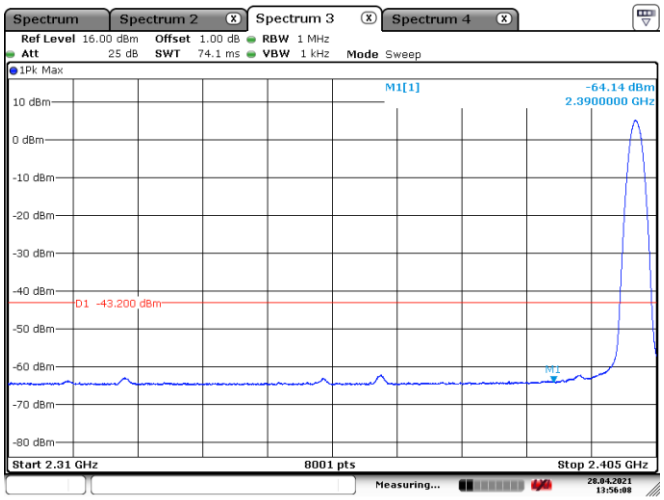
Mode 1 CH39 (2480MHz) AV



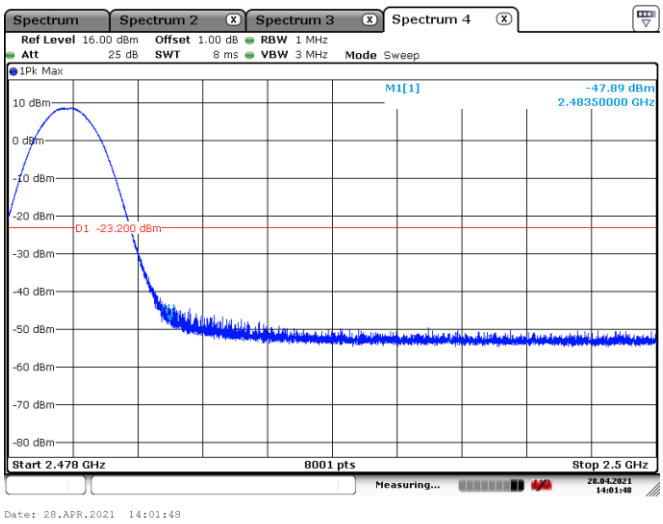
Mode 2 CH00 (2402MHz) PK



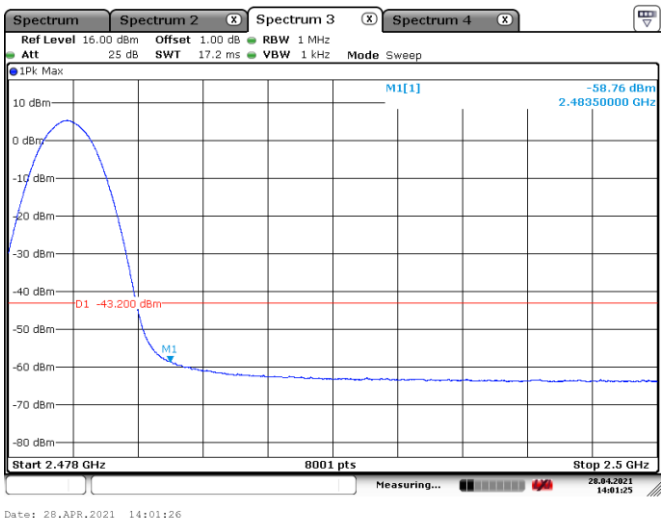
Mode 2 CH00 (2402MHz) AV



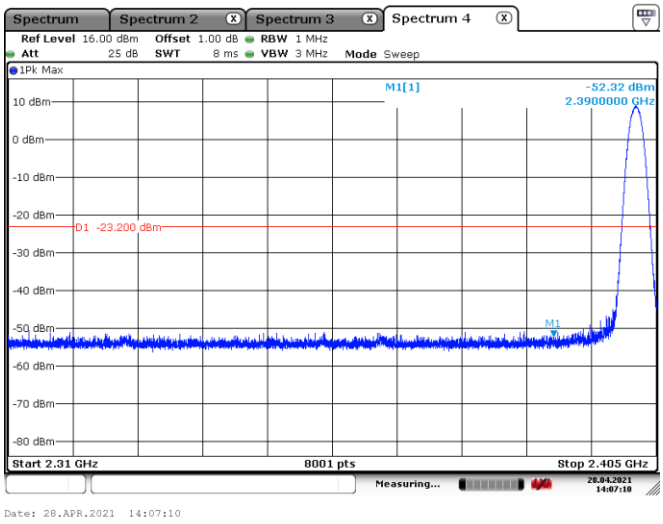
Mode 2 CH39 (2480MHz) PK



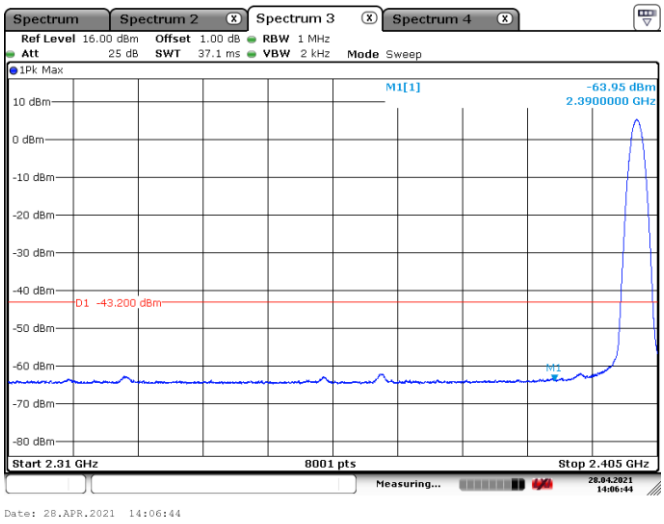
Mode 2 CH39 (2480MHz) AV



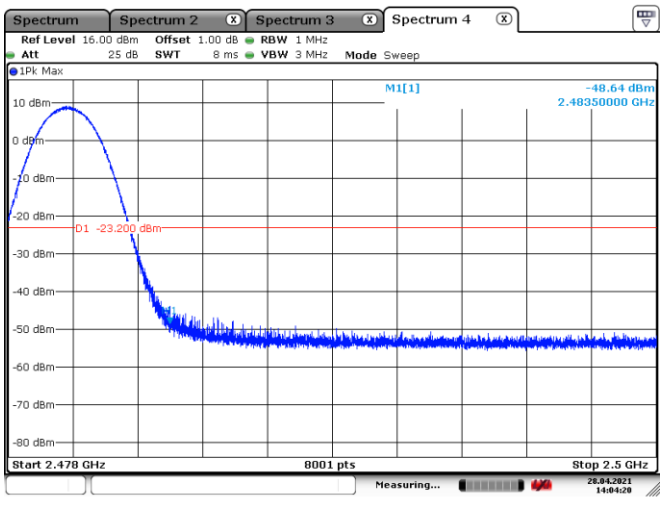
Mode 3 CH00 (2402MHz) PK



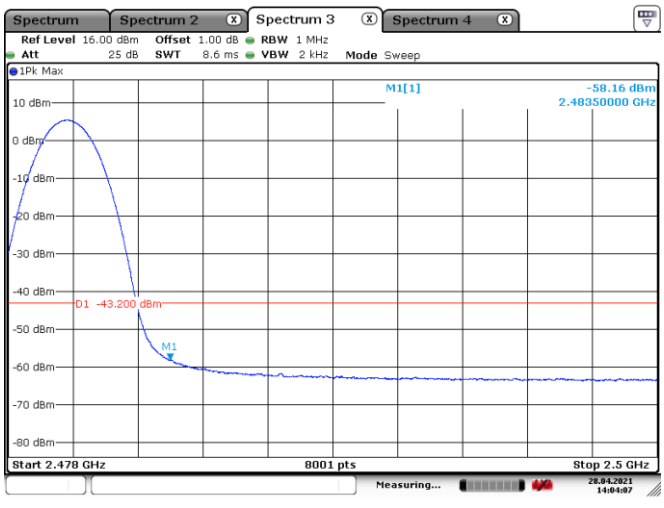
Mode 3 CH00 (2402MHz) AV



Mode 3 CH39 (2480MHz) PK



Mode 3 CH39 (2480MHz) AV



Note:
PK Limit=74dBuV/m-95.2-2(Antenna Gain)=-23.2dBm
AV Limit=54dBuV/m-95.2-2(Antenna Gain)=-43.2dBm

4.11 Antenna Requirement	VERDICT: PASS

4.11.1 Limit:	
Standard	FCC Part 15 Subpart C Paragraph 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.	

4.11.2 Antenna Connector Construction:	
☒	The use of a permanently attached antenna
☐	The antenna use of a unique coupling to the intentional radiator
☐	The use of a nonstandard antenna jack or electrical connector
Please refer to the attached document “Internal Photograph” to show the antenna connector.	

5 TEST SETUP PHOTO AND EUT PHOTO

Remark: The test setup photo and EUT Photo please see appendix.

The End