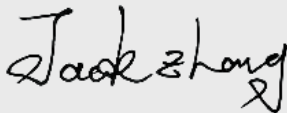


Test report No:
22A0738R-RF-US-P06V02

FCC & ISED TEST REPORT

Product Name	Infotainment Headunit
Model and /or type reference	X297
Trademark	HARMAN
FCC ID	2ACRL-X297
IC	12339A-X297
Applicant's name / address	Harman Automotive Electronic Systems (Suzhou) Co., Ltd. No.125, Fangzhou Road, Suzhou Industrial Park, Jiangsu Province, China 215024
Test method requested, standard	FCC CFR Title 47 Part 15 Subpart C Section 15.247 ANSI C63.10: 2013 RSS-Gen Issue 5 /RSS-247 Issue 2
Verdict Summary	IN COMPLIANCE
Tested by (name / position & signature)	Jun Xu/Project Engineer 
Approved by (name / position & signature)	Jack Zhang/ Manager 
Date of issue	2023-01-06
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)	Oct. 19, 2022
Date (start test)	Oct. 21, 2022
Date (finish test)	Nov. 29, 2022

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
Tx	: Transmitter
Rx	: Receiver
N/A	: Not Applicable
N/M	: Not Measured

DOCUMENT HISTORY

Report No.	Version	Description	Issued Date
22A0738R-RF-US-P06V02	V1.0	Initial issue of report.	2022-12-20
22A0738R-RF-US-P06V02	V1.1	Page62 modified test data.	2023-01-06

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.

USED EQUIPMENT

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	2021.12.15	2022.12.14
MXA Signal Analyzer	Keysight	N9020A	MY56060147	2022.07.14	2023.07.13
4TX MIMO Power Sensor	Keysight	X8750A	MY59400102	2022.03.16	2023.03.15
Coaxial Cable	Woken	N/A	N/A	2022.01.18	2023.01.17
Temperature/Humidity Meter	RTS	RTS-8S	RF08	2022.08.23	2023.08.22

Radiated Emission(30MHz-1GHz) / AC3

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMI Test Receiver	R&S	ESCI	100176	2022.07.10	2023.07.09
Loop Antenna	R&S	HFH2-Z2	833799/003	2022.04.15	2023.04.14
Bilog Antenna	Teseq GmbH	CBL6112D	27613	2022.08.28	2023.08.27
Coaxial Cable	Huber+Suhner	RG 214	AC3-C	2022.03.30	2023.03.29
Temperature/Humidity Meter	RTS	RTS-8S	AC3-TH	2022.07.07	2023.07.06
Dekra test software	Dekra	-	-	-	-

Radiated Emission(1GHz-40GHz) / AC5

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
MXA Signal Analyzer	Keysight	N9020B	MY60112218	2022.01.09	2023.01.08
Amplifier	SKET	LNPA_0118G-45	SK2021041201	2022.04.15	2023.04.14
Preamplifier	EMCI	EMC184045SE	980263	2022.07.19	2023.07.18
DRG Horn Antenna	ETS-Lindgren	3117	00167055	2022.08.29	2023.08.28
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2022.05.19	2023.05.18
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2022.05.22	2023.05.21
Coaxial Cable	ROSENBERGER	LA1-C011-2000/3000	AC5-40G	2022.03.21	2023.03.20
High-Pass Filter	Wainwright	WHKX3.0/18G-12SS	AC5&AC6	2022.06.07	2023.06.06
Temperature/Humidity Meter	RTS	RTS-8S	AC5-TH	2022.07.07	2023.07.06
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 comply 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	Infotainment Headunit
Model No.	X297
Trademark	HARMAN
Hardware Version.....	DVx
Software Version	FSKER_MY23_ FSKER_V_DB22304E
Firmware Version	N/A
FCC ID.....	2ACRL-X297
IC	12339A-X297
Manufacturer	Harman Automotive Electronic Systems (Suzhou) Co., Ltd.
Manufacturer Address	No.125, Fangzhou Road, Suzhou Industrial Park, Jiangsu Province, China 215024
Factory	Harman Automotive Electronic Systems (Suzhou) Co., Ltd.
Address	No.125, Fangzhou Road, Suzhou Industrial Park, Jiangsu Province, China 215024

Wireless specification.....	Bluetooth					
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					

Rated power supply..... :	Voltage and Frequency					
	☐	AC: 220 – 240 V, 50/60 Hz				
	☐	Adapter: Input:100-240V,50/60Hz,0.5A Output:5.0V,3A /9.0V,2.23A /12V,1.67A/3.3-5.9V,3A/3.3-11V,2.2A				
	☒	DC: 12V				
	☐	Battery:3.85V				
Mounting position	☐	Table top equipment				
	☐	Wall/Ceiling mounted equipment				
	☐	Floor standing equipment				
	☐	Head-mounted equipment				
	☒	Other: Equipment for vehicular use				

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.....	-3.29 dBi		

1.3 Channel List

Bluetooth Working Frequency of Each Channel:							
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)

Note 1: Regards to the frequency band operation: the lowest, middle and highest frequency channel were selected to perform the test, then shown on this report.

Note 2: For portable device, radiated tests was verified over X, Y, Z axis, and shown the worst case on this report.

2.2 Accessories Information

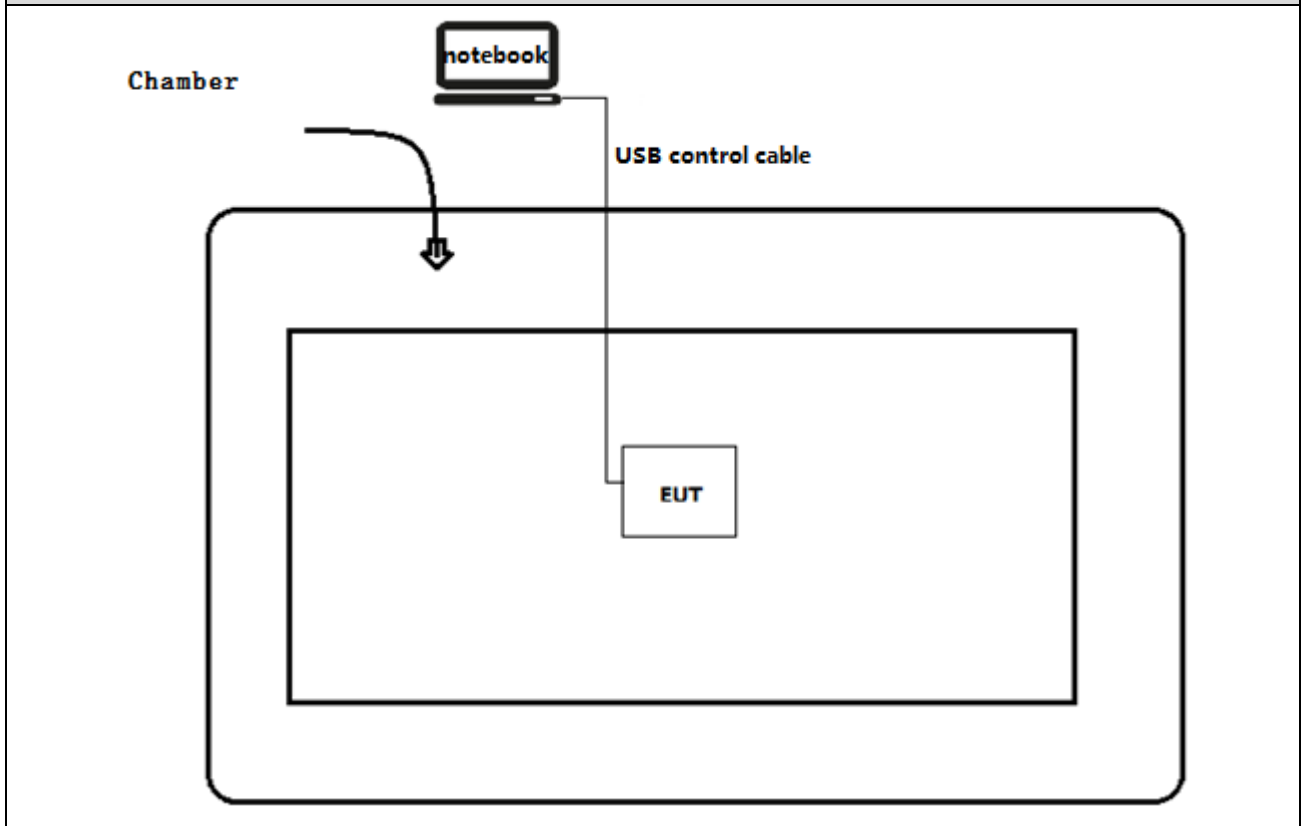
Accessories Information	Brand/model name	Cable		
		Length used during test [m]	Attached during test	Shielded
USB Cable	N/A	10	☒	☒
USB Cable	N/A	0.5	☒	☒

2.3 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
Putty	N/A	N/A	N/A

2.4 Test Configuration / Block diagram used for tests

Test setup Diagram- Radiated Emission



2.5 Testing process

1	Setup the EUT as shown in Section 2.3
2	Run the software “Putty” on the notebook computer.
3	Open the serial port and enter the corresponding commands to configure the test mode, test channel, test power and data rate.
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 bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.
ANSI C63.10	2013	American National Standard of Procedures for Compliance Testing of Unlicensed 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 for Compliance 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	N/A	N/A
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	N/A	N/A
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: N/A

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

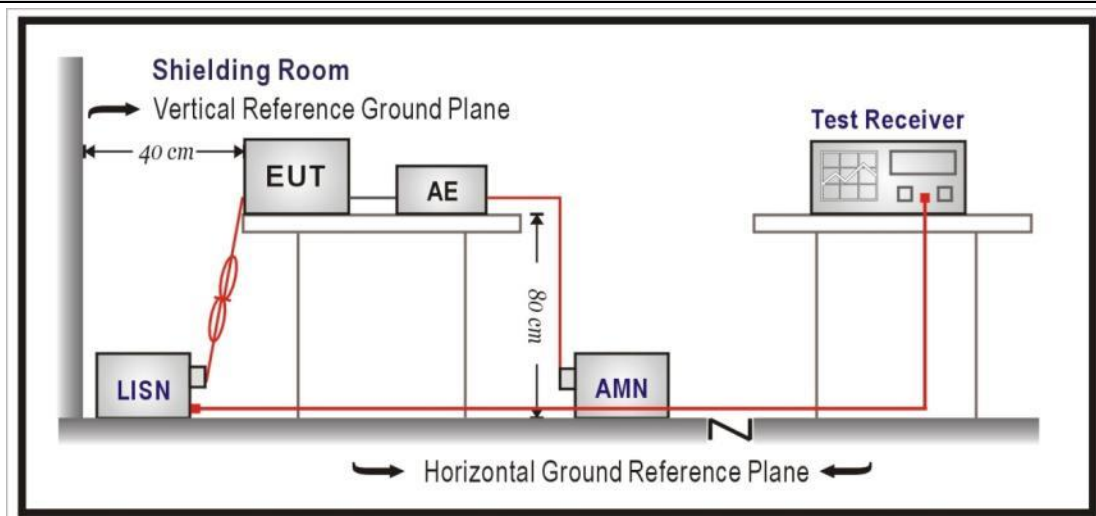
¹⁾ At the transition frequency, the lower limit applies.

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 unlicensed wireless devices

4.1.4 Test Data

Note: Note: EUT is DC powered.

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 operation for ISSED

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	--	

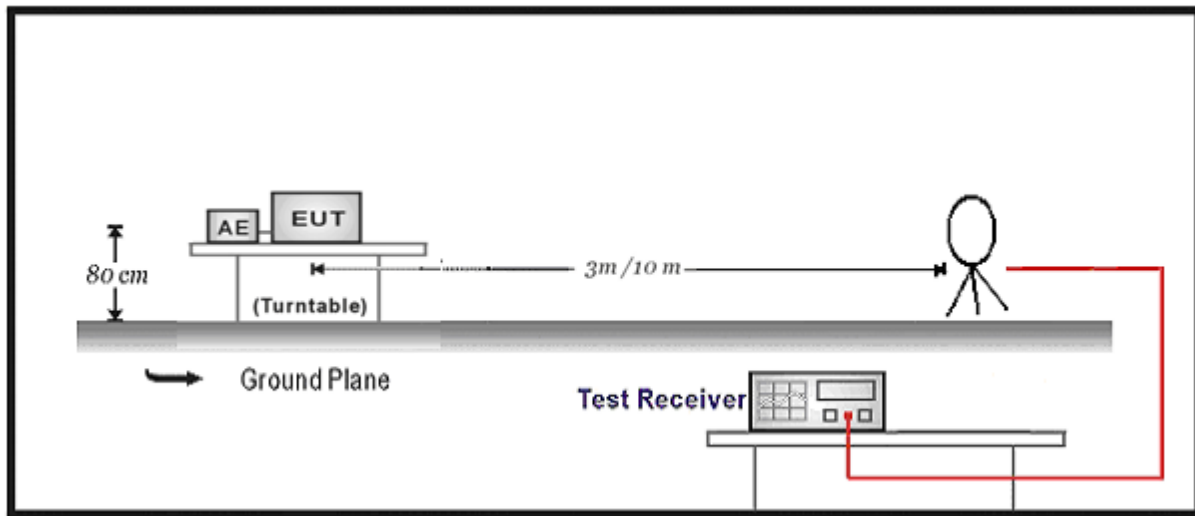
Restricted Band Emissions Limit			
Frequency (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300 _(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30 _(Note 1)
1.705 - 30	30	29.5	30 _(Note 1)
30 - 88	100	40	3 _(Note 2)
88-216	150	43.5	3 _(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).

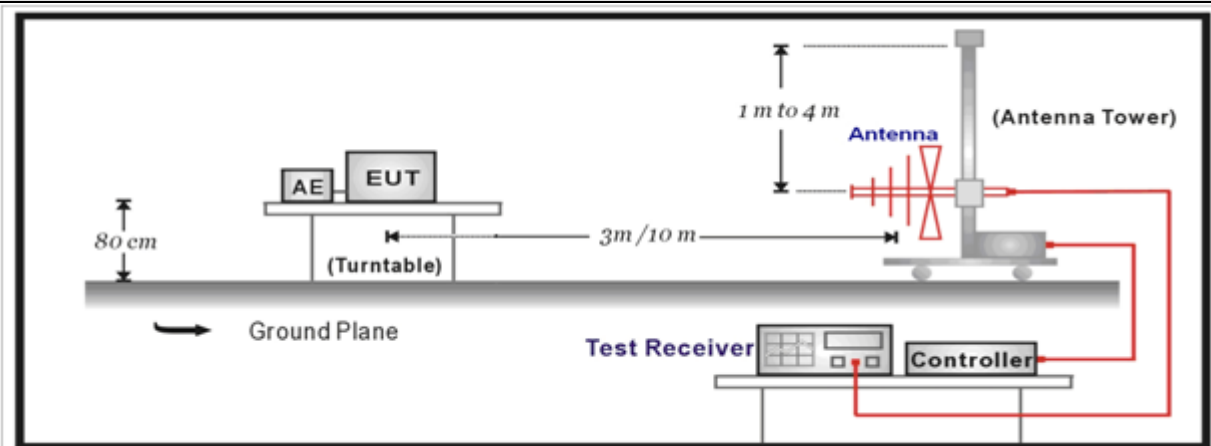
Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated 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

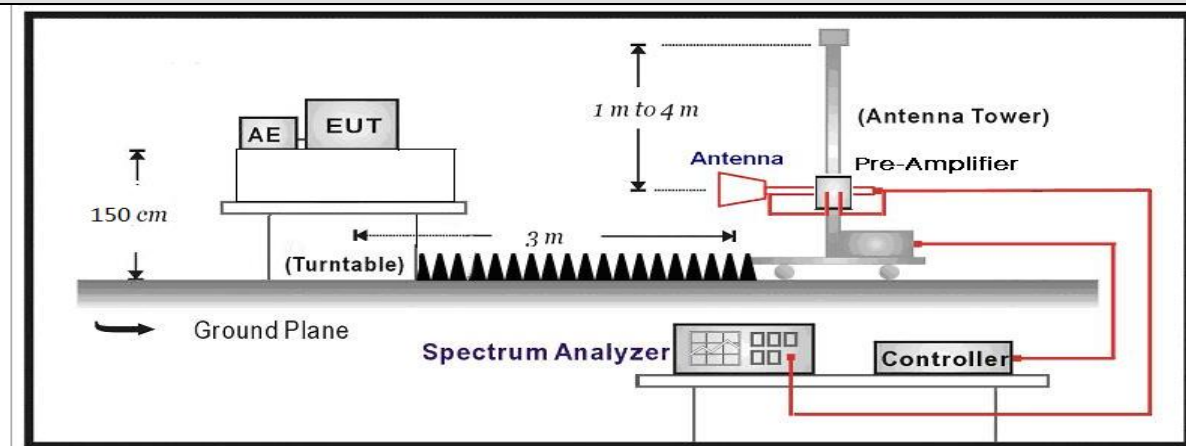
Below 30MHz Test Setup:



30MHz-1GHz Test Setup:



Above 1GHz Test Setup:



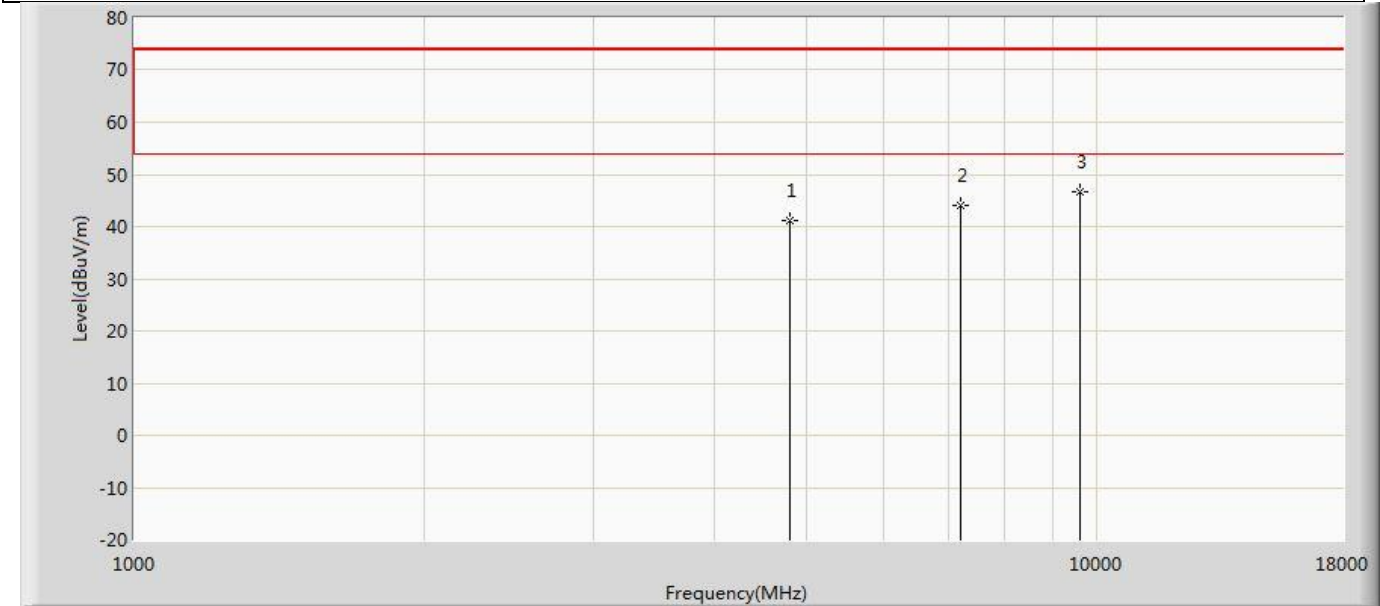
4.2.3 Test Procedure

	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



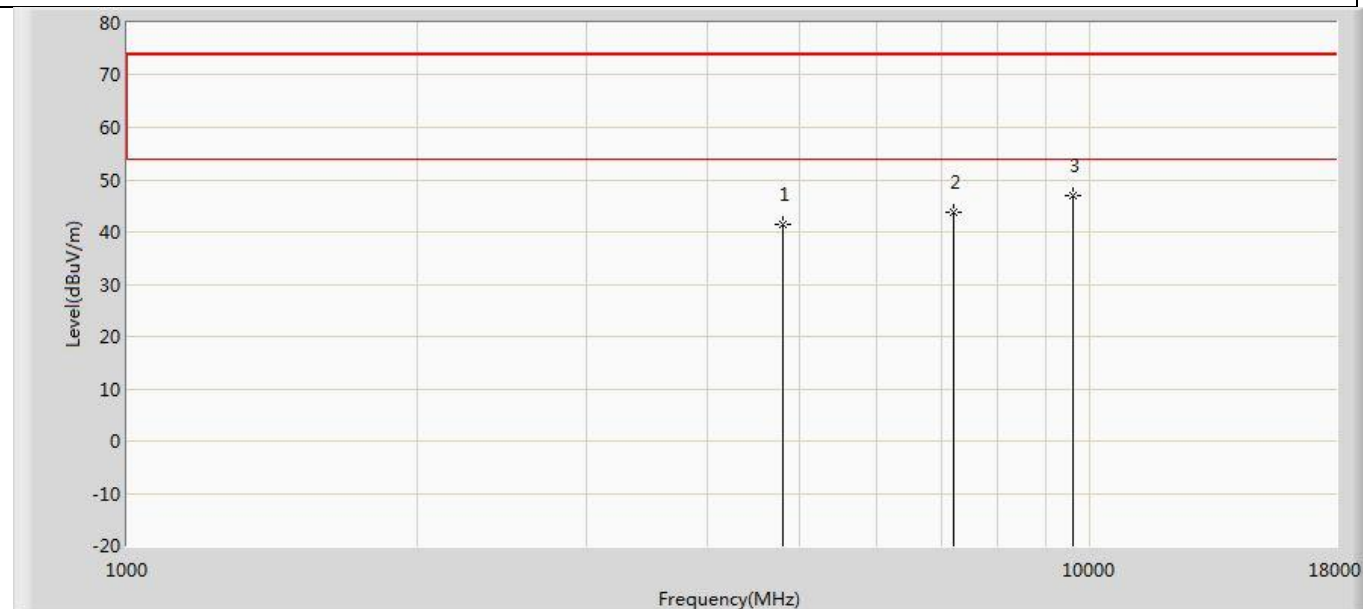
4.2.4 Test Data

Profile: 22A0738R	Page No.: 41
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Horizontal
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode1:Transmit at 2402MHz by DH5	



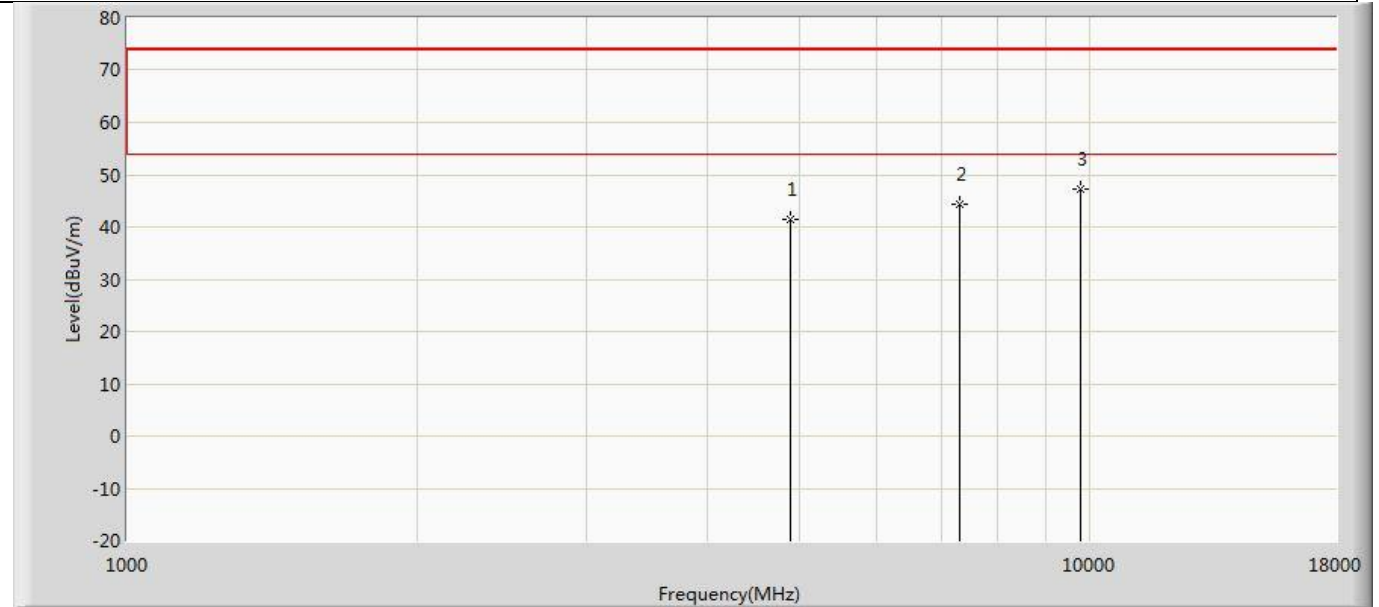
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	41.146	56.126	-32.854	74.000	-14.981	PK
2		7206.000	43.989	54.809	-30.011	74.000	-10.820	PK
3	*	9608.000	46.764	54.858	-27.236	74.000	-8.094	PK

Profile: 22A0738R	Page No.: 42
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Vertical
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode1:Transmit at 2402MHz by DH5	



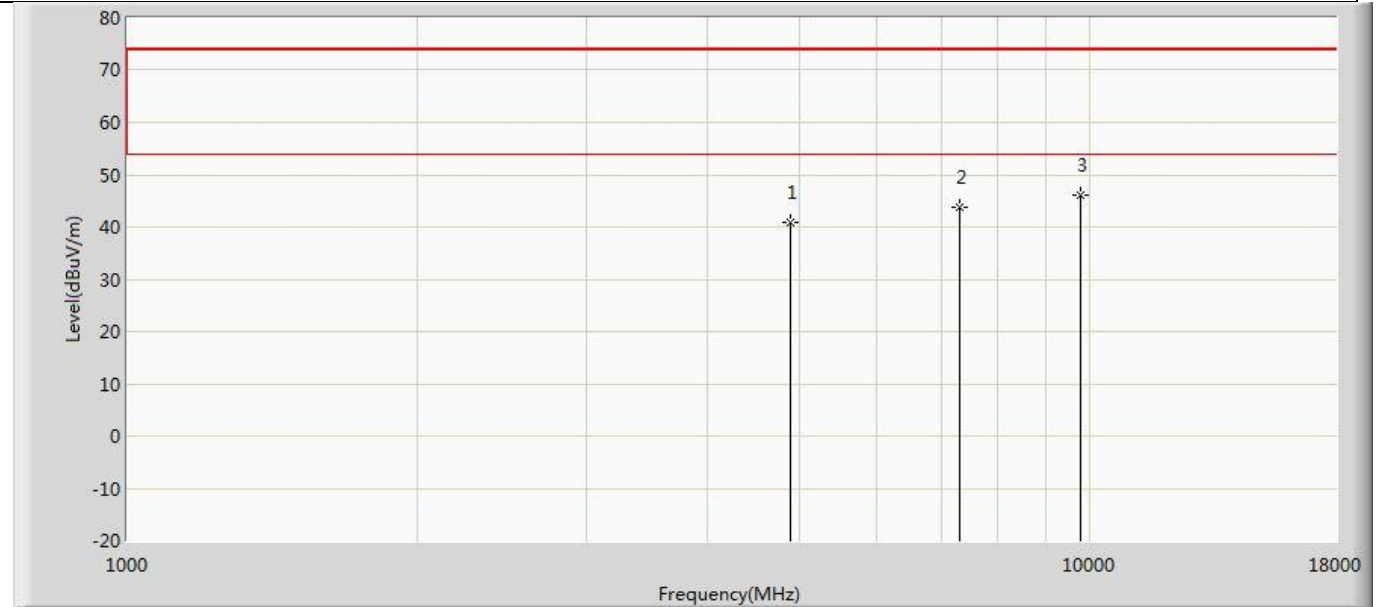
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	41.306	56.286	-32.694	74.000	-14.981	PK
2		7206.000	43.746	54.566	-30.254	74.000	-10.820	PK
3	*	9608.000	46.876	54.970	-27.124	74.000	-8.094	PK

Profile: 22A0738R	Page No.: 43
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Horizontal
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode1:Transmit at 2441MHz by DH5	



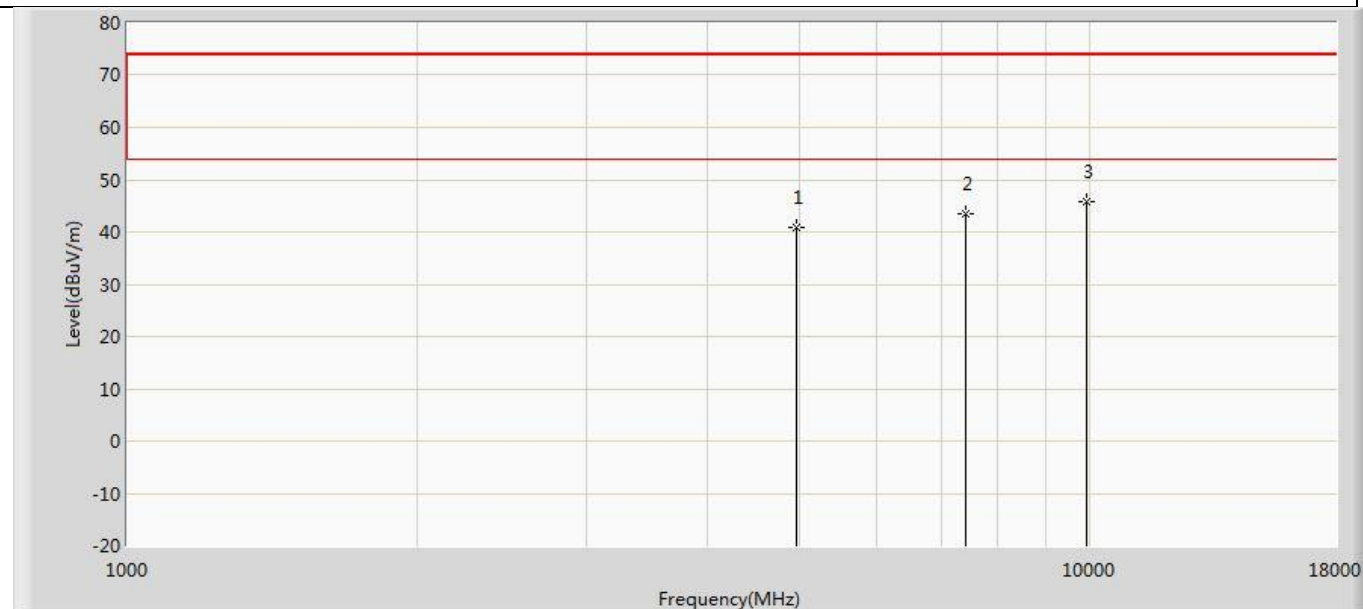
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4882.000	41.333	55.946	-32.667	74.000	-14.612	PK
2		7323.000	44.252	55.128	-29.748	74.000	-10.876	PK
3	*	9764.000	47.119	54.970	-26.881	74.000	-7.850	PK

Profile: 22A0738R	Page No.: 44
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Vertical
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode1:Transmit at 2441MHz by DH5	



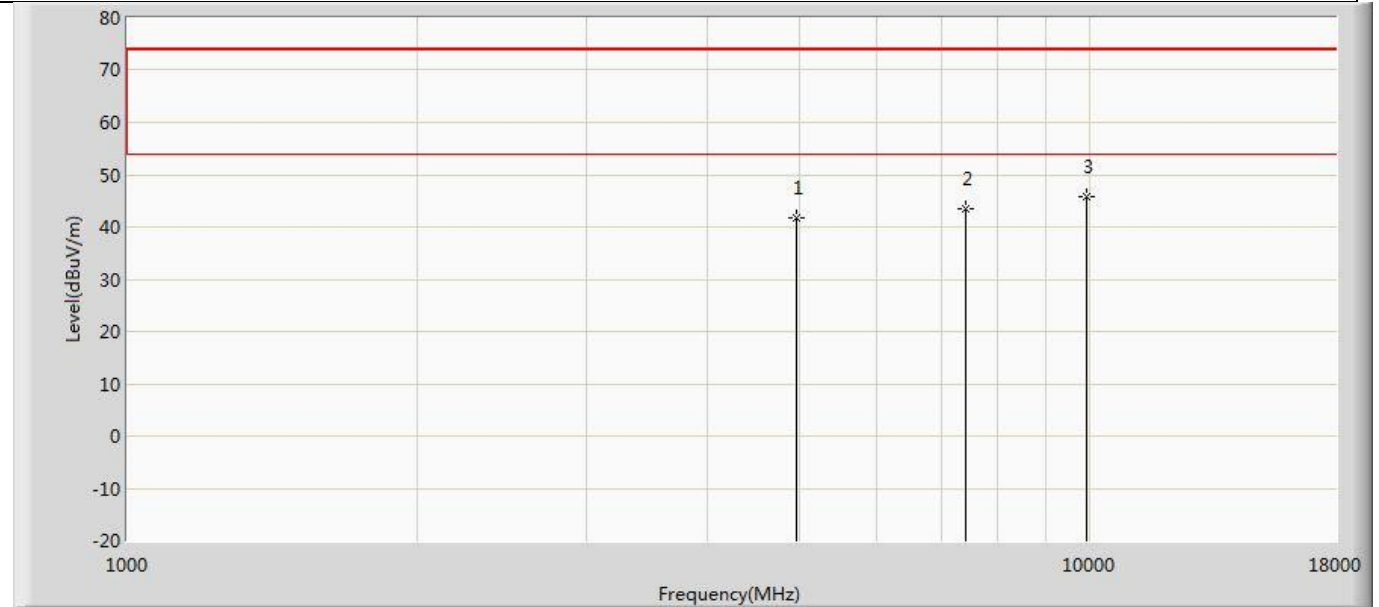
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4882.000	40.873	55.486	-33.127	74.000	-14.612	PK
2		7323.000	43.905	54.781	-30.095	74.000	-10.876	PK
3	*	9764.000	46.168	54.019	-27.832	74.000	-7.850	PK

Profile: 22A0738R	Page No.: 45
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Horizontal
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode1:Transmit at 2480MHz by DH5	



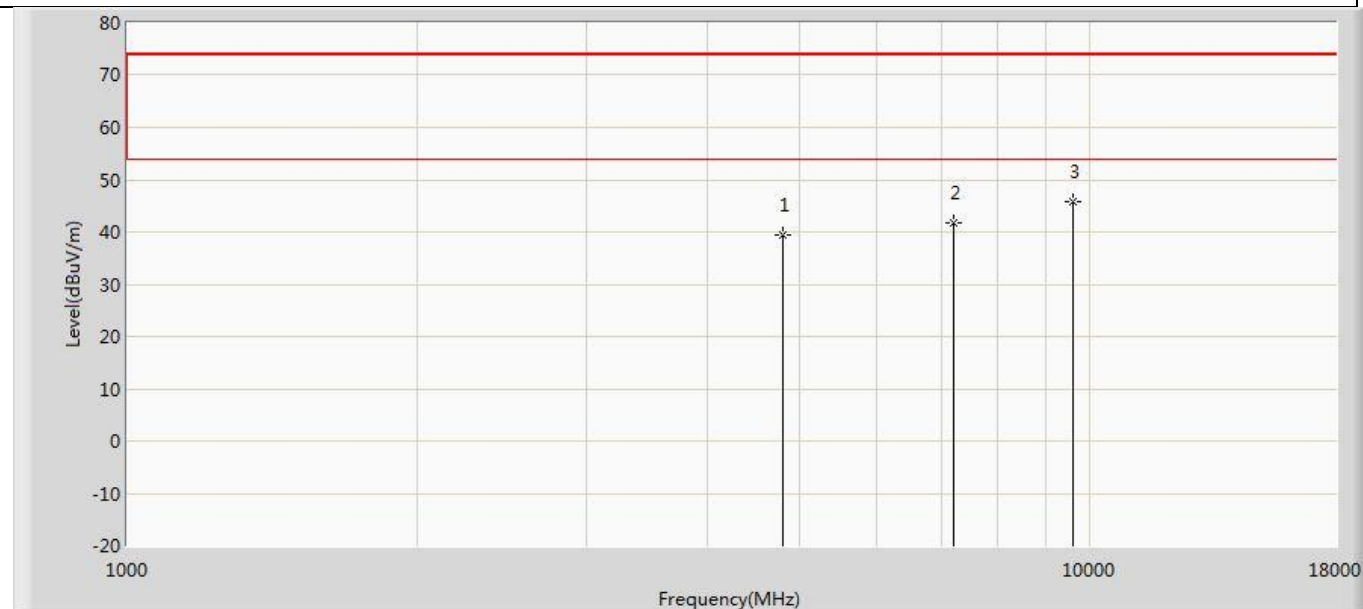
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	40.796	55.360	-33.204	74.000	-14.565	PK
2		7440.000	43.450	54.181	-30.550	74.000	-10.731	PK
3	*	9920.000	45.834	53.411	-28.166	74.000	-7.578	PK

Profile: 22A0738R	Page No.: 46
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Vertical
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode1:Transmit at 2480MHz by DH5	



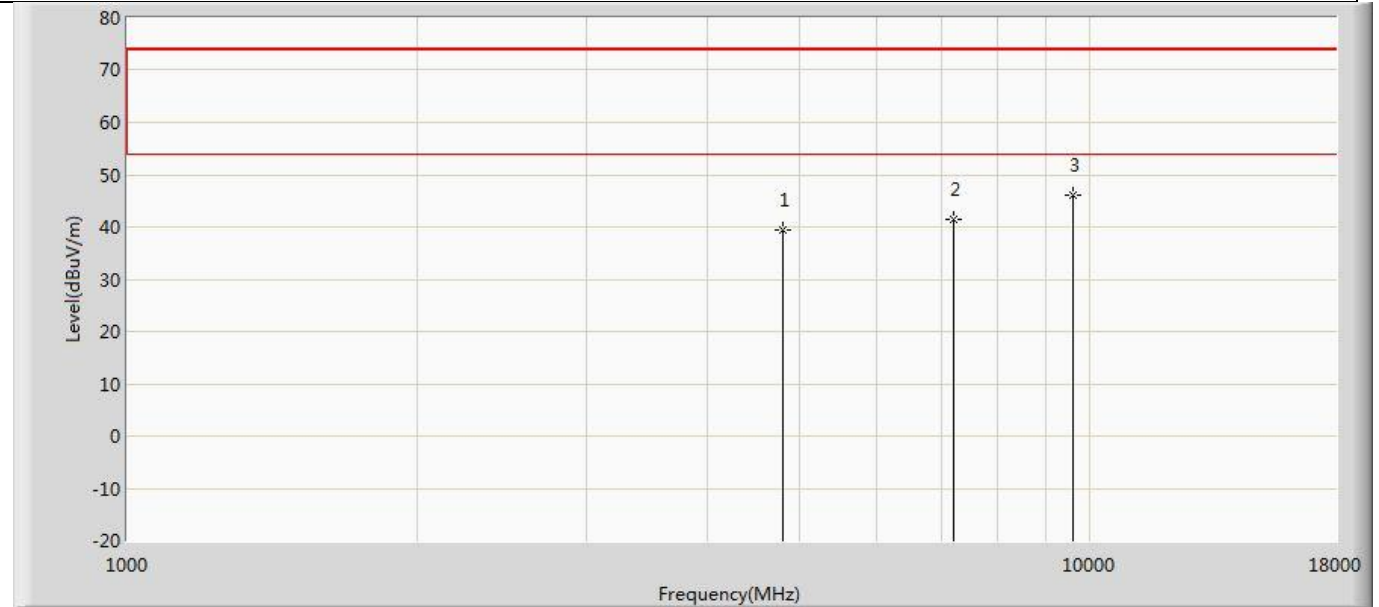
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	41.703	56.267	-32.297	74.000	-14.565	PK
2		7440.000	43.535	54.266	-30.465	74.000	-10.731	PK
3	*	9920.000	45.838	53.415	-28.162	74.000	-7.578	PK

Profile: 22A0738R	Page No.: 47
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:29
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Horizontal
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode2:Transmit at 2402MHz by 2DH5	



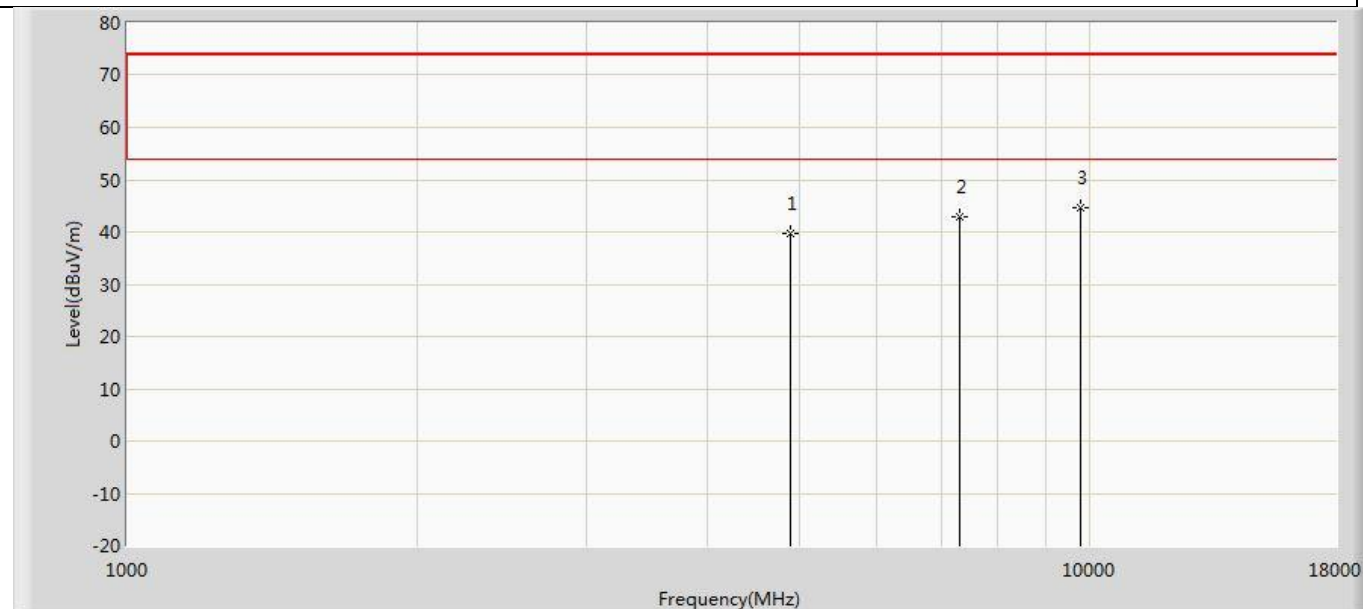
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	39.399	54.379	-34.601	74.000	-14.981	PK
2		7206.000	41.786	52.606	-32.214	74.000	-10.820	PK
3	*	9608.000	45.701	53.795	-28.299	74.000	-8.094	PK

Profile: 22A0738R	Page No.: 48
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:29
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Vertical
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode2:Transmit at 2402MHz by 2DH5	



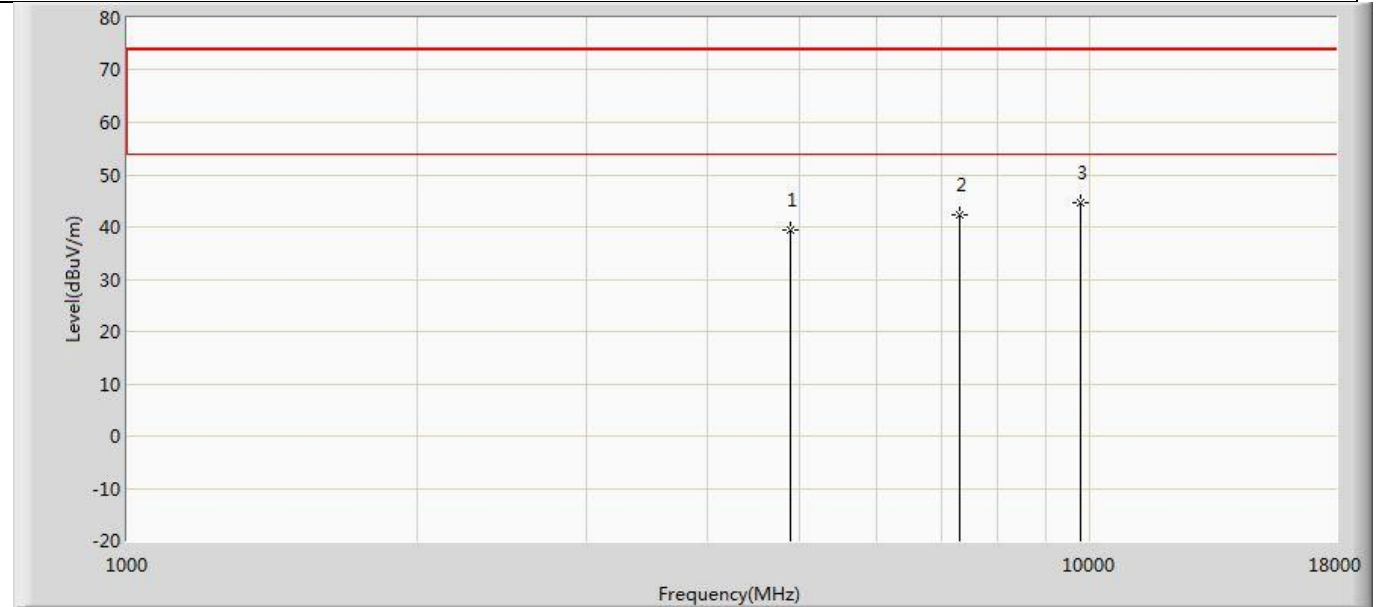
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	39.384	54.364	-34.616	74.000	-14.981	PK
2		7206.000	41.320	52.140	-32.680	74.000	-10.820	PK
3	*	9608.000	46.210	54.304	-27.790	74.000	-8.094	PK

Profile: 22A0738R	Page No.: 49
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:29
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Horizontal
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode2:Transmit at 2441MHz by 2DH5	



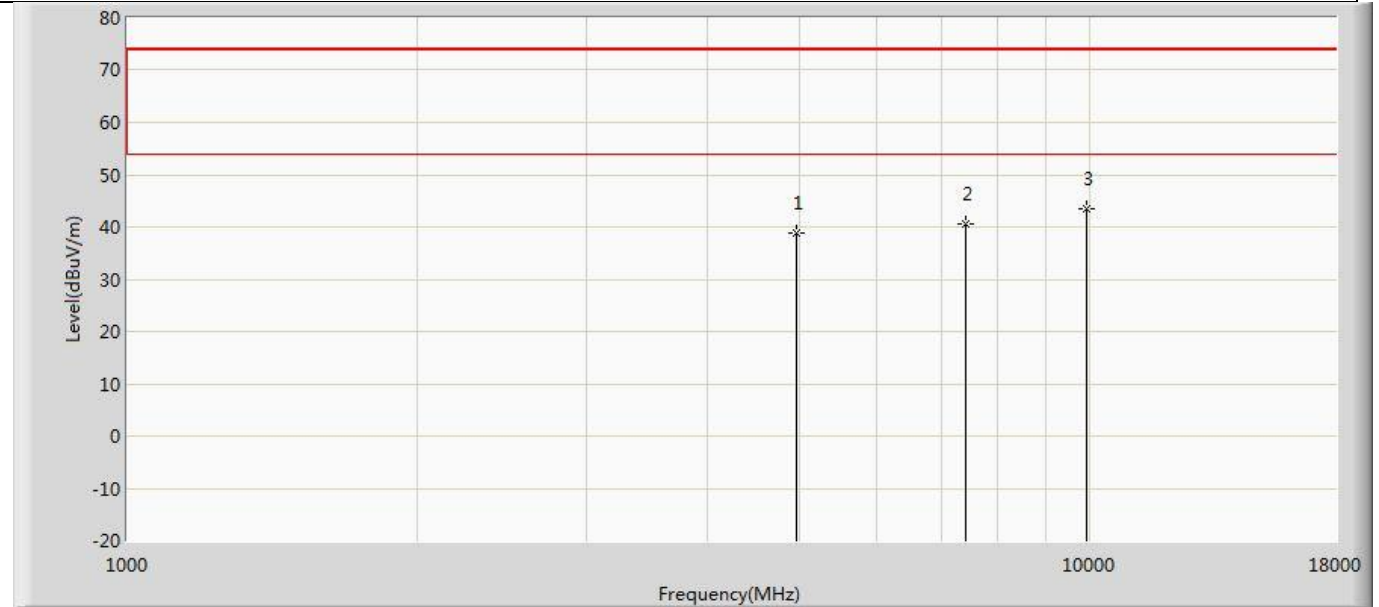
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4882.000	39.819	54.432	-34.181	74.000	-14.612	PK
2		7323.000	42.759	53.635	-31.241	74.000	-10.876	PK
3	*	9764.000	44.694	52.545	-29.306	74.000	-7.850	PK

Profile: 22A0738R	Page No.: 50
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:29
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Vertical
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode2:Transmit at 2441MHz by 2DH5	



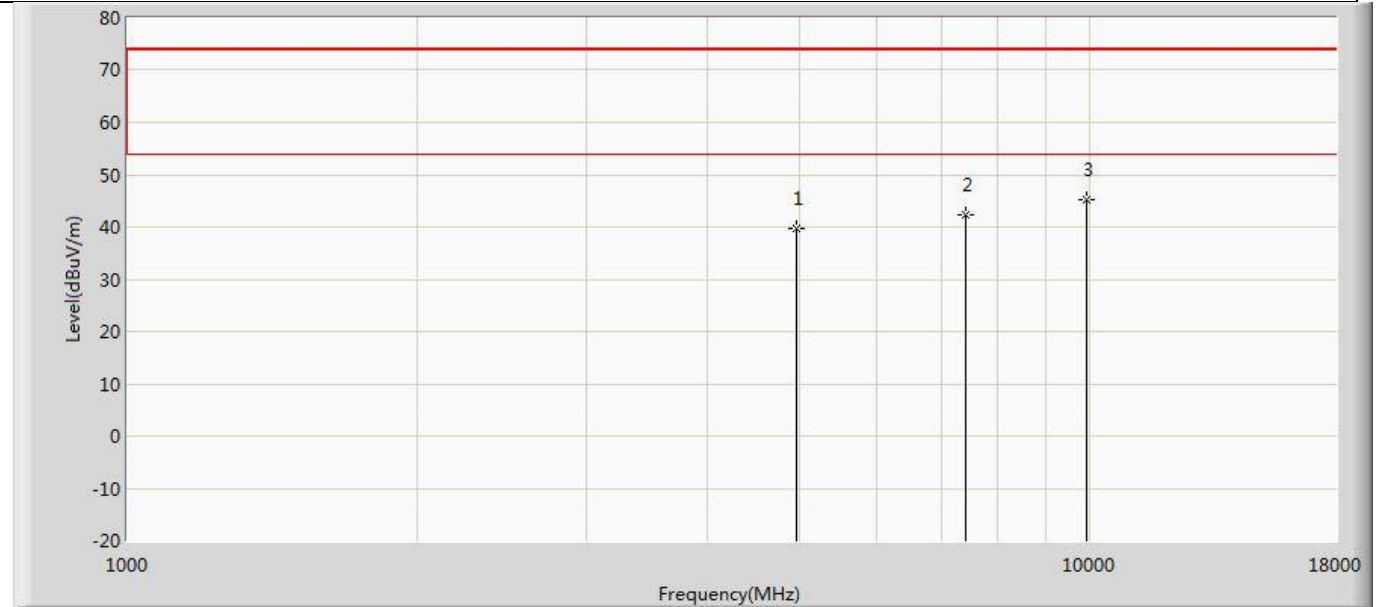
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4882.000	39.443	54.056	-34.557	74.000	-14.612	PK
2		7323.000	42.224	53.100	-31.776	74.000	-10.876	PK
3	*	9764.000	44.533	52.384	-29.467	74.000	-7.850	PK

Profile: 22A0738R	Page No.: 51
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:29
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Horizontal
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode2:Transmit at 2480MHz by 2DH5	



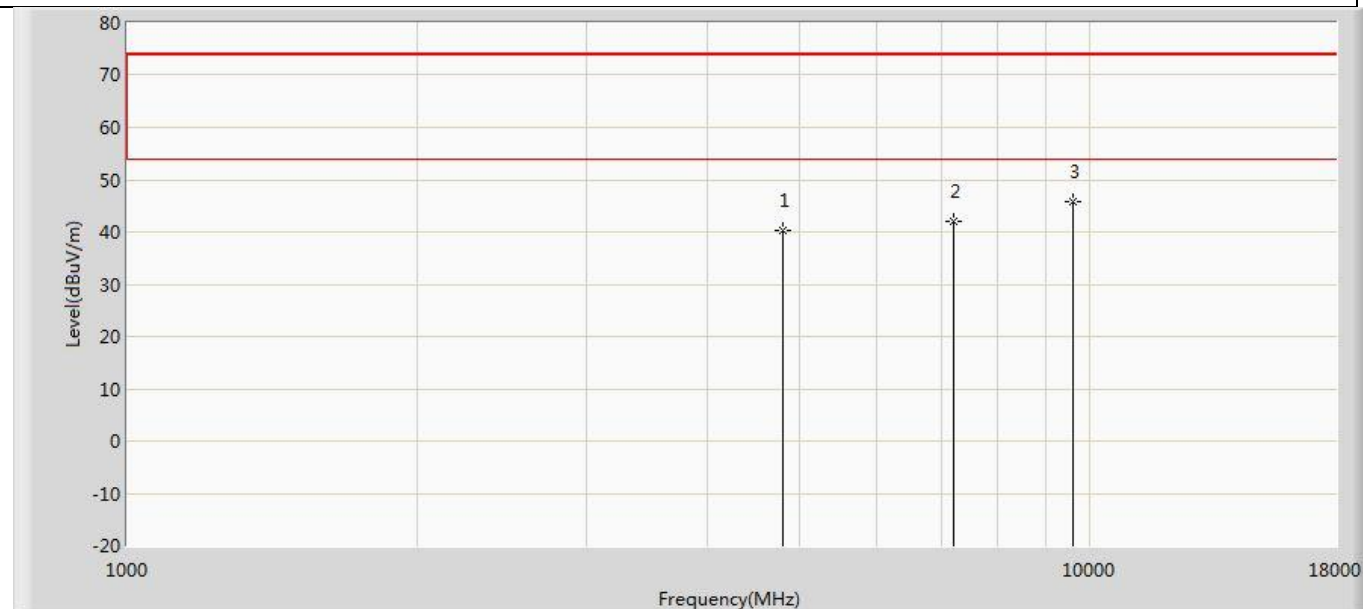
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	38.700	53.264	-35.300	74.000	-14.565	PK
2		7440.000	40.630	51.361	-33.370	74.000	-10.731	PK
3	*	9920.000	43.411	50.988	-30.589	74.000	-7.578	PK

Profile: 22A0738R	Page No.: 52
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:29
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Vertical
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode2:Transmit at 2480MHz by 2DH5	



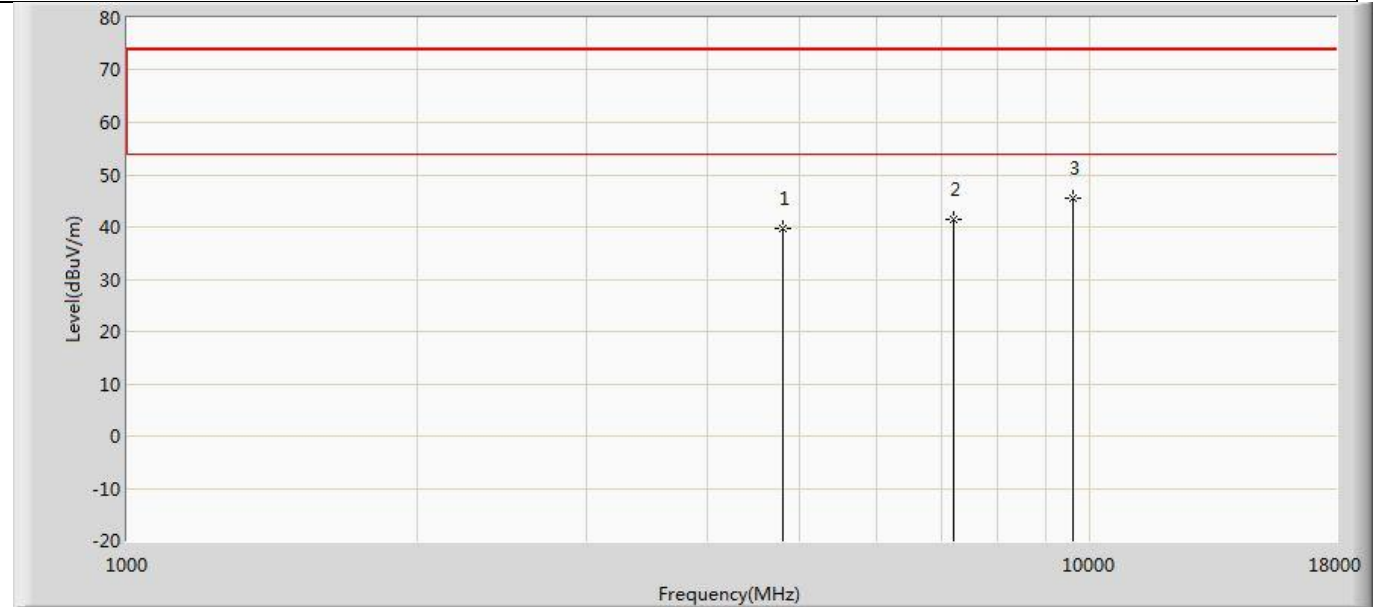
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	39.623	54.187	-34.377	74.000	-14.565	PK
2		7440.000	42.427	53.158	-31.573	74.000	-10.731	PK
3	*	9920.000	45.084	52.661	-28.916	74.000	-7.578	PK

Profile: 22A0738R	Page No.: 53
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:30
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Horizontal
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode3:Transmit at 2402MHz by 3DH5	



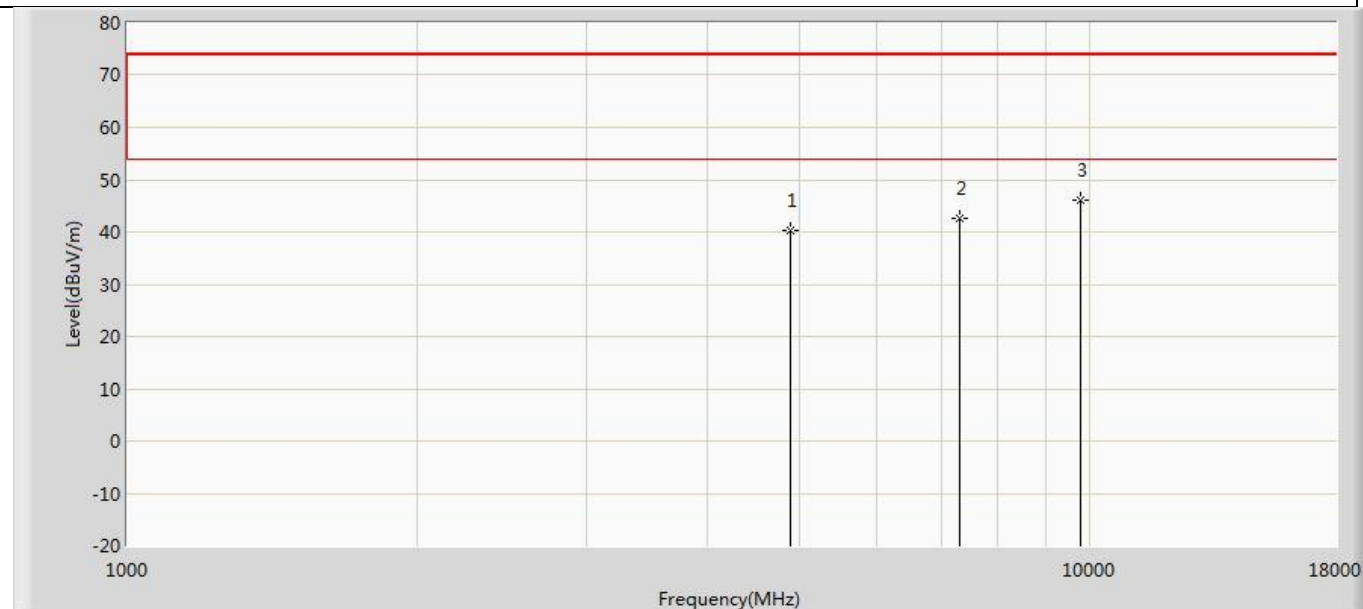
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	40.409	55.389	-33.591	74.000	-14.981	PK
2		7206.000	42.096	52.916	-31.904	74.000	-10.820	PK
3	*	9608.000	45.881	53.975	-28.119	74.000	-8.094	PK

Profile: 22A0738R	Page No.: 54
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:30
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Vertical
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode3:Transmit at 2402MHz by 3DH5	



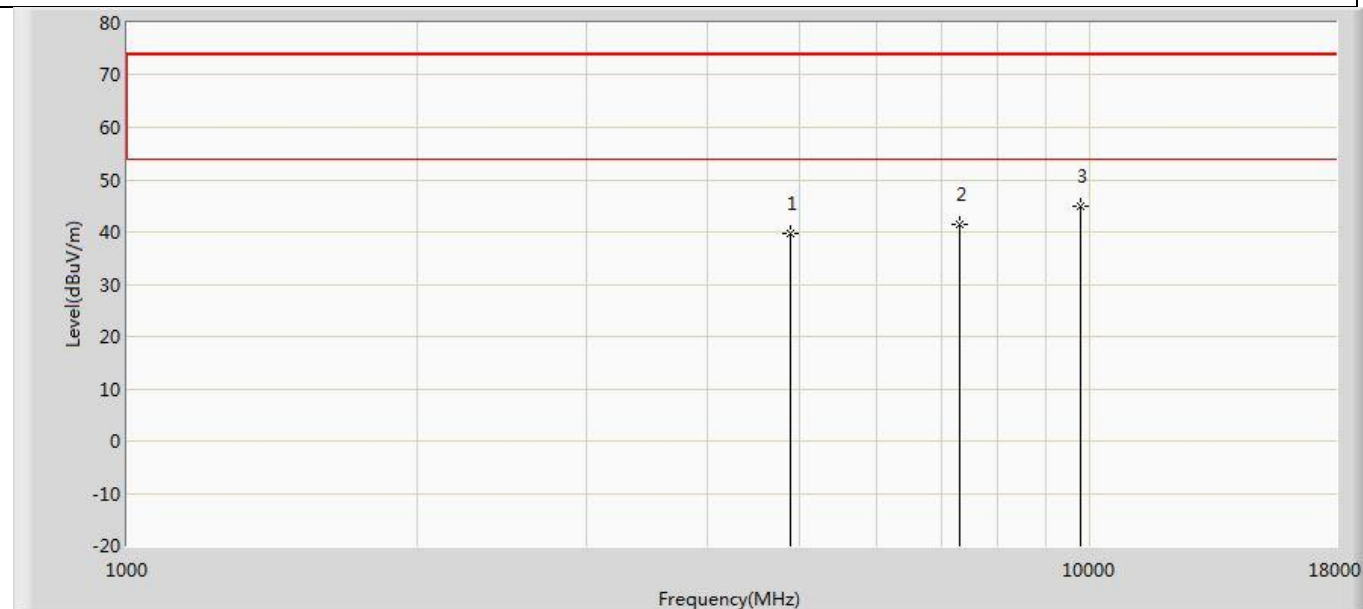
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	39.781	54.761	-34.219	74.000	-14.981	PK
2		7206.000	41.571	52.391	-32.429	74.000	-10.820	PK
3	*	9608.000	45.437	53.531	-28.563	74.000	-8.094	PK

Profile: 22A0738R	Page No.: 55
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:30
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Horizontal
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode3:Transmit at 2441MHz by 3DH5	



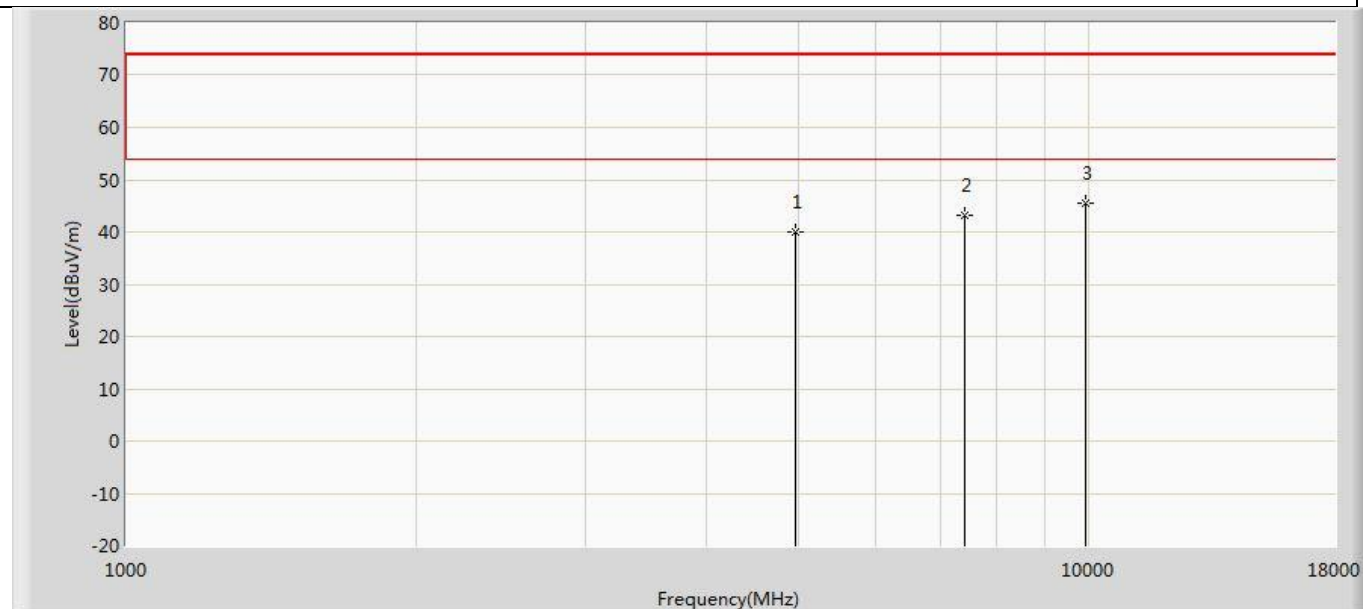
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4882.000	40.321	54.934	-33.679	74.000	-14.612	PK
2		7323.000	42.581	53.457	-31.419	74.000	-10.876	PK
3	*	9764.000	46.148	53.999	-27.852	74.000	-7.850	PK

Profile: 22A0738R	Page No.: 56
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:30
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Vertical
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode3:Transmit at 2441MHz by 3DH5	



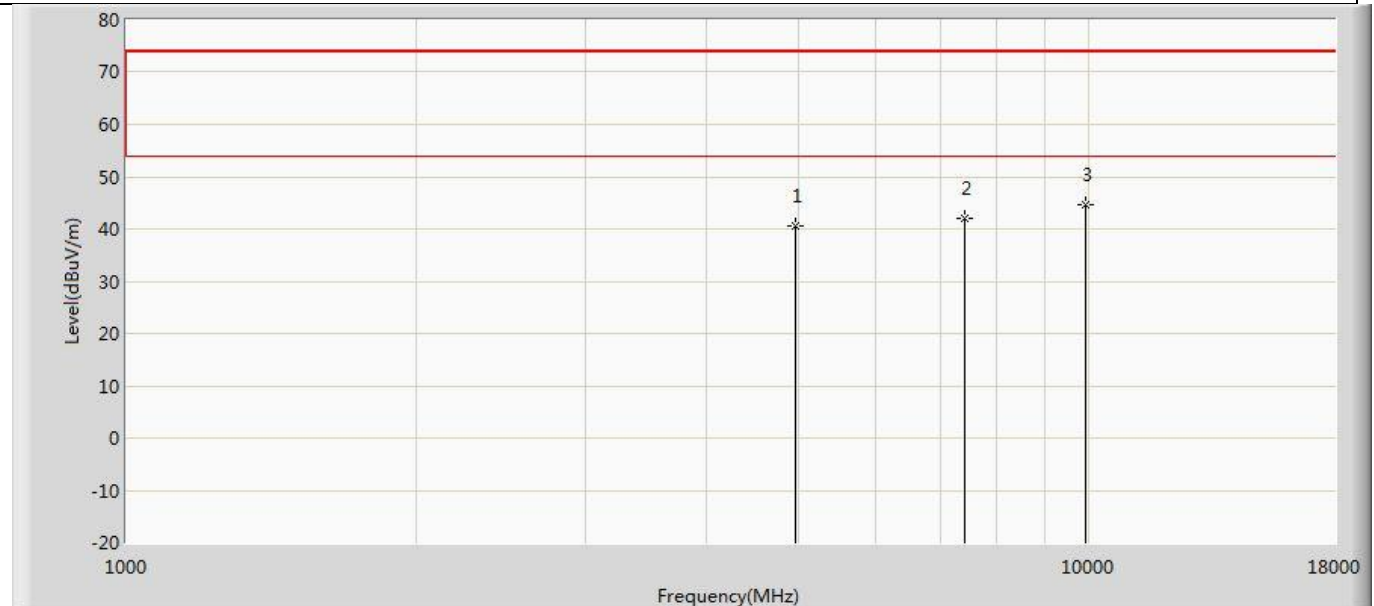
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4882.000	39.665	54.278	-34.335	74.000	-14.612	PK
2		7323.000	41.500	52.376	-32.500	74.000	-10.876	PK
3	*	9764.000	44.977	52.828	-29.023	74.000	-7.850	PK

Profile: 22A0738R	Page No.: 57
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:30
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Horizontal
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode3: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	40.085	54.649	-33.915	74.000	-14.565	PK
2		7440.000	43.047	53.778	-30.953	74.000	-10.731	PK
3	*	9920.000	45.483	53.060	-28.517	74.000	-7.578	PK

Profile: 22A0738R	Page No.: 58
Engineer: YuLiu	
Site: AC5	Time: 2022/11/18 - 00:30
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Vertical
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode3:Transmit at 2480MHz by 3DH5	



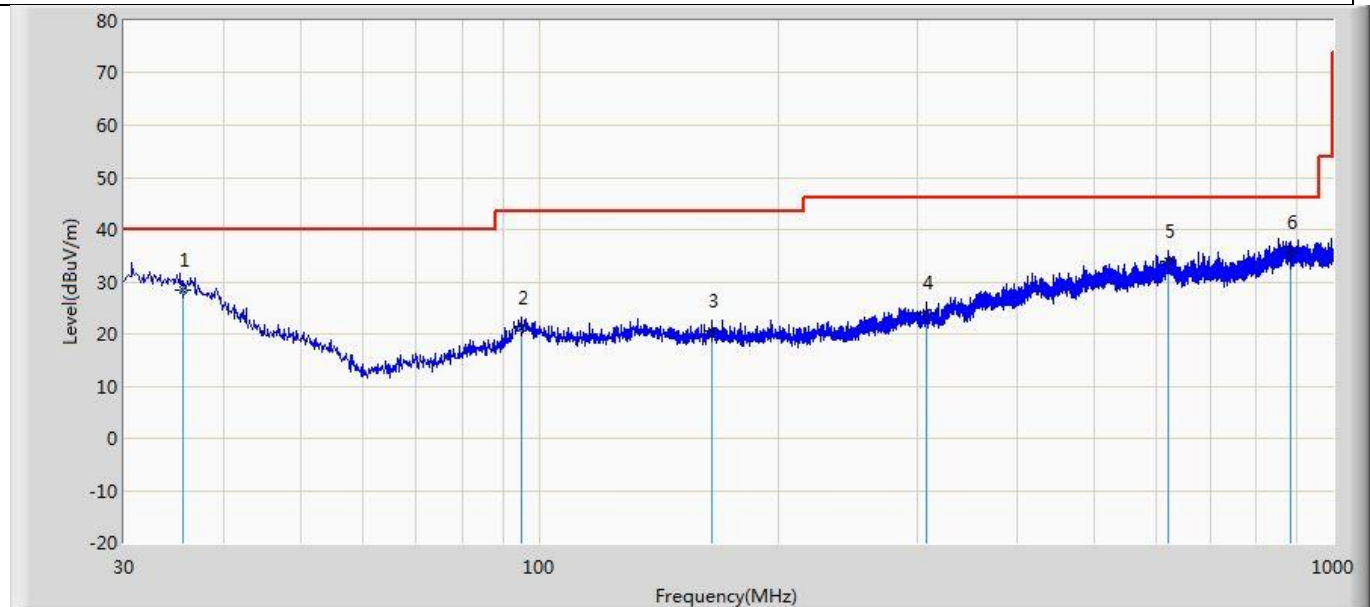
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	40.548	55.112	-33.452	74.000	-14.565	PK
2		7440.000	42.042	52.773	-31.958	74.000	-10.731	PK
3	*	9920.000	44.520	52.097	-29.480	74.000	-7.578	PK

Note:

1. Measured Level = Reading Level + Factor.
2. The test frequency range, 9kHz~30MHz, worst case are at least 20dB below the limits, therefore no data appear in the report.
3. The test frequency range, 18GHz~26GHz test result on peak is lower than average limit, all is the noise base, therefore no data appear in the report.
4. 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.
5. As the radiated emission was performed, so conducted emission was not tested.

The worst case of Radiated Emission below 1GHz:

Profile: 22A0738R	Page No.: 52
Engineer: YuLiu	
Site: AC3	Time: 2022/11/28 - 21:15
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: AC3_3m(30-1000M)	Polarity: Horizontal
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode 1: Transmit at 2441MHz by DH5	

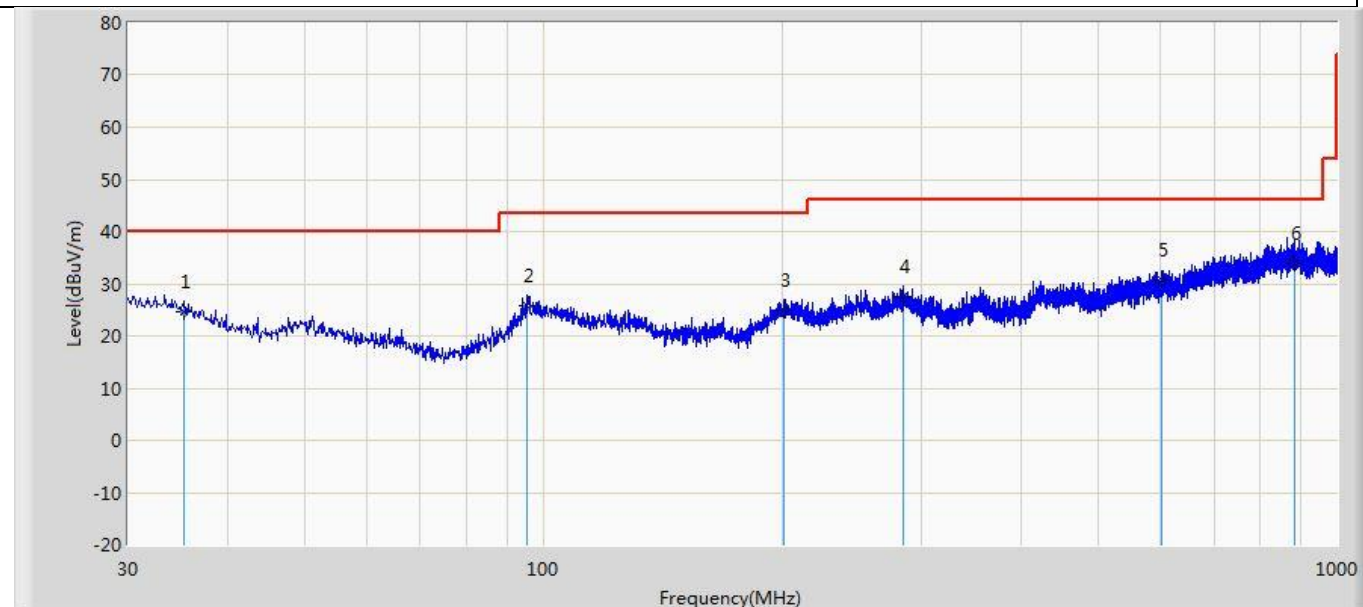


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		35.577	28.262	1.806	-11.738	40.000	26.456	QP
2		95.111	21.212	6.179	-22.288	43.500	15.033	QP
3		164.830	20.644	3.223	-22.856	43.500	17.421	QP
4		307.299	24.065	3.004	-21.935	46.000	21.061	QP
5		619.760	33.984	3.215	-12.016	46.000	30.769	QP
6	*	883.236	35.623	3.069	-10.377	46.000	32.554	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: 22A0738R	Page No.: 53
Engineer: YuLiu	
Site: AC3	Time: 2022/11/28 - 21:17
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: AC3_3m(30-1000M)	Polarity: Vertical
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode 1: Transmit at 2441MHz by DH5	



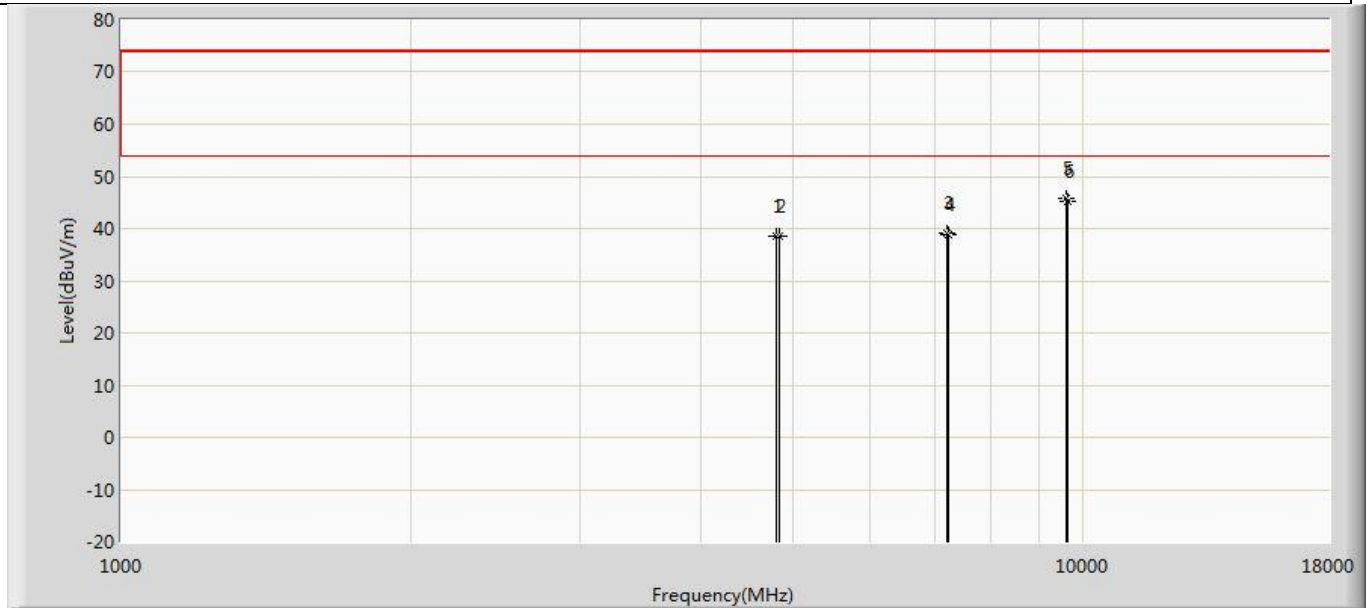
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		35.335	24.594	2.248	-15.406	40.000	22.345	QP
2		95.475	25.743	5.716	-17.757	43.500	20.027	QP
3		200.962	24.998	1.509	-18.502	43.500	23.489	QP
4		284.746	27.665	2.487	-18.335	46.000	25.178	QP
5		601.936	30.604	2.842	-15.396	46.000	27.762	QP
6	*	883.964	33.842	0.084	-12.158	46.000	33.758	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)

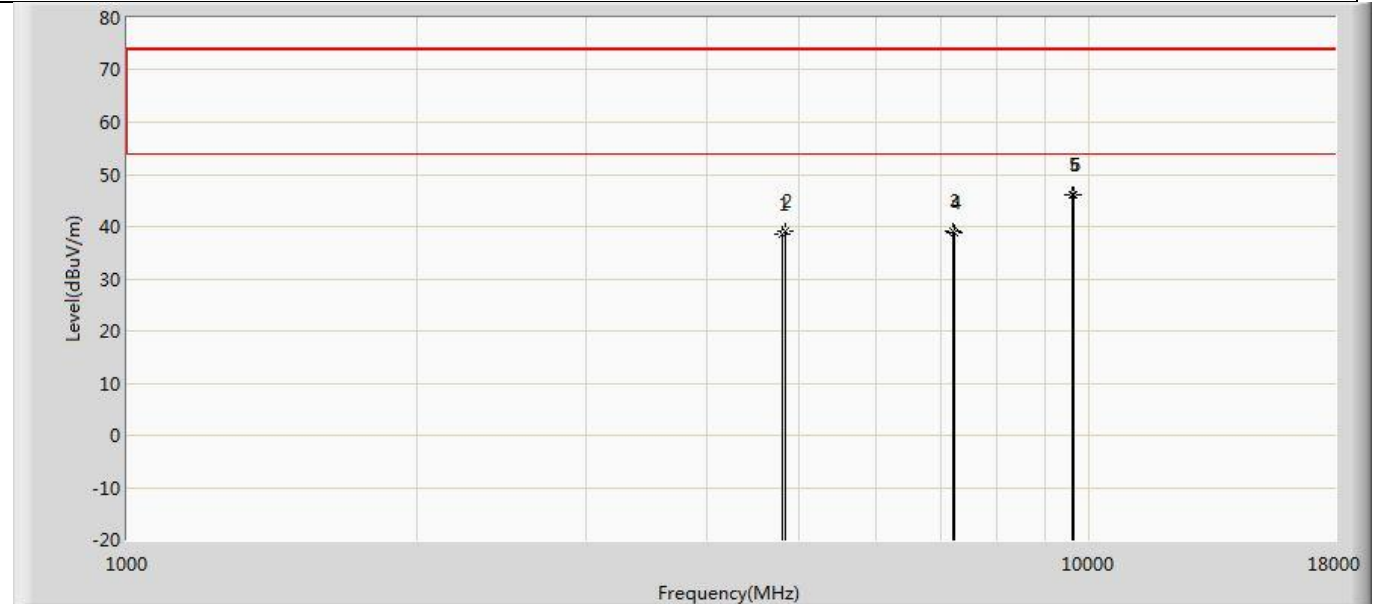
The worst case of Simultaneous Radiated Emission:

Profile: 22A0738R	Page No.: 15
Engineer:YuLiu	
Site: AC5	Time: 2022/12/04 - 20:14
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Horizontal
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode1: Transmit at DH5 2402MHz and 2.4G WIFI 11b 2412MHz	



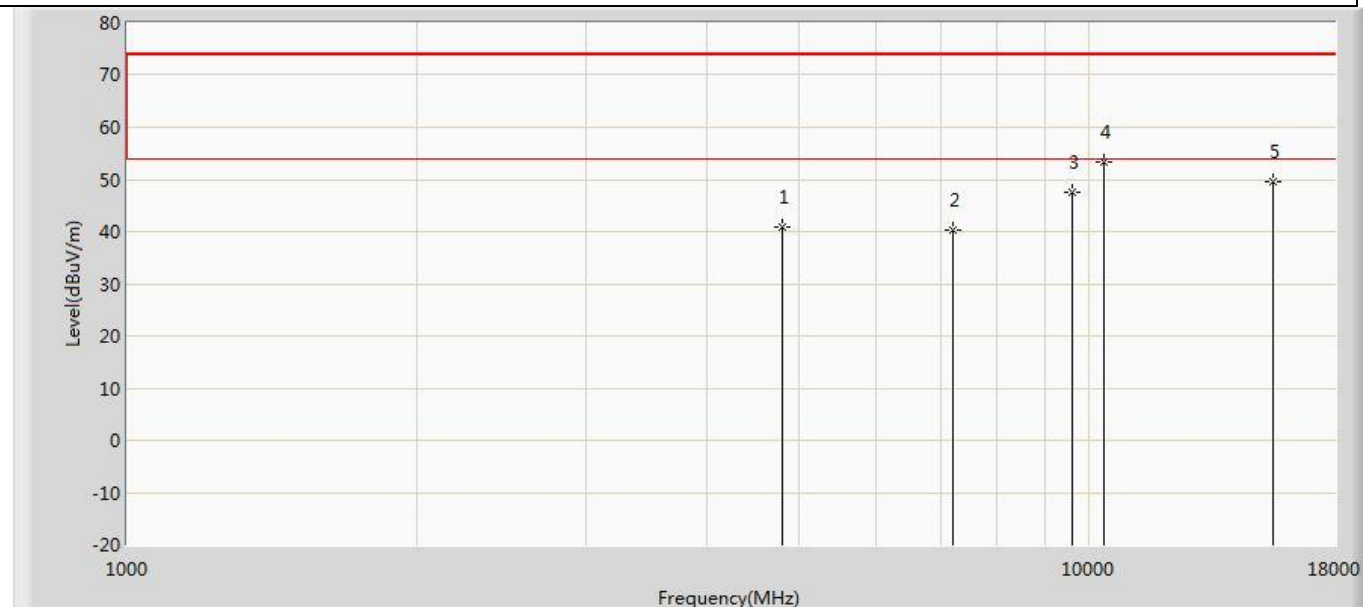
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	38.672	53.652	-35.328	74.000	-14.981	PK
2		4824.000	38.410	53.302	-35.590	74.000	-14.892	PK
3		7206.000	39.264	50.084	-34.736	74.000	-10.820	PK
4		7236.000	38.816	49.660	-35.184	74.000	-10.844	PK
5	*	9608.000	45.918	54.012	-28.082	74.000	-8.094	PK
6		9648.000	45.180	53.041	-28.820	74.000	-7.860	PK

Profile: 22A0738R	Page No.: 16
Engineer: YuLiu	
Site: AC5	Time: 2022/12/04 - 20:15
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Vertical
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode1: Transmit at DH5 2402MHz and 2.4G WIFI 11b 2412MHz	



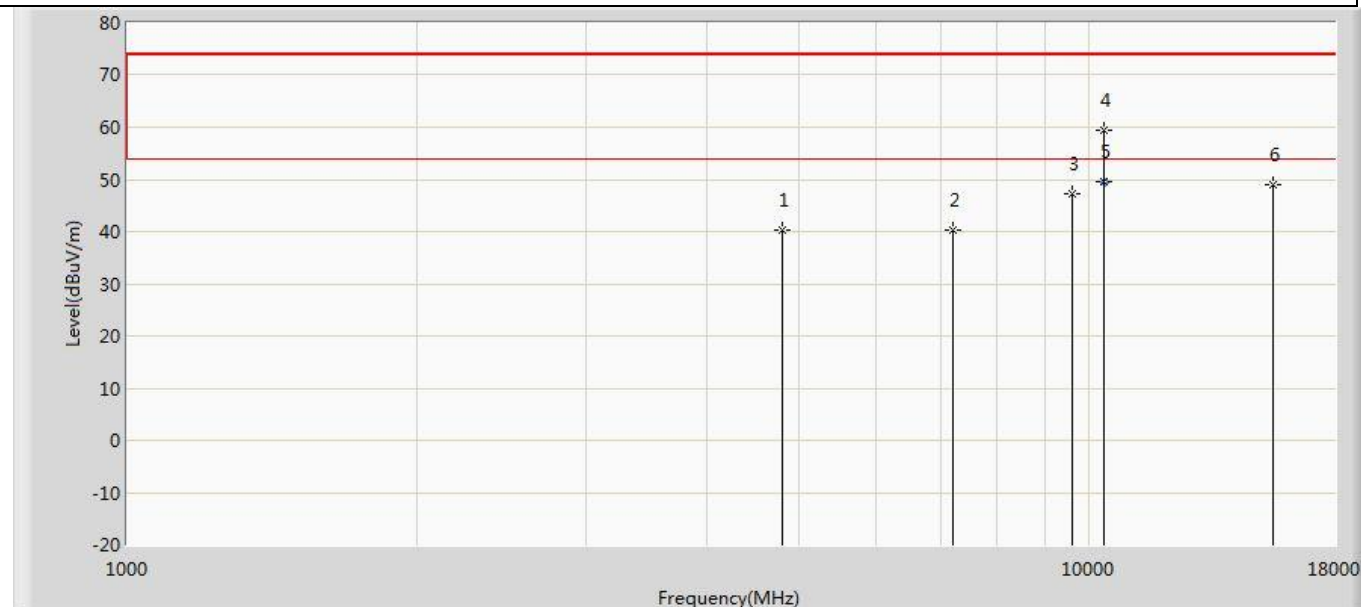
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	38.571	53.551	-35.429	74.000	-14.981	PK
2		4824.000	39.140	54.032	-34.860	74.000	-14.892	PK
3		7206.000	39.239	50.059	-34.761	74.000	-10.820	PK
4		7236.000	38.947	49.791	-35.053	74.000	-10.844	PK
5		9608.000	46.096	54.190	-27.904	74.000	-8.094	PK
6	*	9648.000	46.145	54.006	-27.855	74.000	-7.860	PK

Profile: 22A0738R	Page No.: 11
Engineer: YuLiu	
Site: AC5	Time: 2022/12/04 - 20:14
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Horizontal
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode1: Transmit at DH5 2402MHz and 5G WIFI 11a 5180MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	40.962	55.942	-33.038	74.000	-14.981	PK
2		7206.000	40.280	51.100	-33.720	74.000	-10.820	PK
3		9608.000	47.418	55.512	-26.582	74.000	-8.094	PK
4	*	10367.000	53.444	60.629	-20.556	74.000	-7.185	PK
5		15540.000	49.659	53.772	-24.341	74.000	-4.113	PK

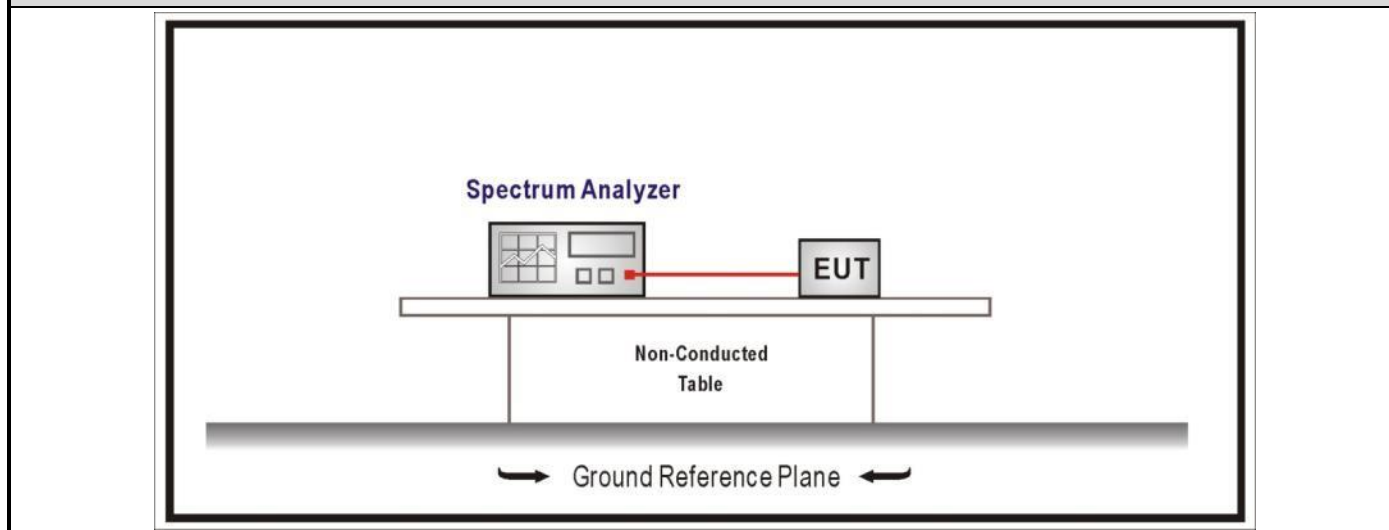
Profile: 22A0738R	Page No.: 12
Engineer: YuLiu	
Site: AC5	Time: 2022/12/04 - 20:14
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)2022	Polarity: Vertical
EUT: INFOTAINMENT HEADUNIT	Power: DC 12V
Note: Mode1: Transmit at DH5 2402MHz and 5G WIFI 11a 5180MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	40.173	55.153	-33.827	74.000	-14.981	PK
2		7206.000	40.426	51.246	-33.574	74.000	-10.820	PK
3		9608.000	47.148	55.242	-26.852	74.000	-8.094	PK
4		10350.000	59.339	67.076	-14.661	74.000	-7.737	PK
5	*	10360.000	49.588	57.000	-4.412	54.000	-7.412	AV
6		15540.000	48.874	52.987	-25.126	74.000	-4.113	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.	

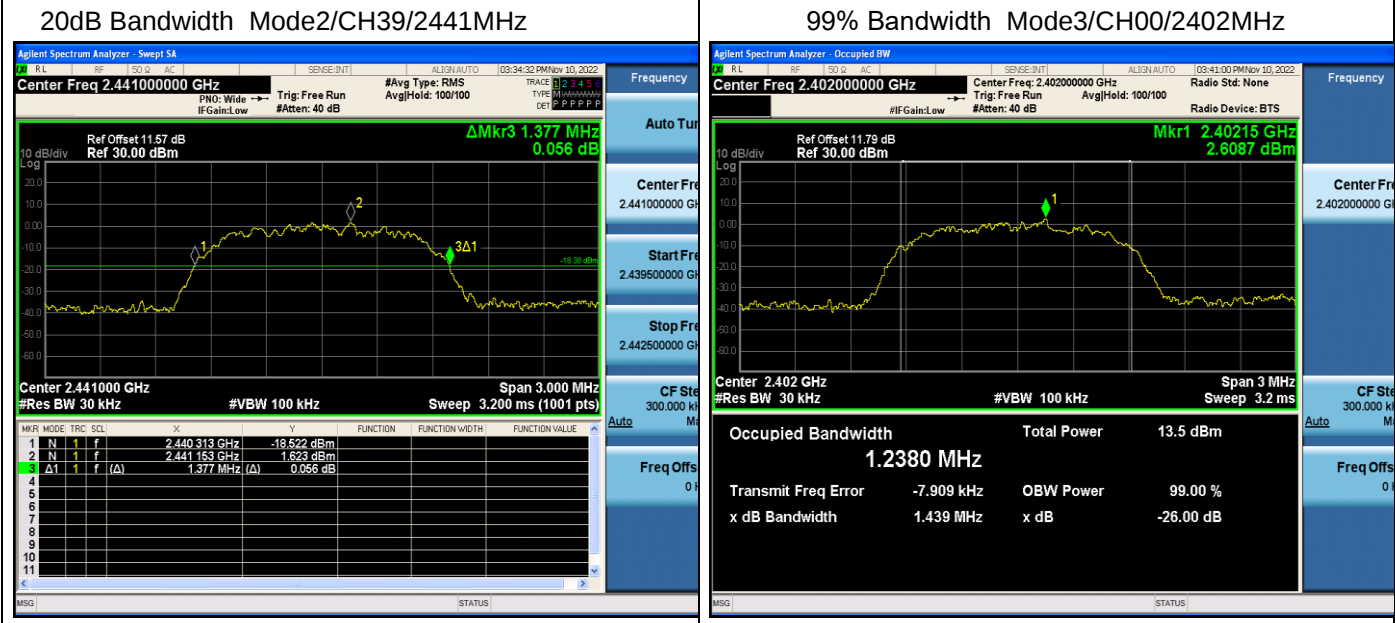
4.3.2 Test Setup**4.3.3 Test Procedure**

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

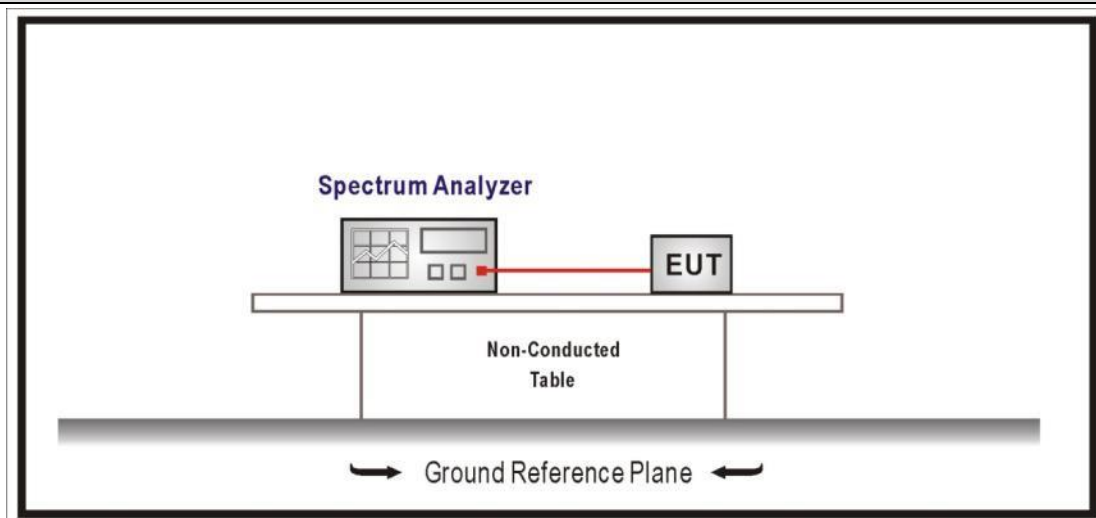
Mode	Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
1	00	2402	0.987	0.91049
	39	2441	0.966	0.90665
	79	2480	0.963	0.90550
2	00	2402	1.368	1.2319
	39	2441	1.377	1.2168
	79	2480	1.371	1.2228
3	00	2402	1.356	1.2380
	39	2441	1.353	1.2243
	79	2480	1.347	1.2271

Note 1: The worst data plot as below:



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**

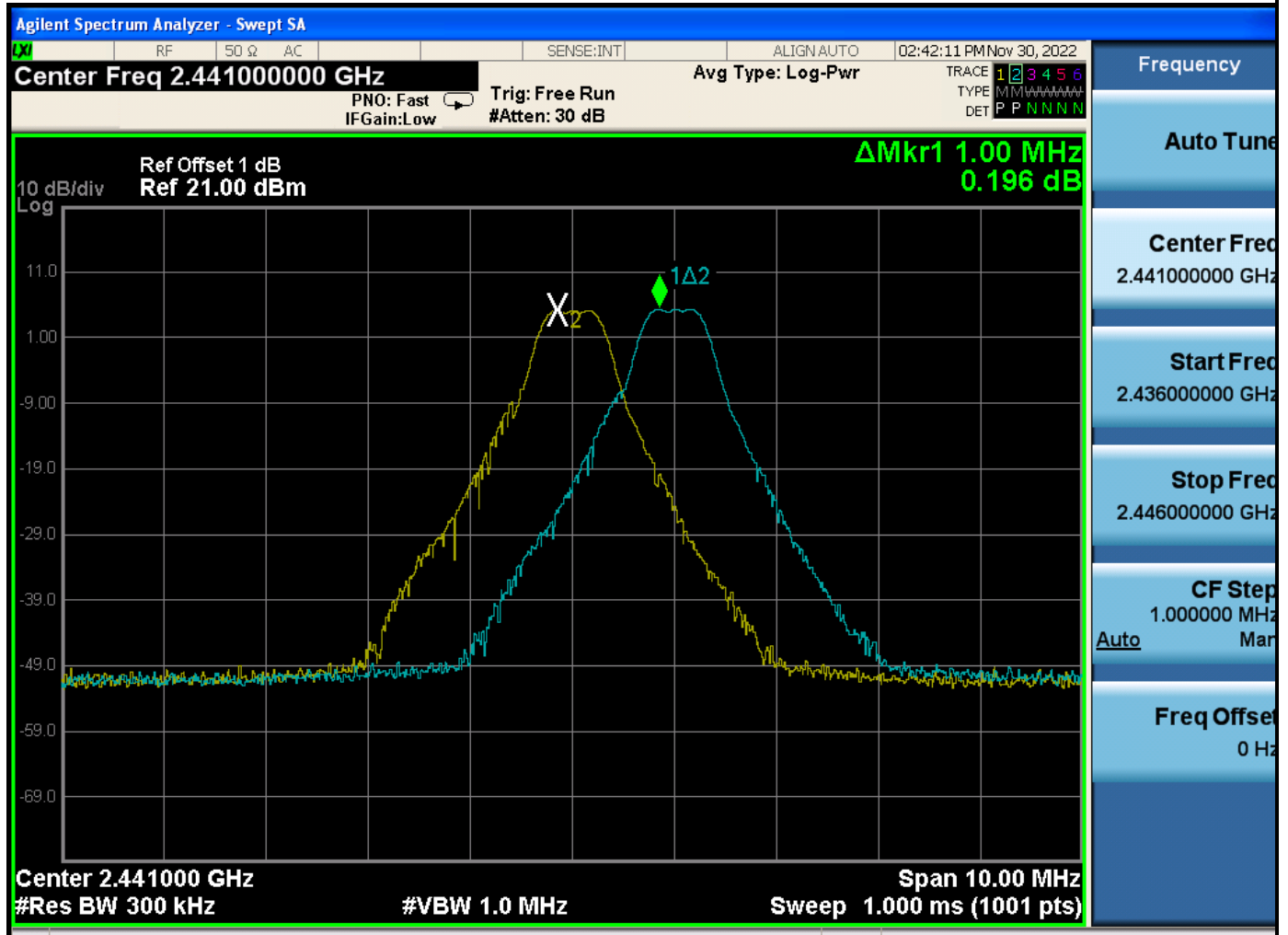
References Rule	Chapter	Description
☒ ANSI C63.10	7.8	Evaluation of frequency-hopping device parameters
☒ ANSI C63.10	7.8.2	Carrier frequency separation

4.4.4 Test Data

Mode	Channel	Frequency (MHz)	Carrier Frequency Separation (kHz)	Limit (kHz)	Result
1	00	2402	1000	987	Pass
	39	2441	1000	966	Pass
	78	2480	1000	963	Pass
2	00	2402	1000	912	Pass
	39	2441	1000	918	Pass
	78	2480	1000	914	Pass
3	00	2402	1000	904	Pass
	39	2441	1000	902	Pass
	78	2480	1000	898	Pass

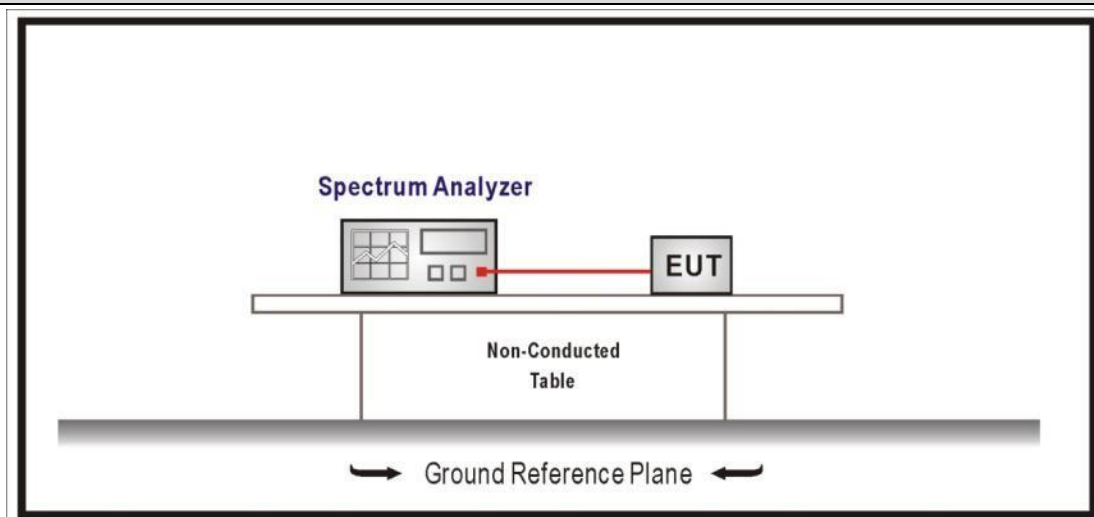
Note 1: The worst data plot as below:

Mode1/CH39/2441MHz



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**

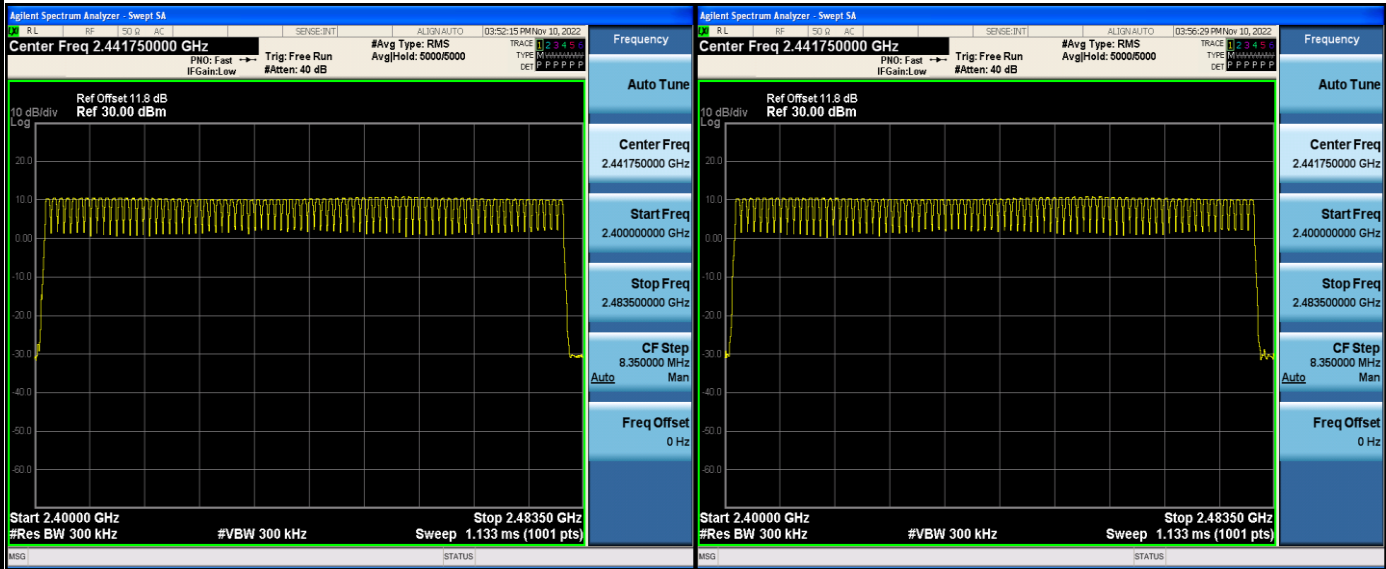
References Rule		Chapter	Description
☒	ANSI C63.10	7.8.	Evaluation of frequency-hopping device parameters
☒	ANSI C63.10	7.8.3	Number of Hopping Frequencies

4.5.4 Test Data

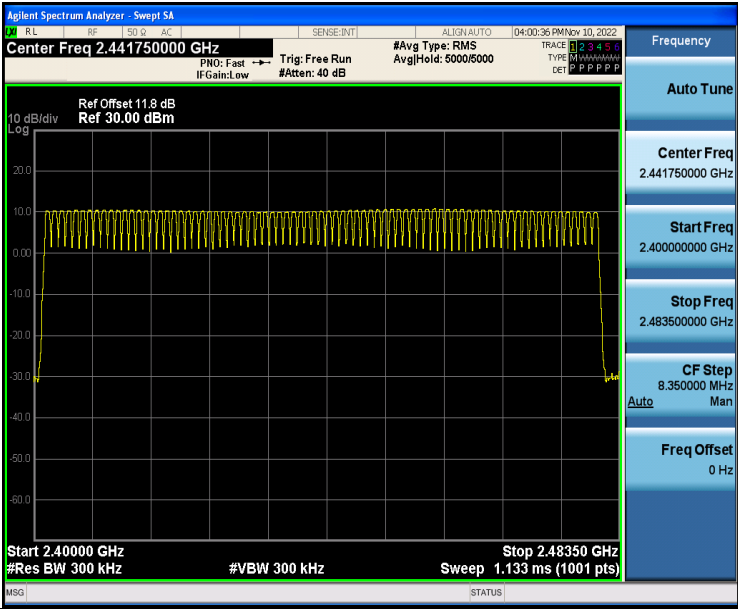
Mode	Number of Hopping Frequencies	Limit	Result
4	79	>15	Pass
5	79	>15	Pass
6	79	>15	Pass

Mode 1

Mode2

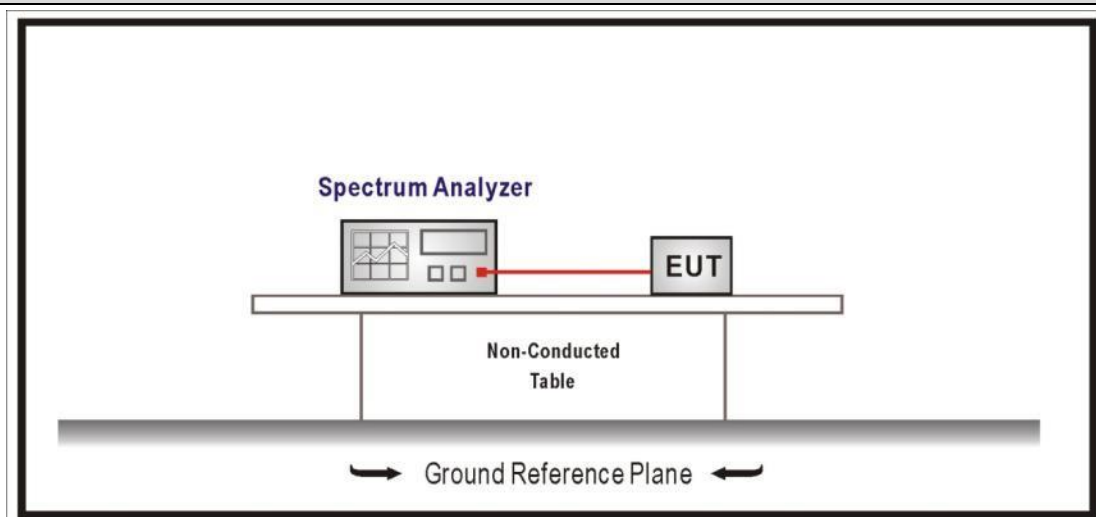


Mode 3



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

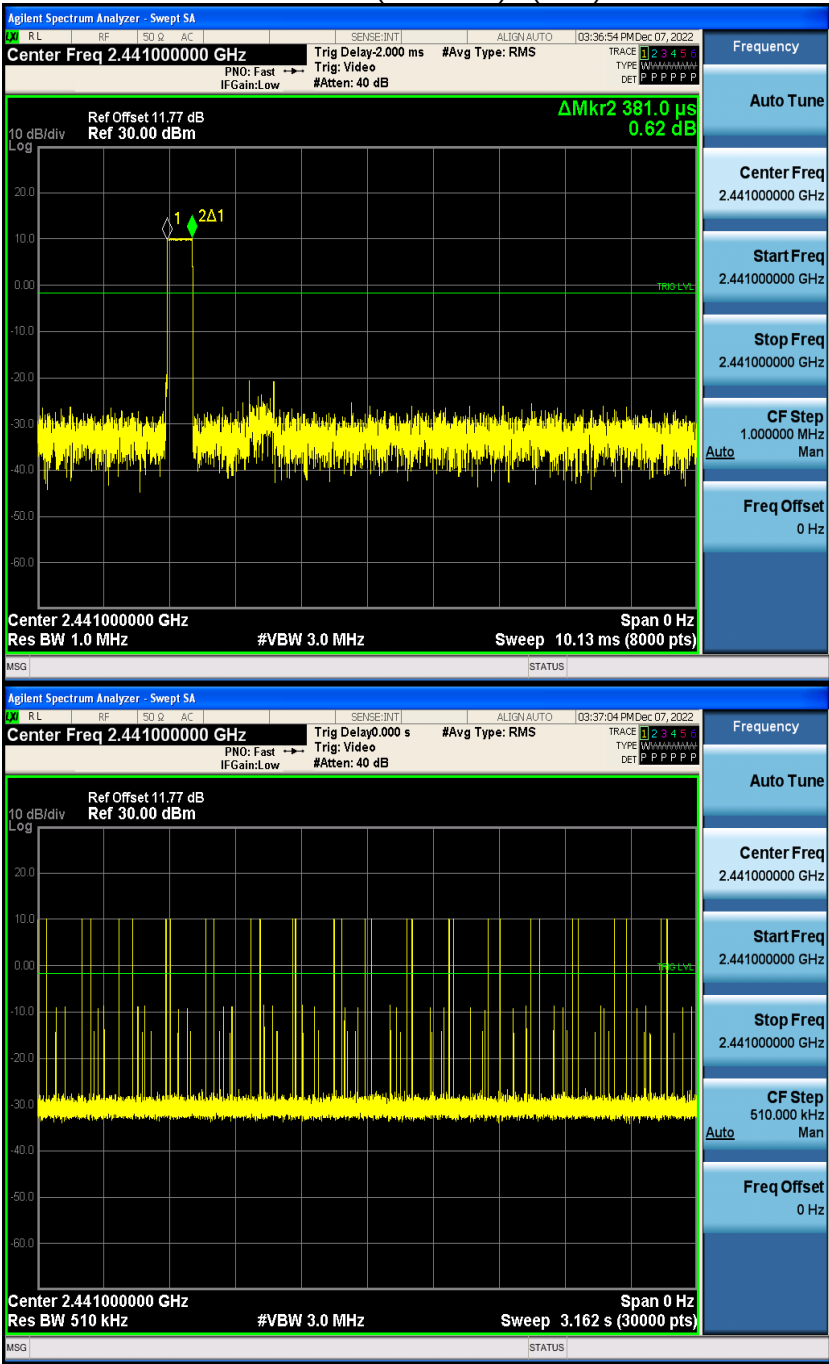
Mode	Channel	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
4	39	2441	121.92	< 400	Pass

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

Note2: Time of Occupancy=0.381*32*31.6/3.16=121.92ms

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

Channel 39 (2441MHz) - (DH1)



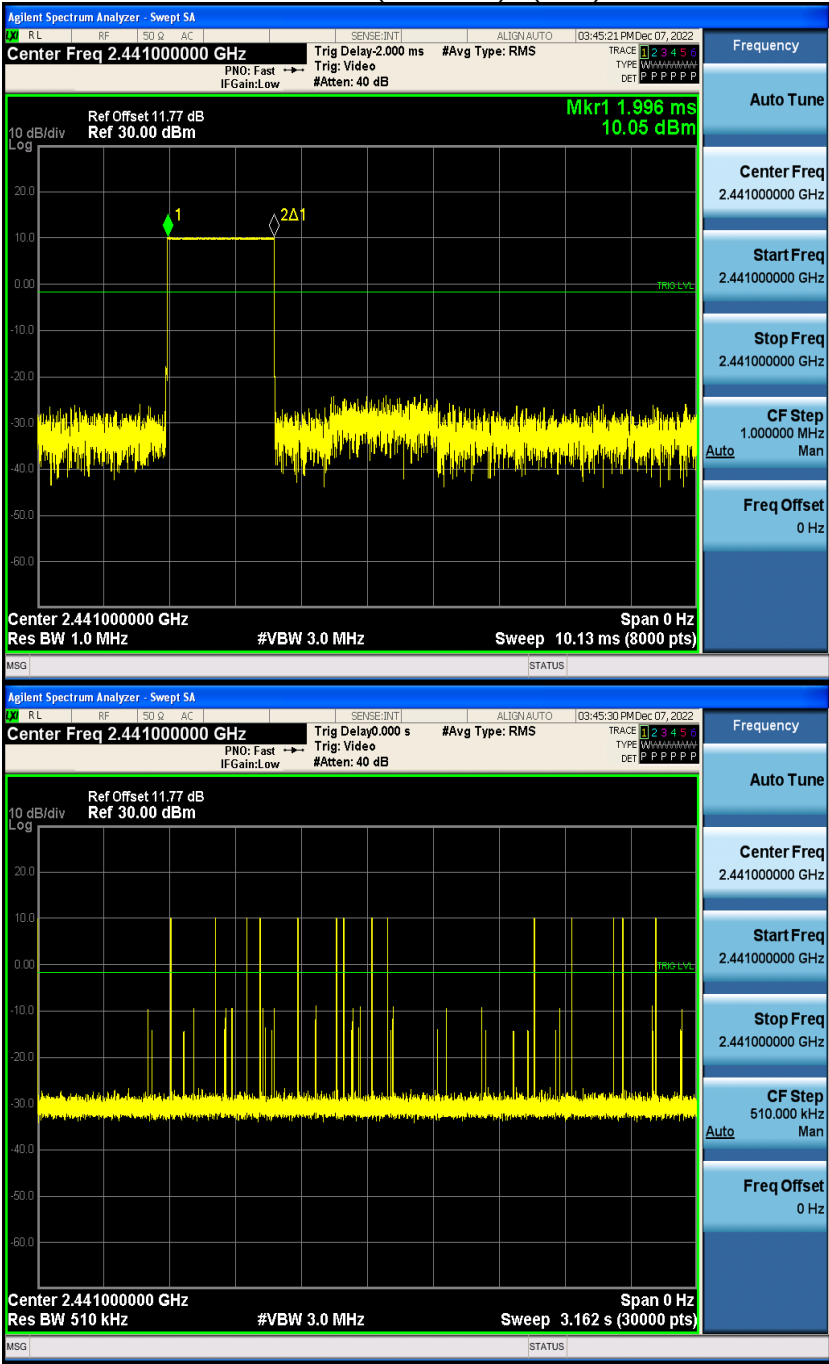
Mode	Channel	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
4	39	2441	299.4	< 400	Pass

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

Note2: Time of Occupancy=1.996*15*31.6/3.16=299.4ms

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

Channel 39 (2441MHz) - (DH3)

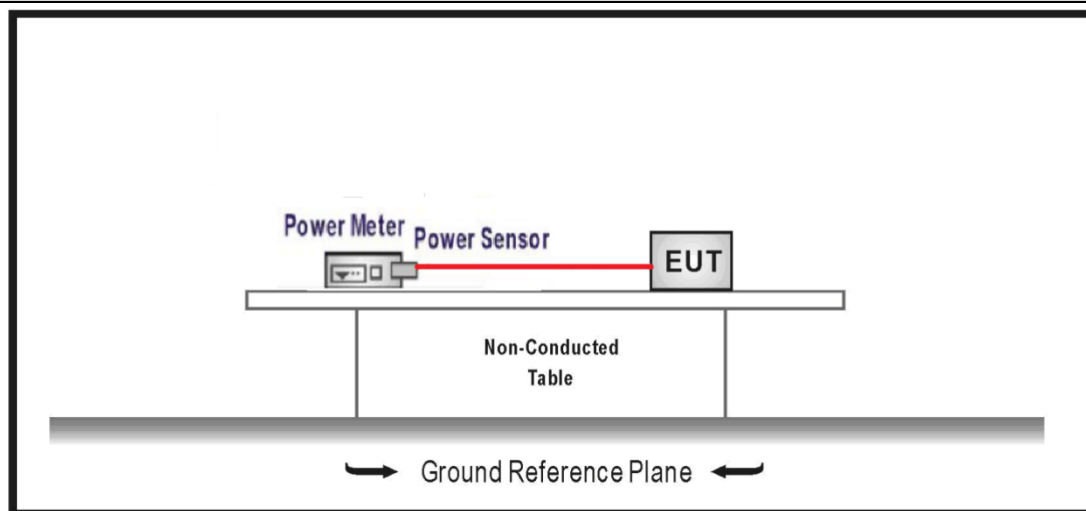


Note3: We have evaluated different packet type, shown in the report is the worst data.

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 $0.4 \times 20 = 8S$, 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

peak output power :

Mode	Channel	Test Frequency (MHz)	Conducted Power (dBm)	Conducted Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
Mode 1	00	2402	10.71	≤30	7.42	≤36	Pass
	39	2441	10.37	≤30	7.08	≤36	Pass
	78	2480	10.15	≤30	6.86	≤36	Pass
Mode 2	00	2402	9.36	≤21	6.07	≤36	Pass
	39	2441	9.15	≤21	5.86	≤36	Pass
	78	2480	8.72	≤21	5.43	≤36	Pass
Mode 3	00	2402	9.69	≤21	6.4	≤36	Pass
	39	2441	9.38	≤21	6.09	≤36	Pass
	78	2480	8.92	≤21	5.63	≤36	Pass

average output power :

Mode	Channel	Test Frequency (MHz)	Conducted Power (dBm)	Conducted Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
Mode 1	00	2402	10.05	≤30	6.76	≤36	Pass
	39	2441	9.82	≤30	6.53	≤36	Pass
	78	2480	9.42	≤30	6.13	≤36	Pass
Mode 2	00	2402	6.20	≤21	2.91	≤36	Pass
	39	2441	5.91	≤21	2.62	≤36	Pass
	78	2480	5.25	≤21	1.96	≤36	Pass
Mode 3	00	2402	6.55	≤21	3.26	≤36	Pass
	39	2441	6.25	≤21	2.96	≤36	Pass
	78	2480	5.97	≤21	2.68	≤36	Pass

Power Setting:

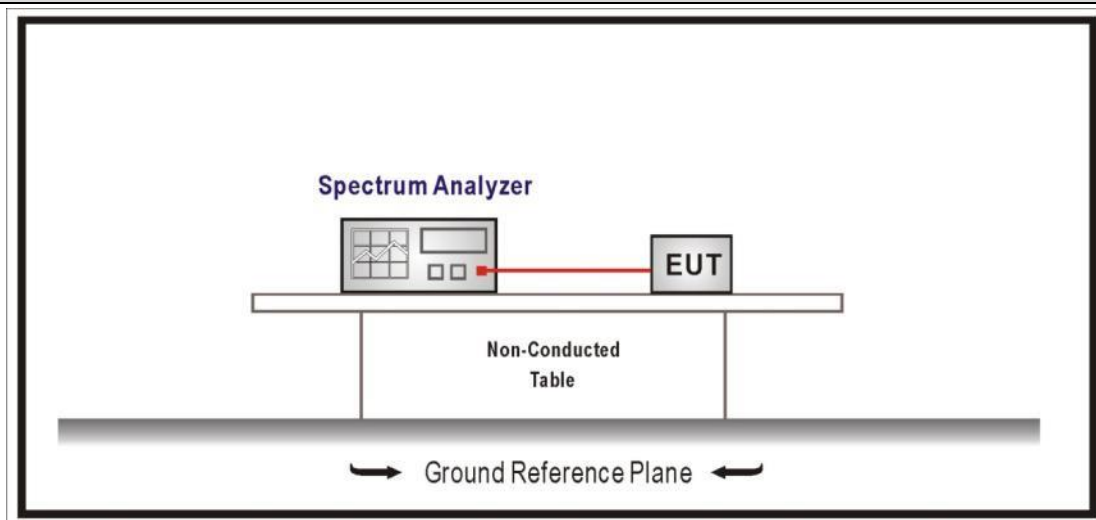
Mode	Channel	Test Frequency (MHz)	Power Setting
Mode 1	00	2402	default
	39	2441	default
	78	2480	default
Mode 2	00	2402	default
	39	2441	default
	78	2480	default
Mode 3	00	2402	default
	39	2441	default
	78	2480	default

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).

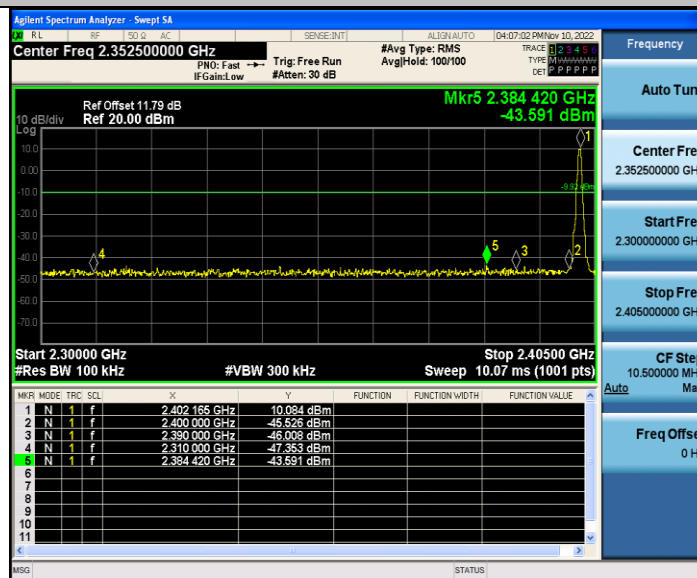
4.8.2 Test Setup**4.8.3 Test Procedure**

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

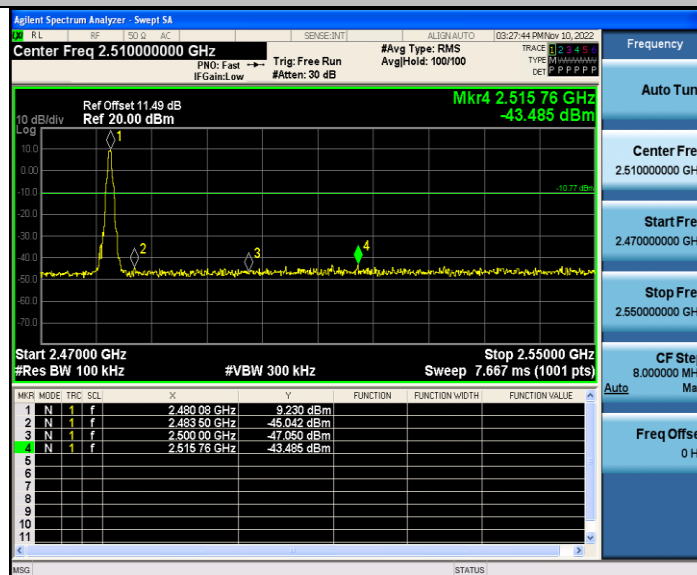
4.8.4 Test Data

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	10.08	-43.59	≤-9.92	PASS
		High	2480	9.23	-43.49	≤-10.77	PASS
		Low	Hop_2402	9.48	-42.6	≤-10.52	PASS
		High	Hop_2480	9.27	-43.62	≤-10.73	PASS
2DH5	Ant1	Low	2402	5.43	-43.58	≤-14.58	PASS
		High	2480	5.33	-43.5	≤-14.67	PASS
		Low	Hop_2402	6.06	-43.96	≤-13.94	PASS
		High	Hop_2480	5.30	-43.51	≤-14.7	PASS
3DH5	Ant1	Low	2402	5.48	-43.93	≤-14.52	PASS
		High	2480	4.79	-42.85	≤-15.21	PASS
		Low	Hop_2402	4.75	-42.93	≤-15.25	PASS
		High	Hop_2480	4.44	-43.39	≤-15.56	PASS

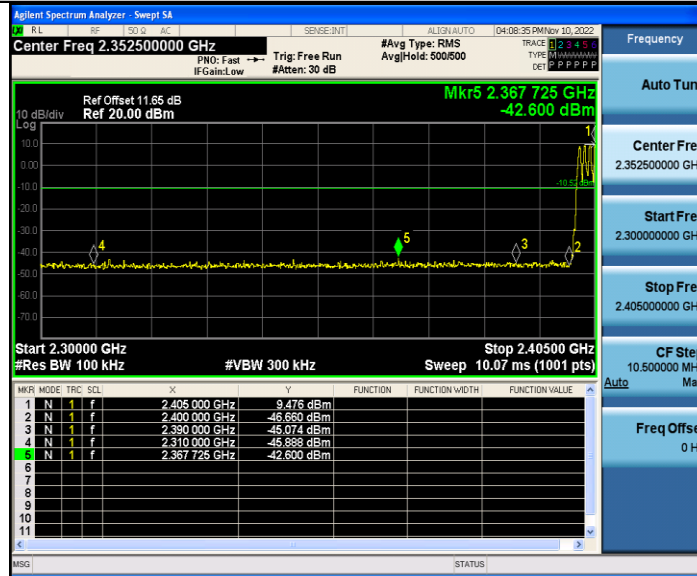
DH5_Ant1_Low_2402



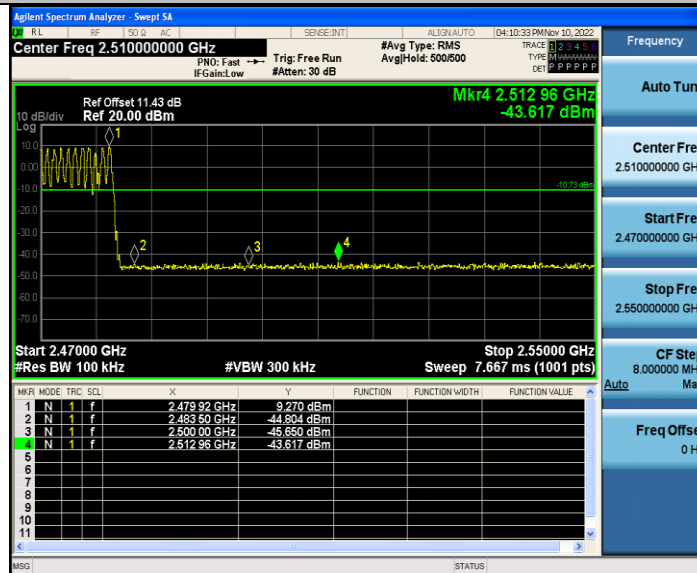
DH5_Ant1_High_2480



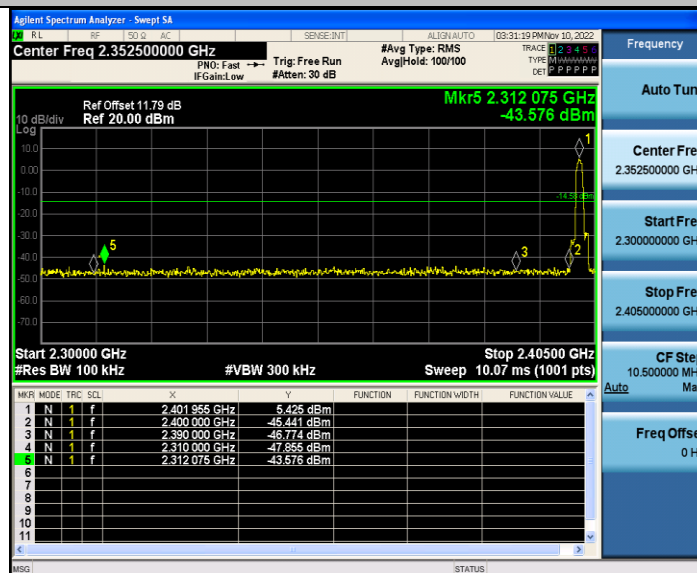
DH5_Ant1_Low_Hop_2402



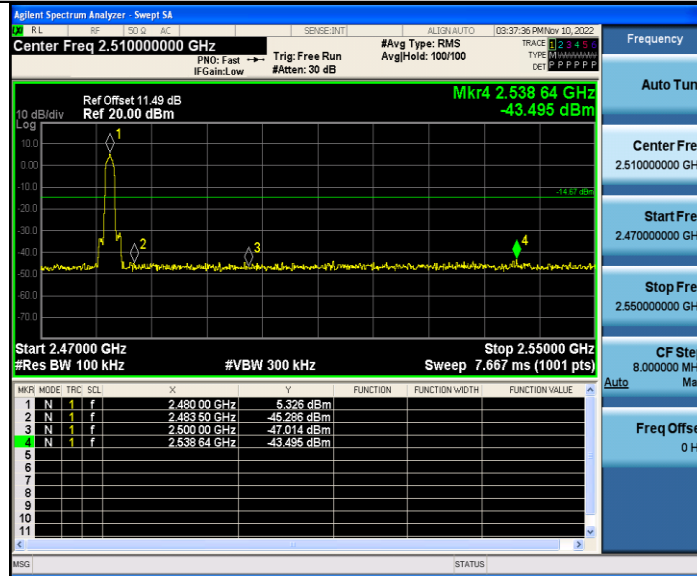
DH5_Ant1_High_Hop_2480



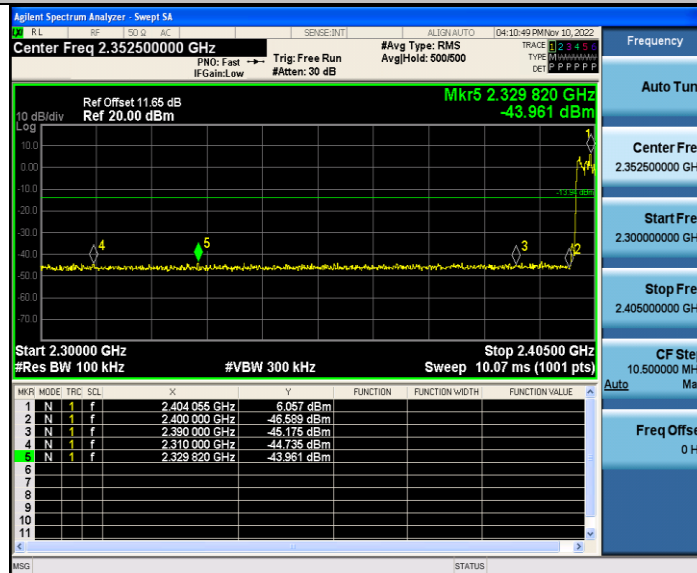
2DH5_Ant1_Low_2402



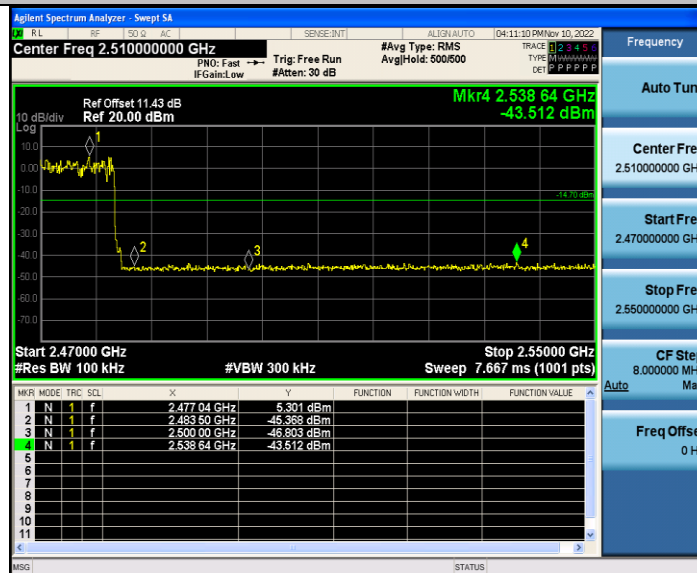
2DH5_Ant1_High_2480



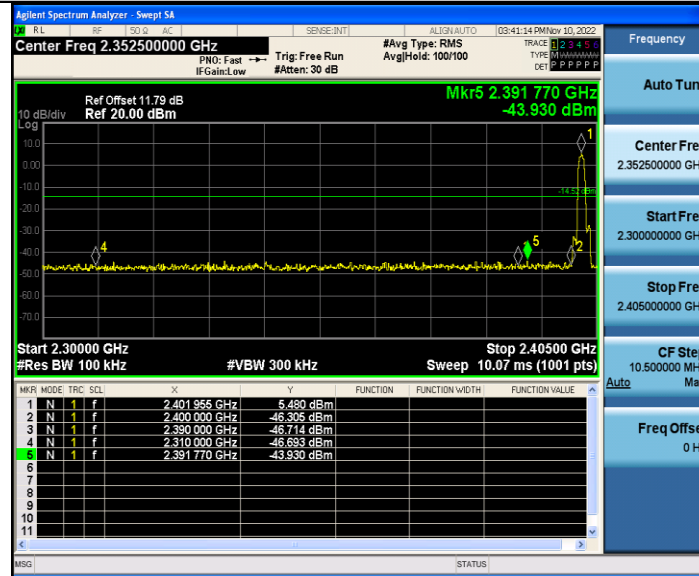
2DH5_Ant1_Low_Hop_2402



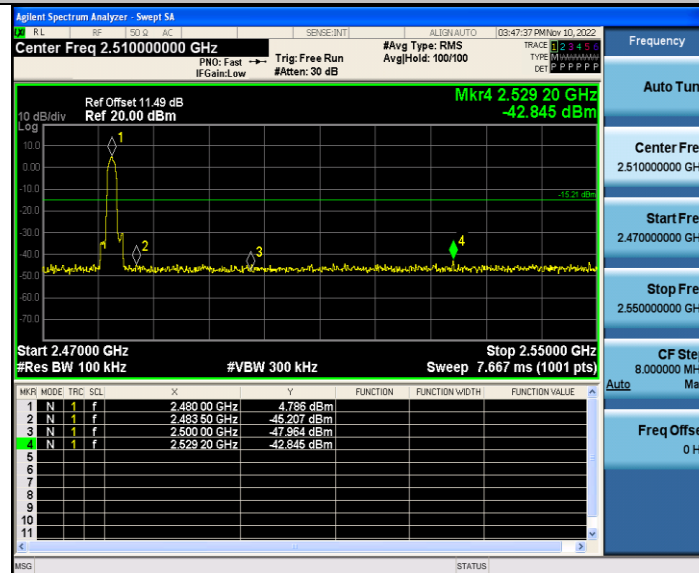
2DH5_Ant1_High_Hop_2480



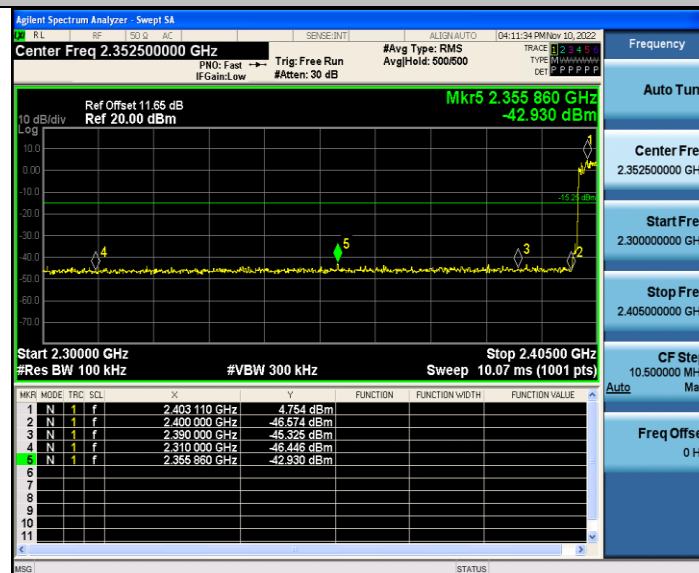
3DH5_Ant1_Low_2402

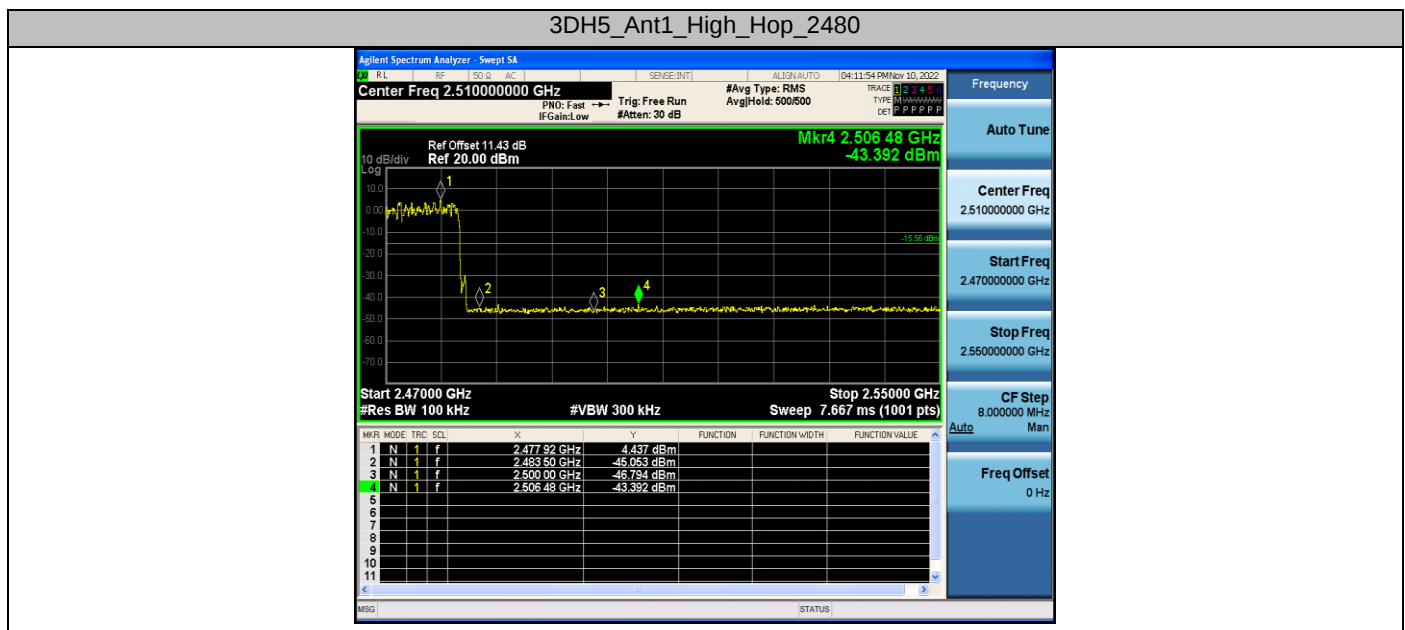


3DH5_Ant1_High_2480



3DH5_Ant1_Low_Hop_2402





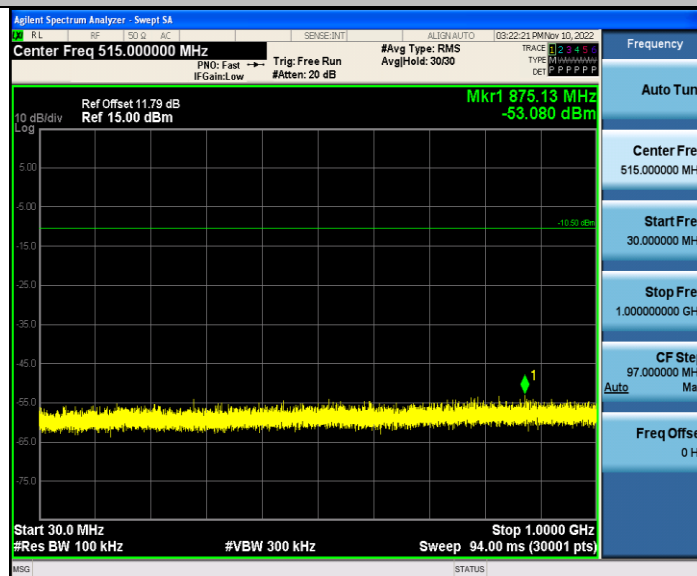
The data of entire corresponding spectrum:

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	9.50	9.50	---	PASS
			30~1000	9.50	-53.08	≤-10.5	PASS
			1000~26500	9.50	-37.08	≤-10.5	PASS
		2441	Reference	9.07	9.07	---	PASS
			30~1000	9.07	-53.43	≤-10.93	PASS
			1000~26500	9.07	-37.9	≤-10.93	PASS
		2480	Reference	8.81	8.81	---	PASS
			30~1000	8.81	-53.6	≤-11.19	PASS
			1000~26500	8.81	-37.89	≤-11.19	PASS
2DH5	Ant1	2402	Reference	5.49	5.49	---	PASS
			30~1000	5.49	-53.03	≤-14.51	PASS
			1000~26500	5.49	-37.2	≤-14.51	PASS
		2441	Reference	3.98	3.98	---	PASS
			30~1000	3.98	-53.45	≤-16.02	PASS
			1000~26500	3.98	-38.08	≤-16.02	PASS
		2480	Reference	4.02	4.02	---	PASS
			30~1000	4.02	-52.31	≤-15.98	PASS
			1000~26500	4.02	-37.33	≤-15.98	PASS
3DH5	Ant1	2402	Reference	5.63	5.63	---	PASS
			30~1000	5.63	-53.19	≤-14.37	PASS
			1000~26500	5.63	-37.83	≤-14.37	PASS
		2441	Reference	5.14	5.14	---	PASS
			30~1000	5.14	-53.6	≤-14.86	PASS
			1000~26500	5.14	-37.73	≤-14.86	PASS
		2480	Reference	3.96	3.96	---	PASS
			30~1000	3.96	-53.05	≤-16.04	PASS
			1000~26500	3.96	-37.11	≤-16.04	PASS

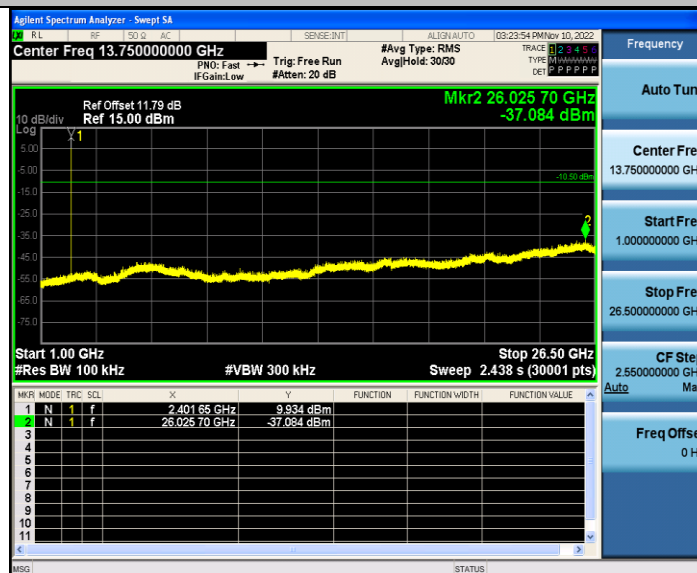
DH5_Ant1_2402_0-Reference



DH5_Ant1_2402_30~1000



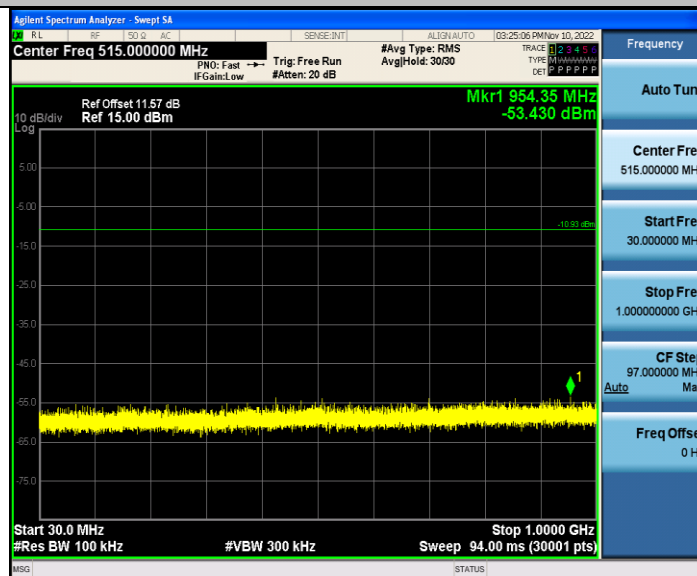
DH5_Ant1_2402_1000~26500



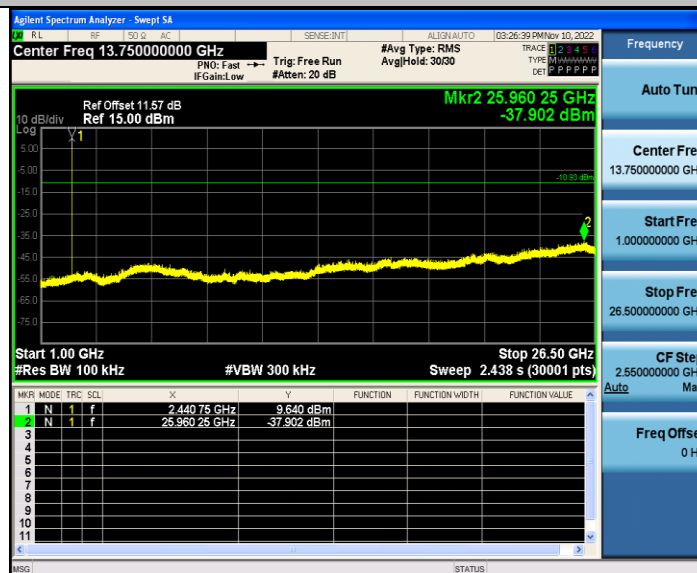
DH5_Ant1_2441_0-Reference



DH5_Ant1_2441_30~1000



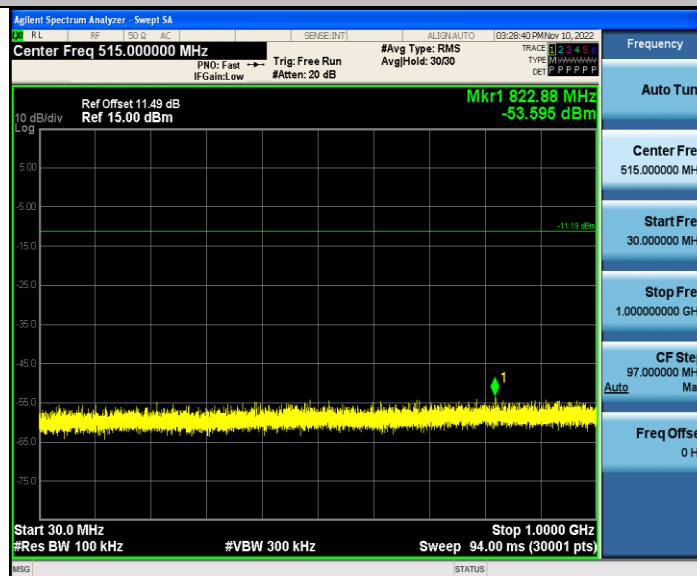
DH5_Ant1_2441_1000~26500



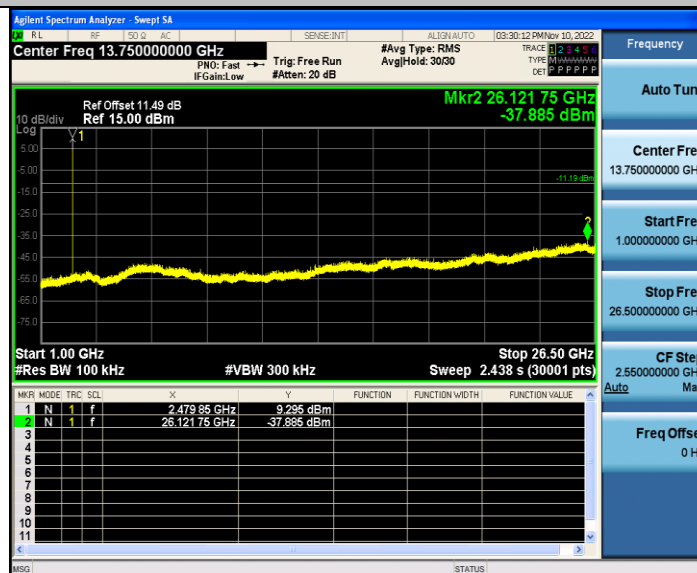
DH5_Ant1_2480_0-Reference



DH5_Ant1_2480_30~1000



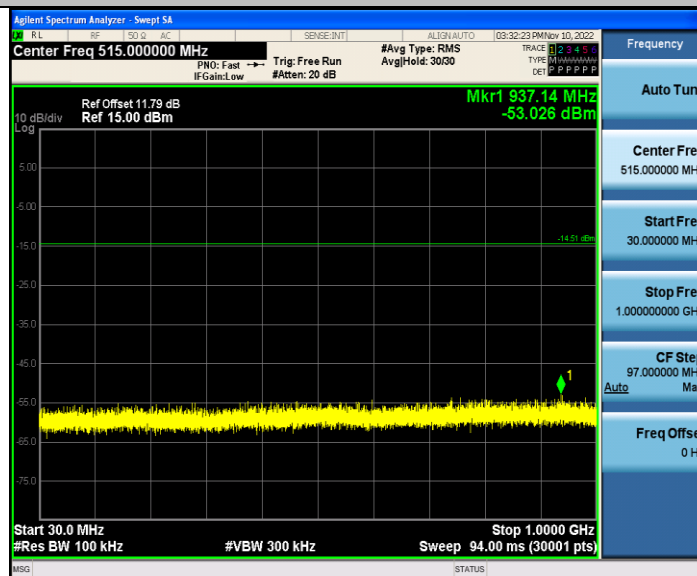
DH5_Ant1_2480_1000~26500



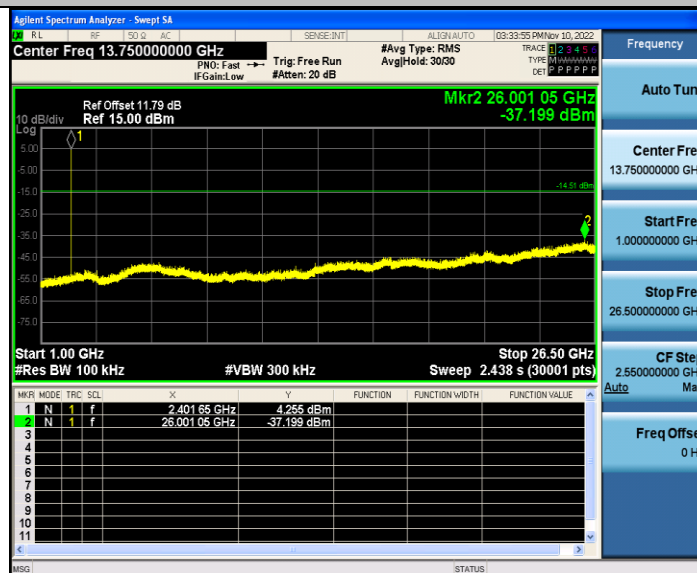
2DH5_Ant1_2402_0~Reference



2DH5_Ant1_2402_30~1000



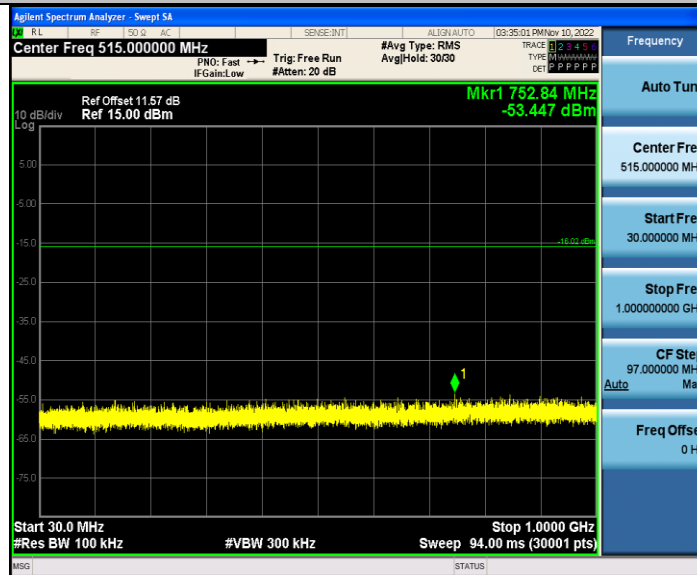
2DH5_Ant1_2402_1000~26500



2DH5_Ant1_2441_0~Reference



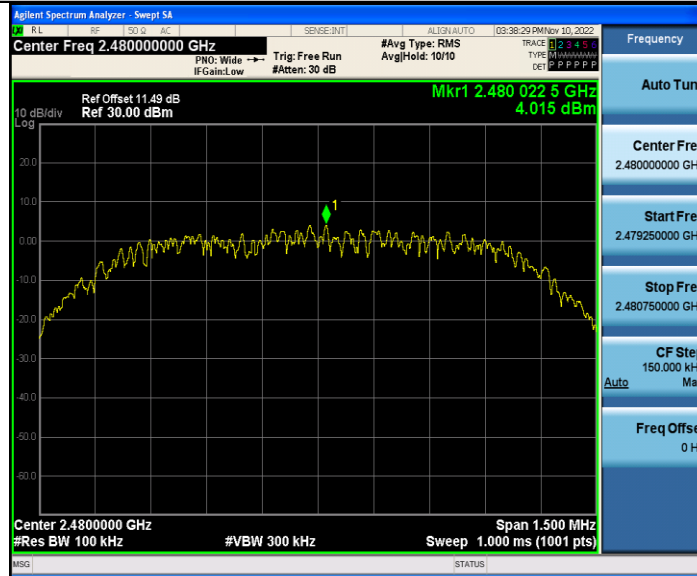
2DH5_Ant1_2441_30~1000



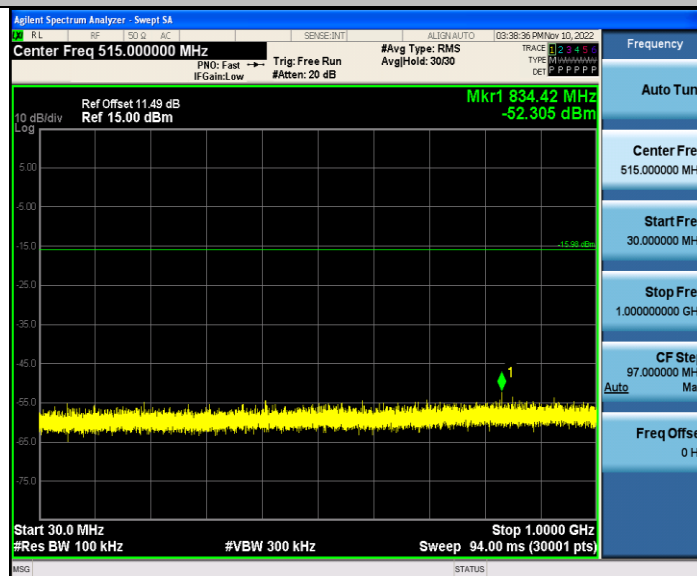
2DH5_Ant1_2441_1000~26500



2DH5_Ant1_2480_0~Reference



2DH5_Ant1_2480_30~1000



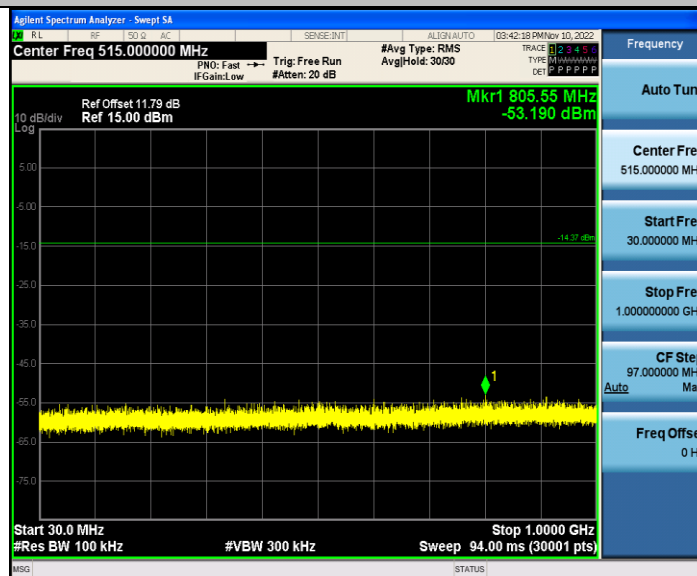
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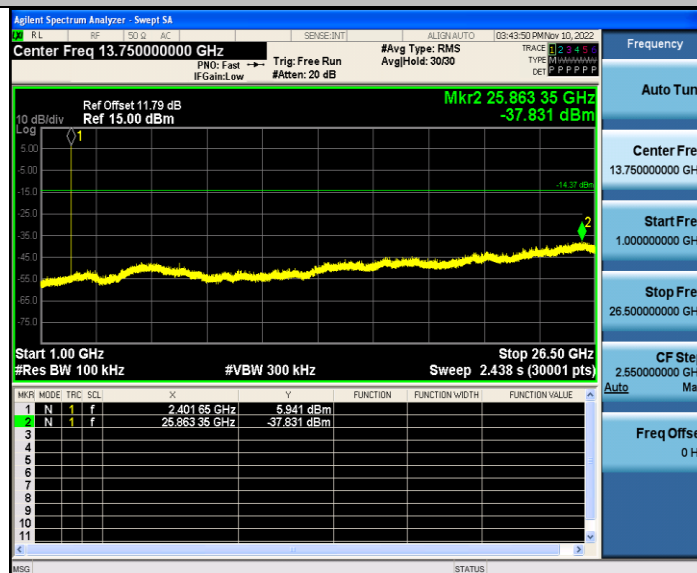
3DH5_Ant1_2402_0~Reference



3DH5_Ant1_2402_30~1000



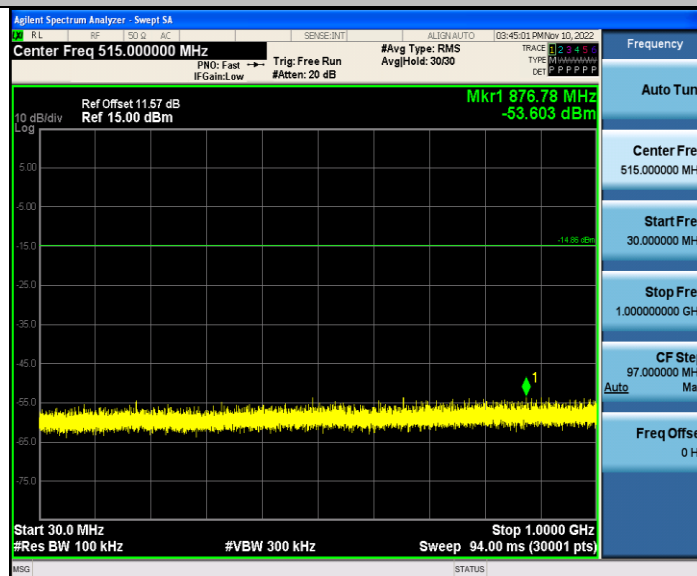
3DH5_Ant1_2402_1000~26500



3DH5_Ant1_2441_0~Reference



3DH5_Ant1_2441_30~1000



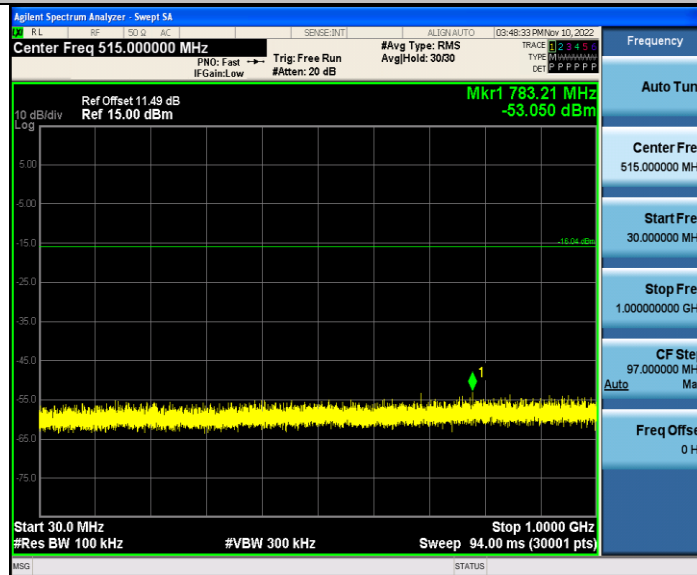
3DH5_Ant1_2441_1000~26500



3DH5_Ant1_2480_0~Reference



3DH5_Ant1_2480_30~1000

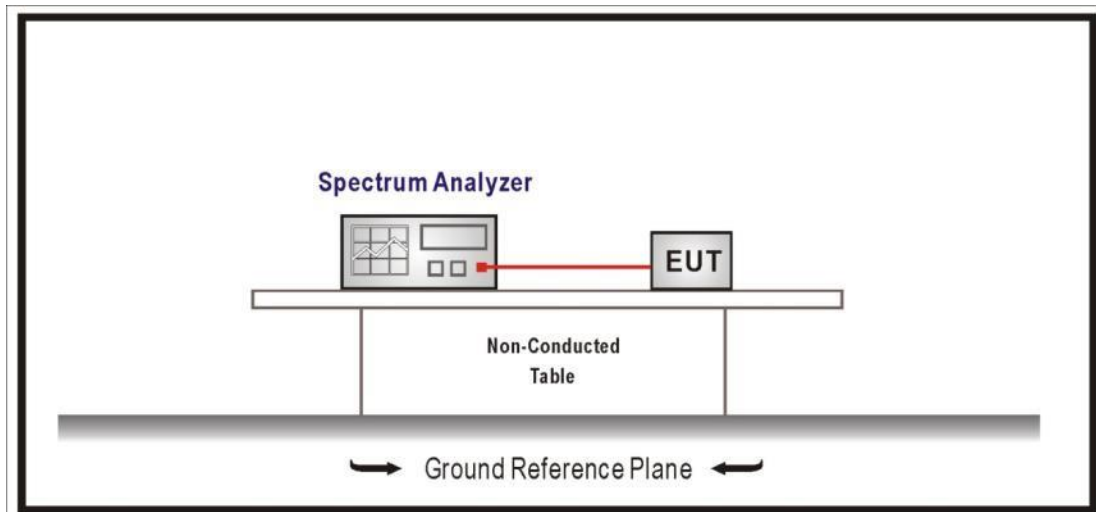


3DH5_Ant1_2480_1000~26500



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