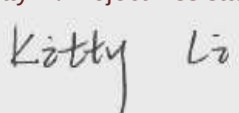
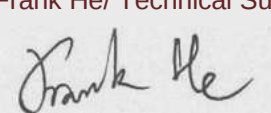
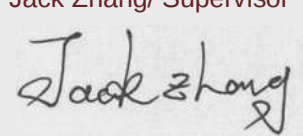


Test report No:
2050503R-RF-US-P06V01

FCC TEST REPORT

Product Name	GPS Tracker
Trademark	KAGA
Model and /or type reference	HKL-1MU,HKS-1MU,HKO-1MU
FCC ID	BXTHKS1MU
Applicant's name / address	Kaga Electronics Co. ,Ltd. 20 Kandamatsunagacho,Chiyoda-ku, Tokyo
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
Verdict Summary	IN COMPLIANCE
Documented by (name / position & signature)	Kitty Li/Project Assistant 
Reviewed by (name / position & signature)	Frank He/ Technical Supervisor 
Approved by (name / position & signature)	Jack Zhang/ Supervisor 
Date of issue	2020-07-31
Report template No	Template_FCC 15.247-RF-V1.0

INDEX

	page
General conditions	5
Environmental conditions	5
Possible test case verdicts	6
Abbreviations	6
Document History	7
Remarks and Comments.....	7
Used Equipment	8
Uncertainty	10
1 General Information.....	11
1.1 General Description of the Item(s)	11
1.2 Antenna Information	12
1.3 Model difference description	13
1.4 Channel List.....	14
2 Description of Test Setup	15
2.1 Operating mode(s) used for tests.....	15
2.2 Auxiliary equipment / Test software for the EUT.....	15
2.3 Test Configuration / Block diagram used for tests	16
2.4 Testing process	17
3 Verdict summary section	18
3.1 Standards.....	18
3.2 Deviation(s) from the Standard(s) / Test Specification(s).....	18
3.3 Overview of results.....	19
3.4 Test Facility.....	20
4 Test Results	21
4.1 Conducted Emission.....	21
4.1.1 Limit	21
4.1.2 Test Setup.....	21
4.1.3 Test Procedure.....	21
4.1.4 Test Data	22
4.2 Emissions in restricted frequency bands	23
4.2.1 Limit	23
4.2.2 Test Setup.....	25
4.2.3 Test Procedure.....	26
4.2.4 Test Data	27

4.3	20dB Bandwidth	49
4.3.1	Limit	49
4.3.2	Test Setup.....	49
4.3.3	Test Procedure.....	49
4.3.4	Test Data	50
4.4	Carrier Frequency Separation.....	51
4.4.1	Limit	51
4.4.2	Test Setup.....	51
4.4.3	Test Procedure.....	51
4.4.4	Test Data	52
4.5	Number of hopping Frequencies.....	53
4.5.1	Limit	53
4.5.2	Test Setup.....	53
4.5.3	Test Procedure.....	53
4.5.4	Test Data	54
4.6	Time of Occupancy(Dwell Time).....	55
4.6.1	Limit	55
4.6.2	Test Setup.....	55
4.6.3	Test Procedure.....	55
4.6.4	Test Data	56
4.7	Peak Output Power	59
4.7.1	Limit	59
4.7.2	Test Setup.....	59
4.7.3	Test Procedure.....	60
4.7.4	Test Data	61
4.8	Emissions in non-restricted frequency band.....	62
4.8.1	Limit	62
4.8.2	Test Setup.....	62
4.8.3	Test Procedure.....	62
4.8.4	Test Data	63
4.9	Duty cycle	64
4.9.1	Limit	64
4.9.2	Test Setup.....	64
4.9.3	Test Procedure.....	64
4.9.4	Test Data	65
4.10	Radiated Emission Band Edge	66
4.10.1	Limit	66



4.10.2	Test Setup.....	66
4.10.3	Test Procedure.....	66
4.10.4	Test Data	67
4.11	Antenna Requirement.....	91
4.11.1	Limit:	91
4.11.2	Antenna Connector Construction:	91
5	Test setup photo and EUT Photo.....	92

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)	May. 21, 2020
Date (start test)	May. 23, 2020
Date (finish test)	Jul. 31, 2020

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
2050503R-RF-US-P06V01	V1.0	Initial issue of report.	2020-07-15
2050503R-RF-US-P06V01	V1.1	1) Remove the model of HKM-1MU 2) Update the models differences 3) Page 45,add Simultaneous Radiated Emission	2020-07-31

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.
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, unless the specification, standard or customer have special requirements.
4. The test results presented in this report relate only to the object tested.
5. The test results relate only to the samples tested.
6. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification (Suzhou) Co., Ltd.
7. This report will not be used for social proof function in China market.

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	2020.04.20	2021.04.19
Two-Line V-Network	R&S	ENV216	101190	2019.12.28	2020.12.27
Two-Line V-Network	R&S	ENV216	101044	2019.12.28	2020.12.27
Current Probe	R&S	EZ-17	100678	2020.03.12	2021.04.11
50ohm Termination	SHX	TF2	07081402	2019.09.02	2020.09.01
50ohm Termination	SHX	TF2	07081403	2019.09.02	2020.09.01
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	N/A	N/A
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2019.08.21	2020.08.20
Coaxial Cable	Suhner	RG 223	TR1-C1	2019.08.25	2020.08.24
Coaxial Cable	Suhner	RG 223	TR1-C2	2019.08.25	2020.08.24
Dekra test software	Dekra	-	-	-	-

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

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2019.09.28	2020.09.27
EXA Spectrum Analyzer	Keysight	N9010A	MY55370495	2020.04.17	2021.04.16
MXA Signal Analyzer	Keysight	N9020A	MY56060147	2019.08.30	2020.08.29
Wideband Peak Power Meter	Anritsu	ML2495A	0905006	2019.08.12	2020.08.11
Power Sensor	Anritsu	MA2411B	0846014	2019.08.12	2020.08.11
Coaxial Cable	Woken	SFL402	F02-150410-044	2020.01.01	2020.12.31
Dekra test software	Dekra	-	-	-	-

Radiated Emission(30MHz-1GHz) / AC3

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMI Test Receiver	R&S	ESCI	100573	2020.03.03	2021.03.02
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2019.09.23	2020.09.22
Temperature/Humidity Meter	RTS	RTS-8S	AC2-TH	2019.09.02	2020.09.01
Coaxial Cable	Huber+Suhner	RG 214	AC2-C	2020.04.13	2021.04.12
Dekra test software	Dekra	-	-	-	-

Radiated Emission / AC5(1GHz-40GHz)

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2020.05.08	2021.05.07
Preamplifier	Miteq	NSP1800-25	1364185	2020.05.06	2021.05.05
Preamplifier	QuieTek	AP-040G	CHM-0906001	2020.05.06	2021.05.05
DRG Horn	ETS-Lindgren	3117	00123988	2020.01.22	2021.01.21
Temperature/Humidity Meter	Zhichen	ZC1-2	AC5-TH	2019.09.02	2020.09.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2020.04.13	2021.04.12
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2020.04.13	2021.04.12
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2020.04.13	2021.04.12
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 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 Output Power	± 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..... :	GPS Tracker
Model No. :	HKL-1MU,HKS-1MU,HKO-1MU
Trademark	KAGA
FCC ID	BXTHKS1MU
Manufacturer..... :	eSky wireless Inc
Manufacturer Address..... :	22-303,#328 xinghu street ,suzhou ,China

Wireless specifiction..... :	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.....:	-40℃ – 70℃					

Rated power supply	Voltage and Frequency	
	☐	AC: 220 – 240 V, 50/60 Hz
	☐	AC: 100 – 240 V, 50/60 Hz
	☒	DC: 12 Vdc
	☐	Battery: ...3V...
Mounting position..... :	☐	Table top equipment
	☐	Wall/Ceiling mounted equipment
	☐	Floor standing equipment
	☐	Head-mounted equipment
	☒	Other: RF module

Note: All the information are from the client.

1.2 Antenna Information

Antenna model / type number	N/A			
Antenna serial number	N/A			
Antenna Delivery	☒	1TX + 1RX		
	☐	2TX + 2RX		
Antenna technology	☒	SISO		
	☐	MIMO	☐	CDD
			☐	Beam-forming
Antenna Type	☐	External	☐	Dipole
			☐	Sectorized
	☒	Internal	☐	PIFA
			☒	PCB
			☐	Metal Monopole Antenna
			☐	Ceramic chip
			☐	Others.....
Antenna Gain.....	-0.5 dBi			

Note: All the information are from the client.

1.3 Model difference description

The difference among the three models are that CAN-BUS and Interface (connector), others part are the same(include the RF module).

	TCU		
	TCU-CAN(L) HKL-1MU	TCU-STD HKS-1MU	TCU-OB HKO-1MU
Cellular Module	EG25-G (Quectel)		
Cellular Function	Packet, SMS		
GNSS	GPS/QZSS, Galileo, GLONASS, BeiDou (1.5m CEP-50)		
MCU	32 bit MCU (ARM Cortex-M3 Flash128KB+SRAM64KB)		
LED Indicator	Power, Cellular, GNSS		
Switch	Reboot		
Sensor	Accelerometer	Accelerometer, Pulse (Hall Effect)	Accelerometer
Cellular Antenna	Internal FPC Antenna		
GPS Antenna	Internal Ceramic Passive Antenna		
CAN-BUS	CAN 500K/250K	N/A	CAN 500K/250K Rx only (ES1: remove)
Terminal Resistance	N/A	N/A	N/A
SIM	4FF SIM Card		
Interface (connector)	Sumitomo 6187-4441, HM waterproof, 4pin, Male		OBDII
	VIN, GND, CAN_H, CAN_L	VIN, GND, (CANL, CANH)	VIN, GND, CAN_H, CAN_L
Internal Battery	Li Battery 750 mAh		
Bluetooth	Bluetooth LE (Bluetooth 4.2)		

Note: All the information are from the client.

1.4 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

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.

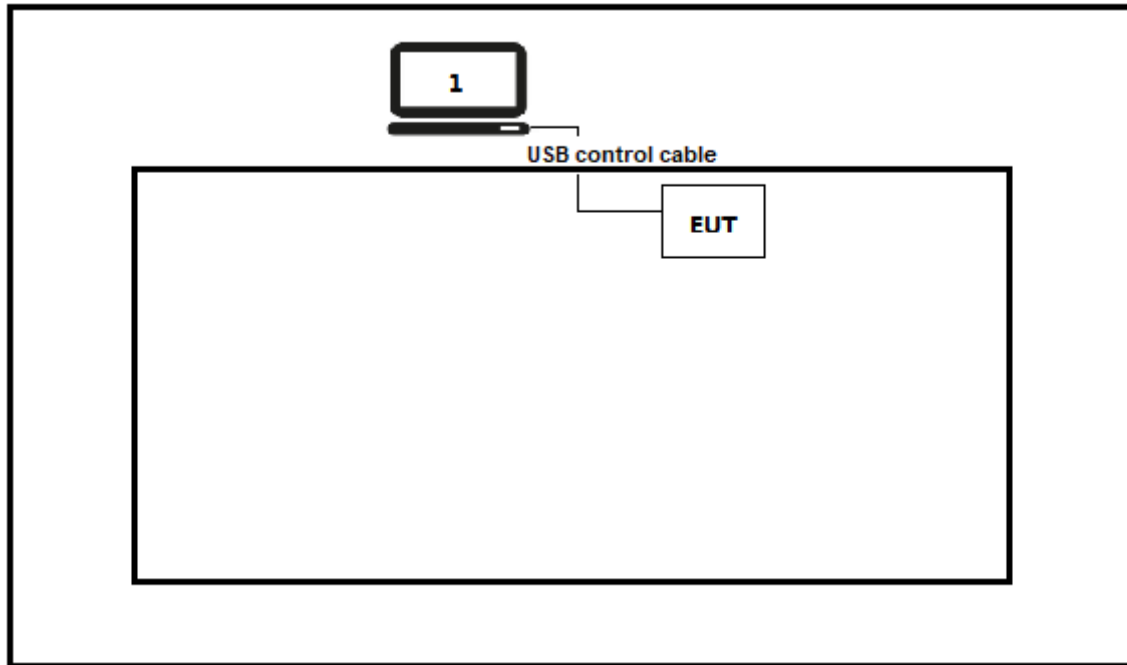
Test Mode For Bluetooth	Mode 1: Transmitter-1Mbps(GFSK_DH5)
	Mode 2: Transmitter-2Mbps(Pi/4 DQPSK_DH5)
	Mode 3: Transmitter-3Mbps(8DPSK_DH5)
	Mode 4: Transmitter-Hopping

2.2 Auxiliary equipment / Test software for the EUT

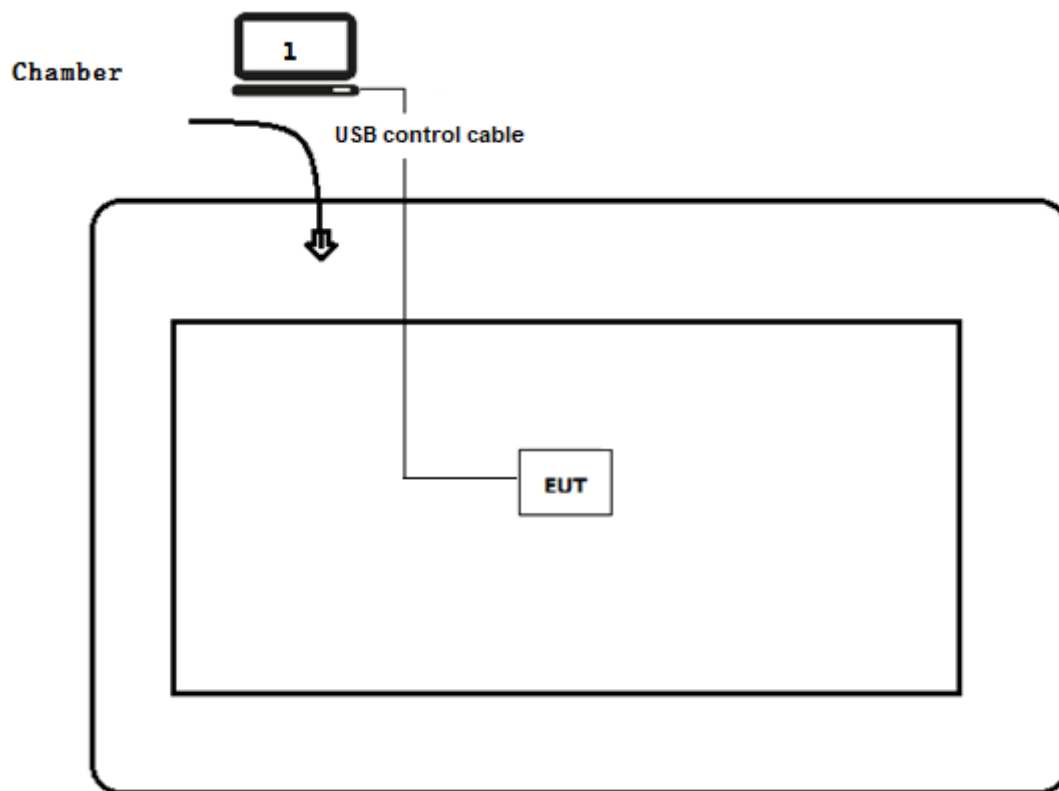
Auxiliary equipment	Type / Version	Manufacturer	Supplied by
Notebook	Think pad x220	Lenovo	Adapter
Software	Type / Version	Manufacturer	Supplied by
BlueTest3	N/A	N/A	N/A

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 "BlueTest3" software.
3	Configure the test mode, the test channel, and the 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	2019	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
KDB 558074 D01 v05r02	2019	Guidance for performing compliance measurements on Digital Transmission System (DTS) operating under section 15.247

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: 2015 Section 15.207	Yes	No
Emissions in restricted frequency bands	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 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 Output Power	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
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(d)	Yes	No
Antenna Requirement	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.203	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

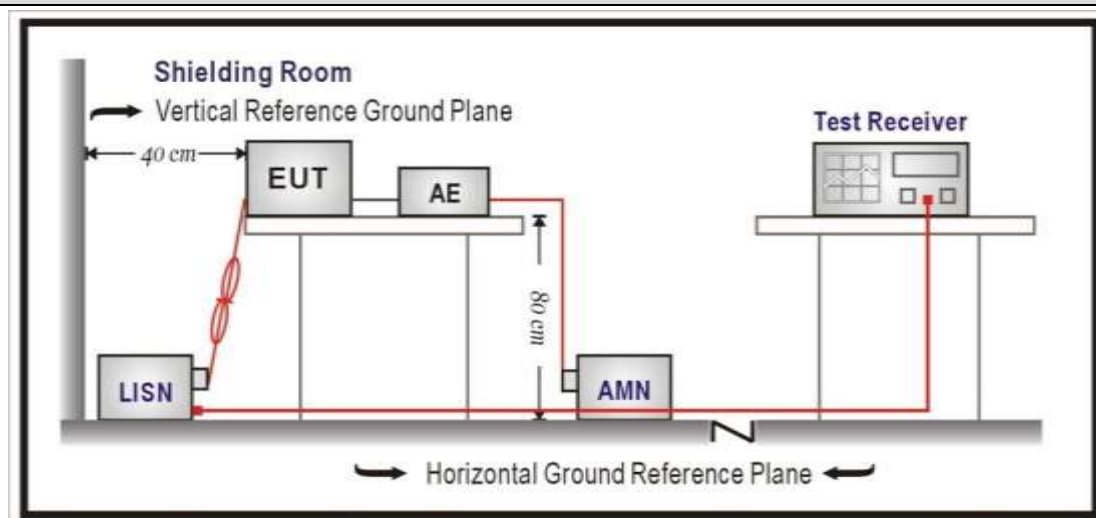
¹⁾ At the transition frequency, the lower limit applies.

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 unlicensed wireless devices

4.1.4 Test Data

The product is powered by DC power supply, so there is no need to test this item

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)

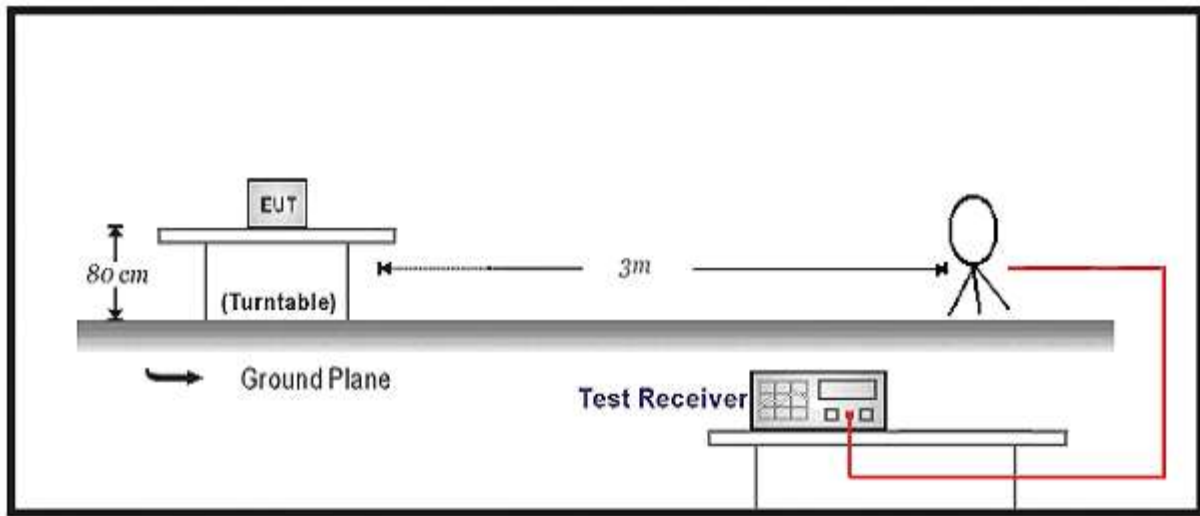
Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed 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.

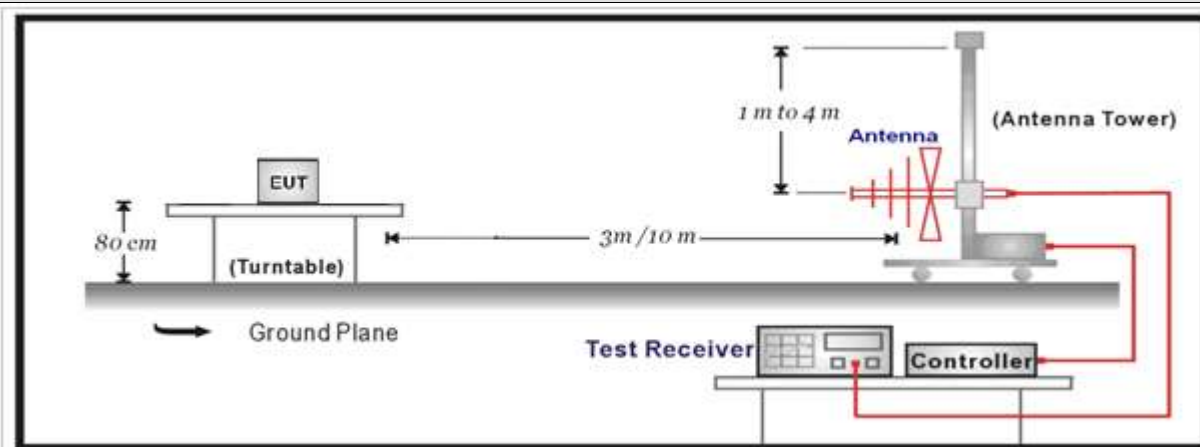
Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified 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

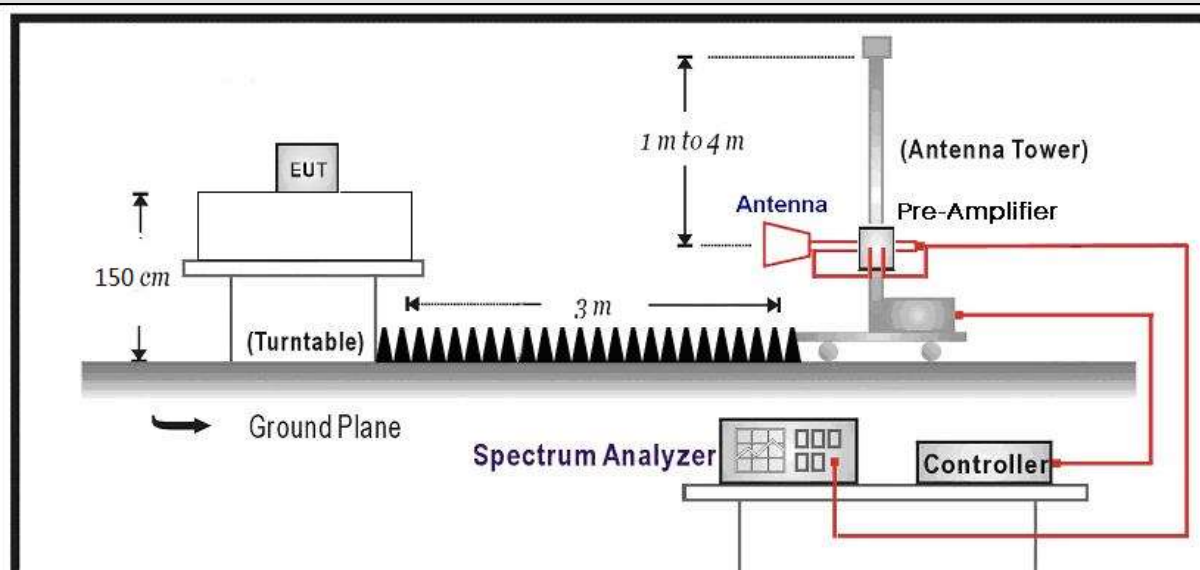
Below 30MHz Test Setup:



30MHz-1GHz Test Setup:



Above 1GHz Test Setup:

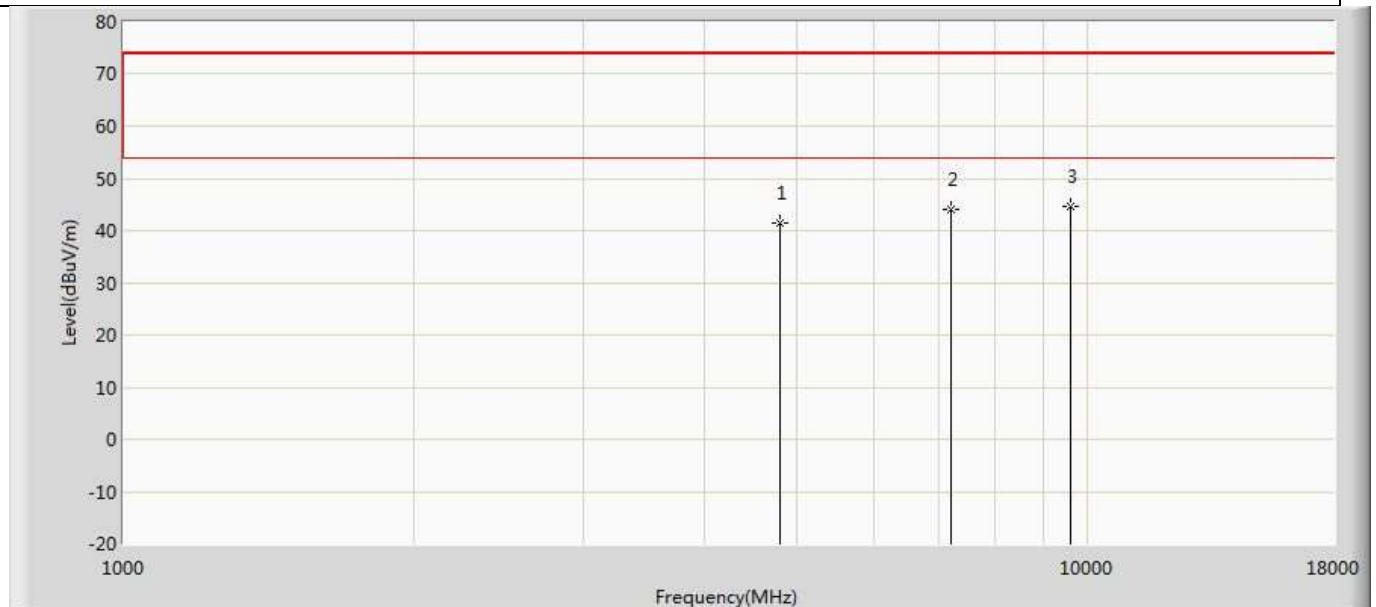


4.2.3 Test Procedure

	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

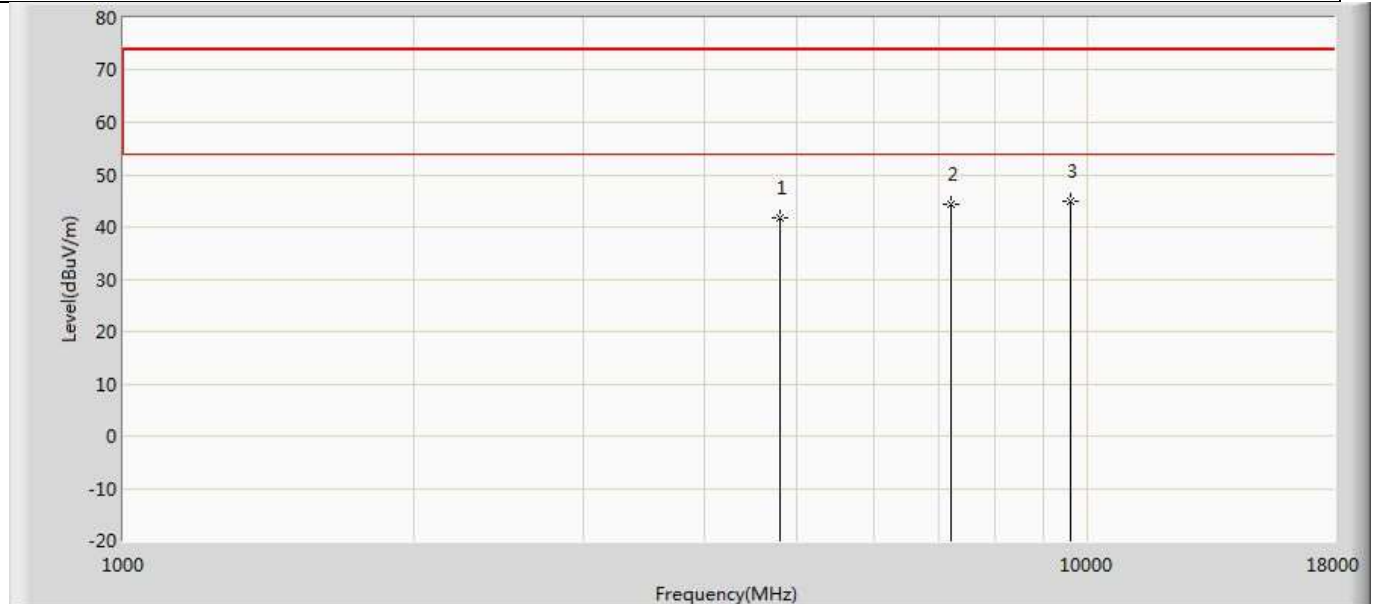
4.2.4 Test Data

Profile: 2050503R	Page No.: 57
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 13:31
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: GPS Tracker	Power: DC 12V
Note: Mode 1:Transmit at 2402MHz by DH5	



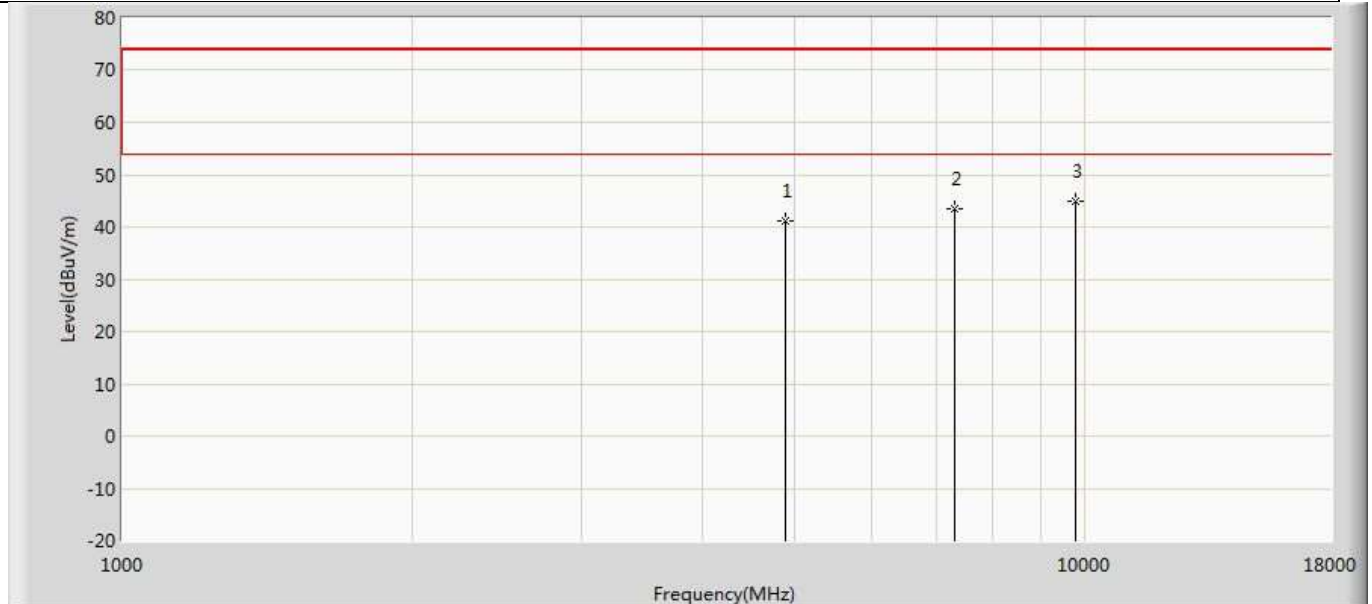
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	41.585	37.924	-32.415	74.000	3.662	PK
2		7206.000	44.088	37.425	-29.912	74.000	6.663	PK
3	*	9608.000	44.615	36.479	-29.385	74.000	8.137	PK

Profile: 2050503R	Page No.: 58
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 13:31
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: GPS Tracker	Power: DC 12V
Note: Mode 1:Transmit at 2402MHz by DH5	



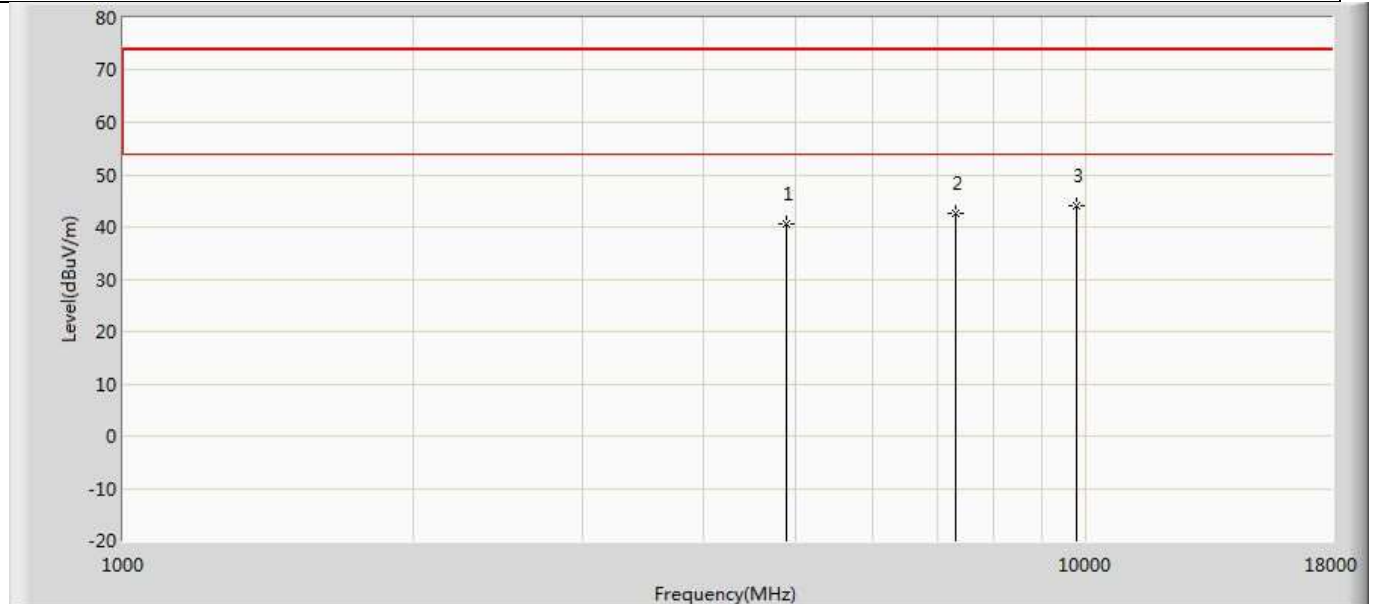
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	41.609	37.948	-32.391	74.000	3.662	PK
2		7206.000	44.406	37.743	-29.594	74.000	6.663	PK
3	*	9608.000	44.890	36.754	-29.110	74.000	8.137	PK

Profile: 2050503R	Page No.: 81
Engineer: YULIU	
Site: AC5	Time: 2020/07/07 - 08:42
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: GPS Tracker	Power: DC 12V
Note: Mode 1:Transmit at 2440MHz by DH5	



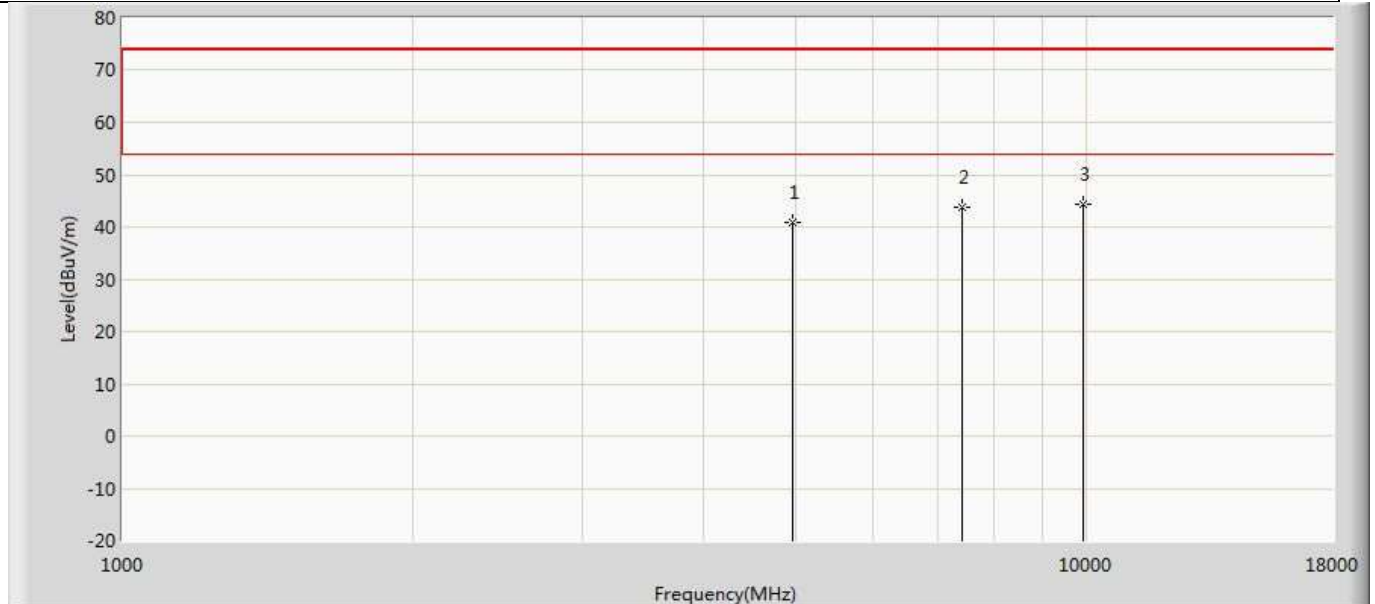
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	41.278	37.637	-32.722	74.000	3.640	PK
2		7320.000	43.437	36.752	-30.563	74.000	6.685	PK
3	*	9760.000	45.054	36.350	-28.946	74.000	8.704	PK

Profile: 2050503R	Page No.: 82
Engineer: YULIU	
Site: AC5	Time: 2020/07/07 - 08:42
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: GPS Tracker	Power: DC 12V
Note: Mode 1:Transmit at 2440MHz by DH5	



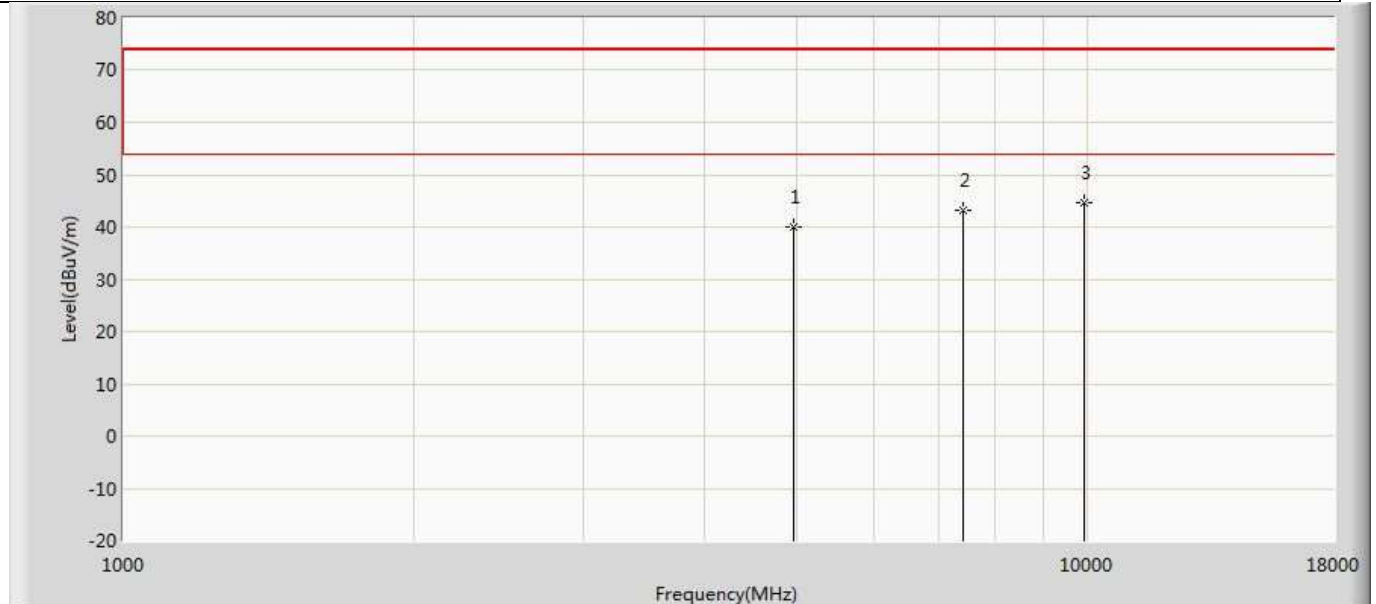
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	40.532	36.891	-33.468	74.000	3.640	PK
2		7320.000	42.750	36.065	-31.250	74.000	6.685	PK
3	*	9760.000	43.918	35.214	-30.082	74.000	8.704	PK

Profile: 2050503R	Page No.: 61
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 13:31
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: GPS Tracker	Power: DC 12V
Note: Mode 1:Transmit at 2480MHz by DH5	



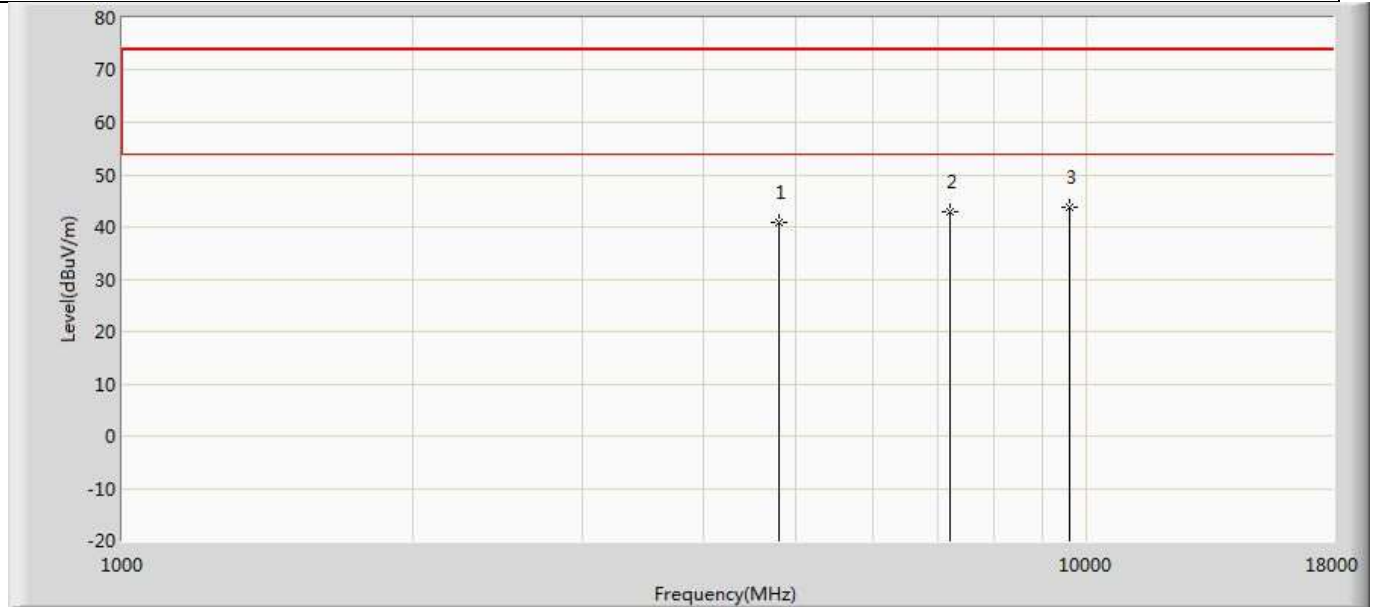
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	40.905	37.294	-33.095	74.000	3.611	PK
2		7440.000	43.885	37.300	-30.115	74.000	6.585	PK
3	*	9920.000	44.324	35.599	-29.676	74.000	8.725	PK

Profile: 2050503R	Page No.: 62
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 13:31
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: GPS Tracker	Power: DC 12V
Note: Mode 1:Transmit at 2480MHz by DH5	



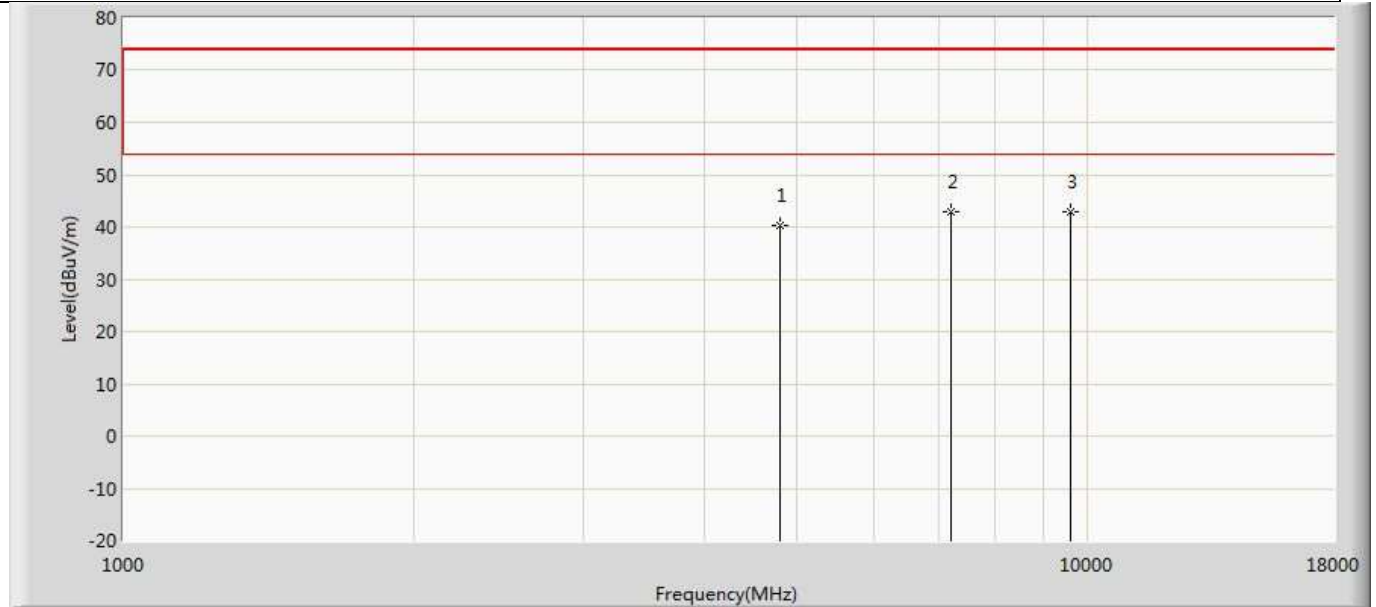
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	39.912	36.301	-34.088	74.000	3.611	PK
2		7440.000	43.302	36.717	-30.698	74.000	6.585	PK
3	*	9920.000	44.617	35.892	-29.383	74.000	8.725	PK

Profile: 2050503R	Page No.: 63
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 13:31
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: GPS Tracker	Power: DC 12V
Note: Mode 2:Transmit at 2402MHz by 2DH5	



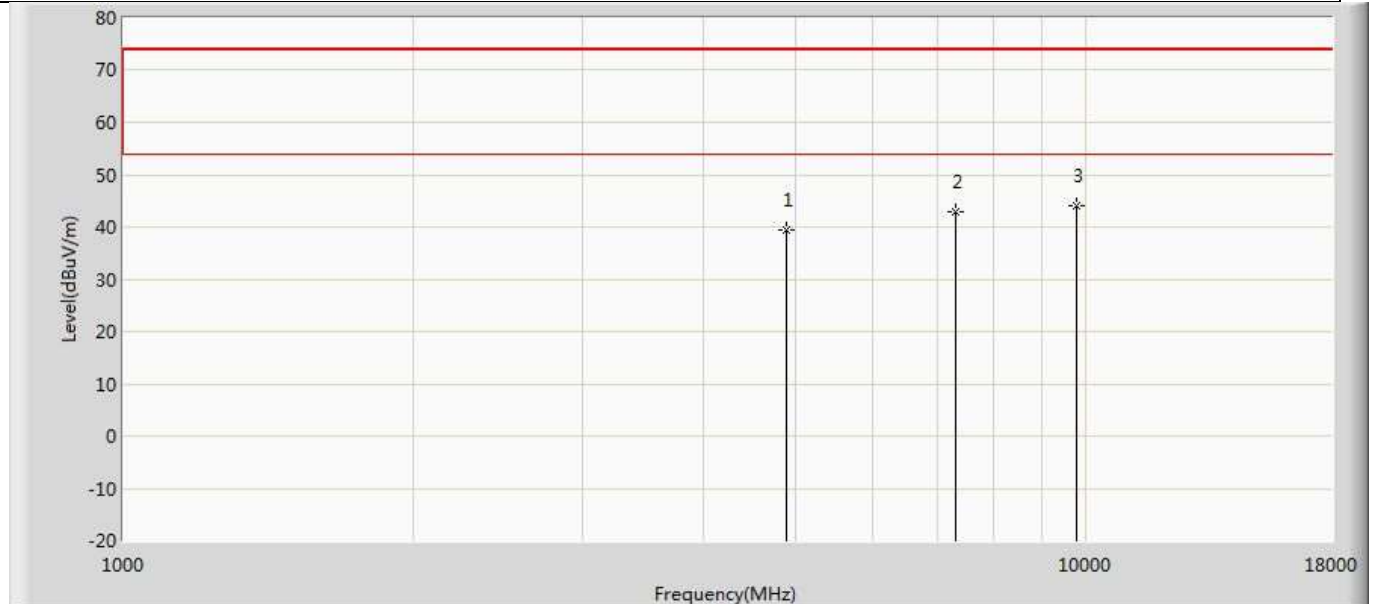
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	40.851	37.190	-33.149	74.000	3.662	PK
2		7206.000	42.971	36.308	-31.029	74.000	6.663	PK
3	*	9608.000	43.897	35.761	-30.103	74.000	8.137	PK

Profile: 2050503R	Page No.: 64
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 13:31
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: GPS Tracker	Power: DC 12V
Note: Mode 2:Transmit at 2402MHz by 2DH5	



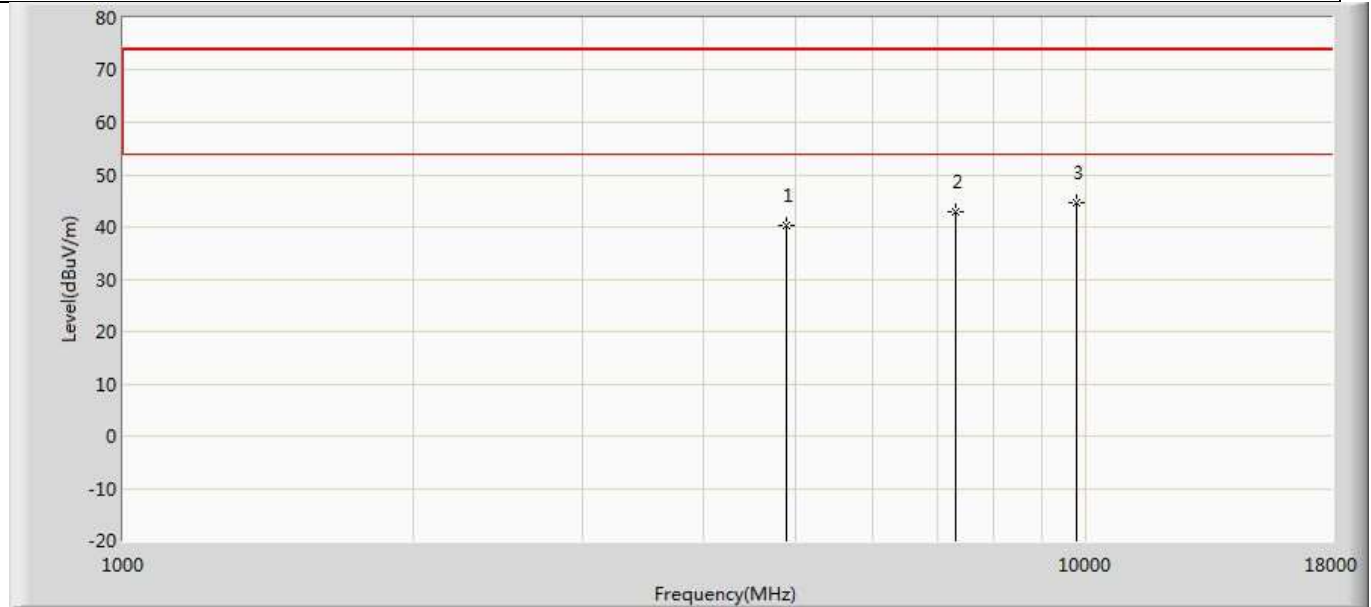
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	40.279	36.618	-33.721	74.000	3.662	PK
2	*	7206.000	43.029	36.366	-30.971	74.000	6.663	PK
3		9608.000	42.980	34.844	-31.020	74.000	8.137	PK

Profile: 2050503R	Page No.: 83
Engineer: YULIU	
Site: AC5	Time: 2020/07/07 - 08:43
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: GPS Tracker	Power: DC 12V
Note: Mode 2:Transmit at 2440MHz by 2DH5	



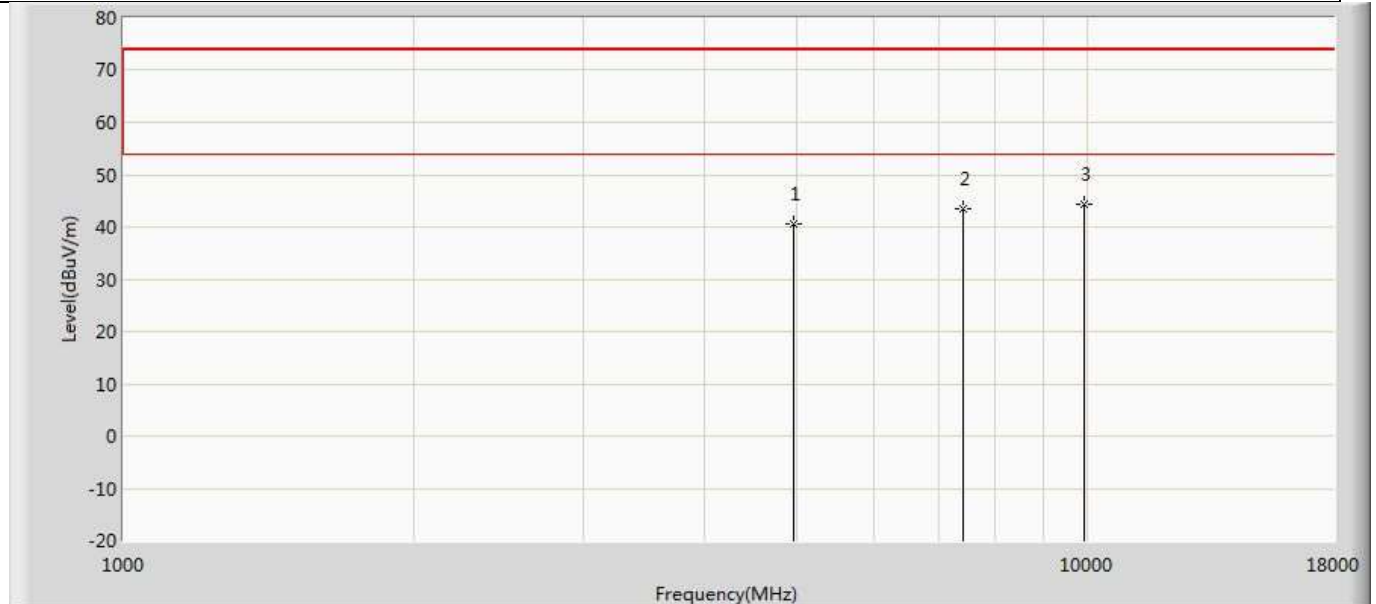
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	39.284	35.643	-34.716	74.000	3.640	PK
2		7320.000	42.795	36.110	-31.205	74.000	6.685	PK
3	*	9760.000	43.988	35.284	-30.012	74.000	8.704	PK

Profile: 2050503R	Page No.: 84
Engineer: YULIU	
Site: AC5	Time: 2020/07/07 - 08:43
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: GPS Tracker	Power: DC 12V
Note: Mode 2:Transmit at 2440MHz by 2DH5	



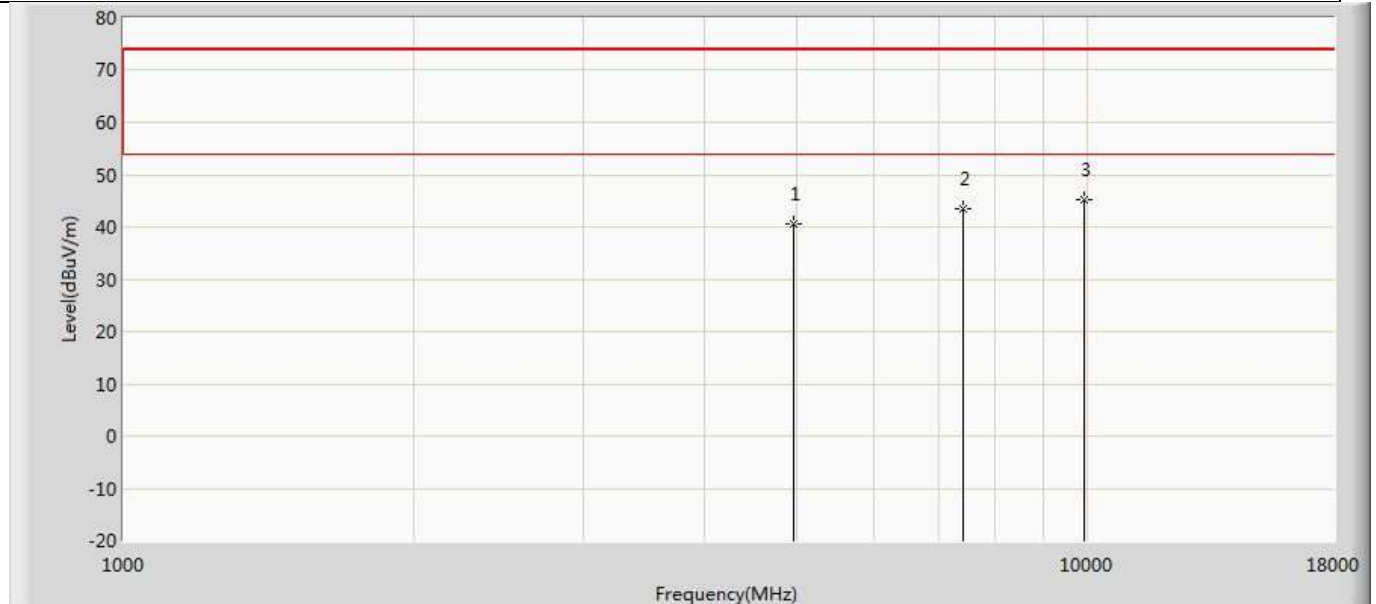
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	40.386	36.745	-33.614	74.000	3.640	PK
2		7320.000	42.982	36.297	-31.018	74.000	6.685	PK
3	*	9760.000	44.628	35.924	-29.372	74.000	8.704	PK

Profile: 2050503R	Page No.: 67
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 13:31
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: GPS Tracker	Power: DC 12V
Note: Mode 2:Transmit at 2480MHz by 2DH5	



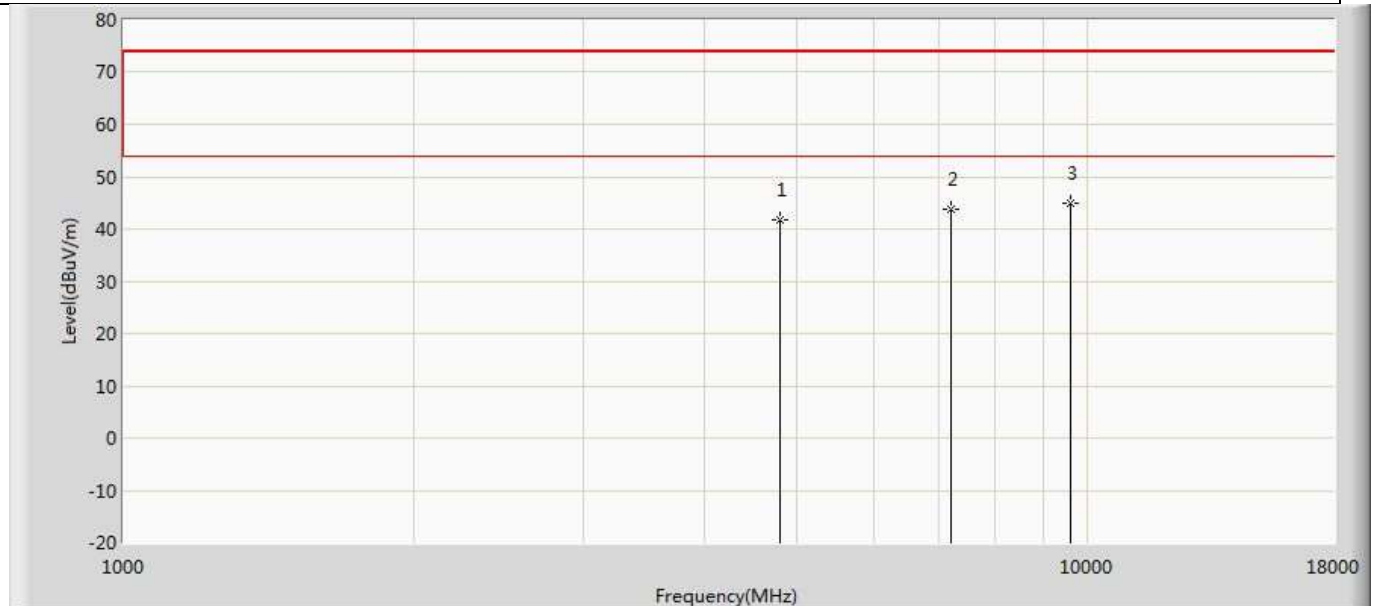
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	40.661	37.050	-33.339	74.000	3.611	PK
2		7440.000	43.558	36.973	-30.442	74.000	6.585	PK
3	*	9920.000	44.309	35.584	-29.691	74.000	8.725	PK

Profile: 2050503R	Page No.: 68
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 13:32
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: GPS Tracker	Power: DC 12V
Note: Mode 2:Transmit at 2480MHz by 2DH5	



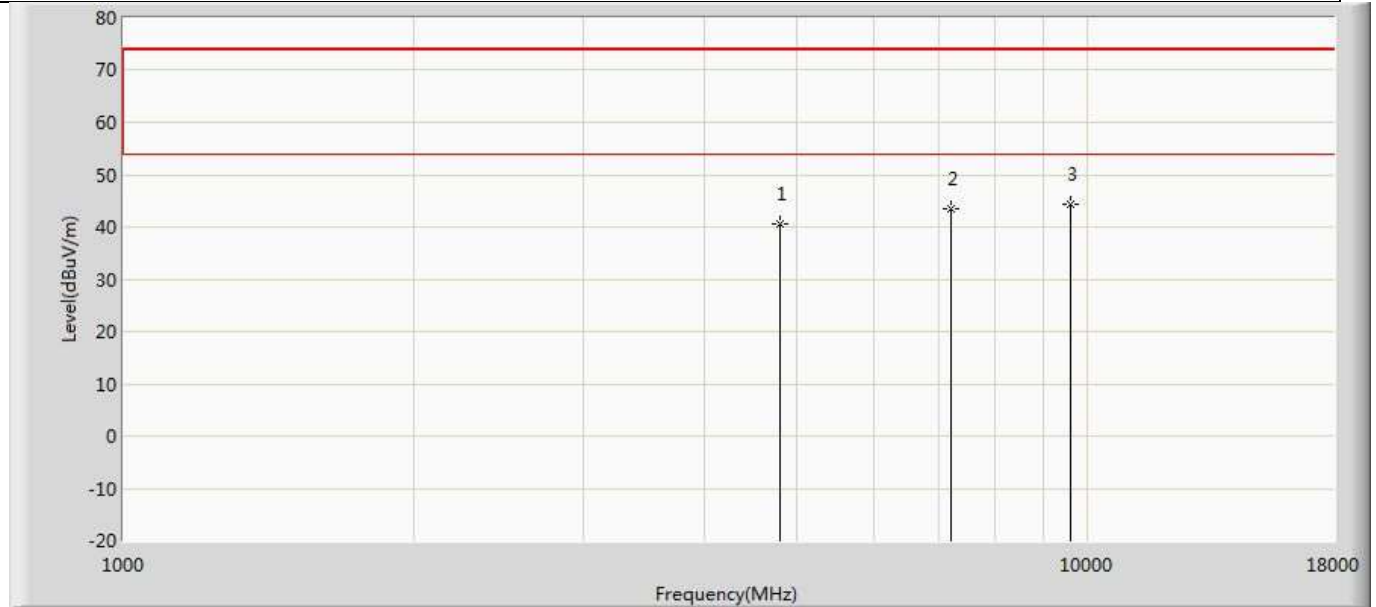
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	40.663	37.052	-33.337	74.000	3.611	PK
2		7440.000	43.575	36.990	-30.425	74.000	6.585	PK
3	*	9920.000	45.174	36.449	-28.826	74.000	8.725	PK

Profile: 2050503R	Page No.: 69
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 13:32
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: GPS Tracker	Power: DC 12V
Note: Mode 3:Transmit at 2402MHz by 3DH5	



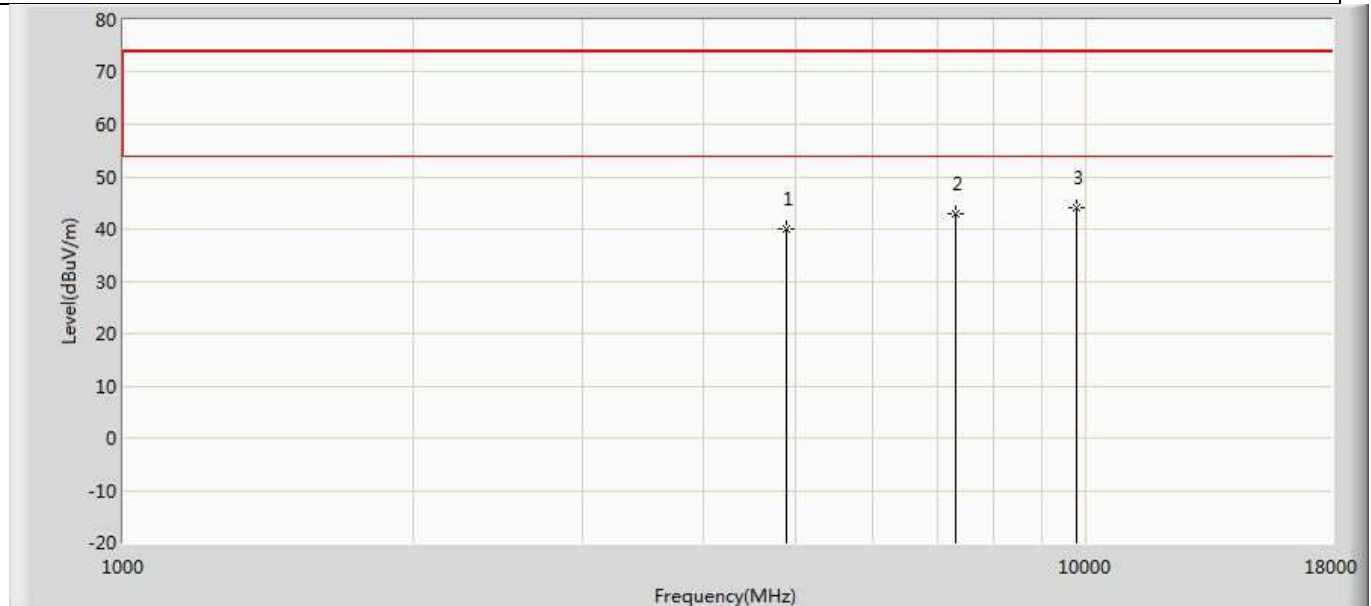
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	41.877	38.216	-32.123	74.000	3.662	PK
2		7206.000	43.821	37.158	-30.179	74.000	6.663	PK
3	*	9608.000	44.873	36.737	-29.127	74.000	8.137	PK

Profile: 2050503R	Page No.: 70
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 13:32
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: GPS Tracker	Power: DC 12V
Note: Mode 3:Transmit at 2402MHz by 3DH5	



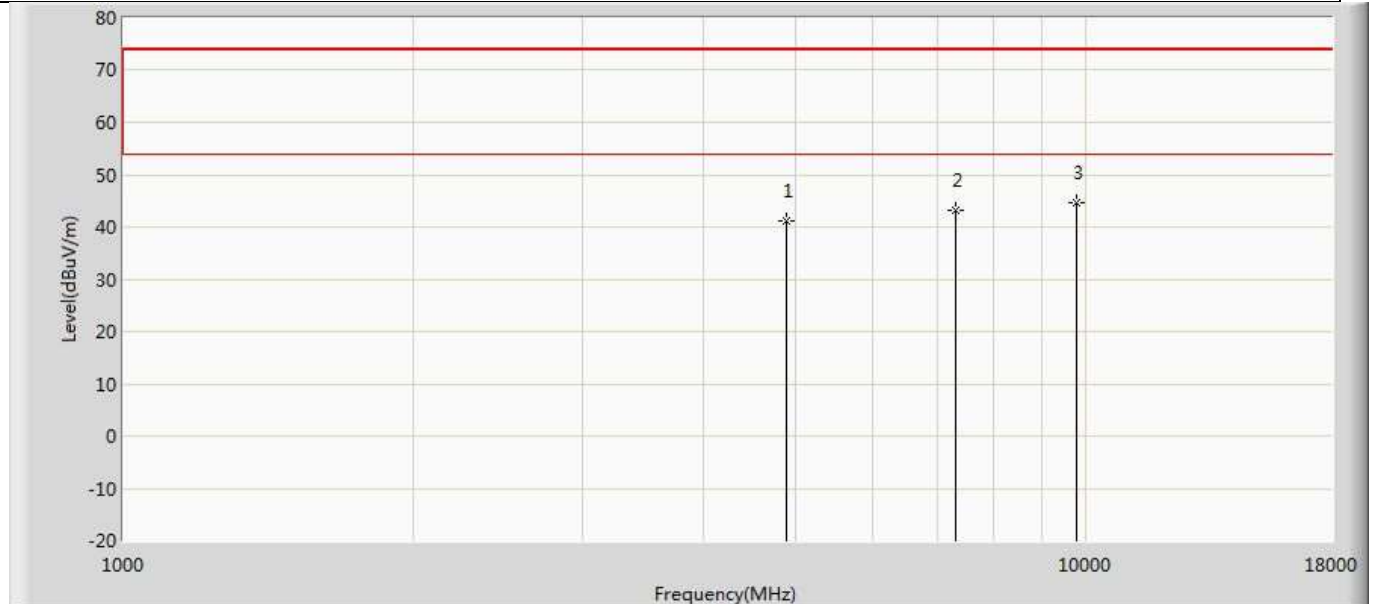
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	40.644	36.983	-33.356	74.000	3.662	PK
2		7206.000	43.571	36.908	-30.429	74.000	6.663	PK
3	*	9608.000	44.283	36.147	-29.717	74.000	8.137	PK

Profile: 2050503R	Page No.: 85
Engineer: YULIU	
Site: AC5	Time: 2020/07/07 - 08:44
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: GPS Tracker	Power: DC 12V
Note: Mode 3:Transmit at 2440MHz by 3DH5	



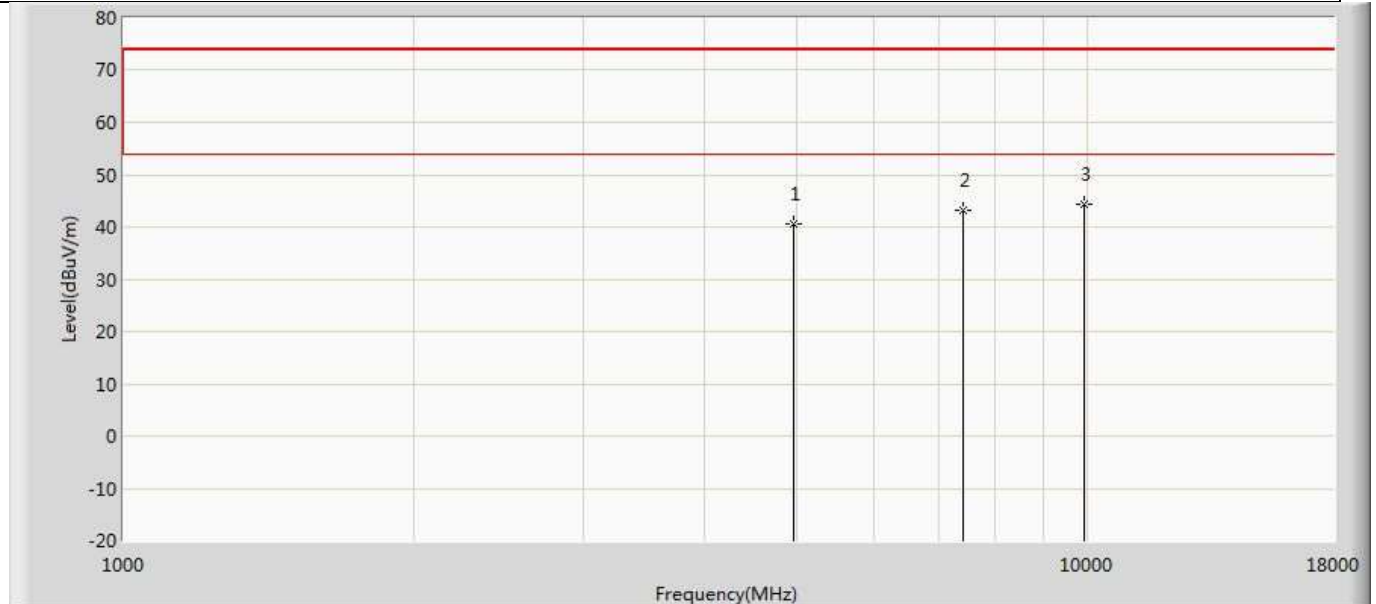
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	40.018	36.377	-33.982	74.000	3.640	PK
2		7320.000	42.994	36.309	-31.006	74.000	6.685	PK
3	*	9760.000	44.154	35.450	-29.846	74.000	8.704	PK

Profile: 2050503R	Page No.: 86
Engineer: YULIU	
Site: AC5	Time: 2020/07/07 - 08:44
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: GPS Tracker	Power: DC 12V
Note: Mode 3:Transmit at 2440MHz by 3DH5	



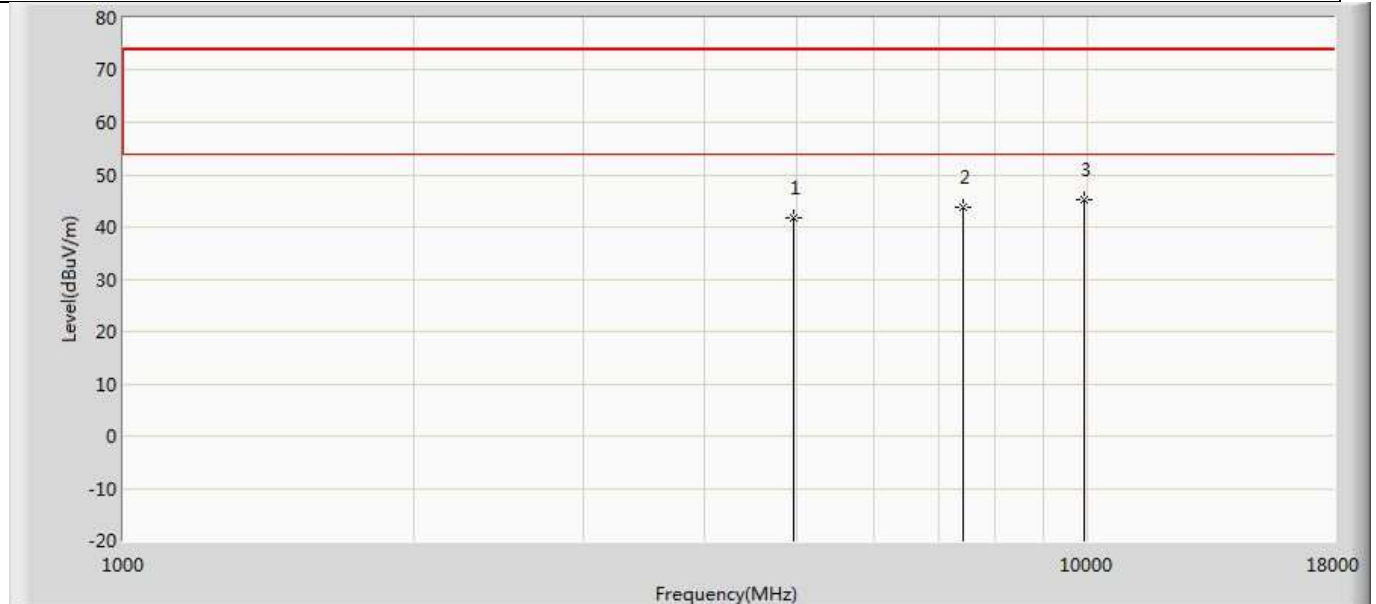
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	41.277	37.636	-32.723	74.000	3.640	PK
2		7320.000	43.311	36.626	-30.689	74.000	6.685	PK
3	*	9760.000	44.550	35.846	-29.450	74.000	8.704	PK

Profile: 2050503R	Page No.: 73
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 13:32
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: GPS Tracker	Power: DC 12V
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	40.552	36.941	-33.448	74.000	3.611	PK
2		7440.000	43.217	36.632	-30.783	74.000	6.585	PK
3	*	9920.000	44.414	35.689	-29.586	74.000	8.725	PK

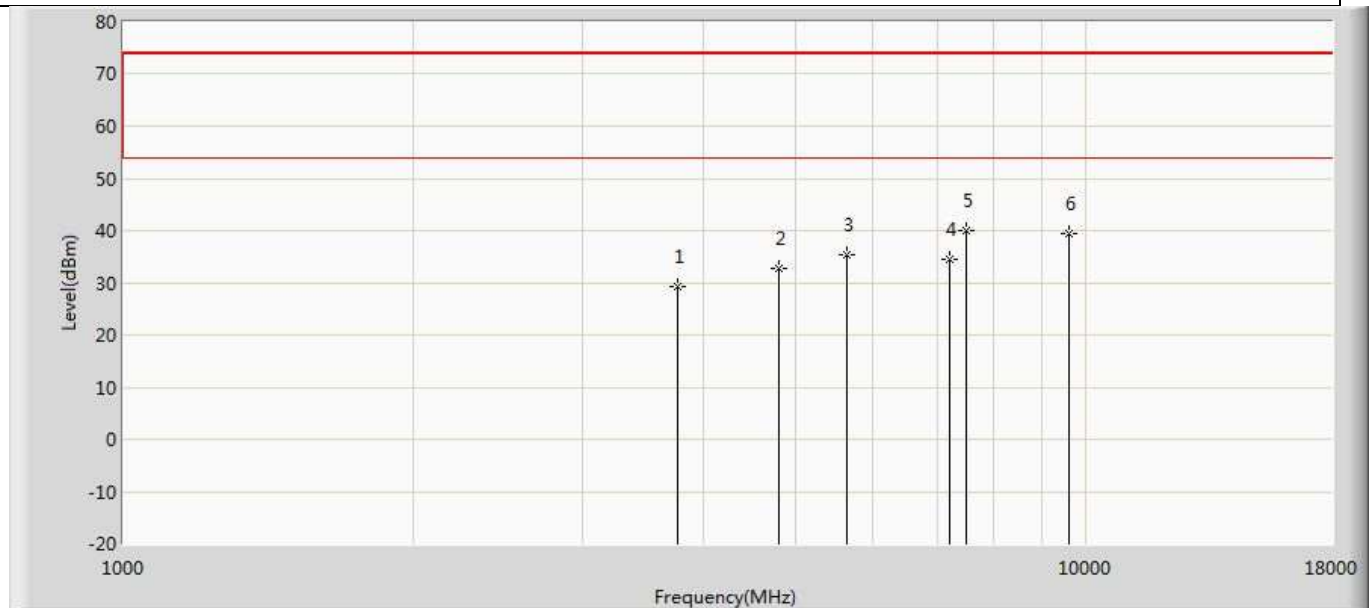
Profile: 2050503R	Page No.: 74
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 13:32
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: GPS Tracker	Power: DC 12V
Note: Mode 3:Transmit at 2480MHz by 3DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	41.849	38.238	-32.151	74.000	3.611	PK
2		7440.000	43.721	37.136	-30.279	74.000	6.585	PK
3	*	9920.000	45.267	36.542	-28.733	74.000	8.725	PK

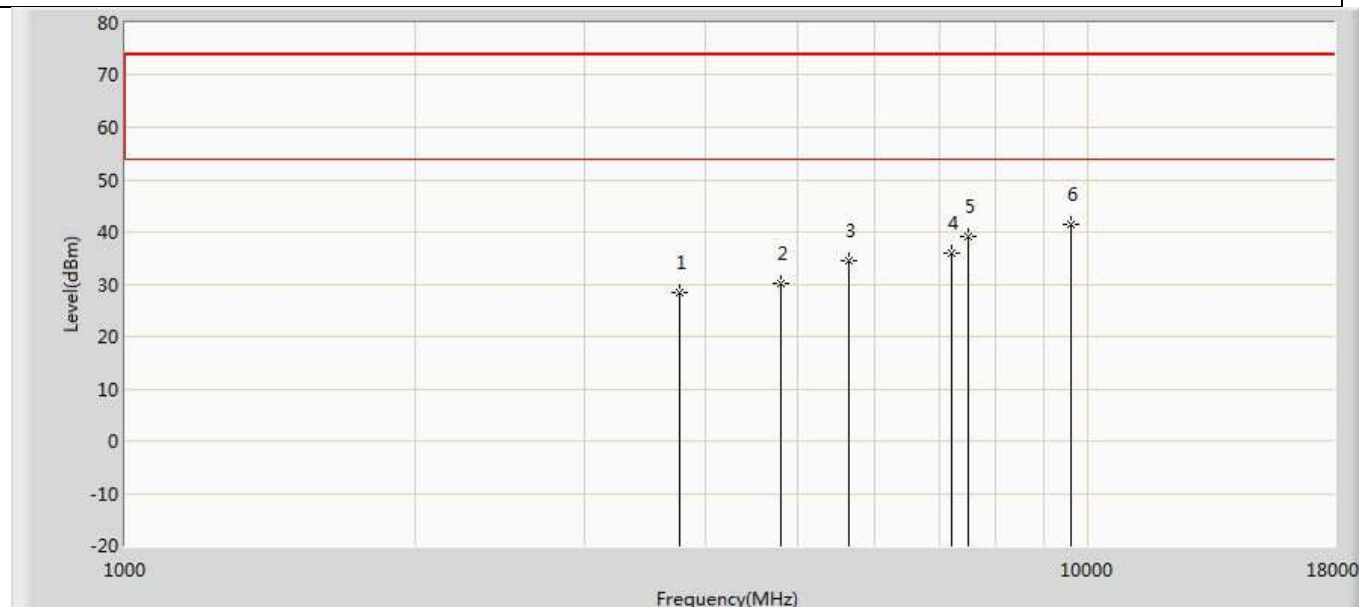
The worst case of Simultaneous Radiated Emission:

Profile: 2050503R	Page No.: 49
Engineer: Neil	
Site: AC5	Time: 2020/07/31 - 15:19
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: GPS Tracker	Power: DC 12V
Note: Mode2: The Simultaneous Transmit by BT & WCDMA band 2	



No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		3760.000	29.179	25.380	-44.821	74.000	3.799	PK
2		4804.000	32.702	28.000	-41.298	74.000	4.702	PK
3		5640.000	35.432	29.340	-38.568	74.000	6.092	PK
4		7206.000	34.625	26.990	-39.375	74.000	7.634	PK
5	*	7520.000	40.085	32.150	-33.915	74.000	7.935	PK
6		9608.000	39.471	30.010	-34.529	74.000	9.461	PK

Profile: 2050503R	Page No.: 50
Engineer: Neil	
Site: AC5	Time: 2020/07/31 - 15:45
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: GPS Tracker	Power: DC 12V
Note: Mode2: The Simultaneous Transmit by BT & WCDMA band 2	



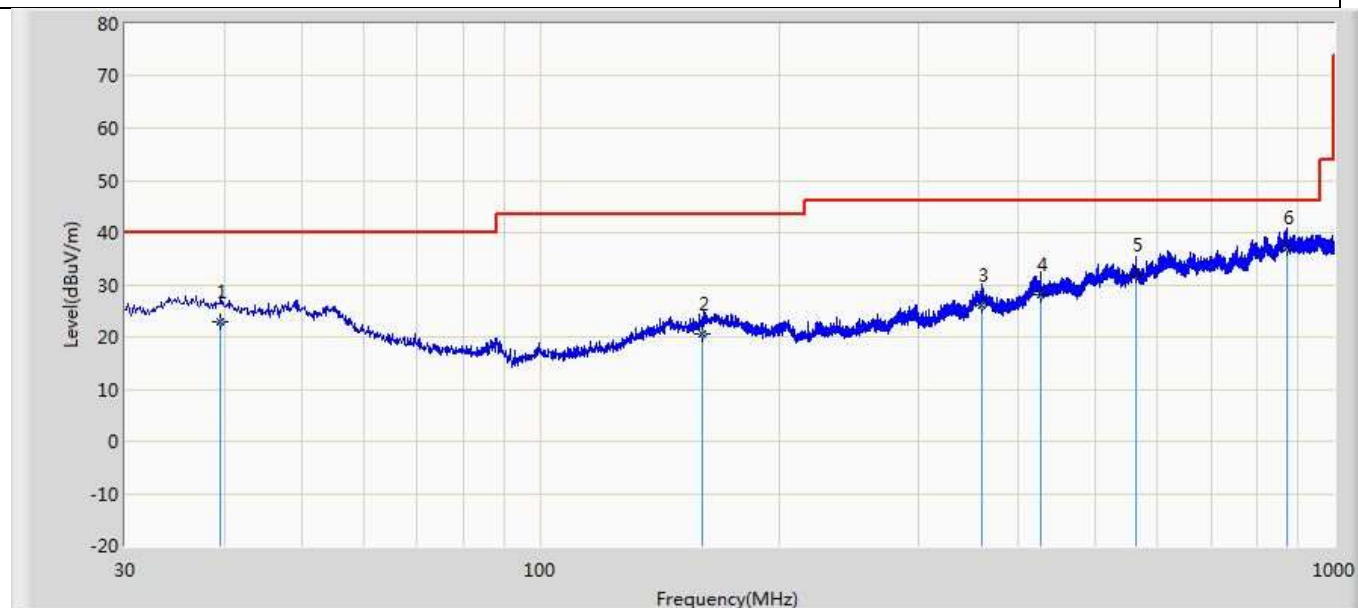
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		3760.000	28.469	24.670	-45.531	74.000	3.799	PK
2		4804.000	30.042	25.340	-43.958	74.000	4.702	PK
3		5640.000	34.432	28.340	-39.568	74.000	6.092	PK
4		7206.000	36.065	28.430	-37.935	74.000	7.634	PK
5		7520.000	39.175	31.240	-34.825	74.000	7.935	PK
6	*	9608.000	41.591	32.130	-32.409	74.000	9.461	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:

Engineer: Wendy	
Site: AC2	Time: 2020/06/02
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: SuZ-2141	Polarity: Horizontal
EUT: GPS Tracker	Power: DC 12V
Note: Mode 1:Transmit at 2402MHz by DH5	

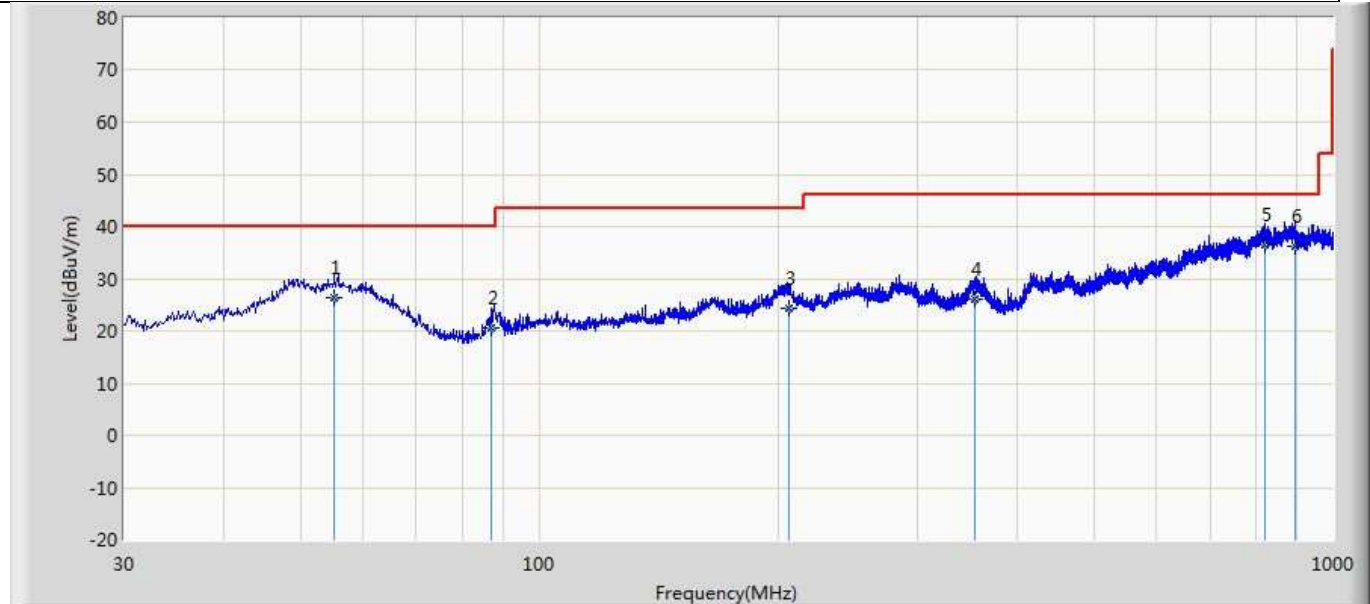


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1		39.560	23.008	0.231	-16.992	40.000	16.362	6.416	0.000	100	2	QP
2		160.256	20.561	1.254	-22.939	43.500	12.260	7.047	0.000	100	164	QP
3		360.251	26.231	1.254	-19.769	46.000	17.224	7.753	0.000	100	2	QP
4		426.870	28.223	1.564	-17.777	46.000	18.702	7.956	0.000	200	258	QP
5		563.980	31.762	2.456	-14.238	46.000	20.963	8.343	0.000	100	192	QP
6	*	872.658	36.987	2.154	-9.013	46.000	25.724	9.108	0.000	100	50	QP

Note:

1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Engineer: Wendy	
Site: AC2	Time: 2020/06/02
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: SuZ-2141	Polarity: Vertical
EUT: GPS Tracker	Power: DC 12V
Note: Mode 1:Transmit at 2402MHz by DH5	



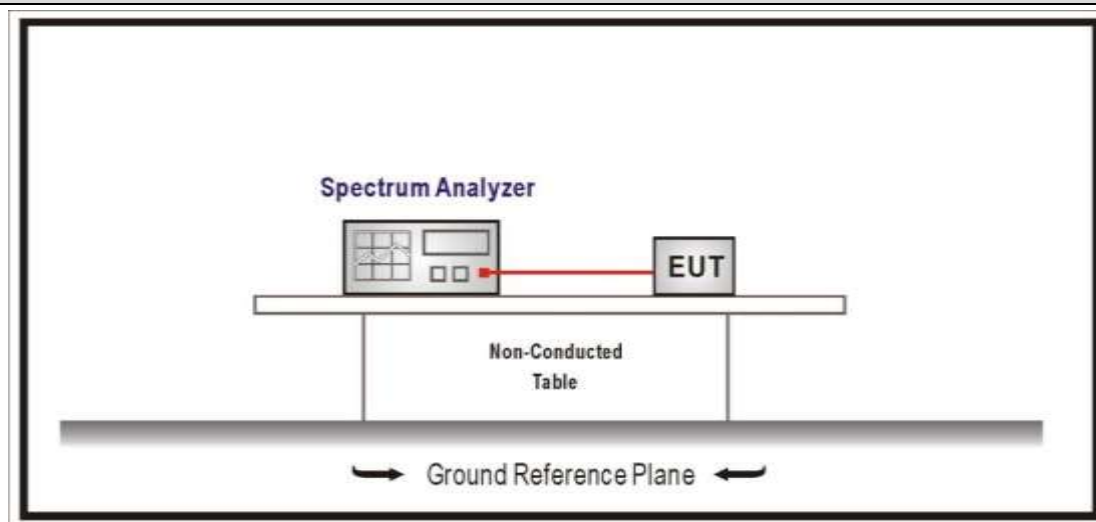
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1		55.126	26.444	1.450	-13.556	40.000	18.469	6.525	0.000	100	101	QP
2		87.156	20.691	6.145	-19.309	40.000	7.841	6.705	0.000	100	266	QP
3		205.950	24.426	0.164	-19.074	43.500	17.039	7.223	0.000	150	360	QP
4		354.584	26.115	0.251	-19.885	46.000	18.128	7.736	0.000	100	66	QP
5	*	820.213	36.643	1.154	-9.357	46.000	26.497	8.992	0.000	200	169	QP
6		895.640	36.210	1.256	-9.790	46.000	25.794	9.160	0.000	200	1	QP

Note:

1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

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**

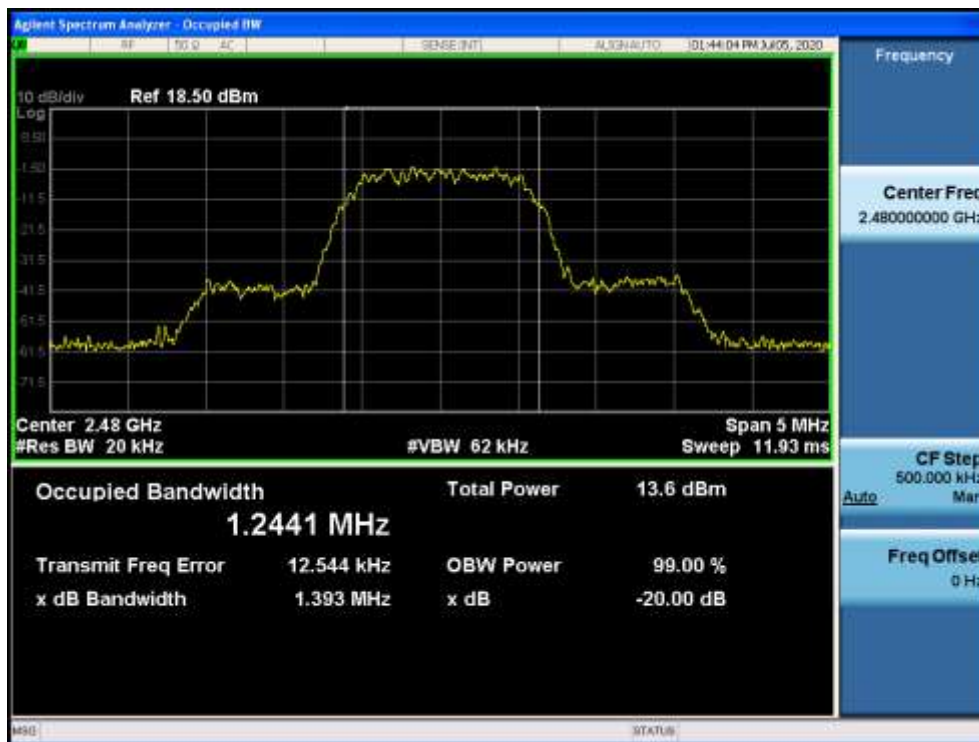
References Rule		Chapter	Description
☒	ANSI C63.10	6.9	Occupied bandwidth tests
☒	ANSI C63.10	6.9.2	Occupied bandwidth—relative measurement procedure

4.3.4 Test Data

Mode	Channel	Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
1	00	2402	924.3	887.10
	39	2441	924.8	888.82
	79	2480	924.7	888.90
2	00	2402	1392	1239.2
	39	2441	1388	1239.5
	79	2480	1393	1244.1
3	00	2402	1373	1232.3
	39	2441	1374	1233.6
	79	2480	1375	1234.1

Note 1: The worst data plot as below:

Mode2/CH79/2480MHz



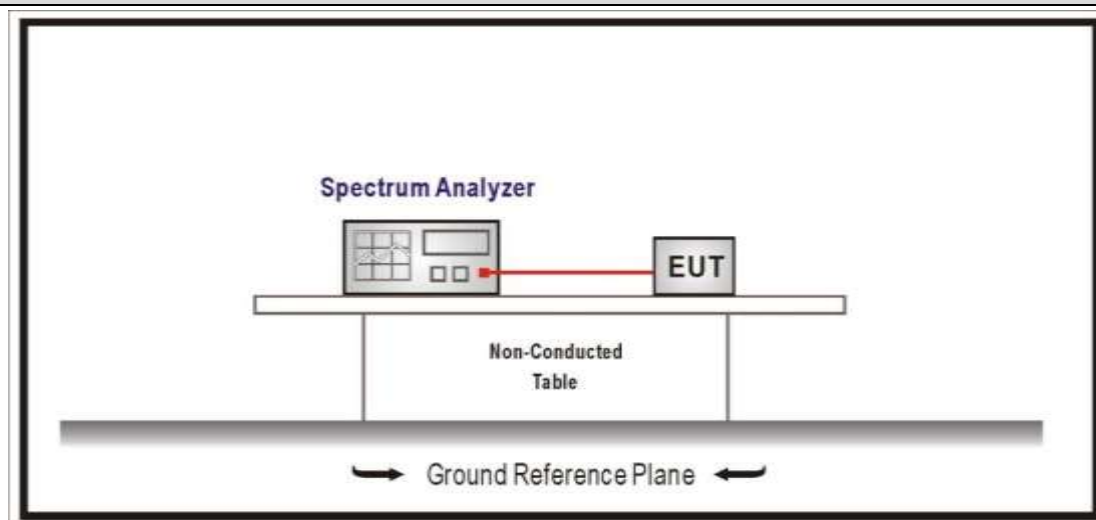
4.4 Carrier Frequency Separation

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

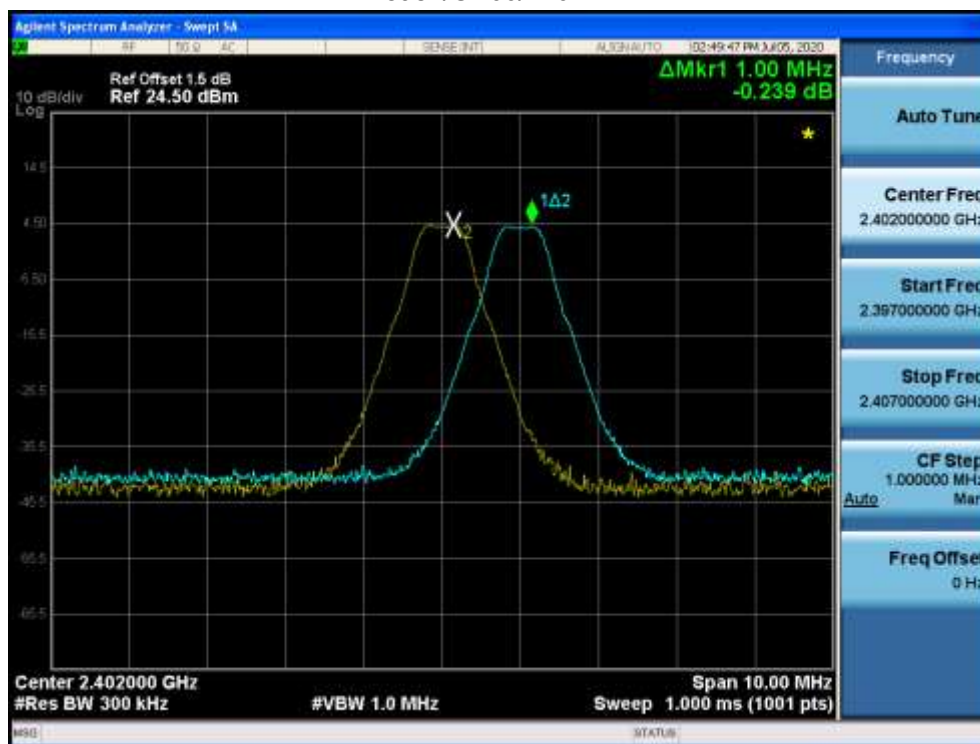
References Rule	Chapter	Description
☒ ANSI C63.10	7.8	Evaluation of frequency-hopping device parameters
☒ ANSI C63.10	7.8.2	Carrier frequency separation

4.4.4 Test Data

Mode	Channel	Frequency (MHz)	Carrier Frequency Separation (kHz)	Limit (kHz)	Result
1	00	2402	1000	924.3	Pass
	39	2441	1000	924.8	Pass
	78	2480	1000	924.7	Pass
2	00	2402	1000	928.0	Pass
	39	2441	1000	925.3	Pass
	78	2480	1000	928.7	Pass
3	00	2402	1000	915.3	Pass
	39	2441	1000	916.0	Pass
	78	2480	1000	916.7	Pass

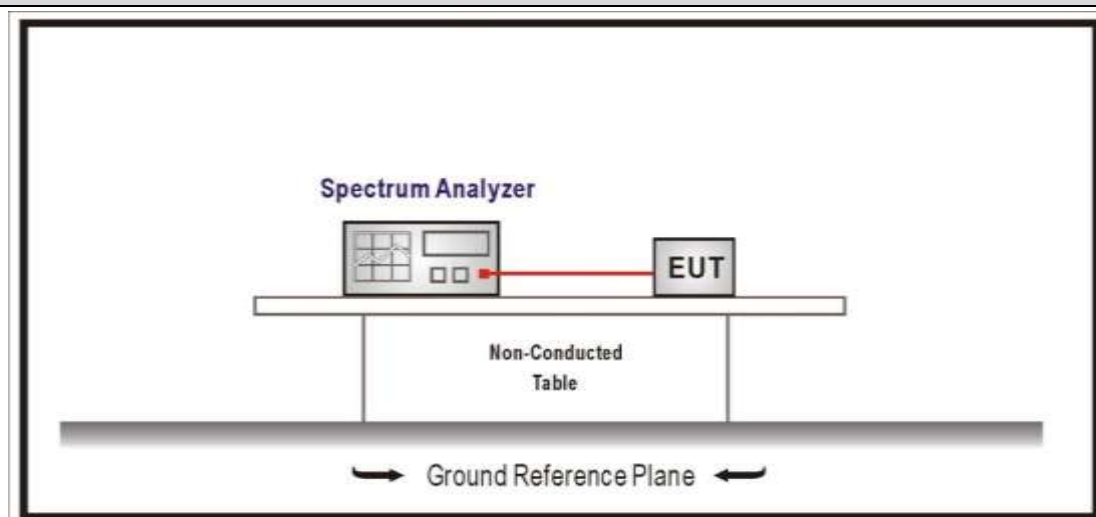
Note 1: The worst data plot as below:

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.	

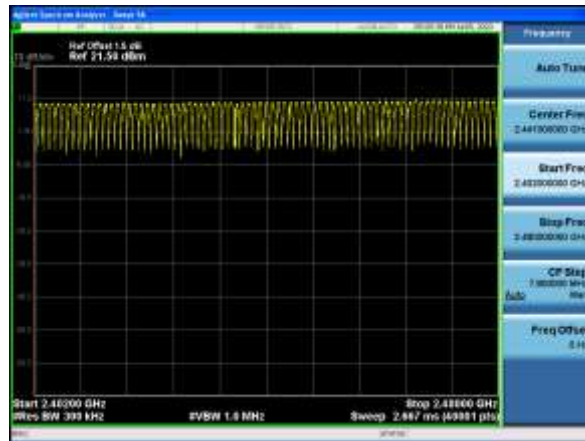
4.5.2 Test Setup**4.5.3 Test Procedure**

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

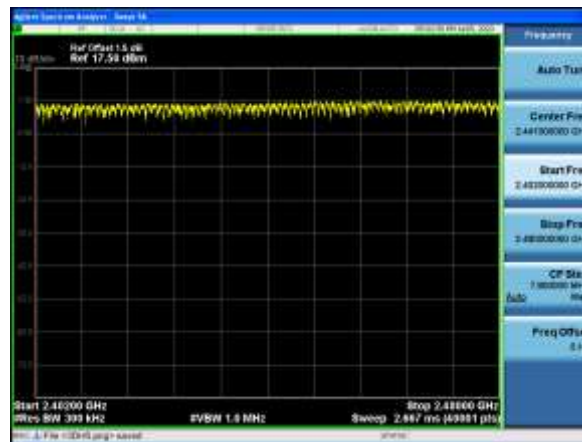
Mode 1



Mode 2

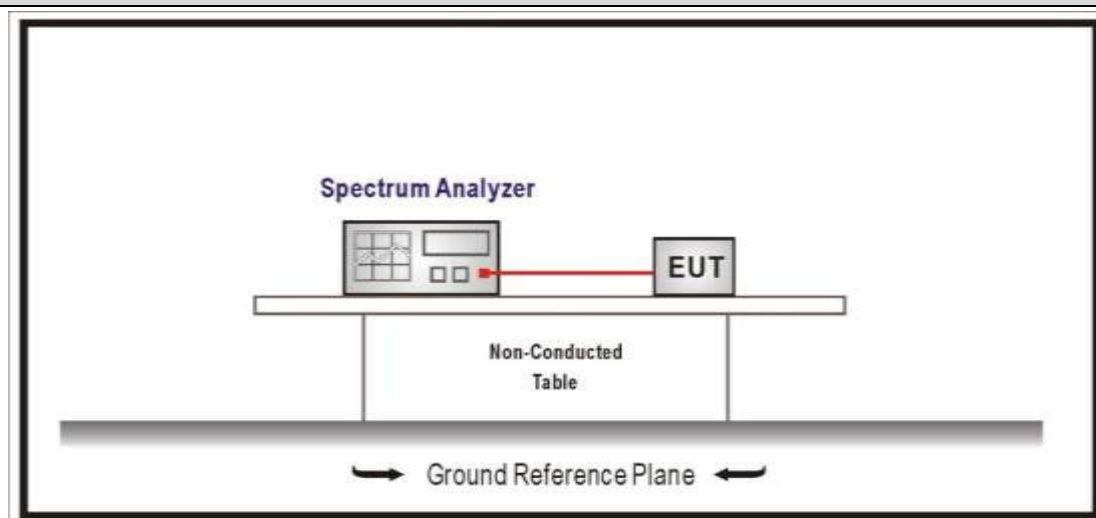


Mode 3



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

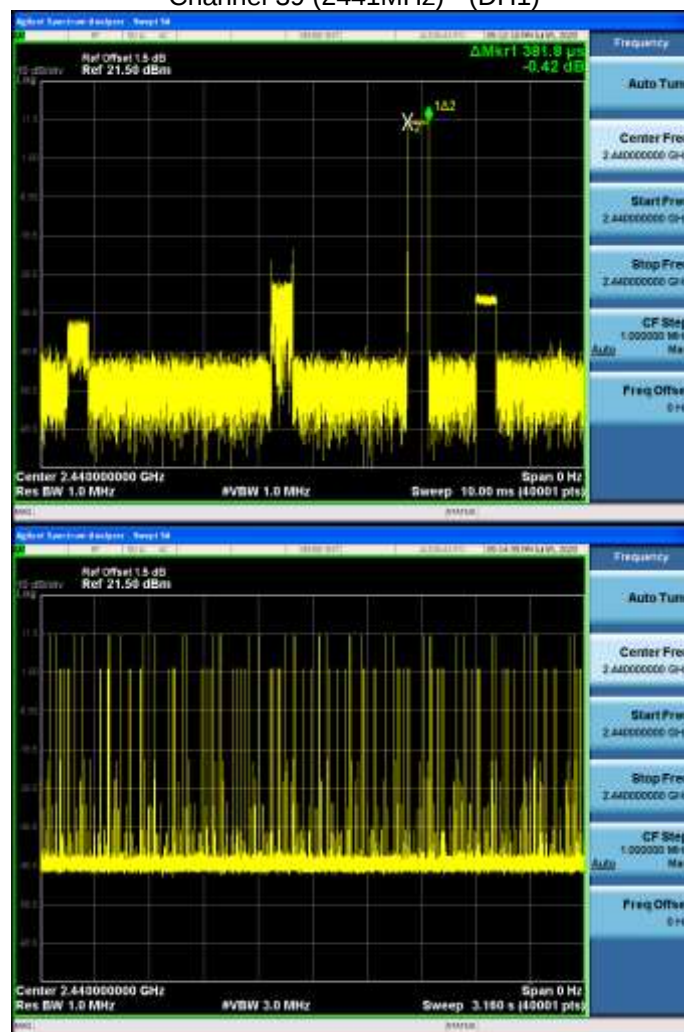
Mode	Channel	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
1	39	2441	125.99	< 400	Pass

Note1: Test Time Period: $0.4 \times 79 = 31.6 \text{ sec}$

Note2: Time of Occupancy = $0.3818 \times 33 \times 31.6 / 3.16 = 125.99 \text{ ms}$

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

Channel 39 (2441MHz) - (DH1)



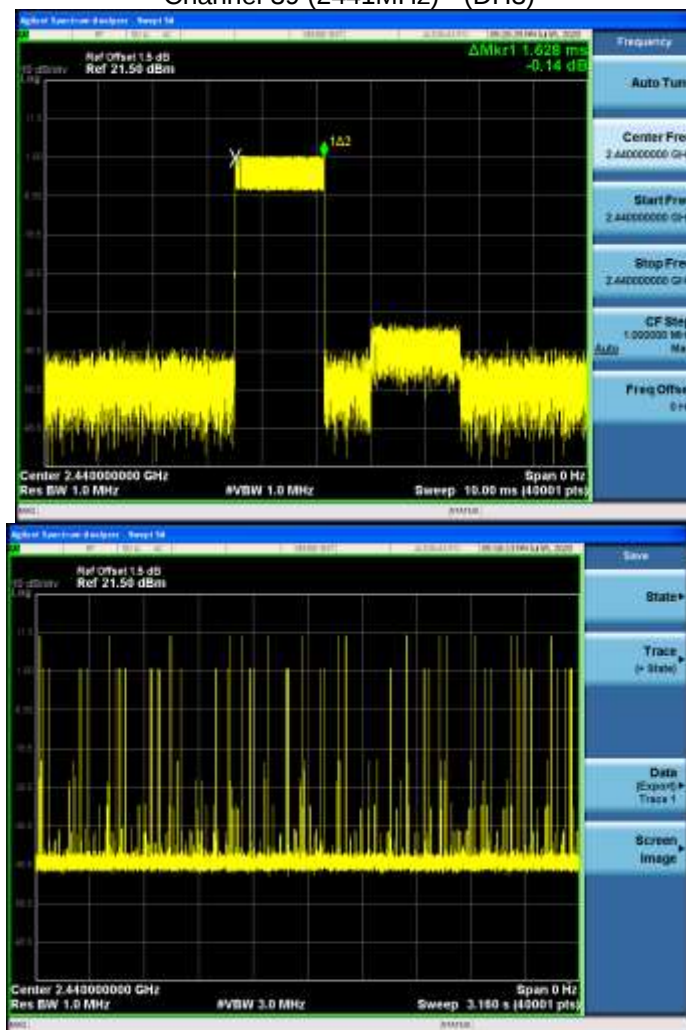
Mode	Channel	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
1	39	2441	260.48	< 400	Pass

Note1: Test Time Period: $0.4 \times 79 = 31.6 \text{ sec}$

Note2: Time of Occupancy = $1.628 \times 16 \times 31.6 / 3.16 = 260.48 \text{ ms}$

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

Channel 39 (2441MHz) - (DH3)



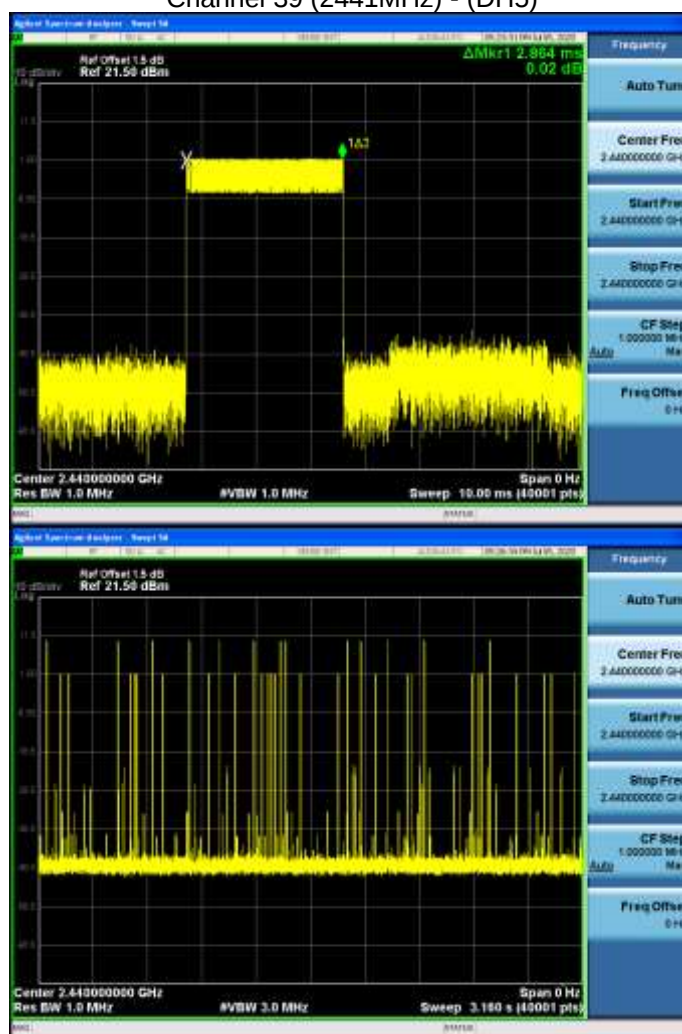
Mode	Channel	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
1	39	2441	372.32	< 400	Pass

Note1: Test Time Period: $0.4 \times 79 = 31.6 \text{ sec}$

Note2: Time of Occupancy = $2.864 \times 13 \times 31.6 / 3.16 = 372.32 \text{ ms}$

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

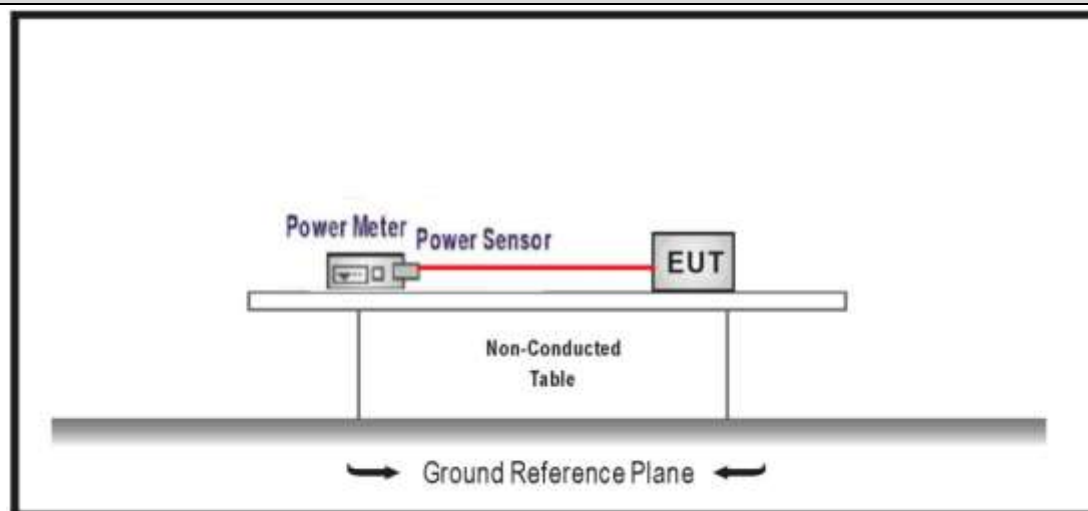
Channel 39 (2441MHz) - (DH5)



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 $0.4 \times 20 = 8 \text{ S}$, 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

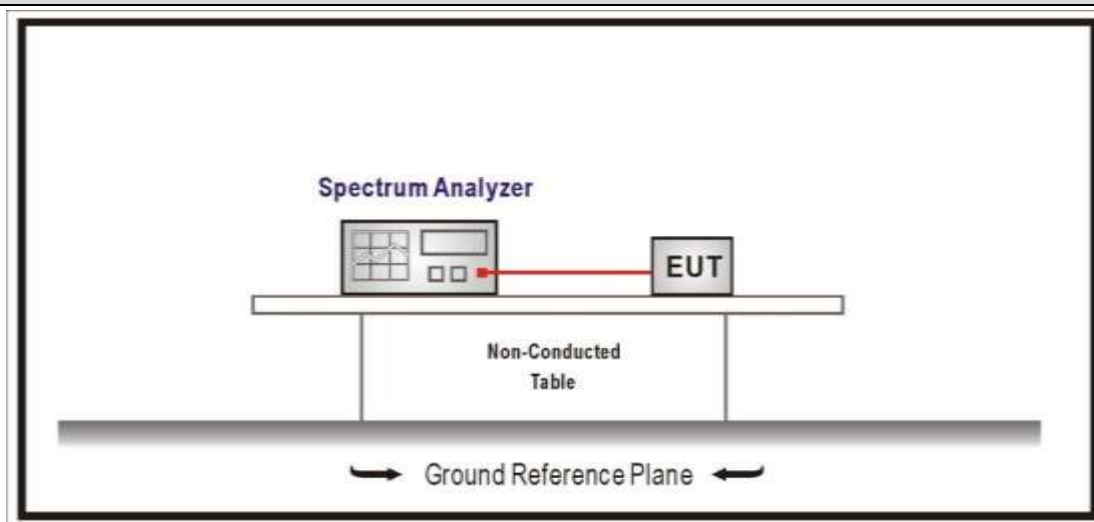
Mode	Channel	Test Frequency (MHz)	Power Output (dBm)	Limit (dBm)	Result
Mode 1	00	2402	8.55	≤ 30	Pass
	39	2441	8.23	≤ 30	Pass
	78	2480	7.95	≤ 30	Pass
Mode 2	00	2402	7.96	≤ 21	Pass
	39	2441	7.72	≤ 21	Pass
	78	2480	7.57	≤ 21	Pass
Mode 3	00	2402	8.01	≤ 21	Pass
	39	2441	7.93	≤ 21	Pass
	78	2480	7.68	≤ 21	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**

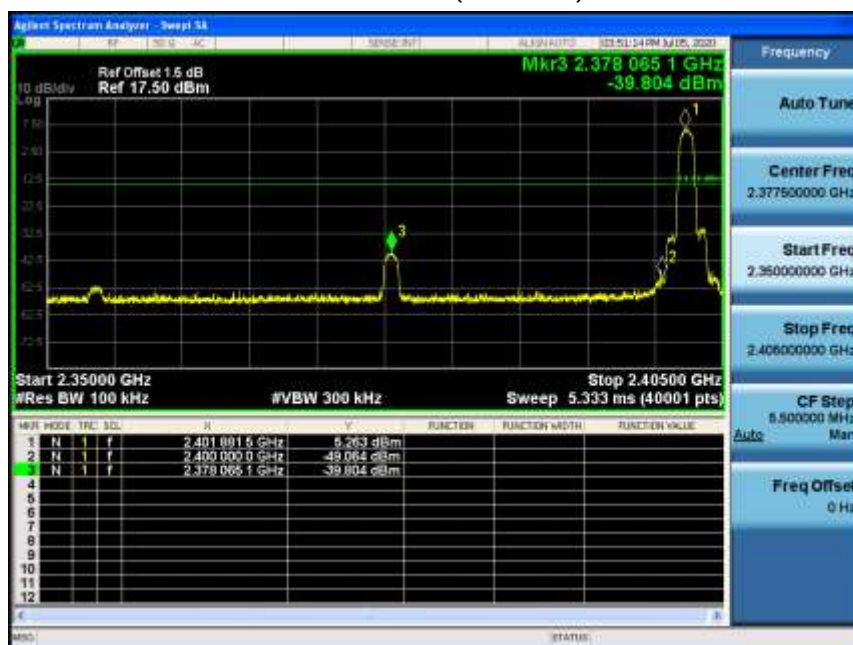
References Rule	Chapter	Description
☒ ANSI C63.10	7.8	Evaluation of frequency-hopping device parameters
☒ ANSI C63.10	7.8.6	Band-edge measurements for RF conducted emissions

4.8.4 Test Data

Mode	Channel	Test Frequency (MHz)	Maximum In-Band PSD[a] (dBm/100kHz)	Frequency (MHz)	Out-Band PSD[b] (dBm/100kHz)	[a]-[b] (dB)	Limit (dB)	Result
1	00	2402	10.853	2400	-34.475	45.328	>20	Pass
	78	2480	11.394	2500	-36.032	47.426	>20	Pass
2	00	2402	5.236	2400	-39.804	45.040	>20	Pass
	78	2480	6.391	2500	-40.390	46.781	>20	Pass
3	00	2402	5.587	2400	-39.582	45.169	>20	Pass
	78	2480	6.862	2500	-39.779	46.641	>20	Pass

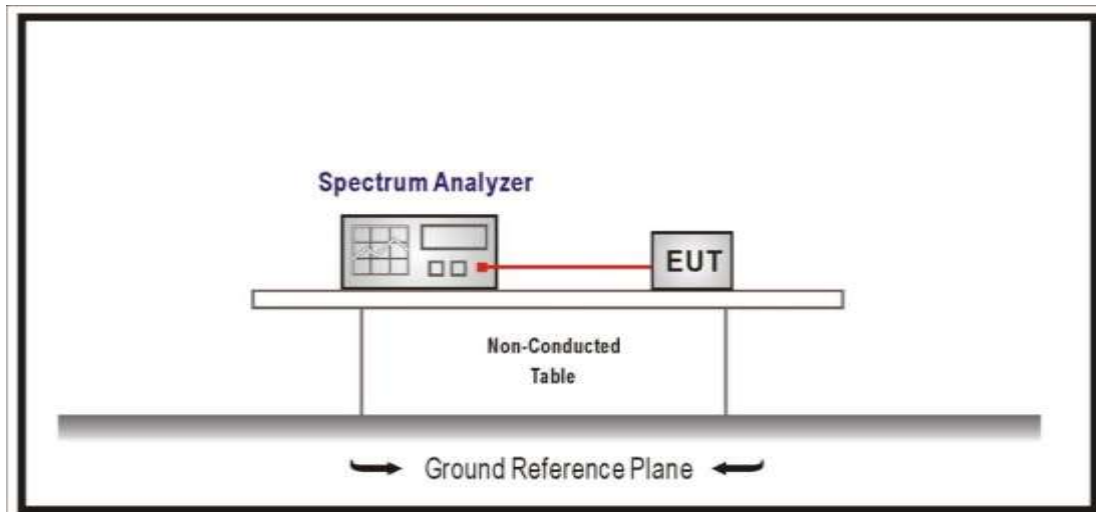
Note: The worst data as shown in below:

Mode 2 CH00(2402MHz)



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 (Hz)	Tx On + Tx Off (ms)	Duty Cycle (%)
Mode 1	N/A	N/A	10	N/A	100.0
Mode 2	N/A	N/A	10	N/A	100.0
Mode 3	N/A	N/A	10	N/A	100.0

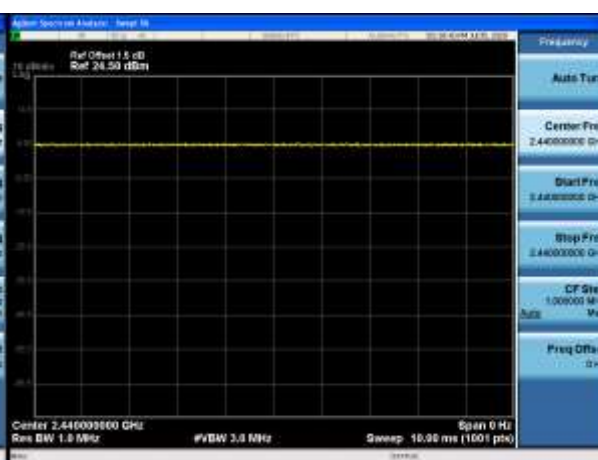
Note 1: T means the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

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

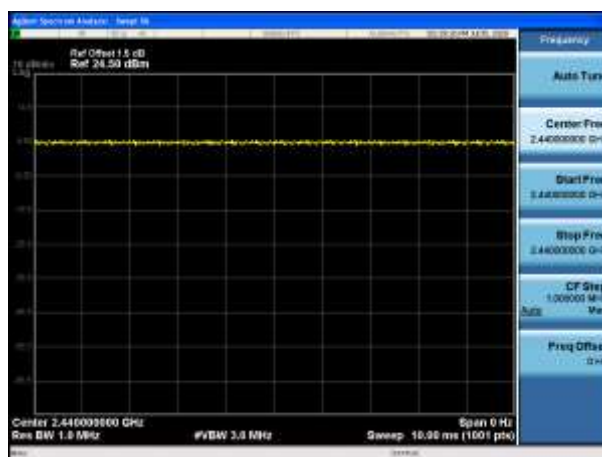
Mode 1 CH39 2441MHz



Mode 2 CH39 2441MHz



Mode 3 CH39 2441MHz



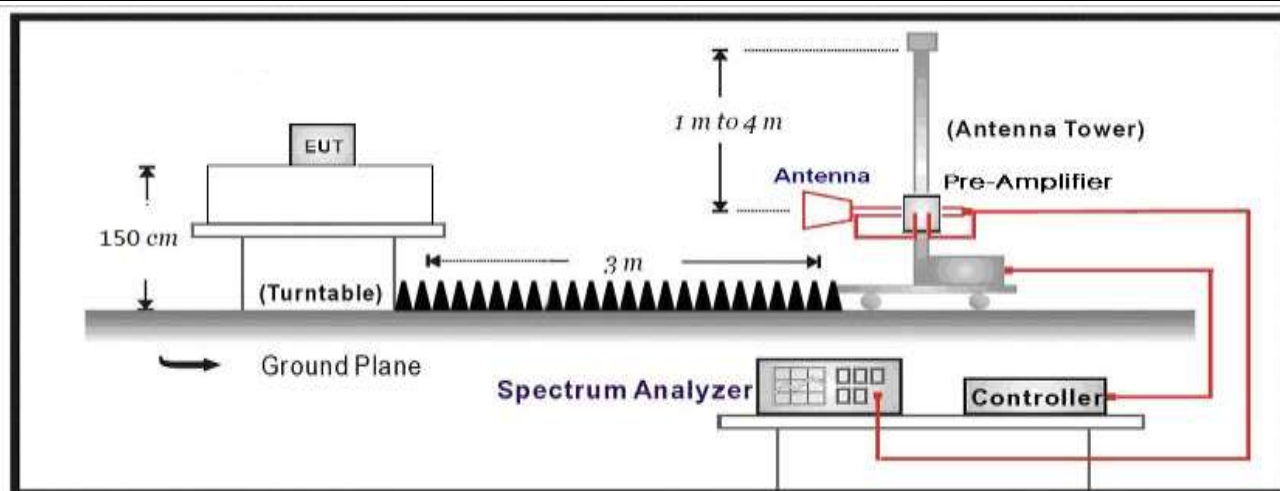
4.10 Radiated Emission Band Edge**VERDICT: PASS****4.10.1 Limit**

Standard		FCC Part 15 Subpart C Paragraph 15.247(d) , 15.209		
Frequency bands (MHz)	Detector	Limit (dB μ V/m)	RBW (MHz)	Distance (m)
2310-2390	PK	74	1	3
2483.5-2500	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

Above 1GHz Test Setup:

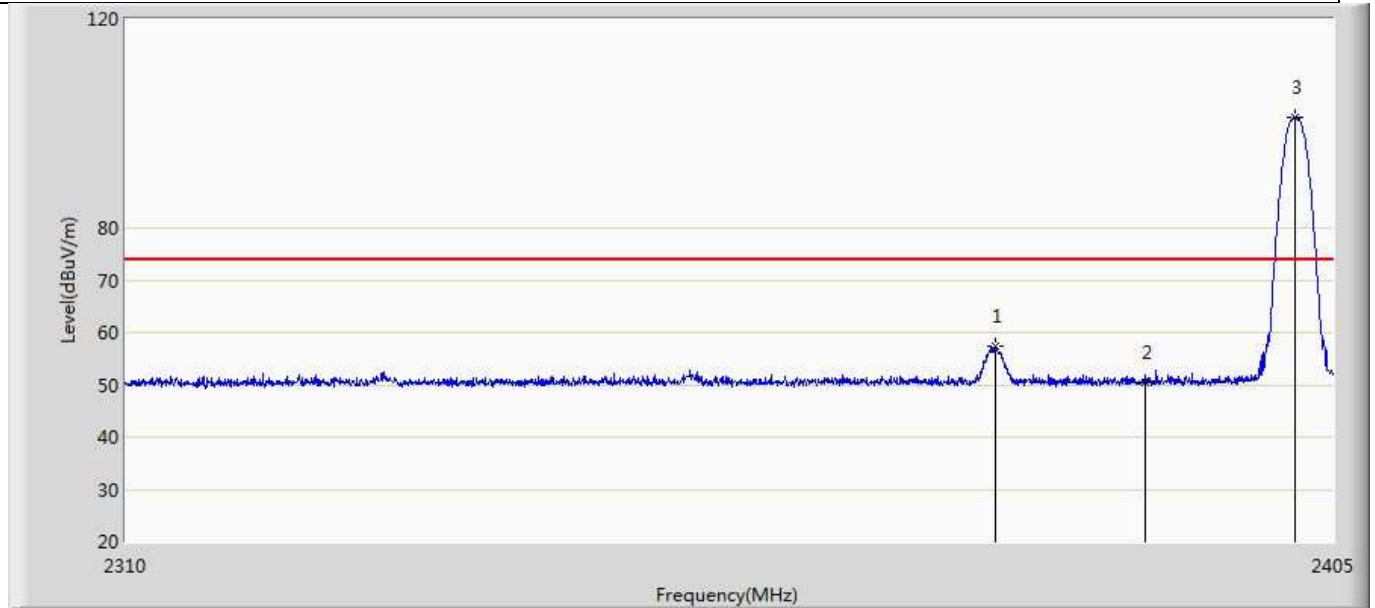
**4.10.3 Test Procedure**

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

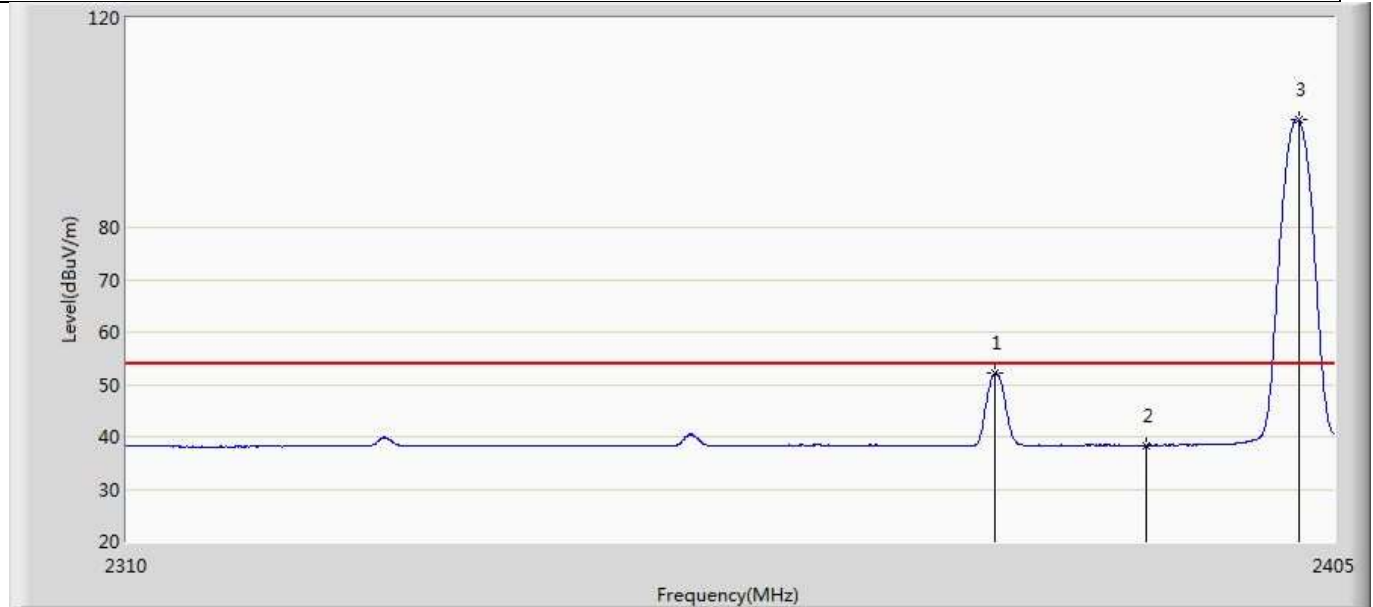
4.10.4 Test Data

Profile: 2050649R	Page No.: 1
Engineer: YULIU	
Site: AC5	Time: 2020/03/12 - 00:39
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: BLE Sensor	Power: DC 12V
Note: Mode 1:Transmit at 2402MHz by DH5	



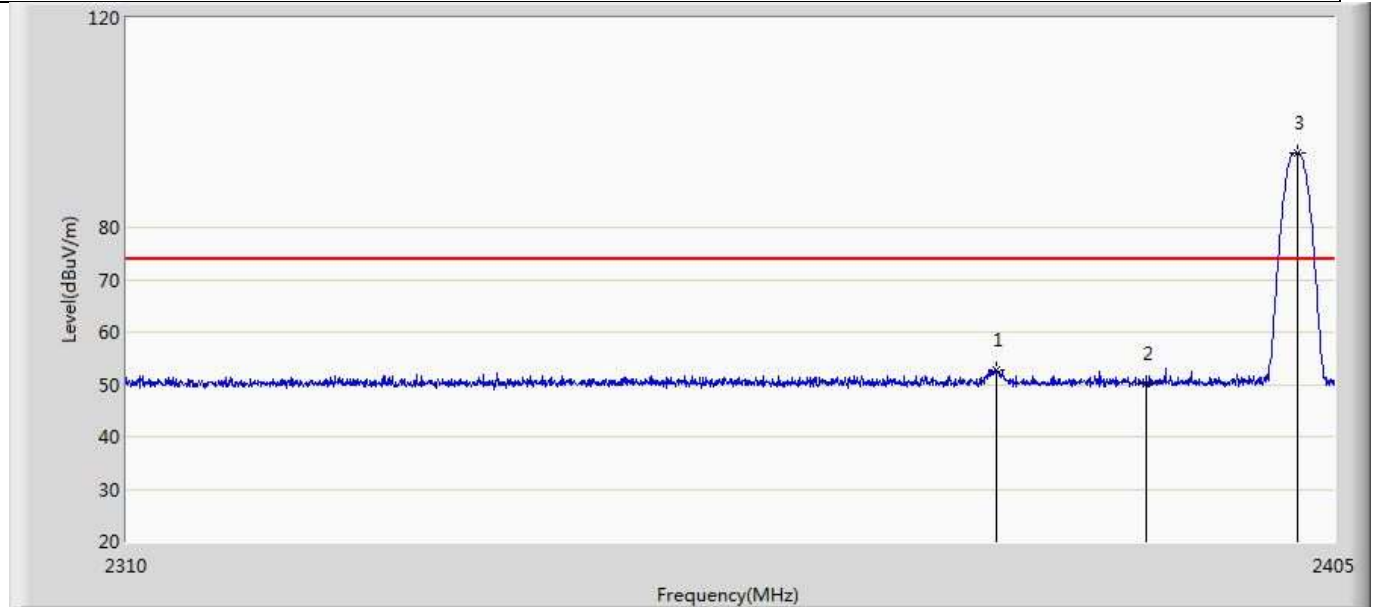
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2378.115	57.261	21.951	-16.739	74.000	35.311	PK
2		2390.000	50.461	15.146	-23.539	74.000	35.315	PK
3	*	2401.913	101.015	65.702	N/A	N/A	35.312	PK

Profile: 2050649R	Page No.: 2
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 10:10
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: BLE Sensor	Power: DC 12V
Note: Mode 1:Transmit at 2402MHz by DH5	



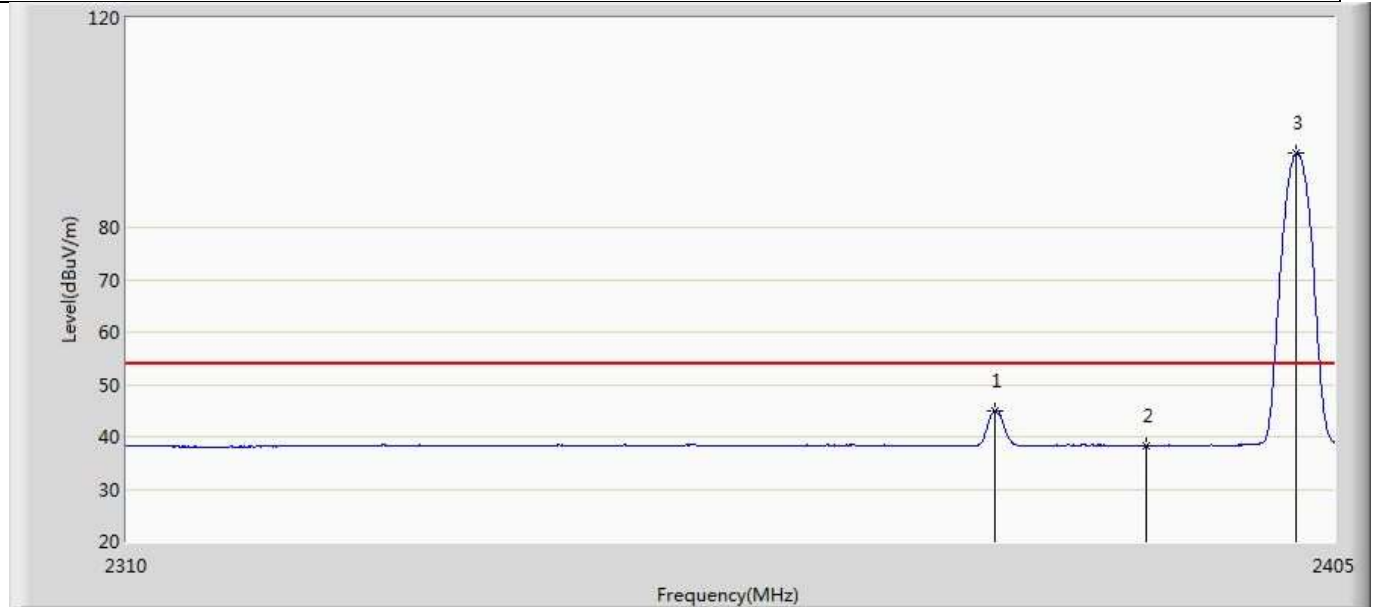
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2377.972	52.094	16.784	-1.906	54.000	35.311	AV
2		2390.000	38.360	3.045	-15.640	54.000	35.315	AV
3	*	2402.198	100.594	65.282	N/A	N/A	35.312	AV

Profile: 2050649R	Page No.: 3
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 10:14
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: BLE Sensor	Power: DC 12V
Note: Mode 1:Transmit at 2402MHz by DH5	



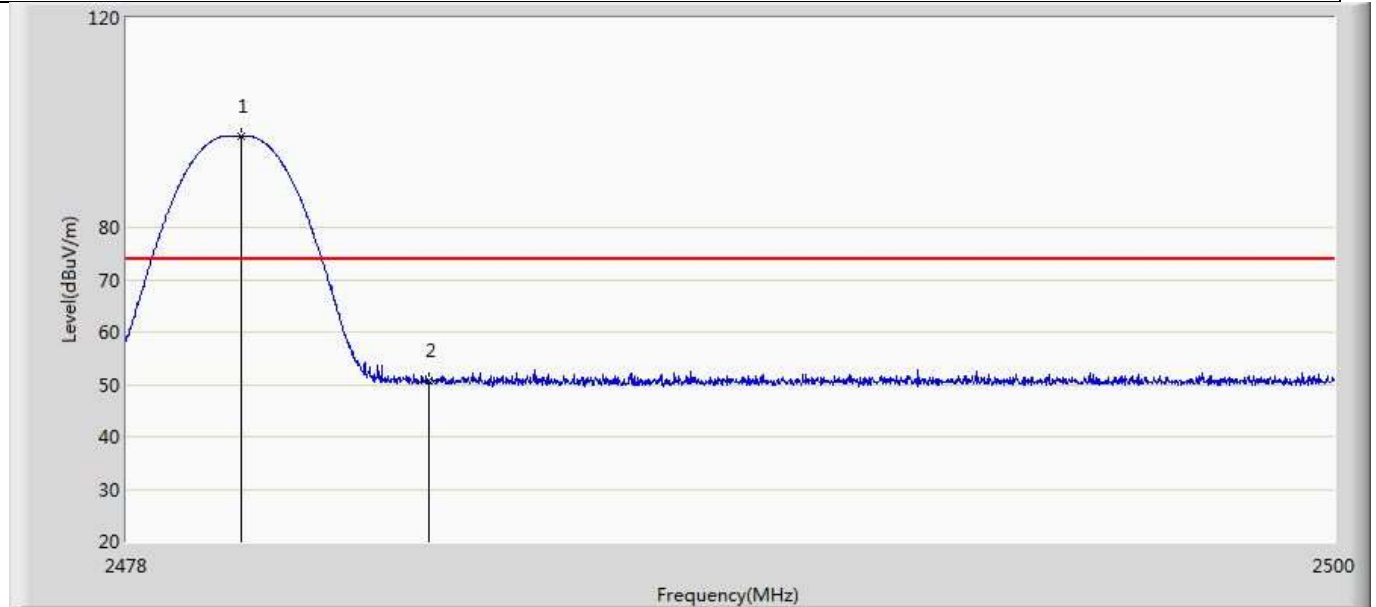
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2378.020	52.816	17.506	-21.184	74.000	35.311	PK
2		2390.000	50.150	14.835	-23.850	74.000	35.315	PK
3	*	2402.055	94.145	58.833	N/A	N/A	35.312	PK

Profile: 2050649R	Page No.: 4
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 10:18
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: BLE Sensor	Power: DC 12V
Note: Mode 1:Transmit at 2402MHz by DH5	



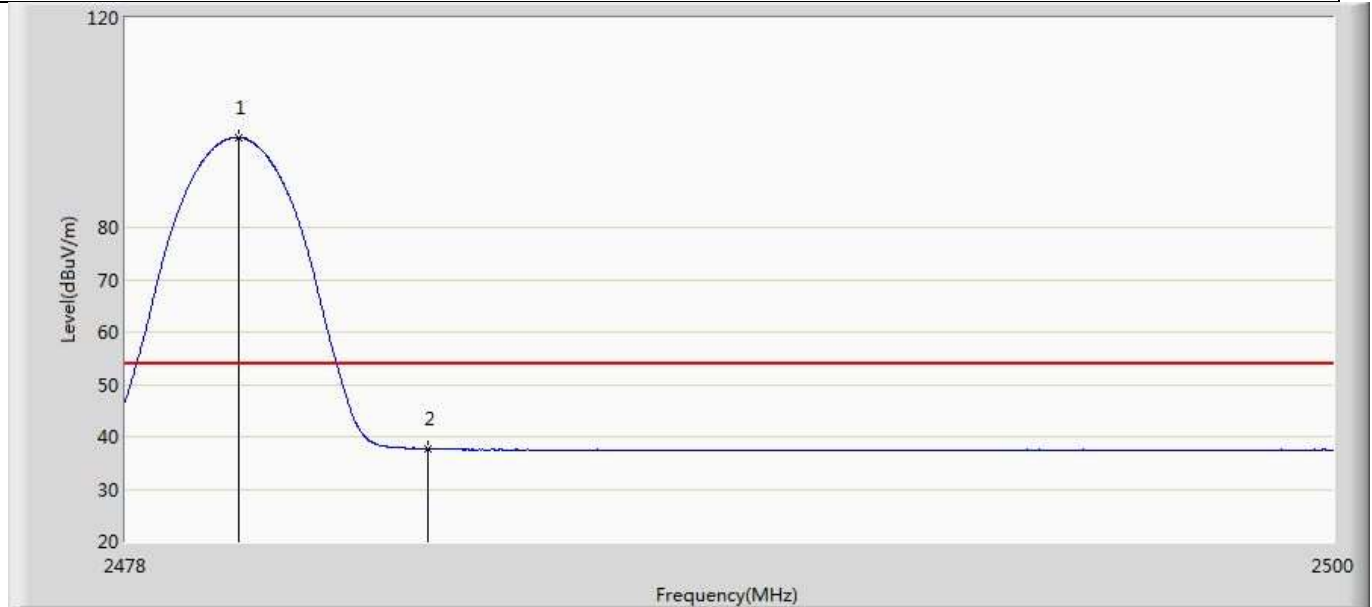
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2377.972	45.063	9.753	-8.937	54.000	35.311	AV
2		2390.000	38.375	3.060	-15.625	54.000	35.315	AV
3	*	2402.008	94.130	58.818	N/A	N/A	35.312	AV

Profile: 2050649R	Page No.: 5
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 10:20
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: BLE Sensor	Power: DC 12V
Note: Mode 1:Transmit at 2480MHz by DH5	



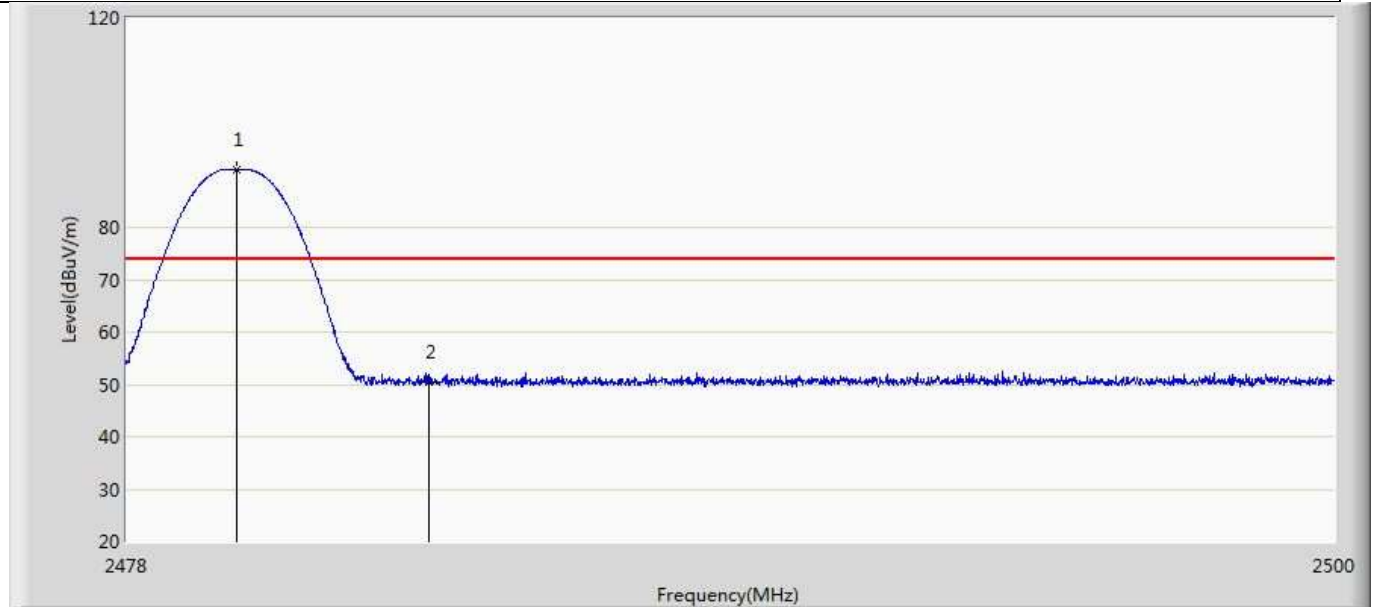
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.079	97.442	62.143	N/A	N/A	35.299	PK
2		2483.500	50.603	15.305	-23.397	74.000	35.297	PK

Profile: 2050649R	Page No.: 6
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 10:30
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: BLE Sensor	Power: DC 12V
Note: Mode 1:Transmit at 2480MHz by DH5	



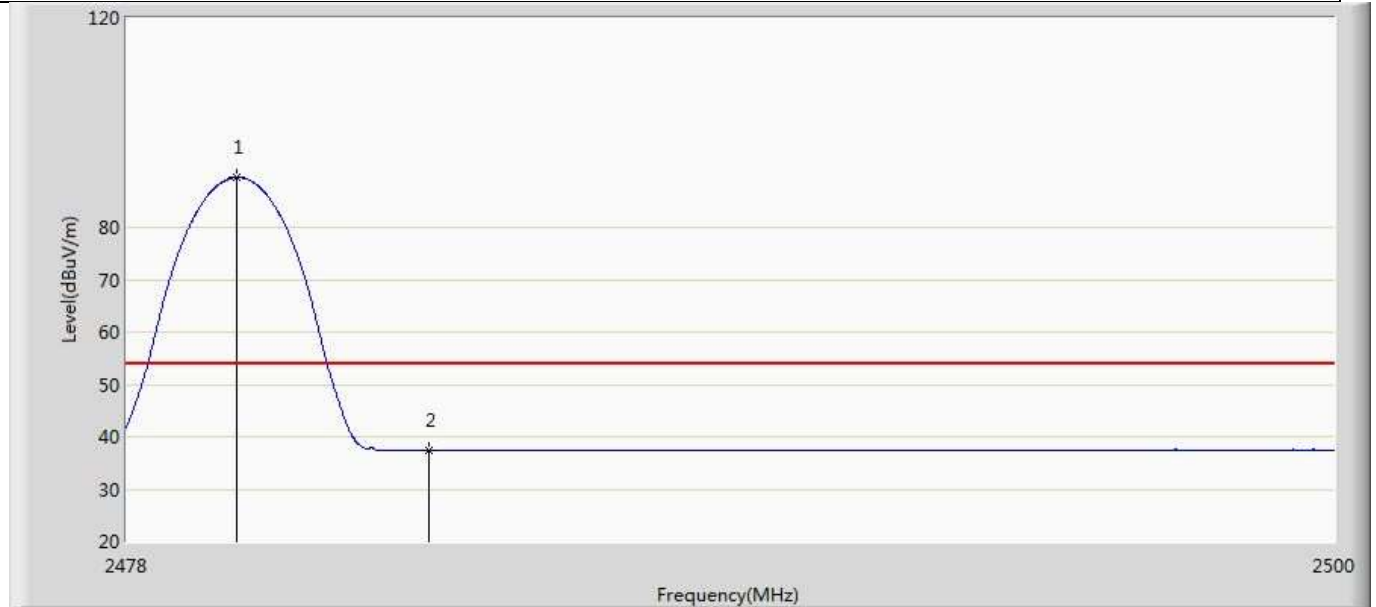
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.046	97.156	61.857	N/A	N/A	35.299	AV
2		2483.500	37.674	2.376	-16.326	54.000	35.297	AV

Profile: 2050649R	Page No.: 7
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 10:31
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: BLE Sensor	Power: DC 12V
Note: Mode 1:Transmit at 2480MHz by DH5	



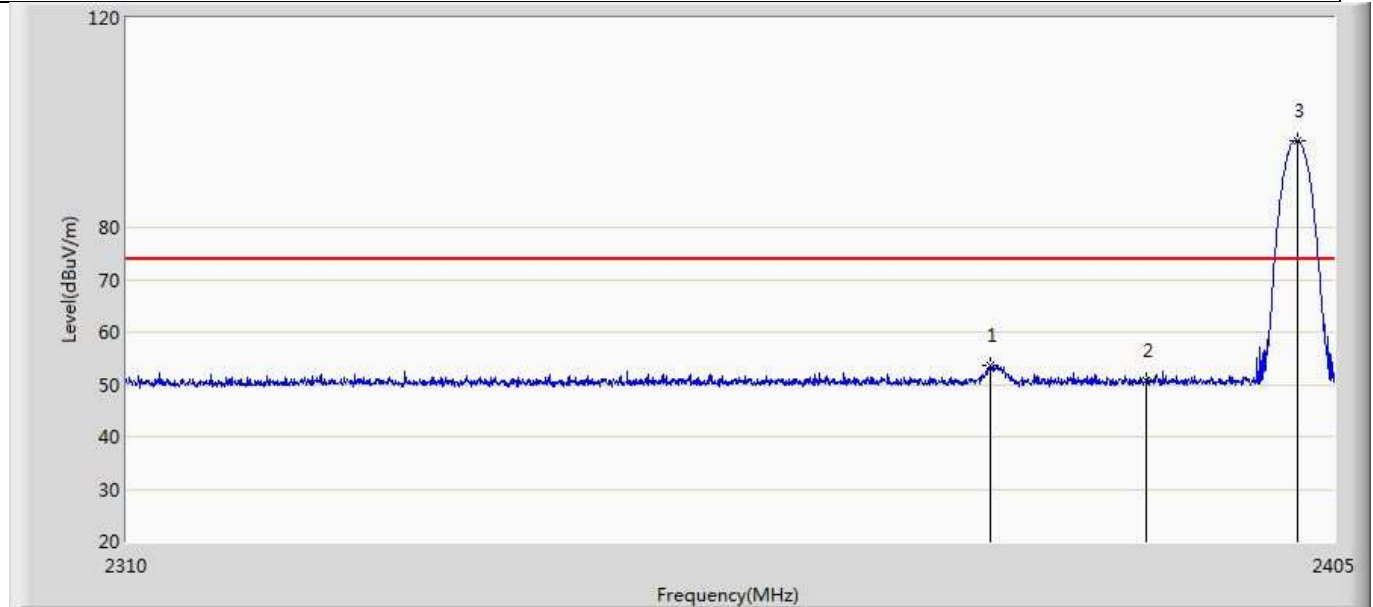
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.013	91.068	55.769	N/A	N/A	35.299	PK
2		2483.500	50.445	15.147	-23.555	74.000	35.297	PK

Profile: 2050649R	Page No.: 8
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 10:34
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: BLE Sensor	Power: DC 12V
Note: Mode 1:Transmit at 2480MHz by DH5	



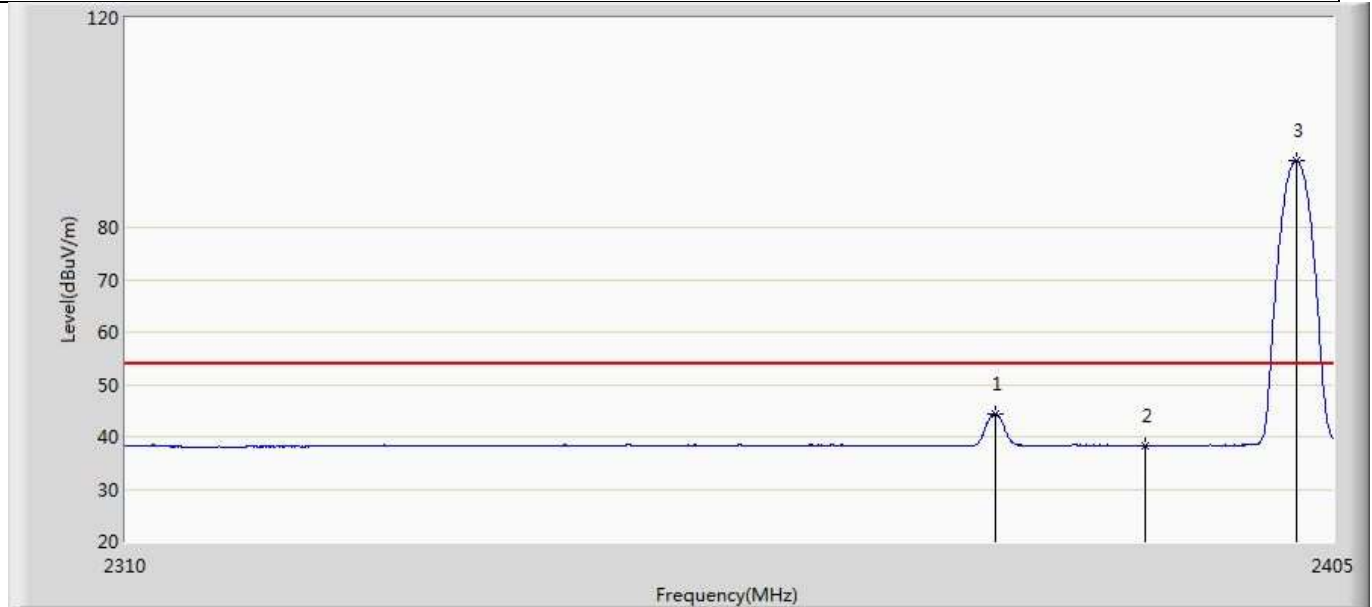
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.013	89.522	54.223	N/A	N/A	35.299	AV
2		2483.500	37.329	2.031	-16.671	54.000	35.297	AV

Profile: 2050649R	Page No.: 9
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 10:42
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: BLE Sensor	Power: DC 12V
Note: Mode 2:Transmit at 2402MHz by 2DH5	



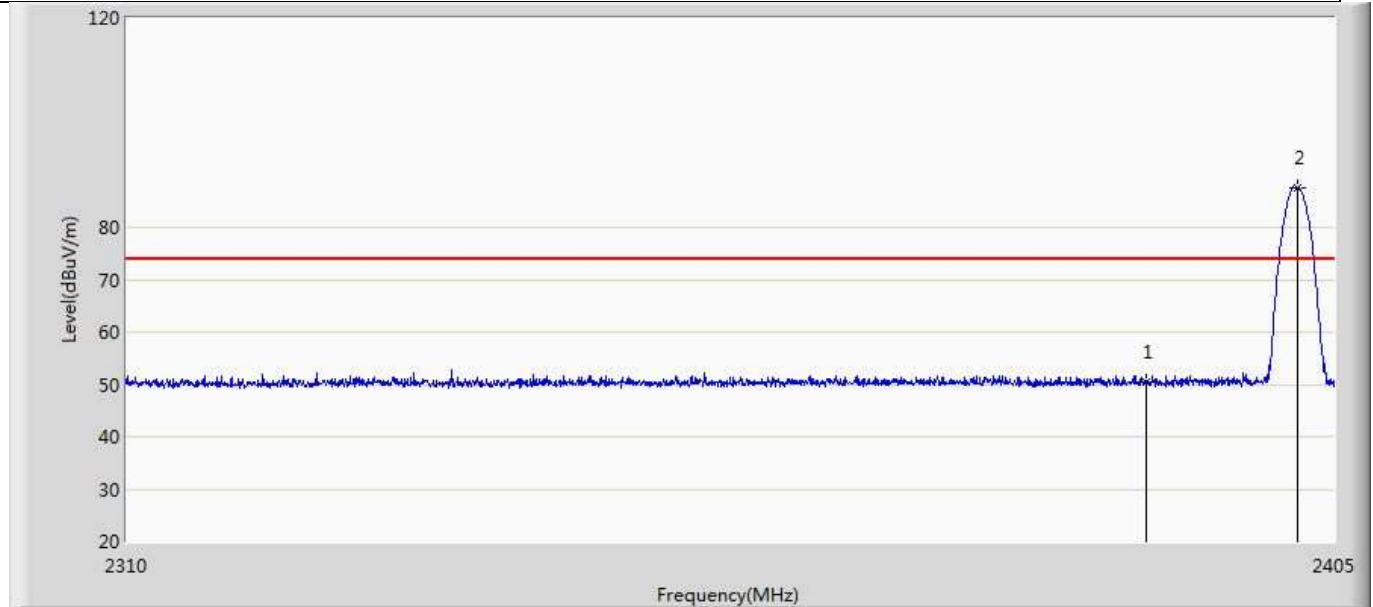
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2377.545	53.744	18.434	-20.256	74.000	35.310	PK
2		2390.000	50.759	15.444	-23.241	74.000	35.315	PK
3	*	2402.055	96.583	61.271	N/A	N/A	35.312	PK

Profile: 2050649R	Page No.: 10
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 10:45
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: BLE Sensor	Power: DC 12V
Note: Mode 2:Transmit at 2402MHz by 2DH5	



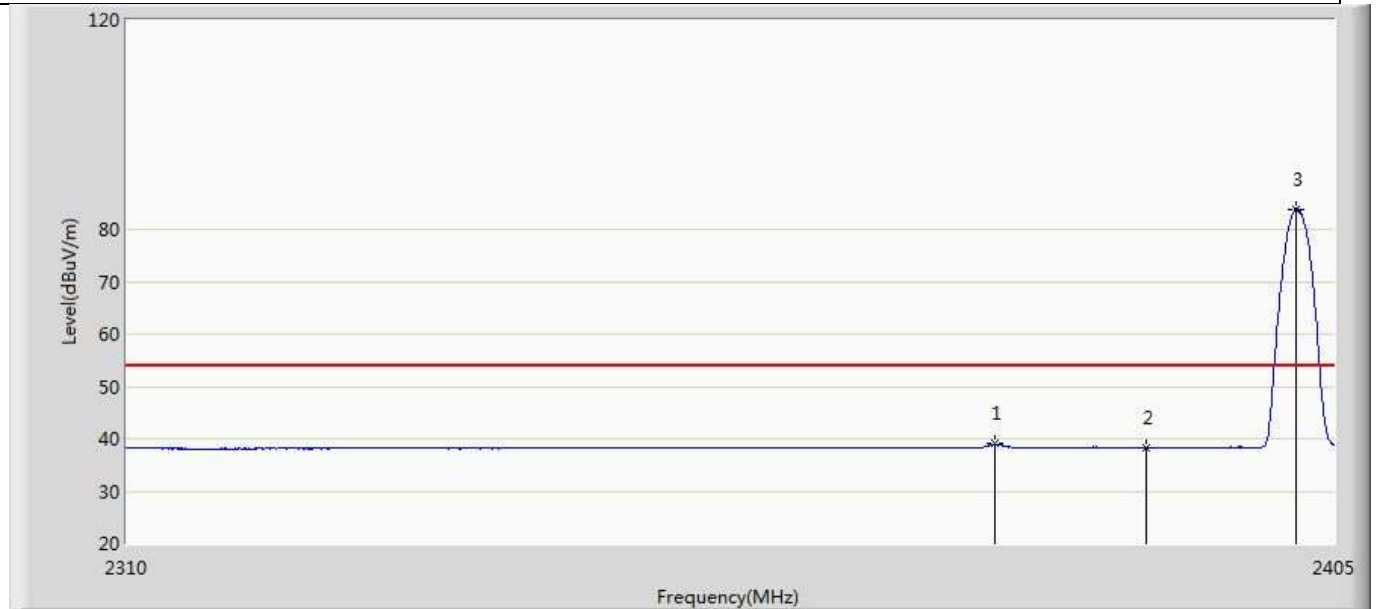
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2378.115	44.385	9.075	-9.615	54.000	35.311	AV
2		2390.000	38.297	2.982	-15.703	54.000	35.315	AV
3	*	2402.055	92.868	57.556	N/A	N/A	35.312	AV

Profile: 2050649R	Page No.: 11
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 10:47
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: BLE Sensor	Power: DC 12V
Note: Mode 2:Transmit at 2402MHz by 2DH5	



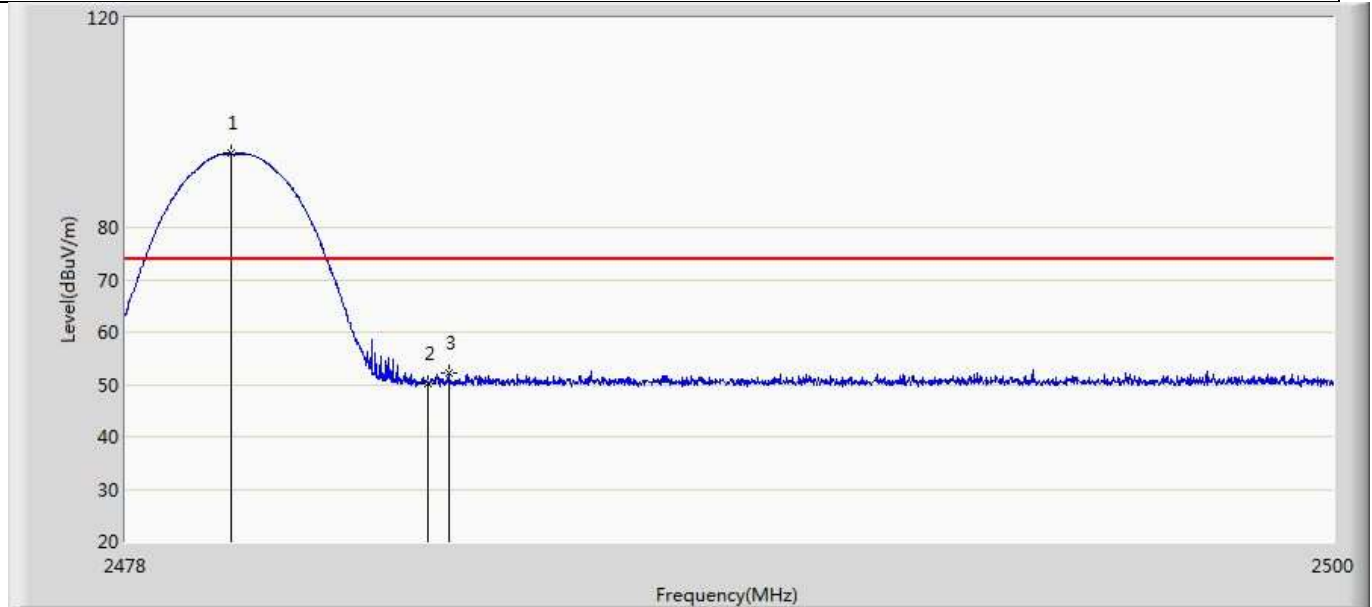
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	50.544	15.229	-23.456	74.000	35.315	PK
2	*	2402.055	87.600	52.288	N/A	N/A	35.312	PK

Profile: 2050649R	Page No.: 12
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 10:50
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: BLE Sensor	Power: DC 12V
Note: Mode 2:Transmit at 2402MHz by 2DH5	



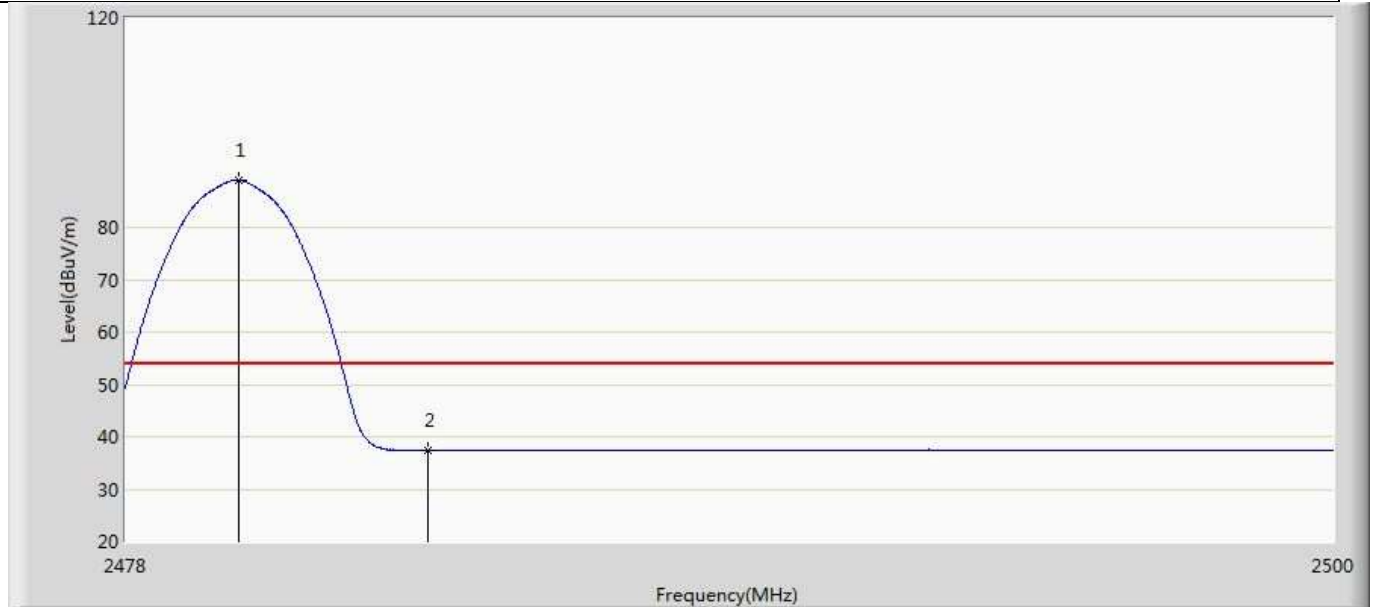
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2377.972	38.995	3.685	-15.005	54.000	35.311	AV
2		2390.000	38.296	2.981	-15.704	54.000	35.315	AV
3	*	2401.960	83.893	48.581	N/A	N/A	35.312	AV

Profile: 2050649R	Page No.: 13
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 10:52
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: BLE Sensor	Power: DC 12V
Note: Mode 2:Transmit at 2480MHz by 2DH5	



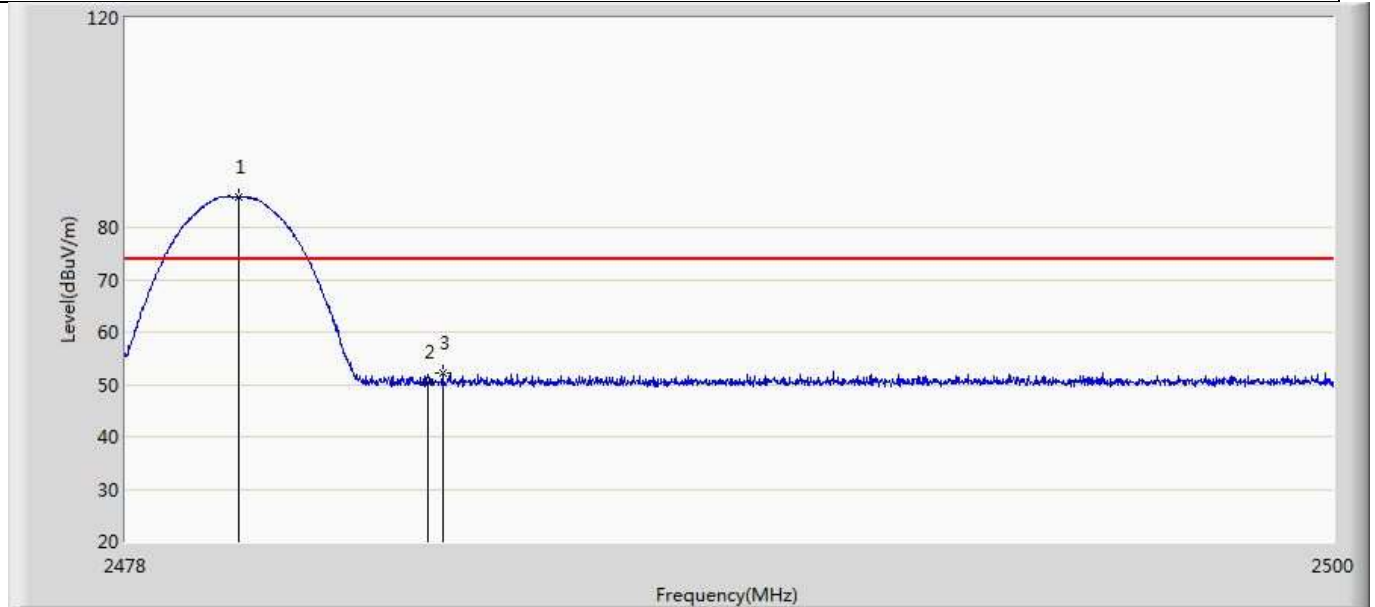
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2479.914	94.078	58.779	N/A	N/A	35.299	PK
2		2483.500	50.272	14.974	-23.728	74.000	35.297	PK
3		2483.874	52.148	16.851	-21.852	74.000	35.297	PK

Profile: 2050649R	Page No.: 14
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 10:55
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: BLE Sensor	Power: DC 12V
Note: Mode 2:Transmit at 2480MHz by 2DH5	



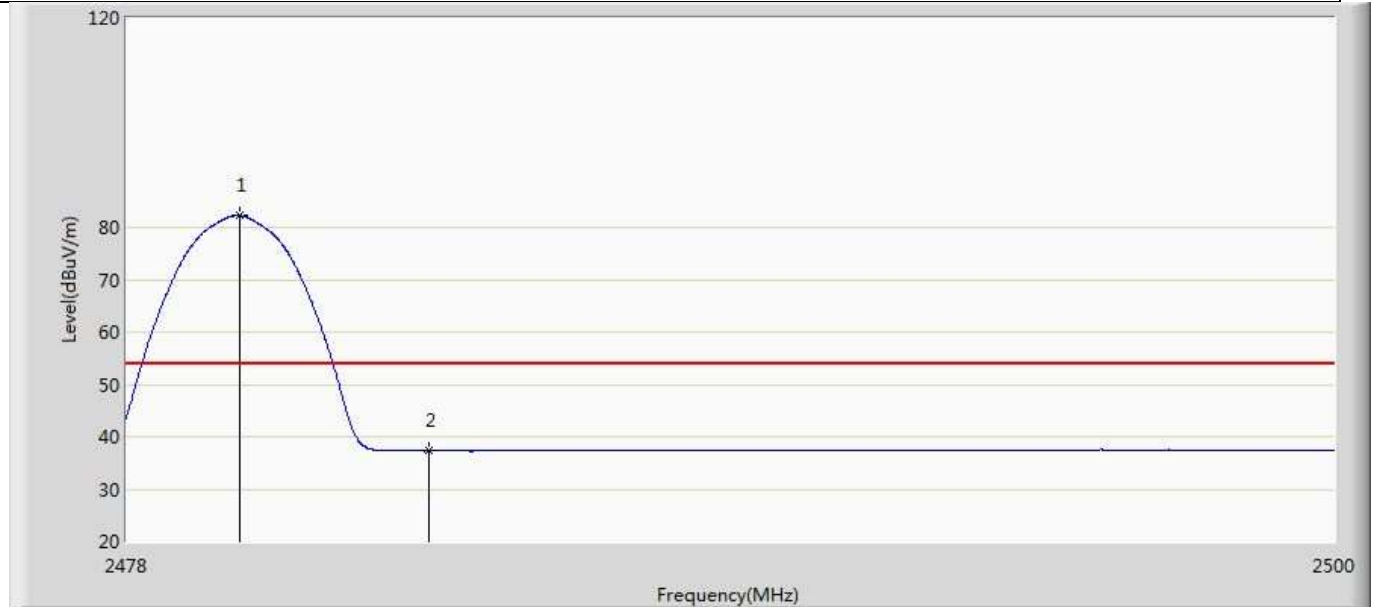
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.046	88.965	53.666	N/A	N/A	35.299	AV
2		2483.500	37.385	2.087	-16.615	54.000	35.297	AV

Profile: 2050649R	Page No.: 15
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 10:57
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: BLE Sensor	Power: DC 12V
Note: Mode 2:Transmit at 2480MHz by 2DH5	



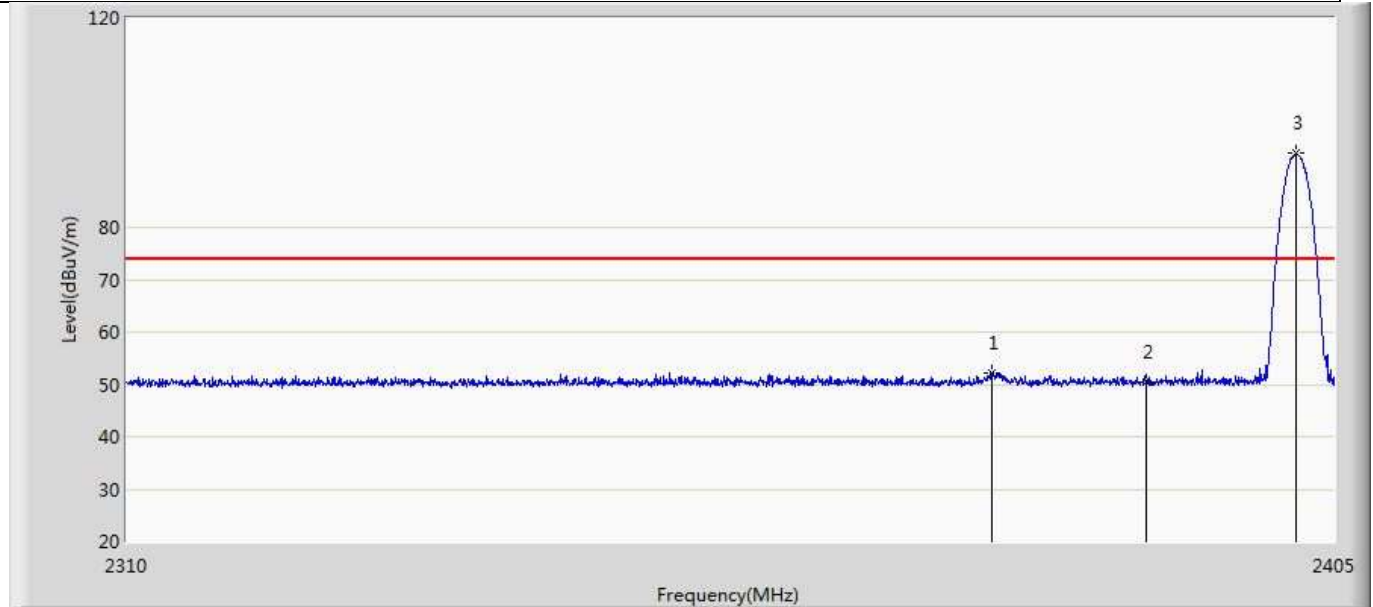
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.046	85.794	50.495	N/A	N/A	35.299	PK
2		2483.500	50.448	15.150	-23.552	74.000	35.297	PK
3		2483.764	52.147	16.850	-21.853	74.000	35.297	PK

Profile: 2050649R	Page No.: 16
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 11:00
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: BLE Sensor	Power: DC 12V
Note: Mode 2:Transmit at 2480MHz by 2DH5	



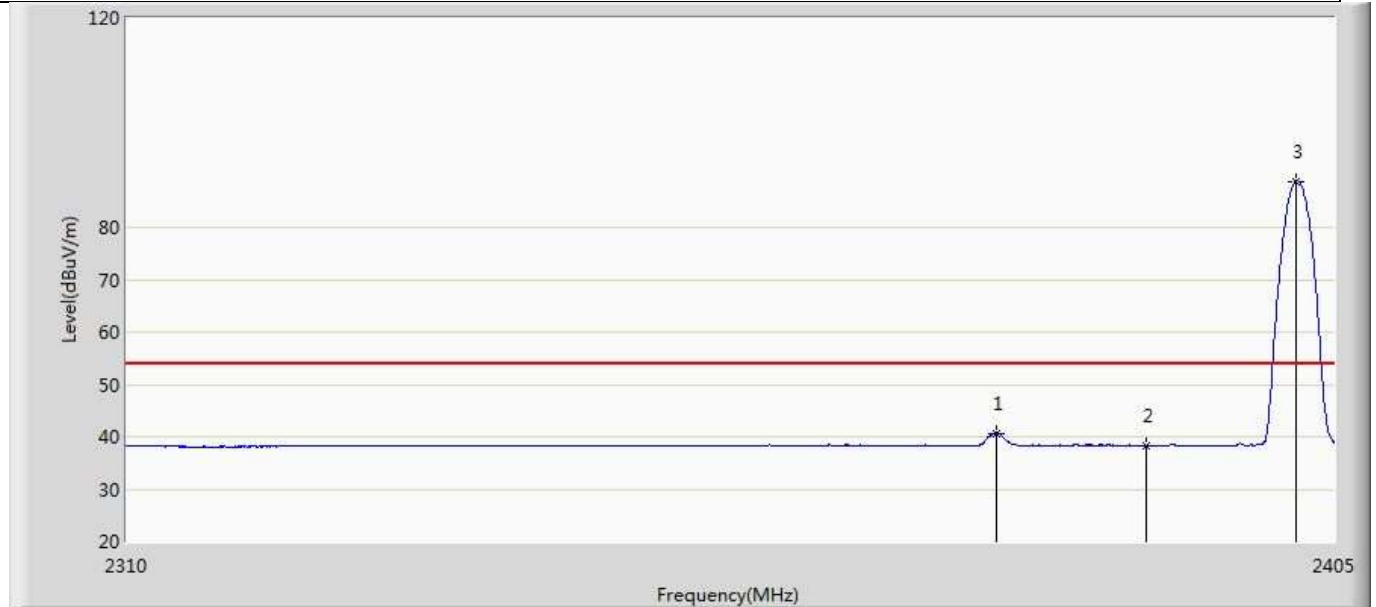
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.046	82.230	46.931	N/A	N/A	35.299	AV
2		2483.500	37.280	1.982	-16.720	54.000	35.297	AV

Profile: 2050649R	Page No.: 17
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 11:01
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: BLE Sensor	Power: DC 12V
Note: Mode 3:Transmit at 2402MHz by 3DH5	



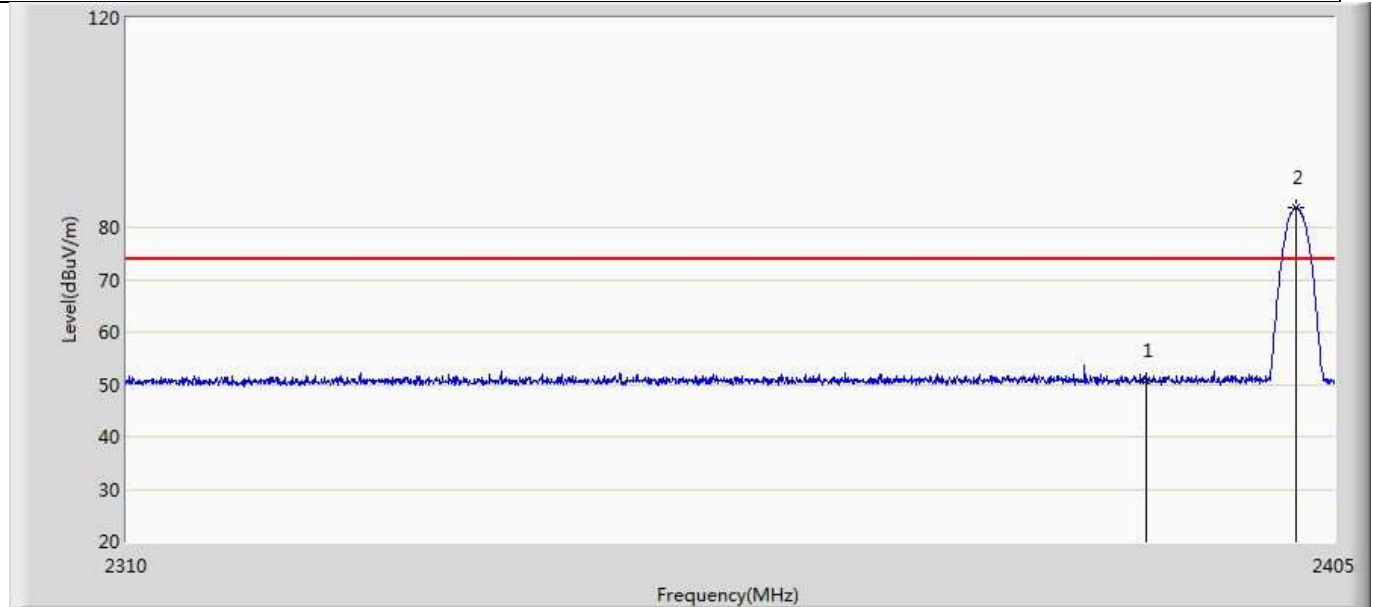
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2377.735	52.299	16.989	-21.701	74.000	35.311	PK
2		2390.000	50.426	15.111	-23.574	74.000	35.315	PK
3	*	2402.008	94.079	58.767	N/A	N/A	35.312	PK

Profile: 2050649R	Page No.: 18
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 11:05
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: BLE Sensor	Power: DC 12V
Note: Mode 3:Transmit at 2402MHz by 3DH5	



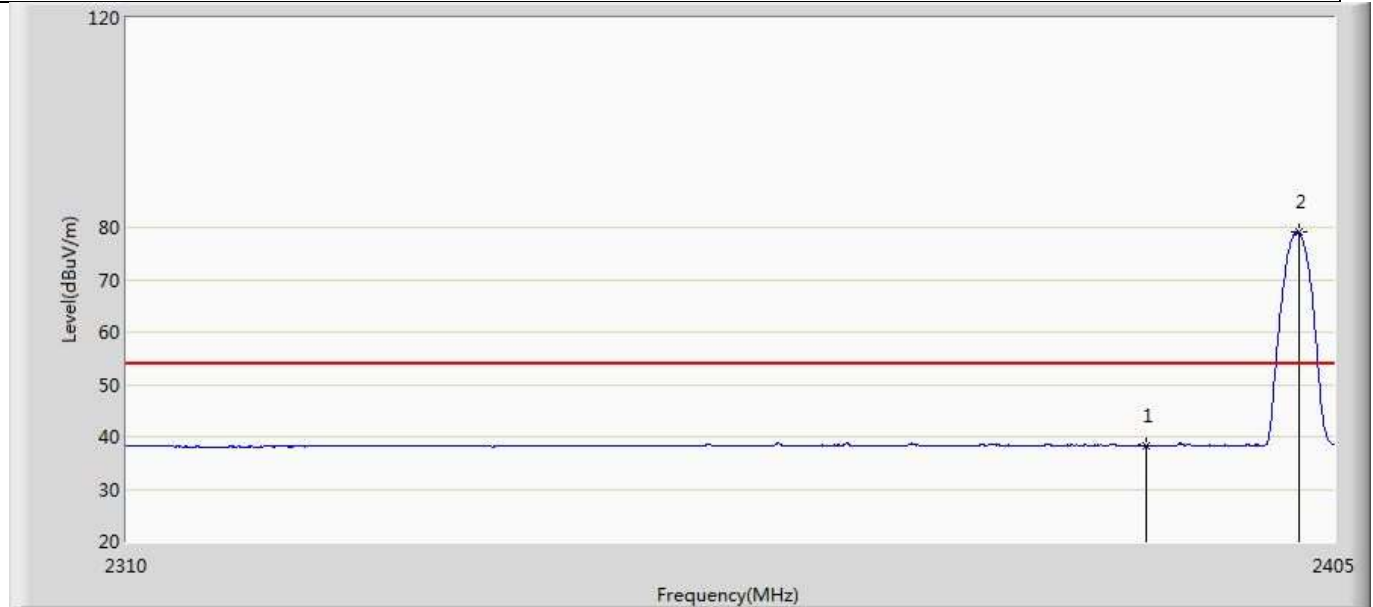
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2378.115	40.704	5.394	-13.296	54.000	35.311	AV
2		2390.000	38.262	2.947	-15.738	54.000	35.315	AV
3	*	2401.960	88.817	53.505	N/A	N/A	35.312	AV

Profile: 2050649R	Page No.: 19
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 11:07
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: BLE Sensor	Power: DC 12V
Note: Mode 3:Transmit at 2402MHz by 3DH5	



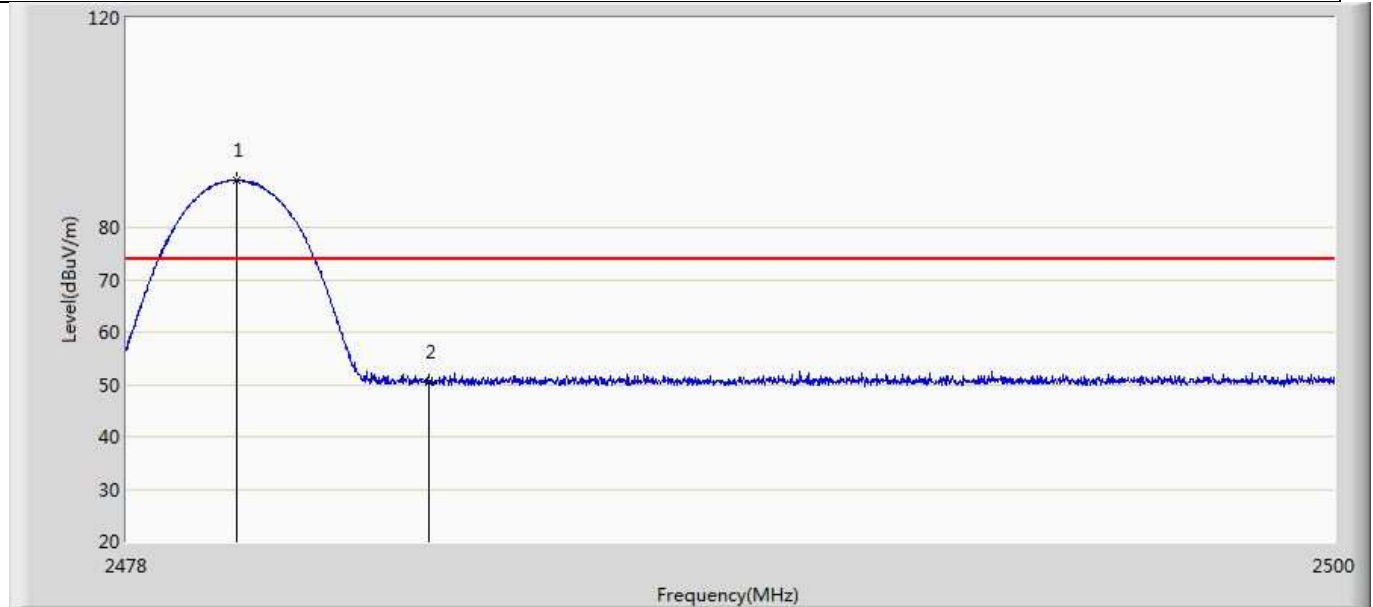
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	50.616	15.301	-23.384	74.000	35.315	PK
2	*	2401.960	83.838	48.526	N/A	N/A	35.312	PK

Profile: 2050649R	Page No.: 20
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 11:11
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: BLE Sensor	Power: DC 12V
Note: Mode 3:Transmit at 2402MHz by 3DH5	



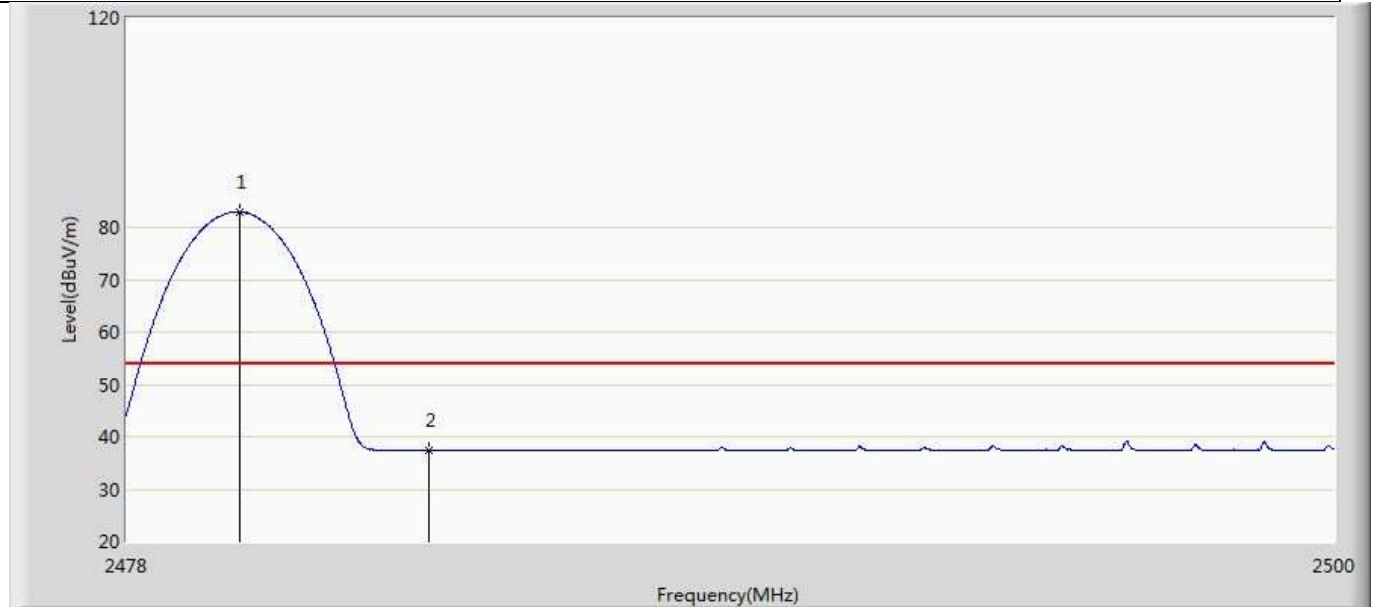
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	38.309	2.994	-15.691	54.000	35.315	AV
2	*	2402.198	78.991	43.679	N/A	N/A	35.312	AV

Profile: 2050649R	Page No.: 21
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 11:13
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: BLE Sensor	Power: DC 12V
Note: Mode 3:Transmit at 2480MHz by 3DH5	



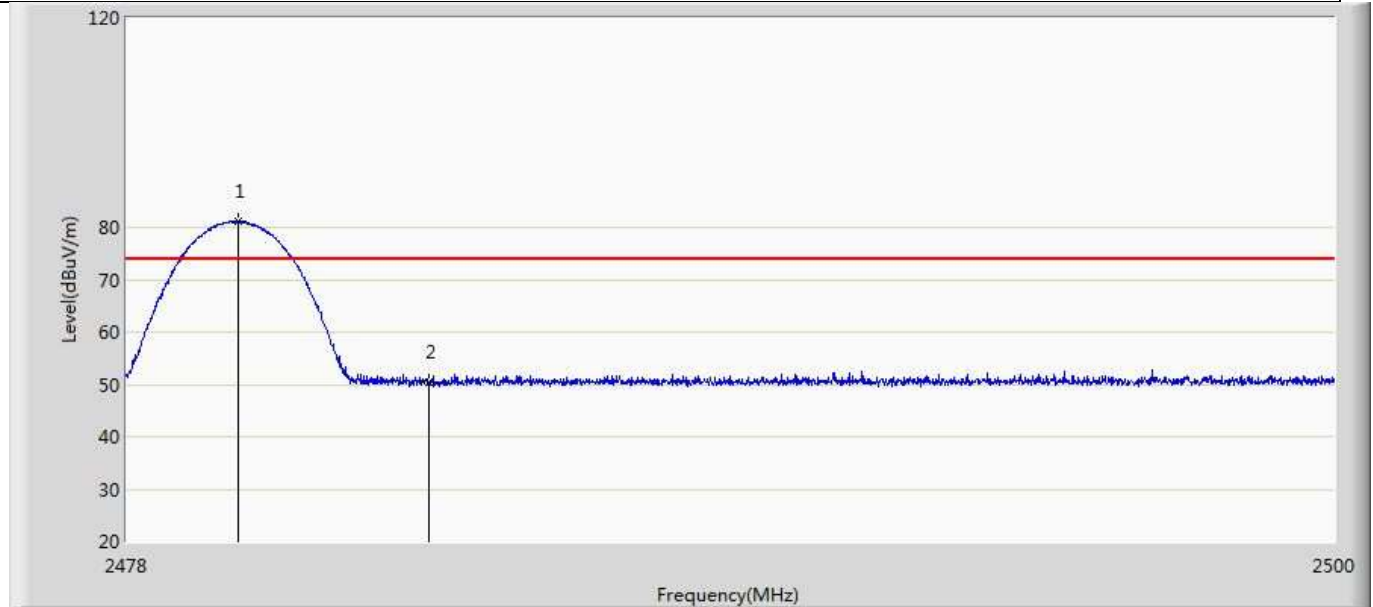
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.002	89.123	53.824	N/A	N/A	35.299	PK
2		2483.500	50.522	15.224	-23.478	74.000	35.297	PK

Profile: 2050649R	Page No.: 22
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 11:16
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: BLE Sensor	Power: DC 12V
Note: Mode 3:Transmit at 2480MHz by 3DH5	



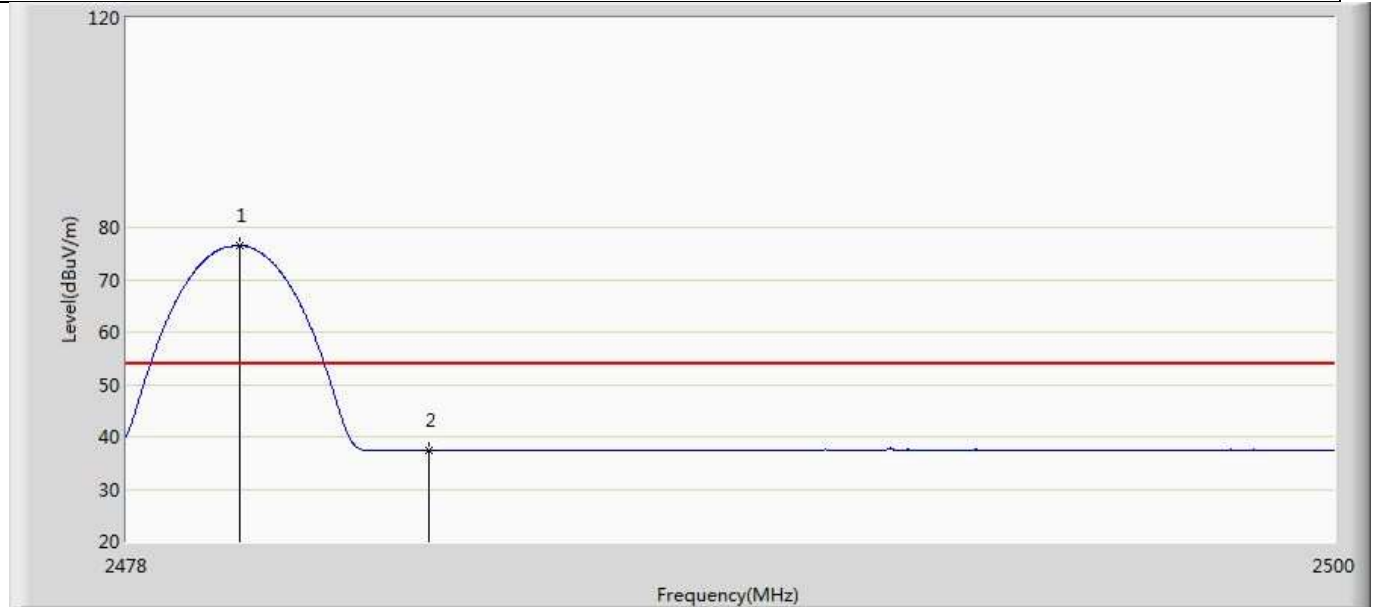
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.046	82.913	47.614	N/A	N/A	35.299	AV
2		2483.500	37.395	2.097	-16.605	54.000	35.297	AV

Profile: 2050649R	Page No.: 23
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 11:18
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: BLE Sensor	Power: DC 12V
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	*	2480.024	81.259	45.960	N/A	N/A	35.299	PK
2		2483.500	50.499	15.201	-23.501	74.000	35.297	PK

Profile: 2050649R	Page No.: 24
Engineer: YULIU	
Site: AC5	Time: 2020/07/05 - 11:21
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: BLE Sensor	Power: DC 12V
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	*	2480.046	76.505	41.206	N/A	N/A	35.299	AV
2		2483.500	37.313	2.015	-16.687	54.000	35.297	AV

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 _____