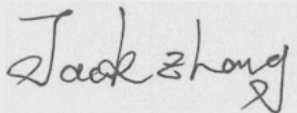


Test report No:
2150819R-RF-US-P06V01

FCC & ISED TEST REPORT

Product Name	LocoTrack Primary
Trademark	LocoTrack Primary
Model and /or type reference	HGD4, HGP4
FCC ID	2AYMO-LTP-H4-1
IC	27269-LTPH41
Applicant's name / address	System Loco Ltd Parkfield, Greaves Park, Lancaster
Test method requested, standard	FCC CFR Title 47 Part 15 Subpart C Section 15.247 ANSI C63.10: 2013 KD558074 D01 15.247 Meas Guidance v05r02 RSS-Gen Issue 5 RSS-247 Issue 2
Verdict Summary	IN COMPLIANCE
Documented by (name / position & signature)	Scott Shen/Project Engineer 
Approved by (name / position & signature)	Jack Zhang/Supervisor 
Date of issue	2021-09-10
Report Version	V1.0
Report template No	Template_FCC 15.247-RF-V1.0

INDEX

	page
General conditions	4
Environmental conditions	4
Possible test case verdicts	5
Abbreviations.....	5
Document History.....	6
Remarks and Comments	6
Used Equipment.....	7
Uncertainty	9
1 General Information	10
1.1 General Description of the Item(s).....	10
1.2 Antenna Information	11
1.3 Channel List.....	12
2 Description of Test Setup.....	13
2.1 Operating mode(s) used for tests	13
2.2 Auxiliary equipment / Test software for the EUT	13
2.3 Test Configuration / Block diagram used for tests.....	14
2.4 Testing process	15
3 Verdict summary section.....	16
3.1 Standards	16
3.2 Deviation(s) from the Standard(s) / Test Specification(s).....	16
3.3 Overview of results	17
3.4 Test Facility.....	18
4 Test Results	19
4.1 AC Power Line Conducted Emission.....	19
4.1.1 Limit	19
4.1.2 Test Setup	19
4.1.3 Test Procedure	19
4.1.4 Test Data	20
The EUT is powered by dc, so this test item is not applicable.	20
4.2 Emissions in restricted frequency bands	21
4.2.1 Limit	21
4.2.2 Test Setup	23
4.2.3 Test Procedure	23
4.2.4 Test Data	24

4.3	Emissions in non-restricted frequency band	52
4.3.1	Limit	52
4.3.2	Test Setup	52
4.3.3	Test Procedure	52
4.3.4	Test Data	53
4.4	Duty cycle	55
4.4.1	Limit	55
4.4.2	Test Setup	55
4.4.3	Test Procedure	55
4.4.4	Test Data	56
4.5	Radiated Emission Band Edge	57
4.5.1	Limit	57
4.5.2	Test Setup	57
4.5.3	Test Procedure	57
4.5.4	Test Data	58
4.6	DTS Bandwidth	90
4.6.1	Limit	90
4.6.2	Test Setup	90
4.6.3	Test Procedure	90
4.6.4	Test Data	91
4.7	Fundamental emission output power	92
4.7.1	Limit	92
4.7.2	Test Setup	92
4.7.3	Test Procedure	93
4.7.4	Test Data	94
4.8	Power Density	95
4.8.1	Limit:	95
4.8.2	Test Setup	95
4.8.3	Test Procedure	95
4.8.4	Test Data	96
4.9	Antenna Requirement	97
4.9.1	Limit:	97
4.9.2	Antenna Connector Construction:	97
5	Test setup photo and EUT Photo	98

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. 25, 2021
Date (start test)	May. 26, 2021
Date (finish test)	Jul. 15, 2021

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

ENVIRONMENTAL CONDITIONS

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

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

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

POSSIBLE TEST CASE VERDICTS

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

ABBREVIATIONS

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

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

DOCUMENT HISTORY

Report No.	Version	Description	Issued Date
2150819R-RF-US-P06V01	V1.0	Initial issue of report.	2021-09-10

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 1.3 Channel List.

USED EQUIPMENT

AC Power Line Conducted Emission / TR1

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMI Test Receiver	R&S	ESCI	100906	2021.04.28	2022.04.27
Two-Line V-Network	R&S	ENV216	101044	2021.03.20	2022.03.19
50ohm Termination	SHX	TF2	7081402	2020.09.23	2021.09.22
50ohm Termination	SHX	TF2	7081403	2020.09.23	2021.09.22
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	N/A	N/A
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2021.07.09	2022.07.08
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	2021.07.11	2022.07.10
EXA Spectrum Analyzer	Keysight	N9010A	MY55370495	2021.03.20	2022.03.19
MXA Signal Analyzer	Keysight	N9020A	MY56060147	2021.07.11	2022.07.10
4TX MIMO Power Sensor	Keysight	X8750A	MY59400102	2021.03.31	2022.03.30
Coaxial Cable	Woken	SFL402	F02-150410-044	2021.01.01	2021.12.31
Temperature/Humidity Meter	RTS	RTS-8S	RF08	2021.07.09	2022.07.08

Radiated Emission(Below 1GHz) / AC3

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMI Test Receiver	R&S	ESCI	100176	2021.08.15	2022.08.14
Loop Antenna	R&S	HFH2-Z2	833799/003	2021.03.04	2022.03.03
TRILOG Broadband Antenna	SCHWARZBECK	VULB 9168	01100	2021.05.20	2022.05.19
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC3-C	2021.03.31	2022.03.30
Temperature/Humidity Meter	RTS	RTS-8S	EMC03	2021.07.09	2022.07.08
Dekra test software	Dekra	-	-	-	-

Radiated Emission(Above 1GHz) / AC5

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EXA Spectrum Analyzer	Keysight	N9010A	MY55370495	2021.03.20	2022.03.19
Amplifier	Keleto	LNPA	SK20190225	2020.09.25	2021.09.24
Preamplifier	EMCI	EMC184045SE	980263	2021.05.22	2022.05.21
DRG Horn Antenna	ETS-Lindgren	3117	00167055	2021.08.23	2022.08.22
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2021.04.19	2022.04.18
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2021.03.31	2022.03.30
Coaxial Cable	ROSENBERGER	LA1-C011- 2000/3000	AC5-40G	2021.03.20	2022.03.19
Temperature/Humidity Meter	RTS	RTS-8S	AC5-TH	2021.07.09	2022.07.08
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 the standard required as below.

Test item	Uncertainty
AC Power Line Conducted Emission	9kHz~150kHz: 2.80dB 150kHz~30MHz: 2.40dB
Peak Power Output	± 1.27 dB
Radiated Emission(30MHz~1GHz)	Horizontal: 30MHz~200MHz: 3.50 dB 300MHz~1GHz: 3.60 dB Vertical: 30MHz~200MHz: 3.60 dB 300MHz~1GHz: 3.50 dB
Radiated Emission(1GHz~26.5GHz)	Horizontal: 1GHz~18GHz: 5.00 dB Vertical: 1GHz~18GHz: 4.80 dB
RF antenna conducted test	± 1.27 dB
Radiated Emission Band Edge	± 3.9 dB
DTS Bandwidth	± 150 Hz
Occupied Bandwidth	± 1 kHz
Power Density	± 1.27 dB

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Product Name/PMN	LocoTrack Primary
Model No./HVIN	HGD4, HGP4
FCC ID	2AYMO-LTP-H4-1
IC	27269-LTPH41
Manufacturer	Qisda Corp
Manufacturer Address	169 Zhujiang Road, New District, Suzhou
Model Difference	The two models have the same PCBA, the difference between the 2 model is that the HGD4 have a 4 AA battery pack connected, the HGP4 have an 8 AA battery pack connected, and associated housings
EUT identification	2150819R-1 is used for radiated test items 2150819R-2 is used for conducted test items

Note: Model HGD4 is chosen to perform test.

Wireless specification	Bluetooth 5.0					
Operating frequency range(s)	2400~2483.5MHz					
Type of Modulation	GFSK					
PHYs	☒	LE 1M	☒	LE 2M	☒	LE Coded S=2/8
Data Rate	☒	1Mbit/s	☒	2Mbit/s	☒	500/125 Kbit/s
Number of channel	40					

Rated power supply	Voltage and Frequency					
	☐	AC: 220 – 240 V, 50 Hz				
	☐	AC: 220 – 240 Vac, 50/60 Hz				
	☒	6 Vdc by battery				
	☐	Battery:				

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
			☐	Others.....
Antenna Gain	3.62 dBi			

1.3 Channel List

Bluetooth Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz	03	2408 MHz
04	2410 MHz	05	2412 MHz	06	2414 MHz	07	2416 MHz
08	2418 MHz	09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz	15	2432 MHz
16	2434 MHz	17	2436 MHz	18	2438 MHz	19	2440 MHz
20	2442 MHz	21	2444 MHz	22	2446 MHz	23	2448 MHz
24	2450 MHz	25	2452 MHz	26	2454 MHz	27	2456 MHz
28	2458 MHz	29	2460 MHz	30	2462 MHz	31	2464 MHz
32	2466 MHz	33	2468 MHz	34	2470 MHz	35	2472 MHz
36	2474 MHz	37	2476 MHz	38	2478 MHz	39	2480 MHz

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.

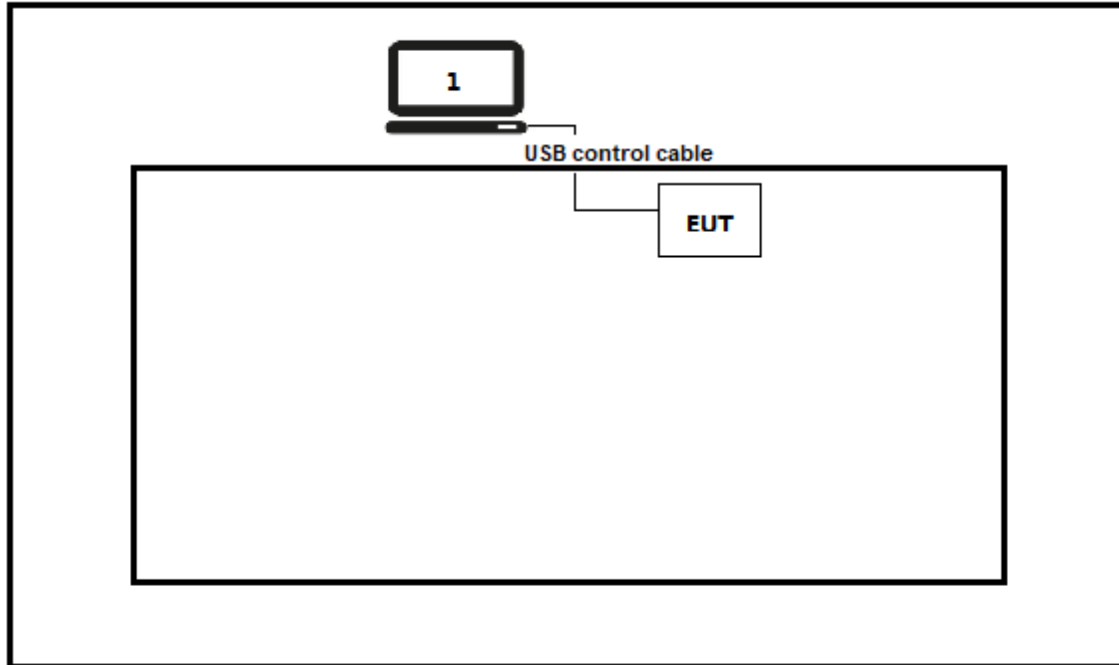
Test Mode For Bluetooth	Mode1: Transmit by LE_1Mbps
	Mode2: Transmit by LE_2Mbps
	Mode3: Transmit by LE_Coded S=2
	Mode4: Transmit by LE_Coded S=8

2.2 Auxiliary equipment / Test software for the EUT

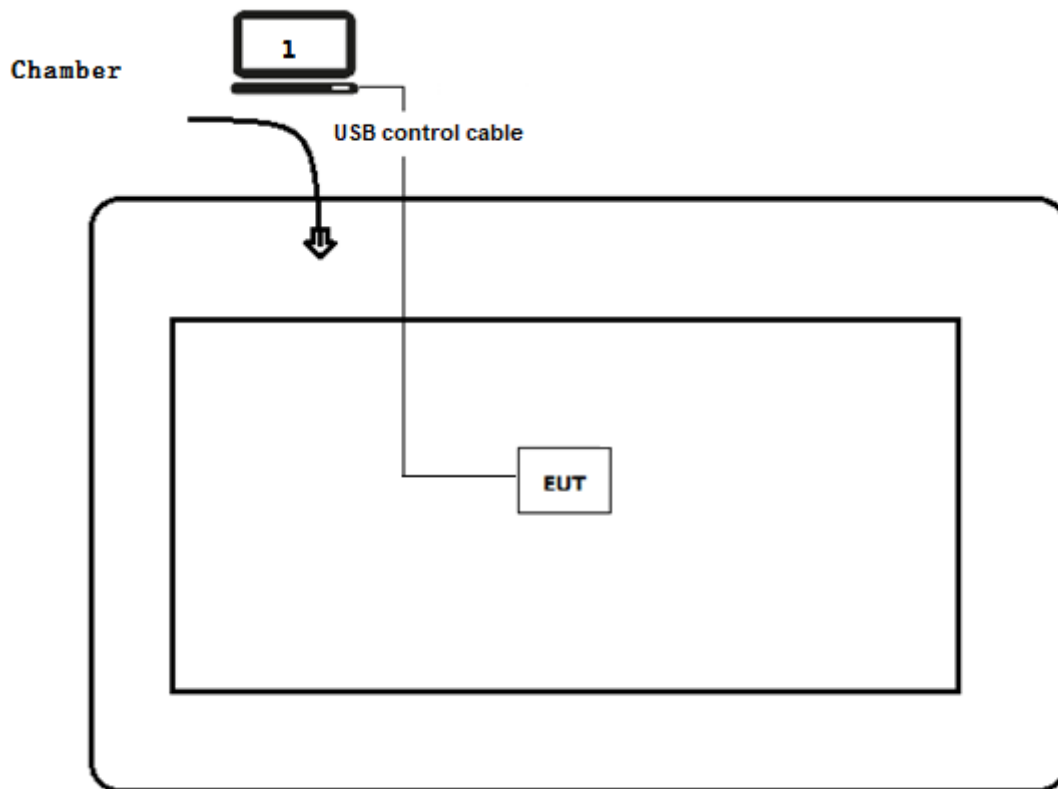
Auxiliary equipment	Type / Version	Manufacturer	Supplied by
Notebook	Think pad L440	Lenovo	Adapter
Software	Type / Version	Manufacturer	Supplied by
Putty	N/A	N/A	N/A

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 test software on the notebook.
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	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

Requirement – Test case	Basic standard(s)	Verdict	Remark
AC Power Line Conducted Emission	FCC 15.207	PASS	---
Emissions in restricted frequency bands	FCC 15.247(b)(3)	PASS	---
Duty cycle	ANSI C63.10:2013	PASS	---
Emissions in non-restricted frequency bands	FCC 15.247(d), FCC 15.209	PASS	---
Radiated Emission Band Edge	FCC 15.247(d)	PASS	---
Fundamental emission output power	FCC 15.247(d), FCC 15.209	PASS	---
DTS Bandwidth	FCC 15.247(a)(2)	PASS	---
Power Spectral Density	FCC 15.247(e)	PASS	---
Antenna Requirement	FCC 15.203	PASS	---

For ISED

Requirement – Test case	Basic standard(s)	Verdict	Remark
AC Power Line Conducted Emission	RSS-Gen Issue 5 Section 8.8	PASS	---
Emissions in restricted frequency bands	RSS-Gen Issue 5 Section 8.9	PASS	---
Duty cycle	ANSI C63.10:2013	PASS	---
Emissions in non-restricted frequency bands	RSS-247 Issue 2 Section 5.5	PASS	---
Radiated Emission Band Edge	RSS-Gen Issue 5 Section 8.10	PASS	---
Fundamental emission output power	RSS-247 Issue 2 Section 5.4(d)	PASS	---
DTS Bandwidth	RSS-Gen Issue 5 Section 6.7	PASS	---
Power Spectral Density	RSS-247 Issue 2 Section 5.2(b)	PASS	---
Antenna Requirement	RSS-Gen Issue 5 Section 6.8	PASS	---

3.4 Test Facility

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

4 TEST RESULTS

4.1 AC Power Line 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

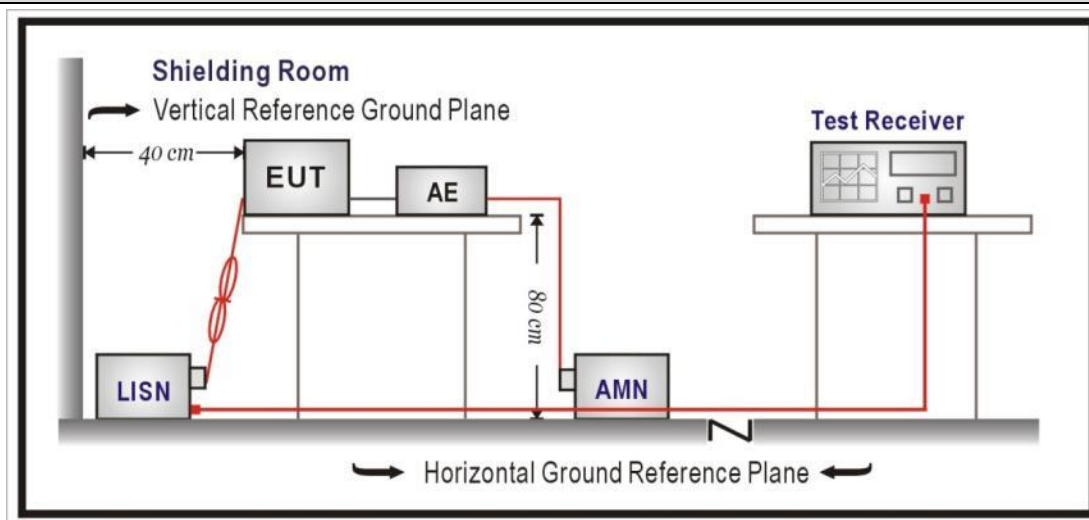
¹⁾ At the transition frequency, the lower limit applies.

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 EUT is powered by dc, so this test item is not applicable.

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 IC

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	
8.81425 - 8.81475	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 ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	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)

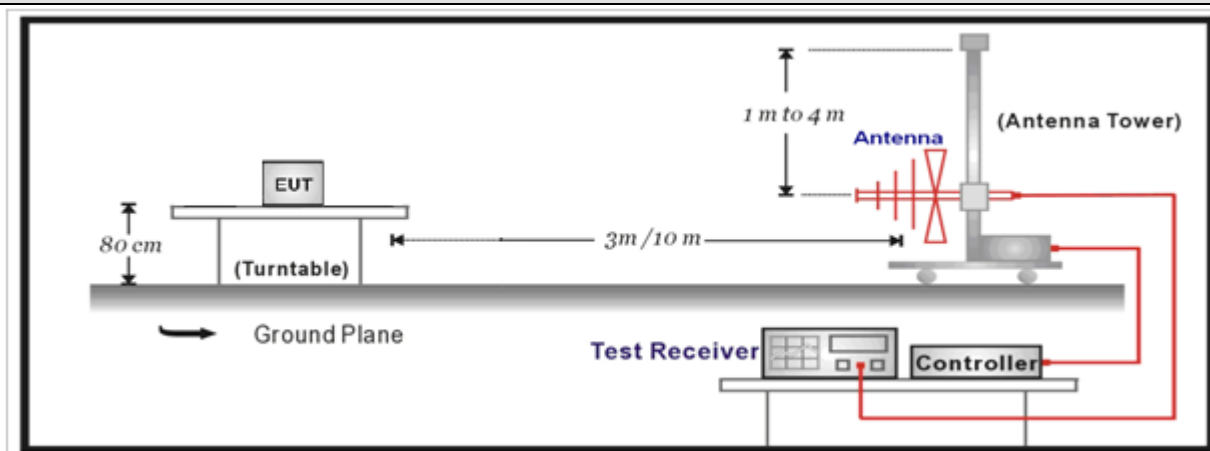
Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed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

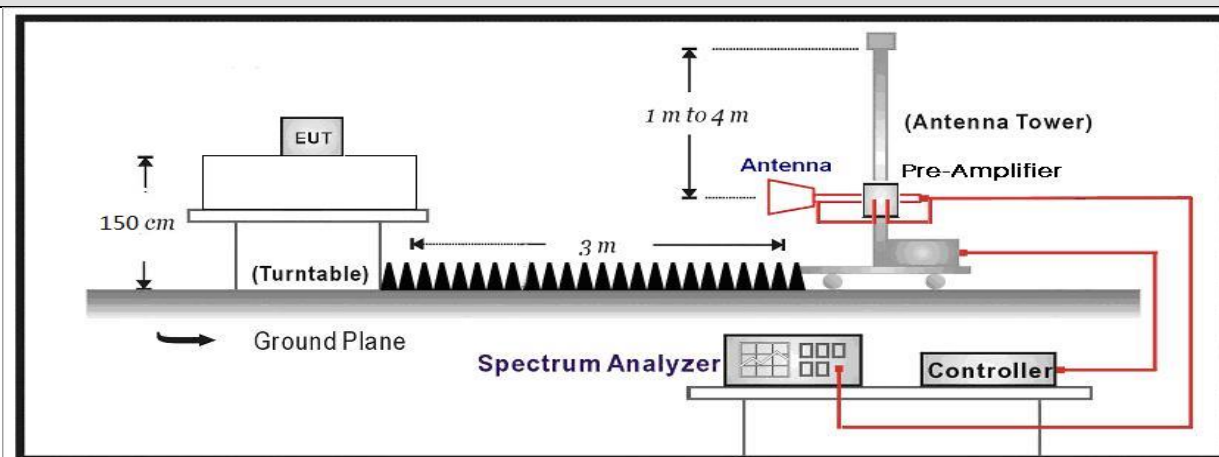
Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified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

30MHz-1GHz Test Setup:



Above 1GHz Test Setup:

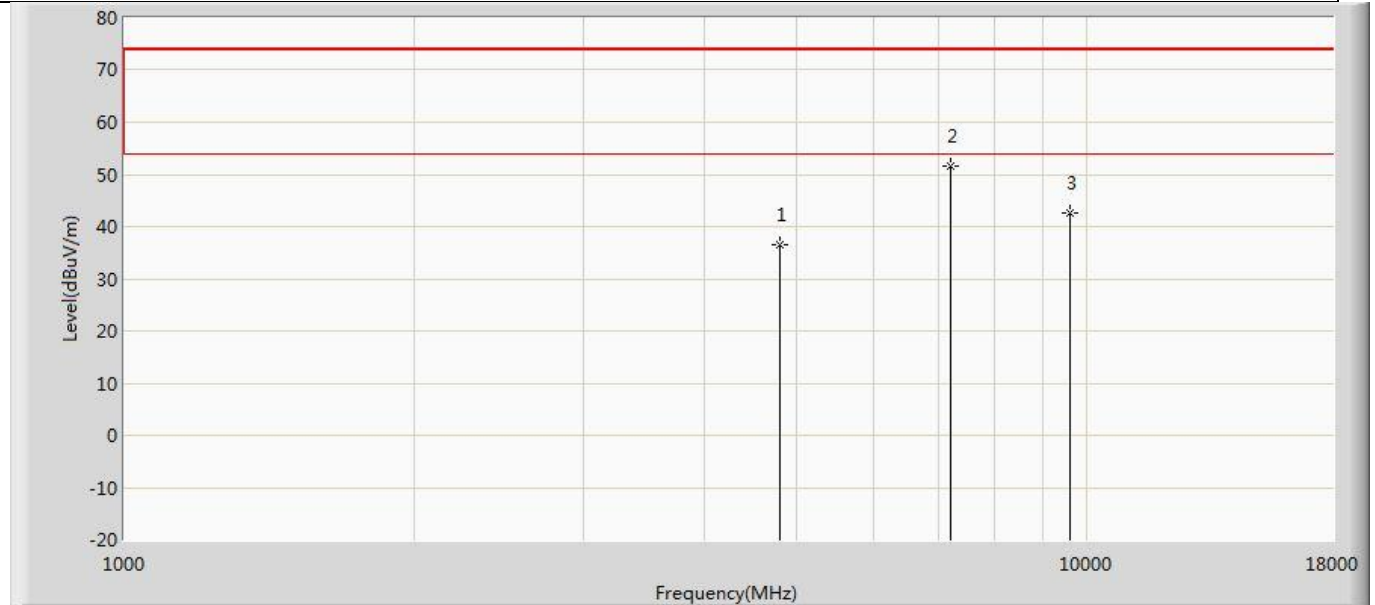


4.2.3 Test Procedure

	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

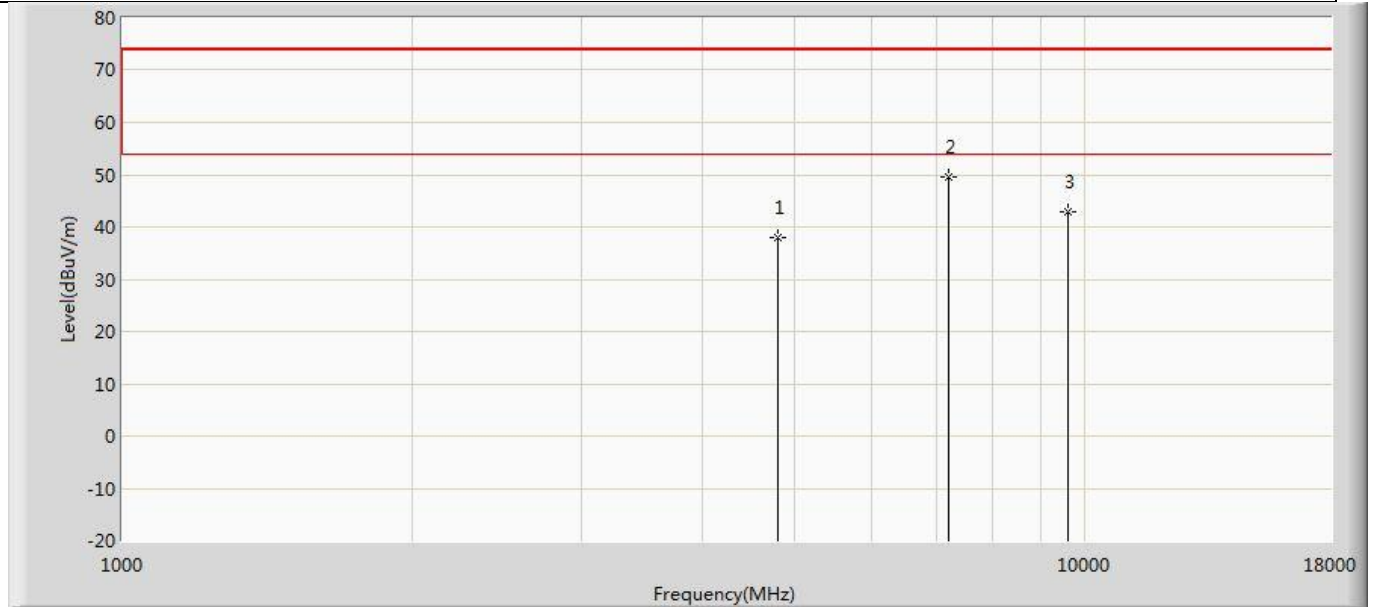
4.2.4 Test Data

Profile: 2150819R	Page No.: 25
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1:Transmit at 2402MHz by LE_1Mbps	



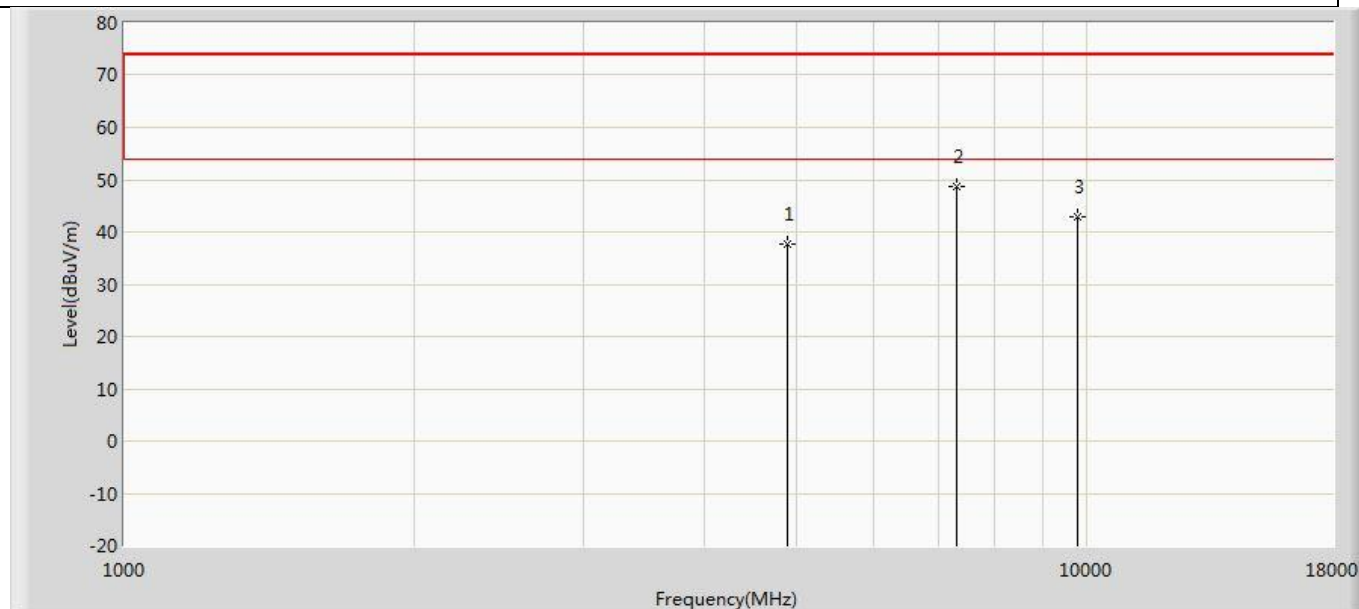
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	36.581	43.777	-37.419	74.000	-7.197	PK
2	*	7205.000	51.630	54.345	-22.370	74.000	-2.715	PK
3		9608.000	42.576	41.990	-31.424	74.000	0.585	PK

Profile: 2150819R	Page No.: 26
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1:Transmit at 2402MHz by LE_1Mbps	



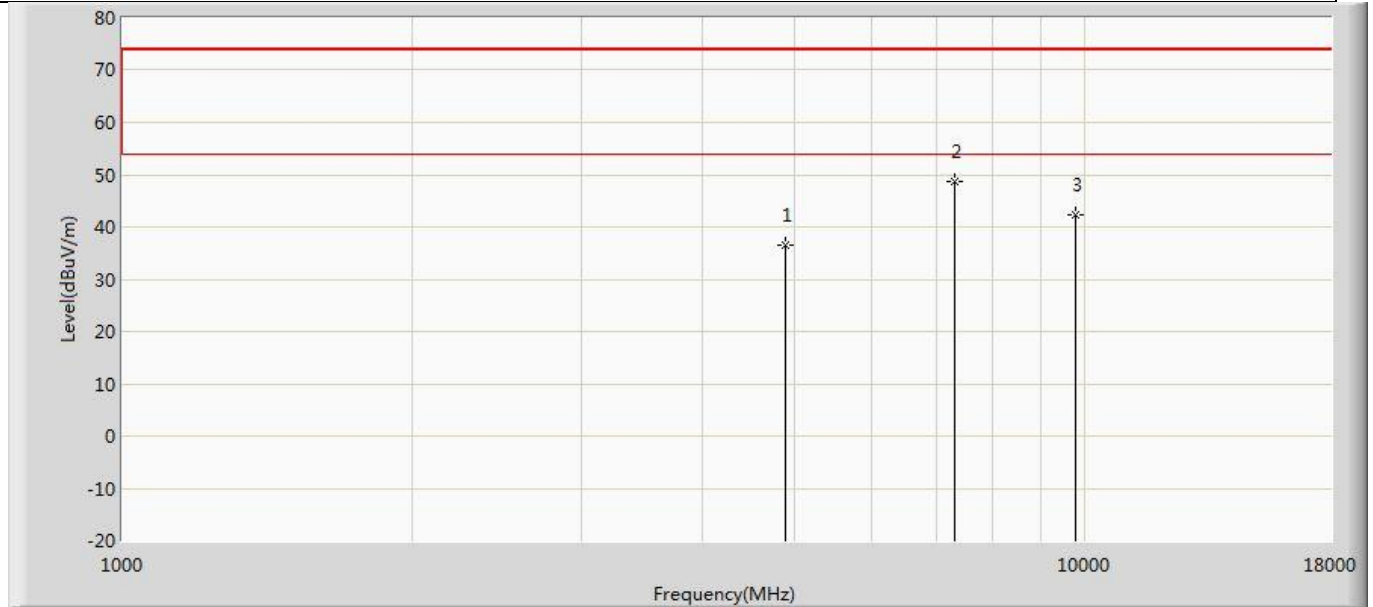
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	37.845	45.041	-36.155	74.000	-7.197	PK
2	*	7205.000	49.623	52.338	-24.377	74.000	-2.715	PK
3		9608.000	42.940	42.354	-31.060	74.000	0.585	PK

Profile: 2150819R	Page No.: 27
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1:Transmit at 2440MHz by LE_1Mbps	



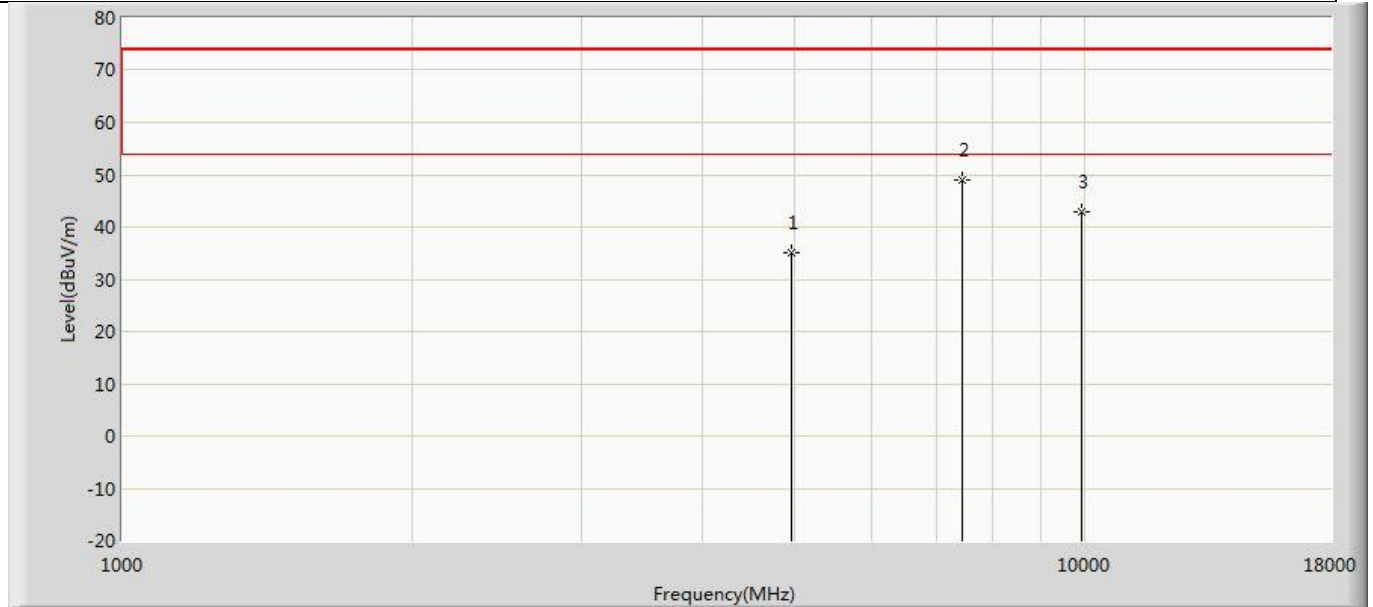
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	37.564	44.378	-36.436	74.000	-6.815	PK
2	*	7315.500	48.768	51.706	-25.232	74.000	-2.938	PK
3		9760.000	43.017	42.274	-30.983	74.000	0.744	PK

Profile: 2150819R	Page No.: 28
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1:Transmit at 2440MHz by LE_1Mbps	



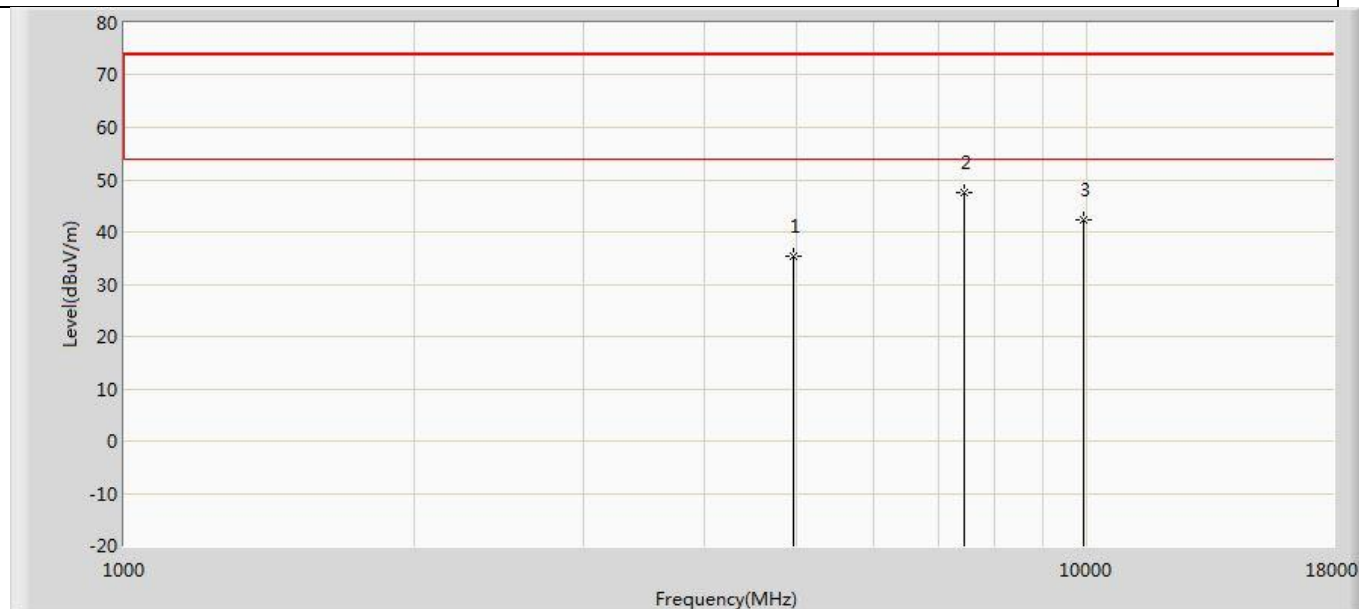
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	36.426	43.240	-37.574	74.000	-6.815	PK
2	*	7315.500	48.768	51.706	-25.232	74.000	-2.938	PK
3		9760.000	42.218	41.475	-31.782	74.000	0.744	PK

Profile: 2150819R	Page No.: 29
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1:Transmit at 2480MHz by LE_1Mbps	



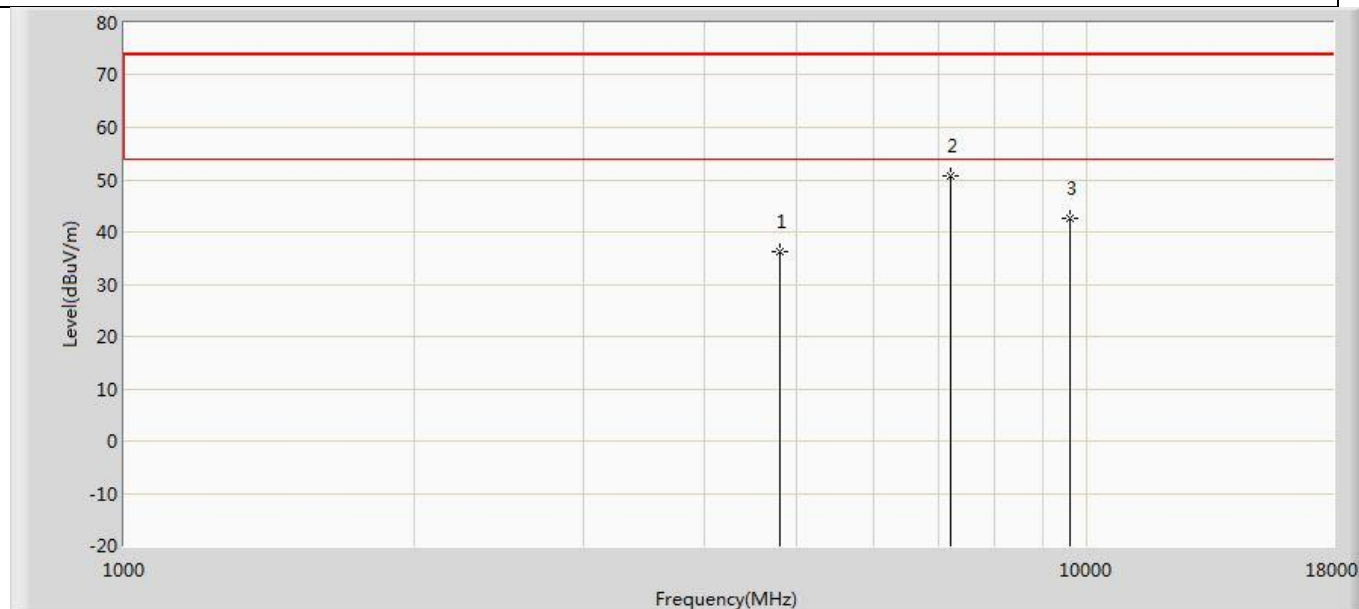
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	35.150	42.023	-38.850	74.000	-6.873	PK
2	*	7443.000	49.062	52.254	-24.938	74.000	-3.192	PK
3		9920.000	42.877	41.904	-31.123	74.000	0.973	PK

Profile: 2150819R	Page No.: 30
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1:Transmit at 2480MHz by LE_1Mbps	



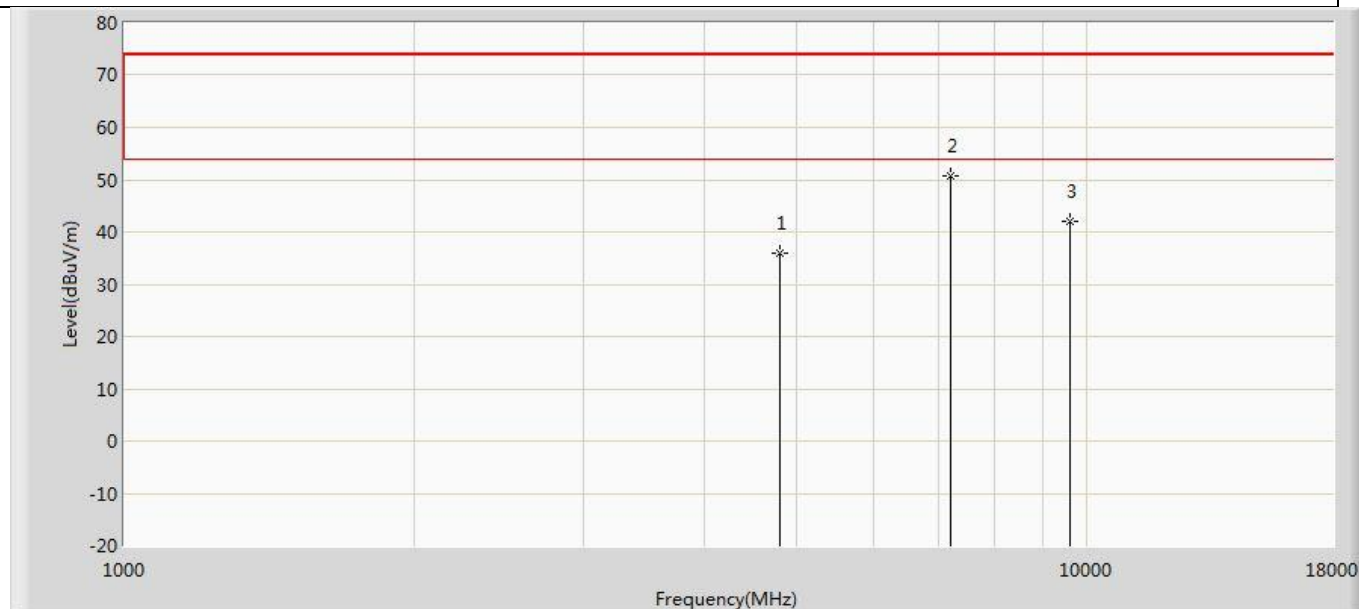
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	35.295	42.168	-38.705	74.000	-6.873	PK
2	*	7443.000	47.657	50.849	-26.343	74.000	-3.192	PK
3		9920.000	42.354	41.381	-31.646	74.000	0.973	PK

Profile: 2150819R	Page No.: 31
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 2:Transmit at 2402MHz by LE_2Mbps	



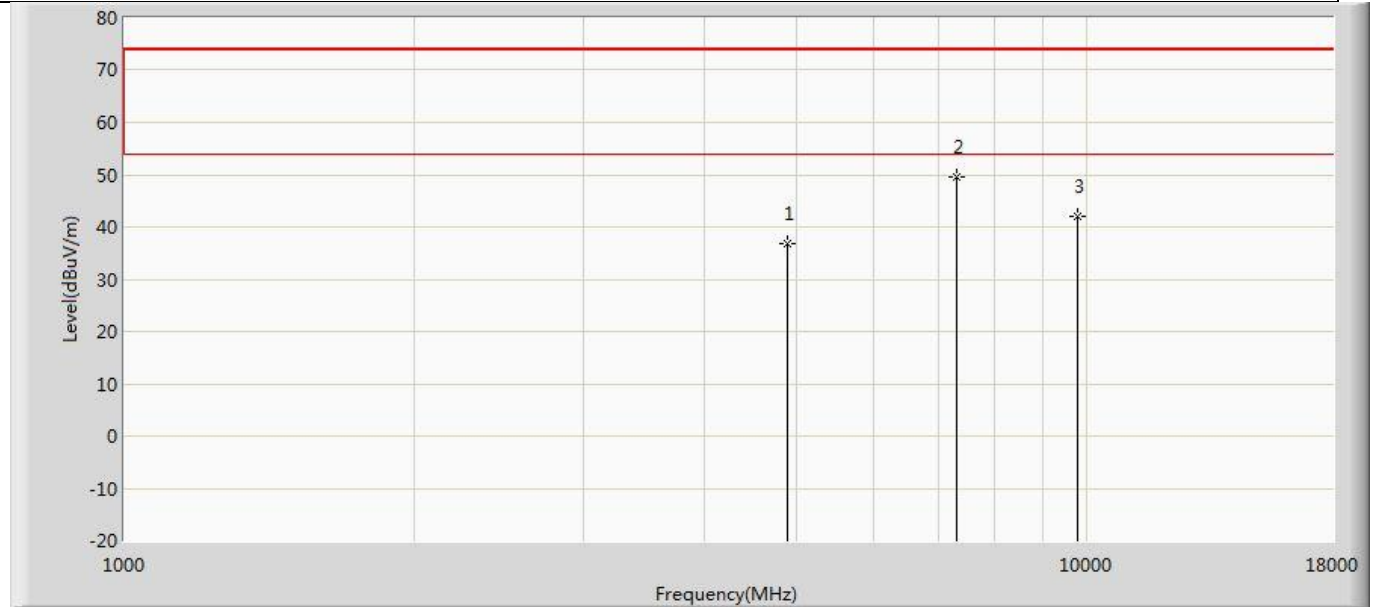
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	36.341	43.537	-37.659	74.000	-7.197	PK
2	*	7205.000	50.830	53.545	-23.170	74.000	-2.715	PK
3		9608.000	42.466	41.880	-31.534	74.000	0.585	PK

Profile: 2150819R	Page No.: 32
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 2:Transmit at 2402MHz by LE_2Mbps	



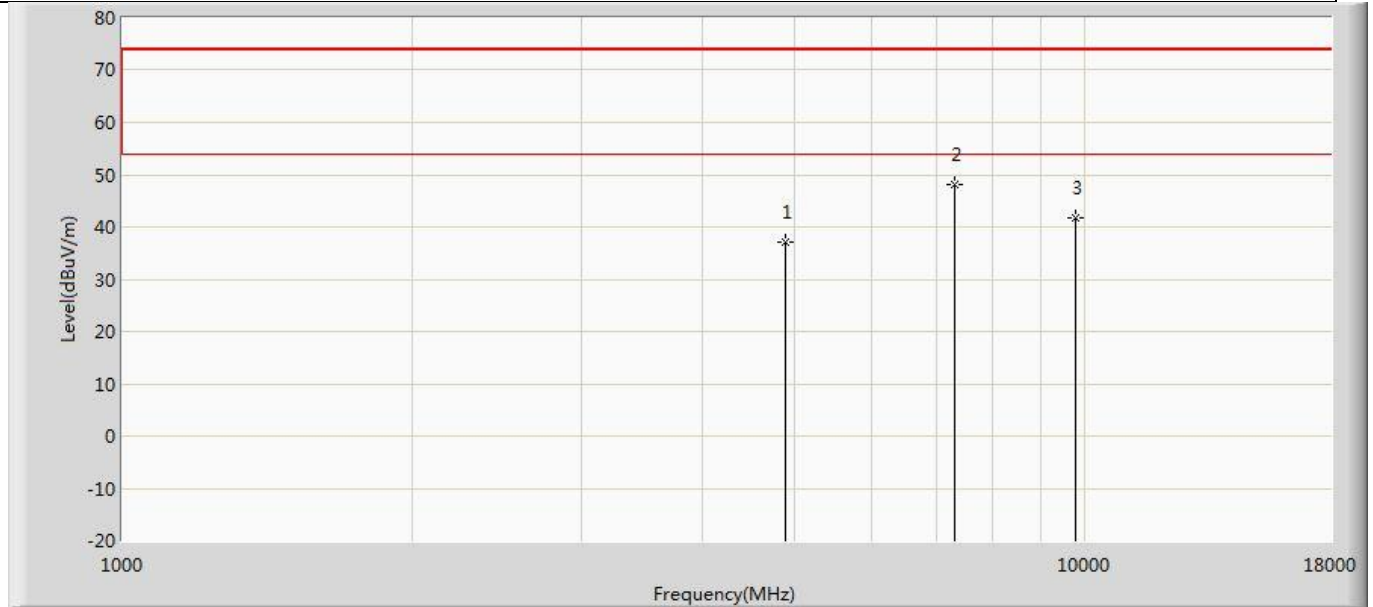
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	35.875	43.071	-38.125	74.000	-7.197	PK
2	*	7205.000	50.830	53.545	-23.170	74.000	-2.715	PK
3		9608.000	42.055	41.469	-31.945	74.000	0.585	PK

Profile: 2150819R	Page No.: 33
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 2:Transmit at 2440MHz by LE_2Mbps	



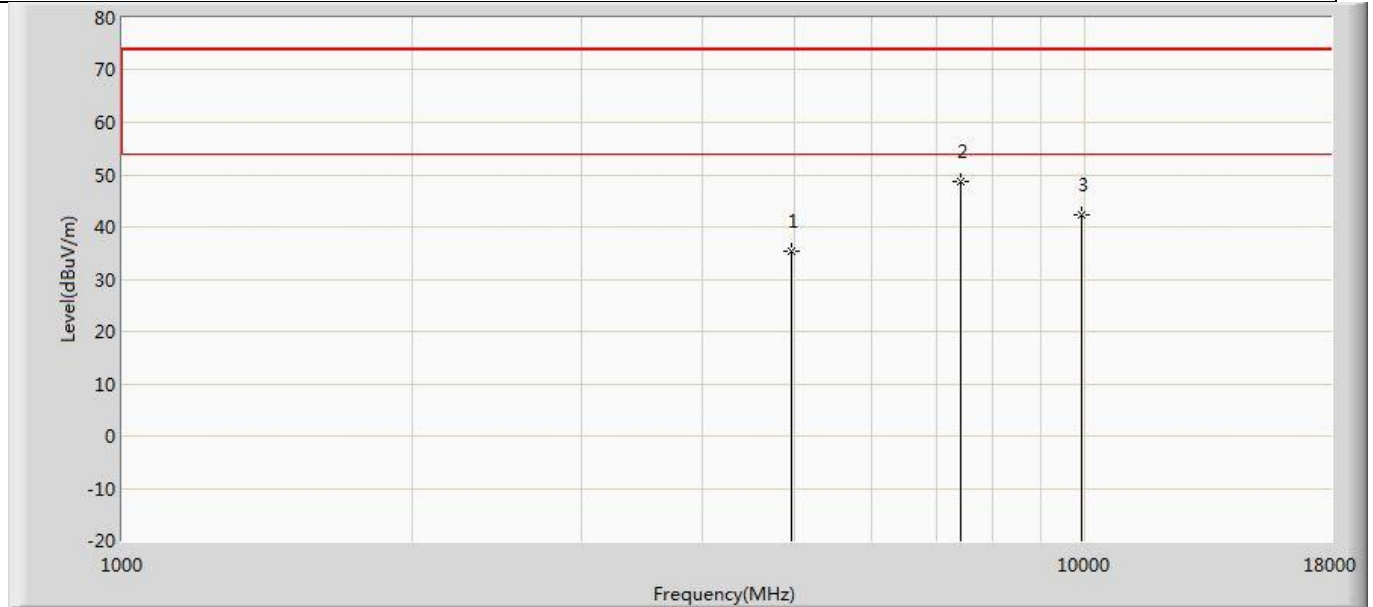
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	36.727	43.541	-37.273	74.000	-6.815	PK
2	*	7324.000	49.629	52.664	-24.371	74.000	-3.035	PK
3		9760.000	42.014	41.271	-31.986	74.000	0.744	PK

Profile: 2150819R	Page No.: 34
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 2:Transmit at 2440MHz by LE_2Mbps	



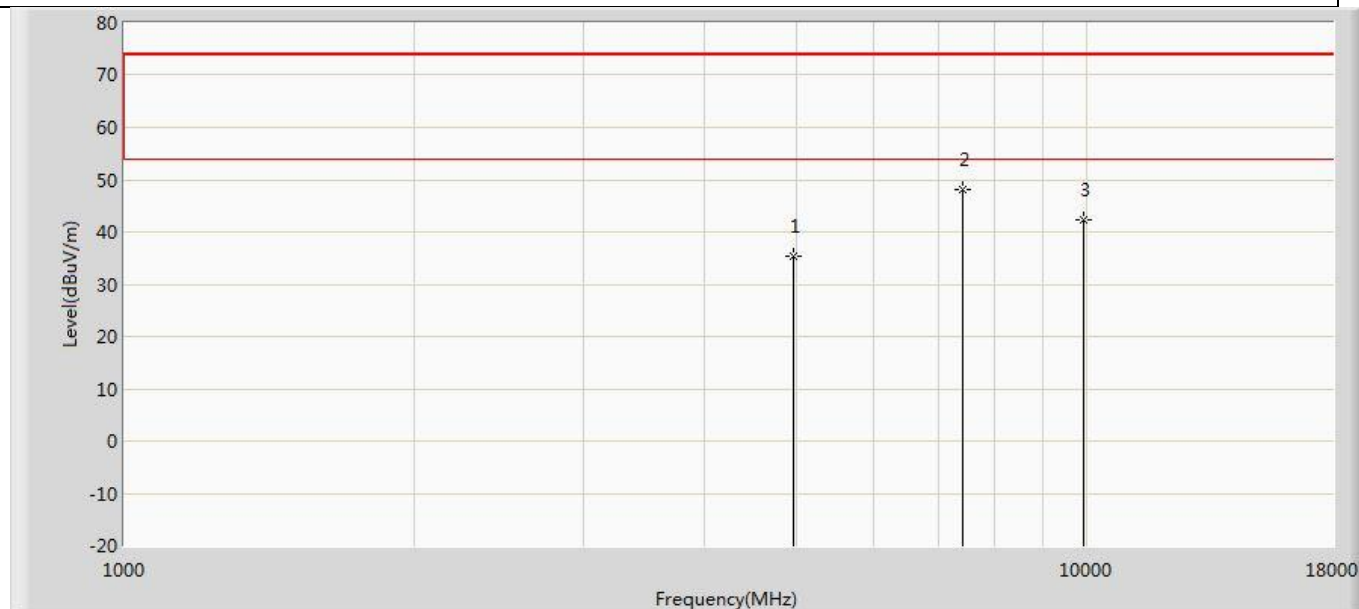
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	37.040	43.854	-36.960	74.000	-6.815	PK
2	*	7315.500	48.132	51.070	-25.868	74.000	-2.938	PK
3		9760.000	41.870	41.127	-32.130	74.000	0.744	PK

Profile: 2150819R	Page No.: 35
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 2:Transmit at 2480MHz by LE_2Mbps	



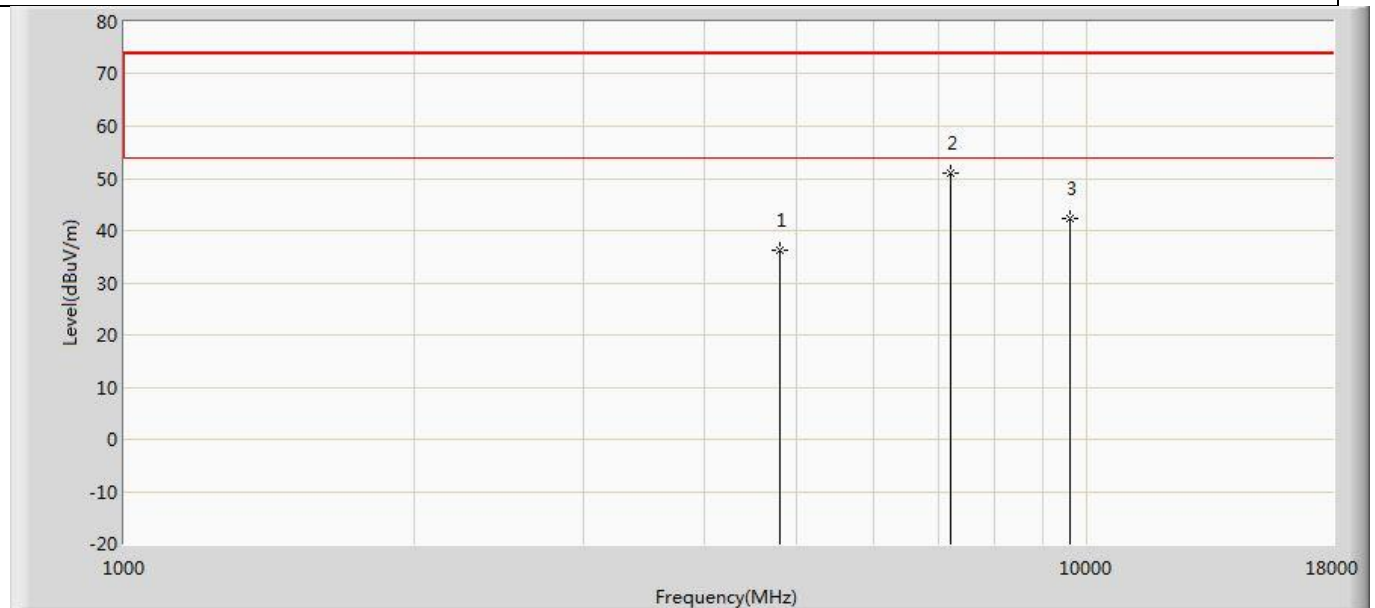
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	35.457	42.330	-38.543	74.000	-6.873	PK
2	*	7434.500	48.571	51.751	-25.429	74.000	-3.181	PK
3		9920.000	42.401	41.428	-31.599	74.000	0.973	PK

Profile: 2150819R	Page No.: 36
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 2:Transmit at 2480MHz by LE_2Mbps	



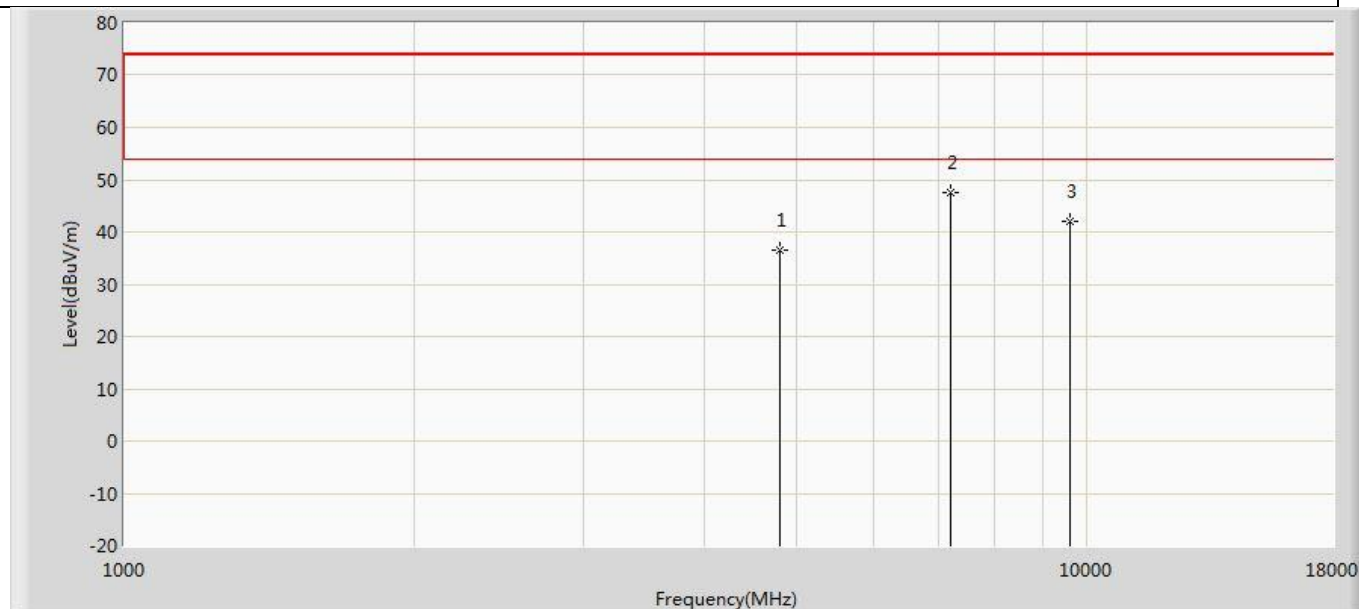
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	35.459	42.332	-38.541	74.000	-6.873	PK
2	*	7434.500	47.993	51.173	-26.007	74.000	-3.181	PK
3		9920.000	42.414	41.441	-31.586	74.000	0.973	PK

Profile: 2150819R	Page No.: 43
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 3:Transmit at 2402MHz by LE_Code S=2	



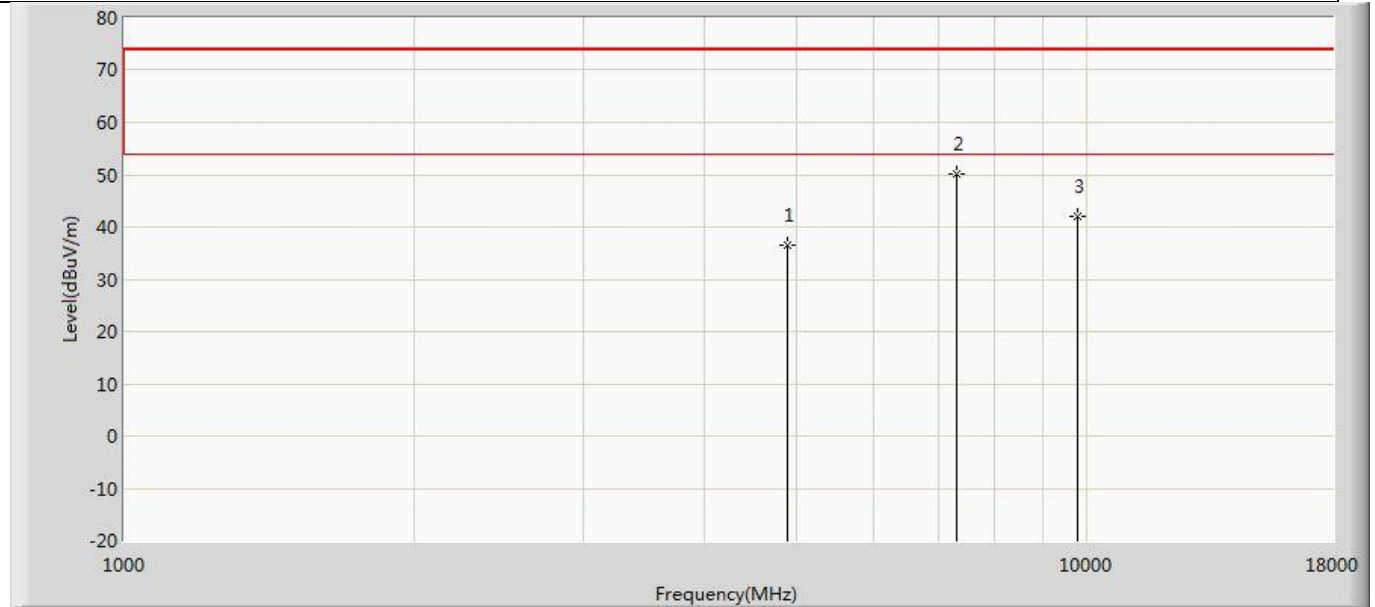
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	36.281	43.477	-37.719	74.000	-7.197	PK
2	*	7205.000	50.975	53.690	-23.025	74.000	-2.715	PK
3		9608.000	42.353	41.767	-31.647	74.000	0.585	PK

Profile: 2150819R	Page No.: 44
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 3:Transmit at 2402MHz by LE_Code S=2	



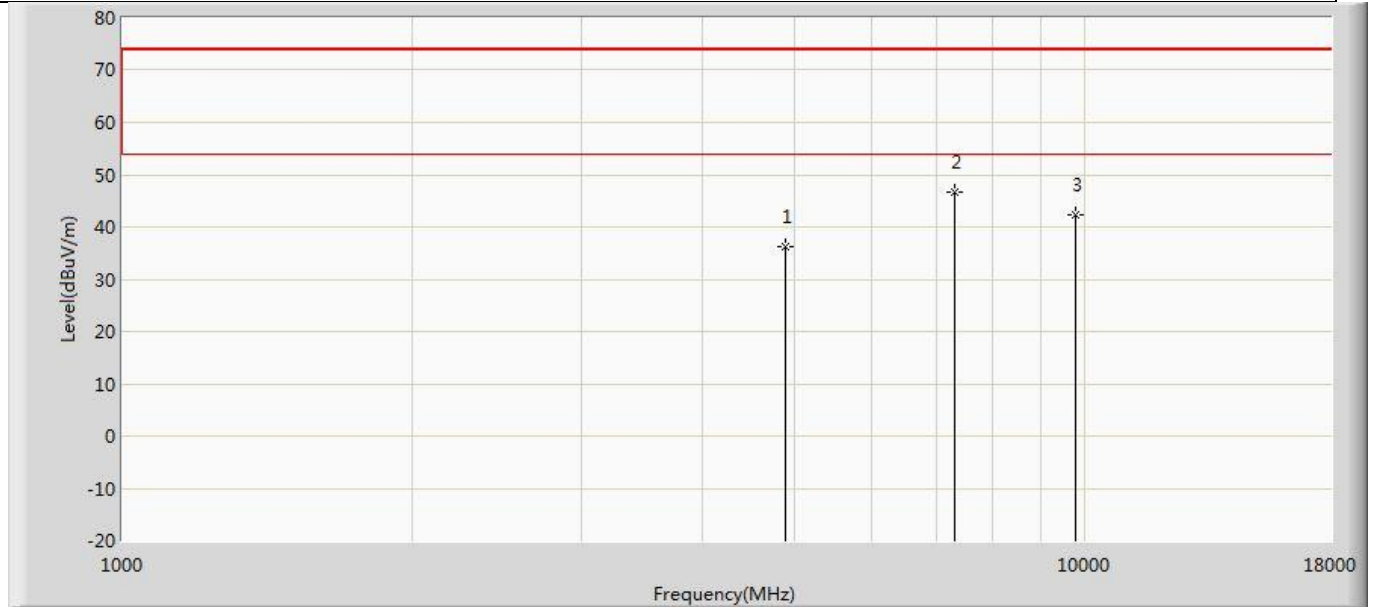
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	36.412	43.608	-37.588	74.000	-7.197	PK
2	*	7205.000	47.476	50.191	-26.524	74.000	-2.715	PK
3		9608.000	42.047	41.461	-31.953	74.000	0.585	PK

Profile: 2150819R	Page No.: 45
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 3:Transmit at 2440MHz by LE_Code S=2	



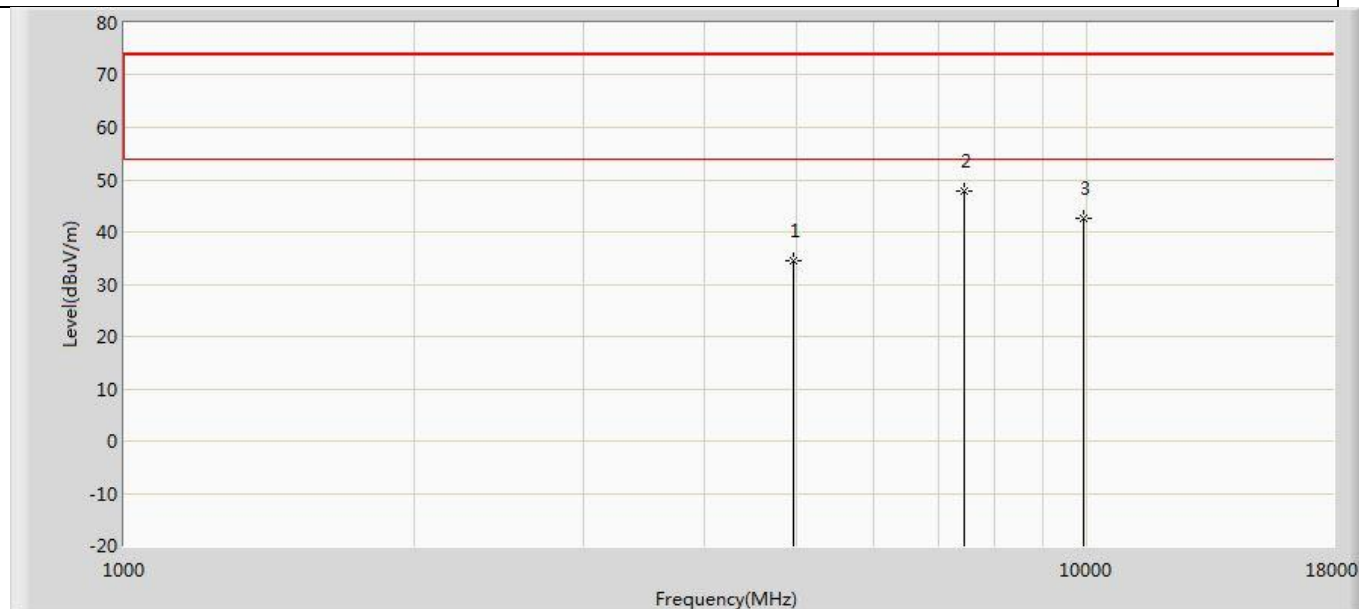
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	36.610	43.424	-37.390	74.000	-6.815	PK
2	*	7315.500	50.279	53.217	-23.721	74.000	-2.938	PK
3		9760.000	41.918	41.175	-32.082	74.000	0.744	PK

Profile: 2150819R	Page No.: 46
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:28
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 3:Transmit at 2440MHz by LE_Code S=2	



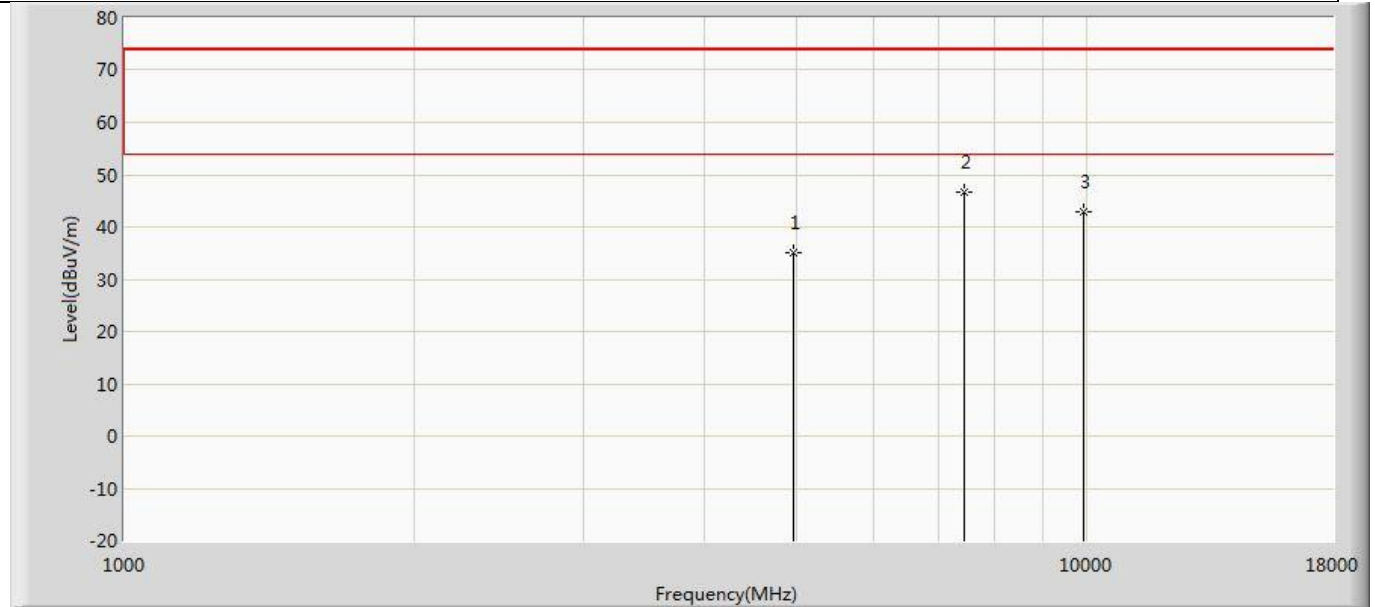
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	36.170	42.984	-37.830	74.000	-6.815	PK
2	*	7315.500	46.771	49.709	-27.229	74.000	-2.938	PK
3		9760.000	42.281	41.538	-31.719	74.000	0.744	PK

Profile: 2150819R	Page No.: 47
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:28
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 3:Transmit at 2480MHz by LE_Code S=2	



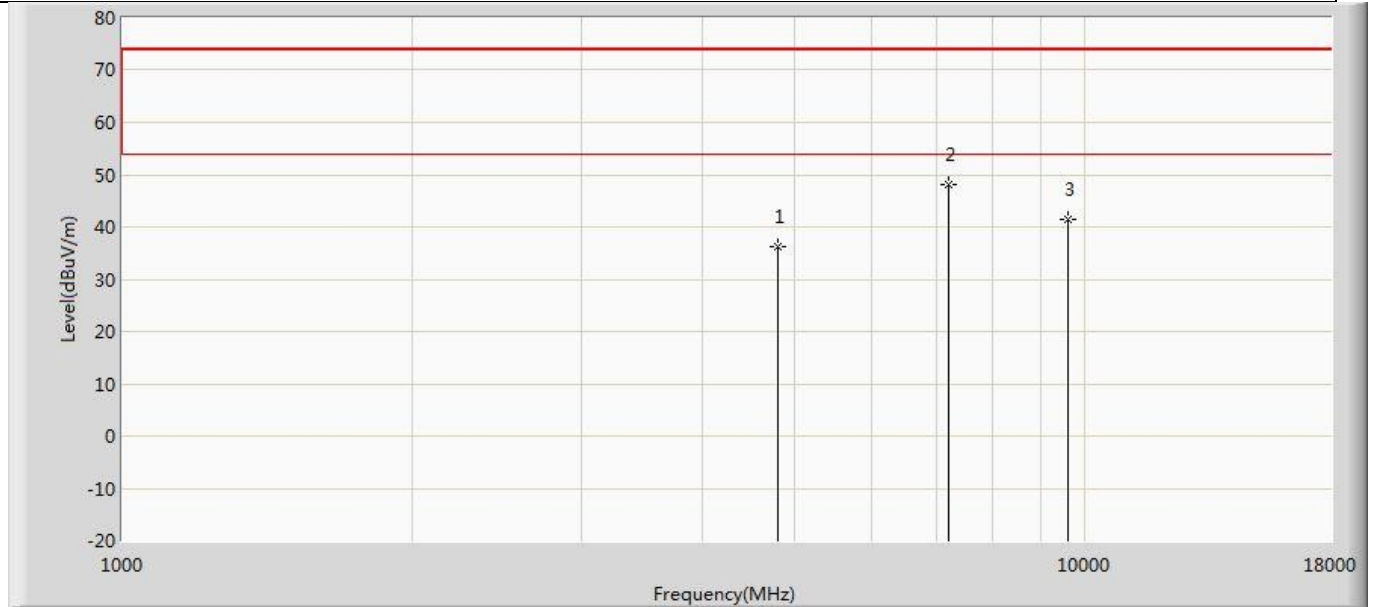
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	34.423	41.296	-39.577	74.000	-6.873	PK
2	*	7443.000	47.765	50.957	-26.235	74.000	-3.192	PK
3		9920.000	42.603	41.630	-31.397	74.000	0.973	PK

Profile: 2150819R	Page No.: 48
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:28
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 3:Transmit at 2480MHz by LE_Code S=2	



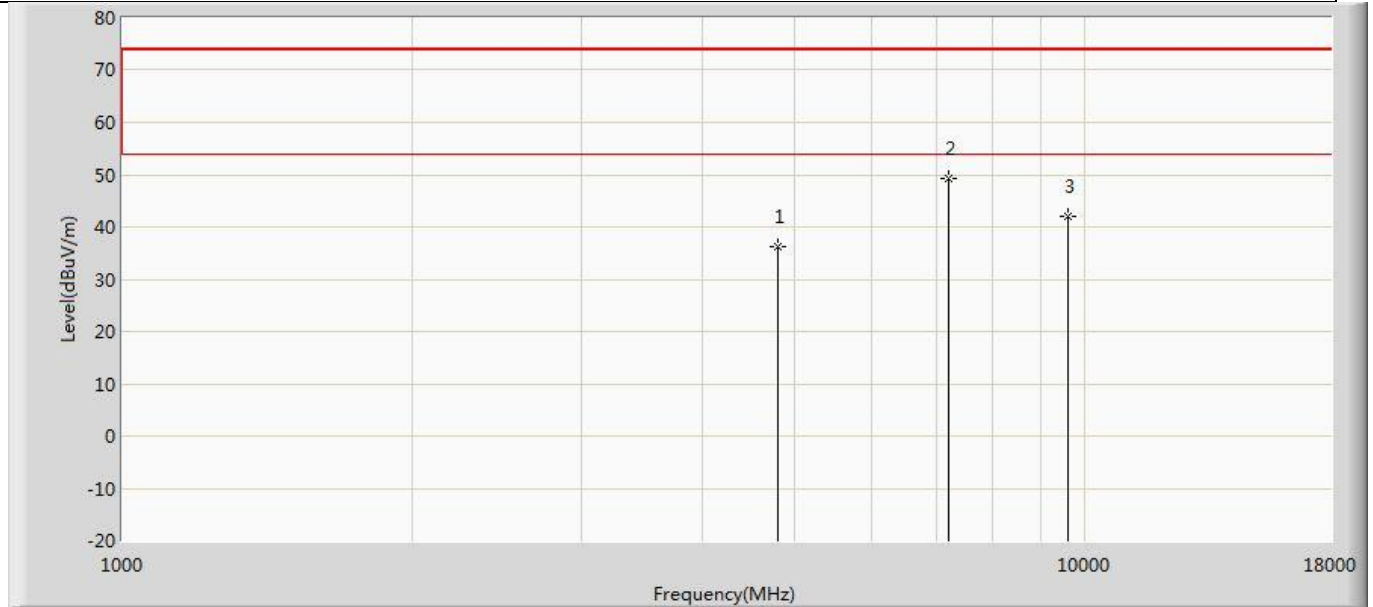
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	35.010	41.883	-38.990	74.000	-6.873	PK
2	*	7443.000	46.629	49.821	-27.371	74.000	-3.192	PK
3		9920.000	42.932	41.959	-31.068	74.000	0.973	PK

Profile: 2150819R	Page No.: 37
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 4:Transmit at 2402MHz by LE_Code S=8	



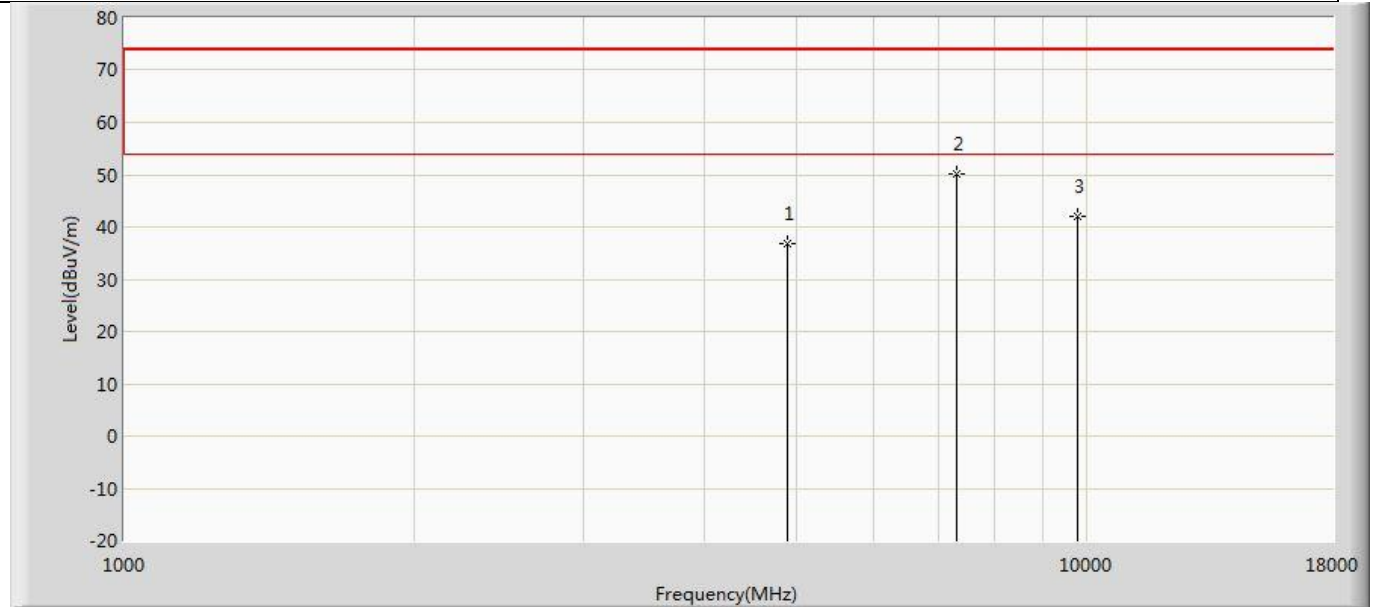
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	36.290	43.486	-37.710	74.000	-7.197	PK
2	*	7205.000	48.159	50.874	-25.841	74.000	-2.715	PK
3		9608.000	41.528	40.942	-32.472	74.000	0.585	PK

Profile: 2150819R	Page No.: 38
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 4:Transmit at 2402MHz by LE_Code S=8	



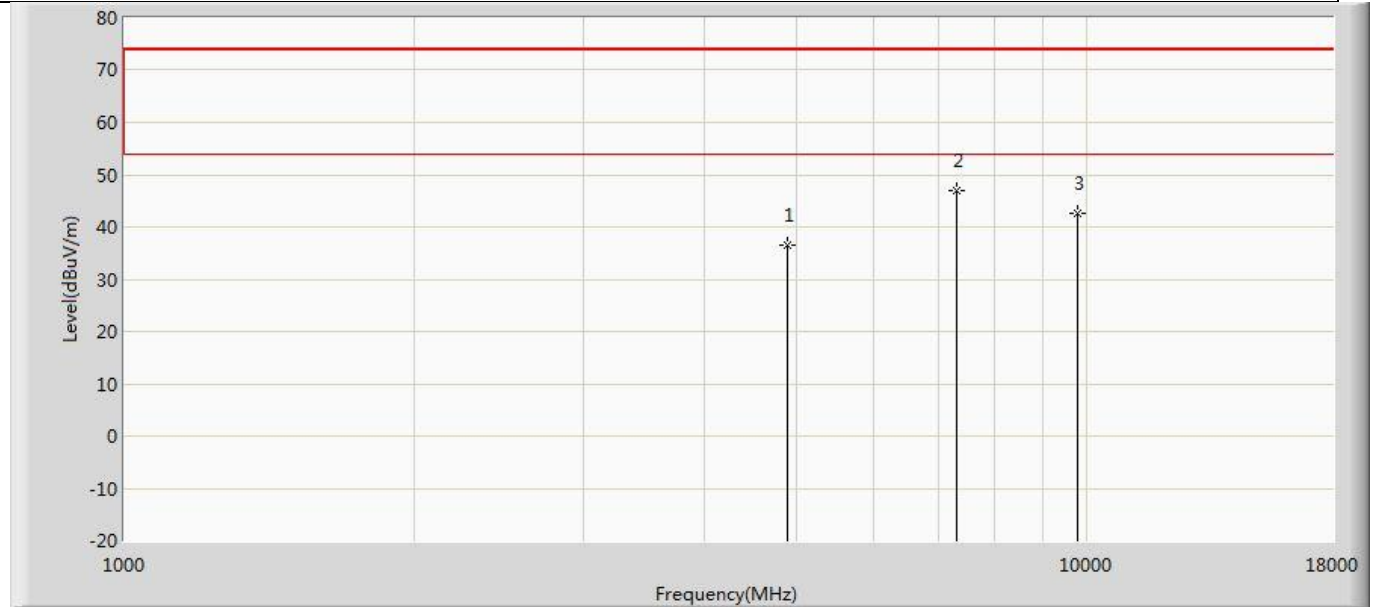
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4804.000	36.128	43.324	-37.872	74.000	-7.197	PK
2	*	7205.000	49.192	51.907	-24.808	74.000	-2.715	PK
3		9608.000	42.172	41.586	-31.828	74.000	0.585	PK

Profile: 2150819R	Page No.: 39
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 4:Transmit at 2440MHz by LE_Code S=8	



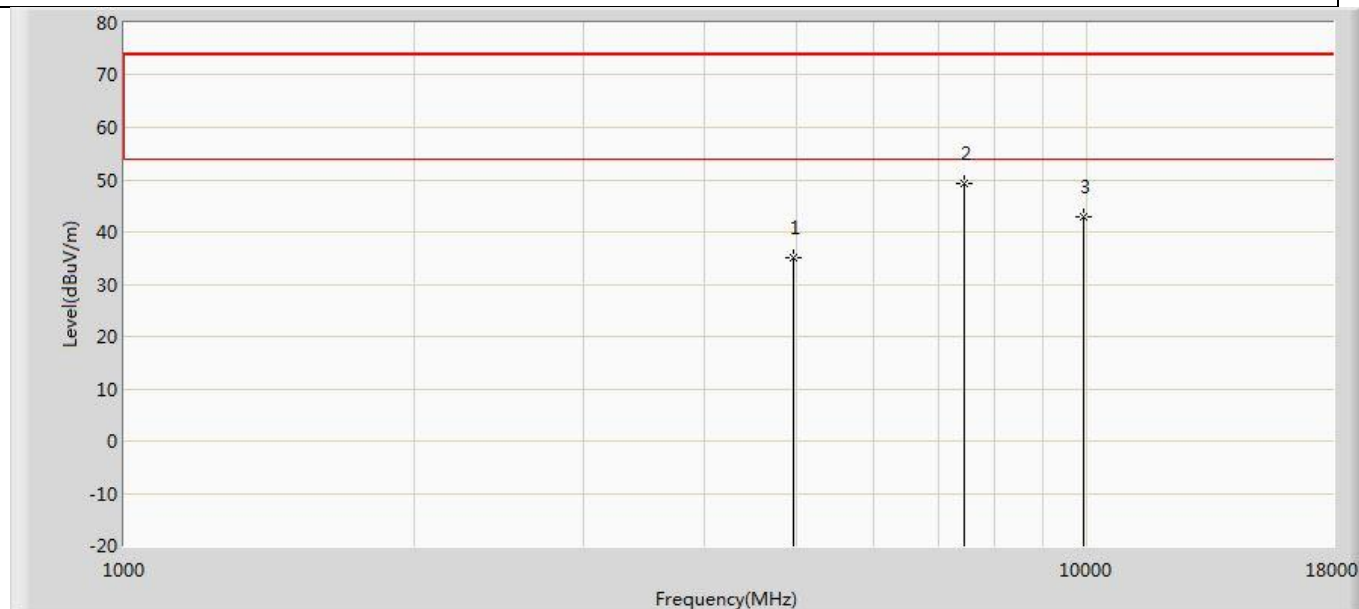
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	36.831	43.645	-37.169	74.000	-6.815	PK
2	*	7315.500	50.205	53.143	-23.795	74.000	-2.938	PK
3		9760.000	41.981	41.238	-32.019	74.000	0.744	PK

Profile: 2150819R	Page No.: 40
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 4:Transmit at 2440MHz by LE_Code S=8	



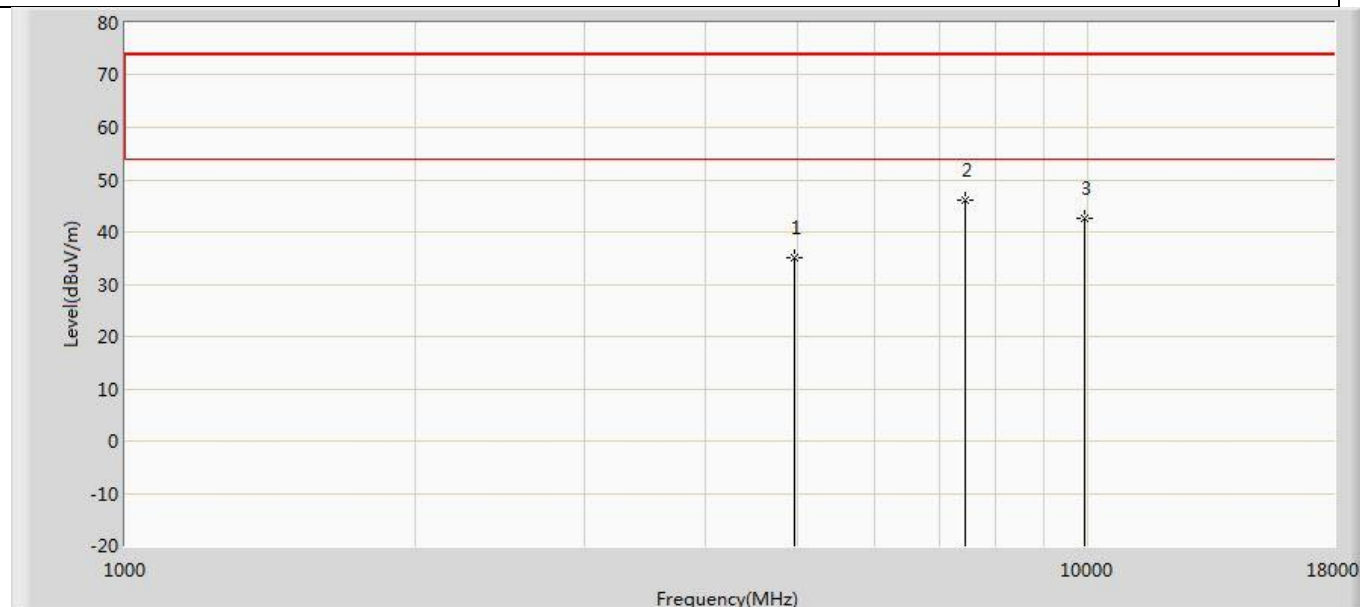
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	36.537	43.351	-37.463	74.000	-6.815	PK
2	*	7315.500	47.076	50.014	-26.924	74.000	-2.938	PK
3		9760.000	42.698	41.955	-31.302	74.000	0.744	PK

Profile: 2150819R	Page No.: 41
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 4:Transmit at 2480MHz by LE_Code S=8	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	35.177	42.050	-38.823	74.000	-6.873	PK
2	*	7443.000	49.234	52.426	-24.766	74.000	-3.192	PK
3		9920.000	42.997	42.024	-31.003	74.000	0.973	PK

Profile: 2150819R	Page No.: 42
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 4:Transmit at 2480MHz by LE_Code S=8	



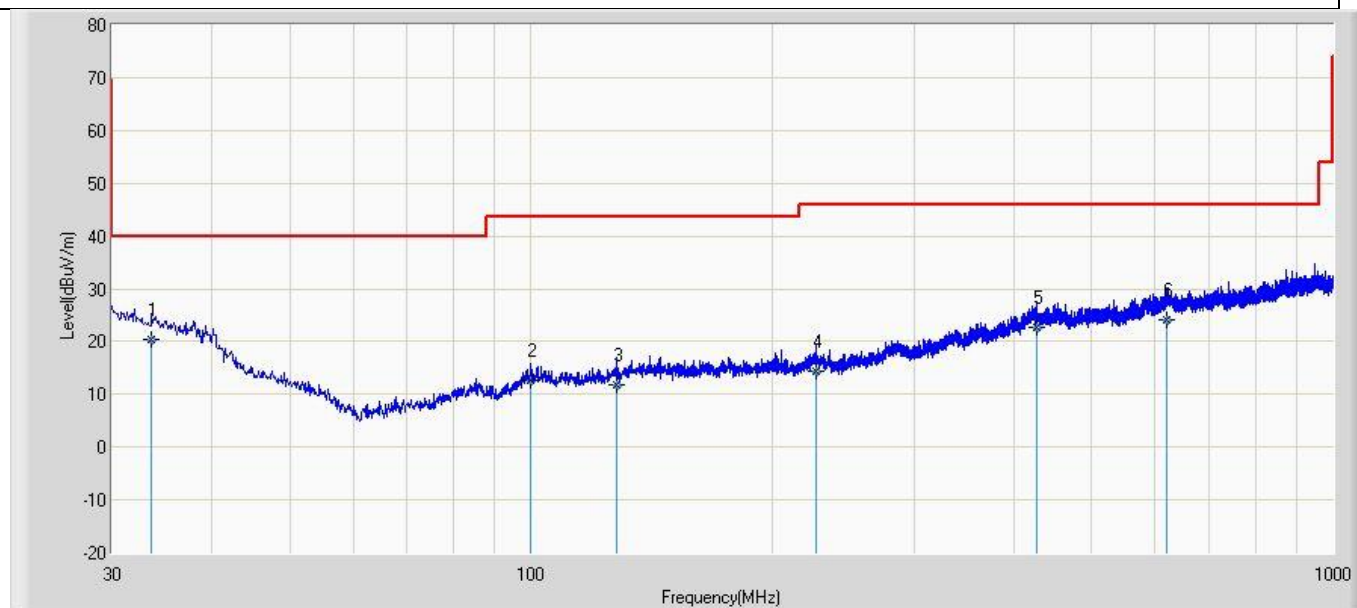
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	35.192	42.065	-38.808	74.000	-6.873	PK
2	*	7443.000	46.102	49.294	-27.898	74.000	-3.192	PK
3		9920.000	42.536	41.563	-31.464	74.000	0.973	PK

Note:

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

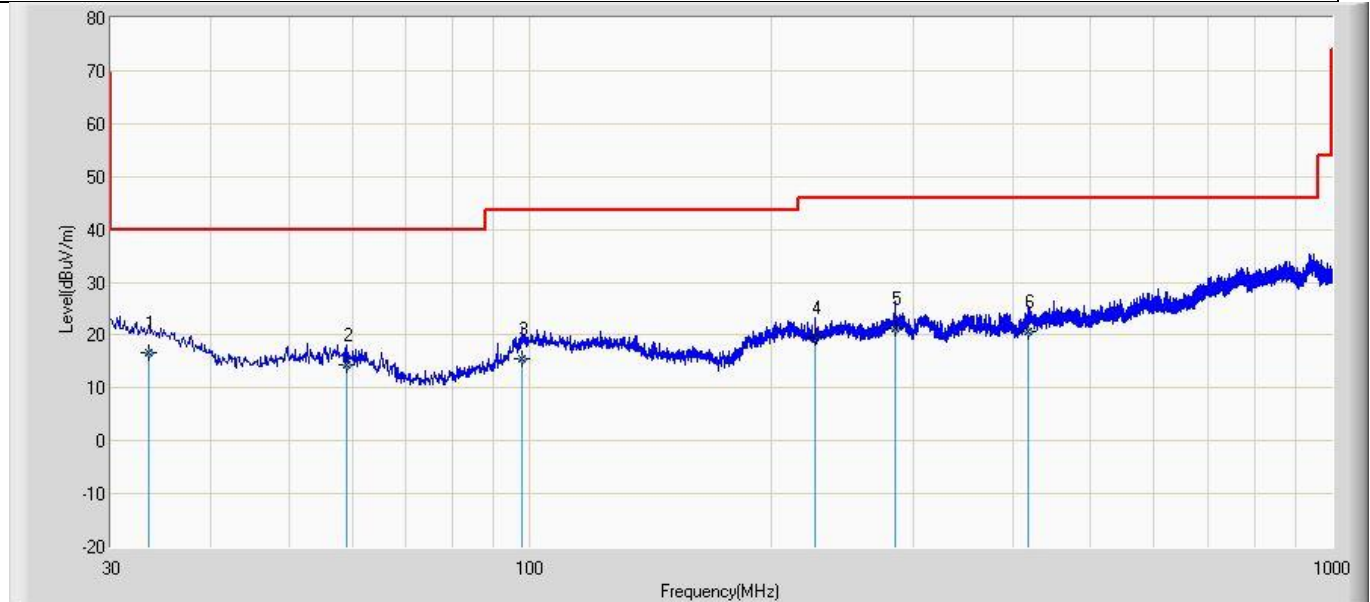
The worst case of Radiated Emission below 1GHz:

Profile: 2150819R	Page No.: 15
Engineer: wangyingfei	
Site: AC3	Time: 2021/07/13 - 21:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: AC3_3m (30-1000MHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	33.638	20.356	-5.586	-19.644	40.000	25.943	QP
2		99.840	12.648	-4.196	-30.852	43.500	16.844	QP
3		127.970	11.889	-4.915	-31.611	43.500	16.804	QP
4		226.425	14.335	-4.220	-31.665	46.000	18.555	QP
5		427.700	22.641	-4.252	-23.359	46.000	26.893	QP
6		621.701	24.024	-5.508	-21.976	46.000	29.532	QP

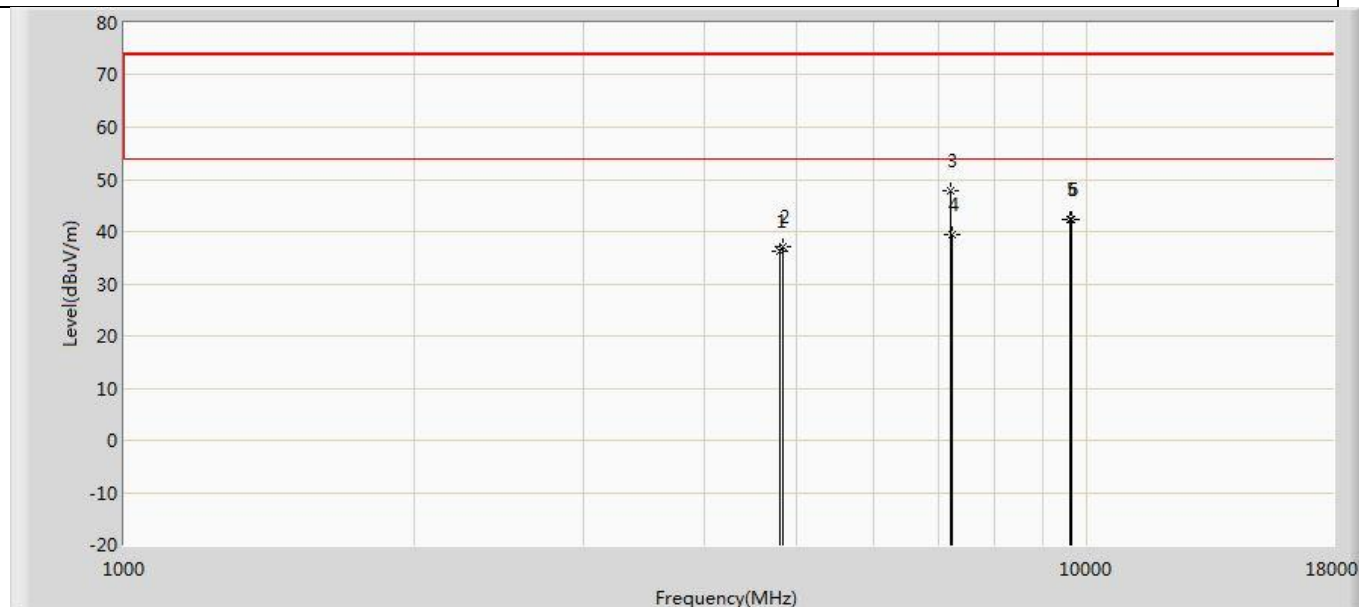
Profile: 2150819R	Page No.: 16
Engineer: wangyingfei	
Site: AC3	Time: 2021/07/13 - 21:51
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: AC3_3m (30-1000MHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	33.395	16.782	-6.102	-23.218	40.000	22.884	QP
2		59.100	14.267	-1.925	-25.733	40.000	16.192	QP
3		97.658	15.509	-5.567	-27.991	43.500	21.075	QP
4		226.910	19.482	-2.459	-26.518	46.000	21.941	QP
5		284.746	21.364	-3.334	-24.636	46.000	24.699	QP
6		418.849	20.621	-4.596	-25.379	46.000	25.217	QP

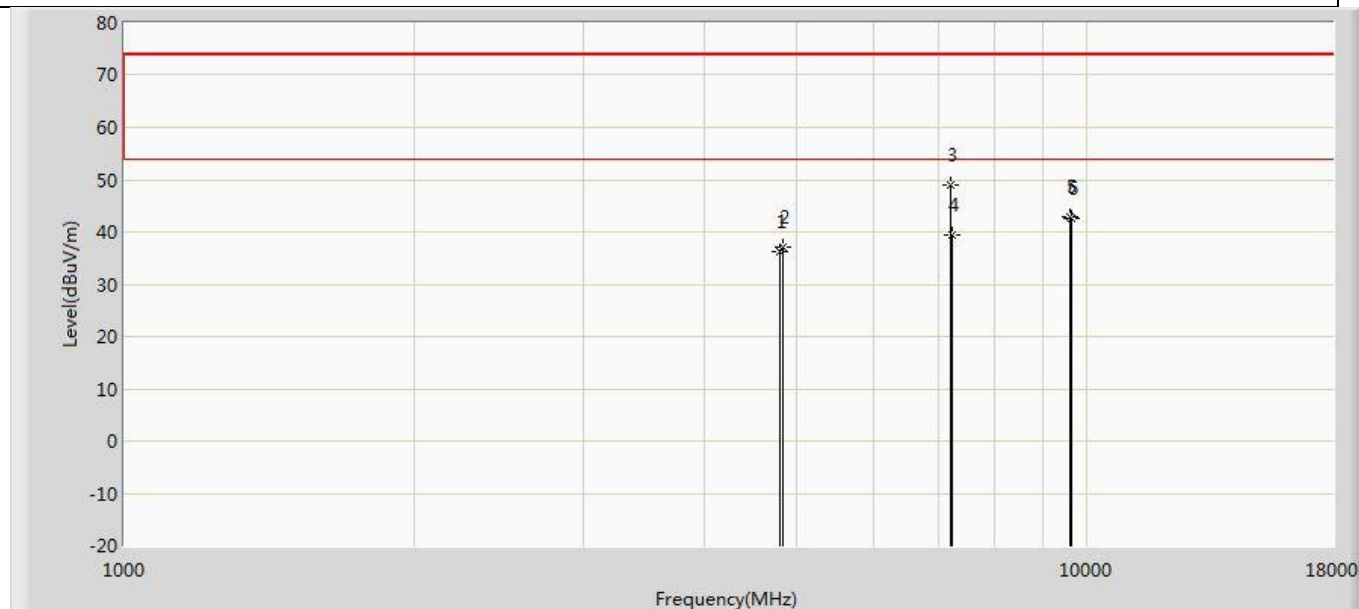
Simultaneous Transmission:

Profile: 2150819R	Page No.: 51
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:37
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Simultaneous transmission with BT + WIFI	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1		4804.000	36.092	43.288	-37.908	74.000	-7.197	0	0	PK
2		4824.000	36.996	43.905	-37.004	74.000	-6.909	0	0	PK
3	*	7206.000	47.855	50.601	-26.145	74.000	-2.746	0	0	PK
4		7236.000	39.467	42.704	-34.533	74.000	-3.237	0	0	PK
5		9608.000	42.193	41.607	-31.807	74.000	0.585	0	0	PK
6		9648.000	42.371	41.737	-31.629	74.000	0.634	0	0	PK

Profile: 2150819R	Page No.: 52
Engineer: Tongben	
Site: AC5	Time: 2021/07/15 - 10:37
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Simultaneous transmission with BT + WIFI	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1		4804.000	36.357	43.553	-37.643	74.000	-7.197	0	0	PK
2		4824.000	37.056	43.965	-36.944	74.000	-6.909	0	0	PK
3	*	7205.000	48.883	51.598	-25.117	74.000	-2.715	0	0	PK
4		7236.000	39.473	42.710	-34.527	74.000	-3.237	0	0	PK
5		9608.000	42.919	42.333	-31.081	74.000	0.585	0	0	PK
6		9648.000	42.670	42.036	-31.330	74.000	0.634	0	0	PK

4.3 Emissions in non-restricted frequency band

VERDICT: PASS

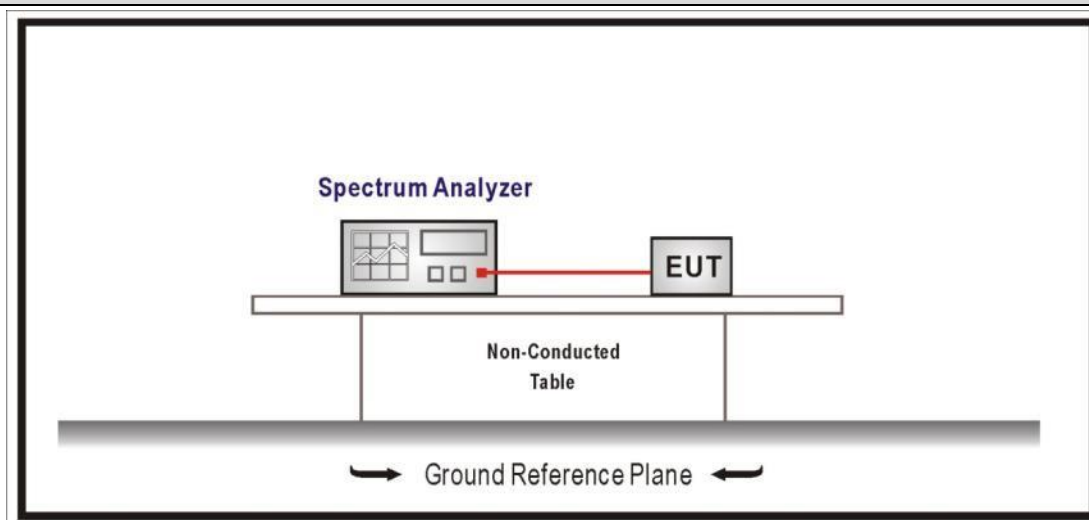
4.3.1 Limit

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).

4.3.2 Test Setup

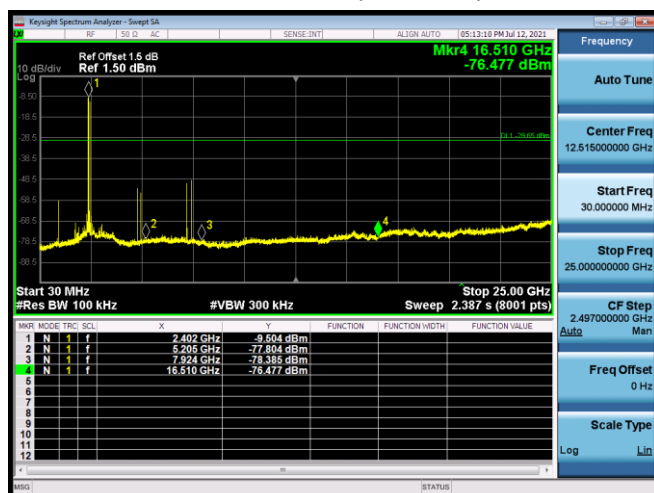


4.3.3 Test Procedure

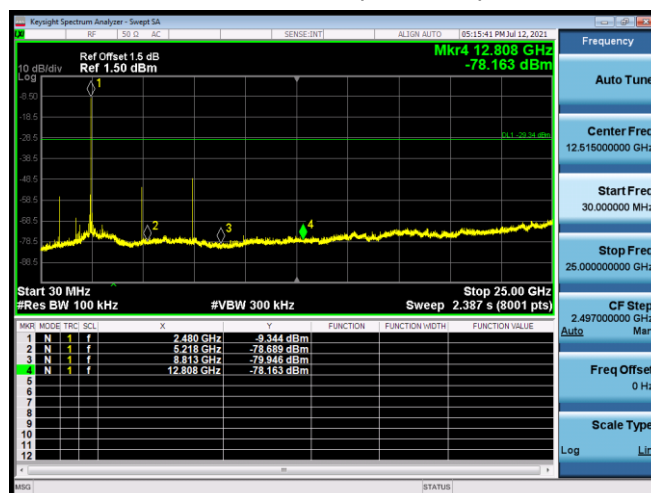
References Rule		Chapter	Description
☒	ANSI C63.10	11.11	Emissions in non-restricted frequency bands
☒	ANSI C63.10	11.11.1	General
☒	ANSI C63.10	11.11.2	Reference level measurement
☒	ANSI C63.10	11.11.3	Emission level measurement

4.3.4 Test Data

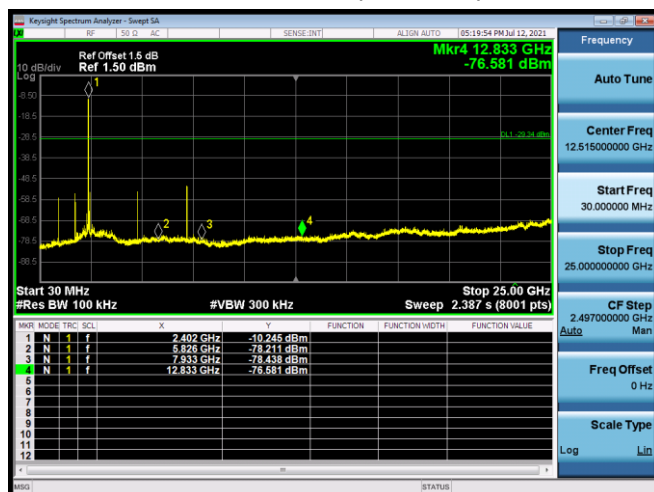
Mode 1 CH00 (2402MHz)



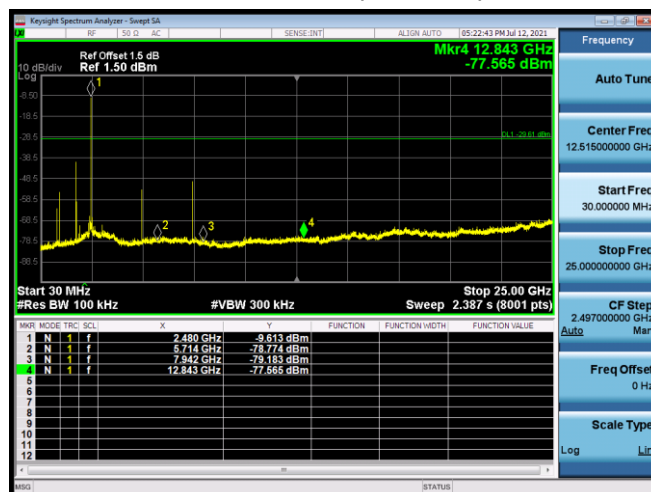
Mode 1 CH39 (2480MHz)



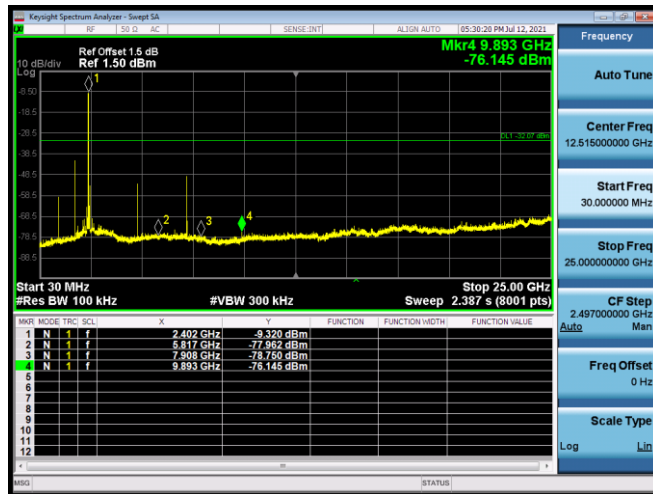
Mode 2 CH00 (2402MHz)



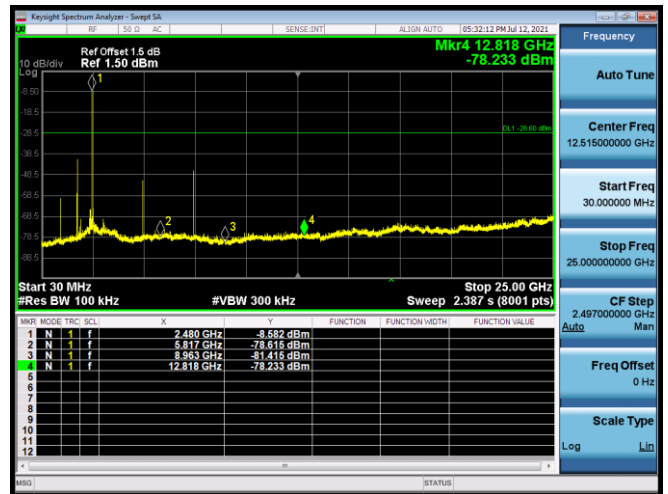
Mode 2 CH39 (2480MHz)



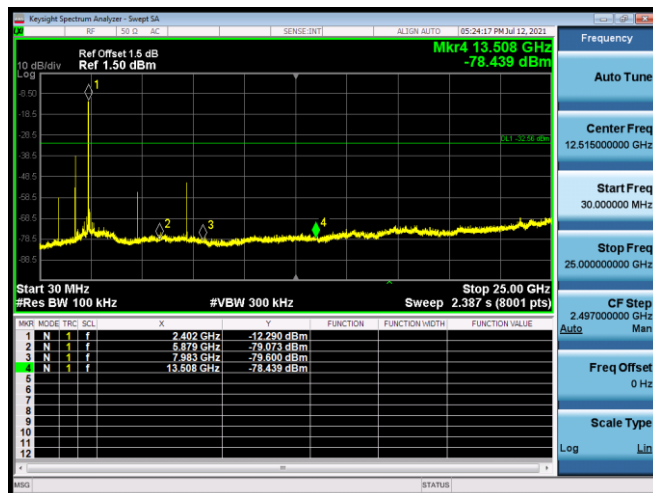
Mode 3 CH00 (2402MHz)



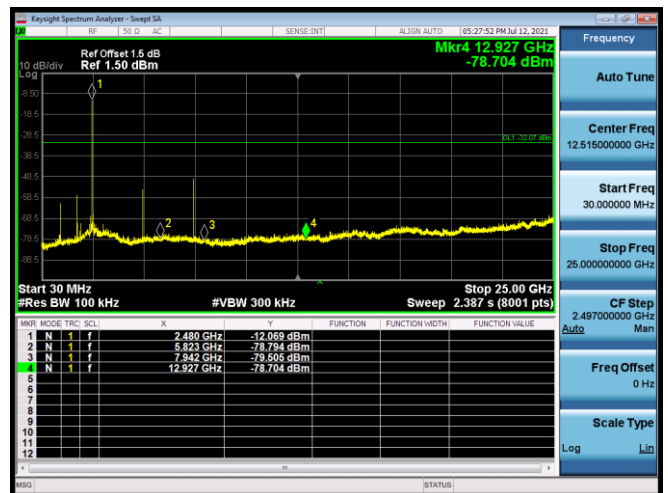
Mode 3 CH39 (2480MHz)



Mode 4 CH00 (2402MHz)

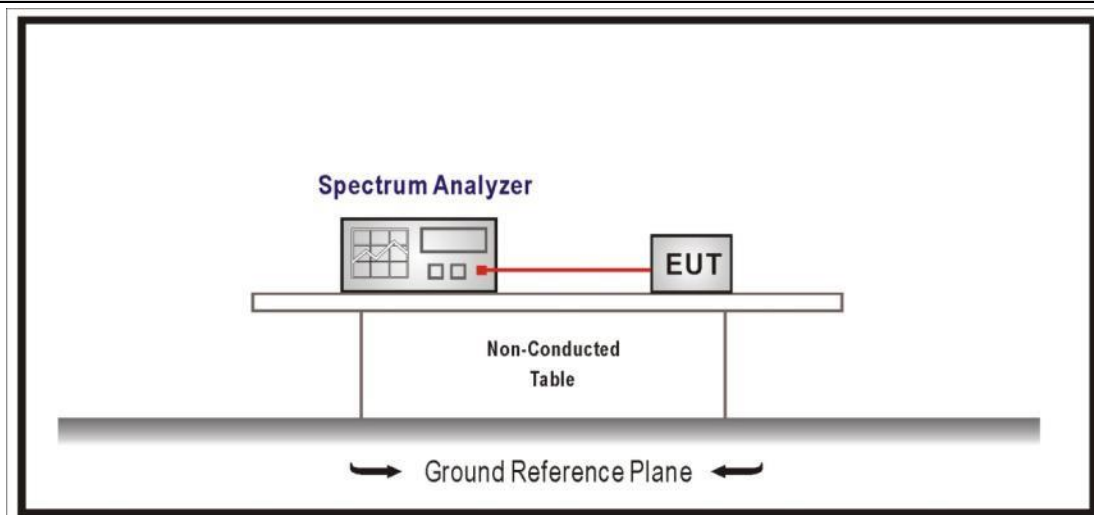


Mode 4 CH39 (2480MHz)



4.4 Duty cycle**VERDICT: PASS****4.4.1 Limit**

N/A

4.4.2 Test Setup**4.4.3 Test Procedure**

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

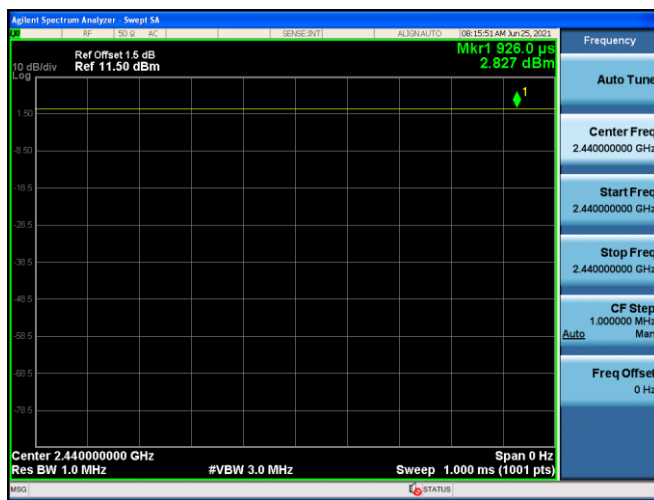
4.4.4 Test Data

Test Mode	Tx On (us)	Tx Off (us)	VBW (kHz)	Tx On + Tx Off (us)	Duty Cycle (%)
Mode 1	--	--	--	--	100
Mode 2	--	--	--	--	100
Mode 3	--	--	--	--	100
Mode 4	--	--	--	--	100

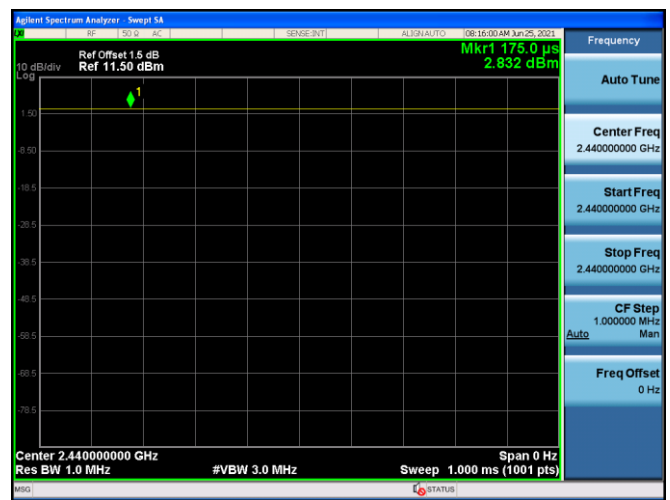
Note 1: T means the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

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.

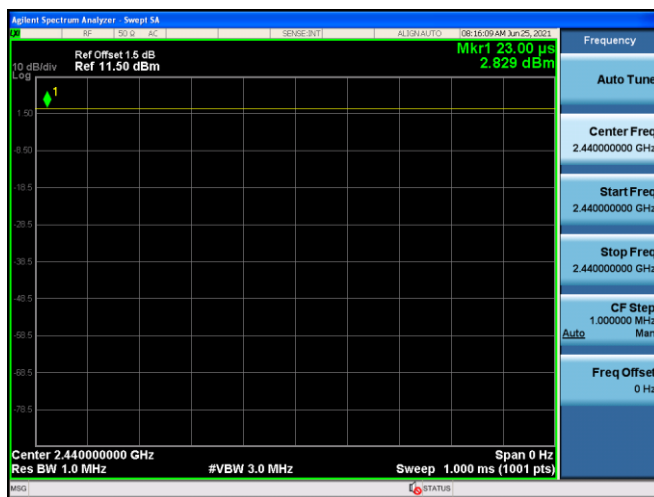
Mode 1 2440MHz



Mode 2 2440MHz



Mode 3 2440MHz



Mode 4 2440MHz



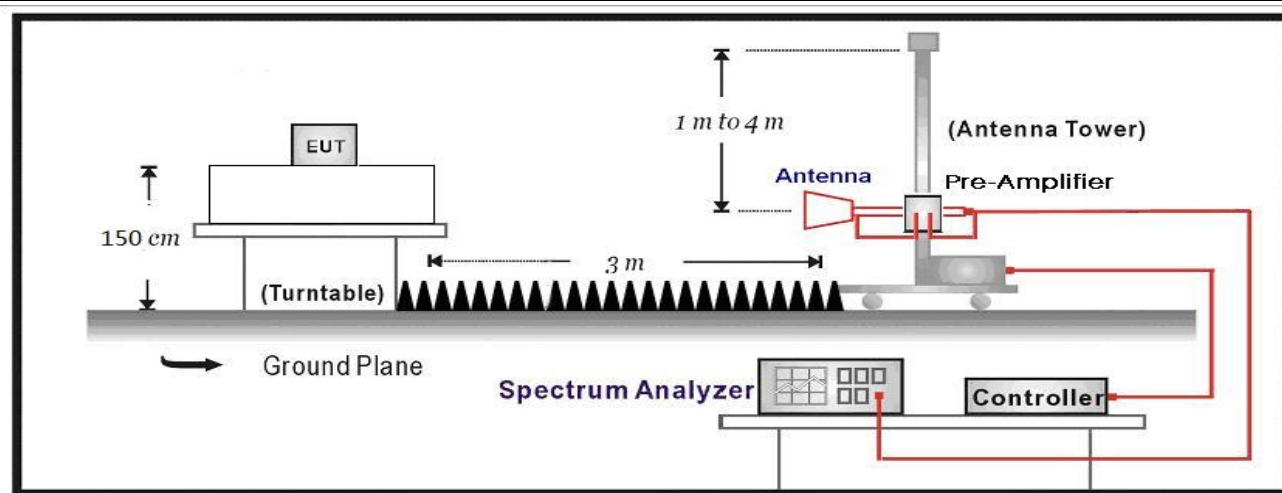
4.5 Radiated Emission Band Edge**VERDICT: PASS****4.5.1 Limit**

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.

4.5.2 Test Setup

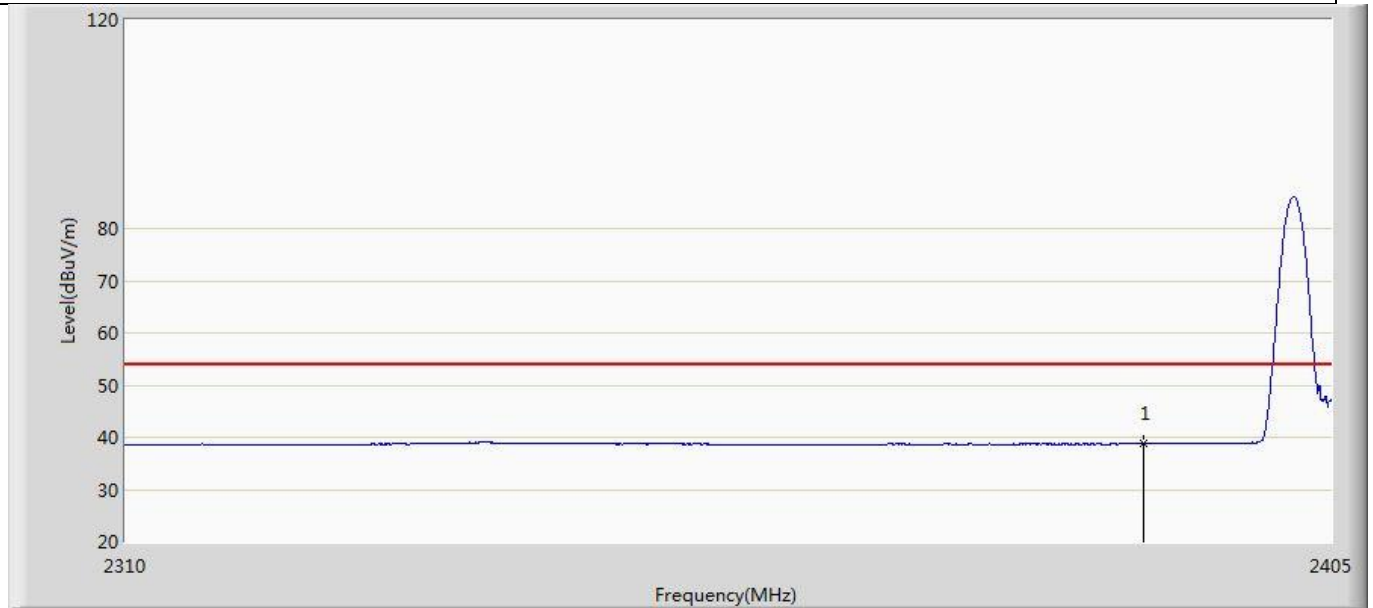
Above 1GHz Test Setup:

**4.5.3 Test Procedure**

	References Rule	Chapter	Description
☒	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	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

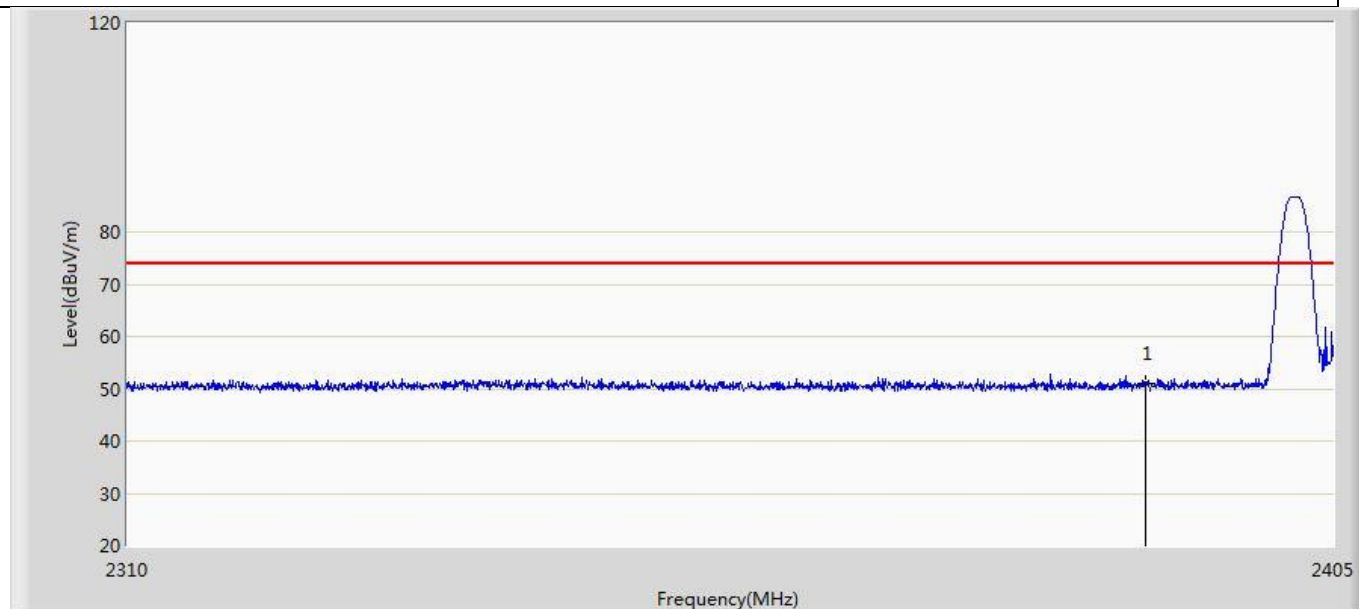
4.5.4 Test Data

Profile: 2150819R	Page No.: 1
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 14:44
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1:Transmit at 2402MHz by LE_1Mbps	



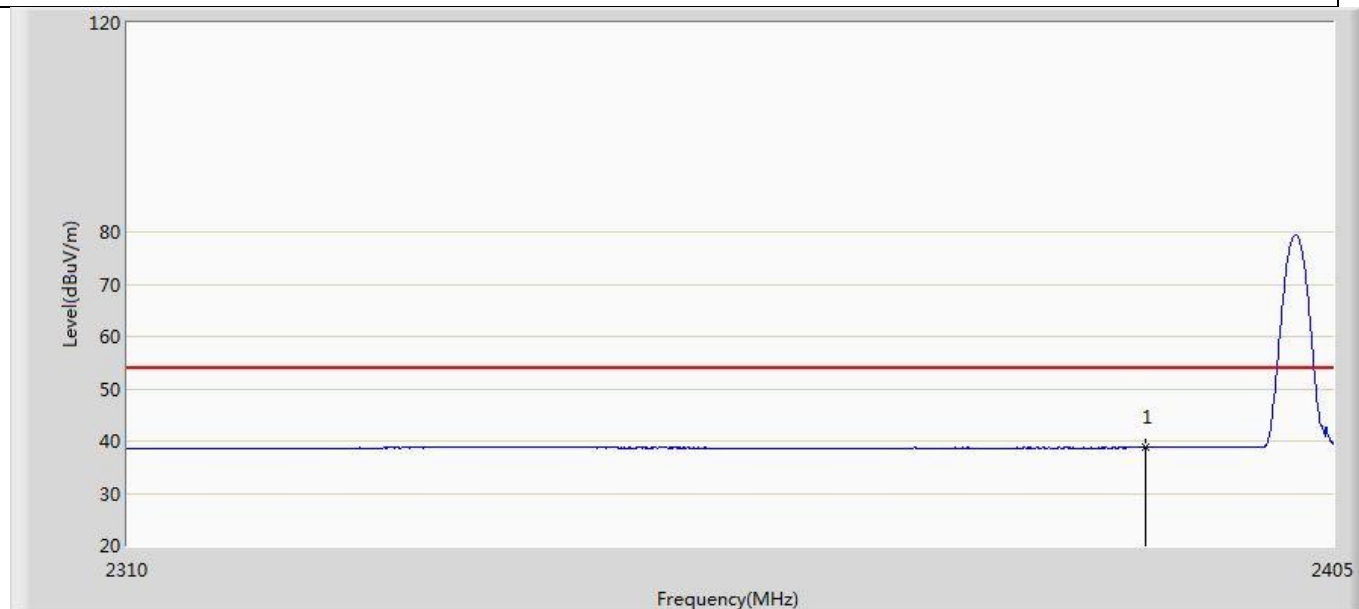
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	38.765	3.306	-15.235	54.000	35.459	AV

Profile: 2150819R	Page No.: 2
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 14:47
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1:Transmit at 2402MHz by LE_1Mbps	



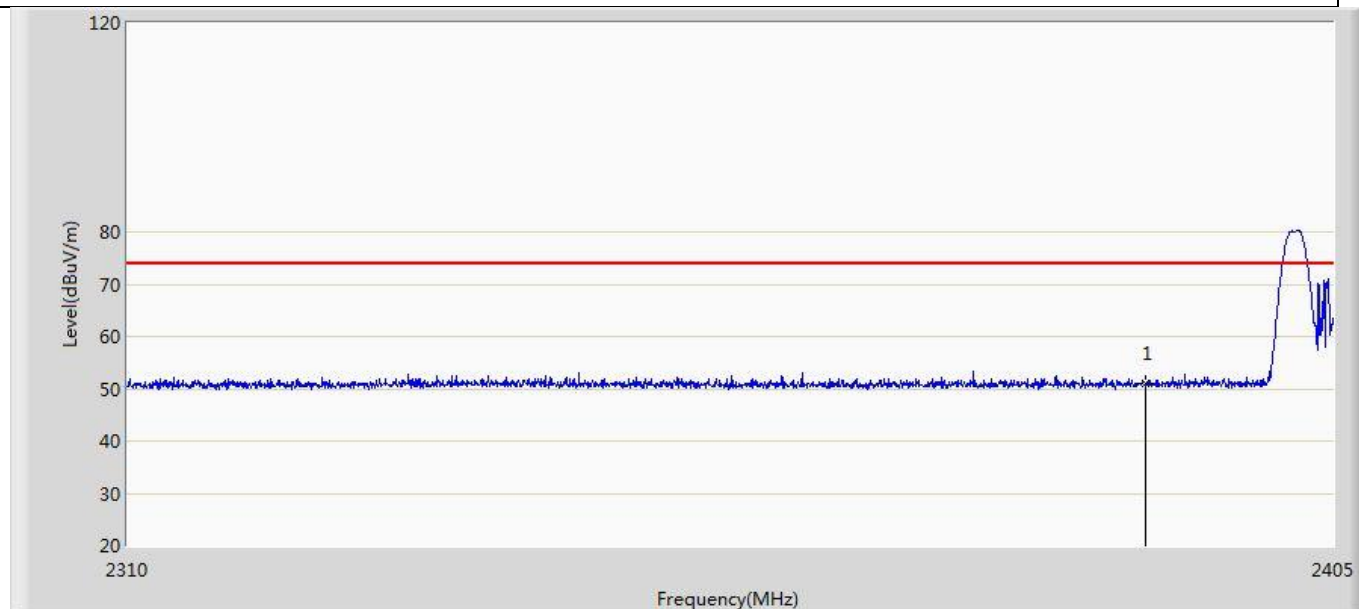
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	51.146	15.687	-22.854	74.000	35.459	PK

Profile: 2150819R	Page No.: 3
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 14:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1:Transmit at 2402MHz by LE_1Mbps	



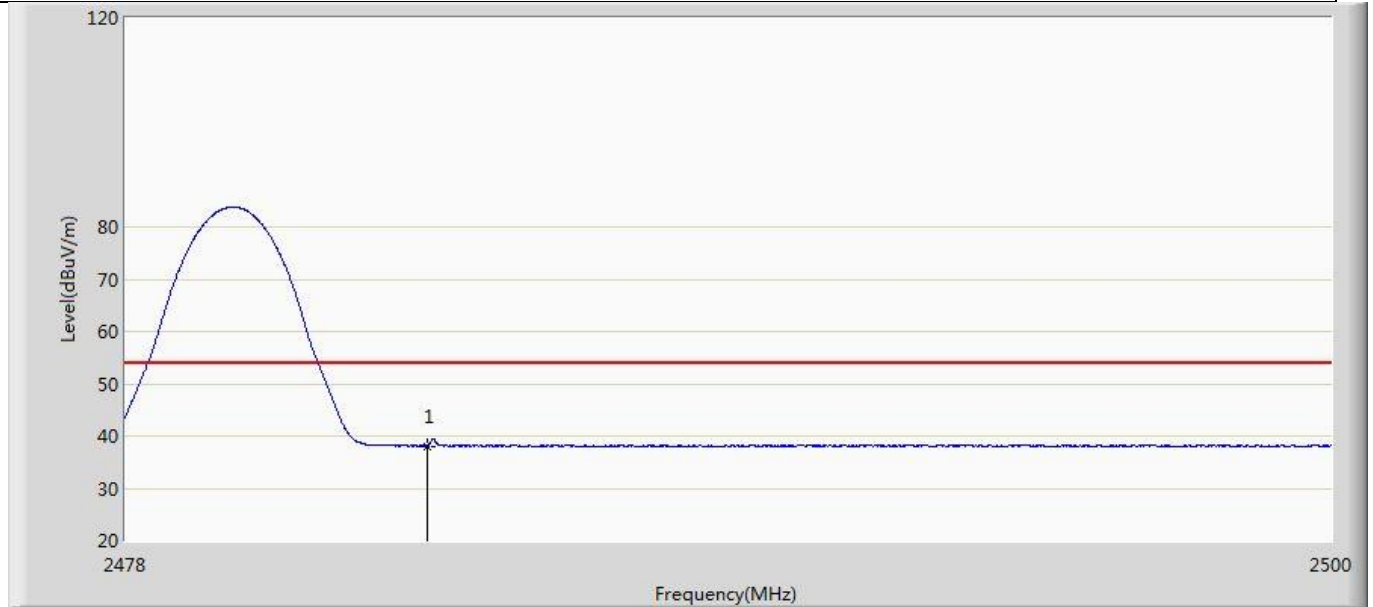
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	38.736	3.277	-15.264	54.000	35.459	AV

Profile: 2150819R	Page No.: 4
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 14:50
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1:Transmit at 2402MHz by LE_1Mbps	



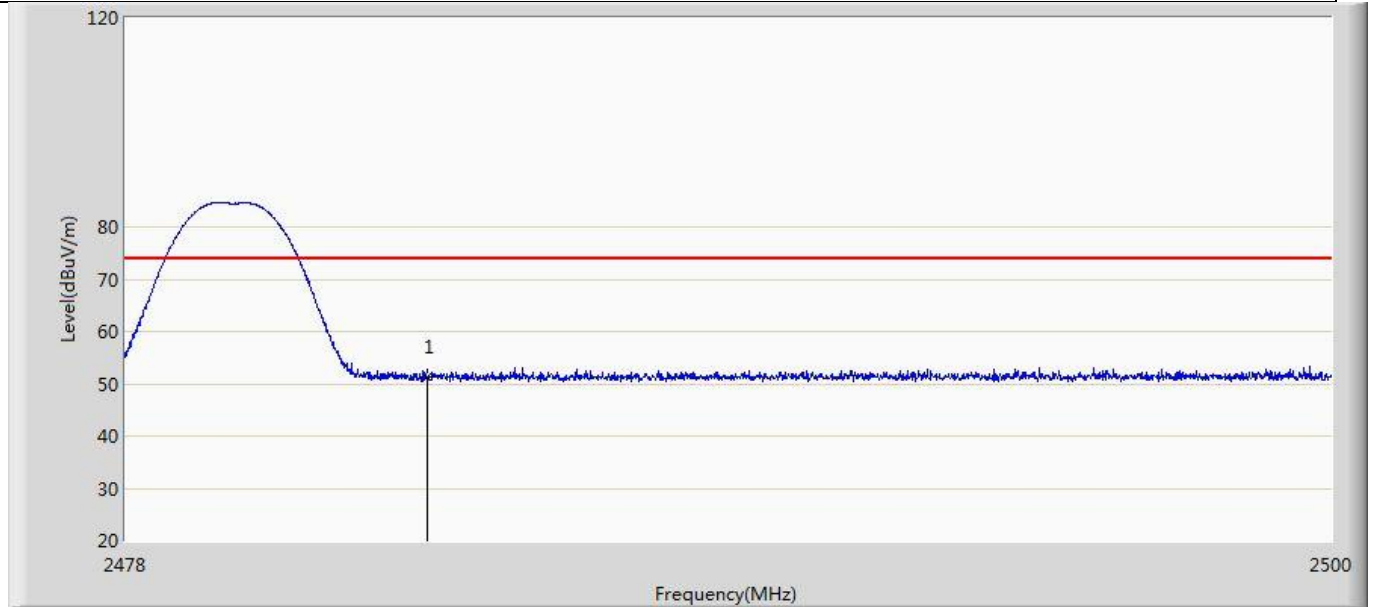
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	51.118	15.659	-22.882	74.000	35.459	PK

Profile: 2150819R	Page No.: 5
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 14:52
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1:Transmit at 2480MHz by LE_1Mbps	



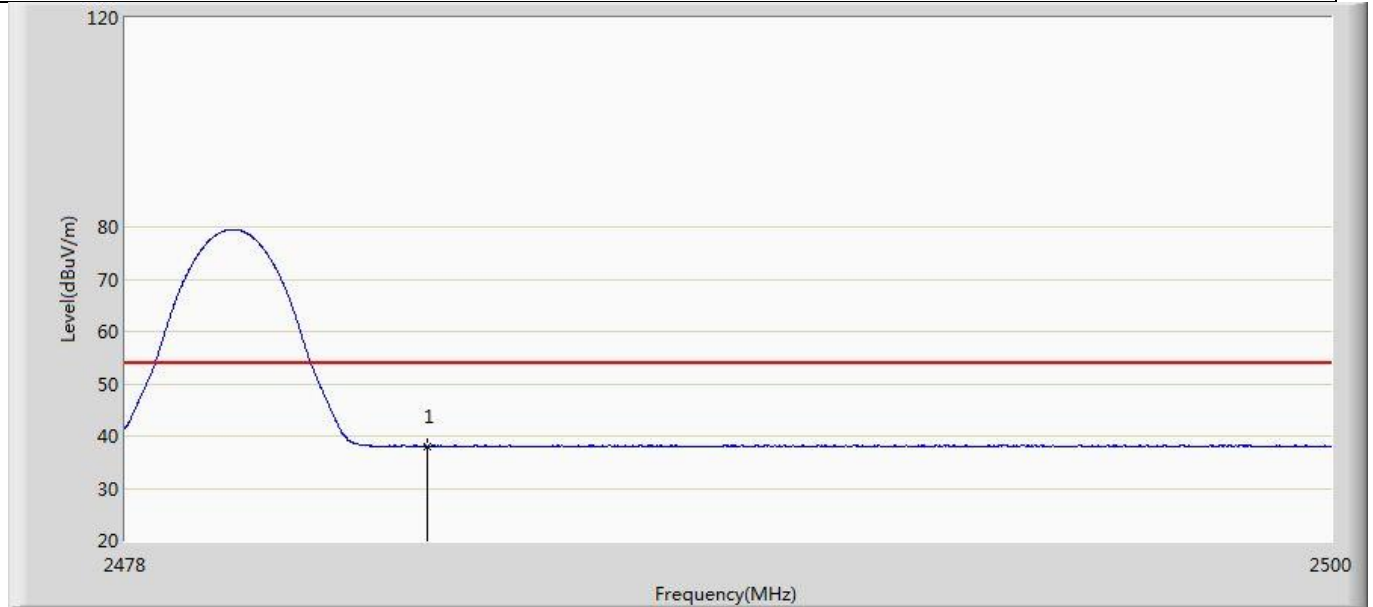
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	38.091	2.416	-15.909	54.000	35.675	AV

Profile: 2150819R	Page No.: 6
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 14:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1:Transmit at 2480MHz by LE_1Mbps	



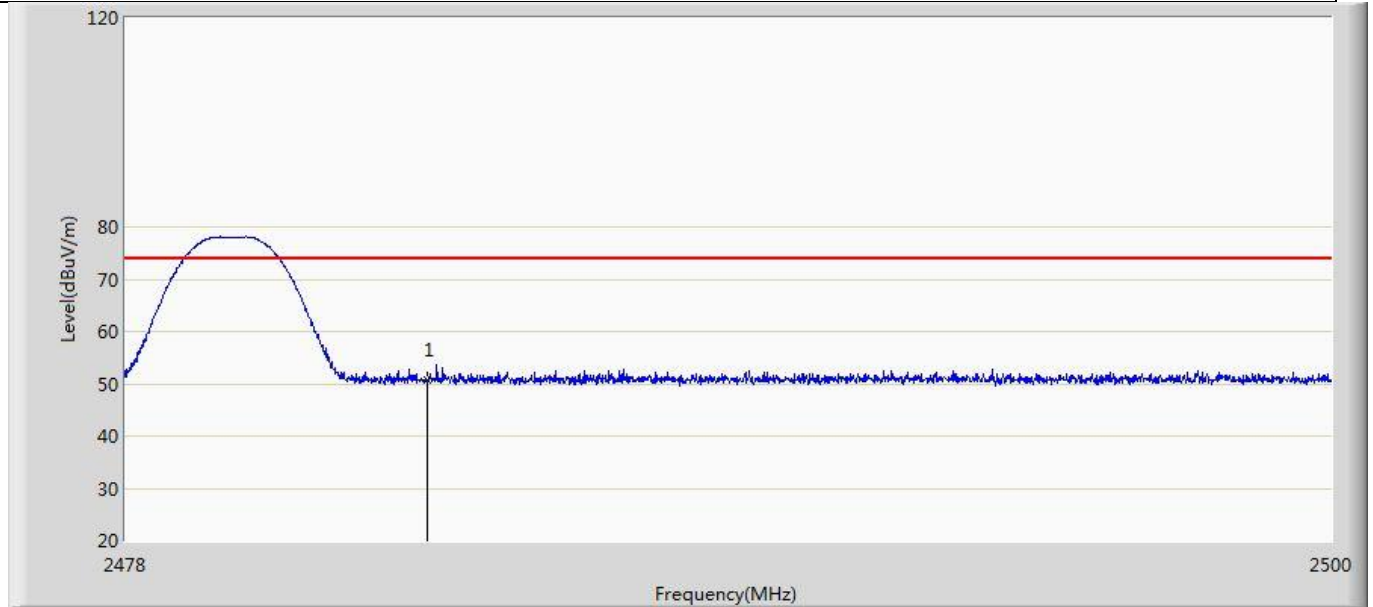
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	51.425	15.750	-22.575	74.000	35.675	PK

Profile: 2150819R	Page No.: 7
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 14:55
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1:Transmit at 2480MHz by LE_1Mbps	



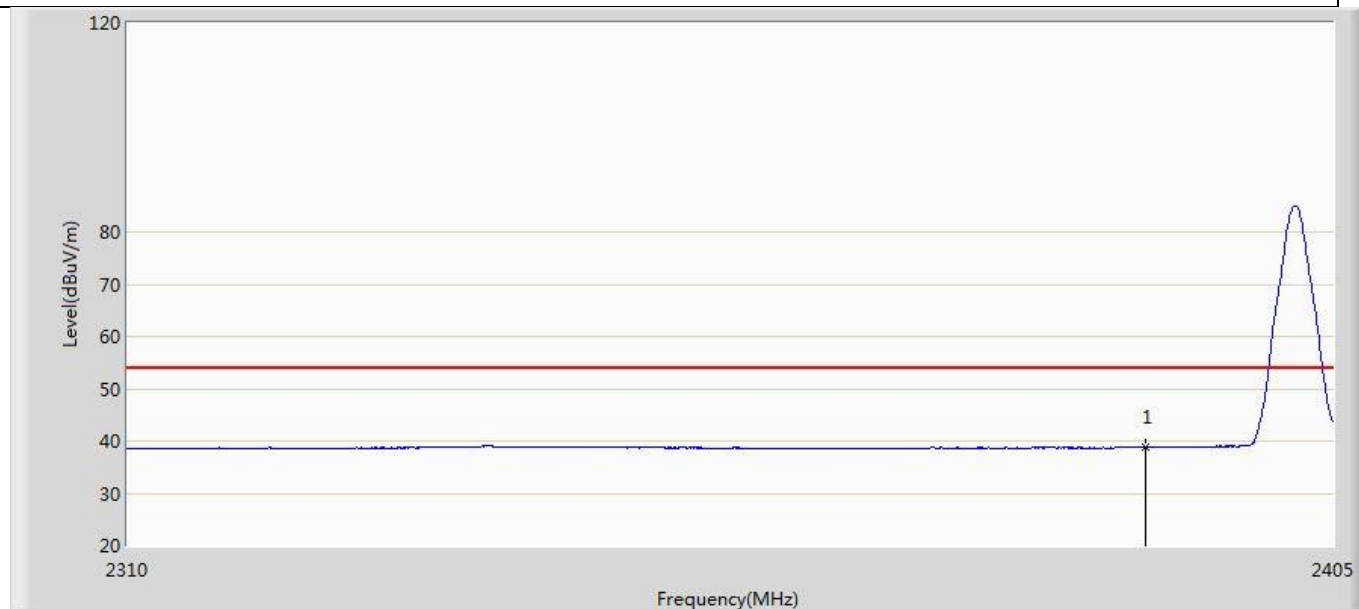
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	38.056	2.381	-15.944	54.000	35.675	AV

Profile: 2150819R	Page No.: 8
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 14:56
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 1:Transmit at 2480MHz by LE_1Mbps	



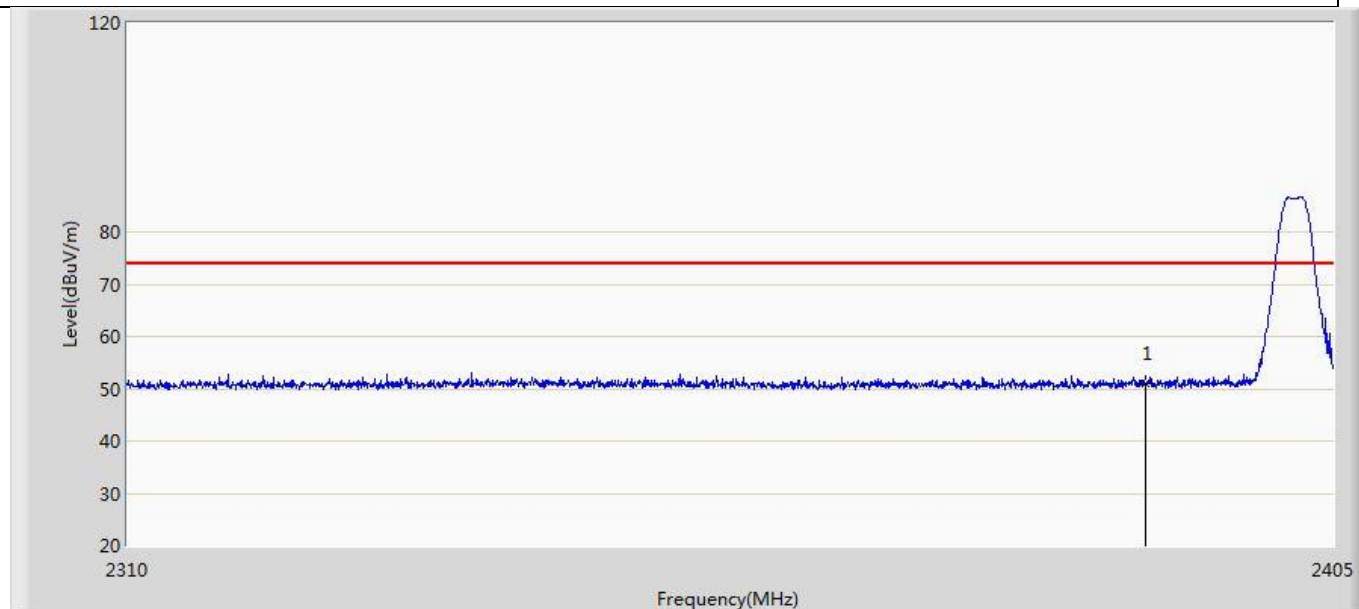
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	50.593	14.918	-23.407	74.000	35.675	PK

Profile: 2150819R	Page No.: 9
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 14:58
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 2:Transmit at 2402MHz by LE_2Mbps	



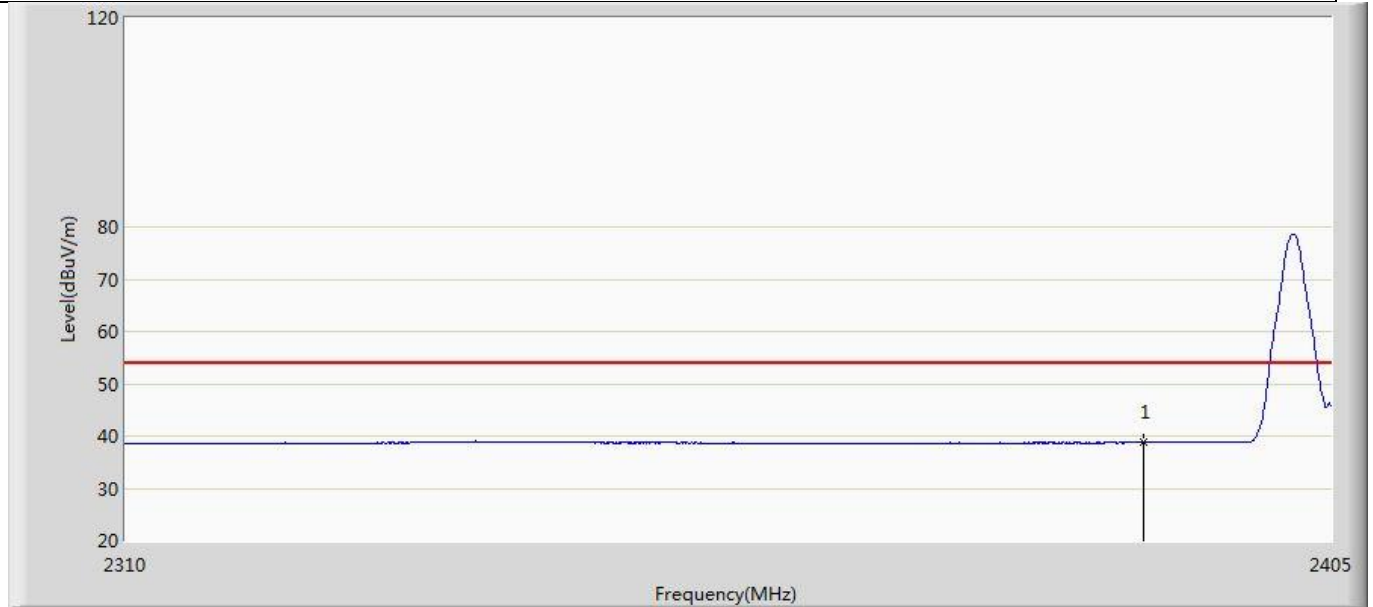
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	38.843	3.384	-15.157	54.000	35.459	AV

Profile: 2150819R	Page No.: 10
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:00
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 2:Transmit at 2402MHz by LE_2Mbps	



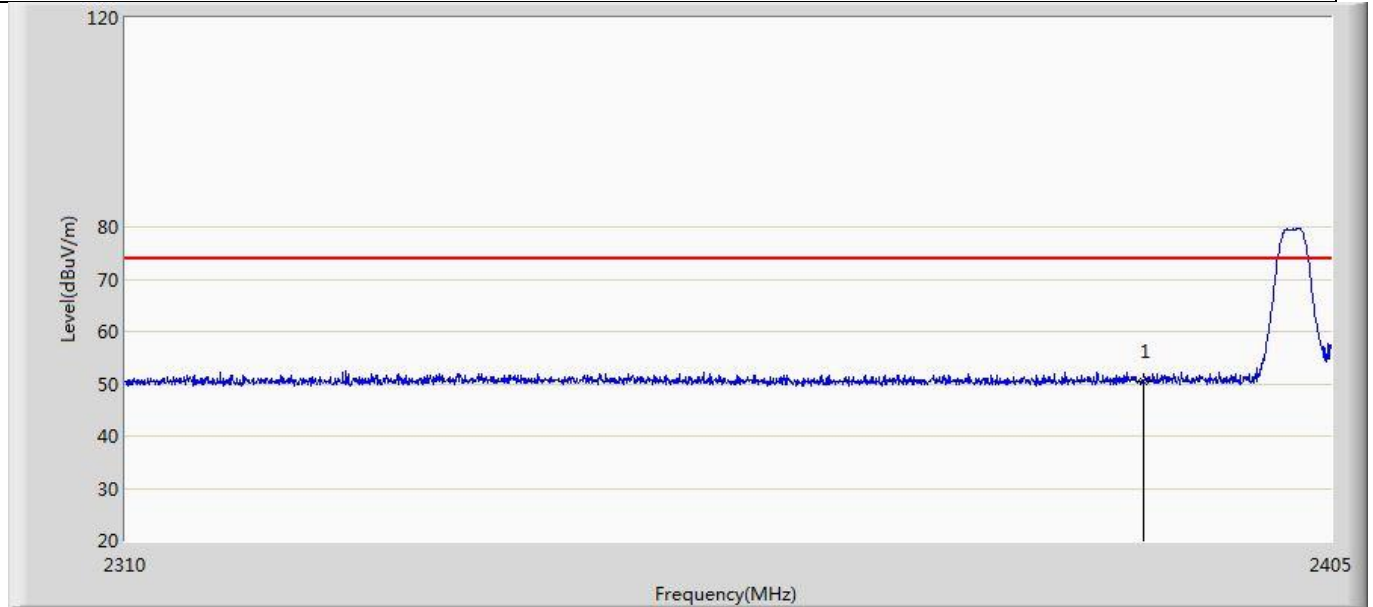
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	50.877	15.418	-23.123	74.000	35.459	PK

Profile: 2150819R	Page No.: 11
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:01
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 2:Transmit at 2402MHz by LE_2Mbps	



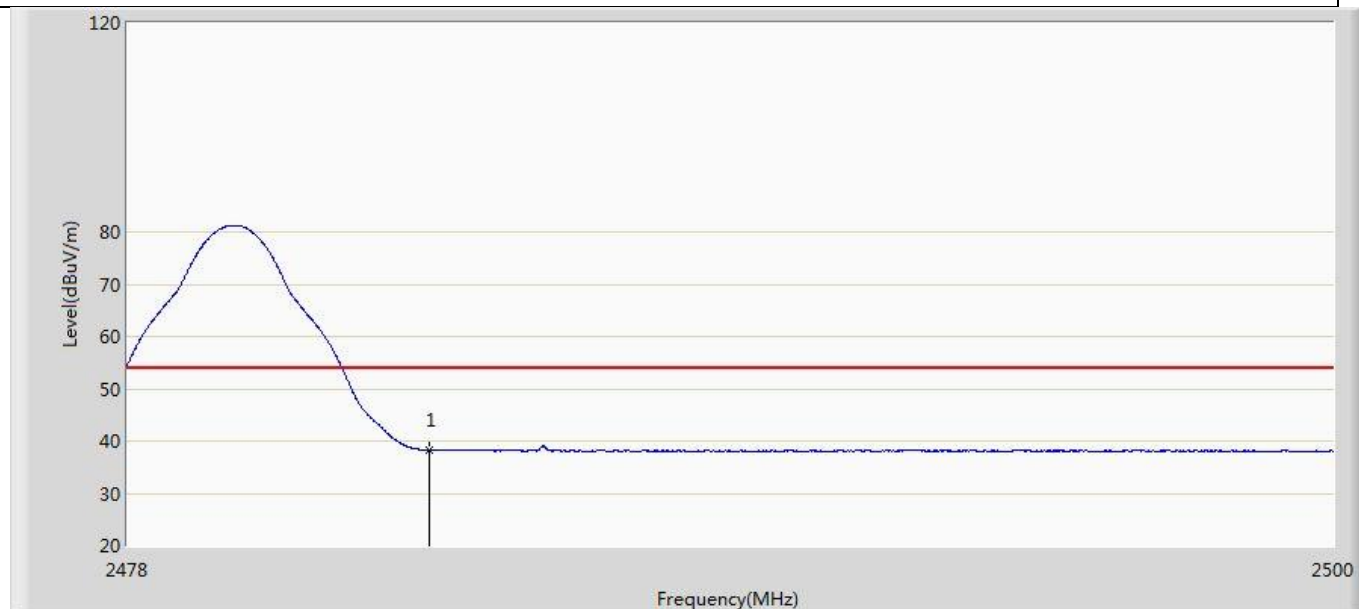
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	38.773	3.314	-15.227	54.000	35.459	AV

Profile: 2150819R	Page No.: 12
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:02
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 2:Transmit at 2402MHz by LE_2Mbps	



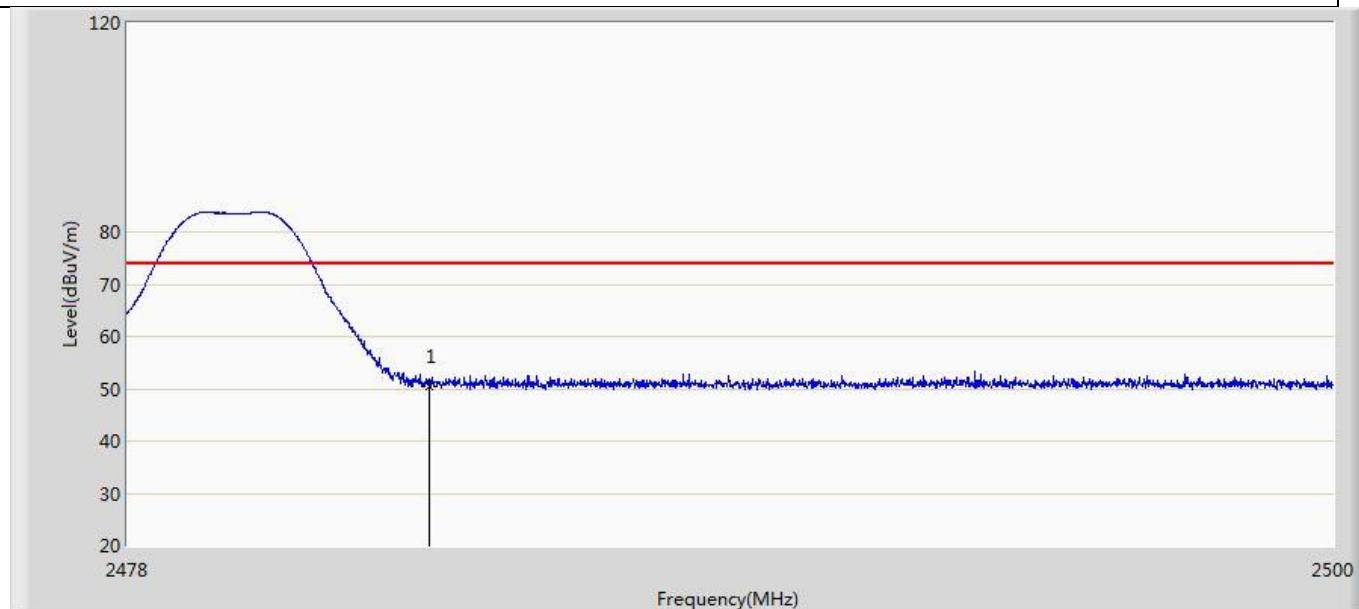
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	50.381	14.922	-23.619	74.000	35.459	PK

Profile: 2150819R	Page No.: 13
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:05
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 2:Transmit at 2480MHz by LE_2Mbps	



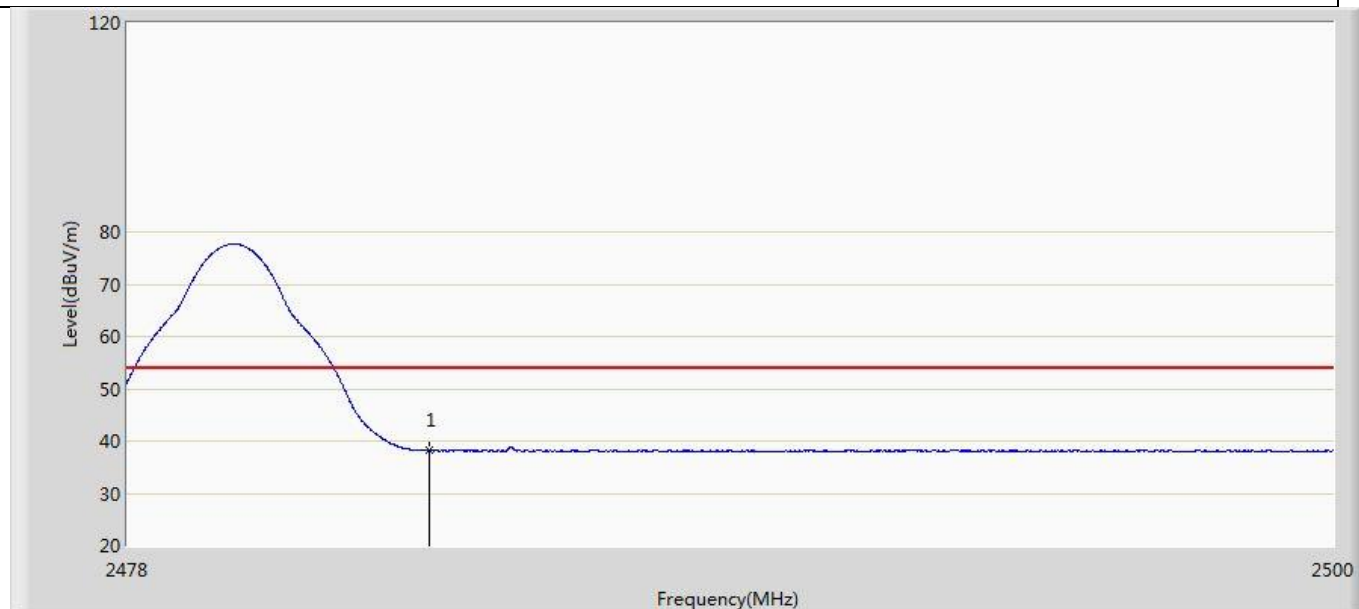
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	38.250	2.575	-15.750	54.000	35.675	AV

Profile: 2150819R	Page No.: 14
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:07
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 2:Transmit at 2480MHz by LE_2Mbps	



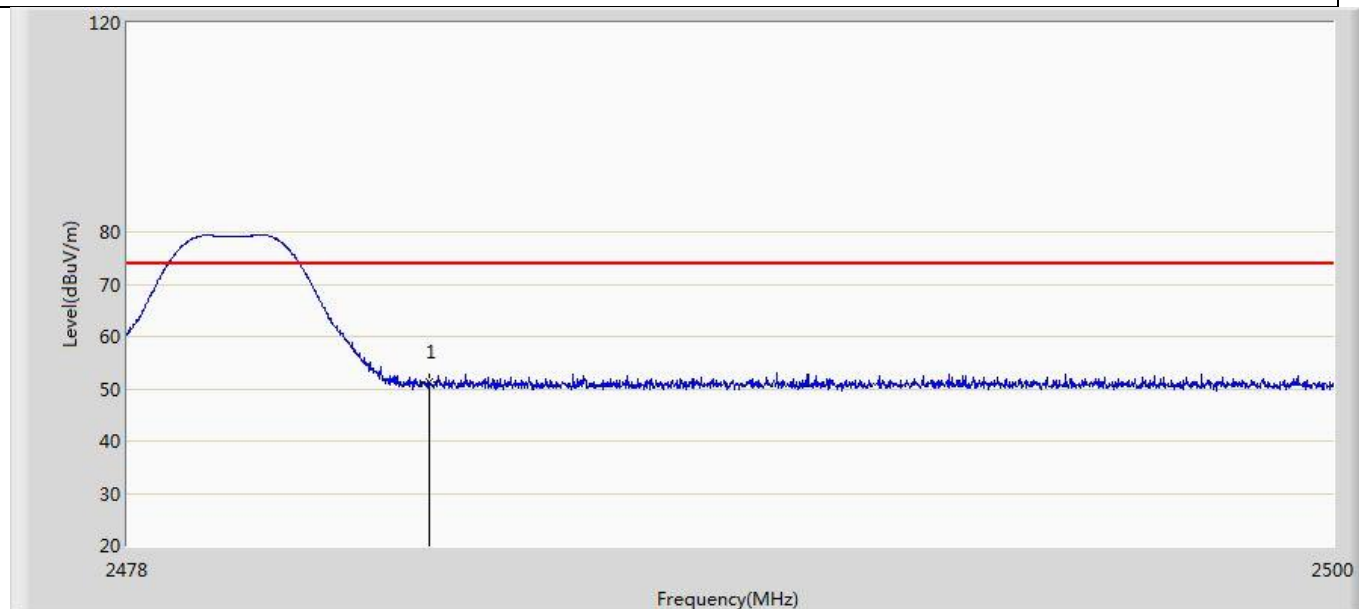
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	50.521	14.846	-23.479	74.000	35.675	PK

Profile: 2150819R	Page No.: 15
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:08
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 2:Transmit at 2480MHz by LE_2Mbps	



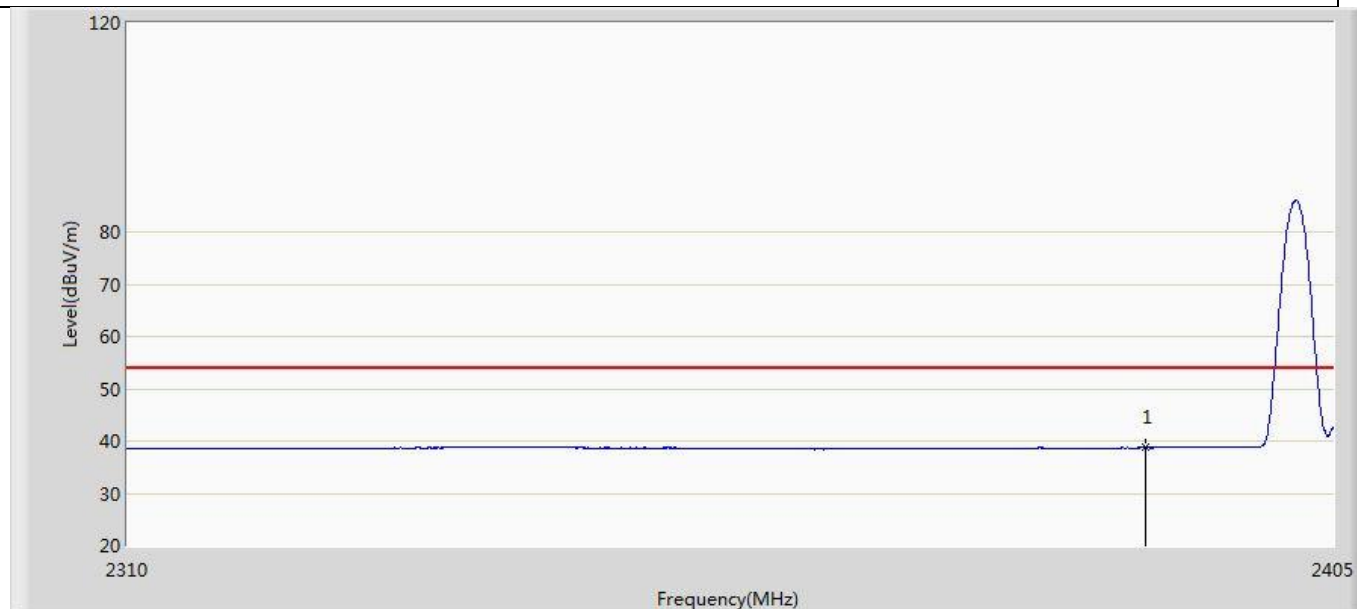
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	38.144	2.469	-15.856	54.000	35.675	AV

Profile: 2150819R	Page No.: 16
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:09
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 2:Transmit at 2480MHz by LE_2Mbps	



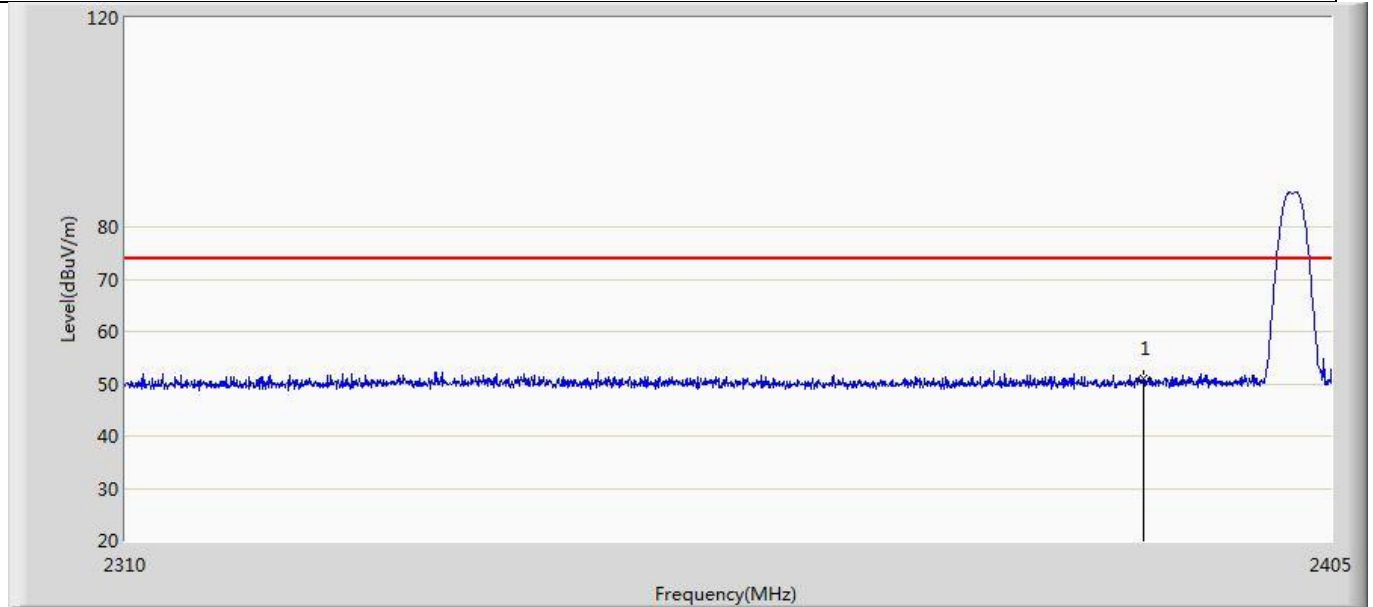
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	51.163	15.488	-22.837	74.000	35.675	PK

Profile: 2150819R	Page No.: 25
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:29
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 3: Transmit at 2402MHz by LE_Code S=2	



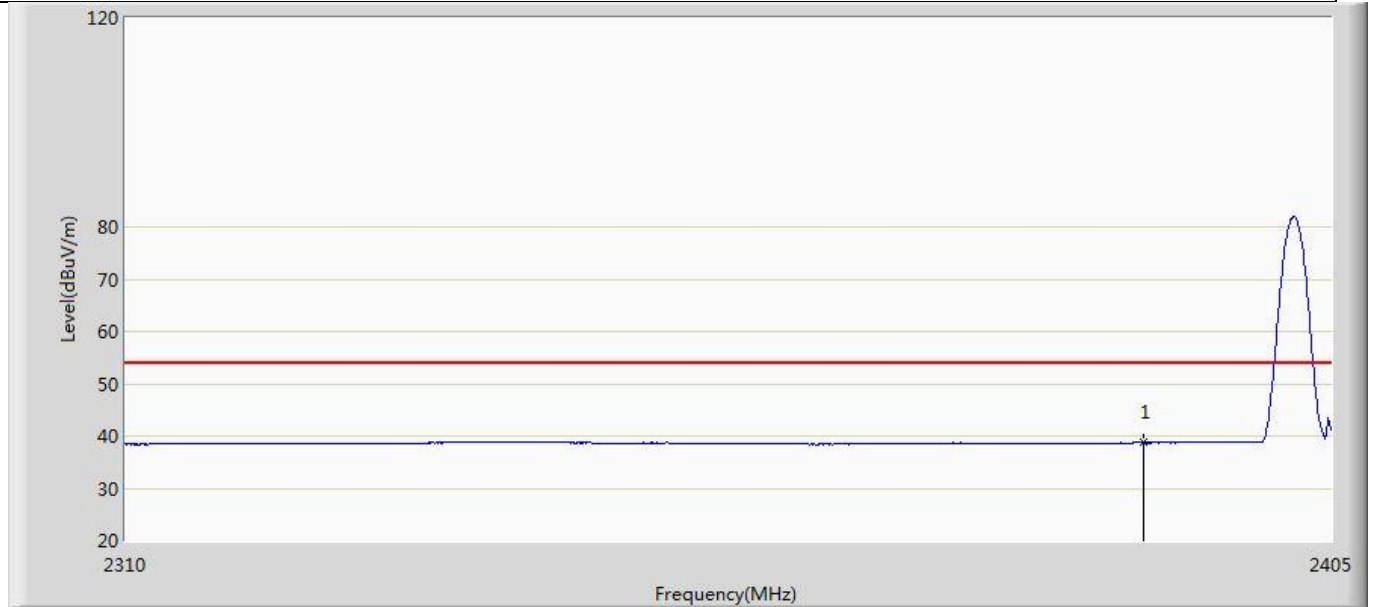
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	38.762	3.303	-15.238	54.000	35.459	AV

Profile: 2150819R	Page No.: 26
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:30
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 3: Transmit at 2402MHz by LE_Code S=2	



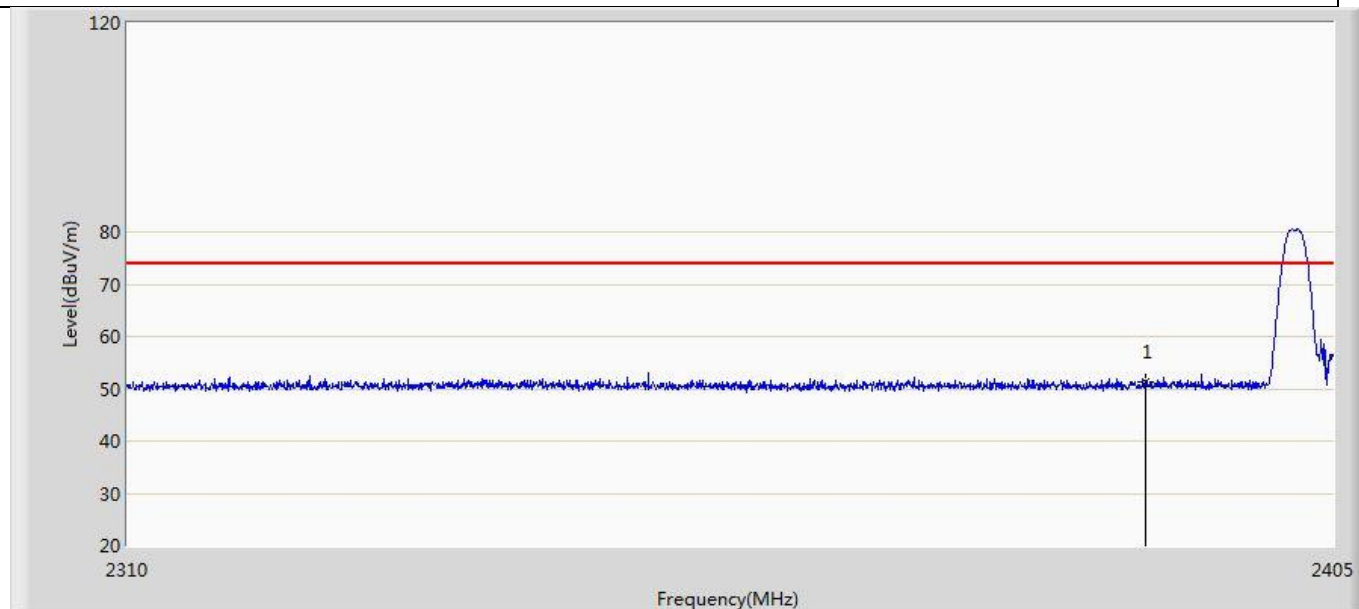
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	51.014	15.555	-22.986	74.000	35.459	PK

Profile: 2150819R	Page No.: 27
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:31
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 3: Transmit at 2402MHz by LE_Code S=2	



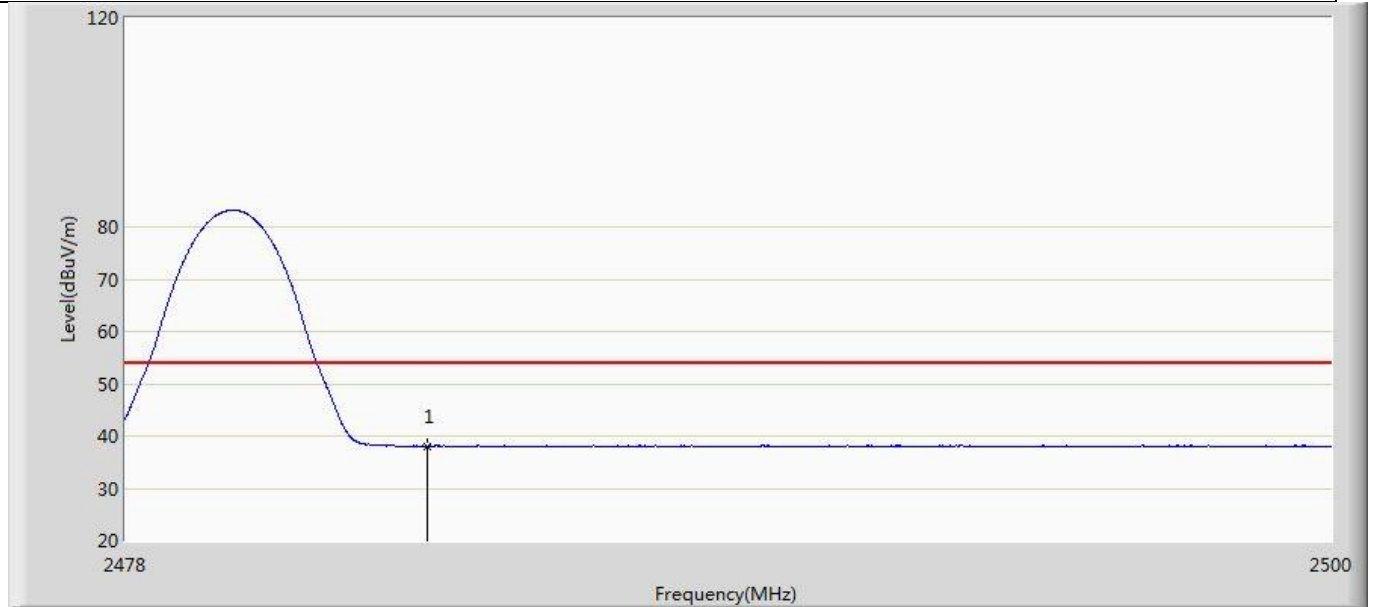
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	38.721	3.262	-15.279	54.000	35.459	AV

Profile: 2150819R	Page No.: 28
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:32
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 3: Transmit at 2402MHz by LE_Code S=2	



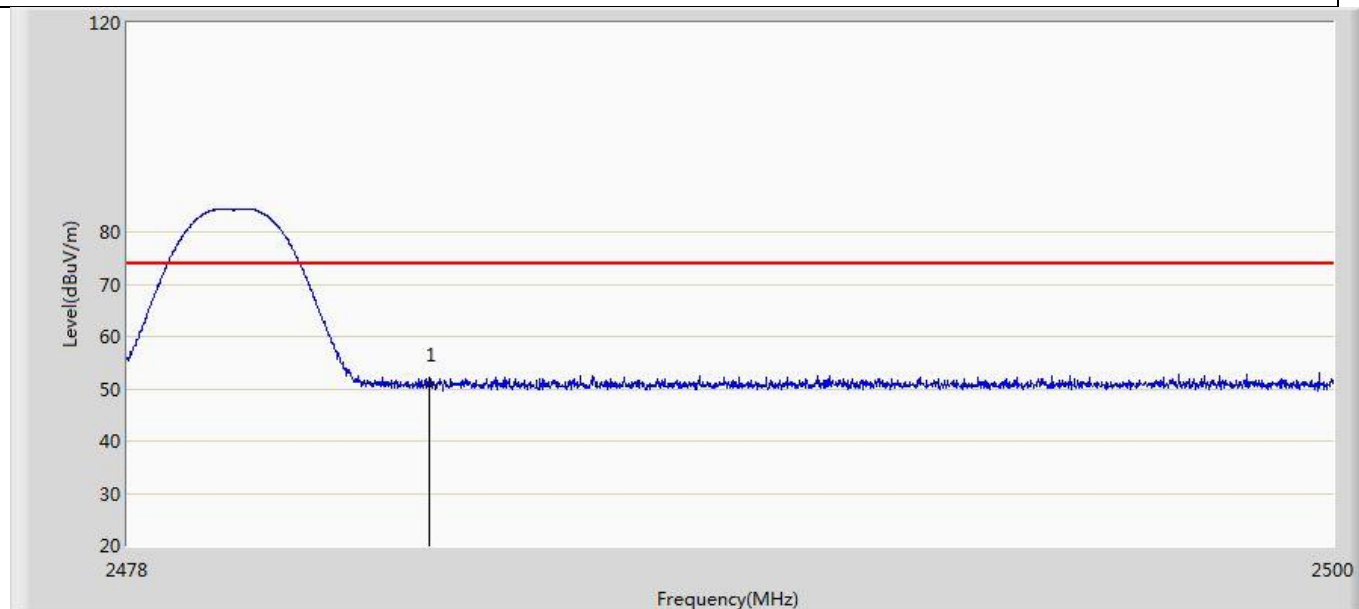
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	51.375	15.916	-22.625	74.000	35.459	PK

Profile: 2150819R	Page No.: 29
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:34
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 3: Transmit at 2480MHz by LE_Code S=2	



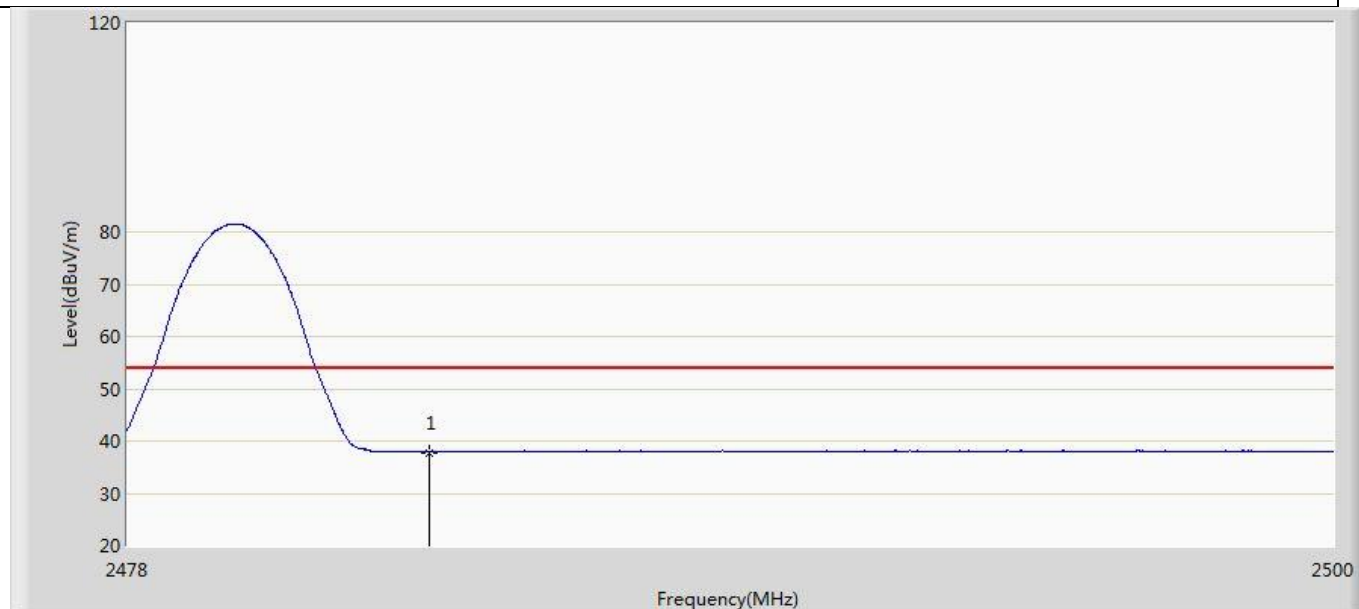
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	38.086	2.411	-15.914	54.000	35.675	AV

Profile: 2150819R	Page No.: 30
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:35
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 3: Transmit at 2480MHz by LE_Code S=2	



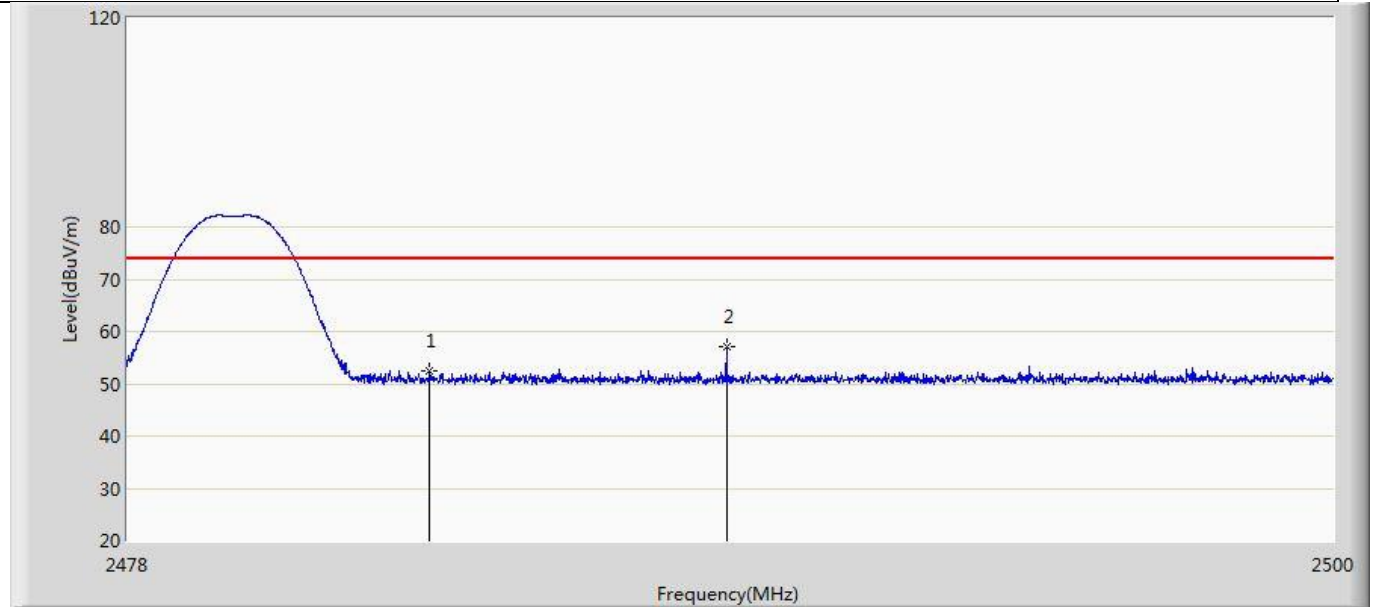
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	50.869	15.194	-23.131	74.000	35.675	PK

Profile: 2150819R	Page No.: 31
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:37
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 3: Transmit at 2480MHz by LE_Code S=2	



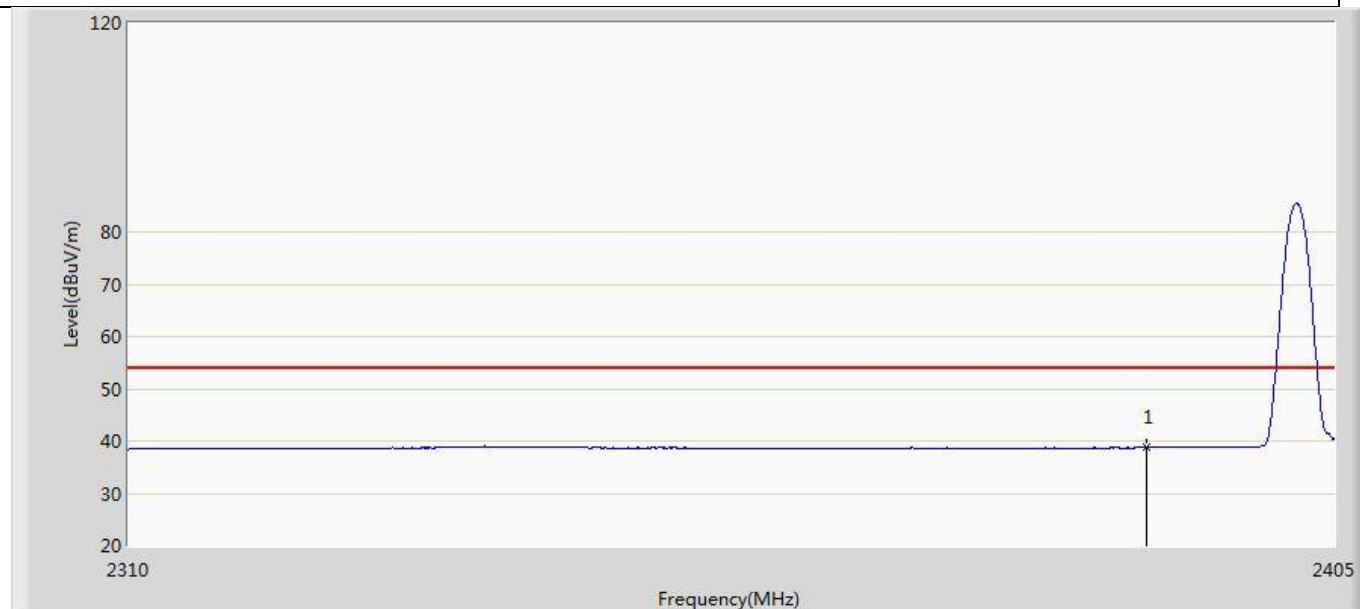
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	37.675	2.000	-16.325	54.000	35.675	AV

Profile: 2150819R	Page No.: 32
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:37
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 3: Transmit at 2480MHz by LE_Code S=2	



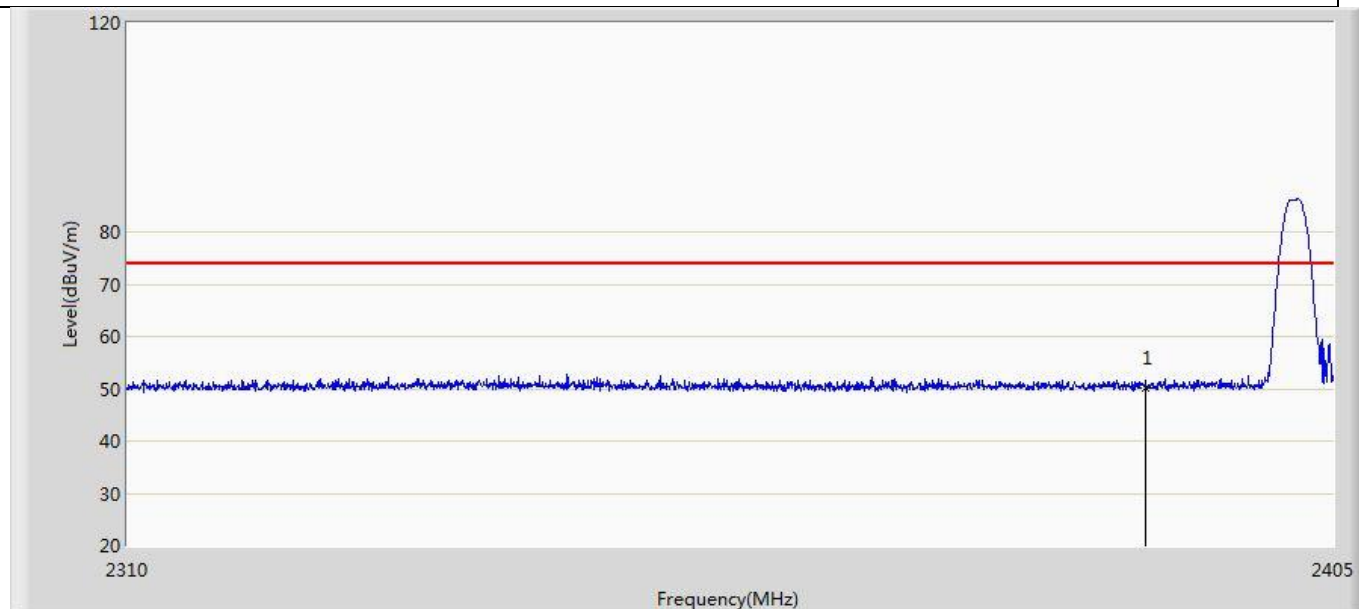
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2483.500	52.333	16.658	-21.667	74.000	35.675	PK
2	*	2488.912	56.971	21.286	-17.029	74.000	35.685	PK

Profile: 2150819R	Page No.: 17
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:14
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 4: Transmit at 2402MHz by LE_Code S=8	



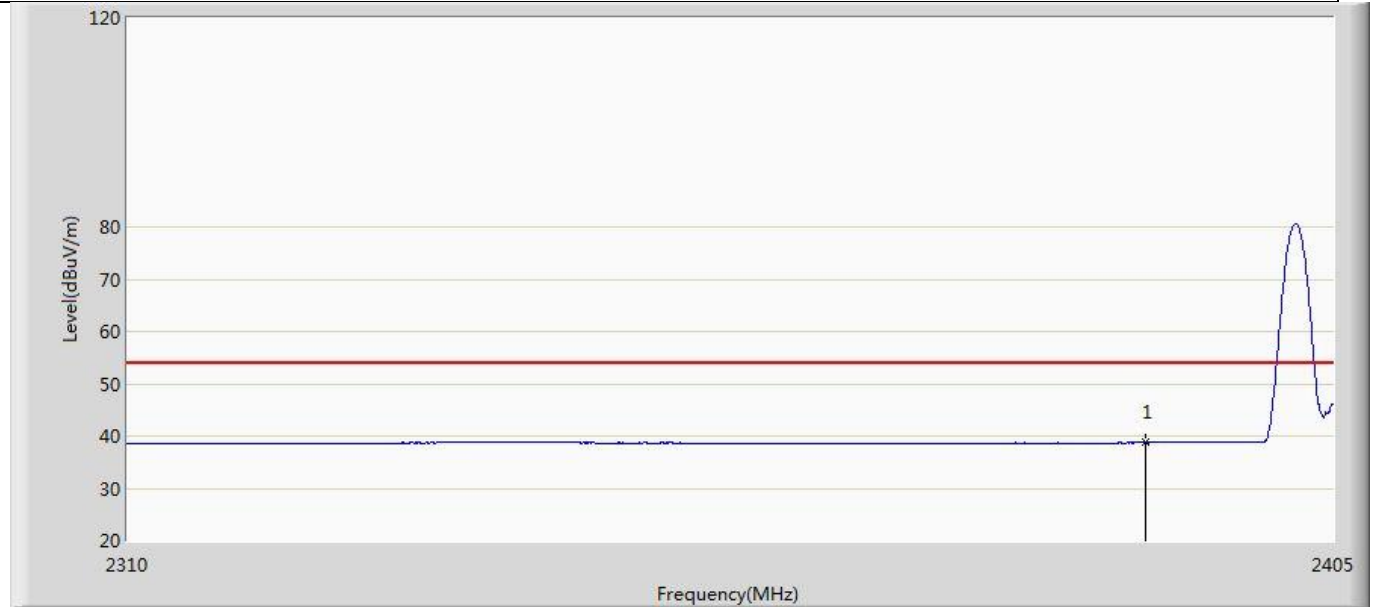
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	38.847	3.388	-15.153	54.000	35.459	AV

Profile: 2150819R	Page No.: 18
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:15
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 4: Transmit at 2402MHz by LE_Code S=8	



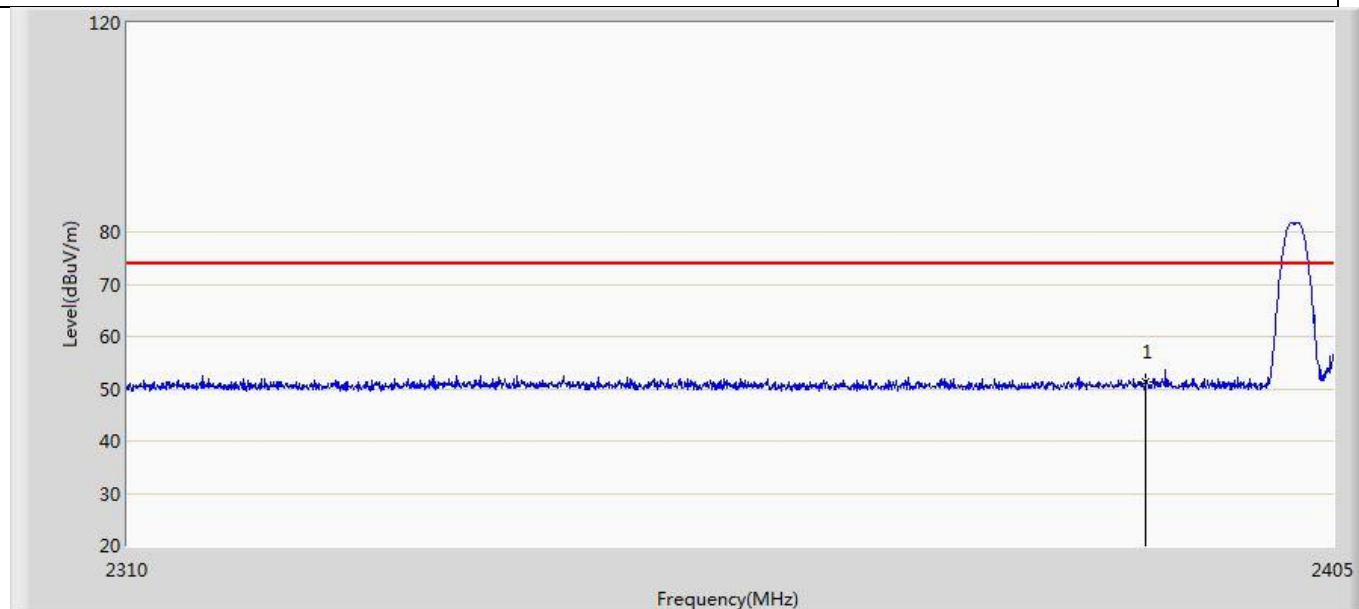
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	50.099	14.640	-23.901	74.000	35.459	PK

Profile: 2150819R	Page No.: 19
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:16
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 4: Transmit at 2402MHz by LE_Code S=8	



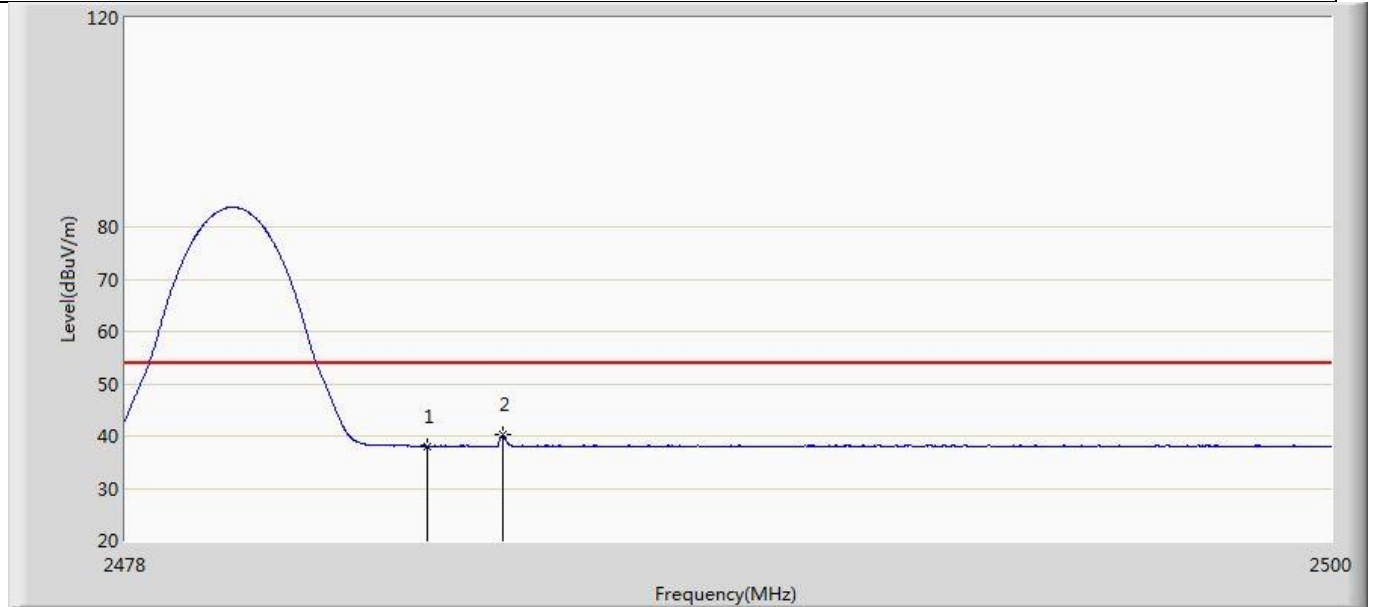
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	38.752	3.293	-15.248	54.000	35.459	AV

Profile: 2150819R	Page No.: 20
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:17
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 4: Transmit at 2402MHz by LE_Code S=8	



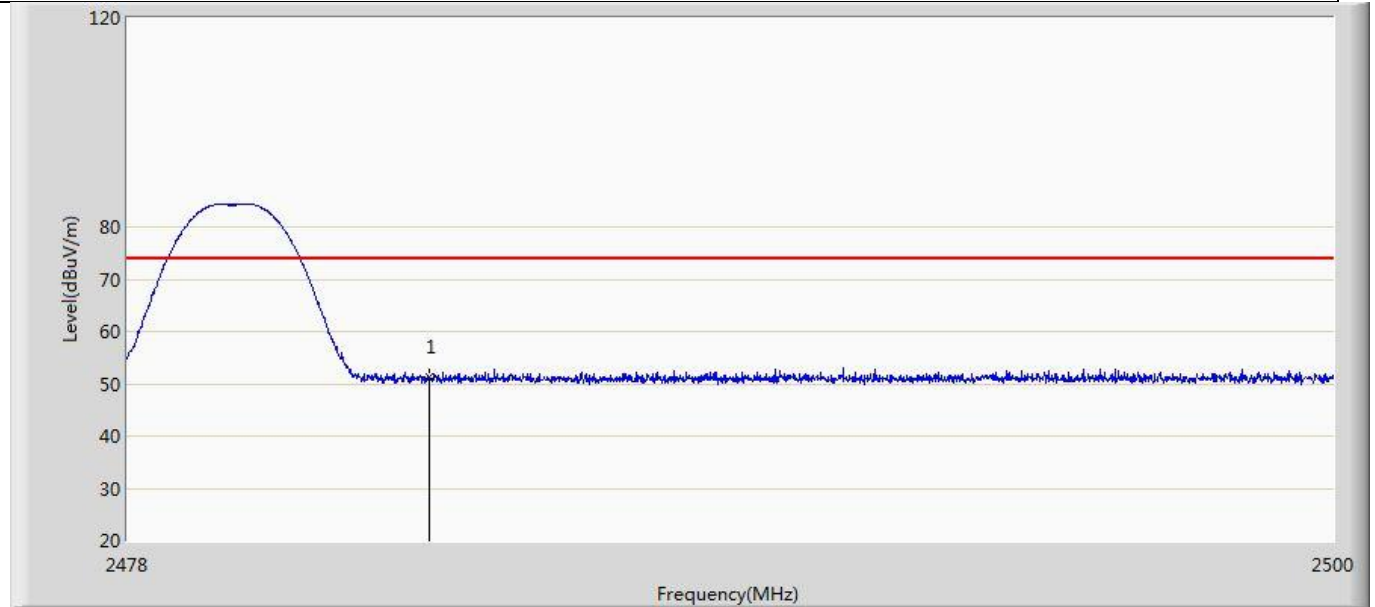
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	51.273	15.814	-22.727	74.000	35.459	PK

Profile: 2150819R	Page No.: 21
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:22
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 4: Transmit at 2480MHz by LE_Code S=8	



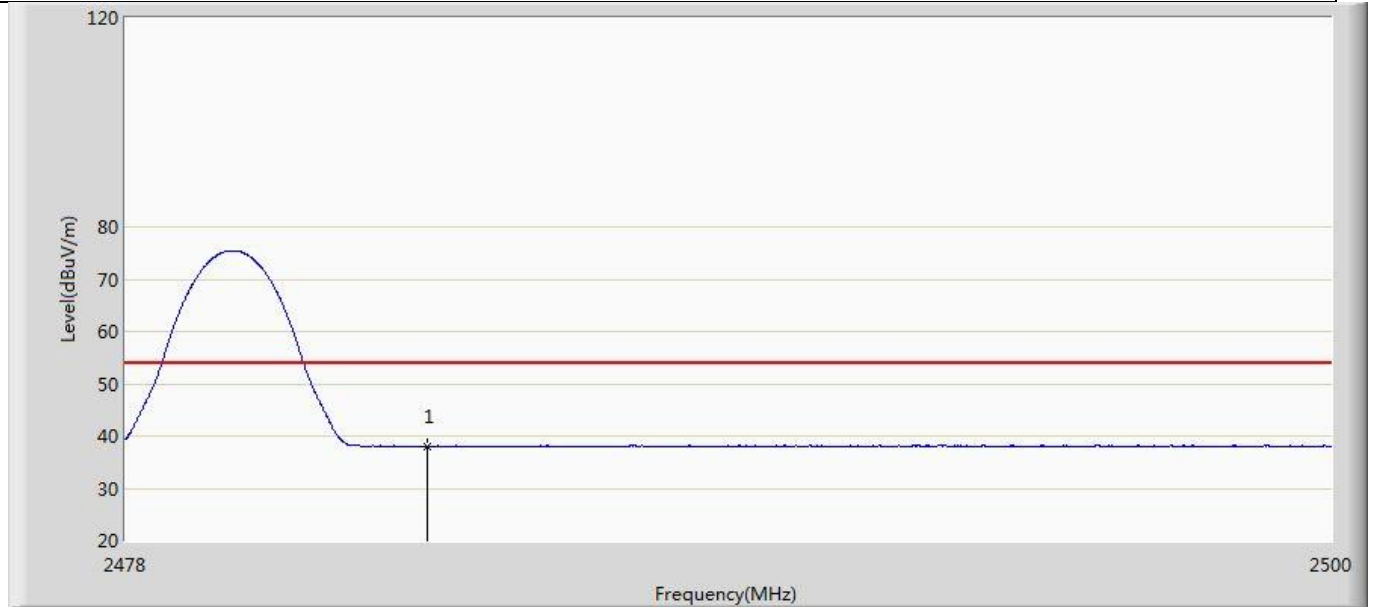
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2483.500	38.104	2.429	-15.896	54.000	35.675	AV
2	*	2484.875	40.360	4.682	-13.640	54.000	35.678	AV

Profile: 2150819R	Page No.: 22
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:23
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Horizontal
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 4: Transmit at 2480MHz by LE_Code S=8	



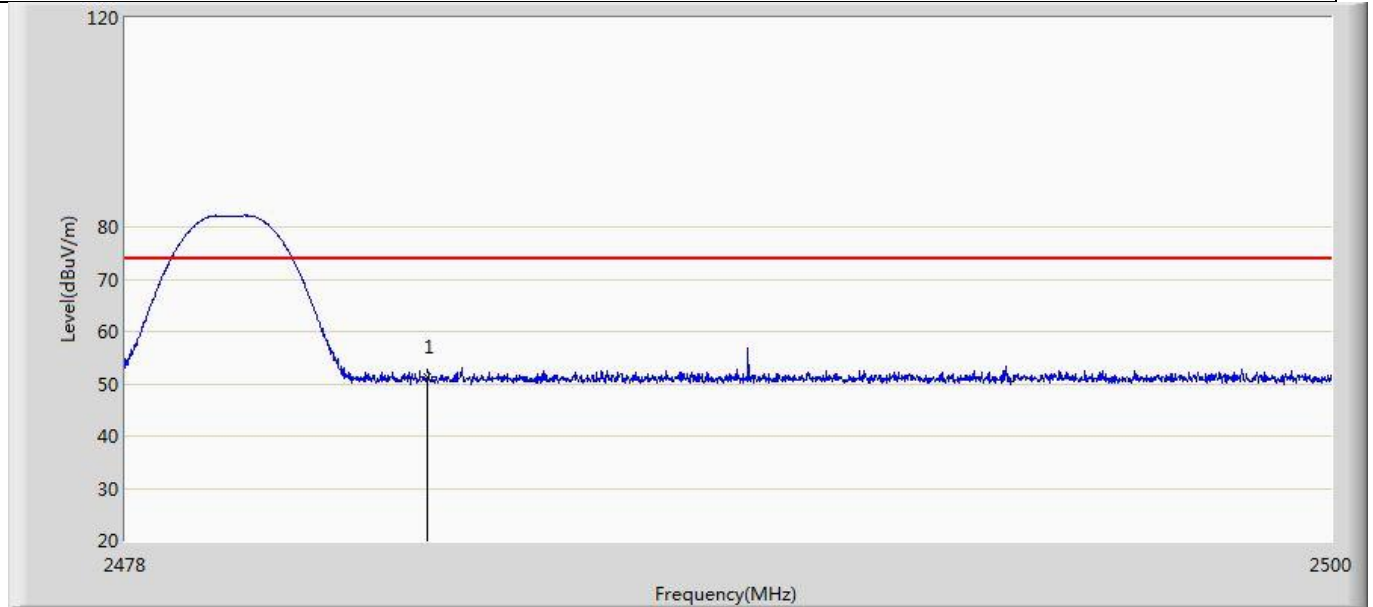
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	51.315	15.640	-22.685	74.000	35.675	PK

Profile: 2150819R	Page No.: 23
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:25
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 4: Transmit at 2480MHz by LE_Code S=8	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	38.069	2.394	-15.931	54.000	35.675	AV

Profile: 2150819R	Page No.: 24
Engineer: Juliuszhou	
Site: AC5	Time: 2021/07/10 - 15:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00123988_(1-18GHz)	Polarity: Vertical
EUT: LocoTrack Primary	Power: 6 Vdc
Note: Mode 4: Transmit at 2480MHz by LE_Code S=8	

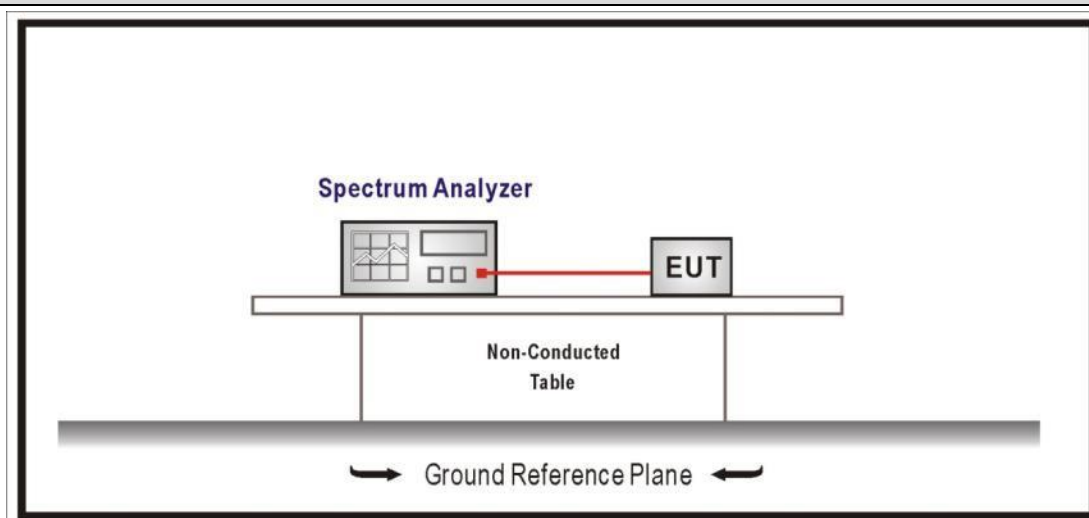


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	51.279	15.604	-22.721	74.000	35.675	PK

4.6 DTS Bandwidth**VERDICT: PASS****4.6.1 Limit****Standard**

FCC Part 15 Subpart C Paragraph 15.247 (a)(2)

Systems using digital modulation techniques operate in the 2400-2483.5 MHz. The minimum 6 dB bandwidth shall be at least 500 kHz

4.6.2 Test Setup**4.6.3 Test Procedure**

	Reference Rule	Chapter	Description
☒	ANSI C63.10	11.8	DTS bandwidth
☐	ANSI C63.10	11.8.1	Option 1
☒	ANSI C63.10	11.8.2	Option 2

4.6.4 Test Data

Mode	CH.	Test Freq. (MHz)	99% Occupied Bandwidth (MHz)	6dB Occupied Bandwidth (kHz)	Limit (kHz)	Result
1	00	2402	1.0144	698	>500	Pass
	19	2440	1.0081	732.2	>500	Pass
	39	2480	1.0136	749.1	>500	Pass
2	00	2402	1.9964	1374	>500	Pass
	19	2440	1.9962	1277	>500	Pass
	39	2480	1.9983	1374	>500	Pass
3	00	2402	1.0122	709.6	>500	Pass
	19	2440	1.0112	720.8	>500	Pass
	39	2480	1.0142	697.1	>500	Pass
4	00	2402	1.0447	731.8	>500	Pass
	19	2440	1.0476	733.8	>500	Pass
	39	2480	1.0443	667.5	>500	Pass

Note : The worst case of Occupied Bandwidth as below:

99% Occupied Bandwidth

Mode 2 CH00 (2402MHz)



6dB Occupied Bandwidth

Mode 4 CH39(2480MHz)



4.7 Fundamental emission output power

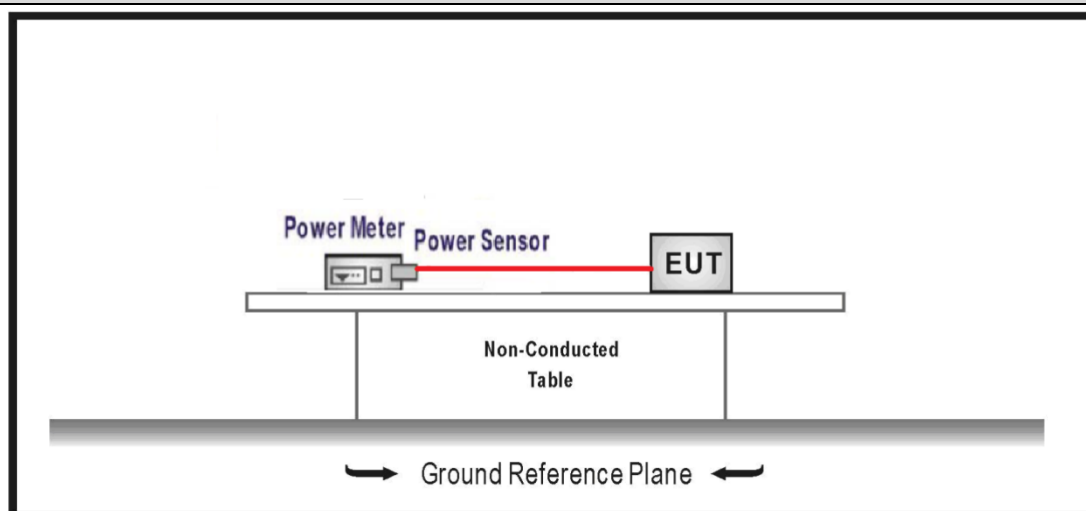
VERDICT: PASS

4.7.1 Limit

Standard		FCC Part 15 Subpart C Paragraph 15.247 (b)(3)
☒	GTX < 6dBi	$P_{out} \leq 30\text{dBm}$
☐	GTX > 6dBi	
☐	Non-Fix point-point	$P_{out} \leq 30 - (GTX - 6)$
☐	Fix point-point	$P_{out} \leq 30 - [(GTX - 6)]/3$
☐	Point-to-multipoint	$P_{out} \leq 30 - (GTX - 6)$
☐	Overlap Beams	$P_{out} \leq 30 - [(GTX - 6)]/3$
☐	Aggregate power transmitted simultaneously on all beams	$P_{out} \leq 30 - [(GTX - 6)]/3$
☐	single directional beam	$P_{out} \leq 30 - [(GTX - 6)]/3 + 8\text{dB}$

Note 1 : GTX directional gain of transmitting antennas.
 Note 2 : Pout is maximum peak conducted output power .

4.7.2 Test Setup



4.7.3 Test Procedure

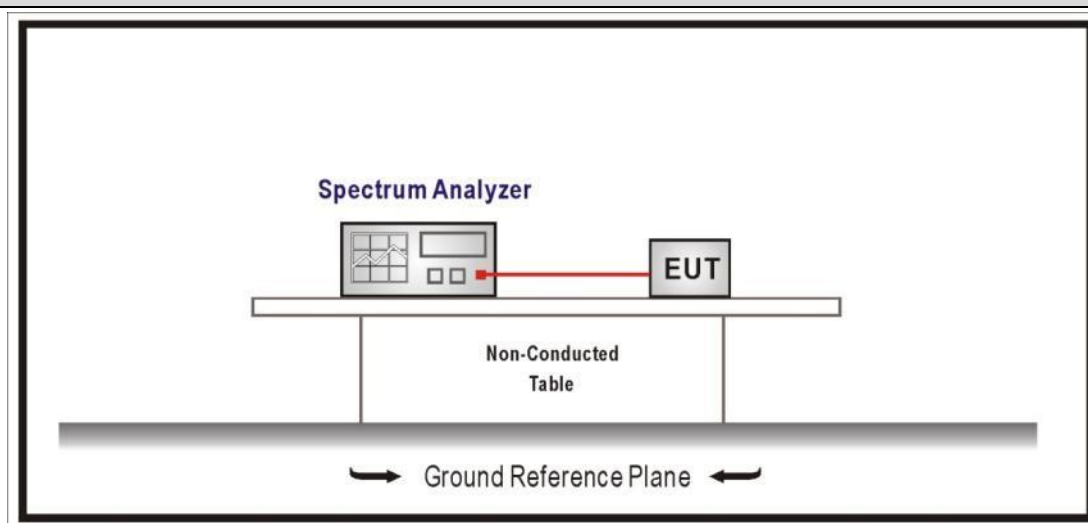
	References Rule			Chapter	Description	
☒	ANSI C63.10			11.9	Fundamental emission output power	
	☒	ANSI C63.10			11.9.1	Maximum peak conducted output power
		☐	ANSI C63.10		11.9.1.1	RBW ≥ DTS bandwidth
		☐	ANSI C63.10		11.9.1.2	Integrated band power method
		☒	ANSI C63.10		11.9.1.3	PKPM1 Peak power meter method
	☐	ANSI C63.10			11.9.2	Maximum conducted (average) output power
		☐	ANSI C63.10		11.9.2.2	Measurement using a spectrum analyzer (SA)
			☐	ANSI C63.10	11.9.2.2.2	Method AVGSA-1(Duty cycle≥98%)
			☐	ANSI C63.10	11.9.2.2.3	Method AVGSA-1A(Duty cycle≥98%)
			☐	ANSI C63.10	11.9.2.2.4	Method AVGSA-2(Duty cycle≤98%)
			☐	ANSI C63.10	11.9.2.2.5	Method AVGSA-2A(Duty cycle≤98%)
			☐	ANSI C63.10	11.9.2.2.4	Method AVGSA-3
			☐	ANSI C63.10	11.9.2.2.5	Method AVGSA-3A
		☐	ANSI C63.10		11.9.2.3	Measurement using a power meter (PM)
			☐	ANSI C63.10	11.9.2.3.1	Method AVGPM
			☐	ANSI C63.10	11.9.2.3.2	Method AVGPM-G

4.7.4 Test Data

Mode	Channel	Test Frequency (MHz)	Conducted Power (dBm)	EIRP (dBm)	Conducted Power Limit (dBm)	EIRP Limit (dBm)	Result
Mode 1	00	2402	-6.70	-3.08	≤30	≤36	Pass
	19	2440	-7.04	-3.42	≤30	≤36	Pass
	39	2480	-6.56	-2.94	≤30	≤36	Pass
Mode 2	00	2402	-5.76	-2.14	≤30	≤36	Pass
	19	2440	-6.03	-2.41	≤30	≤36	Pass
	39	2480	-5.51	-1.89	≤30	≤36	Pass
Mode 3	00	2402	-6.82	-3.20	≤30	≤36	Pass
	19	2440	-7.11	-3.49	≤30	≤36	Pass
	39	2480	-6.65	-3.03	≤30	≤36	Pass
Mode 4	00	2402	-6.84	-3.22	≤30	≤36	Pass
	19	2440	-7.12	-3.50	≤30	≤36	Pass
	39	2480	-6.63	-3.01	≤30	≤36	Pass

4.8 Power Density**VERDICT: PASS****4.8.1 Limit:****Standard**

FCC Part 15 Subpart C Paragraph 15.247 (b)(3)

Power Spectral Density $\leq 8\text{dBm}/3\text{kHz}$ **4.8.2 Test Setup****4.8.3 Test Procedure**

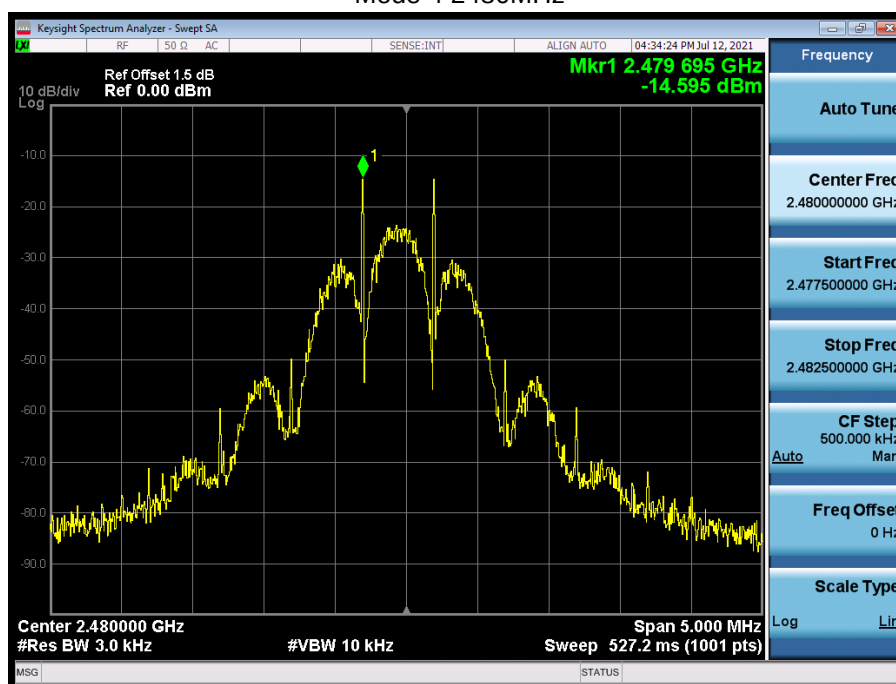
	References Rule		Chapter	Description
☒	ANSI C63.10		11.10	Maximum power spectral density level in the fundamental emission
	☒	ANSI C63.10	11.10.2	Method PKPSD (peak PSD)
	☐	ANSI C63.10	11.10.3	Method AVGPSD-1(Duty cycle $\geq 98\%$)
	☐	ANSI C63.10	11.10.4	Method AVGPSD-1A(Duty cycle $\geq 98\%$)
	☐	ANSI C63.10	11.10.5	Method AVGPSD-2(Duty cycle $< 98\%$)
	☐	ANSI C63.10	11.10.6	Method AVGPSD-2A(Duty cycle $< 98\%$)
	☐	ANSI C63.10	11.10.7	Method AVGPSD-3
	☐	ANSI C63.10	11.10.8	Method AVGPSD-3A

4.8.4 Test Data

Mode	Channel	Test Frequency (MHz)	Measurement PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
Mode 1	00	2402	-15.874	≤8	Pass
	19	2440	-23.423	≤8	Pass
	39	2480	-22.653	≤8	Pass
Mode 2	00	2402	-24.302	≤8	Pass
	19	2440	-24.796	≤8	Pass
	39	2480	-24.181	≤8	Pass
Mode 3	00	2402	-14.992	≤8	Pass
	19	2440	-15.225	≤8	Pass
	39	2480	-14.634	≤8	Pass
Mode 4	00	2402	-14.777	≤8	Pass
	19	2440	-15.062	≤8	Pass
	39	2480	-14.595	≤8	Pass

Note : The worst case of PSD as below:

Mode 4 2480MHz



4.9 Antenna Requirement**VERDICT: PASS****4.9.1 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.

4.9.2 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 _____