

Echelon Fitness Multimedia LLC

TEST REPORT

SCOPE OF WORK

FCC TESTING—ECHKIN24-3399-C

REPORT NUMBER

210420016SZN-003

ISSUE DATE

01 August 2021

[REVISED DATE]

[-----]

PAGES

69

DOCUMENT CONTROL NUMBER

FCC ID 247_b

© 2017 INTERTEK



Echelon Fitness Multimedia LLC

Application
For
Certification

FCC ID: 2AWD4-KS3399A

24 inch Flat Screen-P

Model: ECHKIN24-3399-C

2.4GHz Wi-Fi Transceiver

Report No.: 210420016SZN-003

We hereby certify that the sample of the above item is considered to comply with the
requirements of FCC Part 15, Subpart C for Intentional Radiator,
mention 47 CFR [10-1-19]

Prepared and Checked by:

Approved by:

Ryan Chen
Engineer

Peter Kang
Sr. Technical Supervisor
Date: 01 August 2021

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

Intertek Testing Services Shenzhen Ltd. Longhua Branch

101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China.
Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751

MEASUREMENT/TECHNICAL REPORT

This report concerns (check one) Original Grant ☒ Class II Change ☐

Equipment Type: DTS - Part 15 Digital Transmission Systems (Wi-Fi transmitter portion)

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes ☐ No ☒

If yes, defer until : _____
date

Company Name agrees to notify the Commission by: _____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes ☐ No ☒

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-01-19] Edition] provision.

Report prepared by:

Ryan Chen
Intertek Testing Services Shenzhen Ltd. Longhua Branch
101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing
Community, GuanHu Subdistrict, LongHua District, Shenzhen,
P.R. China.
Tel: (86 755) 8614 0682 Fax: (86 755) 8601 6661

Table of Contents

1.0	<u>Summary of Test results</u>	4
2.0	<u>General Description</u>	5
2.1	Product Description	5
2.2	Related Submittal(s) Grants	5
2.3	Test Methodology	5
2.4	Test Facility	5
3.0	<u>System Test Configuration</u>	6
3.1	Justification	6
3.2	EUT Exercising Software	6
3.3	Special Accessories	6
3.4	Measurement Uncertainty	7
3.5	Equipment Modification	7
3.6	Support Equipment List and Description	7
4.0	<u>Measurement Results</u>	8
4.1	Maximum Conducted Output Power at Antenna Terminals	8
4.2	Minimum 6 dB RF Bandwidth	10
4.3	Maximum Power Density Reading	14
4.4	Out of Band Conducted Emissions	23
4.5	Out of Band Radiated Emissions	49
4.6	Transmitter Radiated Emissions in Restricted Bands	50
4.7	Field Strength Calculation	51
4.8	Radiated Spurious Emission	52
4.9	Conducted Emission	63
4.10	Radiated Emissions from Digital Section of Transceiver	66
4.11	Transmitter Duty Cycle Calculation and Measurements	67
5.0	<u>Equipment Photographs</u>	68
6.0	<u>Product Labelling</u>	68
7.0	<u>Technical Specifications</u>	68
8.0	<u>Instruction Manual</u>	68
9.0	<u>Confidentiality Request</u>	68
10.0	<u>Discussion of Pulse Desensitization</u>	68
11.0	<u>Test Equipment List</u>	69

1.0 Summary of Test results

Applicant: Echelon Fitness Multimedia LLC

Applicant Address: 605 Chestnut Street, 7th Floor, Chattanooga, TN 37450, USA

Manufacturer: SHENZHEN KINSTONE D&T DEVELOP CO.,LTD

Manufacturer Address: 5F, A2 B, XinJianXing Tech Industrial Park, Fengxin Road, Lou Cun, Guangming New Dist., Shenzhen, China

Model: ECHKIN24-3399-C

FCC ID: 2AWD4-KS3399A

TEST ITEM	REFERENCE	RESULTS
Max. Output power	15.247(b)(3)	Pass
6 dB Bandwidth	15.247(a)(2)	Pass
Max. Power Density	15.247(e)	Pass
Out of Band Antenna Conducted Emission	15.247(d)	Pass
Radiated Emission in Restricted Bands	15.247(d), 15.209, FCC 15.205	Pass
AC Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass (See Notes)

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

2.0 General Description

2.1 Product Description

The equipment under test (EUT) is a 24 inch Flat Screen-P with Bluetooth 5.0 (dual-mode) function operating in 2402-2480MHz, 2.4G WIFI function operating in 2412-2462MHz and 5G WIFI function operating in 5150MHz~5250 MHz, 5250MHz~5350MHz, 5470MHz-5725MHZ, 5725MHz~5850MHz. The EUT is powered by DC 12V. For more detail information pls. refer to the user manual.

Type of Modulation: BPSK, QPSK, 16QAM, 64QAM for OFDM; CCK, DQPSK, DBPSK for DSSS.

Antenna Type: Integral Antenna

Antenna Gain 1: 1.2dBi

Antenna Gain 2: 1.2dBi

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

2.2 Related Submittal(s) Grants

This is an application for certification of a transceiver for the 24 inch Flat Screen-P which has 2.4GHz WIFI function.

For the classic Bluetooth function was tested and demonstrated in report 210420016SZN-001.

For the BT BLE function was tested and demonstrated in report 210420016SZN-002.

For the 5GHz WIFI function was tested and demonstrated in report 210420016SZN-004.

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013) and KDB 558074 D01 v05r02. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

2.4 Test Facility

The Semi-anechoic chamber and shielded room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Longhua Branch** and located at 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China. This test facility and site measurement data have been fully placed on file with File Number: CN1188.

3.0 System Test Configuration

3.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. The EUT was powered by DC 12V from an adapter and the adapter is powered by AC 120V/60Hz during the test, only the worst data was reported in this report.

On 802.11b/g/n-HT20 mode, two antennas are used, and all data rates were tested and only the worst case data is shown in the report.

For maximizing emissions, the EUT was rotated through 360°, the EUT was placed on the styrene turntable with 0.8m up to 1GHz and 1.5 m above 1GHz. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

The EUT and transmitting antennas were centered on the turntable.

Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

3.2 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified testing.

The parameters of test software setting:

During the test, Channel and power controlling software provided by the applicant was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the application and is going to be fixed on the firmware of the end product.

Test software: RFTTest Tool V5.4 installed in the EUT.

3.3 Special Accessories

N/A.

3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

3.5 Equipment Modification

Any modifications installed previous to testing by Echelon Fitness Multimedia LLC will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Longhua Branch.

3.6 Support Equipment List and Description

Description	Manufacturer	Remark
AC ADAPTER (Provided by Client)	L.T.E	Model: LTE65ES-S2-1 Input: 100-240VAC 2A max 50-60Hz Output: DC 12 V=5 A
Power Cord (Provided by Client)	---	Unshielded, 1.5m
TF card (Provided by Intertek)	Kingston	class10
USB*2 (Provided by Intertek)	SanDisk	Model: SDCZ36-002G-P36
HDMI Cable (Provided by Intertek)	---	Unshielded, 120cm*2
Test TV (Provided by Intertek)	SAMSUNG	Model: U28H750UQ
Test TV (Provided by Intertek)	SONY	Model: KDL-24EX520)
AUX Cable (Provided by Intertek)	---	Unshielded, 150cm*2
RJ45 Cable (Provided by Intertek)	---	Unshielded, 160cm*2
Type C Cable	---	Unshielded, 150cm
Speaker	Victonic	Model: GSB710
Cement resistance	---	8 Ω

Applicant: Echelon Fitness Multimedia LLC

Date of Test: 01 July 2021

Model: ECHKIN24-3399-C

4.0 Measurement Results

4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(3):

The antenna power of the EUT was connected to the input of a broadband peak RF power meter. The power meter have a video bandwidth that is greater than DTS bandwidth and utilize a fast-responding diode detector. Power was read directly at the EUT antenna terminals with cable loss added.

For antennas with gains of 6 dBi or less, maximum allowed Transmitter output is 1 watt (+30 dBm). 2.4G band Ant gain: 1.2dBi. In MIMO (2Tx), Ant1+Ant2 Directional gain = $GANT + 10 \log(N) \text{ dBi} = 1.2 + 10 \log(2) = 4.2 \text{ dBi} < 6 \text{ dBi}$.

SISO Mode, Ant1:

IEEE 802.11b (Antenna Gain = 1.2dBi) (CCK, 1Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 2412	16.55	45.19
Middle Channel: 2437	17.05	50.70
High Channel: 2462	15.59	36.22

IEEE 802.11g (Antenna Gain = 1.2dBi) (16QAM, 6Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 2412	15.86	38.55
Middle Channel: 2437	15.63	36.56
High Channel: 2462	15.23	33.34

IEEE 802.11n-HT20 (Antenna Gain = 1.2dBi) (64QAM, 6Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 2412	14.89	30.83
Middle Channel: 2437	13.97	24.95
High Channel: 2462	14.39	27.48

SISO Mode, Ant2:

IEEE 802.11b (Antenna Gain = 1.2dBi) (CCK, 1Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 2412	16.50	44.67
Middle Channel: 2437	17.10	51.29
High Channel: 2462	15.89	38.82

IEEE 802.11g (Antenna Gain = 1.2dBi) (16QAM, 6Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 2412	15.96	39.45
Middle Channel: 2437	15.30	33.88
High Channel: 2462	15.03	31.84

IEEE 802.11n-HT20 (Antenna Gain = 1.2dBi) (64QAM, 6Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 2412	14.80	30.20
Middle Channel: 2437	13.57	22.75
High Channel: 2462	14.29	26.85

MIMO Mode:

IEEE 802.11n-HT20 (Antenna Gain = 4.2dBi) (64QAM, 6.5Mbps)				
Frequency (MHz)	Output in dBm (Peak Reading)			Output in mWatt
	Ant 1	Ant 2	Total	
Low Channel: 2412	14.96	14.86	17.92	61.94
Middle Channel: 2437	13.67	13.97	16.83	48.19
High Channel: 2462	14.89	14.69	17.80	60.26

Cable loss: 1.0 dB External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

EUT max. output level = 17.92dBm

EUT max. E.I.R.P = 17.92dBm + 4.2dBi = 22.12dBm = 162.93mW

For RF Exposure, the information is saved with filename: RF exposure.pdf.

Applicant: Echelon Fitness Multimedia LLC

Date of Test: 14 May 2021

Model: ECHKIN24-3399-C

4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a) (2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 KHz according to FCC KDB 558074 D01 v05r02. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Limit: The 6 dB Bandwidth is at least 500 kHz.

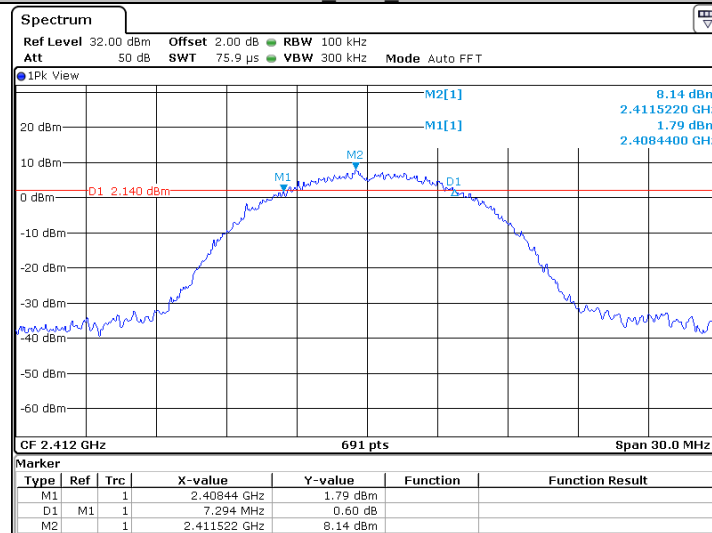
IEEE 802.11b (CCK, 1Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	7.294
2437	8.336
2462	7.641

IEEE 802.11g (16QAM, 6Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	16.541
2437	16.541
2462	16.541

IEEE 802.11n-HT20 (64QAM, 6Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	17.757
2437	17.757
2462	17.757

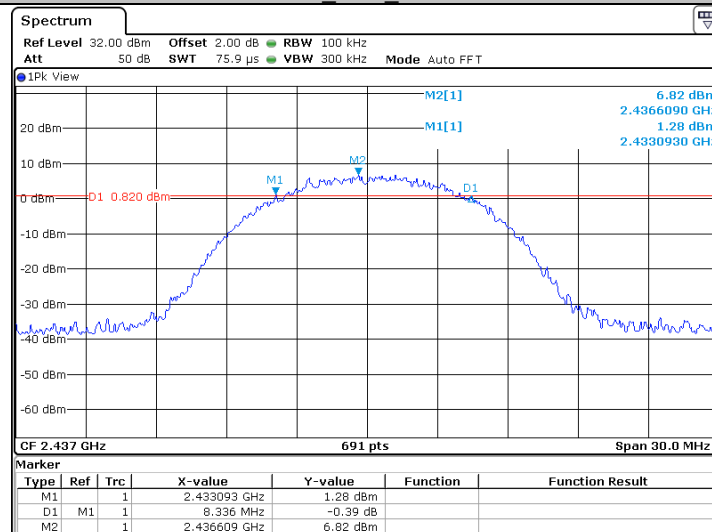
The test plots are attached as below.

11b_Ant1_2412



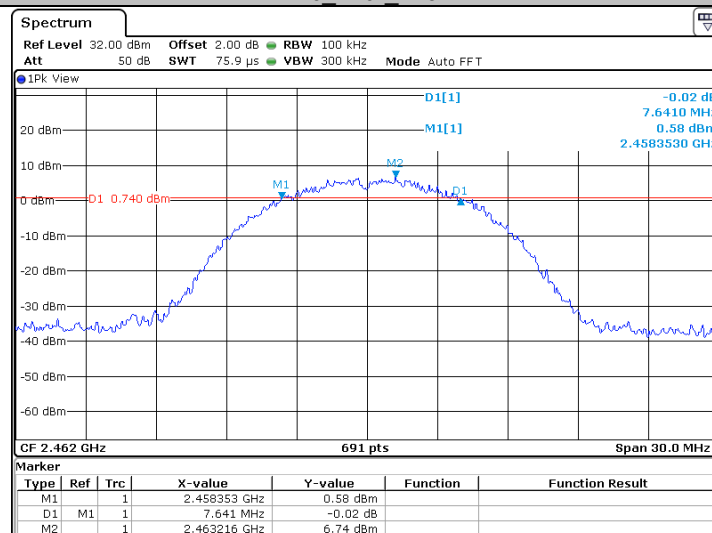
Date: 14.MAY.2021 12:11:04

11b_Ant1_2437



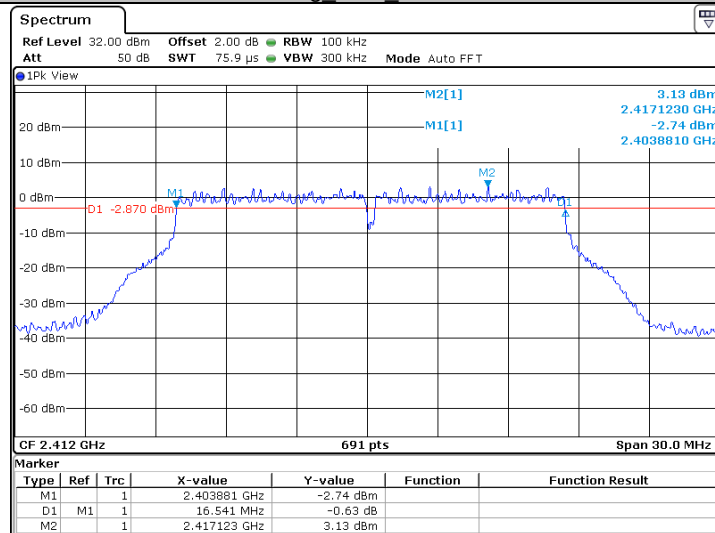
Date: 14.MAY.2021 12:12:51

11b_Ant1_2462



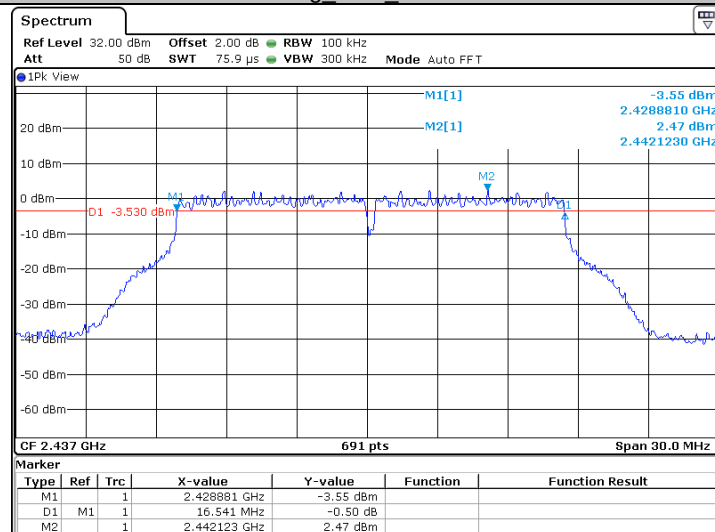
Date: 14.MAY.2021 12:14:52

11g_Ant1_2412



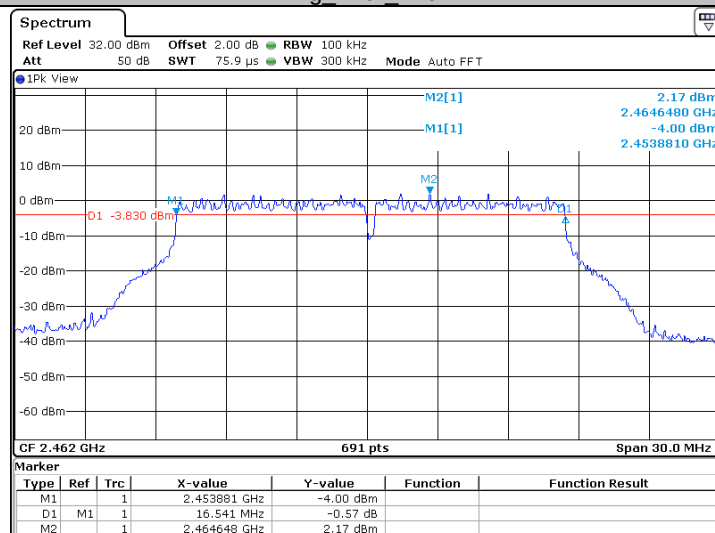
Date: 14.MAY.2021 11:40:18

11g_Ant1_2437



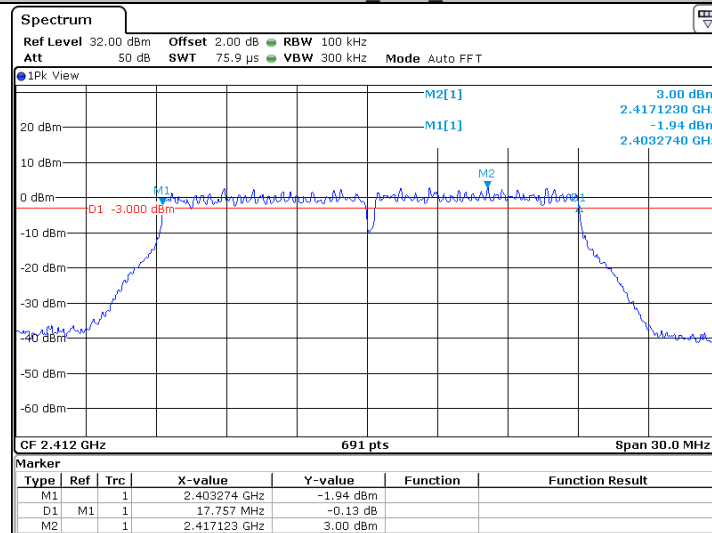
Date: 14.MAY.2021 11:45:48

11g_Ant1_2462



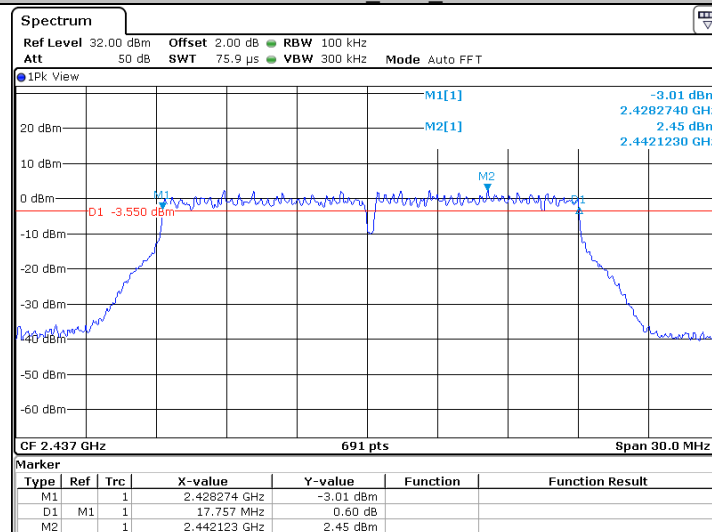
Date: 14.MAY.2021 10:11:40

11N20SISO_Ant1_2412



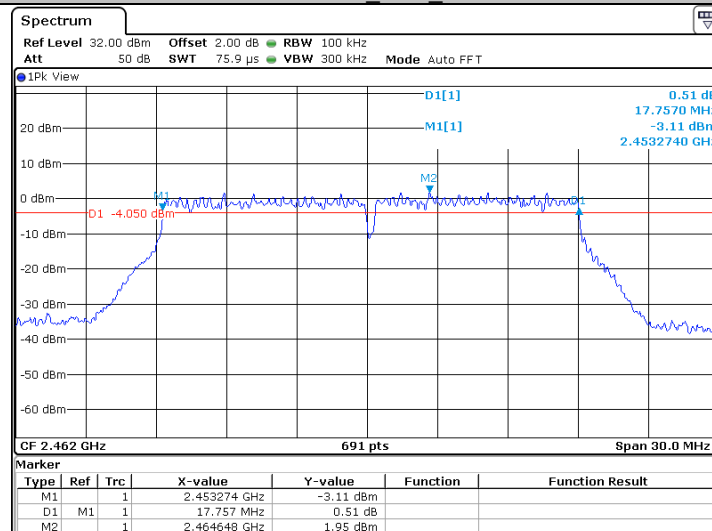
Date: 14.MAY.2021 11:10:32

11N20SISO_Ant1_2437



Date: 14.MAY.2021 11:11:59

11N20SISO_Ant1_2462



Date: 14.MAY.2021 10:47:54

4.3 Maximum Power Density Reading, FCC Rule 15.247(e):

The Measurement Procedure PKPSD was set according to the FCC KDB 558074 D01 v05r02.

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

Limit: The Power Density does not exceed 8dBm/3 kHz.

SISO Mode:

IEEE 802.11b (CCK, 1Mbps)		
Frequency (MHz)	Power Density with RBW 3KHz	
	Ant 1	Ant 2
2412	-5.48	-6.12
2437	-6.02	-6.37
2462	-6.45	-7.13

IEEE 802.11g (16QAM, 6Mbps)		
Frequency (MHz)	Power Density with RBW 3KHz	
	Ant 1	Ant 2
2412	-10.81	-11.51
2437	-11.53	-11.63
2462	-11.65	-11.84

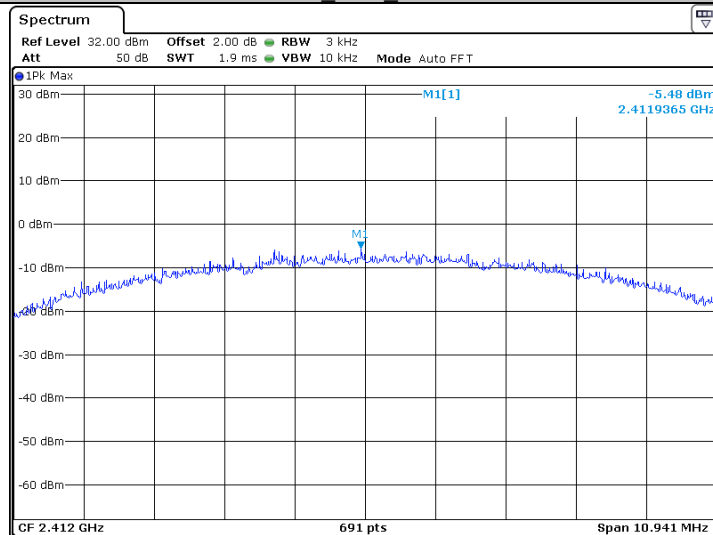
IEEE 802.11n-HT20 (64QAM, 6.5Mbps)		
Frequency (MHz)	Power Density with RBW 3KHz	
	Ant 1	Ant 2
2412	-10.56	-11.22
2437	-11.36	-11.84
2462	-11.74	-11.26

MIMO Mode:

IEEE 802.11n-HT20 (64QAM, 6.5Mbps)			
Frequency (MHz)	Power Density with RBW 3KHz		
	Ant 1	Ant 2	Total
2412	-13.25	-11.87	0.11
2437	-12.11	-13.10	0.11
2462	-11.84	-11.48	0.14

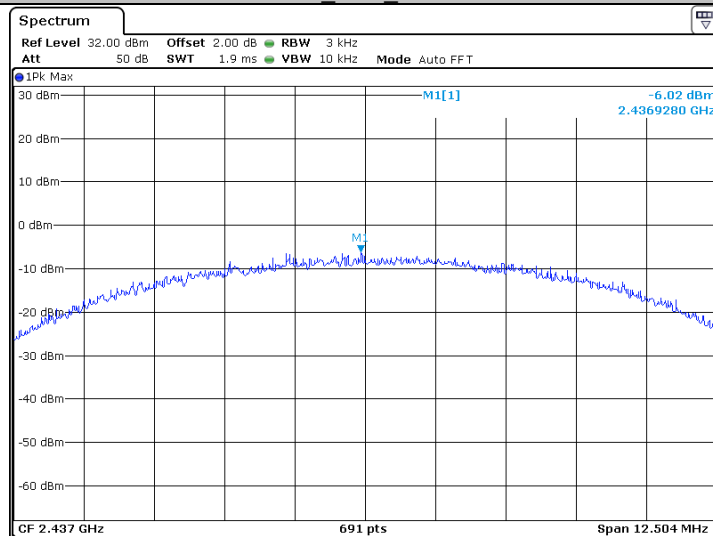
The test plots are attached as below.

11B_Ant1_2412



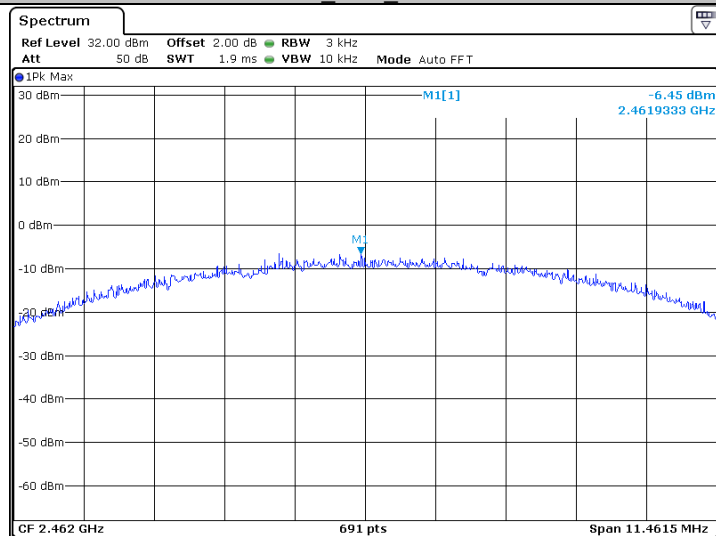
Date: 14.MAY.2021 12:26:53

11B_Ant1_2437



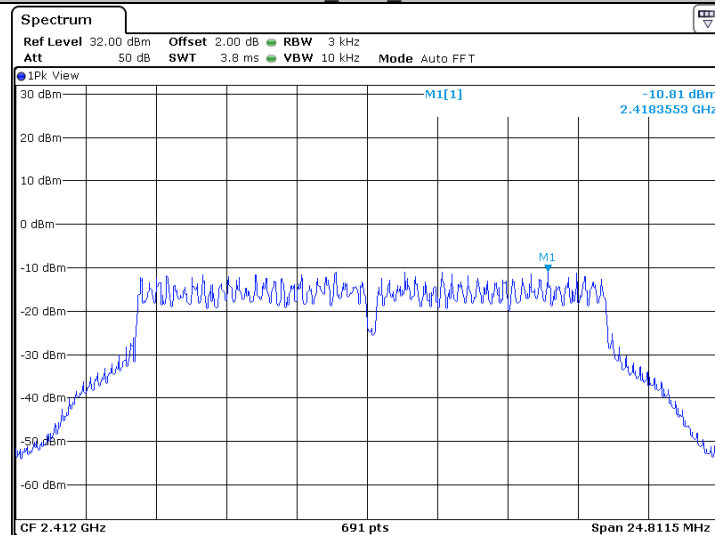
Date: 14.MAY.2021 12:25:15

11B_Ant1_2462



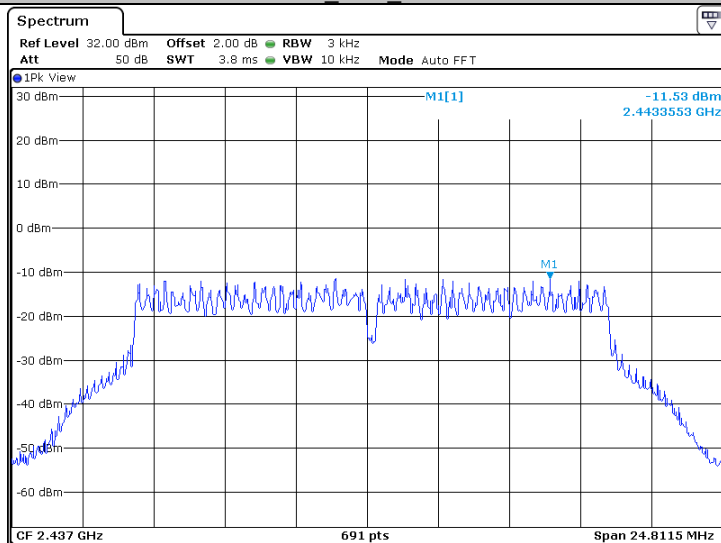
Date: 14.MAY.2021 12:26:06

11G_Ant1_2412



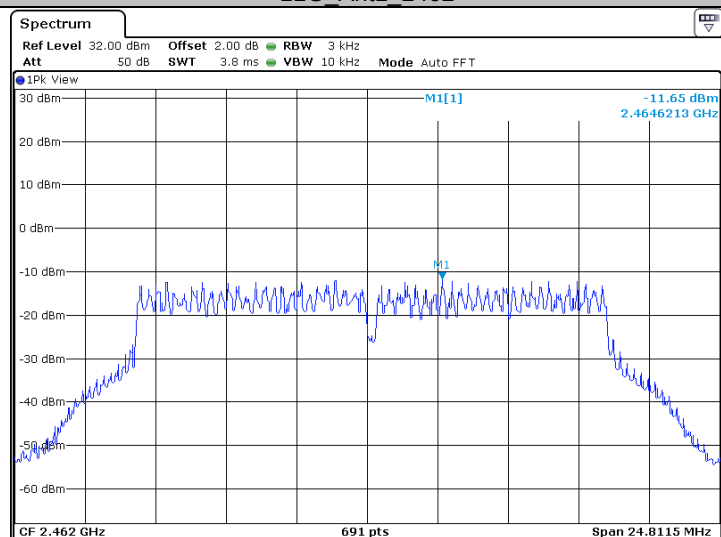
Date: 14.MAY.2021 11:53:04

11G_Ant1_2437



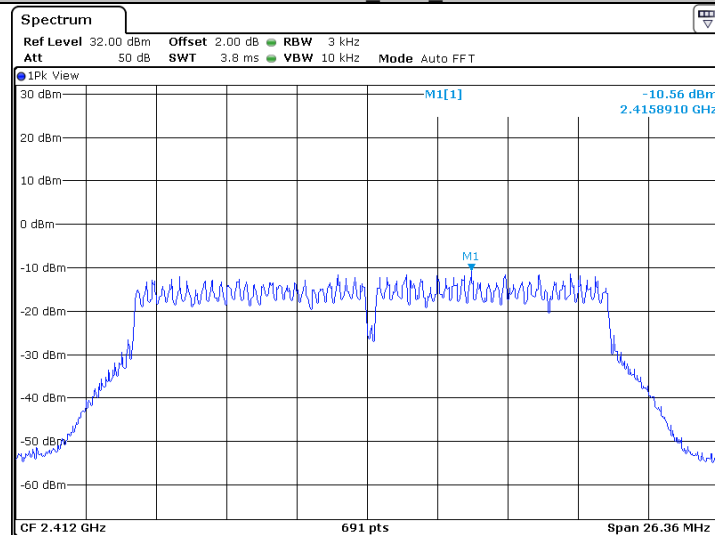
Date: 14.MAY.2021 11:55:30

11G_Ant1_2462



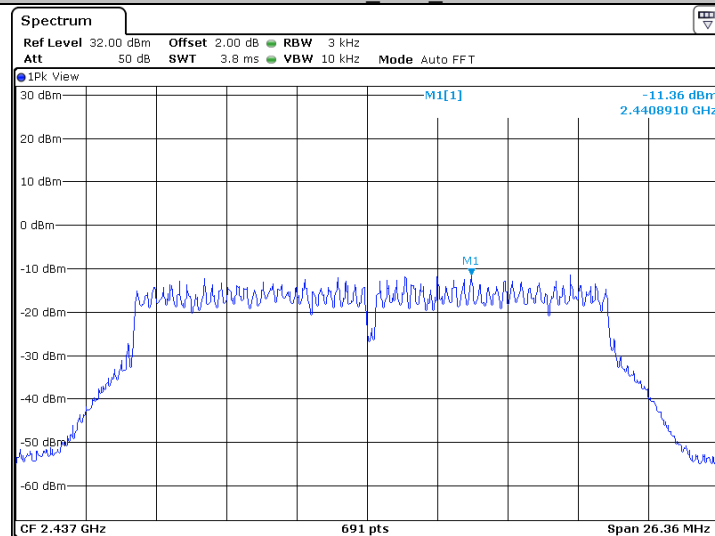
Date: 14.MAY.2021 11:57:24

11N20SISO_Ant1_2412



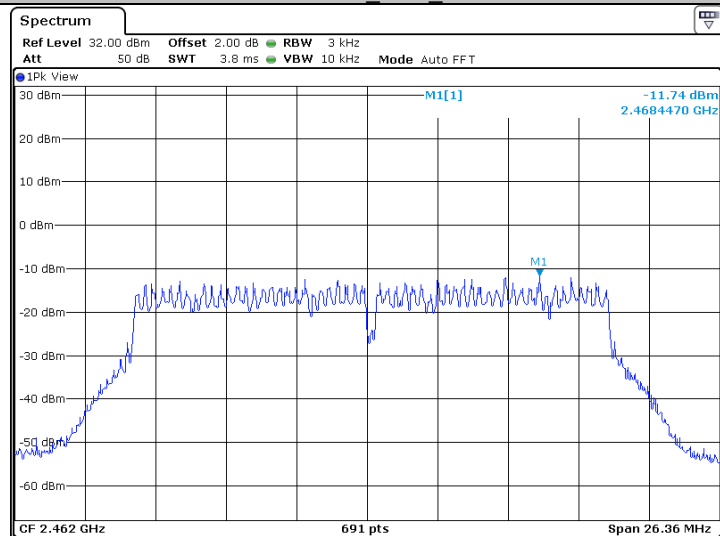
Date: 14.MAY.2021 11:27:53

11N20SISO_Ant1_2437



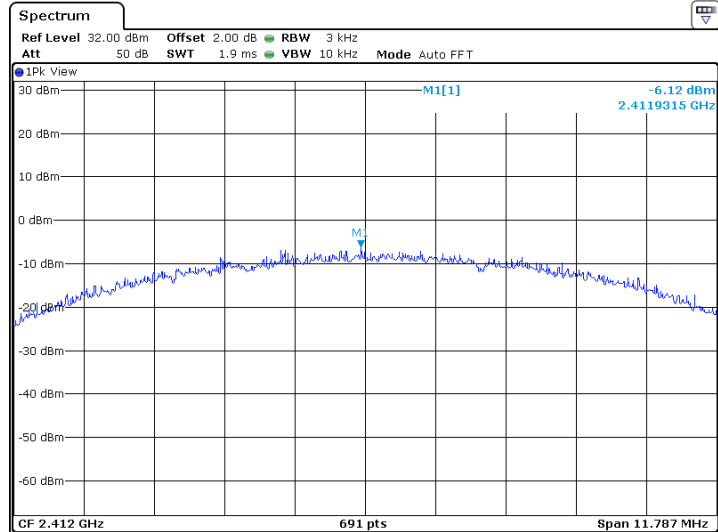
Date: 14.MAY.2021 11:25:52

11N20SISO_Ant1_2462



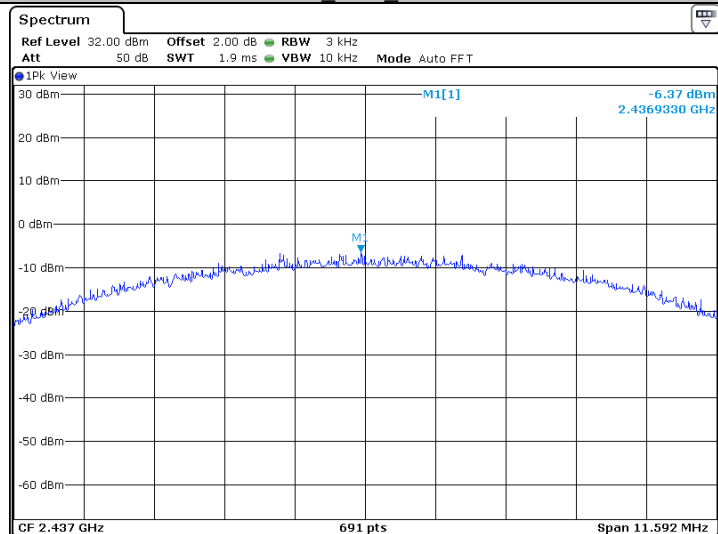
Date: 14.MAY.2021 11:24:40

11B_Ant2_2412



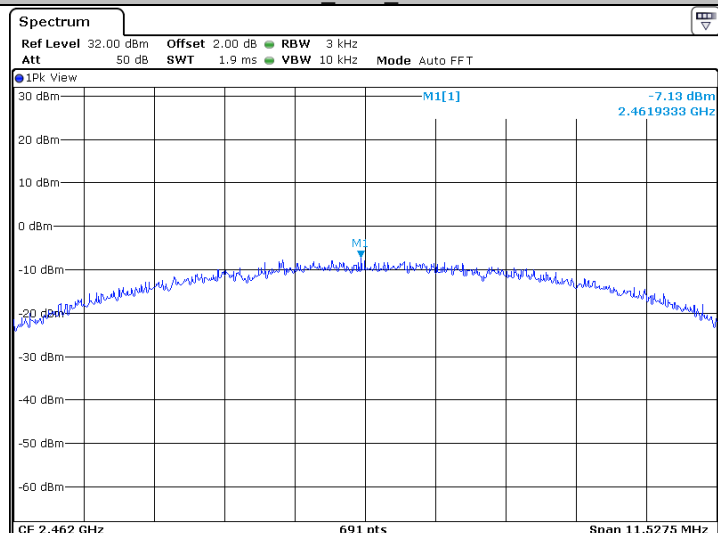
Date: 14.MAY.2021 09:50:15

11B_Ant2_2437



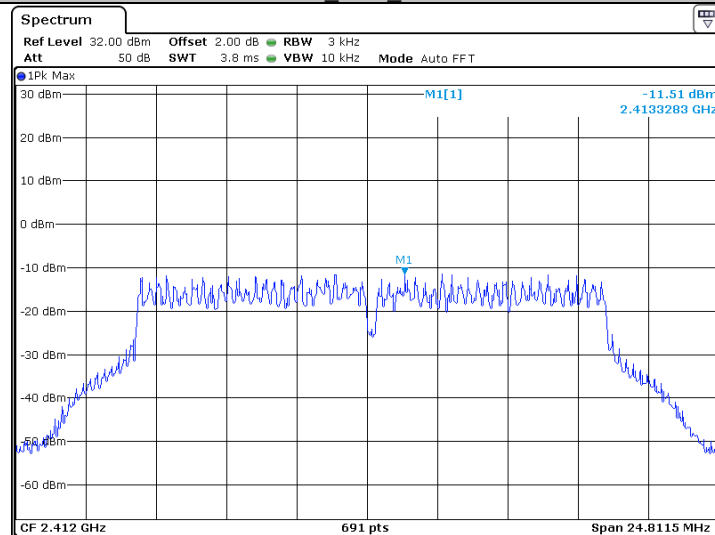
Date: 14.MAY.2021 09:48:35

11B_Ant2_2462



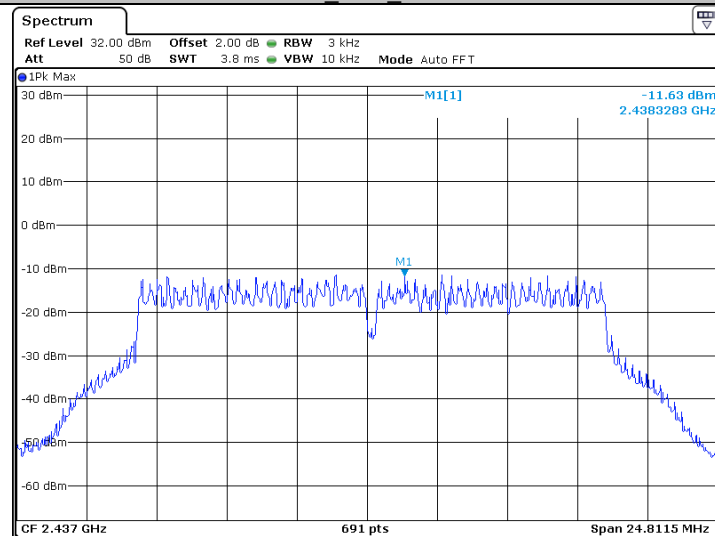
Date: 14.MAY.2021 09:44:50

11G_Ant2_2412



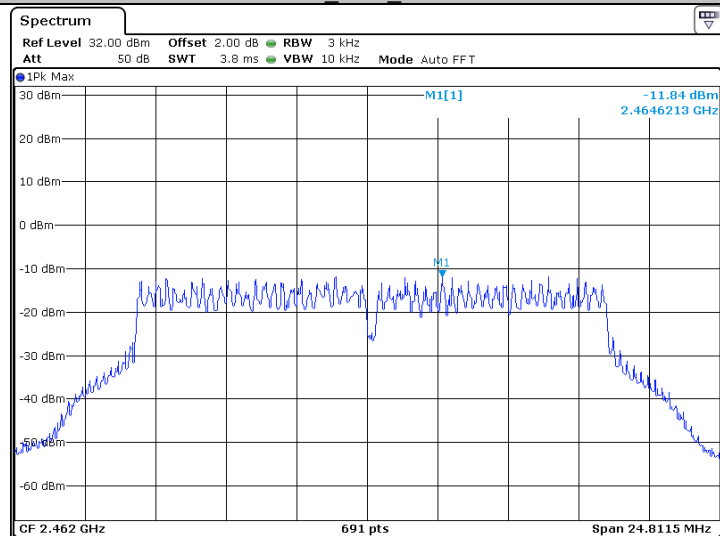
Date: 14.MAY.2021 10:23:45

11G_Ant2_2437



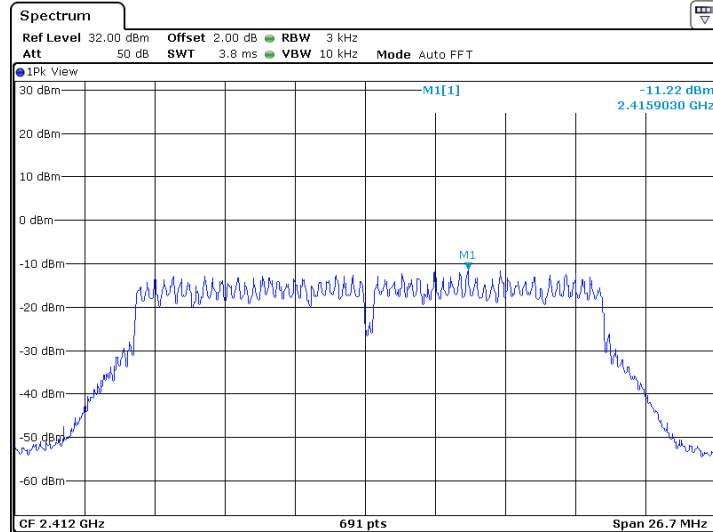
Date: 14.MAY.2021 10:24:33

11G_Ant2_2462



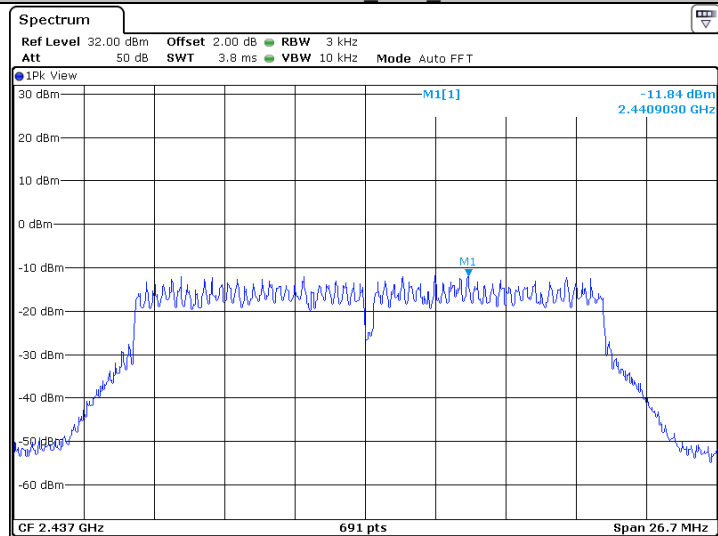
Date: 14.MAY.2021 10:26:52

11N20SISO_Ant2_2412



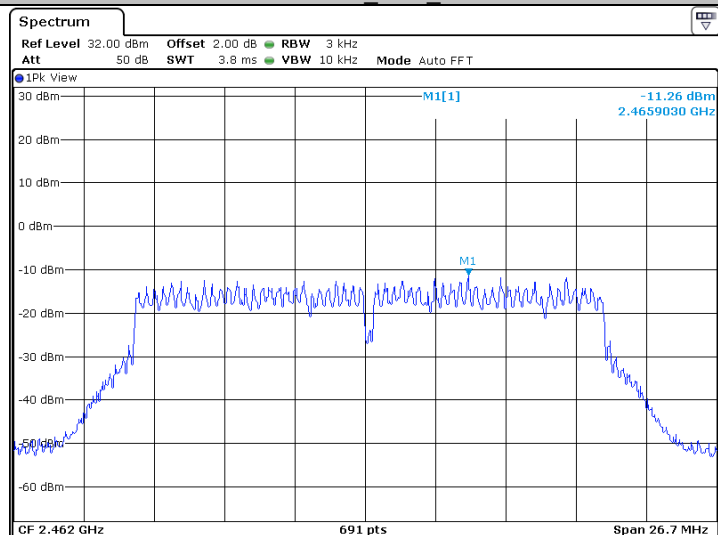
Date: 14.MAY.2021 10:51:49

11N20SISO_Ant2_2437



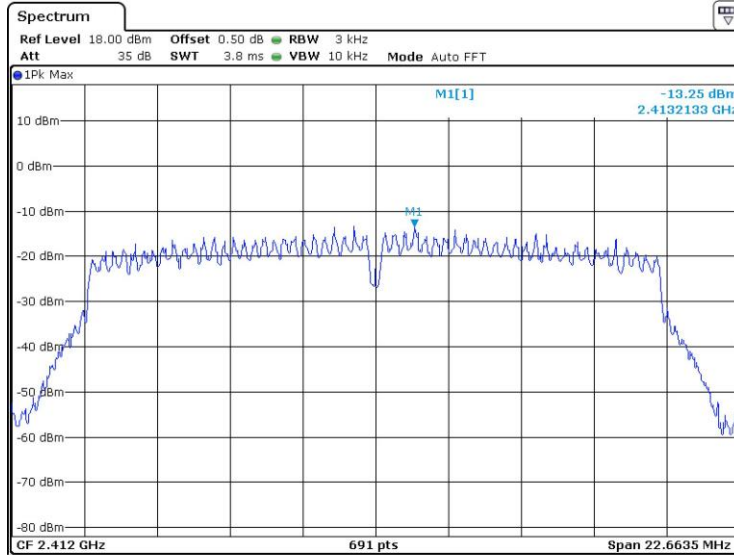
Date: 14.MAY.2021 10:53:46

11N20SISO_Ant2_2462

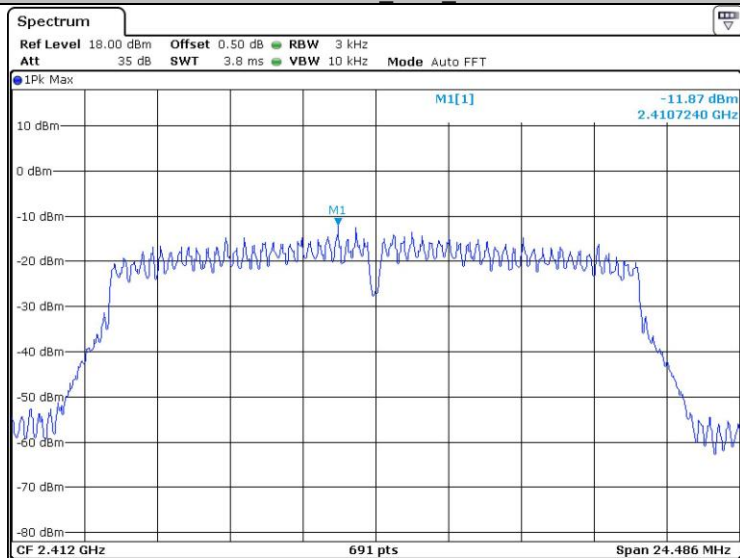


Date: 14.MAY.2021 10:54:45

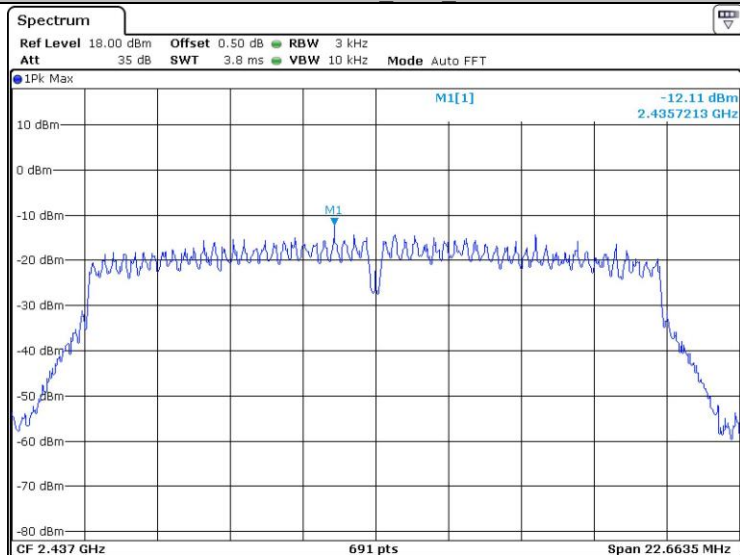
11N20MIMO_Ant1_2412



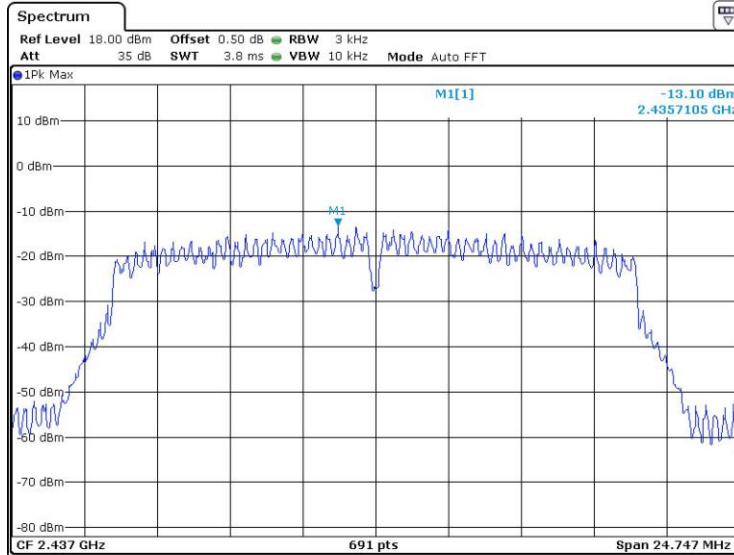
11N20MIMO_Ant2_2412



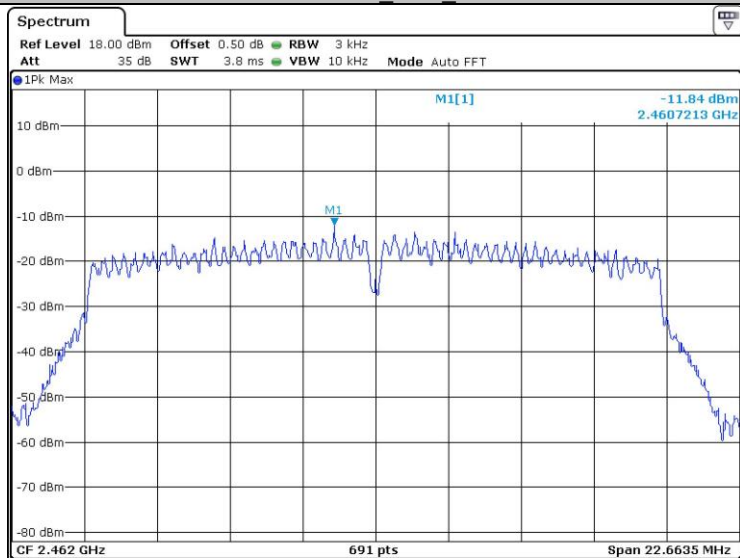
11N20MIMO_Ant1_2437



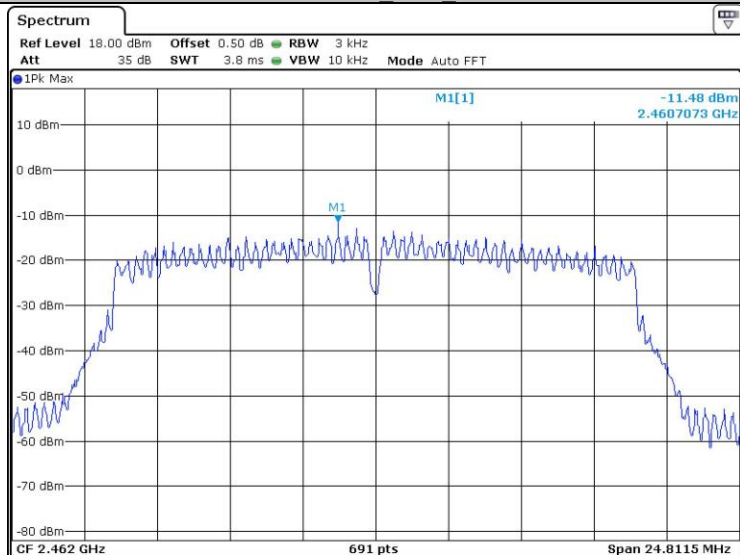
11N20MIMO_Ant2_2437



11N20MIMO_Ant1_2462



11N20MIMO_Ant2_2462



Applicant: Echelon Fitness Multimedia LLC

Date of Test: 14 May 2021

Model: ECHKIN24-3399-C

4.4 Out of Band Conducted Emissions, FCC Rule 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. The Measurement Procedure was set according to the FCC KDB 558074 D01 v05r02.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

Refer to the attached test plots for out of band conducted emissions data with rate of 1Mbps for 802.11b and 6Mbps for 802.11g and 6Mbps for 802.11n-HT20.

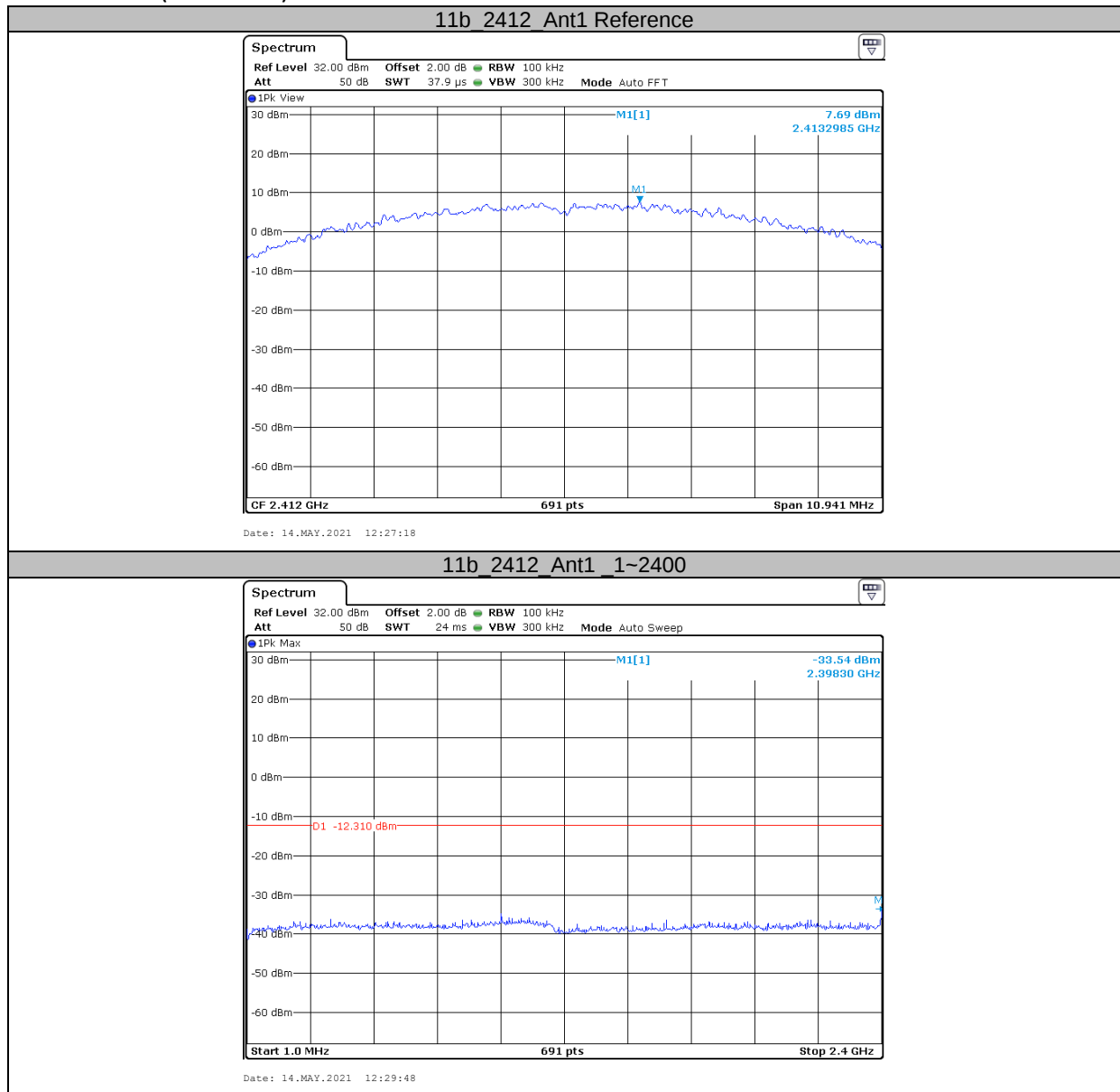
The test plots showed all spurious emission up to the tenth harmonic were measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

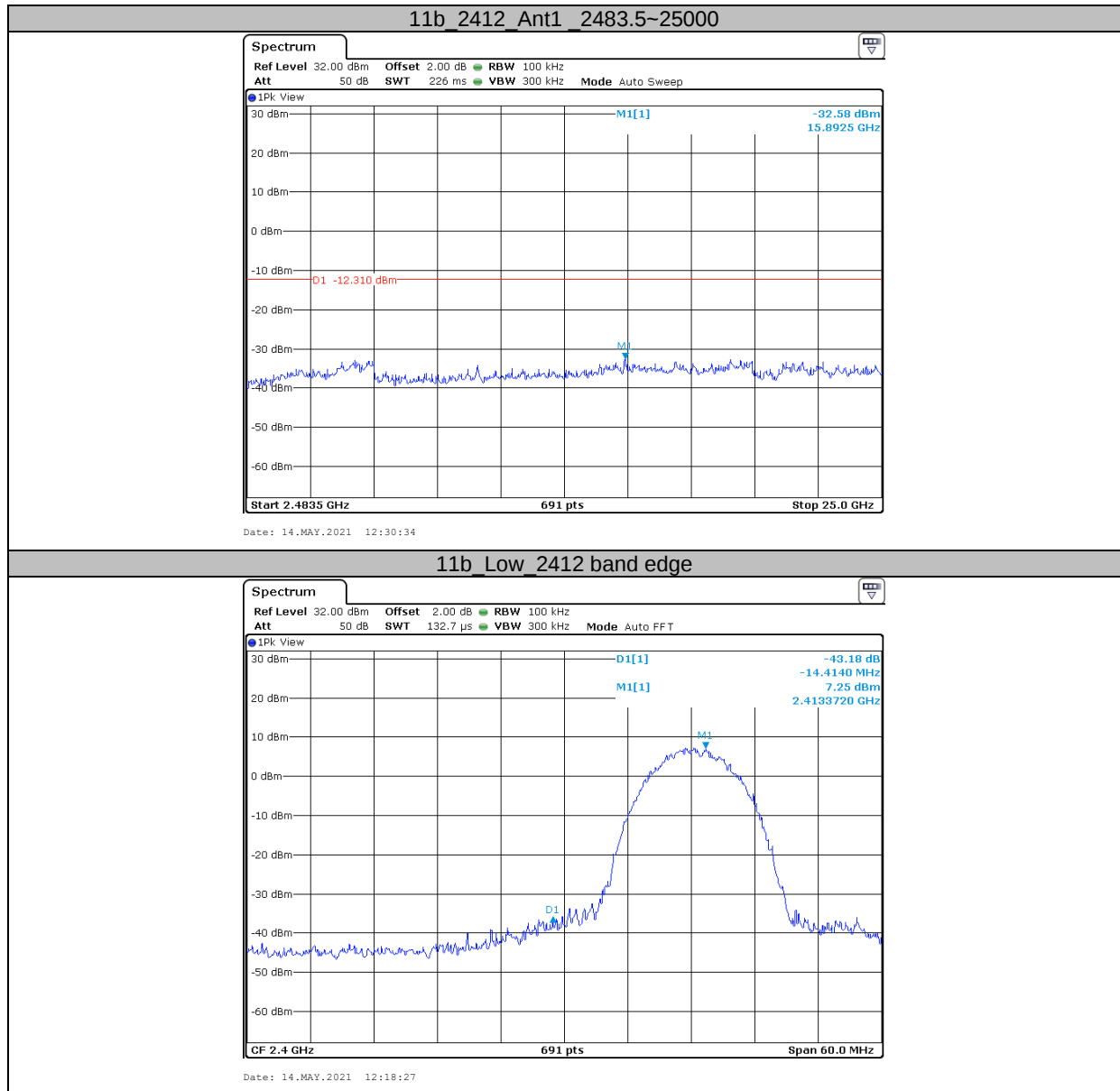
The test plots are attached as below.

SISO Mode, Ant1

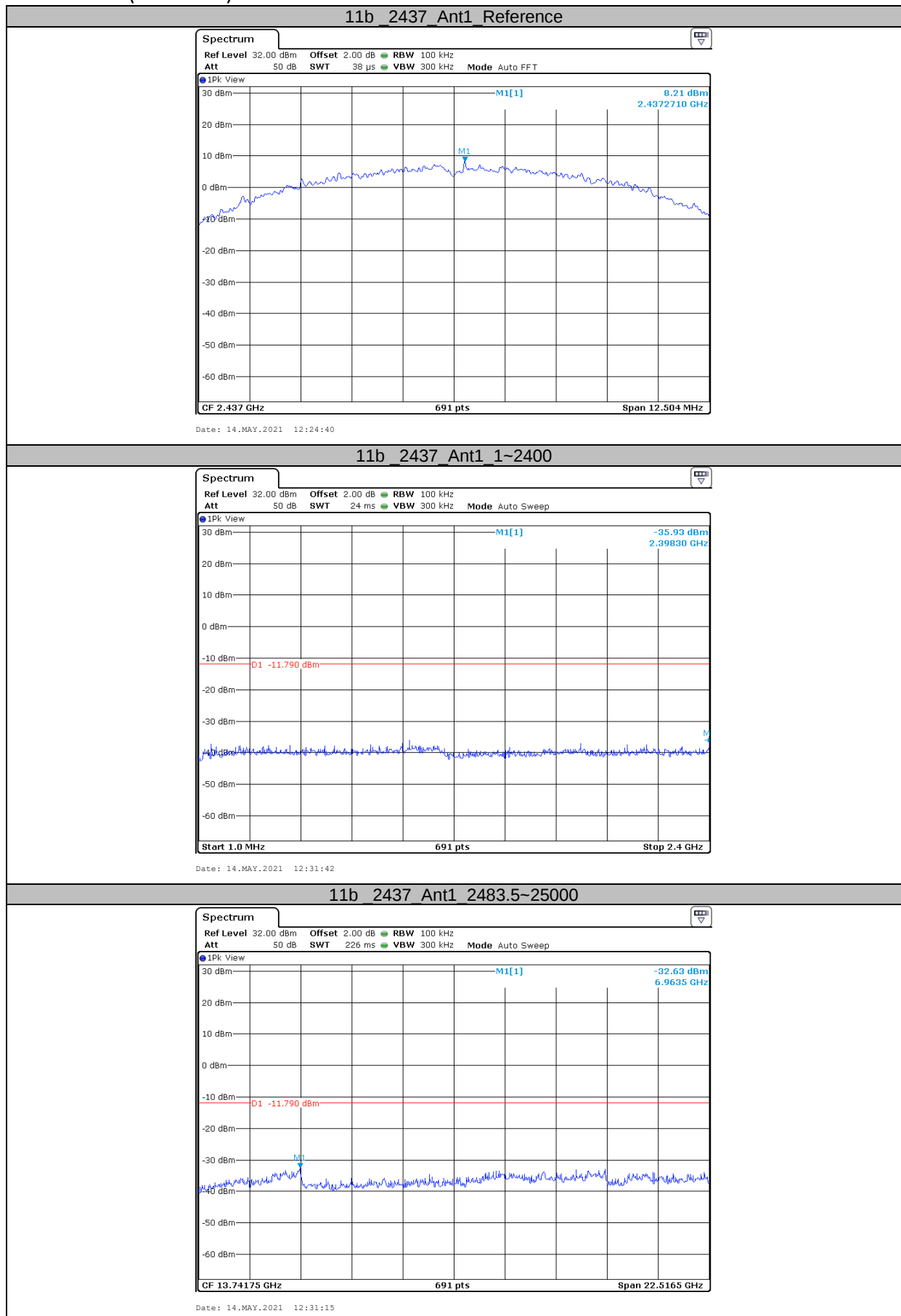
802.11b

Channel 01 (2412MHz) Reference Level: 7.69dBm



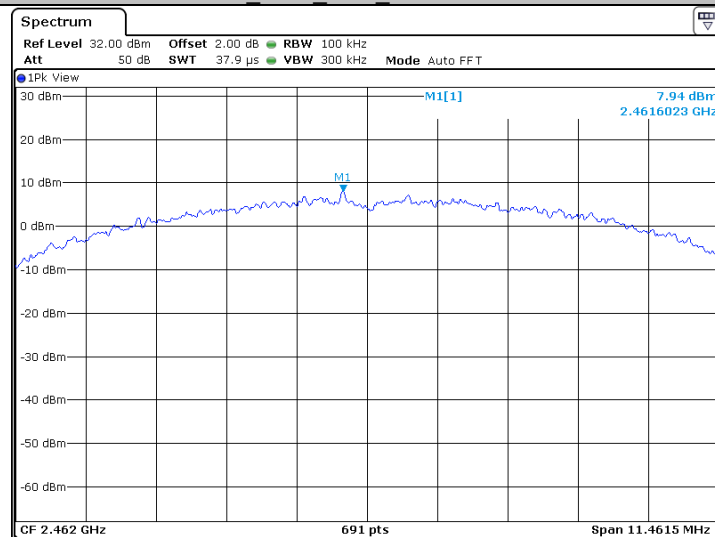


Channel 06 (2437MHz) Reference Level: 8.21dBm



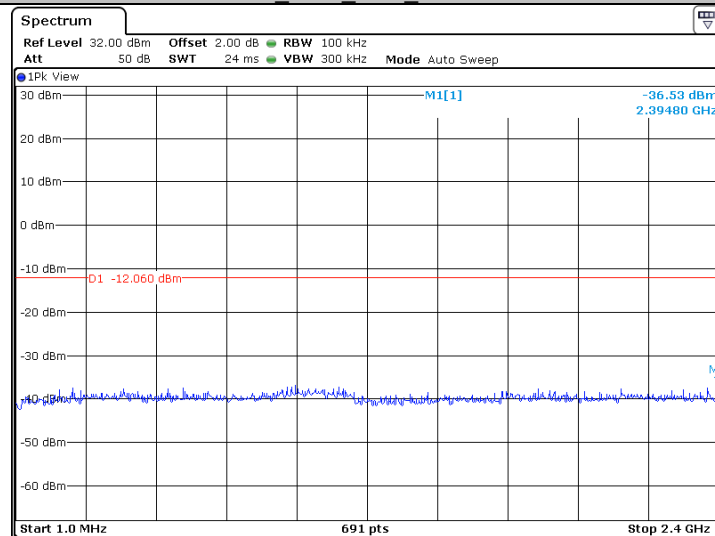
Channel 11 (2462MHz) Reference Level: 7.94dBm

11b 2462 Ant1 0~Reference



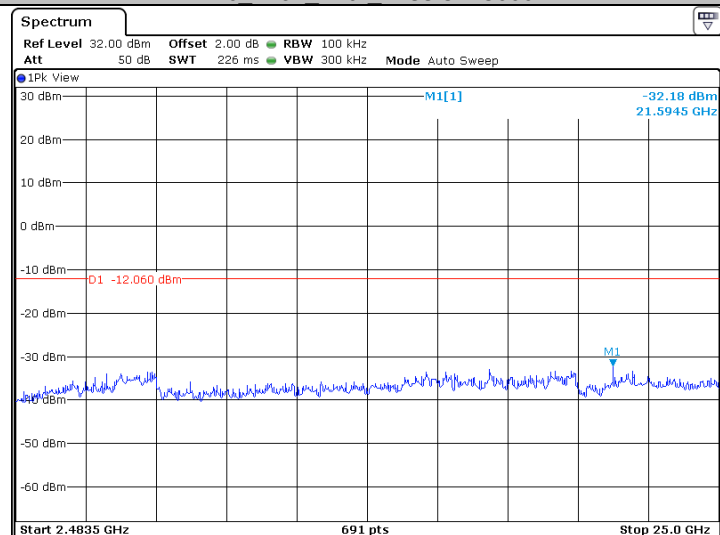
Date: 14.MAY.2021 12:21:16

11b 2462 Ant1 1~2400



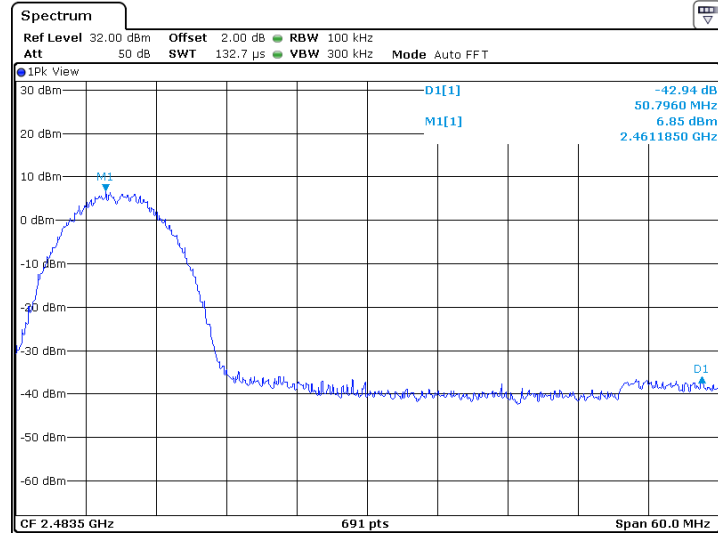
Date: 14.MAY.2021 12:32:34

11b 2462 Ant1 2483.5~25000



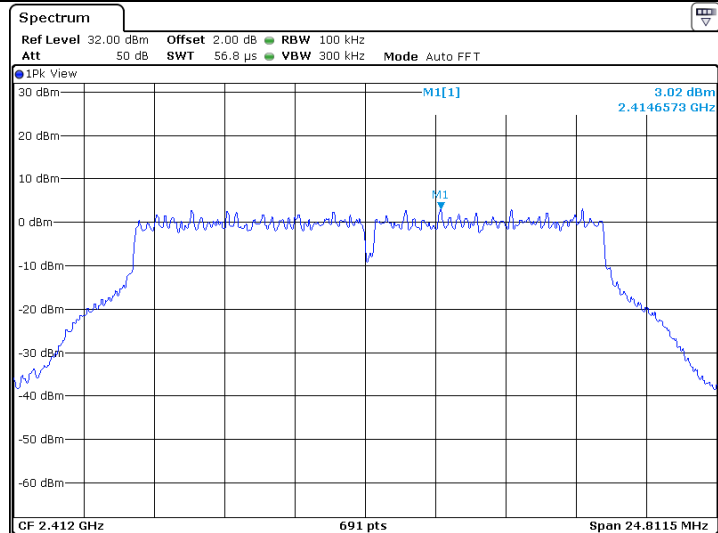
Date: 14.MAY.2021 12:33:02

11b_High_2462 band edge



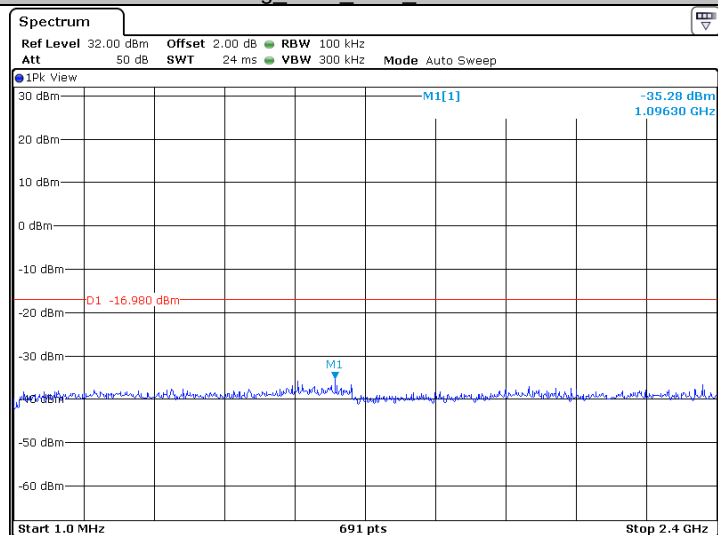
Date: 14.MAY.2021 12:19:21

11g_2412_Ant1_0~Reference



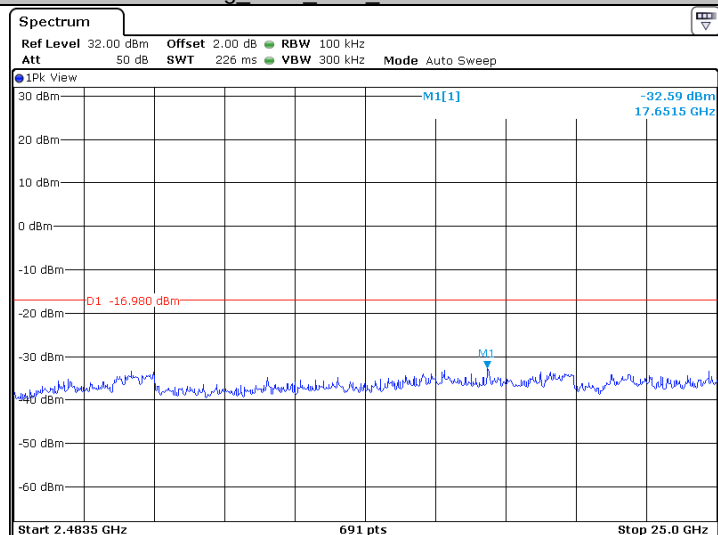
Date: 14.MAY.2021 11:52:12

11g_2412_Ant1_1~2400

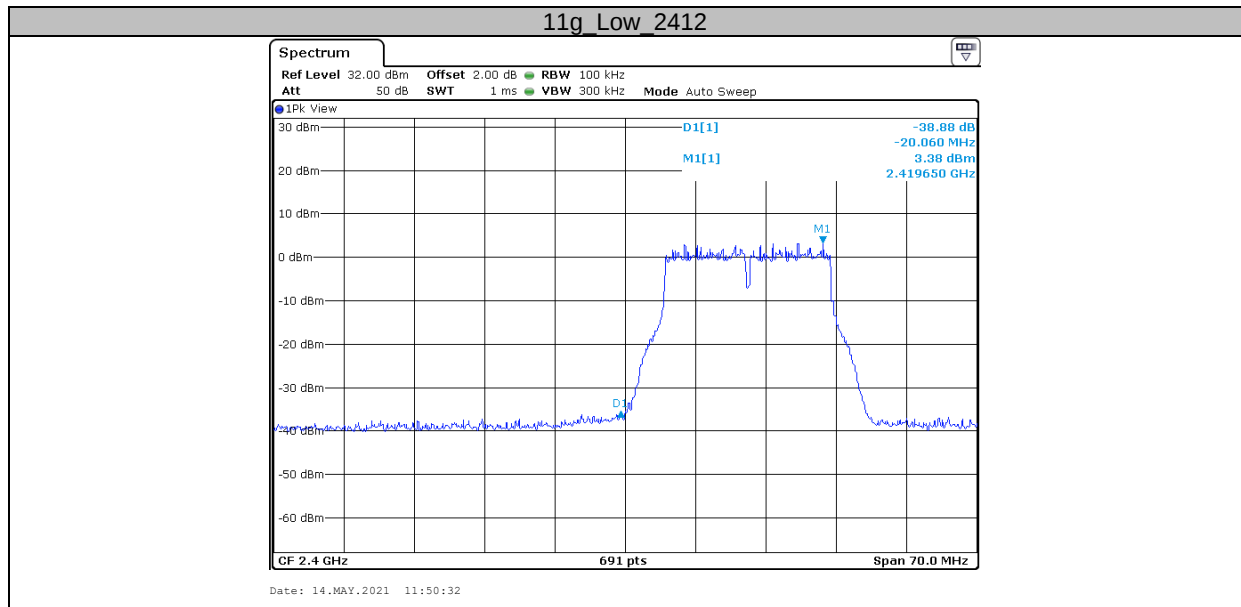


Date: 14.MAY.2021 12:02:14

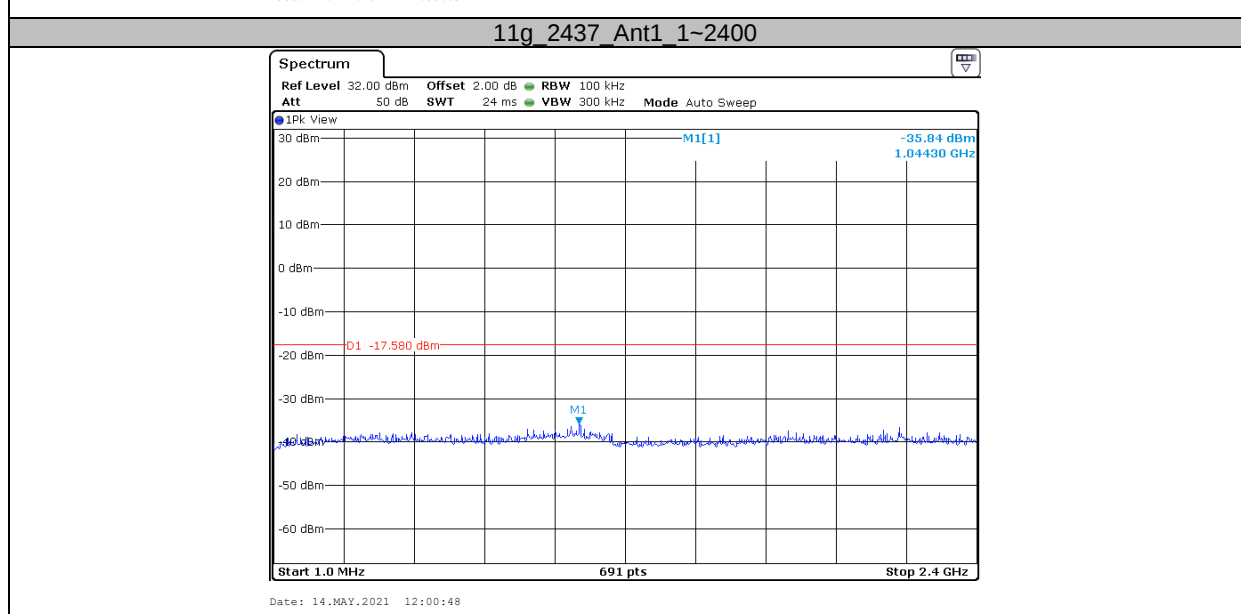
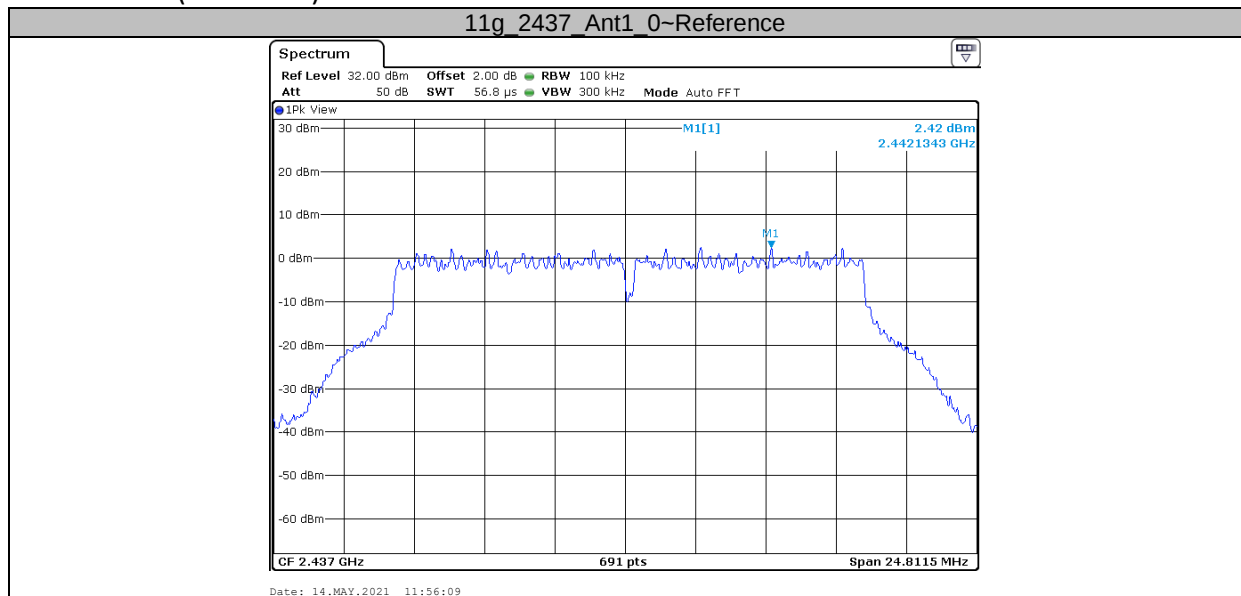
11g_2412_Ant1_2483.5~25000

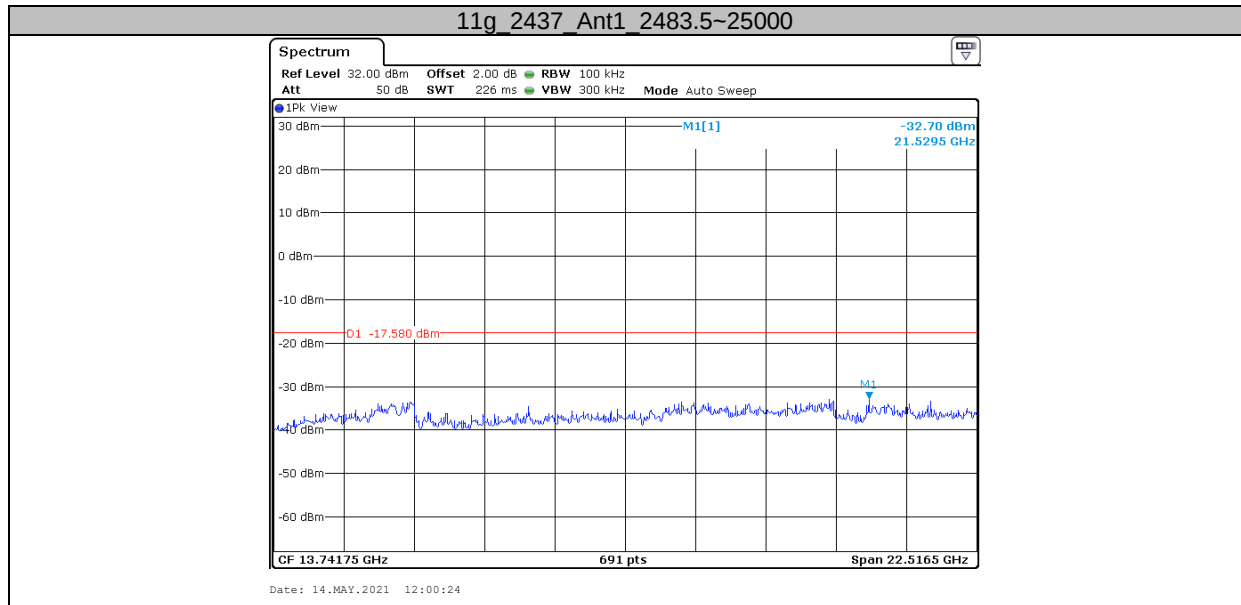


Date: 14.MAY.2021 12:02:51

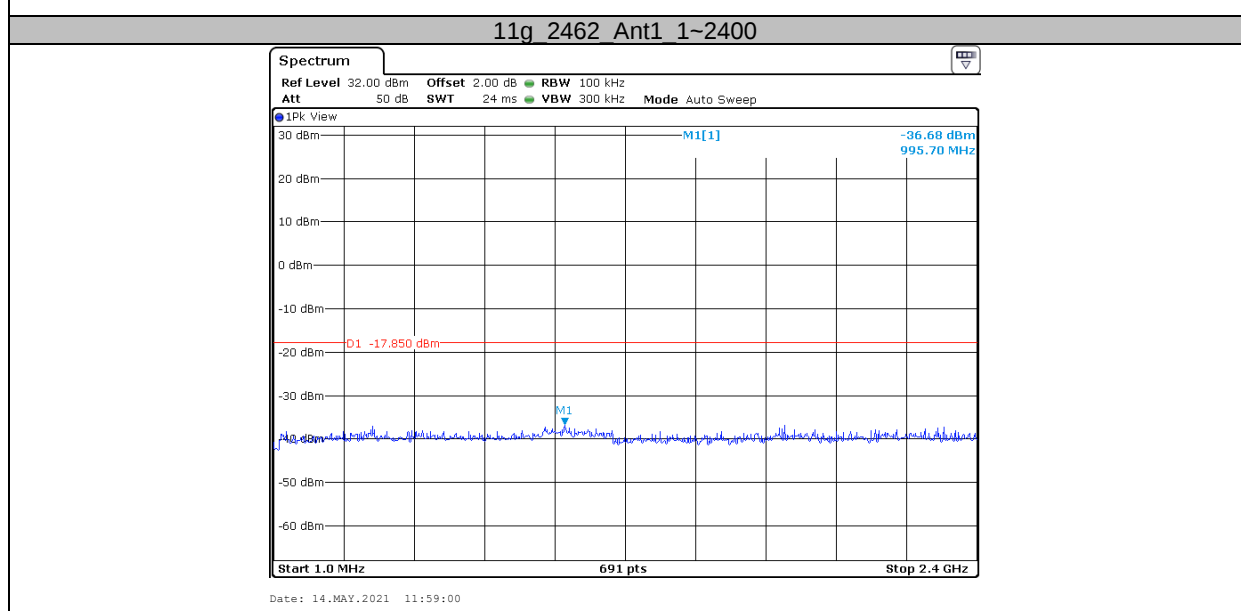
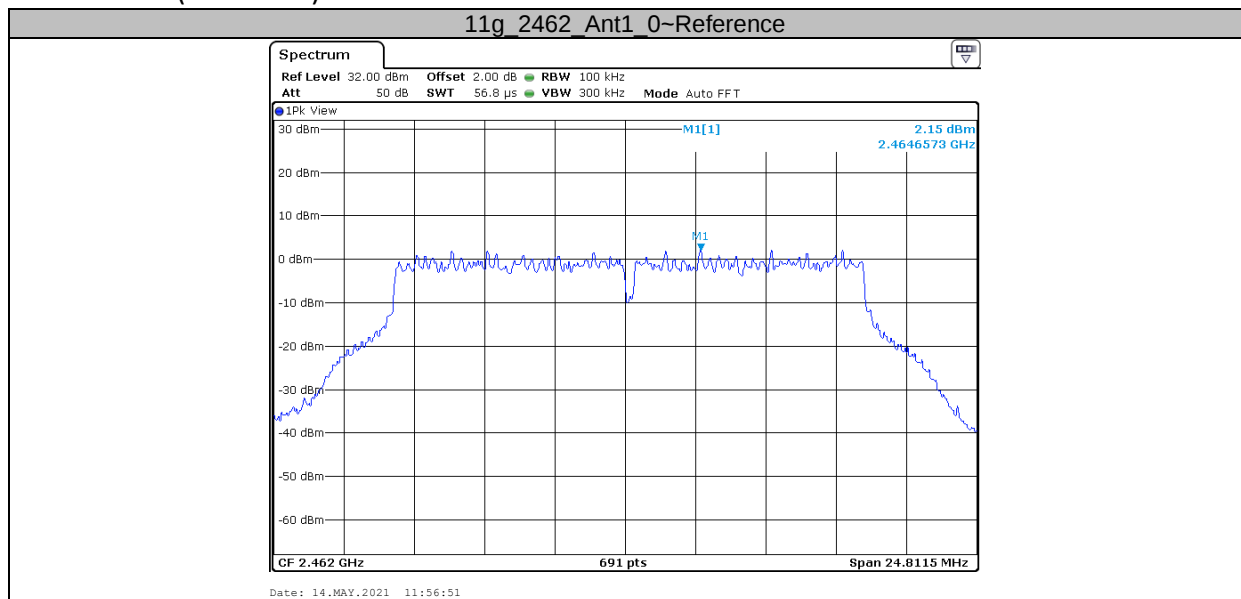


Channel 06 (2437MHz) Reference Level: 2.42dBm

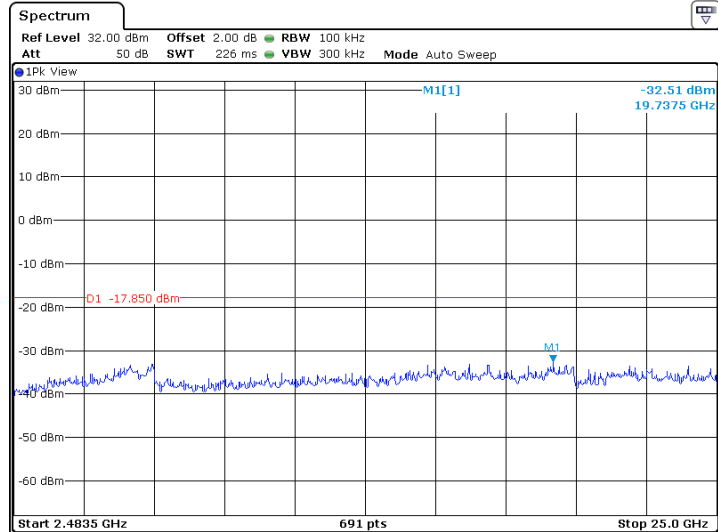




Channel 11 (2462MHz) Reference Level: 2.15dBm

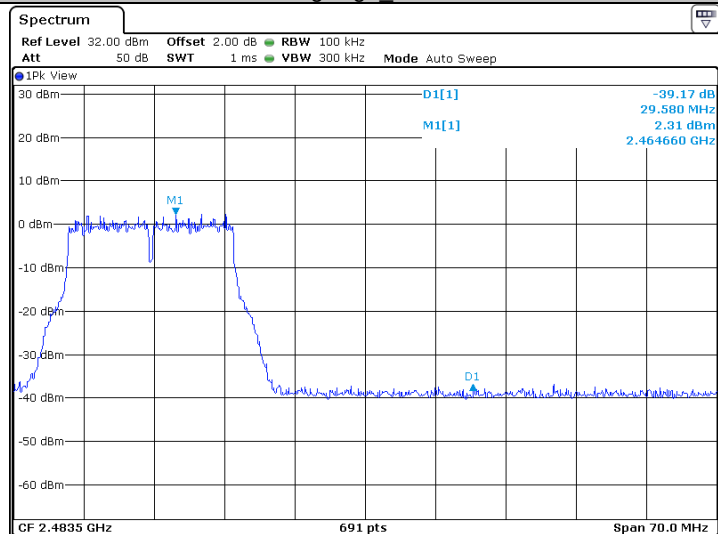


11g 2462_Ant1 2483.5-25000



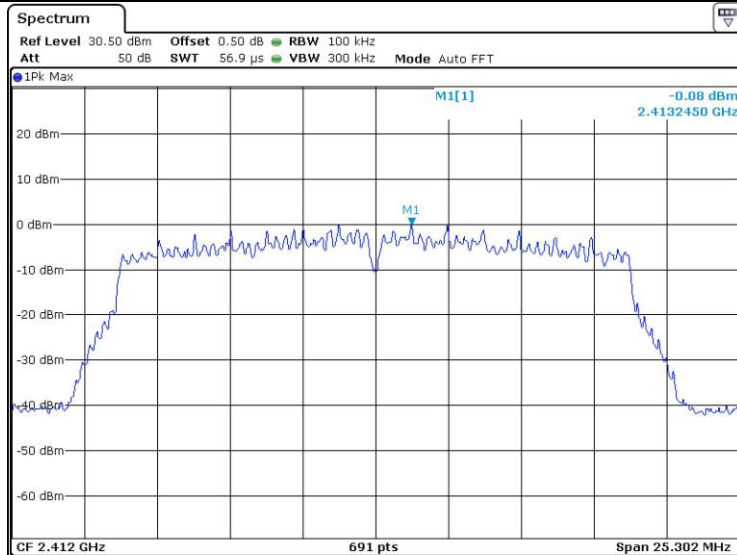
Date: 14.MAY.2021 11:59:47

11g High 2462

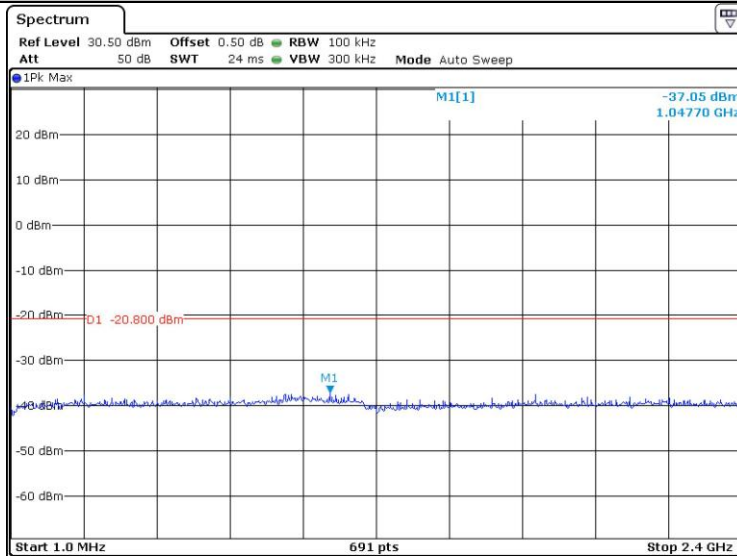


Date: 14.MAY.2021 11:49:44

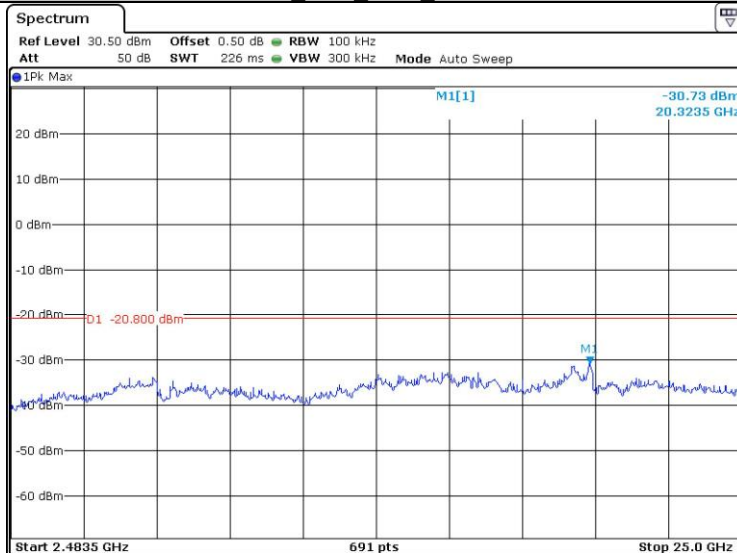
11N20SISO_Ant1_2412_0~Reference



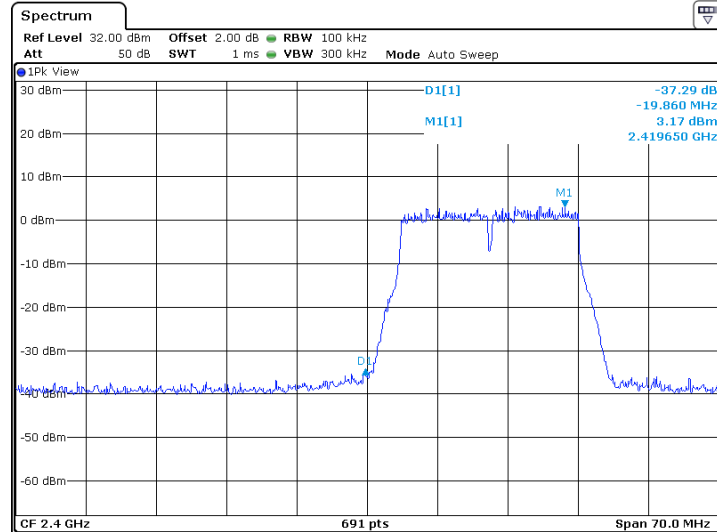
11N20SISO_Ant1_2412_1~2400



11N20SISO_Ant1_2412_2483.5~25000



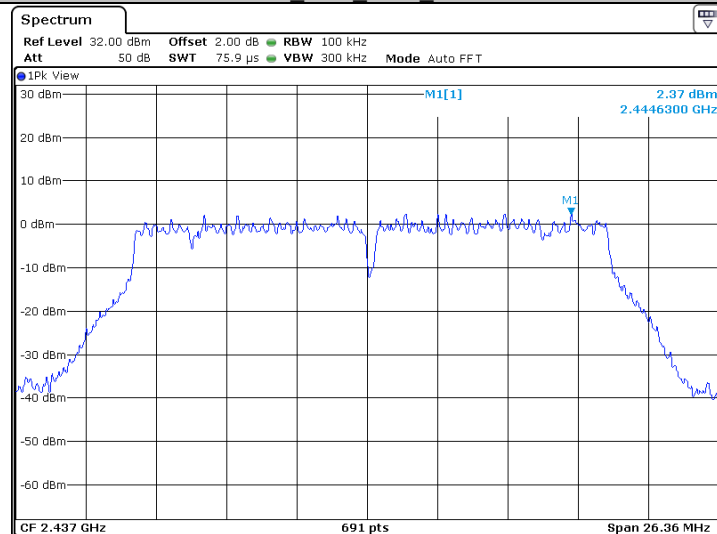
11N20SISO_Ant1_Low_2412



Date: 14.MAY.2021 11:16:52

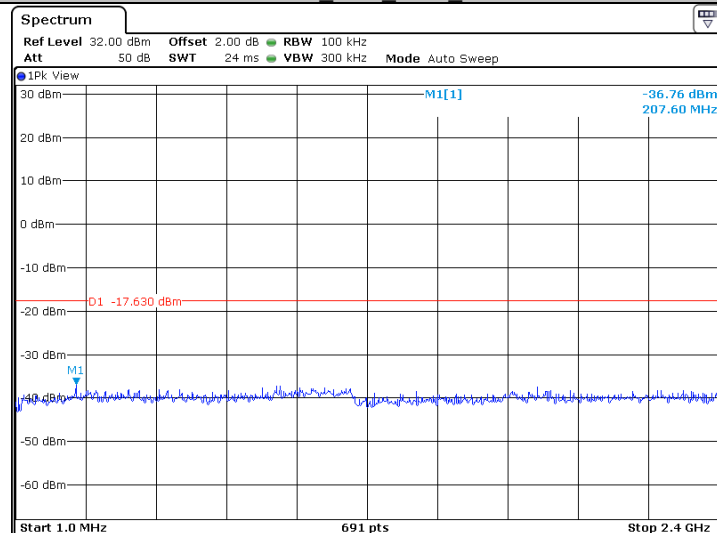
Channel 06 (2437MHz) Reference Level: 2.37dBm

11N20SISO_Ant1_2437_0~Reference



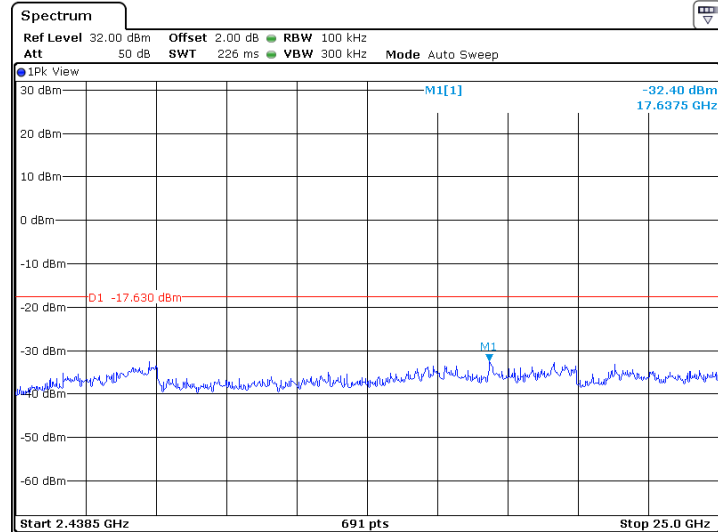
Date: 14.MAY.2021 11:26:18

11N20SISO_Ant1_2437_1~2400



Date: 14.MAY.2021 11:31:04

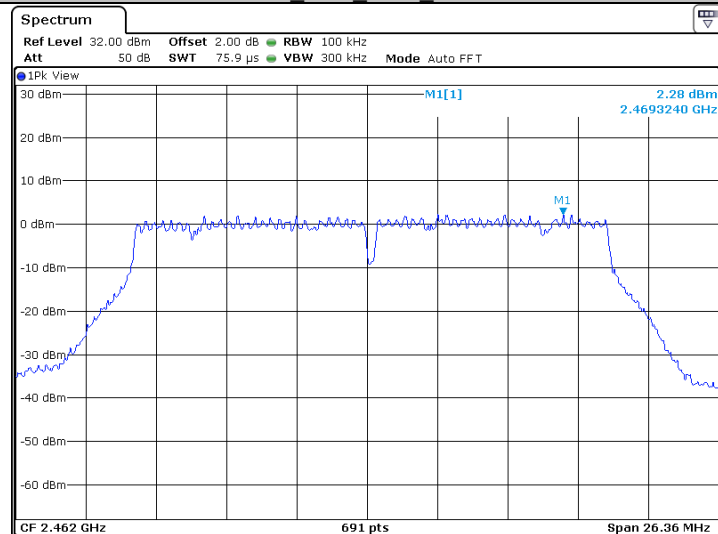
11N20SISO_Ant1_2437_2483.5~25000



Date: 14.MAY.2021 11:30:36

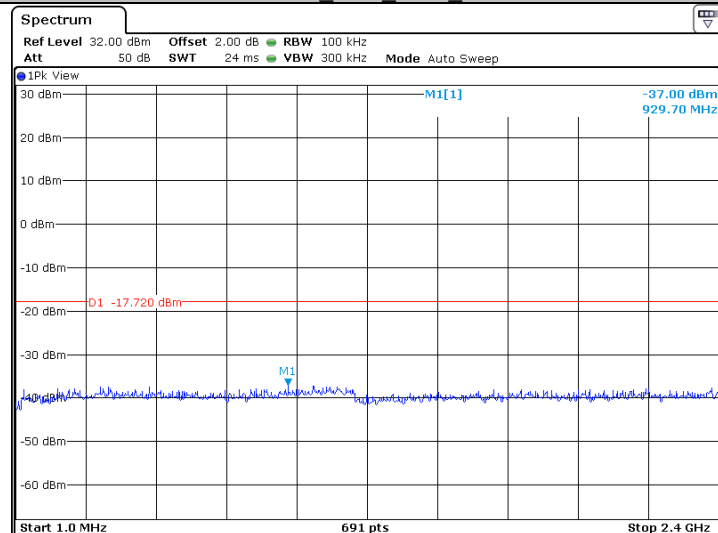
Channel 11 (2462MHz) Reference Level: 2.28dBm

11N20SISO_Ant1_2462_0~Reference



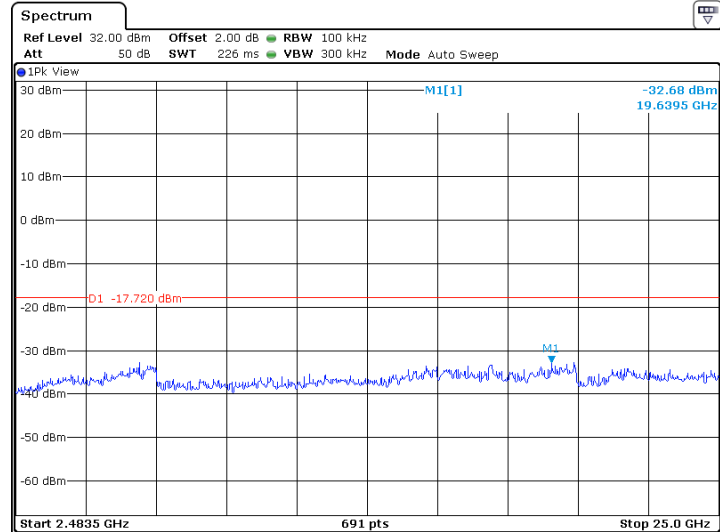
Date: 14.MAY.2021 11:23:47

11N20SISO_Ant1_2462_1~2400



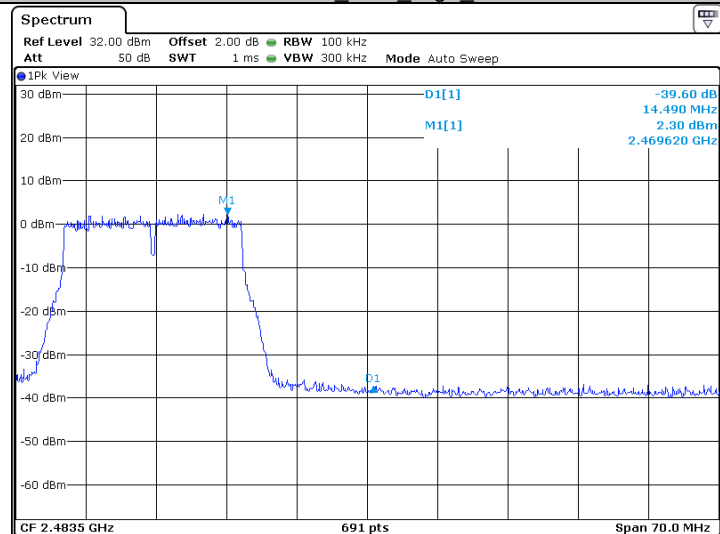
Date: 14.MAY.2021 11:31:45

11N20SISO_Ant1_2462_2483.5~25000



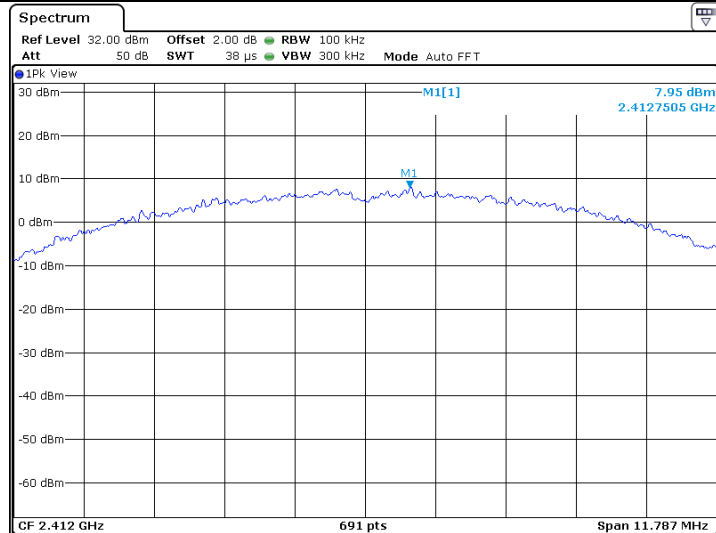
Date: 14.MAY.2021 11:32:09

11N20SISO_Ant1_High_2462



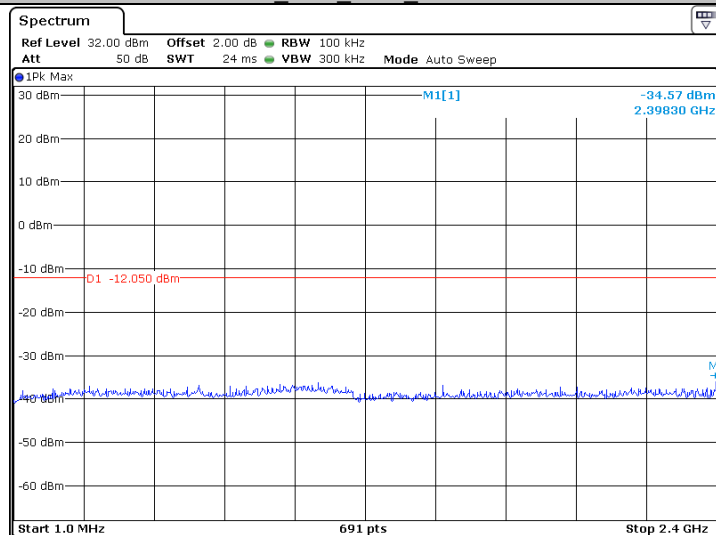
Date: 14.MAY.2021 11:15:54

11B_Ant2_2412_0-Reference



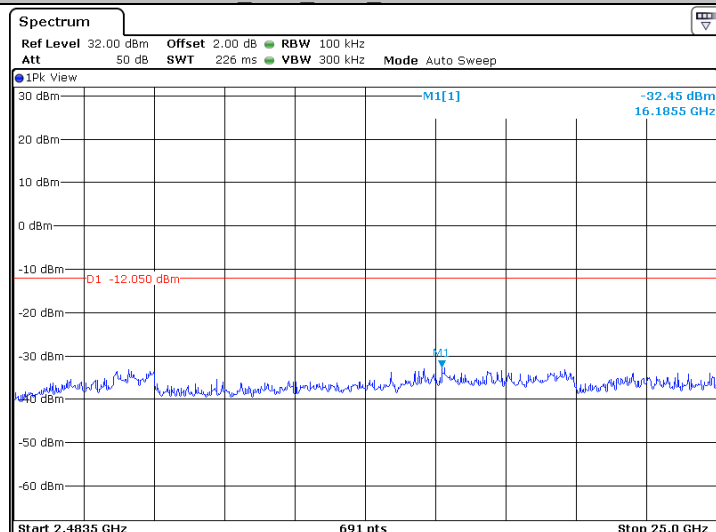
Date: 14.MAY.2021 09:51:05

11B_Ant2_2412_1~2400



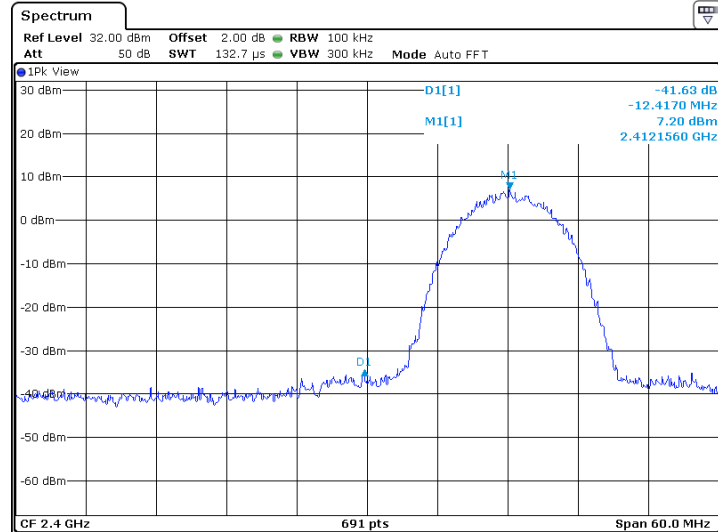
Date: 14.MAY.2021 09:57:17

11B_Ant2_2412_2483.5~25000



Date: 14.MAY.2021 09:57:53

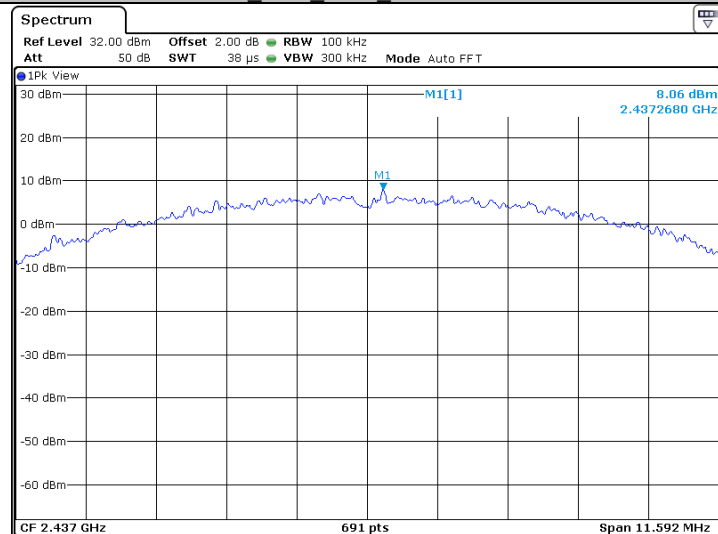
11B_Ant2_Low_2412



Date: 14.MAY.2021 09:24:11

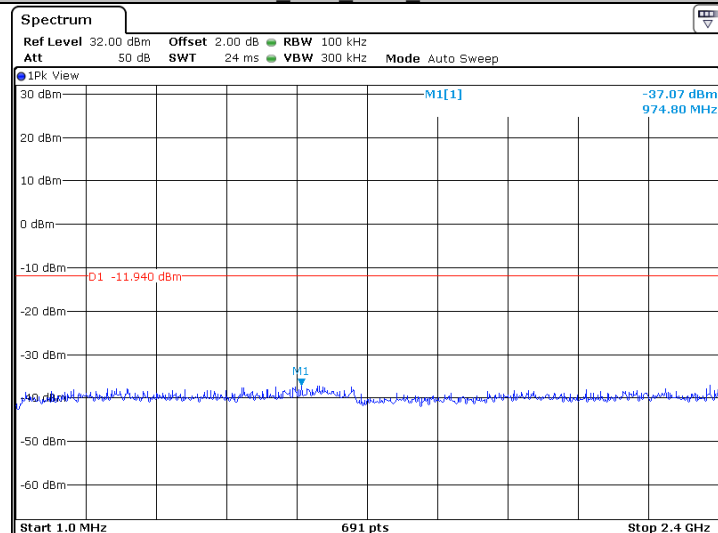
Channel 06 (2437MHz) Reference Level: 8.06dBm

11B_Ant2_2437_0~Reference



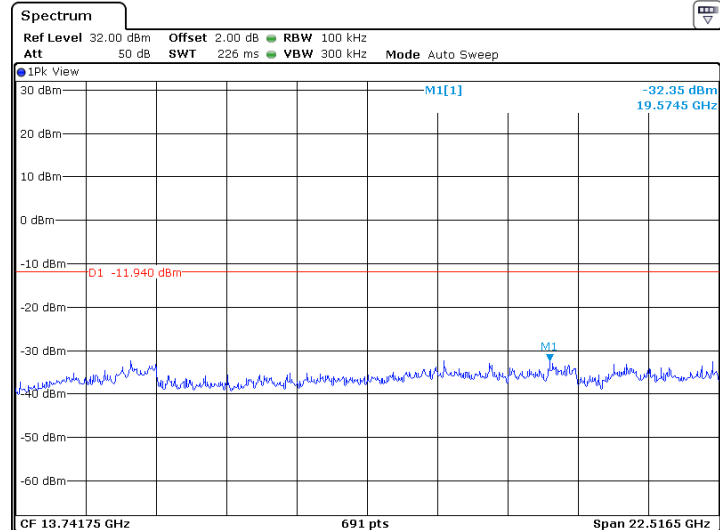
Date: 14.MAY.2021 09:47:49

11B_Ant2_2437_1~2400



Date: 14.MAY.2021 09:59:31

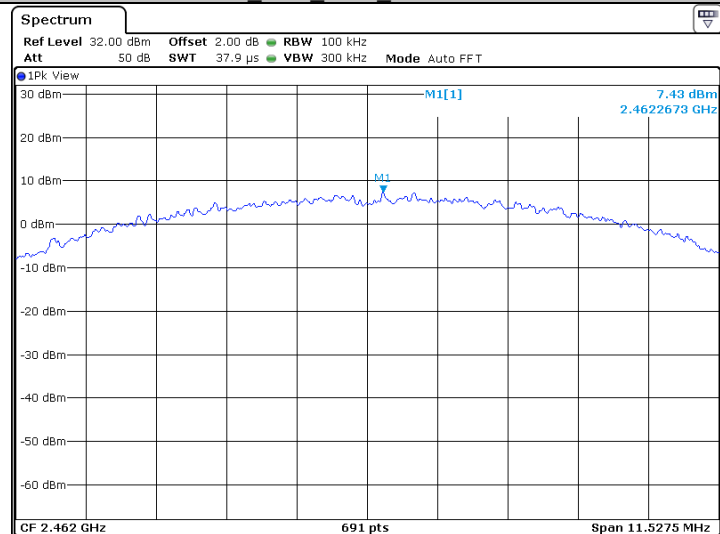
11B_Ant2_2437_2483.5~25000



Date: 14.MAY.2021 09:58:45

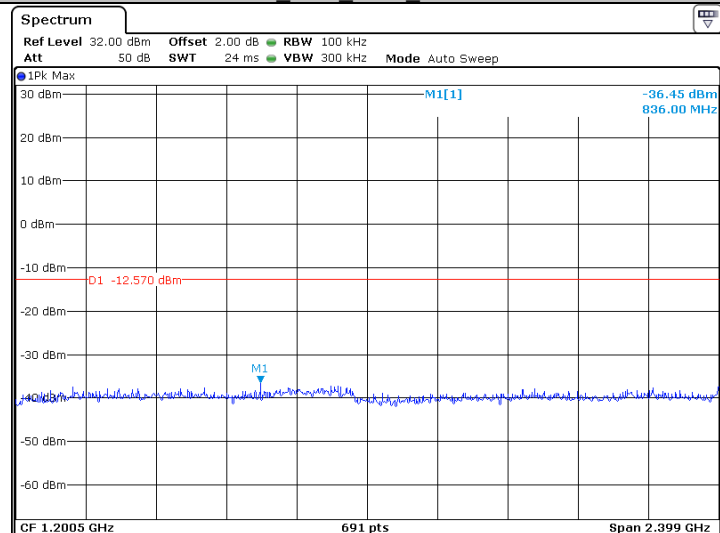
Channel 11 (2462MHz) Reference Level: 7.43dBm

11B_Ant2_2462_0~Reference



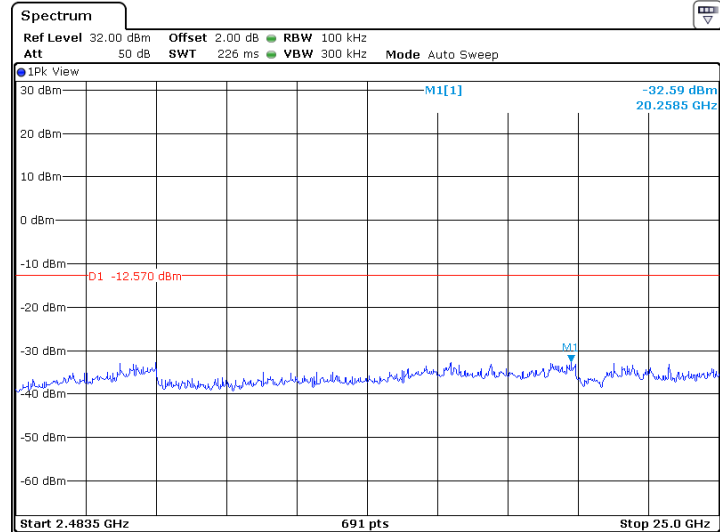
Date: 14.MAY.2021 09:45:59

11B_Ant2_2462_1~2400



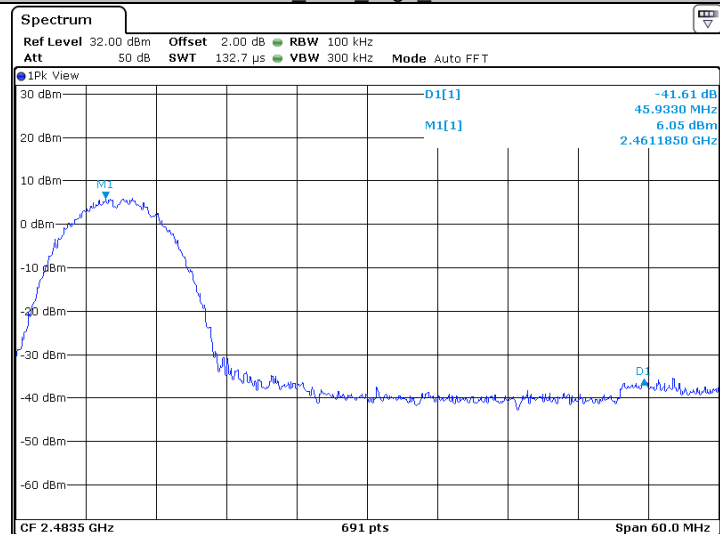
Date: 14.MAY.2021 10:00:25

11B_Ant2_2462_2483.5-25000



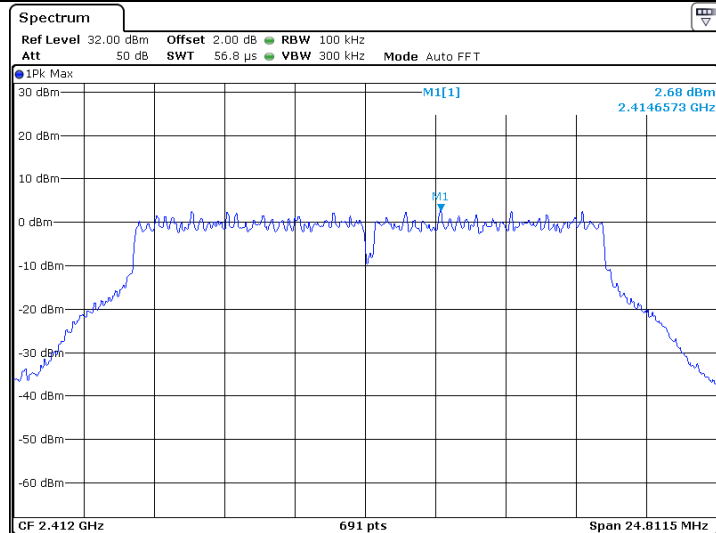
Date: 14.MAY.2021 10:01:46

11B_Ant2_High_2462



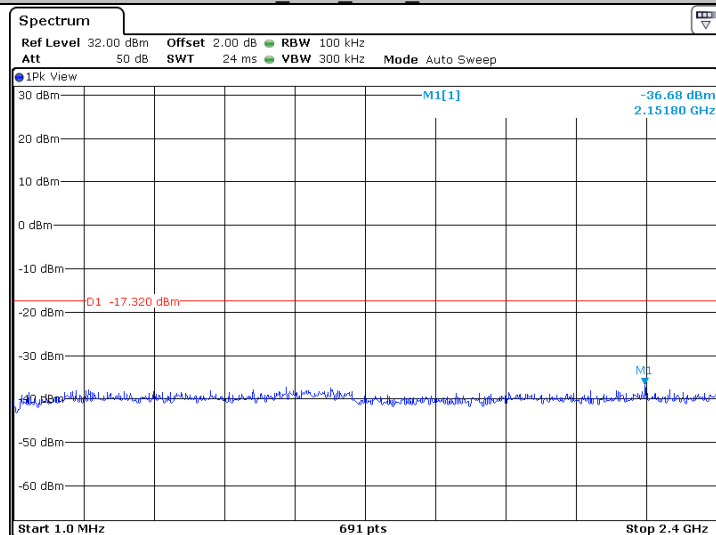
Date: 14.MAY.2021 09:28:11

11G_Ant2_2412_0~Reference



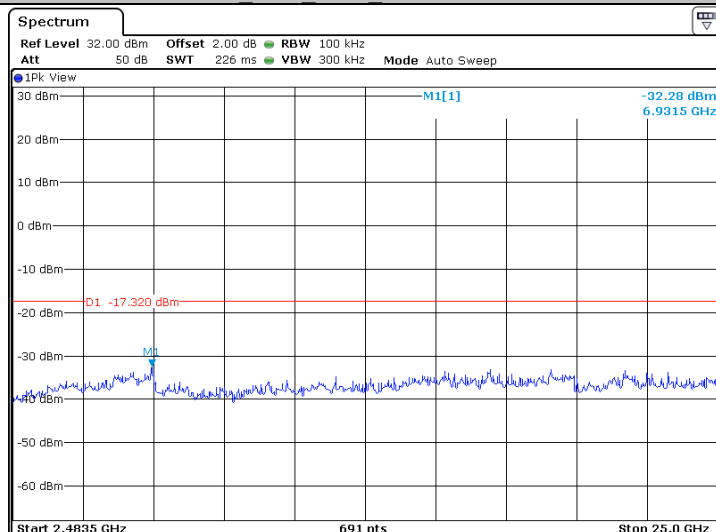
Date: 14.MAY.2021 10:23:20

11G_Ant2_2412_1~2400



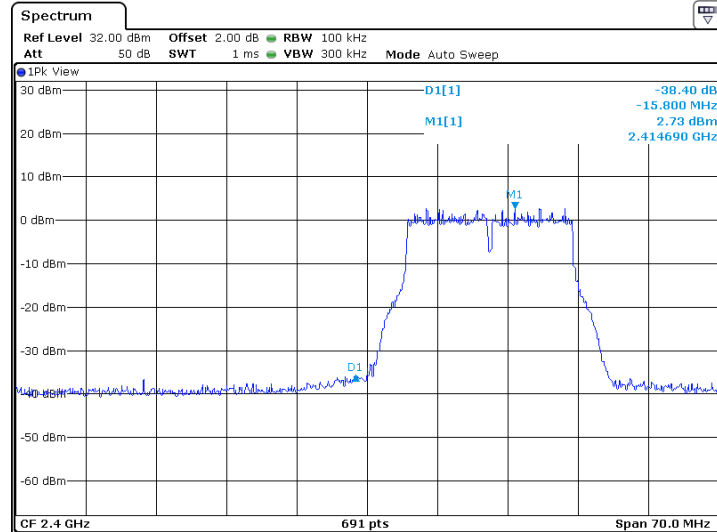
Date: 14.MAY.2021 10:32:03

11G_Ant2_2412_2483.5~25000



Date: 14.MAY.2021 10:33:17

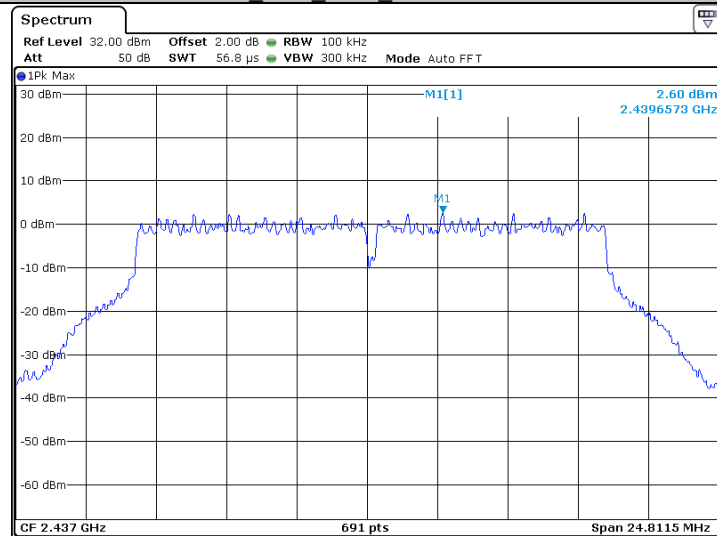
11G_Ant2_Low_2412



Date: 14.MAY.2021 10:19:26

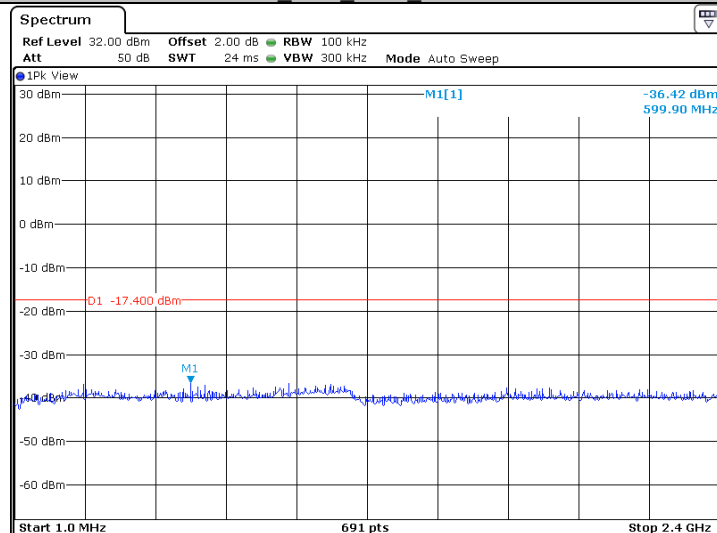
Channel 06 (2437MHz) Reference Level: 2.6dBm

11G_Ant2_2437_0-Reference



Date: 14.MAY.2021 10:25:18

11G_Ant2_2437_1~2400



Date: 14.MAY.2021 10:30:56

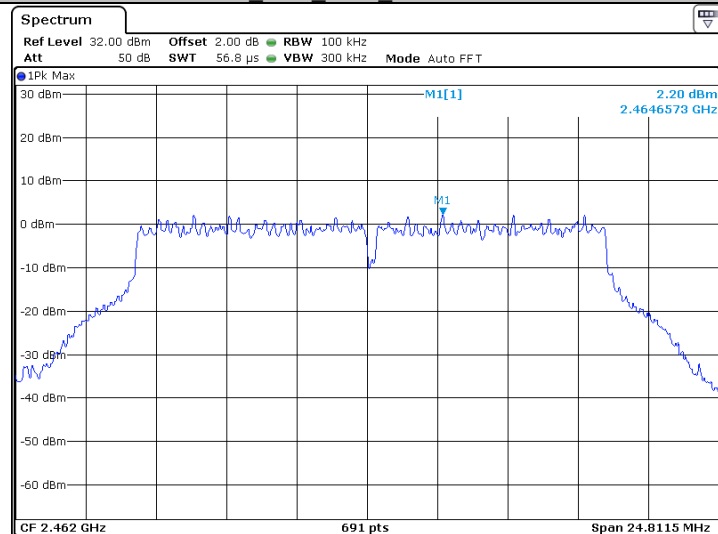
11G_Ant2_2437_2483.5~25000



Date: 14.MAY.2021 10:30:25

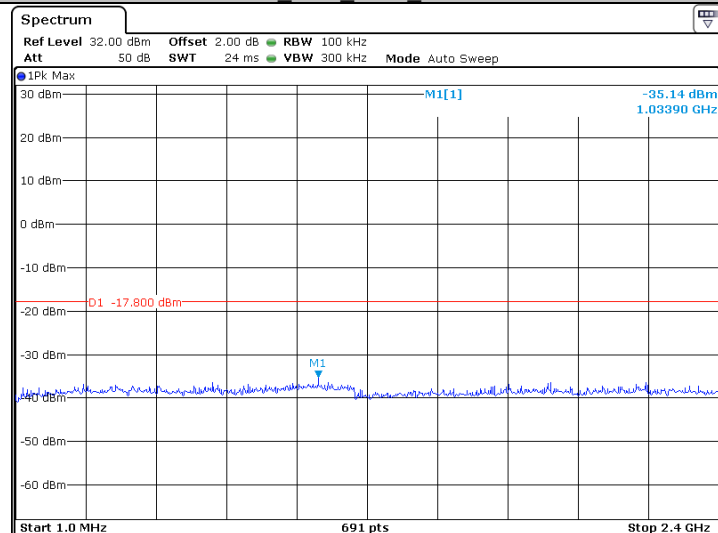
Channel 11 (2462MHz) Reference Level: 2.20dBm

11G_Ant2_2462_0~Reference



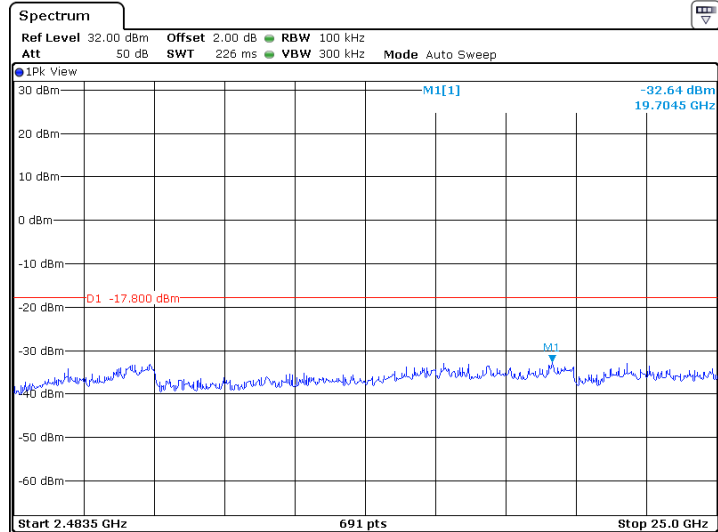
Date: 14.MAY.2021 10:26:21

11G_Ant2_2462_1~2400



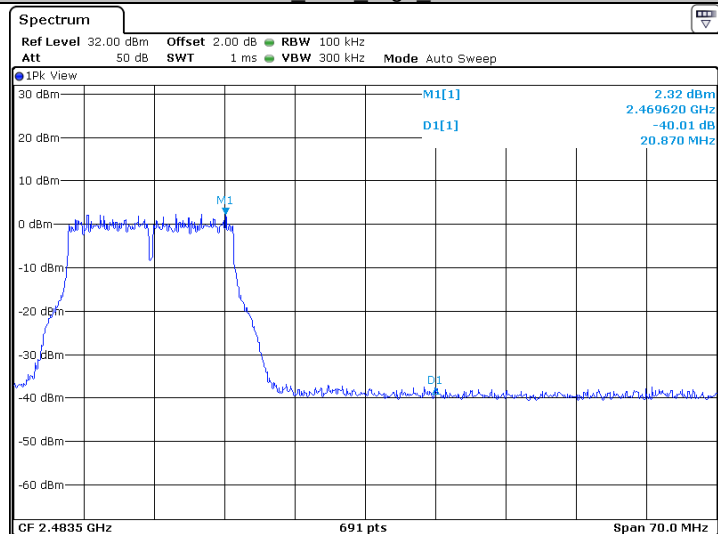
Date: 14.MAY.2021 10:28:33

11G_Ant2_2462_2483.5~25000

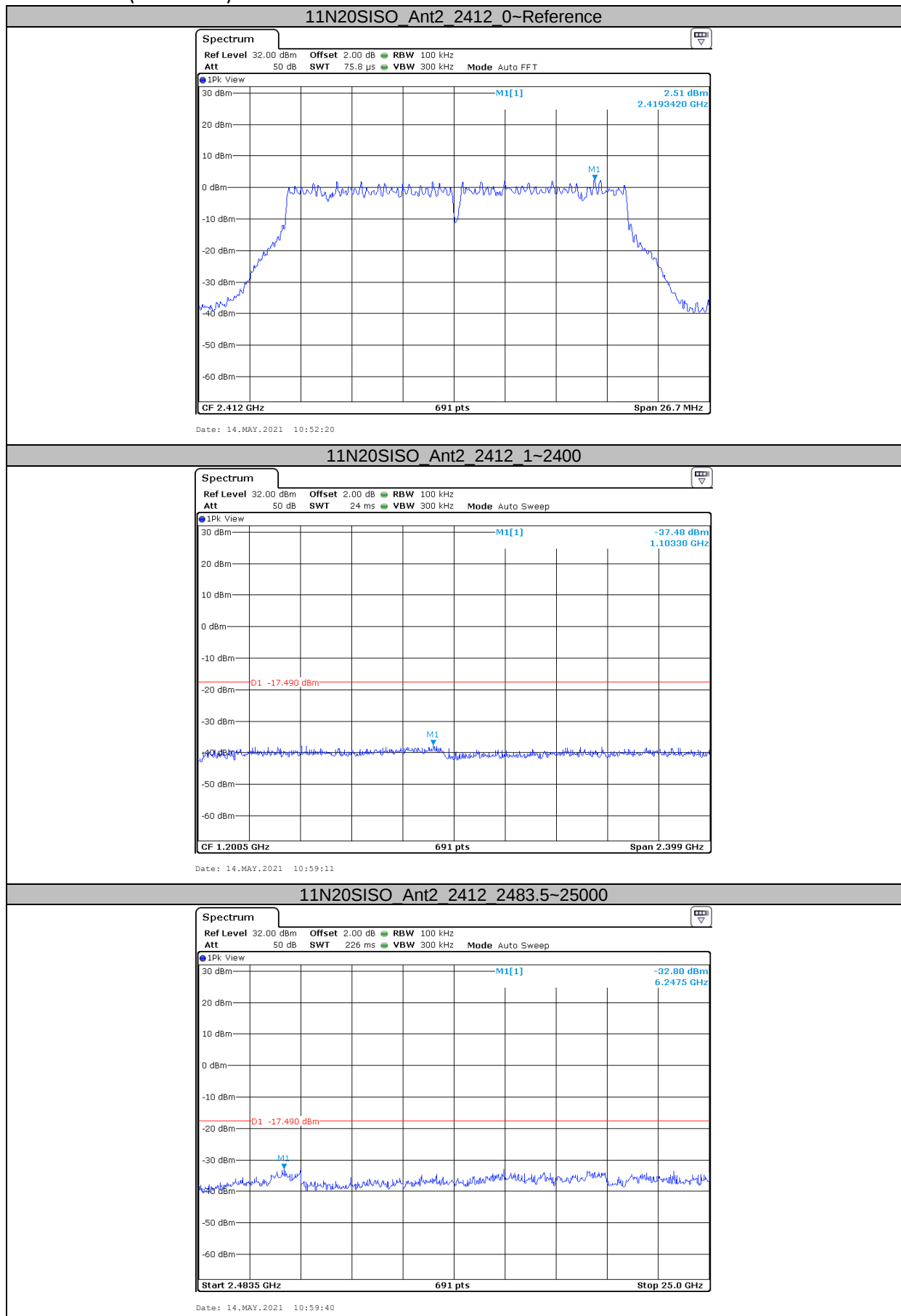


Date: 14.MAY.2021 10:29:14

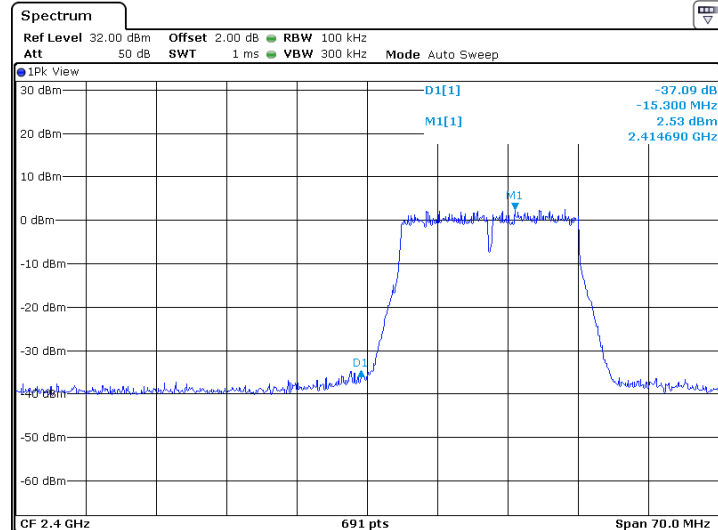
11G_Ant2_High_2462



Date: 14.MAY.2021 10:18:07



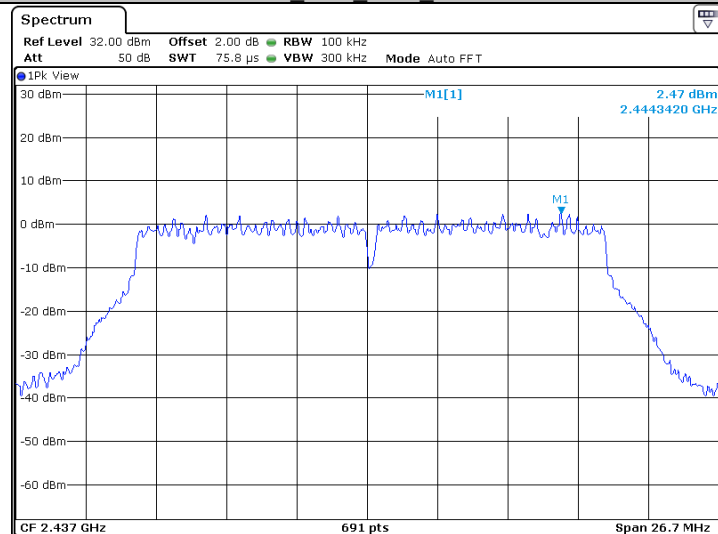
11N20SISO_Ant2_Low_2412



Date: 14.MAY.2021 11:04:57

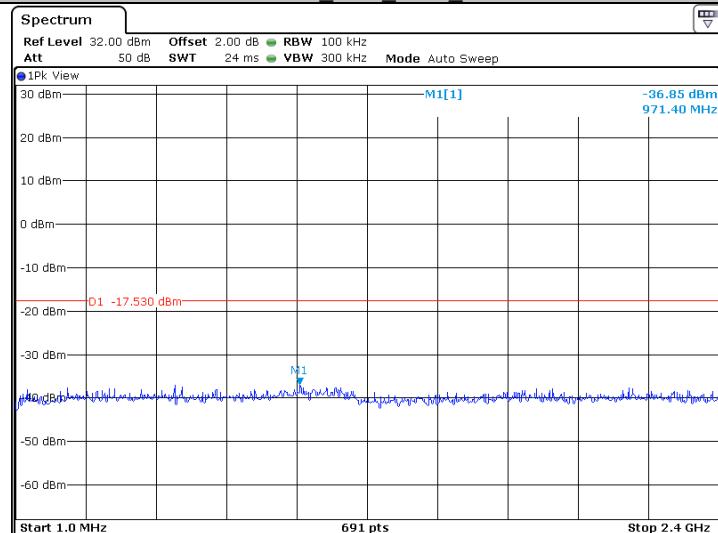
Channel 06 (2437MHz) Reference Level: 2.47dBm

11N20SISO_Ant2_2437_0~Reference



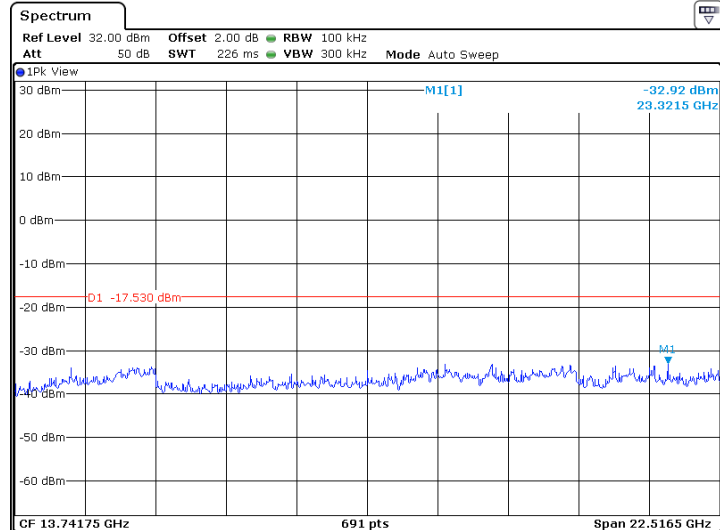
Date: 14.MAY.2021 10:53:14

11N20SISO_Ant2_2437_1~2400



Date: 14.MAY.2021 10:58:29

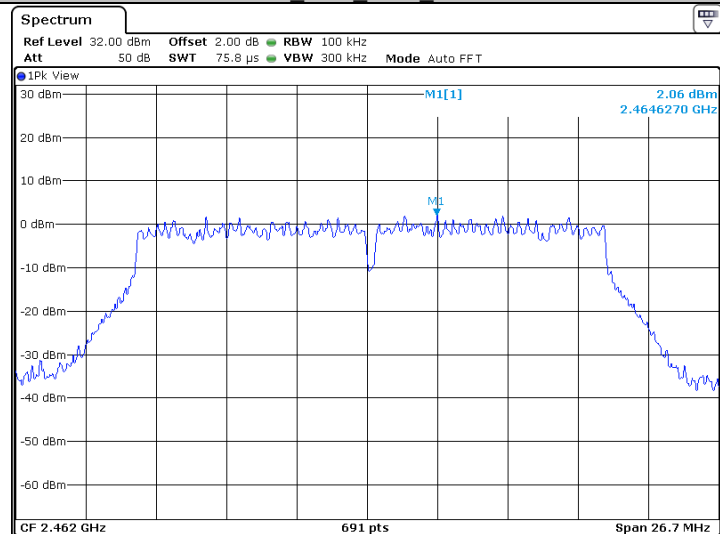
11N20SISO_Ant2_2437_2483.5~25000



Date: 14.MAY.2021 10:57:54

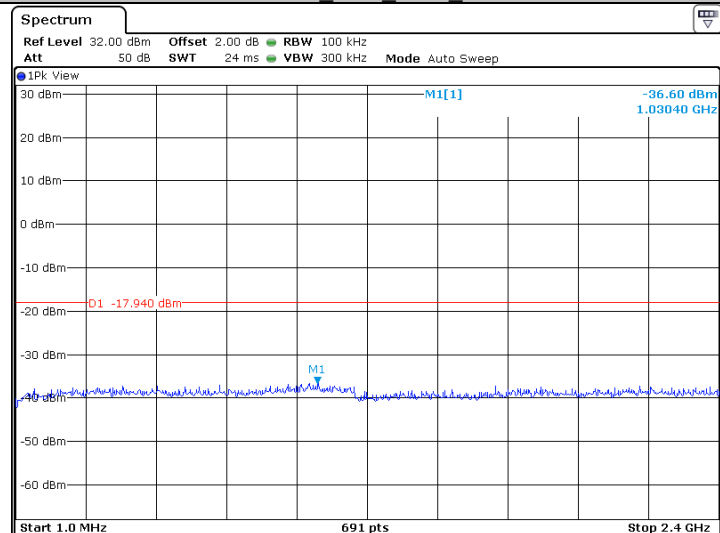
Channel 11 (2462MHz) Reference Level: 2.06dBm

11N20SISO_Ant2_2462_0~Reference



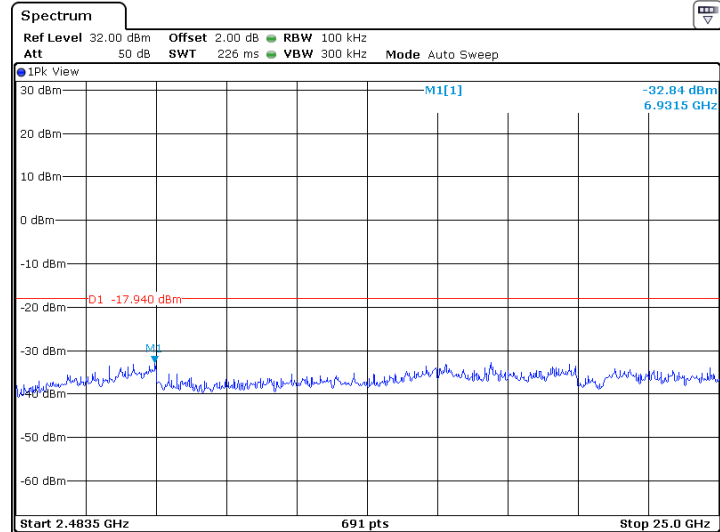
Date: 14.MAY.2021 10:55:20

11N20SISO_Ant2_2462_1~2400



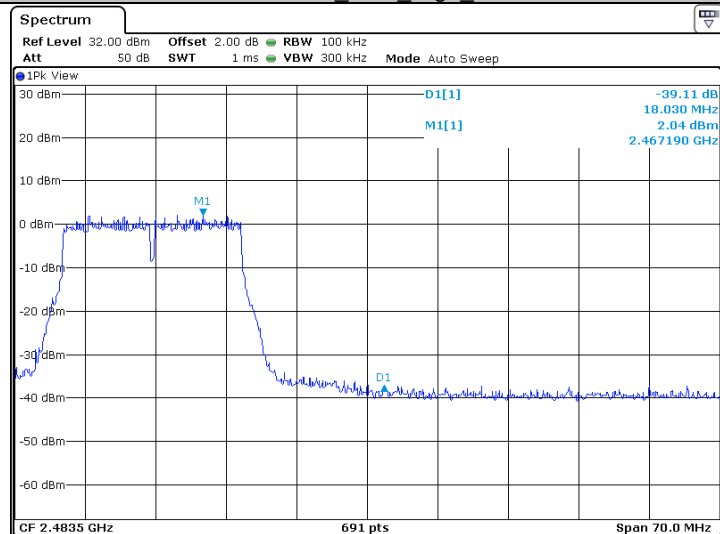
Date: 14.MAY.2021 10:56:41

11N20SISO_Ant2_2462_2483.5~25000



Date: 14.MAY.2021 10:57:08

11N20SISO_Ant2_High_2462



Date: 14.MAY.2021 11:03:54

Applicant: Echelon Fitness Multimedia LLC

Date of Test: 01 July 2021

Model: ECHKIN24-3399-C

4.5 Out of Band Radiated Emissions (for emissions in 4.4 above that are less than 20dB below carrier), FCC Rule 15.247(d):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

☒ Not required, since all emissions are more than 20dB below fundamental

☐ See attached data sheet

Applicant: Echelon Fitness Multimedia LLC

Date of Test: 01 July 2021

Model: ECHKIN24-3399-C

4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b) (c):

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Applicant: Echelon Fitness Multimedia LLC

Date of Test: 01 July 2021

Model: ECHKIN24-3399-C

4.7 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD$$

Where

- FS = Field Strength in dB μ V/m
- RA = Receiver Amplitude (including preamplifier) in dB μ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB
- PD = Pulse Desensitization in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD$$

Example

Assume a receiver reading of 62.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB. The net field strength for comparison to the appropriate emission limit is 42 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 62.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$PD = 0 \text{ dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 \text{ dB}\mu\text{V/m}$$

$$\text{Level in mV/m} = \text{Common Antilogarithm } [(42 \text{ dB}\mu\text{V/m})/20] = 125.9 \mu\text{V/m}$$

Applicant: Echelon Fitness Multimedia LLC

Date of Test: 01 July 2021

Model: ECHKIN24-3399-C

4.8 Radiated Spurious Emission

Worst Case Radiated Spurious Emission
at 374.996667 / 624.998000MHz
is passed by 3.4dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf. Simultaneous transmission was considered during the test, only the worst-case data is recorded in this report.

Applicant: Echelon Fitness Multimedia LLC

Date of Test: 01 July 2021

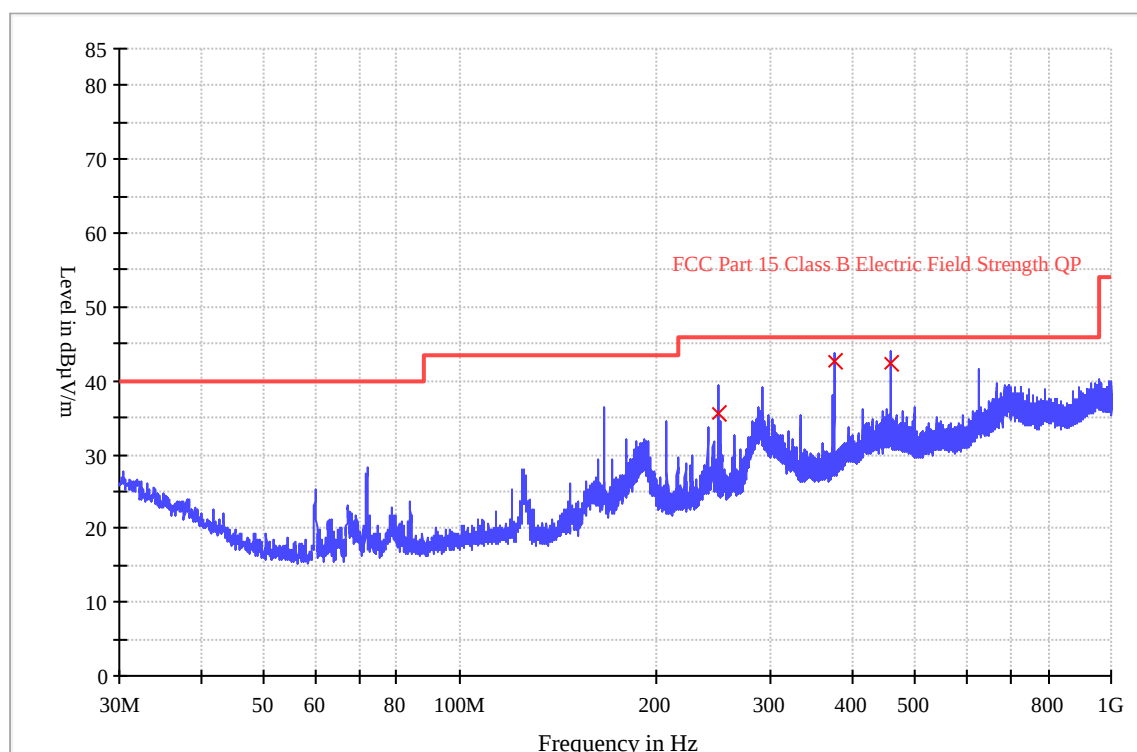
Worst Case Operating Mode:

Model: ECHKIN24-3399-C

Simultaneous transmission

ANT Polarity: Horizontal

FCC Part 15



Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
249.996000	35.6	1000.0	120.000	H	14.2	10.4	46.0
374.996667	42.6	1000.0	120.000	H	17.3	3.4	46.0
457.880000	42.2	1000.0	120.000	H	19.7	3.8	46.0

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBμV/m) = Corr. (dB/m) + Read Level (dBμV)
3. Margin (dB) = Limit Line (dBμV/m) – Level (dBμV/m)

Applicant: Echelon Fitness Multimedia LLC

Date of Test: 01 July 2021

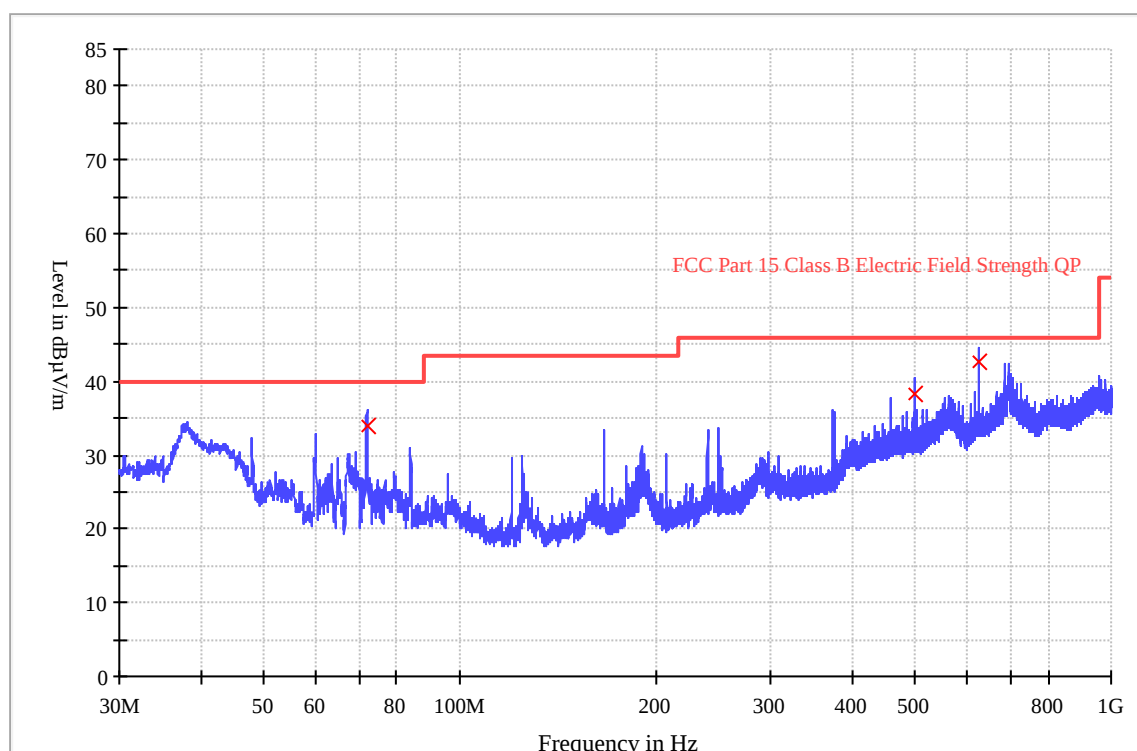
Worst Case Operating Mode:

Model: ECHKIN24-3399-C

Simultaneous transmission

ANT Polarity: Vertical

FCC Part 15



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
72.033333	34.0	1000.0	120.000	V	8.4	6.1	40.0
499.480000	38.3	1000.0	120.000	V	20.7	7.7	46.0
624.998000	42.6	1000.0	120.000	V	24.3	3.4	46.0

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBμV/m) = Corr. (dB/m) + Read Level (dBμV)
3. Margin (dB) = Limit Line (dBμV/m) - Level (dBμV/m)

Applicant: Echelon Fitness Multimedia LLC

Date of Test: 01 July 2021

Model: ECHKIN24-3399-C

Radiated Emissions (above 1GHz)

Worst Case Operating Mode: SISO-ANT1-Transmitting (802.11b-Channel 01)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	62.0	36.8	33.5	58.7	74.0	-15.3
Horizontal	*2390.000	58.1	36.4	29.1	50.8	74.0	-23.2

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	49.6	36.8	33.5	46.3	54.0	-7.7
Horizontal	*2390.000	55.4	36.4	29.1	48.1	54.0	-5.9

Worst Case Operating Mode: SISO-ANT1-Transmitting (802.11b-Channel 06)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	60.8	36.7	33.4	57.5	74.0	-16.5
Horizontal	*7311.000	60.6	36.6	35.8	59.8	74.0	-14.2

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	47.5	36.7	33.4	44.2	54.0	-9.8
Horizontal	*7311.000	47.9	36.6	35.8	47.1	54.0	-6.9

Worst Case Operating Mode: SISO-ANT1-Transmitting (802.11b-Channel 11)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	63.8	36.8	33.3	60.3	74.0	-13.7
Horizontal	*7386.000	68.3	36.5	29.3	61.1	74.0	-12.9

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	49.3	36.8	33.3	45.8	54.0	-8.2
Horizontal	*7386.000	53.5	36.5	29.3	46.3	54.0	-7.7

Worst Case Operating Mode:

SISO-ANT1-Transmitting (802.11g-Channel 01)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	64.5	36.8	33.5	61.2	74.0	-12.8
Horizontal	*2390.000	67.6	36.4	29.1	60.3	74.0	-13.7

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	49.5	36.8	33.5	46.2	54.0	-7.8
Horizontal	*2390.000	55.2	36.4	29.1	47.9	54.0	-6.1

Worst Case Operating Mode:

SISO-ANT1-Transmitting (802.11g-Channel 06)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	63.4	36.7	33.4	60.1	74.0	-13.9
Horizontal	*7311.000	59.2	36.6	35.8	58.4	74.0	-15.6

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	49.0	36.7	33.4	45.7	54.0	-8.3
Horizontal	*7311.000	49.7	36.6	35.8	48.9	54.0	-5.1

Worst Case Operating Mode:

SISO-ANT1-Transmitting (802.11g-Channel 11)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	61.4	36.8	33.3	57.9	74.0	-16.1
Horizontal	*7386.000	68.3	36.5	29.3	61.1	74.0	-12.9

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	50.6	36.8	33.3	47.1	54.0	-6.9
Horizontal	*7386.000	57.0	36.5	29.3	49.8	54.0	-4.2

Worst Case Operating Mode:

SISO-ANT1-Transmitting (802.11n20-Channel 01)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	59.9	36.8	33.5	56.6	74.0	-17.4
Horizontal	*2390.000	64.3	36.4	29.1	57.0	74.0	-17.0

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	50.4	36.8	33.5	47.1	54.0	-6.9
Horizontal	*2390.000	54.0	36.4	29.1	46.7	54.0	-7.3

Worst Case Operating Mode:

SISO-ANT1-Transmitting (802.11n20-Channel 06)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	63.0	36.7	33.4	59.7	74.0	-14.3
Horizontal	*7311.000	61.1	36.6	35.8	60.3	74.0	-13.7

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	50.1	36.7	33.4	46.8	54.0	-7.2
Horizontal	*7311.000	47.1	36.6	35.8	46.3	54.0	-7.7

Worst Case Operating Mode:

SISO-ANT1-Transmitting (802.11n20-Channel 11)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	61.1	36.8	33.3	57.6	74.0	-16.4
Horizontal	*7386.000	65.5	36.5	29.3	58.3	74.0	-15.7

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	49.1	36.8	33.3	45.6	54.0	-8.4
Horizontal	*7386.000	53.9	36.5	29.3	46.7	54.0	-7.3

Worst Case Operating Mode:

SISO-ANT2-Transmitting (802.11b-Channel 01)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	60.1	36.8	33.5	56.8	74.0	-17.2
Horizontal	*2390.000	62.7	36.4	29.1	55.4	74.0	-18.6

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	51.1	36.8	33.5	47.8	54.0	-6.2
Horizontal	*2390.000	55.5	36.4	29.1	48.2	54.0	-5.8

Worst Case Operating Mode:

SISO-ANT2-Transmitting (802.11b-Channel 06)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	59.2	36.7	33.4	55.9	74.0	-18.1
Horizontal	*7311.000	58.5	36.6	35.8	57.7	74.0	-16.3

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	50.6	36.7	33.4	47.3	54.0	-6.7
Horizontal	*7311.000	48.9	36.6	35.8	48.1	54.0	-5.9

Worst Case Operating Mode:

SISO-ANT2-Transmitting (802.11b-Channel 11)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	56.2	36.8	33.3	52.7	74.0	-21.3
Horizontal	*7386.000	63.5	36.5	29.3	56.3	74.0	-17.7

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	49.8	36.8	33.3	46.3	54.0	-7.7
Horizontal	*7386.000	54.4	36.5	29.3	47.2	54.0	-6.8

Worst Case Operating Mode:

SISO-ANT2-Transmitting (802.11g-Channel 01)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	55.4	36.8	33.5	52.1	74.0	-21.9
Horizontal	*2390.000	63.5	36.4	29.1	56.2	74.0	-17.8

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	49.4	36.8	33.5	46.1	54.0	-7.9
Horizontal	*2390.000	55.7	36.4	29.1	48.4	54.0	-5.6

Worst Case Operating Mode:

SISO-ANT2-Transmitting (802.11g-Channel 06)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	59.5	36.7	33.4	56.2	74.0	-17.8
Horizontal	*7311.000	60.1	36.6	35.8	59.3	74.0	-14.7

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	49.5	36.7	33.4	46.2	54.0	-7.8
Horizontal	*7311.000	48.9	36.6	35.8	48.1	54.0	-5.9

Worst Case Operating Mode:

SISO-ANT2-Transmitting (802.11g-Channel 11)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	58.7	36.8	33.3	55.2	74.0	-18.8
Horizontal	*7386.000	66.5	36.5	29.3	59.3	74.0	-14.7

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	48.6	36.8	33.3	45.1	54.0	-8.9
Horizontal	*7386.000	56.2	36.5	29.3	49.0	54.0	-5.0

Worst Case Operating Mode:

SISO-ANT2-Transmitting (802.11n20-Channel 01)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	58.4	36.8	33.5	55.1	74.0	-18.9
Horizontal	*2390.000	65.1	36.4	29.1	57.8	74.0	-16.2

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	48.8	36.8	33.5	45.5	54.0	-8.5
Horizontal	*2390.000	56.0	36.4	29.1	48.7	54.0	-5.3

Worst Case Operating Mode:

SISO-ANT2-Transmitting (802.11n20-Channel 06)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	57.8	36.7	33.4	54.5	74.0	-19.5
Horizontal	*7311.000	62.2	36.6	35.8	61.4	74.0	-12.6

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	50.8	36.7	33.4	47.5	54.0	-6.5
Horizontal	*7311.000	49.9	36.6	35.8	49.1	54.0	-4.9

Worst Case Operating Mode:

SISO-ANT2-Transmitting (802.11n20-Channel 11)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	62.9	36.8	33.3	59.4	74.0	-14.6
Horizontal	*7386.000	68.3	36.5	29.3	61.1	74.0	-12.9

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	46.6	36.8	33.3	43.1	54.0	-10.9
Horizontal	*7386.000	56.5	36.5	29.3	49.3	54.0	-4.7

Worst Case Operating Mode:
MIMO-Transmitting (802.11n20-Channel 01)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	57.4	36.8	33.5	54.1	74.0	-19.9
Horizontal	*2390.000	65.5	36.4	29.1	58.2	74.0	-15.8

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	51.7	36.8	33.5	48.4	54.0	-5.6
Horizontal	*2390.000	57.6	36.4	29.1	50.3	54.0	-3.7

Worst Case Operating Mode:
MIMO-Transmitting (802.11n20-Channel 06)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	57.6	36.7	33.4	54.3	74.0	-19.7
Horizontal	*7311.000	59.9	36.6	35.8	59.1	74.0	-14.9

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	50.1	36.7	33.4	46.8	54.0	-7.2
Horizontal	*7311.000	48.9	36.6	35.8	48.1	54.0	-5.9

Worst Case Operating Mode:
MIMO-Transmitting (802.11n20-Channel 11)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	62.7	36.8	33.3	59.2	74.0	-14.8
Horizontal	*7386.000	64.7	36.5	29.3	57.5	74.0	-16.5

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	49.3	36.8	33.3	45.8	54.0	-8.2
Horizontal	*7386.000	56.5	36.5	29.3	49.3	54.0	-4.7

- NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Echelon Fitness Multimedia LLC

Date of Test: 01 June 2021

Model: ECHKIN24-3399-C

4.9 Conducted Emission

Simultaneous transmission was considered during the test, only the worst-case data is recorded in this report.

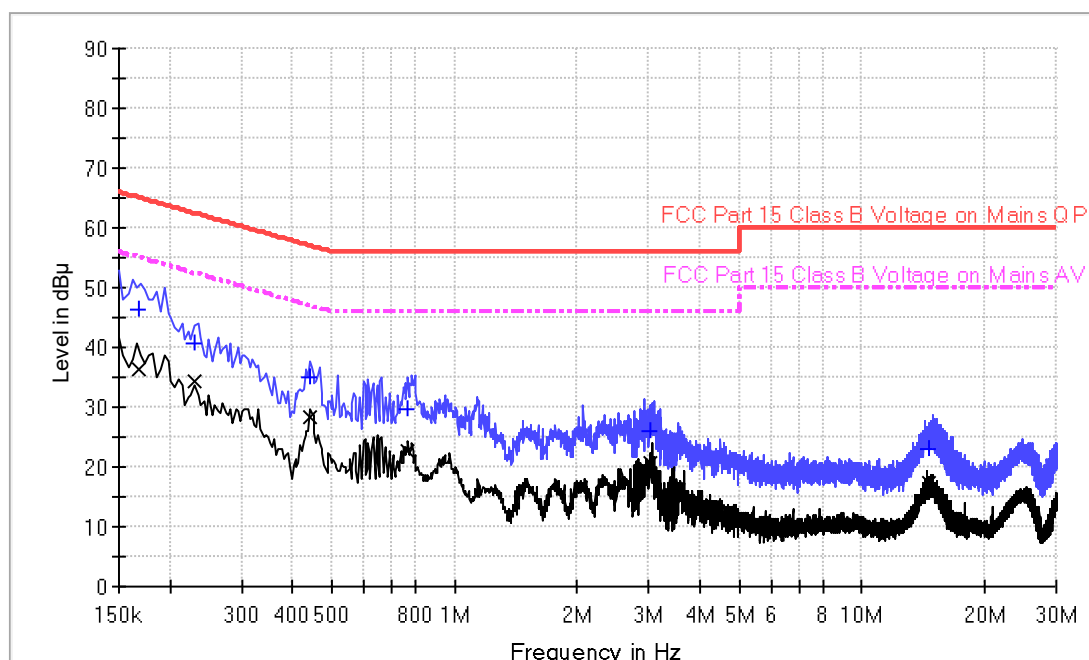
Worst Case Conducted Emission
at 0.230000 / 0.194000MHz
is passed by 18.0dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: conducted photos.pdf.

Applicant: Echelon Fitness Multimedia LLC
Date of Test: 01 June 2021
Model: ECHKIN24-3399-C
Worst Case Operating Mode: Simultaneous transmission
Phase: Live

Graphic / Data Table

Conducted Emissions Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.168000	46.4	9.000	L1	9.6	18.7	65.1
0.230000	40.6	9.000	L1	9.6	21.8	62.4
0.442000	34.9	9.000	L1	9.6	22.1	57.0
0.766000	29.6	9.000	L1	9.6	26.4	56.0
3.014000	26.0	9.000	L1	9.7	30.0	56.0
14.606000	23.1	9.000	L1	10.0	36.9	60.0

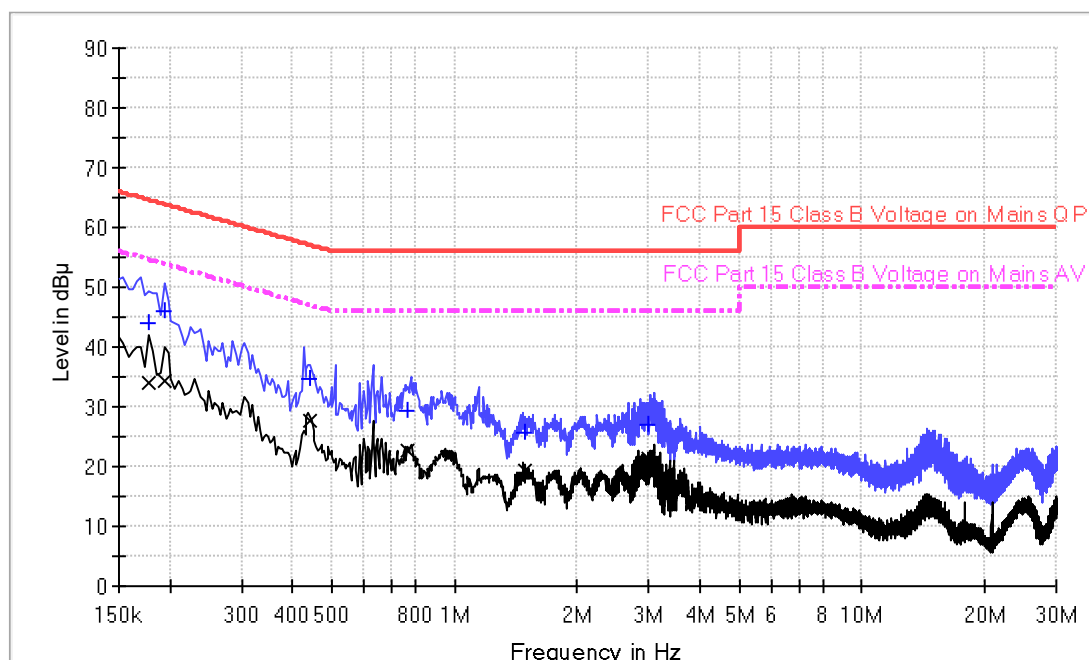
Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.168000	36.3	9.000	L1	9.6	18.8	55.1
0.230000	34.4	9.000	L1	9.6	18.0	52.4
0.442000	28.3	9.000	L1	9.6	18.7	47.0
0.766000	22.7	9.000	L1	9.6	23.3	46.0
3.014000	20.8	9.000	L1	9.7	25.2	46.0
14.606000	17.2	9.000	L1	10.0	32.8	50.0

Applicant: Echelon Fitness Multimedia LLC
Date of Test: 01 June 2021
Model: ECHKIN24-3399-C
Worst Case Operating Mode: Simultaneous transmission
Phase: Neutral

Graphic / Data Table

Conducted Emissions Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.178000	43.9	9.000	N	9.5	20.7	64.6
0.194000	45.9	9.000	N	9.5	18.0	63.9
0.442000	34.6	9.000	N	9.5	22.4	57.0
0.770000	29.5	9.000	N	9.5	26.5	56.0
1.486000	25.7	9.000	N	9.5	30.3	56.0
2.998000	27.1	9.000	N	9.5	28.9	56.0

Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.178000	34.0	9.000	N	9.5	20.6	54.6
0.194000	34.4	9.000	N	9.5	19.5	53.9
0.442000	27.8	9.000	N	9.5	19.2	47.0
0.770000	22.8	9.000	N	9.5	23.2	46.0
1.486000	19.2	9.000	N	9.5	26.8	46.0
2.998000	21.4	9.000	N	9.5	24.6	46.0

Applicant: Echelon Fitness Multimedia LLC
Date of Test: 01 July 2021
Model: ECHKIN24-3399-C

4.10 Radiated Emissions from Digital Section of Transceiver, FCC Ref: 15.109

- ☐ Not required - No digital part
- ☐ Test results are attached
- ☒ Included in the separated report.

Applicant: Echelon Fitness Multimedia LLC
Date of Test: 01 July 2021
Model: ECHKIN24-3399-C

4.11 Transmitter Duty Cycle Calculation and Measurements, FCC Rule 15.35(b), (c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEP function on the analyzer was set to ZERO SPAN. The Transmitter ON time was determined from the resultant time-amplitude display:

	See attached spectrum analyzer chart (s) for Transmitter timing
	See Transmitter timing diagram provided by manufacturer
x	Not applicable, duty cycle was not used.

5.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf & internal photos.pdf.

6.0 Product Labeling

For electronic filing, the FCC ID label artwork and location is saved with filename: label.pdf.

7.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

9.0 Confidentiality Request

For electronic filing, the confidentiality request of the tested EUT is saved with filename: request.pdf.

10.0 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF*.

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.

11.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-13	Biconilog Antenna	ETS	3142E	00217919	2019-06-10	2022-06-10
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	2019-05-24 2021-05-18	2021-05-24 2023-05-18
SZ061-08	Horn Antenna	ETS	3115	00092346	2019-09-07	2021-09-07
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	2019-08-13	2022-08-13
SZ056-03	Spectrum Analyzer	R&S	FSP30	101148	2020-05-27 2021-05-10	2021-05-27 2022-05-10
SZ185-01	EMI Receiver	R & S	ESCI	100547	2020-12-22	2021-12-22
SZ181-04	Preamplifier	Agilent	8449B	3008A024 74	2020-05-27 2021-05-10	2021-05-27 2022-05-10
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	2018-12-15	2021-12-15
SZ062-02	RF Cable	RADIAL	RG 213U	--	2020-12-01 2021-06-01	2021-06-01 2021-12-01
SZ062-05	RF Cable	RADIAL	0.04-26.5GHz	--	2020-12-01 2021-06-01	2021-06-01 2021-12-01
SZ062-12	RF Cable	RADIAL	0.04-26.5GHz	--	2020-12-01 2021-06-01	2021-06-01 2021-12-01
SZ067-04	Notch Filter	Micro-Tronics	BRM5070 2-02	--	2020-05-27 2021-05-11	2021-05-27 2022-05-11
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	2020-10-15	2021-10-15
SZ187-01	Two-Line V-Network	R & S	ENV216	100072	2020-10-27	2021-10-27
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	2020-05-27 2021-05-11	2021-05-27 2022-05-11
SZ188-03	Shielding Room	ETS	RFD-100	4100	2018-12-15	2021-12-15
SZ062-16	RF Cable	HUBER+SUHNER	CBL2-BN-1m	110127-2231000	2020-10-15	2021-10-15

***** End of Report *****