TESTREPORT

Applicant Name :	Shenzhen Junge Yunchuang Technology Co., Ltd.
Address :	1204, Unit 3, Building C, Fu Gui Yuan, Fu Gui Road, Fu Hua Community, Xixiang Street, Baoan District, Shenzhen, China
Report Number:	RA230426-22439E-RF-00C
FCC ID:	2A3FP-P14

Test Standard (s)

FCC PART 15.407

Sample Description

Product Type:	Projector
Model No.:	H507
Multiple Model(s) No.:	H508, H509, H510, H511, H512, Leisure 35U, Leisure 35UW
Trade Mark:	N/A
Date Received:	2023/04/26
Report Date:	2023/06/12

Test Result:	Pass*

* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Amanda Wei

EMC Engineer

Approved By:

Candy Li

EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

Shenzhen Accurate Technology Co., Ltd. is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.

This report cannot be reproduced except in full, without prior written approval of the Company. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY **4**

GENERAL INFORMATION **5**

PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) 5
OBJECTIVE 5
TEST METHODOLOGY 5
MEASUREMENT UNCERTAINTY 6
TEST FACILITY 6

SYSTEM TEST CONFIGURATION **7**

DESCRIPTION OF TEST CONFIGURATION 7
EUT EXERCISE SOFTWARE 7
DUTY CYCLE 8
EQUIPMENT MODIFICATIONS 11
SUPPORT EQUIPMENT LIST AND DETAILS 11
EXTERNAL I/O CABLE 11
BLOCK DIAGRAM OF TEST SETUP 12

SUMMARY OF TEST RESULTS **13**

TEST EQUIPMENT LIST **14**

FCC §1.1307 (B) (3) & §2.1091- MPE-BASED EXEMPTION **16**

FCC §15.203 – ANTENNA REQUIREMENT **18**

APPLICABLE STANDARD 18
ANTENNA CONNECTOR CONSTRUCTION 18

FCC §15.407 (B) (6) §15.207 (A) – CONDUCTED EMISSIONS **19**

APPLICABLE STANDARD 19
EUT SETUP 19
EMI TEST RECEIVER SETUP 19
TEST PROCEDURE 19
FACTOR & OVER LIMIT CALCULATION 20
TEST DATA 20

§15.205 & §15.209 & §15.407(B)– UNDESIRABLE EMISSION **23**

APPLICABLE STANDARD 23
EUT SETUP 23
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP 24
TEST PROCEDURE 24
FACTOR & OVER LIMIT/MARGIN CALCULATION 25
TEST DATA 25

FCC §15.407(A),(E) – 26 DB & 6DB EMISSION BANDWIDTH **36**

APPLICABLE STANDARD 36
TEST PROCEDURE 36
TEST DATA 37

FCC §15.407(A) – CONDUCTED TRANSMITTER OUTPUT POWER **54**

APPLICABLE STANDARD 54
TEST PROCEDURE 54
TEST DATA 55

FCC §15.407(A) - POWER SPECTRAL DENSITY 57
TEST PROCEDURE 57
TEST DATA 58

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RA230426-22439E-RF-00C	Original Report	2023-06-12

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Projector
Tested Model	H507
Multiple Model(s)	H508, H509, H510, H511, H512, Leisure 35U, Leisure 35UW (model difference see product declaration letter of similarity)
Frequency Range	5G Wi-Fi: 5150~5250Mhz ; 5725~5850 MHz
Mode	802.11a/n20/n40
Maximum Conducted Average Output Power	5150-5250MHz: 9.87dBm 5725-5850MHz: 11.88dBm
Modulation Technique	OFDM
Antenna Specification*	3.6dBi (It is provided by the applicant)
Voltage Range	DC 26V from adapter
Sample serial number	255X_1for Conducted and Radiated Emissions Test 255X_2for RF Conducted Test (Assigned by ATC)
Sample/EUT Status	Good condition
Adapter information	Model: JDA2602700 Input: AC 100-240V, 50/60Hz, 1.5A MAX Output: DC26.0V, 2.70A

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. And KDB789033 D02 General U-NII Test Procedures New Rules v02r01.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF Frequency		$0.082*10^{-7}$
RF output power, conducted		0.71dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions	9k-30MHz	2.74dB, k=2
Emissions, Radiated	9kHz - 30MHz	2.06dB
	30MHz - 1GHz	5.08dB
	1GHz - 18GHz	4.96dB
	18GHz - 26.5GHz	5.16dB
	26.5GHz - 40GHz	4.64dB
Temperature		1℃
Humidity		6%
Supply voltages		0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the Floor 1, KuMaKe Building, Dongzhou Community, Guangming Street, Guangming District, Shenzhen, Guangdong, China

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189.

Accredited by American Association for Laboratory Accreditation (A2LA). The Certificate Number is 4297.01

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0016. The Registration Number is 30241.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode, which was provided by manufacturer. The device supports 802.11 a/ n20/n40 mode.

For 5150-5250MHz Band, 6 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
38	5190	46	5230
40	5200	48	5240

For 802.11a/n20 mode: channel 36, 40, 48 were tested;
For 802.11n40 mode: channel 38, 46 were tested;

For 5725-5850MHz Band, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	159	5795
151	5755	161	5805
153	5765	165	5825
157	5785	/	/

For 802.11a/n20 mode: channel 149, 157, 165 were tested;
For 802.11n40 mode: channel 151, 159 were tested;

EUT Exercise Software

"Win7_MP_Kit_RTL11n_8723FU_USB_v0.39*" exercise software was used. The worst case was performed under and the power level was provided by the applicant.

U-NII	Mode	Data rate	Power Level		
			Low Channel	Middle Channel	High Channel
5150 – 5250MHz	802.11a	6Mbps	64	64	64
	802.11n20	MCS0	64	64	64
	802.11n40	MCS0	64	/	64
5725 – 5850MHz	802.11a	6Mbps	64	64	64
	802.11n20	MCS0	64	64	64
	802.11n40	MCS0	64	/	64

The worse-case data rates are determined to be as follows for each mode based upon investigations by measuring the output power and PSD across all data rated bandwidths, and modulations.

Duty cycle

5150 MHz – 5250 MHz

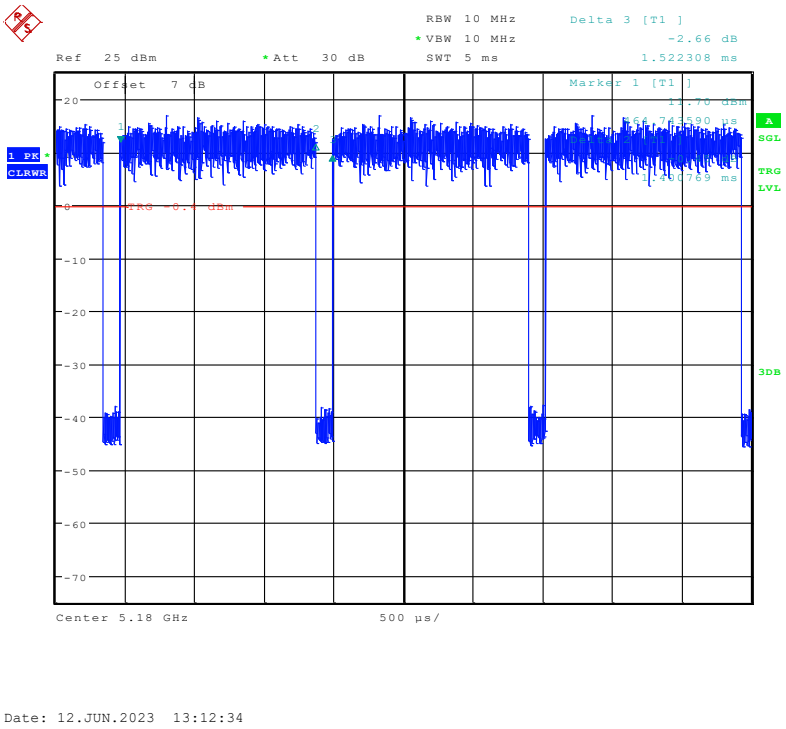
Mode	Ton (ms)	Ton+off (ms)	Duty Cycle (%)	Duty Cycle Factor(dB)	1/T (kHz)
802.11a	1.401	1.522	92.05	0.36	0.71
802.11n20	1.305	1.522	85.74	0.67	0.77
802.11n40	0.646	1.056	61.17	2.13	1.55

5725 MHz – 5850 MHz:

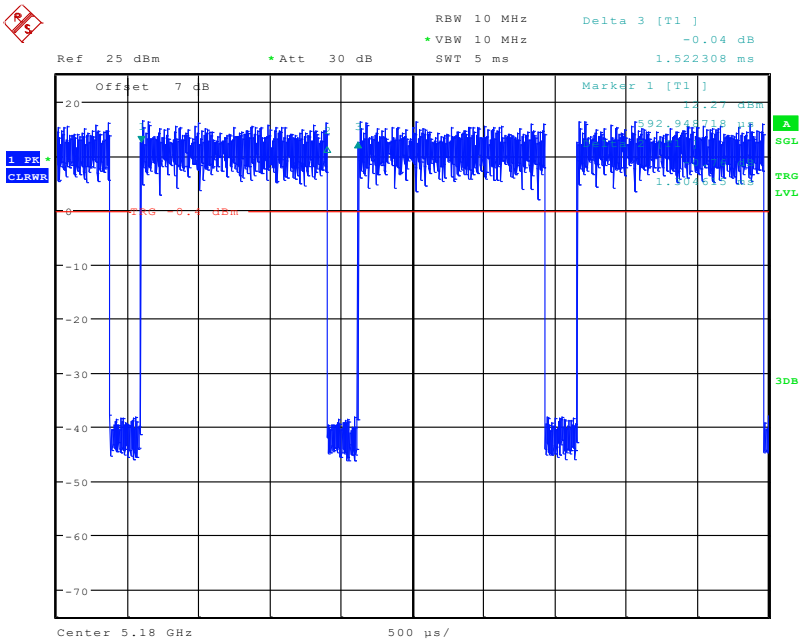
Mode	Ton (ms)	Ton+off (ms)	Duty Cycle (%)	Duty Cycle Factor(dB)	1/T (kHz)
802.11a	1.399	1.537	91.02	0.41	0.71
802.11n20	1.311	1.505	87.11	0.60	0.76
802.11n40	0.648	0.900	72.00	1.43	1.54

5150 MHz - 5250 MHz:

802.11a mode:

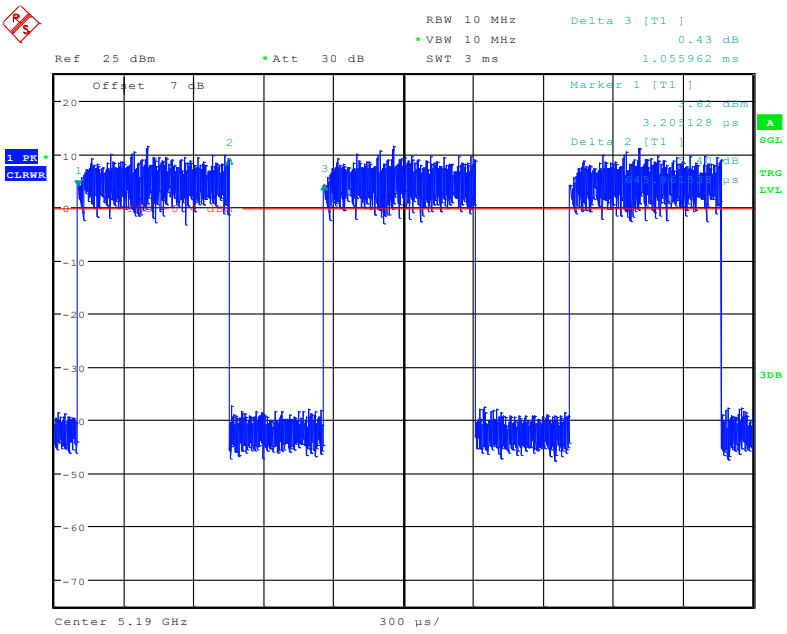


802.11n-HT20 mode:



Date: 12.JUN.2023 13:10:27

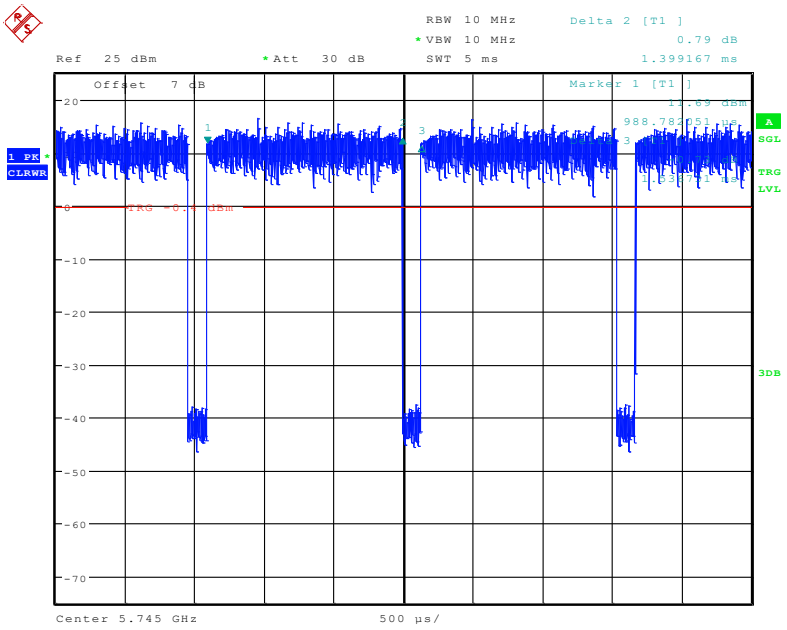
802.11n-HT40 mode:



Date: 12.JUN.2023 13:16:18

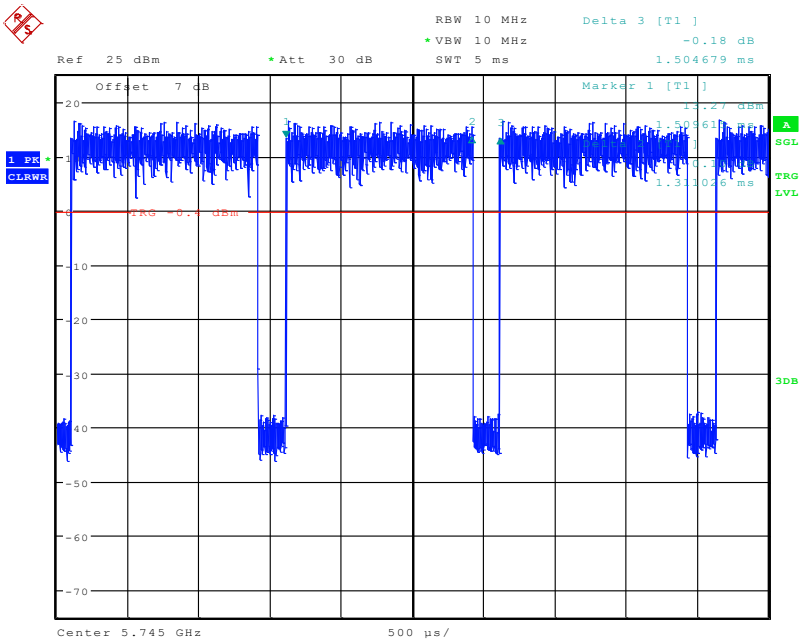
5725 MHz – 5850 MHz:

802.11a mode:



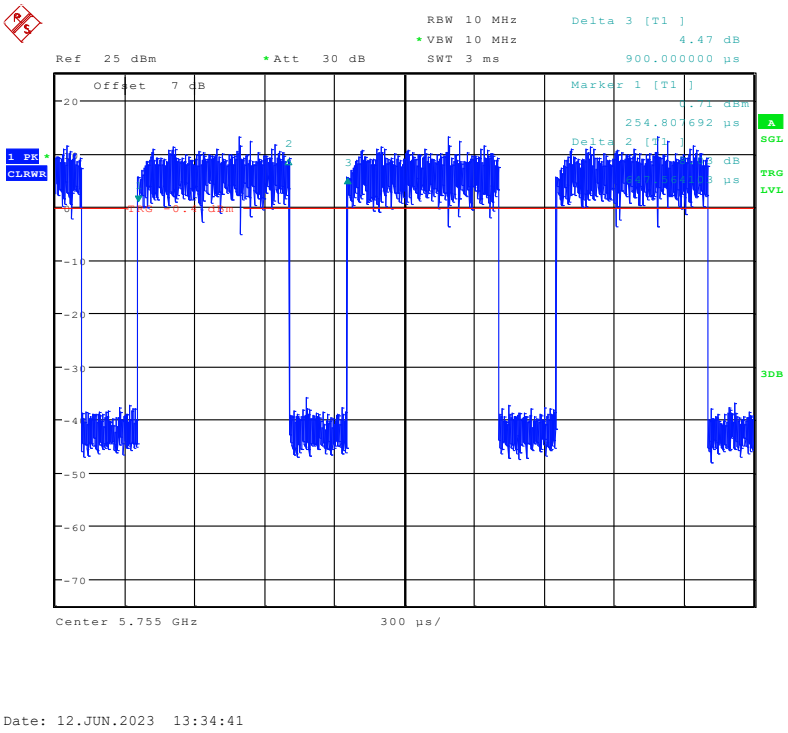
Date: 12.JUN.2023 13:27:18

802.11n-HT20 mode:



Date: 12.JUN.2023 13:31:03

802.11n-HT40 mode:



Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

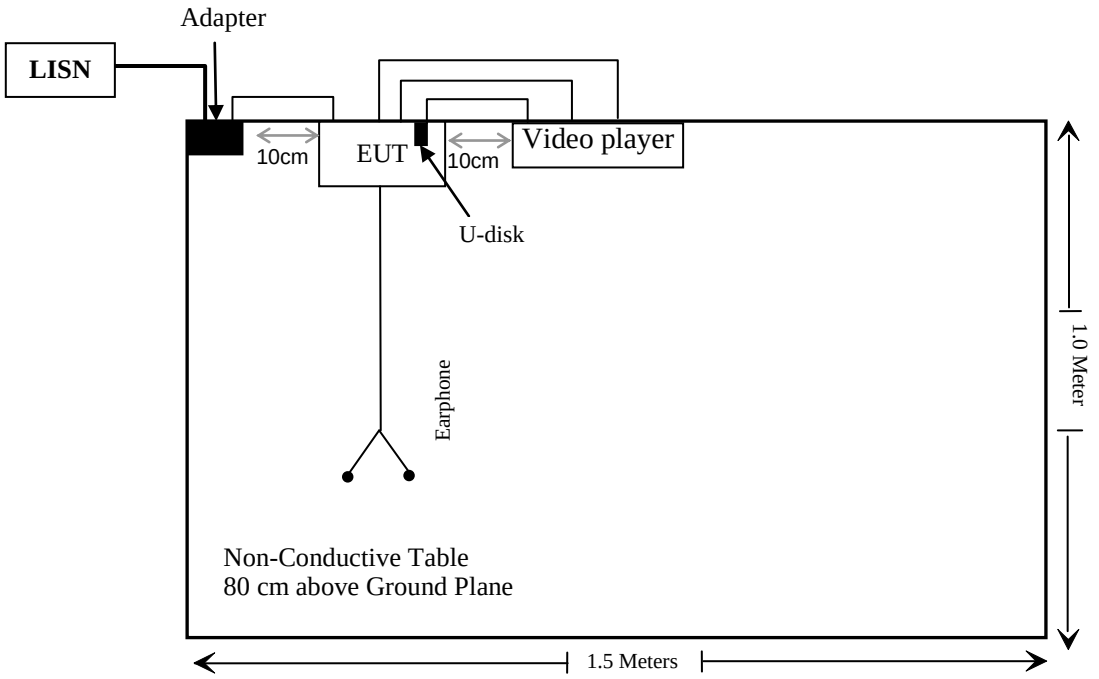
Manufacturer	Description	Model	Serial Number
GIEC	Video player	BDP-G4350	BD4350KXM21041500732
Unknown	U-disk	Unknown	Unknown
Unknown	Earphone	Unknown	Unknown

External I/O Cable

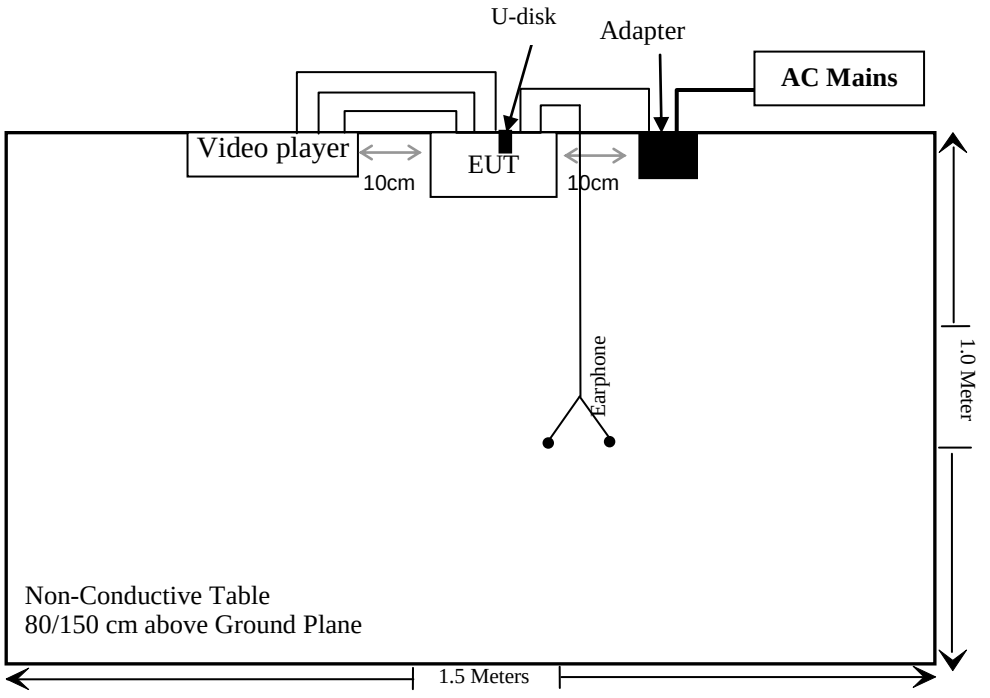
Cable Description	Length (m)	From/Port	To
Un-shielded detachable AC cable	1.2	LISN/ AC Mains	Adapter
Un-shielded Un-detachable DC cable	1.2	Adapter	EUT
Shielded detachable HDMI cable	1.5	EUT	Video player
Shielded detachable HDMI cable	1.5	EUT	Video player
Un-shielded detachable AV cable	1.0	EUT	Video player

Block Diagram of Test Setup

For conducted emission



For Radiated Emissions:



Note: the support table edge was flush with center of turntable

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 (b) & §2.1091	MPE-BASED EXEMPTION	Compliant
§15.203	Antenna Requirement	Compliant
§15.407(b)(9)& §15.207(a)	Conducted Emissions	Compliant
§15.205& §15.209 & §15.407(b)	Undesirable Emission& Restricted Bands	Compliant
§15.407(a) (e)	26 dB Emission Bandwidth & 6dB Bandwidth	Compliant
§15.407(a)	Conducted Transmitter Output Power	Compliant
§15.407 (a)	Power Spectral Density	Compliant
§15.407 (h)	Transmit Power Control (TPC)	Not Applicable
§15.407 (h)	Dynamic Frequency Selection (DFS)	Not Applicable

Not Applicable: the EUT has not operate within DFS frequency band, not supports TPC function

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde& Schwarz	EMI Test Receiver	ESCI	100784	2022/11/25	2023/11/24
Rohde & Schwarz	L.I.S.N.	ENV216	101314	2022/11/25	2023/11/24
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2022/12/07	2023/12/06
Unknown	RF Coaxial Cable	No.17	N0350	2022/11/25	2023/11/24
Conducted Emission Test Software: e3 191218 (V9)					
Radiated Emissions Test					
Rohde& Schwarz	Test Receiver	ESR	102725	2022/11/25	2023/11/24
Rohde&Schwarz	Spectrum Analyzer	FSV40	101949	2022/11/25	2023/11/24
SONOMA INSTRUMENT	Amplifier	310 N	186131	2022/11/08	2023/11/07
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2022/11/08	2023/11/07
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2022/11/08	2023/11/07
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Horn Antenna	BBHA9120D	837	2023/02/22	2026/02/21
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2022/12/26	2025/12/25
Radiated Emission Test Software:e3 191218 (V9)					
Unknown	RF Coaxial Cable	No.10	N050	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.11	N1000	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.12	N040	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.13	N300	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.14	N800	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.15	N600	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.16	N650	2022/11/25	2023/11/24
CD	Band Reject Filter	BRM-5.15/5.35g-45	075	2022/11/25	2023/11/24
CD	Band Reject Filter	BRM-5.725/5.875G-45	065	2022/11/25	2023/11/24

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
SPECTRUM ANALYZER	Rohde & Schwarz	FSU26	200982	2022/07/04	2023/07/03
Agilent	Power Sensor	U2021XA	MY5425003	2023/02/25	2024/02/24
HP	6dB Attenuator	8493B 6dB Attenuator	2708A 04769	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.31	RF-01	Each time	

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §1.1307 (B) (3) & §2.1091- MPE-BASED EXEMPTION

Applicable Standard

According to subpart 1.1307 (b) (3) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

According to KDB 447498 D04 Interim General RF Exposure Guidance

MPE-Based Exemption:

General frequency and separation-distance dependent MPE-based effective radiated power(ERP) thresholds are in Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] to support an exemptionfrom further evaluation from 300 kHz through 100 GHz.

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.

Ris the minimum separation distance in meters
f = frequency in MHz

For multiple RF sources: Multiple RF sources are exempt if:

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation:

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

Result

Mode	Frequency (MHz)	Tune up conducted power	Antenna Gain		ERP		Evaluation Distance (m)	ERP Limit (W)
		(dBm)	(dBi)	(dBd)	(dBm)	(W)		
Bluetooth	2402-2480	3.0	3.24	1.09	4.09	0.003	0.2	0.768
2.4G Wi-Fi	2412-2462	14.5	4.7	2.55	17.05	0.051	0.2	0.768
5G Wi-Fi	5150-5250	10.0	3.6	1.45	11.45	0.014	0.2	0.768
	5725-5850	12.0	3.6	1.45	13.45	0.022	0.2	0.768

Note: 1. The tune up conducted power and antenna gain was declared by the applicant.
2. The BT can transmit at same time with 2.4G Wi-Fi or 5G Wi-Fi
3. 0dBd=2.15dBi

Simultaneous transmitting consideration (worst case):

The ratio=ERP_{BT}/limit+ERP_{Wi-Fi}/limit=0.003/0.768+0.051/0.768=0.070＜1.0, so simultaneous exposure is compliant.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant.

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to §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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.
c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.407 (a), if the transmitting antennas of directional gain greater than 6dBi are used, the transmit power and power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has one internal antenna which was permanently attached, and the maximum antenna gain is 3.6dBi, fulfill the requirement of this section. Please refer to the EUT photos.

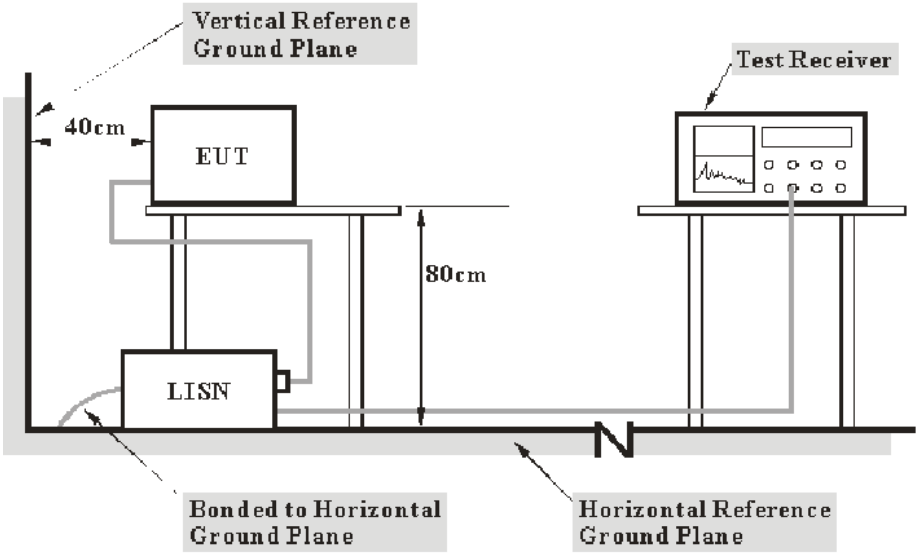
Result: Compliant.

FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207, §15.407(b) (6)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and Average detection mode.

Factor & Over limit Calculation

The factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

Factor = LISN VDF + Cable Loss

The "**Over limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit
Level = Read Level + Factor

Test Data

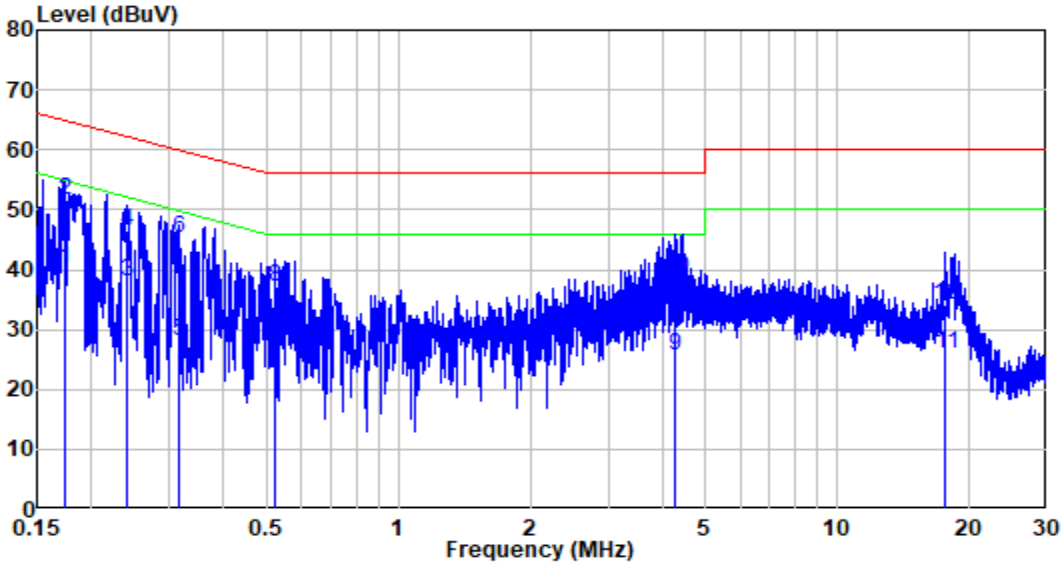
Environmental Conditions

Temperature:	23 °C
Relative Humidity:	49 %
ATM Pressure:	101.0 kPa

The testing was performed by Jerry Wu on 2023-05-25.

EUT operation mode: Transmitting (worst case is 802.11a, 5180MHz)

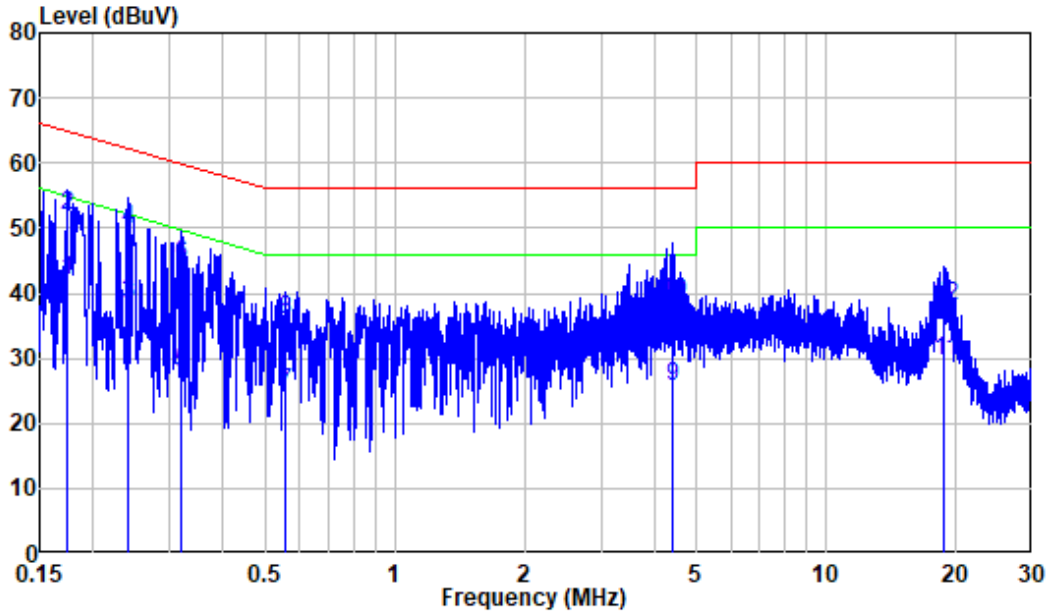
AC 120V/60 Hz, Line:



Site : Shielding Room
Condition: Line
Job No. : RA230426-22439E-RF
Mode : 5G WIFI Transmitting
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.173	10.33	29.70	40.03	54.82	-14.79	Average
2	0.173	10.33	41.24	51.57	64.82	-13.25	QP
3	0.240	10.34	27.62	37.96	52.09	-14.13	Average
4	0.240	10.34	36.18	46.52	62.09	-15.57	QP
5	0.317	10.42	17.73	28.15	49.80	-21.65	Average
6	0.317	10.42	34.72	45.14	59.80	-14.66	QP
7	0.525	10.58	13.22	23.80	46.00	-22.20	Average
8	0.525	10.58	26.58	37.16	56.00	-18.84	QP
9	4.283	10.54	15.07	25.61	46.00	-20.39	Average
10	4.283	10.54	28.09	38.63	56.00	-17.37	QP
11	17.638	10.26	15.56	25.82	50.00	-24.18	Average
12	17.638	10.26	23.71	33.97	60.00	-26.03	QP

AC 120V/60 Hz, Neutral:



Site : Shielding Room
Condition: Neutral
Job No. : RA230426-22439E-RF
Mode : 5G WIFI Transmitting
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.174	10.28	31.55	41.83	54.77	-12.94	Average
2	0.174	10.28	41.63	51.91	64.77	-12.86	QP
3	0.242	10.32	27.92	38.24	52.04	-13.80	Average
4	0.242	10.32	39.53	49.85	62.04	-12.19	QP
5	0.319	10.37	17.53	27.90	49.74	-21.84	Average
6	0.319	10.37	34.05	44.42	59.74	-15.32	QP
7	0.557	10.47	14.18	24.65	46.00	-21.35	Average
8	0.557	10.47	25.50	35.97	56.00	-20.03	QP
9	4.410	10.52	15.18	25.70	46.00	-20.30	Average
10	4.410	10.52	28.08	38.60	56.00	-17.40	QP
11	18.746	10.21	19.28	29.49	50.00	-20.51	Average
12	18.746	10.21	27.71	37.92	60.00	-22.08	QP

§15.205 & §15.209 & §15.407(B)– UNDESIRABLE EMISSION

Applicable Standard

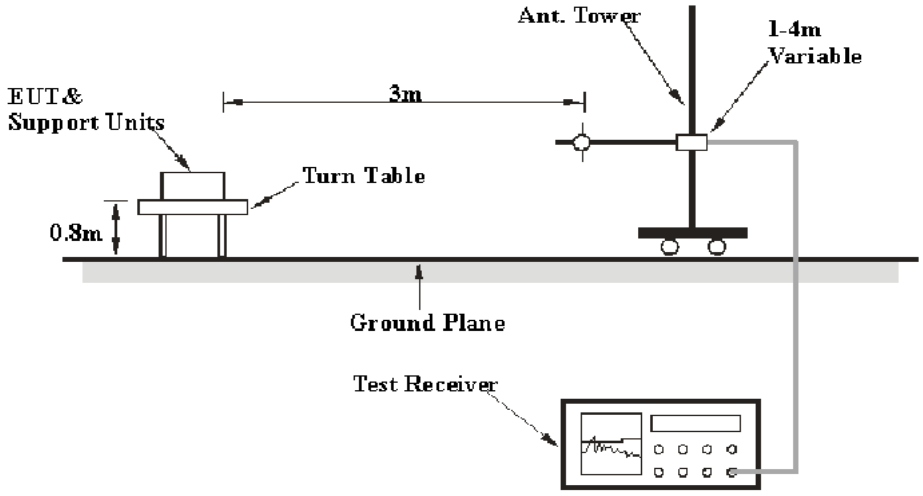
FCC §15.407 (b); §15.209; §15.205;

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:
(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(4) For transmitters operating in the 5.725-5.85 GHz band:
(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

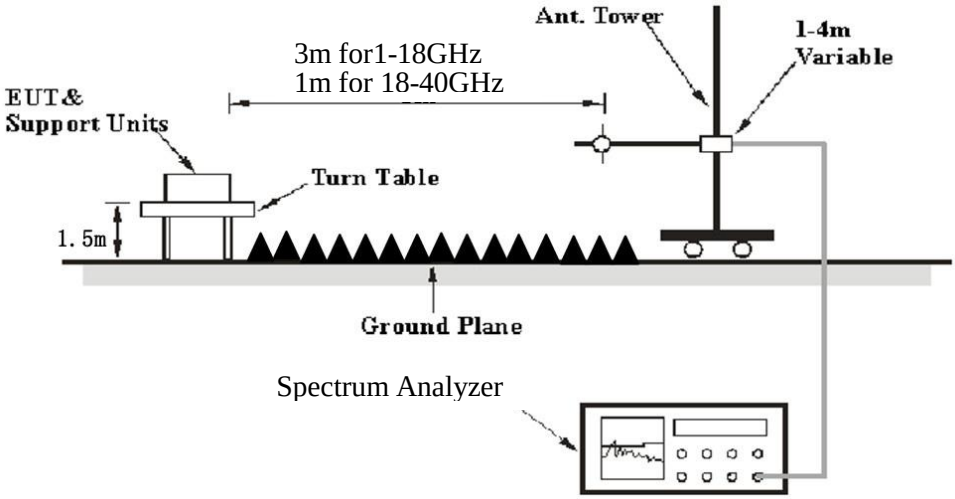
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC 15.209 and FCC 15.407 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1MHz	10 Hz [Note 1]	/	Average
	1MHz	＞1/T [Note 2]	/	Average

Note 1: when duty cycle is no less than 98%
Note 2: when duty cycle is less than 98%

Test Procedure

Radiated Spurious Emission

During the radiated emission test, the adapter was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all the installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

According to ANSI C63.10-2013,9.4: For field strength measurements made at other than the distance at which the applicable limit is specified, extrapolate the measured field strength to the field strength at the distance specified by the limit using an inverse distance correction factor (20 dB/decade of distance). In some cases, a different distance correction factor may be required;

$$E_{\mathrm{SpecLimit}} = E_{\mathrm{Meas}} + 20\log\left(\frac{d_{\mathrm{Meas}}}{d_{\mathrm{SpecLimit}}}\right)$$

where

$E_{\mathrm{SpecLimit}}$	is the field strength of the emission at the distance specified by the limit, in dBμV/m
E_{Meas}	is the field strength of the emission at the measurement distance, in dBμV/m
d_{Meas}	is the measurement distance, in m
$d_{\mathrm{SpecLimit}}$	is the distance specified by the limit, in m

So the extrapolation factor of 1m is 20*log(1/3)= -9.5 dB, for 18-40GHz range, the limit of 1m distance was added by 9.5dB from limit of 3m to compared with the result measurement at 1m distance.

Factor & Over Limit/Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

Over Limit/Margin = Level / Corrected Amplitude – Limit
Level / Corrected Amplitude = Read Level + Factor

Test Data

Environmental Conditions

Temperature:	23~25.5 ℃
Relative Humidity:	50~55 %
ATM Pressure:	101.0 kPa

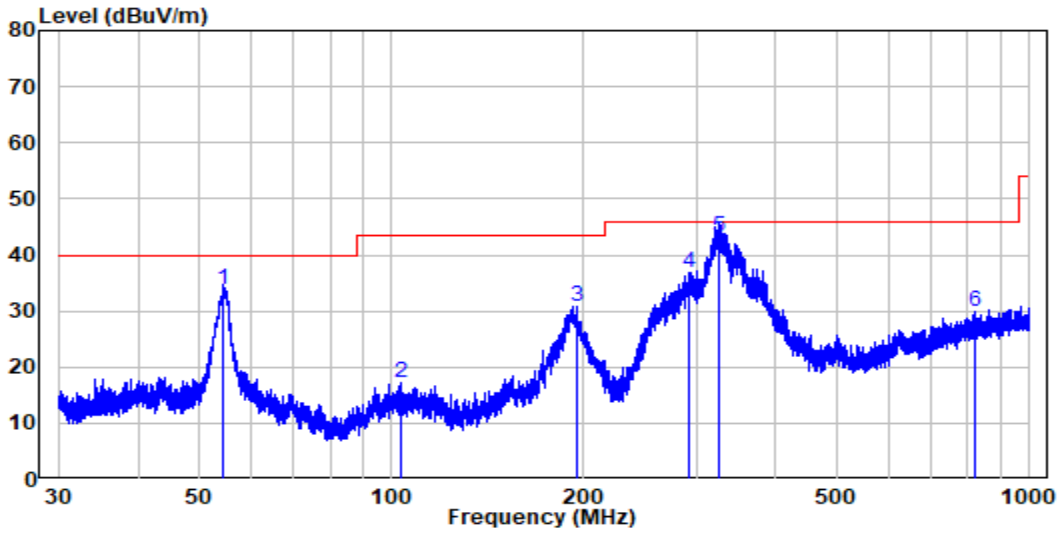
The testing was performed by Jason Liu on 2023-05-26 for below 1GHz and on 2023-05-21 for above 1GHz.

EUT operation mode: Transmitting

30 MHz – 1 GHz: *(worst case is 802.11a, 5180MHz)*

Note: When the test result of Peak was more than 6dB below the limit of QP, just the Peak value was recorded.

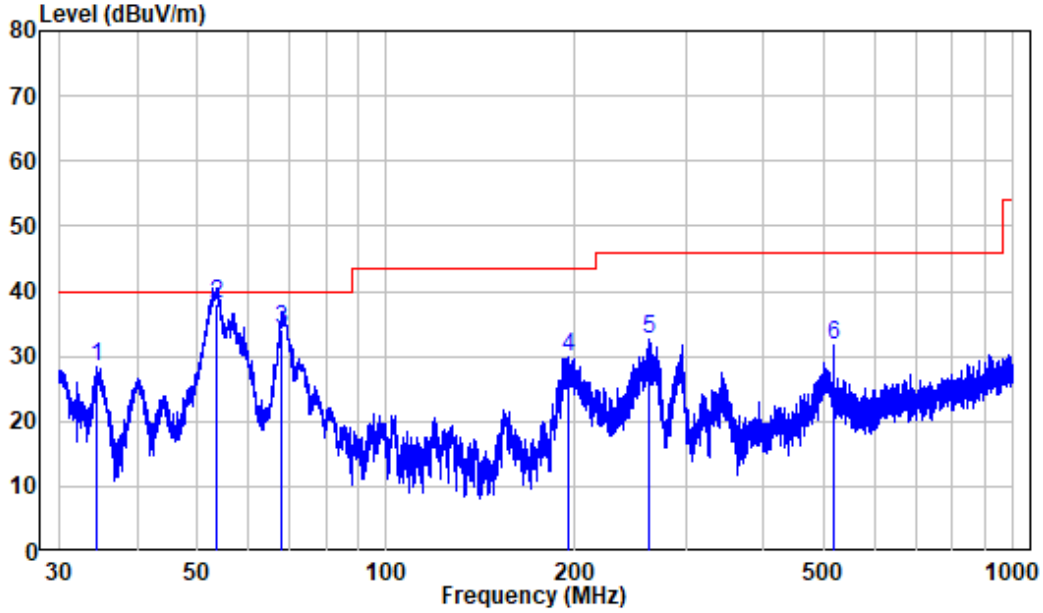
Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No. : RA230426-22439E-RF
Test Mode: 5G WIFI Transmitting

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	54.523	-10.31	44.05	33.74	40.00	-6.26	QP
2	103.624	-11.71	29.05	17.34	43.50	-26.16	Peak
3	194.795	-11.41	42.28	30.87	43.50	-12.63	Peak
4	292.058	-9.29	46.11	36.82	46.00	-9.18	Peak
5	326.024	-8.21	51.24	43.03	46.00	-2.97	QP
6	821.350	0.02	29.78	29.80	46.00	-16.20	Peak

Vertical



Site : chamber
Condition: 3m VERTICAL
Job No. : RA230426-22439E-RF
Test Mode: 5G WIFI Transmitting

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	34.502	-11.70	40.08	28.38	40.00	-11.62	Peak
2	53.646	-10.28	48.21	37.93	40.00	-2.07	QP
3	68.211	-13.94	47.99	34.05	40.00	-5.95	QP
4	195.822	-11.55	41.49	29.94	43.50	-13.56	Peak
5	262.090	-10.53	43.04	32.51	46.00	-13.49	Peak
6	516.116	-4.28	35.93	31.65	46.00	-14.35	Peak

Above 1GHz:

5150-5250 MHz:

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave		Height (m)	Polar (H/V)				
802.11a									
5180 MHz									
4500	65.93	PK	182	1.1	H	-6.01	59.92	74	-14.08
4500	53.67	AV	182	1.1	H	-6.01	47.66	54	-6.34
4500	66.04	PK	139	1.6	V	-6.01	60.03	74	-13.97
4500	53.79	AV	139	1.6	V	-6.01	47.78	54	-6.22
5150	68.53	PK	350	1.9	H	-4.29	64.24	74	-9.76
5150	54.45	AV	350	1.9	H	-4.29	50.16	54	-3.84
5150	68.64	PK	249	2.1	V	-4.29	64.35	74	-9.65
5150	54.58	AV	249	2.1	V	-4.29	50.29	54	-3.71
10360	56.73	PK	229	2.1	H	6.04	62.77	68.2	-5.43
10360	57.04	PK	139	2.1	V	6.04	63.08	68.2	-5.12
5200 MHz									
10400	56.19	PK	37	1.7	H	6.30	62.49	68.2	-5.71
10400	56.52	PK	259	1.7	V	6.30	62.82	68.2	-5.38
5240 MHz									
5350	64.65	PK	267	1.1	H	-3.15	61.50	74	-12.50
5350	50.22	AV	267	1.1	H	-3.15	47.07	54	-6.93
5350	64.77	PK	192	2	V	-3.15	61.62	74	-12.38
5350	50.33	AV	192	2	V	-3.15	47.18	54	-6.82
5460	62.11	PK	182	1.9	H	-2.38	59.73	74	-14.27
5460	48.68	AV	182	1.9	H	-2.38	46.30	54	-7.70
5460	62.23	PK	112	1.4	V	-2.38	59.85	74	-14.15
5460	48.80	AV	112	1.4	V	-2.38	46.42	54	-7.58
10480	56.42	PK	210	1.1	H	6.00	62.42	68.2	-5.78
10480	56.75	PK	97	1.1	V	6.00	62.75	68.2	-5.45

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave		Height (m)	Polar (H/V)				
802.11n20									
5180 MHz									
4500	65.85	PK	240	1.3	H	-6.01	59.84	74	-14.16
4500	53.62	AV	240	1.3	H	-6.01	47.61	54	-6.39
4500	65.97	PK	173	1.2	V	-6.01	59.96	74	-14.04
4500	53.73	AV	173	1.2	V	-6.01	47.72	54	-6.28
5150	68.47	PK	216	2.5	H	-4.29	64.18	74	-9.82
5150	54.51	AV	216	2.5	H	-4.29	50.22	54	-3.78
5150	68.58	PK	249	2.3	V	-4.29	64.29	74	-9.71
5150	54.62	AV	249	2.3	V	-4.29	50.33	54	-3.67
10360	56.60	PK	336	1.8	H	6.04	62.64	68.2	-5.56
10360	56.93	PK	142	1.8	V	6.04	62.97	68.2	-5.23
5200MHz									
10400	56.08	PK	38	1.2	H	6.30	62.38	68.2	-5.82
10400	56.40	PK	136	1.2	V	6.30	62.7	68.2	-5.50
5240 MHz									
5350	64.56	PK	10	1.6	H	-3.15	61.41	74	-12.59
5350	50.15	AV	10	1.6	H	-3.15	47.00	54	-7.00
5350	64.68	PK	171	1.7	V	-3.15	61.53	74	-12.47
5350	50.27	AV	171	1.7	V	-3.15	47.12	54	-6.88
5460	62.09	PK	189	1	H	-2.38	59.71	74	-14.29
5460	48.57	AV	189	1	H	-2.38	46.19	54	-7.81
5460	62.20	PK	103	1.3	V	-2.38	59.82	74	-14.18
5460	48.68	AV	103	1.3	V	-2.38	46.30	54	-7.70
10480	56.32	PK	105	1.6	H	6.00	62.32	68.2	-5.88
10480	56.61	PK	238	1.6	V	6.00	62.61	68.2	-5.59

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave		Height (m)	Polar (H/V)				
802.11n40									
5190 MHz									
4500	66.18	PK	143	2.1	H	-6.01	60.17	74	-13.83
4500	54.07	AV	143	2.1	H	-6.01	48.06	54	-5.94
4500	66.30	PK	81	1.8	V	-6.01	60.29	74	-13.71
4500	54.19	AV	81	1.8	V	-6.01	48.18	54	-5.82
5150	68.76	PK	13	1	H	-4.29	64.47	74	-9.53
5150	55.04	AV	13	1	H	-4.29	50.75	54	-3.25
5150	68.88	PK	87	1.4	V	-4.29	64.59	74	-9.41
5150	55.15	AV	87	1.4	V	-4.29	50.86	54	-3.14
10380	55.17	PK	120	2.4	H	6.17	61.34	68.2	-6.86
10380	55.41	PK	155	2.4	V	6.17	61.58	68.2	-6.62
5230 MHz									
5350	65.11	PK	26	2.5	H	-3.15	61.96	74	-12.04
5350	50.86	AV	26	2.5	H	-3.15	47.71	54	-6.29
5350	65.23	PK	250	2.2	V	-3.15	62.08	74	-11.92
5350	50.98	AV	250	2.2	V	-3.15	47.83	54	-6.17
5460	62.64	PK	43	1.4	H	-2.38	60.26	74	-13.74
5460	49.31	AV	43	1.4	H	-2.38	46.93	54	-7.07
5460	62.76	PK	21	1.3	V	-2.38	60.38	74	-13.62
5460	49.42	AV	21	1.3	V	-2.38	47.04	54	-6.96
10460	55.38	PK	165	1.8	H	5.91	61.29	68.2	-6.91
10460	55.63	PK	82	1.8	V	5.91	61.54	68.2	-6.66

5725 – 5850 MHz:

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave		Height (m)	Polar (H/V)				
802.11a									
5745MHz									
5650	64.70	PK	148	1.8	H	-2.80	61.90	68.2	-6.30
5700	64.94	PK	334	2.3	H	-1.62	63.32	105.2	-41.88
5720	68.83	PK	70	1.2	H	-1.95	66.88	110.8	-43.92
5725	74.62	PK	117	1.6	H	-2.03	72.59	122.2	-49.61
5650	64.83	PK	214	1.3	V	-2.80	62.03	68.2	-6.17
5700	65.51	PK	131	1.6	V	-1.62	63.89	105.2	-41.31
5720	69.75	PK	96	1	V	-1.95	67.80	110.8	-43.00
5725	76.24	PK	165	1.9	V	-2.03	74.21	122.2	-47.99
11490	54.57	PK	52	1.1	H	7.99	62.56	74	-11.44
11490	40.66	AV	276	1.1	H	7.99	48.65	54	-5.35
11490	54.81	PK	287	1.5	V	7.99	62.80	74	-11.20
11490	40.90	AV	131	1.5	V	7.99	48.89	54	-5.11
5785MHz									
11570	54.54	PK	69	1.9	H	7.69	62.23	74	-11.77
11570	40.49	AV	185	1.9	H	7.69	48.18	54	-5.82
11570	54.81	PK	90	2.3	V	7.69	62.50	74	-11.50
11570	40.75	AV	135	2.3	V	7.69	48.44	54	-5.56
5825MHz									
5850	68.86	PK	49	1.2	H	-0.60	68.26	122.2	-53.94
5855	67.27	PK	12	1.4	H	-0.50	66.77	110.8	-44.03
5875	65.19	PK	150	1.8	H	-0.09	65.10	105.2	-40.10
5925	63.74	PK	294	2.2	H	-0.12	63.62	68.2	-4.58
5850	69.98	PK	6	1.6	V	-0.60	69.38	122.2	-52.82
5855	67.99	PK	88	2.4	V	-0.50	67.49	110.8	-43.31
5875	65.75	PK	72	2.4	V	-0.09	65.66	105.2	-39.54
5925	63.87	PK	103	1	V	-0.12	63.75	68.2	-4.45
11650	54.76	PK	196	1.3	H	6.82	61.58	74	-12.42
11650	40.60	AV	58	1.3	H	6.82	47.42	54	-6.58
11650	55.01	PK	202	1.1	V	6.82	61.83	74	-12.17
11650	40.85	AV	192	1.1	V	6.82	47.67	54	-6.33

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave		Height (m)	Polar (H/V)				
802.11n20									
5745MHz									
5650	64.86	PK	158	1.4	H	-2.80	62.06	68.2	-6.14
5700	65.79	PK	193	2.2	H	-1.62	64.17	105.2	-41.03
5720	69.69	PK	127	1.9	H	-1.95	67.74	110.8	-43.06
5725	77.64	PK	20	2.2	H	-2.03	75.61	122.2	-46.59
5650	65.00	PK	231	1.5	V	-2.80	62.20	68.2	-6.00
5700	66.41	PK	239	1.1	V	-1.62	64.79	105.2	-40.41
5720	71.08	PK	320	2.3	V	-1.95	69.13	110.8	-41.67
5725	79.35	PK	293	1.2	V	-2.03	77.32	122.2	-44.88
11490	54.46	PK	35	1.1	H	7.99	62.45	74	-11.55
11490	40.57	AV	344	1.1	H	7.99	48.56	54	-5.44
11490	54.78	PK	206	1.4	V	7.99	62.77	74	-11.23
11490	40.81	AV	123	1.4	V	7.99	48.80	54	-5.20
5785MHz									
11570	54.65	PK	166	2.2	H	7.69	62.34	74	-11.66
11570	40.56	AV	171	2.2	H	7.69	48.25	54	-5.75
11570	54.98	PK	302	1.9	V	7.69	62.67	74	-11.33
11570	40.84	AV	192	1.9	V	7.69	48.53	54	-5.47
5825MHz									
5850	69.85	PK	277	1.4	H	-0.60	69.25	122.2	-52.95
5855	68.04	PK	173	1.2	H	-0.50	67.54	110.8	-43.26
5875	66.27	PK	112	1.5	H	-0.09	66.18	105.2	-39.02
5925	63.85	PK	7	1.4	H	-0.12	63.73	68.2	-4.47
5850	71.28	PK	353	1.9	V	-0.60	70.68	122.2	-51.52
5855	69.09	PK	83	1.7	V	-0.50	68.59	110.8	-42.21
5875	67.45	PK	162	2.2	V	-0.09	67.36	105.2	-37.84
5925	63.99	PK	300	2.4	V	-0.12	63.87	68.2	-4.33
11650	54.83	PK	274	2	H	6.82	61.65	74	-12.35
11650	40.72	AV	231	2	H	6.82	47.54	54	-6.46
11650	55.10	PK	48	1.3	V	6.82	61.92	74	-12.08
11650	40.97	AV	232	1.3	V	6.82	47.79	54	-6.21

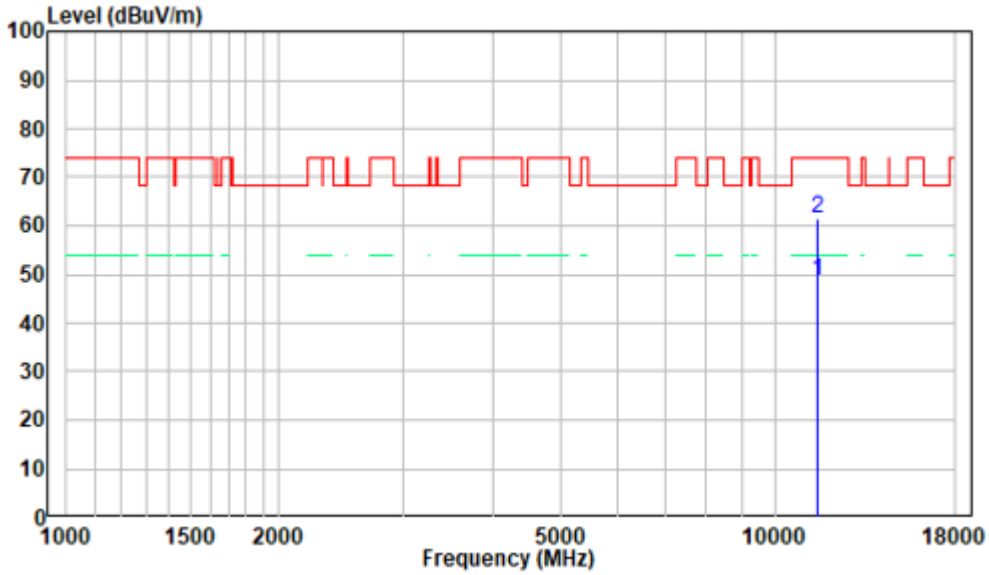
Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave		Height (m)	Polar (H/V)				
802.11n40									
5755MHz									
5650	65.17	PK	228	1.7	H	-2.80	62.37	68.2	-5.83
5700	66.82	PK	3	2.3	H	-1.62	65.20	105.2	-40.00
5720	70.84	PK	262	1.1	H	-1.95	68.89	110.8	-41.91
5725	74.69	PK	348	1.1	H	-2.03	72.66	122.2	-49.54
5650	65.32	PK	285	1.2	V	-2.80	62.52	68.2	-5.68
5700	67.55	PK	253	1	V	-1.62	65.93	105.2	-39.27
5720	72.14	PK	352	2	V	-1.95	70.19	110.8	-40.61
5725	75.77	PK	181	1.1	V	-2.03	73.74	122.2	-48.46
11510	53.62	PK	46	1.6	H	8.04	61.66	74	-12.34
11510	40.79	AV	114	1.6	H	8.04	48.83	54	-5.17
11510	53.88	PK	314	1.1	V	8.04	61.92	74	-12.08
11510	41.01	AV	320	1.1	V	8.04	49.05	54	-4.95
5795MHz									
5850	65.62	PK	342	2.2	H	-0.60	65.02	122.2	-57.18
5855	66.47	PK	20	1.3	H	-0.50	65.97	110.8	-44.83
5875	65.07	PK	17	2.1	H	-0.09	64.98	105.2	-40.22
5925	64.15	PK	25	1.9	H	-0.12	64.03	68.2	-4.17
5850	68.28	PK	81	2.2	V	-0.60	67.68	122.2	-54.52
5855	67.09	PK	64	2.2	V	-0.50	66.59	110.8	-44.21
5875	65.69	PK	251	1.9	V	-0.09	65.60	105.2	-39.60
5925	64.28	PK	321	1.2	V	-0.12	64.16	68.2	-4.04
11590	53.94	PK	118	1.5	H	7.60	61.54	74	-12.46
11590	41.07	AV	355	1.5	H	7.60	48.67	54	-5.33
11590	54.23	PK	128	2	V	7.60	61.83	74	-12.17
11590	41.32	AV	19	2	V	7.60	48.92	54	-5.08

Note:
Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Factor + Reading
Margin = Corrected. Amplitude - Limit
The other spurious emission which is in the noise floor level was not recorded.

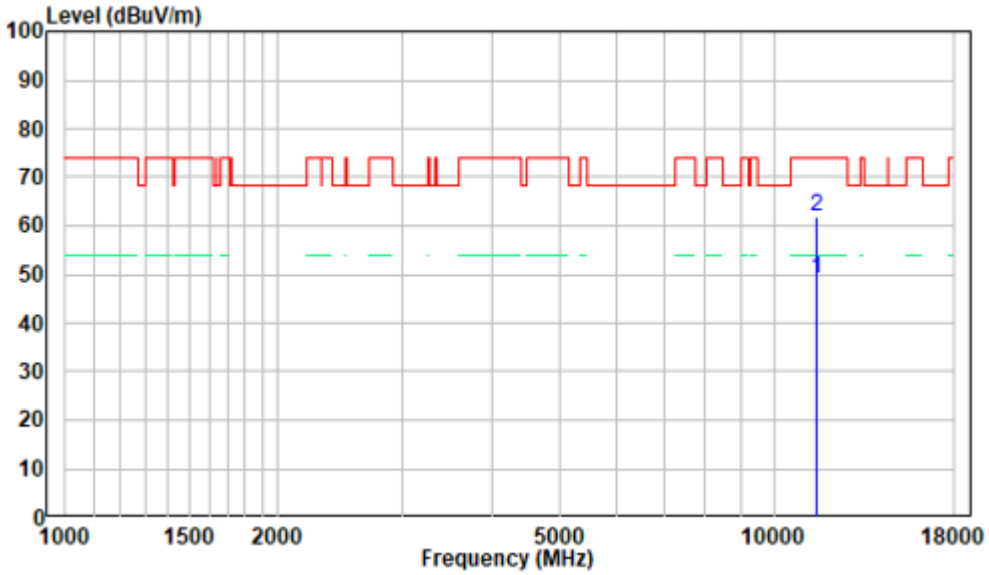
1 GHz - 18 GHz: (Pre-Scan plots)

802.11 n40, 5755MHz

Horizontal



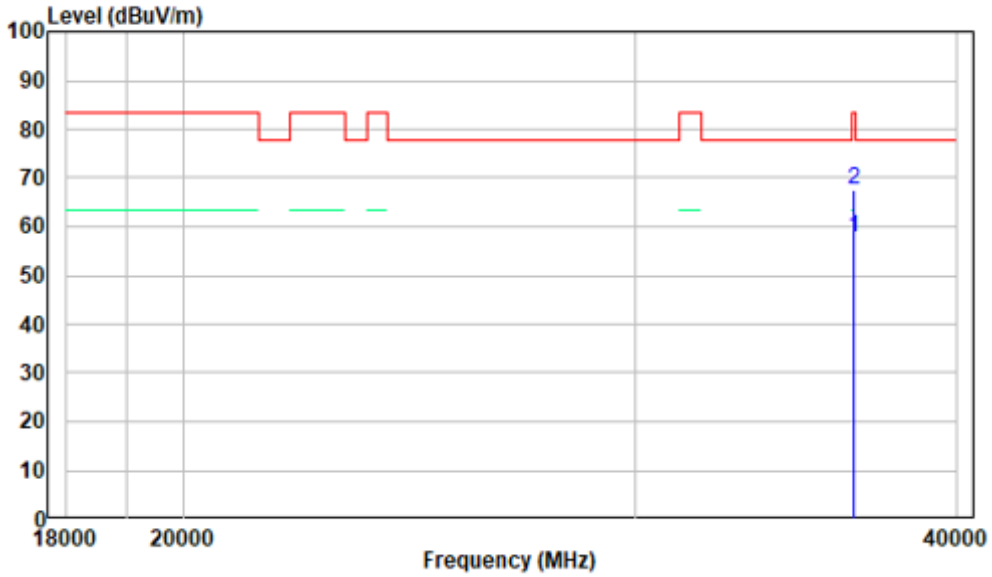
Vertical



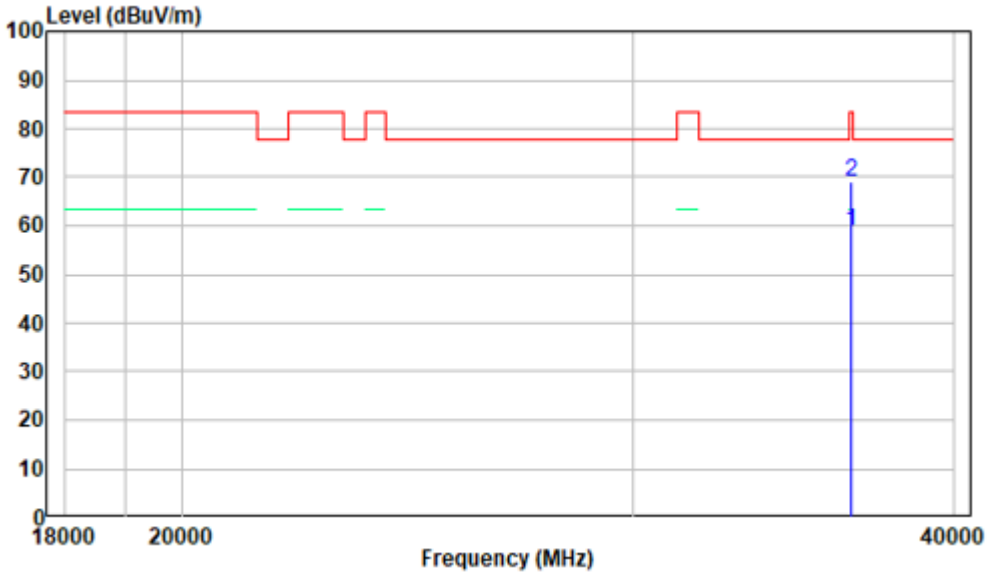
18-40GHz: (Pre-Scan plots)

802.11 n40, 5755MHz

Horizontal



Vertical



FCC §15.407(a),(e) – 26 dB & 6dB EMISSION BANDWIDTH

Applicable Standard

The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

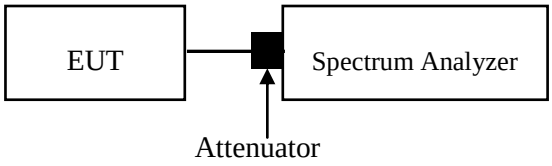
Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Procedure

According to KDB789033 D02 section II.C and section II.D

1. Emission Bandwidth (EBW)
a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

2. **Minimum Emission Bandwidth for the band 5.725-5.85 GHz**
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.725-5.85 GHz. The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Jacob Huang from 2023-05-24 to 2023-05-25.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to following table and plots.

5150 MHz - 5250 MHz:

Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)	Remark
802.11a			No transmitted signal in the 99% bandwidth extends into the U-NII-2A band
5180	21.84	16.64	
5200	20.76	16.56	
5240	21.00	16.52	
802.11n20			
5180	23.88	17.64	
5200	23.04	17.60	
5240	21.32	17.56	
802.11n40			
5190	38.56	35.20	
5230	40.40	35.36	

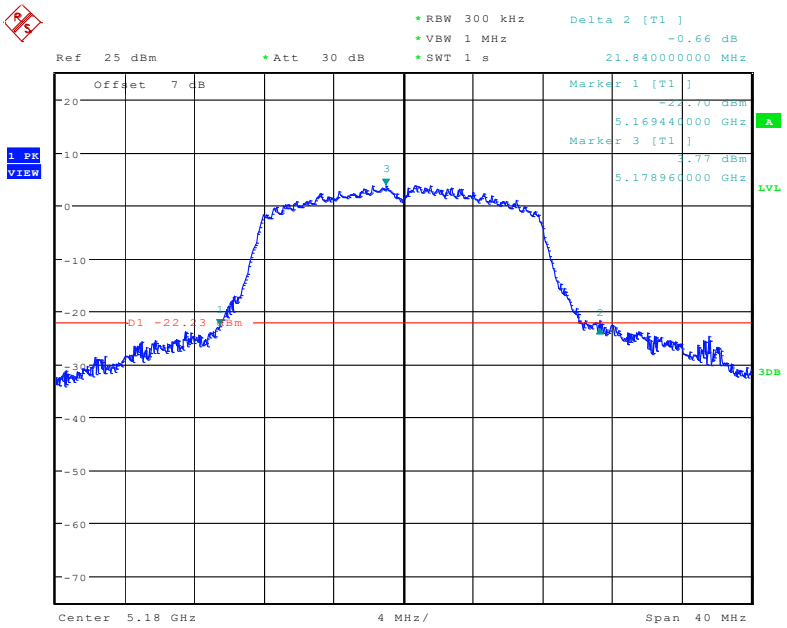
5725 MHz – 5850 MHz:

Frequency (MHz)	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)	Remark
802.11a				No transmitted signal in the 99% bandwidth extends into the U NII-2C band
5745	15.16	16.64	0.5	
5785	15.16	16.80	0.5	
5825	15.20	16.64	0.5	
802.11n20				
5745	15.16	17.84	0.5	
5785	15.16	17.76	0.5	
5825	15.16	17.76	0.5	
802.11n40				
5755	32.72	35.36	0.5	
5795	31.44	35.28	0.5	

5150 MHz - 5250 MHz:

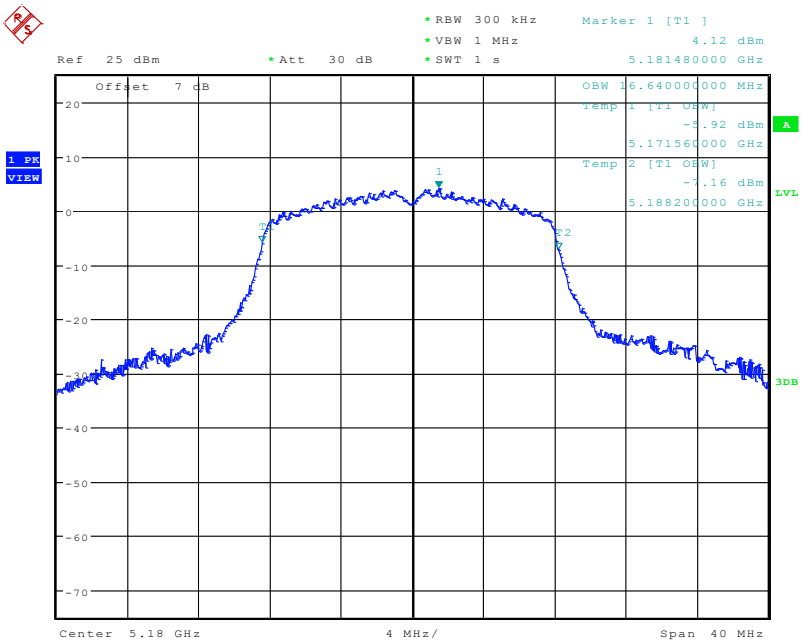
802.11a mode:

26dB Emission Bandwidth, 5180MHz



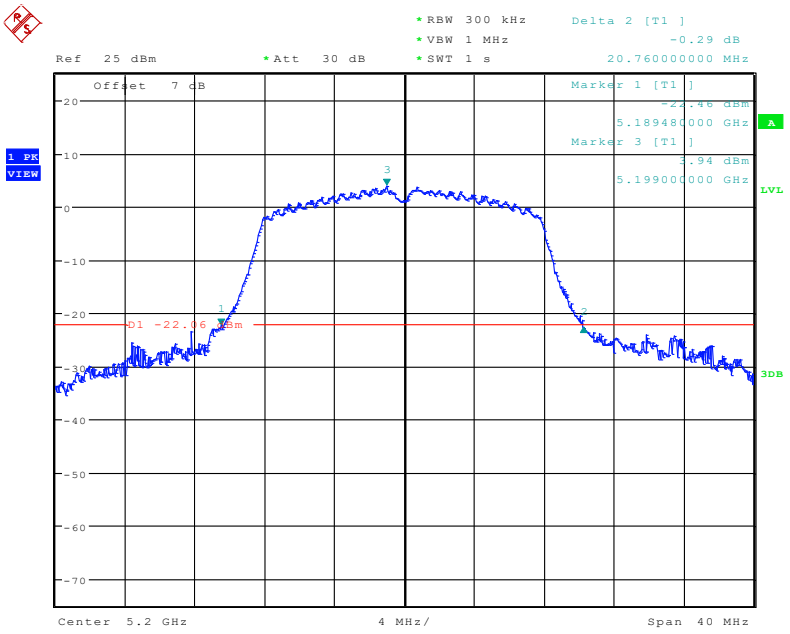
Date: 25.MAY.2023 09:17:39

Occupied Bandwidth, 5180MHz



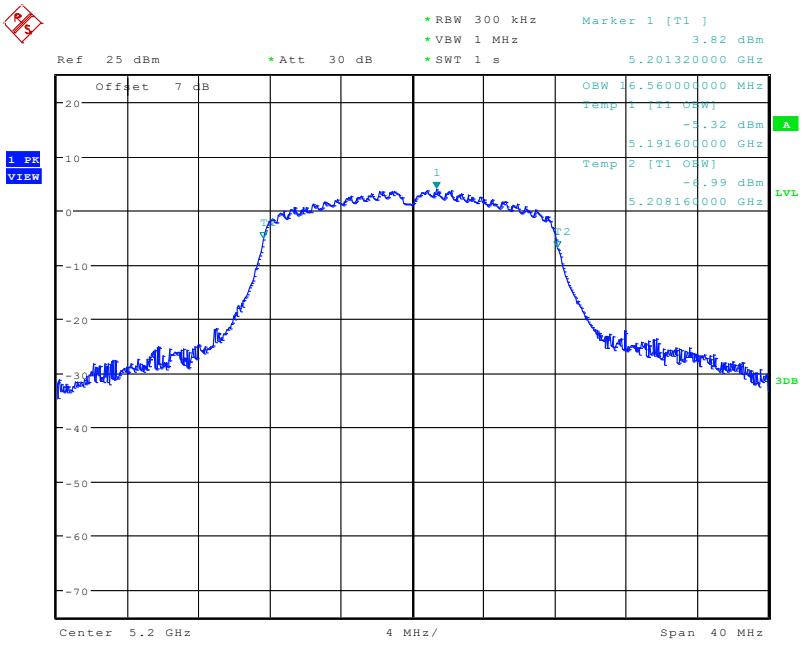
Date: 25.MAY.2023 09:17:03

26dB Emission Bandwidth, 5200MHz



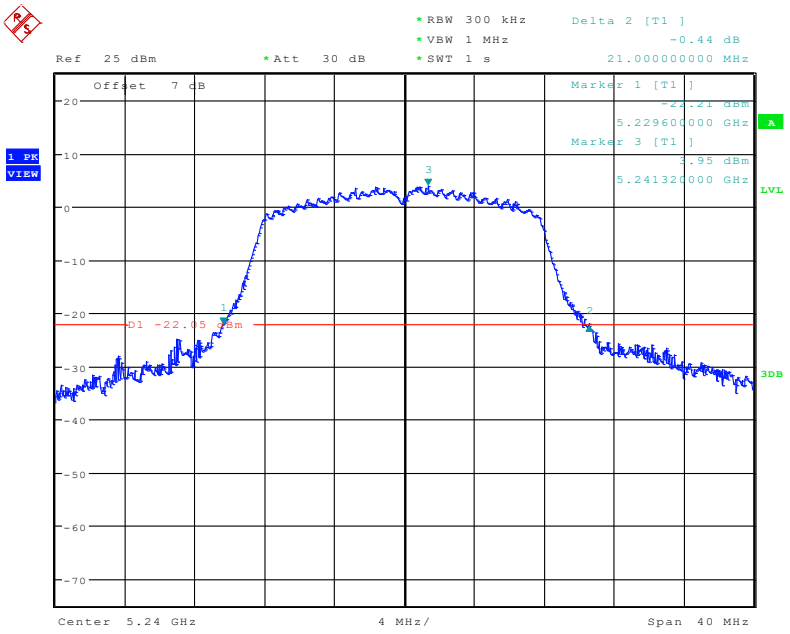
Date: 25.MAY.2023 09:21:35

Occupied Bandwidth, 5200MHz



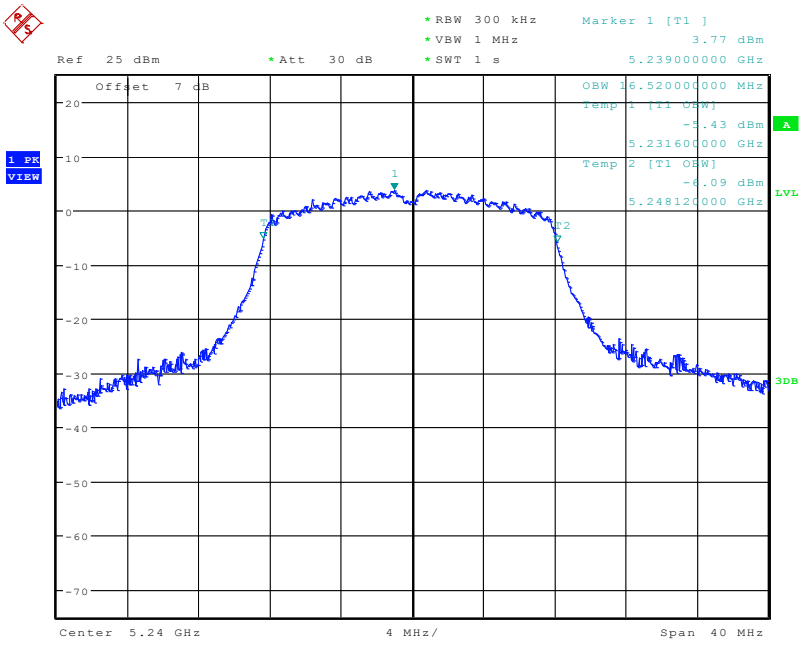
Date: 25.MAY.2023 09:20:47

26dB Emission Bandwidth, 5240MHz



Date: 25.MAY.2023 09:25:02

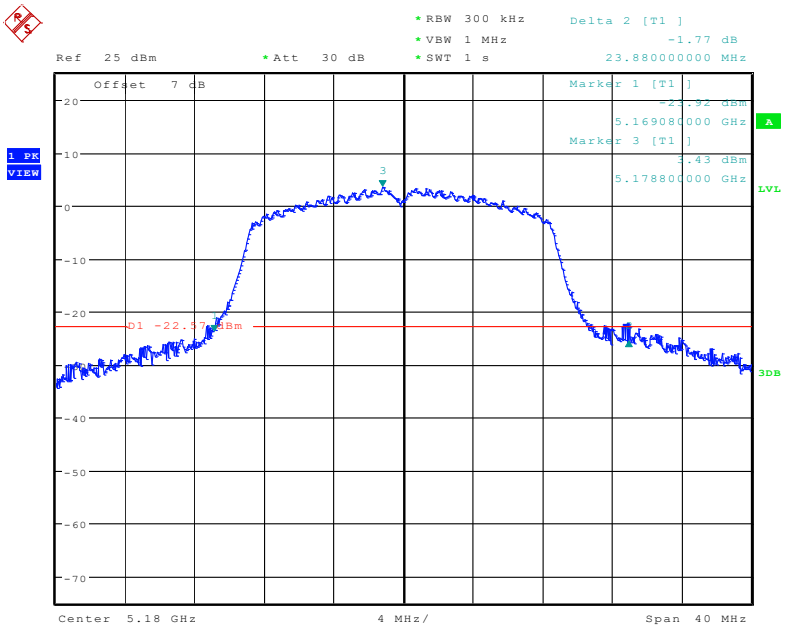
Occupied Bandwidth, 5240MHz



Date: 25.MAY.2023 09:24:28

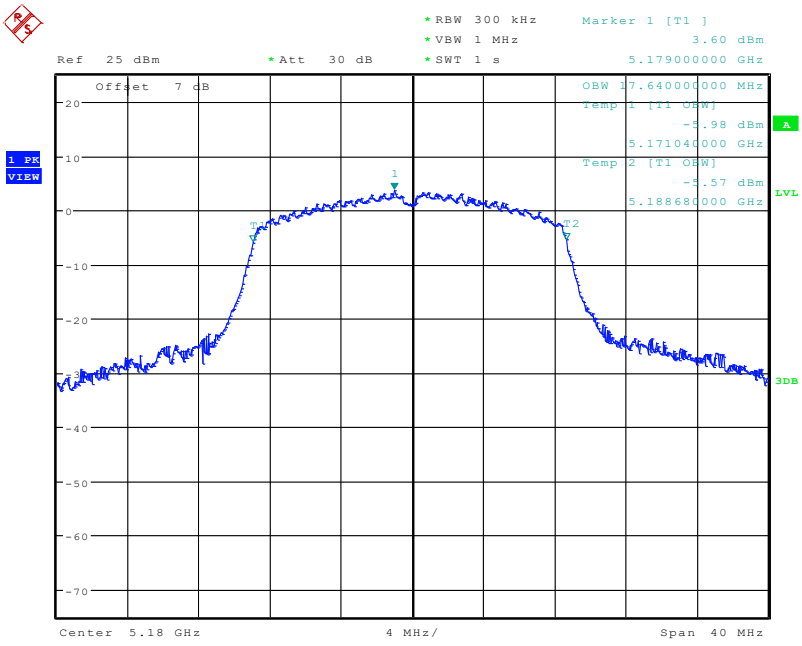
802.11n-HT20 mode:

26dB Emission Bandwidth, 5180MHz



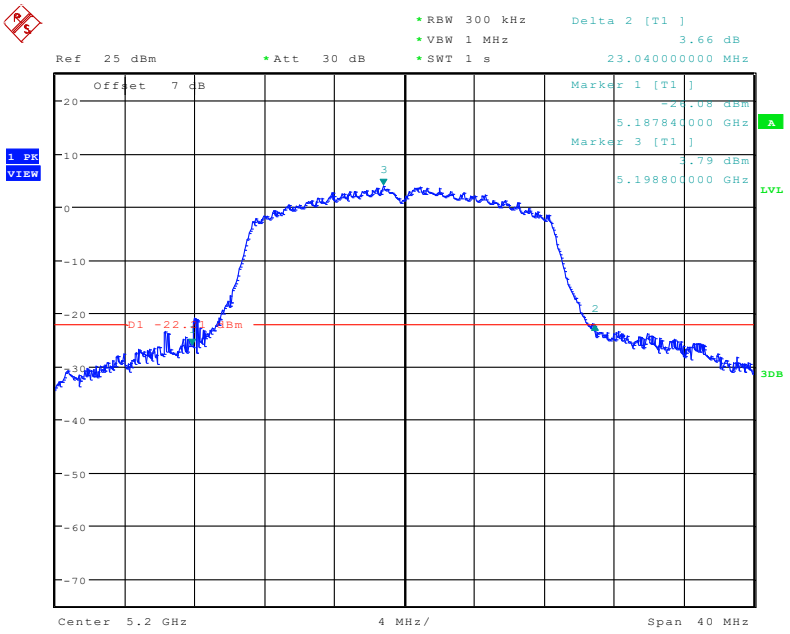
Date: 25.MAY.2023 09:30:20

Occupied Bandwidth, 5180MHz



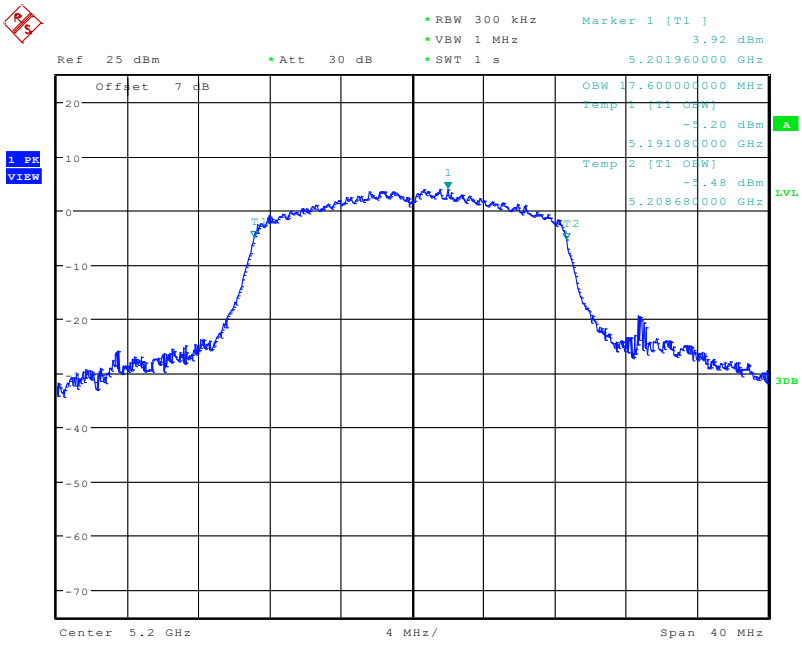
Date: 25.MAY.2023 09:29:46

26dB Emission Bandwidth, 5200MHz



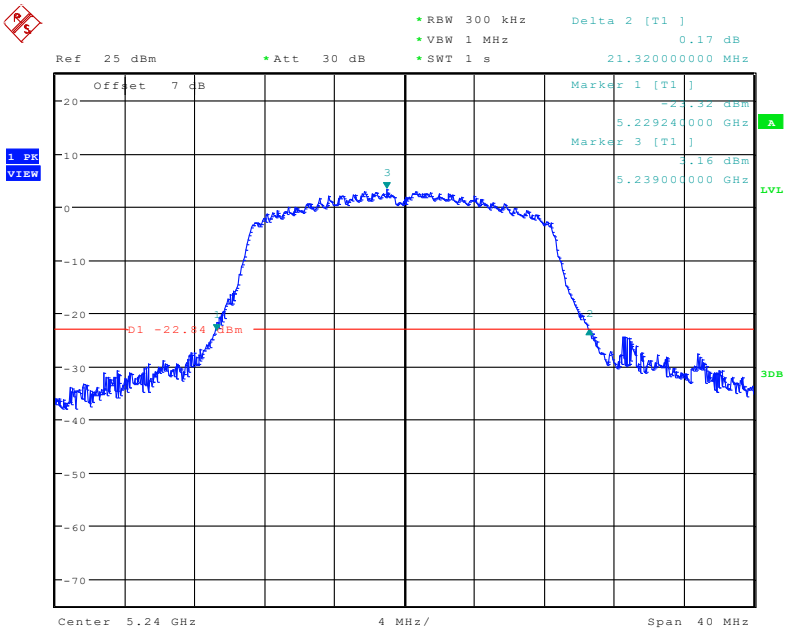
Date: 25.MAY.2023 09:33:10

Occupied Bandwidth, 5200MHz



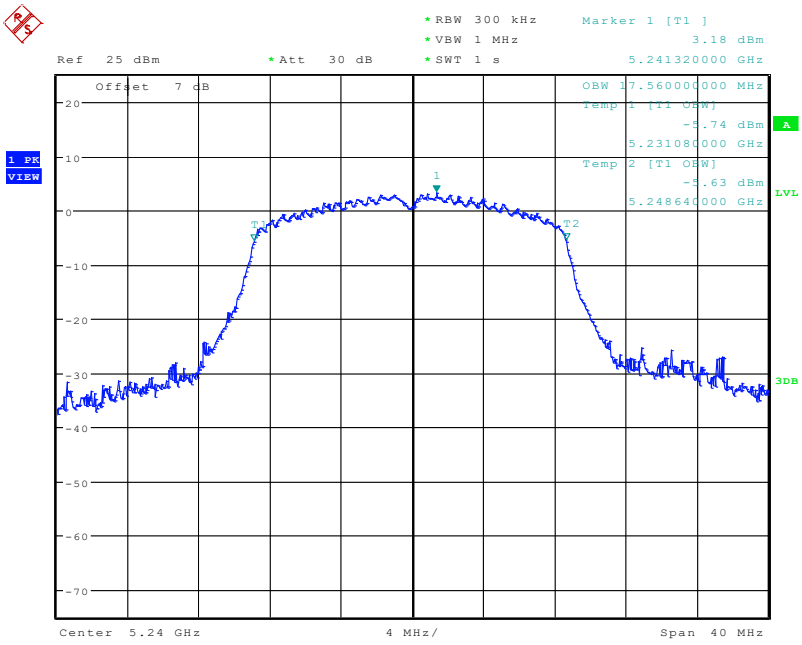
Date: 25.MAY.2023 09:32:33

26dB Emission Bandwidth, 5240MHz



Date: 25.MAY.2023 09:37:13

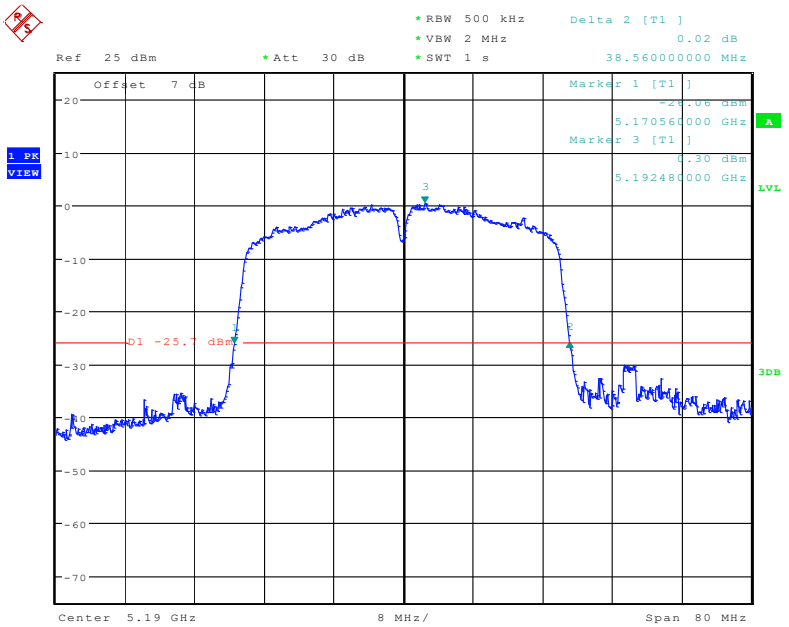
Occupied Bandwidth, 5240MHz



Date: 25.MAY.2023 09:36:26

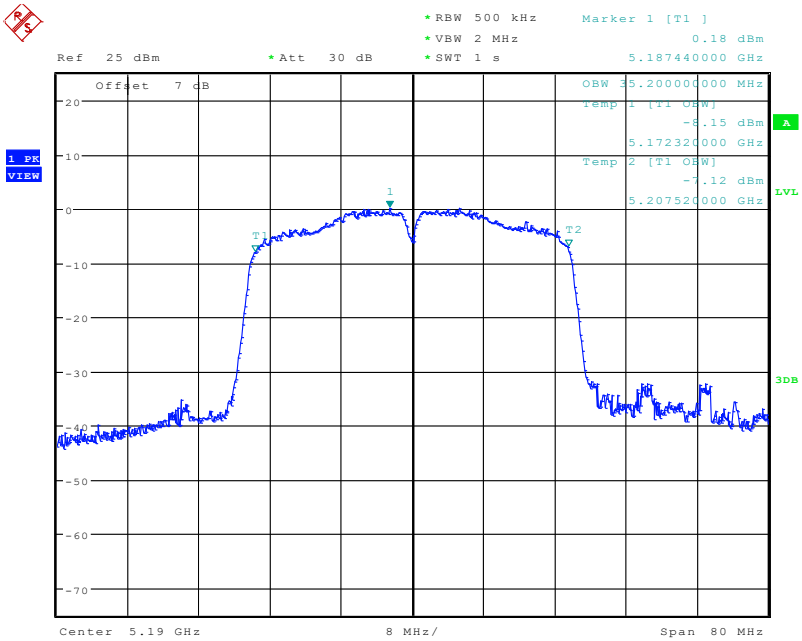
802.11n-HT40 mode:

26dB Emission Bandwidth, 5190MHz



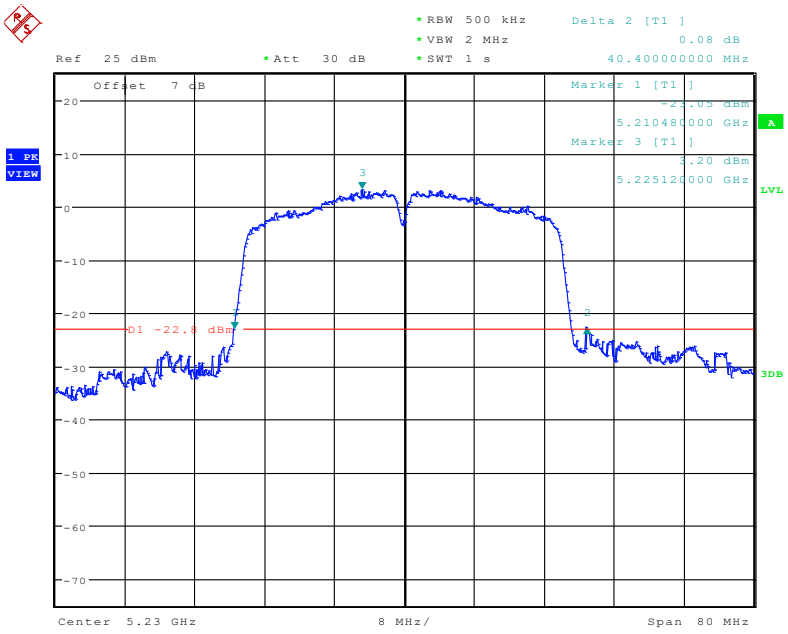
Date: 25.MAY.2023 10:18:51

Occupied Bandwidth, 5190MHz



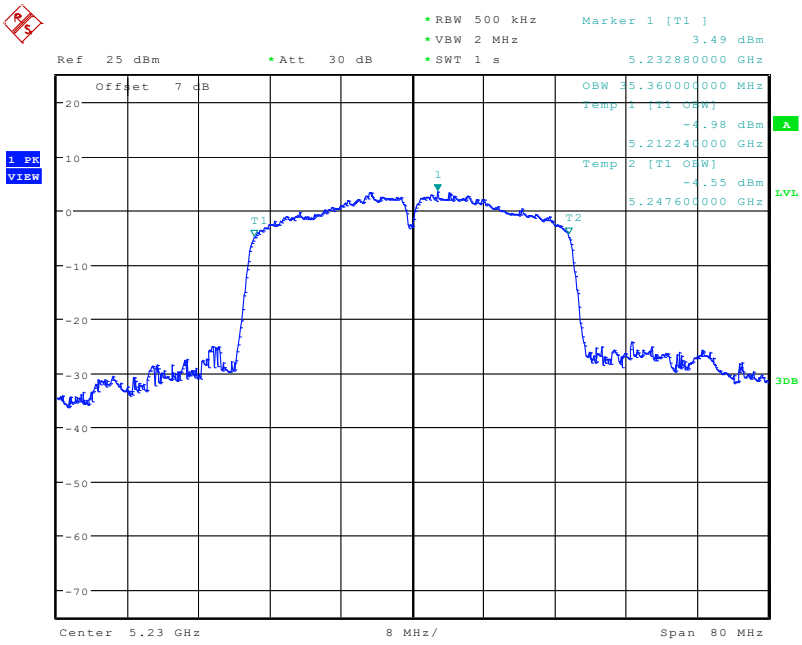
Date: 25.MAY.2023 10:18:04

26dB Emission Bandwidth, 5230MHz



Date: 25.MAY.2023 10:10:04

Occupied Bandwidth, 5230MHz

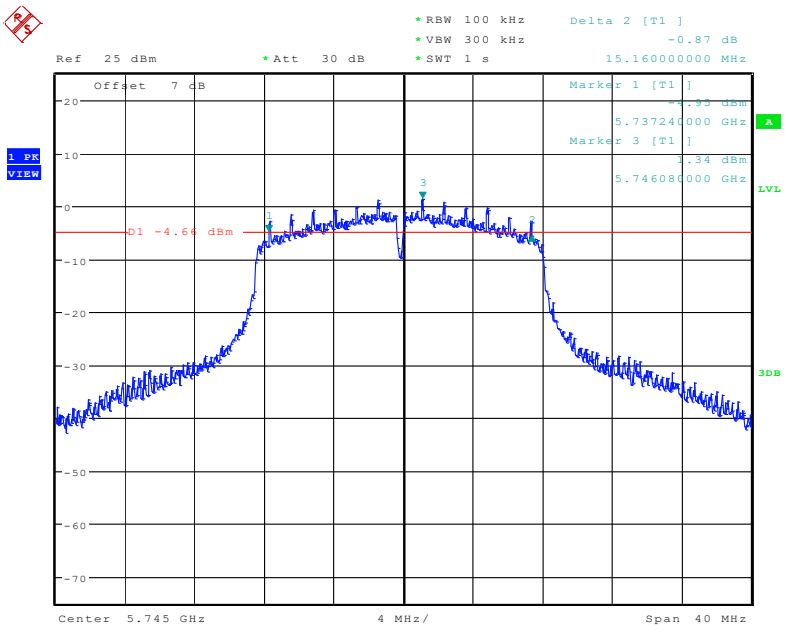


Date: 25.MAY.2023 10:09:29

5725 MHz – 5850 MHz:

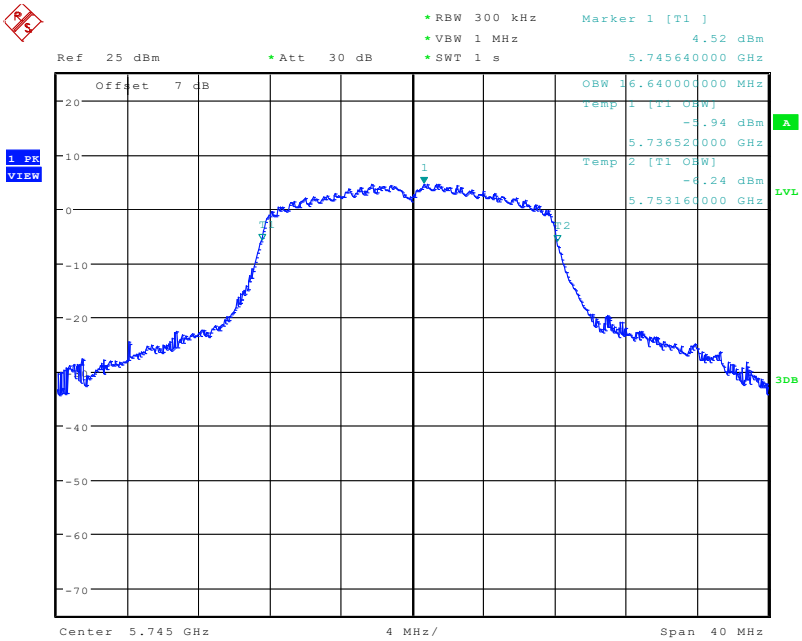
802.11a mode:

26dB Emission Bandwidth, 5745MHz



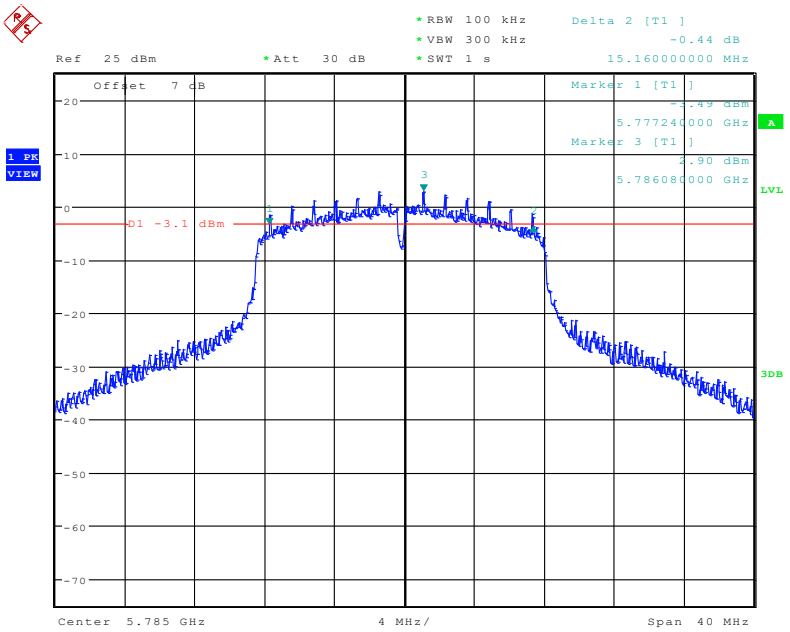
Date: 24.MAY.2023 11:56:21

Occupied Bandwidth, 5745MHz



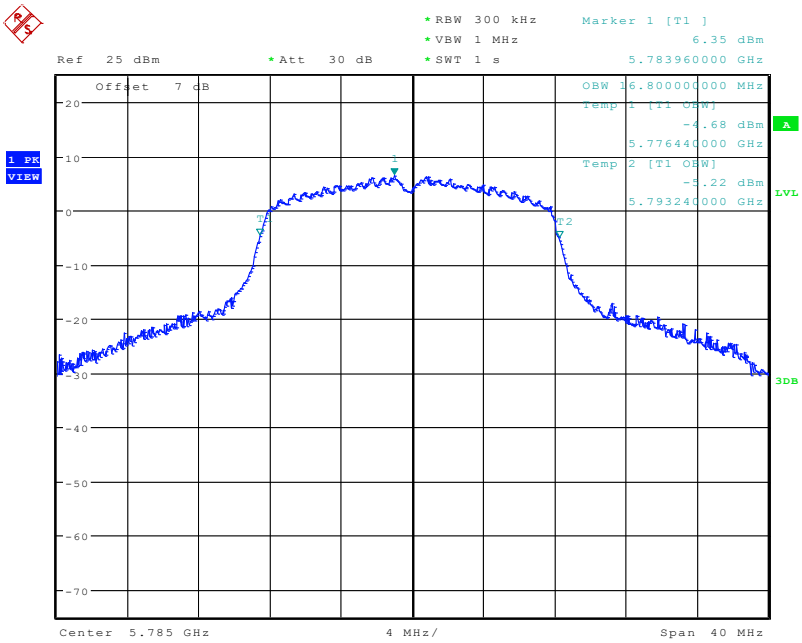
Date: 24.MAY.2023 11:55:46

26dB Emission Bandwidth, 5785MHz



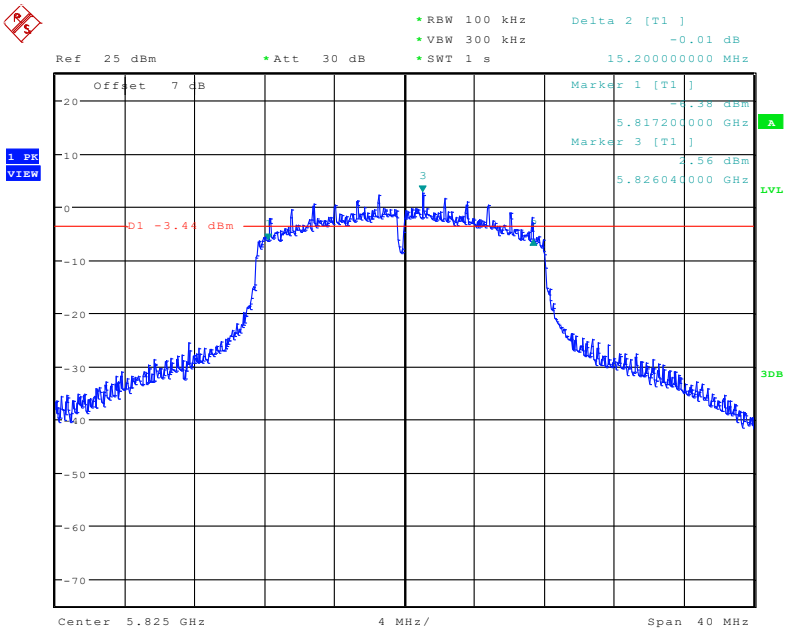
Date: 24.MAY.2023 11:58:54

Occupied Bandwidth, 5785MHz



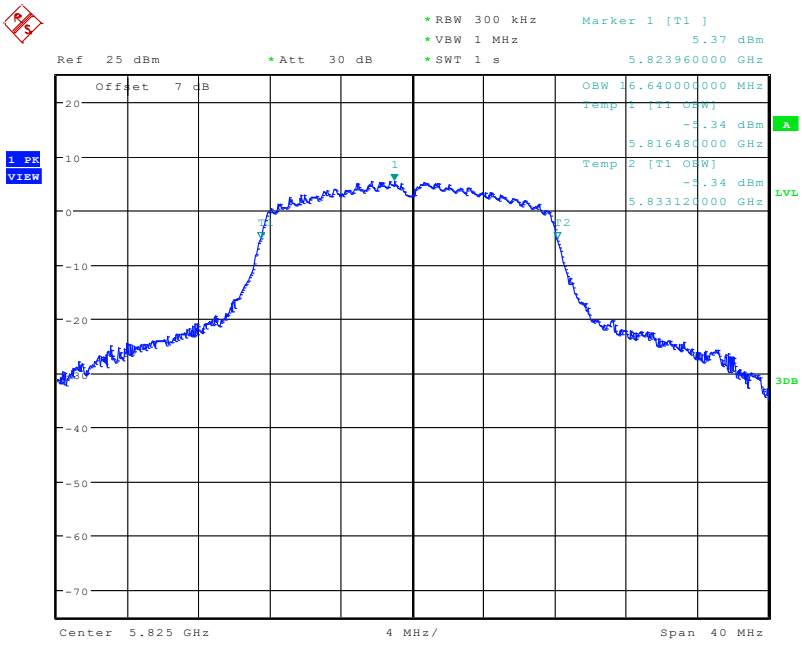
Date: 24.MAY.2023 11:58:31

26dB Emission Bandwidth, 5825MHz



Date: 24.MAY.2023 13:16:05

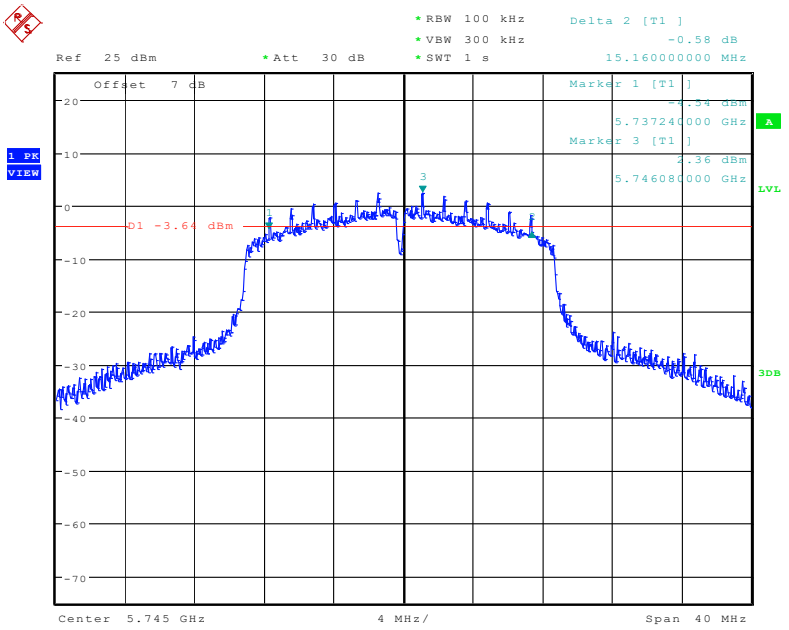
Occupied Bandwidth, 5825MHz



Date: 24.MAY.2023 13:15:30

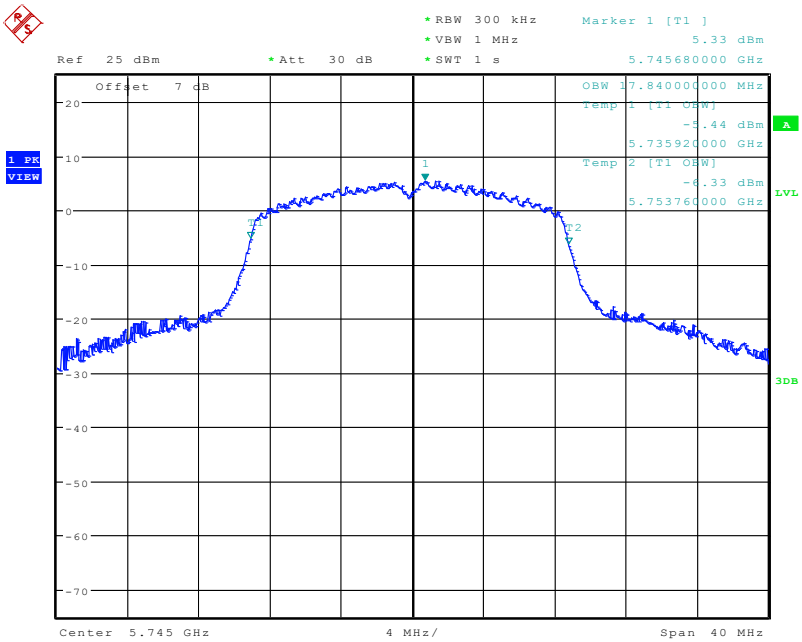
802.11n-HT20 mode:

26dB Emission Bandwidth, 5745MHz



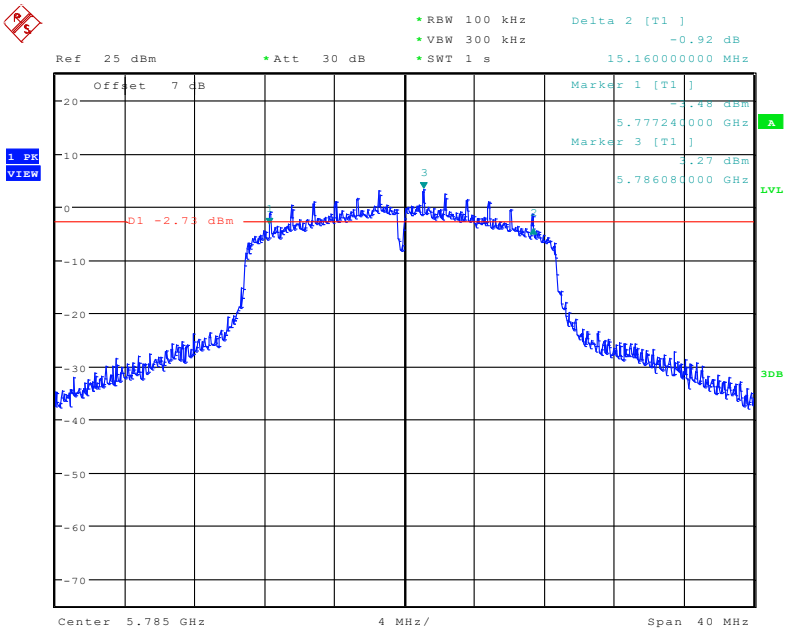
Date: 25.MAY.2023 10:27:12

Occupied Bandwidth, 5745MHz



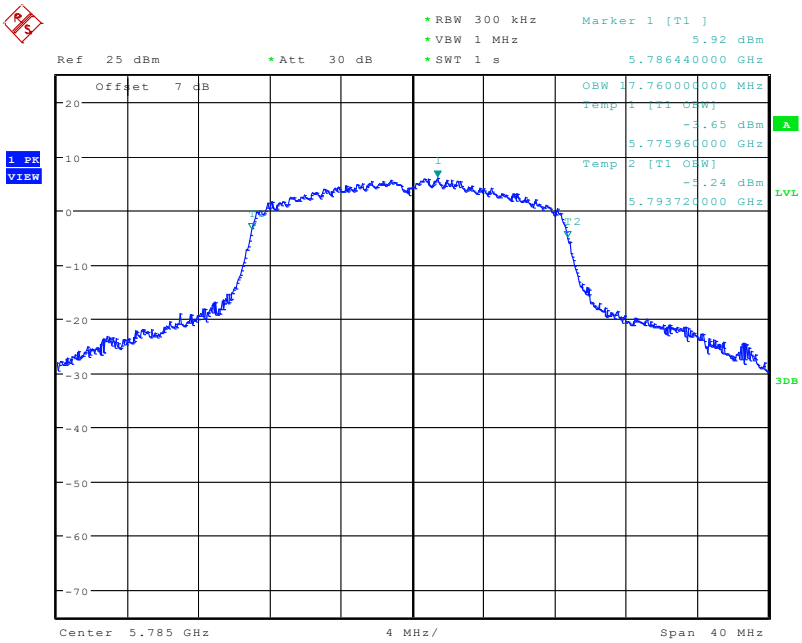
Date: 25.MAY.2023 10:26:49

26dB Emission Bandwidth, 5785MHz



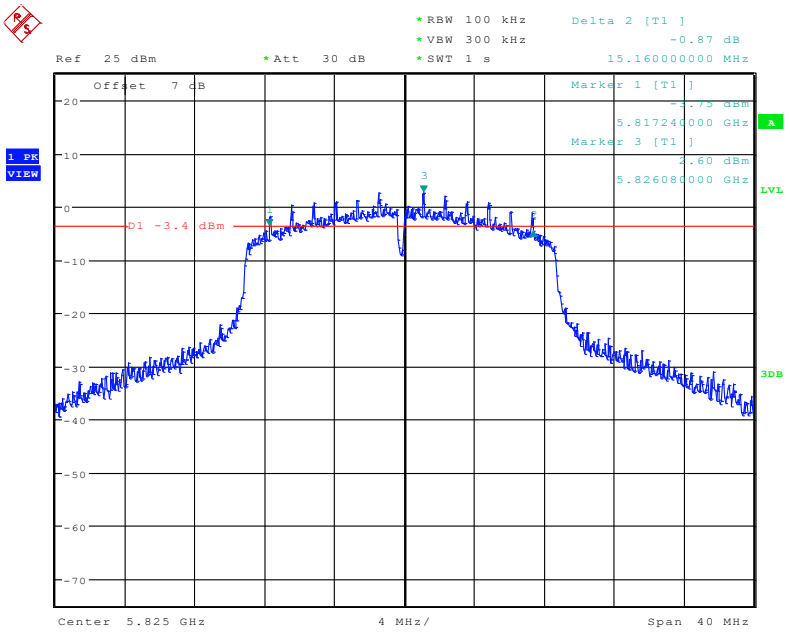
Date: 25.MAY.2023 10:30:44

Occupied Bandwidth, 5785MHz

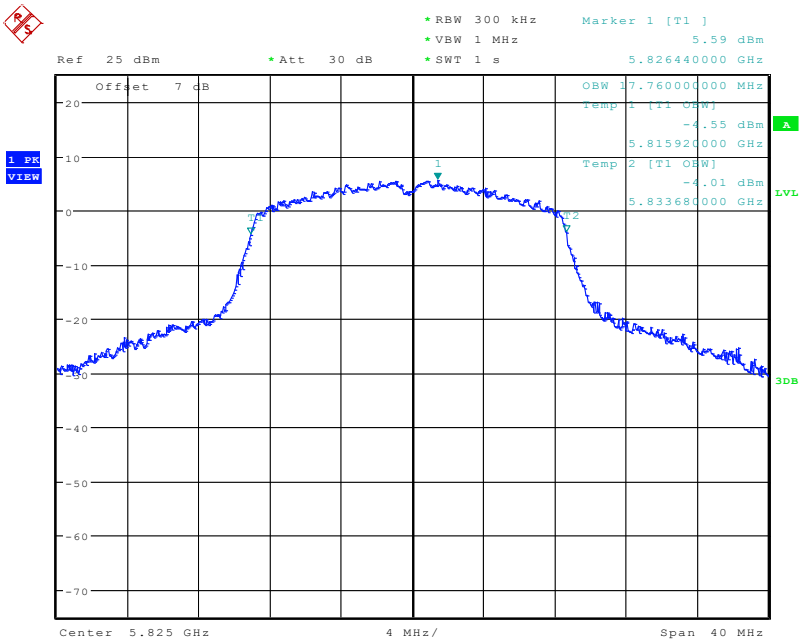


Date: 25.MAY.2023 10:30:09

26dB Emission Bandwidth, 5825MHz

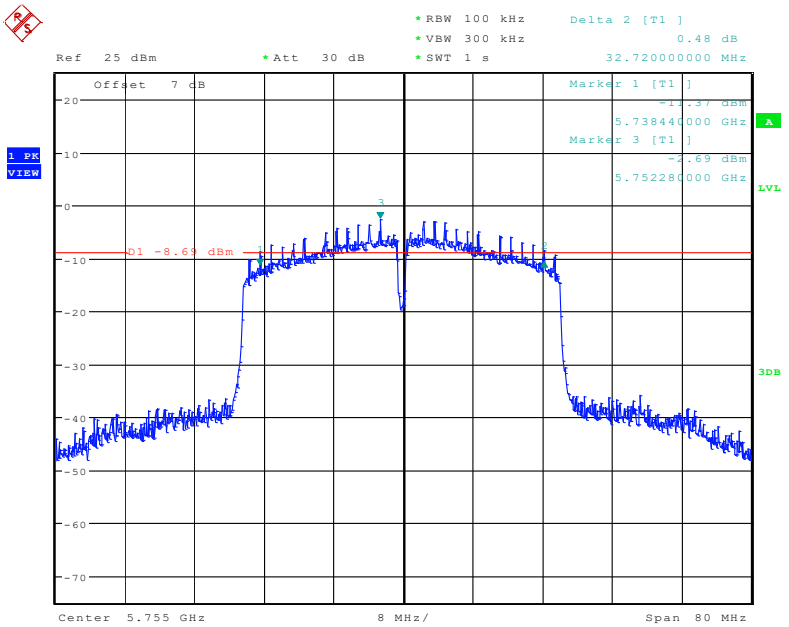


Occupied Bandwidth, 5825MHz



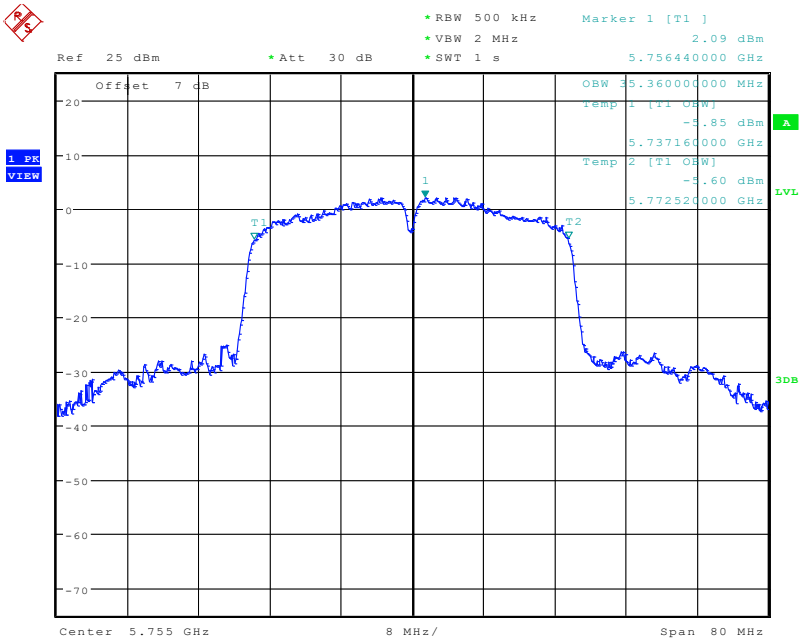
802.11n-HT40 mode:

26dB Emission Bandwidth, 5755MHz



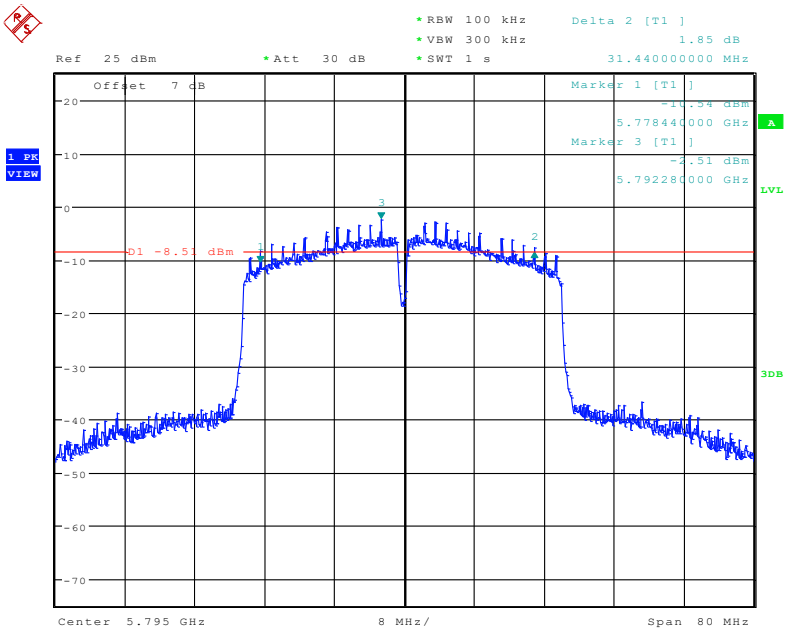
Date: 25.MAY.2023 10:37:49

Occupied Bandwidth, 5755MHz



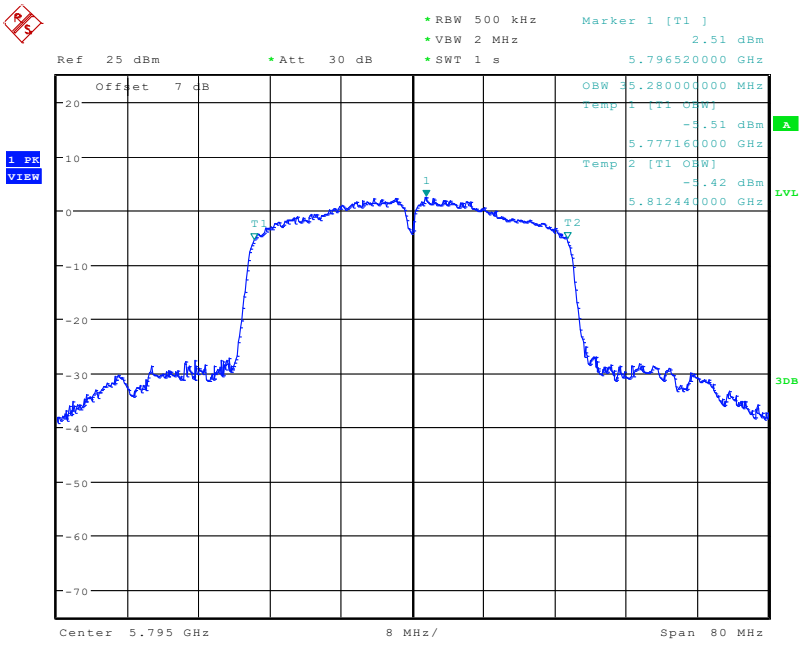
Date: 25.MAY.2023 10:37:25

26dB Emission Bandwidth, 5795MHz



Date: 25.MAY.2023 10:41:33

Occupied Bandwidth, 5795MHz



Date: 25.MAY.2023 10:40:57

FCC §15.407(a) – CONDUCTED TRANSMITTER OUTPUT POWER

Applicable Standard

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

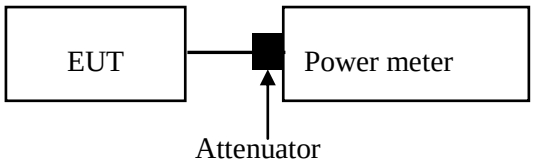
For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 Method PM-G should be applied

1: Place the EUT on a bench and set it in transmitting mode.

2: Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.



Test Data

Environmental Conditions

Temperature:	24~26 ℃
Relative Humidity:	52~54 %
ATM Pressure:	101.0 kPa

The testing was performed by Jacob Huang from 2023-05-24 to 2023-06-12.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to following table and plots.

5150 MHz – 5250 MHz

Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
802.11a		
5180	9.66	23.98
5200	9.06	
5240	9.19	
802.11n20		
5180	**9.87**	23.98
5200	9.6	
5240	8.89	
802.11n40		
5190	7.24	23.98
5230	9.18	

5725 MHz – 5850 MHz

Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
802.11a		
5745	10.13	30
5785	**11.88**	
5825	11.27	
802.11n20		
5745	11.36	30
5785	11.84	
5825	11.36	
802.11n40		
5755	8.75	30
5795	8.70	

FCC §15.407(a) - POWER SPECTRAL DENSITY

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 Method SA-2 should be applied

a) Set RBW=1MHz or 500 kHz. VBW>3 RBW

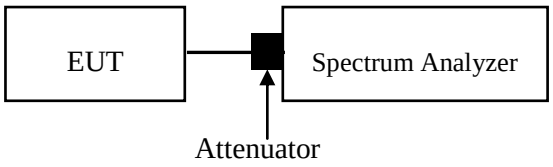
b) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 10g (500 kHz RBW) to the measured result. Where as RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

c) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (<1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement. f) Detector=power averaging(1ms)

d) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter. it is recommended to use reduced RBW of 100 kHz for the II.F.5.c) anc ILF 5.d. since RBW=100 kHz is available on nearly all spectrum analyzers.

h) Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.



Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Jacob Huang on 2023-05-26.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to following table and plots.

5150 MHz – 5250 MHz:

Frequency (MHz)	Reading (dBm/MHz)	Duty Cycle Factor (dB)	PSD (dBm/MHz)	Limit (dBm/MHz)
802.11a				
5180	-0.09	0.36	0.27	11
5200	-0.34	0.36	0.02	
5240	0.05	0.36	0.41	
802.11n20				
5180	-0.55	0.67	0.12	11
5200	0.04	0.67	0.71	
5240	-0.64	0.67	0.03	
802.11n40				
5190	-7.2	2.13	-5.07	11
5230	-4.5	2.13	-2.37	

5725 MHz – 5850 MHz:

Frequency (MHz)	Reading (dBm/500kHz)	Duty Cycle Factor (dB)	PSD (dBm/500kHz)	Limit (dBm/500kHz)
802.11a				
5745	-1.92	0.41	-1.51	30
5785	-0.91	0.41	-0.50	
5825	-2.01	0.41	-1.60	
802.11n20				
5745	-1.04	0.60	-0.44	30
5785	-1.13	0.60	-0.53	
5825	-1.74	0.60	-1.14	
802.11n40				
5755	-7.42	1.43	-5.99	30
5795	-7.92	1.43	-6.49	

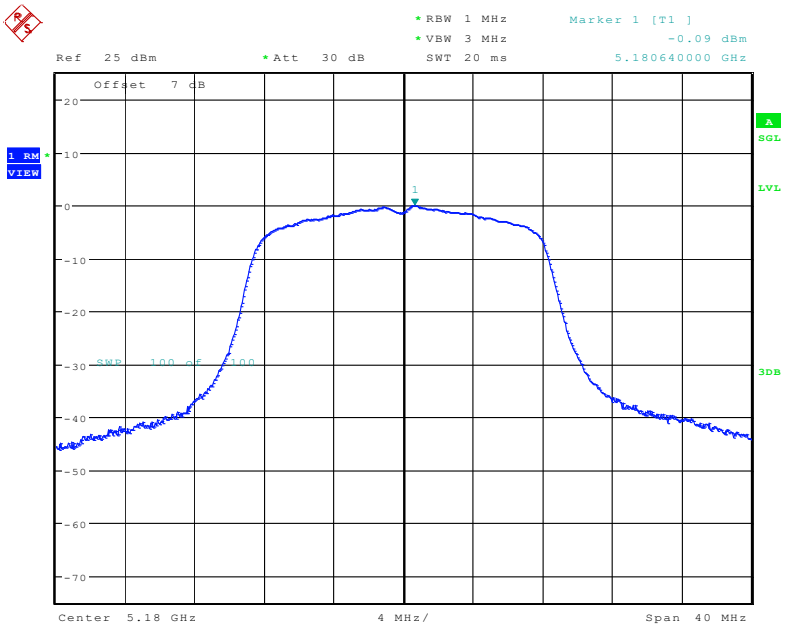
Note:

(1)Duty Cycle Factor=*10 log (1 / D), D=Duty Cycle*

5150 MHz - 5250 MHz:

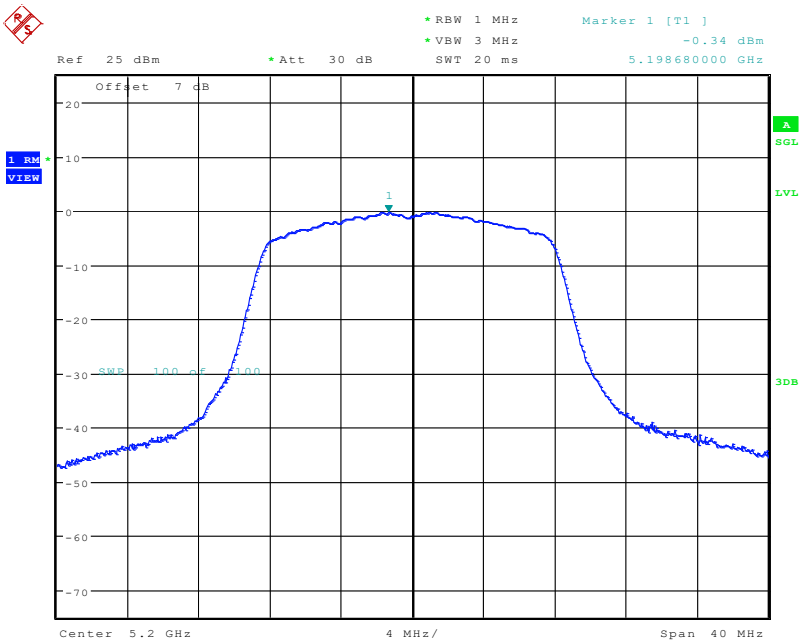
802.11a mode:

5180MHz



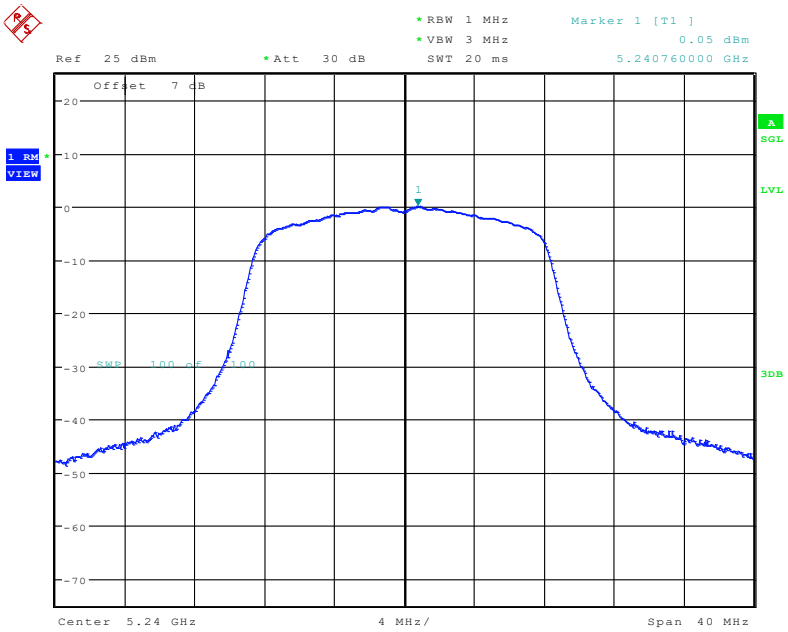
Date: 26.MAY.2023 09:37:31

5200MHz



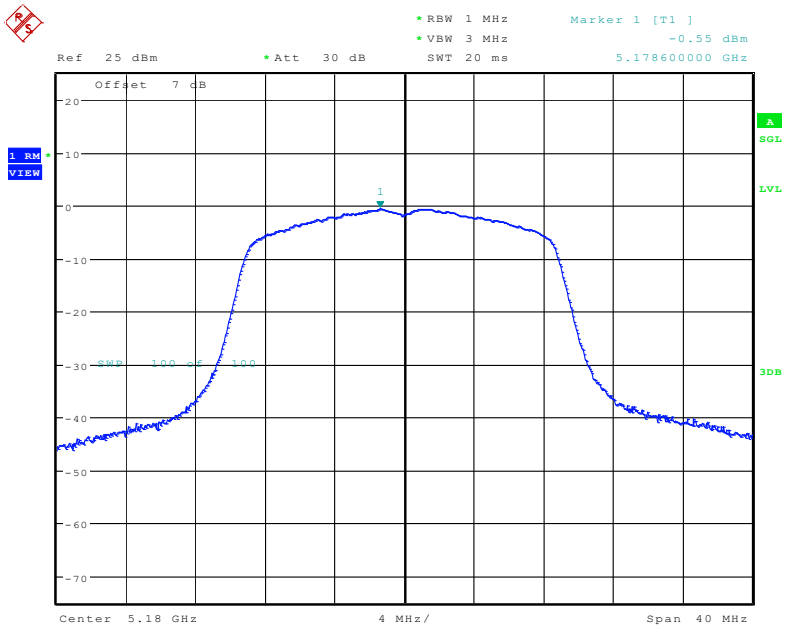
Date: 26.MAY.2023 09:38:13

5240MHz

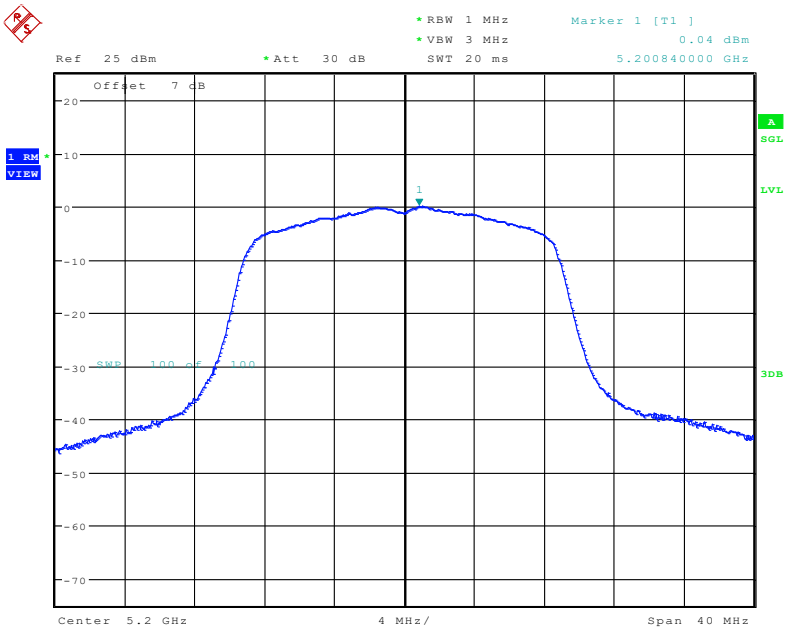


802.11n-HT20 mode:

5180MHz

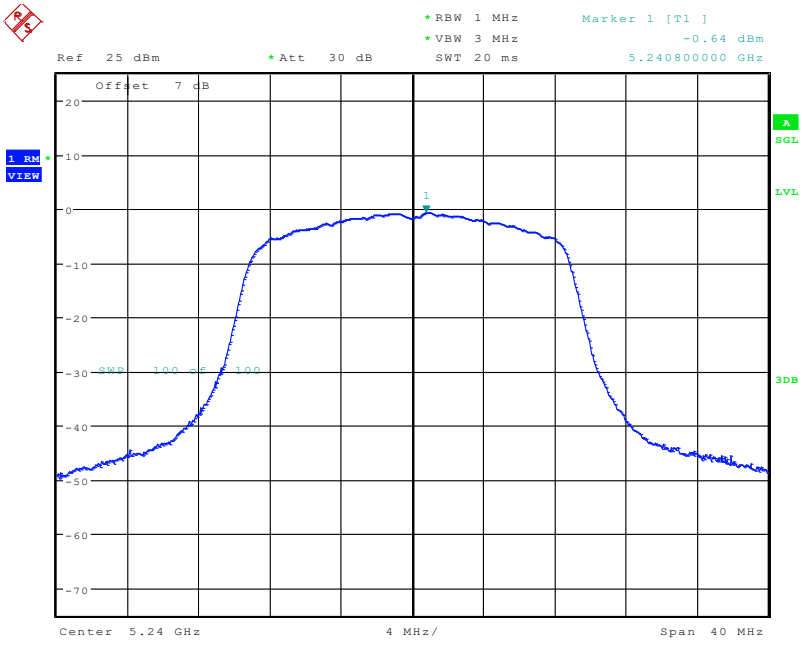


5200MHz



Date: 26.MAY.2023 09:44:35

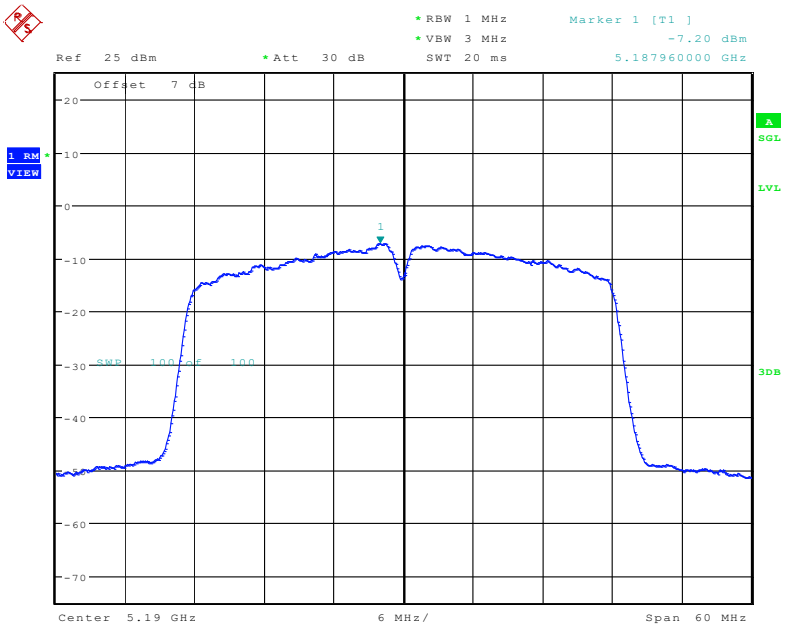
5240MHz



Date: 26.MAY.2023 09:45:04

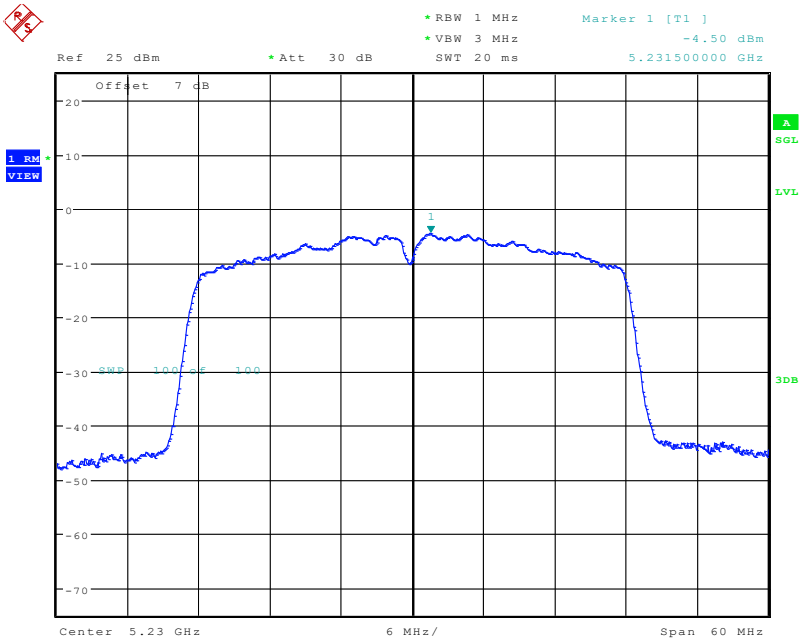
802.11n-HT40 mode:

5190MHz



Date: 26.MAY.2023 09:49:35

5230MHz

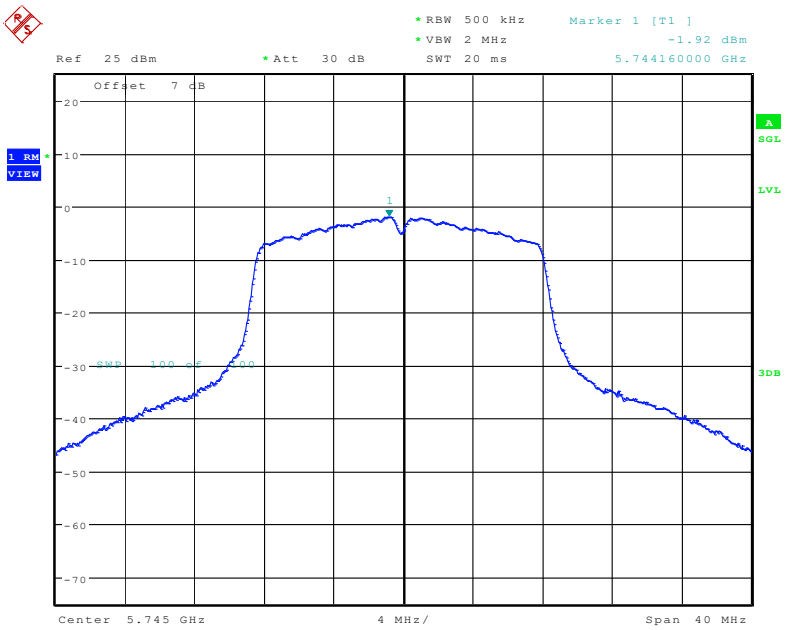


Date: 26.MAY.2023 09:50:02

5725 MHz – 5850 MHz:

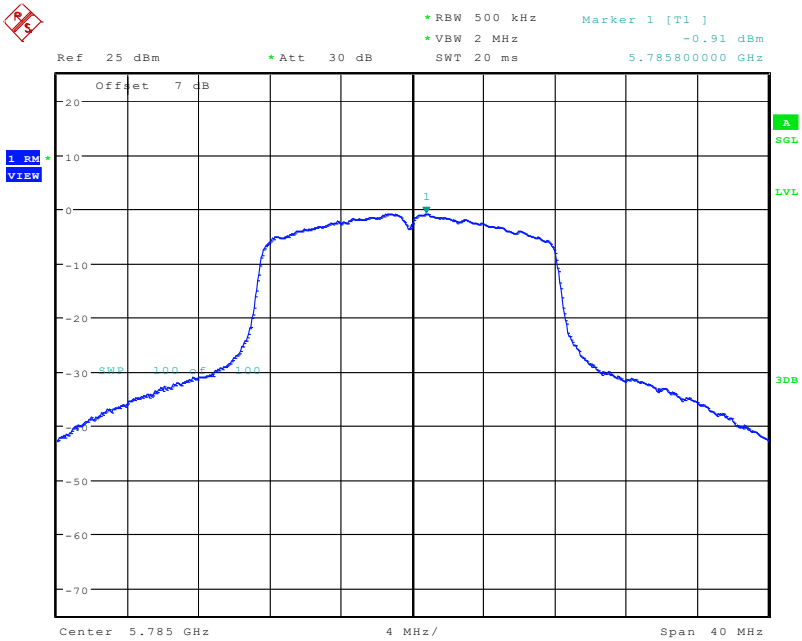
802.11a mode:

5745MHz



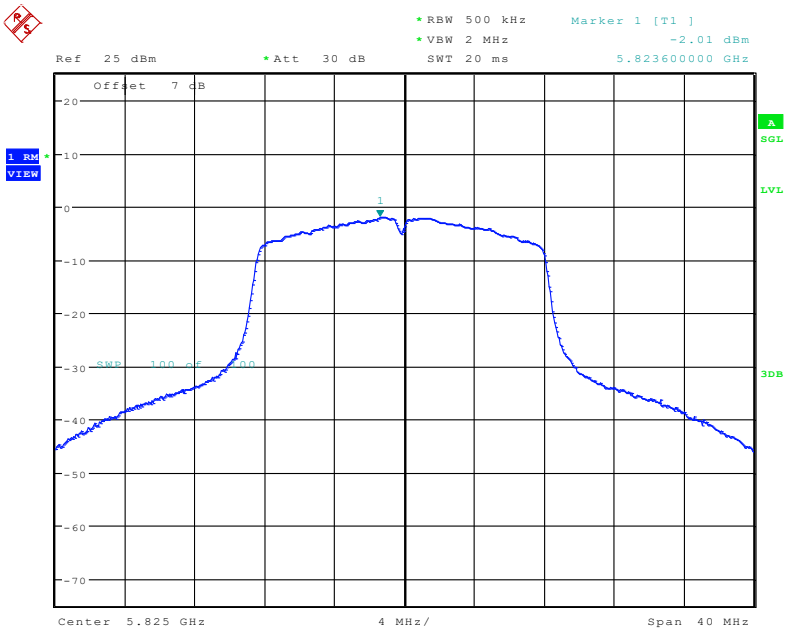
Date: 26.MAY.2023 09:40:19

5785MHz



Date: 26.MAY.2023 09:41:49

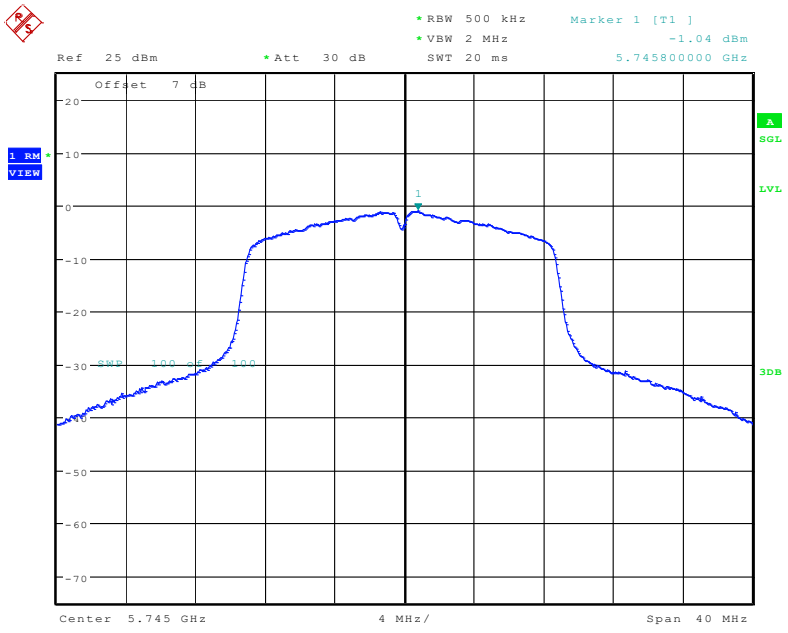
5825MHz



Date: 26.MAY.2023 09:42:19

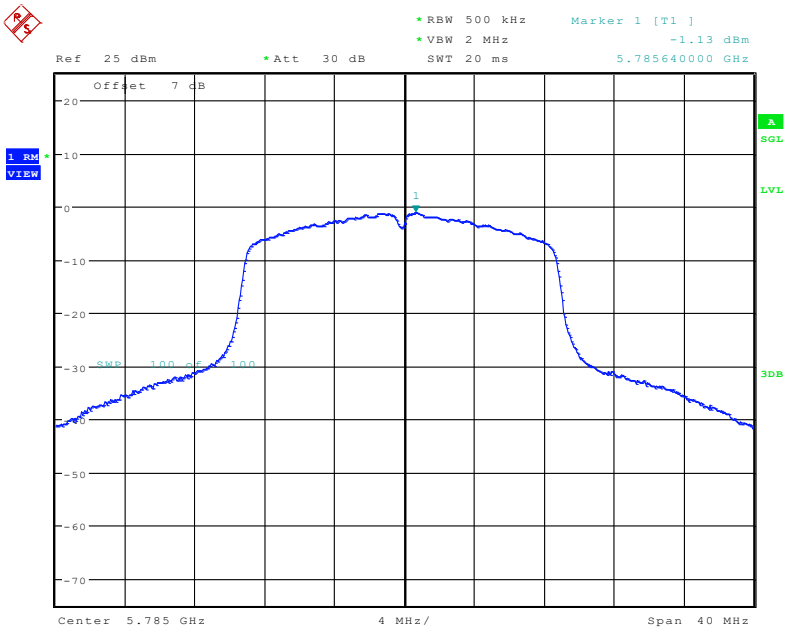
802.11n-HT20 mode:

5745MHz



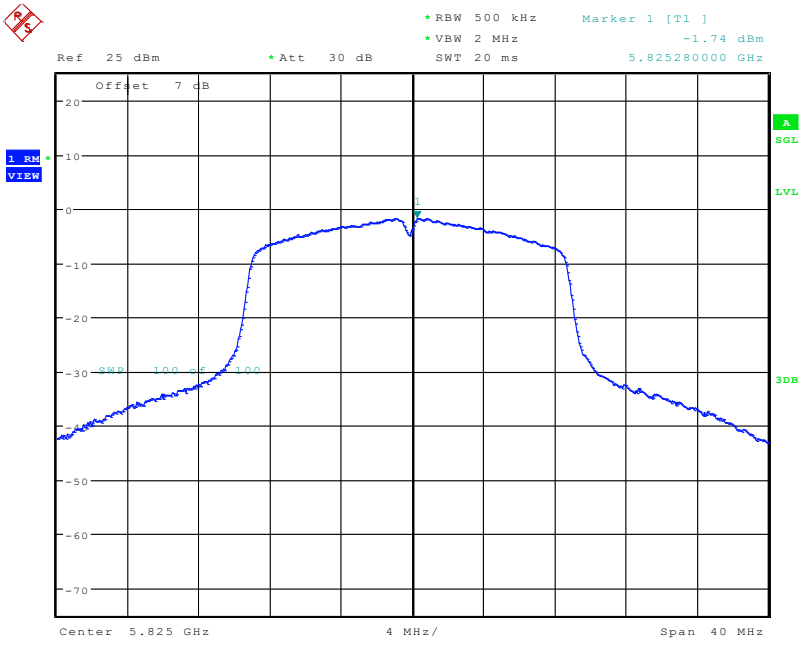
Date: 26.MAY.2023 09:46:51

5785MHz



Date: 26.MAY.2023 09:47:19

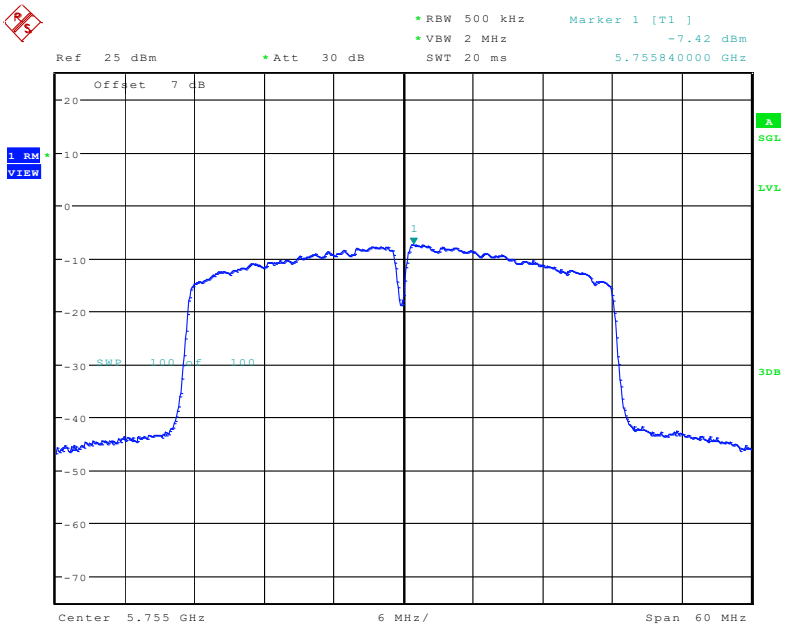
5825MHz



Date: 26.MAY.2023 09:47:46

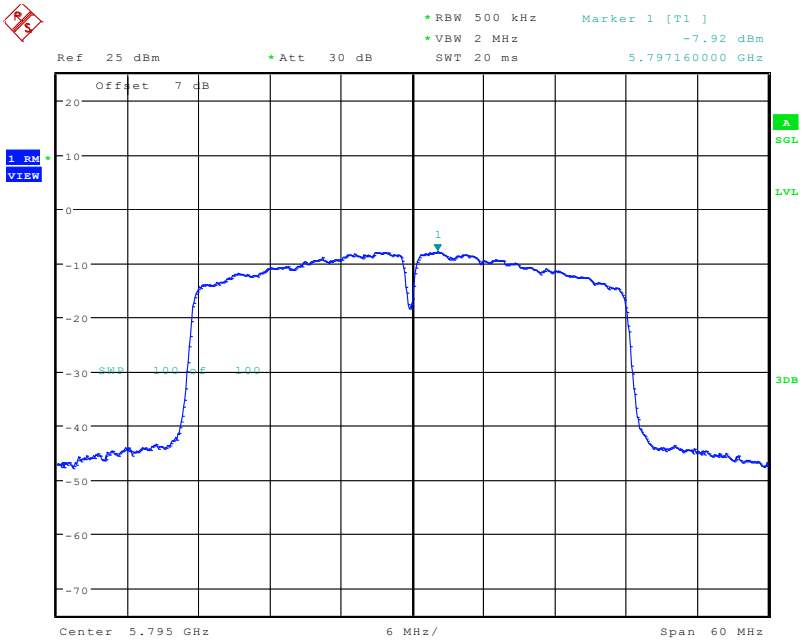
802.11n-HT40 mode:

5755MHz



Date: 26.MAY.2023 09:51:14

5795MHz



Date: 26.MAY.2023 09:51:43

******* END OF REPORT *******