

FCC Part 15.407

TEST REPORT

For

TIBBO TECHNOLOGY

9F-3, NO. 31, LANE 169, KANG-NING ST., HSI-CHIH, TAIPEI, Taiwan

FCC ID: XOJ-WS1102

Report Type:
Original Report

Product Type:
WS1102 Programmable Wireless
RS232/422/485 Controller

Report Producer : Nana Hsu *Nana*

Report Number : RXZ210830002RF02

Report Date : 2021-10-18

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Revision History

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	TIBBO TECHNOLOGY
	9F-3, NO. 31, LANE 169, KANG-NING ST., HSI-CHIH, TAIPEI, Taiwan
Manufacturer	TIBBO TECHNOLOGY
	9F-3, NO. 31, LANE 169, KANG-NING ST., HSI-CHIH, TAIPEI, Taiwan
Brand(Trade) Name	Tibbo or 
Product (Equipment)	WS1102 Programmable Wireless RS232/422/485 Controller
Main Model Name	WS1102
Frequency Range	5150 MHz ~ 5250 MHz, 5725 MHz ~ 5850 MHz
Transmit Power	5150-5250 MHz: IEEE 802.11a Mode: 12.01 dBm IEEE 802.11n HT20 Mode: 12.05 dBm IEEE 802.11n HT40 Mode: 11.34 dBm 5725-5850 MHz: IEEE 802.11a Mode: 14.70 dBm IEEE 802.11n HT20 Mode: 14.93 dBm IEEE 802.11n HT40 Mode: 14.36 dBm
Modulation Technique	IEEE 802.11a Mode: OFDM IEEE 802.11n HT20 Mode: OFDM IEEE 802.11n HT40 Mode: OFDM
Power Operation (Voltage Range)	☒ AC 120V/60Hz ☒ Adapter Brand Name: Anthin Model: APS305-1205 I/P: AC 100~240V 50/60Hz 0.2A ; O/P: DC 12V 0.5A ☐ By AC Power Cord ☐ PoE
	☐ DC Type ☐ Battery ☐ DC Power Supply ☐ External from USB Cable ☐ External DC Adapter
	☐ Host System
Received Date	Aug 31, 2021
Date of Test	Sep 8, 2021 ~ Sep 22, 2021

*All measurement and test data in this report was gathered from production sample serial number:

RXZ210830002-01-07 (Assigned by BACL (New Taipei Laboratory)).

1.2 Objective

This report is prepared on behalf of *TIBBO TECHNOLOGY* in accordance with Part 2, Subpart J, Part 15, Subparts A, C and E of the Federal Communication Commission's rules.

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

1.3 Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS submission with FCC ID: XOJ-WS1102

1.4 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 KDB 789033 D02 General UNII Test Procedures New Rules v02r01

1.5 Statement of Compliance

Decision Rule: No, (The test results do not include MU judgment)

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Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

The determination of the test results does not require consideration of the uncertainty of the measurement, unless the assessment is required by customer agreement, regulation or standard document specification.

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is not responsible for the authenticity of the information provided by the applicant that affects the test results.

1.6 Measurement Uncertainty

Parameter		Uncertainty
AC Mains		+/- 2.36 dB
RF output power, conducted		+/- 0.93 dB
Power Spectral Density, conducted		+/- 0.93 dBm
Occupied Bandwidth		+/- 0.35 MHz
Emissions, radiated	30 MHz~1GHz	+/- 5.22 dB
	1 GHz~18 GHz	+/- 6.12 dB
	18 GHz~40 GHz	+/- 4.99 dB
Temperature		+/- 1.27 °C
Humidity		+/- 3 %

1.7 Environmental Conditions

Test Site	Test Data	Temperature (°C)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
AC Line Conducted Emissions	2021/9/19	25.4	46	1010	Boris
Radiation Spurious Emissions	2021/9/8 ~ 2021/9/9	24.3 ~ 24.4	61 ~ 62	1010	Ken
Emission Bandwidth and Occupied Bandwidth	2021/9/22	25.4	49	1010	David Lee
Maximum Output Power	2021/9/22	25.4	49	1010	David Lee
Power Spectral Density	2021/9/22	25.4	49	1010	David Lee

1.8 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) to collect test data is located on

☒ 70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3732) and the FCC designation No.TW3732 under the Mutual Recognition Agreement (MRA) in FCC Test.

2 System Test Configuration

2.1 Description of Test Configuration

The system was configured for testing in an engineering mode, which is provided by manufacturer.
The system support 802.11a/n ht20/n ht40.

For 5150 ~ 5250MHz

4 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
40	5200	48	5240

2 channels are provided for 802.11n (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230

802.11a/n20 mode Channel 36, 40, 48 were tested.

802.11n40 mode Channel 38, 46 were tested.

For 5725 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	161	5805
153	5765	165	5825
157	5785		

2 channels are provided for 802.11n (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795

802.11a/n20 mode Channel 149, 157, 165 were tested.

802.11n40 mode Channel 151, 159 were tested

2.2 Equipment Modifications

No modification was made to the EUT.

2.3 EUT Exercise Software

The EUT was programmed to be in continuously transmitting mode.

The software was used “QATol_Dbg v1.0”.

UNII Band	Mode	Channel	Frequency (MHz)	Power setting
UNII-1	802.11a	36	5180	1F
		40	5200	1F
		48	5240	1F
UNII-3		149	5745	20
		157	5785	20
		165	5825	20
UNII-1	802.11n HT20	36	5180	1F
		40	5200	1F
		48	5240	1F
UNII-3		149	5745	20
		157	5785	20
		165	5825	20
UNII-1	802.11n HT40	38	5190	1F
		46	5230	1F
UNII-3		151	5755	20
		159	5795	20

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

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

802.11a: 6Mbps

802.11n HT20: MCS0

802.11n HT40: MCS0

2.4 Test Mode

Mode: Full System (Model: WS1102) tested all measure item.

2.5 Support Equipment List and Details

Description	Manufacturer	Model Number	S/N
NB	DELL	E6410	8N7PXN1
Adapter	Anthin	APS305-1205	N/A
fixture	N/A	N/A	N/A

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2.6 External Cable List and Details

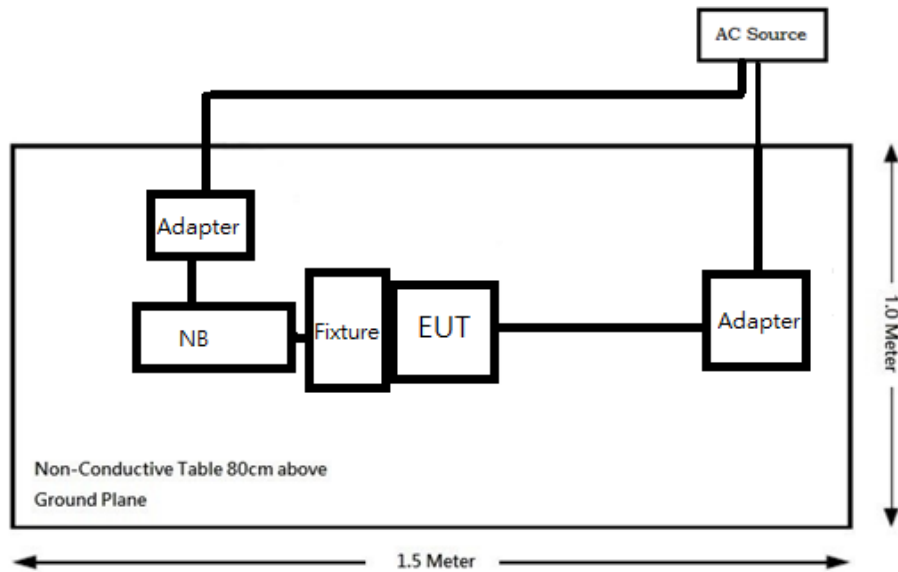
N/A

2.7 Block Diagram of Test Setup

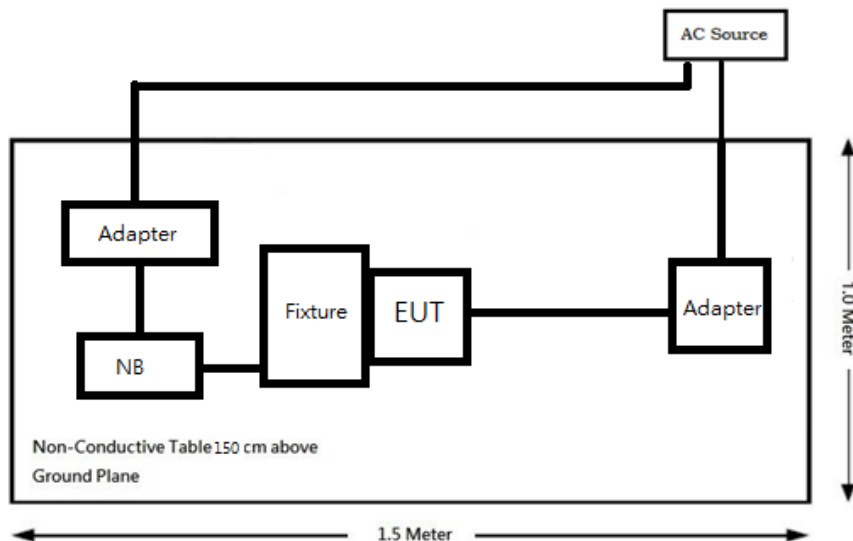
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

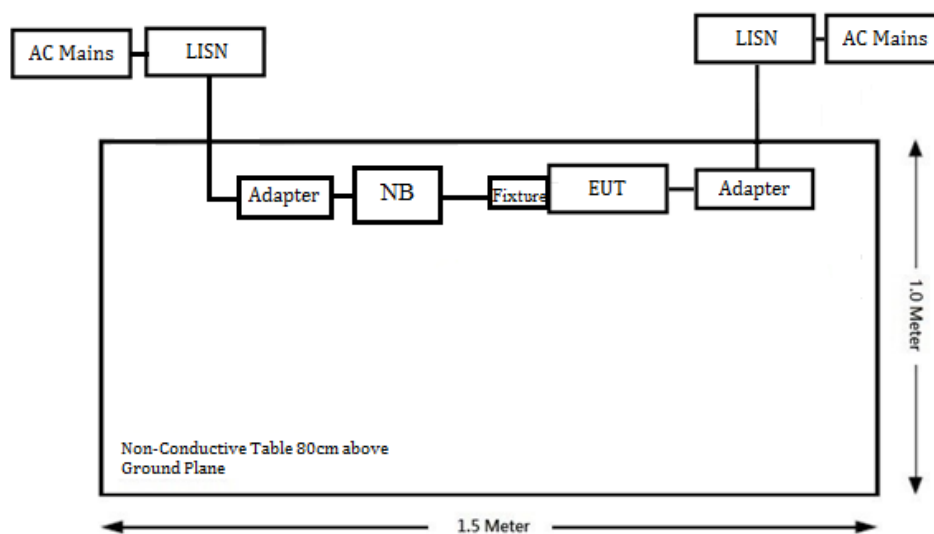
Below 1GHz:



Above 1GHz:



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Conduction:

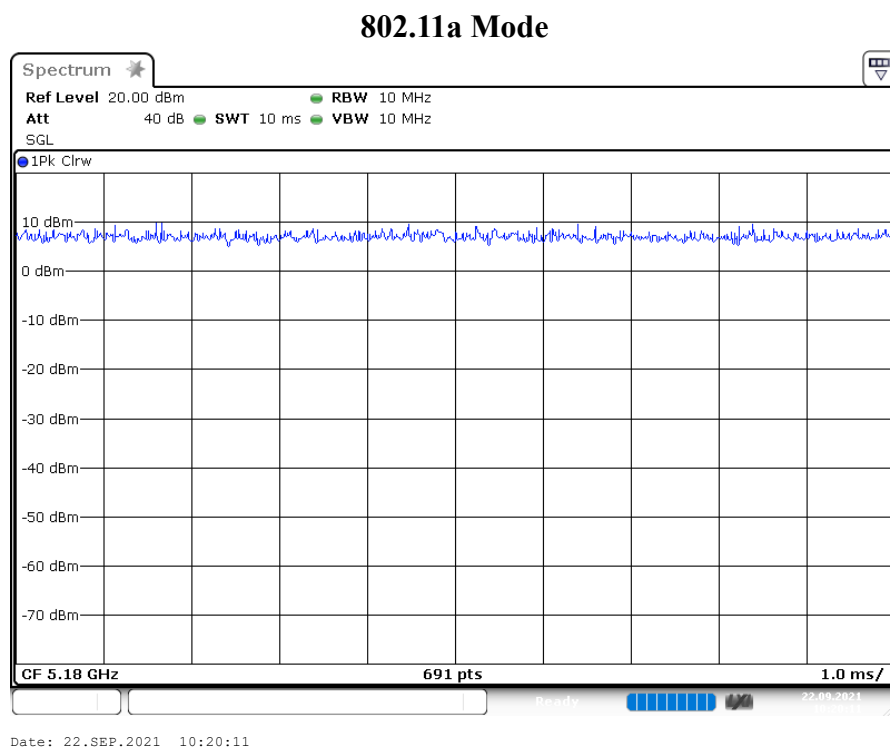
2.8 Duty Cycle

The duty cycle as below:

Radio Mode	On Time (ms)	Off Time (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11a	1	0	100	0
802.11n HT20	1	0	100	0
802.11n HT40	1	0	100	0

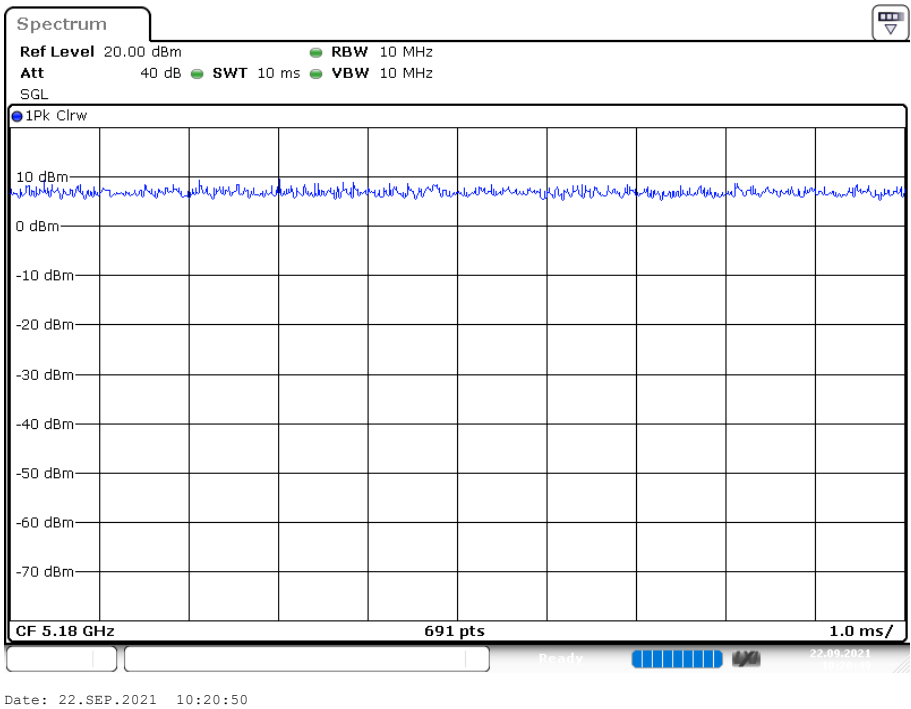
Note: Duty Cycle Correction Factor = $10 \cdot \log(1/\text{duty cycle})$

Please refer to the following plots.

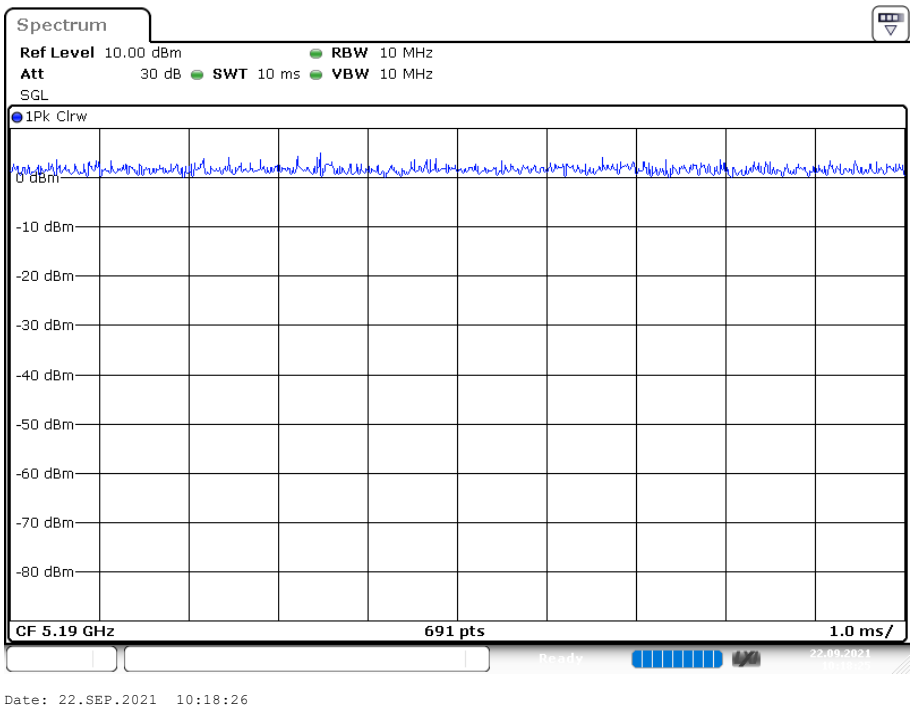


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802.11n HT20 Mode



802.11n HT40 Mode



3 Summary of Test Results

FCC Rules	Description of Test	Results
§15.407(f), §1.1310, §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(9) & §15.207(a)	AC Line Conducted Emissions	Compliance
§15.205 & §15.209 & §15.407(b)	Unwanted Emission	Compliance
§15.407(a)(e)	Emission Bandwidth	Compliance
§15.407(a)(1)(3)	Conducted Transmitter Output Power	Compliance
§15.407(a)(1)(3)	Power Spectral Density	Compliance

4 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conduction Room (CON-A)					
LISN	Rohde & Schwarz	ENV216	101612	2020/12/30	2021/12/29
LISN	Rohde & Schwarz	ENV216	101248	2021/06/08	2022/06/07
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2020/11/12	2021/11/11
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM104	2021/7/29	2022/7/29
RF Cable	EMEC	EM-CB5D	001	2021/6/11	2022/6/11
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R
Radiated Room (966-A)					
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542_01	2021/01/19	2022/01/18
Horn Antenna	EMCO	SAS-571	1020	2021/04/23	2022/04/22
Horn Antenna	ETS-Lindgren	3116	62638	2021/08/11	2022/08/10
Preamplifier	Sonoma	310N	130602	2021/06/08	2022/06/07
Preamplifier	A.H. system Inc.	PAM-0118P	470	2021/03/15	2022/13/14
Microwave Preamplifier	EM Electronics Corporation	EM18G40G	060656	2020/12/30	2021/12/29
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2020/11/12	2021/11/11
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2021/01/07	2022/01/06
Micro flex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2021/2/1	2022/1/31
Coaxial Cable	COMMATE	PEWC	8Dr	2020/12/25	2021/12/24
Coaxial Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2021/2/1	2022/1/31
Coaxial Cable	JUNFLON	J12J102248-00-B-5	AUG-07-15-044	2020/12/25	2021/12/24
Cable	EMC	EMC105-SM-SM-10000	201003	2021/2/3	2022/2/2
Software	Farad	EZ_EM	BACL-03A1	2021/01/19	2022/01/18
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2021/1/7	2022/1/6
Cable	WOKEN	N/A	S02-160323-025	2021/08/06	2022/08/05
Attenuator	MCL	BW-S10W5+	1419	2021/01/28	2022/01/27

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Power Sensor	KEYSIGHT	U2021XA	MY54080018	2021/01/28	2022/01/27
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***Statement of Traceability:** BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to the SI System of Units via the R.O.C. Center for Measurement Standards of the Electronics Testing Center, Taiwan (ETC) or to another internationally recognized National Metrology Institute (NMI), and were compliant with the current Taiwan Accreditation Foundation (TAF) requirements

5 FCC §15.407(f), §1.1310, § 2.1091 - Maximum Permissible Exposure (MPE)

5.1 Applicable Standard

According to subpart 1.1310, 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.

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/		f/1500	30
1500-100,000	/		1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

5.2 RF Exposure Evaluation Result

MPE evaluation for single transmission:

Mode	Frequency Range (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
BLE	2402-2480	2.93	1.963	11.5	14.125	20	0.005	1
WI-FI	2412-2462	2.93	1.963	23.5	223.872	20	0.087	1
WI-FI	5150-5250	3.53	2.254	12.50	17.783	20	0.008	1
WI-FI	5725-5850	2.46	1.762	15.00	31.623	20	0.011	1

Note: the maximum antenna gain was used for evaluation.

Note: Wi-Fi 2.4G, Wi-Fi 5G and BLE can't transmit simultaneously.

Result: MPE evaluation meets the requirements of the **20cm** standard.

6 FCC §15.203 – Antenna Requirements

6.1 Applicable Standard

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.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna does not exceed 6dBi. 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 colocated 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.

6.2 Antenna List and Details

Model	Antenna Type	Frequency Range (MHz)	Antenna Gain
FDAH0I19	PCB	5150-5250	3.53 dBi
		5725-5850	2.46 dBi

Fulfill the requirement of this section. Please refer to the EUT photos

Result: Compliance

7 FCC §15.407(b)(9) & § 15.207(a) – AC Line Conducted Emissions

7.1 Applicable Standard

As per FCC §15.407(b) (9)

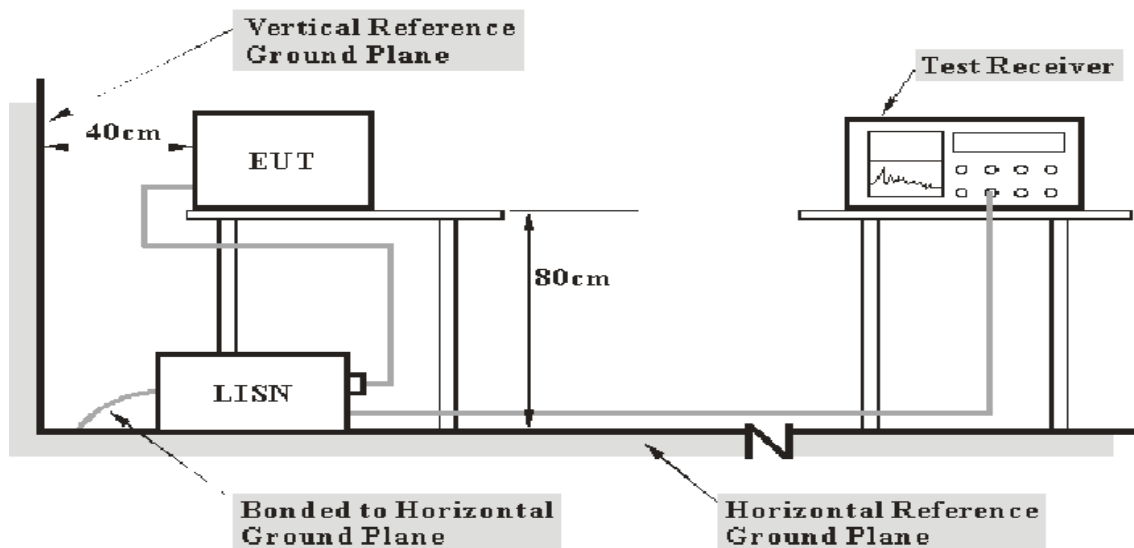
Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207

The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 ^{Note 1}	56 to 46 ^{Note 1}
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.

7.2 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 C63.10-2020 measurement procedure. The specification used was with the FCC Part 15.207 limits.

7.3 EMI Test Receiver Setup

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

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

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

7.4 Test Procedure

During the conducted emission test, the adapter was connected to the outlet of 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.

7.5 Corrected Factor & Margin Calculation

The factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

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 Over Limit calculation is as follows:

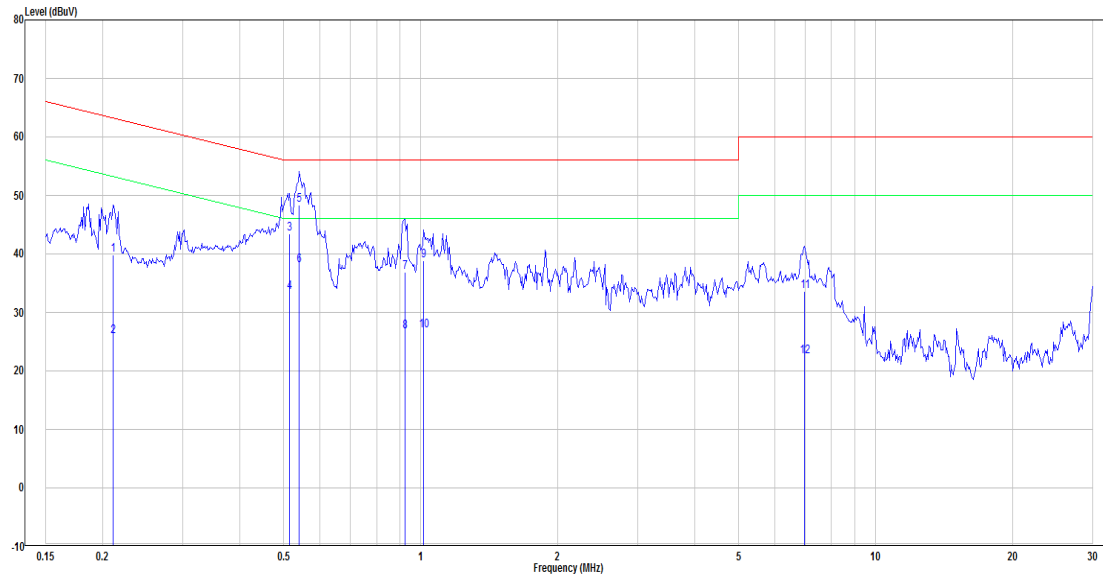
$$\text{Over Limit} = \text{Level} - \text{Limit Line}$$

7.6 Test Results

Test Mode: Transmitting

802.11n HT20 mode low channel of 5180~5250MHz (worst case).

Main: AC120 V, 60 Hz, Line



No.	Frequency (MHz)	Reading (dBμV)	Correct Factor(dB)	Result (dBμV)	Limit (dBμV)	Over limit (dB)	Remark
1	0.211	20.28	19.58	39.86	63.18	-23.32	QP
2	0.211	6.39	19.58	25.97	53.18	-27.21	Average
3	0.516	23.89	19.59	43.48	56.00	-12.52	QP
4	0.516	13.78	19.59	33.37	46.00	-12.63	Average
5	0.541	28.75	19.59	48.34	56.00	-7.66	QP
6	0.541	18.38	19.59	37.97	46.00	-8.03	Average
7	0.923	17.28	19.61	36.89	56.00	-19.11	QP
8	0.923	7.07	19.61	26.68	46.00	-19.32	Average
9	1.016	19.21	19.61	38.82	56.00	-17.18	QP
10	1.016	7.23	19.61	26.84	46.00	-19.16	Average
11	6.988	13.79	19.75	33.54	60.00	-26.46	QP
12	6.988	2.72	19.75	22.47	50.00	-27.53	Average

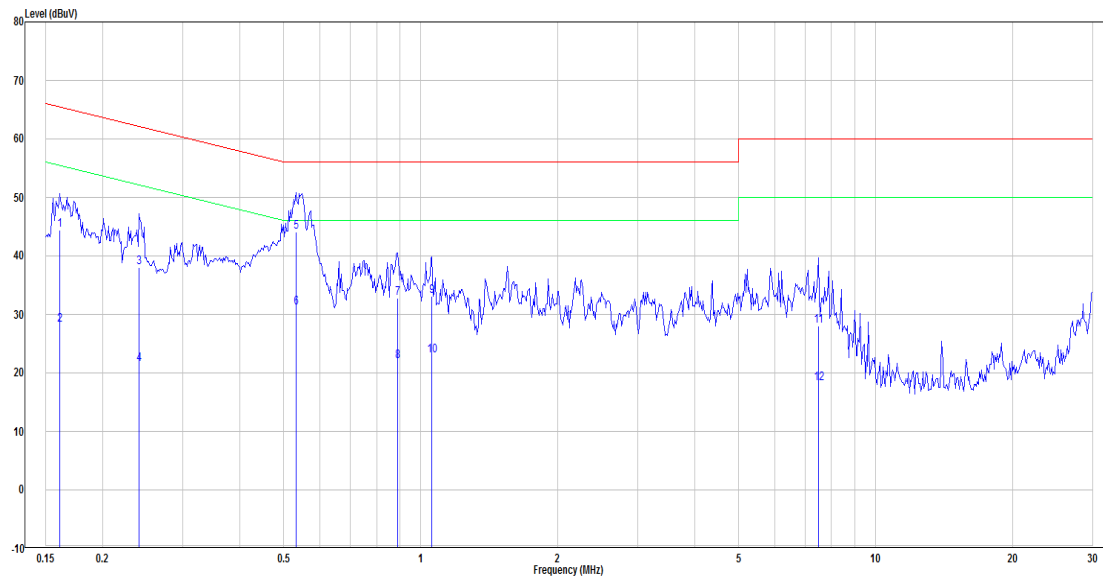
Note:

Level = Read Level + Factor

Over Limit = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

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Main: AC120 V, 60 Hz, Neutral

No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBμV)	Factor(dB)	(dBμV)	(dBμV)	(dB)	
1	0.161	24.87	19.59	44.46	65.43	-20.97	QP
2	0.161	8.54	19.59	28.13	55.43	-27.30	Average
3	0.240	18.41	19.58	37.99	62.08	-24.09	QP
4	0.240	1.98	19.58	21.56	52.08	-30.52	Average
5	0.532	24.47	19.59	44.06	56.00	-11.94	QP
6	0.532	11.63	19.59	31.22	46.00	-14.78	Average
7	0.890	13.15	19.60	32.75	56.00	-23.25	QP
8	0.890	2.39	19.60	21.99	46.00	-24.01	Average
9	1.060	13.58	19.60	33.18	56.00	-22.82	QP
10	1.060	3.35	19.60	22.95	46.00	-23.05	Average
11	7.486	8.31	19.76	28.07	60.00	-31.93	QP
12	7.486	-1.64	19.76	18.12	50.00	-31.88	Average

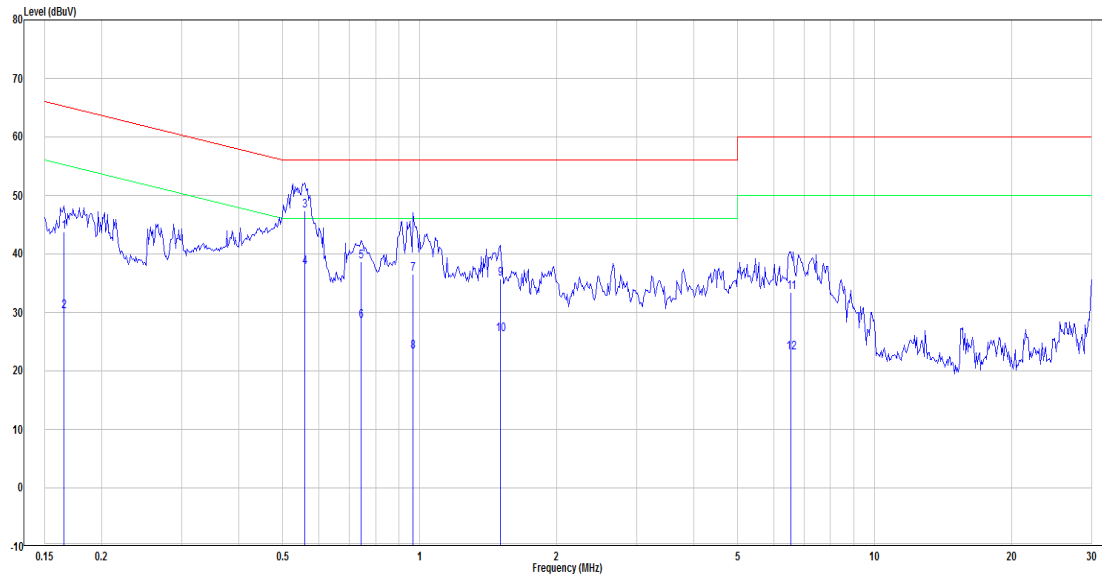
Note:

Level = Read Level + Factor

Over Limit = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.
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802.11a mode low channel of 5725~5850MHz (worst case).**Main: AC120 V, 60 Hz, Line**

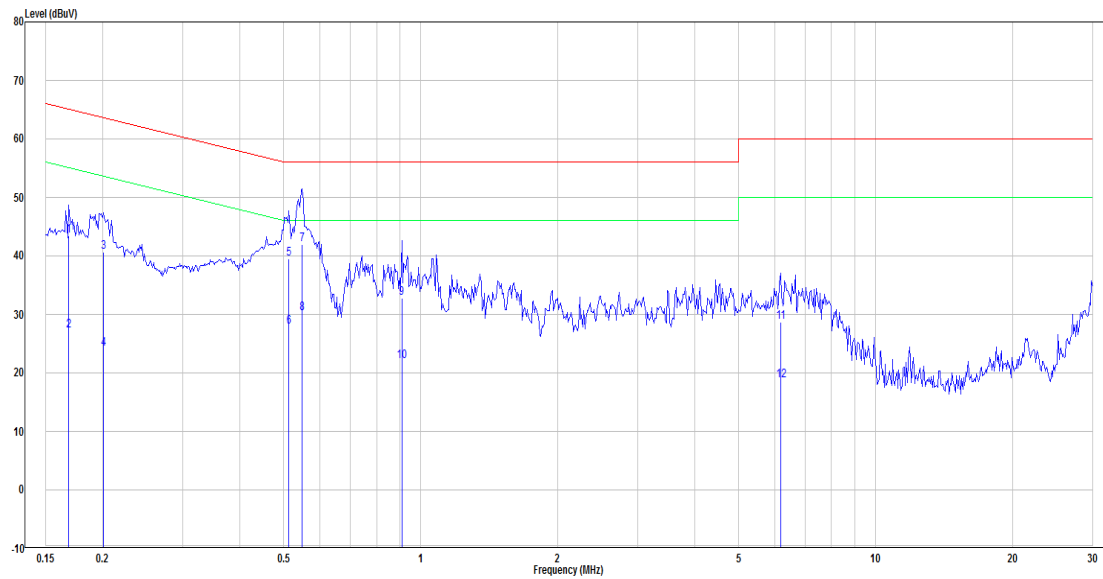
No.	Frequency (MHz)	Reading (dBμV)	Correct Factor(dB)	Result (dBμV)	Limit (dBμV)	Over limit (dB)	Remark
1	0.165	24.18	19.59	43.77	65.21	-21.44	QP
2	0.165	10.63	19.59	30.22	55.21	-24.99	Average
3	0.558	27.81	19.59	47.40	56.00	-8.60	QP
4	0.558	18.19	19.59	37.78	46.00	-8.22	Average
5	0.743	19.02	19.60	38.62	56.00	-17.38	QP
6	0.743	8.96	19.60	28.56	46.00	-17.44	Average
7	0.968	16.90	19.61	36.51	56.00	-19.49	QP
8	0.968	3.65	19.61	23.26	46.00	-22.74	Average
9	1.503	16.19	19.63	35.82	56.00	-20.18	QP
10	1.503	6.59	19.63	26.22	46.00	-19.78	Average
11	6.557	13.68	19.75	33.43	60.00	-26.57	QP
12	6.557	3.30	19.75	23.05	50.00	-26.95	Average

Note:

Level = Read Level + Factor

Over Limit = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

Main: AC120 V, 60 Hz, Neutral

No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBμV)	Factor(dB)	(dBμV)	(dBμV)	(dB)	
1	0.169	23.81	19.59	43.40	65.03	-21.63	QP
2	0.169	7.55	19.59	27.14	55.03	-27.89	Average
3	0.201	21.10	19.58	40.68	63.58	-22.90	QP
4	0.201	4.60	19.58	24.18	53.58	-29.40	Average
5	0.513	19.97	19.59	39.56	56.00	-16.44	QP
6	0.513	8.22	19.59	27.81	46.00	-18.19	Average
7	0.549	22.30	19.59	41.89	56.00	-14.11	QP
8	0.549	10.61	19.59	30.20	46.00	-15.80	Average
9	0.909	13.22	19.60	32.82	56.00	-23.18	QP
10	0.909	2.43	19.60	22.03	46.00	-23.97	Average
11	6.186	8.90	19.74	28.64	60.00	-31.36	QP
12	6.186	-0.99	19.74	18.75	50.00	-31.25	Average

Note:

Level = Read Level + Factor

Over Limit = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.
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8 FCC §15.209, §15.205 , §15.407(b) – Spurious Emissions

8.1 Applicable Standard

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	608 – 614	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	960 – 1240	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	1300 – 1427	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1435 – 1626.5	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1645.5 – 1646.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1660 – 1710	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1718.8 – 1722.2	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	2200 – 2300	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2310 – 2390	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2483.5 – 2500	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2690 – 2900	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	3260 – 3267	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3.332 – 3.339	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3.3458 – 3.358	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3.600 – 4.400	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4		Above 38.6
13.36 – 13.41	399.9 – 410		

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

Note 1: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per FCC Part 15.407 (b)

- (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 5.725-5.85 GHz band: 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

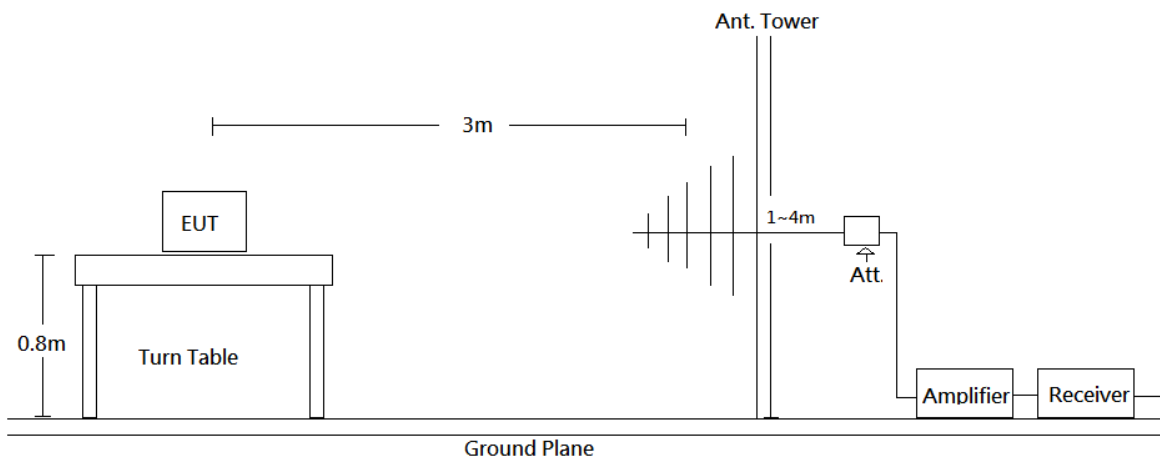
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15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge..

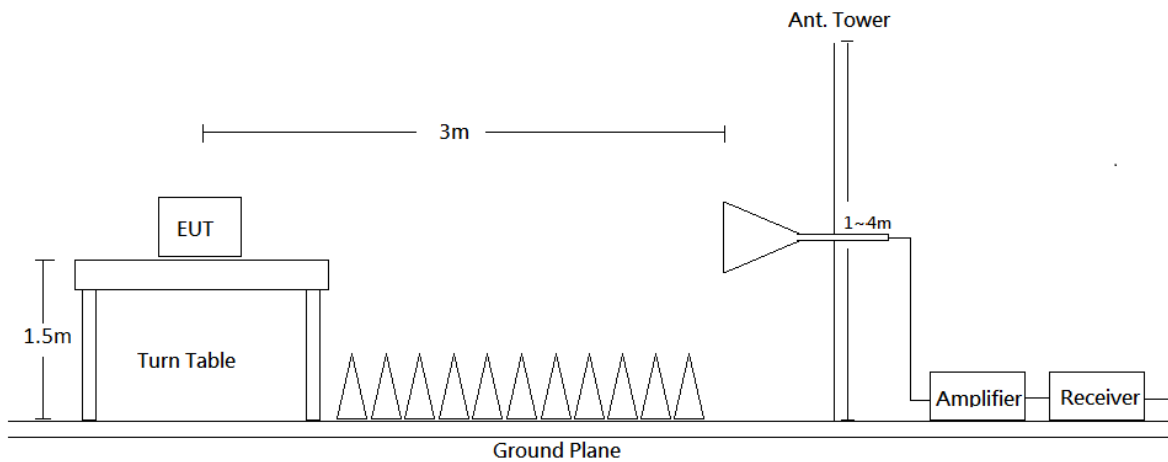
- (3) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (4) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

8.2 EUT Setup

Below 1 GHz:



Above 1 GHz:



Radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2020. The specification used was the FCC Part 15.209 and FCC 15.407 Limits.

8.3 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 was set with the following configurations measurement method 6.3 in ANSI C63.10.

Frequency Range	RBW	VBW	Duty cycle	Measurement method
30-1000 MHz	120 kHz	/	/	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1 MHz	3 MHz	>98%	Ave
	1 MHz	1/T	<98%	Ave

8.4 Test Procedure

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

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

According to C63.10, emission shall be computed as: $E [dB\mu V/m] = EIRP[dBm] + 95.2$, for $d = 3$ meters.

All emissions under the average limit and under the noise floor have not recorded in the report

8.5 Corrected Factor & Margin Calculation

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

$$\text{Correct Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit.

For example, a margin of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Result} - \text{Limit}$$

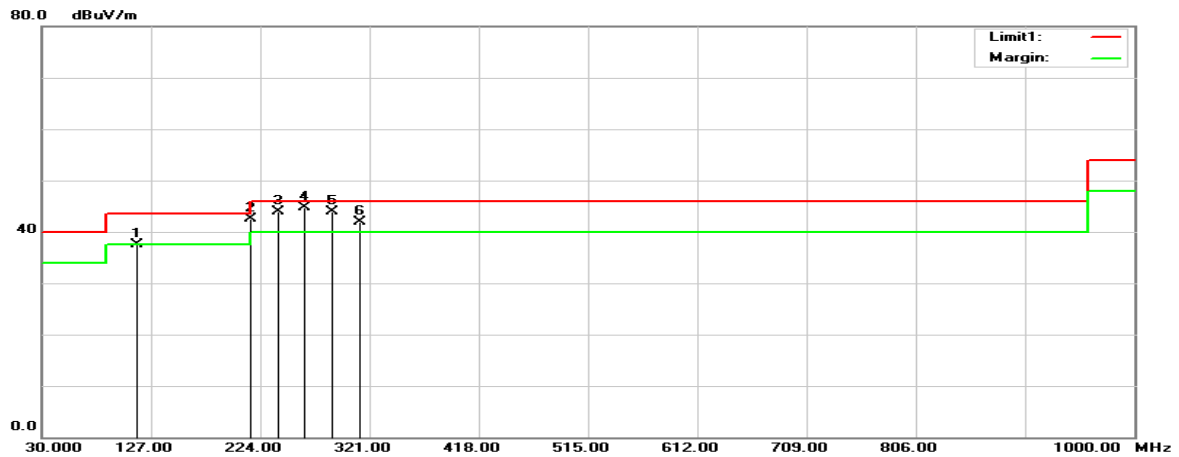
8.6 Test Results

Test Mode: Transmitting

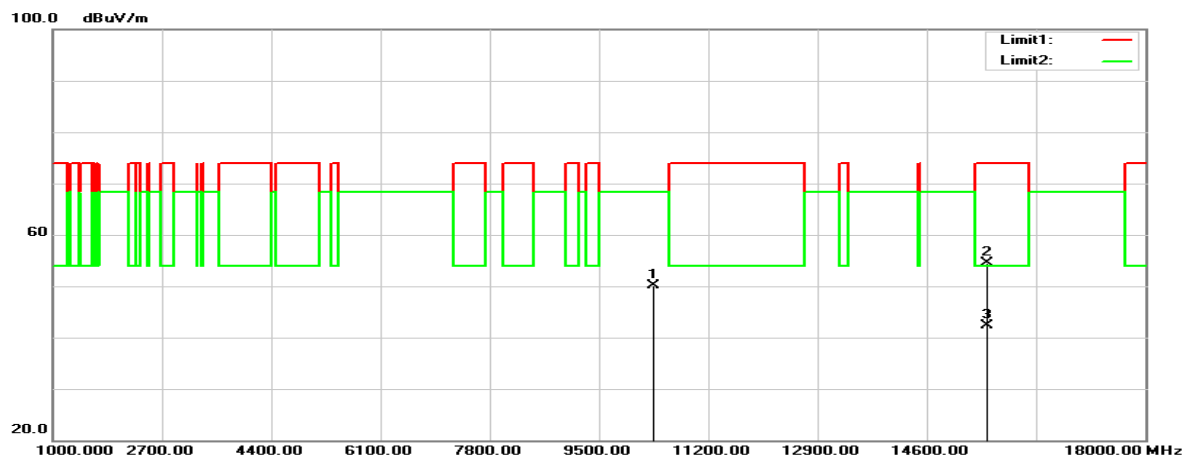
(Pre-scan with three orthogonal axis, and worse case as Z axis.)

Horizontal (worst case is 802.11n HT20 mode 5180MHz)

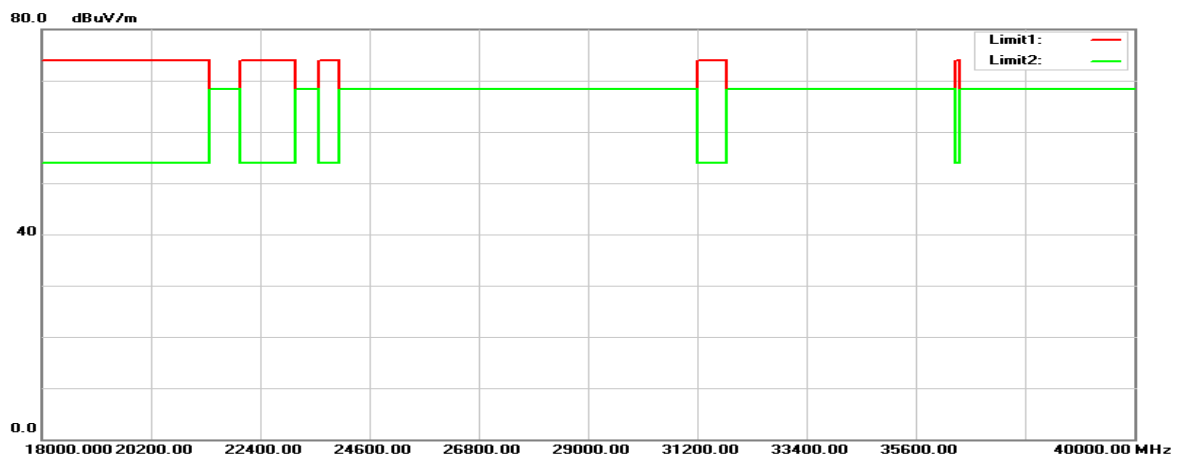
30MHz-1GHz:



1GHz-18GHz:



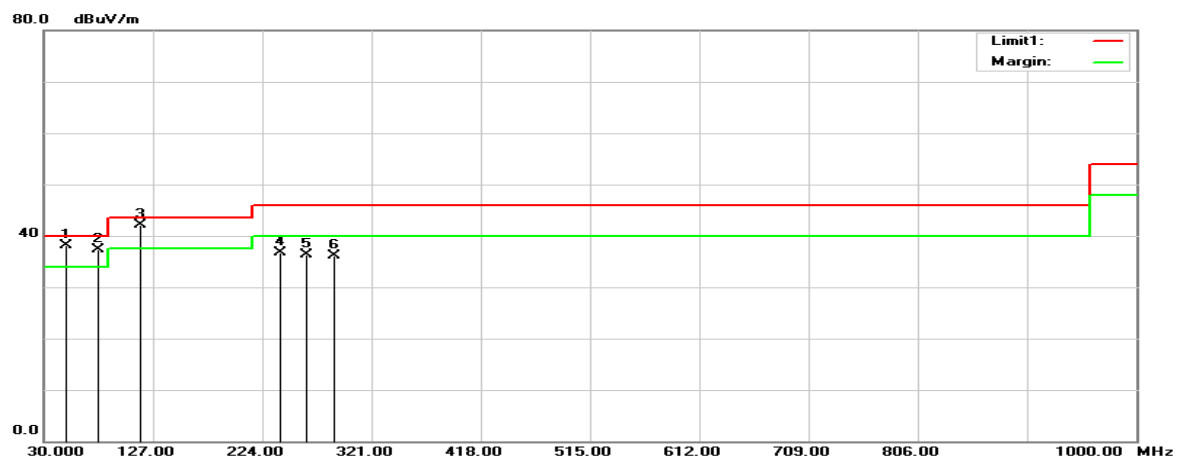
18GHz-40GHz:



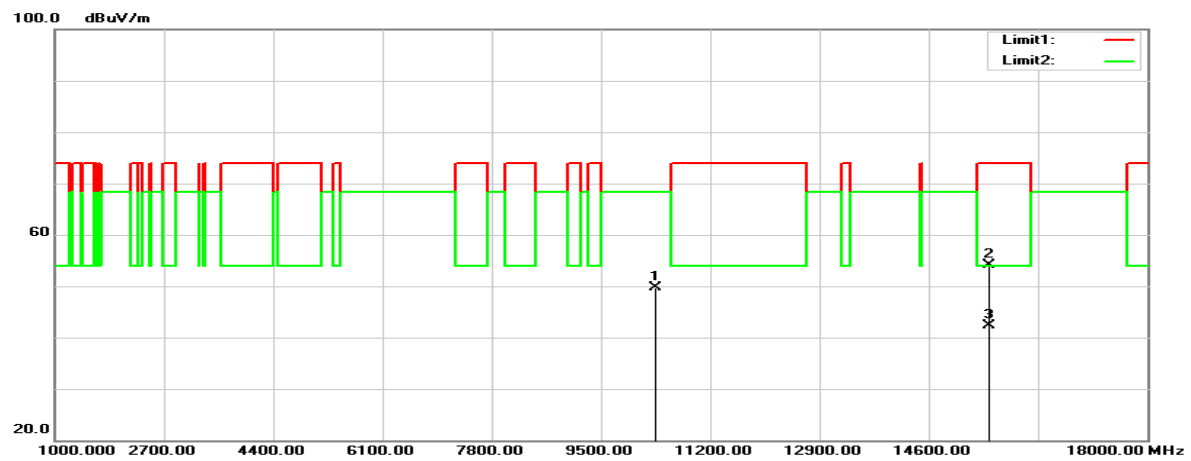
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Vertical (worst case is 802.11n HT20 mode 5180MHz)

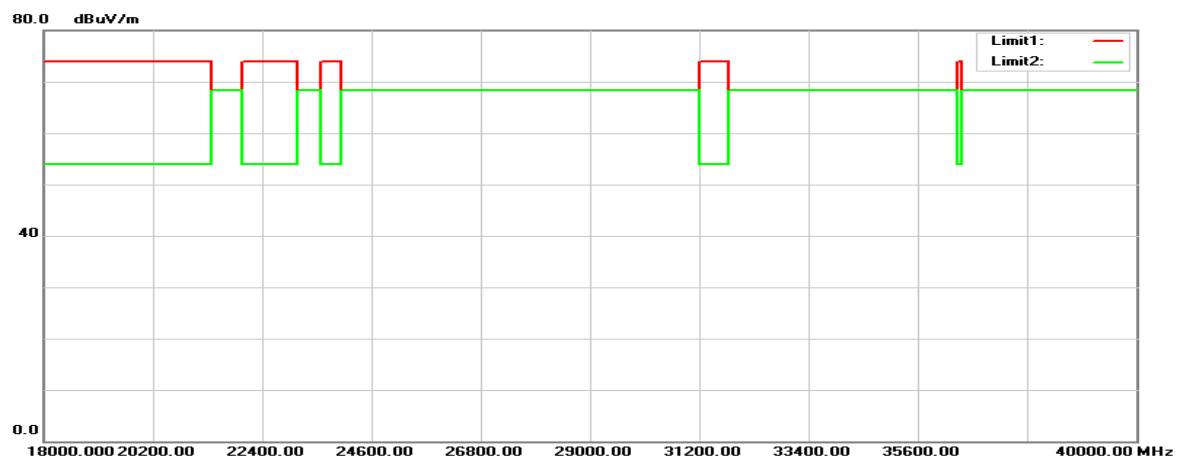
30MHz-1GHz:



1GHz-18GHz:



18GHz-40GHz:



Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

Below 1GHz**Horizontal**

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dB μ V)	Factor(dB/m)	(dB μ V/m)	(dB μ V/m)	(dB)	(cm)	(°)	
114.3900	48.46	-11.01	37.45	43.50	-6.05	100	70	peak
215.2700	55.60	-13.18	42.42	43.50	-1.08	100	131	QP
239.5200	56.21	-12.25	43.96	46.00	-2.04	100	111	QP
263.7700	55.67	-11.06	44.61	46.00	-1.39	100	106	QP
288.0200	53.96	-10.05	43.91	46.00	-2.09	100	58	QP
312.2700	51.71	-9.80	41.91	46.00	-4.09	100	50	peak

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dB μ V)	Factor(dB/m)	(dB μ V/m)	(dB μ V/m)	(dB)	(cm)	(°)	
50.3700	54.40	-16.25	38.15	40.00	-1.85	100	349	QP
78.5000	53.67	-16.42	37.25	40.00	-2.75	100	72	QP
116.3300	53.05	-10.92	42.13	43.50	-1.37	100	351	QP
239.5200	49.05	-12.25	36.80	46.00	-9.20	100	18	peak
263.7700	47.44	-11.06	36.38	46.00	-9.62	100	132	peak
288.0200	46.15	-10.05	36.10	46.00	-9.90	100	160	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

For UNII-1 Band I:**Above 1GHz****Horizontal**

Frequency (MHz)	Reading (dBμV)	Correct Factor(dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
a Mode, Low channel								
5109.400	55.90	-2.04	53.86	74.00	-20.14	124	293	peak
5109.400	42.82	-2.04	40.78	54.00	-13.22	124	293	AVG
5180.000	99.14	-2.29	96.85	N/A	N/A	124	293	peak
5180.000	89.52	-2.29	87.23	N/A	N/A	124	293	AVG
10360.000	42.04	7.11	49.15	68.20	-19.05	150	171	peak
15540.000	42.70	11.95	54.65	74.00	-19.35	150	359	peak
15540.000	30.22	11.95	42.17	54.00	-11.83	150	359	AVG
a Mode, Middle channel								
5125.200	56.86	-2.10	54.76	74.00	-19.24	116	294	peak
5125.200	42.95	-2.10	40.85	54.00	-13.15	116	294	AVG
5200.000	102.09	-2.37	99.72	N/A	N/A	116	294	peak
5200.000	92.54	-2.37	90.17	N/A	N/A	116	294	AVG
5403.600	56.36	-2.44	53.92	74.00	-20.08	116	294	peak
5403.600	42.70	-2.44	40.26	54.00	-13.74	116	294	AVG
10400.000	42.28	7.42	49.70	68.20	-18.50	150	126	peak
15600.000	43.78	11.63	55.41	74.00	-18.59	150	255	peak
15600.000	30.75	11.63	42.38	54.00	-11.62	150	255	AVG
a Mode, High channel								
5057.200	56.21	-2.28	53.93	74.00	-20.07	116	295	peak
5057.200	43.21	-2.28	40.93	54.00	-13.07	116	295	AVG
5240.000	102.89	-2.62	100.27	N/A	N/A	116	295	peak
5240.000	93.23	-2.62	90.61	N/A	N/A	116	295	AVG
5372.400	55.87	-2.51	53.36	74.00	-20.64	116	295	peak
5372.400	42.78	-2.51	40.27	54.00	-13.73	116	295	AVG
10480.000	42.31	7.98	50.29	68.20	-17.91	150	357	peak
15720.000	44.33	11.35	55.68	74.00	-18.32	150	74	peak
15720.000	32.16	11.35	43.51	54.00	-10.49	150	74	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBμV)	Correct Factor(dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
a Mode, Low channel								
5142.400	58.18	-2.15	56.03	74.00	-17.97	153	190	peak
5142.400	44.67	-2.15	42.52	54.00	-11.48	153	190	AVG
5180.000	107.13	-2.29	104.84	N/A	N/A	153	190	peak
5180.000	98.65	-2.29	96.36	N/A	N/A	153	190	AVG
10360.000	42.43	7.11	49.54	68.20	-18.66	150	181	peak
15540.000	43.06	11.95	55.01	74.00	-18.99	150	109	peak
15540.000	30.23	11.95	42.18	54.00	-11.82	150	109	AVG
a Mode, Middle channel								
5139.600	58.92	-2.16	56.76	74.00	-17.24	148	191	peak
5139.600	45.15	-2.16	42.99	54.00	-11.01	148	191	AVG
5200.000	109.53	-2.37	107.16	N/A	N/A	148	191	peak
5200.000	99.85	-2.37	97.48	N/A	N/A	148	191	AVG
5386.800	56.95	-2.45	54.50	74.00	-19.50	148	191	peak
5386.800	44.48	-2.45	42.03	54.00	-11.97	148	191	AVG
10400.000	42.19	7.42	49.61	68.20	-18.59	150	248	peak
15600.000	42.91	11.63	54.54	74.00	-19.46	150	148	peak
15600.000	30.73	11.63	42.36	54.00	-11.64	150	148	AVG
a Mode, High channel								
5119.600	57.89	-2.08	55.81	74.00	-18.19	165	192	peak
5119.600	44.54	-2.08	42.46	54.00	-11.54	165	192	AVG
5240.000	110.48	-2.62	107.86	N/A	N/A	165	192	peak
5240.000	100.29	-2.62	97.67	N/A	N/A	165	192	AVG
5373.200	59.56	-2.50	57.06	74.00	-16.94	165	192	peak
5373.200	46.31	-2.50	43.81	54.00	-10.19	165	192	AVG
10480.000	42.51	7.98	50.49	68.20	-17.71	150	52	peak
15720.000	45.00	11.35	56.35	74.00	-17.65	150	230	peak
15720.000	32.25	11.35	43.60	54.00	-10.40	150	230	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Horizontal

Frequency (MHz)	Reading (dBμV)	Correct Factor(dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N20 Mode, Low channel								
5146.600	56.98	-2.17	54.81	74.00	-19.19	108	295	peak
5146.600	43.34	-2.17	41.17	54.00	-12.83	108	295	AVG
5180.000	102.81	-2.29	100.52	N/A	N/A	108	295	peak
5180.000	92.23	-2.29	89.94	N/A	N/A	108	295	AVG
10360.000	43.08	7.11	50.19	68.20	-18.01	150	188	peak
15540.000	42.47	11.95	54.42	74.00	-19.58	150	279	peak
15540.000	30.36	11.95	42.31	54.00	-11.69	150	279	AVG
N20 Mode, Middle channel								
5065.200	56.78	-2.23	54.55	74.00	-19.45	101	295	peak
5065.200	43.09	-2.23	40.86	54.00	-13.14	101	295	AVG
5200.000	104.13	-2.37	101.76	N/A	N/A	101	295	peak
5200.000	93.53	-2.37	91.16	N/A	N/A	101	295	AVG
5408.400	56.21	-2.50	53.71	74.00	-20.29	101	295	peak
5408.400	42.74	-2.50	40.24	54.00	-13.76	101	295	AVG
10400.000	42.69	7.42	50.11	68.20	-18.09	150	40	peak
15600.000	43.63	11.63	55.26	74.00	-18.74	150	258	peak
15600.000	30.80	11.63	42.43	54.00	-11.57	150	258	AVG
N20 Mode, High channel								
5113.200	56.03	-2.06	53.97	74.00	-20.03	101	296	peak
5113.200	42.89	-2.06	40.83	54.00	-13.17	101	296	AVG
5240.000	103.43	-2.62	100.81	N/A	N/A	101	296	peak
5240.000	93.95	-2.62	91.33	N/A	N/A	101	296	AVG
5366.800	56.38	-2.53	53.85	74.00	-20.15	101	296	peak
5366.800	43.16	-2.53	40.63	54.00	-13.37	101	296	AVG
10480.000	41.91	7.98	49.89	68.20	-18.31	150	37	peak
15720.000	45.14	11.35	56.49	74.00	-17.51	150	296	peak
15720.000	32.25	11.35	43.60	54.00	-10.40	150	296	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBμV)	Correct Factor(dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N20 Mode, Low channel								
5146.600	62.76	-2.17	60.59	74.00	-13.41	173	189	peak
5146.600	46.00	-2.17	43.83	54.00	-10.17	173	189	AVG
5180.000	110.58	-2.29	108.29	N/A	N/A	173	189	peak
5180.000	100.04	-2.29	97.75	N/A	N/A	173	189	AVG
10360.000	42.59	7.11	49.70	68.20	-18.50	150	359	peak
15540.000	42.21	11.95	54.16	74.00	-19.84	150	16	peak
15540.000	30.38	11.95	42.33	54.00	-11.67	150	16	AVG
N20 Mode, Middle channel								
5090.000	57.77	-2.07	55.70	74.00	-18.30	176	180	peak
5090.000	44.92	-2.07	42.85	54.00	-11.15	176	180	AVG
5200.000	109.31	-2.37	106.94	N/A	N/A	176	180	peak
5200.000	99.75	-2.37	97.38	N/A	N/A	176	180	AVG
5367.600	57.75	-2.53	55.22	74.00	-18.78	176	180	peak
5367.600	44.43	-2.53	41.90	54.00	-12.10	176	180	AVG
10400.000	41.66	7.42	49.08	68.20	-19.12	150	349	peak
15600.000	43.33	11.63	54.96	74.00	-19.04	150	281	peak
15600.000	30.77	11.63	42.40	54.00	-11.60	150	281	AVG
N20 Mode, High channel								
5133.200	57.15	-2.13	55.02	74.00	-18.98	150	189	peak
5133.200	44.44	-2.13	42.31	54.00	-11.69	150	189	AVG
5240.000	109.22	-2.62	106.60	N/A	N/A	150	189	peak
5240.000	99.61	-2.62	96.99	N/A	N/A	150	189	AVG
5358.800	58.63	-2.57	56.06	74.00	-17.94	150	189	peak
5358.800	46.51	-2.57	43.94	54.00	-10.06	150	189	AVG
10480.000	41.96	7.98	49.94	68.20	-18.26	150	261	peak
15720.000	44.11	11.35	55.46	74.00	-18.54	150	161	peak
15720.000	32.30	11.35	43.65	54.00	-10.35	150	161	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Horizontal

Frequency (MHz)	Reading (dBμV)	Correct Factor(dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N40 Mode, Low channel								
5148.560	58.83	-2.18	56.65	74.00	-17.35	100	298	peak
5148.560	44.22	-2.18	42.04	54.00	-11.96	100	298	AVG
5190.000	99.62	-2.33	97.29	N/A	N/A	100	298	peak
5190.000	89.22	-2.33	86.89	N/A	N/A	100	298	AVG
10380.000	42.54	7.27	49.81	68.20	-18.39	150	1	peak
15570.000	42.38	11.79	54.17	74.00	-19.83	150	321	peak
15570.000	30.19	11.79	41.98	54.00	-12.02	150	321	AVG
N40 Mode, High channel								
5101.200	56.13	-2.01	54.12	74.00	-19.88	102	297	peak
5101.200	43.00	-2.01	40.99	54.00	-13.01	102	297	AVG
5230.000	100.01	-2.56	97.45	N/A	N/A	102	297	peak
5230.000	90.18	-2.56	87.62	N/A	N/A	102	297	AVG
5434.000	56.32	-2.80	53.52	74.00	-20.48	102	297	peak
5434.000	43.13	-2.80	40.33	54.00	-13.67	102	297	AVG
10460.000	42.82	7.84	50.66	68.20	-17.54	150	300	peak
15690.000	44.96	11.33	56.29	74.00	-17.71	150	322	peak
15690.000	32.05	11.33	43.38	54.00	-10.62	150	322	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBμV)	Correct Factor(dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N40 Mode, Low channel								
5148.560	69.40	-2.18	67.22	74.00	-6.78	169	190	peak
5148.560	47.84	-2.18	45.66	54.00	-8.34	169	190	AVG
5190.000	106.22	-2.33	103.89	N/A	N/A	169	190	peak
5190.000	96.37	-2.33	94.04	N/A	N/A	169	190	AVG
10380.000	42.21	7.27	49.48	68.20	-18.72	150	112	peak
15570.000	42.51	11.79	54.30	74.00	-19.70	150	311	peak
15570.000	30.21	11.79	42.00	54.00	-12.00	150	311	AVG
N40 Mode, High channel								
5134.000	57.88	-2.13	55.75	74.00	-18.25	161	192	peak
5134.000	44.63	-2.13	42.50	54.00	-11.50	161	192	AVG
5230.000	108.31	-2.56	105.75	N/A	N/A	161	192	peak
5230.000	98.45	-2.56	95.89	N/A	N/A	161	192	AVG
5377.200	58.16	-2.49	55.67	74.00	-18.33	161	192	peak
5377.200	46.00	-2.49	43.51	54.00	-10.49	161	192	AVG
10460.000	42.64	7.84	50.48	68.20	-17.72	150	104	peak
15690.000	45.08	11.33	56.41	74.00	-17.59	150	207	peak
15690.000	32.18	11.33	43.51	54.00	-10.49	150	207	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

For UNII-3 Band IV:**Above 1GHz****Horizontal**

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
a Mode, Low channel								
5620.080	55.79	-2.75	53.04	68.20	-15.16	122	296	peak
5659.680	55.93	-2.70	53.23	75.36	-22.13	122	296	peak
5719.440	55.84	-2.67	53.17	110.64	-57.47	122	296	peak
5724.480	63.34	-2.67	60.67	121.01	-60.34	122	296	peak
5745.000	98.20	-2.70	95.50	N/A	N/A	122	296	peak
5745.000	88.22	-2.70	85.52	N/A	N/A	122	296	AVG
5851.200	55.48	-2.16	53.32	119.46	-66.14	122	296	peak
5871.360	54.73	-1.96	52.77	106.22	-53.45	122	296	peak
5918.880	56.19	-1.65	54.54	72.73	-18.19	122	296	peak
5944.800	56.01	-1.72	54.29	68.20	-13.91	122	296	peak
11490.000	47.53	8.87	56.40	74.00	-17.60	162	130	peak
11490.000	34.09	8.87	42.96	54.00	-11.04	162	130	AVG
17235.000	42.82	13.63	56.45	68.20	-11.75	150	109	peak
a Mode, Middle channel								
5638.080	55.37	-2.72	52.65	68.20	-15.55	122	297	peak
5687.760	55.36	-2.66	52.70	96.14	-43.44	122	297	peak
5710.800	55.47	-2.65	52.82	108.22	-55.40	122	297	peak
5723.760	55.06	-2.67	52.39	119.37	-66.98	122	297	peak
5785.000	94.30	-2.67	91.63	N/A	N/A	122	297	peak
5785.000	84.59	-2.67	81.92	N/A	N/A	122	297	AVG
5854.800	54.93	-2.13	52.80	111.26	-58.46	122	297	peak
5856.240	56.30	-2.11	54.19	110.45	-56.26	122	297	peak
5893.680	55.66	-1.76	53.90	91.38	-37.48	122	297	peak
5925.360	56.09	-1.67	54.42	68.20	-13.78	122	297	peak
11570.000	47.00	9.41	56.41	74.00	-17.59	162	79	peak
11570.000	33.55	9.41	42.96	54.00	-11.04	162	79	AVG
17355.000	41.97	13.67	55.64	68.20	-12.56	150	333	peak
a Mode, High channel								
5646.000	55.36	-2.71	52.65	68.20	-15.55	115	306	peak
5658.960	55.75	-2.70	53.05	74.83	-21.78	115	306	peak
5718.720	55.65	-2.67	52.98	110.44	-57.46	115	306	peak
5724.480	55.03	-2.67	52.36	121.01	-68.65	115	306	peak
5825.000	93.50	-2.42	91.08	N/A	N/A	115	306	peak
5825.000	83.50	-2.42	81.08	N/A	N/A	115	306	AVG
5850.480	55.16	-2.17	52.99	121.11	-68.12	115	306	peak
5856.240	56.06	-2.11	53.95	110.45	-56.50	115	306	peak
5921.760	56.10	-1.66	54.44	70.60	-16.16	115	306	peak
5949.840	55.22	-1.73	53.49	68.20	-14.71	115	306	peak
11650.000	45.48	9.34	54.82	74.00	-19.18	150	182	peak
11650.000	31.57	9.34	40.91	54.00	-13.09	150	182	AVG
17475.000	43.29	13.14	56.43	68.20	-11.77	150	147	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

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(New Taipei Laboratory)

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
a Mode, Low channel								
5645.280	60.69	-2.71	57.98	68.20	-10.22	153	176	peak
5689.200	61.80	-2.66	59.14	97.21	-38.07	153	176	peak
5719.440	74.25	-2.67	71.58	110.64	-39.06	153	176	peak
5724.480	82.01	-2.67	79.34	121.01	-41.67	153	176	peak
5745.000	113.67	-2.70	110.97	N/A	N/A	153	176	peak
5745.000	103.61	-2.70	100.91	N/A	N/A	153	176	AVG
5853.360	57.29	-2.14	55.15	114.54	-59.39	153	176	peak
5862.720	57.31	-2.05	55.26	108.64	-53.38	153	176	peak
5894.400	57.13	-1.75	55.38	90.84	-35.46	153	176	peak
5935.440	56.08	-1.69	54.39	68.20	-13.81	153	176	peak
11490.000	45.73	8.87	54.60	74.00	-19.40	150	341	peak
11490.000	33.22	8.87	42.09	54.00	-11.91	150	341	AVG
17235.000	42.42	13.63	56.05	68.20	-12.15	150	343	peak
a Mode, Middle channel								
5640.240	60.14	-2.72	57.42	68.20	-10.78	154	173	peak
5697.120	61.37	-2.64	58.73	103.07	-44.34	154	173	peak
5702.880	60.80	-2.65	58.15	106.01	-47.86	154	173	peak
5720.880	59.53	-2.66	56.87	112.81	-55.94	154	173	peak
5785.000	112.39	-2.67	109.72	N/A	N/A	154	173	peak
5785.000	102.67	-2.67	100.00	N/A	N/A	154	173	AVG
5852.640	60.35	-2.15	58.20	116.18	-57.98	154	173	peak
5858.400	59.64	-2.10	57.54	109.85	-52.31	154	173	peak
5876.400	58.41	-1.92	56.49	104.16	-47.67	154	173	peak
5940.480	56.68	-1.71	54.97	68.20	-13.23	154	173	peak
11570.000	49.36	9.41	58.77	74.00	-15.23	155	172	peak
11570.000	34.48	9.41	43.89	54.00	-10.11	155	172	AVG
17355.000	42.06	13.67	55.73	68.20	-12.47	150	201	peak
a Mode, High channel								
5636.640	59.24	-2.72	56.52	68.20	-11.68	143	177	peak
5670.480	61.49	-2.68	58.81	83.36	-24.55	143	177	peak
5712.240	61.67	-2.65	59.02	108.63	-49.61	143	177	peak
5720.160	60.77	-2.67	58.10	111.16	-53.06	143	177	peak
5825.000	112.02	-2.42	109.60	N/A	N/A	143	177	peak
5825.000	102.07	-2.42	99.65	N/A	N/A	143	177	AVG
5851.200	65.55	-2.16	63.39	119.46	-56.07	143	177	peak
5856.240	63.79	-2.11	61.68	110.45	-48.77	143	177	peak
5913.120	58.79	-1.63	57.16	76.99	-19.83	143	177	peak
5926.800	57.55	-1.66	55.89	68.20	-12.31	143	177	peak
11650.000	48.10	9.34	57.44	74.00	-16.56	150	181	peak
11650.000	33.30	9.34	42.64	54.00	-11.36	150	181	AVG
17475.000	42.07	13.14	55.21	68.20	-12.99	150	103	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

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(New Taipei Laboratory)

Horizontal

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
N20 Mode, Low channel								
5638.080	55.26	-2.72	52.54	68.20	-15.66	121	296	peak
5691.360	55.52	-2.65	52.87	98.81	-45.94	121	296	peak
5718.000	56.20	-2.67	53.53	110.24	-56.71	121	296	peak
5724.480	63.92	-2.67	61.25	121.01	-59.76	121	296	peak
5745.000	97.68	-2.70	94.98	N/A	N/A	121	296	peak
5745.000	87.87	-2.70	85.17	N/A	N/A	121	296	AVG
5850.480	54.79	-2.17	52.62	121.11	-68.49	121	296	peak
5874.240	56.48	-1.94	54.54	105.41	-50.87	121	296	peak
5913.840	55.60	-1.64	53.96	76.46	-22.50	121	296	peak
5944.080	55.70	-1.72	53.98	68.20	-14.22	121	296	peak
11490.000	45.17	8.87	54.04	74.00	-19.96	152	3	peak
11490.000	31.69	8.87	40.56	54.00	-13.44	152	3	AVG
17235.000	43.23	13.63	56.86	68.20	-11.34	150	339	peak
N20 Mode, Middle channel								
5647.440	56.10	-2.71	53.39	68.20	-14.81	114	297	peak
5697.840	55.48	-2.64	52.84	103.60	-50.76	114	297	peak
5716.560	54.98	-2.66	52.32	109.84	-57.52	114	297	peak
5721.600	54.79	-2.66	52.13	114.45	-62.32	114	297	peak
5785.000	95.40	-2.67	92.73	N/A	N/A	114	297	peak
5785.000	85.86	-2.67	83.19	N/A	N/A	114	297	AVG
5850.480	54.85	-2.17	52.68	121.11	-68.43	114	297	peak
5868.480	55.41	-1.99	53.42	107.03	-53.61	114	297	peak
5917.440	55.35	-1.65	53.70	73.79	-20.09	114	297	peak
5929.680	55.55	-1.68	53.87	68.20	-14.33	114	297	peak
11570.000	46.55	9.41	55.96	74.00	-18.04	150	331	peak
11570.000	33.19	9.41	42.60	54.00	-11.40	150	331	AVG
17355.000	42.25	13.67	55.92	68.20	-12.28	150	32	peak
N20 Mode, High channel								
5643.840	55.23	-2.72	52.51	68.20	-15.69	136	308	peak
5671.200	55.51	-2.68	52.83	83.89	-31.06	136	308	peak
5709.360	55.55	-2.66	52.89	107.82	-54.93	136	308	peak
5724.480	54.13	-2.67	51.46	121.01	-69.55	136	308	peak
5825.000	95.84	-2.42	93.42	N/A	N/A	136	308	peak
5825.000	85.43	-2.42	83.01	N/A	N/A	136	308	AVG
5851.200	55.86	-2.16	53.70	119.46	-65.76	136	308	peak
5871.360	55.34	-1.96	53.38	106.22	-52.84	136	308	peak
5911.680	56.06	-1.64	54.42	78.06	-23.64	136	308	peak
5941.920	55.51	-1.71	53.80	68.20	-14.40	136	308	peak
11650.000	46.71	9.34	56.05	74.00	-17.95	148	19	peak
11650.000	34.25	9.34	43.59	54.00	-10.41	148	19	AVG
17475.000	41.80	13.14	54.94	68.20	-13.26	150	151	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

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(New Taipei Laboratory)

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
N20 Mode, Low channel								
5645.280	59.77	-2.71	57.06	68.20	-11.14	156	175	peak
5697.840	60.99	-2.64	58.35	103.60	-45.25	156	175	peak
5719.440	71.56	-2.67	68.89	110.64	-41.75	156	175	peak
5724.480	83.22	-2.67	80.55	121.01	-40.46	156	175	peak
5745.000	112.73	-2.70	110.03	N/A	N/A	156	175	peak
5745.000	103.01	-2.70	100.31	N/A	N/A	156	175	AVG
5852.640	57.68	-2.15	55.53	116.18	-60.65	156	175	peak
5855.520	57.67	-2.13	55.54	110.65	-55.11	156	175	peak
5896.560	57.26	-1.73	55.53	89.25	-33.72	156	175	peak
5926.800	55.85	-1.66	54.19	68.20	-14.01	156	175	peak
11490.000	46.37	8.87	55.24	74.00	-18.76	150	19	peak
11490.000	32.14	8.87	41.01	54.00	-12.99	150	19	AVG
17235.000	42.64	13.63	56.27	68.20	-11.93	150	172	peak
N20 Mode, Middle channel								
5647.440	59.72	-2.71	57.01	68.20	-11.19	154	173	peak
5690.640	60.57	-2.66	57.91	98.27	-40.36	154	173	peak
5709.360	61.23	-2.66	58.57	107.82	-49.25	154	173	peak
5724.480	60.70	-2.67	58.03	121.01	-62.98	154	173	peak
5785.000	112.34	-2.67	109.67	N/A	N/A	154	173	peak
5785.000	102.45	-2.67	99.78	N/A	N/A	154	173	AVG
5853.360	59.18	-2.14	57.04	114.54	-57.50	154	173	peak
5863.440	59.40	-2.05	57.35	108.44	-51.09	154	173	peak
5904.480	58.45	-1.62	56.83	83.38	-26.55	154	173	peak
5939.040	56.47	-1.70	54.77	68.20	-13.43	154	173	peak
11570.000	51.33	9.41	60.74	74.00	-13.26	155	31	peak
11570.000	36.93	9.41	46.34	54.00	-7.66	155	31	AVG
17355.000	42.24	13.67	55.91	68.20	-12.29	150	276	peak
N20 Mode, High channel								
5639.520	58.90	-2.72	56.18	68.20	-12.02	127	174	peak
5682.000	60.17	-2.67	57.50	91.88	-34.38	127	174	peak
5719.440	59.85	-2.67	57.18	110.64	-53.46	127	174	peak
5723.040	60.75	-2.67	58.08	117.73	-59.65	127	174	peak
5825.000	111.75	-2.42	109.33	N/A	N/A	127	174	peak
5825.000	101.83	-2.42	99.41	N/A	N/A	127	174	AVG
5854.080	65.70	-2.14	63.56	112.90	-49.34	127	174	peak
5855.520	65.36	-2.13	63.23	110.65	-47.42	127	174	peak
5912.400	59.68	-1.63	58.05	77.52	-19.47	127	174	peak
5927.520	57.60	-1.66	55.94	68.20	-12.26	127	174	peak
11650.000	45.63	9.34	54.97	74.00	-19.03	150	22	peak
11650.000	31.52	9.34	40.86	54.00	-13.14	150	22	AVG
17475.000	41.57	13.14	54.71	68.20	-13.49	150	120	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

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(New Taipei Laboratory)

Horizontal

Frequency (MHz)	Reading (dBμV)	Correct Factor(dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N40 Mode, Low channel								
5649.600	54.89	-2.71	52.18	68.20	-16.02	115	310	peak
5658.960	55.27	-2.70	52.57	74.83	-22.26	115	310	peak
5716.560	59.38	-2.66	56.72	109.84	-53.12	115	310	peak
5722.320	57.29	-2.66	54.63	116.09	-61.46	115	310	peak
5755.000	91.19	-2.69	88.50	N/A	N/A	115	310	peak
5755.000	81.15	-2.69	78.46	N/A	N/A	115	310	AVG
5854.800	55.35	-2.13	53.22	111.26	-58.04	115	310	peak
5856.240	55.08	-2.11	52.97	110.45	-57.48	115	310	peak
5914.560	55.75	-1.64	54.11	75.93	-21.82	115	310	peak
5934.720	54.94	-1.69	53.25	68.20	-14.95	115	310	peak
11510.000	44.60	9.01	53.61	74.00	-20.39	150	243	peak
11510.000	33.54	9.01	42.55	54.00	-11.45	150	243	AVG
17265.000	42.57	13.67	56.24	68.20	-11.96	150	298	peak
N40 Mode, High channel								
5633.760	55.43	-2.73	52.70	68.20	-15.50	104	297	peak
5674.800	55.59	-2.68	52.91	86.55	-33.64	104	297	peak
5700.000	55.49	-2.64	52.85	105.20	-52.35	104	297	peak
5722.320	54.48	-2.66	51.82	116.09	-64.27	104	297	peak
5795.000	95.13	-2.66	92.47	N/A	N/A	104	297	peak
5795.000	84.92	-2.66	82.26	N/A	N/A	104	297	AVG
5851.200	55.40	-2.16	53.24	119.46	-66.22	104	297	peak
5858.400	56.27	-2.10	54.17	109.85	-55.68	104	297	peak
5900.160	56.42	-1.69	54.73	86.58	-31.85	104	297	peak
5948.400	55.55	-1.73	53.82	68.20	-14.38	104	297	peak
11590.000	44.87	9.55	54.42	74.00	-19.58	150	263	peak
11590.000	30.95	9.55	40.50	54.00	-13.50	150	263	AVG
17385.000	42.41	13.63	56.04	68.20	-12.16	150	1	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
N40 Mode, Low channel								
5640.960	57.35	-2.72	54.63	68.20	-13.57	110	281	peak
5694.960	63.16	-2.65	60.51	101.47	-40.96	110	281	peak
5719.440	77.87	-2.67	75.20	110.64	-35.44	110	281	peak
5723.760	79.74	-2.67	77.07	119.37	-42.30	110	281	peak
5755.000	107.51	-2.69	104.82	N/A	N/A	110	281	peak
5755.000	97.63	-2.69	94.94	N/A	N/A	110	281	AVG
5850.480	57.21	-2.17	55.04	121.11	-66.07	110	281	peak
5867.760	57.52	-2.00	55.52	107.23	-51.71	110	281	peak
5889.360	56.98	-1.80	55.18	94.57	-39.39	110	281	peak
5941.200	55.91	-1.70	54.21	68.20	-13.99	110	281	peak
11510.000	46.68	9.01	55.69	74.00	-18.31	150	33	peak
11510.000	33.28	9.01	42.29	54.00	-11.71	150	33	AVG
17265.000	42.68	13.67	56.35	68.20	-11.85	150	106	peak
N40 Mode, High channel								
5639.520	58.71	-2.72	55.99	68.20	-12.21	100	301	peak
5691.360	60.92	-2.65	58.27	98.81	-40.54	100	301	peak
5705.760	60.84	-2.65	58.19	106.81	-48.62	100	301	peak
5723.040	60.22	-2.67	57.55	117.73	-60.18	100	301	peak
5795.000	108.91	-2.66	106.25	N/A	N/A	100	301	peak
5795.000	99.09	-2.66	96.43	N/A	N/A	100	301	AVG
5852.640	61.66	-2.15	59.51	116.18	-56.67	100	301	peak
5860.560	60.58	-2.08	58.50	109.24	-50.74	100	301	peak
5886.480	59.06	-1.82	57.24	96.70	-39.46	100	301	peak
5936.160	56.94	-1.69	55.25	68.20	-12.95	100	301	peak
11590.000	46.23	9.55	55.78	74.00	-18.22	156	22	peak
11590.000	32.11	9.55	41.66	54.00	-12.34	156	22	AVG
17385.000	41.90	13.63	55.53	68.20	-12.67	150	314	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

9 FCC §15.407(a)(e) – Emission Bandwidth And Occupied Bandwidth

9.1 Applicable Standard

As per FCC §15.407(a): 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.

As per FCC §15.407(e): for equipment operating in the band 5725 – 5850 MHz, the minimum 6 dB bandwidth of U-NII devices shall be 500 kHz.

9.2 Test Procedure

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%.

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 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ 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.

9.3 Test Results

Test mode: Transmitting

UNII Band	Mode	Channel	Frequency (MHz)	26dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)
UNII-1	802.11a	36	5180	20.12	16.46
		40	5200	20.20	16.46
		48	5240	20.32	16.46
	802.11n HT20	36	5180	20.52	17.62
		40	5200	20.48	17.58
		48	5240	20.48	17.58
	802.11n HT40	38	5190	40.88	36.04
		46	5230	40.88	35.96

UNII Band	Mode	Channel	Frequency (MHz)	6dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (kHz)	Result
UNII-3 Band IV	802.11a	149	5745	16.32	16.70	≥500	PASS
		157	5785	16.32	16.54	≥500	PASS
		165	5825	16.32	16.50	≥500	PASS
	802.11n HT20	149	5745	17.60	16.45	≥500	PASS
		157	5785	17.60	16.50	≥500	PASS
		165	5825	17.56	17.74	≥500	PASS
	802.11n HT40	151	5755	36.08	38.68	≥500	PASS
		159	5795	36.08	36.20	≥500	PASS

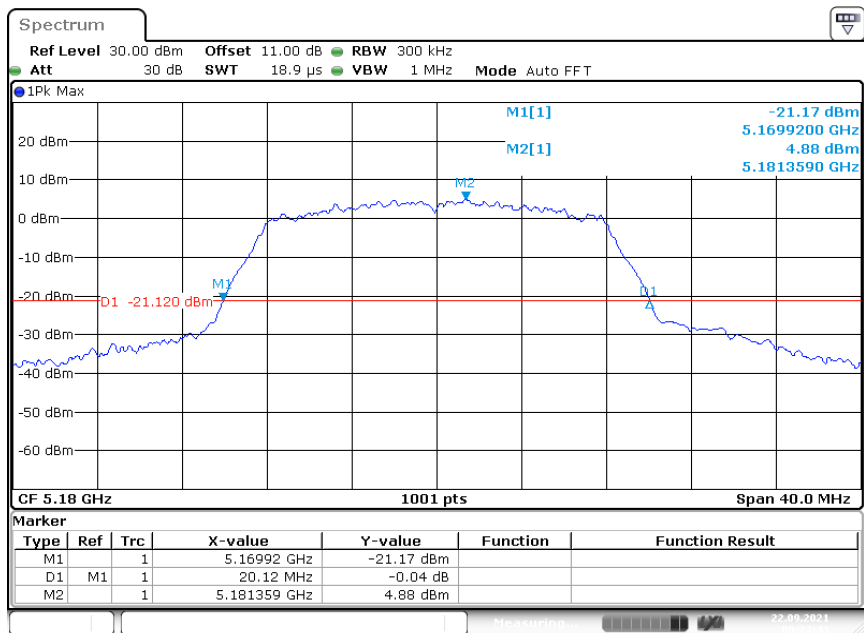
Please refer to the following plots

Transmitting Mode:

UNII-1 Band I / BW 26dBc

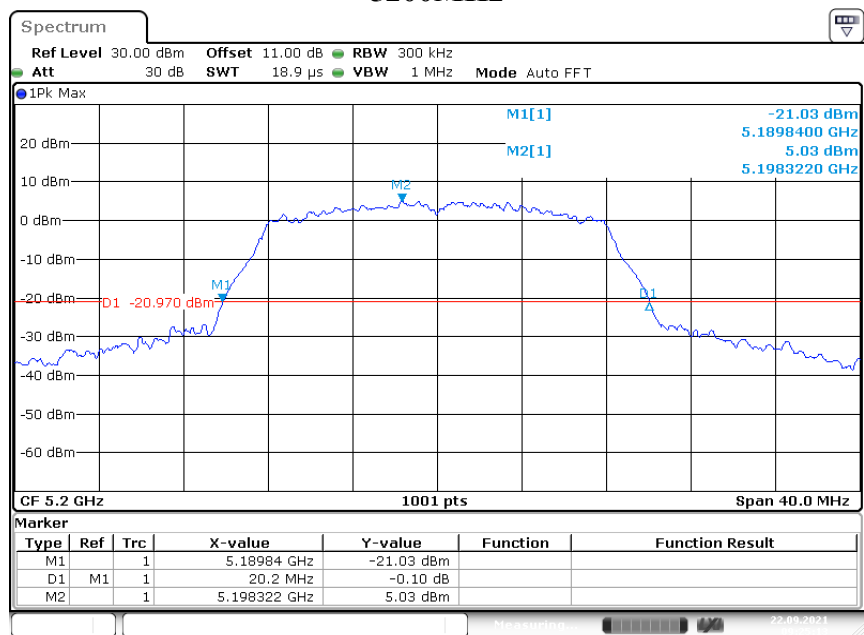
IEEE 802.11a Mode / 5150 ~ 5250MHz

5180MHz



Date: 22.SEP.2021 09:23:43

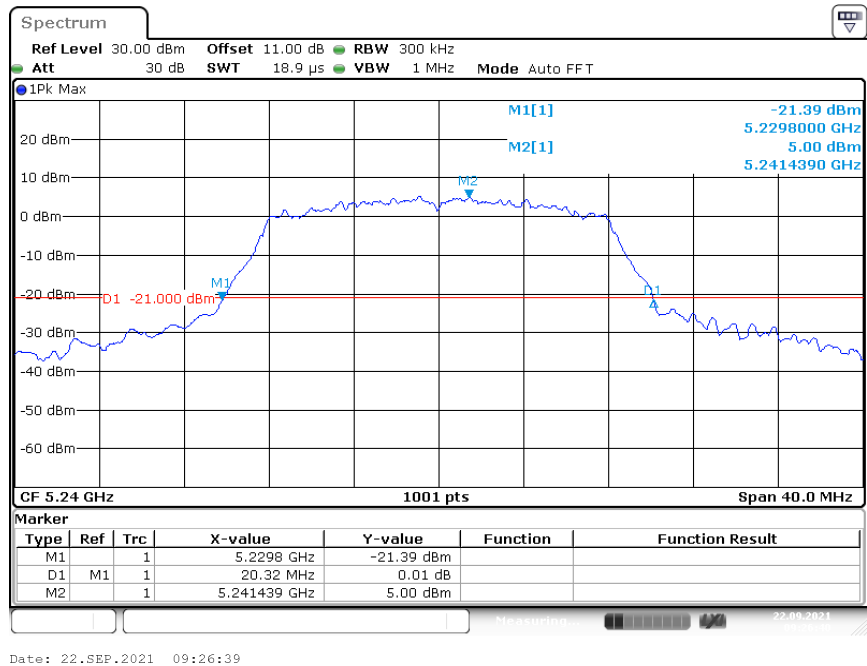
5200MHz



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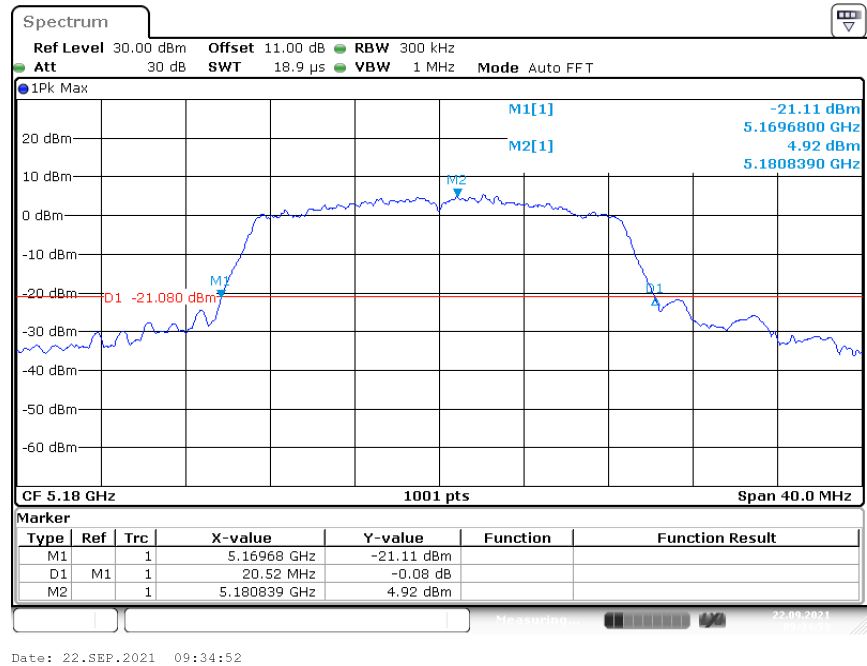
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5240MHz

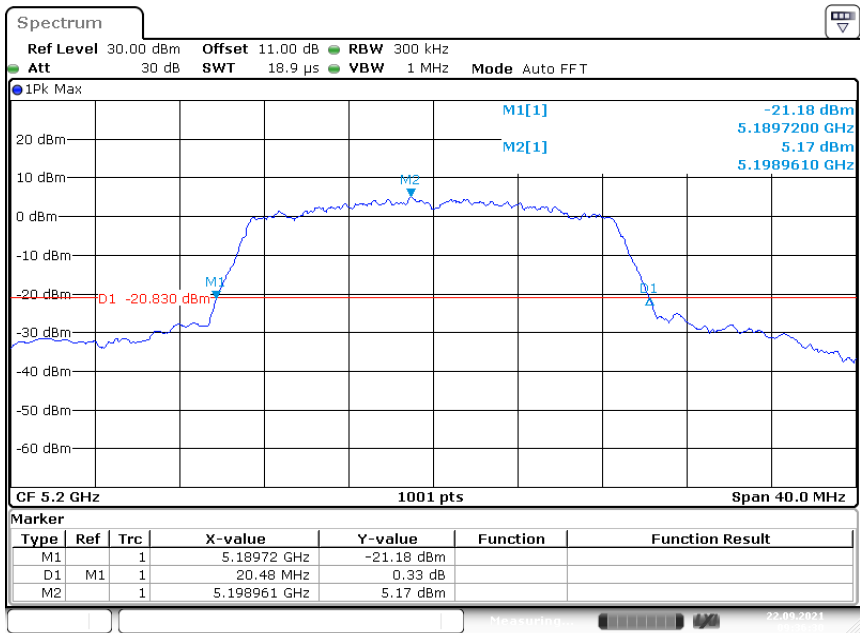


IEEE 802.11n HT20 Mode / 5150 ~ 5250MHz

5180MHz

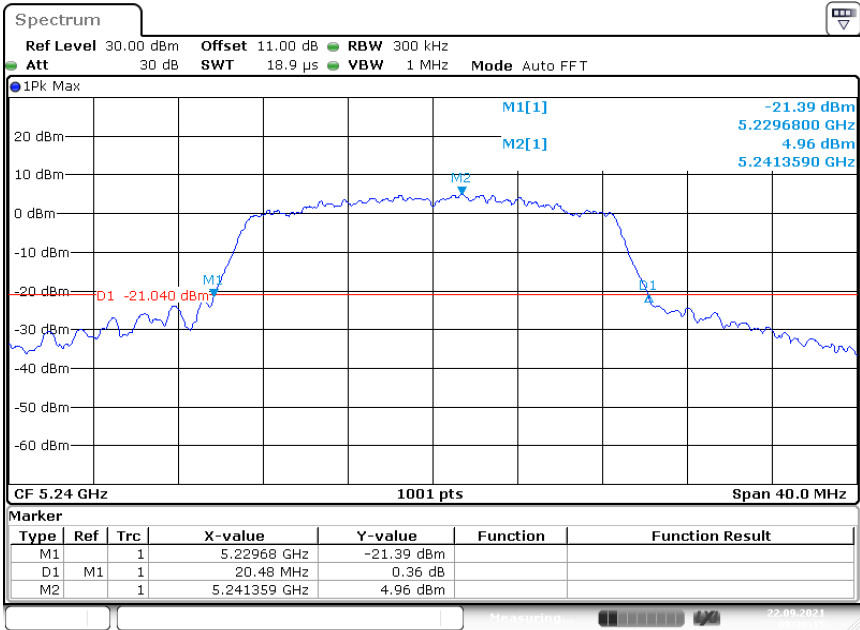


5200MHz



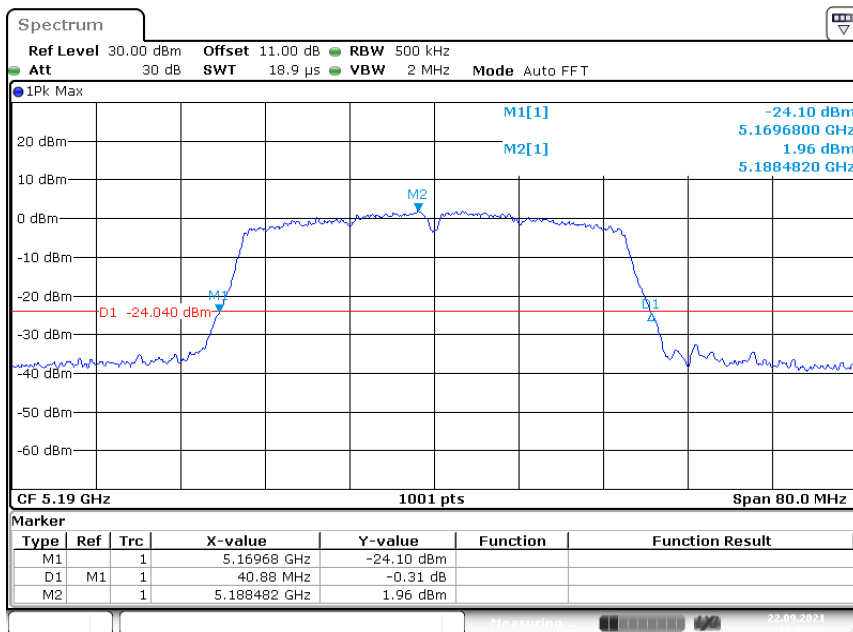
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5240MHz

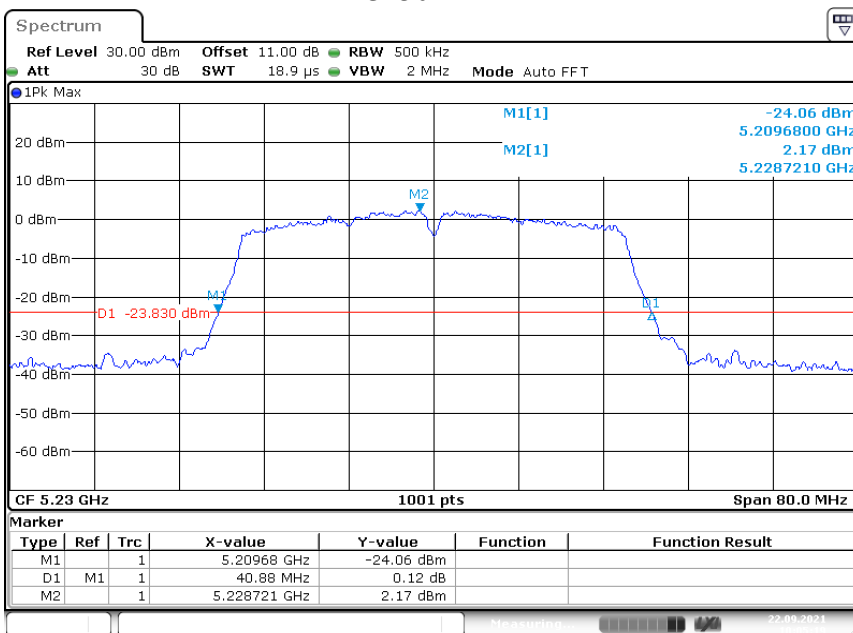


Date: 22.SEP.2021 09:38:15

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IEEE 802.11n HT40 Mode / 5150 ~ 5250MHz
5190MHz

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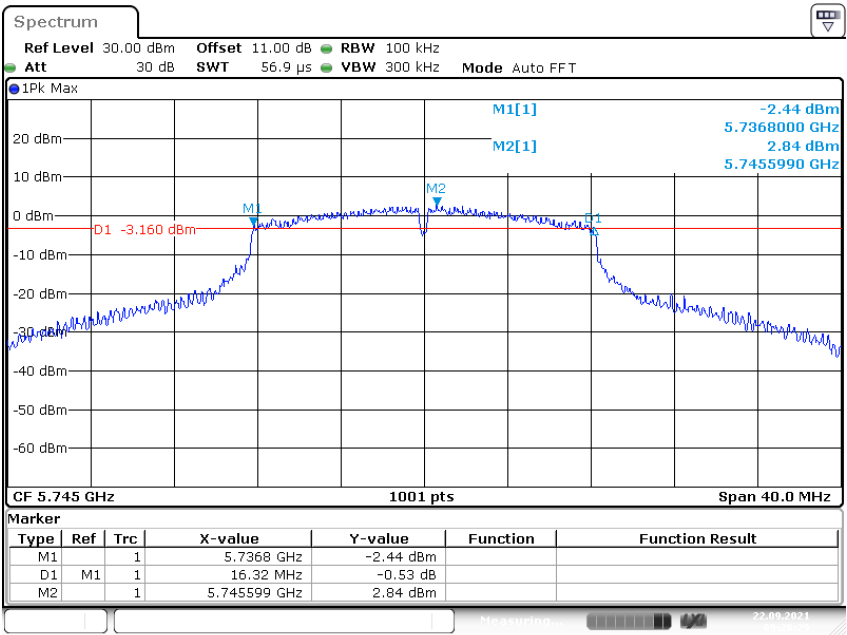
5230MHz

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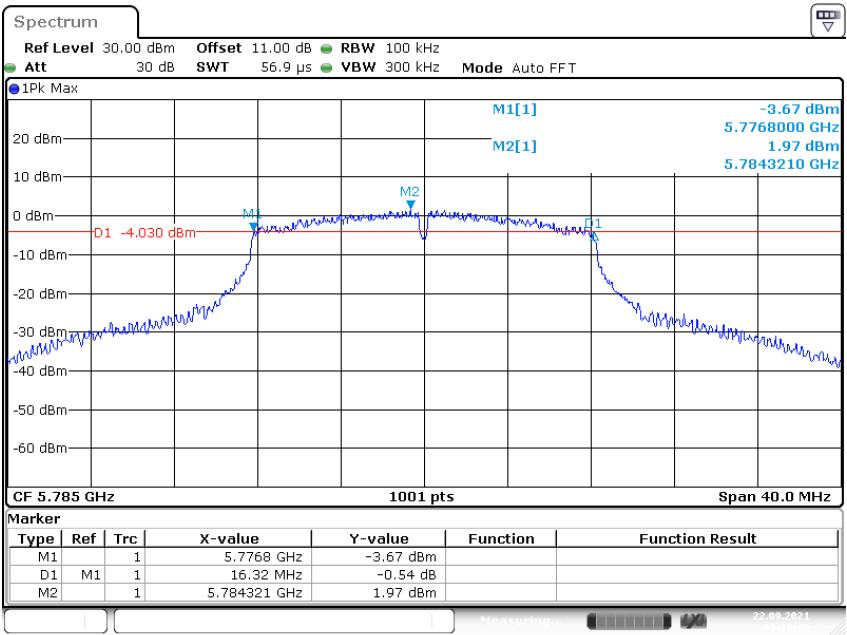
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UNII-3 Band IV / BW 6dBc
IEEE 802.11a Mode / 5725 ~ 5850MHz

5745MHz

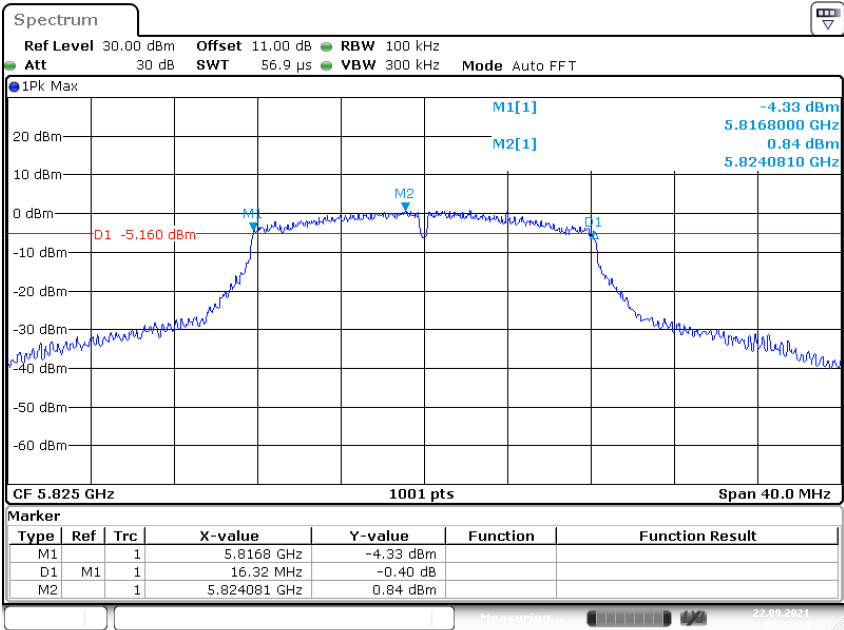


5785MHz



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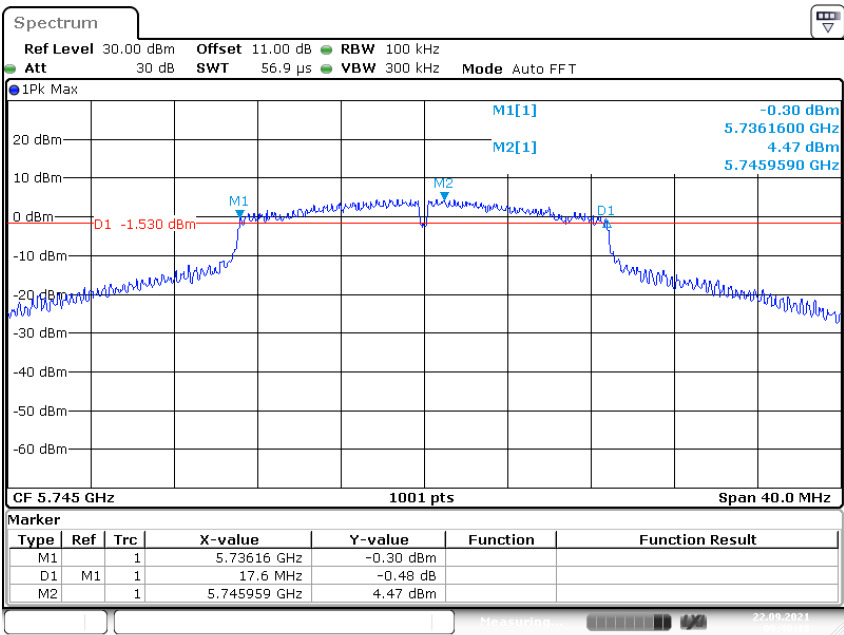
5825MHz



Date: 22.SEP.2021 09:32:34

IEEE 802.11n HT20 Mode / 5725 ~ 5850MHz

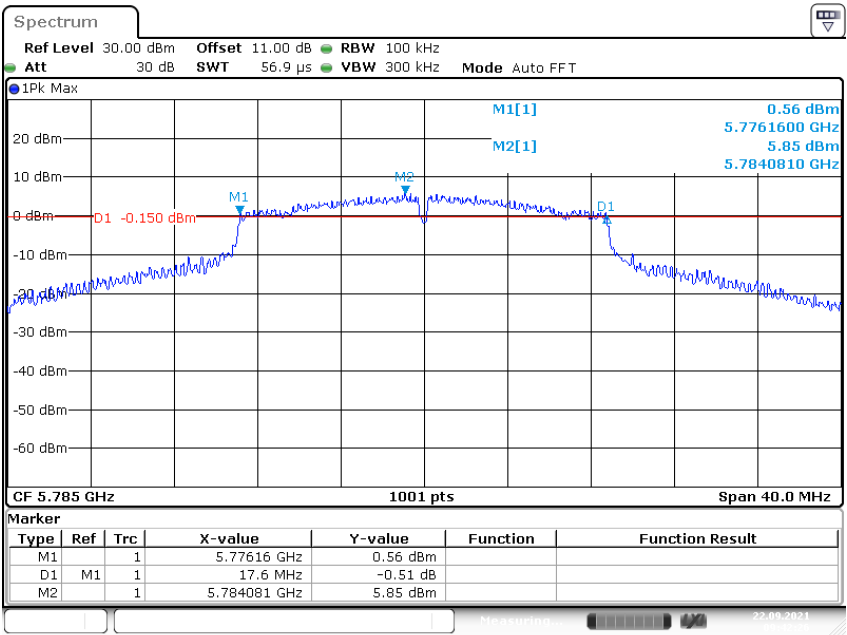
5745MHz



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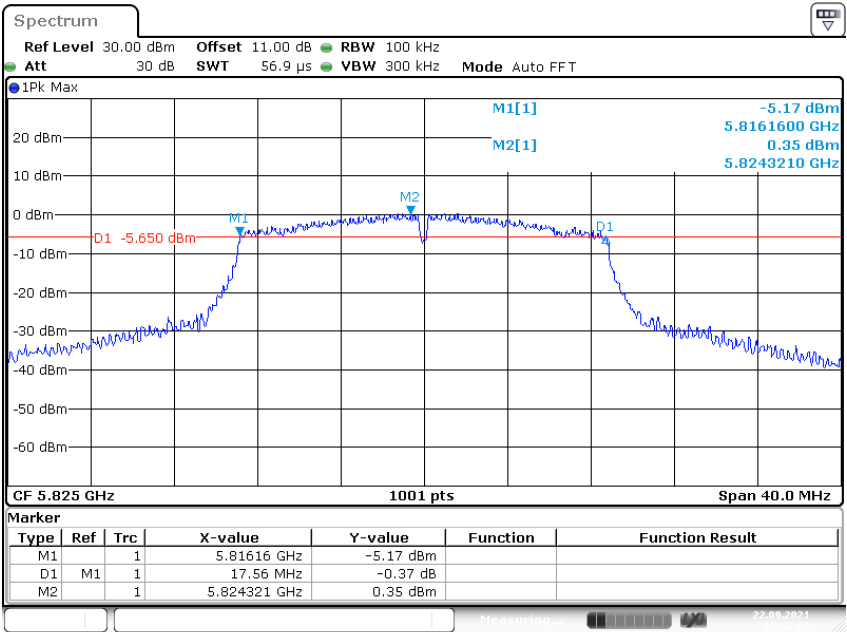
Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

5785MHz



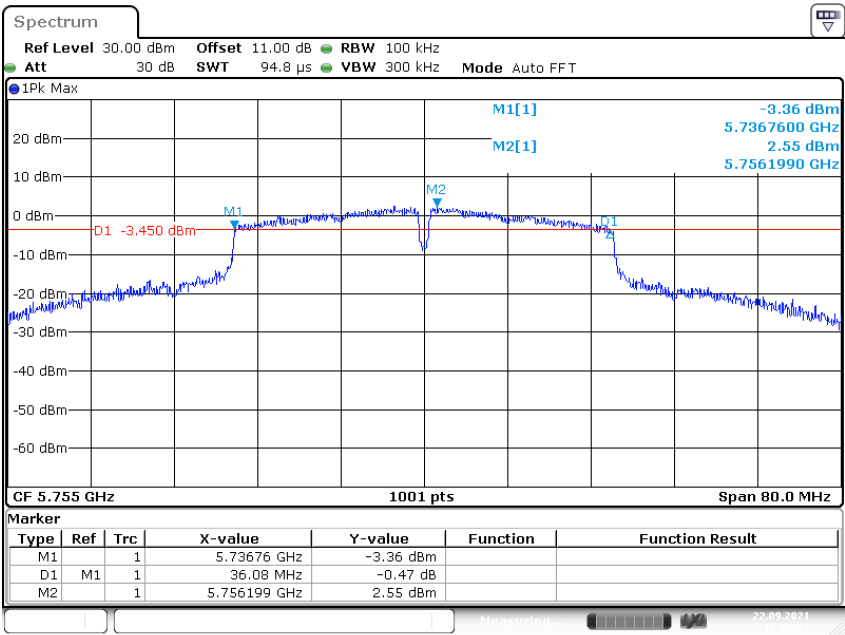
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5825MHz

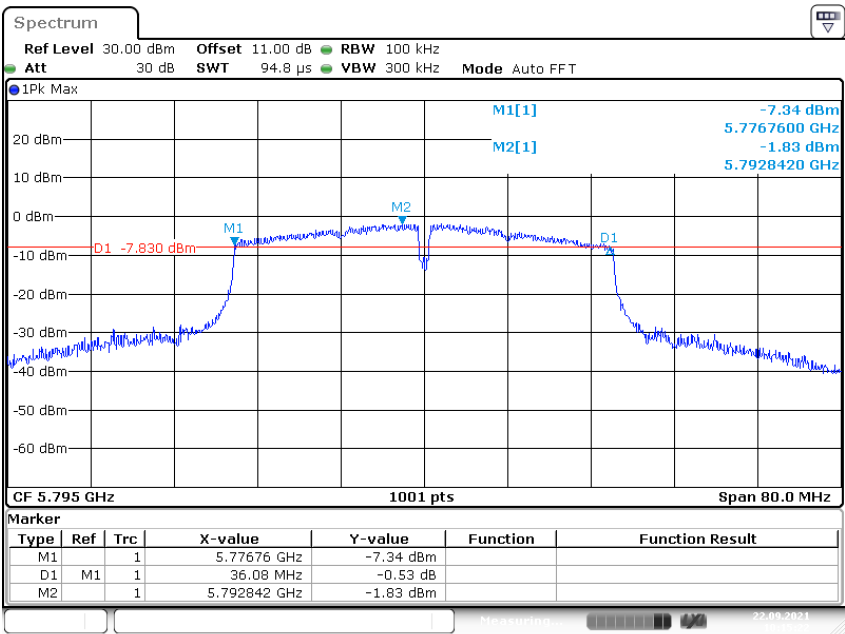


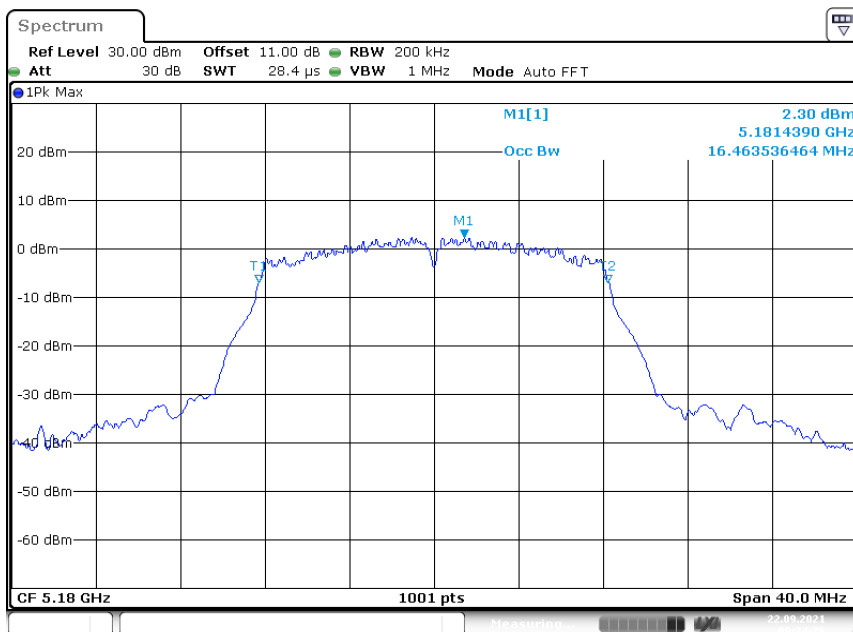
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IEEE 802.11n HT40 Mode / 5725 ~ 5850MHz
5755MHz

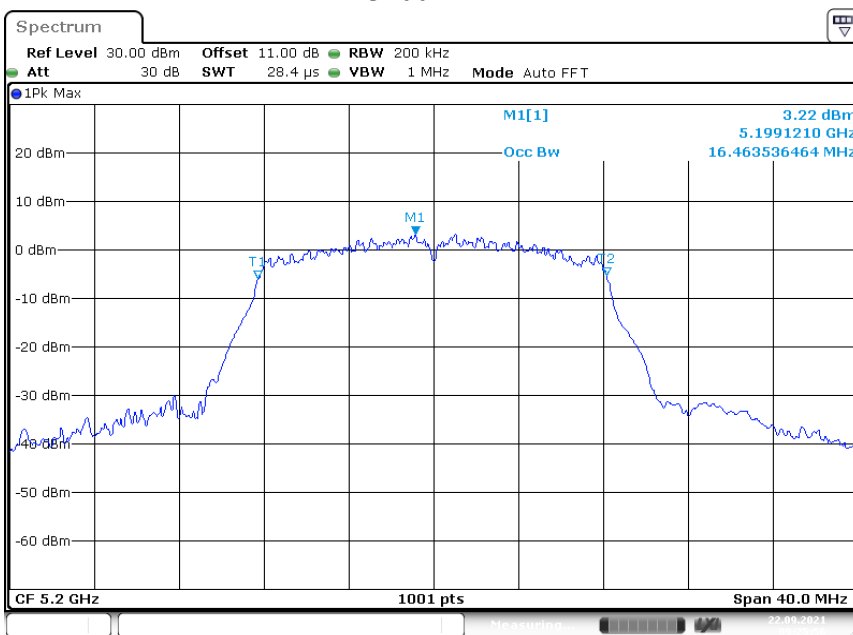


5795MHz



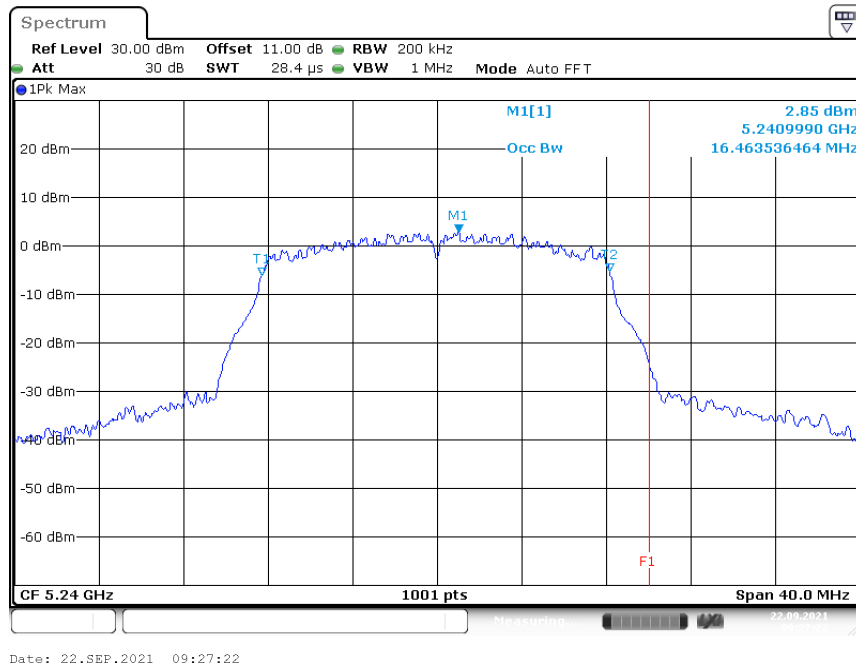
**UNII-1 Band I / OBW 99%
IEEE 802.11a Mode / 5150 ~ 5250MHz****5180MHz**

Date: 22.SEP.2021 09:24:26

5200MHz

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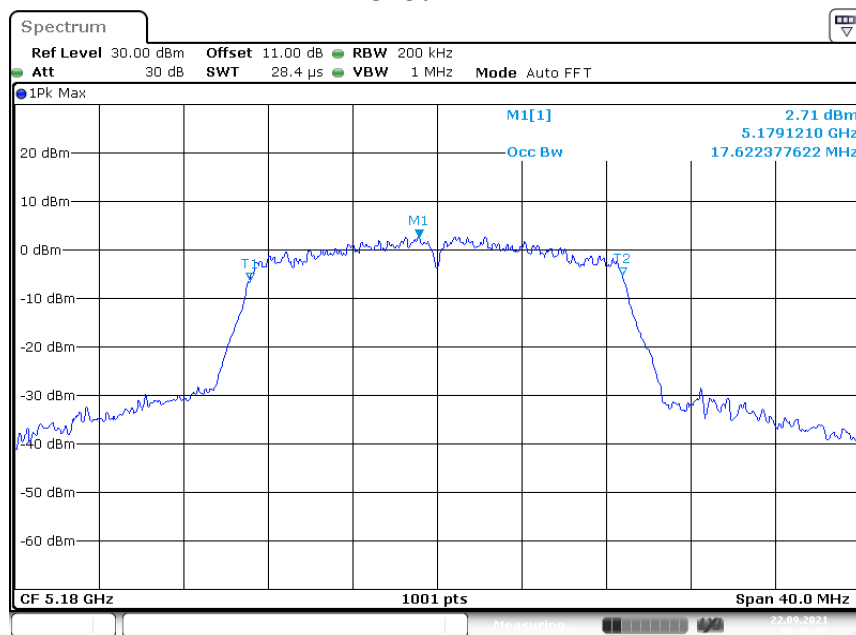
5240MHz



Date: 22.SEP.2021 09:27:22

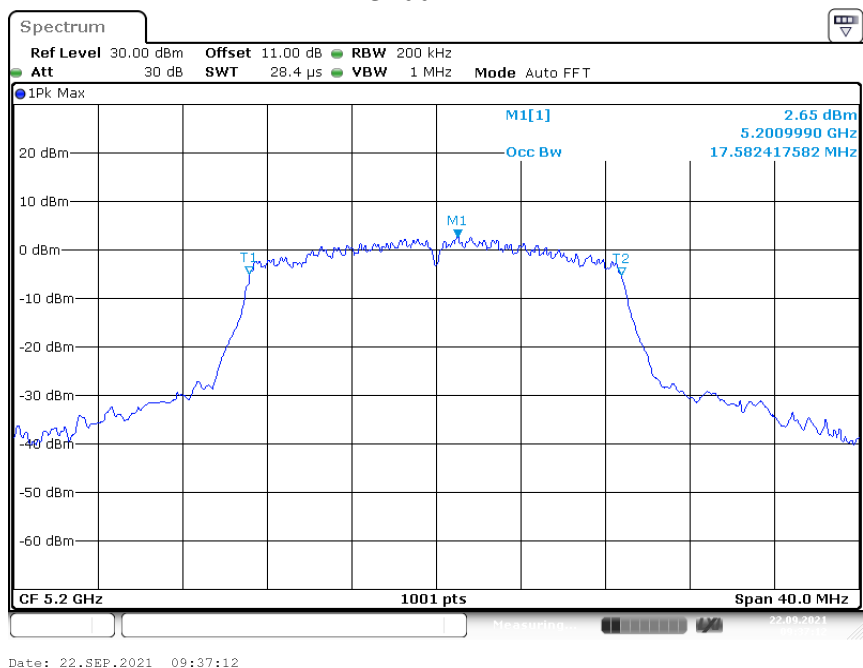
IEEE 802.11n HT20 Mode / 5150 ~ 5250MHz

5180MHz

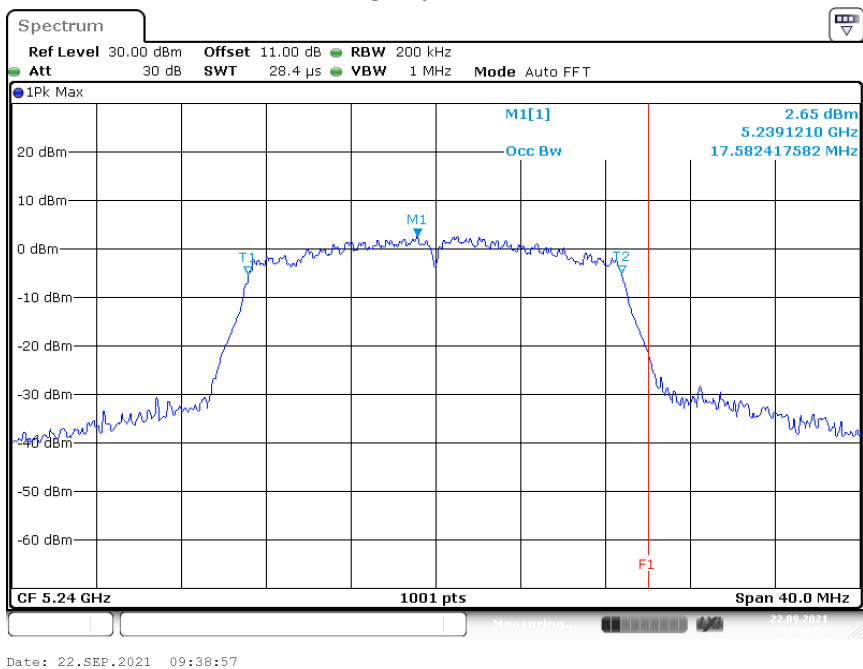


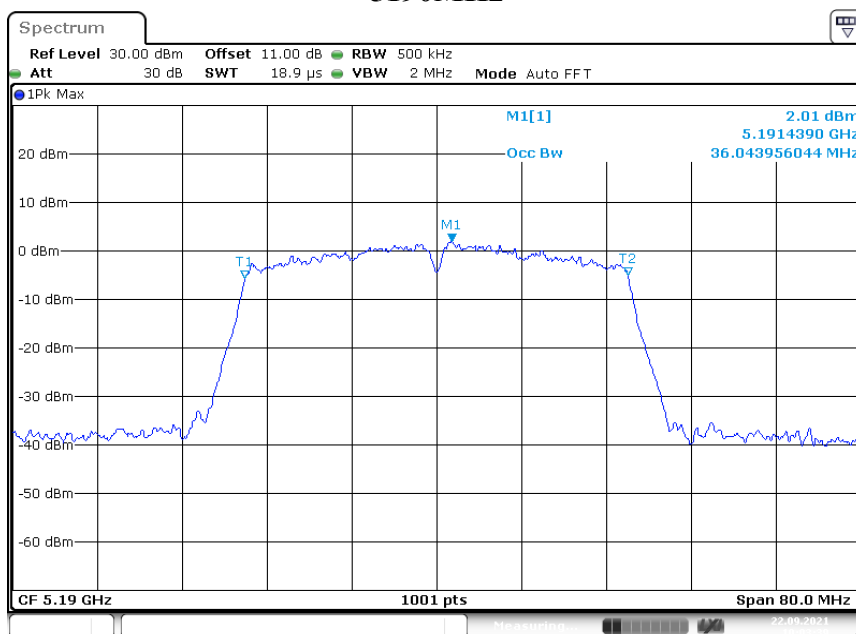
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5200MHz

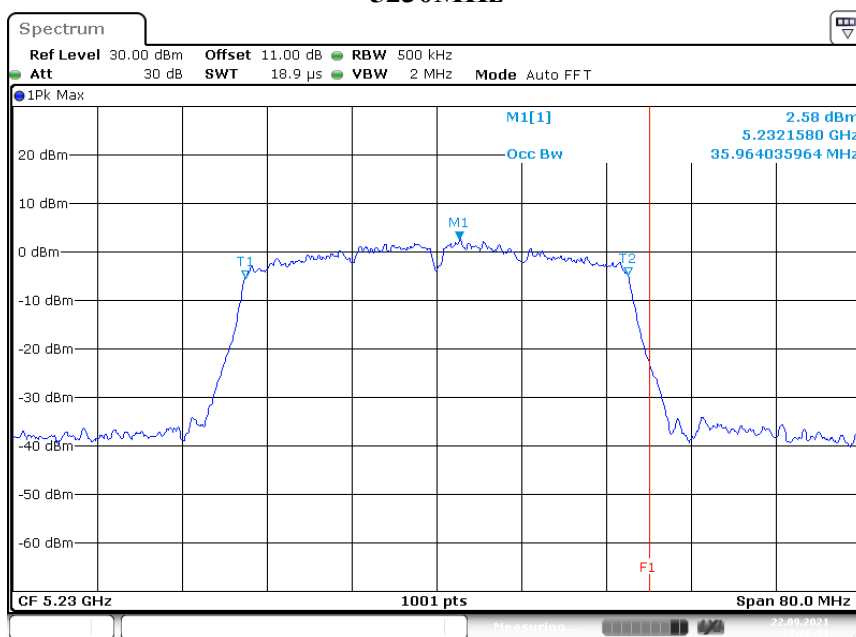


5240MHz



IEEE 802.11n HT40 Mode / 5150 ~ 5250MHz
5190MHz

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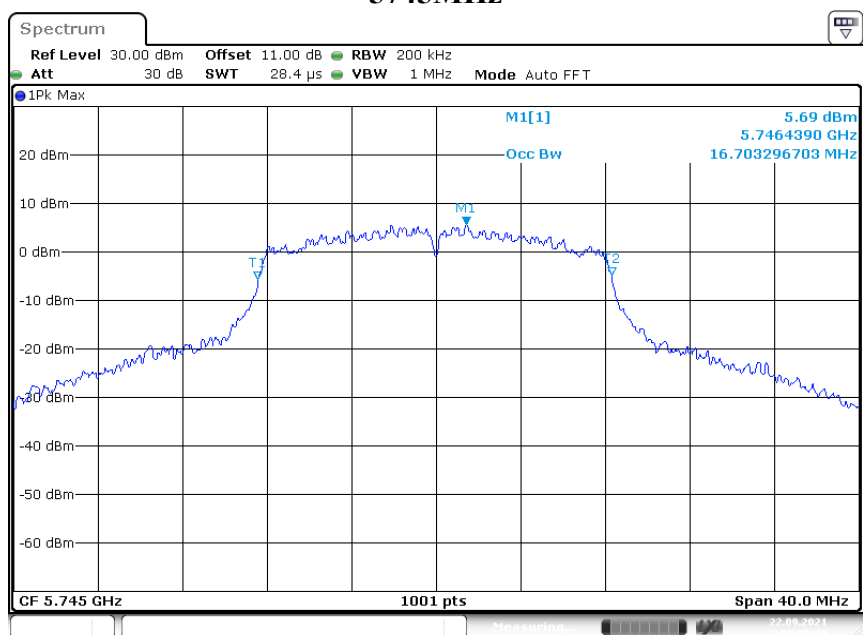
5230MHz

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UNII-3 Band IV / OBW 99%

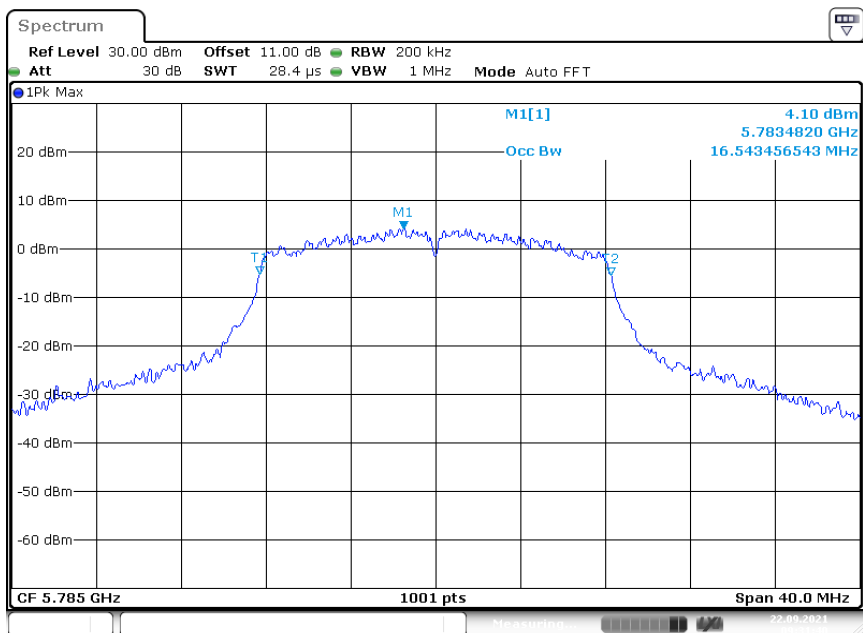
IEEE 802.11a Mode / 5725 ~ 5850MHz

5745MHz



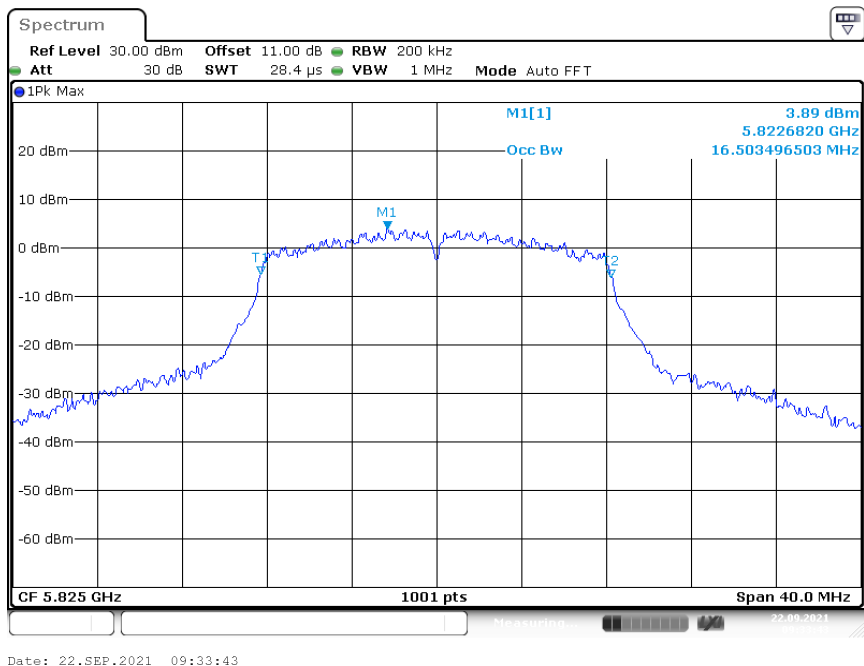
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5785MHz



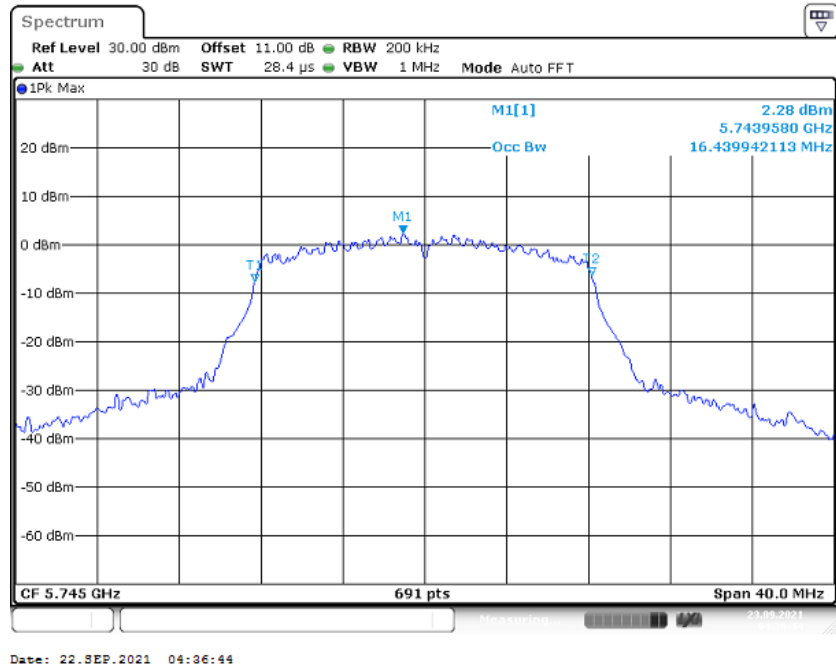
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5825MHz



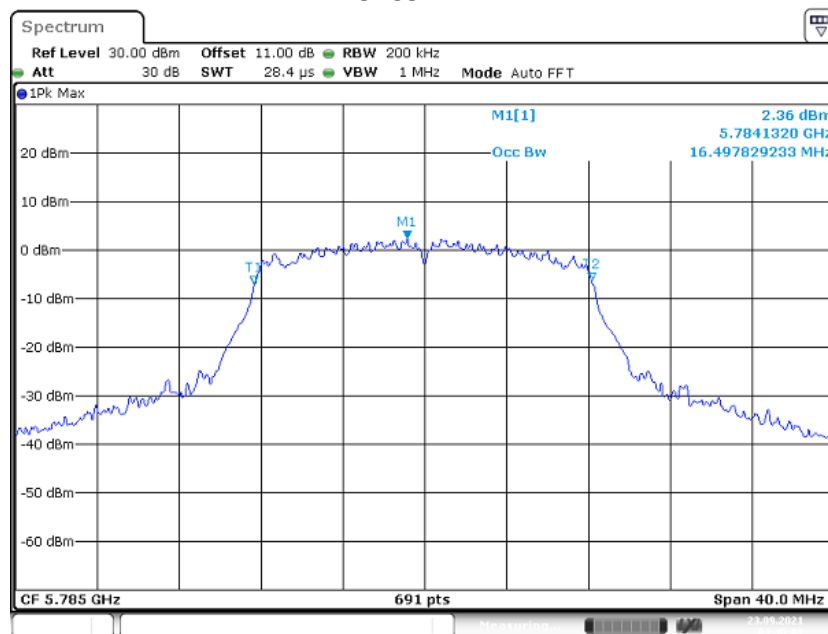
IEEE 802.11n HT20 Mode / 5725 ~ 5850MHz

5745MHz



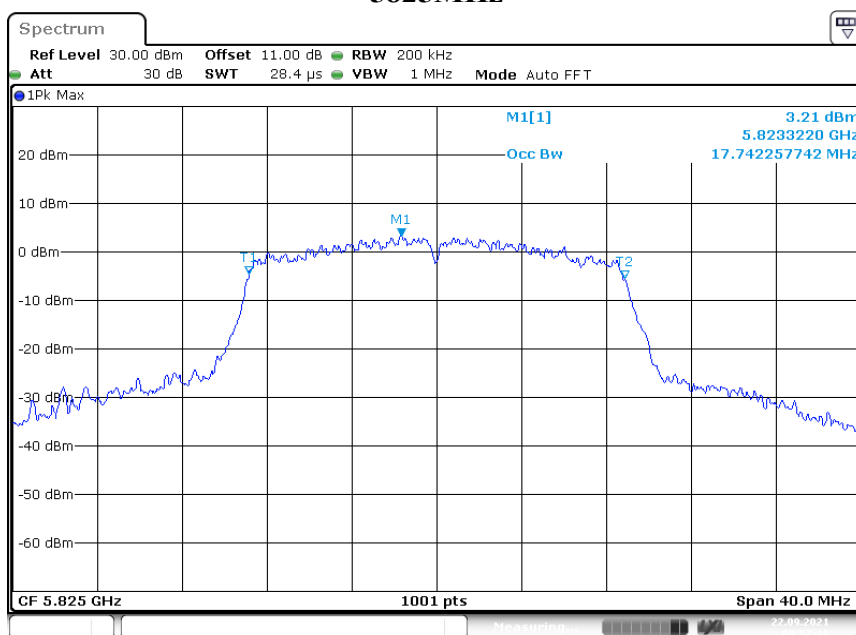
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5785MHz



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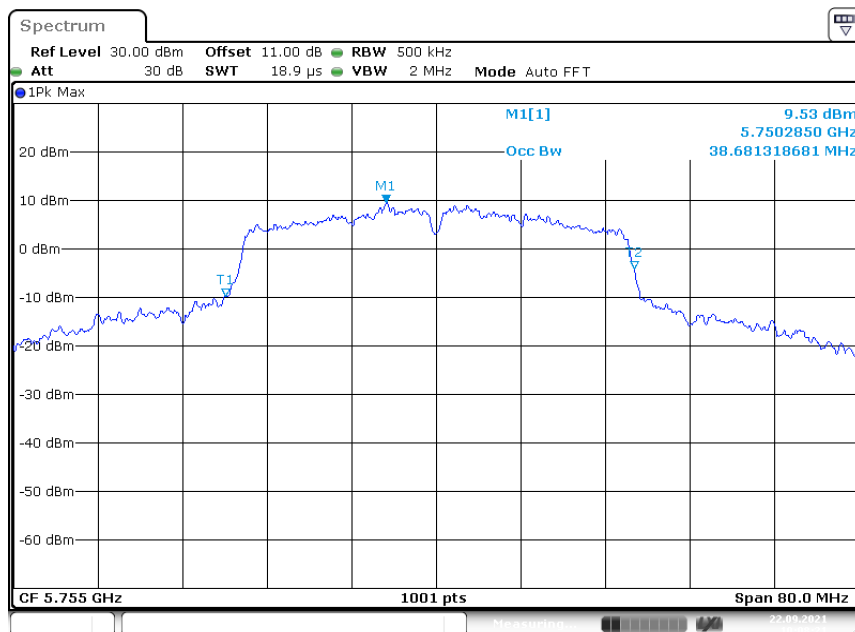
5825MHz



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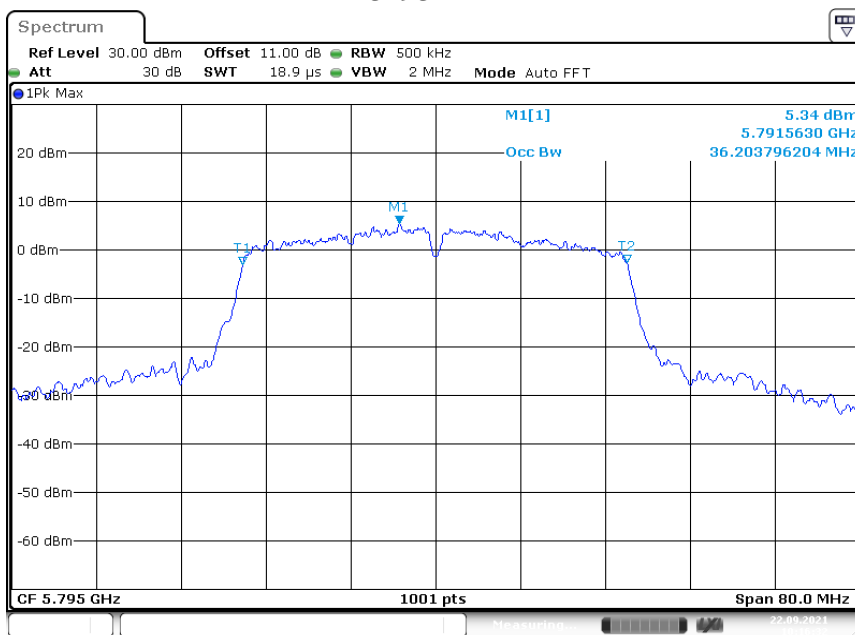
IEEE 802.11n HT40 Mode / 5725 ~ 5850MHz

5755MHz



Date: 22.SEP.2021 10:08:21

5795MHz



Date: 22.SEP.2021 10:16:32

10 FCC §15.407(a) – Maximum Output Power

10.1 Applicable Standard

According to FCC §15.407(a):

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 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.

10.2 Test Procedure

The use Power Meter

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 a Power sensor.

10.3 Test Results

Test Mode: Transmitting

UNII Band	Mode	Channel	Frequency (MHz)	Maximum Conducted Average Output Power (dBm)	Duty Factor (dB)	Total Maximum Conducted Average Output Power With Duty Factor (dBm)	Limit (dBm)
UNII-1	802.11a	36	5180	11.48	0	11.48	24
		40	5200	11.93	0	11.93	24
		48	5240	12.01	0	12.01	24
UNII-3		149	5745	14.70	0	14.70	30
		157	5785	13.65	0	13.65	30
		165	5825	13.51	0	13.51	30
UNII-1	802.11n HT20	36	5180	11.75	0	11.75	24
		40	5200	11.70	0	11.70	24
		48	5240	12.05	0	12.05	24
UNII-3		149	5745	14.93	0	14.93	30
		157	5785	13.68	0	13.68	30
		165	5825	13.45	0	13.45	30
UNII-1	802.11n HT40	38	5190	11.34	0	11.34	24
		46	5230	11.26	0	11.26	24
UNII-3		151	5755	14.36	0	14.36	30
		159	5795	13.06	0	13.06	30

Note: The maximum antenna gain is 3.53 dBi.

11 FCC § 15.407(a) – Power Spectral Density

11.1 Applicable Standard

According to FCC §15.407(a):

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 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 30dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6dBi 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 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi 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.

11.2 Test Procedure

The measurements are base on FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01: Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices section F: Maximum power spectral density (PPSD)

11.3 Test Results

Test Mode: Transmitting

UNII Band	Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/MHz)	Duty Factor (dB)	Power Spectral Density with duty factor (dBm/MHz)	Limit (dBm/MHz)
UNII-1	802.11a	36	5180	9.78	0	9.78	11
		40	5200	10.13	0	10.13	11
		48	5240	9.92	0	9.92	11
	802.11n HT20	36	5180	9.93	0	9.93	11
		40	5200	9.86	0	9.86	11
		48	5240	10.07	0	10.07	11
	802.11n HT40	38	5190	5.25	0	5.25	11
		46	5230	5.42	0	5.42	11
UNII Band	Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/500kHz)	Duty Factor (dB)	Power Spectral Density with duty factor (dBm/500kHz)	Limit (dBm/500kHz)
UNII-3	802.11a	149	5745	8.91	0	8.91	30
		157	5785	8.12	0	8.12	30
		165	5825	7.70	0	7.70	30
	802.11n HT20	149	5745	11.45	0	11.45	30
		157	5785	12.34	0	12.34	30
		165	5825	7.15	0	7.15	30
	802.11n HT20	151	5755	8.89	0	8.89	30
		159	5795	4.72	0	4.72	30

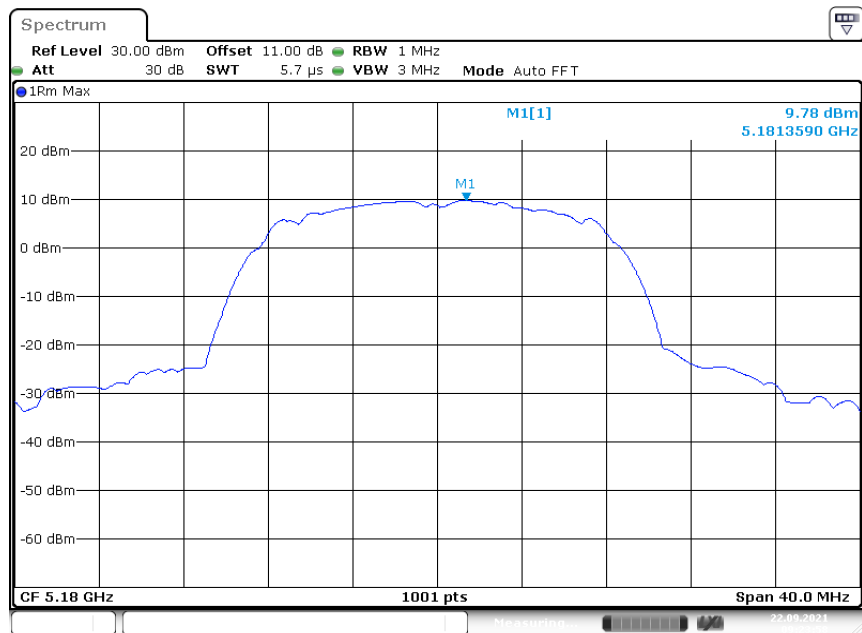
Note:

The maximum antenna gain is 3.53 dBi.

Please refer to the following plots

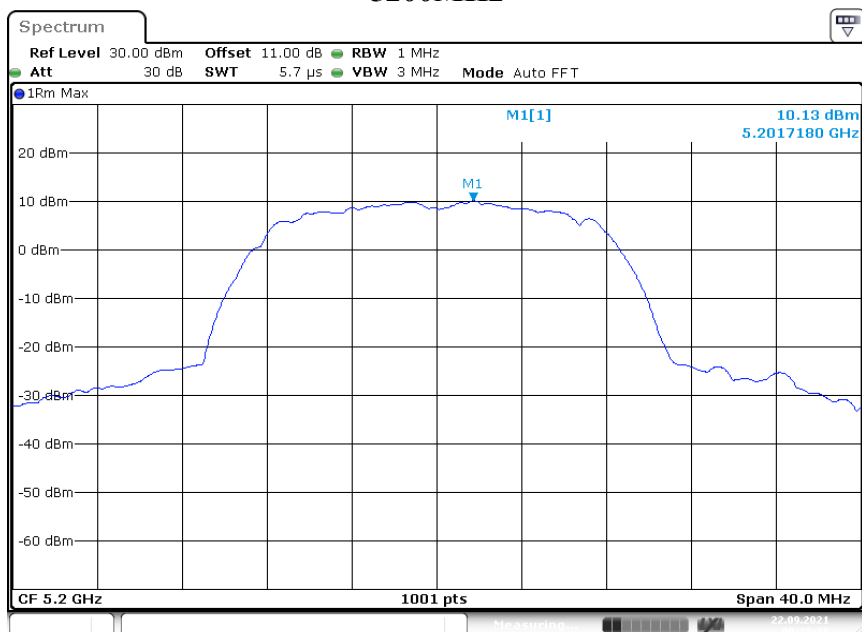
UNII-1 Band I PSD
IEEE 802.11a Mode / 5150 ~ 5250MHz

5180MHz



Date: 22.SEP.2021 09:23:58

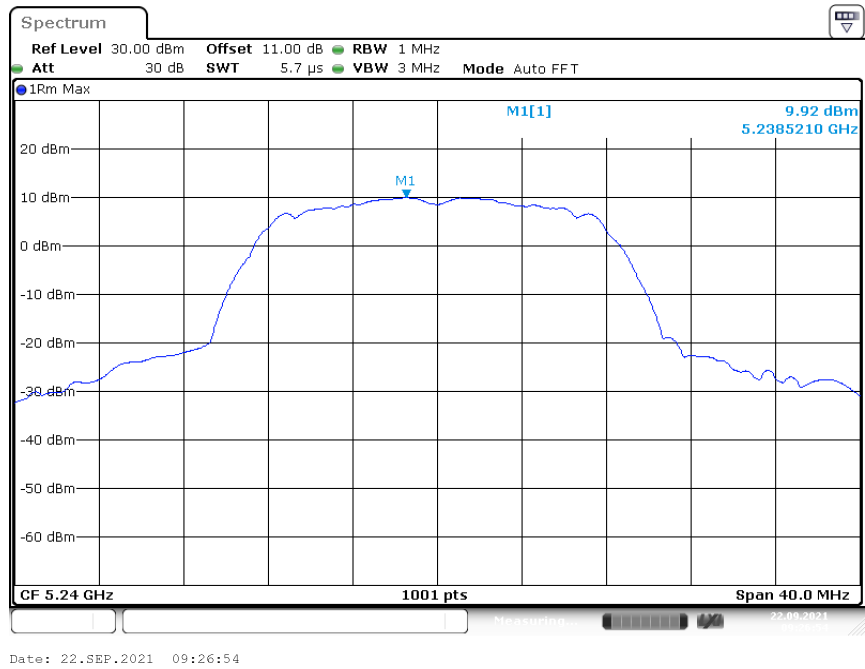
5200MHz



Date: 22.SEP.2021 09:25:28

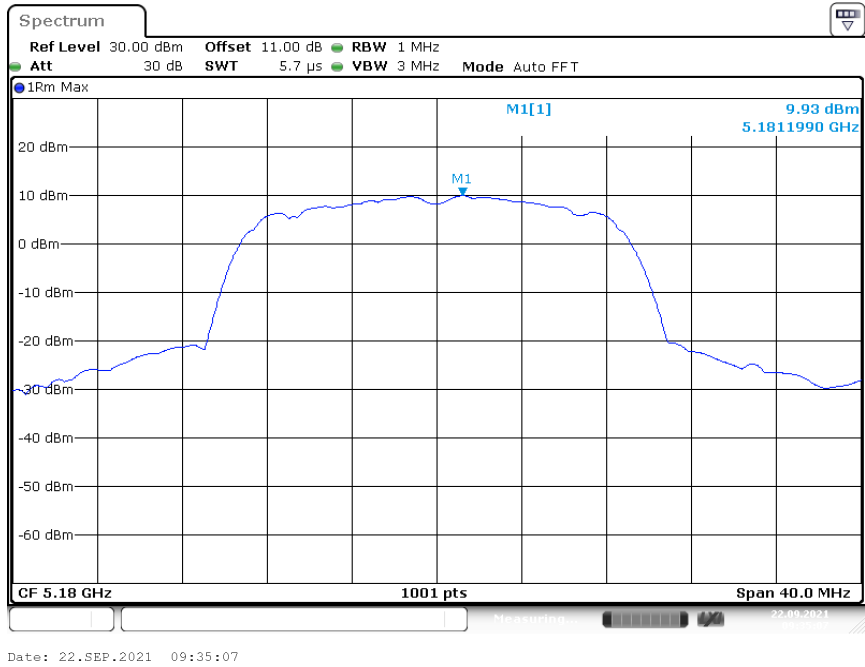
Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.
(New Taipei Laboratory)

5240MHz

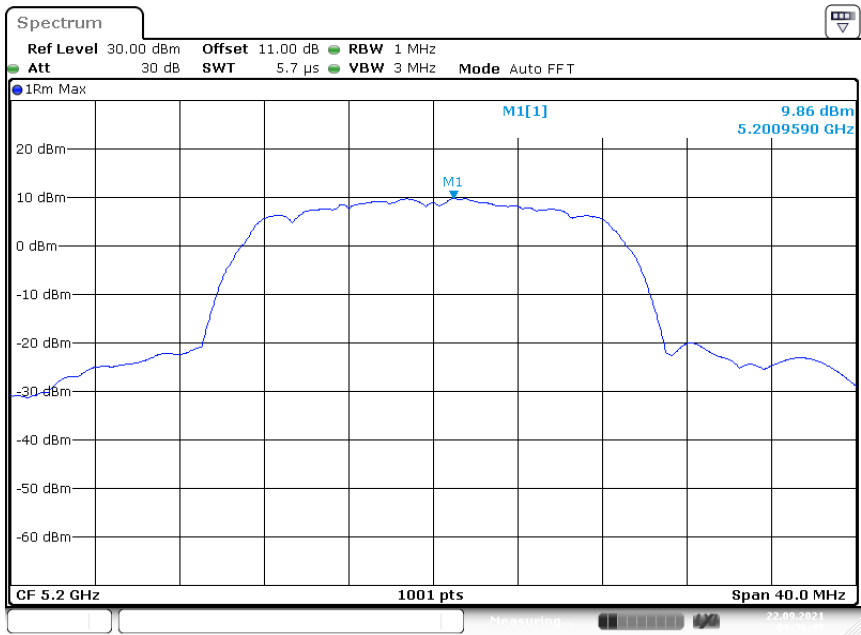


IEEE 802.11n HT20 Mode / 5150 ~ 5250MHz

5180MHz

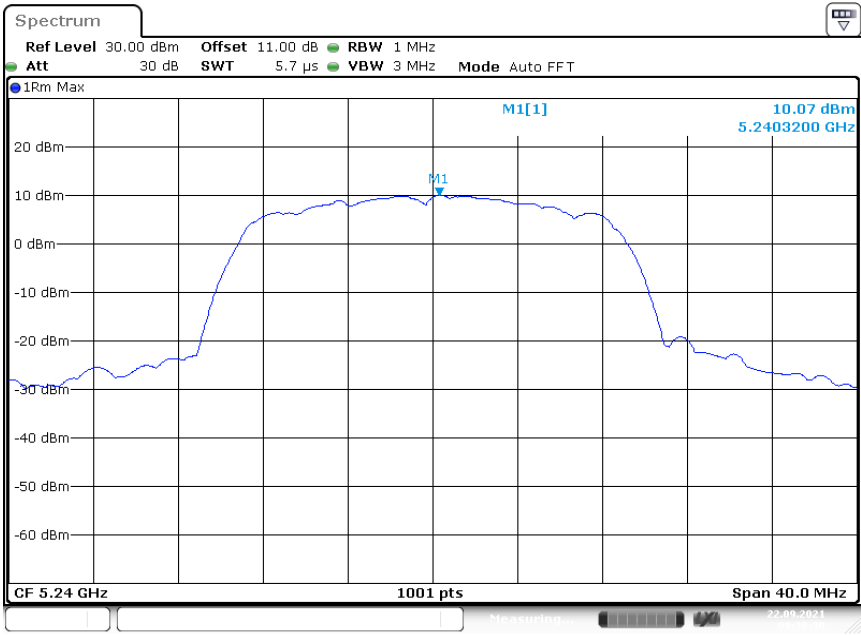


5200MHz



Date: 22.SEP.2021 09:36:45

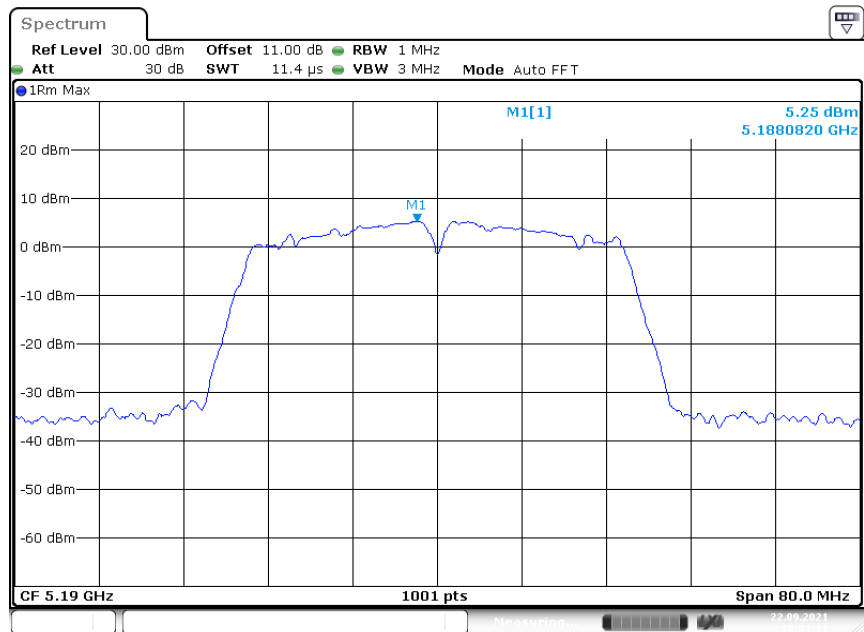
5240MHz



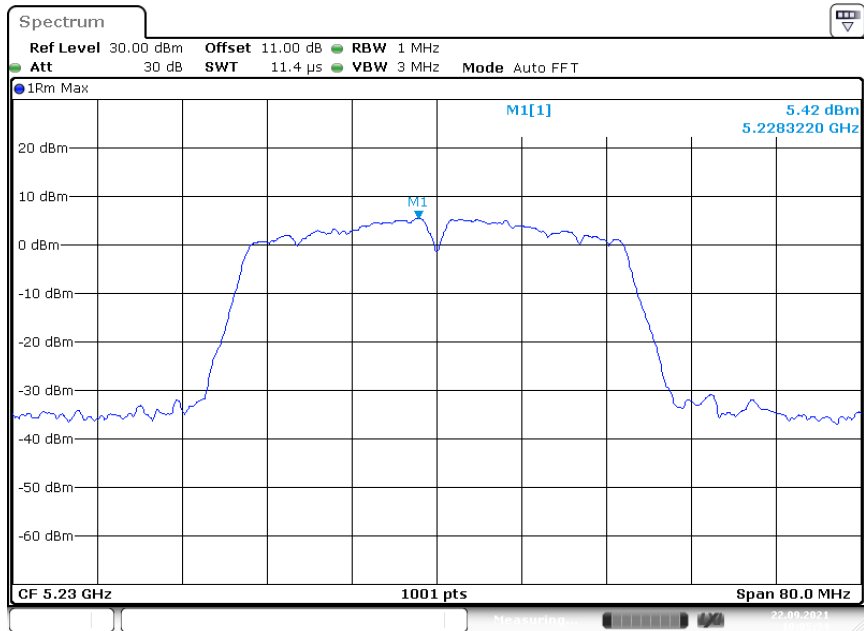
Date: 22.SEP.2021 09:38:30

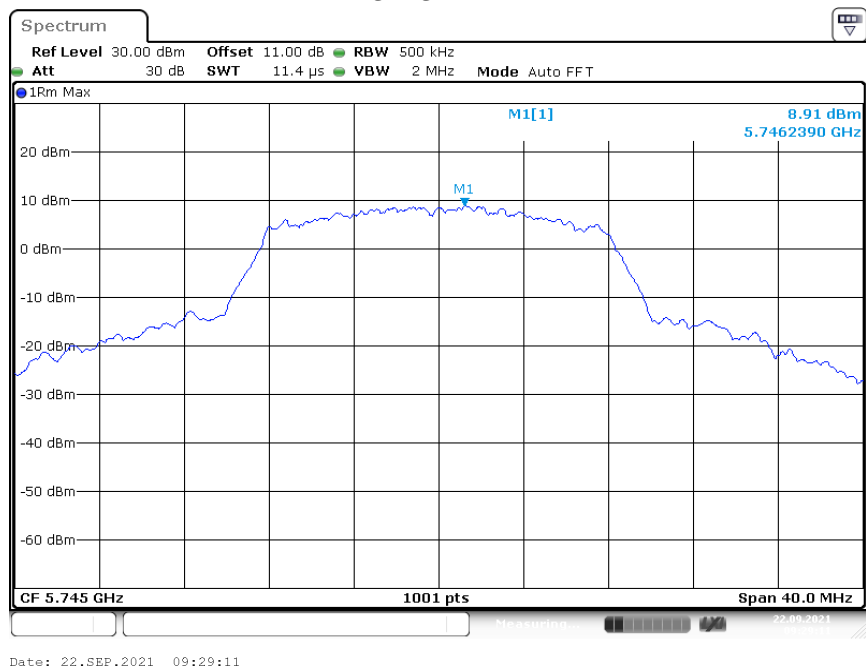
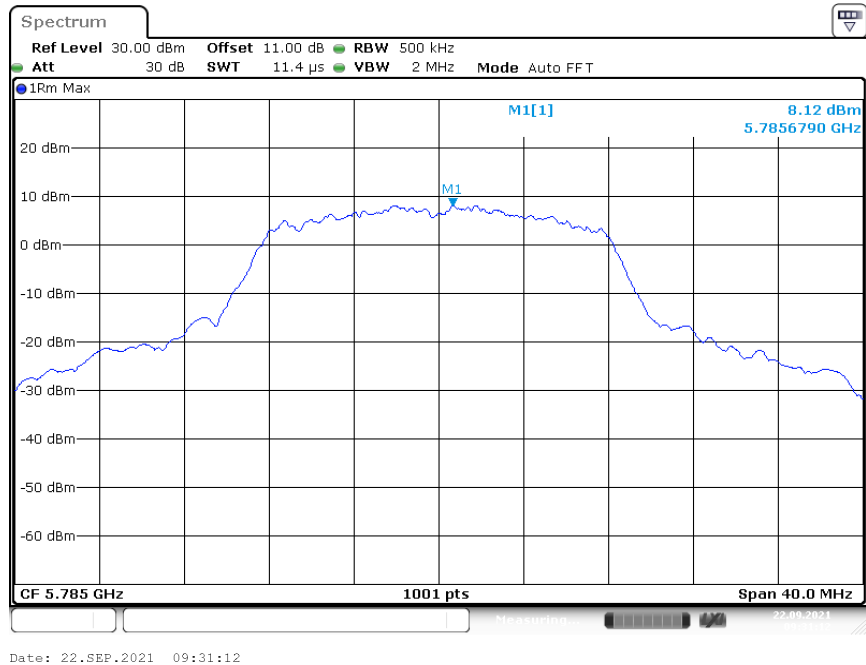
IEEE 802.11n HT40 Mode / 5150 ~ 5250MHz

5190MHz

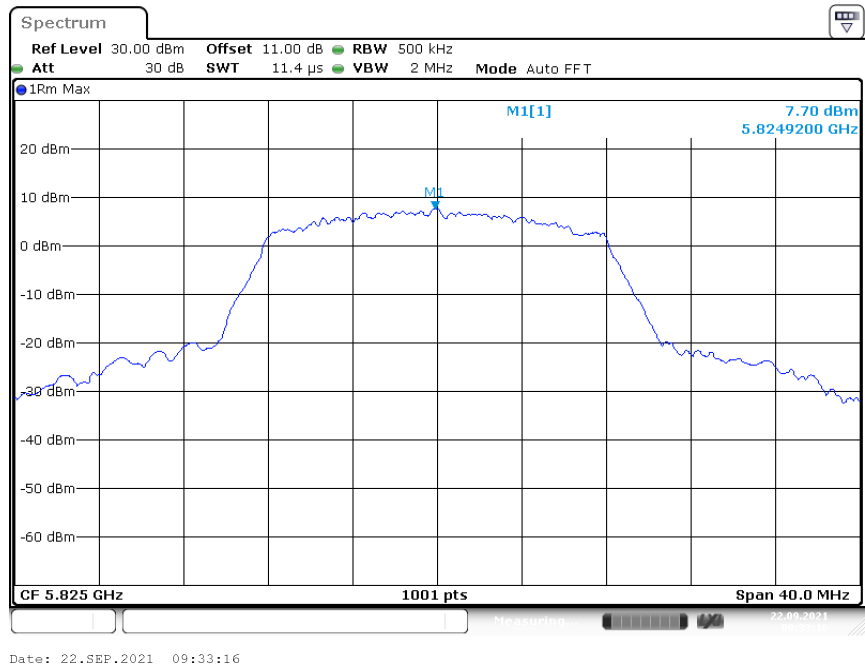


5230MHz



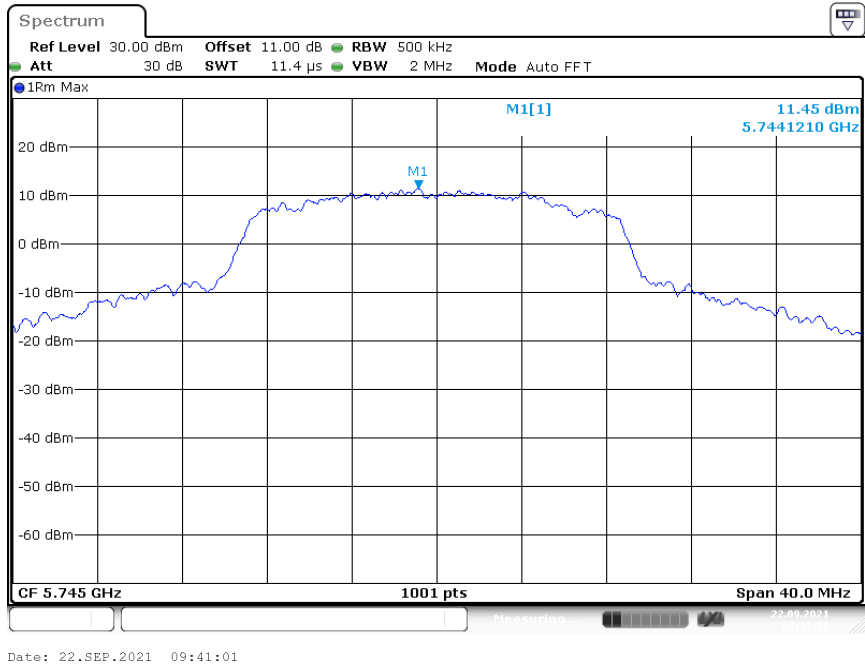
UNII-3 Band IV PSD
IEEE 802.11a mode / 5725 ~ 5850MHz**5745MHz****5785MHz**

5825MHz

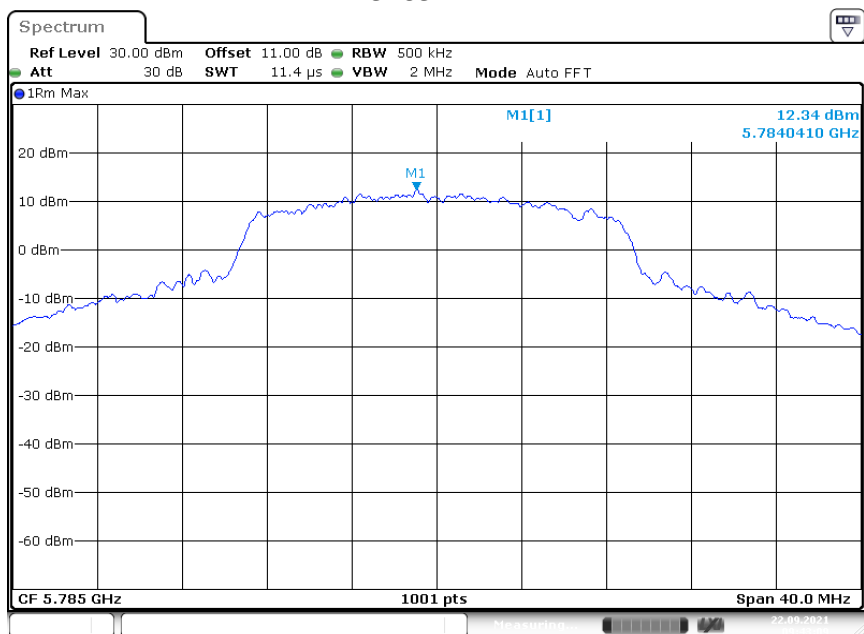


IEEE 802.11n HT20 Mode / 5725 ~ 5850MHz

5745MHz

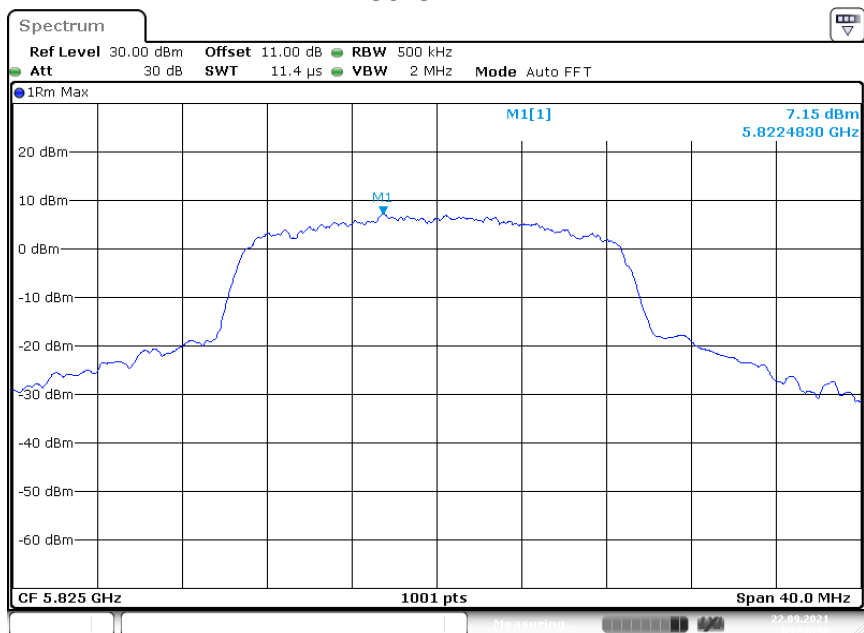


5785MHz



Date: 22.SEP.2021 09:43:09

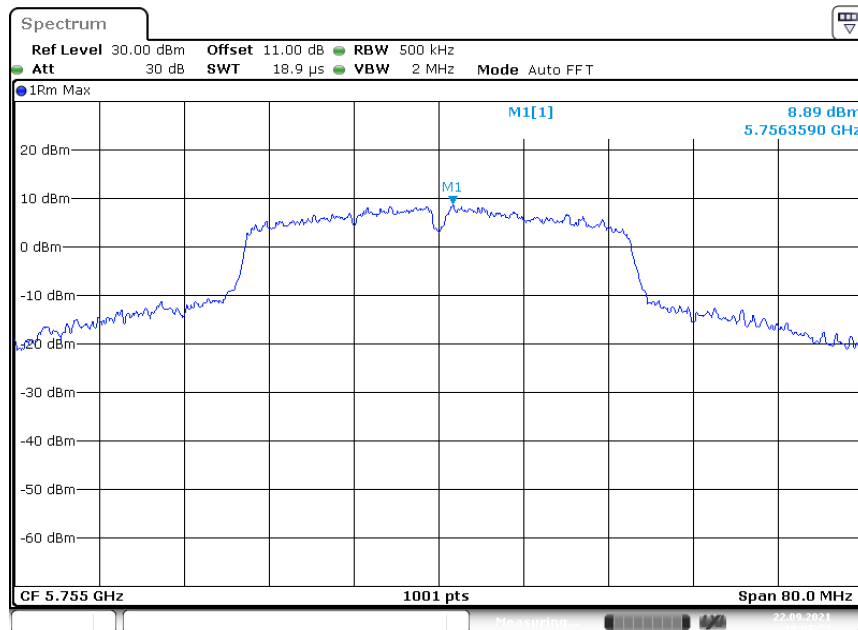
5825MHz



Date: 22.SEP.2021 09:56:48

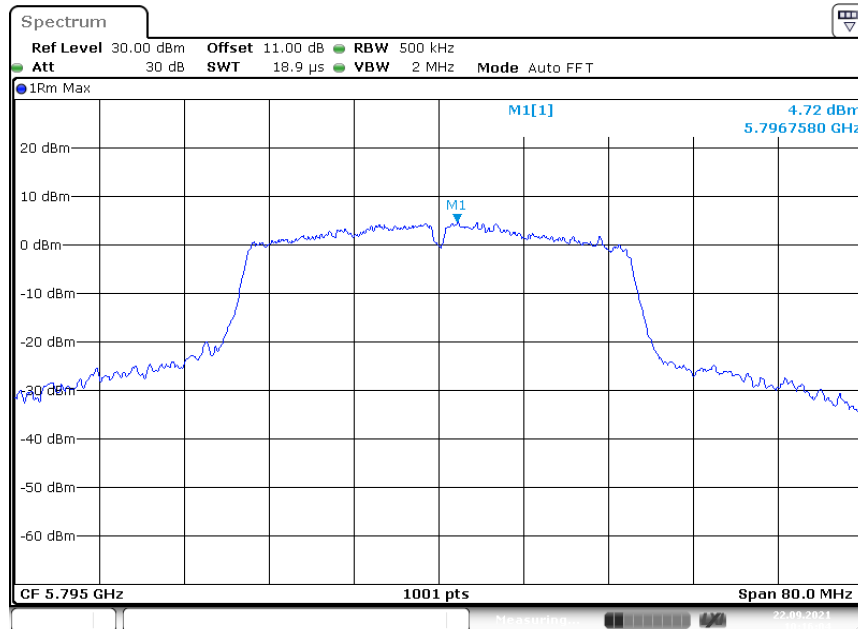
IEEE 802.11n HT40 Mode / 5725 ~ 5850MHz

5755MHz



Date: 22.SEP.2021 10:07:54

5795MHz



Date: 22.SEP.2021 10:16:05

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