TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15.407

TEST REPORT

For

Titanium Intelligent Solutions

275 Seventh Avenue Suite 713 New York, NY 10001, USA

FCC ID:2AXMT-750EXT

Report Type:	**Product Name:**
Original Report	IoT Gateway

Report Number:	RDG200729002-00B
Report Date:	2020-09-11
Reviewed By:	Ivan Cao Assistant manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	IoT Gateway
EUT Model:	TIS-750-EXT
Operation Frequency:	5180-5240(802.11a/n ht20) 5745-5825(802.11a/n ht20)
Maximum Output Power (Conducted):	5150-5250 MHz:20.38 dBm 5725-5850 MHz:17.62 dBm
Modulation Type:	OFDM
Rated Input Voltage:	DC 5V from USB port or DC 48V from PoE adapter
Serial Number:	RDG200729002-RF-S1
EUT Received Date:	2020.7.29
EUT Received Status:	Good

Note: the device contains a SRD certified module, FCC ID:SZV-TCM515U

Objective

This type approval report is prepared on behalf of the *Titanium Intelligent Solutions* in accordance with Part 2-Subpart J, Part 15-Subparts A, and E of the Federal Communications Commission's rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID:2AXMT-750EXT

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 KDB 789033 D02 General U-NII Test Procedures New Rules v02r01.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	30M~200MHz: 4.55 dB,200M~1GHz: 5.92 dB,1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB,18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Unwanted Emissions,conducted	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

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

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

Declarations

BACL 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 a triangle symbol "△ ". Customer model name, addresses, names, trademarks etc. are not considered data.

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

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SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

The system support 802.11a/n ht20.

For 5150~5250 MHz band, 4 channels are provided:

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

For 802.11a, 802.11n ht20, channel 36, 40 and 48 was tested.

For 5725~5850MHz band, 5 channels are provided to testing:

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

For 802.11a, 802.11n ht20, channel 149, 157 and 165 was tested.

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.

The device was powered by USB adapter or PoE adapter, both mode were tested for 15B emission tests, and only the worst USB adapter mode was tested and reported in this report.

Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

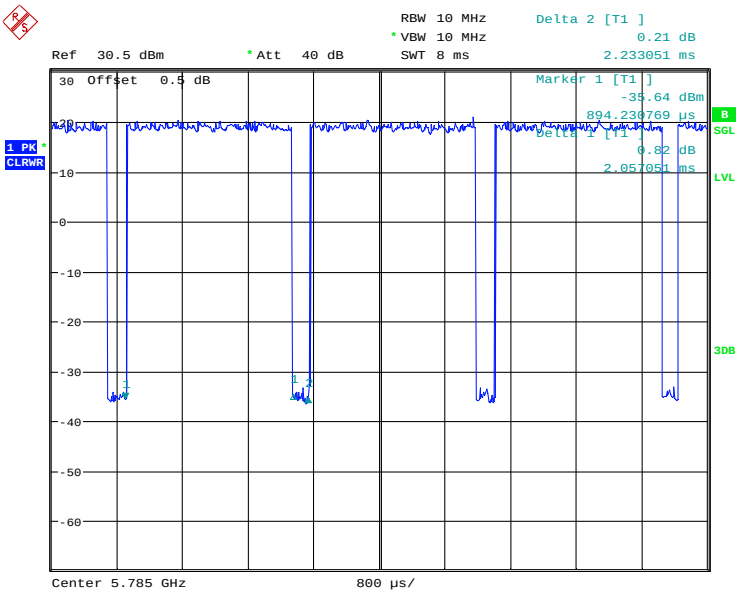
The software “Atheros Radio Test2” was used for testing:

Frequency Bands	Mode	Channel	Frequency (MHz)	Data rate	Power level Setting
5150-5250 MHz	802.11 a	Low	5180	6Mbps	19.5
		Middle	5200	6Mbps	19.5
		High	5240	6Mbps	19.5
	802.11n ht20	Low	5180	MCS0	19.5
		Middle	5200	MCS0	19.5
		High	5240	MCS0	19.5
5725-5850 MHz	802.11 a	Low	5745	6Mbps	14
		Middle	5785	6Mbps	14
		High	5825	6Mbps	14
	802.11n ht20	Low	5745	MCS0	14
		Middle	5785	MCS0	14
		High	5825	MCS0	14

The duty cycle as below:

Mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle(x) (%)
802.11 a	2.057	2.233	92.12
802.11n ht20	1.942	2.008	96.71

802.11a



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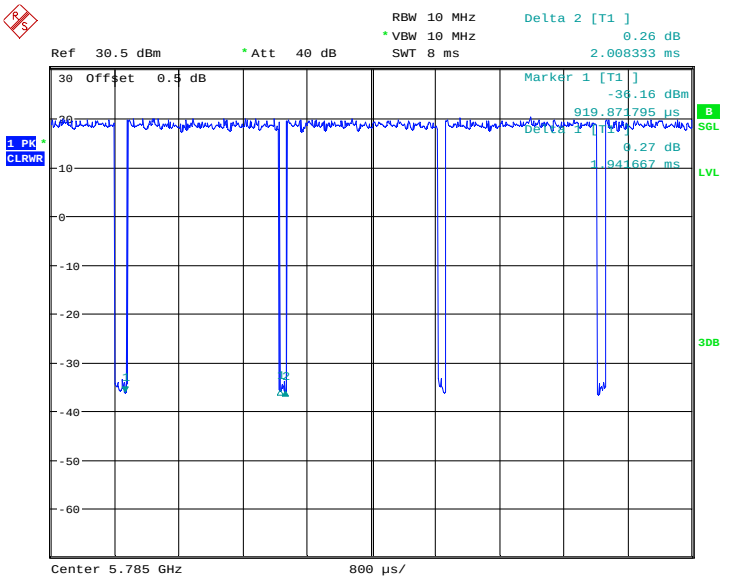
802.11n ht20



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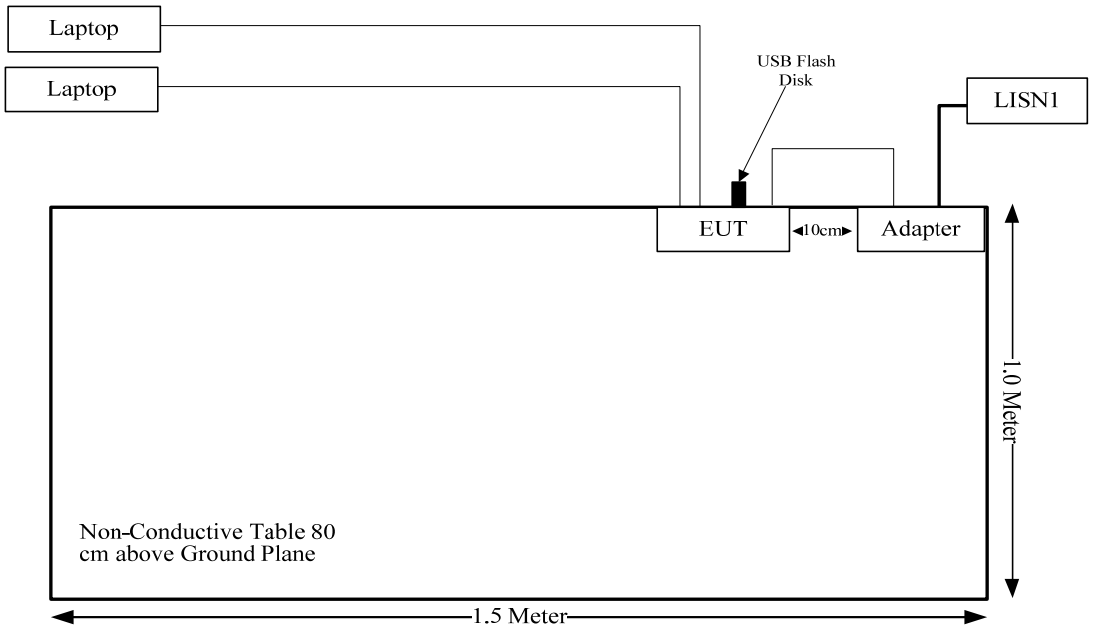
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1232
DELL	Laptop	PP11L	QDS-BRCM1012
HP	USB Flash Disk	8G	0078
Huawei	Adapter	HW-050200C3W	H33L5F4M6947

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	No	No	1.2	Adapter	EUT
RJ45 Cable	Yes	No	10	EUT	Laptop
RJ45 Cable	Yes	No	10	EUT	Laptop

Configuration of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.407 (f) & §1.1310 & §2.1091	Maximum Permissable Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(6)& §15.207(a)	Conducted Emissions	Compliance
§15.205& §15.209 &§15.407(b)	Undesirable Emission& Restricted Bands	Compliance
§15.407(a)(e)	Emission Bandwidth	Compliance
§15.407(a)	Conducted Transmitter Output Power	Compliance
§15.407 (a)	Power Spectral Density	Compliance

FCC §15.407 (f) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.407(f)and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) 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;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
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);

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
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);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Mode	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
WLAN	2412-2462	2.3	1.70	27	501.19	20.00	0.17	1.0
WLAN	5150-5250	3	2.00	21	125.89	20.00	0.05	1.0
WLAN	5725-5850	3	2.00	18	63.10	20.00	0.03	1.0
SRD	902.875	1.0	1.26	<0	<1	20.00	<0.01	0.6

The WLAN 2.4G, 5G and SRD can transmit simultaneously:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$=S_{2.4}/S_{limit\text{-}2.4}+ S_5/S_{limit\text{-}5}+ S_{SRD}/S_{limit\text{-}SRD}$

=0.17/1+0.05/1+0.01/0.6

=0.24

< 1.0

Result: The device meet FCC MPE at 20 cm distance

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 use of a standard antenna jack or electrical connector is prohibited.

Antenna Connector Construction

The EUT has 2 internal antenna for 2.4G WLAN and 1 internal antenna for 5G WLAN, fulfill the requirement of this section. Please refer to the EUT photos and below information:

Antenna	Antenna Type	input impedance (Ohm)	Antenna Gain /Frequency Range
2.4G Chain 0	PCB	50	2.3 dBi/2.4-2.5GHz
2.4G Chain 1	PCB	50	2.3 dBi/2.4-2.5GHz
5G	FPC	50	3 dBi/5.15-5.85GHz

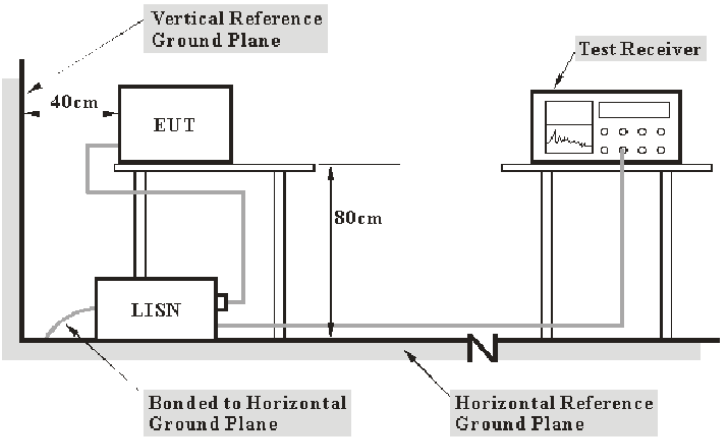
Result: Compliance.

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

Applicable Standard

FCC §15.207(a), §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.

The adapter was connected to the main lisn with a 120 V/60 Hz AC power source.

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

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$
$C_f = A_C + VDF$

Herein,
V_C (cord. Reading): corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN
C_f: Correction Factor

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

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	LISN	ENV 216	101614	2019-09-12	2020-09-12
R&S	EMI Test Receiver	ESCI	101121	2020-07-07	2021-07-07
MICRO-COAX	Coaxial Cable	C-NJNJ-50	C-0200-01	2019-09-05	2020-09-05
R&S	Test Software	EMC32	Version 9.10.00	N/A	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

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

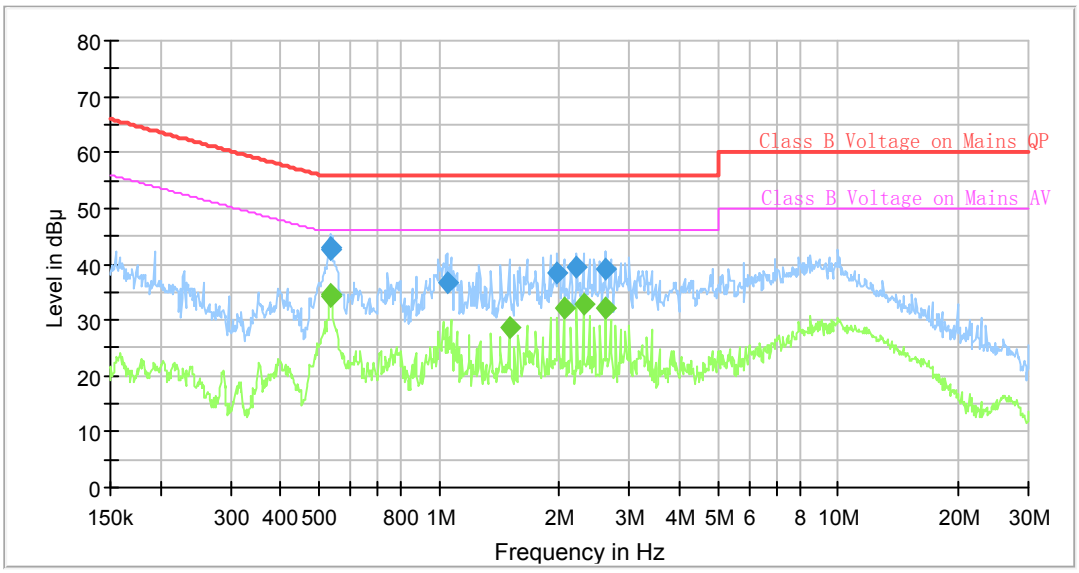
Test Data

Environmental Conditions

Temperature:	25.3 °C
Relative Humidity:	64 %
ATM Pressure:	100.1 kPa
Test by:	Barry Yang
Test Date:	2020-09-02

Test Mode: Transmitting

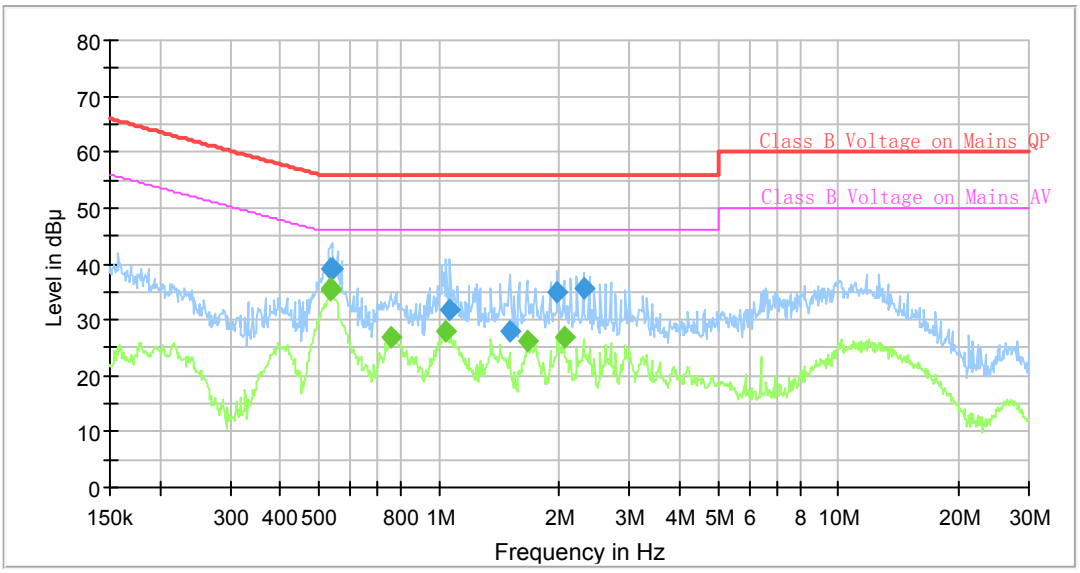
AC120 V, 60 Hz, Line:



Final_Result

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Limit (dB µ V)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.532440	---	34.57	46.00	11.43	9.000	L1	9.6
0.532440	42.92	---	56.00	13.08	9.000	L1	9.6
0.535103	---	34.39	46.00	11.61	9.000	L1	9.6
0.535103	42.56	---	56.00	13.44	9.000	L1	9.6
1.049193	36.64	---	56.00	19.36	9.000	L1	9.7
1.502491	---	28.62	46.00	17.38	9.000	L1	9.7
1.976720	38.53	---	56.00	17.47	9.000	L1	9.7
2.057187	---	32.06	46.00	13.94	9.000	L1	9.7
2.216994	39.40	---	56.00	16.60	9.000	L1	9.7
2.295763	---	32.78	46.00	13.22	9.000	L1	9.7
2.613633	---	31.97	46.00	14.03	9.000	L1	9.7
2.613633	39.07	---	56.00	16.93	9.000	L1	9.7

AC120 V, 60 Hz, Neutral:



Final_Result

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Limit (dB µ V)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.532440	---	35.22	46.00	10.78	9.000	L1	9.6
0.532440	39.17	---	56.00	16.83	9.000	L1	9.6
0.535103	---	35.51	46.00	10.49	9.000	L1	9.6
0.540467	39.00	---	56.00	17.00	9.000	L1	9.6
0.758685	---	27.05	46.00	18.95	9.000	L1	9.7
1.043973	---	28.12	46.00	17.88	9.000	L1	9.7
1.065010	31.83	---	56.00	24.17	9.000	L1	9.7
1.510003	28.07	---	56.00	27.93	9.000	L1	9.7
1.660095	---	26.29	46.00	19.71	9.000	L1	9.7
1.976720	35.00	---	56.00	21.00	9.000	L1	9.7
2.057187	---	27.03	46.00	18.97	9.000	L1	9.7
2.295763	35.60	---	56.00	20.40	9.000	L1	9.7

FCC §15.209, §15.205 & §15.407(b) –UNWANTED EMISSION

Applicable Standard

FCC §15.407; §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.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

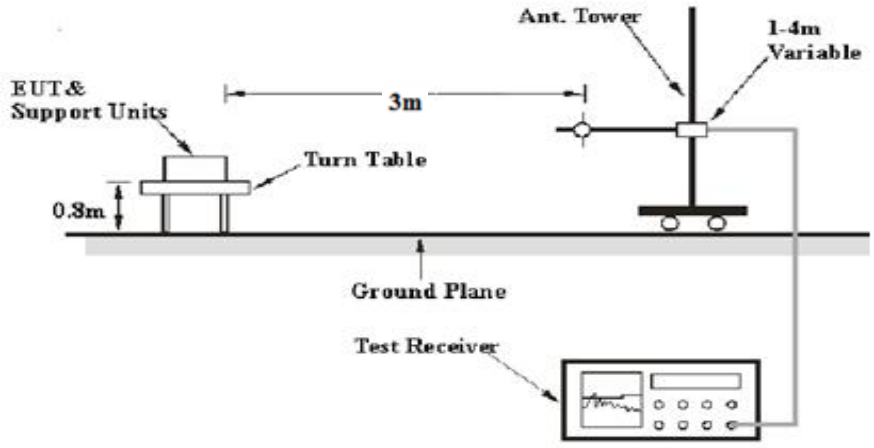
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

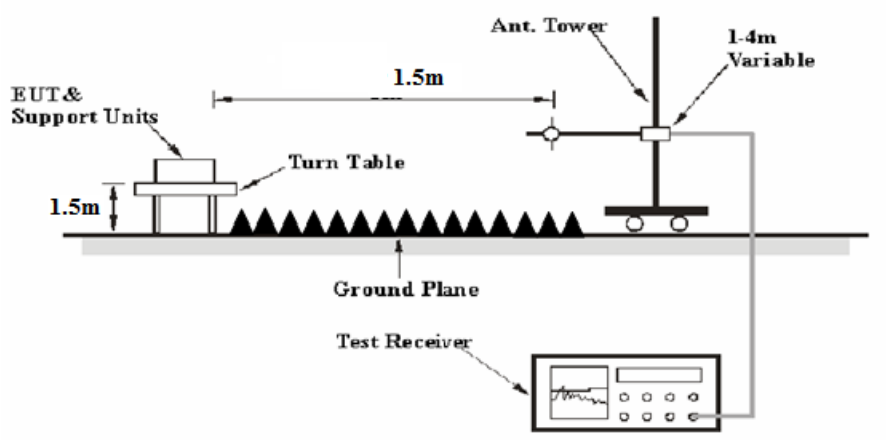
(7) The provisions of §15.205 apply to intentional radiators operating under this section.

EUT Setup

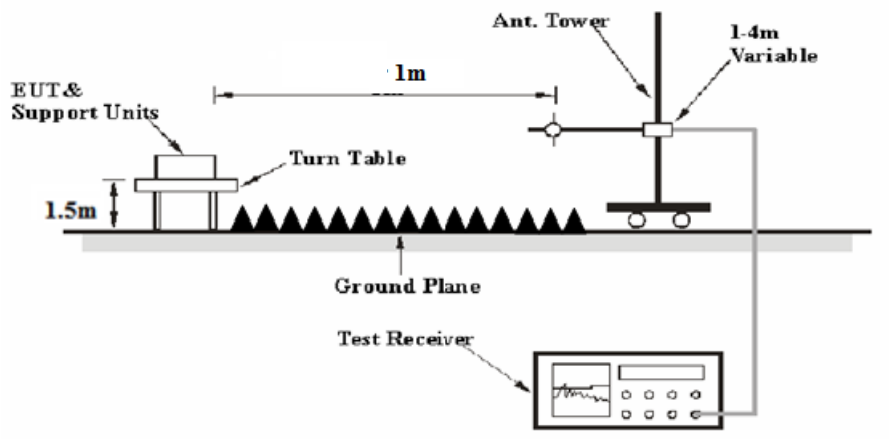
Below 1 GHz:



1-26.5 GHz:



26.5-40 GHz:



The radiated emission Below 1GHz tests were performed in the 10 meters chamber test site, above 1GHz tests were performed in the 3 meters chamber test site B, using the setup accordance with the ANSI C63.10-2013. The specification used was 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.

The spacing between the peripherals was 10 cm.

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:

30-1000MHz:

Measurement	RBW	Video B/W	IF B/W
QP	120 kHz	300 kHz	120kHz

1GHz- 40GHz:

Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
Ave.	>98%	1MHz	10 Hz
	<98%	1MHz	1/T

Note: T is minimum transmission duration

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

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

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 KDB 789033 D02 General UNII Test Procedures New Rules v02r01, emission shall be computed as: E [dBμV/m] = EIRP[dBm] + 95.2, for d = 3 meters.

According to C63.10, the above 1G test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 1.5m or 1m
Distance extrapolation factor =20 log (specific distance [3m]/test distance [1.5m]) dB= 6.02 dB
or
Distance extrapolation factor =20 log (specific distance [3m]/test distance [1m]) dB= 9.54 dB

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

Corrected Amplitude & Margin Calculation

For the range 30MHz-1GHz, the Corrected Amplitude 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:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

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

Margin = Limit - Corrected Amplitude

For the range 1GHz-40GHz, Test performed at 1.5m or 1m, the Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading and the Distance extrapolation factor. The basic equation is as follows:

Corrected Amplitude
= Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain-Distance extrapolation factor

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

Margin = Limit- Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiation Below 1GHz					
Sunol Sciences	Antenna	JB3	A060611-2	2017-08-25	2020-08-25
R&S	EMI Test Receiver	ESCI	100224	2019-09-12	2020-09-12
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2019-09-24	2020-09-24
Sonoma	Amplifier	310N	185914	2019-10-13	2020-10-13
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Radiation Above 1GHz					
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2017-12-06	2020-12-05
Ducommun Technolagies	Horn Antenna	ARH-2823-02	1007726-01 1302	2017-12-06	2020-12-05
R&S	Spectrum Analyzer	FSP 38	100478	2020-07-07	2021-07-07
Agilent	Spectrum Analyzer	E4440A	SG43360054	2020-07-07	2021-07-07
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2020-06-27	2021-06-27
Mini-Circuit	Amplifier	ZVA-213-S+	54201245	2019-09-05	2020-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2020-06-27	2021-06-27
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sinoscite	Bandstop Filters	BSF5150-5850MN-0899-003	0899003	2020-05-06	2021-05-06
Mini Circuits	High Pass Filter	VHF-6010+	31118	2020-06-16	2021-06-16

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

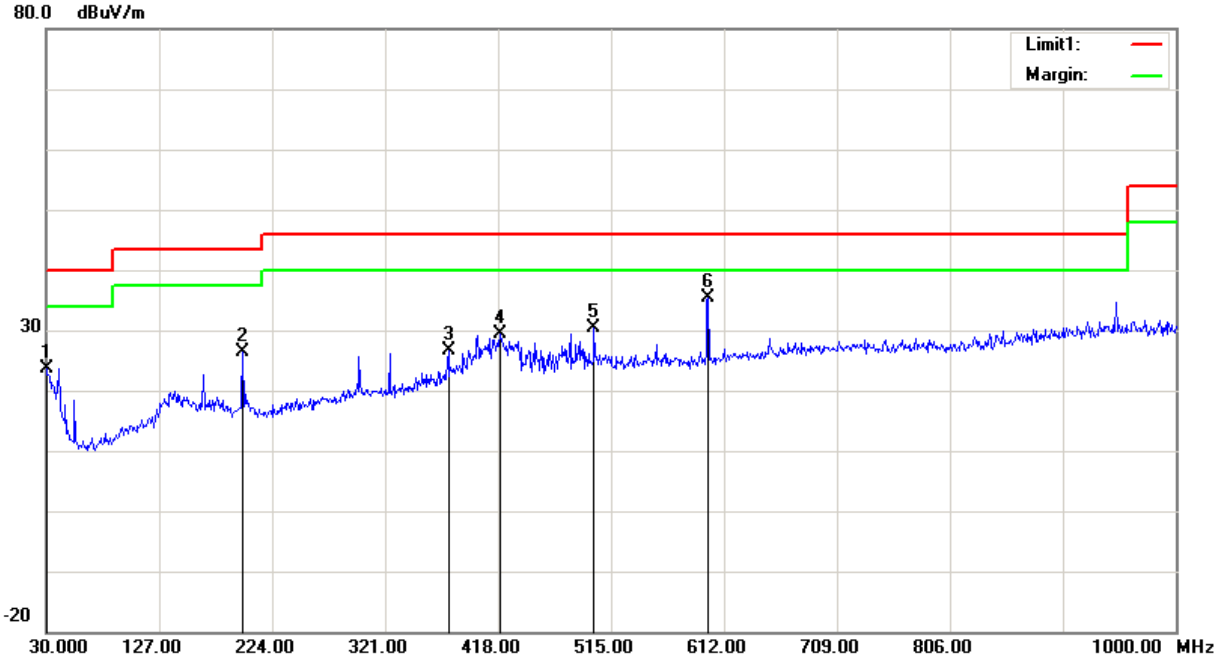
Environmental Conditions

Test Items	Radiation Below 1GHz	Radiation Above 1GHz
Temperature:	25.2 °C	29 °C
Relative Humidity:	39 %	45 %
ATM Pressure:	100.6 kPa	100.4 kPa
Tester:	Jackson Zhang	Bond Qin
Test Date:	2020-08-11	2020-08-25

Test Mode: Transmitting

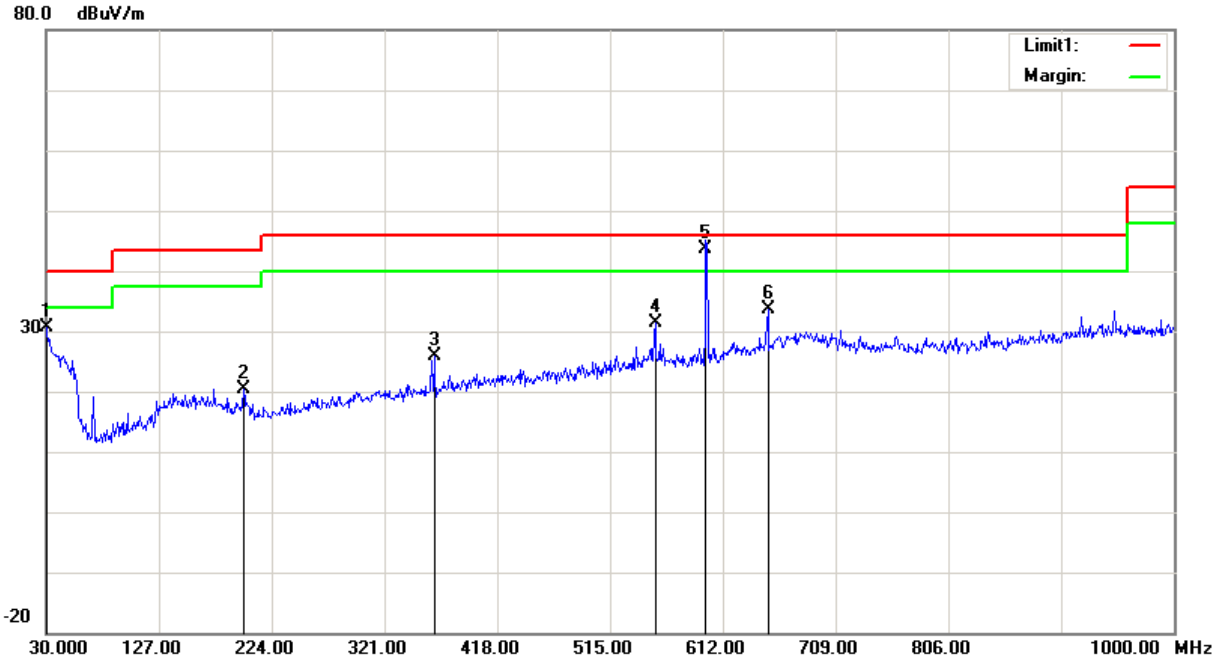
Below 1GHz:

Horizontal



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.0000	27.99	peak	-4.33	23.66	40.00	16.34
198.7800	35.90	peak	-9.56	26.34	43.50	17.16
375.3200	32.67	peak	-5.97	26.70	46.00	19.30
419.9400	34.06	peak	-4.68	29.38	46.00	16.62
500.4500	33.75	peak	-3.45	30.30	46.00	15.70
598.4200	36.74	peak	-1.42	35.32	46.00	10.68

Vertical



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.0000	34.86	peak	-4.33	30.53	40.00	9.47
199.7500	29.70	peak	-9.39	20.31	43.50	23.19
363.6800	32.03	peak	-6.13	25.90	46.00	20.10
553.8000	33.20	peak	-1.71	31.49	46.00	14.51
597.4500	44.99	QP	-1.44	43.55	46.00	2.45
650.8000	34.10	peak	-0.42	33.68	46.00	12.32

1GHz-40GHz:

5150-5250MHz

802.11a

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5180 MHz										
5180.00	83.10	PK	H	33.59	3.58	0.00	120.27	114.25	N/A	N/A
5180.00	73.15	AV	H	33.59	3.58	0.00	110.32	104.3	N/A	N/A
5180.00	77.65	PK	V	33.59	3.58	0.00	114.82	108.8	N/A	N/A
5180.00	67.69	AV	V	33.59	3.58	0.00	104.86	98.84	N/A	N/A
5150.00	32.45	PK	H	33.54	3.56	0.00	69.55	63.53	74.00	10.47
5150.00	21.24	AV	H	33.54	3.56	0.00	58.34	52.32	54.00	1.68
10360.00	48.23	PK	H	38.17	6.29	25.46	67.23	61.21	68.20	6.99
15540.00	43.24	PK	H	38.06	8.85	24.27	65.88	59.86	74.00	14.14
15540.00	29.26	AV	H	38.06	8.85	24.27	51.90	45.88	54.00	8.12
1920.00	52.56	PK	H	26.96	1.67	26.03	55.16	49.14	68.20	19.06
2390.00	51.83	PK	H	28.08	1.80	26.29	55.42	49.4	74.00	24.60
2390.00	46.58	AV	H	28.08	1.80	26.29	50.17	44.15	54.00	9.85
3450.00	45.56	PK	H	31.18	2.39	25.89	53.24	47.22	68.20	20.98
Middle Channel: 5200 MHz										
5200.00	83.52	PK	H	33.62	3.60	0.00	120.74	114.72	N/A	N/A
5200.00	73.61	AV	H	33.62	3.60	0.00	110.83	104.81	N/A	N/A
5200.00	77.89	PK	V	33.62	3.60	0.00	115.11	109.09	N/A	N/A
5200.00	67.90	AV	V	33.62	3.60	0.00	105.12	99.1	N/A	N/A
10400.00	47.00	PK	H	38.18	6.32	25.46	66.04	60.02	68.20	8.18
15600.00	42.30	PK	H	38.00	8.83	24.31	64.82	58.8	74.00	15.20
15600.00	28.41	AV	H	38.00	8.83	24.31	50.93	44.91	54.00	9.09
1920.00	51.88	PK	H	26.96	1.67	26.03	54.48	48.46	68.20	19.74
2390.00	51.66	PK	H	28.08	1.80	26.29	55.25	49.23	74.00	24.77
2390.00	46.10	AV	H	28.08	1.80	26.29	49.69	43.67	54.00	10.33
3450.00	44.56	PK	H	31.18	2.39	25.89	52.24	46.22	68.20	21.98
High Channel: 5240 MHz										
5240.00	84.29	PK	H	33.68	3.52	0.00	121.49	115.47	N/A	N/A
5240.00	74.26	AV	H	33.68	3.52	0.00	111.46	105.44	N/A	N/A
5240.00	78.45	PK	V	33.68	3.52	0.00	115.65	109.63	N/A	N/A
5240.00	68.54	AV	V	33.68	3.52	0.00	105.74	99.72	N/A	N/A
5350.00	29.70	PK	H	33.86	3.52	0.00	67.08	61.06	74.00	12.94
5350.00	17.83	AV	H	33.86	3.52	0.00	55.21	49.19	54.00	4.81
10480.00	46.77	PK	H	38.20	6.37	25.47	65.87	59.85	68.20	8.35
15720.00	41.00	PK	H	37.88	8.79	24.39	63.28	57.26	74.00	16.74
15720.00	28.81	AV	H	37.88	8.79	24.39	51.09	45.07	54.00	8.93
1920.00	51.87	PK	H	26.96	1.67	26.03	54.47	48.45	68.20	19.75
2390.00	51.74	PK	H	28.08	1.80	26.29	55.33	49.31	74.00	24.69
2390.00	46.58	AV	H	28.08	1.80	26.29	50.17	44.15	54.00	9.85
3450.00	44.50	PK	H	31.18	2.39	25.89	52.18	46.16	68.20	22.04

802.11n ht20

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5180 MHz										
5180.00	84.74	PK	H	33.59	3.58	0.00	121.91	115.89	N/A	N/A
5180.00	73.87	AV	H	33.59	3.58	0.00	111.04	105.02	N/A	N/A
5180.00	74.32	PK	V	33.59	3.58	0.00	111.49	105.47	N/A	N/A
5180.00	63.69	AV	V	33.59	3.58	0.00	100.86	94.84	N/A	N/A
5150.00	34.77	PK	H	33.54	3.56	0.00	71.87	65.85	74.00	8.15
5150.00	22.30	AV	H	33.54	3.56	0.00	59.40	53.38	54.00	0.62
10360.00	48.76	PK	H	38.17	6.29	25.46	67.76	61.74	68.20	6.46
15540.00	43.56	PK	H	38.06	8.85	24.27	66.20	60.18	74.00	13.82
15540.00	29.29	AV	H	38.06	8.85	24.27	51.93	45.91	54.00	8.09
1920.00	51.07	PK	H	26.96	1.67	26.03	53.67	47.65	68.20	20.55
2390.00	51.69	PK	H	28.08	1.80	26.29	55.28	49.26	74.00	24.74
2390.00	46.45	AV	H	28.08	1.80	26.29	50.04	44.02	54.00	9.98
3450.00	46.52	PK	H	31.18	2.39	25.89	54.20	48.18	68.20	20.02
Middle Channel: 5200 MHz										
5200.00	85.02	PK	H	33.62	3.60	0.00	122.24	116.22	N/A	N/A
5200.00	73.98	AV	H	33.62	3.60	0.00	111.20	105.18	N/A	N/A
5200.00	74.51	PK	V	33.62	3.60	0.00	111.73	105.71	N/A	N/A
5200.00	63.77	AV	V	33.62	3.60	0.00	100.99	94.97	N/A	N/A
10400.00	48.62	PK	H	38.18	6.32	25.46	67.66	61.64	68.20	6.56
15600.00	42.56	PK	H	38.00	8.83	24.31	65.08	59.06	74.00	14.94
15600.00	28.78	AV	H	38.00	8.83	24.31	51.30	45.28	54.00	8.72
1920.00	51.58	PK	H	26.96	1.67	26.03	54.18	48.16	68.20	20.04
2390.00	51.45	PK	H	28.08	1.80	26.29	55.04	49.02	74.00	24.98
2390.00	46.23	AV	H	28.08	1.80	26.29	49.82	43.8	54.00	10.20
3450.00	46.41	PK	H	31.18	2.39	25.89	54.09	48.07	68.20	20.13
High Channel: 5240 MHz										
5240.00	85.49	PK	H	33.68	3.52	0.00	122.69	116.67	N/A	N/A
5240.00	75.30	AV	H	33.68	3.52	0.00	112.50	106.48	N/A	N/A
5240.00	75.21	PK	V	33.68	3.52	0.00	112.41	106.39	N/A	N/A
5240.00	65.25	AV	V	33.68	3.52	0.00	102.45	96.43	N/A	N/A
5350.00	32.12	PK	H	33.86	3.52	0.00	69.50	63.48	74.00	10.52
5350.00	19.29	AV	H	33.86	3.52	0.00	56.67	50.65	54.00	3.35
10480.00	47.58	PK	H	38.20	6.37	25.47	66.68	60.66	68.20	7.54
15720.00	41.89	PK	H	37.88	8.79	24.39	64.17	58.15	74.00	15.85
15720.00	28.56	AV	H	37.88	8.79	24.39	50.84	44.82	54.00	9.18
1920.00	51.98	PK	H	26.96	1.67	26.03	54.58	48.56	68.20	19.64
2390.00	51.65	PK	H	28.08	1.80	26.29	55.24	49.22	74.00	24.78
2390.00	46.20	AV	H	28.08	1.80	26.29	49.79	43.77	54.00	10.23
3450.00	46.52	PK	H	31.18	2.39	25.89	54.20	48.18	68.20	20.02

5725-5850MHz
802.11a

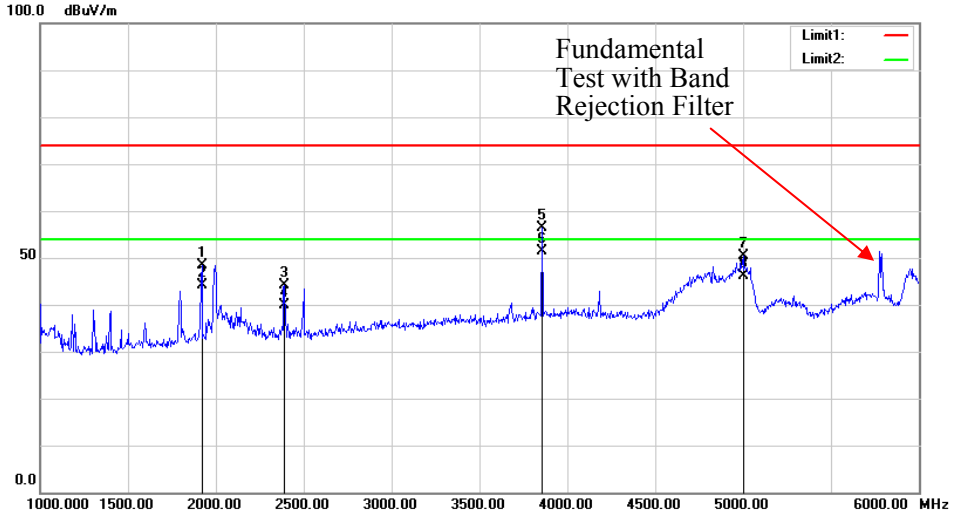
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5745 MHz										
5745.00	74.79	PK	H	34.20	3.69	0.00	112.68	106.66	N/A	N/A
5745.00	64.35	AV	H	34.20	3.69	0.00	102.24	96.22	N/A	N/A
5745.00	73.26	PK	V	34.20	3.69	0.00	111.15	105.13	N/A	N/A
5745.00	62.78	AV	V	34.20	3.69	0.00	100.67	94.65	N/A	N/A
5725.00	45.46	PK	H	34.19	3.69	0.00	83.34	77.32	122.20	44.88
5720.00	32.77	PK	H	34.19	3.69	0.00	70.65	64.63	110.80	46.17
5700.00	29.98	PK	H	34.18	3.68	0.00	67.84	61.82	105.20	43.38
5650.00	29.14	PK	H	34.16	3.63	0.00	66.93	60.91	68.20	7.29
11490.00	52.98	PK	H	38.99	6.59	25.51	73.05	67.03	74.00	6.97
11490.00	38.45	AV	H	38.99	6.59	25.51	58.52	52.5	54.00	1.50
17235.00	41.10	PK	H	41.56	8.78	23.72	67.72	61.7	68.20	6.50
1920.00	51.14	PK	H	26.96	1.67	26.03	53.74	47.72	68.20	20.48
2390.00	51.58	PK	H	28.08	1.80	26.29	55.17	49.15	74.00	24.85
2390.00	47.52	AV	H	28.08	1.80	26.29	51.11	45.09	54.00	8.91
3830.00	53.41	PK	H	32.03	2.51	25.79	62.16	56.14	74.00	17.86
3830.00	49.58	AV	H	32.03	2.51	25.79	58.33	52.31	54.00	1.69
Middle Channel: 5785 MHz										
5785.00	74.08	PK	H	34.21	3.71	0.00	112.00	105.98	N/A	N/A
5785.00	63.54	AV	H	34.21	3.71	0.00	101.46	95.44	N/A	N/A
5785.00	72.89	PK	V	34.21	3.71	0.00	110.81	104.79	N/A	N/A
5785.00	62.41	AV	V	34.21	3.71	0.00	100.33	94.31	N/A	N/A
11570.00	52.70	PK	H	39.00	6.61	25.46	72.85	66.83	74.00	7.17
11570.00	38.82	AV	H	39.00	6.61	25.46	58.97	52.95	54.00	1.05
17355.00	40.39	PK	H	42.26	8.81	23.60	67.86	61.84	68.20	6.36
1920.00	51.20	PK	H	26.96	1.67	26.03	53.80	47.78	68.20	20.42
2390.00	51.23	PK	H	28.08	1.80	26.29	54.82	48.8	74.00	25.20
2390.00	47.74	AV	H	28.08	1.80	26.29	51.33	45.31	54.00	8.69
3830.00	53.52	PK	H	32.03	2.51	25.79	62.27	56.25	74.00	17.75
3830.00	49.02	AV	H	32.03	2.51	25.79	57.77	51.75	54.00	2.25

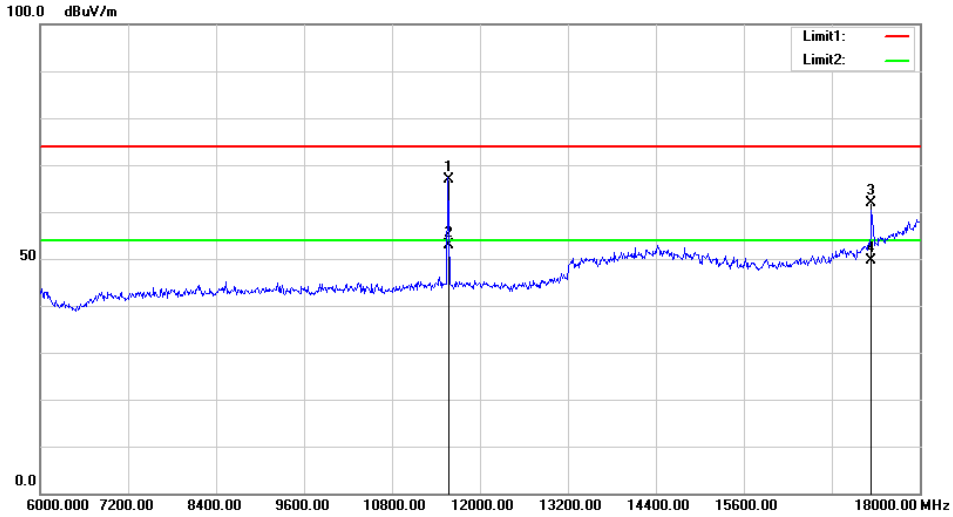
High Channel: 5825 MHz										
5825.00	74.12	PK	H	34.23	3.73	0.00	112.08	106.06	N/A	N/A
5825.00	63.96	AV	H	34.23	3.73	0.00	101.92	95.9	N/A	N/A
5825.00	72.41	PK	V	34.23	3.73	0.00	110.37	104.35	N/A	N/A
5825.00	62.02	AV	V	34.23	3.73	0.00	99.98	93.96	N/A	N/A
5850.00	31.53	PK	H	34.24	3.75	0.00	69.52	63.5	122.20	58.70
5855.00	29.78	PK	H	34.24	3.75	0.00	67.77	61.75	110.80	49.05
5875.00	28.87	PK	H	34.25	3.77	0.00	66.89	60.87	105.20	44.33
5925.00	27.71	PK	H	34.27	3.80	0.00	65.78	59.76	68.20	8.44
11650.00	53.46	PK	H	39.00	6.64	25.41	73.69	67.67	74.00	6.33
11650.00	38.20	AV	H	39.00	6.64	25.41	58.43	52.41	54.00	1.59
17475.00	40.30	PK	H	42.96	8.84	23.48	68.62	62.6	68.20	5.60
1920.00	51.56	PK	H	26.96	1.67	26.03	54.16	48.14	68.20	20.06
2390.00	51.26	PK	H	28.08	1.80	26.29	54.85	48.83	74.00	25.17
2390.00	47.36	AV	H	28.08	1.80	26.29	50.95	44.93	54.00	9.07
3830.00	53.89	PK	H	32.03	2.51	25.79	62.64	56.62	74.00	17.38
3830.00	49.41	AV	H	32.03	2.51	25.79	58.16	52.14	54.00	1.86

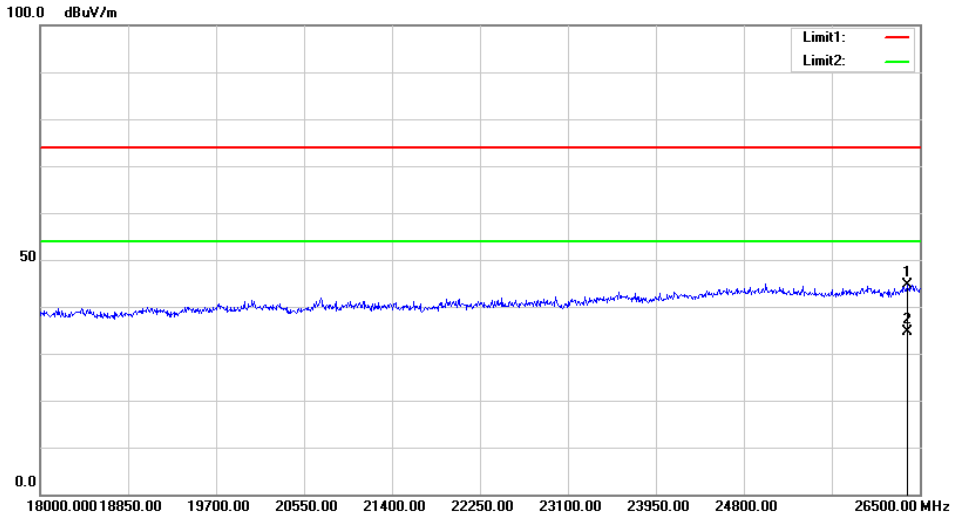
802.11n ht20

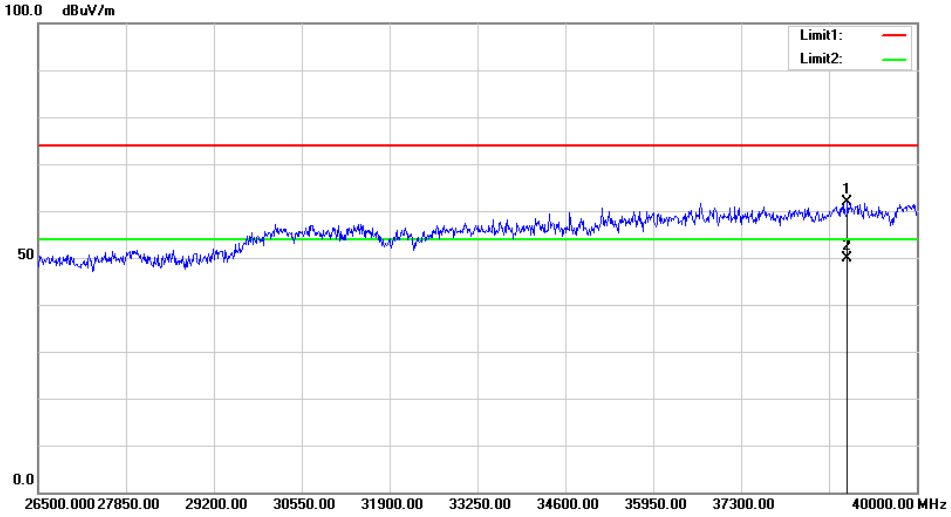
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5745 MHz										
5745.00	74.78	PK	H	34.20	3.69	0.00	112.67	106.65	N/A	N/A
5745.00	64.46	AV	H	34.20	3.69	0.00	102.35	96.33	N/A	N/A
5745.00	72.46	PK	V	34.20	3.69	0.00	110.35	104.33	N/A	N/A
5745.00	62.12	AV	V	34.20	3.69	0.00	100.01	93.99	N/A	N/A
5725.00	45.75	PK	H	34.19	3.69	0.00	83.63	77.61	122.20	44.59
5720.00	39.07	PK	H	34.19	3.69	0.00	76.95	70.93	110.80	39.87
5700.00	29.78	PK	H	34.18	3.68	0.00	67.64	61.62	105.20	43.58
5650.00	27.70	PK	H	34.16	3.63	0.00	65.49	59.47	68.20	8.73
11490.00	53.03	PK	H	38.99	6.59	25.51	73.10	67.08	74.00	6.92
11490.00	37.16	AV	H	38.99	6.59	25.51	57.23	51.21	54.00	2.79
17235.00	40.71	PK	H	41.56	8.78	23.72	67.33	61.31	68.20	6.89
1920.00	50.58	PK	H	26.96	1.67	26.03	53.18	47.16	68.20	21.04
2390.00	50.58	PK	H	28.08	1.80	26.29	54.17	48.15	74.00	25.85
2390.00	46.36	AV	H	28.08	1.80	26.29	49.95	43.93	54.00	10.07
3450.00	46.52	PK	H	31.18	2.39	25.89	54.20	48.18	68.20	20.02
Middle Channel: 5785 MHz										
5785.00	74.23	PK	H	34.21	3.71	0.00	112.15	106.13	N/A	N/A
5785.00	63.85	AV	H	34.21	3.71	0.00	101.77	95.75	N/A	N/A
5785.00	72.23	PK	V	34.21	3.71	0.00	110.15	104.13	N/A	N/A
5785.00	61.90	AV	V	34.21	3.71	0.00	99.82	93.8	N/A	N/A
11570.00	53.21	PK	H	39.00	6.61	25.46	73.36	67.34	74.00	6.66
11570.00	37.35	AV	H	39.00	6.61	25.46	57.50	51.48	54.00	2.52
17355.00	40.53	PK	H	42.26	8.81	23.60	68.00	61.98	68.20	6.22
1920.00	50.15	PK	H	26.96	1.67	26.03	52.75	46.73	68.20	21.47
2390.00	50.25	PK	H	28.08	1.80	26.29	53.84	47.82	74.00	26.18
2390.00	46.26	AV	H	28.08	1.80	26.29	49.85	43.83	54.00	10.17
3450.00	46.33	PK	H	31.18	2.39	25.89	54.01	47.99	68.20	20.21
High Channel: 5825 MHz										
5825.00	74.17	PK	H	34.23	3.73	0.00	112.13	106.11	N/A	N/A
5825.00	64.01	AV	H	34.23	3.73	0.00	101.97	95.95	N/A	N/A
5825.00	71.87	PK	V	34.23	3.73	0.00	109.83	103.81	N/A	N/A
5825.00	61.58	AV	V	34.23	3.73	0.00	99.54	93.52	N/A	N/A
5850.00	35.66	PK	H	34.24	3.75	0.00	73.65	67.63	122.20	54.57
5855.00	29.97	PK	H	34.24	3.75	0.00	67.96	61.94	110.80	48.86
5875.00	27.66	PK	H	34.25	3.77	0.00	65.68	59.66	105.20	45.54
5925.00	27.96	PK	H	34.27	3.80	0.00	66.03	60.01	68.20	8.19
11650.00	53.41	PK	H	39.00	6.64	25.41	73.64	67.62	74.00	6.38
11650.00	37.89	AV	H	39.00	6.64	25.41	58.12	52.1	54.00	1.90
17475.00	41.02	PK	H	42.96	8.84	23.48	69.34	63.32	68.20	4.88
1920.00	50.52	PK	H	26.96	1.67	26.03	53.12	47.1	68.20	21.10
2390.00	50.58	PK	H	28.08	1.80	26.29	54.17	48.15	74.00	25.85
2390.00	46.50	AV	H	28.08	1.80	26.29	50.09	44.07	54.00	9.93
3450.00	46.41	PK	H	31.18	2.39	25.89	54.09	48.07	68.20	20.13

Test Plots(802.11a 5785MHz)
Horizontal

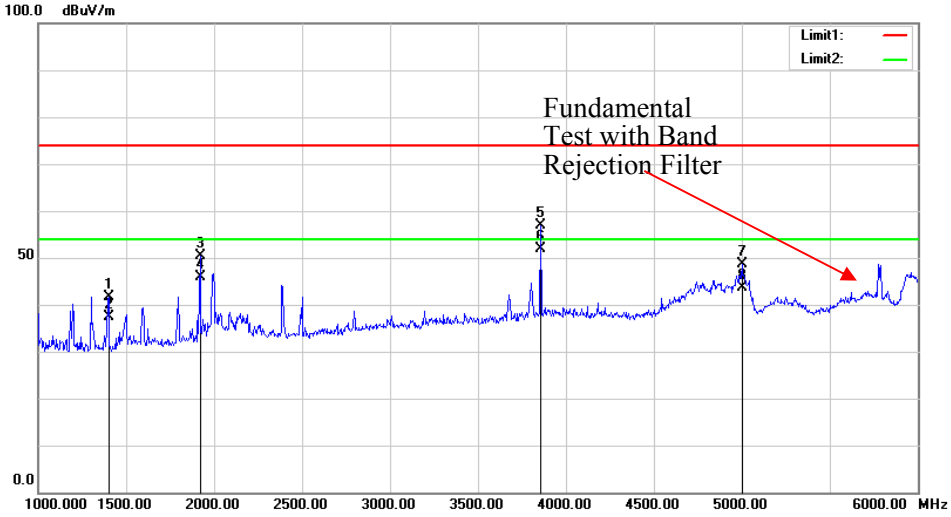


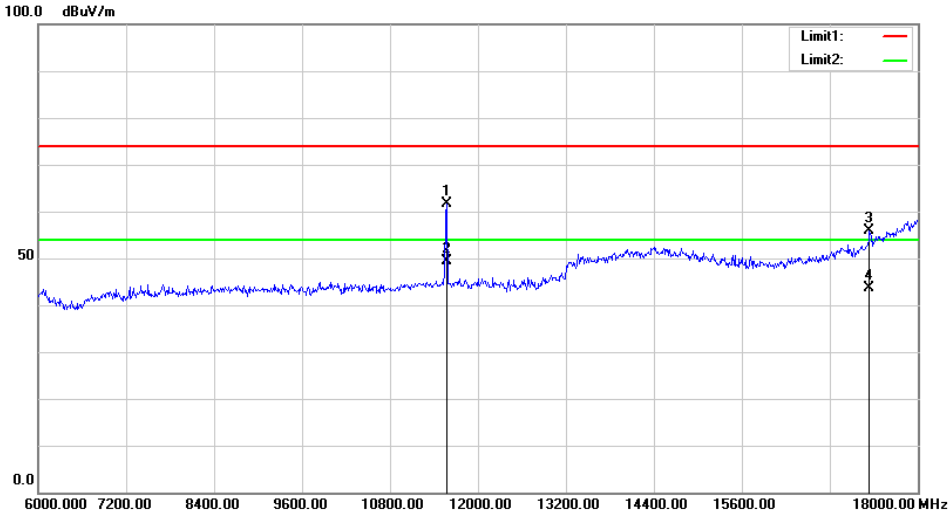


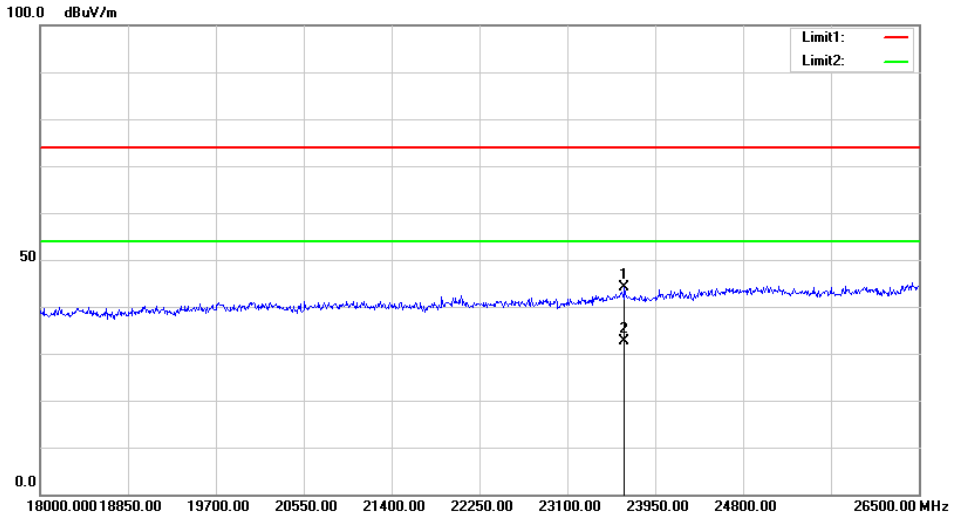


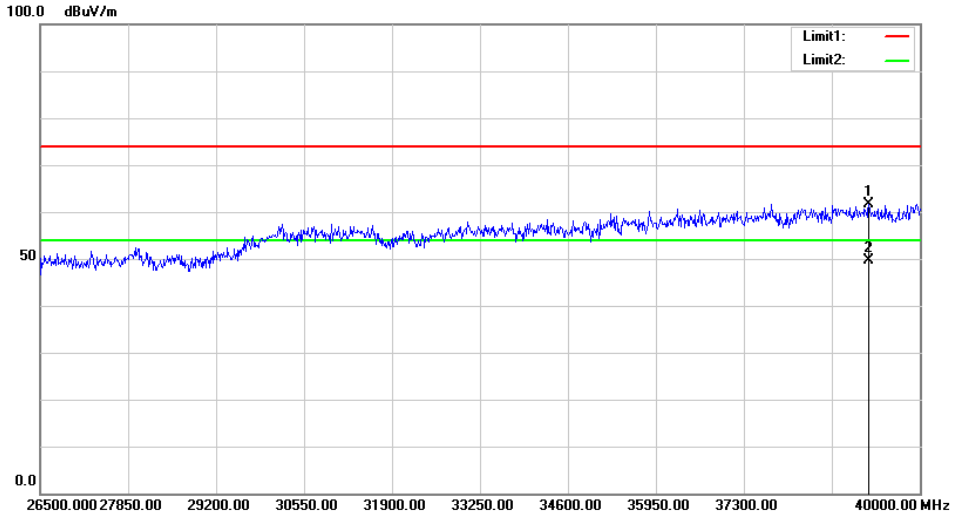

100.0 dBuV/m
Limit1:
Limit2:
50
0.0
26500.000 27850.00 29200.00 30550.00 31900.00 33250.00 34600.00 35950.00 37300.00 40000.00 MHz

Vertical


100.0 dBuV/m
Limit1:
Limit2:
Fundamental
Test with Band
Rejection Filter
50
0.0
1000.000 1500.00 2000.00 2500.00 3000.00 3500.00 4000.00 4500.00 5000.00 6000.00 MHz


100.0 dBuV/m
Limit1:
Limit2:
50
0.0
6000.000 7200.00 8400.00 9600.00 10800.00 12000.00 13200.00 14400.00 15600.00 18000.00 MHz


100.0 dBuV/m
Limit1:
Limit2:
50
0.0
1
2
18000.000 18850.00 19700.00 20550.00 21400.00 22250.00 23100.00 23950.00 24800.00 26500.00 MHz


100.0 dBuV/m
Limit1:
Limit2:
50
0.0
1
2
26500.000 27850.00 29200.00 30550.00 31900.00 33250.00 34600.00 35950.00 37300.00 40000.00 MHz

FCC §15.407(a)(e)–EMISSION BANDWIDTH AND OCCUPIED BANDWIDTH

Applicable Standard

15.407(a) (e)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2020-07-07	2021-07-07
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Test Data

Environmental Conditions

Temperature:	27.3 °C
Relative Humidity:	65 %
ATM Pressure:	100.6 kPa
Tester:	Rita Huang
Test Date:	2020-09-07

Test Result: Pass.

Please refer to the following tables and plots.

Test mode: Transmitting

5150-5250MHz:

Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11 a	5180	27.520	17.600
	5200	29.200	17.920
	5240	31.360	19.280
802.11n ht20	5180	28.160	18.640
	5200	29.760	18.800
	5240	30.800	19.760

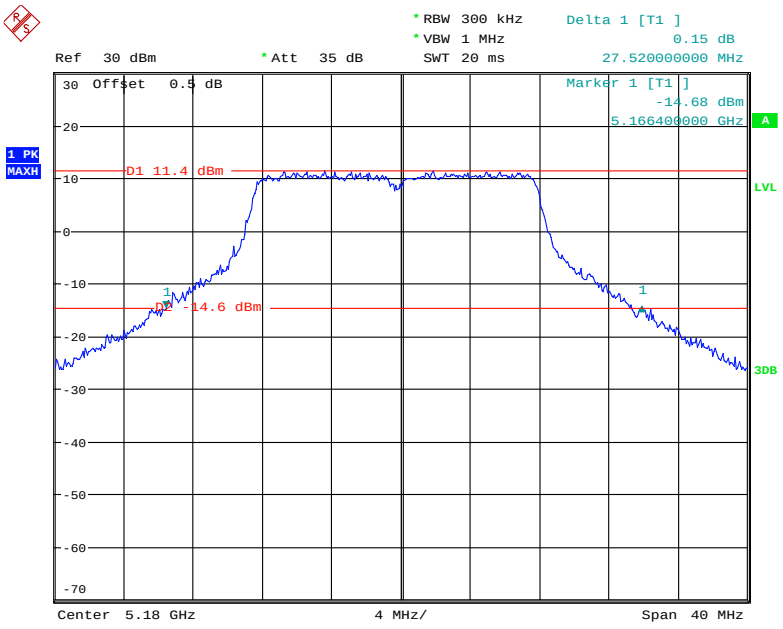
5725-5850MHz:

Mode	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11 a	5745	16.400	20.800
	5785	16.400	20.880
	5825	16.400	20.880
802.11n ht20	5745	17.600	21.200
	5785	17.600	21.040
	5825	17.520	20.960

Note: the 99% Occupied Bandwidth have not fall into the band 5250-5350MHz or 5470-5725MHz, please refer to the test plots of 99% Occupied Bandwidth.

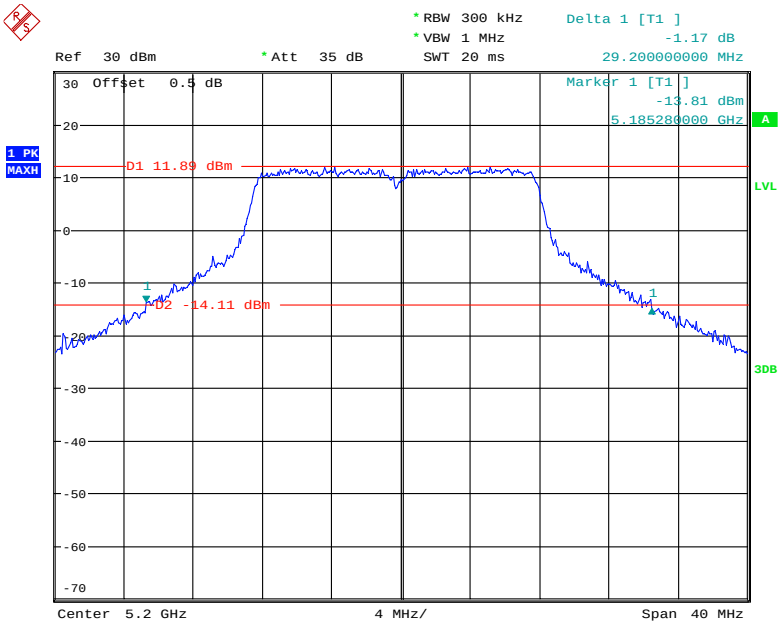
5150-5250MHz:
26dB Emission Bandwidth:

802.11a Low Channel



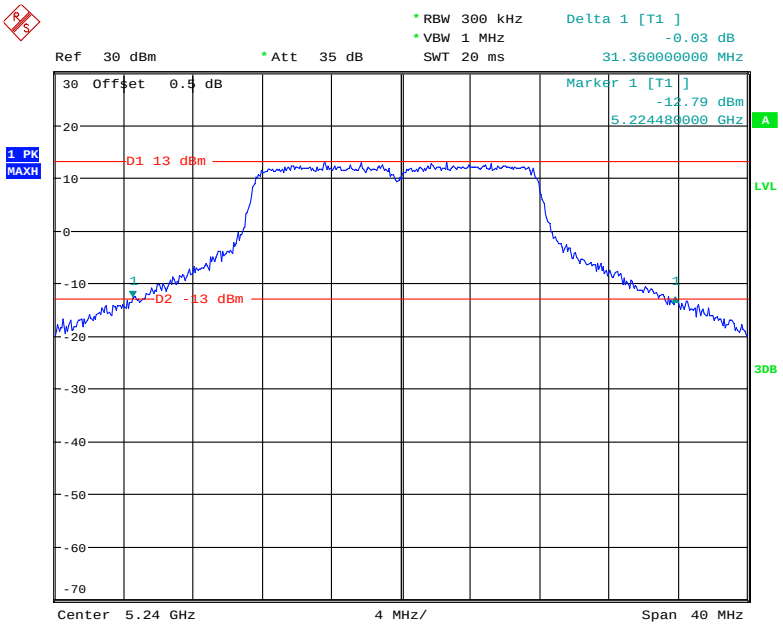
Date: 7.SEP.2020 16:39:39

802.11a Middle Channel



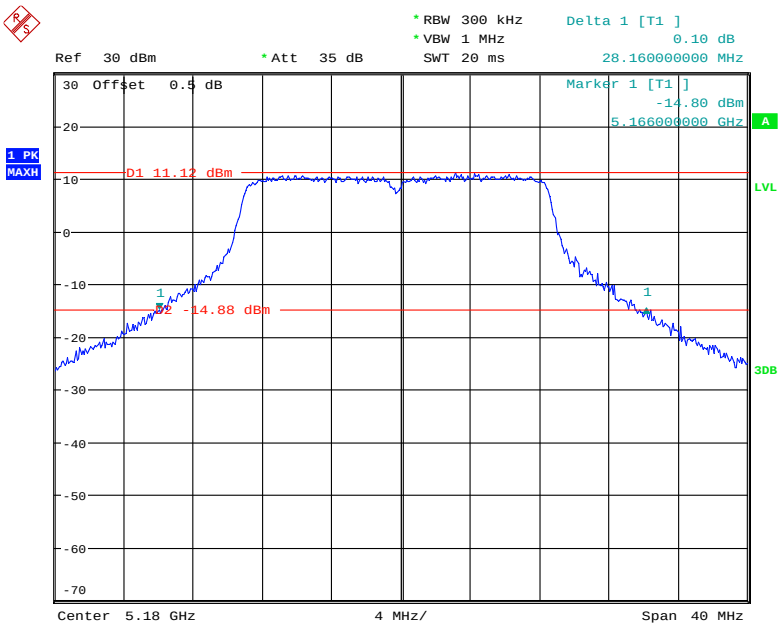
Date: 7.SEP.2020 16:41:42

802.11a High Channel



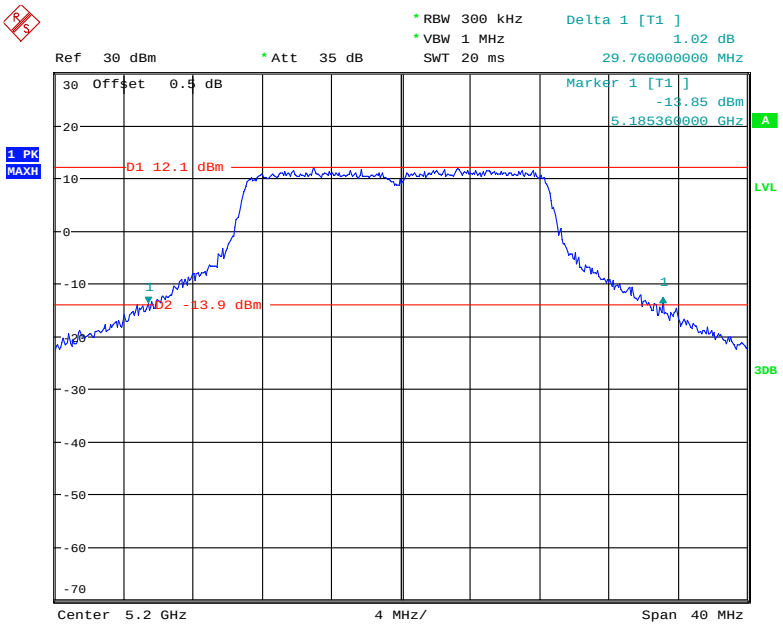
Date: 7.SEP.2020 16:54:56

802.11n ht20 Low Channel



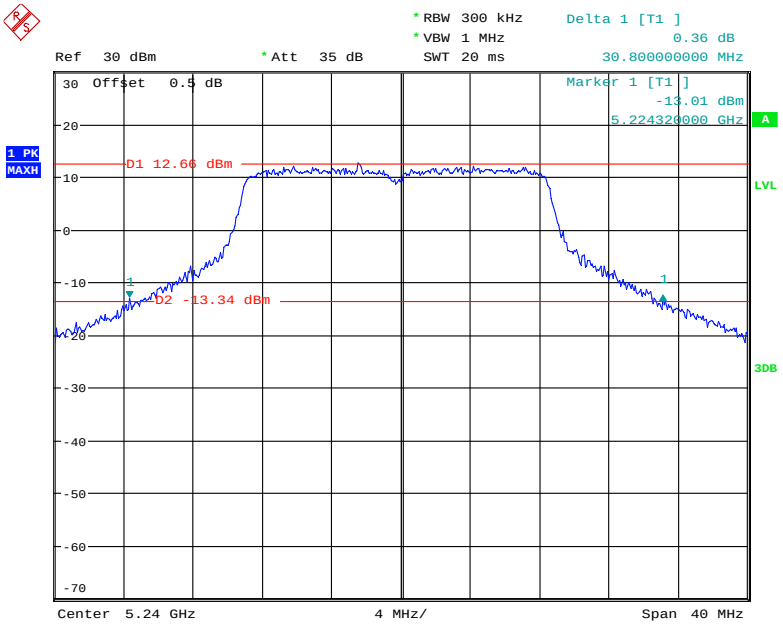
Date: 7.SEP.2020 16:55:44

802.11n ht20 Middle Channel



Date: 7.SEP.2020 16:57:15

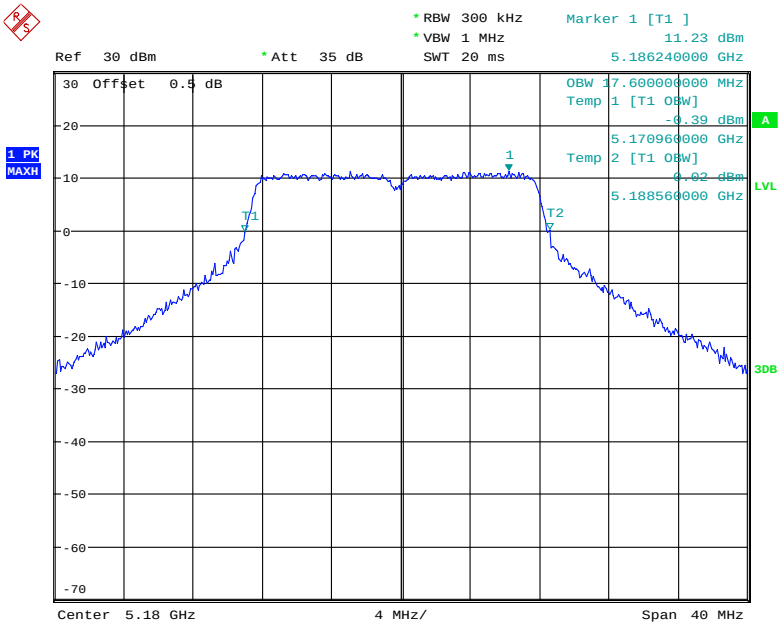
802.11n ht20 High Channel



Date: 7.SEP.2020 17:02:55

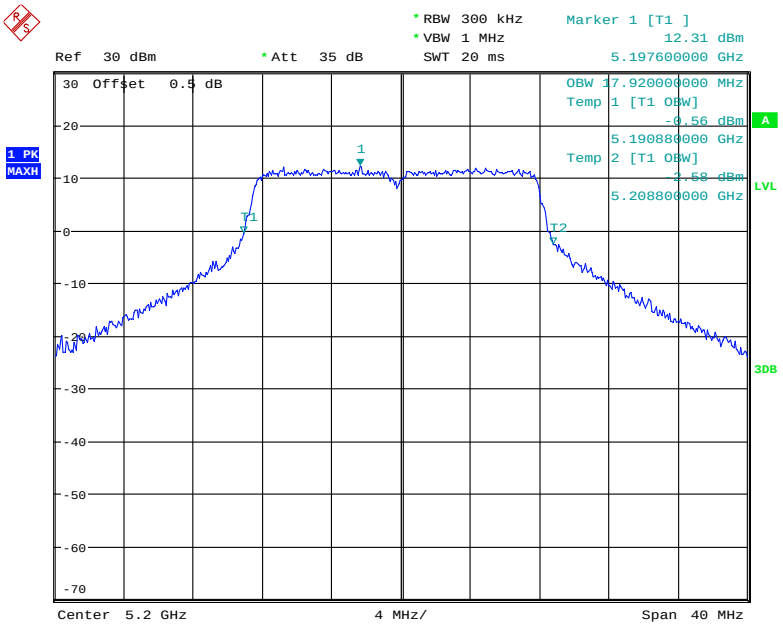
99% Occupied Bandwidth:

802.11a Low Channel



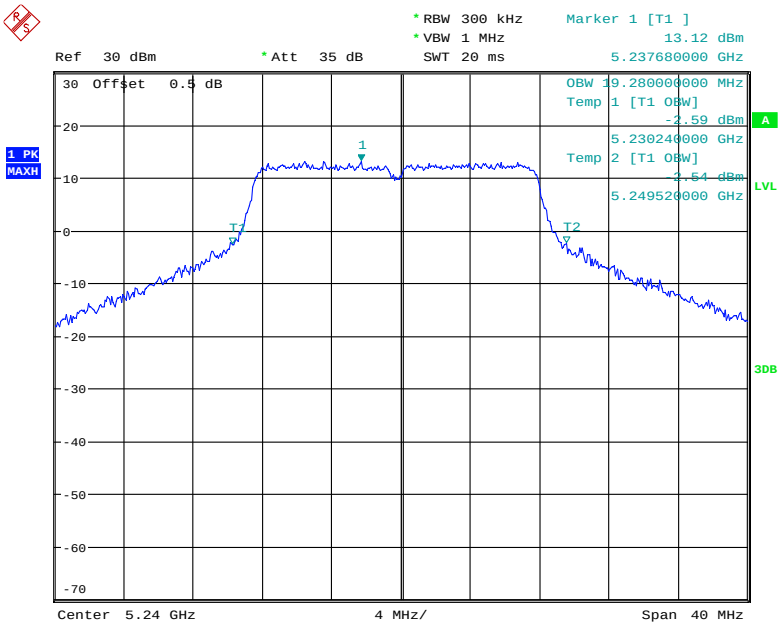
Date: 7.SEP.2020 16:39:53

802.11a Middle Channel



Date: 7.SEP.2020 16:41:58

802.11a High Channel



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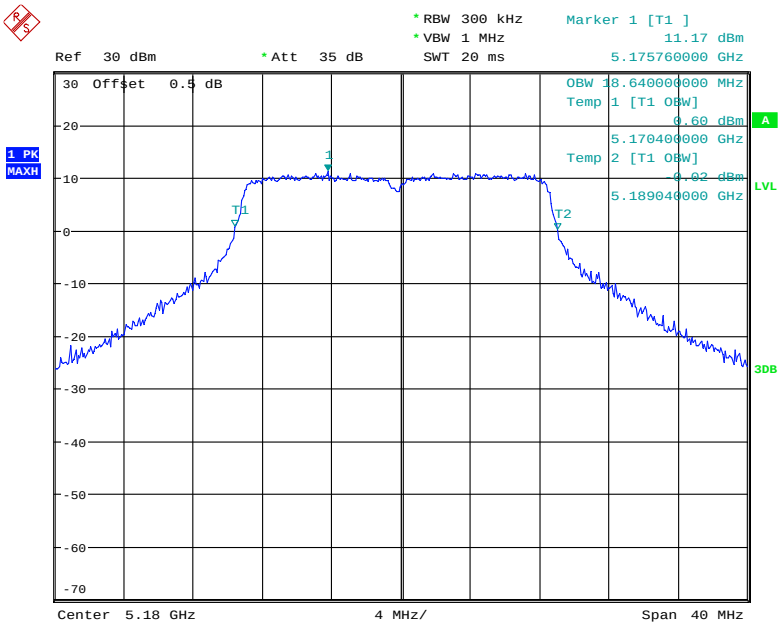
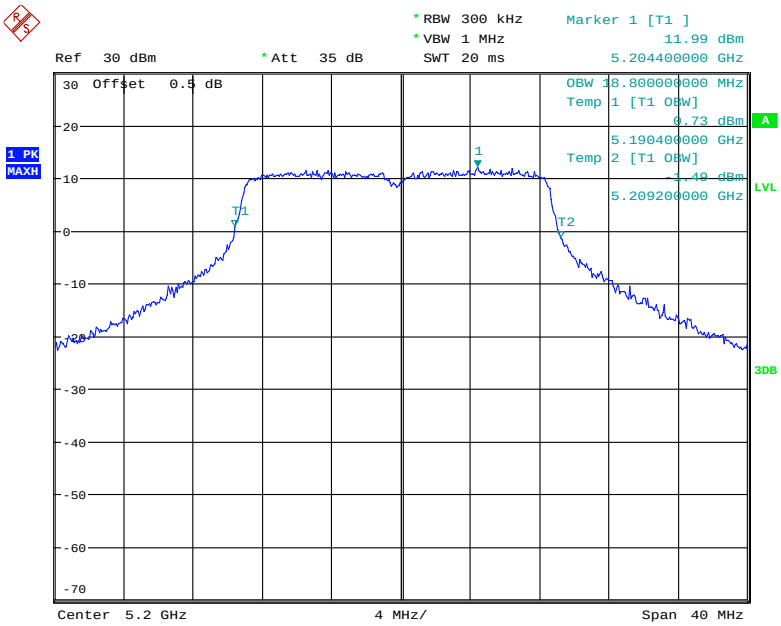
802.11n ht20 Low Channel



Date: 7.SEP.2020 16:55:58

802.11n ht20 Middle Channel



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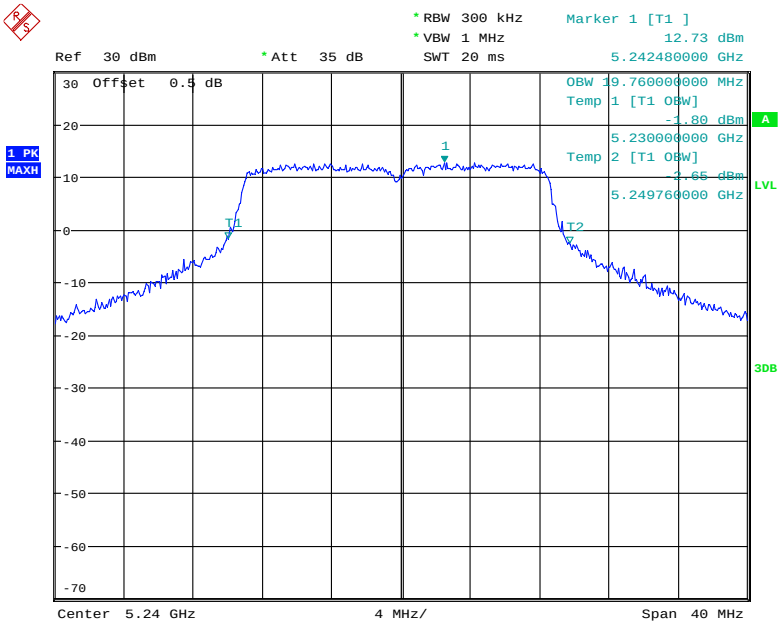
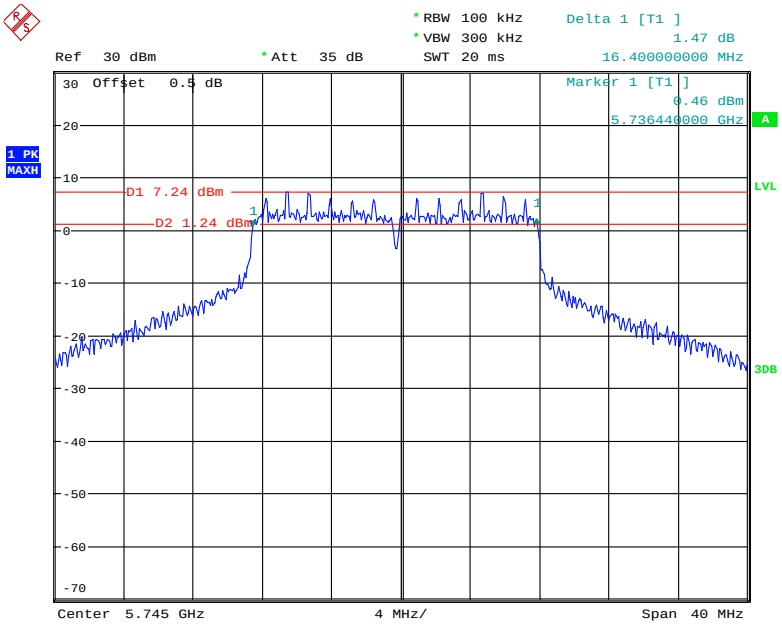
802.11n ht20 High Channel



Date: 7.SEP.2020 16:58:24

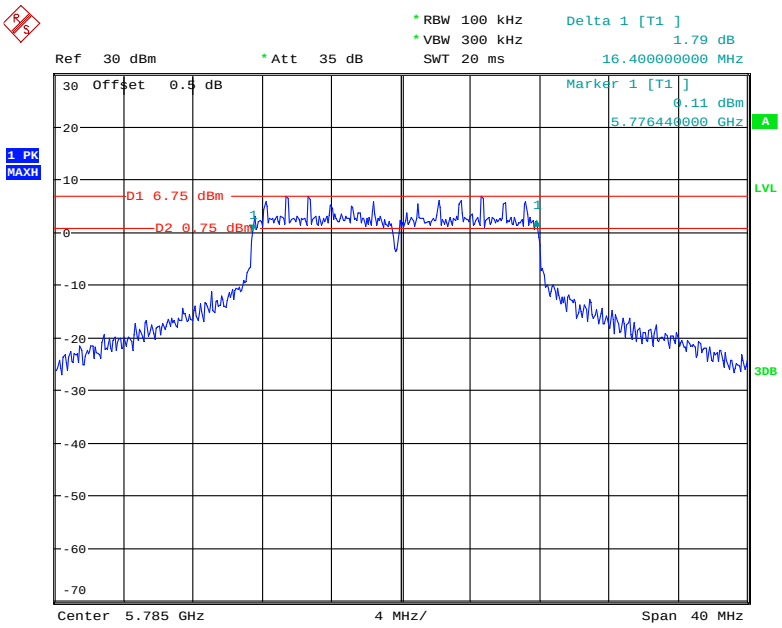
5725-5850MHz:
6dB Emission Bandwidth:

802.11a Low Channel



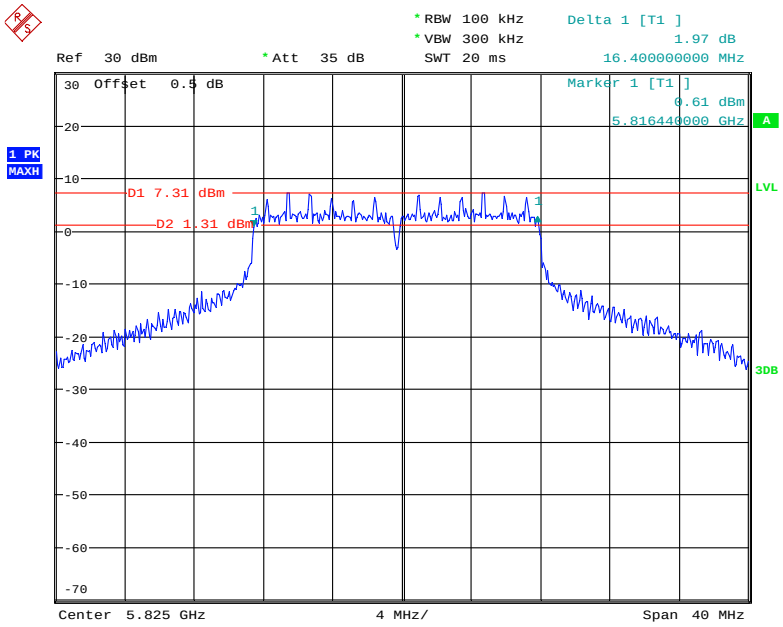
Date: 7.SEP.2020 17:07:46

802.11a Middle Channel



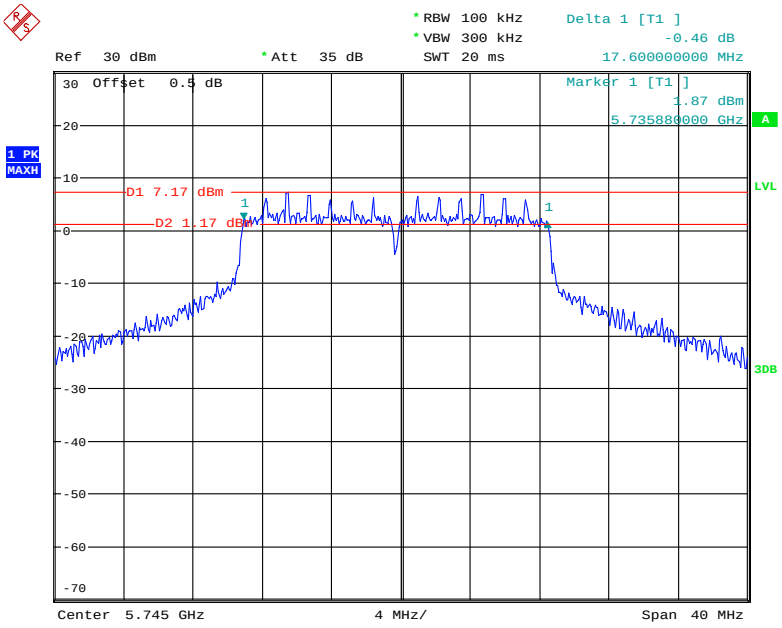
Date: 7.SEP.2020 17:09:26

802.11a High Channel



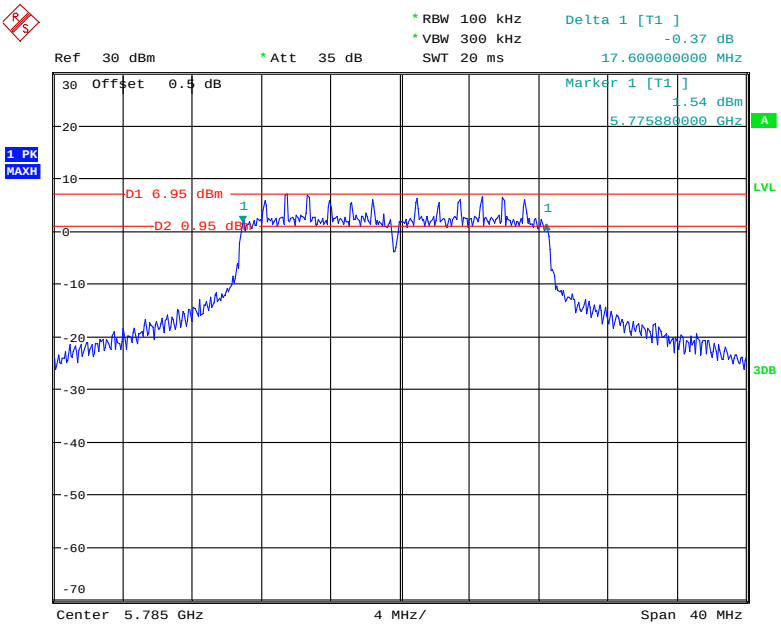
Date: 7.SEP.2020 17:13:22

802.11n ht20 Low Channel



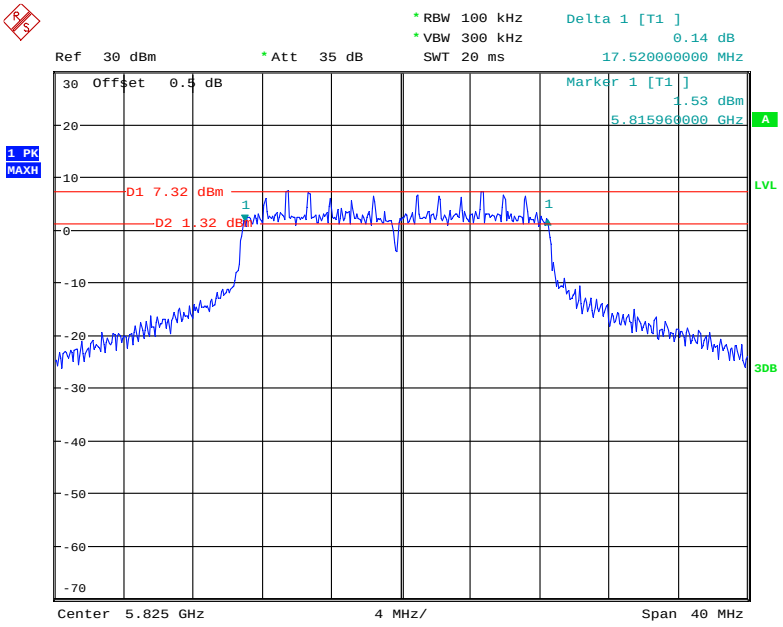
Date: 7.SEP.2020 17:17:16

802.11n ht20 Middle Channel



Date: 7.SEP.2020 17:15:17

802.11n ht20 High Channel



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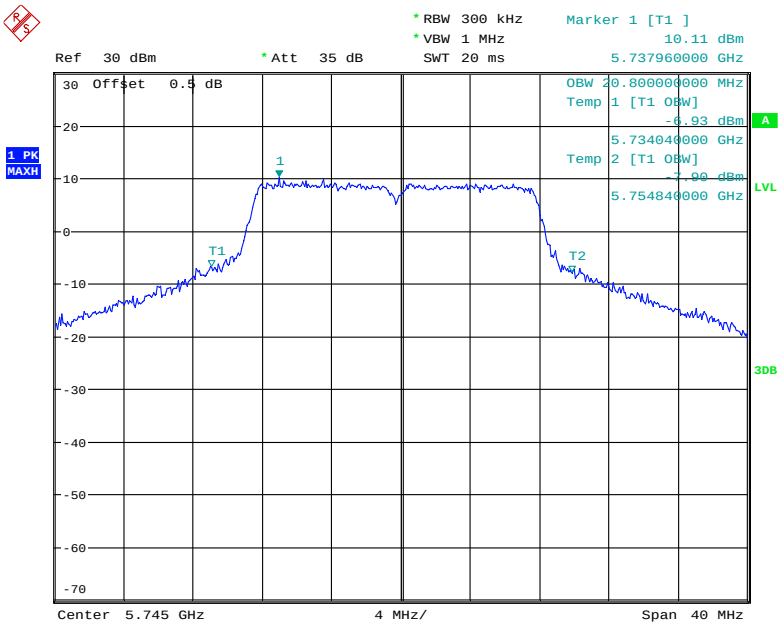
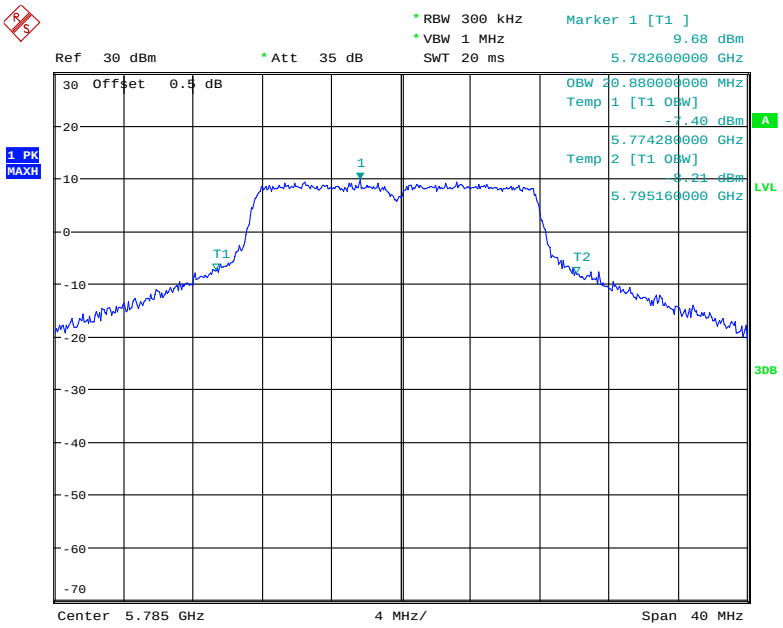
99% Occupied Bandwidth:

802.11a Low Channel



Date: 7.SEP.2020 17:08:55

802.11a Middle Channel



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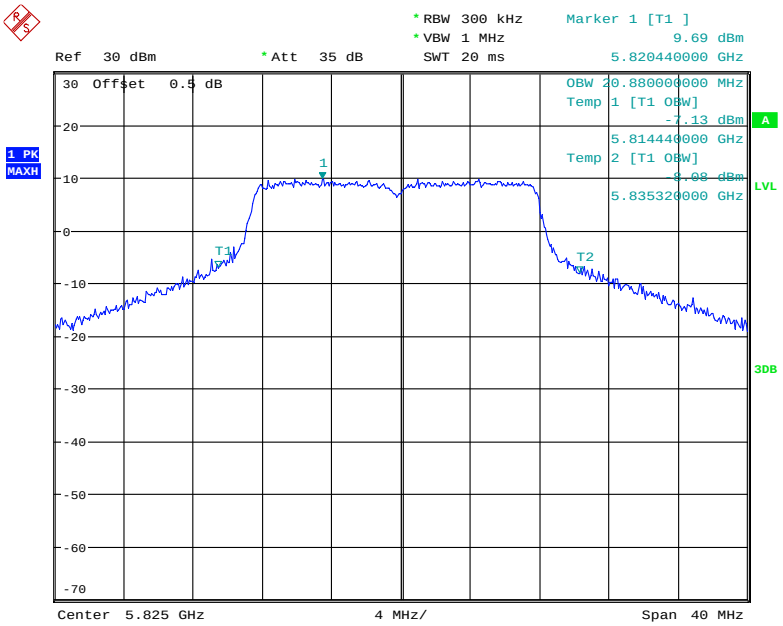
802.11a High Channel



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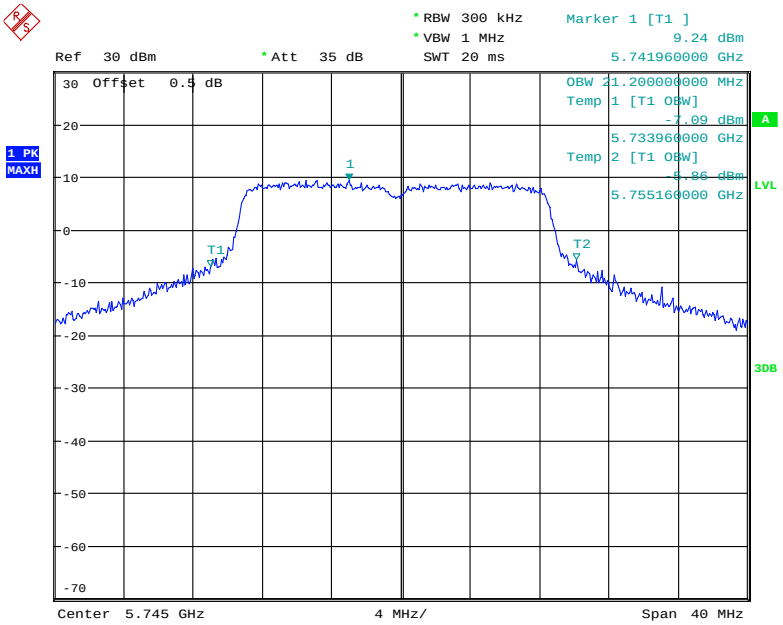
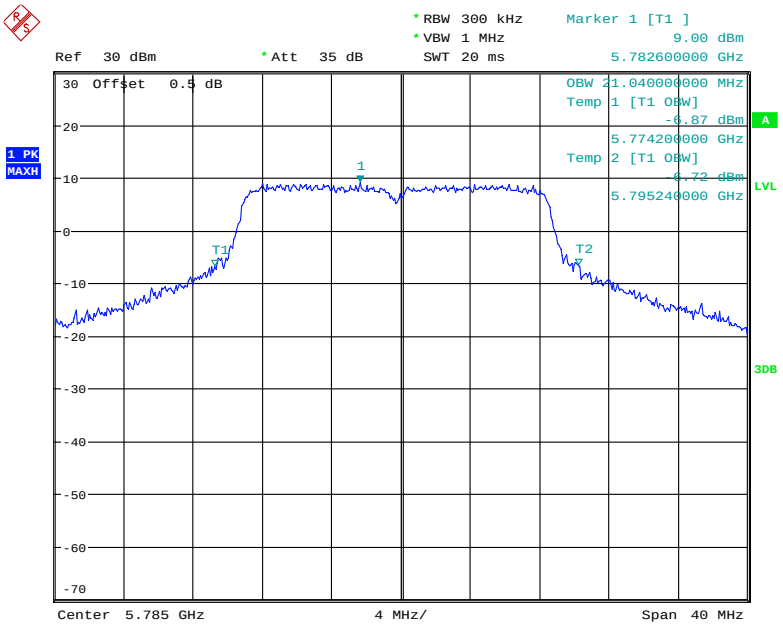
802.11n ht20 Low Channel



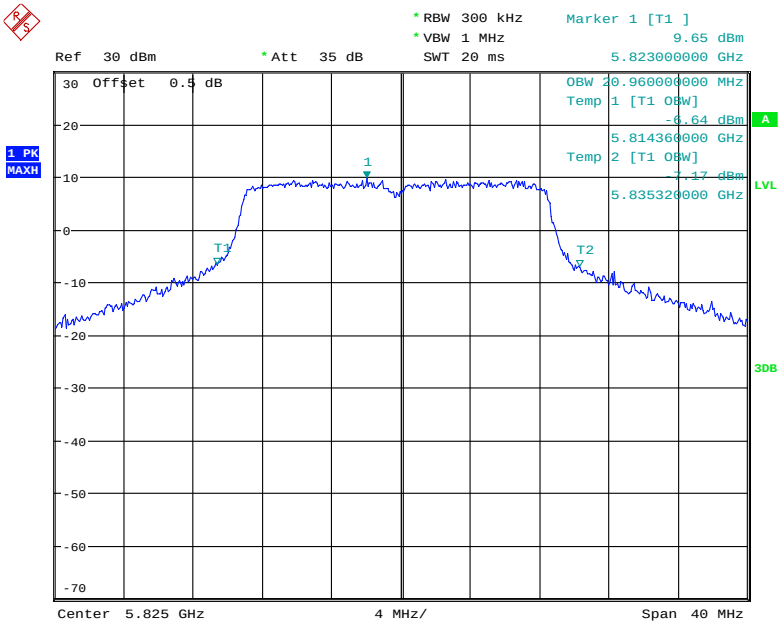
Date: 7.SEP.2020 17:17:28

802.11n ht20 Middle Channel



Date: 7.SEP.2020 17:15:29

802.11n ht20 High Channel



Date: 7.SEP.2020 17:14:36

FCC §15.407(a) –MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) 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.

(iii) For fixed point-to-point access points 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. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. 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.

(iv) For mobile and portable 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.

(2) 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.

(3) 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.

(4) The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Coaxial Attenuators	EMCA10-5RN-6	OE01203239	Each time	N/A
Agilent	USB Wideband Power Sensor	U2022XA	MY5417006	2019-09-23	2020-09-23

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Test Data

Environmental Conditions

Temperature:	27.3 °C
Relative Humidity:	65 %
ATM Pressure:	100.6 kPa
Tester:	Rita Huang
Test Date:	2020-09-07

Test Mode: Transmitting

Band	Mode	Frequency (MHz)	Conducted Average Output Power (dBm)	Limit (dBm)
5150 - 5250 MHz	802.11 a	5180	18.86	30
		5200	19.23	30
		5240	20.38	30
	802.11n ht20	5180	18.64	30
		5200	19.17	30
		5240	20.25	30
5725 - 5850 MHz	802.11 a	5745	17.62	30
		5785	17.40	30
		5825	17.35	30
	802.11n ht20	5745	17.54	30
		5785	17.22	30
		5825	17.25	30

Note:
The device is an indoor AP.
The duty cycle factor has been calculated into the test data.

FCC §15.407(a) - POWER SPECTRAL DENSITY

Applicable Standard

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) 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.

(iii) For fixed point-to-point access points 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. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. 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.

(iv) For mobile and portable 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.

(2) 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.

(3) 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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2020-07-07	2021-07-07
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	27.3 °C
Relative Humidity:	65 %
ATM Pressure:	100.6 kPa
Tester:	Rita Huang
Test Date:	2020-09-07

Test Mode: Transmitting

Test Result:Compliance.Please refer to the following table and plot.

5150-5250MHz

Mode	Frequency (MHz)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)
802.11a	5180	8.50	17
	5200	9.11	17
	5240	10.40	17
802.11n ht20	5180	8.70	17
	5200	9.37	17
	5240	10.45	17

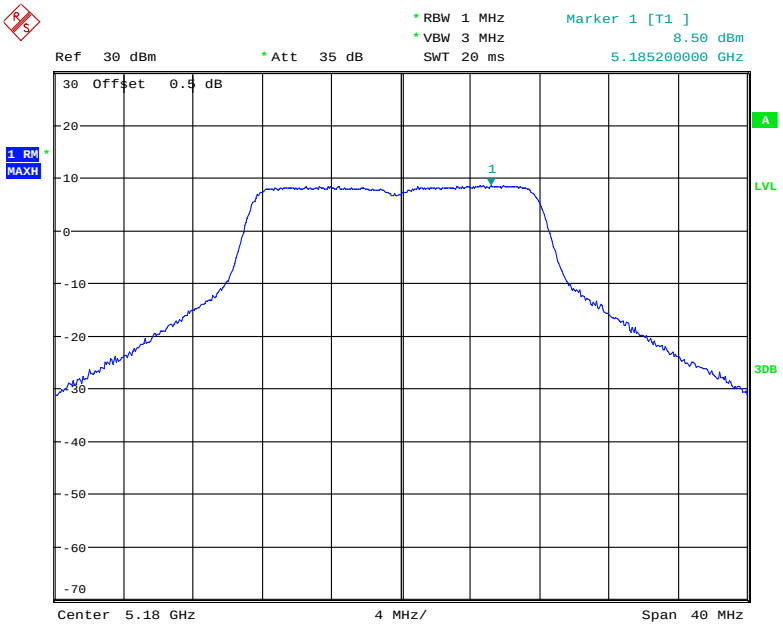
5725-5850MHz

Mode	Frequency (MHz)	Reading (dBm/300kHz)	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)
802.11a	5745	3.44	5.66	30
	5785	3.38	5.6	30
	5825	3.69	5.91	30
802.11n ht20	5745	3.81	6.03	30
	5785	3.59	5.81	30
	5825	3.92	6.14	30

Note:
For 5.8GHz band, If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
Method SA-3 in KDB 789033 D02 General UNII Test Procedures New Rules v02r01was used for PSD test.

5150-5250MHz

802.11a Low Channel



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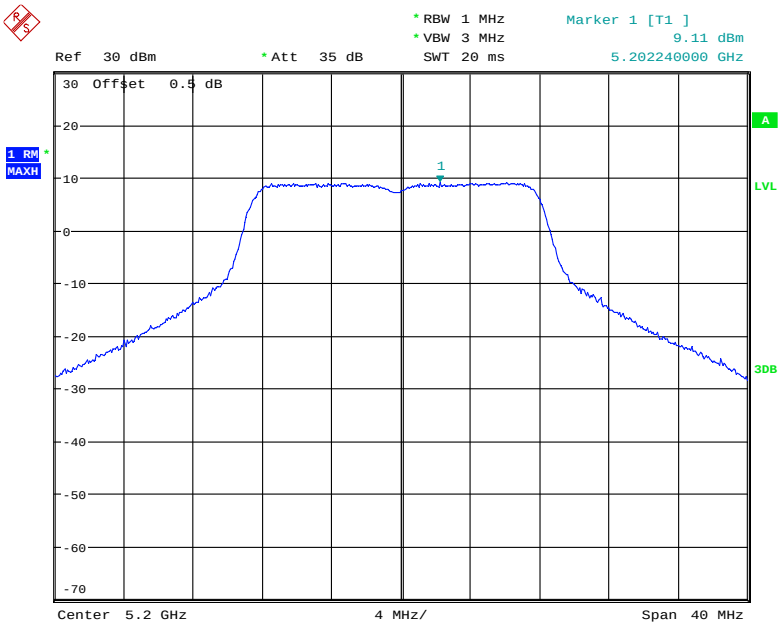
802.11a Middle Channel



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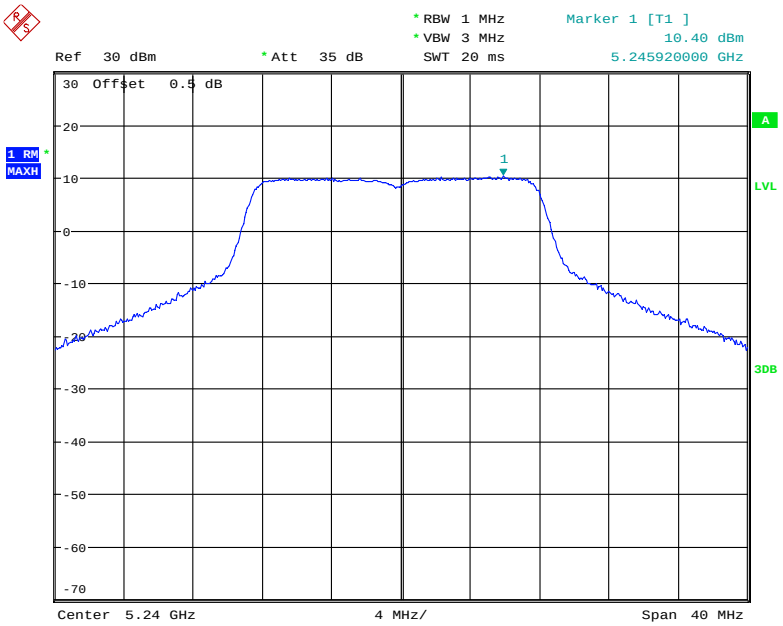
802.11a High Channel



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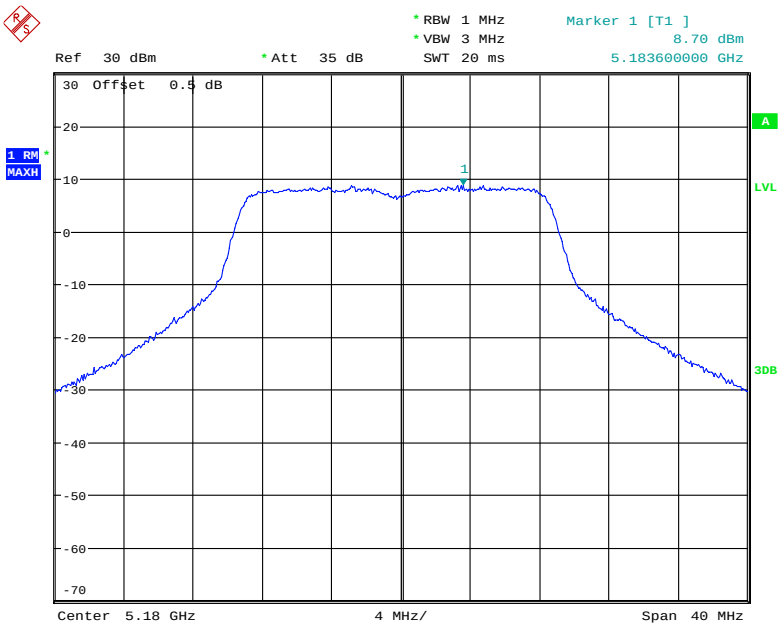
802.11n ht20 Low Channel



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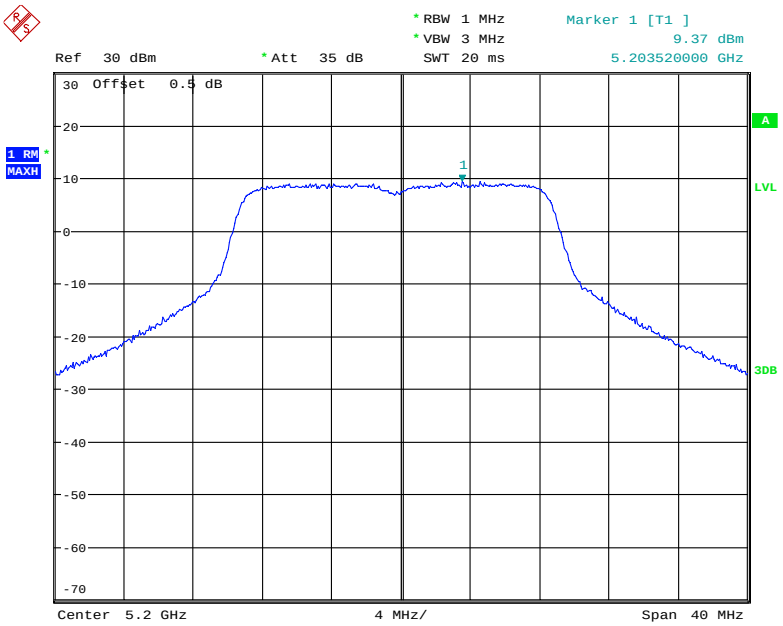

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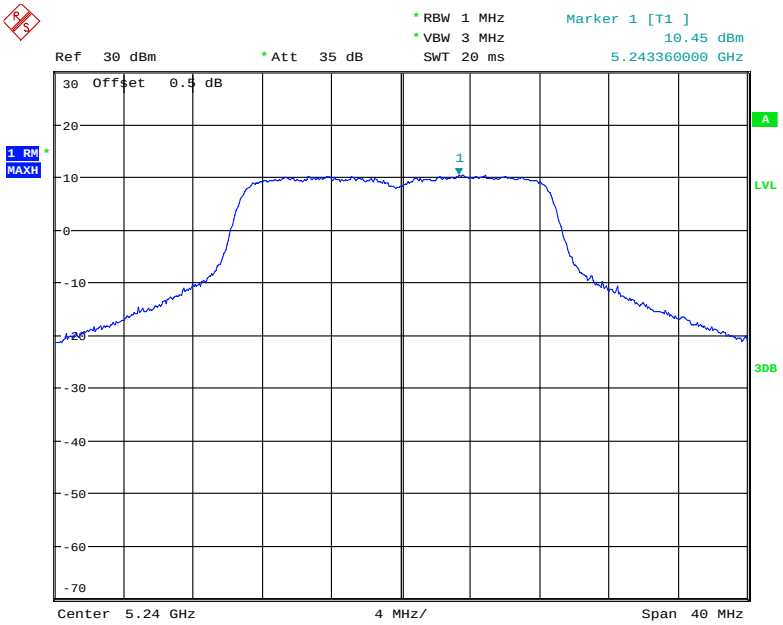

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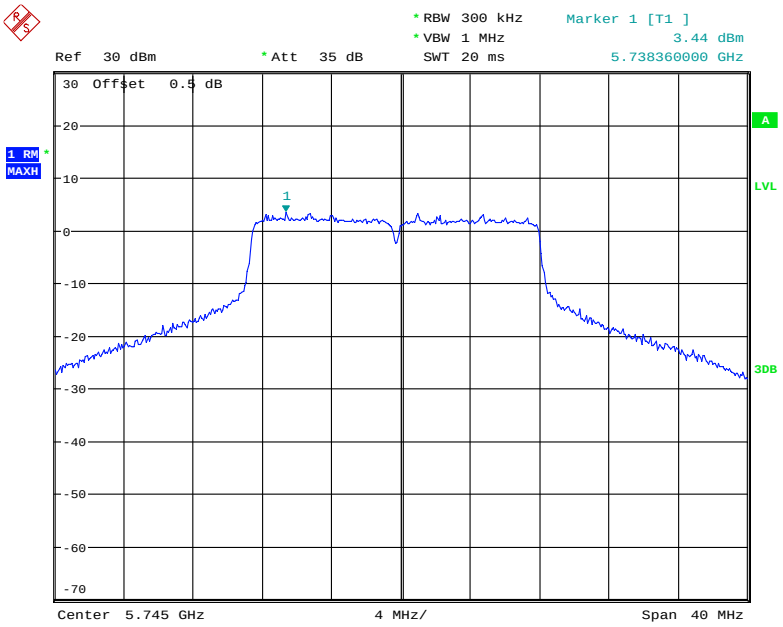
5725-5850MHz
Chain 0

802.11a Low Channel



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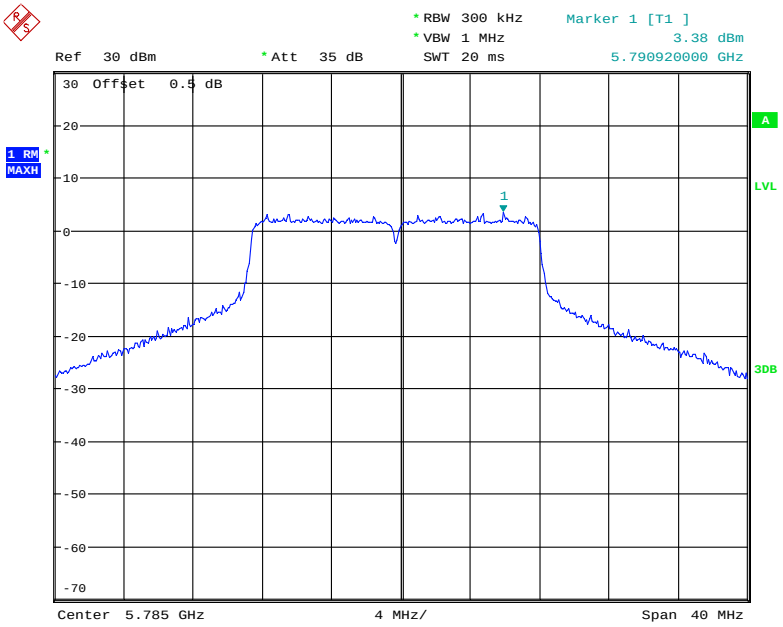
802.11a Middle Channel



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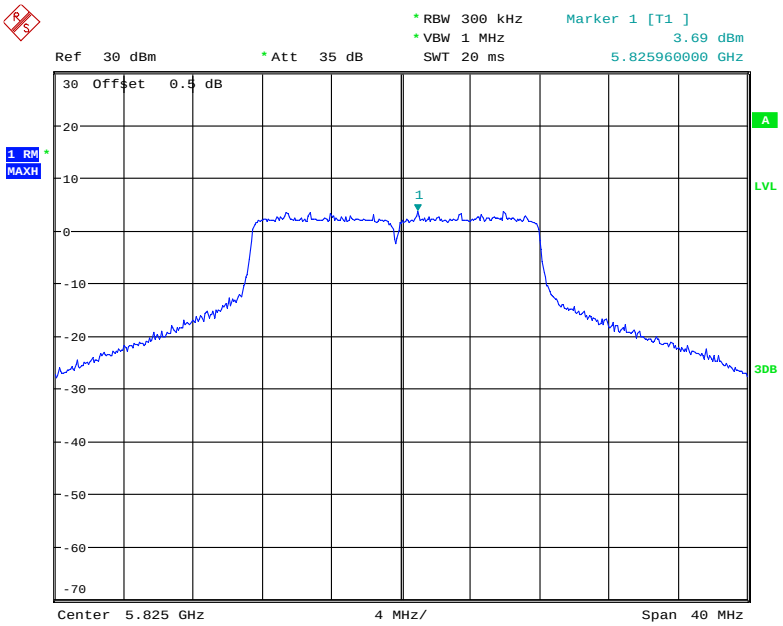
802.11a High Channel



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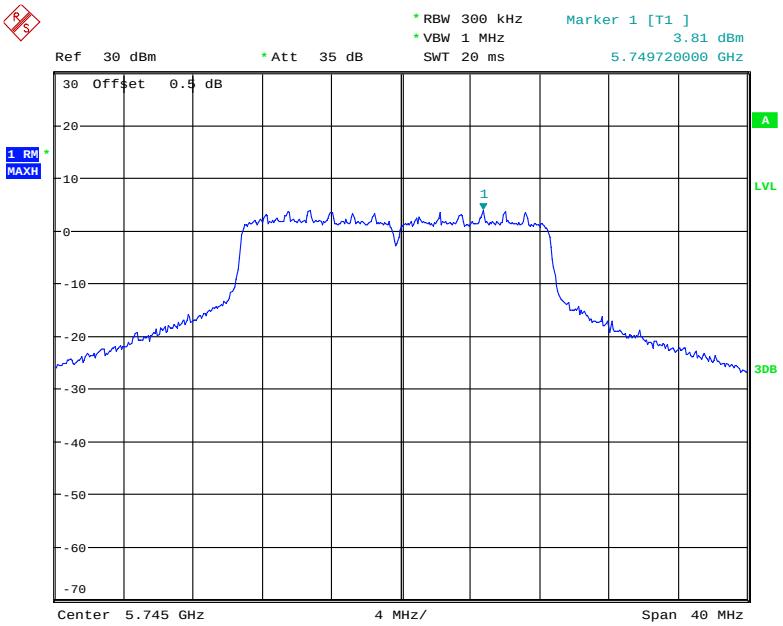

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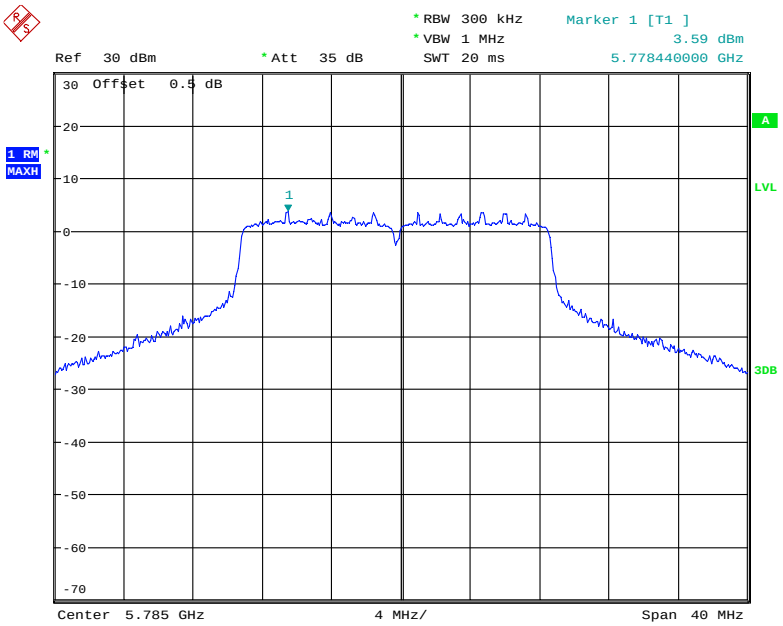

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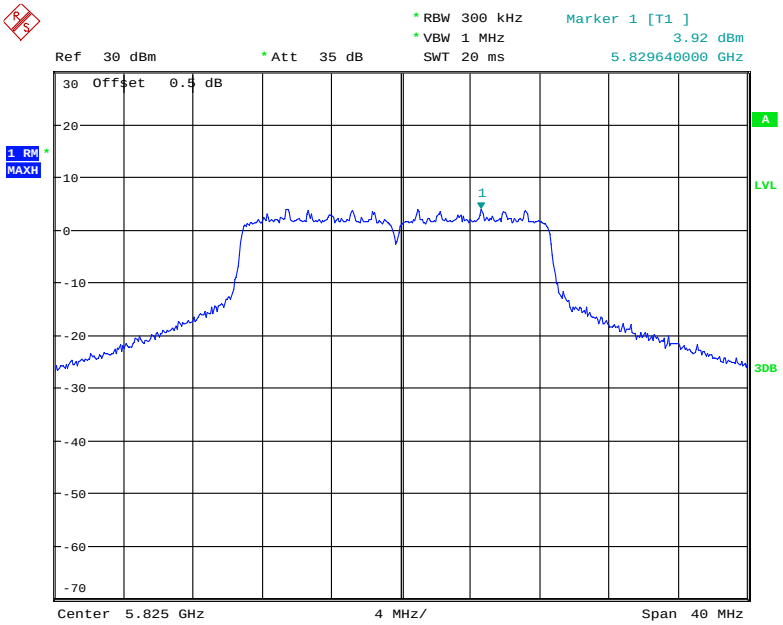

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******* END OF REPORT *******