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TESTING LABORATORY
CERTIFICATE # 4821.01

BACL
Bay Area Compliance Labs Corp.

FCC PART 15.407
RSS-GEN ISSUE 5, MARCH 2019 AMENDMENT 1
RSS-247, ISSUE 2, FEBRUARY 2017

TEST REPORT

For

FCC: VTech Telecommunications Ltd

FCC: 23/F Tai Ping Ind Center Block 1 57 Ting Kok Rd Tai Po NT, Hong Kong

ISEDC: VTECH TELECOMMUNICATIONS LIMITED

ISEDC: BL.1 23/F Tai Ping Industr Ctr. 57 Ting Kok Road Tai Po, NT Hongkong

FCC ID: EW780-H0E4-06
IC: 1135B-80H0E406

Report Type:	**Product Type:**
Original Report	SIP Cordless Hotel Telephone

Report Number:	RSZ200811006B
Report Date:	2020-10-12
Reviewed By:	Jimmy Xiao RF Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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

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 an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	SIP Cordless Hotel Telephone
Tested Model	CTM-S2415
Multiple Model	CTM-S2425
Model Differences	Refer to the DoS letter
HVIN	35-400291BS
Frequency Range	5G Wi-Fi: 5150-5250MHz; 5250-5350MHz; 5470-5725MHz; 5725-5850MHz
Maximum Conducted Average Ouput Power	5150-5250 MHz: 12.77dBm (802.11a), 9.75dBm(802.11n20), 8.77dBm(802.11n40) 8.79dBm (802.11ac20), 9.19dBm(802.11 ac40), 8.83dBm(802.11 ac80) 5250-5350MHz: 12.40dBm (802.11a), 9.36dBm(802.11n20), 7.64 dBm(802.11n40) 8.39dBm (802.11ac20), 8.73dBm(802.11 ac40), 8.51dBm(802.11 ac80) 5470-5725MHz: 12.78dBm (802.11a), 10.89dBm(802.11n20), 10.70 dBm(802.11n40) 9.54dBm (802.11ac20), 9.41dBm(802.11 ac40), 8.77dBm(802.11 ac80) 5725-5850 MHz: 14.89dBm (802.11a), 13.07dBm(802.11n20), 13.46dBm(802.11n40) 11.75dBm (802.11ac20), 12.12dBm(802.11 ac40), 10.95dBm(802.11 ac80)
Modulation Technique	OFDM
Antenna Specification	2.0 dBi
Voltage Range	DC 5.0V from adapter or DC 48V from POE
Date of Test	2020-08-18 to 2020-10-12
Sample serial number	RSZ200811006-RF-S1 (Assigned by BACL, Shenzhen)
Received date	2020-08-11
Sample/EUT Status	Good condition
Adapter information	Model:VT07EUS05200 Input: 100-240V~ 50/60Hz, 0.5A Output: DC 5.0V, 2.0A, 10.0W

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communication Commissions rules and RSS-GEN Issue 5, March 2019 Amendment 1 and RSS-247, Issue 2, February 2017 of the Innovation, Science and Economic Development Canada rules.

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

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, RSS-GEN Issue 5, March 2019 Amendment 1 and RSS-247, Issue 2, February 2017. American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. And KDB789033 D02 General U-NII Test Procedures New Rules v02r01.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF Output Power with Power meter		±0.73dB
RF conducted test with spectrum		±1.6dB
AC Power Lines Conducted Emissions		±1.95dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±1℃
Humidity		±6%
Supply voltages		±0.4%

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

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier : CN0023.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode, which was provided by manufacturer.

The EUT can operate in 802.11a/n20/n40/ac20/ac40/ac80 modes.

For 5150-5250MHz Band, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
38	5190	46	5230
40	5200	48	5240
42	5210	/	/

For 5250-5350MHz Band, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	60	5300
54	5270	62	5310
56	5280	64	5320
58	5290	/	/

For 5470-5725MHz Band, 18 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	124	5620
102	5510	126	5630
104	5520	128	5640
106	5530	132	5660
108	5540	134	5670
110	5550	136	5680
112	5560	140	5700
116	5580	/	/
118	5590	/	/
120	5600	/	/
122	5610	/	/

Note: the channels within the 5600-5650MHz can’t be used in ISEDC.

For 5725-5850MHz Band, 8 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	157	5785
151	5755	159	5795
153	5765	161	5805
155	5775	165	5825

EUT Exercise Software

"SecureCRT" was used. Test frequencies and power level were configured as below:

U-NII	Mode	Frequency (MHz)	Data Rate	Power Level
5150 – 5250MHz	802.11 a	5180	6Mbps	44
		5200	6Mbps	44
		5240	6Mbps	44
	802.11 n20	5180	MCS0	38
		5200	MCS0	38
		5240	MCS0	38
	802.11 n40	5190	MCS0	38
		5230	MCS0	38
	802.11 ac20	5180	MCS0	36
		5200	MCS0	36
		5240	MCS0	36
	802.11 ac40	5190	MCS0	36
		5230	MCS0	36
	802.11 ac80	5210	MCS0	36
5250 – 5350MHz	802.11 a	5260	6Mbps	44
		5280	6Mbps	44
		5320	6Mbps	44
	802.11 n20	5260	MCS0	38
		5280	MCS0	38
		5320	MCS0	38
	802.11 n40	5270	MCS0	38
		5310	MCS0	38
	802.11 ac20	5260	MCS0	36
		5280	MCS0	36
		5320	MCS0	36
	802.11 ac40	5270	MCS0	36
		5310	MCS0	36
	802.11 ac80	5290	MCS0	36

U-NII	Mode	Frequency (MHz)	Data Rate set	Power Level
5470 – 5725MHz	802.11 a	5500	6Mbps	46
		5580	6Mbps	46
		5700	6Mbps	46
	802.11 n20	5500	MCS0	41
		5580	MCS0	41
		5700	MCS0	41
	802.11 n40	5510	MCS0	41
		5550	MCS0	41
		5670	MCS0	41
	802.11 ac20	5500	MCS0	39
		5580	MCS0	39
		5700	MCS0	39
	802.11 ac40	5510	MCS0	39
		5550	MCS0	39
		5670	MCS0	39
	802.11 ac80	5530	MCS0	39
		5610	MCS0	39
5725 – 5850MHz	802.11 a	5745	6Mbps	48
		5785	6Mbps	48
		5825	6Mbps	48
	802.11 n20	5745	MCS0	43
		5785	MCS0	43
		5825	MCS0	43
	802.11 n40	5755	MCS0	43
		5795	MCS0	43
	802.11 ac20	5745	MCS0	41
		5785	MCS0	41
		5825	MCS0	41
	802.11 ac40	5755	MCS0	41
		5795	MCS0	41
	802.11 ac80	5775	MCS0	41

The worse-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 rated bandwidths, and modulations.

Note: the channels within the 5600-5650MHz can’t be used in ISEDC.

Duty cycle

Test Result: Pass. Please refer to the Appendix.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

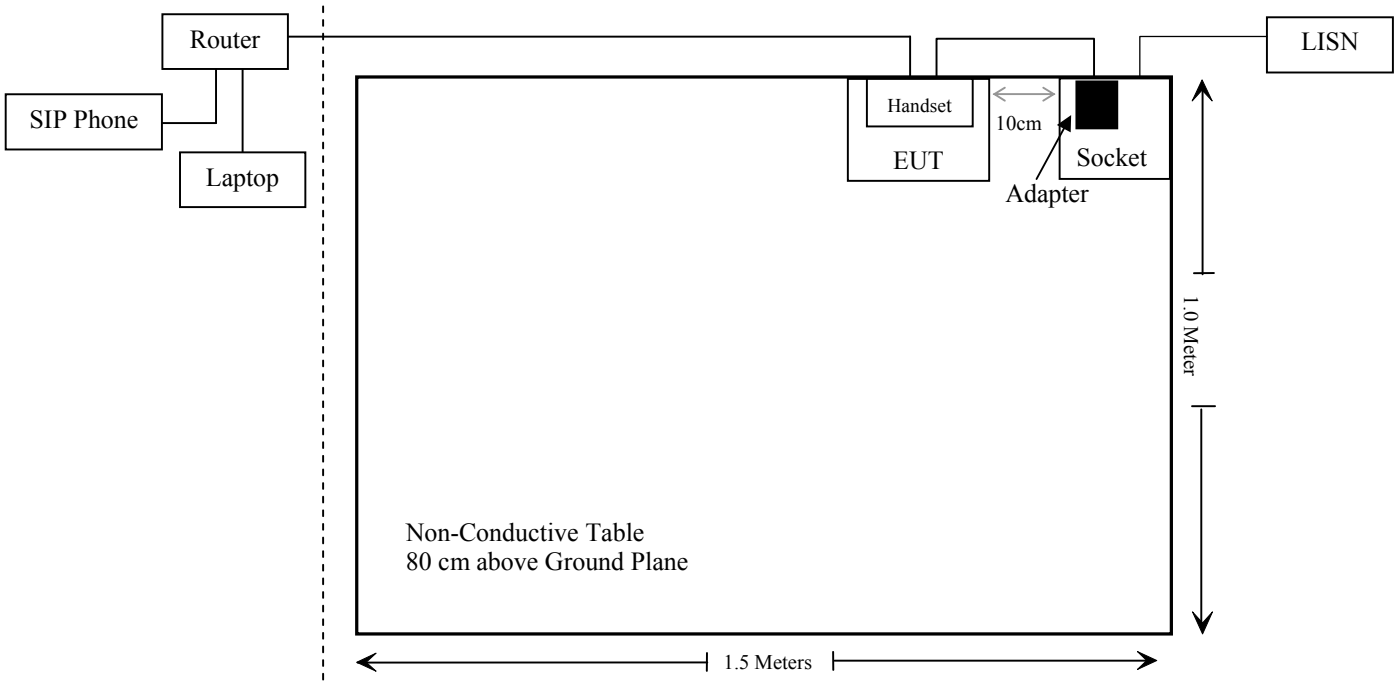
Manufacturer	Description	Model	Serial Number
BULL	Socket	GN-415K	5503290068073
HIKVISION	Router	DS-3WR03-E	10021642429
DELL	Laptop	Latitude E5430	JG3NLV1
VTech	SIP Phone	CTM-S2415	CTM-S2415
GOSPELL	POE	G0720-480-050	200200013

External I/O Cable

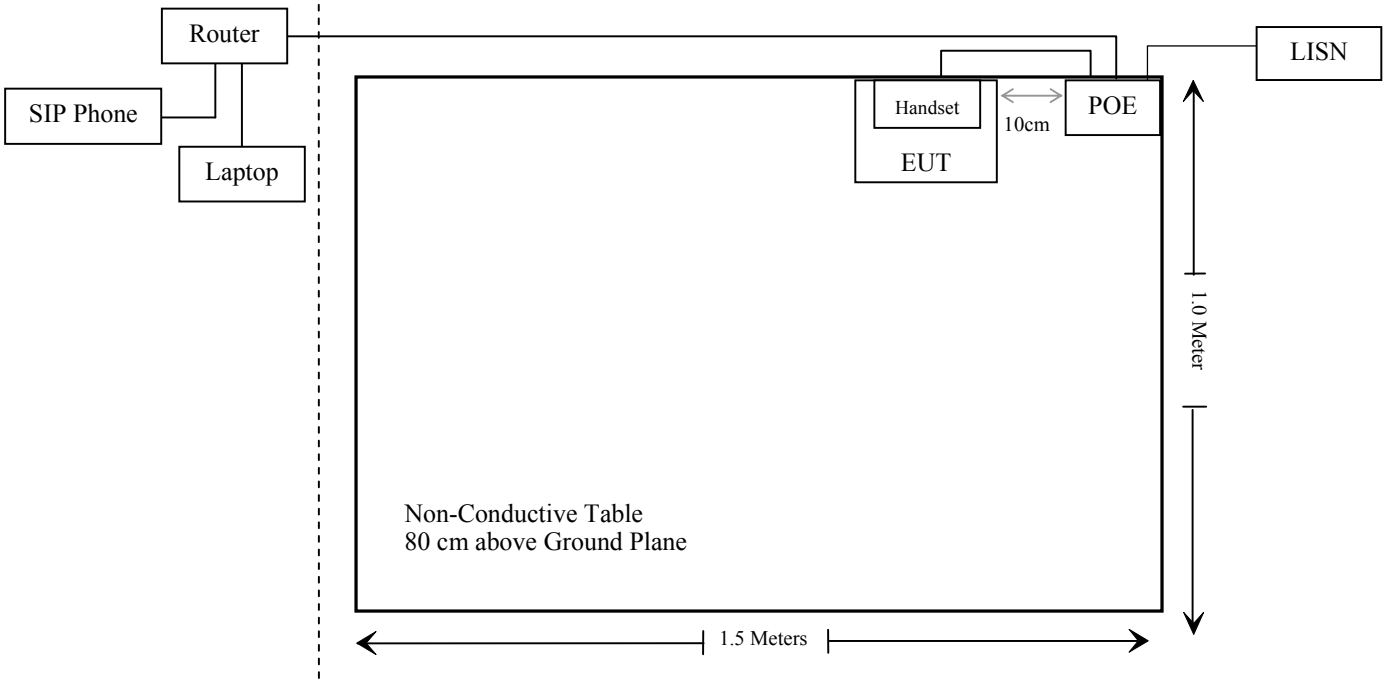
Cable Description	Length (m)	From Port	To
Unshielded Un-detachable AC cable	1.0	Socket	LISN
Unshielded Un-detachable DC cable	1.5	Adapter	EUT
Unshielded Detachable AC cable	1.0	POE	LISN
Un-shielded Detachable RJ45 Cable	8.0	EUT/POE	Router
Un-shielded Detachable RJ45 Cable	1.5	Router	Laptop
Un-shielded Detachable RJ45 Cable	1.5	EUT	POE
Un-shielded Detachable RJ45 Cable	1.5	SIP Phone	Router

Block Diagram of Test Setup

Adapter Power Supply:



POE Power Supply:



SUMMARY OF TEST RESULTS

FCC Rules	RSS-247 & RSS-Gen Rules	Description of Test	Result
§1.1307 (b) (1) & §2.1091	RSS-102 § 4	MaximuM Permissible exposure (MPE) & Exposure Limit	Compliance
§15.203	RSS-Gen §6.8	Antenna Requirement	Compliance
§15.407(b)(6)& §15.207(a)	RSS-Gen §8.8	Conducted Emissions	Compliance
§15.205& §15.209 &§15.407(b) (1), (2), (3), (4), (6) (7)	RSS-Gen §8.10&RSS-247§6.2	Undesirable Emission& Restricted Bands	Compliance
§15.407(a) (1), (5),(e)	RSS- Gen§6.7, RSS-247 § 6.2	26 dB Emission Bandwidth & 6dB & & 99% Bandwidth	Compliance
§15.407(a)(1),(2), (3)	RSS-247 §6.2	Conducted Transmitter Output Power	Compliance
§15.407 (a)(1), (2), (3)	RSS-247 §6.2	Power Spectral Density	Compliance
§15.407 (h)	/	Transmit Power Control (TPC)	Not Applicable
§15.407 (h)	RSS-247 §6.3	Dynamic Frequency Selection (DFS)	Compliance*
/	RSS-247 §6.4	Additional requirements	Compliance

Not Applicable: The EUT don't support the TPC function.
Compliance*: Please refer to the DFS report: RSZ200811007-00A & RSZ200811007-00B.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conducted test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2020/08/04	2021/08/03
Rohde & Schwarz	LISN	ENV216	101613	2020/08/04	2021/08/03
Rohde & Schwarz	Transient Limitor	ESH3Z2	DE25985	2019/11/29	2020/11/28
Unknown	CE Cable	CE Cable	UF A210B-1-0720-504504	2019/11/29	2020/11/28
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2020/08/04	2021/08/03
Sonoma instrument	Pre-amplifier	310 N	186238	2020/08/04	2021/08/03
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017/12/22	2020/12/21
Unknown	Cable 2	RF Cable 2	F-03-EM197	2019/11/29	2020/11/28
Unknown	Cable	Chamber Cable 1	F-03-EM236	2019/11/29	2020/11/28
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2020/08/04	2021/08/03
COM-POWER	Pre-amplifier	PA-122	181919	2019/11/29	2020/11/28
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2019/11/29	2020/11/28
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017/12/22	2020/12/21
Insulted Wire Inc.	RF Cable	SPS-2503-3150	02222010	2019/11/29	2020/11/28
Unknow	RF Cable	W1101-EQ1 OUT	F-19-EM005	2019/11/29	2020/11/28
SNSD	Band Reject filter	BSF5150-5850MN-0899-004	5G filter	2020/4/20	2021/4/20
Ducommun Technolagies	Horn antenna	ARH-4223-02	1007726-02 1304	2017/12/6	2020/12/5
Ducommun Technolagies	Horn antenna	ARH-2823-02	1007726-02 1302	2017/12/6	2020/12/5
RF Conducted Test					
Tonscend Corporation	RF control Unit	JS0806-2	19D8060154	2020/08/04	2021/08/03
Rohde & Schwarz	Signal and Spectrum Analyzer	FSV40	101473	2020/08/04	2021/08/03
Unknown	RF Cable 2	Unknown	F-03-EM198	2019/11/12	2020/11/12

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

FCC §15.247 (i) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

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

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = 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)

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

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

Frequency (MHz)	Antenna Gain		Tune up conducted power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
2412-2462	1	1.26	19.0	79.43	20	0.02	1
5150-5250	2	1.58	13.0	19.95	20	0.006	1
5250-5350	2	1.58	13.0	19.95	20	0.006	1
5470-5725	2	1.58	13.0	19.95	20	0.006	1
5725-5850	2	1.58	15.0	31.62	20	0.010	1
1921.536 - 1928.448	0	1.0	20	100	20	0.02	1

Note: 1. The tune up conducted power was declared by the applicant
2. The 2.4G Wi-Fi can't transmit at the same time with the 5G Wi-Fi.
3. The 2.4G Wi-Fi or 5G Wi-Fi can transmit with DECT function at the same time.

Simultaneous transmitting consideration (worst case):

The ratio=$MPE_{2.4G\ Wi\text{-}Fi}$/limit+MPE_{DECT}/limit=0.02+0.02=0.04＜1.0, so simultaneous exposure is not required.

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

Result: Pass

RSS-102 § 4 –EXPOSURE LIMITS

Applicable Standard

According to RSS-102 §4:

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10[21]	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ $f^{0.5}$	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	58.07/ $f^{0.25}$	0.1540/ $f^{0.25}$	8.944/ $f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $f^{0.3417}$	0.008335 $f^{0.3417}$	0.02619 $f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ $f^{1.2}$
150000-300000	0.158 $f^{0.5}$	4.21 x 10^{-4} $f^{0.5}$	6.67 x 10^{-5} f	616000/$f^{1.2}$

Note: f is frequency in MHz.
* Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = 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)

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

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

Frequency (MHz)	Antenna Gain		Turn up Power		Evaluation Distance (m)	Power Density (W/m^2)	MPE Limit (W/m^2)
	(dBi)	(numeric)	(dBm)	(W)			
2412-2462	1	1.26	19.0	0.079	0.2	0.2	5.37
5150-5250	2	1.58	13.0	0.020	0.2	0.06	9.01
5250-5350	2	1.58	13.0	0.020	0.2	0.06	9.13
5470-5725	2	1.58	13.0	0.020	0.2	0.06	9.39
5725-5850	2	1.58	15.0	0.032	0.2	0.10	9.69
1921.536 - 1928.448	0	1.0	20	0.1	0.2	0.2	4.59

Note: 1. The tune up conducted power was declared by the applicant
2. The 2.4G Wi-Fi can't transmit at the same time with the 5G Wi-Fi.
3. The 2.4G Wi-Fi or 5G Wi-Fi can transmit with DECT function at the same time.

Simultaneous transmitting consideration (worst case):

The ratio=$MPE_{2.4G\ Wi\text{-}Fi}$/limit+MPE_{DECT}/limit=0.2/5.37+0.2/4.59=0.08＜1.0, so simultaneous exposure is not required.

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

Result: Pass

FCC §15.203 & RSS-GEN §6.8– ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.407 (a), if the transmitting antennas of directional gain greater than 6dBi are used, the transmit power and power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.
Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

Antenna Connector Construction

The EUT has one internal antenna arrangement for 5G Wi-Fi, which was permanently attached and the antenna gain is 2.0dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Type	Antenna Gain	Impedance
PCB	2.0 dBi	50Ω

Result: Pass

§ 15.407(b)(6)& §15.207(a) & RSS-Gen §8.8 CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207, §15.407(b) (6)

Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4, as measured using a 50 µH / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in table 4 shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

Table 4 - AC Power Lines Conducted Emission Limits		
Frequency range (MHz)	Conducted limit (dBµV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56[1]	56 to 46[1]
0.5 – 5	56	46
5 – 30	60	50

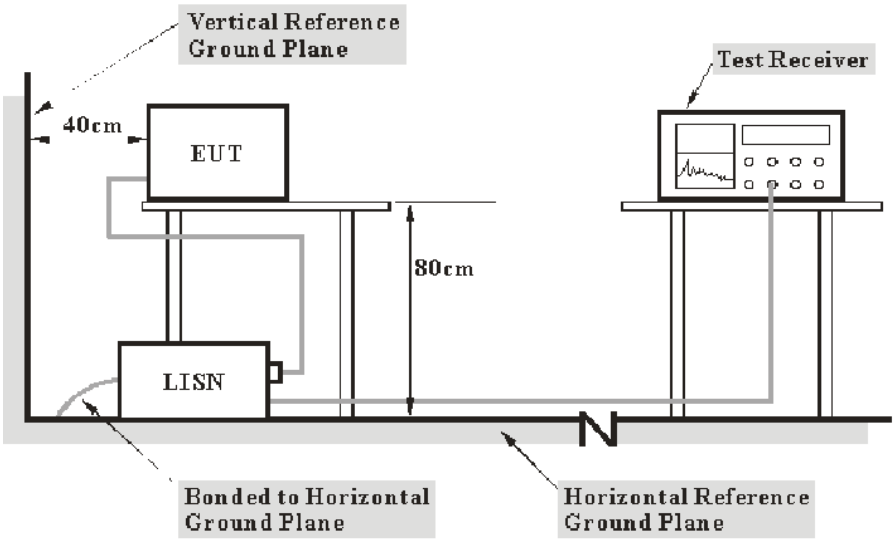
Note 1: The level decreases linearly with the logarithm of the frequency.

For an EUT with a permanent or detachable antenna operating between 150 kHz and 30 MHz, the AC power-line conducted emissions must be measured using the following configurations:

(a) Perform the AC power-line conducted emissions test with the antenna connected to determine compliance with the limits of table 4 outside the transmitter's fundamental emission band.

(b) Retest with a dummy load instead of the antenna to determine compliance with the limits of table 4 within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network that simulates the antenna in the fundamental frequency band.

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 & RSS 247 limits.

The spacing between the peripherals was 10 cm.

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

EMI Test Receiver Setup

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

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

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

Test Procedure

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

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

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

Test Data

Environmental Conditions

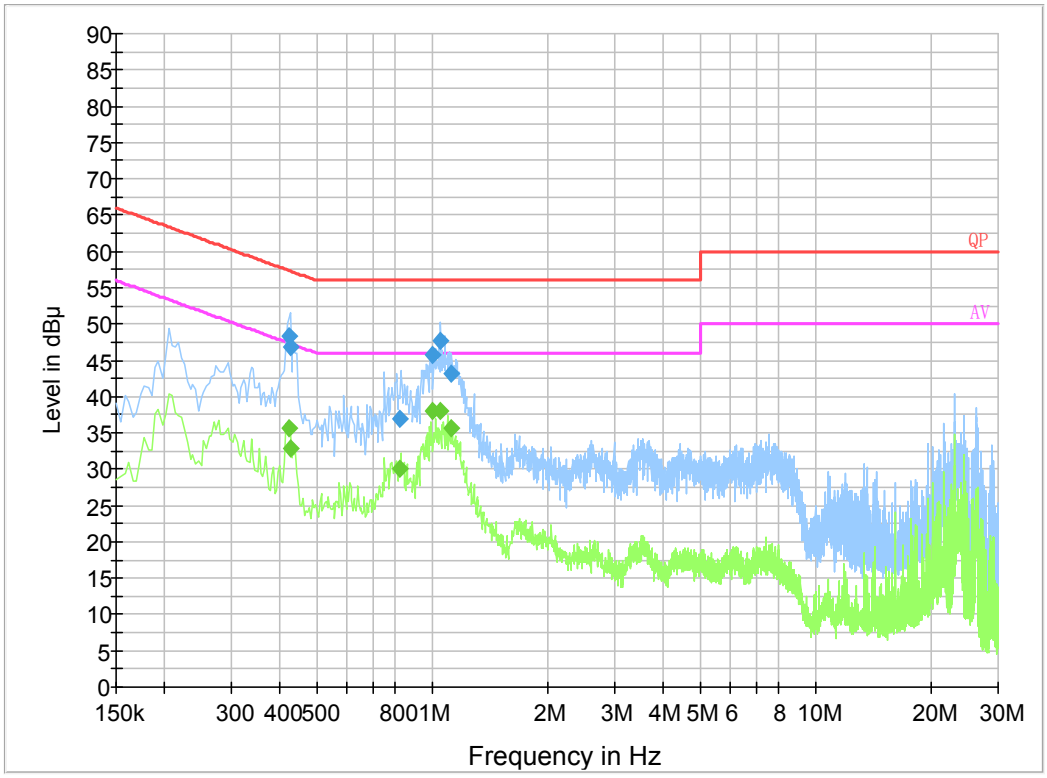
Temperature:	25 ℃
Relative Humidity:	65 %
ATM Pressure:	101.0 kPa

The testing was performed by Haiguo Li on 2020-08-19.

EUT operation mode: Transmitting

Power by adapter:

AC 120V/60 Hz, Line:



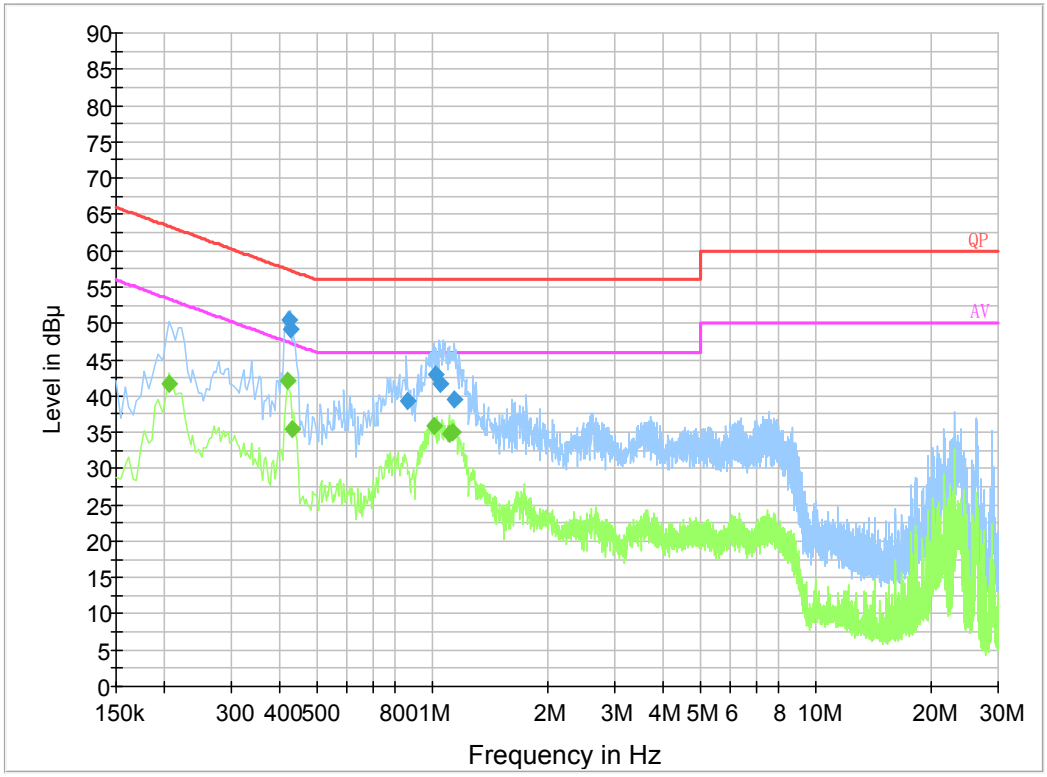
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.423610	48.3	9.000	L1	19.9	9.1	57.4
0.427490	46.8	9.000	L1	19.9	10.5	57.3
0.825550	36.9	9.000	L1	19.8	19.1	56.0
0.998970	45.8	9.000	L1	19.9	10.2	56.0
1.050190	47.8	9.000	L1	19.9	8.2	56.0
1.121110	43.2	9.000	L1	19.8	12.8	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.423610	35.7	9.000	L1	19.9	11.7	47.4
0.427490	32.9	9.000	L1	19.9	14.4	47.3
0.825550	30.1	9.000	L1	19.8	15.9	46.0
0.998970	38.1	9.000	L1	19.9	7.9	46.0
1.050190	37.9	9.000	L1	19.9	8.1	46.0
1.121110	35.6	9.000	L1	19.8	10.4	46.0

AC 120V/60 Hz, Neutral:



Final Result 1

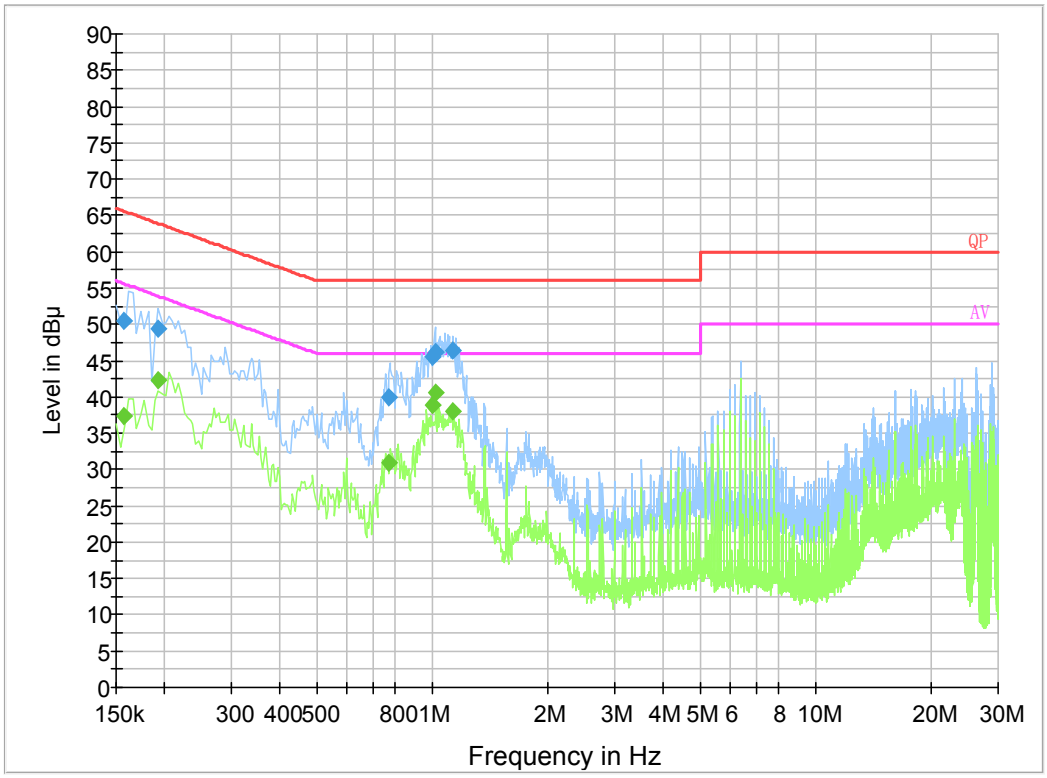
Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.423610	50.4	9.000	N	19.8	7.0	57.4
0.427490	49.1	9.000	N	19.8	8.2	57.3
0.861130	39.4	9.000	N	19.8	16.6	56.0
1.022850	42.9	9.000	N	19.8	13.1	56.0
1.053950	41.7	9.000	N	19.8	14.3	56.0
1.144810	39.5	9.000	N	19.8	16.5	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	41.7	9.000	N	19.8	11.7	53.4
0.422000	42.0	9.000	N	19.8	5.4	47.4
0.434000	35.4	9.000	N	19.8	11.8	47.2
1.010000	35.8	9.000	N	19.8	10.2	46.0
1.110000	34.7	9.000	N	19.8	11.3	46.0
1.130000	35.1	9.000	N	19.8	10.9	46.0

Power by POE:

AC 120V/60 Hz, Line



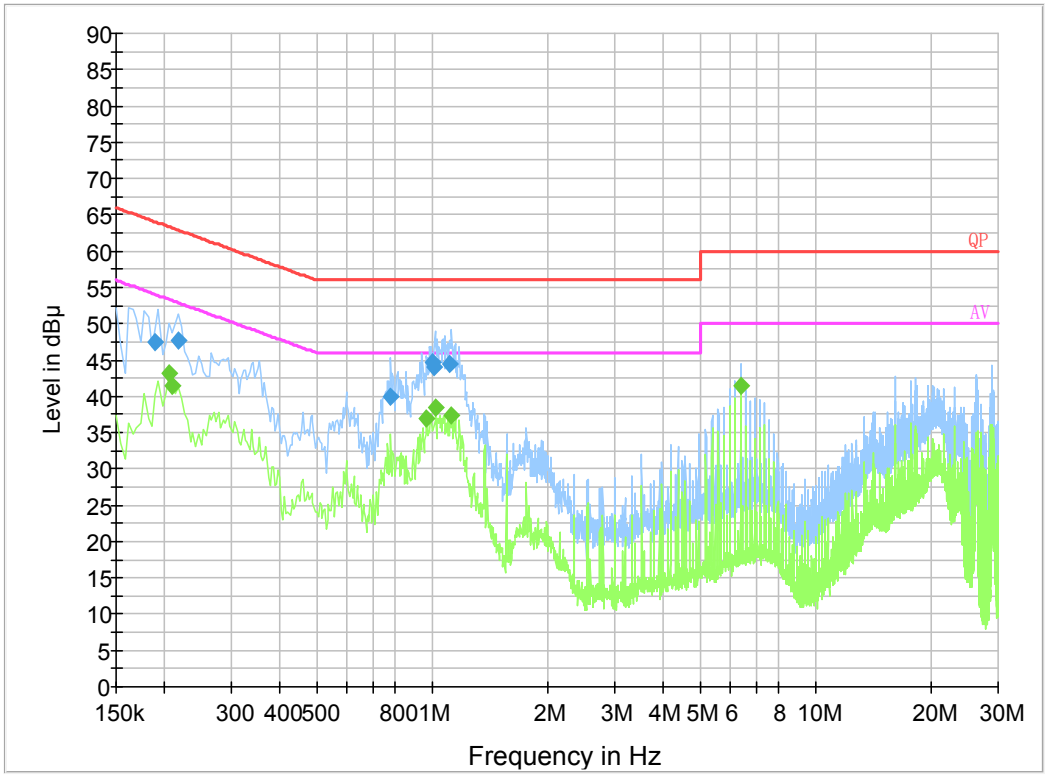
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.157500	50.5	9.000	L1	19.8	15.1	65.6
0.193500	49.4	9.000	L1	19.8	14.5	63.9
0.774330	40.0	9.000	L1	19.8	16.0	56.0
0.999090	45.5	9.000	L1	19.9	10.5	56.0
1.022730	46.2	9.000	L1	19.9	9.8	56.0
1.128990	46.5	9.000	L1	19.8	9.5	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.157500	37.3	9.000	L1	19.8	18.3	55.6
0.193500	42.3	9.000	L1	19.8	11.5	53.9
0.774330	31.0	9.000	L1	19.8	15.0	46.0
0.999090	38.9	9.000	L1	19.9	7.1	46.0
1.022730	40.6	9.000	L1	19.9	5.4	46.0
1.128990	38.1	9.000	L1	19.8	7.9	46.0

AC 120V/60 Hz, Neutral



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.189500	47.5	9.000	N	19.8	16.6	64.1
0.217500	47.8	9.000	N	19.8	15.1	62.9
0.778270	39.9	9.000	N	19.8	16.1	56.0
0.999210	44.6	9.000	N	19.8	11.4	56.0
1.010730	44.1	9.000	N	19.8	11.9	56.0
1.109110	44.4	9.000	N	19.8	11.6	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	43.2	9.000	N	19.8	10.1	53.4
0.210000	41.6	9.000	N	19.8	11.7	53.2
0.970000	36.9	9.000	N	19.8	9.1	46.0
1.022000	38.5	9.000	N	19.8	7.5	46.0
1.126000	37.5	9.000	N	19.8	8.5	46.0
6.382000	41.4	9.000	N	19.9	8.6	50.0

§ 15.205& §15.209&§15.407(b) (1), (2), (3), (4), (6) (7) & RSS-GEN §8.10&RSS-247§6.2 UNDESIRABLE EMISSION

Applicable Standard

FCC §15.407 (b) (1), (2), (3), (4), (6), (7); §15.209; §15.205;

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

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

According to RSS-247§6.2

Frequency band 5150-5250 MHz

6.2.1.2 Unwanted emission limits

For transmitters with operating frequencies in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHzshall not exceed -27 dBm/MHz e.i.r.p. Any unwanted emissions that fall into the band 5250-5350 MHz shall be attenuated below the channel power by at least 26 dB, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth (i.e. 99% bandwidth), above 5250 MHz. The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.

Frequency band 5250-5350 MHz

6.2.2.2 Unwanted emission limits

Devices shall comply with the following:
a. All emissions outside the band 5250-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p.; or
b. All emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. and its power shall comply with the spectral power density for operation within the band 5150-5250 MHz. The device, except devices installed in vehicles, shall be labelled or include in the user manual the following text “for indoor use only.”

Frequency band 5470-5600 MHz and 5650-5725 MHz

6.2.3.2 Unwanted emission limits

Emissions outside the band 5470-5725 MHz shall not exceed -27 dBm/MHz e.i.r.p. However, devices with bandwidth overlapping the band edge of 5725 MHz can meet the emission limit of -27 dBm/MHz e.i.r.p.at 5850 MHz instead of 5725 MHz.

Frequency band 5725-5850 MHz

6.2.4.2 Unwanted emission limits

Devices operating in the band 5725-5850 MHz with antenna gain greater than 10 dBi can have unwanted emissions that comply with either the limits in this section or in section 5.5 until six (6) months after the publication date of this standard for certification. Certified devices that do not comply with emission limits in this section shall not be manufactured, imported, distributed, leased, offered for sale or sold after April 1, 2018.

Devices operating in the band 5725-5850 MHz with antenna gain of 10 dBi or less can have unwanted emissions that comply with either the limits in this section or in section 5.5 until April 1, 2018 for certification. Certified devices that do not comply with emission limits in this section shall not be manufactured, imported, distributed, leased, offered for sale or sold after April 1, 2020.

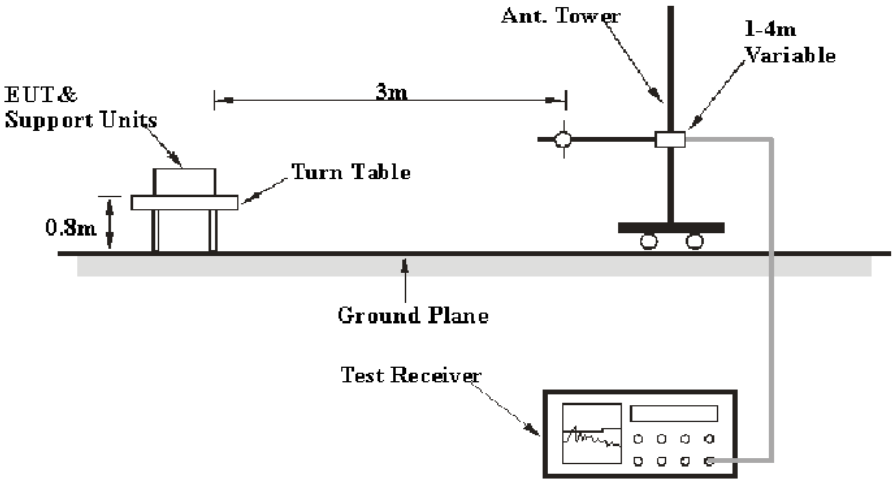
Devices operating in the band 5725-5850 MHz shall have e.i.r.p. of unwanted emissions comply with the following:

a. 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 Bm/MHz at 5 MHz above or below the band edges;

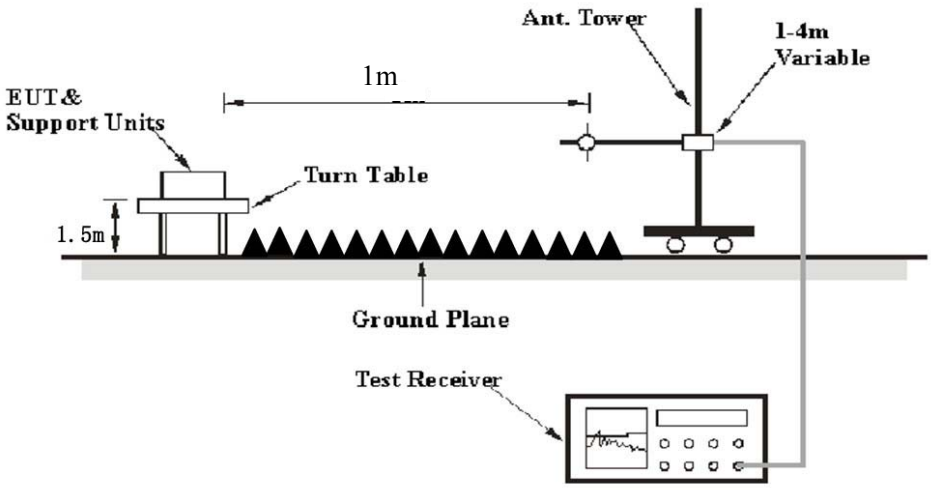
b. 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;
c. 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and
d. -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC 15.209 and FCC 15.407 & RSS-Gen&RSS-247 limits.

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

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

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

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

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

Test Procedure

Radiated Spurious Emission

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

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

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

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

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

where

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

So the extrapolation factor of 1m is 20*log(1/3)= -9.5 dB

Corrected Amplitude & Margin Calculation

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

Test Data

Environmental Conditions

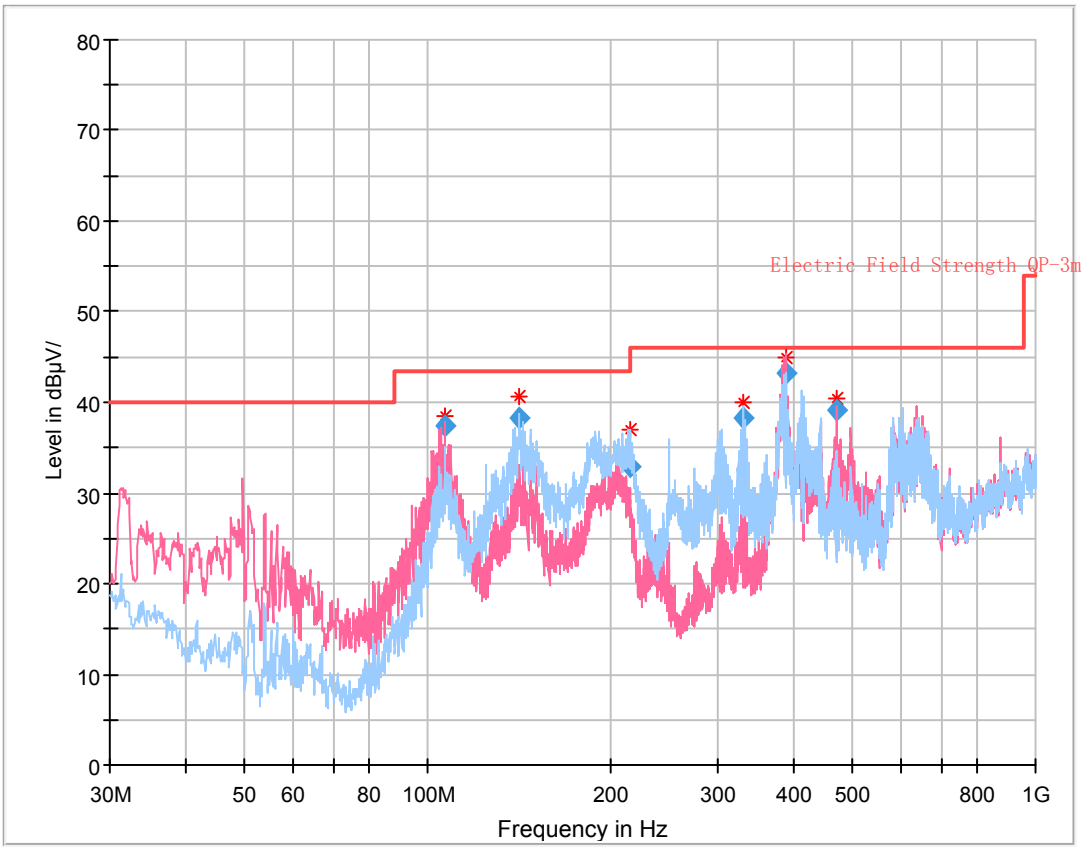
Temperature:	28~32.1 ℃
Relative Humidity:	48~58 %
ATM Pressure:	101.0 kPa

The testing was performed by Holland Yang from 2020-08-18 to 2020-09-24 for below 1GHz and by Leven Gan from 2020-08-28 to 2020-09-08 for above 1GHz.

EUT operation mode: Transmitting

Power by adapter:

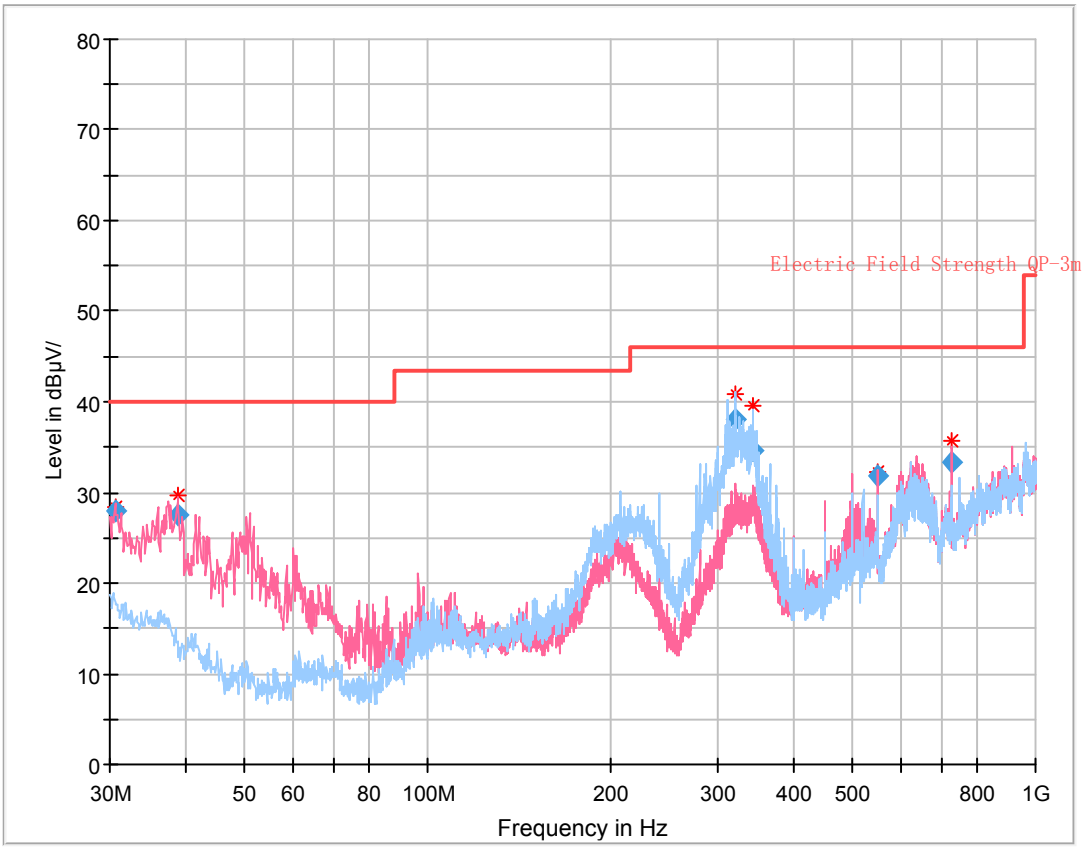
30 MHz – 1 GHz: *(worst case is 802.11a mode 5785 MHz)*



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
106.688875	37.33	43.50	6.17	109.0	V	223.0	-16.0
141.200250	38.30	43.50	5.20	196.0	H	233.0	-14.2
214.719625	33.01	43.50	10.49	157.0	H	257.0	-13.9
330.414125	38.37	46.00	7.63	108.0	H	300.0	-10.7
388.376250	43.19	46.00	2.81	120.0	V	0.0	-10.4
470.015625	39.15	46.00	6.85	107.0	V	75.0	-7.0

Power by POE:



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.648625	27.97	40.00	12.03	101.0	V	241.0	-8.0
38.968000	27.62	40.00	12.38	102.0	V	216.0	-13.1
319.962750	38.15	46.00	7.85	101.0	H	74.0	-10.7
342.482875	34.54	46.00	11.46	109.0	H	67.0	-10.8
550.011000	31.90	46.00	14.10	109.0	V	251.0	-4.1
725.741125	33.29	46.00	12.71	193.0	V	144.0	-0.8

1 ~ 40 GHz:

Note: The test distance is 1m, so the correct factor from 3m to 1m is 20log(3/1)=9.5dB which was added into the final limit.

5150-5250 MHz:

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				
802.11a									
5180 MHz									
5148.76	32.24	PK	183	1.8	V	38.36	70.60	83.5	12.90
5148.76	17.25	Ave.	183	1.8	V	38.36	55.61	63.5	7.89
5351.63	32.03	PK	191	2.5	V	39.09	71.12	83.5	12.38
5351.63	17.24	Ave.	191	2.5	V	39.09	56.33	63.5	7.17
10360.00	56.83	PK	36	2.3	V	17.42	74.25	77.7	3.45
5200 MHz									
10400.00	56.65	PK	33	1.3	V	17.52	74.17	77.7	3.53
5240 MHz									
5149.42	31.94	PK	320	2.2	V	38.36	70.30	83.5	13.20
5149.42	17.19	Ave.	320	2.2	V	38.36	55.55	63.5	7.95
5350.75	32.31	PK	337	1.2	V	39.09	71.40	83.5	12.10
5350.75	17.27	Ave.	337	1.2	V	39.09	56.36	63.5	7.14
10480.00	57.84	PK	56	2.2	V	17.25	75.09	77.7	2.61
802.11n20									
5180 MHz									
5148.78	32.41	PK	251	2.3	V	38.36	70.77	83.5	12.73
5148.78	17.14	Ave.	251	2.3	V	38.36	55.50	63.5	8.00
5351.24	32.11	PK	47	1.6	V	39.09	71.20	83.5	12.30
5351.24	17.06	Ave.	47	1.6	V	39.09	56.15	63.5	7.35
10360.00	54.04	PK	317	1.0	V	17.42	71.46	77.7	6.24
5200 MHz									
10400.00	54.51	PK	128	1.3	V	17.52	72.03	77.7	5.67
5240 MHz									
5147.99	31.94	PK	63	1.1	V	38.36	70.30	83.5	13.20
5147.99	17.15	Ave.	63	1.1	V	38.36	55.51	63.5	7.99
5351.36	32.36	PK	4	2.0	V	38.40	70.76	83.5	12.74
5351.36	17.20	Ave.	4	2.0	V	38.40	55.60	63.5	7.90
10480.00	55.18	PK	219	1.1	V	17.25	72.43	77.7	5.27

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				
802.11n40									
5190 MHz									
5148.86	31.92	PK	162	1.3	V	38.36	70.28	83.5	13.22
5148.86	17.16	Ave.	162	1.3	V	38.36	55.52	63.5	7.98
5351.47	31.85	PK	57	1.3	V	38.40	70.25	83.5	13.25
5351.47	17.22	Ave.	57	1.3	V	38.40	55.62	63.5	7.88
10380.00	50.86	PK	127	1.6	V	17.42	68.28	77.7	9.42
5230 MHz									
5147.71	32.02	PK	167	1.7	V	38.36	70.38	83.5	13.12
5147.71	17.19	Ave.	167	1.7	V	38.36	55.55	63.5	7.95
5351.24	32.17	PK	167	2.2	V	38.40	70.57	83.5	12.93
5351.24	17.27	Ave.	167	2.2	V	38.40	55.67	63.5	7.83
10460.00	51.26	PK	222	1.9	V	17.15	68.41	77.7	9.29
802.11ac20									
5180 MHz									
5149.04	32.10	PK	184	1.2	V	38.36	70.46	83.5	13.04
5149.04	17.23	Ave.	184	1.2	V	38.36	55.59	63.5	7.91
5350.77	31.81	PK	81	2.1	V	38.40	70.21	83.5	13.29
5350.77	17.26	Ave.	81	2.1	V	38.40	55.66	63.5	7.84
10360.00	51.72	PK	216	1.2	V	17.42	69.14	77.7	8.56
5200 MHz									
10400.00	51.78	PK	168	1.5	V	17.52	69.30	77.7	8.40
5240 MHz									
5148.47	32.28	PK	336	1.6	V	38.36	70.64	83.5	12.86
5148.47	17.25	Ave.	336	1.6	V	38.36	55.61	63.5	7.89
5351.66	32.21	PK	336	2.1	V	38.40	70.61	83.5	12.89
5351.66	17.31	Ave.	336	2.1	V	38.40	55.71	63.5	7.79
10480.00	52.31	PK	125	1.4	V	17.25	69.56	77.7	8.14
802.11ac40									
5190 MHz									
5148.79	31.87	PK	32	1.7	V	38.36	70.23	83.5	13.27
5148.79	17.15	Ave.	32	1.7	V	38.36	55.51	63.5	7.99
5351.62	32.51	PK	60	2.0	V	38.40	70.91	83.5	12.59
5351.62	17.33	Ave.	60	2.0	V	38.40	55.73	63.5	7.77
10380.00	49.59	PK	354	2.4	V	17.42	67.01	77.7	10.69
5230 MHz									
5148.19	31.78	PK	251	2.3	V	38.36	70.14	83.5	13.36
5148.19	17.08	Ave.	251	2.3	V	38.36	55.44	63.5	8.06
5351.33	32.44	PK	130	1.7	V	38.40	70.84	83.5	12.66
5351.33	17.29	Ave.	130	1.7	V	38.40	55.69	63.5	7.81
10460.00	50.46	PK	277	2.0	V	17.15	67.61	77.7	10.09

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				
802.11ac80									
5148.36	32.16	PK	34	2.1	V	38.36	70.52	83.5	12.98
5148.36	17.24	Ave.	34	2.1	V	38.36	55.60	63.5	7.90
5350.75	32.24	PK	50	1.8	V	38.40	70.64	83.5	12.86
5350.75	17.35	Ave.	50	1.8	V	38.40	55.75	63.5	7.75
10420.00	46.54	PK	27	2.3	V	17.52	64.06	77.7	13.64

5250-5350 MHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
802.11a									
5260 MHz									
5121.68	31.89	PK	264	2.3	V	38.36	70.25	83.5	13.25
5121.68	17.28	Ave.	264	2.3	V	38.36	55.64	63.5	7.86
5249.89	57.26	PK	171	1.7	V	38.60	95.86	114.7*	18.84
5412.34	31.87	PK	4	1.4	V	39.19	71.06	83.5	12.44
5412.34	17.26	Ave.	4	1.4	V	39.19	56.45	63.5	7.05
10520.00	57.90	PK	327	2.2	V	17.25	75.15	77.7	2.55
5280 MHz									
10560.00	57.87	PK	136	1.4	V	17.91	75.78	77.7	1.92
5320 MHz									
5112.45	31.91	PK	303	2.2	V	38.26	70.17	83.5	13.33
5112.45	17.28	Ave.	303	2.2	V	38.26	55.54	63.5	7.96
5249.23	32.49	PK	82	2.0	V	38.60	71.09	114.7*	43.61
5434.24	31.93	PK	2	1.8	V	39.29	71.22	83.5	12.28
5434.24	17.31	Ave.	2	1.8	V	39.29	56.60	63.5	6.90
10640.00	56.94	PK	316	2.2	V	18.01	74.95	83.5	8.55
10640.00	42.22	Ave.	316	2.2	V	18.01	60.23	63.5	3.27
802.11n20									
5260 MHz									
5137.96	31.87	PK	187	2.2	V	38.36	70.23	83.5	13.27
5137.96	17.28	Ave.	187	2.2	V	38.36	55.64	63.5	7.86
5249.83	54.16	PK	155	1.1	V	38.60	92.76	114.7*	21.94
5427.22	31.89	PK	218	1.4	V	39.19	71.08	83.5	12.42
5427.22	17.31	Ave.	218	1.4	V	39.19	56.50	63.5	7.00
10520.00	57.87	PK	238	2.1	V	17.25	75.12	77.7	2.58
5280 MHz									
10560.00	57.81	PK	243	2.2	V	17.91	75.72	77.7	1.98
5320 MHz									
5134.53	31.91	PK	36	2.5	V	38.36	70.27	83.5	13.23
5134.53	17.29	Ave.	36	2.5	V	38.36	55.65	63.5	7.85
5249.72	52.13	PK	199	1.5	V	38.60	90.73	114.7*	23.97
5446.99	31.96	PK	93	1.1	V	39.29	71.25	83.5	12.25
5446.99	17.36	Ave.	93	1.1	V	39.29	56.65	63.5	6.85
10640.00	57.14	PK	247	1.1	V	18.01	75.15	83.5	8.35
10640.00	41.61	Ave.	247	1.1	V	18.01	59.62	63.5	3.88

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
802.11n40									
5270MHz									
5147.86	31.96	PK	140	1.1	V	38.36	70.32	83.5	13.18
5147.86	17.34	Ave.	140	1.1	V	38.36	55.70	63.5	7.80
5249.26	56.49	PK	144	1.4	V	38.60	95.09	114.7*	19.61
5432.29	31.91	PK	36	1.4	V	39.29	71.20	83.5	12.30
5432.29	17.26	Ave.	36	1.4	V	39.29	56.55	63.5	6.95
10540.00	57.93	PK	212	1.9	V	17.25	75.18	77.7	2.52
5310 MHz									
5131.75	31.92	PK	122	1.0	V	38.36	70.28	83.5	13.22
5131.75	17.32	Ave.	122	1.0	V	38.36	55.68	63.5	7.82
5248.85	33.64	PK	30	1.1	V	38.60	72.24	114.7*	42.46
5447.29	31.93	PK	86	1.1	V	39.29	71.22	83.5	12.28
5447.29	17.34	Ave.	86	1.1	V	39.29	56.63	63.5	6.87
10620.00	56.59	PK	271	2.0	V	18.01	74.60	83.5	8.90
10620.00	42.87	Ave.	271	2.0	V	18.01	60.88	63.5	2.62
802.11ac20									
5260 MHz									
5144.78	31.88	PK	311	1.4	V	38.36	70.24	83.5	13.26
5144.78	17.26	Ave.	311	1.4	V	38.36	55.62	63.5	7.88
5249.19	56.72	PK	221	1.8	V	38.60	95.32	114.7*	19.38
5423.34	31.92	PK	189	1.6	V	39.19	71.11	83.5	12.39
5423.34	17.29	Ave.	189	1.6	V	39.19	56.48	63.5	7.02
10520.00	55.75	PK	101	1.1	V	17.25	73.00	77.7	4.70
5280 MHz									
10560.00	55.68	PK	341	1.9	V	17.91	73.59	77.7	4.11
5320 MHz									
5138.72	31.96	PK	359	1.8	V	38.36	70.32	83.5	13.18
5138.72	17.31	Ave.	359	1.8	V	38.36	55.67	63.5	7.83
5249.36	54.56	PK	301	2.1	V	38.60	93.16	114.7*	21.54
5431.21	31.97	PK	174	2.0	V	39.19	71.16	83.5	12.34
5431.21	17.34	Ave.	174	2.0	V	39.19	56.53	63.5	6.97
10640.00	55.14	PK	330	1.2	V	18.01	73.15	83.5	10.35
10640.00	43.32	Ave.	330	1.2	V	18.01	61.33	63.5	2.17

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
802.11ac40									
5270 MHz									
5114.84	31.89	PK	147	1.6	V	38.36	70.25	83.5	13.25
5114.84	17.27	Ave.	147	1.6	V	38.36	55.63	63.5	7.87
5249.93	57.31	PK	154	1.6	V	38.60	95.91	114.7*	18.79
5415.24	31.99	PK	292	1.9	V	39.19	71.18	83.5	12.32
5415.24	17.32	Ave.	292	1.9	V	39.19	56.51	63.5	6.99
10540.00	57.16	PK	149	2.5	V	17.25	74.41	77.7	3.29
5310 MHz									
5148.81	31.85	PK	94	1.9	V	38.36	70.21	83.5	13.29
5148.81	17.28	Ave.	94	1.9	V	38.36	55.64	63.5	7.86
5248.69	33.94	PK	341	2.4	V	38.60	72.54	114.7*	42.16
5423.25	31.93	PK	179	1.9	V	39.19	71.12	83.5	12.38
5423.25	17.31	Ave.	179	1.9	V	39.19	56.50	63.5	7.00
10620.00	56.92	PK	295	1.9	V	18.01	74.93	83.5	8.57
10620.00	44.00	Ave.	295	1.9	V	18.01	62.01	63.5	1.49
802.11ac80									
5290 MHz									
5147.89	31.85	PK	163	2.2	V	38.36	70.21	83.5	13.29
5147.89	17.29	Ave.	163	2.2	V	38.36	55.65	63.5	7.85
5249.69	56.96	PK	111	2.0	V	38.60	95.56	114.7*	19.14
5410.25	32.73	PK	64	2.0	V	39.19	71.92	83.5	11.58
5410.25	17.35	Ave.	64	2.0	V	39.19	56.54	63.5	6.96
10580.00	56.73	PK	14	1.4	V	17.91	74.64	77.7	3.06

Note*: For ISEDC, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p.and its power shall comply with the spectral power density for operation within the band 5150-5250 MHz. The spectral power density of 5150-5250MHz is 10dBm/MHz. So the emission limit is (10+95.2+9.5)dBuV/m=114.7dBuV/m

5470-5725MHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
802.11a									
5500 MHz									
5468.42	32.15	PK	324	2.4	V	39.37	71.52	77.7	6.18
5726.72	32.24	PK	157	1.4	V	39.49	71.73	77.7	5.97
11000.00	50.04	PK	55	1.4	V	17.66	67.70	83.5	15.80
11000.00	34.99	Ave.	55	1.4	V	17.66	52.65	63.5	10.85
5580MHz									
11160.00	55.88	PK	236	1.7	V	17.39	73.27	83.5	10.23
11160.00	38.74	Ave.	236	1.7	V	17.39	56.13	63.5	7.37
5700 MHz									
5469.56	32.53	PK	120	1.8	V	39.37	71.90	77.7	5.80
5726.72	33.18	PK	32	1.5	V	39.49	72.67	77.7	5.03
11400.00	52.44	PK	258	2.1	V	17.73	70.17	83.5	13.33
11400.00	39.09	Ave.	258	2.1	V	17.73	56.82	63.5	6.68
802.11n20									
5500 MHz									
5468.84	32.55	PK	133	1.9	V	39.37	71.92	77.7	5.78
5726.68	32.28	PK	296	2.4	V	39.49	71.77	77.7	5.93
11000.00	47.85	PK	105	2.0	V	17.66	65.51	83.5	17.99
11000.00	31.99	Ave.	105	2.0	V	17.66	49.65	63.5	13.85
5580 MHz									
11160.00	52.46	PK	31	1.5	V	17.39	69.85	83.5	13.65
11160.00	34.11	Ave.	31	1.5	V	17.39	51.50	63.5	12.00
5700MHz									
5467.87	32.41	PK	187	1.7	V	39.37	71.78	77.7	5.92
5725.85	32.42	PK	188	1.5	V	39.49	71.91	77.7	5.79
11400.00	51.85	PK	121	1.1	V	17.73	69.58	83.5	13.92
11400.00	36.12	Ave.	121	1.1	V	17.73	53.85	63.5	9.65

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
802.11n40									
5510 MHz									
5469.88	32.14	PK	129	1.2	V	39.37	71.51	77.7	6.19
5726.54	32.21	PK	12	1.4	V	39.49	71.70	77.7	6.00
11020.00	43.81	PK	293	1.9	V	17.66	61.47	83.5	22.03
11020.00	31.17	Ave.	293	1.9	V	17.66	48.83	63.5	14.67
5550 MHz									
11100.00	44.50	PK	99	2.3	V	16.72	61.22	83.5	22.28
11100.00	30.27	Ave.	99	2.3	V	16.72	46.99	63.5	16.51
5670 MHz									
5468.47	32.14	PK	72	1.9	V	39.37	71.51	77.7	6.19
5725.64	33.29	PK	30	1.8	V	39.49	72.78	77.7	4.92
11340.00	48.62	PK	209	2.5	V	17.43	66.05	83.5	17.45
11340.00	35.59	Ave.	209	2.5	V	17.43	53.02	63.5	10.48
802.11ac20									
5500 MHz									
5469.74	32.54	PK	281	2.1	V	39.37	71.91	77.7	5.79
5727.45	32.42	PK	299	2.2	V	39.49	71.91	77.7	5.79
11000.00	48.75	PK	7	1.1	V	17.66	66.41	83.5	17.09
11000.00	31.64	Ave.	7	1.1	V	17.66	49.30	63.5	14.20
5580 MHz									
11160.00	51.24	PK	335	2.2	V	17.39	68.63	83.5	14.87
11160.00	33.74	Ave.	335	2.2	V	17.39	51.13	63.5	12.37
5700 MHz									
5468.42	32.41	PK	105	2.4	V	39.37	71.78	77.7	5.92
5726.34	33.42	PK	148	2.2	V	39.49	72.91	77.7	4.79
11400.00	49.66	PK	252	1.5	V	17.73	67.39	83.5	16.11
11400.00	34.66	Ave.	252	1.5	V	17.73	52.39	63.5	11.11

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
802.11ac40									
5510 MHz									
5468.82	32.14	PK	328	1.3	V	39.37	71.51	77.7	6.19
5726.66	32.45	PK	269	2.2	V	39.49	71.94	77.7	5.76
11020.00	44.57	PK	150	2.5	V	17.66	62.23	83.5	21.27
11020.00	30.87	Ave.	150	2.5	V	17.66	48.53	63.5	14.97
5550 MHZ									
11100.00	44.67	PK	77	1.0	V	16.72	61.39	83.5	22.11
11100.00	31.04	Ave.	77	1.0	V	16.72	47.76	63.5	15.74
5670 MHz									
5467.42	32.51	PK	211	1.6	V	39.37	71.88	77.7	5.82
5725.88	33.24	PK	78	1.9	V	39.49	72.73	77.7	4.97
11340.00	47.75	PK	160	1.7	V	17.43	65.18	83.5	18.32
11340.00	34.21	Ave.	160	1.7	V	17.43	51.64	63.5	11.86
802.11ac80									
5530MHz									
5468.48	32.31	PK	205	2.0	V	39.37	71.68	77.7	6.02
5726.54	32.14	PK	282	1.6	V	39.49	71.63	77.7	6.07
11060.00	43.30	PK	356	1.2	V	16.72	60.02	83.5	23.48
11060.00	29.42	Ave.	356	1.2	V	16.72	46.14	63.5	17.36
5610 MHz									
5467.97	31.94	PK	271	1.9	V	39.37	71.31	77.7	6.39
5725.89	33.21	PK	209	1.5	V	39.49	72.70	77.7	5.00
11220.00	44.51	PK	36	2.2	V	17.39	61.90	83.5	21.60
11220.00	29.93	Ave.	36	2.2	V	17.39	47.32	63.5	16.18

5725-5850 MHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
802.11a									
5745 MHz									
5612.84	31.60	PK	41	1.0	V	39.46	71.06	77.7	6.64
5677.24	31.71	PK	56	2.1	V	39.49	71.20	97.86	26.66
5717.67	32.57	PK	185	1.1	V	39.49	72.06	119.65	47.59
5724.74	34.78	PK	161	1.2	V	39.49	74.27	131.11	56.84
11490.00	45.29	PK	157	2.1	V	17.47	62.76	83.5	20.74
11490.00	29.87	Ave.	157	2.1	V	17.47	47.34	63.5	16.16
5785 MHz									
11570.00	51.67	PK	306	1.4	V	17.51	69.18	83.5	14.32
11570.00	34.89	Ave.	306	1.4	V	17.51	52.40	63.5	11.10
5825 MHz									
5853.77	33.68	PK	205	1.1	V	39.87	73.55	123.1	49.55
5870.04	33.12	PK	220	1.7	V	39.87	72.99	116.09	43.10
5875.98	33.63	PK	229	2.4	V	39.87	73.50	113.97	40.47
5955.28	32.70	PK	87	1.6	V	39.84	72.54	77.7	5.16
11650.00	55.24	PK	192	2.3	V	16.18	71.42	83.5	12.08
11650.00	39.64	Ave.	192	2.3	V	16.18	55.82	63.5	7.68
802.11n20									
5745 MHz									
5630.50	31.73	PK	56	1.4	V	39.46	71.19	77.7	6.51
5653.08	31.71	PK	268	1.8	V	39.49	71.20	79.98	8.78
5711.88	32.35	PK	331	1.1	V	39.49	71.84	118.03	46.19
5723.95	32.92	PK	158	1.2	V	39.49	72.41	129.31	56.90
11490.00	44.16	PK	268	2.0	V	17.47	61.63	83.5	21.87
11490.00	28.06	Ave.	268	2.0	V	17.47	45.53	63.5	17.97
5785 MHz									
11570.00	45.88	PK	265	2.0	V	17.51	63.39	83.5	20.11
11570.00	30.44	Ave.	265	2.0	V	17.51	47.95	63.5	15.55
5825 MHz									
5850.30	32.97	PK	255	1.9	V	39.87	72.84	131.02	58.18
5861.53	33.10	PK	16	1.1	V	39.87	72.97	118.47	45.50
5897.83	33.74	PK	264	2.5	V	39.87	73.61	97.81	24.20
5943.78	34.13	PK	227	1.6	V	39.97	74.10	77.7	3.60
11650.00	50.90	PK	267	1.5	V	16.18	67.08	83.5	16.42
11650.00	34.31	Ave.	267	1.5	V	16.18	50.49	63.5	13.01

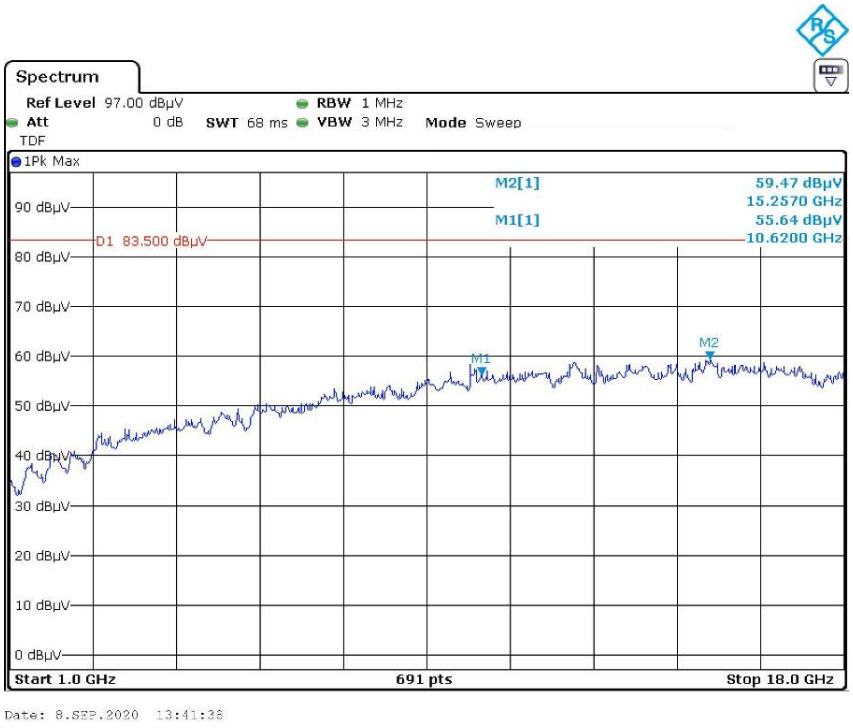
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
802.11n40									
5755 MHz									
5642.37	31.49	PK	111	1.5	V	39.46	70.95	77.7	6.75
5699.75	31.57	PK	153	2.1	V	39.49	71.06	114.52	43.46
5706.67	32.33	PK	124	1.7	V	39.49	71.82	116.57	44.75
5722.96	33.03	PK	160	2.0	V	39.49	72.52	127.05	54.53
11510.00	43.35	PK	52	1.0	V	17.47	60.82	83.5	22.68
11510.00	28.25	Ave.	52	1.0	V	17.47	45.72	63.5	17.78
5795 MHz									
5853.61	33.23	PK	354	2.4	V	39.87	73.10	123.47	50.37
5866.13	33.34	PK	162	1.4	V	39.87	73.21	117.18	43.97
5900.29	33.63	PK	196	1.7	V	39.87	73.50	95.99	22.49
5945.66	34.40	PK	233	2.4	V	39.97	74.37	77.7	3.33
11590.00	45.45	PK	11	2.1	V	17.51	62.96	83.5	20.54
11590.00	30.96	Ave.	11	2.1	V	17.51	48.47	63.5	15.03
802.11ac20									
5745 MHz									
5622.25	31.29	PK	315	2.3	V	39.46	70.75	77.7	6.95
5687.45	31.58	PK	320	2.5	V	39.49	71.07	105.41	34.34
5703.72	31.96	PK	74	1.4	V	39.49	71.45	115.74	44.29
5723.33	32.28	PK	267	1.2	V	39.49	71.77	127.89	56.12
11490.00	42.78	PK	69	2.0	V	17.47	60.25	83.5	23.25
11490.00	27.09	Ave.	69	2.0	V	17.47	44.56	63.5	18.94
5785 MHz									
11570.00	46.29	PK	268	1.4	V	17.51	63.80	83.5	19.70
11570.00	30.30	Ave.	268	1.4	V	17.51	47.81	63.5	15.69
5825 MHz									
5850.01	32.90	PK	72	1.5	V	39.87	72.77	131.68	58.91
5856.46	33.12	PK	239	2.0	V	39.87	72.99	119.89	46.90
5903.84	34.89	PK	35	2.5	V	39.87	74.76	93.36	18.60
5941.10	33.54	PK	317	1.6	V	39.97	73.51	77.7	4.19
11650.00	49.72	PK	291	2.0	V	16.18	65.90	83.5	17.60
11650.00	33.25	Ave.	291	2.0	V	16.18	49.43	63.5	14.07

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
802.11ac40									
5755 MHz									
5629.41	31.25	PK	346	1.6	V	39.46	70.71	77.7	6.99
5678.98	31.63	PK	326	2.0	V	39.49	71.12	99.15	28.03
5718.83	33.45	PK	327	2.3	V	39.49	72.94	119.97	47.03
5722.28	32.72	PK	244	1.8	V	39.49	72.21	125.5	53.29
11510.00	43.65	PK	143	2.2	V	17.47	61.12	83.5	22.38
11510.00	28.12	Ave.	143	2.2	V	17.47	45.59	63.5	17.91
5795 MHz									
5851.81	32.96	PK	116	1.2	V	39.87	72.83	127.57	54.74
5870.12	33.66	PK	59	1.4	V	39.87	73.53	116.07	42.54
5915.27	33.37	PK	85	1.8	V	39.87	73.24	84.9	11.66
5958.76	34.42	PK	303	1.7	V	39.84	74.26	77.7	3.44
11590.00	43.61	PK	193	2.4	V	17.51	61.12	83.5	22.38
11590.00	28.63	Ave.	193	2.4	V	17.51	46.14	63.5	17.36
802.11ac80									
5775 MHz									
5646.99	31.99	PK	72	1.6	V	39.46	71.45	77.7	6.25
5688.53	32.09	PK	66	1.5	V	39.49	71.58	106.21	34.63
5717.18	32.98	PK	176	2.4	V	39.49	72.47	119.51	47.04
5721.84	33.23	PK	208	2.5	V	39.49	72.72	124.5	51.78
5853.48	33.10	PK	269	1.2	V	39.87	72.97	123.77	50.80
5857.48	33.24	PK	296	1.3	V	39.87	73.11	119.61	46.50
5875.25	32.84	PK	144	1.7	V	39.87	72.71	114.52	41.81
5960.64	33.07	PK	325	1.6	V	39.84	72.91	77.7	4.79
11550.00	42.89	PK	129	2.0	V	17.51	60.40	83.5	23.10
11550.00	28.07	Ave.	129	2.0	V	17.51	45.58	63.5	17.92

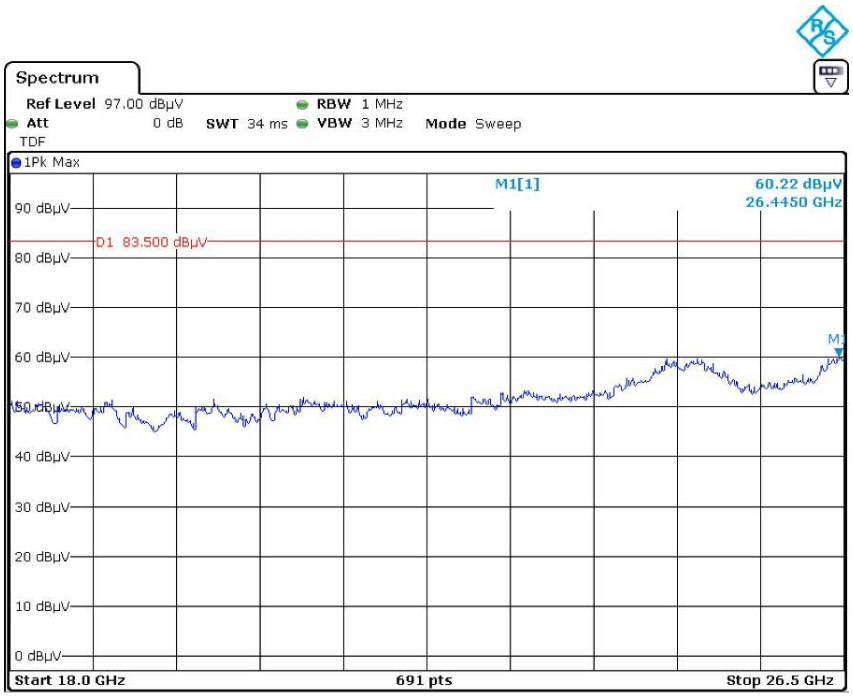
Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor
Margin = Limit- Corr. Amplitude
All other spurious emissions are 20 dB below the limit or are on the system noise floor level.

Peak

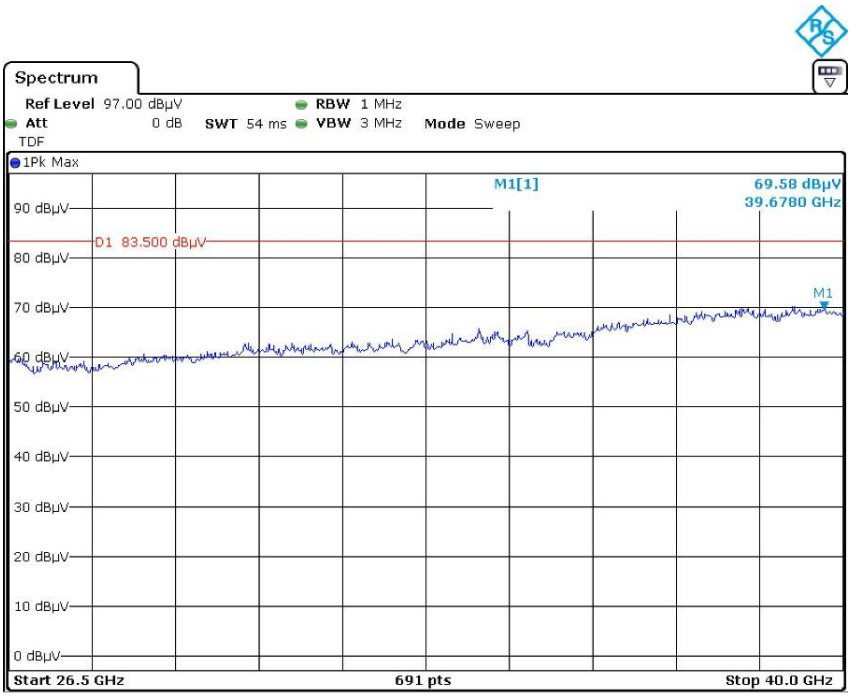
Pre-scan with 802.11ac40 5310MHz
Horizontal



Date: 8.SEP.2020 13:41:38

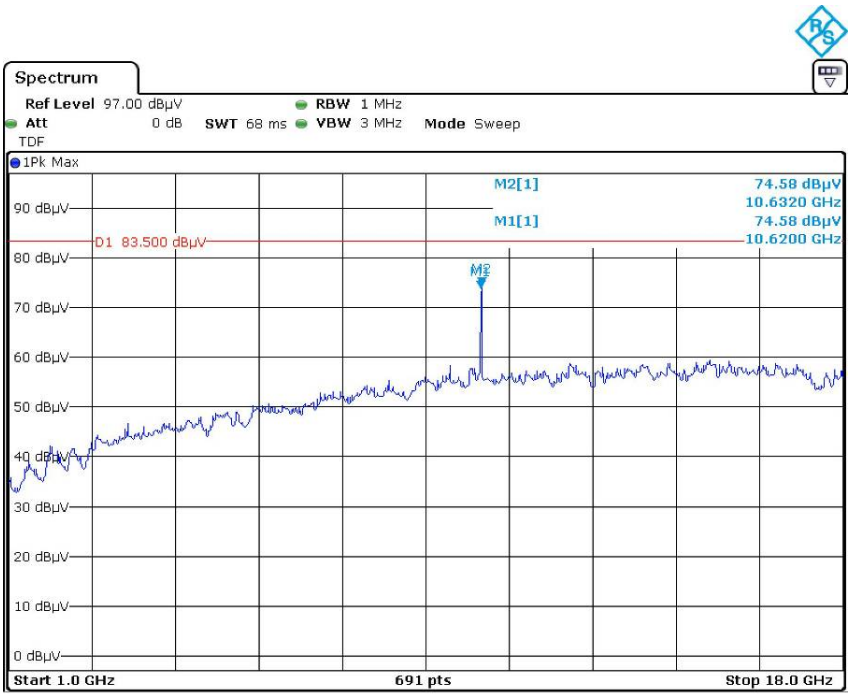


Date: 8.SEP.2020 14:24:08

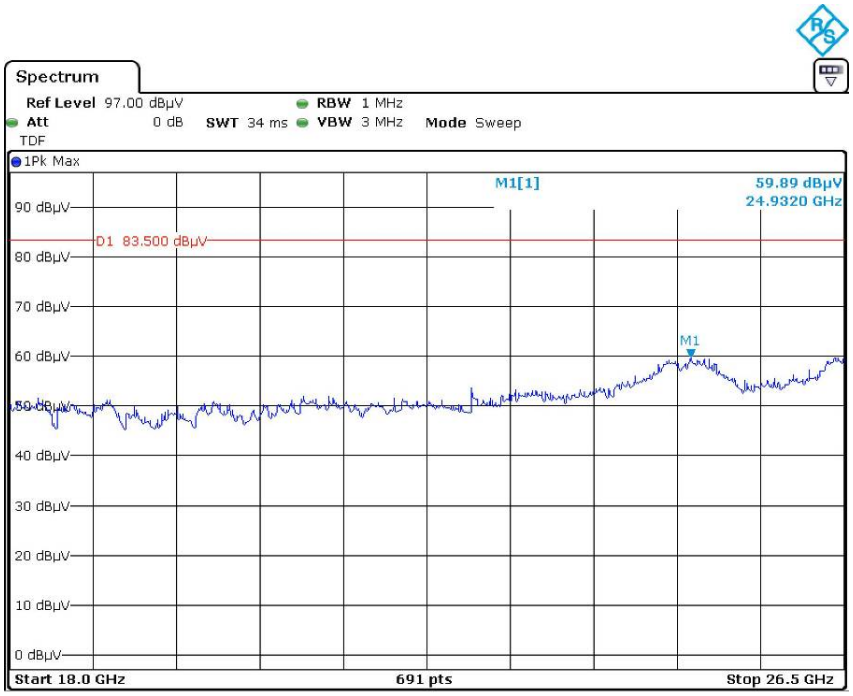


Date: 8.SEP.2020 15:07:01

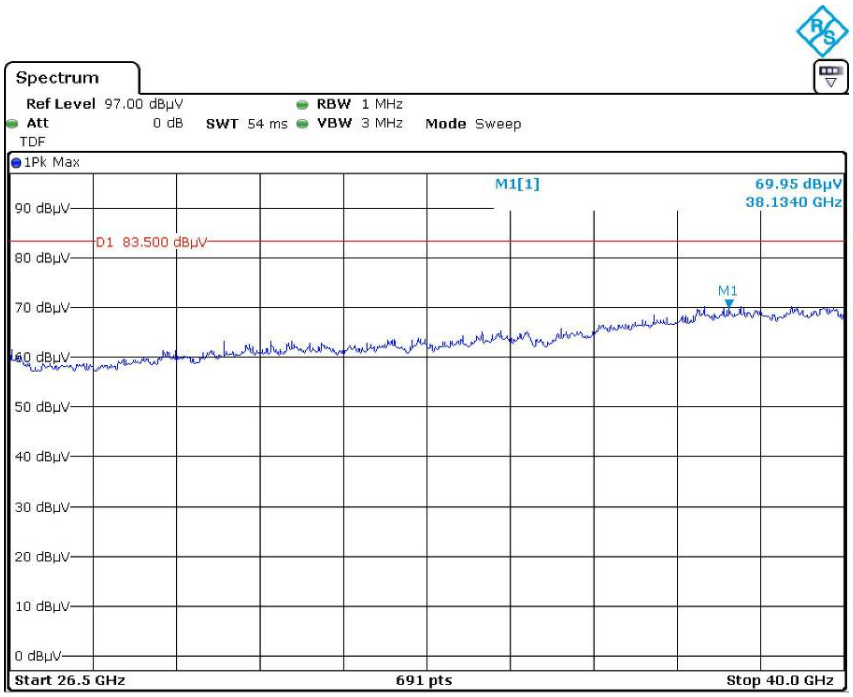
Vertical



Date: 8.SEP.2020 13:46:17

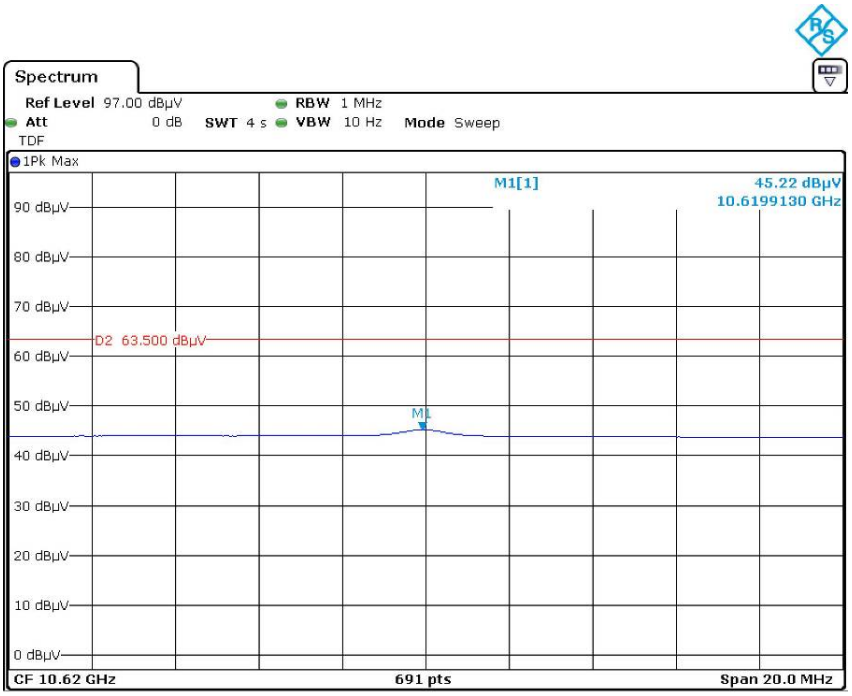


Date: 8.SEP.2020 14:31:43

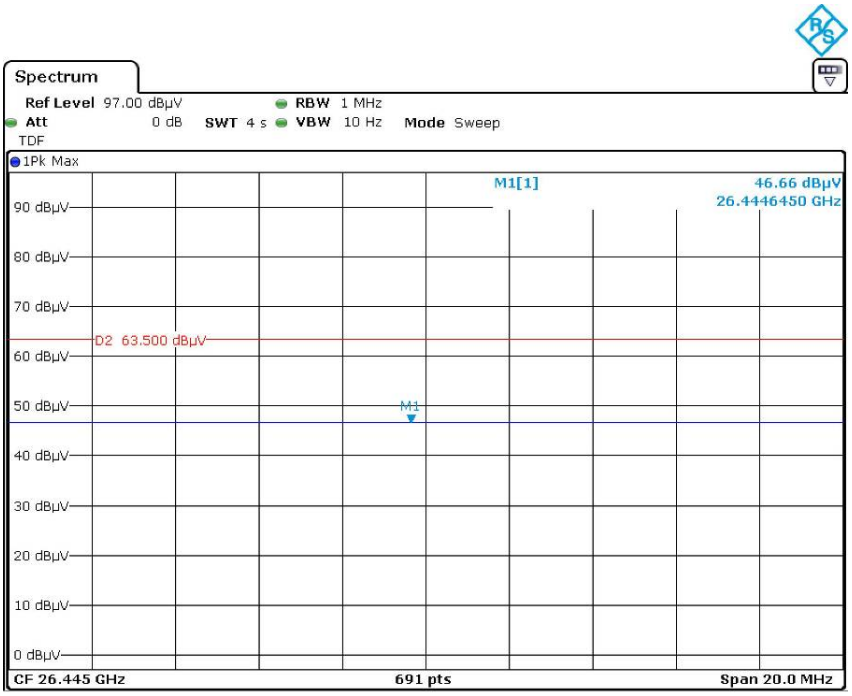


Date: 8.SEP.2020 15:14:55

Average
Horizontal



Date: 8.SEP.2020 13:44:53



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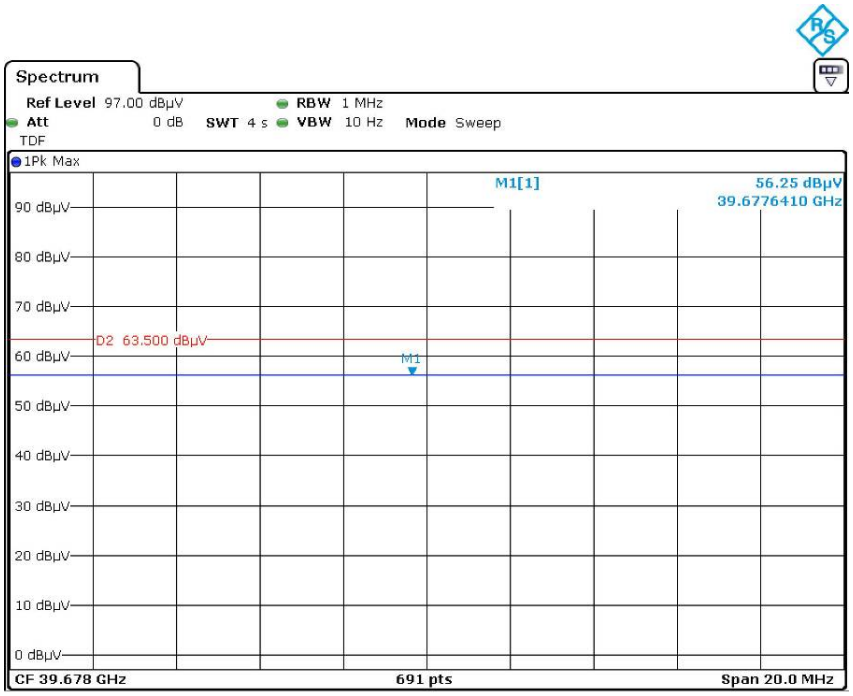
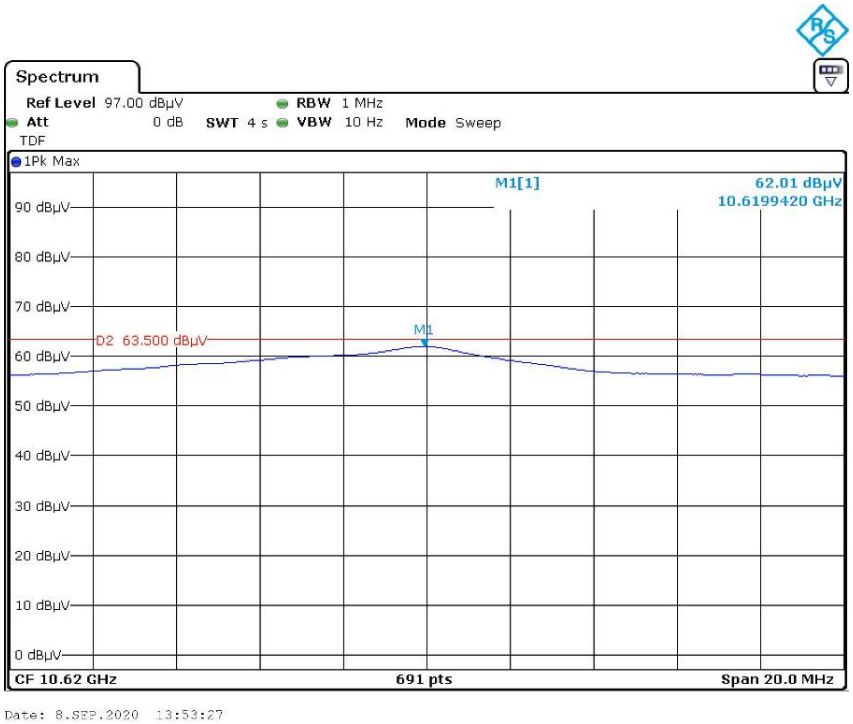
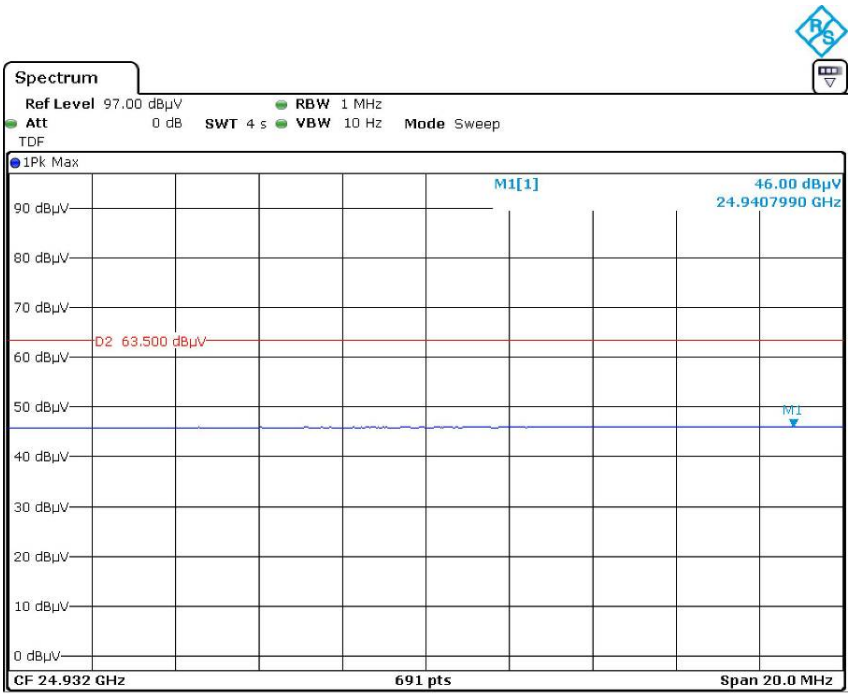
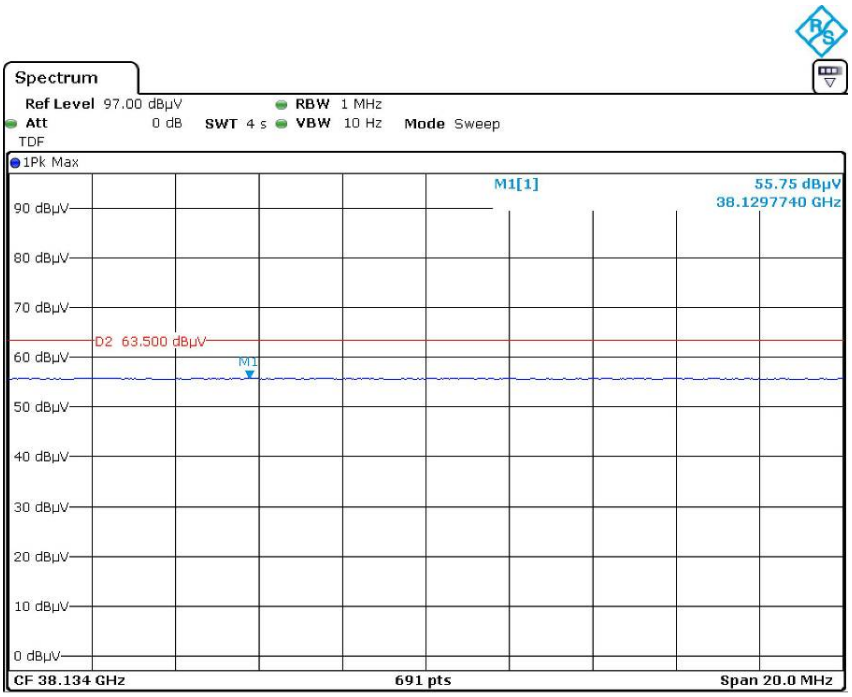

Spectrum
Ref Level 97.00 dBµV
RBW 1 MHz
Att 0 dB
SWT 4 s
VBW 10 Hz
Mode Sweep
TDF
1Pk Max
M1[1]
56.25 dBµV
39.6776410 GHz
D2 63.500 dBµV
M1
90 dBµV
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
20 dBµV
10 dBµV
0 dBµV
CF 39.678 GHz
691 pts
Span 20.0 MHz
Date: 8.SEP.2020 15:10:28

Vertical


Spectrum
Ref Level 97.00 dBµV
RBW 1 MHz
Att 0 dB
SWT 4 s
VBW 10 Hz
Mode Sweep
TDF
1Pk Max
M1[1]
62.01 dBµV
10.6199420 GHz
D2 63.500 dBµV
M1
90 dBµV
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
20 dBµV
10 dBµV
0 dBµV
CF 10.62 GHz
691 pts
Span 20.0 MHz
Date: 8.SEP.2020 13:53:27



Date: 8.SEP.2020 14:35:14



Date: 8.SEP.2020 15:16:25

FCC §15.407(1), (5),(e) – 26 dB & 6dB & RSS-GEN § 6.7 & RSS-247 §6.2– 99% EMISSION BANDWIDTH

Applicable Standard

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

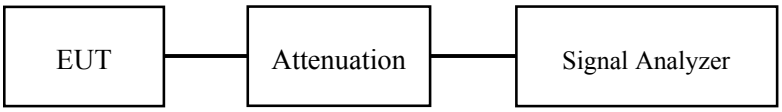
Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

According to RSS-GEN § 6.7 & RSS-247 §6.2.

Test Procedure

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

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



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

Test Data

Environmental Conditions

Temperature:	25℃
Relative Humidity:	52%
ATM Pressure:	101.0 kPa

The testing was performed by Gavin Guo from 2020-08-30 to 2020-10-12.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the Appendix.

FCC §15.407(a)(1)(2)(3) & RSS-247 §6.2– CONDUCTED TRANSMITTER OUTPUT POWER

Applicable Standard

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

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

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

According to RSS-247 §6.2:
Frequency band 5250-5350 MHz

6.2.2.1(a) The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band;

Frequency band 5470-5600 MHz and 5650-5725MHz

6.2.3.1 The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

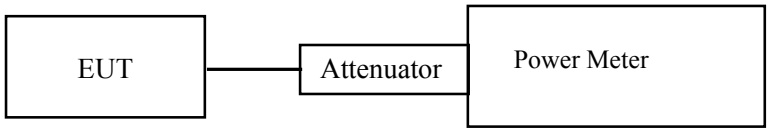
Frequency band 5725-5850 MHz

6.2.4.1 For equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

The maximum conducted output power shall not exceed 1 W. The output 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 output 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 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-multipointFootnote3 systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



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

Test Data

Environmental Conditions

Temperature:	25℃
Relative Humidity:	52%
ATM Pressure:	101.0 kPa

The testing was performed by Gavin Guo from 2020-08-30 to 2020-10-12.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the Appendix.

FCC §15.407(a) (1) (2) (3) & RSS-247 §6.2- POWER SPECTRAL DENSITY

Applicable Standard

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

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

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

According to RSS-247 §6.2:

Frequency band 5250-5350 MHz

6.2.2.1(a) The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band;

Frequency band 5470-5600 MHz and 5650-5725MHz

6.2.3.1 The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

Frequency band 5725-5850 MHz

6.2.4.1 For equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

The maximum conducted output power shall not exceed 1 W. The output 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 output 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 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-multipointFootnote3 systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

Test Procedure

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1/T, where T is defined in section II.B.l.a).
b) Set VBW ≥ 3 RBW.
c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

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

Test Data

Environmental Conditions

Temperature:	25℃
Relative Humidity:	52%
ATM Pressure:	101.0 kPa

The testing was performed by Gavin Guo from 2020-08-30 to 2020-10-12.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the Appendix.

RSS-247 §6.4 - ADDITIONAL REQUIREMENTS

Applicable Standard

According to RSS-247 Clause 6.4 Additional requirement

The following requirements shall apply:

a. The device shall automatically discontinue transmission in cases of absence of information to transmit, or operational failure. A description on how this is done shall accompany the application for equipment certification. Note that this is not intended to prohibit transmission of control or signalling information or the use of repetitive codes where required by the technology.

b. All LE-LAN devices must contain security features to protect against modification of software by unauthorized parties.

   Manufacturers must implement security features in any digitally modulated devices capable of operating in any of the frequency ranges within the 5 GHz band, so that third parties are not able to reprogram the device to operate outside the parameters for which the device was certified. The software must prevent the user from operating the transmitter with operating frequencies, output power, modulation types or other radio frequency parameters outside those that were approved for the device. Manufacturers may use various means, including the use of a private network that allows only authenticated users to download software, electronic signatures in software or coding in hardware that is decoded by software to verify that new software can be legally loaded into a device to meet these requirements and must describe the methods in their application for equipment certification.

   Manufacturers must take steps to ensure that DFS functionality cannot be disabled by the operator of the LE-LAN device.

c. The user manual for LE-LAN devices shall contain instructions related to the restrictions mentioned in the above sections, namely that:

   i. the device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;[Footnote4]
   ii. for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit;
   iii. for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits as appropriate; and
   iv. where applicable, antenna type(s), antenna models(s), and worst-case tilt angle(s) necessary to remain compliant with the e.i.r.p. elevation mask requirement set forth in section 6.2.2.3 shall be clearly indicated.

Result

Pass

RSS-247 Clause 6.4 a):

The device shall automatically discontinue transmission in cases of absence of information to transmit, or operation failure. Please refer to declaration.

RSS-247 Clause 6.4 b):

The device must contain security features to protect against modification of software by unauthorized parties. Please refer to declaration.

RSS-247 Clause 6.4 c):

1. the device for operation in the band 5150–5250MHz is only for indoor.

2. the device has one integral antennas for bands 5250-5350MHz and 5470-5725MHz.

3. the device has one integral antennas for band 5725-5850MHz.

4. For band 5250-5350MHz, the maximum e.i.r.p. of the device is 14.40dBm = 27.54mW<200mW.

APPENDIX

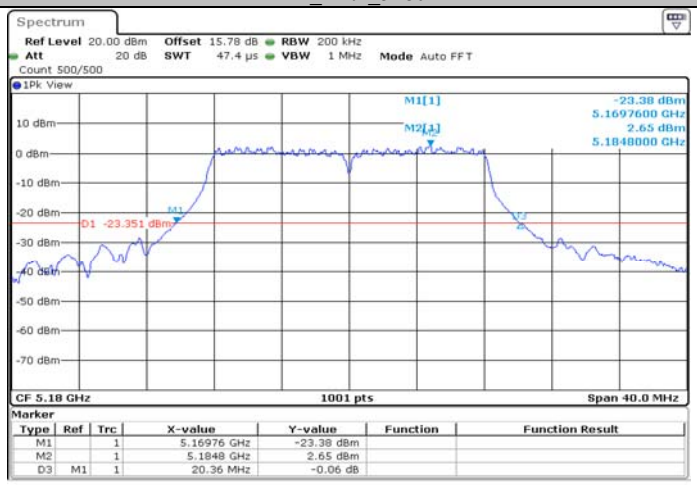
Appendix A1: Emission Bandwidth

Test Result

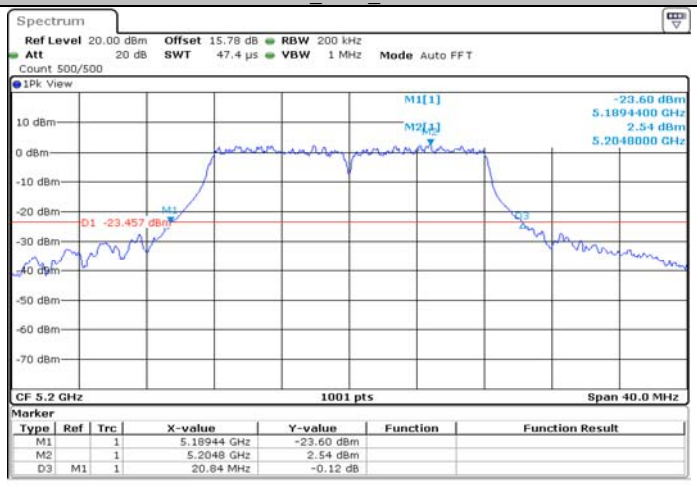
TestMode	Antenna	Channel	26db EBW [MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	20.360	---	PASS
		5200	20.840	---	PASS
		5240	20.760	---	PASS
		5260	20.840	---	PASS
		5280	20.560	---	PASS
		5320	20.760	---	PASS
		5500	20.640	---	PASS
		5580	20.680	---	PASS
		5700	20.640	---	PASS
11N20	Ant1	5180	21.360	---	PASS
		5200	21.520	---	PASS
		5240	21.360	---	PASS
		5260	21.440	---	PASS
		5280	21.400	---	PASS
		5320	21.320	---	PASS
		5500	21.400	---	PASS
		5580	21.480	---	PASS
		5700	21.440	---	PASS
11N40	Ant1	5190	42.000	---	PASS
		5230	42.000	---	PASS
		5270	58.800	---	PASS
		5310	56.880	---	PASS
		5510	42.240	---	PASS
		5550	42.400	---	PASS
		5670	42.240	---	PASS
11AC20	Ant1	5180	21.440	---	PASS
		5200	21.560	---	PASS
		5240	21.520	---	PASS
		5260	21.600	---	PASS
		5280	21.400	---	PASS
		5320	21.360	---	PASS
		5500	21.520	---	PASS
		5580	21.400	---	PASS
		5700	21.520	---	PASS
11AC40	Ant1	5190	42.080	---	PASS
		5230	42.000	---	PASS
		5270	41.920	---	PASS
		5310	42.080	---	PASS
		5510	42.160	---	PASS
		5550	42.240	---	PASS
		5670	42.000	---	PASS
11AC80	Ant1	5210	83.200	---	PASS
		5290	85.280	---	PASS
		5530	83.840	---	PASS
		5610	83.520	---	PASS

Test Graphs

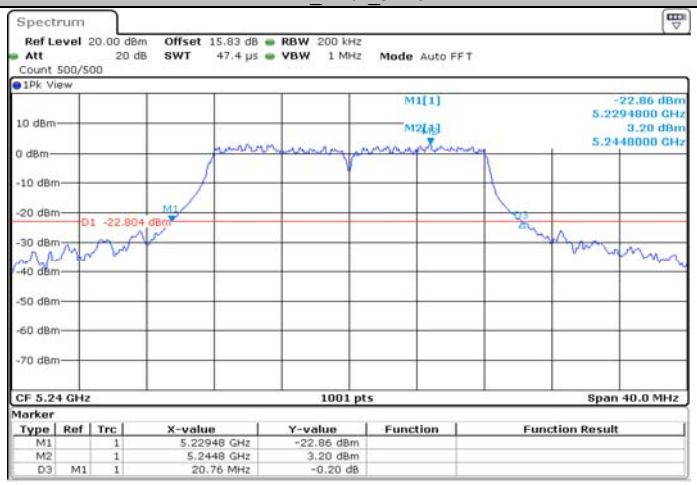
11A_Ant1_5180



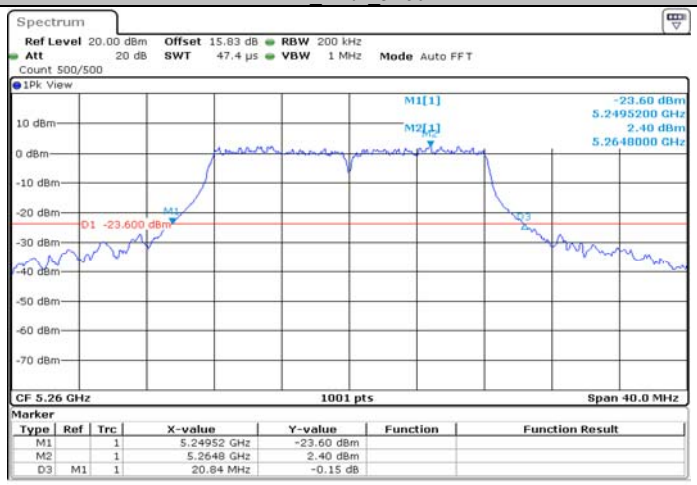
11A_Ant1_5200



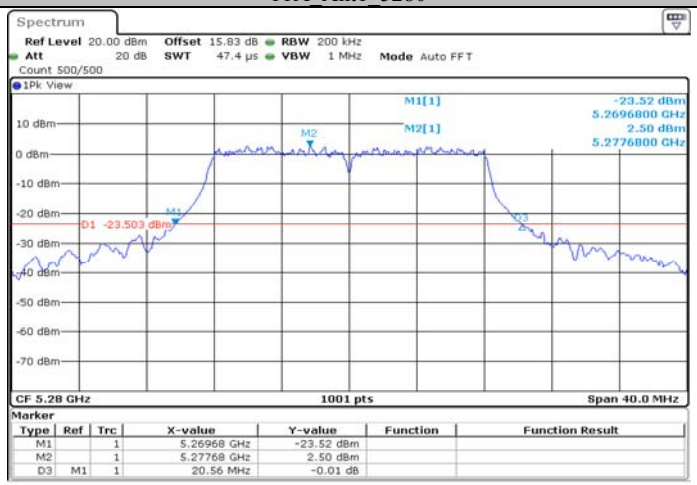
11A_Ant1_5240



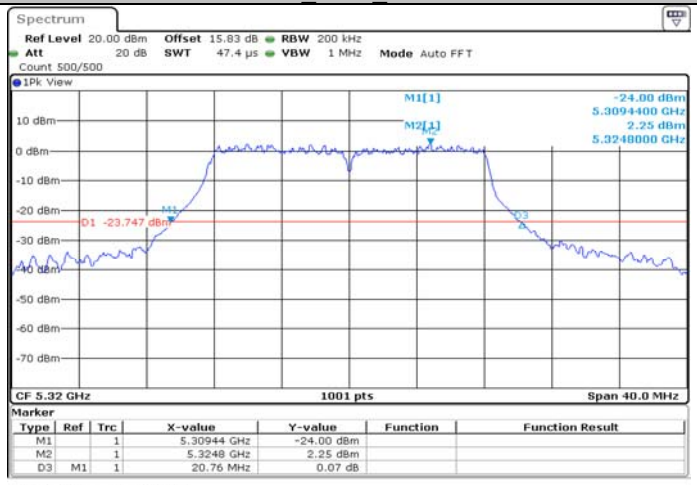
11A_Ant1_5260



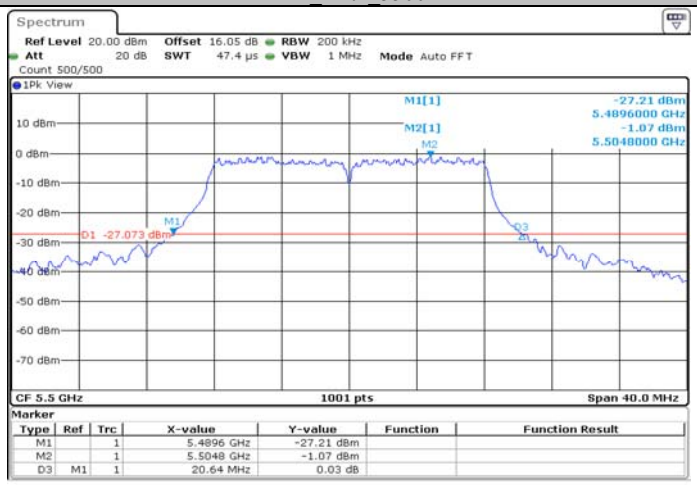
11A_Ant1_5280



11A_Ant1_5320



11A_Ant1_5500



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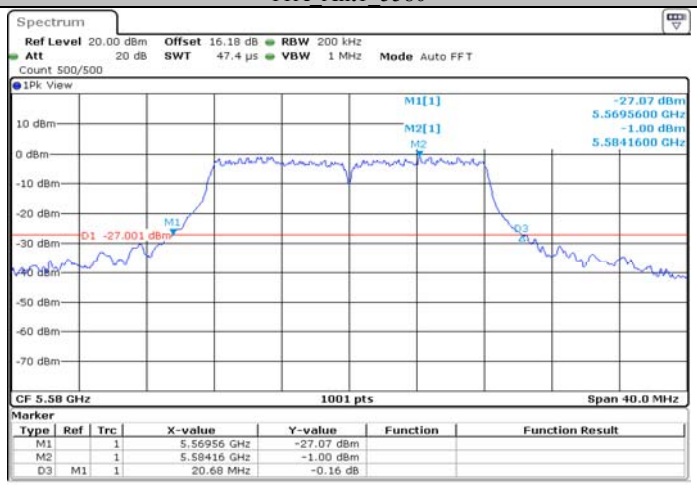
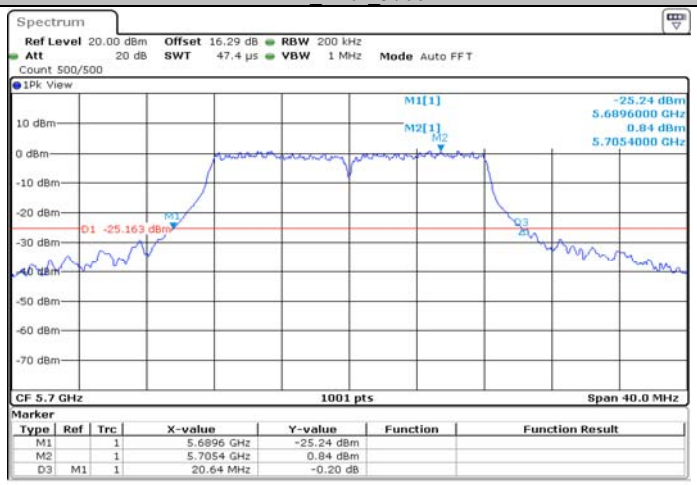
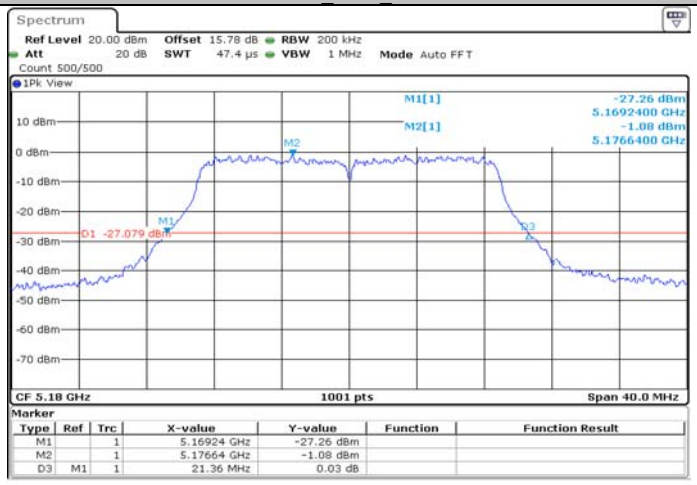


11A_Ant1_5700



11N20_Ant1_5180



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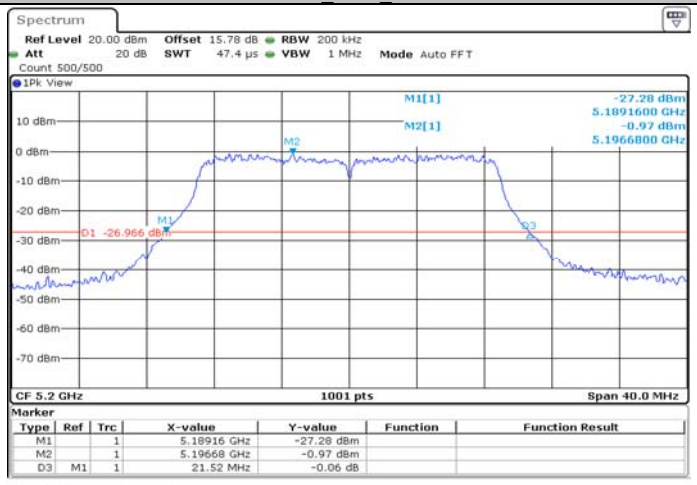
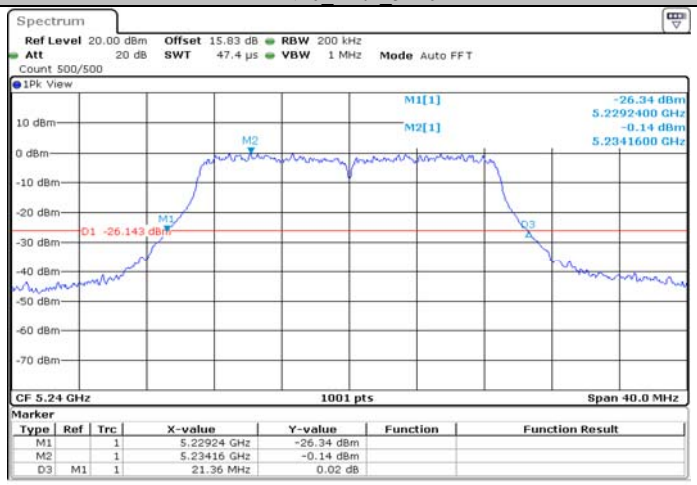


11N20_Ant1_5240



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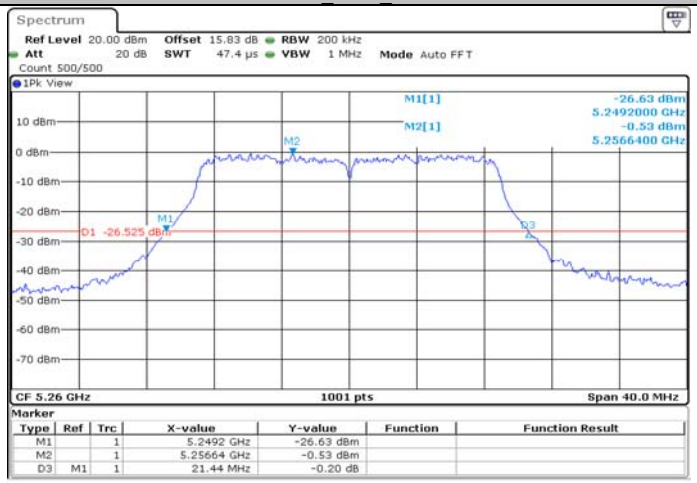

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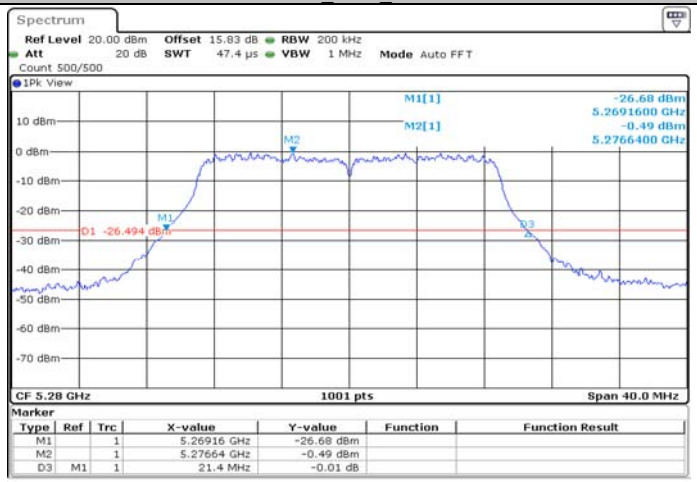
11N20_Ant1_5280



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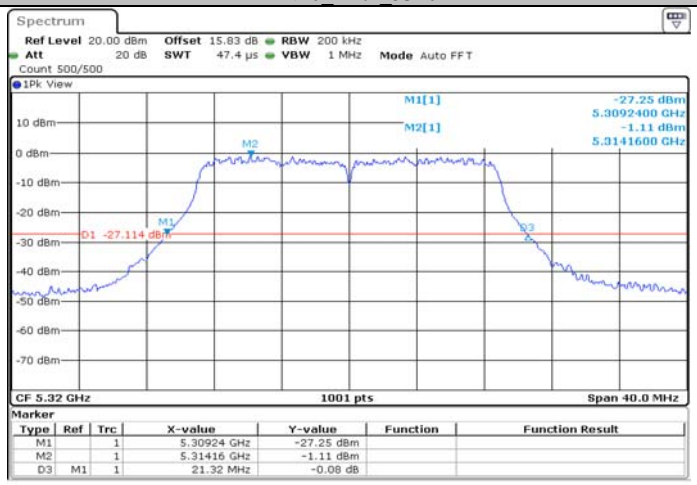

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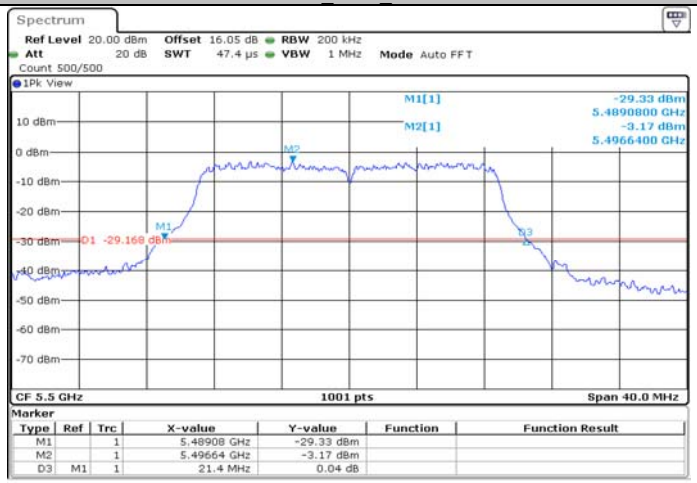

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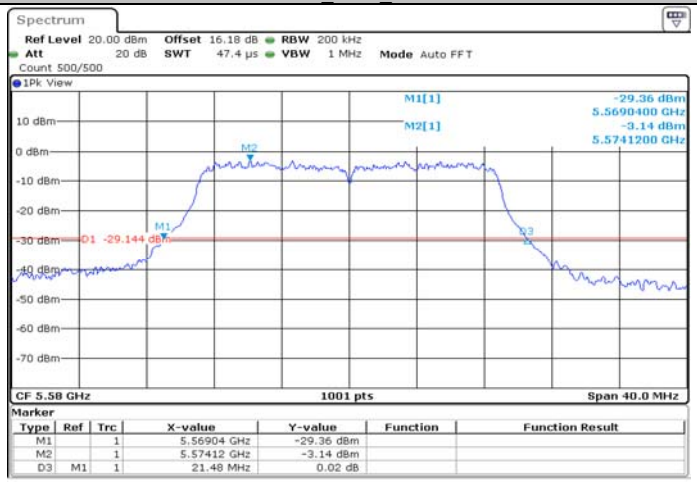
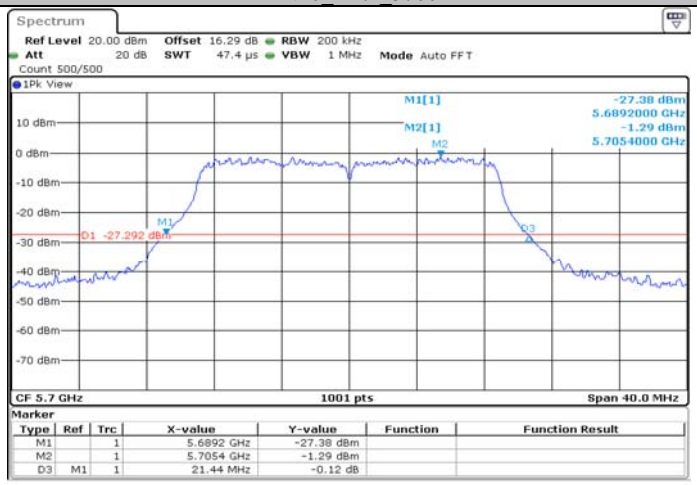
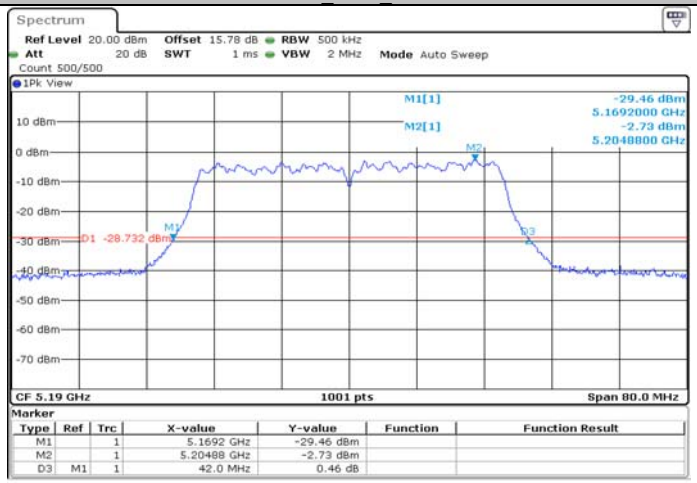


11N20_Ant1_5700



11N40_Ant1_5190



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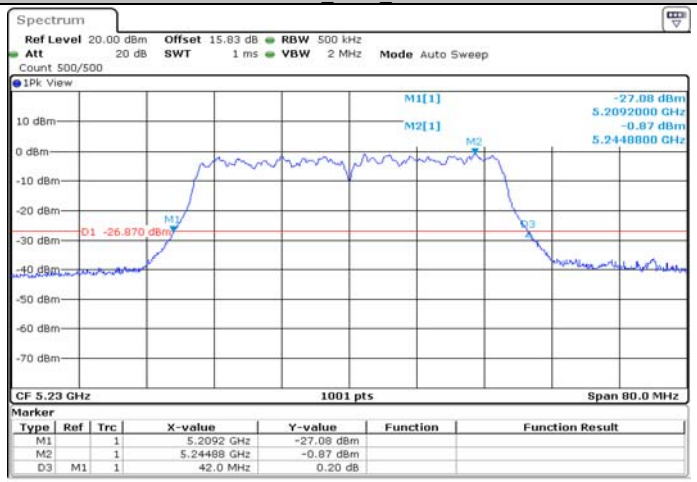
11N40_Ant1_5230



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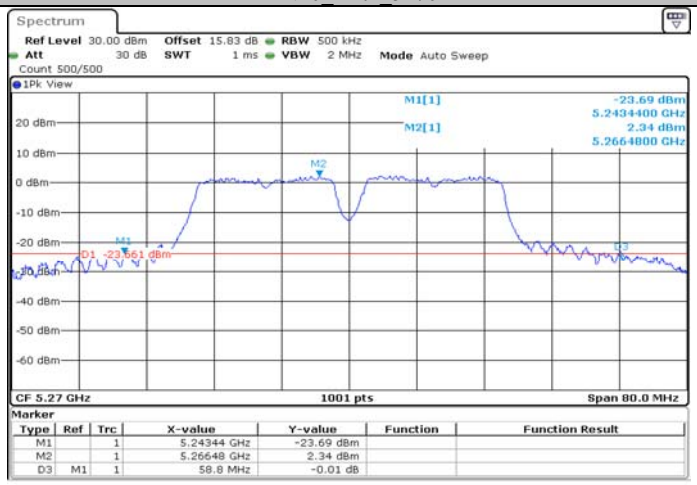

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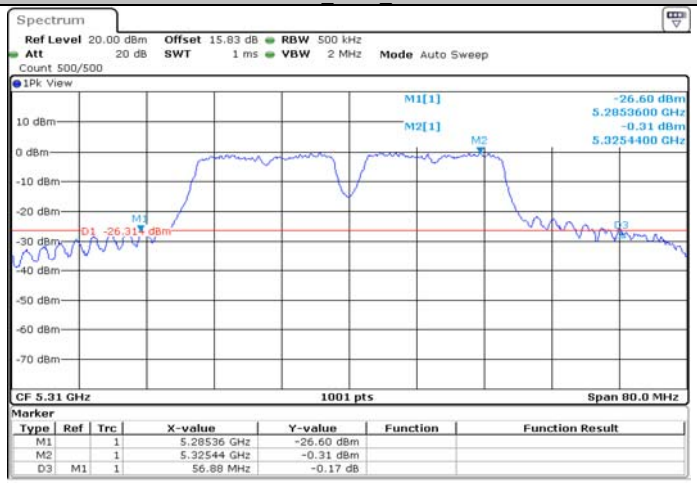
11N40_Ant1_5310



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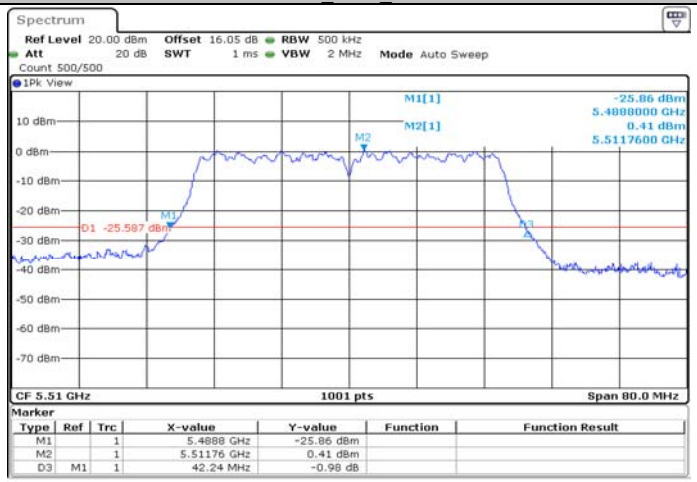

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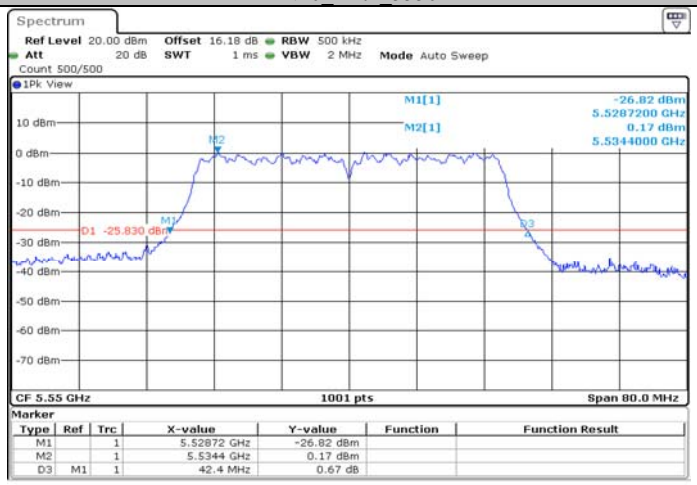
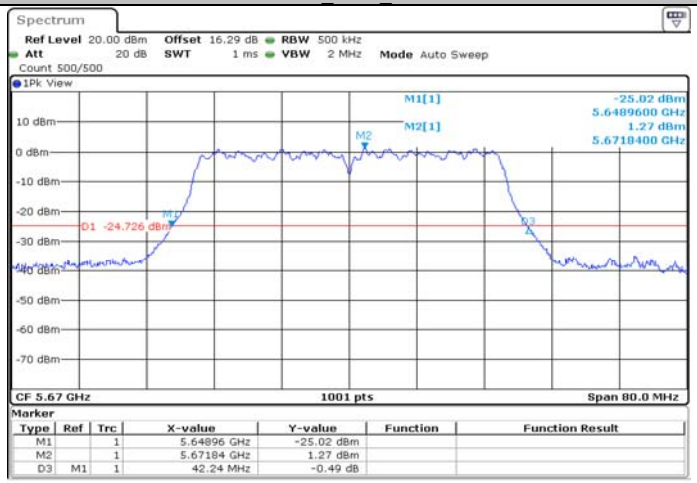


11N40_Ant1_5670



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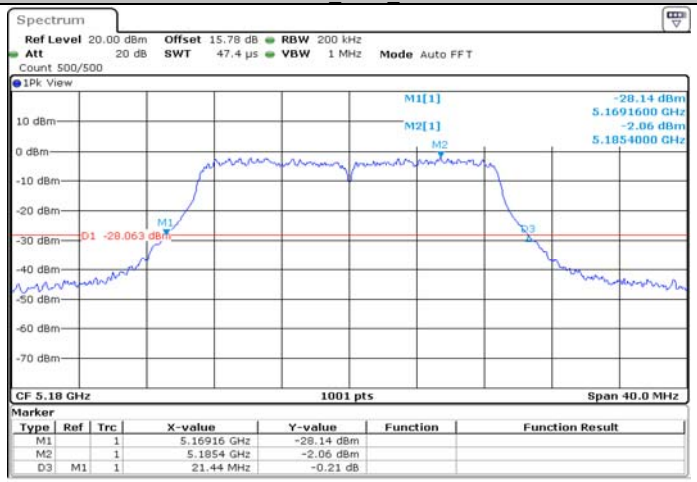
11AC20_Ant1_5180



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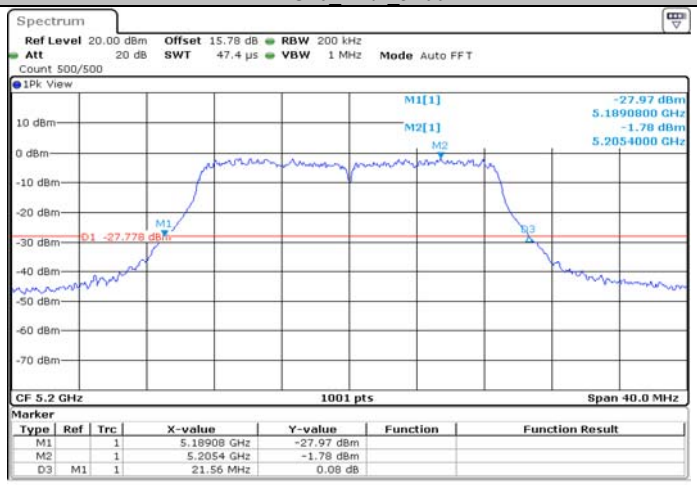
11AC20_Ant1_5200



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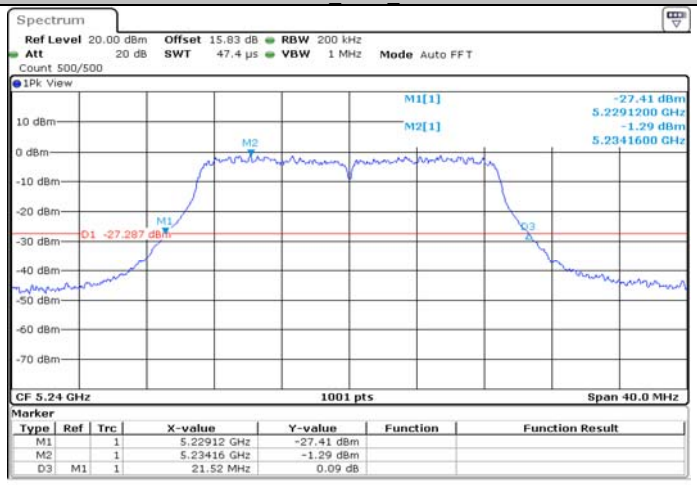
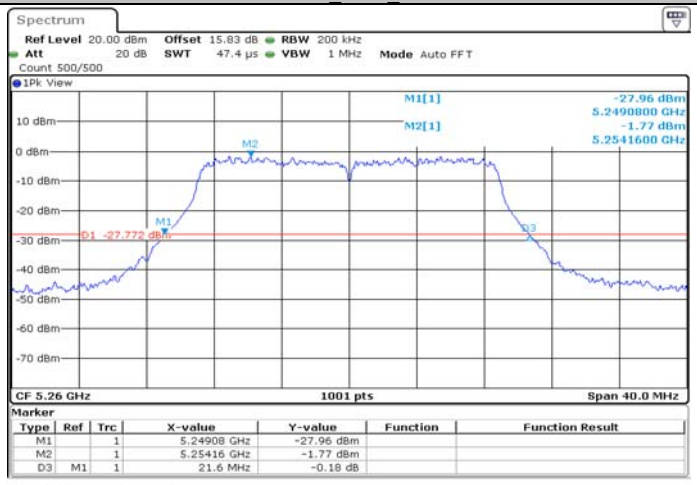
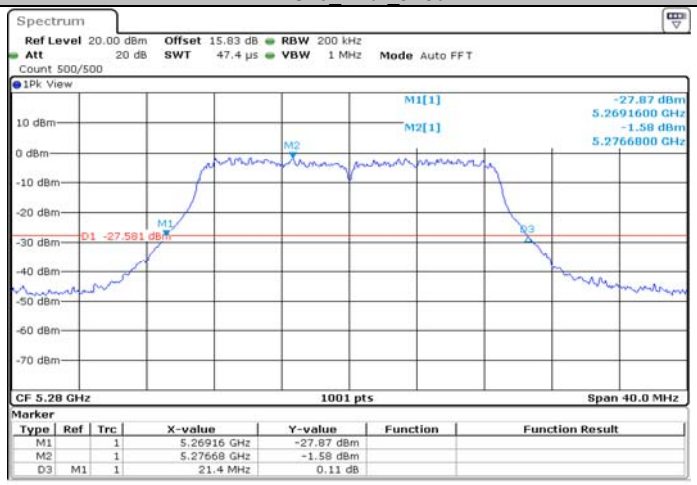


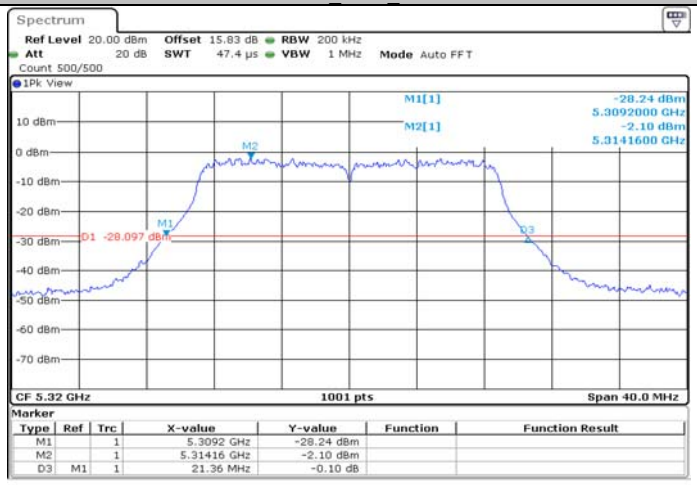
11AC20_Ant1_5260



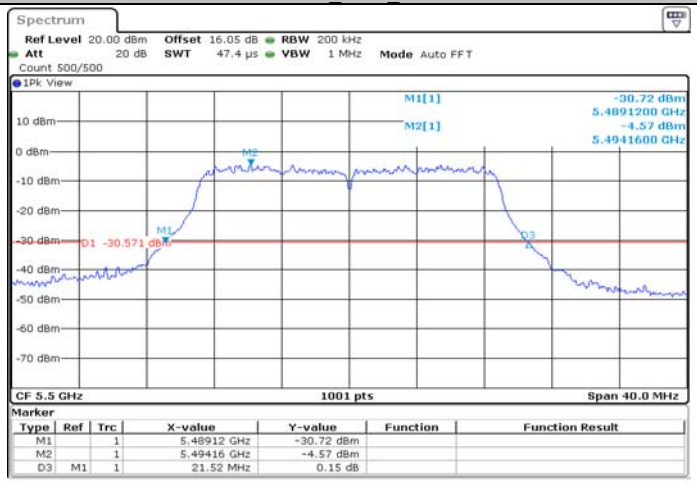
11AC20_Ant1_5280



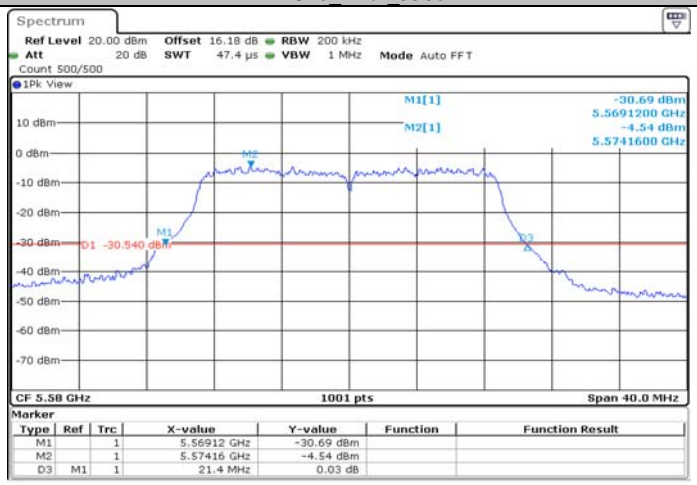
11AC20_Ant1_5320



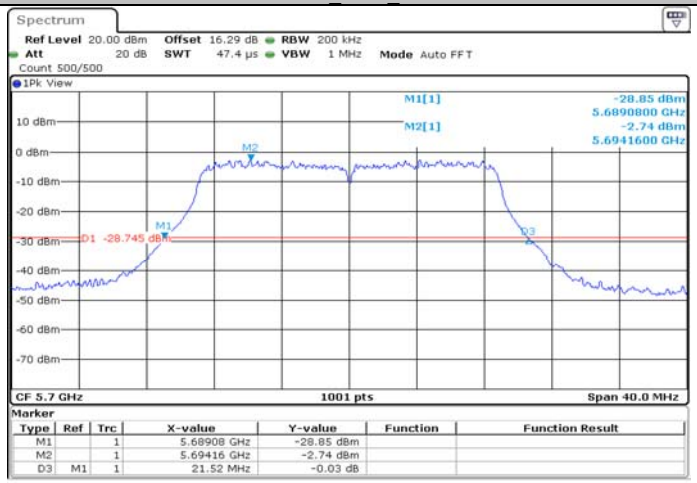
11AC20_Ant1_5500



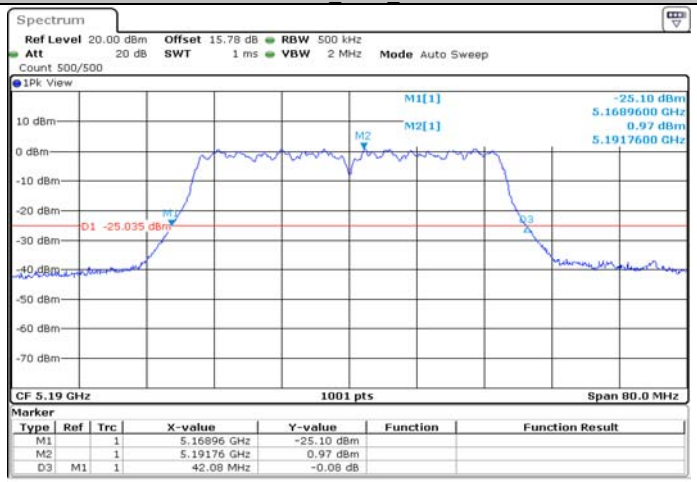
11AC20_Ant1_5580



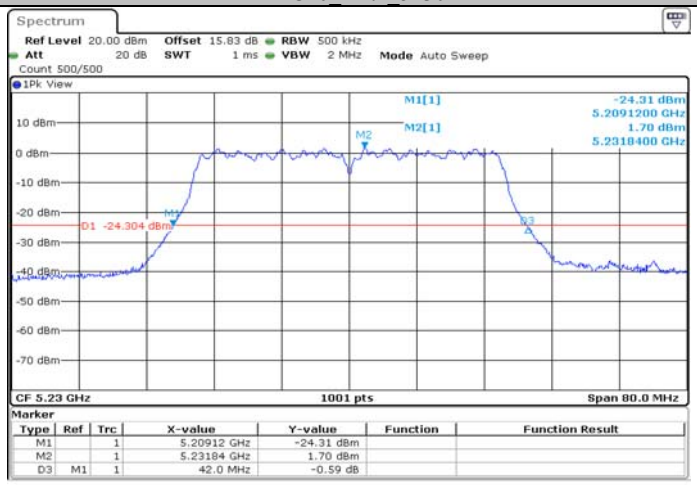
11AC20_Ant1_5700



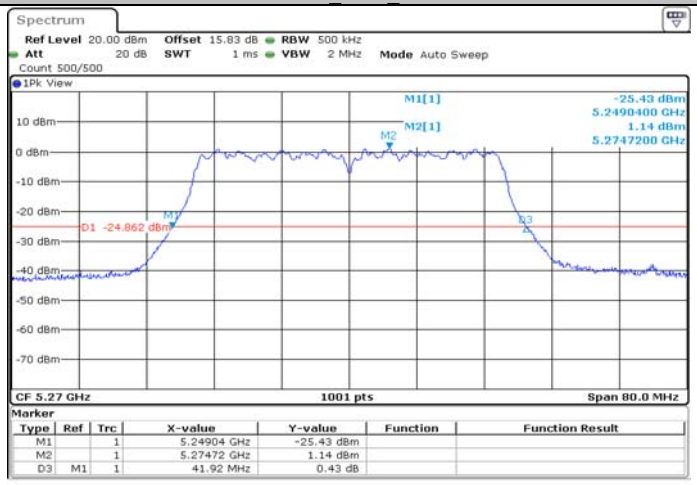
11AC40_Ant1_5190



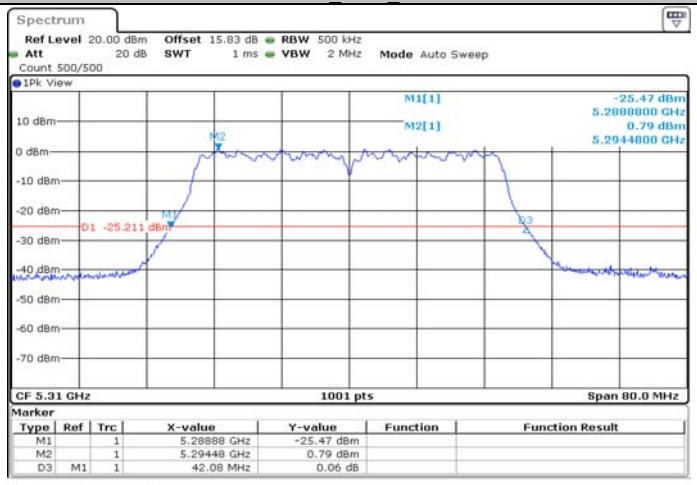
11AC40_Ant1_5230



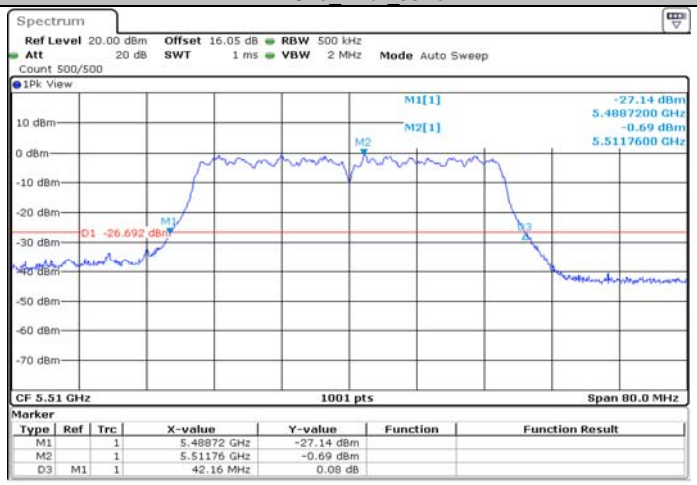
11AC40_Ant1_5270



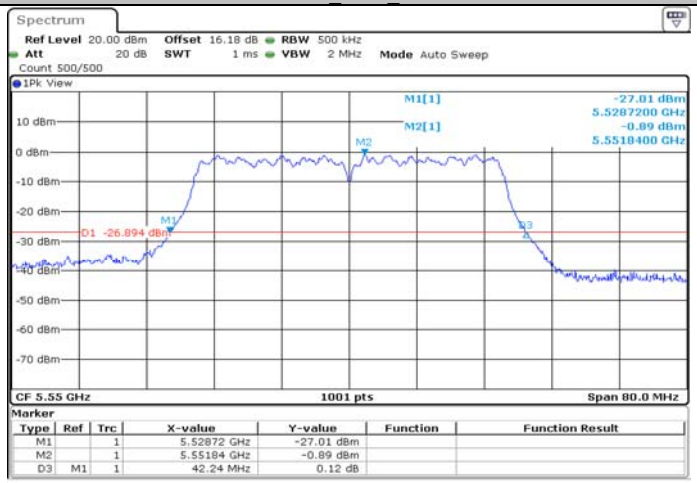
11AC40_Ant1_5310



11AC40_Ant1_5510

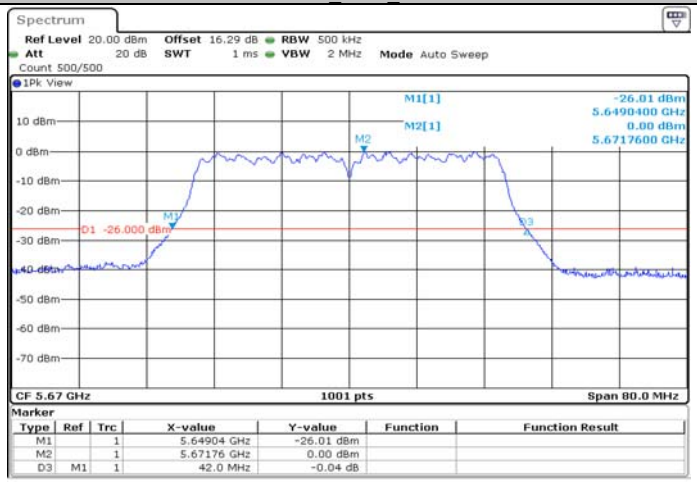


11AC40_Ant1_5550



Date: 30.AUG.2020 17:02:32

11AC40_Ant1_5670



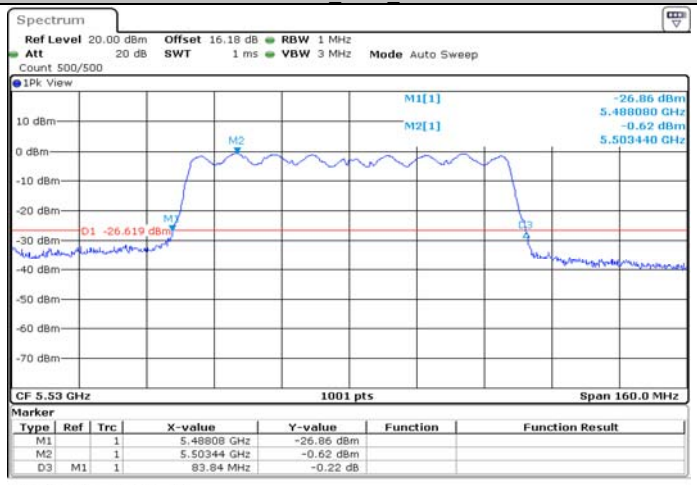
Date: 30.AUG.2020 17:07:21

11AC80_Ant1_5210

Date: 30.AUG.2020 18:11:52

11AC80_Ant1_5290

11AC80_Ant1_5530



11AC80_Ant1_5610

Appendix A2: Occupied channel bandwidth

Test Result

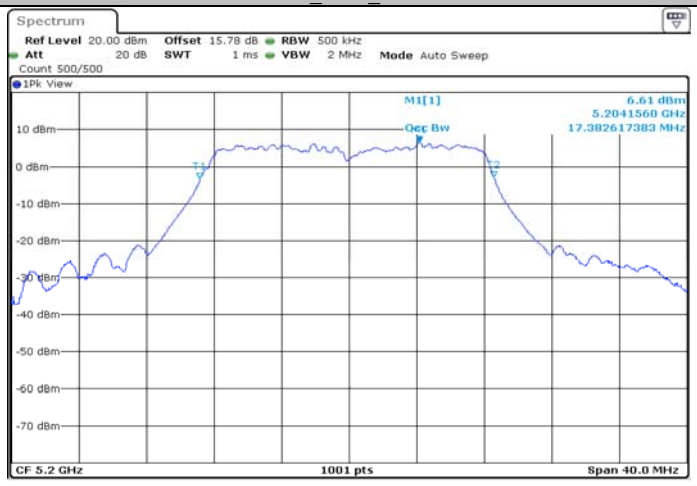
TestMode	Antenna	Channel	OCB [MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	17.223	---	PASS
		5200	17.383	---	PASS
		5240	17.383	---	PASS
		5260	17.343	---	PASS
		5280	17.263	---	PASS
		5320	17.343	---	PASS
		5500	17.343	---	PASS
		5580	17.383	---	PASS
		5700	17.343	---	PASS
		5745	17.463	---	PASS
		5785	17.463	---	PASS
		5825	17.423	---	PASS
11N20	Ant1	5180	18.222	---	PASS
		5200	18.262	---	PASS
		5240	18.182	---	PASS
		5260	18.222	---	PASS
		5280	18.222	---	PASS
		5320	18.182	---	PASS
		5500	18.262	---	PASS
		5580	18.222	---	PASS
		5700	18.222	---	PASS
		5745	18.222	---	PASS
		5785	18.262	---	PASS
		5825	18.222	---	PASS
11N40	Ant1	5190	36.923	---	PASS
		5230	36.843	---	PASS
		5270	37.163	---	PASS
		5310	37.323	---	PASS
		5510	36.763	---	PASS
		5550	36.843	---	PASS
		5670	36.843	---	PASS
		5755	36.923	---	PASS
		5795	36.923	---	PASS
11AC20	Ant1	5180	18.222	---	PASS
		5200	18.262	---	PASS
		5240	18.222	---	PASS
		5260	18.222	---	PASS
		5280	18.222	---	PASS
		5320	18.182	---	PASS
		5500	18.262	---	PASS
		5580	18.262	---	PASS
		5700	18.262	---	PASS
		5745	18.222	---	PASS
		5785	18.262	---	PASS
		5825	18.222	---	PASS
11AC40	Ant1	5190	36.923	---	PASS
		5230	36.843	---	PASS
		5270	36.843	---	PASS
		5310	36.923	---	PASS
		5510	36.923	---	PASS

		5550	37.003	---	PASS
		5670	36.923	---	PASS
		5755	36.923	---	PASS
		5795	36.923	---	PASS
11AC80	Ant1	5210	75.924	---	PASS
		5290	76.883	---	PASS
		5530	76.244	---	PASS
		5610	76.244	---	PASS
		5775	76.084	---	PASS

Test Graphs

11A_Ant1_5180

11A_Ant1_5200

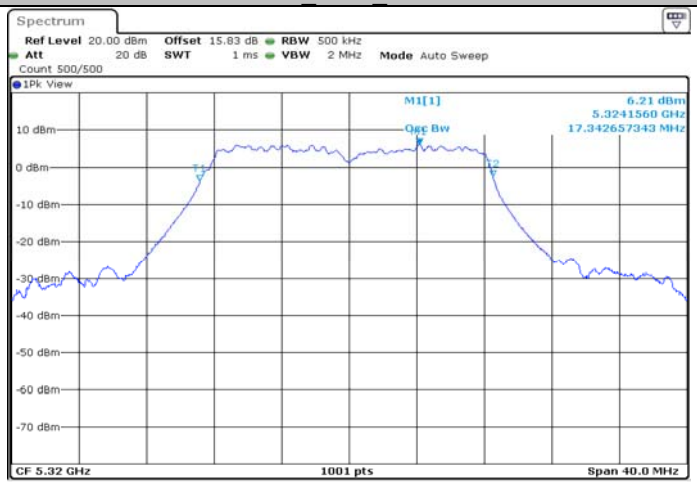


11A_Ant1_5240

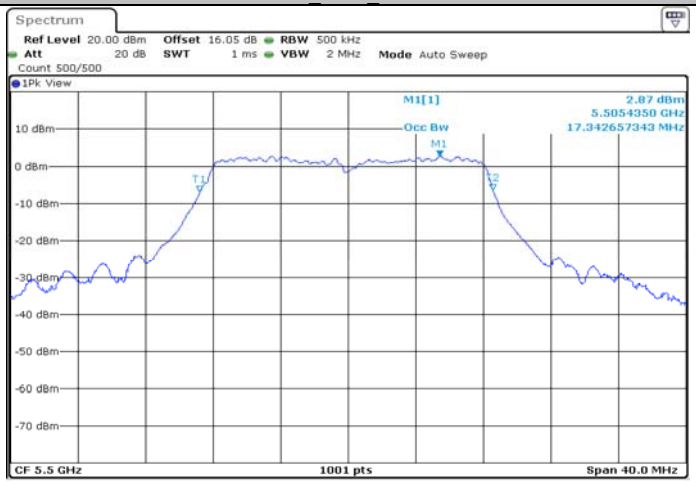
11A_Ant1_5260

11A_Ant1_5280

11A_Ant1_5320



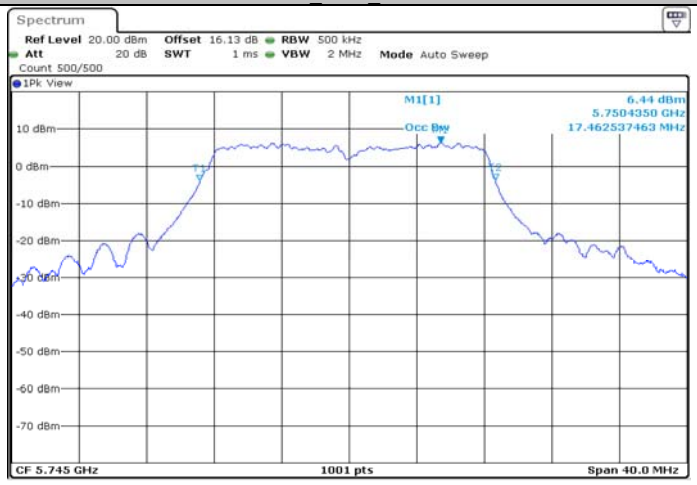
11A_Ant1_5500



11A_Ant1_5580

11A_Ant1_5700

11A_Ant1_5745



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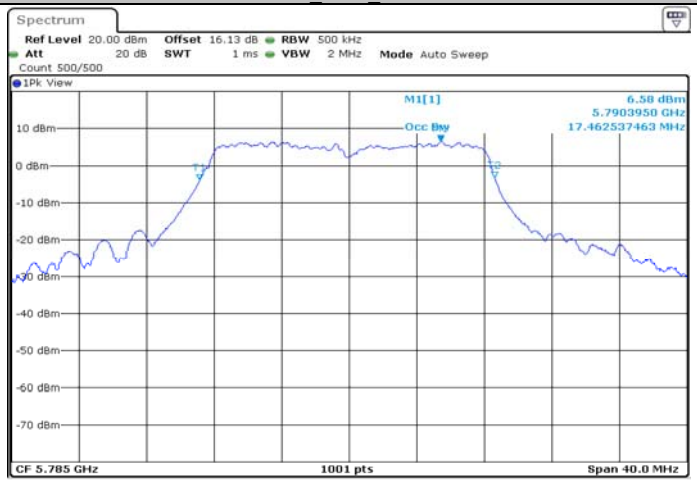
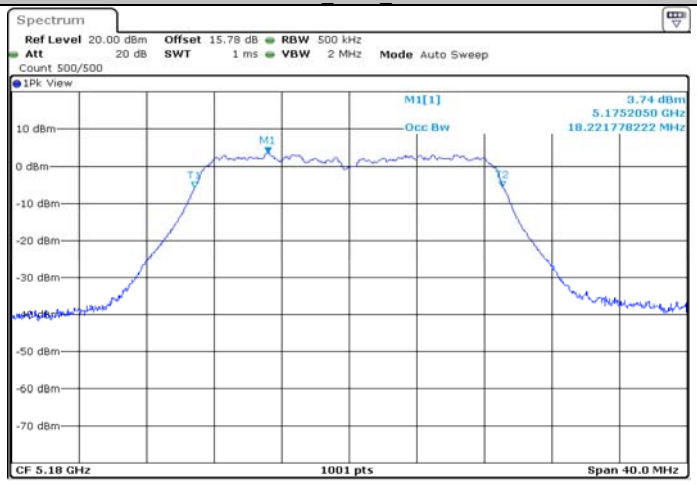


11A_Ant1_5825

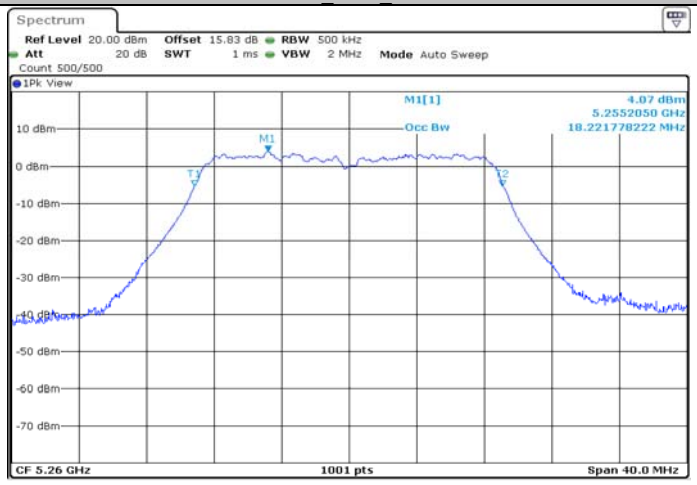
11N20_Ant1_5180



11N20_Ant1_5200

11N20_Ant1_5240

11N20_Ant1_5260



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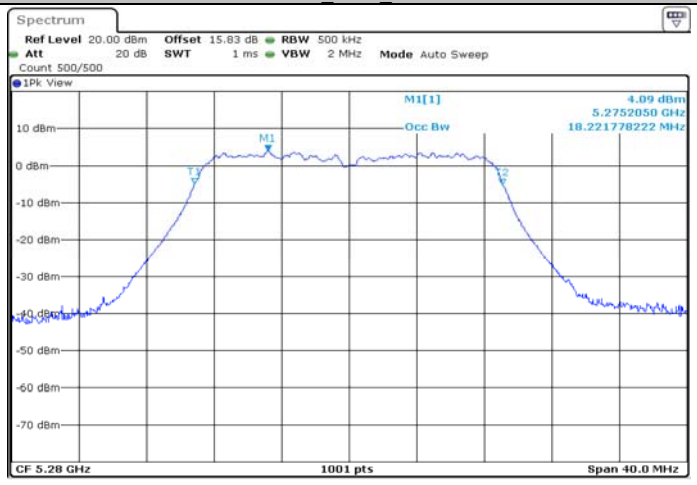

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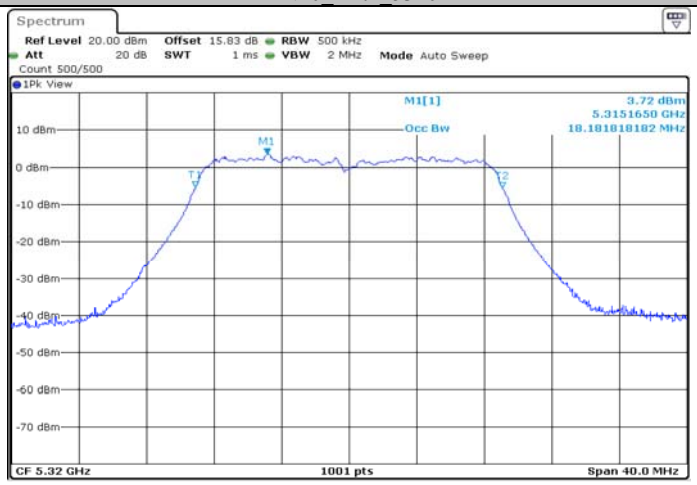

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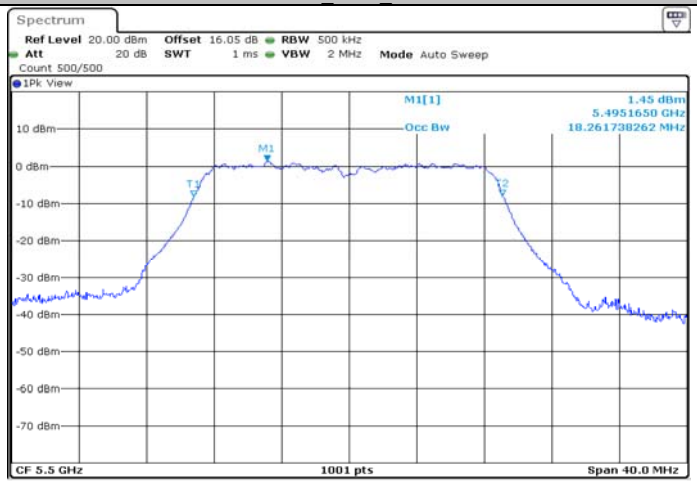

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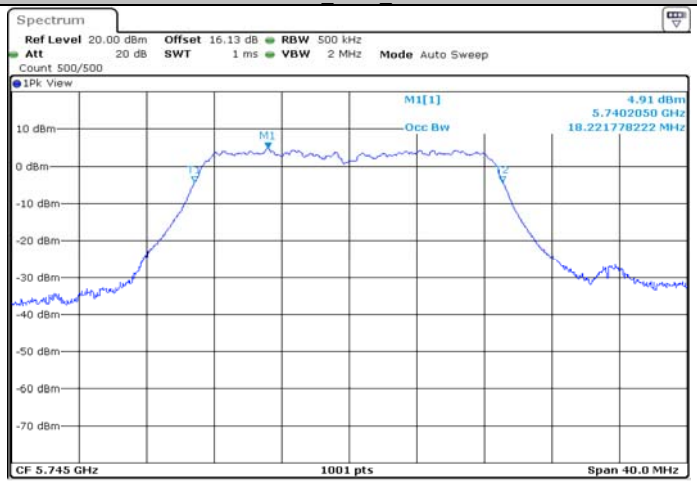
11N20_Ant1_5700

11N20_Ant1_5745



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11N20_Ant1_5825

11N40_Ant1_5190

11N40_Ant1_5230

11N40_Ant1_5270

11N40_Ant1_5310

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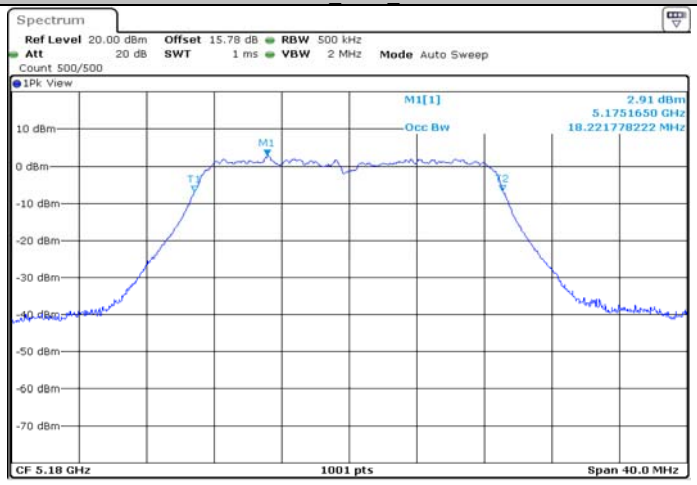

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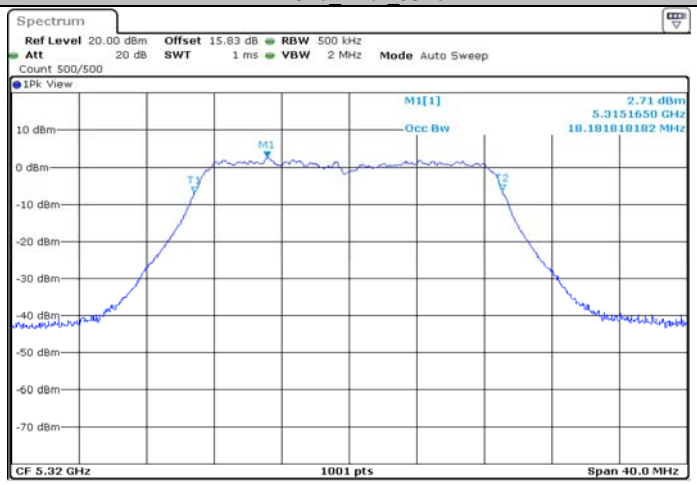

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11AC40_Ant1_5230

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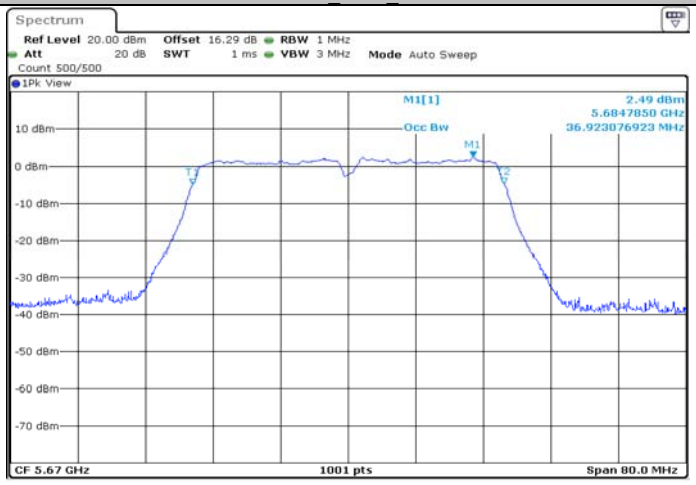

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