ACCREDITED
TESTING LABORATORY
CERTIFICATE # 4821.01

BACL
Bay Area Compliance Labs Corp.

FCC PART 15.407

TEST REPORT

For

VTech Telecommunications Ltd

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

FCC ID: EW780-H0DT-06

Report Type:	Product Type:
Original Report	SIP Corded Hotel Telephone

Report Number: RSZ200811004-00B

Report Date: 2020-09-18

Reviewed By: Nancy Wang
RF Engineer

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

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	SIP Corded Hotel Telephone
Model	CTM-S2315
Frequency Range	5G Wi-Fi: 5150-5250MHz；5250-5350MHz；5470-5725MHz；5725-5850MHz
Maximum Conducted Average Ouput Power	5150-5250 MHz: 12.05dBm (802.11a), 11.02dBm(802.11n20), 11.62dBm(802.11n40) 11.06dBm (802.11ac20), 11.29dBm(802.11 ac40), 10.59dBm(802.11 ac80) 5250-5350MHz: 11.56dBm (802.11a), 10.59dBm(802.11n20), 11.12 dBm(802.11n40) 10.74dBm (802.11ac20), 10.91dBm(802.11 ac40), 10.65dBm(802.11 ac80) 5470-5725MHz: 12.42dBm (802.11a), 11.79dBm(802.11n20), 11.77 dBm(802.11n40) 11.25dBm (802.11ac20), 11.22dBm(802.11 ac40), 10.77dBm(802.11 ac80) 5725-5850 MHz: 14.05dBm (802.11a), 11.69dBm(802.11n20), 12.11dBm(802.11n40) 11.19dBm (802.11ac20), 11.58dBm(802.11 ac40), 8.95dBm(802.11 ac80)
Modulation Technique	OFDM
Antenna Specification	2.0 dBi
Voltage Range	DC5.0V from adapter or DC 48V from POE
Date of Test	2020-08-19 to 2020-09-08
Sample serial number	RSZ200811004-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 type approval report is prepared on behalf of *VTech Telecommunications Ltd* in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communication Commissions rules.

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

Test Methodology

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

All emissions measurement was performed at 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 test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

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	/	/

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	Channel Number	Frequency (MHz)	Data Rate	Power Level
5150 – 5250MHz	802.11 a	CH36	5180	6Mbps	49
		CH40	5200	6Mbps	49
		CH48	5240	6Mbps	49
	802.11 n20	CH36	5180	MCS0	44
		CH40	5200	MCS0	44
		CH48	5240	MCS0	44
	802.11 n40	CH38	5190	MCS0	44
		CH46	5230	MCS0	44
	802.11 ac20	CH36	5180	MCS0	44
		CH40	5200	MCS0	44
		CH48	5240	MCS0	44
	802.11 ac40	CH38	5190	MCS0	44
		CH46	5230	MCS0	44
	802.11 ac80	CH42	5210	MCS0	44
5250 – 5350MHz	802.11 a	CH52	5260	6Mbps	49
		CH56	5280	6Mbps	49
		CH64	5320	6Mbps	49
	802.11 n20	CH52	5260	MCS0	44
		CH56	5280	MCS0	44
		CH64	5320	MCS0	44
	802.11 n40	CH54	5270	MCS0	44
		CH62	5310	MCS0	44
	802.11 ac20	CH52	5260	MCS0	44
		CH56	5280	MCS0	44
		CH64	5320	MCS0	44
	802.11 ac40	CH54	5270	MCS0	44
		CH62	5310	MCS0	44
	802.11 ac80	CH58	5290	MCS0	44

U-NII	Mode	Channel Number	Frequency (MHz)	Data Rate set	Power Level
5470 – 5725MHz	802.11 a	CH100	5500	6Mbps	49
		CH116	5580	6Mbps	49
		CH140	5700	6Mbps	49
	802.11 n20	CH100	5500	MCS0	45
		CH116	5580	MCS0	45
		CH140	5700	MCS0	45
	802.11 n40	CH102	5510	MCS0	45
		CH110	5550	MCS0	45
		CH134	5670	MCS0	45
	802.11 ac20	CH100	5500	MCS0	44
		CH116	5580	MCS0	44
		CH140	5700	MCS0	44
	802.11 ac40	CH102	5510	MCS0	44
		CH110	5550	MCS0	44
		CH134	5670	MCS0	44
	802.11 ac80	CH106	5530	MCS0	44
		CH122	5610	MCS0	44
5725 – 5850MHz	802.11 a	CH149	5745	6Mbps	46
		CH157	5785	6Mbps	46
		CH165	5825	6Mbps	46
	802.11 n20	CH149	5745	MCS0	41
		CH157	5785	MCS0	41
		CH165	5825	MCS0	41
	802.11 n40	CH151	5755	MCS0	41
		CH159	5795	MCS0	41
	802.11 ac20	CH149	5745	MCS0	39
		CH157	5785	MCS0	39
		CH165	5825	MCS0	39
	802.11 ac40	CH151	5755	MCS0	39
		CH159	5795	MCS0	39
	802.11 ac80	CH155	5775	MCS0	39

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.

Duty cycle

Test Result: Compliance. 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	PC	Latitude E5430	JG3NLV1
VTech	SIP Phone	CTM-S2415	Unknown
GOSPELL	POE	G0720-480-050	200200013

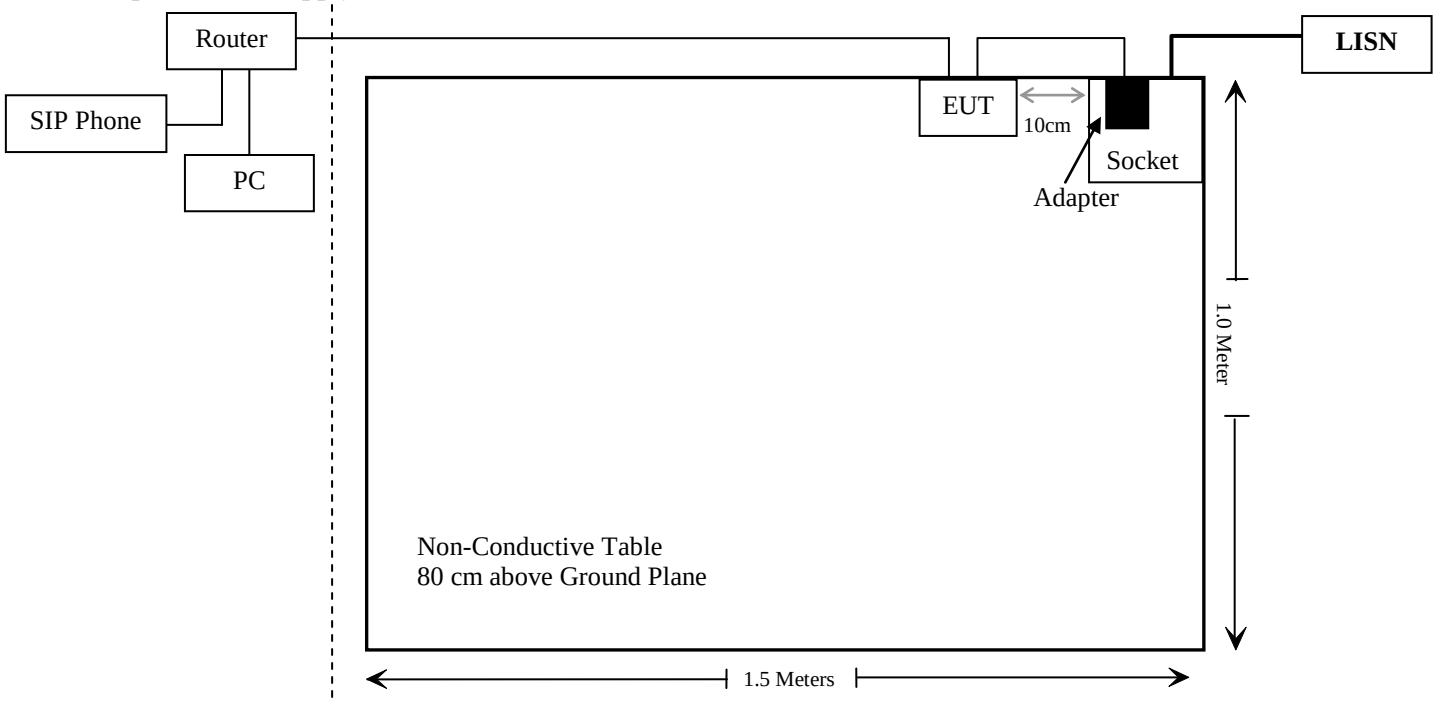
External I/O Cable

Cable Description	Length (m)	From Port	To
Un-shielded Un-detachable AC Cable	1.0	Socket	LISN
Un-shielded Un-detachable DC Cable	1.5	Adapter	EUT
Un-shielded 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	PC
Un-shielded detachable RJ45 Cable	1.5	EUT	POE
Un-shielded detachable RJ45 Cable	1.5	SIP Phone	Router

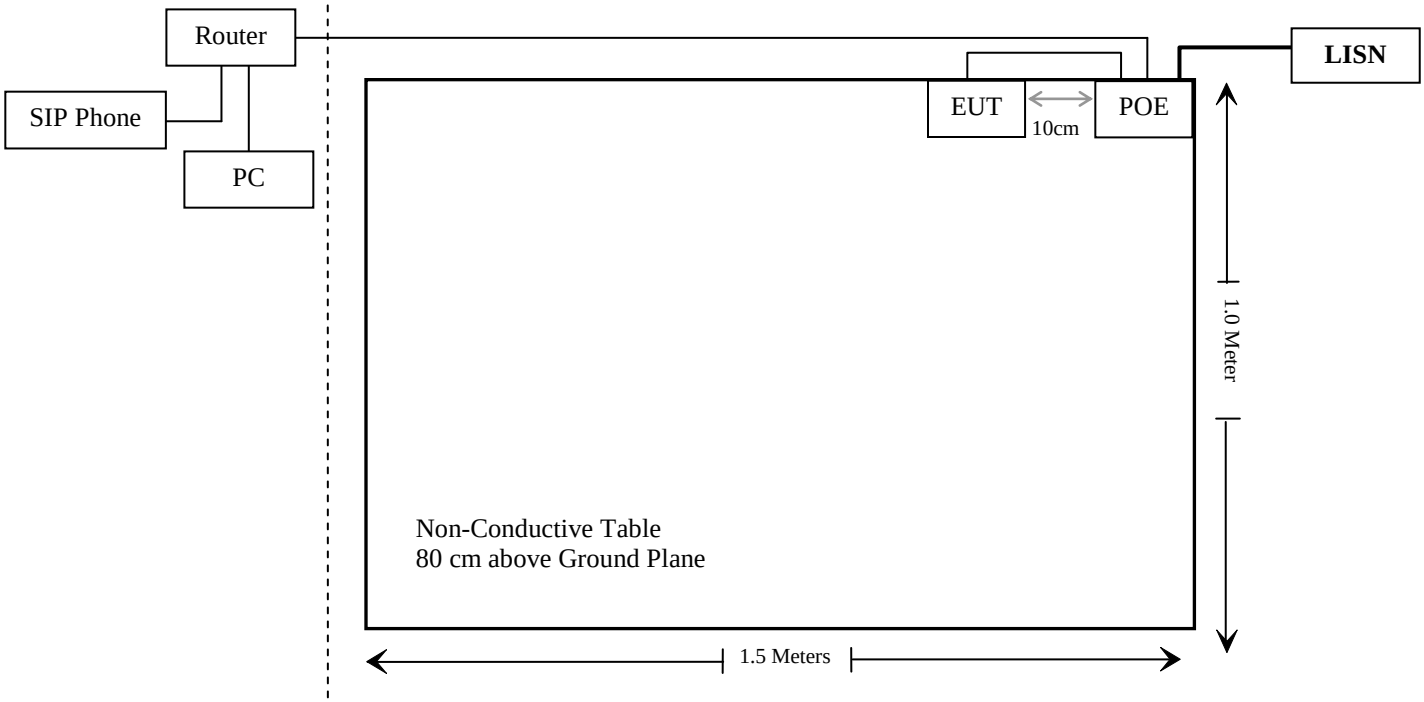
Block Diagram of Test Setup

Test Set up Connect:

Adapter Power Supply:



POE Power Supply:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 (b) (1) & §2.1091	MaximuM Permissible exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(6)& §15.207(a)	Conducted Emissions	Compliance
§15.205& §15.209 & §15.407(b) (1), (2), (3), (4), (6) (7)	Undesirable Emission& Restricted Bands	Compliance
§15.407(a) (1), (5),(e)	26 dB Emission Bandwidth & 6dB Bandwidth	Compliance
§15.407(a)(1),(2), (3)	Conducted Transmitter Output Power	Compliance
§15.407 (a)(1), (2), (3)	Power Spectral Density	Compliance
§15.407 (h)	Transmit Power Control (TPC)	Not Applicable
§15.407 (h)	Dynamic Frequency Selection (DFS)	Compliance*

Not Applicable: the EUT has no TPC function which was declarded by the applicant.
Compliance*: Please refer to the DFS report: RSZ200811005-00A.

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

*** 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).

1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 1.1307 (b)(1), 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/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

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)			
5150-5250	2	1.58	12.5	17.78	20	0.006	1
5250-5350	2	1.58	12.0	15.85	20	0.005	1
5470-5725	2	1.58	12.5	17.78	20	0.006	1
5725-5850	2	1.58	14.5	28.18	20	0.009	1

Note: The 2.4G Wi-Fi can't transmit with the 5G Wi-Fi at the same time.

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

Result: Compliance

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

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

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

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

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

Antenna Connector Construction

The EUT has one internal antenna 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.

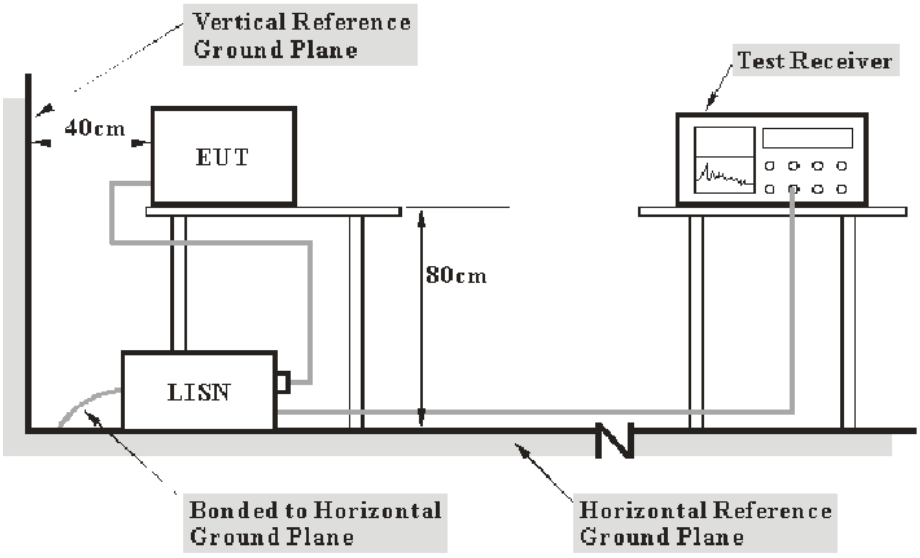
Result: Compliance.

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

Applicable Standard

FCC §15.207, §15.407(b) (6)

EUT Setup



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

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

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

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

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

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

Test Procedure

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

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

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

Test Data

Environmental Conditions

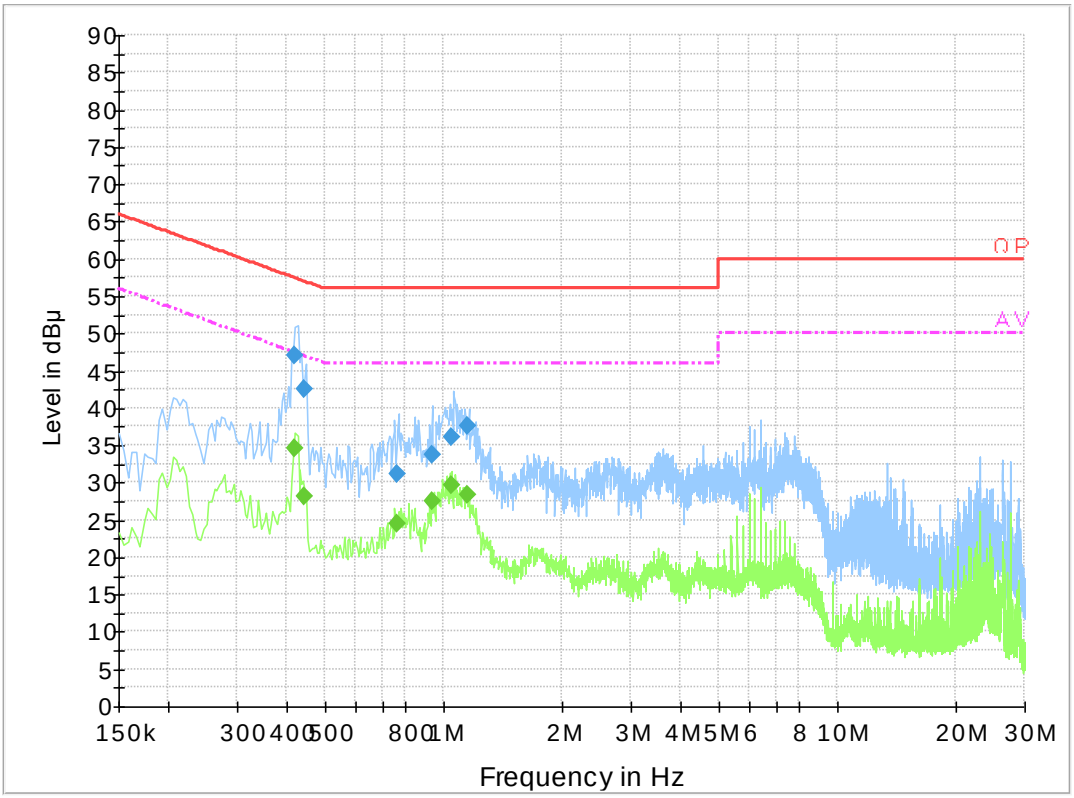
Temperature:	25 ℃
Relative Humidity:	65 %
ATM Pressure:	101.0 kPa

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

EUT operation mode: Transmitting (worst case is 802.11a mode 5745 MHz)

Power by adapter:

AC 120V/60 Hz, Line:



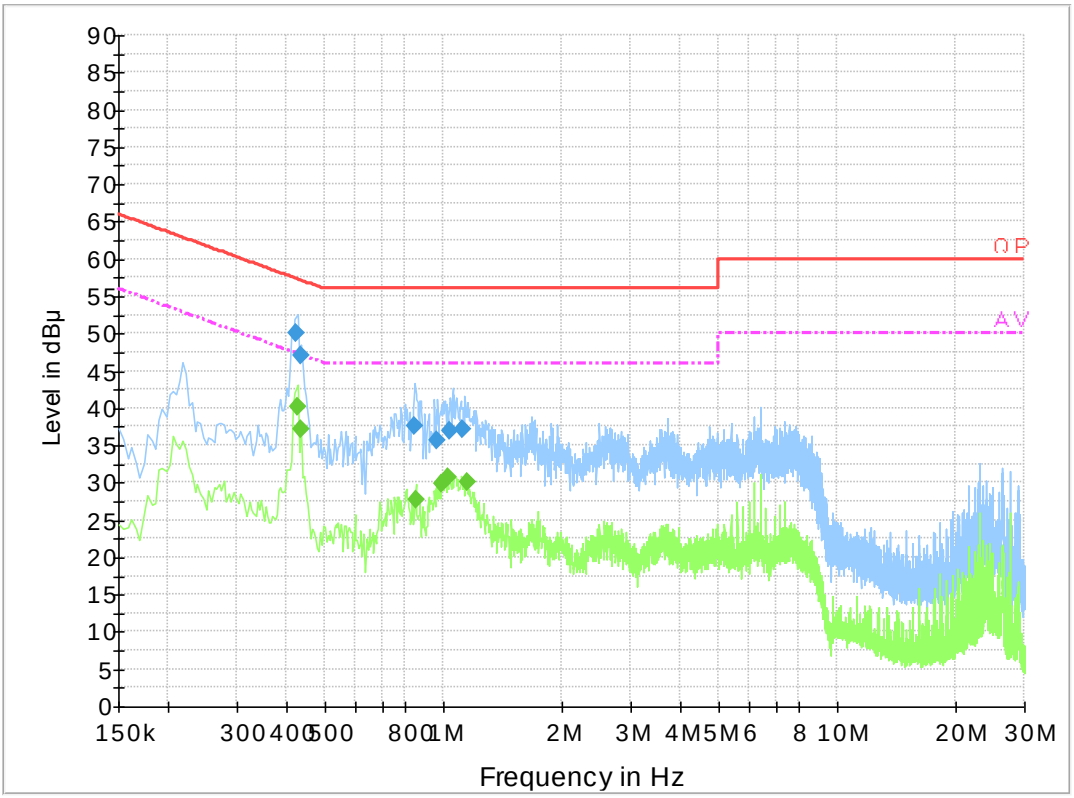
Final Result 1

Frequency (MHz)	QuasiPeak (dBµ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)
0.419610	47.0	9.000	L1	19.9	10.5	57.5
0.444570	42.5	9.000	L1	19.8	14.5	57.0
0.762450	31.2	9.000	L1	19.8	24.8	56.0
0.943930	33.8	9.000	L1	19.8	22.2	56.0
1.050070	36.1	9.000	L1	19.9	19.9	56.0
1.152570	37.5	9.000	L1	19.8	18.5	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.419610	34.7	9.000	L1	19.9	12.8	47.5
0.444570	28.0	9.000	L1	19.8	19.0	47.0
0.762450	24.5	9.000	L1	19.8	21.5	46.0
0.943930	27.5	9.000	L1	19.8	18.5	46.0
1.050070	29.7	9.000	L1	19.9	16.3	46.0
1.152570	28.4	9.000	L1	19.8	17.6	46.0

AC 120V/60 Hz, Neutral:



Final Result 1

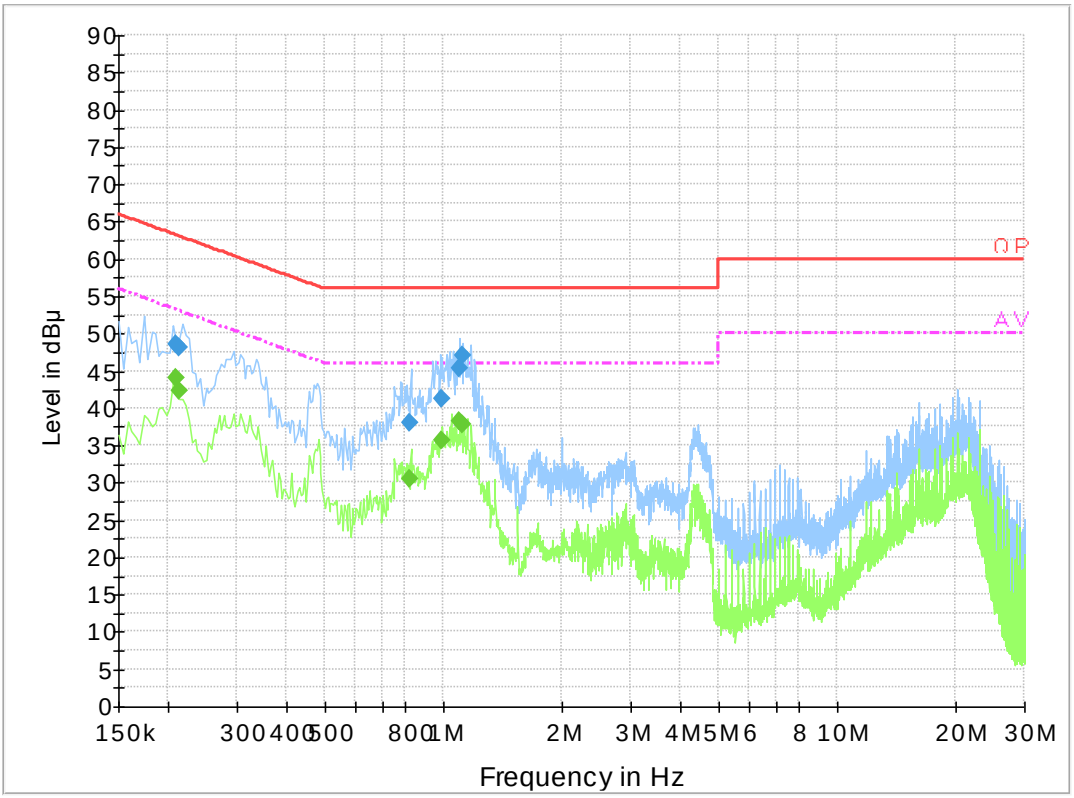
Frequency (MHz)	QuasiPeak (dBµ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)
0.423610	50.1	9.000	N	19.8	7.3	57.4
0.435430	47.1	9.000	N	19.8	10.0	57.1
0.845250	37.7	9.000	N	19.8	18.3	56.0
0.964250	35.6	9.000	N	19.8	20.4	56.0
1.046130	37.1	9.000	N	19.8	18.9	56.0
1.124930	37.1	9.000	N	19.8	18.9	56.0

Final Result 2

Frequency (MHz)	Average (dBµ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)
0.426000	40.1	9.000	N	19.8	7.2	47.3
0.438000	37.3	9.000	N	19.8	9.8	47.1
0.854000	27.8	9.000	N	19.8	18.2	46.0
0.994000	29.9	9.000	N	19.8	16.1	46.0
1.034000	30.8	9.000	N	19.8	15.2	46.0
1.150000	30.1	9.000	N	19.8	15.9	46.0

Power by POE:

AC 120V/60 Hz, Line



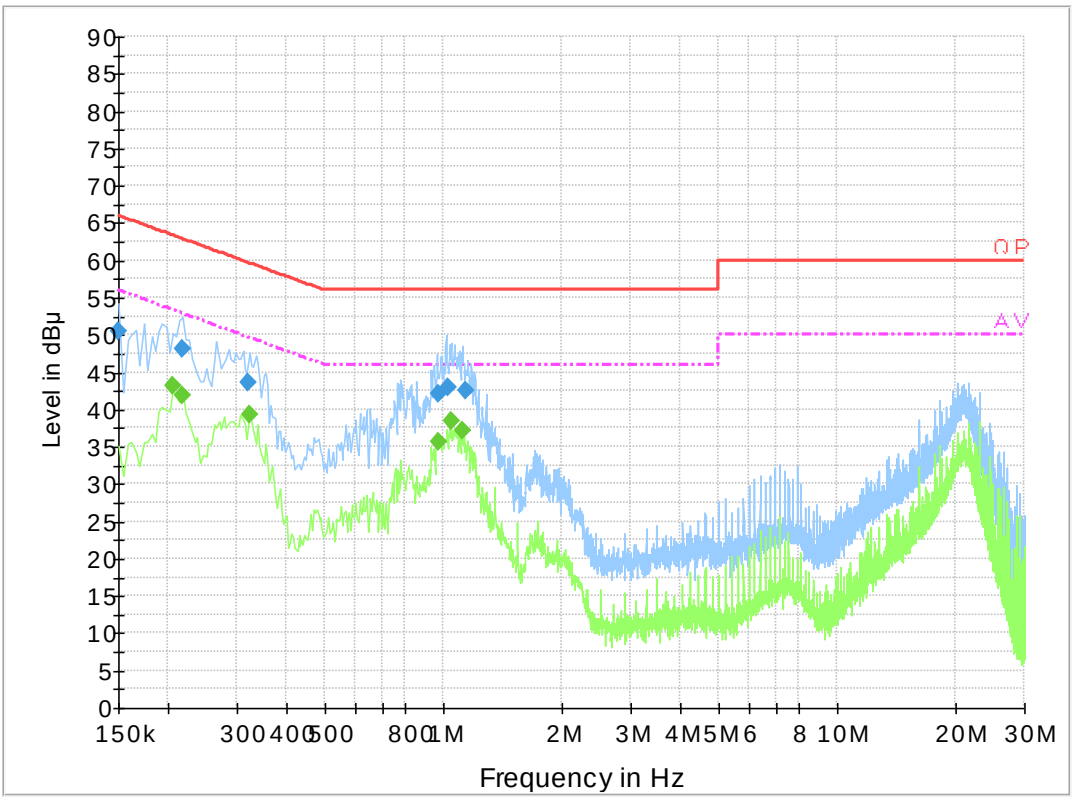
Final Result 1

Frequency (MHz)	QuasiPeak (dBµ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)
0.209500	48.6	9.000	L1	19.8	14.6	63.2
0.213500	48.1	9.000	L1	19.8	15.0	63.1
0.825550	38.0	9.000	L1	19.8	18.0	56.0
0.991210	41.3	9.000	L1	19.9	14.7	56.0
1.097470	45.3	9.000	L1	19.8	10.7	56.0
1.125110	47.0	9.000	L1	19.8	9.0	56.0

Final Result 2

Frequency (MHz)	Average (dBµ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)
0.209500	44.0	9.000	L1	19.8	9.2	53.2
0.213500	42.4	9.000	L1	19.8	10.7	53.1
0.825550	30.4	9.000	L1	19.8	15.6	46.0
0.991210	35.7	9.000	L1	19.9	10.3	46.0
1.097470	38.2	9.000	L1	19.8	7.8	46.0
1.125110	37.8	9.000	L1	19.8	8.2	46.0

AC 120V/60 Hz, Neutral



Final Result 1

Frequency (MHz)	QuasiPeak (dBµ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)
0.150000	50.5	0.200	N	19.8	15.5	66.0
0.217500	48.1	9.000	N	19.8	14.8	62.9
0.321170	43.7	9.000	N	19.8	16.0	59.7
0.971510	42.0	9.000	N	19.8	14.0	56.0
1.030730	43.0	9.000	N	19.8	13.0	56.0
1.140690	42.5	9.000	N	19.8	13.5	56.0

Final Result 2

Frequency (MHz)	Average (dBµ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)
0.206000	43.1	9.000	N	19.8	10.3	53.4
0.218000	41.9	9.000	N	19.8	11.0	52.9
0.322000	39.2	9.000	N	19.8	10.5	49.7
0.974000	35.7	9.000	N	19.8	10.3	46.0
1.050000	38.4	9.000	N	19.8	7.6	46.0
1.126000	37.2	9.000	N	19.8	8.8	46.0

Note:
1) Correction Factor =LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
2) Corrected Amplitude = Reading + Correction Factor
3) Margin = Limit – Corrected Amplitude

§15.205 & §15.209 & §15.407(B) (1), (2), (3), (4),(6),(7) – UNDESIRABLE EMISSION

Applicable Standard

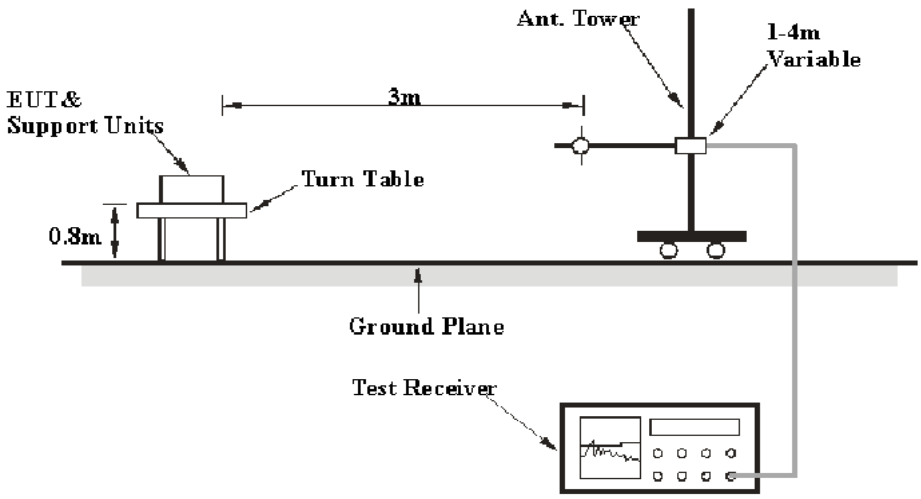
FCC §15.407 (b) (1), (2), (3), (4), (6), (7); §15.209; §15.205;

(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.

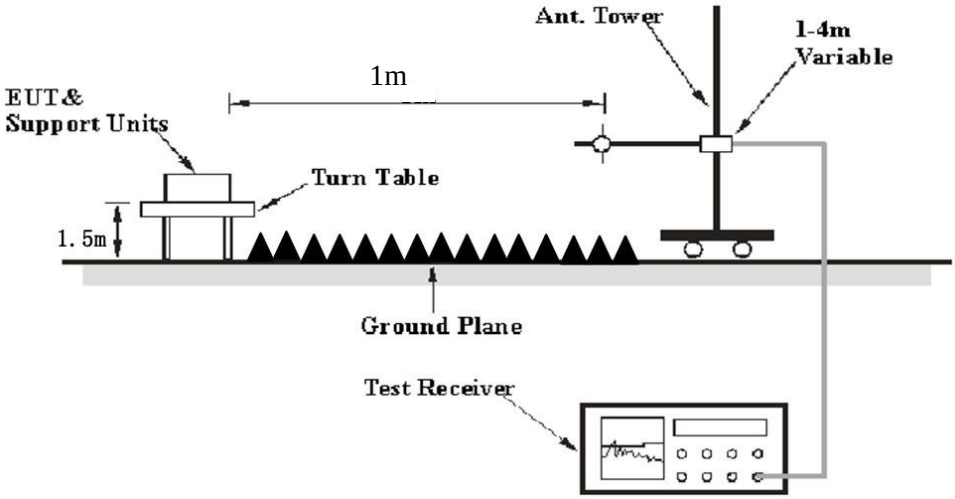
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

EUT Setup

Below 1 GHz:



Above 1 GHz:



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

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

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

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

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

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

Test Procedure

Radiated Spurious Emission

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

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

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

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

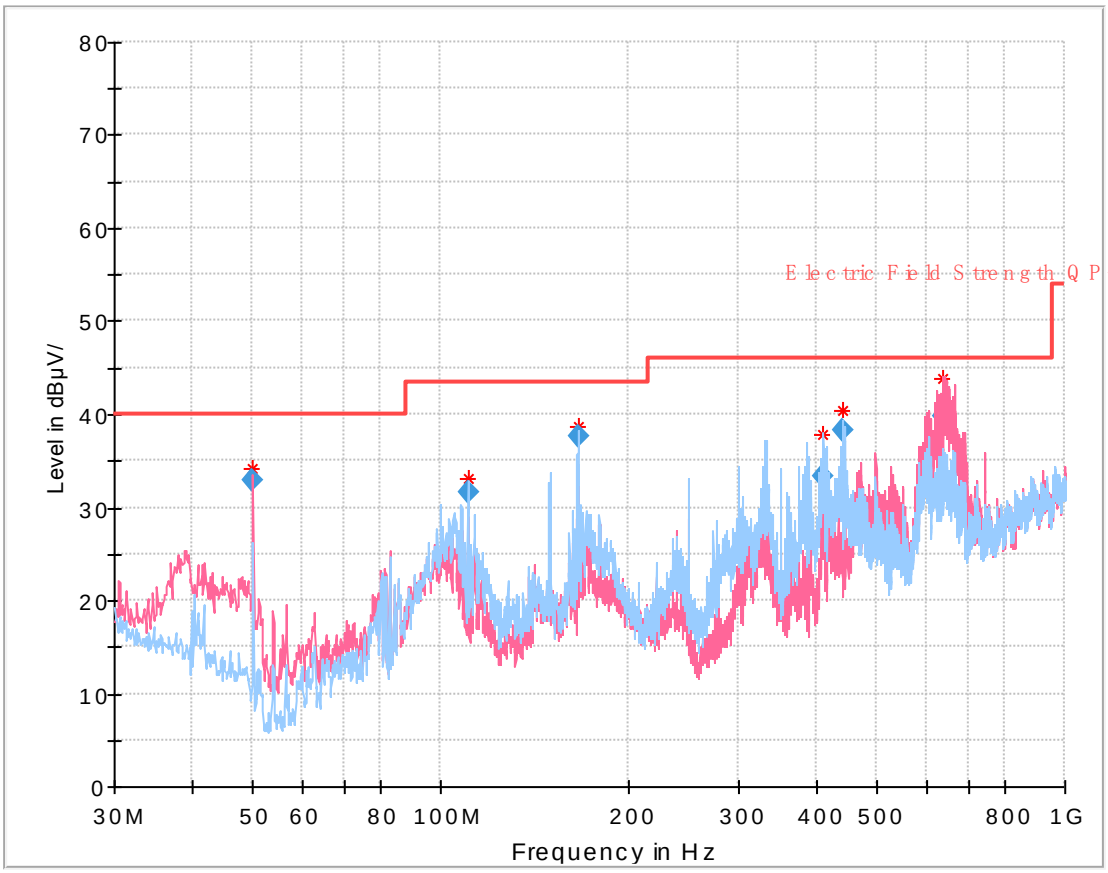
Temperature:	28 ℃
Relative Humidity:	58 %
ATM Pressure:	101.0 kPa

The testing was performed by Harris He from 2020-08-19 to 2020-08-24 for below 1GHz and by leven Gan from 2020-08-28 to 2020-09-08 for above 1GHz.

EUT operation mode: Transmitting

Power by POE:

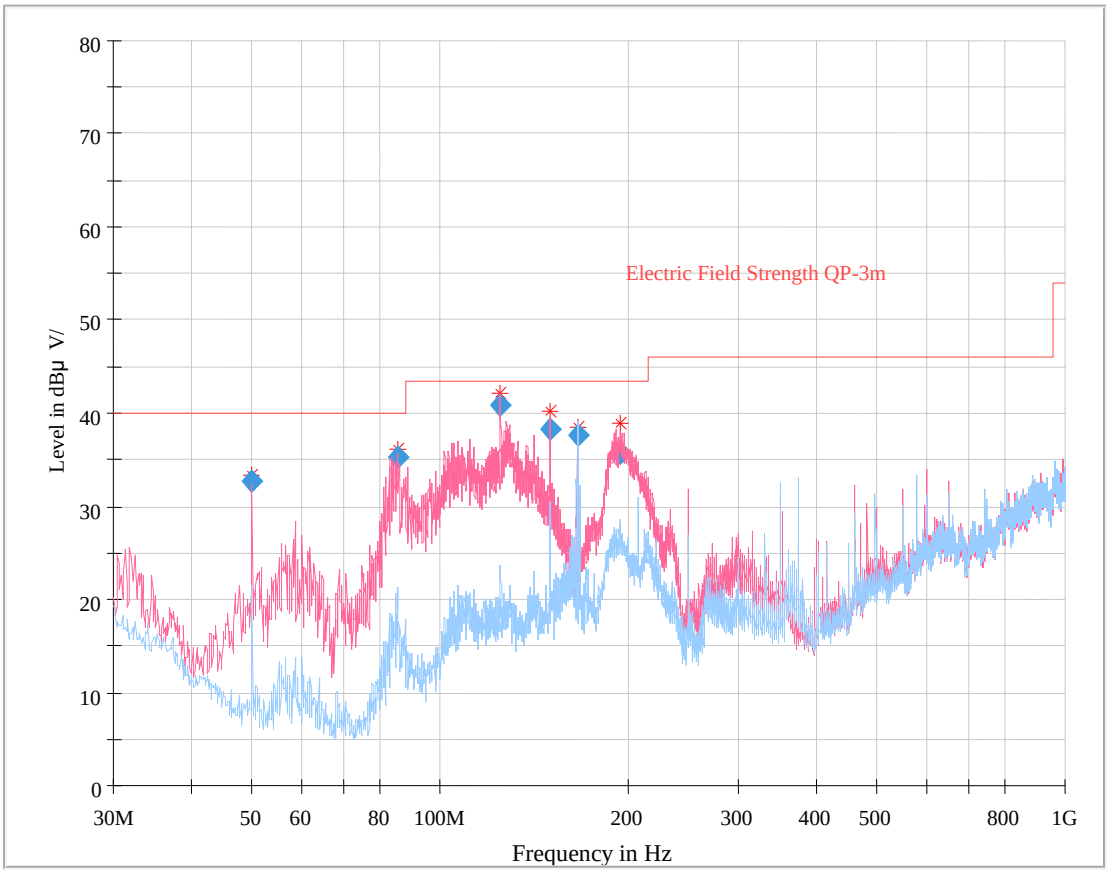
30 MHz – 1 GHz: *(worst case is 802.11a mode 5745 MHz)*



Final_Result

Frequency (MHz)	QuasiPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
50.013250	33.01	40.00	6.99	111.0	V	15.0	-19.6
110.602875	31.72	43.50	11.78	320.0	H	243.0	-15.4
165.920750	37.70	43.50	5.80	195.0	H	82.0	-14.7
410.604250	33.23	46.00	12.77	101.0	H	65.0	-9.9
441.060125	38.25	46.00	7.75	102.0	H	262.0	-8.6
637.416750	39.79	46.00	6.21	102.0	V	11.0	-1.6

Power by adapter:



Final_Result

Frequency (MHz)	QuasiPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
50.006500	32.68	40.00	7.32	103.0	V	44.0	-19.6
85.383875	35.22	40.00	4.78	111.0	V	72.0	-19.5
125.024875	40.89	43.50	2.61	109.0	V	26.0	-13.9
149.991000	38.35	43.50	5.15	116.0	V	307.0	-14.2
165.958000	37.58	43.50	5.92	104.0	V	310.0	-14.7
194.914500	35.66	43.50	7.84	103.0	V	38.0	-14.5

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)	FCC Part 15.407/205/209	
	Reading (dBµV)	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)			Limit (dBµV/m)	Margin (dB)
802.11a									
5180 MHZ									
5148.86	31.89	PK	29	2.0	V	38.36	70.25	83.5	13.25
5148.86	17.10	Ave.	29	2.0	V	38.36	55.46	63.5	8.04
5352.23	31.78	PK	215	1.7	V	39.09	70.87	83.5	12.63
5352.23	16.97	Ave.	215	1.7	V	39.09	56.06	63.5	7.44
10360.00	55.54	PK	175	2.2	V	17.42	72.96	77.7	4.74
5200 MHZ									
10400.00	54.89	PK	217	2.2	V	17.52	72.41	77.7	5.29
5240 MHZ									
5149.68	32.04	PK	102	1.5	V	38.36	70.40	83.5	13.10
5149.68	17.17	Ave.	102	1.5	V	38.36	55.53	63.5	7.97
5351.44	31.96	PK	320	1.5	V	39.09	71.05	83.5	12.45
5351.44	17.30	Ave.	320	1.5	V	39.09	56.39	63.5	7.11
10480.00	53.95	PK	242	1.6	V	17.25	71.20	77.7	6.50
802.11n20									
5180 MHZ									
5147.62	31.81	PK	193	1.9	V	38.36	70.17	83.5	13.33
5147.62	17.18	Ave.	193	1.9	V	38.36	55.54	63.5	7.96
5350.57	31.67	PK	303	1.7	V	39.09	70.76	83.5	12.74
5350.57	17.01	Ave.	303	1.7	V	39.09	56.10	63.5	7.40
10360.00	52.65	PK	16	1.0	V	17.42	70.07	77.7	7.63
5200 MHZ									
10400.00	51.96	PK	67	1.8	V	17.52	69.48	77.7	8.22
5240 MHZ									
5147.62	31.88	PK	83	2.4	V	38.36	70.24	83.5	13.26
5147.62	17.20	Ave.	83	2.4	V	38.36	55.56	63.5	7.94
5350.57	32.21	PK	29	1.7	V	39.09	71.30	83.5	12.20
5350.57	17.33	Ave.	29	1.7	V	39.09	56.42	63.5	7.08
10480.00	51.32	PK	217	1.7	V	17.25	68.57	77.7	9.13

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11n40									
5190 MHZ									
5148.43	32.51	PK	87	2.2	V	38.36	70.87	83.5	12.63
5148.43	17.15	Ave.	87	2.2	V	38.36	55.51	63.5	7.99
5351.24	31.84	PK	26	1.3	V	39.09	70.93	83.5	12.57
5351.24	17.05	Ave.	26	1.3	V	39.09	56.14	63.5	7.36
10380.00	48.89	PK	8	2.2	V	17.42	66.31	77.7	11.39
5230 MHZ									
5149.37	31.54	PK	221	1.0	V	38.36	69.90	83.5	13.60
5149.37	16.94	Ave.	221	1.0	V	38.36	55.30	63.5	8.20
5352.21	31.91	PK	287	1.5	V	39.09	71.00	83.5	12.50
5352.21	17.08	Ave.	287	1.5	V	39.09	56.17	63.5	7.33
10460.00	48.17	PK	257	2.2	V	17.15	65.32	77.7	12.38
802.11ac20									
5180 MHZ									
5148.85	32.72	PK	106	1.3	V	38.36	71.08	83.5	12.42
5148.85	17.26	Ave.	106	1.3	V	38.36	55.62	63.5	7.88
5351.17	31.87	PK	147	2.2	V	39.09	70.96	83.5	12.54
5351.17	17.10	Ave.	147	2.2	V	39.09	56.19	63.5	7.31
10360.00	51.84	PK	196	2.0	V	17.42	69.26	77.7	8.44
5200 MHZ									
10400.00	50.17	PK	314	1.9	V	17.52	67.69	77.7	10.01
5240 MHZ									
5147.86	31.99	PK	15	2.3	V	38.36	70.35	83.5	13.15
5147.86	17.21	Ave.	15	2.3	V	38.36	55.57	63.5	7.93
5352.67	32.51	PK	321	1.8	V	39.09	71.60	83.5	11.90
5352.67	17.27	Ave.	321	1.8	V	39.09	56.36	63.5	7.14
10480.00	49.79	PK	80	1.3	V	17.25	67.04	77.7	10.66
802.11ac40									
5190 MHZ									
5149.99	32.24	PK	134	1.6	V	38.36	70.60	83.5	12.90
5149.99	18.28	Ave.	134	1.6	V	38.36	56.64	63.5	6.86
5351.42	31.45	PK	104	1.7	V	39.09	70.54	83.5	12.96
5351.42	17.32	Ave.	104	1.7	V	39.09	56.41	63.5	7.09
10380.00	50.69	PK	105	1.0	V	17.42	68.11	77.7	9.59
5230 MHZ									
5149.52	31.67	PK	92	1.4	V	38.36	70.03	83.5	13.47
5149.52	17.18	Ave.	92	1.4	V	38.36	55.54	63.5	7.96
5352.24	32.42	PK	20	1.2	V	39.09	71.51	83.5	11.99
5352.24	17.34	Ave.	20	1.2	V	39.09	56.43	63.5	7.07
10460.00	48.98	PK	139	2.1	V	17.15	66.13	77.7	11.57

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11ac80									
5147.56	35.28	PK	127	1.2	V	38.36	73.64	83.5	9.86
5147.56	20.39	Ave.	127	1.2	V	38.36	58.75	63.5	4.75
5351.55	32.42	PK	208	1.3	V	39.09	71.51	83.5	11.99
5351.55	17.33	Ave.	208	1.3	V	39.09	56.42	63.5	7.08
10420.00	46.33	PK	195	1.3	V	17.52	63.85	77.7	13.85

5250-5350 MHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11a									
5260 MHz									
5146.53	31.64	PK	320	1.1	V	38.36	70.00	83.5	13.50
5146.53	17.01	Ave.	320	1.1	V	38.36	55.37	63.5	8.13
5352.41	31.84	PK	147	2.4	V	39.09	70.93	83.5	12.57
5352.41	17.06	Ave.	147	2.4	V	39.09	56.15	63.5	7.35
10520.00	47.87	PK	339	2.4	V	17.25	65.12	77.7	12.58
5280 MHZ									
10560.00	47.41	PK	85	1.7	V	17.91	65.32	77.7	12.38
5320 MHZ									
5147.75	31.57	PK	97	2.4	V	38.36	69.93	83.5	13.57
5147.75	17.07	Ave.	97	2.4	V	38.36	55.43	63.5	8.07
5350.48	31.84	PK	328	1.8	V	39.09	70.93	83.5	12.57
5350.48	17.46	Ave.	328	1.8	V	39.09	56.55	63.5	6.95
10640.00	46.97	PK	0	1.7	V	18.01	64.98	83.5	18.52
10640.00	33.16	Ave.	0	1.7	V	18.01	51.17	63.5	12.33
802.11n20									
5260 MHZ									
5144.97	32.05	PK	39	1.3	V	38.36	70.41	83.5	13.09
5144.97	17.15	Ave.	39	1.3	V	38.36	55.51	63.5	7.99
5351.58	31.61	PK	238	2.3	V	39.09	70.70	83.5	12.80
5351.58	17.10	Ave.	238	2.3	V	39.09	56.19	63.5	7.31
10520.00	46.23	PK	344	1.2	V	17.25	63.48	77.7	14.22
5280 MHZ									
10560.00	45.97	PK	180	1.4	V	17.91	63.88	77.7	13.82
5320 MHz									
5148.47	31.67	PK	95	2.4	V	38.36	70.03	83.5	13.47
5148.47	17.28	Ave.	95	2.4	V	38.36	55.64	63.5	7.86
5352.14	31.52	PK	332	2.4	V	39.09	70.61	83.5	12.89
5352.14	17.32	Ave.	332	2.4	V	39.09	56.41	63.5	7.09
10640.00	45.07	PK	195	1.7	V	18.01	63.08	83.5	20.42
10640.00	30.19	Ave.	195	1.7	V	18.01	48.20	63.5	15.30

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11n40									
5270MHz									
5148.68	31.66	PK	184	2.3	V	38.36	70.02	83.5	13.48
5148.68	17.15	Ave.	184	2.3	V	38.36	55.51	63.5	7.99
5351.26	31.39	PK	119	1.2	V	39.09	70.48	83.5	13.02
5351.26	17.13	Ave.	119	1.2	V	39.09	56.22	63.5	7.28
10540.00	44.88	PK	104	1.7	V	17.25	62.13	77.7	14.57
5310 MHZ									
5147.89	31.56	PK	206	1.1	V	38.36	69.92	83.5	13.58
5147.89	17.18	Ave.	206	1.1	V	38.36	55.54	63.5	7.96
5350.75	32.37	PK	194	2.2	V	39.09	71.46	83.5	12.04
5350.75	18.19	Ave.	194	2.2	V	39.09	57.28	63.5	6.22
10620.00	44.36	PK	250	1.0	V	18.01	62.37	83.5	21.13
10620.00	29.55	Ave.	250	1.0	V	18.01	47.56	63.5	15.94
802.11ac20									
5260 MHZ									
5148.75	31.55	PK	300	1.5	V	38.36	69.91	83.5	13.59
5148.75	17.09	Ave.	300	1.5	V	38.36	55.45	63.5	8.05
5351.24	31.64	PK	135	1.8	V	39.09	70.73	83.5	12.77
5351.24	17.13	Ave.	135	1.8	V	39.09	56.22	63.5	7.28
10520.00	51.10	PK	99	1.1	V	17.25	68.35	77.7	7.95
5280 MHZ									
10560.00	50.84	PK	306	1.0	V	17.91	68.75	77.7	8.95
5320 MHZ									
5149.12	31.19	PK	97	2.0	V	38.36	69.55	83.5	13.95
5149.12	17.06	Ave.	97	2.0	V	38.36	55.42	63.5	8.08
5350.62	32.19	PK	44	1.0	V	39.09	71.28	83.5	12.22
5350.62	17.45	Ave.	44	1.0	V	39.09	56.54	63.5	6.96
10640.00	50.71	PK	35	1.3	V	18.01	68.72	83.5	14.78
10640.00	34.90	Ave.	35	1.3	V	18.01	52.91	63.5	10.59

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11ac40									
5270 MHZ									
5147.68	31.58	PK	134	2.0	V	38.36	69.94	83.5	13.56
5147.68	17.11	Ave.	134	2.0	V	38.36	55.47	63.5	8.03
5350.36	31.37	PK	11	1.3	V	39.09	70.46	83.5	13.04
5350.36	17.07	Ave.	11	1.3	V	39.09	56.16	63.5	7.34
10540.00	48.63	PK	196	1.5	V	17.25	65.88	77.7	11.82
5310 MHZ									
5148.47	31.67	PK	281	1.2	V	38.36	70.03	83.5	13.47
5148.47	17.29	Ave.	281	1.2	V	38.36	55.65	63.5	7.85
5350.36	35.34	PK	289	1.3	V	39.09	74.43	83.5	9.07
5350.36	19.21	Ave.	289	1.3	V	39.09	58.30	63.5	5.20
10620.00	48.47	PK	7	2.0	V	18.01	66.48	83.5	17.02
10620.00	35.61	Ave.	7	2.0	V	18.01	53.62	63.5	9.88
802.11ac80									
5290 MHZ									
5147.68	31.62	PK	294	1.5	V	38.36	69.98	83.5	13.52
5147.68	17.04	Ave.	294	1.5	V	38.36	55.40	63.5	8.10
5352.73	37.77	PK	98	1.3	V	39.09	76.86	83.5	6.64
5352.73	21.55	Ave.	98	1.3	V	39.09	60.64	63.5	2.86
10580.00	46.72	PK	225	2.4	V	17.91	64.63	77.7	13.07

5470-5725MHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11a									
5500 MHZ									
5467.94	32.47	PK	4	1.7	V	39.37	71.84	77.7	5.86
5725.65	32.42	PK	135	1.7	V	39.49	71.91	77.7	5.79
11000.00	46.64	PK	314	1.4	V	17.66	64.30	83.5	19.20
11000.00	31.92	Ave.	314	1.4	V	17.66	49.58	63.5	13.92
5580MHz									
11160.00	45.77	PK	75	2.3	V	17.39	63.16	83.5	20.34
11160.00	28.39	Ave.	75	2.3	V	17.39	45.78	63.5	17.72
5700 MHz									
5468.63	32.42	PK	223	1.6	V	39.37	71.79	77.7	5.91
5726.16	41.25	PK	173	1.7	V	39.49	76.62	77.7	1.08
11400.00	56.18	PK	11	1.5	V	17.73	73.91	83.5	9.59
11400.00	40.53	Ave.	11	1.5	V	17.73	58.26	63.5	5.24
802.11n20									
5500 MHZ									
5469.18	35.64	PK	66	2.2	V	39.37	75.01	77.7	2.69
5726.63	32.24	PK	142	1.7	V	39.49	71.73	77.7	5.97
11000.00	45.71	PK	98	2.3	V	17.66	63.37	83.5	20.13
11000.00	30.98	Ave.	98	2.3	V	17.66	48.64	63.5	14.86
5580 MHZ									
11160.00	41.99	PK	155	2.4	V	17.39	59.38	83.5	24.12
11160.00	27.37	Ave.	155	2.4	V	17.39	44.76	63.5	18.74
5700MHz									
5469.52	32.24	PK	47	2.0	V	39.37	71.61	77.7	6.09
5725.01	37.37	PK	213	1.8	V	39.49	75.86	77.7	1.84
11400.00	51.56	PK	7	1.8	V	17.73	69.29	83.5	14.21
11400.00	36.05	Ave.	7	1.8	V	17.73	53.78	63.5	9.72

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11n40									
5510 MHZ									
5469.84	35.97	PK	230	1.1	V	39.37	75.34	77.7	2.36
5726.55	32.24	PK	270	2.2	V	39.49	71.73	77.7	5.97
11020.00	45.18	PK	105	1.7	V	17.66	62.84	83.5	20.66
11020.00	29.36	Ave.	105	1.7	V	17.66	47.02	63.5	16.48
5550 MHz									
11100.00	44.94	PK	277	2.0	V	16.72	61.66	83.5	21.84
11100.00	29.41	Ave.	277	2.0	V	16.72	46.13	63.5	17.37
5670 MHz									
5468.14	32.24	PK	111	1.7	V	39.37	71.61	77.7	6.09
5725.88	35.41	PK	127	2.4	V	39.49	74.90	77.7	2.80
11340.00	46.33	PK	228	2.5	V	17.43	63.76	83.5	19.74
11340.00	30.96	Ave.	228	2.5	V	17.43	48.39	63.5	15.11
802.11ac20									
5500 MHz									
5468.86	31.87	PK	284	1.3	V	39.37	71.24	77.7	6.46
5727.75	32.12	PK	192	1.8	V	39.49	71.61	77.7	6.09
11000.00	46.03	PK	272	1.9	V	17.66	63.69	83.5	19.81
11000.00	31.18	Ave.	272	1.9	V	17.66	48.84	63.5	14.66
5580 MHz									
11160.00	46.67	PK	172	1.9	V	17.39	64.06	83.5	19.44
11160.00	31.24	Ave.	172	1.9	V	17.39	48.63	63.5	14.87
5700 MHz									
5467.58	32.14	PK	46	2.0	V	39.37	71.51	77.7	6.19
5726.91	35.63	PK	78	2.0	V	39.49	75.12	77.7	2.58
11400.00	46.67	PK	65	1.9	V	17.73	64.40	83.5	19.10
11400.00	35.35	Ave.	65	1.9	V	17.73	53.08	63.5	10.42

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11ac40									
5510 MHz									
5468.16	33.63	PK	163	2.5	V	39.37	73.00	77.7	4.7
5727.75	32.17	PK	250	1.8	V	39.49	71.66	77.7	6.04
11020.00	42.77	PK	47	2.3	V	17.66	60.43	83.5	23.07
11020.00	27.97	Ave.	47	2.3	V	17.66	45.63	63.5	17.87
5550 MHZ									
11100.00	42.54	PK	222	2.0	V	16.72	59.26	83.5	24.24
11100.00	28.43	Ave.	222	2.0	V	16.72	45.15	63.5	18.35
5670 MHz									
5468.74	32.51	PK	353	2.3	V	39.37	71.88	77.7	5.82
5726.63	32.15	PK	255	2.1	V	39.49	71.64	77.7	6.06
11340.00	43.66	PK	273	2.1	V	17.43	61.09	83.5	22.41
11340.00	29.95	Ave.	273	2.1	V	17.43	47.38	63.5	16.12
802.11ac80									
5530MHz									
5469.88	35.17	PK	255	1.3	V	39.37	74.54	77.7	3.16
5727.24	32.42	PK	171	2.4	V	39.49	71.91	77.7	5.79
11060.00	42.86	PK	310	1.4	V	16.72	59.58	83.5	23.92
11060.00	28.94	Ave.	310	1.4	V	16.72	45.66	63.5	17.84
5610 MHz									
5468.58	32.47	PK	162	2.0	V	39.37	71.84	77.7	5.86
5726.66	32.33	PK	17	2.3	V	39.49	71.82	77.7	5.88
11220.00	42.74	PK	27	1.3	V	17.39	60.13	83.5	23.37
11220.00	28.61	Ave.	27	1.3	V	17.39	46.00	63.5	17.50

5725-5850 MHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11a									
5745 MHz									
5647.29	32.62	PK	234	2.0	V	39.46	72.08	77.7	5.62
5684.26	32.36	PK	283	1.4	V	39.49	71.85	103.05	31.20
5719.49	35.26	PK	74	2.3	V	39.49	74.75	120.16	45.41
5724.92	40.22	PK	101	2.1	V	39.49	79.71	130.36	50.65
11490.00	54.42	PK	86	1.4	V	17.47	71.89	83.5	11.61
11490.00	38.13	Ave.	86	1.4	V	17.47	55.60	63.5	7.90
5785 MHZ									
11570.00	53.01	PK	141	1.3	V	17.51	70.52	83.5	12.98
11570.00	37.71	Ave.	141	1.3	V	17.51	55.22	63.5	8.28
5825 MHZ									
5850.03	33.11	PK	313	2.4	V	39.87	72.98	131.63	58.65
5873.35	32.90	PK	321	2.0	V	39.87	72.77	115.16	42.39
5909.26	33.67	PK	133	2.2	V	39.87	73.54	89.35	15.81
5930.42	34.20	PK	235	1.6	V	39.97	74.17	77.7	3.53
11650.00	49.61	PK	309	1.9	V	16.18	65.79	83.5	17.71
11650.00	35.44	Ave.	309	1.9	V	16.18	51.62	63.5	11.88
802.11n20									
5745 MHz									
5610.31	31.16	PK	143	2.2	V	39.46	70.62	77.7	7.08
5678.84	32.03	PK	239	2.2	V	39.49	71.52	99.04	27.52
5719.84	32.50	PK	122	2.2	V	39.49	71.99	120.26	48.27
5724.84	39.28	PK	307	2.3	V	39.49	78.77	130.42	51.65
11490.00	46.72	PK	129	1.5	V	17.47	64.19	83.5	19.31
11490.00	33.37	Ave.	129	1.5	V	17.47	50.84	63.5	12.66
5785 MHz									
11570.00	46.54	PK	269	2.5	V	17.51	64.05	83.5	19.45
11570.00	33.29	Ave.	269	2.5	V	17.51	50.80	63.5	12.70
5825 MHz									
5852.51	32.74	PK	192	1.5	V	39.87	72.61	125.98	53.37
5859.79	33.21	PK	137	2.0	V	39.87	73.08	118.96	45.88
5887.63	33.51	PK	1	2.2	V	39.87	73.38	105.35	31.97
5941.42	34.12	PK	342	1.5	V	39.97	74.09	77.7	3.61
11650.00	45.27	PK	348	2.0	V	16.18	61.45	83.5	22.05
11650.00	31.68	Ave.	348	2.0	V	16.18	47.86	63.5	15.64

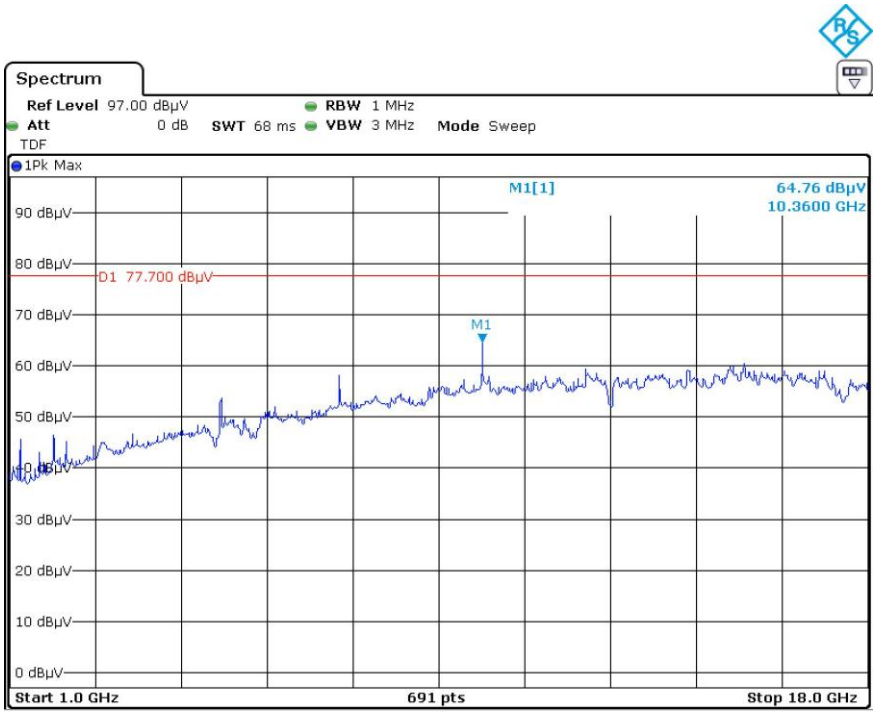
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11n40									
5755 MHZ									
5645.62	31.88	PK	87	2.3	V	39.46	71.34	77.7	6.36
5667.98	32.98	PK	115	1.9	V	39.49	72.47	91.01	18.54
5719.29	34.71	PK	301	2.5	V	39.49	74.20	120.1	45.90
5723.69	36.56	PK	81	1.2	V	39.49	76.05	128.71	52.66
11510.00	47.75	PK	114	2.1	V	17.47	65.22	83.5	18.28
11510.00	34.28	Ave.	114	2.1	V	17.47	51.75	63.5	11.75
5795 MHZ									
5851.64	33.42	PK	82	2.2	V	39.87	73.29	127.96	54.67
5867.78	36.71	PK	62	1.3	V	39.87	76.58	116.72	40.14
5904.20	33.37	PK	292	2.3	V	39.87	73.24	93.09	19.85
5933.67	33.87	PK	291	1.5	V	39.97	73.84	77.7	3.86
11590.00	46.52	PK	318	1.3	V	17.51	64.03	83.5	19.47
11590.00	33.87	Ave.	318	1.3	V	17.51	51.38	63.5	12.12
802.11ac20									
5745 MHZ									
5635.71	32.06	PK	30	1.2	V	39.46	71.52	77.7	6.18
5676.16	31.62	PK	151	2.1	V	39.49	71.11	97.06	25.95
5702.85	33.08	PK	71	1.7	V	39.49	72.57	115.5	42.93
5724.13	35.94	PK	217	1.2	V	39.49	75.43	129.72	54.29
11490.00	48.07	PK	276	1.3	V	17.47	65.54	83.5	17.96
11490.00	32.31	Ave.	276	1.3	V	17.47	49.78	63.5	13.72
5785 MHz									
11570.00	47.98	PK	144	1.8	V	17.51	65.49	83.5	18.01
11570.00	31.91	Ave.	144	1.8	V	17.51	49.42	63.5	14.08
5825 MHZ									
5850.71	32.92	PK	175	2.2	V	39.87	72.79	130.08	57.29
5874.26	34.61	PK	134	1.5	V	39.87	74.48	114.91	40.43
5924.10	33.20	PK	314	1.2	V	39.97	73.17	78.37	5.20
5929.00	34.10	PK	183	2.0	V	39.97	74.07	77.7	3.63
11650.00	45.67	PK	99	1.0	V	16.18	61.85	83.5	21.65
11650.00	30.19	Ave.	99	1.0	V	16.18	46.37	63.5	17.13

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11ac40									
5755 MHZ									
5619.28	32.48	PK	26	1.2	V	39.46	71.94	77.7	5.76
5699.39	32.60	PK	262	2.0	V	39.49	72.09	114.25	42.16
5718.16	33.01	PK	241	1.6	V	39.49	72.50	119.78	47.28
5723.56	35.01	PK	262	1.9	V	39.49	74.50	128.42	53.92
11510.00	46.06	PK	205	2.4	V	17.47	63.53	83.5	19.97
11510.00	32.43	Ave.	205	2.4	V	17.47	49.90	63.5	13.60
5795 MHz									
5851.04	32.85	PK	315	1.1	V	39.87	72.72	129.33	56.61
5855.01	33.35	PK	106	1.7	V	39.87	73.22	120.3	47.08
5900.72	33.03	PK	225	1.4	V	39.87	72.90	95.67	22.77
5951.24	34.01	PK	301	2.4	V	39.84	73.85	77.7	3.85
11590.00	45.86	PK	110	1.3	V	17.51	63.37	83.5	20.13
11590.00	31.80	Ave.	110	1.3	V	17.51	49.31	63.5	14.19
802.11ac80									
5775 MHz									
5646.85	31.52	PK	166	1.7	V	39.46	70.98	77.7	6.72
5688.10	32.29	PK	32	1.7	V	39.49	71.78	105.89	34.11
5719.41	32.49	PK	291	1.8	V	39.49	71.98	120.13	48.15
5724.46	33.32	PK	116	2.2	V	39.49	72.81	130.47	57.66
5852.46	36.14	PK	230	1.0	V	39.87	76.01	126.09	50.08
5858.37	33.66	PK	355	1.1	V	39.87	73.53	119.35	45.82
5893.56	34.17	PK	163	1.5	V	39.87	74.04	100.97	26.93
5952.52	34.61	PK	103	2.5	V	39.84	74.45	77.7	3.25
11550.00	48.35	PK	335	2.4	V	17.51	65.86	83.5	17.64
11550.00	34.31	Ave.	335	2.4	V	17.51	51.82	63.5	11.68

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 802.11a 5180MHz
Horizontal



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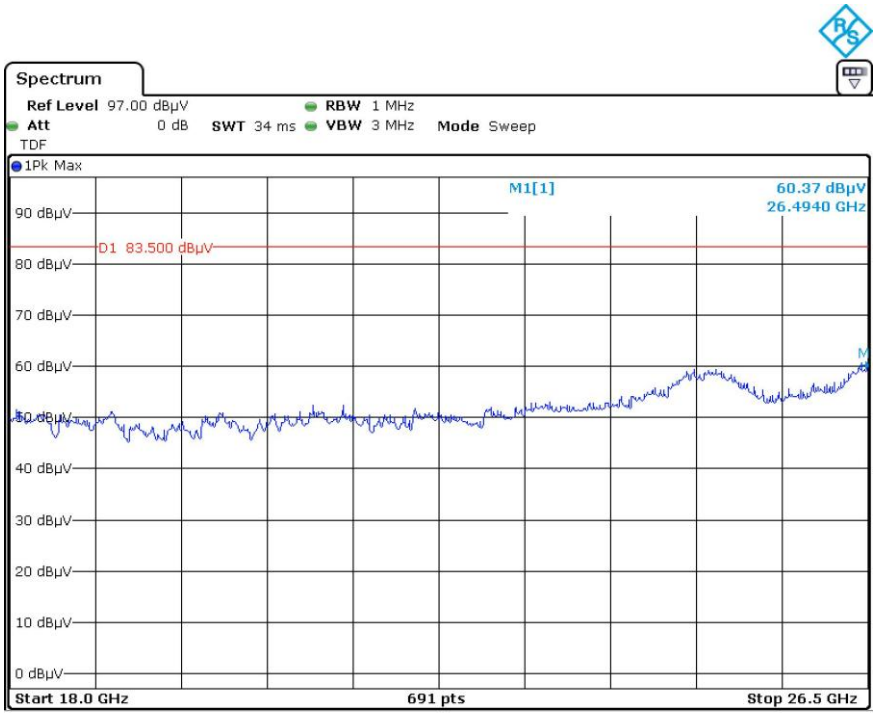

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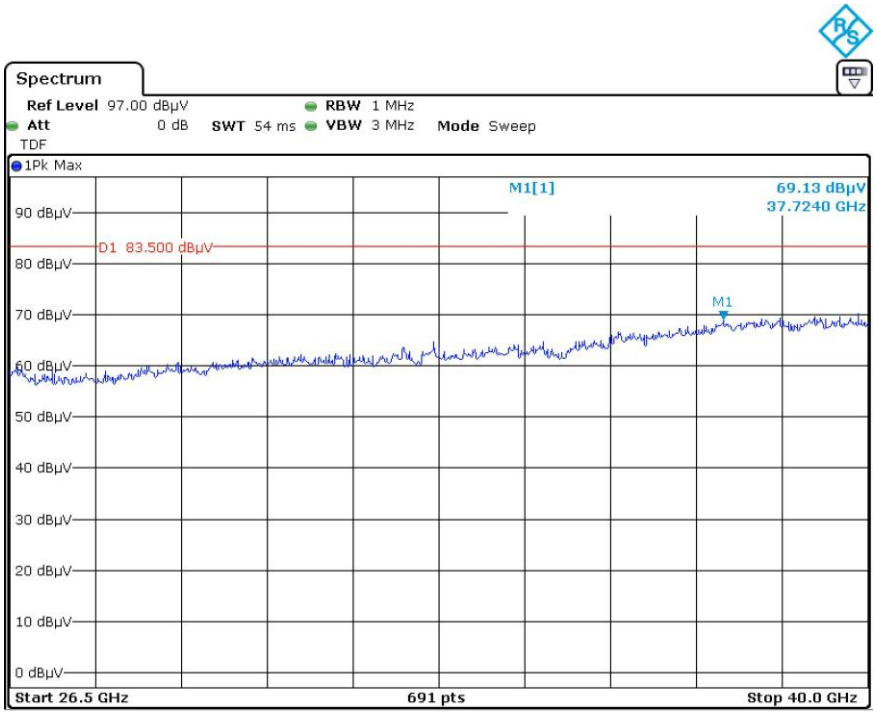
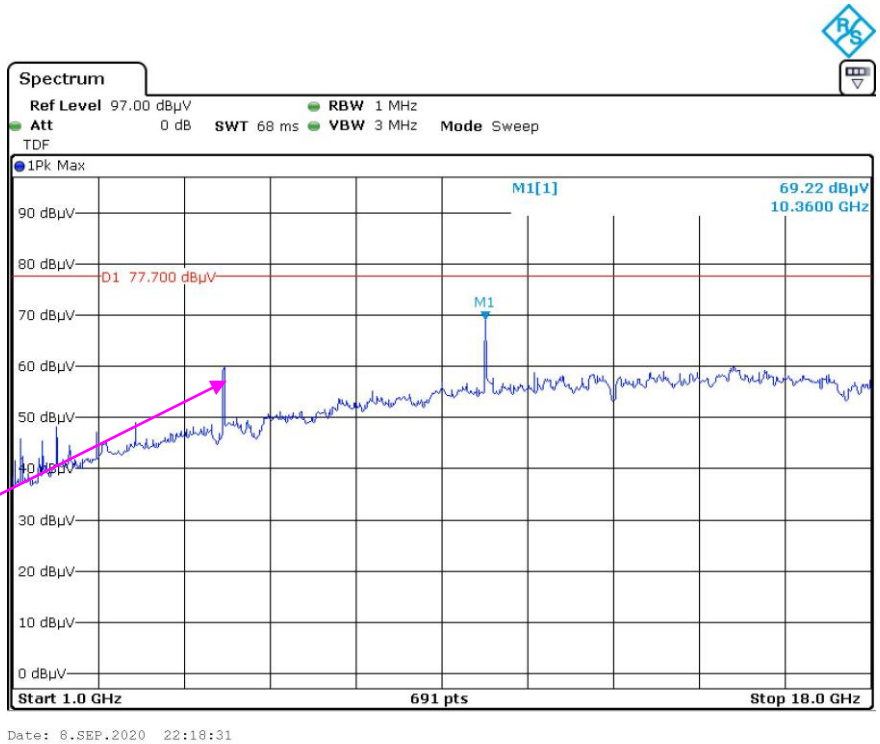
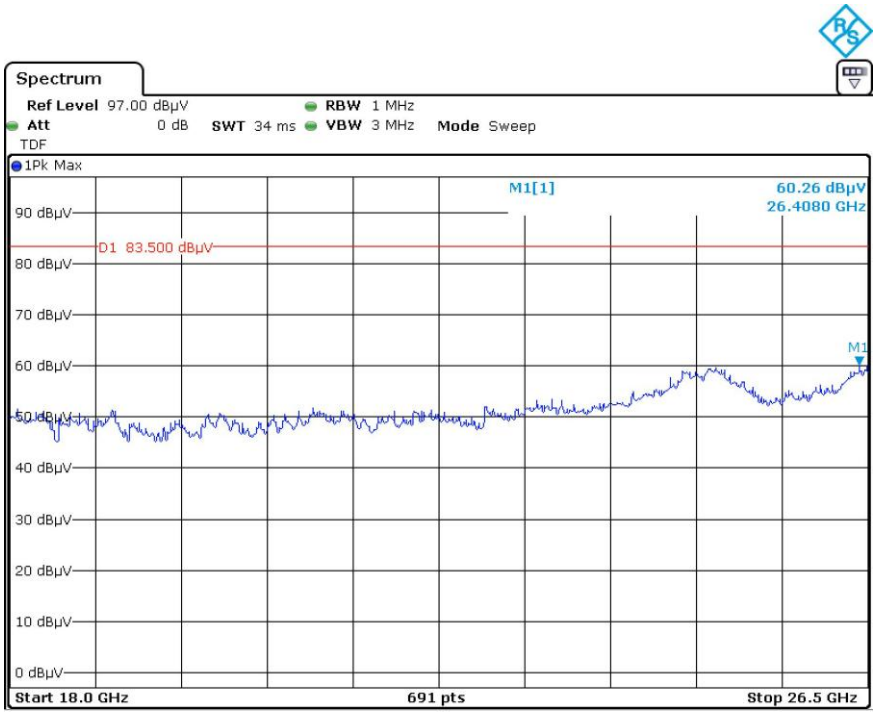


Vertical



Fundamental test



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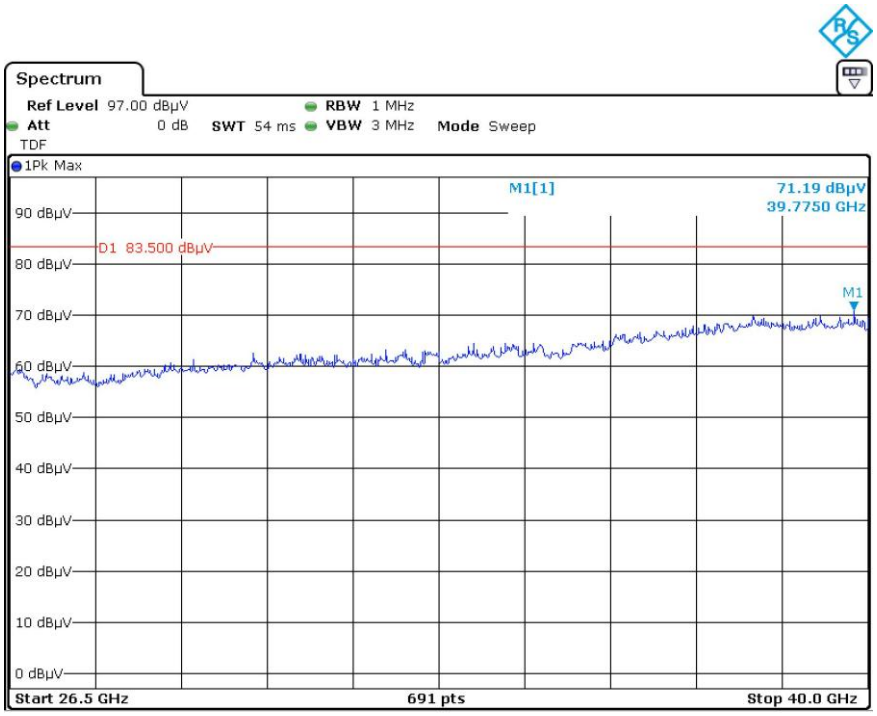

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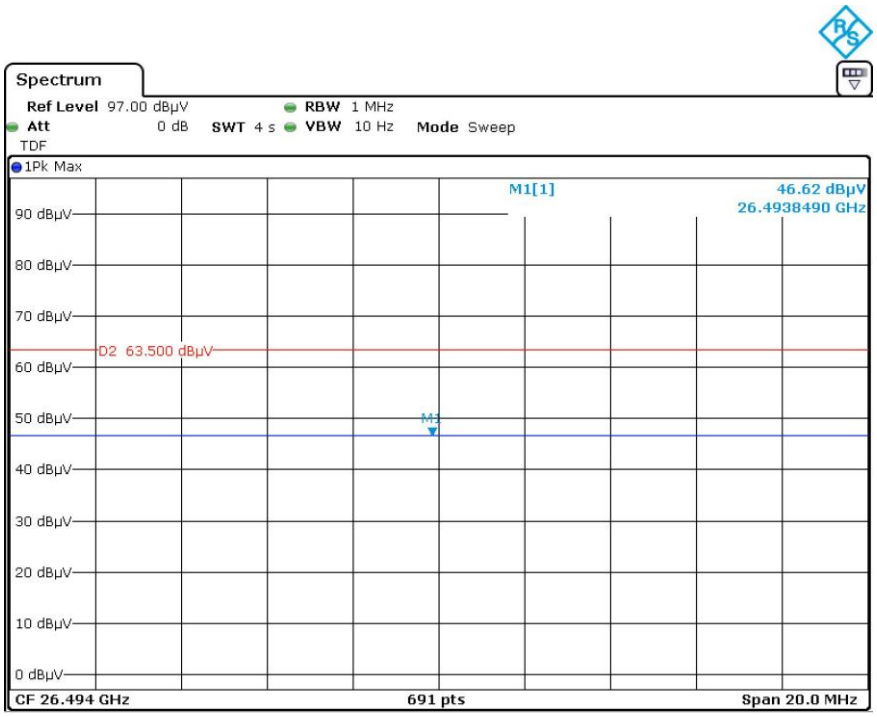
Average
Horizontal



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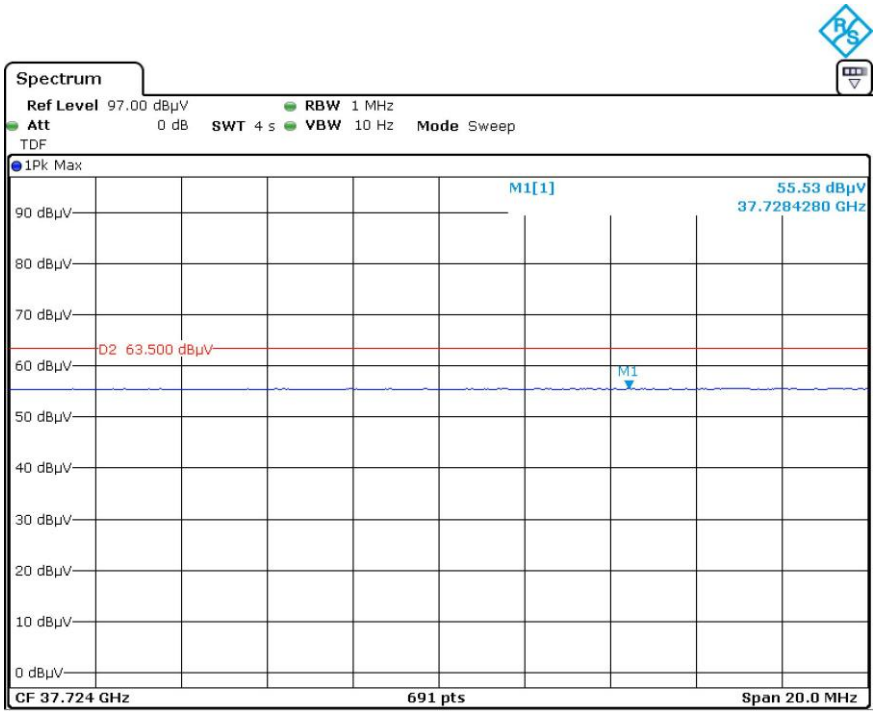

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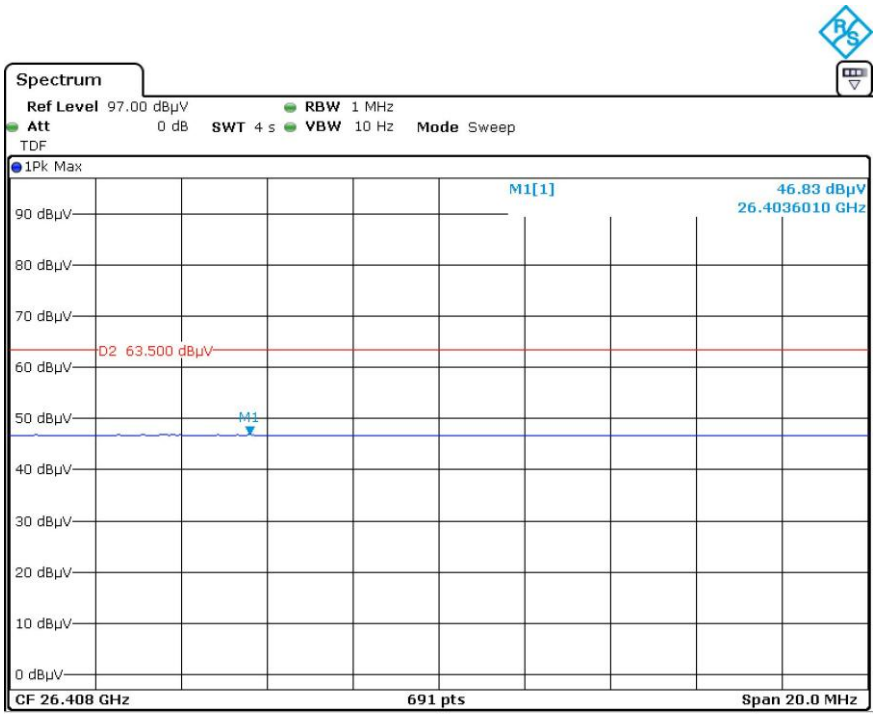
Vertical



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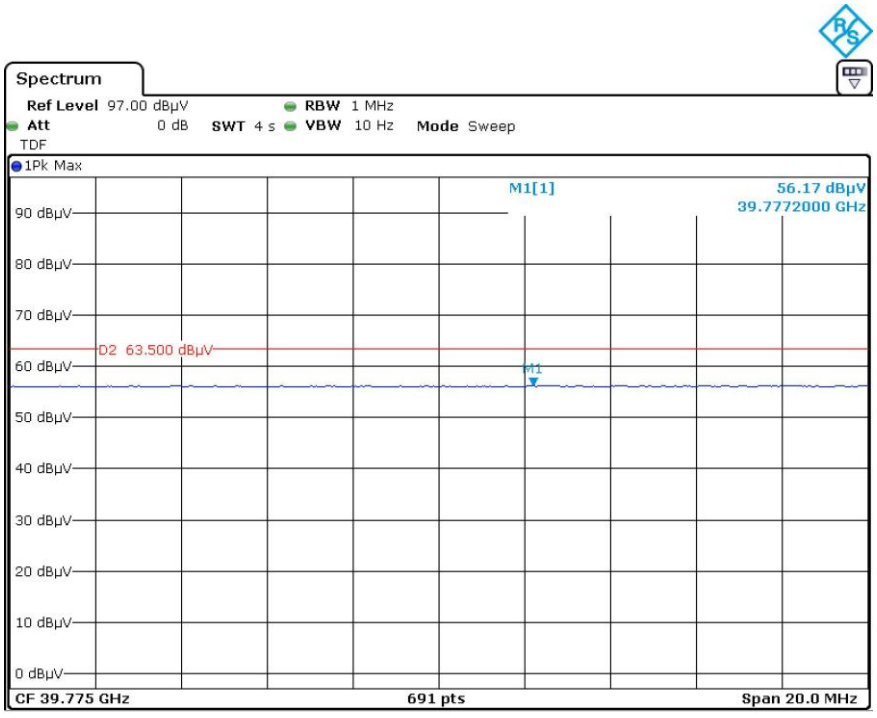

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FCC §15.407(1), (5),(e) – 26 dB & 6dB EMISSION BANDWIDTH

Applicable Standard

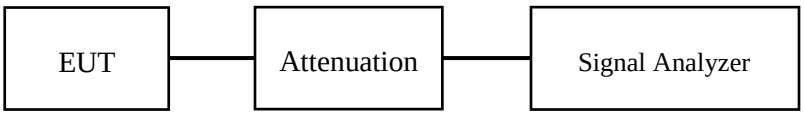
The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band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

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

Test Procedure

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

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



Test Data

Environmental Conditions

Temperature:	27.6℃
Relative Humidity:	54%
ATM Pressure:	101.0 kPa

The testing was performed by James Fu from 2020-09-01 to 2020-09-10.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the Appendix.

FCC §15.407(a)(1)(2)(3) – CONDUCTED TRANSMITTER OUTPUT POWER

Applicable Standard

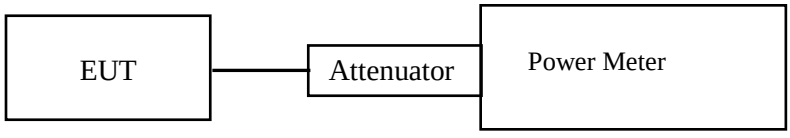
For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting 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.

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.



Test Data

Environmental Conditions

Temperature:	27.6℃
Relative Humidity:	54%
ATM Pressure:	101.0 kPa

The testing was performed by James Fu from 2020-09-01 to 2020-09-10.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the Appendix.

FCC §15.407(a) (1) (2) (3) - 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.

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 $\geqslant$ 1/T, where T is defined in section II.B.l.a).
b) Set VBW $\geqslant$ 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.

Test Data

Environmental Conditions

Temperature:	27.6℃
Relative Humidity:	54%
ATM Pressure:	101.0 kPa

The testing was performed by James Fu from 2020-09-01 to 2020-09-10.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the Appendix.

APPENDIX

AppendixA1: Emission Bandwidth

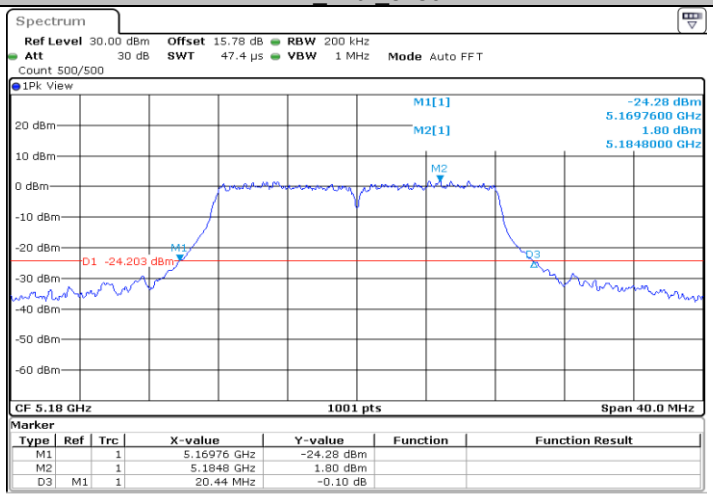
Test Result

TestMode	Antenna	Channel	26db EBW [MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	20.440	---	PASS
		5200	20.520	---	PASS
		5240	20.520	---	PASS
		5260	20.440	---	PASS
		5280	20.480	---	PASS
		5320	20.360	---	PASS
		5500	20.320	---	PASS
		5580	25.120	---	PASS
		5700	23.040	---	PASS
11N20SISO	Ant1	5180	21.080	---	PASS
		5200	21.160	---	PASS
		5240	21.160	---	PASS
		5260	21.040	---	PASS
		5280	21.000	---	PASS
		5320	21.040	---	PASS
		5500	21.200	---	PASS
		5580	21.400	---	PASS
		5700	21.640	---	PASS
11N40SISO	Ant1	5190	41.920	---	PASS
		5230	41.920	---	PASS
		5270	41.520	---	PASS
		5310	41.520	---	PASS
		5510	41.520	---	PASS
		5550	45.360	---	PASS
		5670	43.200	---	PASS
11AC20SISO	Ant1	5180	21.240	---	PASS
		5200	21.120	---	PASS
		5240	21.200	---	PASS
		5260	21.000	---	PASS
		5280	21.320	---	PASS
		5320	20.840	---	PASS
		5500	21.160	---	PASS
		5580	21.520	---	PASS
		5700	21.840	---	PASS

TestMode	Antenna	Channel	26db EBW [MHz]	Limit[MHz]	Verdict
11AC40SISO	Ant1	5190	41.920	---	PASS
		5230	42.240	---	PASS
		5270	41.440	---	PASS
		5310	41.360	---	PASS
		5510	42.000	---	PASS
		5550	41.680	---	PASS
		5670	42.960	---	PASS
11AC80SISO	Ant1	5210	83.040	---	PASS
		5290	83.360	---	PASS
		5530	83.200	---	PASS
		5610	98.560	---	PASS

Test Graphs

11A_Ant1_5180



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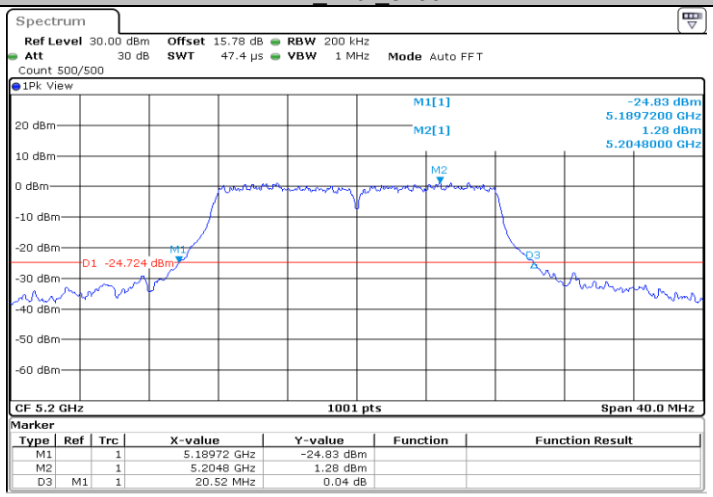

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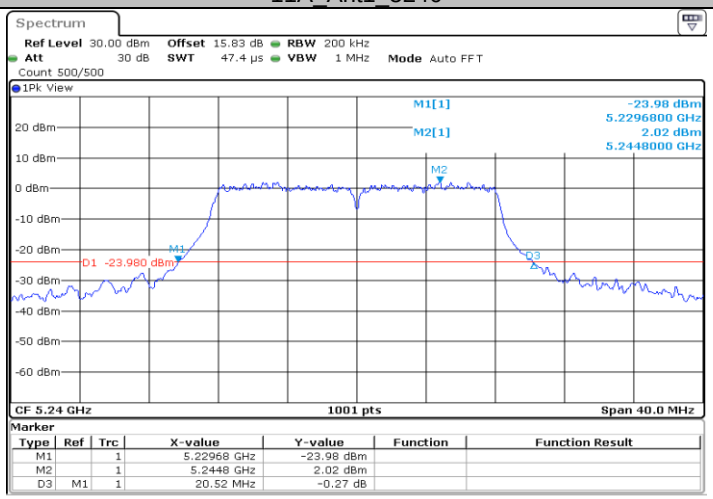

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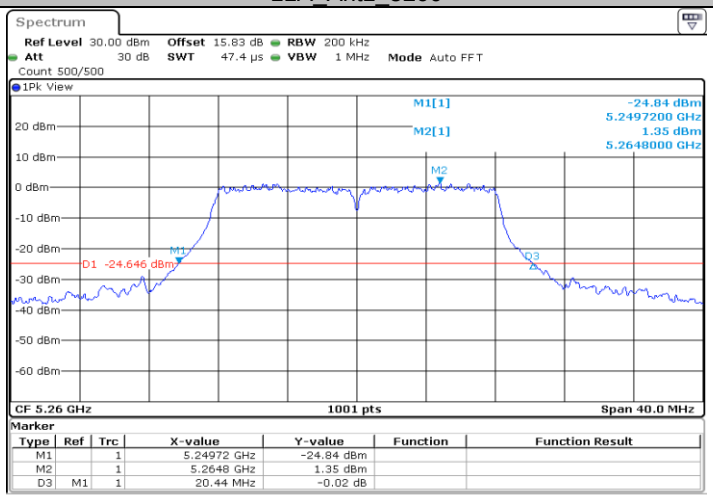

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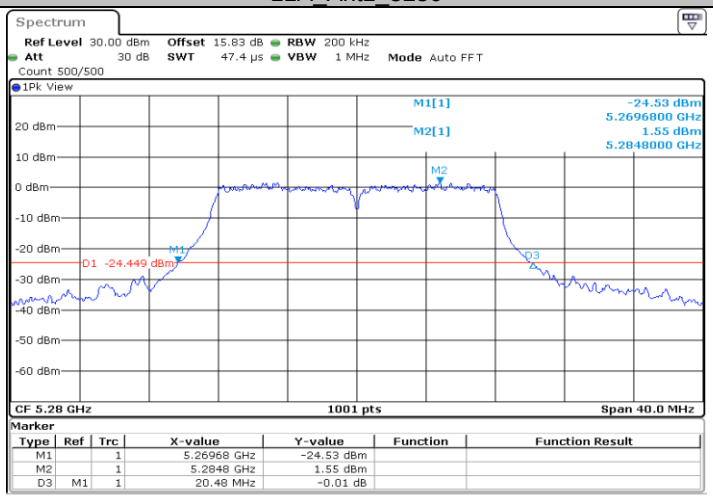

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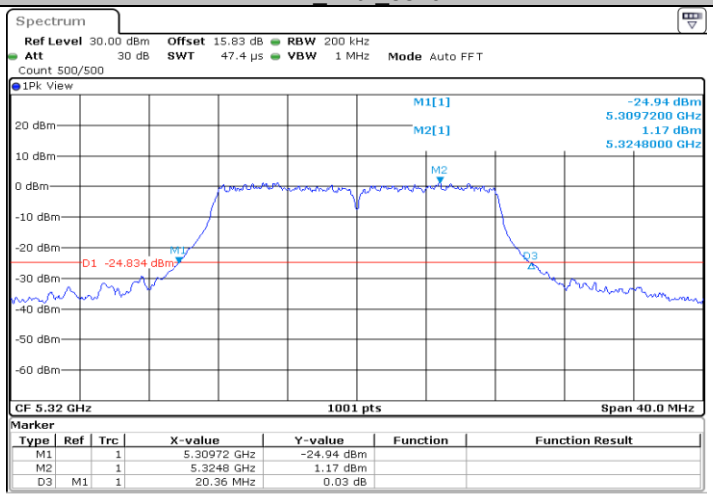

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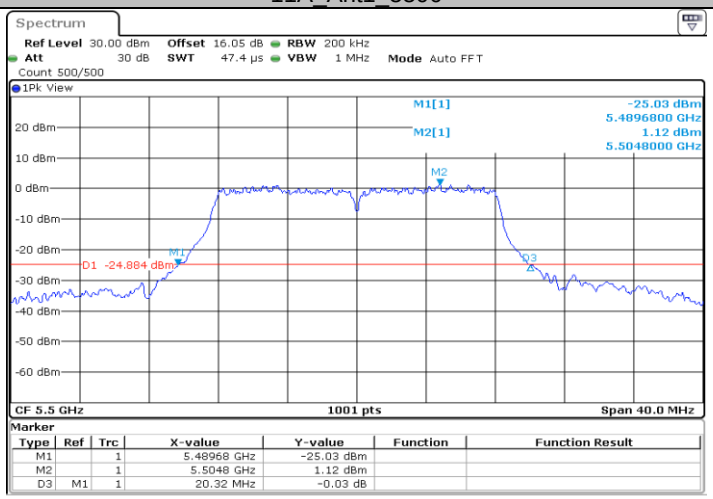

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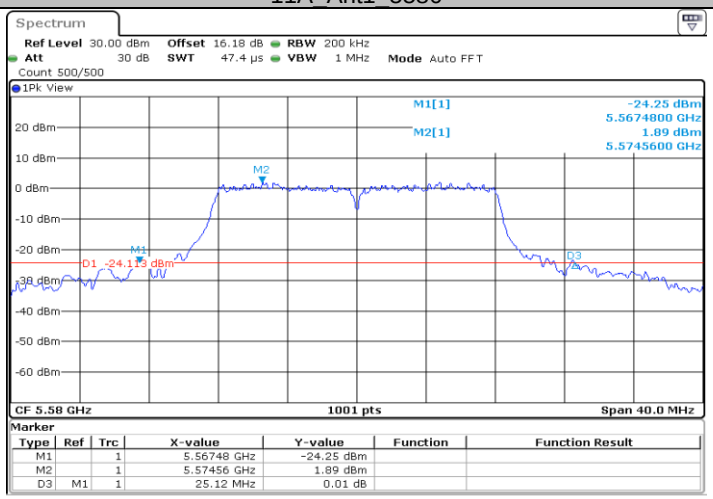

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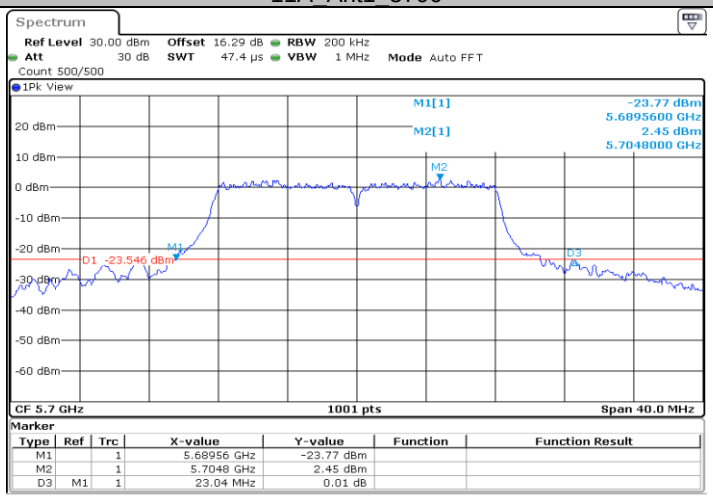

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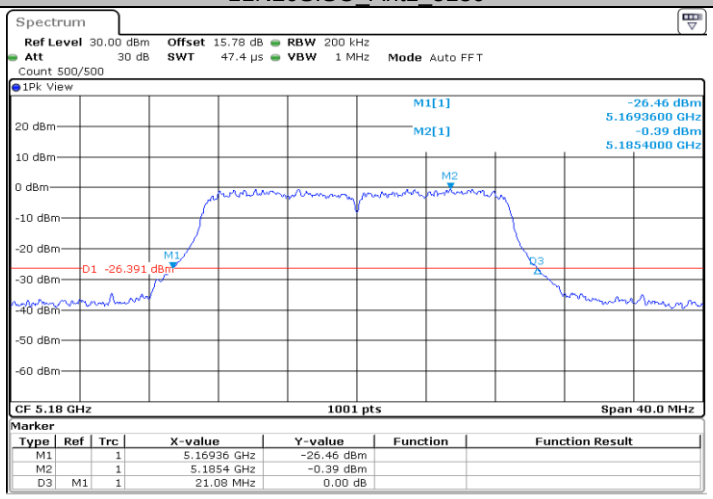

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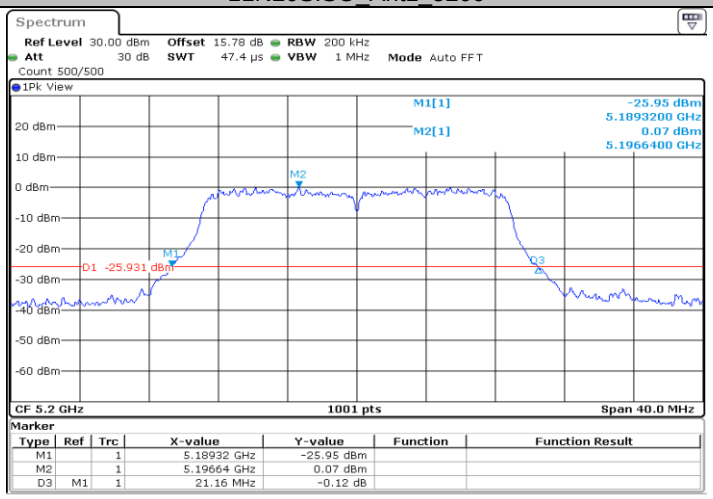

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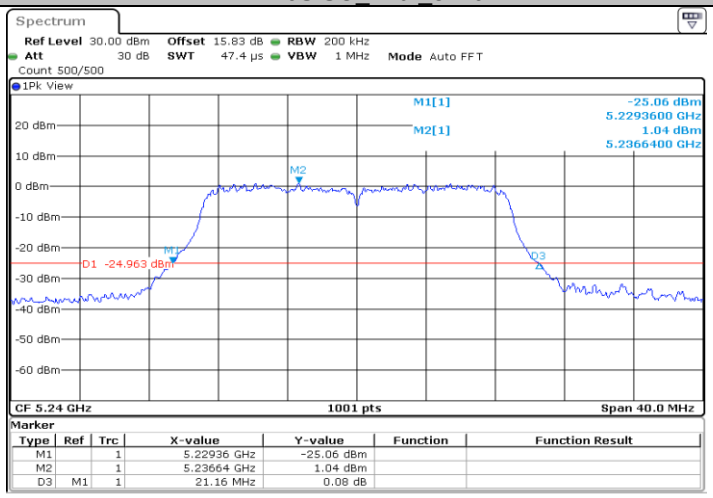

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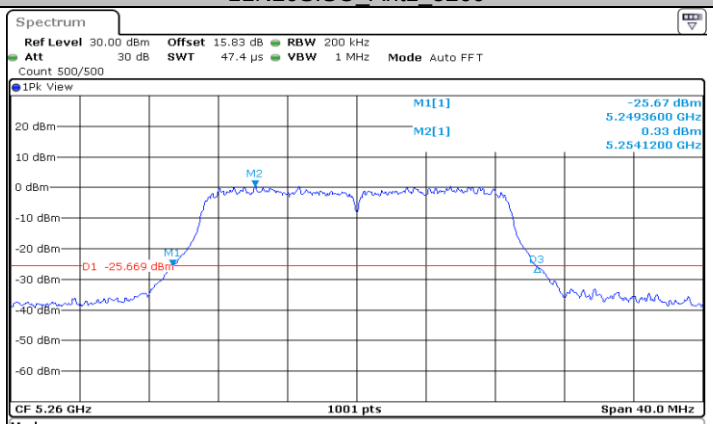

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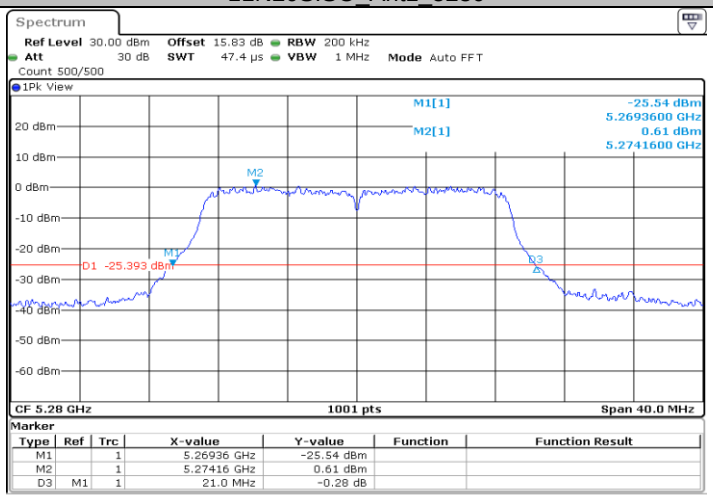

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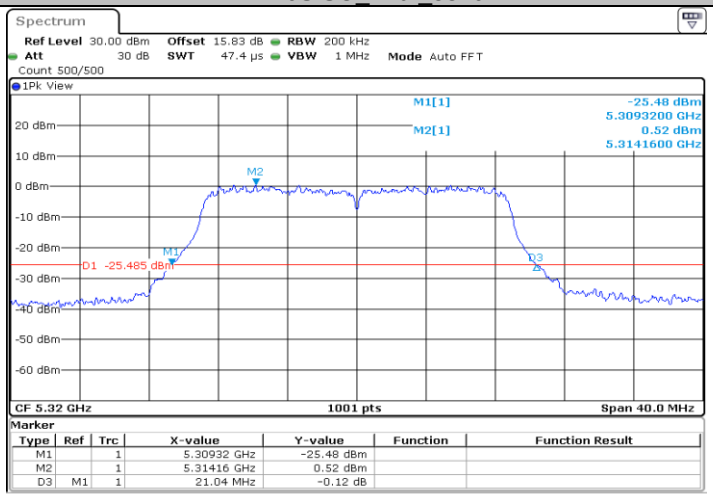

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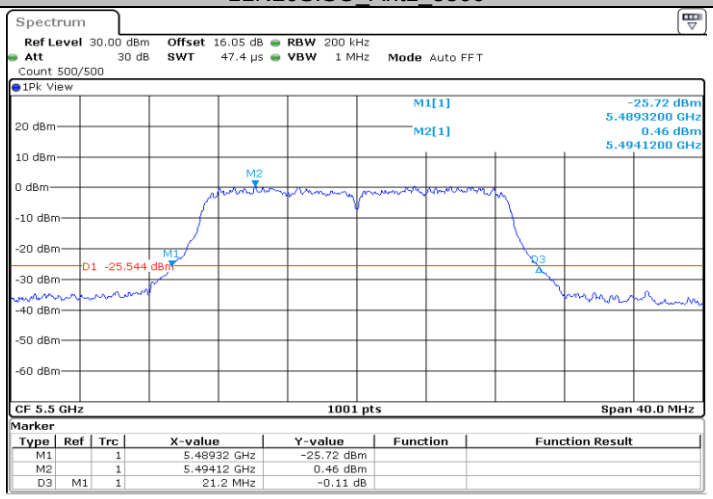

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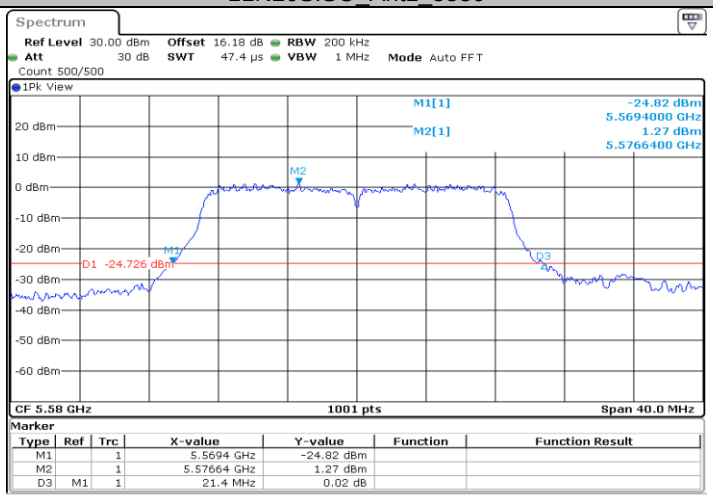

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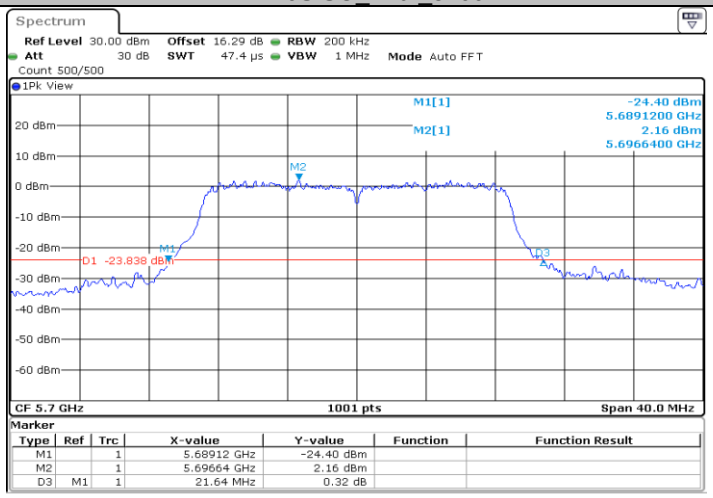

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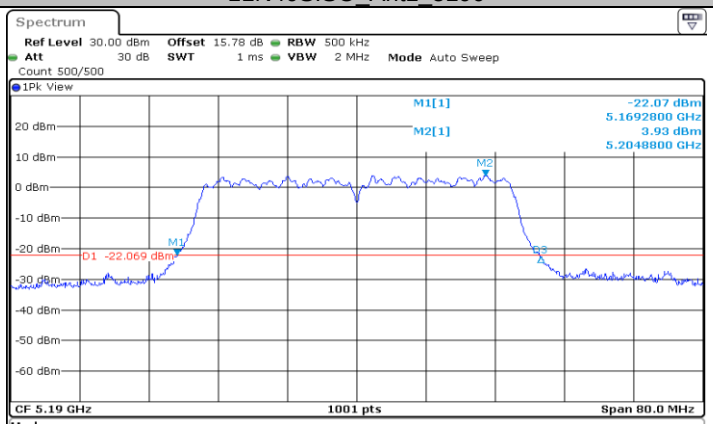

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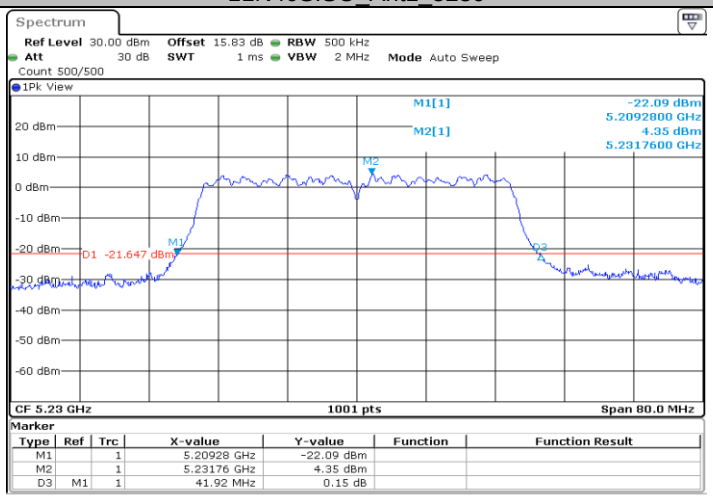

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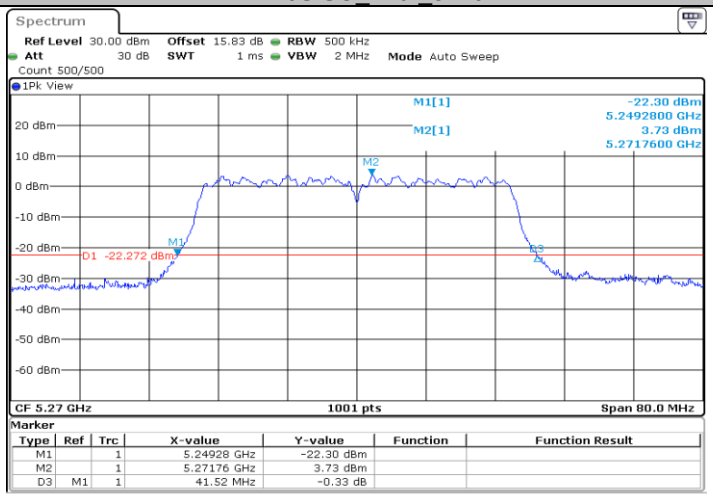

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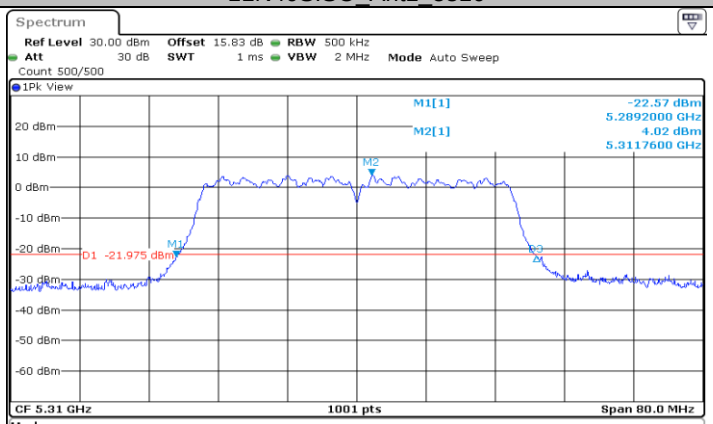

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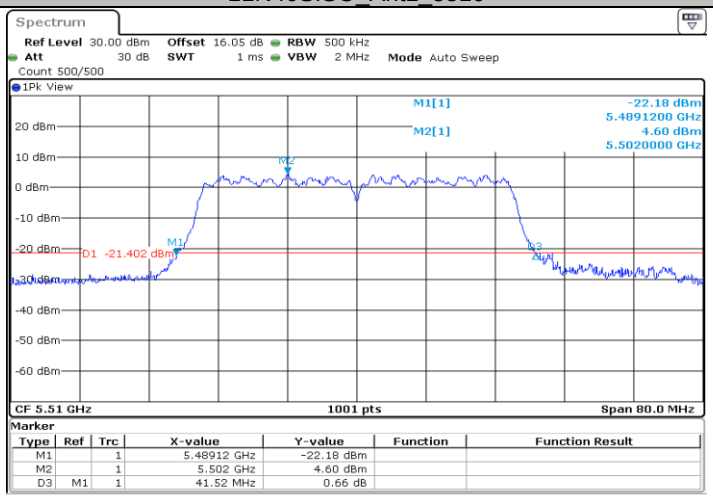

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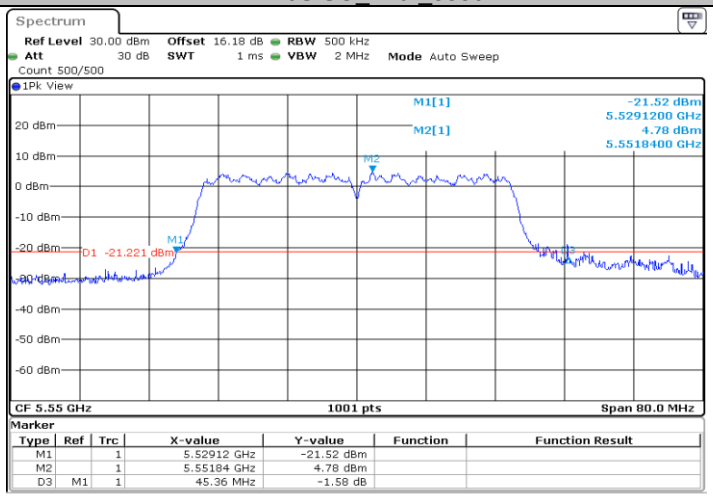

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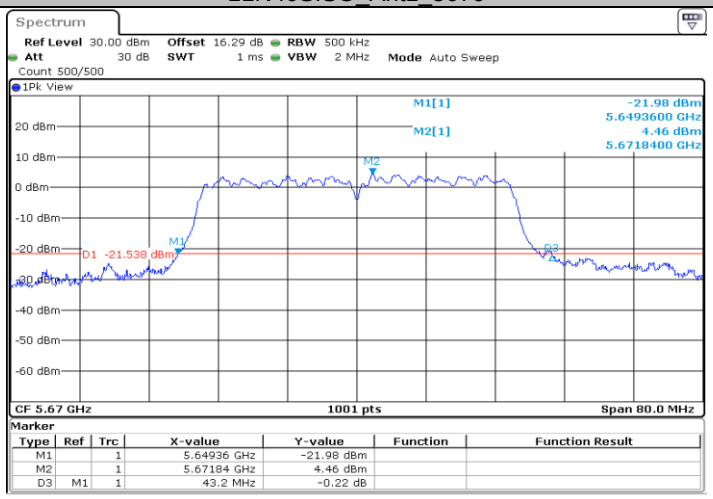

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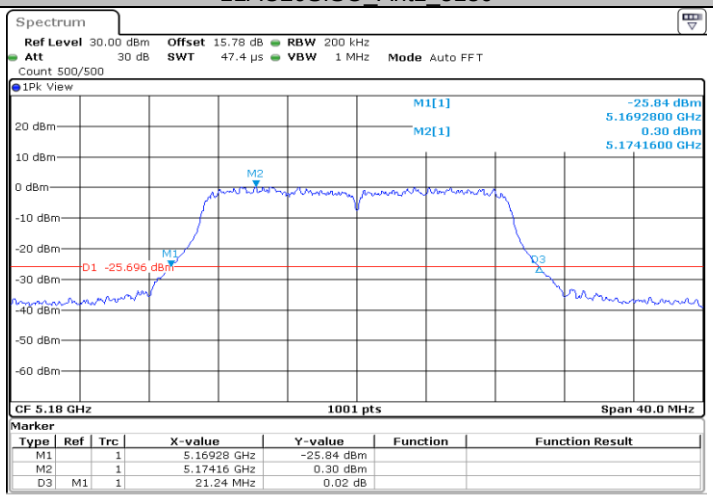

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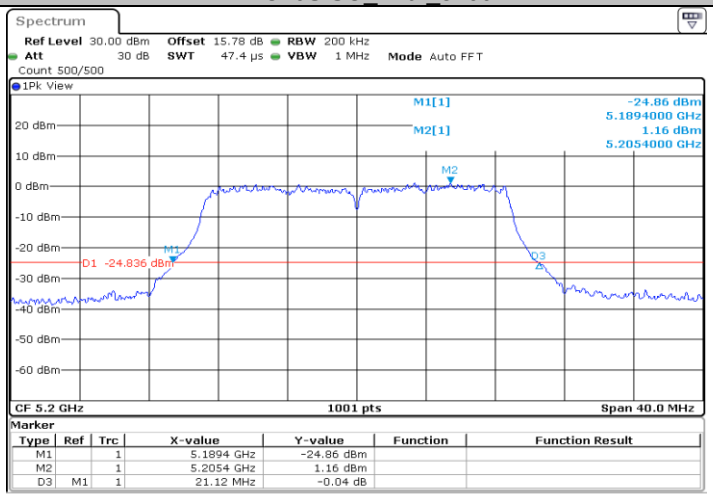

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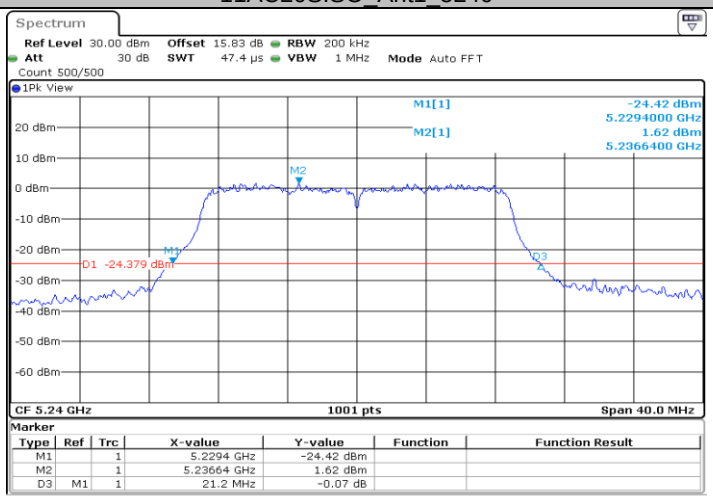

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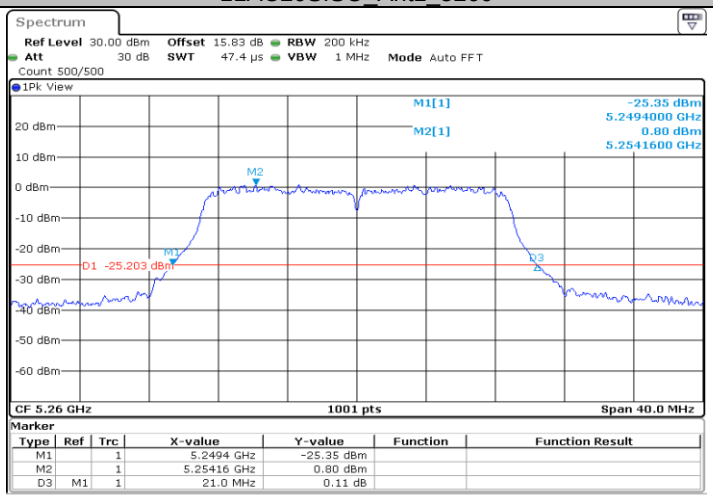

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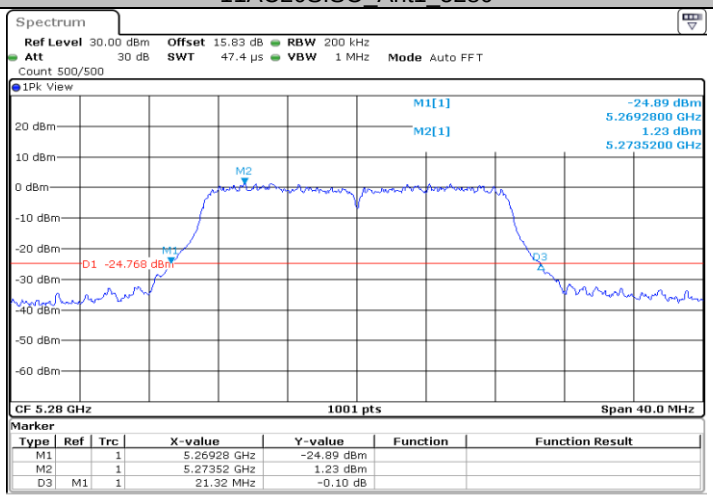

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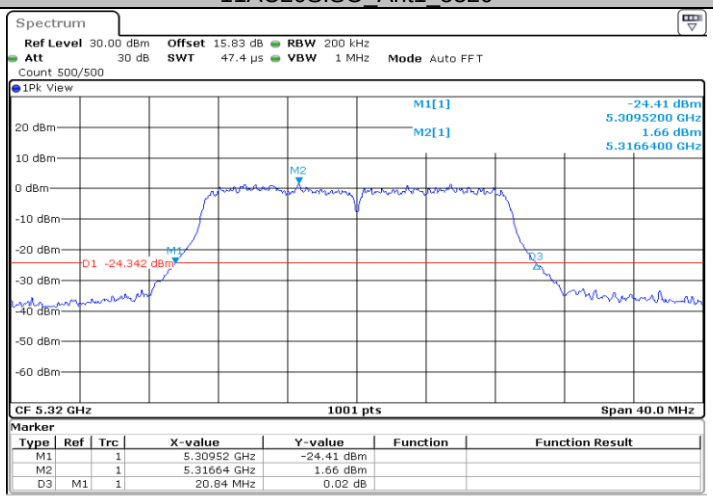

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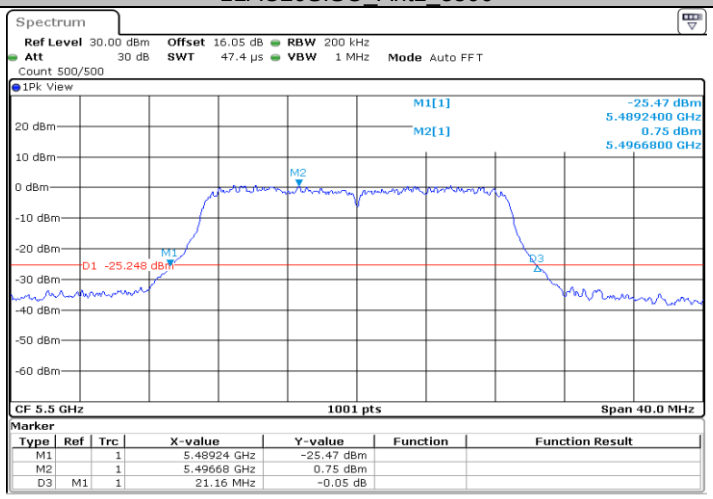

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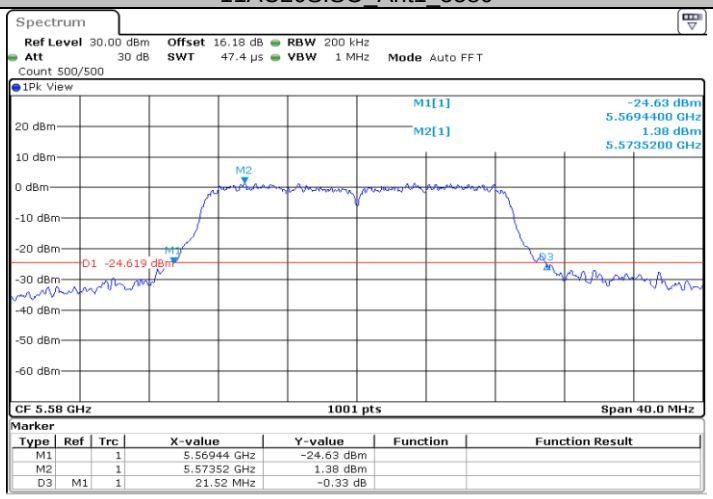

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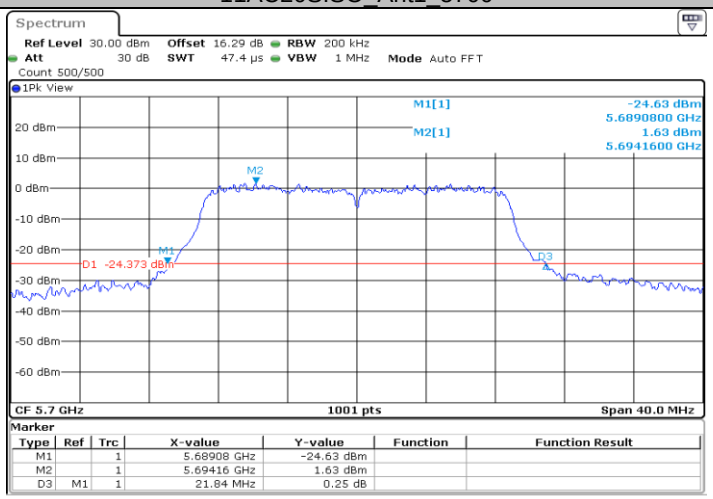

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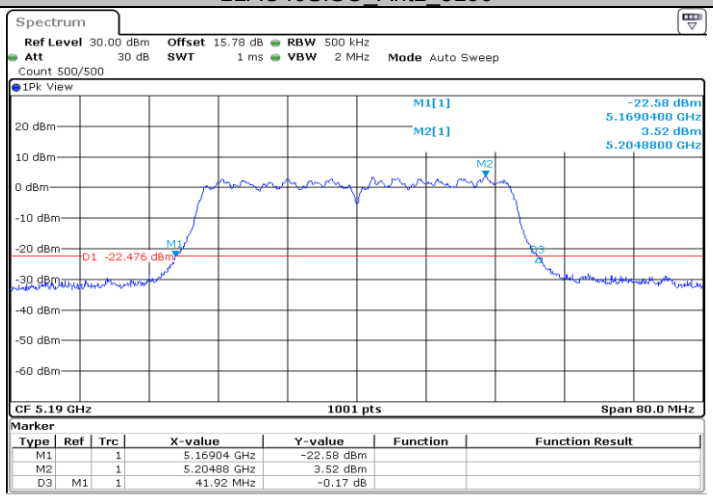

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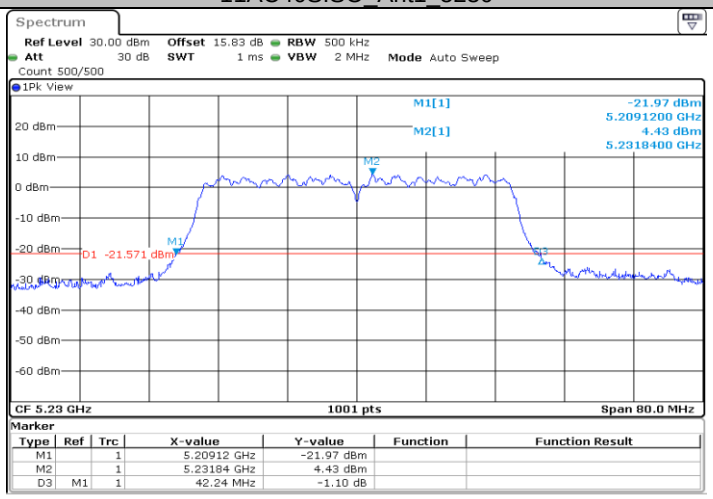

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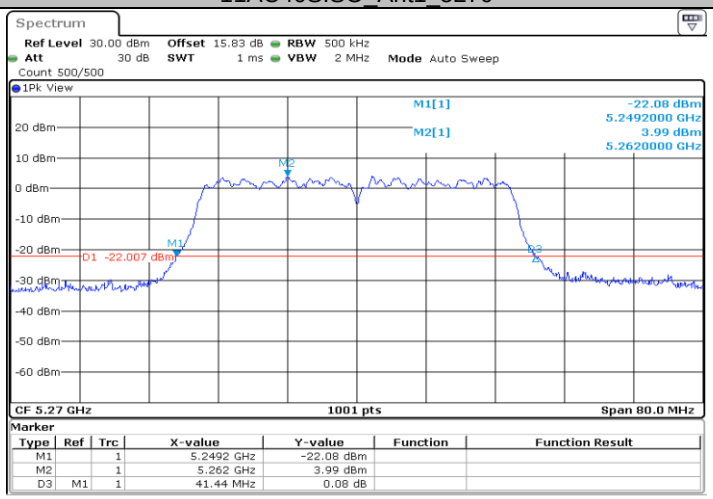

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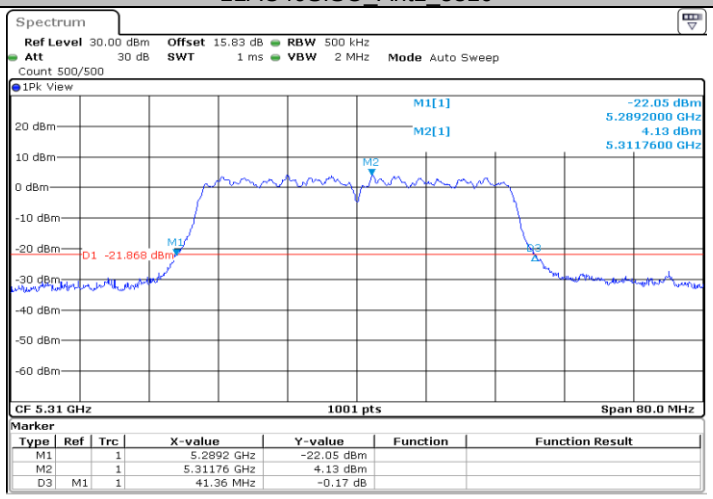

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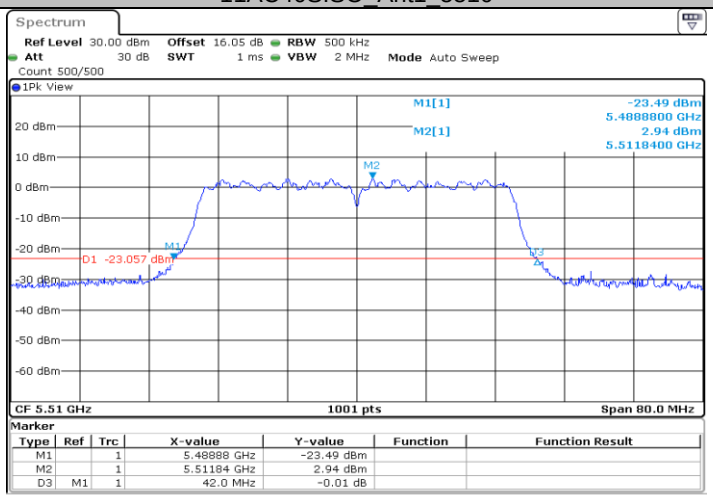

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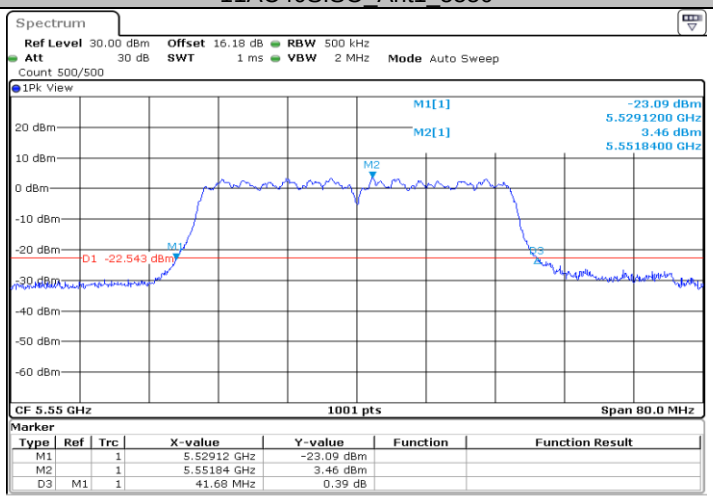
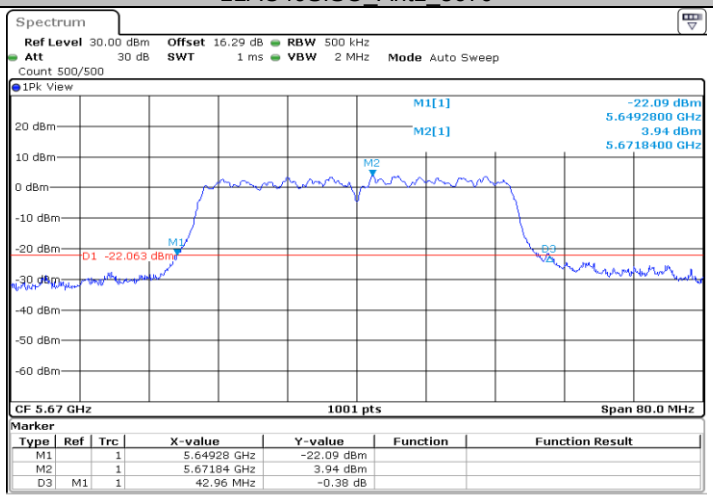
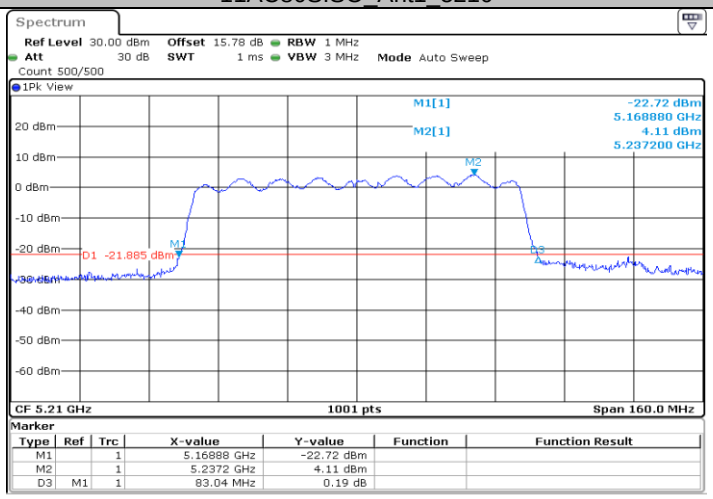


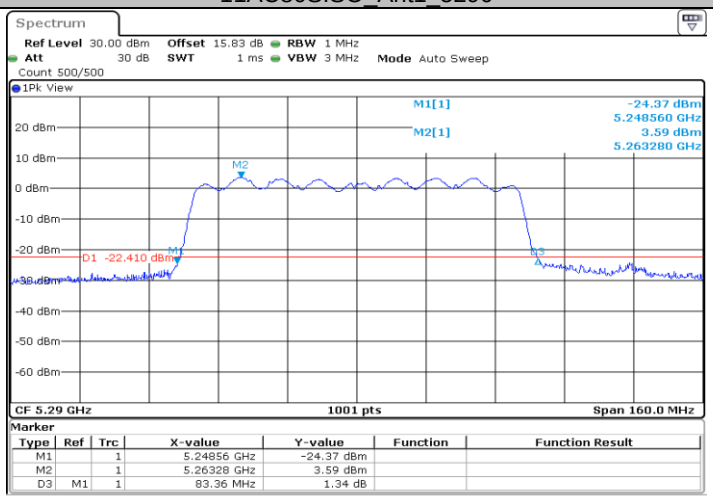
11AC40SISO_Ant1_5670



11AC80SISO_Ant1_5210



11AC80SISO_Ant1_5290



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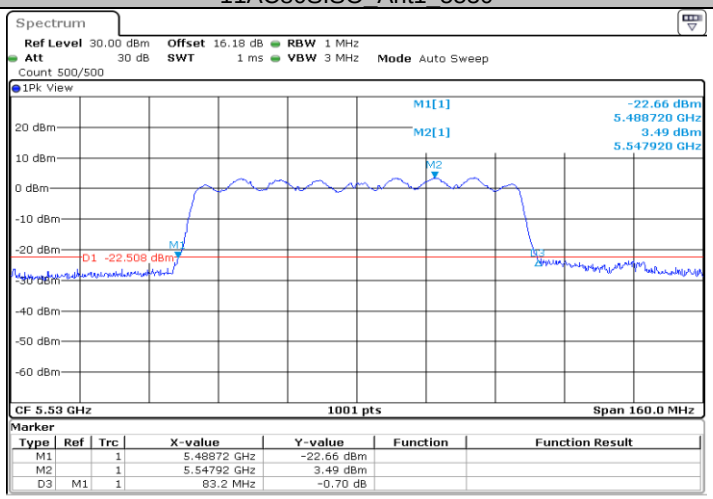
11AC80SISO_Ant1_5530



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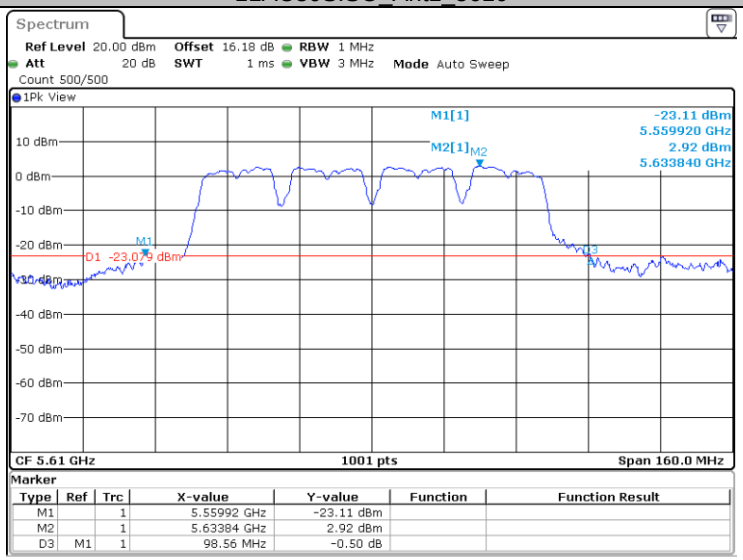
11AC80SISO_Ant1_5610



Date: 13.SEP.2020 13:25:01

AppendixA2: Occupied channel bandwidth

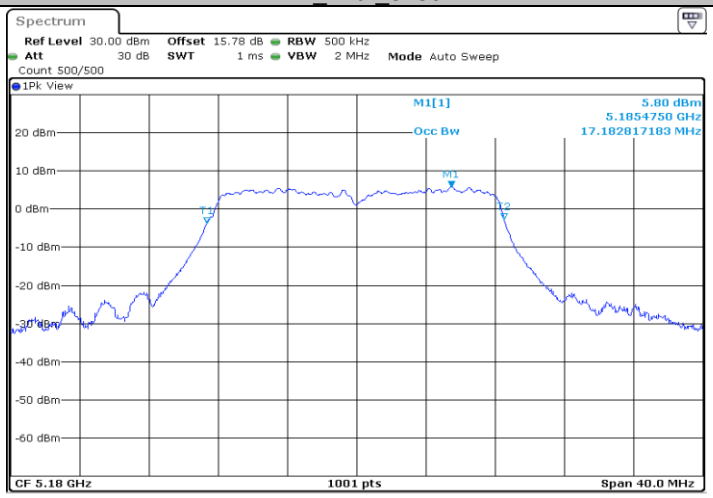
Test Result

TestMode	Antenna	Channel	OCB [MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	17.183	---	PASS
		5200	17.223	---	PASS
		5240	17.223	---	PASS
		5260	17.223	---	PASS
		5280	17.183	---	PASS
		5320	17.183	---	PASS
		5500	17.183	---	PASS
		5580	17.502	---	PASS
		5700	17.463	---	PASS
		5745	18.022	---	PASS
		5785	17.383	---	PASS
		5825	17.343	---	PASS
11N20SISO	Ant1	5180	18.062	---	PASS
		5200	18.062	---	PASS
		5240	18.062	---	PASS
		5260	18.062	---	PASS
		5280	18.062	---	PASS
		5320	18.102	---	PASS
		5500	18.062	---	PASS
		5580	18.142	---	PASS
		5700	18.182	---	PASS
		5745	18.182	---	PASS
		5785	18.102	---	PASS
		5825	18.102	---	PASS
11N40SISO	Ant1	5190	36.763	---	PASS
		5230	36.763	---	PASS
		5270	36.603	---	PASS
		5310	36.603	---	PASS
		5510	36.603	---	PASS
		5550	36.603	---	PASS
		5670	36.683	---	PASS
		5755	36.923	---	PASS
		5795	36.763	---	PASS
11AC20SISO	Ant1	5180	18.102	---	PASS
		5200	18.102	---	PASS
		5240	18.142	---	PASS
		5260	18.062	---	PASS
		5280	18.142	---	PASS
		5320	18.102	---	PASS
		5500	18.062	---	PASS
		5580	18.142	---	PASS
		5700	18.222	---	PASS
		5745	18.182	---	PASS
		5785	18.142	---	PASS
		5825	18.102	---	PASS

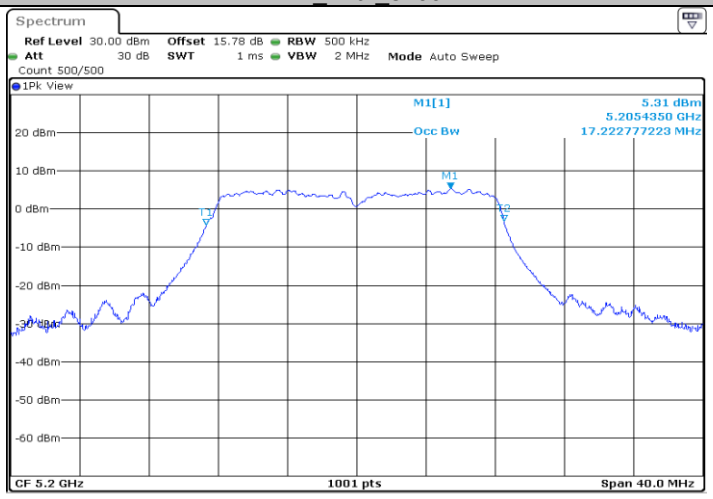
TestMode	Antenna	Channel	OCB [MHz]	Limit[MHz]	Verdict
11AC40SISO	Ant1	5190	36.763	---	PASS
		5230	36.763	---	PASS
		5270	36.683	---	PASS
		5310	36.603	---	PASS
		5510	36.683	---	PASS
		5550	36.603	---	PASS
		5670	36.683	---	PASS
		5755	36.843	---	PASS
		5795	36.763	---	PASS
11AC80SISO	Ant1	5210	75.604	---	PASS
		5290	75.445	---	PASS
		5530	75.764	---	PASS
		5610	75.604	---	PASS
		5775	75.604	---	PASS

Test Graphs

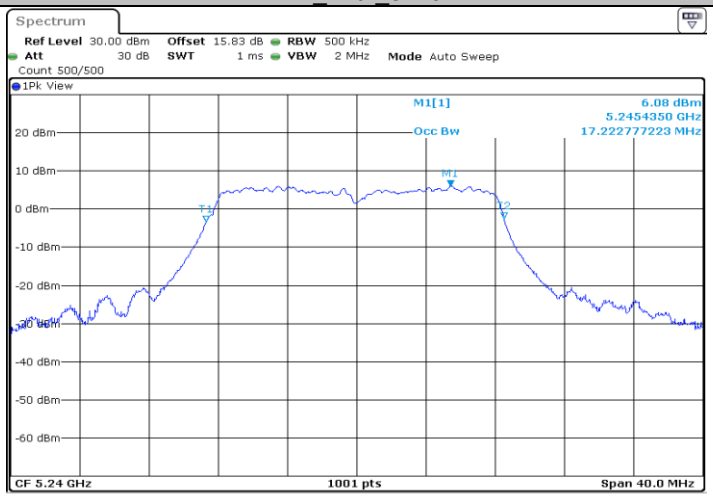
11A_Ant1_5180



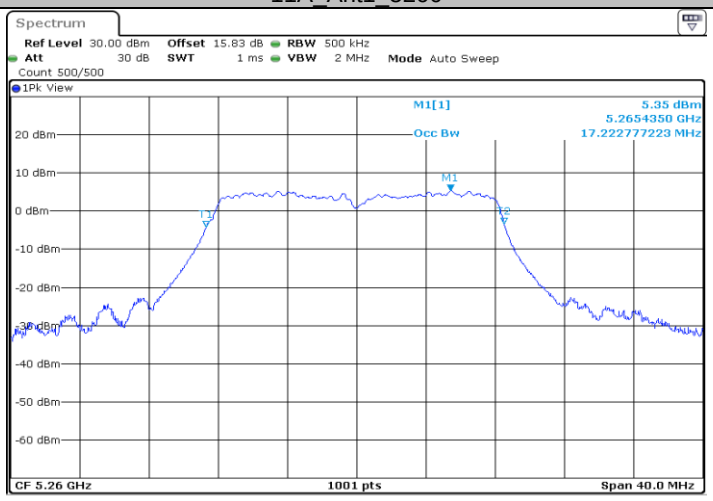
11A_Ant1_5200



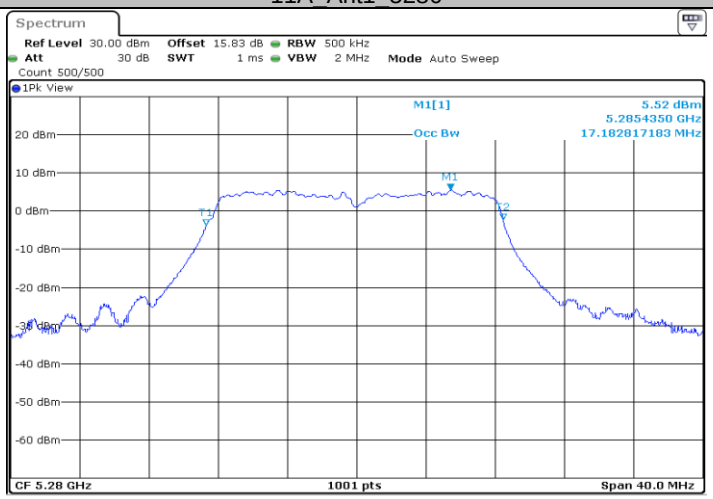
11A_Ant1_5240



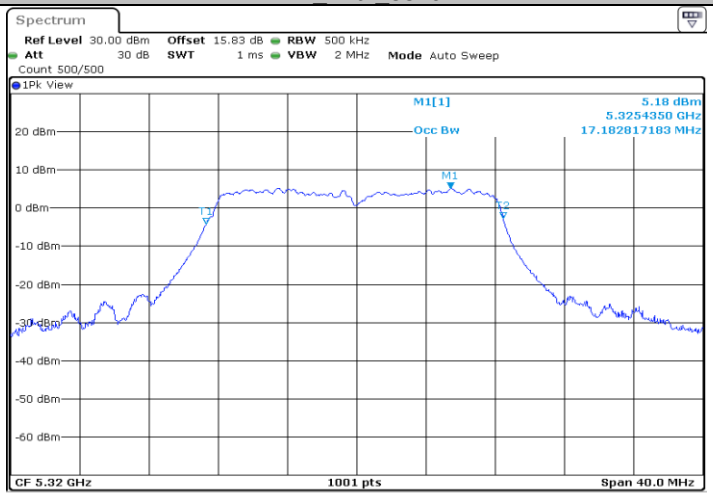
11A_Ant1_5260



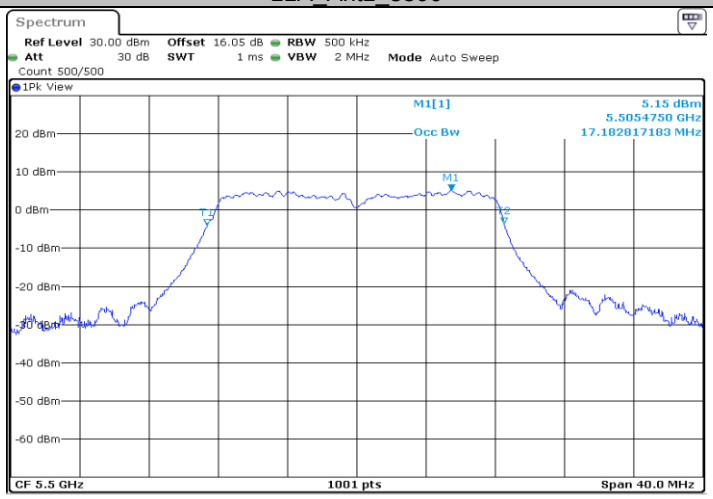
11A_Ant1_5280



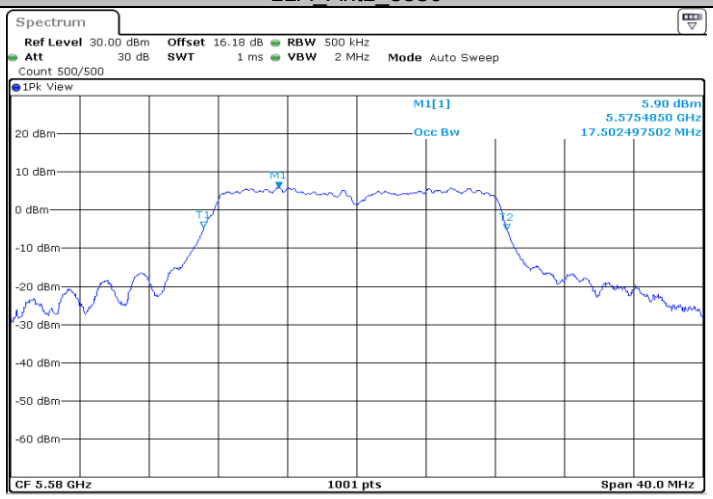
11A_Ant1_5320



11A_Ant1_5500



11A_Ant1_5580



11A_Ant1_5700