FCC TEST REPORT

FCC ID: 2A66L-TBGL2017A

On Behalf of

abone sagl

Android MiniPC Box

Model No.: TBGL2017A

Prepared for	:	abone sagl
Address	:	Via Alla Campagna 4, 6900 Lugano Switzerland

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd.
Address	:	Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

Report Number	:	A2204065-C01-R10
Date of Receipt	:	April 25, 2022
Date of Test	:	April 26, 2022 – May 18, 2022
Date of Report	:	May 28, 2022
Version Number	:	V0

Contents

TEST REPORT DECLARATION

Applicant	:	abone sagl
Address	:	Via Alla Campagna 4, 6900 Lugano Switzerland
Manufacturer	:	Artway Technology International Co., Ltd.
Address	:	621-622, B3 Block, NO.168, Baoyuan Road, Xixiang, Bao'an District, SHENZEN, CHINA
EUT Description	:	Android MiniPC Box
		(A) Model No. : TBGL2017A
		(B) Trademark : N/A

Measurement Standard Used:

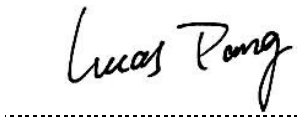
FCC Rules and Regulations Part 15 Subpart E

RSS-247 Issue 2, ANSI C63.4:2014, ANSI C63.10:2013

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart E limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....:	Lucas Pang Project Engineer	
Approved by (name + signature).....:	Simple Guan Project Manager	
Date of issue…… ……..:	May 28, 2022	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	May 28, 2022	Initial released Issue	Lucas Pang

1 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	Section 15.203 Section 7.1.4 RSS-Gen Issue 5	PASS
AC Power Line Conducted Emission	Section 15.207 Section 7.2.4 RSS-GEN(8.8), ANSI C63.10	PASS
Peak Transmit Power	Section 15.407(a), RSS-247 5.4(2)	PASS
Power Spectral Density	Section 15.407(a), RSS-247 5.2(2)	PASS
Undesirable Emission	Section 15.407(b), RSS-247 5.5	PASS
Radiated Emission	Section 15.407(b)&15.209 Section 5.5 RSS-Gen(8.9), RSS-247(5.5), ANSI C63.10	PASS
Band Edge	15.205, RSS-247 Issue 2, ANSI C63.10	PASS
Frequency Stability	15.407(f), RSS-GEN(6.11)	PASS

Remark:1.Pass: The EUT complies with the essential requirements in the standard.

2.Frequency Stability: The manufacturer stated in the user's manual.

3. Decision rules for the conclusion of this test report: decision by actual test data without considering measurement uncertainty.

1.1 Measurement Uncertainty

Item	Uncertainty
Uncertainty for Power point Conducted Emissions Test	1.63dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	3.5dB
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.74dB(Polarize: V)
	3.76dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	3.77dB(Polarize: V)
	3.80dB(Polarize: H)
Uncertainty for radio frequency	5.06×10^{-8}GHz
Uncertainty for conducted RF Power	0.40dB
Uncertainty for temperature	0.2℃
Uncertainty for humidity	1%
Uncertainty for DC and low frequency voltages	0.06%

2 General Information

2.1 General Description of EUT

EUT Name	:	Android MiniPC Box
Trademark	:	N/A
Model No.	:	TBGL2017A
DIFF.	:	N/A
Power supply	:	DC 5V from adapter with AC 120V/60Hz

Radio Technology	**:**	**5G WIFI**
Operation Frequency	:	802.11a/n(HT20)/ac(HT20): 5745~5825MHz 802.11n(HT40)/ac(HT40): 5755~5795MHz 802.11ac(HT80): 5775MHz
Channel separation	:	20MHz for 802.11a/ 802.11ac20/ 802.11n(HT20) 40MHz for 802.11ac40/ 802.11n(HT40) 80MHz for 802.11ac80
Modulation technology:	:	IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Type	:	Internal Antenna, max gain 4.44dBi Antenna information is provided by applicant.

Software version	:	V1.0
Hardware version	:	V1.0
Intend use environment	:	Residential, commercial and light industrial environment

2.2 Test mode

Transmitting mode Keep the EUT in transmitting with modulation.
EUT was test with 99% duty cycle at its maximum power control level.

Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.

2.3 Test Facility

Shenzhen Alpha Product Testing Co., Ltd
Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

June 21, 2018 File on Federal Communication Commission
Registration Number: 293961

July 25, 2017 Certificated by IC
Registration Number: CN0085

2.4 Description of Support Units

Accessories	:	AC Adapter
Manufacturer	:	TEKA
Model	:	TEKA012-05020000EU
Ratings	:	Input: 100-240V~50/60Hz 0.35A MAX Output: 5.0V⎓2.0A 10.0W

2.5 Deviation from Standards

None.

2.6 Abnormalities from Standard Conditions

None.

2.7 Other Information Requested by the Customer

None.

2.8 Additional instructions

Software (Used for test) from client

Channel	Power level
Lowest	Default
Middle	Default
Highest	Default

3 Test Instruments list

Equipment	Manufacture	Model No.	Firmware version	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	CHENYU	9*6*6	N/A	N/A	2020.09.02	3Year
Spectrum analyzer	ROHDE&SCHWARZ	FSV40-N	2.3	102137	2021.08.25	1Year
Spectrum analyzer	Agilent	N9020A	A.14.16	MY499100060	2021.08.25	1Year
Receiver	ROHDE&SCHWARZ	ESR	2.28 SP1	1316.3003K03-102082-Wa	2021.08.25	1Year
Receiver	R&S	ESCI	4.42 SP1	101165	2021.08.25	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	N/A	VULB 9168#627	2021.08.30	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	N/A	2106	2021.08.30	2Year
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	N/A	00059	2021.08.30	2Year
RF Cable	Resenberger	Cable 1	N/A	RE1	2021.08.25	1Year
RF Cable	Resenberger	Cable 2	N/A	RE2	2021.08.25	1Year
RF Cable	Resenberger	Cable 3	N/A	CE1	2021.08.25	1Year
Pre-amplifier	HP	HP8347A	N/A	2834A00455	2021.08.25	1Year
Pre-amplifier	Agilent	8449B	N/A	3008A02664	2021.08.25	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	N/A	8126-466	2021.08.25	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	N/A	101043	2021.08.25	1 Year
Horn Antenna	SCHWARZBECK	BBHA9170	N/A	00946	2021.08.30	2 Year
Preamplifier	SKET	LNPA_1840-50	N/A	SK2018101801	2021.08.25	1 Year
Power Meter	Agilent	E9300A	N/A	MY41496628	2021.08.25	1 Year
Power Sensor	DARE	RPR3006W	N/A	15100041SNO91	2021.08.25	1 Year
Temp. & Humid. Chamber	Weihuang	WHTH-1000-40-880	N/A	100631	2022.04.22	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	N/A	20140927-6	2021.08.25	1 Year
Adjustable attenuator	MWRFtest	N/A	N/A	N/A	N/A	N/A
10dB Attenuator	Mini-Circuits	DC-6G	N/A	N/A	N/A	N/A

Software Information			
Test Item	Software Name	Manufacturer	Version
RE	EZ-EMC	farad	Alpha-3A1
CE	EZ-EMC	farad	Alpha-3A1
RF-CE	MTS 8310	MWRFtest	2.0.0.0

4 Test results and Measurement Data

4.1 Antenna requirement:

Standard requirement:	FCC Part15 C Section 15.203

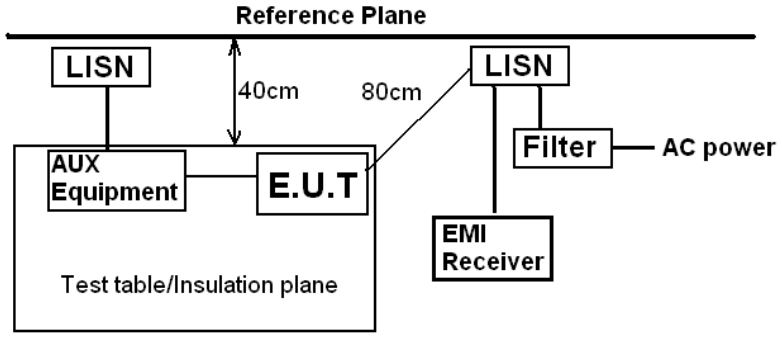
15.203 requirement:

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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

E.U.T Antenna:	

The antenna is internal antenna. The best case gain of the antenna is 4.44dBi for 5.725~5.85GHz

4.2 Conducted Emissions

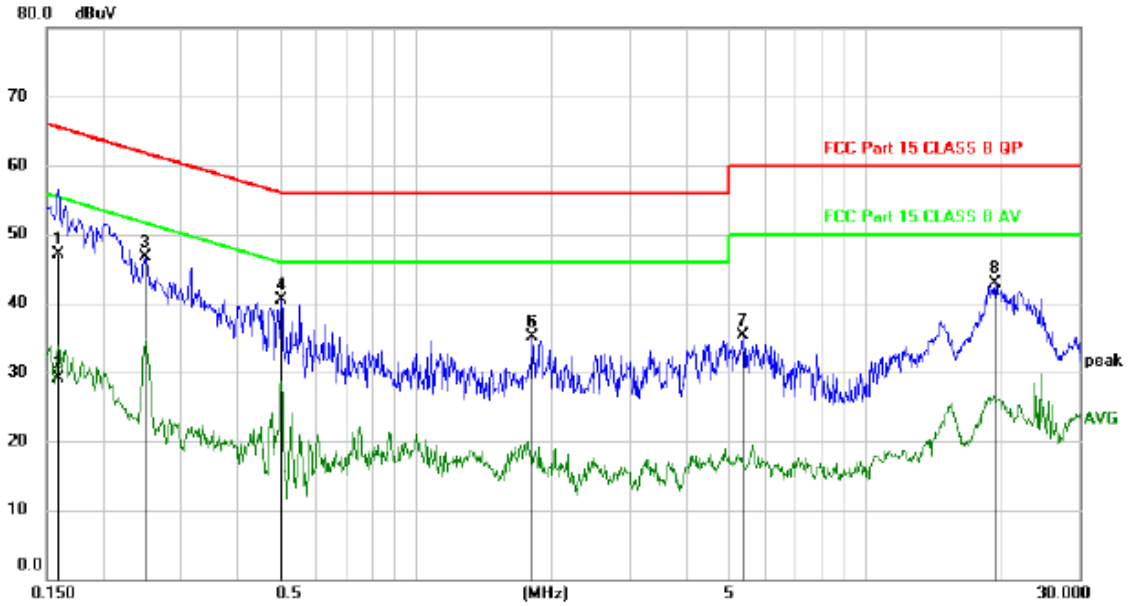
<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.207</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>150KHz to 30MHz</td></tr>
<tr><td>Class / Severity:</td><td>Class B</td></tr>
<tr><td>Receiver setup:</td><td>RBW=9KHz, VBW=30KHz</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr>
<tr><th>Quasi-peak</th><th>Average</th></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
* Decreases with the logarithm of the frequency.
</td></tr>
<tr><td>Test procedure</td><td>The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.</td></tr>
<tr><td>Test setup:</td><td> 

Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 5.10 for details</td></tr>
<tr><td>Test mode:</td><td>Refer to section 5.3 for details</td></tr>
<tr><td>Test results:</td><td>Pass</td></tr>
</table>

Measurement Data

An initial pre-scan was performed on the line and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Line:

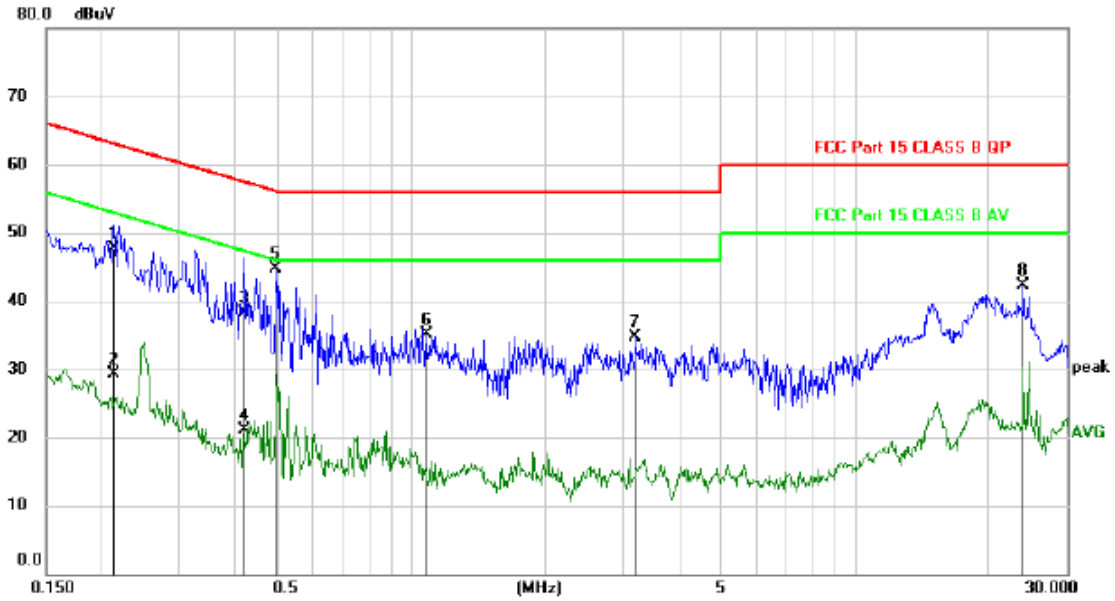


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1590	37.20	9.94	47.14	65.52	-18.38	QP	
2		0.1590	19.24	9.94	29.18	55.52	-26.34	AVG	
3	*	0.2489	36.77	9.97	46.74	61.79	-15.05	peak	
4		0.5010	30.62	9.96	40.58	56.00	-15.42	peak	
5		1.8119	25.18	9.89	35.07	56.00	-20.93	peak	
6		1.8119	25.18	9.89	35.07	56.00	-20.93	peak	
7		5.3609	25.33	10.05	35.38	60.00	-24.62	peak	
8		19.5270	32.54	10.46	43.00	60.00	-17.00	peak	

*:Maximum data x:Over limit !:over margin (Reference Only

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Neutral:



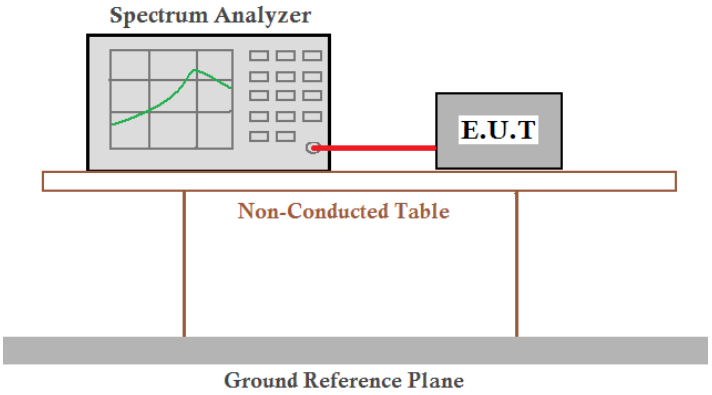
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2130	37.86	9.93	47.79	63.09	-15.30	QP	
2		0.2130	19.36	9.93	29.29	53.09	-23.80	AVG	
3		0.4200	28.46	9.94	38.40	57.45	-19.05	QP	
4		0.4200	11.18	9.94	21.12	47.45	-26.33	AVG	
5	*	0.4950	34.65	9.96	44.61	56.08	-11.47	peak	
6		1.0769	25.14	9.91	35.05	56.00	-20.95	peak	
7		3.2039	24.82	9.96	34.78	56.00	-21.22	peak	
8		24.0000	31.85	10.45	42.30	60.00	-17.70	peak	

*:Maximum data x:Over limit !:over margin (Reference Only

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Note: All modes and channels have been tested and only the A 5745MHz mode with the worst data is listed.

4.3 Emission Bandwidth and 99% Occupied Bandwidth

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General UNII Test Procedures New Rules v02r01
Limit:	N/A
Test setup:	
Test procedure:	According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

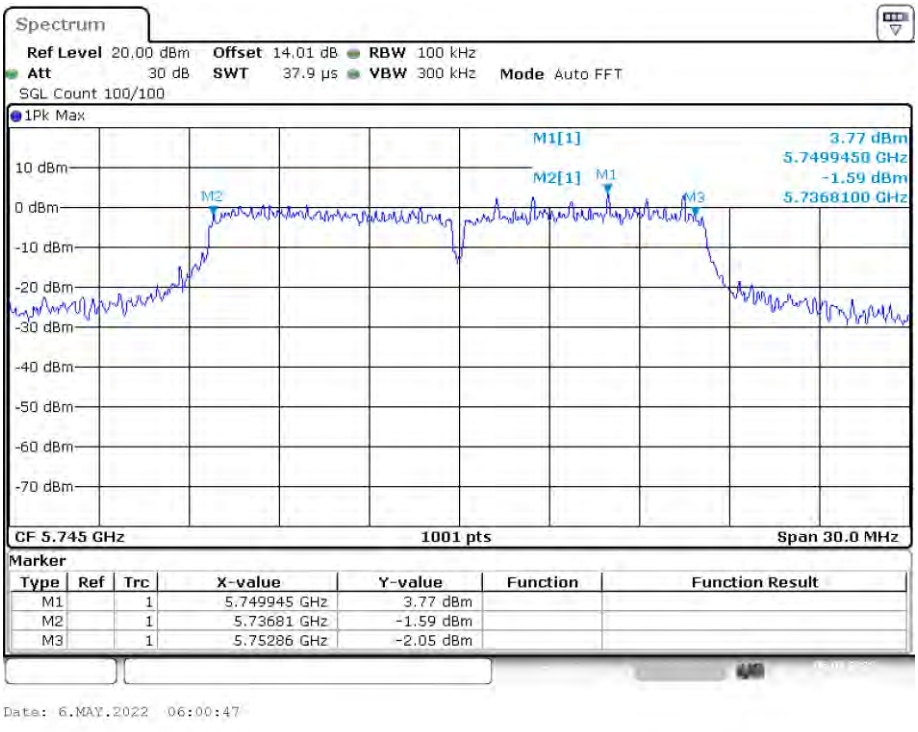
Measurement Data:

Band 4 (5725-5850 MHz):

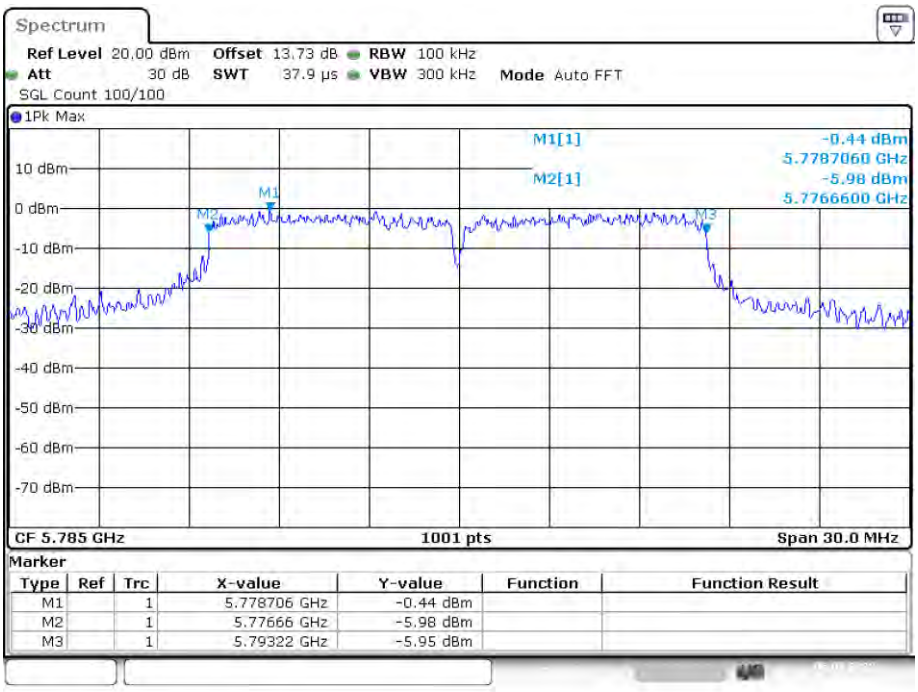
-6dB Bandwidth

Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
a	5745	Ant1	16.05	0.5	Pass
a	5785	Ant1	16.56	0.5	Pass
a	5825	Ant1	16.53	0.5	Pass
ac20	5745	Ant1	17.64	0.5	Pass
ac20	5785	Ant1	17.67	0.5	Pass
ac20	5825	Ant1	17.7	0.5	Pass
ac40	5755	Ant1	34.92	0.5	Pass
ac40	5795	Ant1	35.34	0.5	Pass
ac80	5775	Ant1	72.72	0.5	Pass
n20	5745	Ant1	17.58	0.5	Pass
n20	5785	Ant1	17.73	0.5	Pass
n20	5825	Ant1	16.44	0.5	Pass
n40	5755	Ant1	35.46	0.5	Pass
n40	5795	Ant1	33.84	0.5	Pass

-6dB Bandwidth NVNT a 5745MHz Ant1



-6dB Bandwidth NVNT a 5785MHz Ant1



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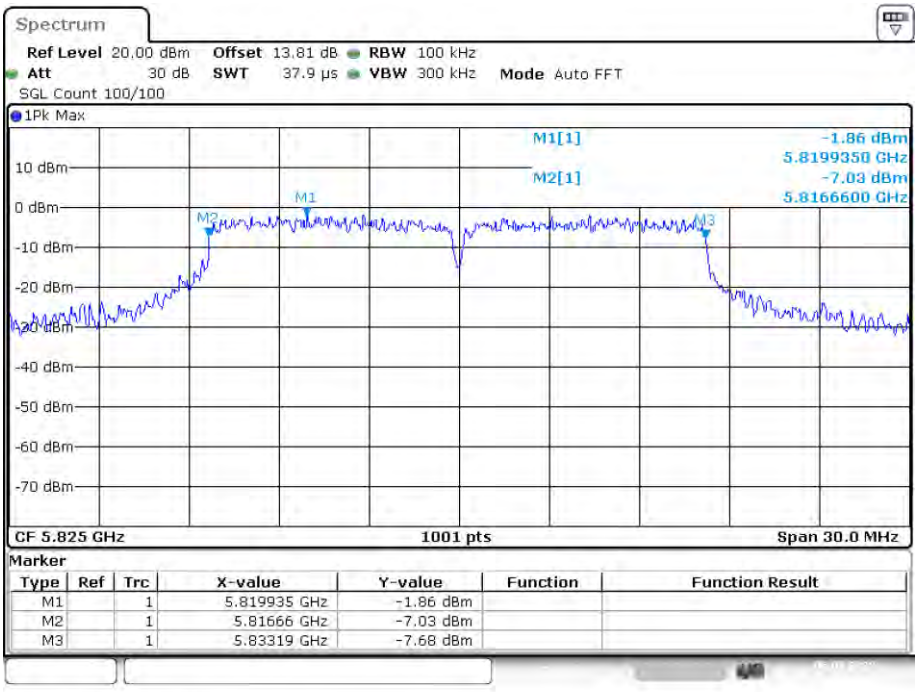

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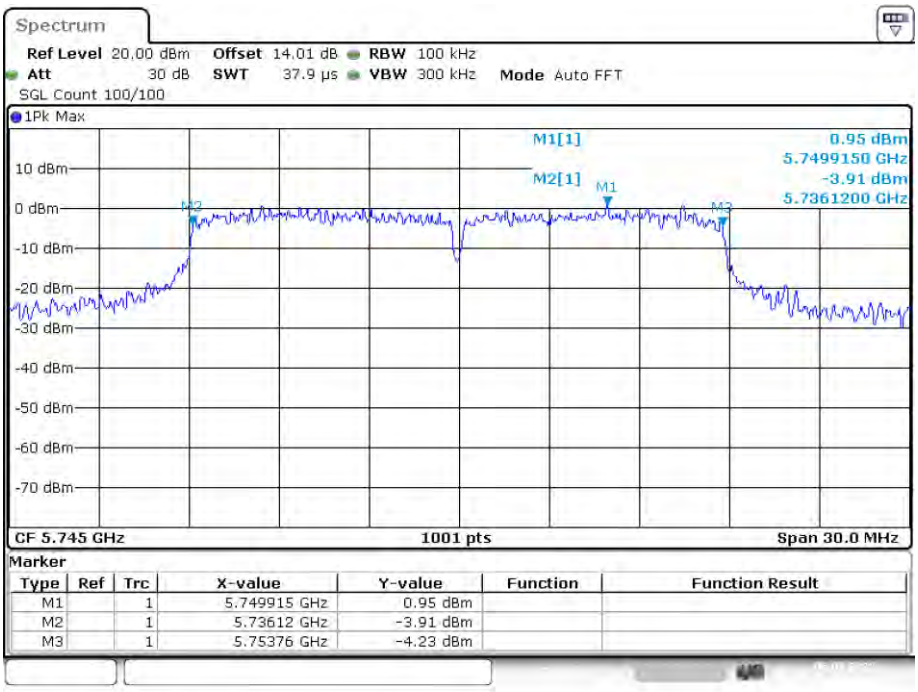
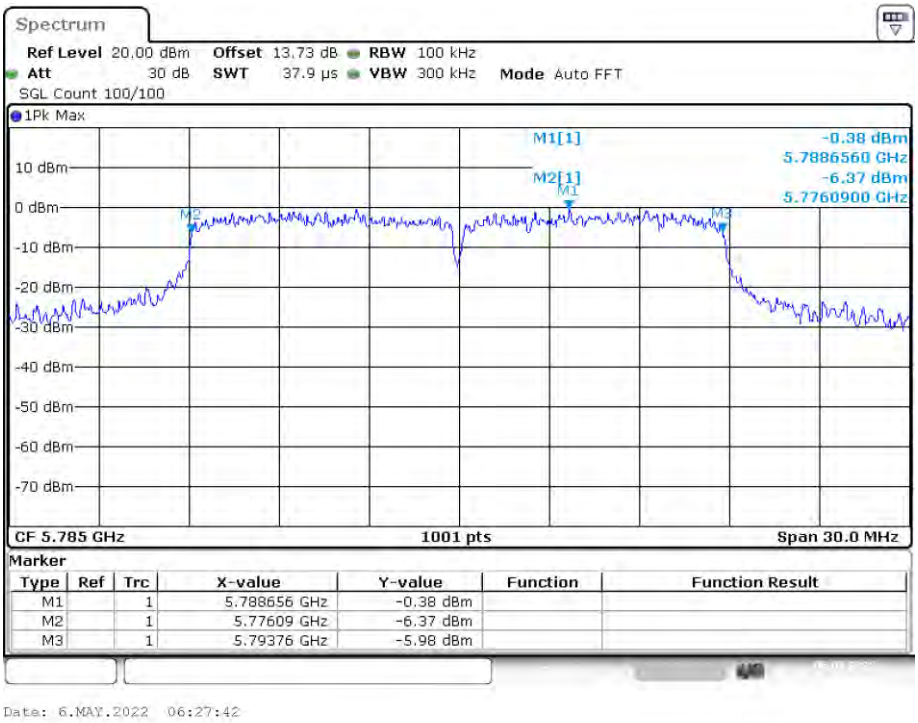
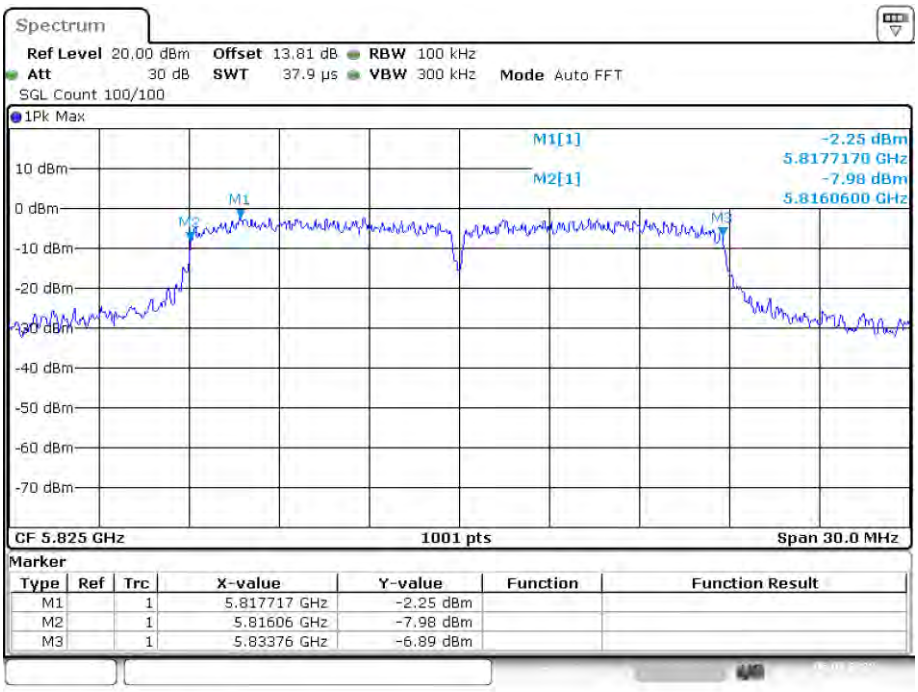
-6dB Bandwidth NVNT ac20 5745MHz Ant1



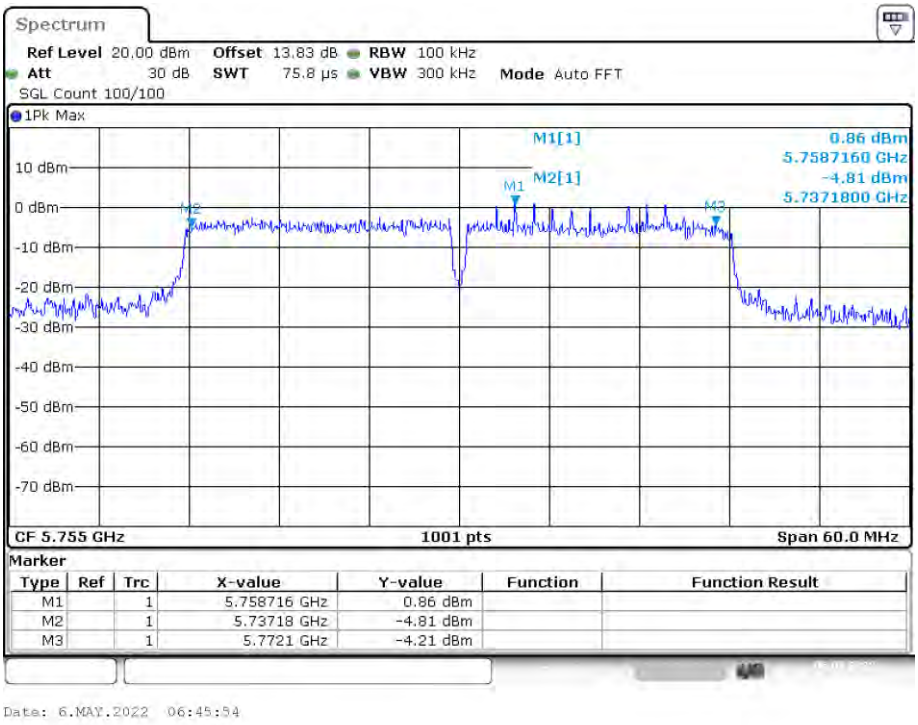
-6dB Bandwidth NVNT ac20 5785MHz Ant1



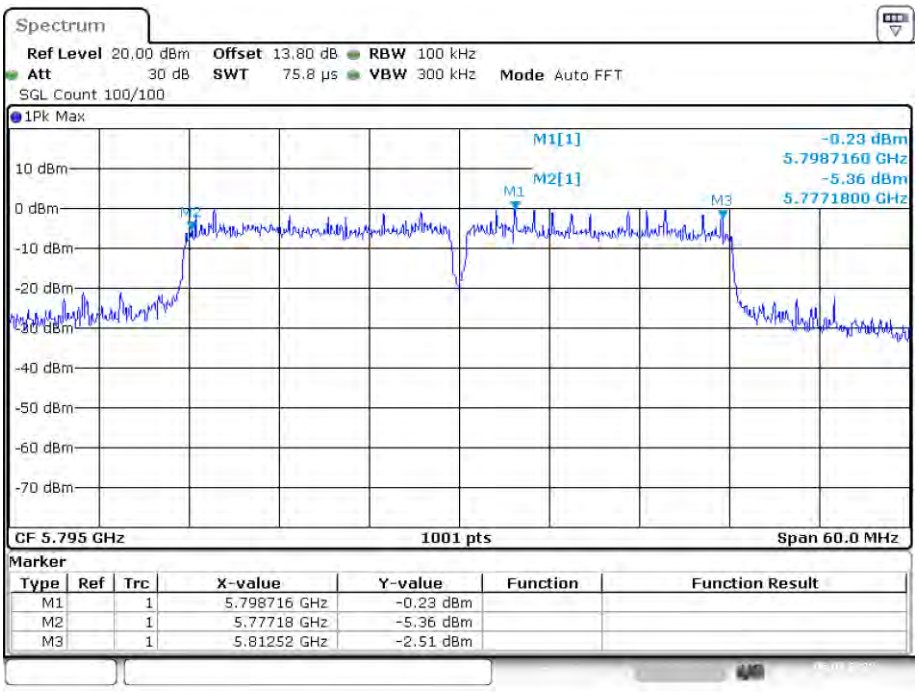
-6dB Bandwidth NVNT ac20 5825MHz Ant1



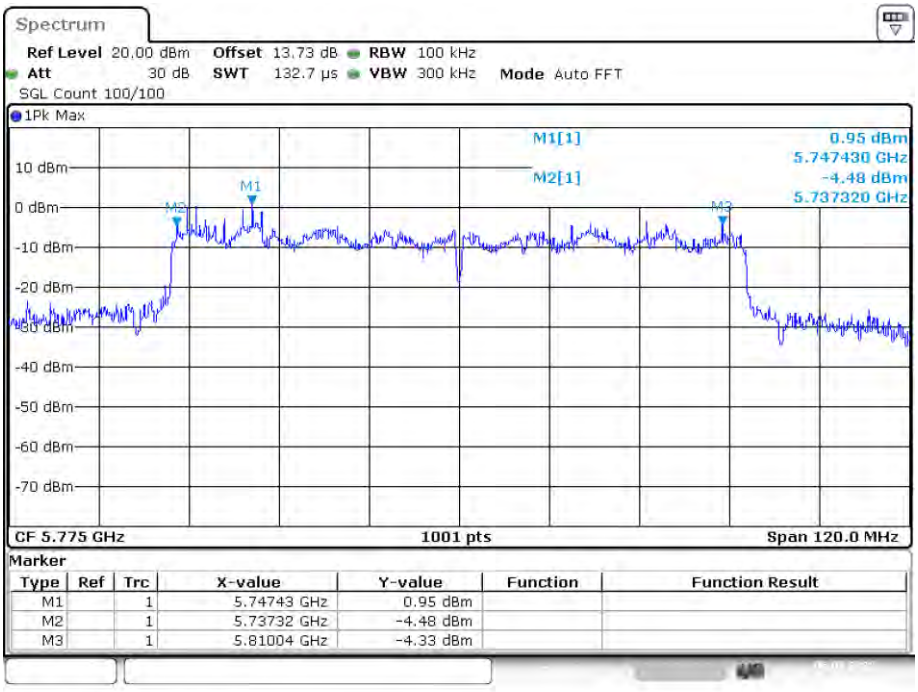
-6dB Bandwidth NVNT ac40 5755MHz Ant1



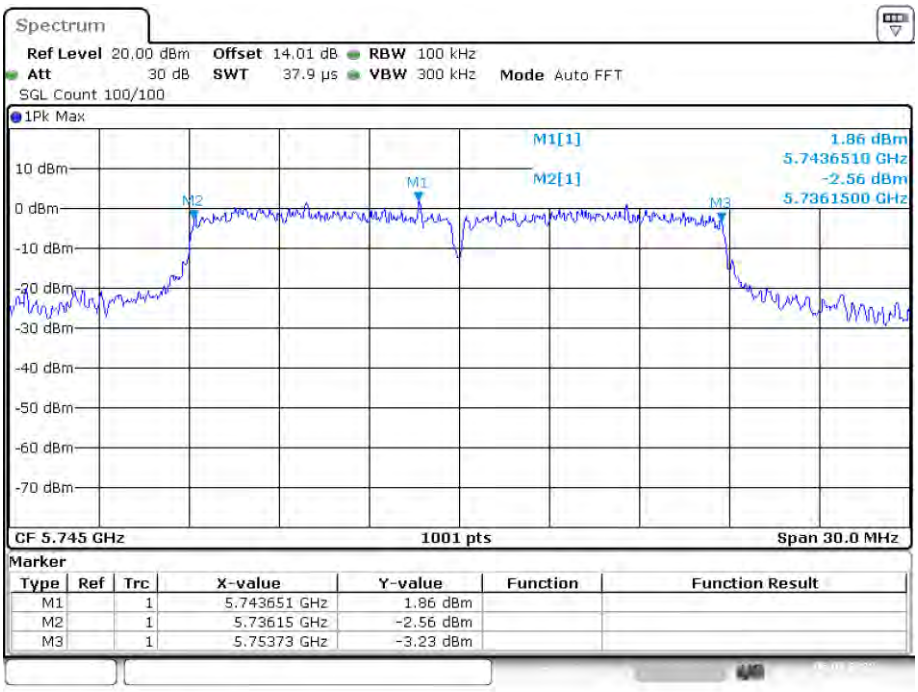
-6dB Bandwidth NVNT ac40 5795MHz Ant1



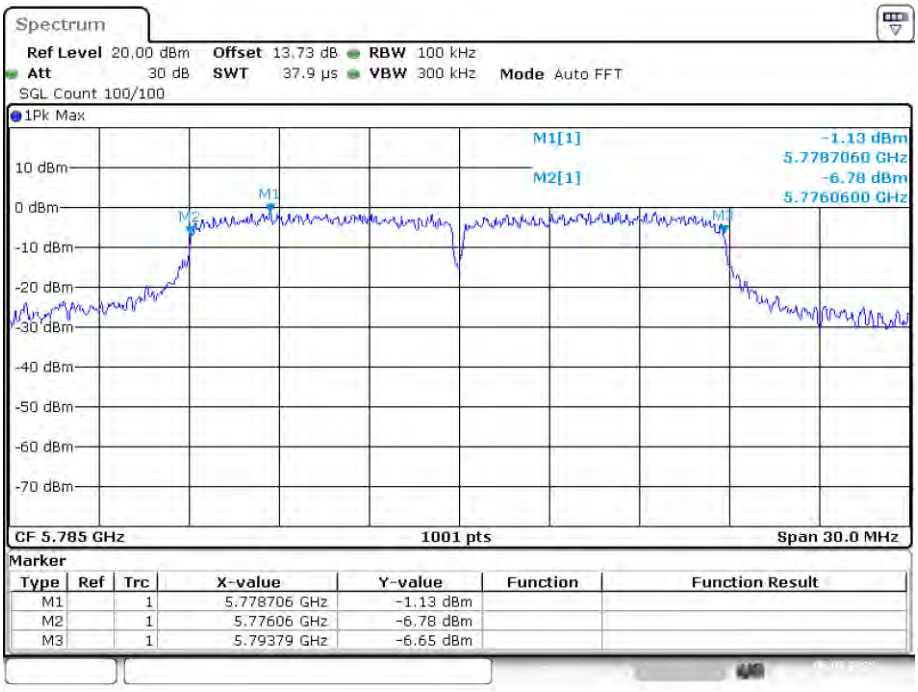
-6dB Bandwidth NVNT ac80 5775MHz Ant1



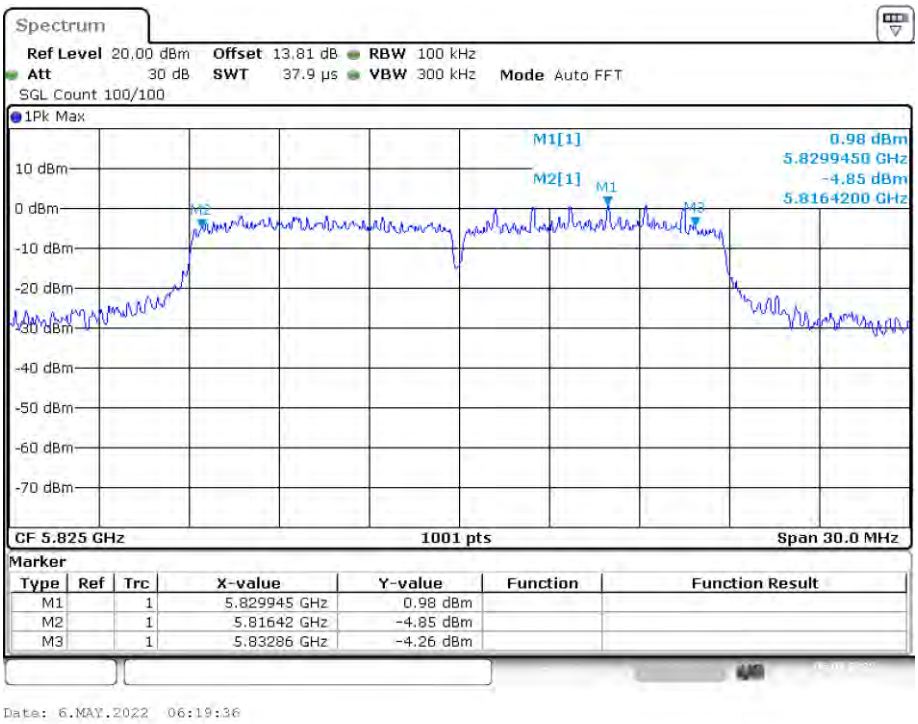
-6dB Bandwidth NVNT n20 5745MHz Ant1



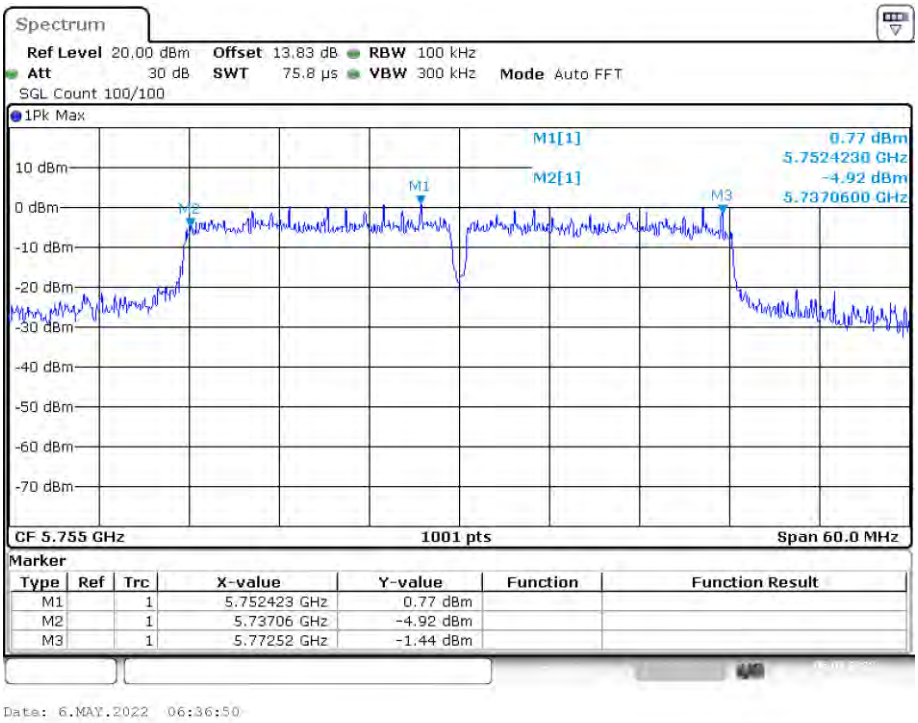
-6dB Bandwidth NVNT n20 5785MHz Ant1



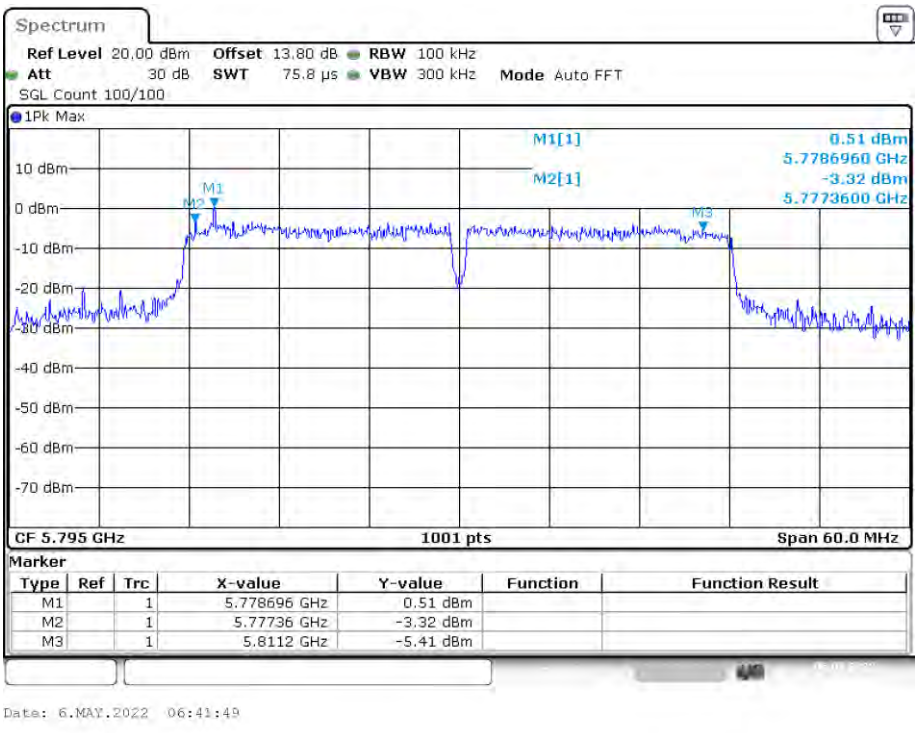
-6dB Bandwidth NVNT n20 5825MHz Ant1



-6dB Bandwidth NVNT n40 5755MHz Ant1



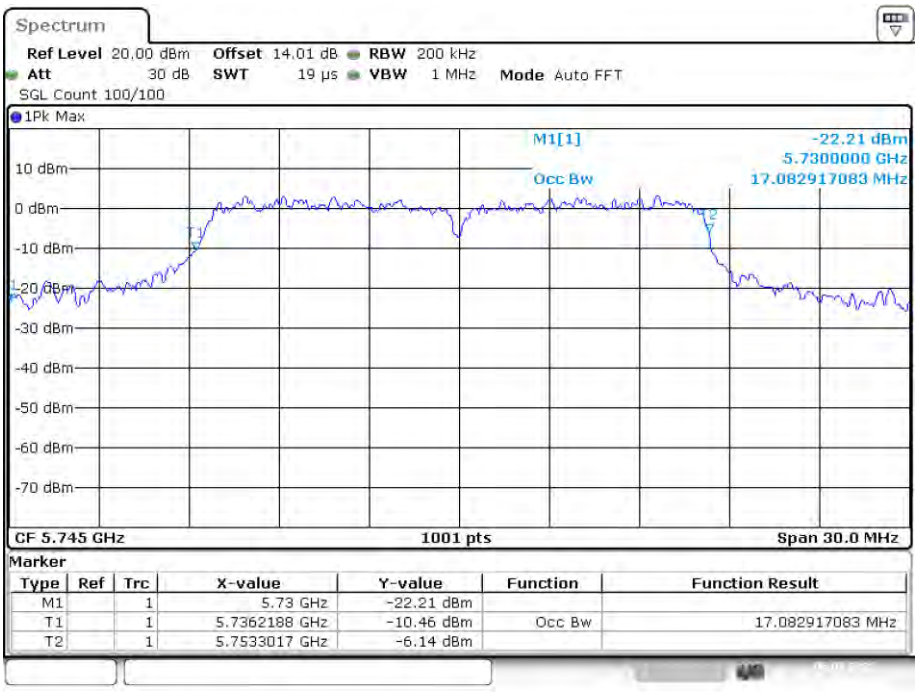
-6dB Bandwidth NVNT n40 5795MHz Ant1



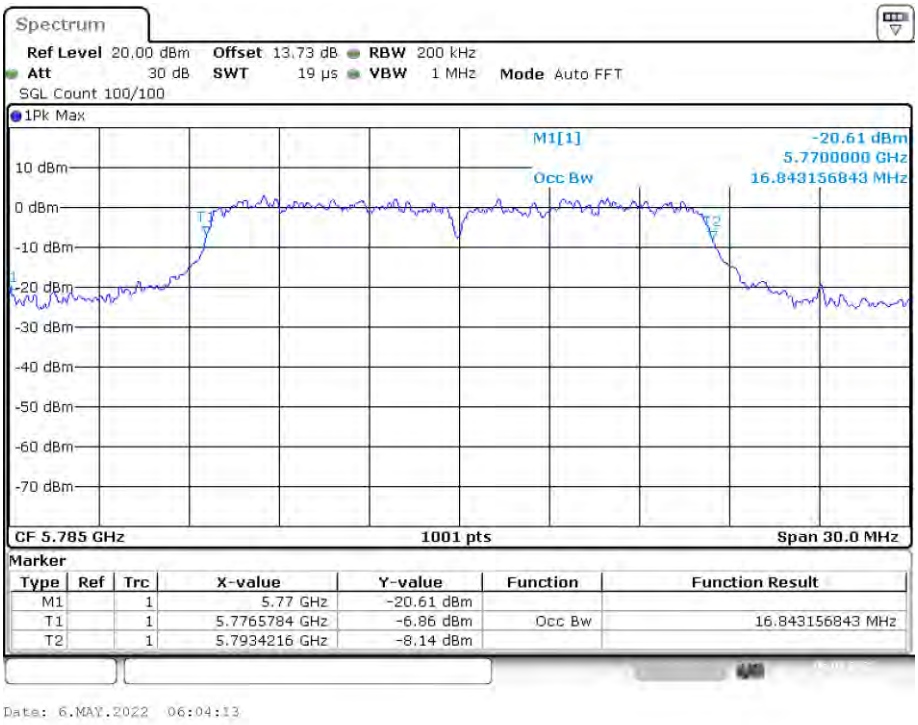
Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	a	5745	Ant1	17.083
NVNT	a	5785	Ant1	16.843
NVNT	a	5825	Ant1	16.933
NVNT	ac20	5745	Ant1	17.982
NVNT	ac20	5785	Ant1	17.772
NVNT	ac20	5825	Ant1	17.772
NVNT	ac40	5755	Ant1	36.563
NVNT	ac40	5795	Ant1	36.503
NVNT	ac80	5775	Ant1	76.244
NVNT	n20	5745	Ant1	17.832
NVNT	n20	5785	Ant1	17.832
NVNT	n20	5825	Ant1	17.862
NVNT	n40	5755	Ant1	36.563
NVNT	n40	5795	Ant1	36.384

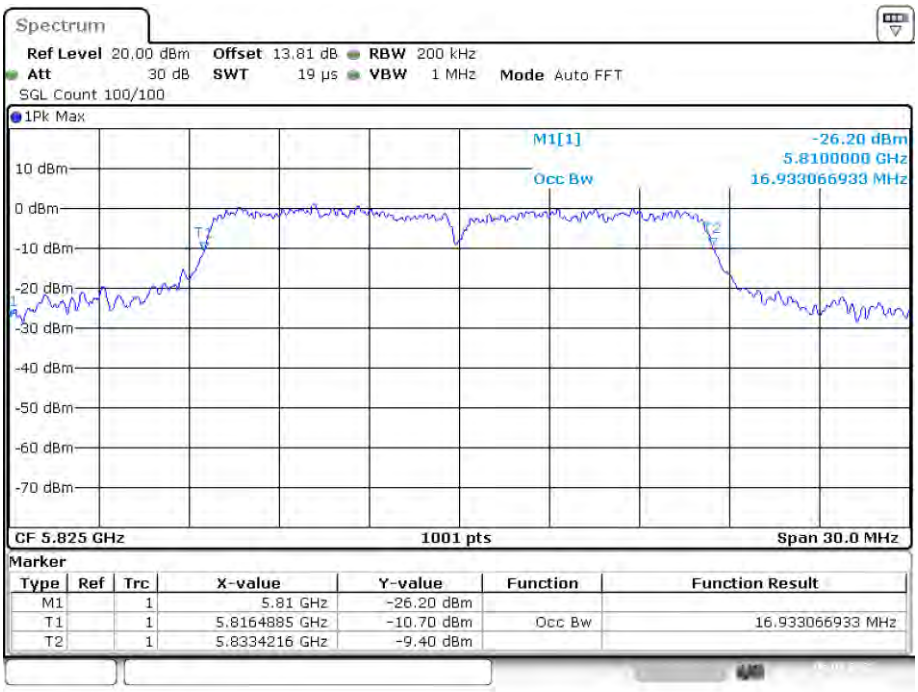
OBW NVNT a 5745MHz Ant1



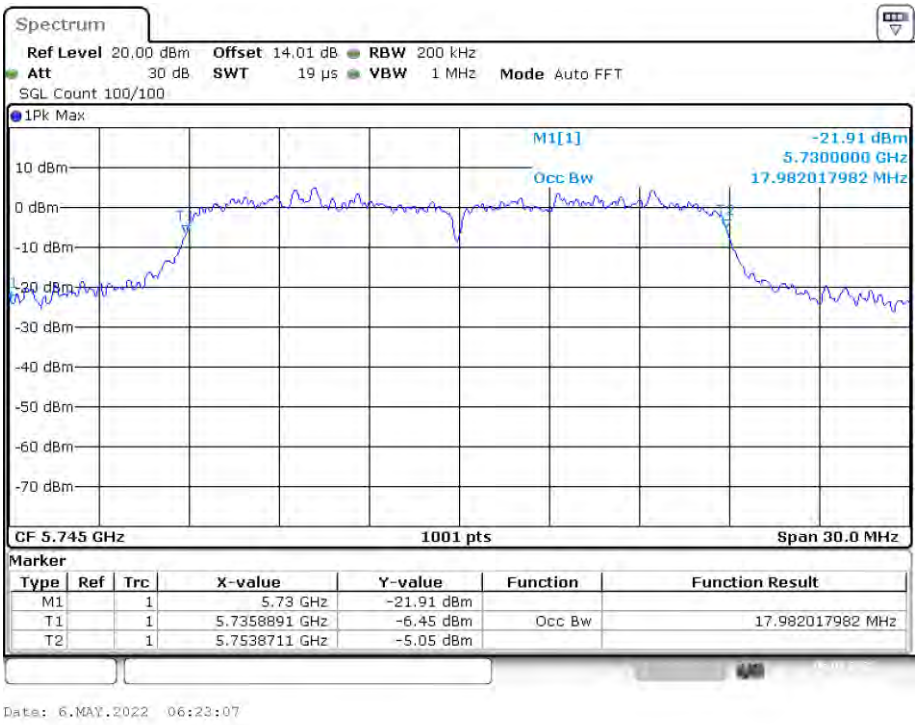
OBW NVNT a 5785MHz Ant1



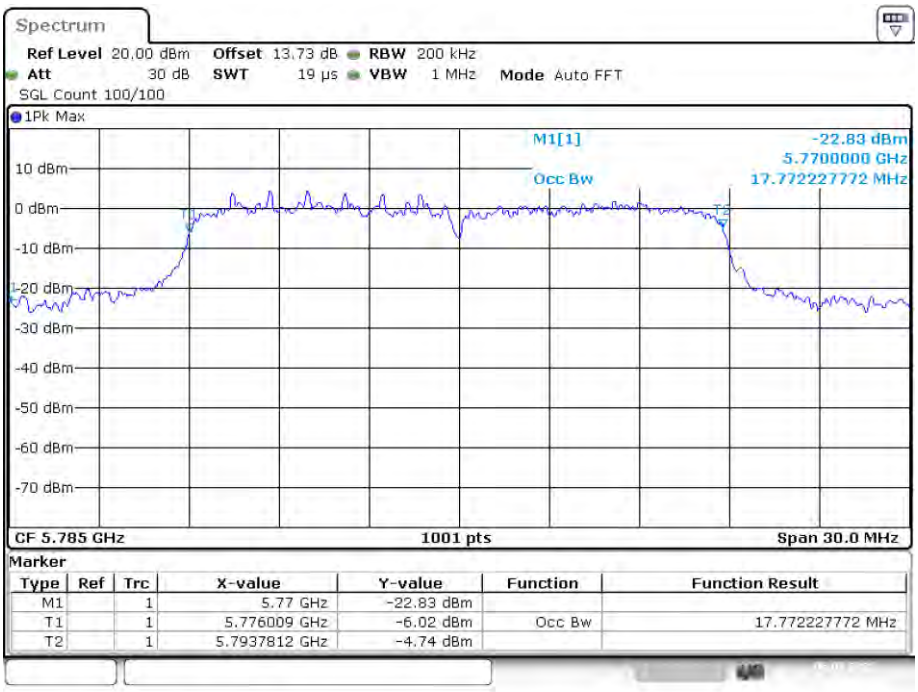
OBW NVNT a 5825MHz Ant1



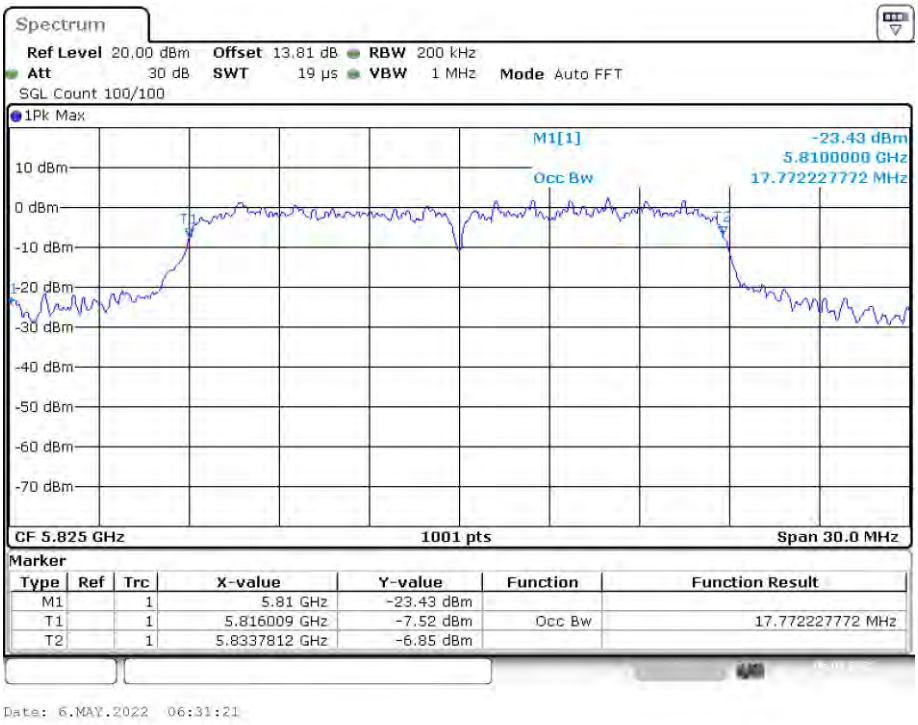
OBW NVNT ac20 5745MHz Ant1



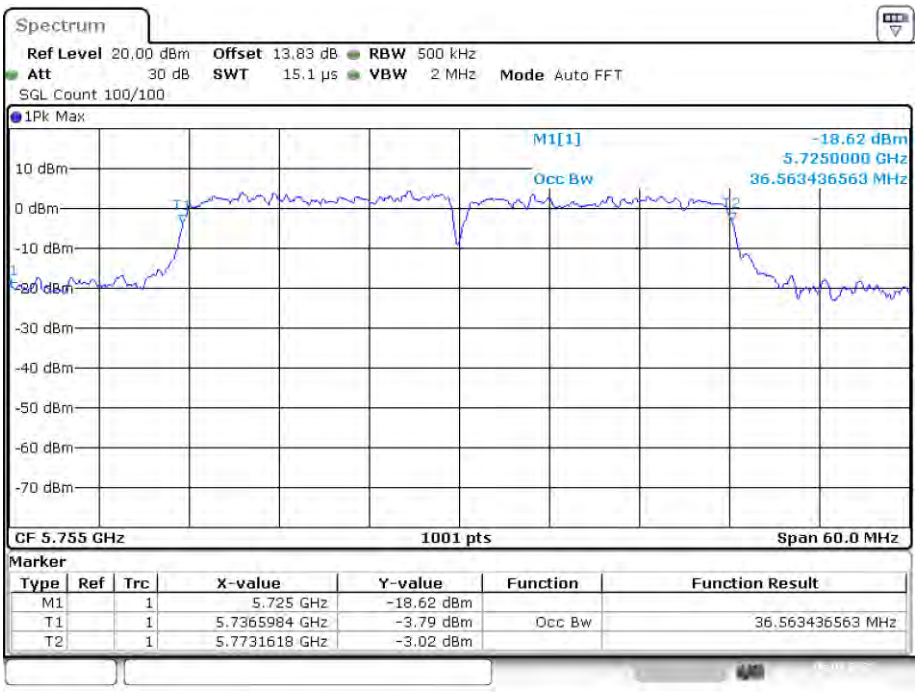
OBW NVNT ac20 5785MHz Ant1



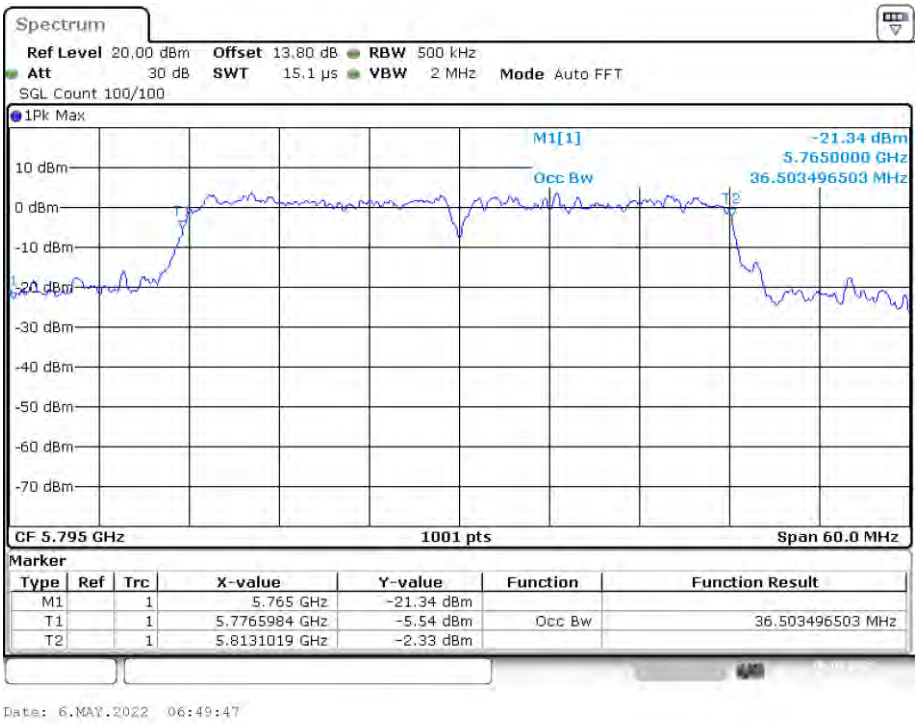
OBW NVNT ac20 5825MHz Ant1



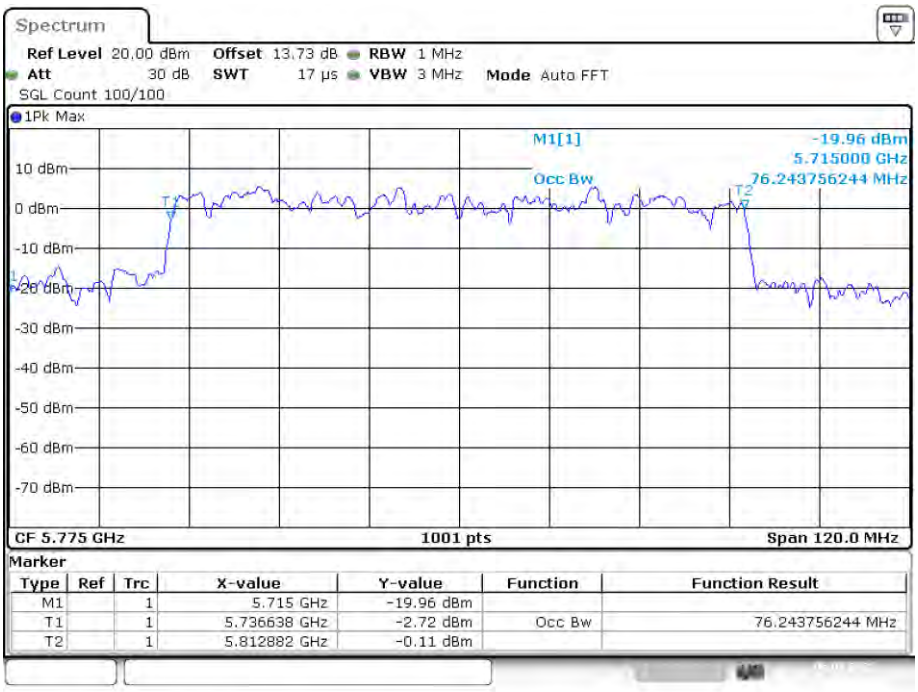
OBW NVNT ac40 5755MHz Ant1



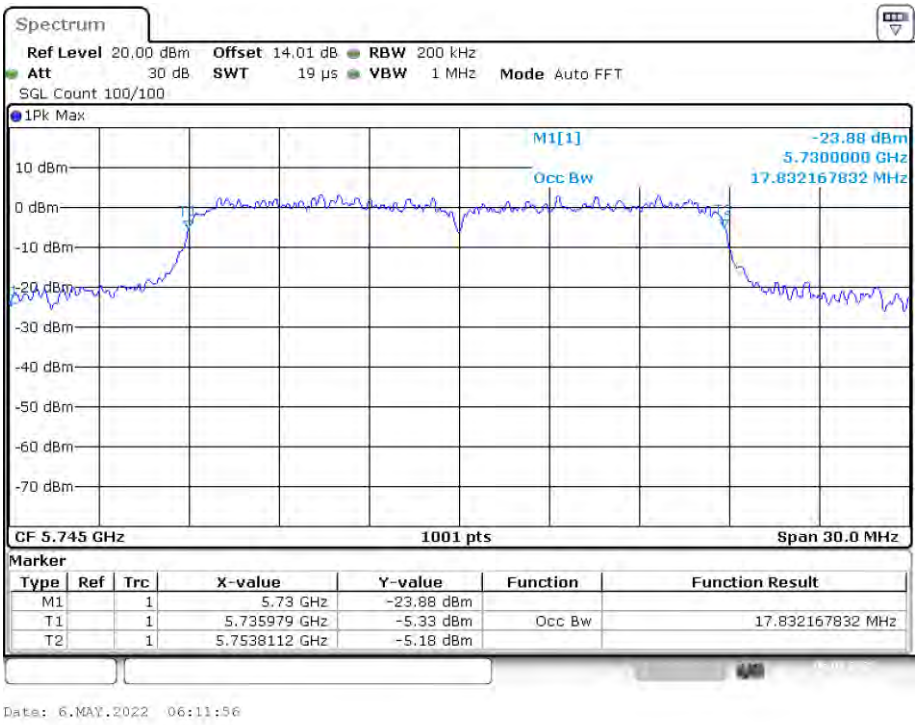
OBW NVNT ac40 5795MHz Ant1



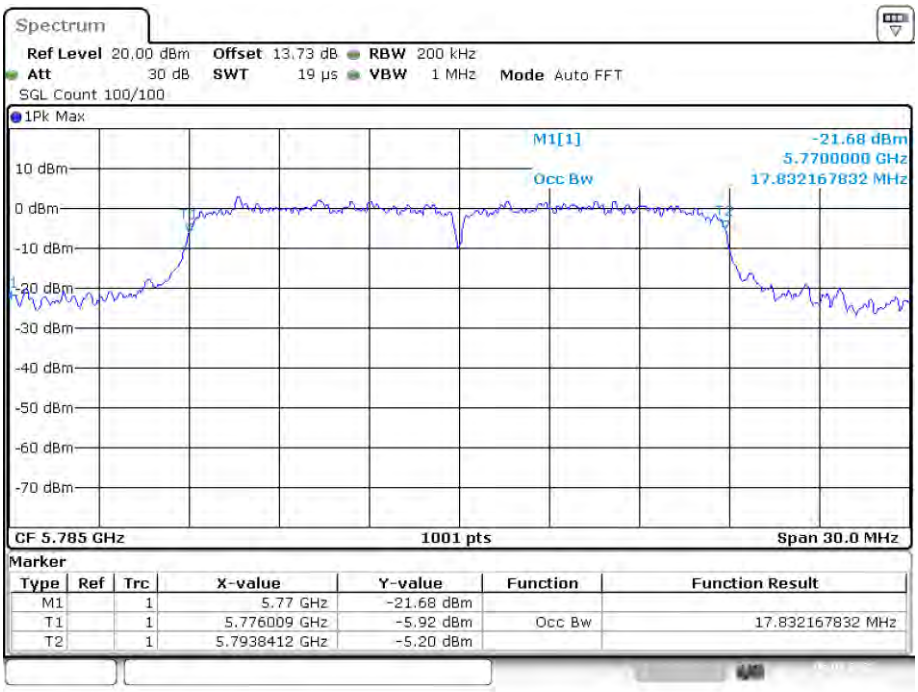
OBW NVNT ac80 5775MHz Ant1



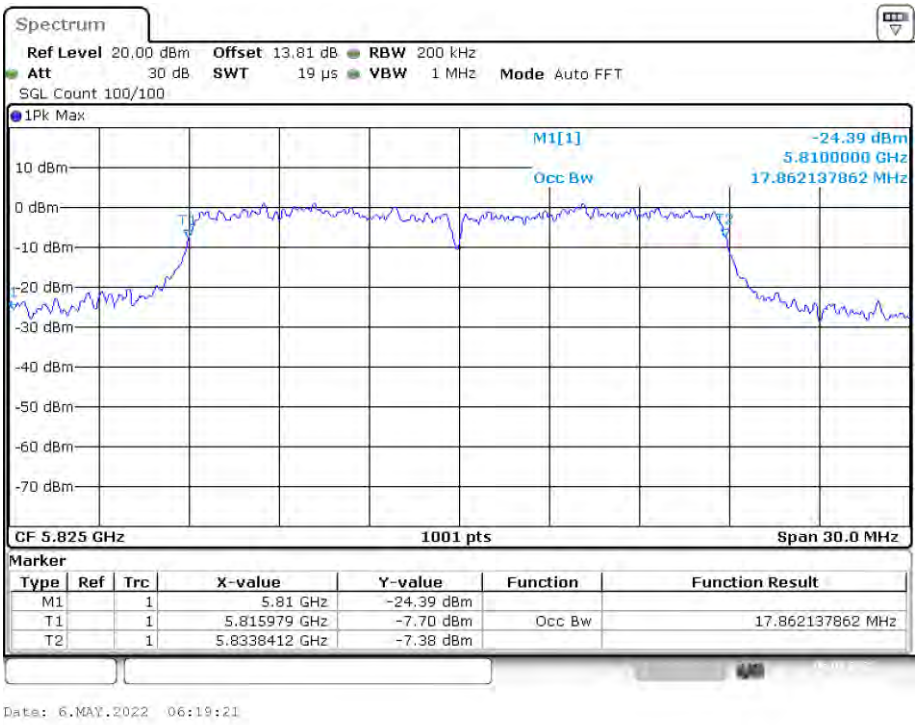
OBW NVNT n20 5745MHz Ant1



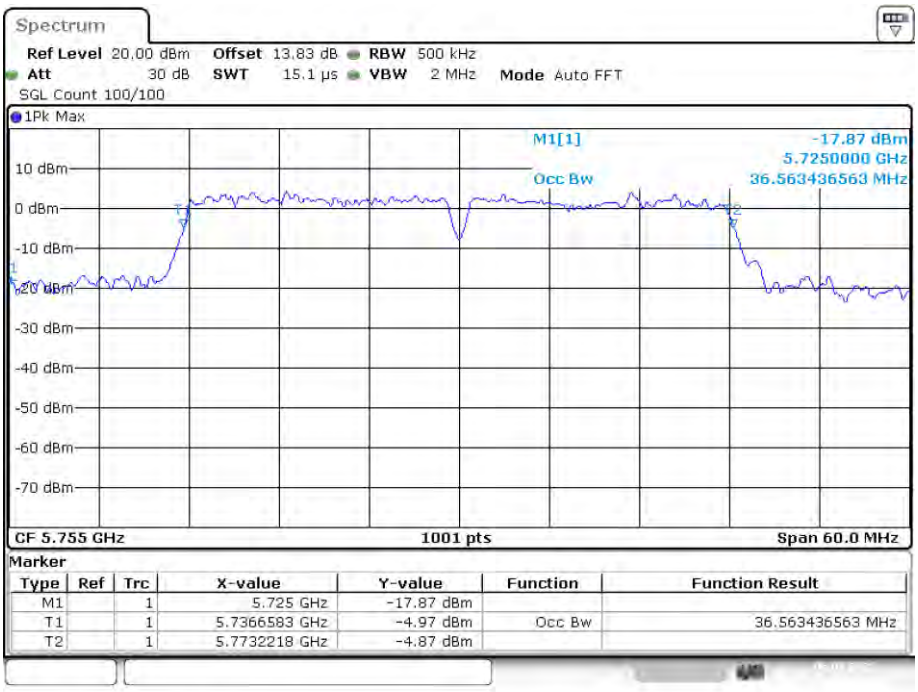
OBW NVNT n20 5785MHz Ant1



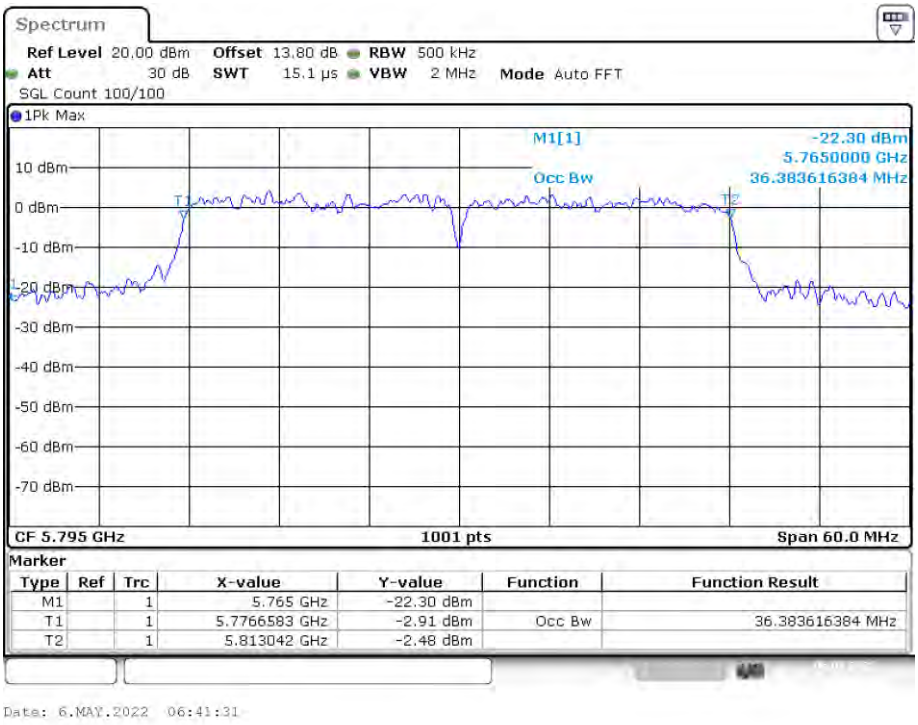
OBW NVNT n20 5825MHz Ant1



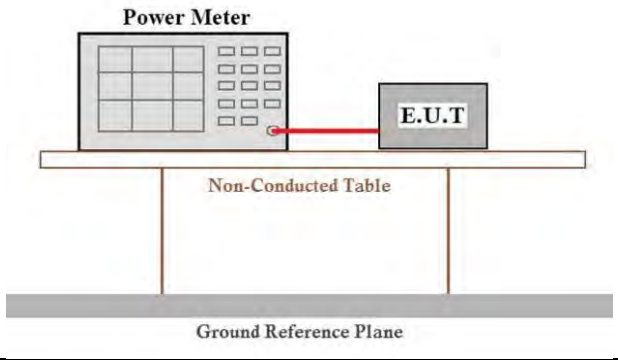
OBW NVNT n40 5755MHz Ant1



OBW NVNT n40 5795MHz Ant1



4.4 Peak Transmit Power

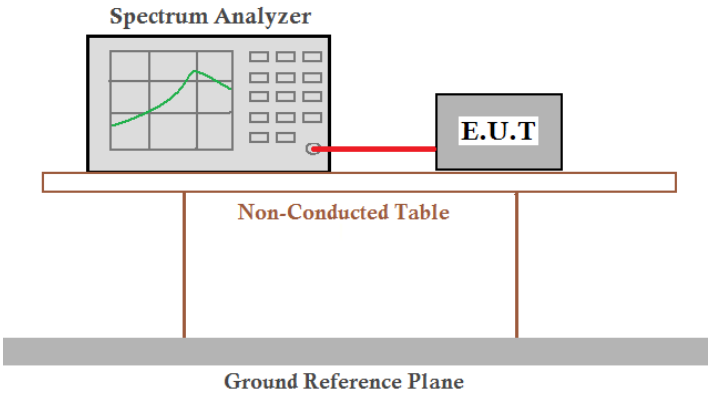
Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General UNII Test Procedures New Rules v02r01
Limit:	For the band 5.15-5.25GHz, 5.25-5.35GHz, 5.47-5.725GHz, the maximum conducted output power over the frequency bands of operation shall not exceed 250mW. For the band 5.725-5.85GHz, the maximum conducted output power over the frequency bands of operation shall not exceed 1W.
Test setup:	
Test procedure:	**Measurement using an RF average power meter** (i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied a) The EUT is configured to transmit continuously or to transmit with a constant duty cycle. b) At all times when the EUT is transmitting, it must be transmitting at its maximum power control level. c) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five. (ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section B). (iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter. (iv) Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10log(1/0.25) if the duty cycle is 25 percent).
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

Band 4 (5725 - 5850)

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	a	5745	Ant1	14.876	0	14.876	30	Pass
NVNT	a	5785	Ant1	13.975	0	13.975	30	Pass
NVNT	a	5825	Ant1	12.72	0	12.720	30	Pass
NVNT	ac20	5745	Ant1	15.185	0	15.185	30	Pass
NVNT	ac20	5785	Ant1	14.041	0	14.041	30	Pass
NVNT	ac20	5825	Ant1	12.795	0	12.795	30	Pass
NVNT	ac40	5755	Ant1	15.405	0	15.405	30	Pass
NVNT	ac40	5795	Ant1	14.541	0	14.541	30	Pass
NVNT	ac80	5775	Ant1	15.551	0	**15.551**	30	Pass
NVNT	n20	5745	Ant1	15.122	0	15.122	30	Pass
NVNT	n20	5785	Ant1	14.053	0	14.053	30	Pass
NVNT	n20	5825	Ant1	12.83	0	12.830	30	Pass
NVNT	n40	5755	Ant1	15.331	0	15.331	30	Pass
NVNT	n40	5795	Ant1	14.565	0	14.565	30	Pass

4.5 Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General UNII Test Procedures New Rules v02r01
Limit:	≤11.00dBm/MHz for 5150MHz-5250MHz, 5250-5350MHz and 5470-5725 MHz ≤30.00dBm/500KHz for 5725MHz-5850MHz
Test setup:	
Test procedure:	1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power…”. 2) Use the peak search function on the instrument to find the peak of the spectrum. 3) Make the following adjustments to the peak value of the spectrum, if applicable: a) If Method SA-2 or SA-2 Alternative was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum. b) If Method SA-3 Alternative was used and the linear mode was used in step E)2)g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging. 4) The result is the PSD.
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

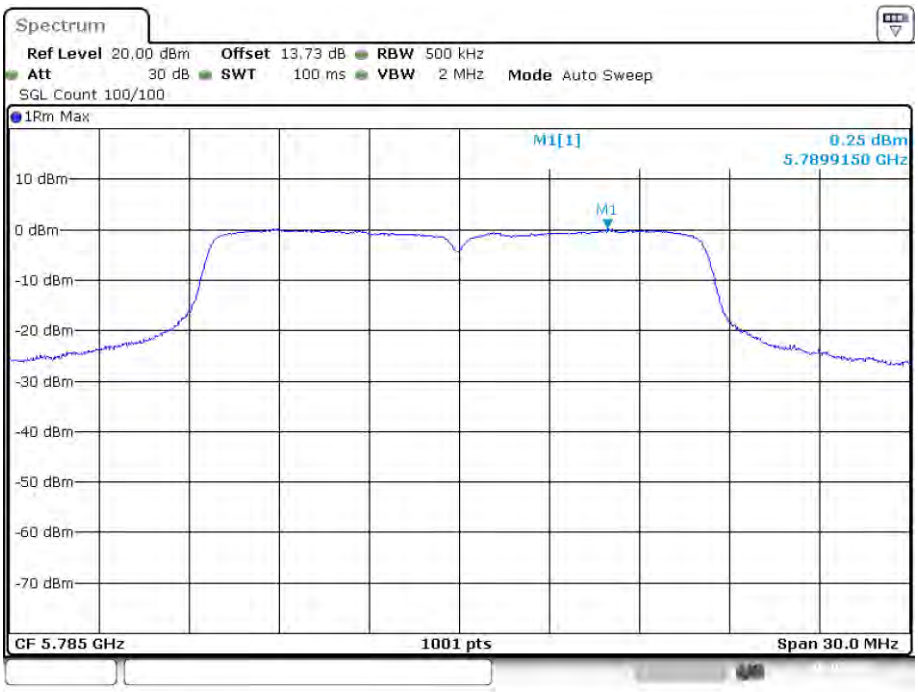
Measurement Data

Band 4 (5725 - 5850 MHz)

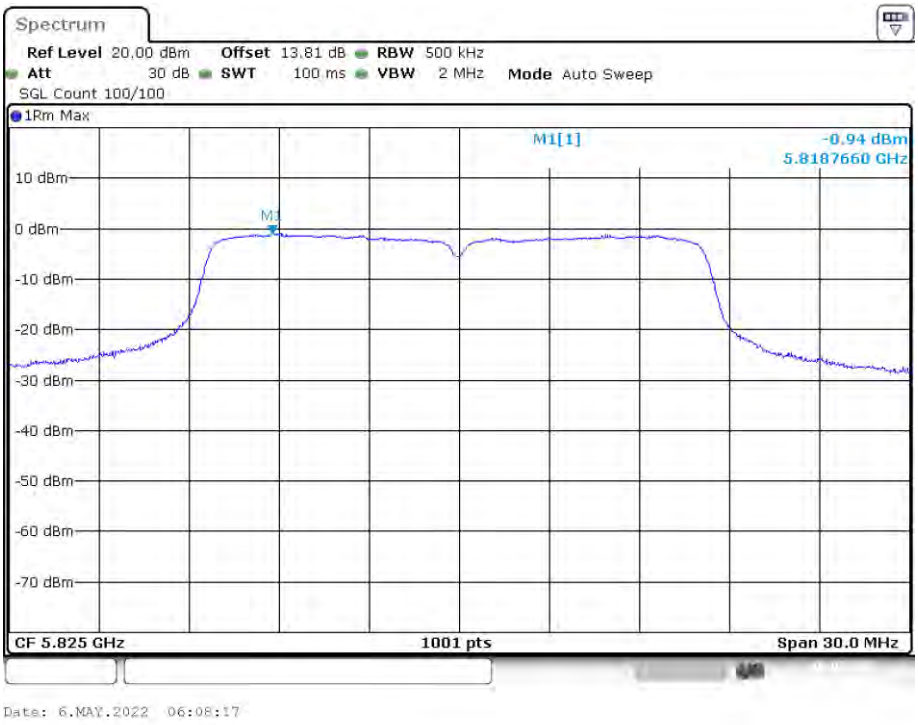
Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	a	5745	Ant1	1.065	30	Pass
NVNT	a	5785	Ant1	0.253	30	Pass
NVNT	a	5825	Ant1	-0.941	30	Pass
NVNT	ac20	5745	Ant1	1.434	30	Pass
NVNT	ac20	5785	Ant1	0.334	30	Pass
NVNT	ac20	5825	Ant1	-0.788	30	Pass
NVNT	ac40	5755	Ant1	-1.476	30	Pass
NVNT	ac40	5795	Ant1	-2.383	30	Pass
NVNT	ac80	5775	Ant1	-2.429	30	Pass
NVNT	n20	5745	Ant1	1.447	30	Pass
NVNT	n20	5785	Ant1	0.194	30	Pass
NVNT	n20	5825	Ant1	-0.785	30	Pass
NVNT	n40	5755	Ant1	-1.398	30	Pass
NVNT	n40	5795	Ant1	-2.376	30	Pass

PSD NVNT a 5745MHz Ant1

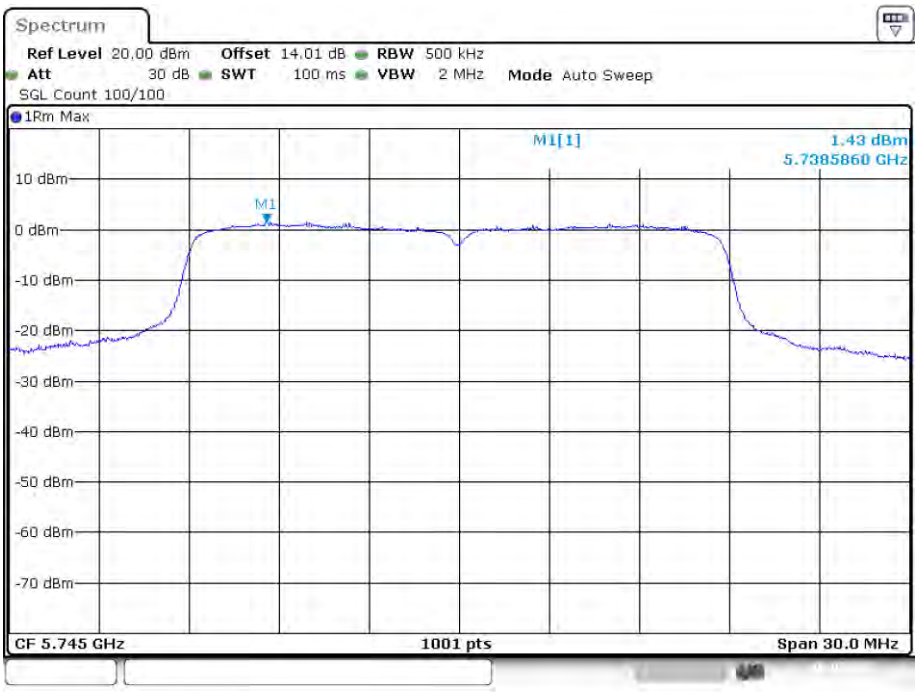
PSD NVNT a 5785MHz Ant1



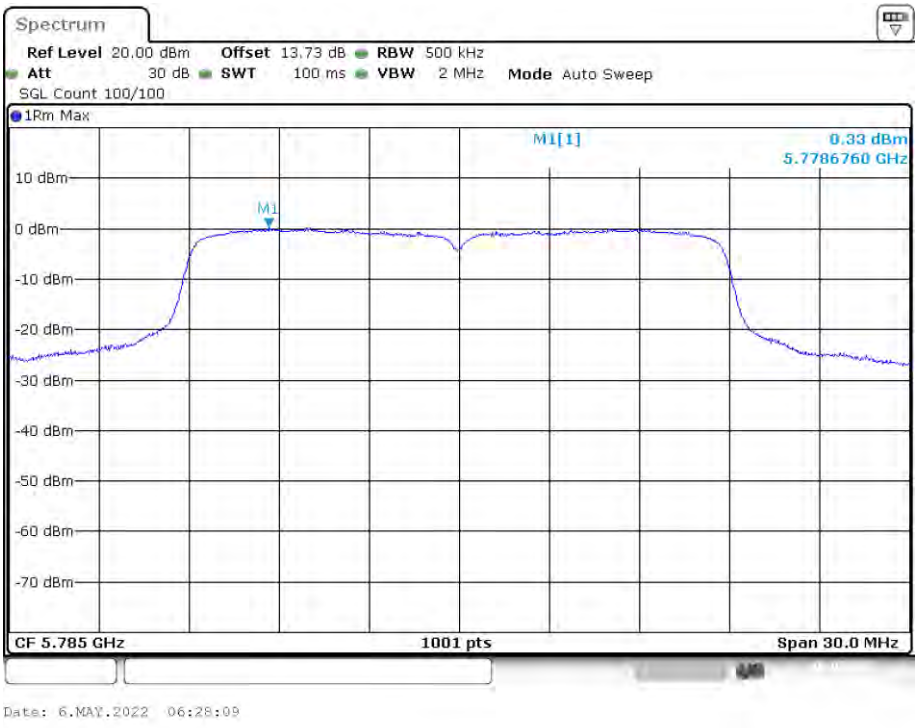
PSD NVNT a 5825MHz Ant1



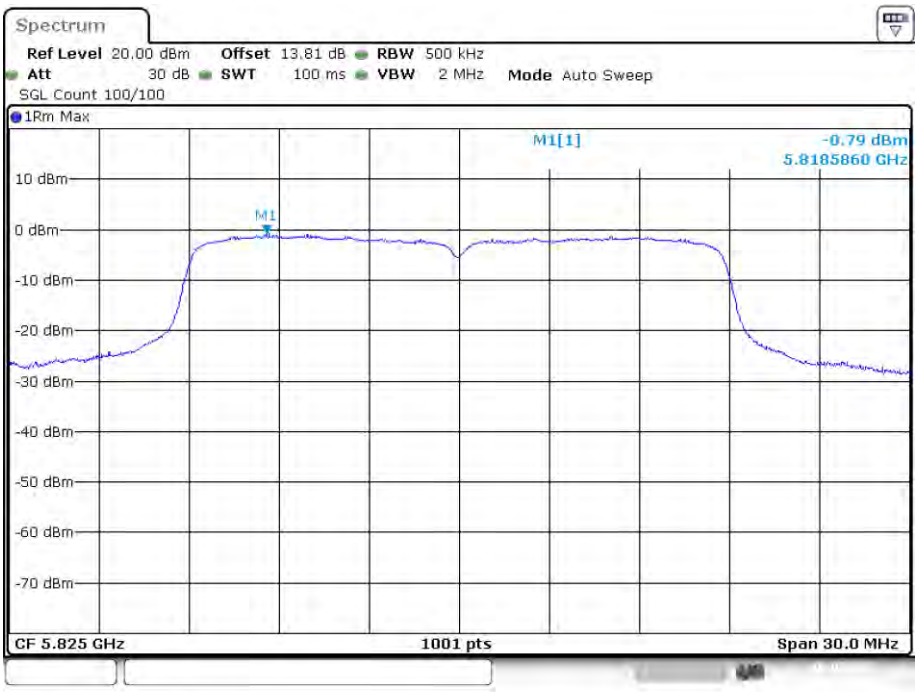
PSD NVNT ac20 5745MHz Ant1



PSD NVNT ac20 5785MHz Ant1



PSD NVNT ac20 5825MHz Ant1



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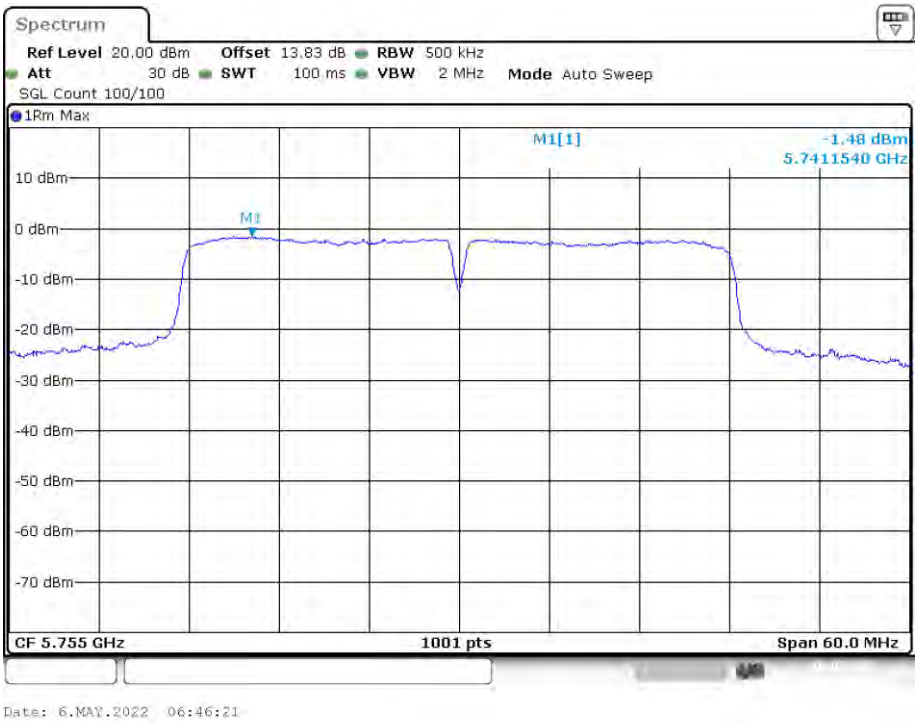
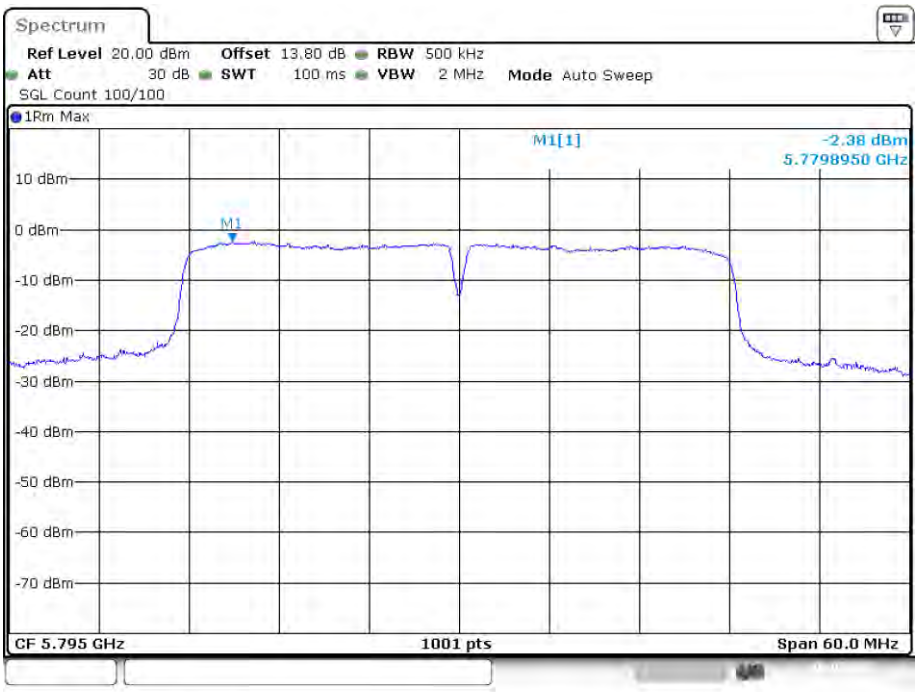


PSD NVNT ac40 5795MHz Ant1



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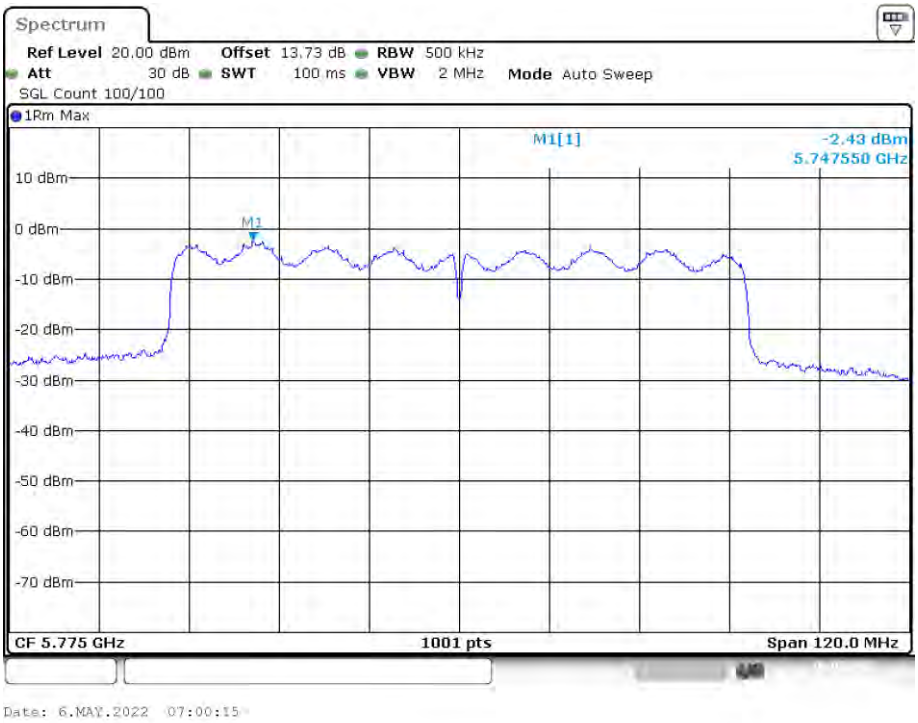
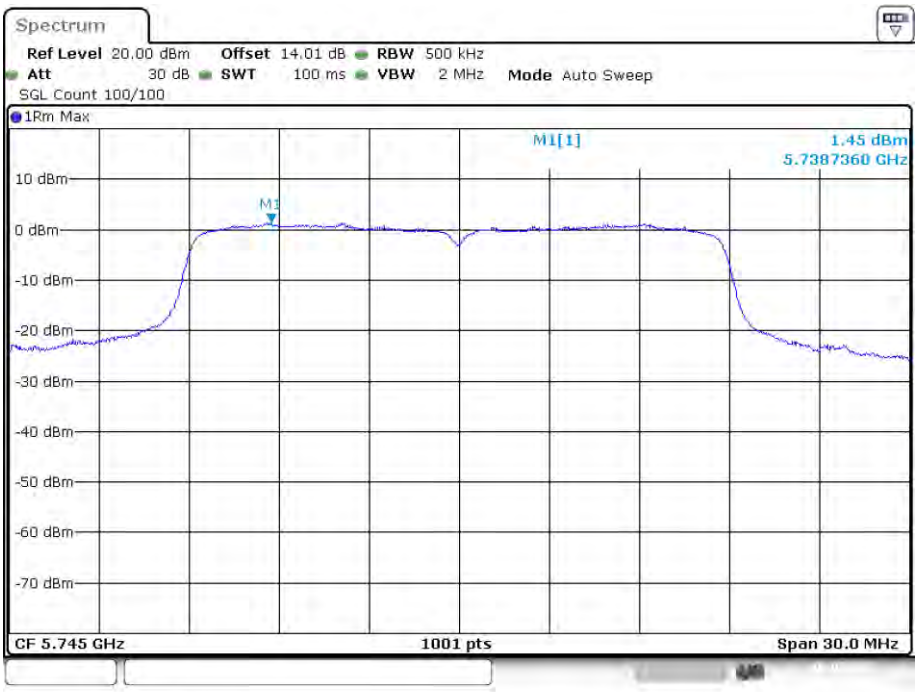


PSD NVNT n20 5745MHz Ant1



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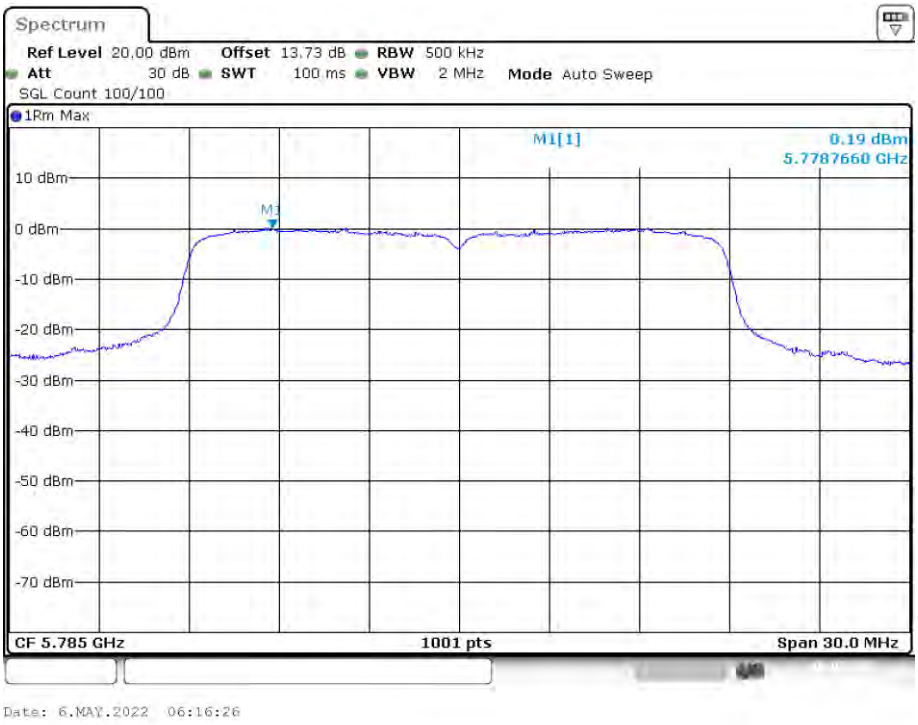
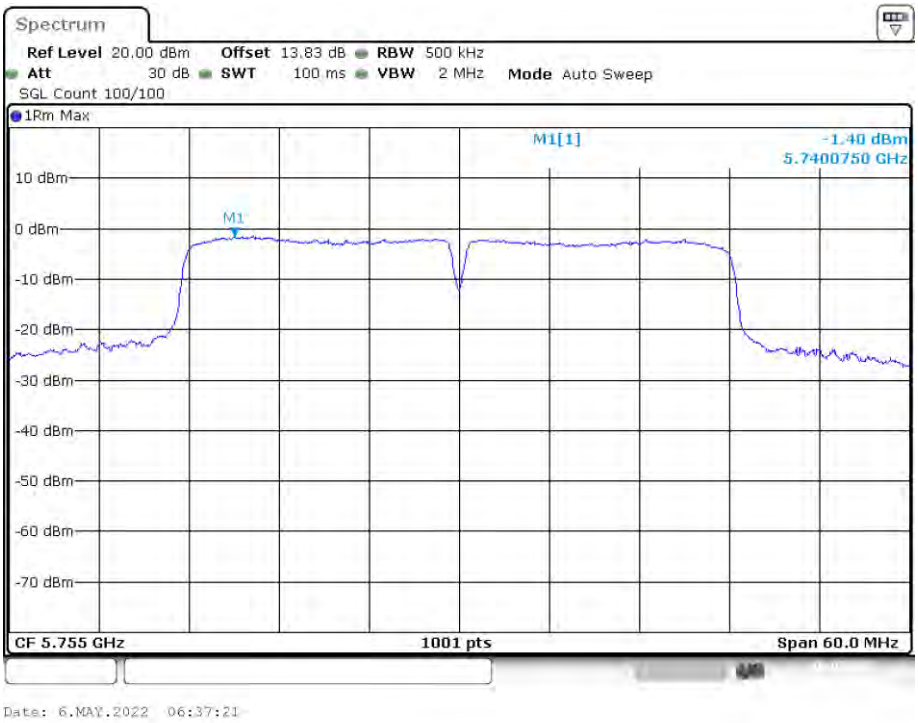
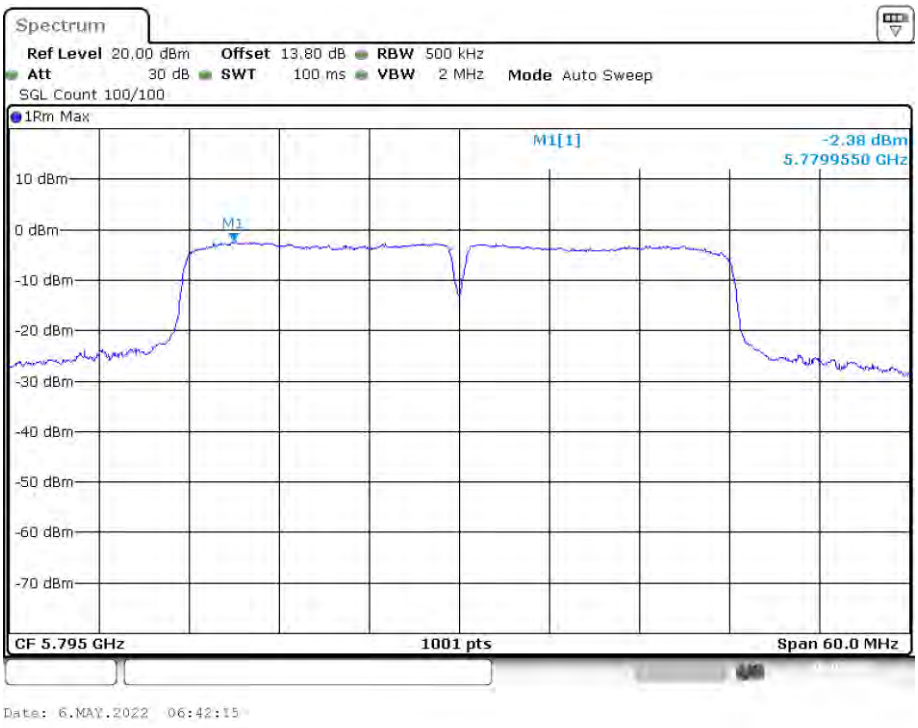


PSD NVNT n20 5825MHz Ant1

PSD NVNT n40 5755MHz Ant1



PSD NVNT n40 5795MHz Ant1



4.6 Band Edge

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 E Section 15.407 and 15.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m (Semi-Anechoic Chamber)</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Remark</th></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>AV</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>68.2</td><td>Peak Value</td></tr>
</table>
Undesirable emission 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 EIRP 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 EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.
(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 EIRP of −27 dBm/MHz.
</td></tr>
<tr><td>Test Procedure:</td><td>
a. The EUT was placed on the top of a rotating table 1.5 m above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
</td></tr>
<tr><td>Test setup:</td><td>Above 1GHz</td></tr>
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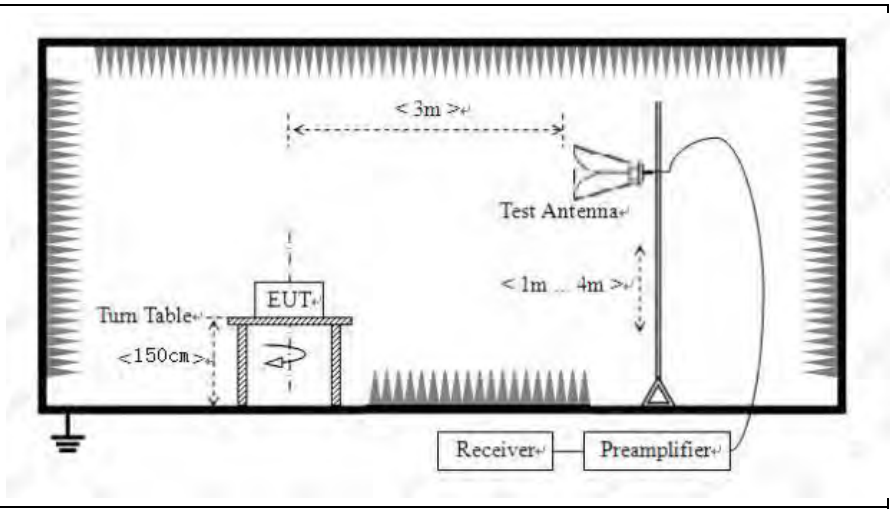
	
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Remark:

According to KDB 789033 D02 v02r01 section G) 1) (d), for For measurements above 1000 MHz @ 3m distance, the limit of field strength is computed as follows:

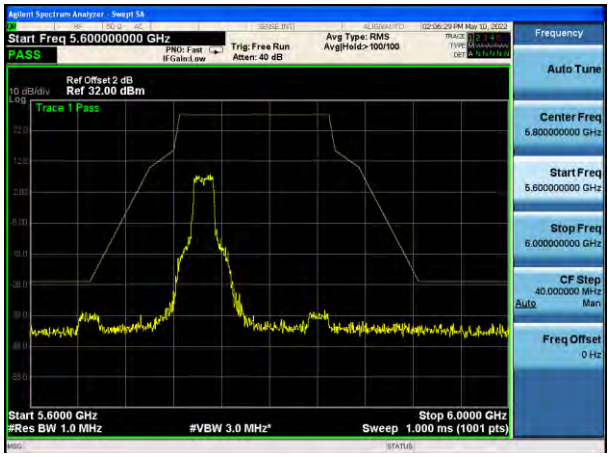
E[dBuV/m] = EIRP[dBm] + 95.2,

For example, if EIRP = -27dBm

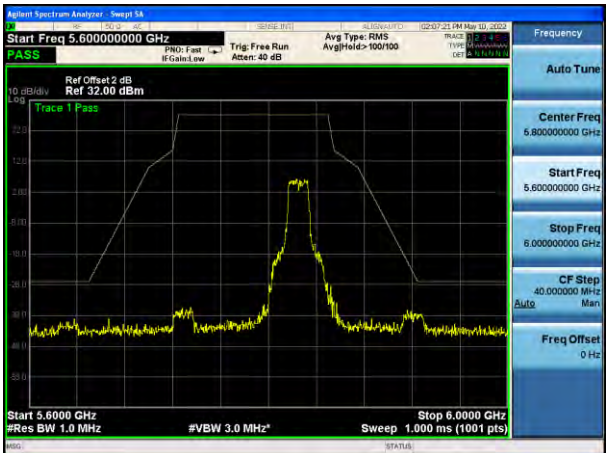
E[dBuV/m] = -27 + 95.2 = 68.2dBuV/m.

Measurement Data:
Band4

802.11a

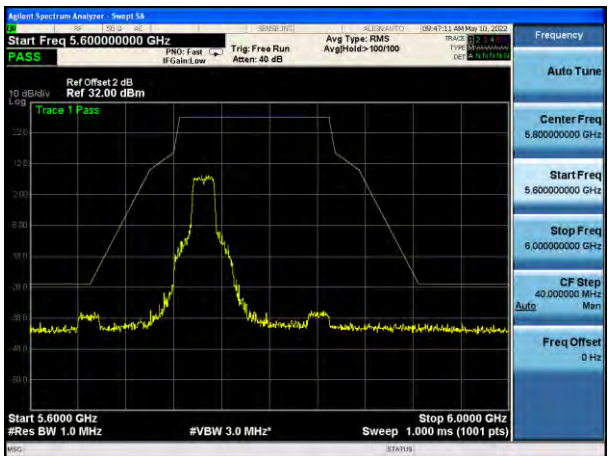


Low: 5745MHz

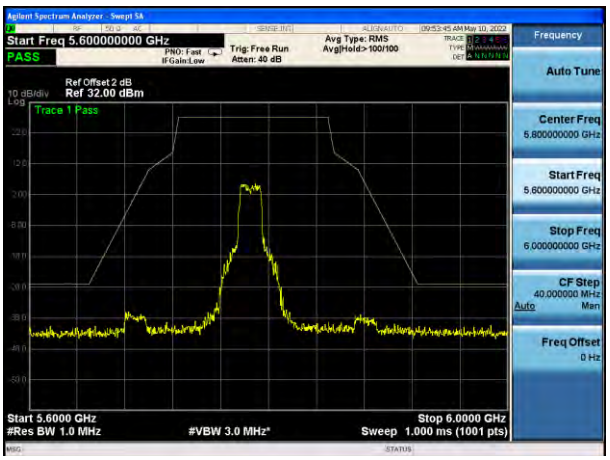


High: 5825MHz

802.11n(HT20)

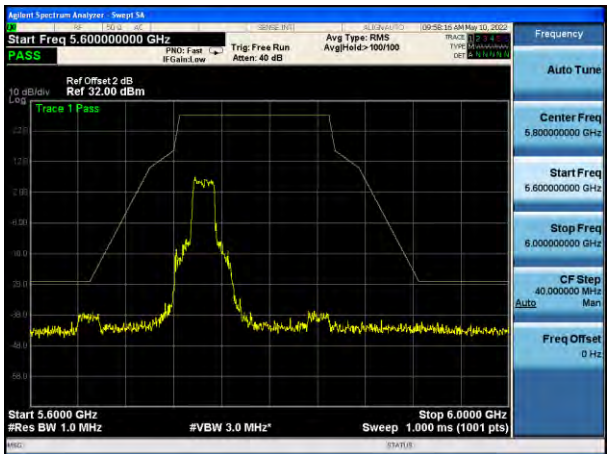


Low: 5745MHz

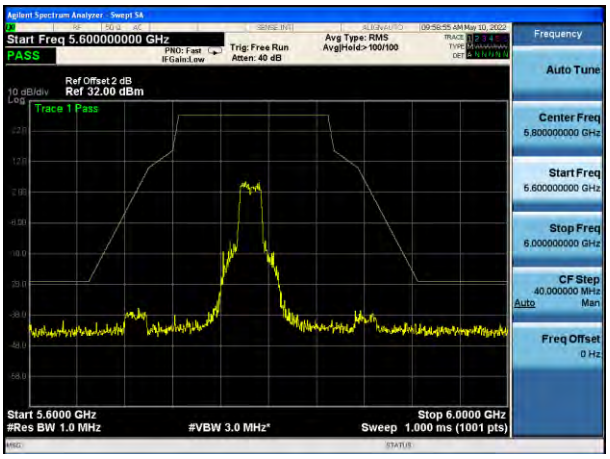


High: 5825MHz

802.11ac(HT20)

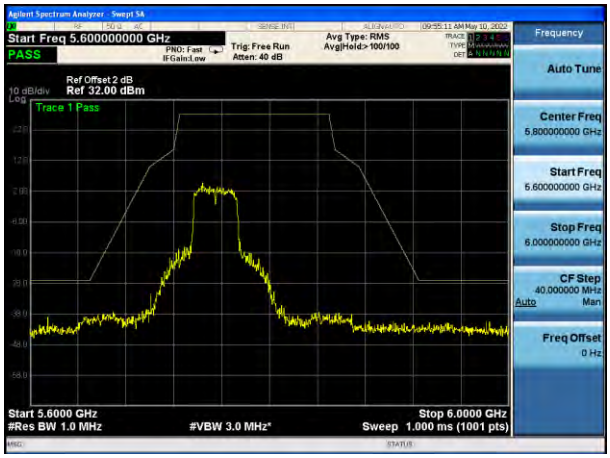


Low: 5745MHz

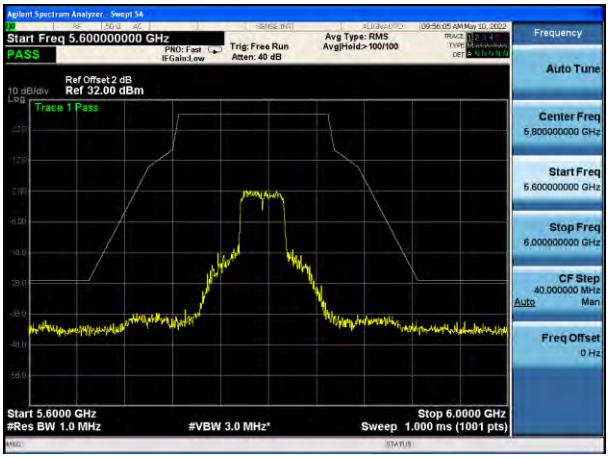


High: 5825MHz

802.11n(HT40)

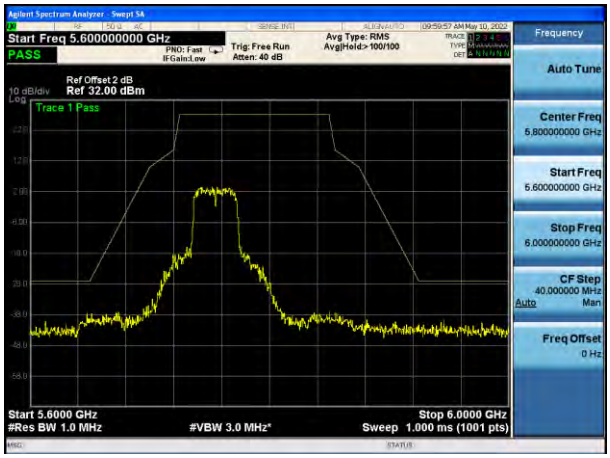


Low: 5755MHz

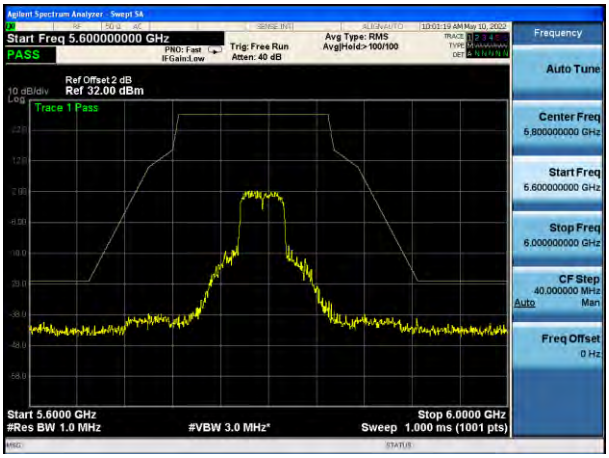


High: 5795MHz

802.11ac(HT40)



Low: 5755MHz



High: 5795MHz

802.11ac(HT80)

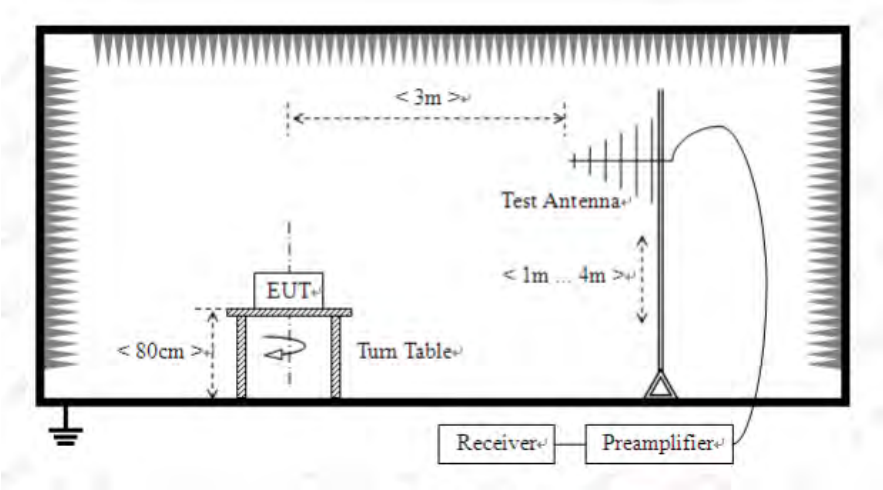
5775MHz

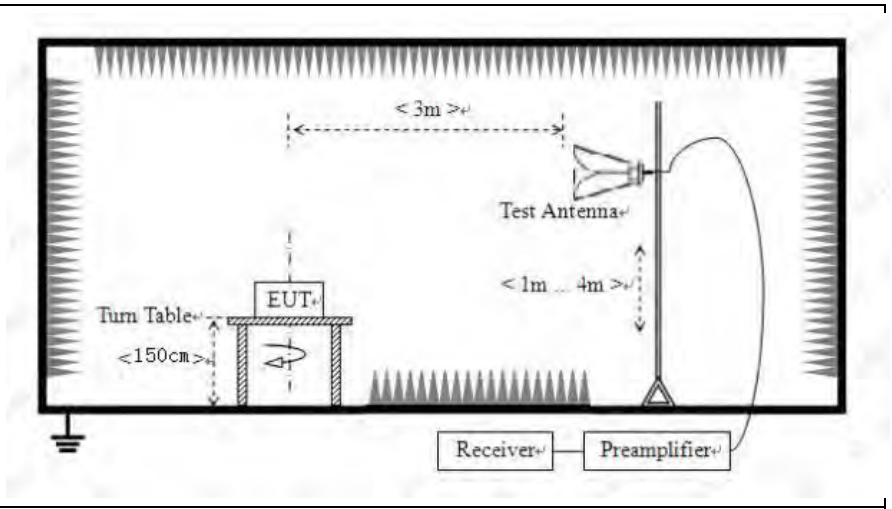
4.7 Radiated Emission

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>30MHz to 40GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m (Semi-Anechoic Chamber)</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Value</th></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>AV</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>74.0</td><td>Peak Value</td></tr>
<tr><td>54.0</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Test Procedure:</td><td>
Substitution method was performed to determine the actual ERP emission levels of the EUT.
The following test procedure as below:

1>.Below 1GHz test procedure:
1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

2>.Above 1GHz test procedure:
1. On the test site as test setup graph above,the EUT shall be placed at the 1.5m support on the turntable and in the position closest to normal use as declared by the provider.
2. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter.The output of the test antenna shall be connected to the measuring receiver.
3. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test.
4. The test antenna shall be raised and lowered from 1m to 4m until a
</td></tr>
</table>

	maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver. 5. Repeat step 4 for test frequency with the test antenna polarized horizontally. 6. Remove the transmitter and replace it with a substitution antenna 7. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output. 8. Repeat step 7 with both antennas horizontally polarized for each test frequency. 9. Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula: EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi) where: Pg is the generator output power into the substitution antenna.
Test setup:	Below 1GHz  Above 1GHz

	
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data:

Below 1GHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
33.93	47.85	11.25	0.59	30.08	29.61	40	-10.39	Vertical
55.26	41.48	11.93	0.81	29.96	24.26	40	-15.74	Vertical
120.38	46.75	9.4	1.36	29.57	27.94	43.5	-15.56	Vertical
172.19	43.28	8.5	1.7	29.31	24.17	43.5	-19.33	Vertical
440.33	37.43	16.29	3.05	29.41	27.36	46	-18.64	Vertical
860.15	33.58	21.83	4.69	29.14	30.96	46	-15.04	Vertical
64.54	35.85	8.73	0.9	29.89	15.59	40	-24.41	Horizontal
99.99	33.85	11.73	1.19	29.7	17.07	43.5	-26.43	Horizontal
269.78	45.82	12.53	2.22	29.79	30.78	46	-15.22	Horizontal
351.12	36.33	14.5	2.62	29.73	23.72	46	-22.28	Horizontal
627.65	36.08	19.43	3.83	29.27	30.07	46	-15.93	Horizontal
955.72	41.34	22.54	5.06	29.1	39.84	46	-6.16	Horizontal

Above 1GHz:

802.11a(HT20) 5745MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.67	29.06	11.25	14.62	32.65	22.28	74	-51.72	Vertical
15540.57	30.84	11.93	17.66	34.46	25.97	74	-48.03	Vertical
10360.99	32.14	9.4	14.62	32.65	23.51	74	-50.49	Horizontal
15540.40	32.39	8.5	17.66	34.46	24.09	74	-49.91	Horizontal

802.11a(HT20) 5765MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.82	29.00	16.29	14.62	32.65	27.26	74	-46.74	Vertical
15540.33	30.89	21.83	17.66	34.46	35.92	74	-38.08	Vertical
10360.47	32.84	8.73	14.62	32.65	23.54	74	-50.46	Horizontal
15540.76	31.65	11.73	17.66	34.46	26.58	74	-47.42	Horizontal

802.11a(HT20) 5825MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.96	28.31	11.25	14.62	32.65	21.53	74	-52.47	Vertical
15540.10	30.61	11.93	17.66	34.46	25.74	74	-48.26	Vertical
10360.21	32.94	9.4	14.62	32.65	24.31	74	-49.69	Horizontal
15540.05	31.85	8.5	17.66	34.46	23.55	74	-50.45	Horizontal

802.11n(HT20) 5745MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.86	28.74	16.29	14.62	32.65	27.00	74	-47.00	Vertical
15540.23	30.85	21.83	17.66	34.46	35.88	74	-38.12	Vertical
10360.66	32.71	8.73	14.62	32.65	23.41	74	-50.59	Horizontal
15540.19	31.63	11.73	17.66	34.46	26.56	74	-47.44	Horizontal

802.11n(HT20) 5765MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.87	28.46	11.25	14.62	32.65	21.68	74	-52.32	Vertical
15540.72	30.62	11.93	17.66	34.46	25.75	74	-48.25	Vertical
10360.53	32.98	9.4	14.62	32.65	24.35	74	-49.65	Horizontal
15540.20	32.26	8.5	17.66	34.46	23.96	74	-50.04	Horizontal

802.11n(HT20) 5825MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.82	28.26	16.29	14.62	32.65	26.52	74	-47.48	Vertical
15540.99	30.44	21.83	17.66	34.46	35.47	74	-38.53	Vertical
10360.68	32.10	8.73	14.62	32.65	22.80	74	-51.20	Horizontal
15540.99	31.63	11.73	17.66	34.46	26.56	74	-47.44	Horizontal

802.11ac(HT20) 5745MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.79	28.36	11.25	14.62	32.65	21.58	74	-52.42	Vertical
15540.86	31.18	11.93	17.66	34.46	26.31	74	-47.69	Vertical
10360.73	32.51	9.4	14.62	32.65	23.88	74	-50.12	Horizontal
15540.10	31.66	8.5	17.66	34.46	23.36	74	-50.64	Horizontal

802.11ac(HT20) 5765MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.20	28.27	16.29	14.62	32.65	26.53	74	-47.47	Vertical
15540.62	30.53	21.83	17.66	34.46	35.56	74	-38.44	Vertical
10360.01	33.05	8.73	14.62	32.65	23.75	74	-50.25	Horizontal
15540.20	31.89	11.73	17.66	34.46	26.82	74	-47.18	Horizontal

802.11ac(HT20) 5825MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.37	28.20	11.25	14.62	32.65	21.42	74	-52.58	Vertical
15540.47	30.56	11.93	17.66	34.46	25.69	74	-48.31	Vertical
10360.21	32.06	9.4	14.62	32.65	23.43	74	-50.57	Horizontal
15540.84	31.66	8.5	17.66	34.46	23.36	74	-50.64	Horizontal

802.11n(HT40) 5755MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.77	29.07	16.29	14.62	32.65	27.33	74	-46.67	Vertical
15540.44	30.32	21.83	17.66	34.46	35.35	74	-38.65	Vertical
10360.46	32.73	8.73	14.62	32.65	23.43	74	-50.57	Horizontal
15540.02	32.25	11.73	17.66	34.46	27.18	74	-46.82	Horizontal

802.11n(HT40) 5795MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.37	28.37	11.25	14.62	32.65	21.59	74	-52.41	Vertical
15540.55	30.56	11.93	17.66	34.46	25.69	74	-48.31	Vertical
10360.74	33.06	9.4	14.62	32.65	24.43	74	-49.57	Horizontal
15540.97	31.82	8.5	17.66	34.46	23.52	74	-50.48	Horizontal

802.11ac(HT40) 5755MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.59	28.35	16.29	14.62	32.65	26.61	74	-47.39	Vertical
15540.72	31.19	21.83	17.66	34.46	36.22	74	-37.78	Vertical
10360.31	32.40	8.73	14.62	32.65	23.10	74	-50.90	Horizontal
15540.05	32.42	11.73	17.66	34.46	27.35	74	-46.65	Horizontal

802.11ac(HT40) 5795MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.56	28.70	11.25	14.62	32.65	21.92	74	-52.08	Vertical
15540.66	30.54	11.93	17.66	34.46	25.67	74	-48.33	Vertical
10360.19	32.52	9.4	14.62	32.65	23.89	74	-50.11	Horizontal
15540.19	31.62	8.5	17.66	34.46	23.32	74	-50.68	Horizontal

802.11ac(HT80) 5775MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.41	28.68	16.29	14.62	32.65	26.94	74	-47.06	Vertical
15540.09	31.17	21.83	17.66	34.46	36.20	74	-37.80	Vertical
10360.66	32.87	8.73	14.62	32.65	23.57	74	-50.43	Horizontal
15540.38	32.43	11.73	17.66	34.46	27.36	74	-46.64	Horizontal

Note:

1. Level = Read Level + Antenna Factor+ Cable loss- Preamp Factor.

2. The test trace is same as the ambient noise (the test frequency range: 18GHz~40GHz), therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn’t be performed.

4.8 Frequency stability

Test limit	Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.
Test results:	Pass

Measurement Data:

Mode	Voltage (V)	FHL (5745MHz)	Deviation (KHz)	FHH (5825MHz)	Deviation (KHz)
Band 4 (5725-5850 MHz)	DC 4.5V	5744.990	10	5824.989	11
	DC 5V	5744.987	13	5824.987	13
	DC 5.5V	5744.989	11	5824.992	8

Mode	Voltage (V)	FHL (5745MHz)	Deviation (KHz)	FHH (5825MHz)	Deviation (KHz)
Band 4 (5725-5850 MHz)	-10℃	5744.987	13	5824.990	10
	-5℃	5744.988	12	5824.990	10
	0℃	5744.989	11	5824.986	14
	+10℃	5744.989	11	5824.992	8
	+20℃	5744.989	11	5824.992	8
	+30℃	5744.990	10	5824.989	11
	+40℃	5744.986	14	5824.987	13
	+50℃	5744.987	13	5824.986	14
	+60℃	5744.988	12	5824.987	13

--------END OF THE REPORT-------