FCC RADIO TEST REPORT
FCC ID: S7A-SP73

Product :	R1 EVO CAM
Trade Mark :	SENA
Model Name :	SP73
Family Model :	N/A
Report No. :	S19072400911002

Prepared for

SENA TECHNOLOGIES.Inc

19, Heolleung-ro 569-gil, Gangnam-gu Seoul, South Korea

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.
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TEST RESULT CERTIFICATION

Applicant's name	:	SENA TECHNOLOGIES.Inc
Address	:	19, Heolleung-ro 569-gil, Gangnam-gu Seoul, South Korea
Manufacturer's Name	:	Sena Technologies, Inc.
Address	:	Floor 4G/4F, Science&Technology building, Maozhoushan industry park, BaoAn District, ShenZhen City, GuangDong province, China

Product description

Product name	:	R1 EVO CAM
Model and/or type reference	:	SP73
Family Model	:	N/A
Standards	:	FCC Part15.407
Test procedure		ANSI C63.10-2013 and KDB 789033 D02 General UNII Test Procedures New Rules v02r01

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements/ the Industry Canada requirements.. And it is applicable only to the tested sample identified in the report.

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Date of Test

Date (s) of performance of tests	24 Jul. 2019 ~ 13 Aug, 2019
Date of Issue	16 Aug, 2019
Test Result	**Pass**

Testing Engineer : Allen Liu

(Allen Liu)

Technical Manager : Jason Chen

(Jason Chen)

Authorized Signatory : Sam Chen

(Sam Chen)

Table of Contents

Revision History

Report No.	Version	Description	Issued Date
S19072400911002	Rev.01	Initial issue of report	16 Aug, 2019

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
15.207	AC Power Line Conducted Emissions	PASS	
15.209(a), 15.407 (b)(1) 15.407 (b)(4) 15.407 (b)(6)	Spurious Radiated Emissions	PASS	
15.407 (a)(1) 15.407 (a)(3)	26 dB and 99% Emission Bandwidth	PASS	
15.407(e)	Minimum 6 dB bandwidth	PASS	
15.407 (a)(1) 15.407 (a)(3)	Maximum Conducted Output Power	PASS	
15.407(b)(1) 15.407(b)(4)	Band Edge	PASS	
15.407 (a)(1) 15.407 (a)(3)	Power Spectral Density	PASS	
15.407(b)	Spurious Emissions at Antenna Terminals	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)” N/A” denotes test is not applicable in this Test Report

1.1 FACILITIES AND ACCREDITATIONS

FACILITIES

All measurement facilities used to collect the measurement data are located at 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

CNAS-Lab.	:	The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005) The Certificate Registration Number is L5516.
IC-Registration		The Certificate Registration Number is 9270A. CAB identifier:CN0074
FCC- Accredited		Test Firm Registration Number: 463705. Designation Number: CN1184
A2LA-Lab.		The Certificate Registration Number is 4298.01 This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).
Name of Firm	:	Shenzhen NTEK Testing Technology Co., Ltd.
Site Location	:	1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China.

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	±2.80dB
2	RF power, conducted	±0.16dB
3	Spurious emissions, conducted	±0.21dB
4	All emissions, radiated(30MHz~1GHz)	±2.64dB
5	All emissions, radiated(1GHz~6GHz)	±2.40dB
6	All emissions, radiated(＞6GHz)	±2.52dB
7	Temperature	±0.5°C
8	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td>R1 EVO CAM</td></tr>
<tr><td>Trade Mark</td><td>SENA</td></tr>
<tr><td>Model Name</td><td>SP73</td></tr>
<tr><td>Family Model</td><td>N/A</td></tr>
<tr><td>Model Difference</td><td>N/A</td></tr>
<tr><td>FCC ID</td><td>S7A-SP73</td></tr>
<tr><td>Product Description</td><td>
<table>
<tr><td>IEEE 802.11 WLAN Mode Supported</td><td>☒802.11a/n (20MHz channel bandwidth)
☒802.11n (40MHz channel bandwidth)</td></tr>
<tr><td>Data Rate</td><td>802.11a: 6,9,12,18,24,36,48,54Mbps;
802.11n(HT20/HT40):MCS0-MCS15;</td></tr>
<tr><td>Modulation</td><td>OFDM with
BPSK/QPSK/16QAM/64QAM/256QAM
for 802.11a/n;</td></tr>
<tr><td>Operating Frequency Range</td><td>☒5745-5825 MHz for 802.11a/n(HT20);
5755-5795 MHz for 802.11n(HT40);</td></tr>
<tr><td>Number of Channels</td><td>☒5 channels for 802.11a/n20 in the 5745-5825MHz band ;
2 channels for 802.11 n40 in the 5755-5795MHz band ;</td></tr>
<tr><td>Antenna Type</td><td>Chip Antenna</td></tr>
<tr><td>Antenna Gain</td><td>0.5dBi</td></tr>
</table>
Based on the application, features, or specification exhibited in User's Manual, More details of EUT technical specification, please refer to the User's Manual.
</td></tr>
<tr><td>Ratings</td><td>DC 3.8V from Helmet Battery</td></tr>
<tr><td>Adapter</td><td>N/A</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
<tr><td>HW Version</td><td>1.2</td></tr>
<tr><td>SW Version</td><td>1.0</td></tr>
</table>

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2. Frequency and Channel list for 802.11a/n(20 MHz) band IV (5745-5825MHz):

802.11a/n (20 MHz) Carrier Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	153	5765	157	5785	161	5805
165	5825	-	-	-	-	-	-

Frequency and Channel list for 802.11n(40MHz) band IV (5755-5795MHz):

802.11n 40MHz Carrier Frequency Channel					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795	-	-

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Normal Link Mode
Mode 2	802.11a /n 20 CH149/ CH157/ CH 165
Mode 3	802.11n40 CH 151 / CH 159

For Radiated Emission	
Final Test Mode	Description
Mode 1	Normal Link Mode
Mode 2	802.11a /n 20 CH149/ CH157/ CH 165
Mode 3	802.11n40 CH 151 / CH 159

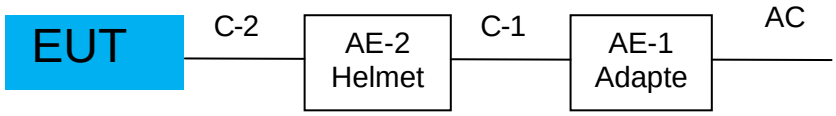
Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

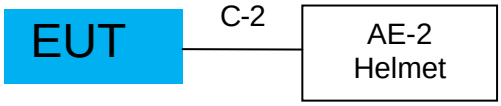
(2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

For AC Conducted Emission Mode



For Radiated Test Cases



For Conducted Test Cases

Note:1.The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
AE-1	Adapter	SIMP	KSAPK0110500200D5	N/A	Peripherals
AE-2	Helmet	N/A	N/A	N/A	Peripherals

Item	Cable Type	Shielded Type	Ferrite Core	Length
C-1	DC Cable	NO	NO	0.1m
C-2	USB Cable	NO	NO	0.8m
C-3	RF Cable	YES	NO	0.1m

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation& Conducted Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Aglient	E4407B	MY45108040	2019.05.13	2020.05.12	1 year
2	Spectrum Analyzer	Agilent	N9020A	MY49100060	2018.10.08	2019.10.07	1 year
3	Spectrum Analyzer	R&S	FSV40	101417	2018.10.08	2019.10.07	1 year
4	Test Receiver	R&S	ESPI7	101318	2019.05.13	2020.05.12	1 year
5	Bilog Antenna	TESEQ	CBL6111D	31216	2019.04.15	2020.04.14	1 year
6	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2018.05.19	2020.05.18	3 year
7	Horn Antenna	EM	EM-AH-10180	2011071402	2019.04.15	2020.04.14	1 year
8	Amplifier	EMC	EMC051835SE	980246	2019.08.04	2020.08.03	1 year
9	Active Loop Antenna	SCHWARZBECK	FMZB 1519 B	055	2018.12.11	2019.12.10	1 year
10	Power Meter	DARE	RPR3006W	15I00041SNO84	2019.08.04	2020.08.03	1 year
11	Test Cable (9KHz-30MHz)	N/A	R-01	N/A	2017.04.21	2020.04.20	3 year
12	Test Cable (30MHz-1GHz)	N/A	R-02	N/A	2017.04.21	2020.04.20	3 year
13	High Test Cable(1G-40GHz)	N/A	R-03	N/A	2017.04.21	2020.04.20	3 year
14	High Test Cable(1G-40GHz)	N/A	R-04	N/A	2017.04.21	2020.04.20	3 year
15	Filter	TRILTHIC	2400MHz	29	2017.04.19	2020.04.18	3 year
16	temporary antenna connector (Note)	NTS	R001	N/A	N/A	N/A	N/A
17	Low Noise Amplifier	B&Z	BZ-P540-550850-452727	16476-11729	2019.04.15	2020.04.14	1 year
18	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	803	2018.12.11	2019.12.10	1 year

Note:
We will use the temporary antenna connector (soldered on the PCB board) When conducted test
And this temporary antenna connector is listed within the instrument list

AC Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2019.05.13	2020.05.12	1 year
2	LISN	R&S	ENV216	101313	2019.04.15	2020.04.14	1 year
3	LISN	SCHWARZBECK	NNLK 8129	8129245	2019.05.13	2020.05.12	1 year
4	50Ω Coaxial Switch	ANRITSU CORP	MP59B	6200983704	2018.05.19	2020.05.18	3 year
5	Test Cable (9KHz-30MHz)	N/A	C01	N/A	2017.04.21	2020.04.20	3 year
6	Test Cable (9KHz-30MHz)	N/A	C02	N/A	2017.04.21	2020.04.20	3 year
7	Test Cable (9KHz-30MHz)	N/A	C03	N/A	2017.04.21	2020.04.20	3 year

Note: Each piece of equipment is scheduled for calibration once a year except the Test Cable& Aux Equipment which is scheduled for calibration every 3 years.

3. TEST REQUIREMENTS

3.1CONDUCTED EMISSION MEASUREMENT

3.1.1 APPLICABLE STANDARD

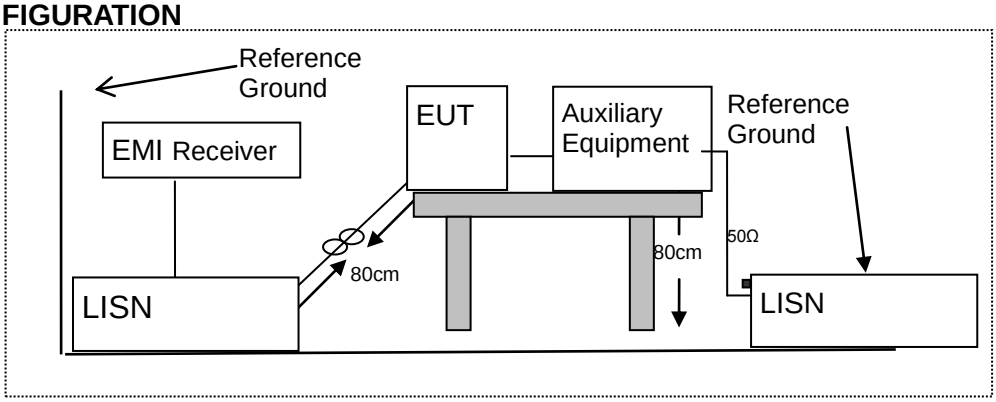
According to FCC Part 15.207(a) and KDB 174176 D01 Line Conducted FAQ v01r01

3.1.2 CONFORMANCE LIMIT

Frequency(MHz)	Conducted Emission Limit	
	Quasi-peak	Average
0.15-0.5	66-56*	56-46*
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. *Decreases with the logarithm of the frequency
2. The lower limit shall apply at the transition frequencies
3. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3.1.3 TEST CONFIGURATION



3.1.4 TEST PROCEDURE

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

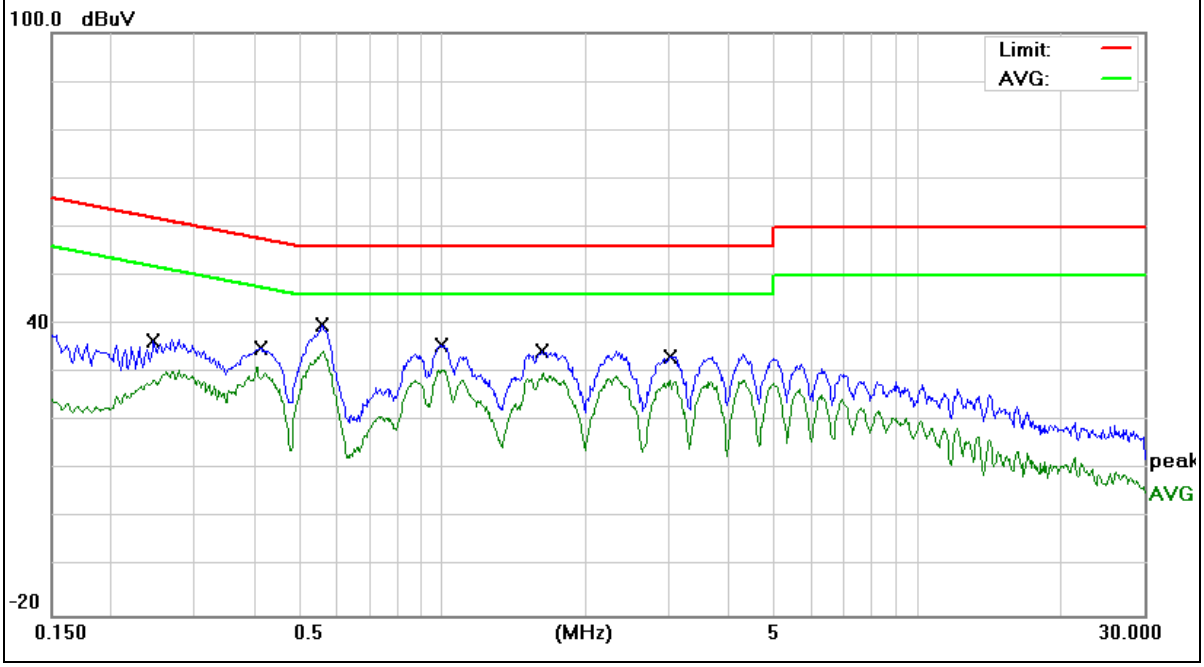
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room.
2. The EUT was placed on a table which is 0.8m above ground plane.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
4. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40cm long.
5. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
6. LISN at least 80 cm from nearest part of EUT chassis.
7. The frequency range from 150KHz to 30MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth(IF bandwidth=9KHz) with Maximum Hold Mode
9. For the actual test configuration, please refer to the related Item –EUT Test Photos.

EUT：	R1 EVO CAM	Model Name ：	SP73
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5V from Adapter AC 120V/60Hz	Test Mode：	Mode 1

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.2459	26.65	9.76	36.41	61.89	-25.48	QP
0.2459	13.59	9.76	23.35	51.89	-28.54	AVG
0.4138	25.39	9.74	35.13	57.57	-22.44	QP
0.4138	15.38	9.74	25.12	47.57	-22.45	AVG
0.5580	29.99	9.74	39.73	56.00	-16.27	QP
0.5580	19.80	9.74	29.54	46.00	-16.46	AVG
0.9899	25.96	9.74	35.70	56.00	-20.30	QP
0.9899	15.59	9.74	25.33	46.00	-20.67	AVG
1.6257	24.63	9.77	34.40	56.00	-21.60	QP
1.6257	14.92	9.77	24.69	46.00	-21.31	AVG
3.0139	23.55	9.83	33.38	56.00	-22.62	QP
3.0139	13.32	9.83	23.15	46.00	-22.85	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

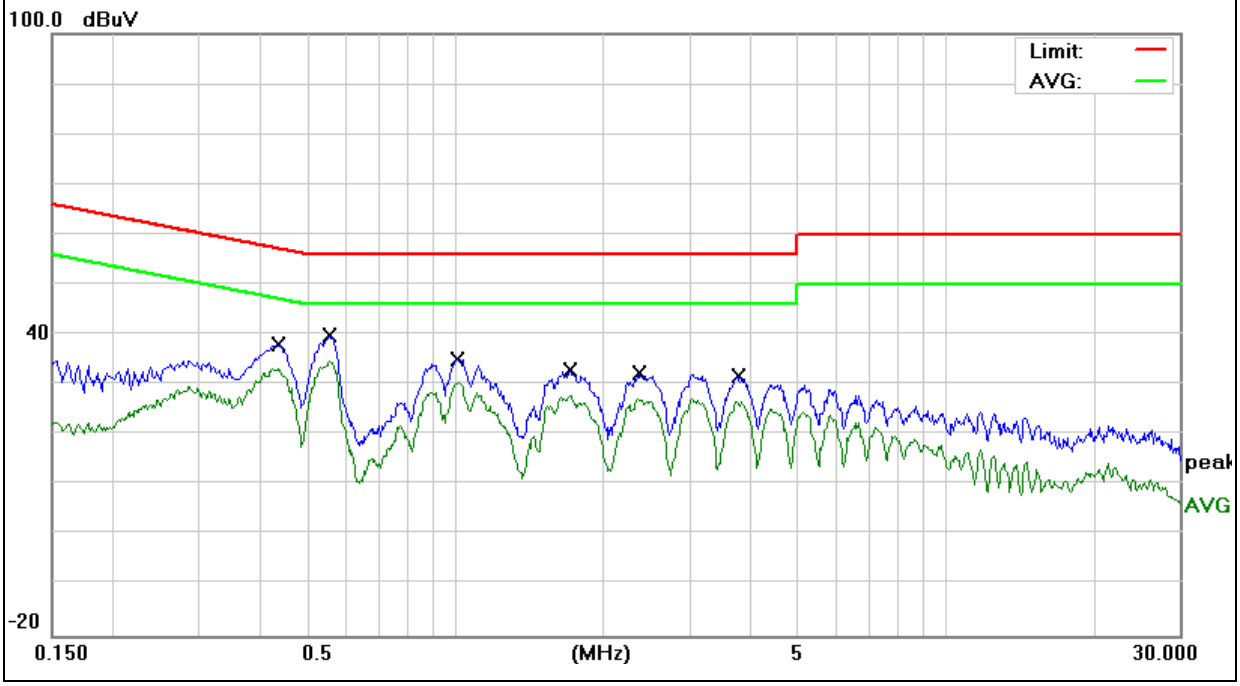


EUT：	R1 EVO CAM	Model Name ：	SP73
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5V from Adapter AC 120V/60Hz	Test Mode：	Mode 1

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.4339	28.29	9.75	38.04	57.18	-19.14	QP
0.4339	18.58	9.75	28.33	47.18	-18.85	AVG
0.5540	30.08	9.75	39.83	56.00	-16.17	QP
0.5540	19.40	9.75	29.15	46.00	-16.85	AVG
1.0100	25.35	9.75	35.10	56.00	-20.90	QP
1.0100	15.61	9.75	25.36	46.00	-20.64	AVG
1.7097	23.05	9.78	32.83	56.00	-23.17	QP
1.7097	12.36	9.78	22.14	46.00	-23.86	AVG
2.3780	22.39	9.81	32.20	56.00	-23.80	QP
2.3780	9.52	9.81	19.33	46.00	-26.67	AVG
3.7700	21.82	9.91	31.73	56.00	-24.27	QP
3.7700	10.83	9.91	20.74	46.00	-25.26	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

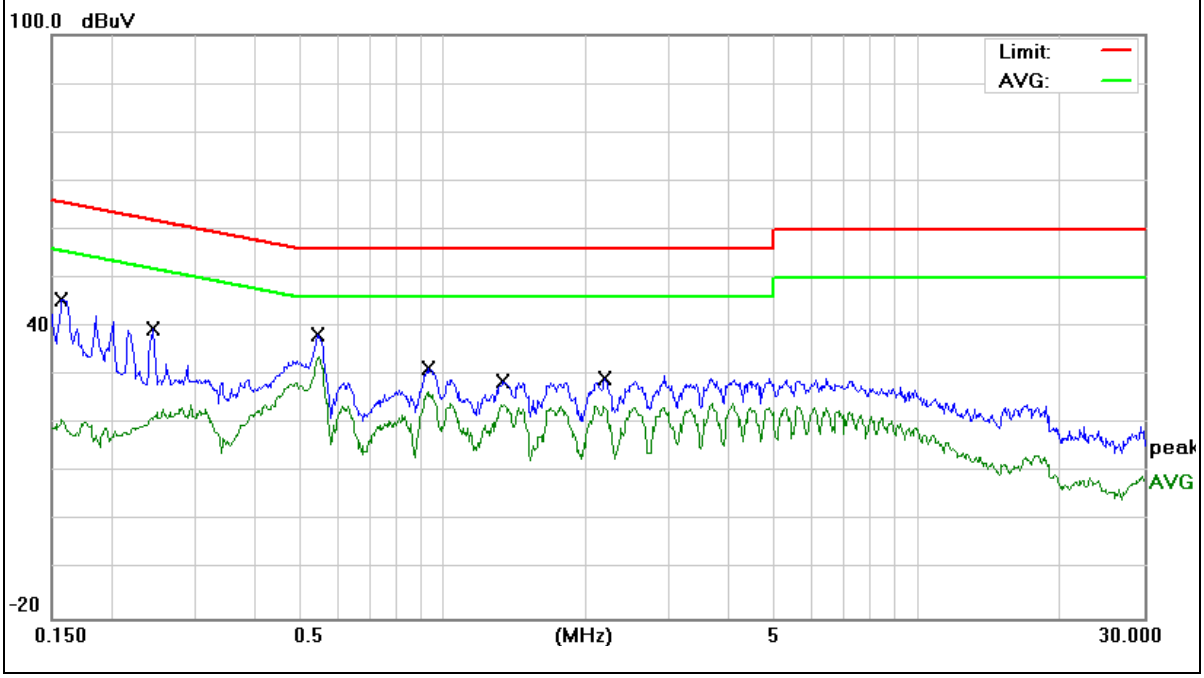


EUT：	R1 EVO CAM	Model Name ：	SP73
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5V from Adapter AC 240V/60Hz	Test Mode：	Mode 1

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1590	35.65	9.75	45.40	65.51	-20.11	QP
0.1590	25.37	9.75	35.12	55.51	-20.39	AVG
0.2459	29.79	9.76	39.55	61.89	-22.34	QP
0.2459	18.69	9.76	28.45	51.89	-23.44	AVG
0.5460	28.57	9.74	38.31	56.00	-17.69	QP
0.5460	17.92	9.74	27.66	46.00	-18.34	AVG
0.9377	21.65	9.74	31.39	56.00	-24.61	QP
0.9377	11.61	9.74	21.35	46.00	-24.65	AVG
1.3380	18.93	9.75	28.68	56.00	-27.32	QP
1.3380	8.27	9.75	18.02	46.00	-27.98	AVG
2.1939	19.68	9.78	29.46	56.00	-26.54	QP
2.1939	8.96	9.78	18.74	46.00	-27.26	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

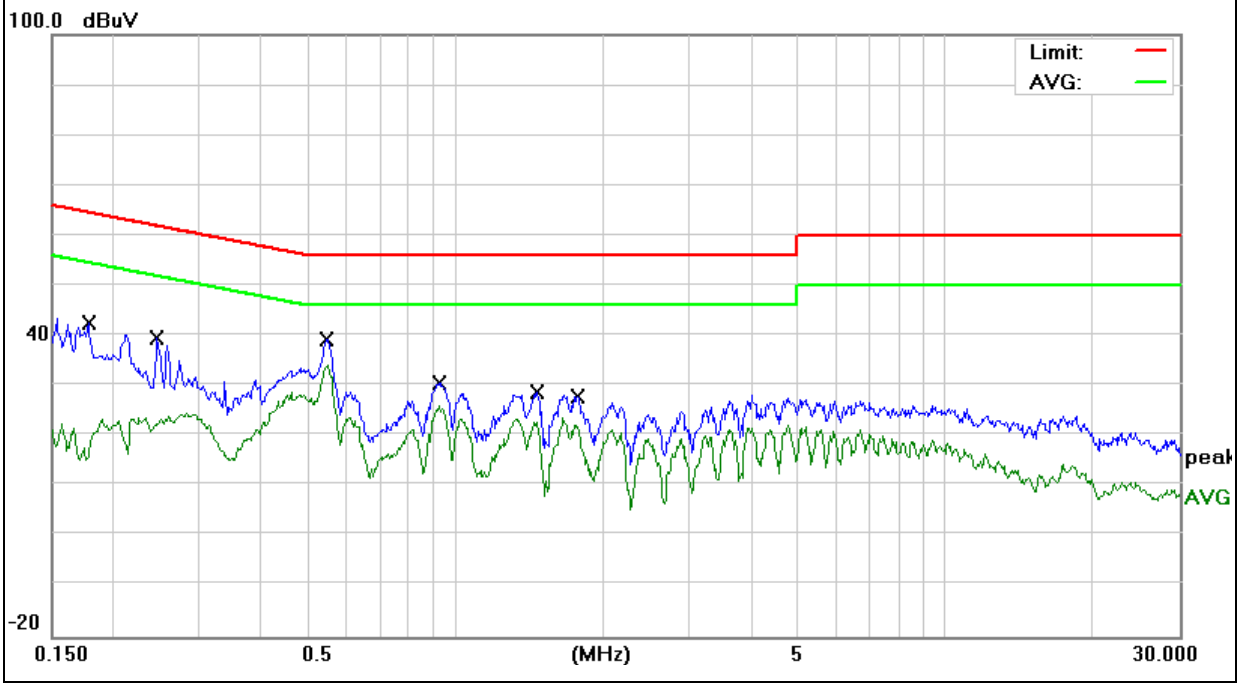


EUT：	R1 EVO CAM	Model Name ：	SP73
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5V from Adapter AC 240V/60Hz	Test Mode：	Mode 1

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1779	32.79	9.73	42.52	64.58	-22.06	QP
0.1779	21.32	9.73	31.05	54.58	-23.53	AVG
0.2459	29.77	9.74	39.51	61.89	-22.38	QP
0.2459	19.71	9.74	29.45	51.89	-22.44	AVG
0.5460	29.48	9.75	39.23	56.00	-16.77	QP
0.5460	18.99	9.75	28.74	46.00	-17.26	AVG
0.9260	20.87	9.75	30.62	56.00	-25.38	QP
0.9260	10.27	9.75	20.02	46.00	-25.98	AVG
1.4657	19.04	9.77	28.81	56.00	-27.19	QP
1.4657	8.56	9.77	18.33	46.00	-27.67	AVG
1.7780	18.17	9.79	27.96	56.00	-28.04	QP
1.7780	7.08	9.79	16.87	46.00	-29.13	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 APPLICABLE STANDARD

According to FCC Part 15.407(b) and 15.209

3.2.2 CONFORMANCE LIMIT

According to FCC Part 15.407(b)(7): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

According to FCC Part15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009~0.490	2400/F(KHz)	20 log (uV/m)	300
0.490~1.705	24000/F(KHz)	20 log (uV/m)	30
1.705~30.0	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Limits of Radiated Emission Measurement(Above 1000MHz)

Frequency(MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Remark :1. Emission level in dBuV/m=20 log (uV/m)

2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

3. For Frequency 9kHz~30MHz:

Distance extrapolation factor =40log(Specific distance/ test distance)(dB);

Limit line=Specific limits(dBuV) + distance extrapolation factor.

For Frequency above 30MHz:

Distance extrapolation factor =20log(Specific distance/ test distance)(dB);

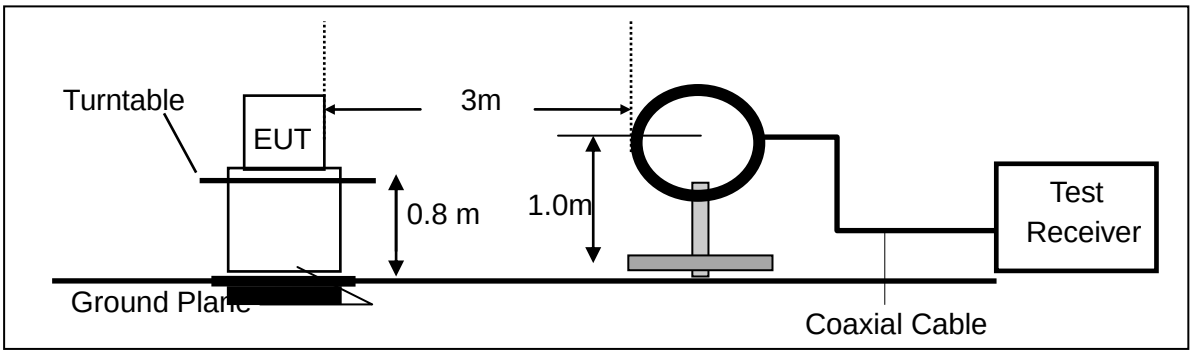
Limit line=Specific limits(dBuV) + distance extrapolation factor.

3.2.3 MEASURING INSTRUMENTS

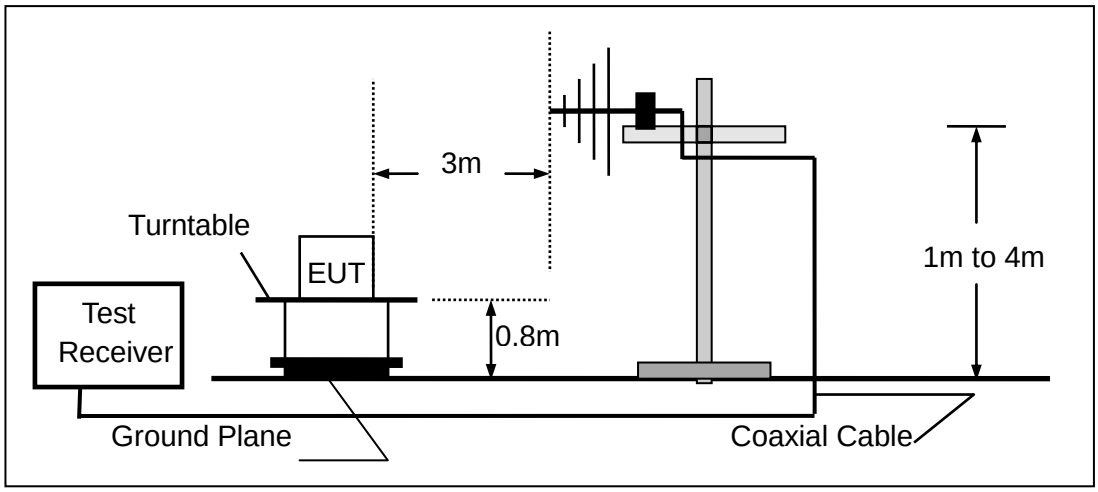
The Measuring equipment is listed in the section 6.3 of this test report.

3.2.4 TEST CONFIGURATION

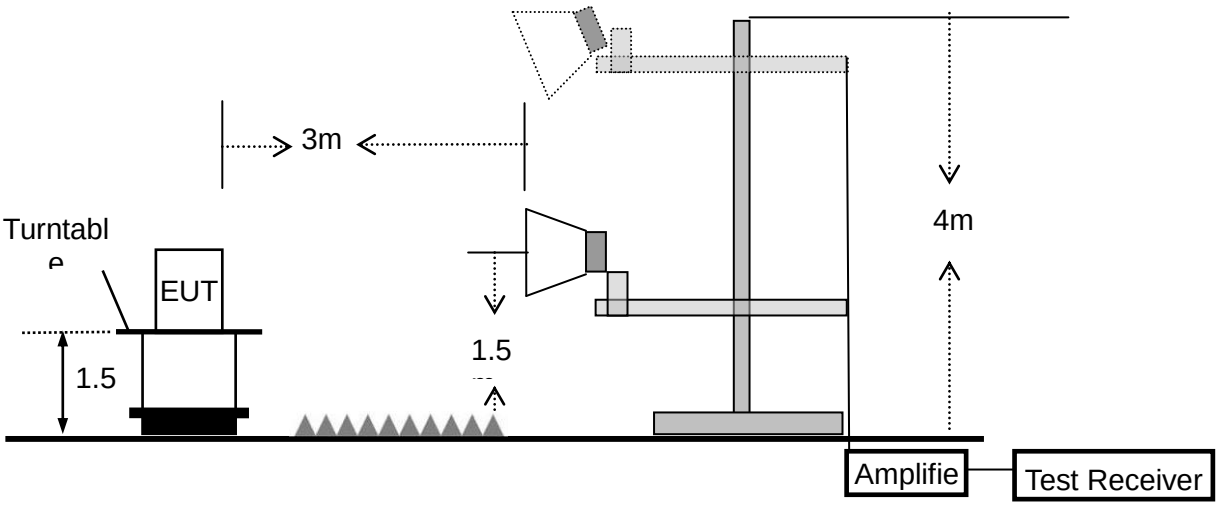
(a) For radiated emissions below 30MHz



(b) For radiated emissions from 30MHz to 1000MHz



(c) For radiated emissions above 1000MHz



3.2.5 TEST PROCEDURE

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10-2013. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.
This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT.
Use the following spectrum analyzer settings:

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Note: for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] =10*lg(100 [kHz]/narrower RBW [kHz]). , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

3.2.6 TEST RESULTS (9KHz – 30 MHz)

EUT：	R1 EVO CAM	Model Name. ：	SP73
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 3.8V
Test Mode ：	TX	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	N/A
--	--	--	--	N/A

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

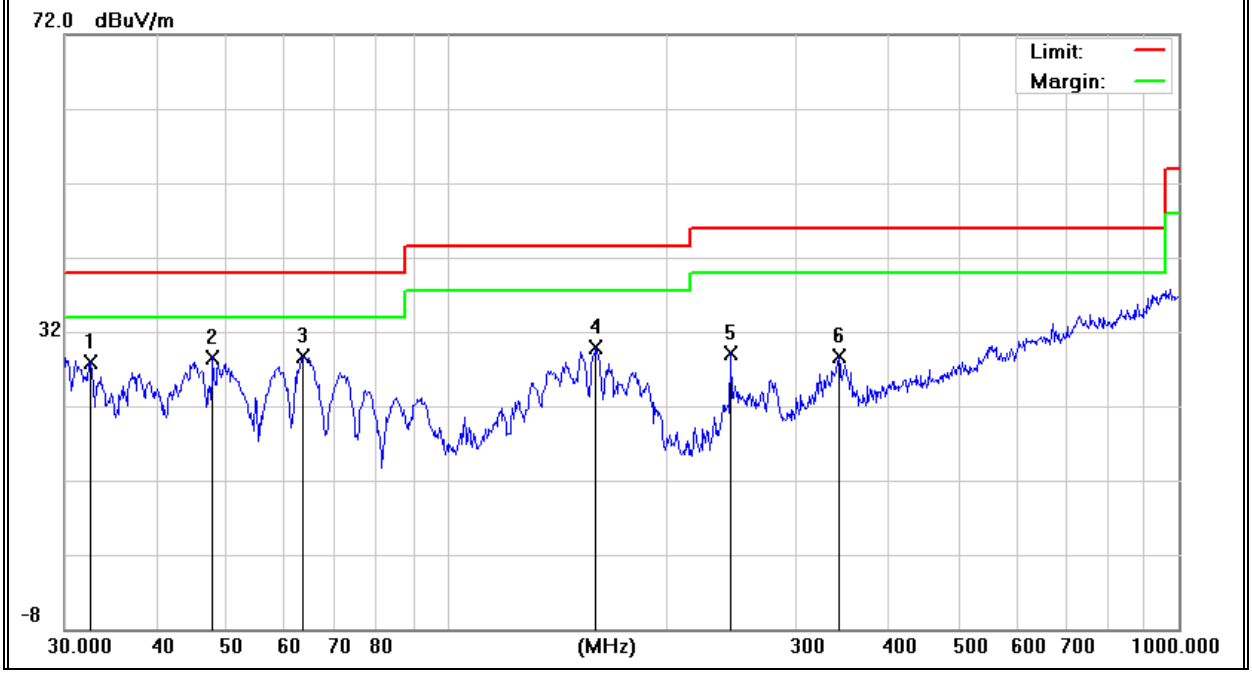
3.2.7 TEST RESULTS (30MHz – 1GHz)

EUT：	R1 EVO CAM	Model Name. ：	SP73
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 3.8V
Test Mode ：	TX(5.8G) - 802.11a (Low CH)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	32.5197	10.05	17.91	27.96	40.00	-12.04	QP
V	47.8260	17.28	11.32	28.60	40.00	-11.40	QP
V	63.5356	22.13	6.50	28.63	40.00	-11.37	QP
V	159.7844	18.33	11.61	29.94	43.50	-13.56	QP
V	244.2321	15.22	13.83	29.05	46.00	-16.95	QP
V	343.1800	11.23	17.49	28.72	46.00	-17.28	QP

Remark:

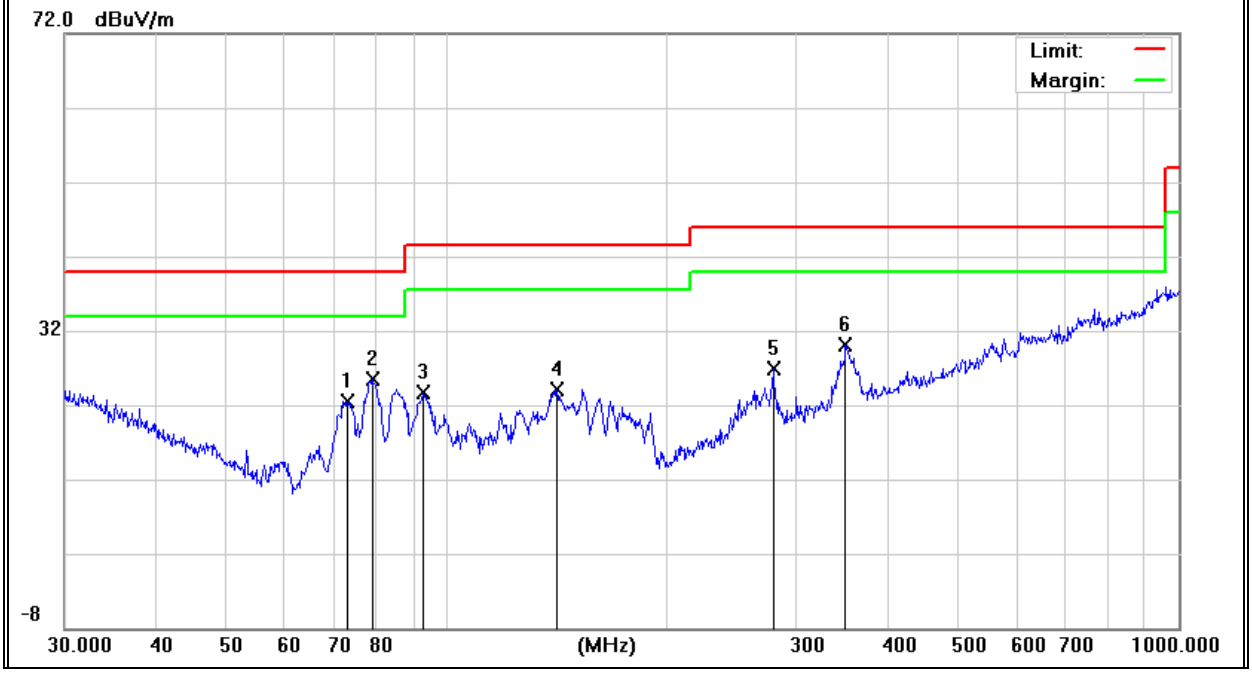
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	73.1025	15.11	7.34	22.45	40.00	-17.55	QP
H	78.9652	17.06	8.50	25.56	40.00	-14.44	QP
H	92.7871	12.70	10.94	23.64	43.50	-19.86	QP
H	141.3298	10.91	13.26	24.17	43.50	-19.33	QP
H	279.0436	9.84	17.02	26.86	46.00	-19.14	QP
H	350.4768	12.52	17.62	30.14	46.00	-15.86	QP

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



3.2.8 TEST RESULTS (1GHz-18GHz)

EUT：	R1 EVO CAM	Model Name. ：	SP73
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 3.8V
Test Mode ：	TX (5.8G) -- 802.11a _5745~5825MHz		

Note:"802.11a (5G)" mode is the worst mode.

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5745 MHz)-Above 1G									
Vertical	4105.788	60.93	5.94	35.40	44.00	58.27	74.00	-15.73	Pk
Vertical	4105.788	43.17	5.94	35.40	44.00	40.51	54.00	-13.49	AV
Vertical	11490.000	58.28	8.46	39.75	44.50	61.99	74.00	-12.01	Pk
Vertical	11490.000	40.68	8.46	39.75	44.50	44.39	54.00	-9.61	AV
Vertical	17235.000	49.20	10.12	38.80	44.10	54.02	74.00	-19.98	Pk
Vertical	17235.000	39.52	10.12	38.80	42.70	45.74	54.00	-8.26	AV
Horizontal	3944.056	57.45	5.94	35.18	44.00	54.57	74.00	-19.43	Pk
Horizontal	3944.056	40.23	5.94	35.18	44.00	37.35	54.00	-16.65	AV
Horizontal	11490.000	56.41	8.46	38.71	44.50	59.08	74.00	-14.92	Pk
Horizontal	11490.000	40.13	8.46	38.71	44.50	42.80	54.00	-11.20	AV
Horizontal	17235.000	59.85	10.12	38.38	44.10	64.25	74.00	-9.75	Pk
Horizontal	17235.000	37.14	10.12	38.38	44.10	41.54	54.00	-12.46	AV
middle Channel (5785 MHz)-Above 1G									
Vertical	3944.066	61.55	6.48	36.35	44.05	60.33	74.00	-13.67	Pk
Vertical	3944.066	41.75	6.48	36.35	44.05	40.53	54.00	-13.47	AV
Vertical	11570.000	57.44	8.47	37.88	44.51	59.28	74.00	-14.72	Pk
Vertical	11570.000	41.88	8.47	37.88	44.51	43.72	54.00	-10.28	AV
Vertical	17355.000	58.63	10.12	38.80	44.10	63.45	74.00	-10.55	Pk
Vertical	17355.000	37.38	10.12	38.80	42.70	43.60	54.00	-10.40	AV
Horizontal	3712.854	58.04	6.48	36.37	44.05	56.84	74.00	-17.16	Pk
Horizontal	3712.854	40.68	6.48	36.37	44.05	39.48	54.00	-14.52	AV
Horizontal	11570.000	58.87	8.47	38.64	44.50	61.48	74.00	-12.52	Pk
Horizontal	11570.000	41.62	8.47	38.64	44.50	44.23	54.00	-9.77	AV
Horizontal	17355.000	58.84	10.12	38.38	44.10	63.24	74.00	-10.76	Pk
Horizontal	17355.000	40.14	10.12	38.38	44.10	44.54	54.00	-9.46	AV
High Channel (5825 MHz)-Above 1G									
Vertical	4105.669	59.81	7.10	37.24	43.50	60.65	74.00	-13.35	Pk
Vertical	4105.669	41.17	7.10	37.24	43.50	42.01	54.00	-11.99	AV
Vertical	11650.000	59.56	8.46	37.68	44.50	61.20	74.00	-12.80	Pk
Vertical	11650.000	40.99	8.46	37.68	44.50	42.63	54.00	-11.37	AV
Vertical	17475.000	58.59	10.12	38.80	44.10	63.41	74.00	-10.59	Pk
Vertical	17475.000	37.94	10.12	38.80	42.70	44.16	54.00	-9.84	AV
Horizontal	3551.364	58.45	7.10	37.24	43.50	59.29	74.00	-14.71	Pk
Horizontal	3551.364	40.19	7.10	37.24	43.50	41.03	54.00	-12.97	AV
Horizontal	11650.000	57.71	8.46	38.57	44.50	60.24	74.00	-13.76	Pk
Horizontal	11650.000	39.27	8.46	38.57	44.50	41.80	54.00	-12.20	AV
Horizontal	17475.000	58.04	10.12	38.38	44.10	62.44	74.00	-11.56	Pk
Horizontal	17475.000	39.94	10.12	38.38	44.10	44.34	54.00	-9.66	AV

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

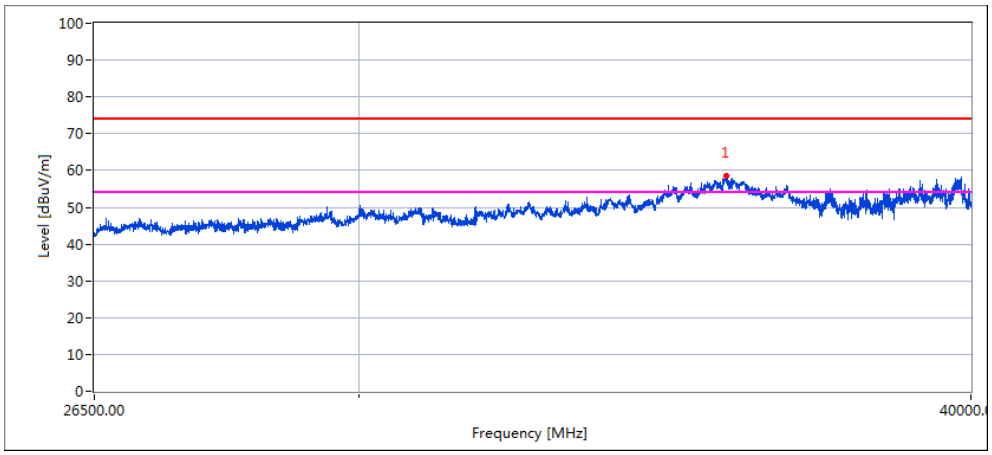
3.2.9 TEST RESULTS (18GHz-40GHz)

EUT：	R1 EVO CAM	Model Name. ：	SP73
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 3.8V
Test Mode ：	TX (5.8G)-802.11a 5745MHz~5825MHz		

All the modulation modes have been tested, and the worst result was report as below:

Low Channel (5745 MHz)-Above 1G

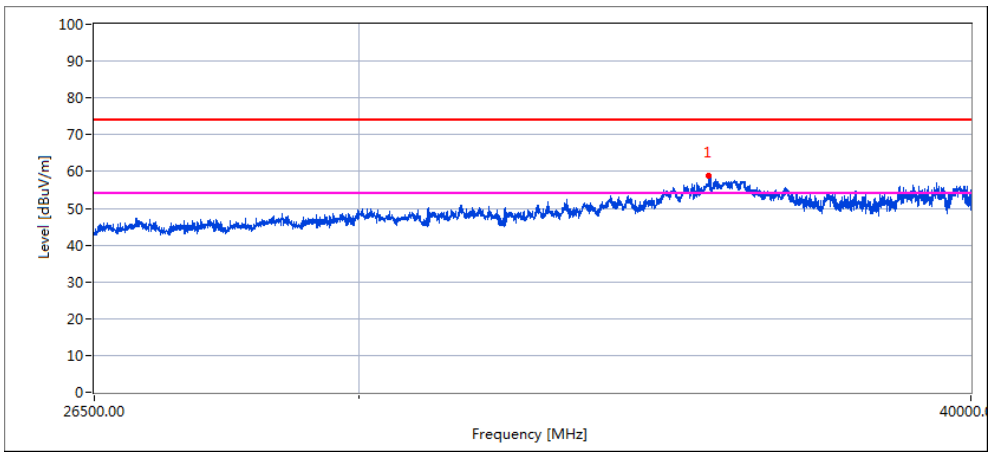
Horizontal



Measurement Result:

Frequency MHz	Pre-scan Level Max dBuV/m	Final Test Level Max dBuV/m	Limit Max dBuV/m	Margin dB	Remark
35656.387	58.8	48.4	74.0	25.6	Peak
35656.387	43.4	43.2	54.0	10.8	AVG

Vertical

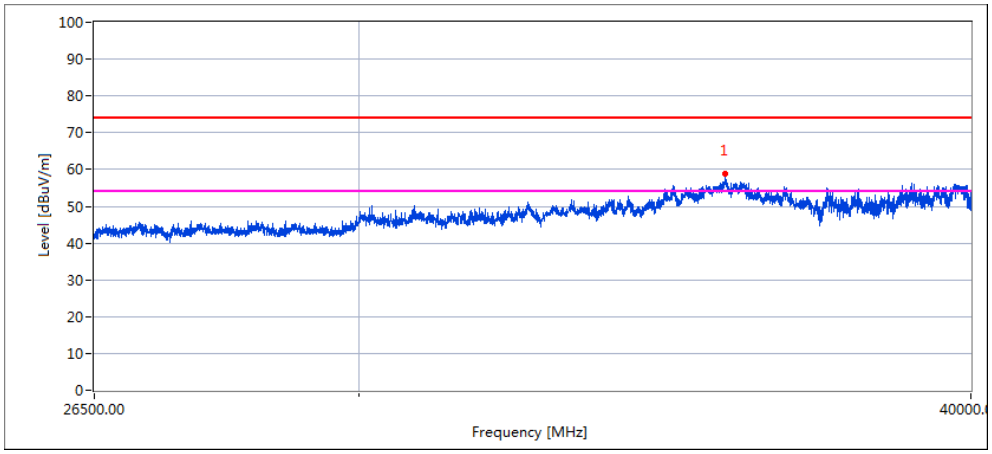


Measurement Result:

Frequency MHz	Pre-scan Level Max dBuV/m	Final Test Level Max dBuV/m	Limit Max dBuV/m	Margin dB	Remark
35415.356	58.6	54.3	74.0	19.7	Peak
35415.356	42.5	42.2	54.0	11.8	AVG

High Channel (5825 MHz)-Above 1G

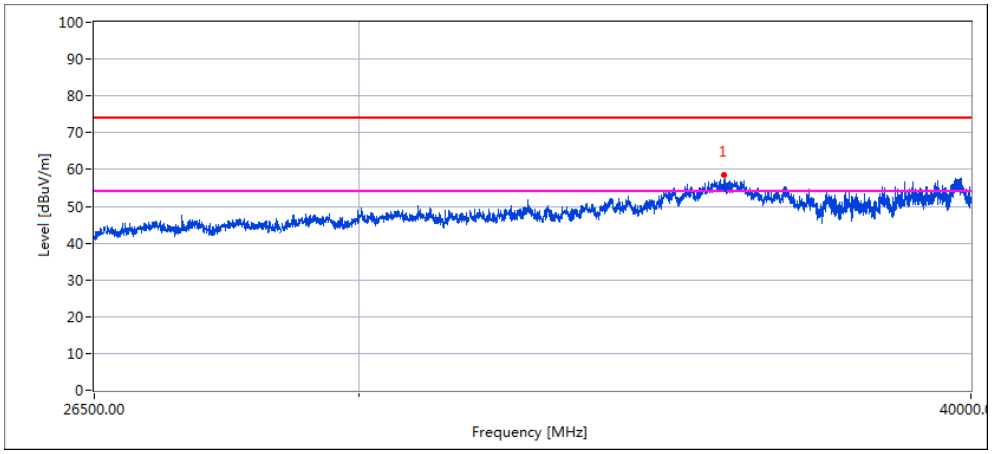
Horizontal



Measurement Result:

Frequency MHz	Pre-scan Level Max dBuV/m	Final Test Level Max dBuV/m	Limit Max dBuV/m	Margin dB	Remark
35632.225	59.3	56.7	74.0	17.3	Peak
35632.225	44.5	43.6	54.0	10.4	AVG

Vertical



Measurement Result:

Frequency MHz	Pre-scan Level Max dBuV/m	Final Test Level Max dBuV/m	Limit Max dBuV/m	Margin dB	Remark
35736.263	58.5	58.1	74.0	15.9	Peak
35736.263	43.8	43.3	54.0	10.7	AVG

3.3 POWER SPECTRAL DENSITY TEST

3.3.1 Applied procedures / limit

According to FCC §15.407(a)(3)

For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For client devices in the 5.15-5.25 GHz band, 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

(3)For the band 5.725-5.85 GHz, 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.

,

3.3.2 TEST PROCEDURE

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

a) Set RBW ≥ 1/T, where T is defined in section II.B.I.a).

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

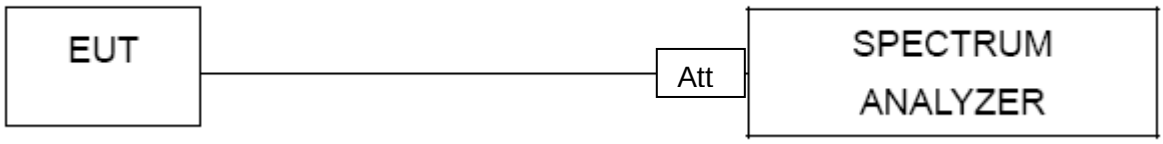
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections 5.c) and 5.d) above, since RBW=100 KHZ is available on nearly all spectrum analyzers.

3.3.3 DEVIATION FROM STANDARD

No deviation.

3.3.4 TEST SETUP



3.3.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

3.3.6 **TEST RESULTS**

EUT：	R1 EVO CAM	Model Name. ：	SP73
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1015 hPa	Test Voltage ：	DC 3.8V
Test Mode ：	TX Band IV (5725-5850MHz)		

Test data reference attachment.

3.4 26DB & 99% EMISSION BANDWIDTH

3.4.1 Applied procedures / limit

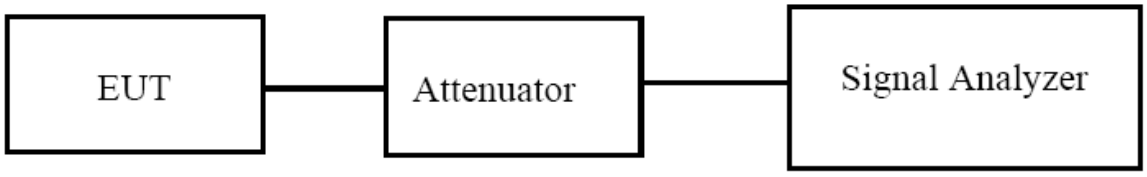
The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band 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.

3.4.2 TEST PROCEDURE

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%.

The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 · RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.



3.4.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.4.4 **TEST RESULTS**

EUT：	R1 EVO CAM	Model Name. ：	SP73
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 3.8V
Test Mode ：	TX Band IV (5725-5850MHz)		

Test data reference attachment.

3.5 MINIMUM 6 DB BANDWIDTH

3.5.1 Applied procedures / limit

According to FCC §15.407(e)
(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

3.5.2 TEST PROCEDURE

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a) Set RBW = 100 kHz.

b) Set the video bandwidth (VBW) ≥ 3 × RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

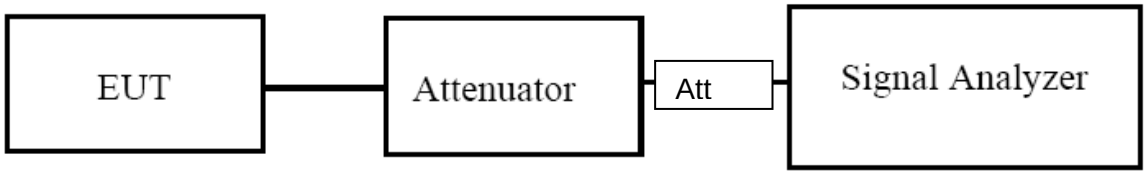
f) Allow the trace to stabilize.

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.

3.5.3 DEVIATION FROM STANDARD

No deviation.

3.5.4 TEST SETUP



3.5.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.5.6 TEST RESULTS

EUT：	R1 EVO CAM	Model Name. ：	SP73
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 3.8V
Test Mode ：	TX (5G) Mode Frequency Band IV (5725-5850MHz)		

Test data reference attachment.

3.6 MAXIMUM CONDUCTED OUTPUT POWER

3.6.1 PPLIED PROCEDURES / LIMIT

According to FCC §15.407

The maximum conduced output power should not exceed:

Frequency Band(MHz)	Limit
5150~5250	250mW
5725~5850	1W

3.6.2 TEST PROCEDURE

· Maximum conducted output power may be measured using a spectrum analyzer/EMI receiver or an RF power meter.

1. Device Configuration

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).

a) The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

2. Measurement using a Spectrum Analyzer or EMI Receiver (SA)

Measurement of maximum conducted output power using a spectrum analyzer requires integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99-percent occupied bandwidth of the signal.1 However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with § 15.407(a).

a) The test method shall be selected as follows: (i) Method SA-1 or SA-1 Alternative (averaging with the EUT transmitting at full power throughout each sweep) shall be applied if either of the following conditions can be satisfied:

• The EUT transmits continuously (or with a duty cycle ≥ 98 percent).

• Sweep triggering or gating can be implemented in a way that the device transmits at the maximum power control level throughout the duration of each of the instrument sweeps to be averaged. This condition can generally be achieved by triggering the instrument's sweep if the duration of the sweep (with the analyzer configured as in Method SA-1, below) is equal to or shorter than the duration T of each transmission from the EUT and if those transmissions exhibit full power throughout their durations.

(ii) Method SA-2 or SA-2 Alternative (averaging across on and off times of the EUT transmissions, followed by duty cycle correction) shall be applied if the conditions of (i) cannot be achieved and the transmissions exhibit a constant duty cycle during the measurement duration. Duty cycle will be considered to be constant if variations are less than ± 2 percent.

(iii) Method SA-3 (RMS detection with max hold) or SA-3 Alternative (reduced VBW with max hold) shall be applied if the conditions of (i) and (ii) cannot be achieved.

b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(ii) Set RBW = 1 MHz.

(iii) Set VBW ≥ 3 MHz.

(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)

(v) Sweep time = auto.

(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".

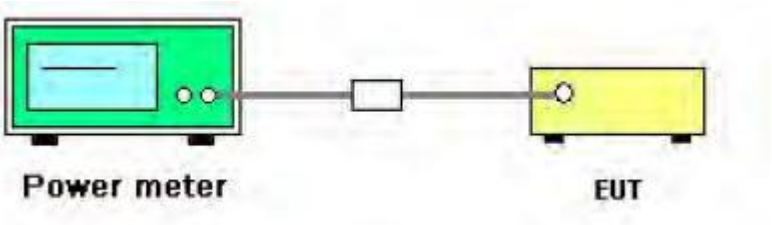
(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum

3.6.3 DEVIATION FROM STANDARD

No deviation.

3.6.4 TEST SETUP



3.6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.6.6 TEST RESULTS

EUT：	R1 EVO CAM	Model Name. ：	SP73
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 3.8V
Test Mode ：	TX (5G) Band IV (5725-5850MHz)		

Test data reference attachment.

3.7 OUT OF BAND EMISSIONS

3.7.1 Applicable Standard

According to FCC §15.407(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 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

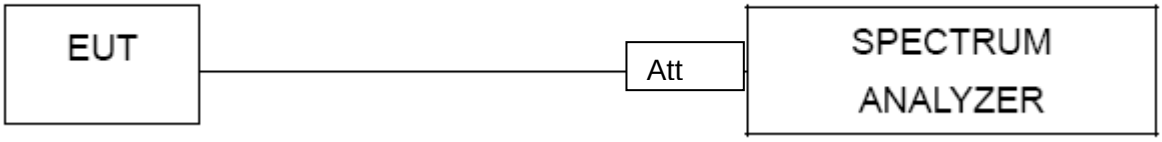
3.7.2 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

3.7.3 DEVIATION FROM STANDARD

No deviation.

3.7.4 TEST SETUP



3.7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.7.6 TEST RESULTS

EUT：	R1 EVO CAM	Model Name. ：	SP73
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 3.8V

Test data reference attachment.

3.8 SPURIOUS RF CONDUCTED EMISSIONS

3.8.1Conformance Limit

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

3.8.2Measuring Instruments

The Measuring equipment is listed in the section 6.3 of this test report.

3.8.3Test Setup

Please refer to Section 6.1 of this test report.

3.8.4Test Procedure

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBW= 300KHz to measure the peak field strength , and mwasure frequeny range from 9KHz to 26.5GHz.

3.8.5Test Results

Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

Test data reference attachment.

3.9 FREQUENCY STABILITY MEASUREMENT

3.9.1 LIMIT

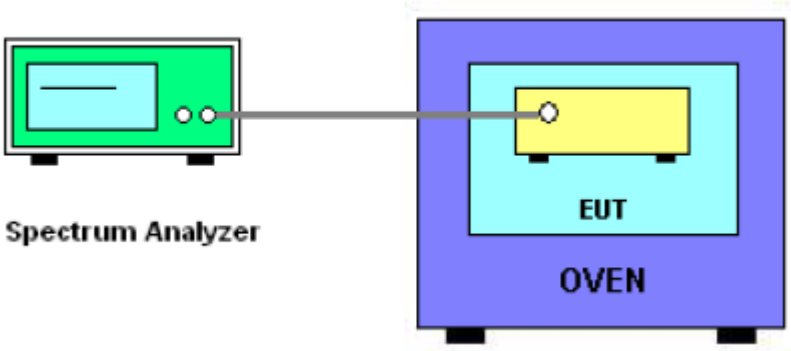
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

3.9.2 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10_6 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is -20°C~70°C.

3.9.3 TEST SETUP LAYOUT



3.9.4 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously un-modulation transmitting mode.

3.9.5 TEST RESULTS

EUT：	R1 EVO CAM	Model Name. ：	SP73
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 3.8V
Test Mode ：	TX Frequency(5745-5825MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.8	5745.00548	5745	0.00548	-0.9539
		V max (V)	4.4	5745.00483	5745	0.00483	-0.8407
		V min (V)	3.4	5745.00441	5745	0.00441	-0.7676
Limits				Within 5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.8	T (°C)	-20	5745.00645	5745	0.00645	-1.1227
		T (°C)	-10	5745.00161	5745	0.00161	-0.2802
		T (°C)	0	5745.00440	5745	0.00440	-0.7659
		T (°C)	10	5745.00107	5745	0.00107	-0.1862
		T (°C)	20	5745.00902	5745	0.00902	-1.5701
		T (°C)	30	5745.00566	5745	0.00566	-0.9852
		T (°C)	40	5745.00085	5745	0.00085	-0.1480
		T (°C)	50	5745.00423	5745	0.00423	-0.7363
		T (°C)	60	5745.00121	5745	0.00121	-0.2106
		T (°C)	70	5745.00158	5745	0.00158	-0.2750
Limits				Within 5725-5850MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.8	5785.00157	5785	0.00157	-0.2714
		V max (V)	4.4	5785.00432	5785	0.00432	-0.7468
		V min (V)	3.4	5785.00659	5785	0.00659	-1.1392
Limits				Within 5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.8	T (°C)	-20	5785.00731	5785	0.00731	-1.2636
		T (°C)	-10	5785.00880	5785	0.00880	-1.5212
		T (°C)	0	5785.00469	5785	0.00469	-0.8107
		T (°C)	10	5785.00895	5785	0.00895	-1.5471
		T (°C)	20	5785.00611	5785	0.00611	-1.0562
		T (°C)	30	5785.00422	5785	0.00422	-0.7295
		T (°C)	40	5785.00103	5785	0.00103	-0.1786
		T (°C)	50	5785.00607	5785	0.00607	-1.0493
		T (°C)	60	5785.00959	5785	0.00959	-1.6577
		T (°C)	70	5785.00497	5785	0.00497	-0.8591
Limits				Within 5725-5850MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.8	5825.00067	5825	0.00067	-0.1150
		V max (V)	4.4	5825.00468	5825	0.00468	-0.8034
		V min (V)	3.4	5825.00408	5825	0.00408	-0.7004
Limits				Within 5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.8	T (°C)	-20	5825.00204	5825	0.00204	-0.3502
		T (°C)	-10	5825.00469	5825	0.00469	-0.8052
		T (°C)	0	5825.00561	5825	0.00561	-0.9631
		T (°C)	10	5825.00613	5825	0.00613	-1.0524
		T (°C)	20	5825.00125	5825	0.00125	-0.2146
		T (°C)	30	5825.00712	5825	0.00712	-1.2223
		T (°C)	40	5825.00496	5825	0.00496	-0.8515
		T (°C)	50	5825.00964	5825	0.00964	-1.6549
		T (°C)	60	5825.00626	5825	0.00626	-1.0747
		T (°C)	70	5825.00122	5825	0.00122	-0.2094
Limits				Within 5725-5850MHz			
Result				Complies			

4. ANTENNA REQUIREMENT

4.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, 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.

4.2 EUT ANTENNA

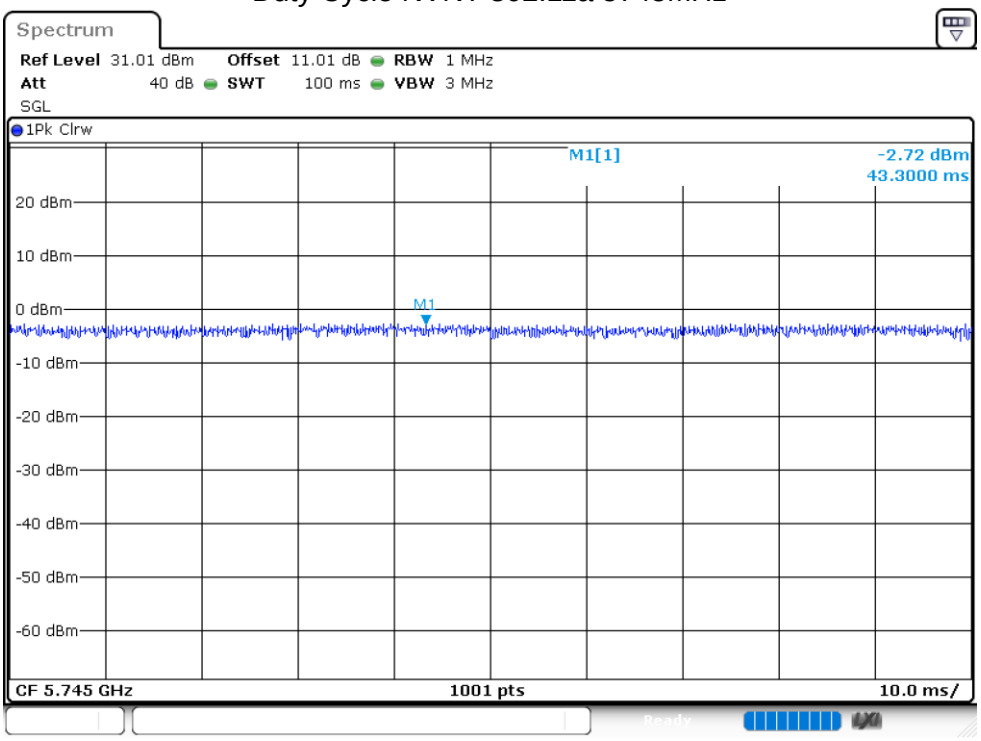
The EUT antenna is permanent attached Chip antenna (antenna gain: 0.5dBi). It comply with the standard requirement.

5. TEST RESULTS

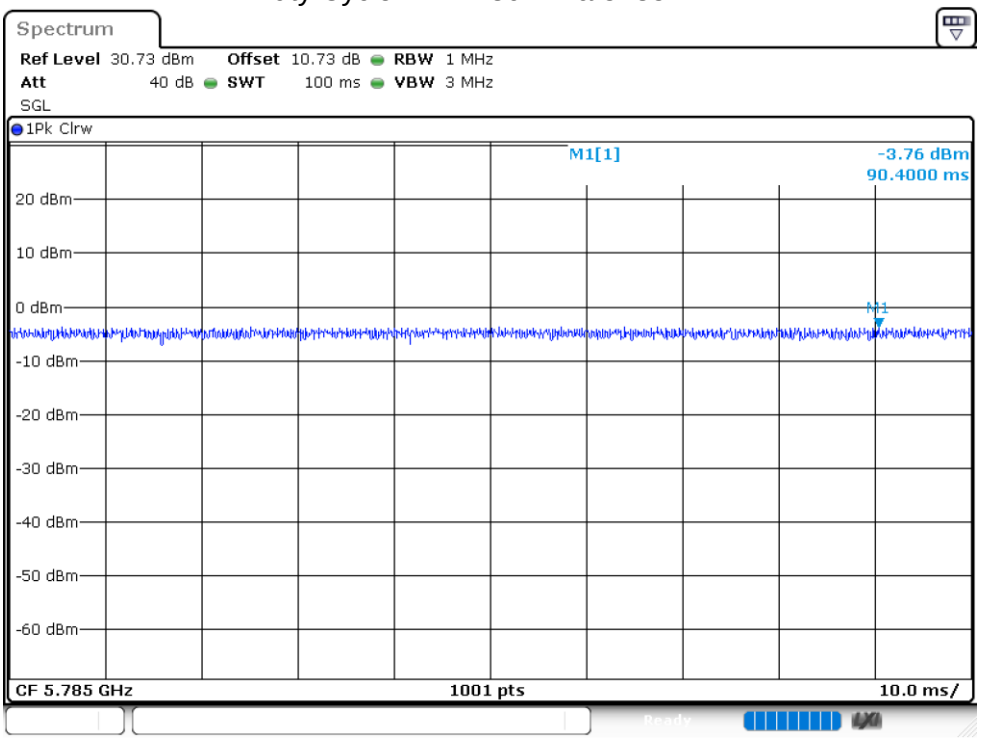
5.1 DUTY CYCLE

Condition	Mode	Frequency (MHz)	Duty Cycle (%)
NVNT	802.11a	5745	100
NVNT	802.11a	5785	100
NVNT	802.11a	5825	100
NVNT	802.11n(HT20)	5745	100
NVNT	802.11n(HT20)	5785	100
NVNT	802.11n(HT20)	5825	100
NVNT	802.11n(HT40)	5755	100
NVNT	802.11n(HT40)	5795	100

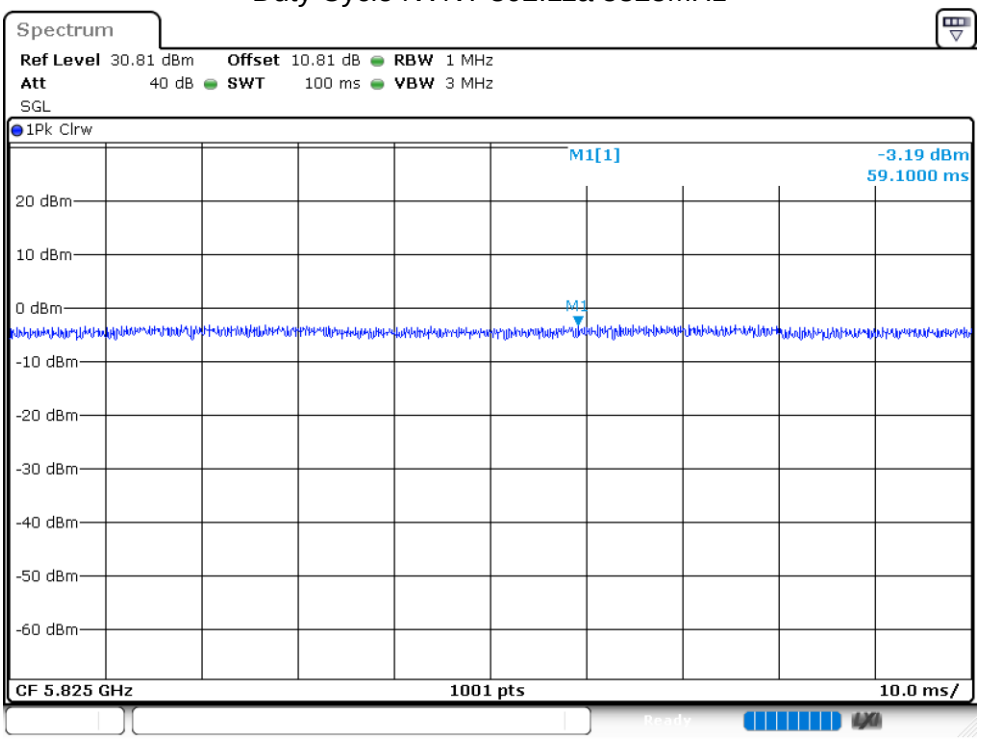
Duty Cycle NVNT 802.11a 5745MHz



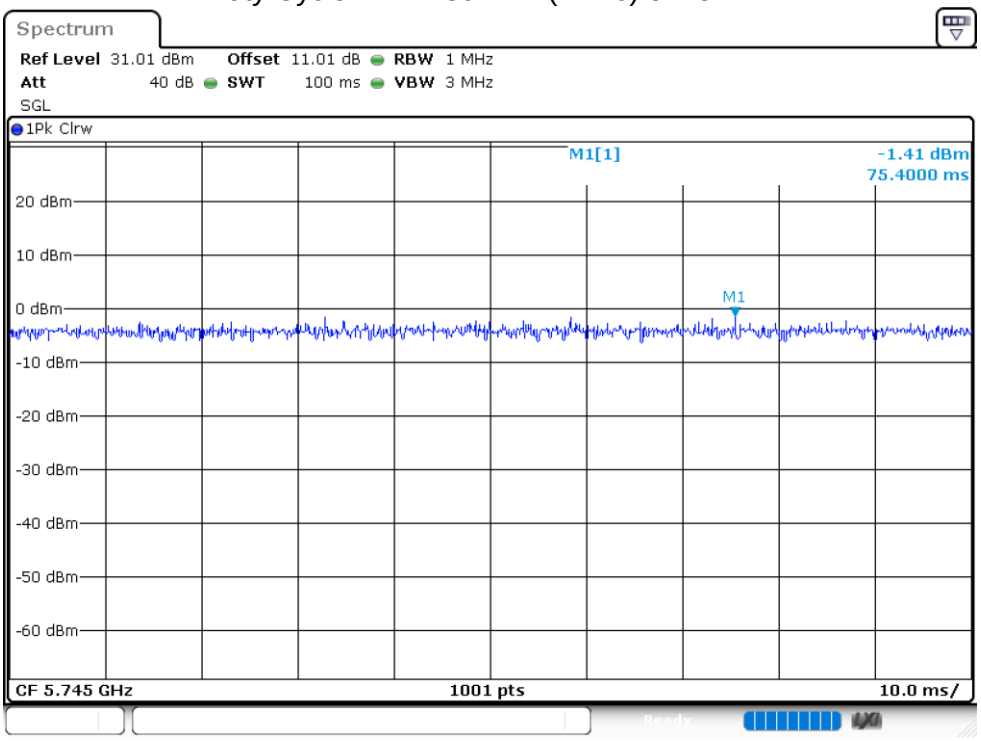
Duty Cycle NVNT 802.11a 5785MHz



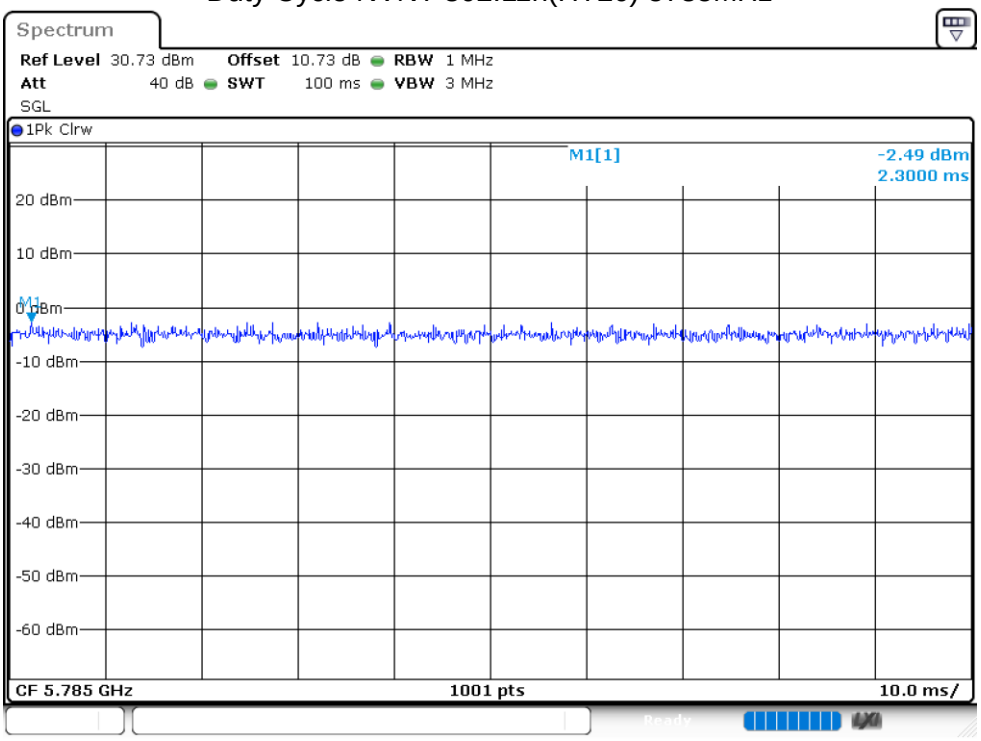
Duty Cycle NVNT 802.11a 5825MHz



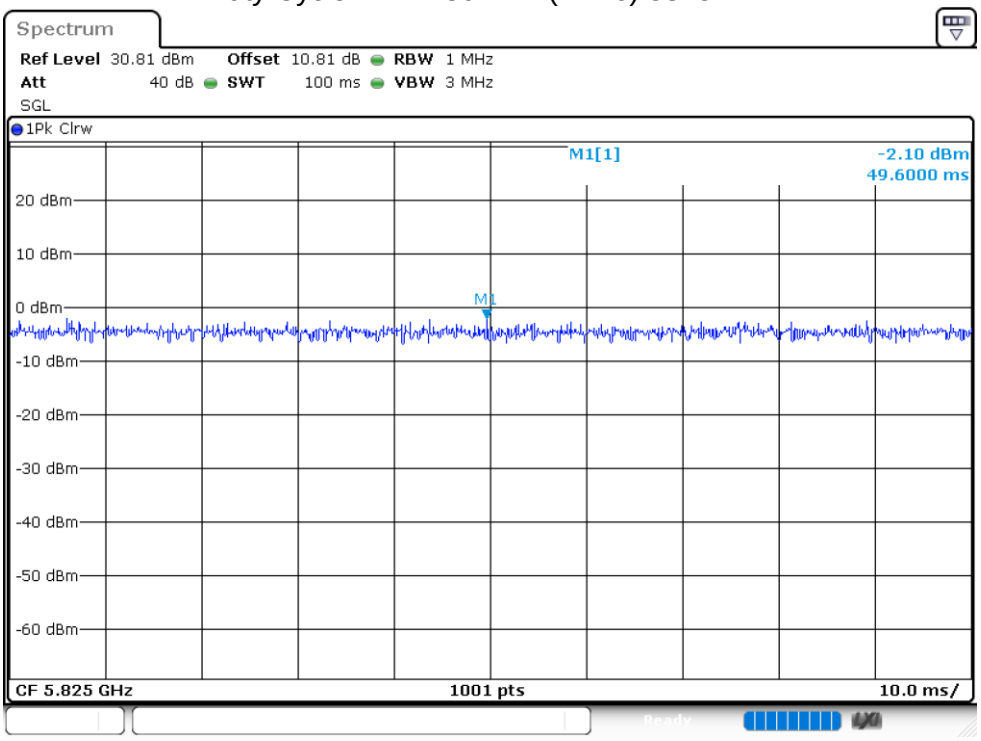
Duty Cycle NVNT 802.11n(HT20) 5745MHz



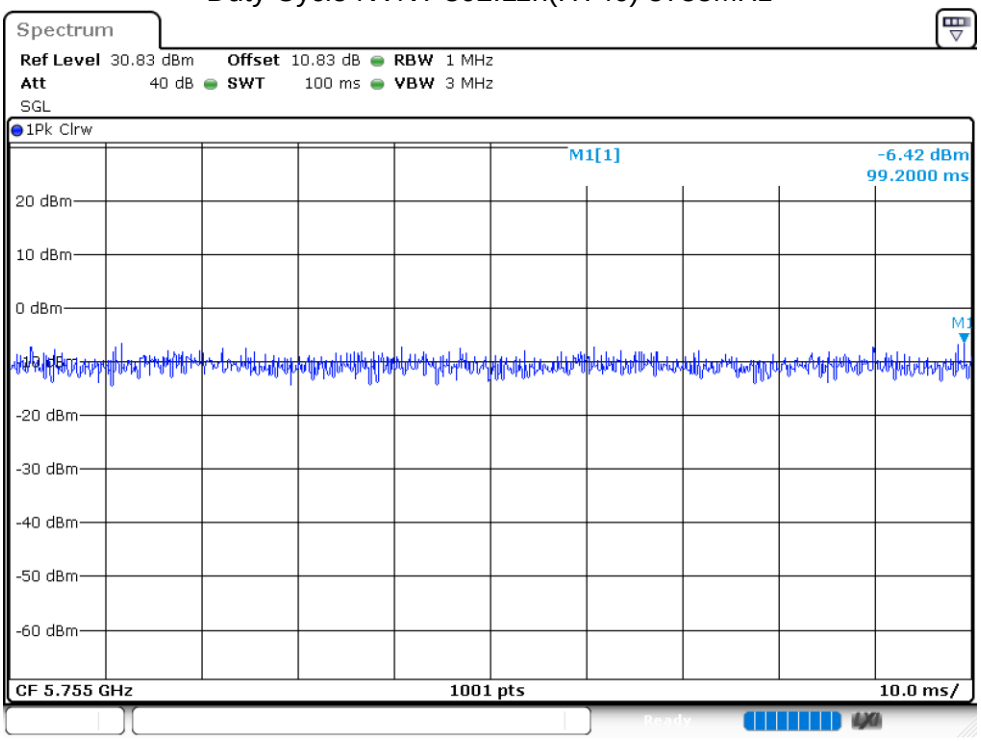
Duty Cycle NVNT 802.11n(HT20) 5785MHz



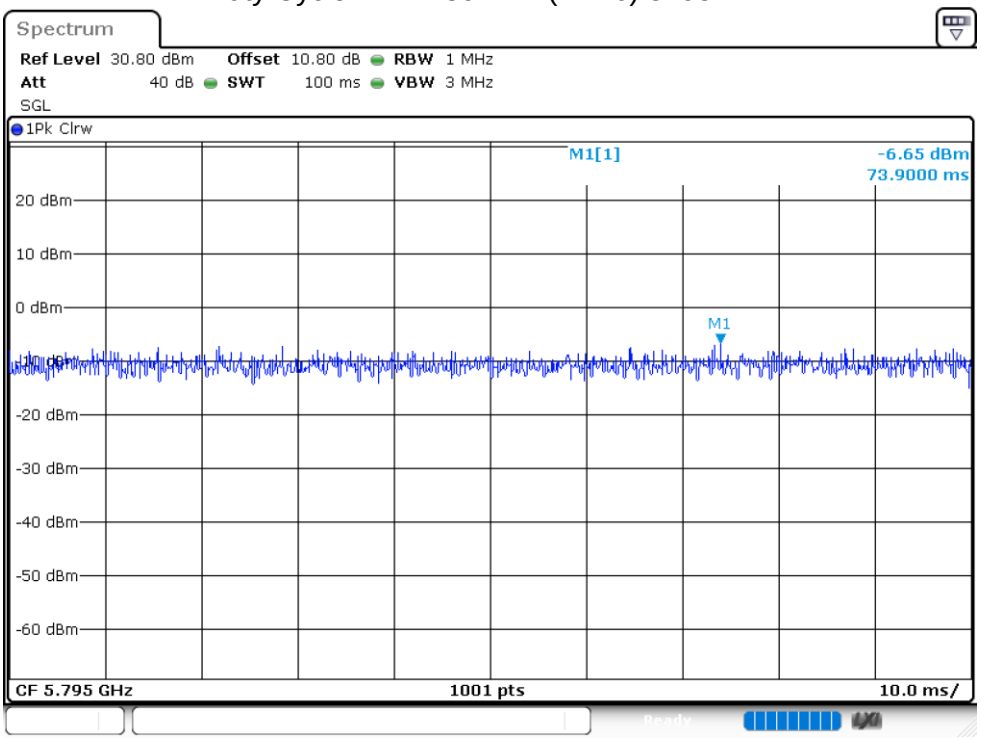
Duty Cycle NVNT 802.11n(HT20) 5825MHz



Duty Cycle NVNT 802.11n(HT40) 5755MHz



Duty Cycle NVNT 802.11n(HT40) 5795MHz



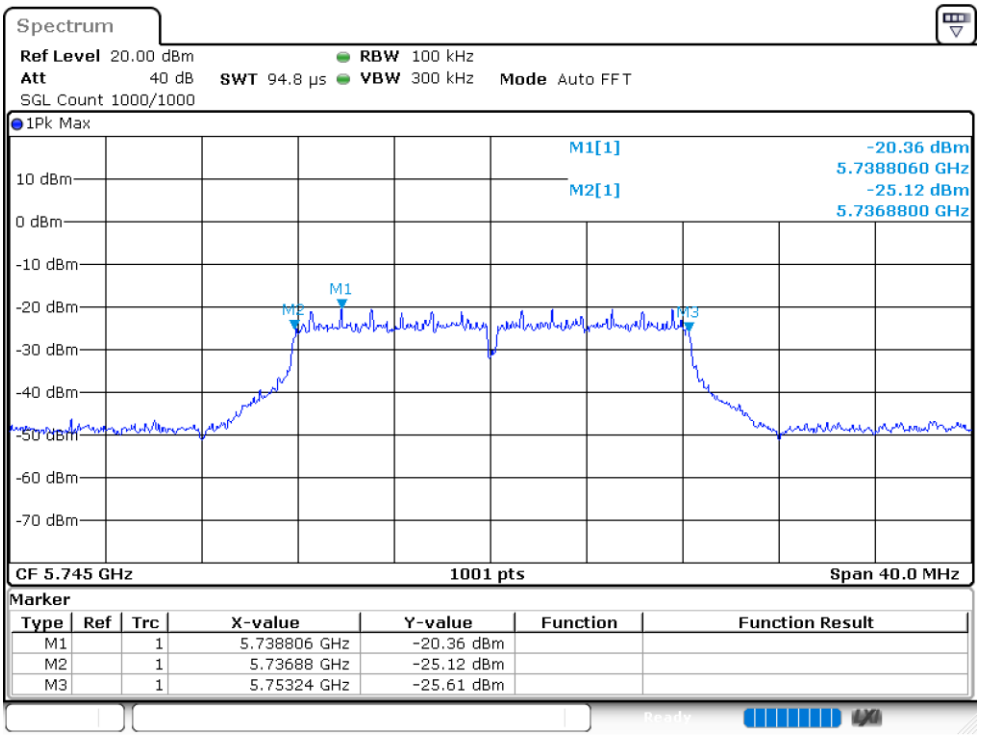
5.2 MAXIMUM CONDUCTED OUTPUT POWER

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	802.11a	5745	Ant 1	0.94	30	Pass
NVNT	802.11a	5785	Ant 1	0.59	30	Pass
NVNT	802.11a	5825	Ant 1	0.72	30	Pass
NVNT	802.11n(HT20)	5745	Ant 1	0.84	30	Pass
NVNT	802.11n(HT20)	5785	Ant 1	0.43	30	Pass
NVNT	802.11n(HT20)	5825	Ant 1	0.63	30	Pass
NVNT	802.11n(HT40)	5755	Ant 1	0.73	30	Pass
NVNT	802.11n(HT40)	5795	Ant 1	0.26	30	Pass

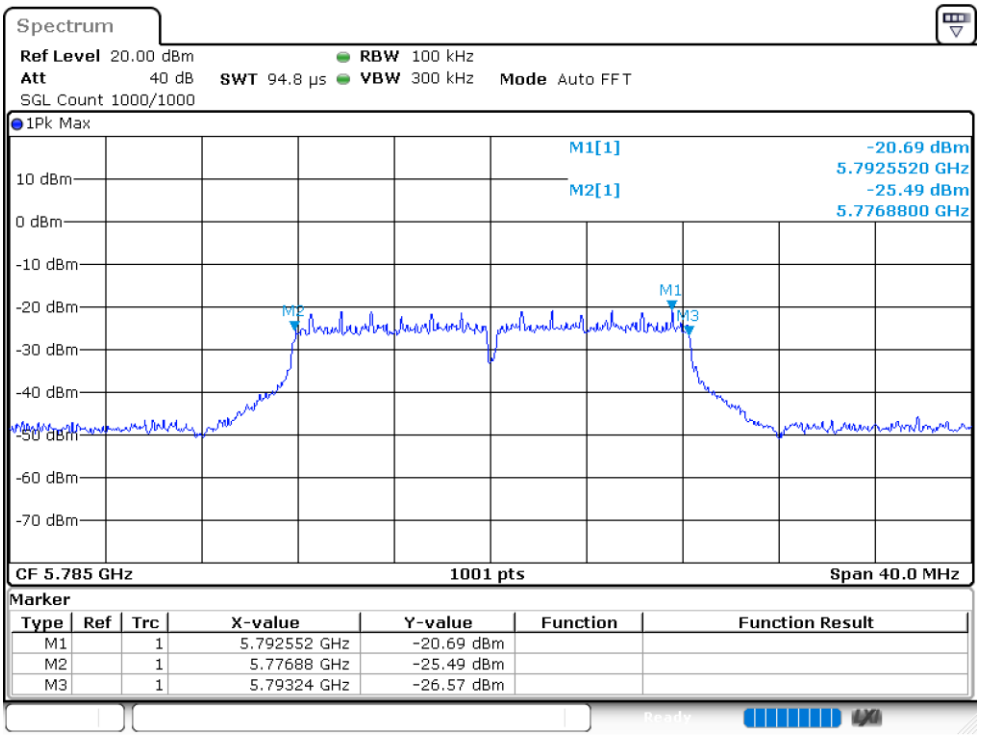
5.3 -6DB EMISSION BANDWIDTH

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	802.11a	5745	Ant 1	16.36	≥0.5	Pass
NVNT	802.11a	5785	Ant 1	16.36	≥0.5	Pass
NVNT	802.11a	5825	Ant 1	16.36	≥0.5	Pass
NVNT	802.11n(HT20)	5745	Ant 1	17.60	≥0.5	Pass
NVNT	802.11n(HT20)	5785	Ant 1	17.60	≥0.5	Pass
NVNT	802.11n(HT20)	5825	Ant 1	17.60	≥0.5	Pass
NVNT	802.11n(HT40)	5755	Ant 1	36.32	≥0.5	Pass
NVNT	802.11n(HT40)	5795	Ant 1	36.08	≥0.5	Pass

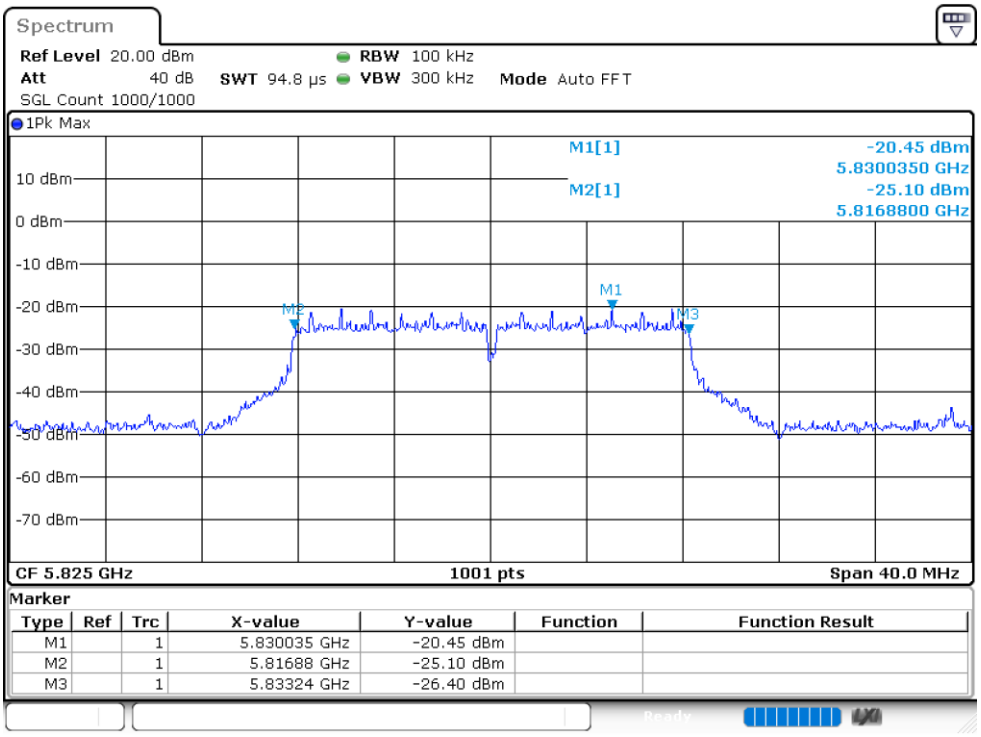
EBW NVNT 802.11a 5745MHz Ant1



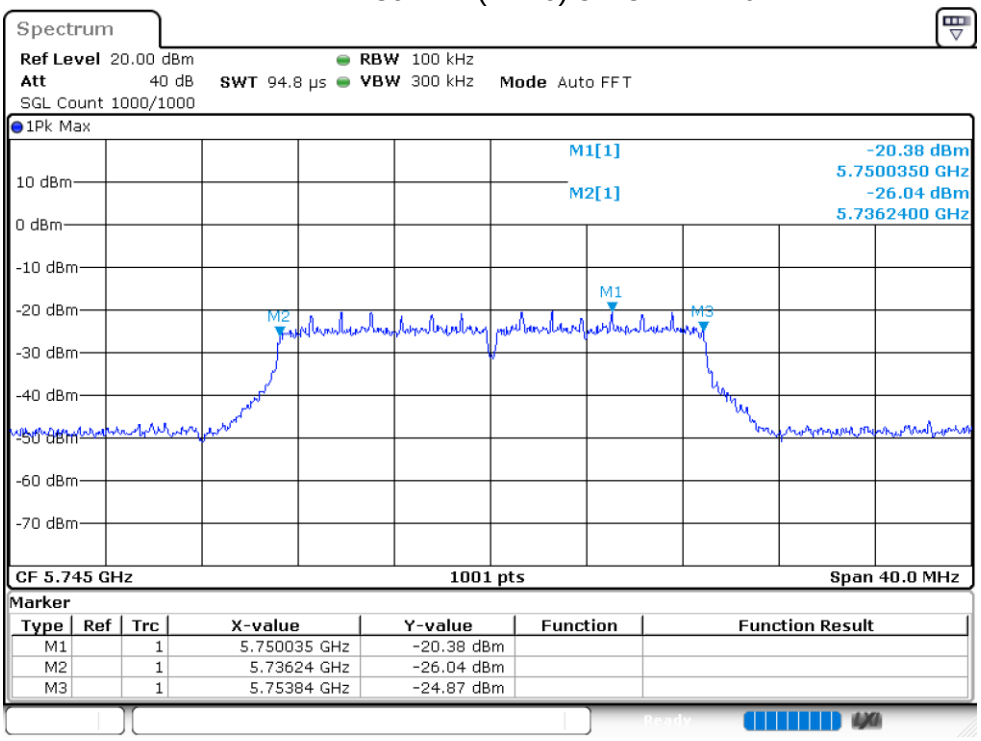
EBW NVNT 802.11a 5785MHz Ant1



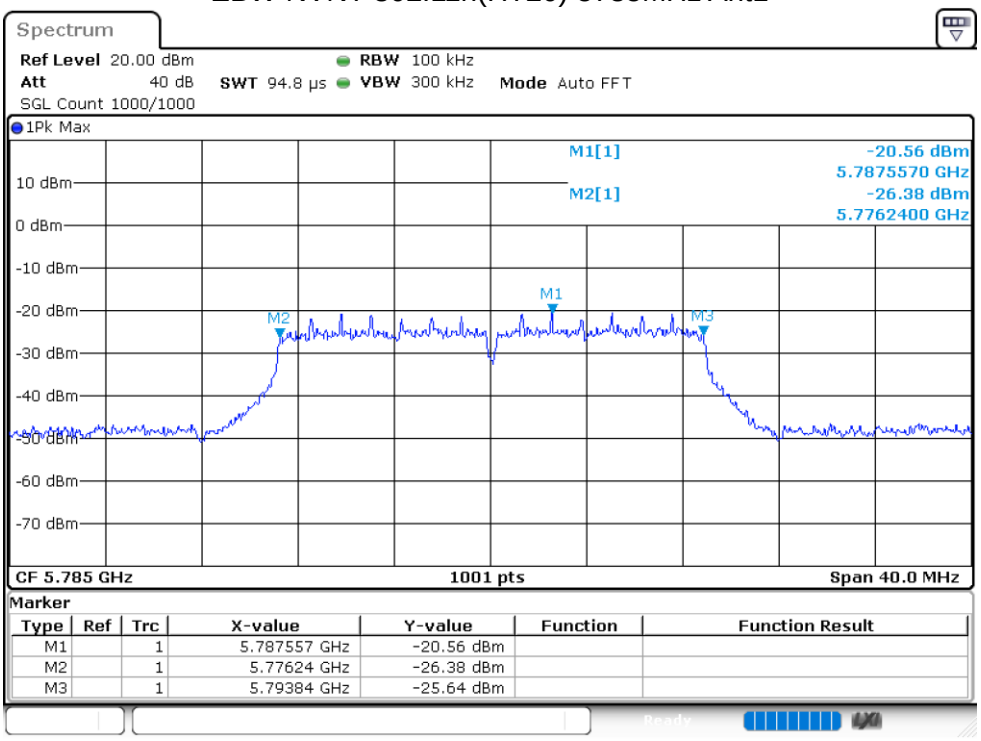
EBW NVNT 802.11a 5825MHz Ant1



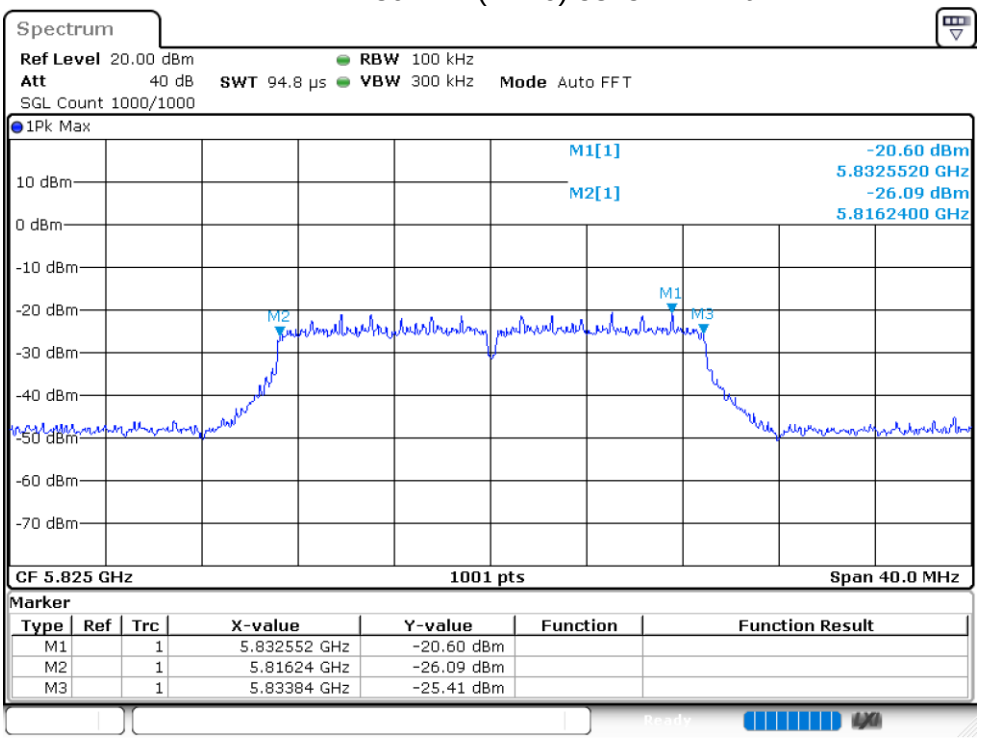
EBW NVNT 802.11n(HT20) 5745MHz Ant1



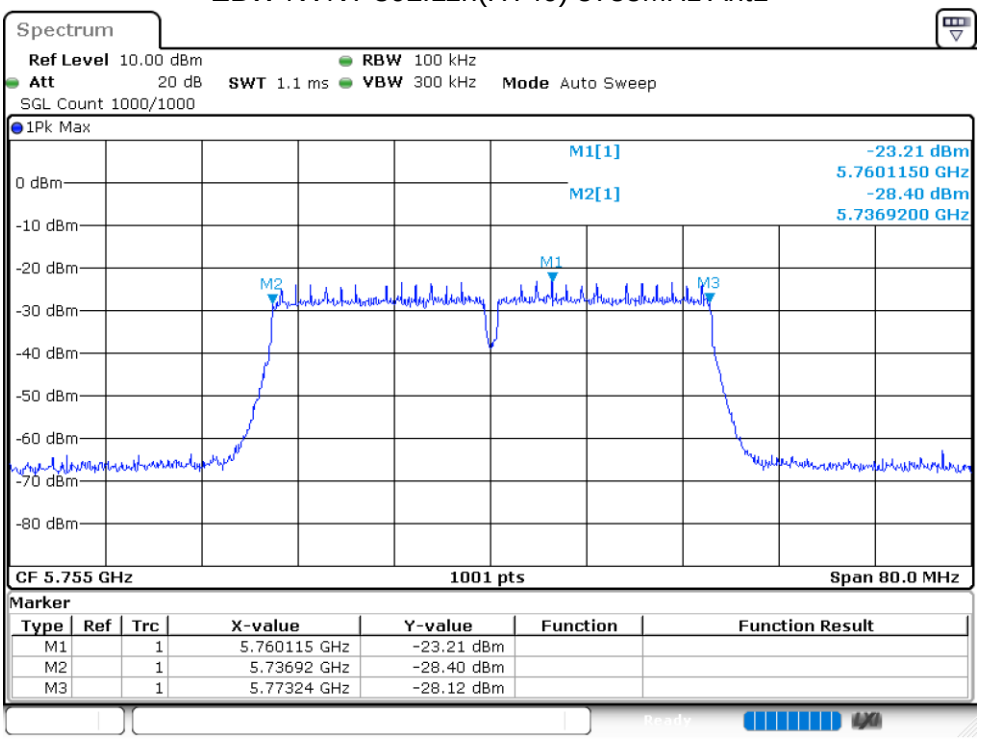
EBW NVNT 802.11n(HT20) 5785MHz Ant1



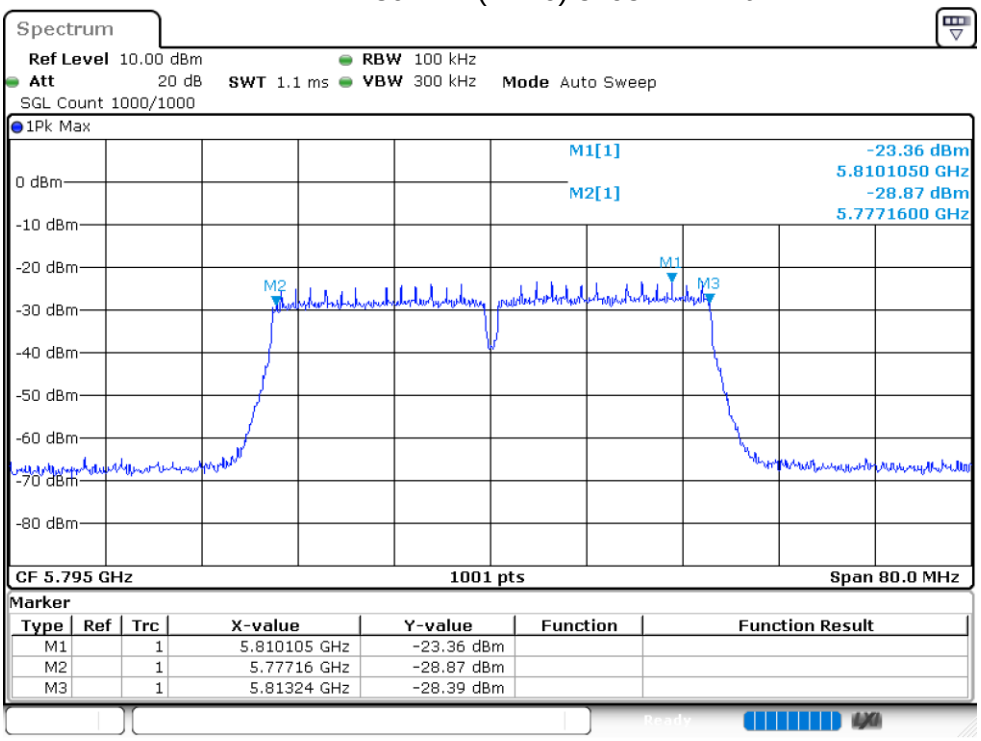
EBW NVNT 802.11n(HT20) 5825MHz Ant1



EBW NVNT 802.11n(HT40) 5755MHz Ant1



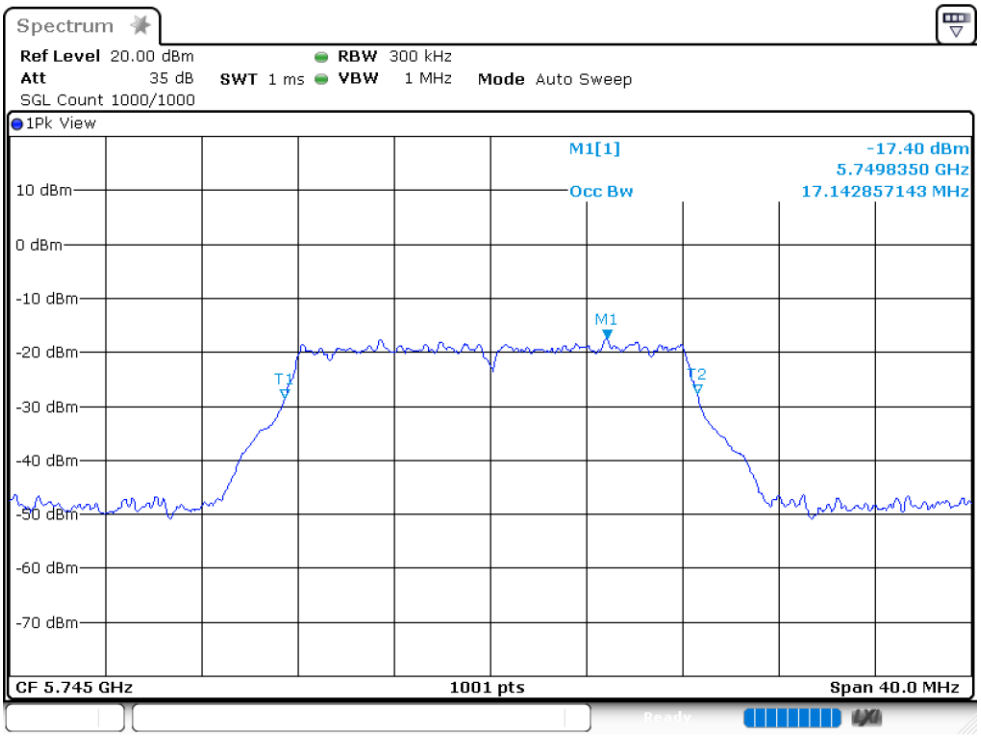
EBW NVNT 802.11n(HT40) 5795MHz Ant1



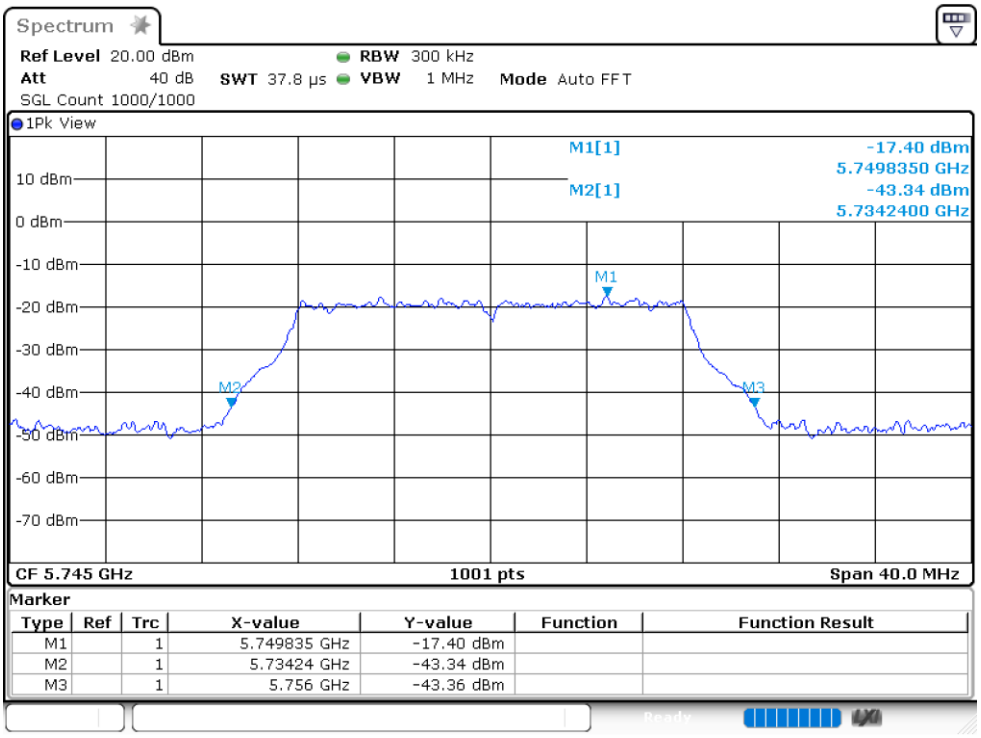
5.4 OCCUPIED CHANNEL BANDWIDTH

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)	-26 dB Bandwidth (MHz)	Limit -26 dB Bandwidth (MHz)	Verdict
NVNT	802.11a	5745	Ant 1	17.1429	21.76	≥0.5	Pass
NVNT	802.11a	5785	Ant 1	17.2627	22.44	≥0.5	Pass
NVNT	802.11a	5825	Ant 1	17.5025	21.88	≥0.5	Pass
NVNT	802.11n(HT20)	5745	Ant 1	18.4216	22.20	≥0.5	Pass
NVNT	802.11n(HT20)	5785	Ant 1	18.4216	22.24	≥0.5	Pass
NVNT	802.11n(HT20)	5825	Ant 1	18.3816	22.40	≥0.5	Pass
NVNT	802.11n(HT40)	5755	Ant 1	36.5235	40.16	≥0.5	Pass
NVNT	802.11n(HT40)	5795	Ant 1	36.4436	40.32	≥0.5	Pass

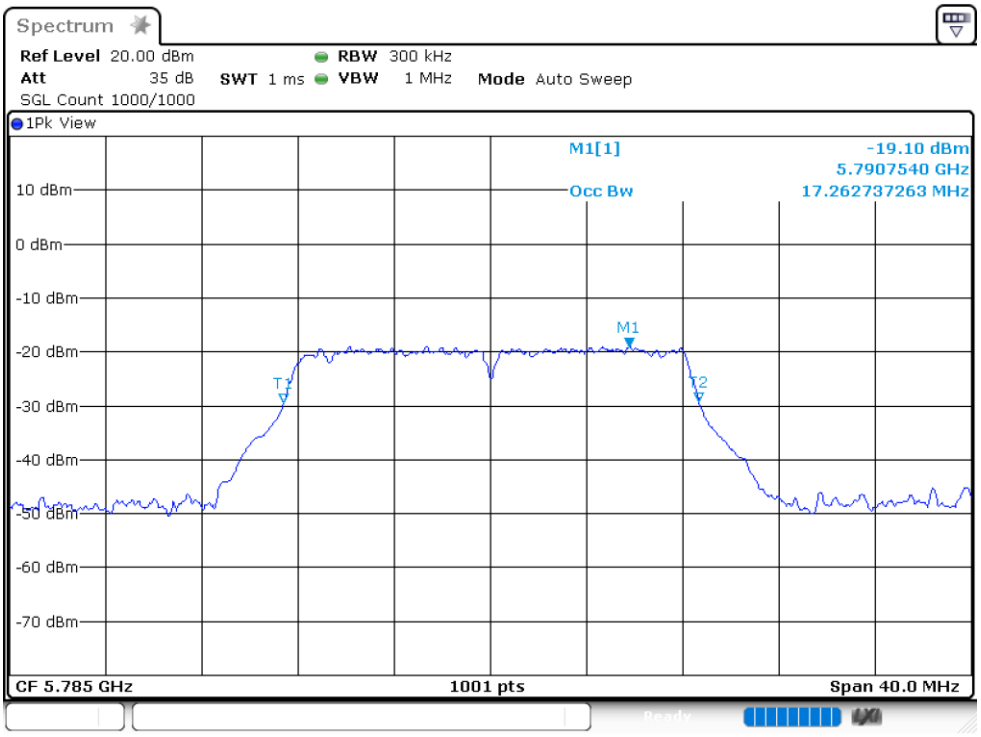
OBW NVNT 802.11a 5745MHz Ant1



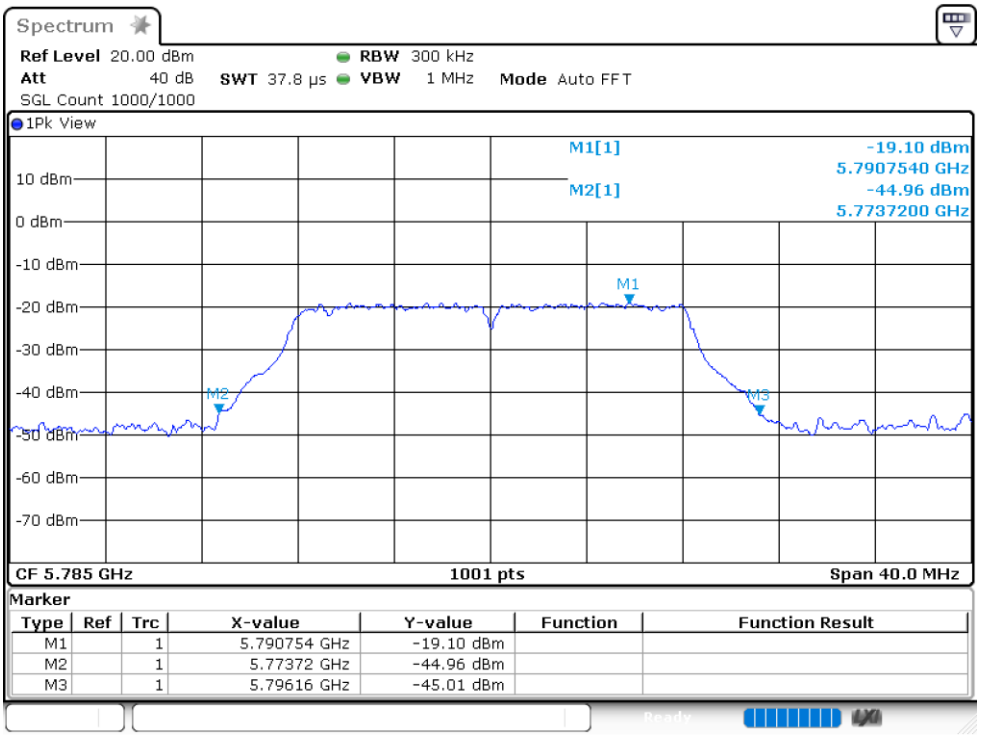
-26 dB BW NVNT 802.11a 5745MHz Ant1



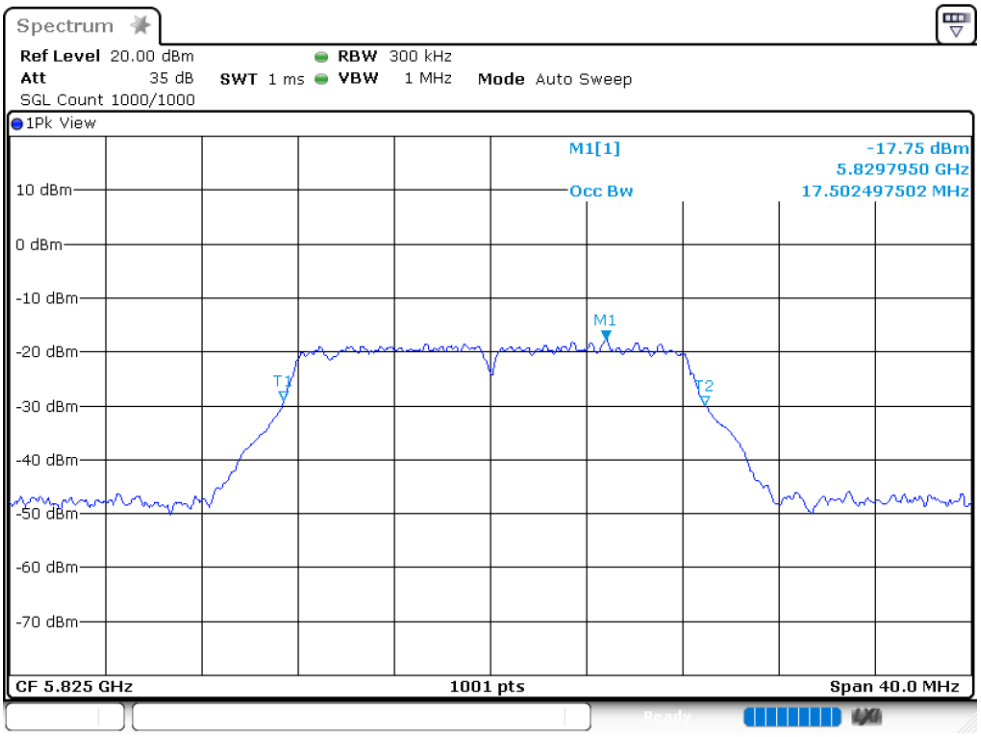
OBW NVNT 802.11a 5785MHz Ant1



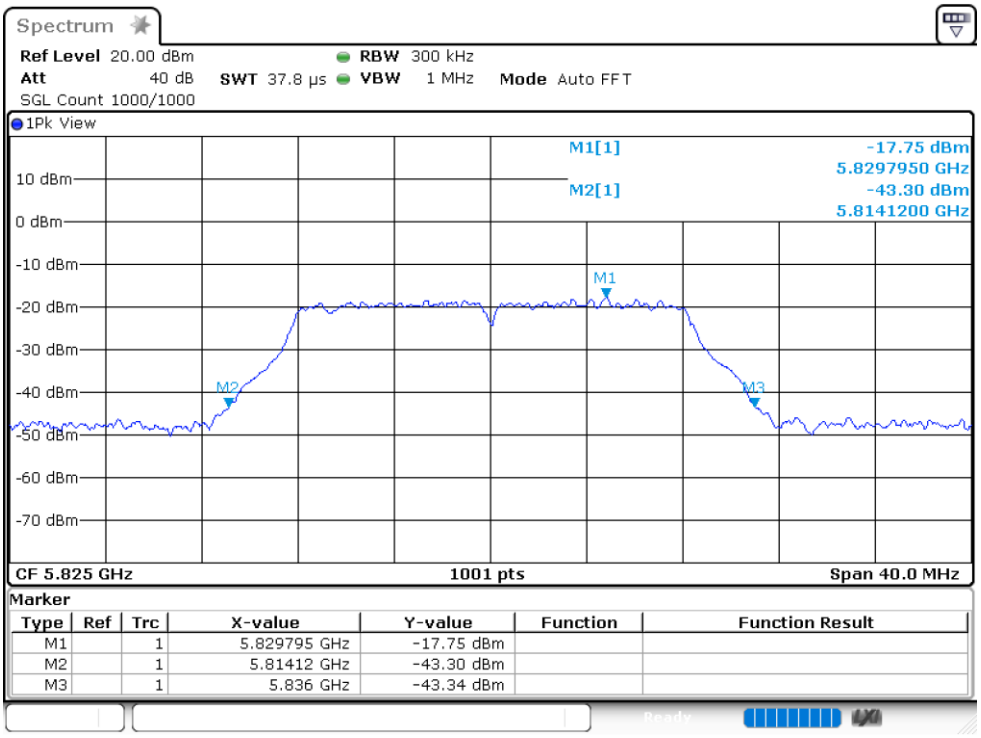
-26 dB BW NVNT 802.11a 5785MHz Ant1



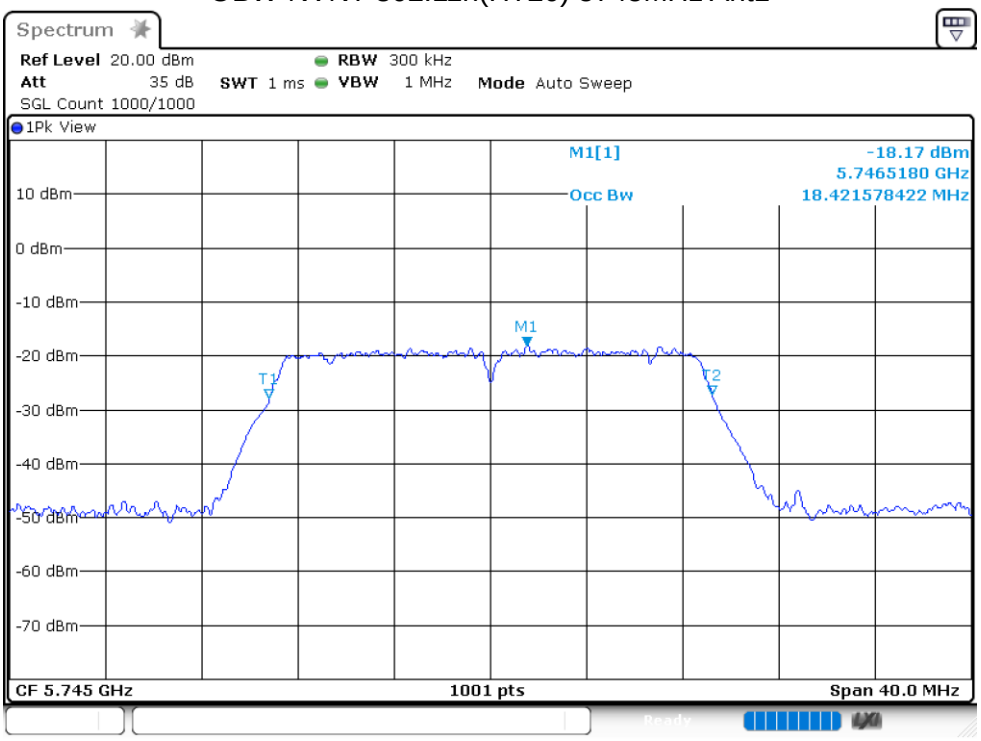
OBW NVNT 802.11a 5825MHz Ant1



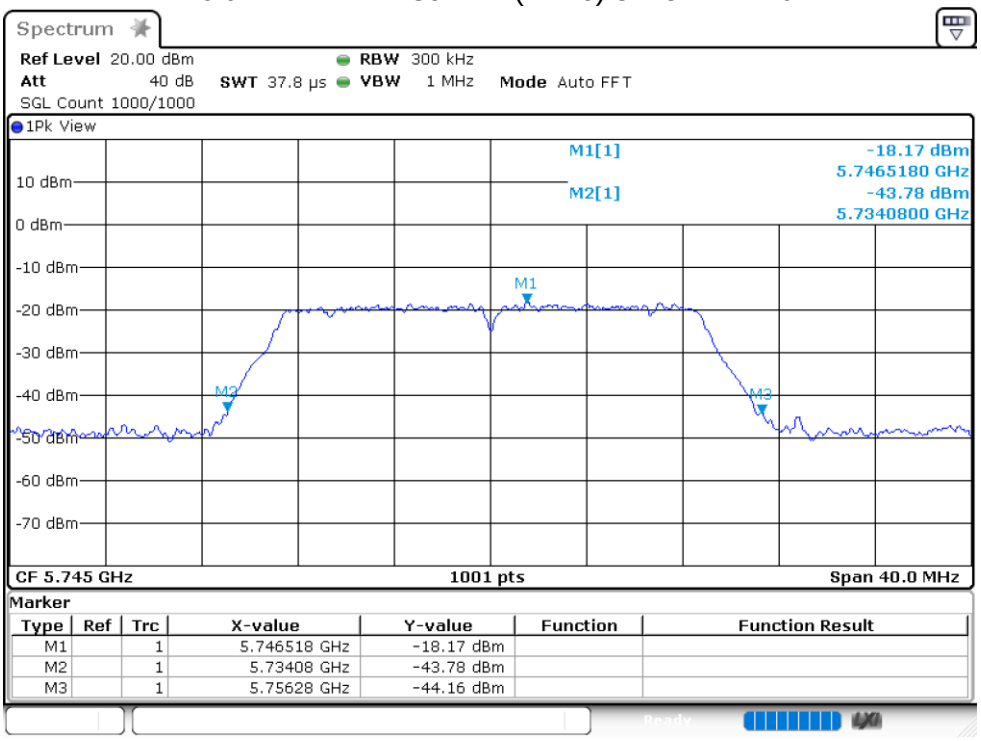
-26 dB BW NVNT 802.11a 5825MHz Ant1



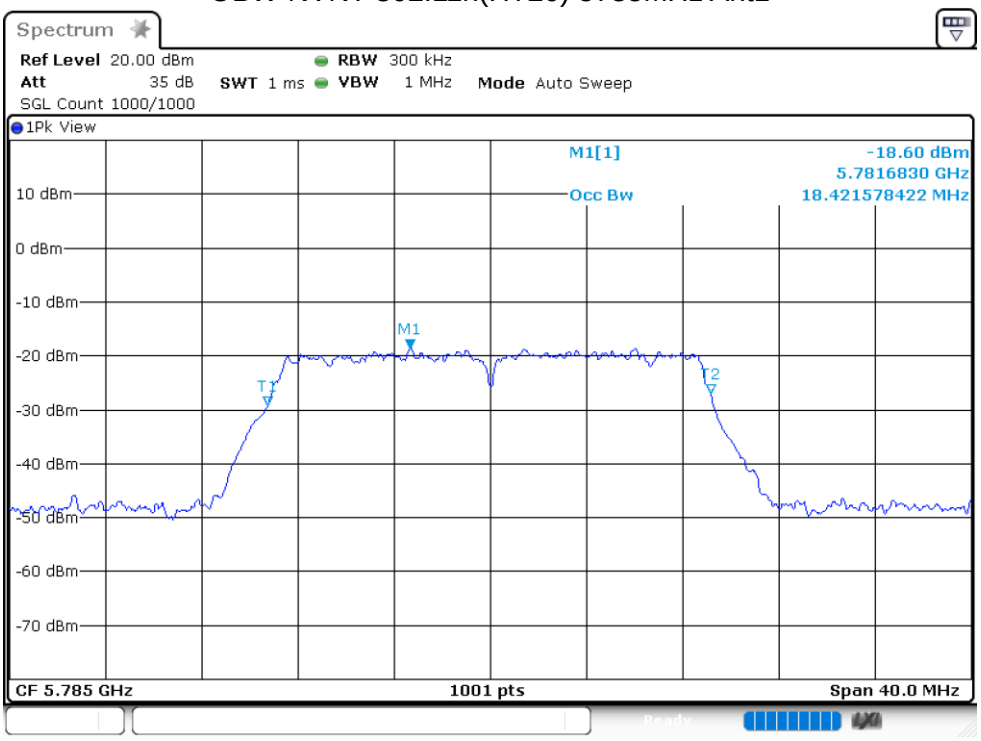
OBW NVNT 802.11n(HT20) 5745MHz Ant1



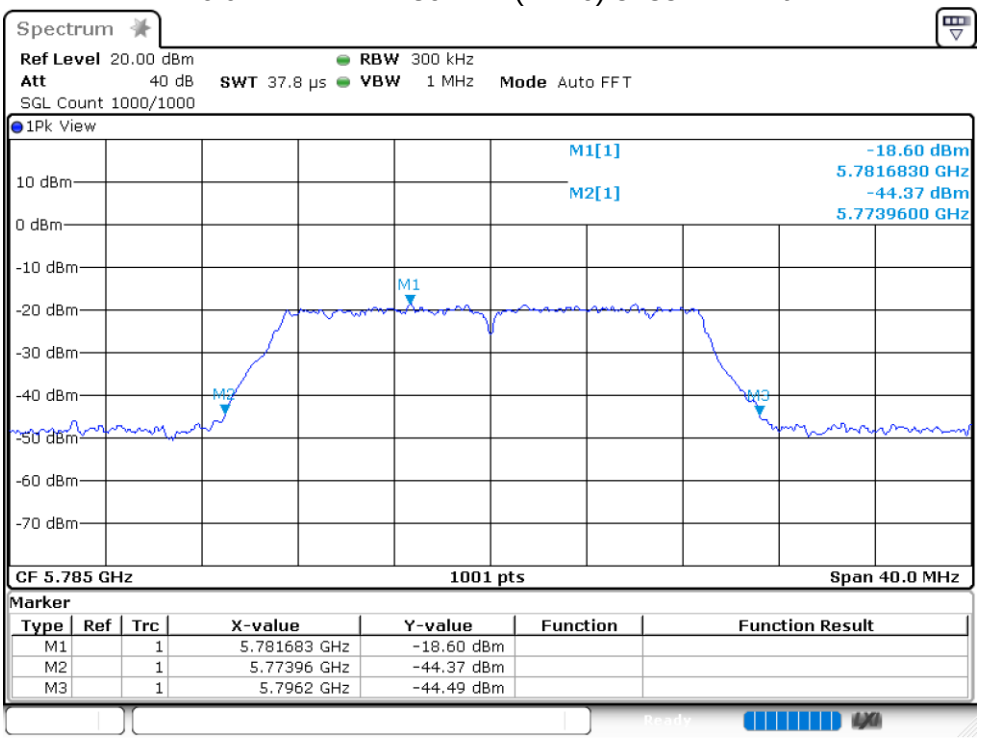
-26 dB BW NVNT 802.11n(HT20) 5745MHz Ant1



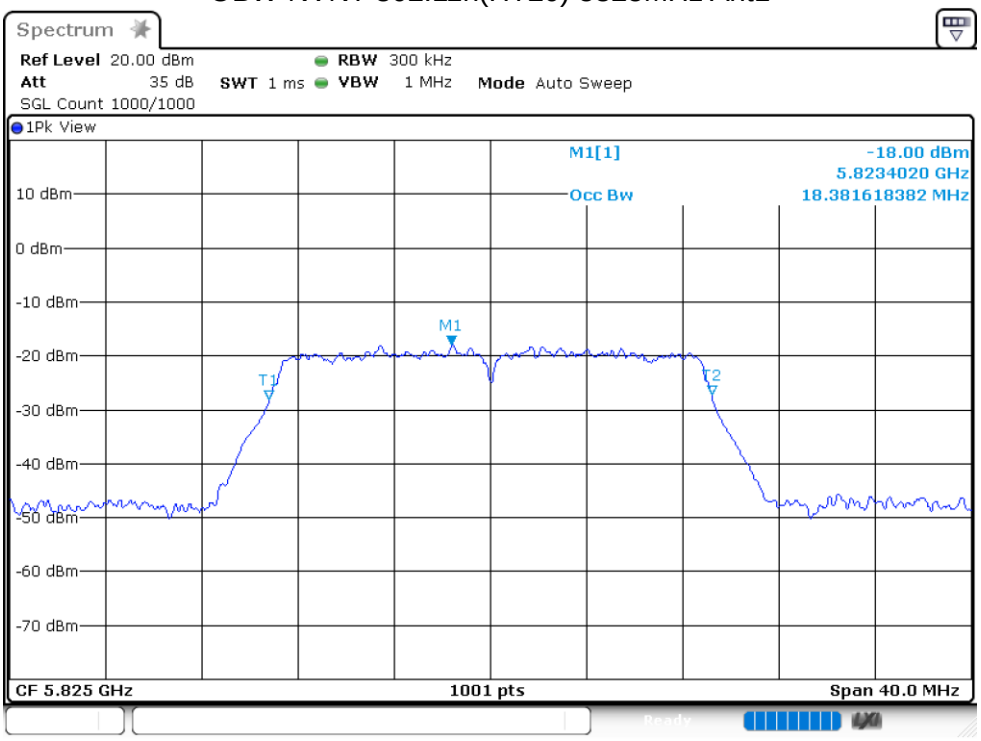
OBW NVNT 802.11n(HT20) 5785MHz Ant1



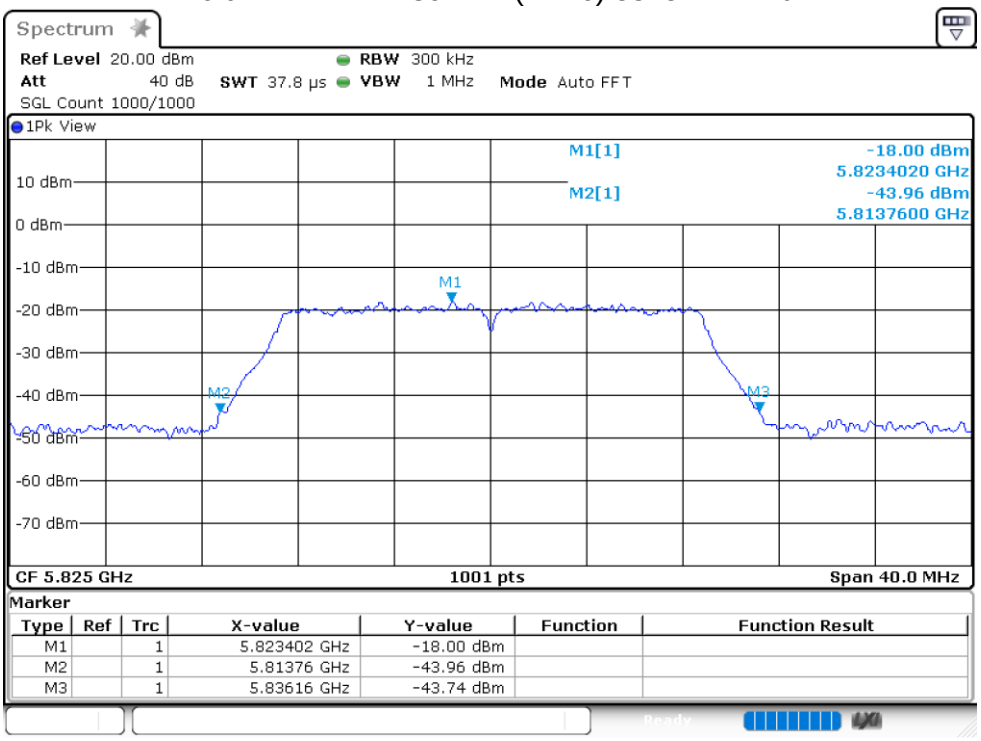
-26 dB BW NVNT 802.11n(HT20) 5785MHz Ant1



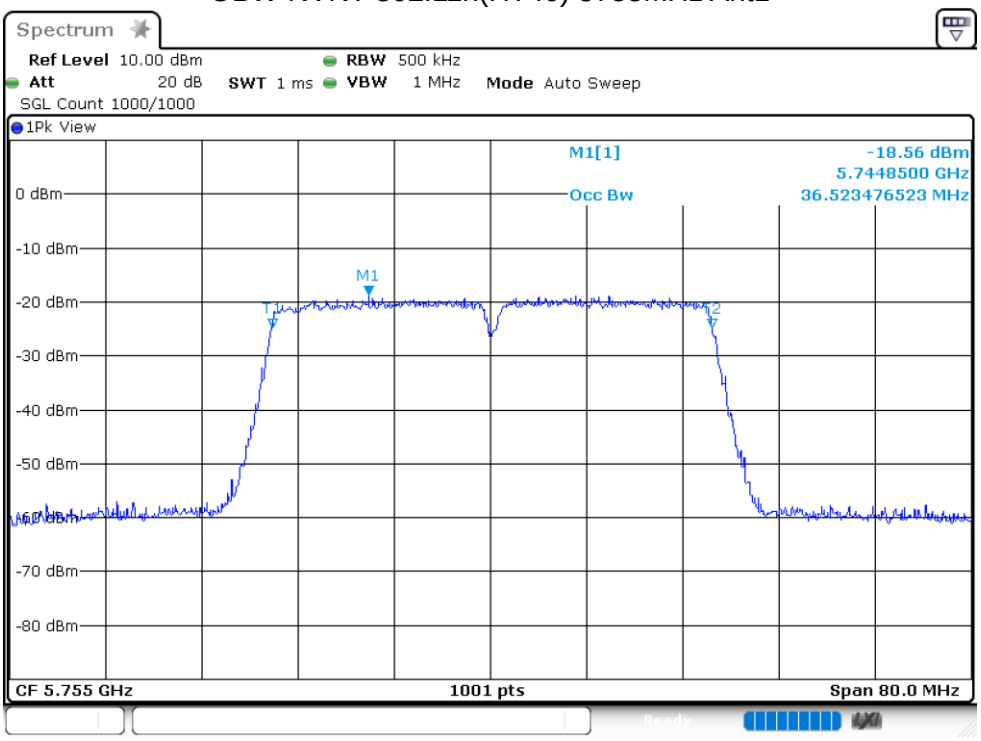
OBW NVNT 802.11n(HT20) 5825MHz Ant1



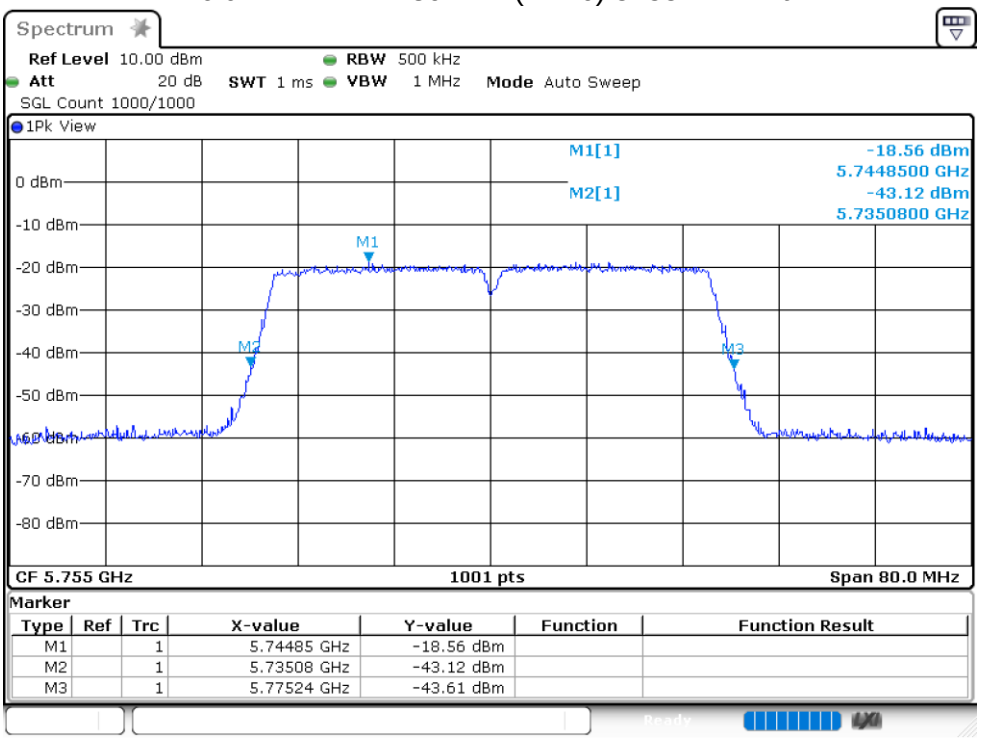
-26 dB BW NVNT 802.11n(HT20) 5825MHz Ant1



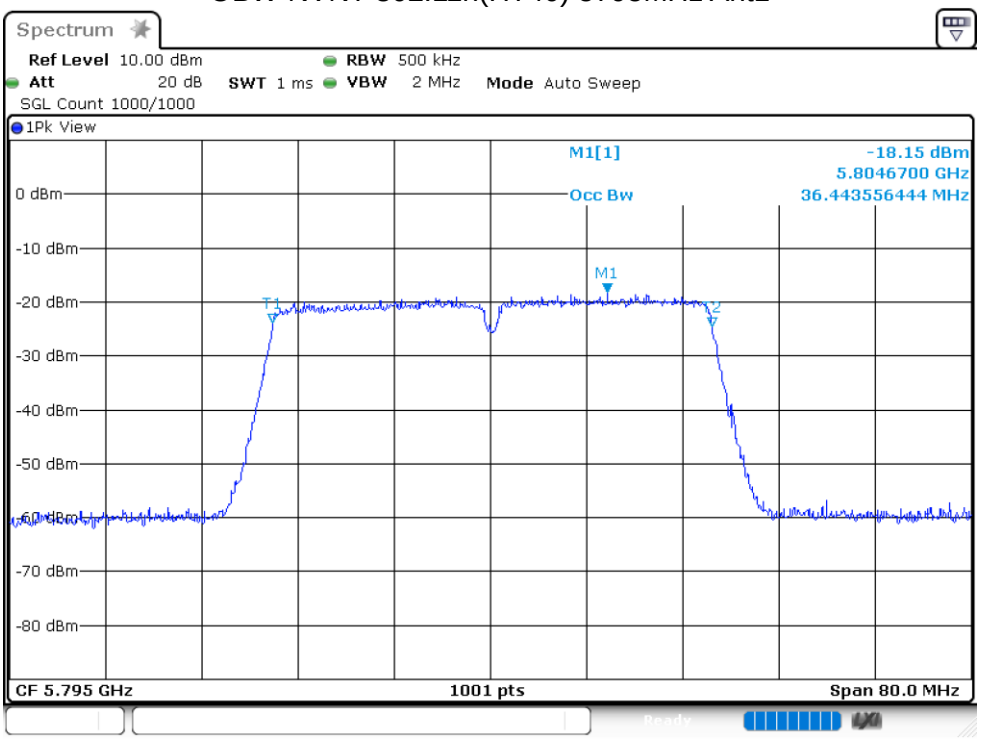
OBW NVNT 802.11n(HT40) 5755MHz Ant1



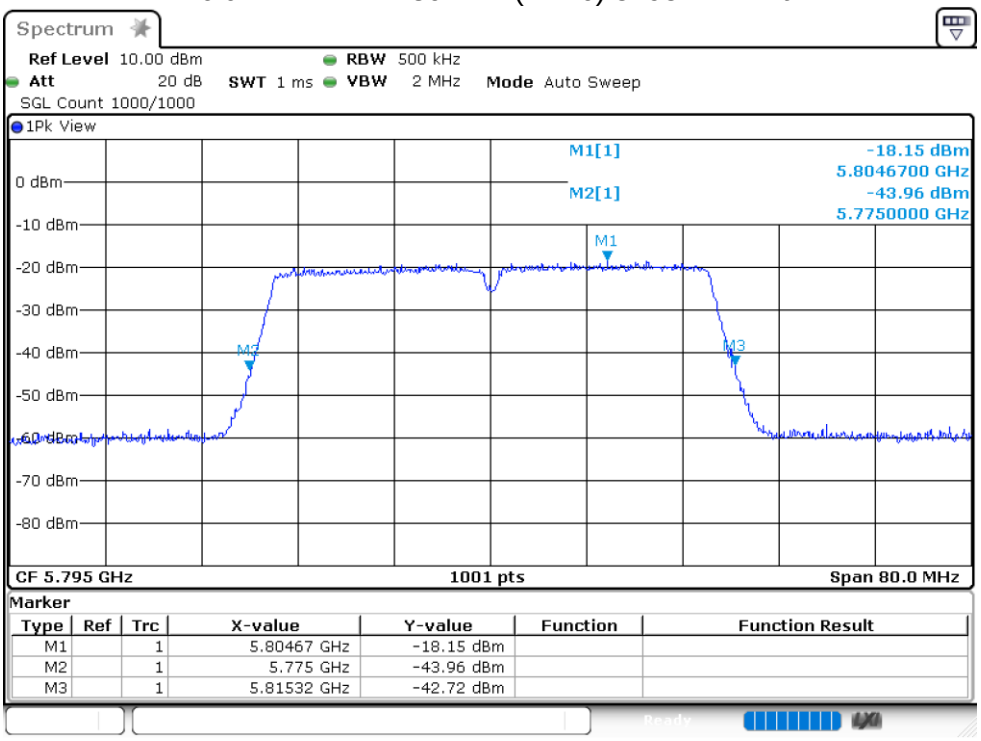
-26 dB BW NVNT 802.11n(HT40) 5755MHz Ant1



OBW NVNT 802.11n(HT40) 5795MHz Ant1



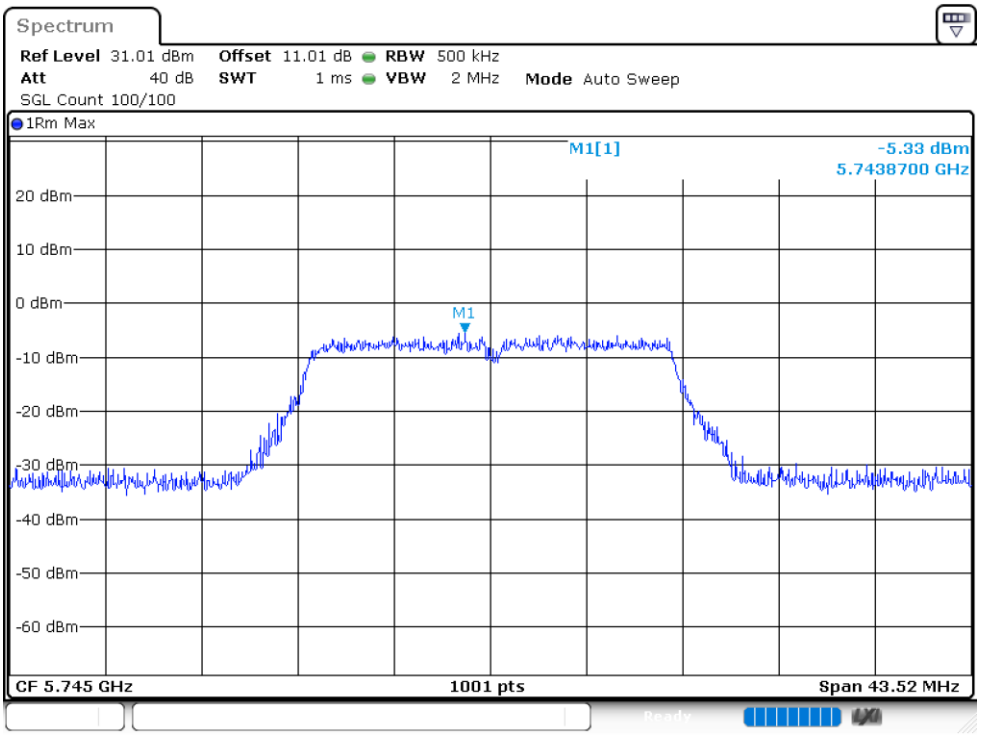
-26 dB BW NVNT 802.11n(HT40) 5795MHz Ant1



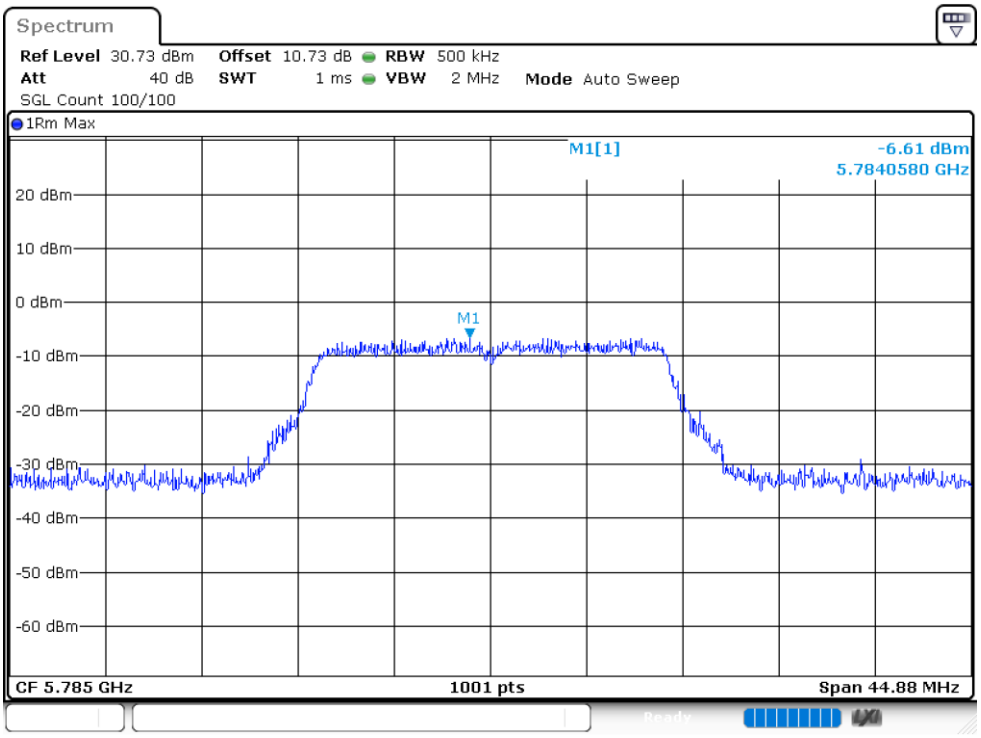
5.5 MAXIMUM POWER SPECTRAL DENSITY LEVEL

Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	802.11a	5745	Ant 1	-5.325	30	Pass
NVNT	802.11a	5785	Ant 1	-6.614	30	Pass
NVNT	802.11a	5825	Ant 1	-6.199	30	Pass
NVNT	802.11n(HT20)	5745	Ant 1	-4.906	30	Pass
NVNT	802.11n(HT20)	5785	Ant 1	-6.075	30	Pass
NVNT	802.11n(HT20)	5825	Ant 1	-6.487	30	Pass
NVNT	802.11n(HT40)	5755	Ant 1	-9.295	30	Pass
NVNT	802.11n(HT40)	5795	Ant 1	-9.629	30	Pass

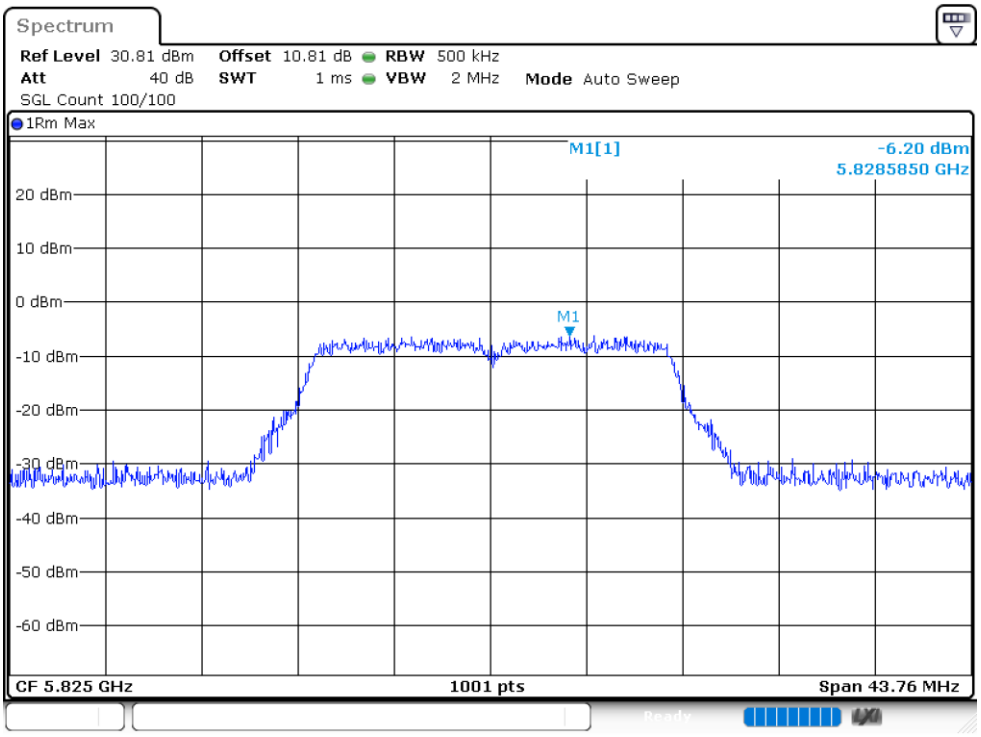
PSD NVNT 802.11a 5745MHz Ant1



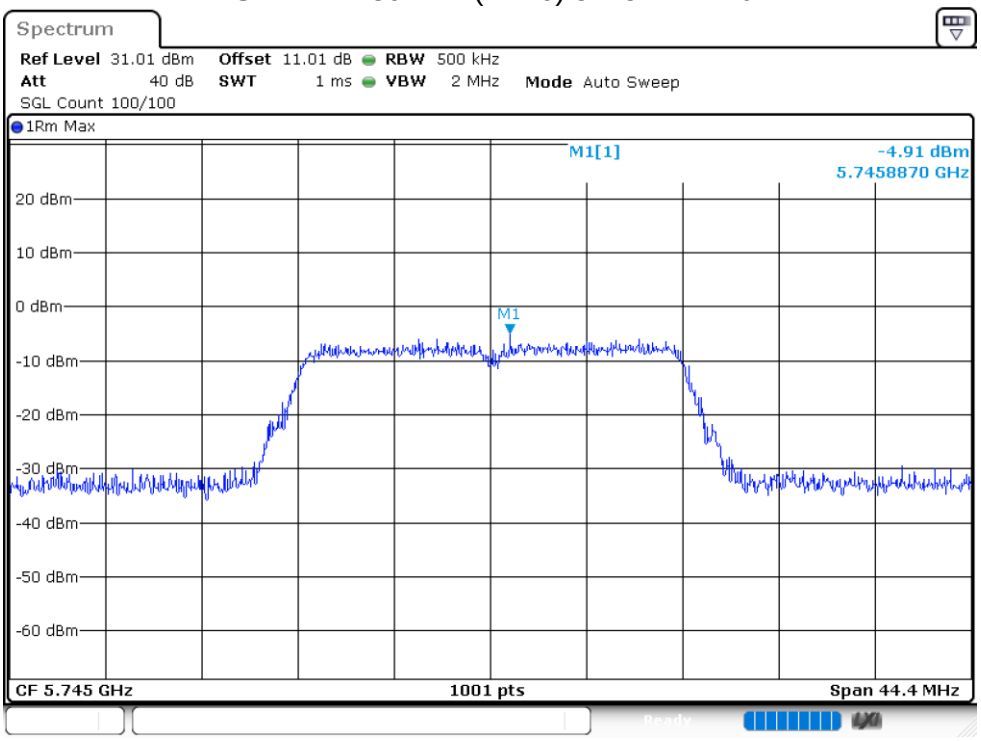
PSD NVNT 802.11a 5785MHz Ant1



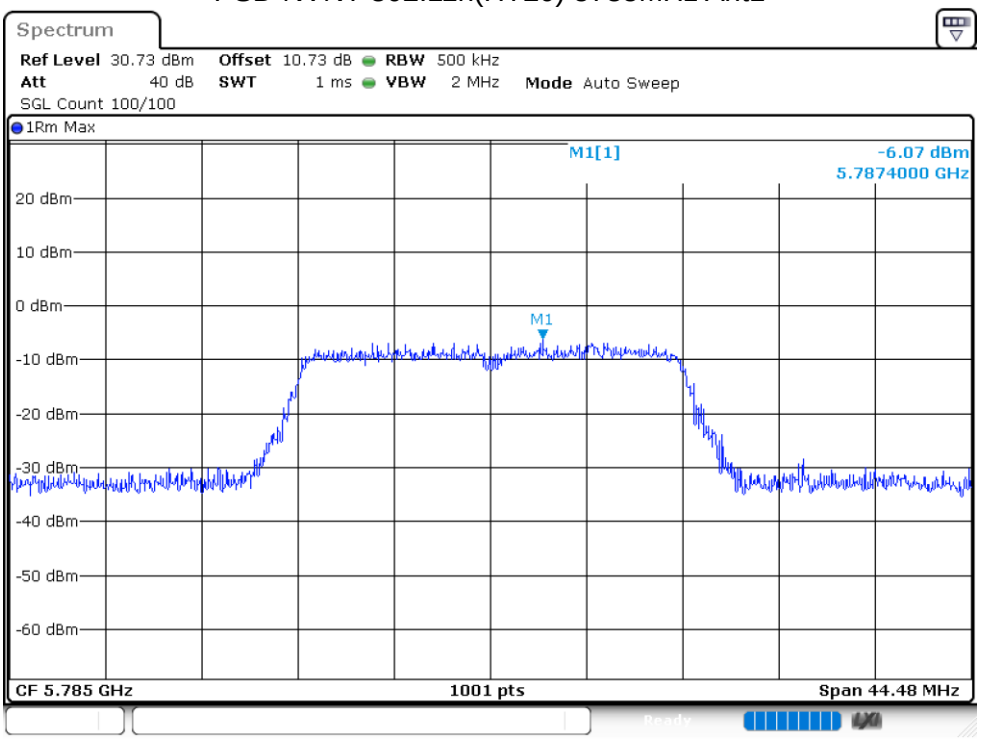
PSD NVNT 802.11a 5825MHz Ant1



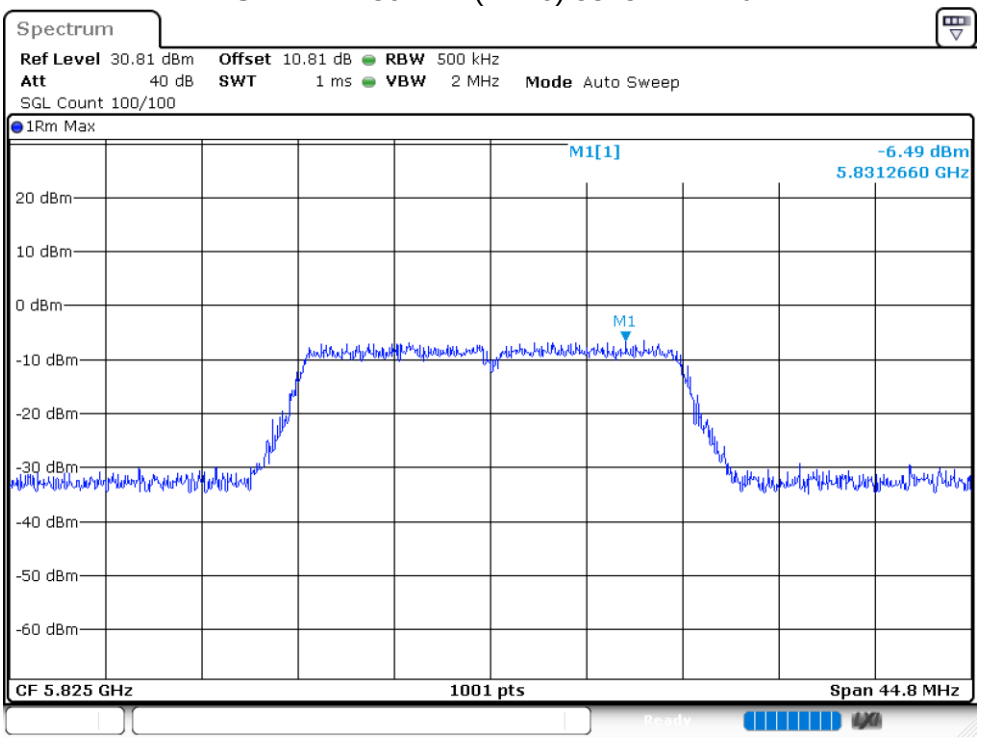
PSD NVNT 802.11n(HT20) 5745MHz Ant1



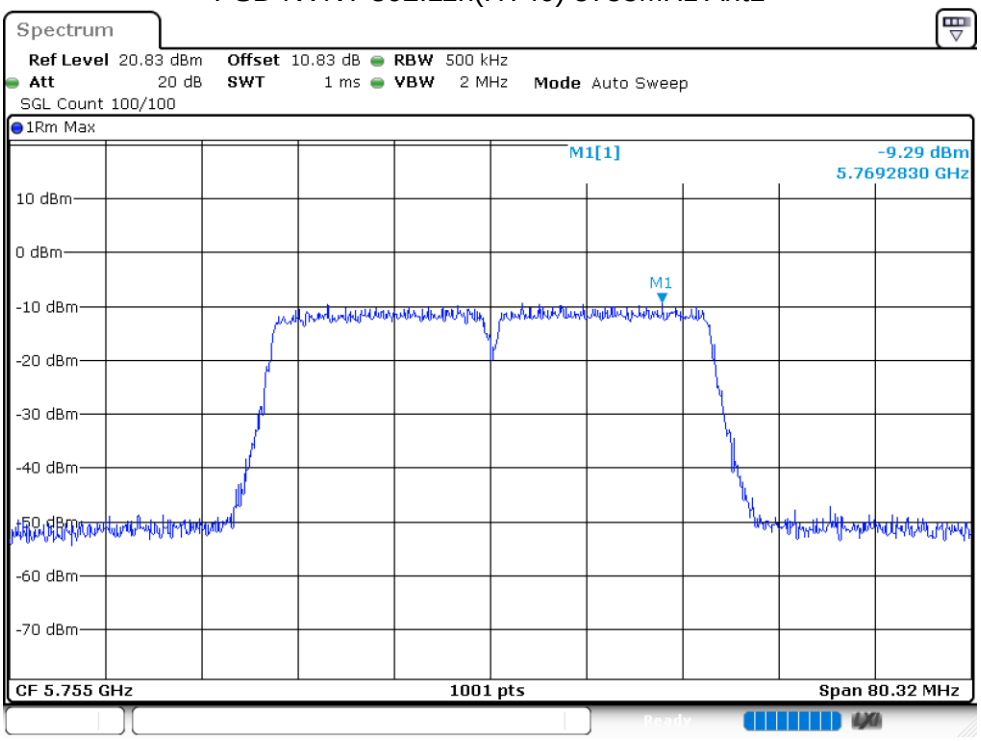
PSD NVNT 802.11n(HT20) 5785MHz Ant1



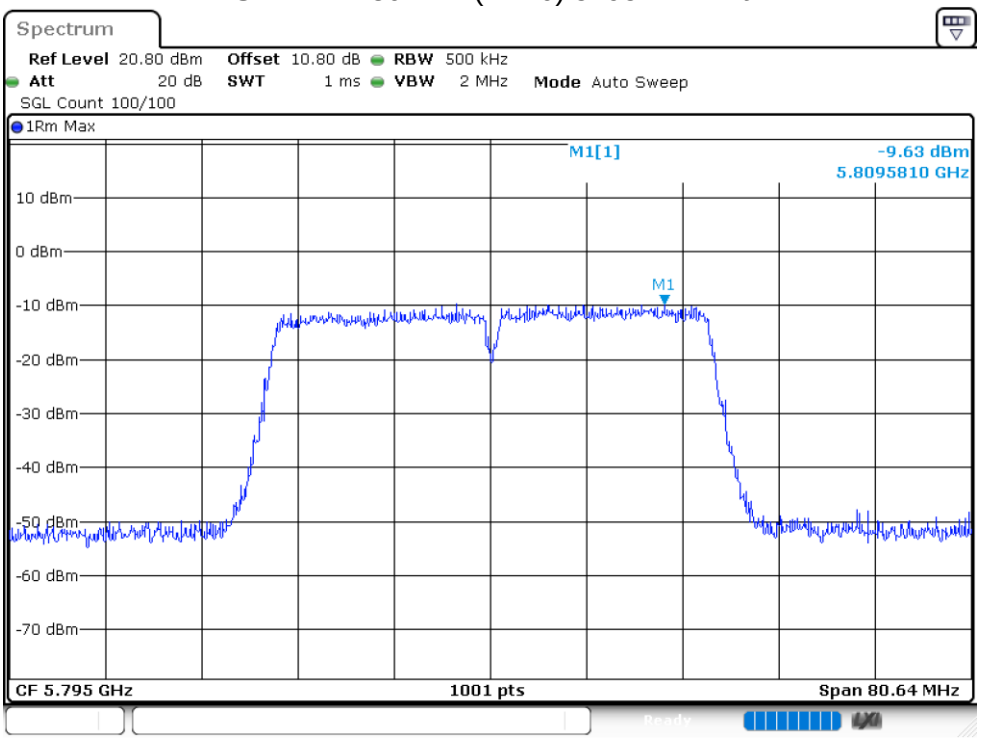
PSD NVNT 802.11n(HT20) 5825MHz Ant1



PSD NVNT 802.11n(HT40) 5755MHz Ant1



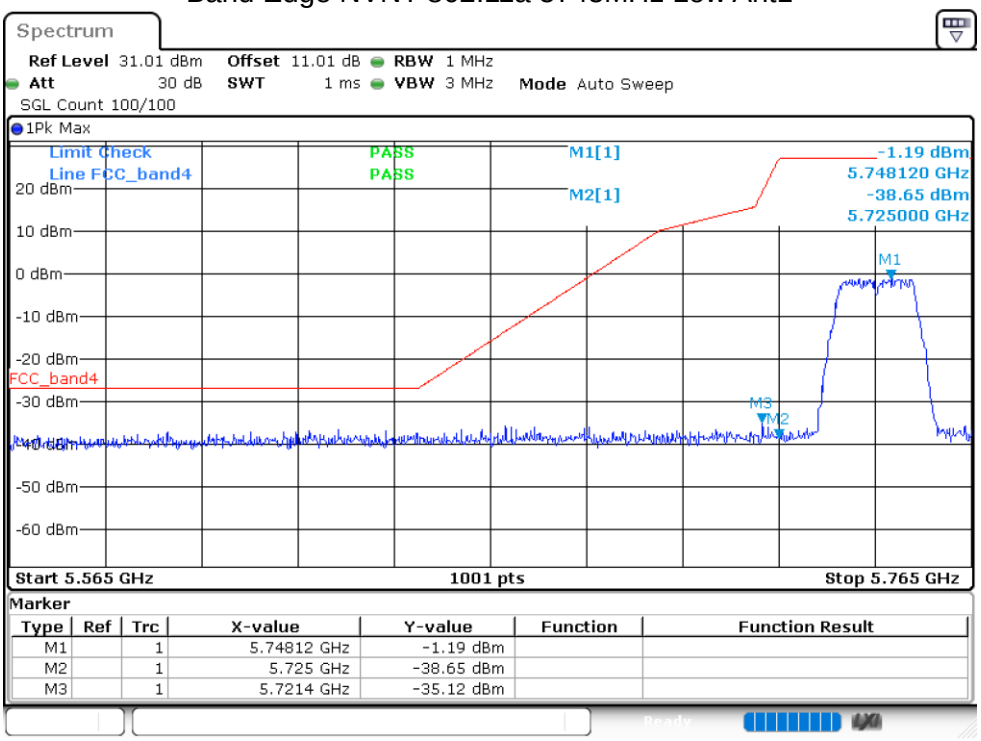
PSD NVNT 802.11n(HT40) 5795MHz Ant1



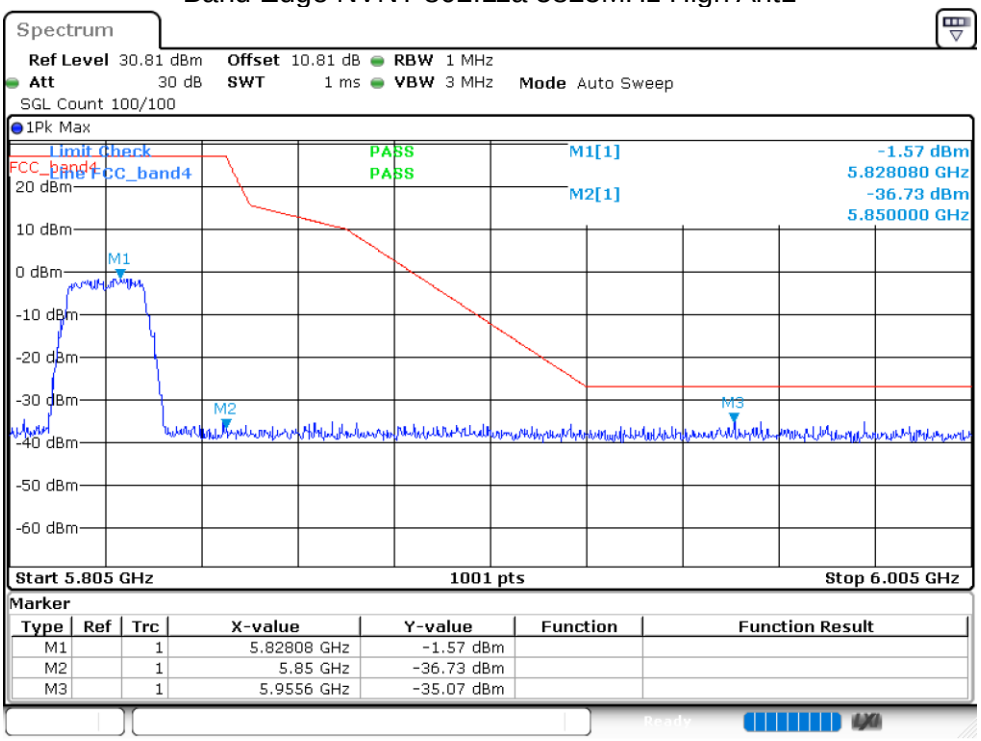
5.6 BAND EDGE

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBm)	Limit (dBm)	Verdict
NVNT	802.11a	5745	Ant 1	-35.12	N/A	Pass
NVNT	802.11a	5825	Ant 1	-35.07	N/A	Pass
NVNT	802.11n(HT20)	5745	Ant 1	-36.21	N/A	Pass
NVNT	802.11n(HT20)	5825	Ant 1	-34.36	N/A	Pass
NVNT	802.11n(HT40)	5755	Ant 1	-35.00	N/A	Pass
NVNT	802.11n(HT40)	5795	Ant 1	-35.24	N/A	Pass

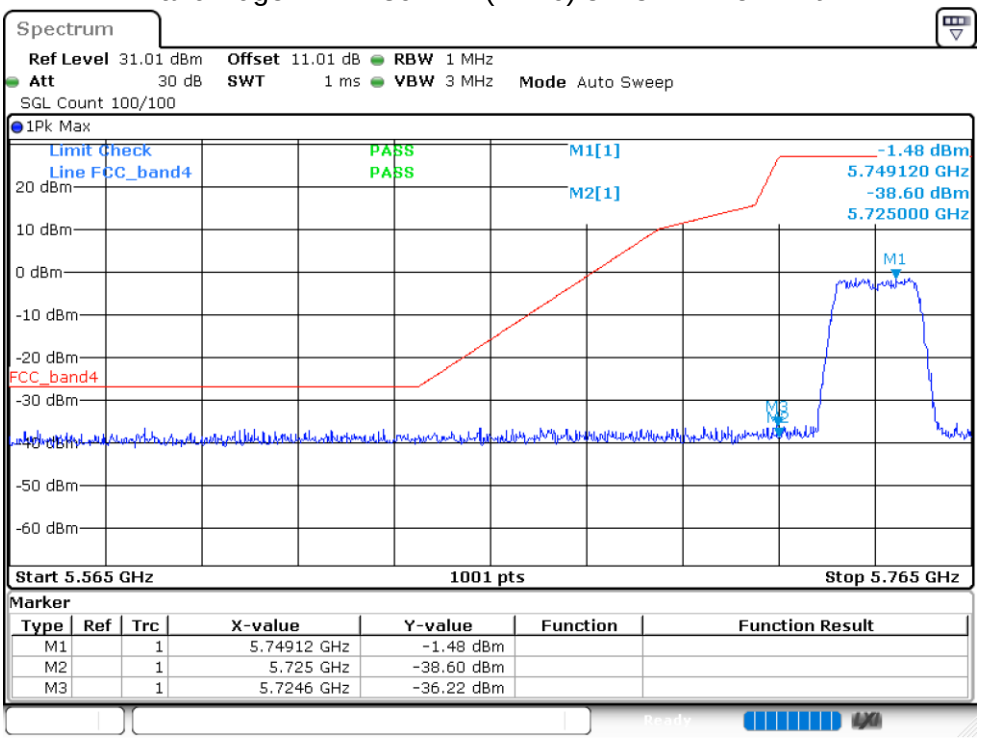
Band Edge NVNT 802.11a 5745MHz Low Ant1



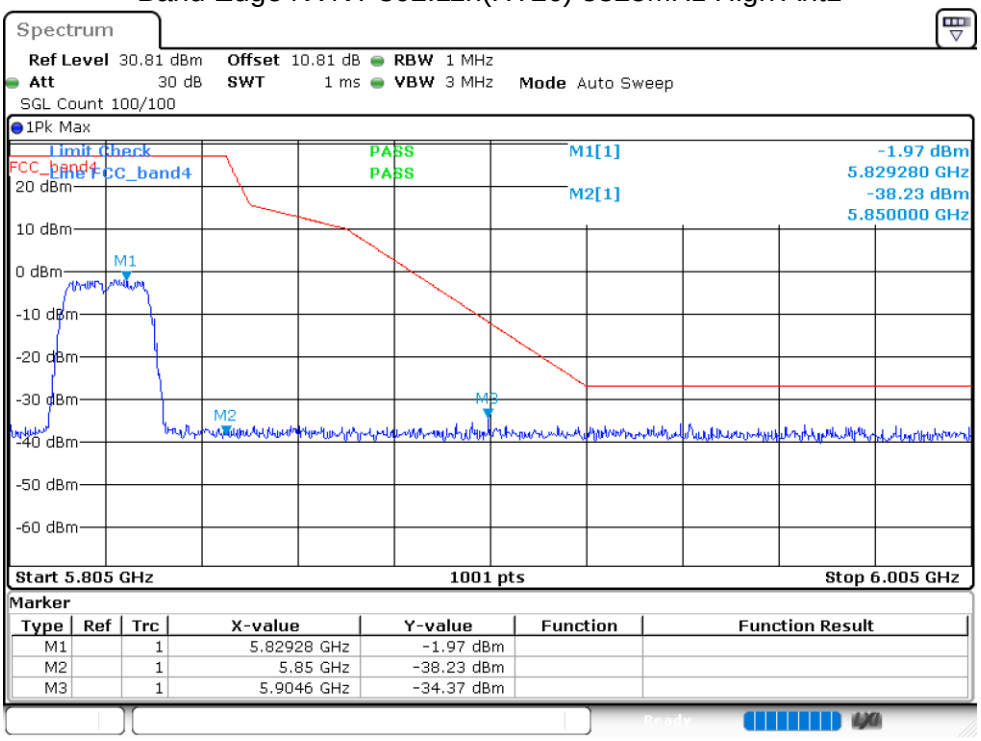
Band Edge NVNT 802.11a 5825MHz High Ant1



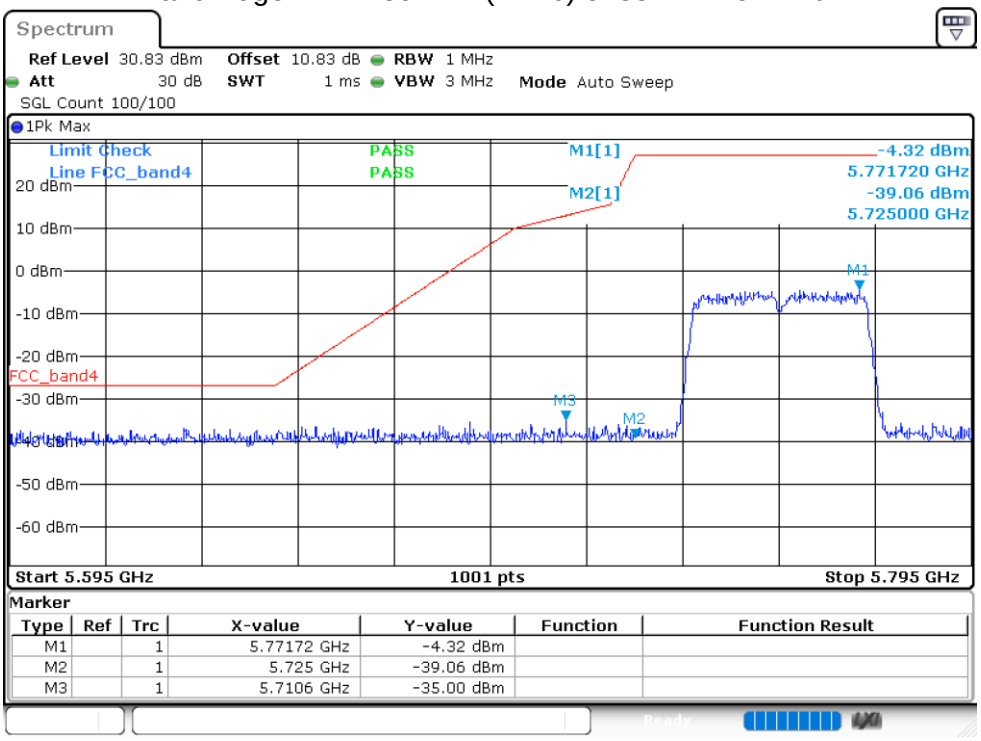
Band Edge NVNT 802.11n(HT20) 5745MHz Low Ant1



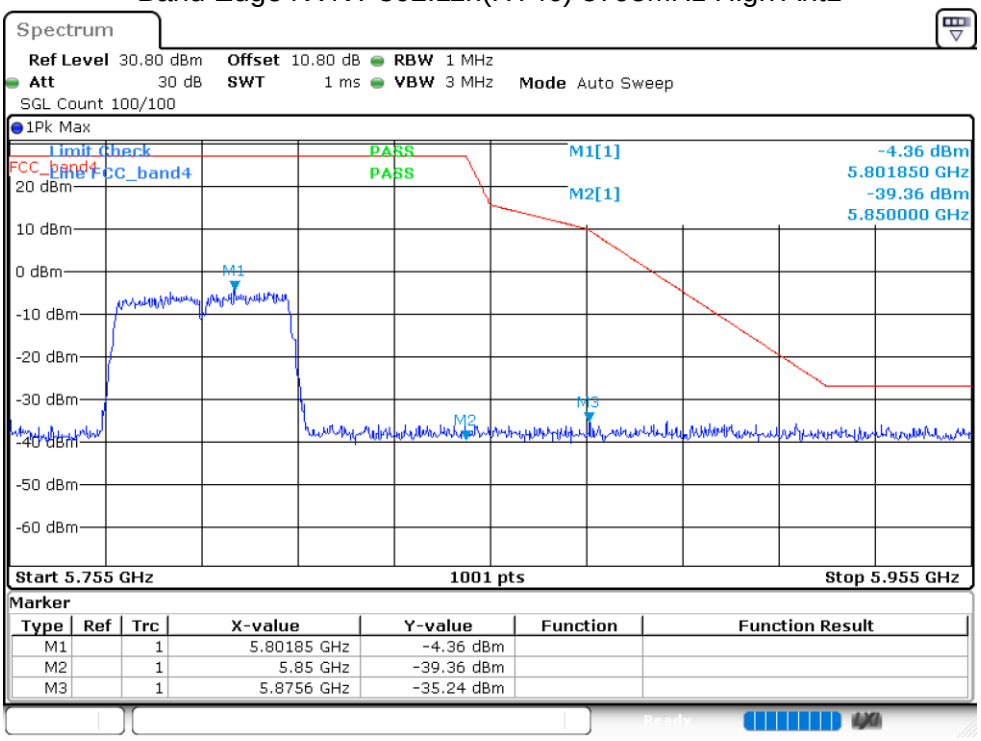
Band Edge NVNT 802.11n(HT20) 5825MHz High Ant1



Band Edge NVNT 802.11n(HT40) 5755MHz Low Ant1



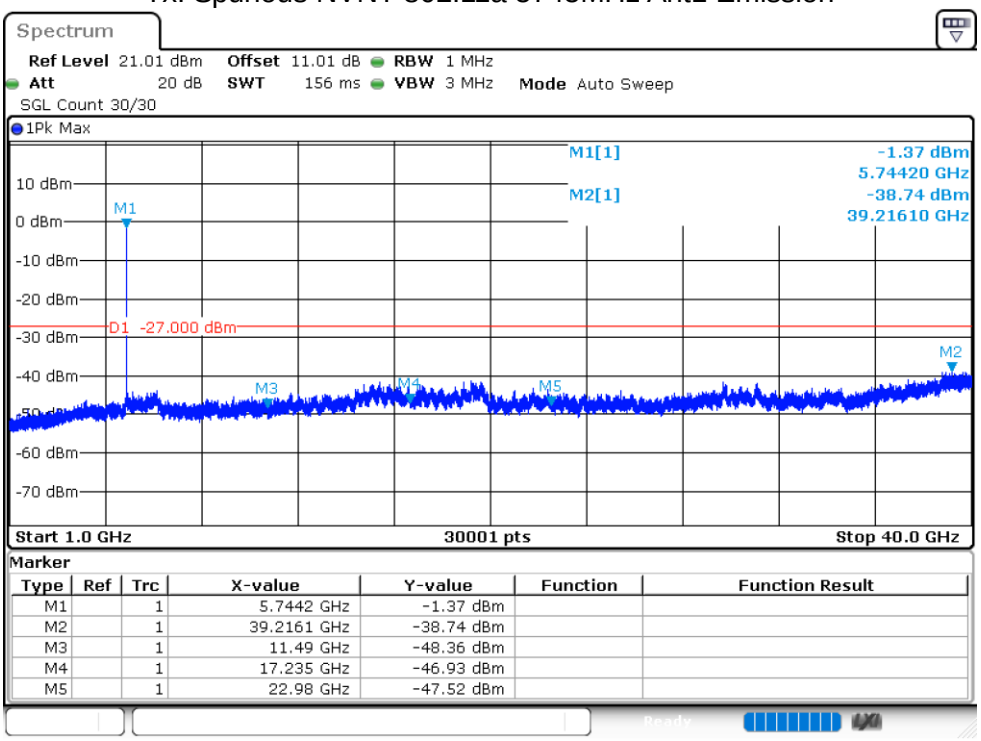
Band Edge NVNT 802.11n(HT40) 5795MHz High Ant1



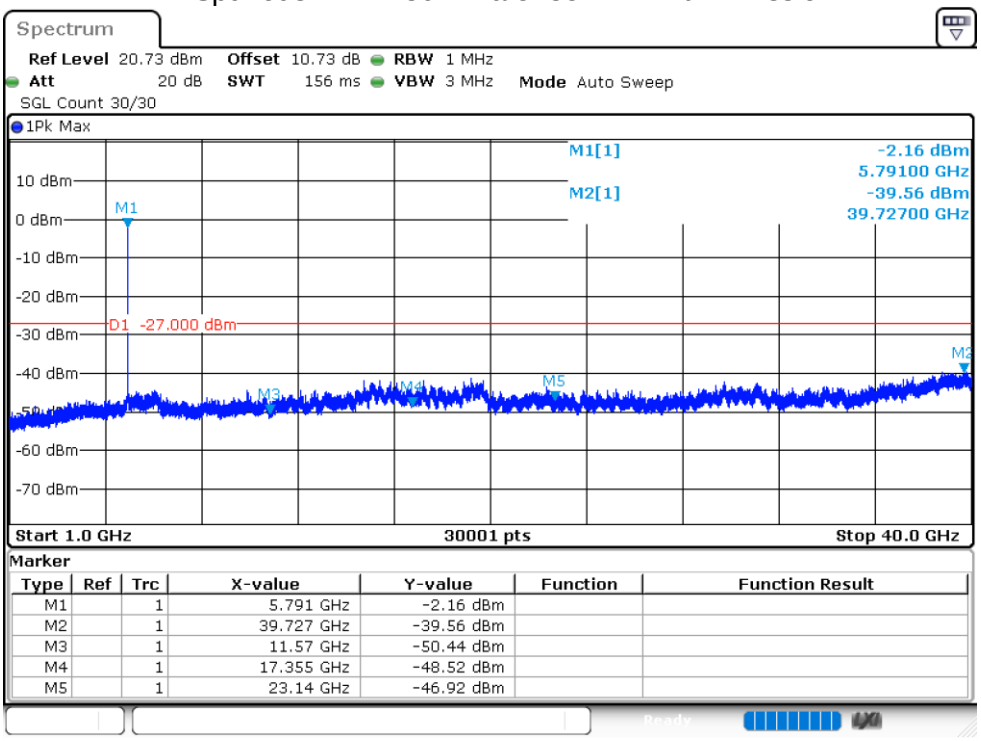
5.7 CONDUCTED RF SPURIOUS EMISSION

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	802.11a	5745	Ant 1	-38.74	-27	Pass
NVNT	802.11a	5785	Ant 1	-39.55	-27	Pass
NVNT	802.11a	5825	Ant 1	-38.38	-27	Pass
NVNT	802.11n(HT20)	5745	Ant 1	-38.28	-27	Pass
NVNT	802.11n(HT20)	5785	Ant 1	-39.33	-27	Pass
NVNT	802.11n(HT20)	5825	Ant 1	-39.22	-27	Pass
NVNT	802.11n(HT40)	5755	Ant 1	-39.19	-27	Pass
NVNT	802.11n(HT40)	5795	Ant 1	-39.5	-27	Pass

Tx. Spurious NVNT 802.11a 5745MHz Ant1 Emission



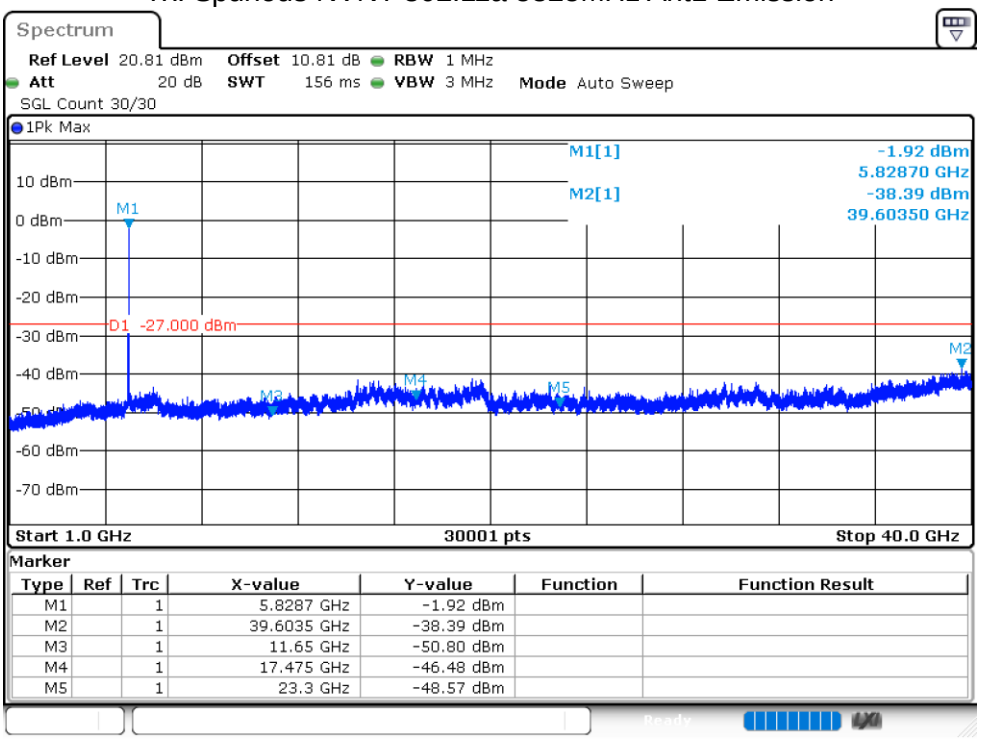
Tx. Spurious NVNT 802.11a 5785MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.791 GHz	-2.16 dBm		
M2		1	39.727 GHz	-39.56 dBm		
M3		1	11.57 GHz	-50.44 dBm		
M4		1	17.355 GHz	-48.52 dBm		
M5		1	23.14 GHz	-46.92 dBm		

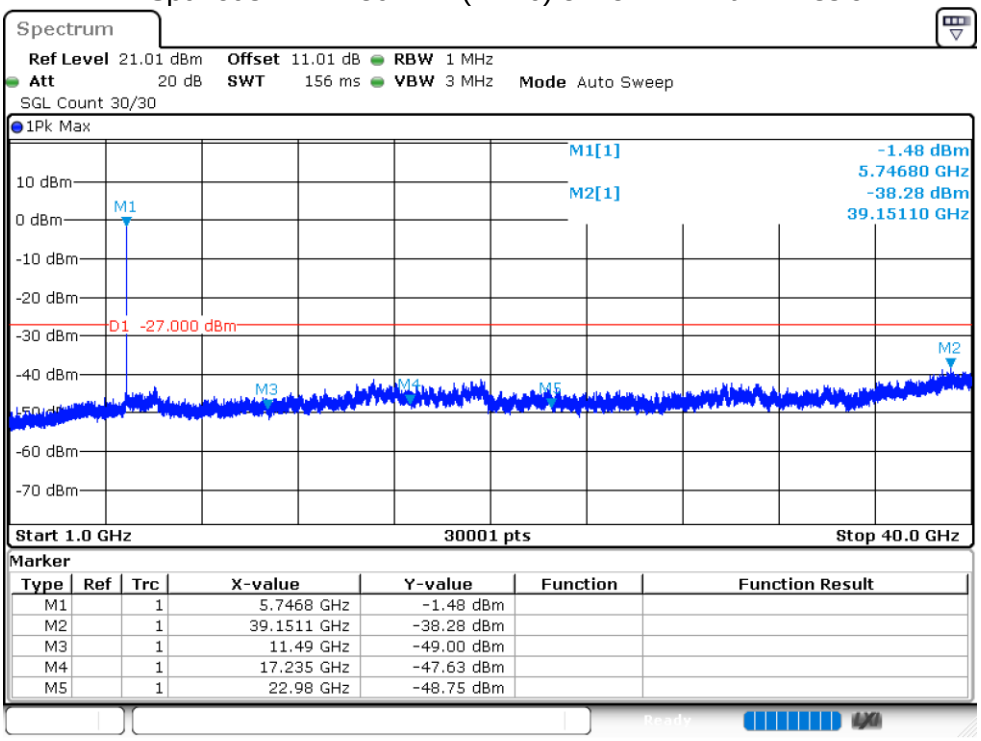
Tx. Spurious NVNT 802.11a 5825MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.8287 GHz	-1.92 dBm		
M2		1	39.6035 GHz	-38.39 dBm		
M3		1	11.65 GHz	-50.80 dBm		
M4		1	17.475 GHz	-46.48 dBm		
M5		1	23.3 GHz	-48.57 dBm		

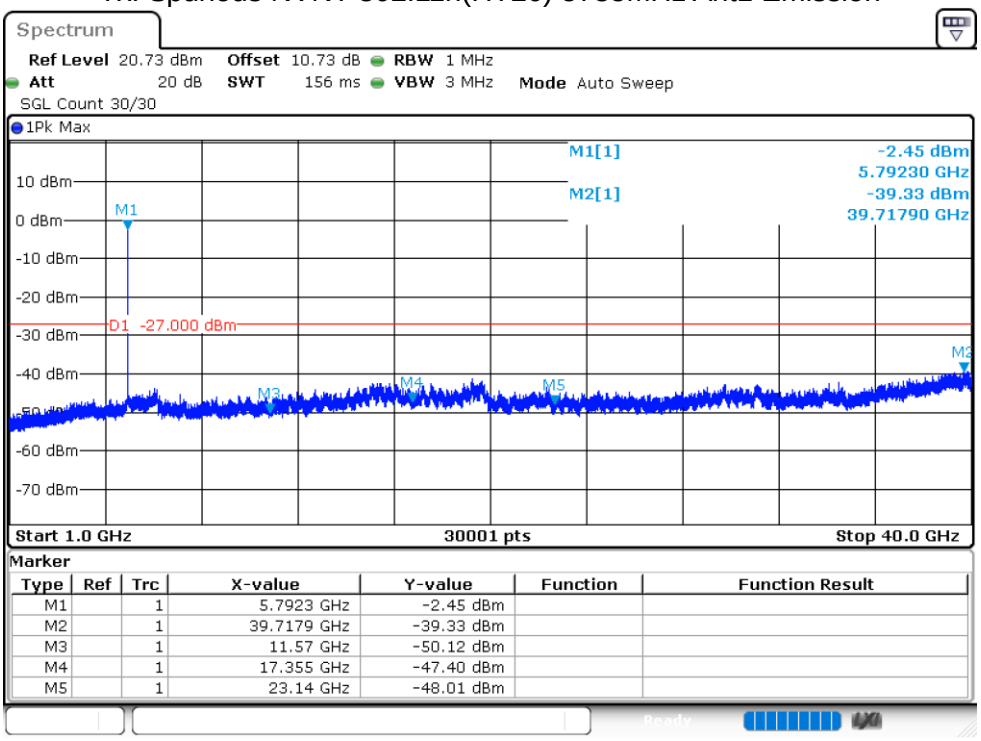
Tx. Spurious NVNT 802.11n(HT20) 5745MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.7468 GHz	-1.48 dBm		
M2		1	39.1511 GHz	-38.28 dBm		
M3		1	11.49 GHz	-49.00 dBm		
M4		1	17.235 GHz	-47.63 dBm		
M5		1	22.98 GHz	-48.75 dBm		

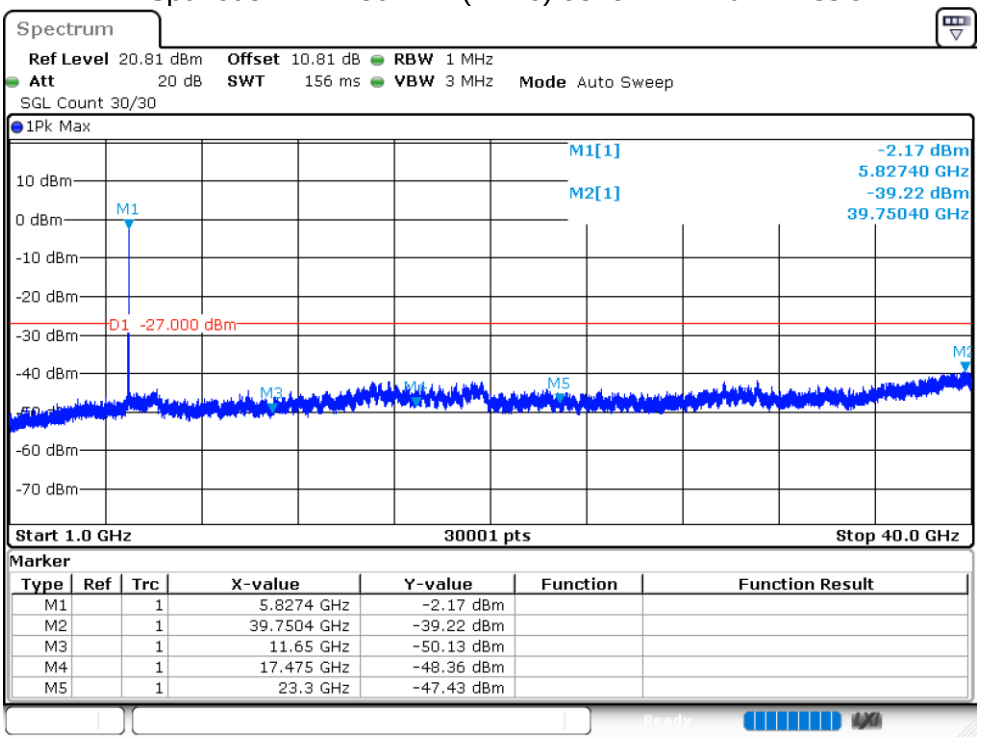
Tx. Spurious NVNT 802.11n(HT20) 5785MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.7923 GHz	-2.45 dBm		
M2		1	39.7179 GHz	-39.33 dBm		
M3		1	11.57 GHz	-50.12 dBm		
M4		1	17.355 GHz	-47.40 dBm		
M5		1	23.14 GHz	-48.01 dBm		

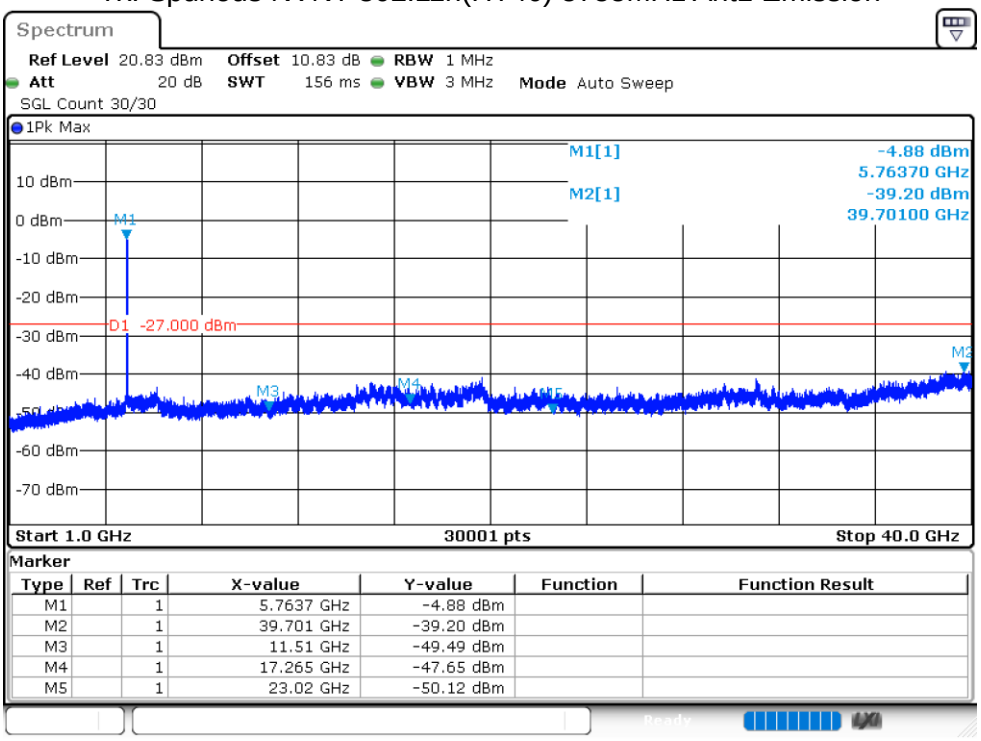
Tx. Spurious NVNT 802.11n(HT20) 5825MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.8274 GHz	-2.17 dBm		
M2		1	39.7504 GHz	-39.22 dBm		
M3		1	11.65 GHz	-50.13 dBm		
M4		1	17.475 GHz	-48.36 dBm		
M5		1	23.3 GHz	-47.43 dBm		

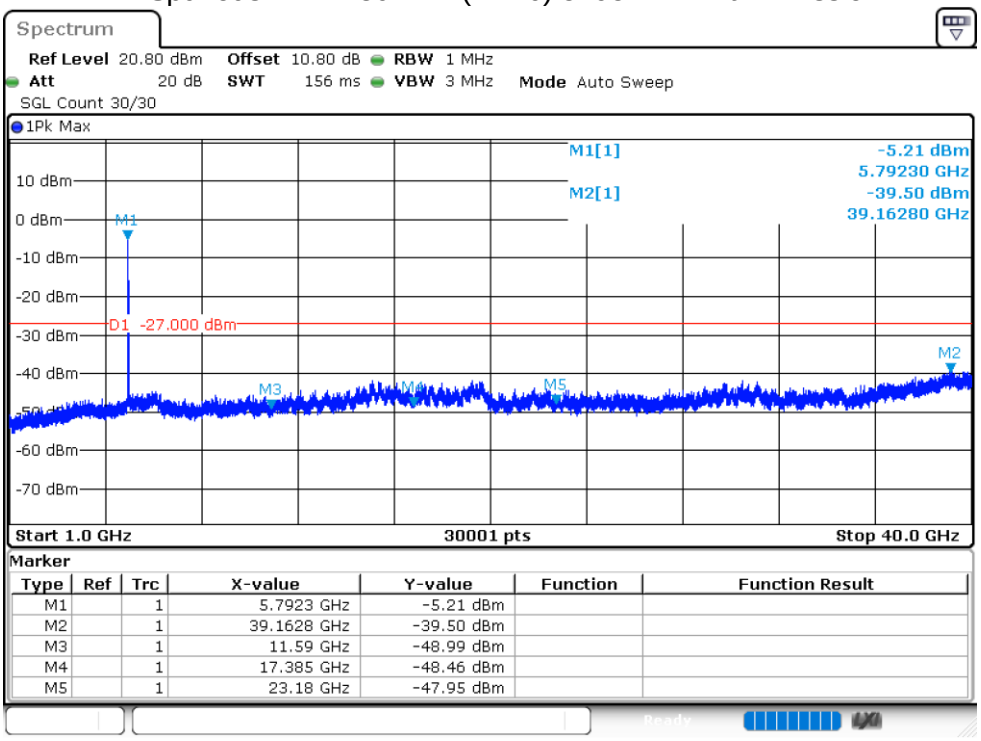
Tx. Spurious NVNT 802.11n(HT40) 5755MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.7637 GHz	-4.88 dBm		
M2		1	39.701 GHz	-39.20 dBm		
M3		1	11.51 GHz	-49.49 dBm		
M4		1	17.265 GHz	-47.65 dBm		
M5		1	23.02 GHz	-50.12 dBm		

Tx. Spurious NVNT 802.11n(HT40) 5795MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.7923 GHz	-5.21 dBm		
M2		1	39.1628 GHz	-39.50 dBm		
M3		1	11.59 GHz	-48.99 dBm		
M4		1	17.385 GHz	-48.46 dBm		
M5		1	23.18 GHz	-47.95 dBm		

END OF REPORT