FCC Part 15
EMI TEST REPORT

of

E.U.T. : AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER

Model : C2SGTVWFAC

FCC ID : TRINITYXTAC,WITRIAC,WITRIACV, WIXXXXXX,TRXXXXXXXXXXXXX, Where either X is could be A-Z, 0-9, or blank for packaging type only

for

APPLICANT : Good Mind Industries, Co.,Ltd

ADDRESS : No.22, Ta Yeou 2nd Street, Ta Fa Industrial District, Ta Liau District, Kaohsiung City 83163 Taiwan (R.O.C.)

Test Performed by

ELECTRONICS TESTING CENTER, TAIWAN
NO. 34. LIN 5. DINGFU VIL., LINKOU DIST.,
NEW TAIPEI CITY, TAIWAN, 24442, R.O.C.
Tel : (02)26023052 Fax : (02)26010910
http://www.etc.org.tw ; e-mail: emc@etc.org.tw

Report Number : 16-08-RBF-041-02

TEST REPORT CERTIFICATION

Applicant : Good Mind Industries, Co.,Ltd
No.22, Ta Yeou 2nd Street, Ta Fa Industrial District, Ta Liau District, Kaohsiung City 83163 Taiwan (R.O.C.)

Manufacturer : Good Mind Industries, Co.,Ltd
No.22, Ta Yeou 2nd Street, Ta Fa Industrial District, Ta Liau District, Kaohsiung City 83163 Taiwan (R.O.C.)

Description of EUT

a) Type of EUT : AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER
b) Trade Name : TERK
c) Model No. : TRINITYXTAC,WITRIAC,WITRIACV,WIXXXXXX, TRXXXXXXXXXXXXX, Where either X is could be A-Z, 0-9, or blank for packaging type only
d) Power Supply : Adapter Model:CS12N120100FUF
I/P:100-240V, 50/60Hz, 500mA
O/P:12.0V, 1.0A

Regulation Applied : FCC Rules and Regulations Part 15 Subpart E

I HEREBY CERTIFY THAT: The data shown in this report were made in accordance with the procedures given in ANSI C63.10-2013, and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Note: 1. The result of the testing report relate only to the item tested.
2. The testing report shall not be reproduced expect in full, without the written approval of ETC

Summary of Tests

Test	Results
Radiated Emission	**Pass**
Conducted Emission	**Pass**
Emission Bandwidth	**Pass**
Output Power	**Pass**
Power Density	**Pass**
Out-of-Band Conducted Emission	**Pass**
Duty Cycle	**N.A.**

Date Test Item Received	:	*Aug. 18, 2016*
Date Test Campaign Completed	:	*Sep. 22, 2016*
Date of Issue	:	*Sep. 29, 2016*

Test Engineer : Brian Huang

(Brian Huang, Engineer)

Approve & Authorized : S S Liou

S. S. Liou, Section Manager
EMC Dept. II of ELECTRONICS
TESTING CENTER, TAIWAN

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1 GENERAL INFORMATION

1.1 Product Description

a) Type of EUT	:	AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER
b) Trade Name	:	TERK
c) Model No.	:	TRINITYXTAC,WITRIAC,WITRIACV,WIXXXXXX, TRXXXXXXXXXXXXX, Where either X is could be A-Z, 0-9, or blank for packaging type only
d) Power Supply	:	Adapter Model:CS12N120100FUF I/P:100-240V, 50/60Hz, 500mA O/P:12.0V, 1.0A
e) Model Difference	:	Only model number is different for marketing purpose. The device is the same.

1.2 Test Methodology

Both conducted and radiated emissions were performed according to the procedures illustrated in ANSI C63.10-2013. Other required measurements were illustrated in separate sections of this test report for details. For RF test the measurement procedure was refered to FCC KDB 789033 D02 General UNII Test Procedures New Rules v01 & FCC KDB 558074 D01 DTS Meas Guidance v03r03.

Instead of 0.8m EUT height above 1GHz, 1.5m was allowed by FCC December 2014 TCB Conference call.

Measurement Software

Software	Version	Note
e3	Version 6.100618b	Radiated Emission Test
e3	Version 6.100421	Conducted Emission Test

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the roof top of Building at No.34, Lin 5, Dingfu Vil., Linkou Dist., New Taipei City, Taiwan 24442, R.O.C.
This site is FCC 2.948 listed and accepted in a letter dated Jan. 29, 2014.
Registration Number: 90589

2 PROVISIONS APPLICABLE

2.1 Definition

Unintentional radiator:
A device that intentionally generates and radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

Class A Digital Device:
A digital device which is marketed for use in commercial or business environment; exclusive of a device which is market for use by the general public, or which is intended to be used in the home.

Class B Digital Device :
A digital device which is marketed for use in a residential environment notwithstanding use in a commercial, business of industrial environment. Example of such devices that are marketed for the general public.

Note : A manufacturer may also qualify a device intended to be marketed in a commercial, business, or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, Regardless of its intended use.

Intentional radiator:
A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Requirement for Compliance

(1) Conducted Emission Requirement

Except for Class A digital devices, for equpment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency MHz	Quasi Peak dBμV	Average dBμV
0.15 - 0.5	66-56*	56-46*
0.5 - 5.0	56	46
5.0 - 30.0	60	50

* Decreases with the logarithm of the frequency

(2) Radiated Emission Requirement

For unintentional device, according to §15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency MHz	Distance Meters	Radiated dBμV/m	Radiated μV/m
30 - 88	3	40.0	100
88 - 216	3	43.5	150
216 - 960	3	46.0	200
Above 960	3	54.0	500

For intentional device, according to §15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

(3) Antenna 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) Bandwidth Requirement

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

(5) Output Power Requirement

According to 15.407(a)(1)(iv), for client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

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.

According to 15.407(a)(3), for the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

(6) Undesirable emission limits

According to 15.407(b)(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.

According to 15.407(b)(4), for transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or

below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Note: The following formula is used to convert the EIRP to field strength.

$$E=\frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts)

EIRP (dBm)	Field Strength at 3m (dBμ V/m)
-17	78.3
-27	68.3

KDB789033 D02 v01r02 G)2)c) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

(7) Power Density Requirement

According to 15.407(a)(1)(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.

According to 15.407(a)(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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

2.3 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below :

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	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	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	2655-2900	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	3360-4400	Above 38.6
13.36-13.41			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2.4 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions : (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual.

The Federal Communications Commission Radio Frequency Interference Statement includes the following paragraph.

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio / TV technician for help.

3. SYSTEM TEST CONFIGURATION

3.1 Justification

For both radiated and conducted emissions below 1 GHz, the system was configured for testing in a typical fashion as a customer would normally use it. The peripherals other than EUT were connected in normally standing by situation. Measurement was performed under the condition that a computer program was exercised to simulate data communication of EUT, and the transmission rate was set to maximum allowed by EUT. Three highest emissions were verified with varying placement of the cables connected to EUT to maximize the emission from EUT.

For conducted and radiated emissions, whichever RF channel is operated, the digital circuits' function identically. As the reason, measurement of emissions from digital circuits is performed with the highest, middle and the lowest channel by transmitting mode.

3.2 Devices for Tested System

Device	Manufacture	Model / FCC ID.	Description
AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER*	Good Mind Industries, Co.,Ltd	TRINITYXTAC,WITRIAC ,WITRIACV,WIXXXXXX ,TRXXXXXXXXXXXXX, Where either X is could be A-Z, 0-9, or blank for packaging type only / C2SGTVWFAC	1.8m Unshielded AC Adaptor Power Line

Remark "*" means equipment under test.

4 RADIATED EMISSION MEASUREMENT

4.1 Applicable Standard

According to 15.407(b)(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.
According to 15.407(b)(4), for transmitters operating in the 5.725-5.85 GHz band:
(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Note: The following formula is used to convert the EIRP to field strength.

$$E=\frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts)

EIRP (dBm)	Field Strength at 3m (dBμ V/m)
-17	78.3
-27	68.3

KDB789033 D02 v01r02 G)2)c) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

4.2 Measurement Procedure

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively.

2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.

3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.

4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 ° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.

5. Repeat step 4 until all frequencies need to be measured were complete.

6. Repeat step 5 with search antenna in vertical polarized orientations.

7. Check the three frequencies of highest emission with varying the placement of cables associated with EUT to obtain the worse case and record the result.

Figure 1 : Frequencies measured below 1 GHz configuration

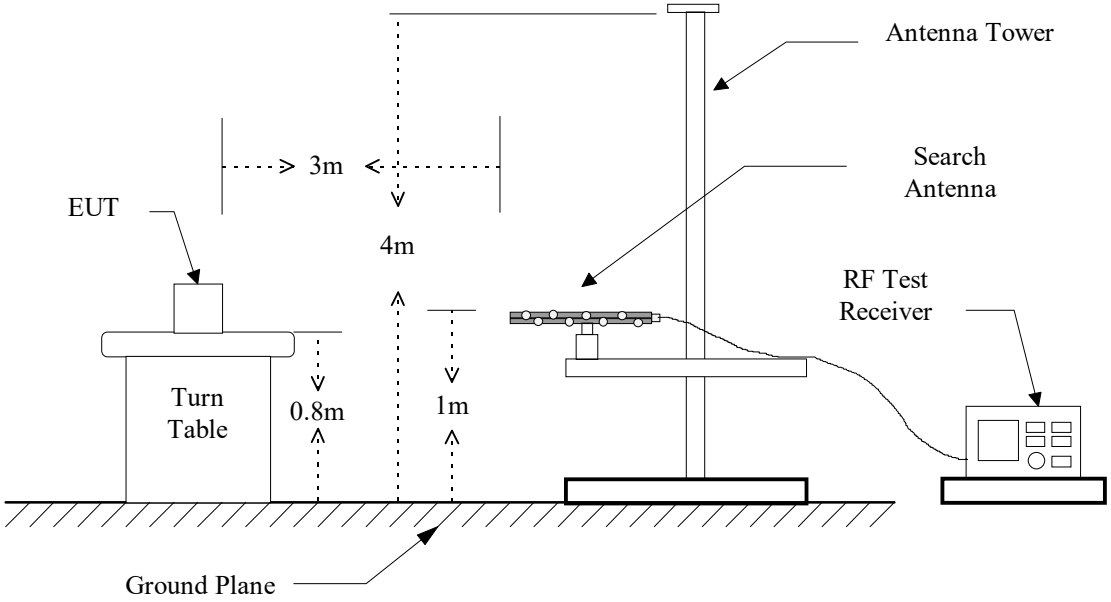
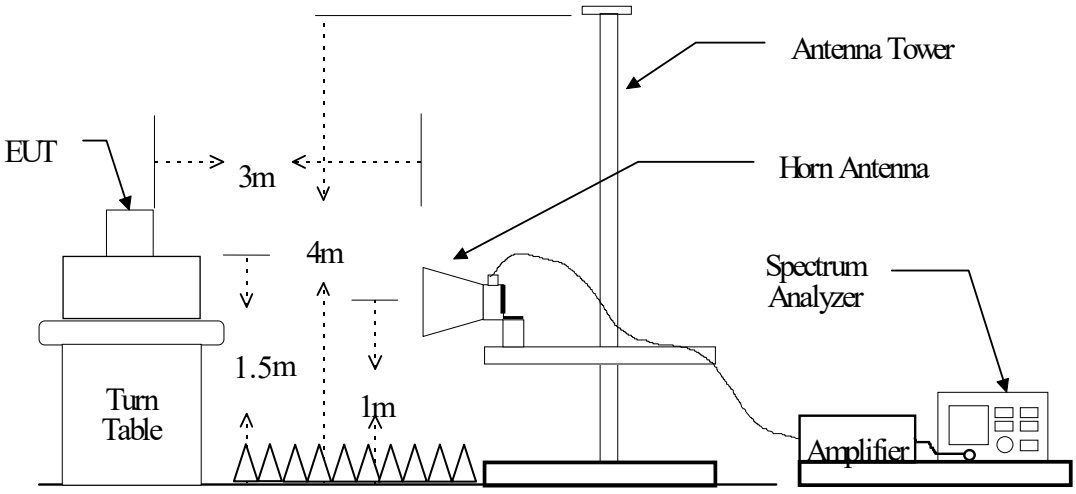


Figure 2 : Frequencies measured above 1 GHz configuration



4.3 Measuring Instrument

The following instrument are used for radiated emissions measurement:

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum	Rohde & Schwarz	FSP40	2016/07/06	2017/07/05
EMI Test Receiver	Rohde & Schwarz	ESCI	2015/12/05	2016/12/04
Double Ridged Antenna	EMCO	3115	2015/10/08	2016/10/07
Double Ridged Guide Horn Antenna	EMCO	3116	2015/10/12	2016/10/11
Log-periodic Antenna	EMCO	3146	2015/11/17	2016/11/16
Biconical Antenna	EMCO	3110B	2015/11/17	2016/11/16
Amplifier	HP	8449B	2015/10/06	2016/10/05
Amplifier	HP	8447D	2015/12/17	2016/12/16
Amplifier	HP	83051A	2016/07/18	2017/07/17

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi-Peak	120 kHz	N/A
	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz
	Spectrum Analyzer	Average	1 MHz	10 Hz or ≥ 1/T (Note 1)

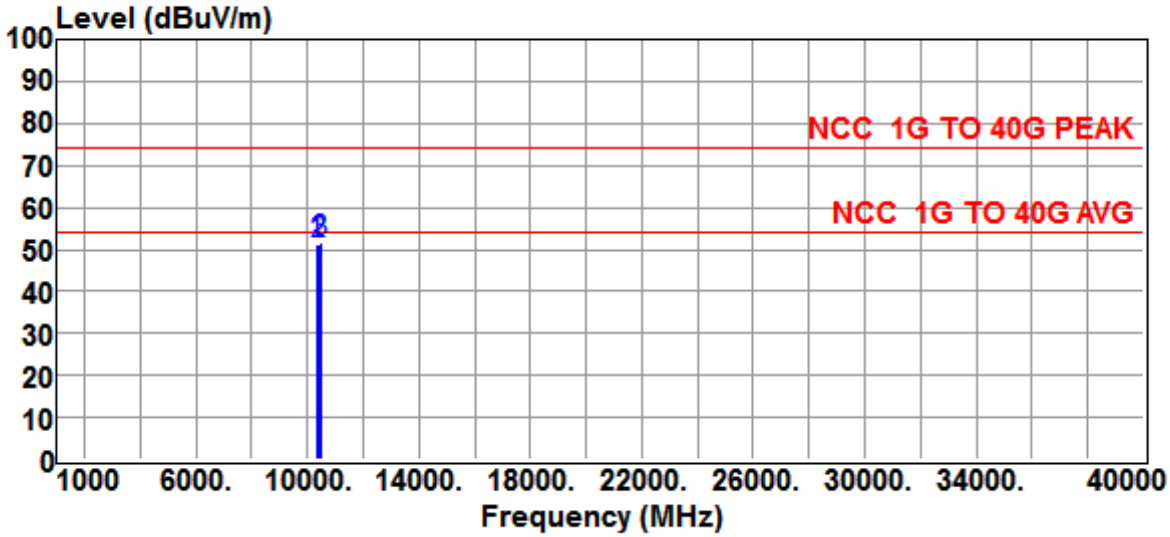
Note 1:
VBW = 10 Hz, when the duty cycle is no less than 98%.
VBW ≥ 1/T, when duty cycle is less than 98% where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

4.4 Radiated Emission Data

4.4.1 RF Portion

(A) Band 5.15~5.25GHz

(a) 802.11a

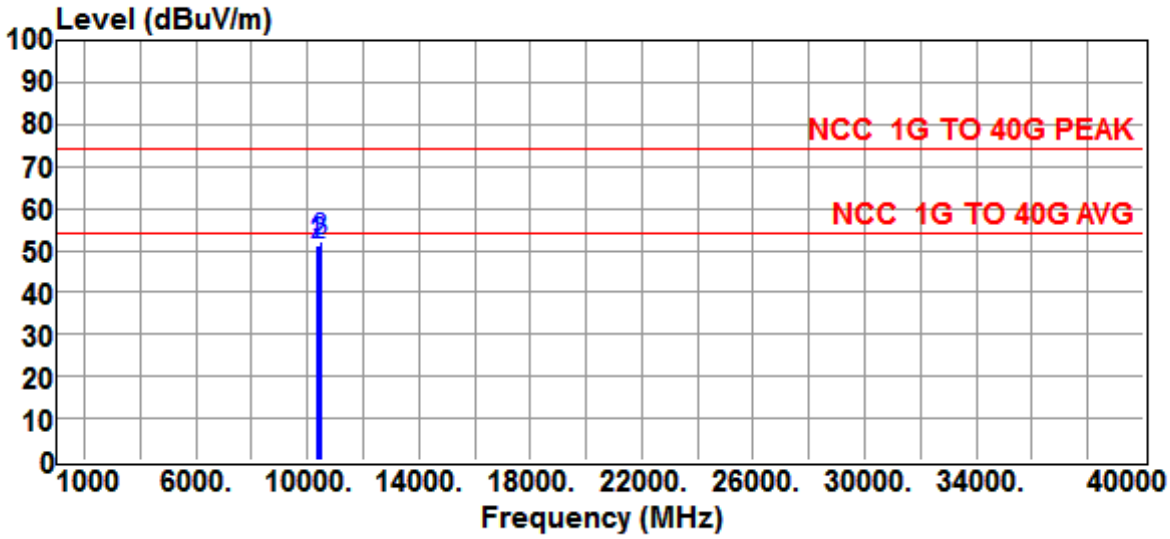


Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:HORIZONTAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11a20		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
10360.0000	41.6	9.6	51.2	74.0	-22.8	Peak
10400.0000	41.7	9.6	51.3	74.0	-22.7	Peak
10480.0000	42.0	9.7	51.7	74.0	-22.3	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result



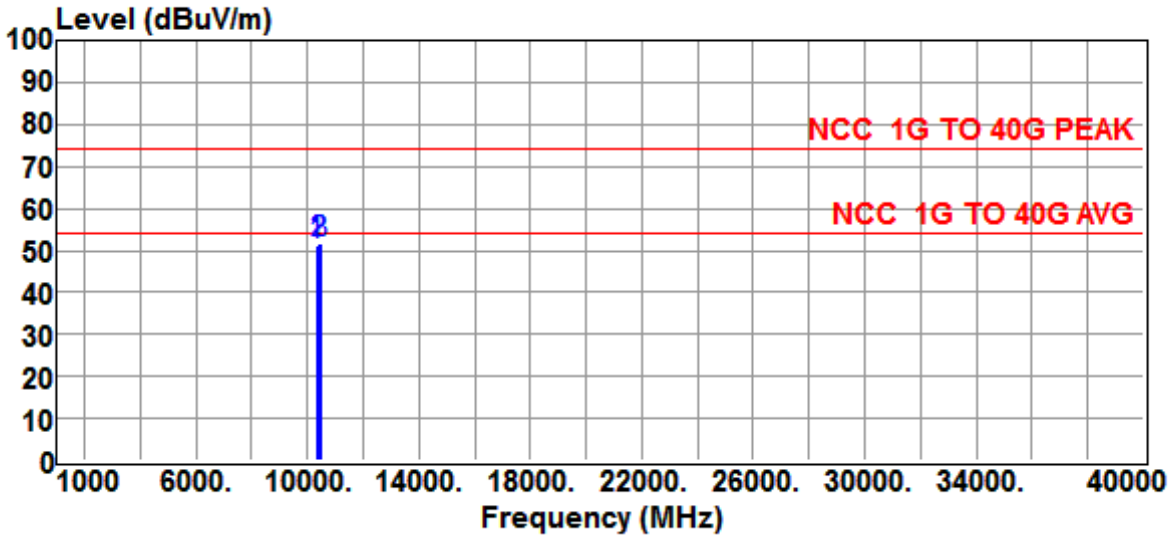
Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:VERTICAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11a20		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
10360.0000	41.4	9.6	51.0	74.0	-23.0	Peak
10400.0000	41.8	9.6	51.4	74.0	-22.6	Peak
10480.0000	42.3	9.7	52.0	74.0	-22.0	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result

(b) 802.11an HT-20

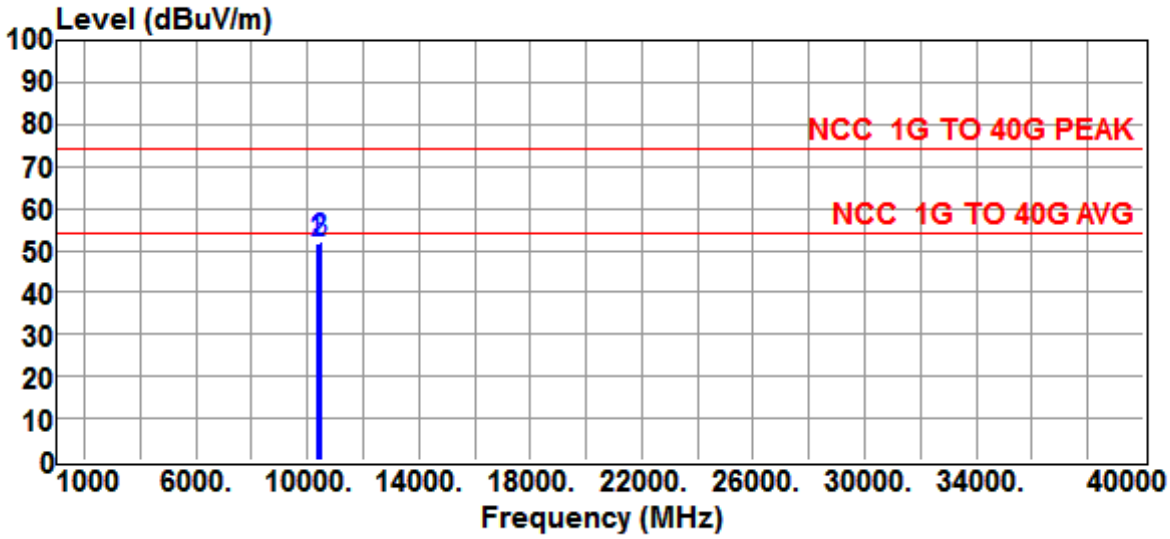


Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:HORIZONTAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11n20		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
10360.0000	41.8	9.6	51.4	74.0	-22.6	Peak
10400.0000	42.1	9.6	51.7	74.0	-22.3	Peak
10480.0000	42.0	9.7	51.7	74.0	-22.3	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result



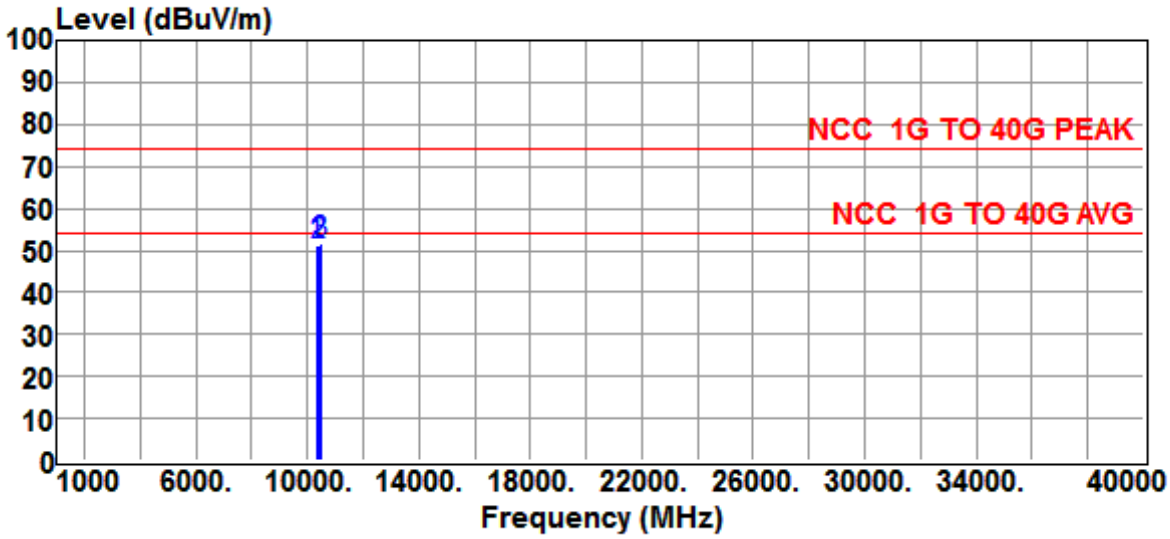
Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:VERTICAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11n20		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
10360.0000	42.2	9.6	51.8	74.0	-22.2	Peak
10400.0000	42.2	9.6	51.8	74.0	-22.2	Peak
10480.0000	42.4	9.7	52.1	74.0	-21.9	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result

(c) 802.11an HT-40

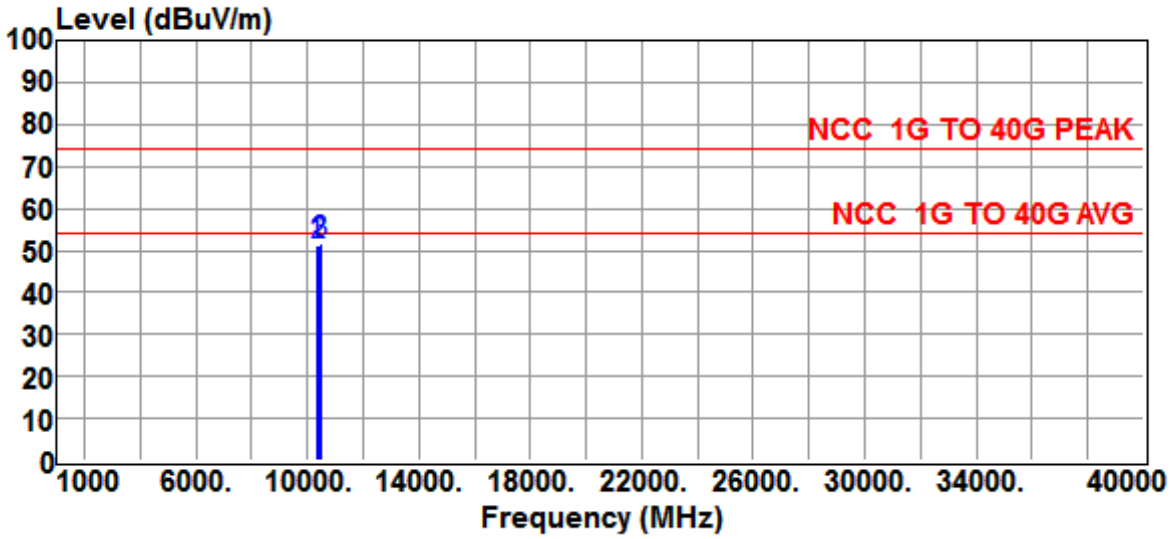


Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:HORIZONTAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11n40		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
10380.0000	41.6	9.6	51.2	74.0	-22.8	Peak
10420.0000	41.8	9.6	51.4	74.0	-22.6	Peak
10460.0000	42.0	9.7	51.7	74.0	-22.3	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result



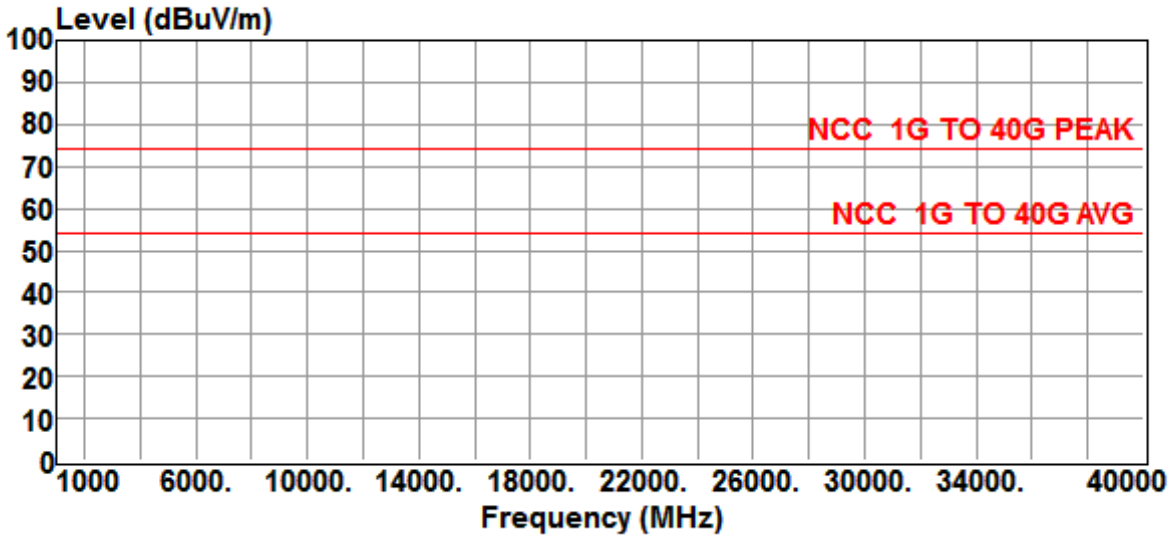
Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:VERTICAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11n40		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
10380.0000	41.7	9.6	51.3	74.0	-22.7	Peak
10420.0000	41.8	9.6	51.4	74.0	-22.6	Peak
10460.0000	42.0	9.7	51.7	74.0	-22.3	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result

(d) 802.11ac VHT-80

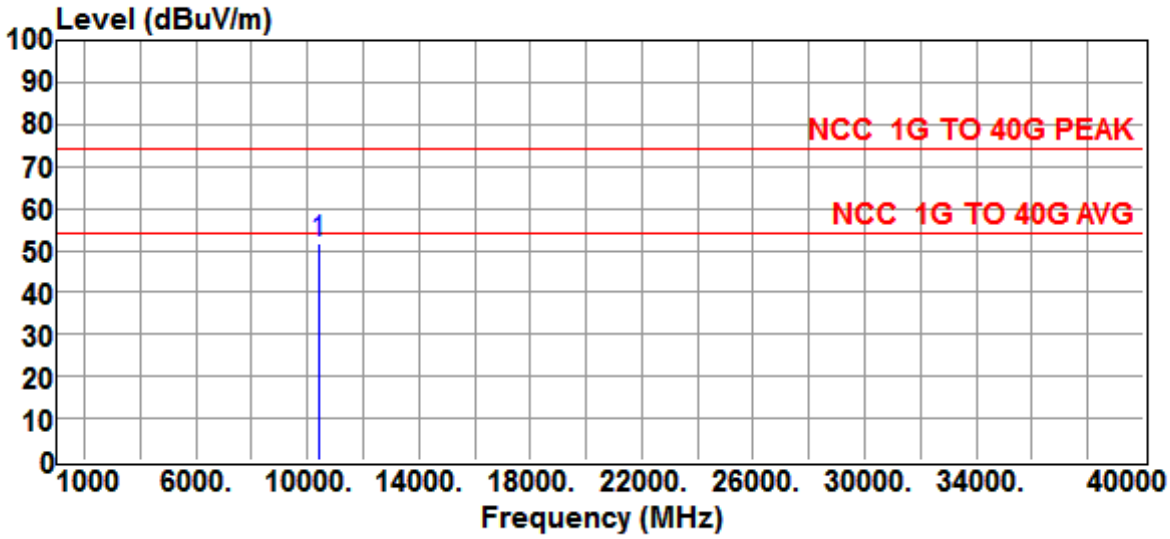


Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:HORIZONTAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11ac80		

Freq	Reading	Correction Factor	Result	Limits	Over limit	Detector
MHz	dBµV	dB	dBµV/m	dBµV/m	dB	

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result



Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:VERTICAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11ac80		

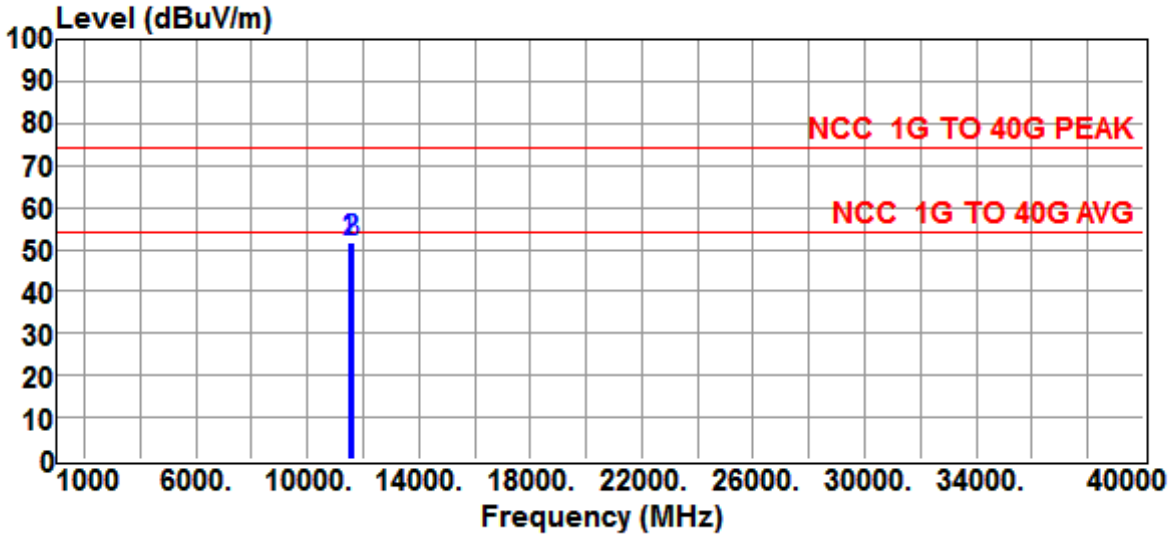
Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
10420.0000	42.2	9.6	51.8	74.0	-22.2	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result

(B) 5.725~5.850GHz

(a) 802.11a

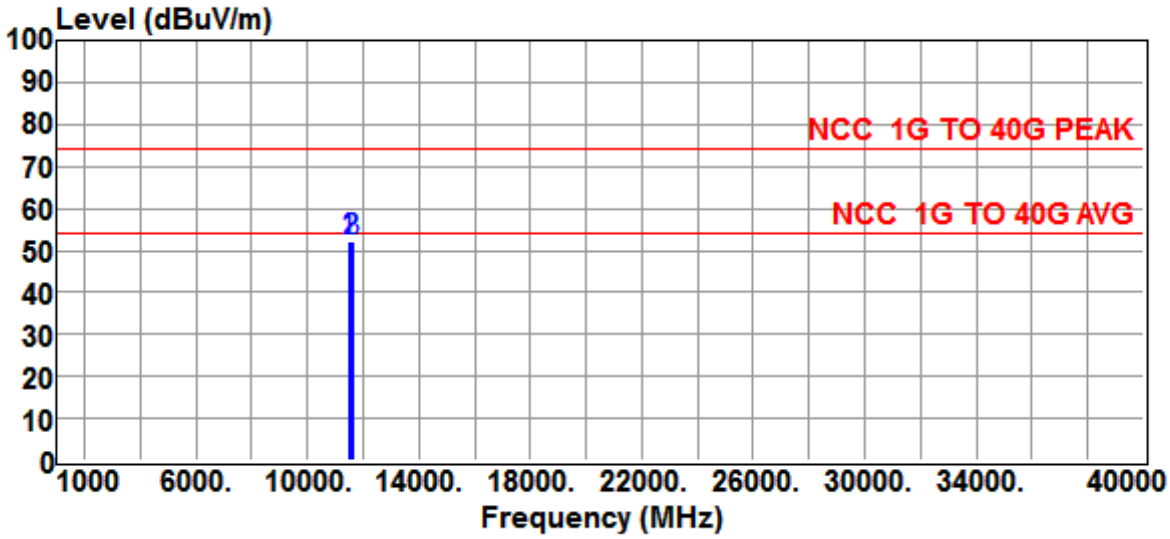


Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:HORIZONTAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11a20		

Freq MHz	Reading dBμV	Correction Factor dB	Result dBμV/m	Limits dBμV/m	Over limit dB	Detector
11530.0000	41.1	10.7	51.8	74.0	-22.2	Peak
11570.0000	41.1	10.8	51.9	74.0	-22.1	Peak
11650.0000	41.0	10.8	51.8	74.0	-22.2	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result



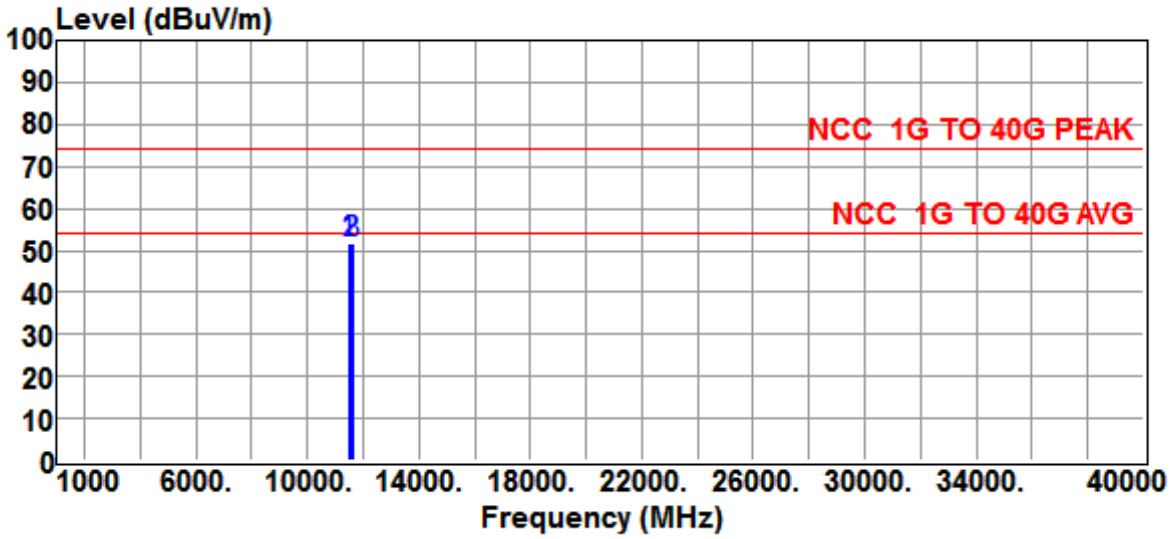
Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:VERTICAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11a20		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
11530.0000	41.3	10.7	52.0	74.0	-22.0	Peak
11570.0000	41.4	10.8	52.2	74.0	-21.8	Peak
11650.0000	41.2	10.8	52.0	74.0	-22.0	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result

(b) 802.11an HT-20

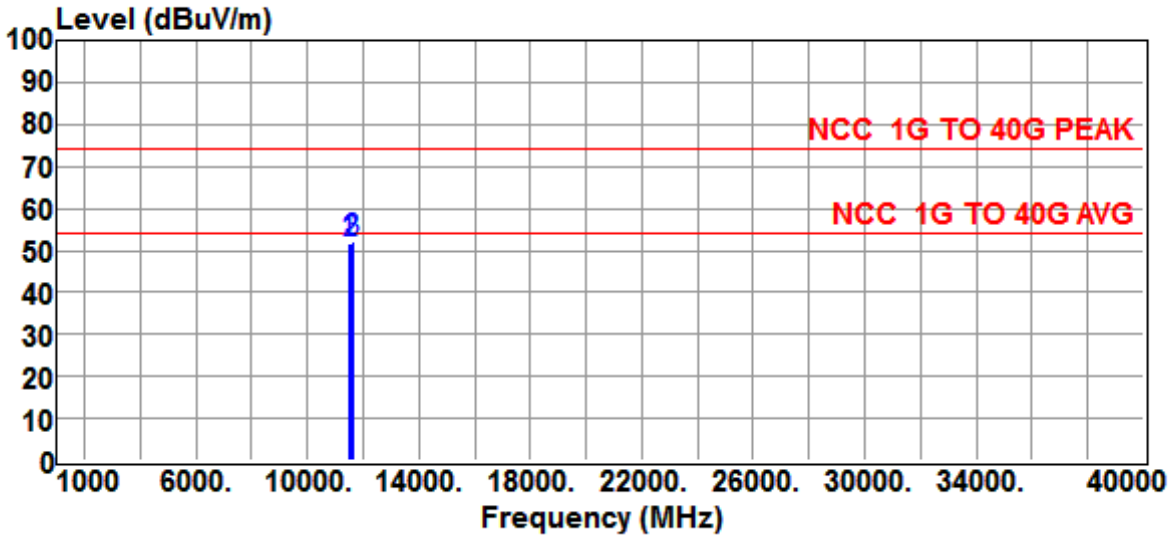


Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:HORIZONTAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11n20		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
11530.0000	41.1	10.7	51.8	74.0	-22.2	Peak
11570.0000	41.1	10.8	51.9	74.0	-22.1	Peak
11650.0000	41.1	10.8	51.9	74.0	-22.1	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result



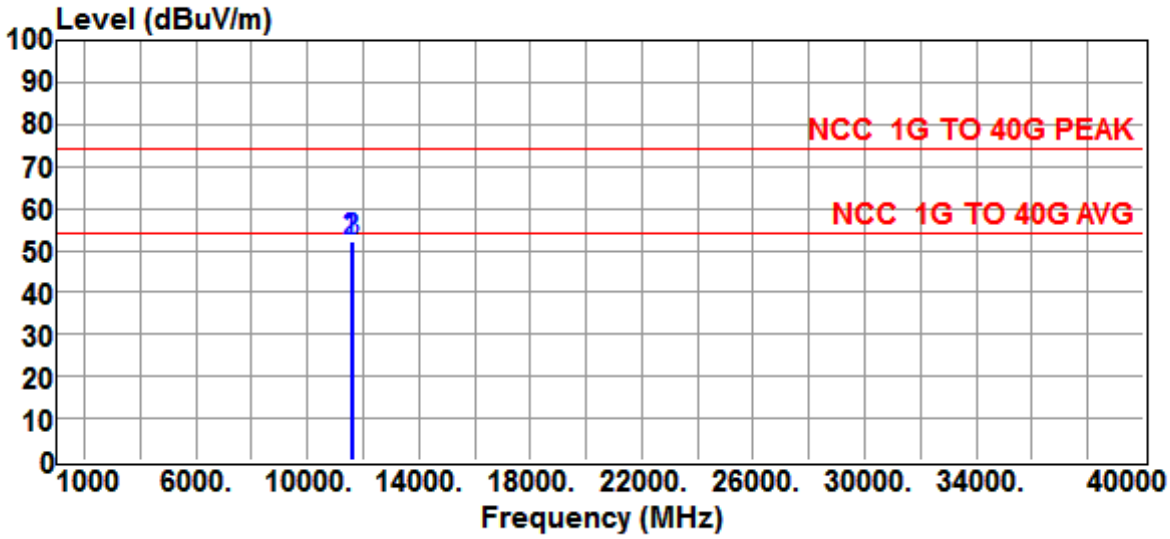
Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:VERTICAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11n20		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
11530.0000	41.2	10.7	51.9	74.0	-22.1	Peak
11570.0000	41.0	10.8	51.8	74.0	-22.2	Peak
11650.0000	41.3	10.8	52.1	74.0	-21.9	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result

(c) 802.11an HT-40

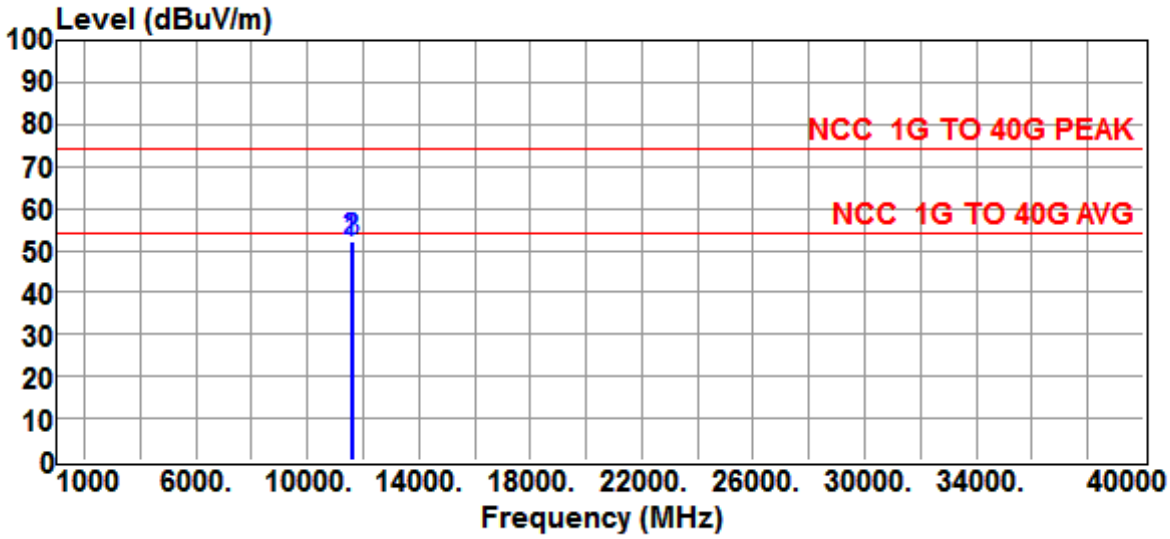


Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:HORIZONTAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11n40		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
11550.0000	41.4	10.8	52.2	74.0	-21.8	Peak
11590.0000	41.1	10.9	52.0	74.0	-22.0	Peak
11630.0000	41.3	10.8	52.1	74.0	-21.9	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result



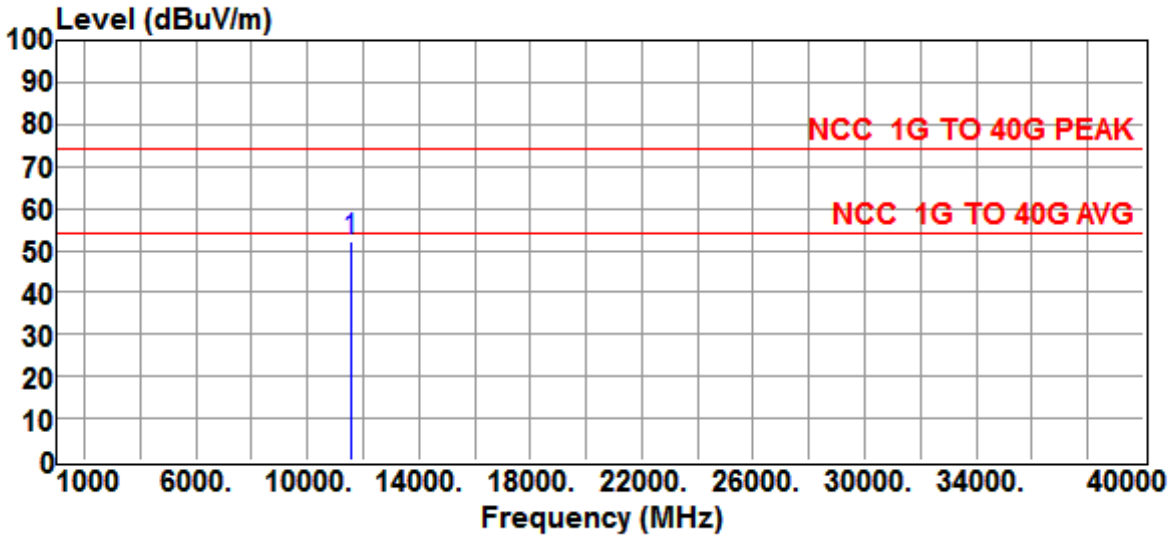
Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:VERTICAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11n40		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
11550.0000	41.1	10.8	51.9	74.0	-22.1	Peak
11590.0000	41.2	10.9	52.1	74.0	-21.9	Peak
11630.0000	41.2	10.8	52.0	74.0	-22.0	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result

(d) 802.11ac VHT-80

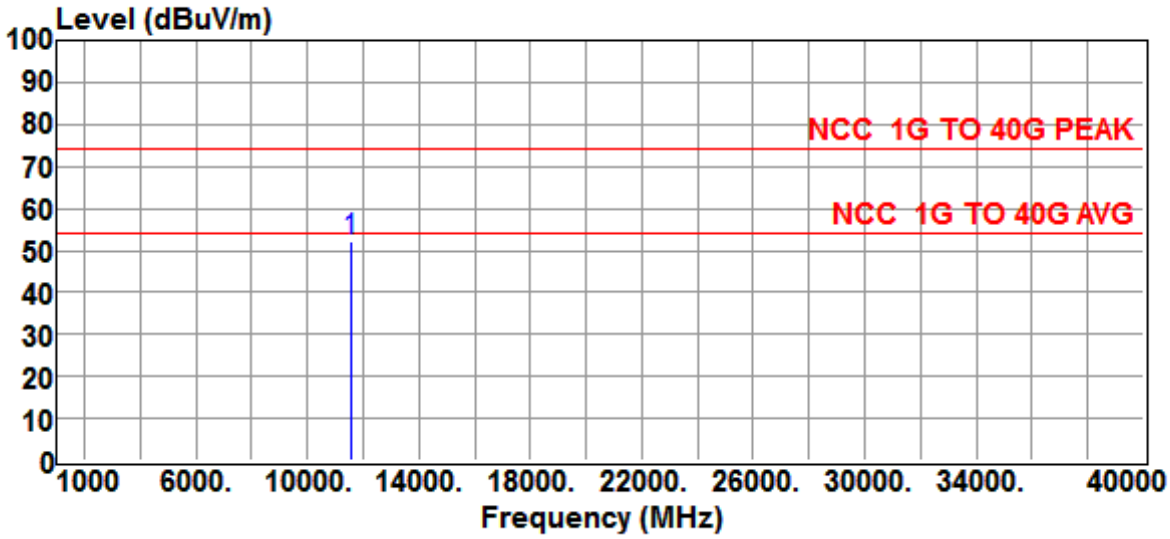


Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:HORIZONTAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11ac80		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
11550.0000	41.3	10.8	52.1	74.0	-21.9	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result



Site	:CHAMBER	Date	:2016-09-22
Limit	:NCC 1G TO 40G PEAK	Ant. Pol.	:VERTICAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:5G	Humi.	:53 %
Test Mode	:11ac80		

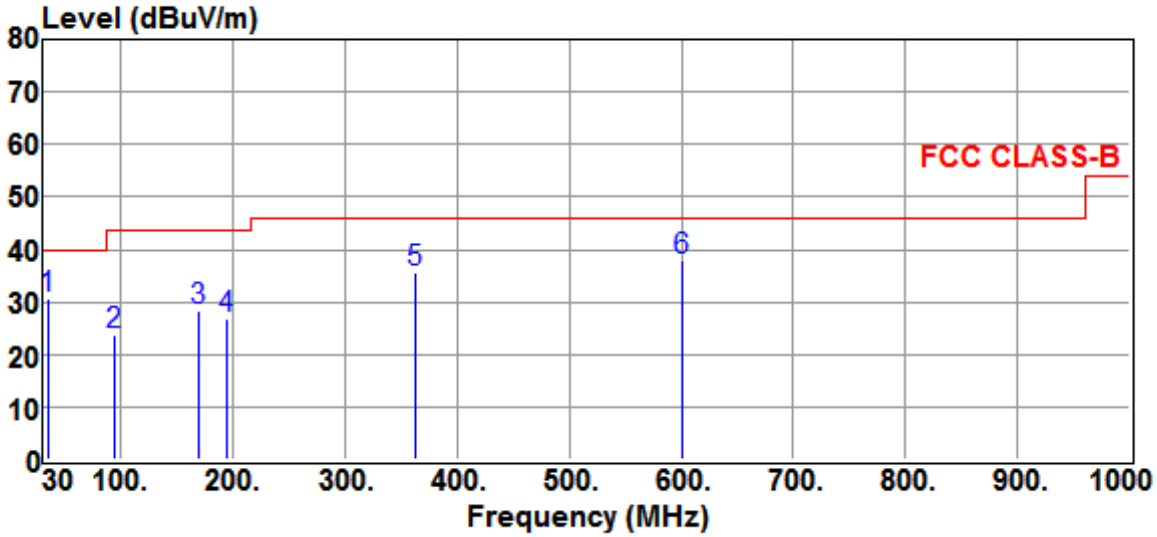
Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
11550.0000	41.2	10.8	52.0	74.0	-22.0	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result

4.4.2 Other Emission

a) Emission frequencies below 1 GHz

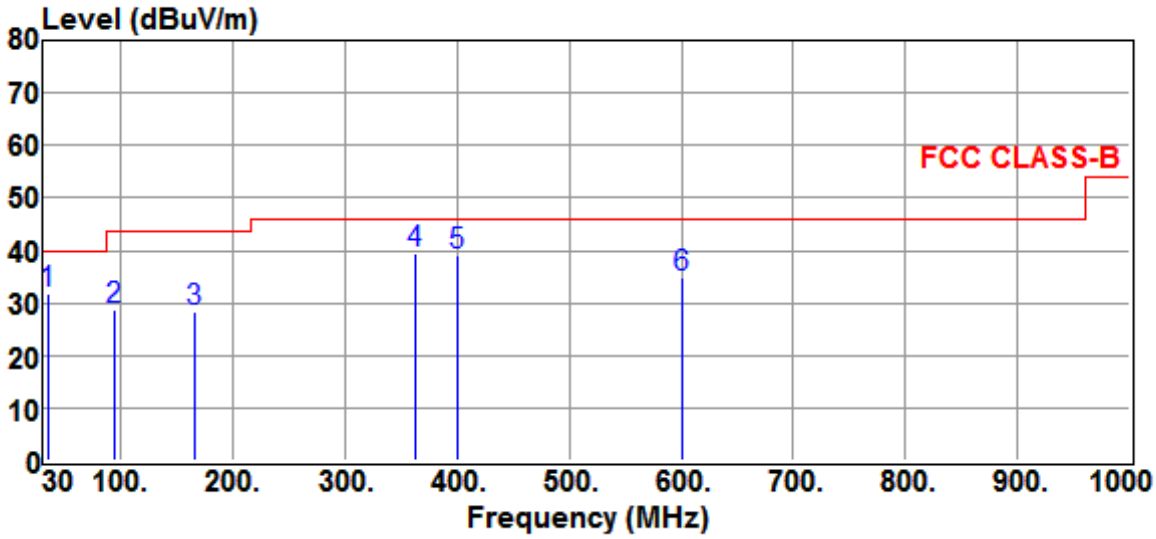


Site	:Chamber#2	Date	:2016-09-01
Limit	:FCC CLASS-B	Ant. Pol.	:HORIZONTAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:TX Mode	Humi.	:53 %

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
34.8500	40.5	-10.0	30.5	40.0	-9.5	QP
94.0200	40.3	-16.6	23.7	43.5	-19.8	QP
168.7100	42.4	-14.2	28.2	43.5	-15.3	QP
194.9000	41.8	-15.0	26.8	43.5	-16.7	QP
362.7100	43.4	-7.8	35.6	46.0	-10.4	QP
600.3600	43.1	-5.3	37.8	46.0	-8.2	QP

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss
3. The margin value=Limit - Result



Site	:Chamber#2	Date	:2016-09-01
Limit	:FCC CLASS-B	Ant. Pol.	:VERTICAL
EUT	:AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	:AC 120V60Hz	Model	:TRINITYXTAC
Engineer	:Brian Huang	Temp.	:25˚C
Test Mode	:TX Mode	Humi.	:53 %

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
34.8500	41.8	-10.0	31.8	40.0	-8.2	QP
94.0200	45.4	-16.6	28.8	43.5	-14.7	QP
166.7700	42.4	-14.0	28.4	43.5	-15.1	QP
362.7100	47.1	-7.8	39.3	46.0	-6.7	QP
399.5700	46.5	-7.5	39.0	46.0	-7.0	QP
600.3600	40.0	-5.3	34.7	46.0	-11.3	QP

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss
3. The margin value=Limit – Result

b) Emission frequencies above 1 GHz

Radiated emission frequencies above 1 GHz to 40 GHz were too low to be measured with a pre-amplifier of 35 dB.

c) Emission frequencies below 30MHz (9kHz - 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

4.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, High Pass Filter Loss(if used) and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation calculation is as follows:

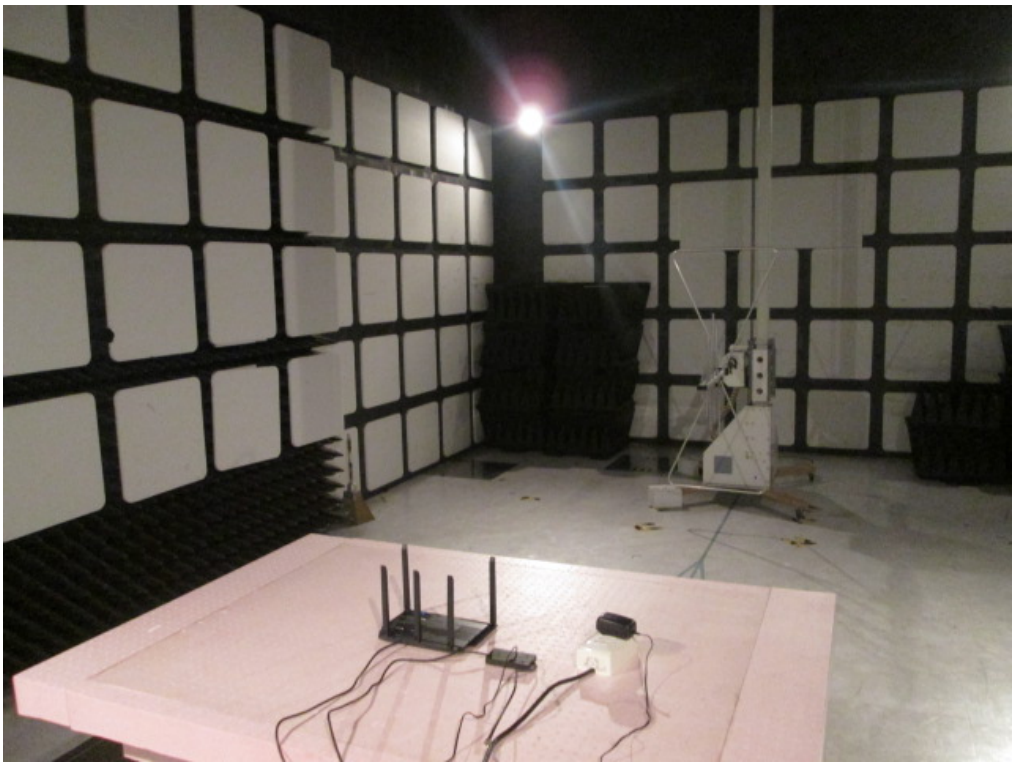
Result = Reading + Corrected Factor

where

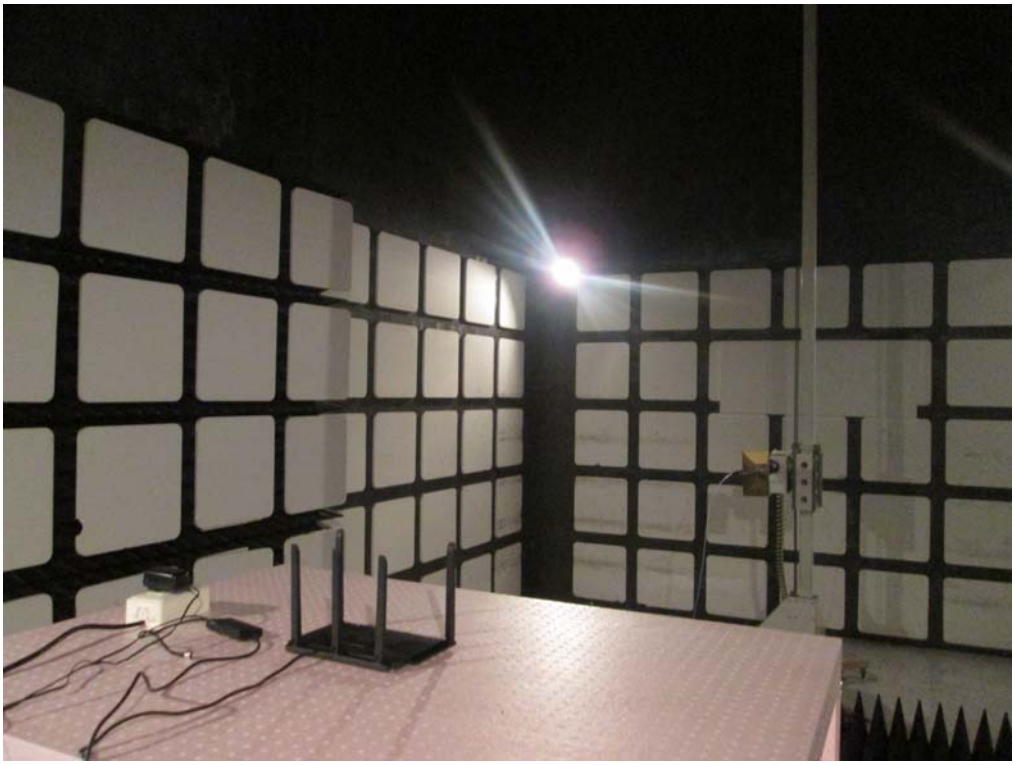
Corrected Factor = Antenna FACTOR + Cable Loss + High Pass Filter Loss - Amplifier Gain

4.6 Photos of Radiation Measuring Setup

(Below 1GHz)



(Above 1GHz)



5 CONDUCTED EMISSION MEASUREMENT

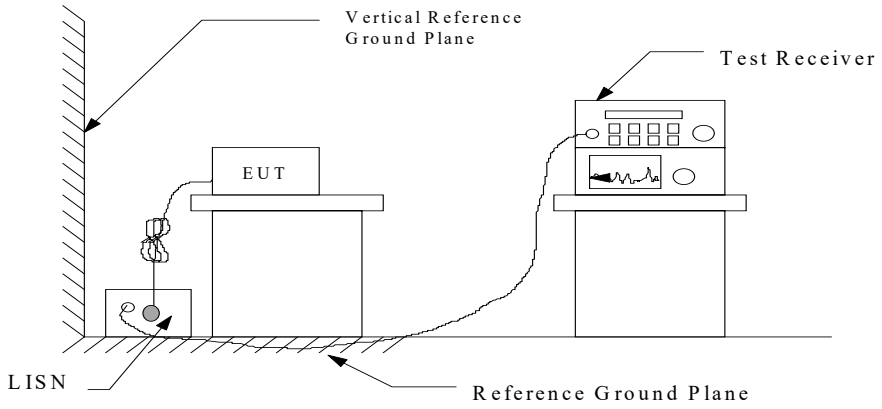
5.1 Standard Applicable

For unintentional and intentional device, Line Conducted Emission Limits are in accordance to §15.107(a) and §15.207(a) respectively. Both Limits are identical specification.

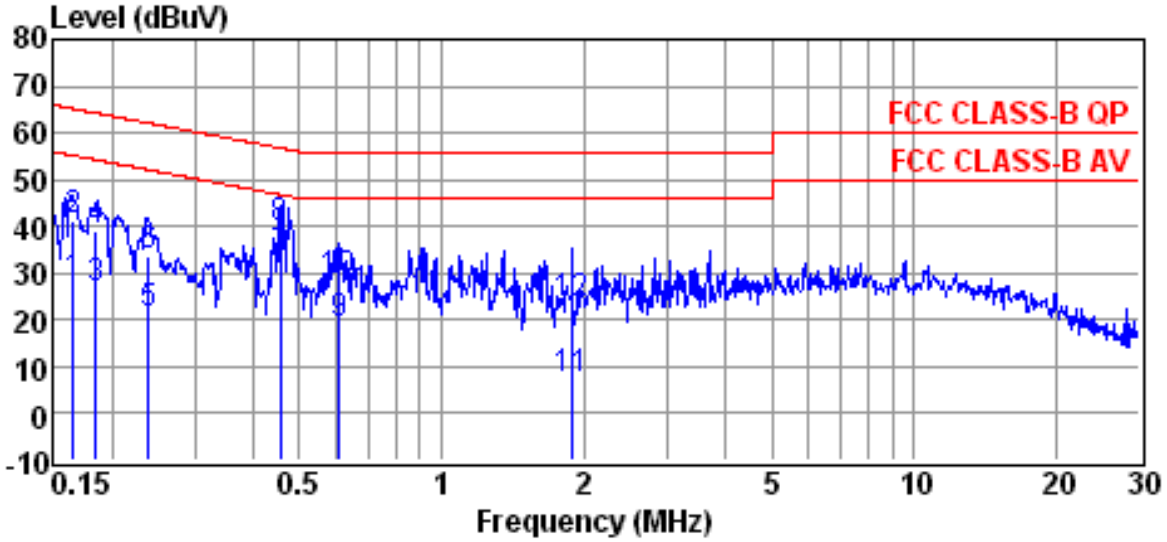
5.2 Measurement Procedure

1. Setup the configuration per figure 3.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 6 or 8 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then record the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest three emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

Figure 3 : Conducted emissions measurement configuration



5.3 Conducted Emission Data

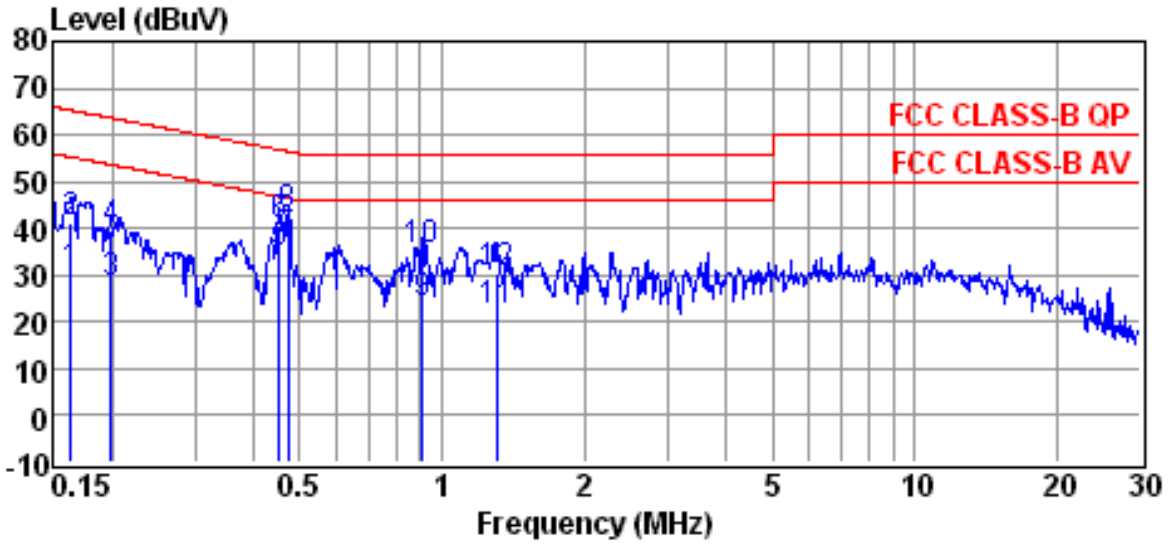


Site	: conducted #1	Date	: 09-01-2016
Condition	: FCC CLASS-B AV	LISN	: NEUTRAL
Tem / Hum	: 24 ℃ / 55%	Test Mode	:
EUT	: AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	: 120V/60Hz	Memo	:

Freq (MHz)	Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Remark
0.1659	17.53	10.15	27.68	55.16	-27.48	Average
0.1659	30.89	10.15	41.04	65.16	-24.12	QP
0.1854	16.51	10.15	26.66	54.24	-27.58	Average
0.1854	28.84	10.15	38.99	64.24	-25.25	QP
0.2391	11.25	10.16	21.41	52.13	-30.72	Average
0.2391	23.32	10.16	33.48	62.13	-28.65	QP
0.4564	23.11	10.18	33.29	46.76	-13.47	Average
0.4564	29.40	10.18	39.58	56.76	-17.18	QP
0.6075	8.98	10.19	19.17	46.00	-26.83	Average
0.6075	18.15	10.19	28.34	56.00	-27.66	QP
1.8880	-3.15	10.25	7.10	46.00	-38.90	Average
1.8880	13.13	10.25	23.38	56.00	-32.62	QP

Note :

1. Result = Reading + Factor
2. Factor = LISN Factor + Cable Loss



Site	: conducted #1	Date	: 09-01-2016
Condition	: FCC CLASS-B AV	LISN	: LINE
Tem / Hum	: 24 ℃ / 55%	Test Mode	:
EUT	: AMPLIFIED INDOOR HDTV ANTENNA WITH WIFI EXTENDER		
Power Rating	: 120V/60Hz	Memo	:

Freq (MHz)	Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Remark
0.1641	20.34	10.15	30.49	55.25	-24.76	Average
0.1641	30.99	10.15	41.14	65.25	-24.11	QP
0.1997	18.15	10.16	28.31	53.62	-25.31	Average
0.1997	29.19	10.16	39.35	63.62	-24.27	QP
0.4516	24.47	10.18	34.65	46.85	-12.20	Average
0.4516	30.62	10.18	40.80	56.85	-16.05	QP
0.4736	27.26	10.19	37.45	46.45	-9.00	Average
0.4736	32.68	10.19	42.87	56.45	-13.58	QP
0.9087	13.69	10.21	23.90	46.00	-22.10	Average
0.9087	25.16	10.21	35.37	56.00	-20.63	QP
1.3030	12.05	10.23	22.28	46.00	-23.72	Average
1.3030	20.36	10.23	30.59	56.00	-25.41	QP

Note :

1. Result = Reading + Factor
2. Factor = LISN Factor + Cable Loss

5.4 Result Data Calculation

The result data is calculated by adding the LISN Factor to the measured reading. The basic equation with a sample calculation is as follows:

RESULT = READING + LISN FACTOR

Assume a receiver reading of 22.5 dB μ V is obtained, and LISN Factor is 0.1 dB, then the total of disturbance voltage is 22.6 dB μ V.

RESULT = 22.5 + 0.1 = 22.6 dB μ V
Level in μ V = Common Antilogarithm[(22.6 dB μ V)/20]
= 13.48 μ V

5.5 Conducted Measurement Equipment

The following test equipment are used during the conducted test .

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESCI	2015/12/05	2016/12/04
LISN	Schwarzbeck	NNLK 8129	2016/05/31	2018/05/30
LISN	Rohde & Schwarz	ESH2-Z5	2016/05/05	2017/05/04

5.6 Photos of Conduction Measuring Setup

6 ANTENNA REQUIREMENT

6.1 Standard Applicable

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.

According to §15.407 (a)(3), if transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

6.2 Antenna Construction and Directional Gain

The antenna gain is 3.0dBi so there is no need to reduce the power.

Please see internal photos and the antenna specifications.

7 EMISSION BANDWIDTH MEASUREMENT

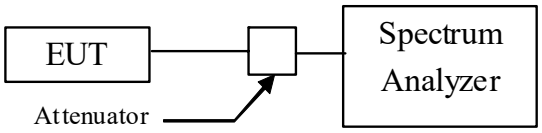
7.1 Standard Applicable

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

7.2 Measurement 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 as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value. The settings of spectrum analyzer is as followings.
    1) Set RBW = 100 kHz.
    2) Set the video bandwidth (VBW) ≥ 3 x RBW.
    3) Detector = Peak.
    4) Trace mode = max hold.
    5) Sweep = auto couple.
    6) Allow the trace to stabilize.
    7) 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. Repeat above procedures until all frequencies measured were complete.

Figure 4: Emission bandwidth measurement configuration.



7.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/07/06	2017/07/05
Attenuator	MINI-CIRCUITS	BW-S10W2+	2015/10/07	2016/10/06

7.4 Measurement Data

Test Date : Aug. 19, 2016 Temperature : 24 °C Humidity : 56 %

Band 5.15~5.25GHz

Mode: 802.11a

a) Channel Low: 26 dB Emission Bandwidth is 22.56 MHz
b) Channel Mid: 26 dB Emission Bandwidth is 22.44 MHz
c) Channel High: 26 dB Emission Bandwidth is 22.44 MHz

Mode: 802.11an HT-20

a) Channel Low: 26 dB Emission Bandwidth is 21.60 MHz
b) Channel Mid: 26 dB Emission Bandwidth is 21.60 MHz
c) Channel High: 26 dB Emission Bandwidth is 21.60 MHz

Mode: 802.11an HT-40

a) Channel Low: 26 dB Emission Bandwidth is 42.96 MHz
b) Channel Mid: 26 dB Emission Bandwidth is 42.72 MHz
c) Channel High: 26 dB Emission Bandwidth is 42.72 MHz

Mode: 802.11ac VHT-80

a) Channel Low: 26 dB Emission Bandwidth is 85.20 MHz

Note : The expanded uncertainty: frequency $\times 1.65 \times 10^{-6}$ (1 GHz $< f \leq$ 18 GHz).

Test Date : Aug. 22, 2016 Temperature : 26 °C Humidity : 56 %

Band 5.725~5.850GHz

Mode: 802.11a

a) Channel Low: 6 dB Emission Bandwidth is 17.85 MHz
b) Channel Mid: 6 dB Emission Bandwidth is 17.85 MHz
c) Channel High: 6 dB Emission Bandwidth is 17.85 MHz

Mode: 802.11an HT-20

a) Channel Low: 6 dB Emission Bandwidth is 17.85 MHz
b) Channel Mid: 6 dB Emission Bandwidth is 17.85 MHz
c) Channel High: 6 dB Emission Bandwidth is 17.85 MHz

Mode: 802.11an HT-40

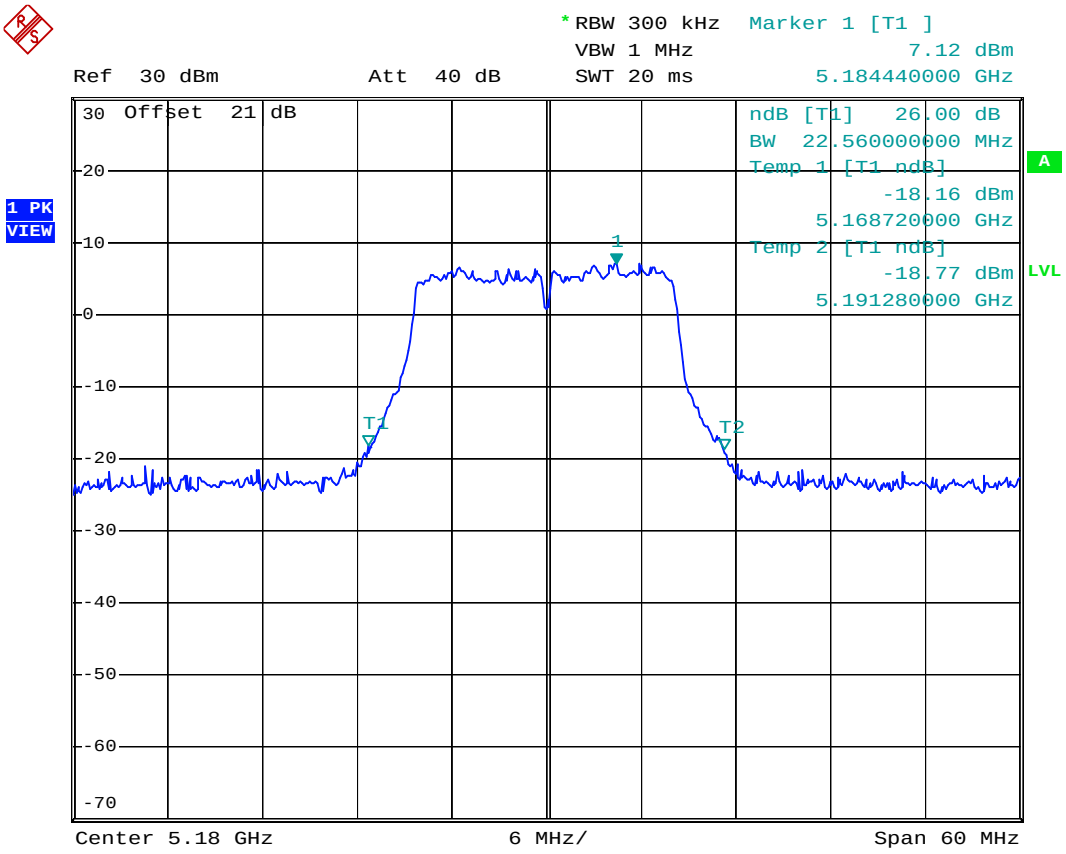
a) Channel Low: 6 dB Emission Bandwidth is 36.70 MHz
b) Channel Mid: 6 dB Emission Bandwidth is 36.70 MHz
c) Channel High: 6 dB Emission Bandwidth is 36.70 MHz

Mode: 802.11ac VHT-80

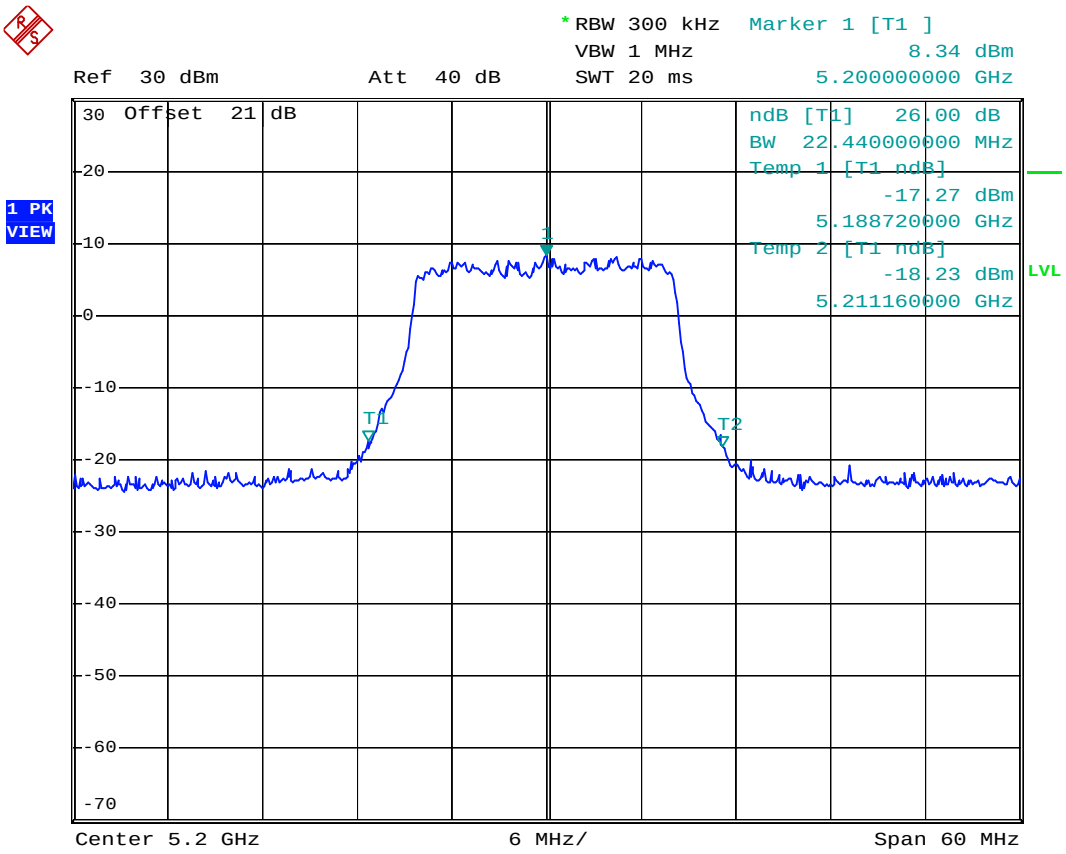
a) Channel Low: 6 dB Emission Bandwidth is 77.28 MHz

Note : The expanded uncertainty: frequency $\times 1.65 \times 10^{-6}$ (1 GHz $< f \leq$ 18 GHz).

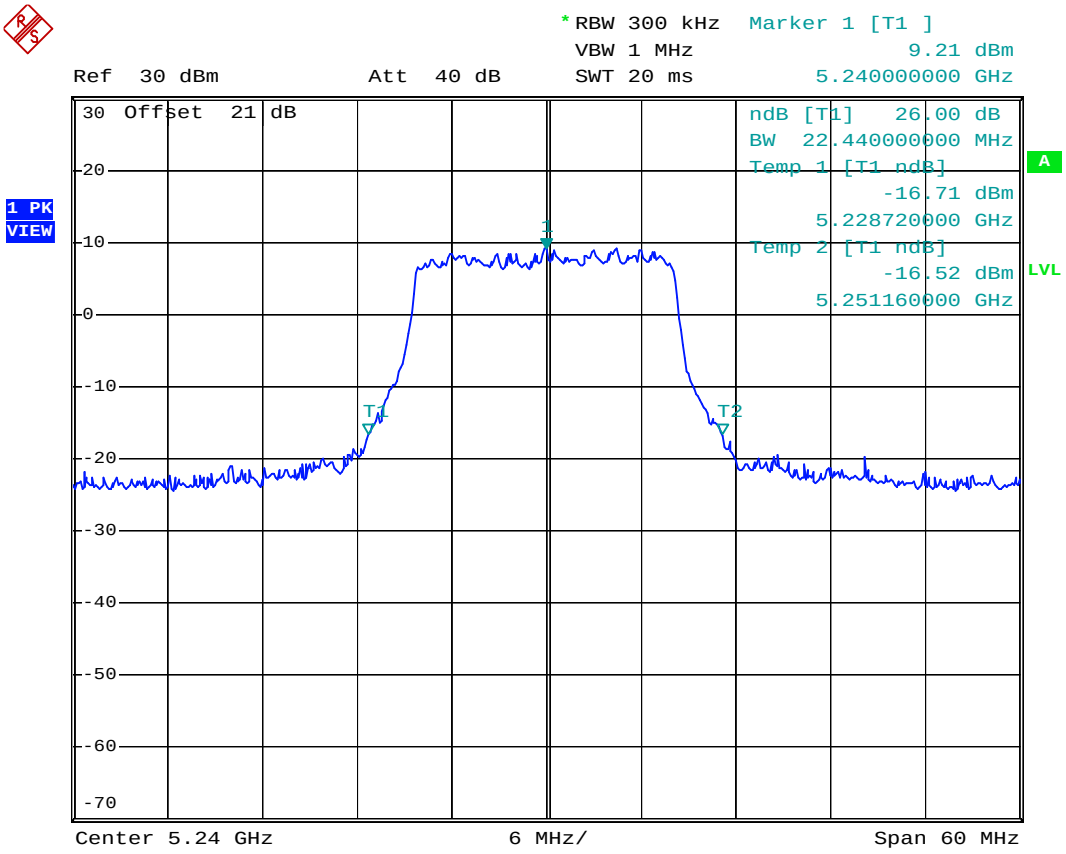
Band 5.15~5.25GHz / Mode: 802.11a / Channel Low



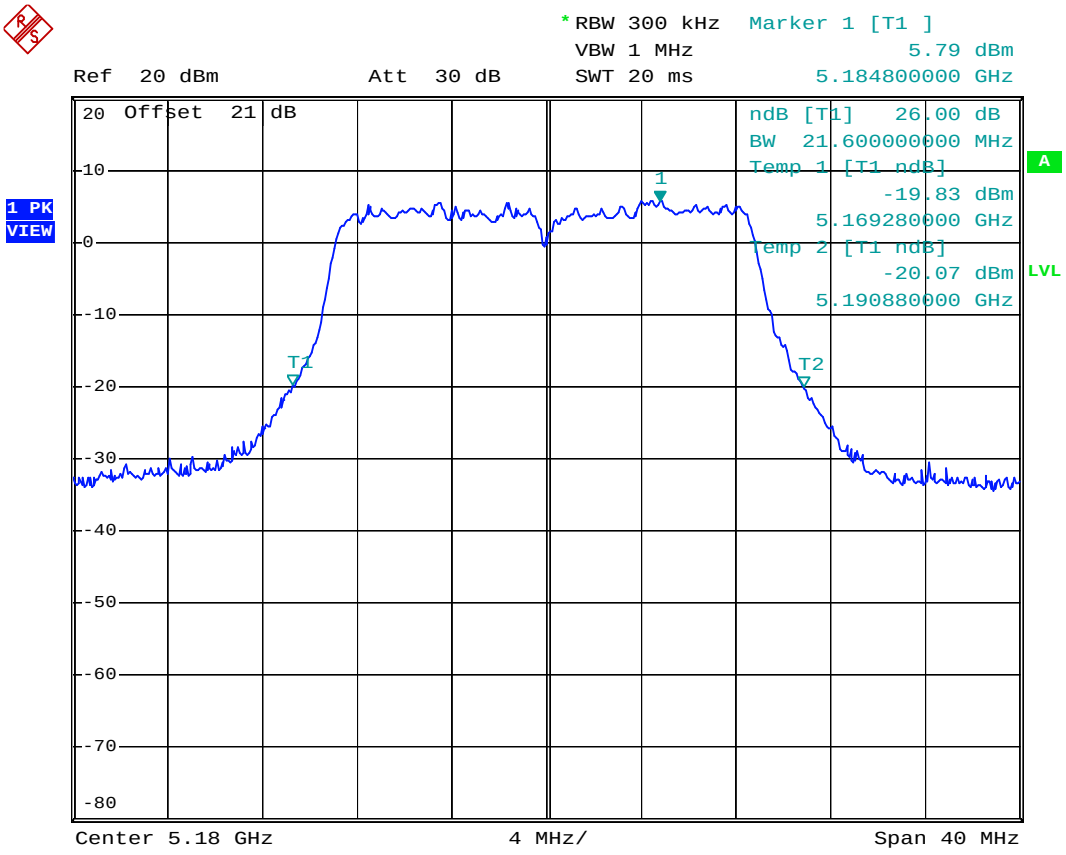
Band 5.15~5.25GHz / Mode: 802.11a / Channel Mid



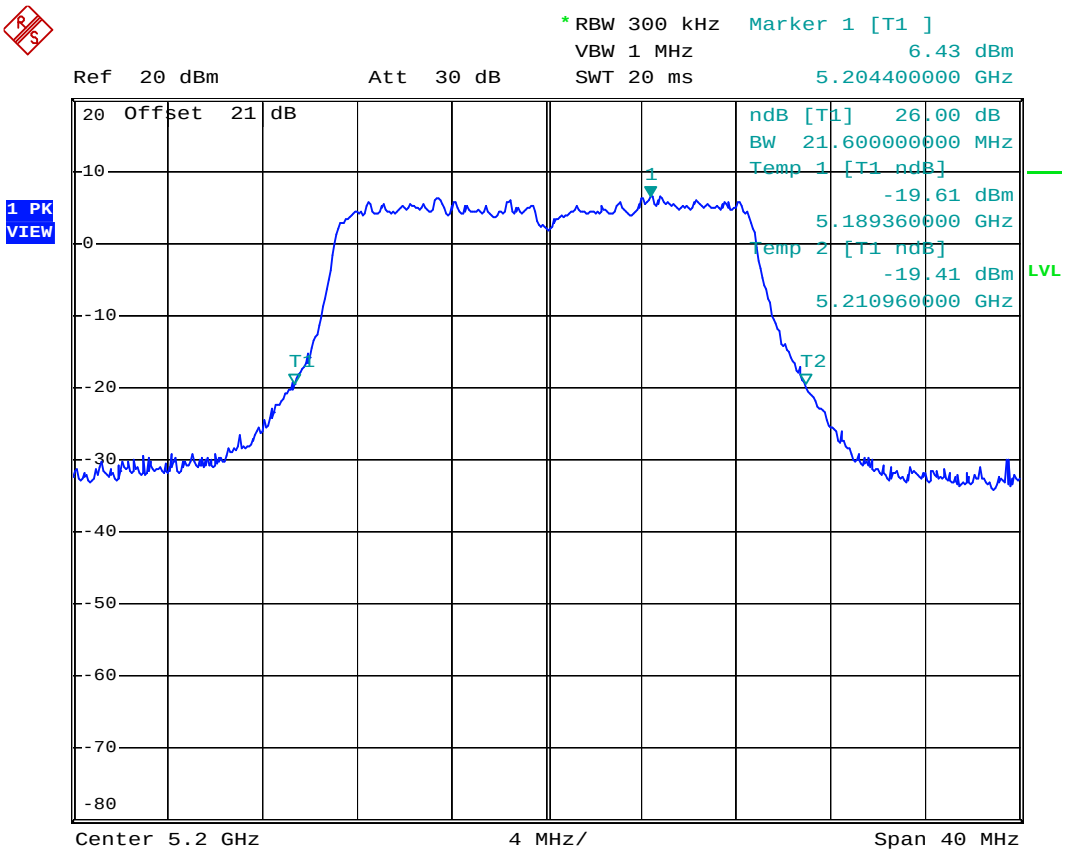
Band 5.15~5.25GHz / Mode: 802.11a / Channel High



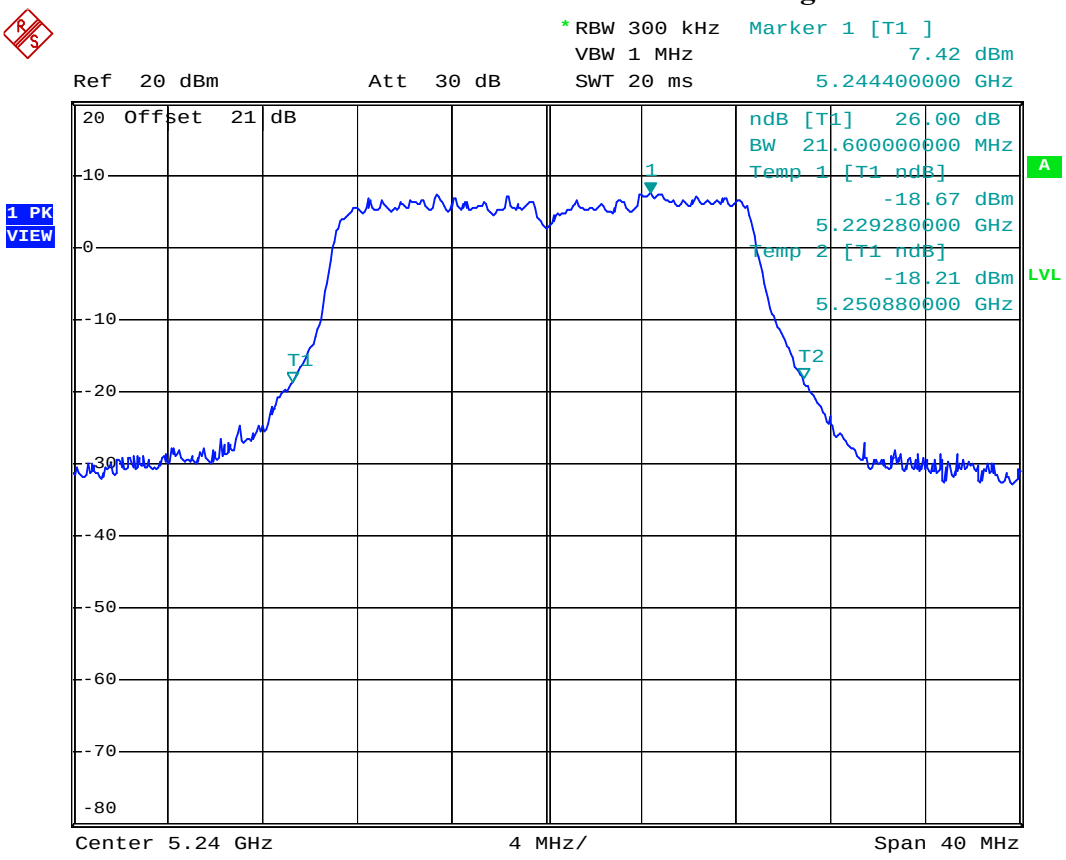
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel Low



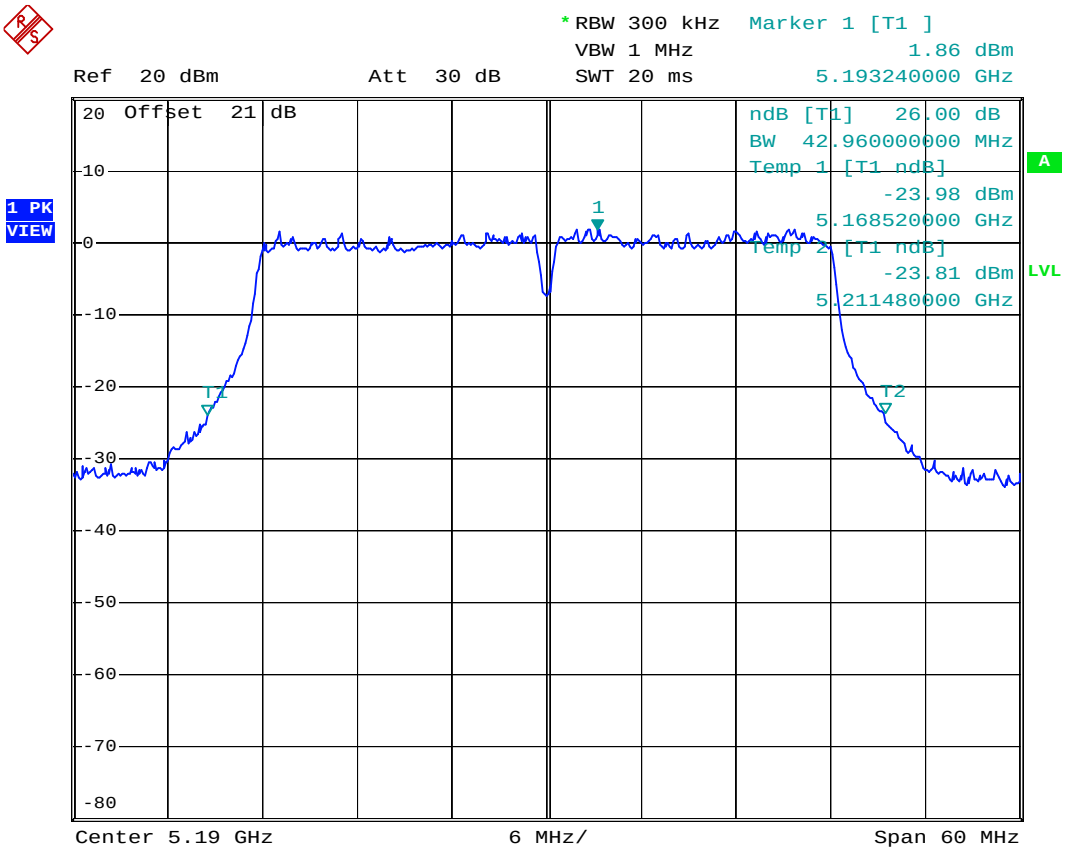
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel Mid



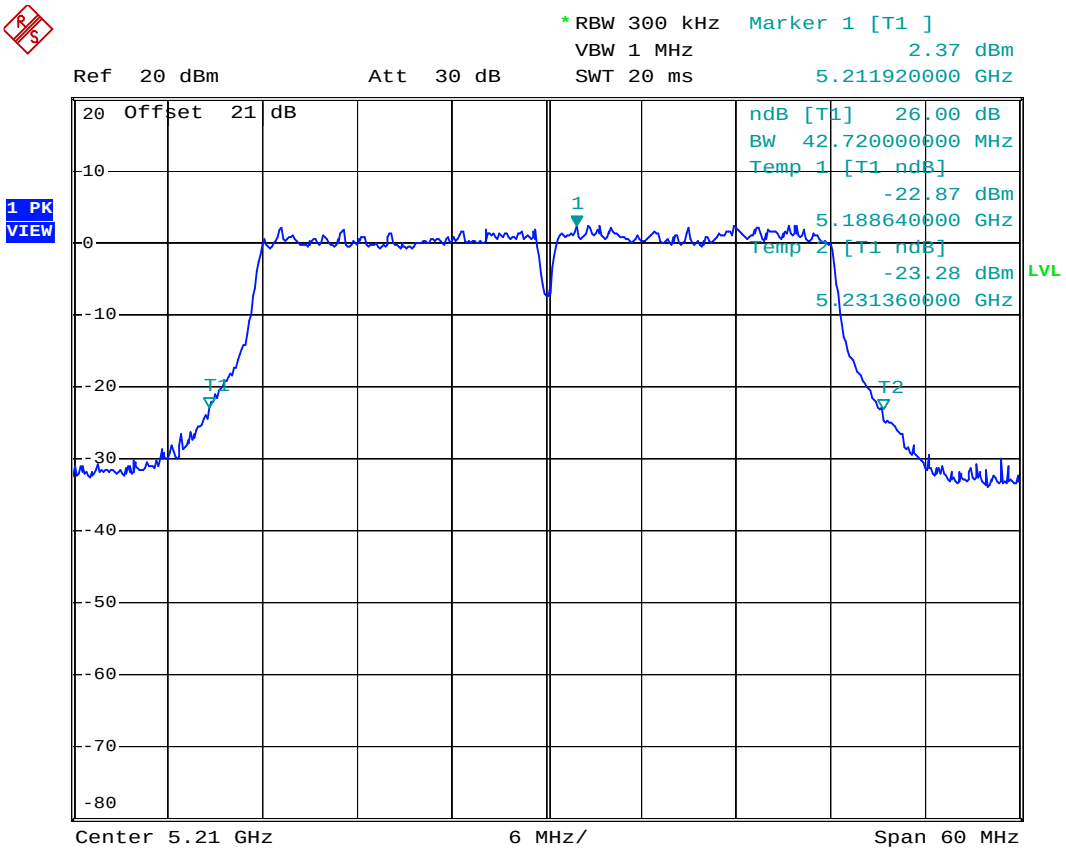
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel High



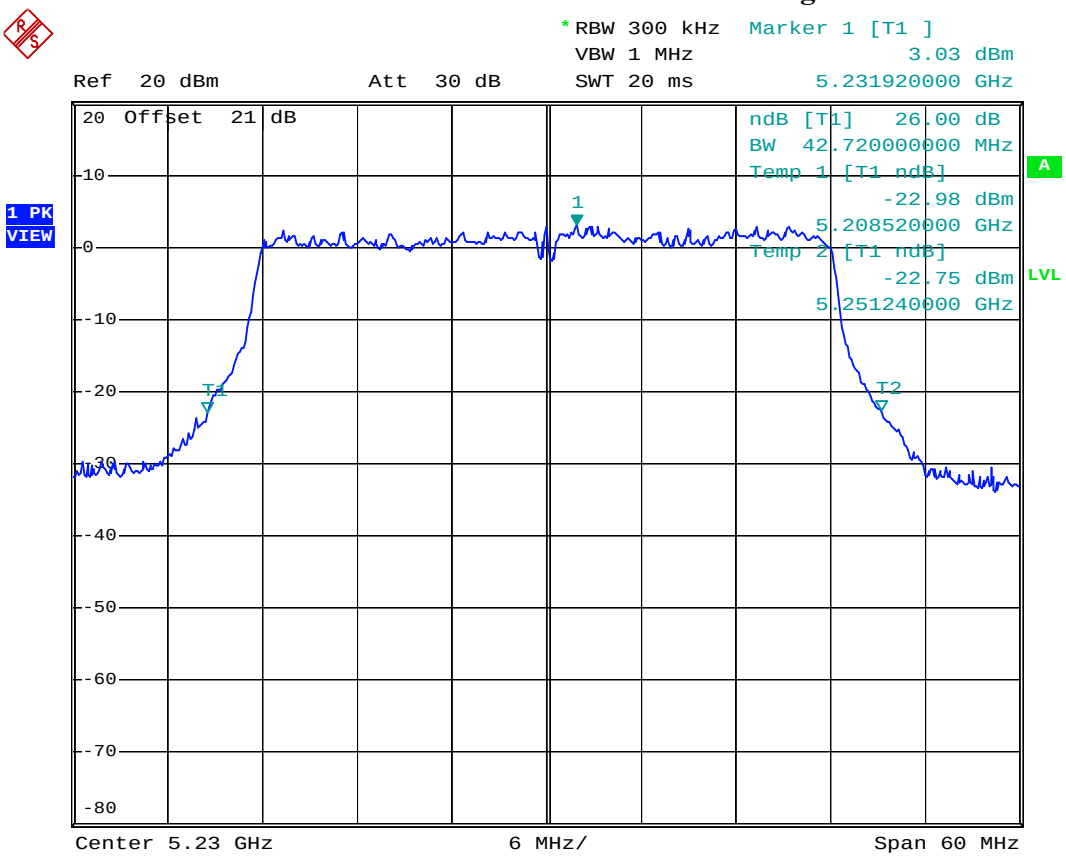
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel Low



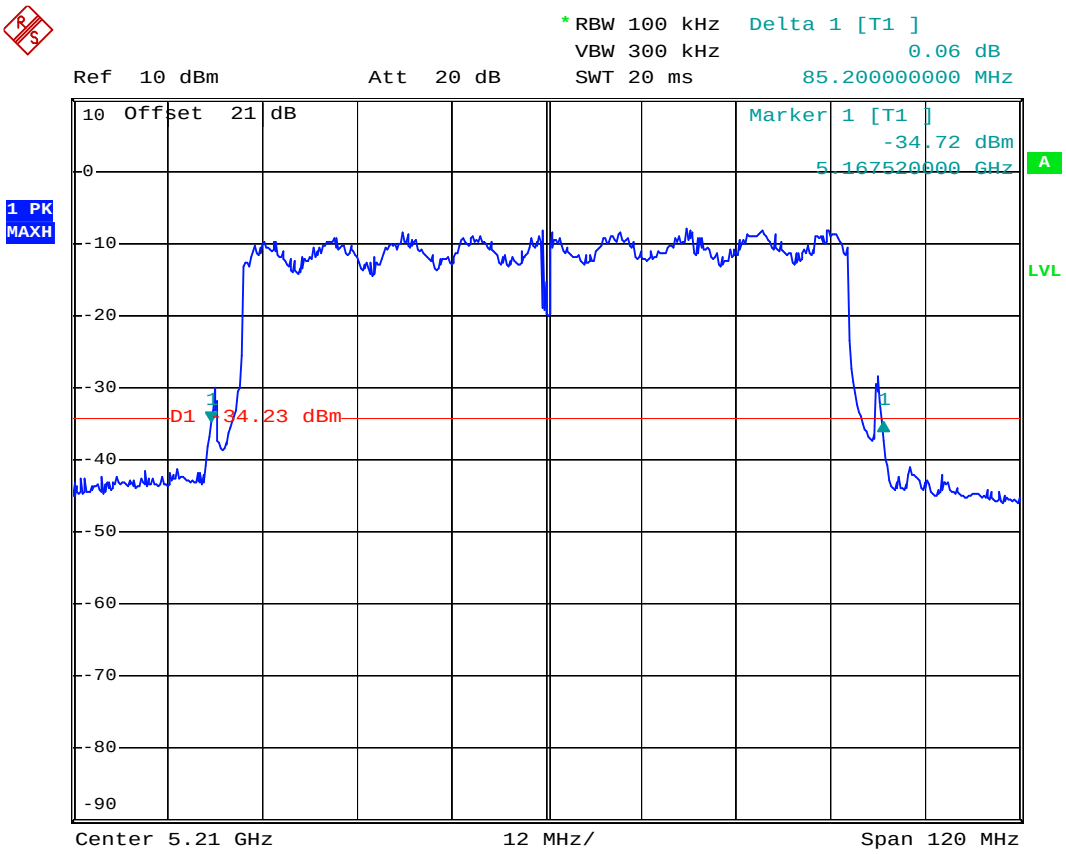
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel Mid



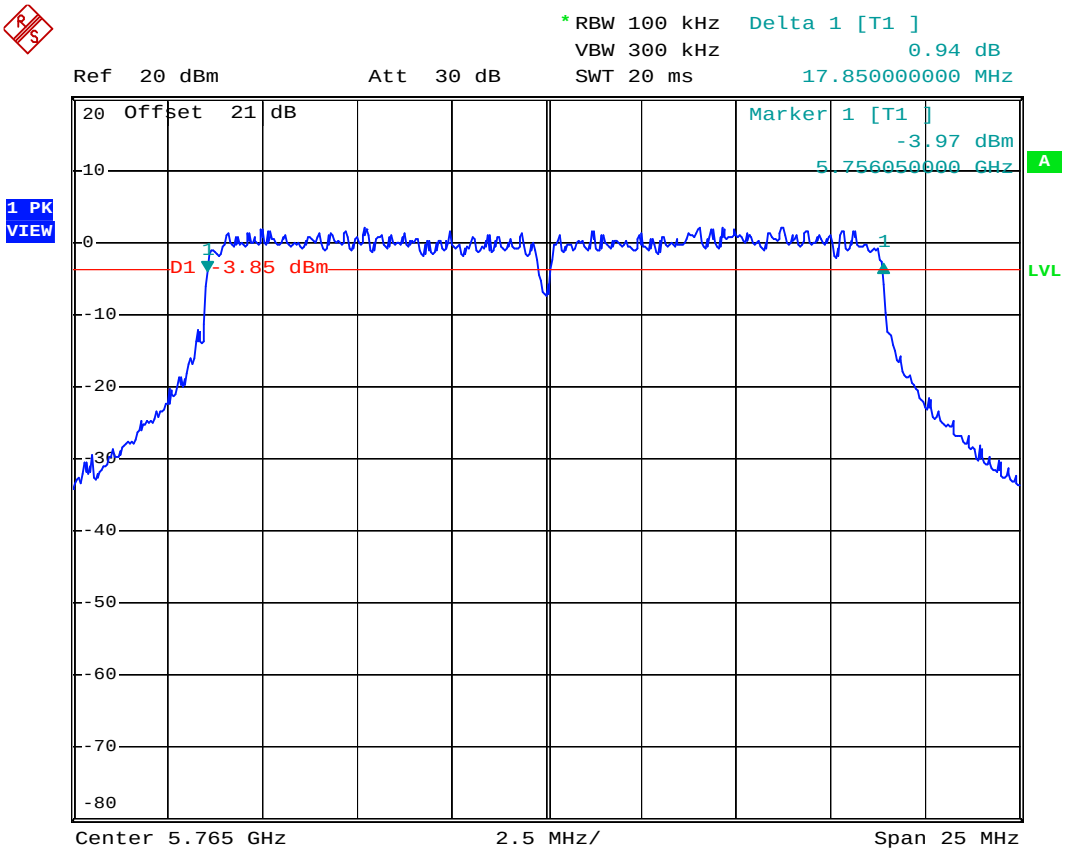
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel High



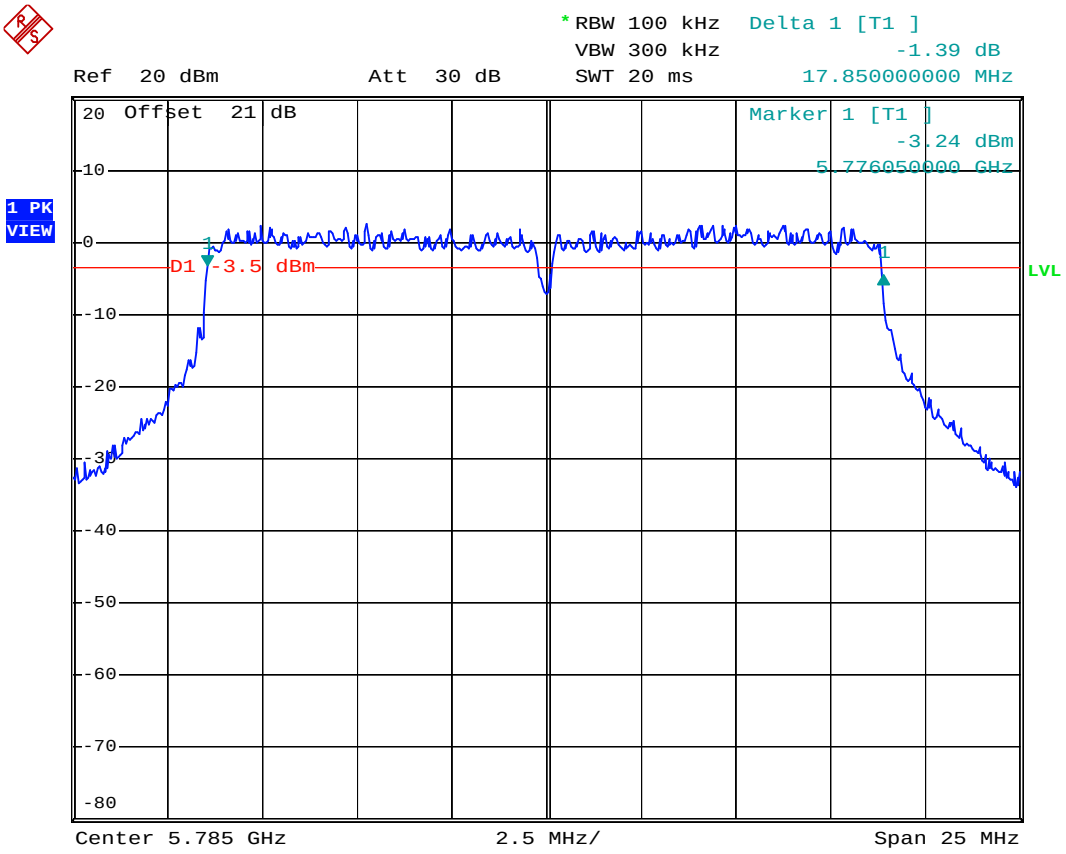
Band 5.15~5.25GHz / Mode: 802.11ac VHT-80



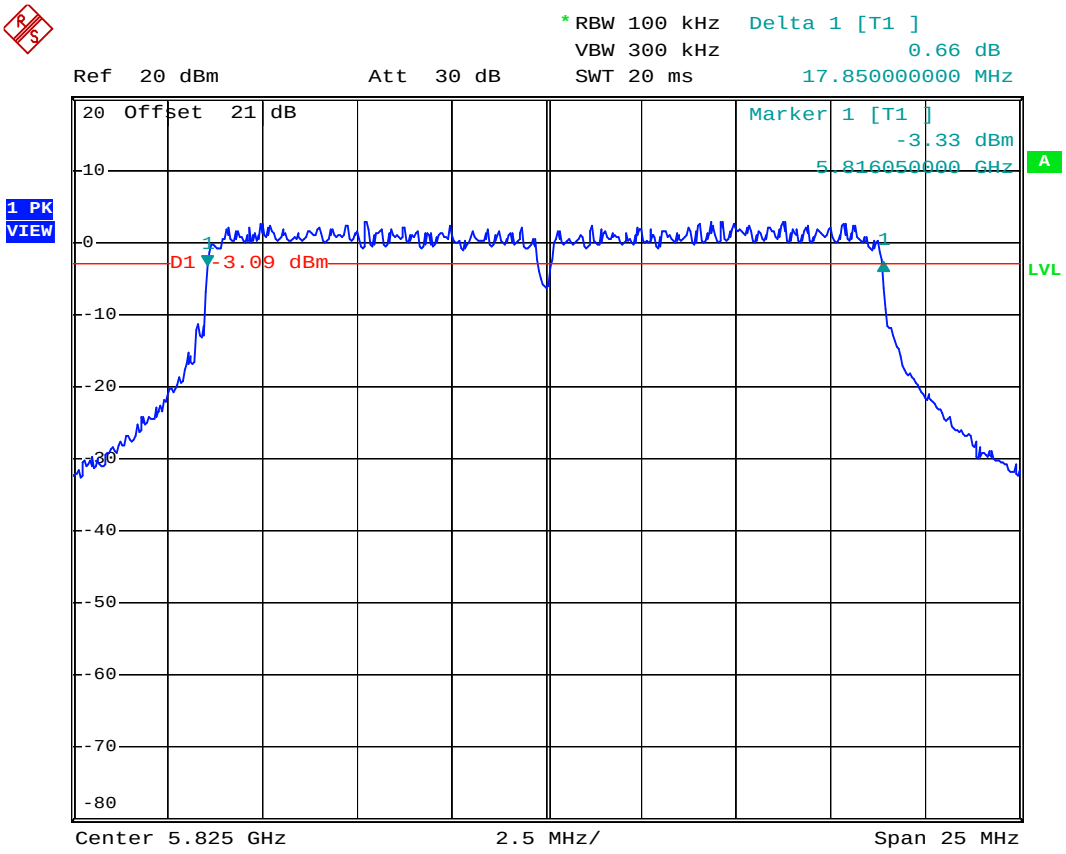
Band 5.725~5.850GHz / Mode: 802.11a / Channel Low



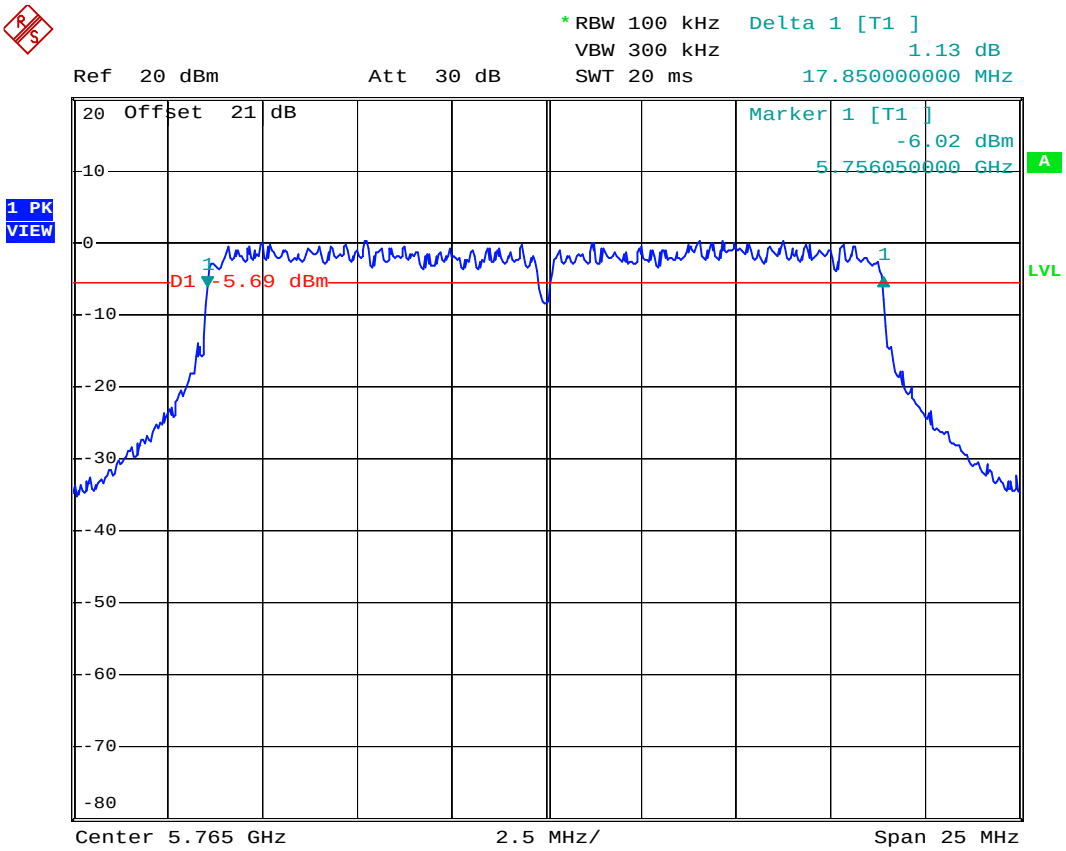
Band 5.725~5.850GHz / Mode: 802.11a / Channel Mid



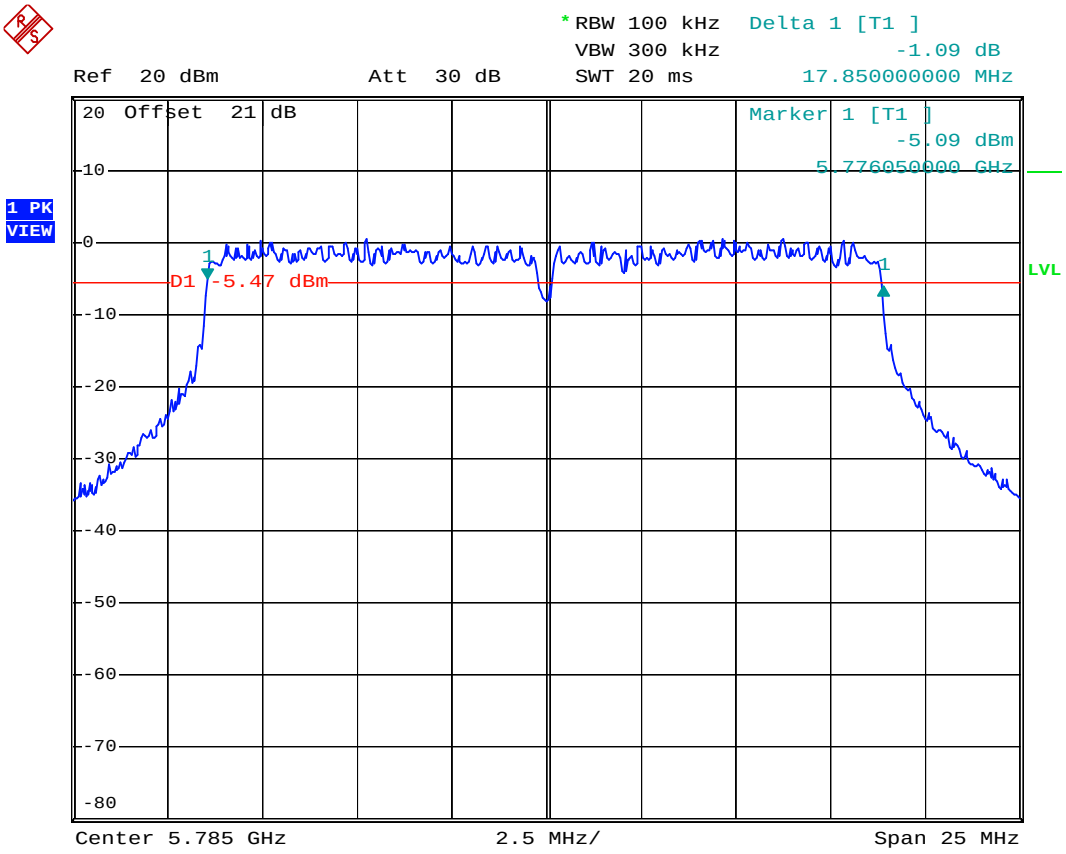
Band 5.725~5.850GHz / Mode: 802.11a / Channel High



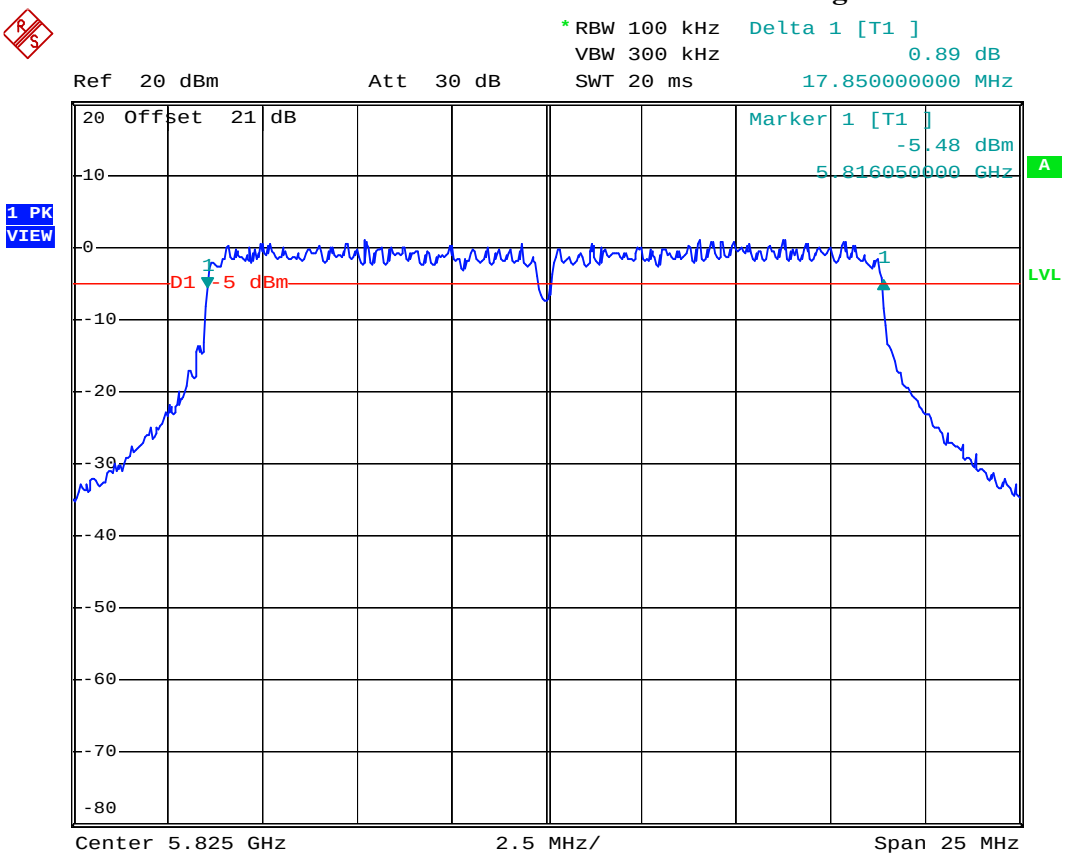
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel Low



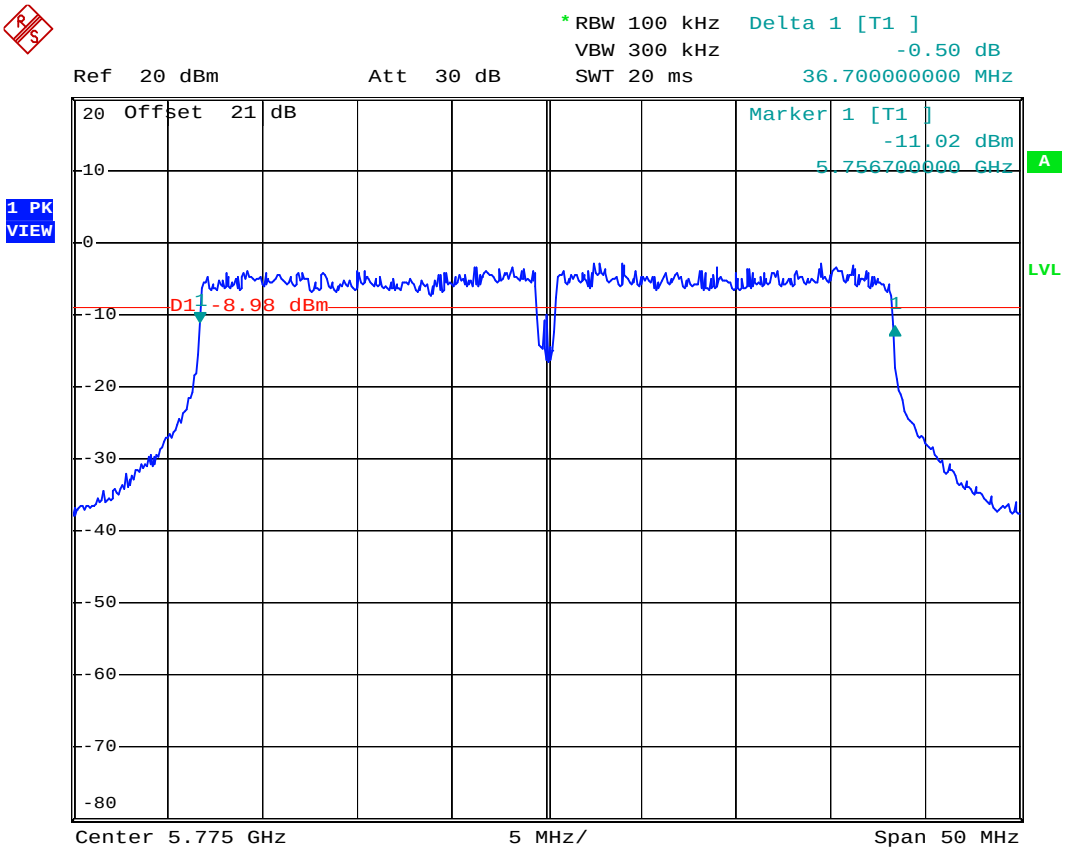
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel Mid



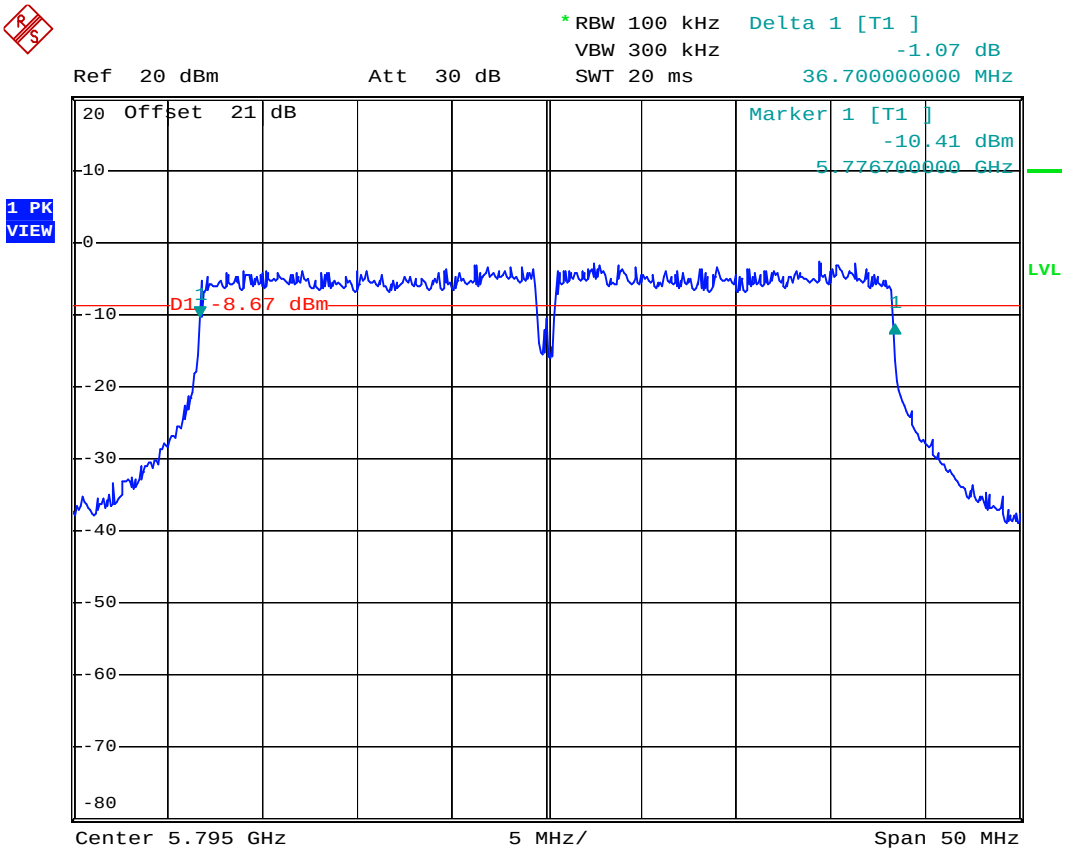
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel High



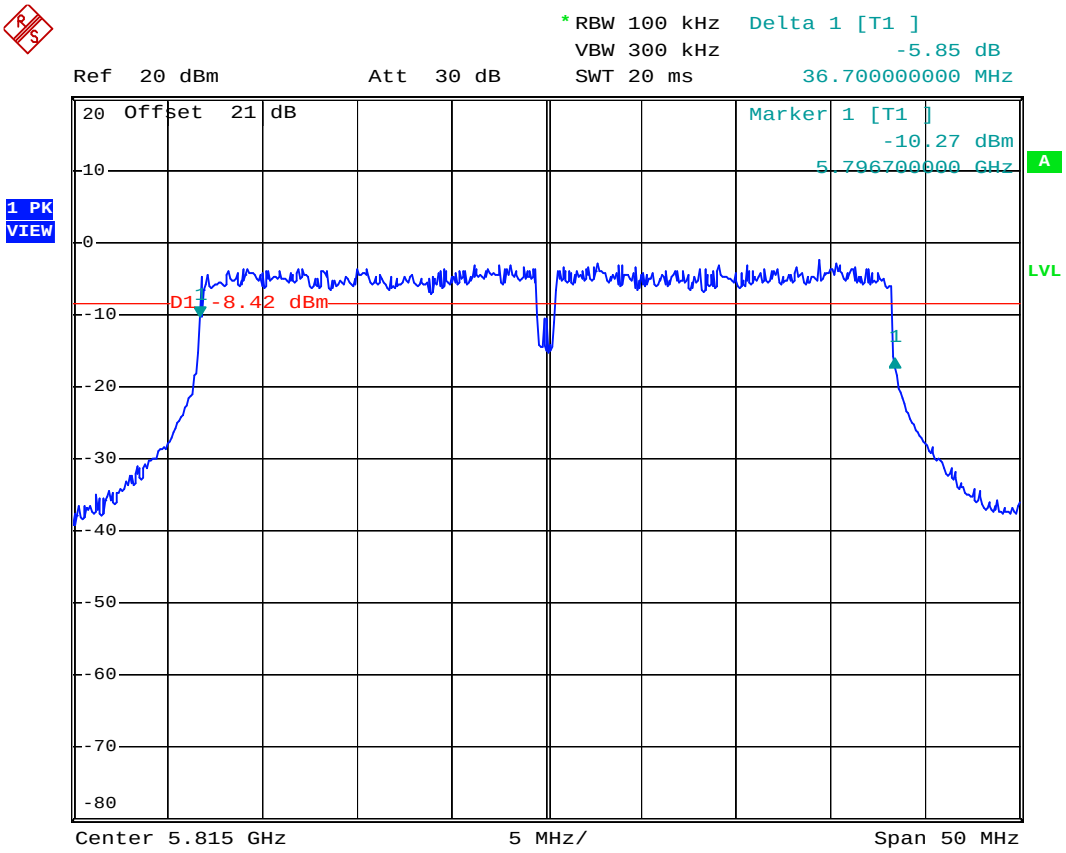
Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel Low



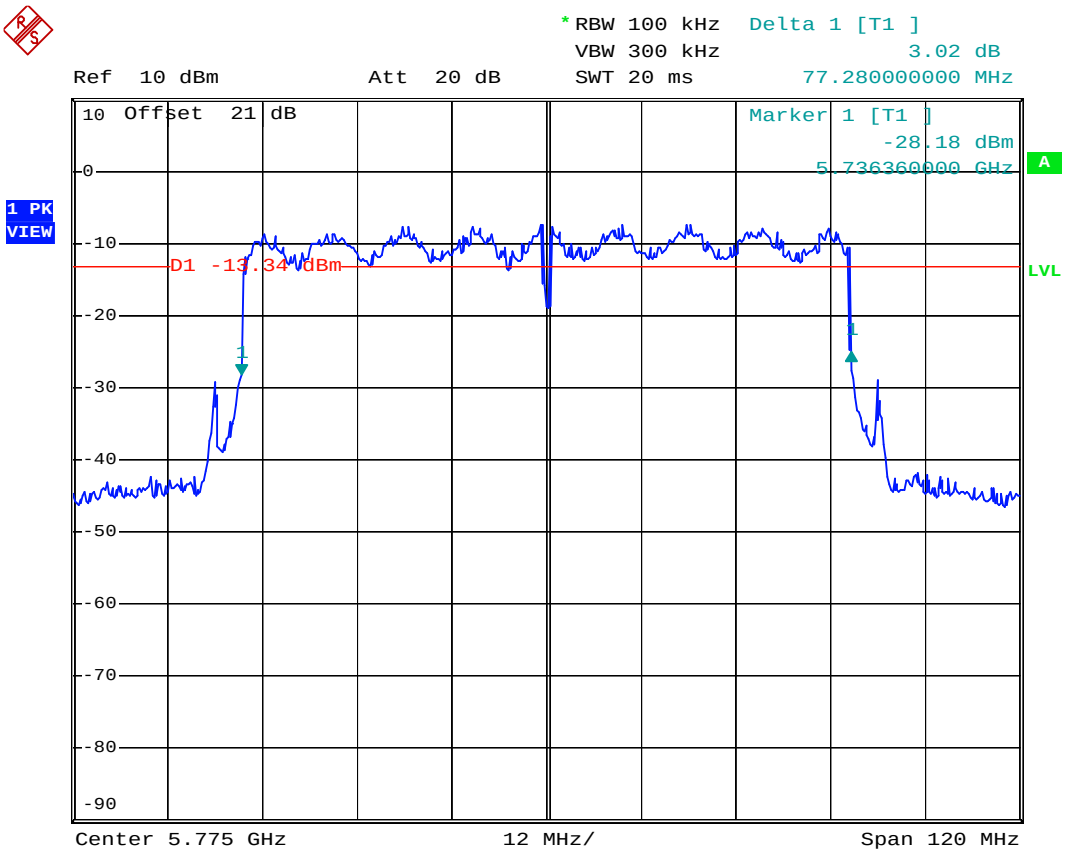
Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel Mid



Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel High



Band 5.725~5.850GHz / Mode: 802.11ac VHT-80



8 OUTPUT POWER MEASUREMENT

8.1 Standard Applicable

According to 15.407(a)(1)(iv), for client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

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.

According to 15.407(a)(3), for the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

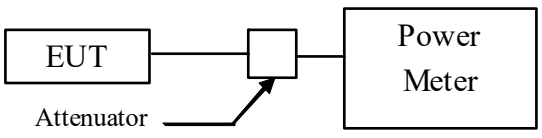
8.2 Measurement Procedure

Measurement Procedure:

Method PM (Measurement using an RF average power meter)

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 as shown in figure 5 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable.
3. Record the readings on the instrument and add a compensat factor of the attenuator.
4. Repeat above procedures until all frequencies measured were complete.

Figure 5: Output power and measurement configuration.



8.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
POWER METER +SENSOR	ANRITSU	ML2487A +MA2491A	2016/05/12	2017/05/11
Attenuator	MINI-CIRCUITS	BW-S10W2+	2015/10/07	2016/10/06

8.4 Measurement Data

Test Date : Aug. 31, 2016 Temperature : 24 °C Humidity : 56 %

Measurement Procedure:

Method PM (Measurement using an RF average power meter)

Band 5.15~5.25GHz

(A) 802.11a

Output Peak Power		dBm	mW
Operation	Channel Low:5180MHz	15.19	**33.037**
	Channel Mid: 5200MHz	15.76	**37.670**
	Channel High:5240MHz	16.83	**48.195**

(B) 802.11an HT-20

Output Peak Power		dBm	mW
Operation	Channel Low:5180MHz	13.76	**23.768**
	Channel Mid: 5200MHz	14.26	**26.669**
	Channel High:5240MHz	15.24	**33.420**

(C) 802.11an HT-40

Output Peak Power		dBm	mW
Operation	Channel Low:5190MHz	12.33	**17.100**
	Channel Mid: 5210MHz	12.92	**19.588**
	Channel High:5230MHz	13.51	**22.439**

(D) 802.11ac VHT-80

Output Peak Power		dBm	mW
Operation	Channel Low:5210MHz	11.36	**13.677**

Test Date : Sep. 08, 2016 Temperature : 25 °C Humidity : 58 %

Measurement Procedure:

Method PM (Measurement using an RF average power meter)

Band 5.725~5.850GHz

(A) 802.11a

Output Peak Power		dBm	mW
Operation	Channel Low:5765MHz	15.06	**32.063**
	Channel Mid: 5785MHz	15.26	**33.574**
	Channel High:5825MHz	15.70	**37.154**

(B) 802.11an HT-20

Output Peak Power		dBm	mW
Operation	Channel Low:5765MHz	13.19	**20.845**
	Channel Mid: 5785MHz	13.39	**21.827**
	Channel High:5825MHz	13.78	**23.878**

(C) 802.11an HT-40

Output Peak Power		dBm	mW
Operation	Channel Low:5775MHz	12.79	**19.011**
	Channel Mid: 5795MHz	12.99	**19.907**
	Channel High:5815MHz	13.15	**20.654**

(D) ac80

Output Peak Power		dBm	mW
Operation	Channel Low:5775MHz	10.73	**11.830**

Note : The expanded uncertainty: 2dB.

9 POWER DENSITY MEASUREMENT

9.1 Standard Applicable

According to 15.407(a)(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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

9.2 Measurement Procedure

Measurement Method: SA-2

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 as shown in figure 5 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set EUT to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set analyzer center frequency to channel center frequency.
4. Set span to encompass the entire emission bandwidth (EBW) of the signal.
5. Set RBW ≥ 1/T.
6. Set the VBW ≥ 3 x RBW.
7. Detector = power averaging (rms).
8. Sweep time = auto.
9. Trace mode = free run.
10. Trace average at least 100 traces in power averaging (rms) mode
11. Add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
12. Repeat above procedures until all measured frequencies were complete.

9.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/07/06	2017/07/05
Attenuator	MINI-CIRCUITS	BW-S10W2+	2015/10/07	2016/10/06

9.4 Measurement Data

Test Date : Aug. 31, 2016 Temperature : 24 °C Humidity : 56 %

Band 5.15~5.25GHz

Mode: 802.11a

a) Channel Low: Maximun PSD is 13.53 dBm
b) Channel Mid: Maximun PSD is 14.13 dBm
c) Channel High: Maximun PSD is 15.13 dBm

Mode: 802.11an HT-20

a) Channel Low: Maximun PSD is 11.24 dBm
b) Channel Mid: Maximun PSD is 11.72 dBm
c) Channel High: Maximun PSD is 12.73 dBm

Mode: 802.11an HT-40

a) Channel Low: Maximun PSD is 7.66 dBm
b) Channel Mid: Maximun PSD is 8.20 dBm
c) Channel High: Maximun PSD is 8.63 dBm

Mode: 802.11ac VHT-80

a) Channel Low: Maximun PSD is 4.31 dBm

Note : The expanded uncertainty: 2dB.

Test Date : Aug. 31, 2016 Temperature : 24 °C Humidity : 56 %

Band 5.725~5.850GHz

Mode: 802.11a

a) Channel Low: Maximun PSD is -11.70 dBm
b) Channel Mid: Maximun PSD is -11.23 dBm
c) Channel High: Maximun PSD is -11.23 dBm

Mode: 802.11an HT-20

a) Channel Low: Maximun PSD is -13.27 dBm
b) Channel Mid: Maximun PSD is -13.06 dBm
c) Channel High: Maximun PSD is -12.45 dBm

Mode: 802.11an HT-40

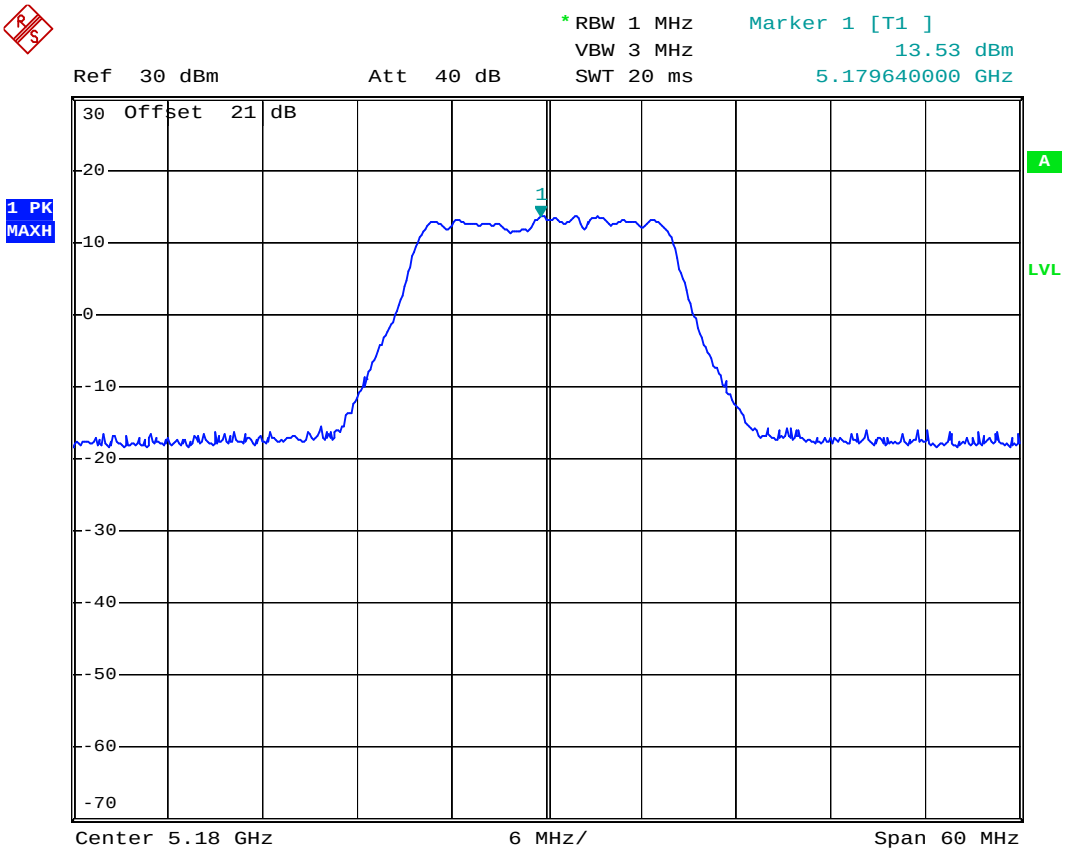
a) Channel Low: Maximun PSD is -11.56 dBm
b) Channel Mid: Maximun PSD is -14.30 dBm
c) Channel High: Maximun PSD is -13.63 dBm

Mode: 802.11ac VHT-80

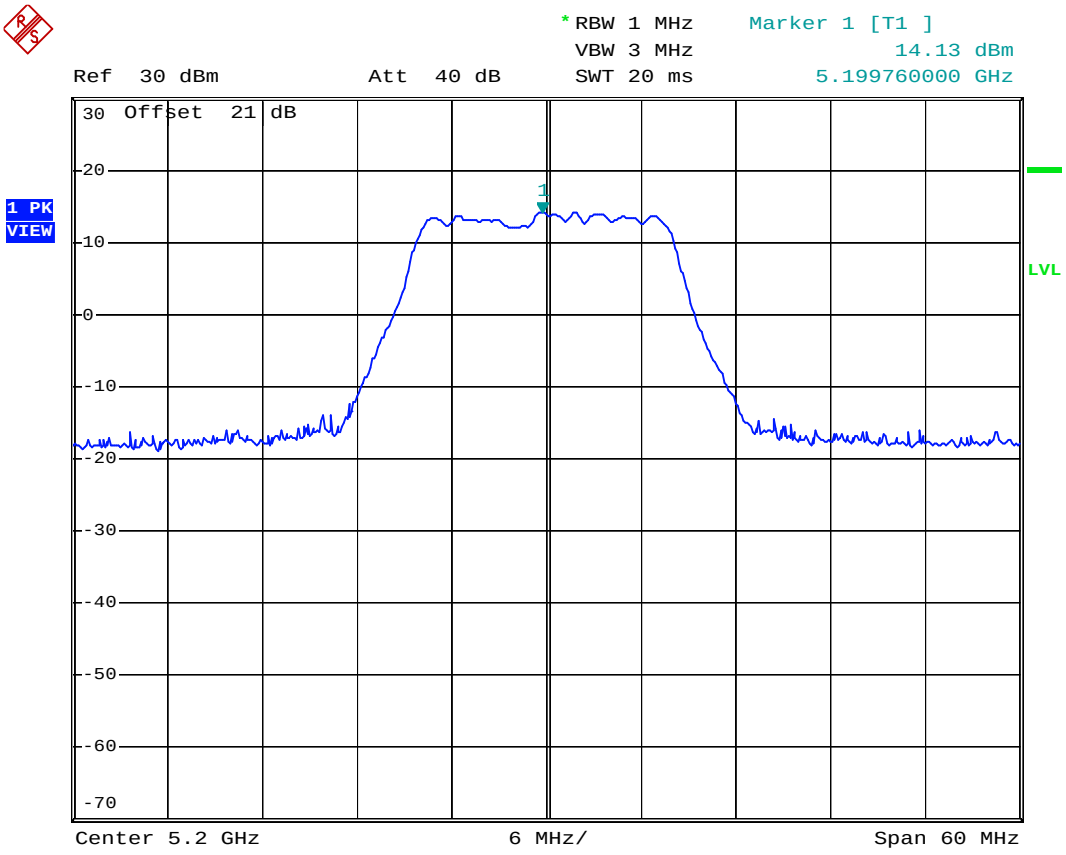
a) Channel Low: Maximun PSD is -19.42 dBm

Note : The expanded uncertainty: 2dB.

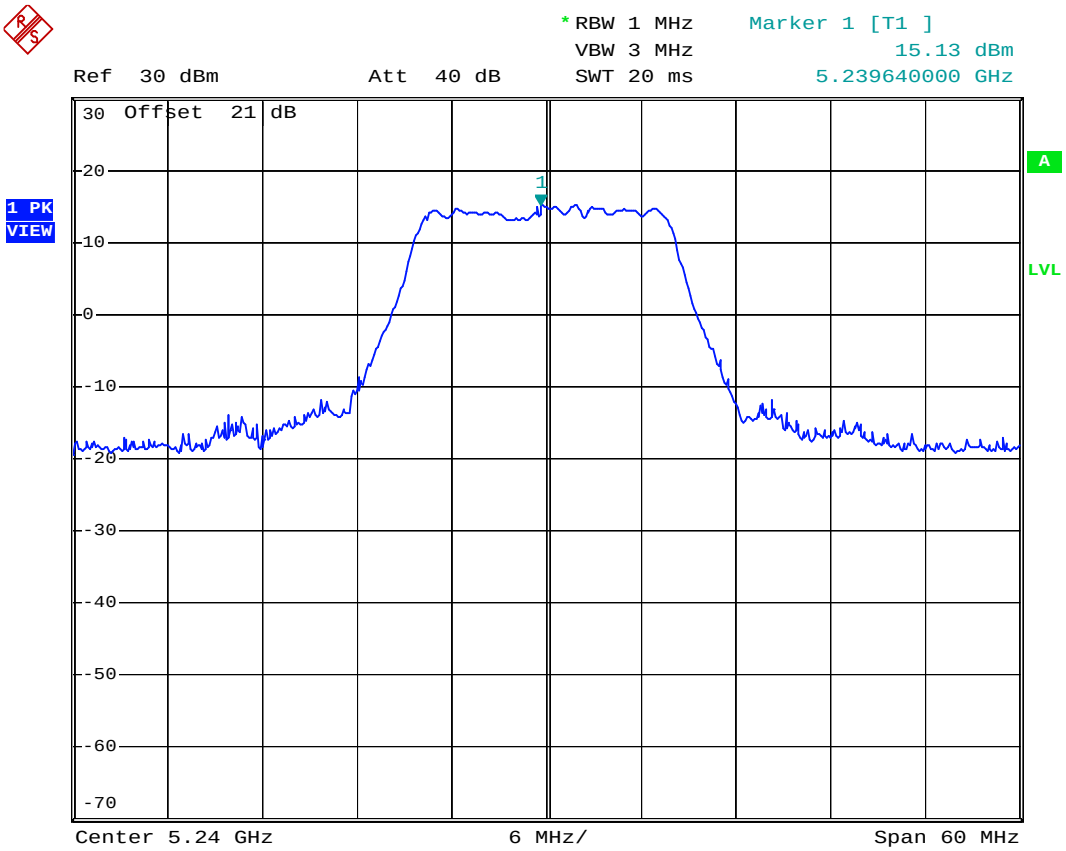
Band 5.15~5.25GHz / Mode: 802.11a / Channel Low



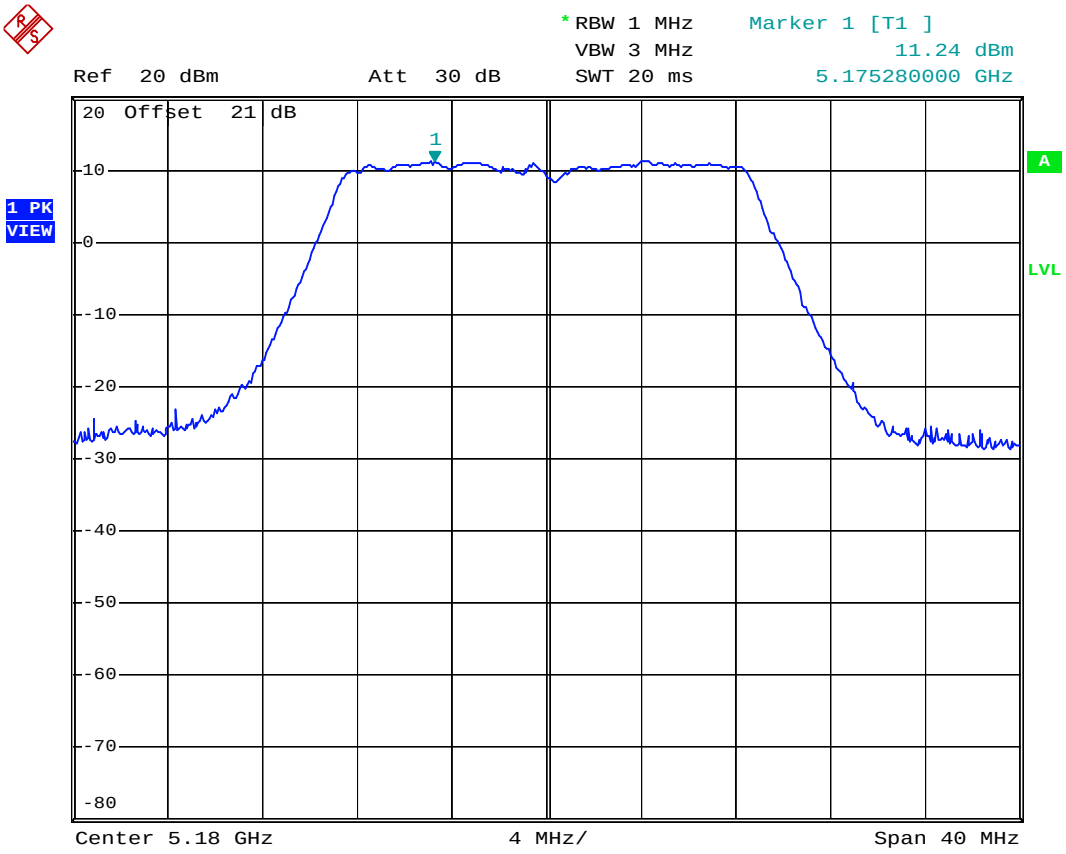
Band 5.15~5.25GHz / Mode: 802.11a / Channel Mid



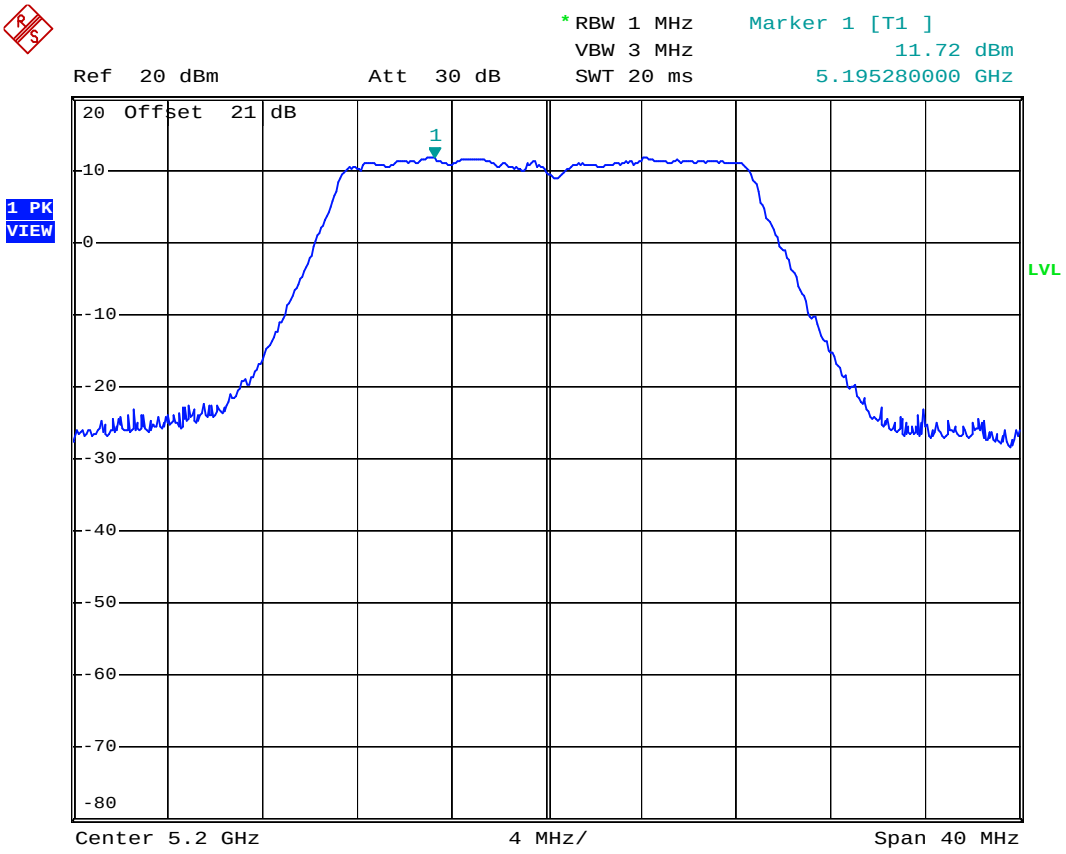
Band 5.15~5.25GHz / Mode: 802.11a / Channel High



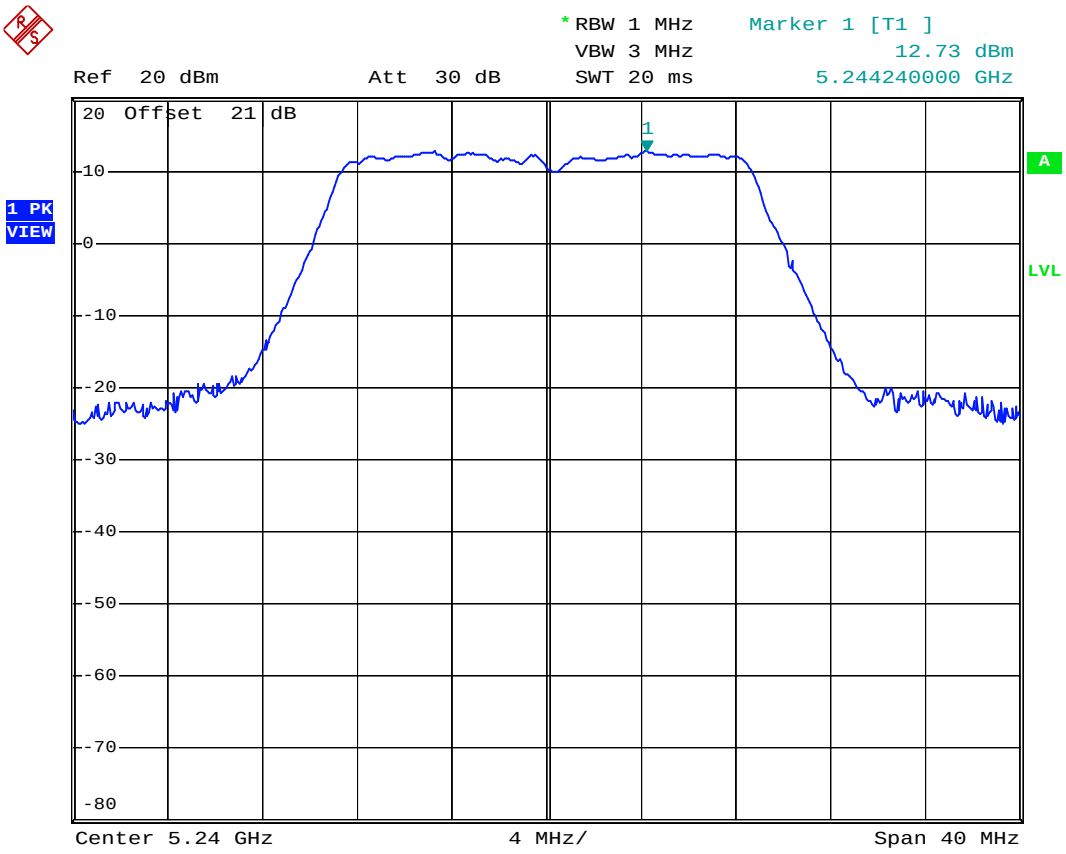
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel Low



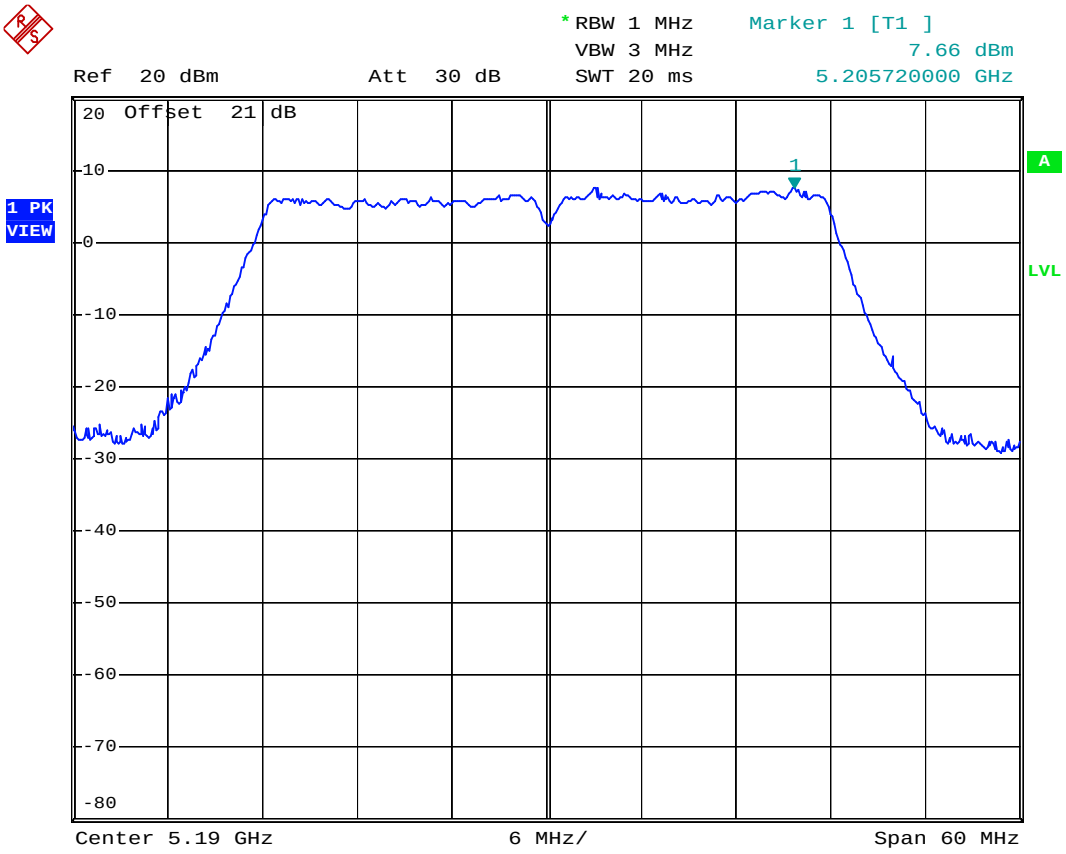
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel Mid



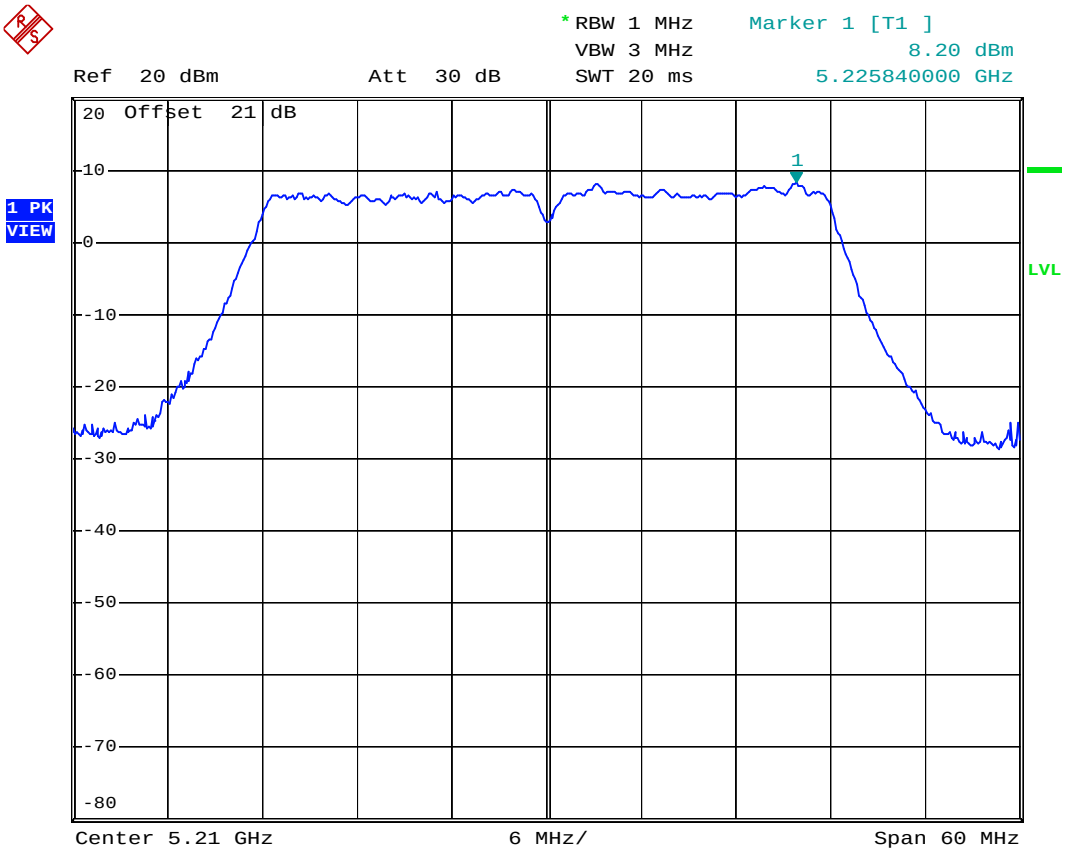
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel High



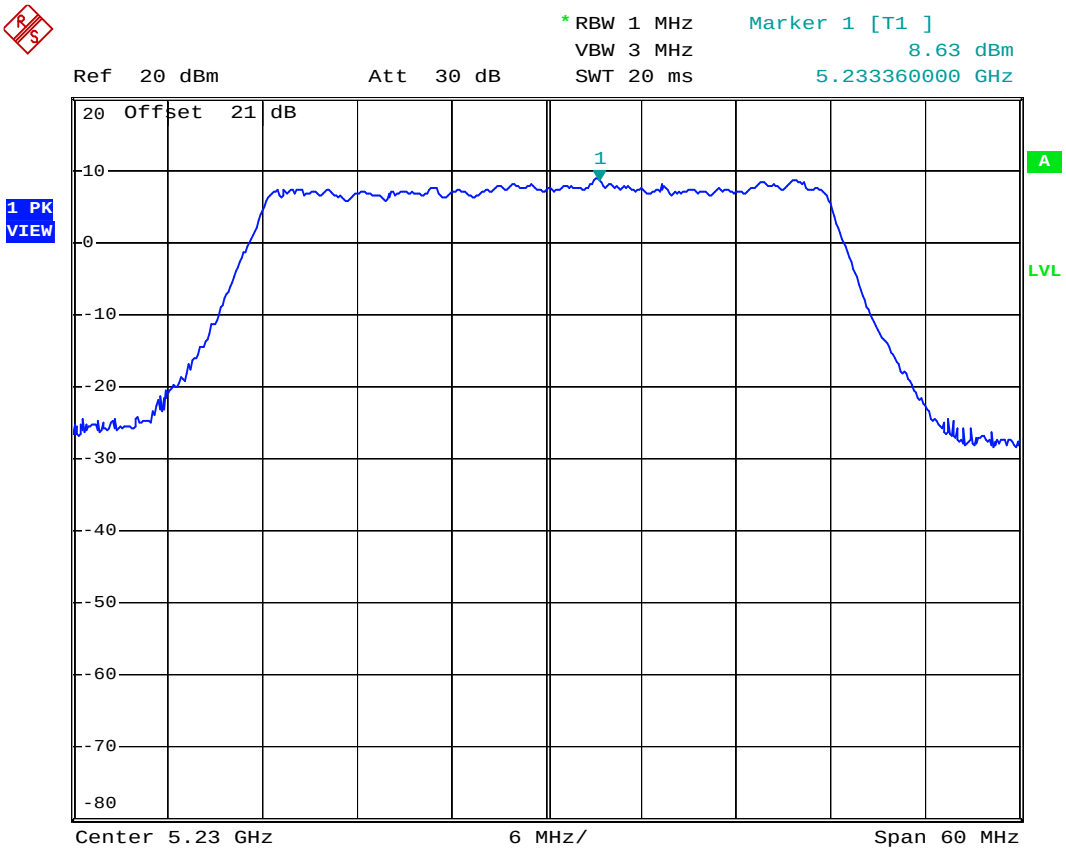
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel Low



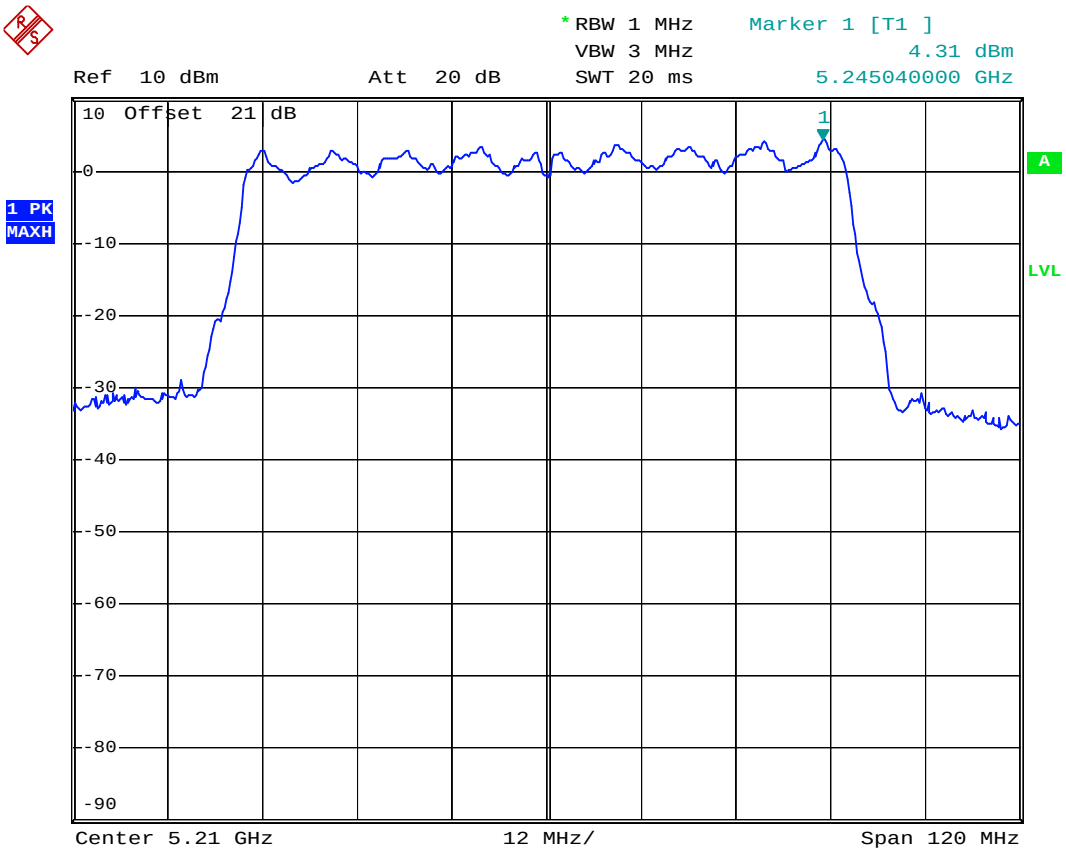
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel Mid



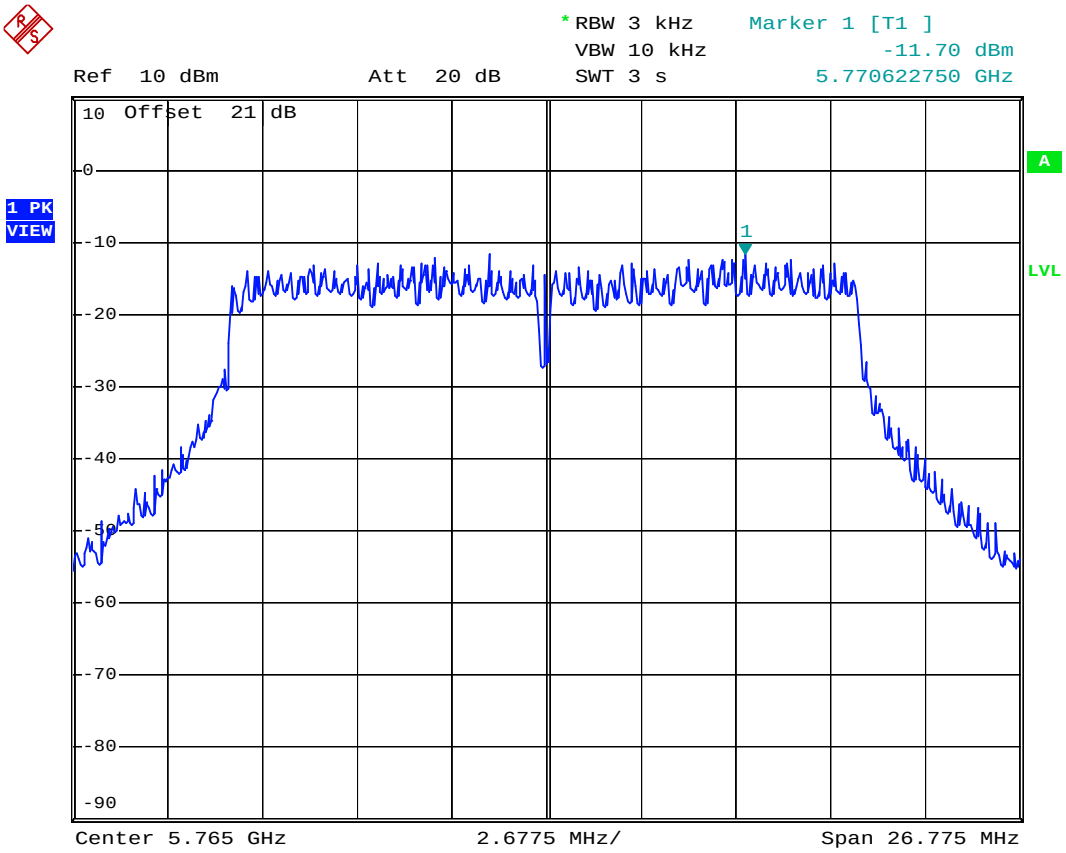
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel High



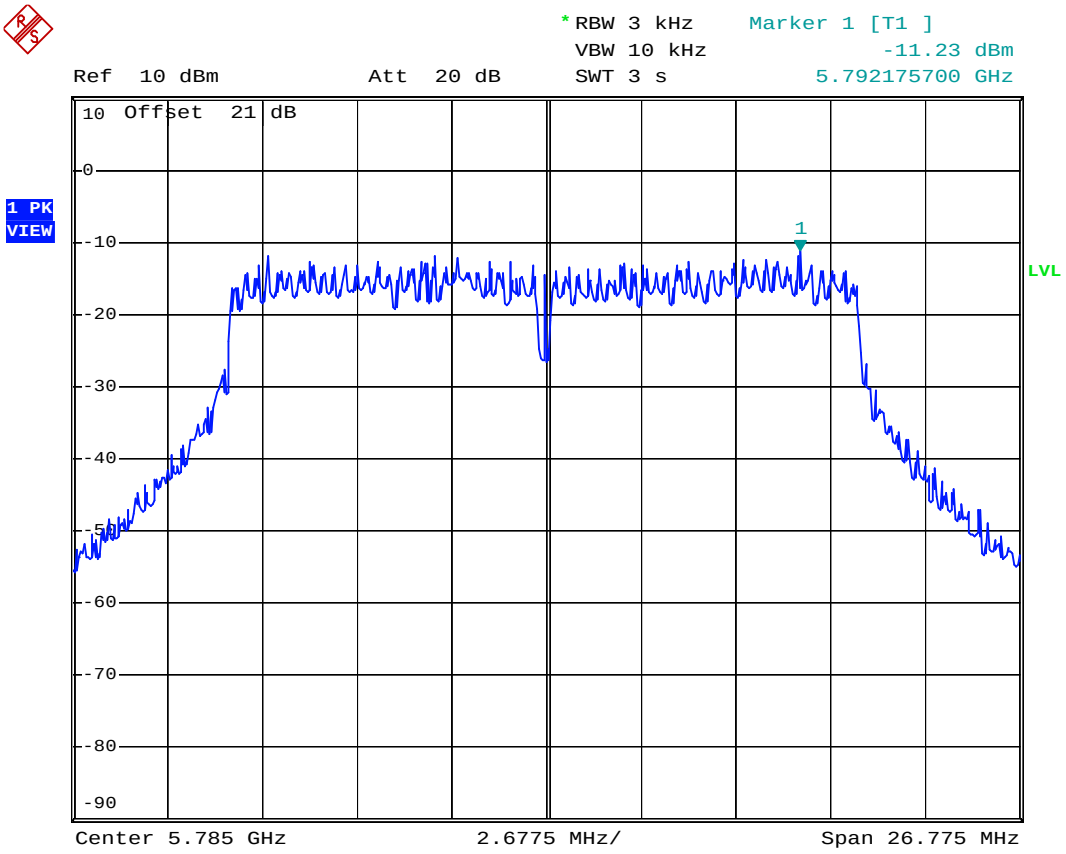
Band 5.15~5.25GHz / Mode: 802.11ac VHT-80



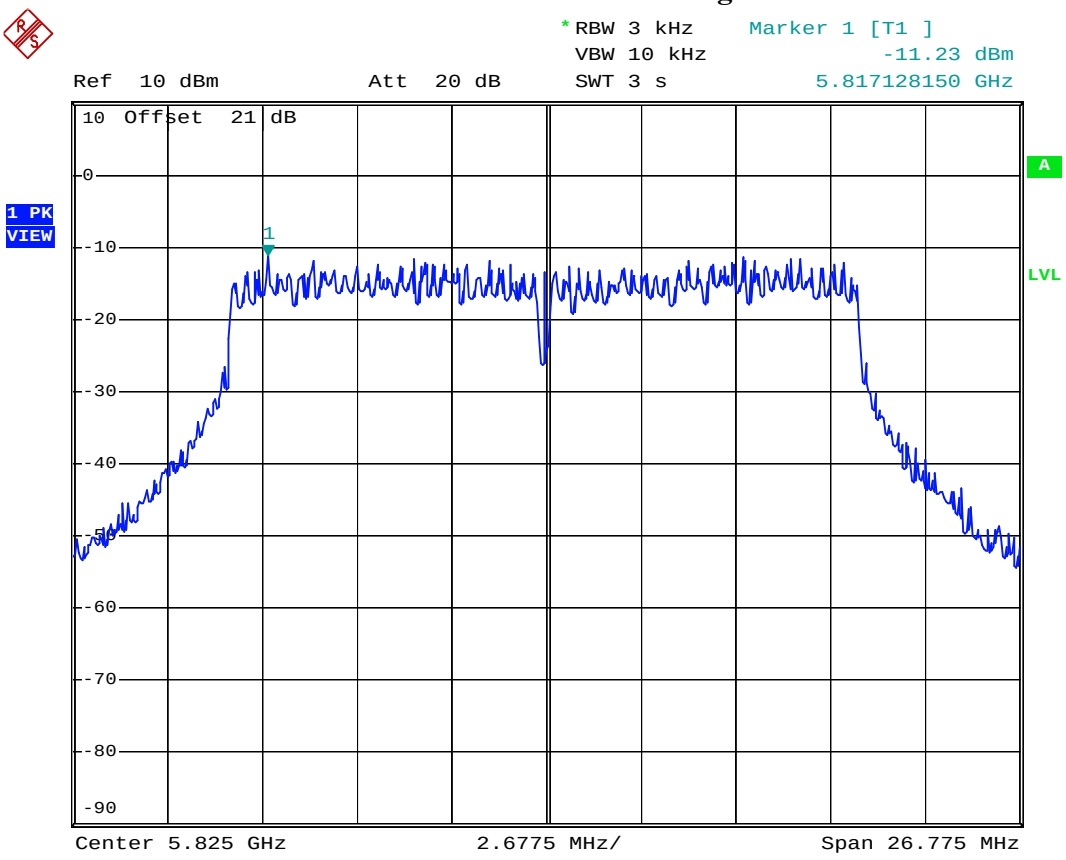
Band 5.725~5.850GHz / Mode: 802.11a / Channel Low



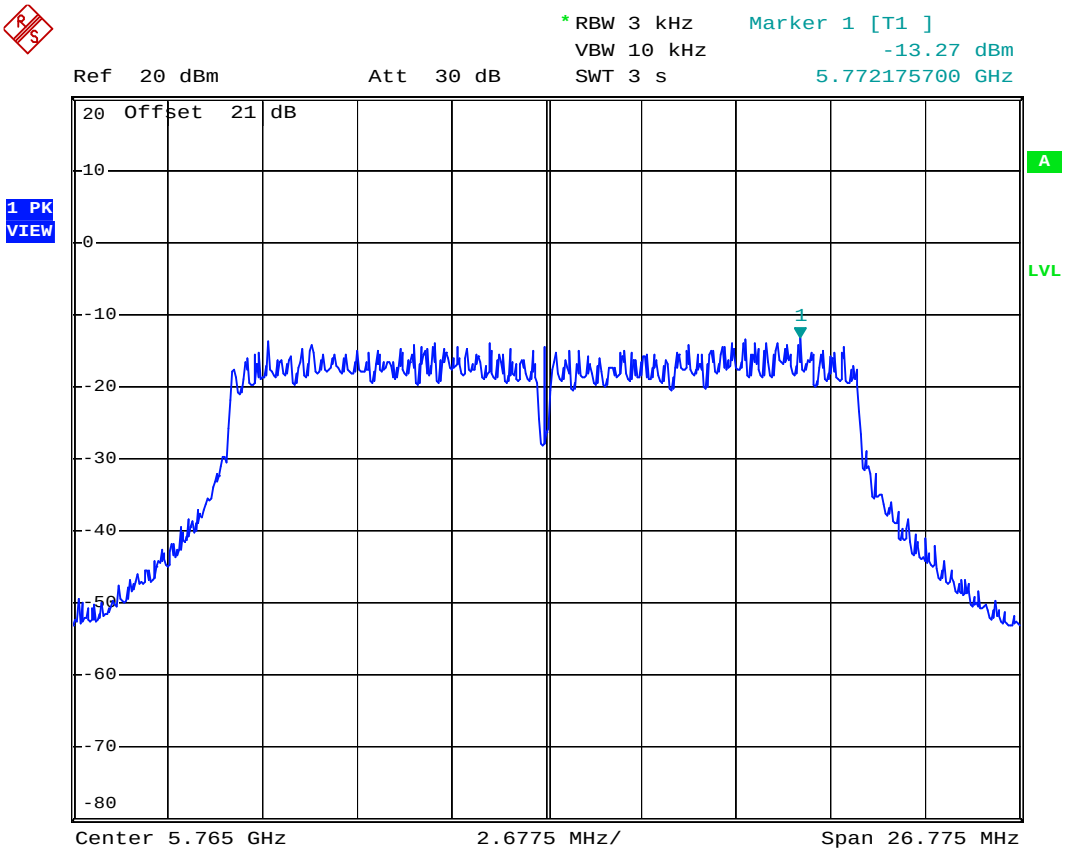
Band 5.725~5.850GHz / Mode: 802.11a / Channel Mid



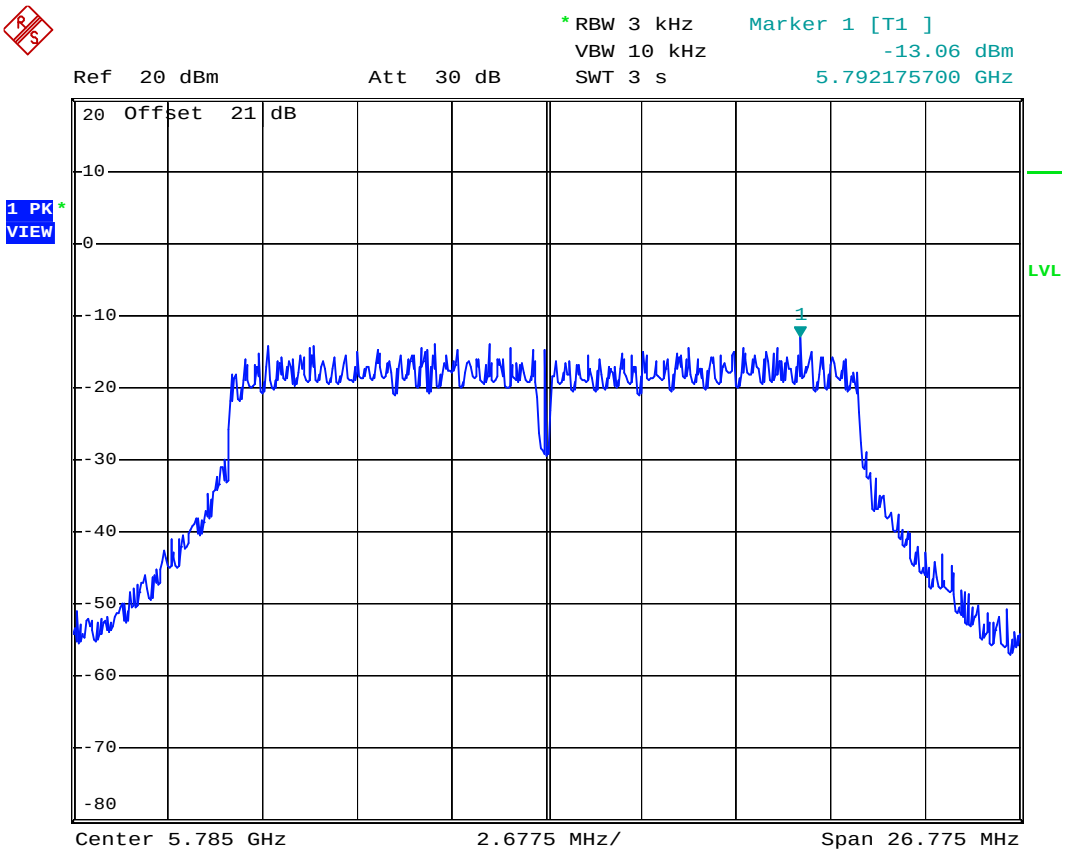
Band 5.725~5.850GHz / Mode: 802.11a / Channel High



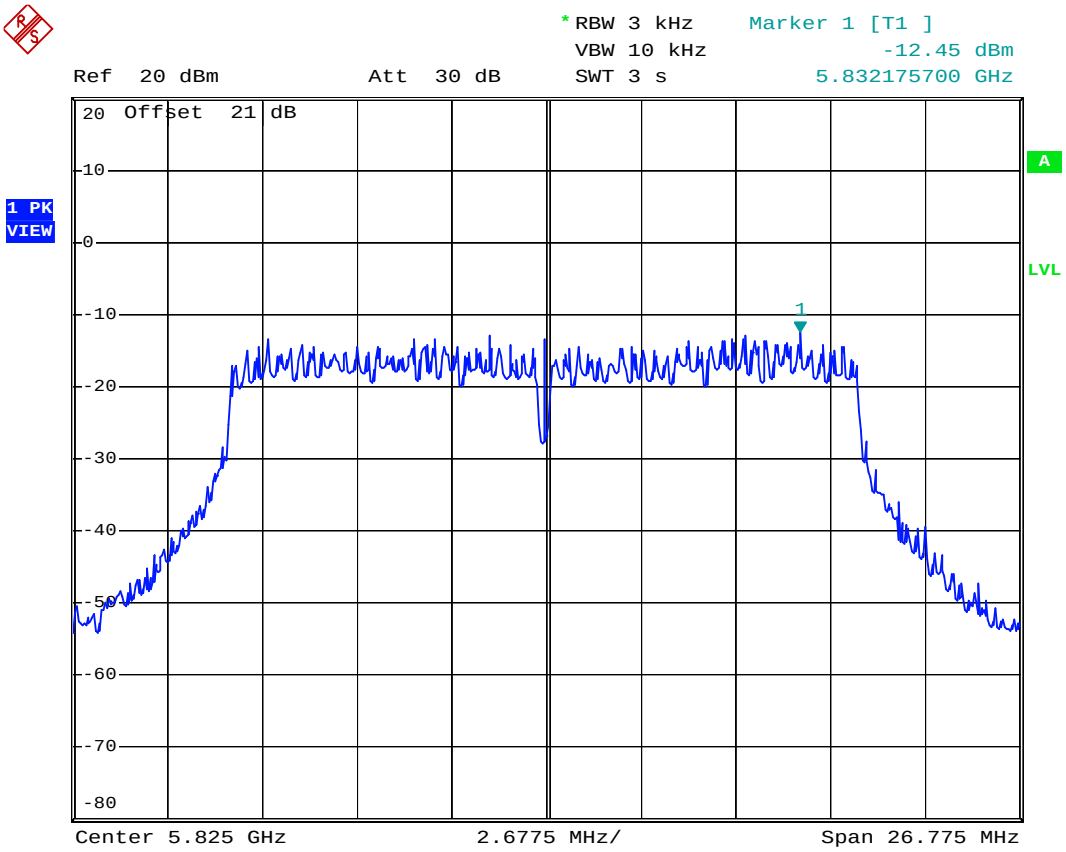
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel Low



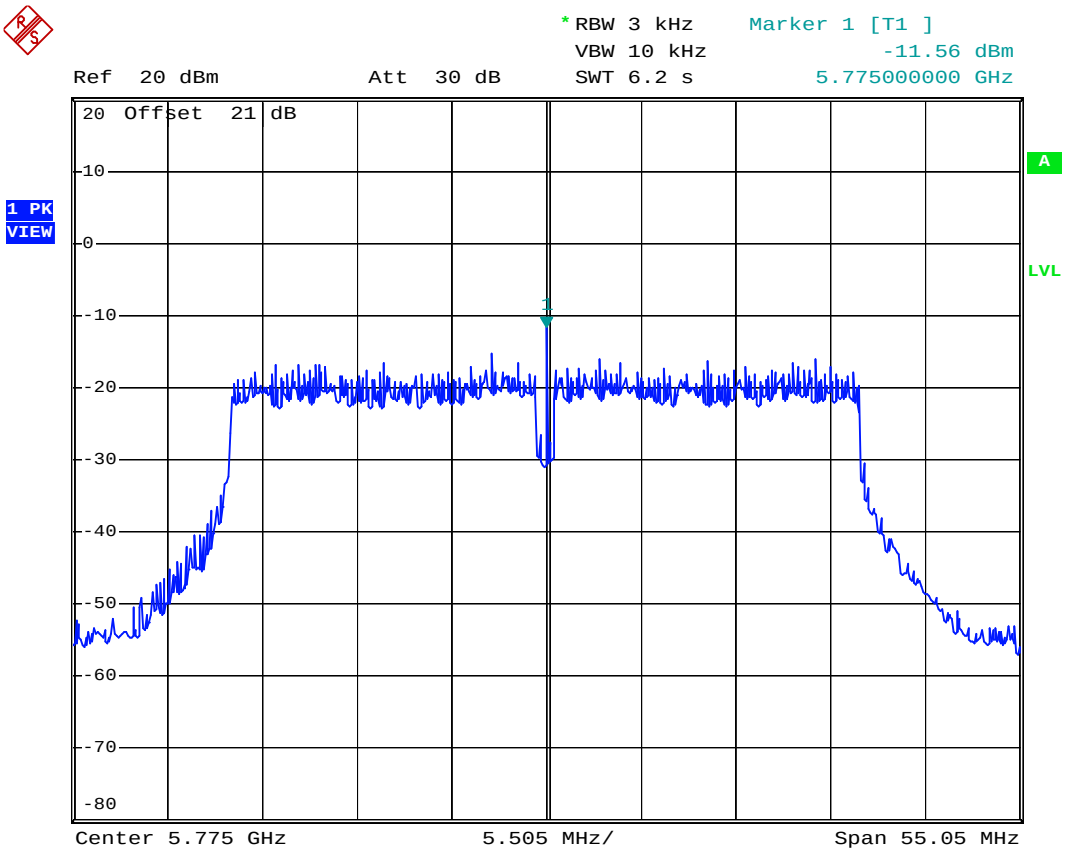
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel Mid



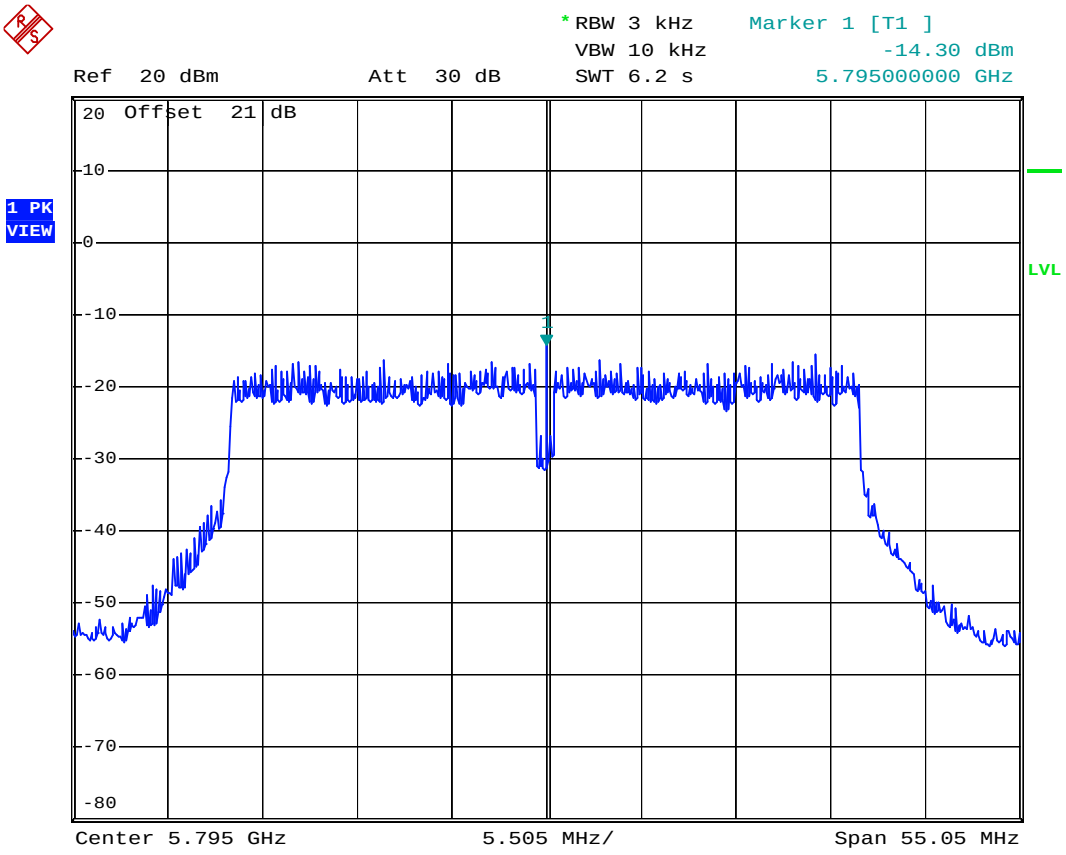
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel High



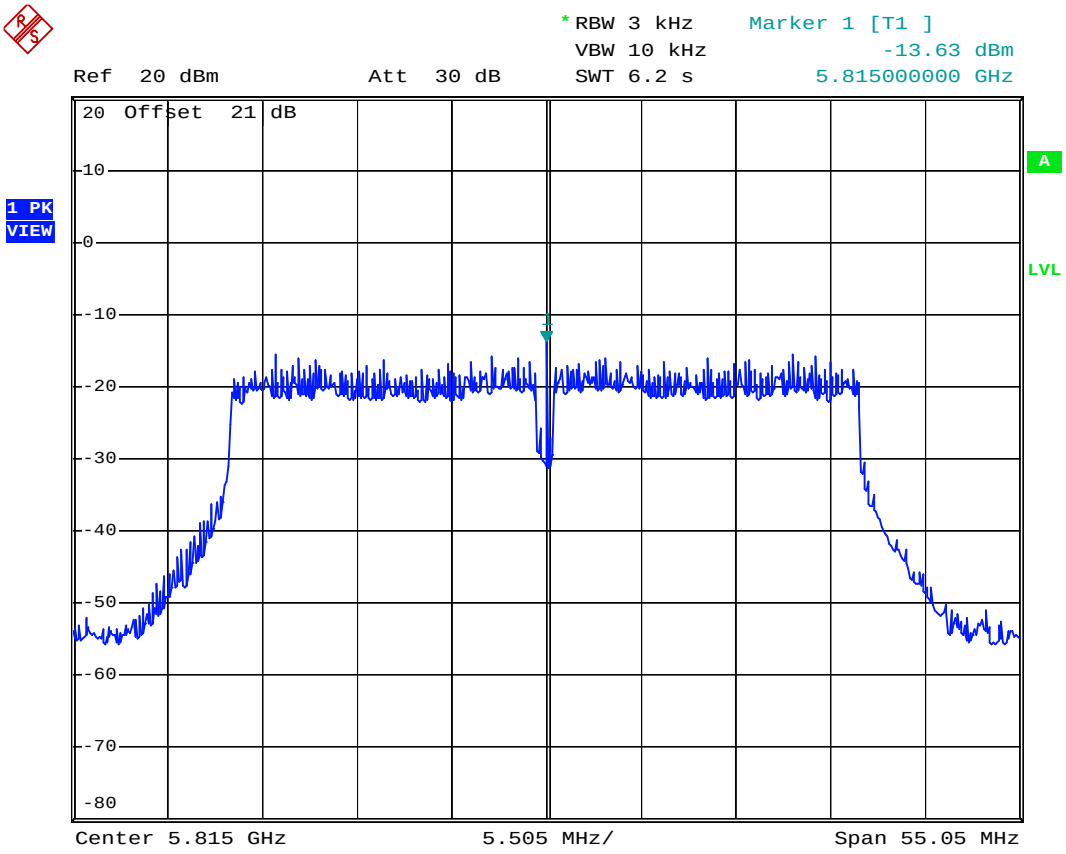
Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel Low



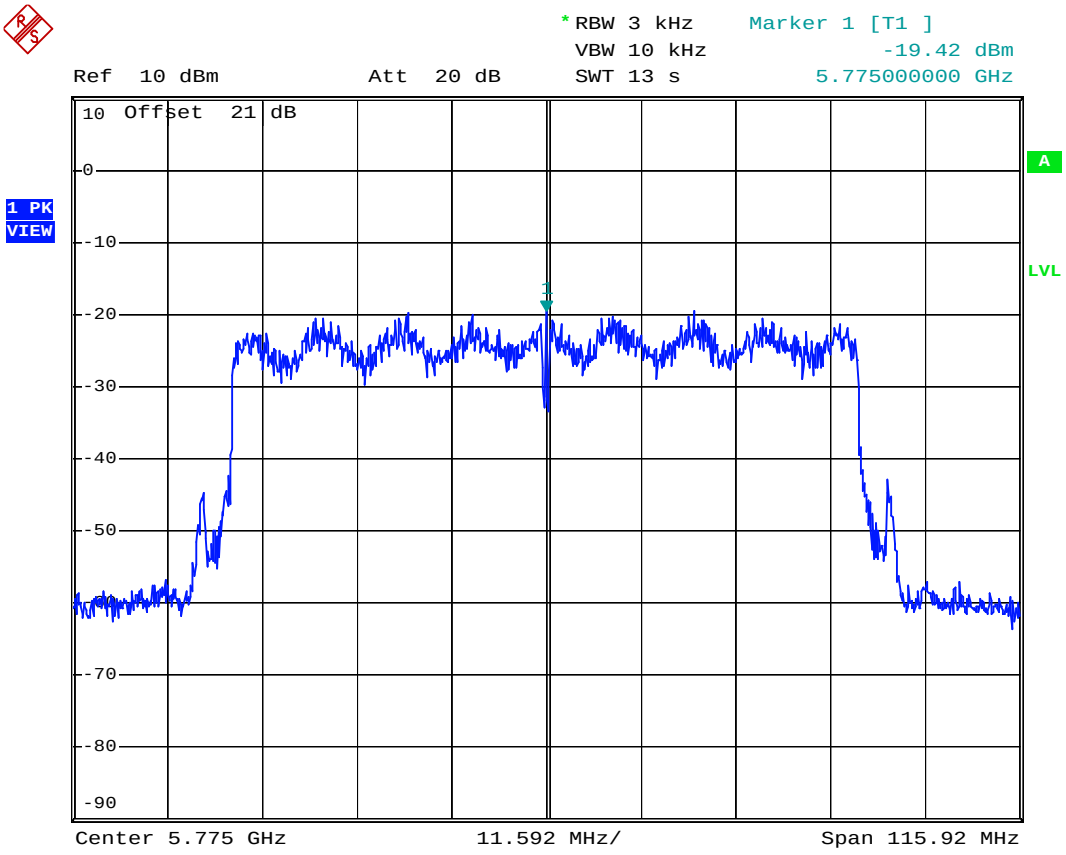
Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel Mid



Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel High



Band 5.725~5.850GHz / Mode: 802.11ac VHT-80



11. OUT-OF-BAND CONDUCTED EMISSION MEASUREMENT

11.1 Standard Applicable

According to 15.407(b)(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.
According to 15.407(b)(4), for transmitters operating in the 5.725-5.85 GHz band:
(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

11.2 Measurement 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 as shown in figure 4 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. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
   RBW = 100 kHz
   VBW ≥ RBW
   Sweep = auto
   Detector function = peak
   Trace = max hold.
4. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. Plot the result on the screen of spectrum analyzer.
5. Repeat above procedures until all measured frequencies were complete.

11.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/07/06	2017/07/05
Attenuator	MINI-CIRCUITS	BW-S10W2+	2015/10/07	2016/10/06

11.4 Measurement Data

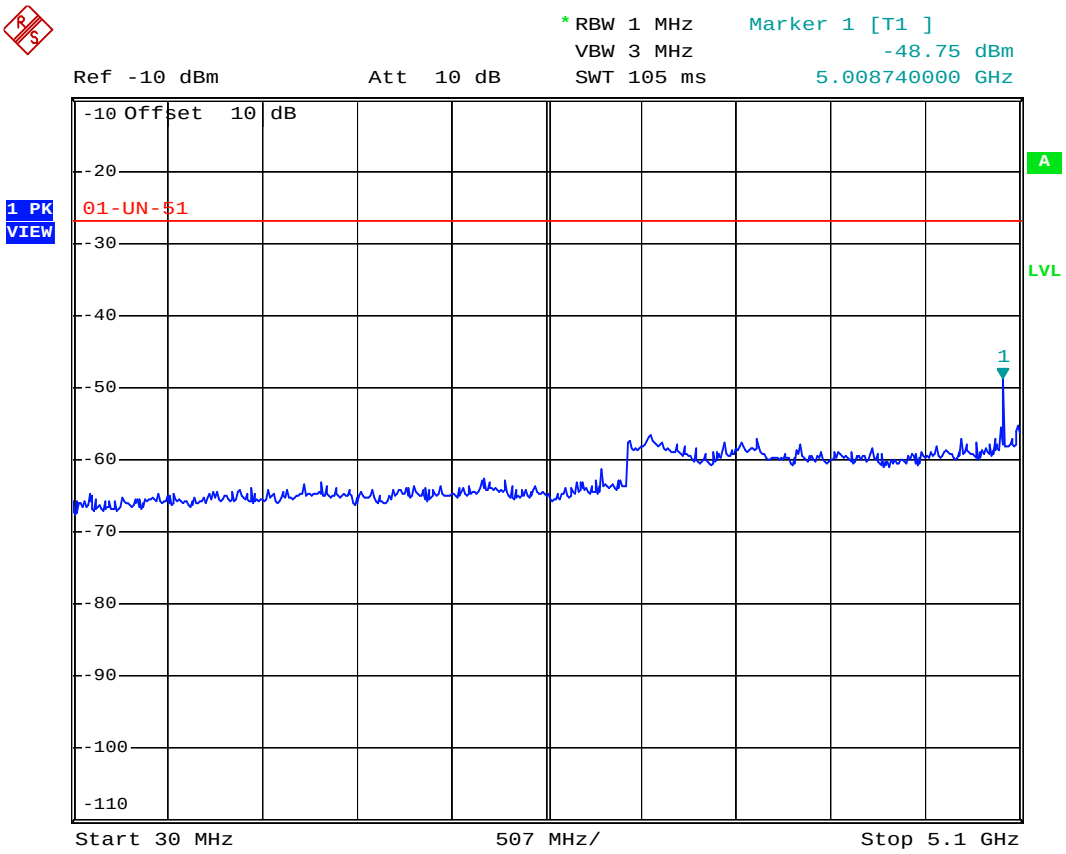
Test Date : Sep. 12, 2016 Temperature : 25 °C Humidity : 50 %

Band 5.15~5.25GHz
Mode: 802.11a, 802.11an HT-20, 802.11an HT-40, 802.11ac VHT-80
1 GHz to 40 GHz frequency band: All emissions outside of the 5.15-5.35 GHz band are less than an e.i.r.p. of −27 dBm/MHz.

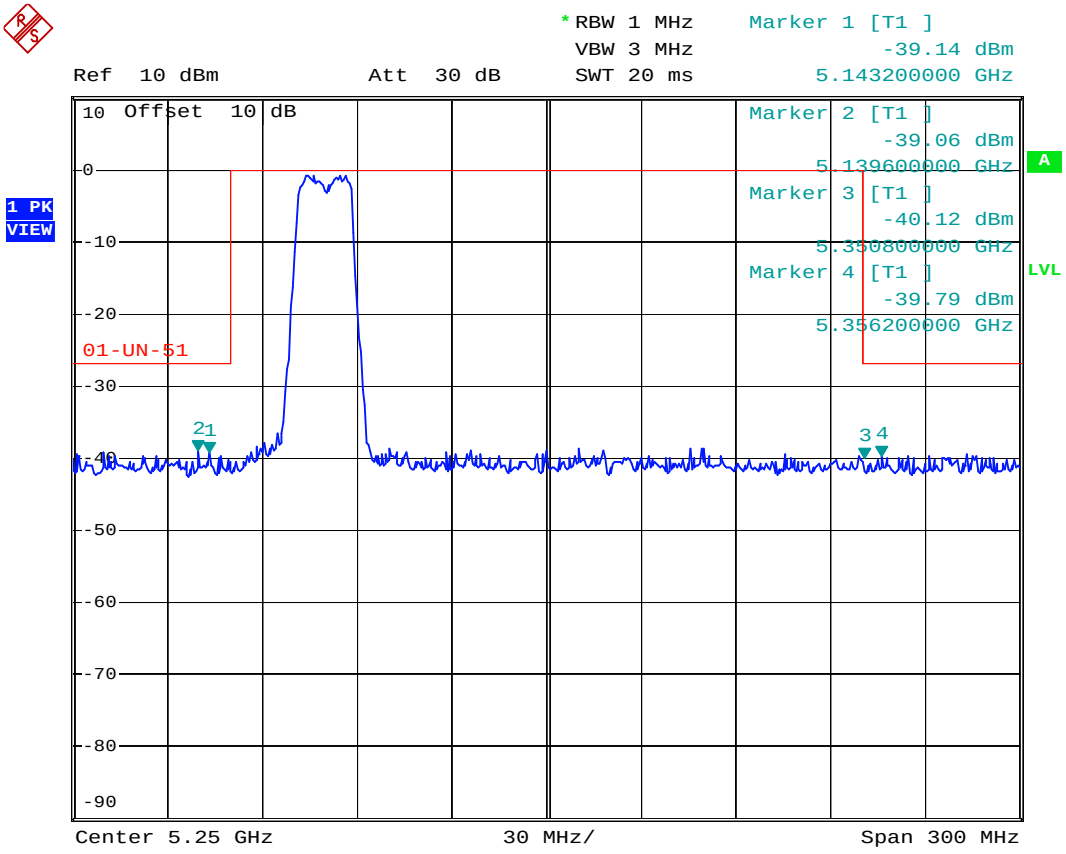
Band 5.725~5.850GHz
Mode: 802.11a, 802.11an HT-20, 802.11an HT-40, 802.11ac VHT-80
1 GHz to 40 GHz frequency band: All emissions are below the mask of 15.407(b)(4)(i).

Note : The expanded uncertainty: 2dB.

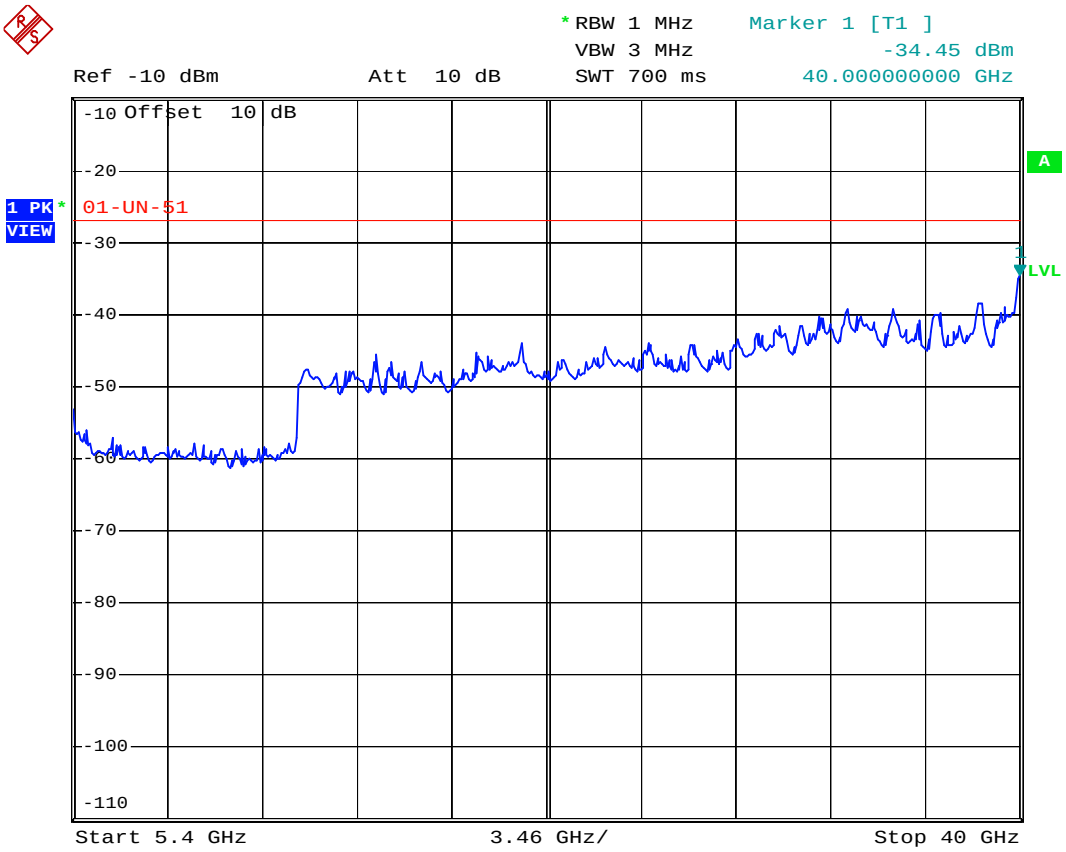
Band 5.15~5.25GHz / Mode: 802.11a / Channel Low 30MHz ~ 5.1GHz



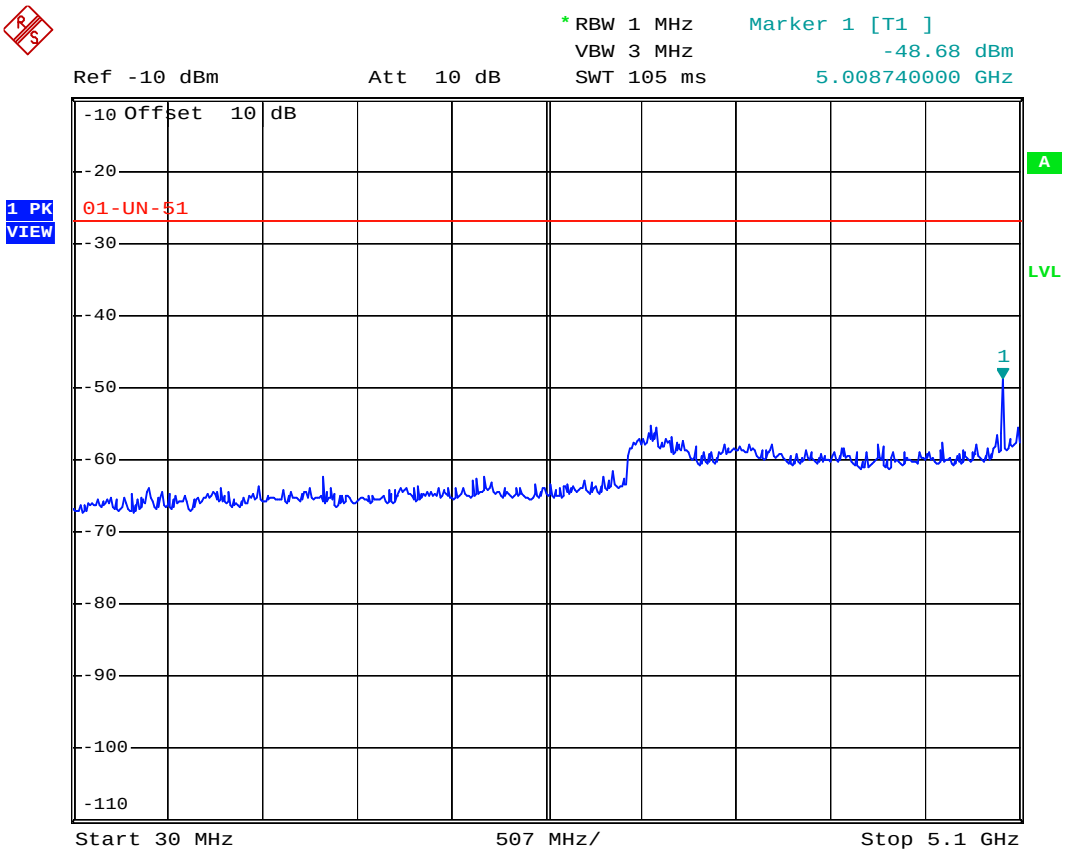
Band 5.15~5.25GHz / Mode: 802.11a / Channel Low 5.1GHz~5.4GHz



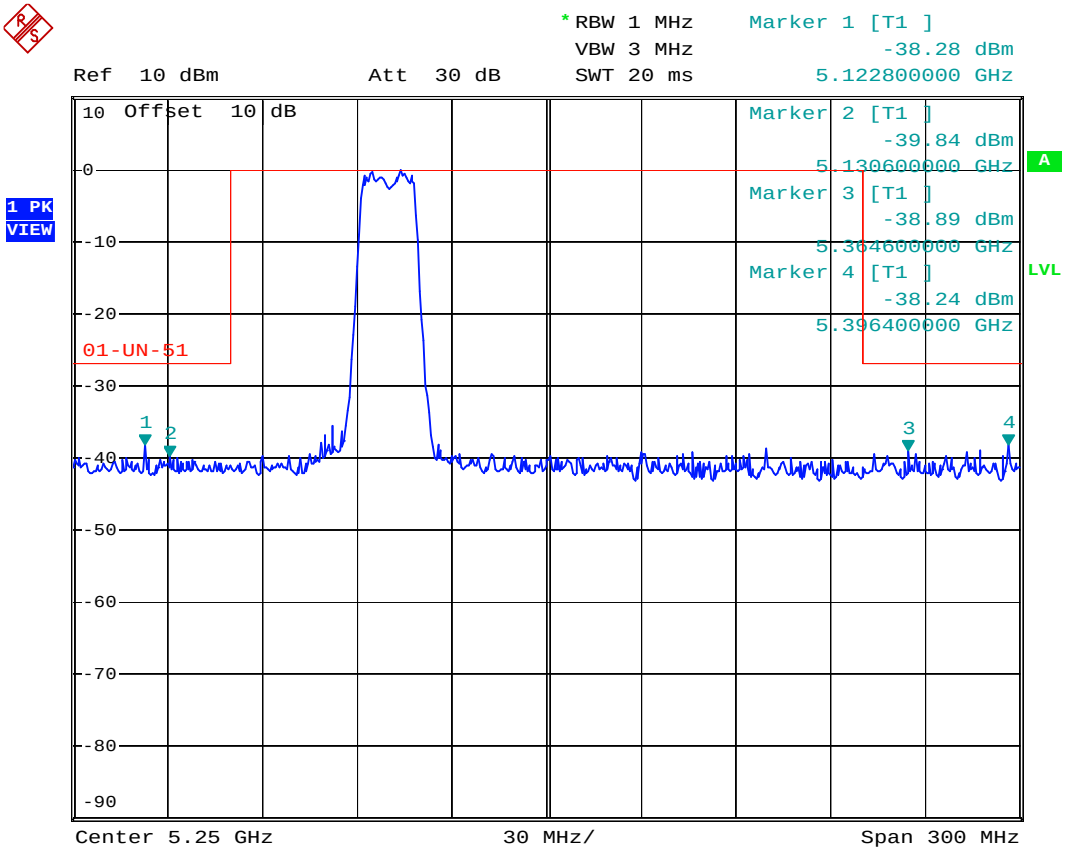
Band 5.15~5.25GHz / Mode: 802.11a / Channel Low 5.4GHz ~ 40GHz



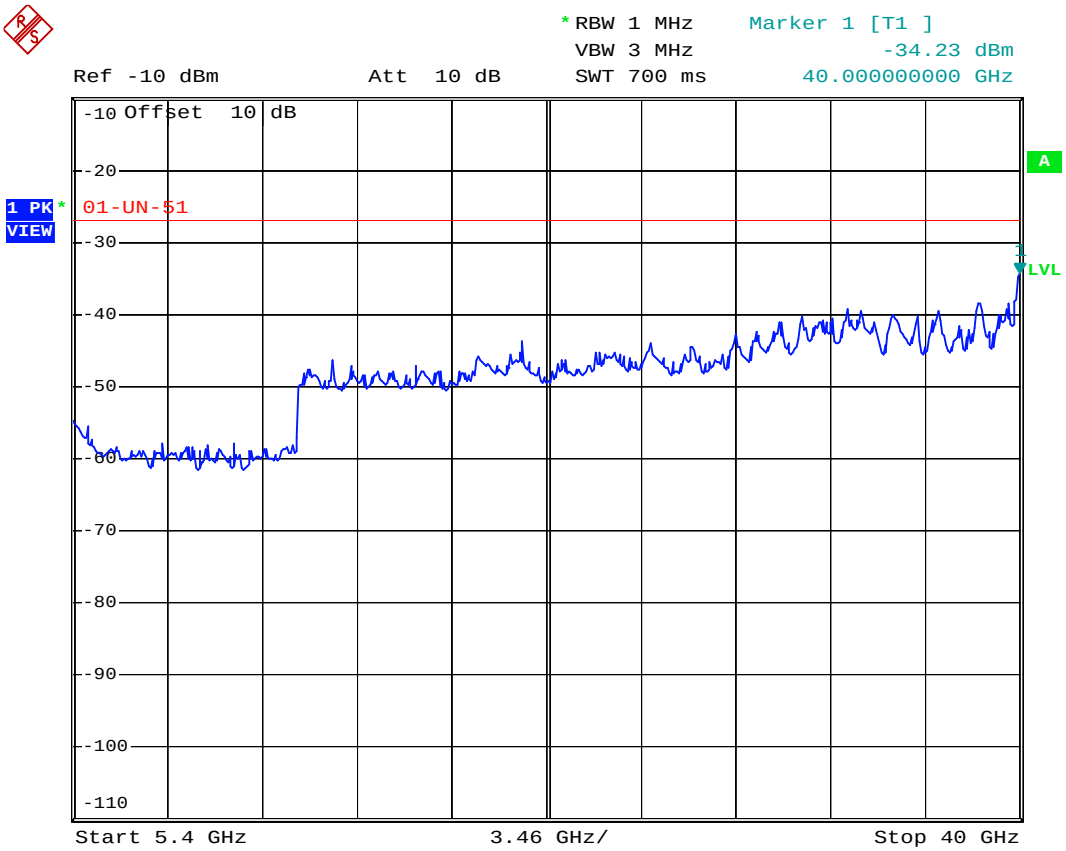
Band 5.15~5.25GHz / Mode: 802.11a / Channel Mid 30MHz ~ 5.1GHz



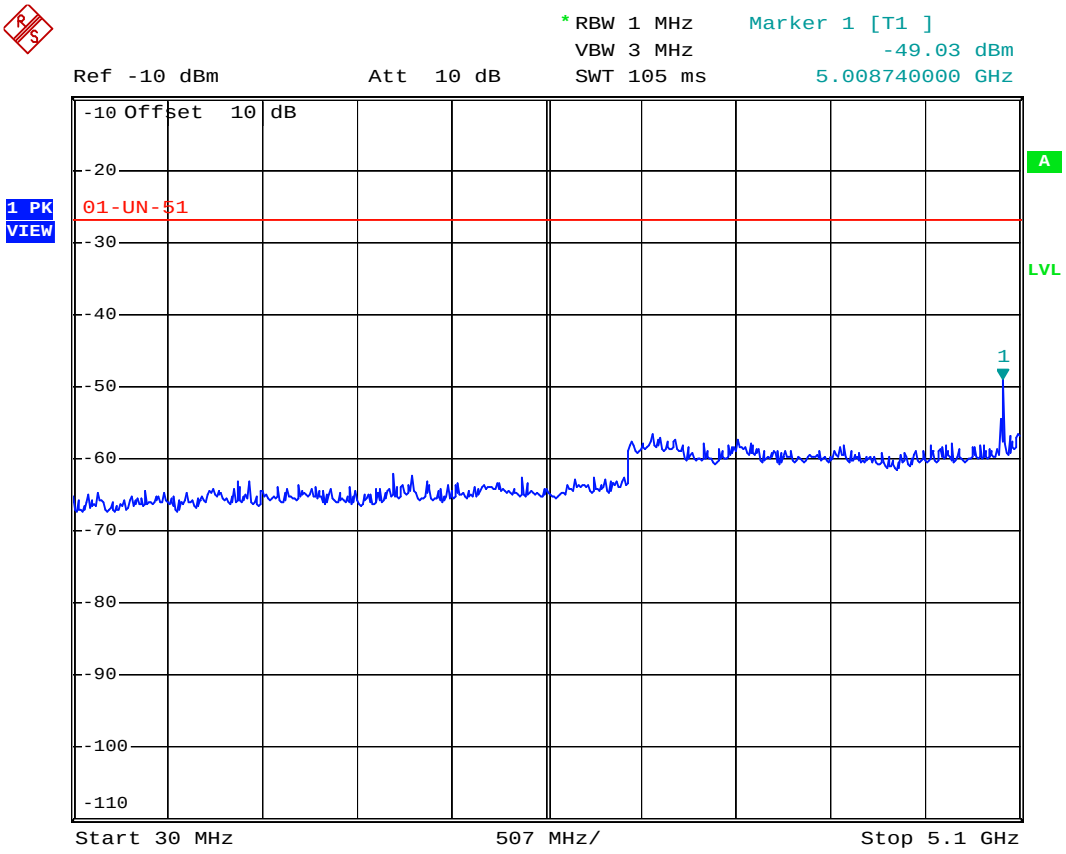
Band 5.15~5.25GHz / Mode: 802.11a / Channel Mid 5.1GHz~5.4GHz



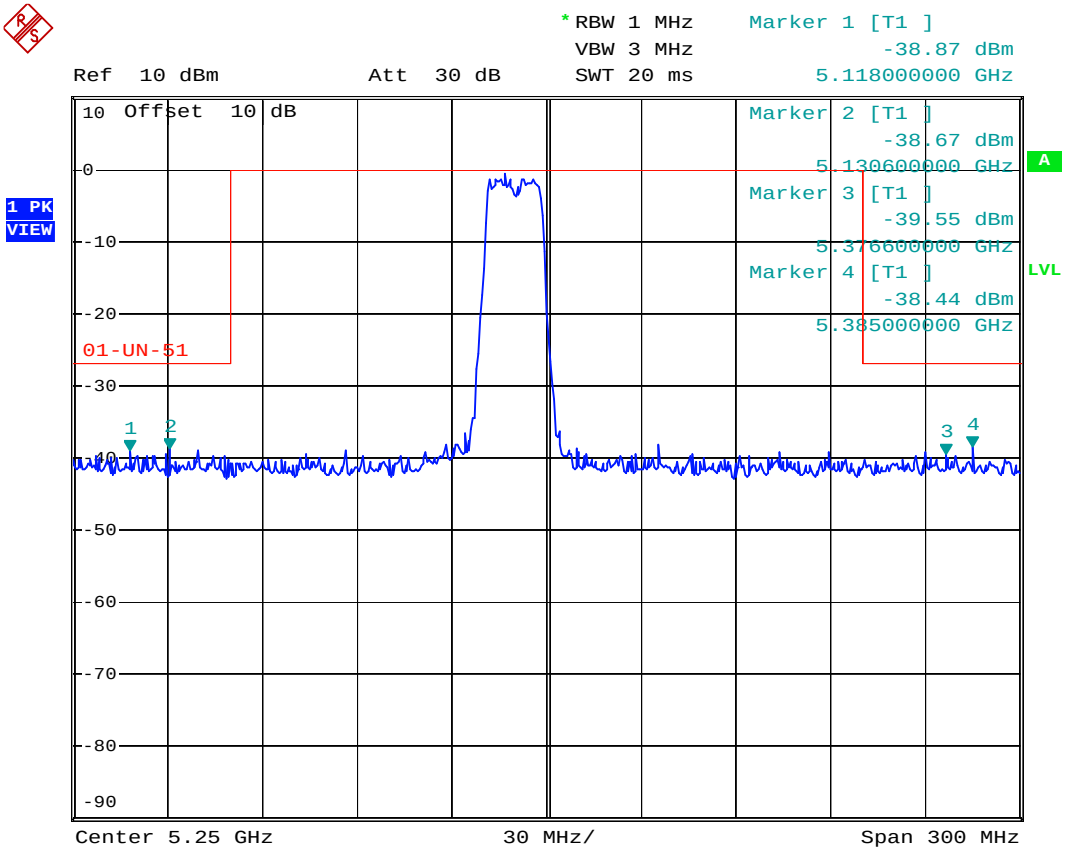
Band 5.15~5.25GHz / Mode: 802.11a / Channel Mid 5.4GHz ~ 40GHz



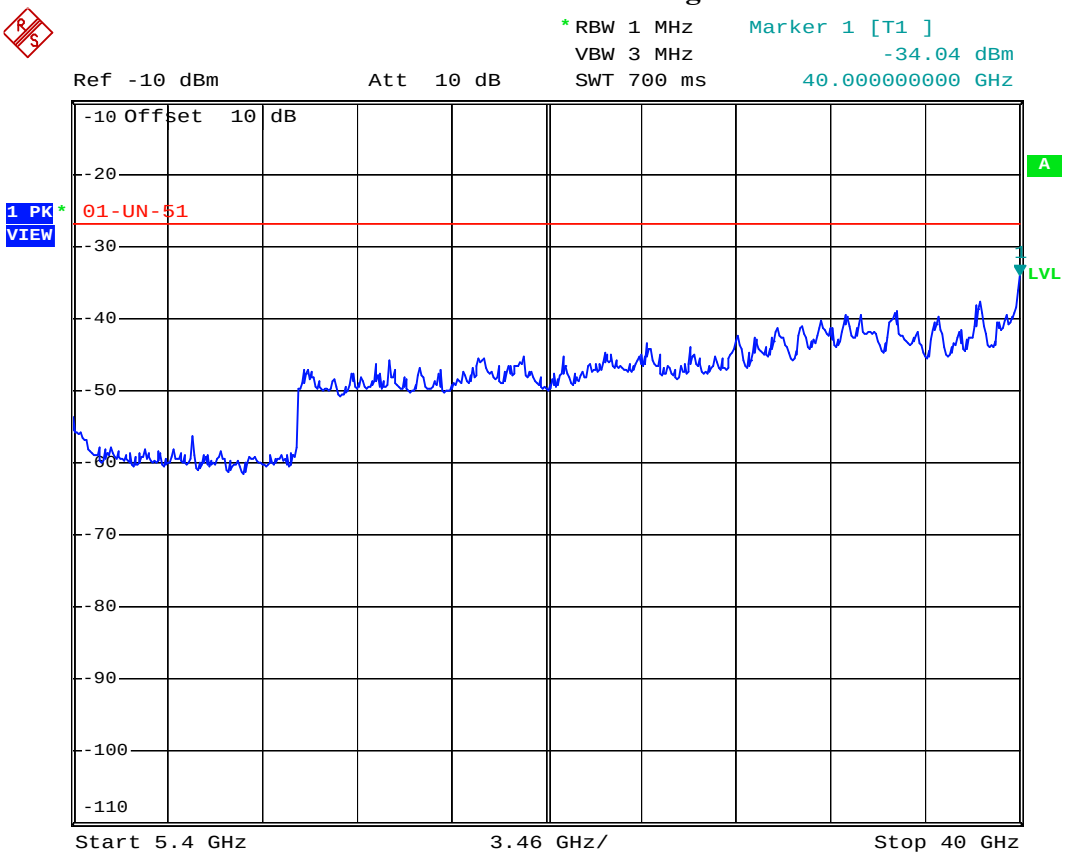
Band 5.15~5.25GHz / Mode: 802.11a / Channel High 30MHz ~ 5.1GHz



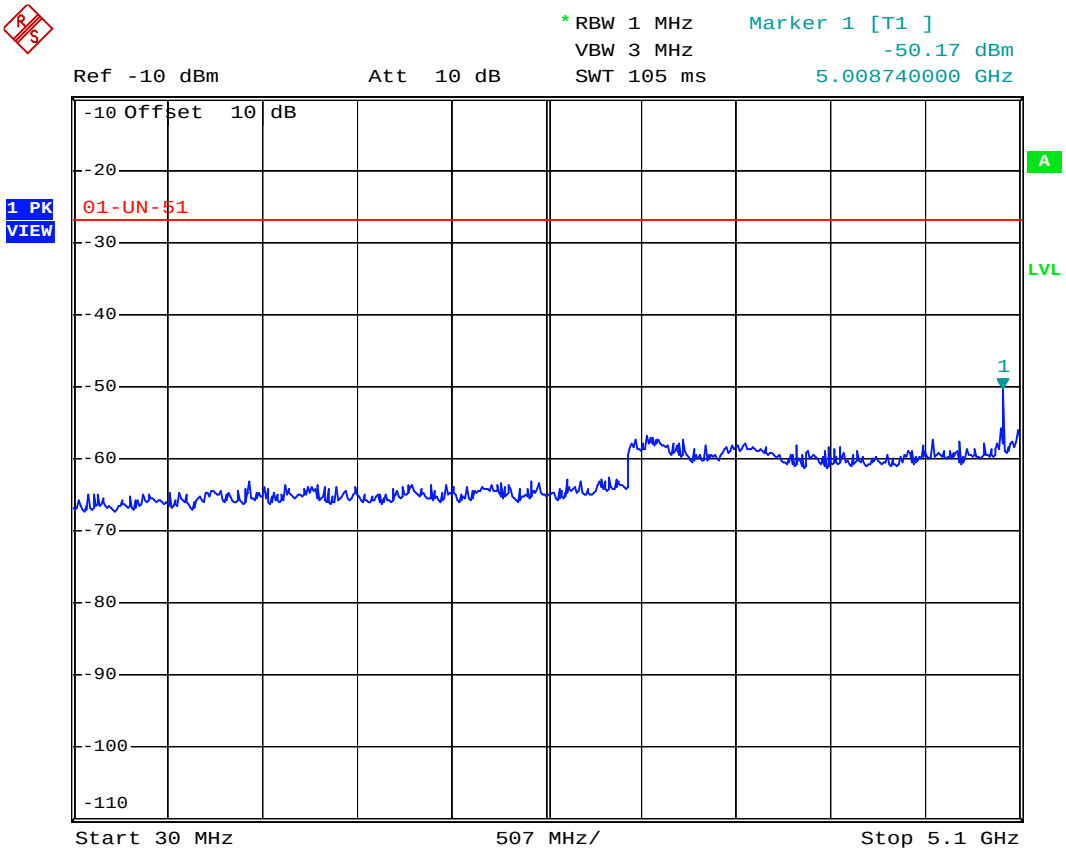
Band 5.15~5.25GHz / Mode: 802.11a / Channel High 5.1GHz~5.4GHz



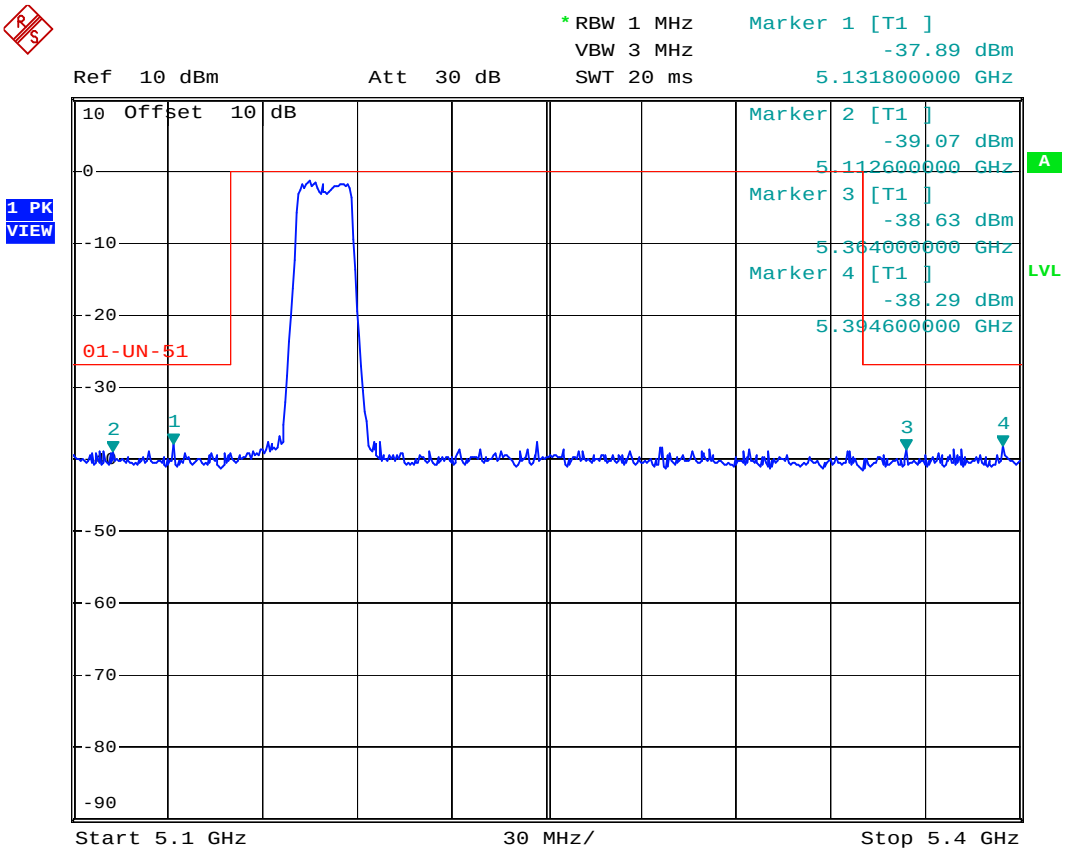
Band 5.15~5.25GHz / Mode: 802.11a / Channel High 5.4GHz ~ 40GHz



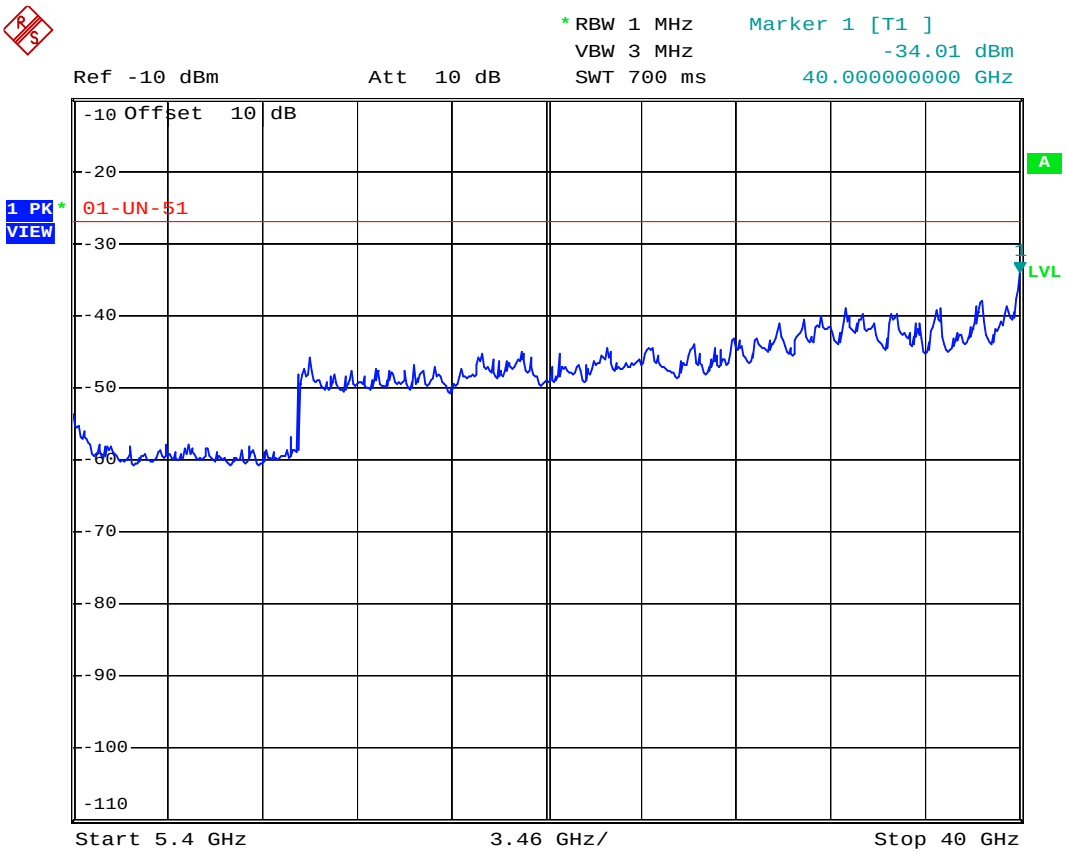
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel Low 30MHz ~ 5.1GHz



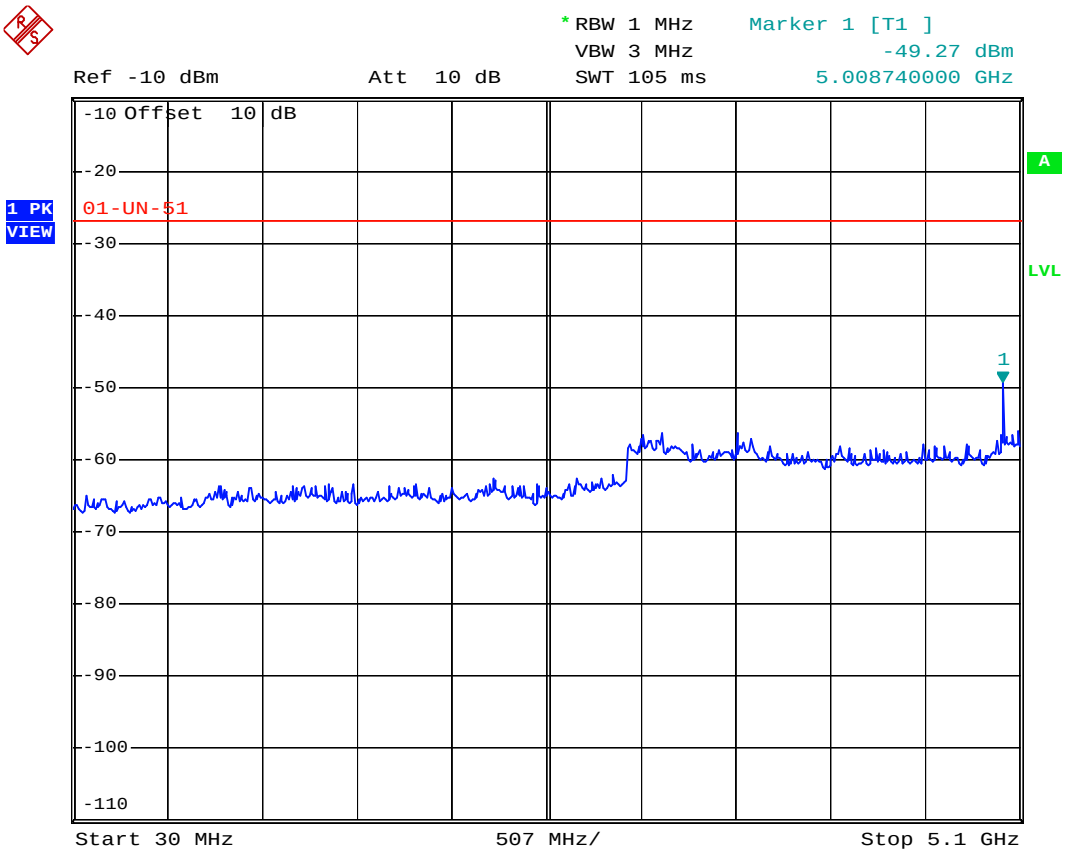
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel Low 5.1GHz~5.4GHz



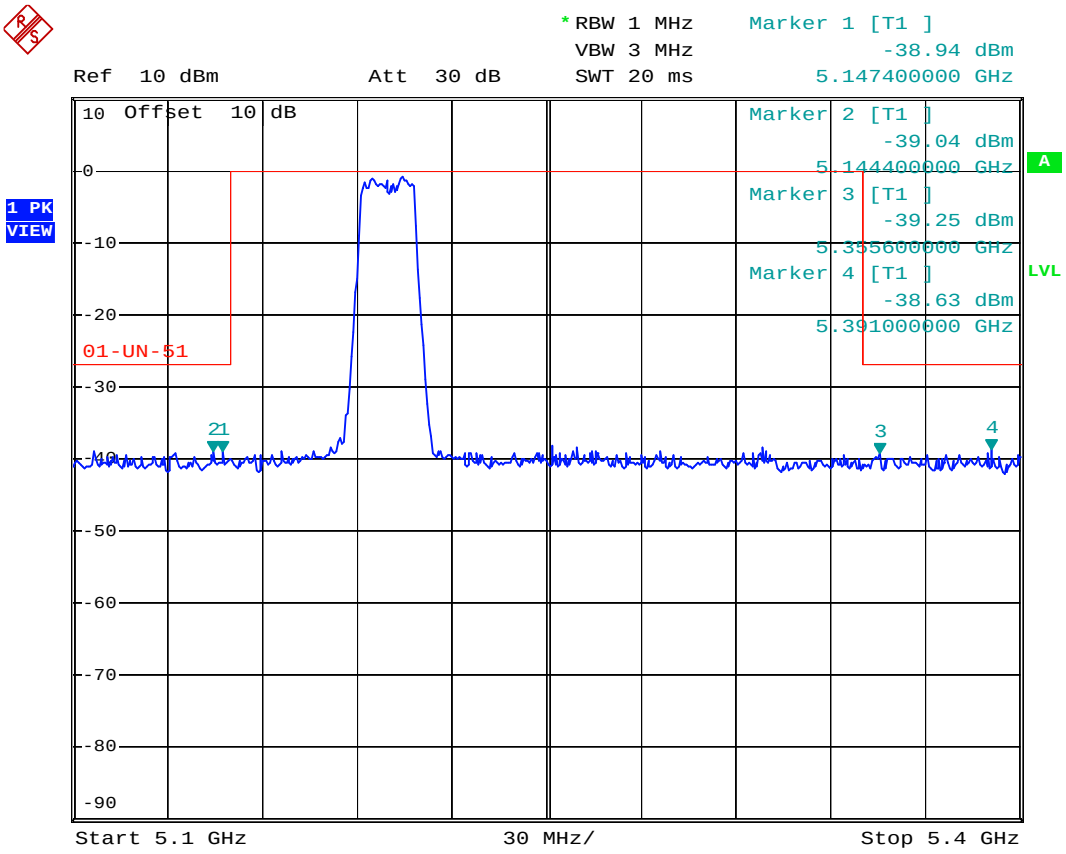
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel Low 5.4GHz ~ 40GHz



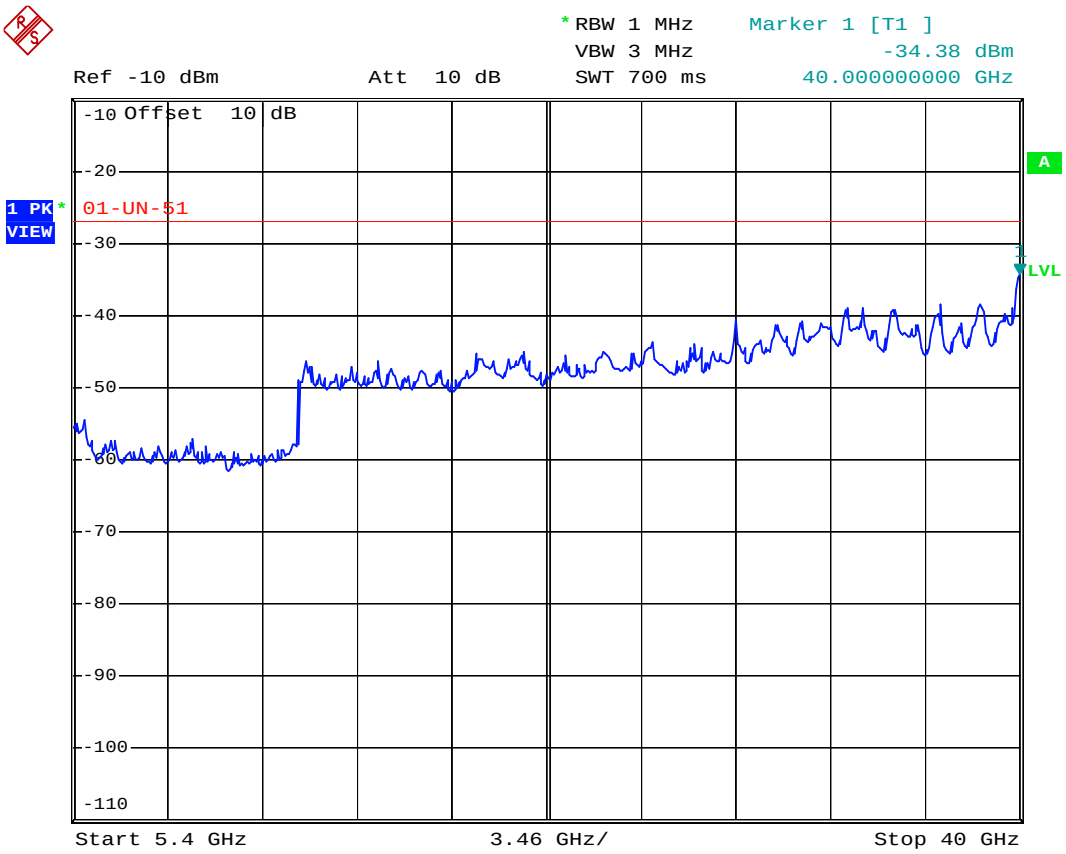
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel Mid 30MHz ~ 5.1GHz



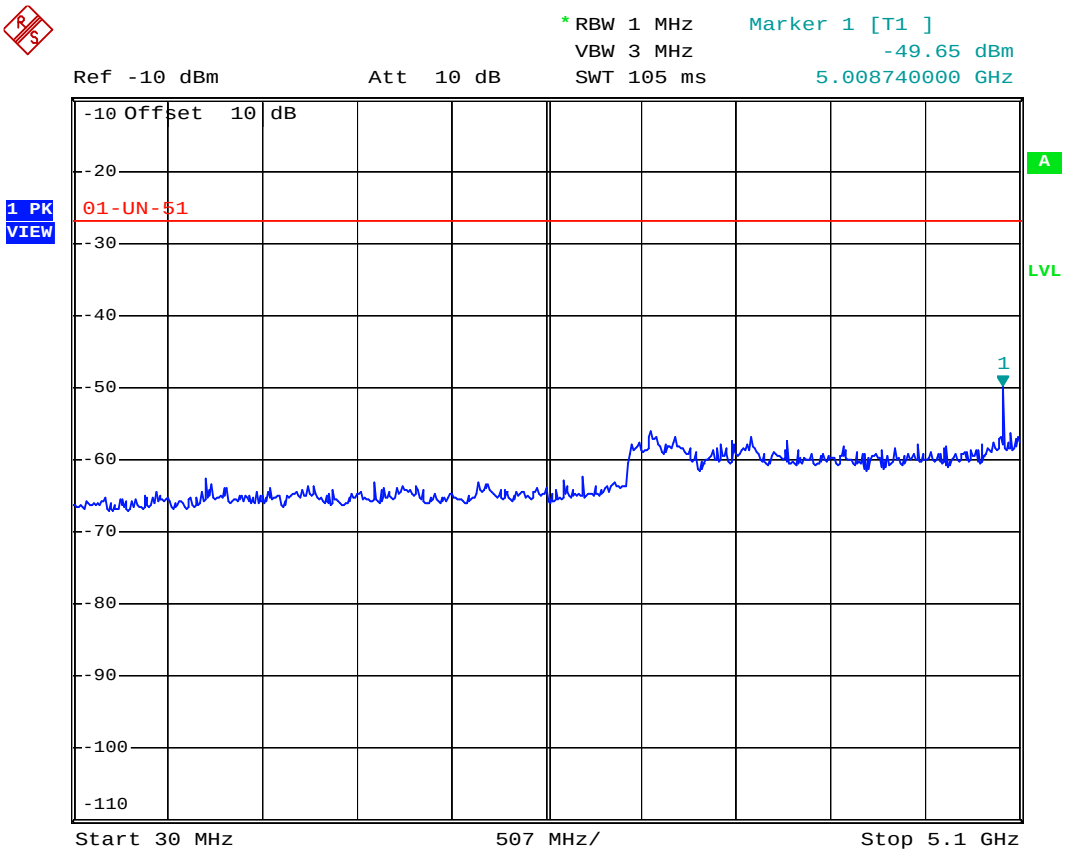
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel Mid 5.1GHz~5.4GHz



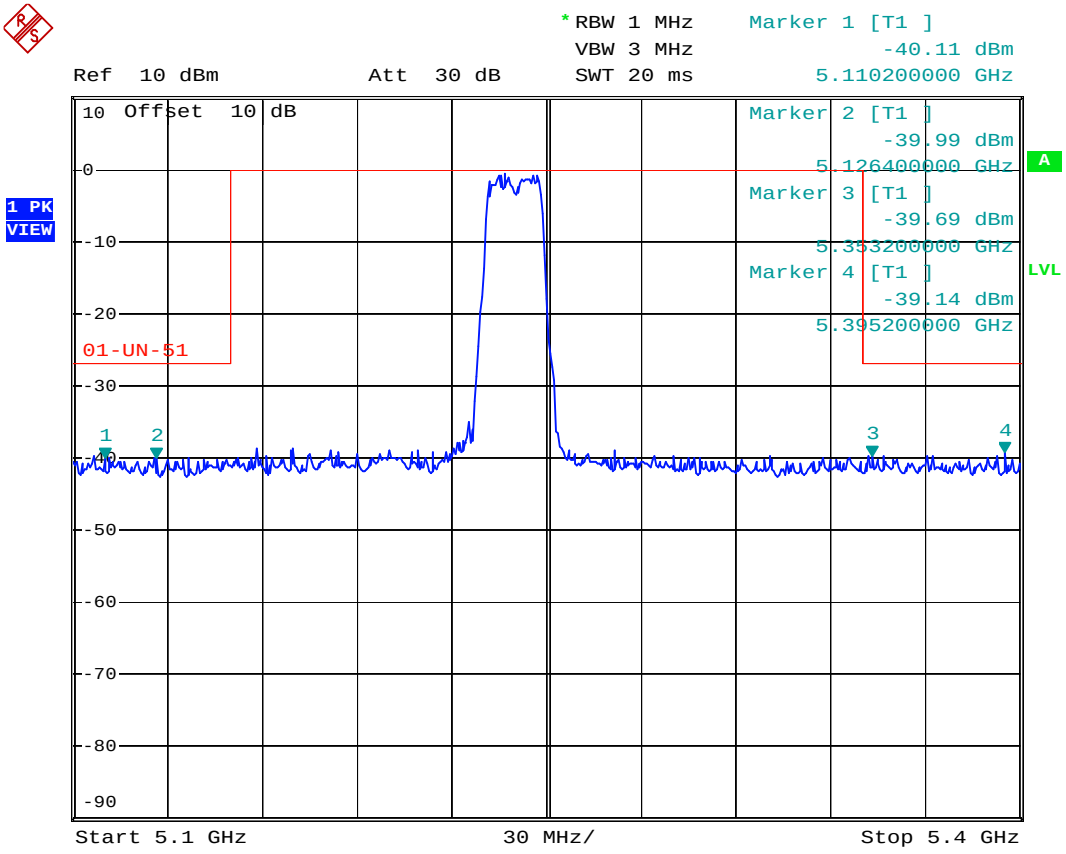
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel Mid 5.4GHz ~ 40GHz



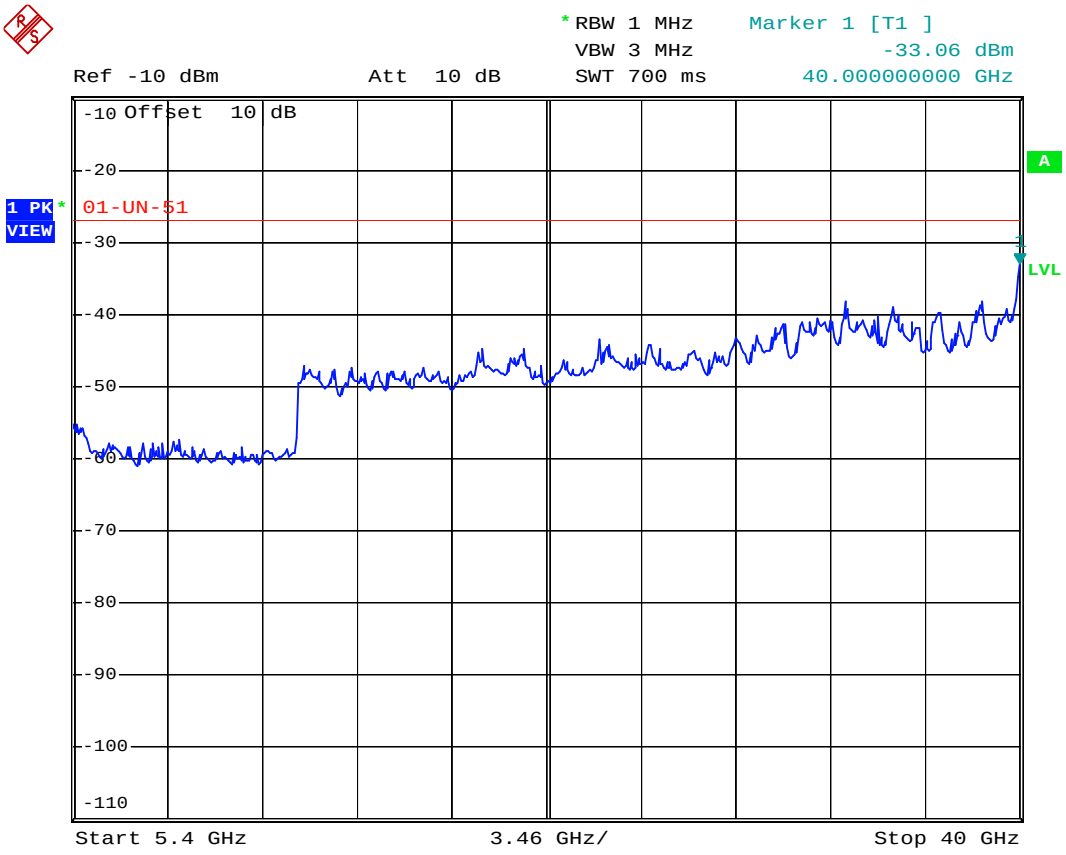
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel High 30MHz ~ 5.1GHz



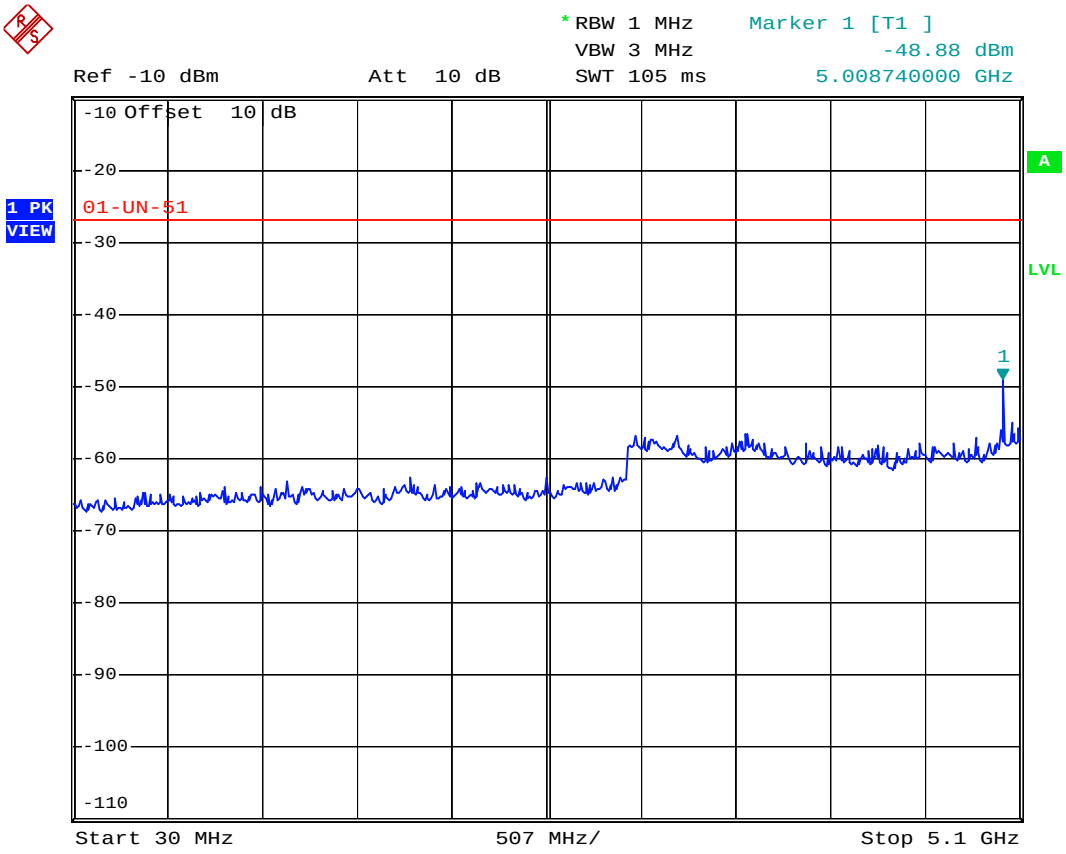
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel High 5.1GHz~5.4GHz



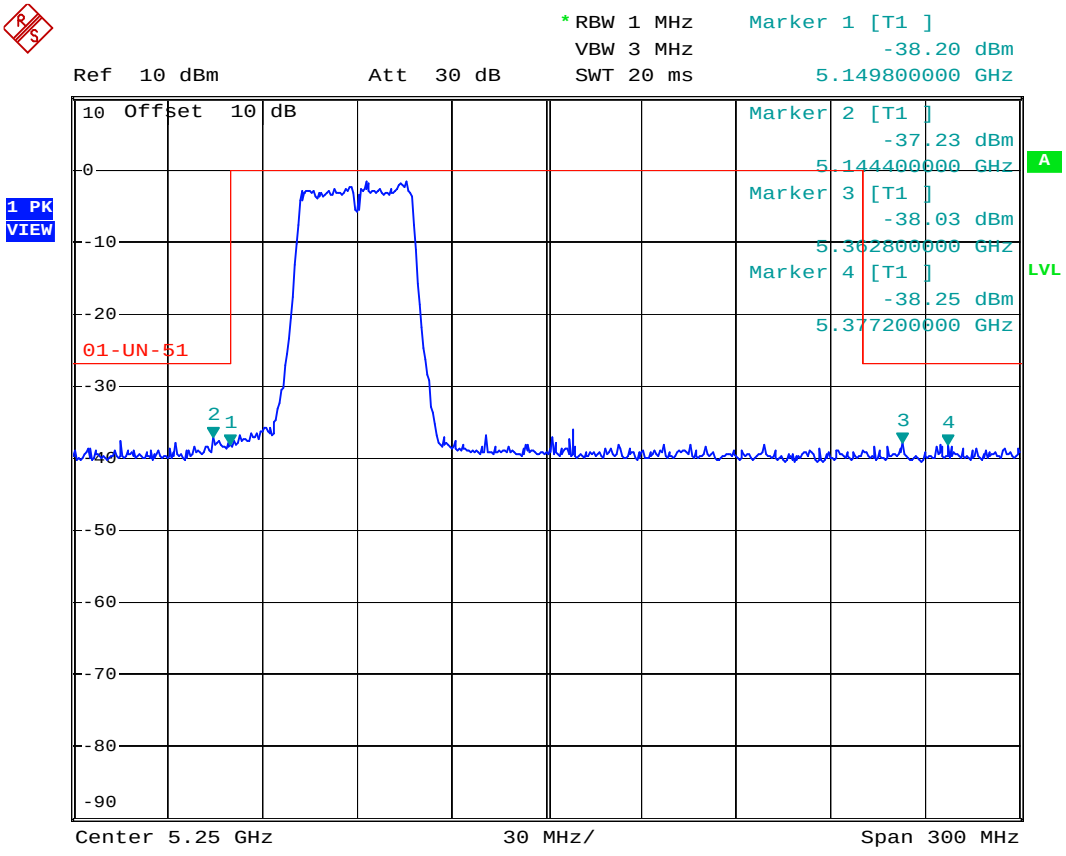
Band 5.15~5.25GHz / Mode: 802.11an HT-20 / Channel High 5.4GHz ~ 40GHz



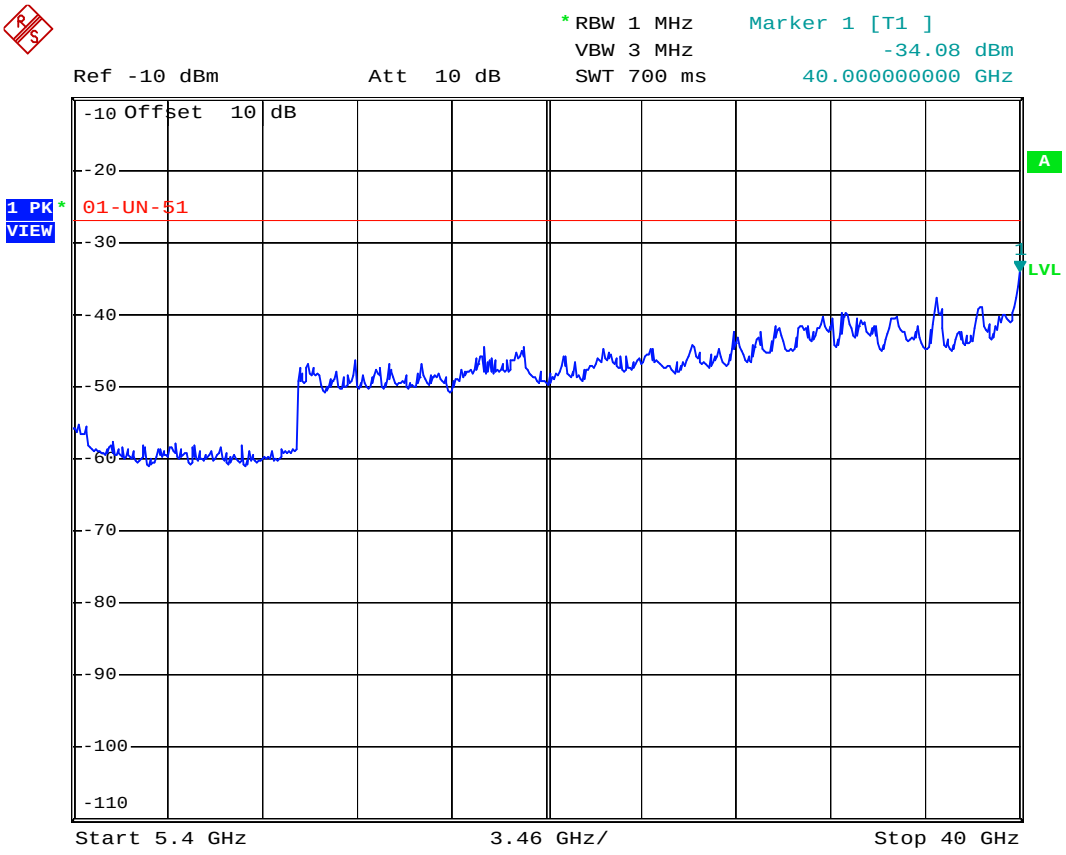
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel Low 30MHz ~ 5.1GHz



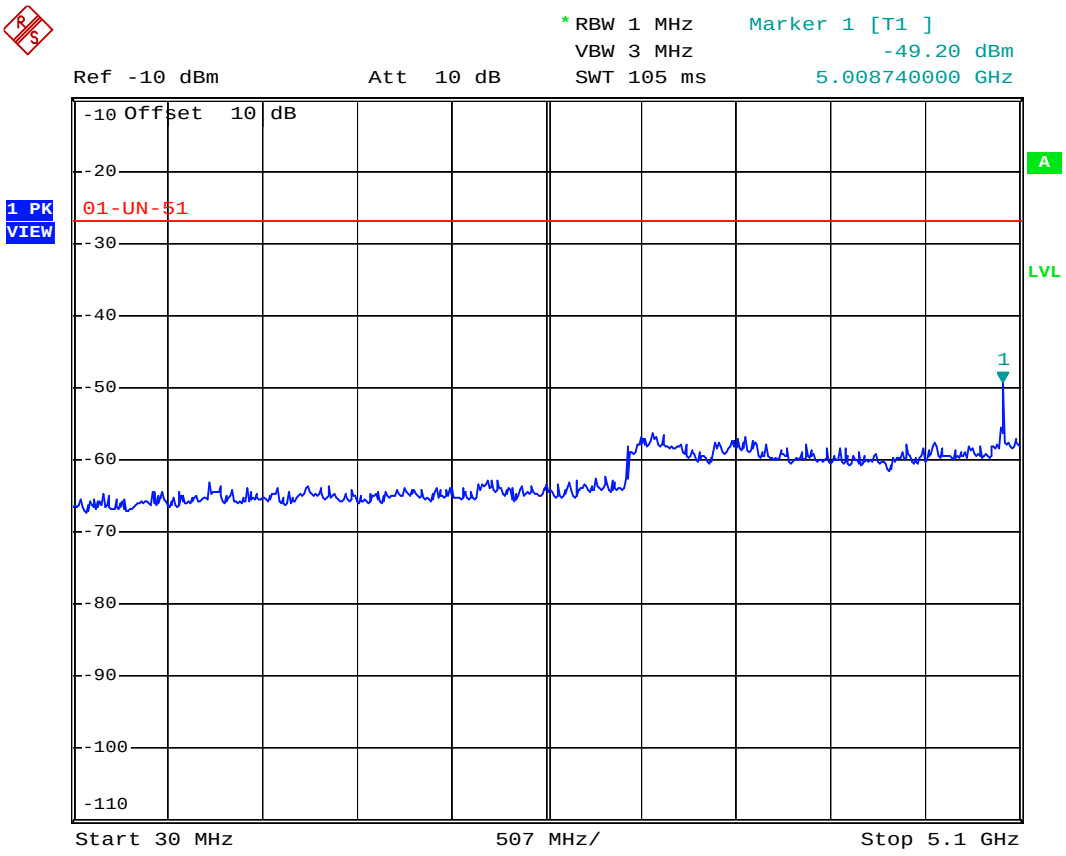
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel Low 5.1GHz~5.4GHz



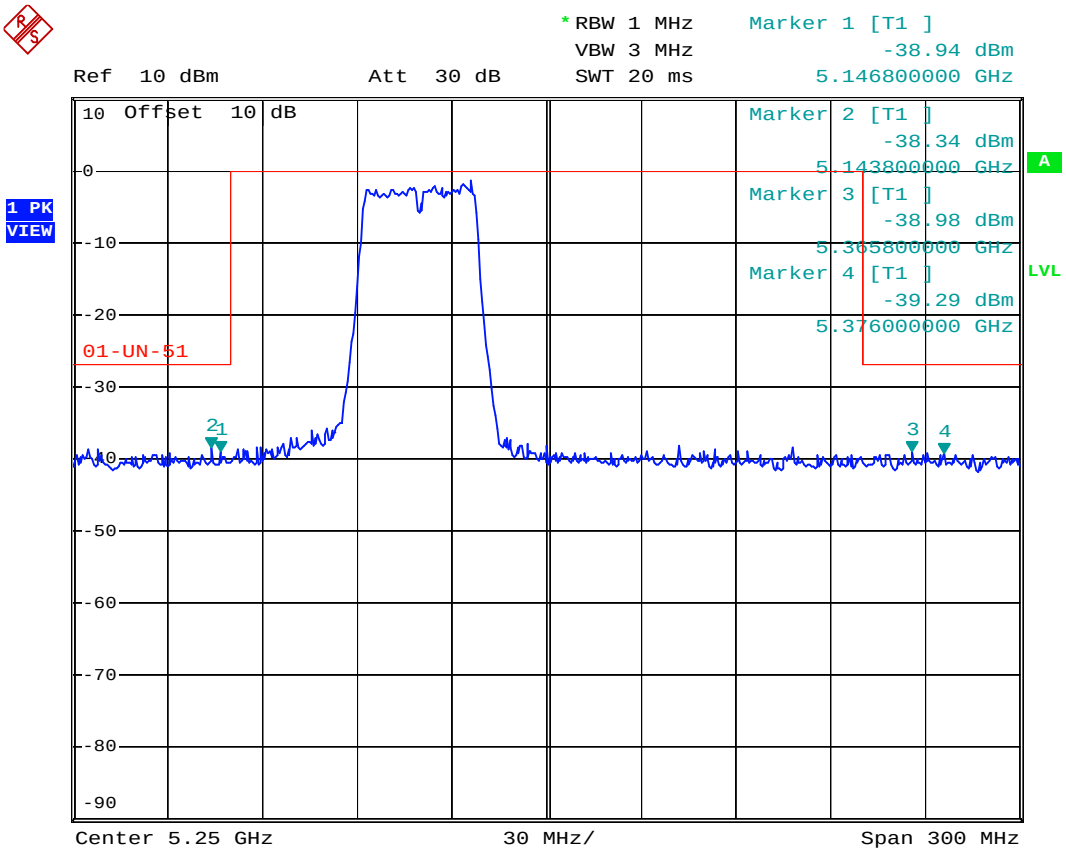
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel Low 5.4GHz ~ 40GHz



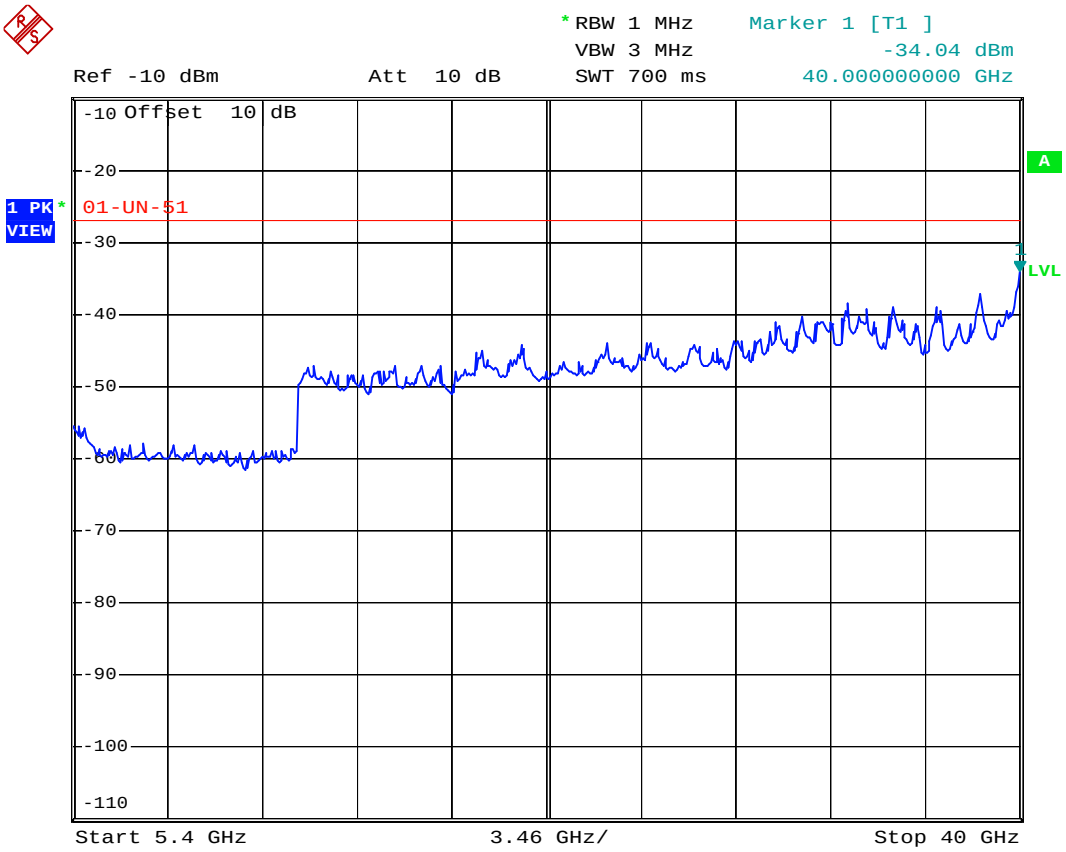
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel Mid 30MHz ~ 5.1GHz



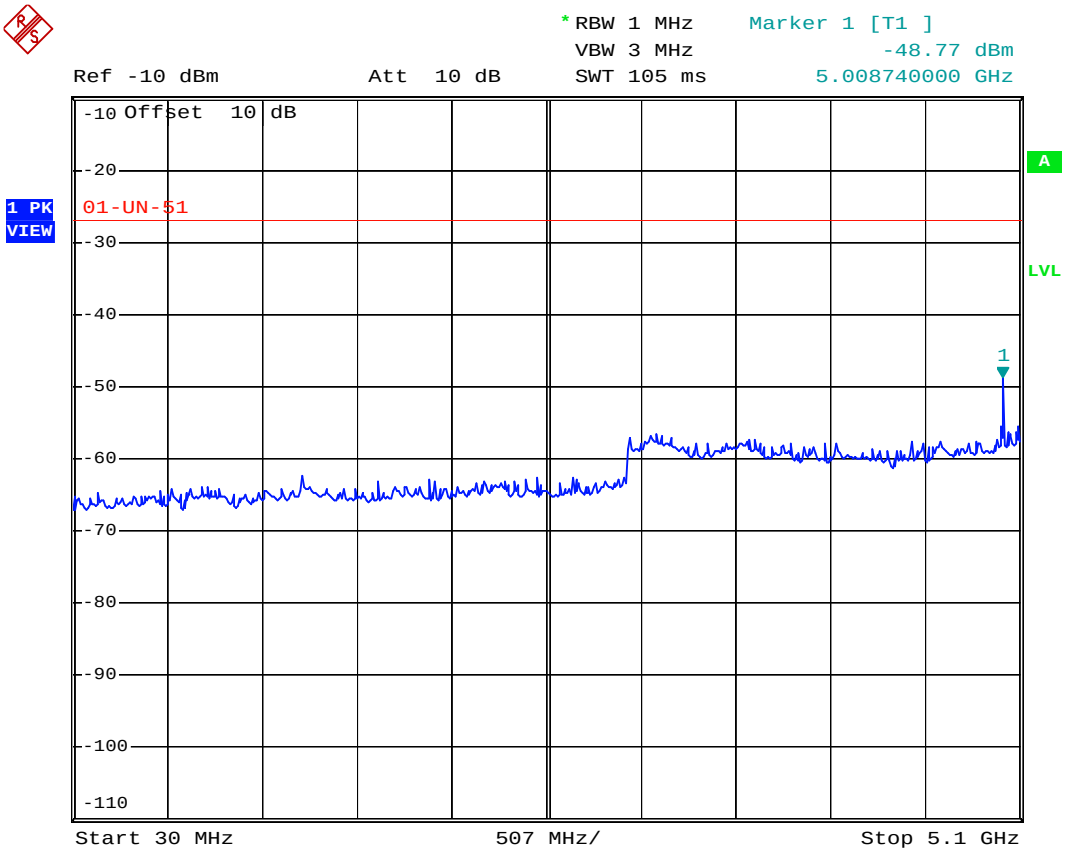
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel Mid 5.1GHz~5.4GHz



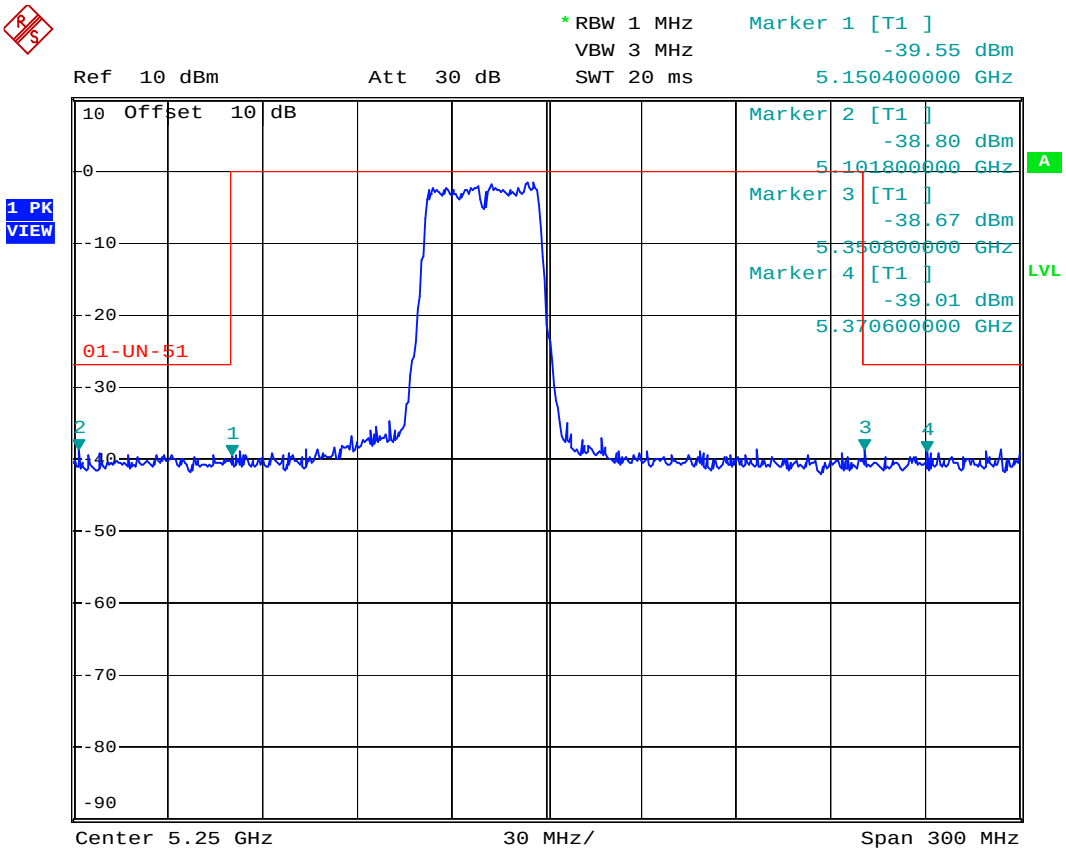
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel Mid 5.4GHz ~ 40GHz



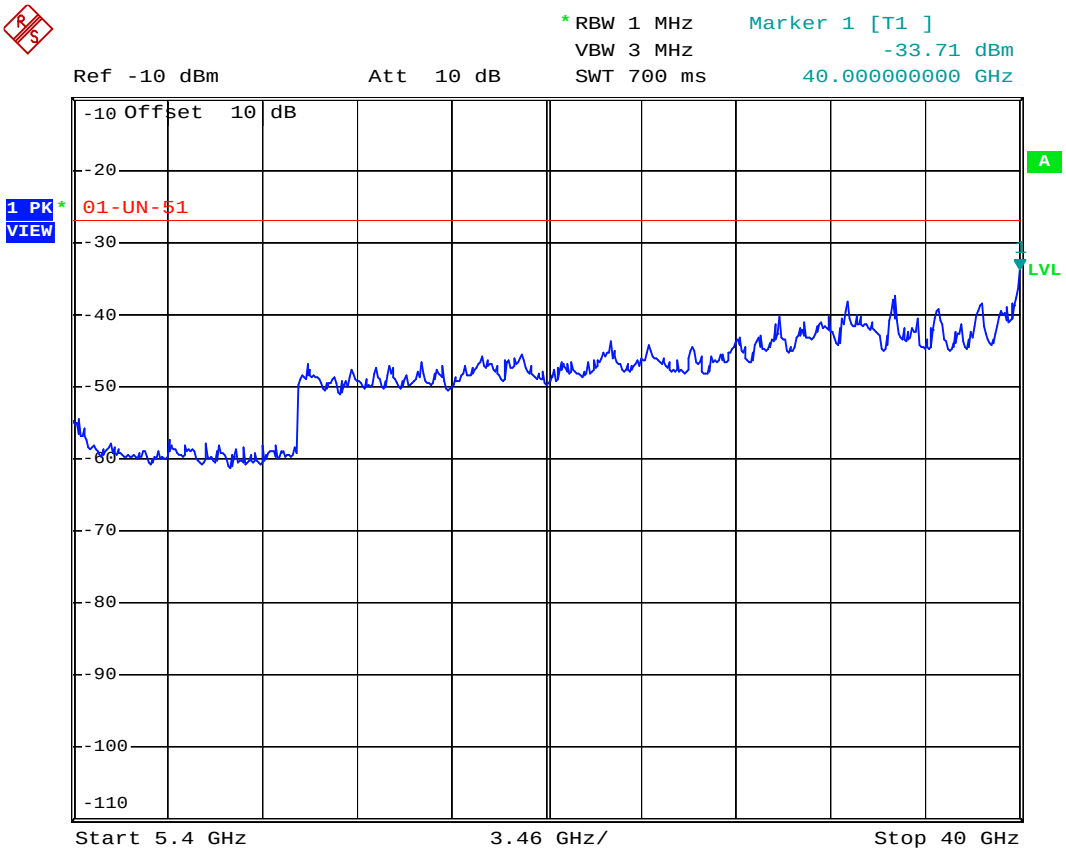
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel High 30MHz ~ 5.1GHz



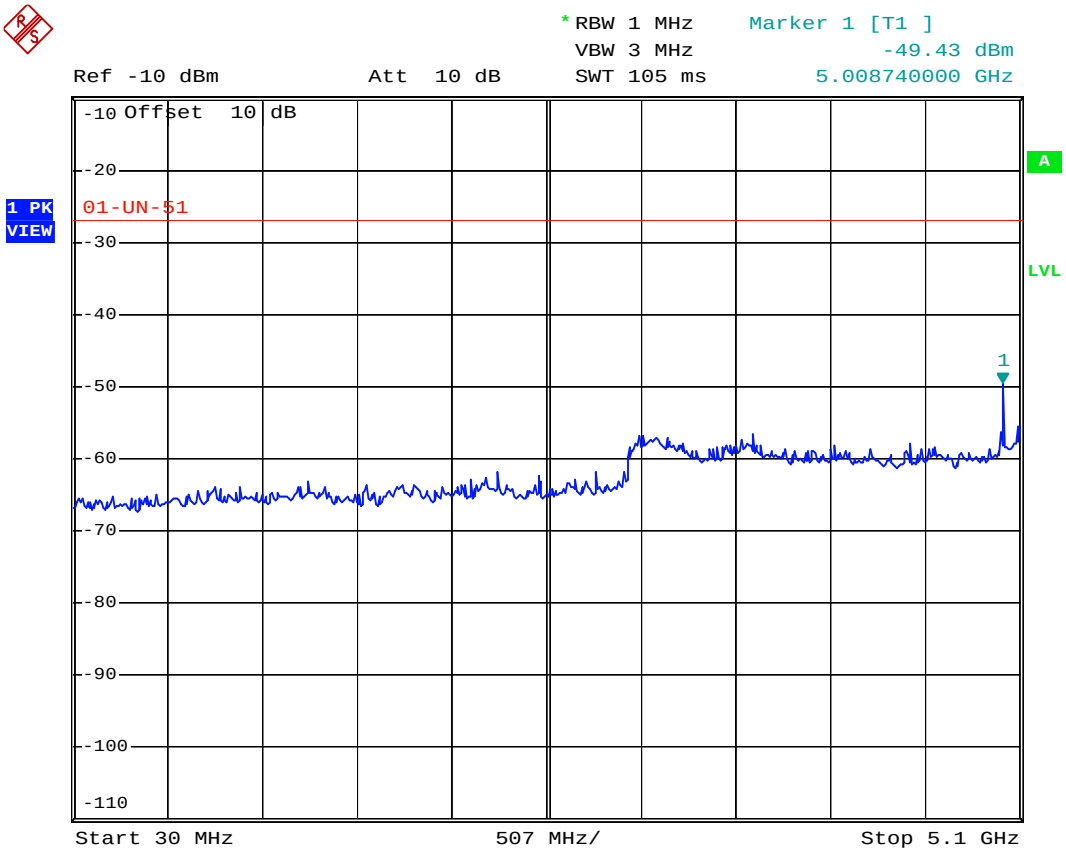
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel High 5.1GHz~5.4GHz



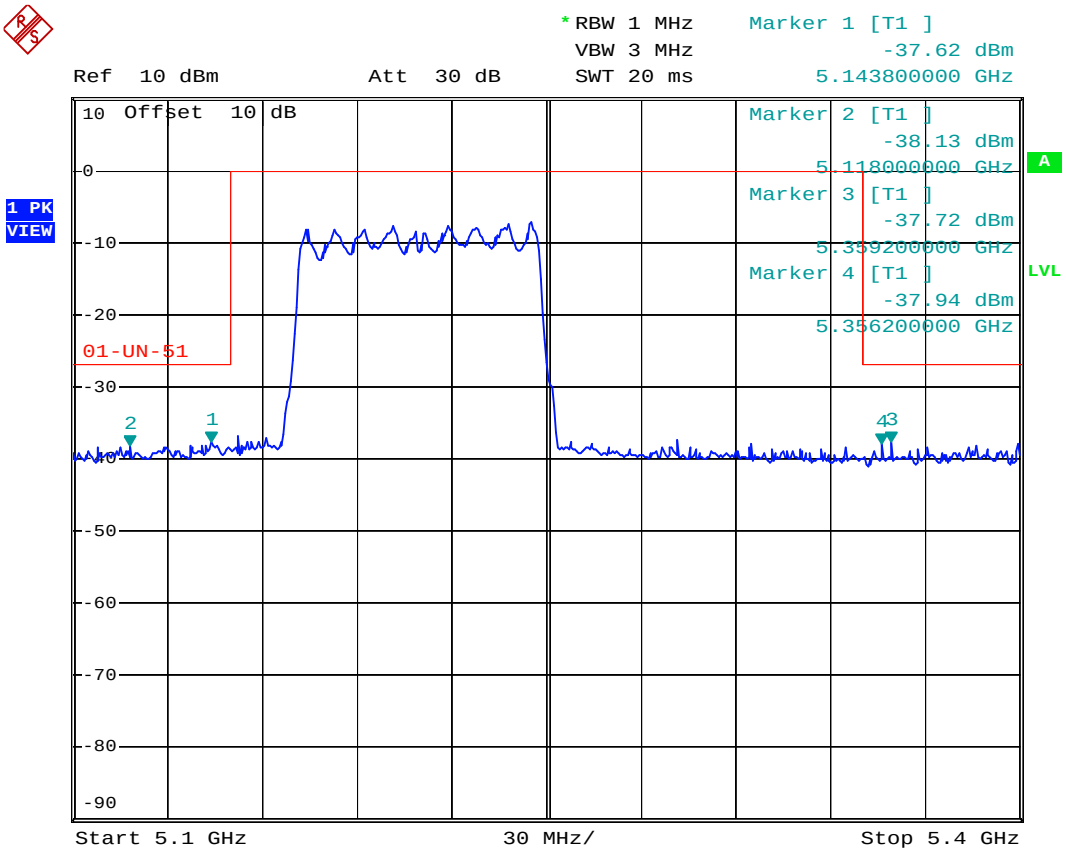
Band 5.15~5.25GHz / Mode: 802.11an HT-40 / Channel High 5.4GHz ~ 40GHz



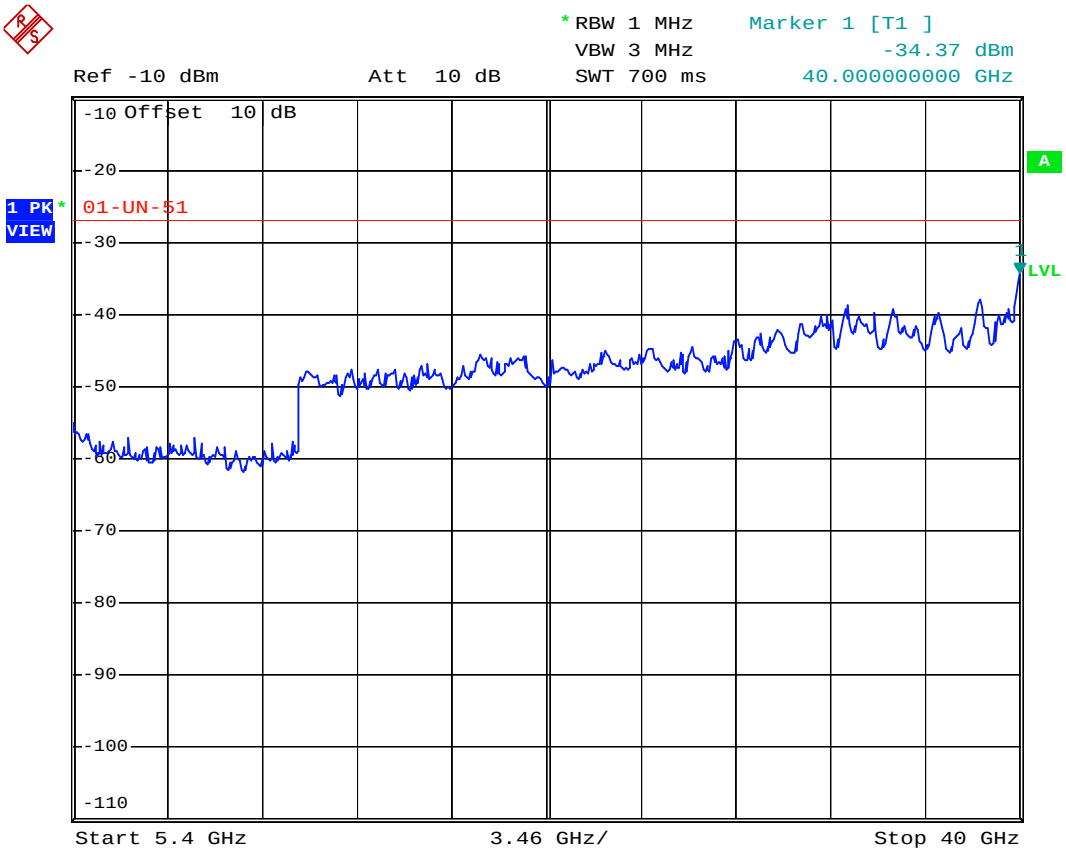
Band 5.15~5.25GHz / Mode: 802.11ac VHT-80 / Channel 30MHz ~ 5.1GHz



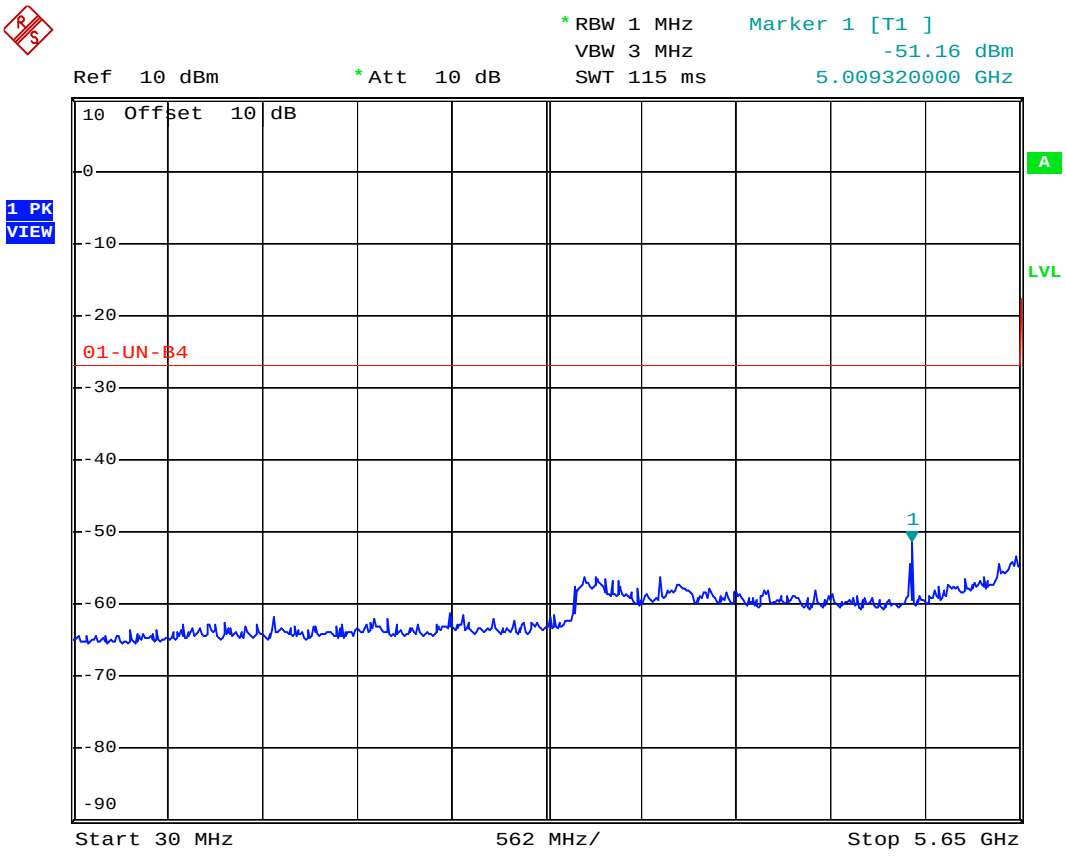
Band 5.15~5.25GHz / Mode: 802.11ac VHT-80 / Channel 5.1GHz~5.4GHz



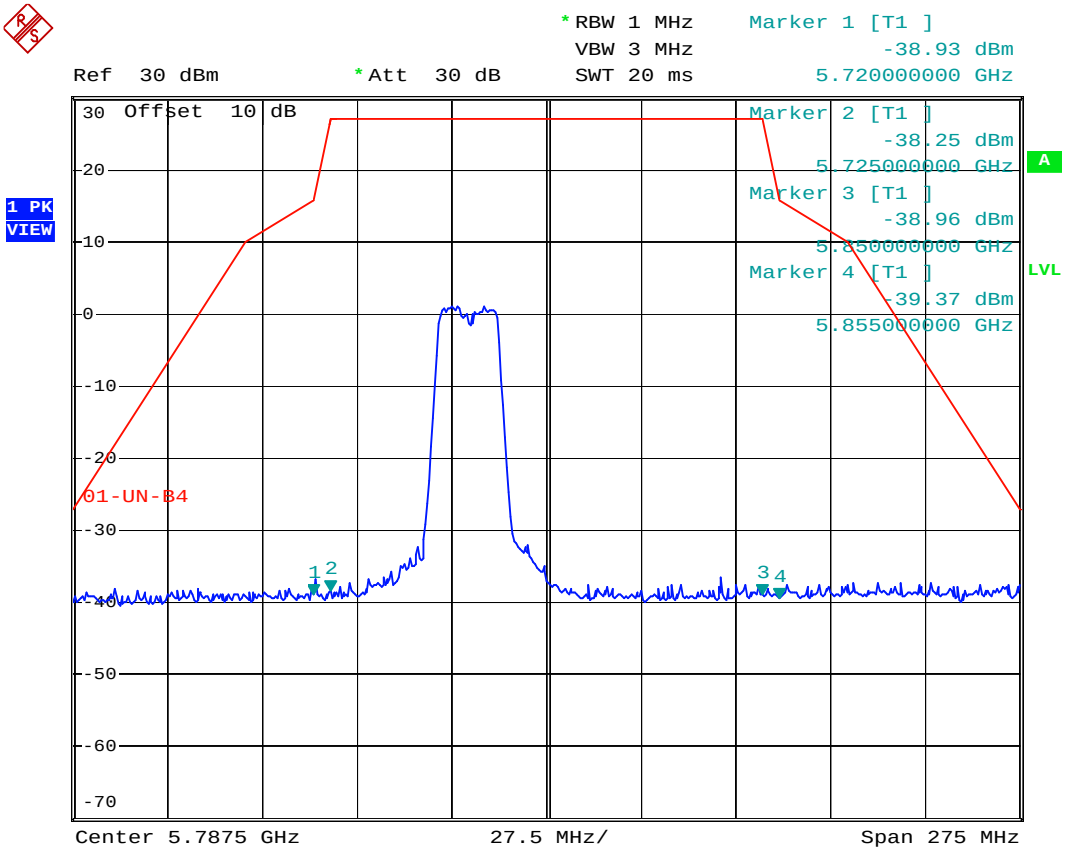
Band 5.15~5.25GHz / Mode: 802.11ac VHT-80 / Channel 5.4GHz ~ 40GHz



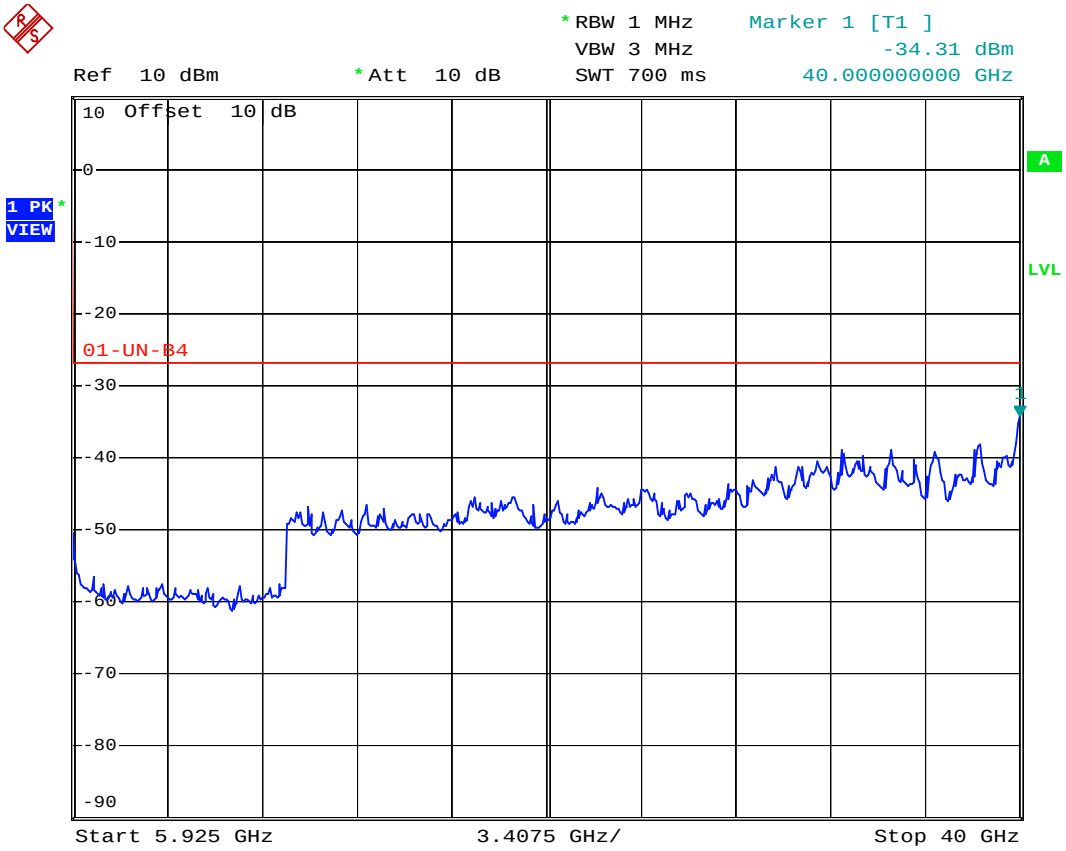
Band 5.725~5.850GHz / Mode: 802.11a / Channel Low 30MHz ~ 5.65GHz



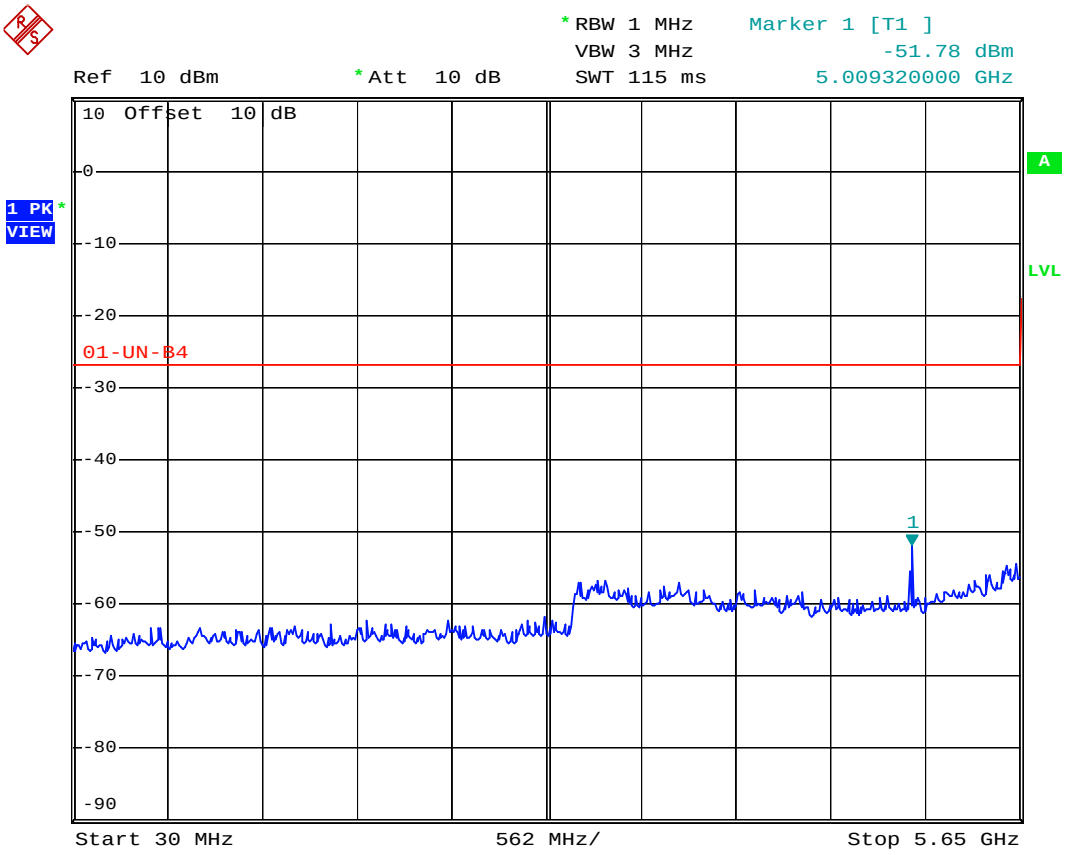
Band 5.725~5.850GHz / Mode: 802.11a / Channel Low 5.65GHz~5.925GHz



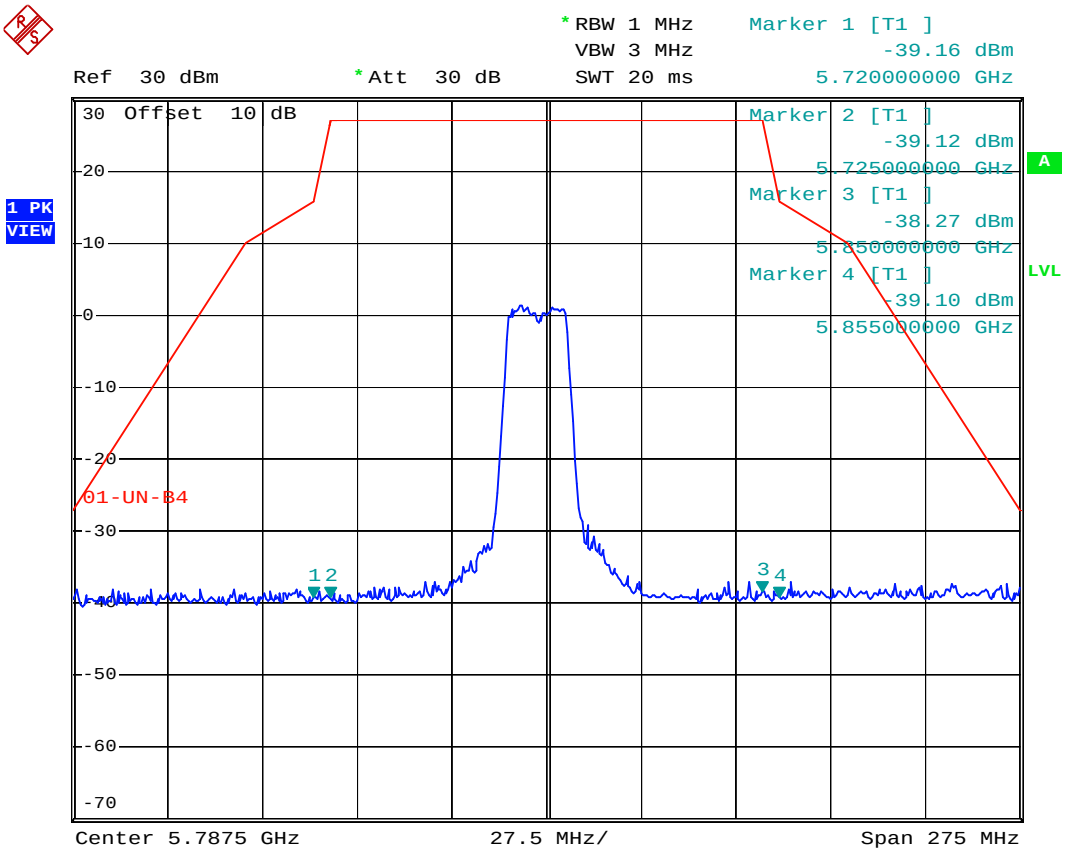
Band 5.725~5.850GHz / Mode: 802.11a / Channel Low 5.925GHz ~ 40GHz



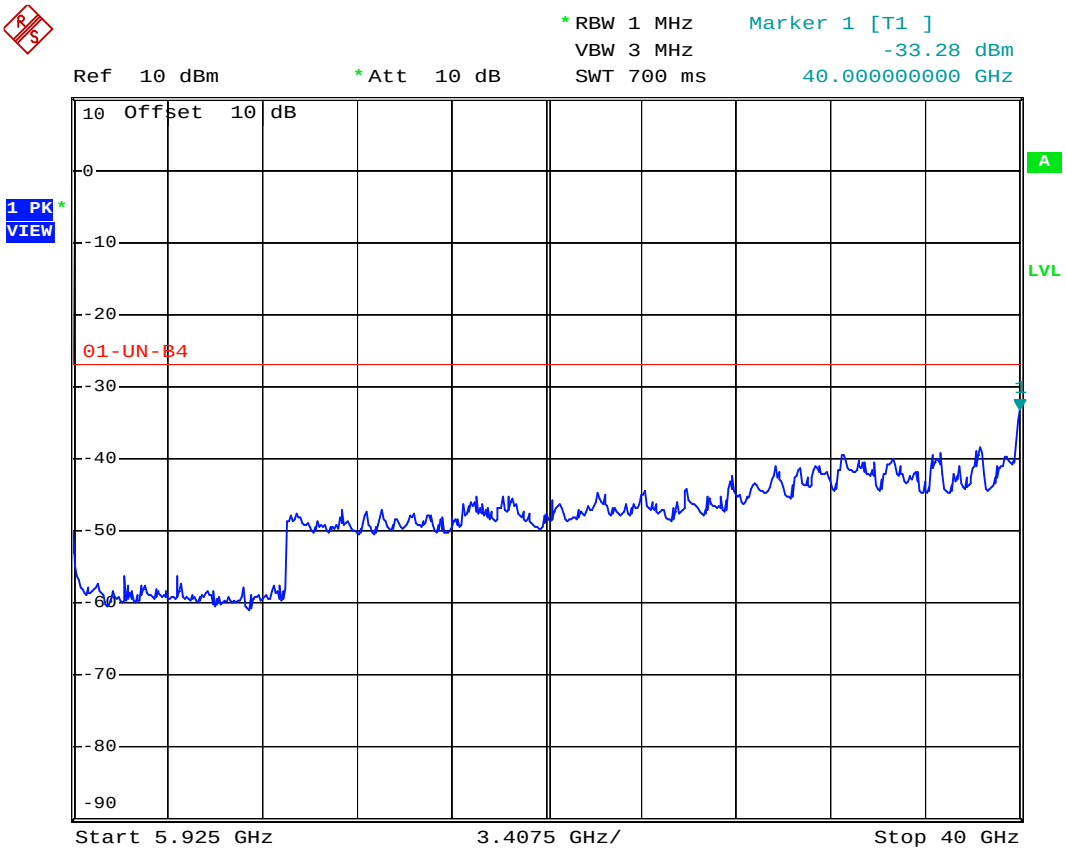
Band 5.725~5.850GHz / Mode: 802.11a / Channel Mid 30MHz ~ 5.65GHz



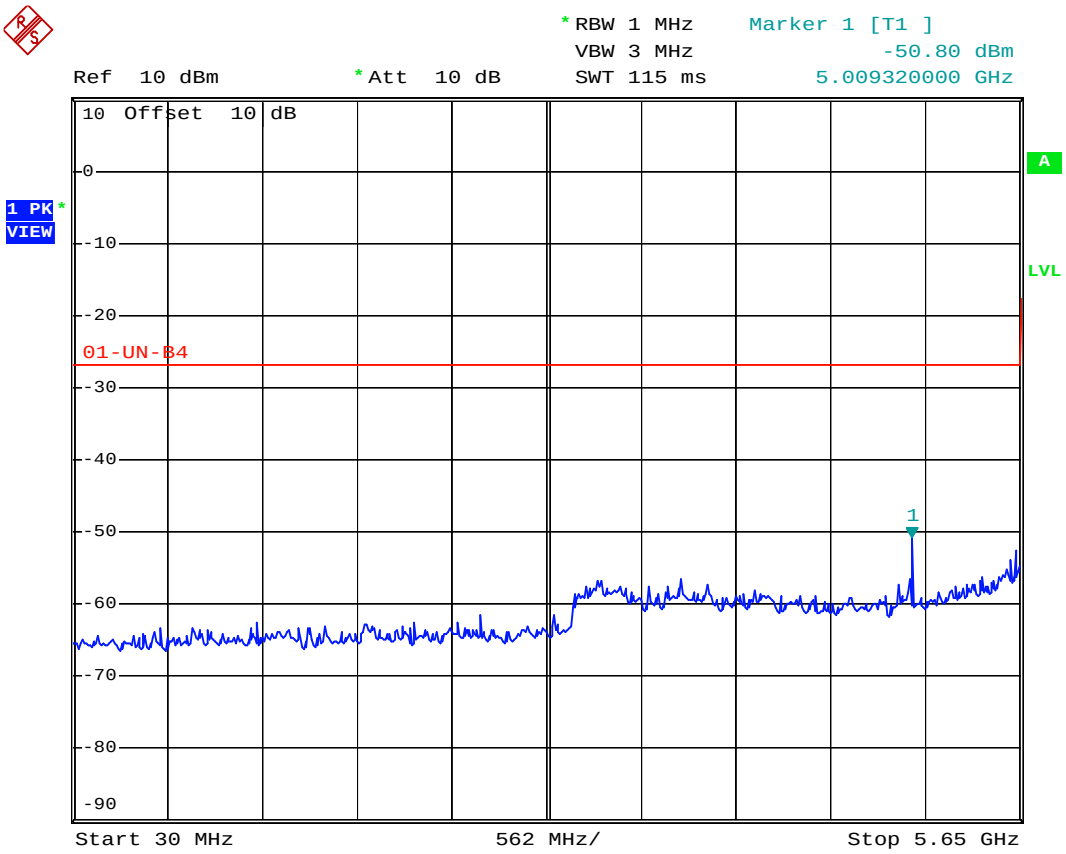
Band 5.725~5.850GHz / Mode: 802.11a / Channel Mid 5.65GHz~5.925GHz



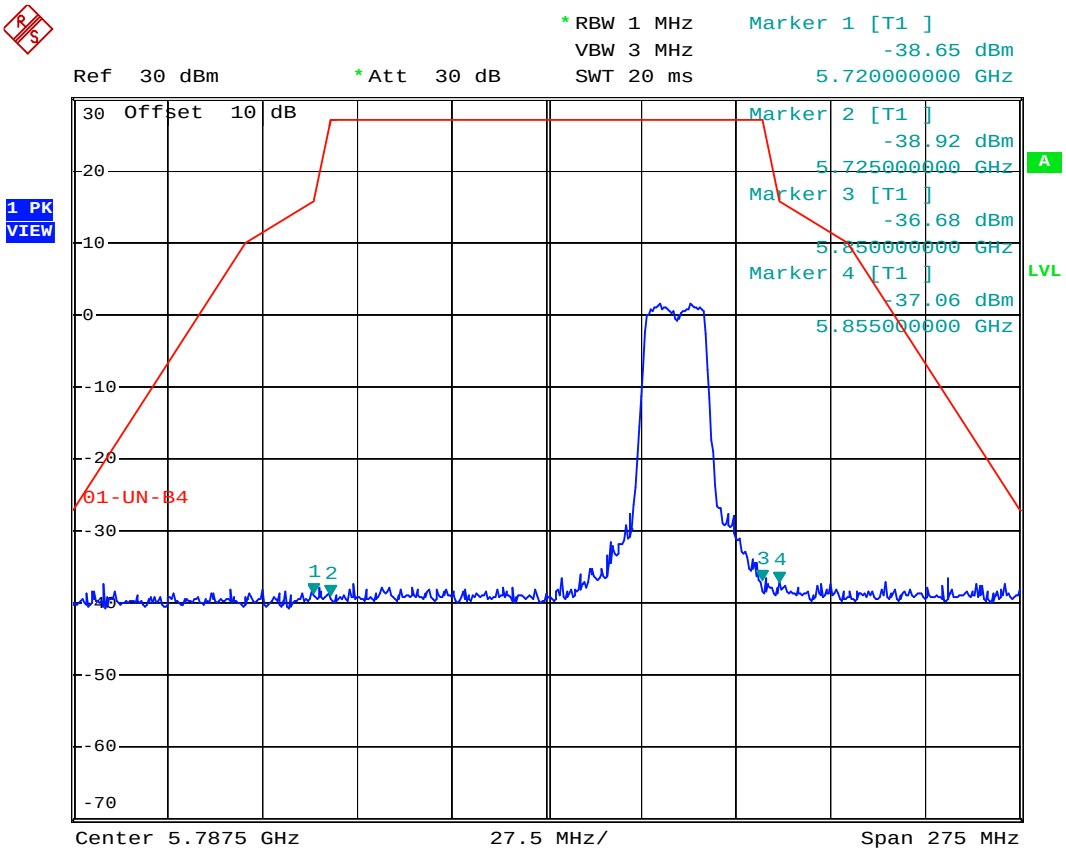
Band 5.725~5.850GHz / Mode: 802.11a / Channel Mid 5.925GHz ~ 40GHz



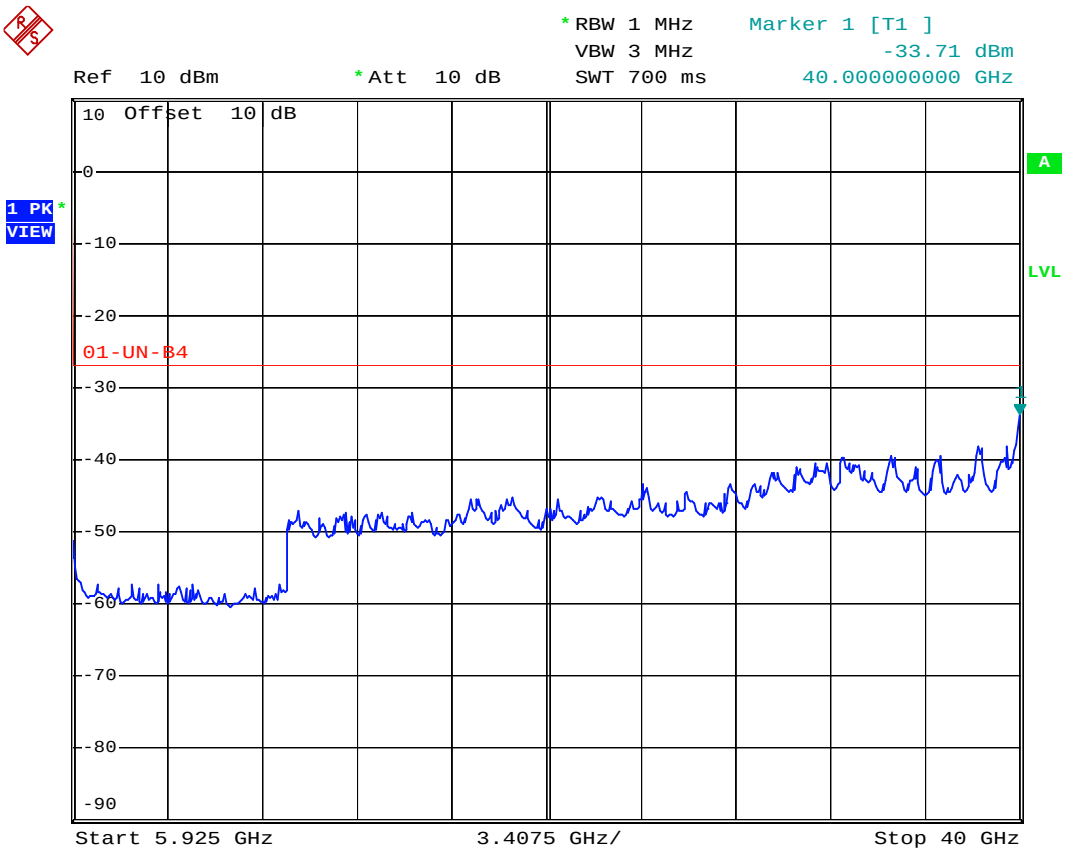
Band 5.725~5.850GHz / Mode: 802.11a / Channel High 30MHz ~ 5.65GHz



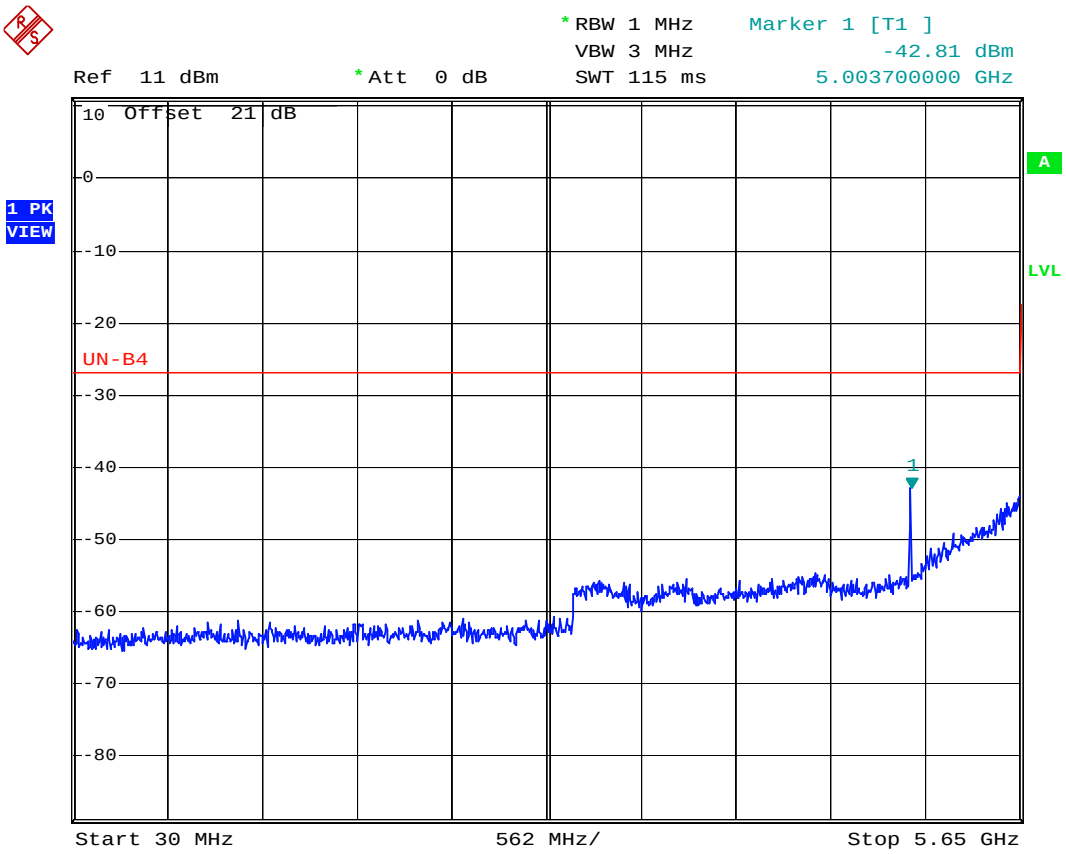
Band 5.725~5.850GHz / Mode: 802.11a / Channel High 5.65GHz~5.925GHz



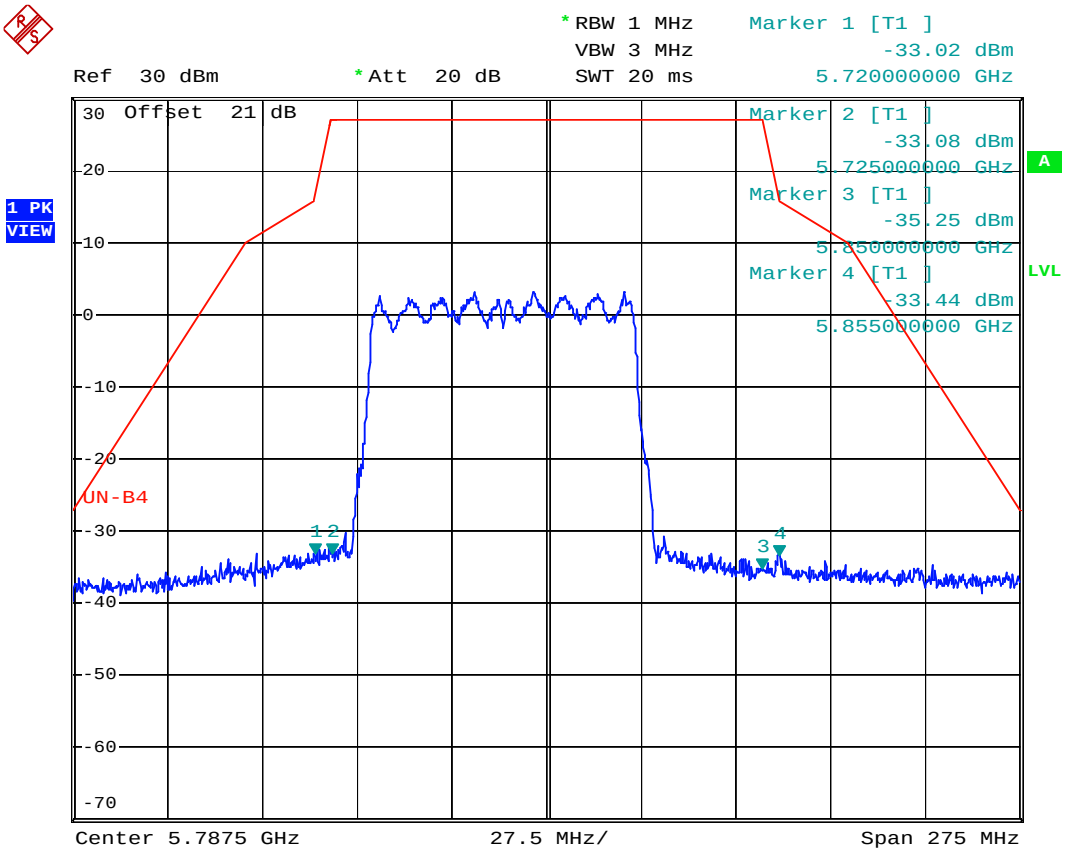
Band 5.725~5.850GHz / Mode: 802.11a / Channel High 5.925GHz ~ 40GHz



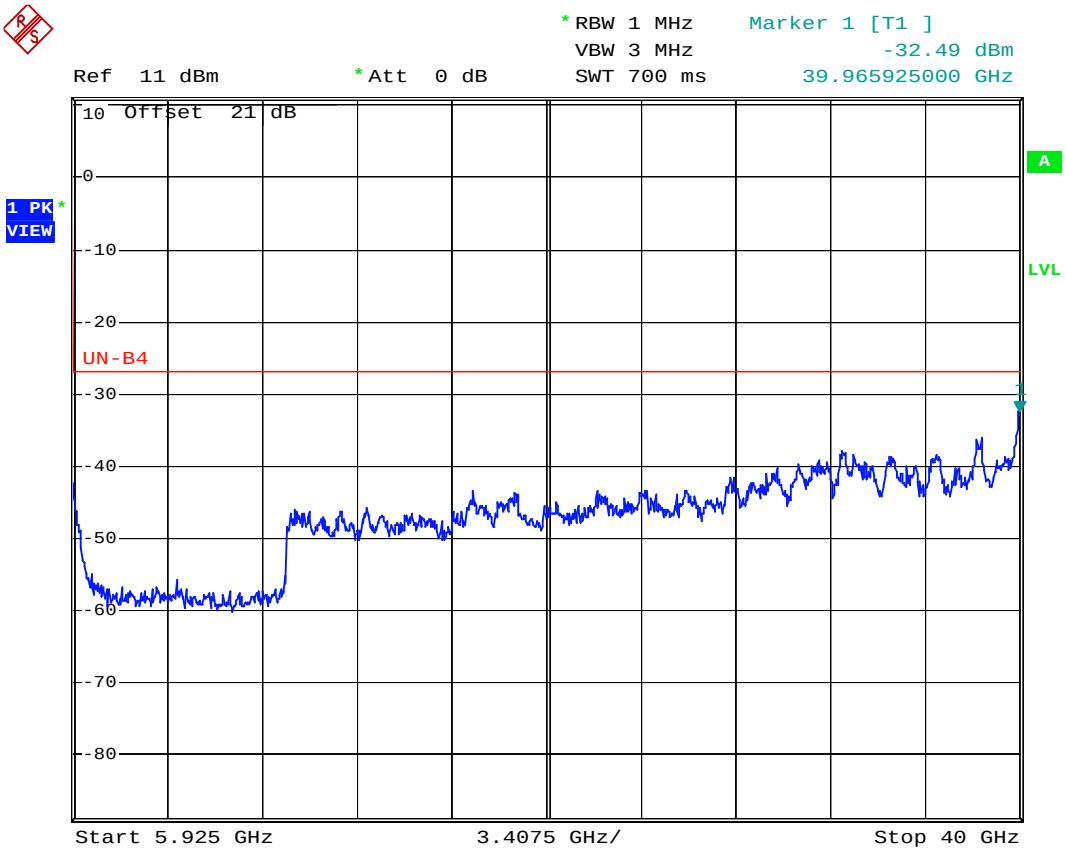
Band 5.725~5.850GHz / Mode: 802.11ac VHT-80 / Channel 30MHz ~ 5.65GHz



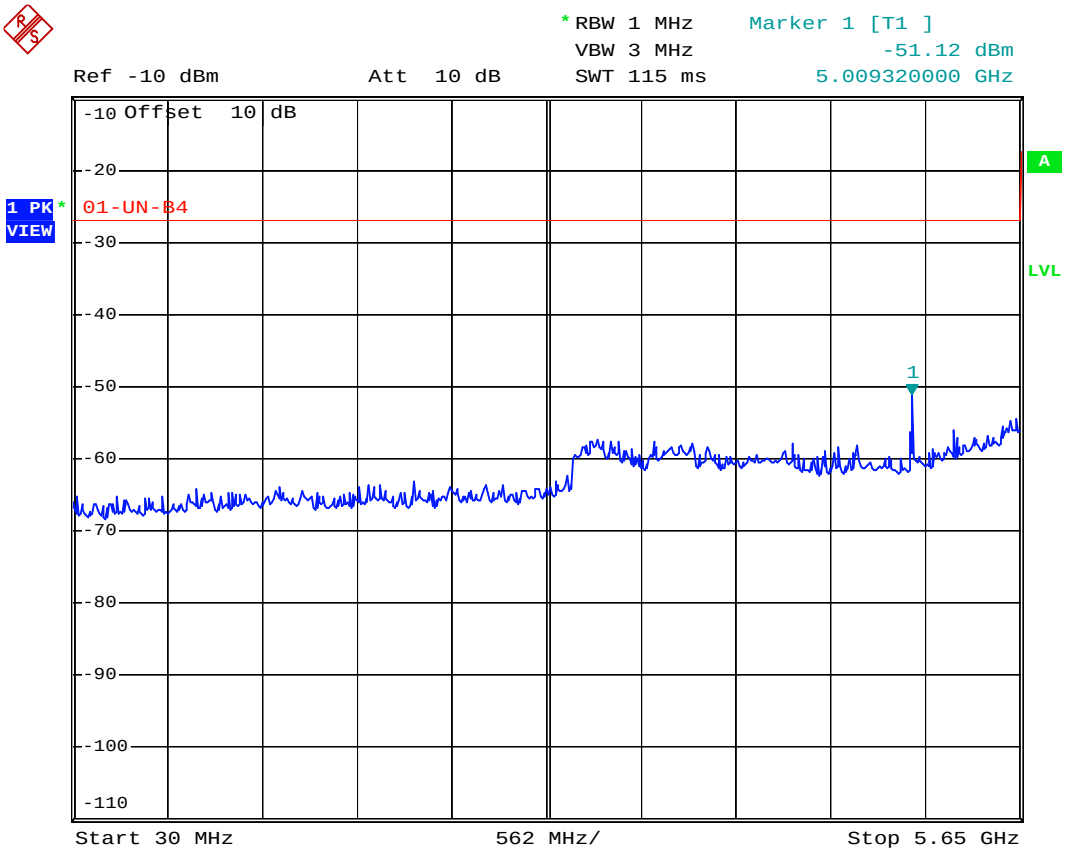
Band 5.725~5.850GHz / Mode: 802.11ac VHT-80 / Channel 5.65GHz~5.925GHz



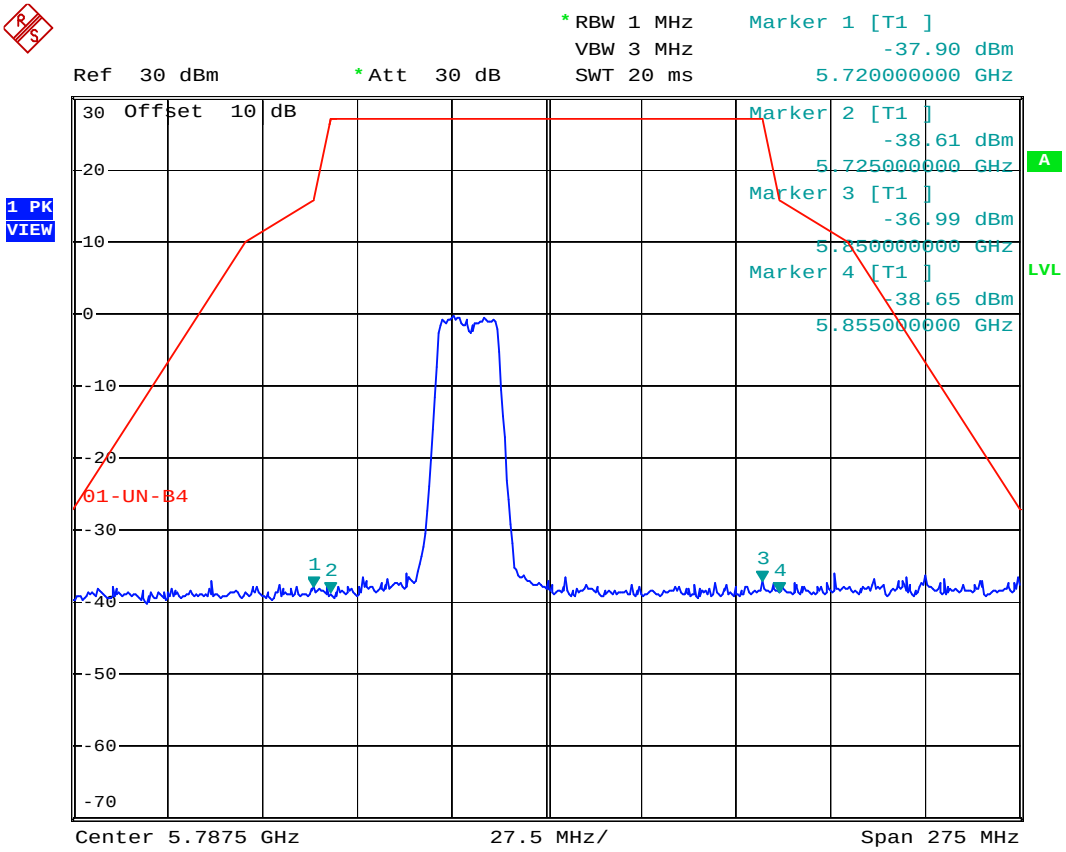
Band 5.725~5.850GHz / Mode: 802.11ac VHT-80 / Channel 5.925GHz ~ 40GHz



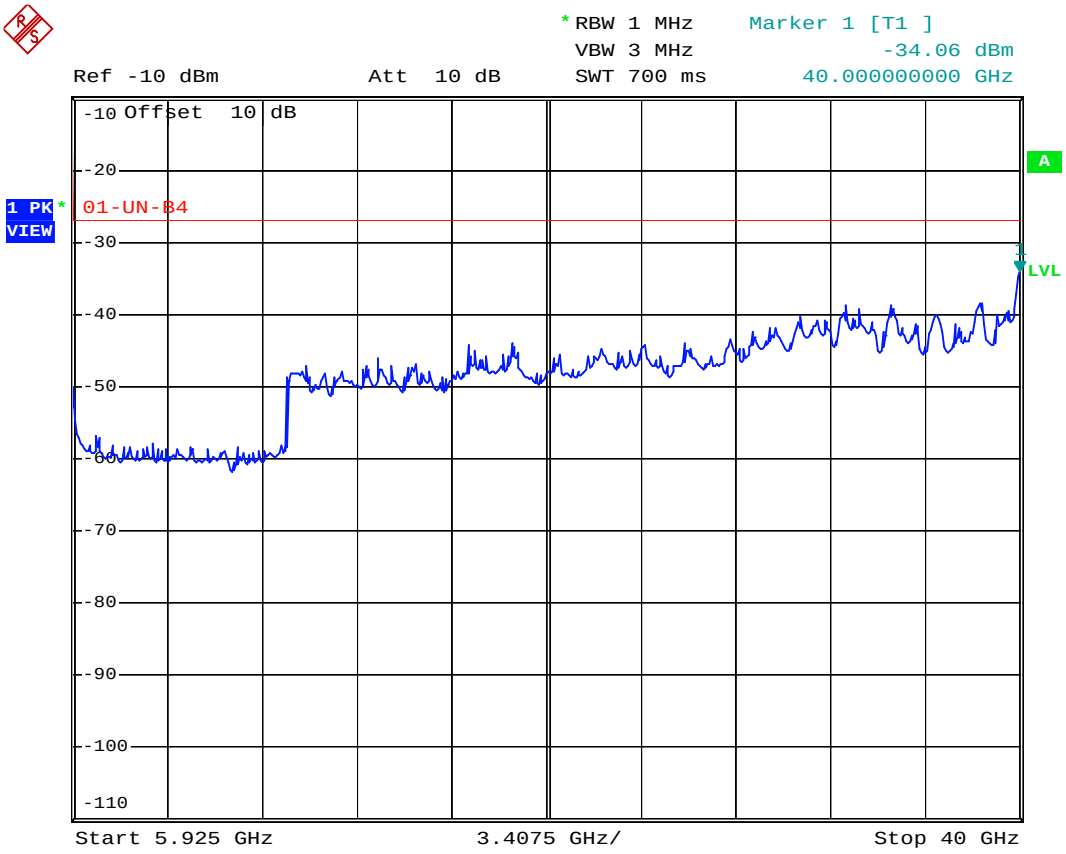
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel Low 30MHz ~ 5.65GHz



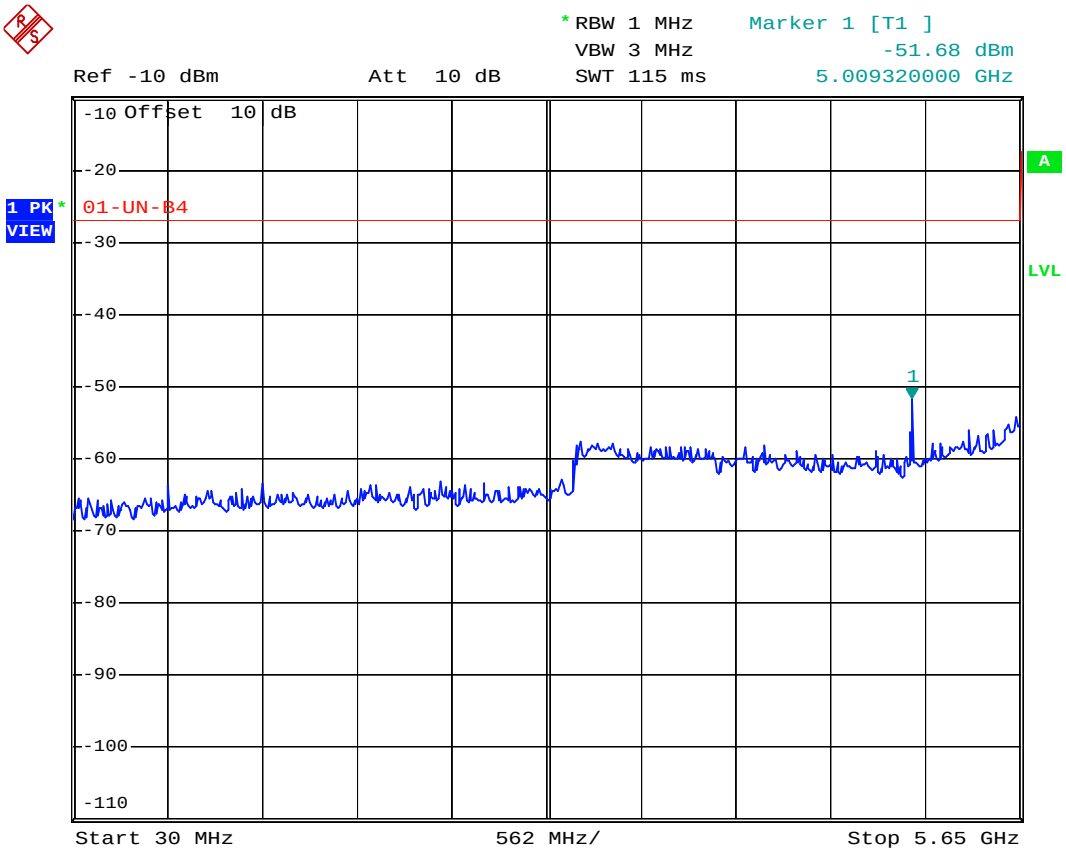
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel Low 5.65GHz~5.925GHz



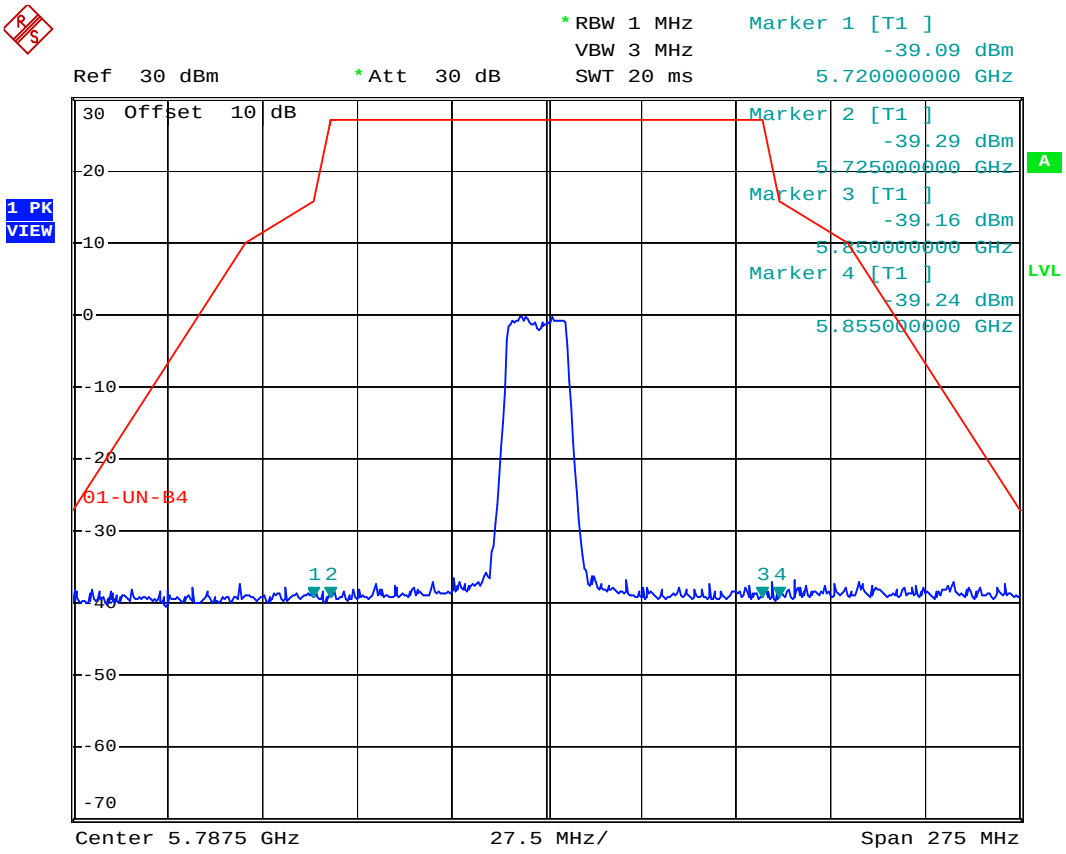
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel Low 5.925GHz ~ 40GHz



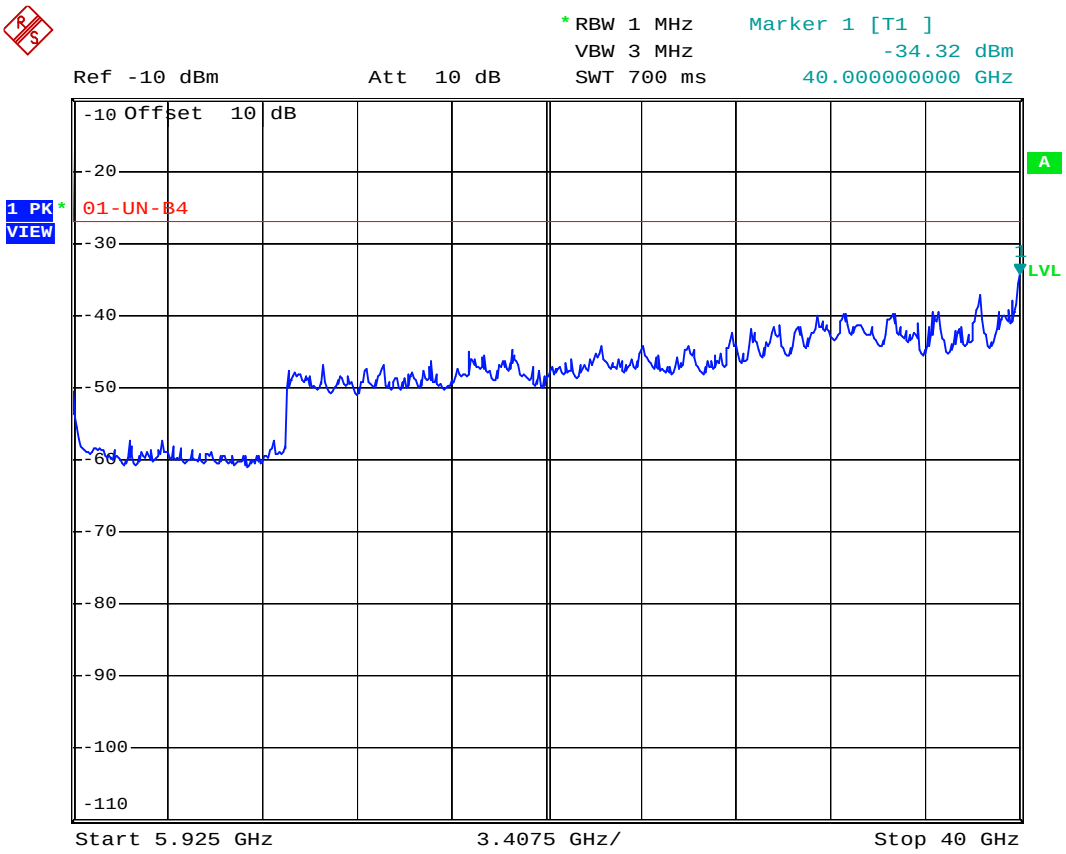
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel Mid 30MHz ~ 5.65GHz



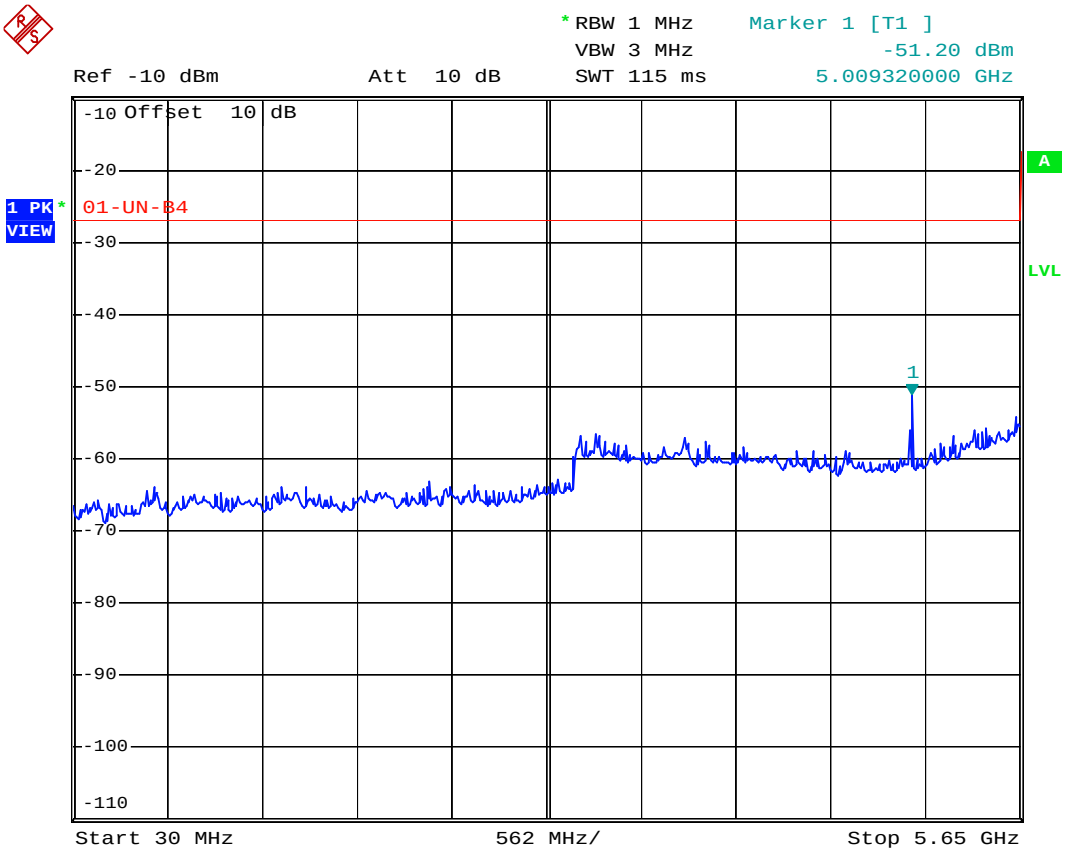
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel Mid 5.65GHz~5.925GHz



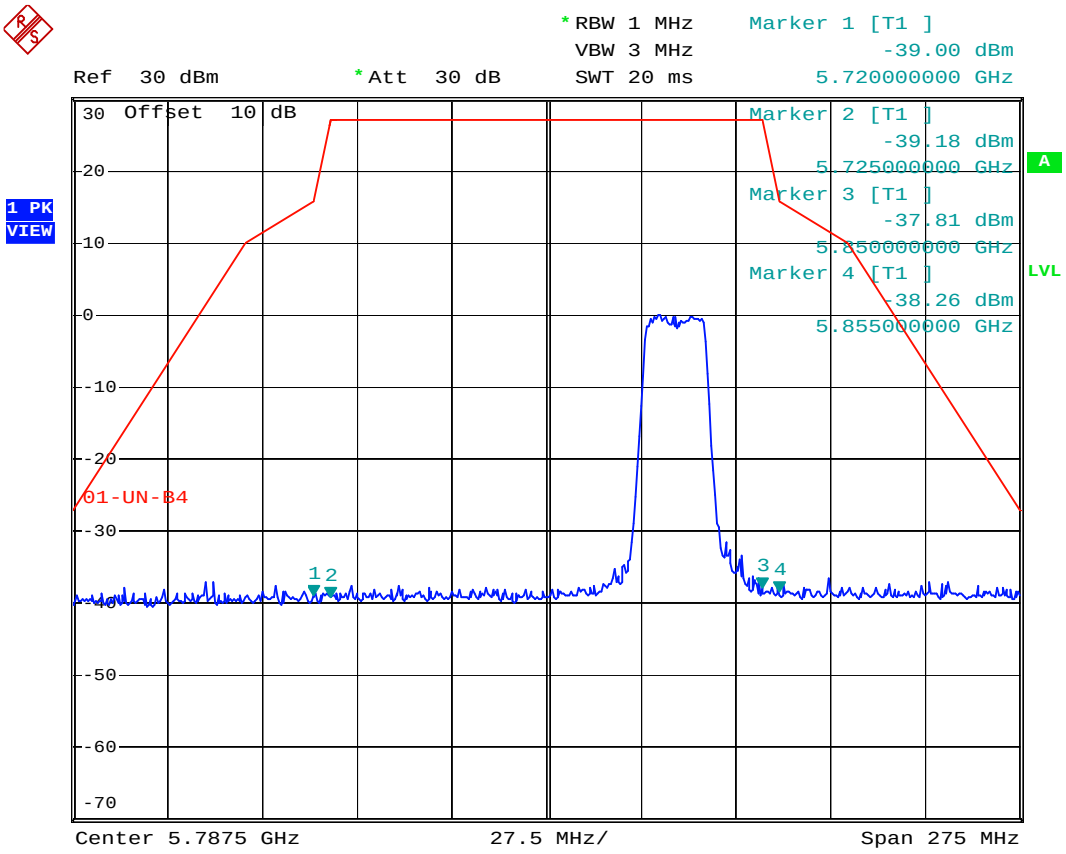
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel Mid 5.925GHz ~ 40GHz



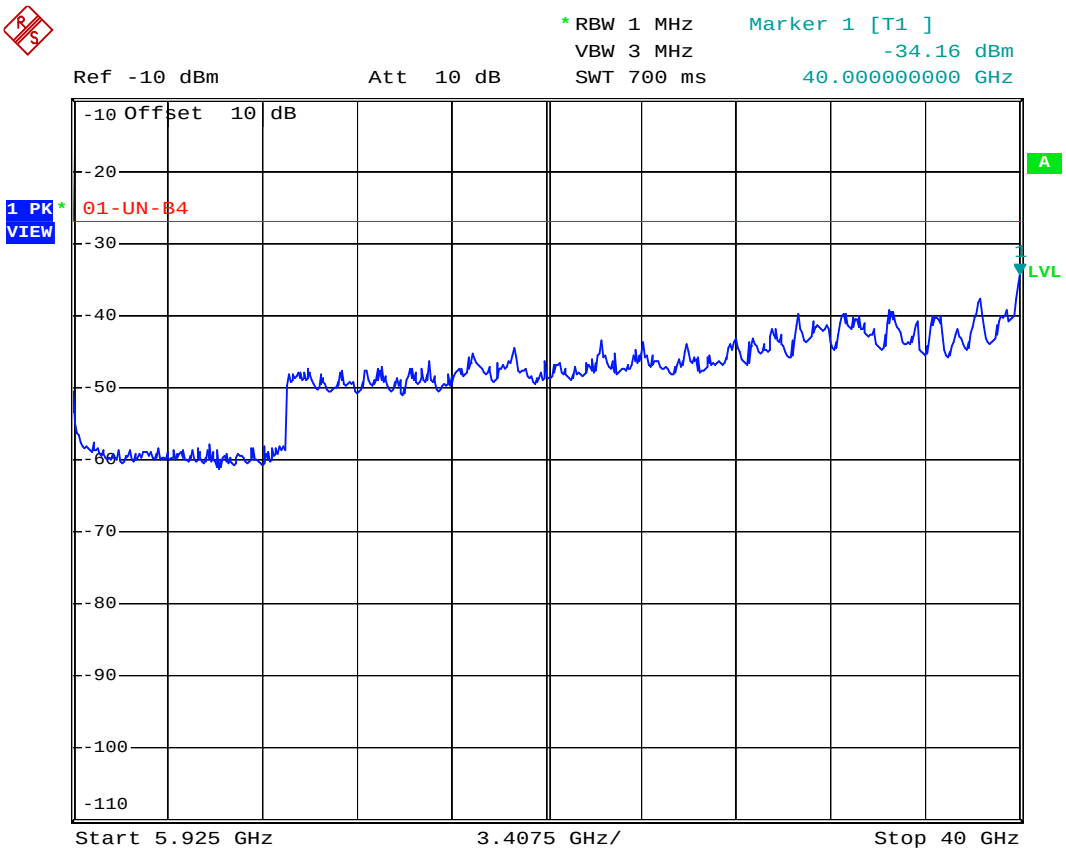
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel High 30MHz ~ 5.65GHz



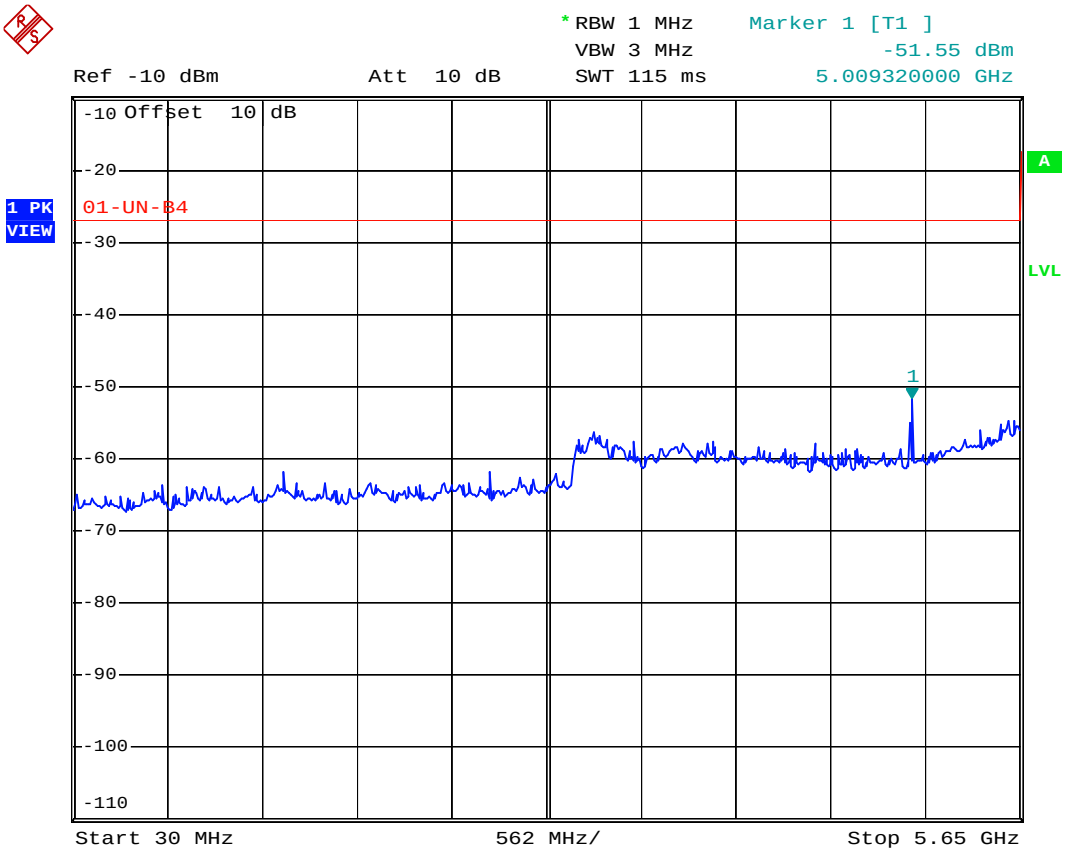
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel High 5.65GHz~5.925GHz



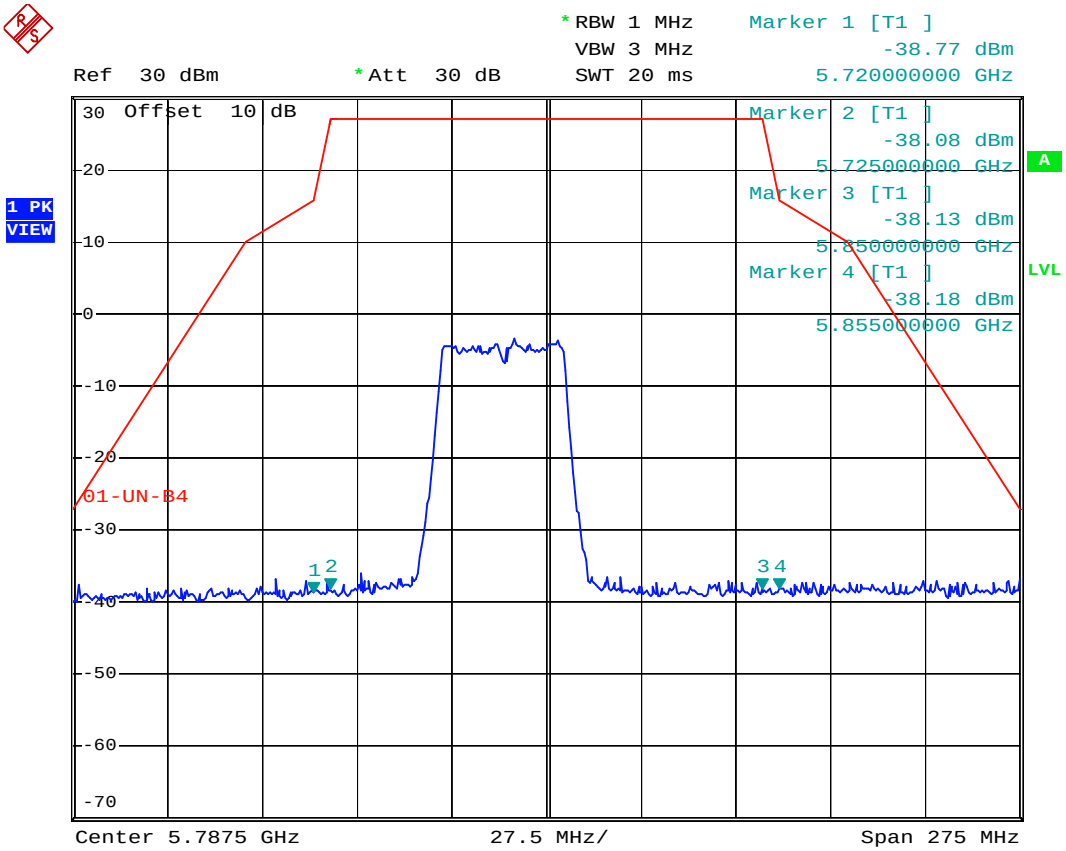
Band 5.725~5.850GHz / Mode: 802.11an HT-20 / Channel High 5.925GHz ~ 40GHz



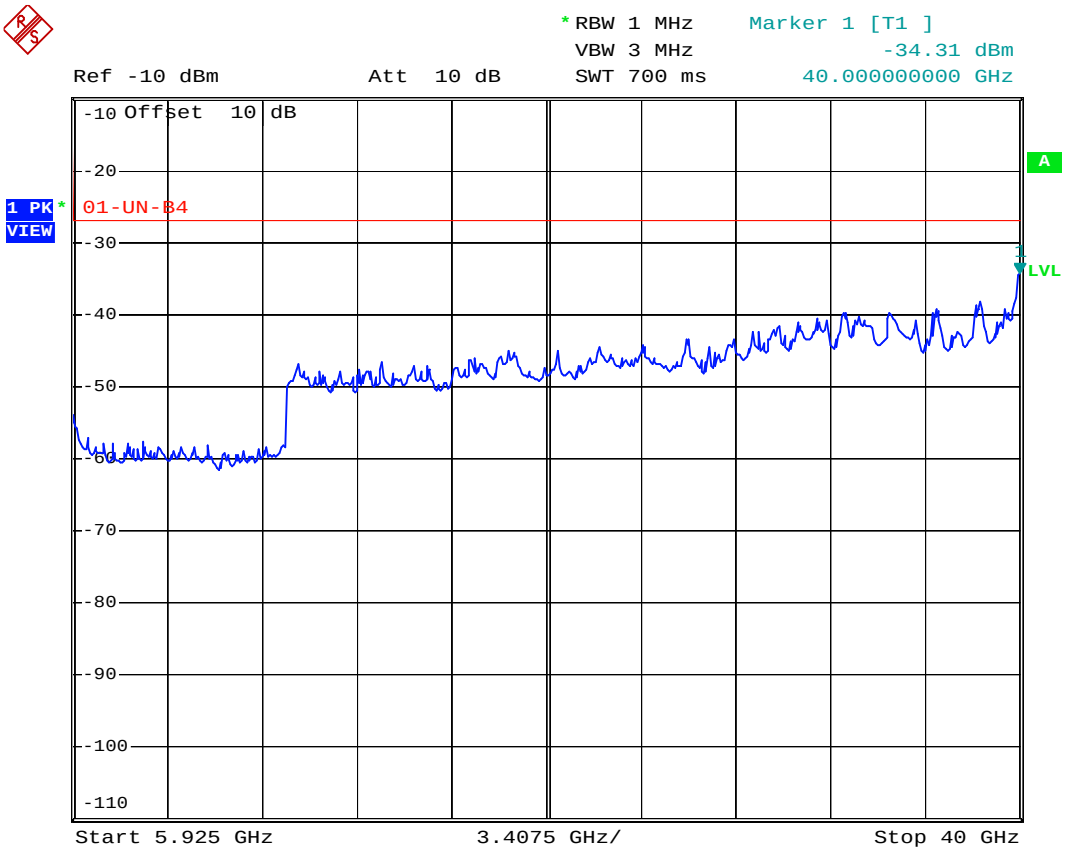
Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel Low 30MHz ~ 5.65GHz



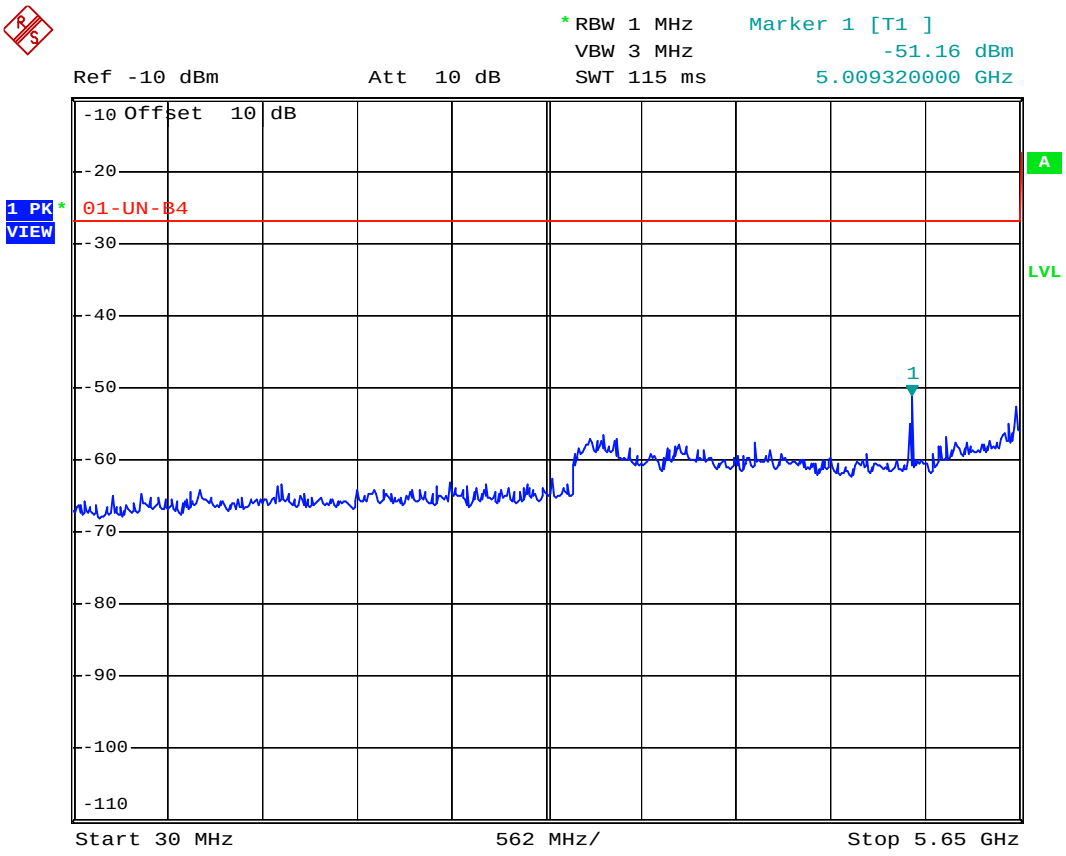
Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel Low 5.65GHz~5.925GHz



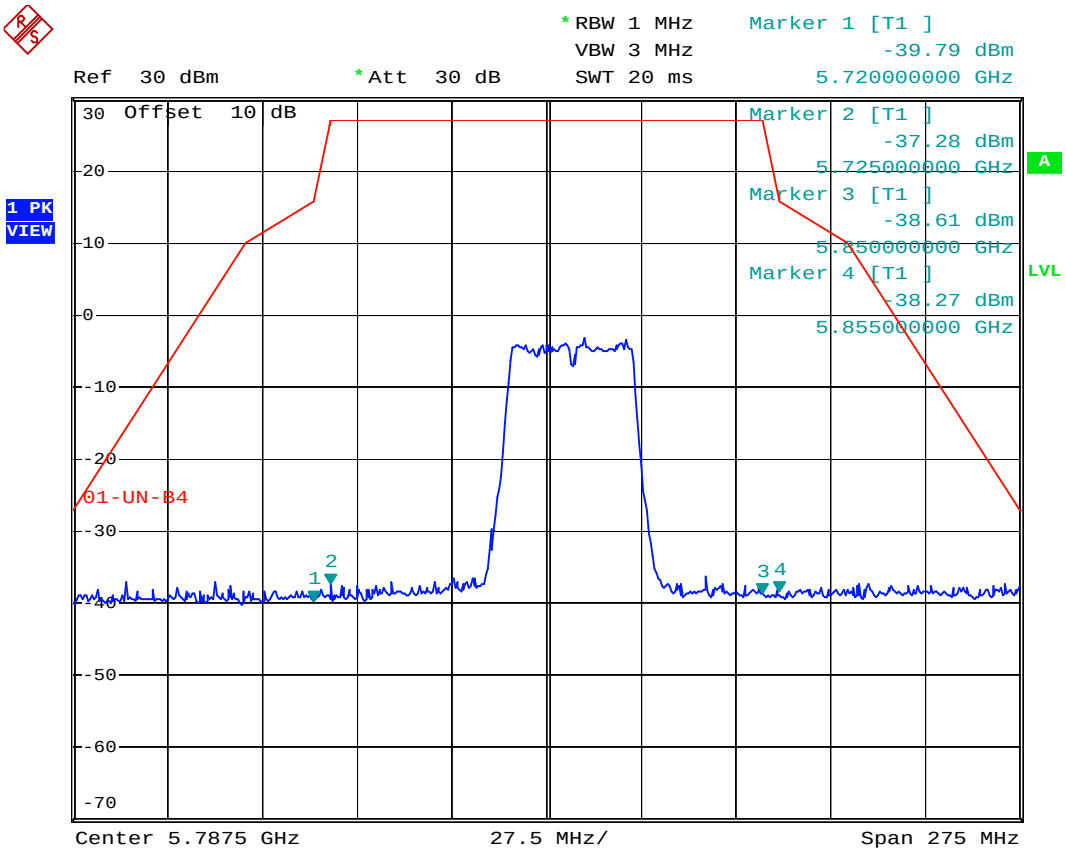
Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel Low 5.925GHz ~ 40GHz



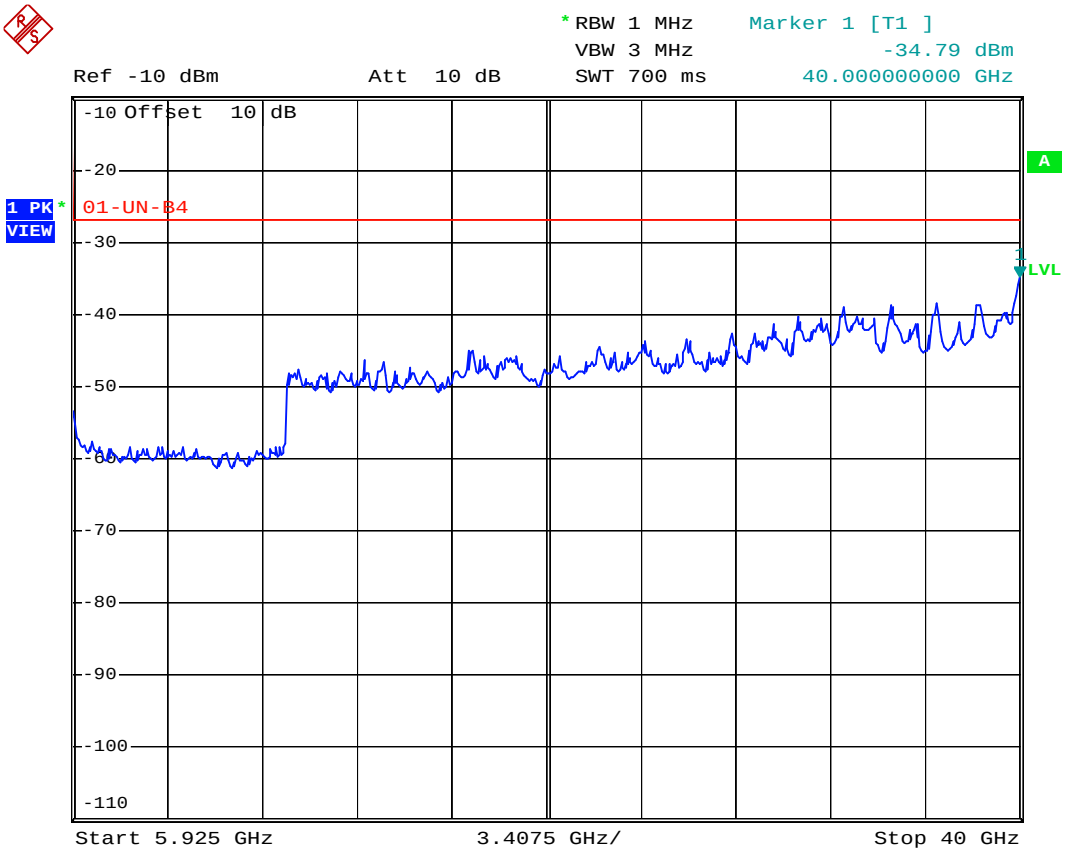
Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel Mid 30MHz ~ 5.65GHz



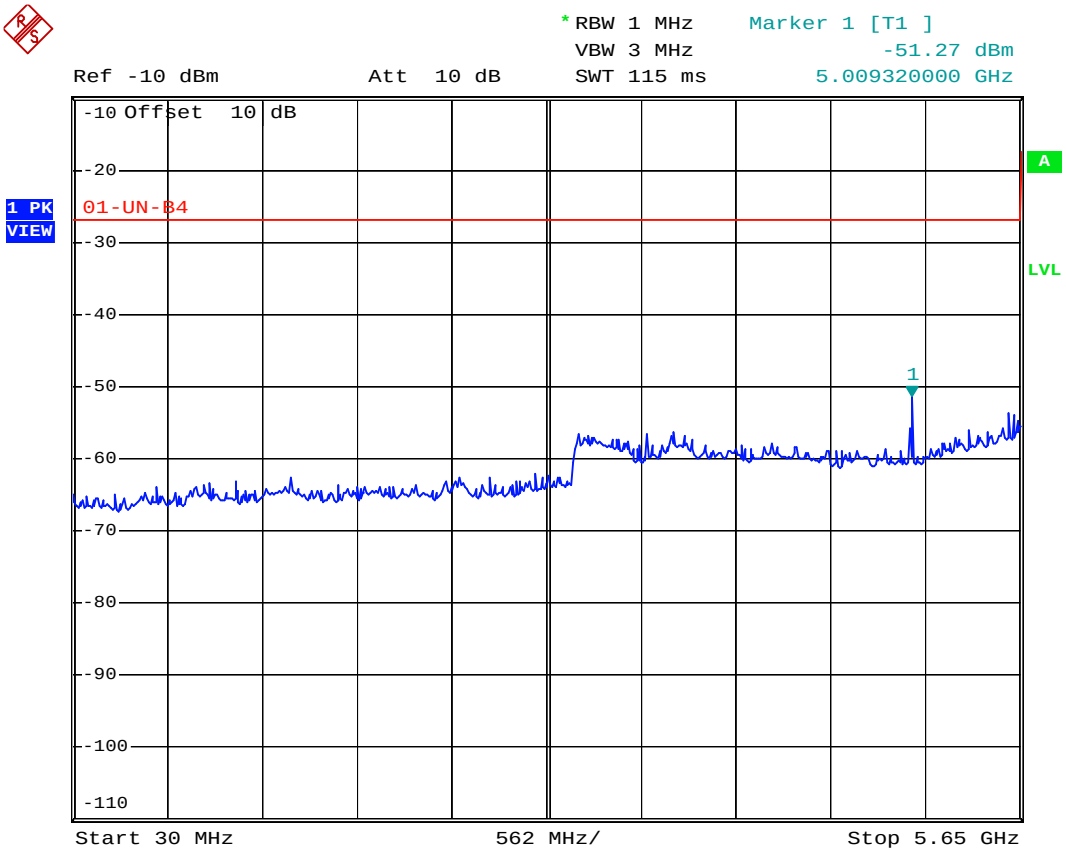
Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel Mid 5.65GHz~5.925GHz



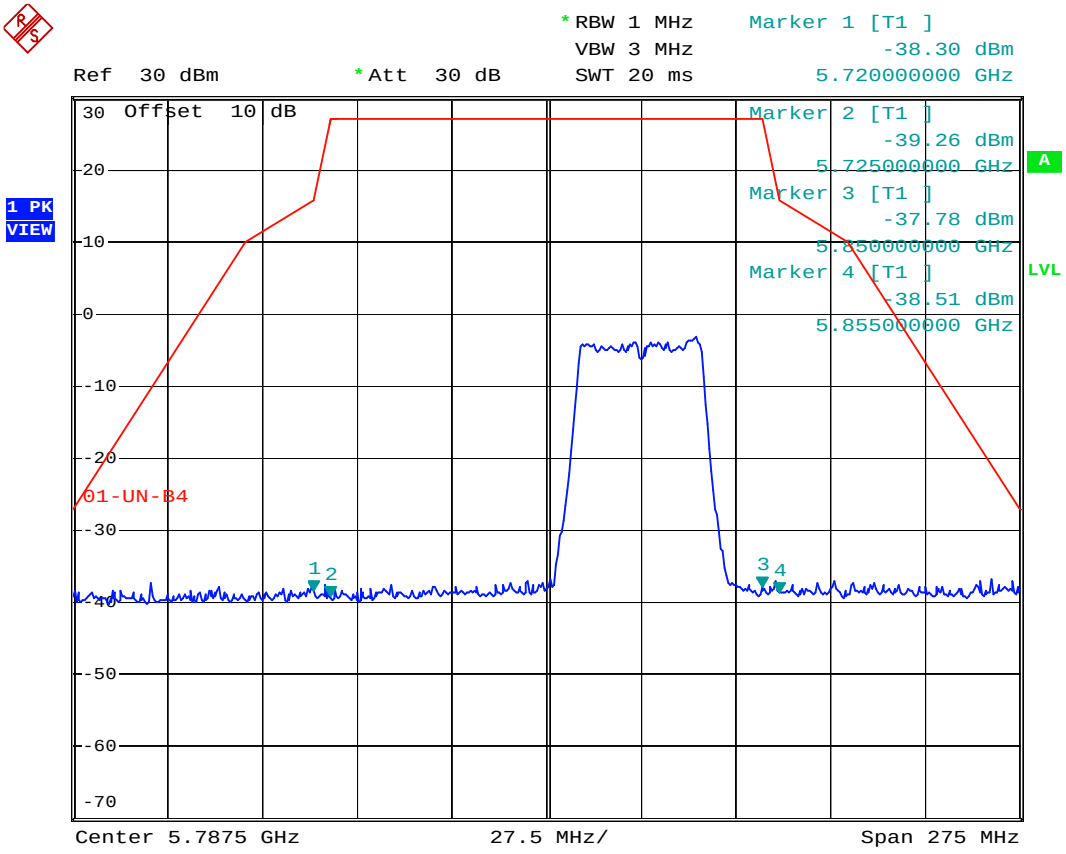
Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel Mid 5.925GHz ~ 40GHz



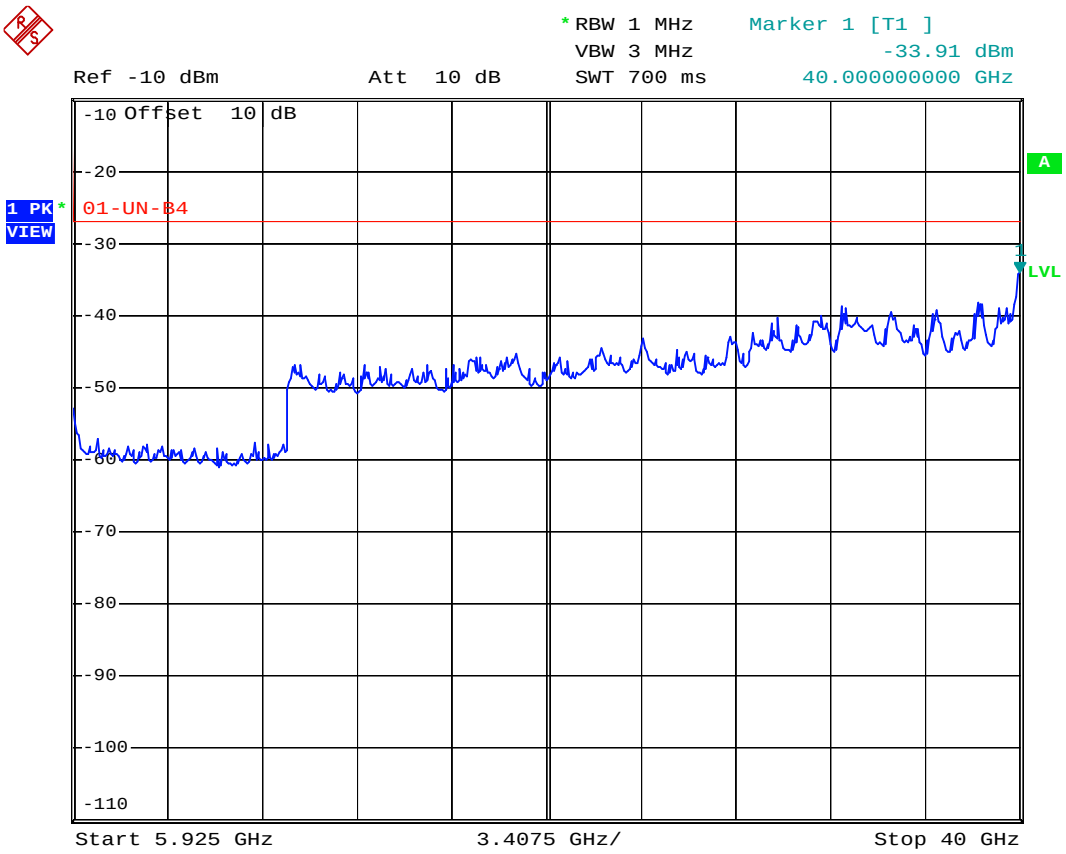
Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel High 30MHz ~ 5.65GHz



Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel High 5.65GHz~5.925GHz



Band 5.725~5.850GHz / Mode: 802.11an HT-40 / Channel High 5.925GHz ~ 40GHz



12. DYTY CYCLE

12.1 Standard Applicable

None. Refereency only.

12.2 Measurement Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/07/06	2017/07/05

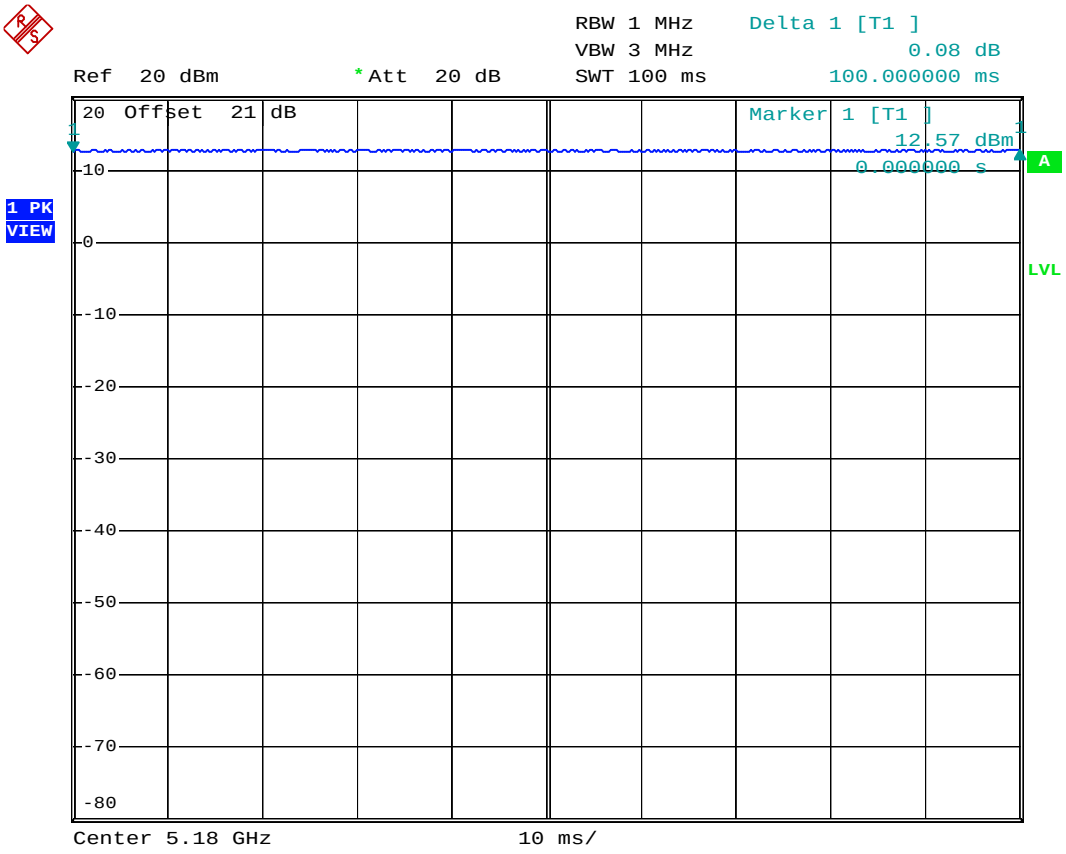
12.3 Measurement Data

Test Date : Aug. 31, 2016 Temperature : 24 °C Humidity : 56 %

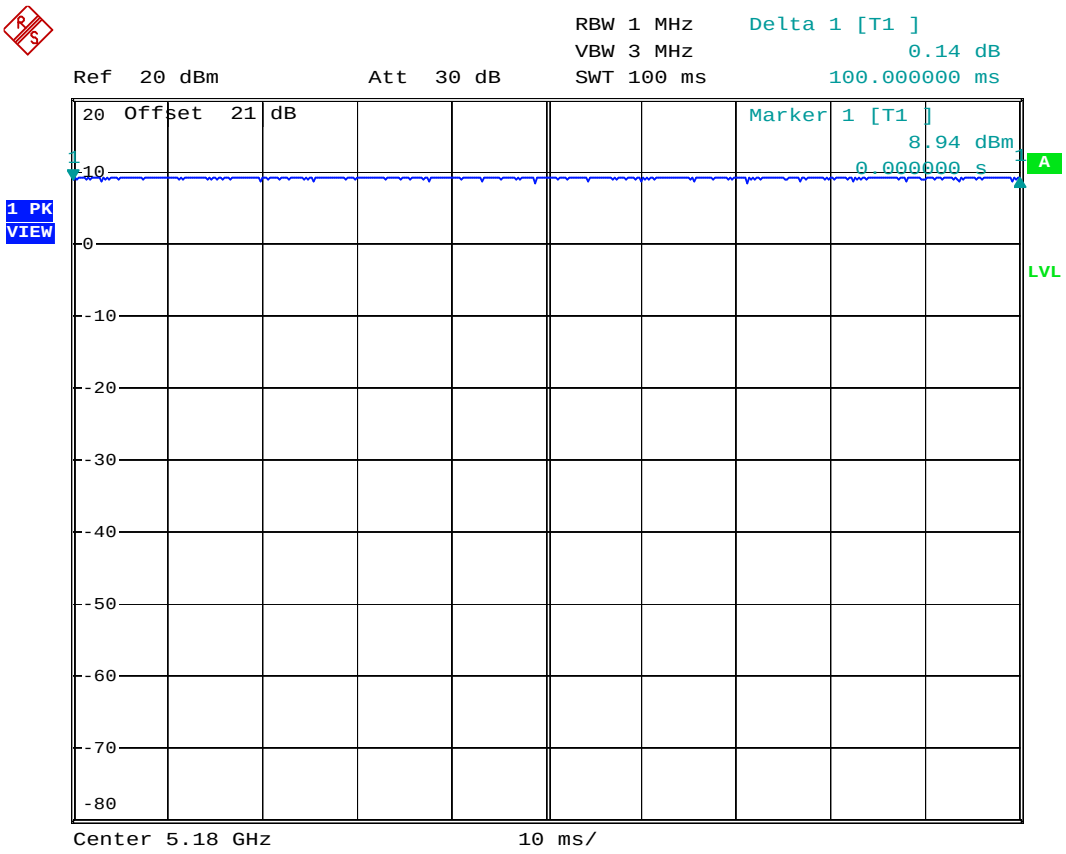
The EUT set for test with the continuous transmission mode and the duty cycle >98%.

Refer to the following page for data plots..

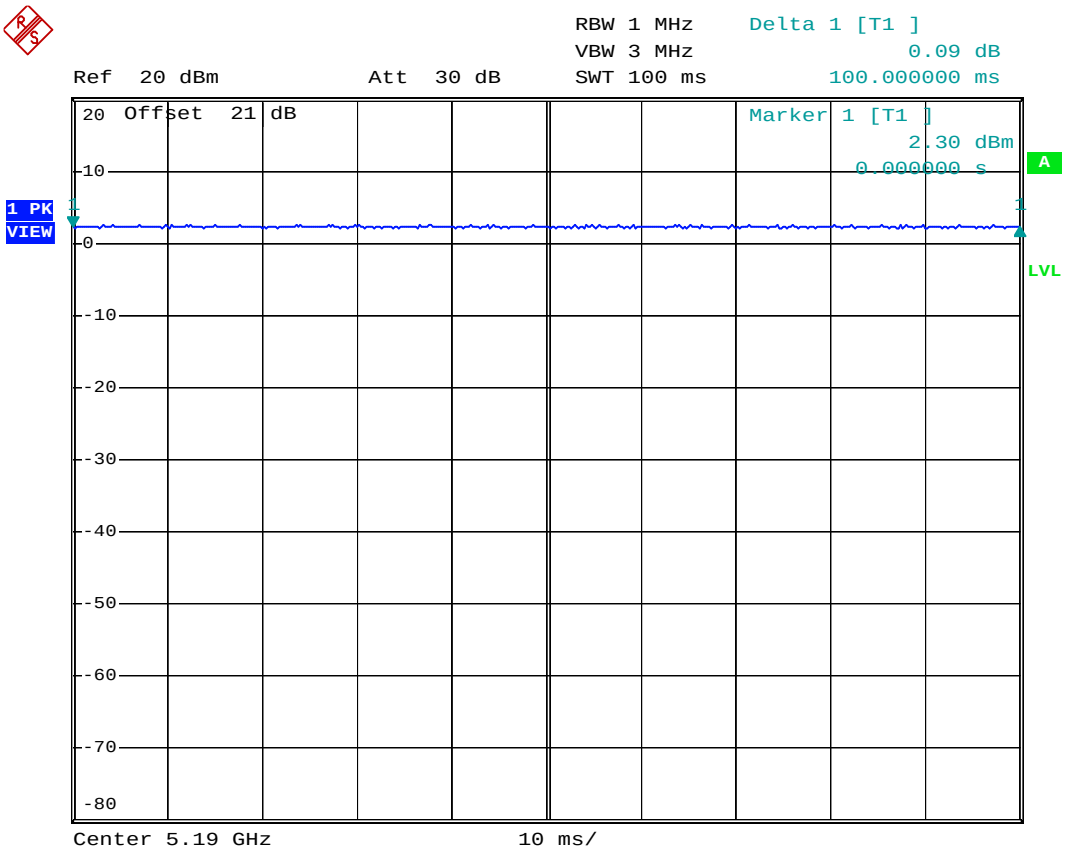
Band 5.15~5.25GHz / Mode: 802.11a



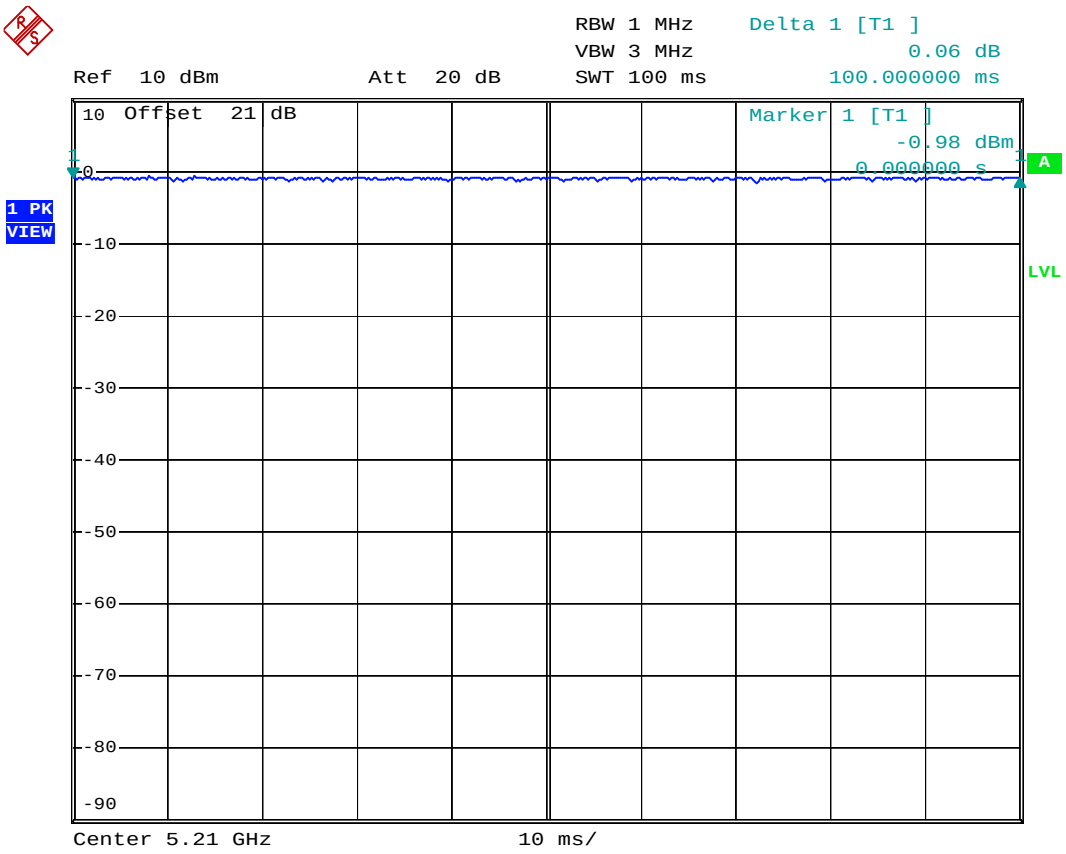
Band 5.15~5.25GHz / Mode: 802.11an HT-20



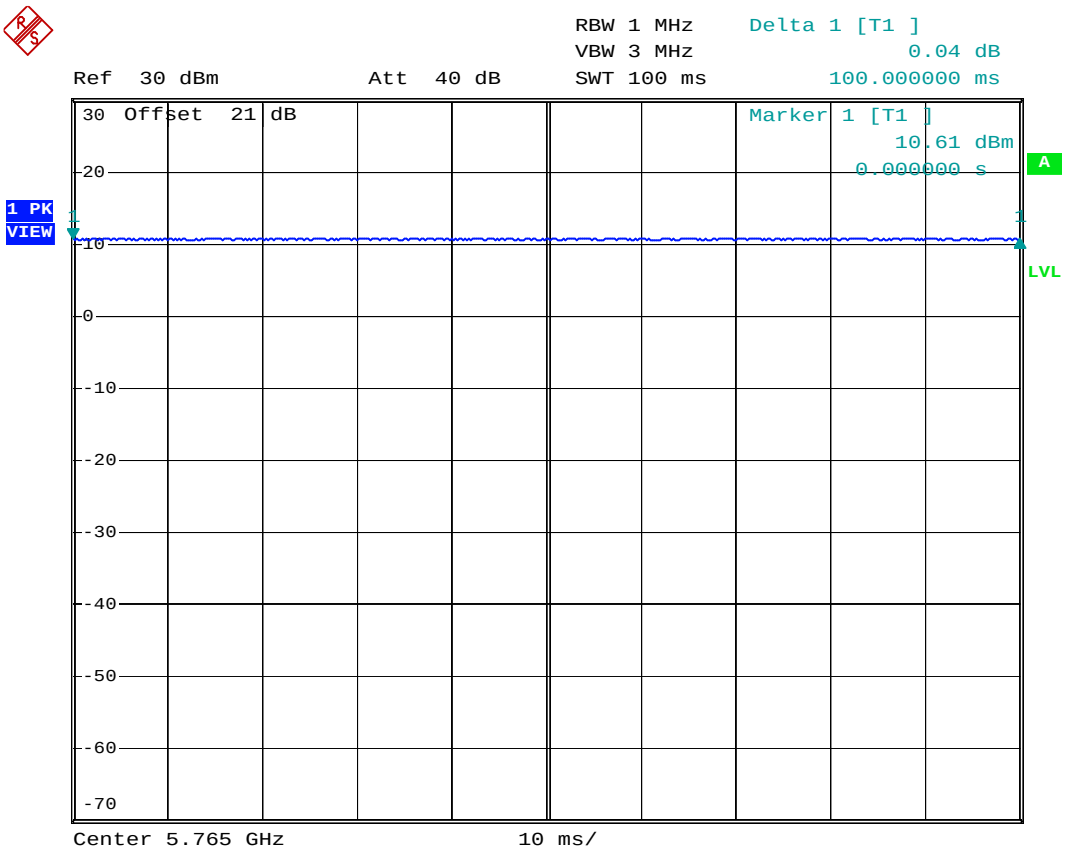
Band 5.15~5.25GHz / Mode: 802.11an HT-40



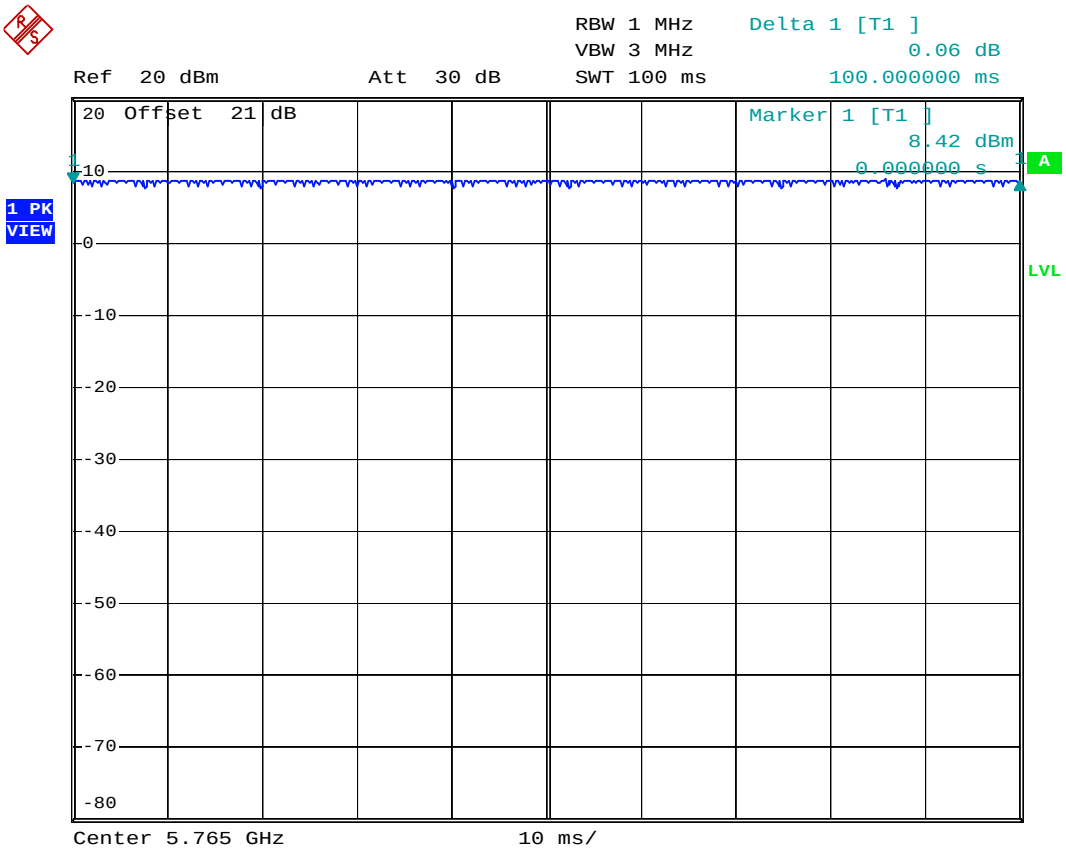
Band 5.15~5.25GHz / Mode: 802.11ac VHT-80



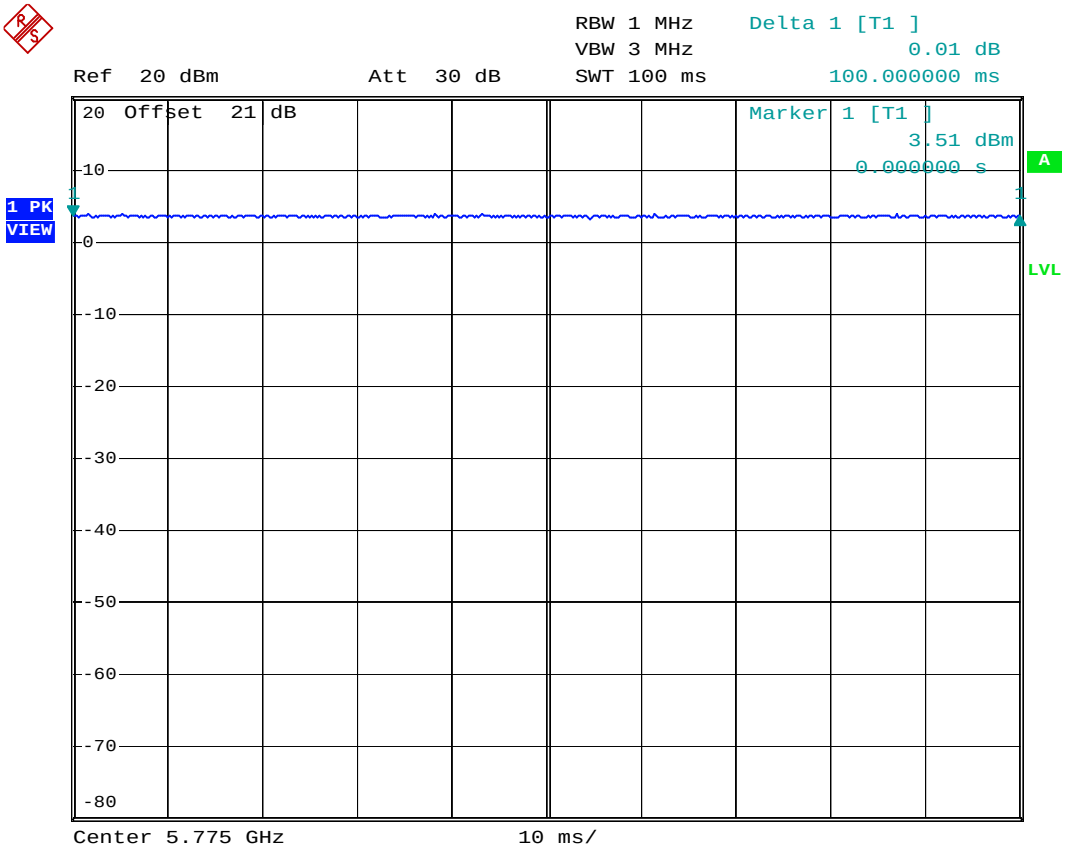
Band 5.725~5.850GHz / Mode: 802.11a



Band 5.725~5.850GHz / Mode: 802.11an HT-20



Band 5.725~5.850GHz / Mode: 802.11an HT-40



Band 5.725~5.850GHz / Mode: 802.11ac VHT-80