

RF TEST REPORT

According to

CFR 47 Part 15 Subpart C

Kind of Product : 10G GEAPON ONU
Model Name : C1004W
FCC ID : TOUC1004W
Applicant : CommScope, Inc. of North Carolina
Manufacturer : ubiquoss Inc.
Date of receipt : 11. 12. 2014
Date of Issue : 11. 28. 2014
Begin of test date : 11. 12. 2014
End of test date : 11. 27. 2014

This report applies only to the product named in the title of this report manufactured at the location indicated.

Test results apply only to the particular equipment and functionality described in this test report.

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This is the result of test that was carried out from the submitted type-samples of a product in conformity with the specification of the respective standards.

Date : 2014.11.28



Tested by Ui-hyun Ryu

Date : 2014.11.28



Reviewed by Seung-jun Oh

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1.0 Summary of test results

The EUT has been tested according to the follow specification:

Description of Test	FCC Rule Parts	Results
Maximum Peak Output Power	15.247(b)(3)	Complies
Peak Power Spectral Density	15.247(e)	Complies
6 dB Channel Bandwidth	15.247(a)(2)	Complies
Spurious Emission, Band Edge, and Restricted bands	15.247(d), 15.205(a), 15.209(a)	Complies
Conducted Emissions	15.207(a)	Complies
Antenna Requirement	15.203	Complies

2.0 Measurement uncertainty.

Where relevant, the following measurement uncertainty level have been estimated for tests performed on the EUT :

PARAMETER	UNCERTAINTY
RF Power	± 1.49 dB
Conducted Emission	± 2.73 dB
Radiated Emission	± 4.00 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

3.0 General Information

3.1 General Description

Information	
Applicant	CommScope, Inc. of North Carolina
Address of Applicant	1100 CommScope Place SE Hickory NC 28602, USA
Manufacturer	ubiquoss Inc.
Address of Manufacturer	68, Pangyo-ro, 255beon-gil, bundang-gu, Seongnam-si, Gyeonggi-do, Korea
Kind of Product	10G GEAPON ONU
Model Name	C1004W
Serial no.	N/A

3.2 Product Type

EUT description	
Wireless Connections	IEEE 802.11ac as well as b/g/n(at 2.4 GHz : b/g/n, at 5 GHz ac)
10G PON Uplink	Optical port for upstream transmission
LAN1-LAN4	Gigabit Internet Ports(RJ-45)
USB	used for downloading the updated system image
Power	DC 12 V / 3A
Physical dimension and weight	255.5(W) x 190.2(D) x 52.5(H) / 730 g

*For more detail specification, please refer to User's Manual of EUT

3.3 Test Frequency and Voltage

For all test items, the low, middle and high channels of the modes were tested with below data rate.

802.11b/g/n_HT20	
Low Frequency	2412 MHz
Middle Frequency	2437 MHz
High Frequency	2462 MHz
802.11n_HT40	
Low Frequency	2422 MHz
Middle Frequency	2437 MHz
High Frequency	2452 MHz
Voltage	
Nominal voltage	DC 12 V

Data Rate

Test Mode	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n_HT20_SISO	MCS0
802.11n_HT40_SISO	MCS0
802.11n_HT20_MIMO(2x2)	MCS8
802.11n_HT40_MIMO(2x2)	MCS8
802.11n_HT20_MIMO(3x3)	MCS16
802.11n_HT40_MIMO(3x3)	MCS16

3.4 Test Laboratory Information

Address

GSTL Co., Ltd.

#89-5, Gyeongchung-daero 3233beon-gil, Sindun-myeon, Icheon-si, Gyeonggi-do, Korea

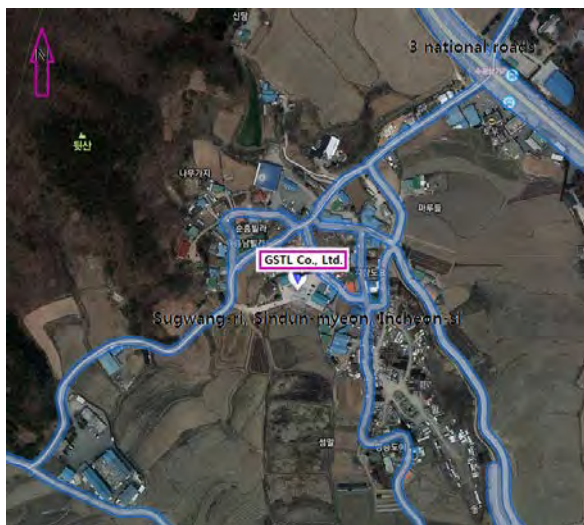
Tel : +82-31-634-1800

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Certificate

- MSIP Registration No. : KR0146
- FCC MRA Registration No. : 273444
- TUV SUD Ohtama Radio Test Lab No. : H240604_K008

Location



4.0 Test results

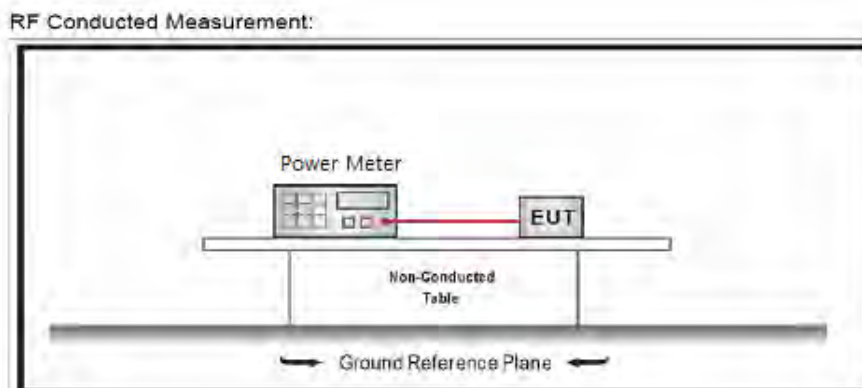
4.1 Maximum Peak Output Power

4.1.1 Test Limit

According to §15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2 400-2 483.5 MHz, and 5 725-5 850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

According to §15.247(b)(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.1.2 Test Configuration



4.1.3 Test Procedure

1. The transmitter output is connected to the Power meter
2. These test measurement setting are specified in section 9.0 of 558074 D01 DTS Meas Guidance.
3. For MIMO mode, the output power is calculated according to KDB 662911 D01 Multiple Transmitter Output v02r01.

4.1.4 Test Result and Data

SISO(Single Input Single Output)

802.11b_Ant0

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	20.45	30	Pass
06	2437	20.53	30	Pass
11	2462	20.36	30	Pass

802.11b_Ant1

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	20.40	30	Pass
06	2437	20.64	30	Pass
11	2462	20.22	30	Pass

802.11b_Ant2

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	20.29	30	Pass
06	2437	20.14	30	Pass
11	2462	20.03	30	Pass

802.11g_Ant0

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	18.71	30	Pass
06	2437	18.80	30	Pass
11	2462	18.67	30	Pass

802.11g_Ant1

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	18.73	30	Pass
06	2437	18.68	30	Pass
11	2462	18.57	30	Pass

802.11g_Ant2

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	18.40	30	Pass
06	2437	18.37	30	Pass
11	2462	18.21	30	Pass

802.11n_HT20_Ant0

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	18.47	30	Pass
06	2437	18.14	30	Pass
11	2462	18.19	30	Pass

802.11n_HT20_Ant1

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	18.12	30	Pass
06	2437	18.15	30	Pass
11	2462	18.07	30	Pass

802.11n_HT20_Ant2

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	18.23	30	Pass
06	2437	18.19	30	Pass
11	2462	18.04	30	Pass

802.11n_HT40_Ant0

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
03	2422	16.70	30	Pass
06	2437	16.61	30	Pass
09	2452	16.53	30	Pass

802.11n_HT40_Ant1

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
03	2422	16.59	30	Pass
06	2437	16.69	30	Pass
09	2452	16.56	30	Pass

802.11n_HT40_Ant2

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
03	2422	16.34	30	Pass
06	2437	16.42	30	Pass
09	2452	16.27	30	Pass

MIMO(Multi Input Multi Output)

802.11n_HT20_Ant0 + Ant1

Channel	Frequency (MHz)	Measurement (dBm)		Limit (dBm)	Result
		Ant0	Ant1		
01	2412	17.42	17.28	Please refer to 4.1.3 Clause 3 for MIMO power calculation method.	
06	2437	17.59	17.15		
11	2462	17.18	17.03		
Measured Power Summing(Ant0+Ant1)					
01	2412	20.36		30	Pass
06	2437	20.39		30	Pass
11	2462	20.12		30	Pass

802.11n_HT20_Ant0 + Ant2

Channel	Frequency (MHz)	Measurement (dBm)		Limit (dBm)	Result
		Ant0	Ant2		
01	2412	17.62	17.15	Please refer to 4.1.3 Clause 3 for MIMO power calculation method.	
06	2437	17.56	17.12		
11	2462	17.22	17.03		
Measured Power Summing(Ant0+Ant2)					
01	2412	20.40		30	Pass
06	2437	20.36		30	Pass
11	2462	20.14		30	Pass

802.11n_HT20_Ant1 + Ant2

Channel	Frequency (MHz)	Measurement (dBm)		Limit (dBm)	Result
		Ant1	Ant2		
01	2412	17.29	17.15	Please refer to 4.1.3 Clause 3 for MIMO power calculation method.	
06	2437	17.07	17.01		
11	2462	17.02	16.98		
Measured Power Summing(Ant1+Ant2)					
01	2412	20.23		30	Pass
06	2437	20.05		30	Pass
11	2462	20.01		30	Pass

802.11n_HT40_Ant0 + Ant1

Channel	Frequency (MHz)	Measurement (dBm)		Limit (dBm)	Result
		Ant0	Ant1		
03	2422	15.81	15.36	Please refer to 4.1.3 Clause 3 for MIMO power calculation method.	
06	2437	15.68	15.31		
09	2452	15.39	15.38		
Measured Power Summing(Ant0+Ant1)					
03	2422	18.60		30	Pass
06	2437	18.51		30	Pass
09	2452	18.40		30	Pass

802.11n_HT40_Ant0 + Ant2

Channel	Frequency (MHz)	Measurement (dBm)		Limit (dBm)	Result
		Ant0	Ant2		
03	2422	15.75	15.47	Please refer to 4.1.3 Clause 3 for MIMO power calculation method.	
06	2437	15.71	15.37		
09	2452	15.64	15.32		
Measured Power Summing(Ant0+Ant2)					
03	2422	18.62		30	Pass
06	2437	18.55		30	Pass
09	2452	18.49		30	Pass

802.11n_HT40_Ant1 + Ant2

Channel	Frequency (MHz)	Measurement (dBm)		Limit (dBm)	Result
		Ant1	Ant2		
03	2422	15.50	15.51	Please refer to 4.1.3 Clause 3 for MIMO power calculation method.	
06	2437	15.65	15.71		
09	2452	15.75	15.49		
Measured Power Summing(Ant1+Ant2)					
03	2422	18.52		30	Pass
06	2437	18.69		30	Pass
09	2452	18.63		30	Pass

802.11n_HT20_Ant0+Ant1 + Ant2

Channel	Frequency (MHz)	Measurement (dBm)			Limit (dBm)	Result
		Ant0	Ant1	Ant2		
01	2412	17.09	17.19	16.84	Please refer to 4.1.3 Clause 3 for MIMO power calculation method.	
06	2437	17.11	17.17	16.77		
11	2462	16.93	17.02	16.76		
Measured Power Summing(Ant0+Ant1+Ant2)						
01	2412	21.81			30	Pass
06	2437	21.79			30	Pass
11	2462	21.68			30	Pass

802.11n_HT40_Ant0+Ant1 + Ant2

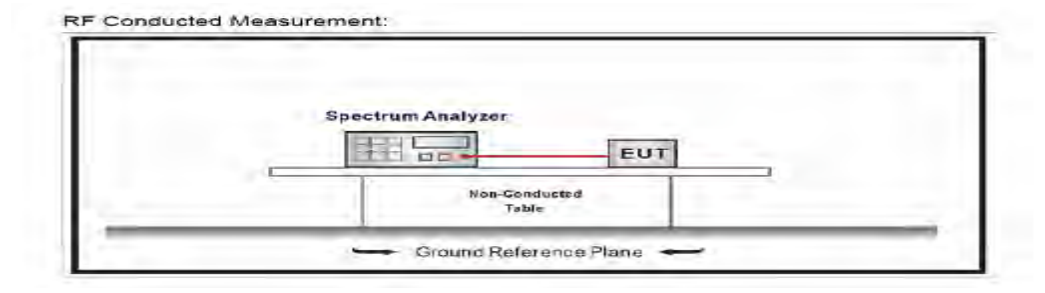
Channel	Frequency (MHz)	Measurement (dBm)			Limit (dBm)	Result
		Ant0	Ant1	Ant2		
03	2422	14.64	14.41	14.29	Please refer to 4.1.3 Clause 3 for MIMO power calculation method.	
06	2437	14.70	14.32	14.26		
09	2452	14.63	14.20	14.17		
Measured Power Summing(Ant0+Ant1+Ant2)						
03	2422	19.22			30	Pass
06	2437	19.20			30	Pass
09	2452	19.15			30	Pass

4.2 6dB Bandwidth

4.2.1 Test Limit

The minimum 6dB bandwidth shall be at least 500 KHz.

4.2.2 Test Configuration



4.2.3 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operation range. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 100 KHz RBW and VBW of $\geq 3 \times \text{RBW}$.
4. Measure the captured power within the band and recording the plot.
5. Repeat above procedures until all frequencies required were complete.

4.2.4 Test Result and Data

SISO(Single Input Single Output)

802.11b_Ant0

Channel	Frequency (MHz)	Measurement (KHz)	Limit (KHz)	Result
01	2412	8560	500	Pass
06	2437	8560	500	Pass
11	2462	8960	500	Pass

802.11b_Ant1

Channel	Frequency (MHz)	Measurement (KHz)	Limit (KHz)	Result
01	2412	8640	500	Pass
06	2437	8560	500	Pass
11	2462	8560	500	Pass

802.11b_Ant2

Channel	Frequency (MHz)	Measurement (KHz)	Limit (KHz)	Result
01	2412	8960	500	Pass
06	2437	8960	500	Pass
11	2462	9040	500	Pass

802.11g_Ant0

Channel	Frequency (MHz)	Measurement (KHz)	Limit (KHz)	Result
01	2412	16480	500	Pass
06	2437	16480	500	Pass
11	2462	16480	500	Pass

802.11g_Ant1

Channel	Frequency (MHz)	Measurement (KHz)	Limit (KHz)	Result
01	2412	16480	500	Pass
06	2437	16480	500	Pass
11	2462	16480	500	Pass

802.11g_Ant2

Channel	Frequency (MHz)	Measurement (KHz)	Limit (KHz)	Result
01	2412	16480	500	Pass
06	2437	16400	500	Pass
11	2462	16480	500	Pass

802.11n_HT20_Ant0

Channel	Frequency (MHz)	Measurement (KHz)	Limit (KHz)	Result
01	2412	17680	500	Pass
06	2437	17680	500	Pass
11	2462	17680	500	Pass

802.11n_HT20_Ant1

Channel	Frequency (MHz)	Measurement (KHz)	Limit (KHz)	Result
01	2412	17600	500	Pass
06	2437	17600	500	Pass
11	2462	17680	500	Pass

802.11n_HT20_Ant2

Channel	Frequency (MHz)	Measurement (KHz)	Limit (KHz)	Result
01	2412	17600	500	Pass
06	2437	17680	500	Pass
11	2462	17680	500	Pass

802.11n_HT40_Ant0

Channel	Frequency (MHz)	Measurement (KHz)	Limit (KHz)	Result
03	2422	36200	500	Pass
06	2437	36000	500	Pass
09	2452	36600	500	Pass

802.11n_HT40_Ant1

Channel	Frequency (MHz)	Measurement (KHz)	Limit (KHz)	Result
03	2422	36000	500	Pass
06	2437	36200	500	Pass
09	2452	36400	500	Pass

802.11n_HT40_Ant2

Channel	Frequency (MHz)	Measurement (KHz)	Limit (KHz)	Result
03	2422	36200	500	Pass
06	2437	36200	500	Pass
09	2452	36600	500	Pass

MIMO(Multi Input Multi Output)

802.11n_HT20_Ant0 + Ant1

Channel	Frequency (MHz)	Measurement (KHz)		Limit (KHz)	Result
		Ant0	Ant1		
01	2412	17680	16400	500	Pass
06	2437	17600	16560	500	Pass
11	2462	17400	16560	500	Pass

802.11n_HT20_Ant0 + Ant2

Channel	Frequency (MHz)	Measurement (KHz)		Limit (KHz)	Result
		Ant0	Ant2		
01	2412	17600	16320	500	Pass
06	2437	17680	16400	500	Pass
11	2462	17680	16560	500	Pass

802.11n_HT20_Ant1 + Ant2

Channel	Frequency (MHz)	Measurement (KHz)		Limit (KHz)	Result
		Ant1	Ant2		
01	2412	16080	16320	500	Pass
06	2437	16240	16400	500	Pass
11	2462	16560	16560	500	Pass

802.11n_HT40_Ant0 + Ant1

Channel	Frequency (MHz)	Measurement (KHz)		Limit (KHz)	Result
		Ant0	Ant1		
03	2422	36000	36000	500	Pass
06	2437	36400	36200	500	Pass
09	2452	36400	36400	500	Pass

802.11n_HT40_Ant0 + Ant2

Channel	Frequency (MHz)	Measurement (KHz)		Limit (KHz)	Result
		Ant0	Ant2		
03	2422	36000	36000	500	Pass
06	2437	36400	36400	500	Pass
09	2452	36400	36400	500	Pass

802.11n_HT40_Ant1 + Ant2

Channel	Frequency (MHz)	Measurement (KHz)		Limit (KHz)	Result
		Ant1	Ant2		
03	2422	35800	36000	500	Pass
06	2437	36400	36400	500	Pass
09	2452	36400	36400	500	Pass

802.11n_HT20_Ant0+Ant1 + Ant2

Channel	Frequency (MHz)	Measurement (KHz)			Limit (KHz)	Result
		Ant0	Ant1	Ant2		
01	2412	17600	17680	17600	500	Pass
06	2437	17680	17680	17680	500	Pass
11	2462	17680	17760	17680	500	Pass

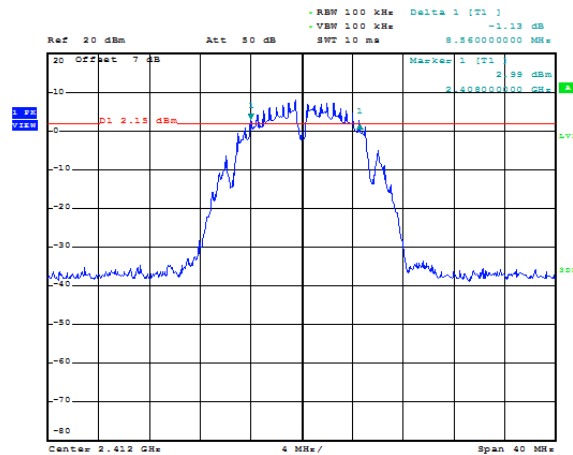
802.11n_HT40_Ant0+Ant1 + Ant2

Channel	Frequency (MHz)	Measurement (KHz)			Limit (KHz)	Result
		Ant0	Ant1	Ant2		
03	2422	36200	36200	36000	500	Pass
06	2437	36400	36400	36000	500	Pass
09	2452	36400	36400	36400	500	Pass

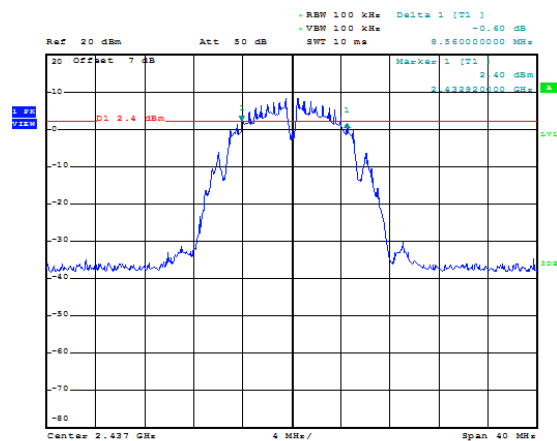
Data Plot

SISO(1T1R)

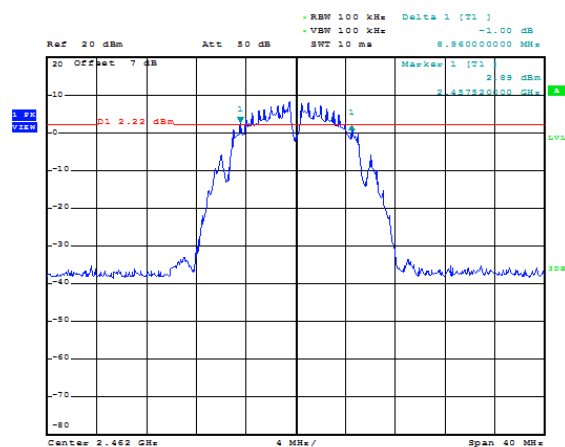
802.11b_Ant0_Low



802.11b_Ant0_Middel



802.11b_Ant0_High



Ref 20 dBm Att 50 dB SWT 10 ms Delta 1 [T1] 1.51 dB 0.20 dBm

20 Offset 7 dB

0 dBm

D1 1.12 dBm

1

Center 2.612 GHz 4 MHz/ Span 40 MHz

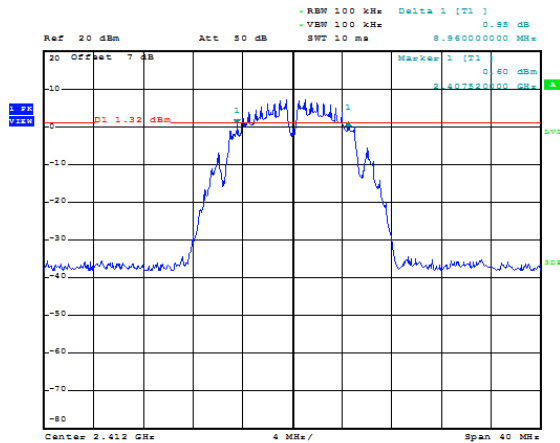
Ref 20 dBm Att 50 dB BW 10 ns Delta 1 (T1) 0.05 dB 8.560000000 MHz

20 Offset 7 dB

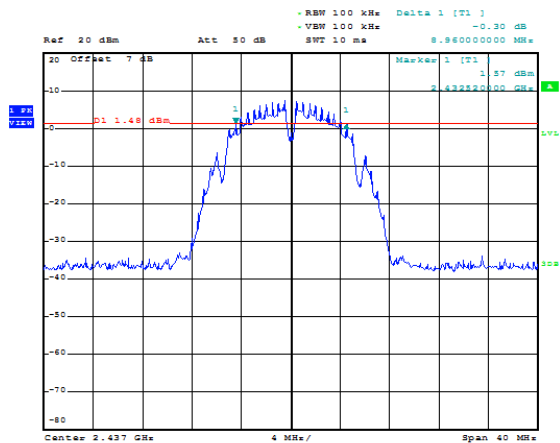
Marker 1 [T1] 1.51 dBm 2.457920000 GHz

Center 2.462 GHz 4 MHz/ Span 40 MHz

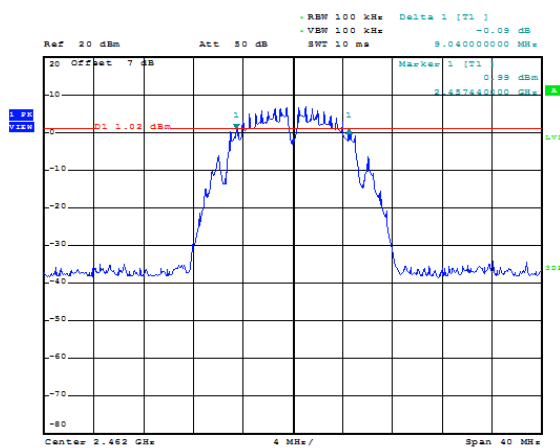
802.11b_Ant2_Low



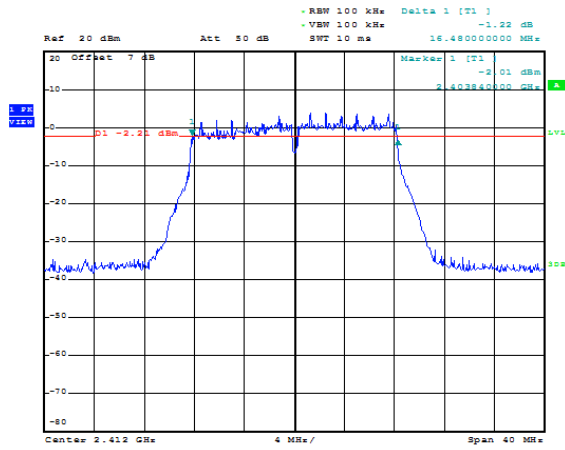
802.11b_Ant2_Middel



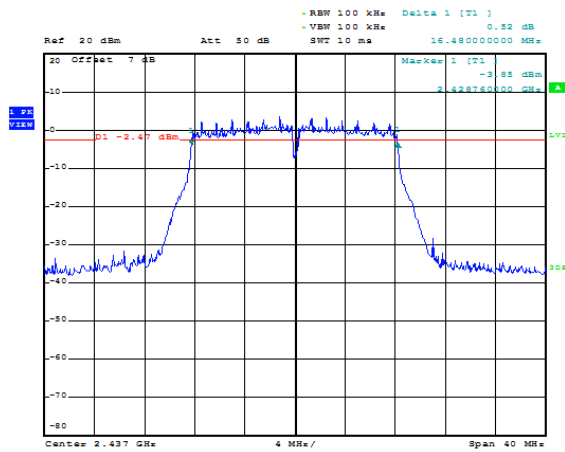
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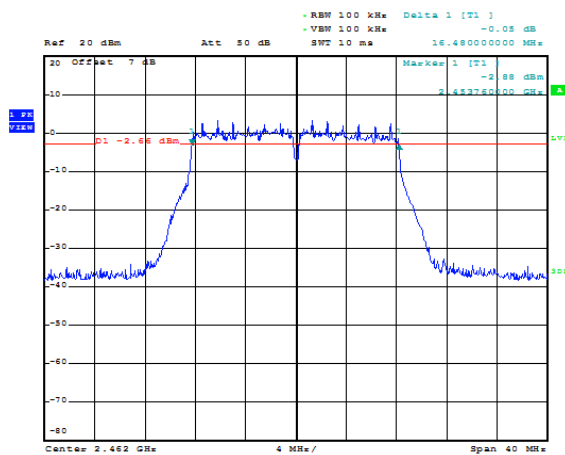
802.11g_Ant0_Low



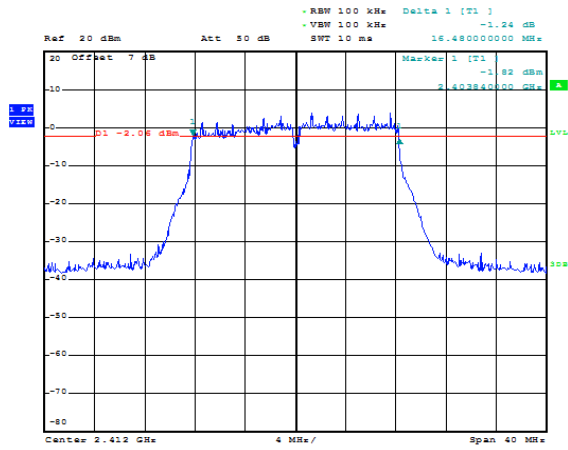
802.11g_Ant0_Middel



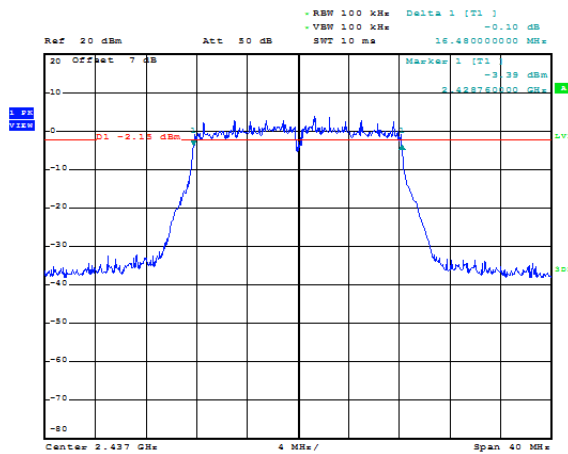
802.11g_Ant0_High



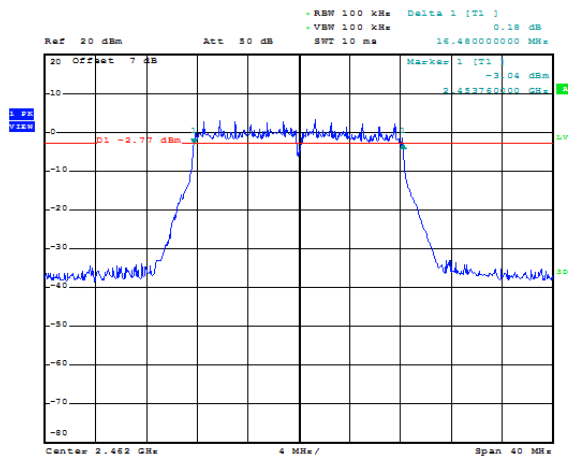
802.11g_Ant1_Low



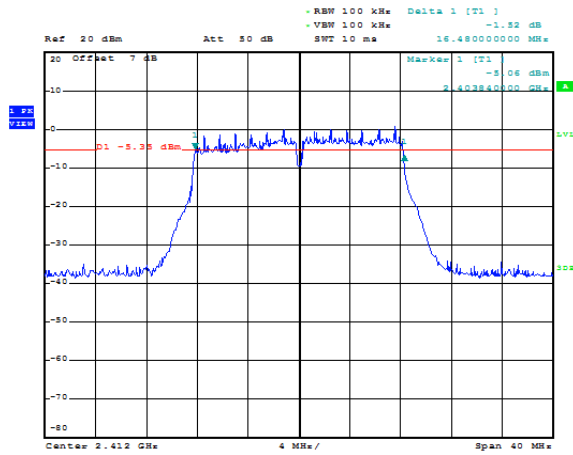
802.11g_Ant1_Middel



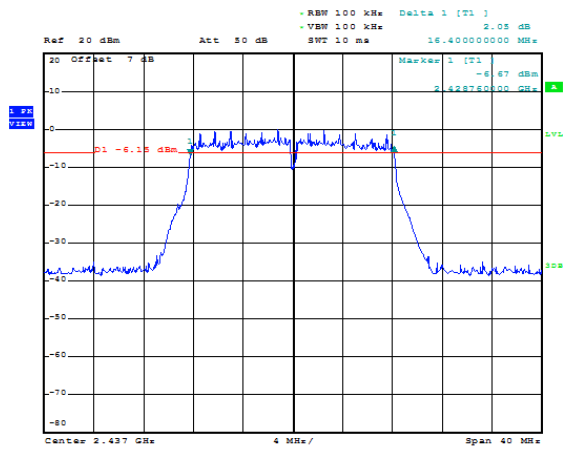
802.11g_Ant1_High



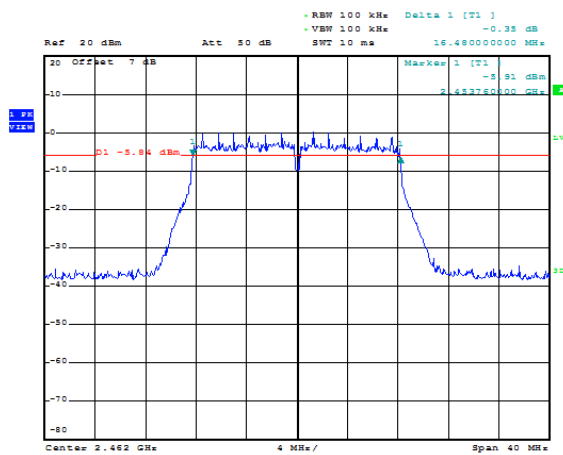
802.11g_Ant2_Low



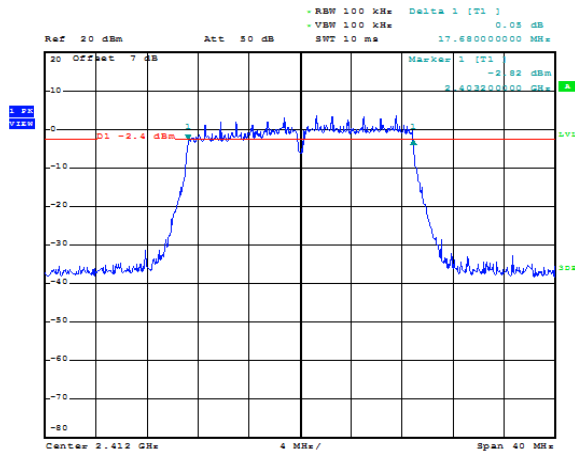
802.11g_Ant2_Middel



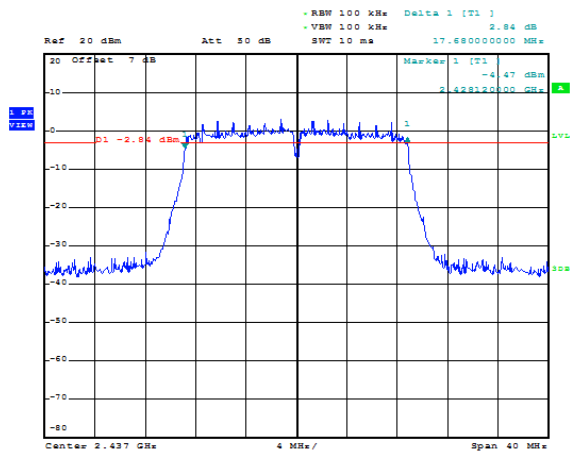
802.11g_Ant2_High



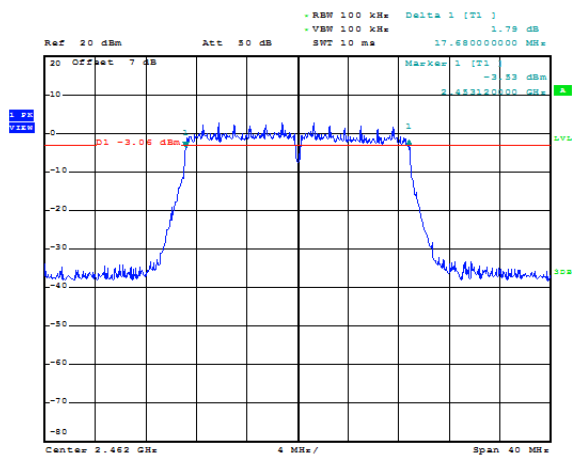
802.11n_HT20_Ant0_Low



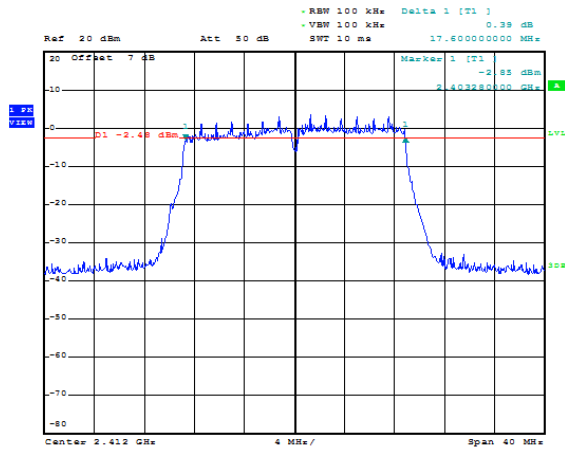
802.11n_HT20_Ant0_Middel



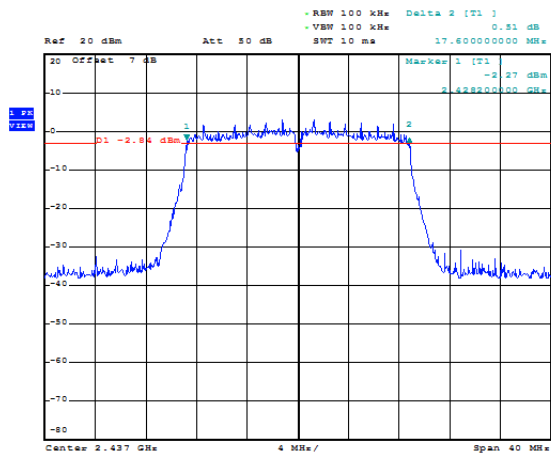
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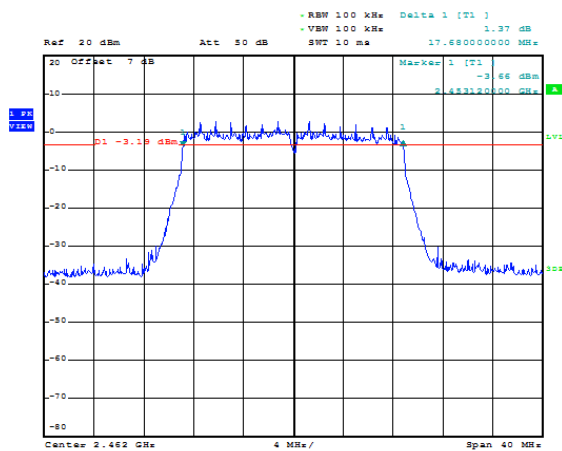
802.11n_HT20_Ant1_Low



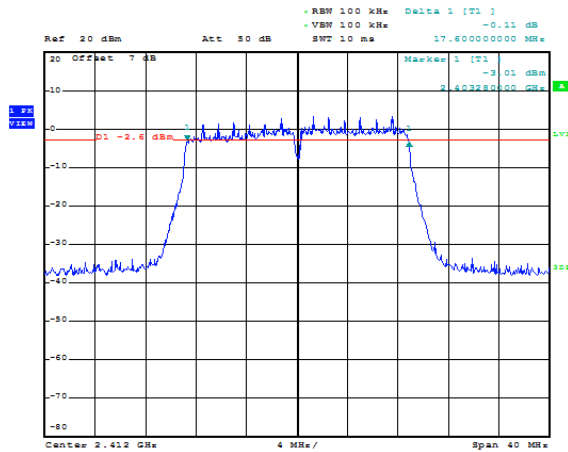
802.11n_HT20_Ant1_Middel



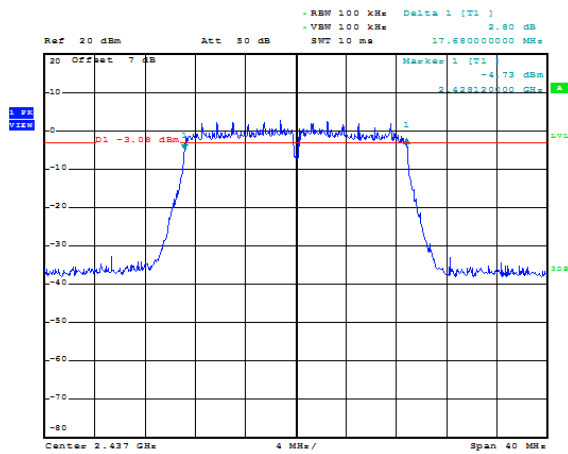
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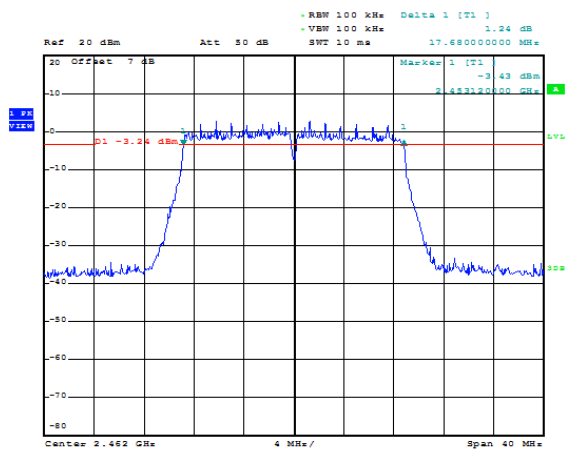
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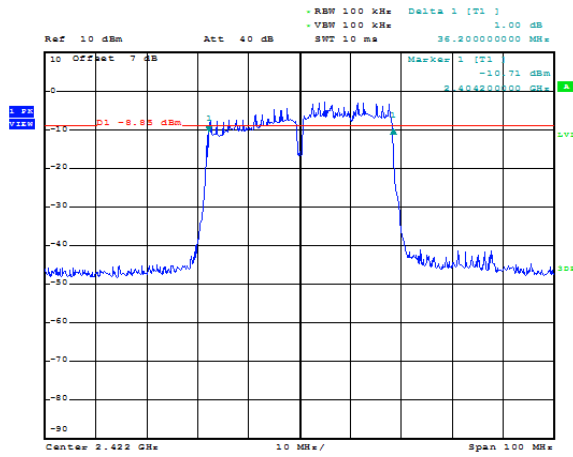
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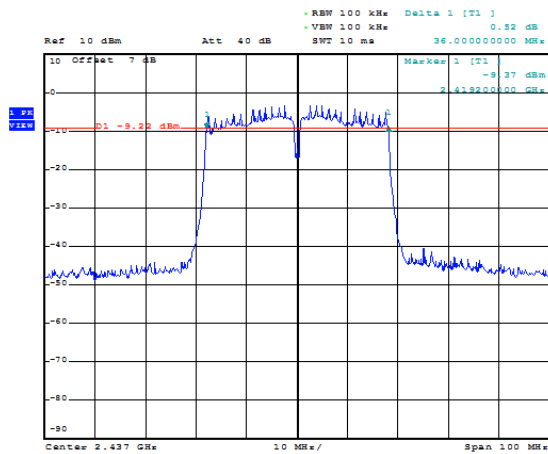
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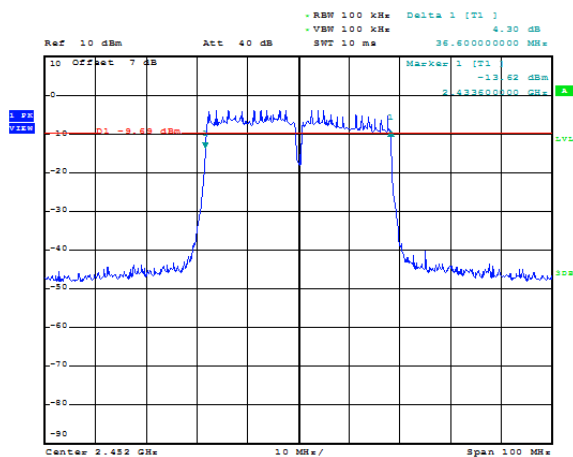
802.11n_HT40_Ant0_Low



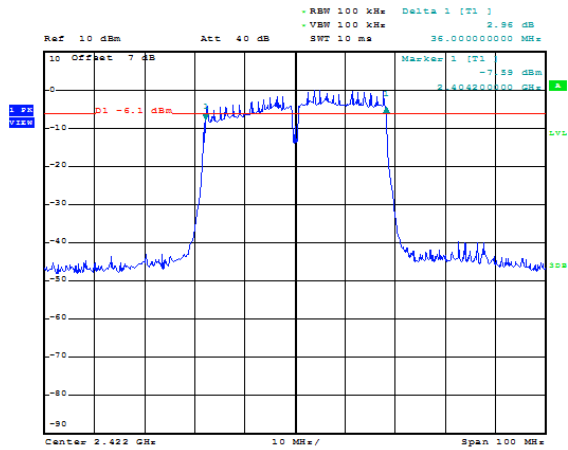
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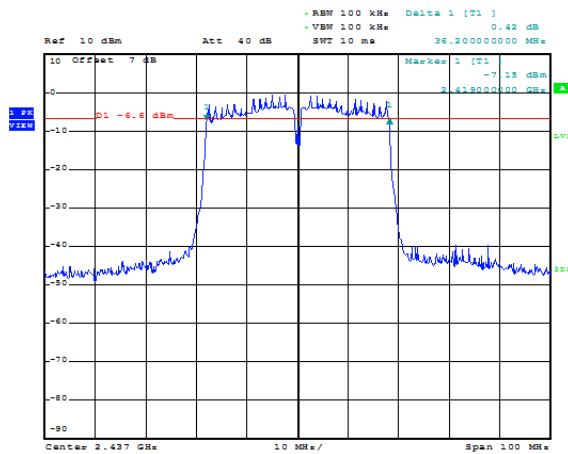
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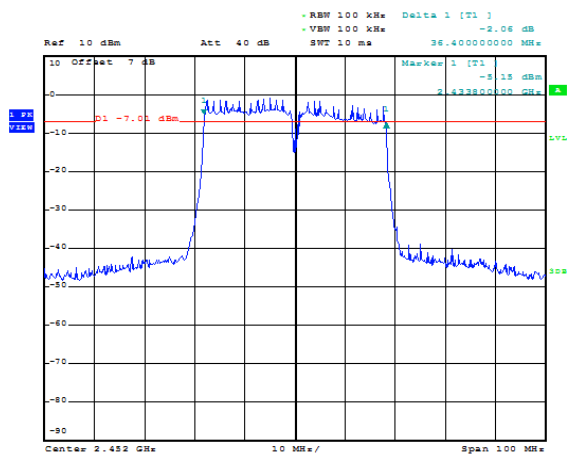
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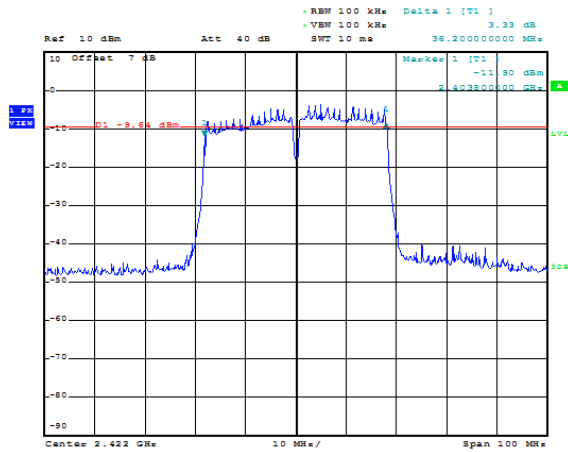
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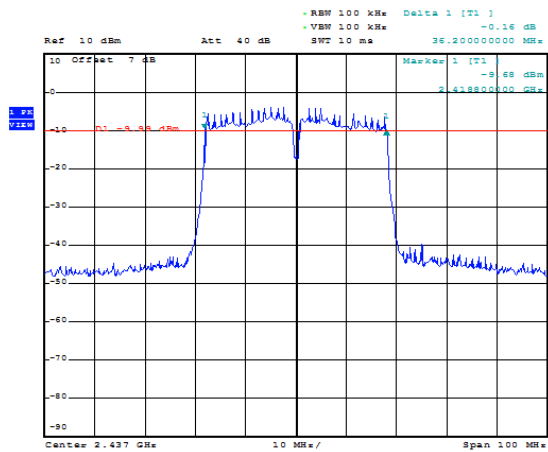
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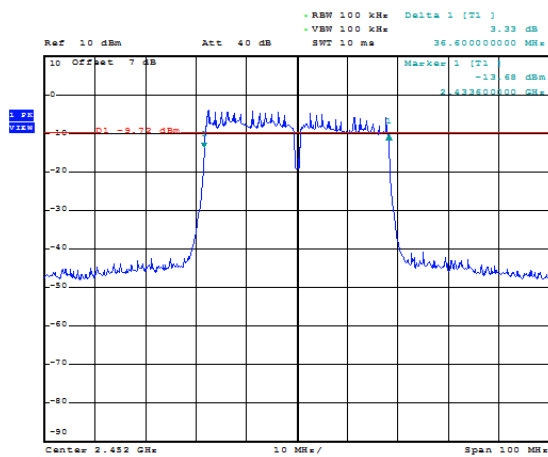
802.11n_HT40_Ant2_Low



802.11n_HT40_Ant2_Middel



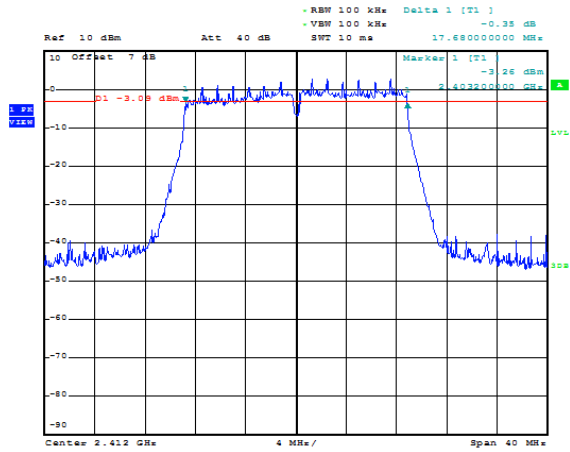
802.11n_HT40_Ant2_High



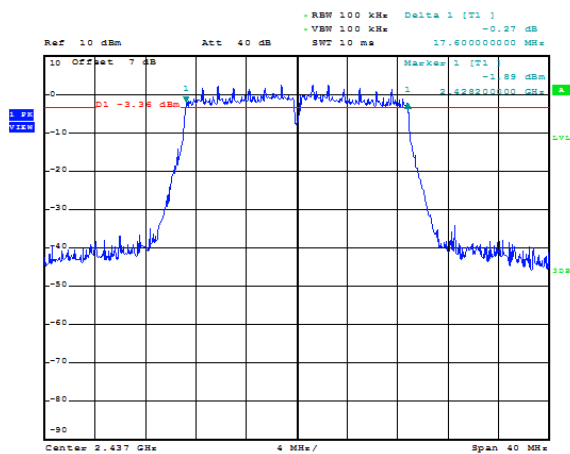
MIMO(2T2R)_HT20

Ant0+Ant1

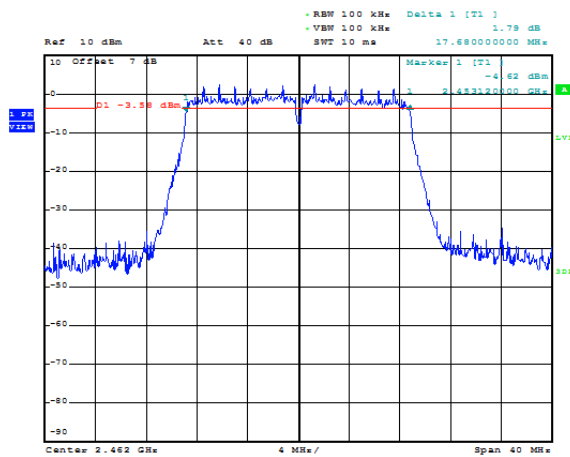
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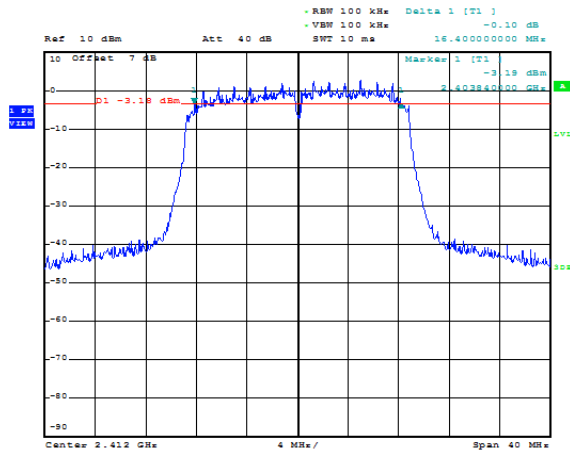
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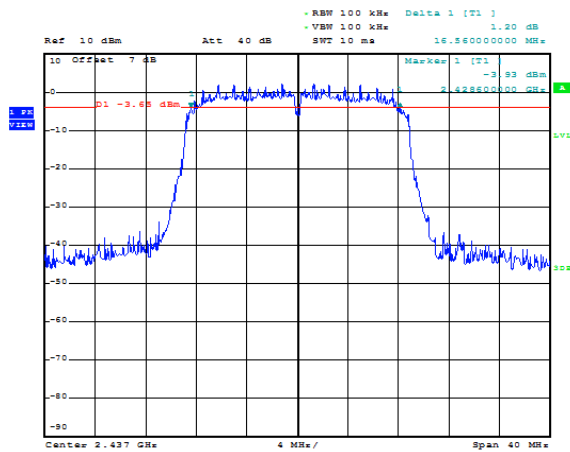
802.11n_Ant0_High



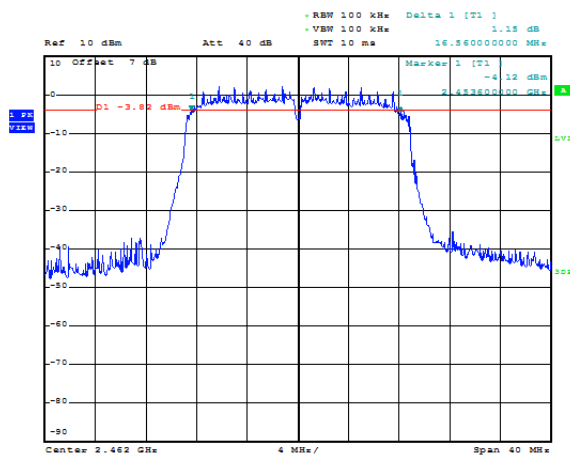
802.11n_Ant1_Low



802.11n_Ant1_Middel

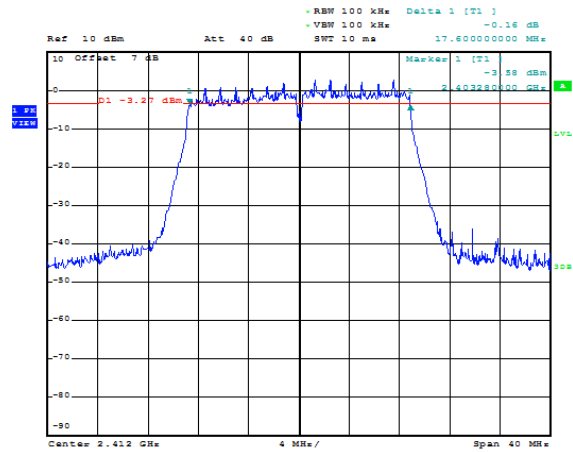


802.11n_Ant1_High

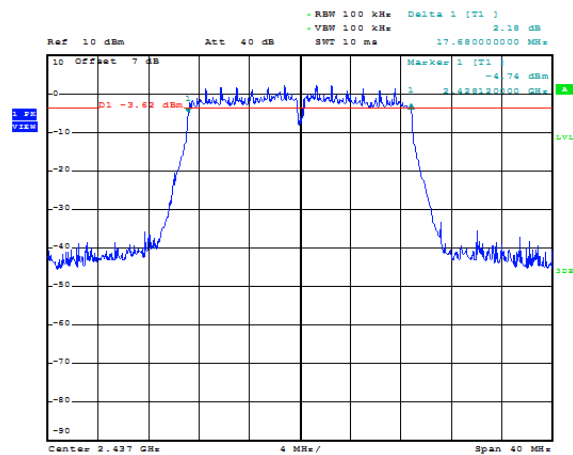


Ant0+Ant2

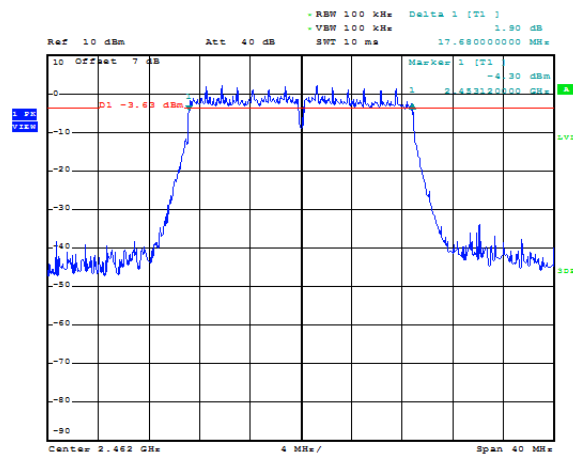
802.11n_Ant0_Low



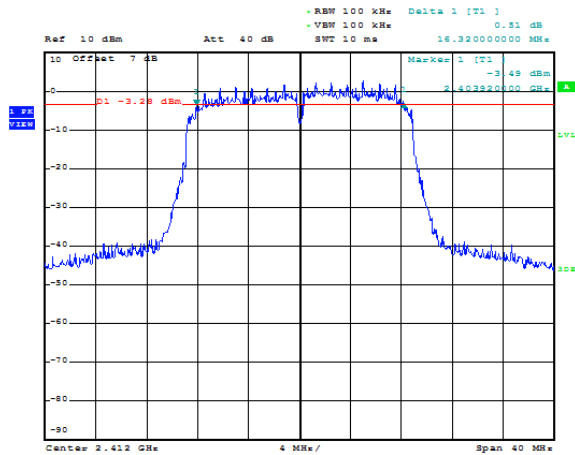
802.11n_Ant0_Middel



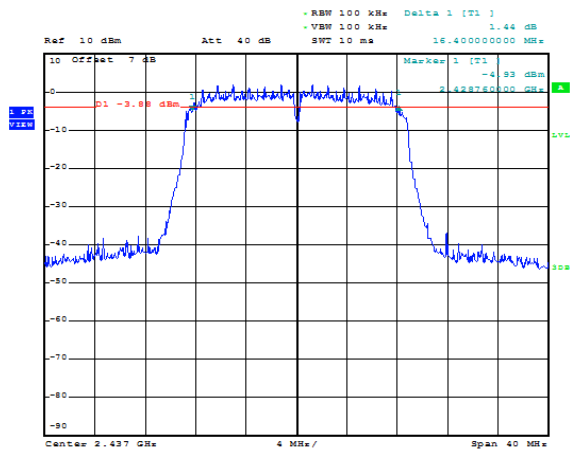
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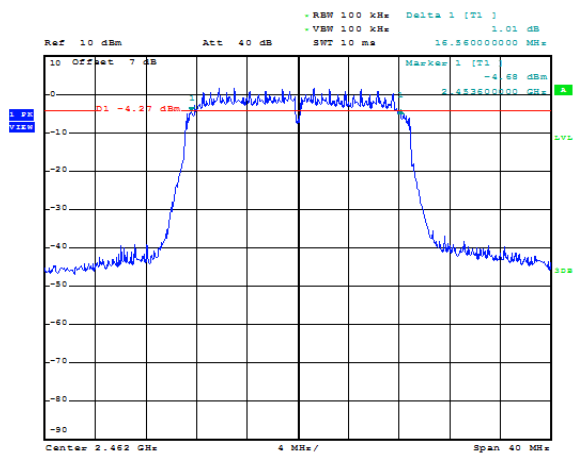
802.11n_Ant2_Low



802.11n_Ant2_Middel

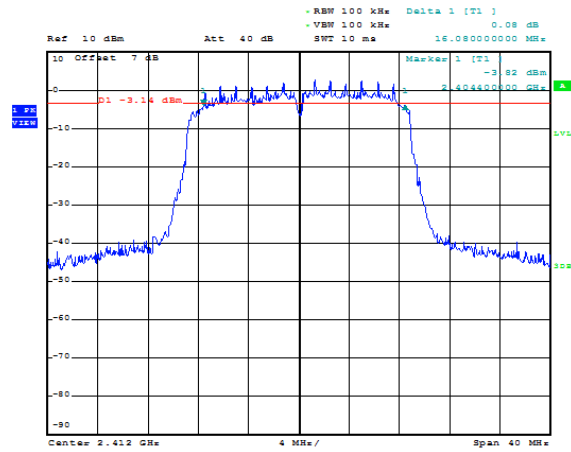


802.11n_Ant2_High

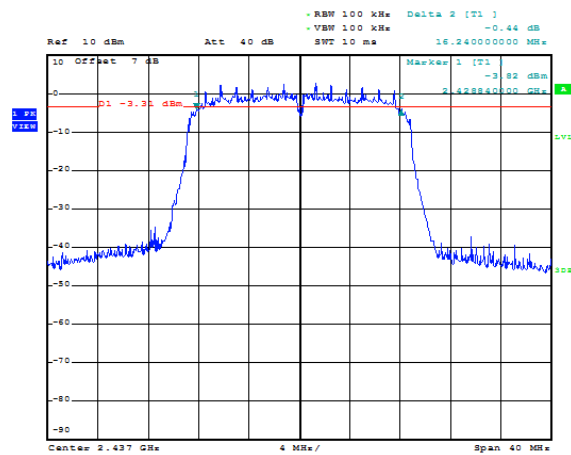


Ant1+Ant2

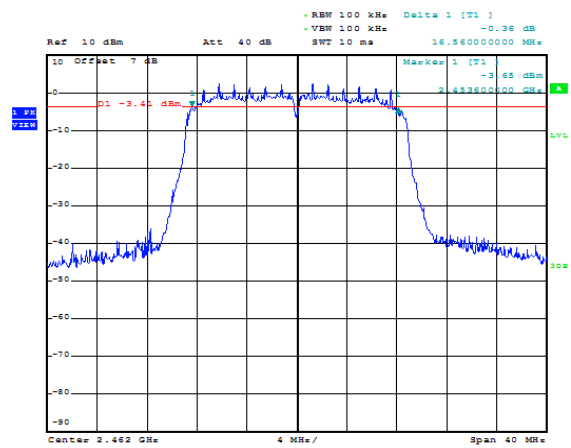
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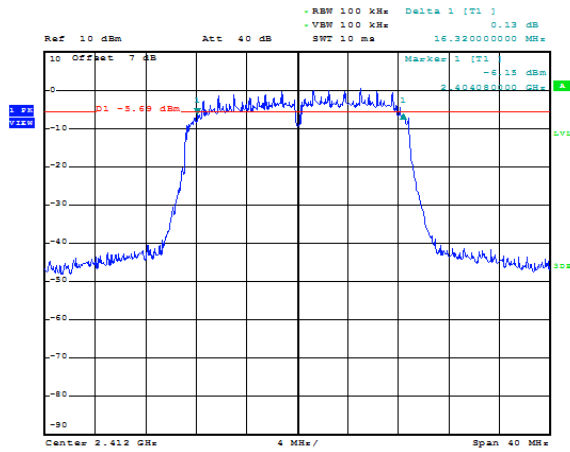
802.11n_Ant1_Middel



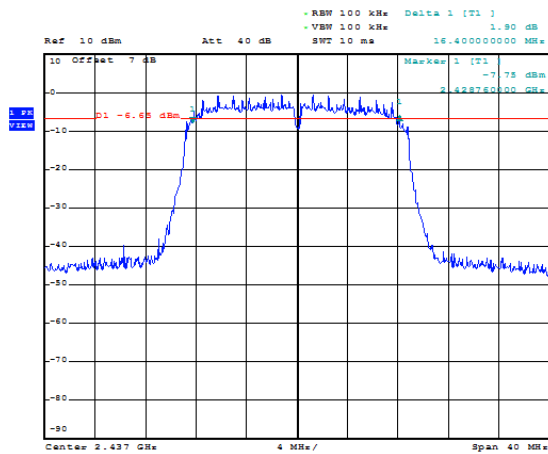
802.11n_Ant1_High



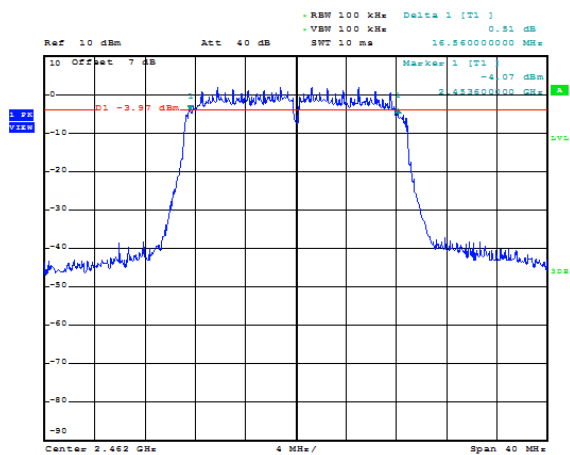
802.11n_Ant2_Low



802.11n_Ant2_Middel



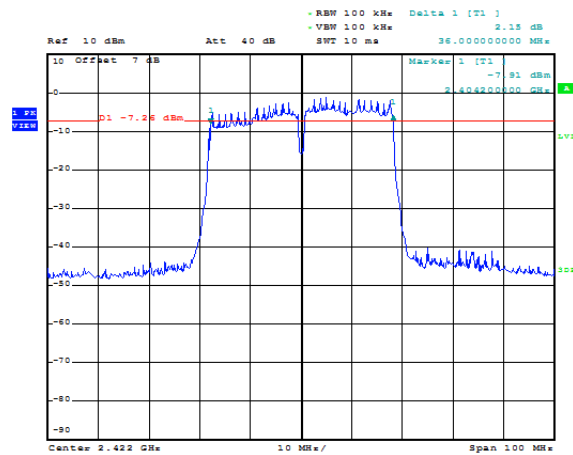
802.11n_Ant2_High



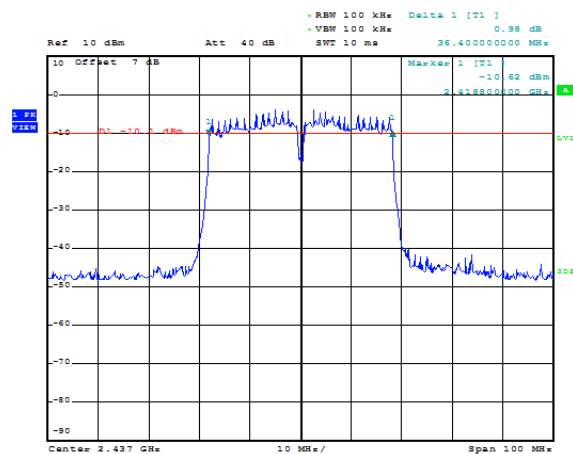
MIMO(2T2R)_HT40

Ant0+Ant1

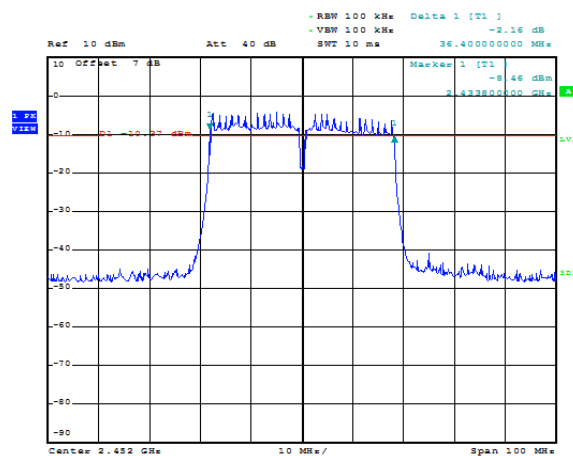
802.11n_Ant0_Low



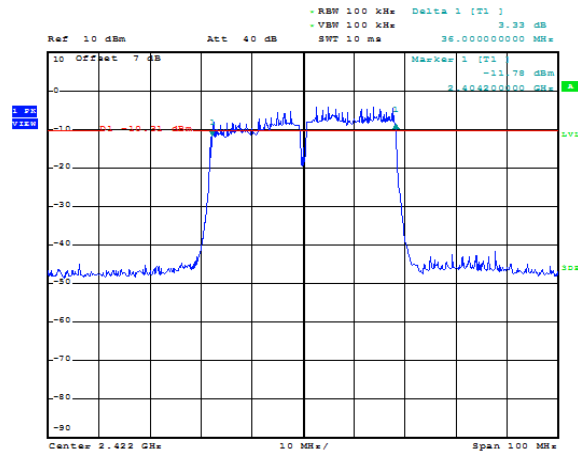
802.11n_Ant0_Middel



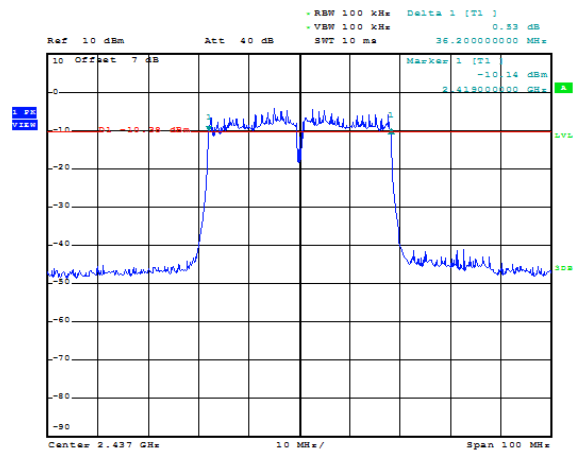
802.11n_Ant0_High



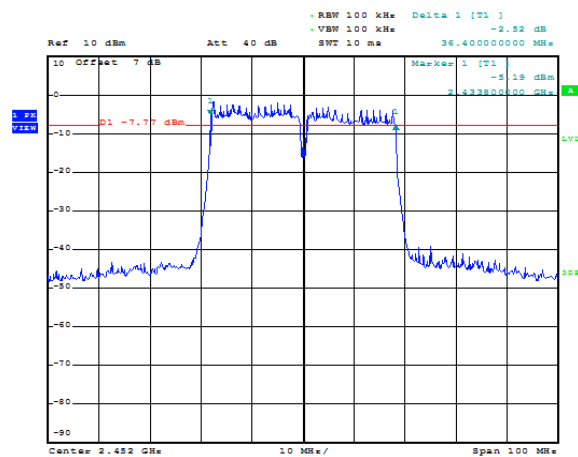
802.11n_Ant1_Low



802.11n_Ant1_Middel

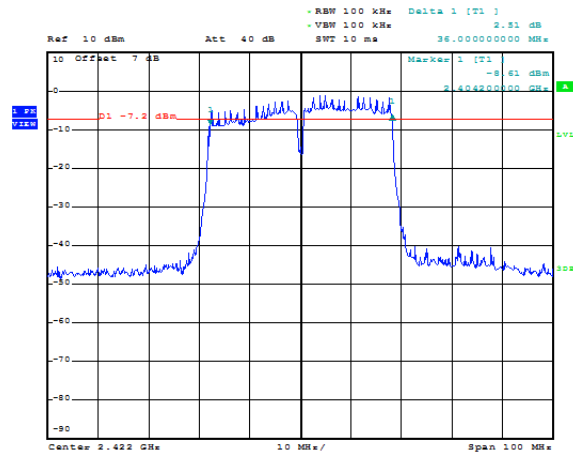


802.11n_Ant1_High

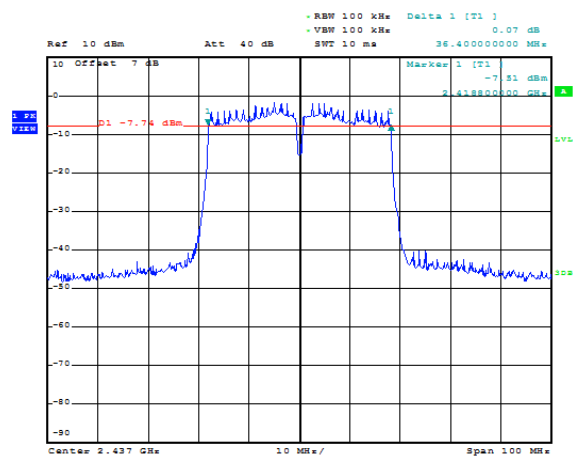


Ant0+Ant2

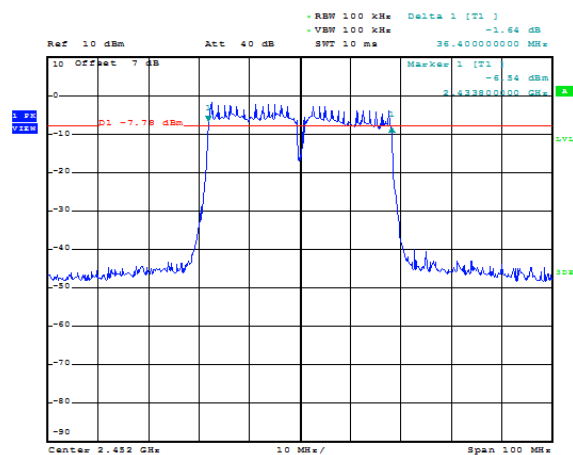
802.11n_Ant0_Low



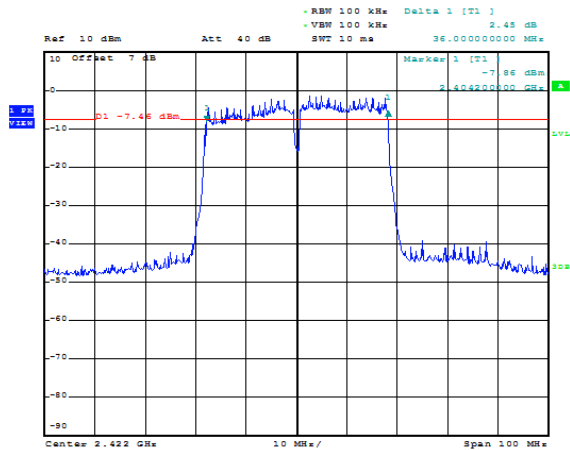
802.11n_Ant0_Middel



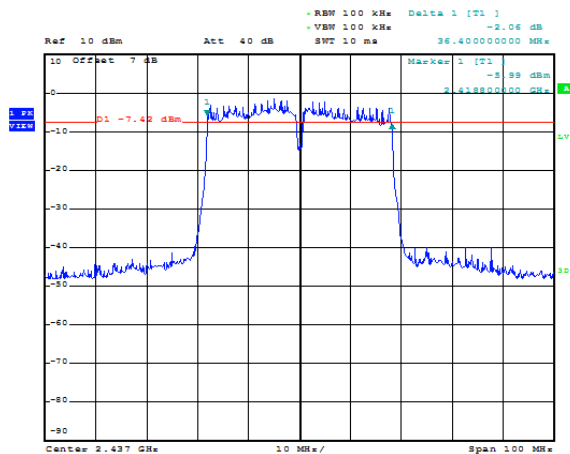
802.11n_Ant0_High



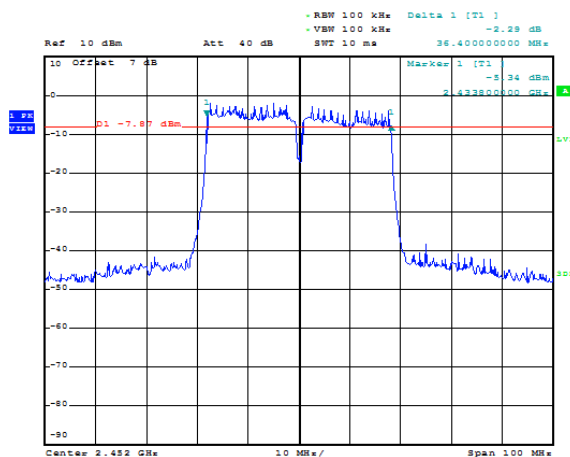
802.11n_Ant2_Low



802.11n_Ant2_Middel

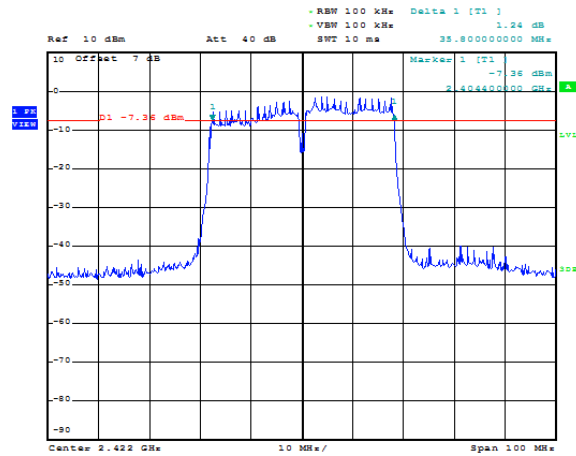


802.11n_Ant2_High

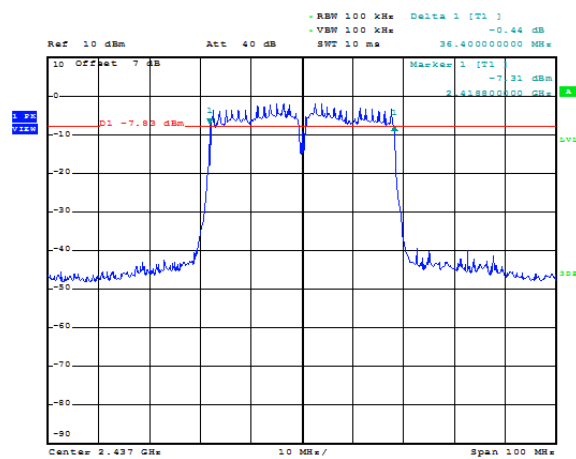


Ant1+Ant2

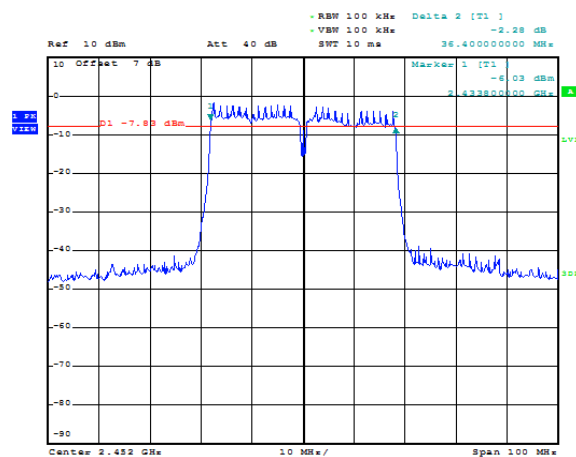
802.11n_Ant1_Low



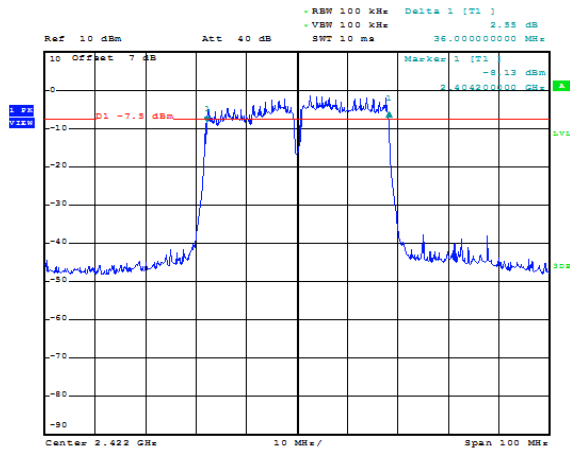
802.11n_Ant1_Middel



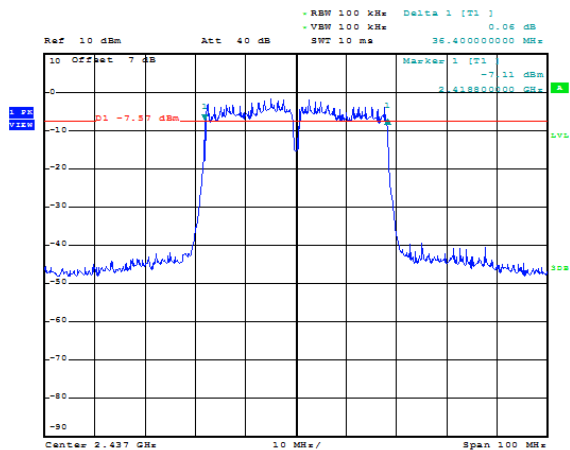
802.11n_Ant1_High



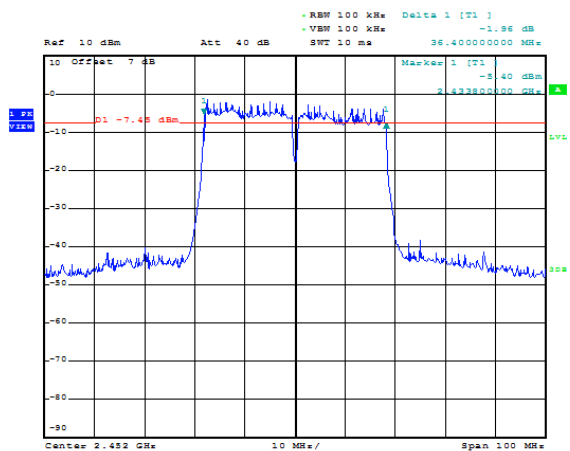
802.11n_Ant2_Low



802.11n_Ant2_Middel



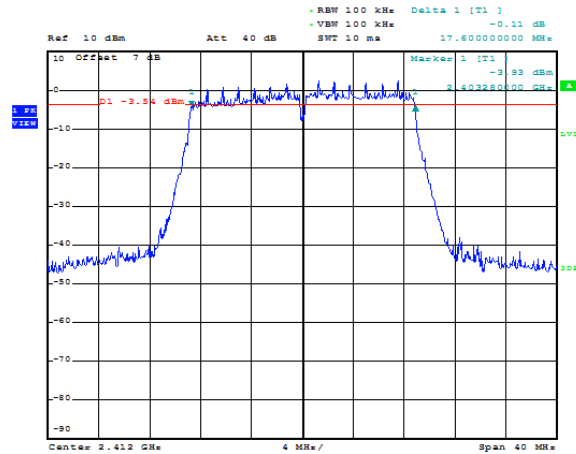
802.11n_Ant2_High



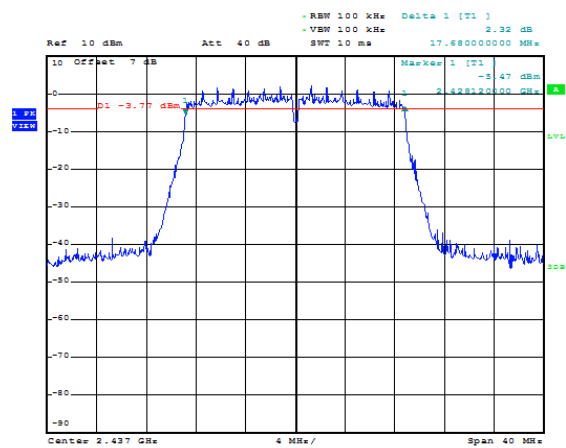
MIMO(3T3R)_HT20

Ant0+Ant1+Ant2

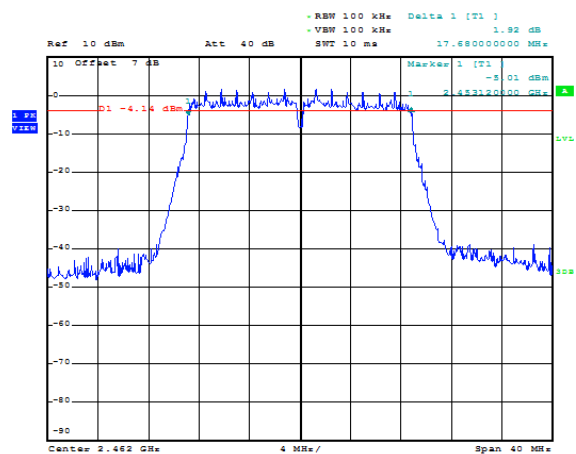
802.11n_Ant0_Low



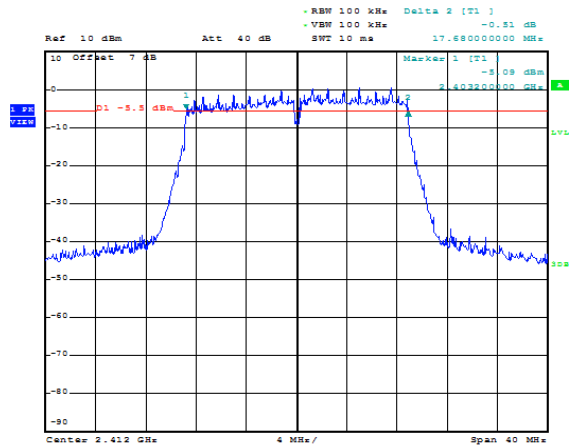
802.11n_Ant0_Middel



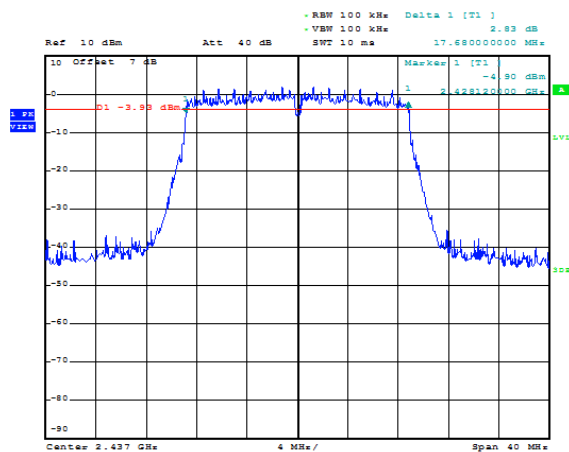
802.11n_Ant0_High



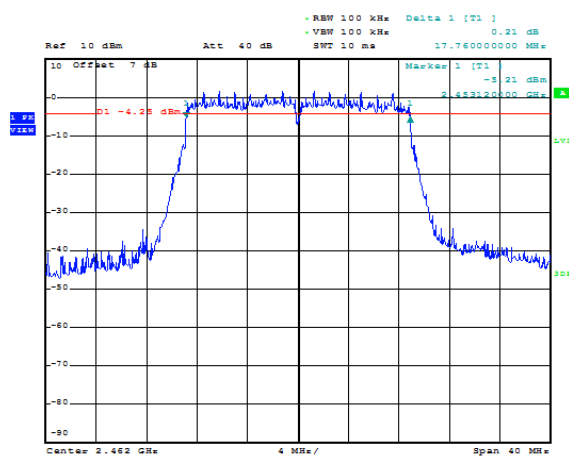
802.11n_Ant1_Low



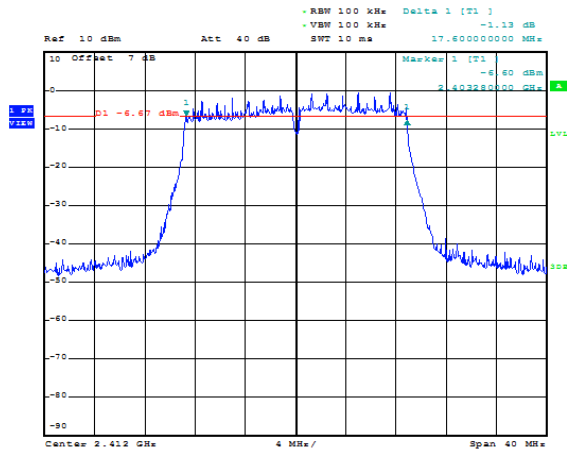
802.11n_Ant1_Middel



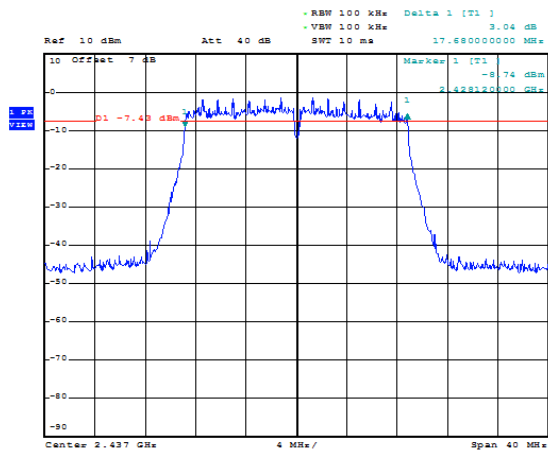
802.11n_Ant1_High



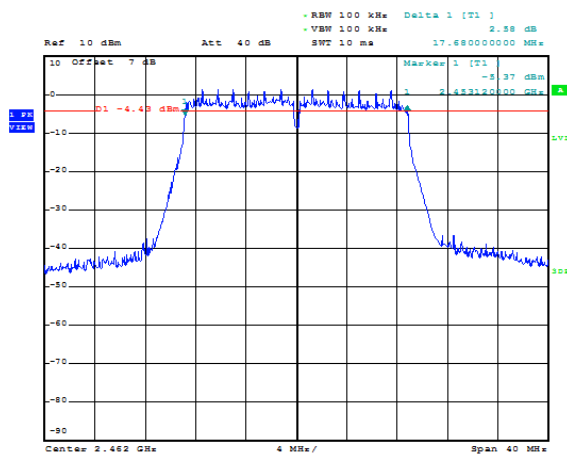
802.11n_Ant2_Low



802.11n_Ant2_Middel



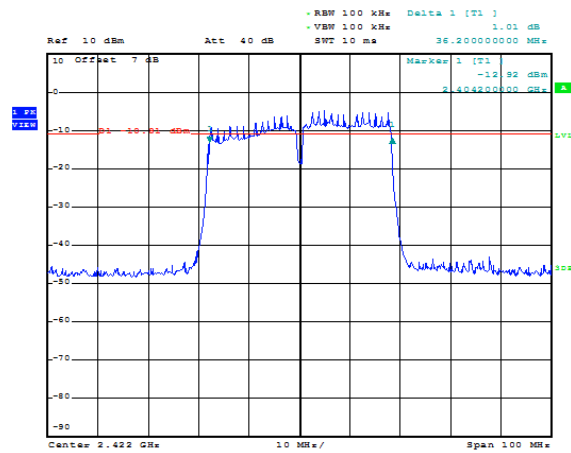
802.11n_Ant2_High



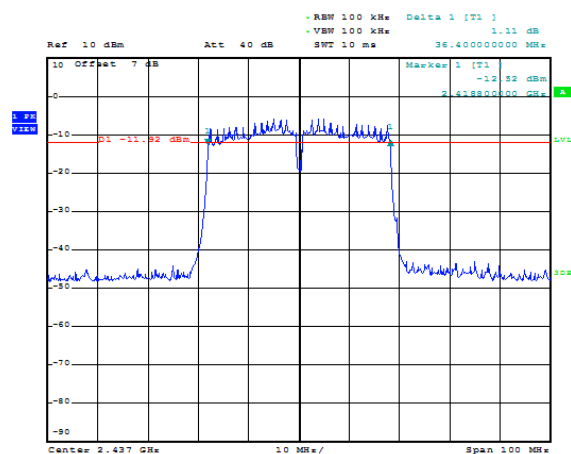
MIMO(3T3R)_HT40

Ant0+Ant1+Ant2

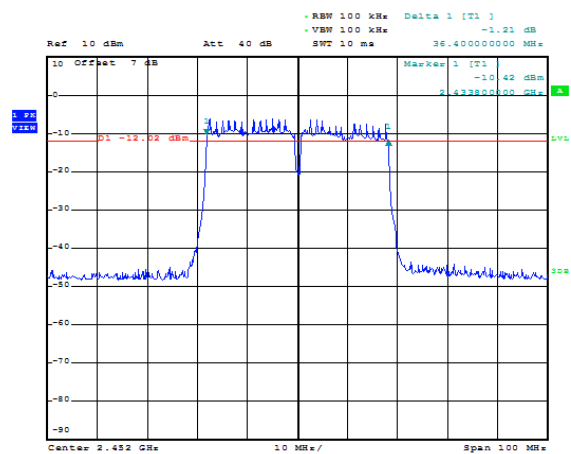
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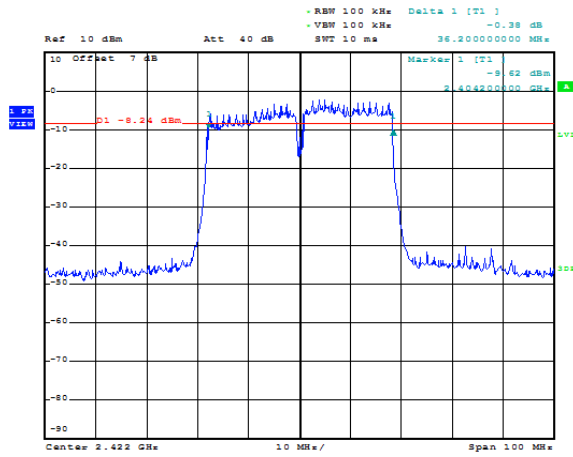
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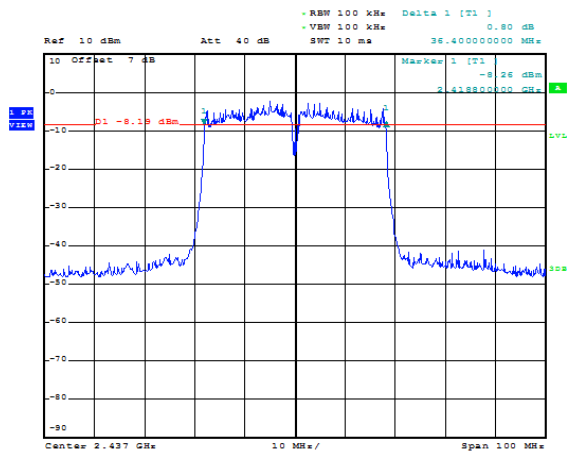
802.11n_Ant0_High



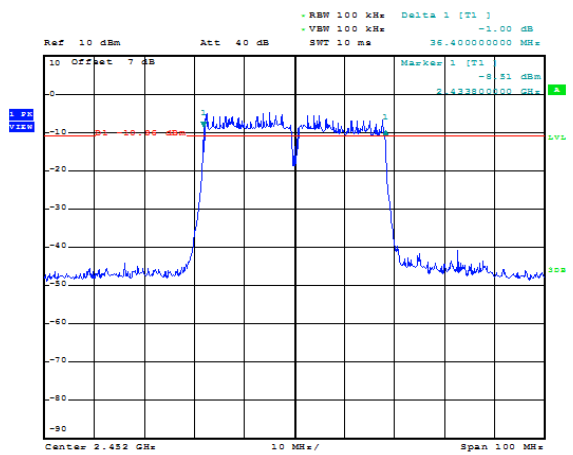
802.11n_Ant1_Low



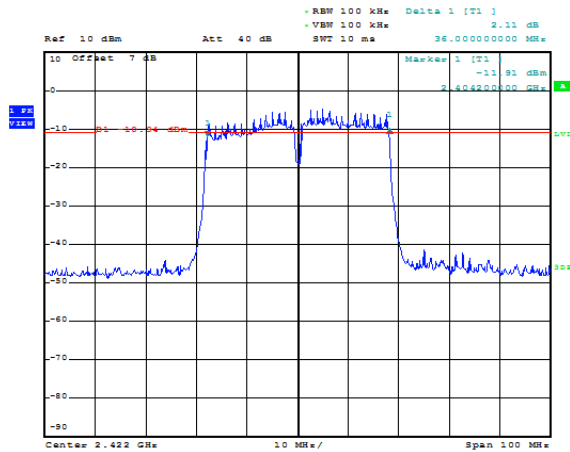
802.11n_Ant1_Middel



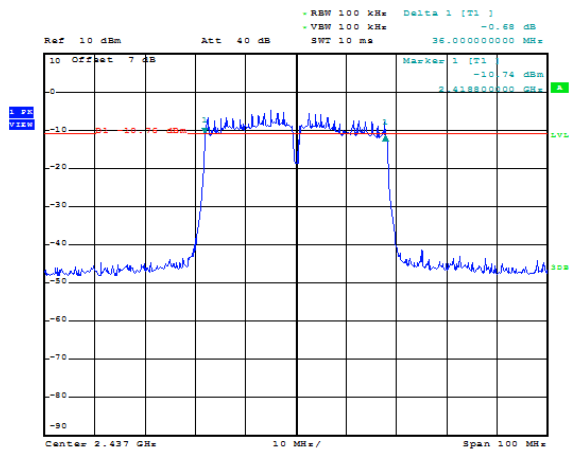
802.11n_Ant1_High



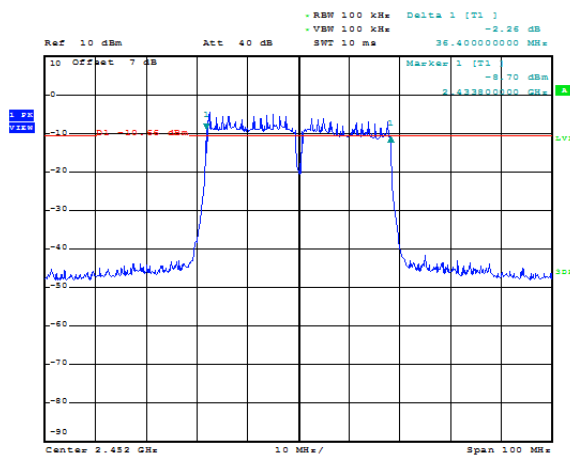
802.11n_Ant2_Low



802.11n_Ant2_Middel



802.11n_Ant2_High



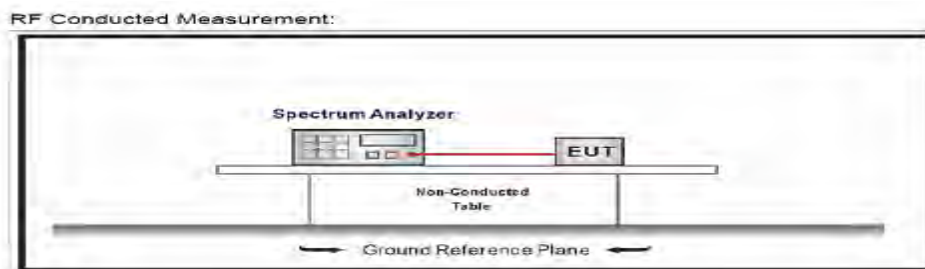
4.3 Peak power Spectral Density

4.3.1 Test Limit

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 KHz band.

< 8 dBm @ 3 KHz BW

4.3.2 Test Configuration



4.3.3 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operation range. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3 KHz RBW and 10 KHz VBW.
4. Measure the captured power within the band and recording the plot.
5. Repeat above procedures until all frequencies required were complete.
6. For MIMO mode, the output power is calculated according to KDB 662911 D01 Multiple Transmitter Output v02r01.
7. For MIMO mode Limit conversion is below;

$$\text{Directional Gain} = 10 \cdot \text{LOG}(10^{(G1/10)} + 10^{(G2/10)} + \dots + 10^{(Gn/10)})$$

2Tx Ant0+Ant1 mode

7.301 dBi > 6 dBi, so the power density limit shall be reduced to $8-(7.301-6) = 6.70$ dBm.

2Tx Ant0+Ant2 mode

6.807 dBi > 6 dBi, so the power density limit shall be reduced to $8-(6.807-6) = 7.19$ dBm.

2Tx Ant1+Ant2 mode

6.838 dBi > 6 dBi, so the power density limit shall be reduced to $8-(6.838-6) = 7.16$ dBm.

3Tx Ant0+Ant1+Ant2 mode

9.09 dBi > 6 dBi, so the power density limit shall be reduced to $8-(9.09-6) = 4.9$ dBm.

Note : regarding each of antenna gain, refer to 5.7 Antenna Requirements in this report

4.3.4 Test Result and Data

SISO(Single Input Single Output)

802.11b_Ant0

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	-3.11	8	Pass
06	2437	-2.30	8	Pass
11	2462	-3.38	8	Pass

802.11b_Ant1

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	-5.94	8	Pass
06	2437	-6.23	8	Pass
11	2462	-6.57	8	Pass

802.11b_Ant2

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	-6.12	8	Pass
06	2437	-7.29	8	Pass
11	2462	-7.70	8	Pass

802.11g_Ant0

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	-9.96	8	Pass
06	2437	-9.68	8	Pass
11	2462	-10.59	8	Pass

802.11g_Ant1

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	-12.17	8	Pass
06	2437	-11.22	8	Pass
11	2462	-11.67	8	Pass

802.11g_Ant2

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	-13.33	8	Pass
06	2437	-13.04	8	Pass
11	2462	-12.61	8	Pass

802.11n_HT20_Ant0

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	-10.31	8	Pass
06	2437	-11.11	8	Pass
11	2462	-11.64	8	Pass

802.11n_HT20_Ant1

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	-13.48	8	Pass
06	2437	-12.80	8	Pass
11	2462	-12.93	8	Pass

802.11n_HT20_Ant2

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
01	2412	-13.54	8	Pass
06	2437	-13.66	8	Pass
11	2462	-14.59	8	Pass

802.11n_HT40_Ant0

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
03	2422	-14.37	8	Pass
06	2437	-13.64	8	Pass
09	2452	-15.25	8	Pass

802.11n_HT40_Ant1

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
03	2422	-14.14	8	Pass
06	2437	-10.87	8	Pass
09	2452	-12.57	8	Pass

802.11n_HT40_Ant2

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
03	2422	-18.08	8	Pass
06	2437	-18.35	8	Pass
09	2452	-18.08	8	Pass

MIMO(Multi Input Multi Output)

802.11n_HT20_Ant0 + Ant1

Channel	Frequency (MHz)	Measurement (dBm)		Limit (dBm)	Result
		Ant0	Ant1		
01	2412	-14.85	-11.19	Please refer to 4.3.3 Clause 6 and 7 for MIMO power calculation and limit method.	
06	2437	-10.91	-10.74		
11	2462	-11.99	-13.87		
Measured Power Summing(Ant0+Ant1)					
01	2412	-9.64		6.67	Pass
06	2437	-7.83		6.67	Pass
11	2462	-9.83		6.67	Pass

802.11n_HT20_Ant0 + Ant2

Channel	Frequency (MHz)	Measurement (dBm)		Limit (dBm)	Result
		Ant0	Ant2		
01	2412	-11.27	-14.28	Please refer to 4.3.3 Clause 6 and 7 for MIMO power calculation and limit method.	
06	2437	-12.10	-14.31		
11	2462	-12.46	-14.36		
Measured Power Summing(Ant0+Ant2)					
01	2412	-9.51		6.67	Pass
06	2437	-10.04		6.67	Pass
11	2462	-10.27		6.67	Pass

802.11n_HT20_Ant1 + Ant2

Channel	Frequency (MHz)	Measurement (dBm)		Limit (dBm)	Result
		Ant1	Ant2		
01	2412	-14.47	-14.37	Please refer to 4.3.3 Clause 6 and 7 for MIMO power calculation and limit method.	
06	2437	-10.21	-14.53		
11	2462	-11.70	-14.52		
Measured Power Summing(Ant1+Ant2)					
01	2412	-11.37		6.67	Pass
06	2437	-8.86		6.67	Pass
11	2462	-9.87		6.67	Pass

802.11n_HT40_Ant0 + Ant1

Channel	Frequency (MHz)	Measurement (dBm)		Limit (dBm)	Result
		Ant0	Ant1		
03	2422	-15.79	-15.95	Please refer to 4.3.3 Clause 6 and 7 for MIMO power calculation and limit method.	
06	2437	-15.85	-12.02		
09	2452	-15.49	-14.53		
Measured Power Summing(Ant0+Ant1)					
03	2422	-12.92		6.67	Pass
06	2437	-10.51		6.67	Pass
09	2452	-12.01		6.67	Pass

802.11n_HT40_Ant0 + Ant2

Channel	Frequency (MHz)	Measurement (dBm)		Limit (dBm)	Result
		Ant0	Ant2		
03	2422	-15.40	-18.22	Please refer to 4.3.3 Clause 6 and 7 for MIMO power calculation and limit method.	
06	2437	-15.75	-15.74		
09	2452	-16.66	-15.67		
Measured Power Summing(Ant0+Ant2)					
03	2422	-13.57		6.67	Pass
06	2437	-12.68		6.67	Pass
09	2452	-13.10		6.67	Pass

802.11n_HT40_Ant1 + Ant2

Channel	Frequency (MHz)	Measurement (dBm)		Limit (dBm)	Result
		Ant1	Ant2		
03	2422	-18.47	-18.45	Please refer to 4.3.3 Clause 6 and 7 for MIMO power calculation and limit method.	
06	2437	-14.94	-19.77		
09	2452	-16.30	-18.17		
Measured Power Summing(Ant1+Ant2)					
03	2422	-15.53		6.67	Pass
06	2437	-13.67		6.67	Pass
09	2452	-14.20		6.67	Pass

802.11n_HT20_Ant0+Ant1 + Ant2

Channel	Frequency (MHz)	Measurement (dBm)			Limit (dBm)	Result
		Ant0	Ant1	Ant2		
01	2412	-11.52	-11.94	-14.82	Please refer to 4.3.3 Clause 6 and 7 for MIMO power calculation and limit method.	
06	2437	-11.42	-11.79	-12.17		
11	2462	-10.79	-11.32	-12.29		
Measured Power Summing(Ant0+Ant1+Ant2)						
01	2412	-7.77			4.910	Pass
06	2437	-6.84			4.910	Pass
11	2462	-6.66			4.910	Pass

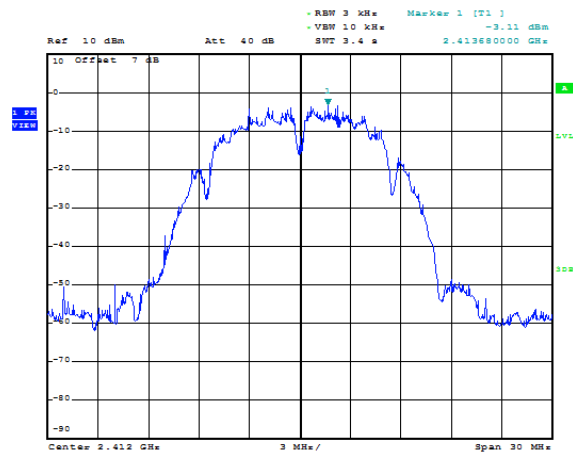
802.11n_HT40_Ant0+Ant1 + Ant2

Channel	Frequency (MHz)	Measurement (dBm)			Limit (dBm)	Result
		Ant0	Ant1	Ant2		
03	2422	-16.97	-18.76	-19.02	Please refer to 4.3.3 Clause 6 and 7 for MIMO power calculation and limit method.	
06	2437	-16.85	-12.87	-19.33		
09	2452	-17.98	-17.53	-20.87		
Measured Power Summing(Ant0+Ant1+Ant2)						
03	2422	-13.37			4.910	Pass
06	2437	-10.76			4.910	Pass
09	2452	-13.77			4.910	Pass

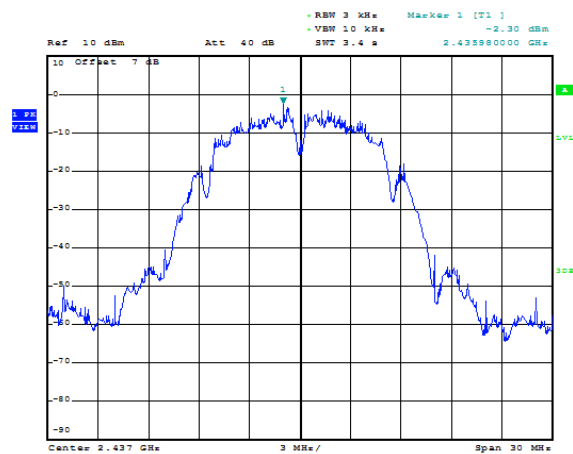
Data Plot

SISO(1T1R)

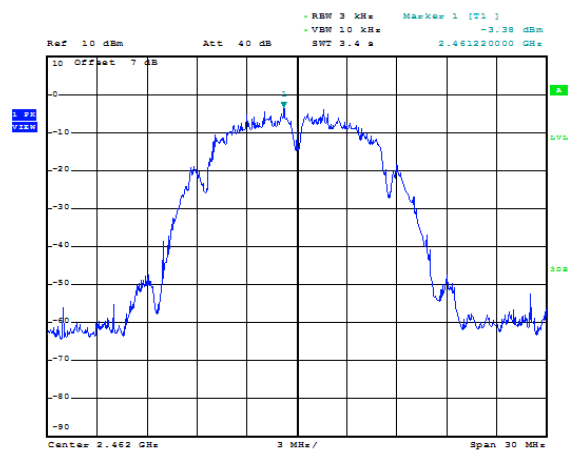
802.11b_Ant0_Low



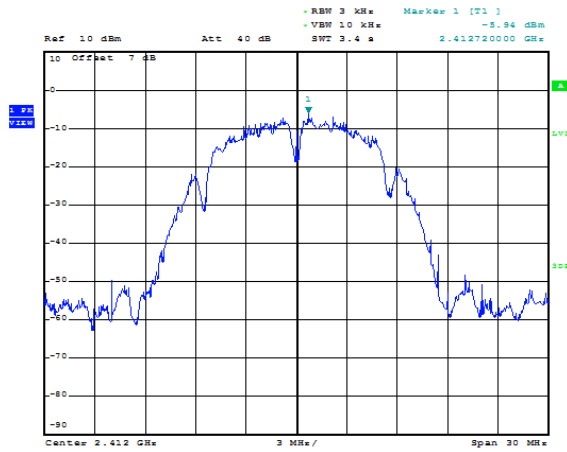
802.11b_Ant0_Middel



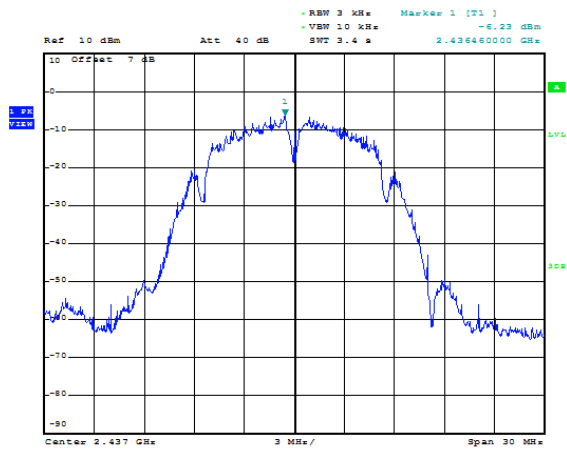
802.11b_Ant0_High



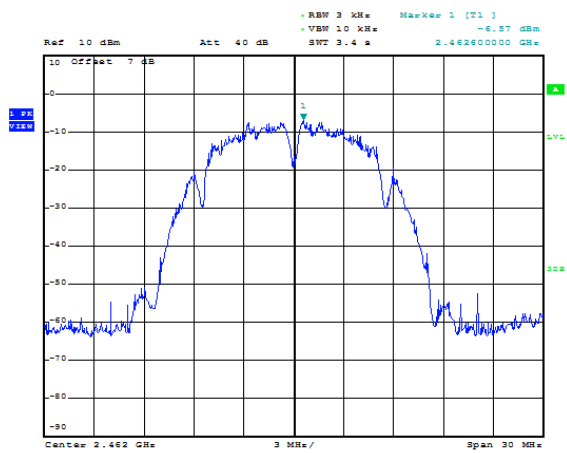
802.11b_Ant1_Low



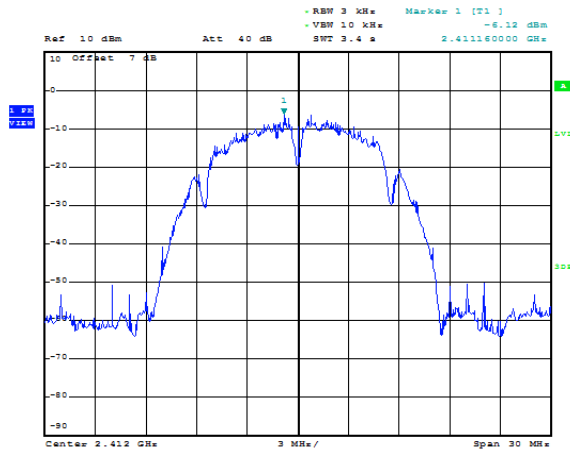
802.11b_Ant1_Middel



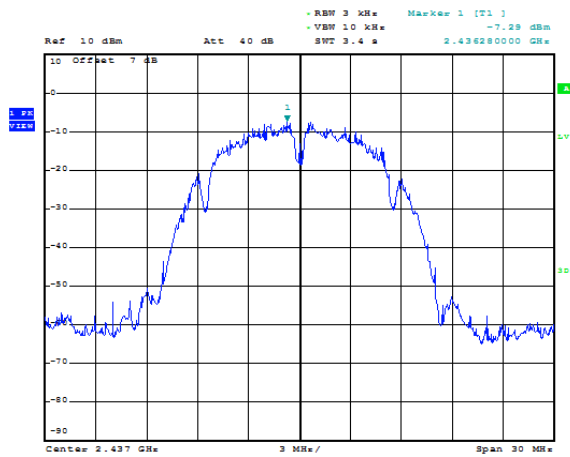
802.11b_Ant1_High



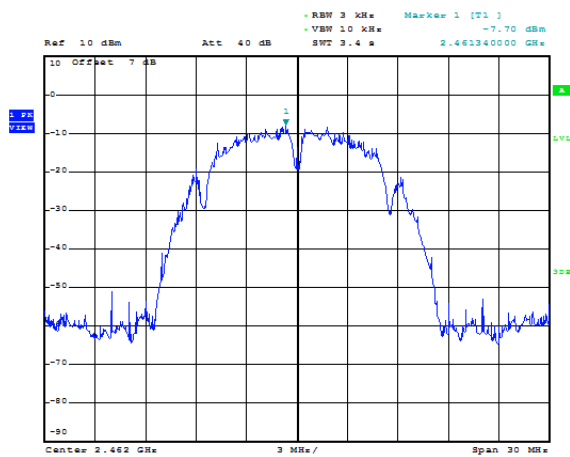
802.11b_Ant2_Low



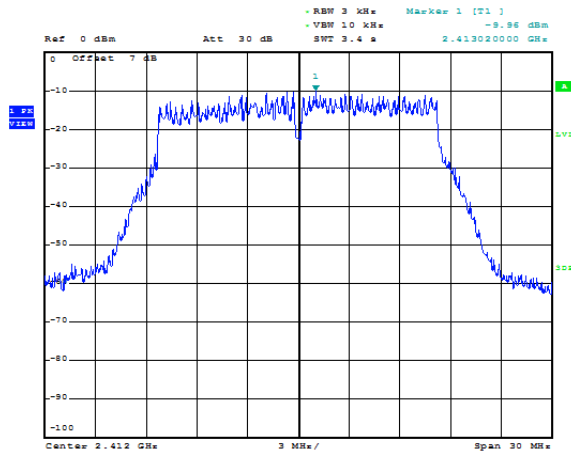
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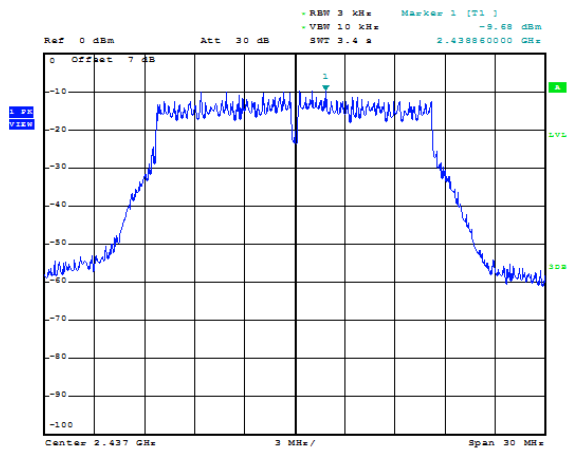
802.11b_Ant2_High



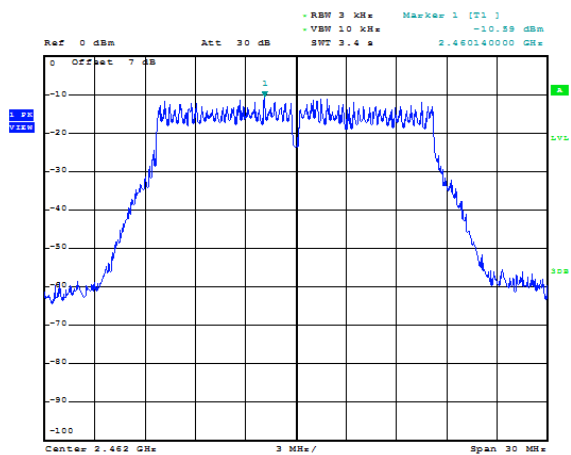
802.11g_Ant0_Low



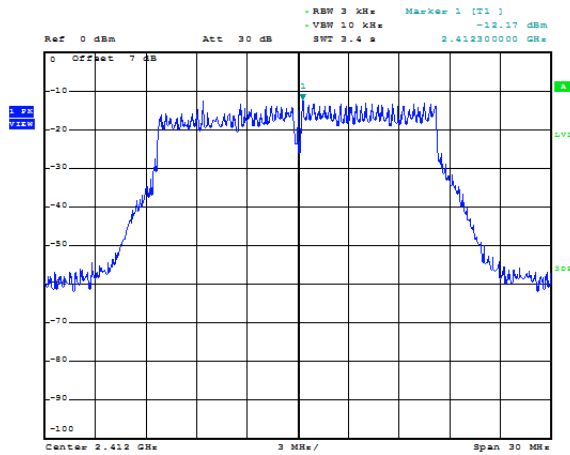
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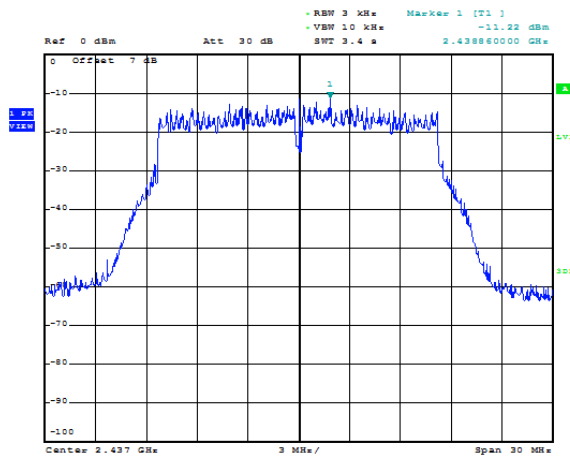
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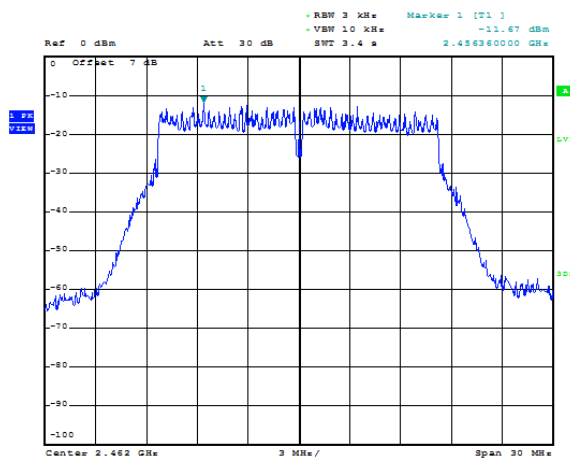
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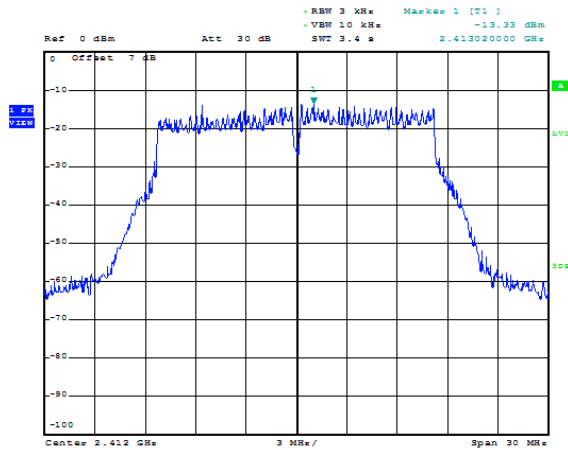
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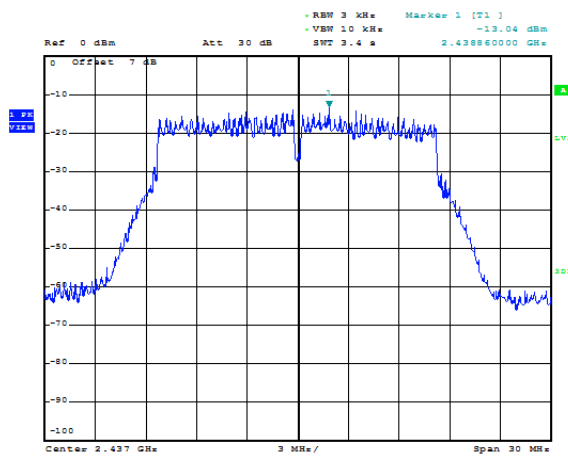
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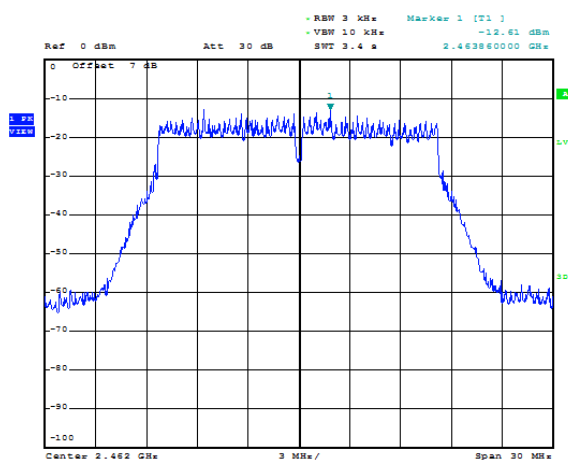
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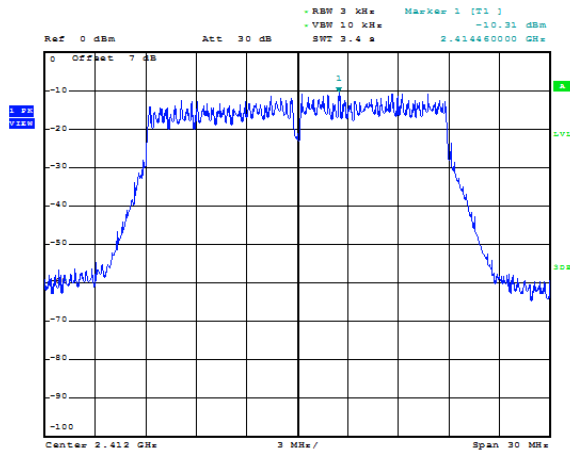
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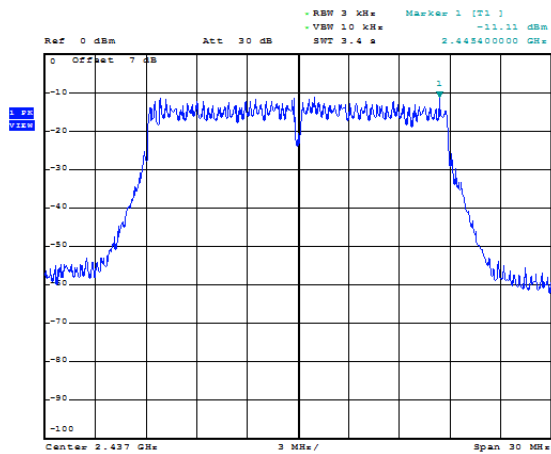
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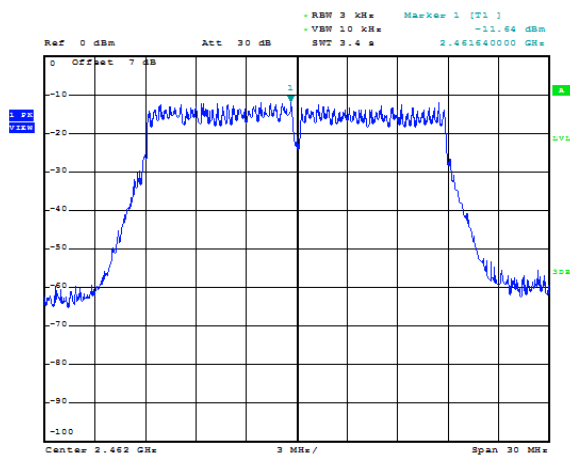
802.11n_HT20_Ant0_Low



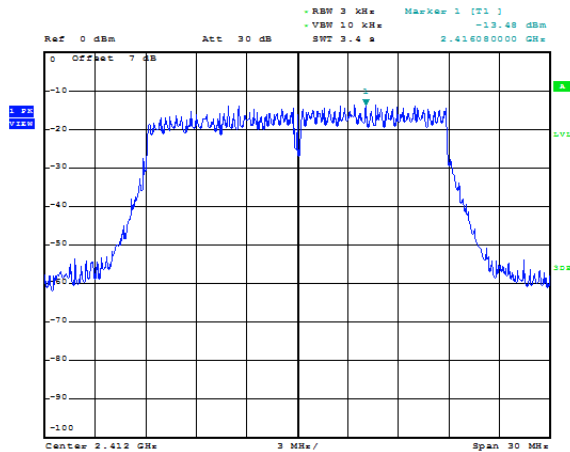
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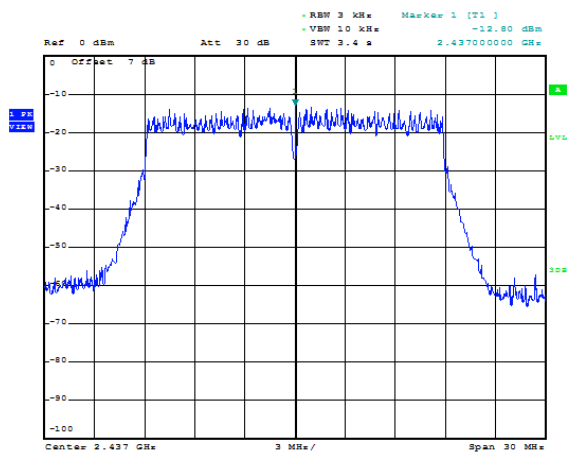
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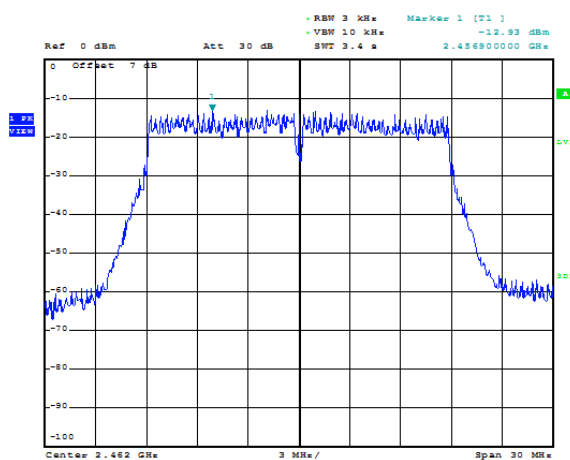
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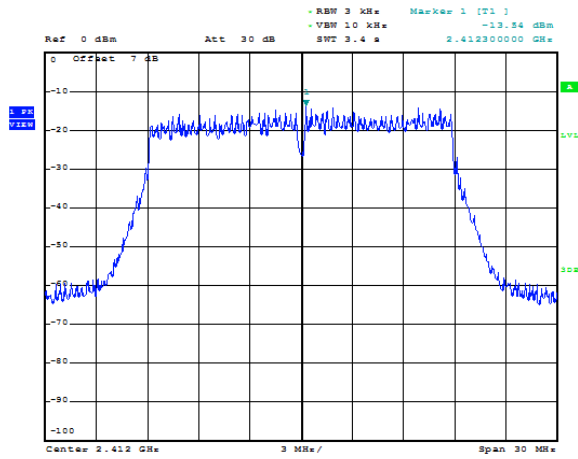
802.11n_HT20_Ant1_Middel



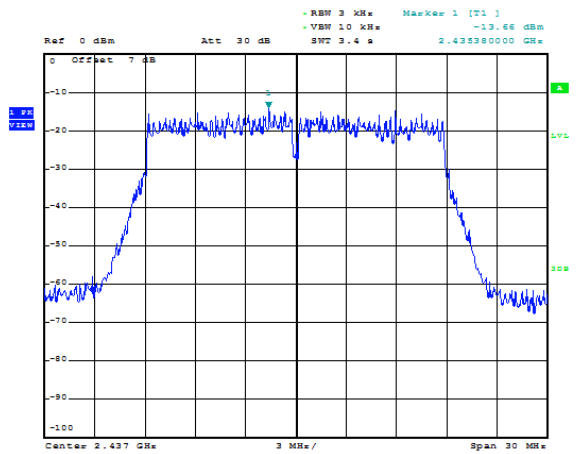
802.11n_HT20_Ant1_High



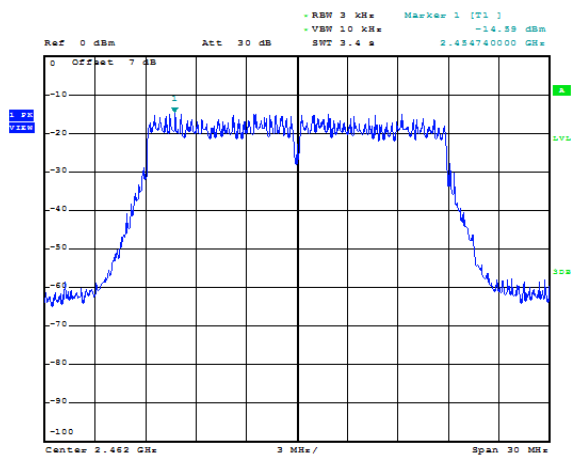
802.11n_HT20_Ant2_Low



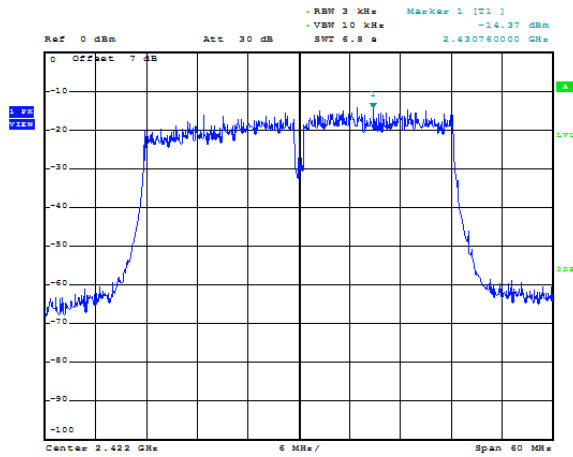
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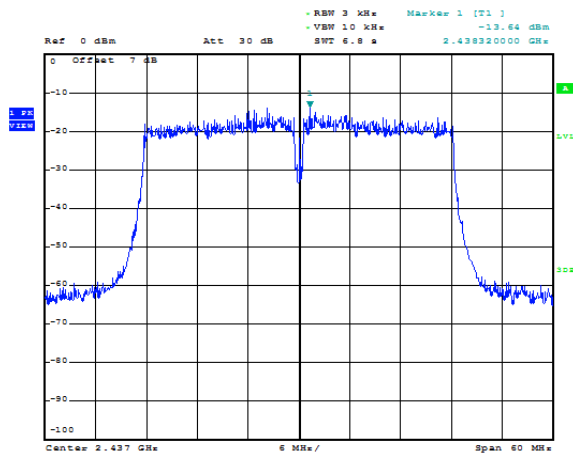
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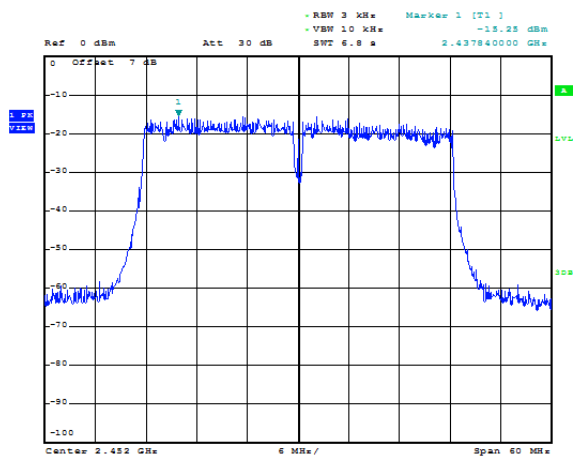
802.11n_HT40_Ant0_Low



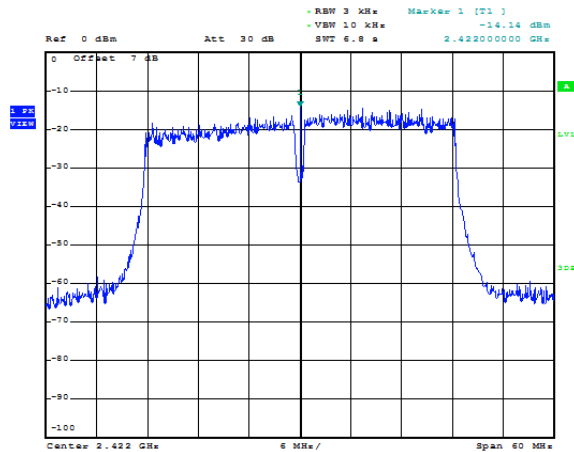
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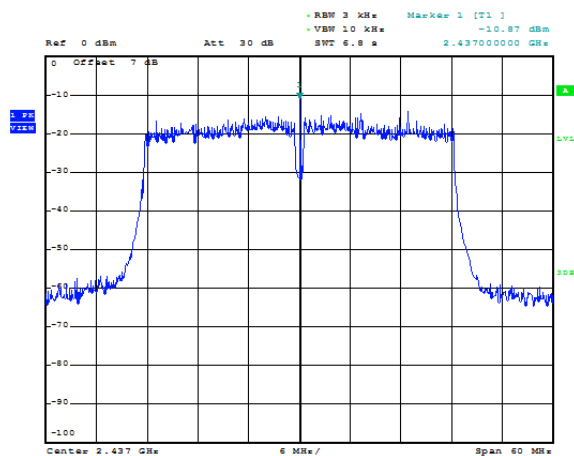
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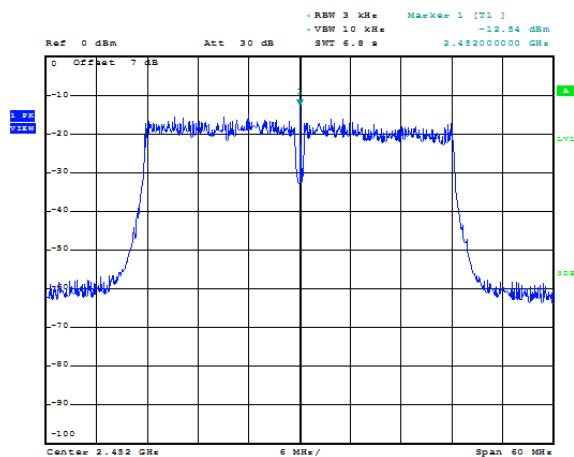
802.11n_HT40_Ant1_Low



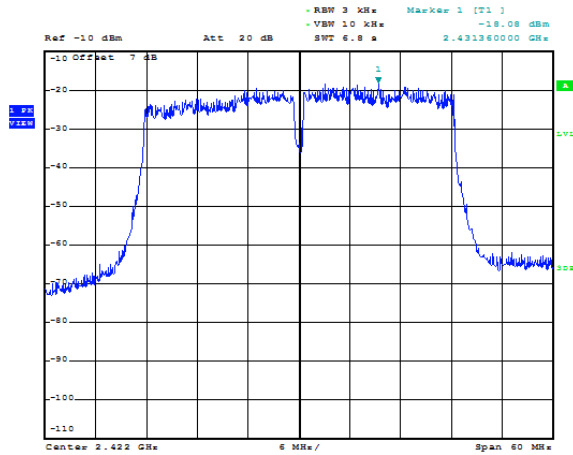
802.11n_HT40_Ant1_Middel



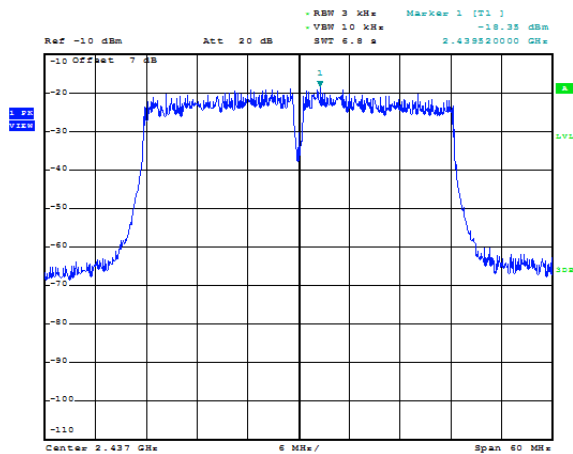
802.11n_HT40_Ant1_High



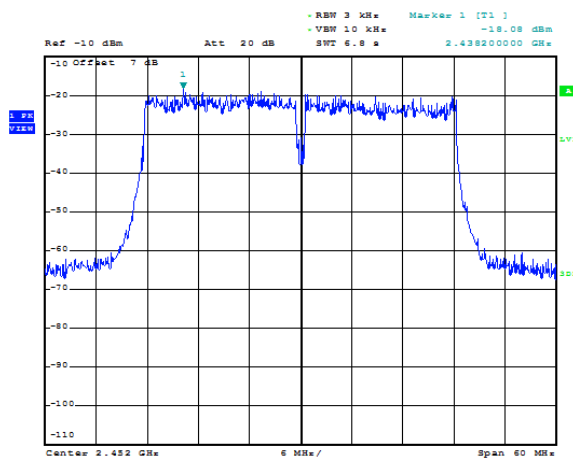
802.11n_HT40_Ant2_Low



802.11n_HT40_Ant2_Middel



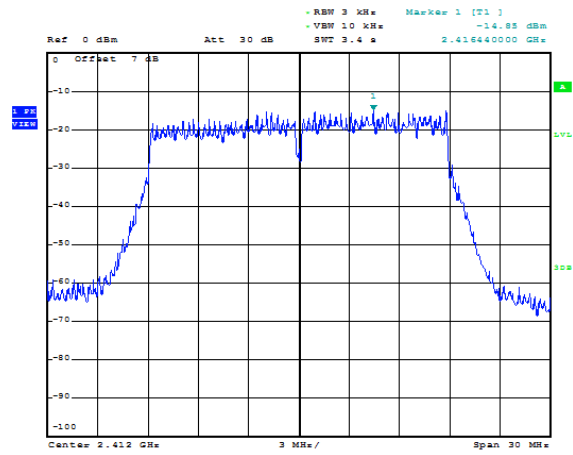
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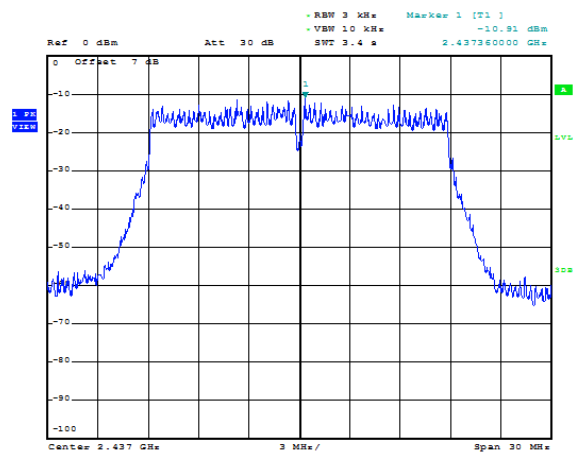
MIMO(2T2R)_HT20

Ant0+Ant1

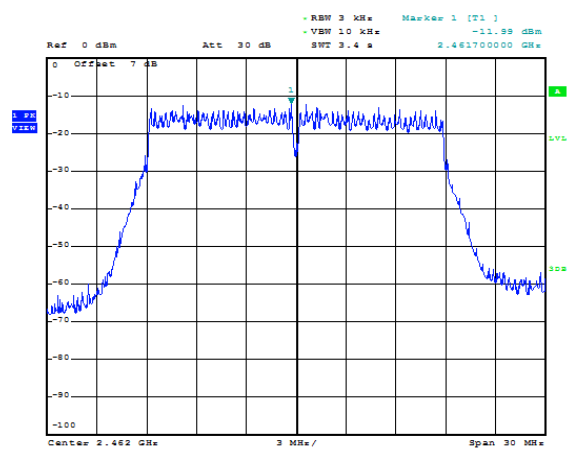
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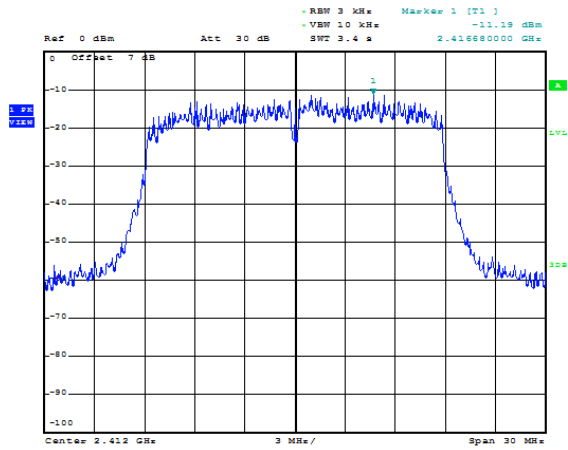
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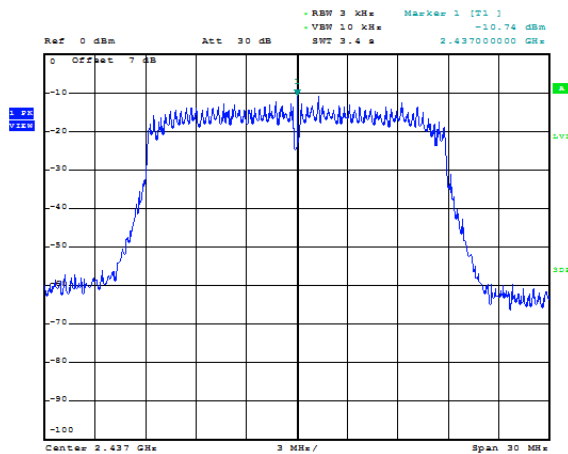
802.11n_Ant0_High



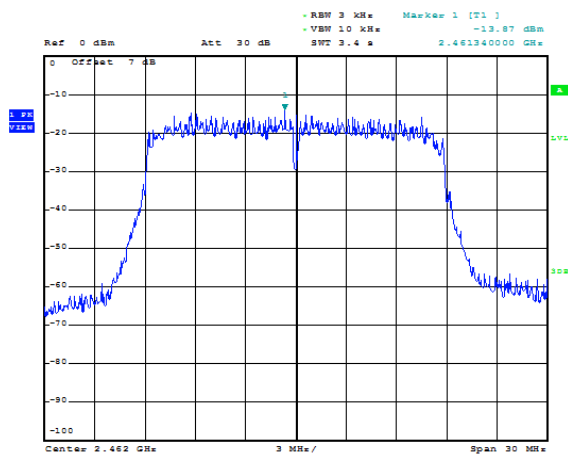
802.11n_Ant1_Low



802.11n_Ant1_Middel

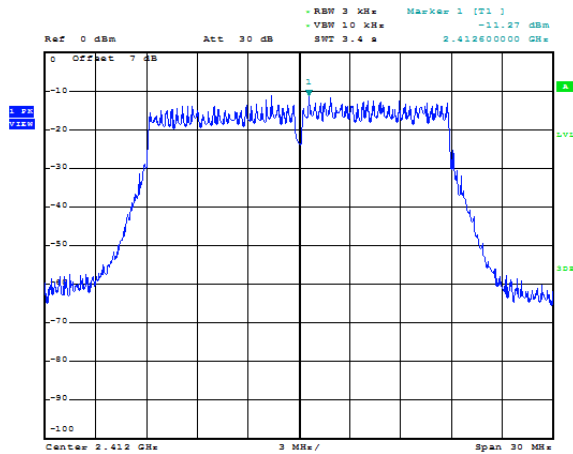


802.11n_Ant1_High

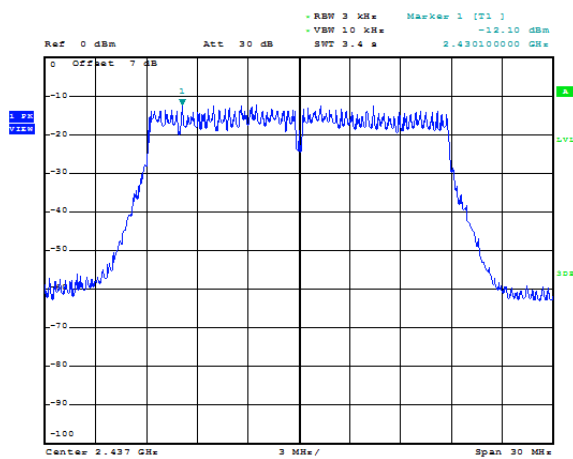


Ant0+Ant2

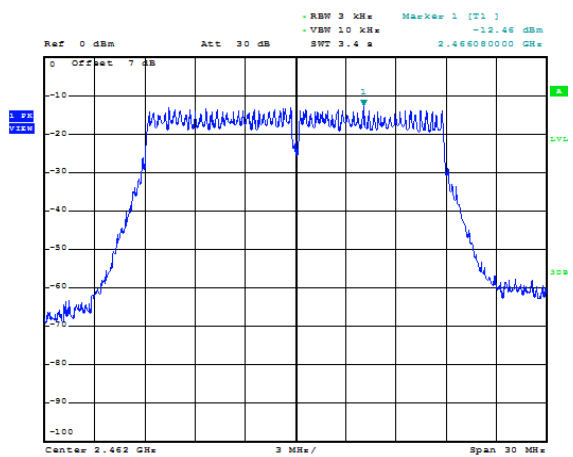
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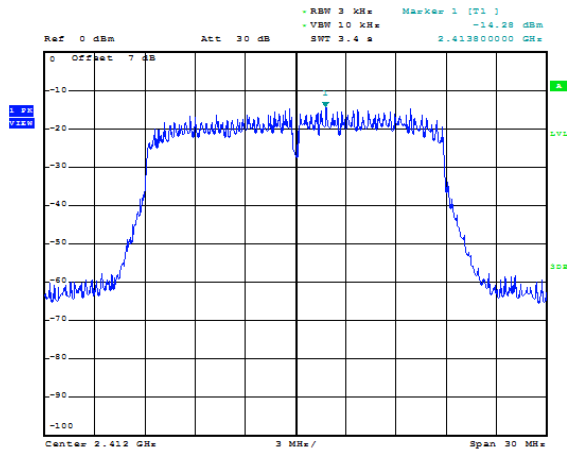
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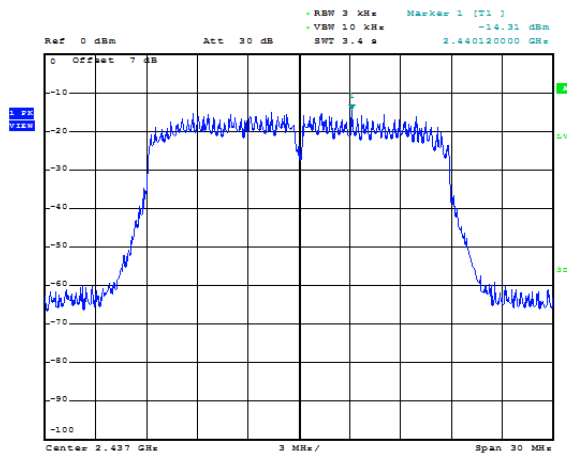
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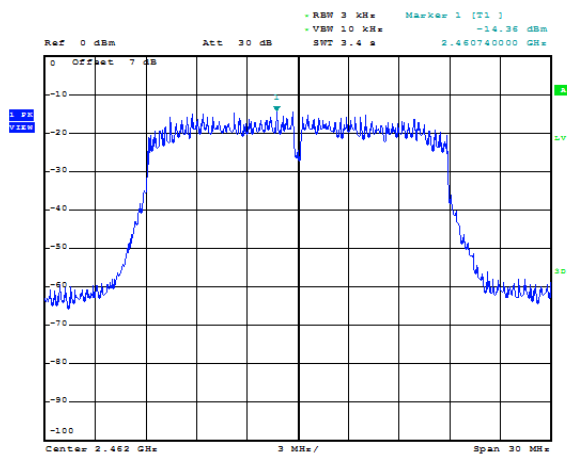
802.11n_Ant2_Low



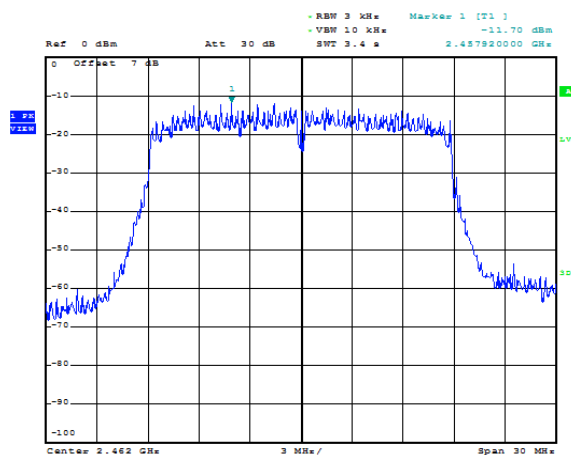
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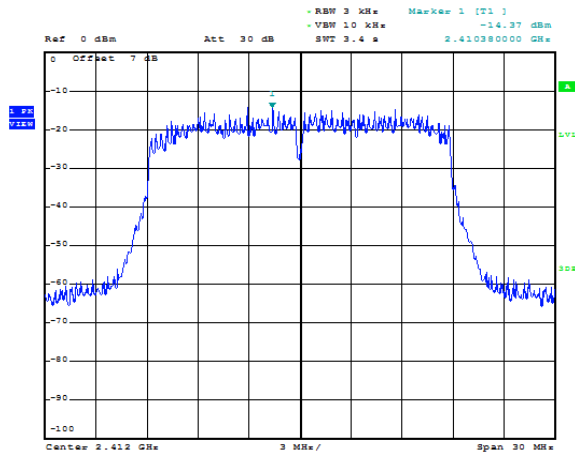
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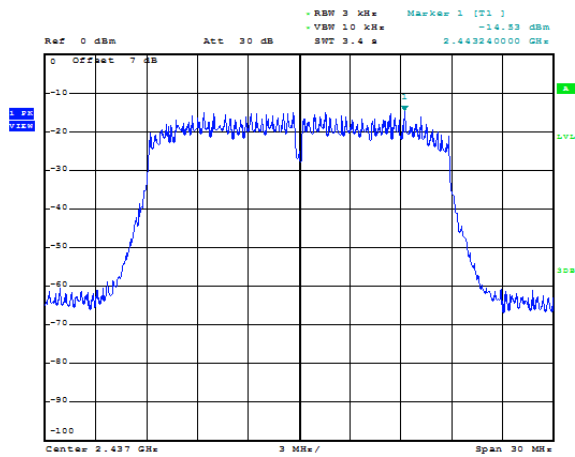
802.11n_Ant1_Low



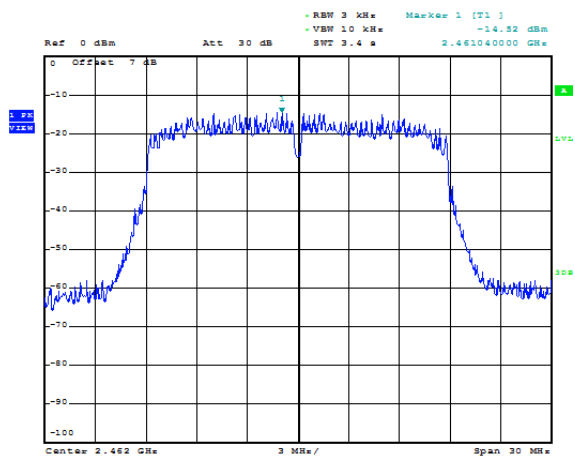
802.11n_Ant2_Low



802.11n_Ant2_Middel



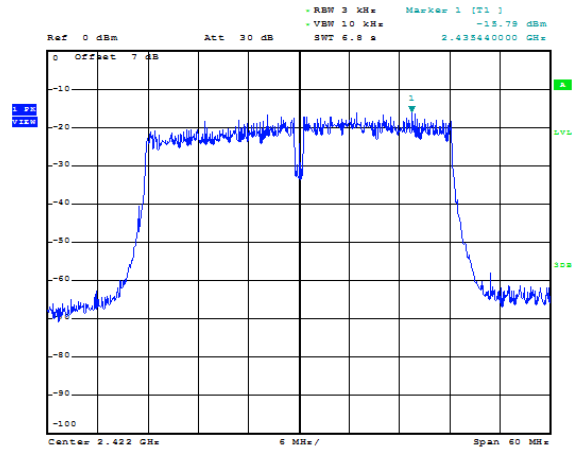
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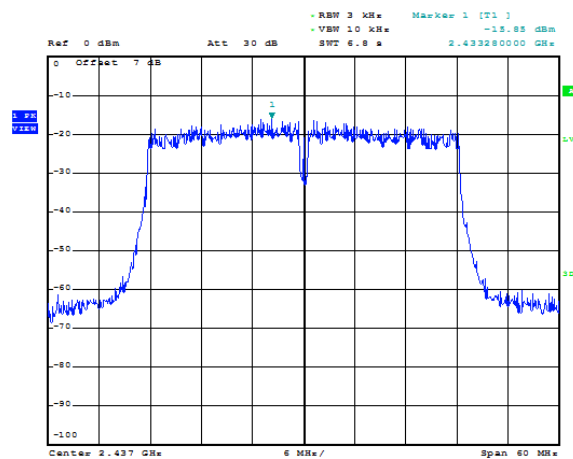
MIMO(2T2R)_HT40

Ant0+Ant1

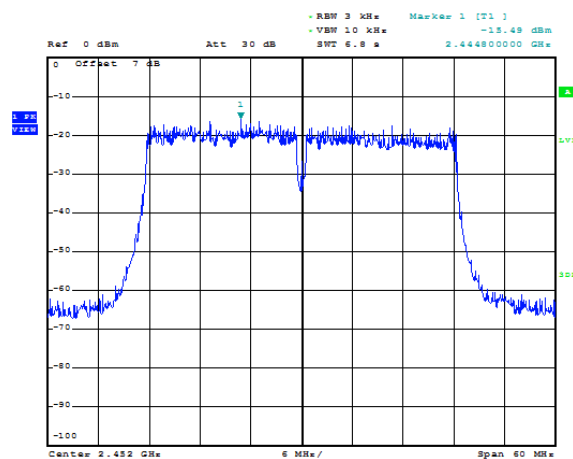
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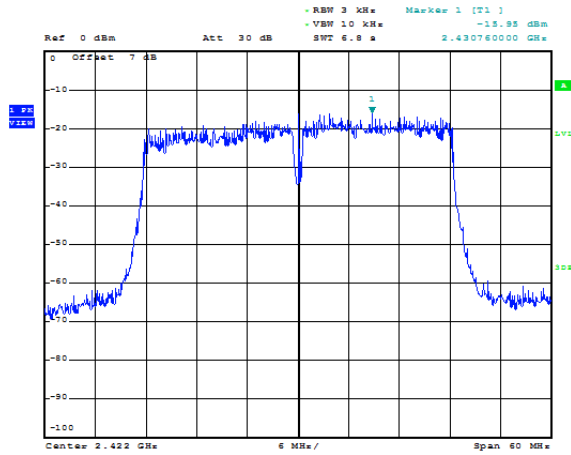
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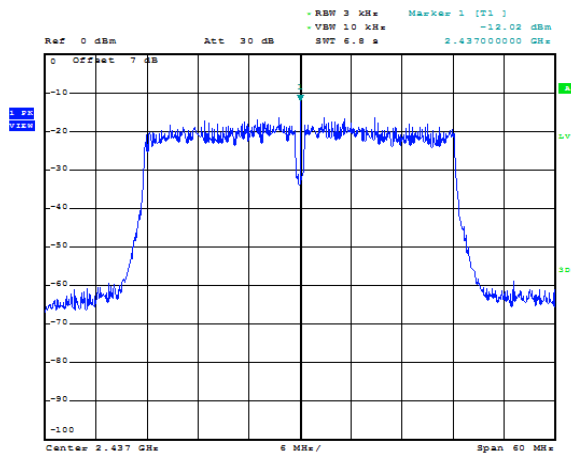
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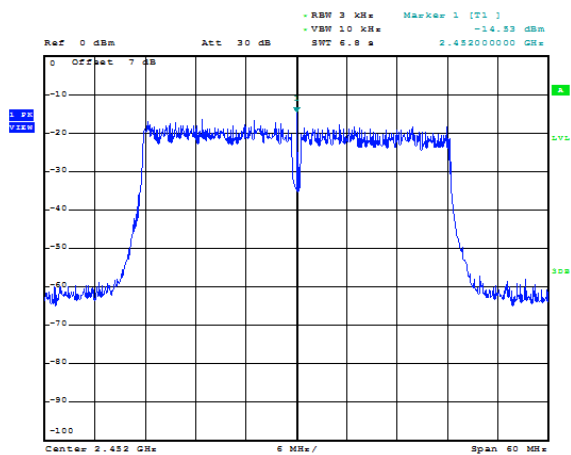
802.11n_Ant1_Low



802.11n_Ant1_Middel

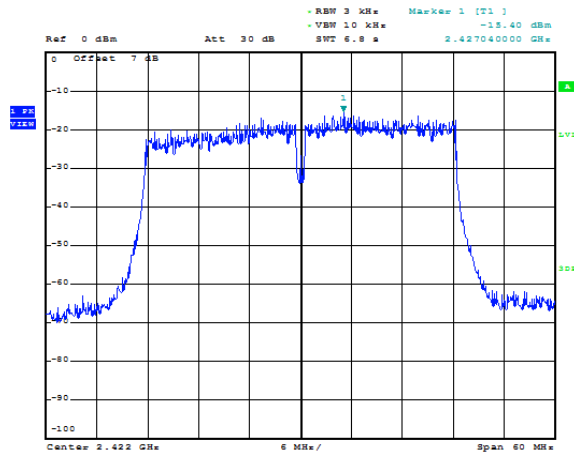


802.11n_Ant1_High

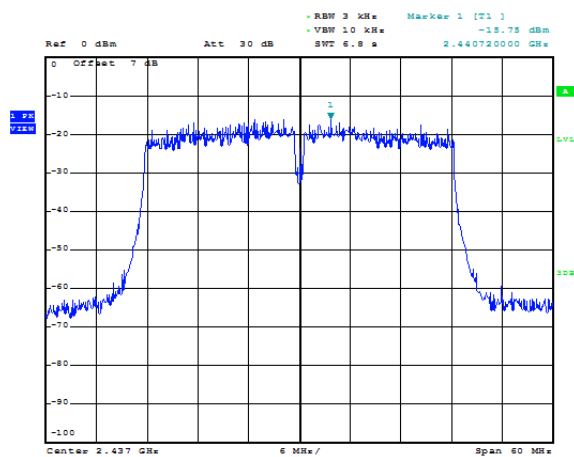


Ant0+Ant2

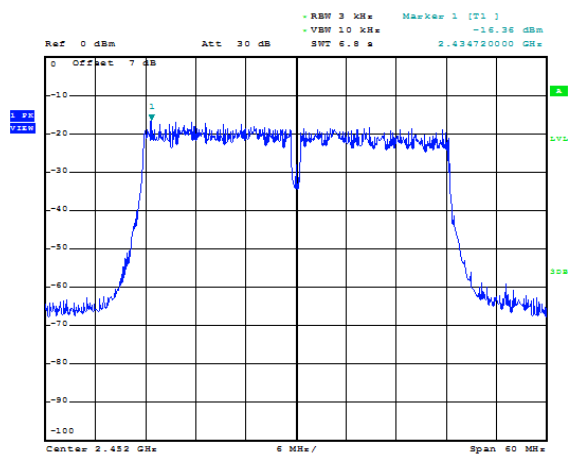
802.11n_Ant0_Low



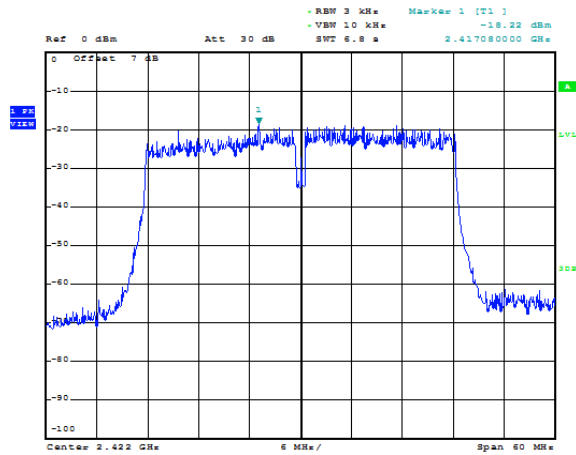
802.11n_Ant0_Middel



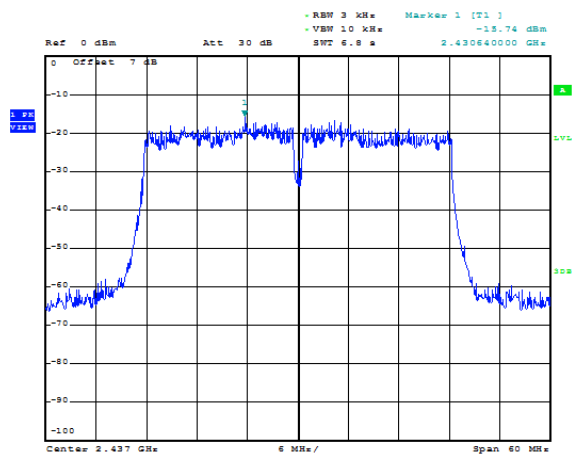
802.11n_Ant0_High



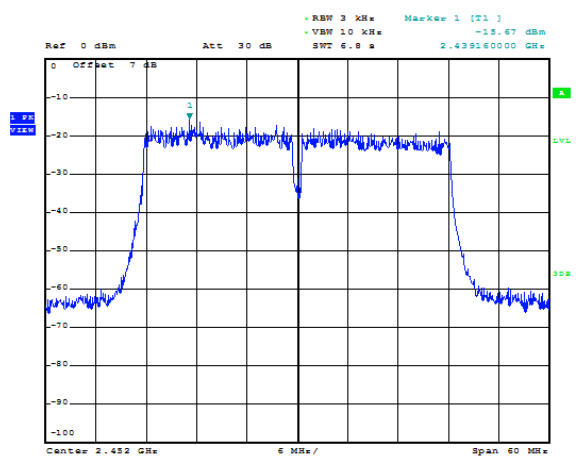
802.11n_Ant2_Low



802.11n_Ant2_Middel

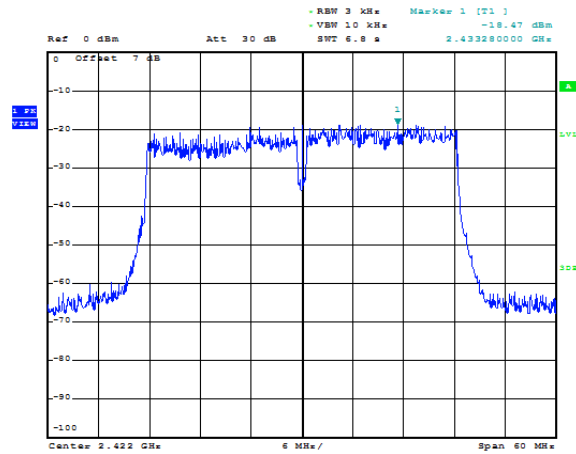


802.11n_Ant2_High

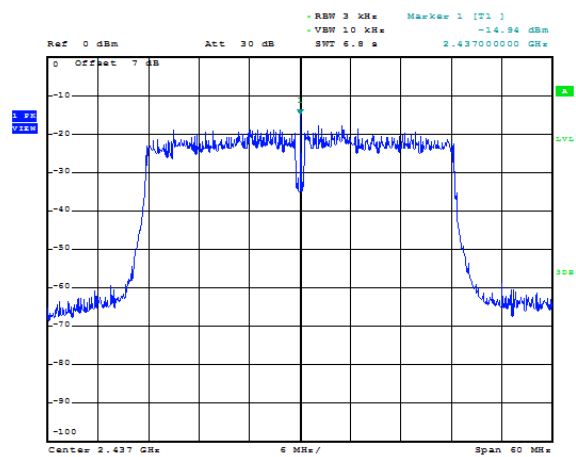


Ant1+Ant2

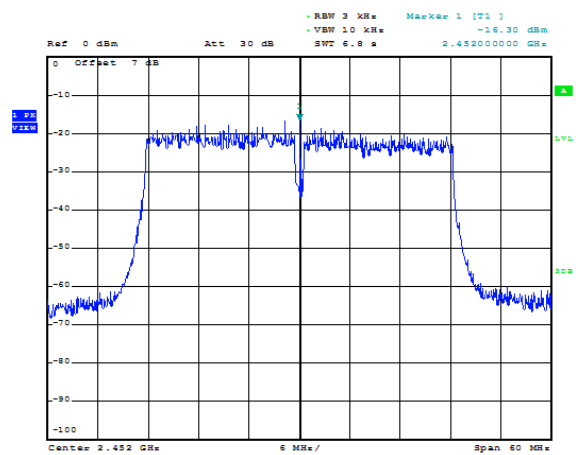
802.11n_Ant1_Low



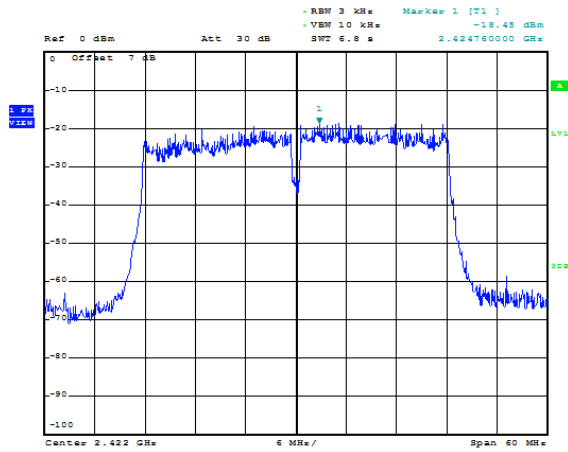
802.11n_Ant1_Middel



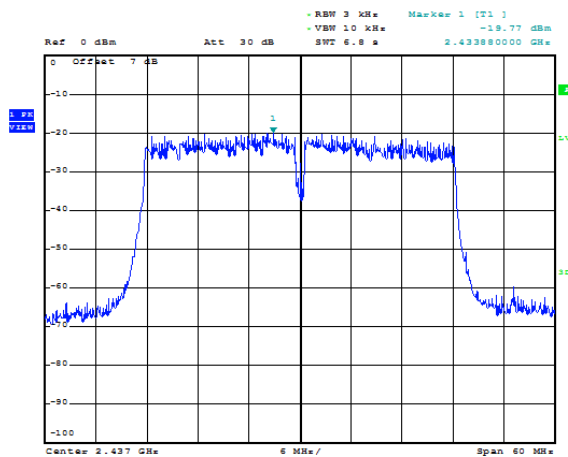
802.11n_Ant1_High



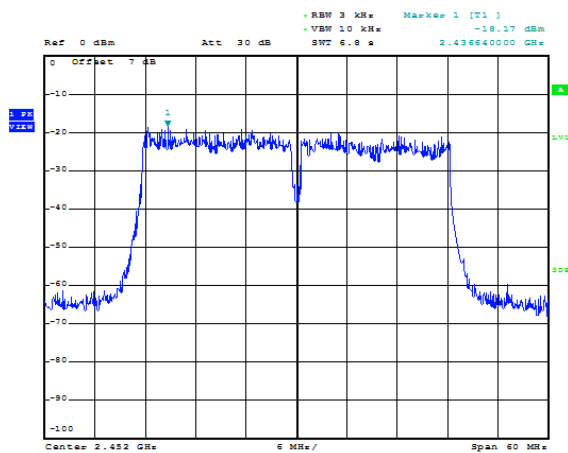
802.11n_Ant2_Low



802.11n_Ant2_Middel



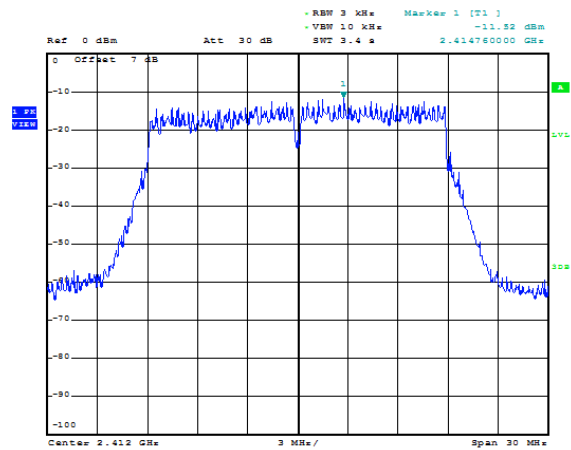
802.11n_Ant2_High



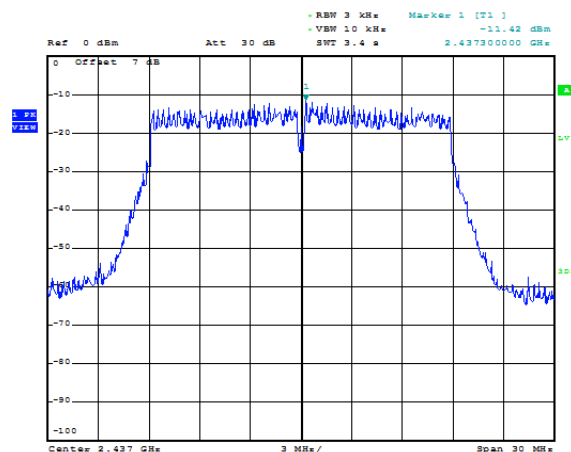
MIMO(3T3R)_HT20

Ant0+Ant1+Ant2

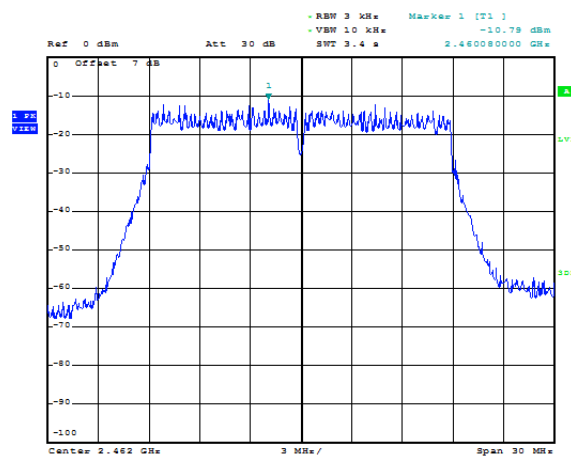
802.11n_Ant0_Low



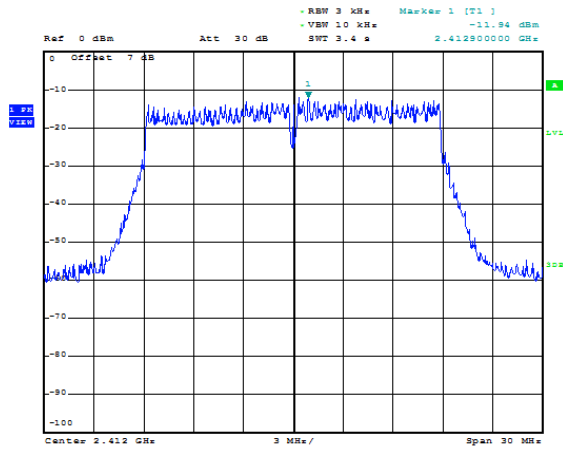
802.11n_Ant0_Middel



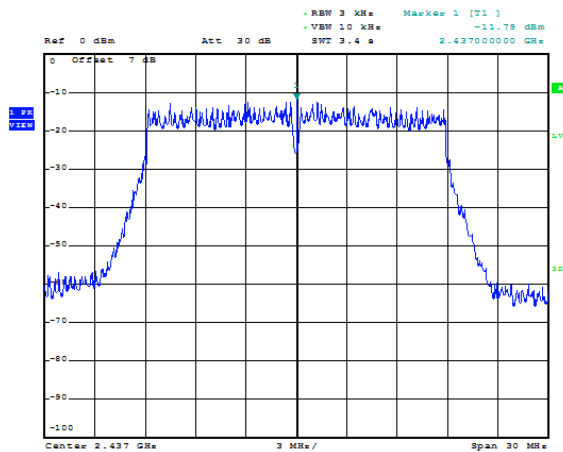
802.11n_Ant0_High



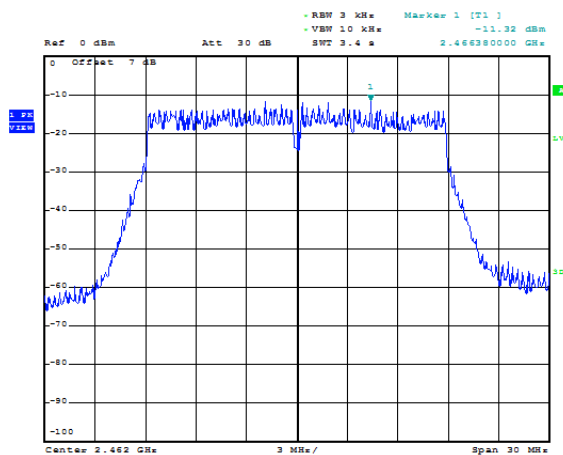
802.11n_Ant1_Low



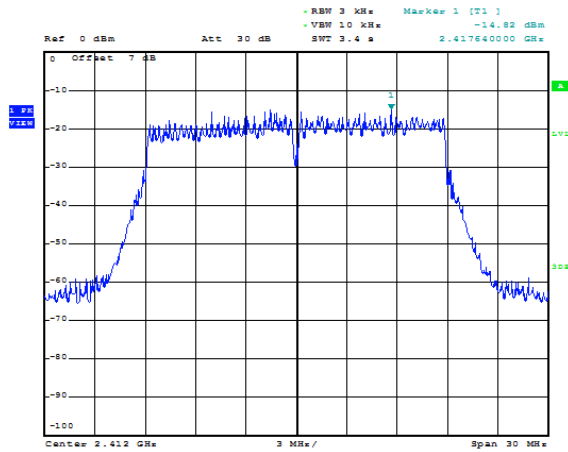
802.11n_Ant1_Middel



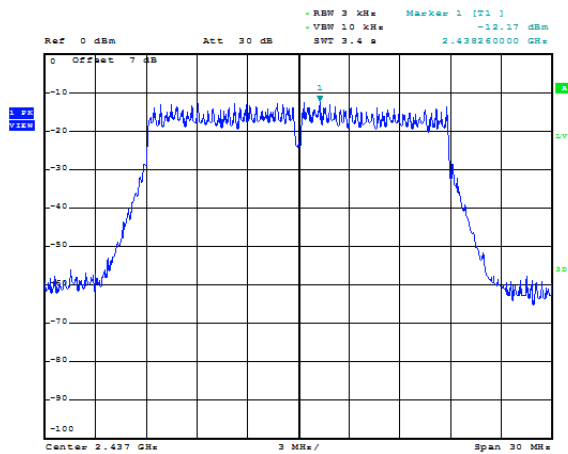
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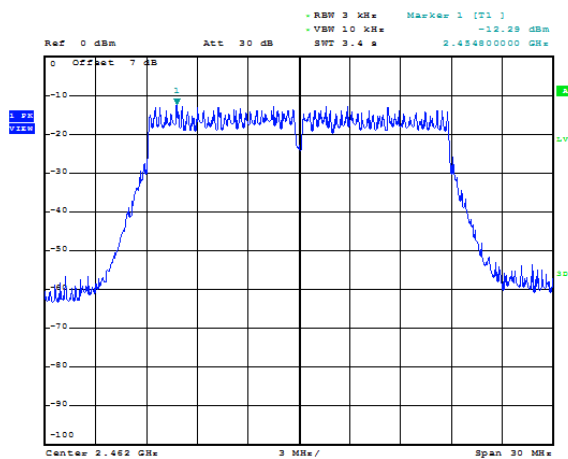
802.11n_Ant2_Low



802.11n_Ant2_Middel



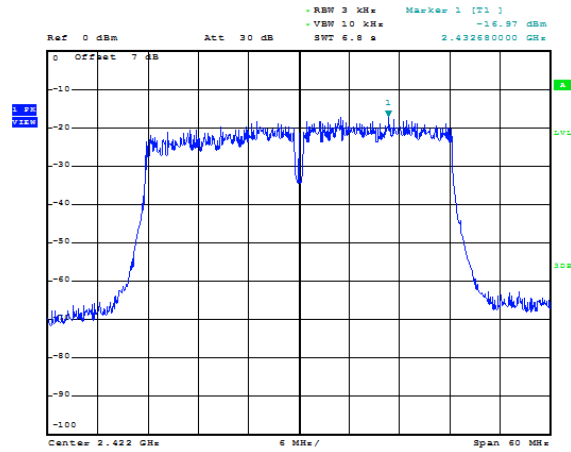
802.11n_Ant2_High



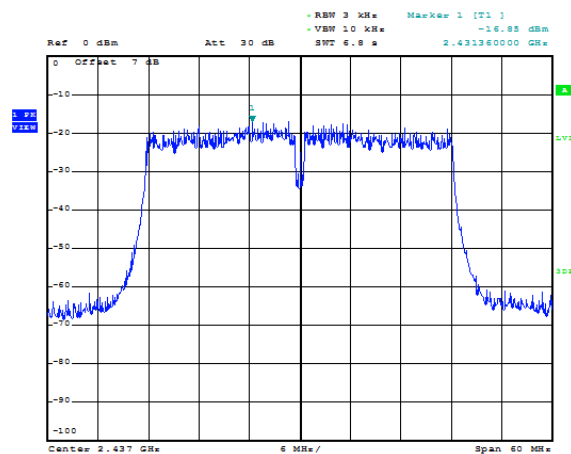
MIMO(3T3R)_HT40

Ant0+Ant1+Ant2

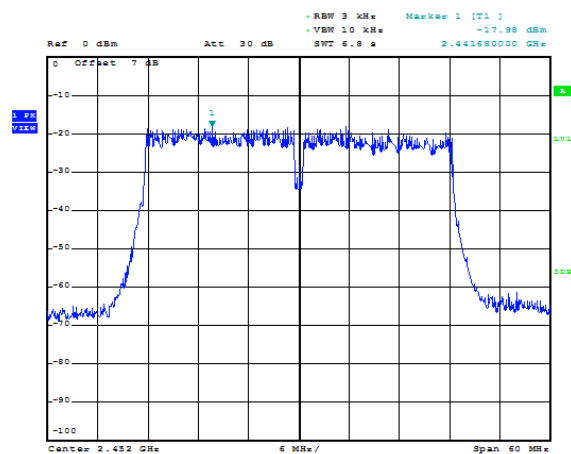
802.11n_Ant0_Low



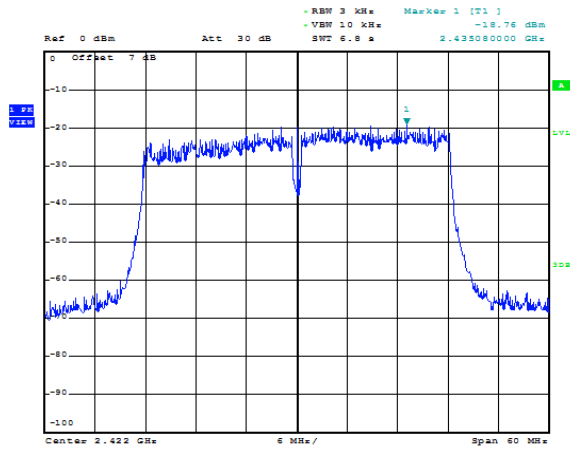
802.11n_Ant0_Middel



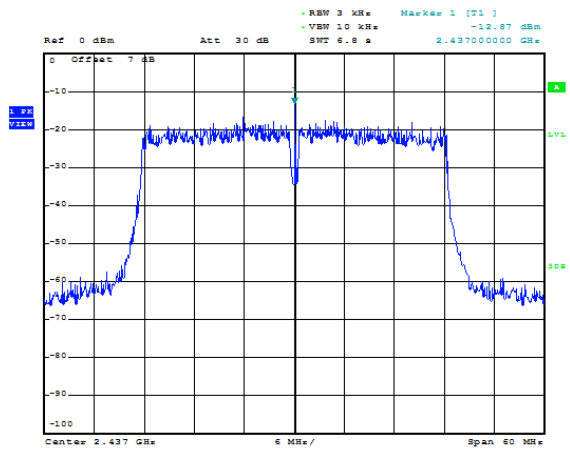
802.11n_Ant0_High



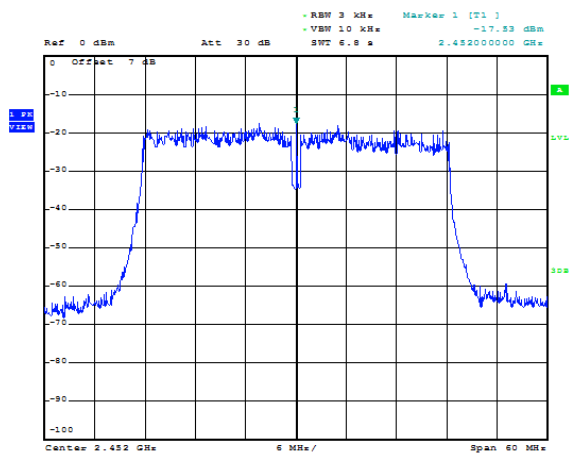
802.11n_Ant1_Low



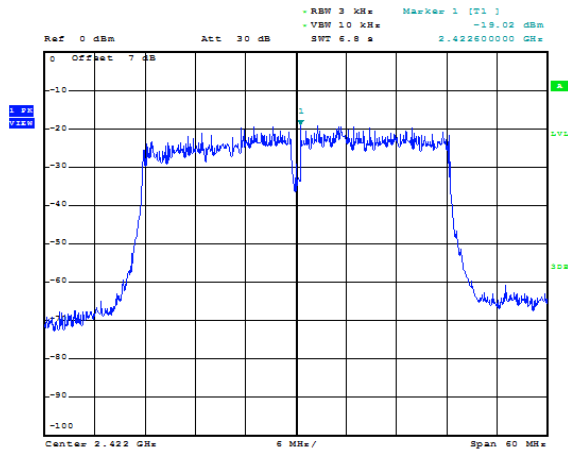
802.11n_Ant1_Middel



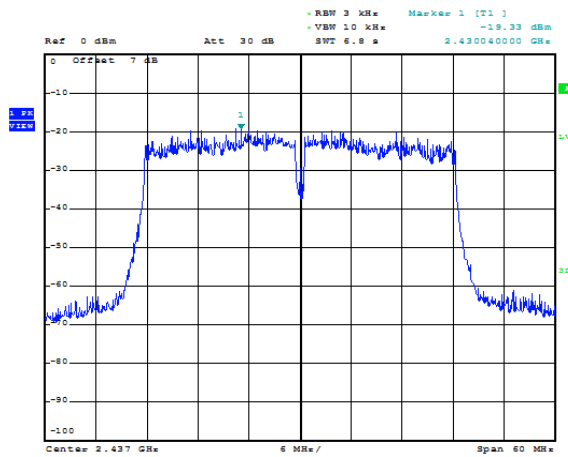
802.11n_Ant1_High



802.11n_Ant2_Low



802.11n_Ant2_Middel



802.11n_Ant2_High

