

# TEST REPORT

## FCC Part 15.247

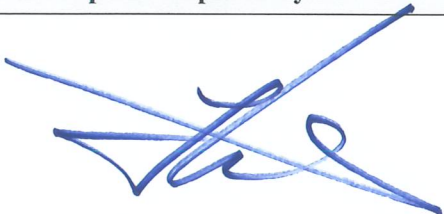
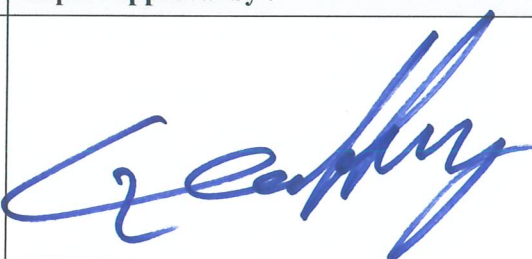
**Equipment under test** Q-CAST  
**Model name** CAST2300RH  
**FCC ID** 2AE98CAST2300RH  
**Applicant** QDIS CO., LTD.  
**Manufacturer** QDIS CO., LTD.  
**Date of test(s)** 2015.08.24 ~ 2015.10.02  
**Date of issue** 2015.11.03

**Issued to**  
**QDIS CO., LTD**

RM#404, B-Dong WooRimLionsValley, 168,  
Gasan Digital 1-ro, Geumchen-gu, Seoul, Korea

**Issued by**  
**KES Co., Ltd.**

C-3701, Simin-daero 365-40, Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea  
473-29, Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea  
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Test and report completed by :	Report approval by :
	
Hyeon-Su Jang Test engineer	Jeff Do Technical manager



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### Revision history

Revision	Date of issue	Test report No.	Description
-	2015.11.03	KES-RF-15T0083	Initial

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## 1. General information

Applicant: QDIS CO., LTD.  
Applicant address: RM#404, B-Dong WooRimLionsValley, 168,  
Gasam Digital 1-ro, Geumchen-gu, Seoul, Korea  
Test site: KES Co., Ltd.  
Test site address: C-3701, Simin-daero 365-40, Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea  
473-29, Gayeo-ro, Yeuju-si, Gyeonggi-do, 12658, Korea  
FCC rule part(s): 15.247  
Test device serial No.: ☐ Production ☒ Pre-production ☐ Engineering

### 1.1. EUT description

Equipment under test Q-CAST  
Frequency range 2412 MHz~ 2462 MHz (802.11 b/g/n\_HT20)  
2422 MHz~ 2452 MHz (802.11 n\_HT40)  
Model: CAST2300RH  
Modulation technique DSSS, OFDM  
Number of channels 11ch (802.11 b/g/n\_HT20), 9ch (802.11 n\_HT40)  
Antenna specification Antenna type: PCB Antenna // Peak gain: 0.38 dBi  
Power source DC 5 V

### 1.2. Frequency/channel operations

Ch.	Frequency (MHz)	Mode
1	2 412	11b/g/n_HT20
.	.	.
6	2 437	11b/g/n_HT20
.	.	.
11	2 462	11b/g/n_HT20

Ch.	Frequency (MHz)	Mode
3	2 422	11n_HT40
.	.	.
6	2 437	11n_HT40
.	.	.
9	2 452	11n_HT40

### 1.3 Device information

- The device duty cycles are as follows:  
802.11b/g/n\_HT20, 40 ≥ 98 percent.

## 2. Summary of tests

Reference	Test description	Test results
15.205, 15.209	Radiated restricted band and emission	Pass
15.207(d)	Conducted band edge and out of band emissions	Pass
15.247(a)(2)	6 dB bandwidth	Pass
15.247(b)(3)	Peak output power	Pass
15.247(e)	Power spectral density	Pass
15.207	AC conducted emissions	Pass

### Test procedures;

The EUT was tested per the guidance of ANSI C63.10-2009 was used to reference the appropriate EUT setup for radiated spurious emissions testing, the guidance provided in KDB 558074\_v03r03 were used in the measurement of the EUT.

### Pre-scanned maximum output power

Preliminary tests were performed in different data rate as below table and the highest power data rates(802.11b, 802.11g, 802.11n\_HT20, 802.11n\_HT40) were chosen for full test in the following section to demonstrate compliance to the FCC limit line.

#### 802.11b

channel	Detector mode	Conducted power(dB m)			
		Data rate(Mbps)			
		1	2	5.5	11
Low	Peak	15.77	15.75	15.74	15.65
Middle		16.08	16.05	16.04	16.05
High		16.28	16.23	16.19	16.17

#### 802.11g

channel	Detector mode	Conducted power(dB m)							
		Data rate(Mbps)							
		6	9	12	18	24	36	48	54
Low	Peak	19.17	19.12	19.04	18.85	18.75	18.90	18.89	18.65
Middle		19.35	19.31	19.18	19.15	19.20	19.22	19.14	19.07
High		19.64	19.53	19.57	19.49	19.50	19.40	19.31	19.38

#### 802.11n(HT20)

Test mode	Detector mode	Conducted power(dB m)							
		Data rate(Mbps)							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Low	Peak	18.31	18.20	18.14	18.21	18.19	18.15	18.20	18.10
Middle		18.79	18.77	18.66	18.46	18.55	18.42	18.58	18.37
High		18.99	18.83	18.70	18.72	18.68	18.55	18.58	18.44

#### 802.11n(HT40)

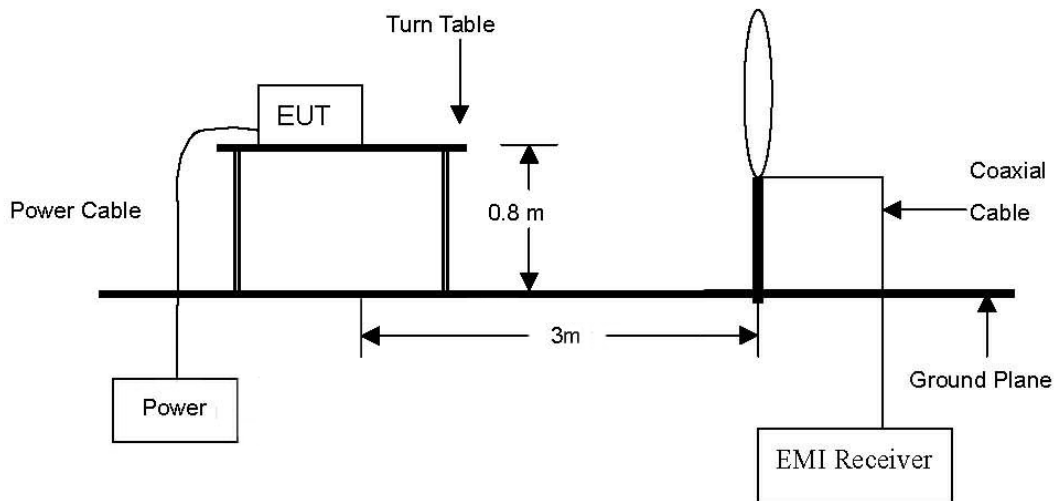
channel	Detector mode	Conducted power(dB m)							
		Data rate(Mbps)							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Low	Peak	18.15	18.13	18.05	18.12	17.98	18.05	18.11	18.11
Middle		18.28	18.20	18.22	18.25	18.13	18.10	18.24	18.22
High		18.88	18.79	18.70	18.75	18.62	18.69	18.84	18.74

### 3. Test results

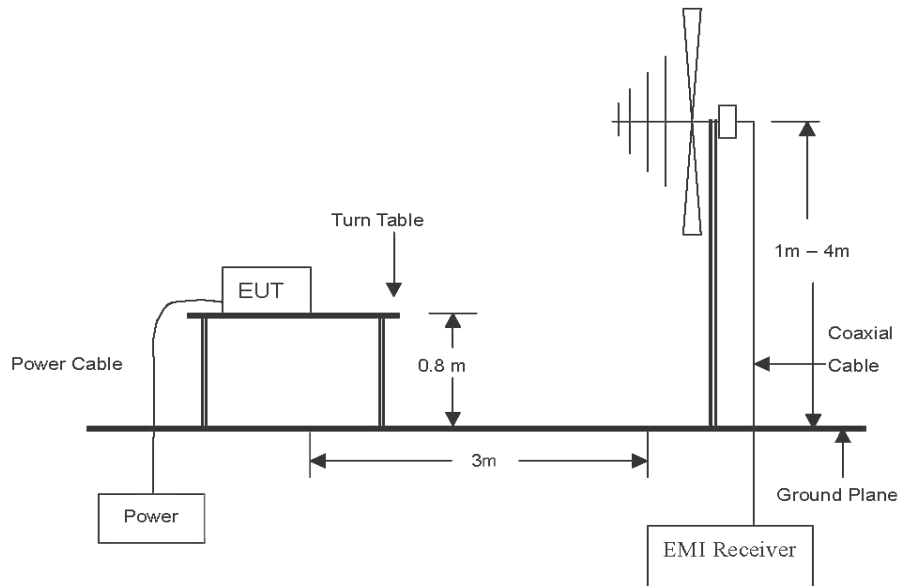
#### 3.1. Radiated restricted band and emissions

##### Test setup

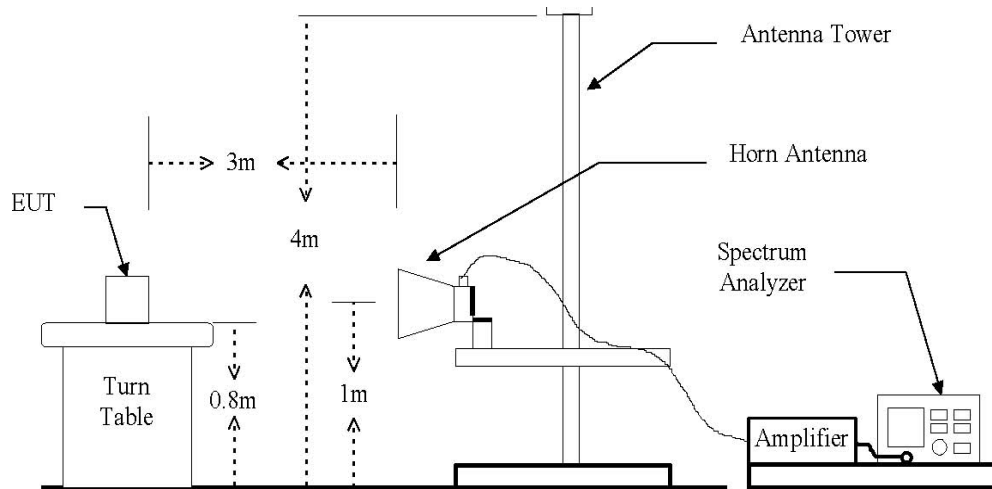
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 24 GHz emissions.



### Test procedure

Radiated emissions from the EUT were measured according to the dictates in section 11.0 & 12.0 of KDB 558074\_v03r03 and ANSI C63.4-2009

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site or open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission below 1GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 3 meter away from the interference receiving antenna.
3. The antenna is a broadband antenna, and its height is varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be retested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

### Note.

All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

#### 1. Average Field Strength Measurements per Section 12.2.5.1

Analyzer center frequency was set to the frequency of the radiated spurious emission of interest.

Set RBW = 1 MHz.

Set VBW = 3 MHz ( $\geq 3 \times \text{RBW}$ ).

Set detector = power average(RMS).

Set sweep time = auto.

Trace (RMS) averaging was performed over at least 100 traces.

#### 2. Peak Field Strength Measurements per Section 12.2.4

Analyzer center frequency was set to the frequency of the radiated spurious emission of interest.

Set RBW = 1 MHz.

Set VBW = 3 MHz ( $\geq 3 \times \text{RBW}$ ).

Set detector = Peak.

Set sweep time = auto.

Trace mode = max hold.

Allow sweeps to continue until the trace stabilizes.

### Limit

According to 15.209(a), for an intentional radiator devices, the general required of 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 ( $\mu\text{V/m}$ )
0.009 ~ 0.490	300	2 400 / F(kHz)
0.490 ~ 1.705	30	24 000 / F(kHz)
1.705 ~ 30.0	30	30
30 ~ 88	3	100**
88 ~ 216	3	150**
216 ~ 960	3	200**
Above 960	3	500

\*\*Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 ~ 72 MHz, 76 ~ 88 MHz, 174 ~ 216 MHz or 470 ~ 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

### Test results (Below 30 MHz)

Mode:	802.11 g
Transfer rate:	6 Mbps
Distance of measurement:	3 meter
Operating frequency:	2 462 MHz (Worst case)
Channel:	11

Frequency (MHz)	Level (dB $\mu$ V)	Ant. Pol.	Correction factors (dB/m)	F <sub>d</sub> (dB)	Field strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
No signal detected							

### Test results (Below 1 000 MHz)

Mode:	802.11 g
Transfer rate:	6 Mbps
Distance of measurement:	3 meter
Operating frequency:	2 462 MHz (Worst case)
Channel:	11

Radiated emissions		Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB $\mu$ V)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Actual (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
96.930	24.29	H	11.00	2.51	37.80	43.50	5.70
221.090	22.34	H	11.77	4.06	38.17	46.00	7.83
336.520	13.00	V	14.23	5.13	32.36	46.00	13.64
380.170	17.27	H	15.24	5.55	38.06	46.00	7.94
450.980	16.35	H	16.41	6.19	38.95	46.00	7.05
528.580	14.61	V	17.73	6.81	39.15	46.00	6.85

### Note.

1. All spurious emission at channels are almost the same below 1 GHz, so that high channel was chosen at representative in final test.
2. Actual = Reading + Ant. factor + Cable loss
3. Detector mode: Quasi peak
4. To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.

### Test results (Above 1 000 MHz)

Mode: 802.11b  
Transfer rate: 1 Mbps  
Operating frequency: 2 412 MHz

Frequency (MHz)	Level (dBμV)	Detect	Ant. Pol.	Correction factors (dB/m)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2387.90	45.18	Peak	H	-0.96	44.22	74.00	29.78
2387.90	44.36	Peak	V	-0.96	43.40	74.00	30.60
4824.00	51.65	Peak	H	8.21	59.86	74.00	14.14
4824.00	34.43	Avg	H	8.21	42.64	54.00	11.36
4824.00	42.28	Peak	V	8.21	50.49	74.00	23.51

Mode: 802.11b  
Transfer rate: 1 Mbps  
Operating frequency: 2 437 MHz

Frequency (MHz)	Level (dBμV)	Detect	Ant. Pol.	Correction factors (dB/m)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4874.00	47.86	Peak	H	8.57	56.43	74.00	17.57
4874.00	34.97	Avg	H	8.57	43.54	54.00	10.46
4874.00	41.11	Peak	V	8.57	49.68	74.00	24.32

Mode: 802.11b  
Transfer rate: 1 Mbps  
Operating frequency: 2 462 MHz

Frequency (MHz)	Level (dBμV)	Detect	Ant. Pol.	Correction factors (dB/m)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2487.70	46.25	Peak	H	-0.43	45.82	74.00	28.18
2487.70	45.58	Peak	V	-0.43	45.15	74.00	28.85
4924.00	49.87	Peak	H	8.93	58.80	74.00	15.20
4924.00	35.60	Avg	H	8.93	44.53	54.00	9.47
4924.00	42.02	Peak	V	8.93	50.95	74.00	23.05



Mode: 802.11g  
Transfer rate: 6 Mbps  
Operating frequency: 2 412 MHz

Frequency (MHz)	Level (dBμV)	Detect	Ant. Pol.	Correction factors (dB/m)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2389.80	45.72	Peak	H	-0.95	44.77	74.00	29.23
2389.80	44.98	Peak	V	-0.95	44.03	74.00	29.97
4824.00	43.55	Peak	H	8.21	51.76	74.00	22.24
4824.00	40.28	Peak	V	8.21	48.49	74.00	25.51

Mode: 802.11g  
Transfer rate: 6 Mbps  
Operating frequency: 2 437 MHz

Frequency (MHz)	Level (dBμV)	Detect	Ant. Pol.	Correction factors (dB/m)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4874.00	40.18	Peak	H	8.57	48.75	74.00	25.25
4874.00	39.95	Peak	V	8.57	48.52	74.00	25.48

Mode: 802.11g  
Transfer rate: 6 Mbps  
Operating frequency: 2 462 MHz

Frequency (MHz)	Level (dBμV)	Detect	Ant. Pol.	Correction factors (dB/m)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2483.70	47.12	Peak	H	-0.45	46.67	74.00	27.33
2483.70	46.30	Peak	V	-0.45	45.85	74.00	28.15
4924.00	40.69	Peak	H	8.93	49.62	74.00	24.38
4924.00	39.89	Peak	V	8.93	48.82	74.00	25.18

Mode: 802.11n (HT20)  
Transfer rate: 64 Mbps  
Operating frequency: 2 412 MHz

Frequency (MHz)	Level (dBμV)	Detect	Ant. Pol.	Correction factors (dB/m)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2389.80	45.80	Peak	H	-0.95	44.85	74.00	29.15
2389.80	45.22	Peak	V	-0.95	44.27	74.00	29.73
4824.00	41.89	Peak	H	8.21	50.10	74.00	23.90
4824.00	40.25	Peak	V	8.21	48.46	74.00	25.54

Mode: 802.11n (HT20)  
Transfer rate: 64 Mbps  
Operating frequency: 2 437 MHz

Frequency (MHz)	Level (dBμV)	Detect	Ant. Pol.	Correction factors (dB/m)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4874.00	41.33	Peak	H	8.57	49.90	74.00	24.10
4874.00	40.56	Peak	V	8.57	49.13	74.00	24.87

Mode: 802.11n (HT20)  
Transfer rate: 64Mbps  
Operating frequency: 2 462 MHz

Frequency (MHz)	Level (dBμV)	Detect	Ant. Pol.	Correction factors (dB/m)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2483.70	47.05	Peak	H	-0.45	46.60	74.00	27.40
2483.70	46.11	Peak	V	-0.45	45.66	74.00	28.34
4924.00	41.20	Peak	H	8.93	50.13	74.00	23.87
4924.00	40.73	Peak	V	8.93	49.66	74.00	24.34



Mode: 802.11n (HT40)  
Transfer rate: 64 Mbps  
Operating frequency: 2 422 MHz

Frequency (MHz)	Level (dBμV)	Detect	Ant. Pol.	Correction factors (dB/m)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2389.40	46.14	Peak	H	-0.95	45.19	74.00	28.81
2389.40	45.45	Peak	V	-0.95	44.50	74.00	29.50
4844.00	41.46	Peak	H	8.21	49.67	74.00	24.33
4844.00	41.01	Peak	V	8.21	49.22	74.00	24.78

Mode: 802.11n (HT40)  
Transfer rate: 64 Mbps  
Operating frequency: 2 437 MHz

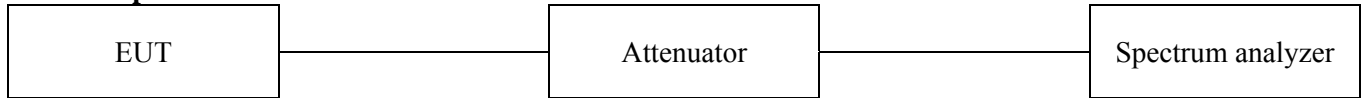
Frequency (MHz)	Level (dBμV)	Detect	Ant. Pol.	Correction factors (dB/m)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4874.00	41.08	Peak	H	8.57	49.65	74.00	24.35
4874.00	40.55	Peak	V	8.57	49.12	74.00	24.88

Mode: 802.11n (HT40)  
Transfer rate: 64 Mbps  
Operating frequency: 2 452 MHz

Frequency (MHz)	Level (dBμV)	Detect	Ant. Pol.	Correction factors (dB/m)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2485.00	46.37	Peak	H	-0.44	45.93	74.00	28.07
2485.00	45.81	Peak	V	-0.44	45.37	74.00	28.63
4904.00	41.95	Peak	H	8.78	50.73	74.00	23.27
4904.00	40.82	Peak	V	8.78	49.60	74.00	24.40

### 3.2. Conducted spurious emissions & band edge

#### Test setup



#### Test procedure

All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.

Per the guidance of KDB 558074\_v03r03, section 11.2&11.3,

1. Use the following spectrum analyzer setting

Center frequency: Low and high channel.

Set the span to encompass frequency range to be measured.

Set the RBW = 100 kHz.

Set the VBW = 300 kHz ( $\geq 3 \times$  RBW).

Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum PSD level.

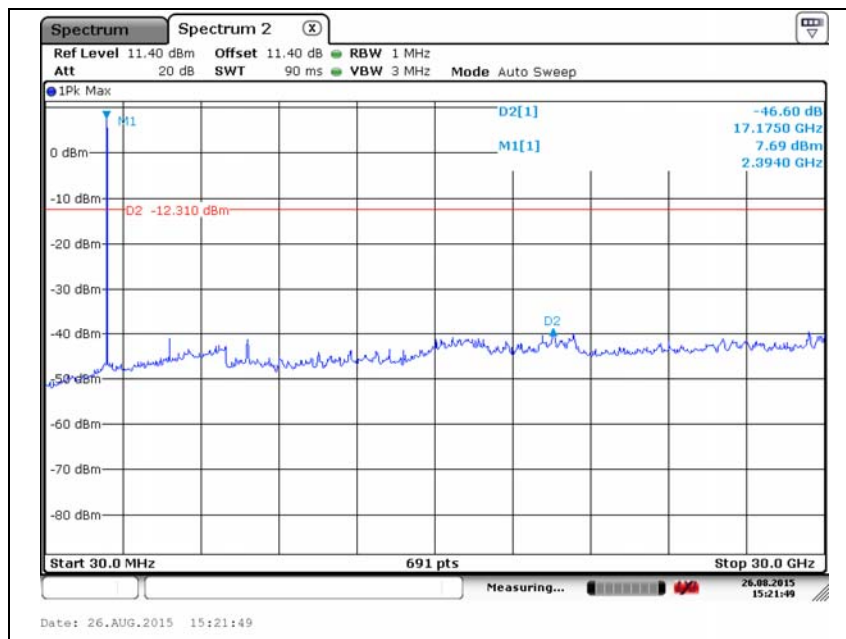
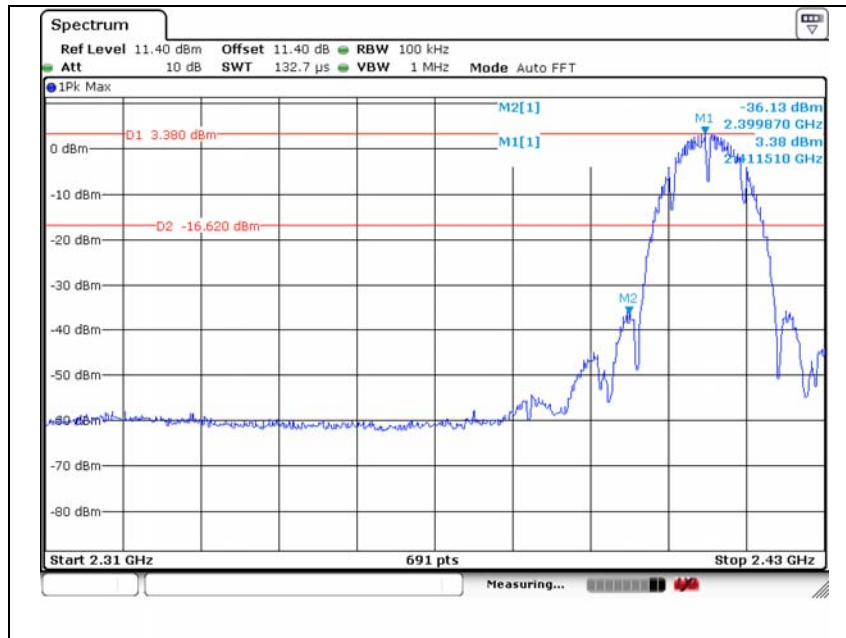
2. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.

#### Limit

According to 15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph(b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in section 15.209(a) is not required. In addition, radiated emission which in the restricted band, as defined in section 15.205(a), must also comply the radiated emission limits specified in section 15.209(a) (see section 15.205(c))

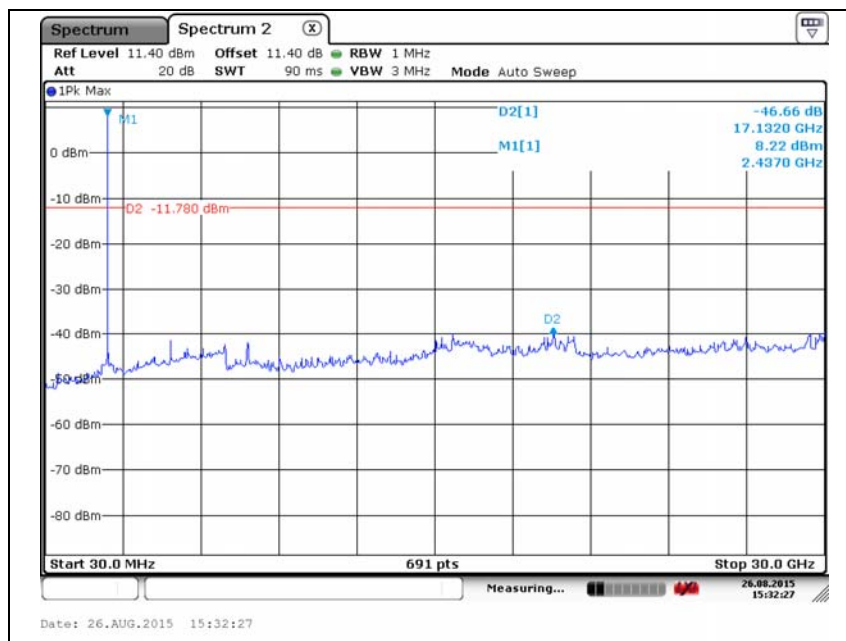
## Test results for conducted spurious emission

### 802.11b // Low channel

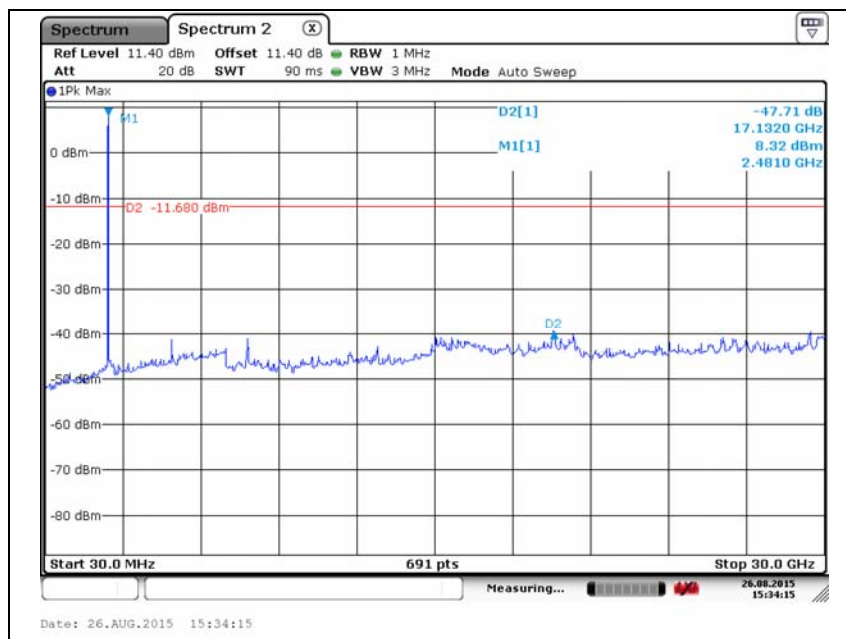
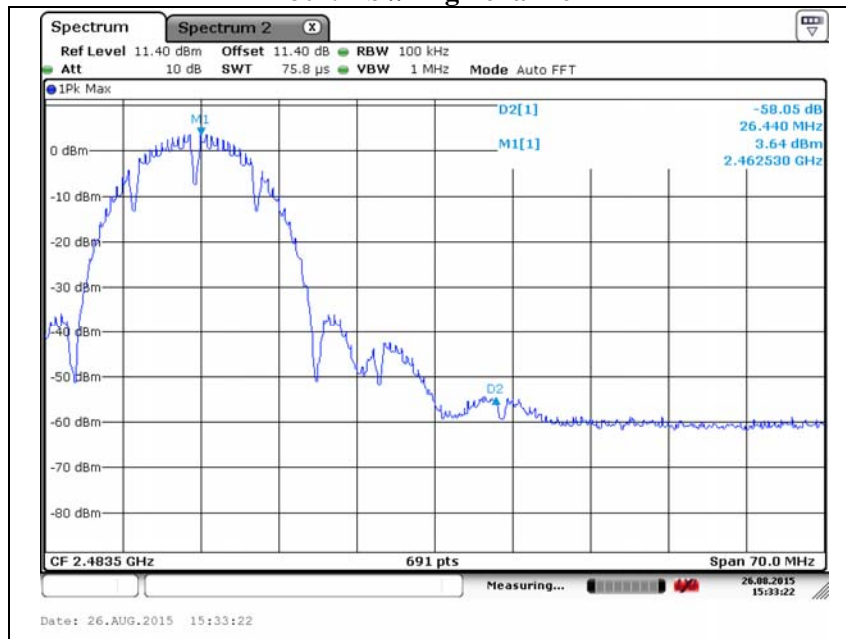


### 802.11b // Middle channel

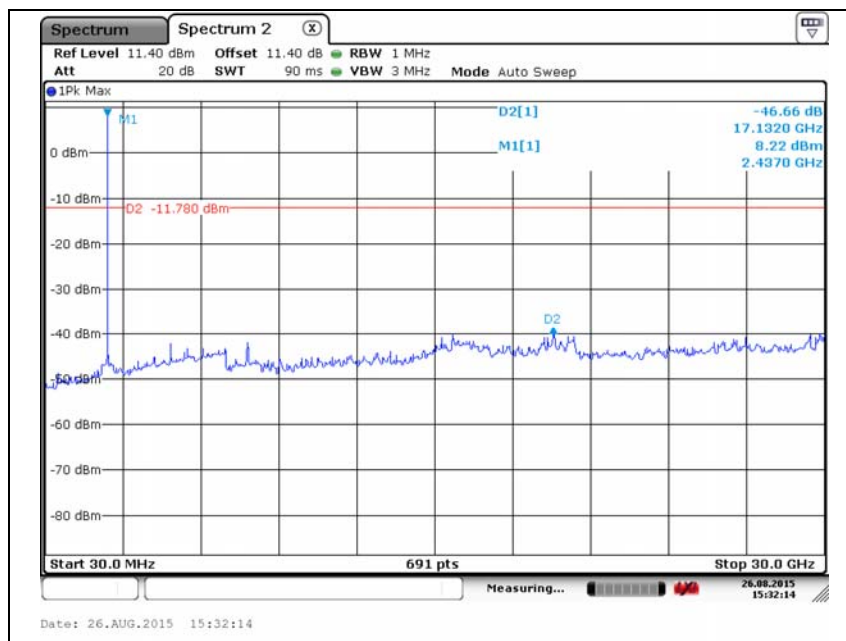
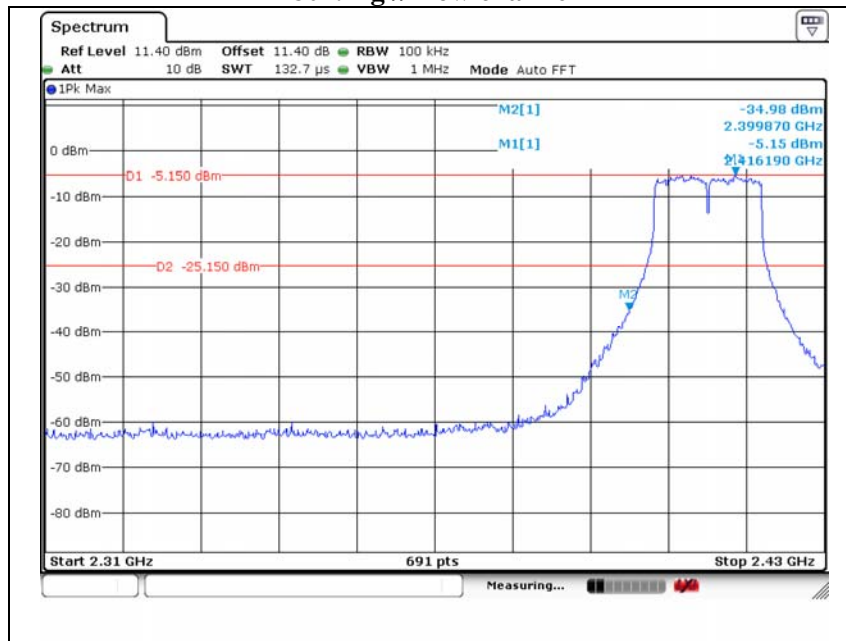
N/A



### 802.11b // High channel

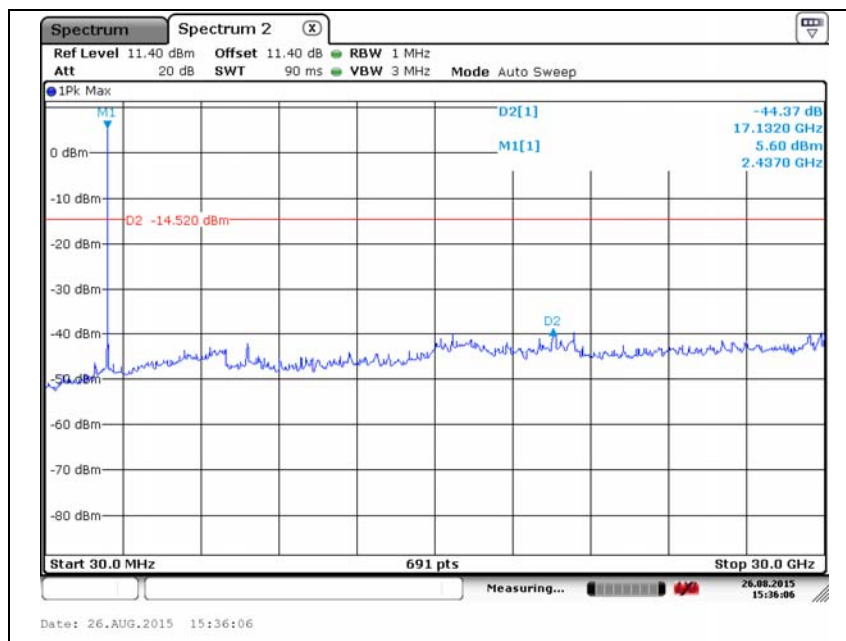


### 802.11g // Low channel



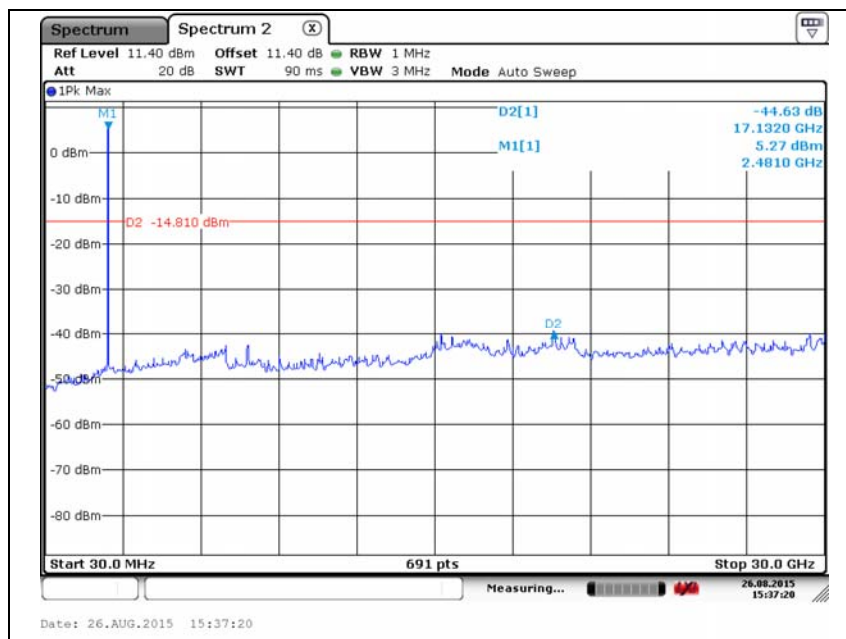
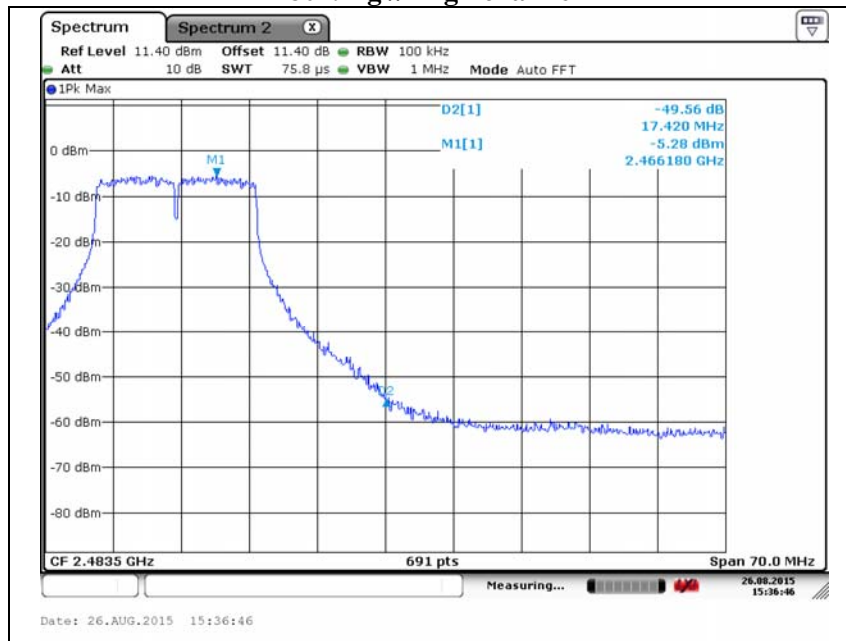
### 802.11g // Middle channel

N/A

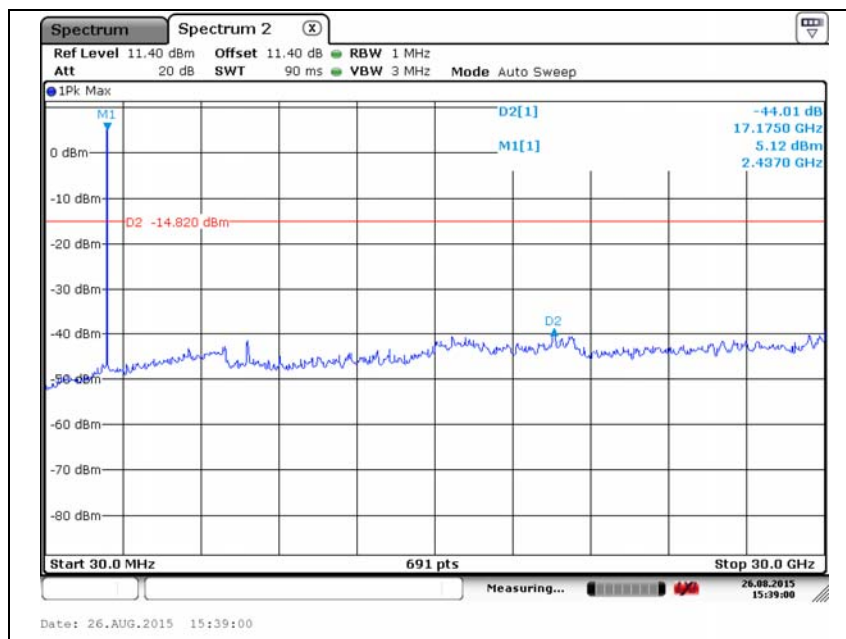
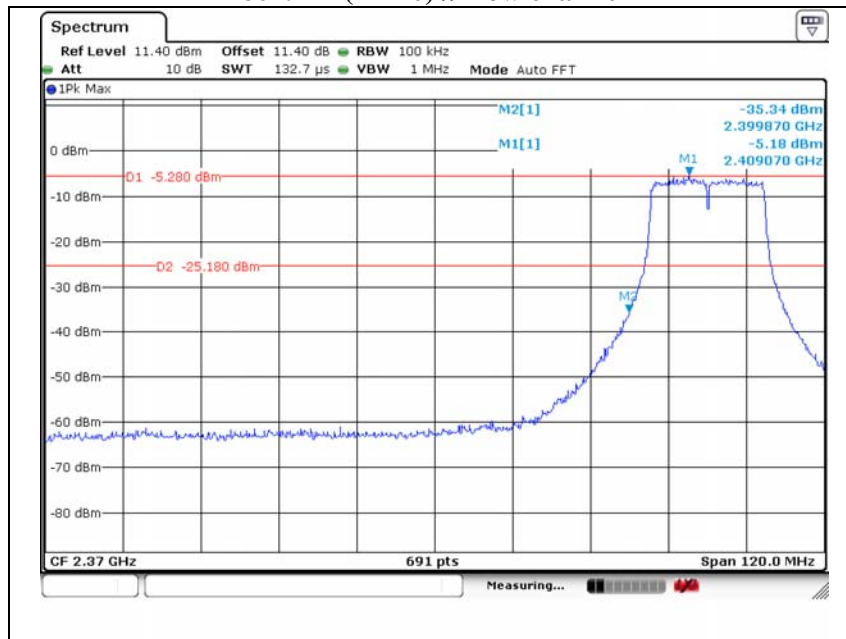


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The test results in the report only apply to the tested sample.

### 802.11g // High channel

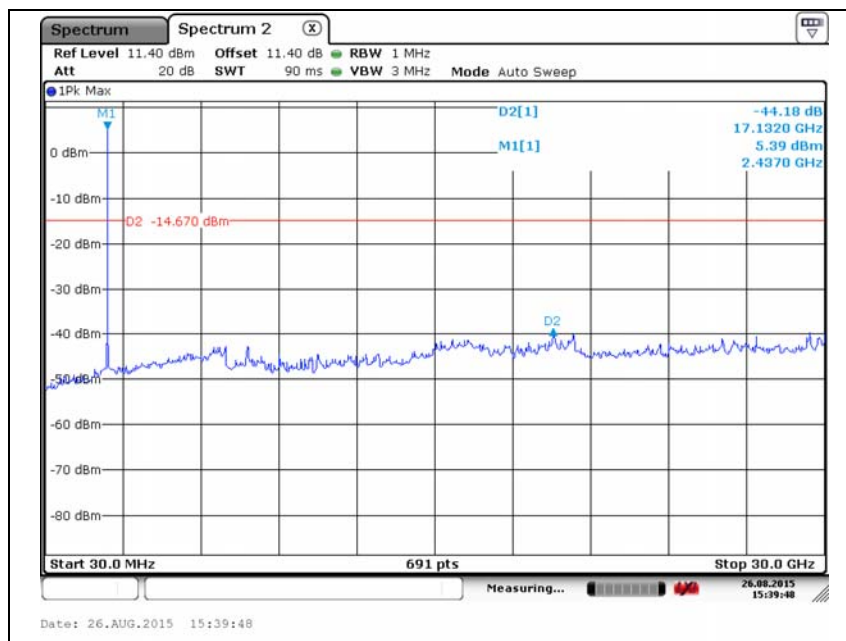


### 802.11n (HT20) // Low channel

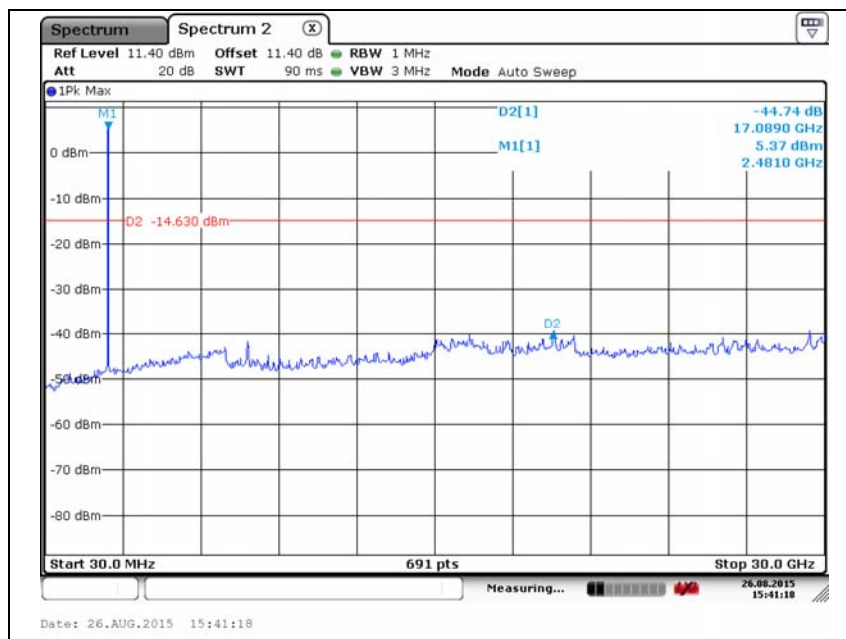
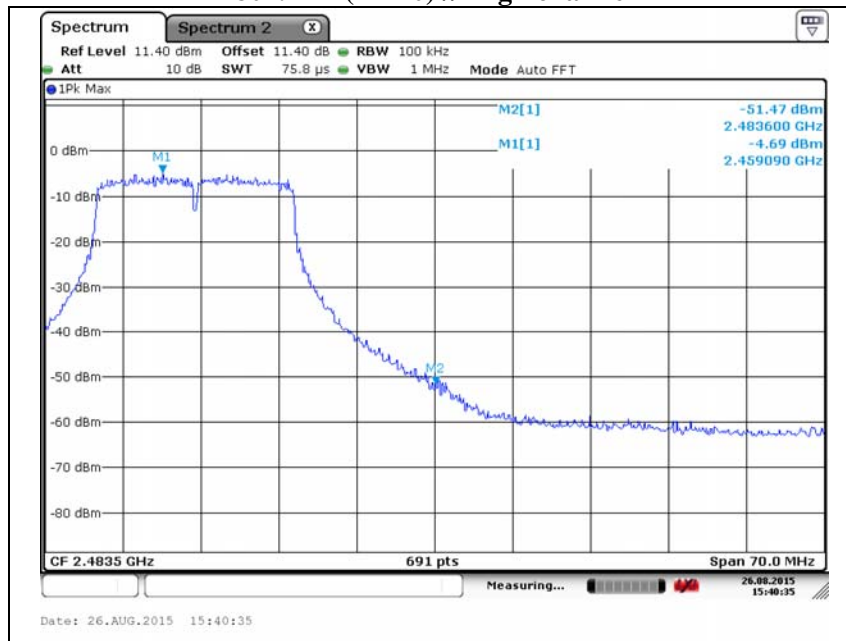


### 802. 11n (HT20) // Middle channel

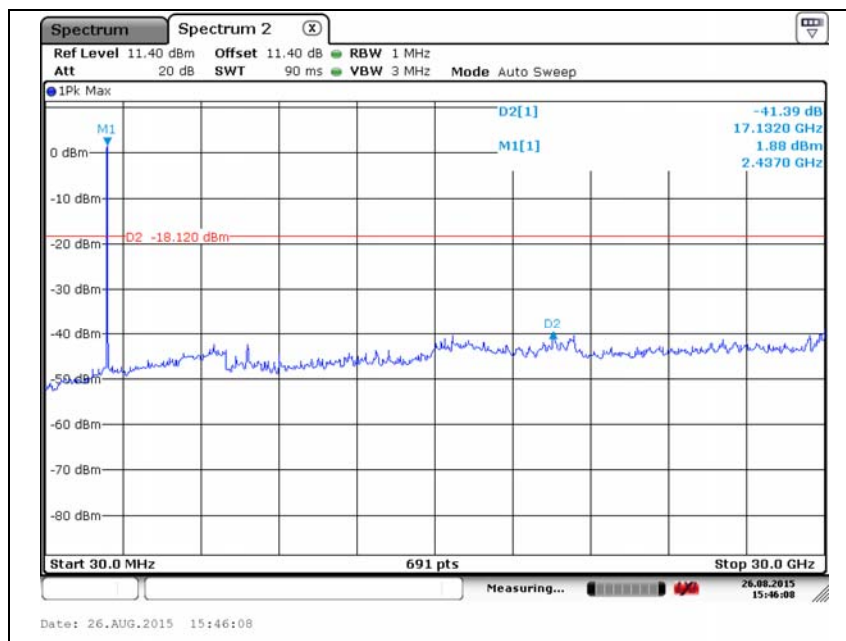
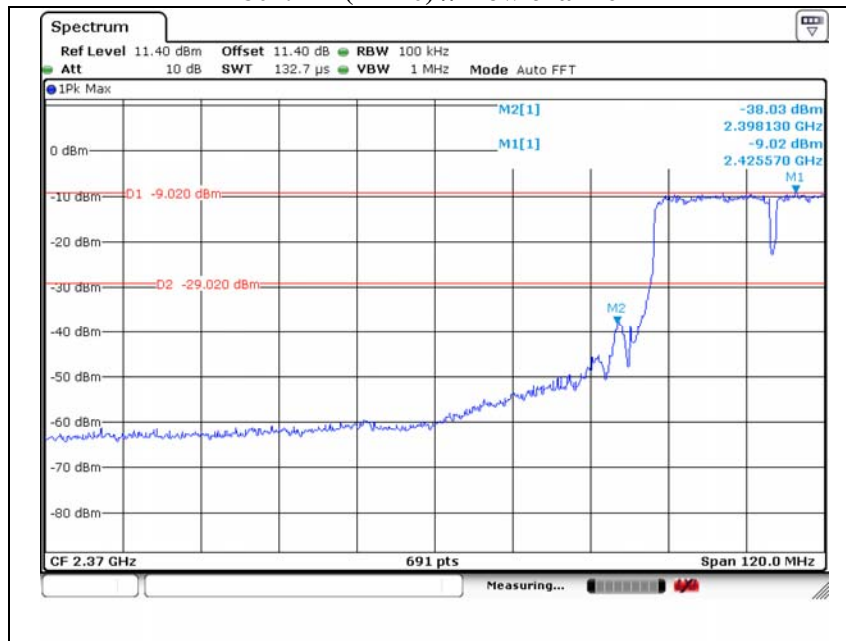
N/A



### 802.11n (HT20) // High channel

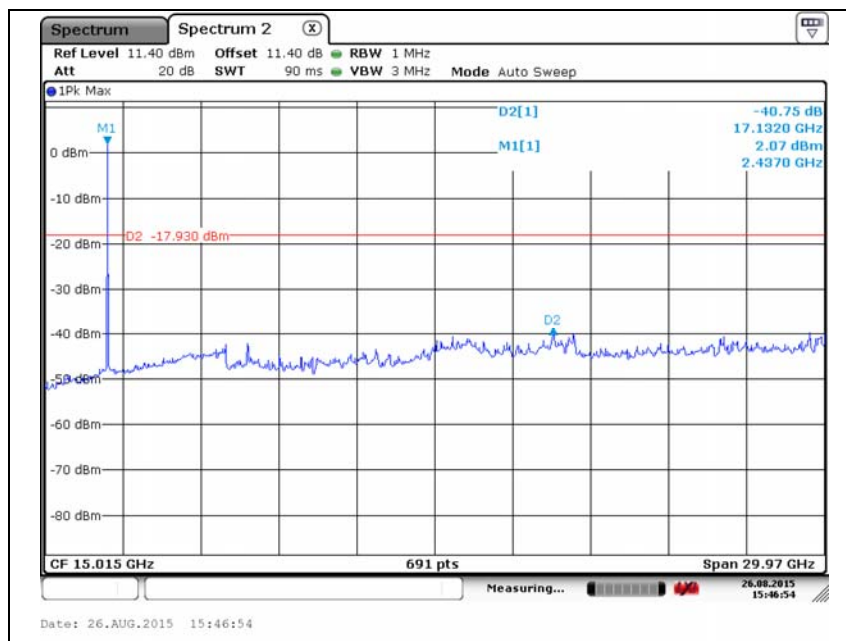


### 802.11n (HT40) // Low channel

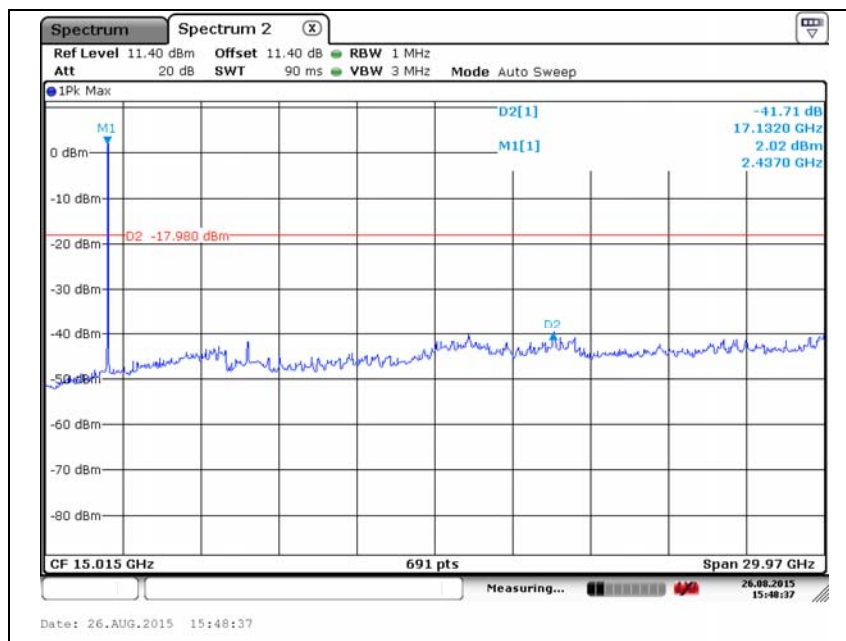
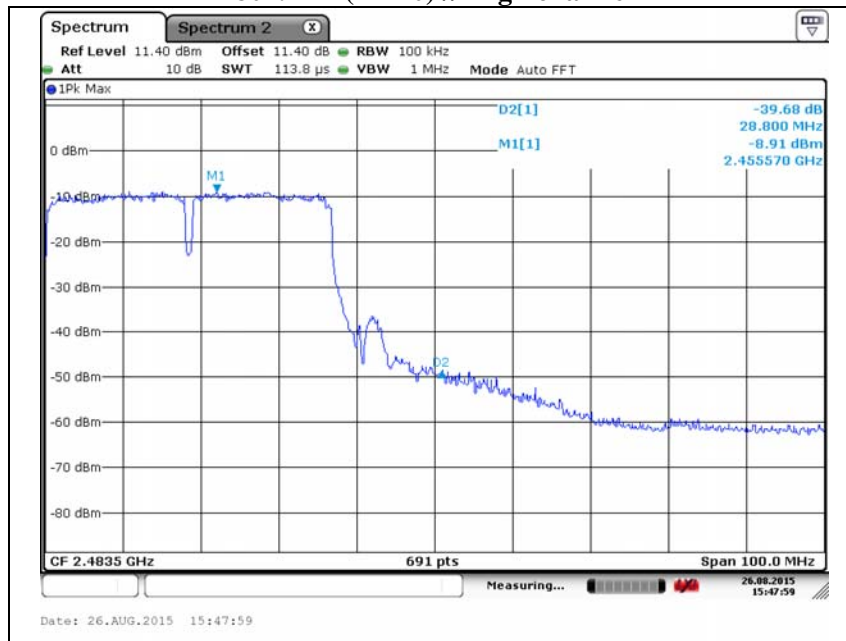


### 802. 11n (HT40) // Middle channel

N/A

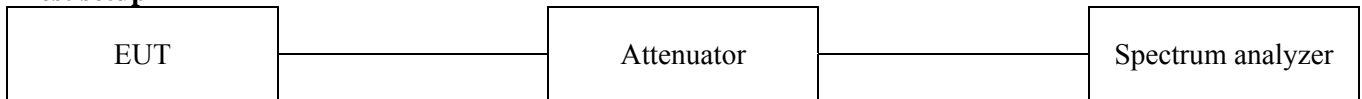


### 802.11n (HT40) // High channel



### 3.3. 6 dB bandwidth

#### Test setup



#### Test procedure

KDB 558074\_v03r03 – section 8.1 option 1 or section 8.2 option 2.

#### Option 1:

- Set RBW = 100 kHz.
- Set the video bandwidth(VBW)  $\geq 3 \times$  RBW.
- Detector = peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- 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.

#### Option 2:

The automatic bandwidth measurement capability of an instrument may be employed using the X bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW  $\geq 3 \times$  RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be  $\geq 6$  dB.

#### Limit

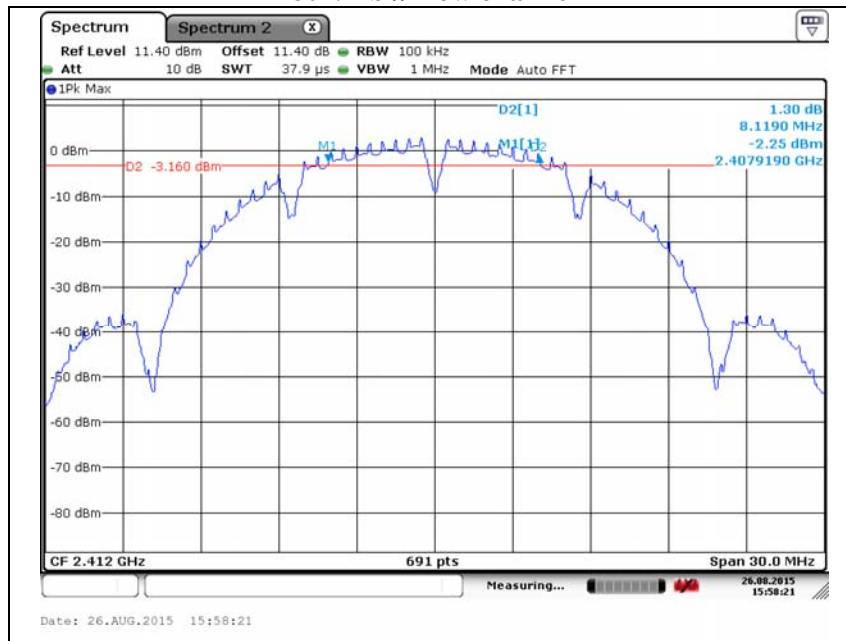
According to §15.247(a)(2), systems using digital modulation techniques may operate 902 ~ 928 MHz, 2 400 ~ 2 483.5 MHz, and 5 725 ~ 5 850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.



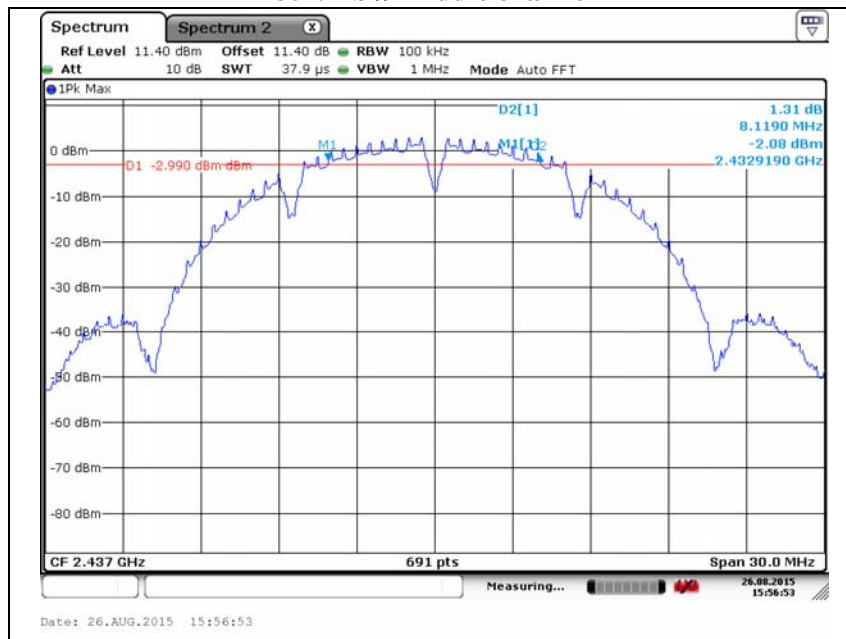
## Test results

Operation mode	Frequency(MHz)	6 dB bandwidth(MHz)	Limit(MHz)
802.11b	2 412	8.119	0.5
	2 437	8.119	
	2 462	8.119	
802.11g	2 412	16.541	
	2 437	16.541	
	2 462	16.411	
802.11n (HT20)	2 412	17.757	
	2 437	17.713	
	2 462	17.757	
802.11n (HT40)	2 422	36.370	
	2 437	36.160	
	2 452	36.270	

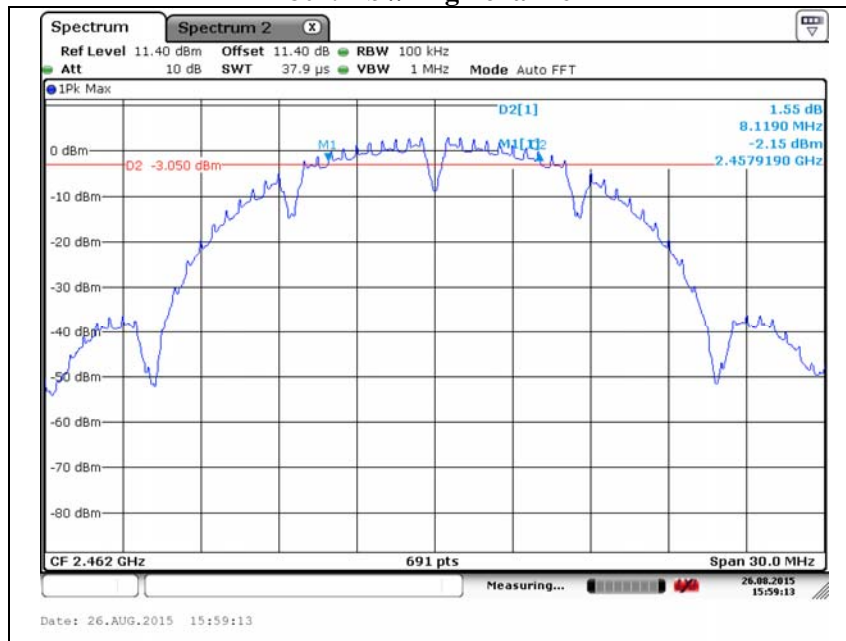
### 802.11b // Low channel



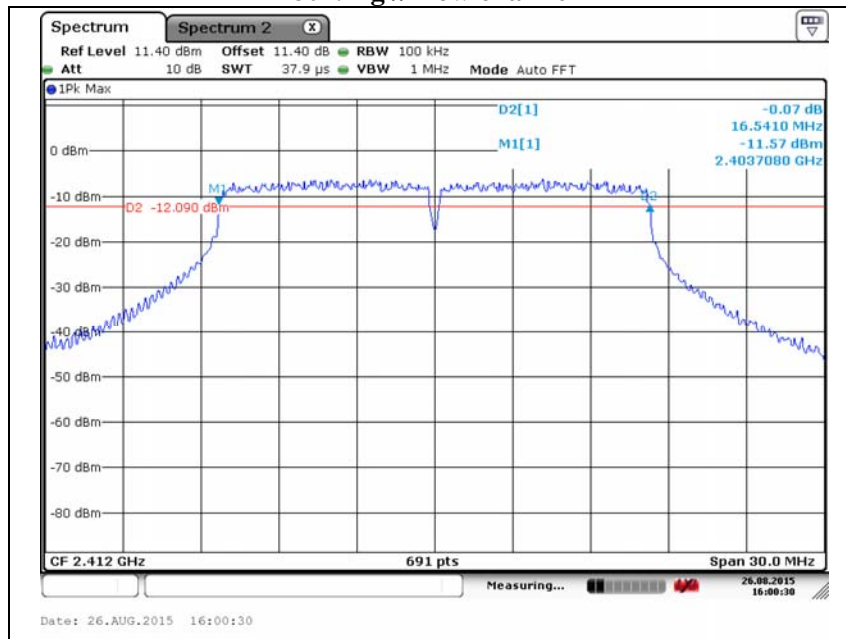
### 802.11b // Middle channel



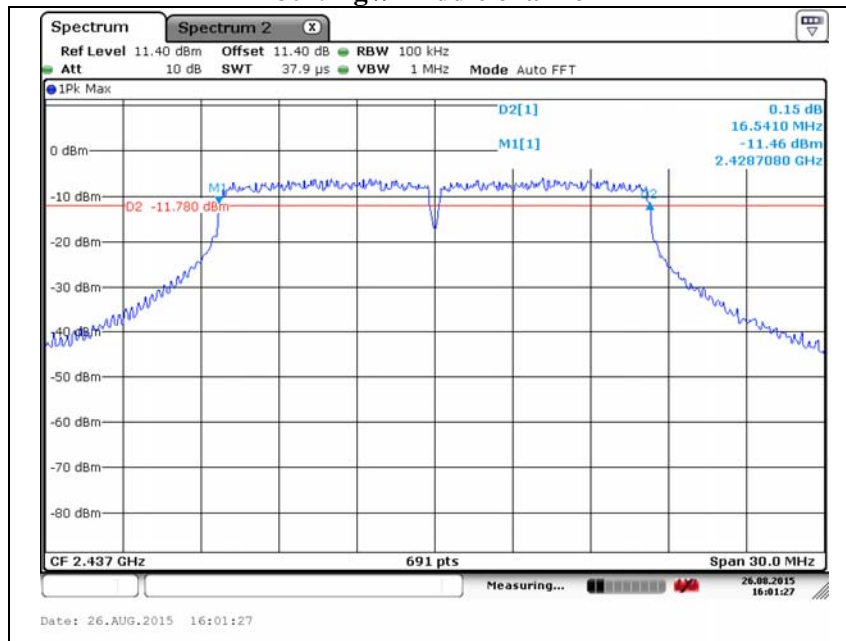
### 802.11b // High channel



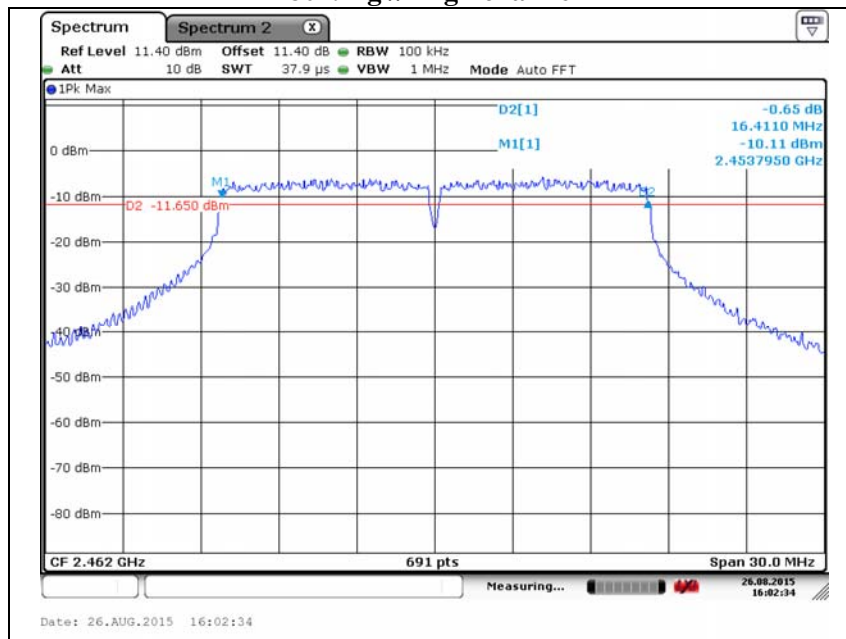
### 802.11g // Low channel



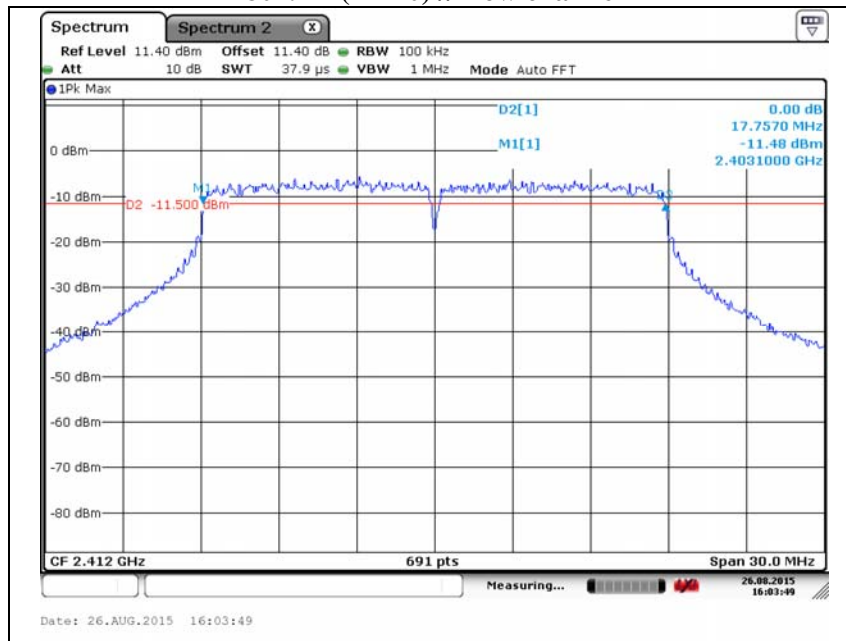
### 802.11g // Middle channel



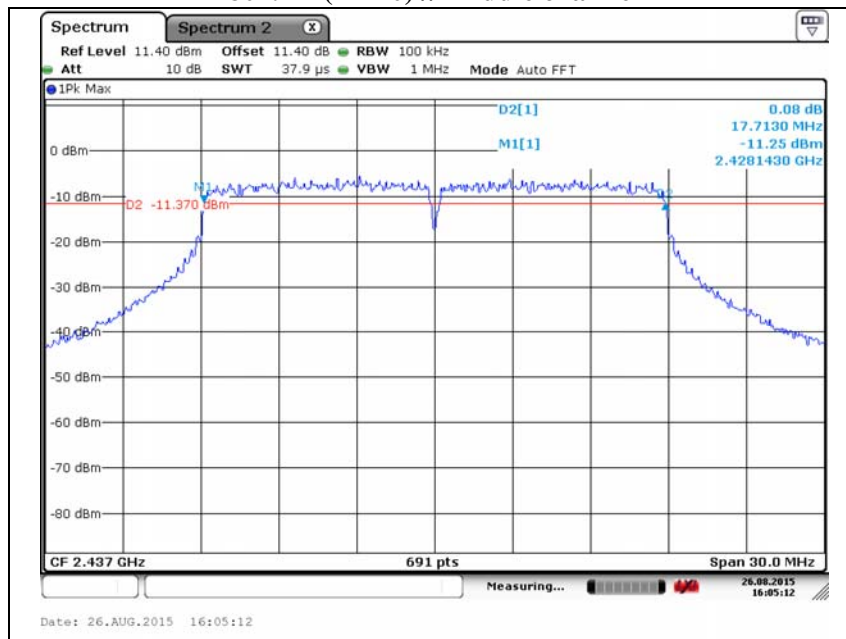
### 802.11g // High channel



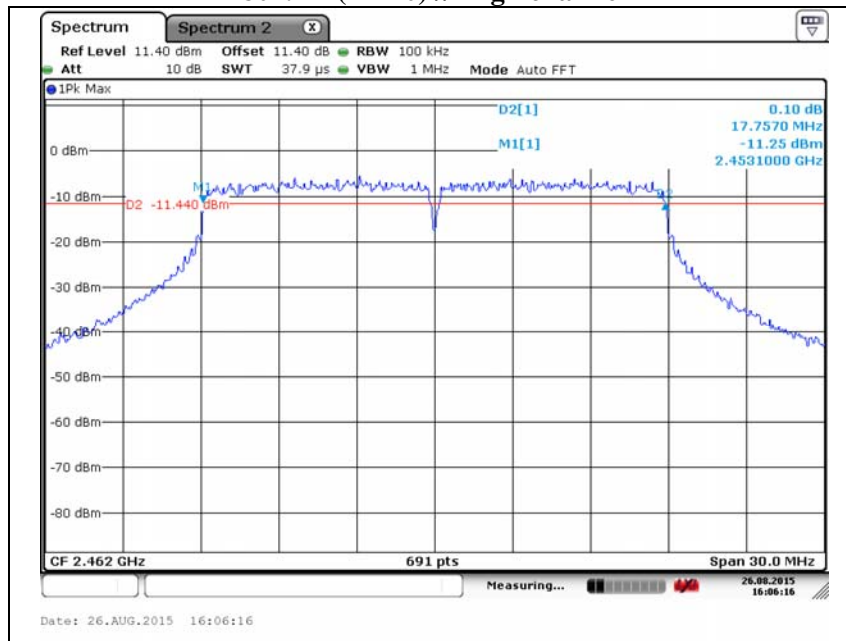
### 802.11n(HT20) // Low channel



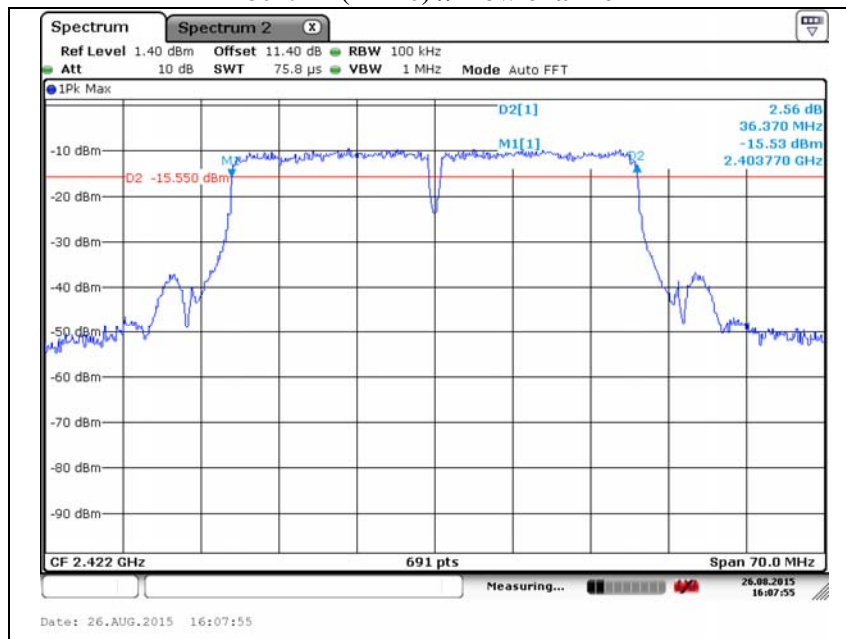
### 802.11n(HT20) // Middle channel



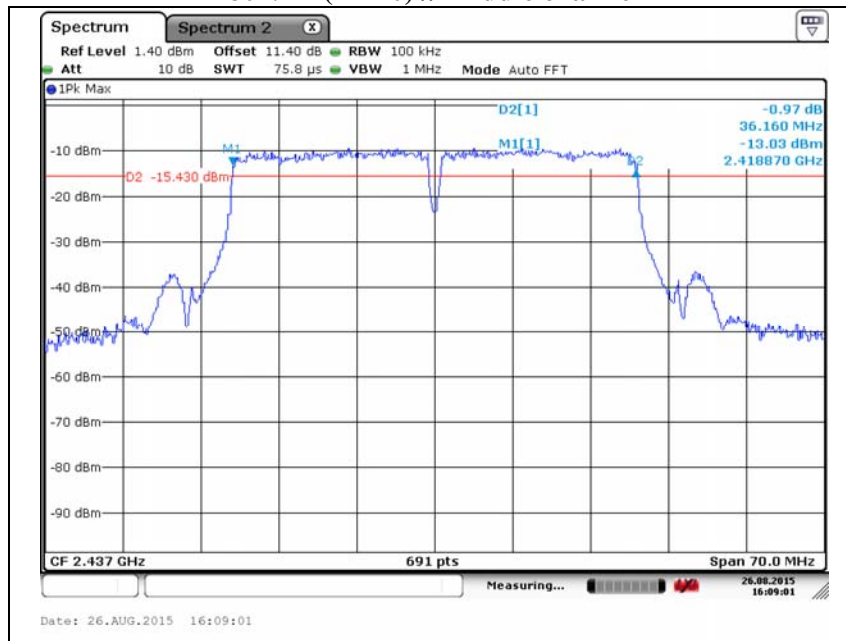
### 802.11n(HT20) // High channel



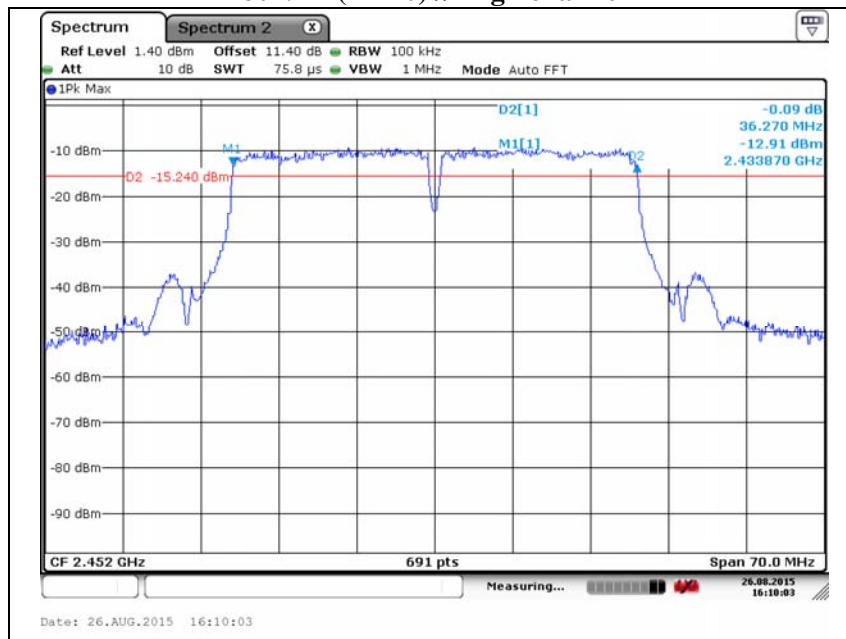
### 802.11n(HT40) // Low channel



### 802.11n(HT40) // Middle channel

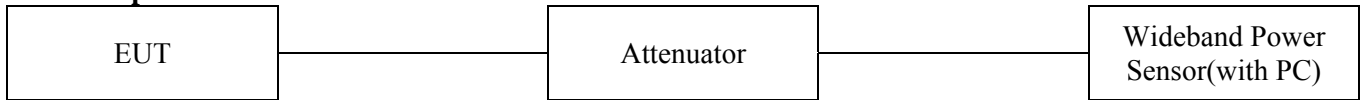


### 802.11n(HT40) // High channel



### 3.4. Peak output power

#### Test setup



#### Test procedure

All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.

KDB 558074\_v03r03 – section 9.1.2

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

#### 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 out-put power. Maximum Conducted Out-put 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.

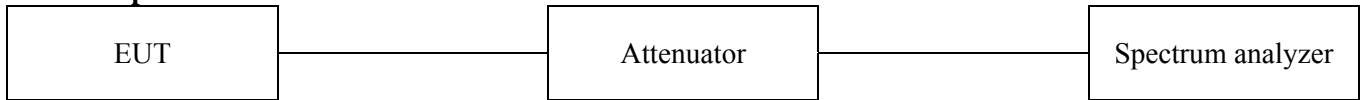


### Test results

Test mode	Frequency(MHz)	Results (dBm)	Limit(dBm)
802.11b	2 412	15.77	30
	2 437	16.08	
	2 462	16.28	
802.11g	2 412	19.17	
	2 437	19.35	
	2 462	19.64	
802.11n(HT20)	2 412	18.31	
	2 437	18.79	
	2 462	18.99	
802.11n(HT40)	2 422	18.15	
	2 437	18.28	
	2 452	18.88	

### 3.5. Power spectral density

#### Test setup



#### Test procedure

KDB 558074\_v03r03– section 10.2

#### Measurement procedure

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS channel bandwidth.
- Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
- Set the VBW  $\geq 3 \times \text{RBW}$ .
- Detector = power averaging (RMS) or sample detector(when RMS not available).
- Sweep time = auto couple.
- Trace mode = max hold.
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.
- If measured value exceeds limit, reduce RBW(no less than 3 kHz) and repeat.

#### Limit

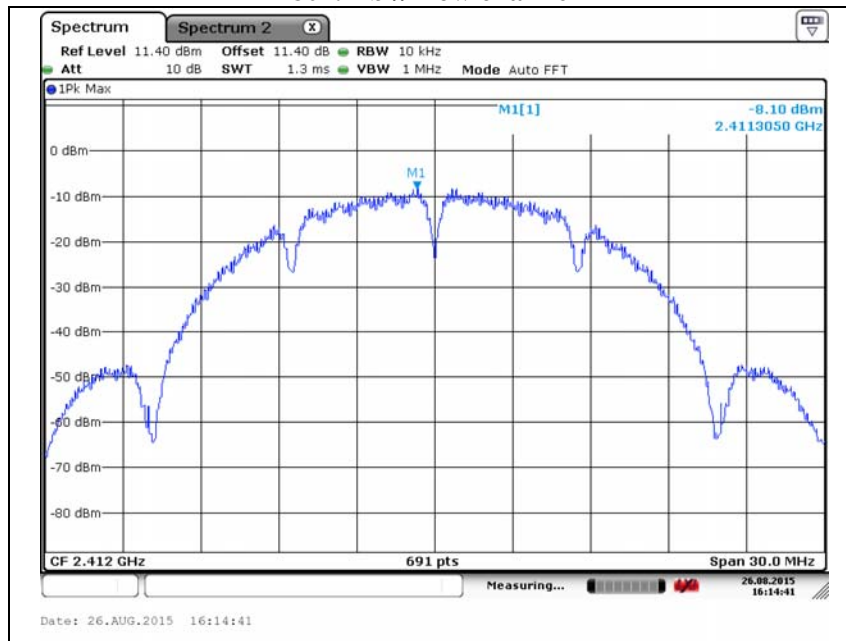
According to §15.247€, For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.



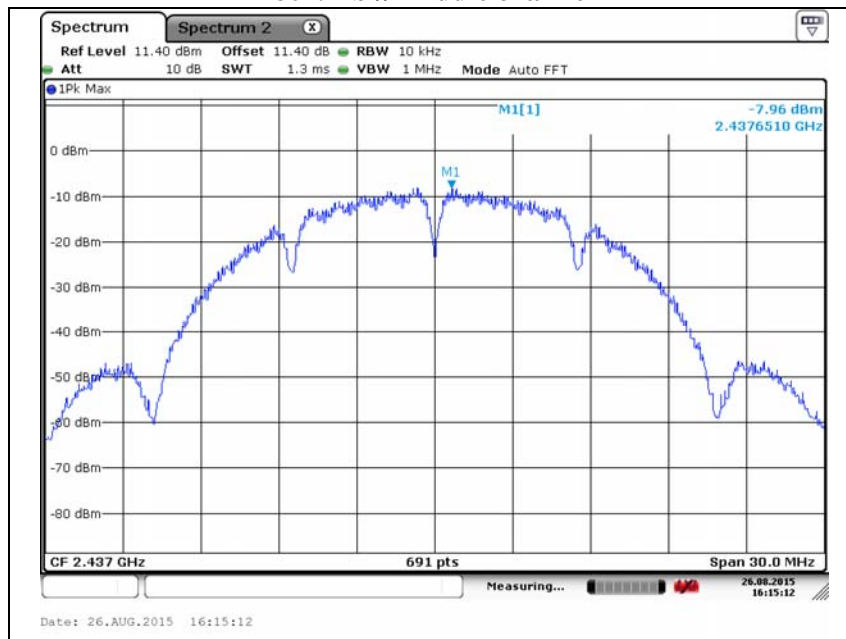
### Test results

Operation mode	Frequency(MHz)	Measured PSD(dBm)	Limit(dBm)
802.11b	2 412	-8.10	8
	2 437	-7.96	
	2 462	-7.67	
802.11g	2 412	-14.18	
	2 437	-13.90	
	2 462	-13.79	
802.11n (HT20)	2 412	-13.31	
	2 437	-13.04	
	2 462	-12.80	
802.11n (HT40)	2 422	-15.38	
	2 437	-15.24	
	2 452	-15.16	

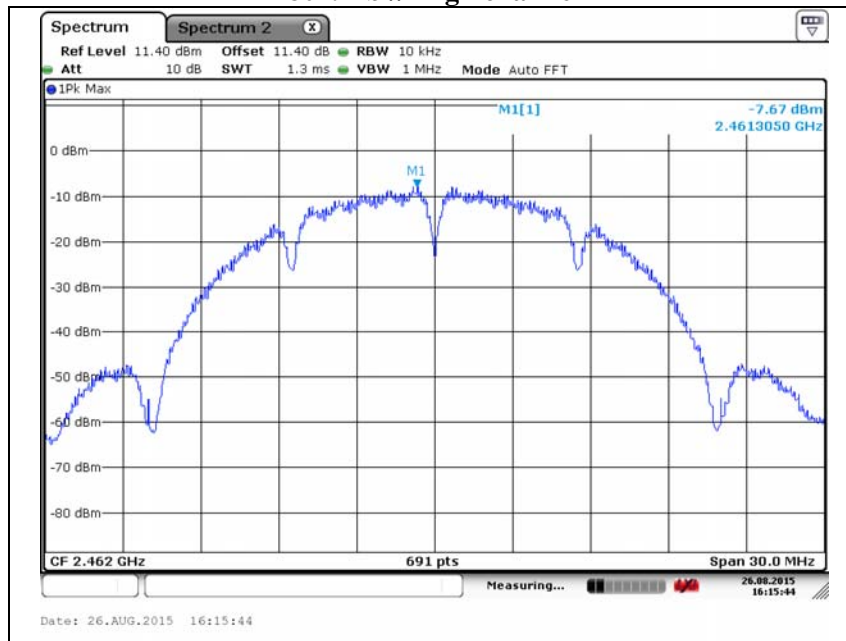
### 802.11b // Low channel



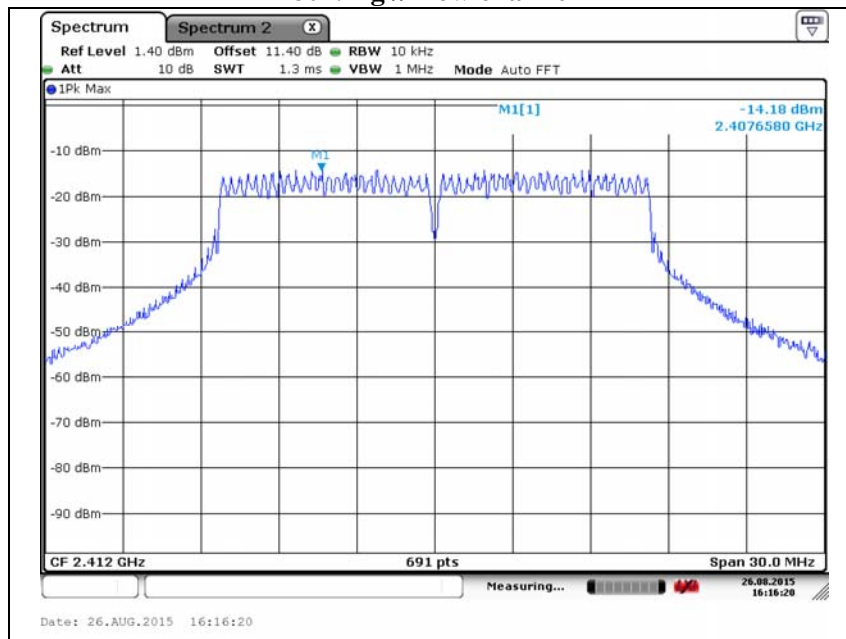
### 802.11b // Middle channel



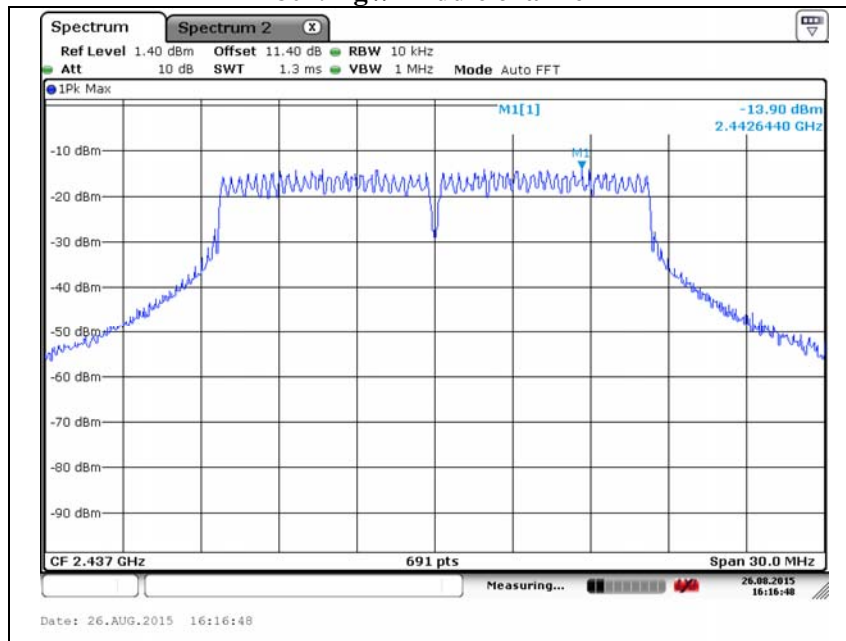
### 802.11b // High channel



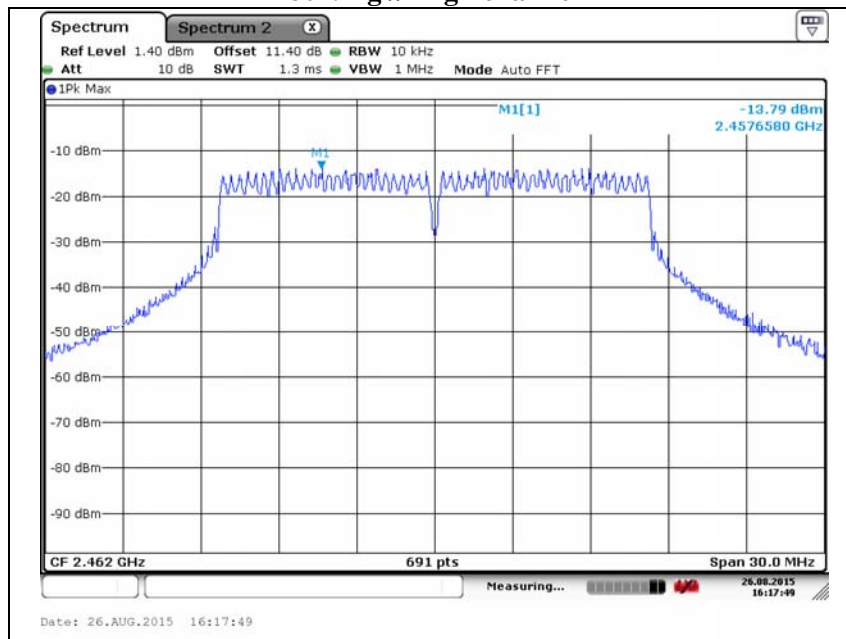
### 802.11g // Low channel



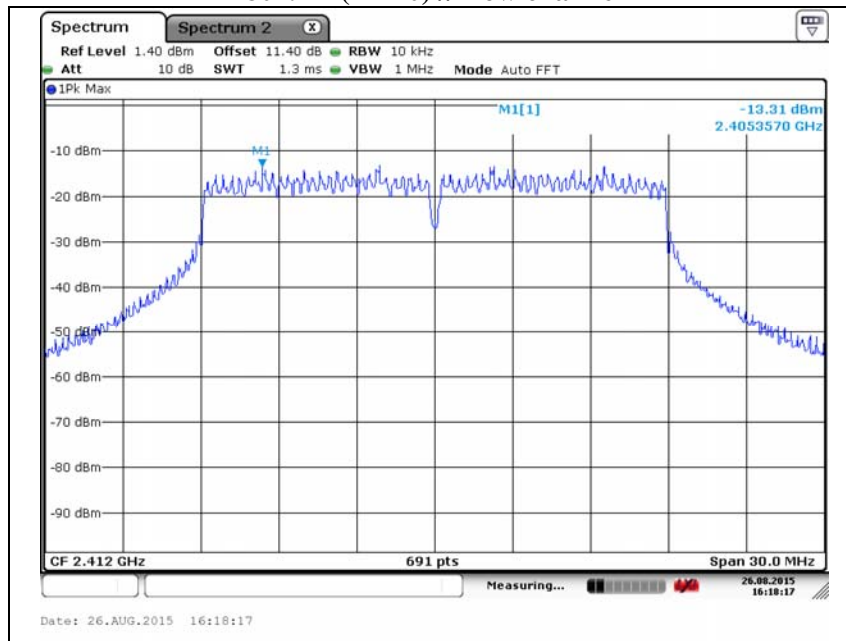
### 802.11g // Middle channel



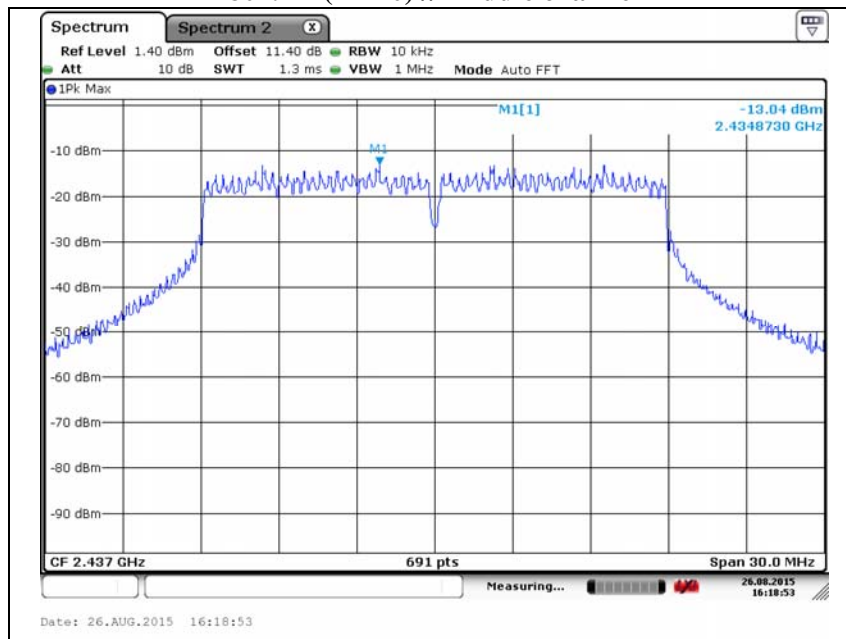
### 802.11g // High channel



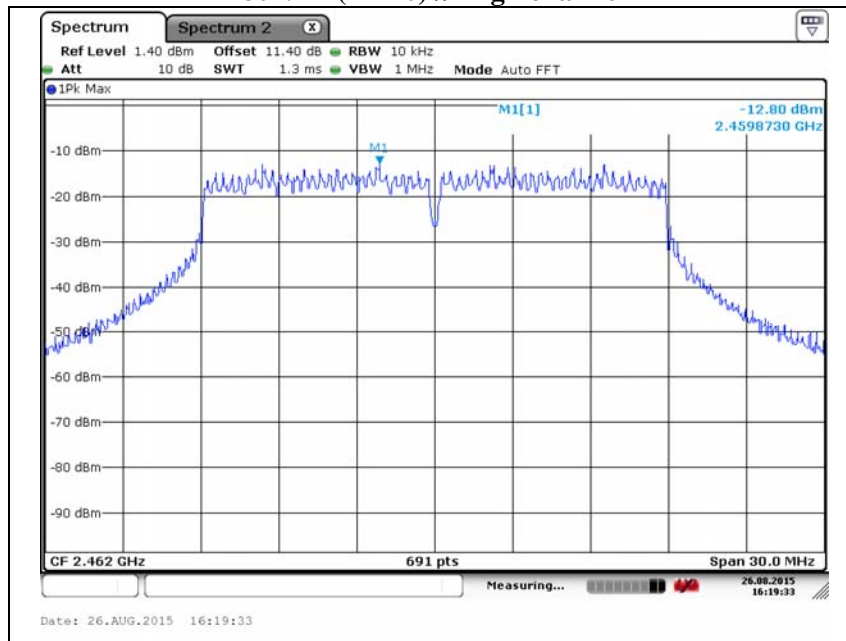
### 802.11n(HT20) // Low channel



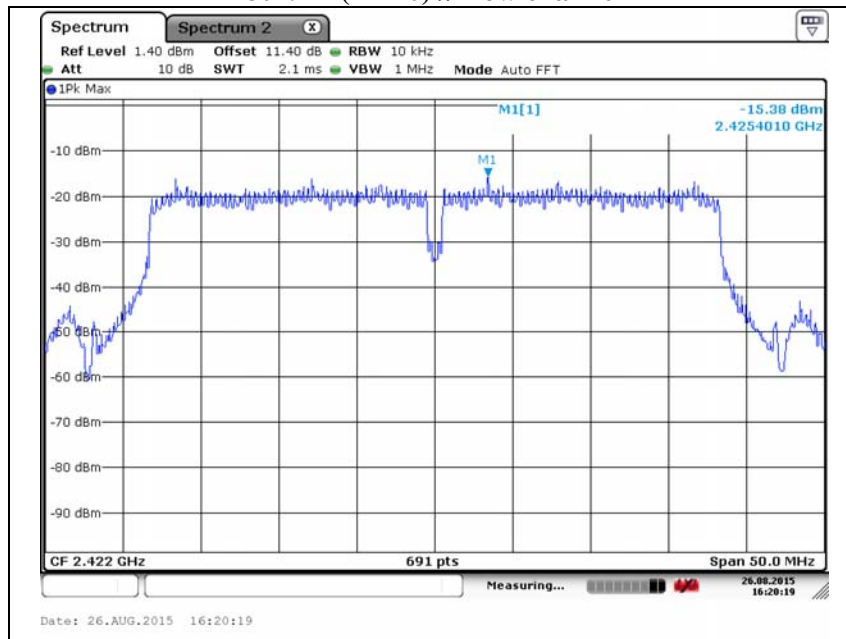
### 802.11n(HT20) // Middle channel



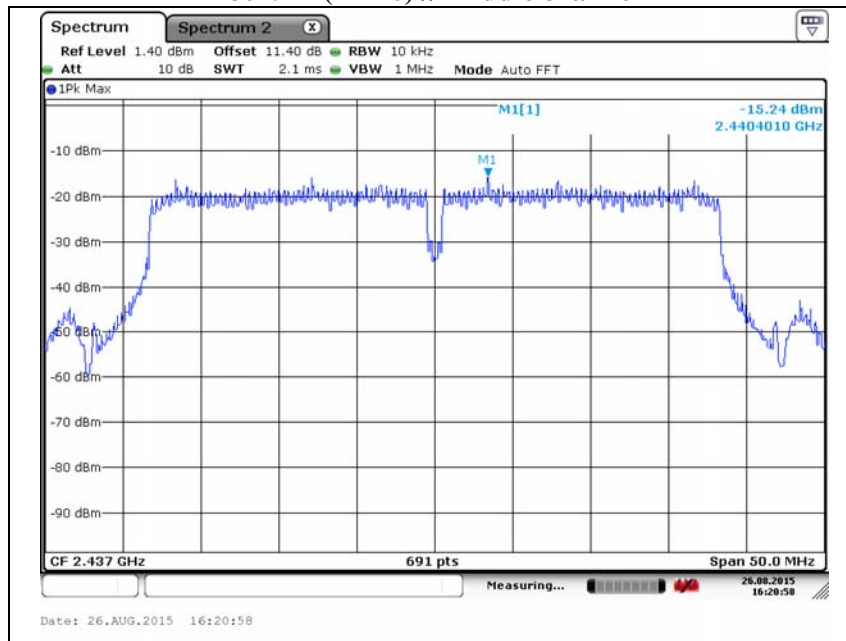
### 802.11n(HT20) // High channel



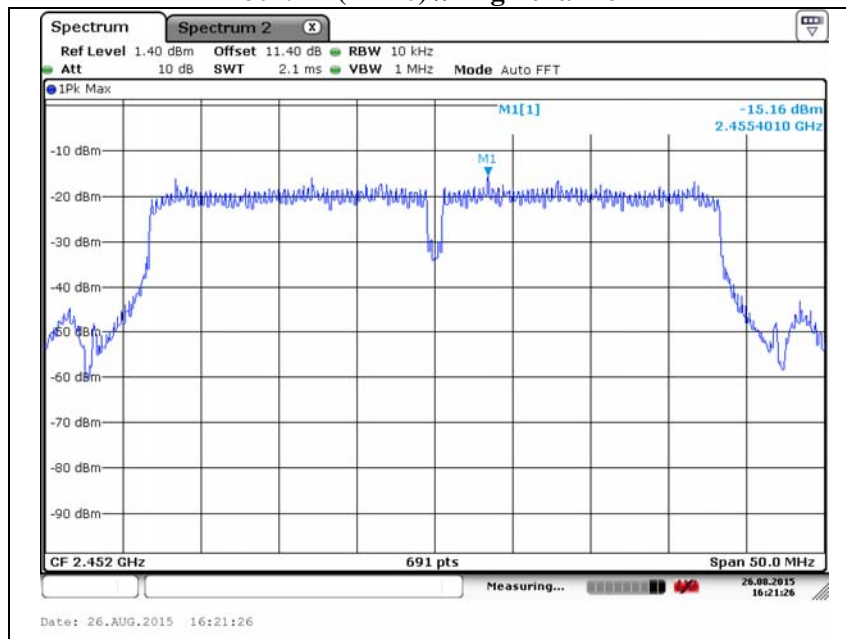
### 802.11n(HT40) // Low channel



### 802.11n(HT40) // Middle channel



### 802.11n(HT40) // High channel



## Appendix A. Measurement equipment

Equipment	Manufacturer	Model	Serial No.	Calibration interval	Calibration due.
Spectrum Analyzer	R&S	FSV40	101002	1 year	2016.07.25
8360B Series Swept Signal Generator	HP	83630B	3844A00786	1 year	2016.01.23
Attenuator	HP	8493C	51401	1 year	2016.07.24
Power Meter	Anritsu	ML2495A	1438001	1 year	2016.01.22
Pulse Power Sensor	Anritsu	MA2411B	1339205	1 year	2016.01.26
Loop Antenna	R&S	HFH2-Z2.335.4711.52	826532	2 years	2017.03.03
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-461	2 years	2017.04.03
Horn Antenna	A.H. System	SAS-571	414	2 years	2017.02.09
Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170550	2 years	2017.04.30
High Pass Filter	Wainwright Instrument	WHJS3000-10TT	1	1 year	2016.07.24
Preamplifier	SCHWARZBECK	BBV-9718	9718-246	1 year	2016.10.23
Broadband Amplifier	SCHWARZBECK	BBV-9721	PS9721-003	1 year	2016.04.03
EMI Test Receiver	R & S	ESR3	101781	1 year	2016.05.06
EMI Test Receiver	R & S	ESR3	101783	1 year	2016.05.06

## Peripheral devices

Device	Manufacturer	Model No.	Serial No.
Notebook Computer	Samsung Electronics Co., Ltd.	NP-QX411L	HJV993BB905283V