

TEST REPORT

of

FCC Part 15 Subpart B&C §15.247 / RSS-210 Issue 8, RSS-Gen Issue 3

FCC ID/IC Certification: A3LDV300F / 649E-DV300F

Equipment Under Test : Digital Camera
Model Name : DV300F
Serial No. : N/A
Applicant : SAMSUNG ELECTRONICS Co., Ltd.
Manufacturer : SAMSUNG ELECTRONICS Co., Ltd.
Manufacturer's factory : TIANJIN SAMSUNG OPTO-ELECTRONICS CO., LTD.
Date of Test(s) : 2011. 11. 25 ~ 2011. 11. 28
Date of Issue : 2011. 11. 28

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Date

2011. 11. 28

Alvin Kim

Approved By:



Date

2011. 11. 28

Charles Kim

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd.

- Wireless Div. 2FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-dong, Korea

- 705, Dongcheon-dong Suji-gu, Yongin-si, Gyeonggi-do, Korea

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1.2. Details of Applicant

Applicant : SAMSUNG ELECTRONICS Co., Ltd.

Address : 416, Maetan3-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea

Contact Person : Kim, Hyuck

Phone No. : +82 +31 277 6803

1.3. Details of Factory Information

Name : TIANJIN SAMSUNG OPTO-ELECTRONICS CO., LTD.

Address : No.9 ZhangHeng Street, Micro-Electronic Industrial Park, JinGang Road, Tianjin, China

1.4. Description of EUT

Kind of Product	Digital Camera
Model Name	DV300F
Serial Number	N / A
Power Supply	DC 3.7 V (Li-ion Battery)
Frequency Range	2 412 ~ 2 462 MHz (802.11b/g/n-HT20_SISO)
Modulation Technique	DSSS, OFDM
Number of Channels	11
Antenna Type	Integral Type
Antenna Gain	-0.66 dBi

1.5. Declaration by the manufacturer

- 802.11n supports HT20 mode only.

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1.6. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal Due.
Signal Generator	R & S	SMR40	100272	Jul. 15, 2012
Spectrum Analyzer	R & S	FSV30	100768	Mar. 31, 2012
Power Divider	KRYTAR	6005265	126340	Sep. 01, 2012
High Pass Filter	Wainwright	WHK3.0/18G-10SS	344	Jul. 07, 2012
DC power Supply	Agilent	U8002A	MY49030063	Jan. 05, 2012
Preamplifier	H.P.	8447F	2944A03909	Jul. 04, 2012
Preamplifier	R & S	SCU 18	10117	Mar. 23, 2012
Test Receiver	R & S	ESU26	100109	Feb. 21, 2012
Two-Line V-Network	R & S	ENV216	100190	Jan. 06, 2012
Test Receiver	R & S	ESHS10	863365/018	Apr. 27, 2012
Bilog Antenna	SCHWARZBECK MESSELEKTRONIK	VULB9163	396	Apr. 27, 2013
Horn Antenna	R & S	HF 907	100019	Jul. 29, 2012
Horn Antenna	SCHWARZBECK	BBH 9120D	BBHA9170431	Mar. 17, 2012
Antenna Master	EMCO	1050	N.C.R.	N.C.R.
Turn Table	Daeil EMC	DI-1500	N.C.R.	N.C.R.
Anechoic Chamber	SY Corporation	L × W × H (6.5 m×3.5 m×3.5 m)	N.C.R.	N.C.R.
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.6 m)	N.C.R.	N.C.R.

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1.7. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD:FCC Part15 subpart B&C, RSS-210, RSS-Gen			
Standard section		Test Item	Result
15.205(a) 15.209 15.247(d)	A8.5	Transmitter Radiated Spurious Emissions Conducted Spurious Emission	Complied
15.109(a)	RSS-Gen 6	Receiver Radiated Spurious Emission	Complied
15.247(a)(2)	A8.2(a)	6 dB Bandwidth and 99% BW	Complied
15.247(b)(3)	A8.4(4)	Maximum Peak Output Power	Complied
15.247(e)	A8.3(2)	Power Spectral Density	Complied
15.207	RSS-Gen 7.2.4	Transmitter AC Power Line Conducted Emission	Complied
15.107	RSS-Gen 7.2.4	Receiver AC Power Line Conducted Emission	Complied
15.247(i) 1.1307(b)(1)	RSS-Gen 5.5/ RSS-102	Maximum Permissible Exposure (Exposure of Humans to RF Fields)	Complied

1.8. Conclusion of worst-case

The field strength of spurious emission was measured in three orthogonal EUT positions(X-axis, Y-axis and Z-axis). Worst case is Z-axis. 1 Mbps is the highest output power in the 11b. 6 Mbps is the highest output power in the 11g. In case of 11n, we chose MCS0 mode.

1.9. Test report revision

Revision	Report number	Description
0	F690501/RF-RTL005138	Initial

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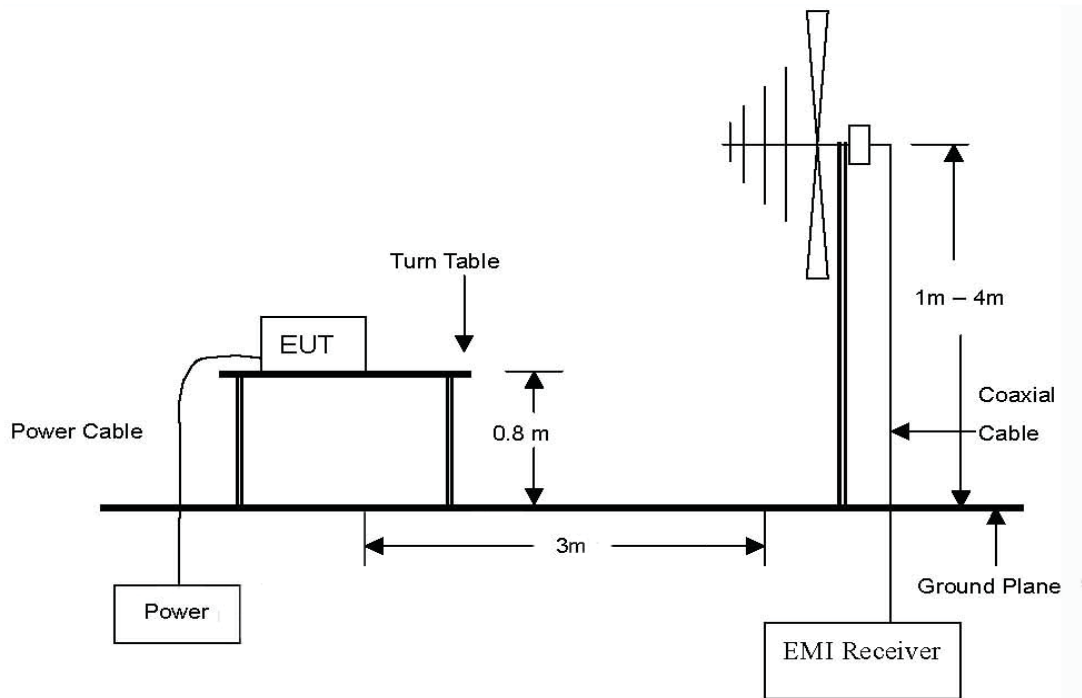
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2. Transmitter Radiated Spurious Emissions and Conducted Spurious Emission

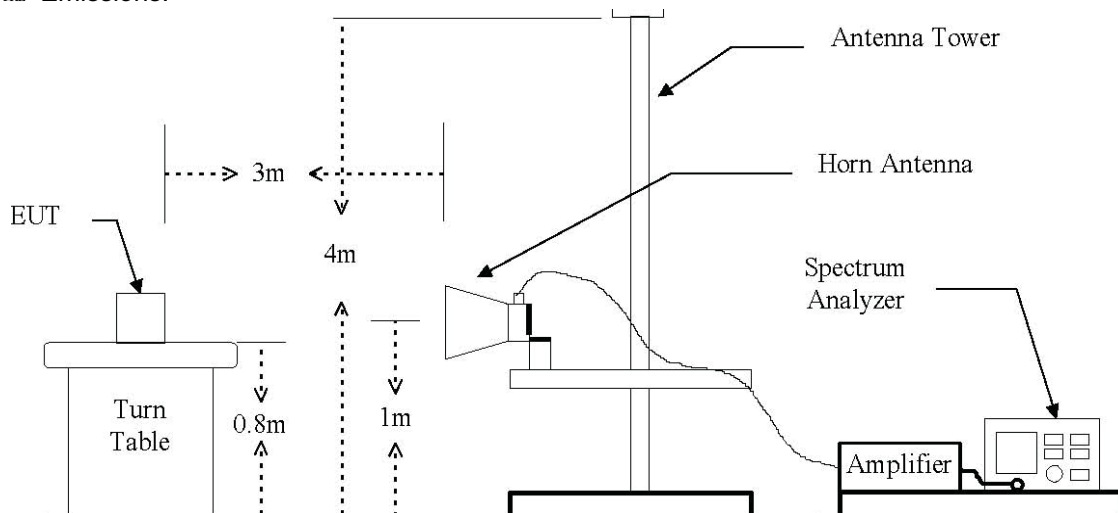
2.1. Test Setup

2.1.1. Transmitter Radiated Spurious 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.



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2.1.2. Conducted Spurious Emission



2.2. 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 define in section §15.205(a), must also comply the radiated emission limits specified in section §15.209(a) (see section §15.205(c))

According to § 15.209(a), Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Frequency (MHz)	Distance (Meters)	Field Strength (dBμV/m)	Field Strength (μV/m)
30 - 88	3	40.0	100
88 – 216	3	43.5	150
216 – 960	3	46.0	200
Above 960	3	54.0	500

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2.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

2.3.1. Test Procedures for Radiated Spurious Emissions

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. The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission below 1 GHz, 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 one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the 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 re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE ;

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1 GHz.

2.3.2. Test Procedures for Conducted Spurious Emissions

1. The transmitter output was connected to the spectrum analyzer.
2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW = 100 kHz, VBW = 100 kHz.

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2.4. Test Results

Ambient temperature : (24 ± 2) °C
Relative humidity : 47 % R.H.

2.4.1. Spurious Radiated Emission (Worst case configuration_11g mode)

The frequency spectrum from 30 MHz to 1 000 MHz was investigated. Emission levels are not reported much lower than the limits by over 30 dB. All reading values are peak values.

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Below 1 000.00	Not Detected	-	-	-	-	-	-	-

Remark:

1. All spurious emission at channels are almost the same below 1 GHz, so that the channel was chosen at representative in final test.
2. Actual = Reading + AF + AMP + CL

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2.4.2. Spurious Radiated Emission

The frequency spectrum above 1000 MHz was investigated. Emission levels are not reported much lower than the limits by over 30 dB.

DSSS : 802.11b

Low Channel (2 412 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
*2 390.00	26.45	Peak	H	28.47	5.23	60.15	74.00	13.85
*2 390.00	14.51	Average	H	28.47	5.23	48.21	54.00	5.79

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4 824.15	39.50	Peak	H	32.86	-36.68	35.68	74.00	38.32
4 824.15	29.29	Average	H	32.86	-36.68	25.47	54.00	28.53
Above 4 900.00	Not detected	-	-	-	-	-	-	-

Middle Channel (2 437 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4 874.07	39.90	Peak	H	33.00	-36.70	36.20	74.00	37.80
4 874.07	29.49	Average	H	33.00	-36.70	25.79	54.00	28.21
Above 4 900.00	Not detected	-	-	-	-	-	-	-

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High Channel (2 462 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
*2 483.50	27.20	Peak	H	28.71	5.37	61.28	74.00	12.72
*2 483.50	14.26	Average	H	28.71	5.37	48.34	54.00	5.66

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4 924.33	39.72	Peak	H	33.15	-36.41	36.46	74.00	37.54
4 924.33	28.95	Average	H	33.15	-36.41	25.69	54.00	28.31
Above 5 000.00	Not detected	-	-	-	-	-	-	-

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OFDM : 802.11g

Low Channel (2 412 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
*2 390.00	26.68	Peak	H	28.47	5.23	60.38	74.00	13.62
*2 390.00	14.54	Average	H	28.47	5.23	48.24	54.00	5.76

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4 823.84	39.29	Peak	H	32.86	-36.68	35.47	74.00	38.53
4 823.84	26.94	Average	H	32.86	-36.68	23.12	54.00	30.88
Above 4 900.00	Not detected	-	-	-	-	-	-	-

Middle Channel (2 437 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4 873.12	39.68	Peak	H	33.00	-36.71	35.97	74.00	38.03
4 873.12	26.85	Average	H	33.00	-36.71	23.14	54.00	30.86
Above 4 900.00	Not detected	-	-	-	-	-	-	-

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High Channel (2 462 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
*2 483.50	25.59	Peak	H	28.71	5.37	59.67	74.00	14.33
*2 483.50	14.50	Average	H	28.71	5.37	48.58	54.00	5.42

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4 927.68	39.62	Peak	H	33.15	-36.38	36.39	74.00	37.61
4 927.68	26.53	Average	H	33.15	-36.38	23.30	54.00	30.70
Above 5 000.00	Not detected	-	-	-	-	-	-	-

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OFDM : 802.11n

Low Channel (2 412 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
*2 390.00	25.44	Peak	H	28.47	5.23	59.14	74.00	14.86
*2 390.00	14.53	Average	H	28.47	5.23	48.23	54.00	5.77

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4 822.80	38.98	Peak	H	32.86	-36.67	35.17	74.00	38.83
4 822.80	26.93	Average	H	32.86	-36.67	23.12	54.00	30.88
Above 4 900.00	Not detected	-	-	-	-	-	-	-

Middle Channel (2 437 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4 874.09	38.83	Peak	H	33.00	-36.70	35.13	74.00	38.87
4 874.09	26.79	Average	H	33.00	-36.70	23.09	54.00	30.91
Above 4 900.00	Not detected	-	-	-	-	-	-	-

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High Channel (2 462 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
*2 483.50	26.84	Peak	H	28.71	5.37	60.92	74.00	13.08
*2 483.50	14.51	Average	H	28.71	5.37	48.59	54.00	5.41

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4 923.63	38.82	Peak	H	33.14	-36.41	35.55	74.00	38.45
4 923.63	26.51	Average	H	33.14	-36.41	23.24	54.00	30.76
Above 5 000.00	Not detected	-	-	-	-	-	-	-

Remarks ;

1. “*” means the restricted band.
2. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
3. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
4. Actual = Reading + AF + AMP + CL

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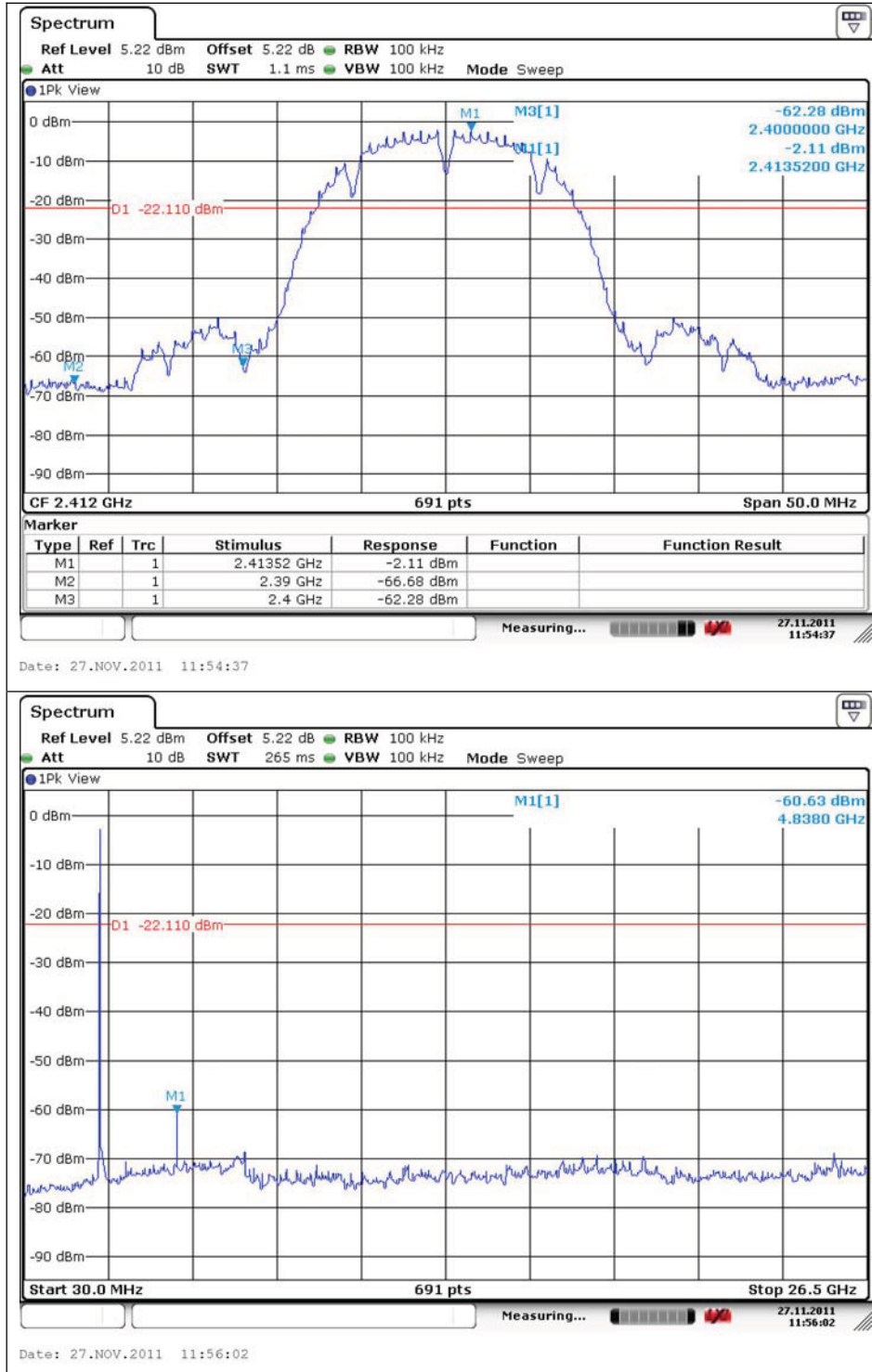
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2.4.3. Spurious RF Conducted Emissions: Plot of Spurious RF Conducted Emission

DSSS : 802.11b

Low Channel



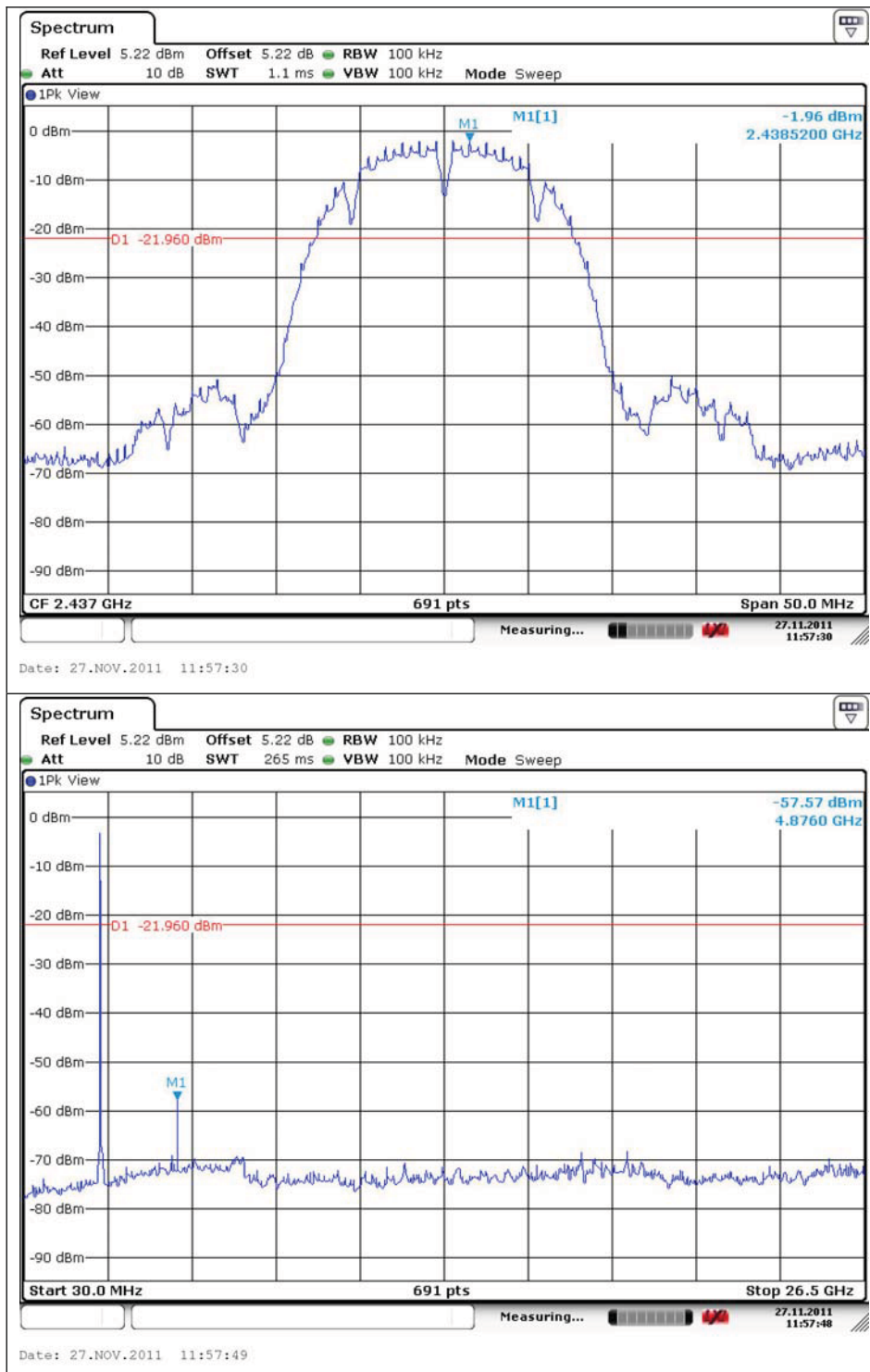
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Middle Channel



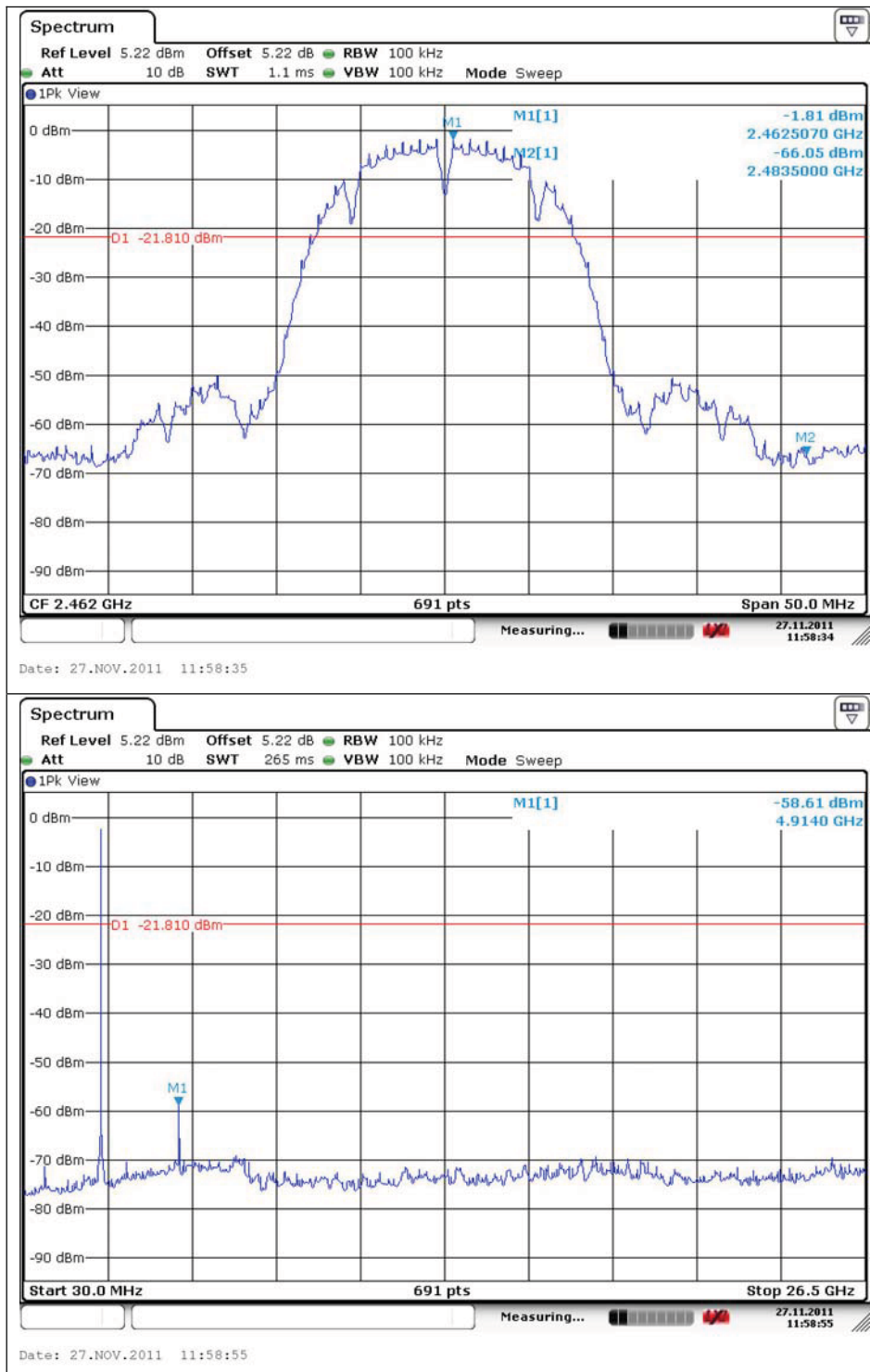
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High Channel



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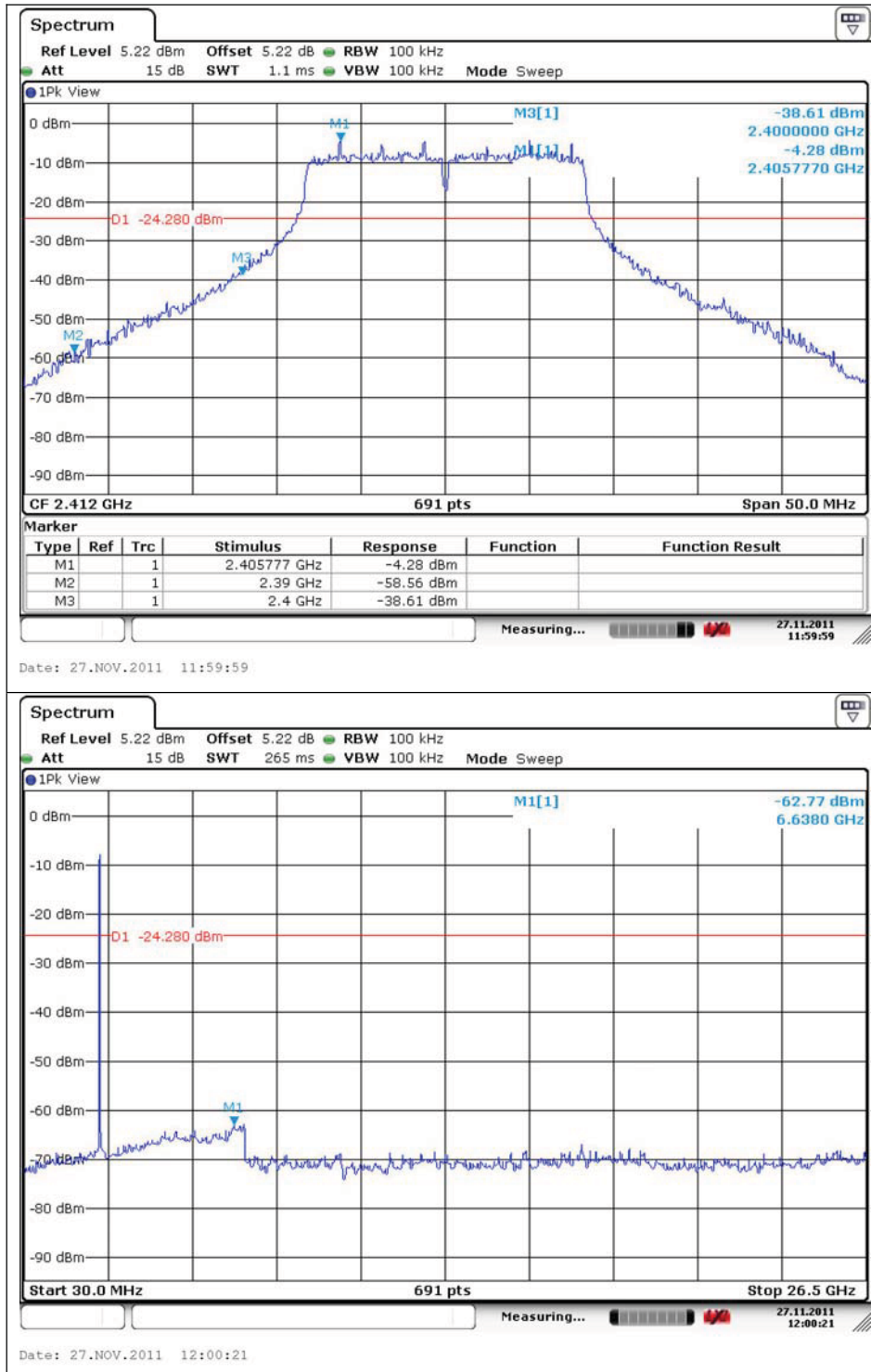
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OFDM : 802.11g

Low Channel



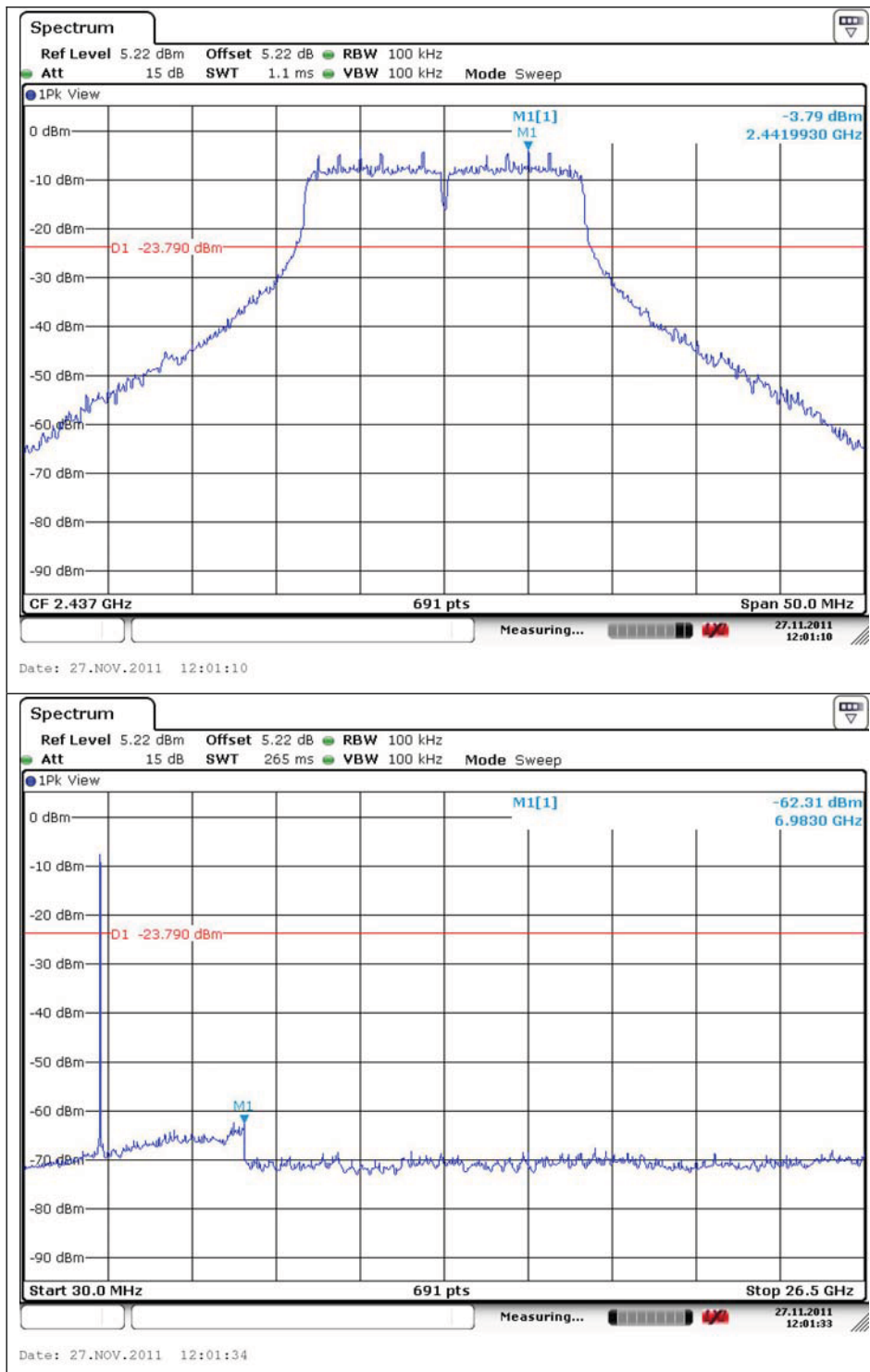
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Middle Channel



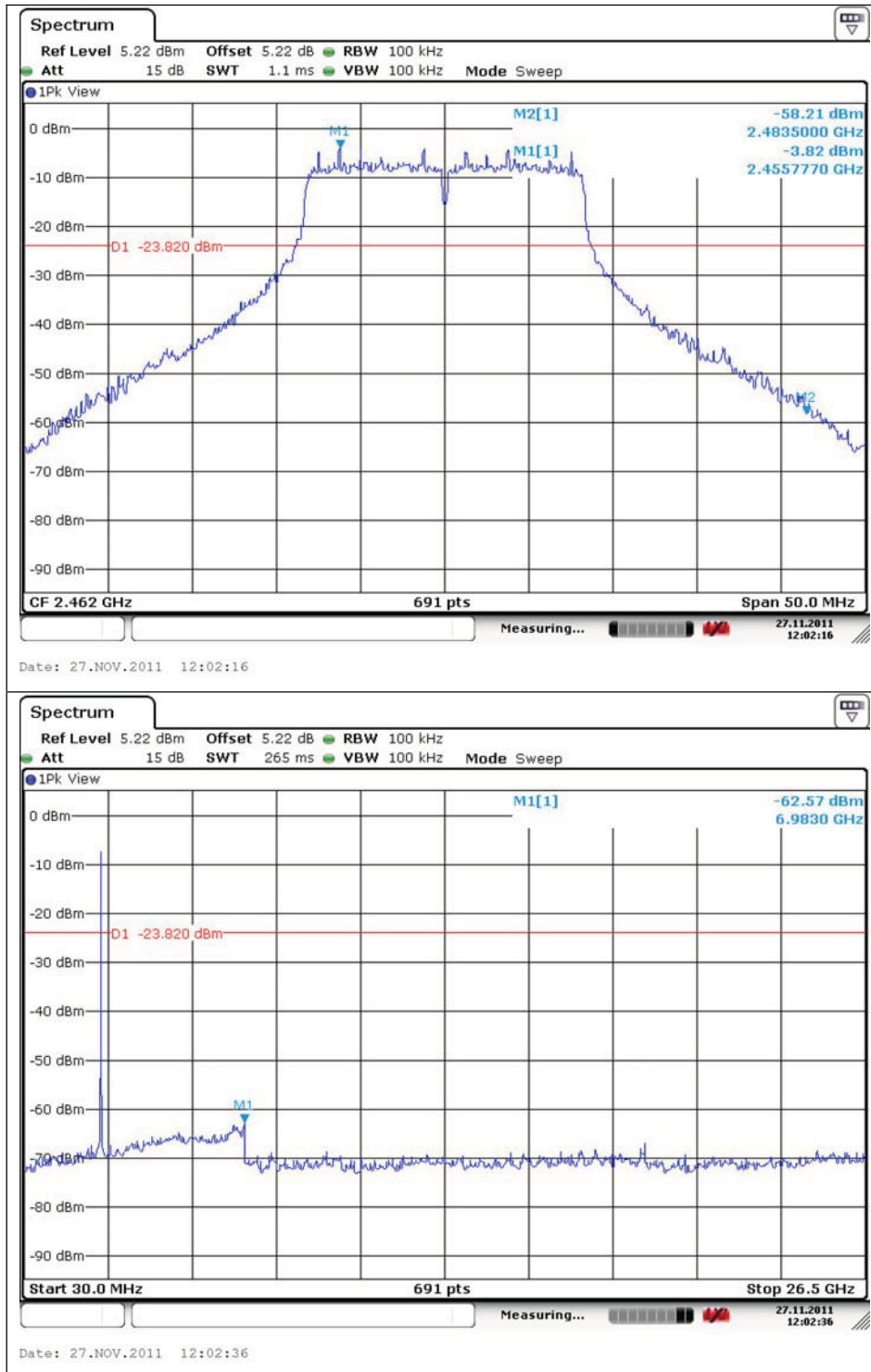
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High Channel



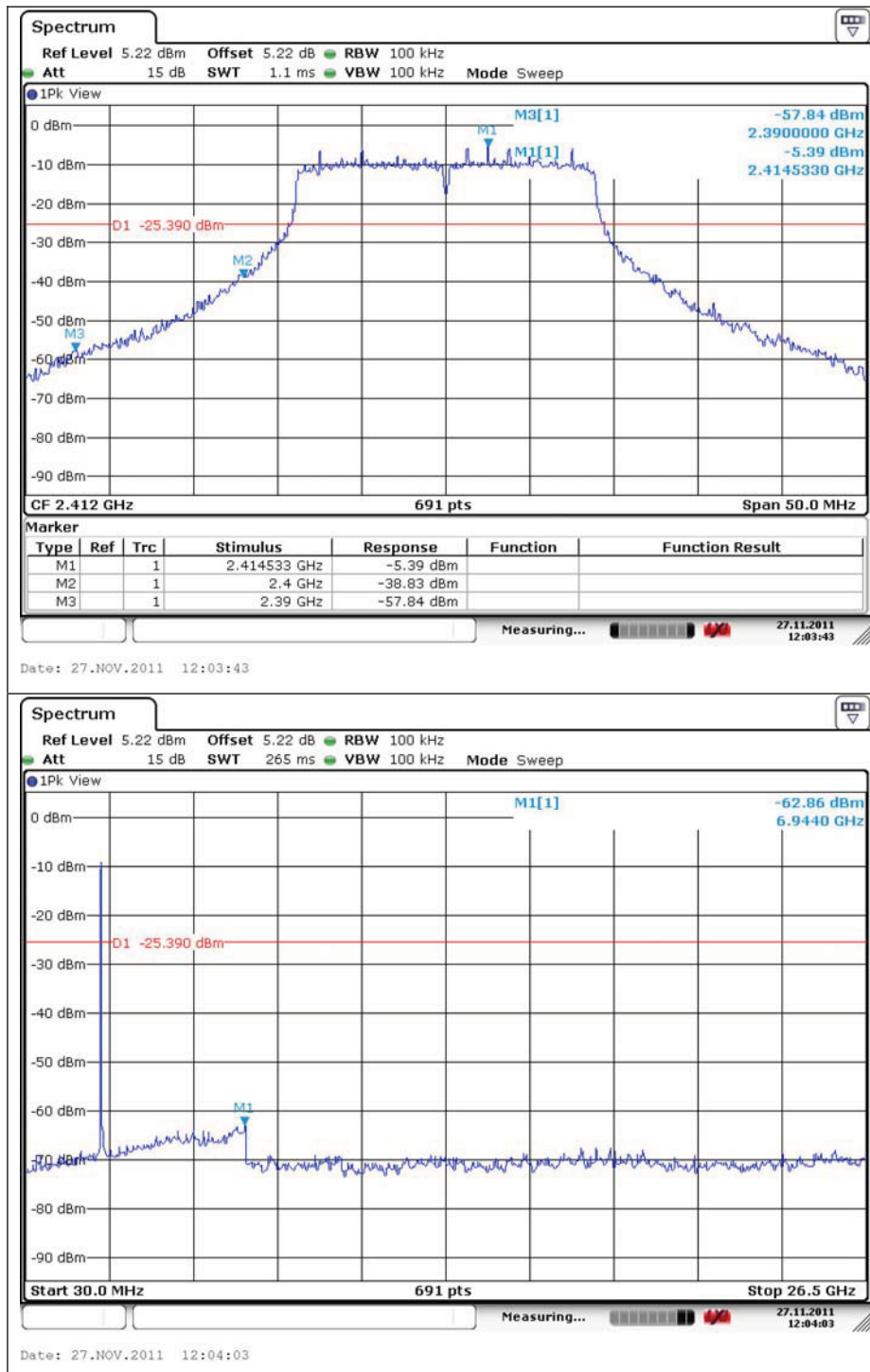
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OFDM : 802.11n
Low Channel



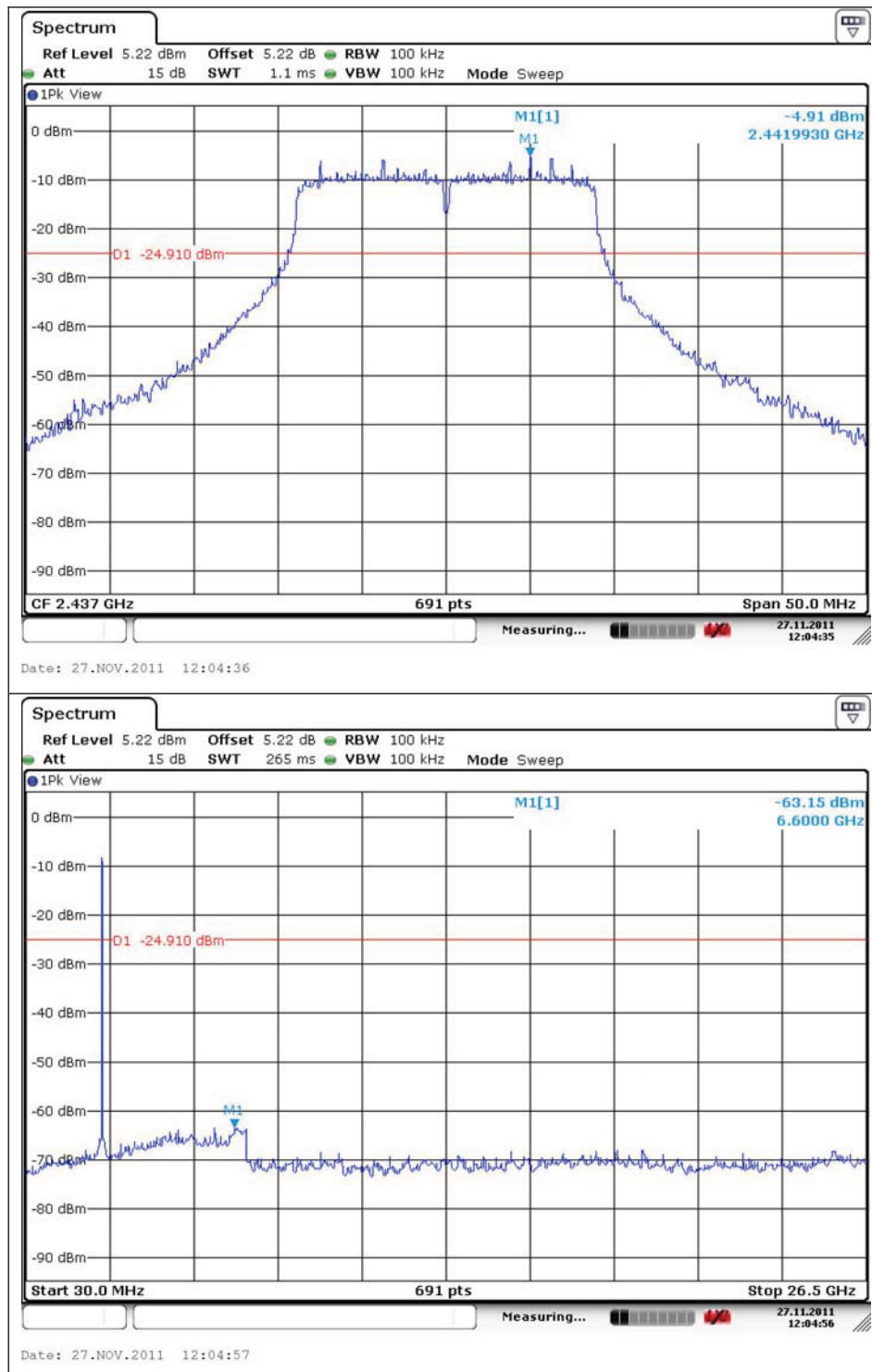
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Middle Channel



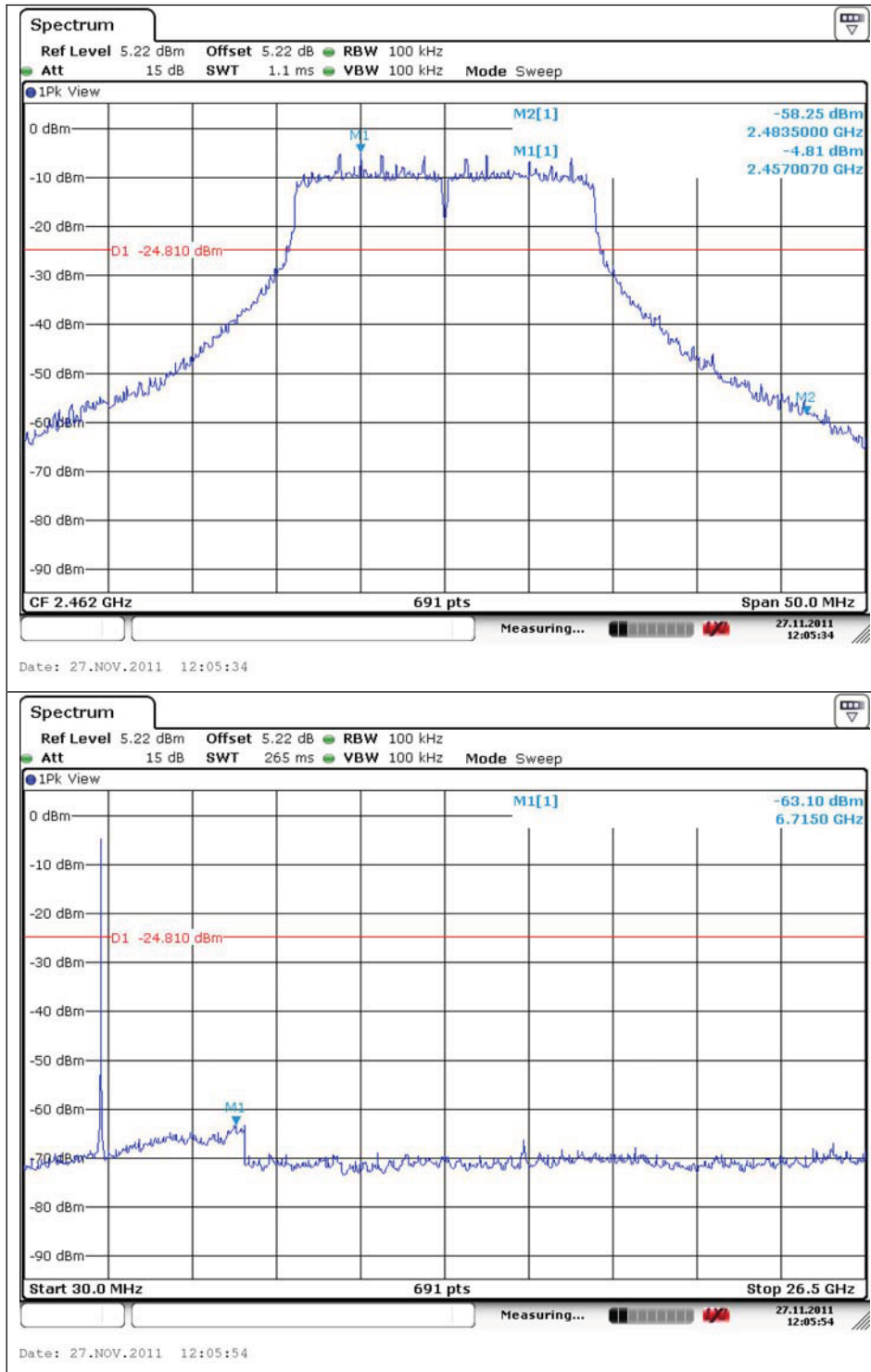
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3. Receiver Radiated spurious emissions

3.1. Test setup - Same as clause 2.1.

3.1.1. Receiver Radiated Spurious Emissions - Same as clause 2.1.1.

3.2. Limit

According to §15.109(a), Except for Class A digital devices, the field strength of radiated emission from unintentional radiator at a distance of 3 m shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
30 - 88	3	40.0	100
88 – 216	3	43.5	150
216 – 960	3	46.0	200
Above 960	3	54.0	500

3.3. Test Procedures - Same as clause 2.3.

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

3.3.1. Test Procedures for Radiated Spurious Emissions- Same as clause 2.3.1.

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3.4. Test Results

Ambient temperature : (24 ± 2) °C

Relative humidity : 47 % R.H.

3.4.1. Spurious Radiated Emission (Worst case configuration_11g mode)

The frequency spectrum from 30 MHz to 26.5 GHz was investigated. Emission levels are not reported much lower than the limits by over 30 dB. All reading values are peak values.

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Below 1 000.00	Not Detected	-	-	-	-	-	-	-
Above 1 000.00	Not Detected	-	-	-	-	-	-	-

Remark:

1. All spurious emission at channels are almost the same from 30 MHz to 26.5 GHz, so that the middle channel was chosen at representative in final test.
2. Actual = Reading + AF + AMP + CL

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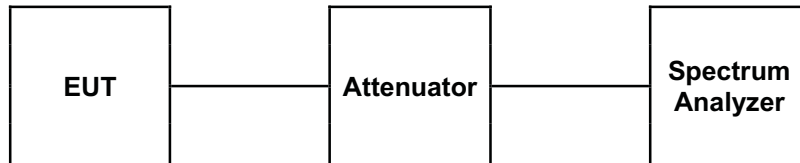
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4. 6 dB Bandwidth Measurement

4.1. Test Setup



4.2. Limit

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 ~928 MHz, 2 400 ~ 2 483.5 MHz, and 5 725 ~ 5 825 MHz bands. The minimum of 6 dB Bandwidth shall be at least 500 kHz

4.3. Test Procedure

1. The 6 dB band width was measured with a spectrum analyzer connected to RF antenna connector(conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency. The analyzer center frequency was set to the EUT carrier frequency, using the analyzer. Display Line and Marker Delta functions, the 6 dB band width of the emission was determined.
2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW = 100 kHz, VBW = 100 kHz, Span = 50 MHz.

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4.4. Test Results

Ambient temperature : (24 ± 2) °C
Relative humidity : 47 % R.H.

Operation Mode	Channel	Channel Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Bandwidth (MHz)
DSSS (802.11b)	Low	2 412	10.13	13.82
	Middle	2 437	10.13	13.75
	High	2 462	9.12	13.82
OFDM (802.11g)	Low	2 412	16.35	17.37
	Middle	2 437	16.35	17.37
	High	2 462	16.35	17.37
OFDM (802.11n)	Low	2 412	17.22	18.45
	Middle	2 437	17.19	18.45
	High	2 462	17.15	18.38

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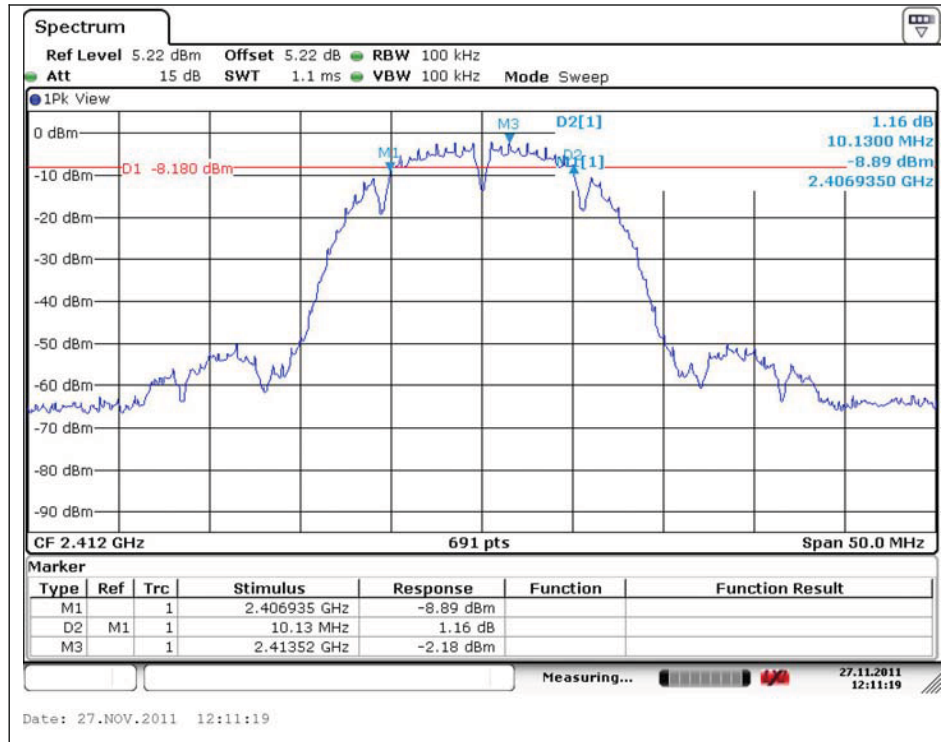
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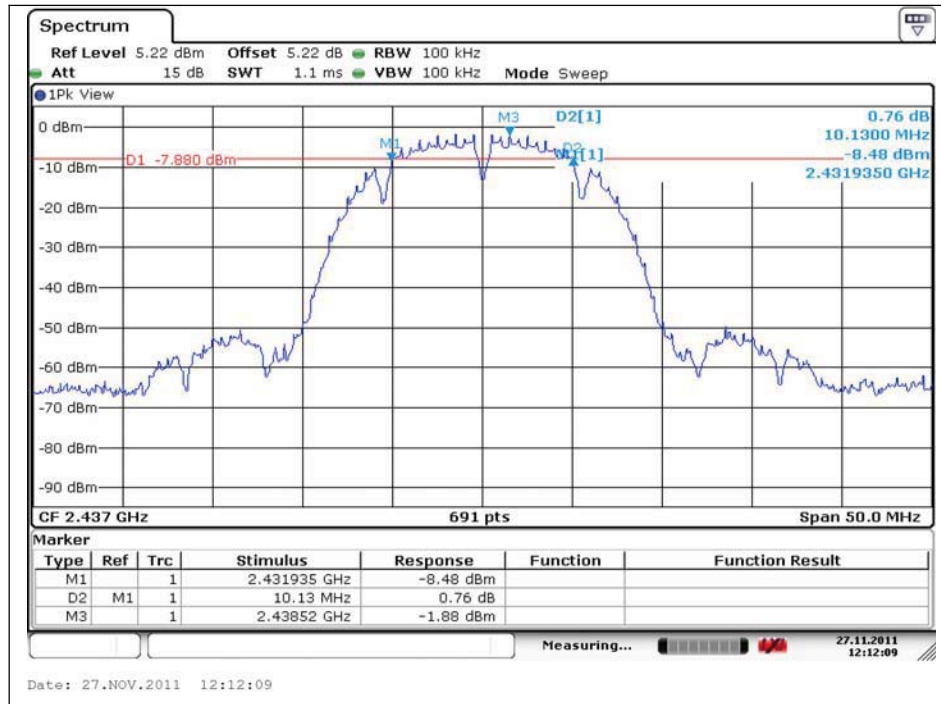
6 dB Bandwidth

DSSS : 802.11b

Low Channel



Middle Channel



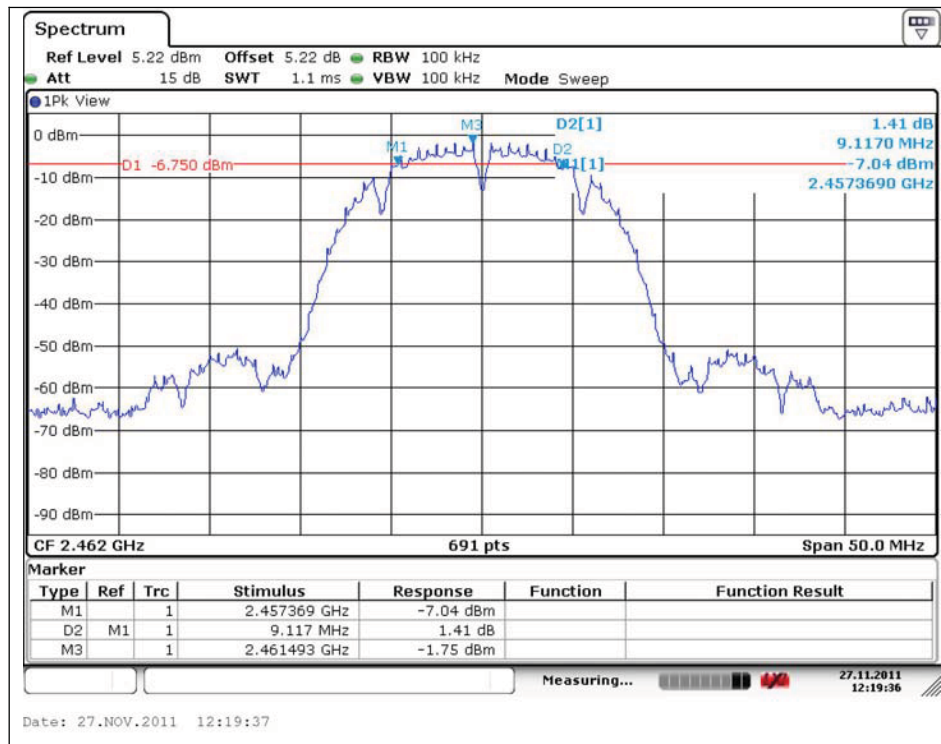
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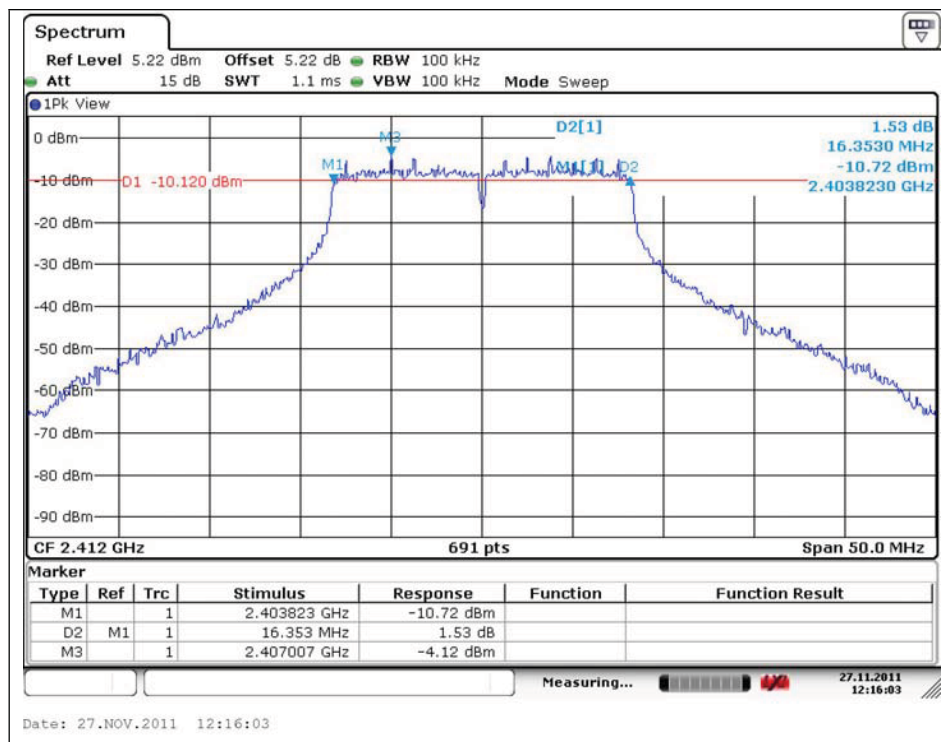
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High Channel



OFDM : 802.11g

Low Channel



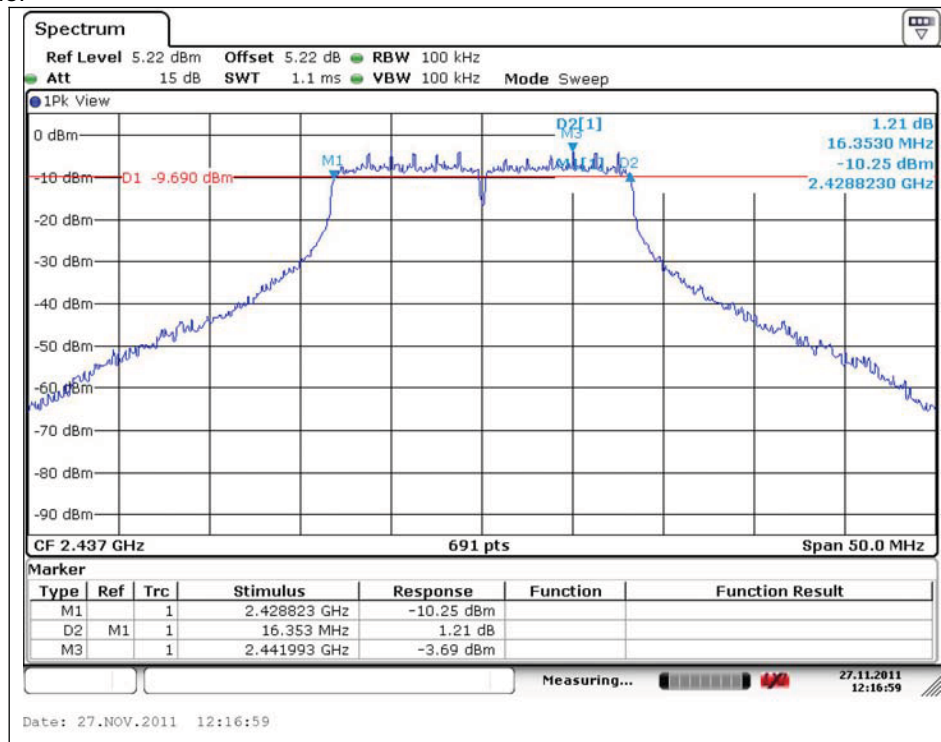
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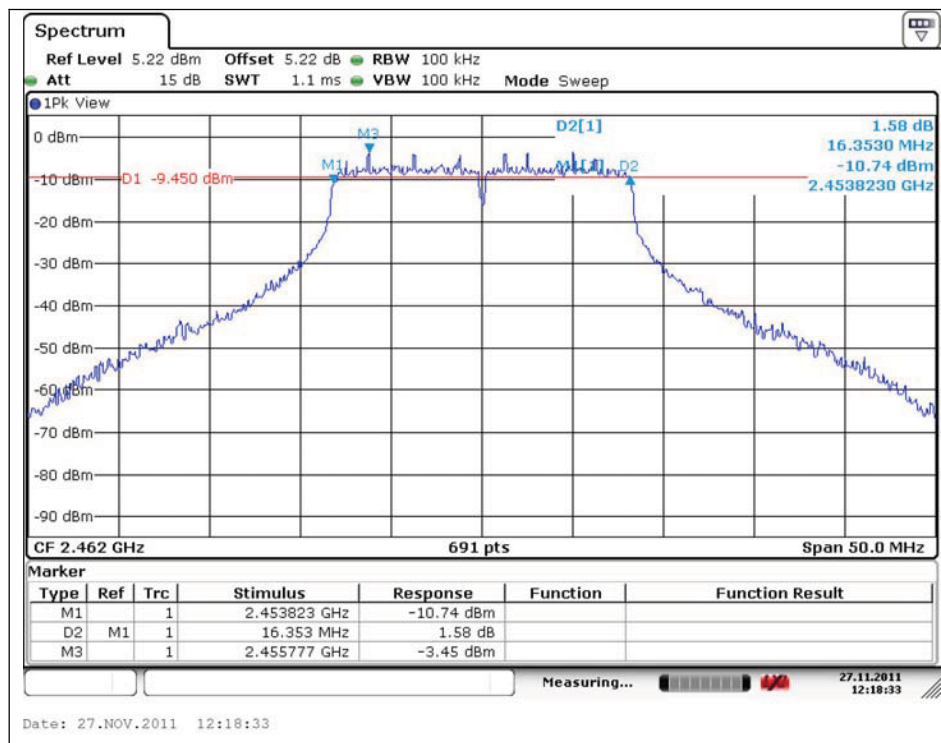
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Middle Channel



High Channel



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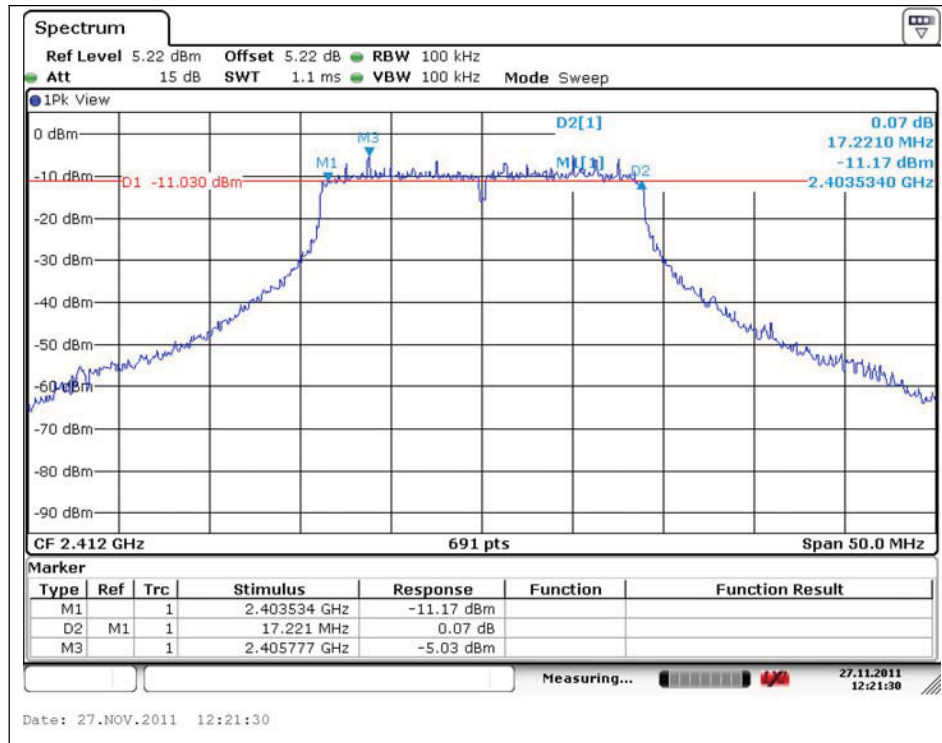
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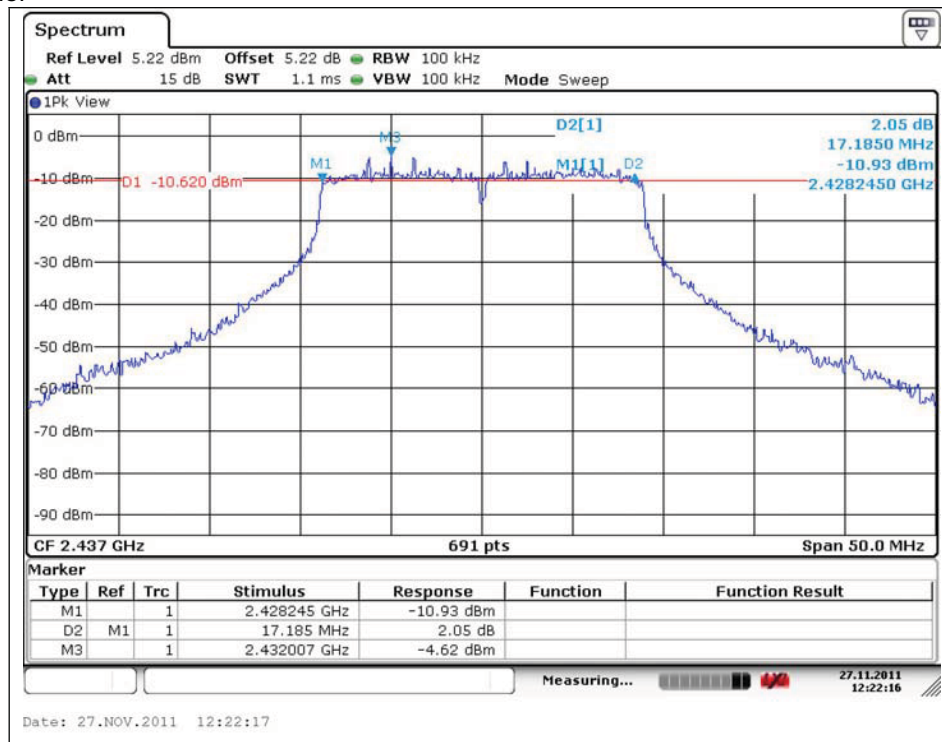
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OFDM : 802.11n

Low Channel



Middle Channel



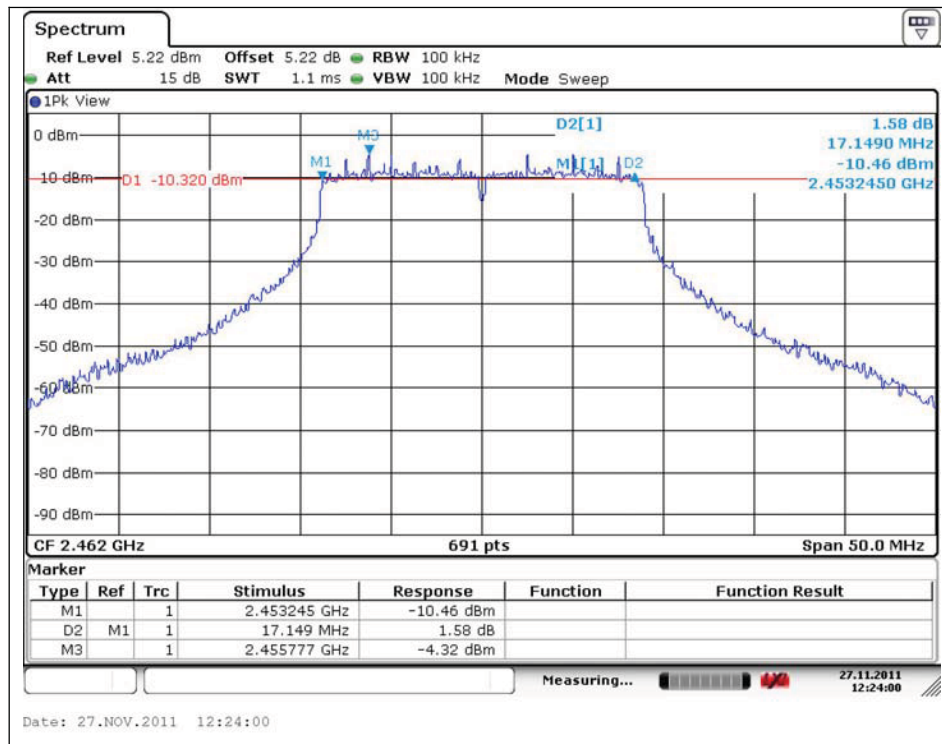
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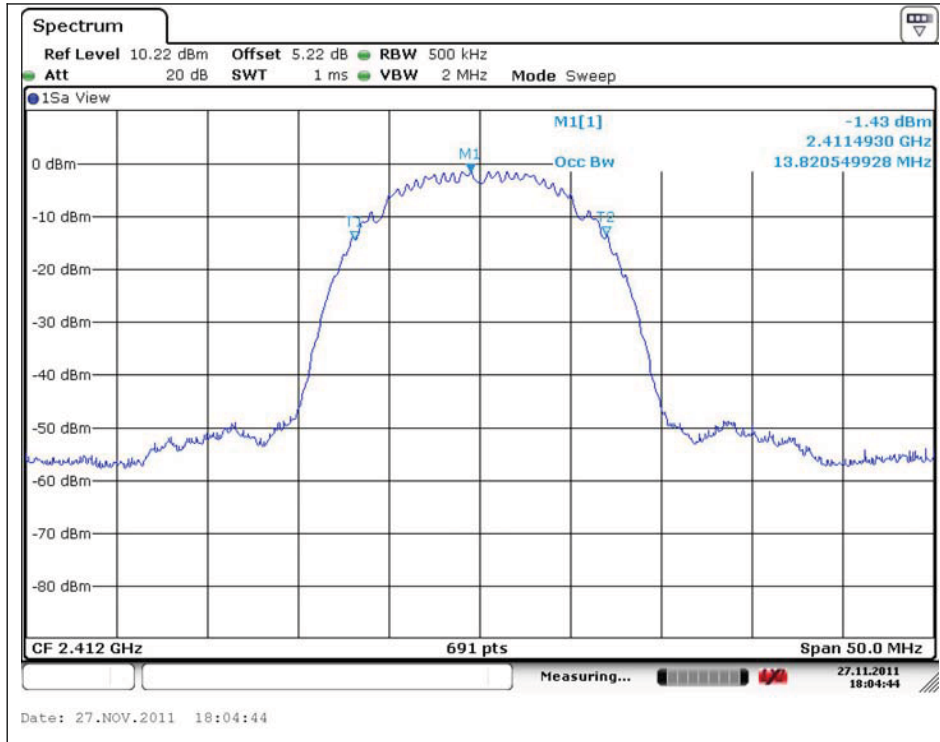
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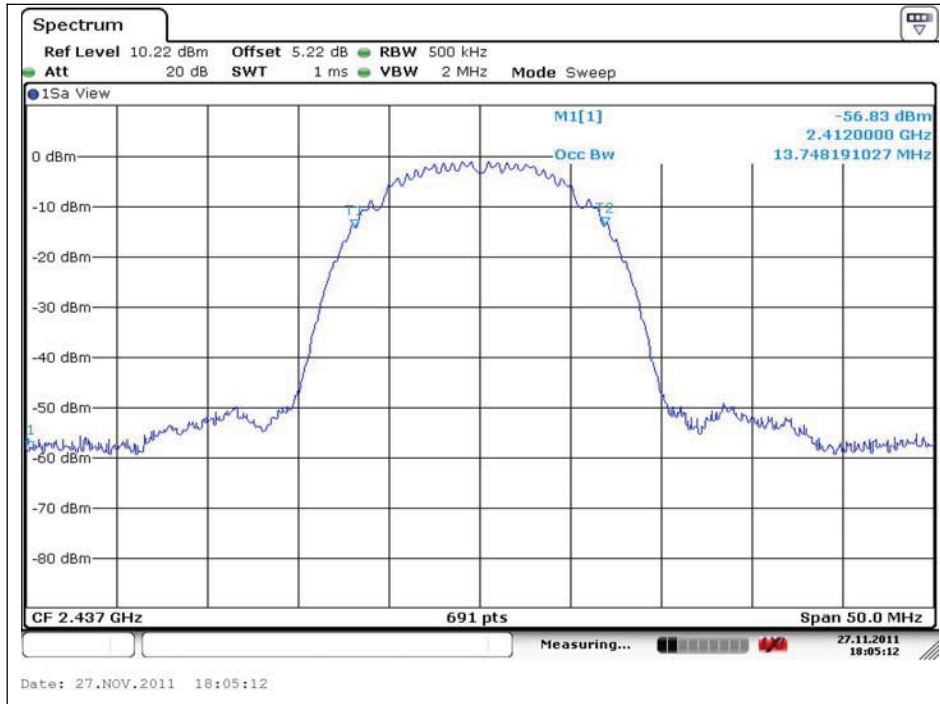
99% Bandwidth

DSSS : 802.11b

Low Channel



Middle Channel



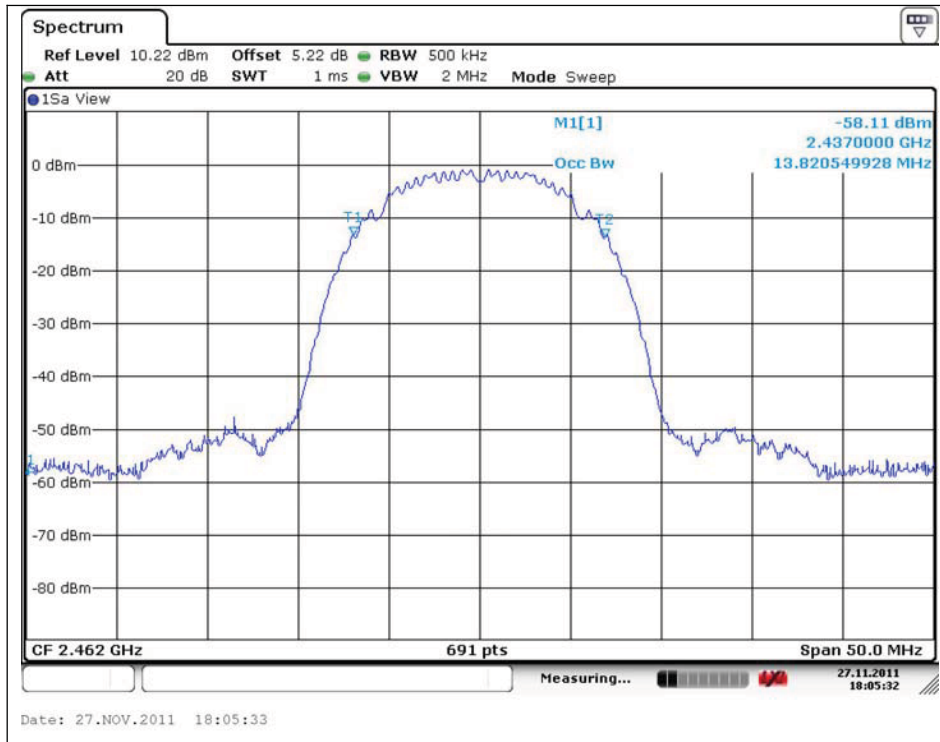
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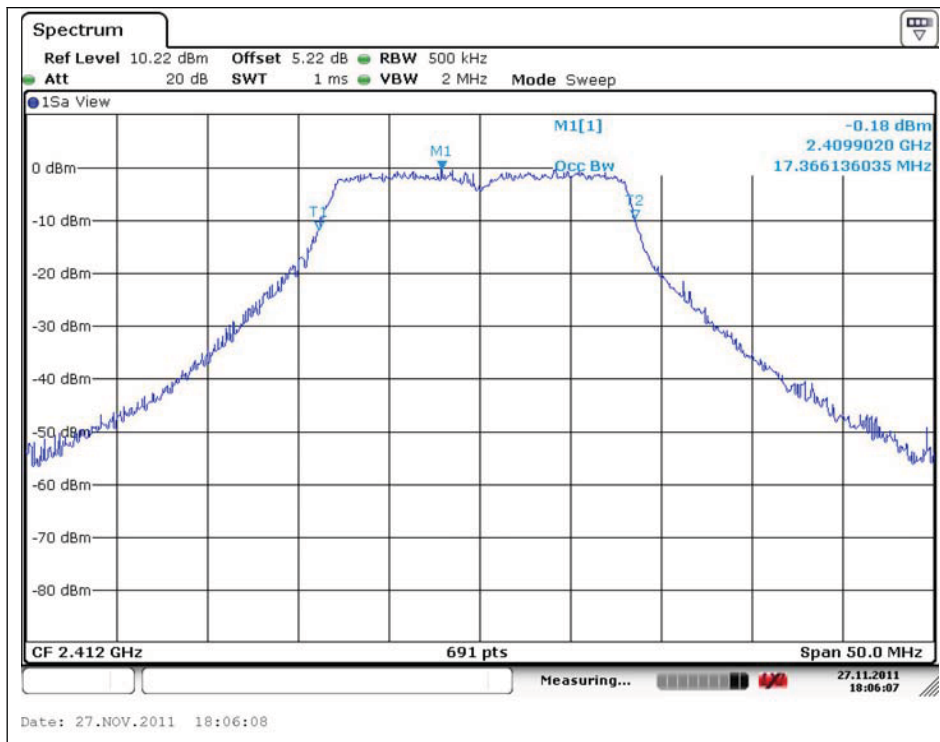
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High Channel



OFDM : 802.11g

Low Channel



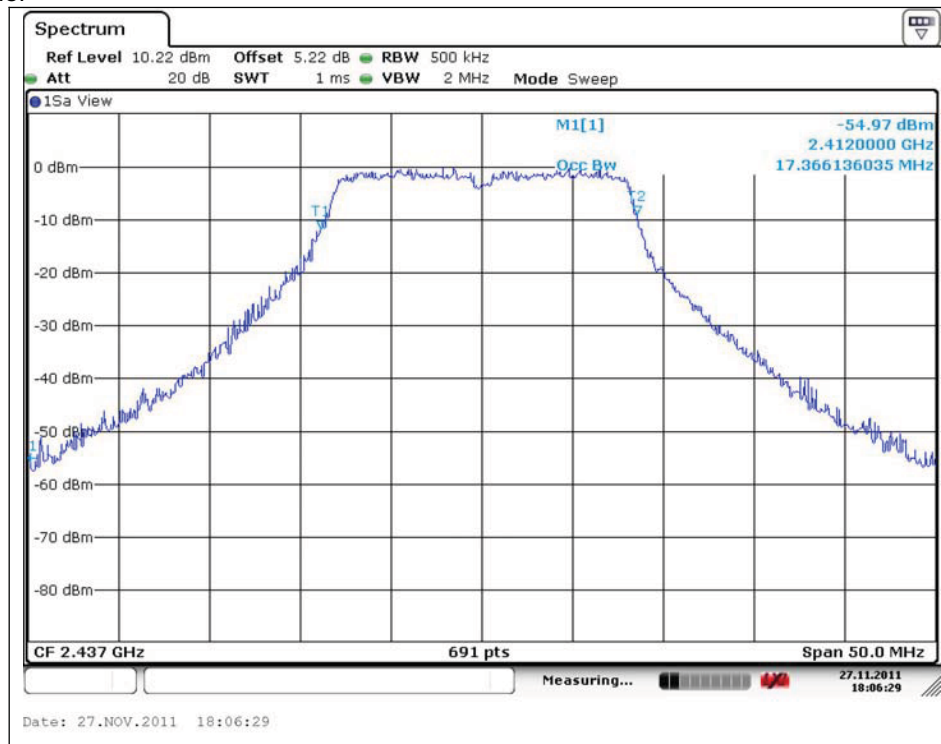
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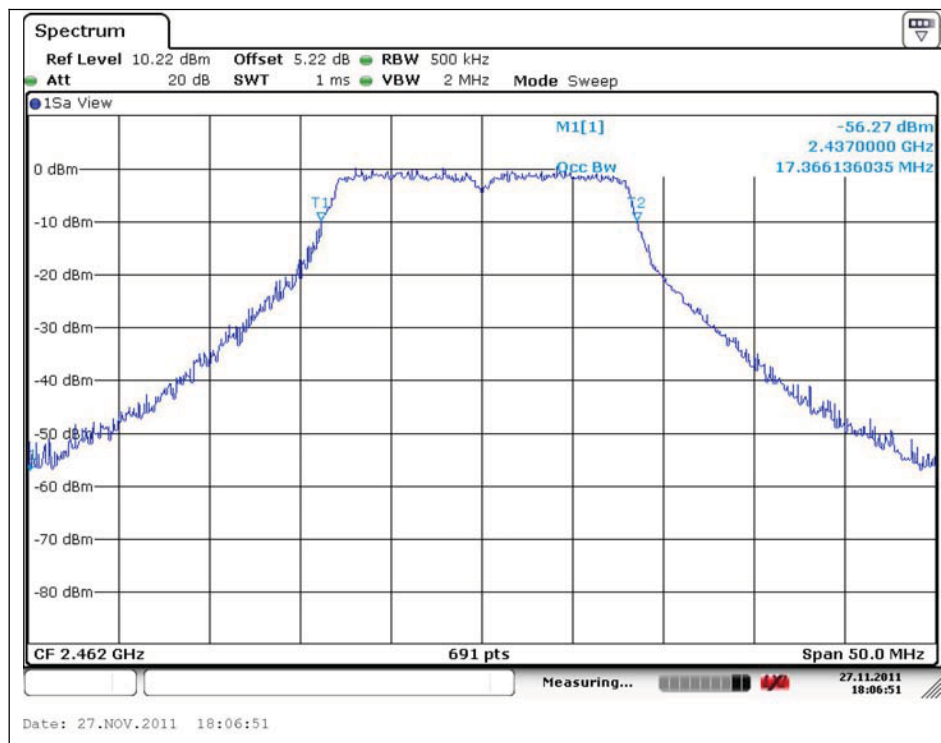
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Middle Channel



High Channel



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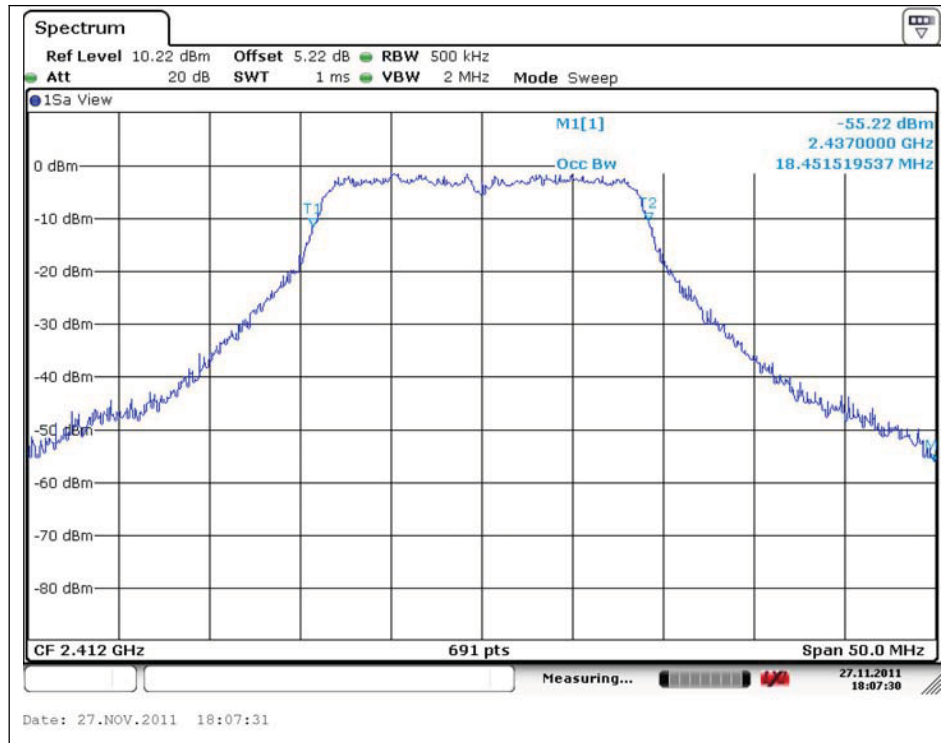
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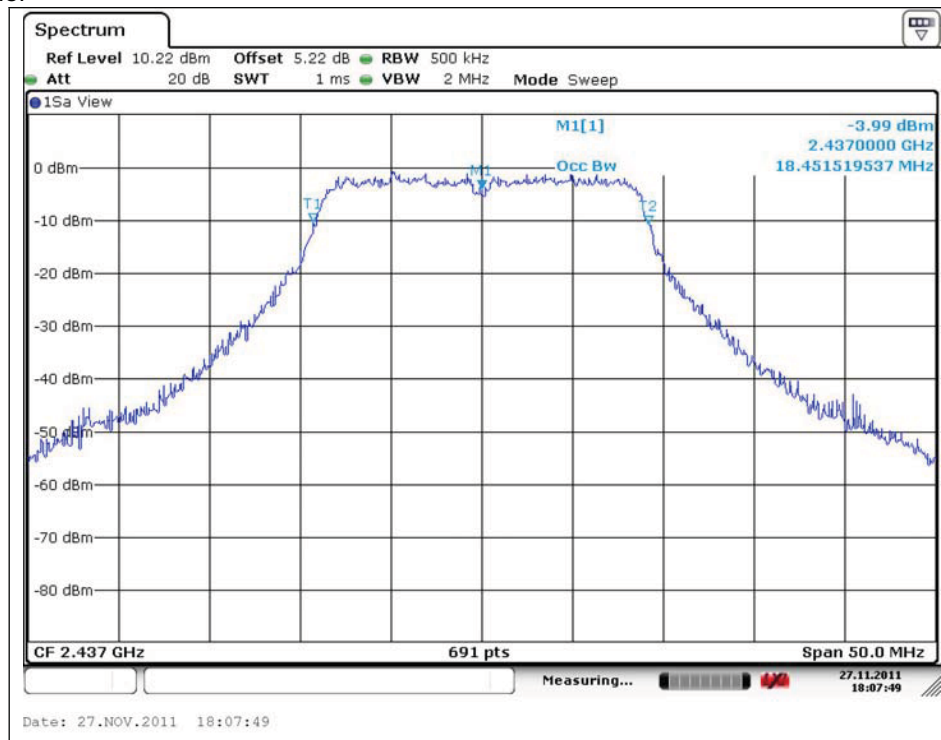
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OFDM : 802.11n

Low Channel



Middle Channel



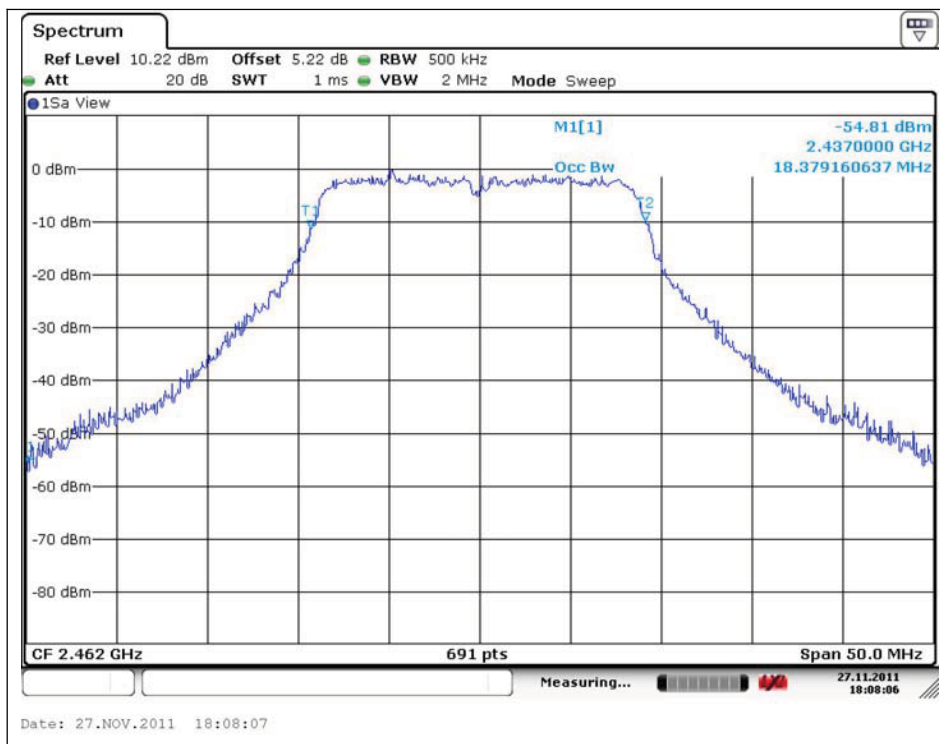
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