

FCC Part 15 Subpart C §15.247

RSS-210 ISSUE No. :8

Test Report

Equipment Under Test	Pico projector
Model Name	Pico Air
Applicant	CELLUON, INC.
FCC ID	TCLPICOAIR
IC	10211A-PICOAIR
Manufacturer	CELLUON, INC.
Date of Test(s)	2014. 12. 29 ~ 2015. 01. 12
Date of Issue	2015. 01. 14

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

Issue to	Issue by
CELLUON, INC. Ace High-End Tower 1101 235-2, Guro-Dong, Guro-Gu, Seoul, Korea, 152-740 Tel.: +82-2-6220-3886 Fax: +82-2-6220-3899	MOVON CORPORATION 498-2, Geumeo-ro, Pogok-eup, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 449-812 Tel.: +82-31-338-8837 Fax: +82-31-338-8847

Revision history

Revision	Date of issue	Description	Revised by
--	Jan. 14, 2015	Initial	--

Table of contents

1. GENERAL INFORMATION.....	5
1.1. DETAILS OF APPLICANT.....	5
1.2. SUMMARY OF TEST RESULTS.....	5
2. EUT DESCRIPTION.....	6
2.1. DECLARATIONS BY THE MANUFACTURER.....	6
2.2. DETAILS OF MODIFICATION.....	6
3. MEASUREMENT EQUIPMENT	7
4. TRANSMITTER RADIATED SPURIOUS EMISSIONS AND CONDUCTED SPURIOUS EMISSIONS	8
4.1. TEST SETUP.....	8
4.1.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS	8
4.2. LIMIT	9
4.3. TEST PROCEDURES.....	11
4.3.1. TEST PROCEDURES FOR RADIATED SPURIOUS EMISSIONS.....	11
4.3.2. TEST PROCEDURES FOR CONDUCTED SPURIOUS EMISSIONS	11
4.4. TEST RESULT	12
4.4.1. SPURIOUS RADIATED EMISSION	12
4.4.2. SPURIOUS RADIATED EMISSION	18
4.4.3. SPURIOUS RADIATED EMISSION	21
THE AMPLITUDE OF SPURIOUS EMISSIONS FROM INTENTIONAL RADIATORS AND EMISSIONS FROM UNINTENTIONAL RADIATORS WHICH ARE ATTENUATED MORE THAN 20 dB BELOW THE PERMISSIBLE VALUE NEED NOT BE REPORTED UNLESS SPECIFICALLY REQUIRED ELSEWHERE IN THIS PART.....	23
THE AMPLITUDE OF SPURIOUS EMISSIONS FROM INTENTIONAL RADIATORS AND EMISSIONS FROM UNINTENTIONAL RADIATORS WHICH ARE ATTENUATED MORE THAN 20 dB BELOW THE PERMISSIBLE VALUE NEED NOT BE REPORTED UNLESS SPECIFICALLY REQUIRED ELSEWHERE IN THIS PART.....	24
THE AMPLITUDE OF SPURIOUS EMISSIONS FROM INTENTIONAL RADIATORS AND EMISSIONS FROM UNINTENTIONAL RADIATORS WHICH ARE ATTENUATED MORE THAN 20 dB BELOW THE PERMISSIBLE VALUE NEED NOT BE REPORTED UNLESS SPECIFICALLY REQUIRED ELSEWHERE IN THIS PART.....	25
THE AMPLITUDE OF SPURIOUS EMISSIONS FROM INTENTIONAL RADIATORS AND EMISSIONS FROM UNINTENTIONAL RADIATORS WHICH ARE ATTENUATED MORE THAN 20 dB BELOW THE PERMISSIBLE VALUE NEED NOT BE REPORTED UNLESS SPECIFICALLY REQUIRED ELSEWHERE IN THIS PART.....	26
4.4.4. BAND EDGE	27
4.4.5 CONDUCTED POWER LINE TEST.....	29
4.4.5.1 TEST SETUP	29
4.4.5.2 LIMIT	29
4.4.5.3 TEST PROCEDURES.....	29
4.4.5.4 TEST RESULTS	30
4.4.6. OUT OF BAND EMISSIONS IN NON-RESTRICTED FREQUENCY BAND.....	32
5. RECEIVER RADIATED SPURIOUS EMISSIONS	76
5.1. TEST SETUP	76
5.1.1. RECEIVER RADIATED SPURIOUS EMISSIONS.....	76
5.2. LIMIT	76
5.3. TEST PROCEDURES.....	76
5.3.1. TEST PROCEDURES FOR RADIATED SPURIOUS EMISSIONS.....	76
5.4. TEST RESULTS	77
5.4.1. SPURIOUS RADIATED EMISSION.	77
6. 6 dB BANDWIDTH & 99 % BANDWIDTH MEASUREMENT	79
6.1. TEST SETUP.....	79
6.2. LIMIT	79
6.3. TEST PROCEDURE	79
6.4. TEST RESULTS	80

7. MAXIMUM OUTPUT POWER MEASUREMENT.....	107
7.1. TEST SETUP.....	107
7.2. LIMIT.....	107
7.3 TEST PROCEDURE	107
7.4 TEST RESULTS	108
8. POWER SPECTRAL DENSITY MEASUREMENT	109
8.1. TEST SETUP.....	109
7.2. LIMIT	109
7.3. TEST PROCEDURE (PKPSD)	109
7.4. TEST RESULTS	110
9. ANTENNA REQUIREMENT	124
9.1. STANDARD APPLICABLE	124
9.2. ANTENNA CONNECTED CONSTRUCTION.....	124
10. RF EXPOSURE EVALUATION	125
10.1. ENVIRONMENTAL EVALUATION AND EXPOSURE LIMIT ACCORDING TO FCC CFR 47 PART 1, 1.1307(B), 1.1310125	
10.2. FRIIS TRANSMISSION FORMULA : $P_d=(P_{out}*G)/(4*\pi*R^2)$	125
10.3. TEST RESULT OF RF EXPOSURE EVALUATION	126
10.4. OUTPUT POWER INTO ANTENNA & RF EXPOSURE EVALUATION DISTANCE	126

1. General information

1.1. Details of applicant

Applicant : CELLUON, INC.
Address : Ace High-End Tower 1101 235-2, Guro-Dong, Guro-Gu, Seoul, Korea, 152-742
Contact Person : Chun Bae, Park
Telephone : +82-2-6220-3886
Fax : +82-2-6220-3899

1.2. Summary of test results

The EUT has been tested according to the following specifications;

Section in FCC part 15	Section in RSS-GEN, RSS-210	Description	Result
§15.205 §15.209 §15.247(d)	A8.5	Transmitter radiated spurious emissions, Conducted spurious emission	C
§15.109(a)	RSS-Gen 6	Receiver radiated spurious emission	C
§15.107	7.2.2	Conducted power line test	C
§15.247(a)(2)	A8.2(a)	6 dB Bandwidth and 99 % bandwidth	C
§15.247(b)(e)	A8.4(4)	Maximum Peak Output Power	C
§15.247(e)	A8.2(b)	Transmitter Power Spectral Density	C
§1.1307(b)(1)	RSS-Gen 5.5 RSS-102	RF exposure evaluation	C

The sample was tested according to the following specification:

**FCC Parts 15.247; ANSI C-63.4-2009, FCC Public Notice KDB 558074 D01 v03r02
RSS-210 and ISSUE No.:8 Date: 2010
TEST SITE REGISTRATION NUMBER:
FCC(670686), IC(6432B-1)**

※ Abbreviation

C Complied
N/A Not applicable
F Fail

Approval Signatories

Test and Report Completed by :	Report Approval by :
	
Jungmoo Her Test Engineer MOVON CORPORATION	Issac Jin Technical Manager MOVON CORPORATION

2. EUT Description

Kind of product	Pico projector
FCC ID	Pico Air
IC Number	TCLPICOAIR
Model Name	10211-PICOAIR
Serial Number	N/A
Power supply	DC 3.8V
Frequency range	2 412 MHz ~ 2 462 MHz (802.11b/g/n20)
	5 745 MHz ~ 5 805 MHz (802.11a/an20)
	5 755 MHz ~ 5 795 MHz (802.11an40)
Modulation technique	DSSS (802.11b)
	OFDM (802.11g/n20/a/an20/an40)
Number of channels	11 (802.11b/g/n20)
	4 (802.11a/an20)
	2 (802.11an40)
RF Input Output port type	2x2 MIMO (2tx / 2rx)
Antenna gain	2.39 dB i (Max.) (2 412 MHz ~ 2 462 MHz)
	4.78 dB i (Max.) (5 745 MHz ~ 5 805 MHz)
Test Site Registration Number	FCC(670686), IC(6432B-1)

2.1. Declarations by the manufacturer

None

2.2. Details of modification

None

2.3. Table for Test Modes (WLAN)

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Mode	Data rate (Worst case)	Channel No. (Freq. MHz)
802.11b	11 Mbps	01 (2 412) / 06 (2 437) / 11 (2 472)
802.11g	54 Mbps	01 (2 412) / 06 (2 437) / 11 (2 472)
802.11n_20	MCS15	01 (2 412) / 06 (2 437) / 11 (2 472)
802.11a	54 Mbps	149 (5 745) / 157 (5 785) / 161 (5 805)
802.11an_20	MCS15	149 (5 745) / 157 (5 785) / 161 (5 805)
802.11an_40	MCS15	151 (5 755) / 159 (5 795)

3. Measurement equipment

Equipment	Manufacturer	Model	Serial number	Calibration Interval	Calibration due.
EMI Test Receiver	R&S	ESU26	100196/026	1 year	2015-12-22
Signal Generator	R&S	SMBV100	257379	1 year	2015-09-29
Spectrum Analyzer	R&S	FSV-40	100832	1 year	2015-08-13
Power Meter	Agilent	E4416A	GB41290645	1 year	2015-09-29
Power Sensor	Agilent	9327A	US40441490	1 year	2015-07-09
Double Ridge Horn Antenna	R&S	HF906	100236	2 year	2015-02-28
Horn Antenna	AH Systems	SAS-572	269	2 year	2015-09-06
Double Ridge Horn Antenna	ETS LINDGREN	3116B	133350	2 year	2016-02-26
Bi - Log Antenna	AH Systems	SAS-521-7	128	2 year	2015-10-04
Power Amplifier	MITEQ	AM-1431	1497315	1 year	2015-09-29
Power Amplifier	MITEQ	AFS43-01002600	1374382	1 year	2015-09-29
High Pass Filter	Wainwright	WHK3.0/18G-10SS	508	1 year	2015-09-29
DC Power Supply	HP	6674A	3637A01351	1 year	2015-09-29
Controller	INNCO	CO2000	co200/064/6961003/L	N/A	N/A
Antenna Master	INNCO	MA4000	MA4000/038/6961003/L	N/A	N/A
Loop Antenna	ETS LINDGREN	6502	00118166	2 year	2015-09-27

※ Remark;
Support equipment

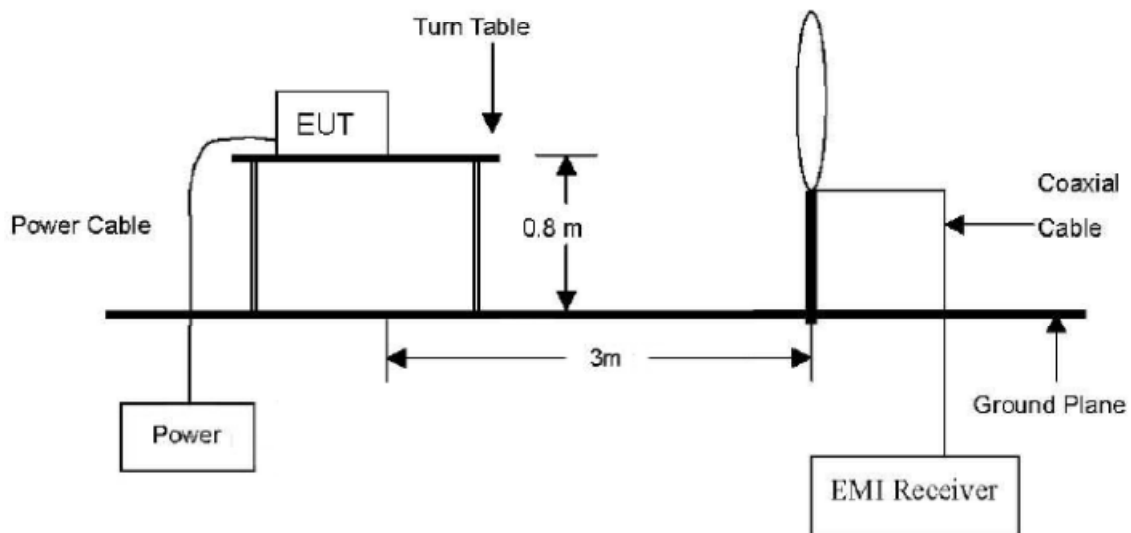
Description	Manufacturer	Model	Serial number
NOTEBOOK	DELL	Latitude E5440	8HCMN12

4. Transmitter radiated spurious emissions and conducted spurious emissions

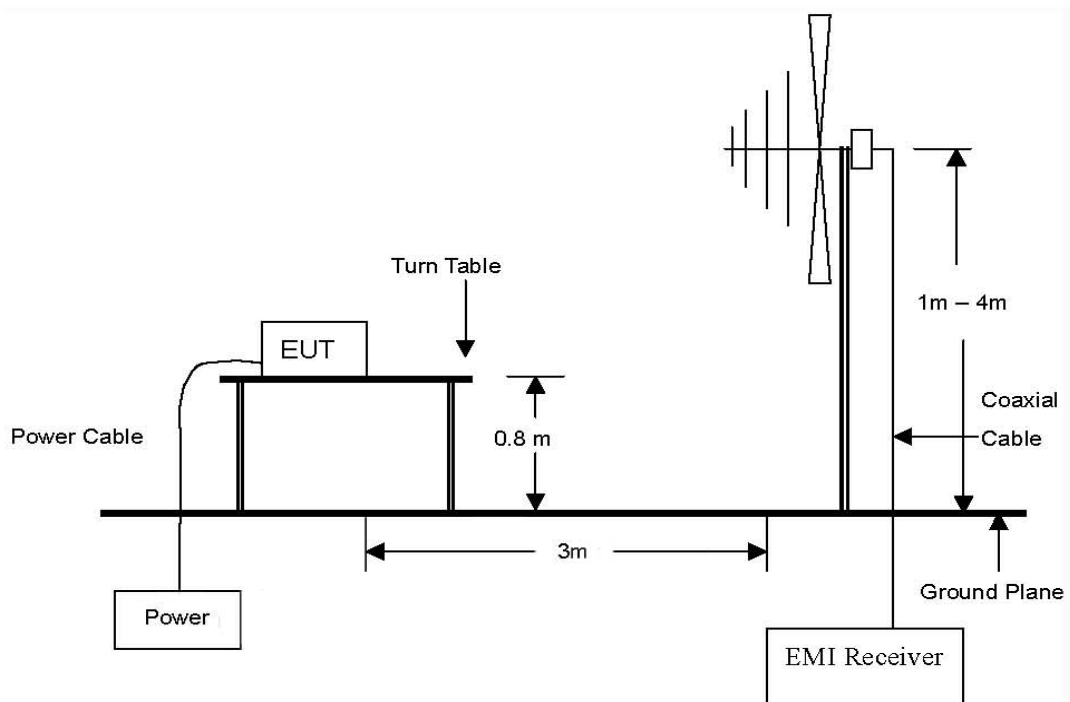
4.1. Test setup

4.1.1. Transmitter radiated spurious emissions

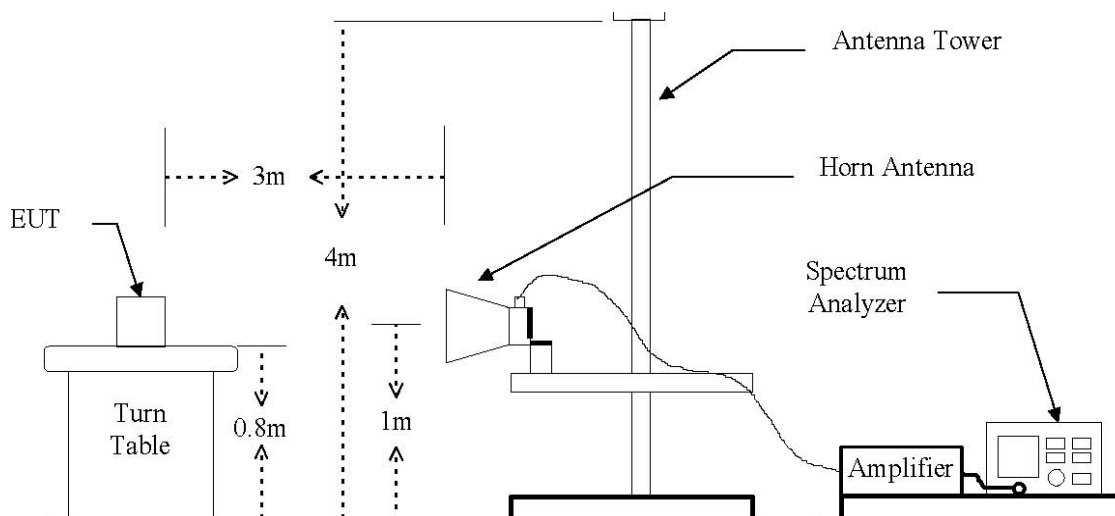
The diagram below shows the test setup that is utilized to make the measurements for emission from 9kHz to 30MHz Emissions.



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 40 GHz emissions.



4.2. 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 in 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 §15.209(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)	Radiated at 3M (dBμV/m)	Radiated (μV/m)
0.009–0.490	300	See the remark	2400/F(kHz)
0.490–1.705	30		24000/F(kHz)
1.705–30.0	30		30
30 - 88	3	40.0	100
88 – 216	3	43.5	150
216 – 960	3	46.0	200
Above 960	3	54.0	500

According to §15.205(a), Except as provided elsewhere in this Subpart, the emissions from Restricted bands of operation shall not exceed the field strength levels specified in the following table:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.694 75 – 16.695 25	608 – 614	5.35 – 5.46
2.173 5 – 2.190 5	16.804 25 -16.804 75	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.177 25 – 4.177 75	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.207 25 – 4.207 75	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.267 75 – 6.268 25	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.311 75 – 6.312 25	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
9.362 – 8.366	156.524 75 – 156.525 25	2483.5 – 2500	17.7 – 21.4
8.376 25 – 8.386 75	156.7 – 156.9	2655 – 2900	22.01 – 23.12
8.414 25 – 8.414 75	162.012 5 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 - 3339	31.2 – 31.8
12.519 75 – 12.520 25	240 – 285	3345.8 – 3358	36.43 – 36.5
12.576 75 – 12.577 25	322 -335.4	3600 – 4400	
13.36 – 13.41			

*Remark

1. Emission level in dB uV/m = 20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Distance extrapolation factor = 40log(Specific distance/ test distance) (dB)
Limit line=Specific limits(dB uV) + distance extrapolation factor.

4.3. Test procedures

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

4.3.1. Test procedures for radiated spurious emissions

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

※ **Remark;**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10 kHz for Peak detection (PK) at frequency below 30 MHz
2. 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.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1 GHz.
4. 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.

4.3.2. Test procedures for conducted spurious emissions

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, section 5.4.1.1, the reference level for out of band emissions is established from the plots of this section since the band edge emissions are measured with a RBW of 100 kHz. This reference level is then used as the limit in subsequent plots for out of band spurious emissions shown in section 4.4.4. The limit for out of band spurious emission at the band edge is 30 dB below the fundamental emission level measured in a 100 kHz bandwidth.

4.4. Test result

Ambient temperature: 23 °C
Relative humidity: 42 % R.H.

4.4.1. Spurious radiated emission

The frequency spectrum from 9kHz to 30 MHz was investigated. Emission levels are not reported much lower than the limits by over 20 dB. All reading values are peak values.
To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

Operation mode: 802.11b mode

A. Low channel (2 412 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

B. Middle channel (2 437 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

C. High channel (2 462 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

※ Remark

1. Actual = Reading + Ant. factor + CL (Cable loss)
2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
3. Limit line = specific Limits (dBuV) + Distance extrapolation factor
4. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

Operation mode: 802.11g mode

A. Low channel (2 412 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

B. Middle channel (2 437 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

C. High channel (2 462 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

※ **Remark**

1. Actual = Reading + Ant. factor + CL (Cable loss)
2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
3. Limit line = specific Limits (dB μ V) + Distance extrapolation factor
4. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

Operation mode: 802.11n_20MHz mode

A. Low channel (2 412 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

B. Middle channel (2 437 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

C. High channel (2 462 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

※ **Remark**

1. Actual = Reading + Ant. factor + CL (Cable loss)
2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
3. Limit line = specific Limits (dB μ V) + Distance extrapolation factor
4. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

Operation mode: 802.11a mode

A. Low channel (5 745 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

B. Middle channel (5 785 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

C. High channel (5 805 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

※ **Remark**

1. Actual = Reading + Ant. factor + CL (Cable loss)
2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
3. Limit line = specific Limits (dB μ V) + Distance extrapolation factor
4. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

Operation mode: 802.11an20 mode

A. Low channel (5 745 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

B. Middle channel (5 785 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

C. High channel (5 805 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

※ **Remark**

1. Actual = Reading + Ant. factor + CL (Cable loss)
2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
3. Limit line = specific Limits (dB μ V) + Distance extrapolation factor
4. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

Operation mode: 802.11an40 mode

A. Low channel (5 755 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

B. High channel (5 795 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

※ **Remark**

1. Actual = Reading + Ant. factor + CL (Cable loss)
2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
3. Limit line = specific Limits (dBuV) + Distance extrapolation factor
4. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

4.4.2. Spurious radiated emission

The frequency spectrum from 30 MHz to 1 000 MHz was investigated. Emission levels are not reported much lower than the limits by over 20 dB. All reading values are peak values.

To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

Operation mode: 802.11b mode

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
35.83	17.84	PK	V	15.02	1.71	34.57	40.00	5.43
47.49	16.98	PK	V	9.11	1.97	28.06	40.00	11.94
168.02	11.36	PK	V	15.72	3.68	30.76	43.50	12.74
222.44	12.93	PK	H	12.74	4.27	29.94	46.00	16.06
296.31	20.39	PK	H	15.12	4.95	40.46	46.00	5.54
372.12	7.64	PK	H	15.96	5.64	29.24	46.00	16.76
Above 400.00	Not detected	-	-	-	-	-	-	-

Operation mode: 802.11g mode

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
35.83	16.95	PK	V	15.02	1.71	33.68	40.00	6.32
47.49	16.77	PK	V	9.11	1.97	27.85	40.00	12.15
168.02	12.05	PK	V	15.72	3.68	31.45	43.50	12.05
222.44	12.58	PK	H	12.74	4.27	29.59	46.00	16.41
296.31	21.11	PK	H	15.12	4.95	41.18	46.00	4.82
372.12	7.59	PK	H	15.96	5.64	29.19	46.00	16.81
Above 400.00	Not detected	-	-	-	-	-	-	-

※ Remark

1. Actual = Reading + Ant. factor + CL (Cable loss)
2. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

Operation mode: 802.11n_20 mode

.Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
35.83	17.72	PK	V	15.02	1.71	34.45	40.00	5.55
47.49	17.05	PK	V	9.11	1.97	28.13	40.00	11.87
168.02	12.33	PK	V	15.72	3.68	31.73	43.50	11.77
222.44	13.05	PK	H	12.74	4.27	30.06	46.00	15.94
296.31	20.56	PK	H	15.12	4.95	40.63	46.00	5.37
372.12	7.25	PK	H	15.96	5.64	28.85	46.00	17.15
Above 400.00	Not detected	-	-	-	-	-	-	-

Operation mode: 802.11a mode

.Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
35.83	15.92	PK	V	15.02	1.71	32.65	40.00	7.35
47.49	16.33	PK	V	9.11	1.97	27.41	40.00	12.59
168.02	12.01	PK	V	15.72	3.68	31.41	43.50	12.09
222.44	11.89	PK	H	12.74	4.27	28.90	46.00	17.10
296.31	19.69	PK	H	15.12	4.95	39.76	46.00	6.24
372.12	7.91	PK	H	15.96	5.64	29.51	46.00	16.49
Above 400.00	Not detected	-	-	-	-	-	-	-

※ **Remark**

1. Actual = Reading + Ant. factor + CL (Cable loss)
2. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

Operation mode: 802.11an20 mode

.Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
35.83	15.59	PK	V	15.02	1.71	32.32	40.00	7.68
47.49	16.03	PK	V	9.11	1.97	27.11	40.00	12.89
168.02	11.22	PK	V	15.72	3.68	30.62	43.50	12.88
222.44	12.35	PK	H	12.74	4.27	29.36	46.00	16.64
296.31	19.43	PK	H	15.12	4.95	39.50	46.00	6.50
372.12	8.84	PK	H	15.96	5.64	30.44	46.00	15.56
Above 400.00	Not detected	-	-	-	-	-	-	-

Operation mode: 802.11an40 mode

.Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
35.83	16.62	PK	V	15.02	1.71	33.35	40.00	6.65
47.49	16.75	PK	V	9.11	1.97	27.83	40.00	12.17
168.02	12.05	PK	V	15.72	3.68	31.45	43.50	12.05
222.44	13.44	PK	H	12.74	4.27	30.45	46.00	15.55
296.31	19.20	PK	H	15.12	4.95	39.27	46.00	6.73
372.12	7.55	PK	H	15.96	5.64	29.15	46.00	16.85
Above 400.00	Not detected	-	-	-	-	-	-	-

※ Remark

1. Actual = Reading + Ant. factor + CL (Cable loss)
2. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

4.4.3. Spurious radiated emission

The frequency spectrum above 1 000 MHz was investigated. Emission levels are not reported much lower than the limits by over 20 dB.

To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

Operation mode: 802.11b mode

A. Low channel (2 412 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4824.02	63.40	Peak	H	33.26	44.10	52.56	74.00	21.44
4824.02	49.15	Avg	H	33.26	44.10	38.31	54.00	15.69
7235.35	60.90	Peak	H	35.66	43.05	53.51	74.00	20.49
7235.35	49.40	Avg	H	35.66	43.05	42.01	54.00	11.99
Above 8 000	Not detected	-	-	-	-	-	-	-

B. Middle channel (2 437 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4874.00	66.71	Peak	H	33.26	44.10	55.87	74.00	18.13
4874.00	51.90	Avg	H	33.26	44.10	41.06	54.00	12.94
7309.51	67.15	Peak	H	35.66	43.05	59.76	74.00	14.24
7309.51	54.30	Avg	H	35.66	43.05	46.91	54.00	7.09
Above 8 000	Not detected	-	-	-	-	-	-	-

C. High channel (2 462 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4924.06	60.31	Peak	H	33.26	44.10	49.47	74.00	24.53
4924.06	45.41	Avg	H	33.26	44.10	34.57	54.00	19.43
7384.48	63.60	Peak	H	35.66	43.05	56.21	74.00	17.79
7384.48	50.26	Avg	H	35.66	43.05	42.87	54.00	11.13
Above 8 000	Not detected	-	-	-	-	-	-	-

※ Remark

1. Measuring frequencies from 1 GHz to the 40 GHz.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Actual = Reading + Ant. factor + Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

Operation mode: 802.11g mode

A. Low channel (2 412 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4827.42	52.77	Peak	H	33.26	44.10	41.93	74.00	32.07
4827.42	34.68	Avg	H	33.26	44.10	23.84	54.00	30.16
7238.39	52.43	Peak	H	35.66	43.05	45.04	74.00	28.96
7238.39	34.10	Avg	H	35.66	43.05	26.71	54.00	27.29
Above 8 000	Not detected	-	-	-	-	-	-	-

B. Middle channel (2 437 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4875.46	53.79	Peak	H	33.26	44.10	42.95	74.00	31.05
4875.46	35.51	Avg	H	33.26	44.10	24.67	54.00	29.33
7307.93	59.94	Peak	H	35.66	43.05	52.55	74.00	21.45
7307.93	36.66	Avg	H	35.66	43.05	29.27	54.00	24.73
Above 8 000	Not detected	-	-	-	-	-	-	-

C. High channel (2 462 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4913.13	48.09	Peak	H	33.26	44.10	37.25	74.00	36.75
4913.13	31.58	Avg	H	33.26	44.10	20.74	54.00	33.26
7390.86	53.95	Peak	H	35.66	43.05	46.56	74.00	27.44
7390.86	34.75	Avg	H	35.66	43.05	27.36	54.00	26.64
Above 8 000	Not detected	-	-	-	-	-	-	-

※ Remark

1. Measuring frequencies from 1 GHz to the 40 GHz.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Actual = Reading + Ant. factor + Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

Operation mode: 802.11n_20 mode

A. Low channel (2 412 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4824.89	49.13	Peak	H	33.26	44.10	38.29	74.00	35.71
4824.89	33.77	Avg	H	33.26	44.10	22.93	54.00	31.07
7236.06	51.19	Peak	H	35.66	43.05	43.80	74.00	30.20
7236.06	31.83	Avg	H	35.66	43.05	24.44	54.00	29.56
Above 8 000	Not detected	-	-	-	-	-	-	-

B. Middle channel (2 437 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4871.78	52.06	Peak	H	33.26	44.10	41.22	74.00	32.78
4871.78	34.59	Avg	H	33.26	44.10	23.75	54.00	30.25
7310.63	55.78	Peak	H	35.66	43.05	48.39	74.00	25.61
7310.63	33.82	Avg	H	35.66	43.05	26.43	54.00	27.57
Above 8 000	Not detected	-	-	-	-	-	-	-

C. High channel (2 462 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
7391.56	48.97	Peak	H	33.26	44.10	38.13	74.00	35.87
7391.56	32.95	Avg	H	33.26	44.10	22.11	54.00	31.89
Above 8 000	Not detected	-	-	-	-	-	-	-

※ **Remark**

1. Measuring frequencies from 1 GHz to the 40 GHz.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Actual = Reading + Ant. factor + Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

Operation mode: 802.11a mode

A. Low channel (5 745 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

B. Middle channel (5 785 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

C. High channel (5 805 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

※ **Remark**

1. Measuring frequencies from 1 GHz to the 40 GHz.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Actual = Reading + Ant. factor + Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

Operation mode: 802.11an20 mode

A. Low channel (5 745 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

B. Middle channel (5 785 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

C. High channel (5 805 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

※ Remark

1. Measuring frequencies from 1 GHz to the 40 GHz.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Actual = Reading + Ant. factor + Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

Operation mode: 802.11an40 mode

A. Low channel (5 755 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

B. High channel (5 795 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.								

※ **Remark**

1. Measuring frequencies from 1 GHz to the 40 GHz.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Actual = Reading + Ant. factor + Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

4.4.4. Band Edge

Operation mode: 802.11b mode

A. 2 310 - 2 390 MHz measurement

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2389.94	54.40	Peak	H	28.86	43.65	39.61	74.00	34.39
2389.94	46.99	Average	H	28.86	43.65	32.20	54.00	21.80
2389.94	52.26	Peak	V	28.86	43.65	37.47	74.00	36.53
2389.94	44.83	Average	V	28.86	43.65	30.04	54.00	23.96

B. 2 483.5 – 2 500 MHz measurement

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2488.02	55.58	Peak	H	28.86	43.65	40.79	74.00	33.21
2488.02	42.68	Average	H	28.86	43.65	27.89	54.00	26.11
2488.02	51.05	Peak	V	28.86	43.65	36.26	74.00	37.74
2488.02	39.69	Average	V	28.86	43.65	24.90	54.00	29.10

Operation mode: 802.11g mode

A. 2 310 - 2 390 MHz measurement

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2389.94	59.70	Peak	H	28.86	43.65	44.91	74.00	29.09
2389.94	47.55	Average	H	28.86	43.65	32.76	54.00	21.24
2389.94	53.11	Peak	V	28.86	43.65	38.32	74.00	35.68
2389.94	42.38	Average	V	28.86	43.65	27.59	54.00	26.41

B. 2 483.5 – 2 500 MHz measurement

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2483.51	57.76	Peak	H	28.86	43.65	42.97	74.00	31.03
2483.51	37.27	Average	H	28.86	43.65	22.48	54.00	31.52
2483.51	55.60	Peak	V	28.86	43.65	40.81	74.00	33.19
2483.51	34.41	Average	V	28.86	43.65	19.62	54.00	34.38

Operation mode: 802.11n_20 mode

A. 2 310 - 2 390 MHz measurement

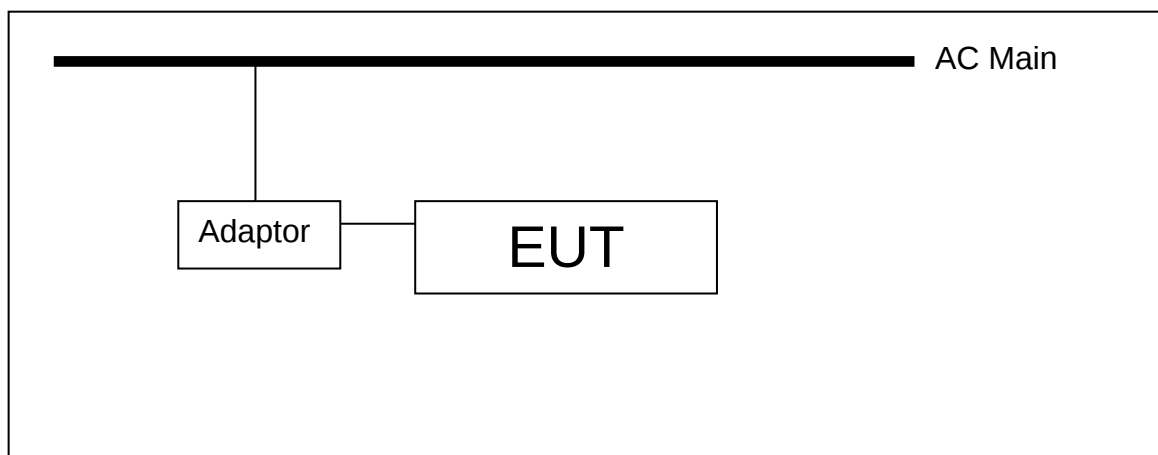
Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2389.83	56.07	Peak	H	28.86	43.65	41.28	74.00	32.72
2389.83	47.68	Average	H	28.86	43.65	32.89	54.00	21.11
2389.83	51.11	Peak	V	28.86	43.65	36.32	74.00	37.68
2389.83	43.04	Average	V	28.86	43.65	28.25	54.00	25.75

B. 2 483.5 – 2 500 MHz measurement

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2483.94	56.93	Peak	H	28.86	43.65	42.14	74.00	31.86
2483.94	35.80	Average	H	28.86	43.65	21.01	54.00	32.99
2483.94	50.40	Peak	V	28.86	43.65	35.61	74.00	38.39
2483.94	32.31	Average	V	28.86	43.65	17.52	54.00	36.48

4.4.5 Conducted power line test

4.4.5.1 Test setup



4.4.5.2 Limit

According to §15.107(a) for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 uH/ 50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted limit (dBμV/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

※ Remark

Decreases with the logarithm of the frequency.

4.4.5.3 Test procedures

The test procedure is performed in a 6.5 m × 3.6 m × 3.6 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m(W) × 1.5 m(L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.

The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

4.4.5.4 Test results

Ambient temperature: 23 °C

Relative humidity: 42 % R.H.

Frequency range: 0.15 MHz ~ 30 MHz

Measured bandwidth: 9 kHz

Freq. (MHz)	Line	Q-Peak		
		Level(dB μ V/m)	Limit(dB μ V/m)	Margin(dB)
0.166	H	53.87	65.16	11.29
0.226	N	51.47	62.60	11.13
0.430	N	47.44	57.25	14.48
2.158	H	41.52	56.00	17.76
3.670	H	38.24	56.00	29.78
26.89	H	30.22	60.00	11.29

Freq. (MHz)	Line	Average		
		Level(dB μ V/m)	Limit(dB μ V/m)	Margin(dB)
0.170	N	39.13	54.96	15.83
0.226	N	36.93	52.60	15.67
0.430	N	34.38	47.25	12.87
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

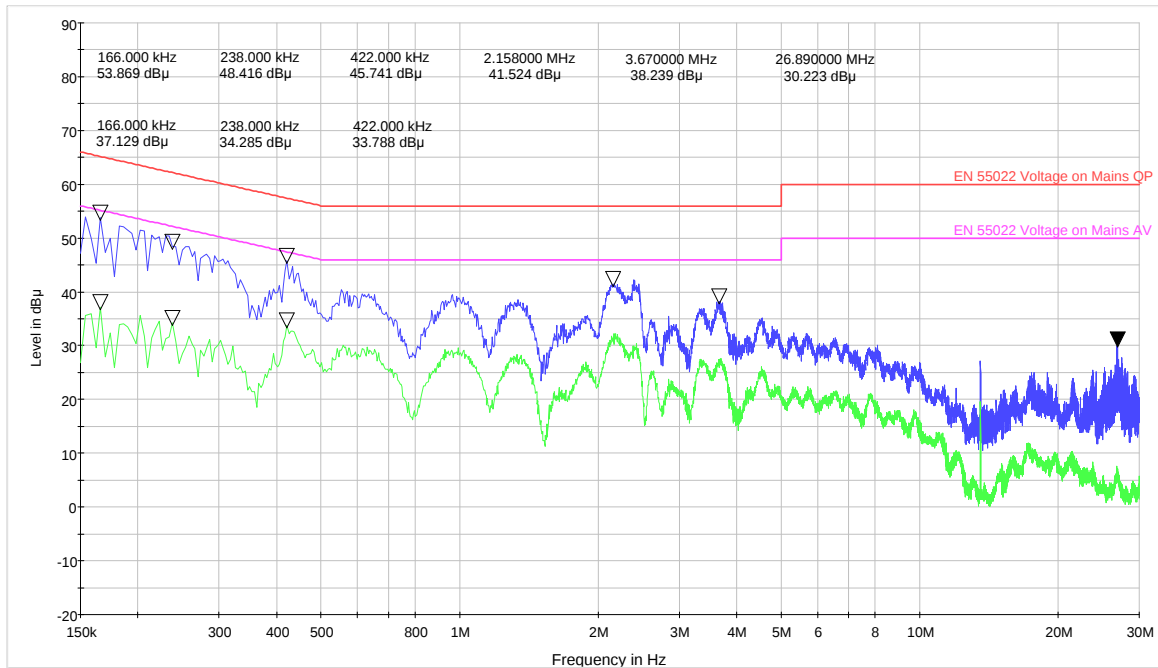
※ Remark

Line(H): Hot

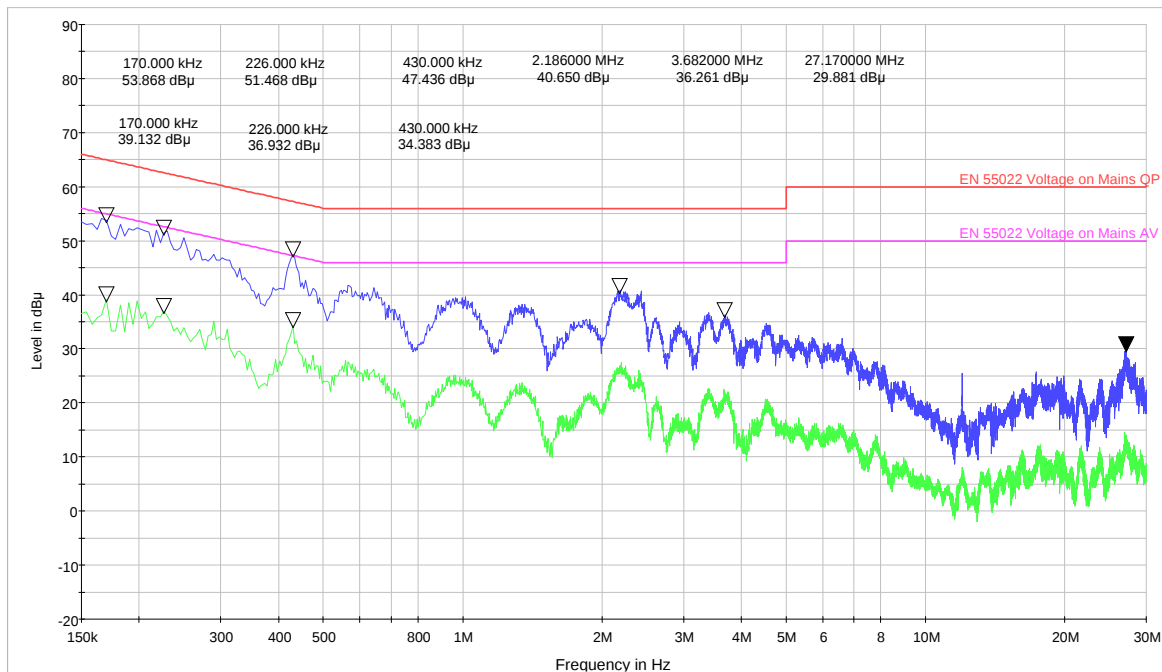
Line(N): Neutral

Plot of conducted power line

Test mode: Hot



Test mode: Neutral



4.4.6. Out of Band Emissions in non-restricted frequency band

4.4.6.1. Test requirements and limit

The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc). If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc). In either case, attenuation to levels below the 15.209 general radiated emissions limits is not required.

4.4.6.2. Test procedure

The transmitter output is connected to a spectrum analyzer.

•Measurement Procedure 1 – Reference level measurement

1. Set instrument center frequency to DTS channel center frequency.
2. Set the span to ≥ 1.5 times the DTS bandwidth.
3. Set the RBW = 100 kHz.
4. Set the VBW $\geq 3 \times$ RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum PSD level

•Measurement Procedure 2– Emissions level measurement

1. Set the center frequency and span to encompass frequency range to be measured.
2. Set the RBW = 100 kHz (See below note for actual setting)
3. Set the VBW $\geq 3 \times$ RBW (See below note for actual setting)
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow the trace to stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

(Note: This test item was tested with below settings.)

- RBW= 100kHz, VBW= 300kHz for frequency range: 9 kHz ~ 30 MHz
- RBW= 1MHz, VBW= 3MHz for frequency range: 30 MHz ~ 10 GHz and 10 GHz~25 GHz

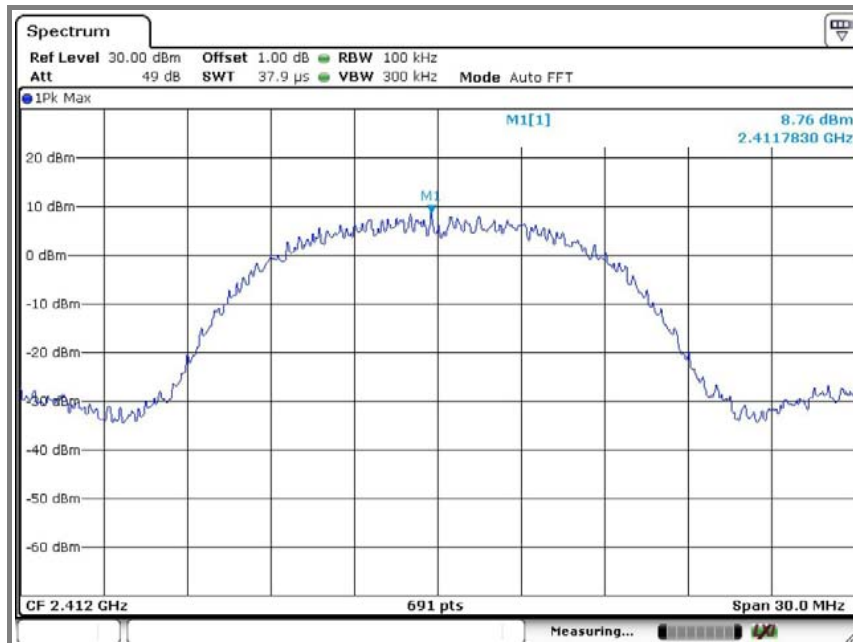
If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 kHz, VBW = 300 kHz, SPAN = 100 MHz and BINS = 2001 to get accurate emission level within 100 kHz BW.

4.4.6.3. Test results : **Comply** (refer to Next page – test plots)

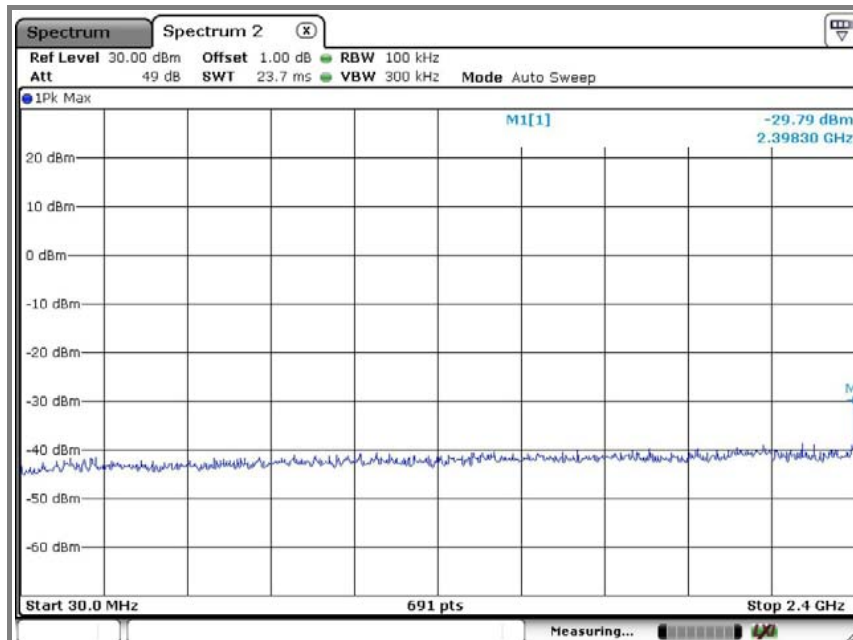
Operation mode: 802.11b mode (Ant 1)

A. Low channel (2 412 MHz)

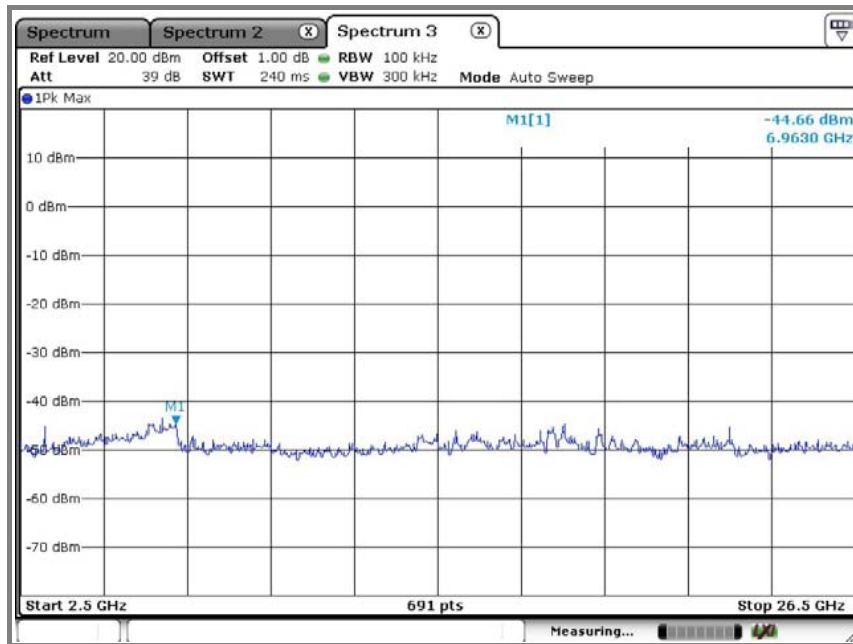
Reference level measurement



Emission level measurement 1

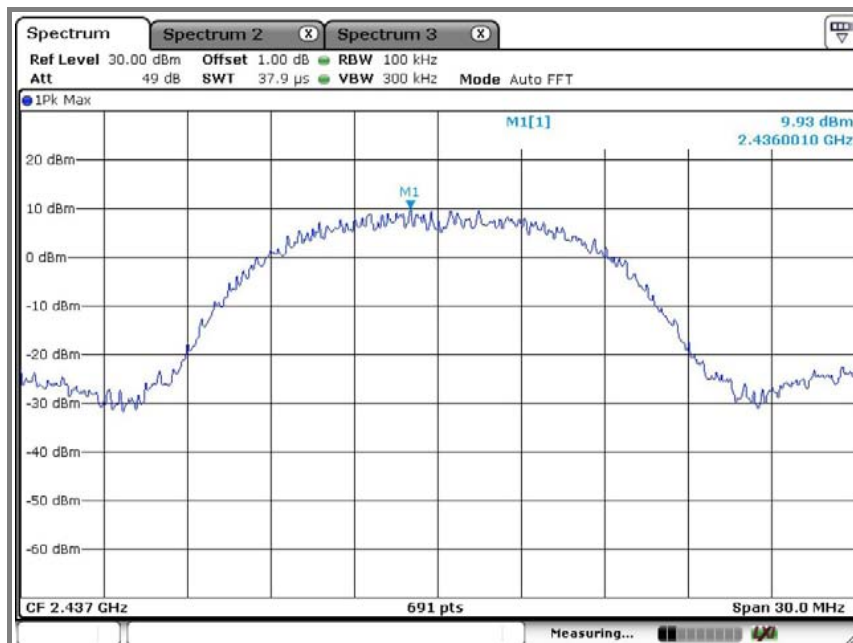


Emission level measurement 2

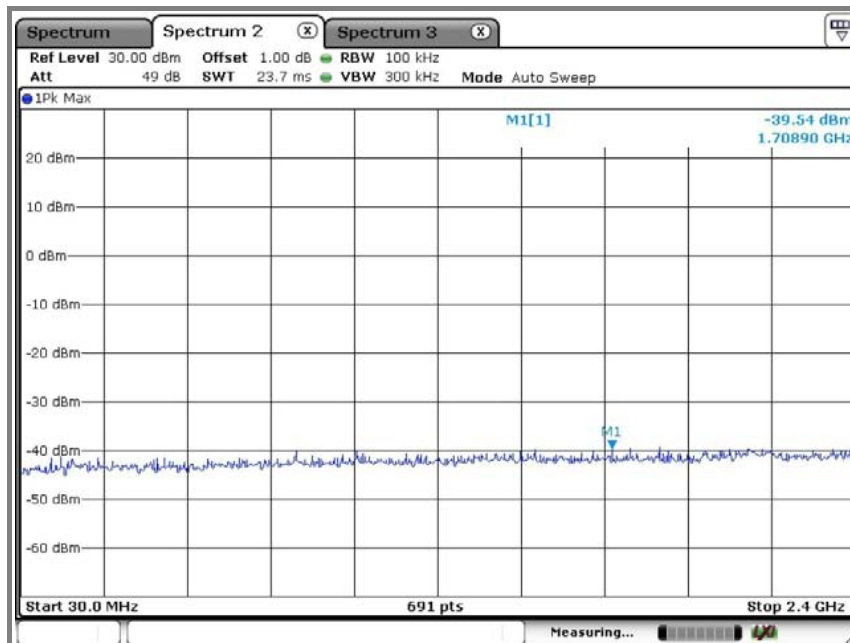


B. Middle channel (2 437 MHz)

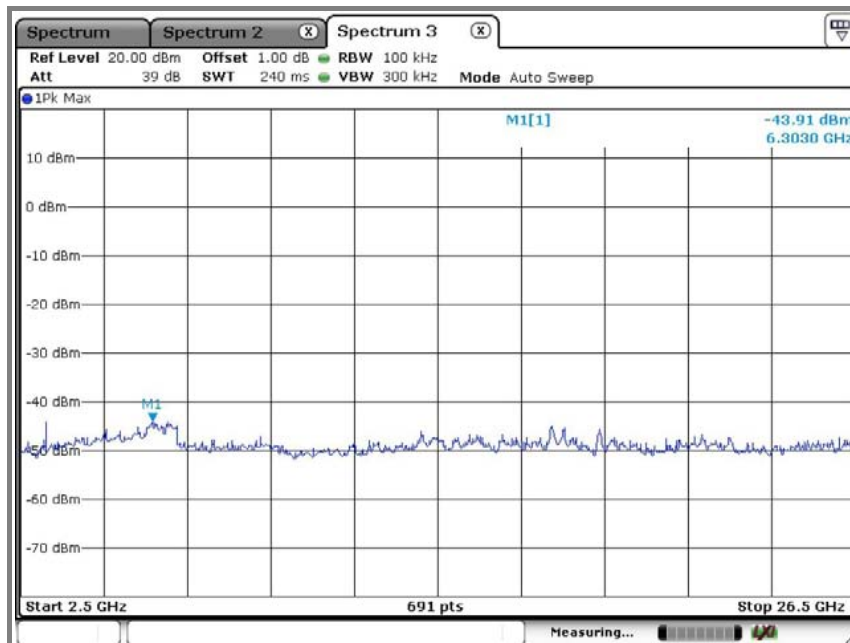
Reference level measurement



Emission level measurement 1

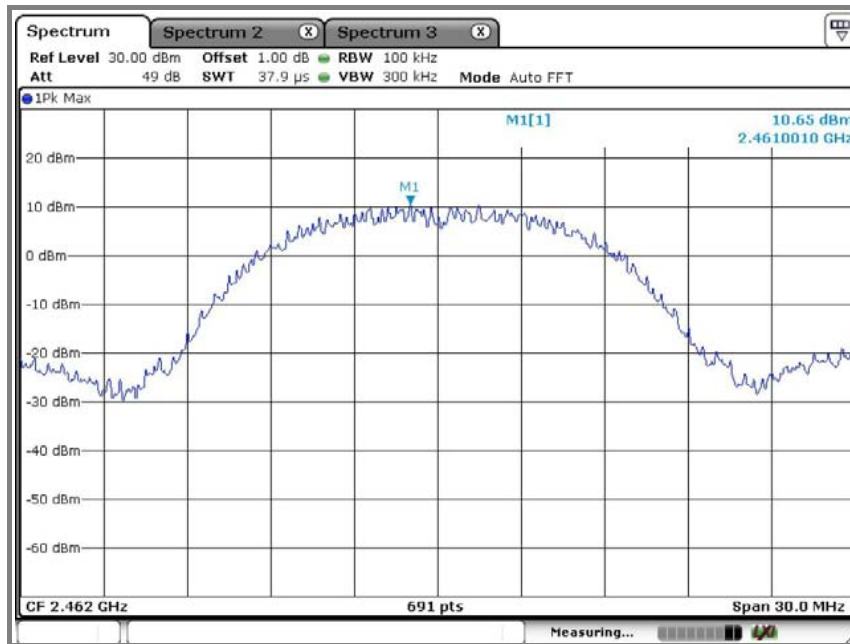


Emission level measurement 2

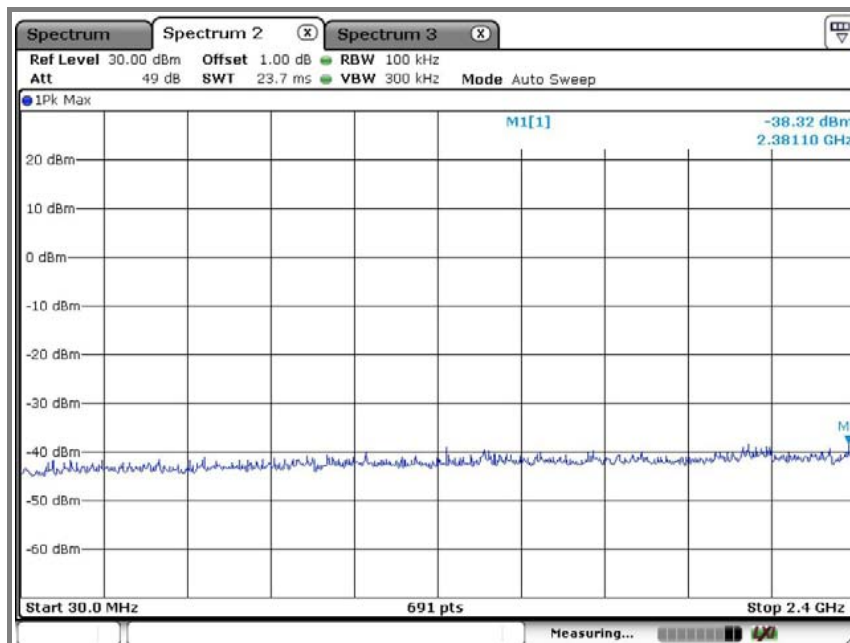


C. High channel (2 462 MHz)

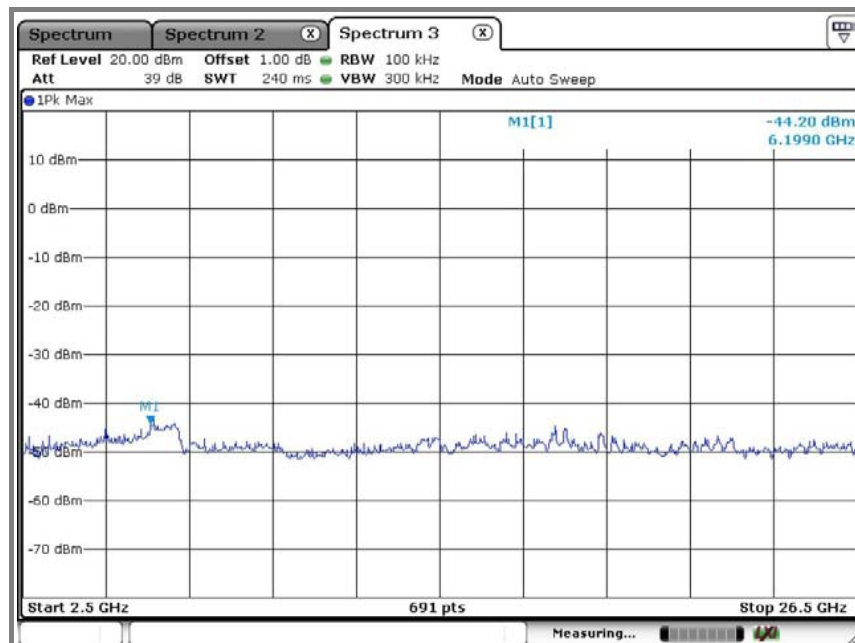
Reference level measurement



Emission level measurement 1



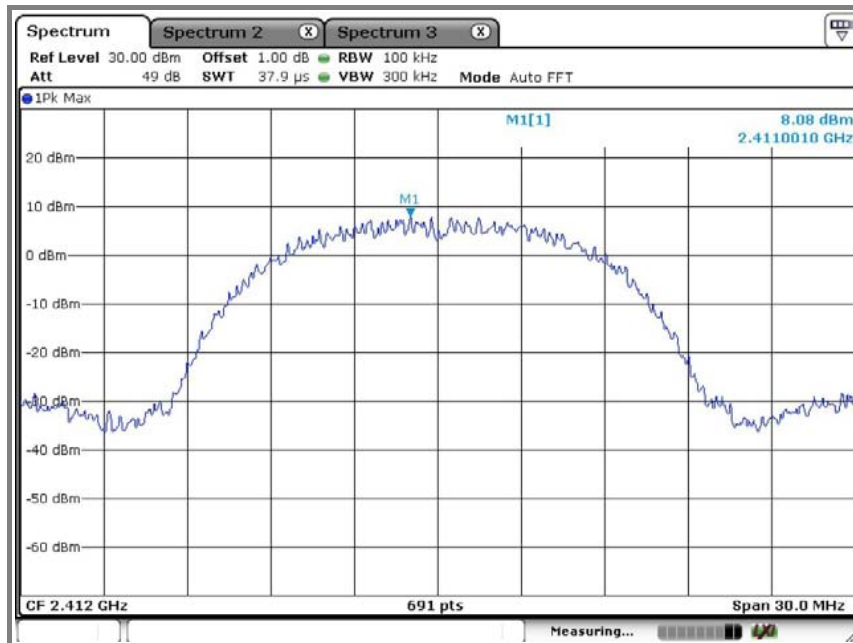
Emission level measurement 2



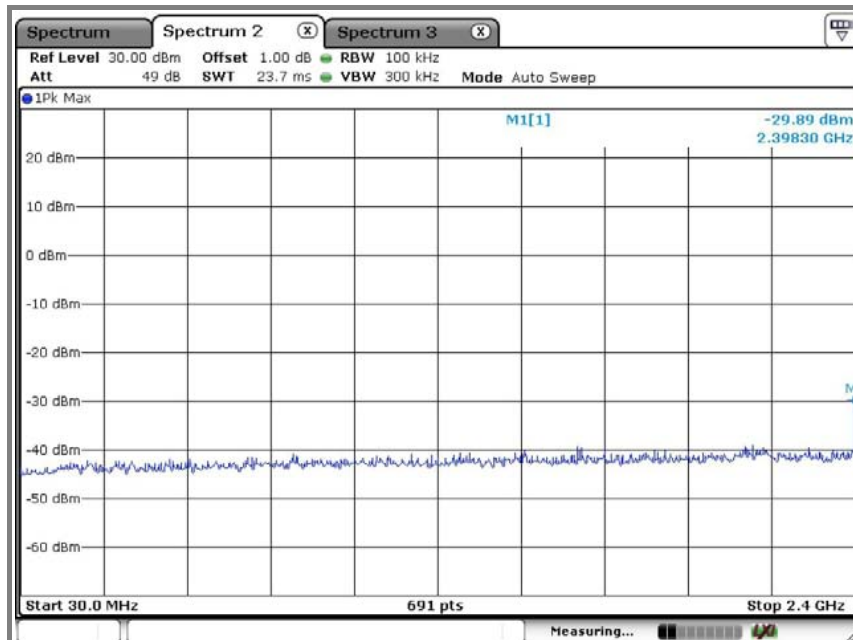
Operation mode: 802.11b mode (Ant 2)

A. Low channel (2 412 MHz)

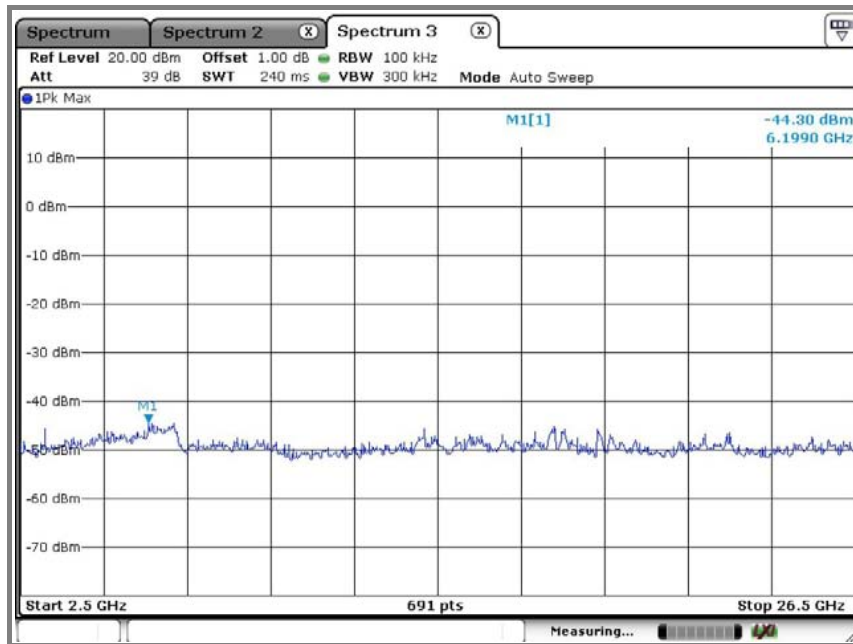
Reference level measurement



Emission level measurement 1

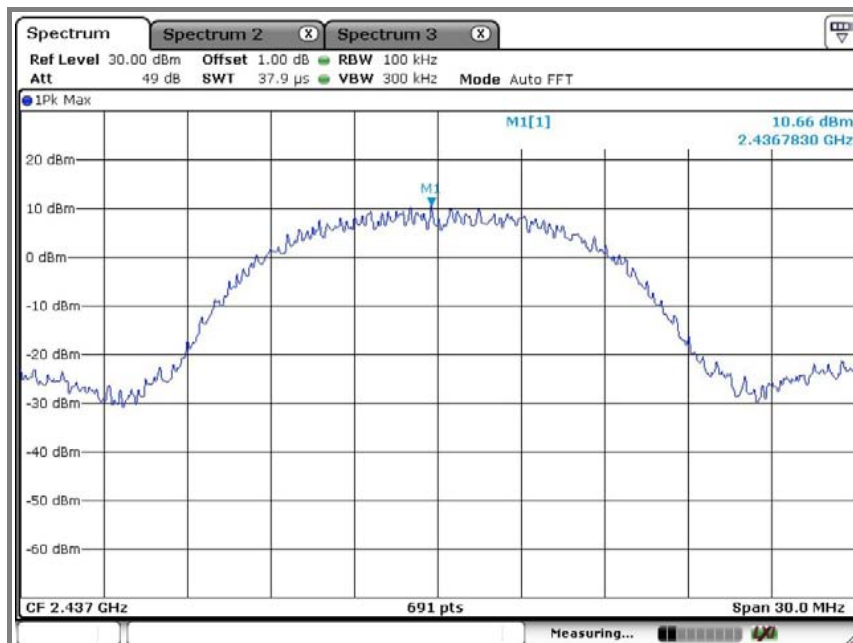


Emission level measurement 2

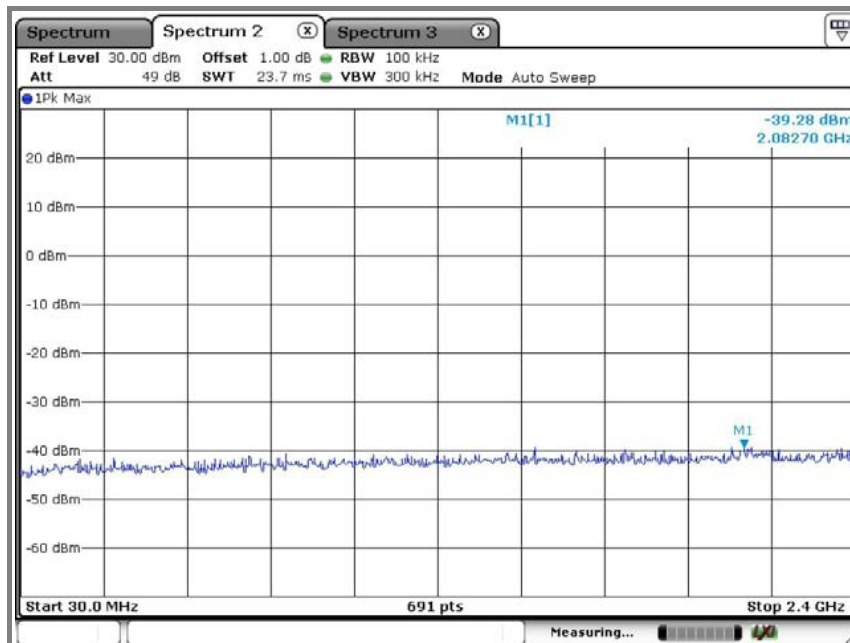


B. Middle channel (2 437 MHz)

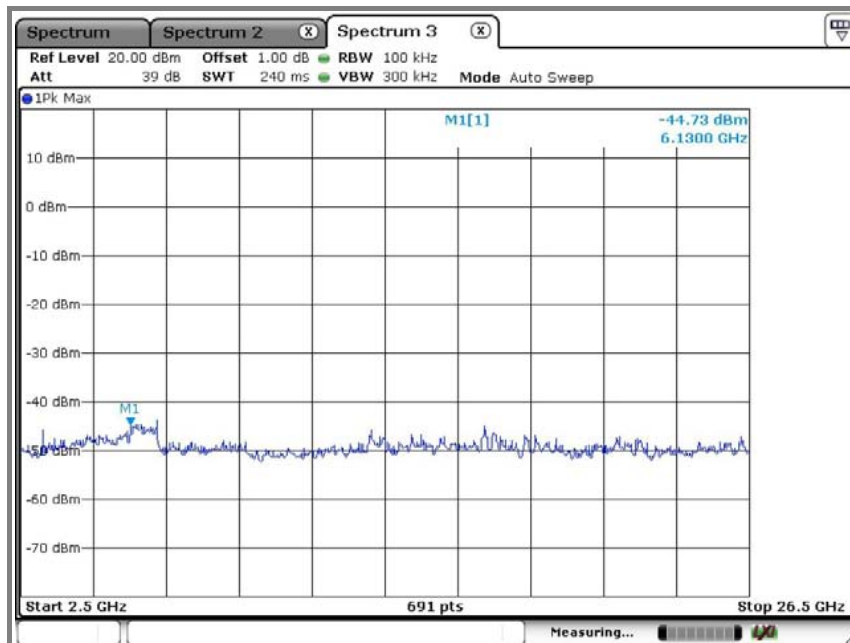
Reference level measurement



Emission level measurement 1

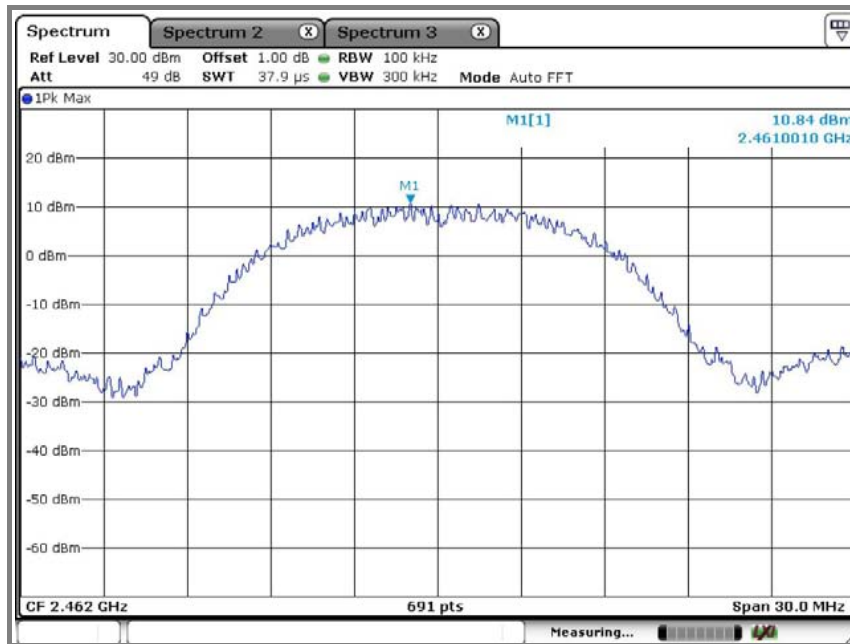


Emission level measurement 2

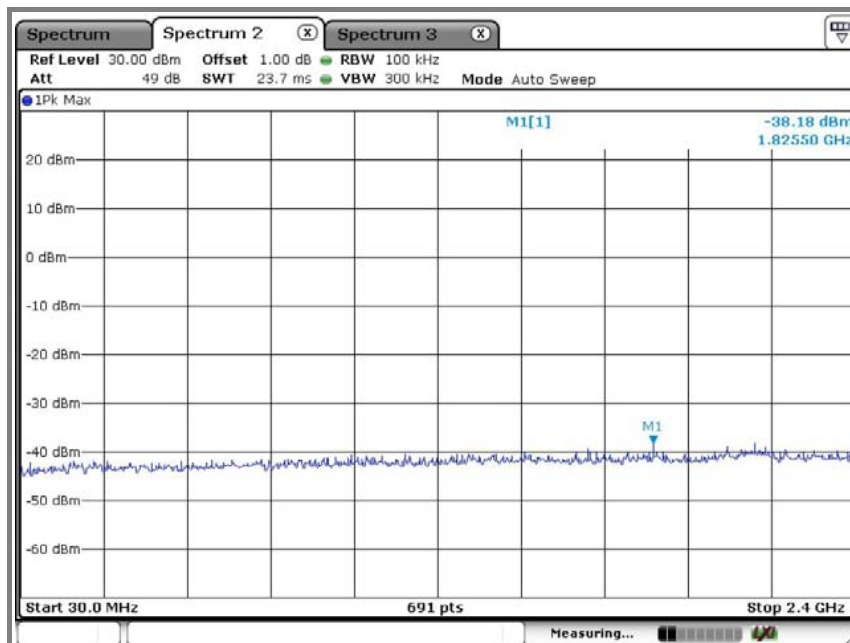


C. High channel (2 462 MHz)

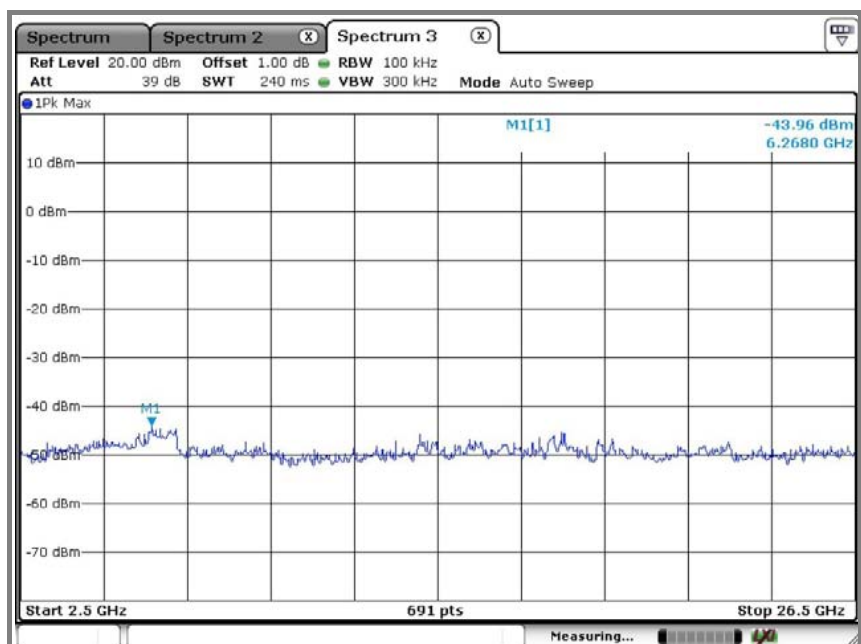
Reference level measurement



Emission level measurement 1

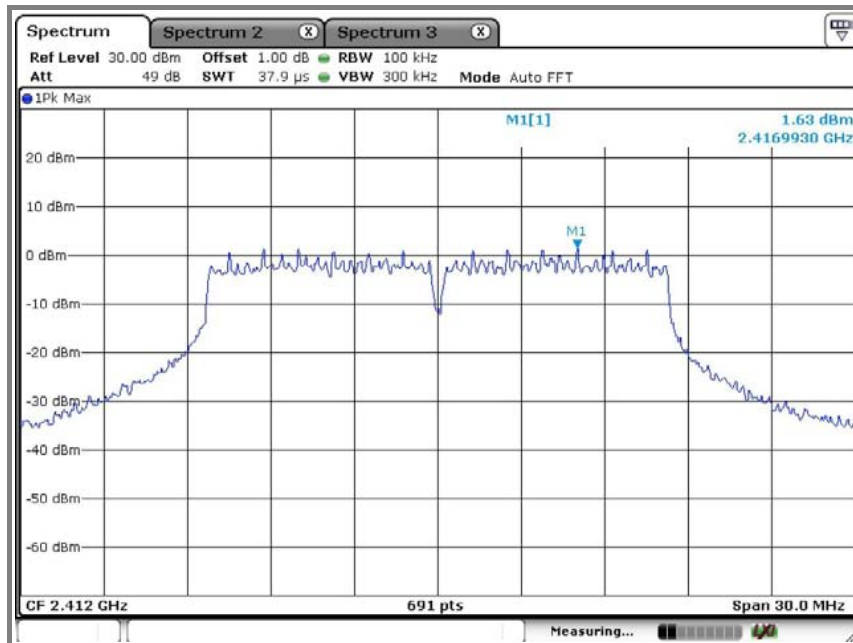


Emission level measurement 2

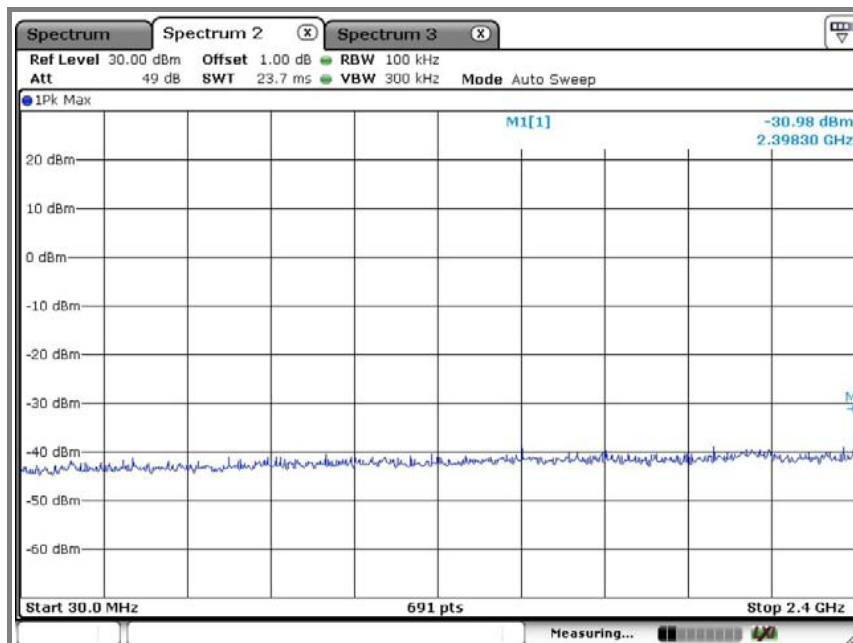


Operation mode: 802.11g mode (Ant 1)
A. Low channel (2 412 MHz)

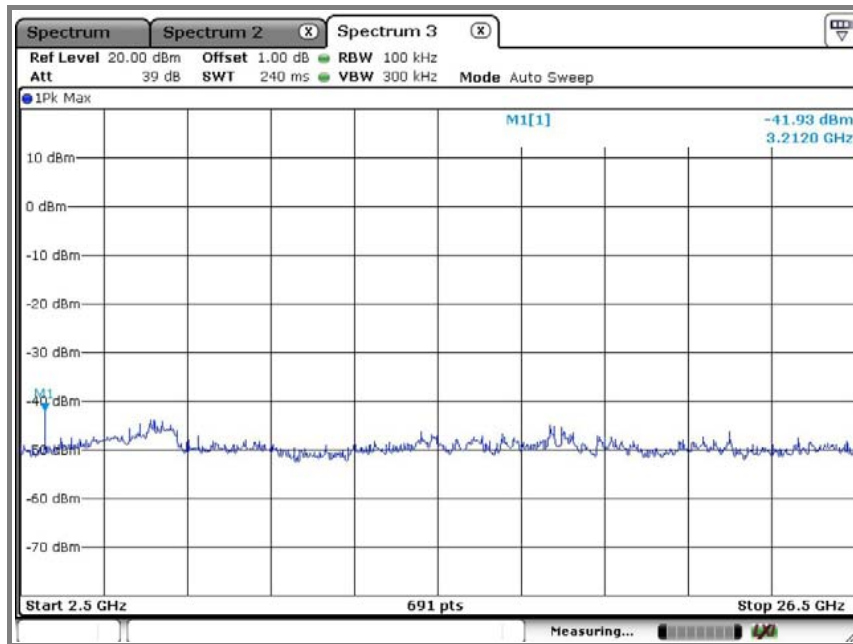
Reference level measurement



Emission level measurement 1

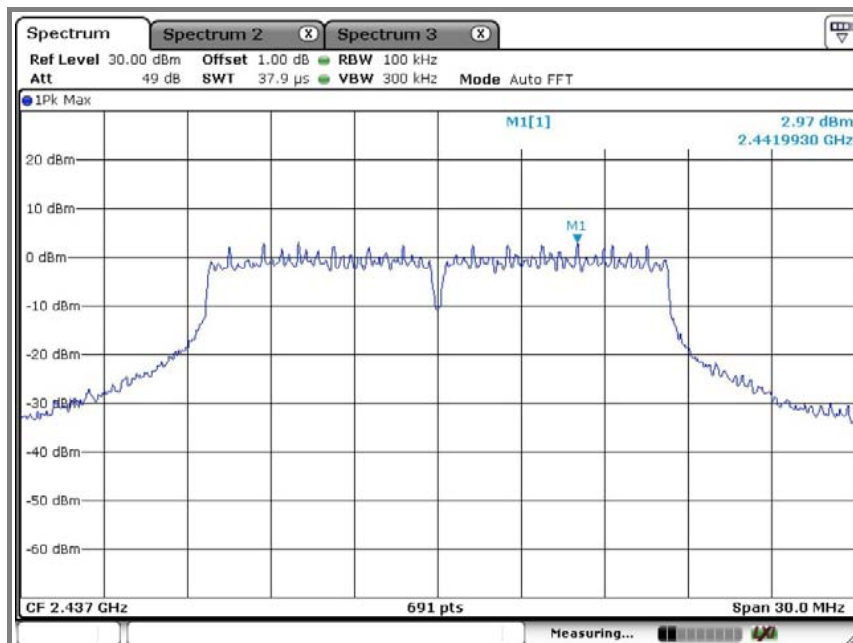


Emission level measurement 2

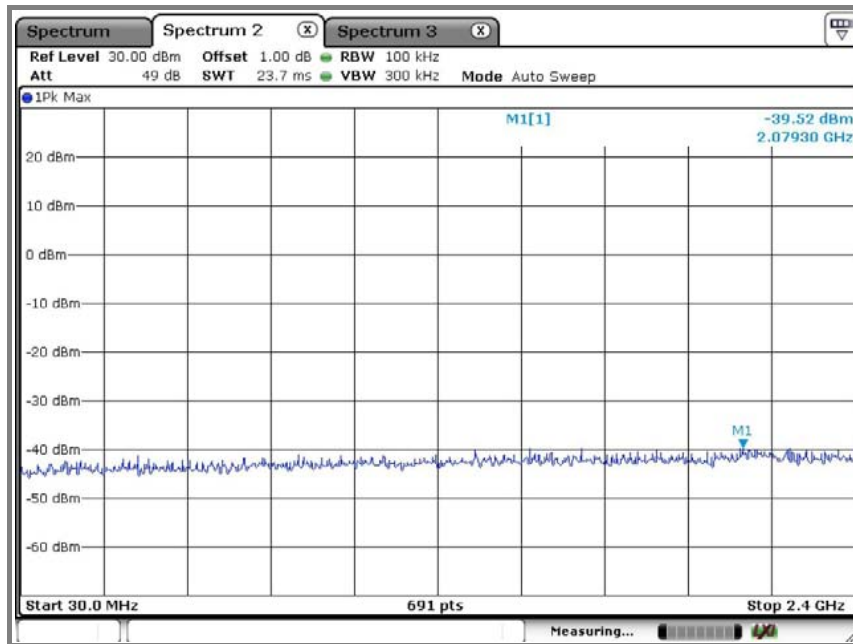


B. Middle channel (2 437 MHz)

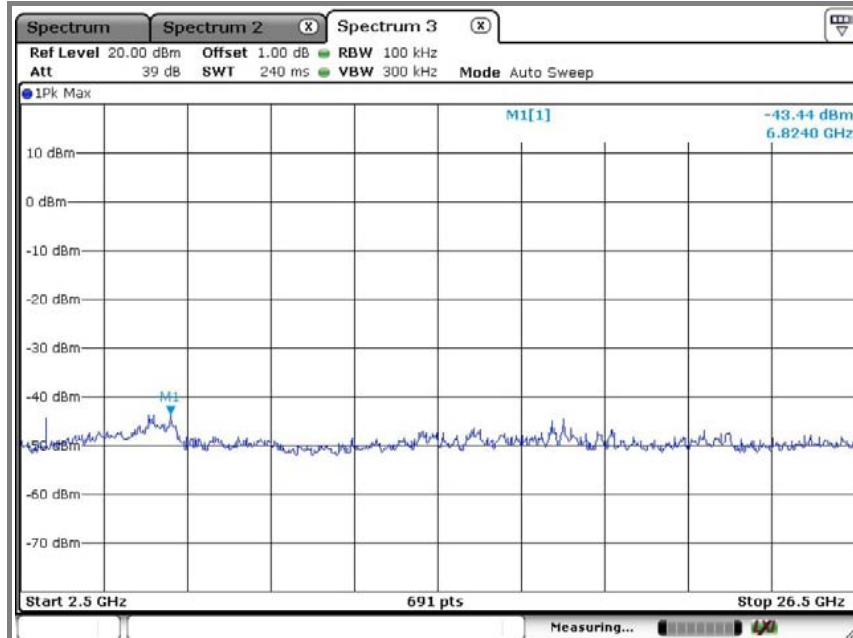
Reference level measurement



Emission level measurement 1

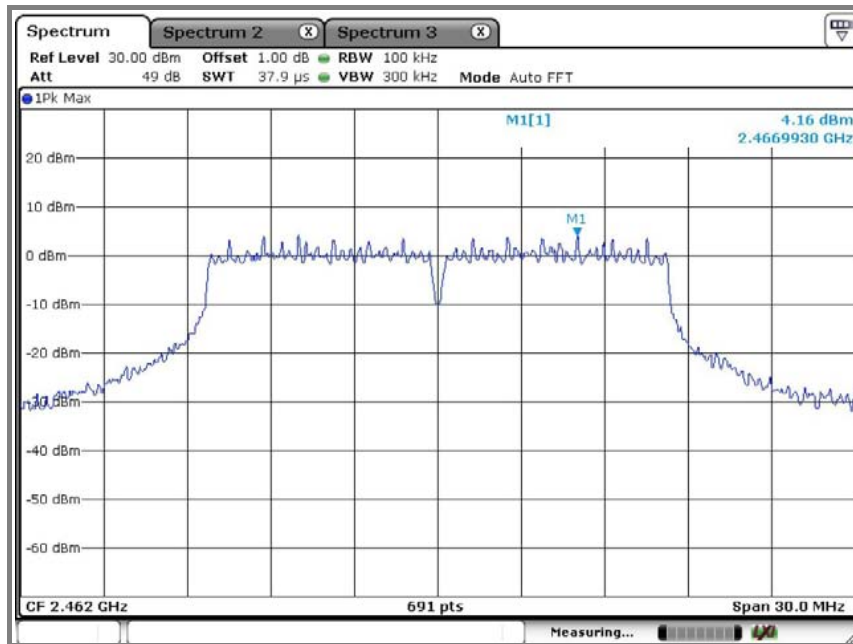


Emission level measurement 2

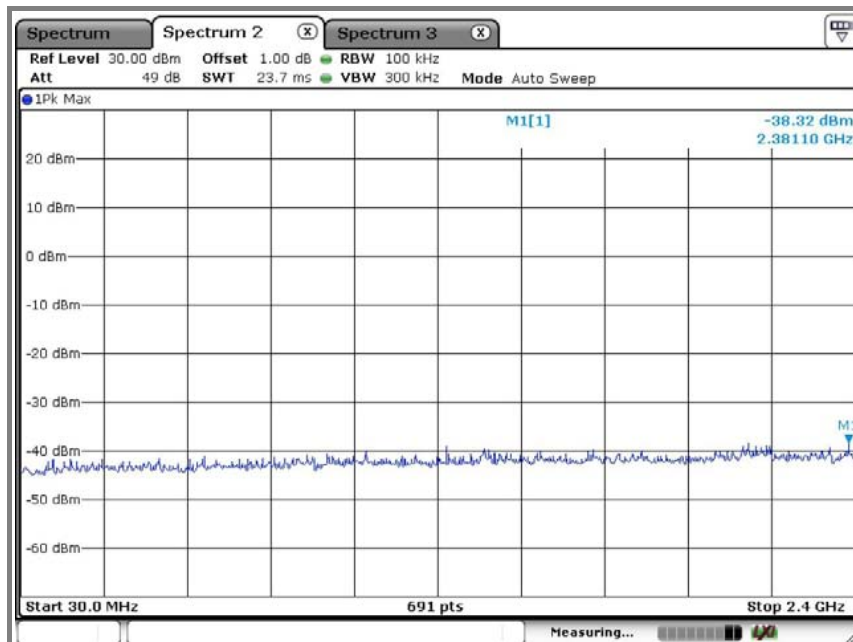


C. High channel (2 462 MHz)

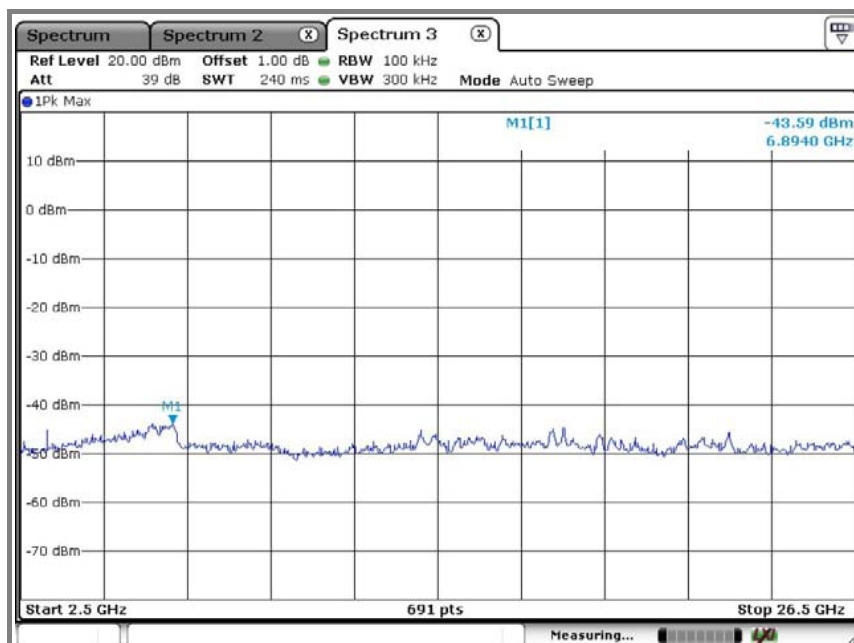
Reference level measurement



Emission level measurement 1



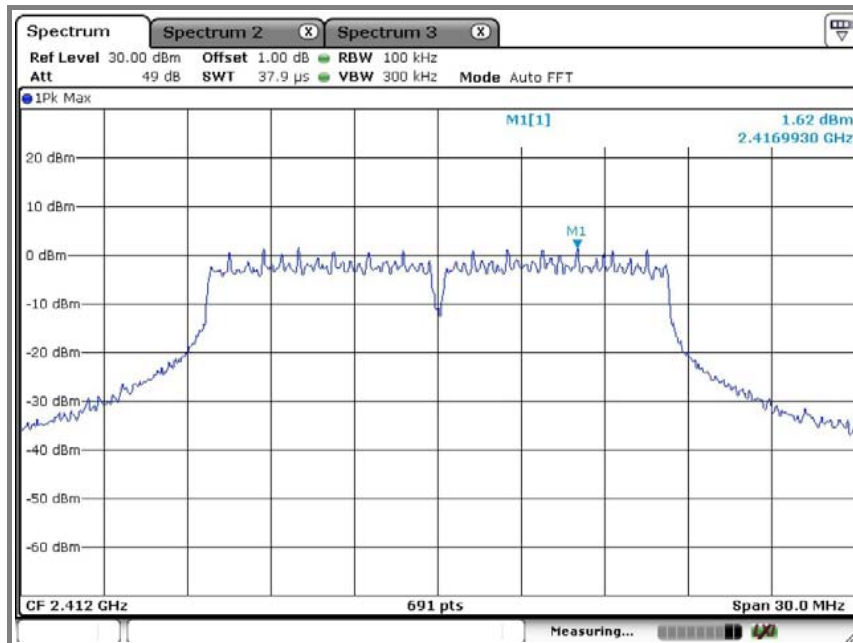
Emission level measurement 2



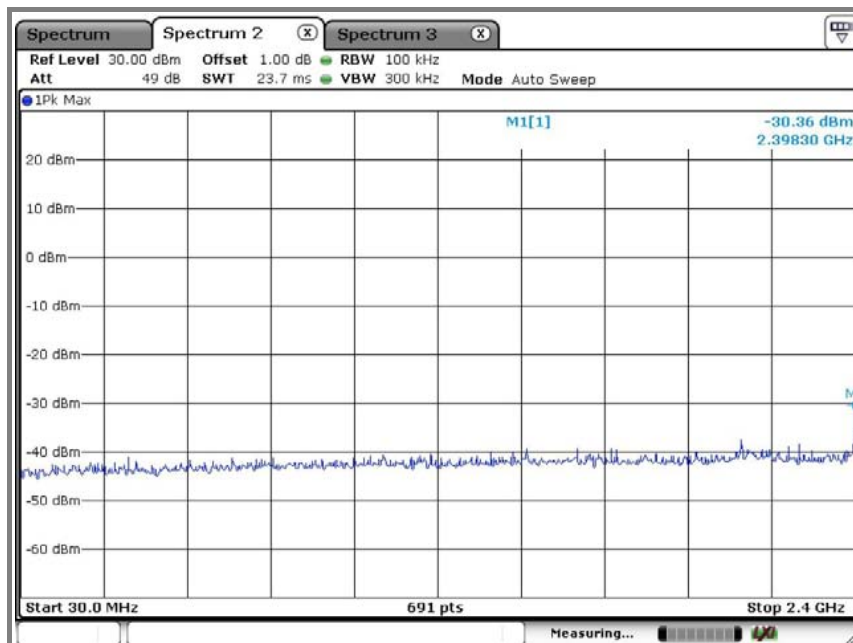
Operation mode: 802.11g mode (Ant 2)

A. Low channel (2 412 MHz)

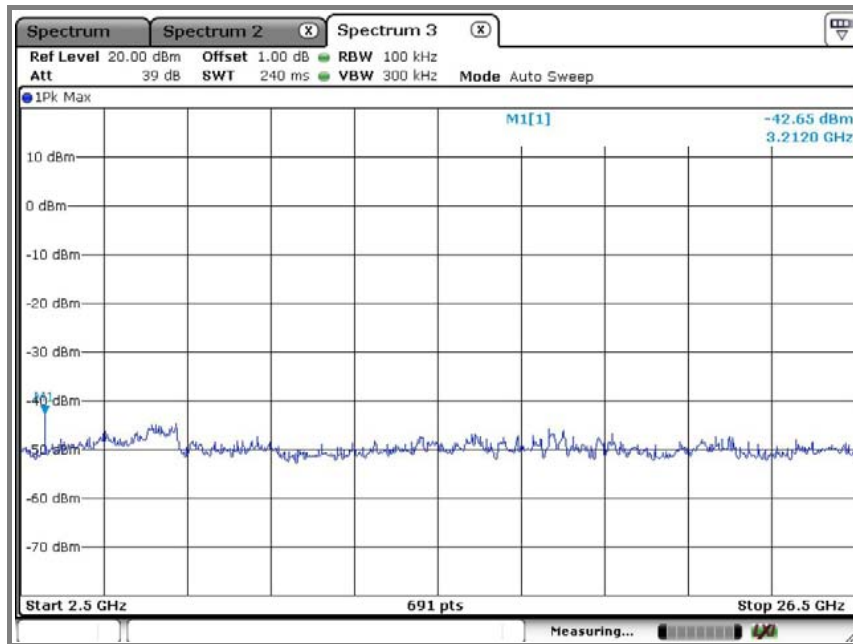
Reference level measurement



Emission level measurement 1

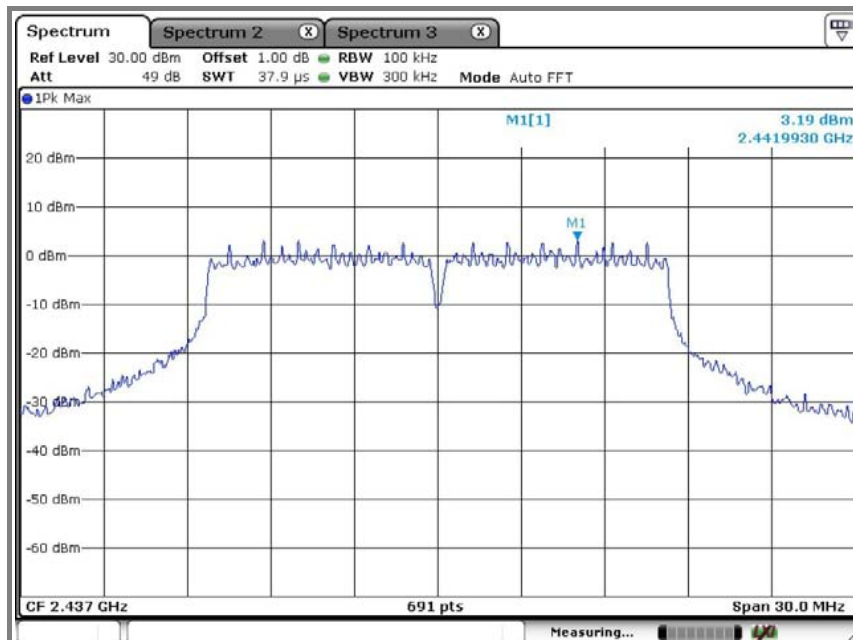


Emission level measurement 2

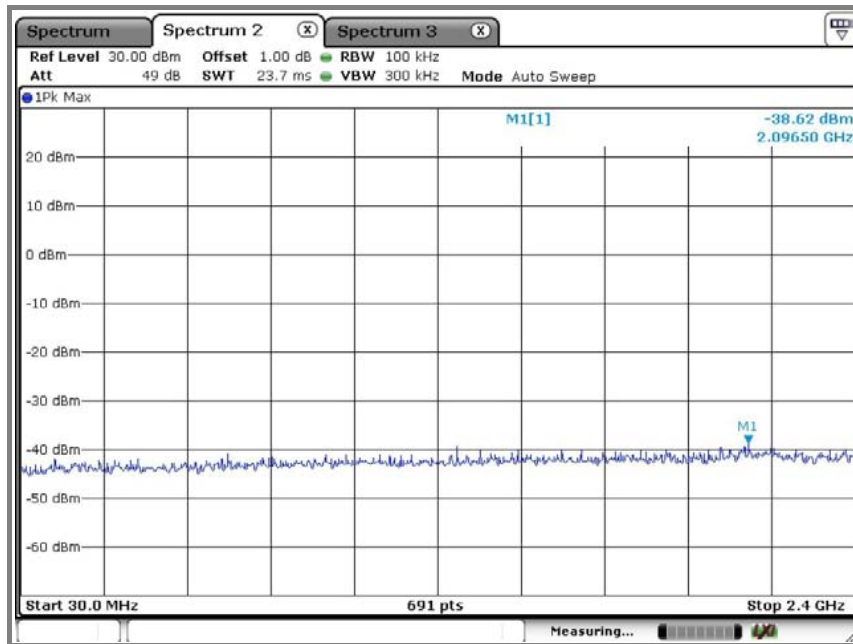


B. Middle channel (2 437 MHz)

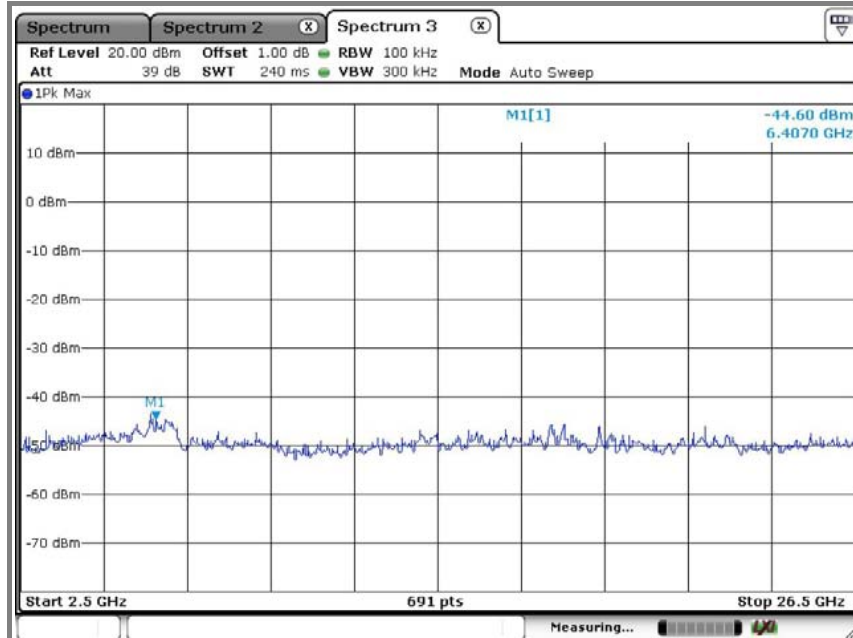
Reference level measurement



Emission level measurement 1

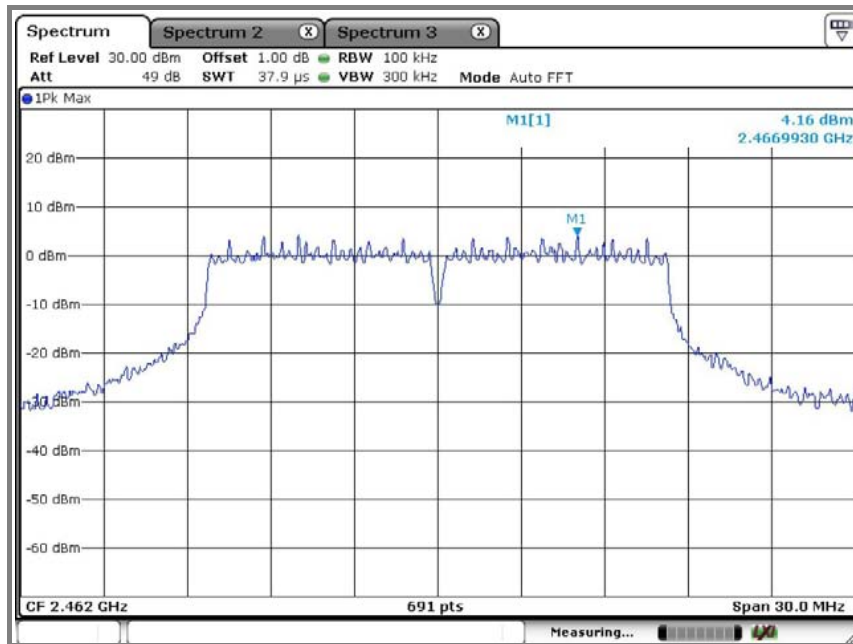


Emission level measurement 2

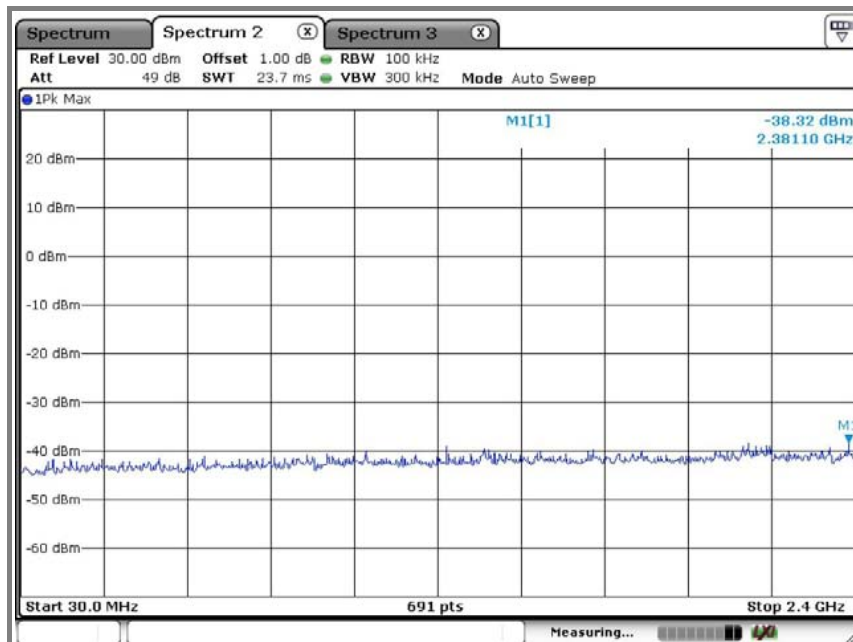


C. High channel (2 462 MHz)

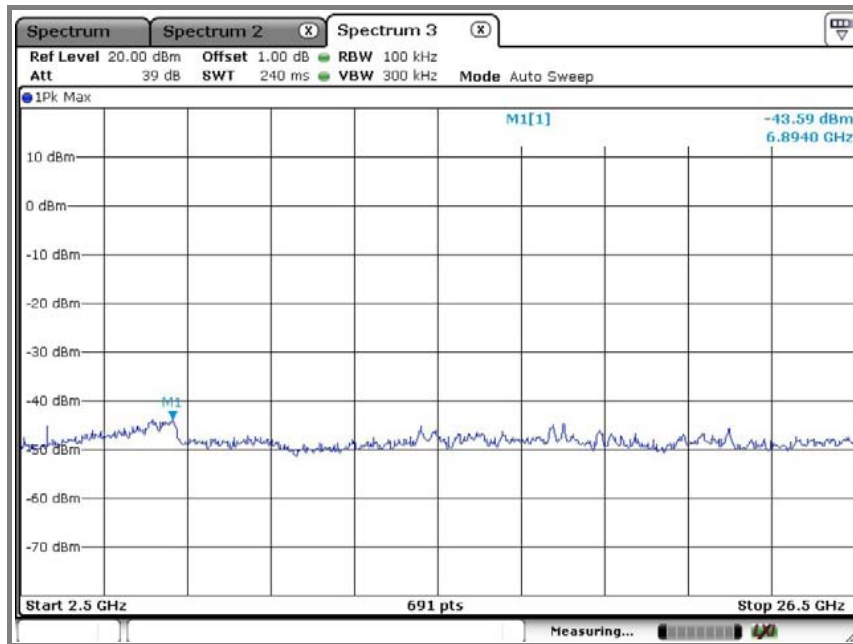
Reference level measurement



Emission level measurement 1



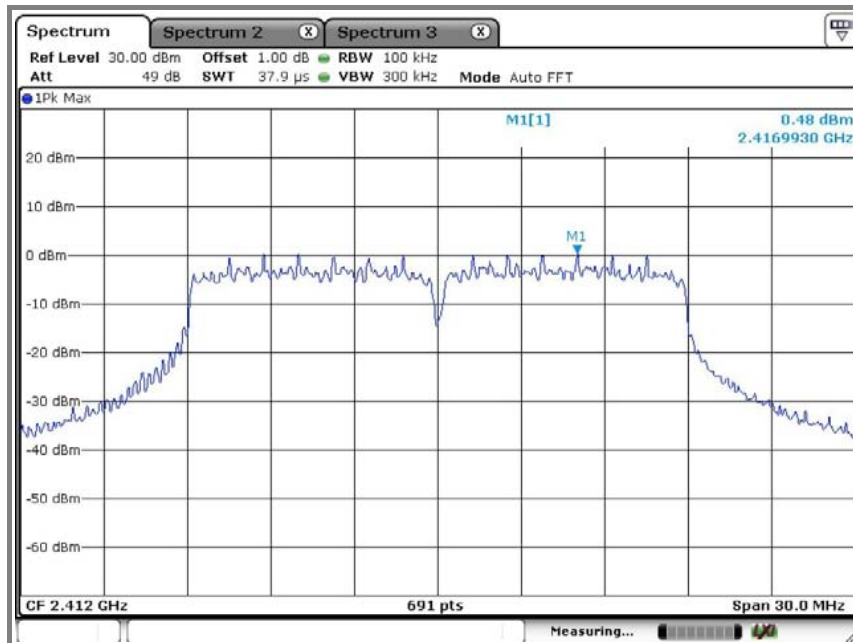
Emission level measurement 2



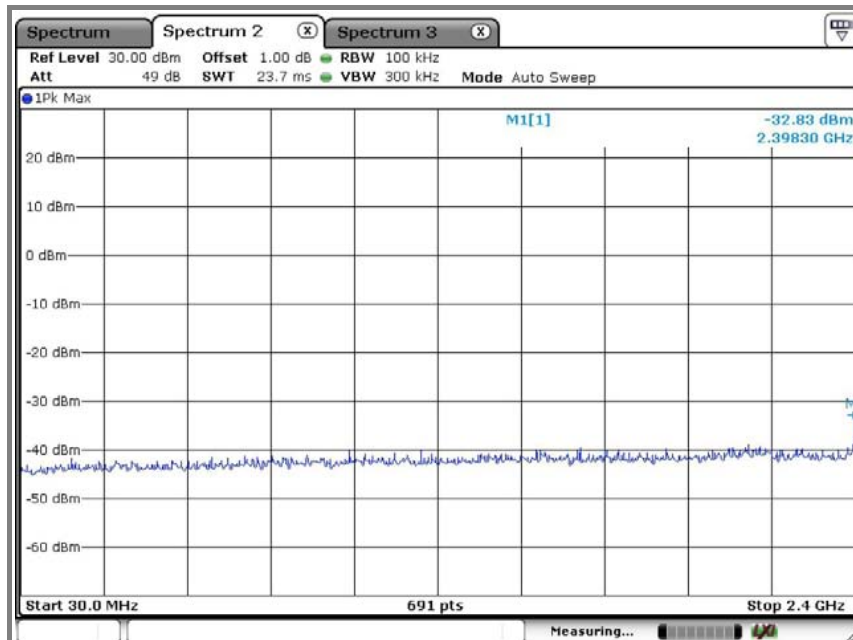
Operation mode: 802.11n_20 mode (MIMO)

A. Low channel (2 412 MHz)

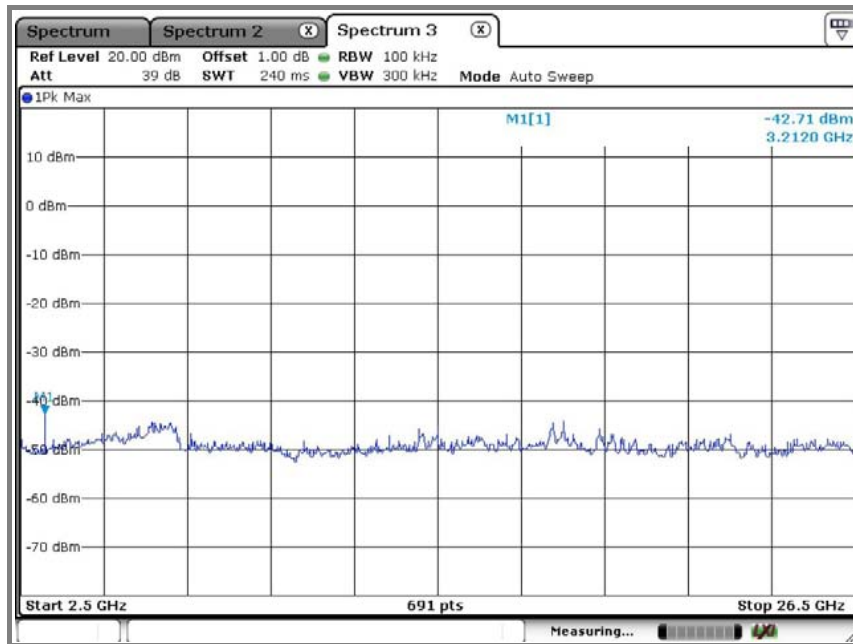
Reference level measurement



Emission level measurement 1

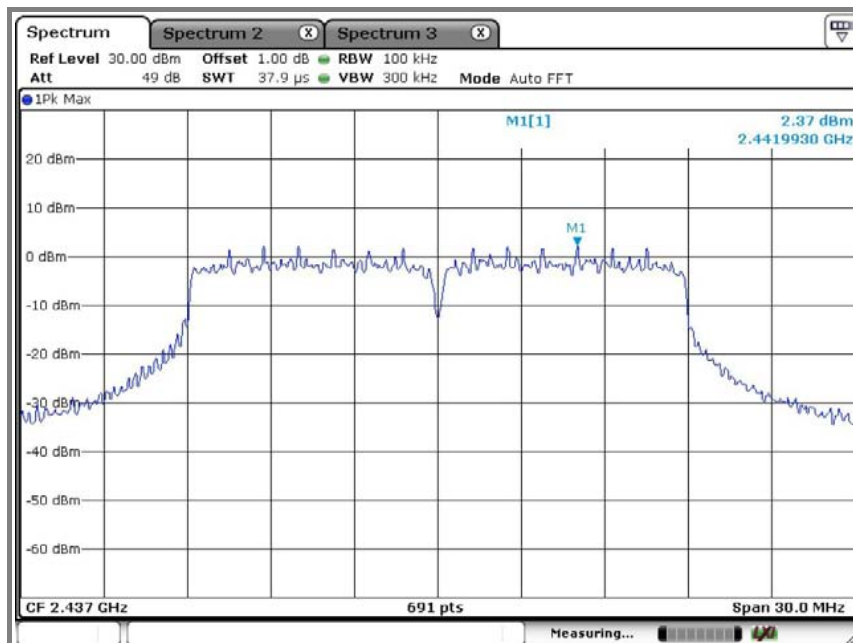


Emission level measurement 2

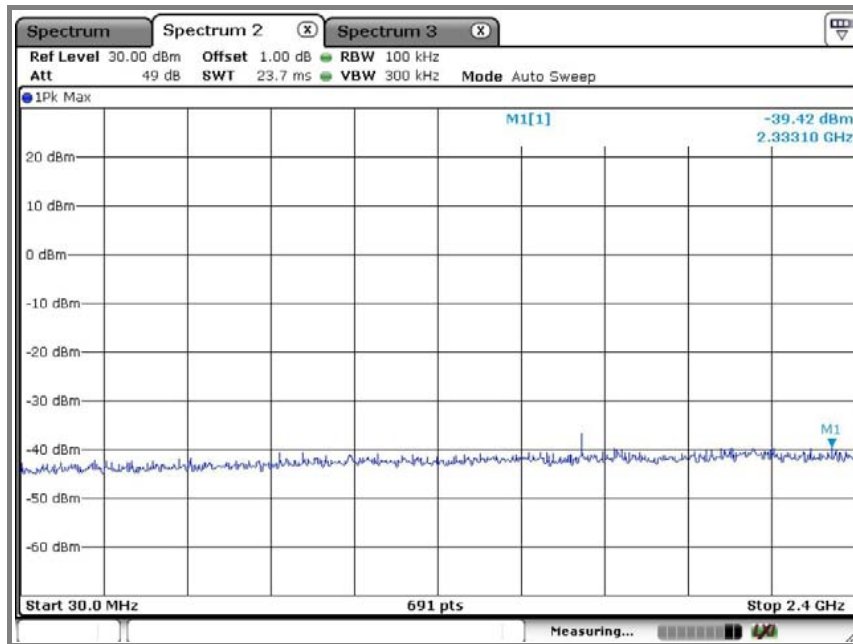


B. Middle channel (2 437 MHz)

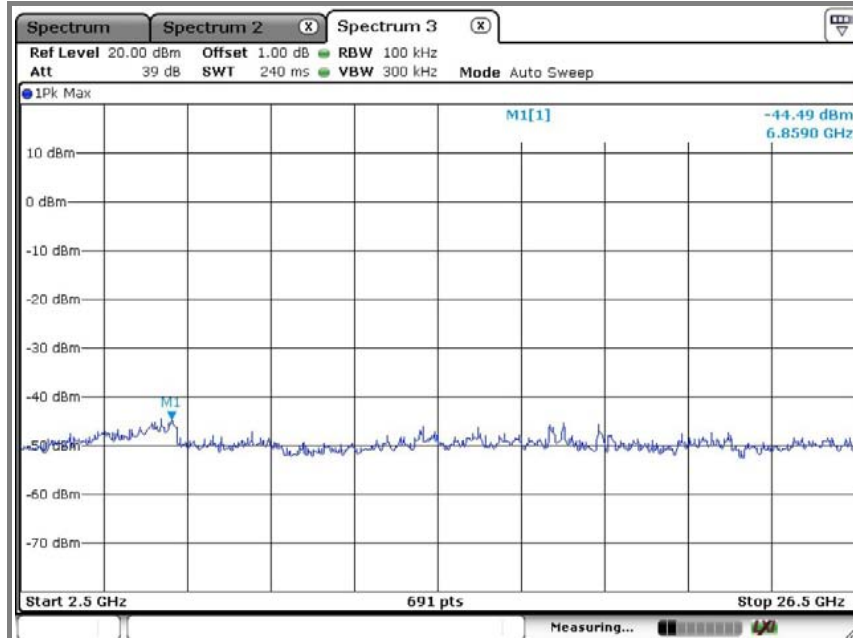
Reference level measurement



Emission level measurement 1

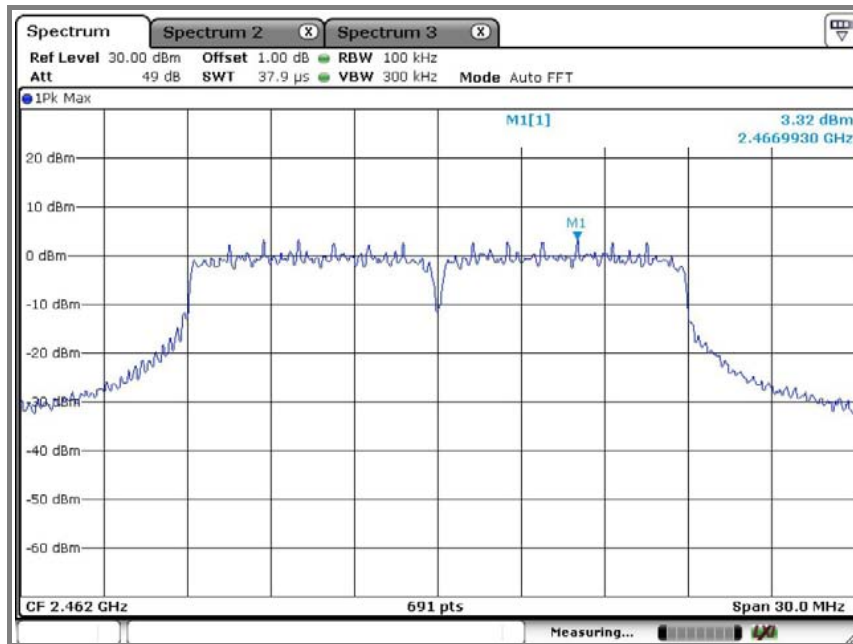


Emission level measurement 2

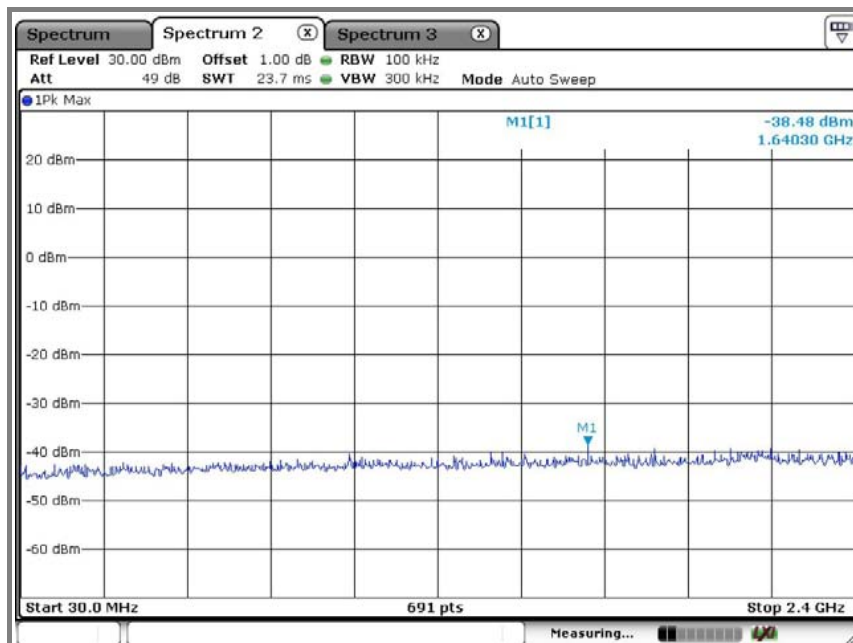


C. High channel (2 462 MHz)

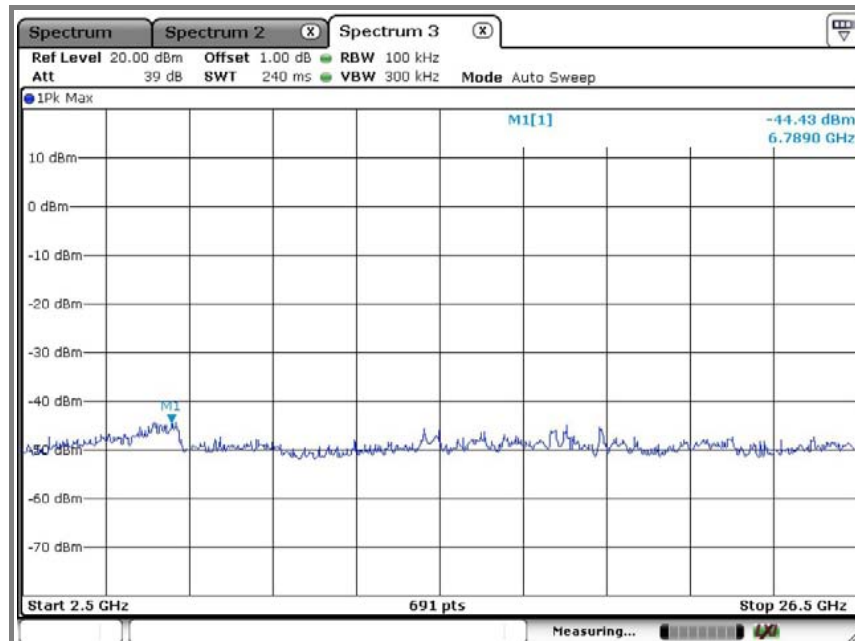
Reference level measurement



Emission level measurement 1

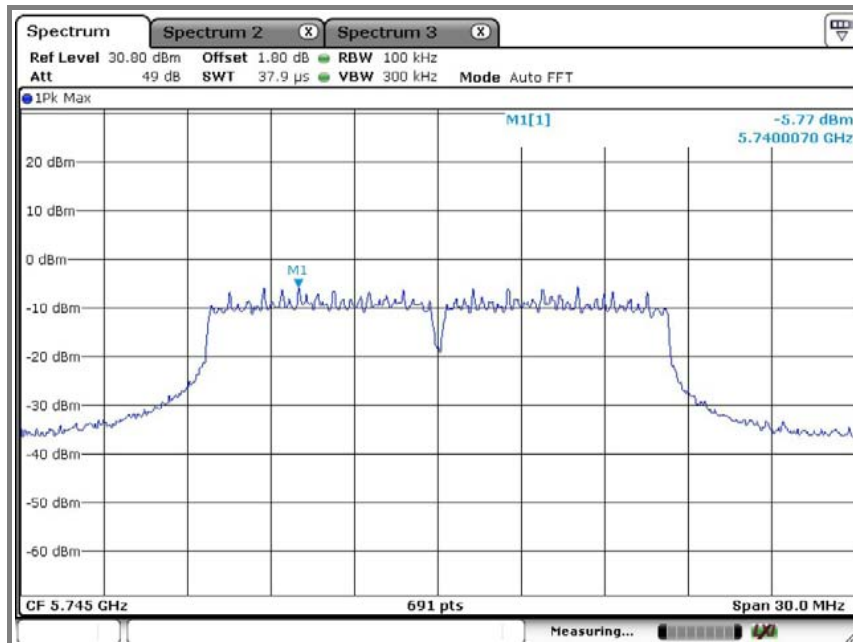


Emission level measurement 2

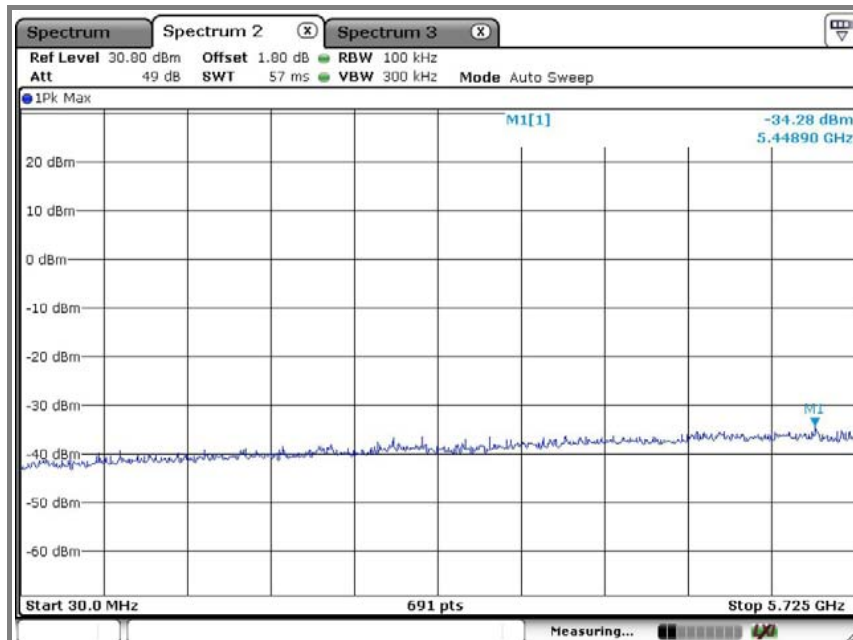


Operation mode: 802.11a mode (Ant 1)
A. Low channel (5 745 MHz)

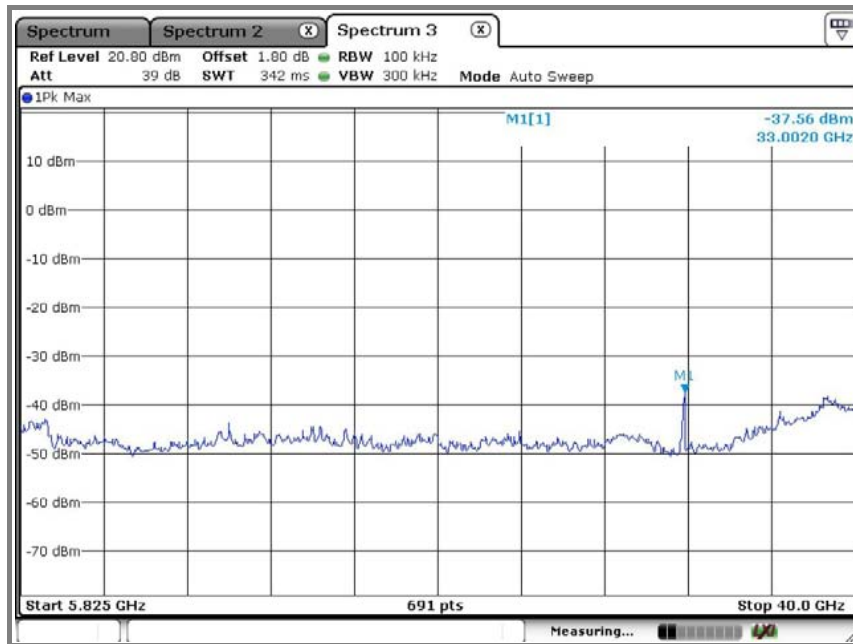
Reference level measurement



Emission level measurement 1

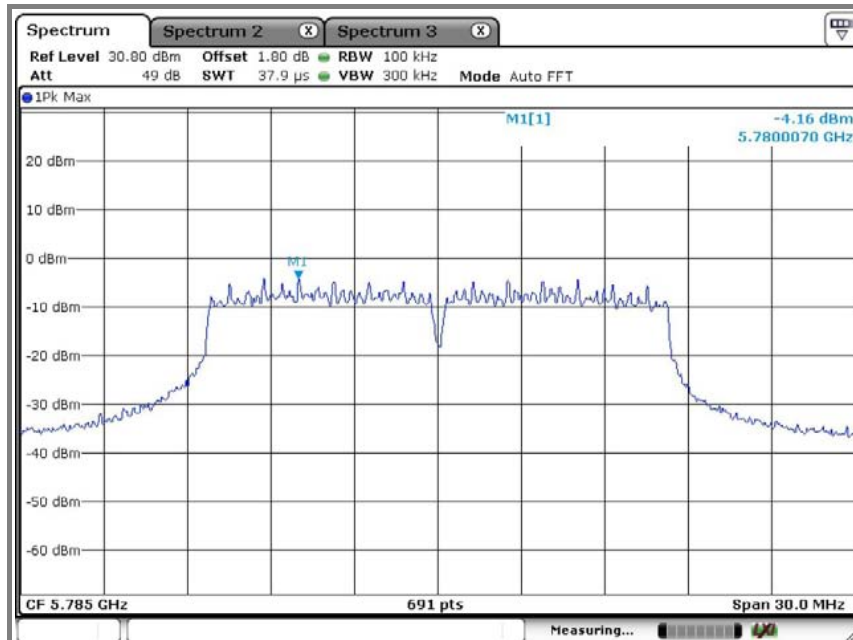


Emission level measurement 2

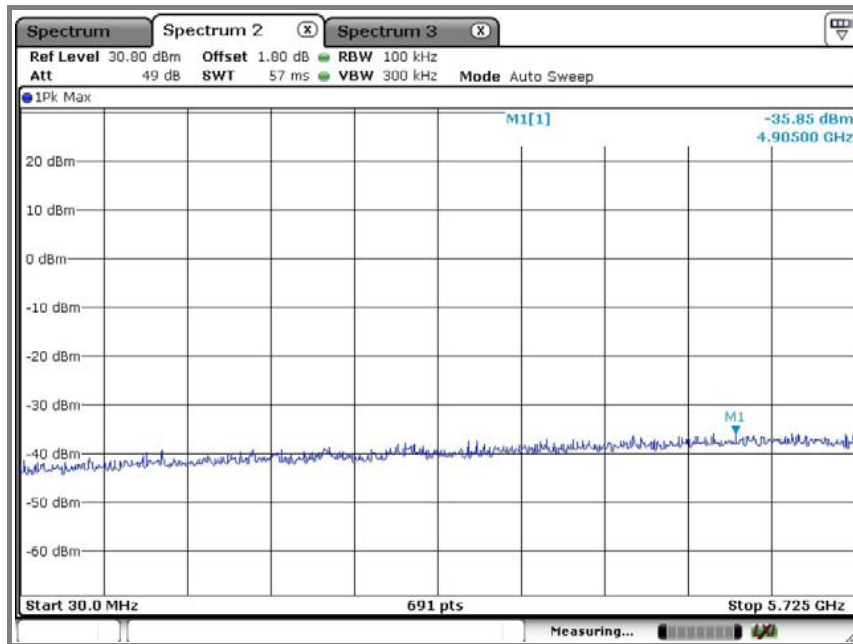


B. Middle channel (5 785 MHz)

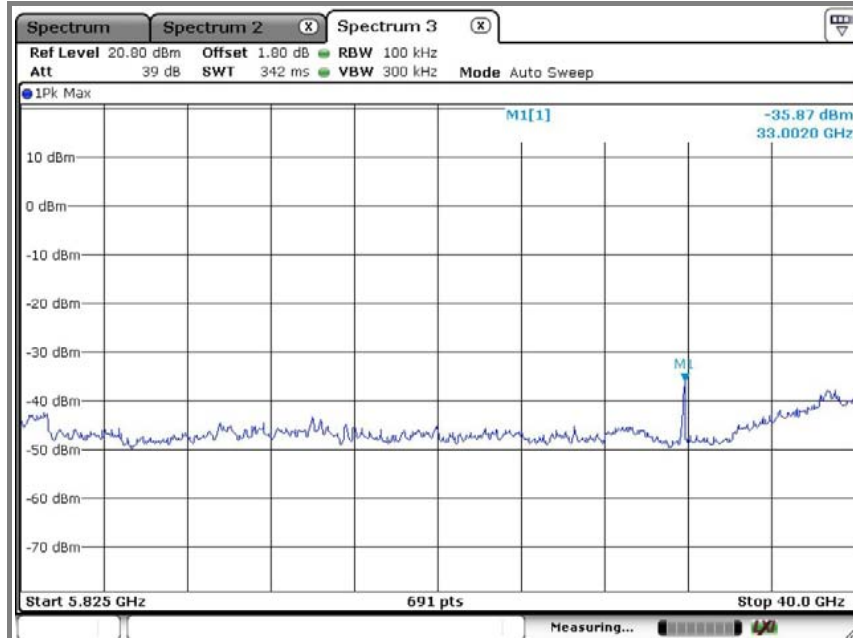
Reference level measurement



Emission level measurement 1

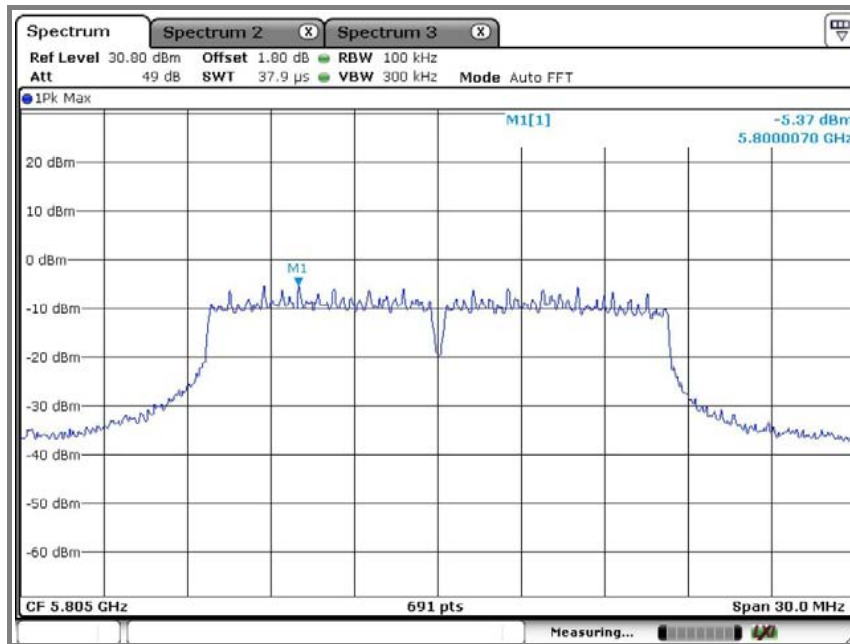


Emission level measurement 2

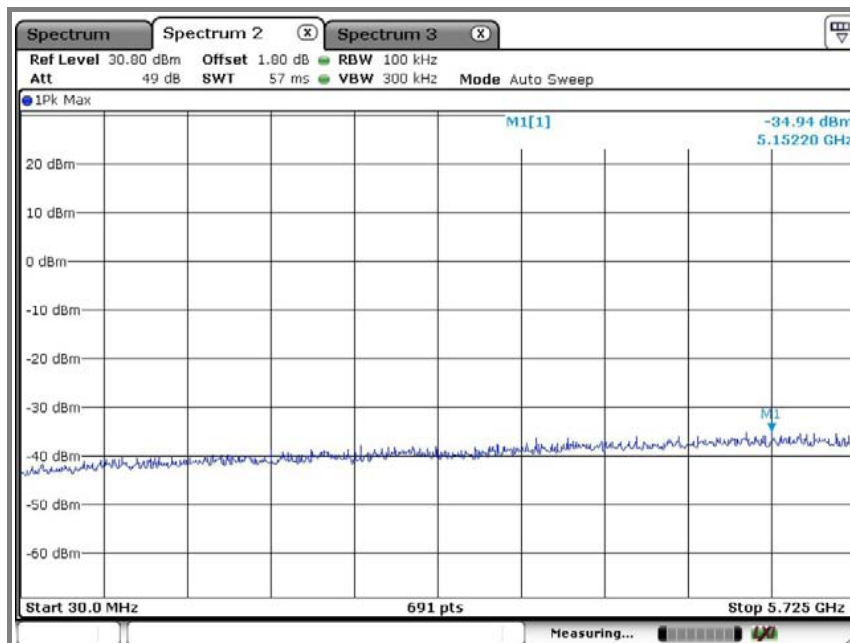


C. High channel (5 805 MHz)

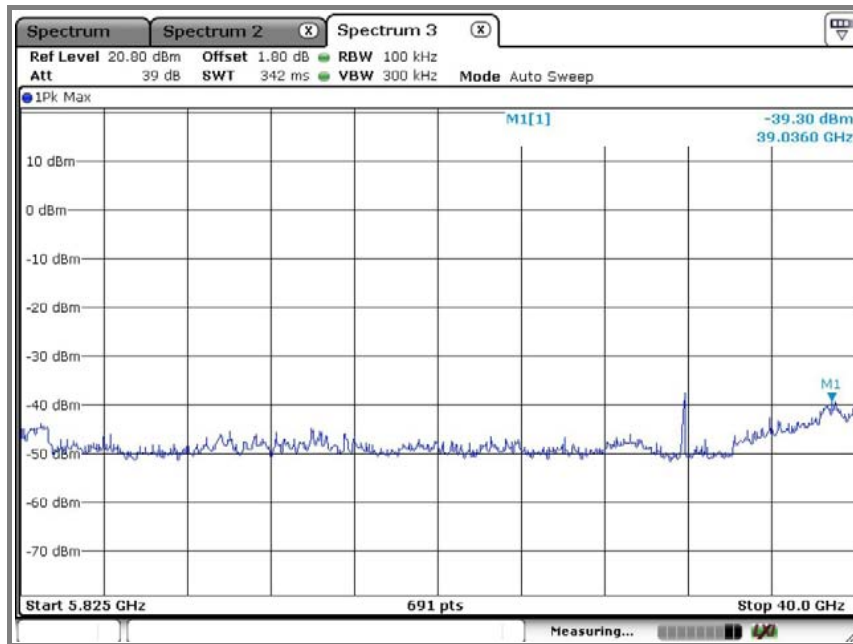
Reference level measurement



Emission level measurement 1

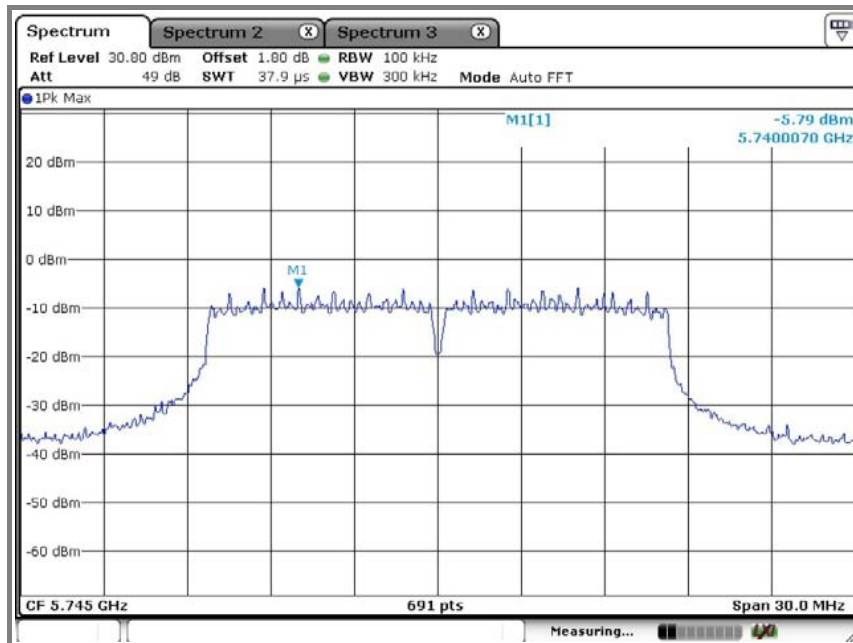


Emission level measurement 2

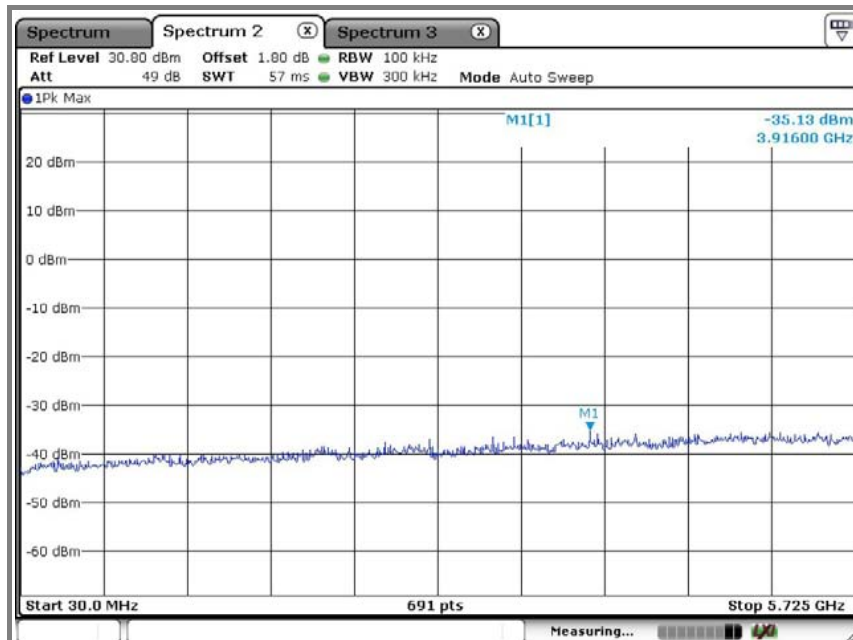


Operation mode: 802.11a mode (Ant 2)
A. Low channel (5 745 MHz)

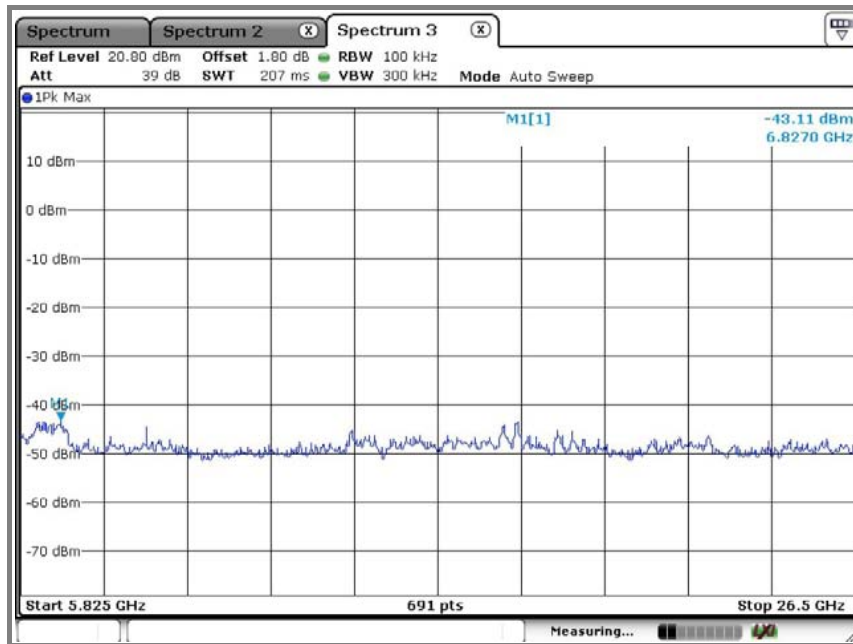
Reference level measurement



Emission level measurement 1

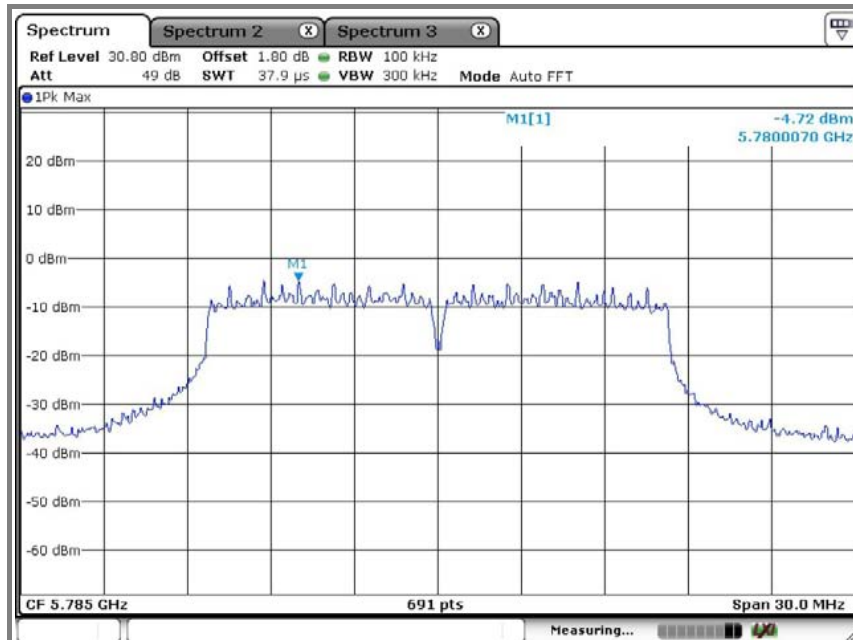


Emission level measurement 2

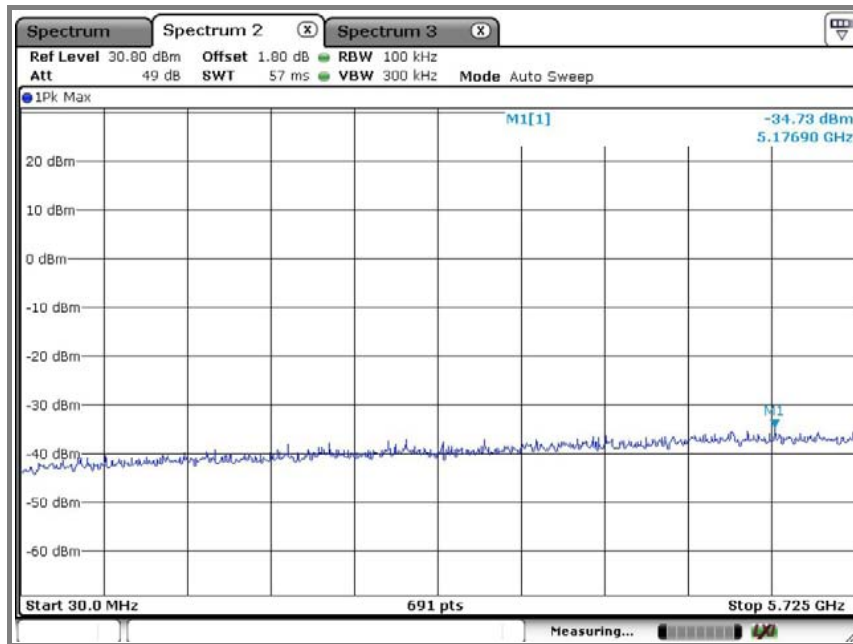


B. Middle channel (5 785 MHz)

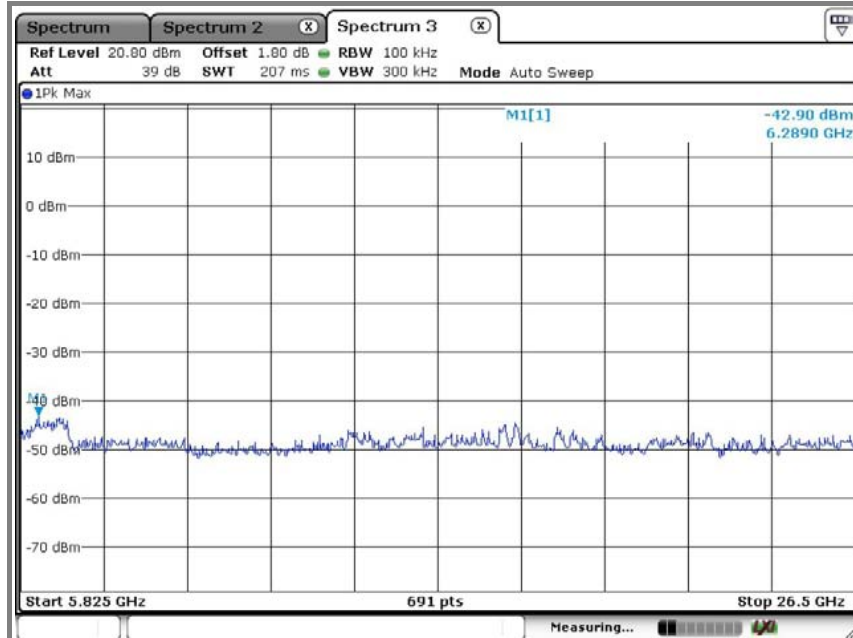
Reference level measurement



Emission level measurement 1

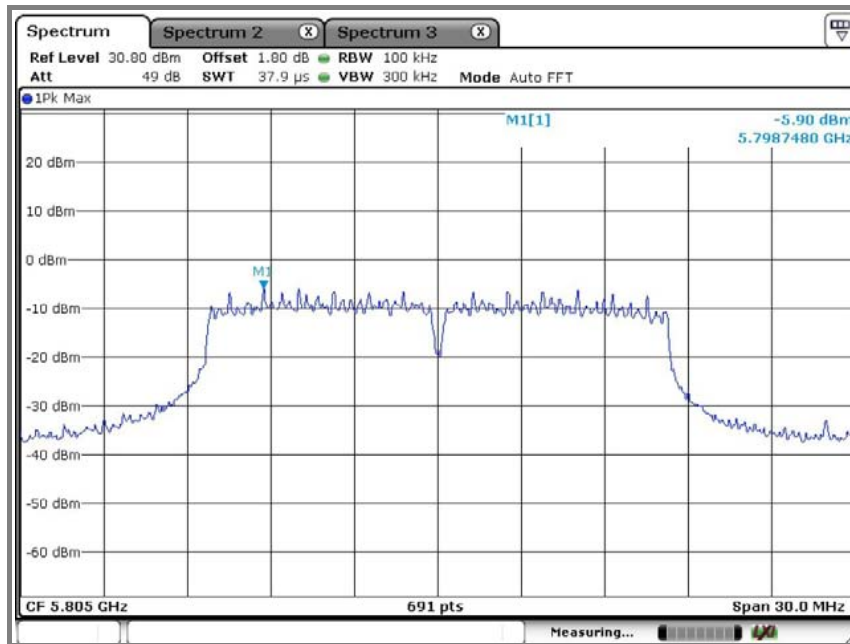


Emission level measurement 2

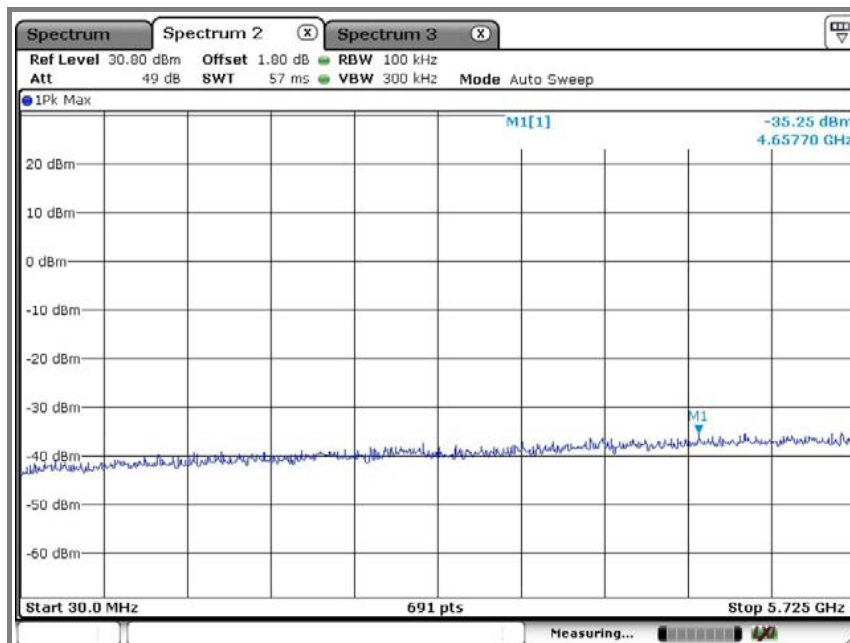


C. High channel (5 805 MHz)

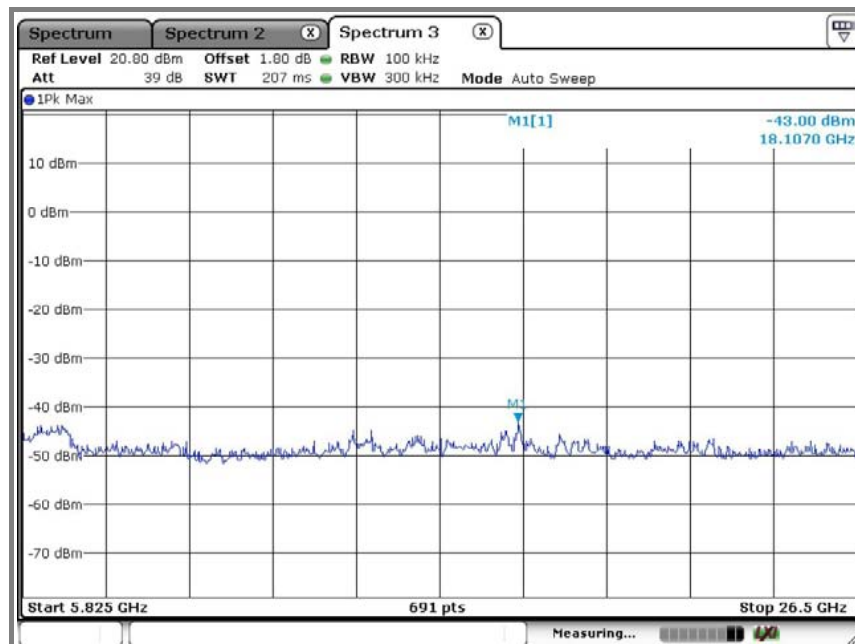
Reference level measurement



Emission level measurement 1



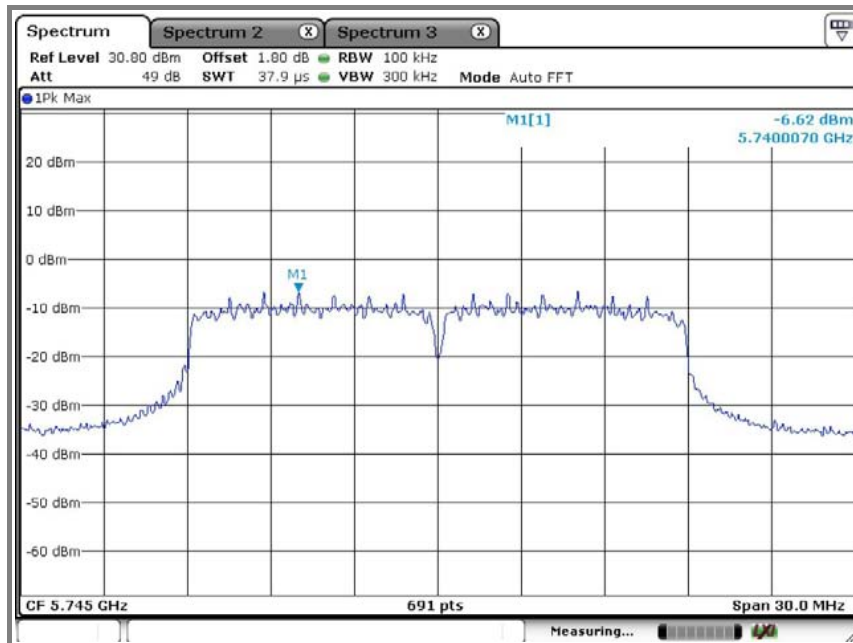
Emission level measurement 2



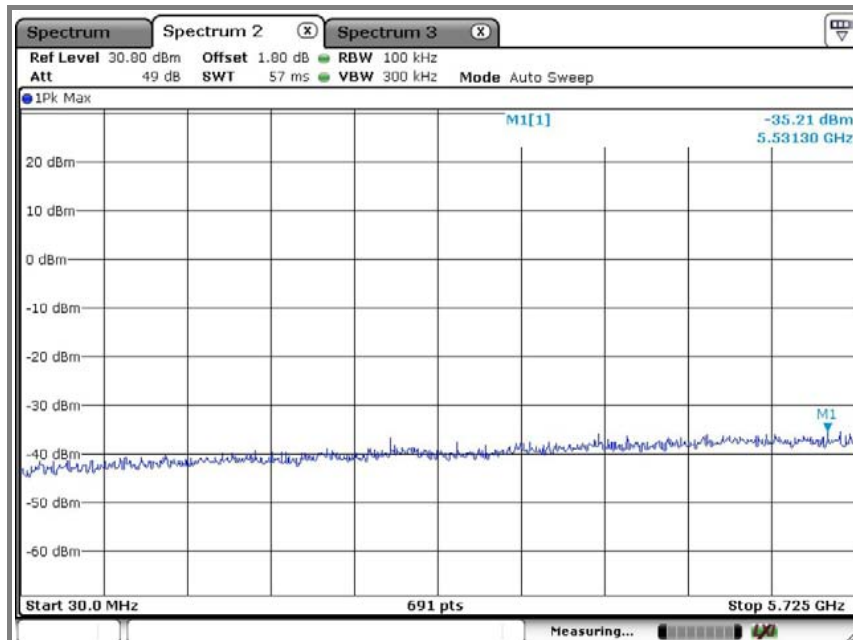
Operation mode: 802.11an20 mode (MIMO)

A. Low channel (5 745 MHz)

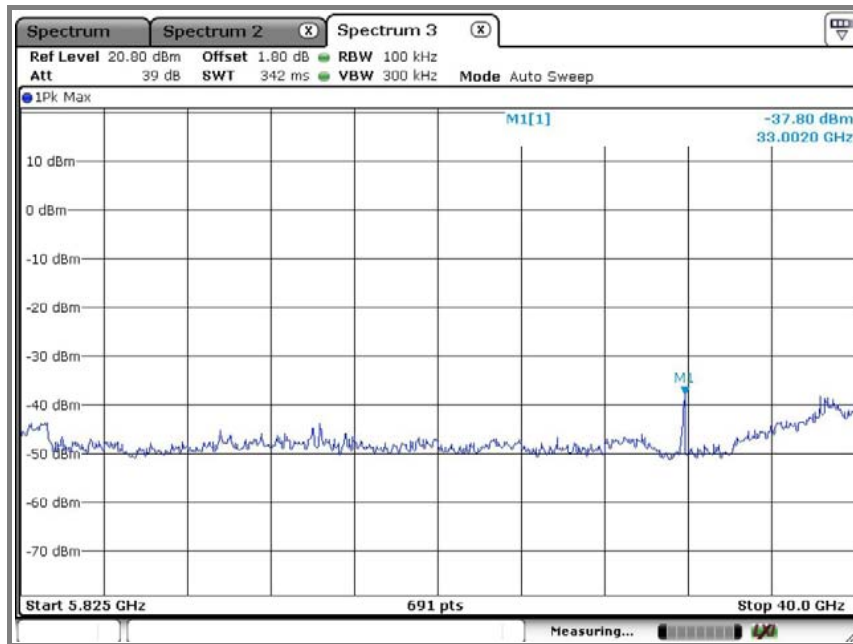
Reference level measurement



Emission level measurement 1

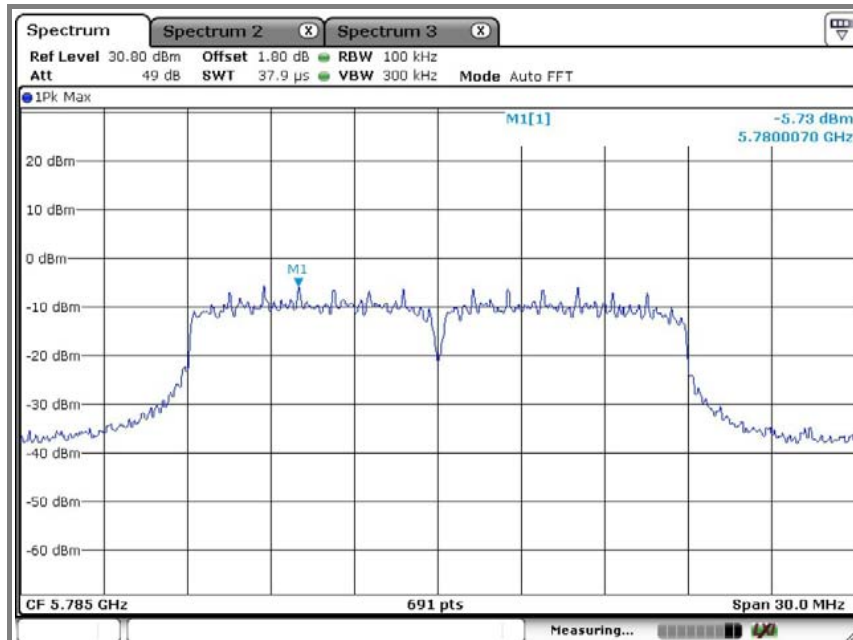


Emission level measurement 2

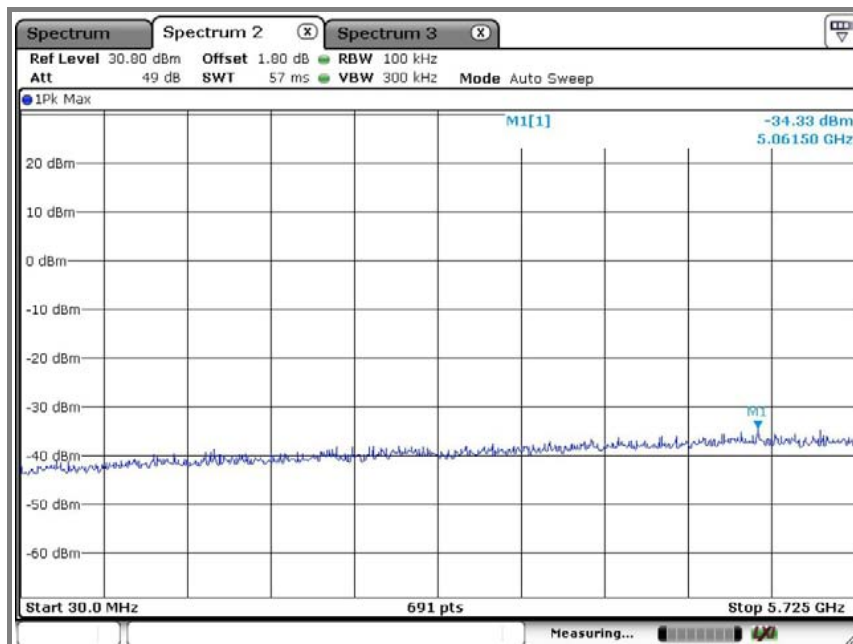


B. Middle channel (5 785 MHz)

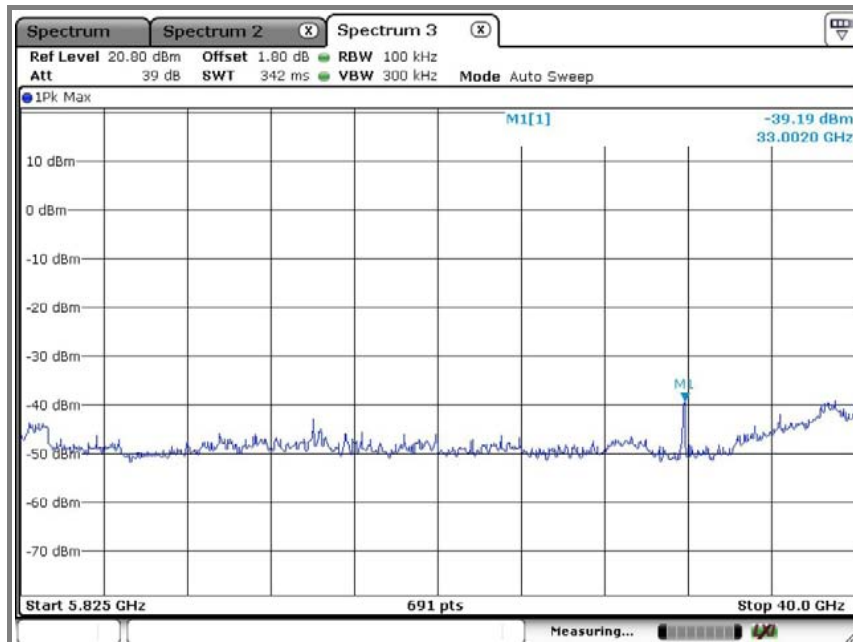
Reference level measurement



Emission level measurement 1

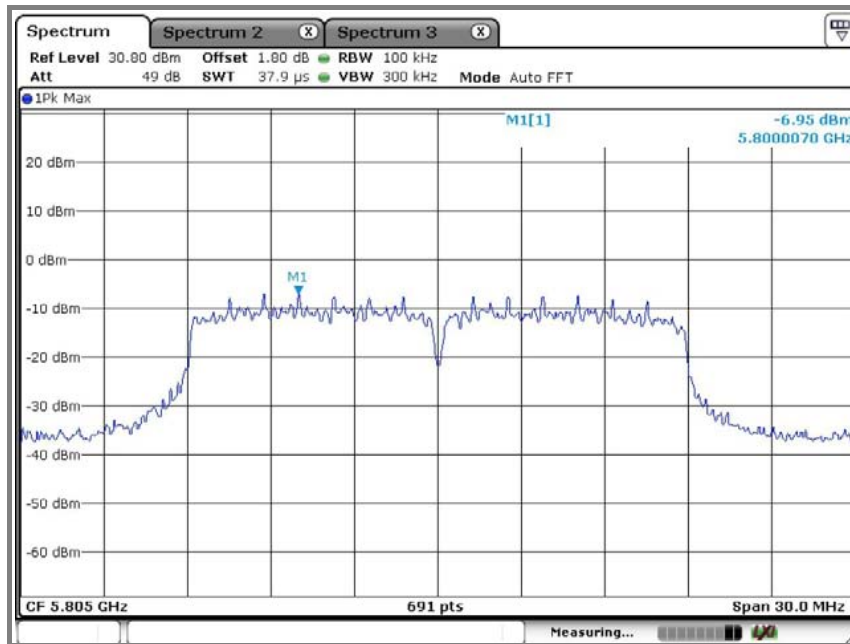


Emission level measurement 2

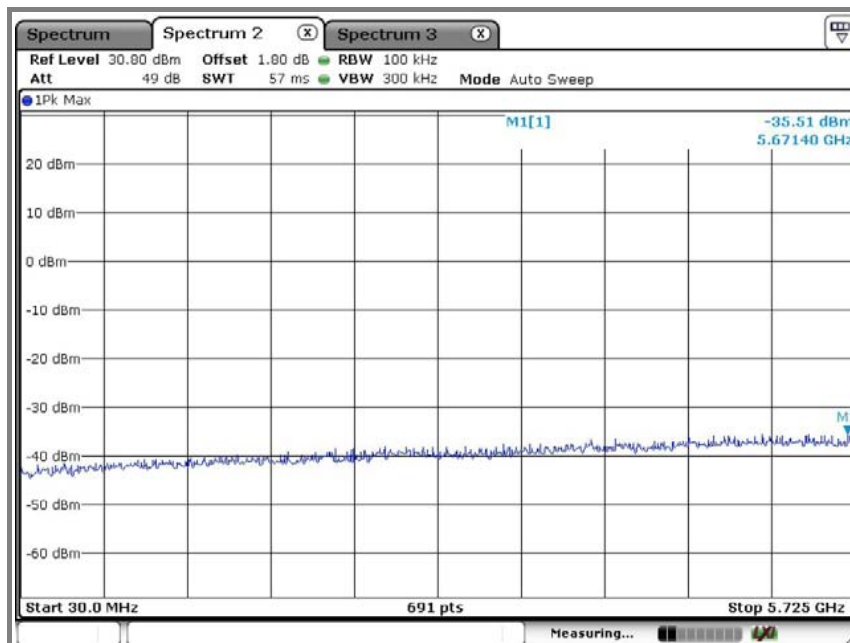


C. High channel (5 805 MHz)

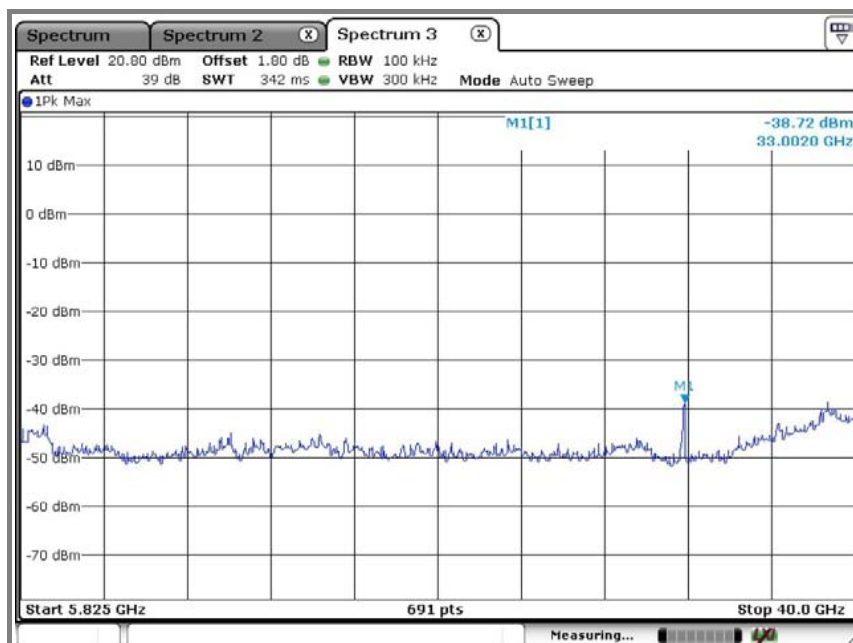
Reference level measurement



Emission level measurement 1



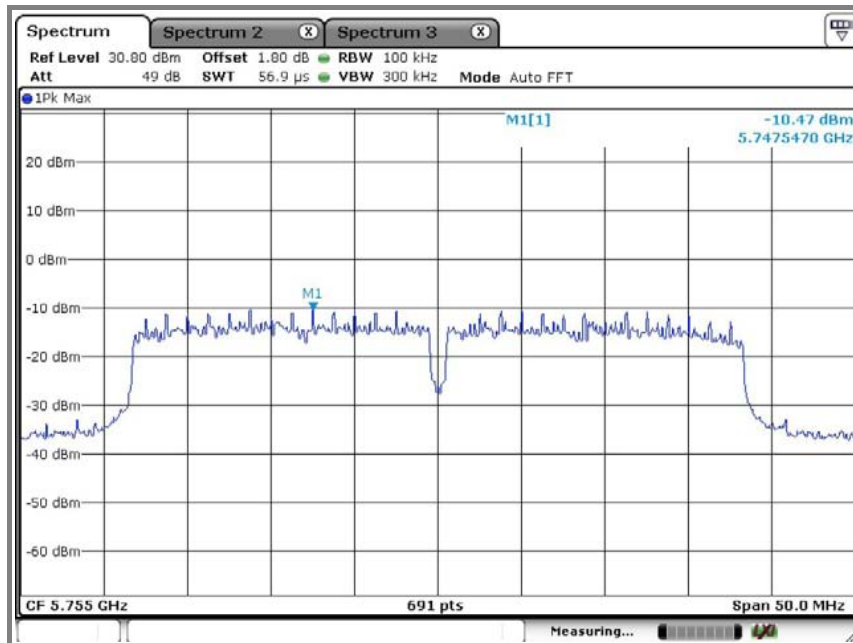
Emission level measurement 2



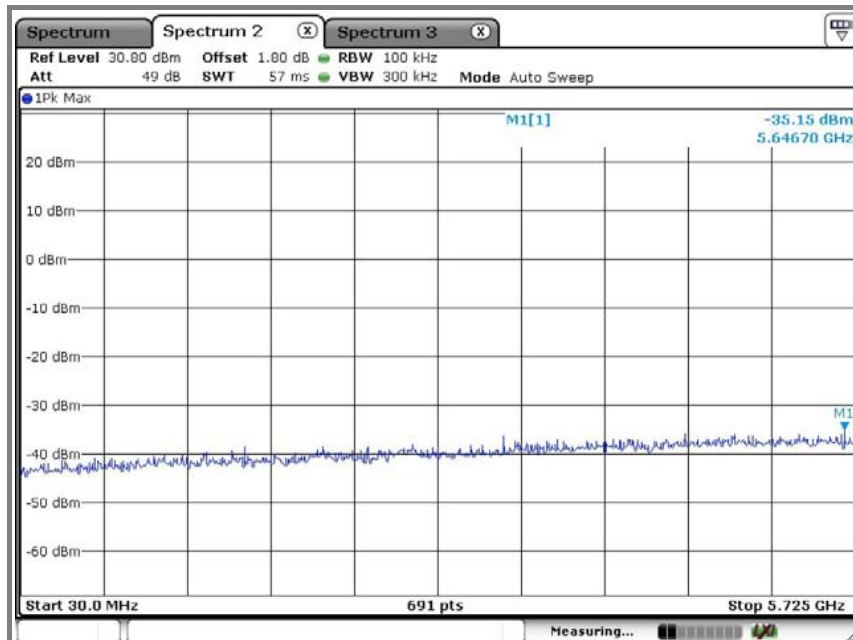
Operation mode: 802.11an40 mode (MIMO)

A. Low channel (5 755 MHz)

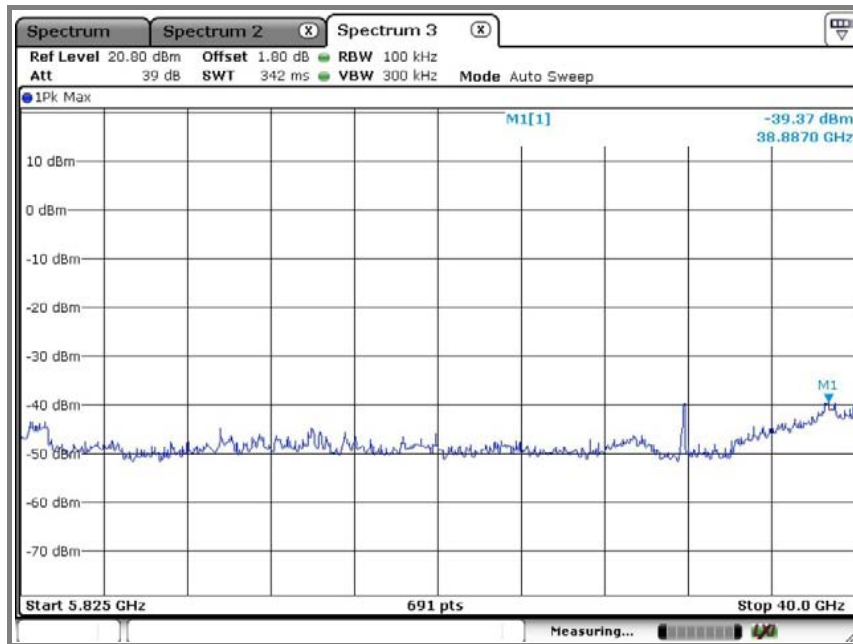
Reference level measurement



Emission level measurement 1

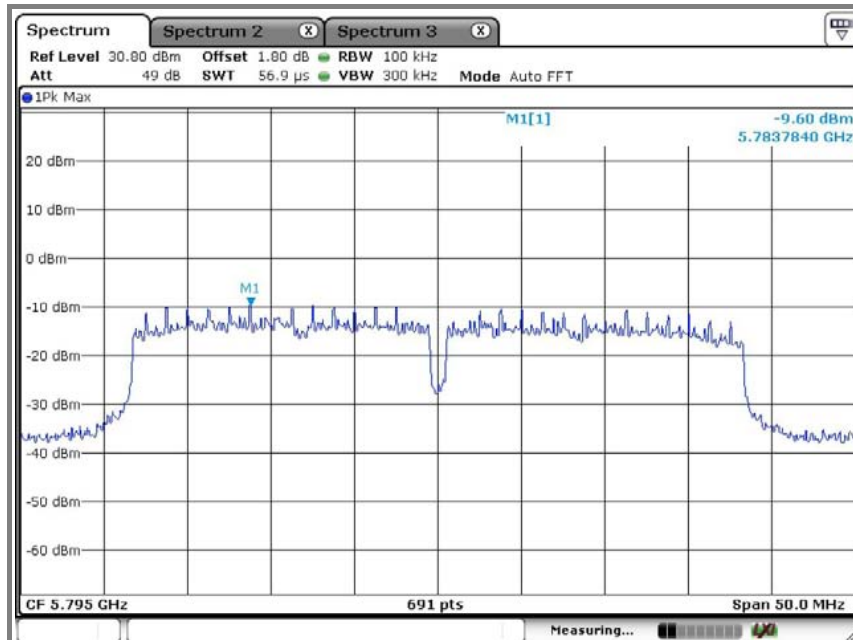


Emission level measurement 2

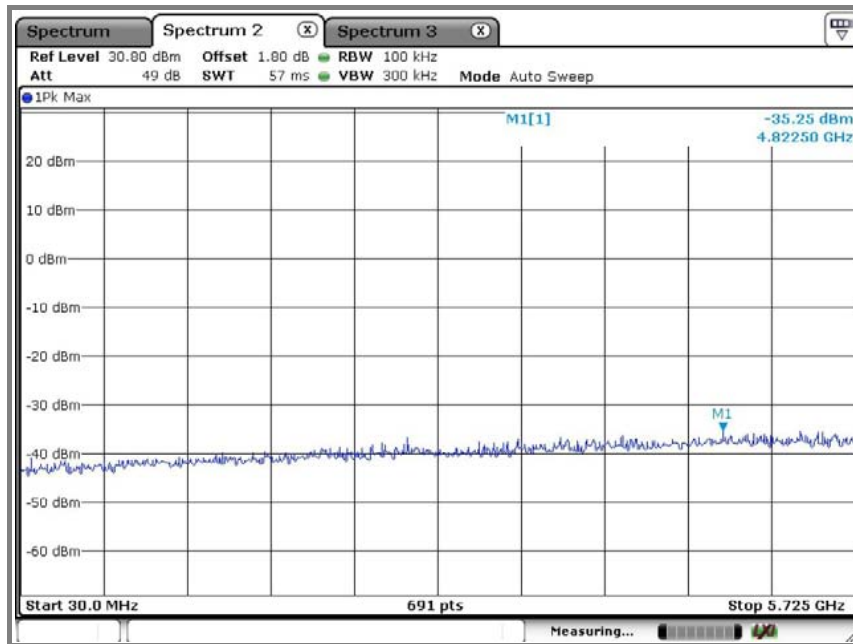


B. High channel (5 795 MHz)

Reference level measurement



Emission level measurement 1



Emission level measurement 2

