TEST REPORT

Part 15 Subpart C 15.247

Equipment under test mini-PCIe WiFi Module

Model name WiMi300

FCC ID ZD7- WIMI300

Applicant Nimbus, Inc.

Manufacturer Nimbus, Inc.

Date of test(s) 2014.03.20 ~ 2014.04.11

Date of issue 2014.04.15

Issued to

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Revision history

Revision	Date of issue	Test report No.	Description
-	2014.04.15	KES-RF-14T0019	Initial

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1. General information

1.1. EUT description

Equipment under test	mini-PCIe WiFi Module
Model name	WiMi300
Serial number	N/A
Frequency range	5190 ㎒ ~ 5230 ㎒(802.11an HT40), 5755 ㎒ ~ 5795 ㎒(802.11n HT40)
Modulation technique	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Number of channels	5190 ㎒ ~ 5230 ㎒ : 2 ch, 5755 ㎒ ~ 5795 ㎒ : 2ch
Antenna type & gain	Dipole antenna // 7.23 dBi
Power source	Power Adapter (AC 100-240 V 50/60 Hz // DC 12 V)

1.2. Test frequency

	Low channel	**Middle channel**	**High channel**
Frequency (㎒)	5 755	-	5 795

1.3. Information about derivative model

N/A

1.4. Device modifications

N/A

1.5 Device information

- The device shall be used only 802.11n (HT 40).

1.6. Test facility

C-3701, Simin-daero 365-40, Dongan-gu, Anyang-si, Gyeonggi-do,431-716, Korea
473-29, Gayeo-ro, Yeoju-si, Gyeonggi-do, Korea

The open area test site is constructed in conformance with the requirements ANSI C63.4-2003/2009.

1.7. Laboratory accreditations and listings

Country	Agency	Scope of accreditation	Certificate No.
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	343818
KOREA	KC	EMI (10 meter Open Area Test Site and two conducted sites) Radio (3 & 10 meter Open Area Test Sites and one conducted site)	KR0100
CANADA	IC	3 & 10 meter Open Area Test Sites and one conducted site	4769B-1

1.8. Directional antenna gain for MIMO (uncorrelated)

ANT1 Gain (dBi)	ANT2 Gain (dBi)	ANT3 Gain (dBi)	Total Gain (dBi)
7.23	7.23	7.23	7.23

Ant Gain = 10 log[($10^{G1/10}$ + $10^{G2/10}$+ $10^{G3/10}$) /N] = 7.23 dBi

2. Summary of tests

Reference	Parameter	Test results
15.205 15.209	Radiated spurious emission	Pass
15.247(d)	Conducted spurious emission and band edge	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

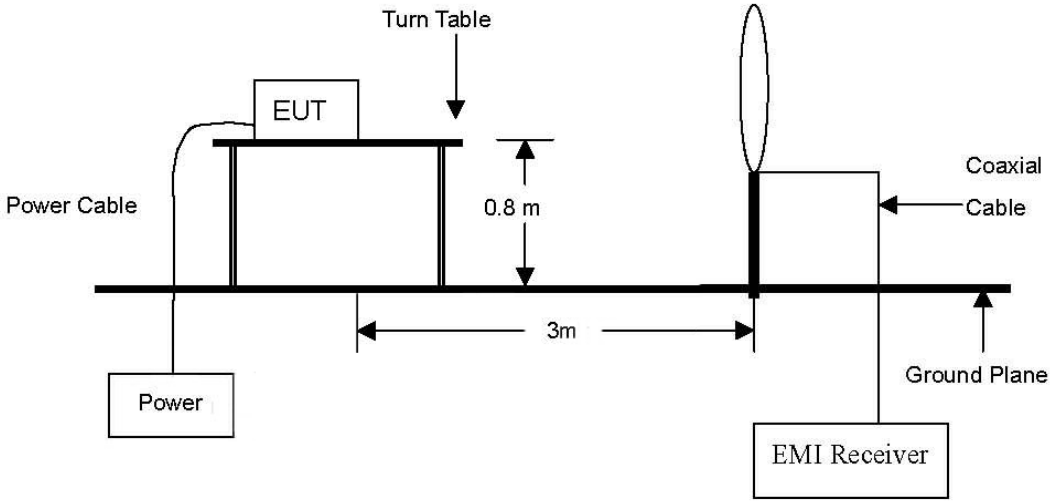
Test procedures;
The measurement procedures described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 ㎑ to 40 ㎓ (ANSI C63.4-2003/2009), the guidance provided in KDB 558074_v03r01 and KDB 662911 D01 v02r01 were used in the measurement of the EUT.

3. Test results

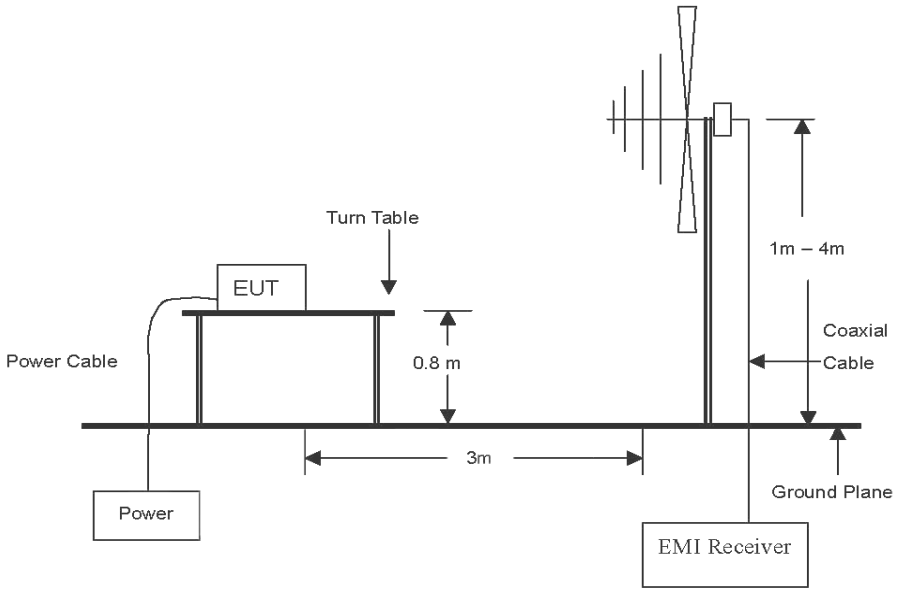
3.1 Radiated spurious emissions

Test setup

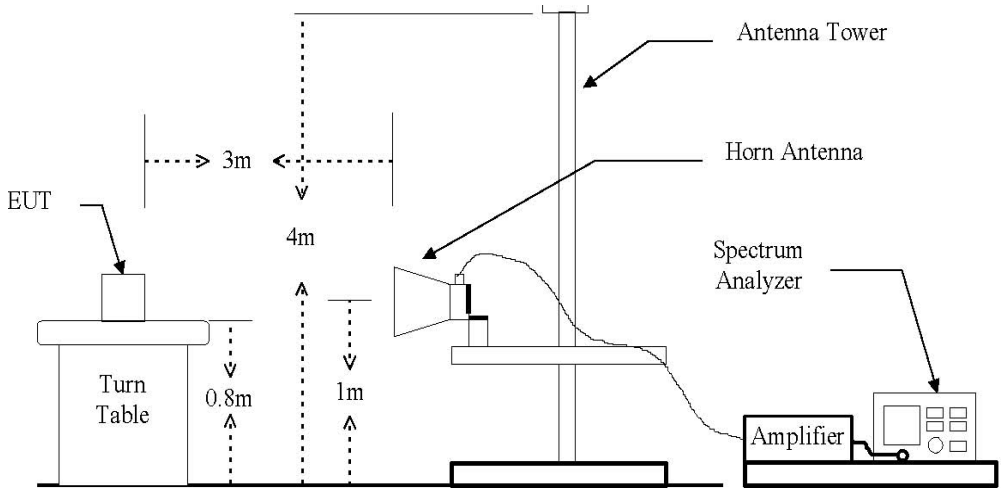
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions.



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



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



Test procedure

Radiated emissions from the EUT were measured according to the dictates in section 12.0 of KDB 558074_v03r01 and ANSI C63.4-2003/2009

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 1㎓, 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 ㎓, 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 ㏈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 have10 ㏈ 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.

The spectrum analyzer is set to:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 200 ㎐ for Quasi-peak detection (QP) at frequency below 9 ㎑~ 150 ㎑.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 9 ㎑ for Quasi-peak detection (QP) at frequency below 150 ㎑~ 30 ㎒.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 120 ㎑ for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 ㎓.
4. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 ㎒ and video bandwidth is 3 ㎒ for Peak detection at frequency above 1 ㎓.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1 ㎒ and the video bandwidth is 3 ㎒ for Average detection (AV) at frequency above 1 ㎓. (Detect mode: RMS(power), Averaging 100)

To get a maximum emission level from the EUT, the EUT is manipulated through three orthogonal planes.

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 (㎒)	Distance (Meters)	Radiated (㎶/m)
0.009 ~ 0.490	300	2 400 / F(㎑)
0.490 ~ 1.705	30	24 000 / F(㎑)
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 ㎒, 76 ~ 88 ㎒, 174 ~ 216 ㎒ or 470 ~ 806 ㎒. 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 ㎒)

The frequency spectrum from 9 ㎑ to 30 ㎒ was investigated. Emission levels are not reported much lower than the limits by over 20 ㏈.

Radiated emissions		Ant.	Correction factors			Total	Limit	
Frequency (㎒)	Reading (㏈㎶)	Pol.	Ant. factor (㏈/m)	Cable loss (㏈)	F_d (㏈)	Actual (㏈㎶/m)	Limit (㏈㎶/m)	Margin (㏈)
Not detected for above 30 ㎒								

Note.

1. All spurious emission at channels are almost the same below 30 ㎒, so that high channel was chosen at representative in final test.
2. Actual = Reading + Ant. factor + Cable loss + F_d
3. $F_d = 40\log(D_m / D_s)$
   Where:
   F_d = Distance factor in ㏈
   D_m = Measurement distance in meters
   D_s = Specification distance in meters

Test results (Below 1 000 ㎒)

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

Radiated emissions		Ant.	Correction factors		Total	Limit	
Frequency (㎒)	Reading (㏈㎶)	Pol.	Ant. factor (㏈/m)	Cable loss (㏈)	Actual (㏈㎶/m)	Limit (㏈㎶/m)	Margin (㏈)
107.6	28.38	V	9.76	1.98	40.12	43.5	3.38
216.7	26.08	V	10.50	3.21	39.79	46.0	6.21
333.1	22.37	H	14.12	4.27	40.76	46.0	5.24
405.9	20.70	H	15.71	4.93	41.34	46.0	4.66
534.4	16.36	V	18.39	5.77	40.52	46.0	5.48
568.4	17.83	H	19.02	5.94	42.79	46.0	3.21

Note.

1. All spurious emission at channels are almost the same below 1 ㎓, 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 ㎒)

The frequency spectrum from 1 ㎓ to 25 ㎓ was investigated. No Emissions were found above 20 dB below the limit.

Low channel

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detector mode	Pol.	AFCL (dB)	DCF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
5 384.05	45.30	PK	H	16.53	-	61.83	74.00	12.17
5 384.11	32.30	Avg	H	16.53	-	48.83	54.00	5.17

High channel

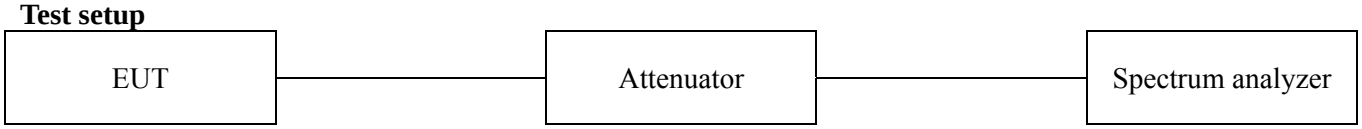
Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detector mode	Pol.	AFCL (dB)	DCF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
5 433.23	44.02	PK	H	16.61	-	60.63	74.00	13.37
5 432.20	32.47	Avg	H	16.61	-	49.08	54.00	4.92

Note.

1. Measuring frequencies from 1 ㎓ to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1 000 ㎒ 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 + AFCL(Ant. factor – Amp. gain + Cable loss) + DCF(Duty cycle Correction Factor)
5. DCF(Duty cycle Correction Factor) = 10log(1/Duty cycle)
6. To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.

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_v03r01, section 11.1&11.2,

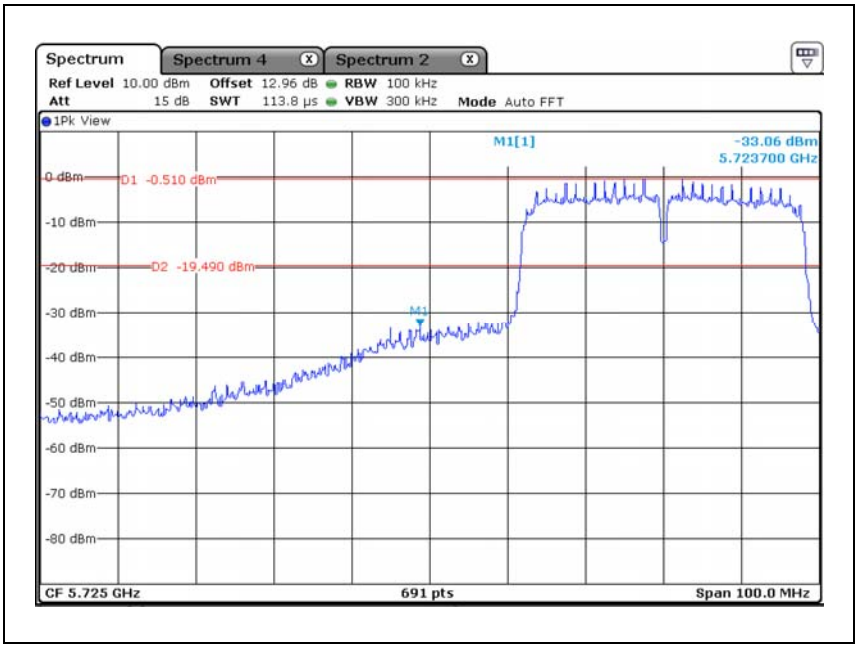
1. Use the following spectrum analyzer setting
   Center frequency: Low and high channel.
   RBW = 100 ㎑
   VBW = 300 ㎑ (≥3x RBW)
   Sweep = auto
   Detector function = peak
   Trace = max hold
2. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding 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.

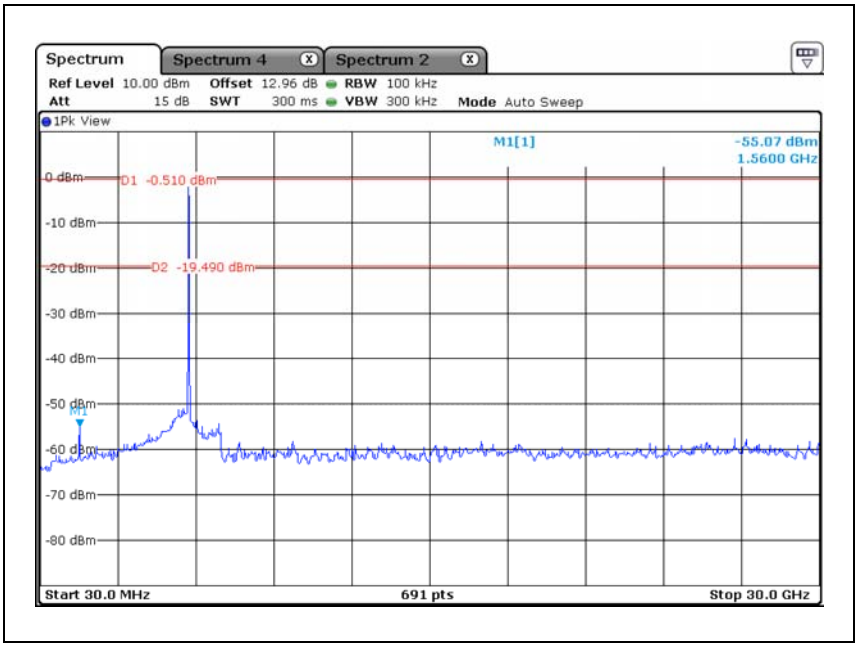
Limit

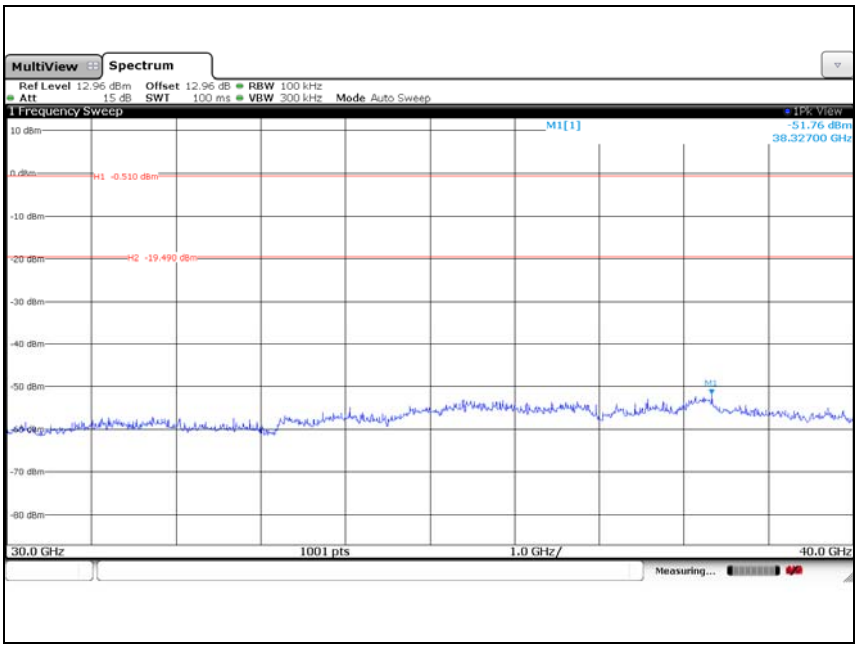
According to 15.247(d), in any 100 ㎑ bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 ㏈ below that in the 100 ㎑ bandwidth within the band 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 ㏈ instead of 20 ㏈. 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))

Test results
- Antenna port 1

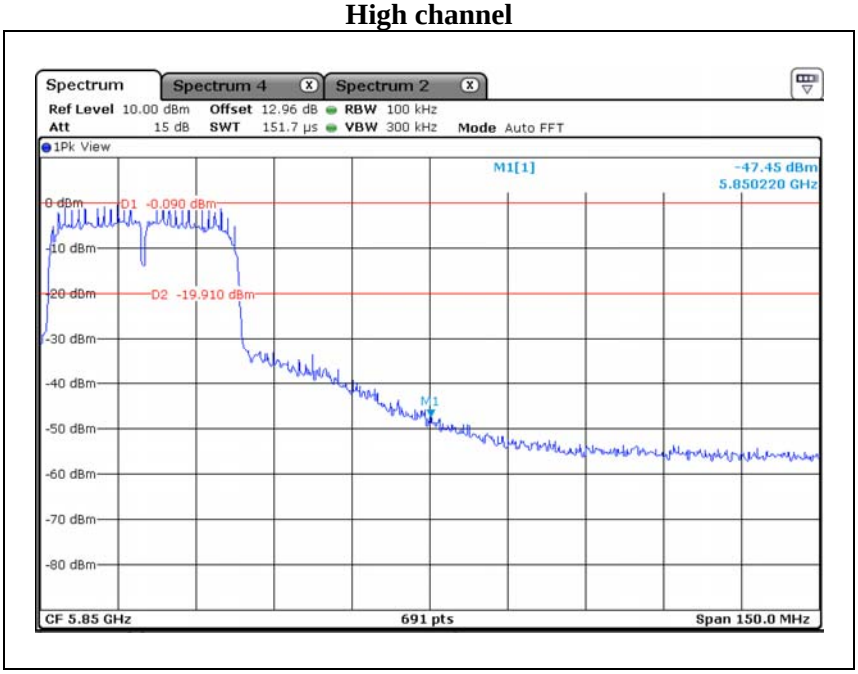
Low channel

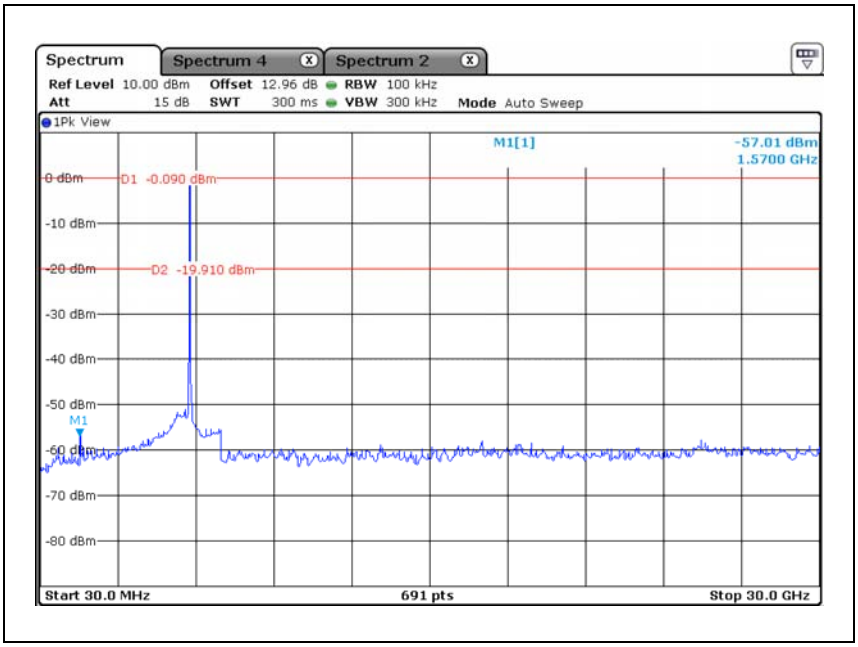


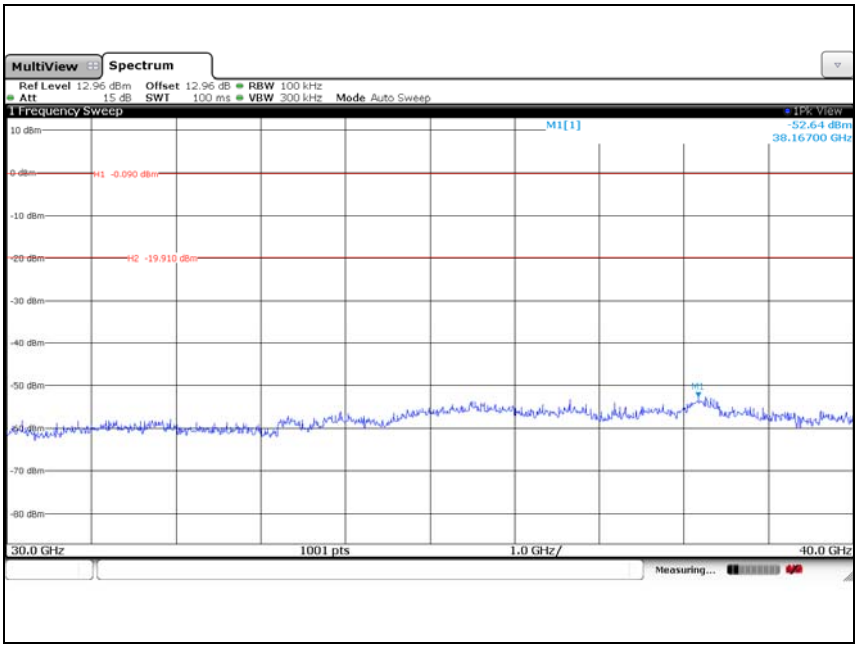




High channel

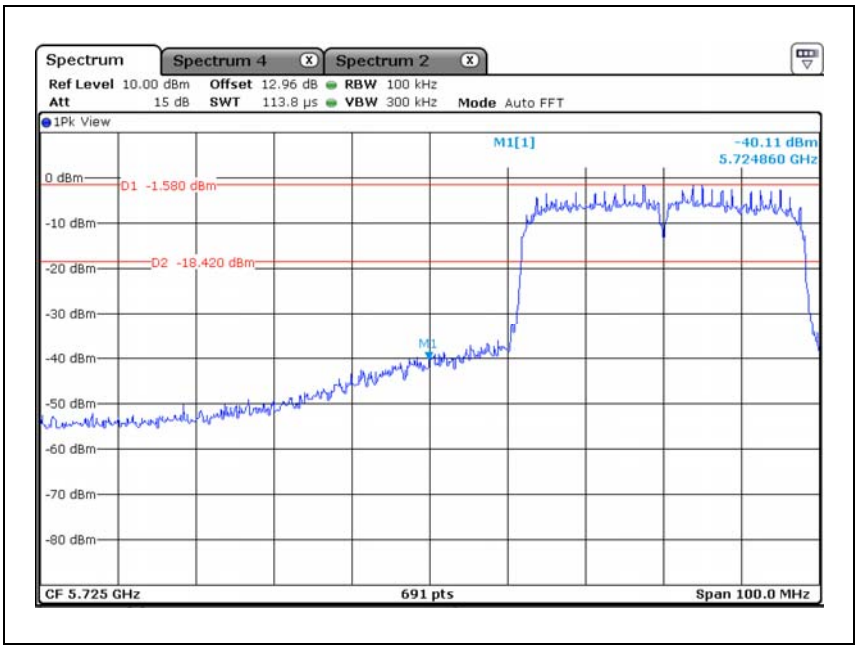


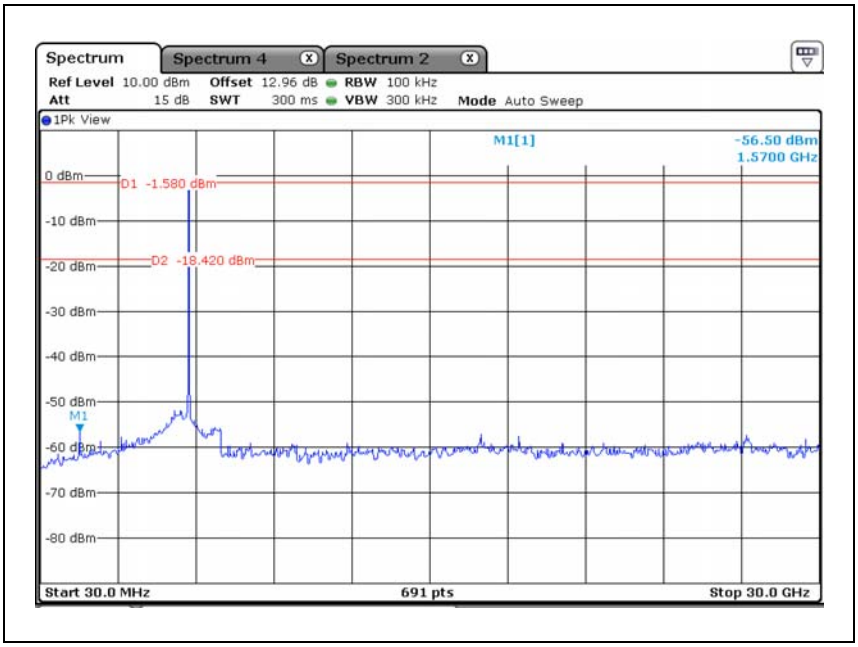


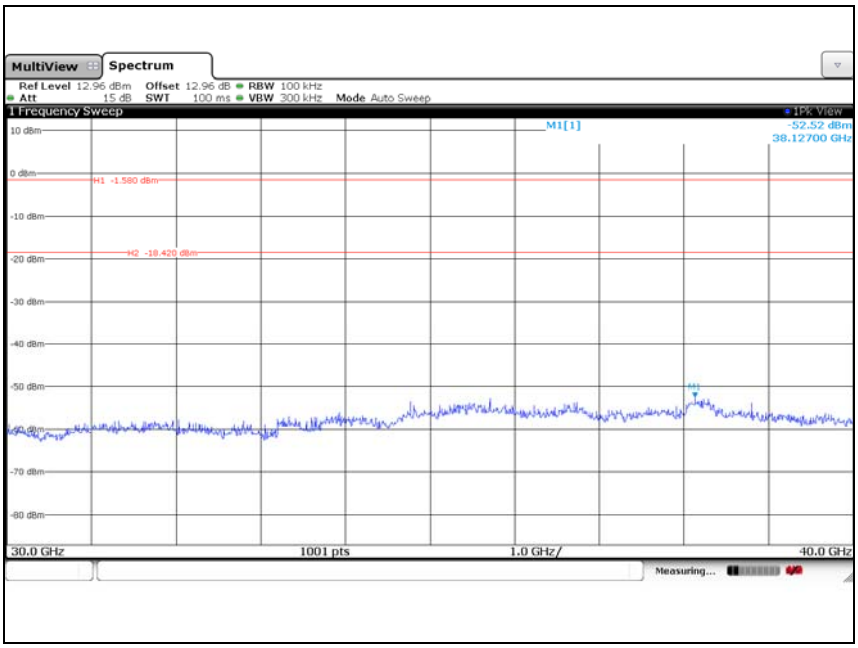


- Antenna port 2

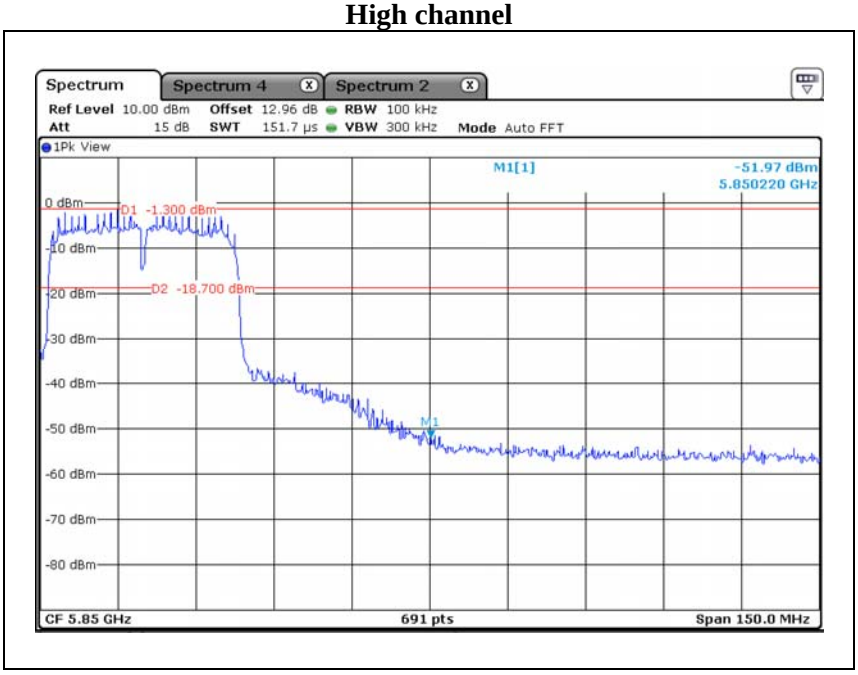
Low channel

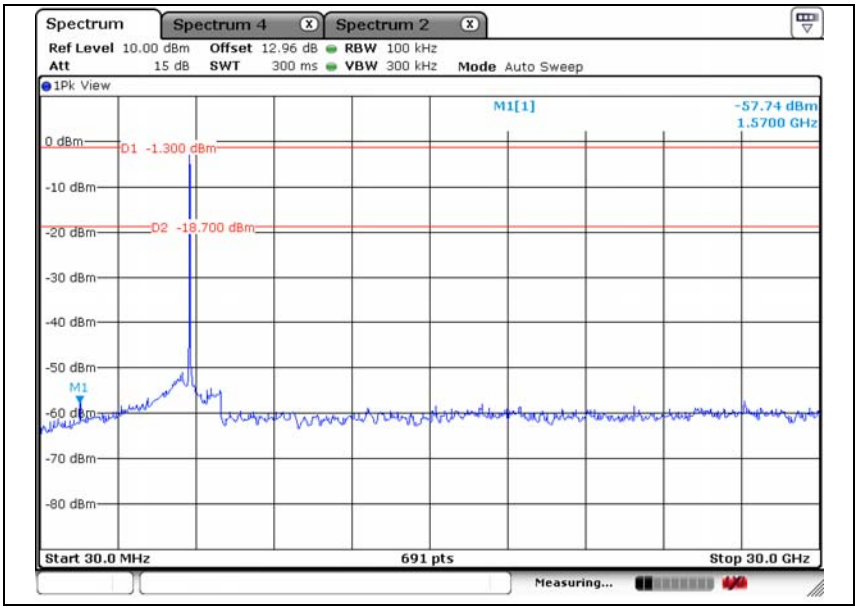


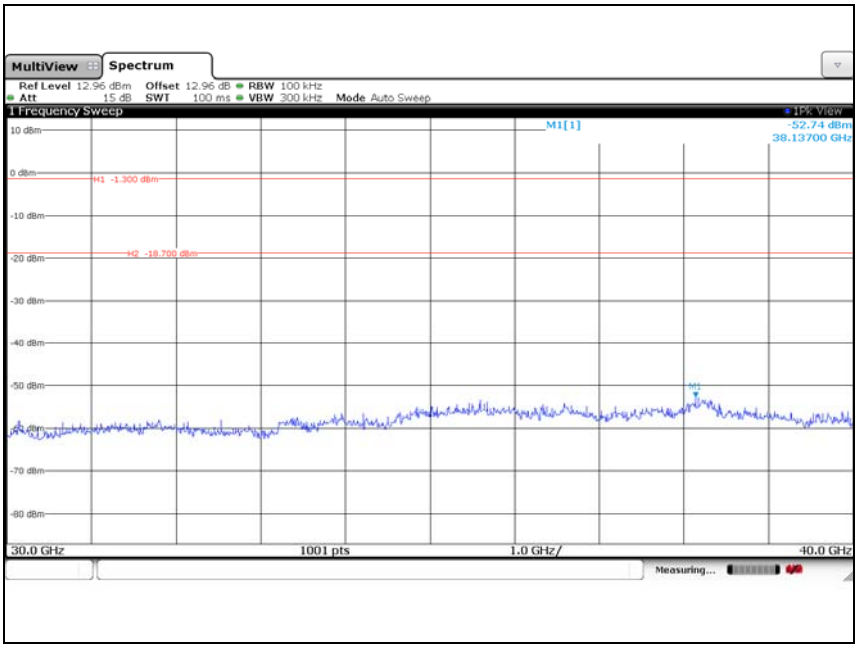




High channel

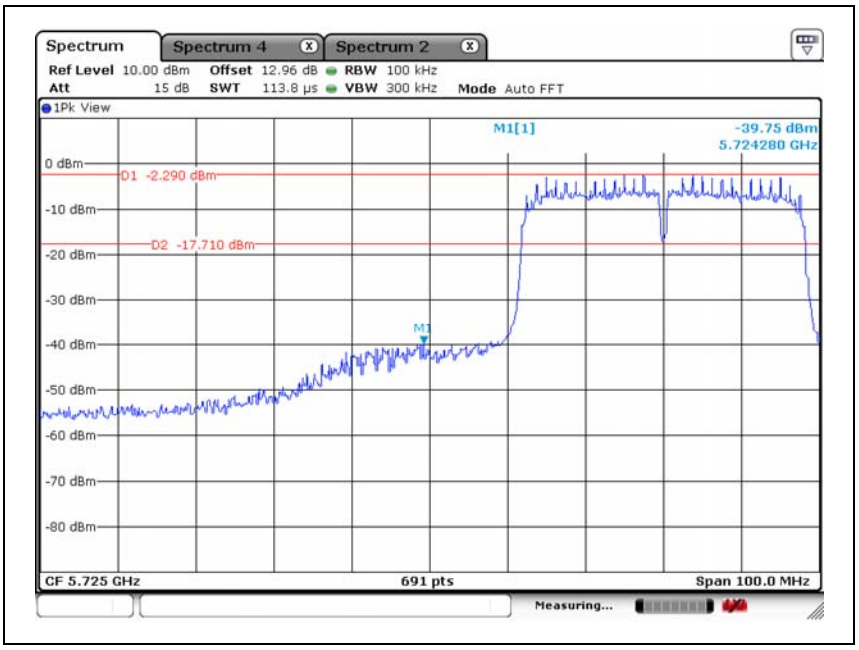


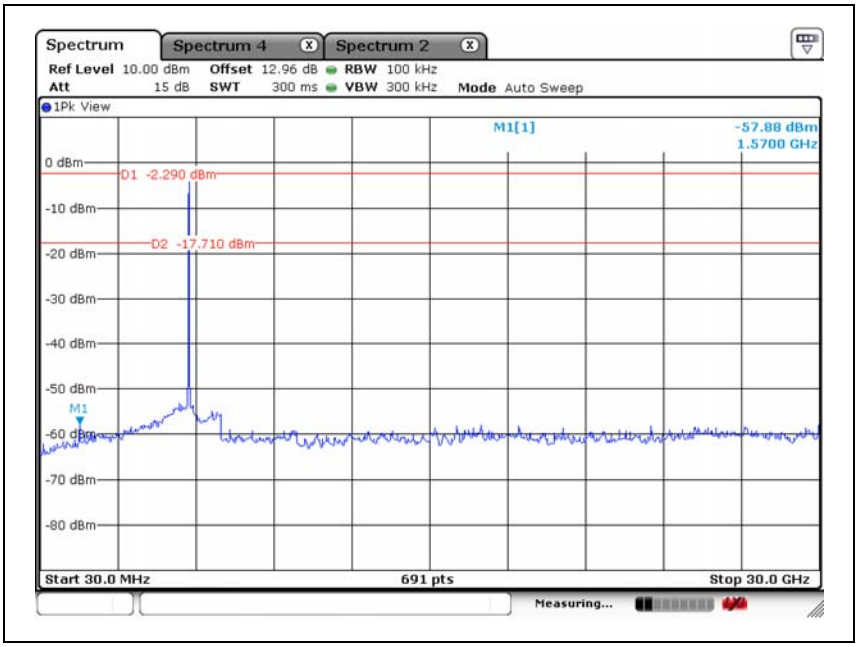


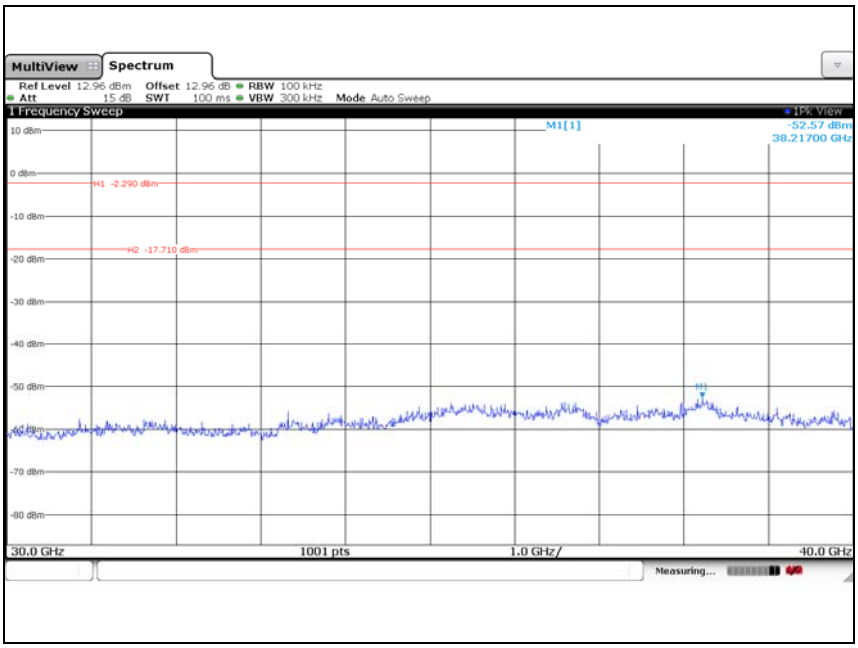


- Antenna port 3

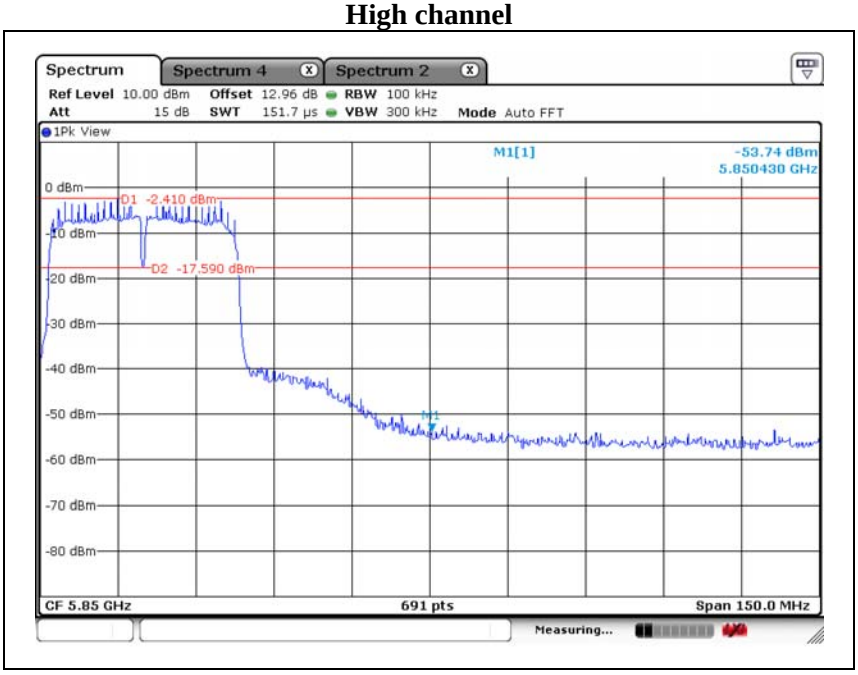
Low channel

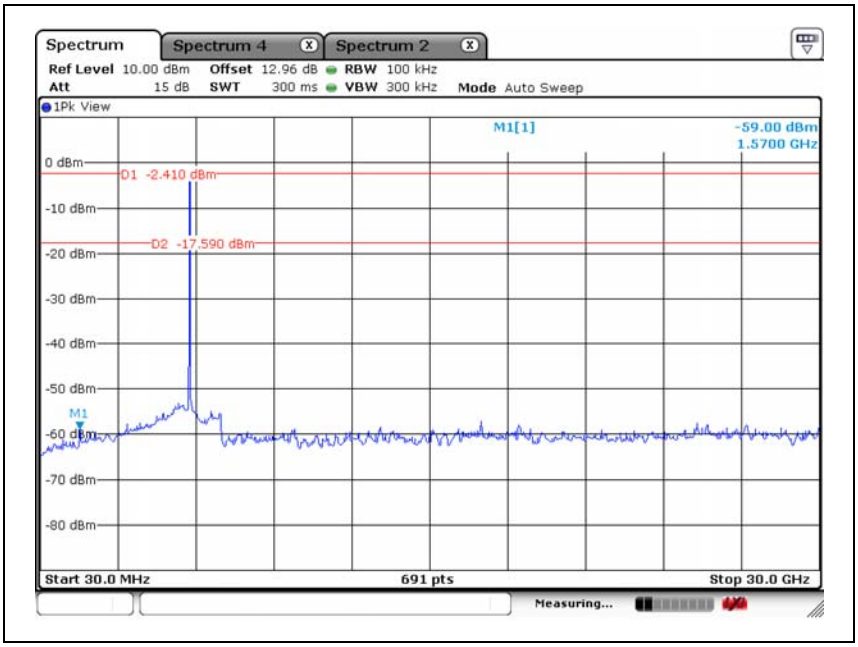


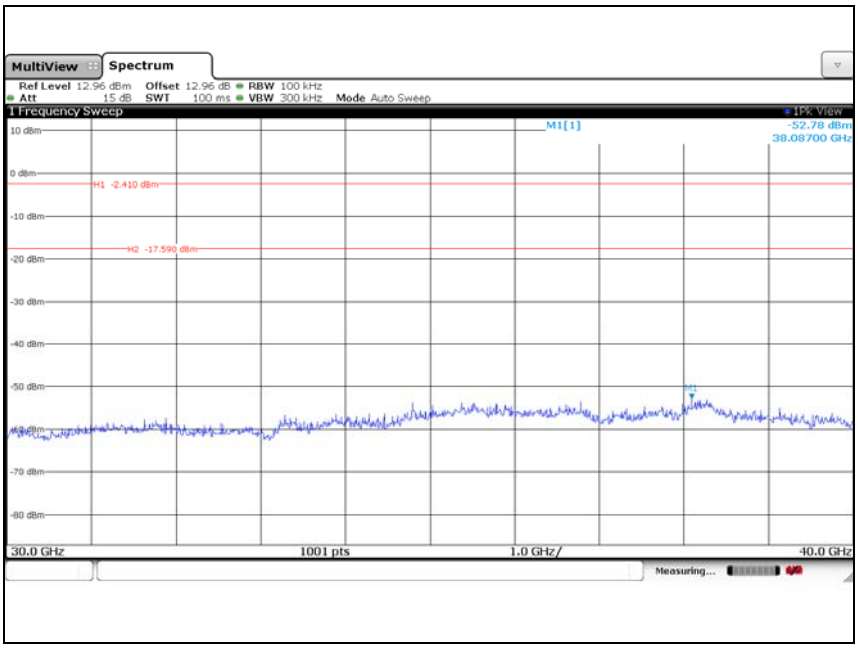




High channel

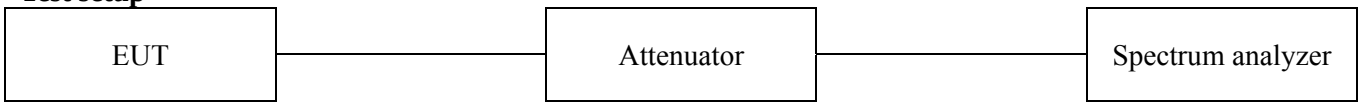






3.3. 6 dB bandwidth

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_v03r01 – section 8.2 option 1.

Option 1:

a) Set RBW = 100 ㎑.
b) Set the video bandwidth(VBW) ≥ 3 × RBW.
c) Detector = peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) 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.

Limit

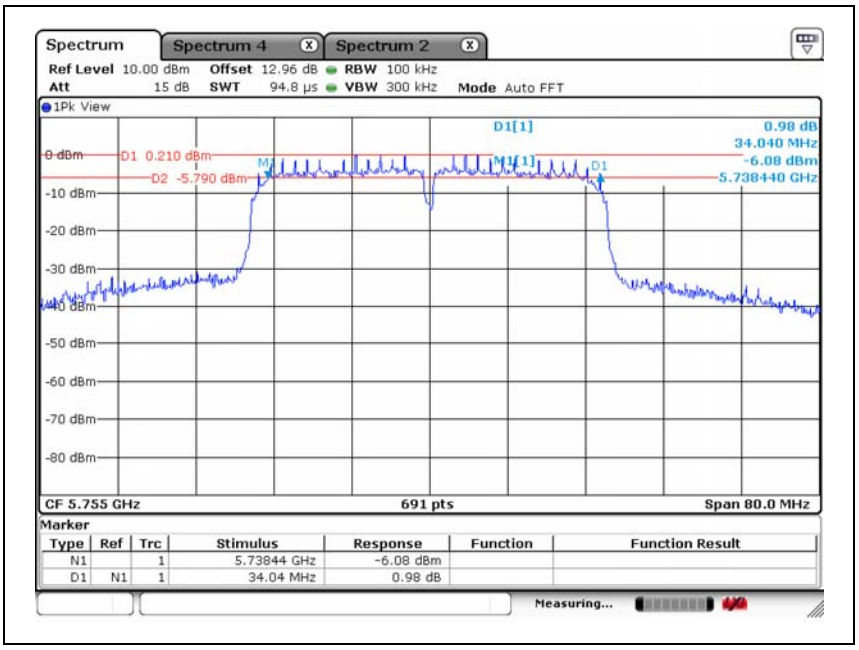
According to §15.247(a)(2), systems using digital modulation techniques may operate 902 ~ 928 ㎒, 2 400 ~ 2 483.5 ㎒, and 5 725 ~ 5 850 ㎒ bands. The minimum 6 dB bandwidth shall be at least 500 ㎑.

Test results

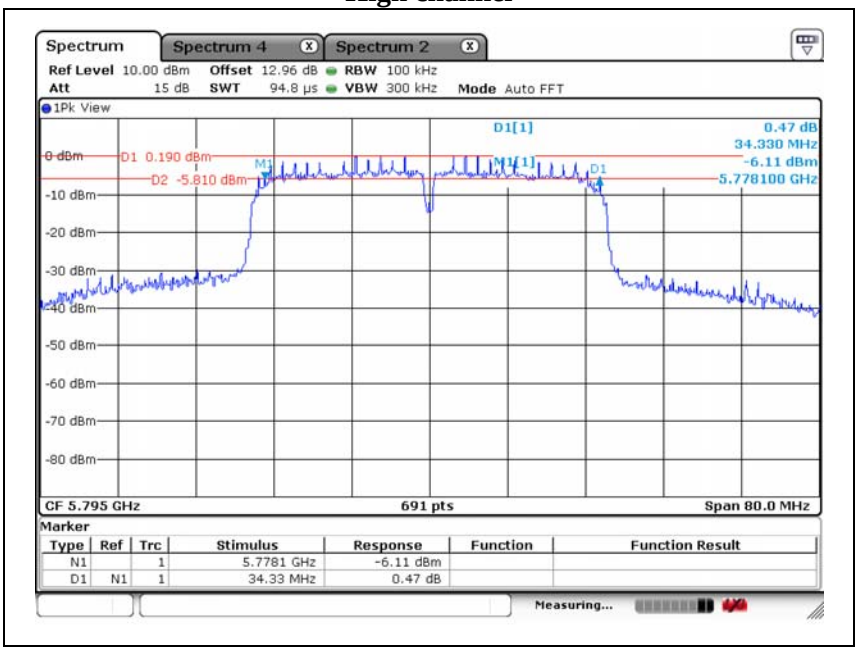
Antenna port	Frequency(㎒)	6 dB bandwidth(㎒)	Limit(㎒)
1	5 755	34.04	0.5
	5 795	34.33	
2	5 755	33.92	
	5 795	34.04	
3	5 755	34.15	
	5 795	34.27	

- Antenna port 1

Low channel

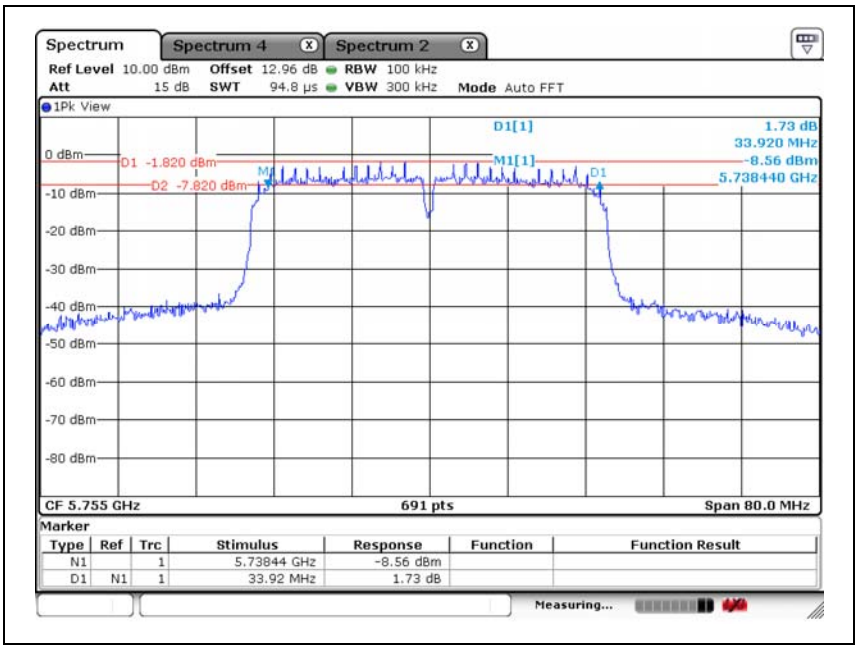


High channel

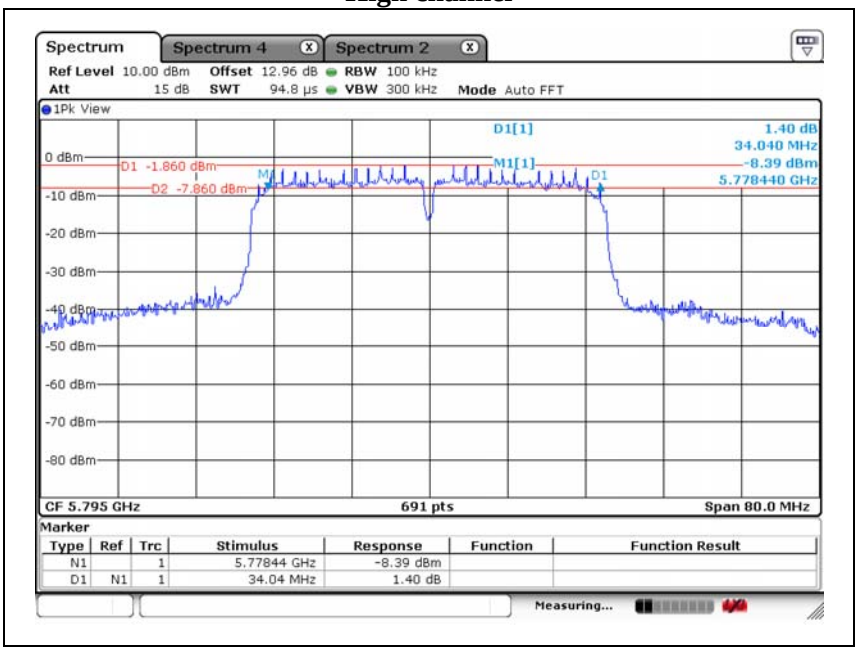


- Antenna port 2

Low channel

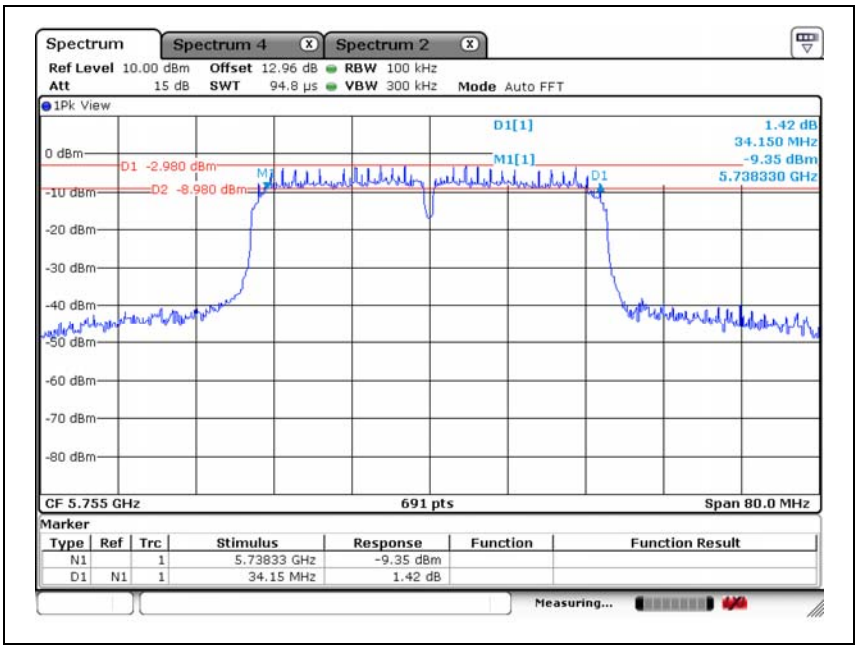


High channel

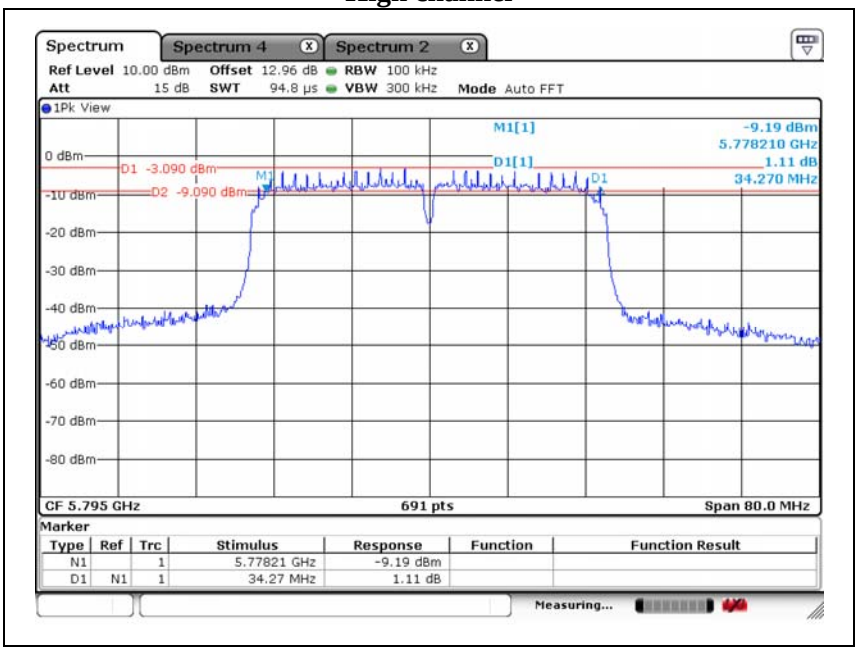


- Antenna port 3

Low channel

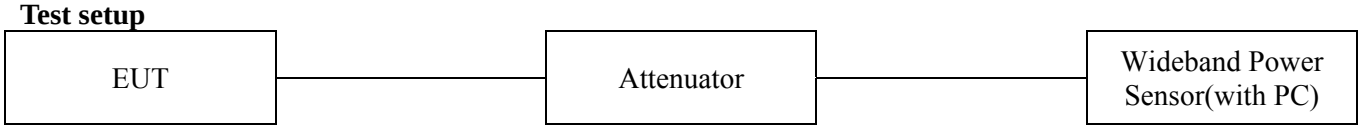


High channel



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.

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The maximum peak conducted output power may be measured using a broadband peak RF power meter.

Limit

According to §15.247(b)(3), For systems using digital modulation in the 902~928 ㎒, 2 400~2 483.5 ㎒, and 5 725~5 850 ㎒ 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 ㏈i. Except as shown in paragraph (c) of this section, if transmit-ting antennas of directional gain greater than 6 ㏈i 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 ㏈i.

Pre-scanned maximum output power

Preliminary tests were performed in different data rate as below table and the highest power data rates were chosen for full test in the following section to demonstrate compliance to the FCC limit line.

Frequency (㎒) / Ant port	Output power(dBm)															
	Data rate(Mbps)															
	Mcs0	Mcs1	Mcs2	Mcs3	Mcs4	Mcs5	Mcs6	Mcs7	Mcs8	Mcs9	Mcs10	Mcs11	Mcs12	Mcs13	Mcs14	Mcs15
5 755 /ant 1	21.44	21.38	21.39	21.40	21.31	21.20	21.24	21.16	21.30	21.34	21.30	21.26	21.20	21.23	21.20	21.18
5 795 /ant 1	21.52	21.45	21.40	21.49	21.29	21.34	21.20	21.12	21.30	21.25	21.27	21.21	21.17	21.20	21.15	21.10
5 755 /ant 2	20.42	20.40	20.34	20.31	20.35	20.22	20.15	20.01	20.27	20.21	20.25	20.17	20.11	20.07	20.05	20.00
5 795 /ant 2	21.21	21.20	21.02	21.15	21.11	20.71	20.43	19.94	20.19	20.15	20.10	20.08	20.14	20.04	20.00	19.95
5 755 /ant 3	19.11	19.05	19.07	18.90	18.84	18.95	18.96	18.87	20.01	19.71	19.51	19.62	19.33	19.16	19.20	18.90
5 795 /ant 3	18.60	18.55	18.50	18.52	18.43	18.47	18.39	18.31	18.51	18.40	18.50	18.41	18.39	18.40	18.38	18.35

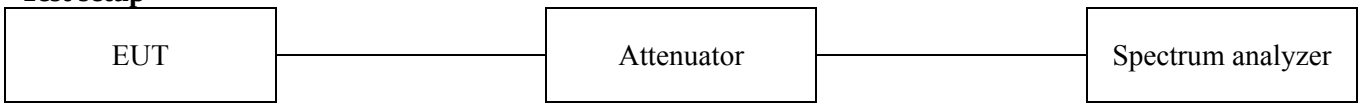
Test results

Frequency (㎒)	Conducted power (dBm)				Limit (dBm)
	Ant. 1	Ant. 2	Ant. 3	Total	
5 755	21.44	20.42	19.11	25.20	28.77
5 795	21.52	21.21	18.60	25.40	28.77

Ant Gain = 10 log [($10^{G1/10} + 10^{G2/10} + 10^{G3/10}$) /N] = 7.23 dBi > 6 dBi, so need to reduce the limit. (1.23dB)
Total = 10 log ($10^{Ant1/10} + 10^{ANT2/10} + 10^{ANT3/10}$)

3.5. Power spectral density

Test setup



Test procedure

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Measurement procedure

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS channel bandwidth.
c) Set the RBW : 3 ㎑ ≤ RBW ≤ 100 ㎑
d) Set the VBW ≥ 3 × RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level.
j) If measured value exceeds limit, reduce RBW(no less than 3 ㎑) and repeat.

Limit

According to §15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 ㏈m in any 3 ㎑ 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.

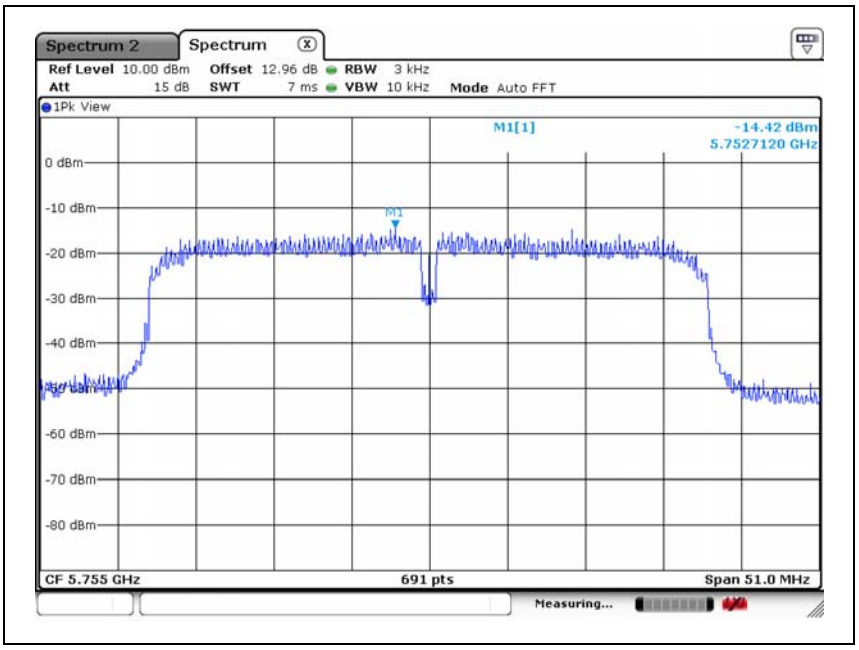
Test results

Frequency (㎒)	Conducted power (dBm)				Limit (dBm)
	Ant. 1	Ant. 2	Ant. 3	Total	
5 755	-14.42	-15.45	-17.45	-10.83	6.77
5 795	-14.83	-15.03	-17.10	-10.77	6.77

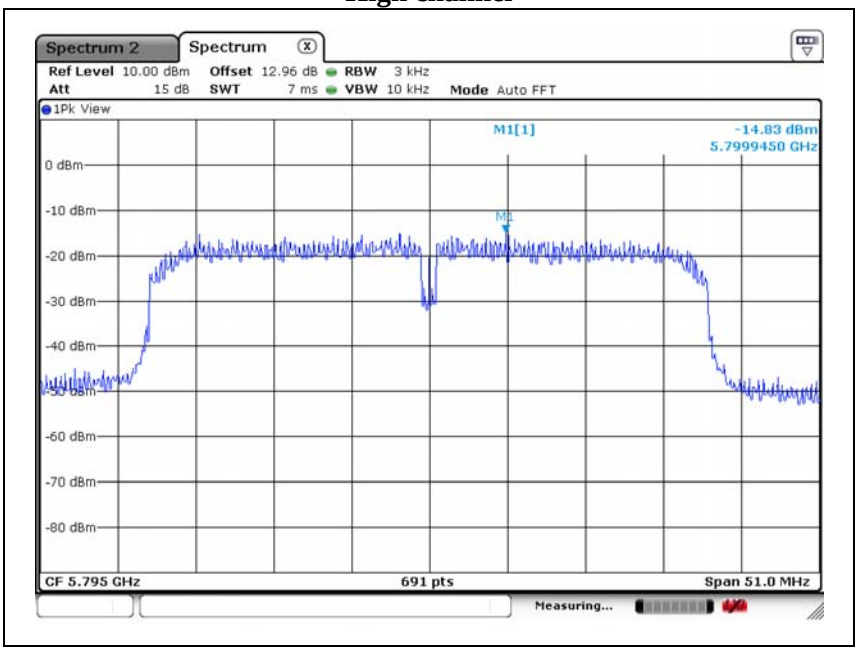
Ant Gain = 10 log [($10^{G1/10}$ + $10^{G2/10}$+ $10^{G3/10}$) /N] = 7.23 dBi > 6 dBi, so need to reduce the limit. (1.23dB)
Total = 10 log ($10^{Ant1/10}$ + $10^{ANT2/10}$+ $10^{ANT3/10}$)

- Antenna port 1

Low channel

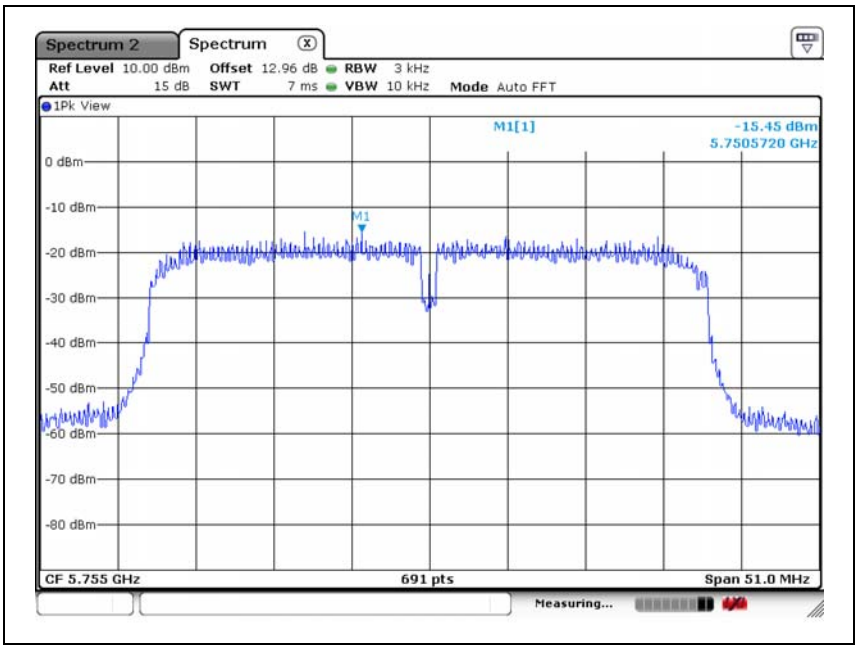


High channel

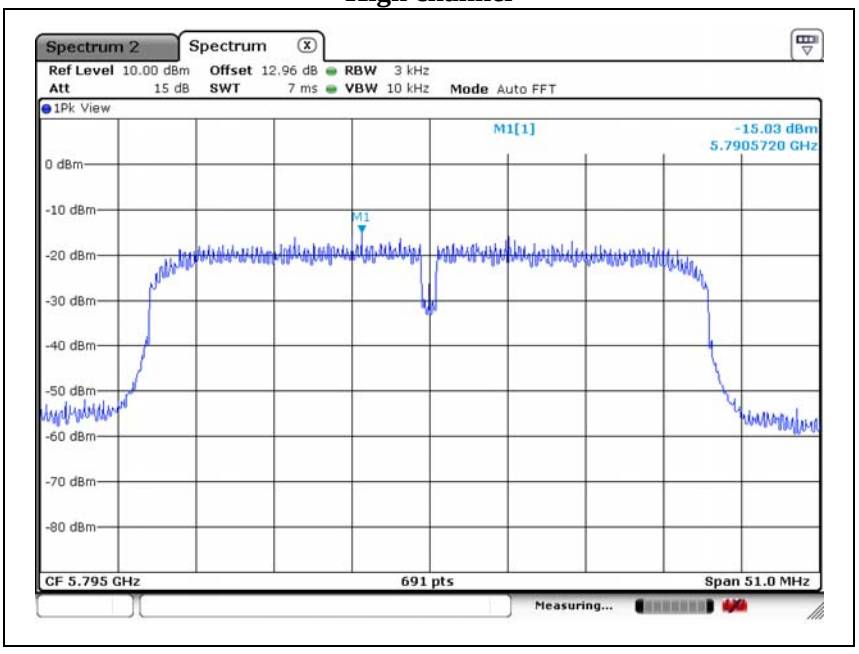


- Antenna port 2

Low channel

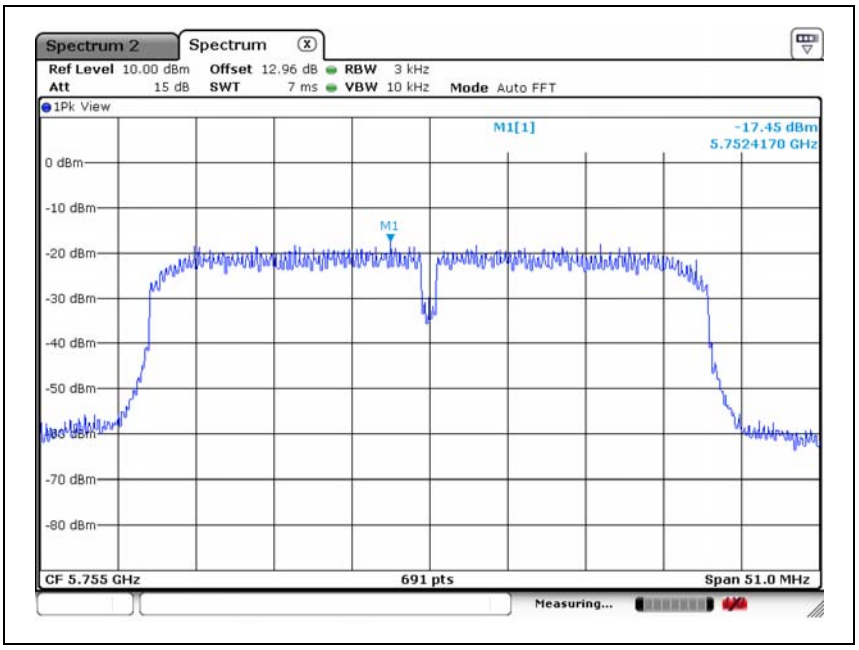


High channel

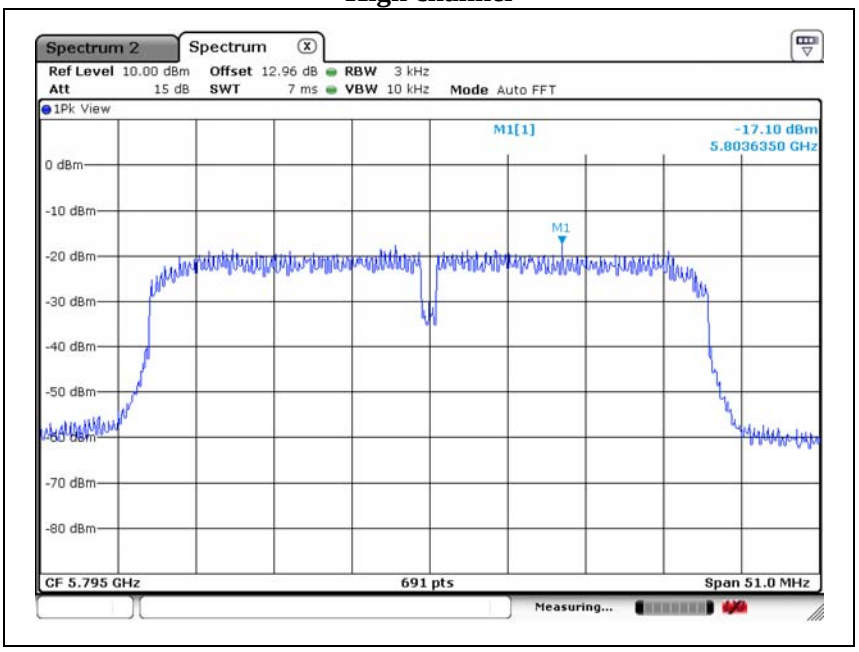


- Antenna port 3

Low channel



High channel



3.6. AC conducted emissions

Frequency range of measurement
150 ㎑ to 30 ㎒

Instrument settings
IF Band Width: 9 ㎑

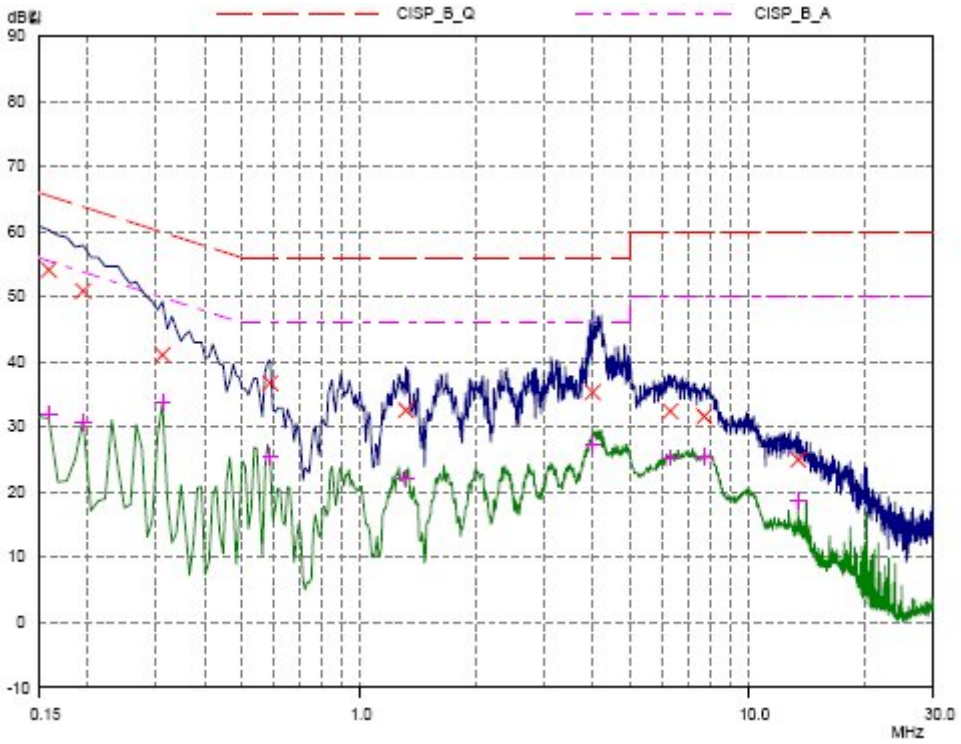
Test procedures
The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m. Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit
According to 15.207(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 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50uH/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 (㎒)	Conducted limit (dB㎶/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

Note.
a) Decreases with the logarithm of the frequency.
b) All AC Conducted emission at channels are almost the same, so that high channel was chosen at representative in final test.

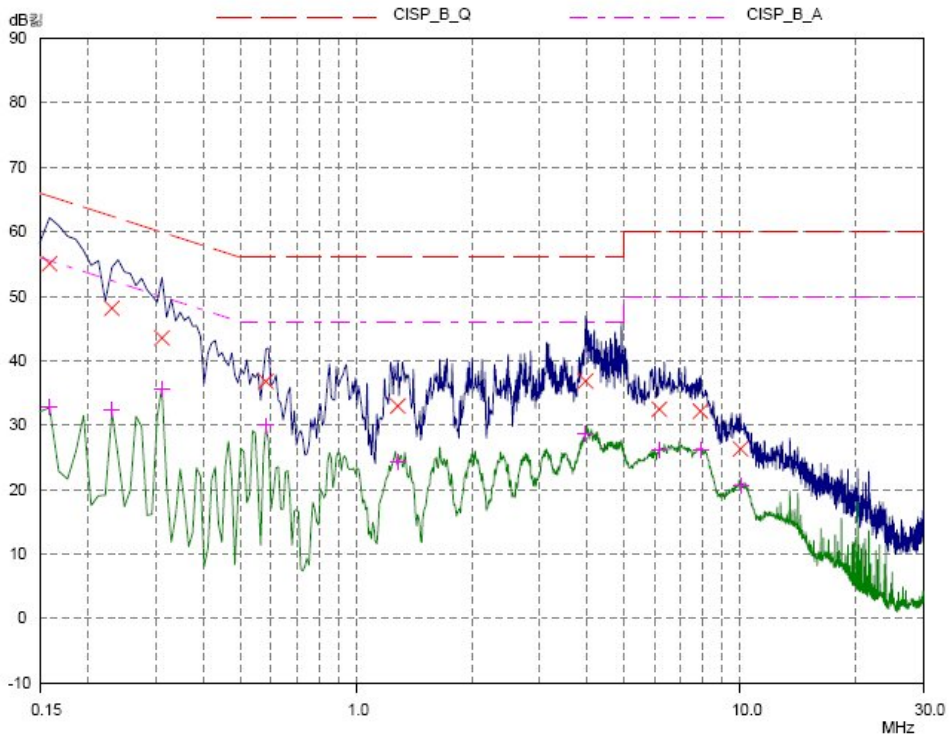
Test results



Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
0.159	54.15	65.52	11.37
0.195	50.87	63.82	12.95
0.312	41.08	59.92	18.84
0.591	36.78	56.00	19.22
1.32	32.59	56.00	23.41
3.993	35.34	56.00	20.66
6.323	32.44	60.00	27.56
7.727	31.66	60.00	28.34
13.476	25.00	60.00	35.00

Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB
0.159	32.04	55.52	23.48
0.195	30.65	53.82	23.17
0.312	33.74	49.92	16.18
0.591	25.42	46.00	20.58
1.32	22.16	46.00	23.84
3.993	27.24	46.00	18.76
6.323	25.30	50.00	24.70
7.727	25.47	50.00	24.53
13.476	18.78	50.00	31.22

Note: Hot Line
Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).



Frequency MHz	QP Level dBㅀ	QP Limit dBㅀ	QP Delta dB
0.159	55.03	65.52	10.49
0.231	48.14	62.41	14.27
0.312	43.50	59.92	16.42
0.582	36.79	56.00	19.21
1.284	32.95	56.00	23.05
3.957	36.81	56.00	19.19
6.161	32.46	60.00	27.54
7.889	32.13	60.00	27.87
10.022	26.29	60.00	33.71

Frequency MHz	AV Level dBㅀ	AV Limit dBㅀ	AV Delta dB
0.159	32.87	55.52	22.65
0.231	32.29	52.41	20.12
0.312	35.68	49.92	14.24
0.582	29.93	46.00	16.07
1.284	24.26	46.00	21.74
3.957	28.72	46.00	17.28
6.161	26.04	50.00	23.96
7.889	26.21	50.00	23.79
10.022	20.62	50.00	29.38

Note: Neutral Line
Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

Appendix A. Measurement equipment

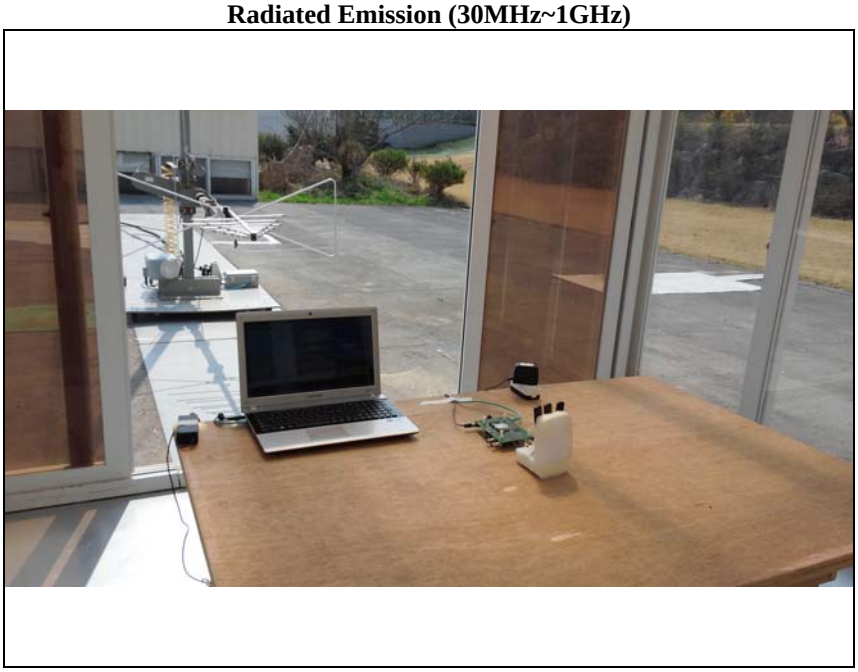
Equipment	Manufacturer	Model	Serial No.	Calibration interval	Calibration due.
Spectrum analyzer	R&S	FSV30	101389	1 year	2014.05.06
Spectrum analyzer	R&S	FSW43	100637	1 year	2014.07.26
Wideband Power Sensor	R&S	NRP-Z81	1137.9009.02-101886-ds	1 year	2015.01.07
Vector signal generator	R&S	SMBV2100A	1407.6004K02	1 year	2015.01.06
8360B Series Swept Signal Generator	HP	83630B	3844A00786	1 year	2014.05.06
Loop antenna	R&S	HFH2-Z2.335.4711.52	826532	2 years	2015.04.25
Trilog-broadband antenna	Schwarzbeck	VULB 9168	9168-385	2 years	2015.05.09
Horn antenna	A.H.	SAS-571	414	2 years	2015.02.28
Horn antenna	Schwarzbeck	BBHA 9170	BBHA9170551	2 years	2015.09.04
Preamplifier	HP	8447F	2805A02570	1 year	2014.05.06
Brodband coaxial preamplifier	Schwarzbeck Mess-Elektronik	BB9718	9168-385	2 years	2014.09.23
Preamplifier	Schwarzbeck	BBV 9721	9721-003	2 years	2015.09.04
Attenuator	HP	8494B	2630A12857	1 year	2014.05.06
EMI Test Receiver	LIG NEX1	ISA-80	L0912K014	1 year	2014.11.15
EMI Test Receiver	R & S	ESHS10	862970/018	1 year	2014.05.06
LISN	SCHWARZBECK	2823-568-1	8126157	1 year	2015.01.29
HIGH PASS FILTER	WAINWRIGHT INSTRUMENT	WHNX6.0/26.5G-6SS	1	1 year	2015.02.11
LOW PASS FILTER	WEINSCHEL	WLK1.0/18G-10TT	1	1 year	2014.08.05

Peripheral devices

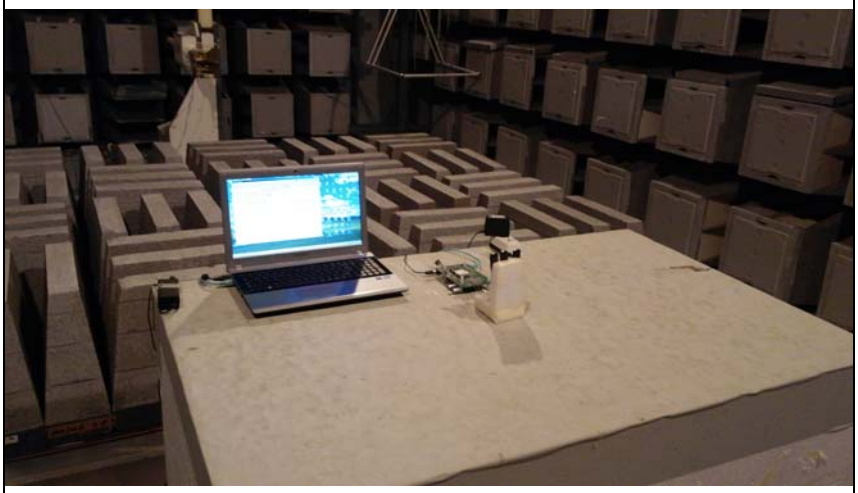
Device	Manufacturer	Model No.	Serial No.
Notebook(Laptop)	Samsung Electronics	RV518	HTK991NC600207R

Appendix B. Test setup photo

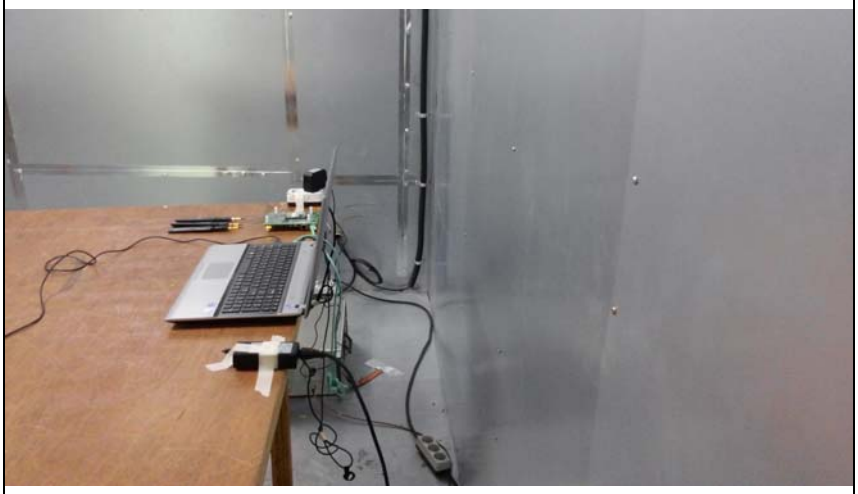
Radiated Emission (30MHz~1GHz)



Radiated Emission (Above 1GHz)



AC conducted Emission



Appendix C. Duty Cycle

Frequency (㎒)	Data rate	Duty cycle(X) = Tx_{on} time / (Tx_{on} time + Tx_{off} time)		
		Tx_{on} time (㎳)	Tx_{off} time (㎳)	X
5755	MCS0	0.648	0.032	0.953