FCC TEST REPORT

Product	:	IP CAM
Trade mark	:	Aoni, ANC
Model/Type reference	:	256H1, 232H1, 960G0, 961H1, 970H1, 971H1, 980H1, 980M1, 981H1, 981M1, 982H1, 982M1, 962N1, 962N2, 963N1, 963N2, 951N1, 990H1, 256G0
Serial number	:	N/A
Ratings	:	AC 100-240V, 50/60Hz
FCC ID	:	Z63-IPC18
Report number	:	EESZG01160013
Date	:	Mar. 14, 2014
Regulations	:	See below

Test Standards	Results
☒ 47 CFR FCC Part 15 Subpart C 15.247: 2013	PASS

Prepared for:

SHENZHEN AONI ELECTRONIC INDUSTRY CO., LTD
No.5 Bldg, Honghui Industrial park, 2nd liuxian Road, Xinan street, Baoan District, Shenzhen

Prepared by:

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Approved by: Date: Mar. 14, 2014

Jimmy Li
Lab manager

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N/A means not applicable.

1. CERTIFICATION INFORMATION

Applicant:	SHENZHEN AONI ELECTRONIC INDUSTRY CO., LTD No.5 Bldg, Honghui Industrial park, 2nd liuxian Road, Xinan street, Baoan District, Shenzhen
Manufacturer:	SHENZHEN AONI ELECTRONIC INDUSTRY CO., LTD No.5 Bldg, Honghui Industrial park, 2nd liuxian Road, Xinan street, Baoan District, Shenzhen
Equipment authorization:	Certification
FCC ID:	Z63-IPC18
Product:	IP CAM
Model/Type reference:	256H1, 232H1, 960G0, 961H1, 970H1, 971H1, 980H1, 980M1, 981H1, 981M1, 982H1, 982M1, 962N1, 962N2, 963N1, 963N2, 951N1, 990H1, 256G0
Trade Name:	Aoni, ANC
Serial Number:	N/A
Report Number:	EESZG01160012
Sample Received Date:	Jan. 16, 2014
Sample tested Date:	Jan. 16, 2014 to Mar. 14, 2014

The above equipment was tested by Centre Testing International (Shenzhen) Corporation for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, Subpart C and the measurement procedure according to ANSI C63.4:2009.

2. TEST SUMMARY

No.	Test Item	Rule	Result
1	6dB Bandwidth	15.247(a)(2)	**PASS**
2	Peak Output Power	15.247(b)(3)	**PASS**
3	Power Spectral Density	15.247(e)	**PASS**
4	Bandedge Emission	15.247(d)	**PASS**
5	Spurious RF Conducted Emission	15.247(d)	**PASS**
6	Radiated Emission	15.247(d)	**PASS**
7	Conducted Emission	15.207	**PASS**
8	Antenna requirements	15.203	**PASS** (See Notes)

Notes: The product uses a Internal integral antenna which in accordance with Section 15.203 is considered sufficient to comply with the provisions of this section.

3. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Value (dB)
Conducted disturbance	3.0
Radiated disturbance	4.9

4. PRODUCT INFORMATION

Model difference: All models are same except appearance and color. The test model is 256H1 and the test results are applicable to others.

Items	Description
Rating	AC 100-240V, 50/60Hz
Transmit Data Rate	IEEE 802.11b: 1Mbps, 2Mbps, 5.5Mbps, 11Mbps IEEE 802.11g: 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps IEEE 802.11n HT20: MCS0, MCS1, MCS2, MCS3, MCS4, MCS5, MCS6, MCS7 IEEE 802.11n HT40: MCS0, MCS1, MCS2, MCS3, MCS4, MCS5, MCS6, MCS7
Type of Modulation	IEEE 802.11b: DSSS (CCK, QPSK, BPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20/40: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Type	Integral antenna
Connector	fixed on board
Gain	0dBi

Technical Specification of WiFi module (802.11b/g/n)

Item	Description			
	IEEE 802.11b	IEEE 802.11g	IEEE 802.11n	
Operating Frequency band	2412-2462MHz for 802.11b/g/nHT20; 2422-2452MHz for 802.11n HT40			
Channel Number	11	11	11	7
Channel Bandwidth (MHz)	20	20	20	40

Technical Specification of Carrier Frequency

Frequency Band	Channel No.	Frequency	Channel No.	Frequency	Channel No.	Frequency
2412-2462MHz (802.11b/g/n HT20)	1	2412 MHz	6	2437 MHz	11	2462 MHz
	2	2417 MHz	7	2442 MHz	--	--
	3	2422 MHz	8	2447 MHz	--	--
	4	2427 MHz	9	2452 MHz	--	--
	5	2432 MHz	10	2457 MHz	--	--

Frequency Band	Channel No.	Frequency	Channel No.	Frequency	Channel No.	Frequency
2422-2452MHz (802.11n HT40)	1	2422 MHz	4	2437 MHz	7	2452 MHz
	2	2427 MHz	5	2442 MHz	--	--
	3	2432 MHz	6	2447 MHz	--	--

5. SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. It was powered by 12DC from 100-240V AC input adaptor. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

6. TEST EQUIPMENT LIST

Equipment	Manufacturer	Model Number	Serial Number	Due Date
3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	07/12/2016
Spectrum Analyzer	Agilent	E4443A	MY45300910	01/15/2015
Spectrum Analyzer	R&S	FSP40	100416	07/06/2014
Receiver	R&S	ESCI	100435	07/19/2014
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	618	06/25/2014
Multi device Controller	ETS-LINGREN	2090	00057230	N/A
Horn Antenna	ETS-LINGREN	3117	00057407	07/07/2015
Microwave Preamplifier	Agilent	8449B	3008A02425	04/16/2014
Receiver	R&S	ESCI	100009	07/19/2014
LISN	R&S	ENV216	100098	07/19/2014

7. SUPPORT EQUIPMENT LIST

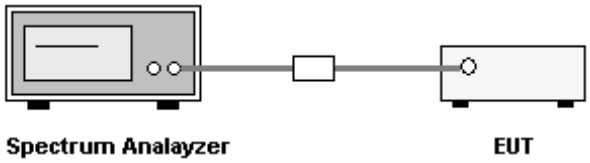
No.	Device Type	Brand	Model	Series No.	Certification Type
1.	---	---	---	---	---
2.	---	---	---	---	---

8. 6DB BANDWIDTH MEASUREMENT

8.1. LIMITS

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

8.2. BLOCK DIAGRAM OF TEST SETUP



8.3. TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.

2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.

3. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level.

4. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

8.4. TEST RESULT

The test data of worst case are below:

802.11b, 1Mbps

Frequency (MHz)	Measured Value (MHz)	Result
2412	8.94	PASS
2437	9.78	PASS
2462	9.24	PASS

802.11g, 6Mbps

Frequency (MHz)	Measured Value (MHz)	Result
2412	16.62	PASS
2437	16.62	PASS
2462	16.62	PASS

802.11n HT20, MSC0

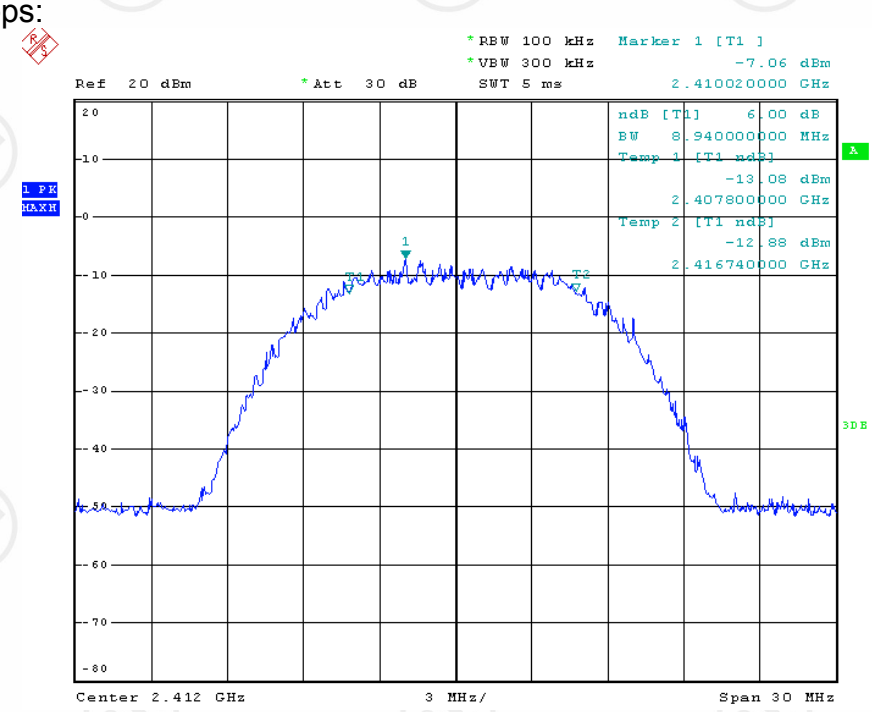
Frequency (MHz)	Measured Value (MHz)	Result
2412	17.82	PASS
2437	17.82	PASS
2462	17.82	PASS

802.11n HT40, MCS0

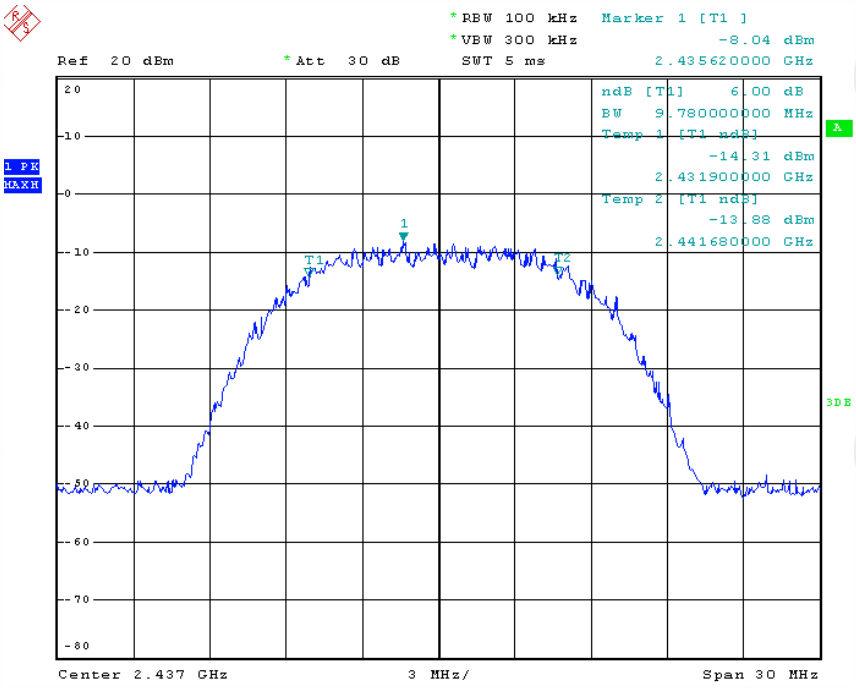
Frequency (MHz)	Measured Value (MHz)	Result
2422	35.80	PASS
2437	36.00	PASS
2452	36.00	PASS

Please see the following plots (worst case):

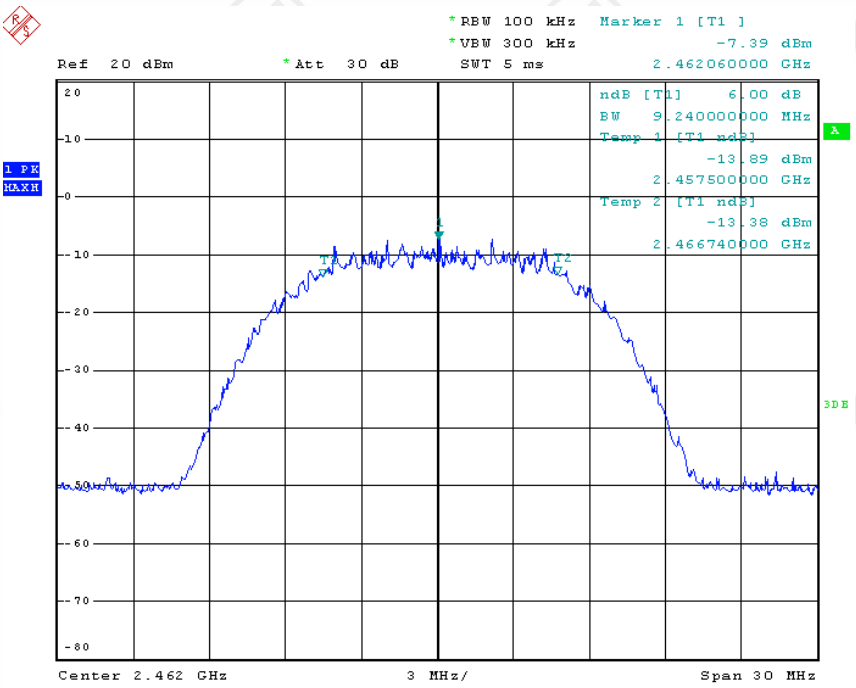
802.11b, 1Mbps:



Low channel

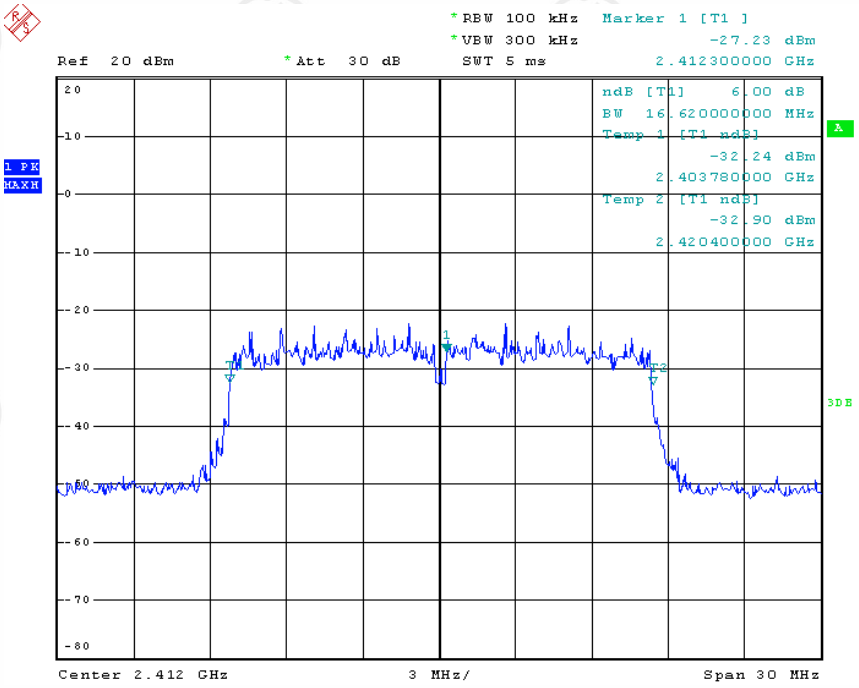


Middle channel

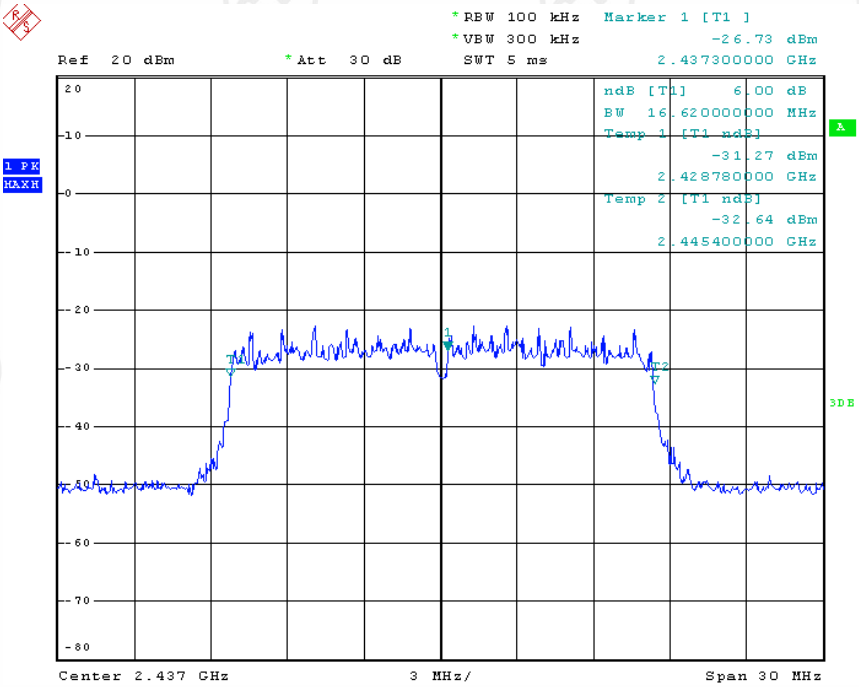


High channel

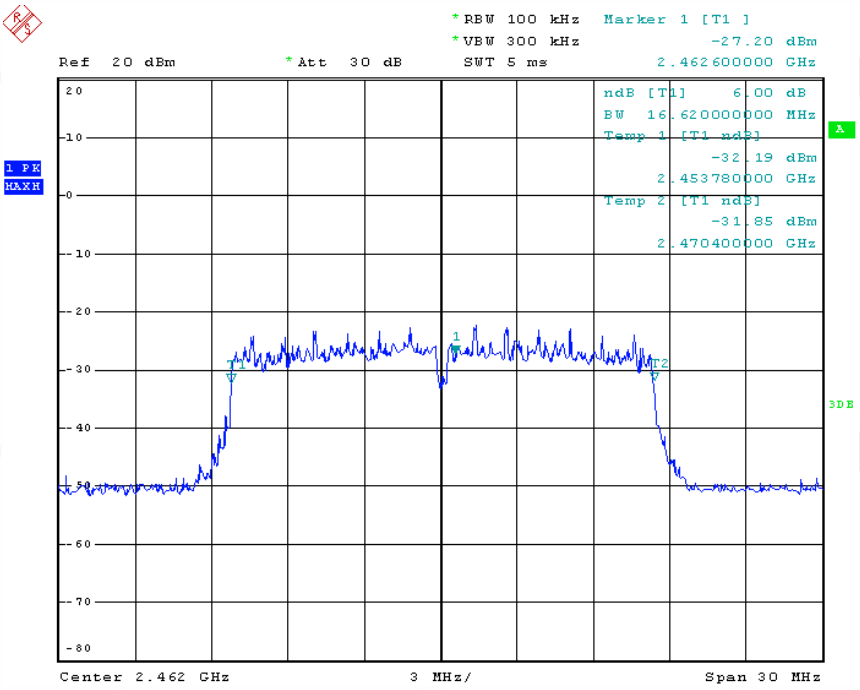
802.11g, 6Mbps:



Low channel

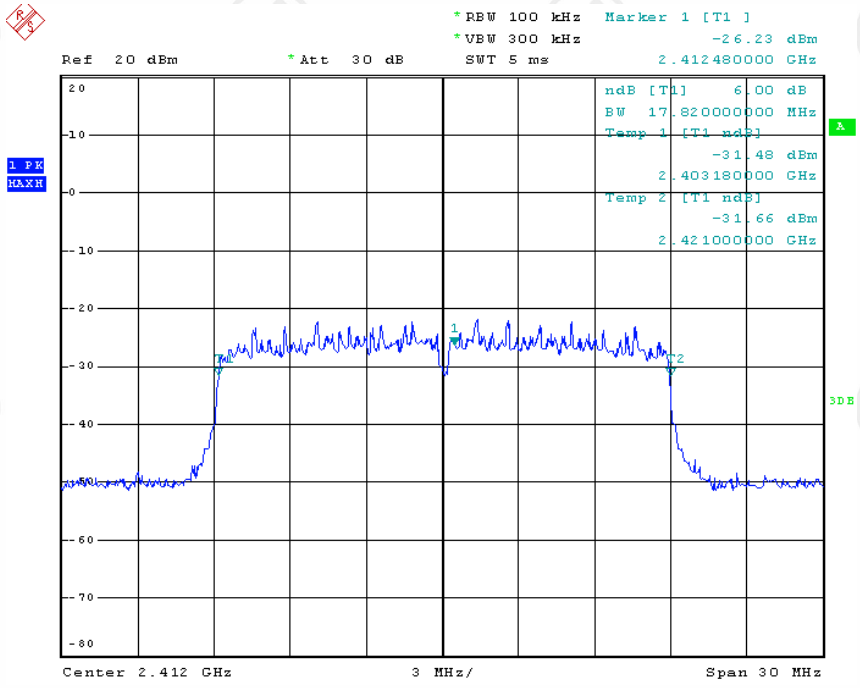


Middle channel

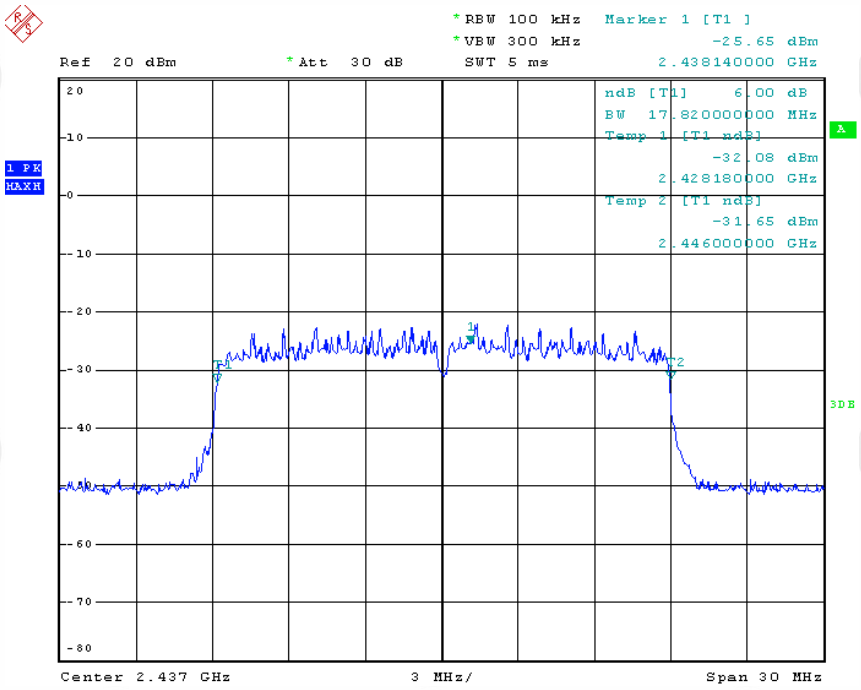


High channel

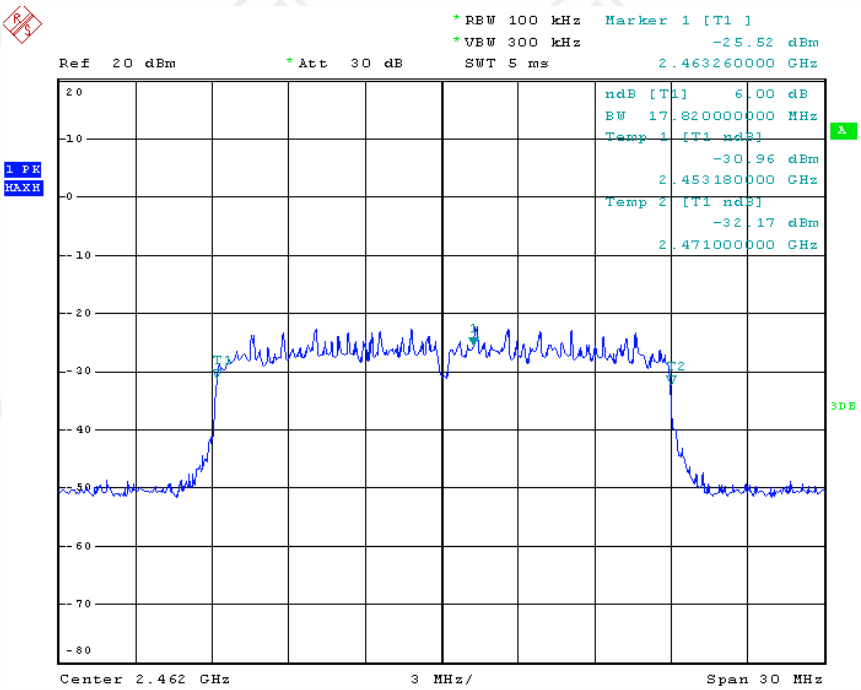
802.11n HT20, MCS0:



Low channel

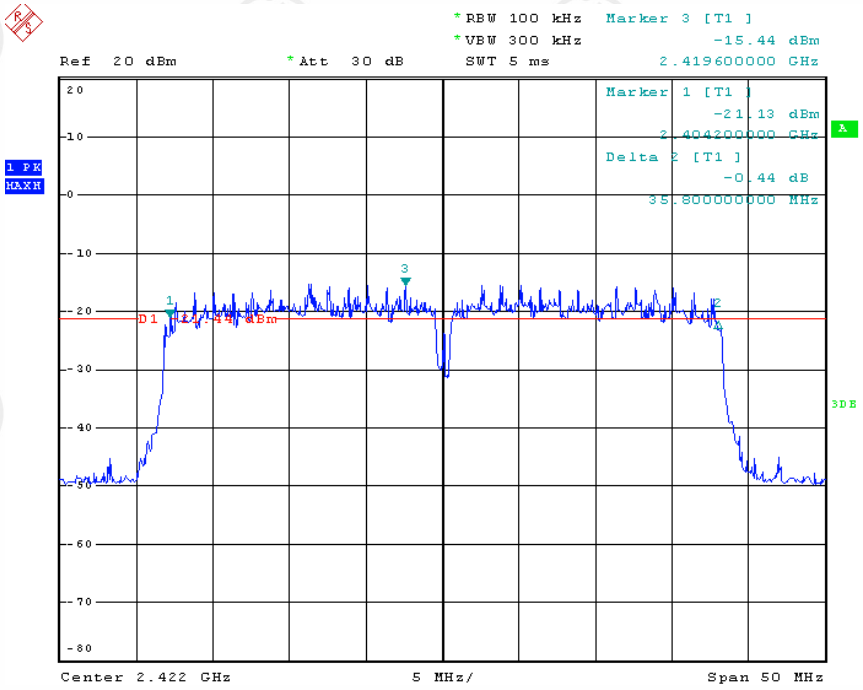


Middle channel

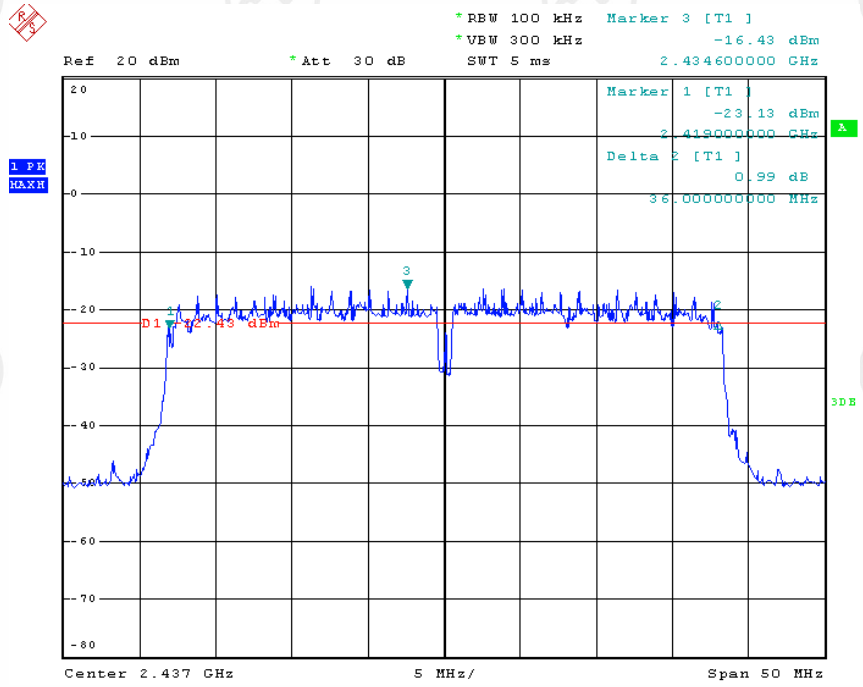


High channel

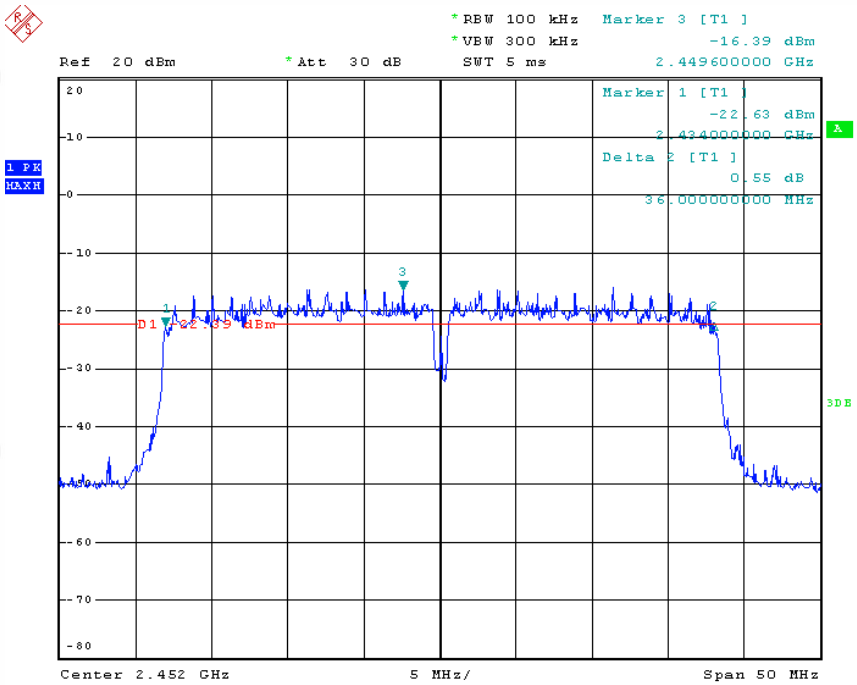
802.11n HT40, MCS0:



Low channel



Middle channel



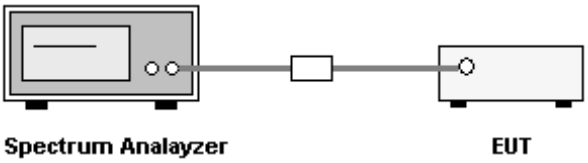
High channel

9. POWER SPECTRAL DENSITY

9.1. LIMITS

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

9.2. BLOCK DIAGRAM OF TEST SETUP



9.3. TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.

2. Set spectrum analyzer's RBW and VBW to applicable and set span wide enough to capture the whole plot, record the frequency of the max emission in the plot.

3. Set the frequency as center frequency, and set RBW = 3 kHz, VBW >RBW, sweep= (SPAN/3 kHz) with Peak detector in Max Hold mode.

4. Read the output peak data from the spectrum analyzer directly.

9.4. TEST RESULT

The test data of worst case are below:

802.11b, 1Mbps

Frequency (MHz)	Measured Value (dBm)	Result
2412	-20.03	PASS
2437	-21.63	PASS
2462	-20.44	PASS

802.11g, 6Mbps

Frequency (MHz)	Measured Value (MHz)	Result
2412	-29.12	PASS
2437	-28.65	PASS
2462	-29.12	PASS

802.11n HT20, MSC0

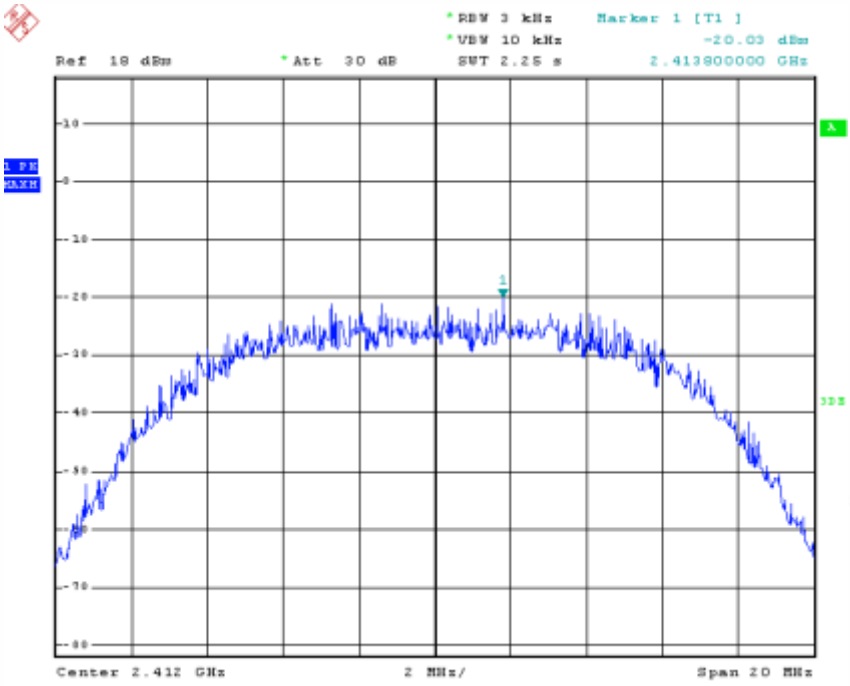
Frequency (MHz)	Measured Value (MHz)	Result
2412	-28.71	PASS
2437	-29.44	PASS
2462	-28.83	PASS

802.11n HT40, MCS0

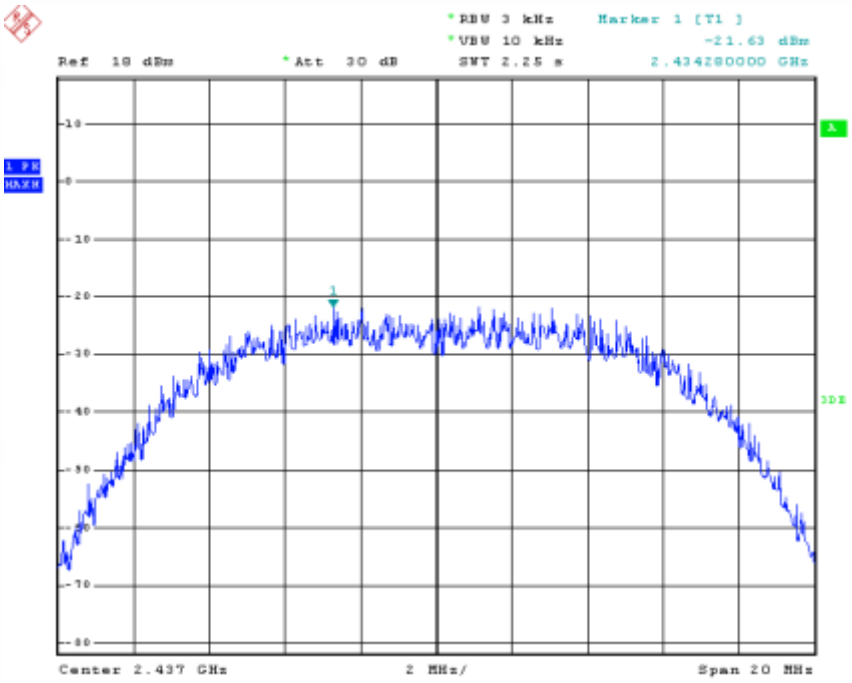
Frequency (MHz)	Measured Value (MHz)	Result
2422	-41.02	PASS
2437	-39.66	PASS
2452	-42.61	PASS

Please see the following plots (worst case):

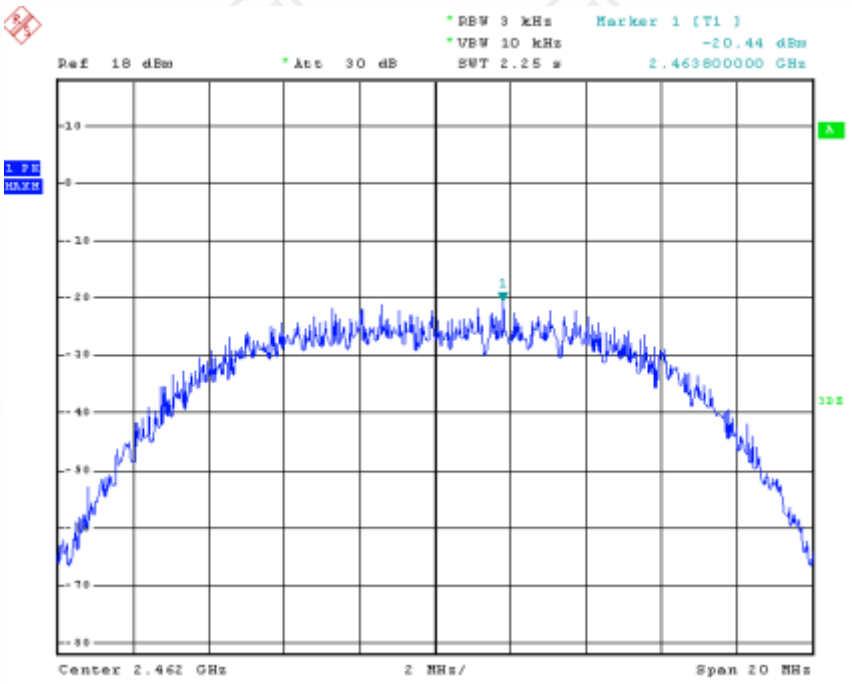
802.11b, 1Mbps:



Low channel

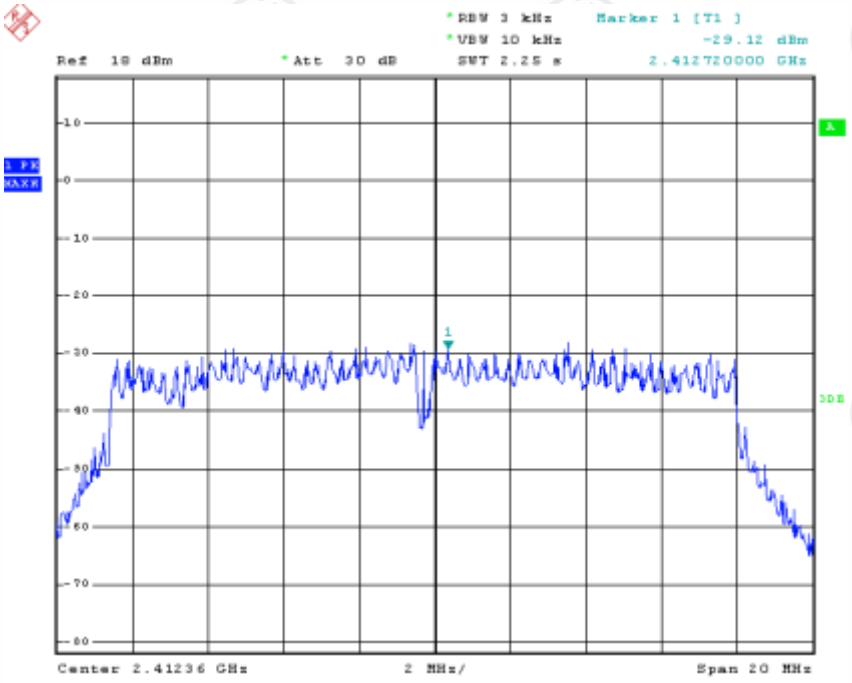


Middle channel

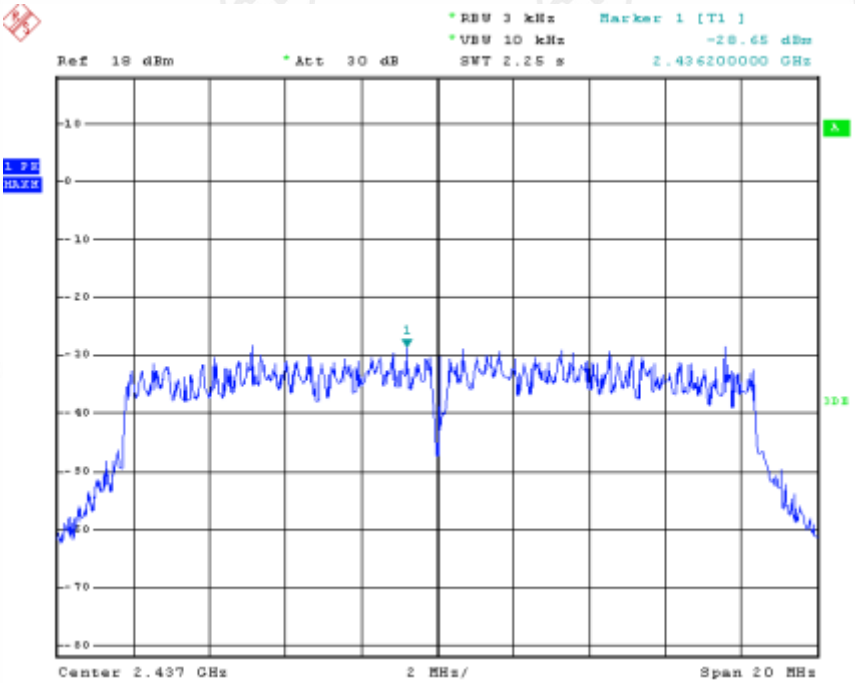


High channel

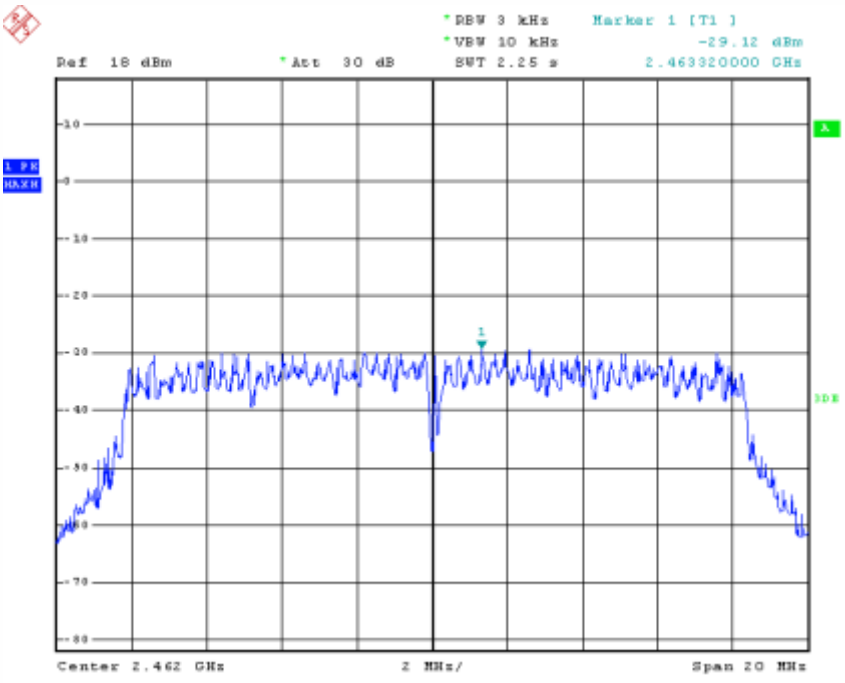
802.11g, 6Mbps:



Low channel

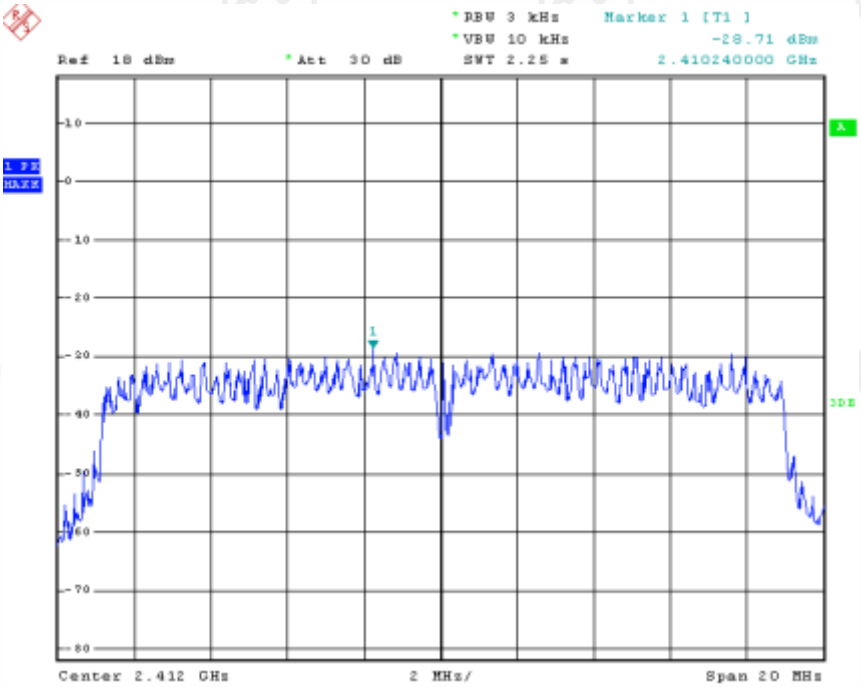


Middle channel

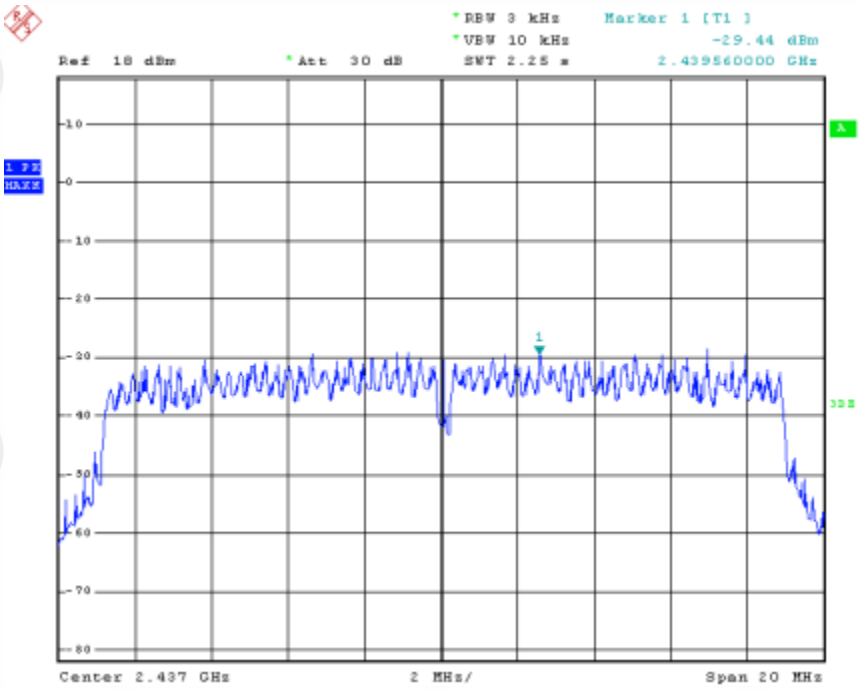


High channel

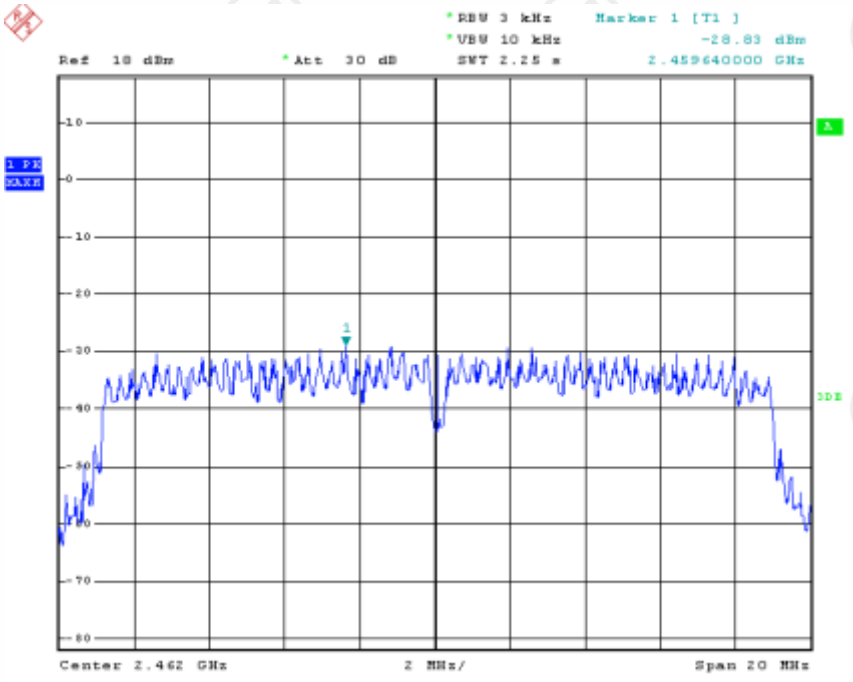
802.11n HT20, MCS0:



Low channel

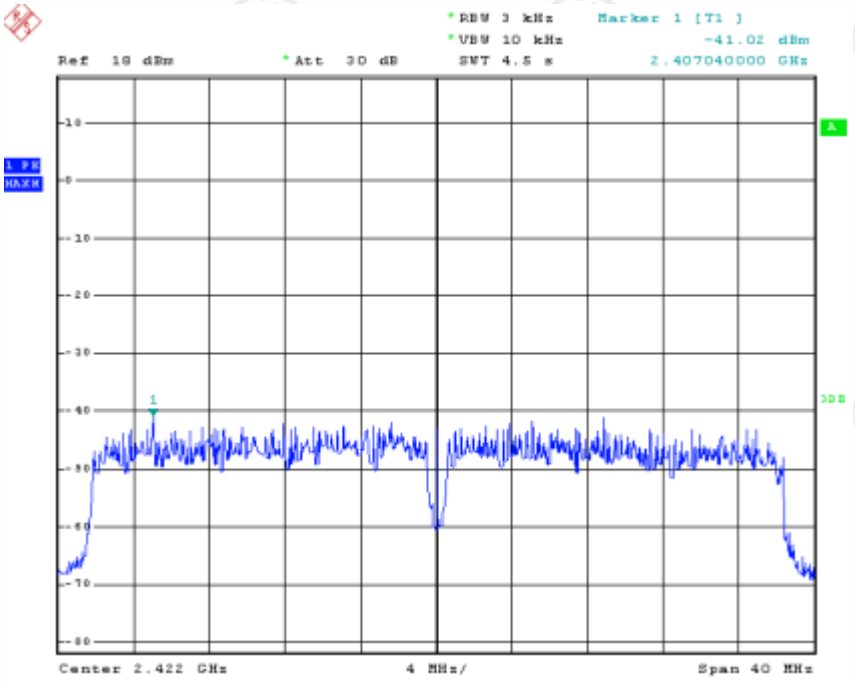


Middle channel

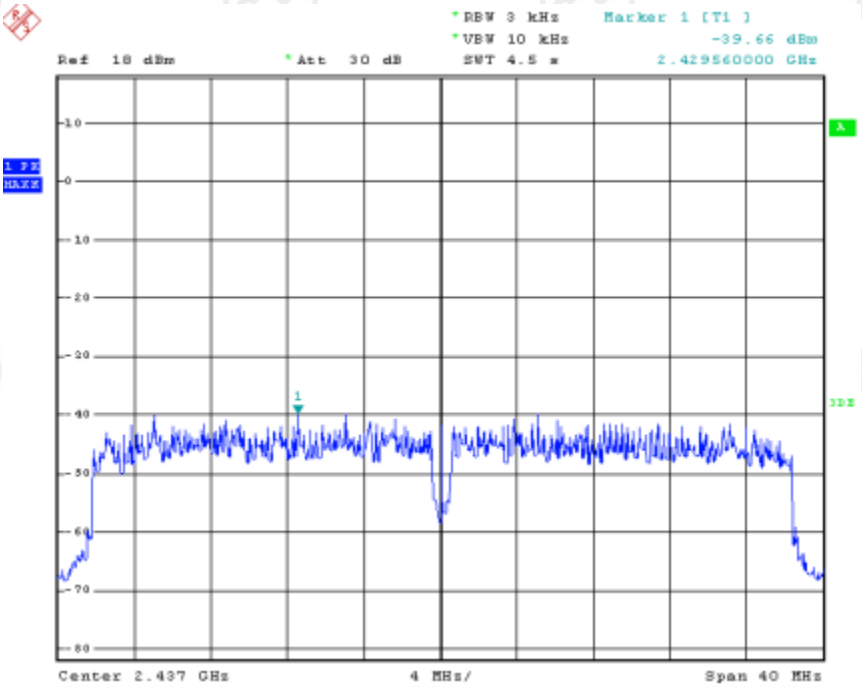


High channel

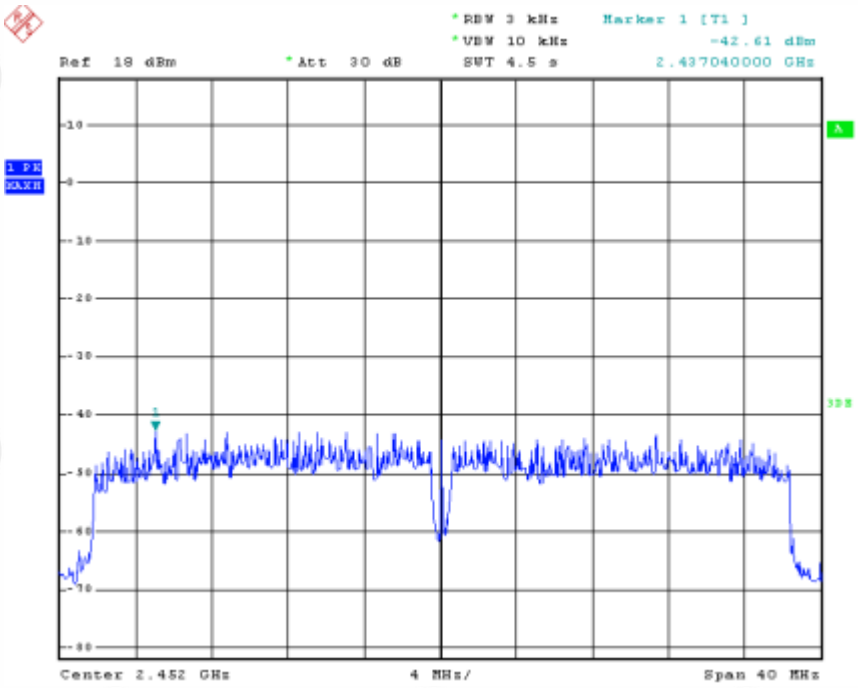
802.11n HT40, MCS0:



Low channel



Middle channel



High channel

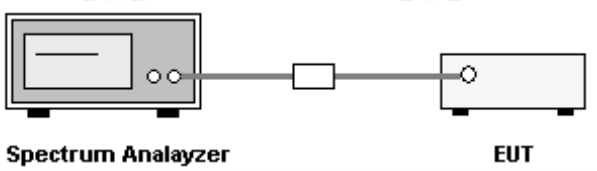
10. MAXIMUM PEAK CONDUCTED OUTPUT POWER MEASUREMENT

10.1. LIMITS

The maximum peak conducted output power of the intentional radiator shall not exceed the following:

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt (30dBm).

10.2. BLOCK DIAGRAM OF TEST SETUP



10.3. TEST PROCEDURE

1. The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.
2. Set spectrum analyzer's RBW and VBW to applicable and set span wide enough to capture the whole plot, record the frequency of the max emission in the plot.
3. Set the frequency as center frequency, and set RBW = 1 MHz, VBW >RBW, sweep= auto with Peak detector in Max Hold mode.

10.4. TEST RESULT

802.11b:

Frequency (MHz)	Data rate (Mbps)	Result (dBm)	Limit (dBm)
Low Channel: 2412	1	7.43	30
	5.5	7.41	30
	11	7.38	30
Middle Channel: 2437	1	7.31	30
	5.5	7.30	30
	11	7.27	30
High Channel: 2462	1	7.22	30
	5.5	7.18	30
	11	7.19	30

802.11g:

Frequency (MHz)	Data rate (Mbps)	Result (dBm)	Limit (dBm)
Low Channel: 2412	6	6.84	30
	18	6.81	30
	54	6.82	30
Middle Channel: 2437	6	6.89	30
	18	6.87	30
	54	6.85	30
High Channel: 2462	6	6.75	30
	18	6.72	30
	54	6.72	30

802.11n HT20:

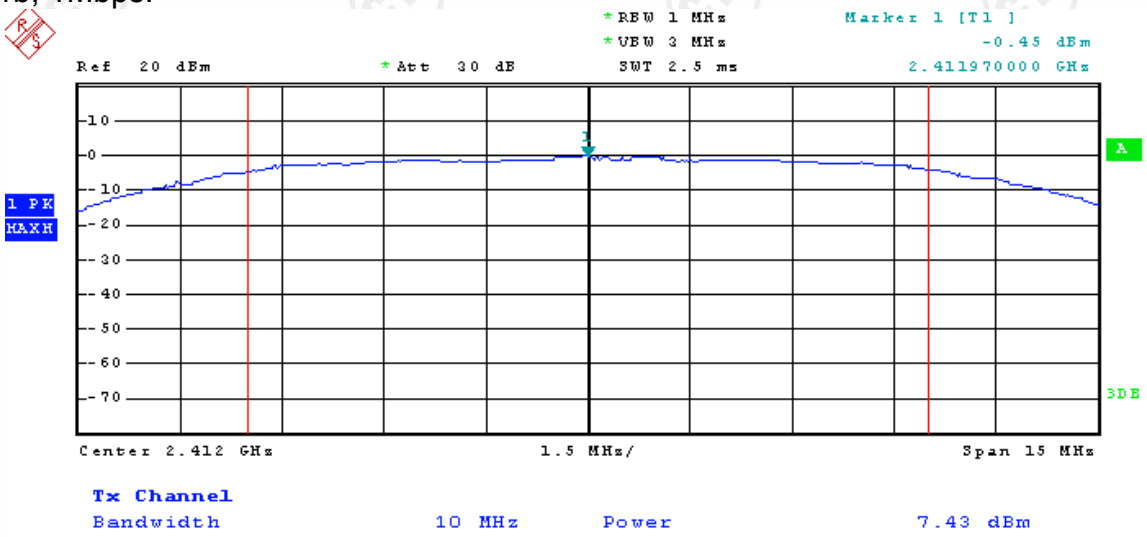
Frequency (MHz)	Data rate (Mbps)	Result (dBm)	Limit (dBm)
Low Channel: 2412	MCS0	6.58	30
	MCS3	6.54	30
	MCS7	6.54	30
Middle Channel: 2437	MCS0	6.73	30
	MCS3	6.71	30
	MCS7	6.70	30
High Channel: 2462	MCS0	6.59	30
	MCS3	6.51	30
	MCS7	6.53	30

802.11n HT40:

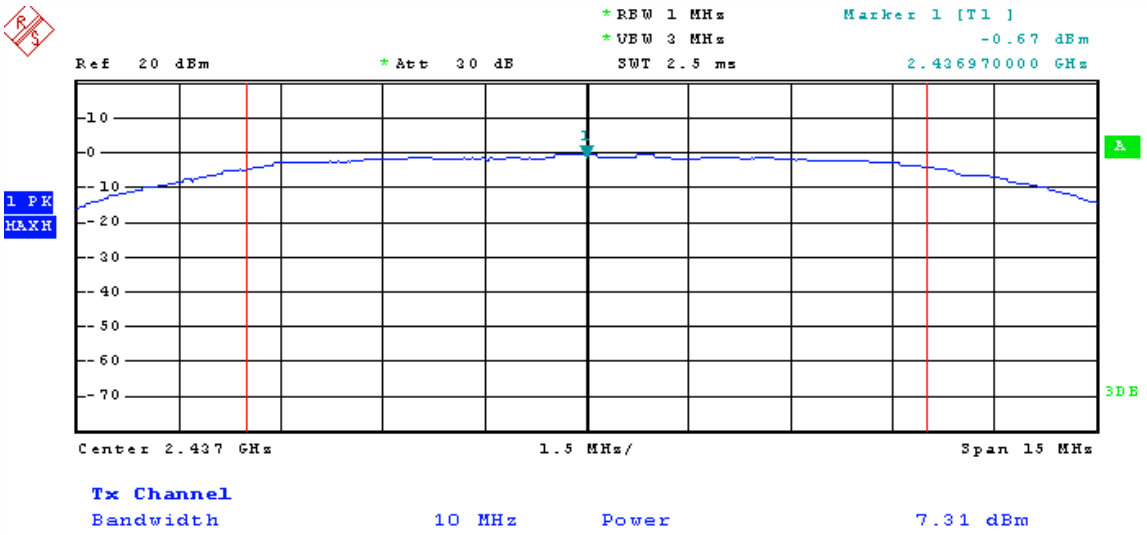
Frequency (MHz)	Data rate (Mbps)	Result (dBm)	Limit (dBm)
Low Channel: 2422	MCS0	6.45	30
	MCS3	6.39	30
	MCS7	6.37	30
Middle Channel: 2437	MCS0	6.52	30
	MCS3	6.48	30
	MCS7	6.50	30
High Channel: 2452	MCS0	6.57	30
	MCS3	6.53	30
	MCS7	6.51	30

Please see the following plots (worst case):

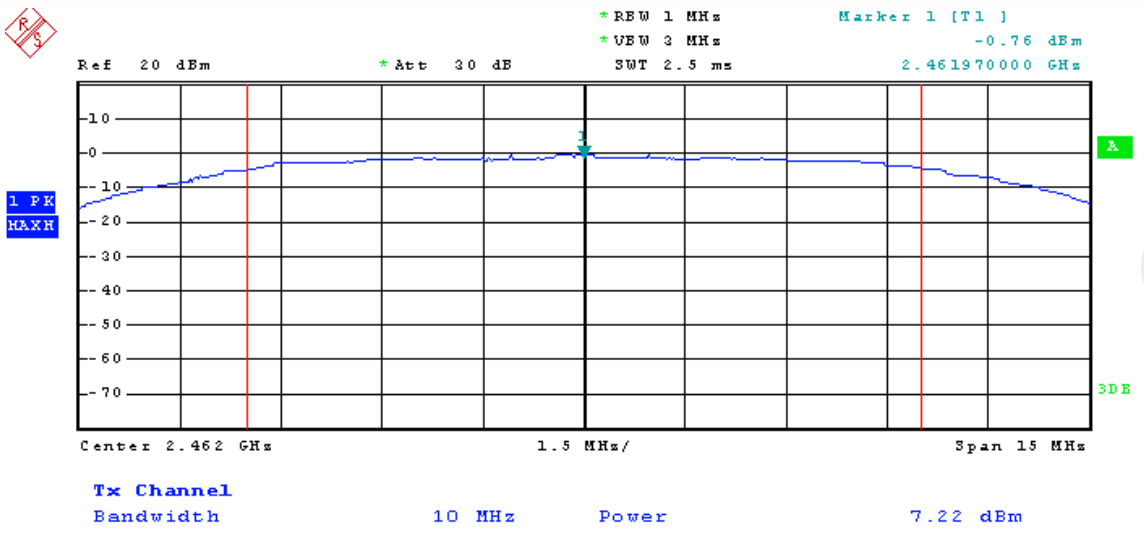
802.11b, 1Mbps:



Low channel

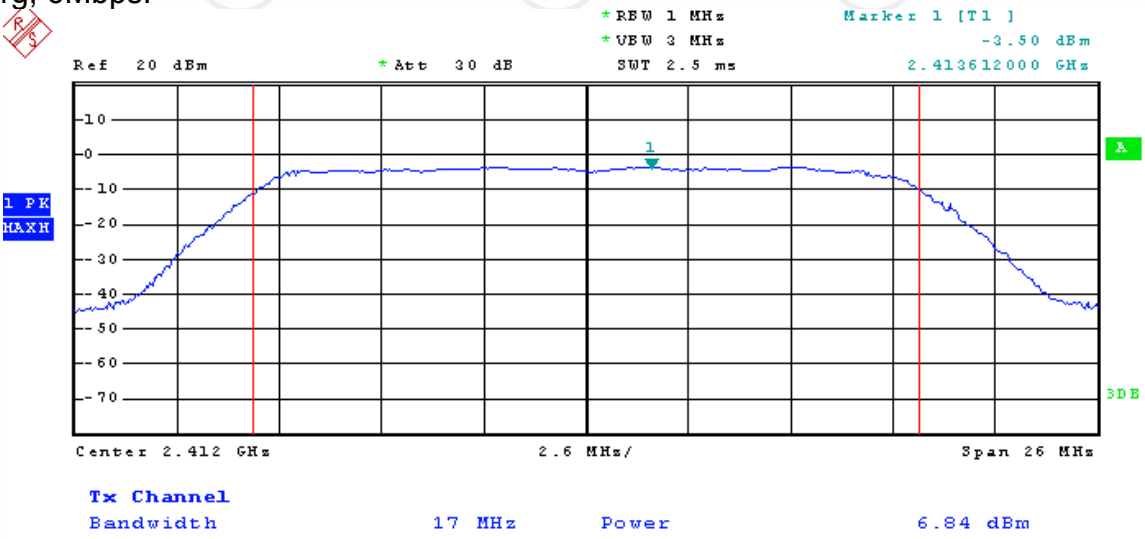


Middle channel

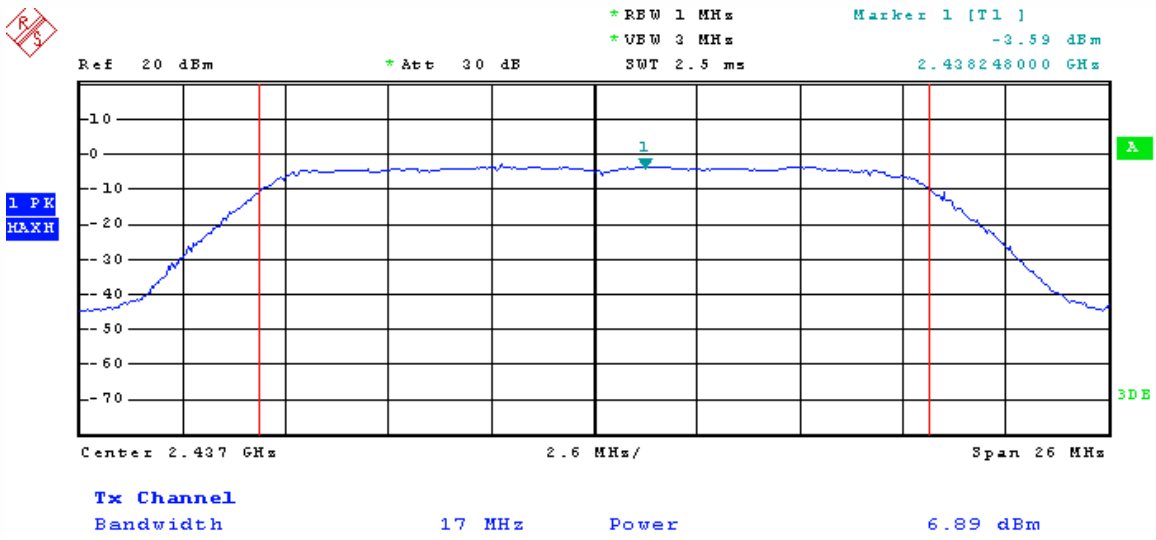


High channel

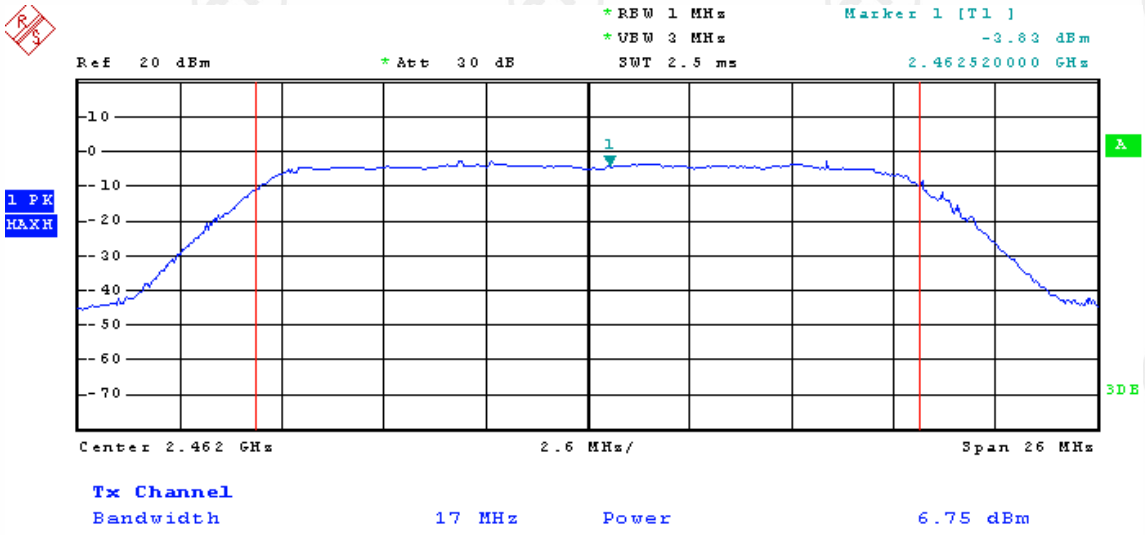
802.11g, 6Mbps:



Low channel

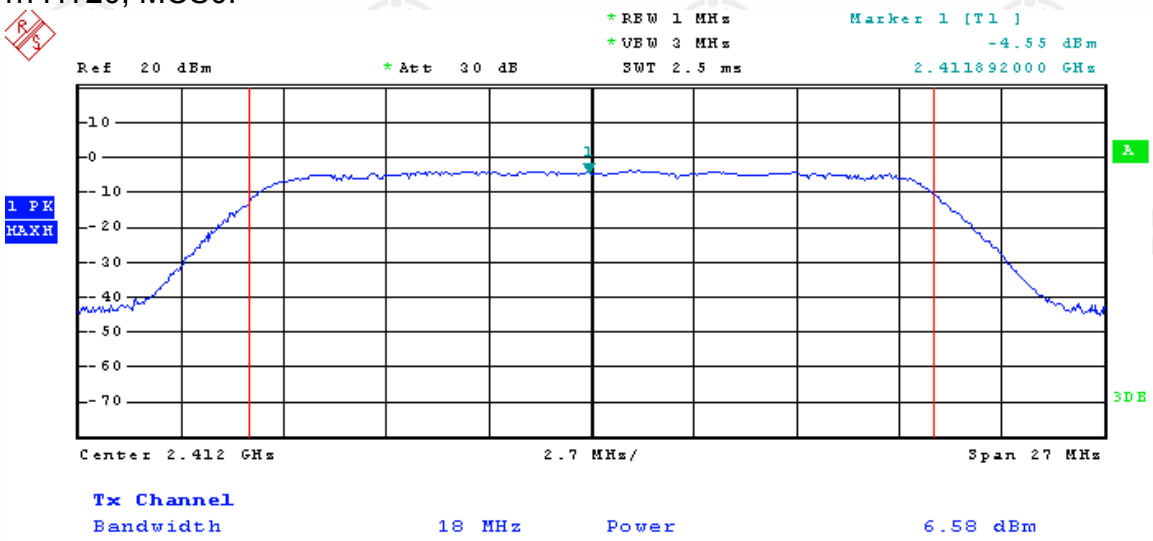


Middle channel

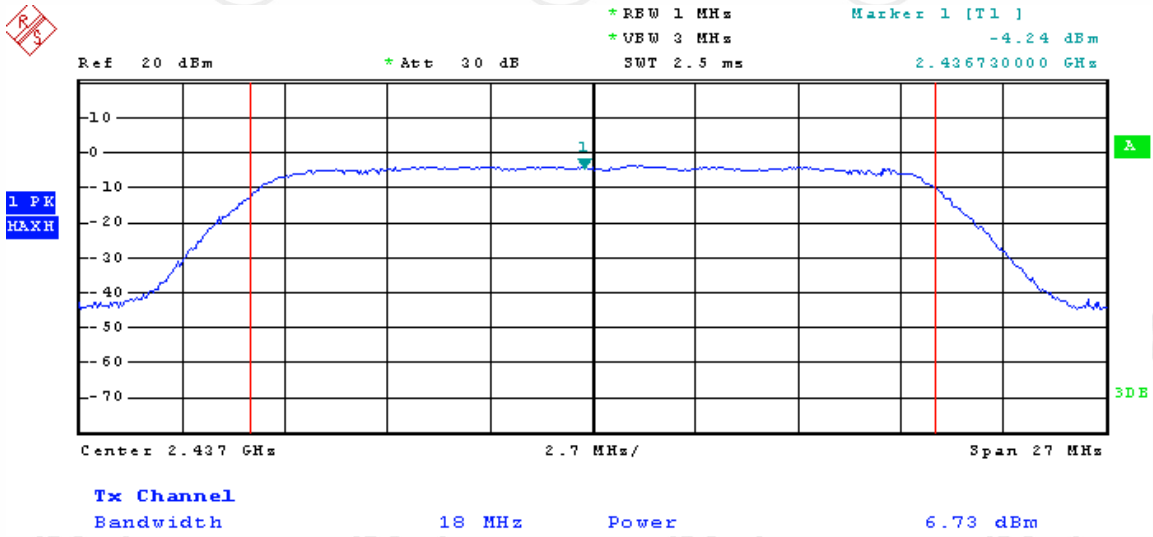


High channel

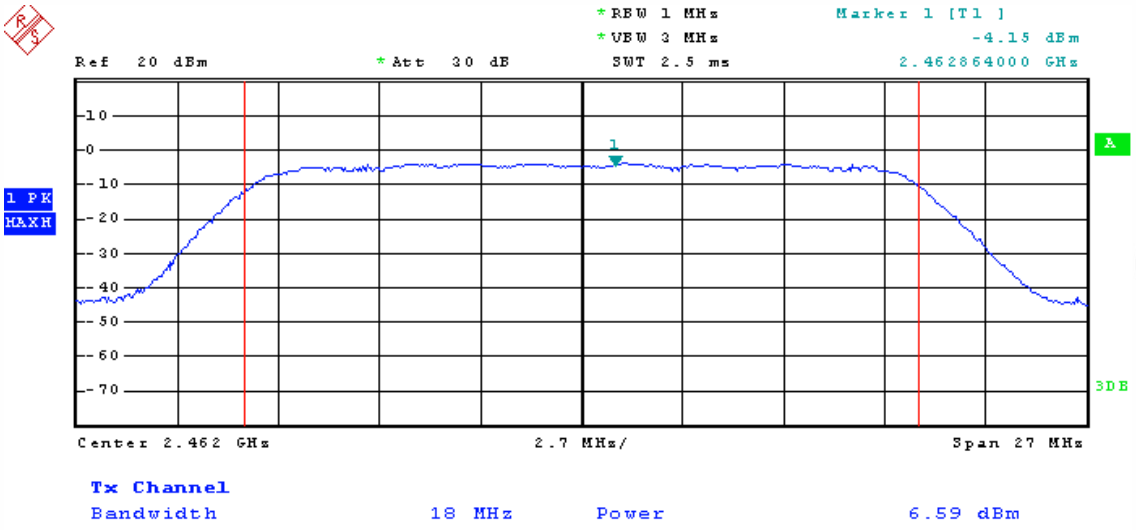
802.11n HT20, MCS0:



Low channel

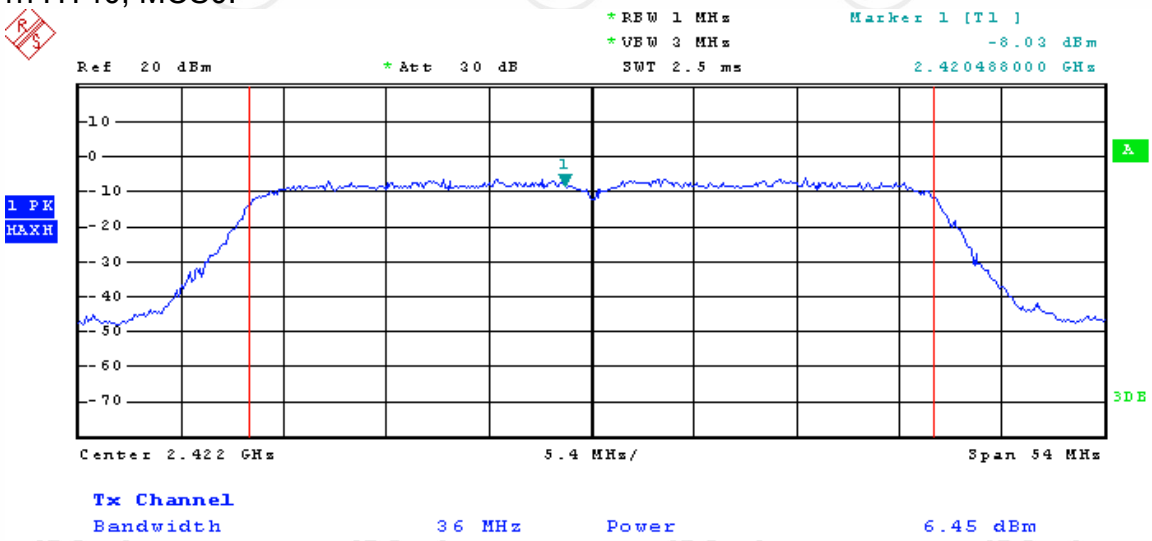


Middle channel

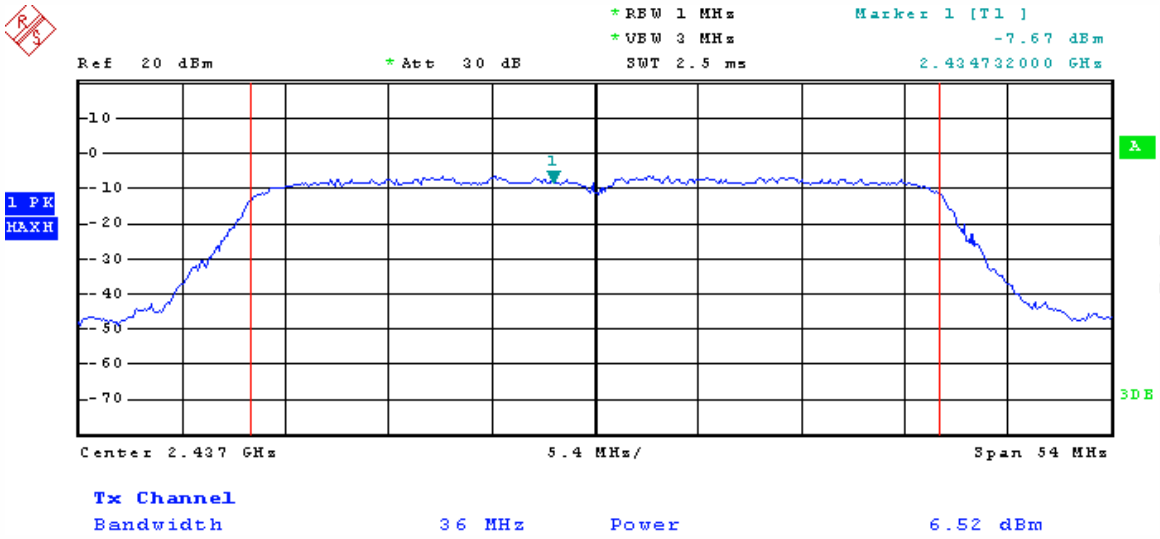


High channel

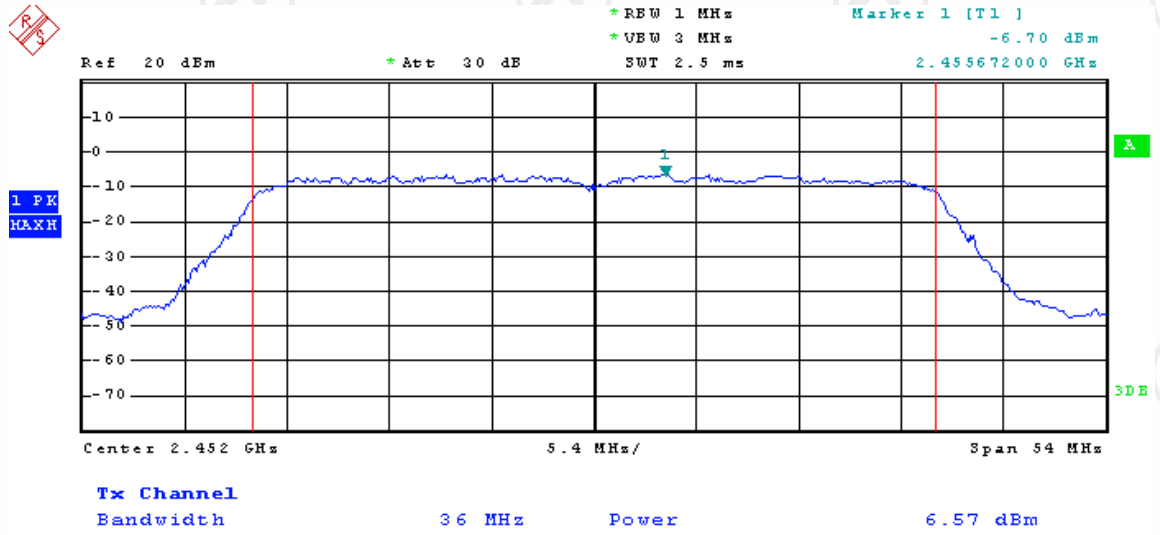
802.11n HT40, MCS0:



Low channel



Middle channel



High channel

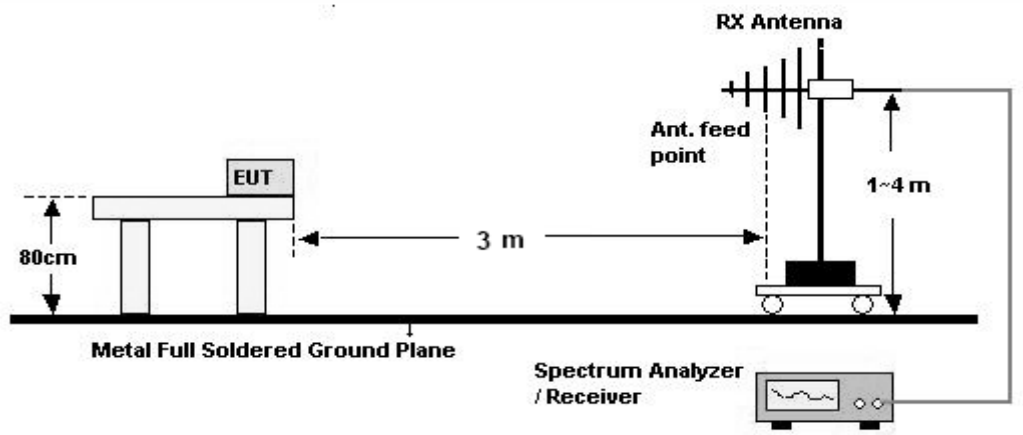
11. BAND EDGE EMISSION MEASUREMENT

11.1. LIMITS

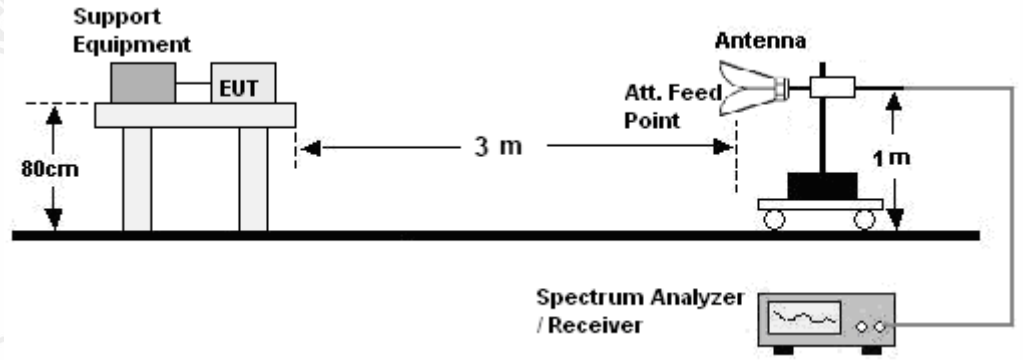
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the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

11.2. BLOCK DIAGRAM OF TEST SETUP

For radiated emissions from 30 - 1000MHz



For radiated emissions from 1GHz to 25GHz



11.3. TEST PROCEDURE

Below 30MHz:

30MHz ~ 1GHz:

a. The product was placed on the non-conductive turntable 0.8m above the ground at a chamber.

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 100 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Above 1GHz:

a. The product was placed on the non-conductive turntable 0.8m above the ground at a chamber.

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, set 1MHz RBW. Record the maximum PK field strength in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

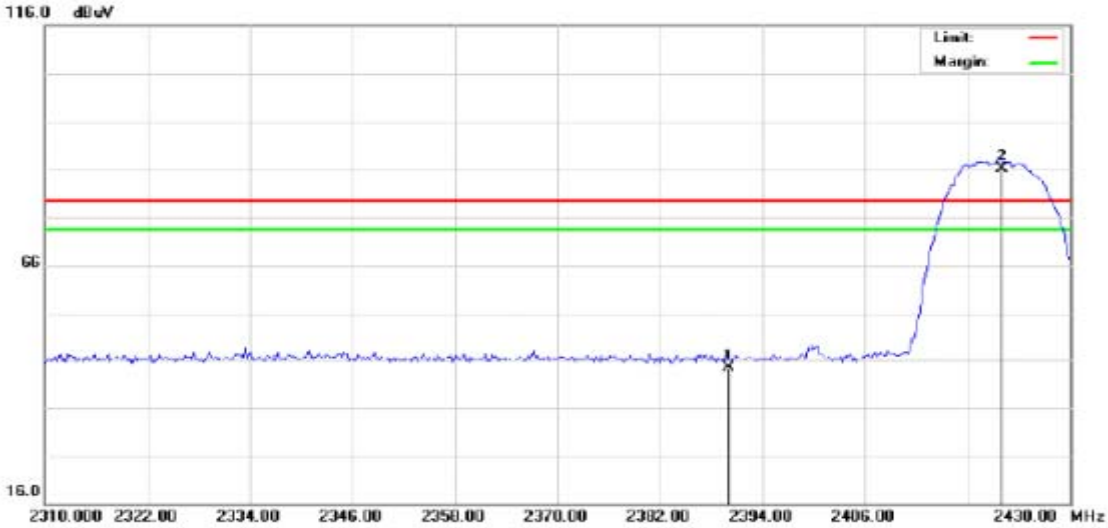
c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

11.4. TEST RESULT

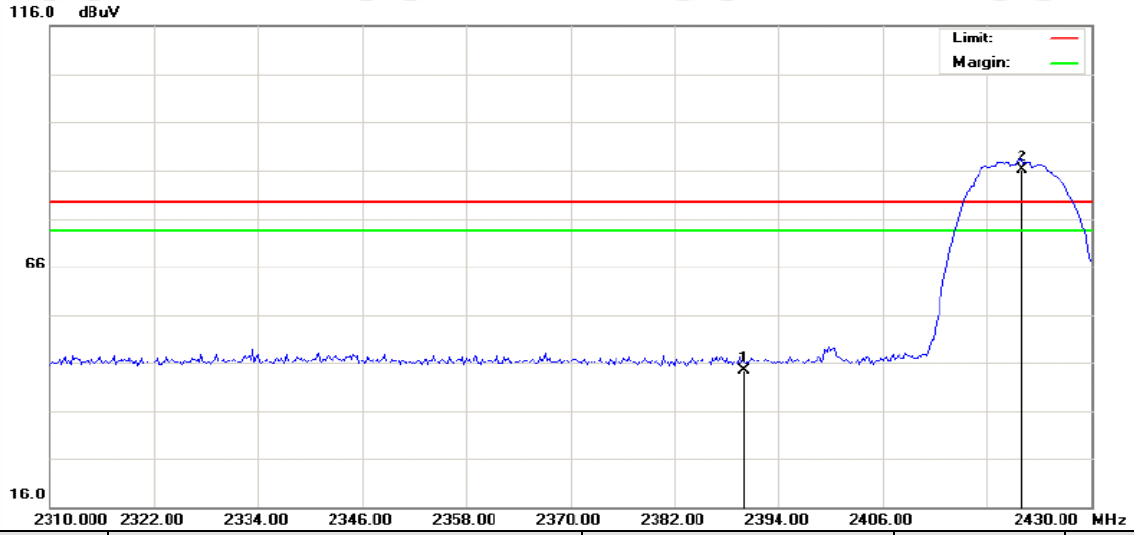
Worst case data attached.---please see the following plots.

802.11b 1Mbps:

2412MHz:

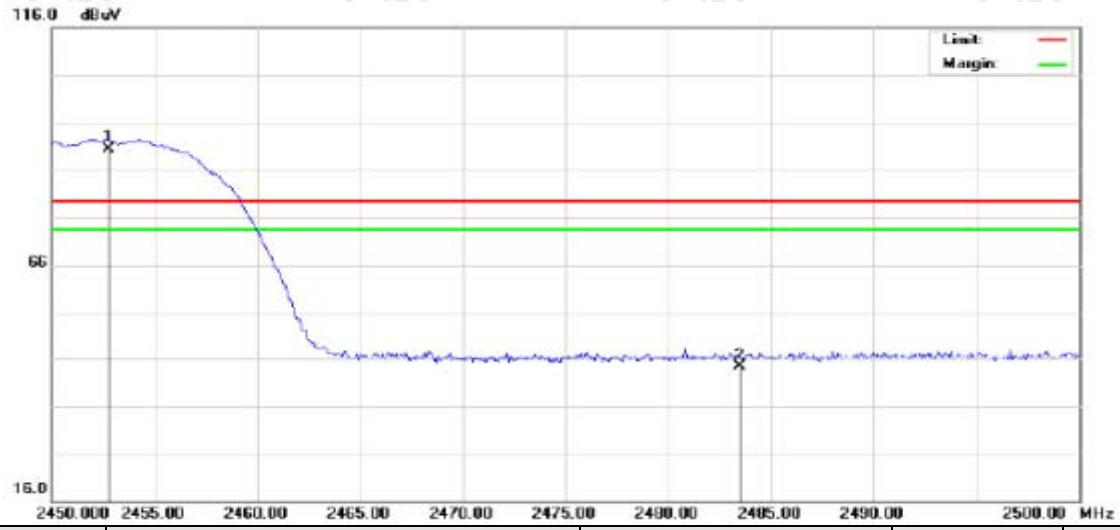


Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2390.000	47.06	---	---	74	54	H	P

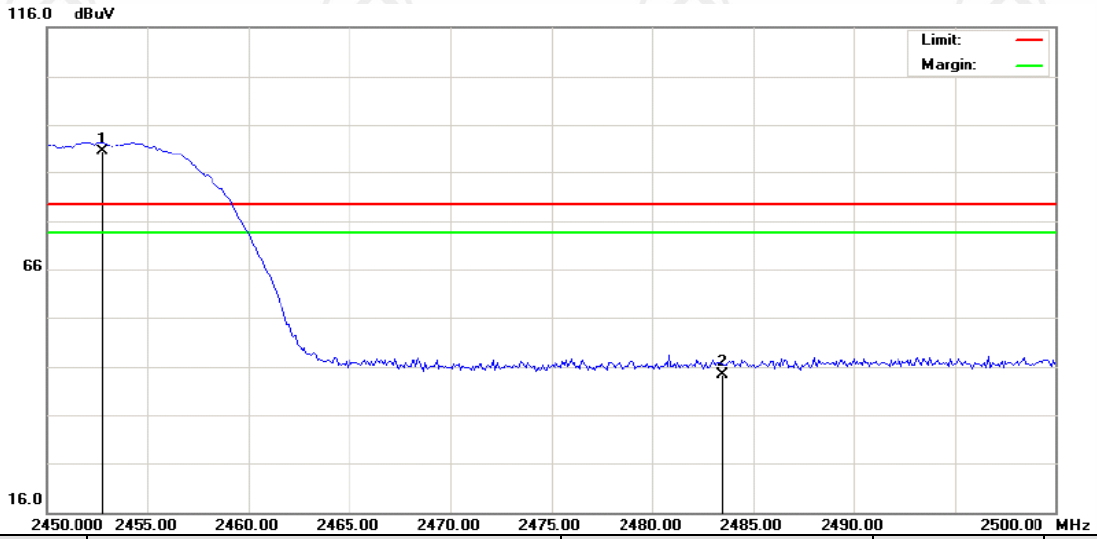


Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2390.000	46.49	---	---	74	54	V	P

2462MHz:



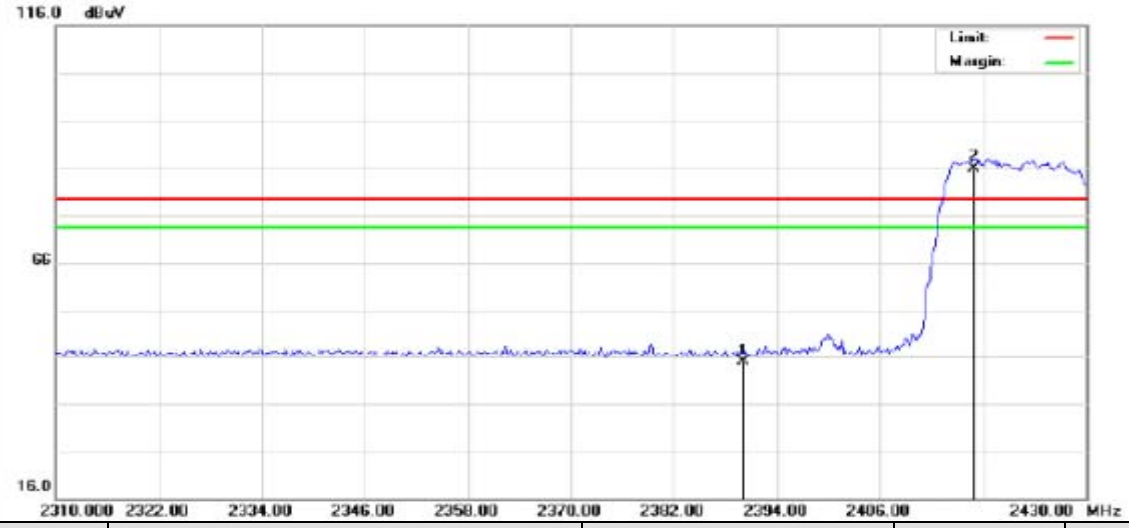
Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2483.500	44.24	---	---	74	54	H	P



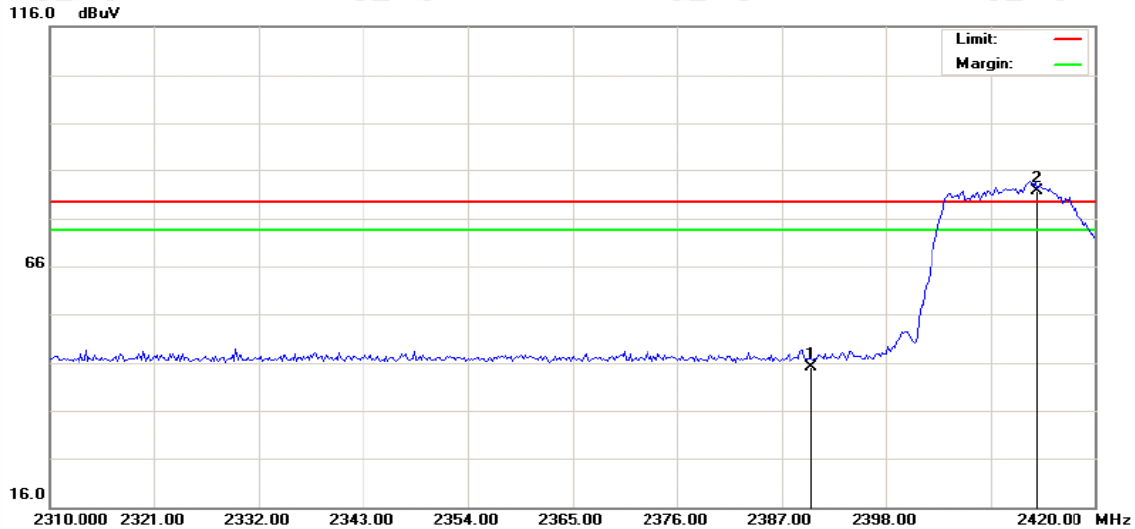
Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2483.500	46.43	---	---	74	54	V	P

802.11g, 6Mbps:

2412MHz:

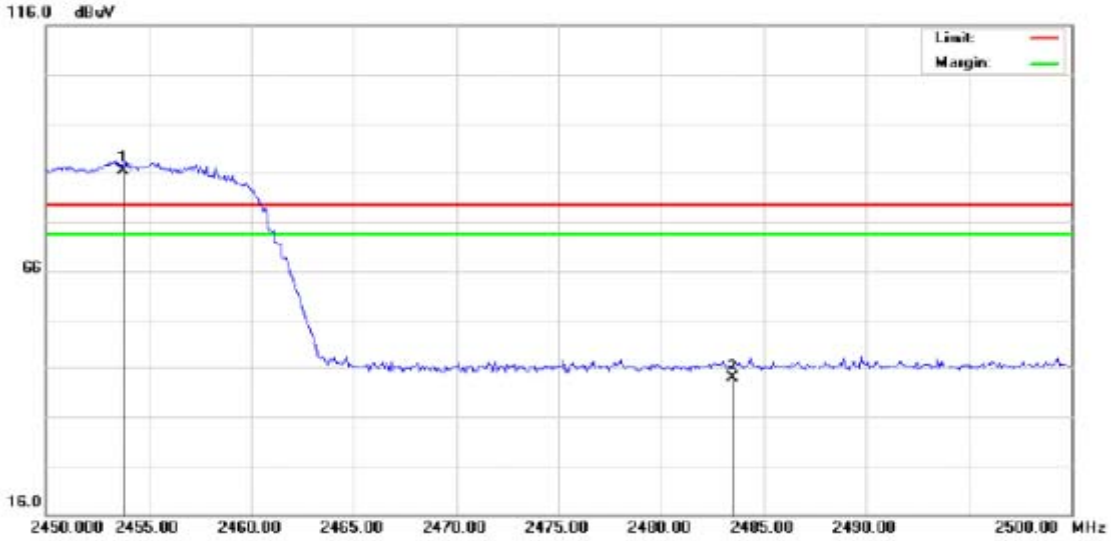


Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2390.000	44.82	---	---	74	54	H	P

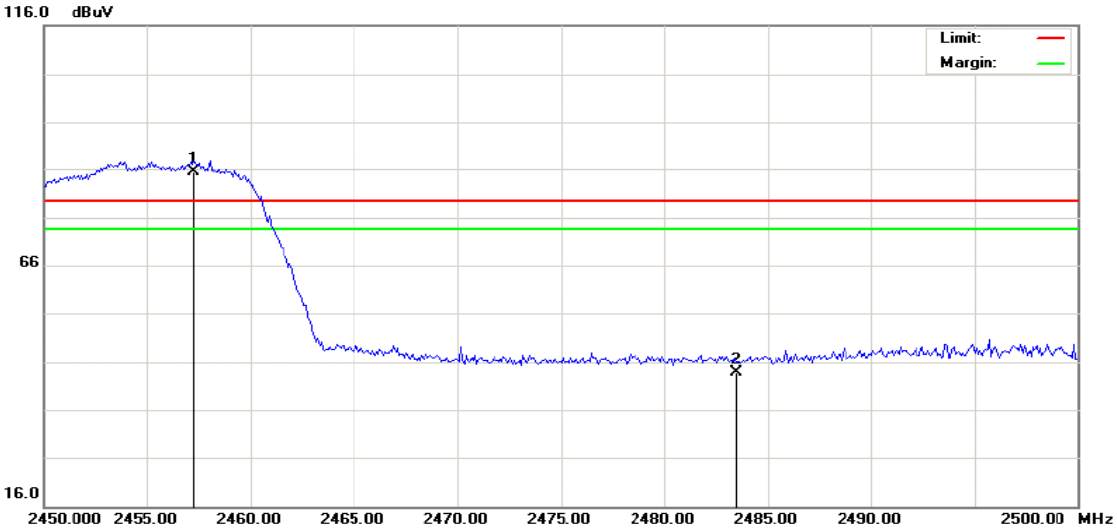


Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2390.000	45.13	---	---	74	54	V	P

2462MHz:



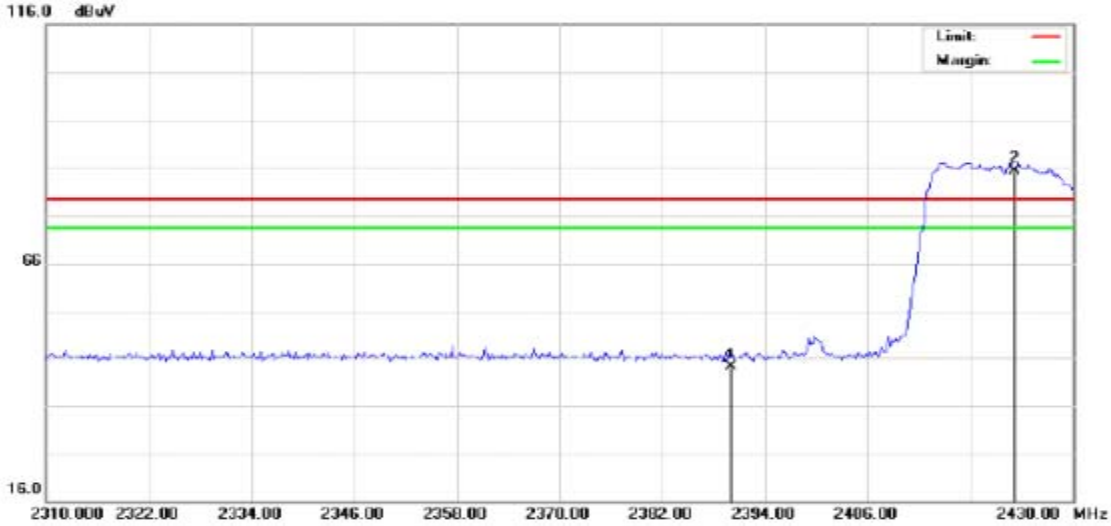
Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2483.500	43.69	---	---	74	54	H	P



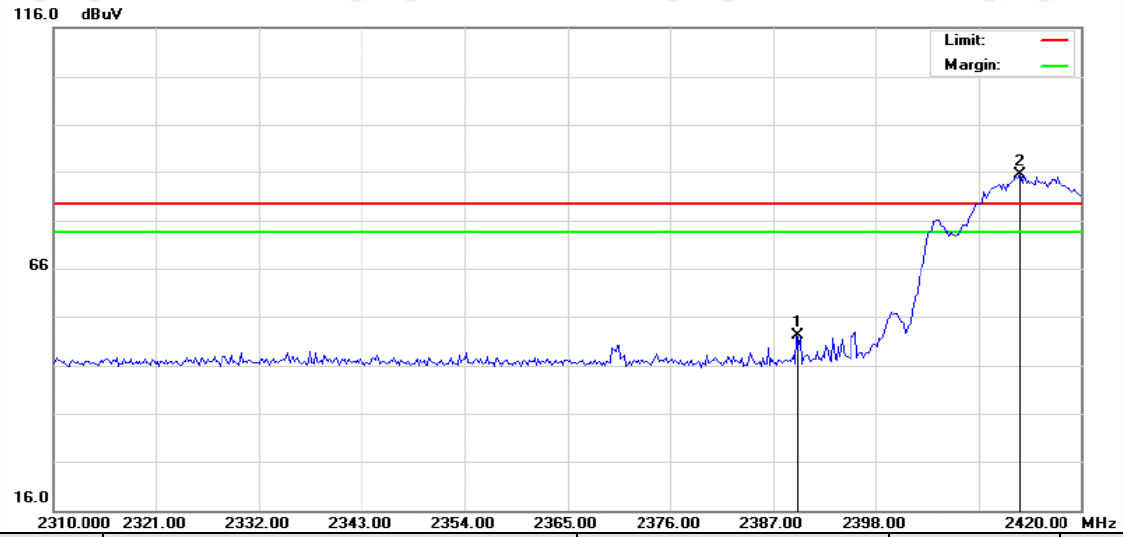
Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2483.500	43.58	---	---	74	54	V	P

802.11n HT20, MCS0:

2412MHz:

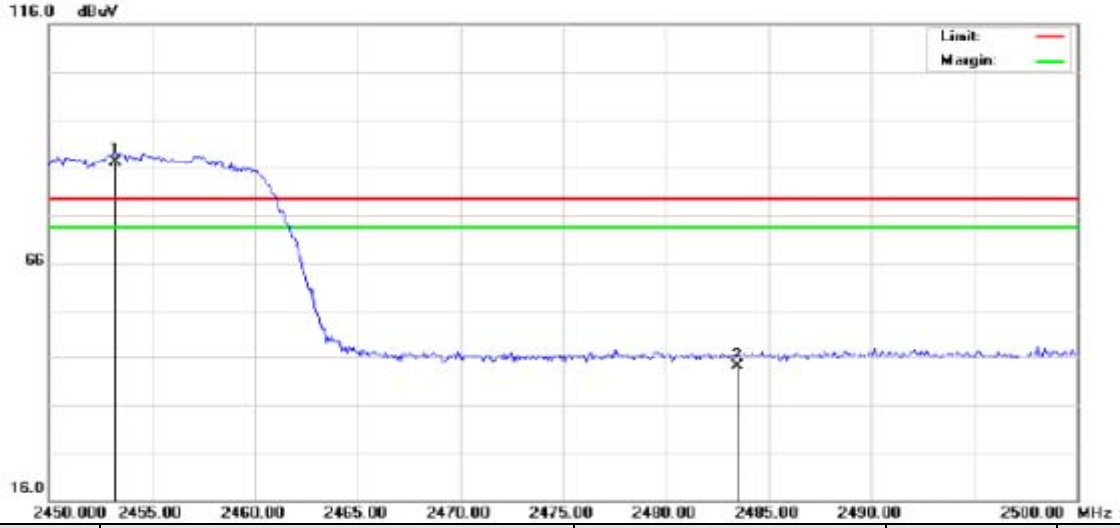


Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2390.000	44.24	---	---	74	54	H	P

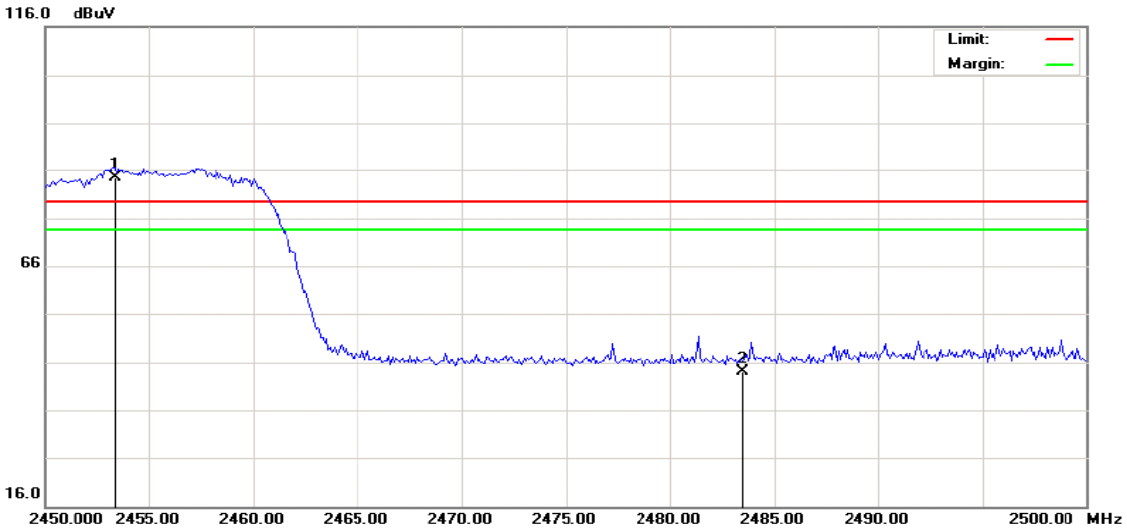


Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2390.000	52.07	---	---	74	54	V	P

2462MHz:



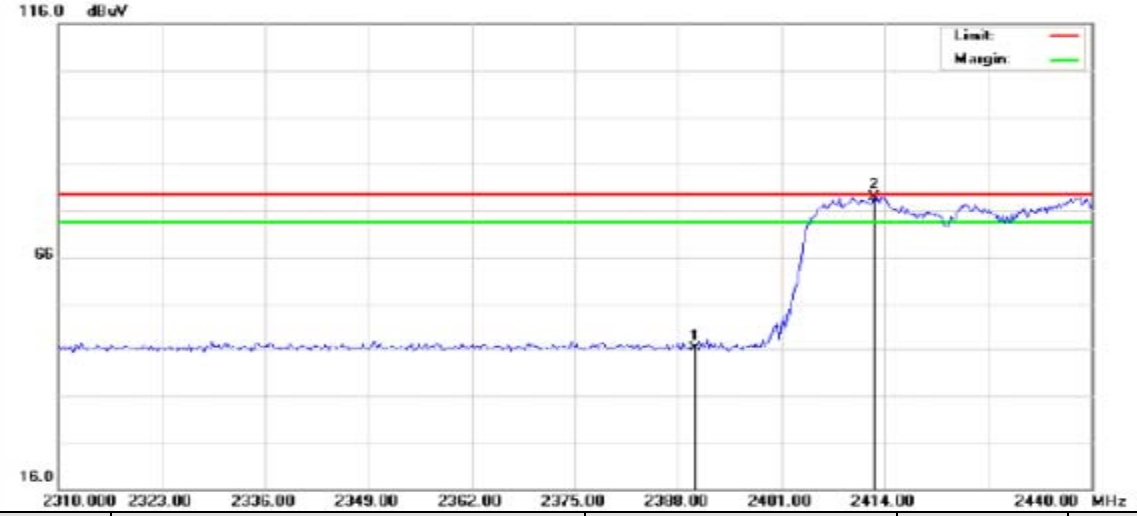
Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2483.500	44.20	---	---	74	54	H	P



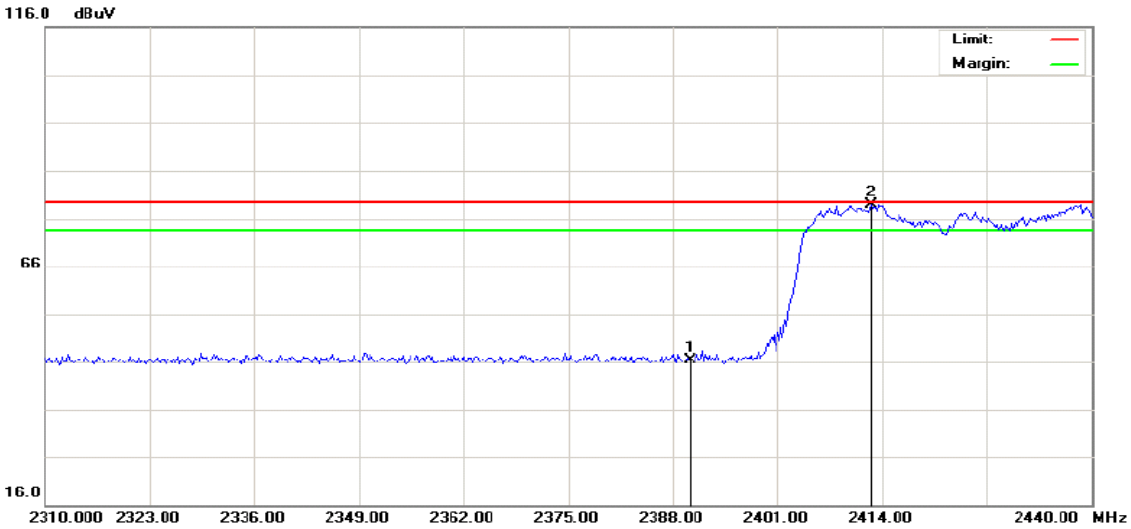
Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2483.500	44.20	---	---	74	54	V	P

802.11n HT40, MCS0:

2422MHz:

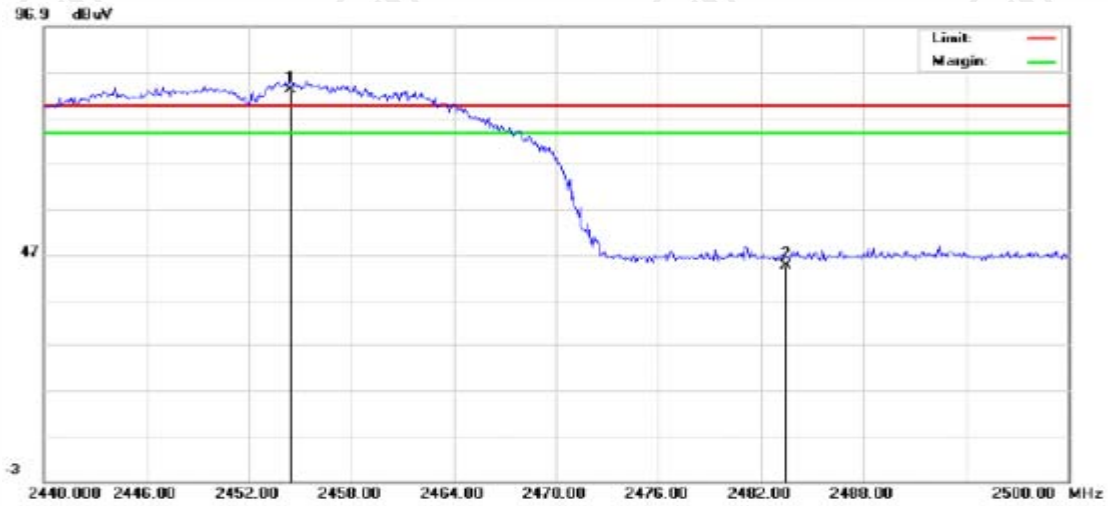


Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2390.000	44.44	---	---	74	54	H	P

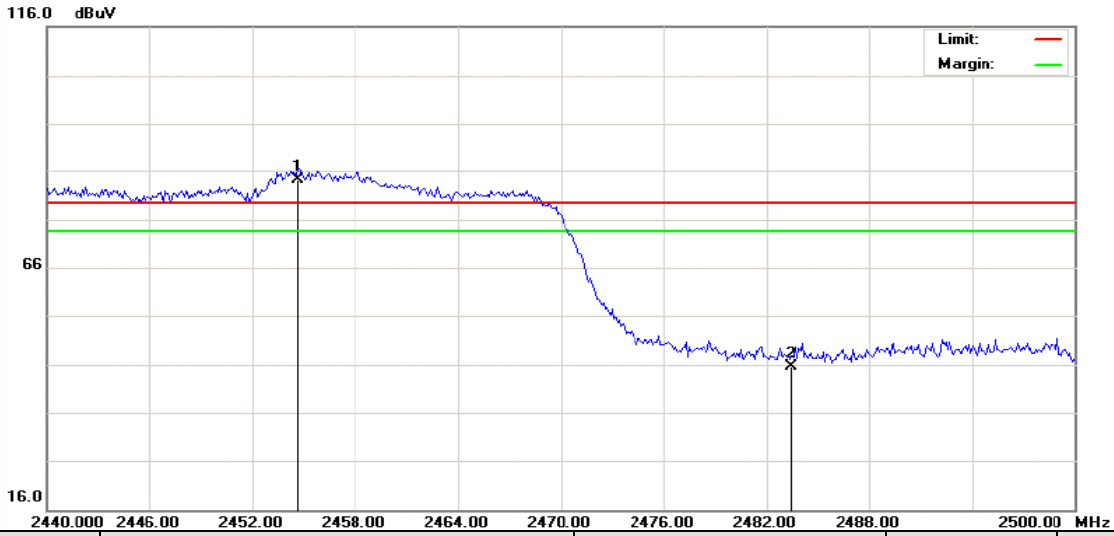


Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2390.000	46.43	---	---	74	54	V	P

2452MHz:



Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2483.500	44.62	---	---	74	54	H	P



Frequency (MHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2483.500	45.63	---	---	74	54	V	P

Note: The above plots show that the peak data of the frequencies which out of the operating band are all below the average limit, so the average data of these frequencies are deems to fulfill the average limits and not reported.

12. SPURIOUS RF CONDUCTED EMISSIONS MEASUREMENT

12.1. LIMITS

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

12.2. BLOCK DIAGRAM OF TEST SETUP

12.3. TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.

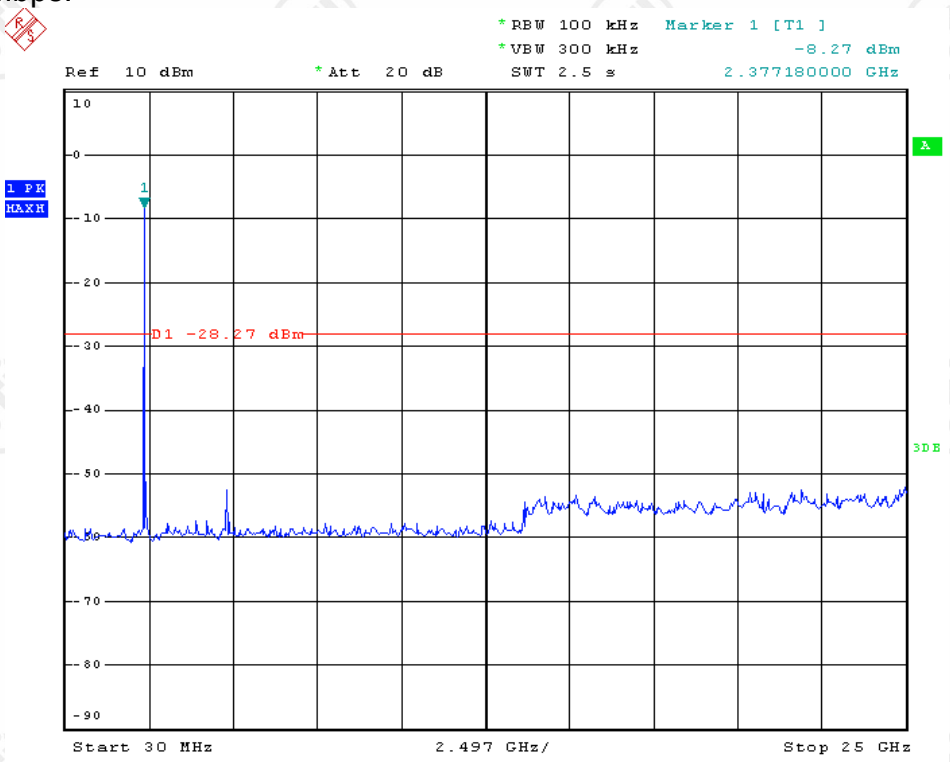
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.

3. Record the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the product up through the 10th harmonic.

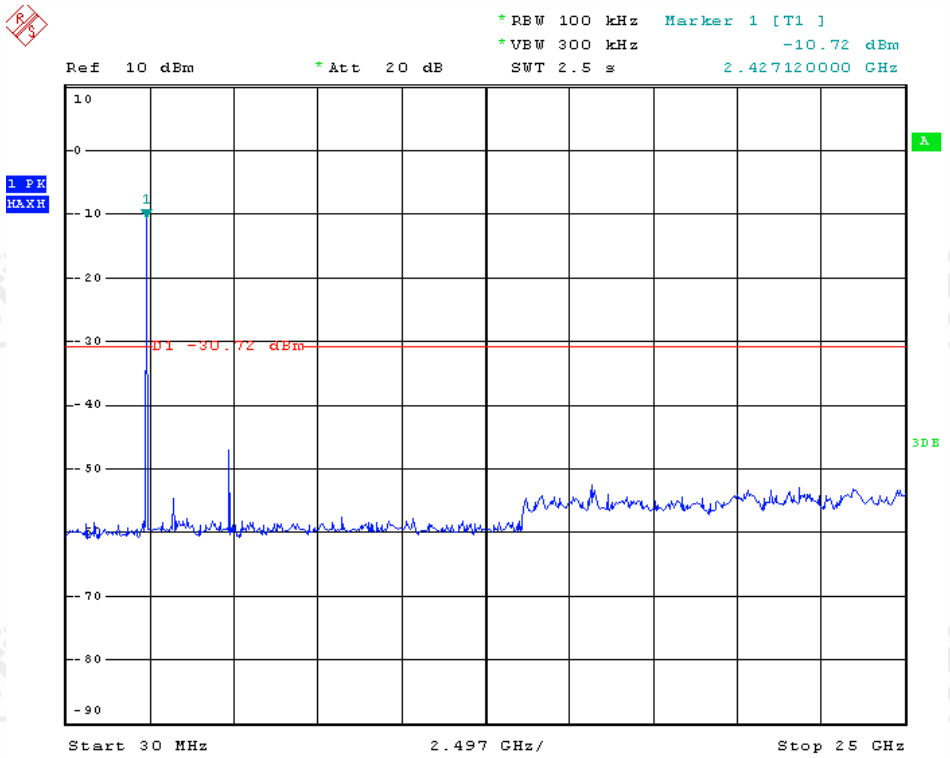
12.4. TEST RESULT

Worst case data---Please see the following plots.

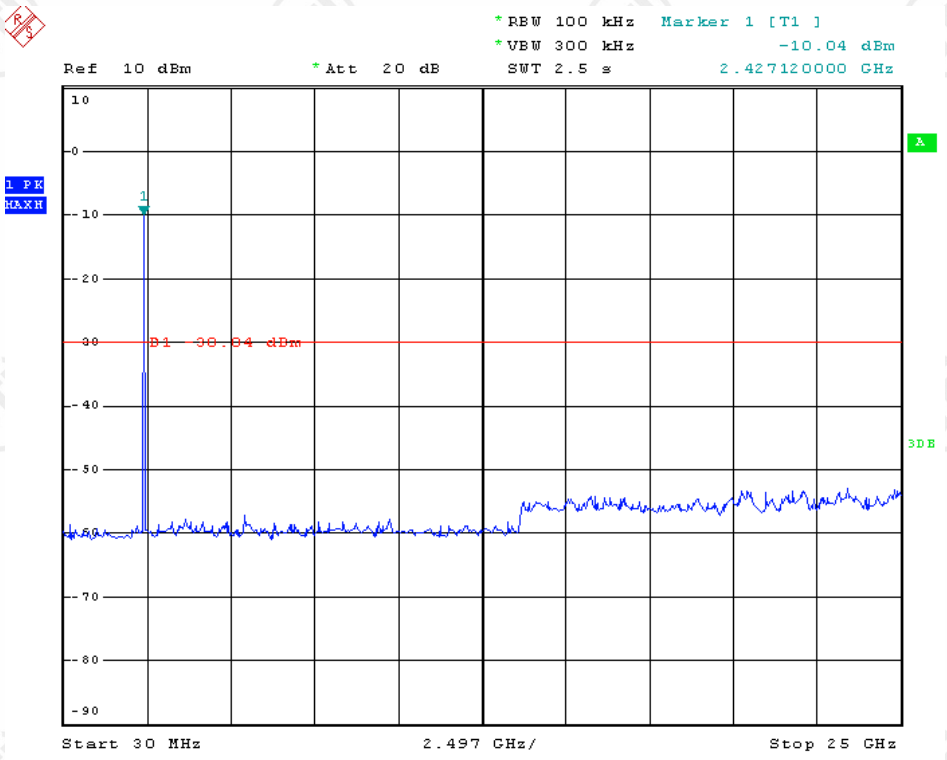
802.11b, 1Mbps:



Low channel

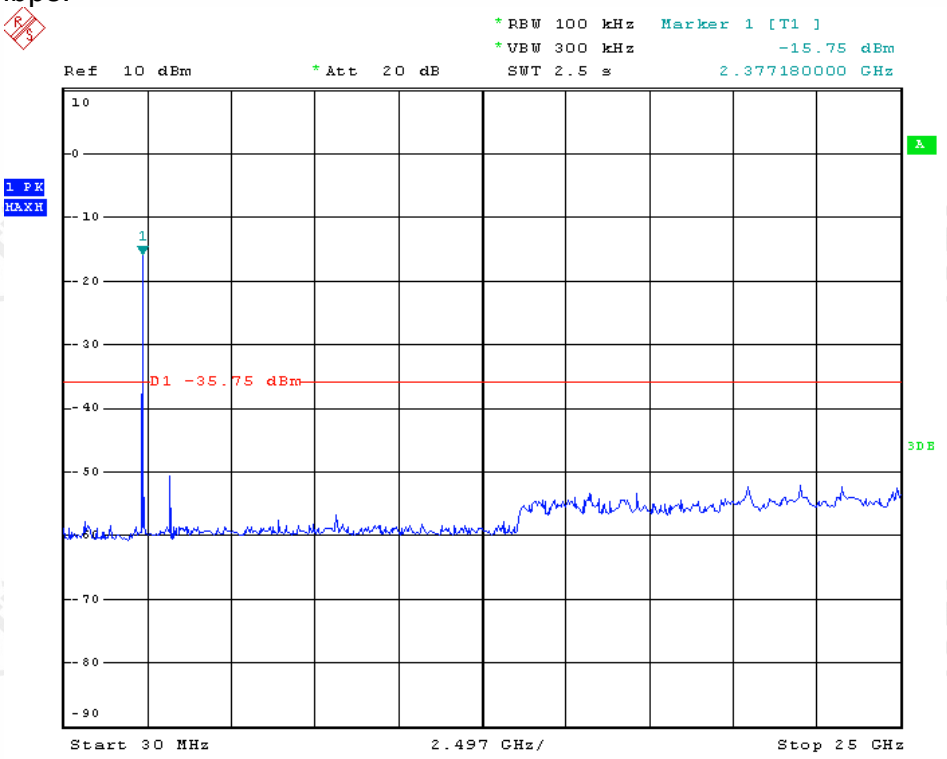


Middle channel

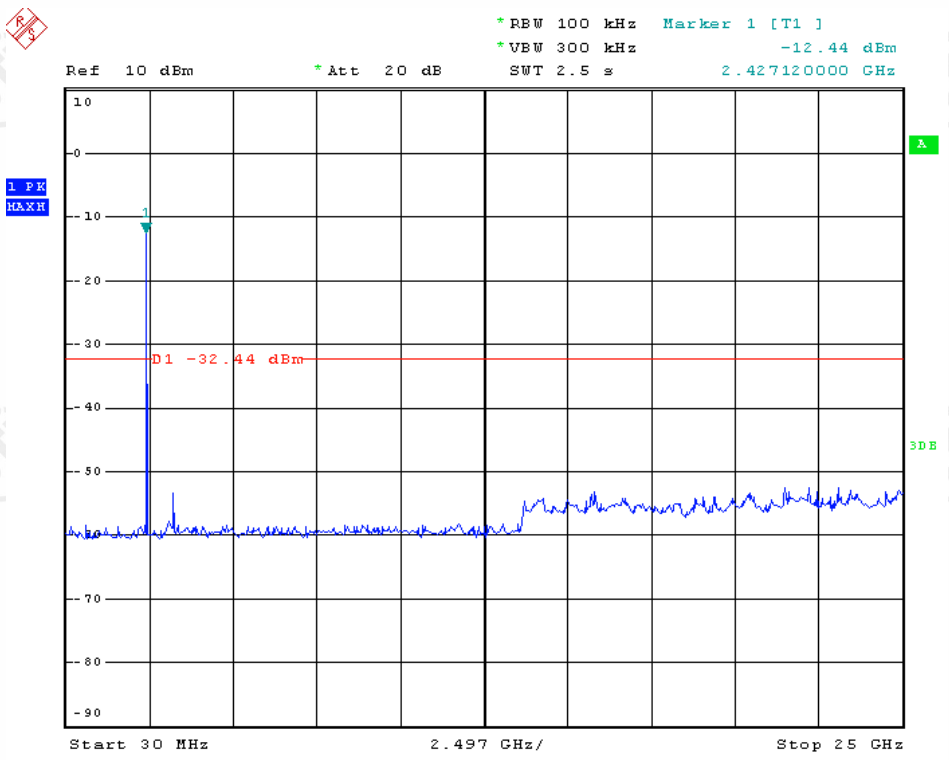


High channel

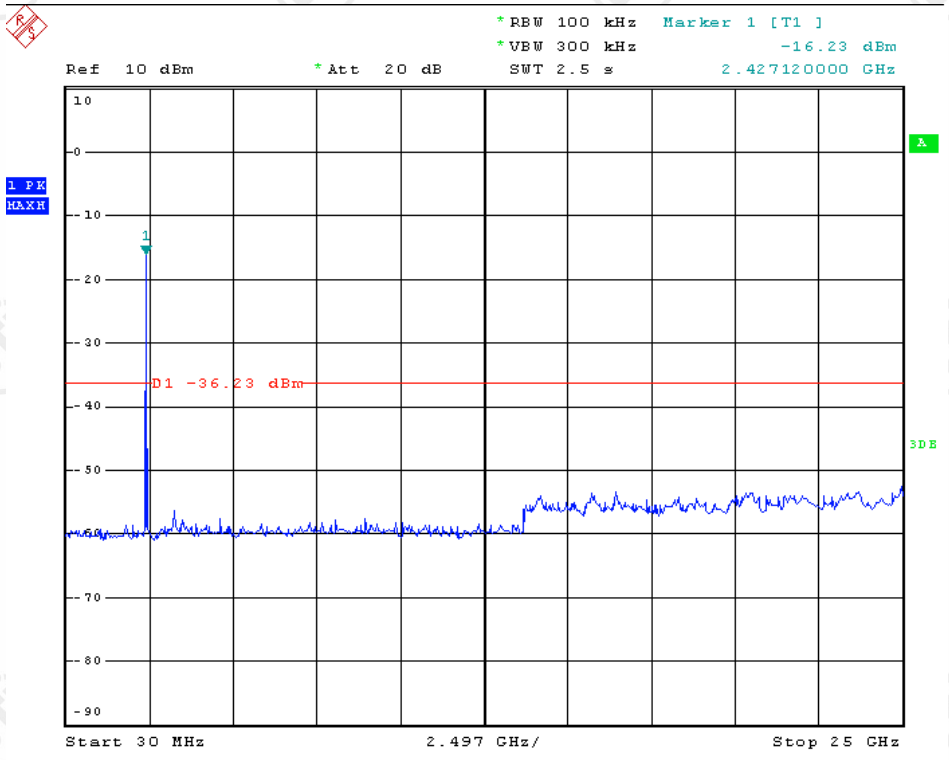
802.11g, 6Mbps:



Low channel

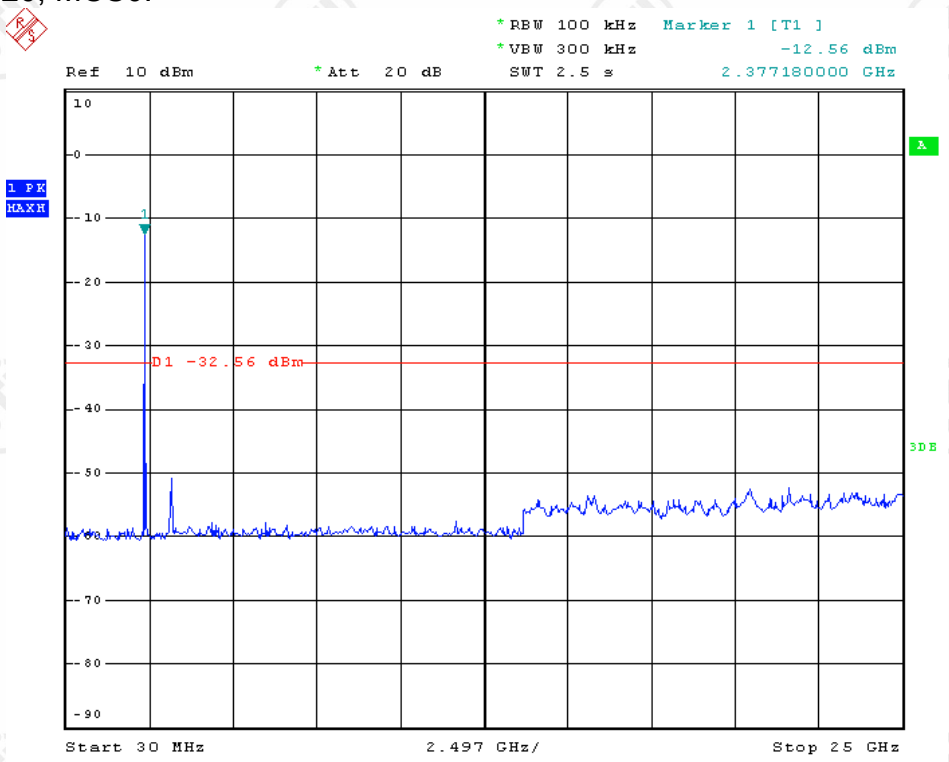


Middle channel

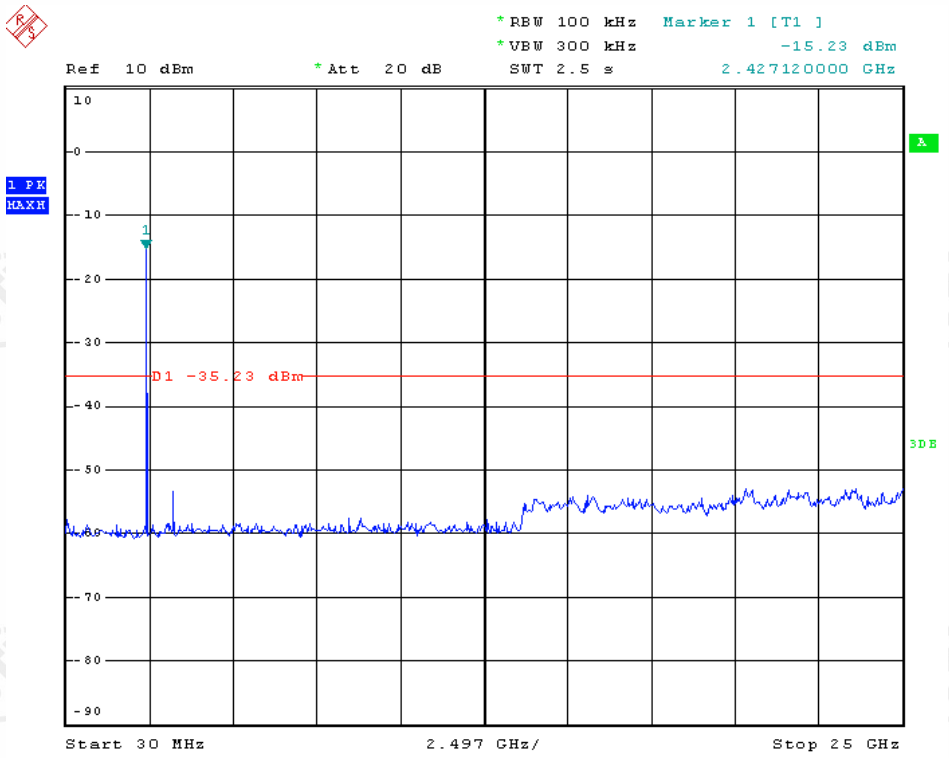


High channel

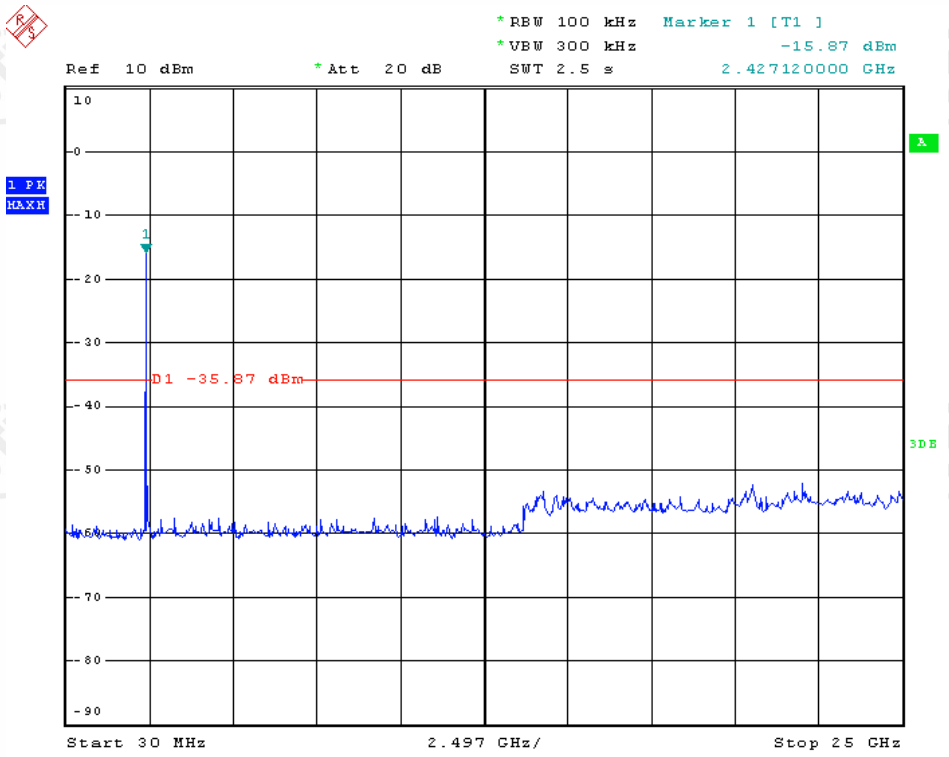
802.11n HT20, MCS0:



Low channel

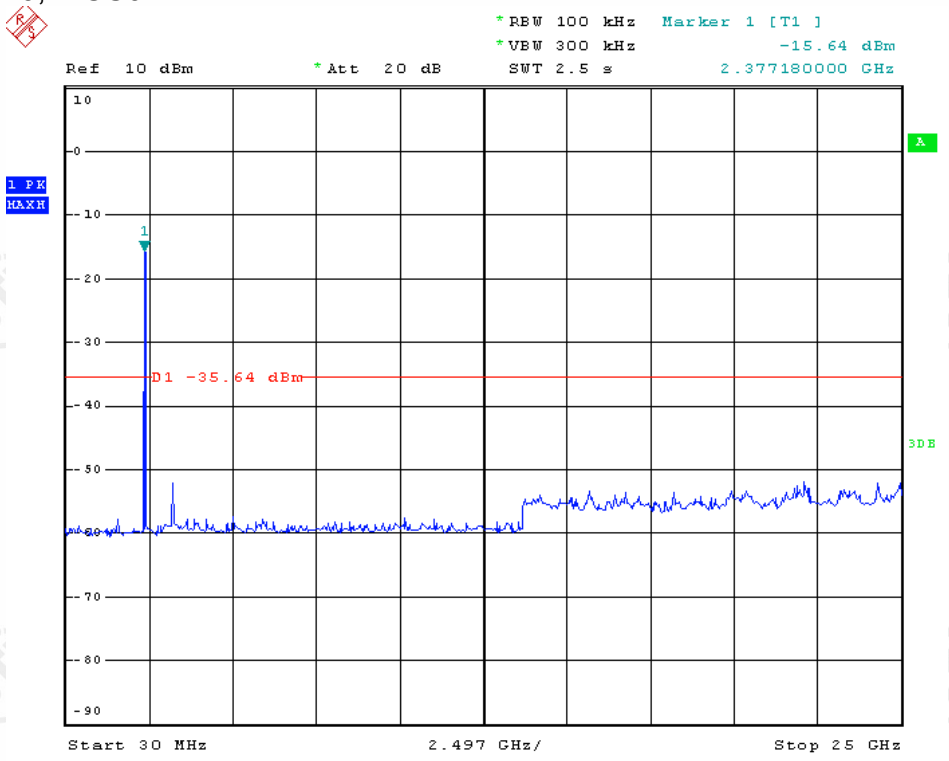


Middle channel

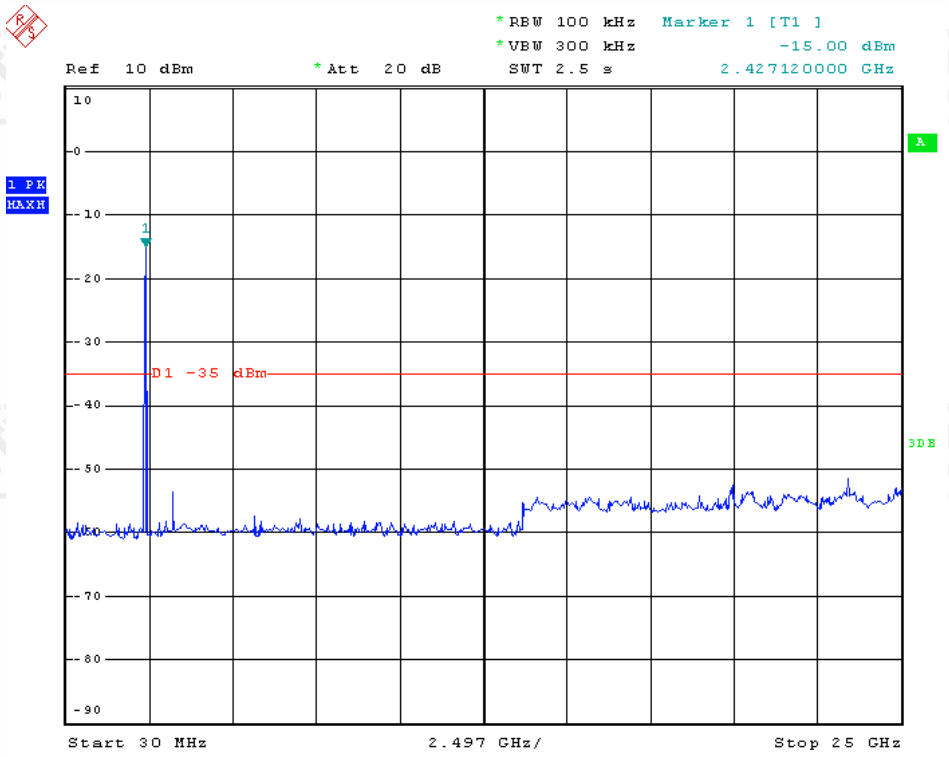


High channel

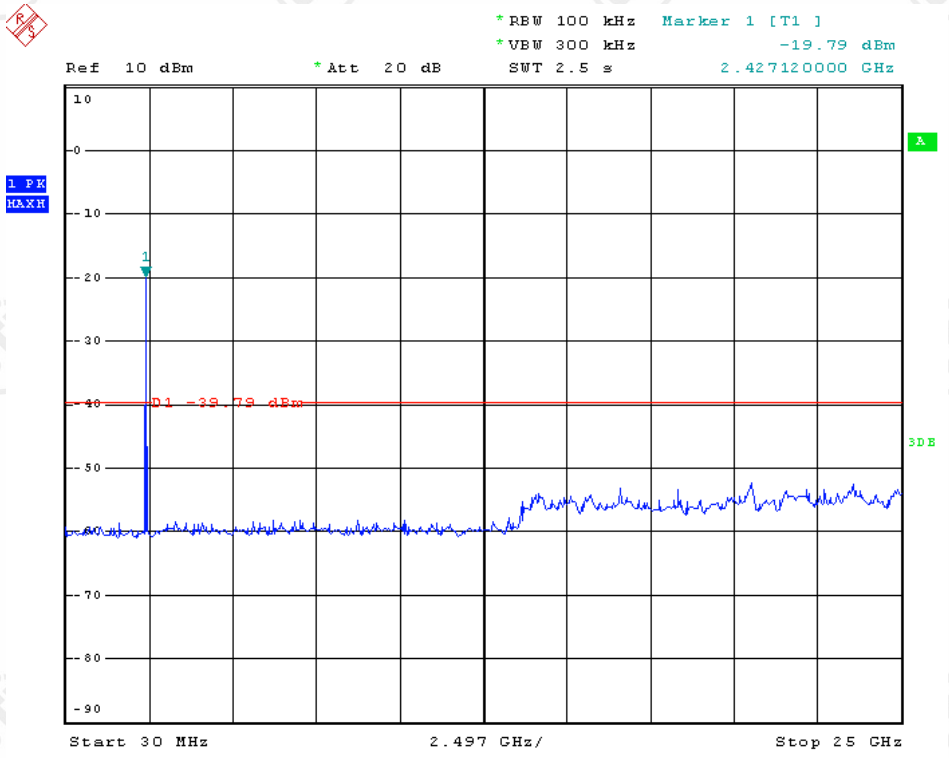
802.11n HT40, MCS0:



Low channel



Middle channel



High channel

13. RADIATED EMISSIONS MEASUREMENT

13.1. LIMITS

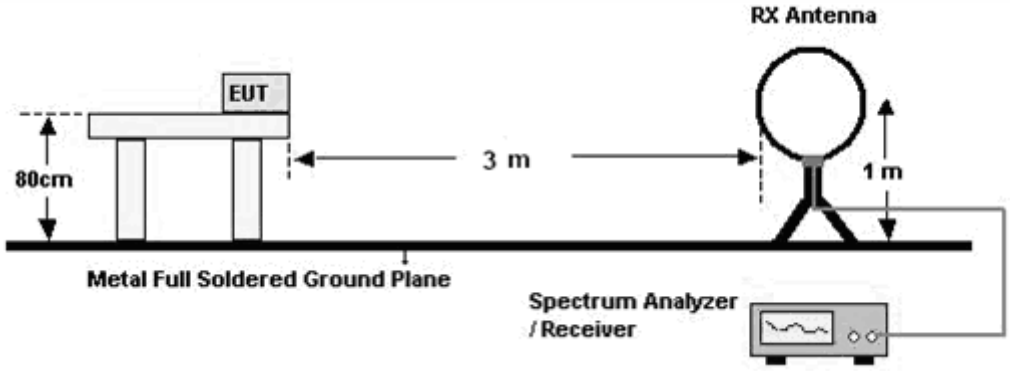
The field strength of any emissions, which appear outside of operating frequency band and restricted band specified on 15.205(a), shall not exceed the general radiated emission limits as below.

Frequency (MHz)	Field strength (μV/m)	Distance (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

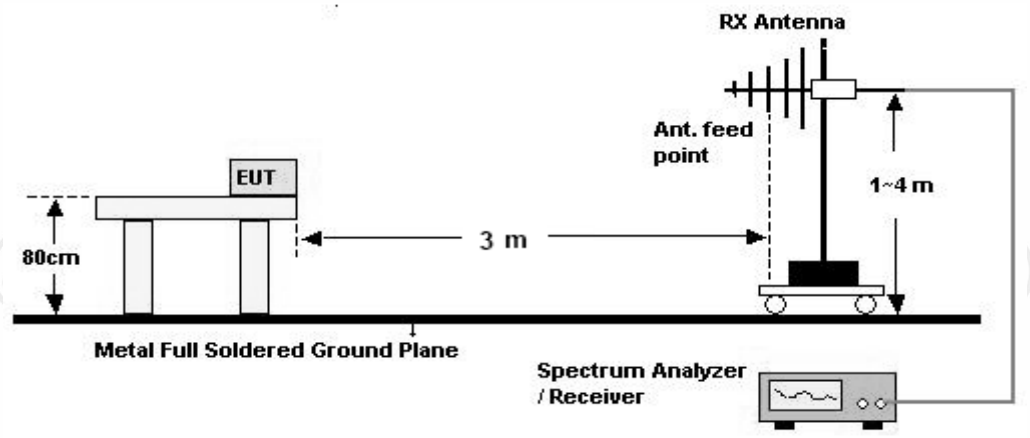
Note: the tighter limit applies at the band edges.

13.2. BLOCK DIAGRAM OF TEST SETUP

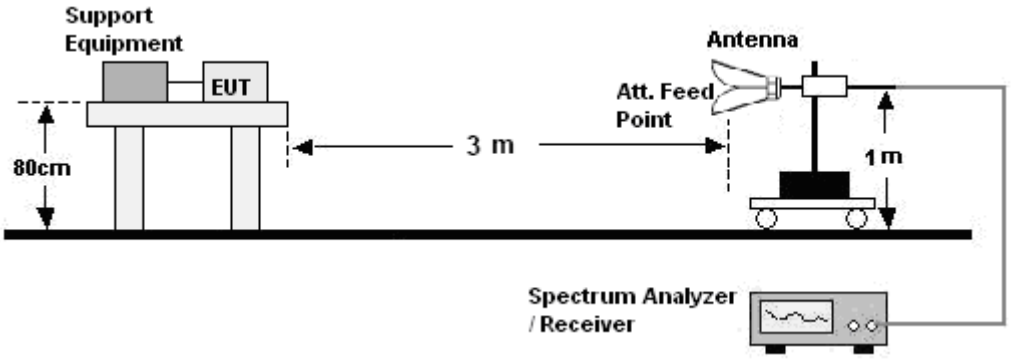
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30 - 1000MHz



For radiated emissions from 1GHz to 25GHz



13.3. TEST PROCEDURE

Below 30MHz:

a. The product is placed on a turntable 0.8 meters above the ground in the chamber, 1 meter away from the antenna (loop antenna). The maximum values of the field strength are recorded by adjusting the polarizations of the test antenna and rotating the turntable.

b. For each suspected emission, the product was arranged to its worst case and then turn table was turned from 0 degrees to 360 degrees to find the maximum reading.

c. The test frequency analyzer system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

30MHz ~ 1GHz:

a. The Product was placed on the non-conductive turntable 0.8m above the ground at a chamber.

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 100 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c. For each frequency whose maximum record was higher or close to limit, measure its QP value (120 kHz RBW): vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Above 1GHz:

a. The EUT was placed on the non-conductive turntable 0.8 m above the ground at a chamber.

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees

13.4. TEST RESULT

Below 30MHz:

No emissions were found higher than the background below 30MHz and background is lower than the limit, so it deems to compliance with the limit without recorded.

Above 30MHz:

The test data of worst case are below:

IEEE 802.11b, 1Mbps:

Frequency (MHz)	Antenna Polarization (H / V)	Detector (PK / QP / AV)	Factor (dB)	Final Result (dBμV/m)	Limit (dBμV/m)	Result (Pass / Fail)
Low channel (2412MHz)						
39.700	H	QP	13.6	39.60	40.0	Pass
1175.000	H	PK	-4.21	47.90	74.0	Pass
*2412.000	H	PK	1.99	88.21	---	Pass
4364.000	H	PK	6.97	50.50	74.0	Pass
200.058	V	QP	13.0	27.30	43.5	Pass
1016.667	V	PK	-4.21	53.65	74.0	Pass
*2412.000	V	PK	1.99	92.05	---	Pass
4364.000	V	PK	6.97	53.50	74.0	Pass
Middle channel (2437MHz)						
39.700	H	QP	13.6	38.20	40.0	Pass
*2437.000	H	PK	1.99	87.56	---	Pass
4874.000	H	PK	6.97	51.20	74.0	Pass
200.058	V	QP	13.0	26.70	43.5	Pass
1016.667	V	PK	-4.21	52.13	74.0	Pass
*2437.000	V	PK	1.99	91.46	---	Pass
4874.000	V	PK	6.97	52.89	74.0	Pass
High channel (2462MHz)						
39.700	H	QP	13.6	38.60	40.0	Pass
*2462.000	H	PK	1.99	87.70	---	Pass
4924.000	H	PK	6.97	51.90	74.0	Pass
200.058	V	QP	13.0	26.80	43.5	Pass
1016.667	V	PK	-4.21	52.57	74.0	Pass
*2462.000	V	PK	1.99	91.42	---	Pass
4924.000	V	PK	6.97	52.96	74.0	Pass

*: fundamental frequency

IEEE 802.11g, 6Mbps:

Frequency (MHZ)	Antenna Polarization (H / V)	Detector (PK / QP / AV)	Factor (dB)	Final Result (dBµV/m)	Limit (dBµV/m)	Result (Pass / Fail)
Low channel (2412MHz)						
39.700	H	QP	13.6	39.60	40.0	Pass
1175.000	H	PK	-4.21	47.80	74.0	Pass
*2412.000	H	PK	1.99	83.32	---	Pass
4364.000	H	PK	6.97	41.50	74.0	Pass
200.058	V	QP	13.0	27.30	43.5	Pass
1016.667	V	PK	-4.21	53.60	74.0	Pass
*2412.000	V	PK	1.99	87.62	---	Pass
4364.000	V	PK	6.97	47.30	74.0	Pass
Middle channel (2437MHz)						
39.700	H	QP	13.6	38.20	40.0	Pass
*2437.000	H	PK	1.99	83.34	---	Pass
4874.000	H	PK	6.97	41.30	74.0	Pass
200.058	V	QP	13.0	26.70	43.5	Pass
1016.667	V	PK	-4.21	52.13	74.0	Pass
*2437.000	V	PK	1.99	87.50	---	Pass
4874.000	V	PK	6.97	47.60	74.0	Pass
High channel (2462MHz)						
39.700	H	QP	13.6	38.60	40.0	Pass
*2462.000	H	PK	1.99	83.41	---	Pass
4924.000	H	PK	6.97	41.28	74.0	Pass
200.058	V	QP	13.0	26.80	43.5	Pass
1016.667	V	PK	-4.21	52.57	74.0	Pass
*2462.000	V	PK	1.99	87.20	---	Pass
4924.000	V	PK	6.97	47.10	74.0	Pass

*: fundamental frequency

IEEE 802.11n HT20, MCS0:

Frequency (MHZ)	Antenna Polarization (H / V)	Detector (PK / QP / AV)	Factor (dB)	Final Result (dBμV/m)	Limit (dBμV/m)	Result (Pass / Fail)
Low channel (2412MHz)						
39.700	H	QP	13.6	39.60	40.0	Pass
1175.000	H	PK	-4.21	47.80	74.0	Pass
*2412.000	H	PK	1.99	87.37	---	Pass
4364.000	H	PK	6.97	41.25	74.0	Pass
200.058	V	QP	13.0	27.30	43.5	Pass
1016.667	V	PK	-4.21	53.60	74.0	Pass
*2412.000	V	PK	1.99	87.35	---	Pass
4364.000	V	PK	6.97	42.56	74.0	Pass
Middle channel (2437MHz)						
39.700	H	QP	13.6	38.20	40.0	Pass
*2437.000	H	PK	1.99	87.39	---	Pass
4874.000	H	PK	6.97	51.20	74.0	Pass
200.058	V	QP	13.0	26.70	43.5	Pass
1016.667	V	PK	-4.21	52.13	74.0	Pass
*2437.000	V	PK	1.99	87.42	---	Pass
4874.000	V	PK	6.97	52.89	74.0	Pass
High channel (2462MHz)						
39.700	H	QP	13.6	38.60	40.0	Pass
*2462.000	H	PK	1.99	87.28	---	Pass
4924.000	H	PK	6.97	41.23	74.0	Pass
200.058	V	QP	13.0	26.80	43.5	Pass
1016.667	V	PK	-4.21	52.57	74.0	Pass
*2462.000	V	PK	1.99	87.56	---	Pass
4924.000	V	PK	6.97	42.93	74.0	Pass

*: fundamental frequency

IEEE 802.11n HT40, MCS0:

Frequency (MHZ)	Antenna Polarization (H / V)	Detector (PK / QP / AV)	Factor (dB)	Final Result (dBμV/m)	Limit (dBμV/m)	Result (Pass / Fail)
Low channel (2422MHz)						
39.700	H	QP	13.6	39.60	40.0	Pass
1175.000	H	PK	-4.21	47.80	74.0	Pass
*2422.000	H	PK	1.99	80.79	---	Pass
4844.000	H	PK	6.97	40.21	74.0	Pass
200.058	V	QP	13.0	27.30	43.5	Pass
1016.667	V	PK	-4.21	53.60	74.0	Pass
*2422.000	V	PK	1.99	86.19	---	Pass
4844.000	V	PK	6.97	42.35	74.0	Pass
Middle channel (2437MHz)						
39.700	H	QP	13.6	38.20	40.0	Pass
*2437.000	H	PK	1.99	80.85	---	Pass
4874.000	H	PK	6.97	40.45	74.0	Pass
200.058	V	QP	13.0	26.70	43.5	Pass
1016.667	V	PK	-4.21	52.13	74.0	Pass
*2437.000	V	PK	1.99	86.32	---	Pass
4874.000	V	PK	6.97	42.36	74.0	Pass
High channel (2452MHz)						
39.700	H	QP	13.6	38.60	40.0	Pass
*2452.000	H	PK	1.99	80.93	---	Pass
4904.000	H	PK	6.97	41.40	74.0	Pass
200.058	V	QP	13.0	26.80	43.5	Pass
1016.667	V	PK	-4.21	52.57	74.0	Pass
*2452.000	V	PK	1.99	86.40	---	Pass
4904.000	V	PK	6.97	42.16	74.0	Pass

*: fundamental frequency

Remark:

1. The above tables show that the frequencies peak data are all below the average limit, so the average data of these frequencies are deems to fulfill the average limits and not reported.
2. According to the emissions below 18GHz, the data curve is lower than the limit, and the data between 18GHz to 25GHz will be lower than the limit, so they are not recorded in the report.
3. All outside of operating frequency band and restricted band specified are below 15.209.

14. CONDUCTED EMISSION TEST

14.1. LIMITS

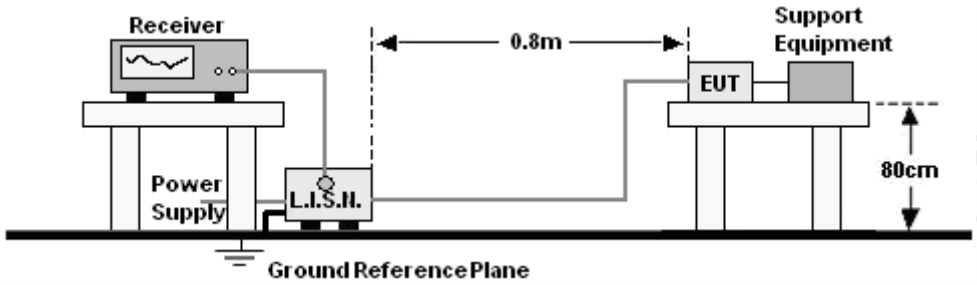
Limits for Class B digital devices

Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

NOTE: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

14.2. BLOCK DIAGRAM OF TEST SETUP



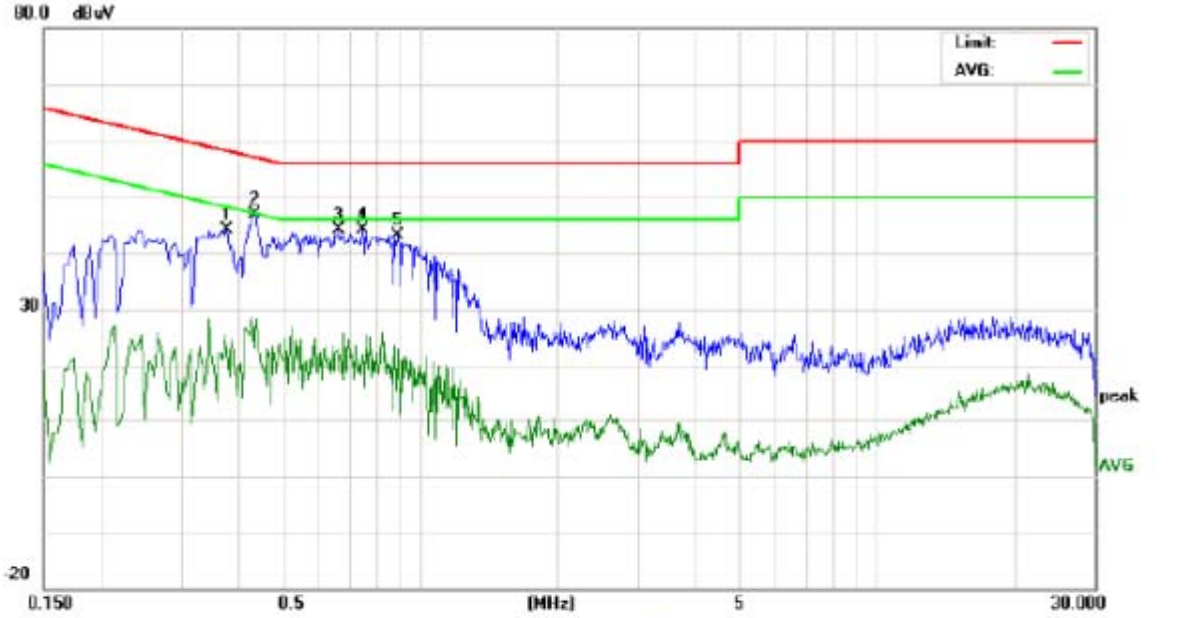
14.3. PROCEDURE OF CONDUCTED EMISSION TEST

a. The Product was placed on a nonconductive table above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).

b. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.

c. For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

14.4. GRAPHS AND DATA

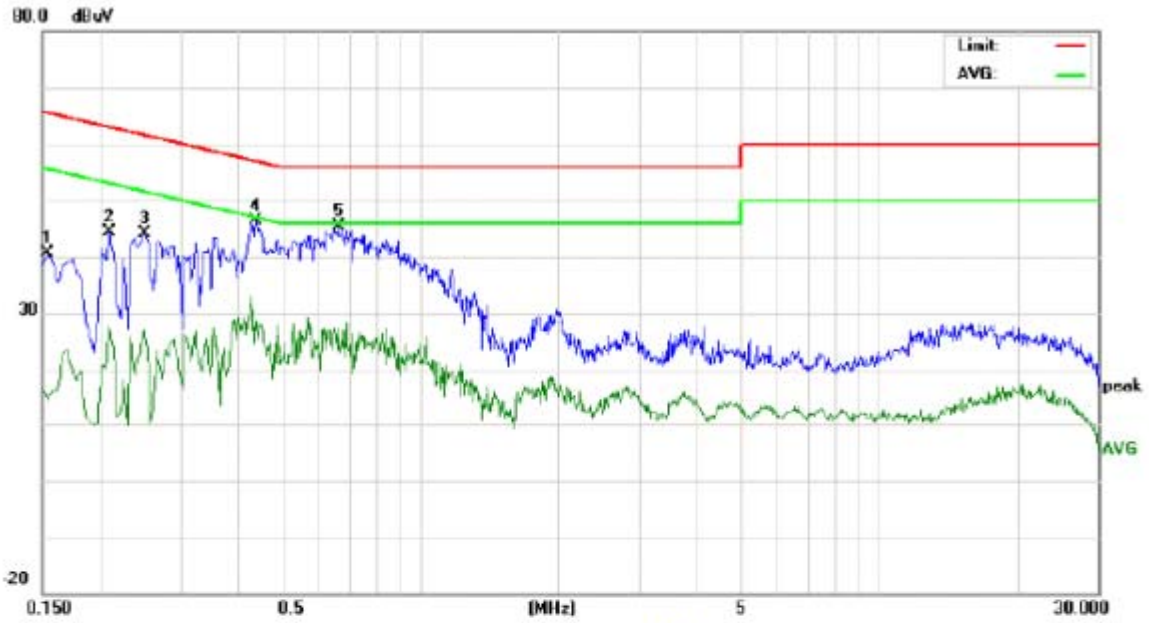


Site site #1
Limit: FCC CE
EUT: IP CAM
M/N: 256H1
Mode: WIFI
Note:

Phase: L
Power: AC 120V/60Hz

Temperature: 20
Humidity: 48 %

No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F Comment
1	0.3780	34.21	32.10	12.99	9.80	44.01	41.90	22.79	58.32	48.32	-16.42	-25.53	P
2	0.4340	37.14	35.40	13.34	9.80	46.94	45.20	23.14	57.18	47.18	-11.98	-24.04	P
3	0.6660	34.31	31.60	9.64	9.80	44.11	41.40	19.44	56.00	46.00	-14.60	-26.56	P
4	0.7500	34.33	32.40	12.03	9.80	44.13	42.20	21.83	56.00	46.00	-13.80	-24.17	P
5	0.8900	33.37	31.80	9.63	9.80	43.17	41.60	19.43	56.00	46.00	-14.40	-26.57	P



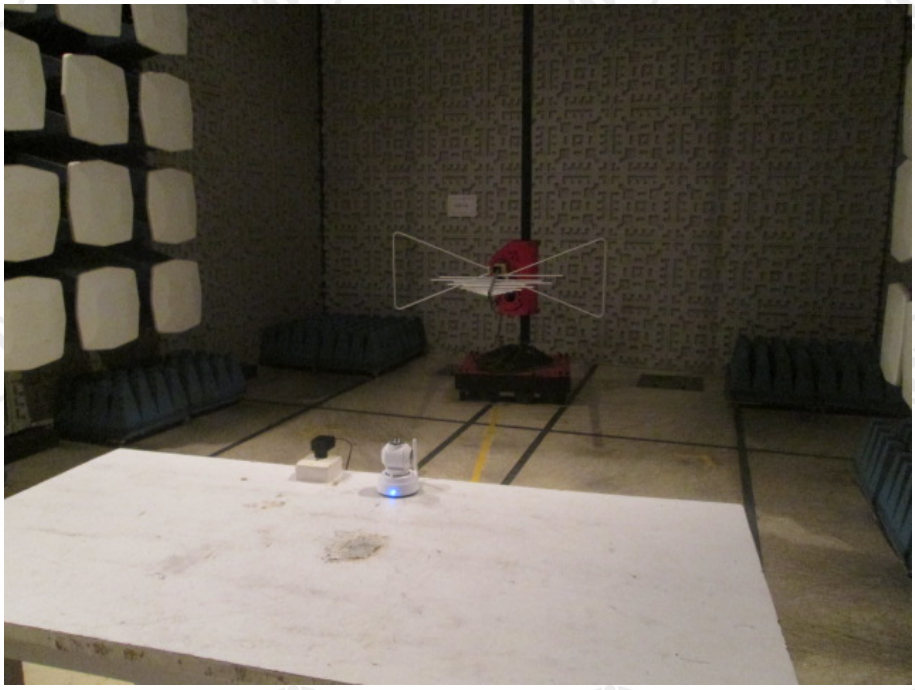
Site site #1
Limit: FCC CE
EUT: IP CAM
M/N: 256H1
Mode: WIFI
Note:

Phase: N
Power: AC 120V/60Hz

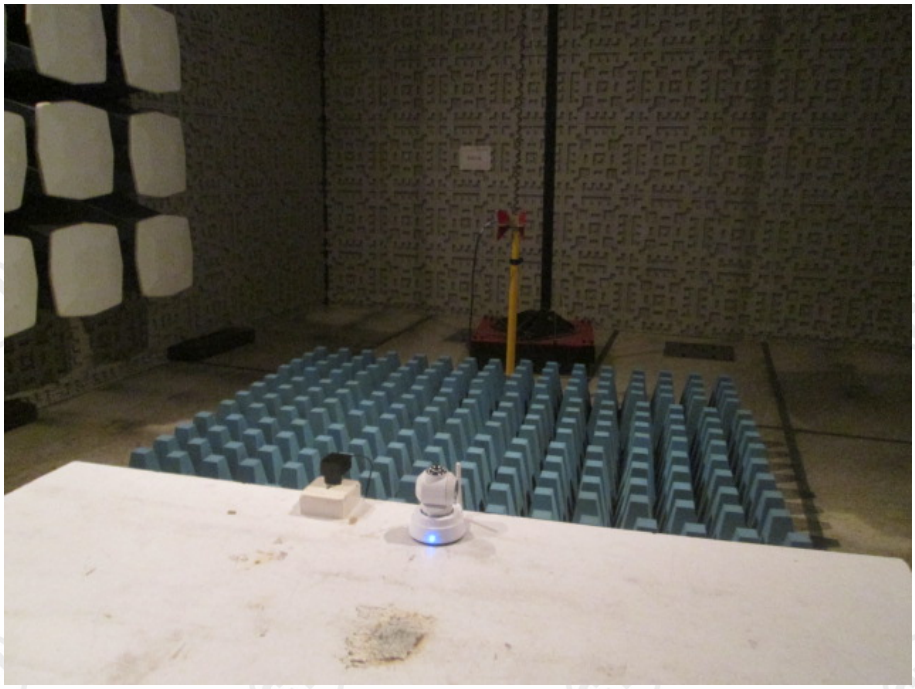
Temperature: 20
Humidity: 48 %

No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	0.1539	30.87	25.40	5.00	9.75	40.62	35.15	14.75	65.78	55.78	-30.63	-41.03	P	
2	0.2100	34.56	31.20	17.73	9.80	44.36	41.00	27.53	63.20	53.20	-22.20	-25.67	P	
3	0.2500	34.24	31.80	17.29	9.80	44.04	41.60	27.09	61.75	51.75	-20.15	-24.66	P	
4	0.4380	36.51	33.50	18.92	9.80	46.31	43.30	28.72	57.10	47.10	-13.80	-18.38	P	
5	0.6620	35.48	32.64	17.60	9.80	45.28	42.44	27.40	56.00	46.00	-13.56	-18.60	P	

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP



TEST SETUP OF RADIATED EMISSION (30MHz-1GHz)



TEST SETUP OF RADIATED EMISSION (above 1GHz)

TEST SETUP OF CONDUCTED EMISSION

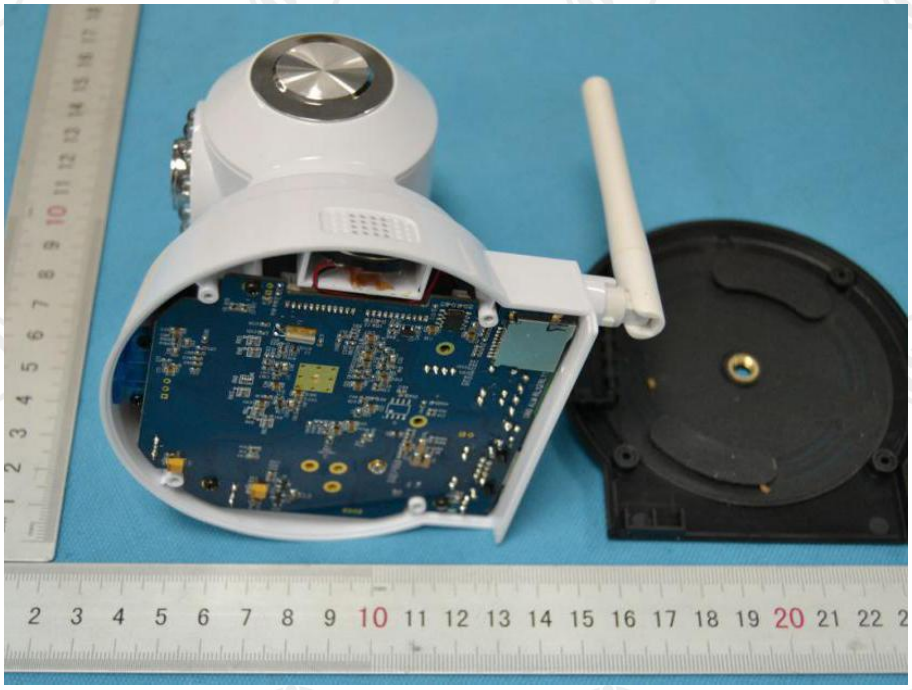
APPENDIX 2 EXTERNAL PHOTOGRAPHS OF PRODUCT

External View of product-1

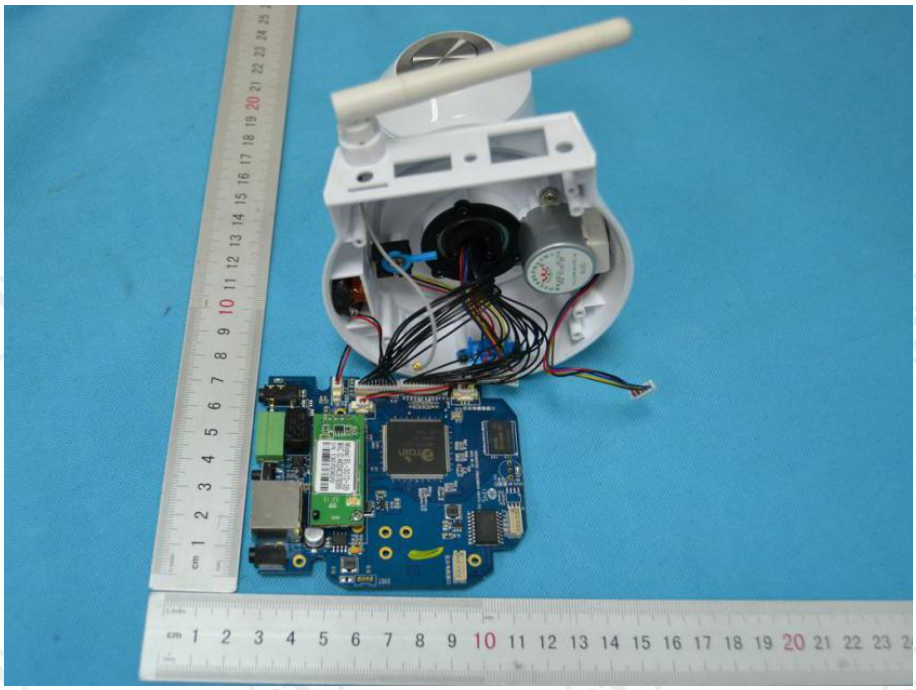
External View of product-2

External View of product-3

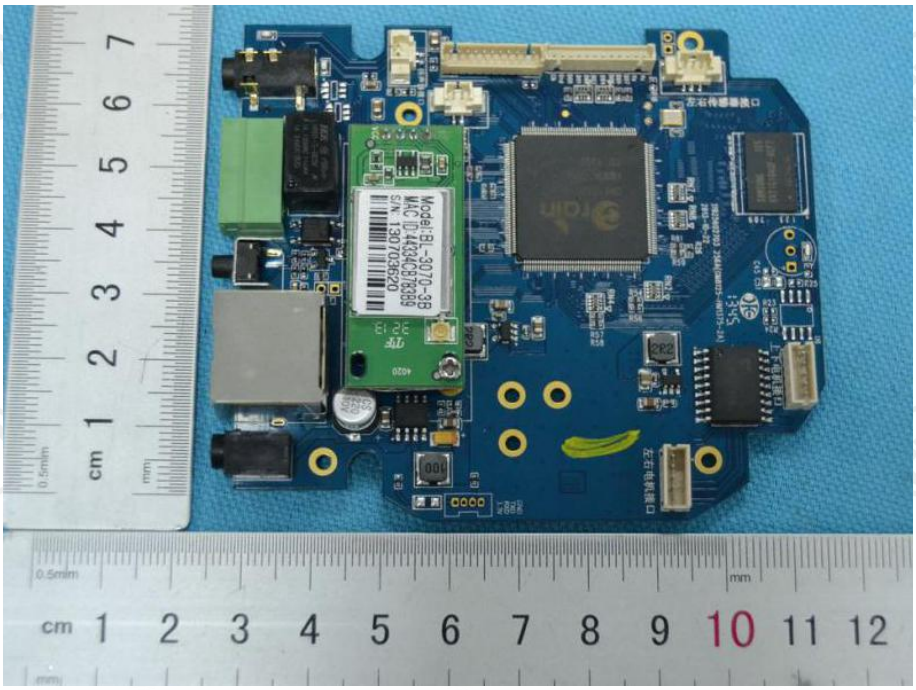
APPENDIX 3 INTERNAL PHOTOGRAPHS OF PRODUCT



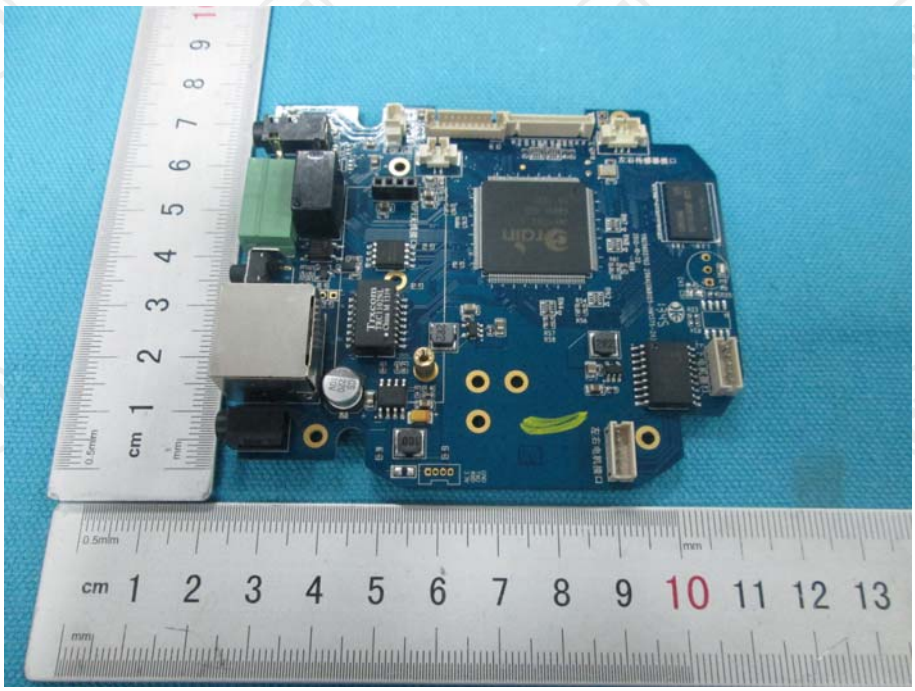
Internal View of product-1



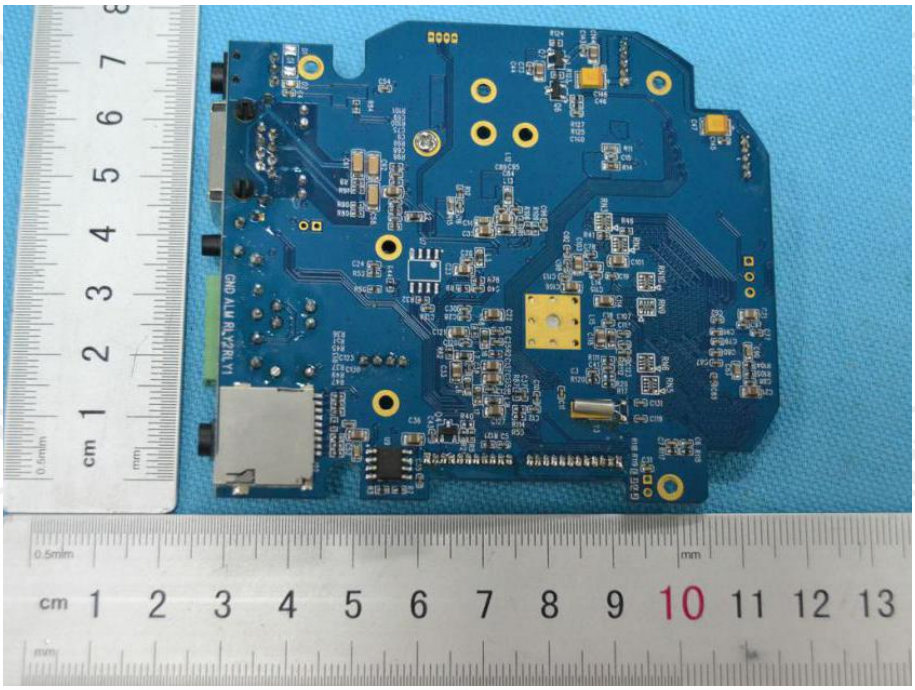
Internal View of product-2



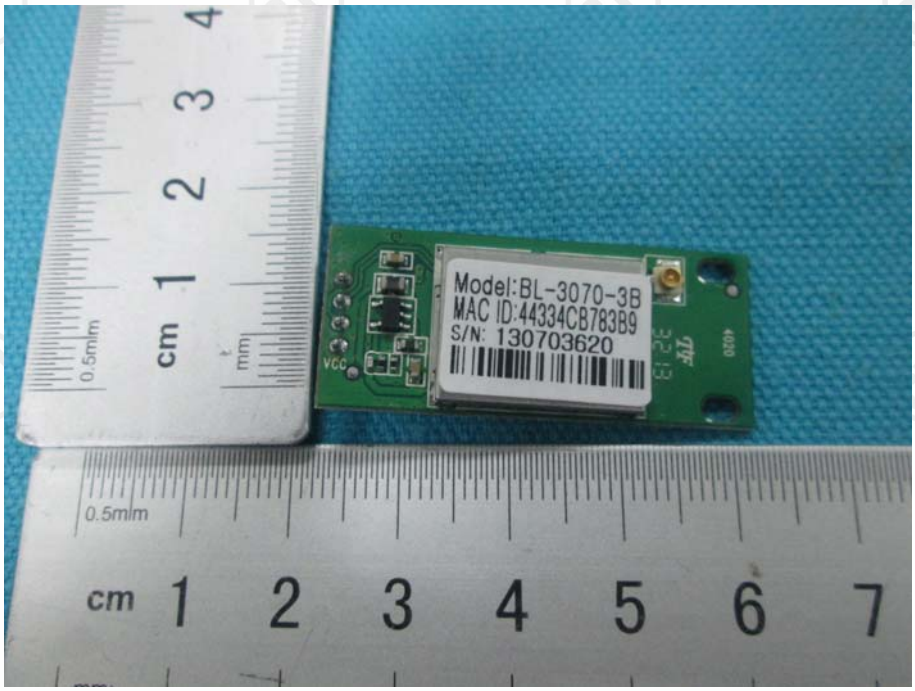
Internal View of product-3



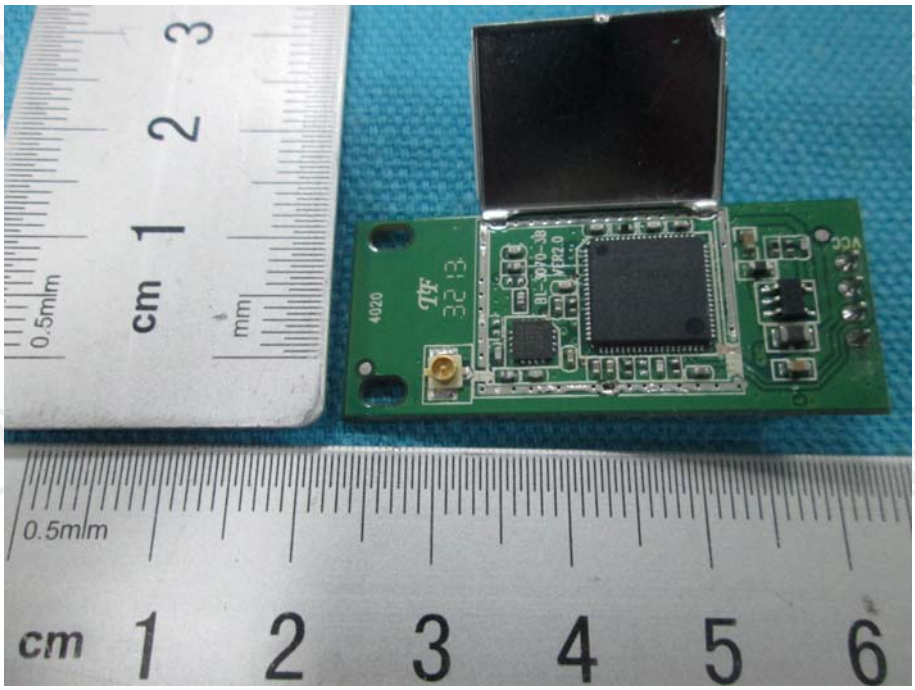
Internal View of product-4



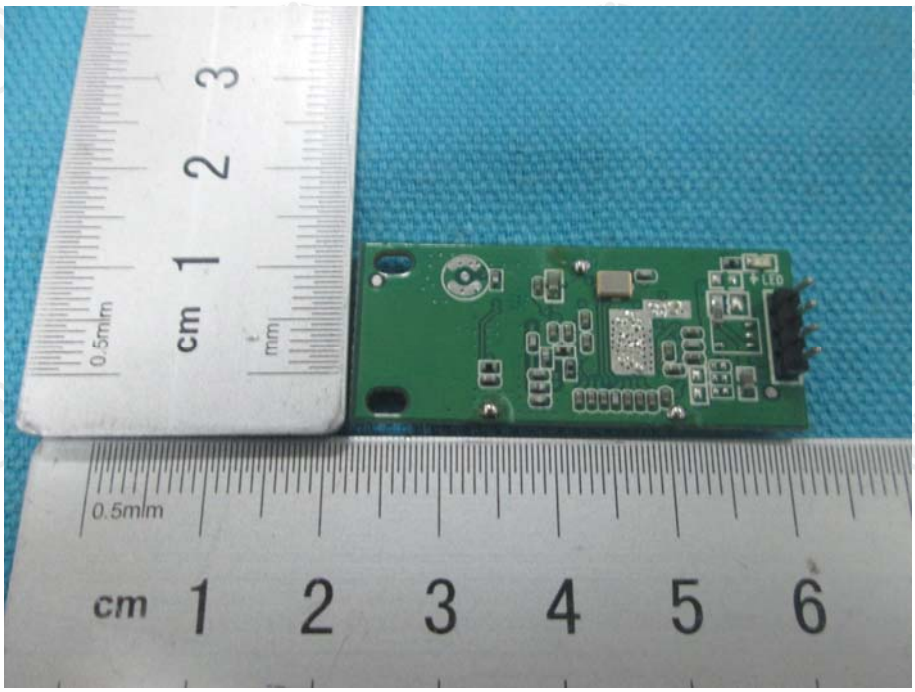
Internal View of product-5



Internal View of product-6



Internal View of product-7



Internal View of product-8

*** End of Report ***