FCC TEST REPORT

Product	:	HD DRIVE RECORDER
Trade mark	:	CYL-V
Model/Type reference	:	DV301, DV302, DV303, DV304
Serial number	:	N/A
Ratings	:	DC 12V-24V
FCC ID	:	2AEDL-CYL-V
Report number	:	EED32H000183-1
Date	:	Mar. 12, 2015
Regulations	:	See below

Test Standards	Results
☒ 47 CFR FCC Part 15 Subpart C 15.247: 2014	PASS

Prepared for:

ROSCO, INC

90-21 144TH PLACE, JAMAICA, NY 11435, United States

Prepared by:

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Approved by: Jimmy Li Date: Mar. 12, 2014

Jimmy Li
Lab manager

Check No.: 1702048896

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Description Page

N/A means not applicable.

1. CERTIFICATION INFORMATION

Applicant: ROSCO, INC
90-21 144TH PLACE, JAMAICA, NY 11435, United States

Manufacturer: Shenzhen Samoon Technology Co., Ltd
9th Floor, Block 7, Zhongyuntai Industrial Park, Songbai Road, Shiyan Town, Bao'an District, Shenzhen, China

Equipment authorization: Certification

FCC ID: 2AEDL-CYL-V

Product: HD DRIVE RECORDER

Model/Type reference: DV301, DV302, DV303, DV304

Trade Name: CYL-V

Serial Number: N/A

Report Number: EED32H000183-1

Sample Received Date: Feb. 18, 2015

Sample tested Date: Feb. 18, 2015 to Mar. 12, 2015

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 and ANSI C63.10:2013.

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	**N/A**
8	Antenna requirements	15.203	**PASS** (See Notes)

Notes: The product uses an 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

Items	Description
Rating	DC 12V-24V
Transmit Data Rate	6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps
Type of Modulation	IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Type	Integral antenna
Connector	fixed on board
Gain	0dBi

Technical Specification of WiFi module (802.11g)

Item	Description
Operating Frequency band	2412-2462MHz
Channel Number	11
Channel Bandwidth (MHz)	20

Technical Specification of Carrier Frequency

Frequency Band	Channel No.	Frequency	Channel No.	Frequency	Channel No.	Frequency
2412-2462MHz (802.11g)	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	--	--

Model DV301, DV302, DV303 and DV304 are almost the same (including similar circuit, components, construction) except model name and outer color. Model DV304 was selected for full testing and evaluation

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 DC 12V. 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	Serial No.	Due Date
3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	07/12/2016
Spectrum Analyzer	Agilent	E4443A	MY45300910	01/15/2016
Receiver	R&S	ESCI	100435	07/08/2015
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	617	07/13/2015
Multi device Controller	ETS-LINGREN	2090	00057230	N/A
Horn Antenna	ETS-LINGREN	3117	00057407	07/07/2015
Microwave Preamplifier	Agilent	8449B	3008A02425	03/19/2015
Spectrum Analyzer	R&S	FSP40	100416	07/06/2015

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.

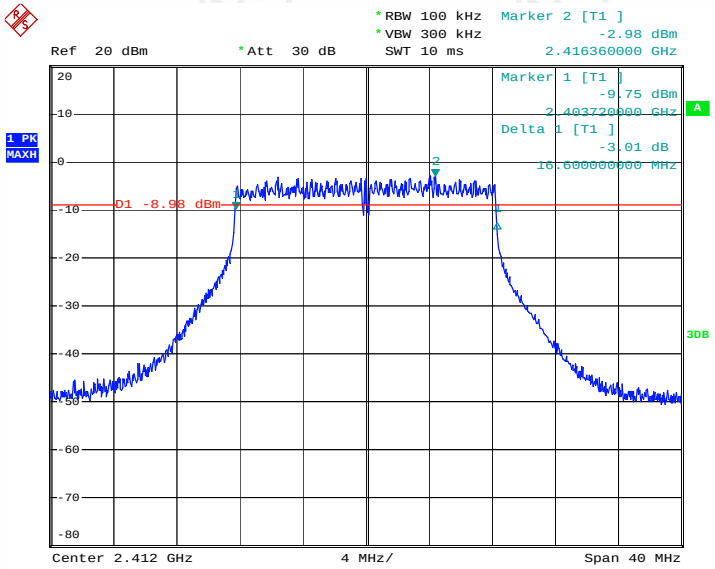
8.4. TEST RESULT

The test data of worst case are below:

802.11g, 6Mbps

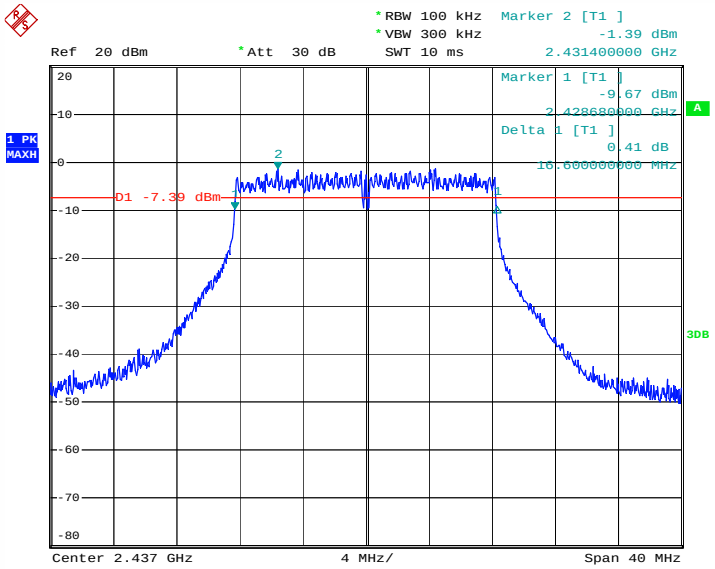
Frequency (MHz)	Measured Value (MHz)	Result
2412	16.60	PASS
2437	16.60	PASS
2462	16.52	PASS

Please see the following plots (worst case):
802.11g, 6Mbps:



Date: 5.MAR.2015 09:01:03

Low channel



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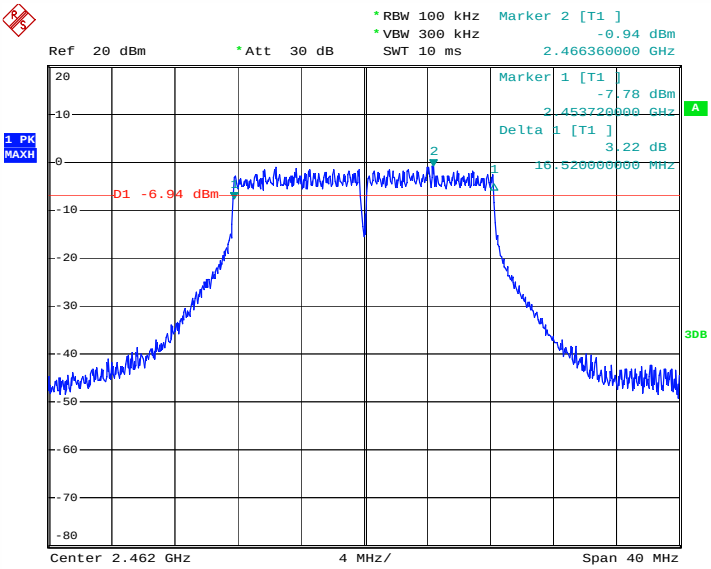
Middle channel



Date: 5.MAR.2015 09:09:23

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.

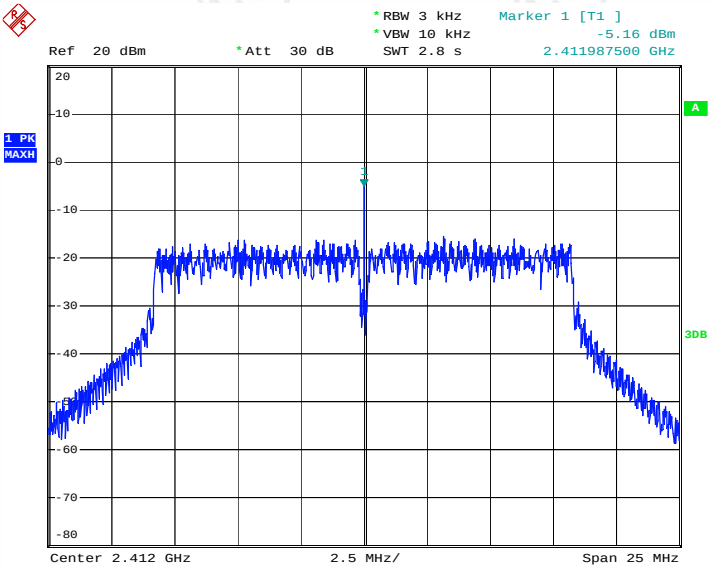
9.4. TEST RESULT

The test data of worst case are below:

802.11g, 6Mbps

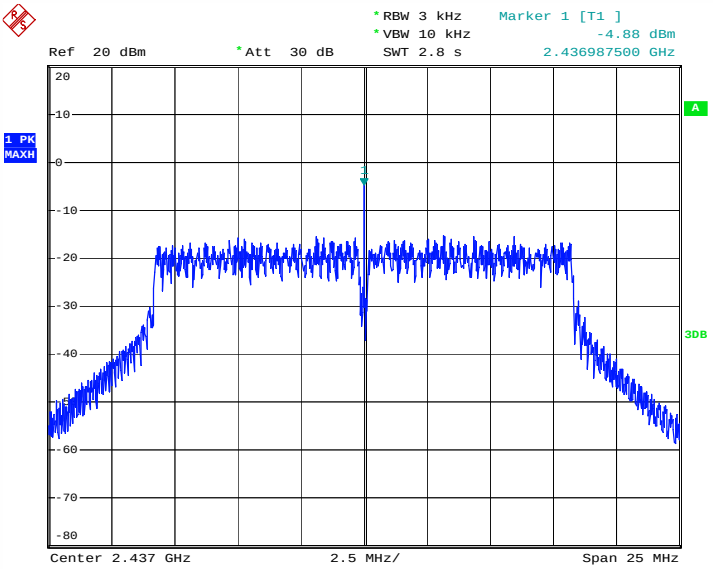
Frequency (MHz)	Measured Value (dBm)	Result
2412	-5.16	PASS
2437	-4.88	PASS
2462	-4.54	PASS

Please see the following plots (worst case):
802.11g, 6Mbps:



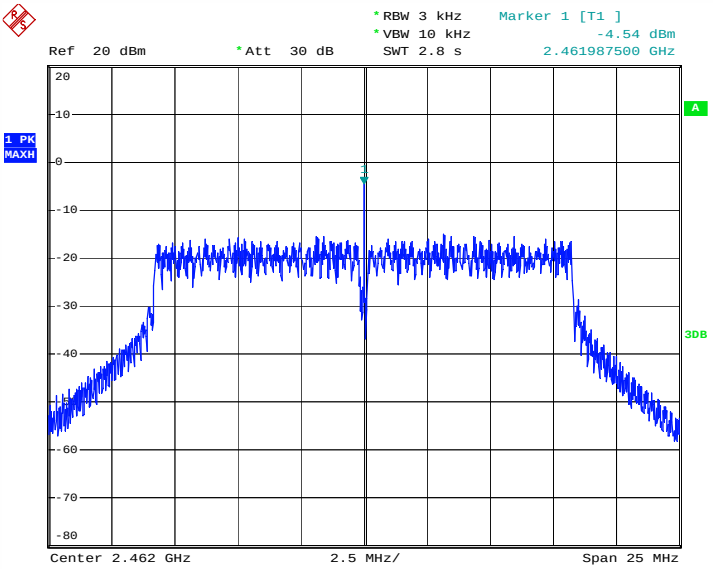
Date: 5.MAR.2015 09:14:57

Low channel



Date: 5.MAR.2015 09:18:26

Middle channel



Date: 5.MAR.2015 09:20:24

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

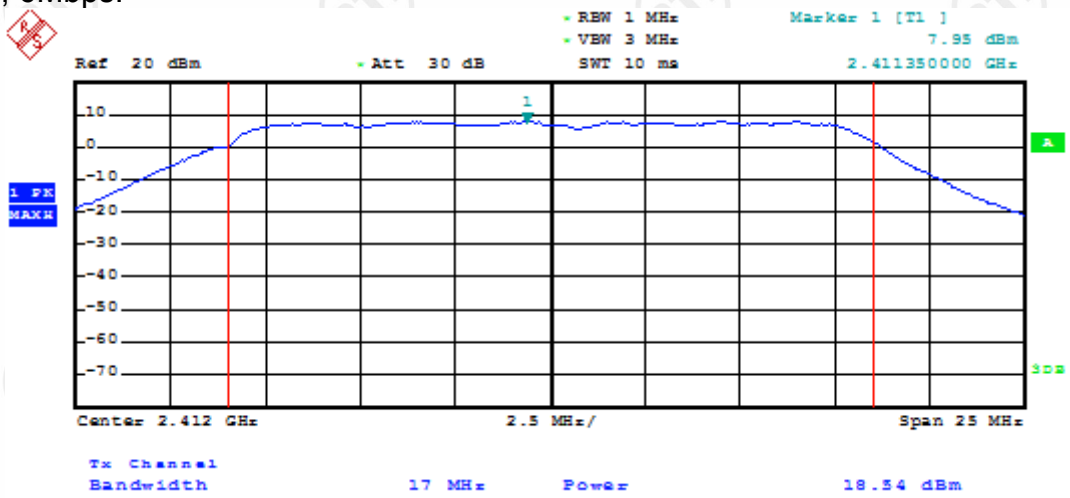
1. The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.
2. Set spectrum analyzer's RBW and VBW to applicable and set span wide enough to capture the whole plot, record the frequency of the max emission in the plot.
3. Set the frequency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

10.4. TEST RESULT

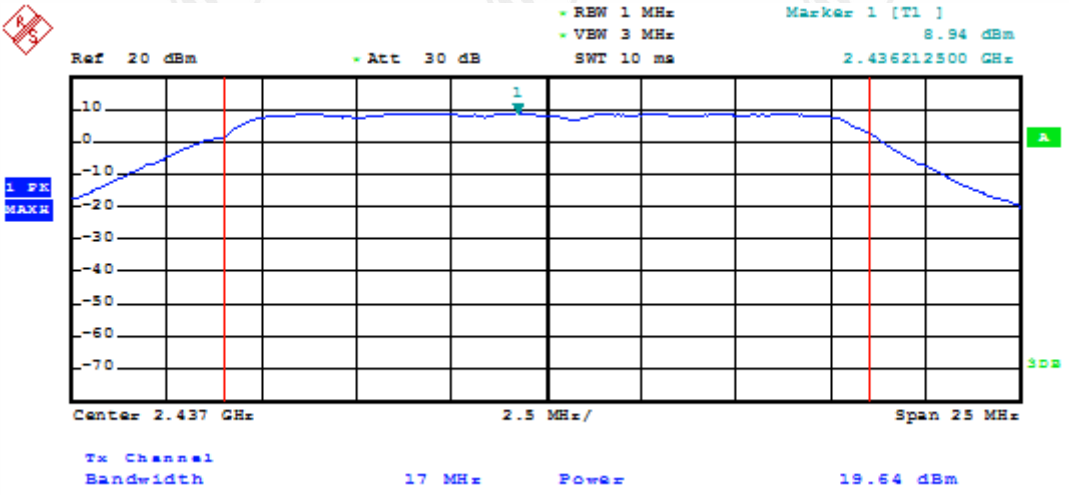
802.11g:

Frequency (MHz)	Data rate (Mbps)	Result (dBm)	Limit (dBm)
Low Channel: 2412	6	18.54	30
	18	18.21	30
	54	19.74	30
Middle Channel: 2437	6	19.64	30
	18	19.07	30
	54	19.55	30
High Channel: 2462	6	19.74	30
	18	19.09	30
	54	19.68	30

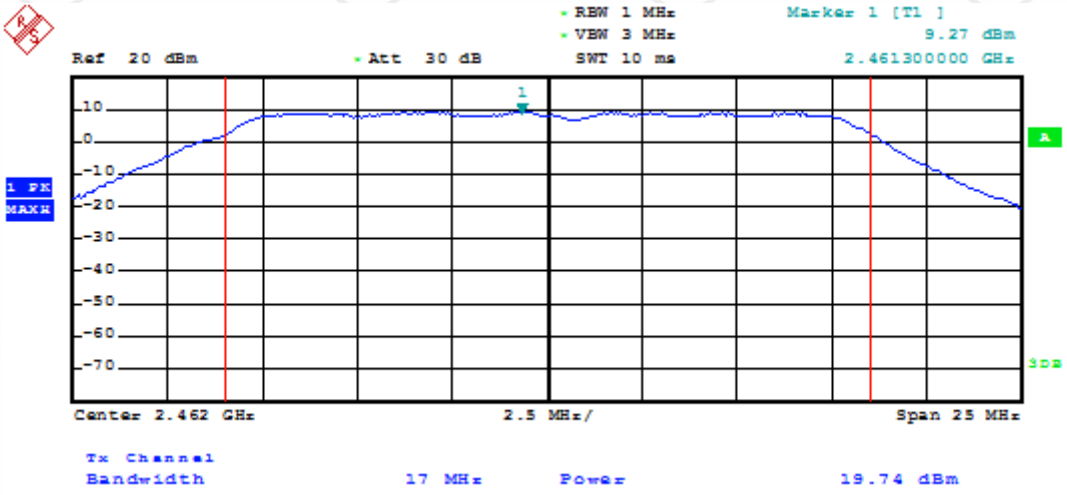
Please see the following plots (worst case):
802.11g, 6Mbps:



Low channel



Middle channel



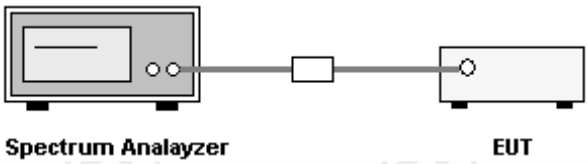
High channel

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



11.3. TEST PROCEDURE

a) Set to the maximum power setting and enable the EUT transmit continuously.

b) Set RBW = 100 kHz, VBW = 300 kHz (≥ RBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

c) Enable hopping function of the EUT and then repeat step a and b.

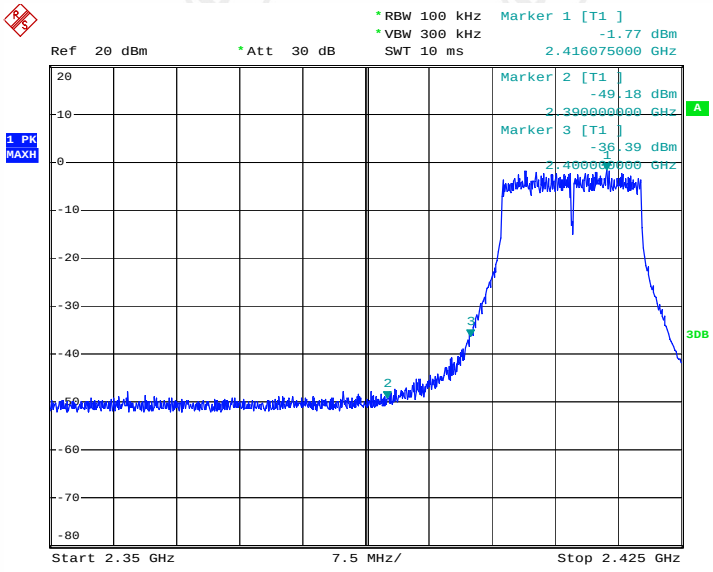
d) Measure and record the results in the test report.

11.4. TEST RESULT

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

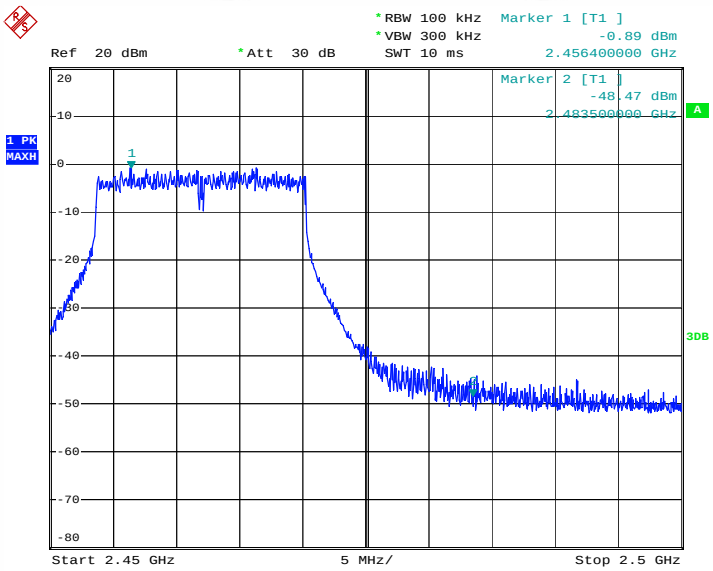
802.11g, 6Mbps:

2412MHz:



Date: 5.MAR.2015 09:25:37

2462MHz:



Date: 5.MAR.2015 09:29:59

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.

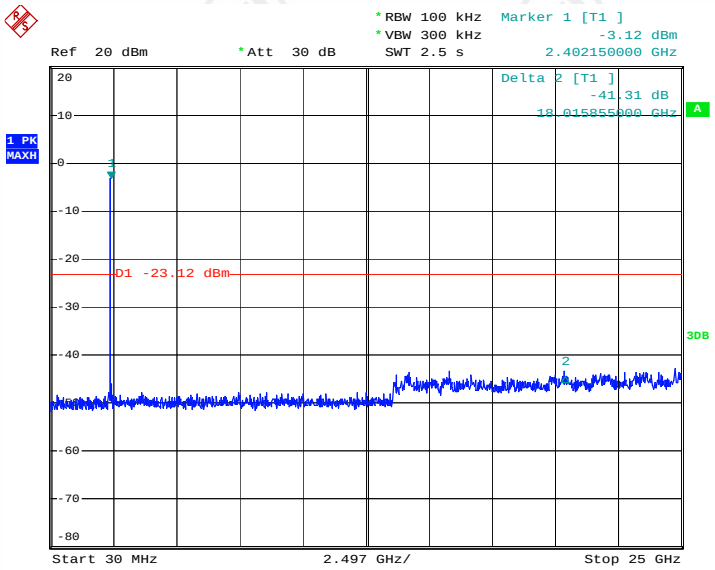
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.

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

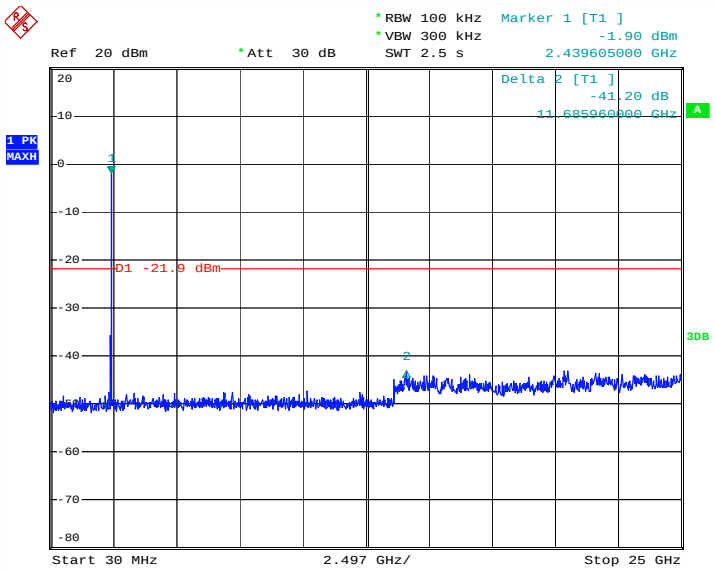
Worst case data---Please see the following plots.

802.11g, 6Mbps:



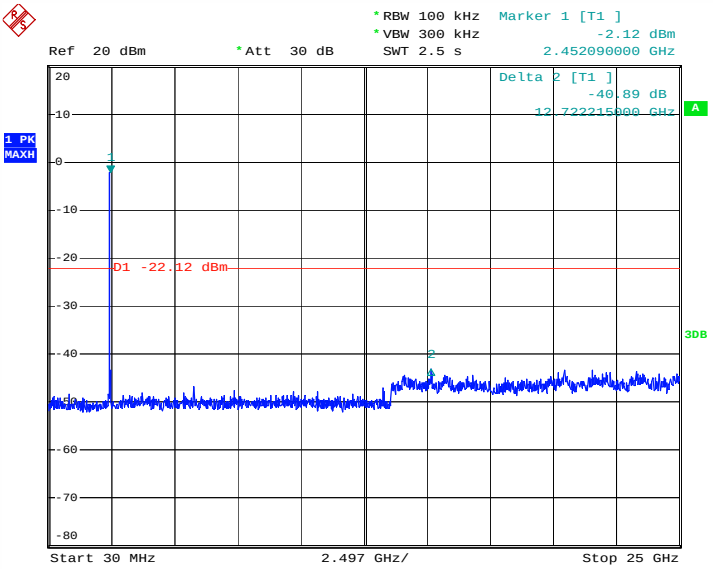
Date: 5.MAR.2015 09:39:48

Low channel



Date: 5.MAR.2015 09:41:34

Middle channel



Date: 5.MAR.2015 09:45:43

High channel

13. RADIATED EMISSIONS MEASUREMENT

13.1. LIMITS

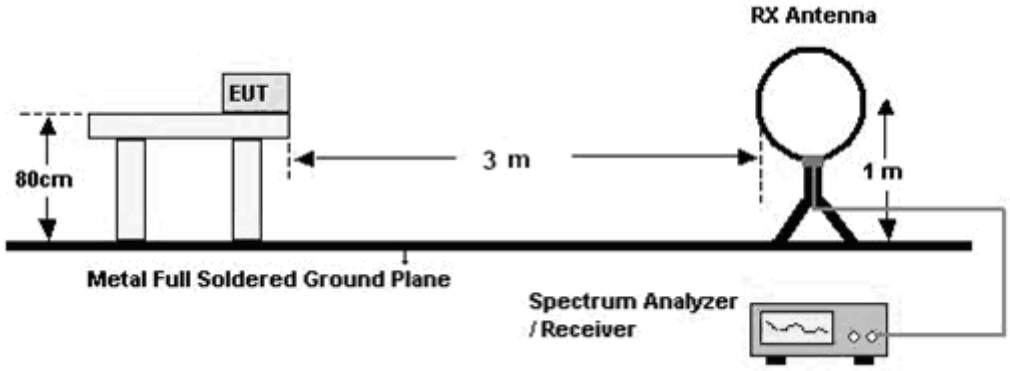
The field strength of any emissions, which appear outside of operating frequency band and restricted band specified on 15.205(a), shall not exceed the general radiated emission limits as below.

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

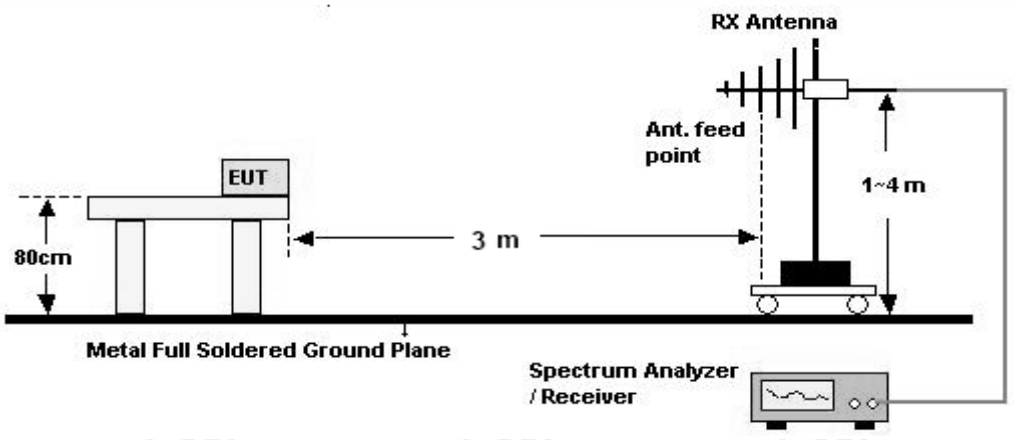
Note: the tighter limit applies at the band edges.

13.2. BLOCK DIAGRAM OF TEST SETUP

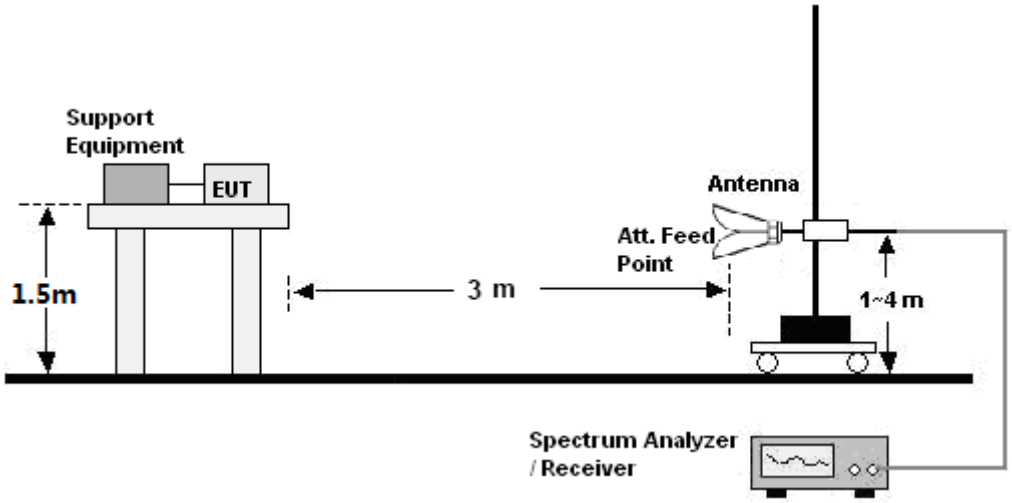
For radiated emissions from 9kHz to 30MHz



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 1.5 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

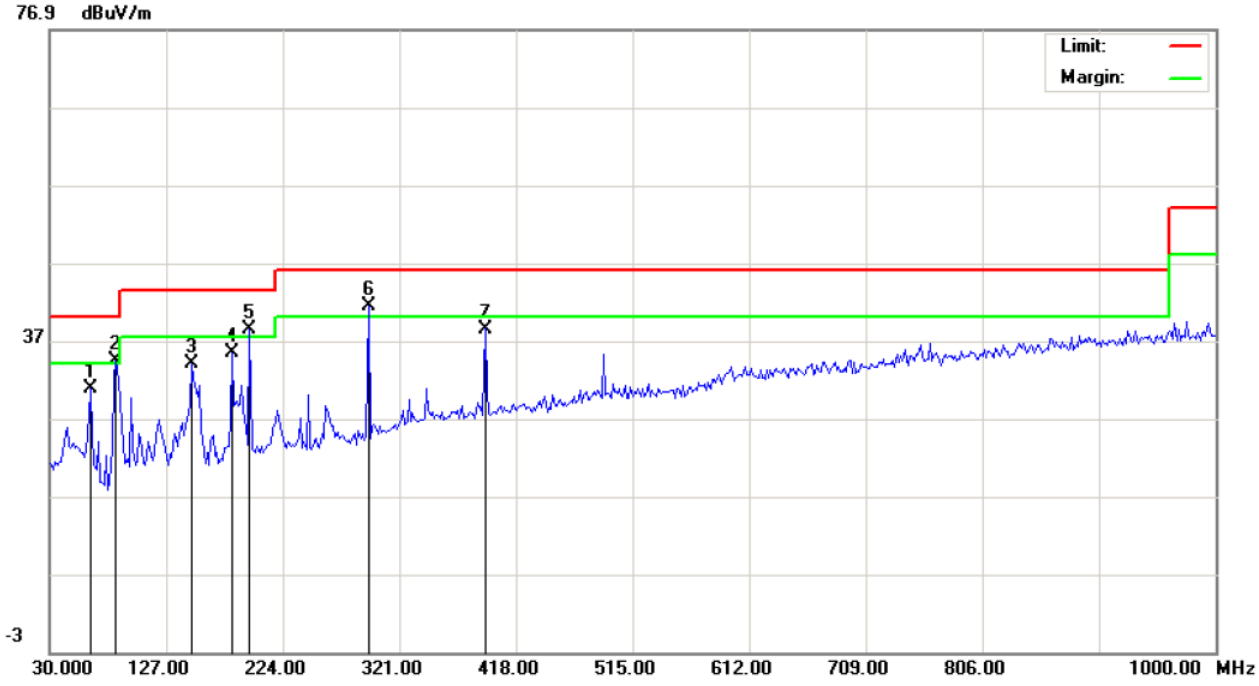
Below 30MHz:

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.

30MHz ～ 1GHz:

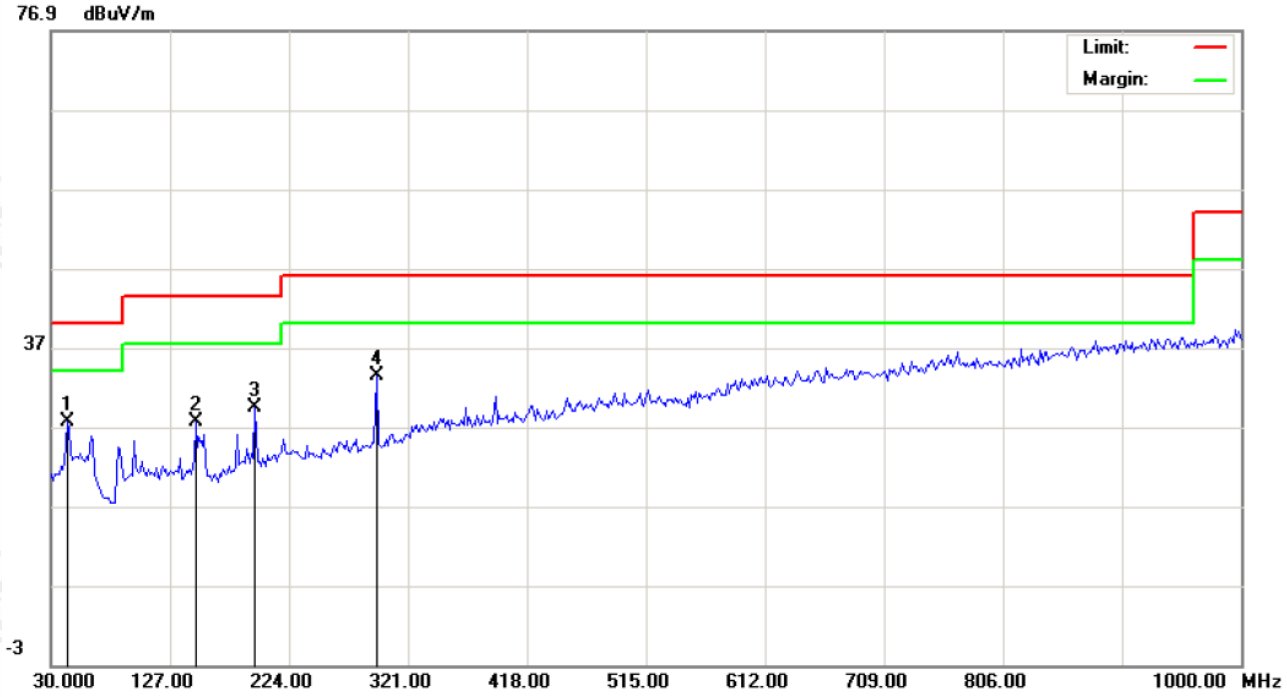
The test data of low channel, middle channel and high channel in IEEE 802.11b/g/n are almost same in frequency bands 30MHz to 1GHz and the data of low channel in IEEE 802.11b of 1Mbps are chosen as representative in below:

H:



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	63.9500	17.50			13.30	30.80			40.00		-9.20		P	
2	84.9666	24.24	23.36		10.19	34.43	33.55		40.00		-6.45		P	
3	148.0167	21.39			12.55	33.94			43.50		-9.56		P	
4	181.9667	21.60			13.71	35.31			43.50		-8.19		P	
5	196.5167	24.22			14.27	38.49			43.50		-5.01		P	
6	295.1333	24.91	23.01		16.58	41.49	39.59		46.00		-6.41		P	
7	392.1333	19.06			19.44	38.50			46.00		-7.50		P	

V:



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	42.9333	12.73			14.84	27.57			40.00		-12.43		P	
2	148.0167	15.03			12.55	27.58			43.50		-15.92		P	
3	196.5167	15.05			14.27	29.32			43.50		-14.18		P	
4	295.1333	16.78			16.58	33.36			46.00		-12.64		P	

Above 1GHz:

The test data of worst case are below:

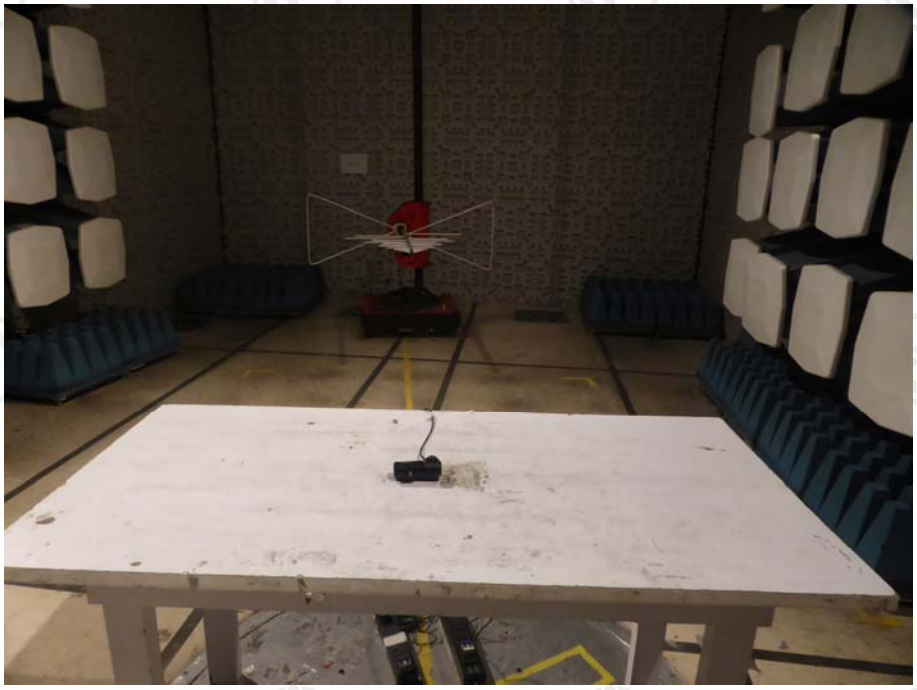
IEEE 802.11g, 6Mbps:

Frequency (MHz)	Measurement (dBuV/m)	Limit (dBuV/m)	Detector Type	Antenna (H/V)	Result (P/F)
Low channel (2412MHz)					
2390.0	34.12	74	PK	H	P
2400.0	45.13	74	PK	H	P
4824.0	43.66	74	PK	H	P
2390.0	35.10	74	PK	V	P
2400.0	44.80	74	PK	V	P
4824.0	44.18	74	PK	V	P
Middle channel (2437MHz)					
4874.0	45.19	74	PK	H	P
7311.0	34.18	74	PK	H	P
4874.0	46.10	74	PK	V	P
High channel (2462MHz)					
2483.5	34.98	74	PK	H	P
4924.0	42.78	74	PK	H	P
2483.5	38.74	74	PK	V	P
4924.0	43.95	74	PK	V	P

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. No emission found from 18GHz to 25GHz.
3. All outside of operating frequency band and restricted band specified are below 15.209.

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP



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

TEST SETUP OF RADIATED EMISSION (above 1GHz)

APPENDIX 2 EXTERNAL PHOTOGRAPHS OF PRODUCT

External View of product-1

External View of product-2

External View of product-3

External View of product-4

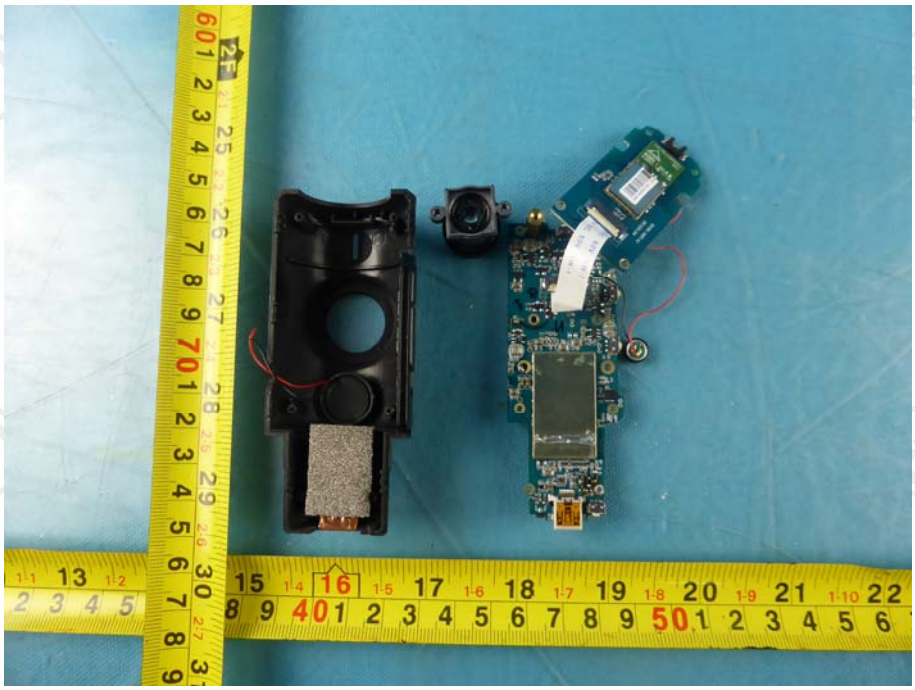
External View of product-5

External View of product-6

APPENDIX 3 INTERNAL PHOTOGRAPHS OF PRODUCT

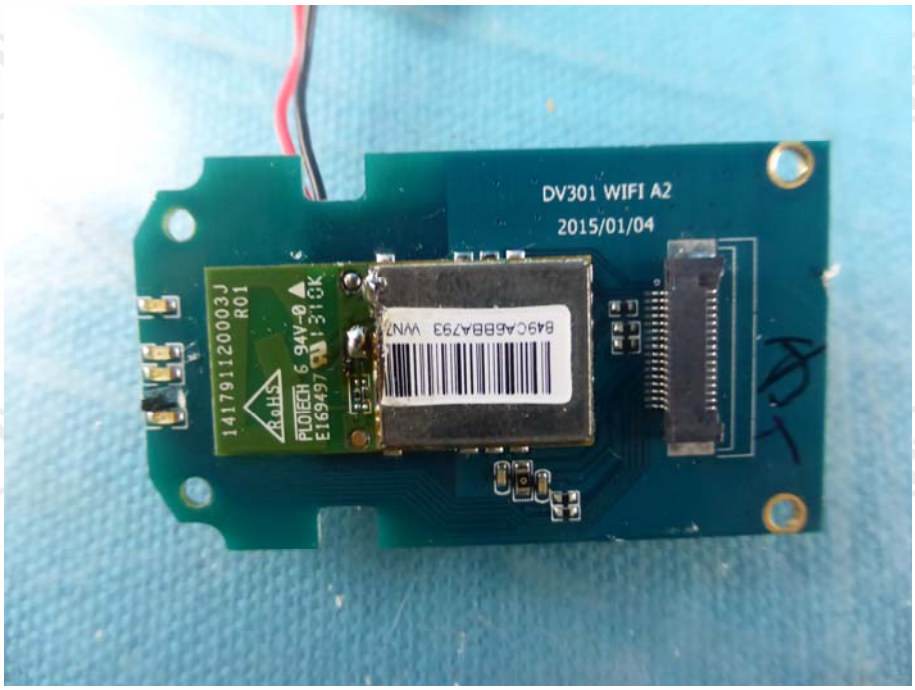
Internal View of product-1

Internal View of product-2

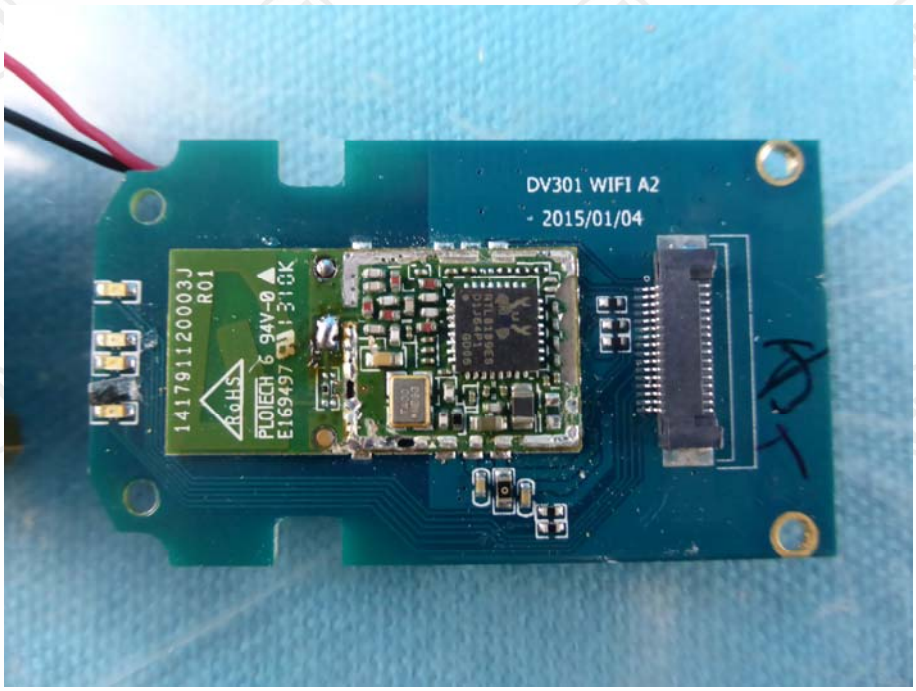


Internal View of product-3

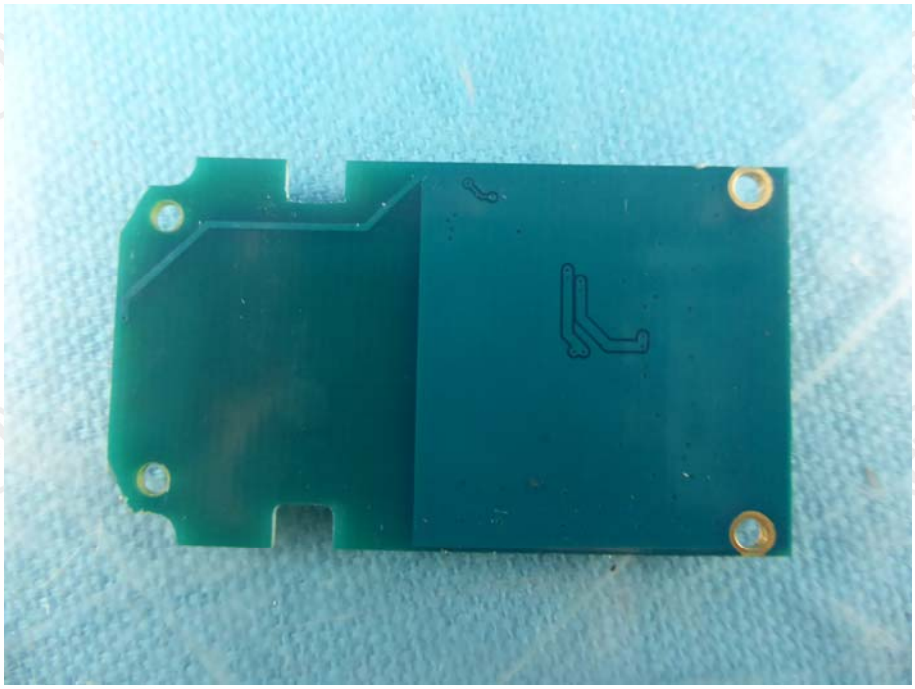
Internal View of product-4



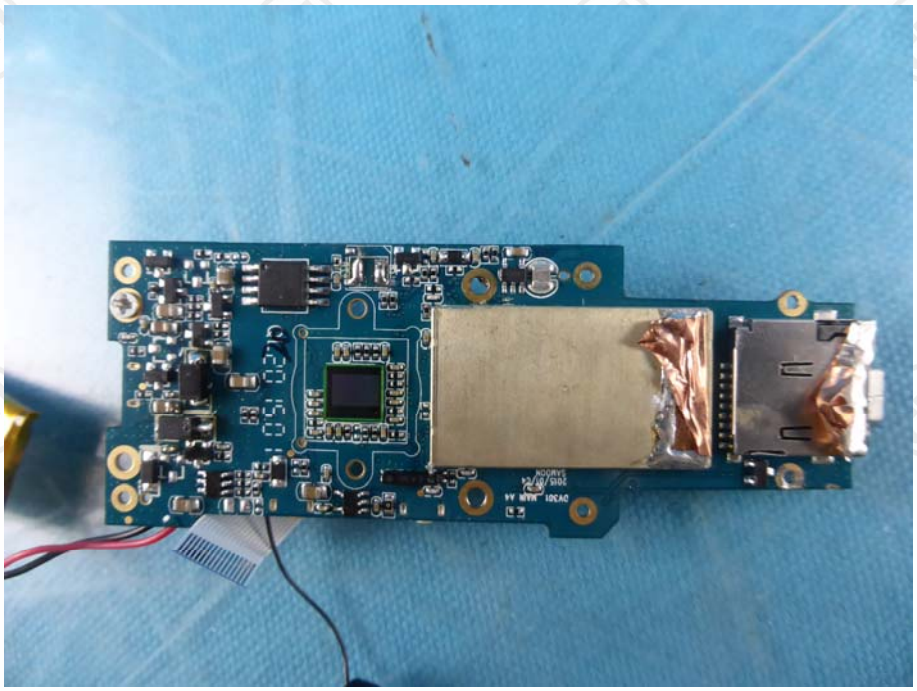
Internal View of product-5



Internal View of product-6

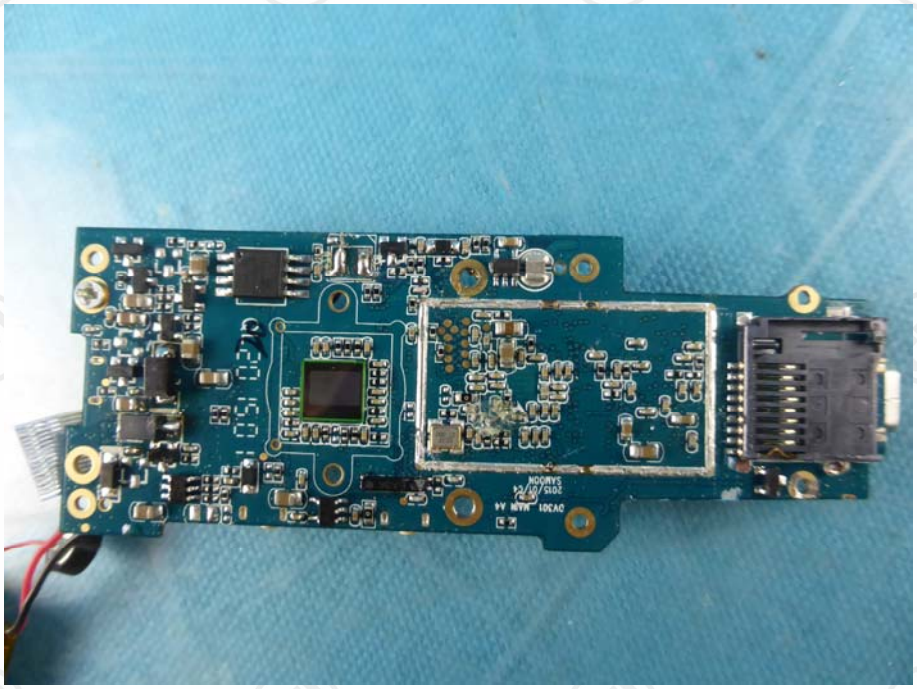


Internal View of product-7

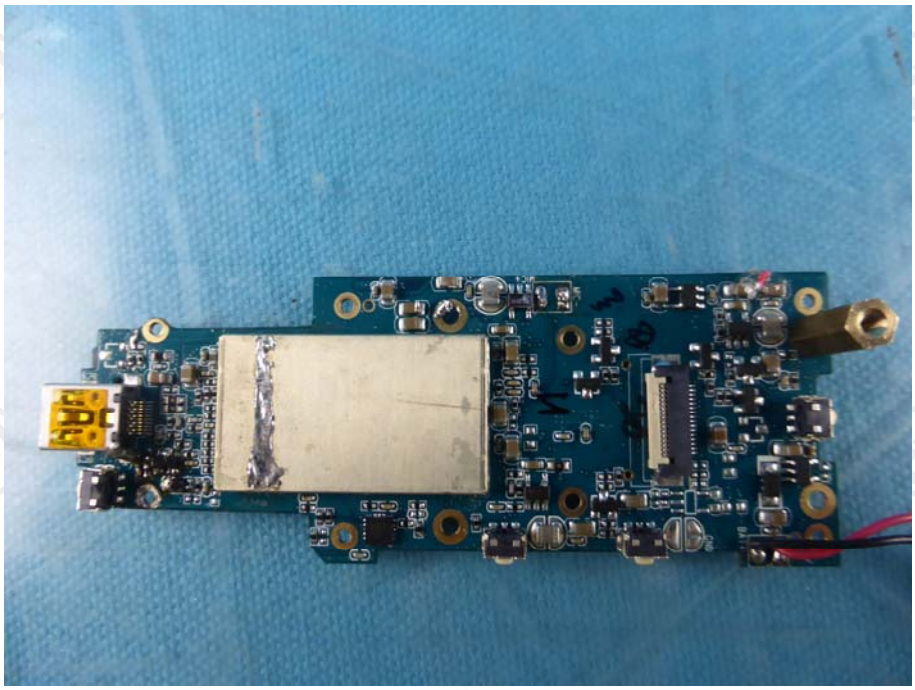


Internal View of product-8

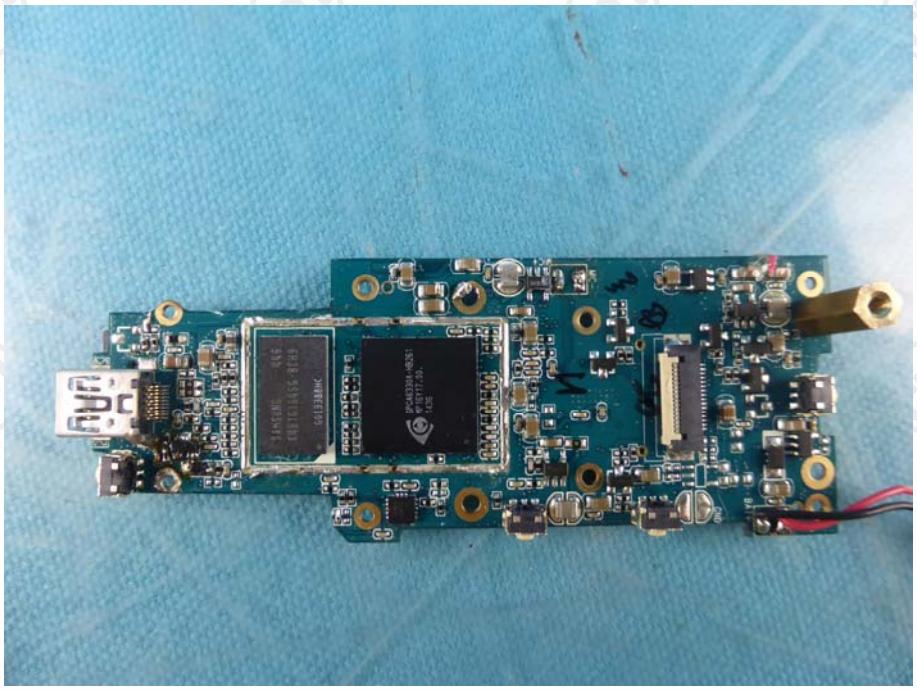
Internal View of product-9



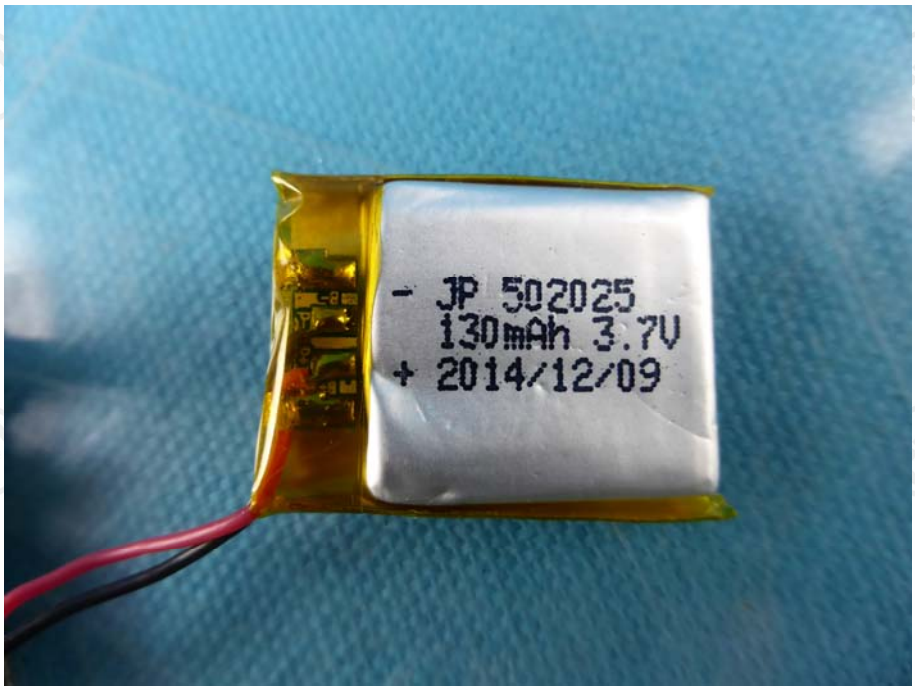
Internal View of product-10



Internal View of product-11



Internal View of product-12



Internal View of product-13

*** End of Report ***

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