EMC TEST REPORT for DTS Device

No. 141200187SHA-001

Applicant	: Pass & Seymour, Inc., d/b/a Legrand 301 Fulling Mill Road, Suite G, Middletown, Pennsylvania 17057 USA
Manufacturer	: Hangzhou Samko Electronics Co. Ltd. No.8,Jiaqi Road,Xianlin Street,Yuhang District, Hangzhou City, Zhejiang Province, 311122, China
Equipment	: Wireless Zone Player
Type/Model	: NV-P100

SUMMARY

The equipment complies with the requirements according to the following standard(s):

47CFR Part 15 (2014): Radio Frequency Devices

ANSI C63.4 (2003): American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

Date of issue: Dec 22, 2014

Prepared by:

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Reviewed by:

Daniel Zhao (*Reviewer*)

Description of Test Facility

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IC Assigned Code: 2042B-1

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1. General Information

1.1 Applicant Information

Applicant:		Pass & Seymour, Inc., d/b/a Legrand 301 Fulling Mill Road, Suite G, Middletown, Pennsylvania 17057 USA
Name of contact:		Rick Kukulies
Tel:		1-859 817 7218
Fax:		1-859 817 7250
Manufacturer:		Hangzhou Samko Electronics Co. Ltd. No.8,Jiaqi Road,Xianlin Street,Yuhang District, Hangzhou City, Zhejiang Province, 311122, China
Sample received date	:	June 1, 2014
Sample Identification No	:	/
Date of test	:	June 1, 2014 ~ Dec 10, 2014

1.2 Identification of the EUT

Equipment:	Wireless Zone Player
Type/model:	NV-P100
FCC ID:	YV8-NVP100
IC:	9922A- NVP100

1.3 Technical specification

Operation Frequency Band: 2412 - 2462 MHz

Modulation: DBPSK @1Mbps
DQPSK@2Mbp
CCK@5.5/11Mbps
BPSK@6/9 Mbps
QPSK@12/18Mbps
16-QAM@24Mbps
64-QAM@48/54Mpb and above

Gain of Antenna: Internal antenna

Antenna Type	Applied Chain	Gain of antenna
P/N 1002985	1 (Front)	2.4GHz band: 3.7dBi
		5GHz band: 5.7dBi
P/N 1002988	2 (Right)	2.4GHz band: 4.4dBi
		5GHz band: 6.0dBi

Rating: AC 100-240V, 50-60Hz, 70W

Description of EUT: The EUT is a wireless audio device containing Wi-Fi module. There is one model only.

Port identification: Line in × 1; Line out × 1; L × 2; R × 2; USB × 1;
LAN × 1

Category of EUT: Class B

EUT type: ☒ Table top ☐ Floor standing

EUT Modes: 802.11a/b/g/n20 (802.11b/g/n20 assessed in this report)

Channel Number: Channel 1 - 11 for 2412MHz~2462MHz

Channel Description: The channel spacing is 5MHz.

MIMO Function Description:

Freq. Band	Modulation	Transmission / Idle		Beam forming	Beam forming gain
		Chain 1	Chain 2		
2412 – 2462 MHz	802.11b	Transmission	Idle	NO	0 dBi
	802.11g	Transmission	Idle	NO	0 dBi
	802.11 n20	Transmission	Transmission	NO	0 dBi

1.4 Mode of operation during the test / Test peripherals used

While testing transmitting mode of EUT, the internal modulation was applied.

The lowest, middle and highest channel were tested as representatives (2412MHz, 2437MHz and 2462MHz).

Test Peripherals:
PC: HP ProBook 6450b

Test software setting:
The power level setting for 802.11b/g/n is used with the software offered by the manufactory.

Mode 1	Frequency (MHz)	Software Setting	Note
802.11b	2412	15.0	
	2437	15.0	
	2462	15.0	
802.11g	2412	15.0	
	2437	15.0	
	2462	8.0	
802.11n20	2412	15.0	
	2437	15.0	
	2462	8.0	

Data rate VS Power

The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases.

After this pre-scan,we choose the following table of the data rata as the worst case.

Mode	Worst case data rate
802.11b	1Mbps
802.11g	6Mbps
802.11 n20	MCS8

2. Test Specification

2.1 Instrument list

Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
Test Receiver	ESCS 30	R&S	EC 2107	2014-10-21	2015-10-20
Test Receiver	ESIB 26	R&S	EC 3045	2014-10-20	2015-10-19
A.M.N.	ESH2-Z5	R&S	EC 3119	2014-1-9	2015-1-8
Bilog Antenna	CBL 6112D	TESEQ	EC 4206	2013-4-28	2015-4-27
Horn antenna	HF 906	R&S	EC 3049	2013-4-28	2015-4-27
Pre-amplifier	Pre-amp 18	R&S	EC 3222	2014-4-12	2015-4-11
Semi-anechoic chamber	-	Albatross project	EC 3048	2014-5-12	2015-5-11
High Pass Filter	WHKX 1.0/15G-10SS	Wainwright	EC4297-1	2014-1-8	2015-1-7
Power sensor / Power meter	N1911A/N1921A	Agilent	EC4318	2014-04-12	2015-04-11
Loop Antenna	FMZB 1516	SCHWARZBECK	/	2014-11-29	2015-11-28
Temperature Camber	SETH-E	tayasaf	EC4315	2014-4-9	2015-4-9

2.2 Test Standard

47CFR Part 15 (2014)
ANSI C63.4: 2003
KDB 558074 (V03R02)

2.3 Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERANCE	RESULT
Minimum 6dB Bandwidth	15.247(a)(2)	Pass
Maximum peak output power	15.247(b)	Pass
Power spectrum density	15.247(e)	Pass
Radiated emission	15.205 & 15.209	Pass
Emission outside the frequency band	15.247(d)	Pass
Power line conducted emission	15.207	Pass

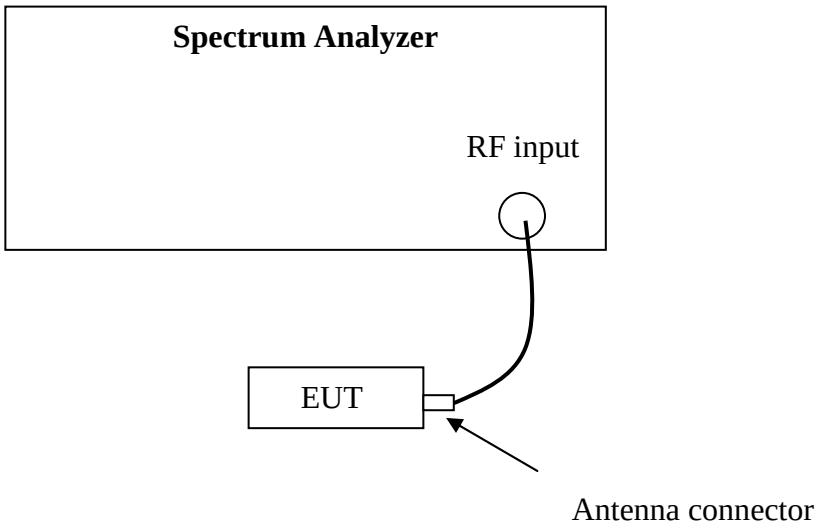
3. Minimum 6dB Bandwidth

Test result: PASS

3.1 Limit

For systems using digital modulation techniques that 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.

3.2 Test Configuration



3.3 Test Procedure and test setup

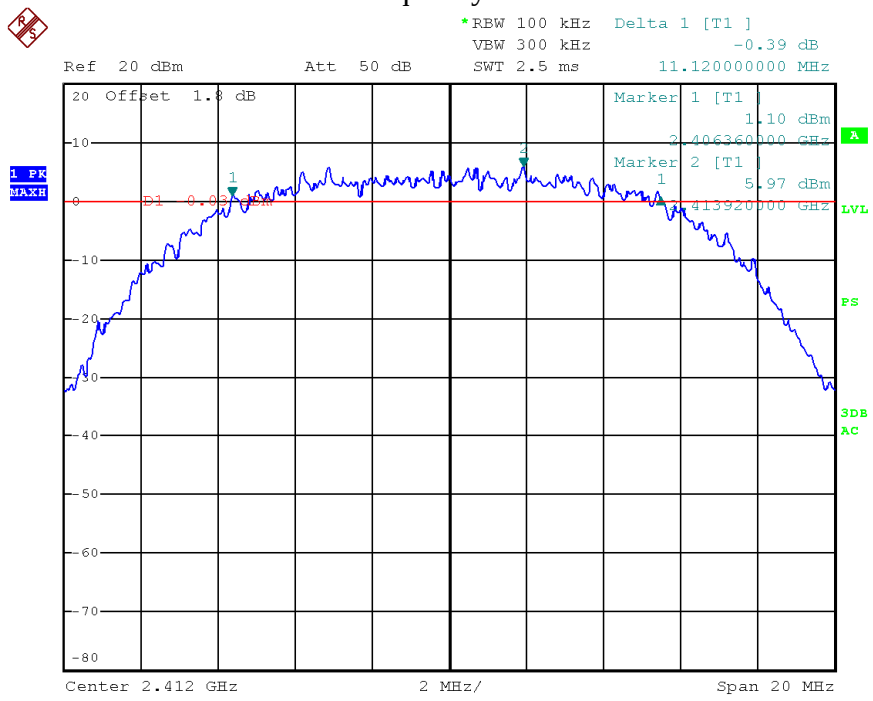
The minimum 6dB bandwidth per FCC §15.247(a)(2) is measured using the Spectrum Analyzer according to DTS test procedure of "KDB558074 D01 DTS Meas Guidance v03r02" for compliance to FCC 47CFR 15.247 requirements(clause 8.2).

3.4 Test Protocol

Temperature : 25°C
Relative Humidity : 55%

Mode	CH	Chain 1 (MHz)	Chain 2 (MHz)	Limit (MHz)
802.11b	L	11.12	-	⩾0.5
	M	11.12	-	
	H	11.20	-	

Frequency L – Chain 1



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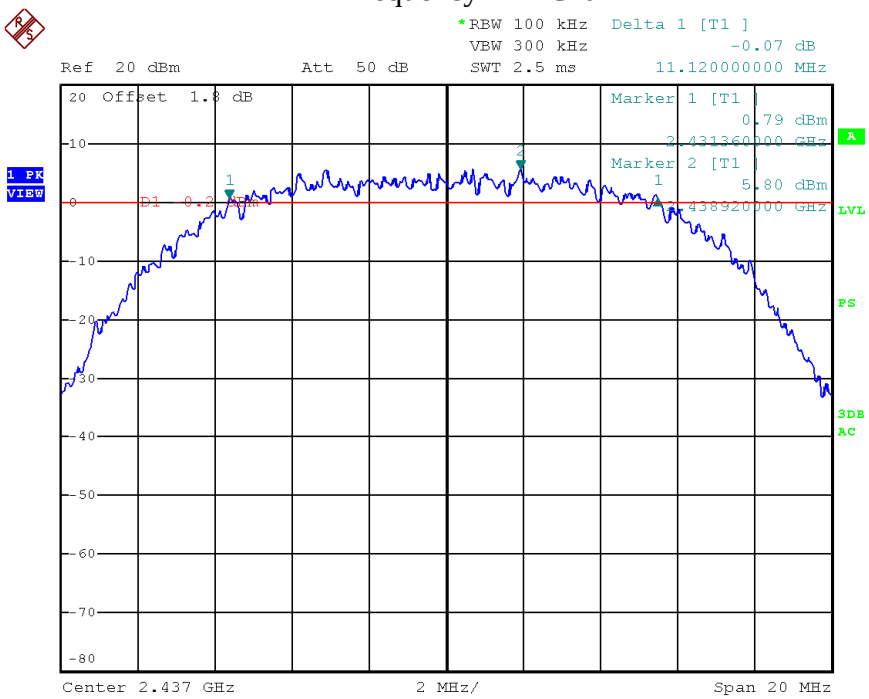
Frequency M – Chain 1



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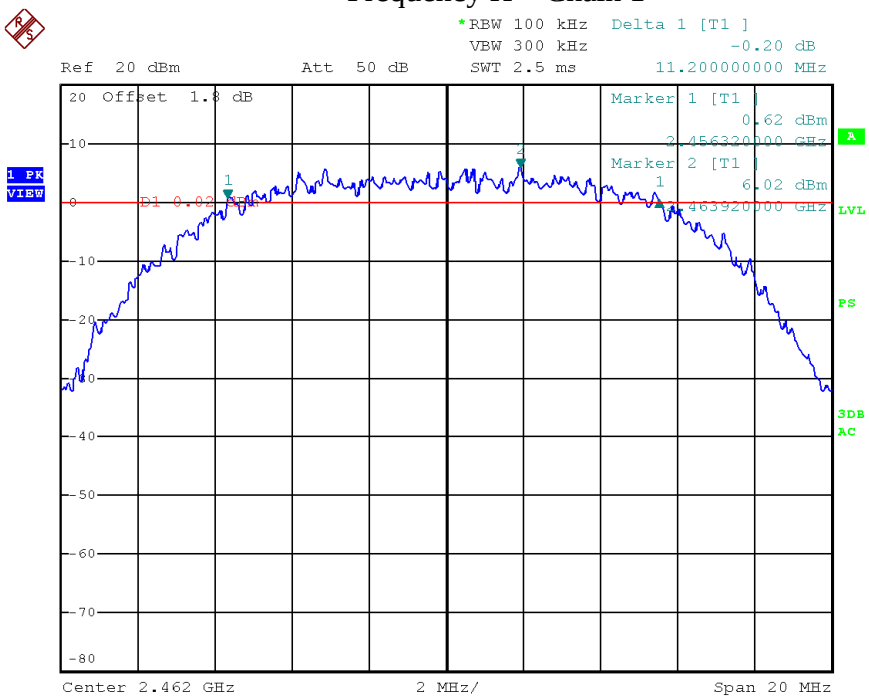
Frequency H – Chain 1



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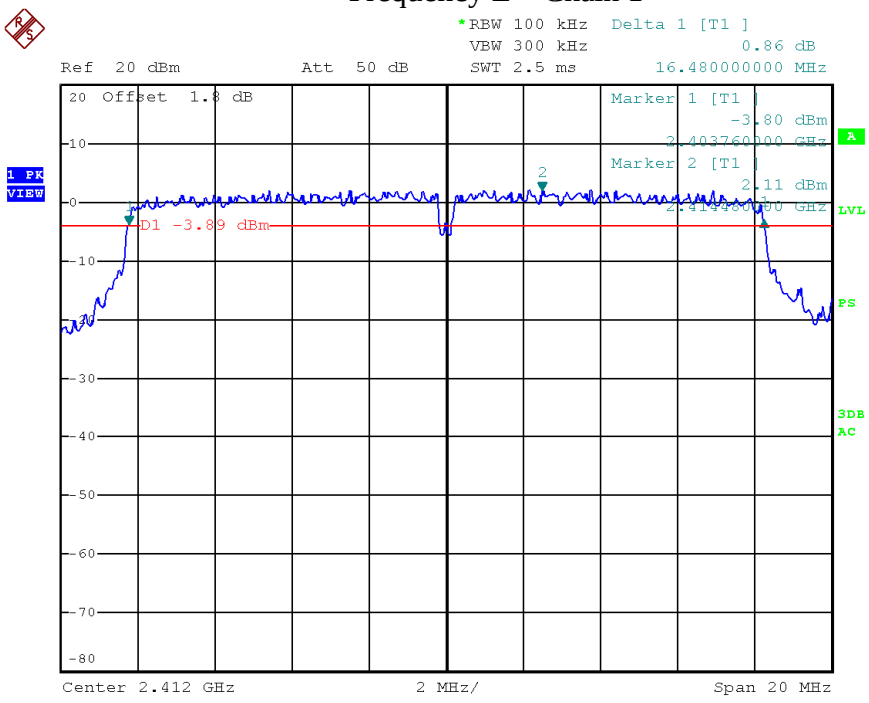
Mode	CH	Chain 1 (MHz)	Chain 2 (MHz)	Limit (MHz)
802.11g	L	16.48	-	⩾0.5
	M	16.44	-	
	H	16.48	-	

Frequency L – Chain 1



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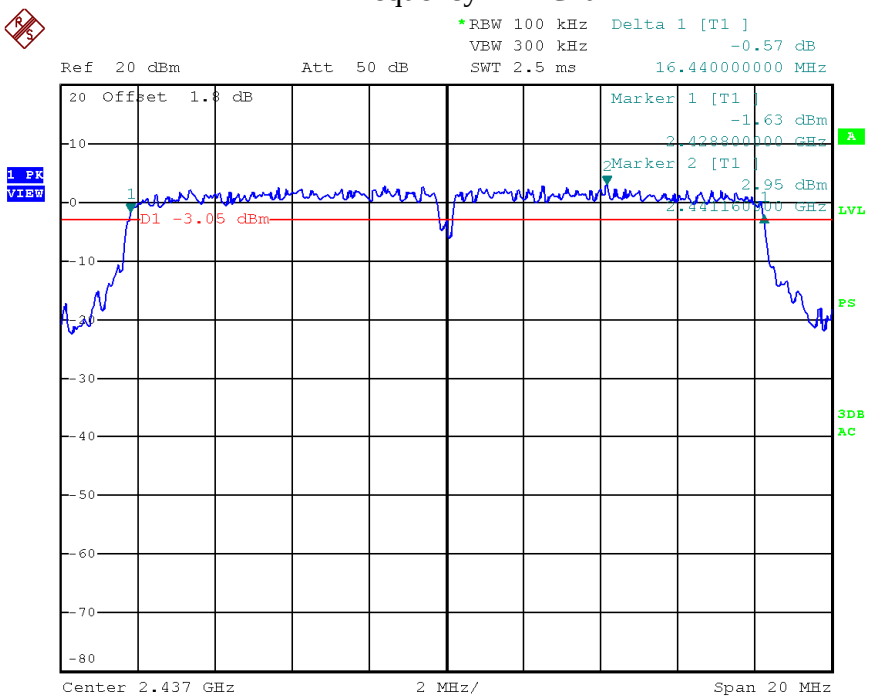
Frequency M – Chain 1



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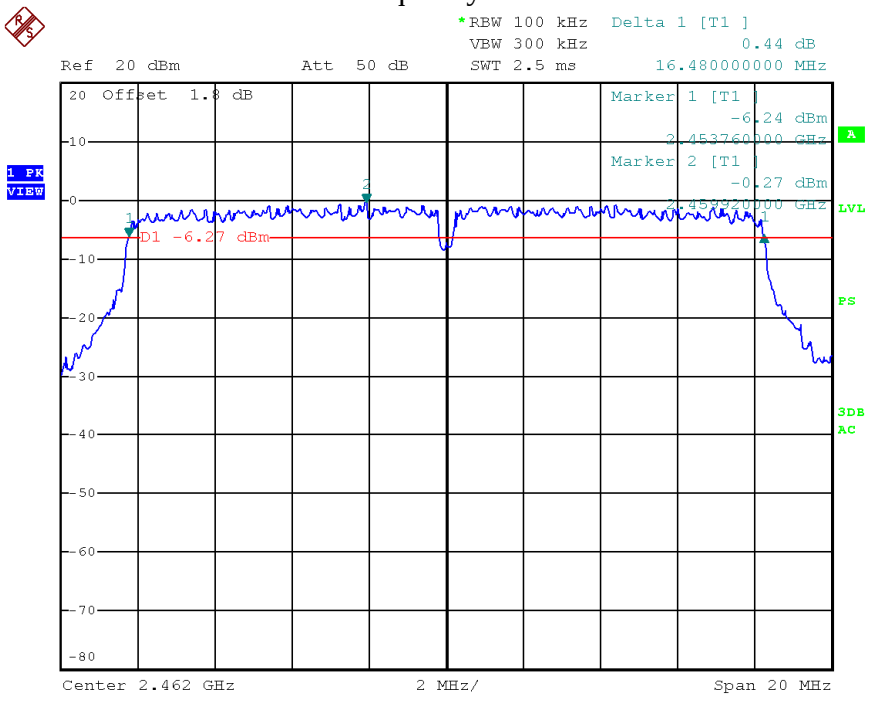
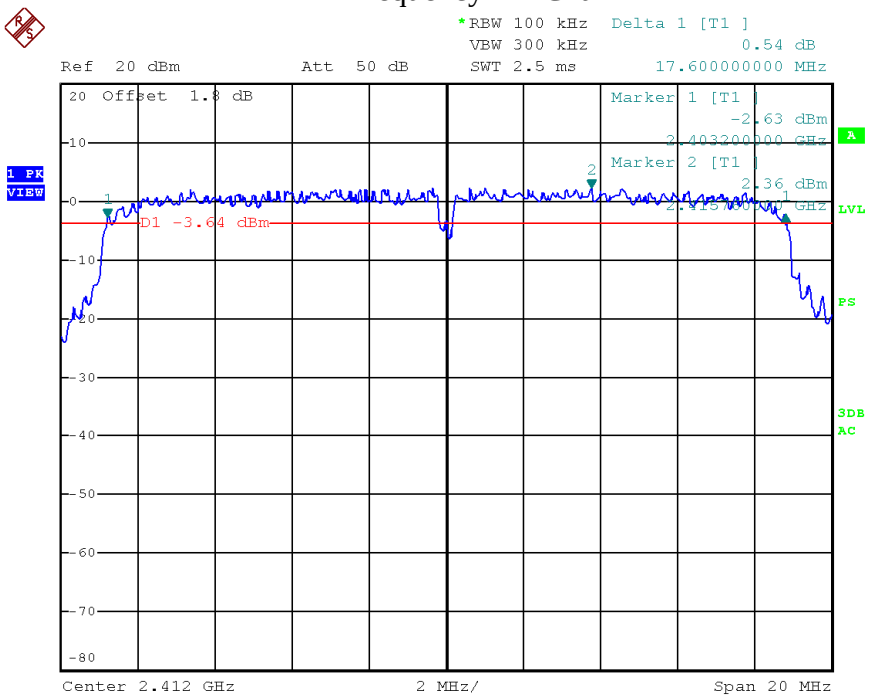
Frequency H – Chain 1



Date: 24.JUN.2014 16:10:48

Mode	CH	Chain 1 (MHz)	Chain 2 (MHz)	Limit (MHz)
802.11 n20	L	17.60	17.44	⩾0.5
	M	17.60	17.52	
	H	17.60	17.60	

Frequency L – Chain 1



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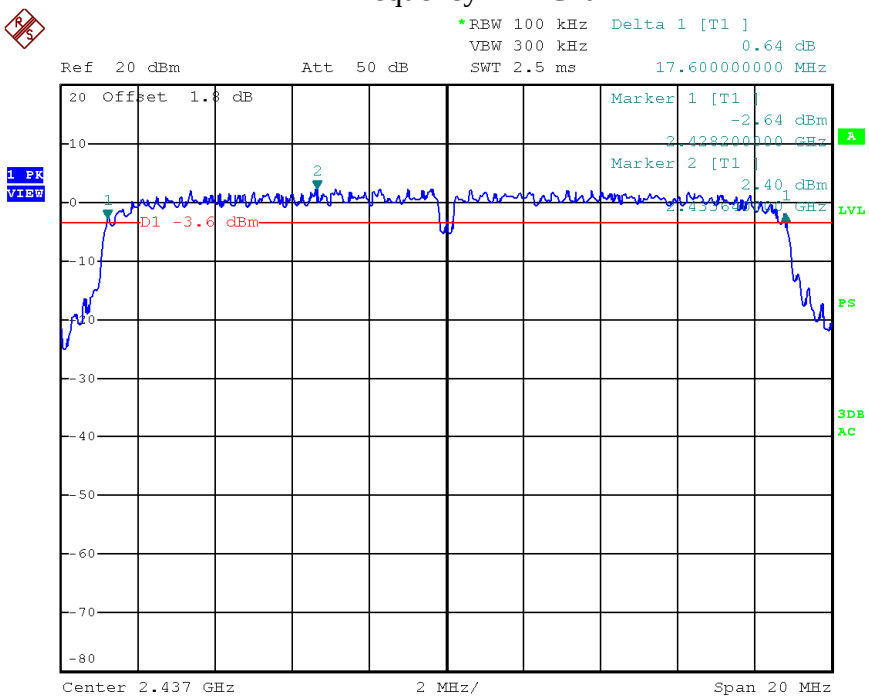
Frequency M – Chain 1



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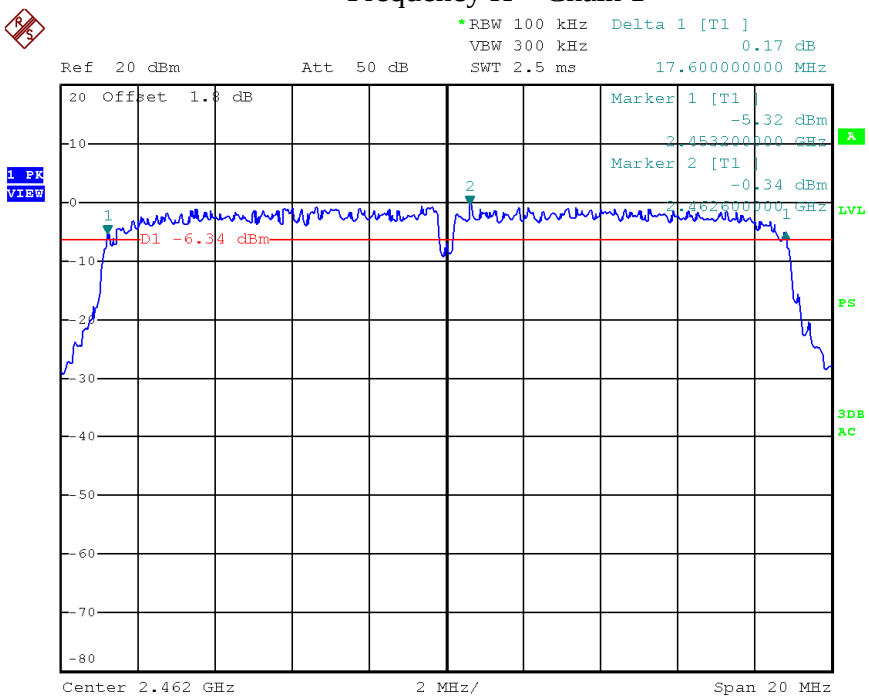
Frequency H – Chain 1



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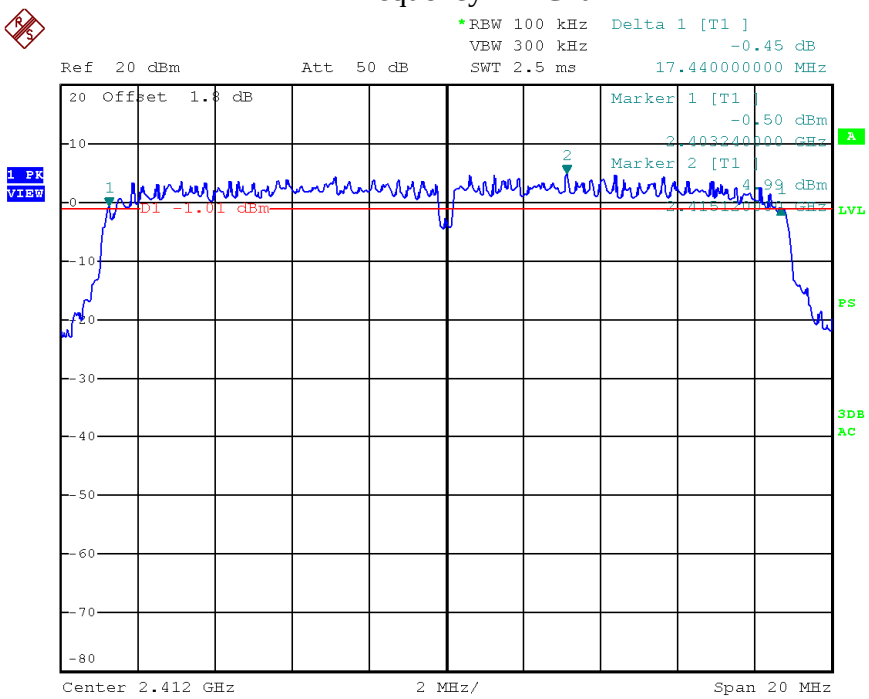
Frequency L – Chain 2



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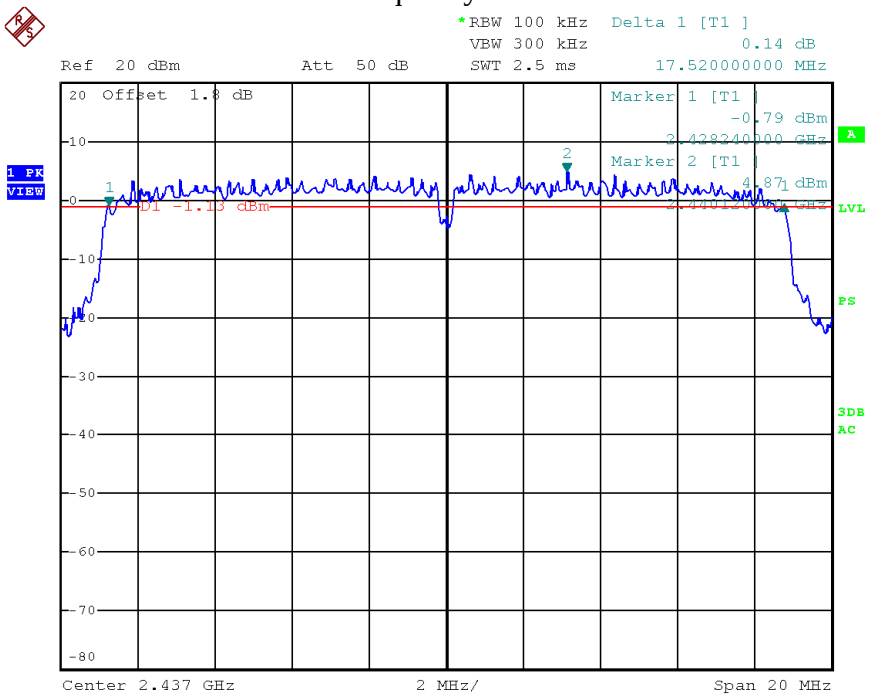
Frequency M – Chain 2



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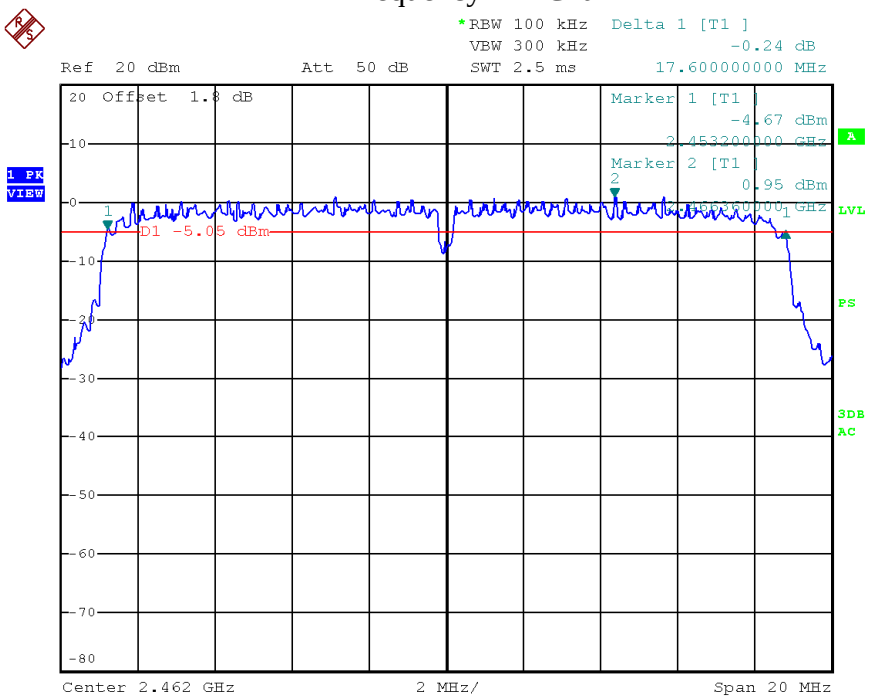
Frequency H – Chain 2



Date: 24.JUN.2014 16:22:12

4. Maximum peak output power

Test result: Pass

4.1 Test limit

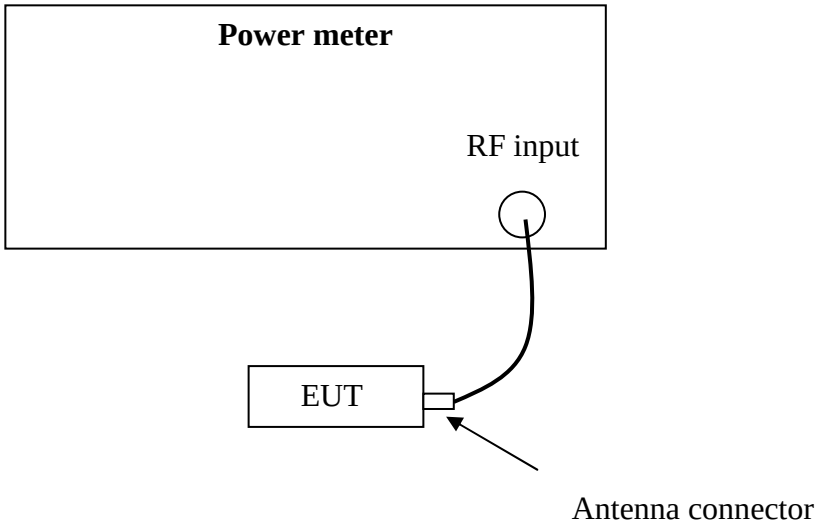
☐ For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt

☐ For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts

☒ For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.2 Test Configuration



4.3 Test procedure and test setup

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance v03r02” for compliance to FCC 47CFR 15.247 requirements (clause 9.1.2).

4.4 Test protocol

Temperature : 25 °C
Relative Humidity : 55 %

Mode	CH	Cable loss (dB)	Reading (dBm)		Total Peak power (dBm)	Limit (dBm)
			Chain 1	Chain 2		
802.11b	L	1.8	21.30	-	21.30	30.00
	M	1.8	21.40	-	21.40	30.00
	H	1.8	21.20	-	21.20	30.00
802.11g	L	1.8	25.70	-	25.70	30.00
	M	1.8	26.00	-	26.00	30.00
	H	1.8	24.50	-	24.50	30.00
802.11n20	L	1.8	25.70	26.40	29.10	30.00
	M	1.8	26.30	26.80	29.60	30.00
	H	1.8	23.80	23.90	26.90	30.00

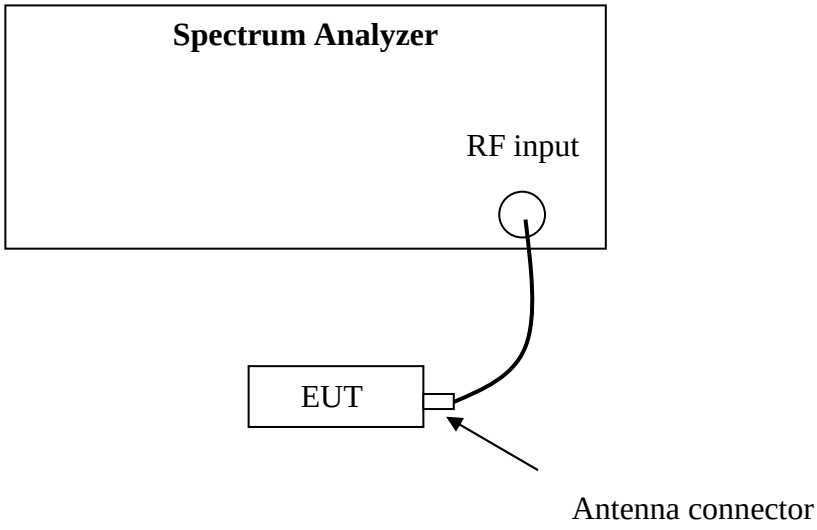
5. Power spectrum density

Test result: **Pass**

5.1 Test limit

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

5.2 Test Configuration



5.3 Test procedure and test setup

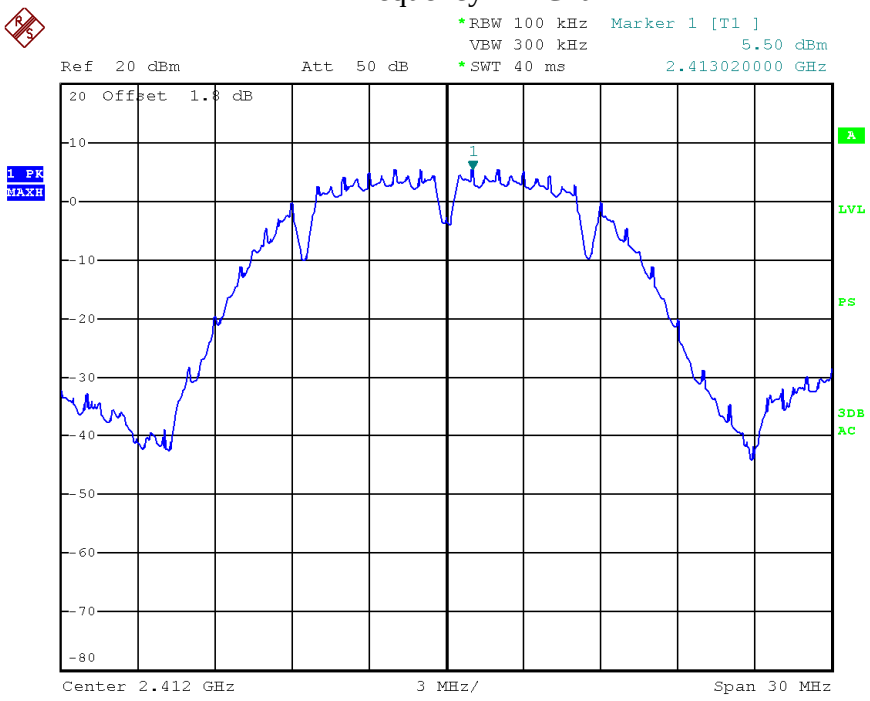
The power output per FCC §15.247(e) was tested according to DTS test procedure of "KDB558074 D01 DTS Meas Guidance v03r02" (clause 10.2) for compliance to FCC 47CFR 15.247 requirements.

5.4 Test Protocol

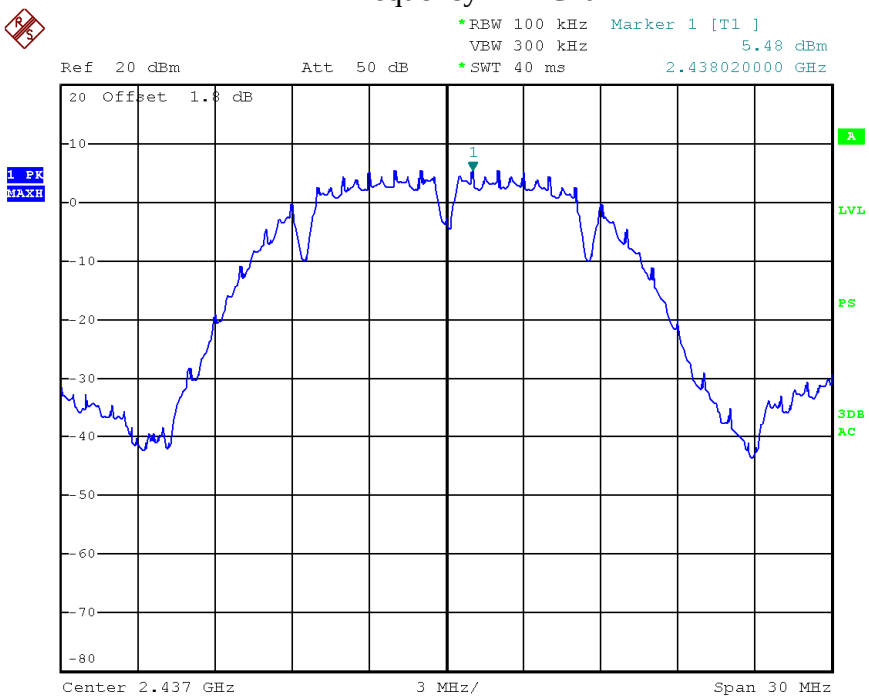
Temperature : 25 °C
Relative Humidity: 55 %

Mode	CH	Cable loss (dB)	PSD (dBm/100kHz)		Total PSD (dBm/100kHz)	Limit (dBm/3kHz)
			Chain 1	Chain 2		
802.11b	L	1.8	5.50	-	5.50	≤8.00
	M	1.8	5.48	-	5.48	
	H	1.8	5.77	-	5.77	

Frequency L – Chain 1

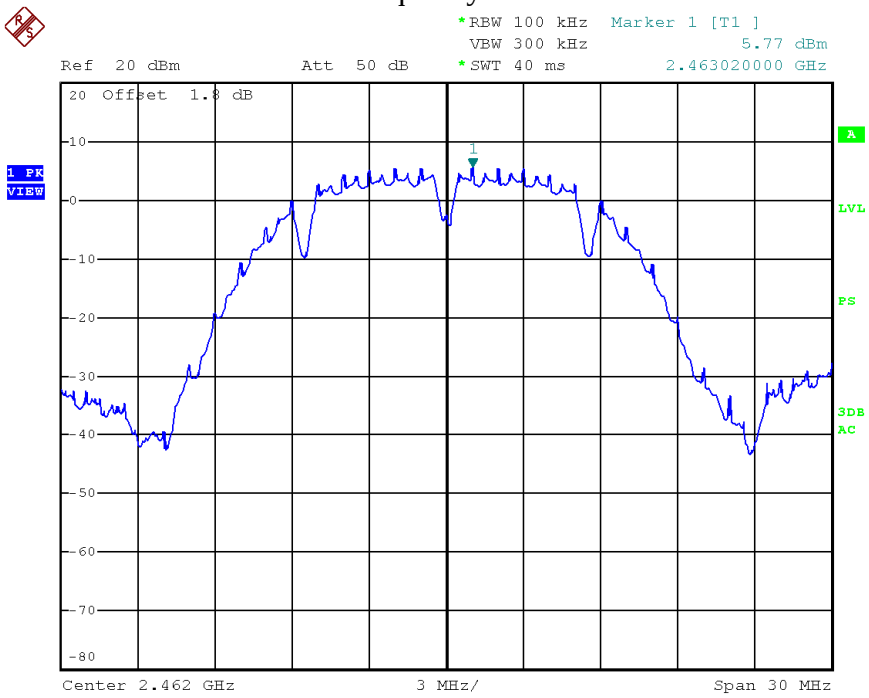


Frequency M – Chain 1



Date: 24.JUN.2014 17:06:36

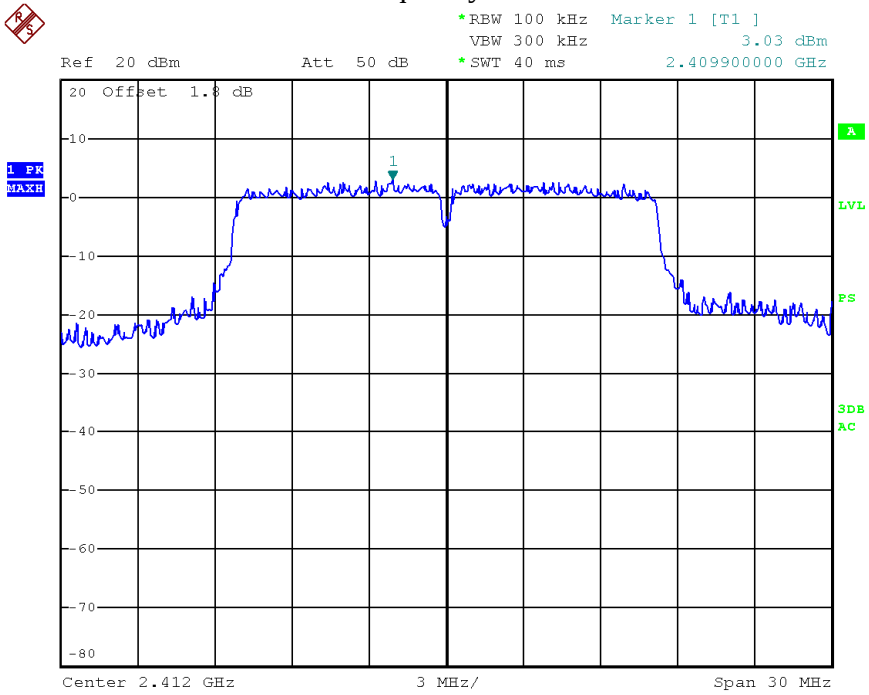
Frequency H – Chain 1



Date: 24.JUN.2014 17:07:09

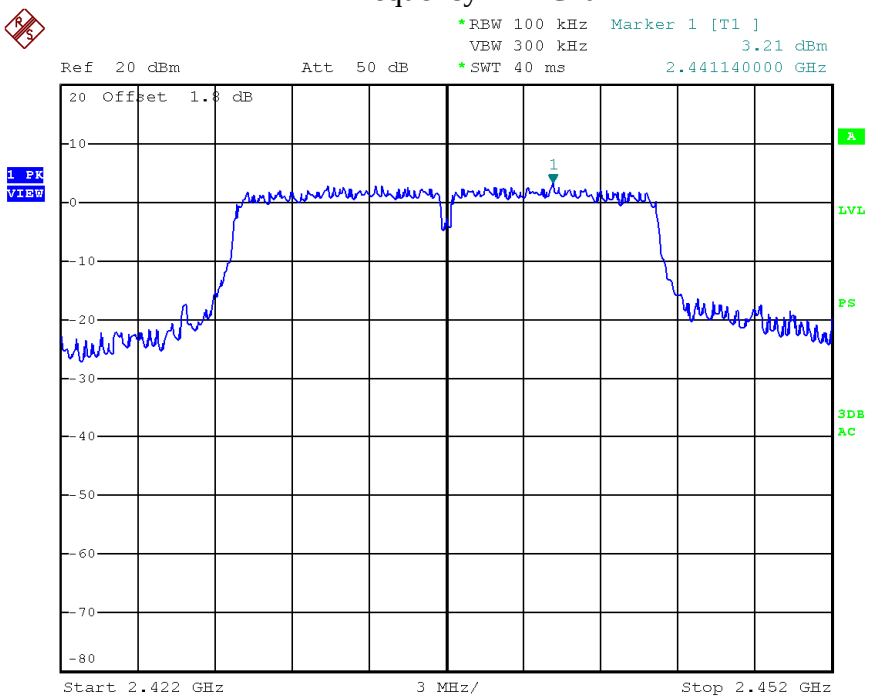
Mode	CH	Cable loss (dB)	PSD (dBm/100kHz)		Total PSD (dBm/100kHz)	Limit (dBm/3kHz)
			Chain 1	Chain 2		
802.11g	L	1.8	3.03	-	3.03	≤8.00
	M	1.8	3.21	-	3.21	
	H	1.8	-0.10	-	-0.10	

Frequency L – Chain 1



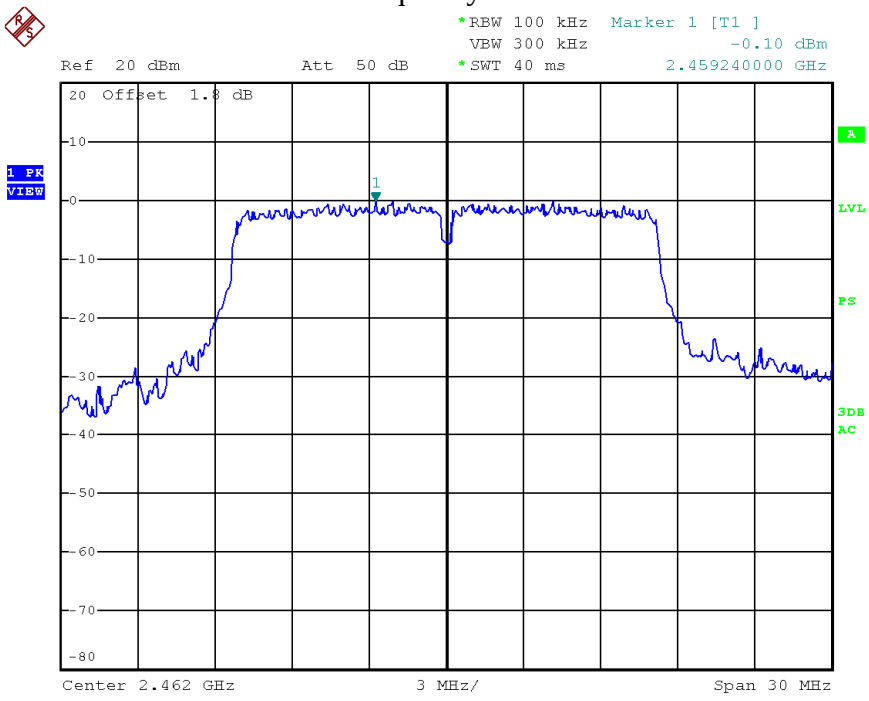
Date: 24.JUN.2014 17:07:48

Frequency M – Chain 1



Date: 24.JUN.2014 17:09:13

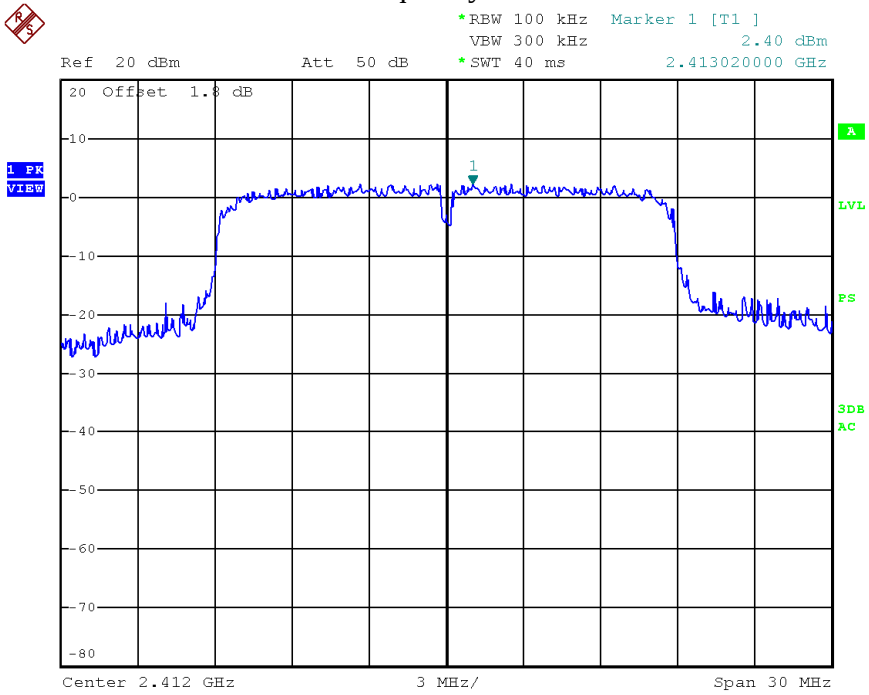
Frequency H – Chain 1



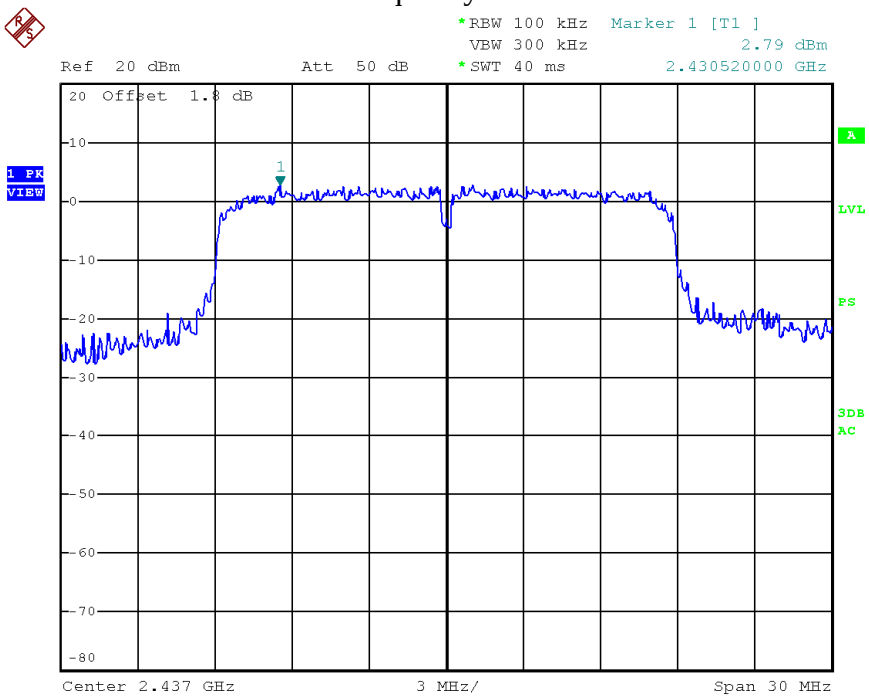
Date: 24.JUN.2014 17:09:47

Mode	CH	Cable loss (dB)	PSD (dBm/100kHz)		Total PSD (dBm/100kHz)	Limit (dBm/3kHz)
			Chain 1	Chain 2		
802.11n20	L	1.8	2.40	3.42	5.95	≤8.00
	M	1.8	2.79	4.02	6.46	
	H	1.8	-0.32	0.35	3.04	

Frequency L – Chain 1



Frequency M – Chain 1



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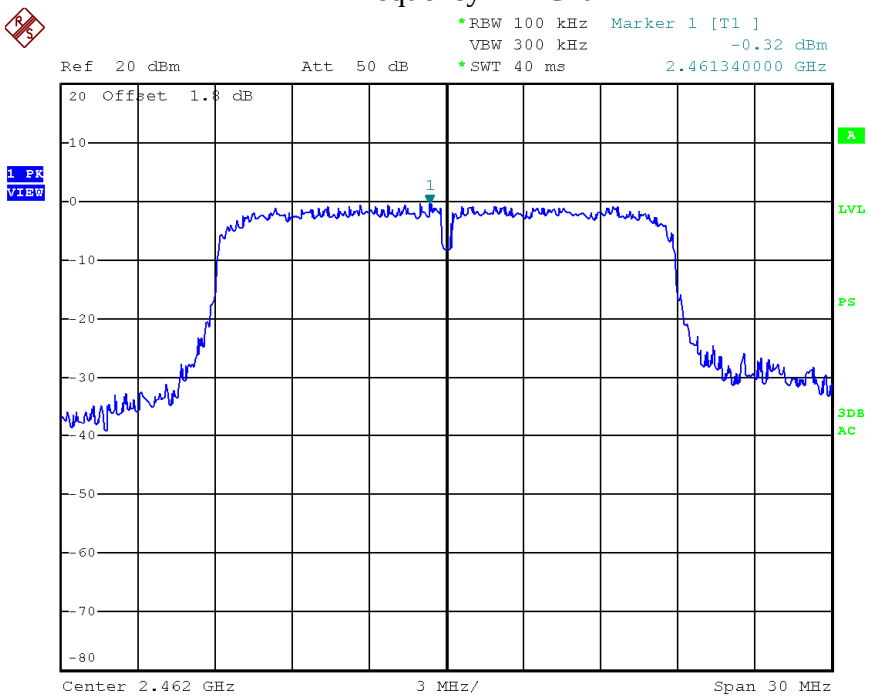
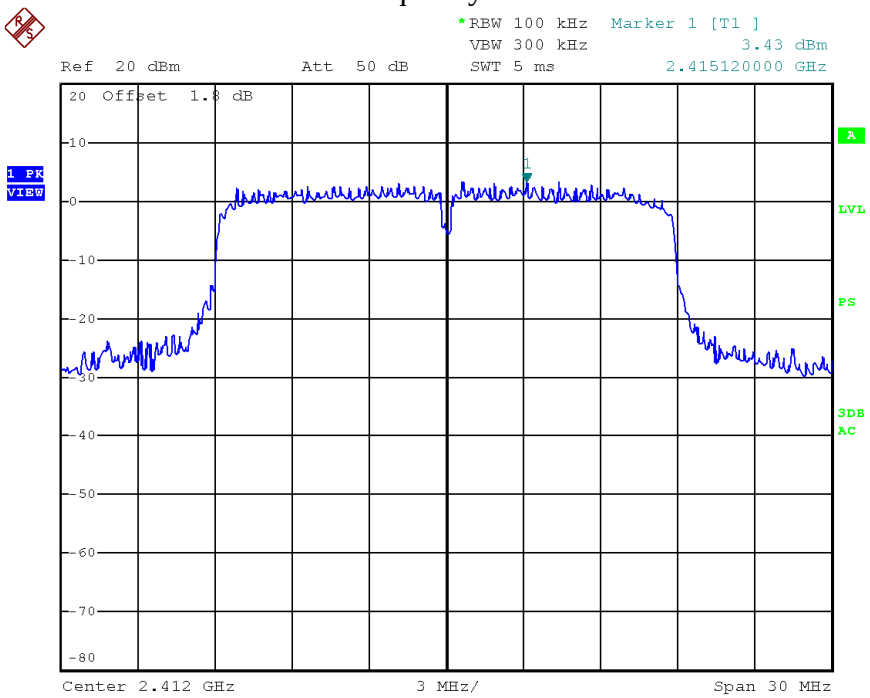
Frequency H – Chain 1



Date: 24.JUN.2014 17:11:34

Frequency L – Chain 2



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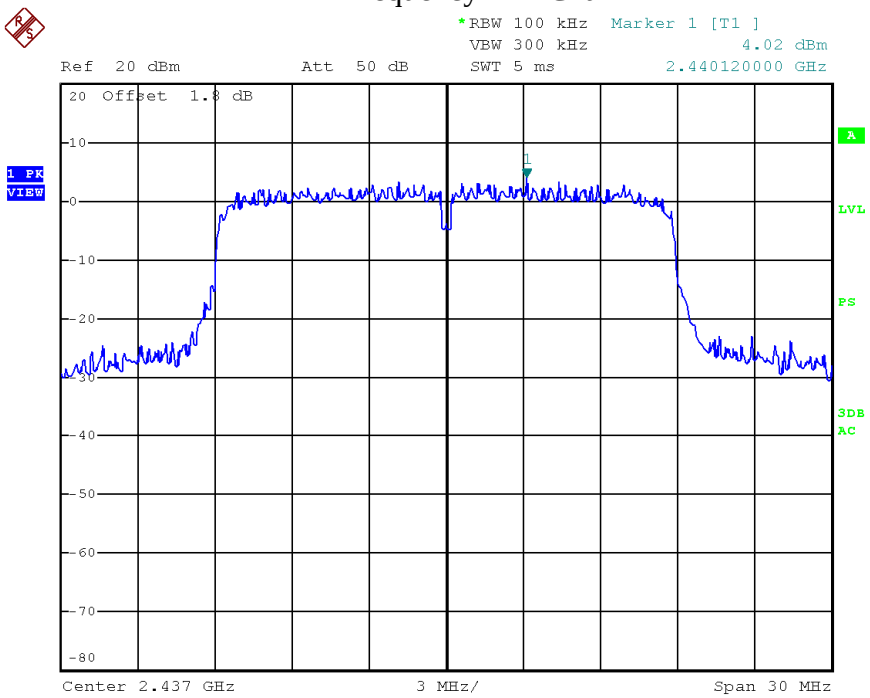
Frequency M – Chain 2



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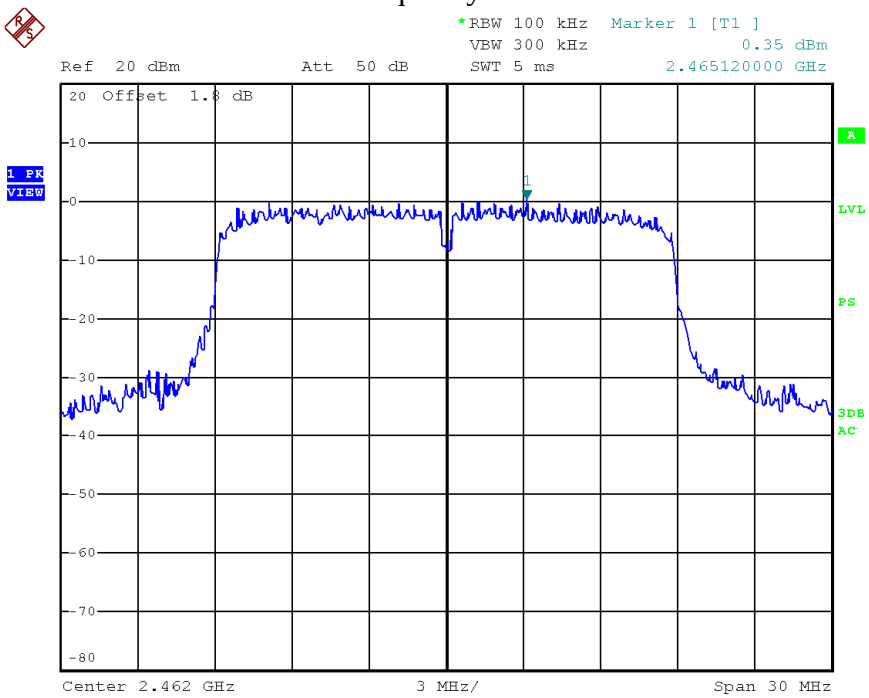
Frequency H – Chain 2



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6. Radiated emission in the restricted bands

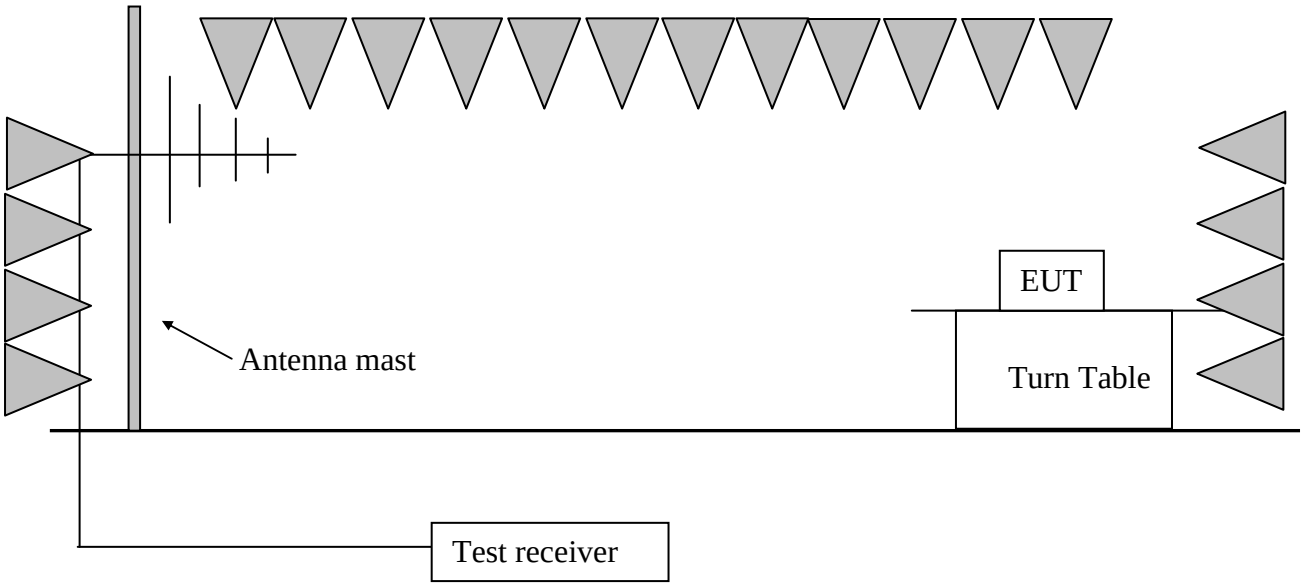
Test result: PASS

6.1 Test limit

The 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) showed as below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

6.2 Test Configuration



6.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.
The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.
The EUT was tested according to DTS test procedure of KDB558074 D01 DTS “Meas Guidance v03r02” (clause 12) for compliance to FCC 47CFR 15.247 requirements.

6.4 Test protocol

Temperature : 25 °C
Relative Humidity : 55 %

Mode 802.11b

CH	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2413.43	34.50	101.50	/	/	PK
	V	53.32	10.40	38.20	40.00	1.80	QP
	H	125.25	16.00	37.60	43.50	5.90	PK
	H	356.57	17.10	39.30	46.00	6.70	PK
	H	2390.00	34.40	64.00	74.00	10.00	PK
	H	2390.00	34.40	44.30	54.00	9.70	AV
	H	3210.42	-8.00	52.60	54.00	1.40	PK
	H	4823.64	-3.50	56.20	74.00	17.80	PK
	H	4823.53	-3.50	52.10	54.00	1.90	AV
M	H	2438.66	34.60	102.30	/	/	PK
	V	53.32	10.40	38.20	40.00	1.80	QP
	H	125.25	16.00	37.60	43.50	5.90	PK
	H	356.57	17.10	39.30	46.00	6.70	PK
	H	3244.93	-7.80	51.50	54.00	2.50	PK
	H	4881.90	-3.40	56.70	74.00	17.30	PK
	H	4881.90	-3.40	52.50	54.00	1.50	AV
	V	7390.78	2.60	44.00	54.00	10.00	PK
H	H	2460.72	34.70	103.50	/	/	PK
	V	53.32	10.40	38.20	40.00	1.80	QP
	H	125.25	16.00	37.60	43.50	5.90	PK
	H	356.57	17.10	39.30	46.00	6.70	PK
	H	2483.50	34.70	64.20	74.00	9.80	PK
	H	2483.50	34.70	44.60	54.00	9.40	AV
	H	3280.56	-7.70	51.00	54.00	3.00	PK
	H	4921.84	-3.30	57.10	74.00	16.90	PK

	H	4921.67	-3.30	52.90	54.00	1.10	AV

Mode 802.11g

CH	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2413.83	34.50	104.70	/	/	PK
	V	53.32	10.40	38.20	40.00	1.80	QP
	H	125.25	16.00	37.60	43.50	5.90	PK
	H	356.57	17.10	39.30	46.00	6.70	PK
	H	2390.00	34.40	67.70	74.00	6.30	PK
	H	2390.00	34.40	47.90	54.00	6.10	AV
	H	3210.42	-8.00	51.30	54.00	2.70	PK
	H	4823.64	-3.50	56.20	74.00	17.80	PK
	H	4823.53	-3.50	45.40	54.00	8.60	AV
M	H	2440.29	34.60	105.10	/	/	PK
	V	53.32	10.40	38.20	40.00	1.80	QP
	H	125.25	16.00	37.60	43.50	5.90	PK
	H	356.57	17.10	39.30	46.00	6.70	PK
	H	3244.93	-7.80	51.90	54.00	2.10	PK
	H	4881.90	-3.40	56.70	74.00	17.30	PK
	H	4881.90	-3.40	45.50	54.00	8.50	AV
	V	7348.69	2.50	44.30	54.00	9.70	PK
H	H	2463.53	34.70	104.50	/	/	PK
	V	53.32	10.40	38.20	40.00	1.80	QP
	H	125.25	16.00	37.60	43.50	5.90	PK
	H	356.57	17.10	39.30	46.00	6.70	PK
	H	2483.50	34.70	73.20	74.00	0.80	PK
	H	2483.50	34.70	53.40	54.00	0.60	AV
	H	3280.56	-7.70	50.50	54.00	3.50	PK
	H	4921.84	-3.30	52.30	74.00	21.70	PK

Mode 802.11n20

CH	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2410.22	34.50	106.00	/	/	PK
	V	53.32	10.40	38.20	40.00	1.80	QP
	H	125.25	16.00	37.60	43.50	5.90	PK
	H	356.57	17.10	39.30	46.00	6.70	PK
	H	2390.00	34.40	67.30	74.00	6.70	PK
	H	2390.00	34.40	47.50	54.00	6.50	AV
	H	3210.42	-8.00	53.00	54.00	1.00	PK
	H	4823.64	-3.50	55.00	74.00	19.00	PK
	H	4823.53	-3.50	40.60	54.00	13.40	AV
M	H	2440.29	34.60	105.10	/	/	PK
	V	53.32	10.40	38.20	40.00	1.80	QP
	H	125.25	16.00	37.60	43.50	5.90	PK
	H	356.57	17.10	39.30	46.00	6.70	PK
	H	3244.93	-7.80	51.90	54.00	2.10	PK
	H	4881.90	-3.40	55.20	74.00	18.80	PK
	H	4881.90	-3.40	44.80	54.00	9.20	AV
	V	7390.78	2.60	44.70	54.00	9.30	PK
H	H	2460.32	34.70	105.70	/	/	PK
	V	53.32	10.40	38.20	40.00	1.80	QP
	H	125.25	16.00	37.60	43.50	5.90	PK
	H	356.57	17.10	39.30	46.00	6.70	PK
	H	2483.50	34.70	73.30	74.00	0.70	PK
	H	2483.50	34.70	53.10	54.00	0.90	AV
	H	3280.56	-7.70	53.00	54.00	1.00	PK
	H	4921.84	-3.30	50.80	74.00	23.20	PK

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = limit – Corrected Reading

4. The QP detector is applied only while the Pulse-repetition frequency of assessed frequency is higher than 20Hz.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Original Receiver Reading = 10dBuV.
Then Correct Factor = 30.20 + 2.00 = 32.20dB/m; Corrected Reading = 10dBuV + 32.20dB/m = 42.20dBuV/m
Assuming limit = 54dBuV/m, Corrected Reading = 42.20dBuV/m, then Margin = 54 -42.20 = 11.80dBuV/m

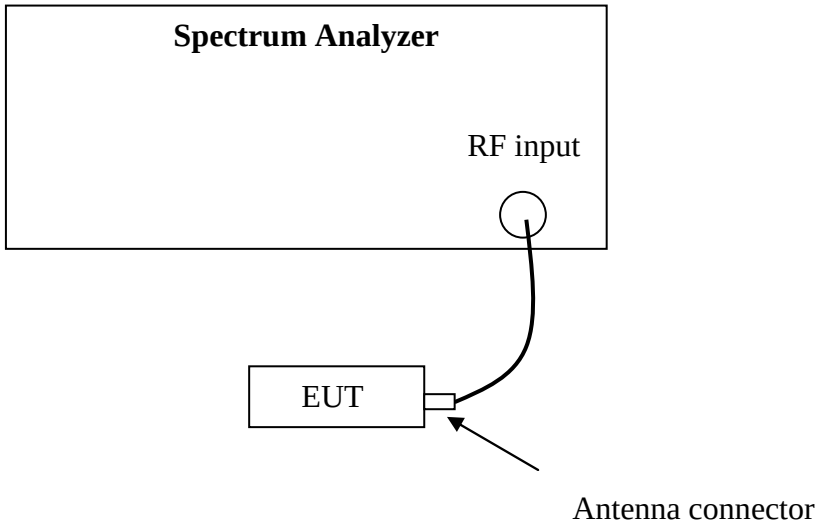
7. Emission outside the frequency Band

Test result: **PASS**

7.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

7.2 Test Configuration



7.3 Test procedure and test setup

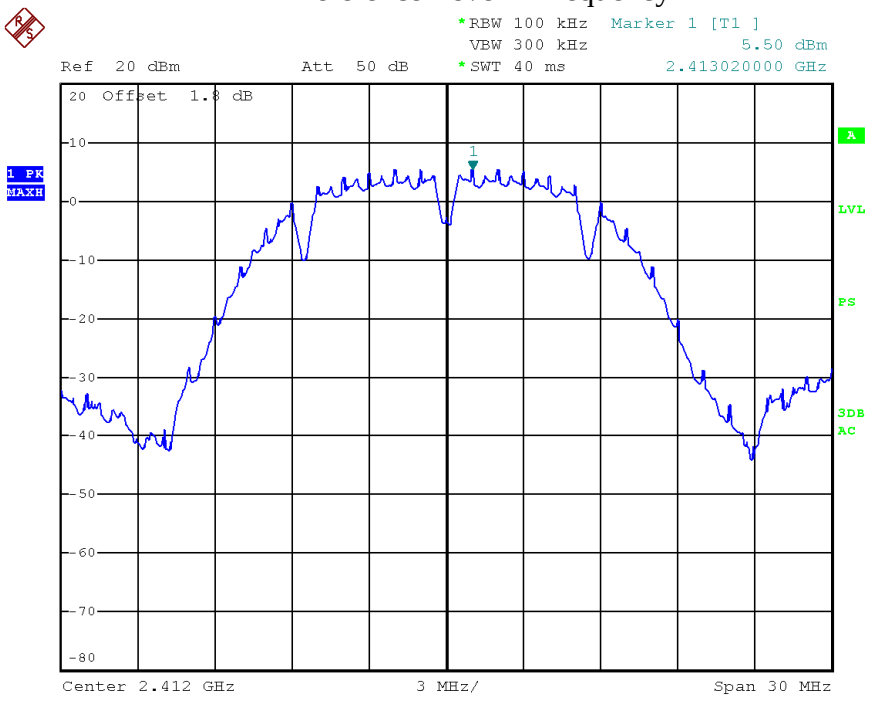
The Emission outside the frequency Band per FCC §15.247(d) is measured using the Spectrum Analyzer with the resolutions bandwidth set at 100kHz, the video bandwidth set at 300kHz, and the SPAN>>RBW.
The EUT was tested according to DTS test procedure of "KDB558074 D01 DTS Meas Guidance v03r02" (clause 11.0) for compliance to FCC 47CFR 15.247 requirements.

7.4 Test protocol

Temperature : 25 °C
Relative Humidity : 55 %

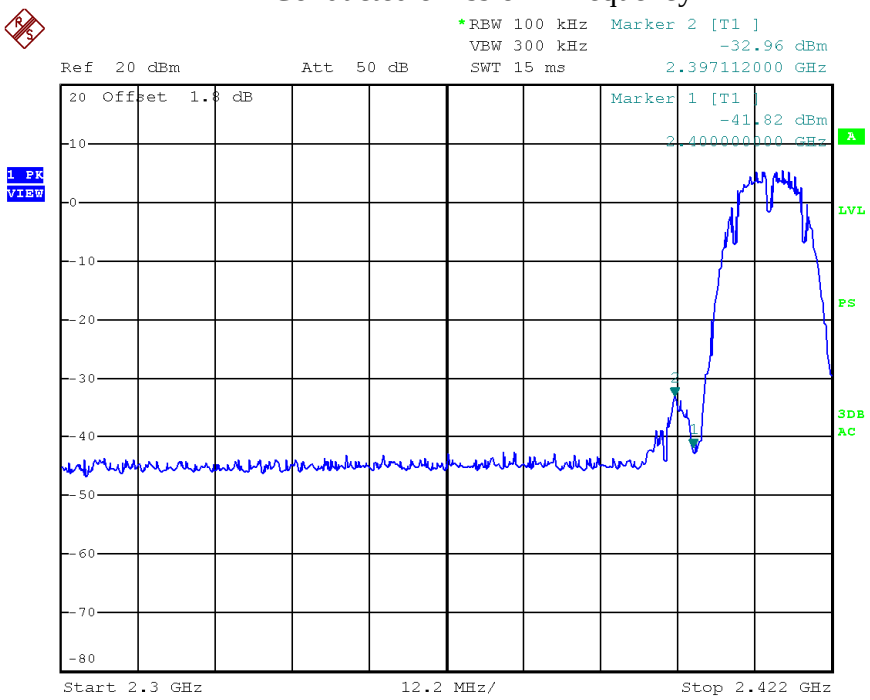
802.11b Out-of-Band Emissions – Chain 1

Reference Level – Frequency L



Date: 24.JUN.2014 17:06:11

Conducted emission - Frequency L



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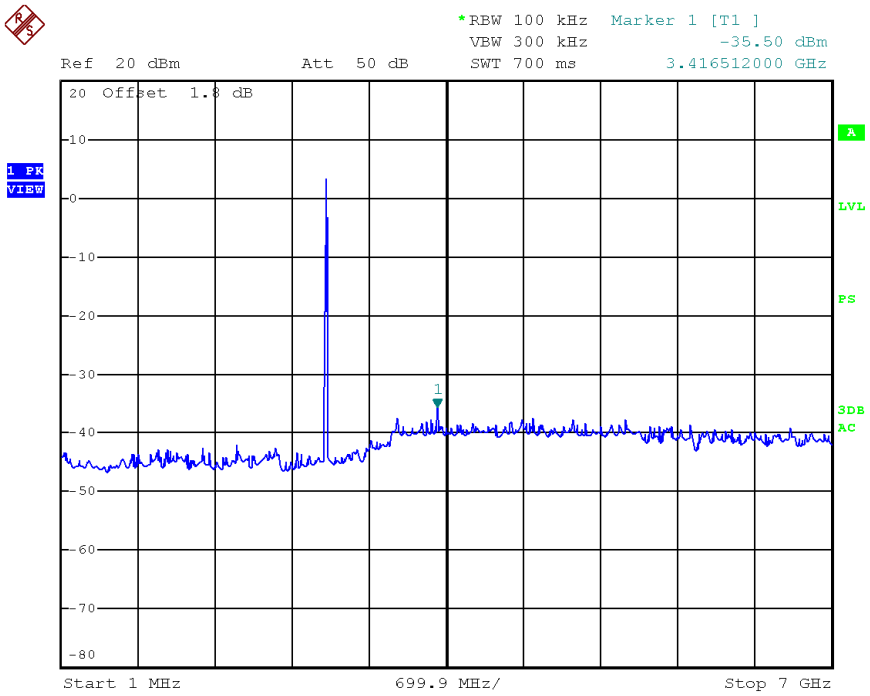

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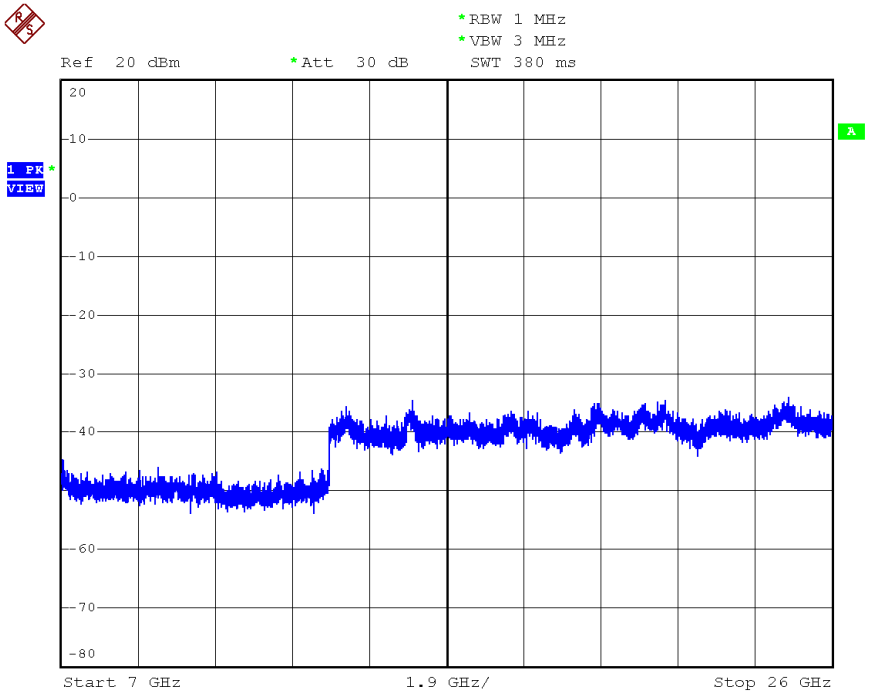
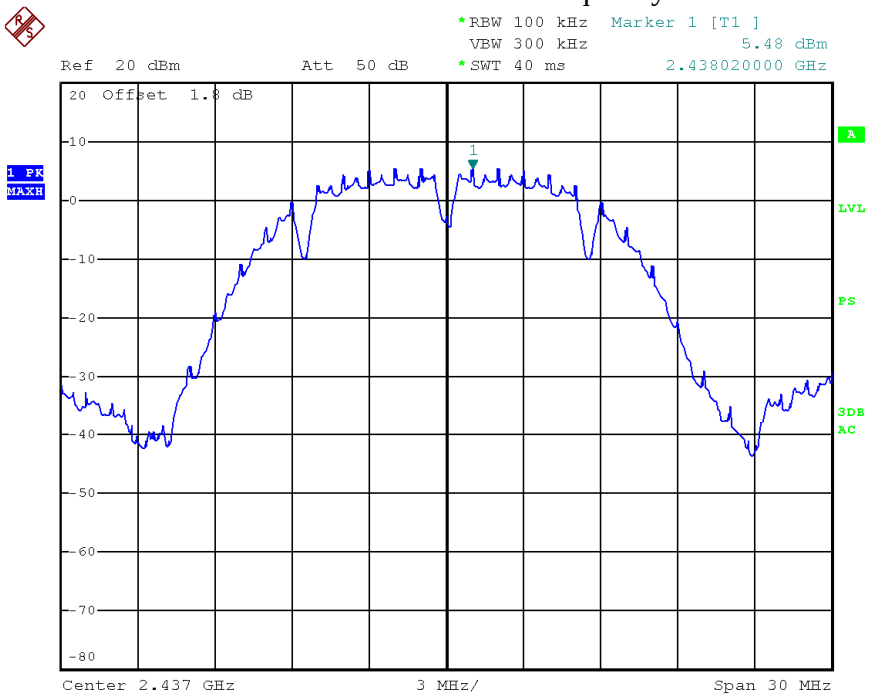


Date: 3.JUN.2014 14:45:29

Reference Level – Frequency M



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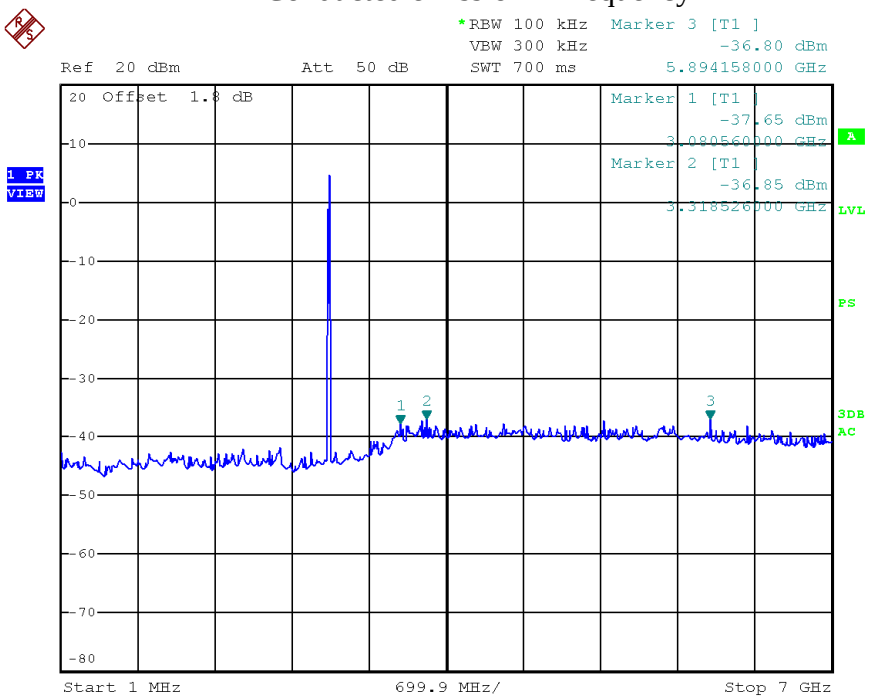
Conducted emission – Frequency M



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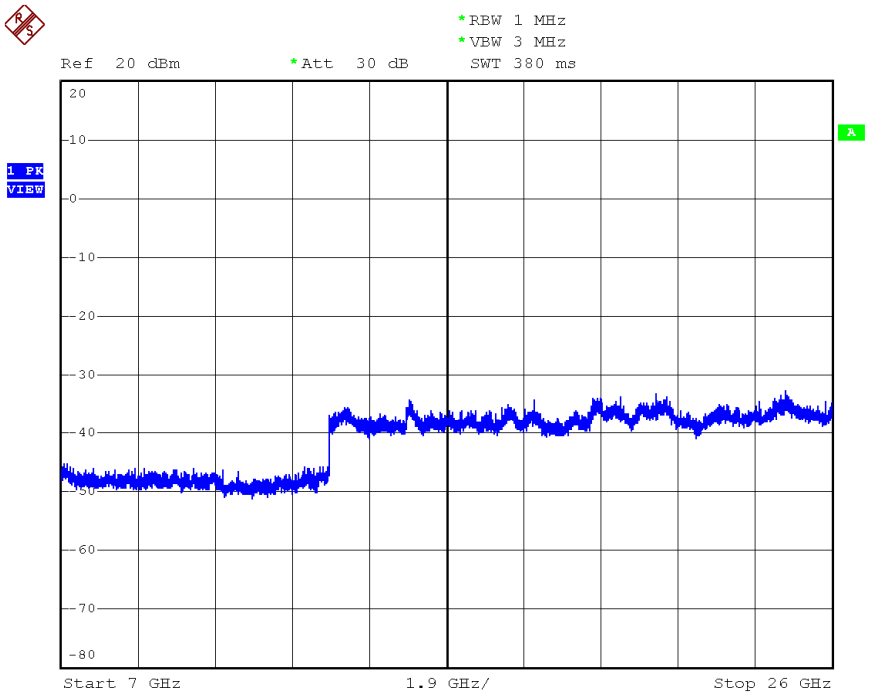
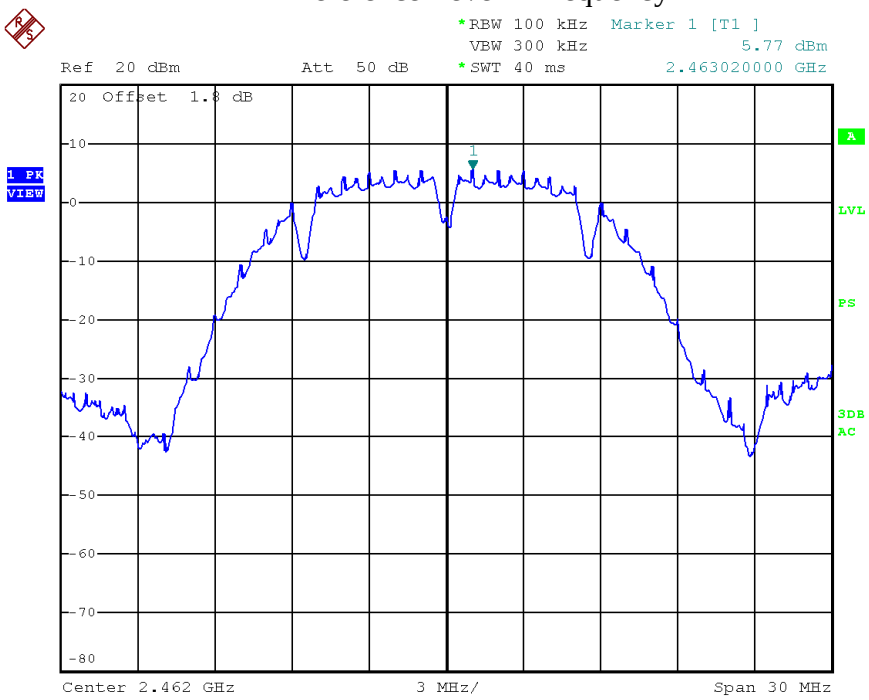


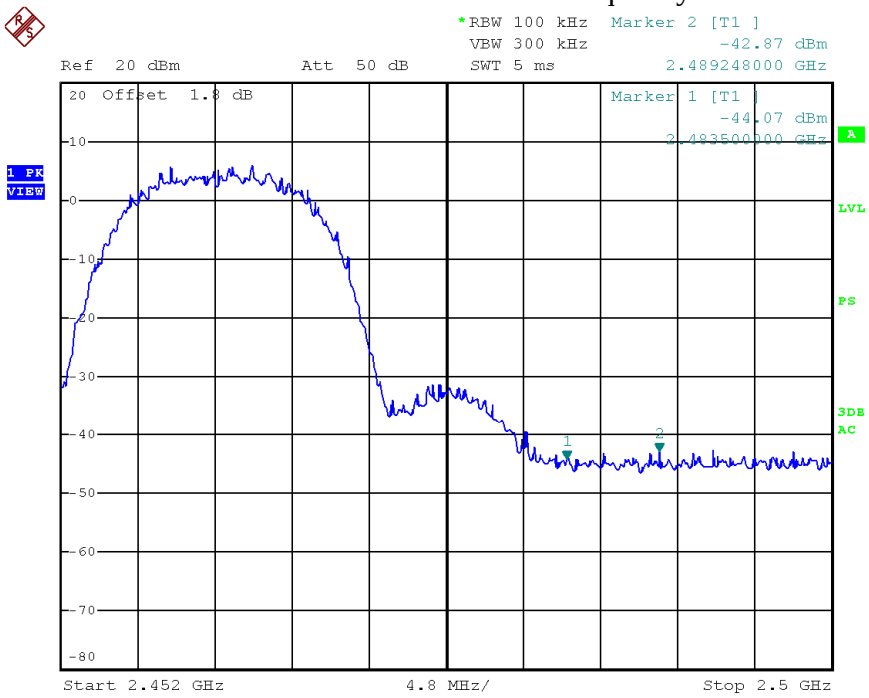
Date: 3.JUN.2014 14:35:08

Reference Level – Frequency H

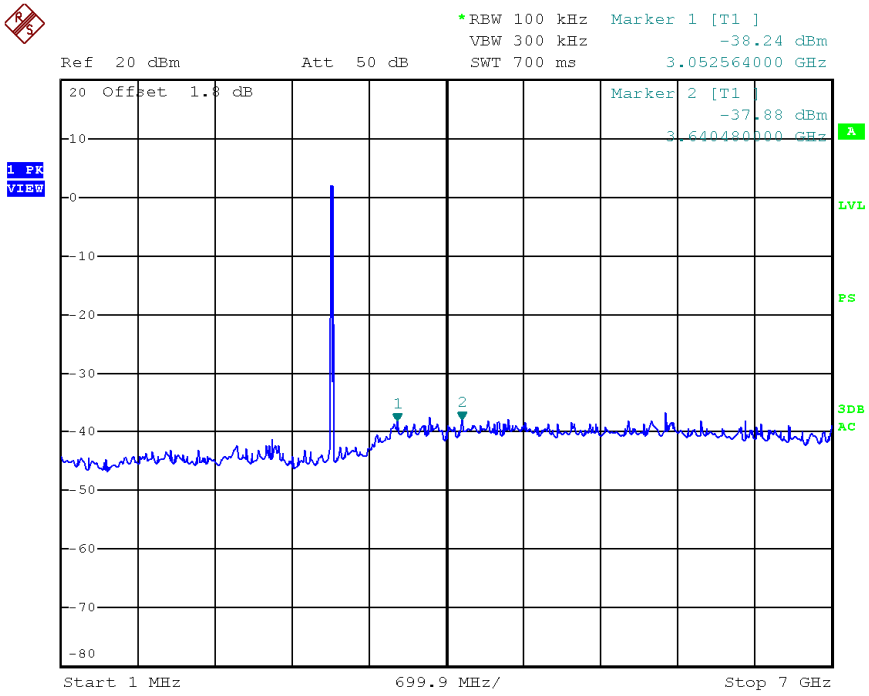


Date: 24.JUN.2014 17:07:09

Conducted emission - Frequency H



Date: 24.JUN.2014 17:47:20



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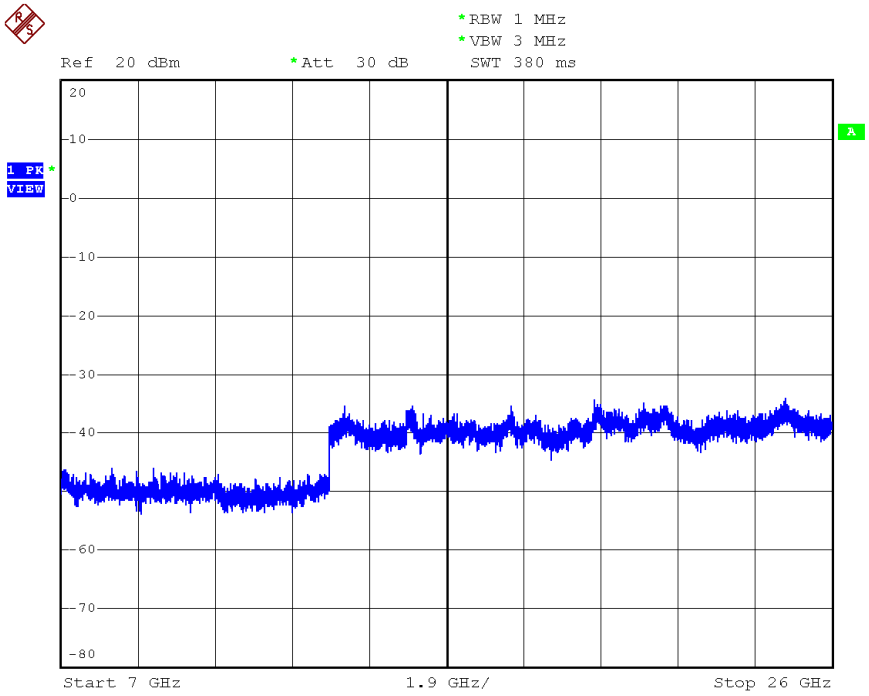
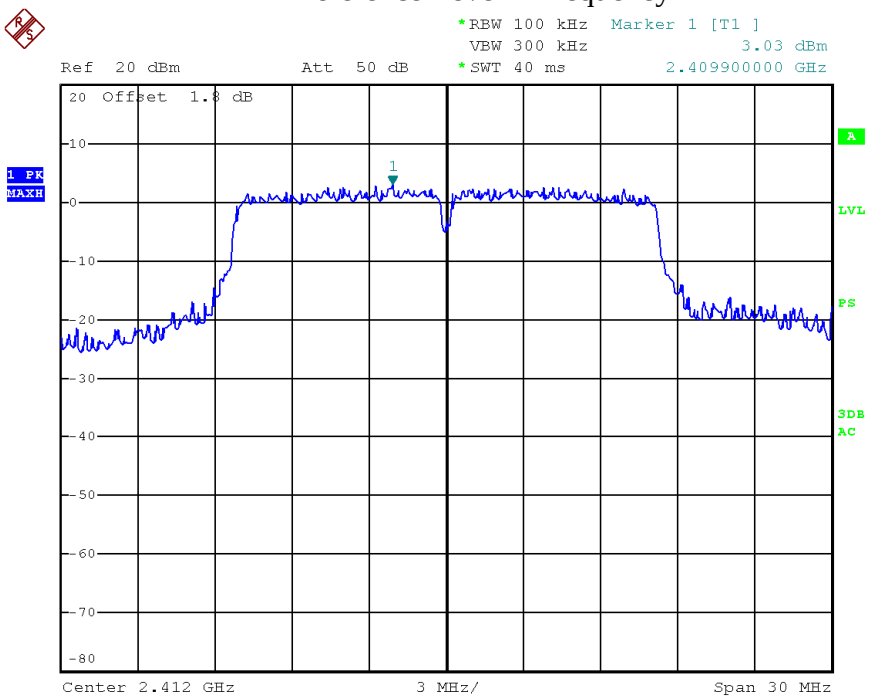


Date: 3.JUN.2014 14:45:45

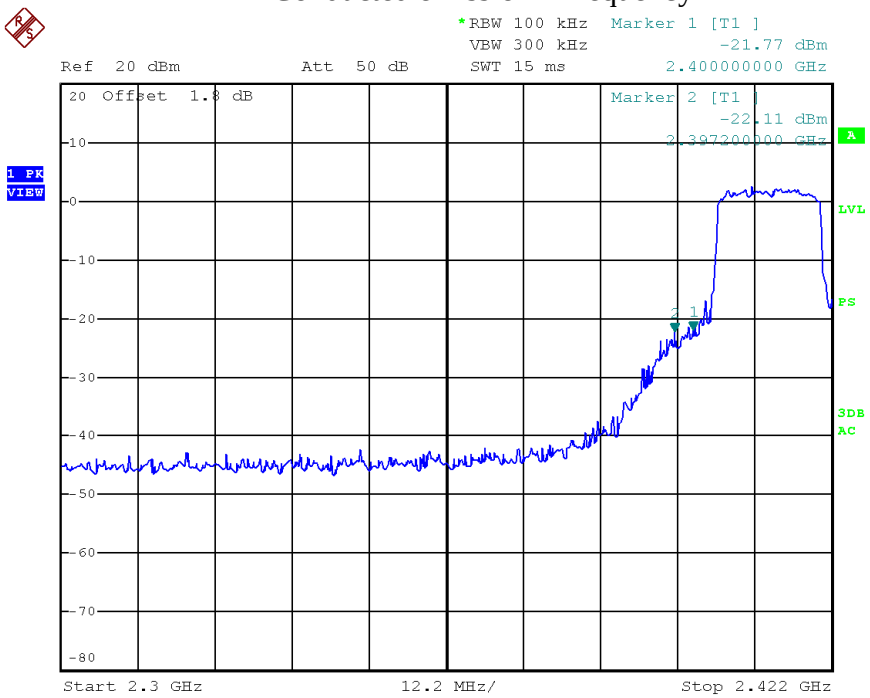
802.11g Out-of-Band Emissions – Chain 1

Reference Level – Frequency L



Date: 24.JUN.2014 17:07:48

Conducted emission - Frequency L



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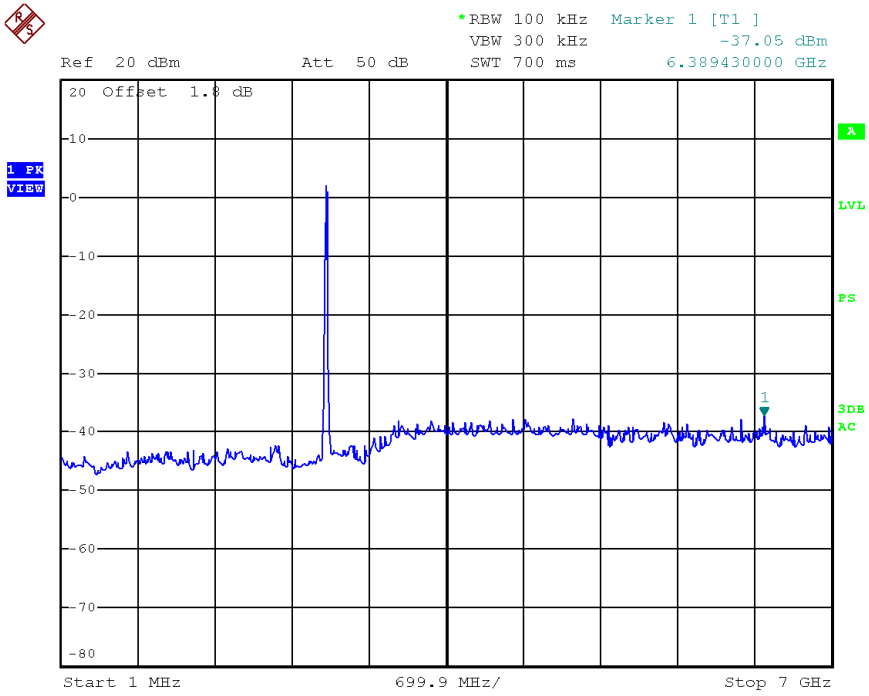

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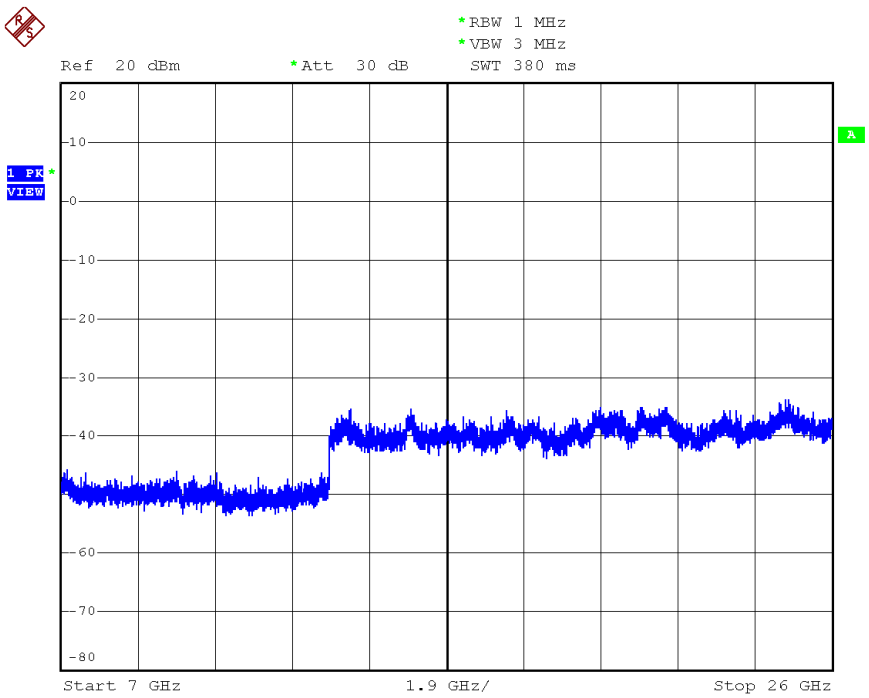
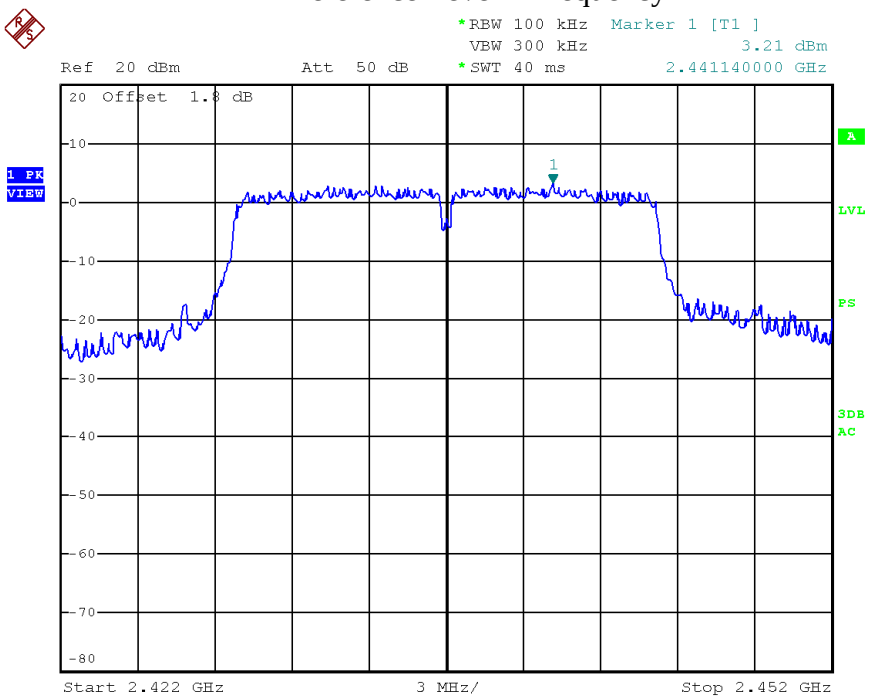


Date: 3.JUN.2014 14:46:03

Reference Level – Frequency M



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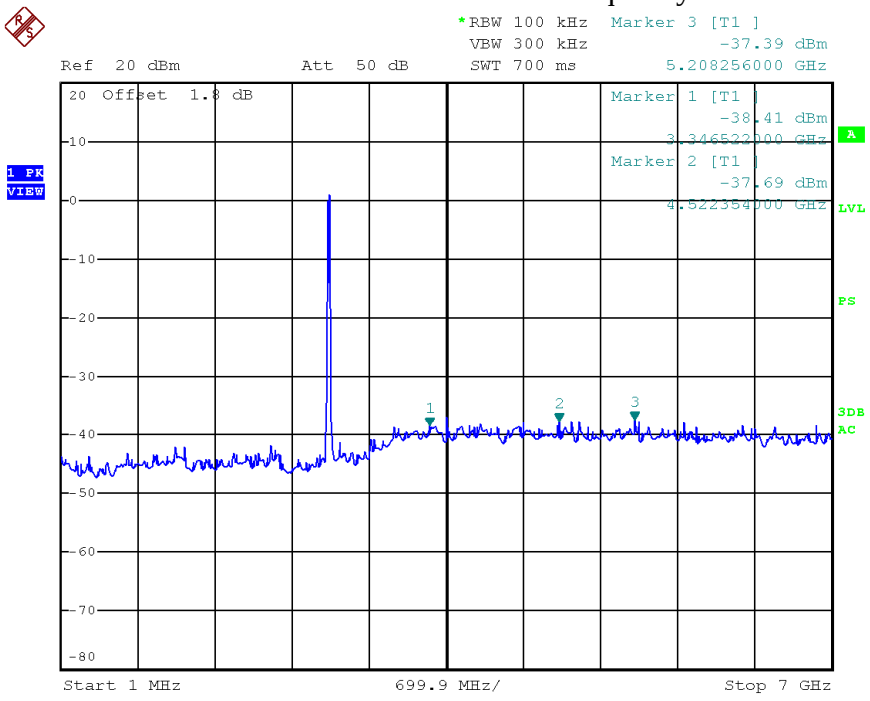
Conducted emission – Frequency M



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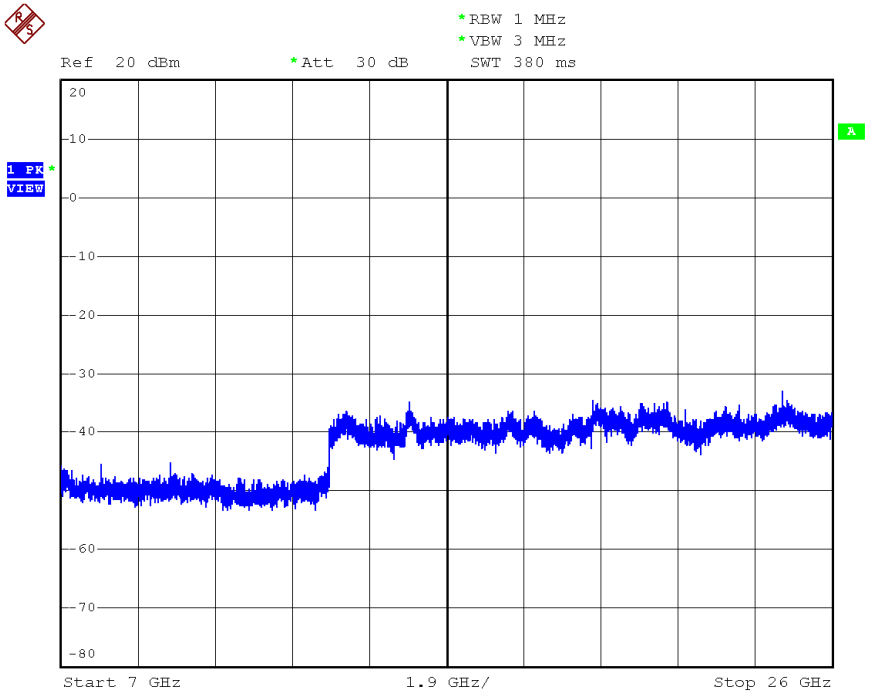
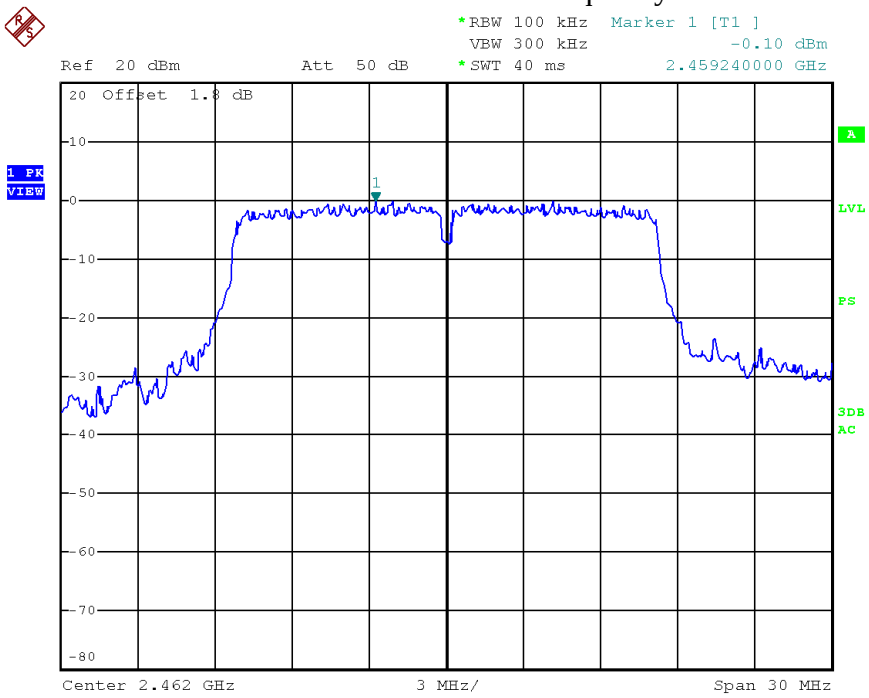


Date: 3.JUN.2014 14:46:26

Reference Level – Frequency H



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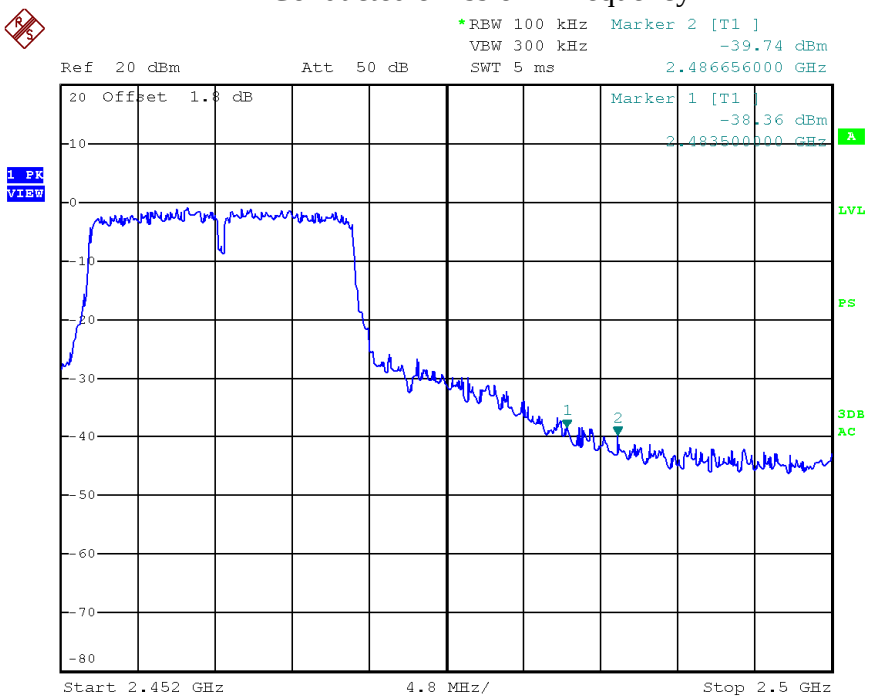
Conducted emission - Frequency H



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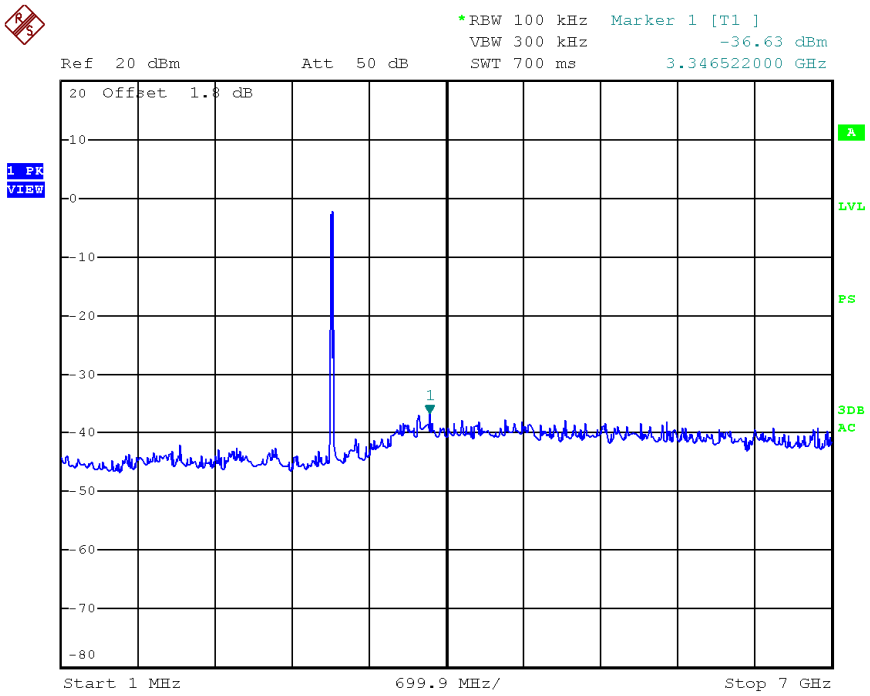

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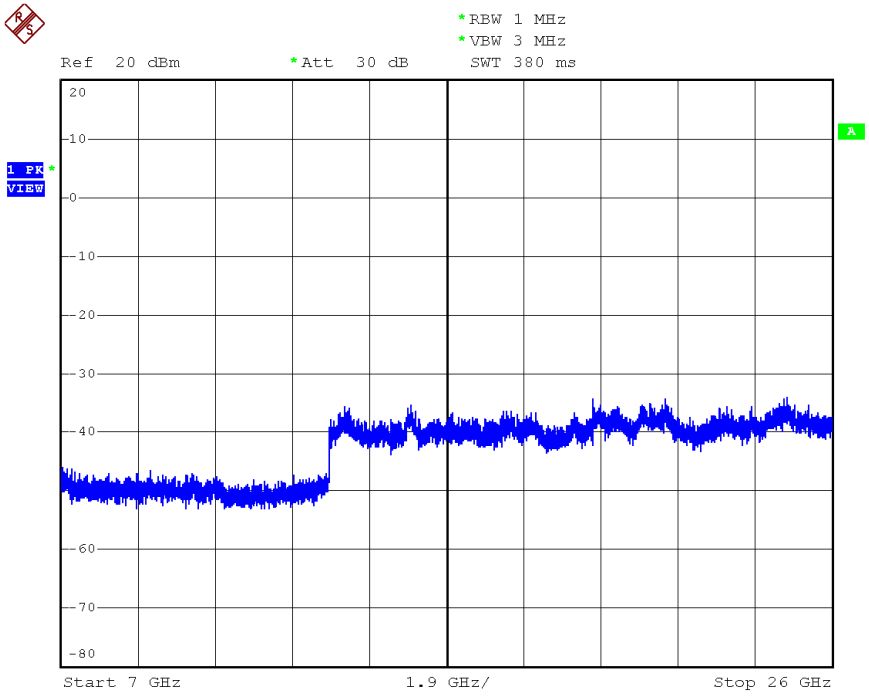

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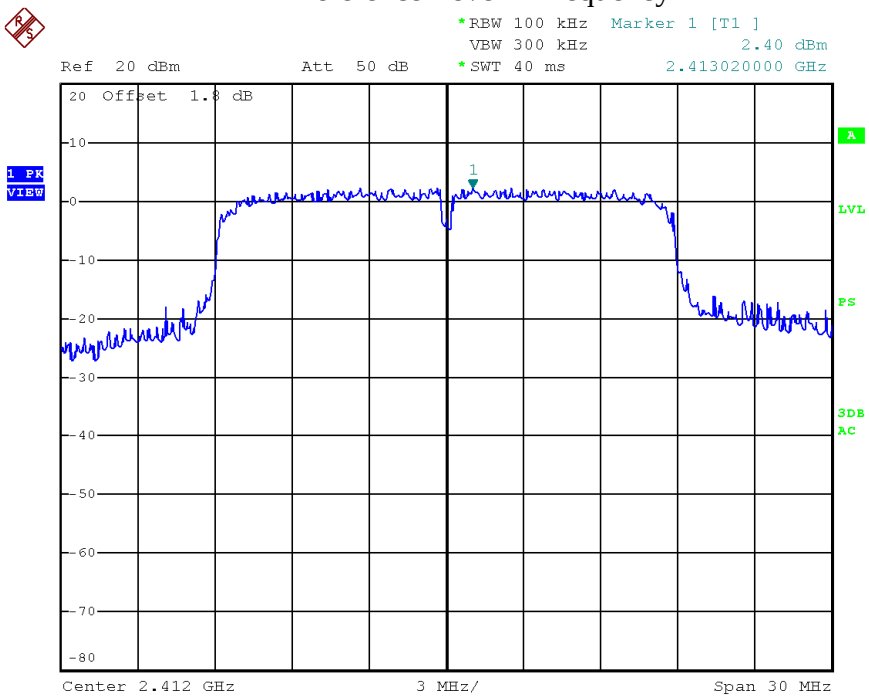
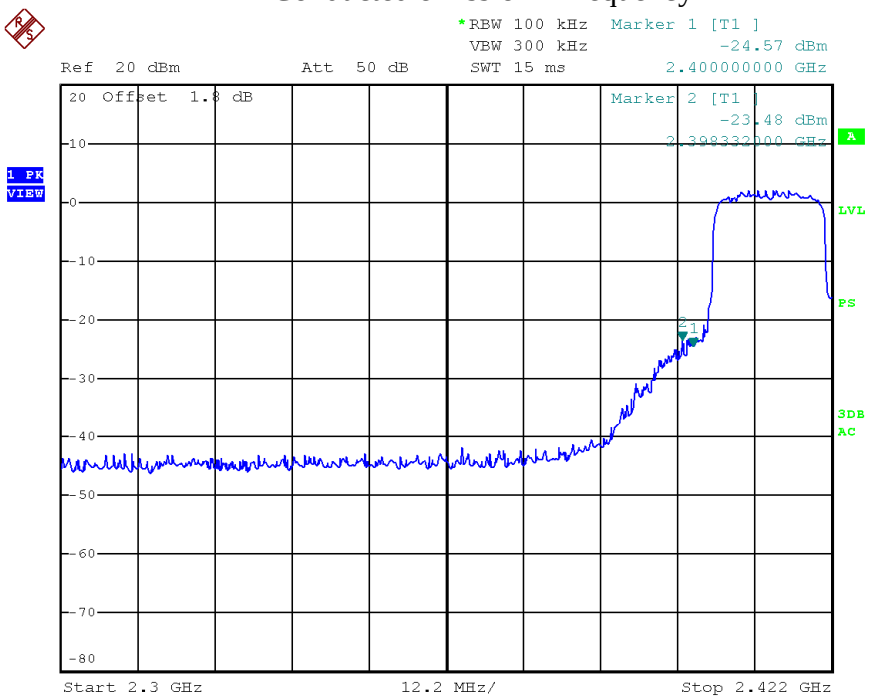
802.11n20 Out-of-Band Emissions – Chain 1

Reference Level – Frequency L



Date: 24.JUN.2014 17:10:43

Conducted emission - Frequency L



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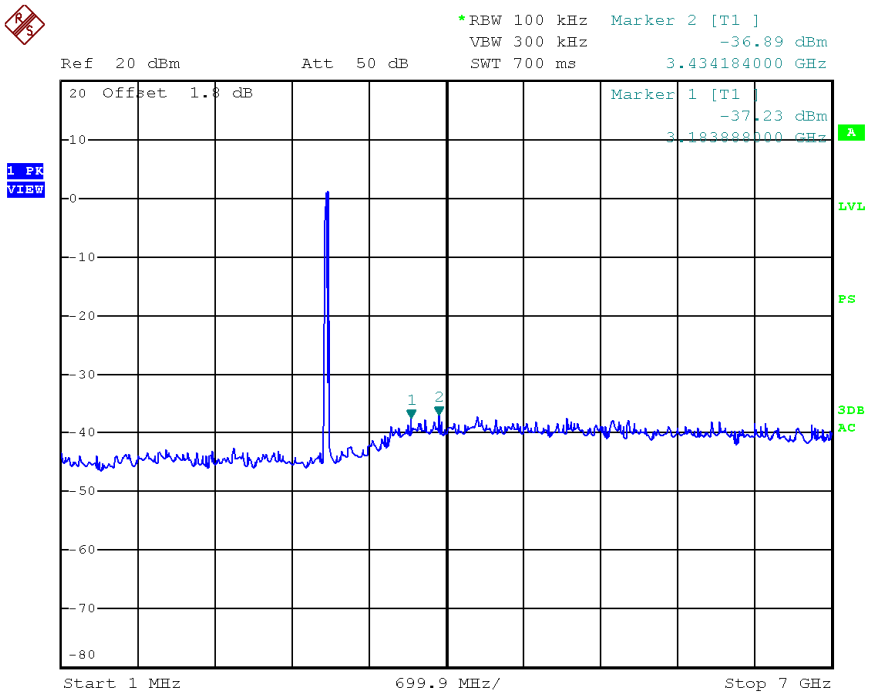

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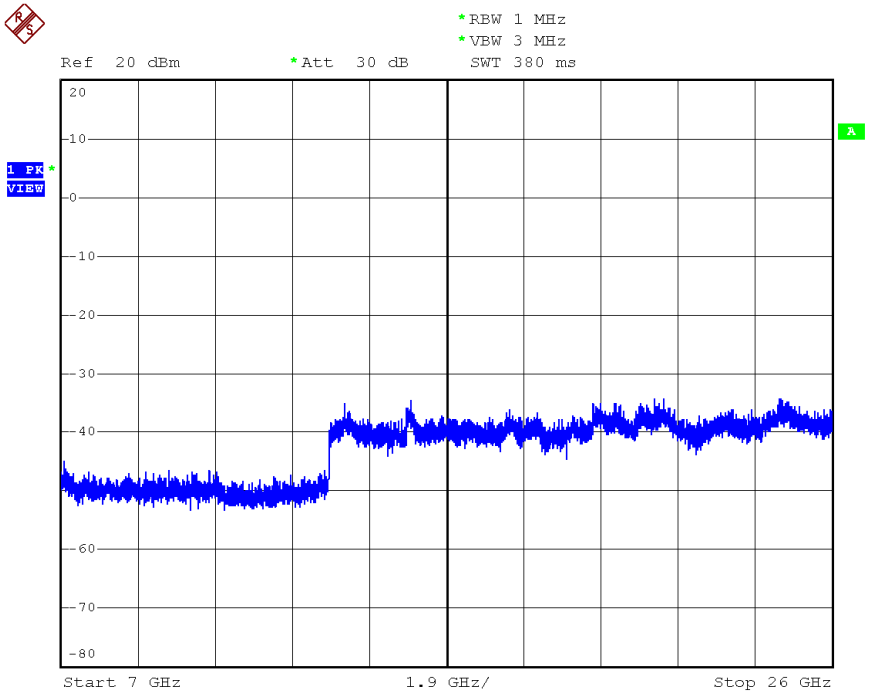

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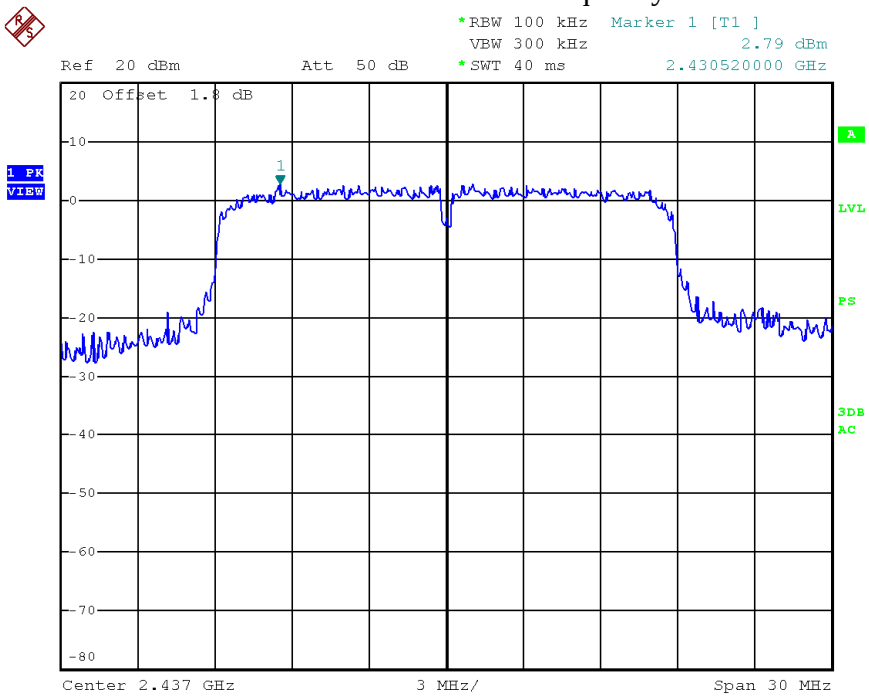
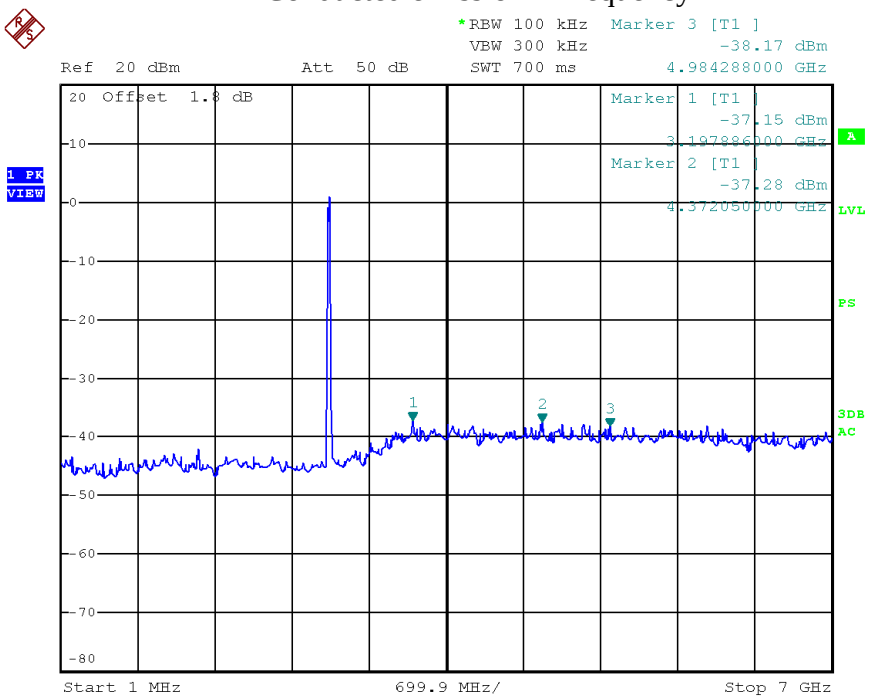
Reference Level – Frequency M

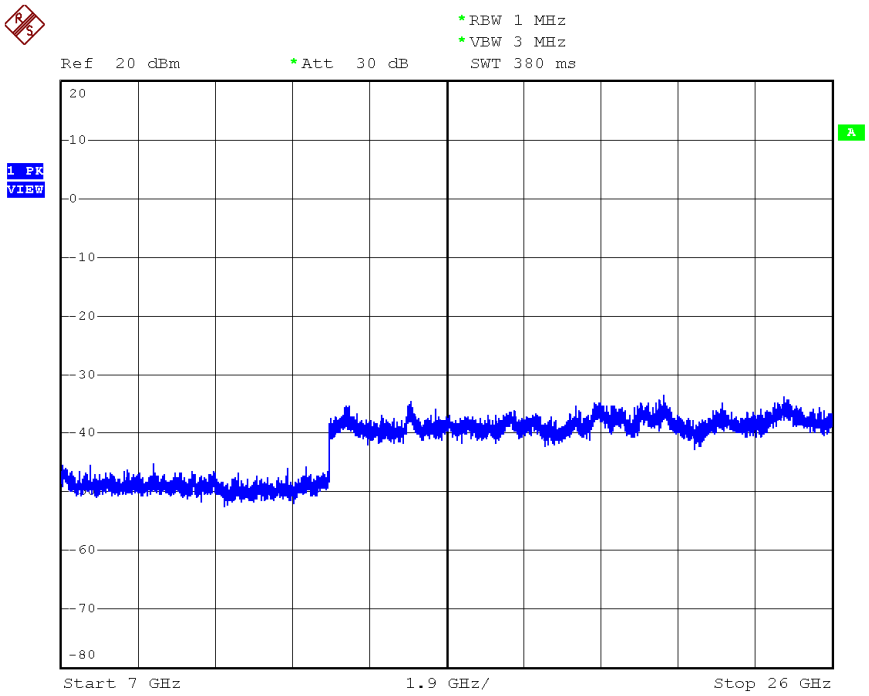


Date: 24.JUN.2014 17:11:10

Conducted emission – Frequency M

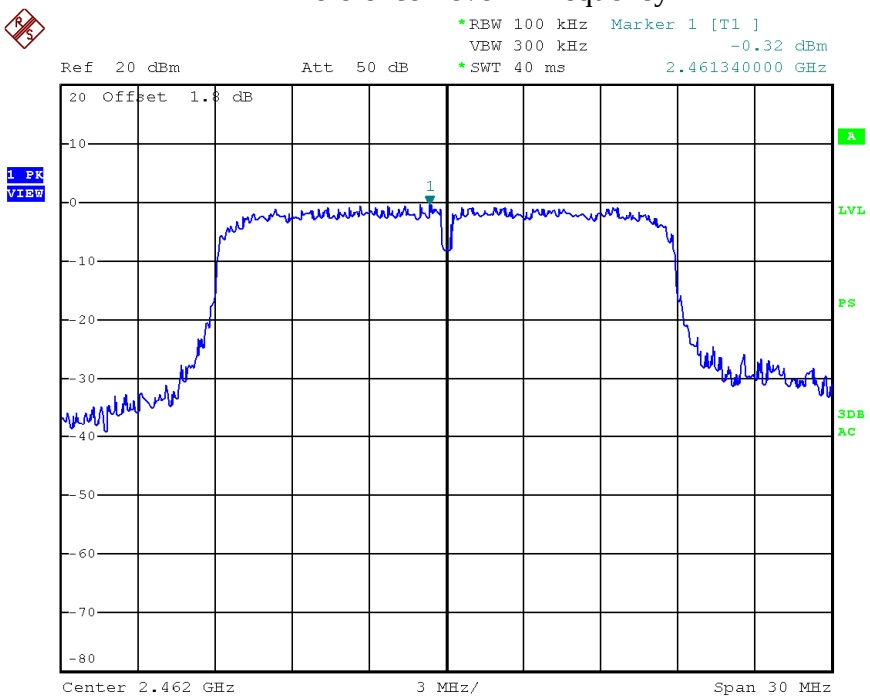


Date: 25.JUN.2014 21:21:20



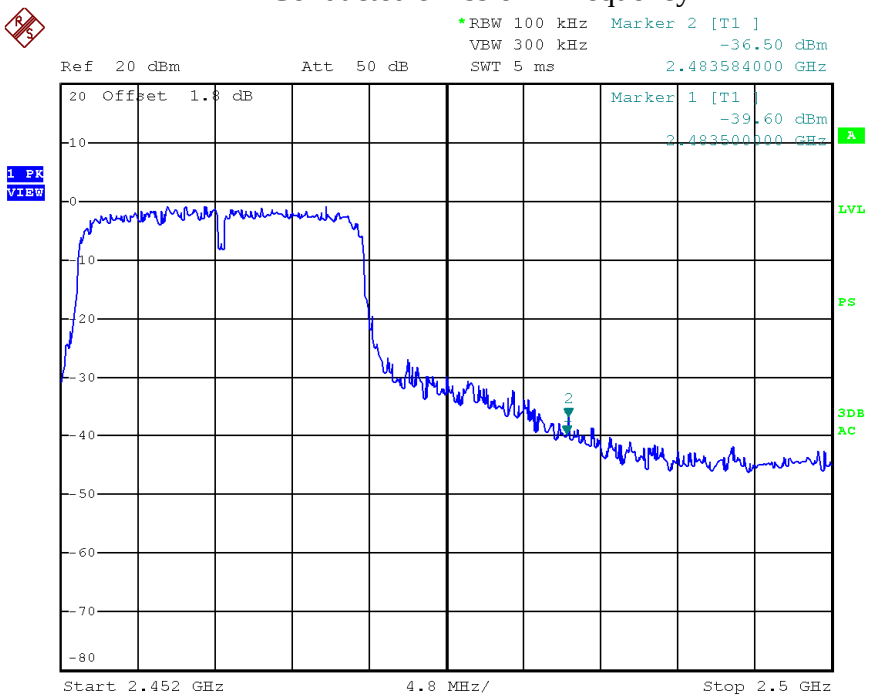
Date: 3.JUN.2014 14:35:37

Reference Level – Frequency H

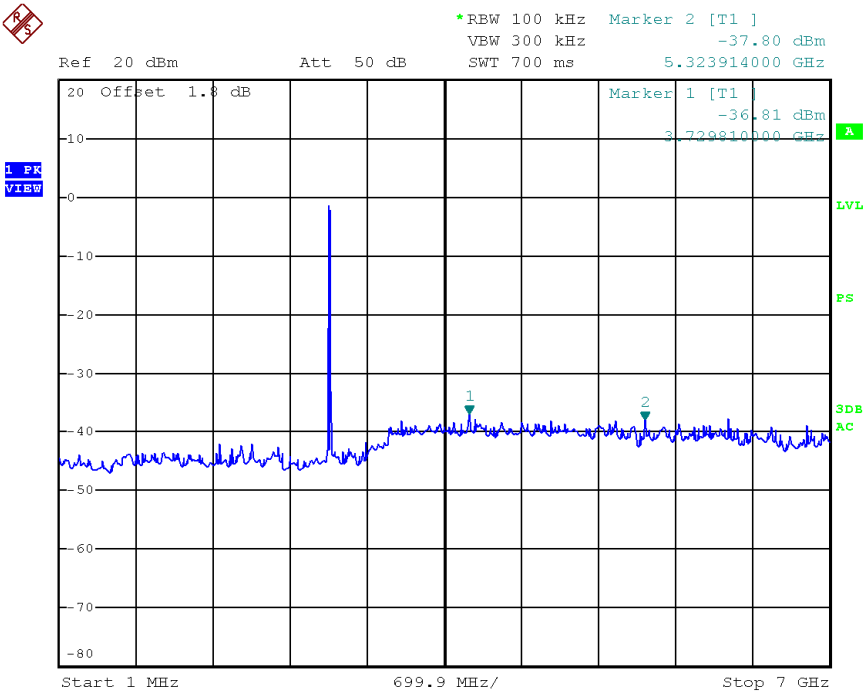


Date: 24.JUN.2014 17:11:34

Conducted emission - Frequency H



Date: 25.JUN.2014 21:22:43



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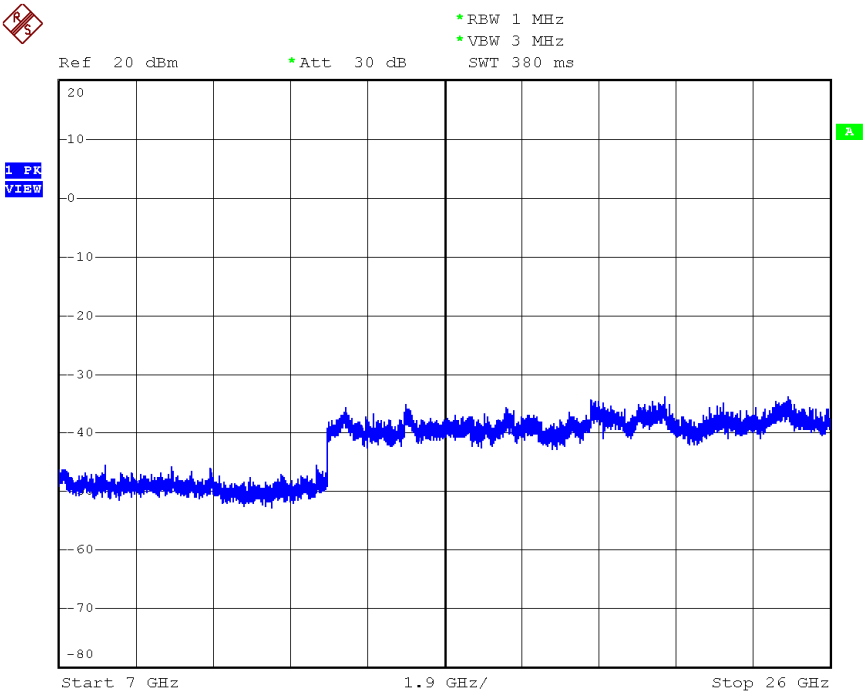
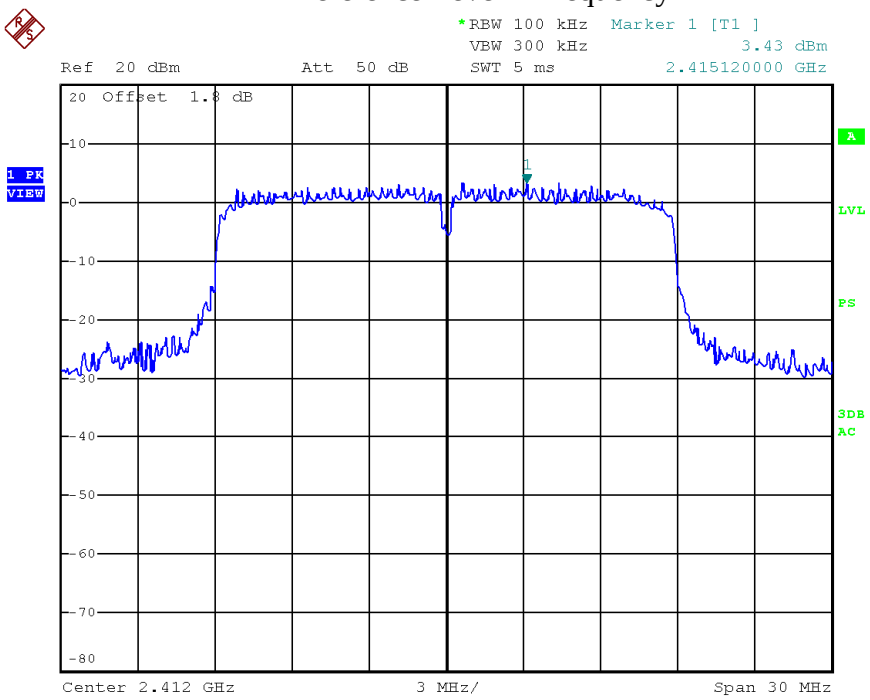


Date: 3.JUN.2014 14:41:11

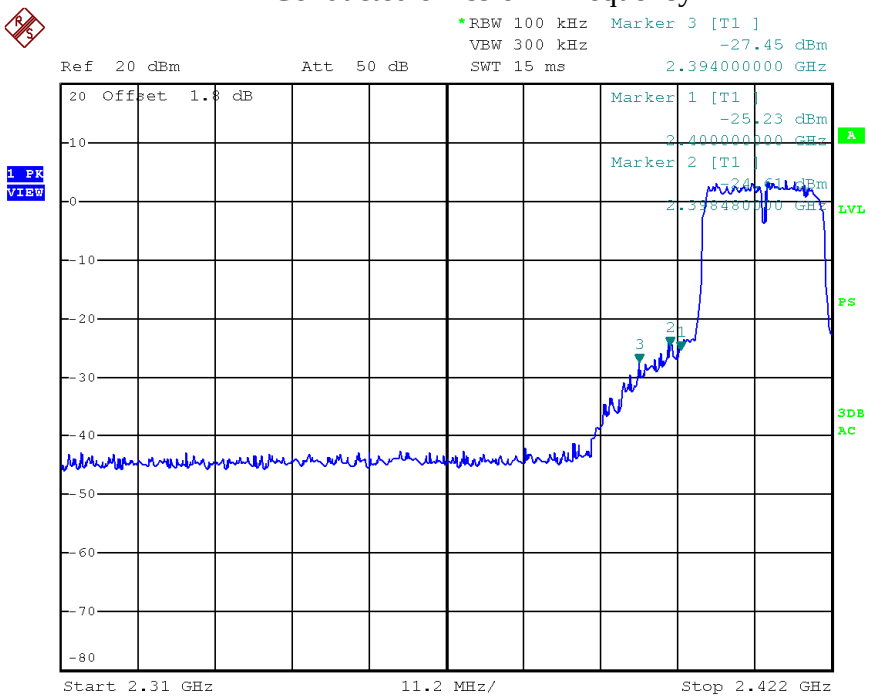
802.11n20 Out-of-Band Emissions – Chain 2

Reference Level – Frequency L

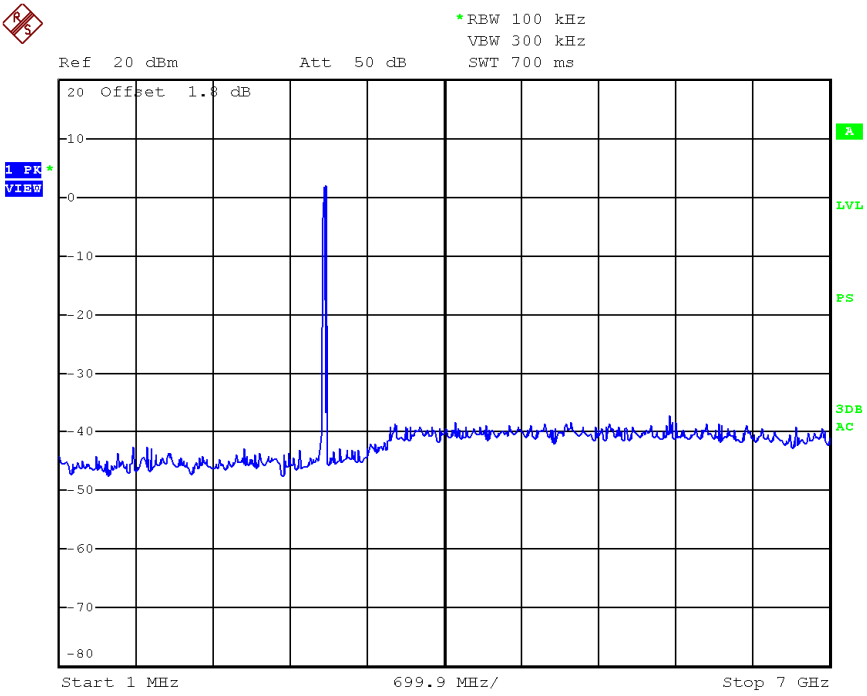


Date: 24.JUN.2014 17:27:57

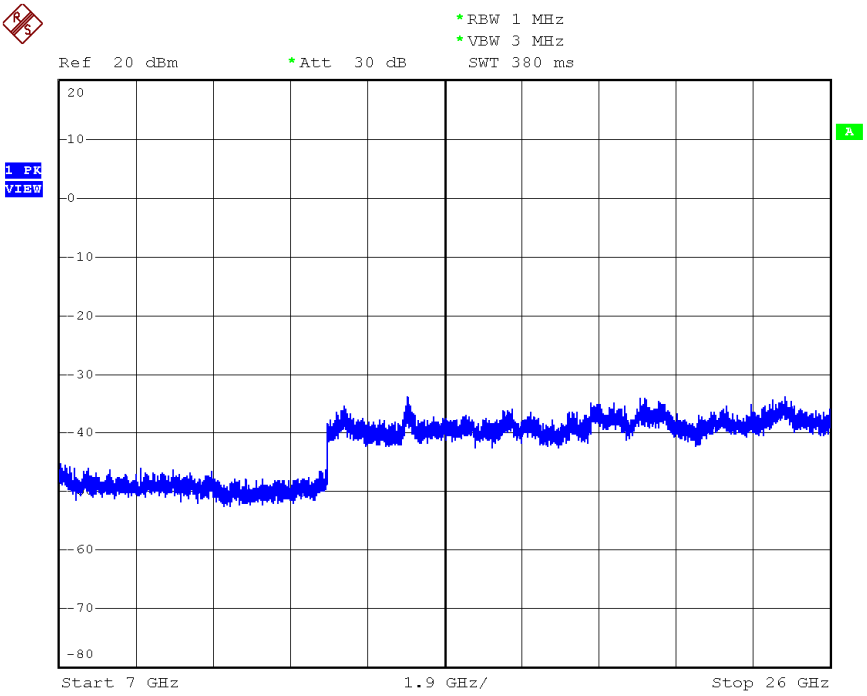
Conducted emission - Frequency L



Date: 24.JUN.2014 17:33:51

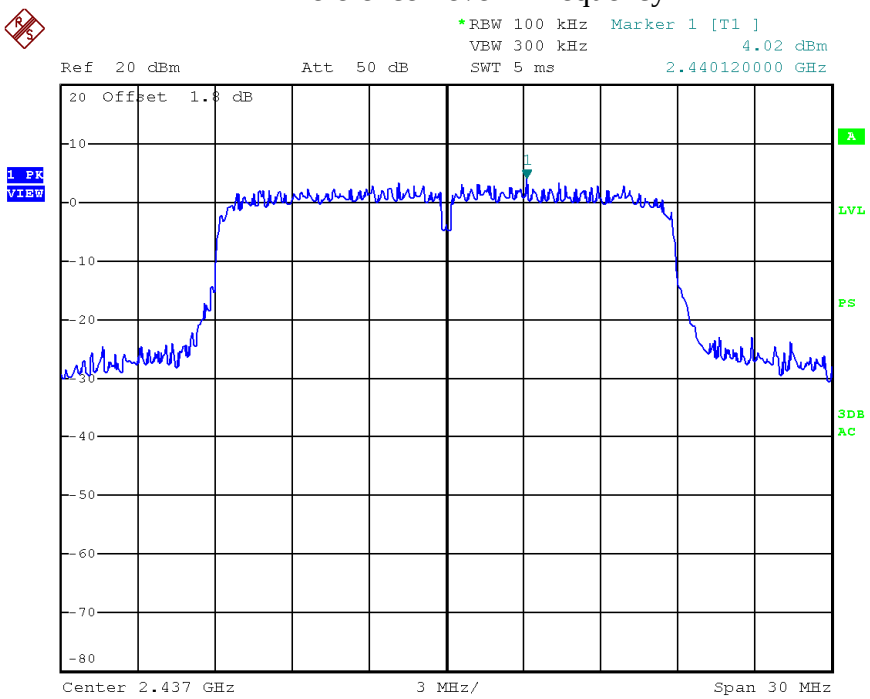


Date: 24.JUN.2014 17:34:44



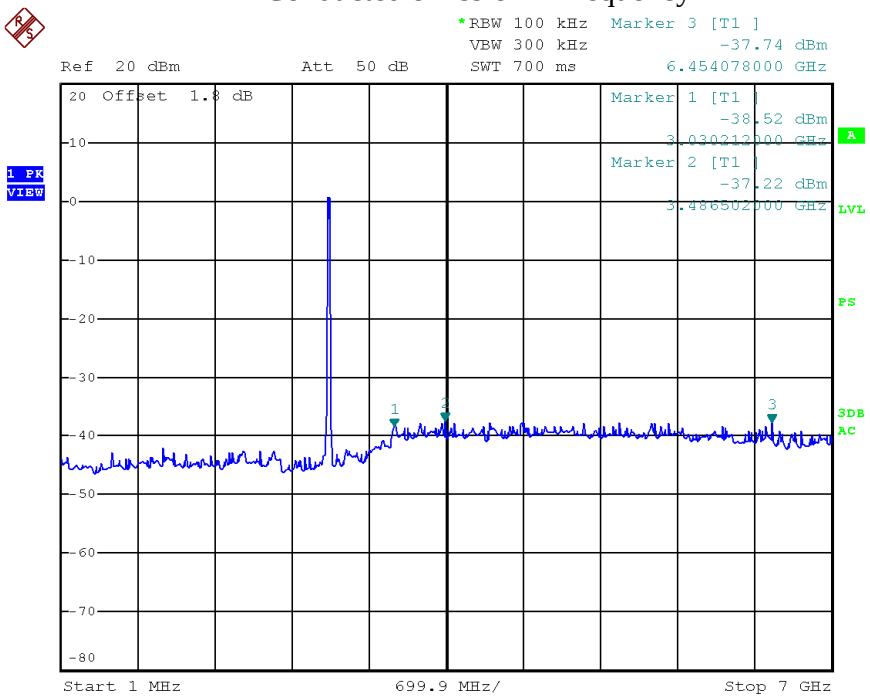
Date: 3.JUN.2014 14:41:24

Reference Level – Frequency M

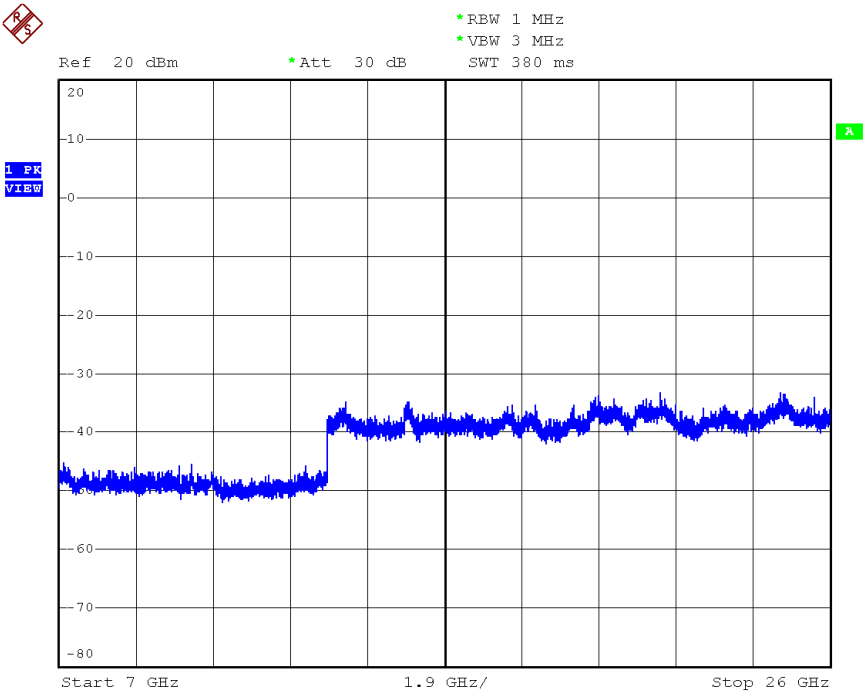


Date: 24.JUN.2014 17:29:26

Conducted emission – Frequency M

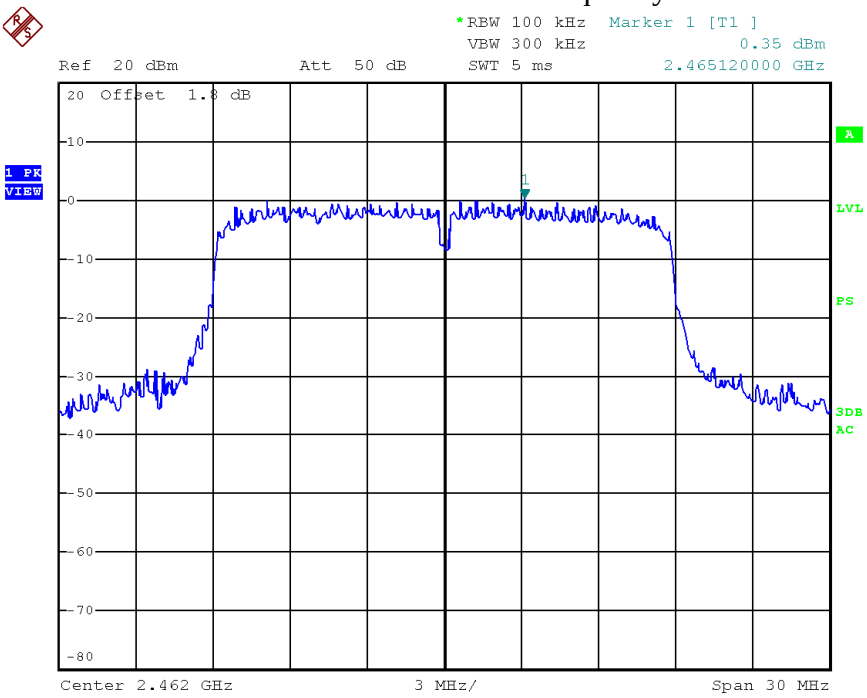


Date: 24.JUN.2014 17:37:08



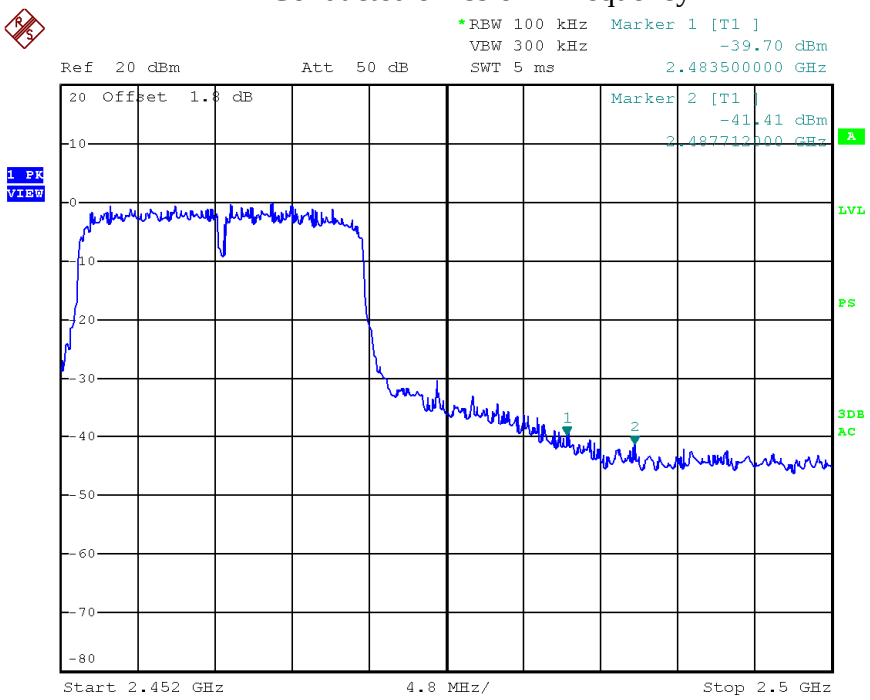
Date: 3.JUN.2014 14:41:40

Reference Level – Frequency H

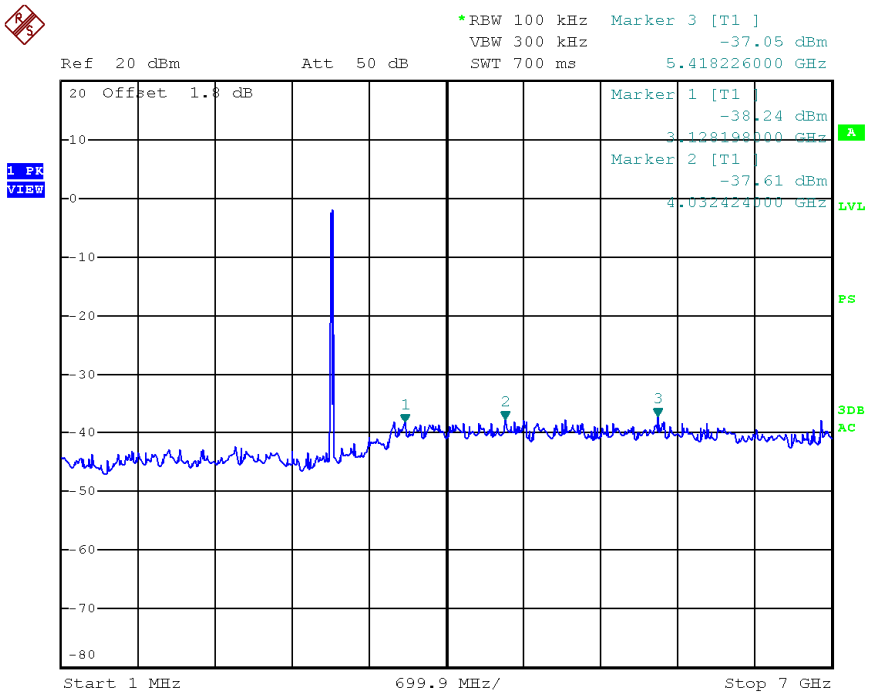


Date: 24.JUN.2014 17:30:01

Conducted emission - Frequency H



Date: 24.JUN.2014 17:39:05



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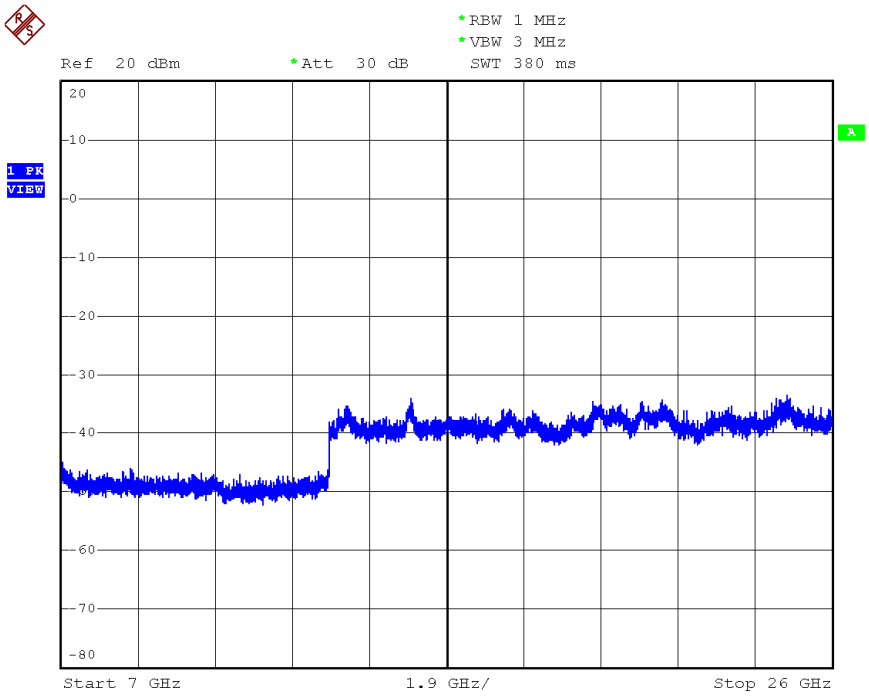


Date: 3.JUN.2014 14:42:06

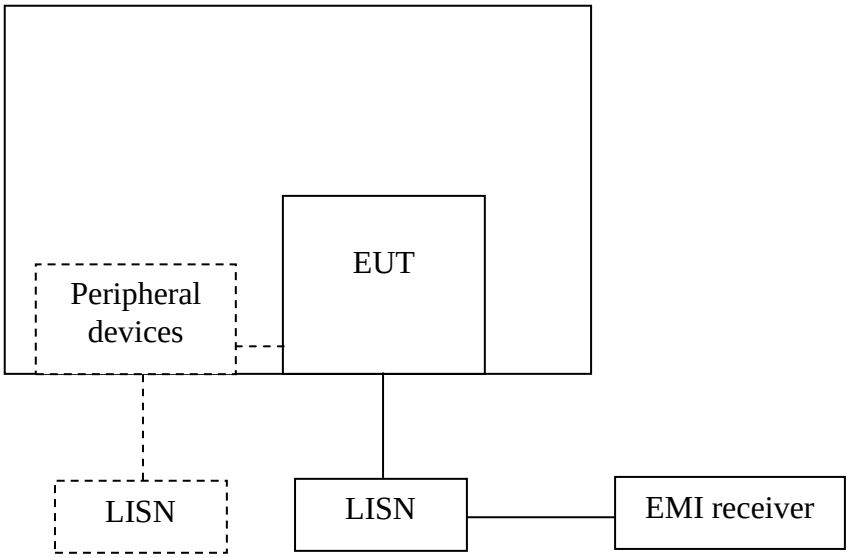
8. Power line conducted emission

Test result: **Pass**

8.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

8.2 Test configuration



☒ For table top equipment, wooden support is 0.8m height table

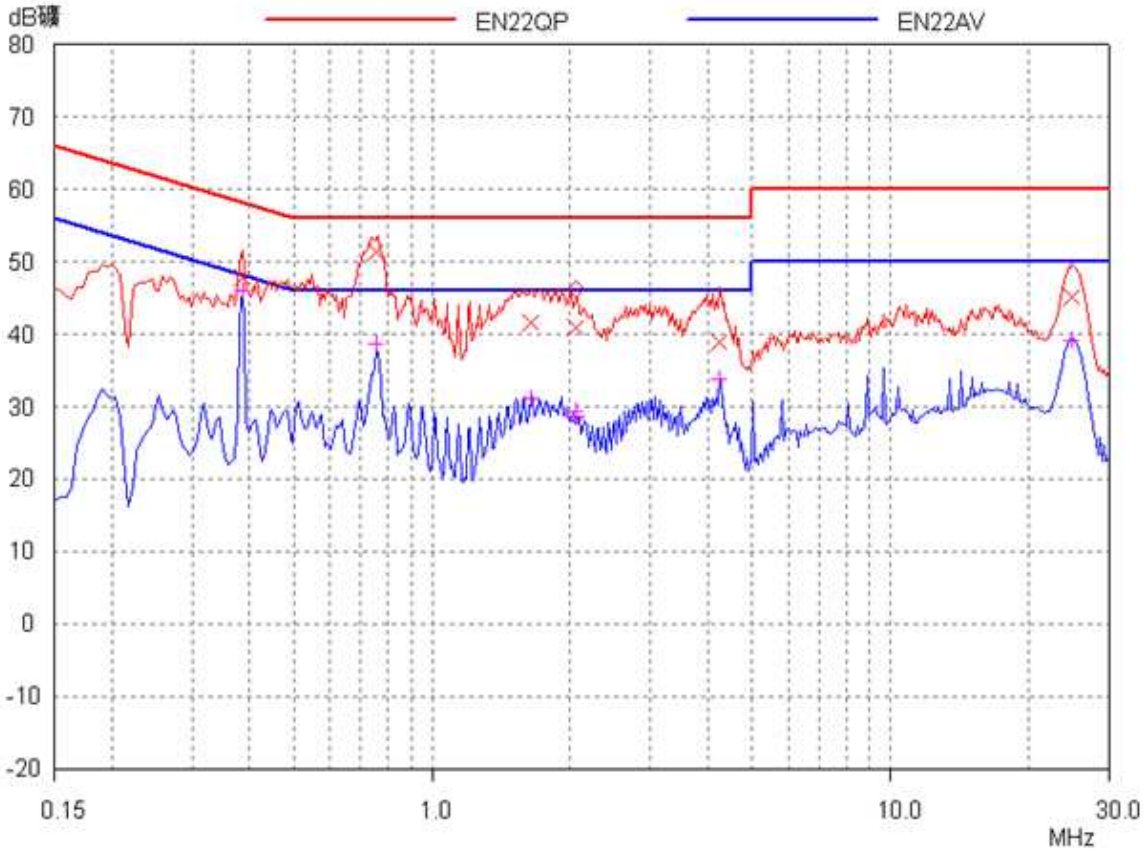
☐ For floor standing equipment, wooden support is 0.1m height rack.

8.3 Test procedure and test set up

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50Ω/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50Ω/50uH coupling impedance with 50Ω termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 on conducted measurement.
The bandwidth of the test receiver is set at 9 kHz.

8.4 Test protocol

Temperature : 25 °C
Relative Humidity : 55 %



Frequency	Correct Factor (dB)	Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV
0.38 (N)	3.00	47.82	46.13	58.19	48.19	10.37	2.06
0.76 (N)	3.00	51.46	38.78	56.00	46.00	4.54	7.22
1.64 (L)	3.00	41.58	31.15	56.00	46.00	14.42	14.85
2.07 (N)	3.00	40.95	29.32	56.00	46.00	15.05	16.68
4.22 (L)	3.00	38.94	33.72	56.00	46.00	17.06	12.28
24.74 (L)	3.00	45.19	39.06	60.00	50.00	14.81	10.94
Remark: 1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB). 2. Margin (dB) = Limit - Corrected Reading.							