FCC 47 CFR PART 15 SUBPART C AND ANSI C63.4: 2012

TEST REPORT

For

HSPA+ 3G SOHO Router

Model Number: DWR-712

Brand: D-Link

Issued for

D-Link Corporation

No. 289, Sinhu 3rd Rd., Neihu District, Taipei City 114, Taiwan R.O.C.

Issued by

Compliance Certification Services Inc.
Tainan Lab.
No.8,Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.)

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Issued Date: October 29, 2013

Testing Laboratory
1109

REVISION HISTORY

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	October 29, 2013	Initial Issue	ALL	Eva Lin

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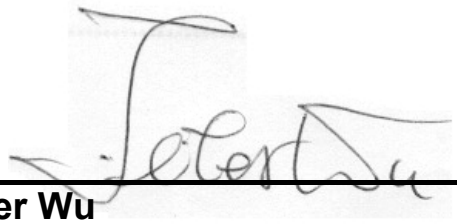
1. TEST REPORT CERTIFICATION

Applicant	**：D-Link Corporation**
Address	：No. 289, Sinhu 3rd Rd., Neihu District, Taipei City 114, Taiwan R.O.C.
Manufacture	**：Advance Multimedia Internet Technology Inc.**
Address	：No.28, Lane 31 , Sec. 1 , Huandong Rd., Sinshih District , Tainan City 74146 , Taiwan
Equipment Under Test	：HSPA+ 3G SOHO Router
Model Number	：DWR-712
Brand Name	：D-Link
Date of Test	：October 21, 2013 – October 24, 2013

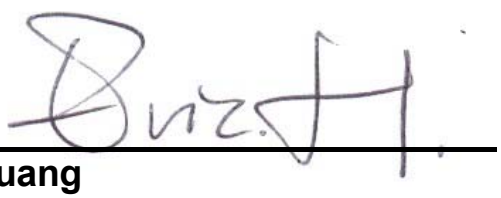
APPLICABLE STANDARD	
STANDARD	**TEST RESULT**
FCC Part 15 Subpart C AND ANSI C63.4 : 2003	No non-compliance noted

Approved by:



Jeter Wu
Assistant Manager

Reviewed by:



Eric Huang
Assistant Section Manager

2. EUT DESCRIPTION

2.1 DESCRIPTION OF EUT & POWER

Product Name	HSPA+ 3G SOHO Router
Model Number	DWR-712
Brand Name	D-Link
Received Date	October 17, 2013
Frequency Range	IEEE 802.11b/g, 802.11n HT20 (DTS Band):2412MHz~2462MHz IEEE 802.11n HT40 (DTS Band):2422MHz~2452MHz
Transmit Power	IEEE 802.11b Mode :17.39dBm (DTS Band) (54.8277 mW) IEEE 802.11g Mode : 23.13dBm (DTS Band) (205.589 mW) IEEE 802.11n HT20 Mode : 21.55dBm (DTS Band) (142.889 mW) IEEE 802.11n HT40 Mode : 20.65dBm (DTS Band) (116.145 mW)
Channel Spacing	IEEE 802.11b/g, 802.11n HT20/HT40: 5MHz
Channel Number	IEEE 802.11b/g, 802.11n HT20:11 Channels IEEE 802.11n HT40 :7 Channels
Transmit Data Rate	IEEE 802.11b：11, 5.5, 2, 1 Mbps IEEE 802.11g：54, 48 ,36, 24, 18, 12, 9, 6 Mbps IEEE 802.11n HT20 : 65, 58.5, 52, 39, 26, 19.5, 13, 6.5 Mbps IEEE 802.11n HT40 : 150, 135, 121.5, 108, 81, 54, 40.5, 27, 13.5 Mbps
Type of Modulation	IEEE 802.11b：DSSS (CCK, DQPSK, DBPSK)
	IEEE 802.11g：OFDM (64QAM, 16QAM, QPSK, BPSK)
	IEEE 802.11n HT20/40：OFDM (64QAM, 16QAM, QPSK, BPSK)
Frequency Selection	By software / firmware
Antenna Type	**Replace antenna*1 (Internal antenna)** **2.4G PCB Antenna *1 (1TX1RX)** Model: GY196HT467-017 Brand: Wieson Gain: 3.39 dBi Type: PCB

Power Source	Powered from Adapter Brand: D-Link Model: AMS9-1201000FU2 Input: 100-240Vac, 50/60Hz, 0.5A Output: 12Vdc, 1.0A
Temperature Range	0 ~ +40°C

REMARK:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **KA2WR712C1** filing to comply with Section 15.207,15.209 and 15.247 of the FCC Part 15, Subpart C Rules.
3. For more details, please refer to the user manual.

3. DESCRIPTION OF TEST MODES

The EUT is a HSPA+ 3G SOHO Router.

The RF chipset is manufactured by Ralink Technology, Corp.

The antenna peak gain 3.39dBi (highest gain) were chosen for full testing.

IEEE 802.11 b ,802.11g ,802.11n HT20 mode (DTS Band)

The EUT had been tested under operating condition.

There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2412
Middle	2437
High	2462

IEEE 802.11b mode: 11Mbps data rates (worst case) were chosen for full testing.

IEEE 802.11g mode: 6Mbps data rates (worst case) were chosen for full testing.

IEEE 802.11n HT20 mode: 6.5Mbps data rates (worst case) were chosen for full testing.

IEEE 802.11n HT40 mode (DTS Band)

The EUT had been tested under operating condition.

There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2422
Middle	2437
High	2452

IEEE 802.11n HT40 mode: 13.5Mbps data rates (worst case) were chosen for full testing.

The worst-case data rates are determined according to the description above, based on the investigations by measuring the PSD, peak power and average power across all the data rates, bandwidths, modulations and spatial stream modes.

4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 15.207, 15.209 and 15.247 and KDB 558074.

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No.8,Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.)

The sites are constructed in conformance with the requirements of ANSI C63.7:1992, ANSI C63.4: 2003 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

5.3 LABORATORY ACCREDITATIONS LISTINGS

The test facilities used to perform radiated and conducted emissions tests are accredited by Taiwan Accreditation Foundation for the specific scope of accreditation under Lab Code: 1109 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by TAF or any agency of the Government. In addition, the test facilities are listed with Federal Communications Commission (registration no: TW-1037 and 455173).

5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

Taiwan	TAF

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	Industry Canada
Germany	TUV NORD
Taiwan	BSMI
USA	FCC

Copies of granted accreditation certificates are available for downloading from our web site, http:///www.ccsrf.com

6. CALIBRATION AND UNCERTAINTY

6.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

6.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

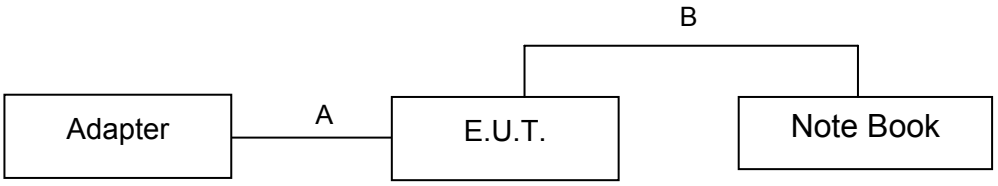
PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz Test Site : OATS-6	±3.59dB
Radiated Emission, 200 to 1000 MHz Test Site : OATS-6	±3.27dB
Radiated Emission, 1 to 26.5 GHz	± 3.20dB
Power Line Conducted Emission	± 2.90dB

This measurement uncertainty is confidence of approximately 95%, k=2

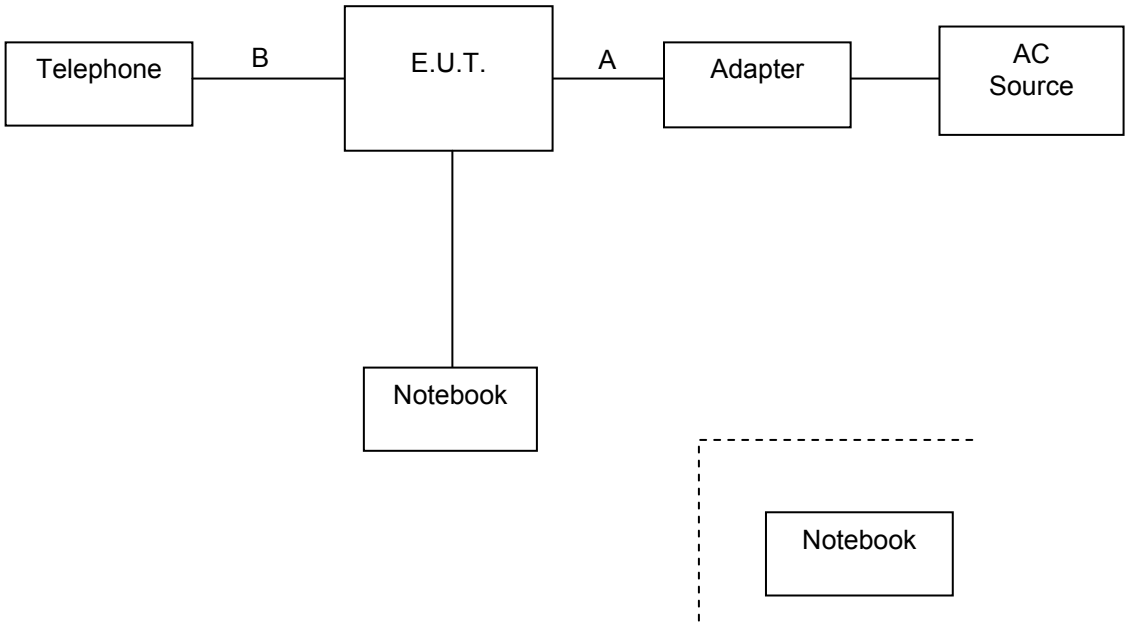
7. SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT

RF Test Setup:



EMI Test Setup:



7.2 SUPPORT EQUIPMENT

RF test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1.	Note Book	IBM	T43	DoC	Power cable, unshd, 1.6m

No.	Signal cable description	
A	DC	Unshielded, 1.2m, 1pcs.
B	LAN	Unshielded, 10m, 1pcs.

EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1.	Note Book	Acer	AS 3830TG	DoC	Power cable, unshd, 1.6m
2.	Note Book	TOSHIBA	Satellite L730	DoC	Power cable, unshd, 1.6m
3.	Telephone	B.A.S.S	BS-101	DoC	N/A

No.	Signal cable description	
A	DC Power	Unshielded, 1.6m, 1pcs.
B	Telephone	Shielded, 1.5m, 1pcs.
C	LAN	Unshielded, 12m, 1pcs.

REMARK:

1. All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.
2. Grounding was established in accordance with the manufacturer’s requirements and conditions for the intended use.

7.3 EUT OPERATING CONDITION

RF Setup

1. Set up all computers like the setup diagram.
2. The Ralink QA Test Program for “RT5350 AP V1.0.0.4” software was used for testing The EUT driver software installed in the host support equipment during testing was Ralink QA Test Program for “RT5350 AP V1.0.0.4” Drive

TX Mode:

⇨ **Tx Mode:CCK 、OFDM、 HT MixMode** (Bandwidth: 20、40)

⇨ **Tx Data Rate: 1Mbps long** (IEEE 802.11b mode ,chain 0 TX)
6Mbps (IEEE 802.11g mode ,chain 0 TX)
6.5Mbps (IEEE 802.11n HT20 mode ,chain 0)
13Mbps (IEEE 802.11n HT40 mode, chain 0**)**

Power control mode

Target Power: IEEE 802.11b Channel Low (2412MHz) =17 **(Chain 0)**
IEEE 802.11b Channel Middle (2437MHz) =1A **(Chain 0)**
IEEE 802.11b Channel High (2462MHz) = 18 **(Chain 0)**
Target Power: IEEE 802.11g Channel Low (2412MHz) = 15 **(Chain 0)**
IEEE 802.11g Channel Middle (2437MHz) = 16 **(Chain 0)**
IEEE 802.11g Channel High (2462MHz) = 14 **(Chain 0)**
Target Power: IEEE 802.11n HT20 Channel Low (2412MHz) = 12 **(Chain 0)**
IEEE 802.11 n HT20 Channel Middle (2437MHz) =13 **(Chain 0)**
IEEE 802.11 n HT20 Channel High (2462MHz) = 11 **(Chain 0)**
Target Power: IEEE 802.11n HT40 Channel Low (2422MHz) = 09 **(Chain 0)**
IEEE 802.11 n HT40 Channel Middle (2437MHz) = 12 **(Chain 0)**
IEEE 802.11 n HT40 Channel High (2452MHz) = 06 **(Chain 0)**

(2) **RX Mode：**

Start RX

3. All of the function are under run.
4. Start test.

Normal Link Setup

1. Set up all computers like the setup diagram.
2. All of the function are under run.
3. Notebook PC (2) ping 192.168.0.10 –t to Notebook PC (1).
4. Notebook PC (1) ping 192.168.0.20 –t to Notebook PC (2).
5. Notebook PC (1) ping 192.168.0.50 –t to Wireless Access Point (3).

Start test.

8. APPLICABLE LIMITS AND TEST RESULTS

8.1 6DB BANDWIDTH

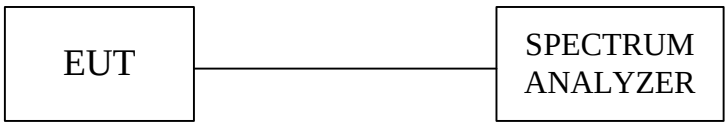
LIMIT

§ 15.207(a) (2) For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

TEST EQUIPMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	SEP.28, 2014

TEST SETUP



TEST PROCEDURE

The tests were performed in accordance with KDB 558074 8.1 & 8.2.

Option 1:

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Option 2:

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW ≥ 3 RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

TEST RESULTS

No non-compliance noted.

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	12.12	500	PASS
Middle	2437	12.16	500	PASS
High	2462	12.12	500	PASS

NOTE : 1. At finial test to get the worst-case emission at11Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	16.44	500	PASS
Middle	2437	16.54	500	PASS
High	2462	16.49	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	17.60	500	PASS
Middle	2437	17.64	500	PASS
High	2462	17.63	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

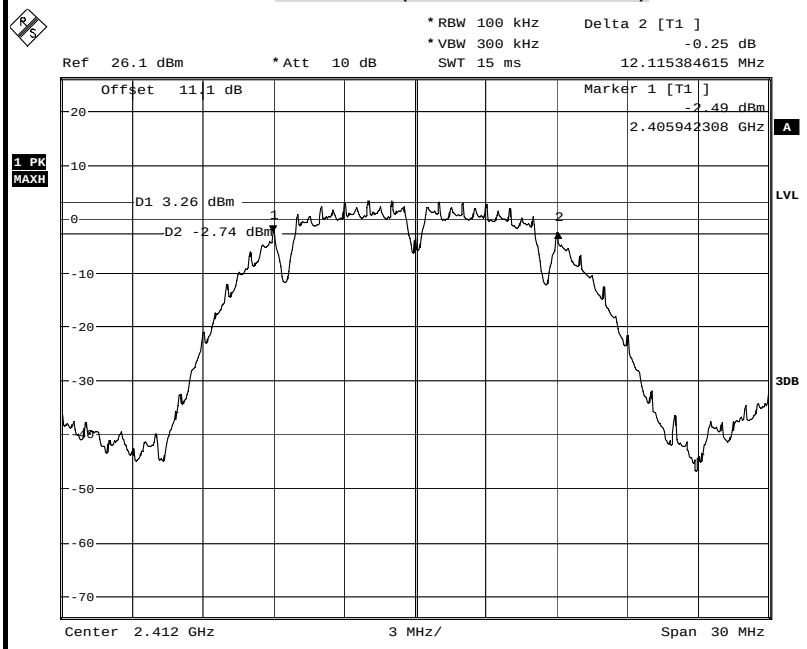
IEEE 802.11n HT40 mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2422	36.20	500	PASS
Middle	2437	36.30	500	PASS
High	2452	35.82	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 13.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

6dB BANDWIDTH (802.11b MODE)

CH Low (802.11b MODE)



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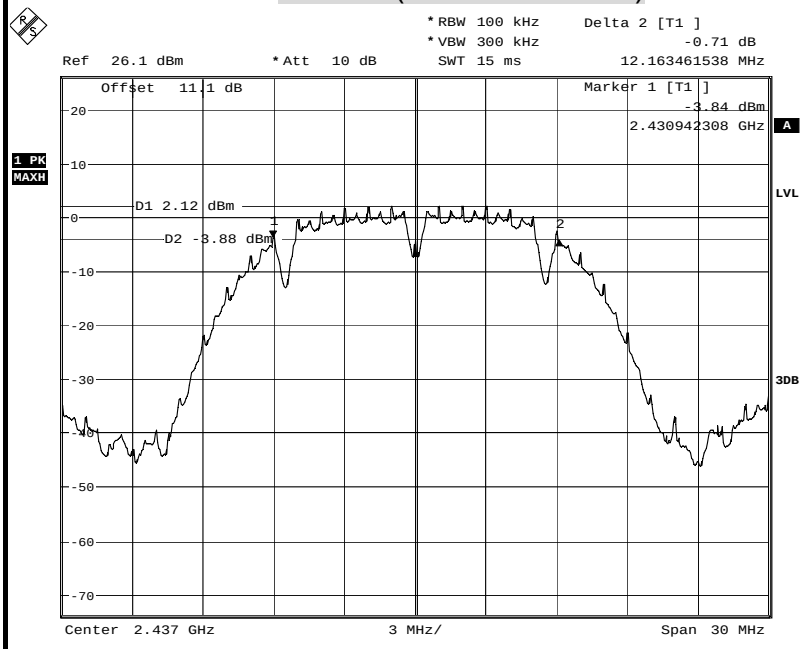

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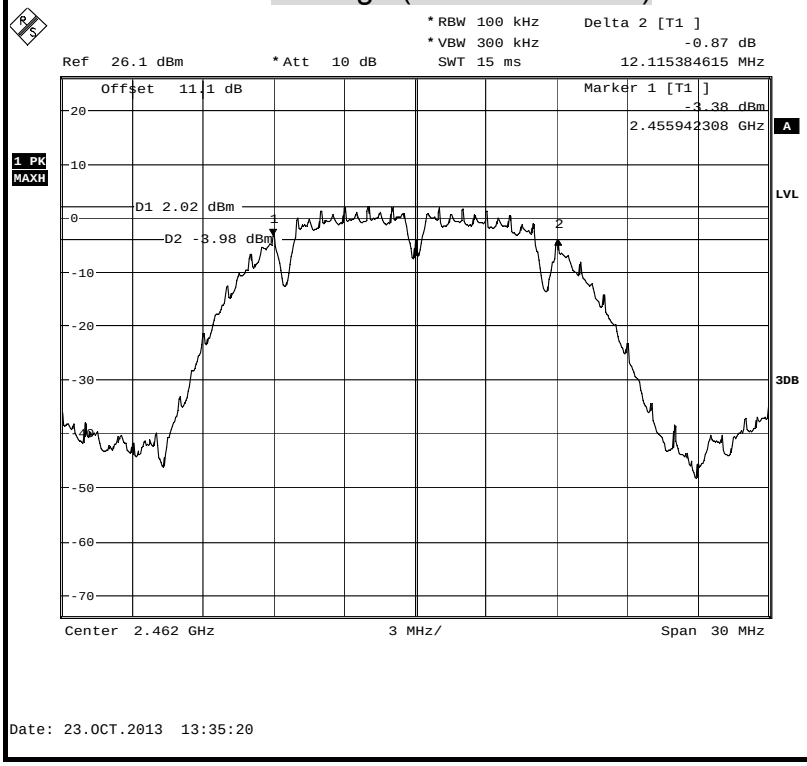
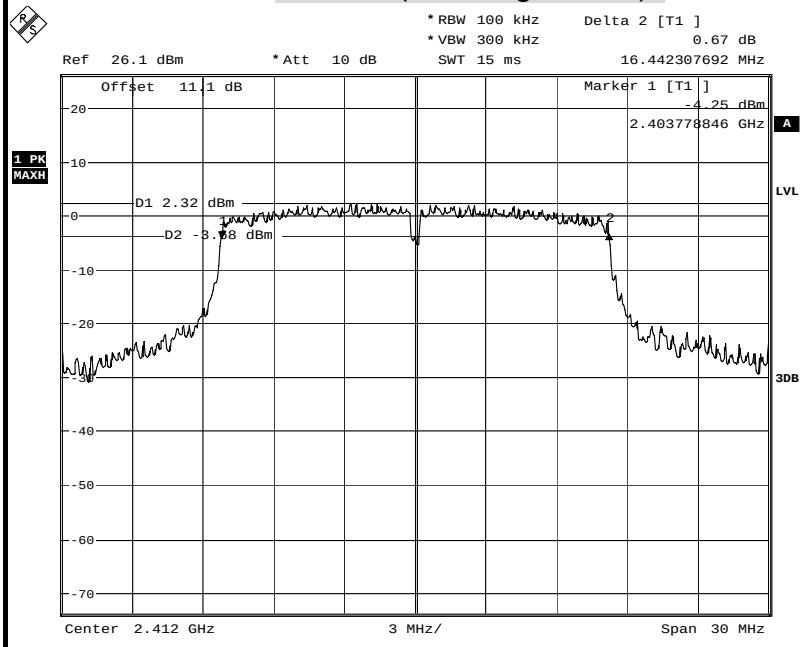


6dB BANDWIDTH (802.11g MODE)

CH Low (802.11g MODE)



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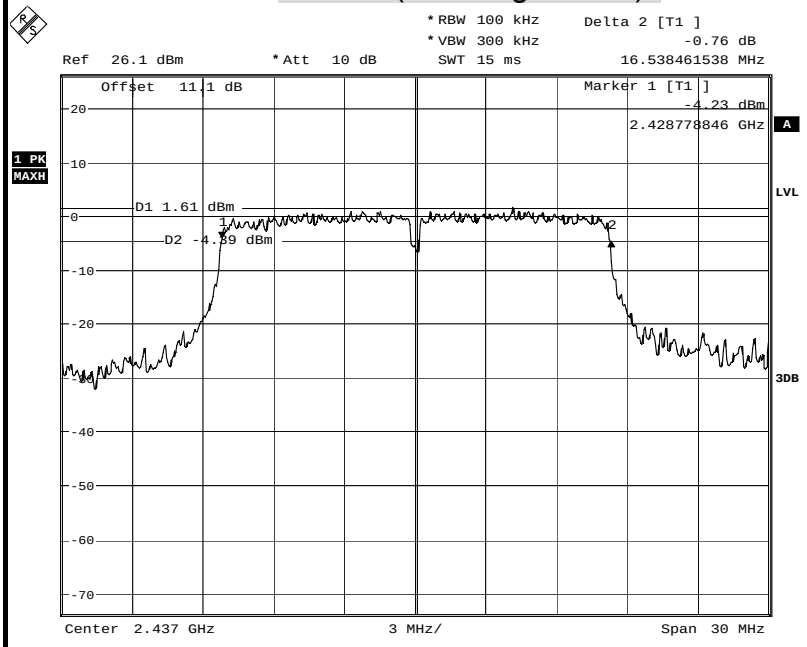

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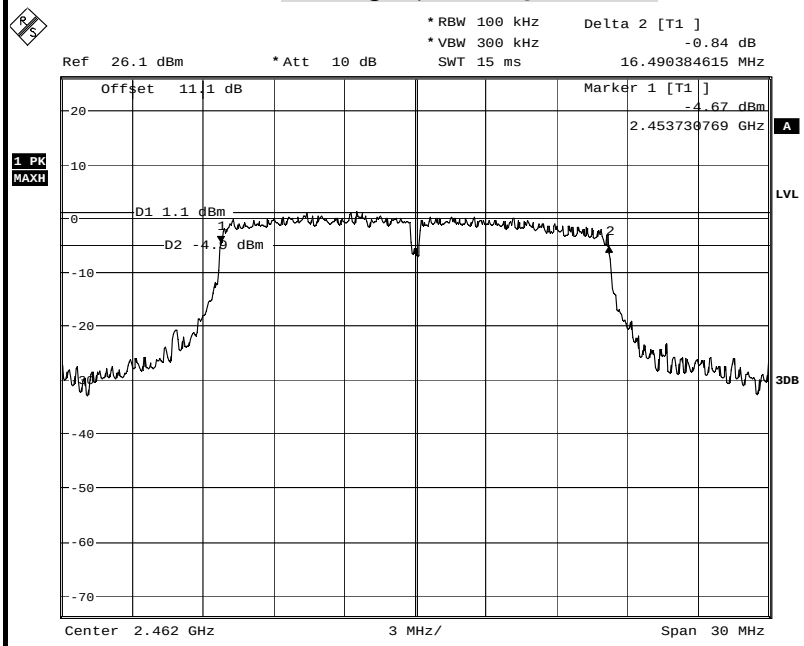
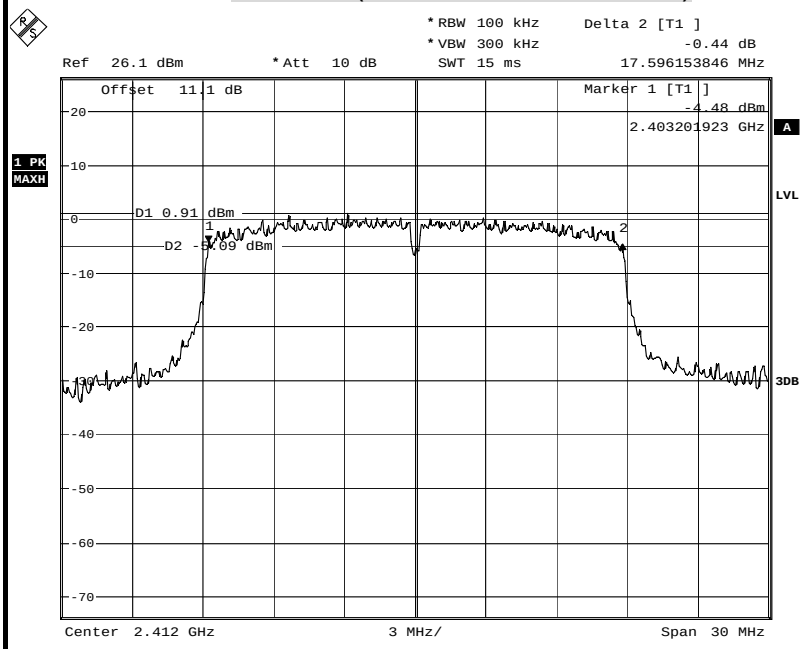


6dB BANDWIDTH (802.11n HT20 MODE)

CH Low (802.11n HT20 MODE)



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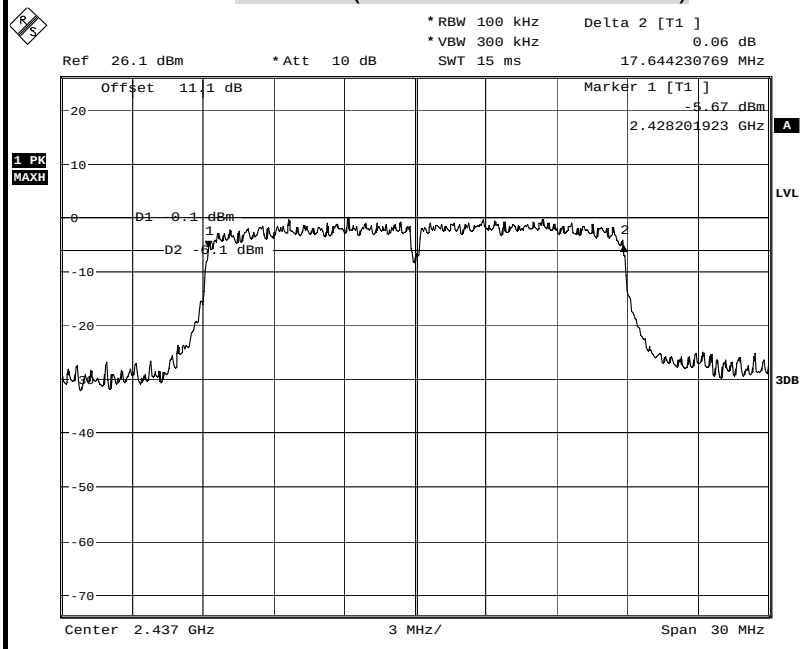

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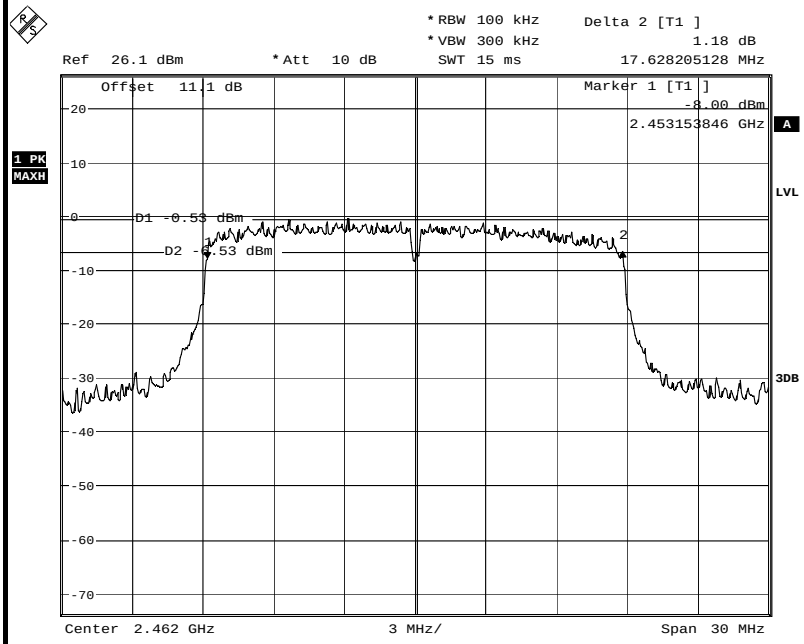
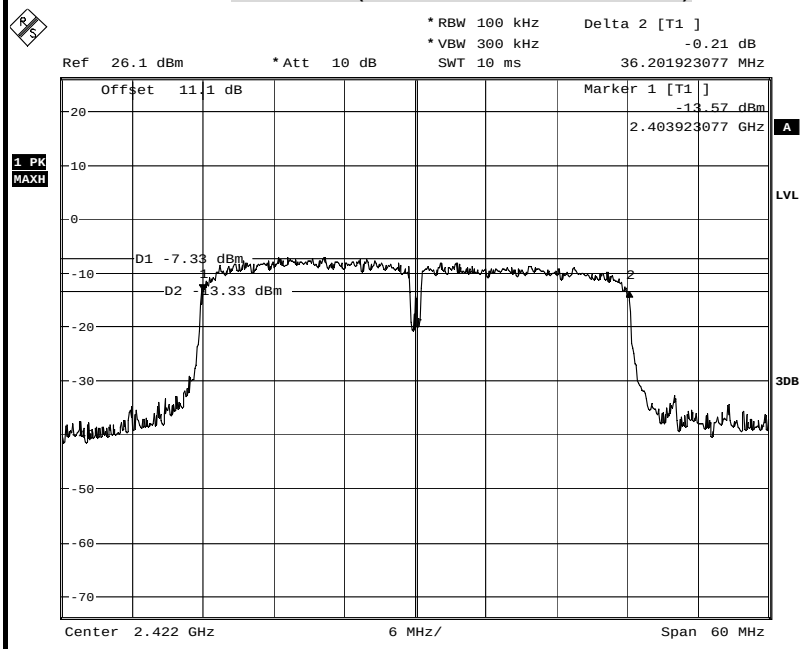


6dB BANDWIDTH (802.11n HT40 MODE)

CH Low (802.11n HT40 MODE)



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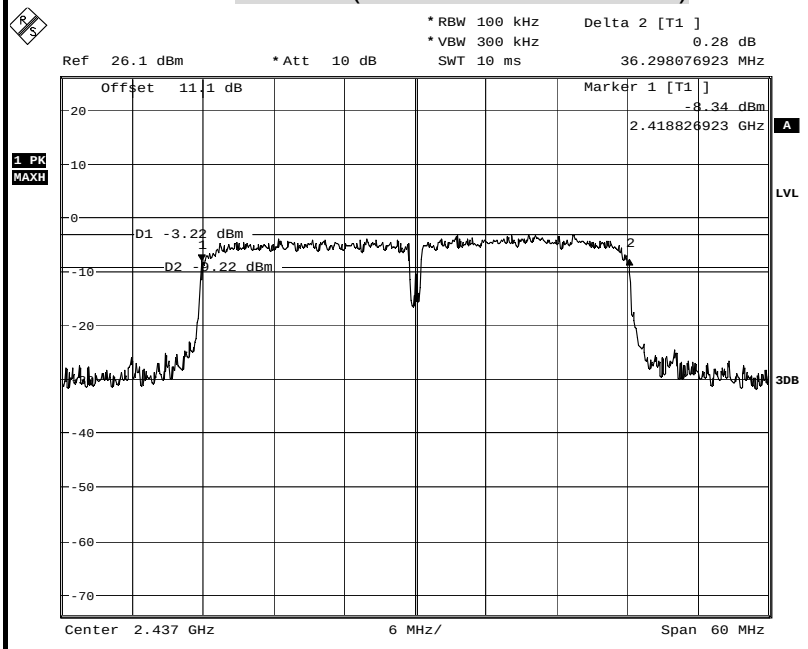

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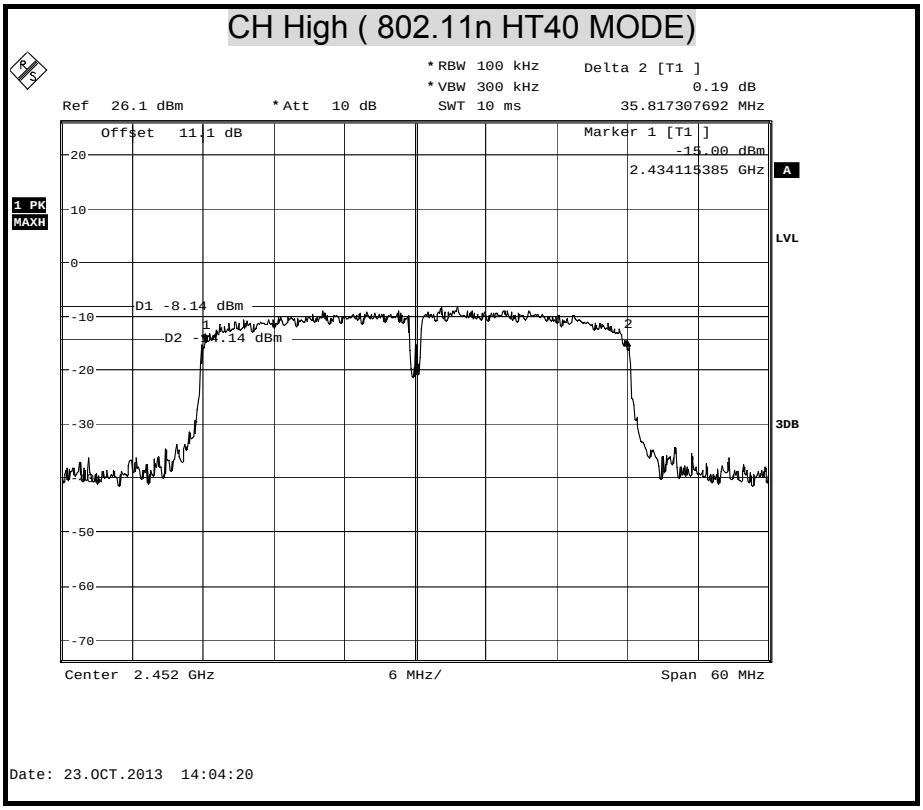


8.2 MAXIMUM PEAK OUTPUT POWER

LIMIT

§ 15.247(b) The maximum peak output power of the intentional radiator shall not exceed the following :

§ 15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands : 1 watt.

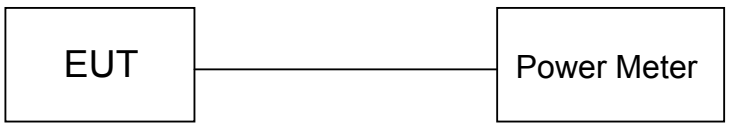
§ 15.247(b) (4) Except as shown in paragraphs (c) of this section , if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2), and (b)(3) of this section , as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST EQUIPMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Power Meter	Anritsu	ML2487A	6K00003888	JUN. 24, 2014

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP



TEST PROCEDURE

The tests were performed in accordance with KDB 558074 9.1.2 & 9.2.2.3 .

Integrated band power method

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.
a) Set the RBW = 1 MHz.
b) Set the VBW ≥ 3 RBW
c) Set the span ≥ 1.5 x DTS bandwidth.
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

9.2.2.3 Method AVGSA-1 Alternative (RMS detection with slow sweep and EUT transmitting continuously at full power)

a) Set span to at least 1.5 times the OBW.
b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
c) Set VBW ≥ 3 x RBW.
d) Number of points in sweep ≥ 2 span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
e) Manually set sweep time ≥ 10 (number of points in sweep) (transmission symbol period), but not less than the automatic default sweep time.
NOTE— The transmission symbol period (in seconds) is the reciprocal of the symbol rate (in baud or symbols per second). Note that each symbol can represent one or several data bits and thus the symbol rate should not be confused with the gross bit rate (expressed in bits/second). In no case should the sweep time be set less than the auto sweep time.
f) Set detector = RMS.
g) The EUT shall be operated at ≥ 98 % duty cycle or sweep triggering/signal gating shall be employed such that the sweep time is less than or equal to the transmission duration T.
h) Perform a single sweep.
i) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

TEST RESULTS

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	17.39	30	PASS
Middle	2437	16.80	30	PASS
High	2462	16.18	30	PASS

NOTE : 1. At finial test to get the worst-case emission at 11Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	23.13	30	PASS
Middle	2437	22.40	30	PASS
High	2462	21.82	30	PASS

NOTE : 1. At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	21.55	30	PASS
Middle	2437	20.97	30	PASS
High	2462	20.46	30	PASS

NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

IEEE 802.11n HT40 mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2422	16.61	30	PASS
Middle	2437	20.65	30	PASS
High	2452	14.96	30	PASS

NOTE : 1. At finial test to get the worst-case emission at 13.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Average Power Data

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2412	15.49
Middle	2437	14.72
High	2462	14.16

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2412	16.74
Middle	2437	15.85
High	2462	15.44

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2412	15.05
Middle	2437	14.24
High	2462	13.79

IEEE 802.11n HT40 mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2422	10.47
Middle	2437	14.54
High	2452	8.43

8.3 POWER SPECTRAL DENSITY

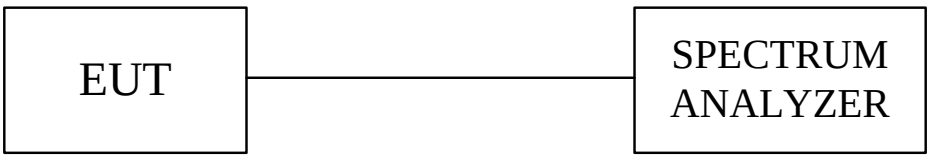
LIMIT

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

TEST EQUIPMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	SEP. 28, 2014

TEST SETUP



TEST PROCEDURE

The tests were performed in accordance with KDB 558074 10.2.

Method PKPSD (peak PSD)

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.
a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3 RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST RESULTS

No non-compliance noted.

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2412	3.77	8	PASS
Middle	2437	2.94	8	PASS
High	2462	2.75	8	PASS

NOTE : 1. At finial test to get the worst-case emission at 11Mbps.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2412	2.13	8	PASS
Middle	2437	1.58	8	PASS
High	2462	1.42	8	PASS

NOTE : 1. At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2412	1.06	8	PASS
Middle	2437	0.00	8	PASS
High	2462	-0.37	8	PASS

NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

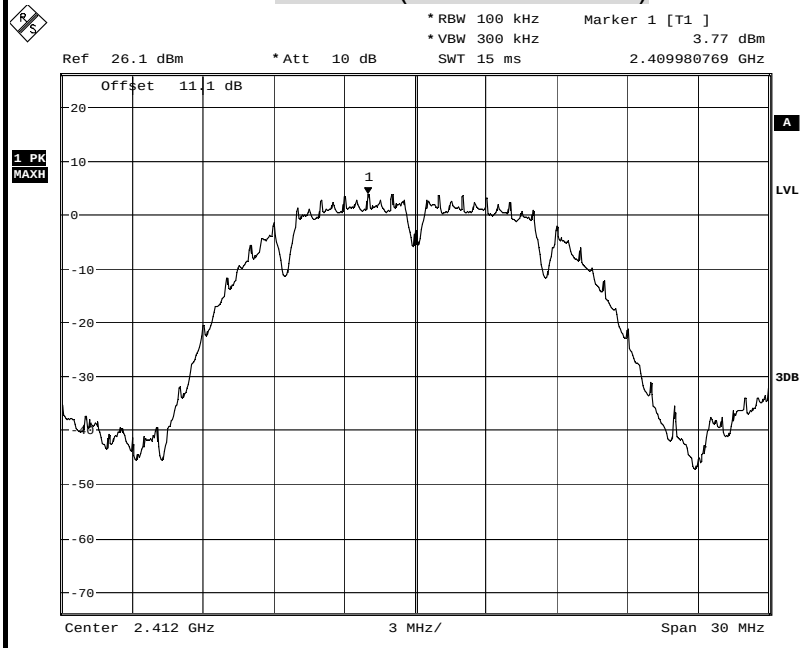
IEEE 802.11n HT40 mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2422	-6.67	8	PASS
Middle	2437	-3.08	8	PASS
High	2452	-8.56	8	PASS

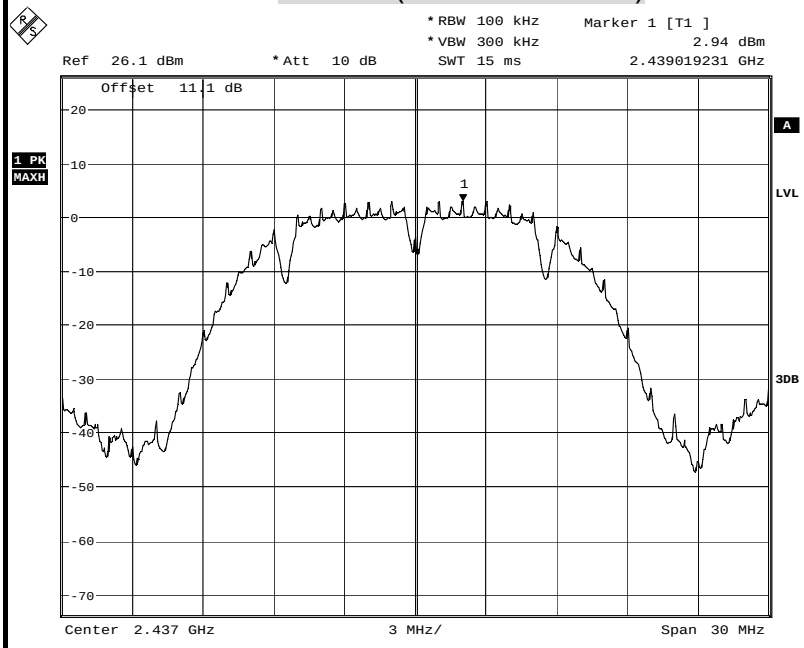
NOTE : 1. At finial test to get the worst-case emission at 13.5Mbps.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

POWER SPECTRAL DENSITY (IEEE 802.11b MODE)

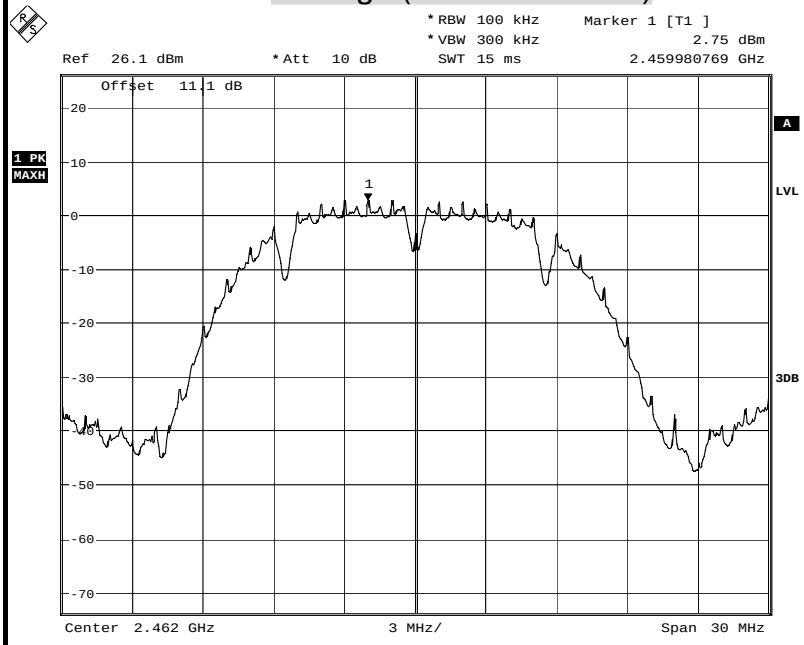
CH Low (802.11b MODE)



CH Mid (802.11b MODE)

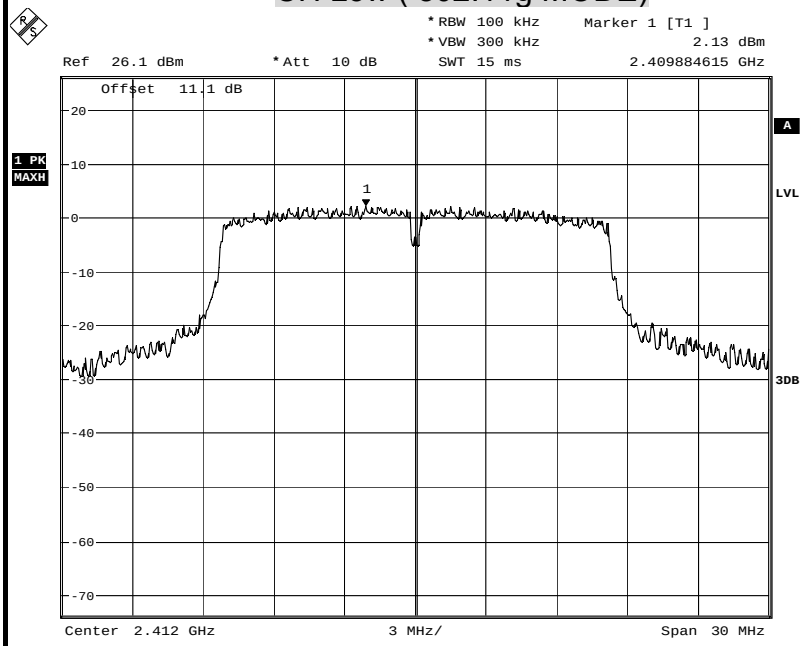


CH High (802.11b MODE)



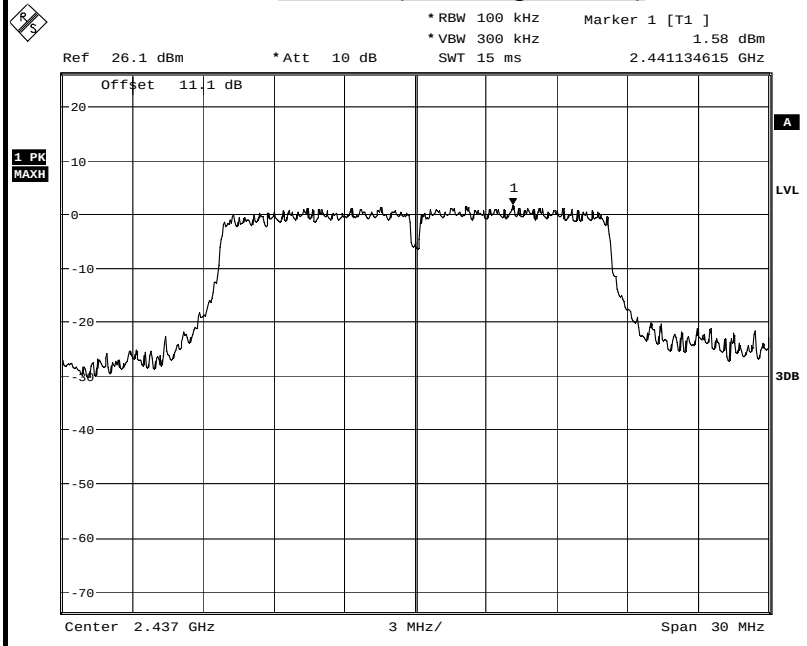
POWER SPECTRAL DENSITY (IEEE 802.11g MODE)

CH Low (802.11g MODE)



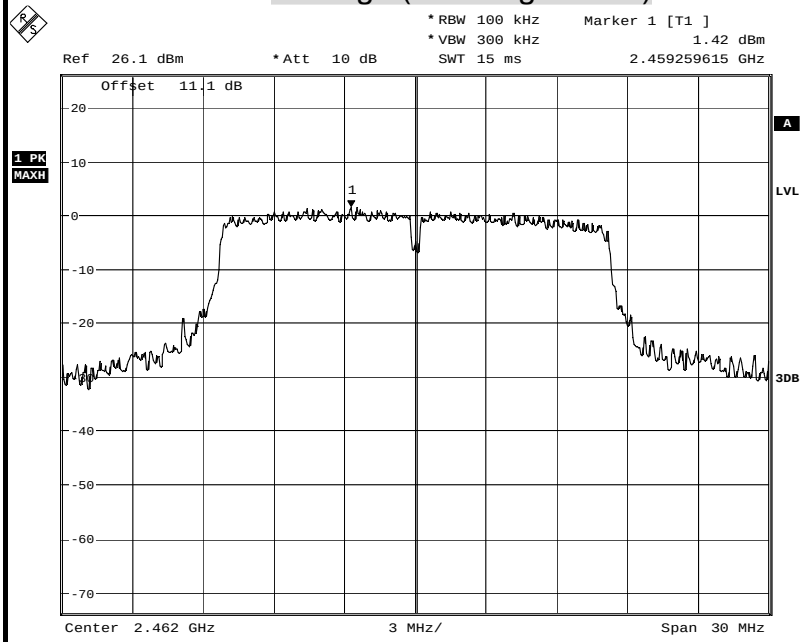
Date: 23.OCT.2013 14:27:57

CH Mid (802.11g MODE)



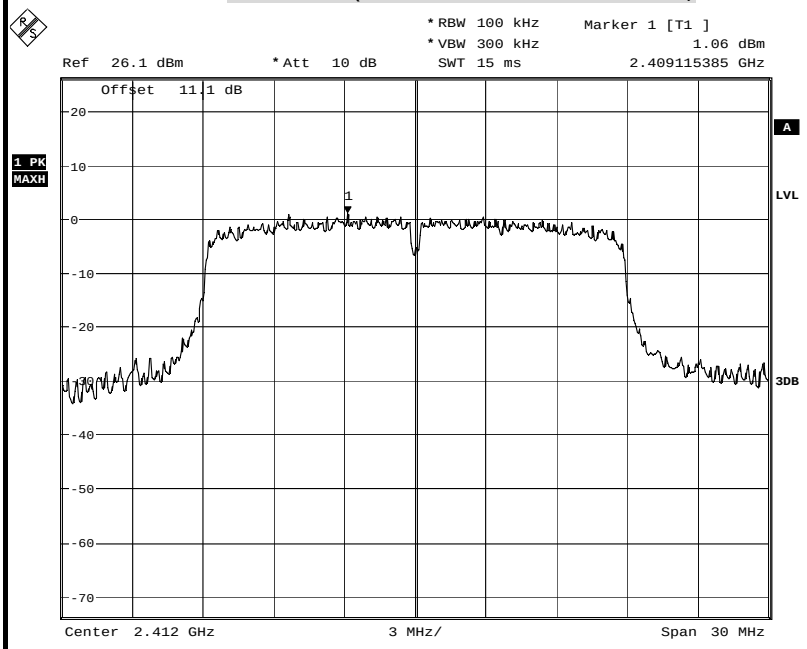
Date: 23.OCT.2013 14:28:30

CH High (802.11g MODE)



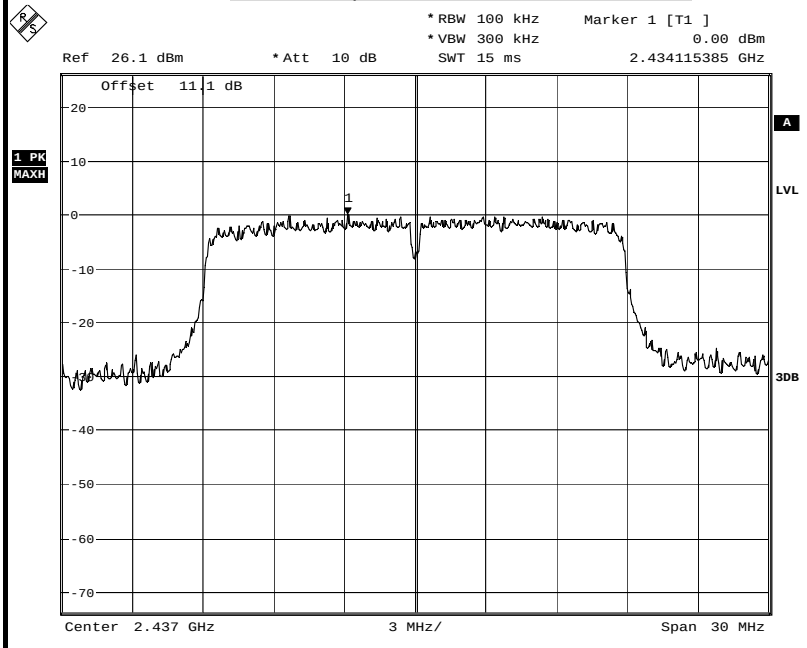
POWER SPECTRAL DENSITY (802.11n HT20 MODE)

CH Low (802.11n HT20 MODE)



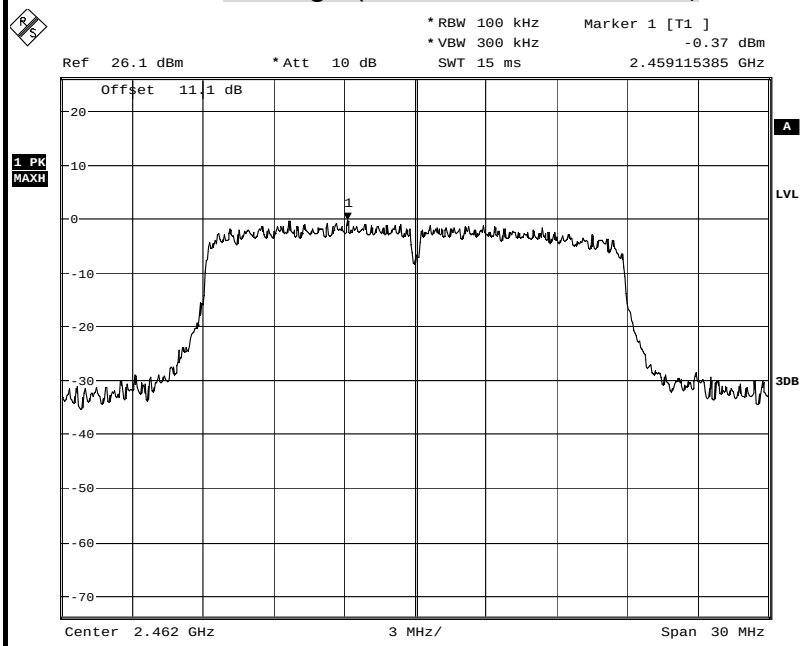
Date: 23.OCT.2013 14:27:20

CH Mid (802.11n HT20 MODE)



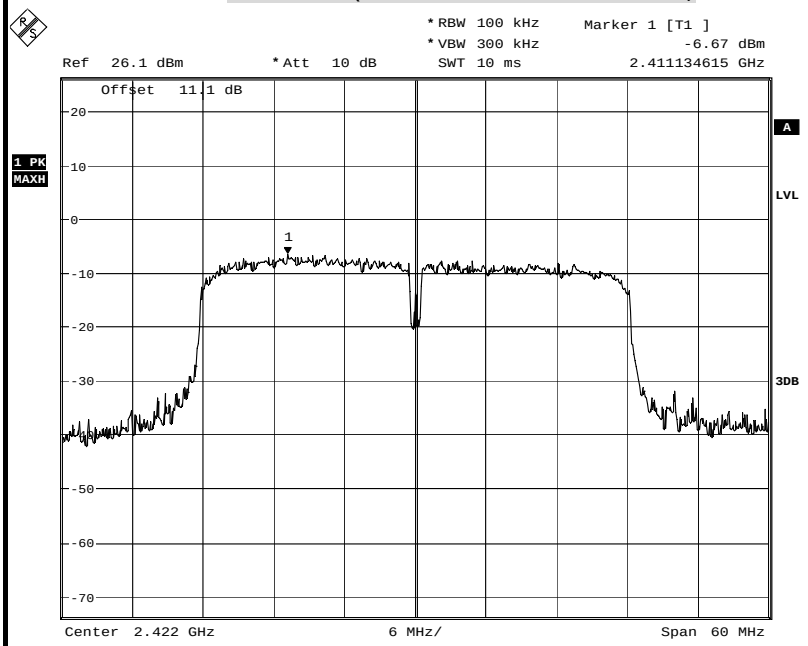
Date: 23.OCT.2013 14:26:38

CH High (802.11n HT20 MODE)



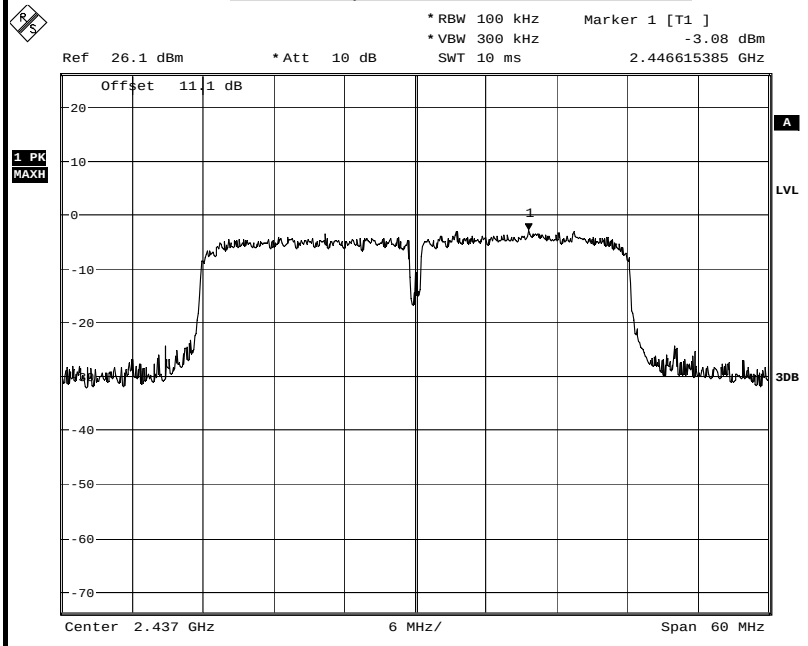
POWER SPECTRAL DENSITY (802.11n HT40 MODE)

CH Low (802.11n HT40 MODE)



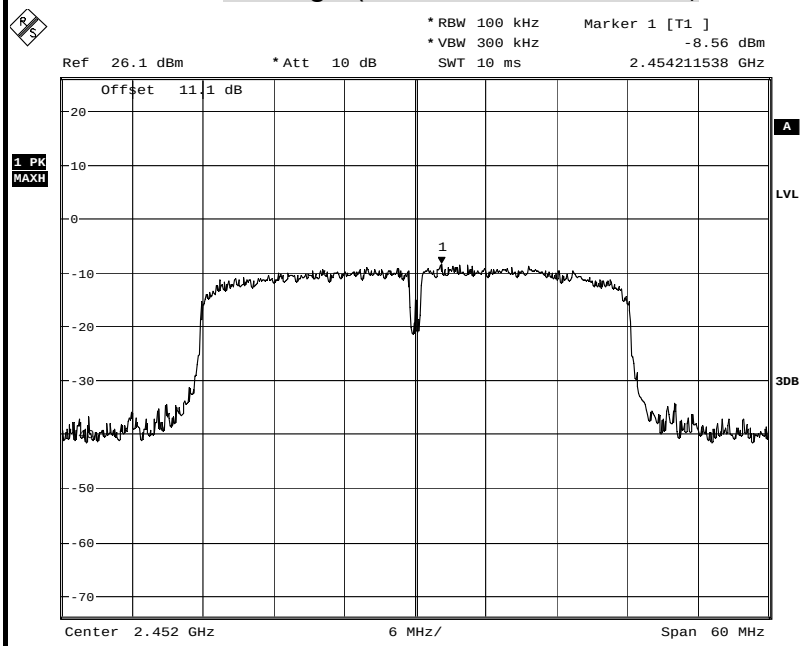
Date: 23.OCT.2013 14:22:52

CH Mid (802.11n HT40 MODE)



Date: 23.OCT.2013 14:23:27

CH High (802.11n HT40 MODE)



8.4 CONDUCTED SPURIOUS EMISSION

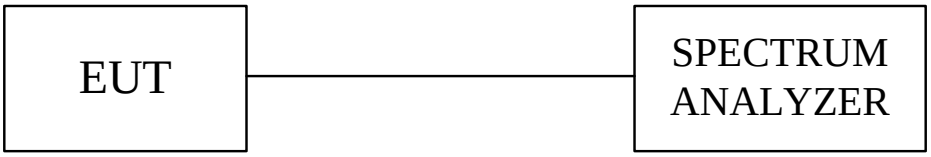
LIMITS

§ 15.247(d) 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 and that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. 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) (see § 15.205(c)).

TEST EQUIPMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	SEP.28.2014

TEST SETUP



TEST PROCEDURE

The tests were performed in accordance with KDB 558074 11.2 & 11.3 .

11.2 Reference level measurement

Establish a reference level by using the following procedure:

a) Set instrument center frequency to DTS channel center frequency.

b) Set the span to ≥ 1.5 times the *DTS bandwidth*.

c) Set the RBW = 100 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

11.3 Emission level measurement

a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ 3 x RBW.
d) Detector = peak.
e) Ensure that the number of measurement points ≥ span/RBW
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.

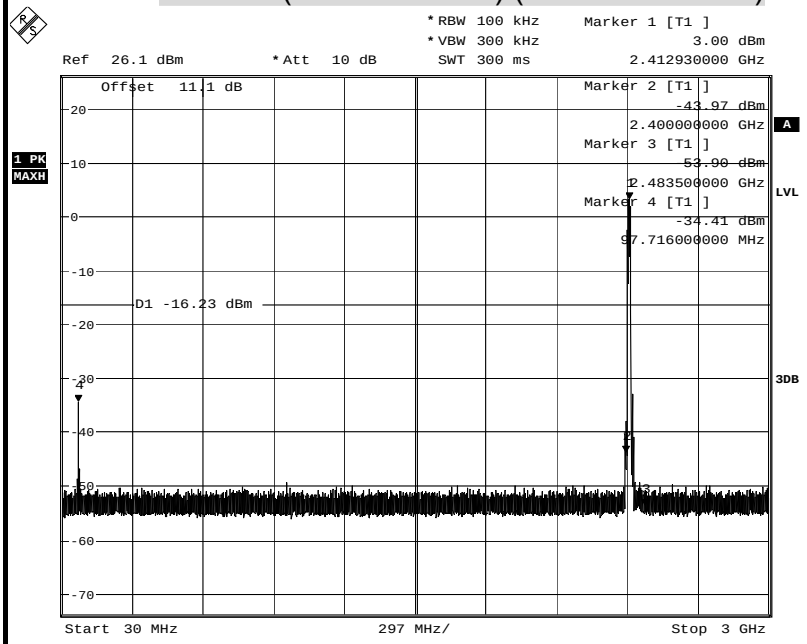
TEST RESULTS

No non-compliance noted.

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

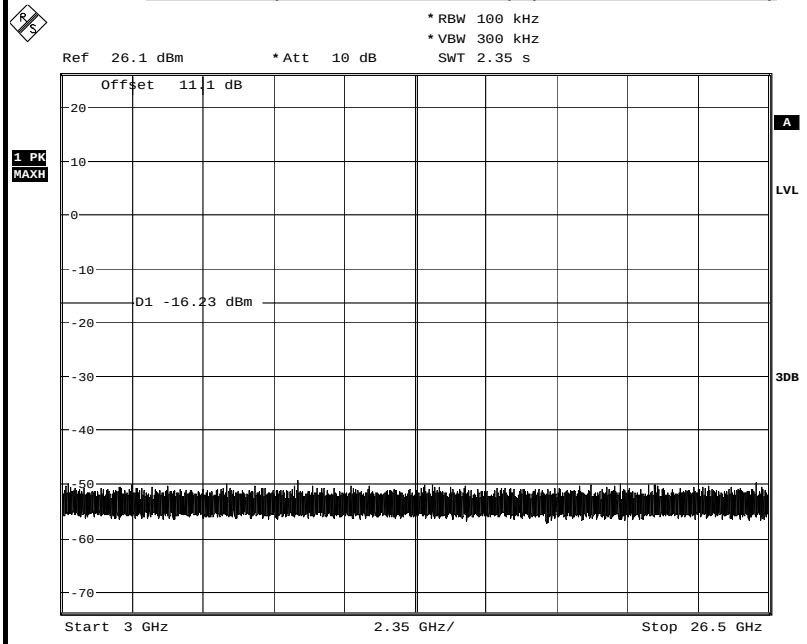
(IEEE 802.11b MODE)

CH Low (30MHz~3GHz) (802.11b MODE)



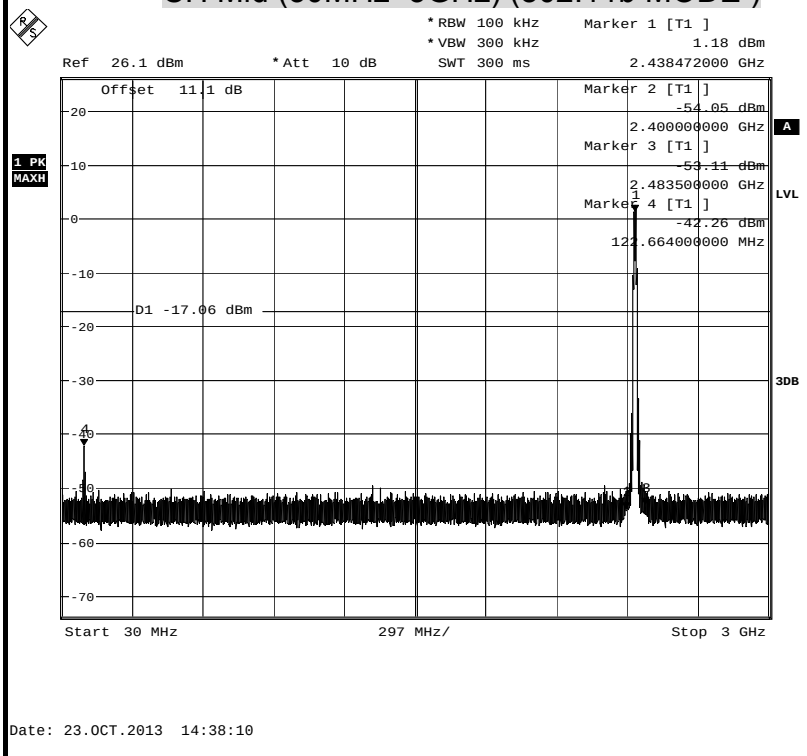
Date: 23.OCT.2013 14:35:17

CH Low (3GHz~26.5GHz) (802.11b MODE)



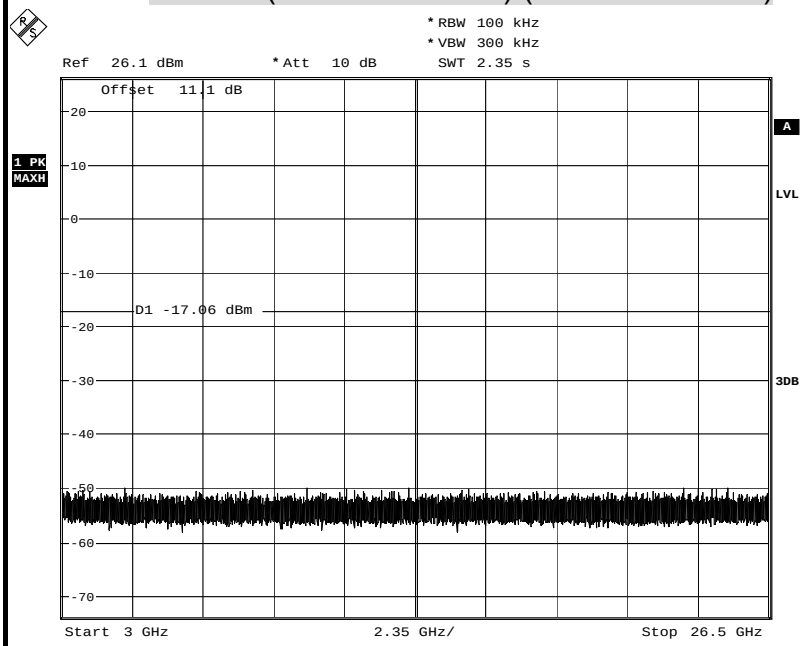
Date: 23.OCT.2013 14:36:12

CH Mid (30MHz~3GHz) (802.11b MODE)



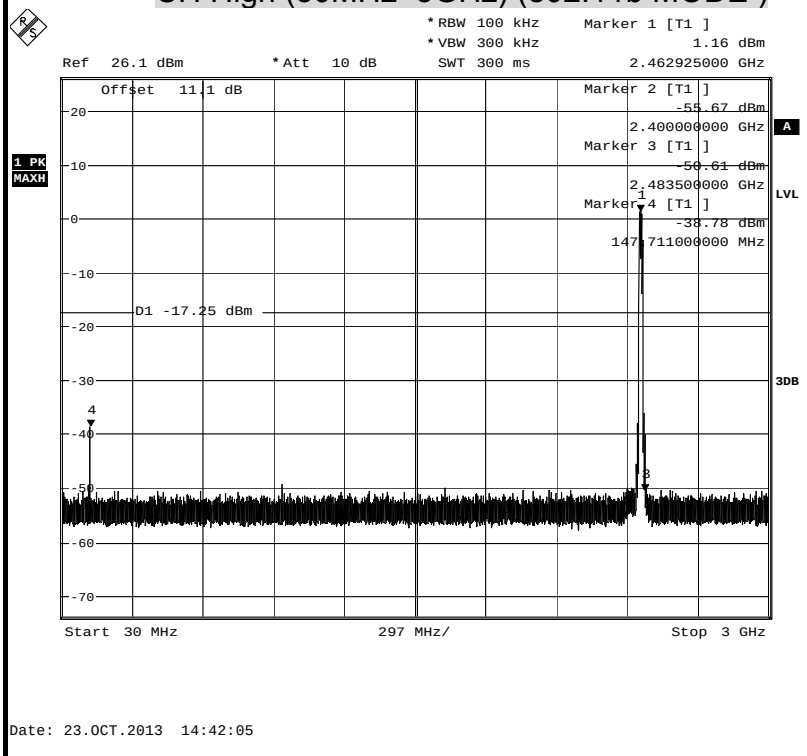
Date: 23.OCT.2013 14:38:10

CH Mid (3GHz~26.5GHz) (802.11b MODE)



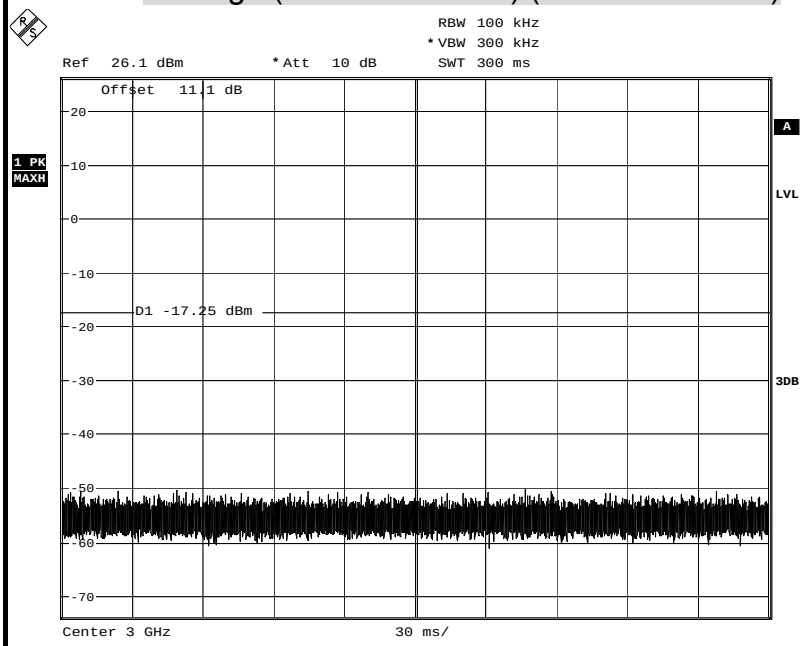
Date: 23.OCT.2013 14:38:46

CH High (30MHz~3GHz) (802.11b MODE)



Date: 23.OCT.2013 14:42:05

CH High (3GHz~26.5GHz) (802.11b MODE)

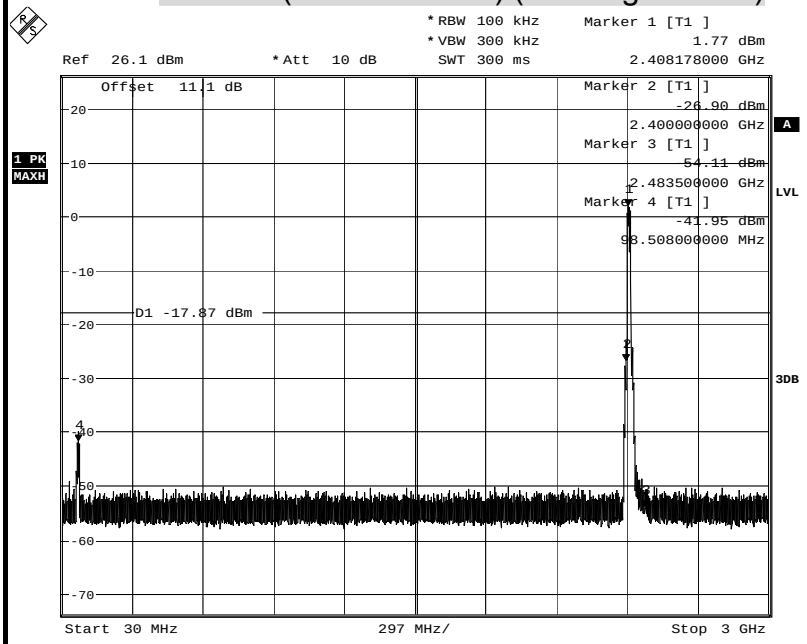


Date: 23.OCT.2013 14:42:33

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

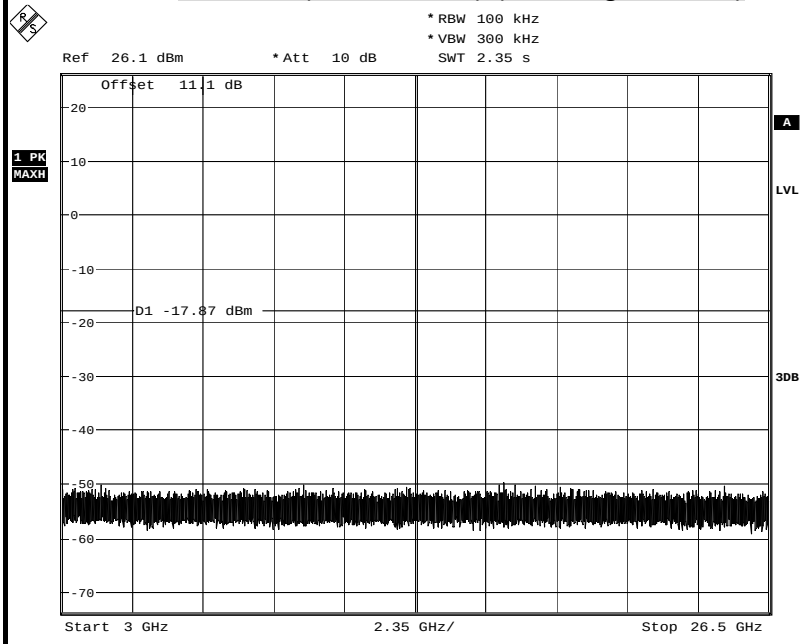
(802.11g MODE)

CH Low (30MHz~3GHz) (802.11g MODE)



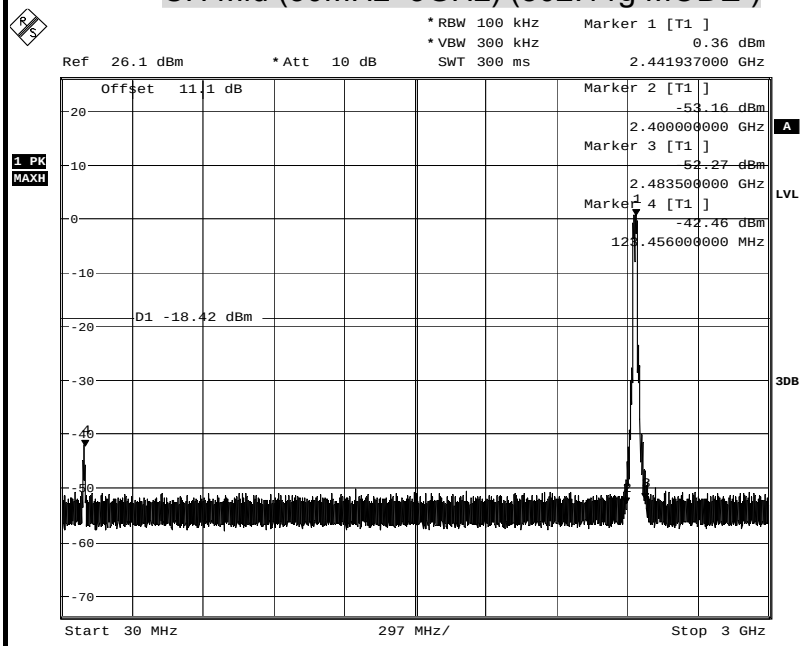
Date: 23.OCT.2013 14:49:37

CH Low (3~26.5GHz) (802.11g MODE)



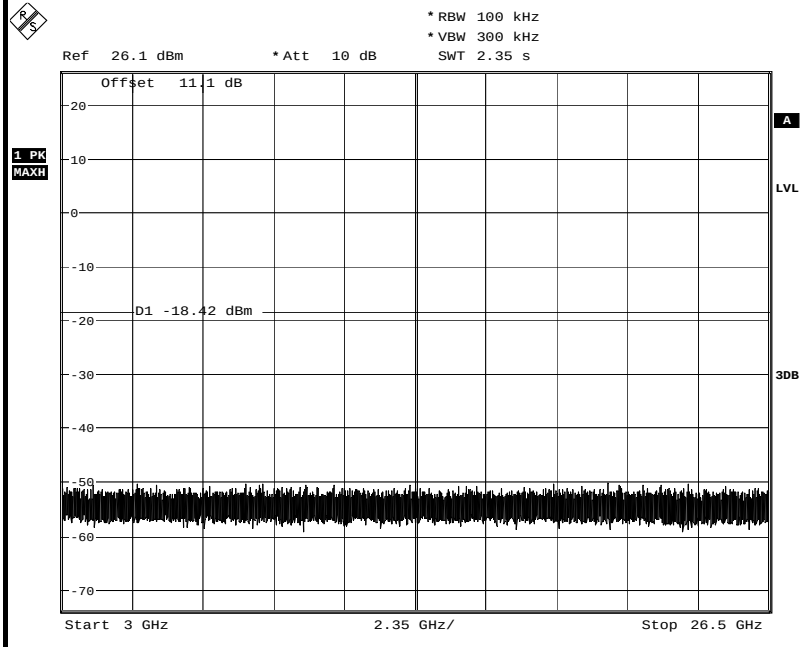
Date: 23.OCT.2013 14:50:05

CH Mid (30MHz~3GHz) (802.11g MODE)



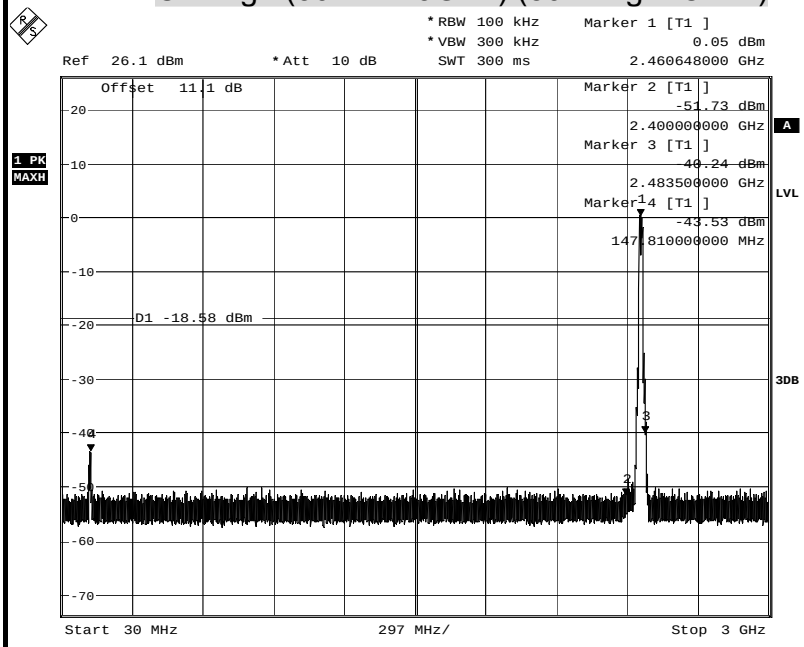
Date: 23.OCT.2013 14:46:25

CH Mid (3~26.5GHz) (802.11g MODE)



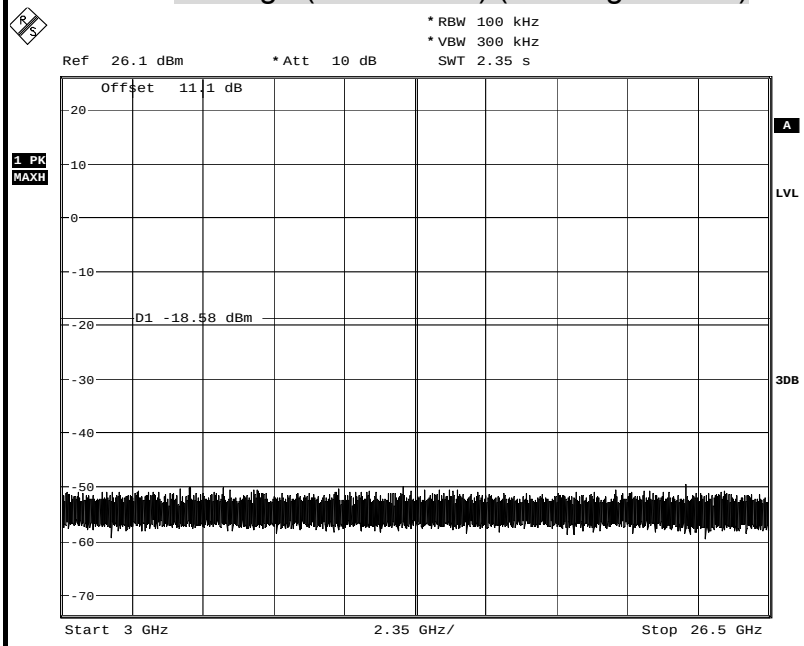
Date: 23.OCT.2013 14:47:57

CH High (30MHz~3GHz) (802.11g MODE)



Date: 23.OCT.2013 14:44:20

CH High (3~26.5GHz) (802.11g MODE)

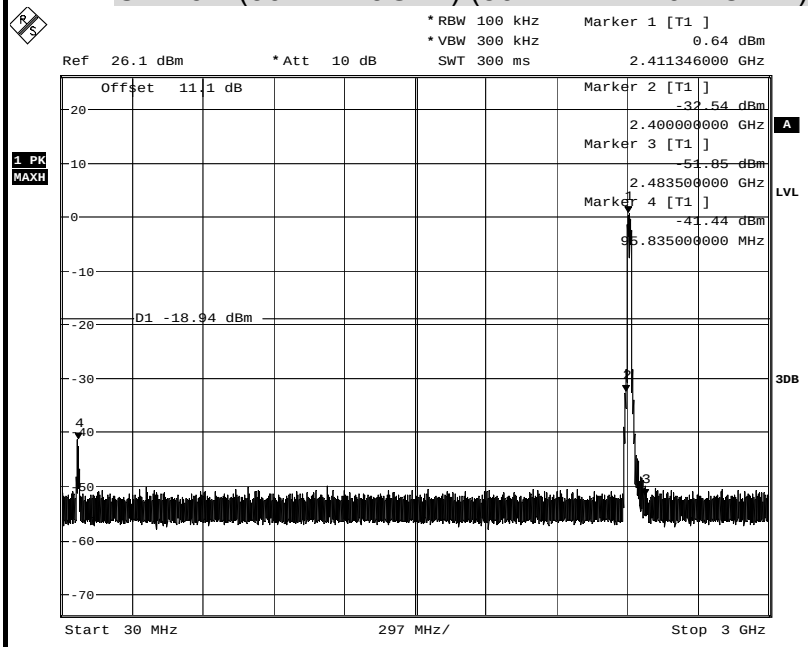


Date: 23.OCT.2013 14:44:50

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

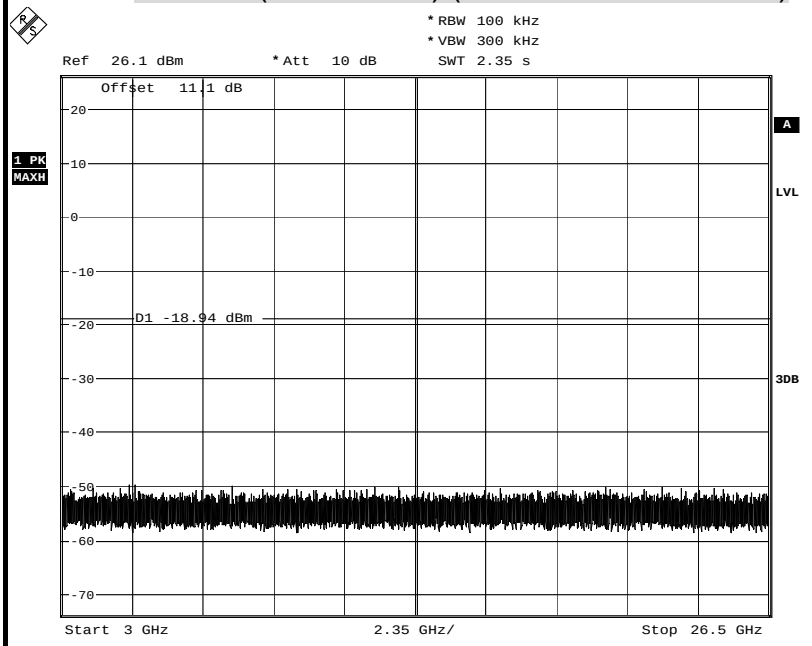
(802.11n HT20 MODE)

CH Low (30MHz~3GHz) (802.11n HT20 MODE)



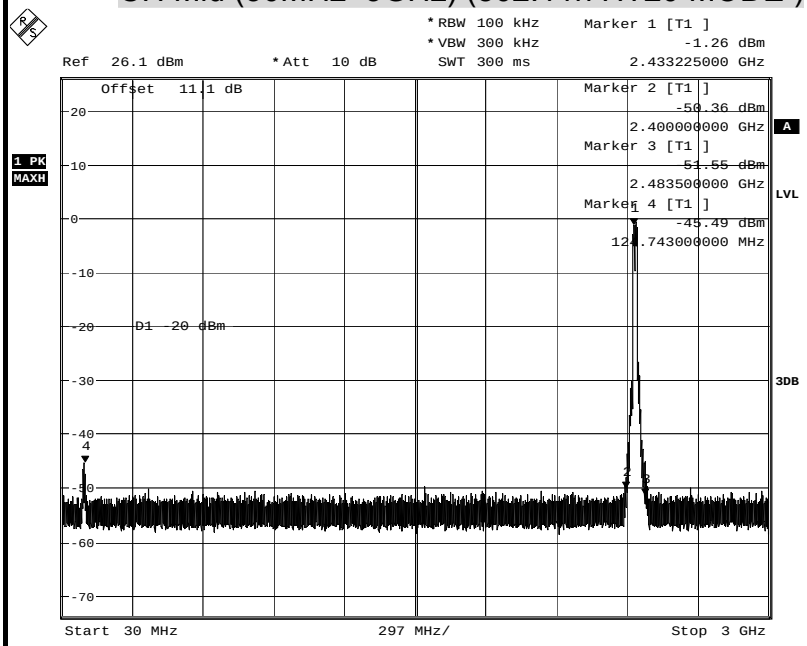
Date: 23.OCT.2013 14:52:06

CH Low (3~26.5GHz) (802.11n HT20 MODE)



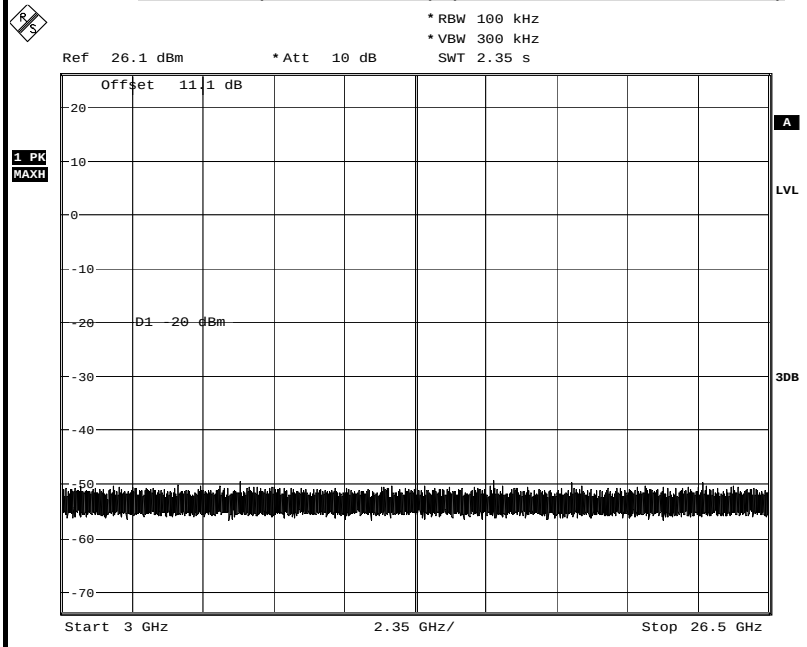
Date: 23.OCT.2013 14:52:33

CH Mid (30MHz~3GHz) (802.11n HT20 MODE)



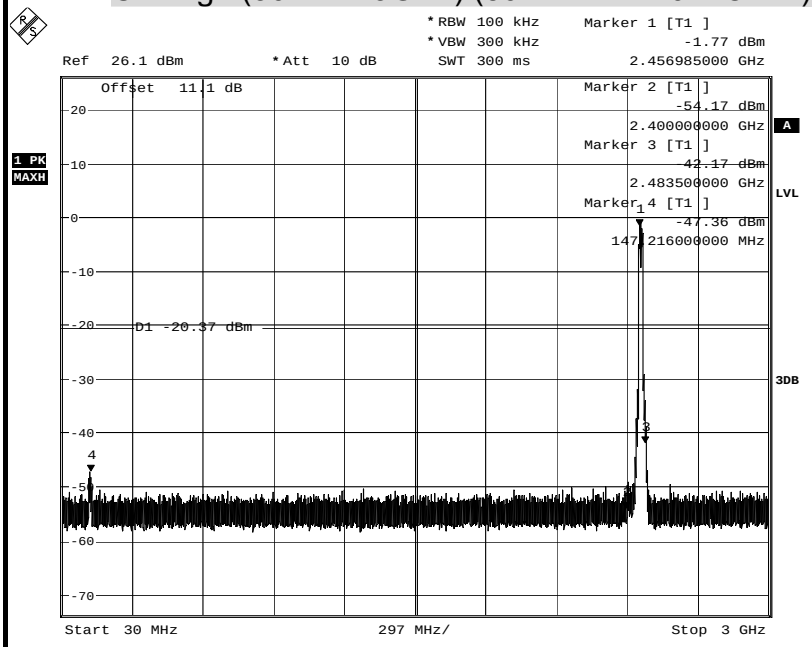
Date: 23.OCT.2013 14:54:16

CH Mid (3~26.5GHz) (802.11n HT20 MODE)



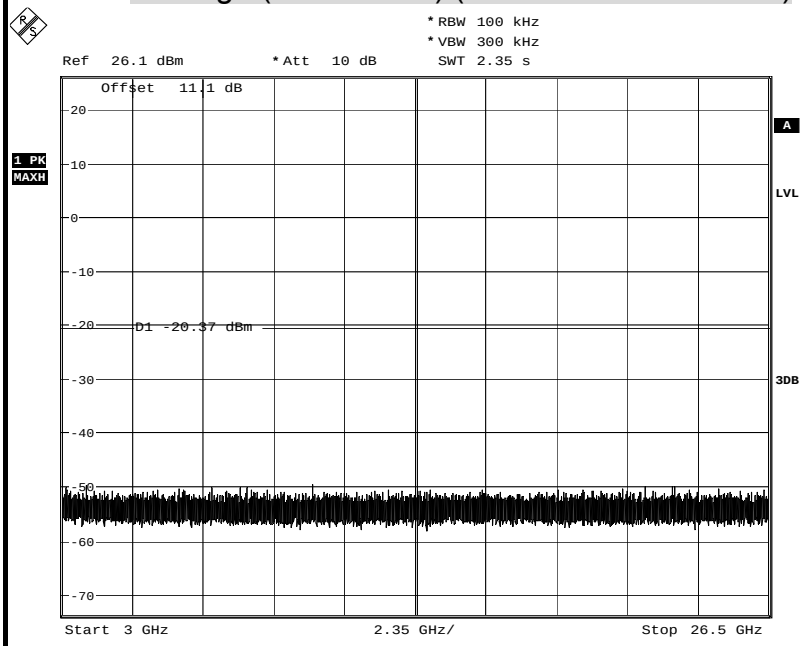
Date: 23.OCT.2013 14:56:03

CH High (30MHz~3GHz) (802.11n HT20 MODE)



Date: 23.OCT.2013 14:57:37

CH High (3~26.5GHz) (802.11n HT20 MODE)

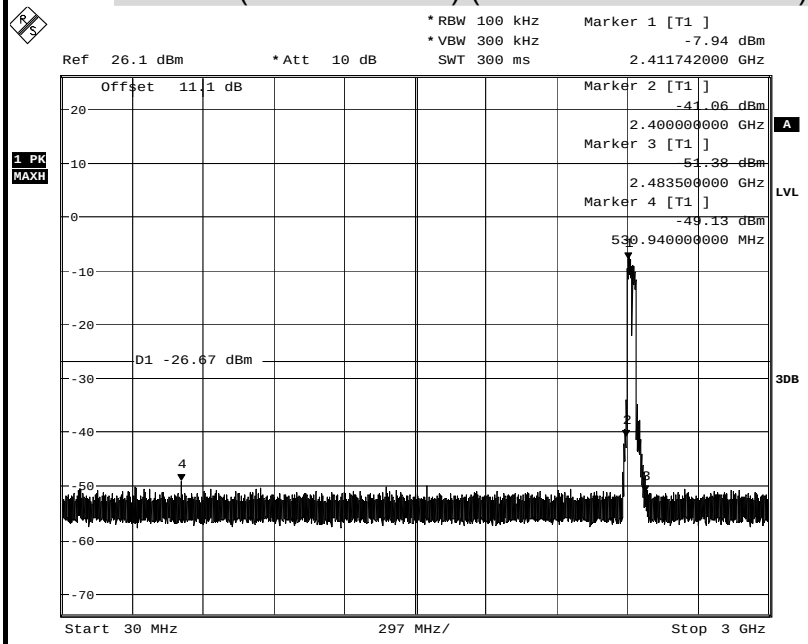


Date: 23.OCT.2013 14:58:10

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

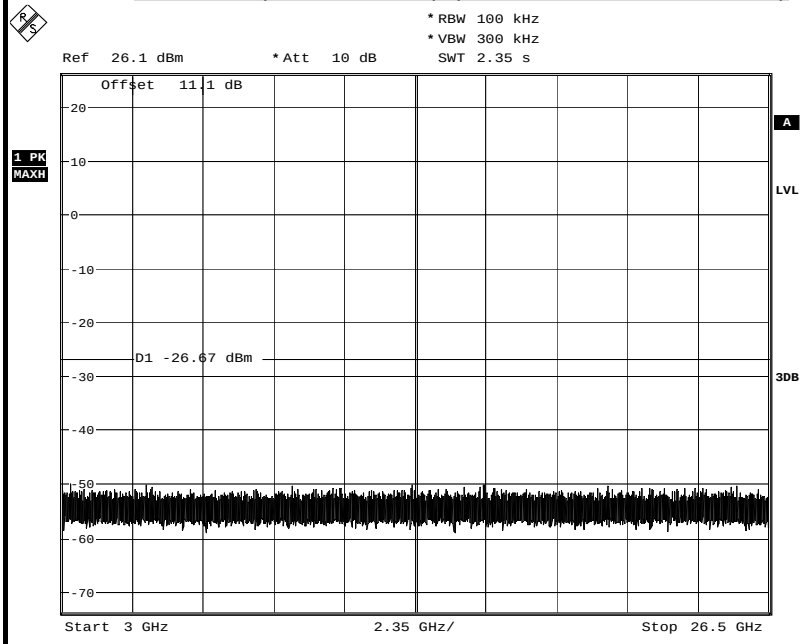
(802.11n HT40 MODE)

CH Low (30MHz~3GHz) (802.11n HT40 MODE)



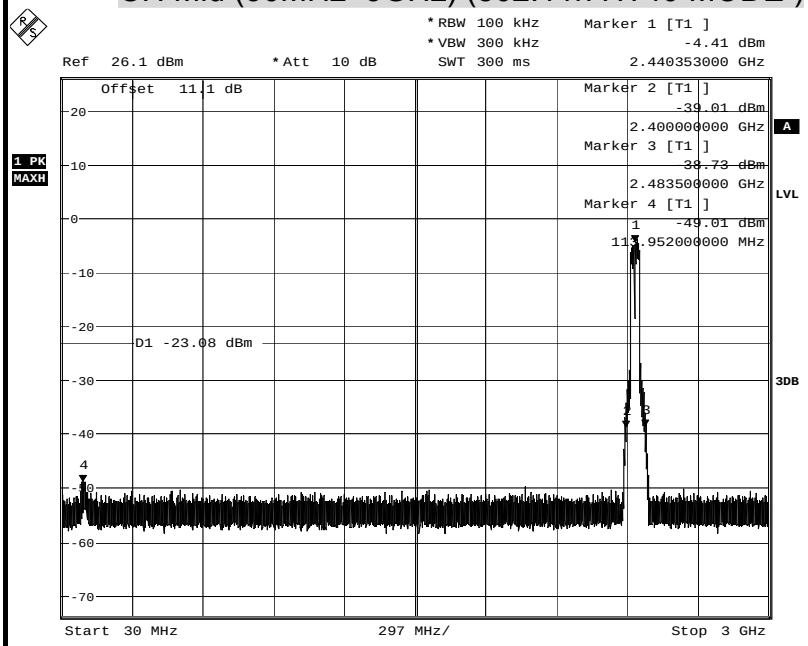
Date: 23.OCT.2013 15:01:22

CH Low (3~26.5GHz) (802.11n HT40 MODE)



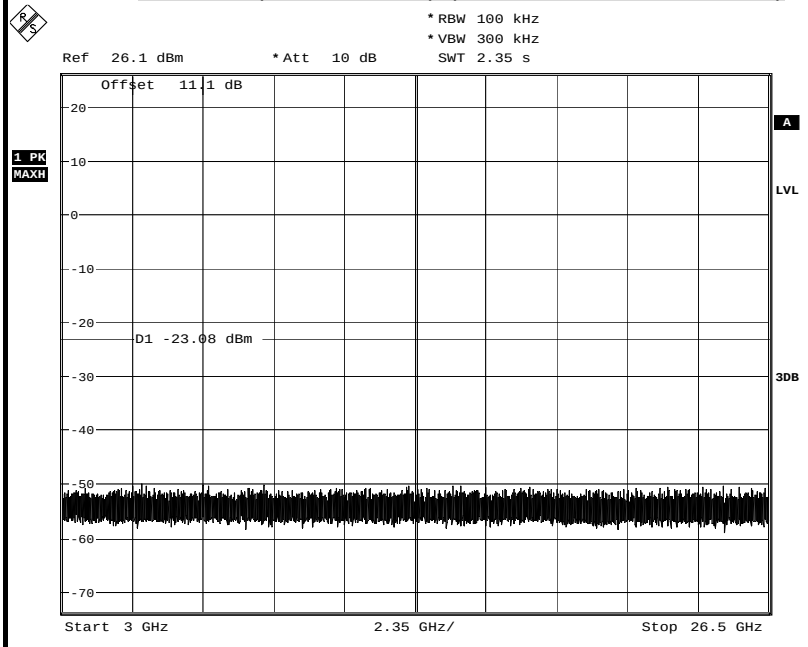
Date: 23.OCT.2013 15:01:54

CH Mid (30MHz~3GHz) (802.11n HT40 MODE)



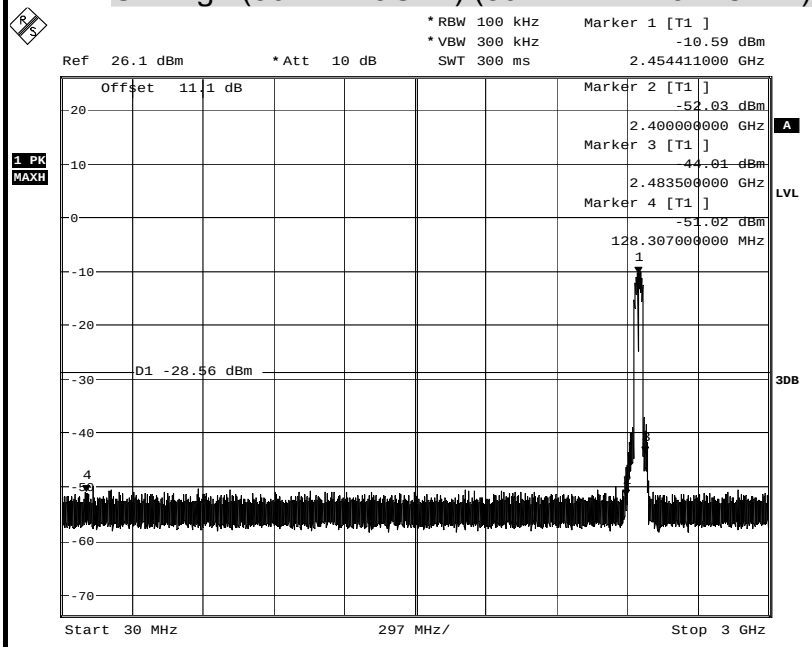
Date: 23.OCT.2013 15:03:17

CH Mid (3~26.5GHz) (802.11n HT40 MODE)



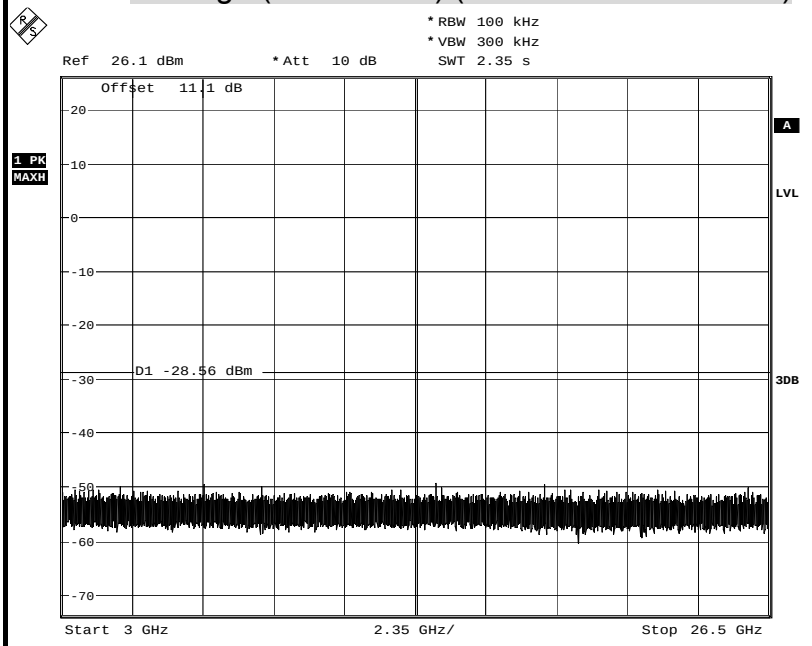
Date: 23.OCT.2013 15:03:48

CH High (30MHz~3GHz) (802.11n HT40 MODE)



Date: 23.OCT.2013 15:05:23

CH High (3~26.5GHz) (802.11n HT40 MODE)



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8.5 RADIATED EMISSIONS

8.5.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

LIMITS

§ 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 -1710	10.6 -12.7
6.26775 - 6.26825	108 -121.94	1718.8 - 1722.2	13.25 -13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 – 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 -16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown is Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§ 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz, However, operation within these frequency bands is permitted under other sections of this Part, e-g, Sections 15.231 and 15.241.

§ 15.209 (b) In the emission table above, the tighter limit applies at the band edges.

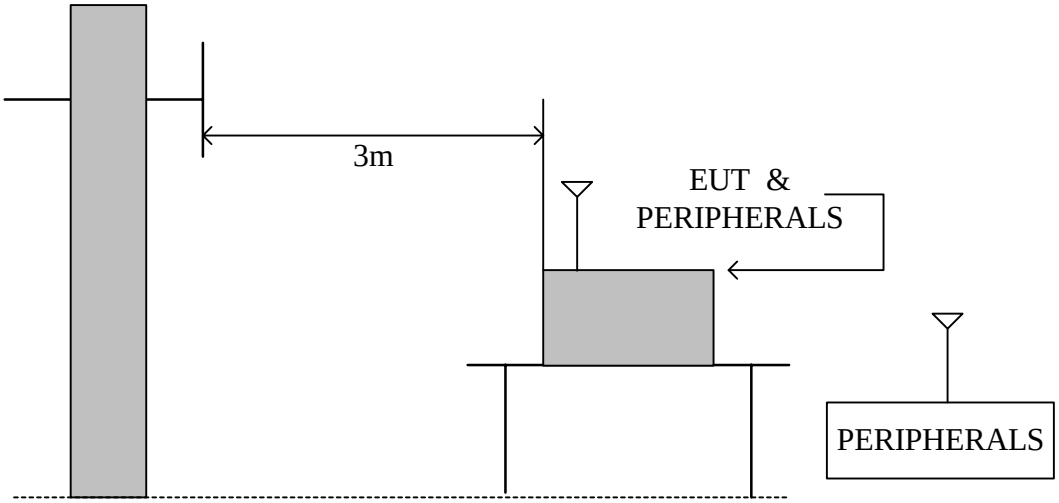
TEST EQUIPMENTS

The following test equipments are utilized in making the measurements contained in this report.

Open Area Test Site # 6				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
TYPE N COAXIAL CABLE	SUHNER	CHA9513	6	DEC. 18, 2013
BI-LOG Antenna	Sunol	JB1	A070506-2	SEP. 09, 2014
LOOP ANTENNA	EMCO	6502	8905-2356	JUN. 10, 2013
Pre-Amplifier	HP	8447F	2944A03817	DEC.18, 2013
EMI Receiver	R&S	ESVS10	833206/012	JUN.29, 2014
RF Cable	SUHNER	SUCOFLEX104PEA	20520/4PEA	NOV. 10, 2013
Horn Antenna	Com-Power	AH-118	071032	DEC. 05, 2013
Spectrum Analyzer	R&S	FSEK 30	835253/002	SEP. 28, 2014
Turn Table	Yo Chen	001	----------	N.C.R.
Antenna Tower	AR	TP1000A	309874	N.C.R.
Controller	CT	SC101	----------	N.C.R.
Test S/W	e-3 (5.04303e)			

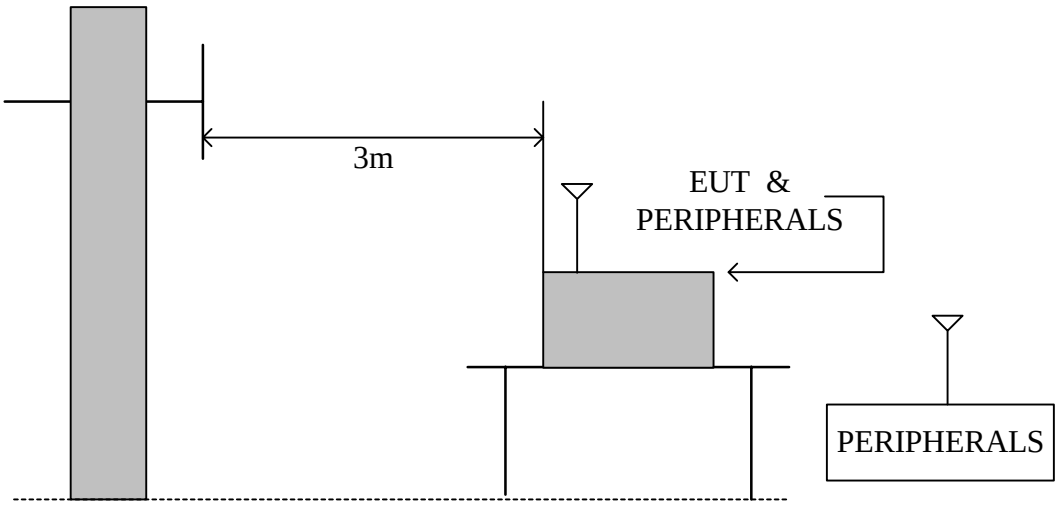
TEST SETUP

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



Antenna Elevation Variable

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



Antenna Elevation Variable

TEST PROCEDURE

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

b. White measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. White measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

g. The tests were performed in accordance with KDB 558074 5.4 .

Remark：

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

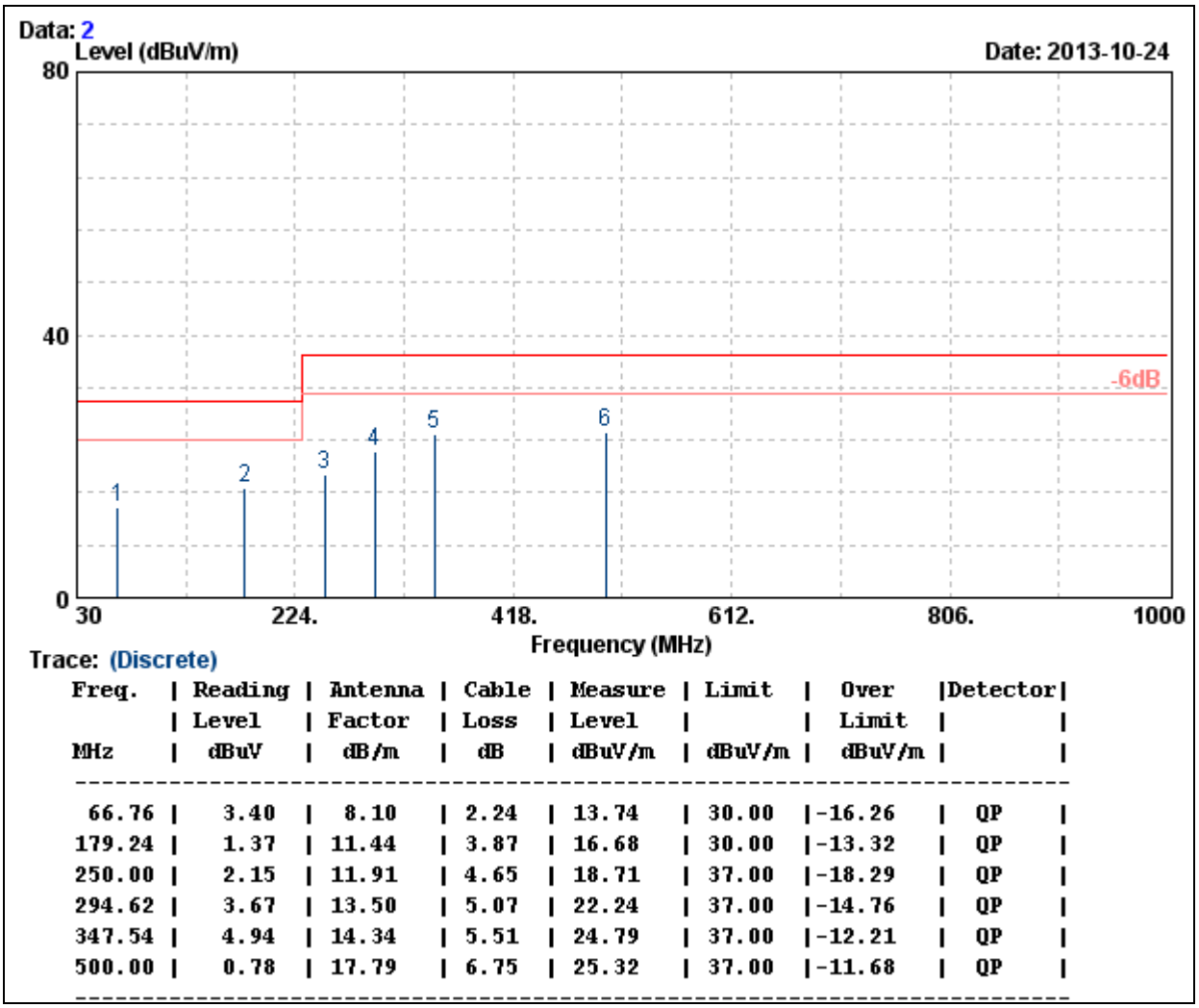
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.

3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

8.5.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/24
Model	DWR-712	Test By	Ted Huang
Test Mode	Powered from Adapter	TEMP& Humidity	24℃, 45%

Horizontal



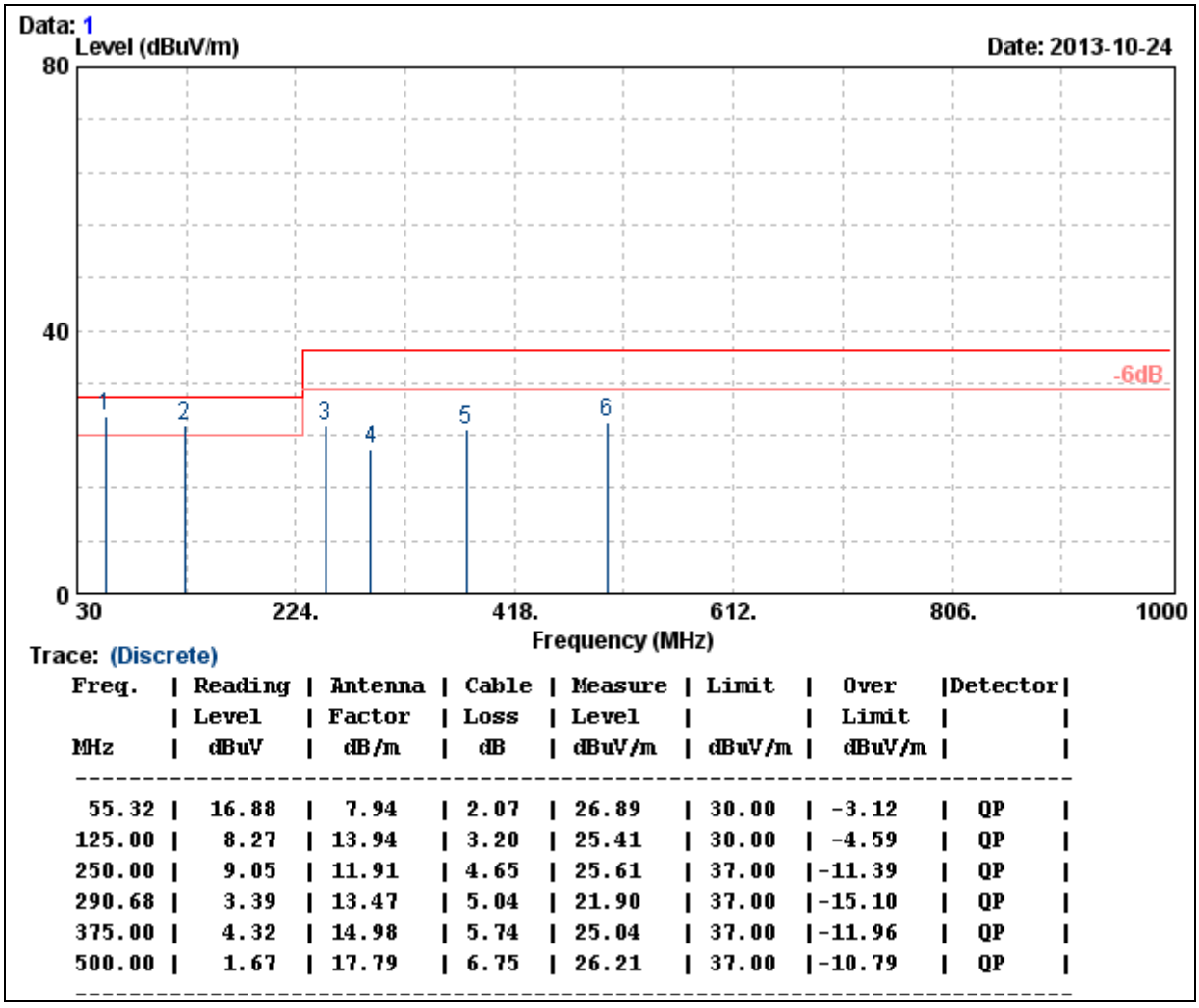
Trace: (Discrete)

Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
66.76	3.40	8.10	2.24	13.74	30.00	-16.26	QP
179.24	1.37	11.44	3.87	16.68	30.00	-13.32	QP
250.00	2.15	11.91	4.65	18.71	37.00	-18.29	QP
294.62	3.67	13.50	5.07	22.24	37.00	-14.76	QP
347.54	4.94	14.34	5.51	24.79	37.00	-12.21	QP
500.00	0.78	17.79	6.75	25.32	37.00	-11.68	QP

REMARK: Emission level (dBμV/m) =Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/24
Model	DWR-712	Test By	Ted Huang
Test Mode	Powered from Adapter	TEMP& Humidity	24℃, 45%

Vertical



Trace: (Discrete)

Freq.	Reading Level	Antenna Factor	Cable Loss	Measure Level	Limit	Over Limit	Detector
MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dBuV/m	
55.32	16.88	7.94	2.07	26.89	30.00	-3.12	QP
125.00	8.27	13.94	3.20	25.41	30.00	-4.59	QP
250.00	9.05	11.91	4.65	25.61	37.00	-11.39	QP
290.68	3.39	13.47	5.04	21.90	37.00	-15.10	QP
375.00	4.32	14.98	5.74	25.04	37.00	-11.96	QP
500.00	1.67	17.79	6.75	26.21	37.00	-10.79	QP

REMARK: Emission level (dBμV/m) =Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).

8.5.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11b TX (CH Low)	TEMP& Humidity	25.4°C,51%

Horizontal

	TX / IEEE 802.11b mode / CH Low				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.95	63.52	26.98	2.29	44.67	0.30	48.42	74.00	-25.58	P
*	1537.95	52.14	26.98	2.29	44.67	0.30	37.04	54.00	-16.96	A
	3215.95	59.12	30.44	3.23	44.28	0.30	48.81	74.00	-25.19	P
	3215.95	52.16	30.44	3.23	44.28	0.30	41.85	54.00	-12.15	A
*	4823.92	62.39	33.47	3.84	45.07	0.40	55.02	74.00	-18.98	P
*	4823.97	57.16	33.47	3.84	45.07	0.40	49.79	54.00	-4.21	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11b TX (CH Low)	TEMP& Humidity	25.4°C,51%

Vertical

	TX / IEEE 802.11b mode / CH Low				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.86	60.34	26.98	2.29	44.67	0.30	45.24	74.00	-28.76	P
*	1537.86	50.59	26.98	2.29	44.67	0.30	35.49	54.00	-18.51	A
	3215.94	60.62	30.44	3.23	44.28	0.30	50.31	74.00	-23.69	P
	3215.94	54.88	30.44	3.23	44.28	0.30	44.57	54.00	-9.43	A
*	4823.93	63.89	33.47	3.84	45.07	0.40	56.52	74.00	-17.48	P
*	4823.94	59.83	33.47	3.84	45.07	0.40	52.46	54.00	-1.54	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11b TX (CH Middle)	TEMP& Humidity	25.4°C,51%

Horizontal

	TX / IEEE 802.11b mode / CH Middle				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.91	63.47	26.98	2.29	44.67	0.30	48.37	74.00	-25.63	P
*	1537.91	52.44	26.98	2.29	44.67	0.30	37.34	54.00	-16.66	A
	3249.34	60.32	30.45	3.24	44.30	0.30	50.01	74.00	-23.99	P
	3249.34	52.87	30.45	3.24	44.30	0.30	42.56	54.00	-11.44	A
*	4873.94	60.10	33.65	3.85	45.13	0.40	52.87	74.00	-21.13	P
*	4873.94	51.31	33.65	3.85	45.13	0.40	44.08	54.00	-9.92	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11b TX (CH Middle)	TEMP& Humidity	25.4°C,51%

Vertical

	TX / IEEE 802.11b mode / CH Middle				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.90	61.02	26.98	2.29	44.67	0.30	45.92	74.00	-28.08	P
*	1537.90	50.82	26.98	2.29	44.67	0.30	35.72	54.00	-18.28	A
	3249.31	61.38	30.45	3.24	44.30	0.30	51.07	74.00	-22.93	P
	3249.31	55.49	30.45	3.24	44.30	0.30	45.18	54.00	-8.82	A
*	4873.98	60.92	33.65	3.85	45.13	0.40	53.69	74.00	-20.31	P
*	4873.98	54.76	33.65	3.85	45.13	0.40	47.53	54.00	-6.47	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11b TX (CH High)	TEMP& Humidity	25.4°C,51%

Horizontal

	TX / IEEE 802.11b mode / CH High				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.46	63.52	26.98	2.29	44.67	0.30	48.41	74.00	-25.59	P
*	1537.46	52.60	26.98	2.29	44.67	0.30	37.49	54.00	-16.51	A
	3282.55	61.37	30.46	3.26	44.32	0.30	51.07	74.00	-22.93	P
	3282.55	55.00	30.46	3.26	44.32	0.30	44.70	54.00	-9.30	A
*	4924.02	60.79	33.83	3.86	45.18	0.40	53.70	74.00	-20.30	P
*	4924.02	54.91	33.83	3.86	45.18	0.40	47.82	54.00	-6.18	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11b TX (CH High)	TEMP& Humidity	25.4°C,51%

Vertical

	TX / IEEE 802.11b mode / CH High				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1536.88	60.08	26.97	2.29	44.67	0.30	44.97	74.00	-29.03	P
*	1536.88	49.64	26.97	2.29	44.67	0.30	34.53	54.00	-19.47	A
	3282.63	61.11	30.46	3.26	44.32	0.30	50.81	74.00	-23.19	P
	3282.63	56.38	30.46	3.26	44.32	0.30	46.08	54.00	-7.92	A
*	4923.97	63.84	33.83	3.86	45.18	0.40	56.75	74.00	-17.25	P
*	4923.97	59.73	33.83	3.86	45.18	0.40	52.64	54.00	-1.36	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11g TX (CH Low)	TEMP& Humidity	25.4°C,51%

Horizontal

	TX / IEEE 802.11g mode / CH Low				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.84	64.52	26.98	2.29	44.67	0.30	49.42	74.00	-24.58	P
*	1537.84	52.46	26.98	2.29	44.67	0.30	37.36	54.00	-16.64	A
	3215.94	60.35	30.44	3.23	44.28	0.30	50.04	74.00	-23.96	P
	3215.94	52.74	30.44	3.23	44.28	0.30	42.43	54.00	-11.57	A
*	4825.21	59.73	33.47	3.84	45.07	0.40	52.36	74.00	-21.64	P
*	4825.21	48.54	33.47	3.84	45.07	0.40	41.17	54.00	-12.83	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11g TX (CH Low)	TEMP& Humidity	25.4°C,51%

Vertical

	TX / IEEE 802.11g mode / CH Low				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.54	61.31	26.98	2.29	44.67	0.30	46.20	74.00	-27.80	P
*	1537.54	50.46	26.98	2.29	44.67	0.30	35.35	54.00	-18.65	A
	3215.96	61.35	30.44	3.23	44.28	0.30	51.04	74.00	-22.96	P
	3215.96	54.28	30.44	3.23	44.28	0.30	43.97	54.00	-10.03	A
*	4823.88	63.42	33.47	3.84	45.07	0.40	56.05	74.00	-17.95	P
*	4823.88	53.47	33.47	3.84	45.07	0.40	46.10	54.00	-7.90	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11g TX (CH Middle)	TEMP& Humidity	25.4°C,51%

Horizontal

	TX / IEEE 802.11g mode / CH Middle				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.62	62.94	26.98	2.29	44.67	0.30	47.83	74.00	-26.17	P
*	1537.62	52.46	26.98	2.29	44.67	0.30	37.35	54.00	-16.65	A
	3249.36	60.38	30.45	3.24	44.30	0.30	50.07	74.00	-23.93	P
	3249.36	52.14	30.45	3.24	44.30	0.30	41.83	54.00	-12.17	A
*	4873.14	58.18	33.64	3.85	45.13	0.40	50.95	74.00	-23.05	P
*	4873.14	47.63	33.64	3.85	45.13	0.40	40.40	54.00	-13.60	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11g TX (CH Middle)	TEMP& Humidity	25.4°C,51%

Vertical

	TX / IEEE 802.11g mode / CH Middle				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.46	61.67	26.98	2.29	44.67	0.30	46.56	74.00	-27.44	P
*	1537.46	50.90	26.98	2.29	44.67	0.30	35.79	54.00	-18.21	A
	3249.33	62.37	30.45	3.24	44.30	0.30	52.06	74.00	-21.94	P
	3249.33	54.24	30.45	3.24	44.30	0.30	43.93	54.00	-10.07	A
*	4873.92	59.43	33.65	3.85	45.13	0.40	52.20	74.00	-21.80	P
*	4873.92	48.21	33.65	3.85	45.13	0.40	40.98	54.00	-13.02	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11g TX (CH High)	TEMP& Humidity	25.4°C,51%

Horizontal

	TX / IEEE 802.11g mode / CH High				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.59	64.24	26.98	2.29	44.67	0.30	49.13	74.00	-24.87	P
*	1537.59	52.93	26.98	2.29	44.67	0.30	37.82	54.00	-16.18	A
	3282.61	62.14	30.46	3.26	44.32	0.30	51.84	74.00	-22.16	P
	3282.61	55.14	30.46	3.26	44.32	0.30	44.84	54.00	-9.16	A
*	4923.35	61.24	33.82	3.86	45.18	0.40	54.15	74.00	-19.85	P
*	4923.35	51.83	33.82	3.86	45.18	0.40	44.74	54.00	-9.26	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11g TX (CH High)	TEMP& Humidity	25.4°C,51%

Vertical

	TX / IEEE 802.11g mode / CH High				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1536.70	60.56	26.97	2.29	44.67	0.30	45.45	74.00	-28.55	P
*	1536.70	50.10	26.97	2.29	44.67	0.30	34.99	54.00	-19.01	A
	3282.64	62.42	30.46	3.26	44.32	0.30	52.12	74.00	-21.88	P
	3282.64	57.95	30.46	3.26	44.32	0.30	47.65	54.00	-6.35	A
*	4922.16	61.39	33.82	3.86	45.18	0.40	54.29	74.00	-19.71	P
*	4922.16	52.13	33.82	3.86	45.18	0.40	45.03	54.00	-8.97	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11n HT20 TX (CH Low)	TEMP& Humidity	25.4°C,51%

Horizontal

	TX / IEEE 802.11n HT20 mode / CH Low				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.69	63.95	26.98	2.29	44.67	0.30	48.85	74.00	-25.15	P
*	1537.69	52.47	26.98	2.29	44.67	0.30	37.36	54.00	-16.64	A
	3215.88	60.24	30.44	3.23	44.28	0.30	49.93	74.00	-24.07	P
	3215.88	52.79	30.44	3.23	44.28	0.30	42.48	54.00	-11.52	A
*	4824.69	58.62	33.47	3.84	45.07	0.40	51.25	74.00	-22.75	P
*	4824.69	47.46	33.47	3.84	45.07	0.40	40.09	54.00	-13.91	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11n HT20 TX (CH Low)	TEMP& Humidity	28.4°C,54%

Vertical

	TX / IEEE 802.11n HT20 mode / CH Low				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.49	61.38	26.98	2.29	44.67	0.30	46.27	74.00	-27.73	P
*	1537.49	50.35	26.98	2.29	44.67	0.30	35.24	54.00	-18.76	A
	3215.62	62.34	30.44	3.23	44.28	0.30	52.03	74.00	-21.97	P
	3215.62	54.88	30.44	3.23	44.28	0.30	44.57	54.00	-9.43	A
*	4823.50	62.17	33.46	3.84	45.07	0.40	54.80	74.00	-19.20	P
*	4823.50	52.60	33.46	3.84	45.07	0.40	45.23	54.00	-8.77	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11n HT20 TX (CH Middle)	TEMP& Humidity	25.4°C,51%

Horizontal

	TX / IEEE 802.11n HT20 mode / CH Middle				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.93	63.41	26.98	2.29	44.67	0.30	48.31	74.00	-25.69	P
*	1537.93	52.75	26.98	2.29	44.67	0.30	37.65	54.00	-16.35	A
	3249.37	60.84	30.45	3.24	44.30	0.30	50.53	74.00	-23.47	P
	3249.37	51.90	30.45	3.24	44.30	0.30	41.59	54.00	-12.41	A
*	4873.20	58.46	33.64	3.85	45.13	0.40	51.23	74.00	-22.77	P
*	4873.20	47.93	33.64	3.85	45.13	0.40	40.70	54.00	-13.30	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11n HT20 TX (CH Middle)	TEMP& Humidity	25.4°C,51%

Vertical

	TX / IEEE 802.11n HT20 mode / CH Middle				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.24	61.24	26.98	2.29	44.67	0.30	46.13	74.00	-27.87	P
*	1537.24	50.76	26.98	2.29	44.67	0.30	35.65	54.00	-18.35	A
	3249.41	63.41	30.45	3.24	44.30	0.30	53.10	74.00	-20.90	P
	3249.41	54.08	30.45	3.24	44.30	0.30	43.77	54.00	-10.23	A
*	4873.39	59.64	33.64	3.85	45.13	0.40	52.41	74.00	-21.59	P
*	4873.39	47.88	33.64	3.85	45.13	0.40	40.65	54.00	-13.35	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11n HT20 TX (CH High)	TEMP& Humidity	25.4°C,51%

Horizontal

	TX / IEEE 802.11n HT20 mode / CH High				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.75	64.82	26.98	2.29	44.67	0.30	49.72	74.00	-24.28	P
*	1537.75	53.34	26.98	2.29	44.67	0.30	38.24	54.00	-15.76	A
	3282.66	62.49	30.46	3.26	44.32	0.30	52.19	74.00	-21.81	P
	3282.66	55.08	30.46	3.26	44.32	0.30	44.78	54.00	-9.22	A
*	4923.56	60.52	33.82	3.86	45.18	0.40	53.43	74.00	-20.57	P
*	4923.56	50.14	33.82	3.86	45.18	0.40	43.05	54.00	-10.95	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11n HT20 TX (CH High)	TEMP& Humidity	25.4°C,51%

Vertical

	TX / IEEE 802.11n HT20 mode / CH High				Measurement Distance at 3m		Vertical polarity			
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.29	61.28	26.98	2.29	44.67	0.30	46.17	74.00	-27.83	P
*	1537.29	50.47	26.98	2.29	44.67	0.30	35.36	54.00	-18.64	A
	3282.61	63.79	30.46	3.26	44.32	0.30	53.49	74.00	-20.51	P
	3282.61	56.52	30.46	3.26	44.32	0.30	46.22	54.00	-7.78	A
*	4923.14	61.38	33.82	3.86	45.18	0.40	54.29	74.00	-19.71	P
*	4923.14	51.68	33.82	3.86	45.18	0.40	44.59	54.00	-9.41	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11n HT40 TX (CH Low)	TEMP& Humidity	25.4°C,51%

Horizontal

	TX / IEEE 802.11n HT40 mode / CH Low				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.17	62.52	26.98	2.29	44.67	0.30	47.41	74.00	-26.59	P
*	1537.17	52.79	26.98	2.29	44.67	0.30	37.68	54.00	-16.32	A
	3229.35	60.27	30.45	3.24	44.29	0.30	49.96	74.00	-24.04	P
	3229.35	51.98	30.45	3.24	44.29	0.30	41.67	54.00	-12.33	A
*	4844.52	58.73	33.54	3.84	45.10	0.40	51.42	74.00	-22.58	P
*	4844.52	47.68	33.54	3.84	45.10	0.40	40.37	54.00	-13.63	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11n HT40 TX (CH Low)	TEMP& Humidity	25.4°C,51%

Vertical

	TX / IEEE 802.11n HT40 mode / CH Low				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.60	61.28	26.98	2.29	44.67	0.30	46.17	74.00	-27.83	P
*	1537.60	49.93	26.98	2.29	44.67	0.30	34.82	54.00	-19.18	A
	3229.36	63.79	30.45	3.24	44.29	0.30	53.48	74.00	-20.52	P
	3229.36	53.48	30.45	3.24	44.29	0.30	43.17	54.00	-10.83	A
*	4842.52	62.47	33.53	3.84	45.09	0.40	55.15	74.00	-18.85	P
*	4842.52	52.84	33.53	3.84	45.09	0.40	45.52	54.00	-8.48	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11n HT40 TX (CH Middle)	TEMP& Humidity	25.4°C,51%

Horizontal

	TX / IEEE 802.11n HT40 mode / CH Middle				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.54	64.29	26.98	2.29	44.67	0.30	49.18	74.00	-24.82	P
*	1537.54	53.10	26.98	2.29	44.67	0.30	37.99	54.00	-16.01	A
	3249.46	60.28	30.45	3.24	44.30	0.30	49.97	74.00	-24.03	P
	3249.46	50.15	30.45	3.24	44.30	0.30	39.84	54.00	-14.16	A
*	4872.71	58.63	33.64	3.85	45.13	0.40	51.40	74.00	-22.60	P
*	4872.71	48.02	33.64	3.85	45.13	0.40	40.79	54.00	-13.21	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11n HT40 TX (CH Middle)	TEMP& Humidity	25.4°C,51%

Vertical

	TX / IEEE 802.11n HT40 mode / CH Middle				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.16	61.36	26.97	2.29	44.67	0.30	46.25	74.00	-27.75	P
*	1537.16	50.73	26.97	2.29	44.67	0.30	35.62	54.00	-18.38	A
	3249.52	64.92	30.45	3.24	44.30	0.30	54.61	74.00	-19.39	P
	3249.52	53.45	30.45	3.24	44.30	0.30	43.14	54.00	-10.86	A
*	4872.65	58.46	33.64	3.85	45.13	0.40	51.23	74.00	-22.77	P
*	4872.65	47.29	33.64	3.85	45.13	0.40	40.06	54.00	-13.94	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11n HT40 TX (CH High)	TEMP& Humidity	25.4°C,51%

Horizontal

	TX / IEEE 802.11n HT40 mode / CH High				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.62	64.08	26.98	2.29	44.67	0.30	48.97	74.00	-25.03	P
*	1537.62	52.49	26.98	2.29	44.67	0.30	37.38	54.00	-16.62	A
	3269.35	61.62	30.45	3.25	44.31	0.30	51.32	74.00	-22.68	P
	3269.35	53.83	30.45	3.25	44.31	0.30	43.53	54.00	-10.47	A
*	4901.52	59.72	33.75	3.86	45.16	0.40	52.57	74.00	-21.43	P
*	4901.52	49.66	33.75	3.86	45.16	0.40	42.51	54.00	-11.49	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/22
Model	DWR-712	Test By	John Chen
Test Mode	IEEE 802.11n HT40 TX (CH High)	TEMP& Humidity	25.4°C,51%

Vertical

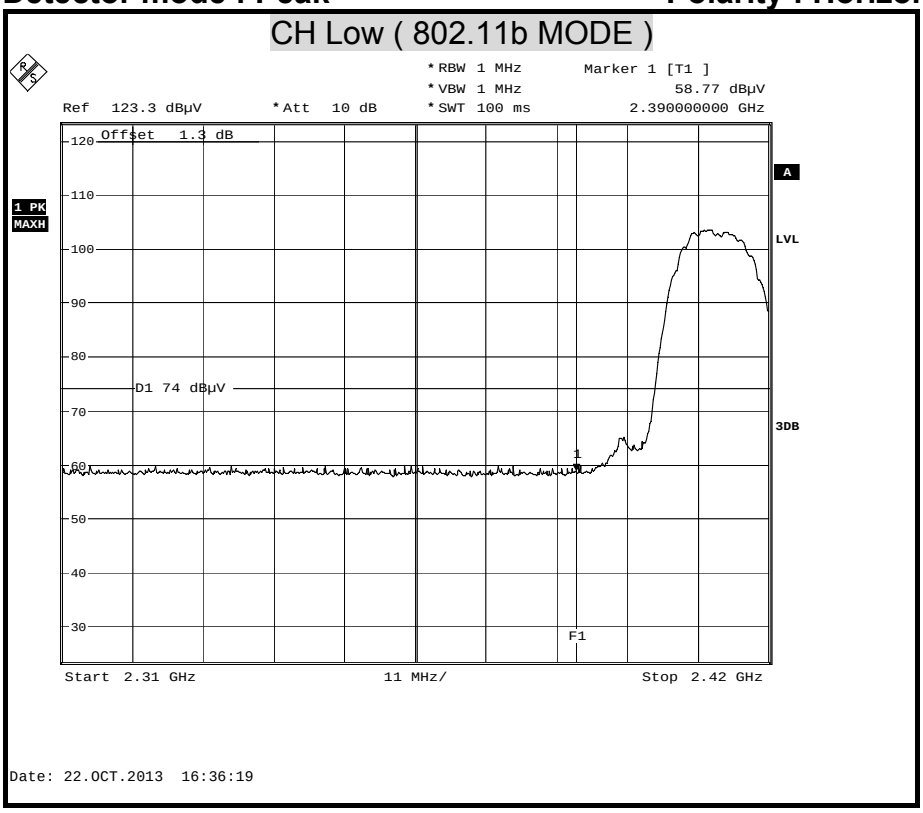
	TX / IEEE 802.11n HT40 mode / CH High				Measurement Distance at 3m				Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1537.80	62.24	26.98	2.29	44.67	0.30	47.14	74.00	-26.86	P
*	1537.80	50.08	26.98	2.29	44.67	0.30	34.98	54.00	-19.02	A
	3269.33	63.37	30.45	3.25	44.31	0.30	53.07	74.00	-20.93	P
	3269.33	55.14	30.45	3.25	44.31	0.30	44.84	54.00	-9.16	A
*	4902.34	60.75	33.75	3.86	45.16	0.40	53.60	74.00	-20.40	P
*	4902.34	51.32	33.75	3.86	45.16	0.40	44.17	54.00	-9.83	A

REMARK:

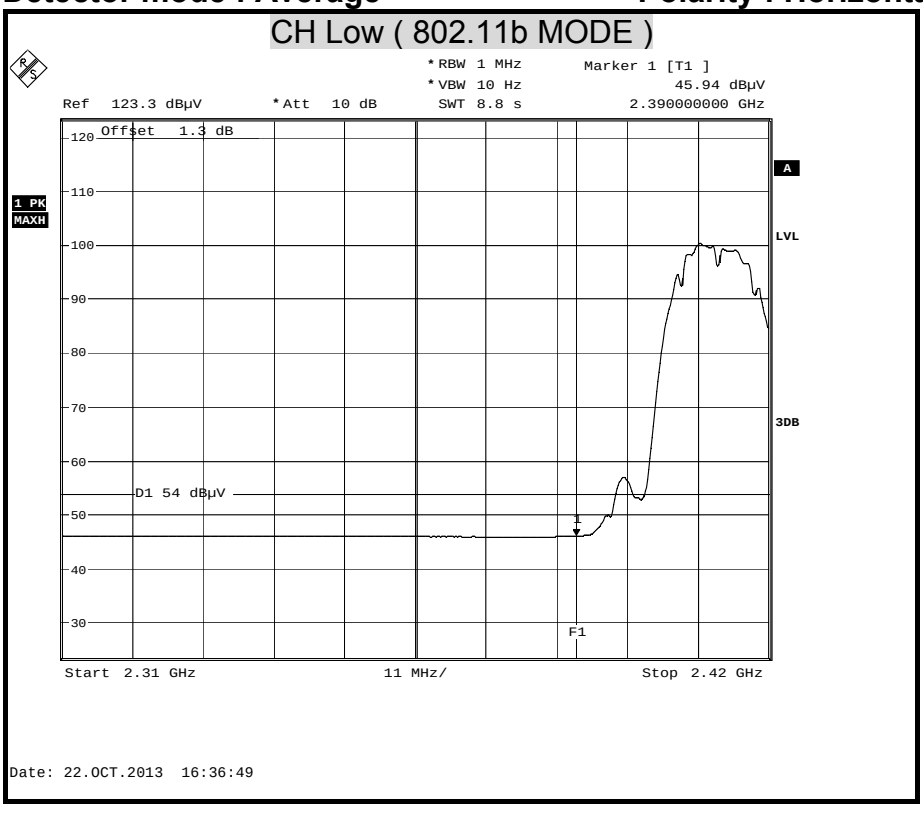
1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: Band-rejection Filter Insertion Loss
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

8.5.4 RESTRICTED BAND EDGES

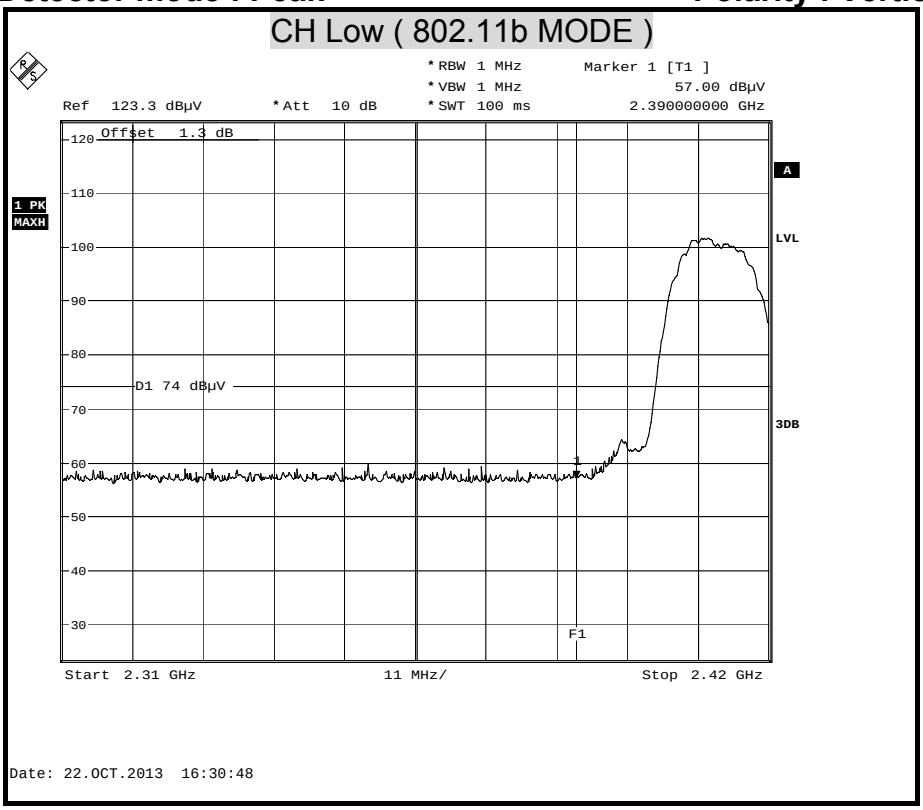
Detector mode : Peak **Polarity : Horizontal**



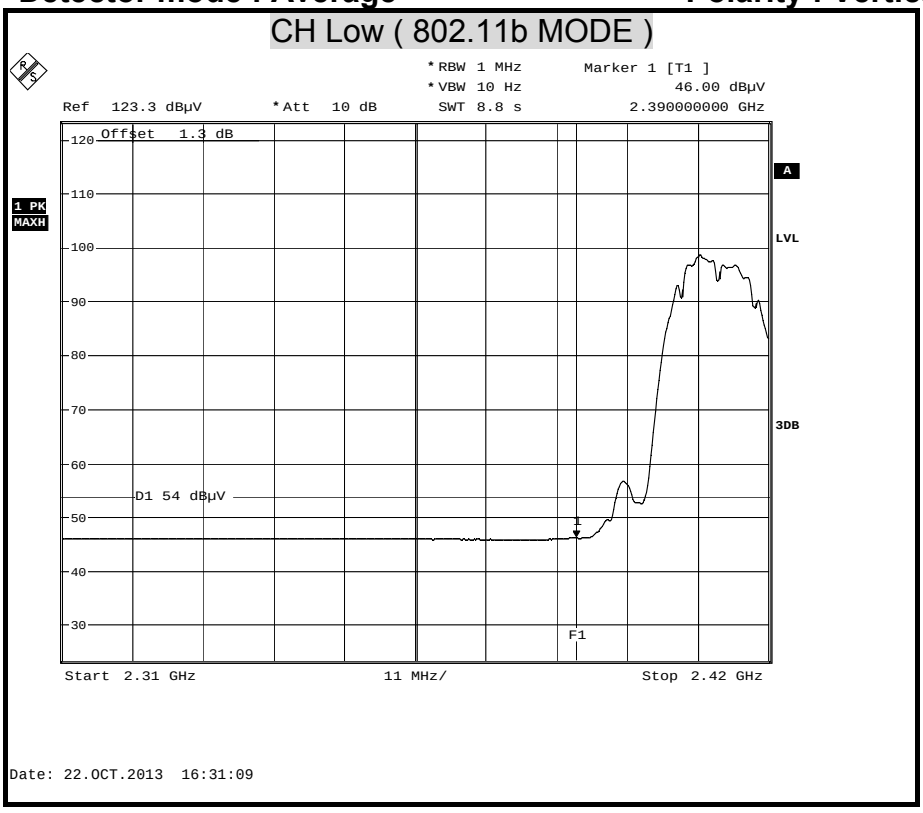
Detector mode : Average **Polarity : Horizontal**



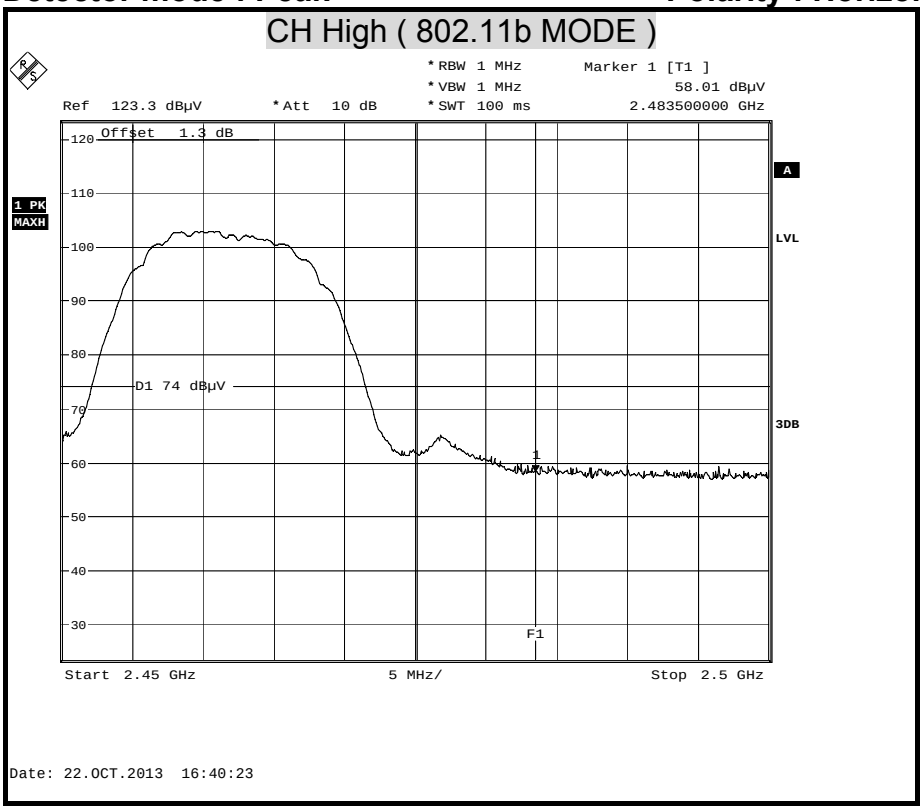
Detector mode : Peak **Polarity : Vertical**



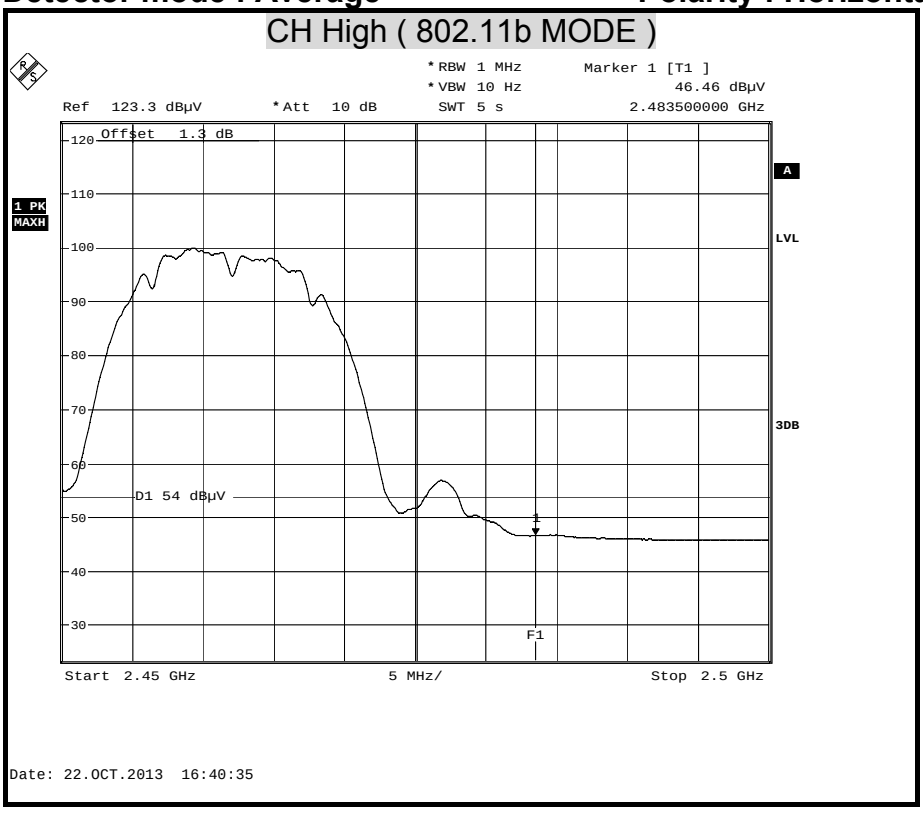
Detector mode : Average **Polarity : Vertical**



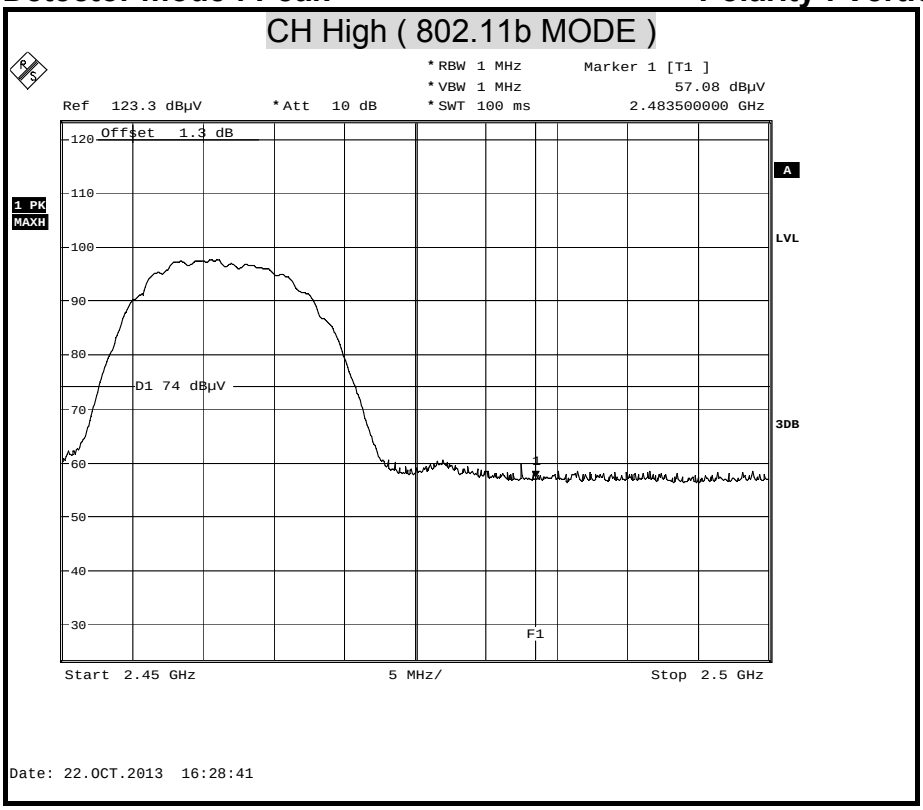
Detector mode : Peak **Polarity : Horizontal**



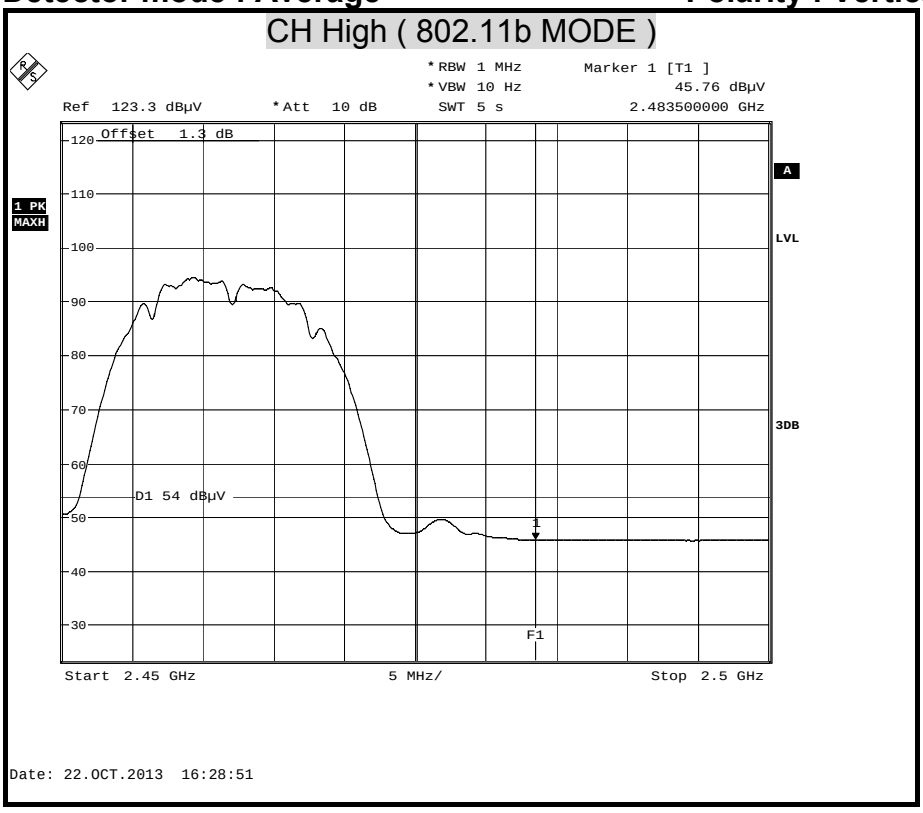
Detector mode : Average **Polarity : Horizontal**



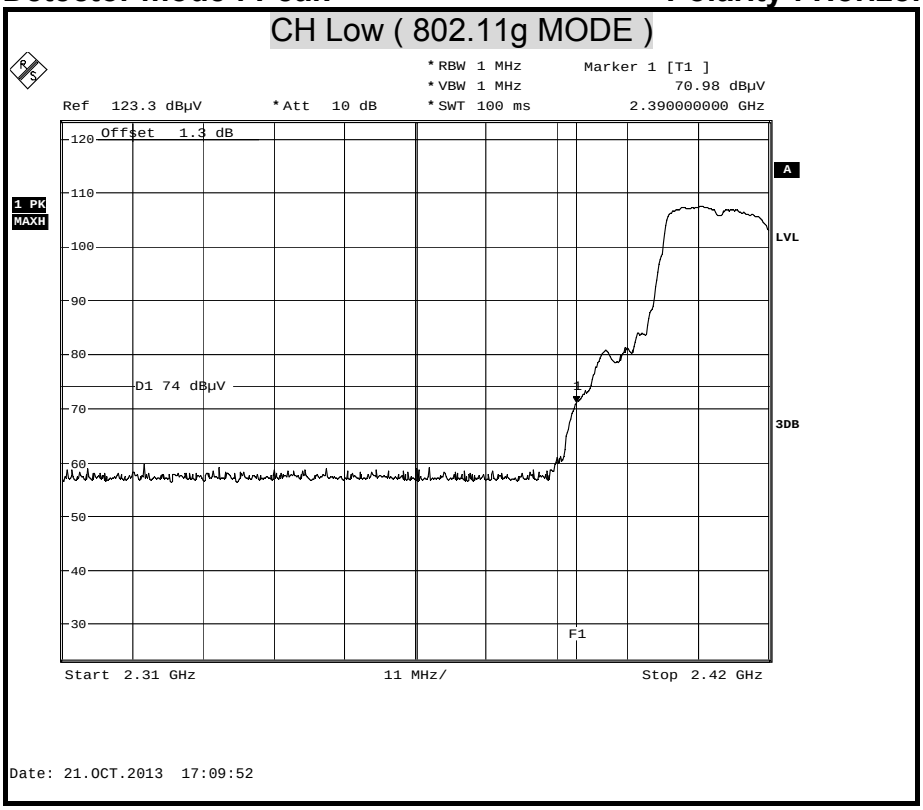
Detector mode : Peak **Polarity : Vertical**



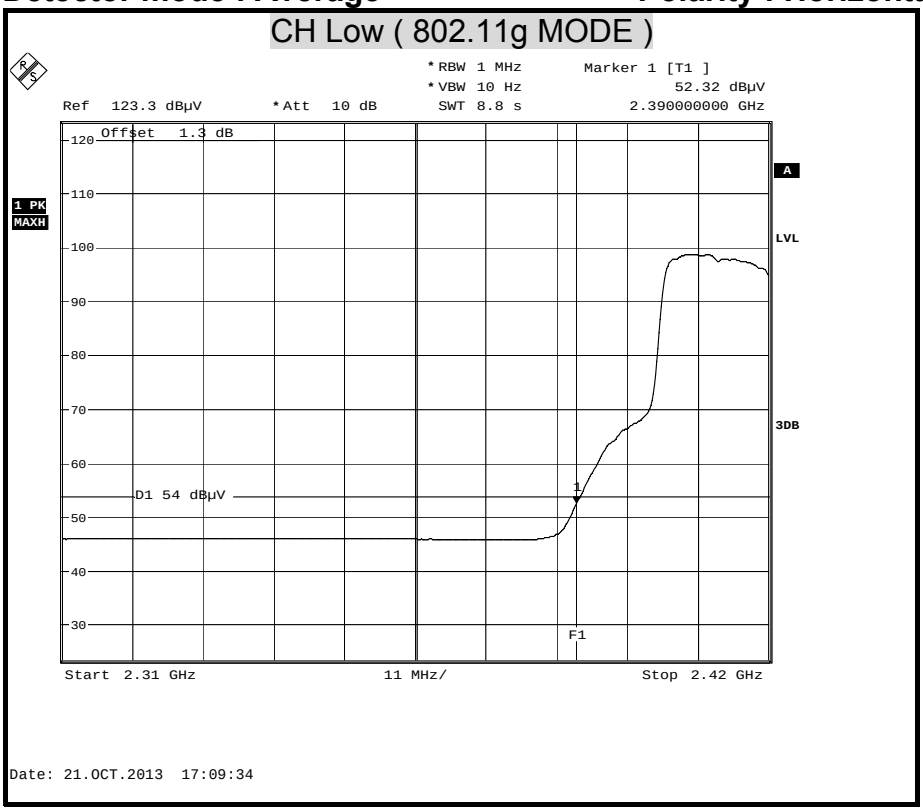
Detector mode : Average **Polarity : Vertical**



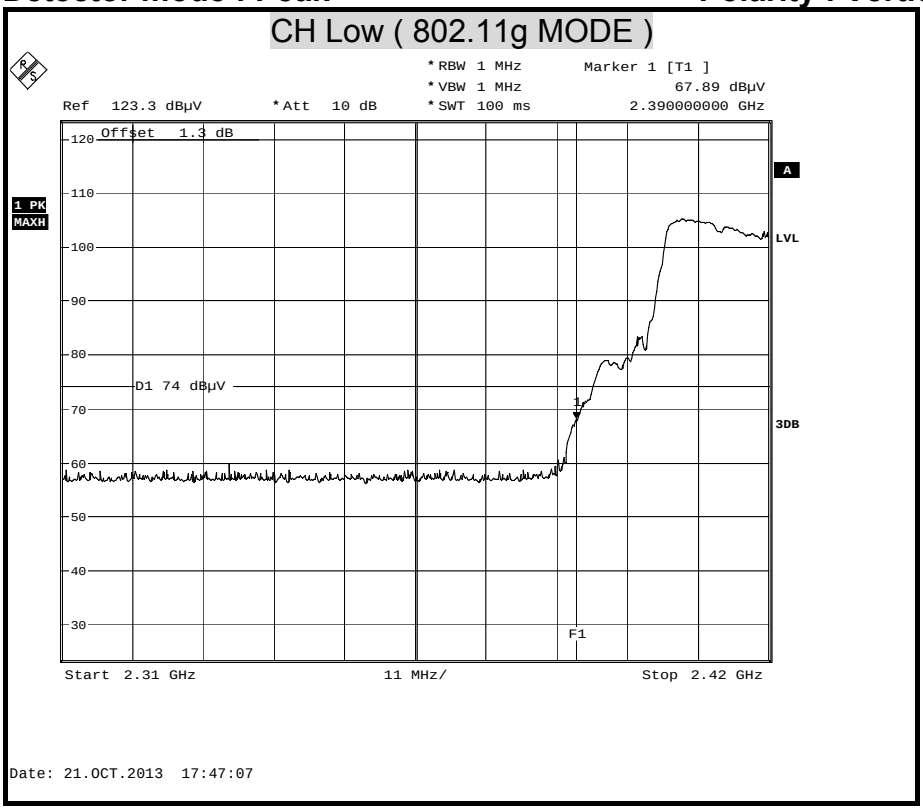
Detector mode : Peak **Polarity : Horizontal**



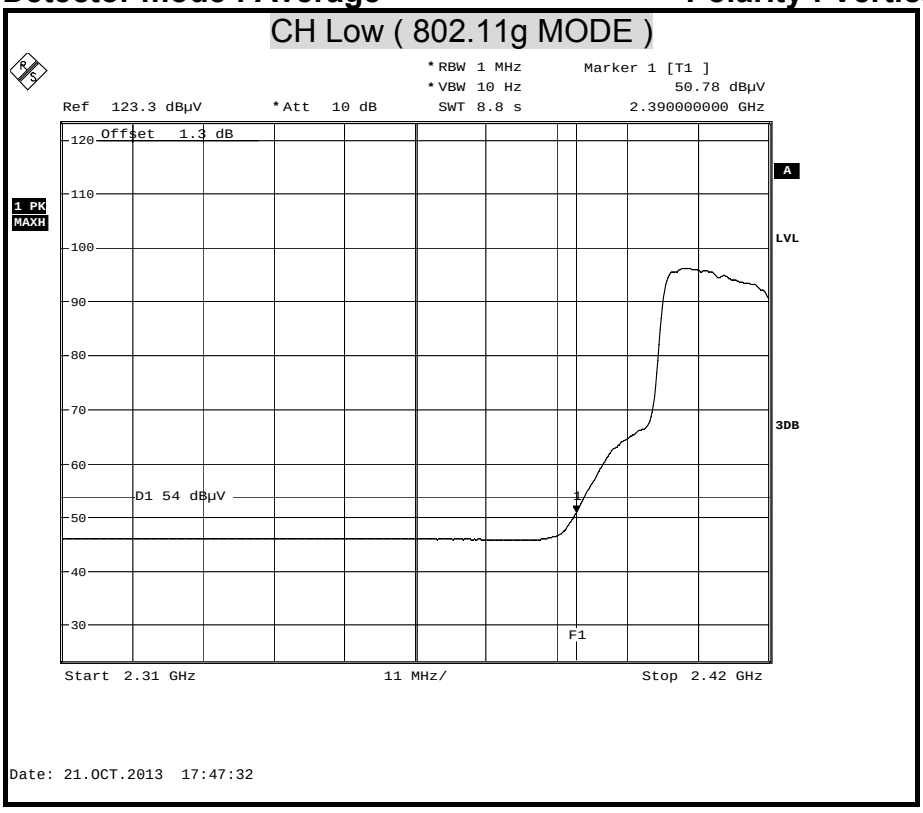
Detector mode : Average **Polarity : Horizontal**



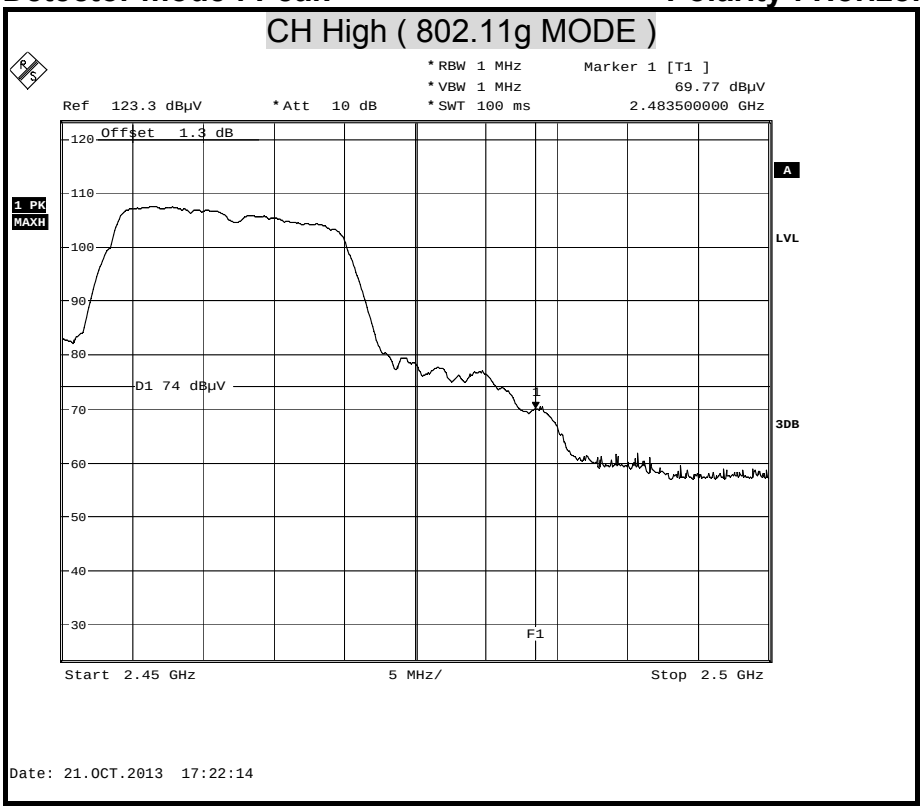
Detector mode : Peak **Polarity : Vertical**



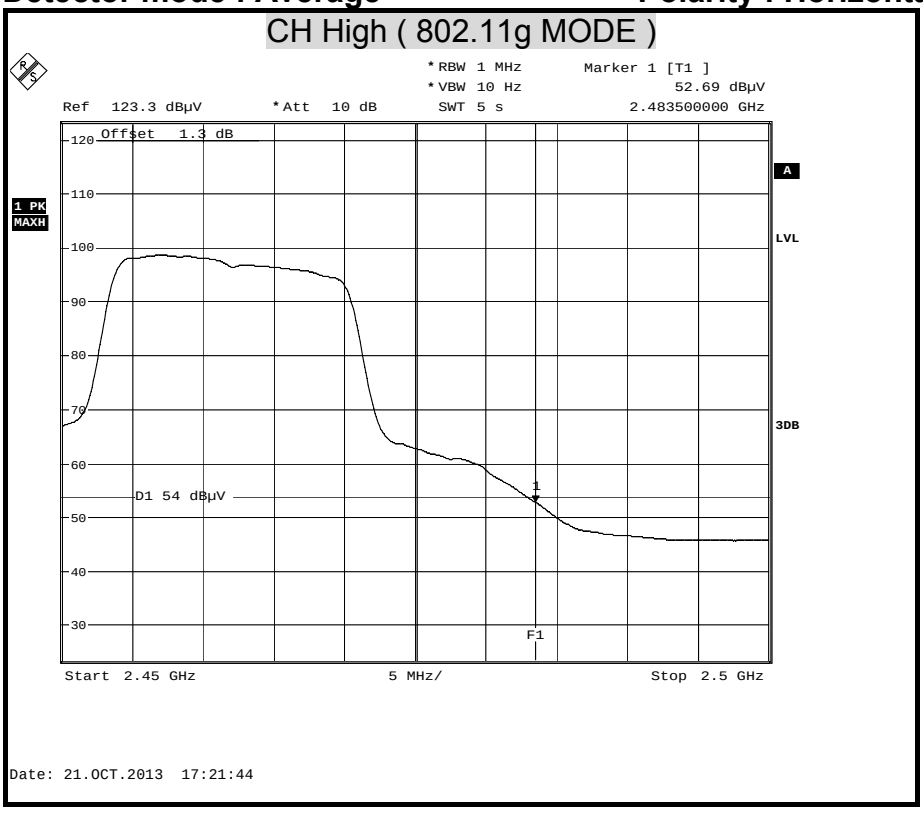
Detector mode : Average **Polarity : Vertical**



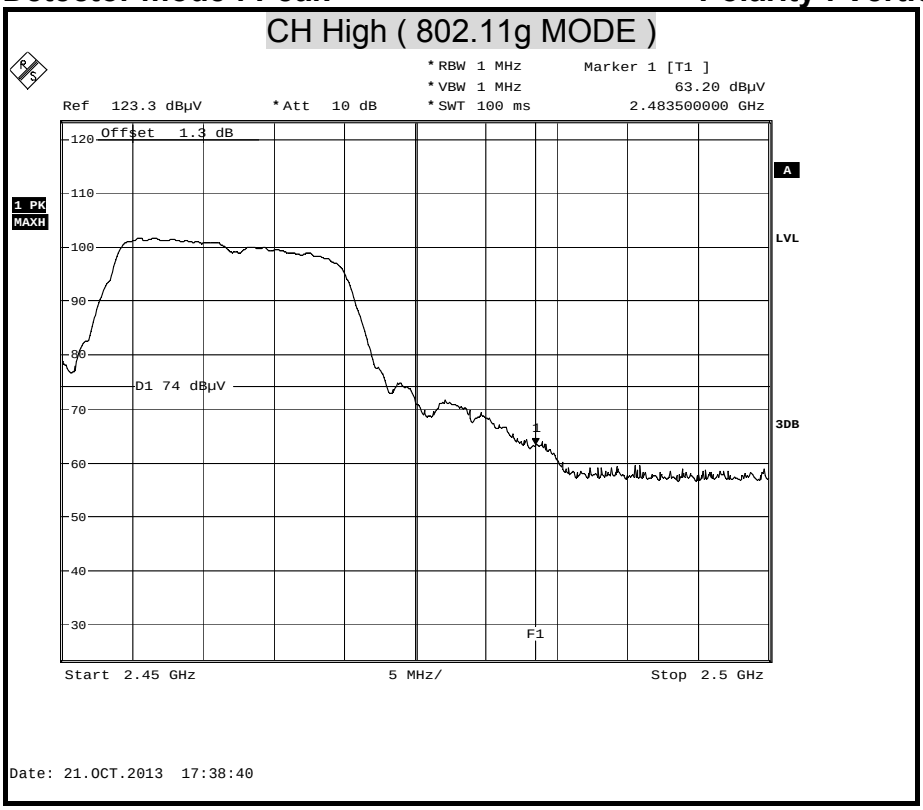
Detector mode : Peak **Polarity : Horizontal**



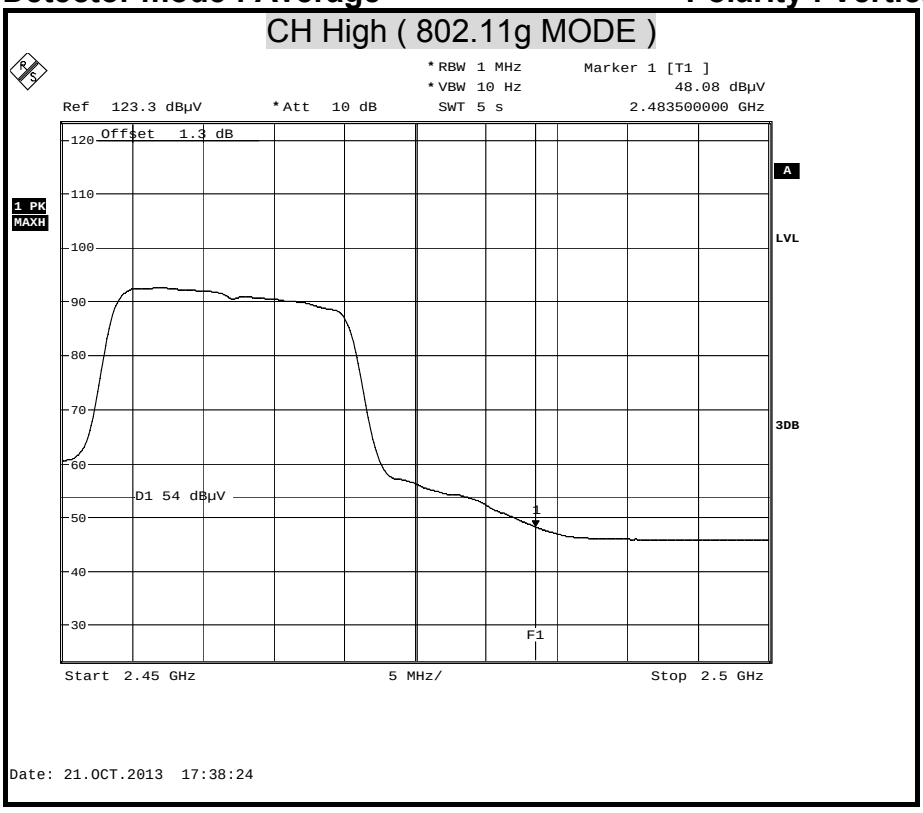
Detector mode : Average **Polarity : Horizontal**



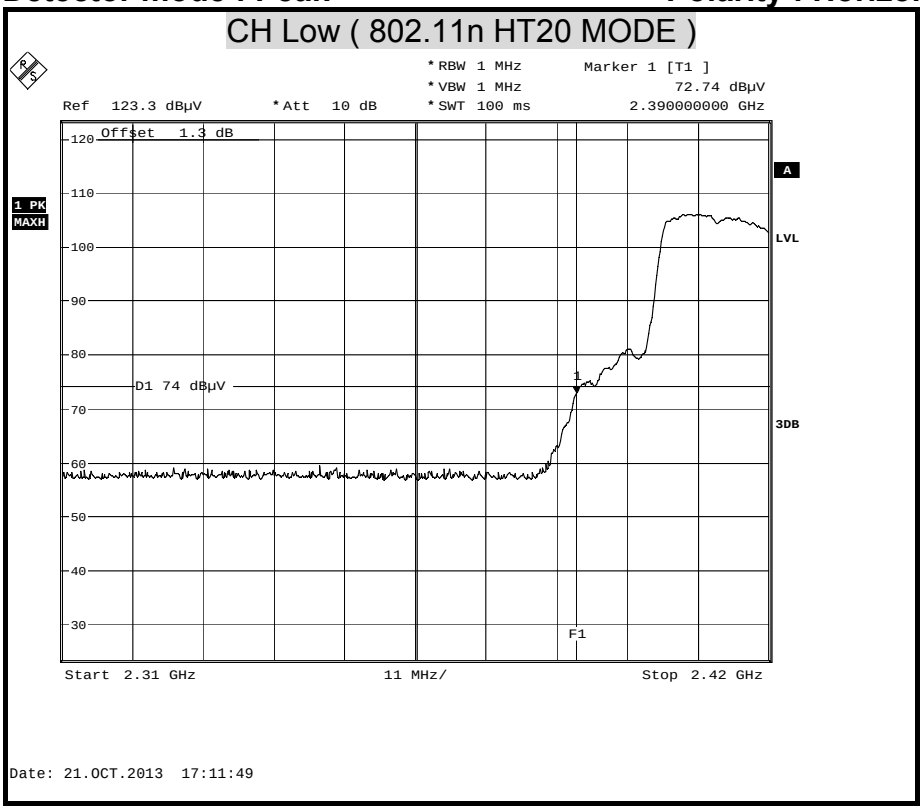
Detector mode : Peak **Polarity : Vertical**



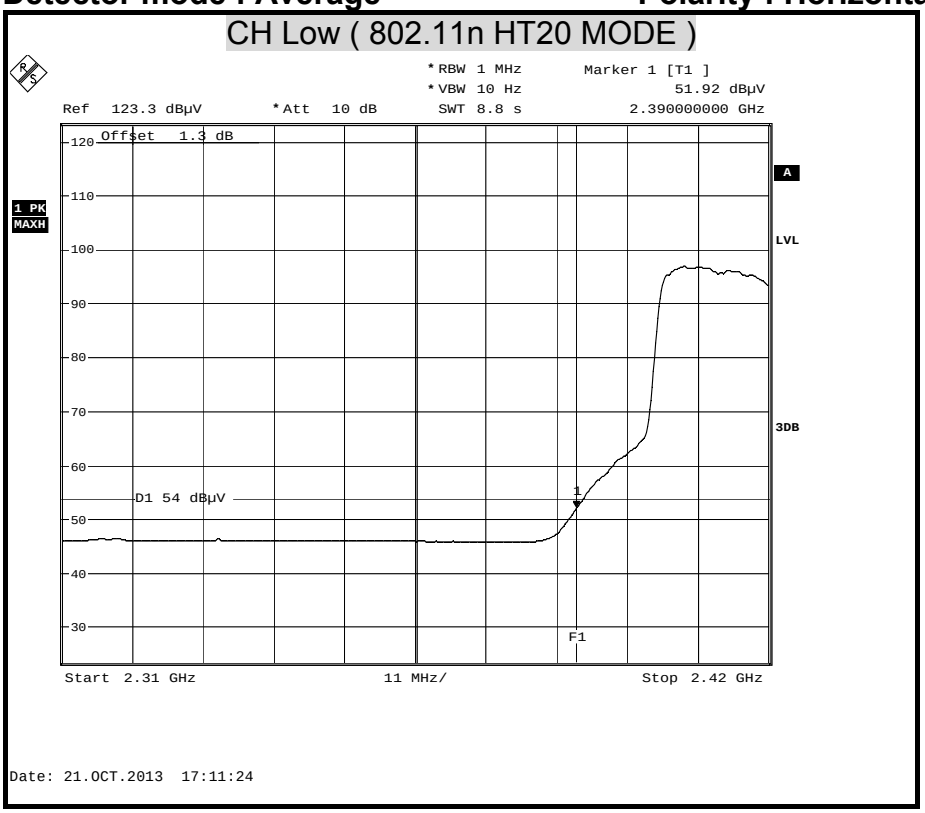
Detector mode : Average **Polarity : Vertical**



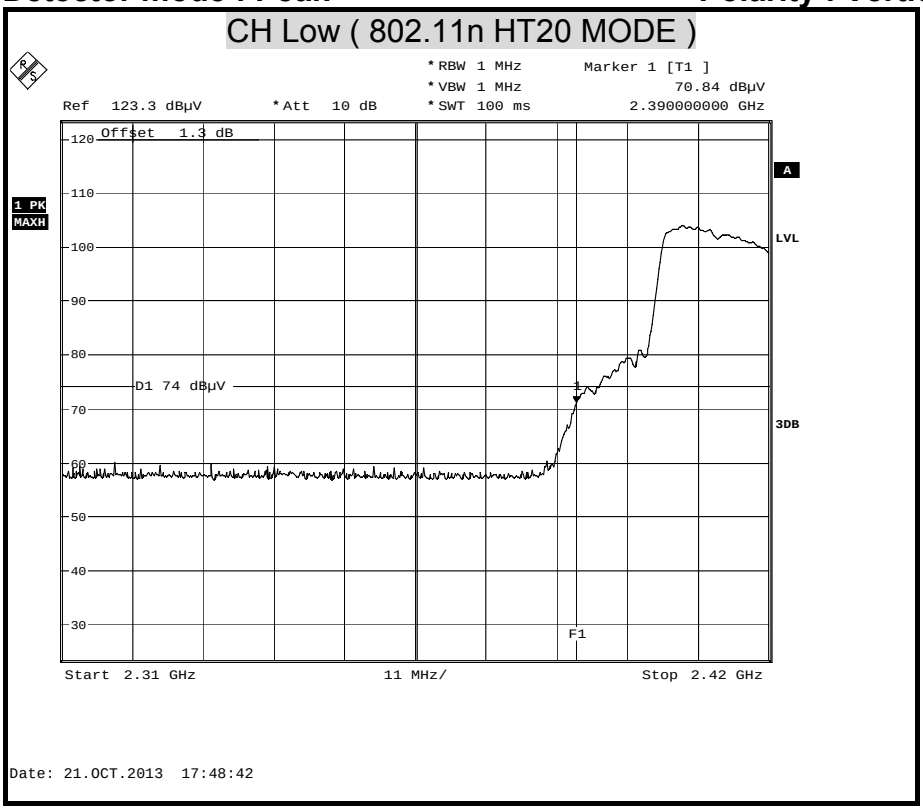
Detector mode : Peak **Polarity : Horizontal**



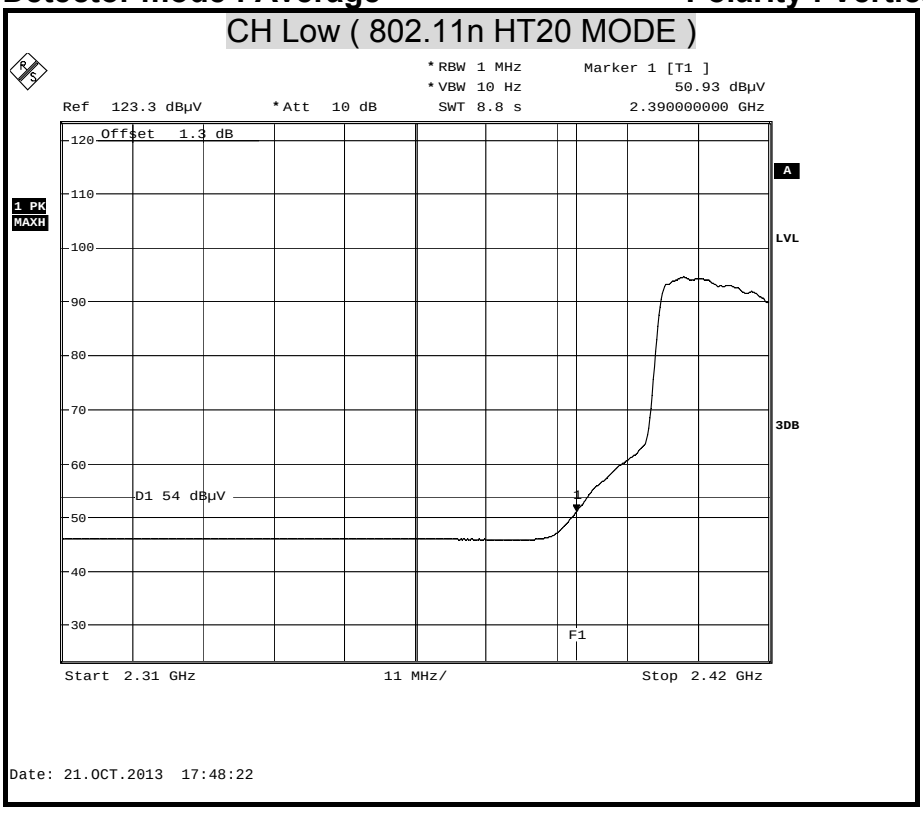
Detector mode : Average **Polarity : Horizontal**



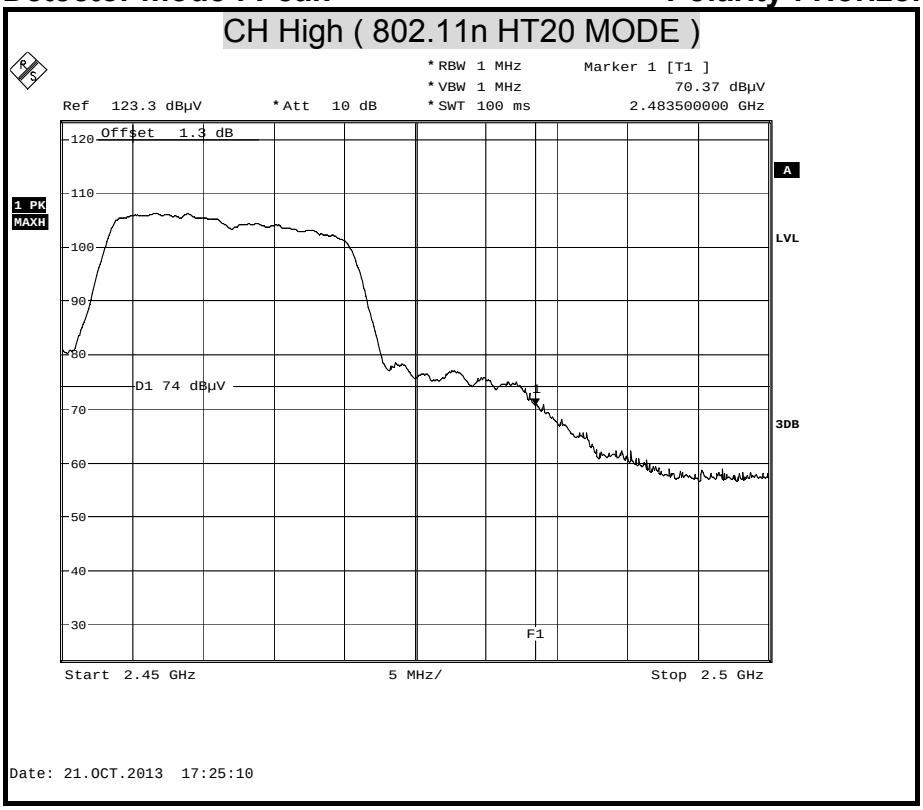
Detector mode : Peak **Polarity : Vertical**



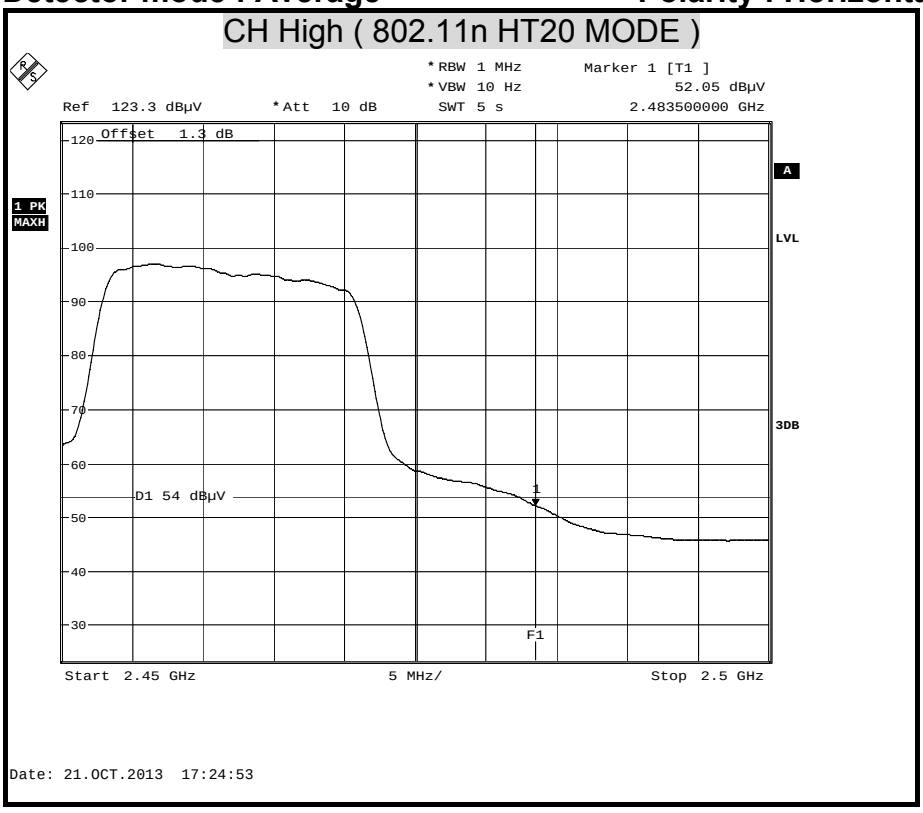
Detector mode : Average **Polarity : Vertical**



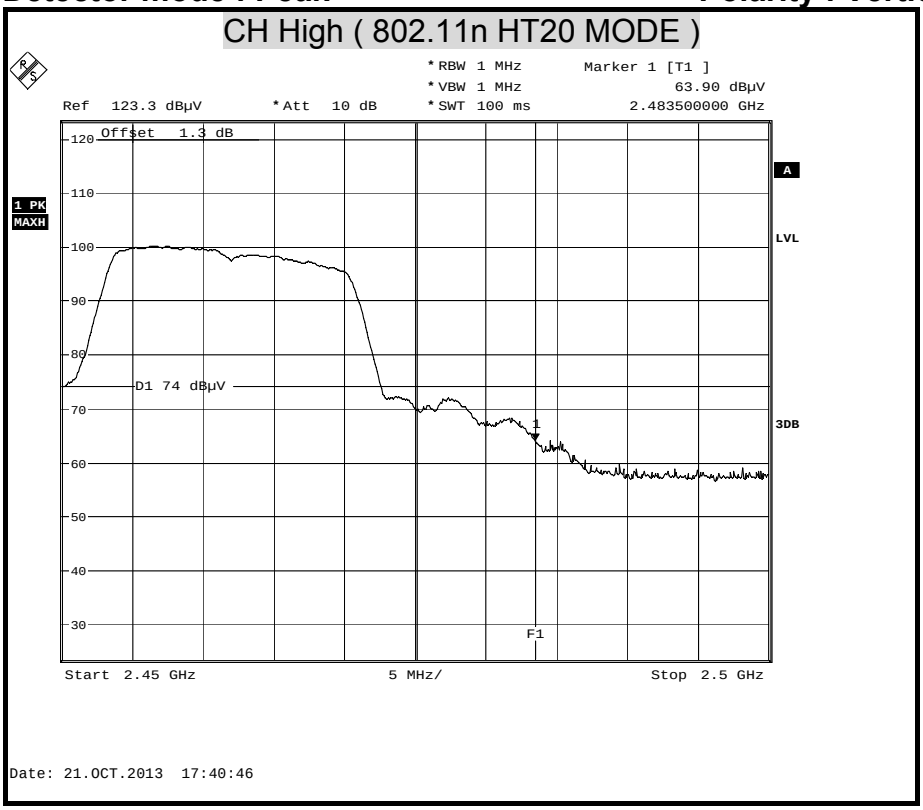
Detector mode : Peak **Polarity : Horizontal**



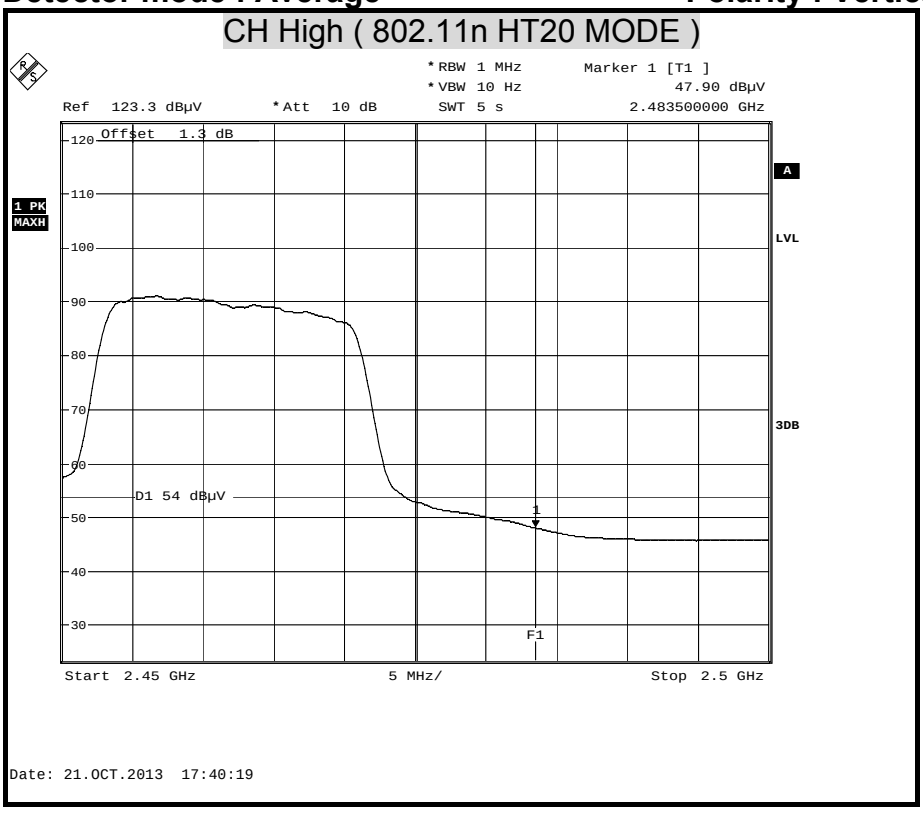
Detector mode : Average **Polarity : Horizontal**



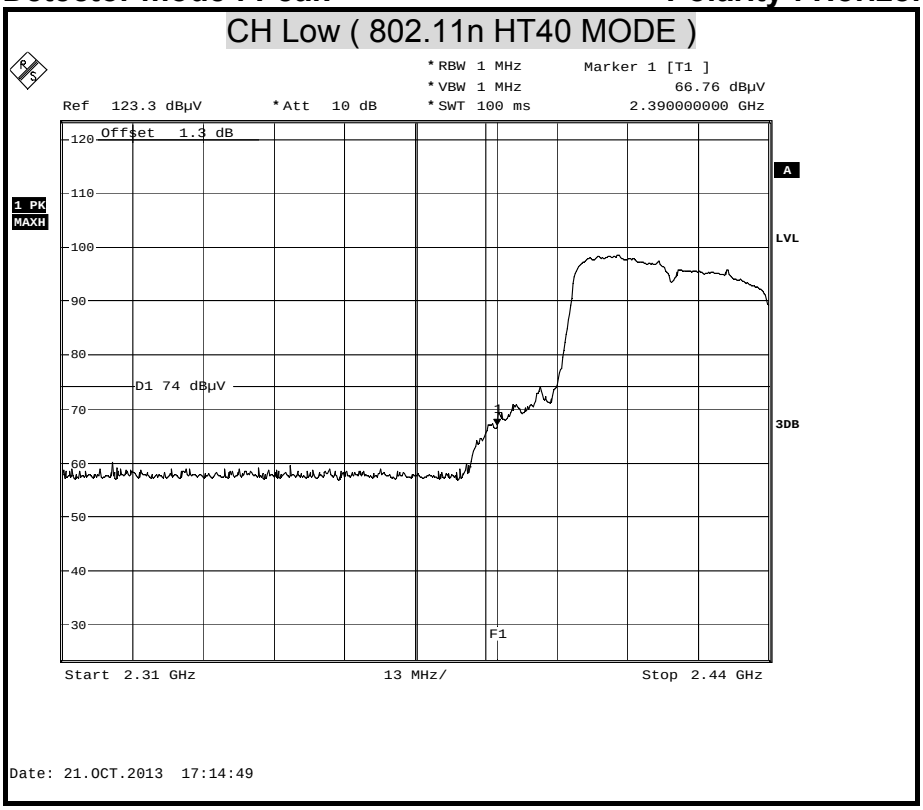
Detector mode : Peak **Polarity : Vertical**



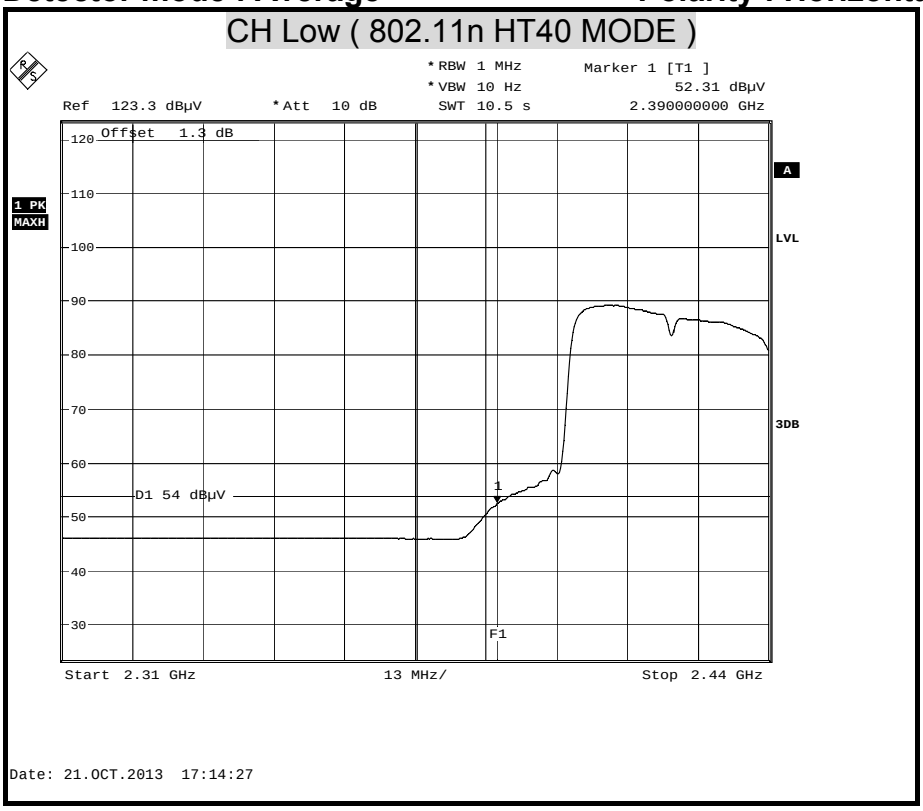
Detector mode : Average **Polarity : Vertical**



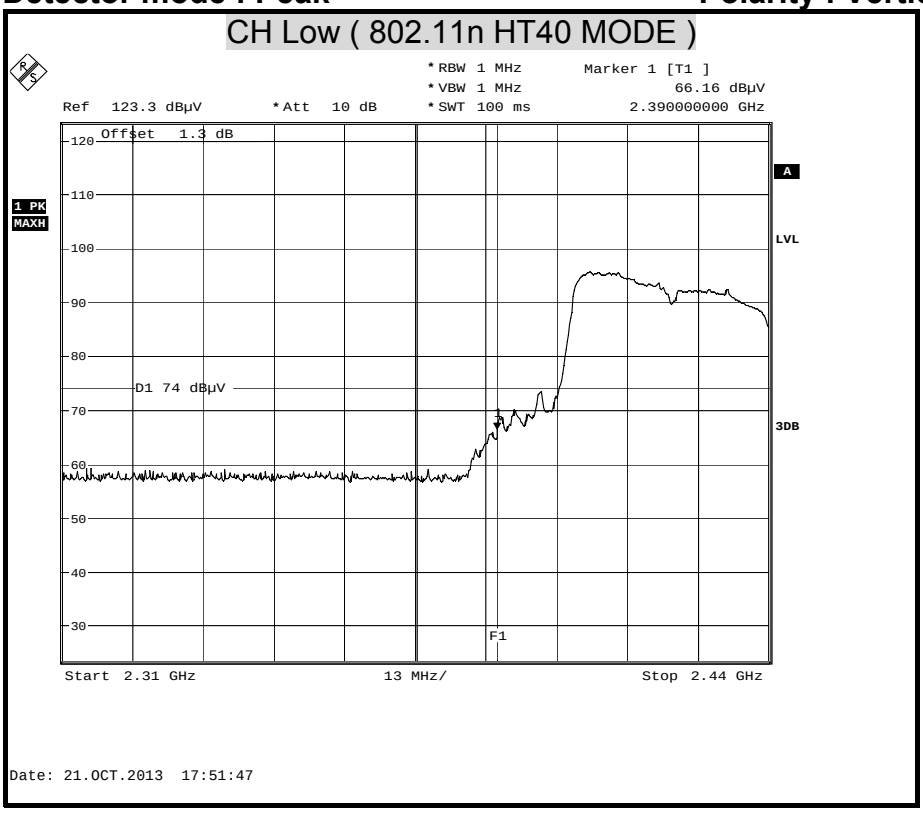
Detector mode : Peak **Polarity : Horizontal**



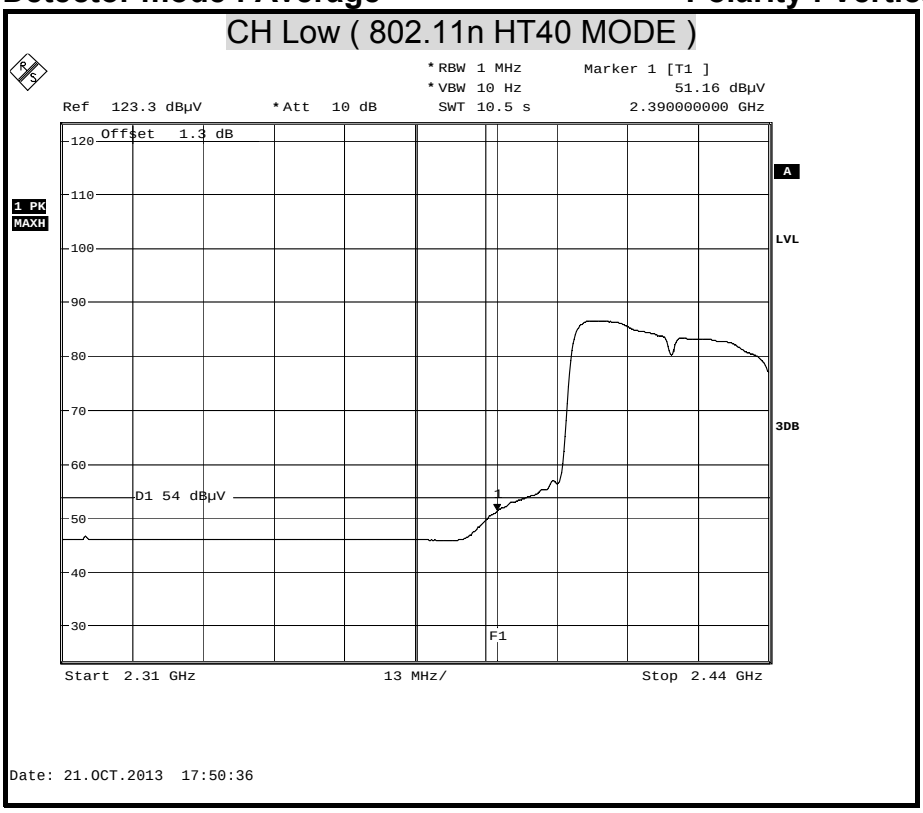
Detector mode : Average **Polarity : Horizontal**



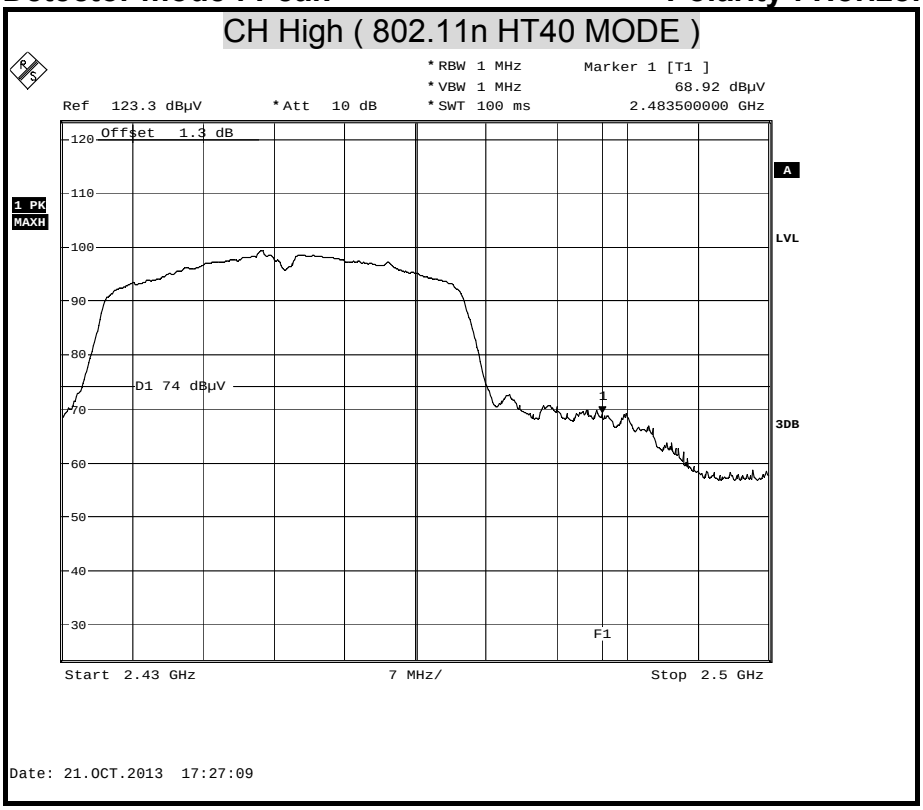
Detector mode : Peak **Polarity : Vertical**



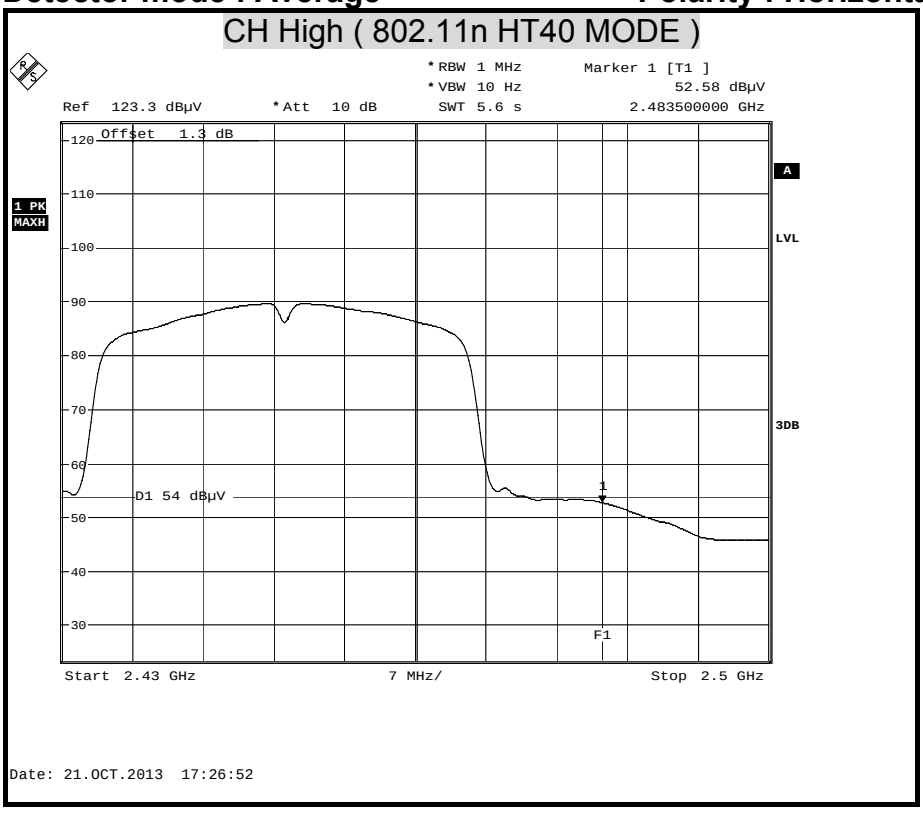
Detector mode : Average **Polarity : Vertical**



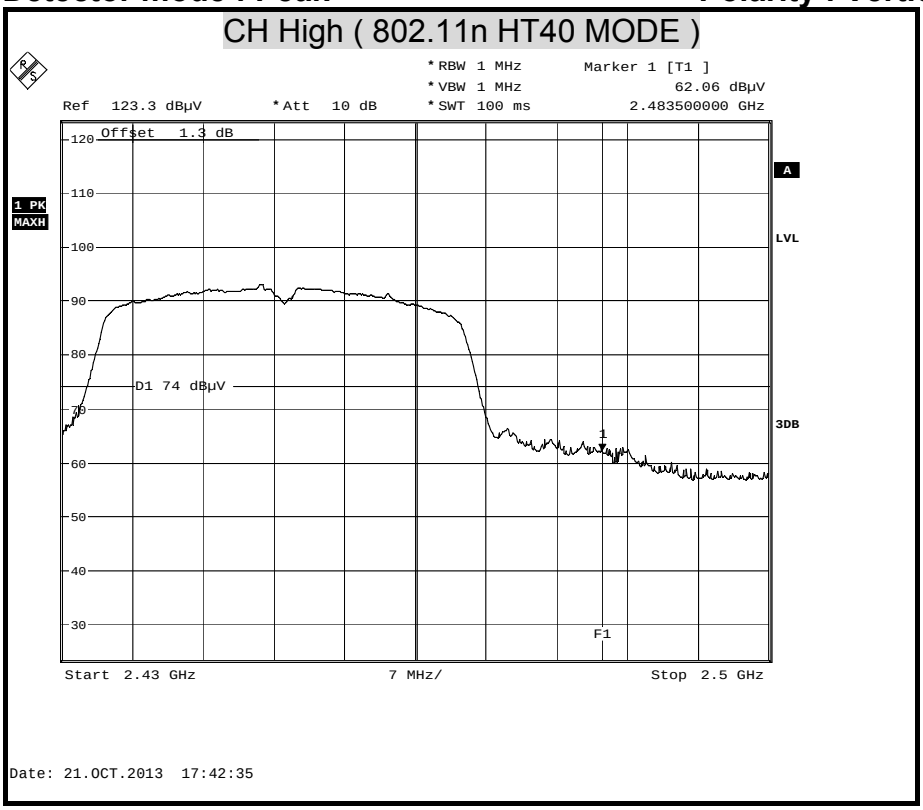
Detector mode : Peak **Polarity : Horizontal**



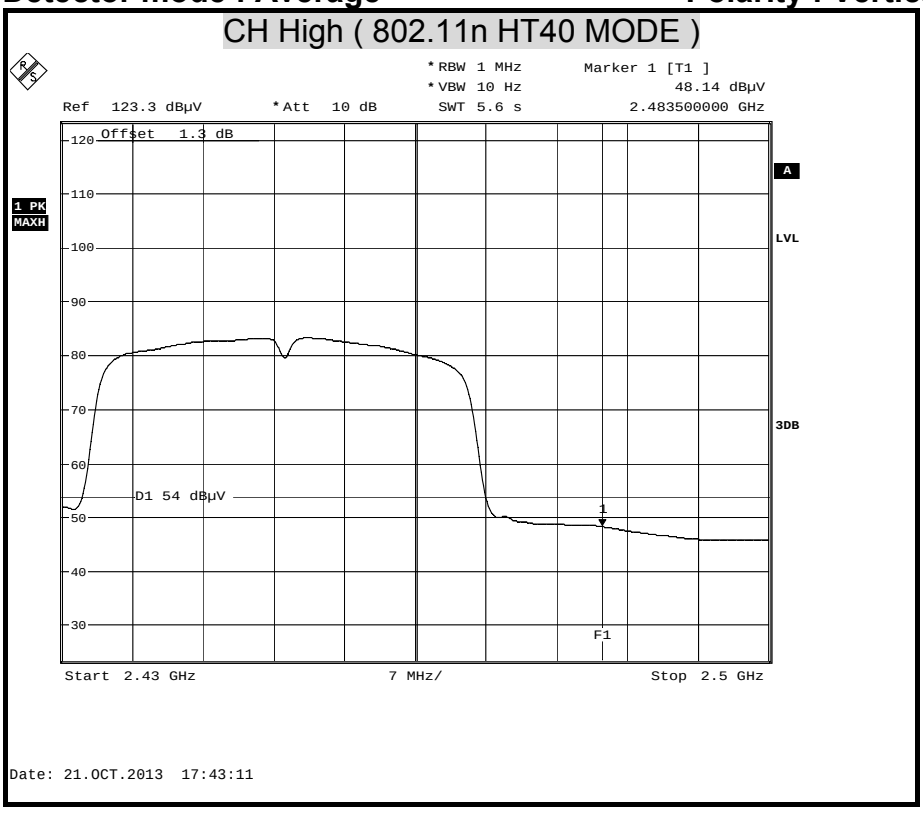
Detector mode : Average **Polarity : Horizontal**



Detector mode : Peak **Polarity : Vertical**



Detector mode : Average **Polarity : Vertical**



8.6 POWERLINE CONDUCTED EMISSIONS

LIMITS

§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

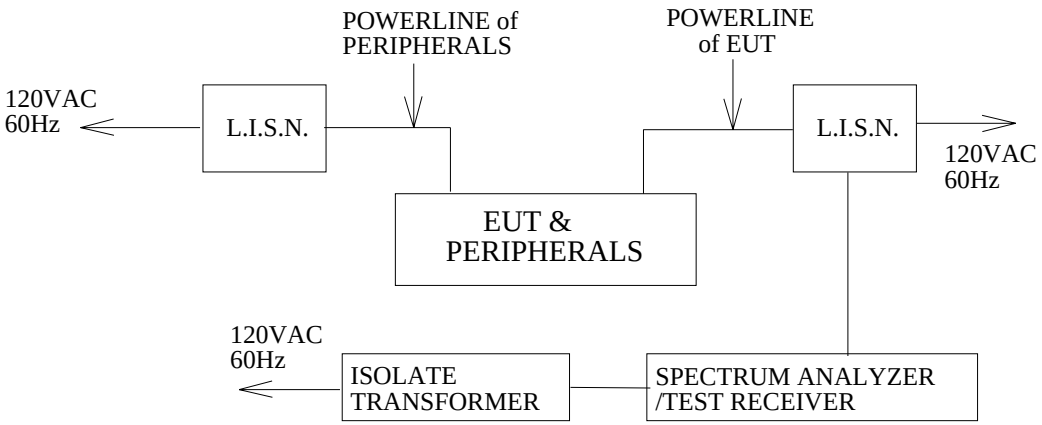
Frequency of Emission (MHz)	Conducted limit (dBμv)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 - 30	60	50

TEST EQUIPMENTS

The following test equipments are used during the conducted power line tests：

Conducted Emission room #1				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
L.I.S.N.	SCHWARZBECK	NNLK8121	8130124	AUG. 12, 2014
	Rohde & Schwarz	ESH 3-Z5	840062/021	SEP. 09, 2014
TEST RECEIVER	Rohde & Schwarz	ESCS 30	100348	AUG. 09, 2014
TYPE N COAXIAL CABLE	CCS	BNC50	11	OCT. 30, 2013
Test S/W	e-3 (5.04211c) R&S (2.27)			

TEST SETUP



TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80cm above the horizontal ground plane. The EUT IS CONFIGURED IN ACCORDANCE WITH ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both quasi-peak detection and average detection measurements.

Line conducted data is recorded for both NEUTRAL and LINE.

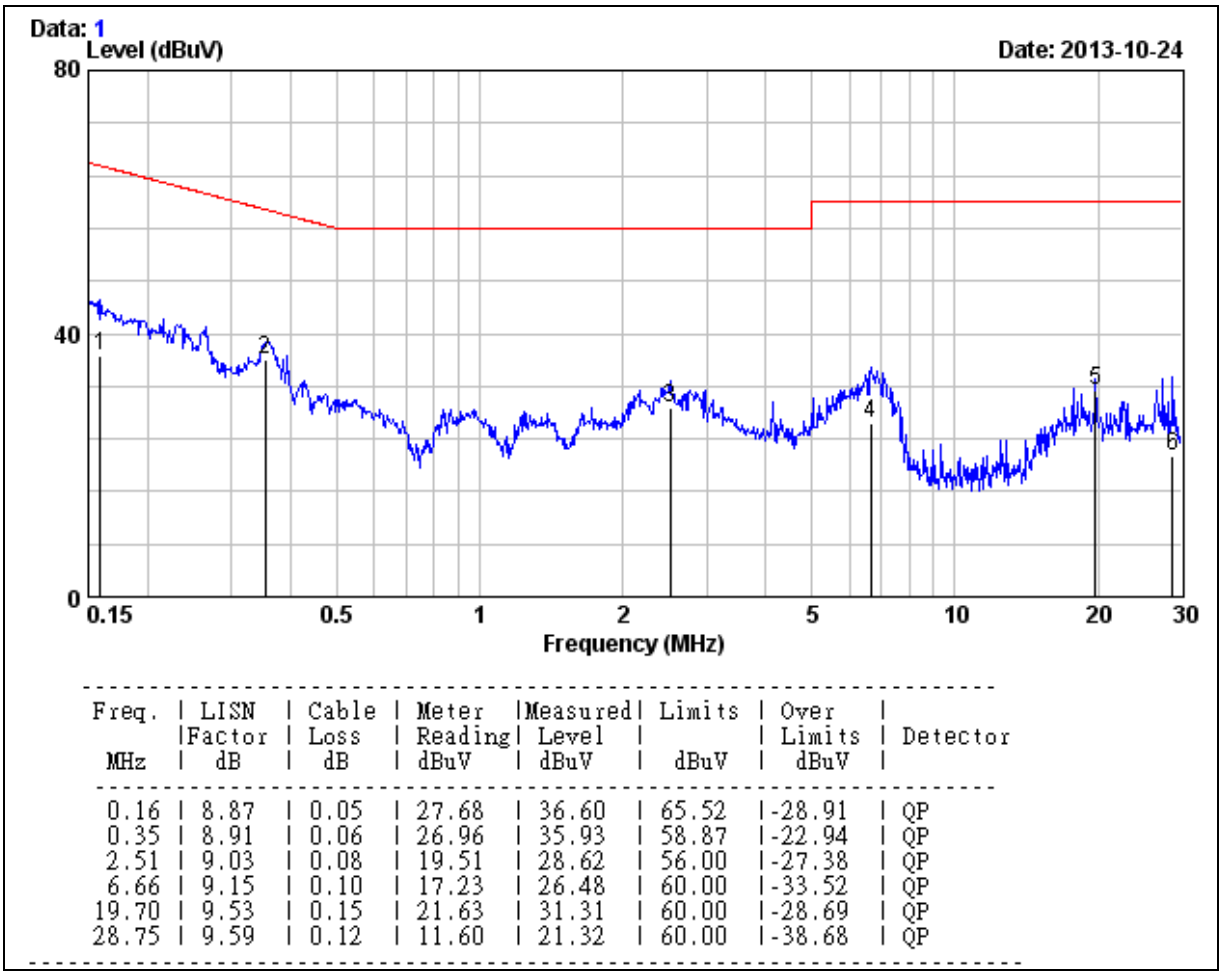
TEST RESULTS

No non-compliance noted.

CONDUCTED RF VOLTAGE MEASUREMENT

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/24
Model	DWR-712	Test By	Shiang Su
Test Mode	Powered from Adapter	TEMP& Humidity	25.5°C, 48%

LINE

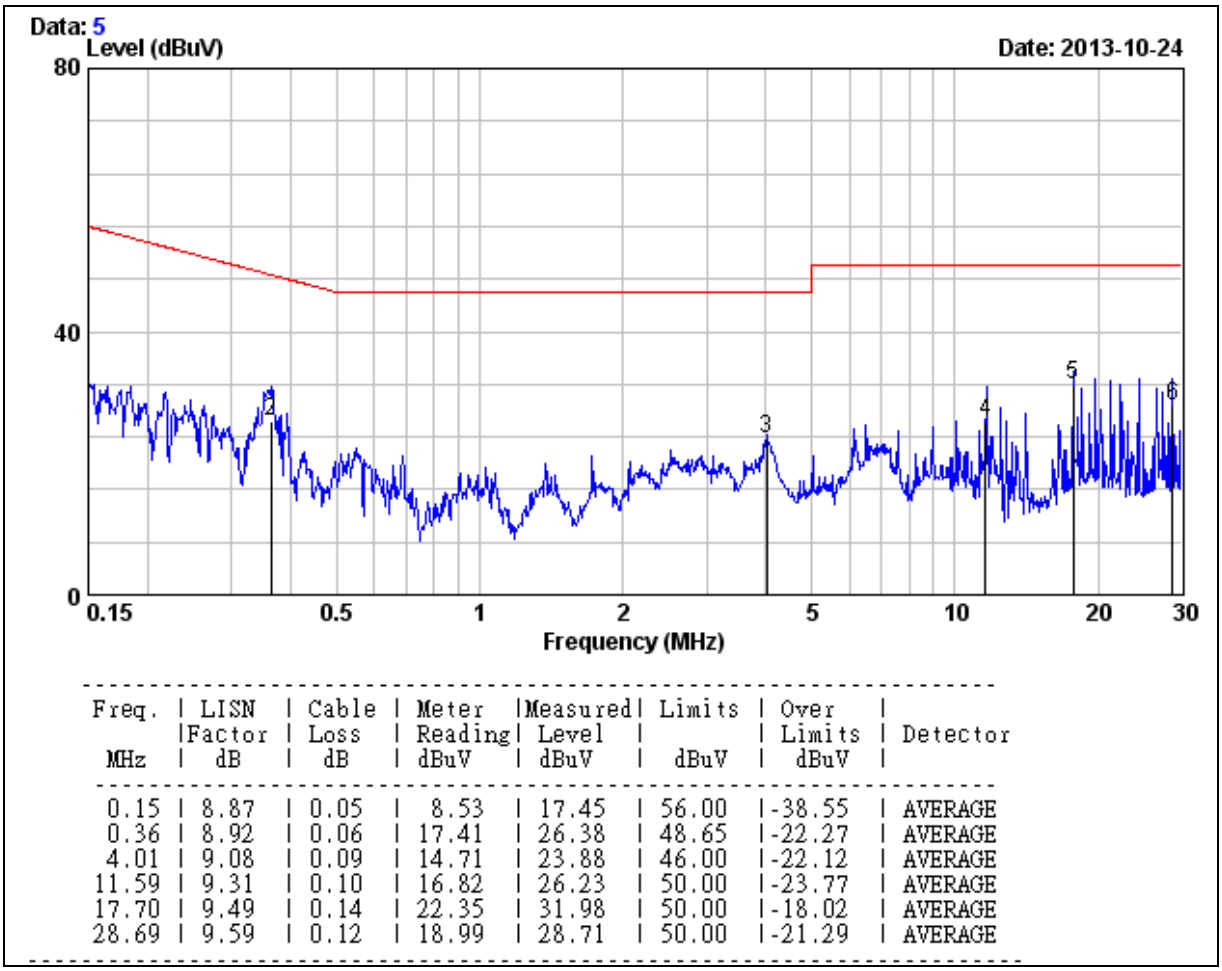


Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.16	8.87	0.05	27.68	36.60	65.52	-28.91	QP
0.35	8.91	0.06	26.96	35.93	58.87	-22.94	QP
2.51	9.03	0.08	19.51	28.62	56.00	-27.38	QP
6.66	9.15	0.10	17.23	26.48	60.00	-33.52	QP
19.70	9.53	0.15	21.63	31.31	60.00	-28.69	QP
28.75	9.59	0.12	11.60	21.32	60.00	-38.68	QP

REMARK:
1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/24
Model	DWR-712	Test By	Shiang Su
Test Mode	Powered from Adapter	TEMP& Humidity	25.5°C, 48%

LINE

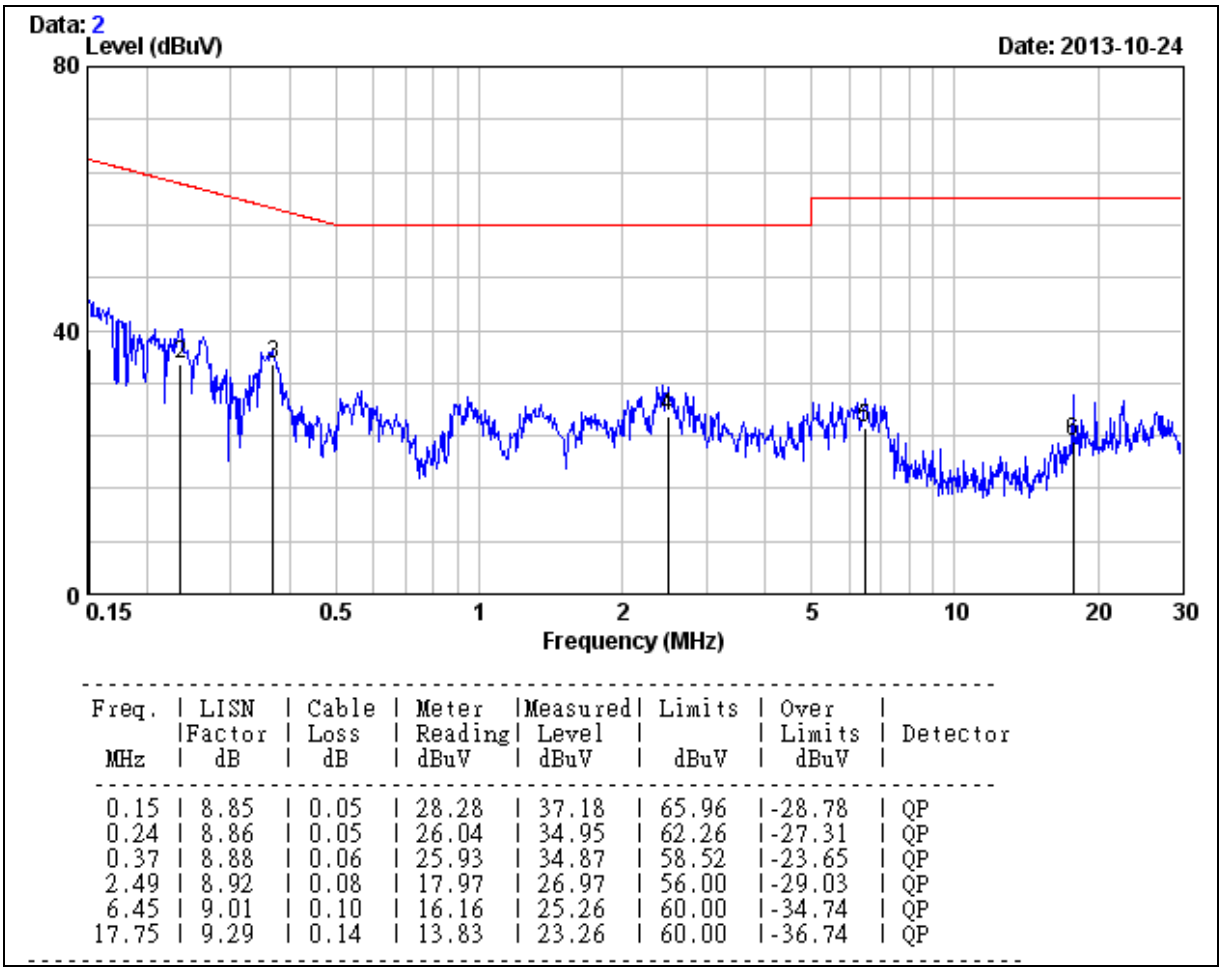


Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.15	8.87	0.05	8.53	17.45	56.00	-38.55	AVERAGE
0.36	8.92	0.06	17.41	26.38	48.65	-22.27	AVERAGE
4.01	9.08	0.09	14.71	23.88	46.00	-22.12	AVERAGE
11.59	9.31	0.10	16.82	26.23	50.00	-23.77	AVERAGE
17.70	9.49	0.14	22.35	31.98	50.00	-18.02	AVERAGE
28.69	9.59	0.12	18.99	28.71	50.00	-21.29	AVERAGE

REMARK:
1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/24
Model	DWR-712	Test By	Shiang Su
Test Mode	Powered from Adapter	TEMP& Humidity	25.5°C, 48%

NEUTRAL

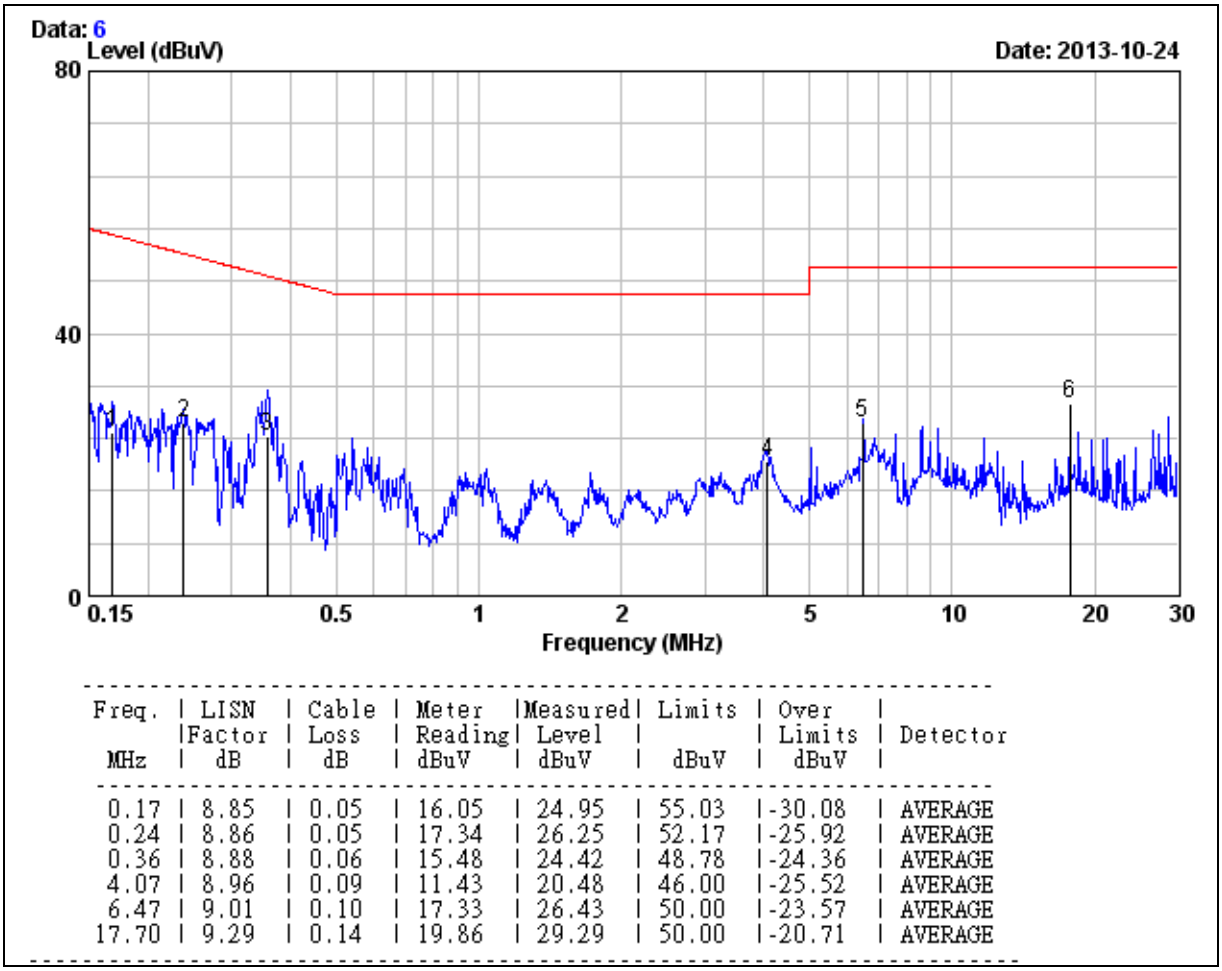


Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.15	8.85	0.05	28.28	37.18	65.96	-28.78	QP
0.24	8.86	0.05	26.04	34.95	62.26	-27.31	QP
0.37	8.88	0.06	25.93	34.87	58.52	-23.65	QP
2.49	8.92	0.08	17.97	26.97	56.00	-29.03	QP
6.45	9.01	0.10	16.16	25.26	60.00	-34.74	QP
17.75	9.29	0.14	13.83	23.26	60.00	-36.74	QP

REMARK:
1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value

Product Name	HSPA+ 3G SOHO Router	Test Date	2013/10/24
Model	DWR-712	Test By	Shiang Su
Test Mode	Powered from Adapter	TEMP& Humidity	25.5°C, 48%

NEUTRAL



Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.17	8.85	0.05	16.05	24.95	55.03	-30.08	AVERAGE
0.24	8.86	0.05	17.34	26.25	52.17	-25.92	AVERAGE
0.36	8.88	0.06	15.48	24.42	48.78	-24.36	AVERAGE
4.07	8.96	0.09	11.43	20.48	46.00	-25.52	AVERAGE
6.47	9.01	0.10	17.33	26.43	50.00	-23.57	AVERAGE
17.70	9.29	0.14	19.86	29.29	50.00	-20.71	AVERAGE

REMARK:
1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value

9. ANTENNA REQUIREMENT

9.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

9.2 ANTENNA CONNECTED CONSTRUCTION

Replace antenna*1 (Internal antenna)
2.4G PCB Antenna *1 (1TX1RX)
Model: GY196HT467-017
Brand: Wieson
Gain: 3.39 dBi
Type: PCB