

**Radio Test Report**

**for**

**Pace plc**

**on**

**A5520N Home Network Gateway**

**Document No: TRA-009368-W-US1**

**HULL**

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**TRaC Wireless Test Report** : TRA-009368-W-US1

**Applicant** : Pace plc

**Apparatus** : A5520N Home Network Gateway

**Specification** : CFR47 Part 15.247, July 2011

**FCCID** : NQ8A5520N

**Purpose of Test** : Certification

**Authorised by** :



Radio Products Manager

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**Section 1:****Introduction****1.1 General**

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on samples submitted to the Laboratory.

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## **1.2 Tests requested by**

This testing in this report was requested by:

Pace plc  
Victoria Road  
Saltaire  
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## **1.3 Manufacturer**

Same as above.

## **1.4 Apparatus Assessed**

The following apparatus was assessed between 22<sup>nd</sup> March and 27<sup>th</sup> April 2012:

*A5520N Home Network Gateway*

The above device is a domestic network interface system with a Wi-Fi transmitter capable of generating 802.11b, 802.11g, 802.11n HT20 and 802.11n HT40 signals.

## 1.5 Test Result Summary

Full details of test results are contained within Appendix A. The following table summarises the results of the assessment.

The statements relating to compliance with the standards below apply ONLY as qualified in the notes and deviations stated in sections 1.6 to 1.7 of this test report.

Full details of test results are contained within Appendix A. The following table summarises the results of the assessment.

Test Type	Regulation	Measurement standard	Result
Radiated spurious emissions (Restricted bands)	Title 47 of the CFR: Part 15 Subpart C; 15.247	ANSI C63.10:2009	Pass
Conducted spurious emissions (Non-restricted bands)	Title 47 of the CFR: Part 15 Subpart C; 15.247	ANSI C63.10:2009	Pass
AC Power conducted emissions	Title 47 of the CFR: Part 15 Subpart C; 15.207	ANSI C63.10:2009	Pass
Occupied Bandwidth	Title 47 of the CFR : Part 15 Subpart C; 15.247(a)(2)	ANSI C63.10:2009	Pass
Conducted Carrier Power	Title 47 of the CFR : Part 15 Subpart C; 15.247(b)	ANSI C63.10:2009	Pass
Power Spectral Density	Title 47 of the CFR : Part 15 Subpart C; 15.247(d)	ANSI C63.10:2009	Pass
Unintentional Radiated Spurious Emissions	Title 47 of the CFR: Part 15 Subpart B; 15.109	ANSI C63.10:2009	Pass
Digital Modulation	Title 47 of the CFR: Part 15 Subpart C; 15.403	-	N/A
RF Safety	Title 47 of the CFR : Part 15 Subpart C; 15.247(b)(5)	-	N/A

Abbreviations used in the above table:

ANSI C 63.10:2009 is outside the scope of the laboratories UKAS accreditation.

Mod	: Modification	ANSI	: American National Standards Institution
CFR	: Code of Federal Regulations	PLCE	: Power Line Conducted Emissions
REFE	: Radiated Electric Field Emissions		

## 1.6 Notes relating to the assessment

With regard to this assessment, the following points should be noted:

The results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

The apparatus was set up and exercised using the configurations, modes of operation and arrangements defined in this report only.

Particular operating modes, apparatus monitoring methods and performance criteria required by the standards tested to have been performed except where identified in Section 1.7 of this test report (Deviations from Test Standards).

For emissions testing, throughout this test report, "Pass" indicates that the results for the sample as tested were below the specified limit (refer also to Section 2, Measurement Uncertainty).

Where relevant, the apparatus was only assessed using the monitoring methods and susceptibility criteria defined in this report.

All testing with the exception of testing at the Open Area Test Site was performed under the following environmental conditions:

Temperature	: 17 to 23 °C
Humidity	: 45 to 75 %
Barometric Pressure	: 86 to 106 kPa

All dates used in this report are in the format dd/mm/yy.

This assessment has been performed in accordance with the requirements of ISO/IEC 17025.

## 1.7 Deviations from Test Standards

There were no deviations from the standards tested to.

## Section 2:

## Measurement Uncertainty

### 2.1 Measurement Uncertainty Values

All statements of uncertainty are expanded standard uncertainty using a coverage factor of 1.96 to give a 95% confidence where no required test level exists.

#### **[1] Adjacent Channel Power**

Uncertainty in test result = **1.86dB**

#### **[2] Carrier Power**

Uncertainty in test result (Power Meter) = **1.08dB**

Uncertainty in test result (Spectrum Analyser) = **2.48dB**

#### **[3] Effective Radiated Power**

Uncertainty in test result = **4.71dB**

#### **[4] Spurious Emissions**

Uncertainty in test result = **4.75dB**

#### **[5] Maximum frequency error**

Uncertainty in test result (Power Meter) = **0.113ppm**

Uncertainty in test result (Spectrum Analyser) = **0.265ppm**

#### **[6] Radiated Emissions, field strength OATS 14kHz-18GHz Electric Field**

Uncertainty in test result (14kHz – 30MHz) = **4.8dB**,

Uncertainty in test result (30MHz – 1GHz) = **4.6dB**,

Uncertainty in test result (1GHz – 18GHz) = **4.7dB**

#### **[7] Frequency deviation**

Uncertainty in test result = **3.2%**

#### **[8] Magnetic Field Emissions**

Uncertainty in test result = **2.3dB**

#### **[9] Conducted Spurious**

Uncertainty in test result – Up to 8.1GHz = **3.31dB**

Uncertainty in test result – 8.1GHz – 15.3GHz = **4.43dB**

Uncertainty in test result – 15.3GHz – 21GHz = **5.34dB**

Uncertainty in test result – Up to 26GHz = **3.14dB**

#### **[10] Channel Bandwidth**

Uncertainty in test result = **15.5%**

#### **[11] Amplitude and Time Measurement – Oscilloscope**

Uncertainty in overall test level = **2.1dB**,

Uncertainty in time measurement = **0.59%**,

Uncertainty in Amplitude measurement = **0.82%**

#### **[12] Power Line Conduction**

Uncertainty in test result = **3.4dB**



**[13] Spectrum Mask Measurements**

Uncertainty in test result = **2.59% (frequency)**  
Uncertainty in test result = **1.32dB (amplitude)**

**[14] Adjacent Sub Band Selectivity**

Uncertainty in test result = **1.24dB**

**[15] Receiver Blocking – Listen Mode, Radiated**

Uncertainty in test result = **3.42dB**

**[16] Receiver Blocking – Talk Mode, Radiated**

Uncertainty in test result = **3.36dB**

**[17] Receiver Blocking – Talk Mode, Conducted**

Uncertainty in test result = **1.24dB**

**[18] Receiver Threshold**

Uncertainty in test result = **3.23dB**

**[19] Transmission Time Measurement**

Uncertainty in test result = **7.98%**

**Section 3:**

**Modifications**

**3.1 Modifications Performed During Assessment**

No modifications were performed during the assessment.

**Appendix A:****Formal Emission Test Results**

Abbreviations used in the tables in this appendix:

Spec	: Specification	ALSR	: Absorber Lined Screened Room
Mod	: Modification	OATS	: Open Area Test Site
EUT	: Equipment Under Test	ATS	: Alternative Test Site
SE	: Support Equipment	Ref	: Reference
L	: Live Power Line	Freq	: Frequency
N	: Neutral Power Line	MD	: Measurement Distance
E	: Earth Power Line	SD	: Spec Distance
Pk	: Peak Detector	Pol	: Polarisation
QP	: Quasi-Peak Detector	H	: Horizontal Polarisation
Av	: Average Detector	V	: Vertical Polarisation
CDN	: Coupling & decoupling network		

**A1 6dB Bandwidth**

Title 47 of the CFR: Part 15 Subpart (c) 15.247(a)(2) requires the measurement of the bandwidth of the transmission between the 6dB points on the transmitted spectrum.

<b>Test Details: 802.11b Tx mode</b>	
Regulation	Title 47 of the CFR: Part 15 Subpart (c) 15.247(a)(2)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
Temperature	20 <sup>o</sup> C
EUT set up	Refer to Appendix C

<b>Channel Frequency (MHz)</b>	<b>F<sub>lower</sub> (MHz)</b>	<b>F<sub>Higher</sub> (MHz)</b>	<b>6dB Bandwidth (MHz)</b>	<b>Limit (kHz)</b>	<b>Result</b>
2412	2405.91	2418.55	12.64	≥500	Pass
2437	2430.90	2443.58	12.68	≥500	Pass
2462	2455.88	2468.09	12.21	≥500	Pass

**Notes:**

1. Measurements were performed on Chain 0 temporary antenna connector provided by the client
2. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02

**6dB Bandwidth contd.**

<b>Test Details: 802.11g Tx mode</b>	
Regulation	Title 47 of the CFR: Part 15 Subpart (c) 15.247(a)(2)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
Temperature	20 <sup>0</sup> C
EUT set up	Refer to Appendix C

<b>Channel Frequency (MHz)</b>	<b>F<sub>lower</sub> (MHz)</b>	<b>F<sub>Higher</sub> (MHz)</b>	<b>6dB Bandwidth (MHz)</b>	<b>Limit (kHz)</b>	<b>Result</b>
2412	2403.56	2420.24	16.68	≥500	Pass
2437	2428.64	2445.32	16.68	≥500	Pass
2462	2453.62	2470.30	16.68	≥500	Pass

**Notes:**

3. Measurements were performed on Chain 0 temporary antenna connector provided by the client
4. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02

**6dB Bandwidth contd.**

<b>Test Details: 802.11n HT20 Tx mode</b>	
Regulation	Title 47 of the CFR: Part 15 Subpart (c) 15.247(a)(2)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
Temperature	20 <sup>0</sup> C
EUT set up	Refer to Appendix C

<b>Channel Frequency (MHz)</b>	<b>F<sub>lower</sub> (MHz)</b>	<b>F<sub>Higher</sub> (MHz)</b>	<b>6dB Bandwidth (MHz)</b>	<b>Limit (kHz)</b>	<b>Result</b>
2412	2403.11	2420.85	17.74	≥500	Pass
2437	2428.11	2445.86	17.75	≥500	Pass
2462	2453.11	2470.84	17.73	≥500	Pass

**Notes:**

5. Measurements were performed on Chain 0 temporary antenna connector provided by the client
6. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02

**6dB Bandwidth contd.**

<b>Test Details: 802.11n HT40 Tx mode</b>	
Regulation	Title 47 of the CFR: Part 15 Subpart (c) 15.247(a)(2)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
Temperature	20 <sup>0</sup> C
EUT set up	Refer to Appendix C

<b>Channel Frequency (MHz)</b>	<b>F<sub>lower</sub> (MHz)</b>	<b>F<sub>Higher</sub> (MHz)</b>	<b>6dB Bandwidth (MHz)</b>	<b>Limit (kHz)</b>	<b>Result</b>
2412	2413.92	2450.24	36.32	≥500	Pass
2437	2423.94	2460.22	36.28	≥500	Pass
2462	2433.92	2470.24	36.32	≥500	Pass

**Notes:**

7. Measurements were performed on Chain 0 temporary antenna connector provided by the client
8. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02

**A2 Maximum Conducted Output Power**

Carrier power was verified with the EUT transmitting on its lowest, centre and highest carrier frequency in turns.

<b>Test Details: 802.11b 1x1 Tx mode</b>	
Regulation	Title 47 of the CFR: Part15 Subpart (c) 15.247(b)(3)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C

Channel Frequency (MHz)	Peak Conducted Carrier Power		Limit (W)	Result
	dBm	W		
2412	22.16	0.164	1	Pass
2437	22.41	0.174	1	Pass
2462	21.37	0.137	1	Pass

**Notes:**

1. Measured peak output power does not include the gain of any antenna being used
2. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02
3. Measurements only on Chain 0 – This is the only active chain



**Maximum Conducted Output Power contd.**

<b>Test Details: 802.11g 2x2 Tx mode</b>	
Regulation	Title 47 of the CFR: Part15 Subpart (c) 15.247(b)(3)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C

<b>BOTTOM - 802.11g 2x2 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	11.09	12.85
Chain 1	11.06	12.76
<b>Total Output Power</b>		25.62

<b>MIDDLE - 802.11g 2x2 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	12.05	16.03
Chain 1	11.66	14.66
<b>Total Output Power</b>		30.69

<b>TOP - 802.11g 2x2 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	9.10	8.13
Chain 1	8.57	7.19
<b>Total Output Power</b>		15.32

**Notes:**

1. Measured total output power does not include the gain of any antenna being used
2. 2x2 mode results are based on highest 2 chains from 3x3 mode
3. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02
4. Total output power Calculated using the Measure - and - sum technique as per 662911 D01 Multiple Transmitter Output v01

**Maximum Conducted Output Power contd.**

<b>Test Details: 802.11g 3x3 Tx mode</b>	
Regulation	Title 47 of the CFR: Part15 Subpart (c) 15.247(b)(3)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C

<b>BOTTOM - 802.11g – 3x3 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	11.09	12.85
Chain 1	11.06	12.76
Chain 2	9.76	9.46
<b>Total Output Power</b>		<b>35.08</b>

<b>MIDDLE - 802.11g – 3x3 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	12.05	16.03
Chain 1	11.66	14.66
Chain 2	11.09	12.85
<b>Total Output Power</b>		<b>43.54</b>

<b>TOP - 802.11g – 3x3 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	9.10	8.13
Chain 1	8.57	7.19
Chain 2	7.05	5.07
<b>Total Output Power</b>		<b>20.39</b>

**Notes:**

1. Measured total output power does not include the gain of any antenna being used
2. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02
3. Total output power Calculated using the Measure - and - sum technique as per 662911 D01 Multiple Transmitter Output v01

**Maximum Conducted Output Power contd.**

<b>Test Details: 802.11n HT20 2x2 Tx mode</b>	
Regulation	Title 47 of the CFR: Part15 Subpart (c) 15.247(b)(3)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C

<b>BOTTOM - 802.11n HT20 2x2 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	13.74	23.66
Chain 1	11.67	14.69
<b>Total Output Power</b>		38.35

<b>MIDDLE - 802.11n HT20 2x2 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	12.06	16.07
Chain 1	12.05	16.03
<b>Total Output Power</b>		32.10

<b>TOP - 802.11n HT20 2x2 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	11.77	15.03
Chain 1	8.87	7.71
<b>Total Output Power</b>		22.74

**Notes:**

1. Measured total output power does not include the gain of any antenna being used
2. 2x2 mode results are based on highest 2 chains from 3x3 mode
3. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02
4. Total output power Calculated using the Measure - and - sum technique as per 662911 D01 Multiple Transmitter Output v01

**Maximum Conducted Output Power contd.**

<b>Test Details: 802.11n HT20 3x3 Tx mode</b>	
Regulation	Title 47 of the CFR: Part15 Subpart (c) 15.247(b)(3)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C

<b>BOTTOM - 802.11n HT20 – 3x3 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	13.74	23.66
Chain 1	11.67	14.69
Chain 2	9.88	9.73
<b>Total Output Power</b>		48.08

<b>MIDDLE - 802.11n HT20 – 3x3 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	12.06	16.07
Chain 1	12.05	16.03
Chain 2	11.59	14.42
<b>Total Output Power</b>		46.52

<b>TOP - 802.11n HT20 – 3x3 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	11.77	15.03
Chain 1	8.87	7.71
Chain 2	6.30	4.27
<b>Total Output Power</b>		27.01

**Notes:**

1. Measured total output power does not include the gain of any antenna being used
2. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02
3. Total output power Calculated using the Measure - and - sum technique as per 662911 D01 Multiple Transmitter Output v01

**Maximum Conducted Output Power contd.**

<b>Test Details: 802.11n HT40 2x2 Tx mode</b>	
Regulation	Title 47 of the CFR: Part15 Subpart (c) 15.247(b)(3)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C

<b>BOTTOM - 802.11n HT40 2x2 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	8.47	7.03
Chain 1	8.41	6.93
<b>Total Output Power</b>		13.96

<b>MIDDLE - 802.11n HT40 2x2 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	12.23	16.71
Chain 1	11.94	15.63
<b>Total Output Power</b>		32.34

<b>TOP - 802.11n HT40 2x2 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	4.42	2.77
Chain 1	3.67	2.33
<b>Total Output Power</b>		5.10

**Notes:**

1. Measured total output power does not include the gain of any antenna being used
2. 2x2 mode results are based on highest 2 chains from 3x3 mode
3. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02
4. Total output power Calculated using the Measure - and - sum technique as per 662911 D01 Multiple Transmitter Output v01

**Maximum Conducted Output Power contd.**

<b>Test Details: 802.11n HT40 3x3 Tx mode</b>	
Regulation	Title 47 of the CFR: Part15 Subpart (c) 15.247(b)(3)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C

<b>BOTTOM - 802.11n HT40 – 3x3 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	8.47	7.03
Chain 1	8.41	6.93
Chain 2	8.11	6.47
<b>Total Output Power</b>		20.44

<b>MIDDLE - 802.11n HT40 – 3x3 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	12.23	16.71
Chain 1	11.94	15.63
Chain 2	11.61	14.49
<b>Total Output Power</b>		46.83

<b>TOP - 802.11n HT40 – 3x3 Tx mode</b>		
Freq	Analyser Level	Output (mW)
Chain 0	4.42	2.77
Chain 1	3.67	2.33
Chain 2	2.54	1.79
<b>Total Output Power</b>		6.89

**Notes:**

1. Measured total output power does not include the gain of any antenna being used
2. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02
3. Total output power Calculated using the Measure - and - sum technique as per 662911 D01 Multiple Transmitter Output v01

**A3 Transmitter Power Spectral Density**

Transmitter Power Spectral Density was verified with the EUT transmitting on its lowest, centre and highest carrier frequency in turns.

<b>Test Details: 802.11b Tx mode</b>	
Regulation	Title 47 of the CFR: Part15 Subpart (c) 15.247(b)(3)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C

<b>Channel Frequency (MHz)</b>	<b>Conducted Peak Power Spectral Density (dBm/3kHz)</b>	<b>Limit (dBm/3kHz)</b>	<b>Result</b>
2412	-5.39	8	Pass
2437	-7.56	8	Pass
2462	-8.90	8	Pass

**Notes:**

1. Measured Power Spectral Density does not include the gain of any antenna being used
2. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02
3. Measurements only on Chain 0 – This is the only active chain
4. Plots For Chain zero in appendix B

**Transmitter Power Spectral Density contd.**

<b>Test Details: 802.11g Tx mode</b>	
Regulation	Title 47 of the CFR: Part15 Subpart (c) 15.247(b)(3)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C

<b>BOTTOM - 802.11g –Tx mode</b>			
Freq	Analyser Level	Number of Outputs Correction	PSD
Chain 0	-15.18	4.77	-10.41
Chain 1	-15.55	4.77	-10.78
Chain 2	-16.28	4.77	-11.51

<b>MIDDLE - 802.11g –Tx mode</b>			
Freq	Analyser Level	Number of Outputs Correction	PSD
Chain 0	-13.32	4.77	-8.55
Chain 1	-14.77	4.77	-10.00
Chain 2	-15.02	4.77	-10.25

<b>TOP - 802.11g –Tx mode</b>			
Freq	Analyser Level	Number of Outputs Correction	PSD
Chain 0	-16.94	4.77	-12.17
Chain 1	-18.03	4.77	-13.26
Chain 2	-18.77	4.77	-14.00

**Notes:**

1. Measured Power Spectral Density does not include the gain of any antenna being used
2. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02
3. Total output power Calculated using the Measure – and – add  $10\text{Log}(N)$  technique as per 662911 D01 Multiple Transmitter Output v01, where  $N$  is the number of outputs.
4.  $N = 3 - 10\text{Log}(3) = 4.77$  dB
5. Plots For Chain zero in appendix B



**Transmitter Power Spectral Density contd.**

<b>Test Details: 802.11n HT20 Tx mode</b>	
Regulation	Title 47 of the CFR: Part15 Subpart (c) 15.247(b)(3)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20 <sup>o</sup> C

<b>BOTTOM - 802.11n HT20 Tx mode</b>			
Freq	Analyser Level	Number of Outputs Correction	PSD
Chain 0	-15.18	4.77	-10.41
Chain 1	-15.55	4.77	-10.78
Chain 2	-16.28	4.77	-11.51

<b>MIDDLE - 802.11n HT20 Tx mode</b>			
Freq	Analyser Level	Number of Outputs Correction	PSD
Chain 0	-13.32	4.77	-8.55
Chain 1	-14.77	4.77	-10.00
Chain 2	-15.02	4.77	-10.25

<b>TOP - 802.11n HT20 Tx mode</b>			
Freq	Analyser Level	Number of Outputs Correction	PSD
Chain 0	-16.94	4.77	-12.17
Chain 1	-18.03	4.77	-13.26
Chain 2	-18.77	4.77	-14.00

**Notes:**

1. Measured Power Spectral Density does not include the gain of any antenna being used
2. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02
3. Total output power Calculated using the Measure – and – add 10Log (N) technique as per 662911 D01 Multiple Transmitter Output v01, where N is the number of outputs.
4.  $N = 3 - 10\text{Log}(3) = 4.77$  dB
5. Plots For Chain zero in appendix B

**Transmitter Power Spectral Density contd.**

<b>Test Details: 802.11n HT40 Tx mode</b>	
Regulation	Title 47 of the CFR: Part15 Subpart (c) 15.247(b)(3)
Measurement standard	ANSI C63.10, OET Guidance Notes
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20 <sup>o</sup> C

<b>BOTTOM - 802.11n HT40 Tx mode</b>			
Freq	Analyser Level	Number of Outputs Correction	PSD
Chain 0	-16.53	4.77	-11.76
Chain 1	-16.12	4.77	-11.35
Chain 2	-17.69	4.77	-12.92

<b>MIDDLE - 802.11n HT40 Tx mode</b>			
Freq	Analyser Level	Number of Outputs Correction	PSD
Chain 0	-14.25	4.77	-9.48
Chain 1	-15.01	4.77	-10.24
Chain 2	-14.75	4.77	-9.98

<b>TOP - 802.11n HT40 Tx mode</b>			
Freq	Analyser Level	Number of Outputs Correction	PSD
Chain 0	-17.10	4.77	-12.33
Chain 1	-18.58	4.77	-13.81
Chain 2	-18.87	4.77	-14.10

**Notes:**

1. Measured Power Spectral Density does not include the gain of any antenna being used
2. Measurements were performed as per DTS 558074 D01 DTS Meas Guidance v02
3. Total output power Calculated using the Measure – and – add 10Log (N) technique as per 662911 D01 Multiple Transmitter Output v01, where N is the number of outputs.
4.  $N = 3 - 10\text{Log}(3) = 4.77$  dB
5. Plots For Chain zero in appendix B

#### A4 Conducted Spurious Emissions

Measurement of conducted spurious emissions at the antenna port was performed using a peak detector with the RBW set to 100kHz and the VBW>RBW. Frequencies were scanned up through to the 10th harmonic with the EUT transmitting on its lowest, centre and highest carrier frequency in turns.

Test Details: 802.11b Tx mode	
Regulation	Title 47 of the CFR: Part 15 Subpart (c) Clause 15.247(d) and Clause 15.205
Measurement standard	ANSI C63.10, OET Guidance Notes
Frequency range	9 kHz to 25 GHz
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C

The worst case conducted emission measurements at the antenna port are listed below:

Ref No.	Emission Freq (MHz)	Det.	Restricted band? (Y/N)	Emission power (RBW =100kHz) (dBm)	15.247(d) Limit (dBm)	Summary
No emissions detected within 20dB of the limit						

#### Notes:

1. The conducted emission limit for emissions outside the restricted bands, defined in 47CFR Part 15.205(a) are based on a transmitted carrier level of 15.247(b). With the EUT transmitting on its lowest, centre and highest carrier frequencies in turn, emissions from the EUT are required to be 20 dB below the level of the highest fundamental as measured within a 100 kHz RBW in accordance with 15.247(d) using a peak detector.
2. The RBW = 100 kHz, Video bandwidth (VBW) > RBW and the radio spectrum was investigated up to the 10th harmonic in accordance 15.33 (a)(1).
3. The measurements at 2400 MHz and 2483.5 MHz were made to ensure band edge compliance.
4. The carrier level was measured whilst varying the supply voltage between 85% and 105% of the nominal supply voltage as required by 15.31(e). No variation in carrier level was observed. All other emissions were at least 20dB below the test limit.
5. The plots for worst case emissions on one of the modulation types can be found in Appendix B

The limit outside the restricted band in 100 kHz RBW is defined using the following formula in accordance with 15.247(d):

$$\text{The limit in 100 kHz RBW} = (\text{Maximum Peak Conducted Carrier}) - 20\text{dB}$$

**Conducted Spurious Emissions contd.**

<b>Test Details: 802.11g Tx mode</b>	
Regulation	Title 47 of the CFR: Part 15 Subpart (c) Clause 15.247(d) and Clause 15.205
Measurement standard	ANSI C63.10, OET Guidance Notes
Frequency range	9 kHz to 25 GHz
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C

The worst case conducted emission measurements at the antenna port are listed below:

Ref No.	Emission Freq (MHz)	Det.	Restricted band? (Y/N)	Emission power (RBW =100kHz) (dBm)	15.247(d) Limit (dBm)	Summary
No emissions detected within 20dB of the limit						

**Notes:**

1. The conducted emission limit for emissions outside the restricted bands, defined in 47CFR Part 15.205(a) are based on a transmitted carrier level of 15.247(b). With the EUT transmitting on its lowest, centre and highest carrier frequencies in turn, emissions from the EUT are required to be 20 dB below the level of the highest fundamental as measured within a 100 kHz RBW in accordance with 15.247(d) using a peak detector.
2. The RBW = 100 kHz, Video bandwidth (VBW) > RBW and the radio spectrum was investigated up to the 10th harmonic in accordance 15.33 (a)(1).
3. The measurements at 2400 MHz and 2483.5 MHz were made to ensure band edge compliance.
4. The carrier level was measured whilst varying the supply voltage between 85% and 105% of the nominal supply voltage as required by 15.31(e). No variation in carrier level was observed. All other emissions were at least 20dB below the test limit.
5. The plots for worst case emissions on one of the modulation types can be found in Appendix B

The limit outside the restricted band in 100 kHz RBW is defined using the following formula in accordance with 15.247(d):

$$\text{The limit in 100 kHz RBW} = (\text{Maximum Peak Conducted Carrier}) - 20\text{dB}$$

**Conducted Spurious Emissions contd.**

<b>Test Details: 802.11n HT20 Tx mode</b>	
Regulation	Title 47 of the CFR: Part 15 Subpart (c) Clause 15.247(d) and Clause 15.205
Measurement standard	ANSI C63.10, OET Guidance Notes
Frequency range	9 kHz to 25 GHz
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C

The worst case conducted emission measurements at the antenna port are listed below:

Ref No.	Emission Freq (MHz)	Det.	Restricted band? (Y/N)	Emission power (RBW =100kHz) (dBm)	15.247(d) Limit (dBm)	Summary
No emissions detected within 20dB of the limit						

**Notes:**

1. The conducted emission limit for emissions outside the restricted bands, defined in 47CFR Part 15.205(a) are based on a transmitted carrier level of 15.247(b). With the EUT transmitting on its lowest, centre and highest carrier frequencies in turn, emissions from the EUT are required to be 20 dB below the level of the highest fundamental as measured within a 100 kHz RBW in accordance with 15.247(d) using a peak detector.
2. The RBW = 100 kHz, Video bandwidth (VBW) > RBW and the radio spectrum was investigated up to the 10th harmonic in accordance 15.33 (a)(1).
3. The measurements at 2400 MHz and 2483.5 MHz were made to ensure band edge compliance.
4. The carrier level was measured whilst varying the supply voltage between 85% and 105% of the nominal supply voltage as required by 15.31(e). No variation in carrier level was observed. All other emissions were at least 20dB below the test limit.
5. The plots for worst case emissions on one of the modulation types can be found in Appendix B

The limit outside the restricted band in 100 kHz RBW is defined using the following formula in accordance with 15.247(d):

$$\text{The limit in 100 kHz RBW} = (\text{Maximum Peak Conducted Carrier}) - 20\text{dB}$$

**Conducted Spurious Emissions contd.**

<b>Test Details: 802.11n HT40 Tx mode</b>	
Regulation	Title 47 of the CFR: Part 15 Subpart (c) Clause 15.247(d) and Clause 15.205
Measurement standard	ANSI C63.10, OET Guidance Notes
Frequency range	9 kHz to 25 GHz
EUT sample number	S05
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C

The worst case conducted emission measurements at the antenna port are listed below:

Ref No.	Emission Freq (MHz)	Det.	Restricted band? (Y/N)	Emission power (RBW =100kHz) (dBm)	15.247(d) Limit (dBm)	Summary
No emissions detected within 20dB of the limit						

**Notes:**

1. The conducted emission limit for emissions outside the restricted bands, defined in 47CFR Part 15.205(a) are based on a transmitted carrier level of 15.247(b). With the EUT transmitting on its lowest, centre and highest carrier frequencies in turn, emissions from the EUT are required to be 20 dB below the level of the highest fundamental as measured within a 100 kHz RBW in accordance with 15.247(d) using a peak detector.
2. The RBW = 100 kHz, Video bandwidth (VBW) > RBW and the radio spectrum was investigated up to the 10th harmonic in accordance 15.33 (a)(1).
3. The measurements at 2400 MHz and 2483.5 MHz were made to ensure band edge compliance.
4. The carrier level was measured whilst varying the supply voltage between 85% and 105% of the nominal supply voltage as required by 15.31(e). No variation in carrier level was observed. All other emissions were at least 20dB below the test limit.
5. The plots for worst case emissions on one of the modulation types can be found in Appendix B

The limit outside the restricted band in 100 kHz RBW is defined using the following formula in accordance with 15.247(d):

$$\text{The limit in 100 kHz RBW} = (\text{Maximum Peak Conducted Carrier}) - 20\text{dB}$$

## A5 Radiated Electric Field Emissions

Preliminary scans were performed using a peak detector with RBW = 100kHz. The radiated electric field emission test applies to spurious emissions and harmonics that fall within the restricted bands listed in Section 15.205. The maximum permitted field strength is listed in Section 15.209. The EUT was set to transmit on its lowest, centre and highest carrier frequency.

The following test site was used for final measurements as specified by the standard tested to:

3m open area test site :       3m alternative test site :

The effect of the EUT set-up on the measurements is summarised in note (c) below.

Test Details: 802.11b Tx mode	
Regulation	Title 47 of the CFR, Part 15 Subpart (c) Clause 15.247(d) and Clause 15.205
Measurement standard	ANSI C63.10, OET Guidance Notes
Frequency range	30MHz – 25GHz
EUT sample number	S11
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C
Photographs (Appendix F)	1

The worst case radiated emission measurements for spurious emissions and harmonics that fall within the restricted bands are listed below:

### Channel 1

Emission Frequency (MHz)	Measurement Type (Pk/Av)	Poln. (H/V)	Max Reading (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp (dB)	3m Field Strength (dBµV/m)	3m Limit (dBµV/m)	Margin (dB)	Summary
4824	Av	H	50.21	3.6	32.7	35.7	51.51	54	-2.49	Pass
7236	Av	H	40.98	4.3	36.0	36.2	45.88	54	-8.12	Pass

### Channel 6

Emission Frequency (MHz)	Measurement Type (Pk/Av)	Poln. (H/V)	Max Reading (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp (dB)	3m Field Strength (dBµV/m)	3m Limit (dBµV/m)	Margin (dB)	Summary
4874	Av	H	51.08	3.7	32.9	35.7	52.58	54	-1.42	Pass
7311	Av	H	47.75	4.2	36.2	36.2	52.75	54	-1.25	Pass

### Channel 11

Emission Frequency (MHz)	Measurement Type (Pk/Av)	Poln. (H/V)	Max Reading (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp (dB)	3m Field Strength (dBµV/m)	3m Limit (dBµV/m)	Margin (dB)	Summary
4924	Av	V	48.10	3.8	33.0	35.7	49.80	54	-4.20	Pass
7386	Av	V	39.22	4.2	36.5	36.3	44.42	54	-9.58	Pass

**Radiated Electric Field Emissions contd.**

The effect of the EUT set-up on the measurements is summarised in note (c) below.

<b>Test Details: 802.11g Tx mode</b>	
Regulation	Title 47 of the CFR: Part 15 Subpart (c) Clause 15.247(d) and Clause 15.205
Measurement standard	ANSI C63.10:2003, OET Guidance Notes
Frequency range	30MHz to 25 GHz
EUT sample number	S11
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20 <sup>o</sup> C
Photographs (Appendix F)	1

The worst case radiated emission measurements for spurious emissions and harmonics that fall within the restricted bands are listed below:

**Channel 1**

Emission Frequency (MHz)	Measurement Type (Pk/Av)	Poln. (H/V)	Max Reading (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp (dB)	3m Field Strength (dBµV/m)	3m Limit (dBµV/m)	Margin (dB)	Summary
4824	Av	H	40.86	3.6	32.7	35.7	42.16	54	-11.84	Pass
7236	Av	H	41.69	4.3	36.0	36.2	46.49	54	-7.51	Pass

**Channel 6**

Emission Frequency (MHz)	Measurement Type (Pk/Av)	Poln. (H/V)	Max Reading (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp (dB)	3m Field Strength (dBµV/m)	3m Limit (dBµV/m)	Margin (dB)	Summary
4874	Av	H	44.66	3.7	32.9	35.7	46.16	54	-7.84	Pass
7311	Av	H	38.11	4.2	36.2	36.2	43.21	54	-10.79	Pass

**Channel 11**

Emission Frequency (MHz)	Measurement Type (Pk/Av)	Poln. (H/V)	Max Reading (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp (dB)	3m Field Strength (dBµV/m)	3m Limit (dBµV/m)	Margin (dB)	Summary
4924	Av	V	40.37	3.8	33.0	35.7	42.07	54	-11.93	Pass
7386	Av	V	38.00	4.2	36.5	36.3	43.20	54	-10.8	Pass



**Radiated Electric Field Emissions contd.**

The effect of the EUT set-up on the measurements is summarised in note (c) below.

<b>Test Details: 802.11n HT20 Tx mode</b>	
Regulation	Title 47 of the CFR: Part 15 Subpart (c) Clause 15.247(d) and Clause 15.205
Measurement standard	ANSI C63.10, OET Guidance Notes
Frequency range	30MHz to 25 GHz
EUT sample number	S11
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20 <sup>o</sup> C
Photographs (Appendix F)	1

The worst case radiated emission measurements for spurious emissions and harmonics that fall within the restricted bands are listed below:

**Channel 1**

Emission Frequency (MHz)	Measurement Type (Pk/Av)	Poln. (H/V)	Max Reading (dB $\mu$ V)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp (dB)	3m Field Strength (dB $\mu$ V/m)	3m Limit (dB $\mu$ V/m)	Margin (dB)	Summary
4824	Av	H	40.04	3.6	32.7	35.7	41.34	54	-12.66	Pass
7236	Av	H	38.39	4.3	36.0	36.2	43.19	54	-10.81	Pass

**Channel 6**

Emission Frequency (MHz)	Measurement Type (Pk/Av)	Poln. (H/V)	Max Reading (dB $\mu$ V)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp (dB)	3m Field Strength (dB $\mu$ V/m)	3m Limit (dB $\mu$ V/m)	Margin (dB)	Summary
4874	Av	V	42.33	3.7	32.9	35.7	43.83	54	-10.17	Pass
7311	Av	V	44.93	4.2	36.2	36.2	50.03	54	-3.97	Pass

**Channel 11**

Emission Frequency (MHz)	Measurement Type (Pk/Av)	Poln. (H/V)	Max Reading (dB $\mu$ V)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp (dB)	3m Field Strength (dB $\mu$ V/m)	3m Limit (dB $\mu$ V/m)	Margin (dB)	Summary
4924	Av	V	40.29	3.8	33.0	35.7	41.99	54	-12.01	Pass
7386	Av	V	38.17	4.2	36.5	36.3	43.37	54	-10.63	Pass

**Radiated Electric Field Emissions contd.**

The effect of the EUT set-up on the measurements is summarised in note (c) below.

<b>Test Details: 802.11n HT40 Tx mode</b>	
Regulation	Title 47 of the CFR: Part 15 Subpart (c) Clause 15.247(d) and Clause 15.205
Measurement standard	ANSI C63.10, OET Guidance Notes
Frequency range	30MHz to 25 GHz
EUT sample number	S11
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20°C
Photographs (Appendix F)	1

The worst case radiated emission measurements for spurious emissions and harmonics that fall within the restricted bands are listed below:

**Channel 3**

Emission Frequency (MHz)	Measurement Type (Pk/Av)	Poln. (H/V)	Max Reading (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp (dB)	3m Field Strength (dBµV/m)	3m Limit (dBµV/m)	Margin (dB)	Summary
4864	Av	H	38.82	3.8	32.8	35.7	40.32	54	-13.68	Pass
7296	Av	H	37.68	4.3	36.2	36.2	42.78	54	-11.22	Pass

**Channel 5**

Emission Frequency (MHz)	Measurement Type (Pk/Av)	Poln. (H/V)	Max Reading (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp (dB)	3m Field Strength (dBµV/m)	3m Limit (dBµV/m)	Margin (dB)	Summary
4884	Av	H	43.67	3.8	32.9	35.7	45.27	54	-8.73	Pass
7326	Pk	V	66.64	4.2	36.3	36.2	71.74	74	-2.26	Pass

**Channel 7**

Emission Frequency (MHz)	Measurement Type (Pk/Av)	Poln. (H/V)	Max Reading (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp (dB)	3m Field Strength (dBµV/m)	3m Limit (dBµV/m)	Margin (dB)	Summary
No emissions detected within 20dB of the limit.										

**Notes:**

- 1 Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.10: section 4.5, Table 1
- 2 In accordance with 15.35(b), above 1 GHz, emissions measured using a peak detector shall not exceed a level 20 dB above the average limit.
- 3 Measurements at 2400 & 2483.5 MHz were made to ensure band edge compliance.
- 4 Testing was performed with the EUT orientated in three orthogonal planes and the maximum emissions level recorded. In addition, the EUT antenna was varied within its range of motion in order to maximise emissions.
- 5 For Frequencies below 1 GHz, RBW= 100 kHz, testing was performed with CISPR16 compliant test receiver with QP detector. Above 1 GHz tests were performed using a spectrum analyser using the following settings:
 

Peak	RBW=VBW= 1MHz
Average	RBW=VBW= 1MHz

These settings as per ANSI C63.10

6. The plots for worst case emissions on all modulation types can be found in Appendix B

The upper and lower frequency of the measurement range was decided according to 47 CFR Part 15 Clause 15.33(a) and 15.33(a)(1).

Radiated emission limits (47 CFR Part 15: Clause 15.209) for emissions falling within the restricted bands defined in 15.205(a):

Frequency of emission (MHz)	Field strength ( $\mu\text{V}/\text{m}$ )	Measurement Distance (m)	Field strength ( $\text{dB}\mu\text{V}/\text{m}$ )
0.009-0.490	2400/F(kHz)	300	67.6/F (kHz)
0.490-1.705	24000/F(kHz)	30	87.6/F (kHz)
1.705-30	30	30	29.5
30-88	100	3	40.0
88-216	150	3	43.5
216-960	200	3	46.0
Above 960	500	3	54.0

## A6 Power Line Conducted Emissions

Preview power line conducted emission measurements were performed with a peak detector in a screened room. The effect of the EUT set-up on the measurements is summarised in note (b). Where applicable, formal measurements of the emissions were performed with a peak, average and/or quasi peak detector. The EUT was set to transmit on its lowest, centre and highest carrier frequency in turn. The formal measurements are detailed below:

Test Details: See note	
Regulation	Title 47 of the CFR: Part 15 Subpart (c) Clause 15.207
Measurement standard	ANSI C63.10, OET Guidance Notes
Frequency range	150kHz to 30MHz
EUT sample number	S11
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Photographs (Appendix F)	2

The worst-case power line conducted emission measurements are listed below:

### Results measured using the average detector compared to the quasi-peak limit

Ref No.	Freq (MHz)	Conductor	Result (dBuV)	Spec Limit (dBuV)	Margin (dB)	Result Summary
1	0.16	Live	48.16	65.46	17.3	Pass
2	0.215	Live	42.57	63.01	20.44	Pass
3	0.35	Live	39.19	58.96	19.77	Pass
4	0.375	Live	38.47	58.39	19.92	Pass
5	0.345	Neutral	41.42	59.08	17.66	Pass

### Results measured using the quasi-peak detector compared to the average limit

Ref No.	Freq (MHz)	Conductor	Result (dBuV)	Spec Limit (dBuV)	Margin (dB)	Result Summary
1	0.16	Live	35.86	55.46	19.6	Pass
2	0.345	Live	37.34	49.08	11.74	Pass
3	0.4	Live	36.18	47.85	11.67	Pass
4	0.69	Live	30.06	46	15.94	Pass
5	1.17	Live	28.21	46	17.79	Pass
6	1.56	Live	26.72	46	19.28	Pass
7	2.125	Neutral	26.65	46	19.35	Pass
8	2.56	Neutral	26.74	46	19.26	Pass
9	5.455	Neutral	32.62	50	17.38	Pass
10	5.765	Neutral	34.6	50	15.4	Pass

Note: The above emissions were seen on all channels and modulation types

**Specification limits:**

Conducted emission limits (47 CFR Part 15: Clause 15.207):

Conducted disturbance at the mains ports shall not exceed the following values.

Frequency range MHz	Limits dB $\mu$ V	
	Quasi-peak	Average
0.15 to 0.5	66 to 56 <sup>2</sup>	56 to 46 <sup>2</sup>
0.5 to 5	56	46
5 to 30	60	50

Notes:

- The lower limit shall apply at the transition frequency.
- The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

Notes:

- (a) The levels may have been rounded for display purposes.
- (b) The following table summarises the effect of the EUT operating mode and internal configuration on the measured emission levels:

	See (i)	See (ii)	See (iii)	See (iv)
Effect of EUT operating mode on emission levels	✓			
Effect of EUT internal configuration on emission levels		✓		

(i) Parameter defined by standard and / or single possible, refer to Appendix C  
(ii) Parameter defined by client and / or single possible, refer to Appendix C  
(iii) Parameter had a negligible effect on emission levels, refer to Appendix C  
(iv) Worst case determined by initial measurement, refer to Appendix C

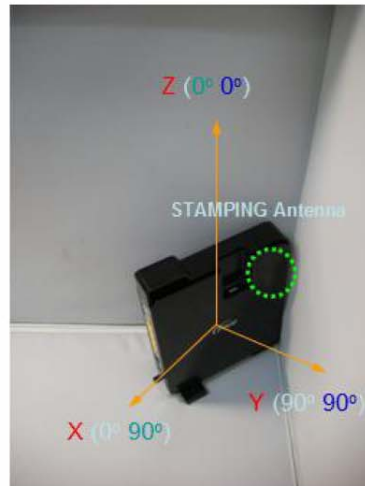
**A7 Antenna Gain**

The antenna gain details are shown in the data below, please see C262-3325\_G70\_ TEST REPORT 2012 02 06 for full information.

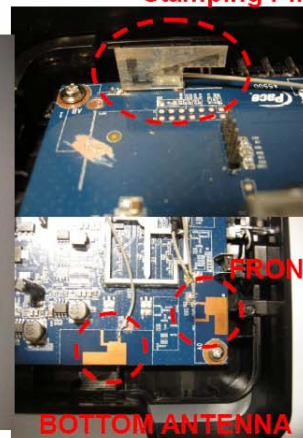
**ARISTOTLE**  
ENTERPRISES INC.

Tel : +886-2-2225-8209  
Fax : +886-2-2225-7523  
E-mail : jing@aristotle.com.tw

**1. Antenna Photo**



**Stamping PIFA ANTENNA**





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### 3. Gain Table

#### 3.1 Stamping PIFA(G70)

Frequency	3D			V+H Avg. Gain			V+H Peak Gain		
	Efficiency	Avg. Gain	Peak Gain	XY-plane	YZ-plane	ZX-plane	XY-plane	YZ-plane	ZX-plane
2400MHz	77%	-1.1	4.8	-1.4	-1.4	-2.1	1.3	1.3	1.1
2450MHz	76%	-1.2	4.5	-1.1	-1.1	-2.0	1.8	1.8	1.2
2500MHz	76%	-1.2	4.4	-0.9	-0.9	-2.0	1.9	1.9	1.2

#### 3.2 On-board PIFA @ FRONT

Frequency	3D			V+H Avg. Gain			V+H Peak Gain		
	Efficiency	Avg. Gain	Peak Gain	XY-plane	YZ-plane	ZX-plane	XY-plane	YZ-plane	ZX-plane
2400MHz	74%	-1.3	4.5	-3.3	-1.2	-1.9	-1.4	4.4	4.3
2450MHz	69%	-1.6	4.1	-3.0	-1.6	-2.1	-1.2	4.1	4.0
2500MHz	60%	-2.2	4.0	-3.0	-2.1	-2.7	-1.4	3.3	3.5

#### 3.3 On-board PIFA @ BOTTOM

Frequency	3D			V+H Avg. Gain			V+H Peak Gain		
	Efficiency	Avg. Gain	Peak Gain	XY-plane	YZ-plane	ZX-plane	XY-plane	YZ-plane	ZX-plane
2400MHz	69%	-1.6	4.1	-0.8	-2.3	-2.5	2.4	-0.1	2.1
2450MHz	69%	-1.6	4.0	-0.7	-2.3	-2.6	2.5	0.1	1.8
2500MHz	69%	-1.6	4.1	-0.8	-2.7	-2.9	2.8	-0.2	1.4

**A8 Unintentional Radiated Electric Field Emissions**

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The maximum permitted field strength is listed in Section 15.109. The EUT was set to receive mode only on its lowest, centre and highest carrier frequency in turn. The EUT was also checked for common unintentional emissions in all modulation types and channels.

The following test site was used for final measurements as specified by the standard tested to:

3m open area test site :       3m alternative test site :

<b>Test Details: See note</b>	
Regulation	Title 47 of the CFR: Part 15 Subpart (b) Clause 15.109
Measurement standard	ANSI C63.10, OET Guidance Notes
Frequency range	30MHz to 25 GHz
EUT sample number	S11
Modification state	0
SE in test environment	N/A
SE isolated from EUT	N/A
EUT set up	Refer to Appendix C
Temperature	20 <sup>0</sup> C
Photographs (Appendix F)	1

The worst case radiated emission measurements are listed overleaf:



Frequency (MHz)	Max Reading (dBuV)	Cable Loss (dB)	Antenna Fact (dB/m)	Pre-amp (dB)	Field Strength (dBuV/m)	Extrap Fact (dB)	Field Strength (uV/m)	Limit (uV/m)
30	15.56	0.84	18.6	-	35	-	56.23	100
30.65	19.57	0.85	18.28	-	38.7	-	86.10	100
31.45	18.36	0.85	17.79	-	37	-	70.79	100
32.25	18.46	0.86	17.28	-	36.6	-	67.61	100
32.6	20.73	0.87	17.1	-	38.7	-	86.10	100
32.9	19.38	0.87	16.95	-	37.2	-	72.44	100
33.15	18.92	0.87	16.81	-	36.6	-	67.61	100
33.45	18.49	0.88	16.63	-	36	-	63.10	100
33.7	16.44	0.88	16.48	-	33.8	-	48.98	100
34.1	18.67	0.88	16.25	-	35.8	-	61.66	100
34.65	19.03	0.89	15.98	-	35.9	-	62.37	100
35	16.71	0.89	15.8	-	33.4	-	46.77	100
39.5	18.43	0.92	13.25	-	32.6	-	42.66	100
39.7	18.03	0.92	13.15	-	32.1	-	40.27	100
42.35	21.24	0.93	11.73	-	33.9	-	49.55	100
42.8	21.66	0.94	11.5	-	34.1	-	50.70	100
42.95	21.93	0.94	11.43	-	34.3	-	51.88	100
45.1	23.89	0.95	10.16	-	35	-	56.23	100
45.75	22.55	0.95	9.9	-	33.4	-	46.77	100
51.4	22.21	0.99	7.1	-	30.3	-	32.73	100
60.35	25.18	1.08	5.04	-	31.3	-	36.73	100
63.2	25.53	1.07	5	-	31.6	-	38.02	100
67.25	22.97	1.1	5.23	-	29.3	-	29.17	100
73.3	23.21	1.13	5.86	-	30.2	-	32.36	100
89.75	21.73	1.22	8.65	-	31.6	-	38.02	150
90.65	21.81	1.22	8.77	-	31.8	-	38.90	150
209.75	3.23	1.89	8.68	-	13.8	-	4.90	150
233.75	5.47	2.03	9.7	-	17.2	-	7.24	200
262.15	1.88	2.13	13.39	-	17.4	-	7.41	200
279.65	6.32	2.18	12.7	-	21.2	-	11.48	200
300	18.94	2.26	13	-	34.2	-	51.29	200
405	15.27	2.63	16.5	-	34.4	-	52.48	200
419.45	0.89	2.71	16.5	-	20.1	-	10.12	200
432.1	21.47	2.73	16.4	-	40.6	-	107.15	200
489.4	-2.03	2.83	17.8	-	18.6	-	8.51	200
500	17.35	2.85	18	-	38.2	-	81.28	200
528.1	16.33	2.96	18.81	-	38.1	-	80.35	200
559.3	-0.61	3.07	20.14	-	22.6	-	13.49	200
625	8.4	3.2	20.7	-	32.3	-	41.21	200
739.95	-2.32	3.52	23.2	-	24.4	-	16.60	200
810	10.65	3.75	23.2	-	37.6	-	75.86	200
832.8	1.58	3.82	23.5	-	28.9	-	27.86	200
913.65	-1.23	3.95	24.18	-	26.9	-	22.13	200
957.4	-1.27	4.03	24.74	-	27.5	-	23.71	200

Note: The above emissions were seen on all channels and modulation types

**Notes:**

- 1 Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.10: section 4.5, Table 1
- 2 In accordance with 15.35(b), above 1 GHz, emissions measured using a peak detector shall not exceed a level 20 dB above the average limit.
- 3 Measurements at 2400 & 2483.5 MHz were made to ensure band edge compliance.
- 4 Testing was performed with the EUT orientated in three orthogonal planes and the maximum emissions level recorded. In addition, the EUT antenna was varied within its range of motion in order to maximise emissions.
- 5 For Frequencies below 1 GHz, RBW= 100 kHz, testing was performed with CISPR16 compliant test receiver with QP detector. Above 1 GHz tests were performed using a spectrum analyser using the following settings:
 

Peak	RBW=VBW= 1MHz
Average	RBW=VBW= 1MHz

These settings as per ANSI C63.10

The upper and lower frequency of the measurement range was decided according to 47 CFR Part 15 Clause 15.33(a) and 15.33(a)(1).

Radiated emission limits (47 CFR Part 15: Clause 15.209) for emissions falling within the restricted bands defined in 15.205(a):

Frequency of emission (MHz)	Field strength ( $\mu\text{V}/\text{m}$ )	Measurement Distance (m)	Field strength ( $\text{dB}\mu\text{V}/\text{m}$ )
0.009-0.490	2400/F(kHz)	300	67.6/F (kHz)
0.490-1.705	24000/F(kHz)	30	87.6/F (kHz)
1.705-30	30	30	29.5
30-88	100	3	40.0
88-216	150	3	43.5
216-960	200	3	46.0
Above 960	500	3	54.0

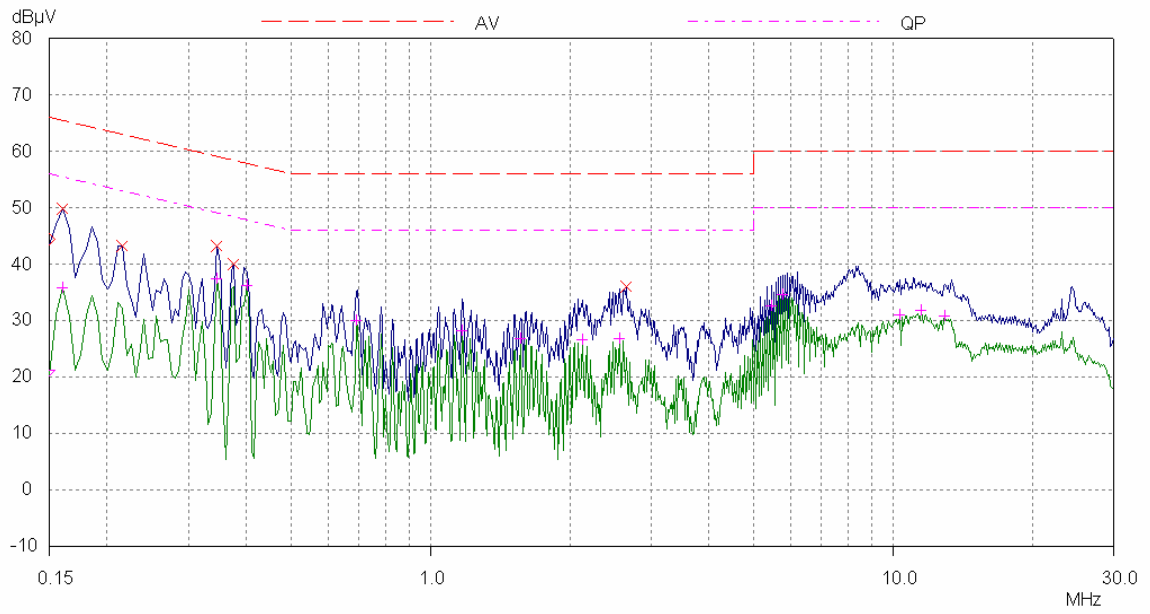
**Appendix B:****Supporting Graphical Data**

This appendix contains graphical data obtained during testing.

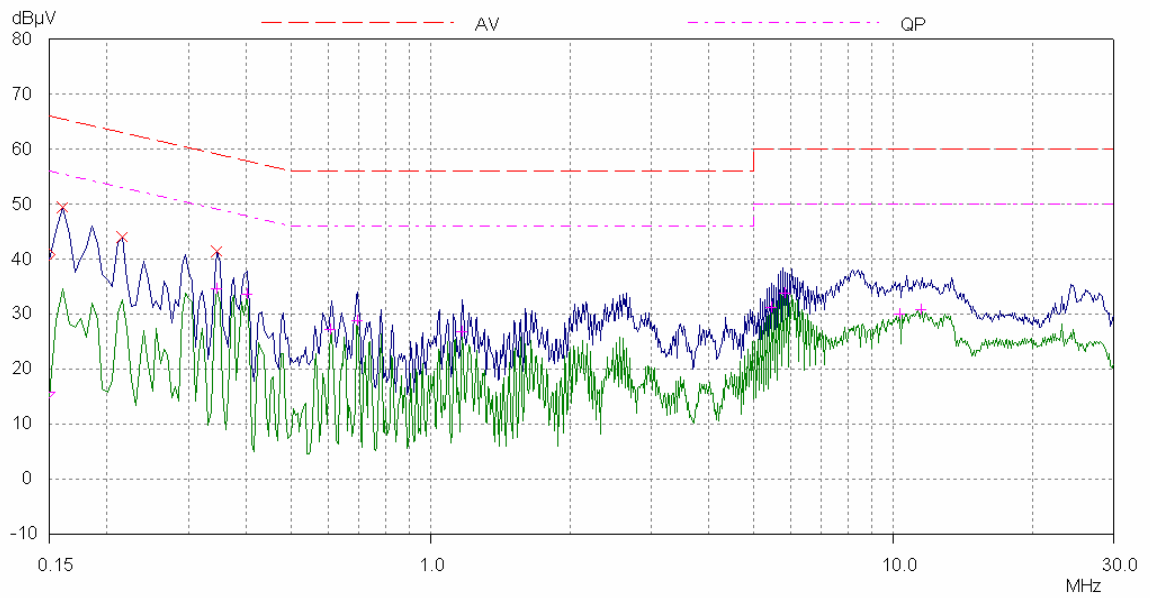
Notes:

- (a) The radiated electric field emissions and conducted emissions graphical data in this appendix is preview data. For details of formal results, refer to Appendix A and Appendix B.
- (b) The time and date on the plots do not necessarily equate to the time of the test.
- (c) Where relevant, on power line conducted emission plots, the limit displayed is the average limit, which is stricter than the quasi peak limit.
- (d) Appendix C details the numbering system used to identify the sample and its modification state.
- (e) The plots presented in this appendix may not be a complete record of the measurements performed, but are a representative sample, relative to the final assessment.

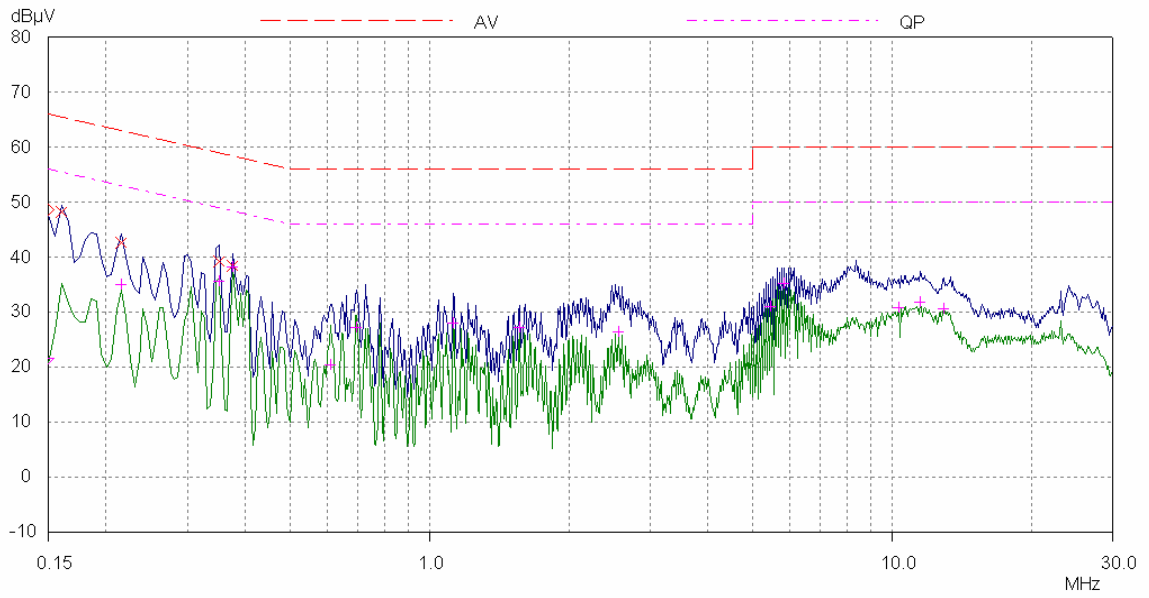
Powerline conducted emissions –Tx Live



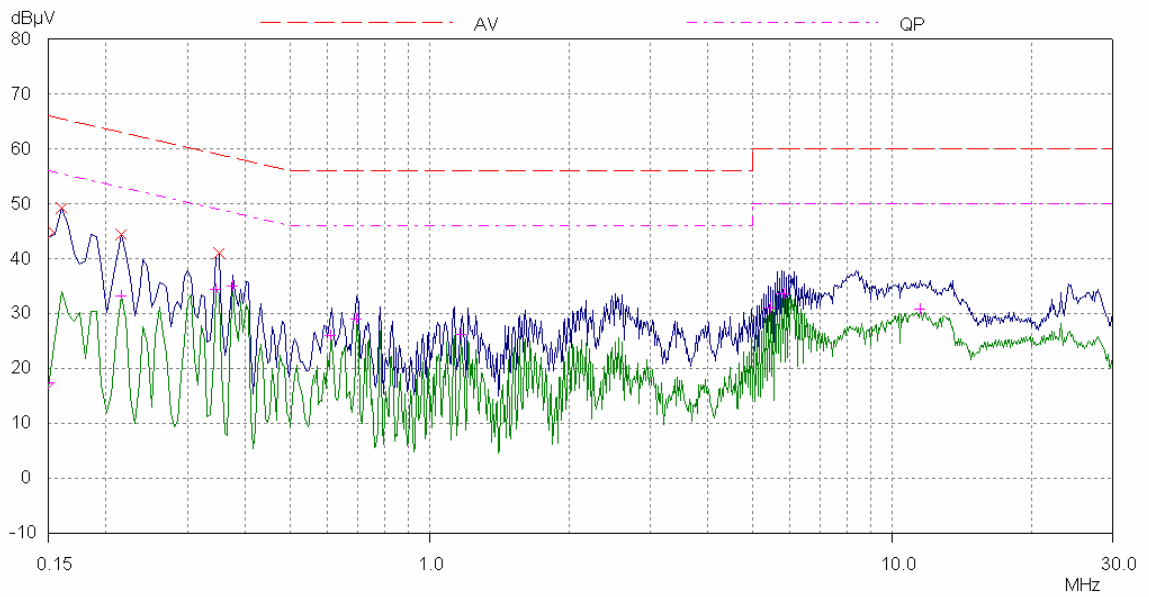
Powerline conducted emissions – Tx Neutral



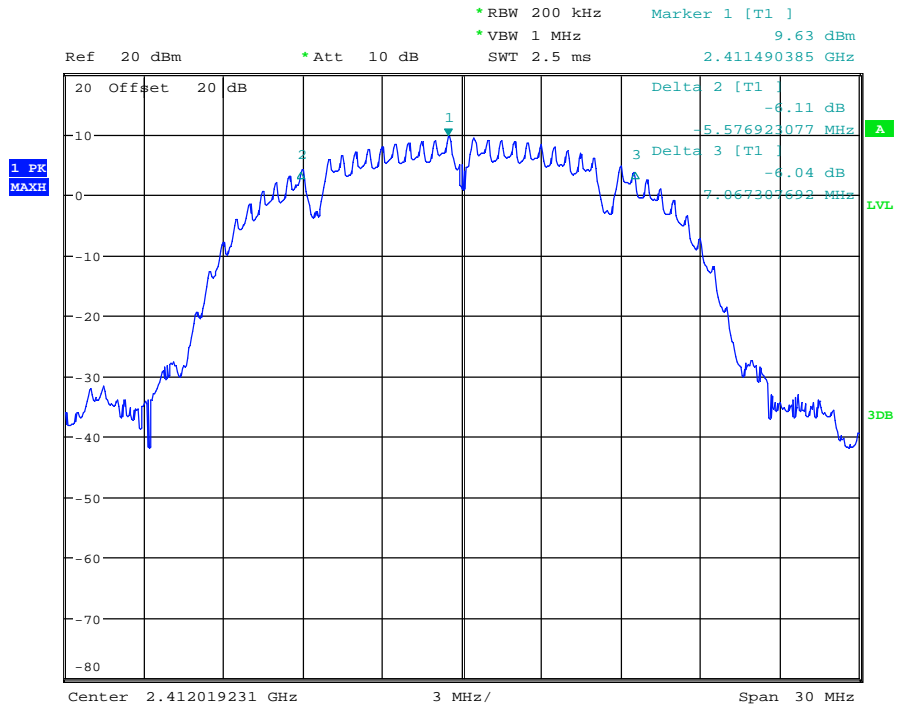
Powerline conducted emissions – Rx Live



Powerline conducted emissions – Rx Neutral

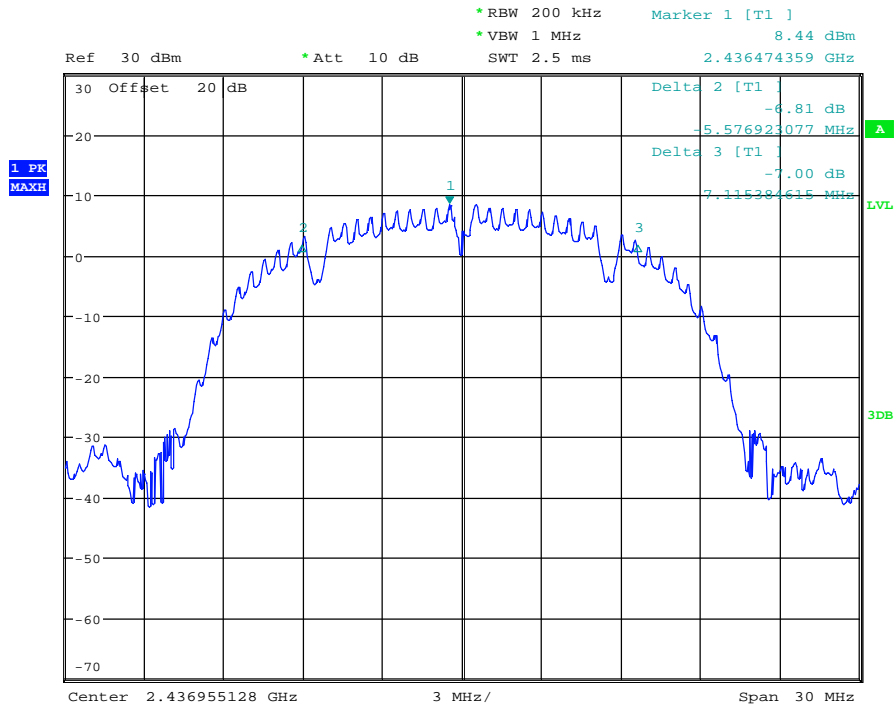


6dB Bandwidth - 802.11b Channel 1



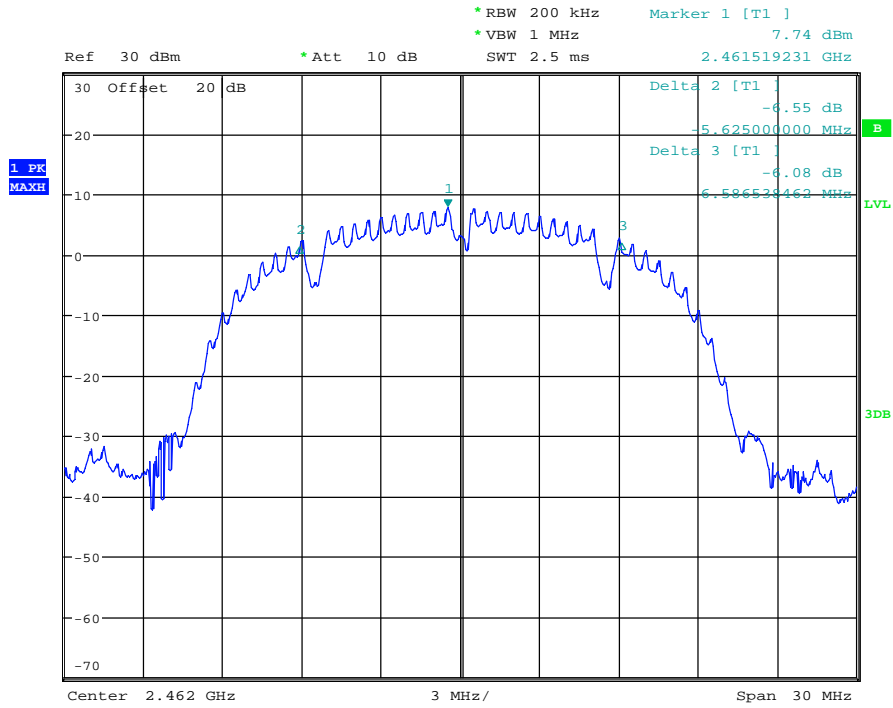
Date: 25.APR.2012 19:11:22

6dB Bandwidth - 802.11b Channel 6



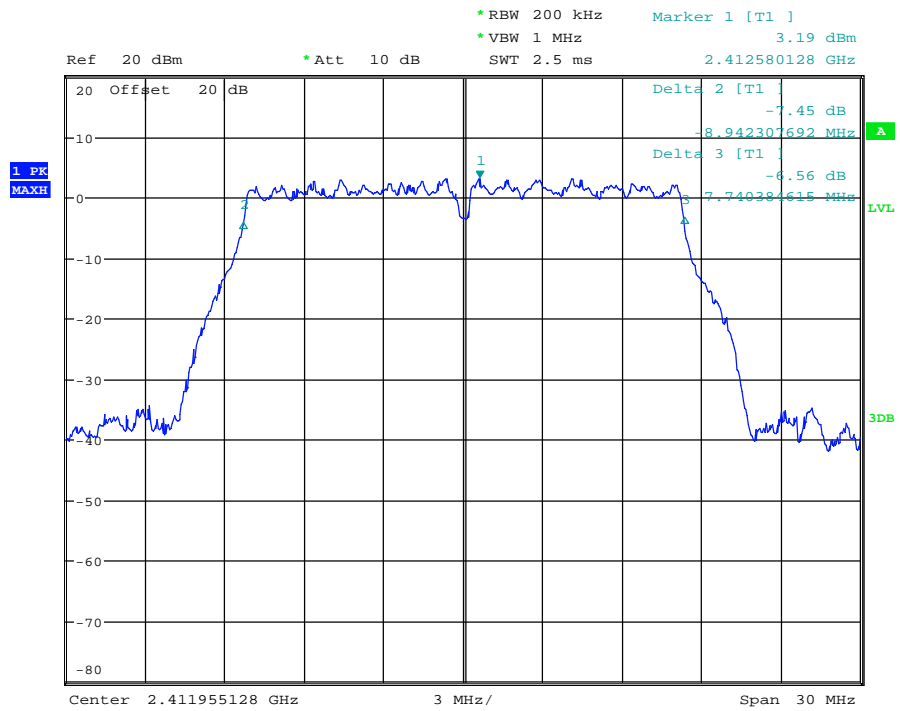
Date: 25.APR.2012 19:43:22

6dB Bandwidth - 802.11b Channel 11



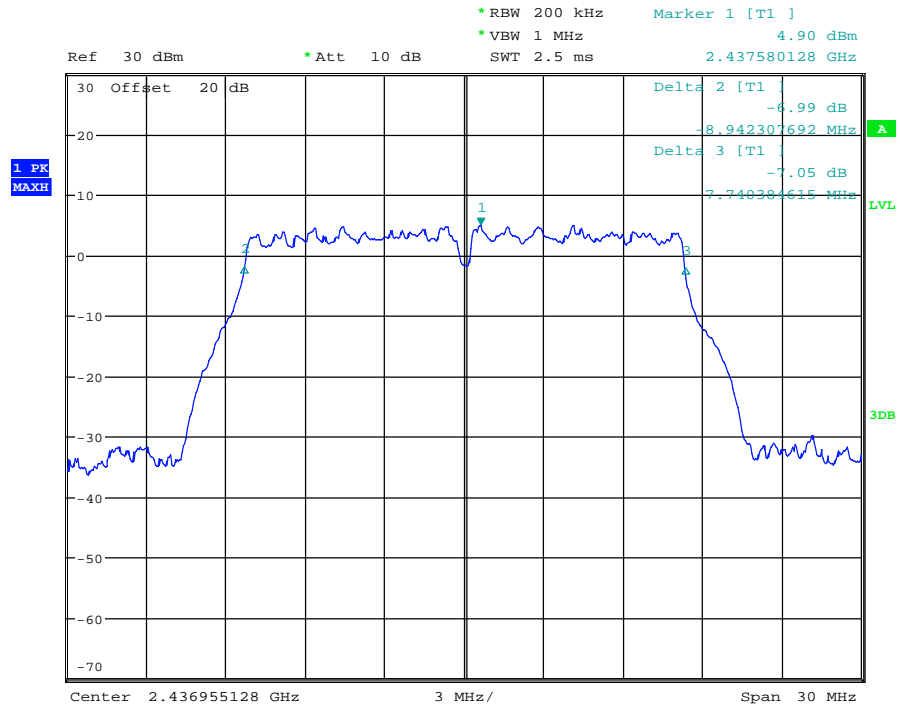
Date: 27.APR.2012 10:03:35

6dB Bandwidth - 802.11g Channel 1



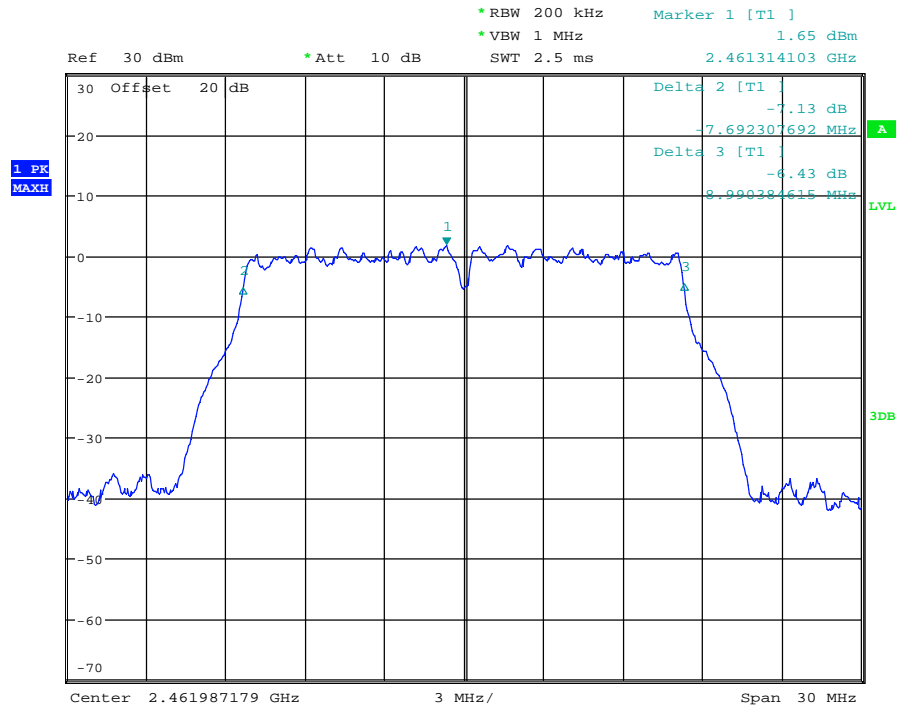
Date: 25.APR.2012 20:24:05

6dB Bandwidth - 802.11g Channel 6



Date: 25.APR.2012 20:33:07

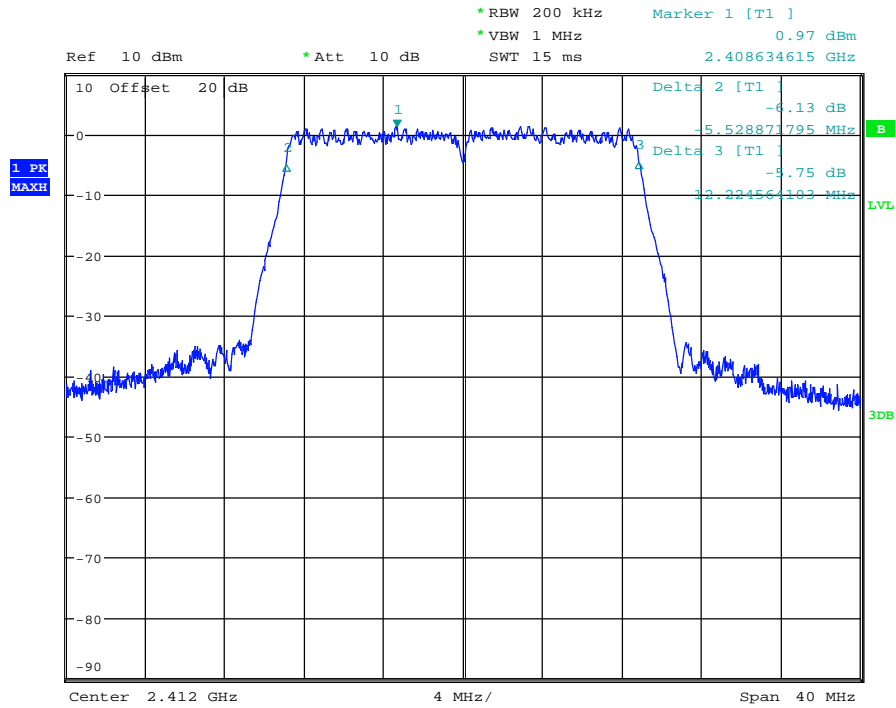
6dB Bandwidth - 802.11g Channel 11



Date: 25.APR.2012 20:40:52

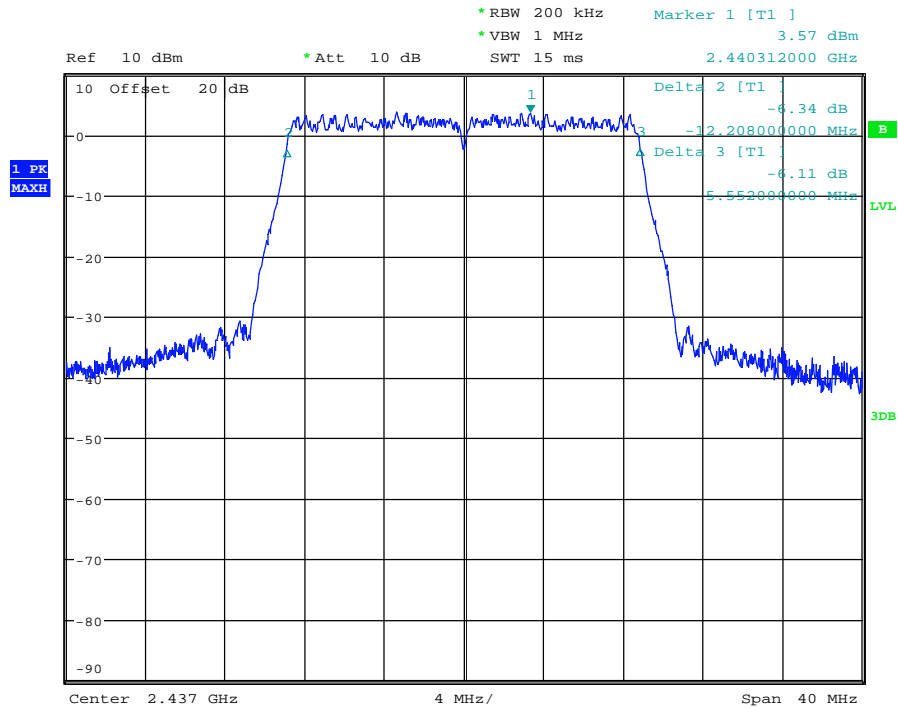


6dB Bandwidth - 802.11n HT20 Channel 1



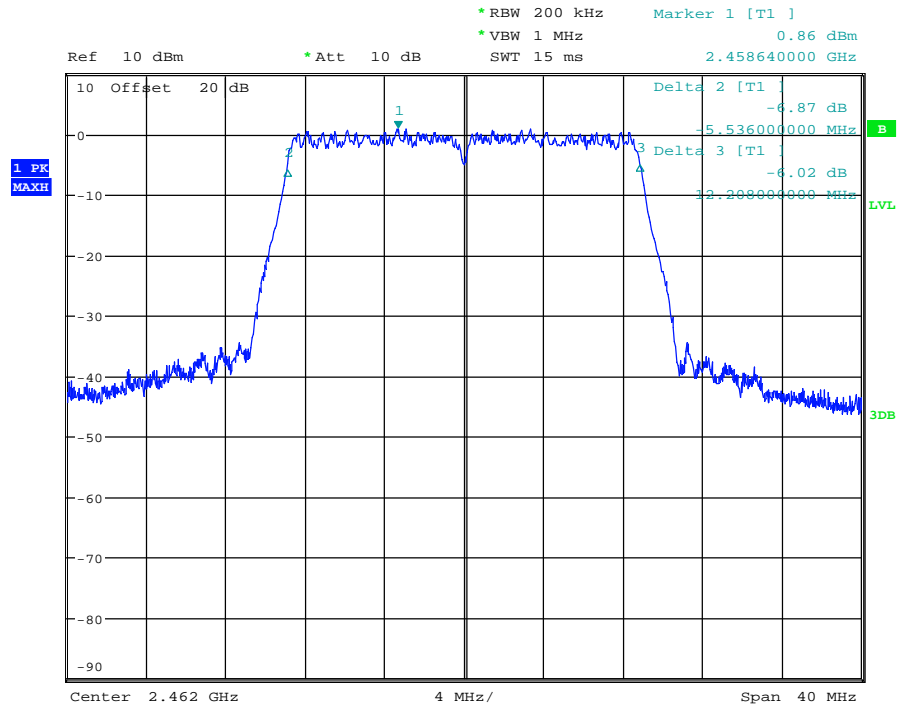
Date: 26.APR.2012 06:30:09

6dB Bandwidth - 802.11n HT20 Channel 6



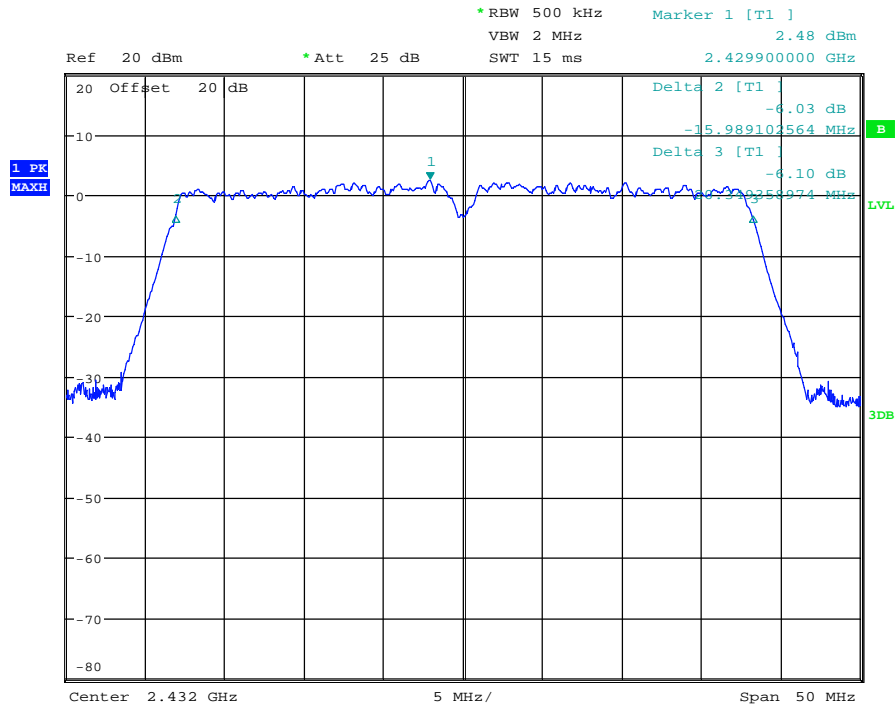
Date: 26.APR.2012 06:31:17

6dB Bandwidth - 802.11n HT20 Channel 11



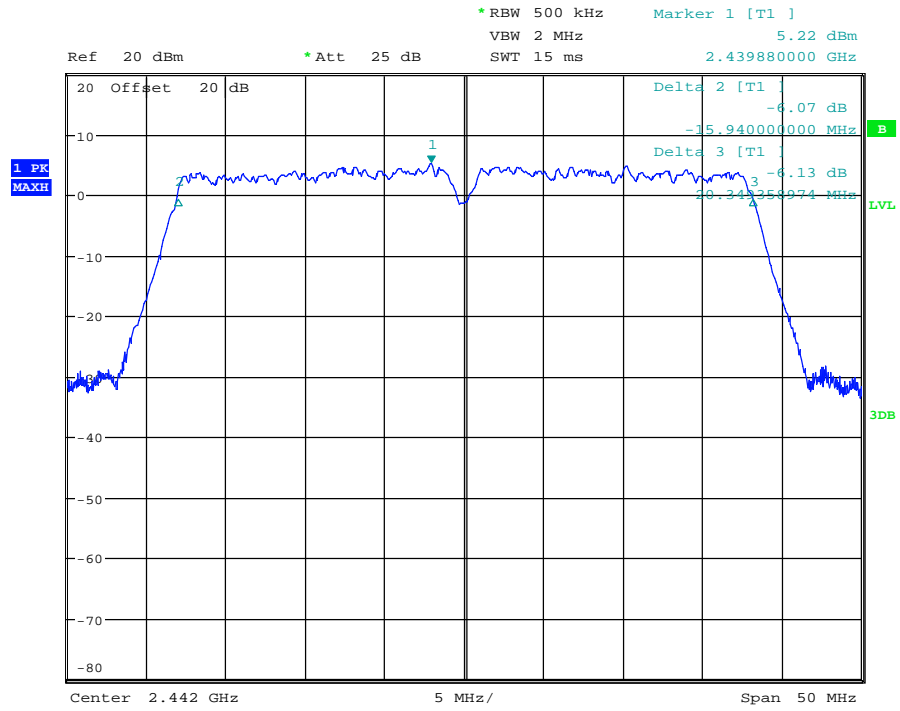
Date: 26.APR.2012 06:32:35

6dB Bandwidth - 802.11n HT40 Channel 3



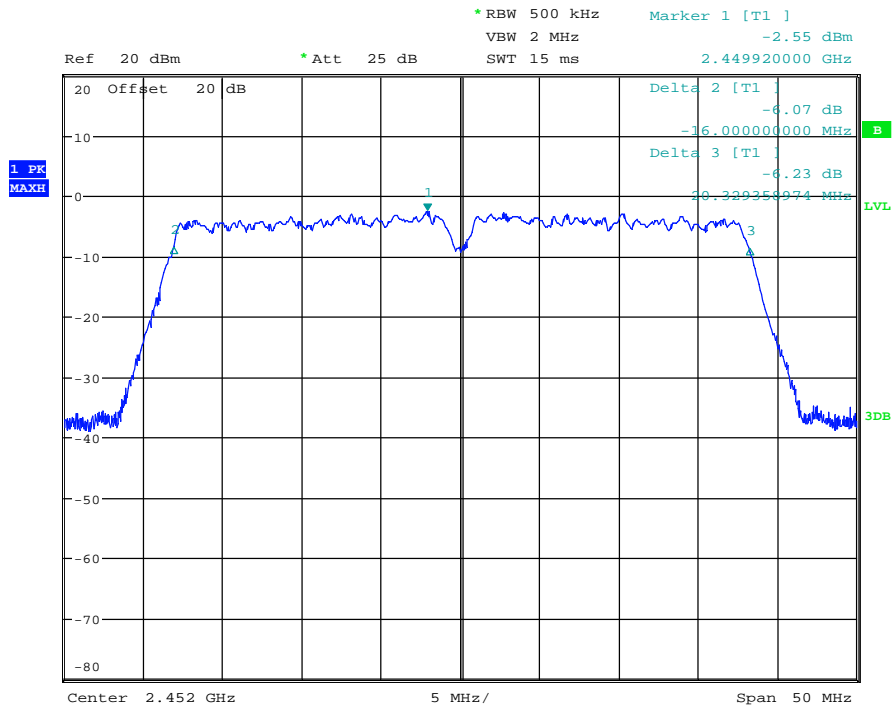
Date: 26.APR.2012 07:39:43

6dB Bandwidth - 802.11n HT40 Channel 5



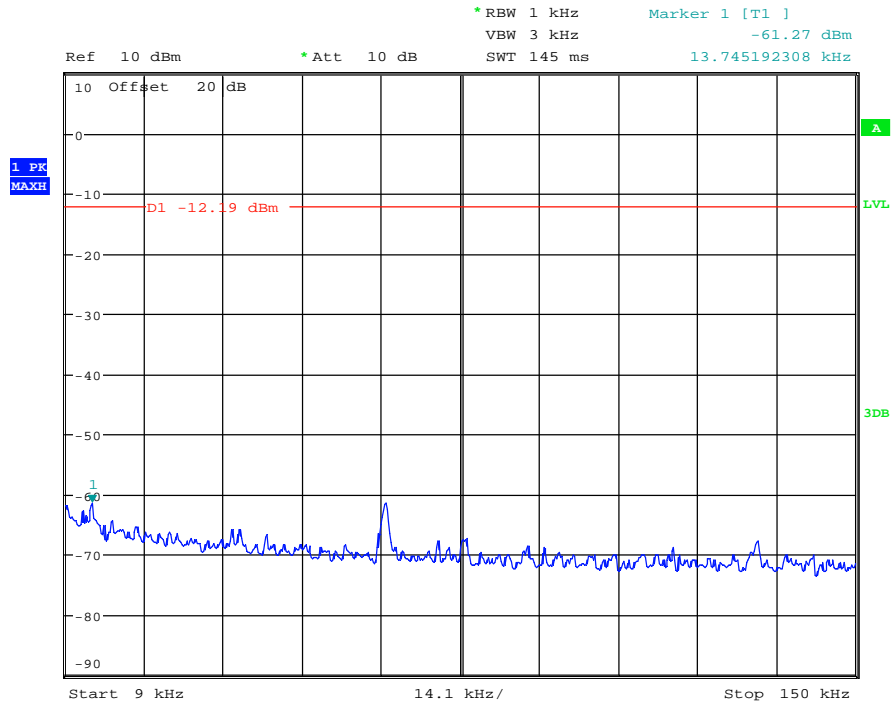
Date: 26.APR.2012 07:40:51

6dB Bandwidth - 802.11n HT40 Channel 7



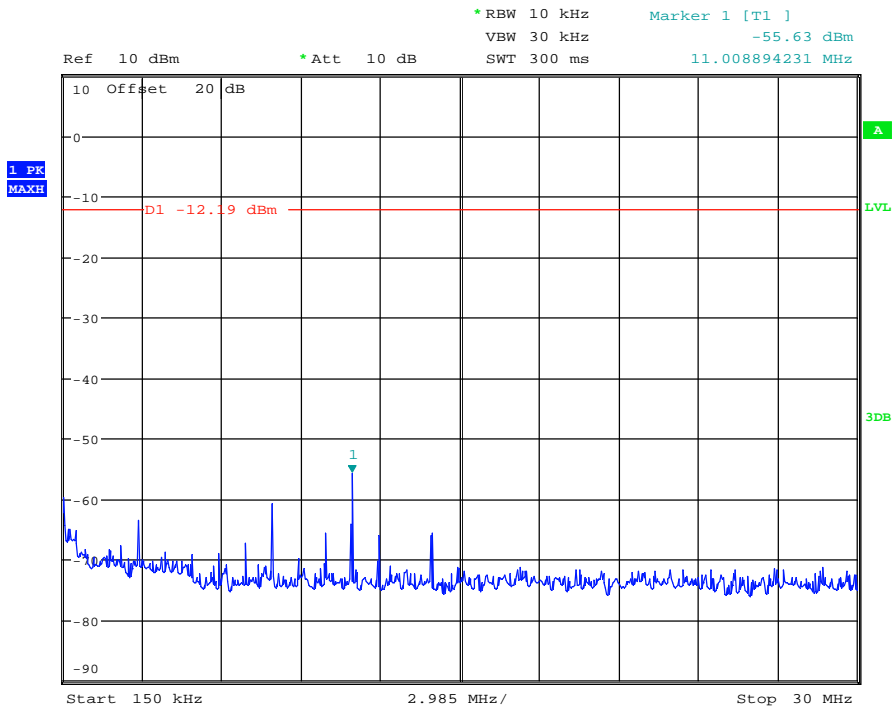
Date: 26.APR.2012 07:41:53

Conducted spurious emissions 9kHz to 150kHz



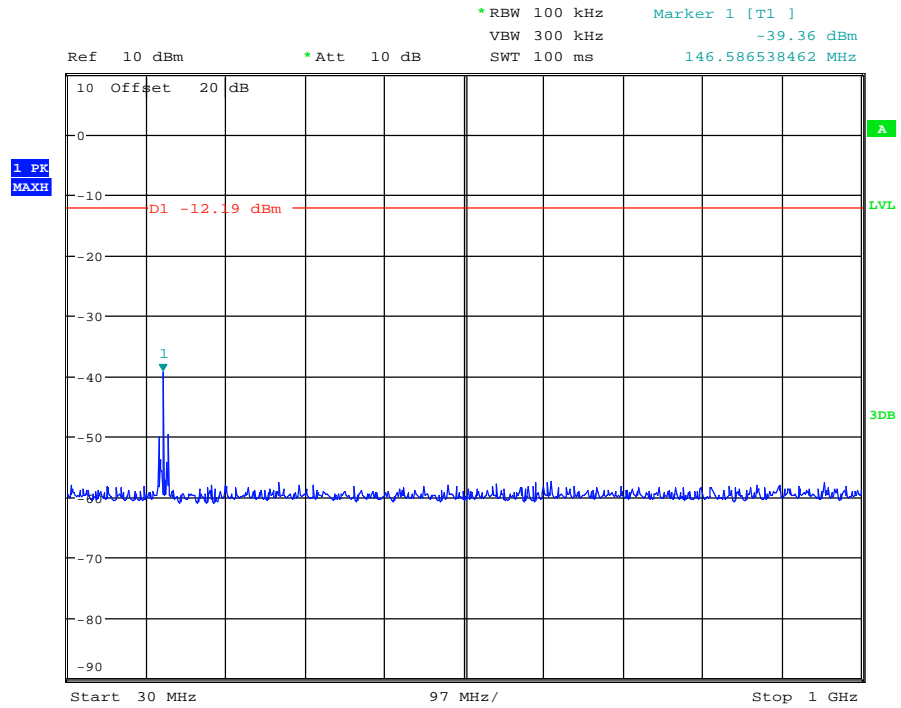
Date: 25.APR.2012 20:18:45

Conducted spurious emissions 150kHz to 30MHz



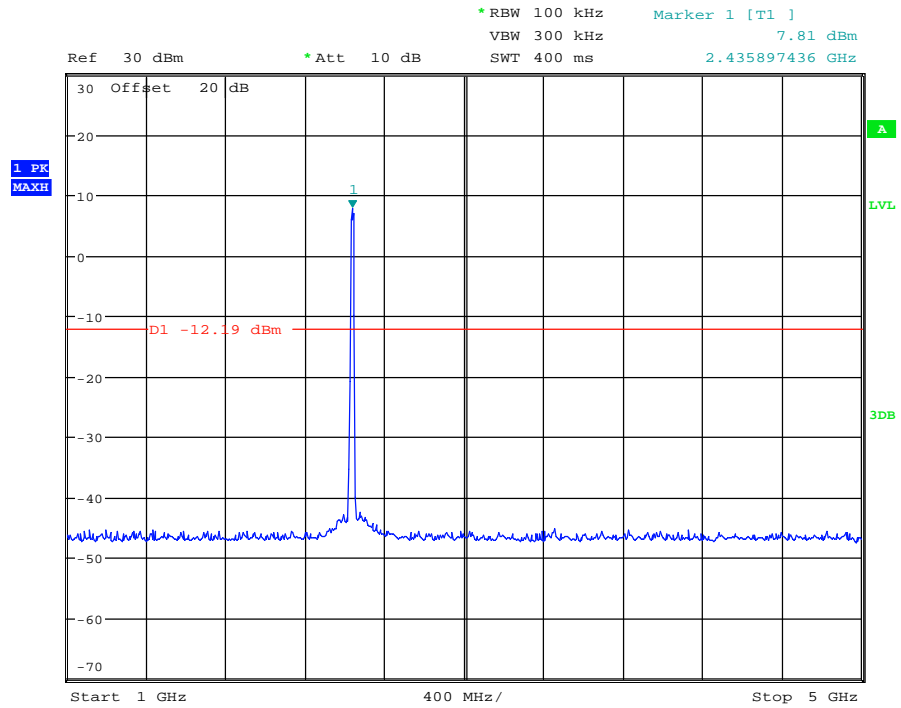
Date: 25.APR.2012 20:19:08

Conducted spurious emissions 30MHz to 1GHz



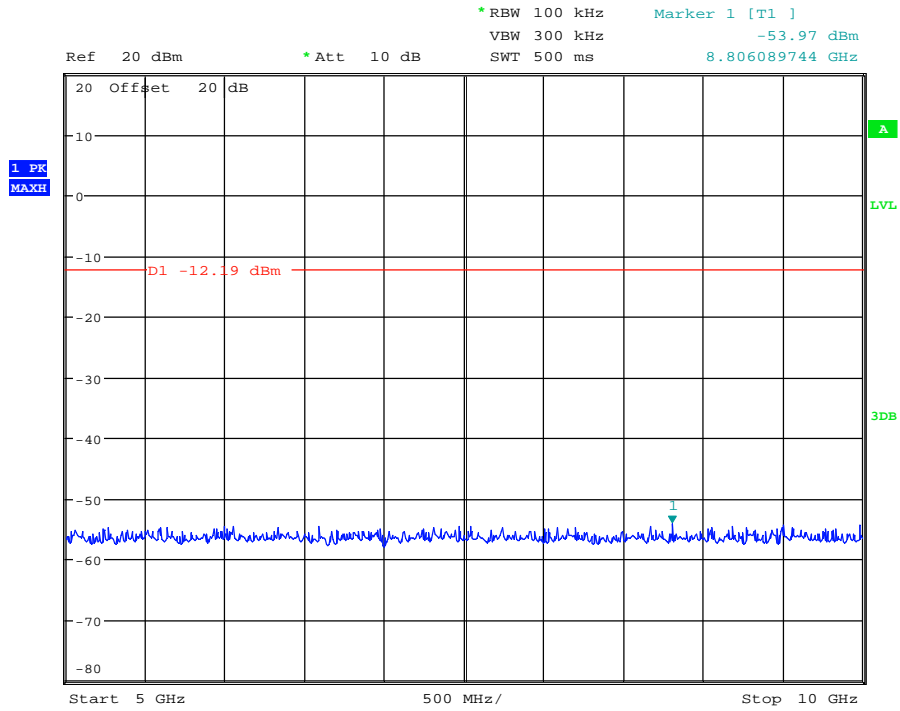
Date: 25.APR.2012 20:19:31

Conducted spurious emissions 1GHz to 5GHz



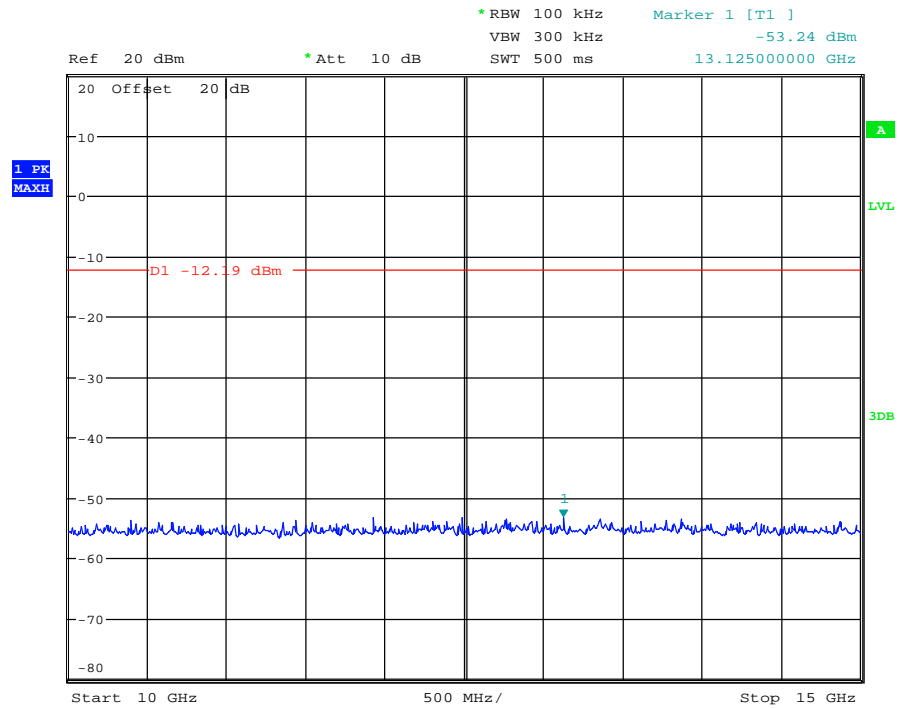
Date: 25.APR.2012 19:58:49

Conducted spurious emissions 5GHz to 10GHz



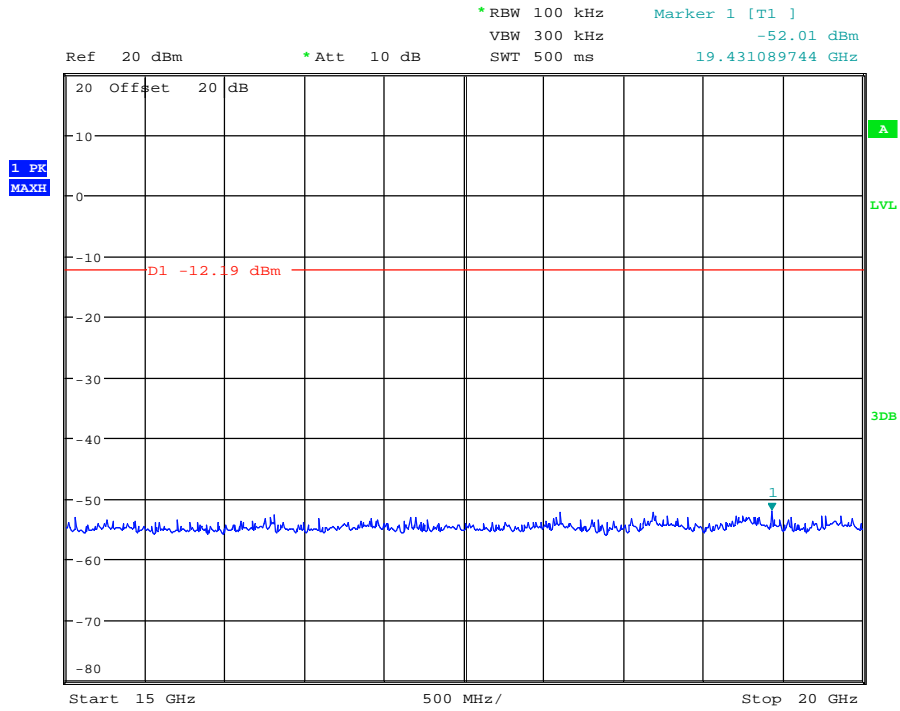
Date: 25.APR.2012 19:59:41

Conducted spurious emissions 10GHz to 15GHz



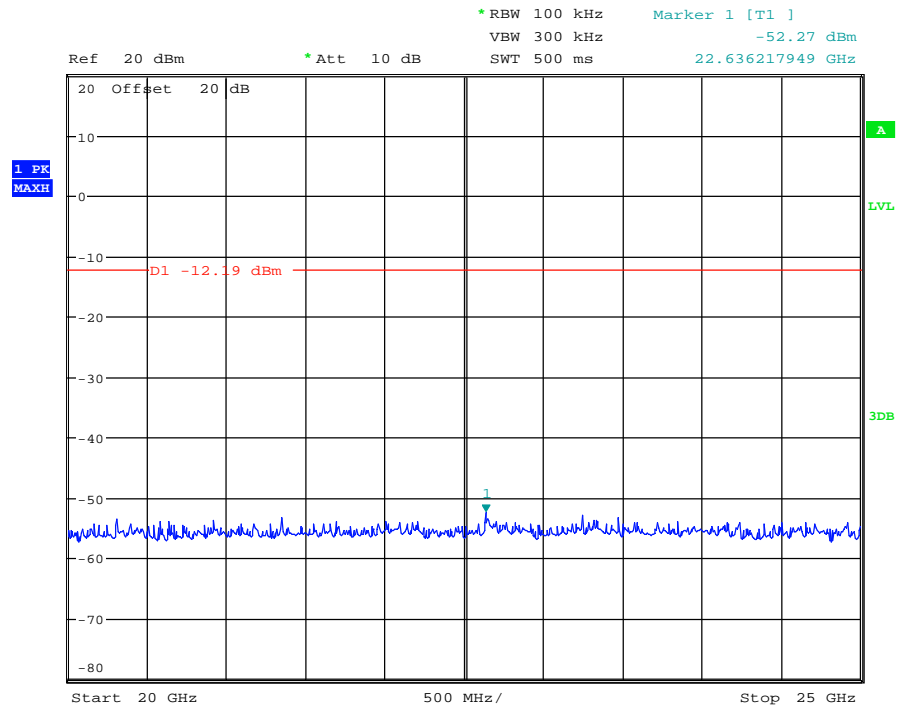
Date: 25.APR.2012 20:00:26

Conducted spurious emissions 15GHz – 20GHz



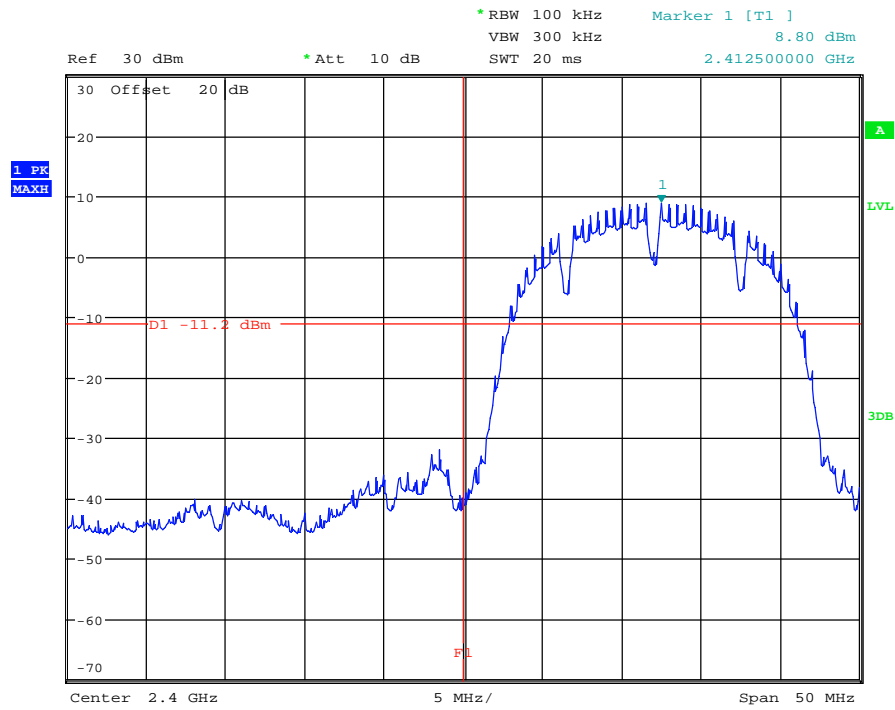
Date: 25.APR.2012 20:01:53

Conducted spurious emissions 20GHz to 25GHz



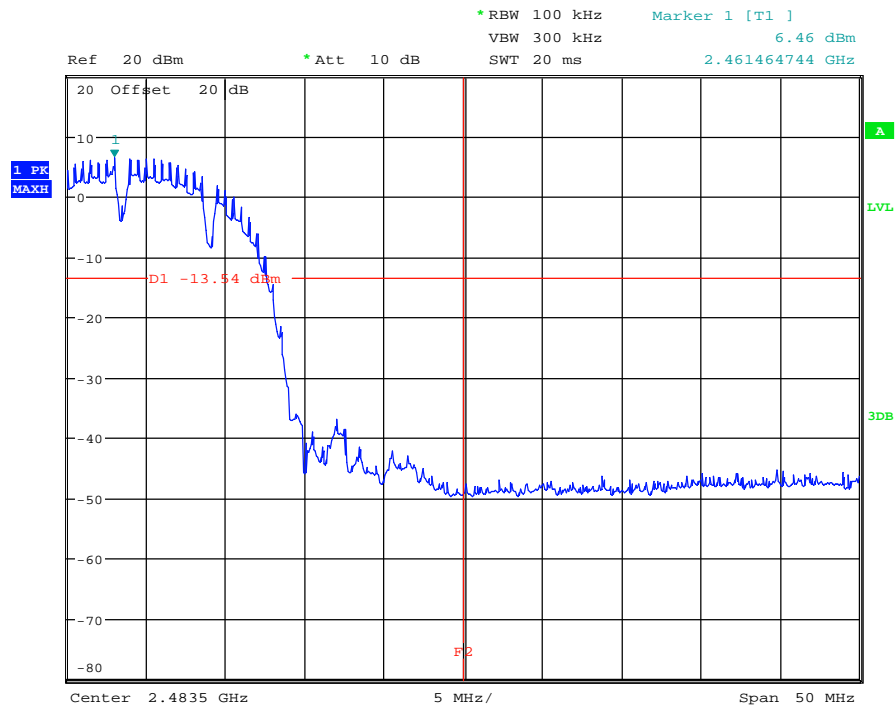
Date: 25.APR.2012 20:02:09

Conducted lower band-edge compliance – 802.11b



Date: 25.APR.2012 19:26:46

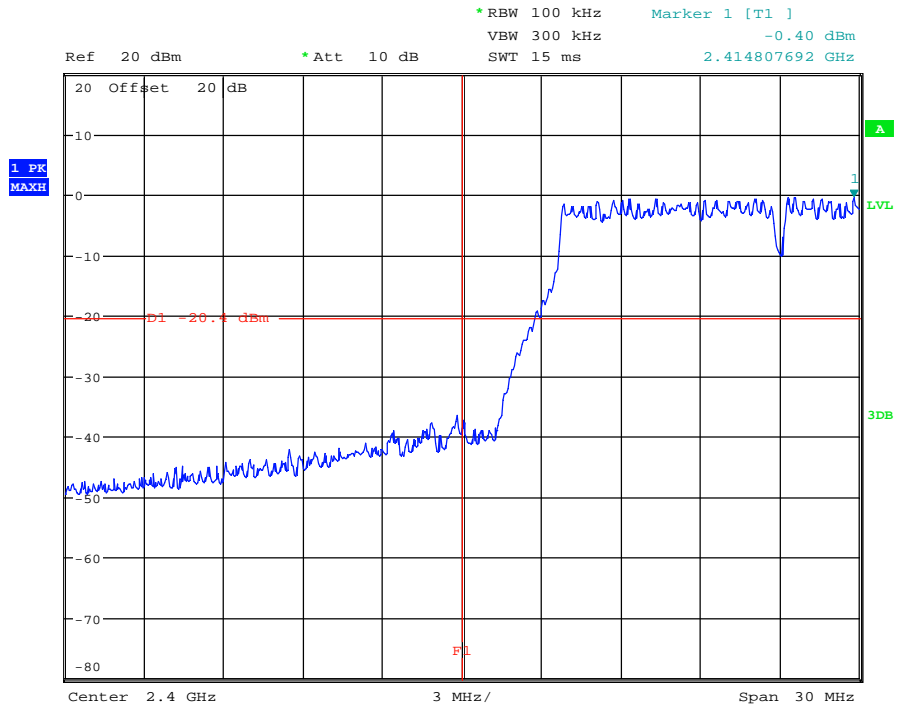
Conducted upper band-edge compliance – 802.11b



Date: 25.APR.2012 20:08:00

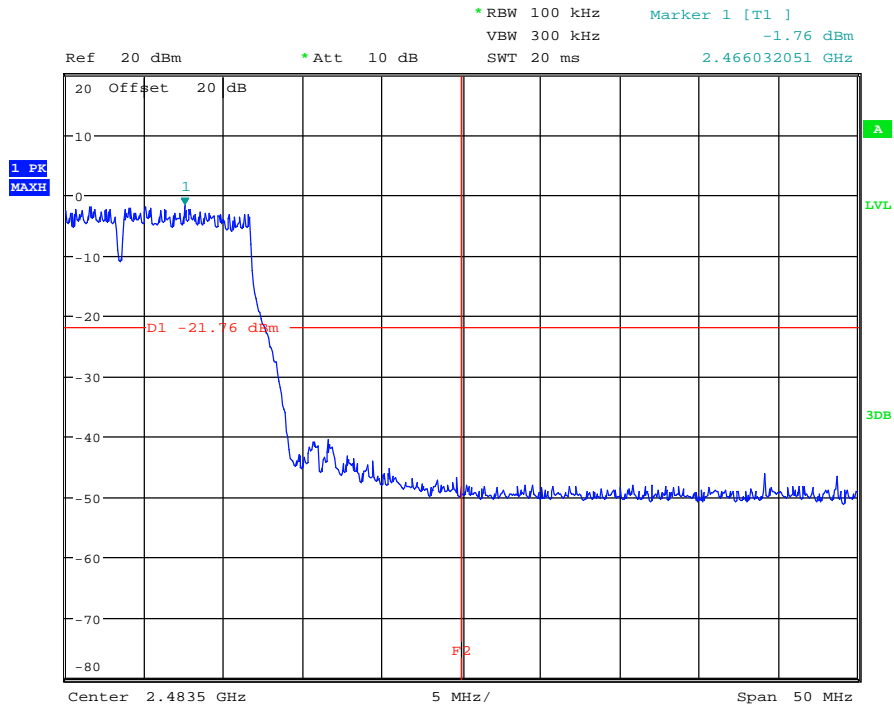


Conducted lower band-edge compliance – 802.11g



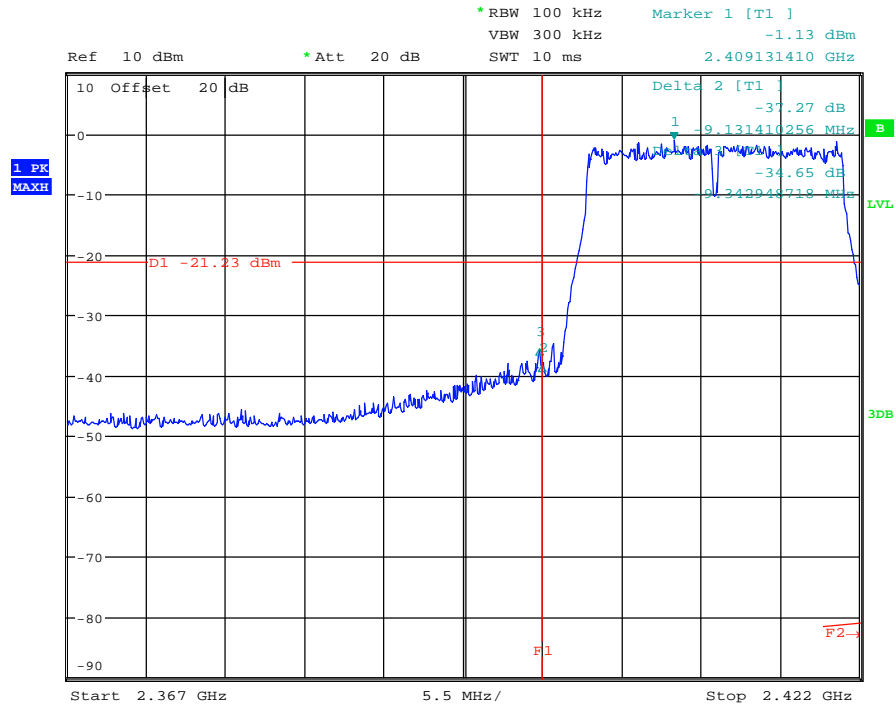
Date: 25.APR.2012 20:25:58

Conducted upper band-edge compliance – 802.11g



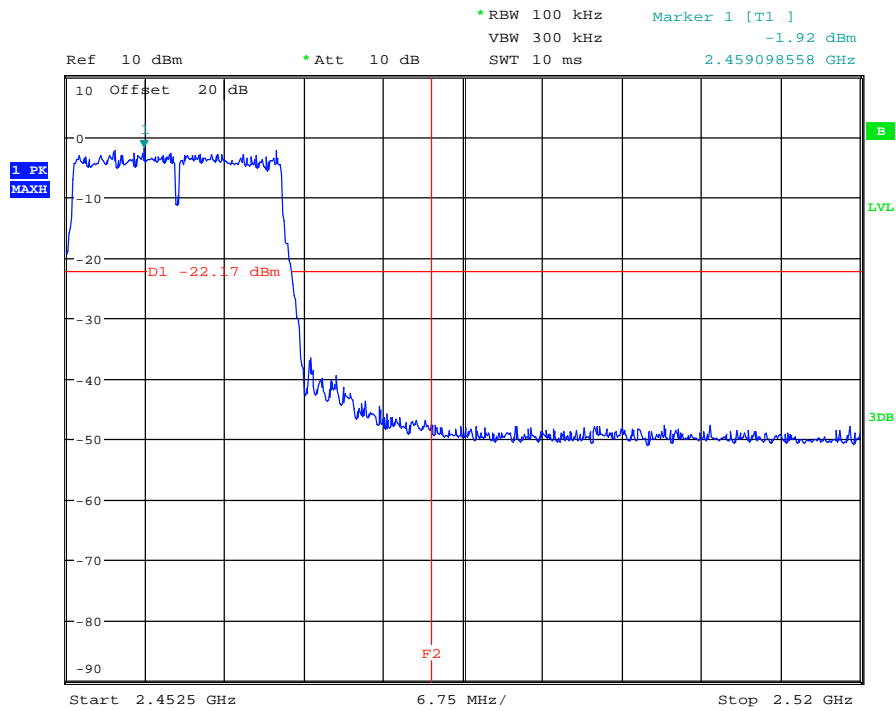
Date: 25.APR.2012 20:43:02

Conducted lower band-edge compliance – 802.11n HT20



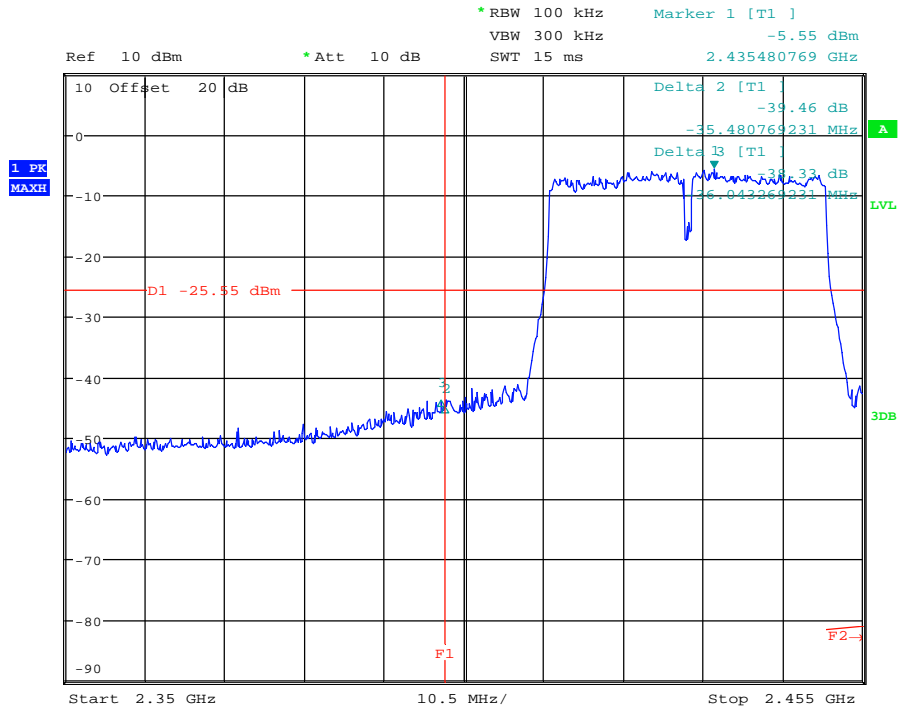
Date: 26.APR.2012 06:57:49

Conducted upper band-edge compliance – 802.11n HT20



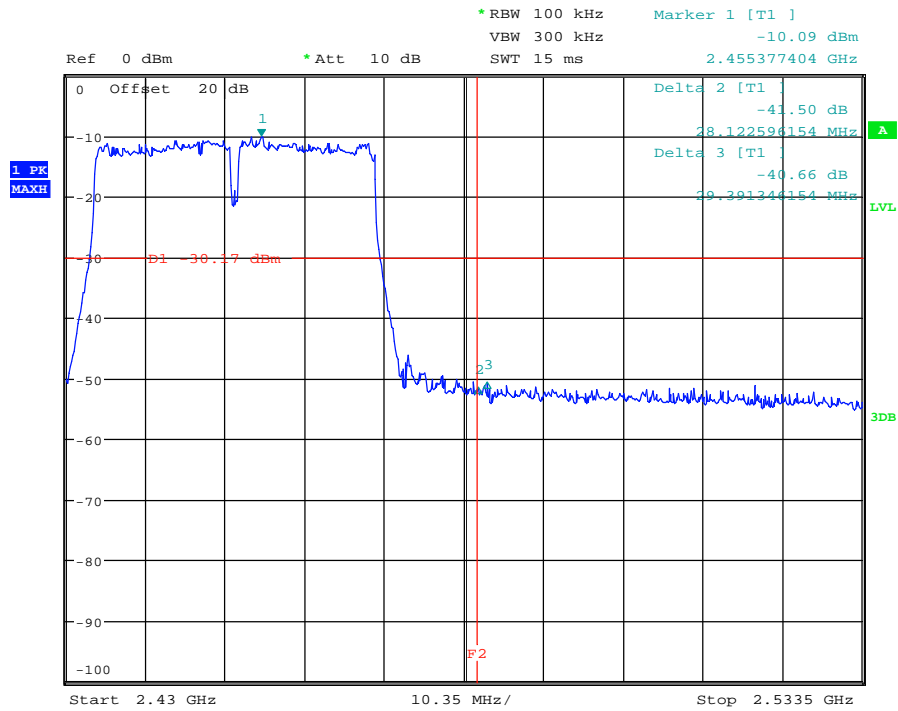
Date: 26.APR.2012 06:50:45

Conducted lower band-edge compliance – 802.11n HT40



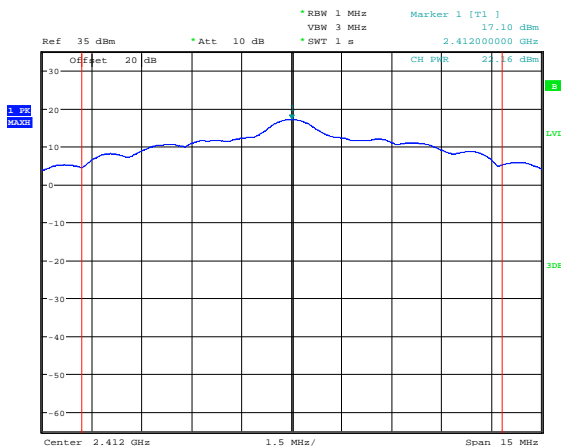
Date: 26.APR.2012 07:58:57

Conducted upper band-edge compliance – 802.11n HT40



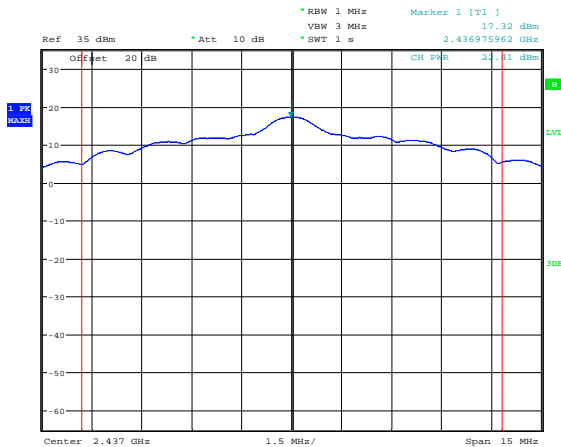
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Conducted carrier power – 802.11b Channel 1



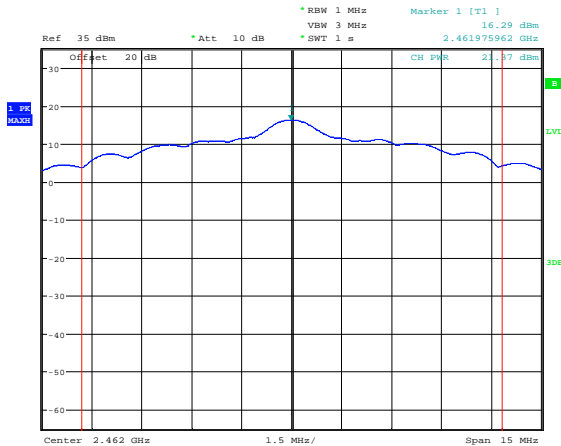
Date: 26.APR.2012 10:25:34

Conducted carrier power – 802.11b Channel 6



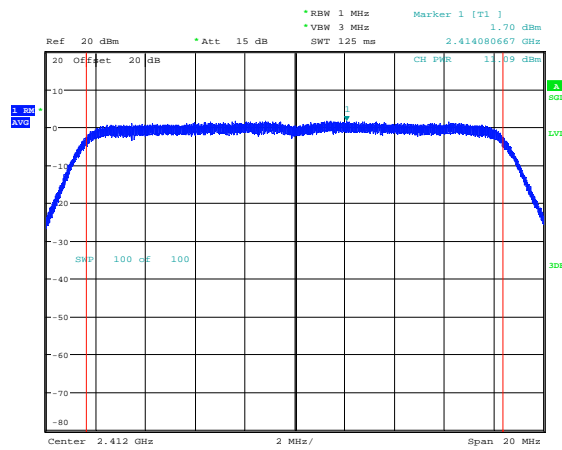
Date: 26.APR.2012 10:26:50

Conducted carrier power – 802.11b Channel 11



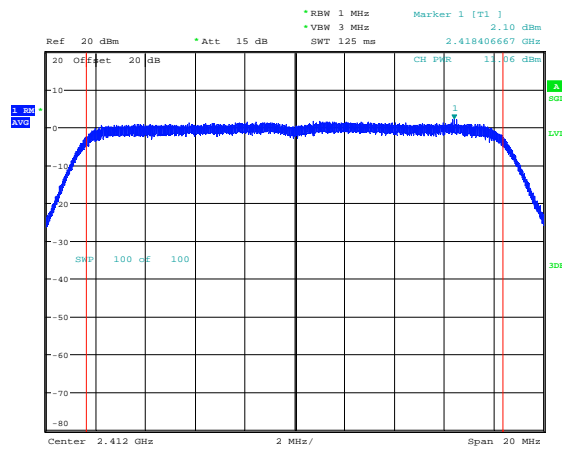
Date: 26.APR.2012 10:27:39

Conducted carrier power – 802.11g Channel 1 – Chain 0



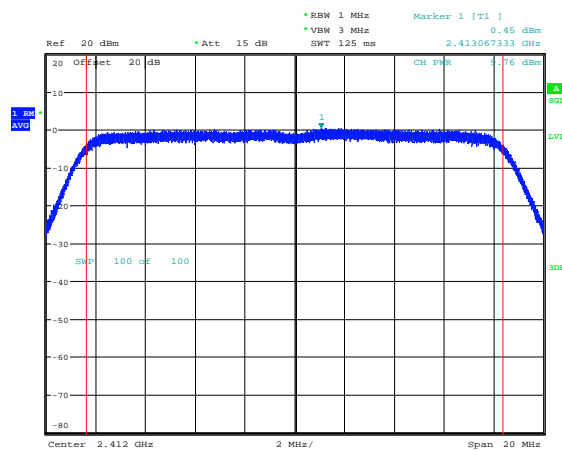
Date: 3.MAY.2012 10:41:38

Conducted carrier power – 802.11g Channel 1 – Chain 1



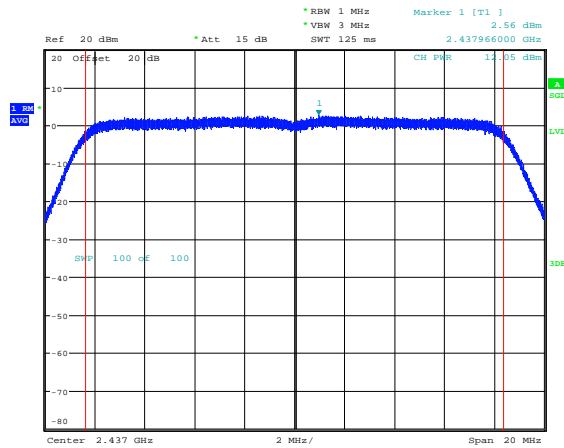
Date: 3.MAY.2012 10:45:50

Conducted carrier power – 802.11g Channel 1 – Chain 2



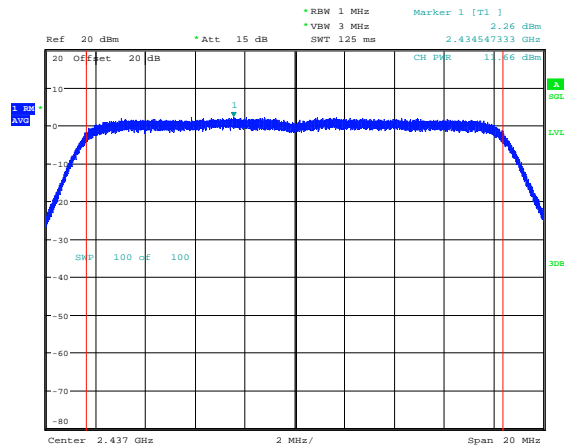
Date: 3.MAY.2012 10:48:37

Conducted carrier power – 802.11g Channel 6 – Chain 0



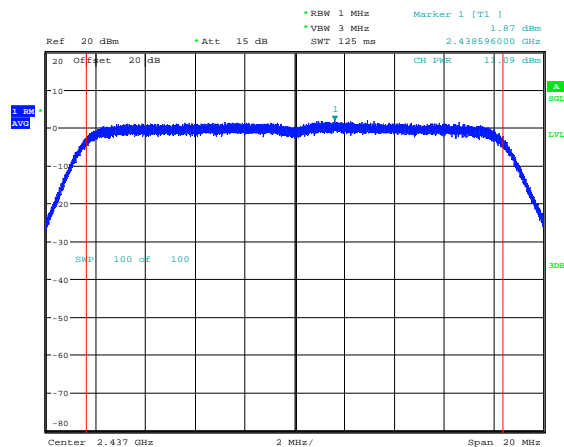
Date: 3.MAY.2012 10:33:43

Conducted carrier power – 802.11g Channel 6 – Chain 1



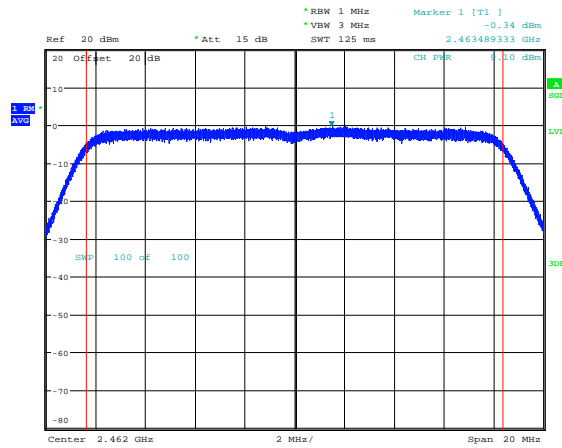
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Conducted carrier power – 802.11g Channel 6 – Chain 2



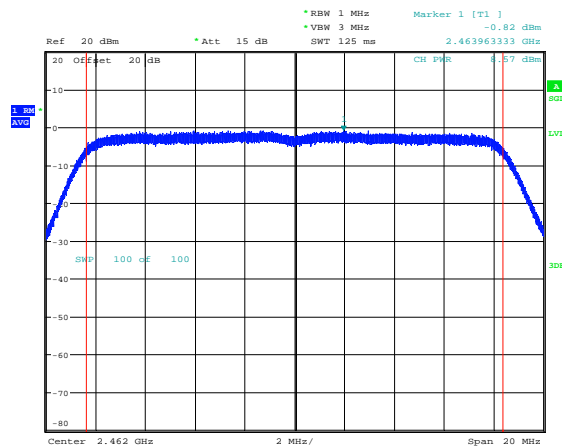
Date: 3.MAY.2012 10:31:57

Conducted carrier power – 802.11g Channel 11 – Chain 0



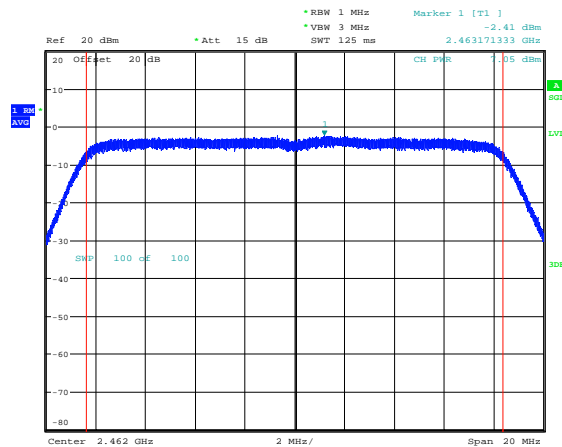
Date: 3.MAY.2012 10:36:23

Conducted carrier power – 802.11g Channel 11 – Chain 1



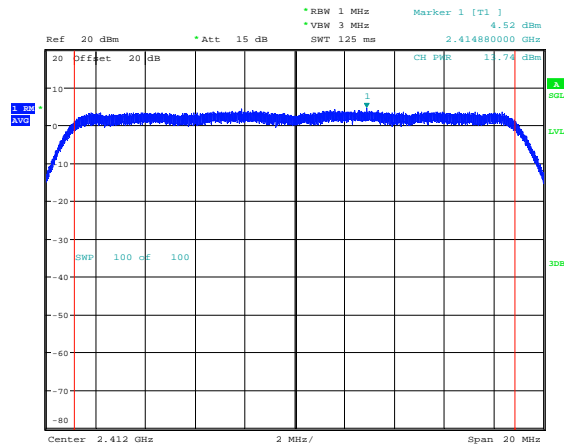
Date: 3.MAY.2012 10:40:23

Conducted carrier power – 802.11g Channel 11 – Chain 2



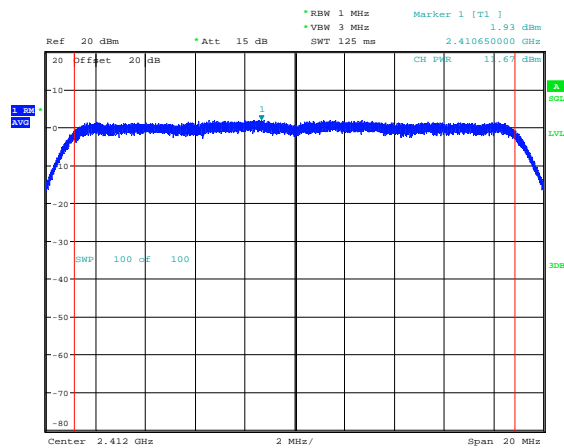
Date: 3.MAY.2012 10:38:53

Conducted carrier power – 802.11n HT20 Channel 1 – Chain 0



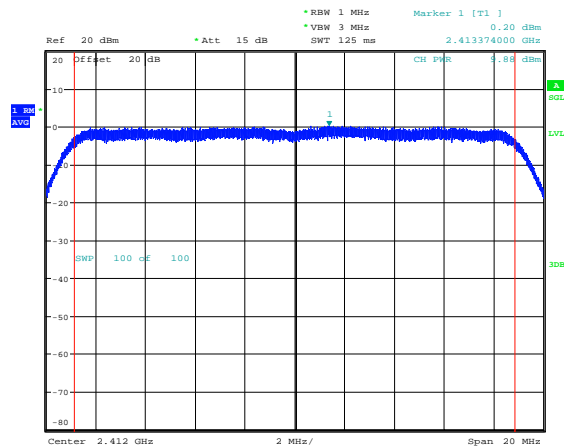
Date: 3.MAY.2012 10:01:23

Conducted carrier power – 802.11n HT20 Channel 1 – Chain 1



Date: 3.MAY.2012 10:03:55

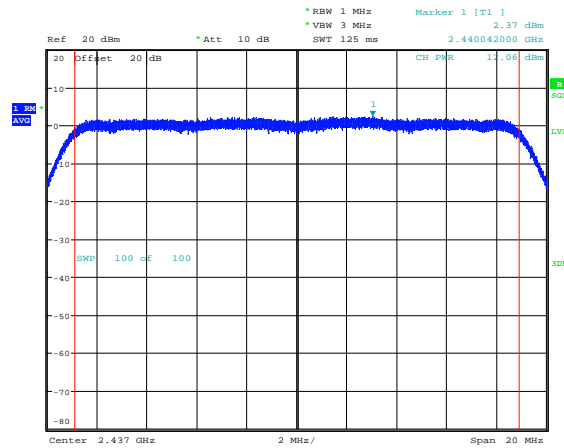
Conducted carrier power – 802.11n HT20 Channel 1 – Chain 2



Date: 3.MAY.2012 09:55:13

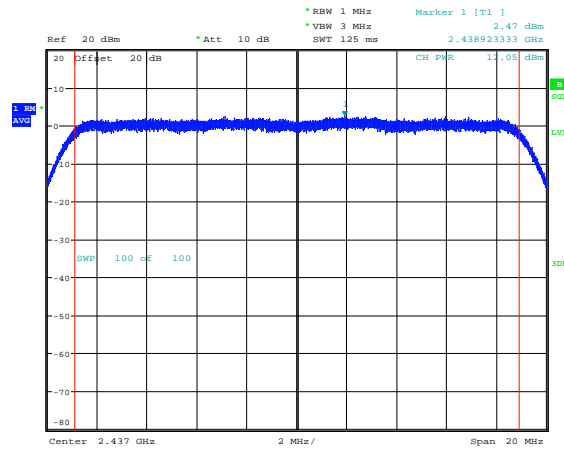


Conducted carrier power – 802.11n HT20 Channel 6 – Chain 0



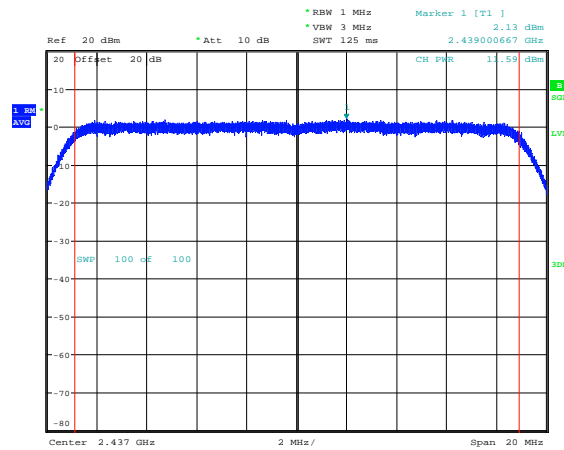
Date: 3.MAY.2012 15:23:16

Conducted carrier power – 802.11n HT20 Channel 6 – Chain 1



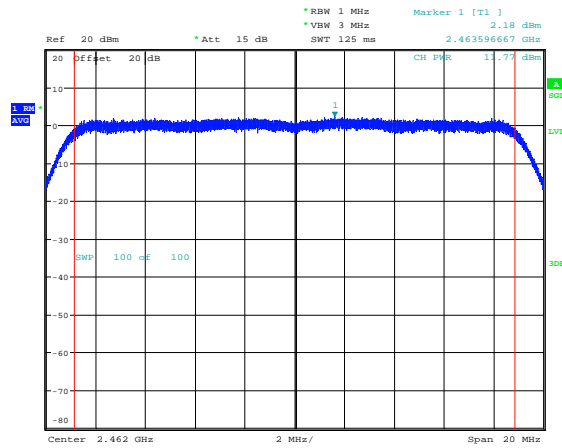
Date: 3.MAY.2012 15:21:42

Conducted carrier power – 802.11n HT20 Channel 6 – Chain 2



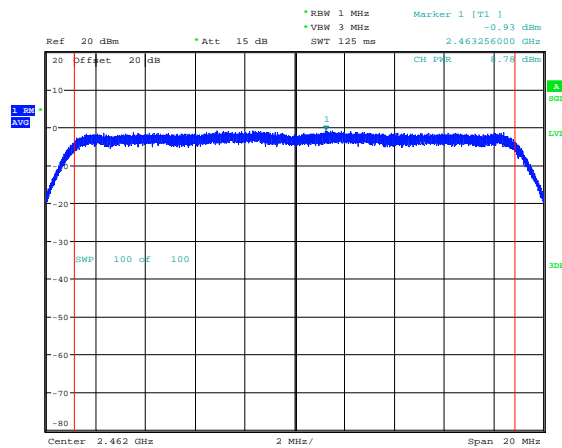
Date: 3.MAY.2012 15:20:26

Conducted carrier power – 802.11n HT20 Channel 11 – Chain 0



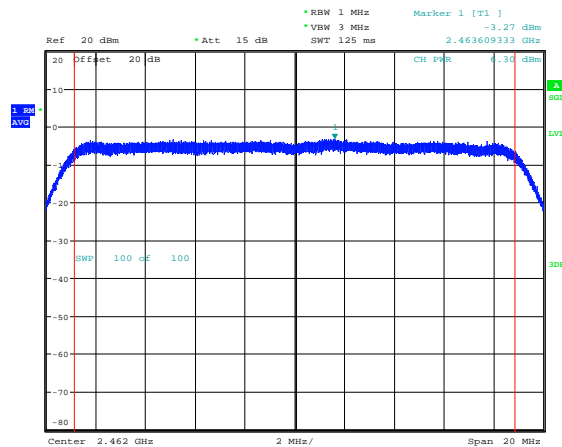
Date: 3.MAY.2012 10:07:26

Conducted carrier power – 802.11n HT20 Channel 11 – Chain 1



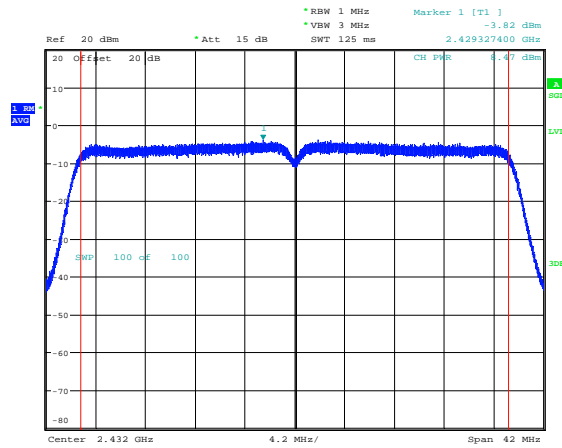
Date: 3.MAY.2012 10:06:11

Conducted carrier power – 802.11n HT20 Channel 11 – Chain 2



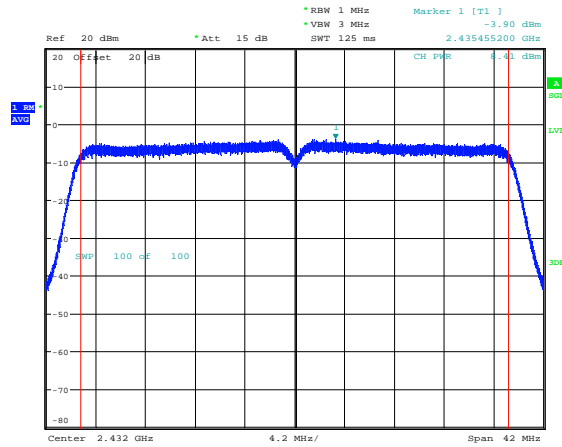
Date: 3.MAY.2012 10:09:37

Conducted carrier power – 802.11n HT40 Channel 3 – Chain 0



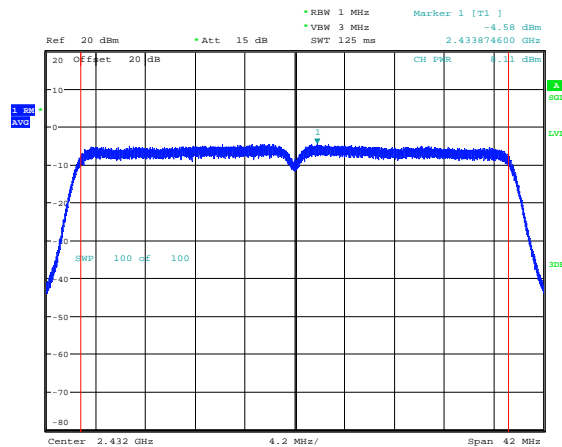
Date: 3.MAY.2012 11:04:05

Conducted carrier power – 802.11n HT40 Channel 3 – Chain 1



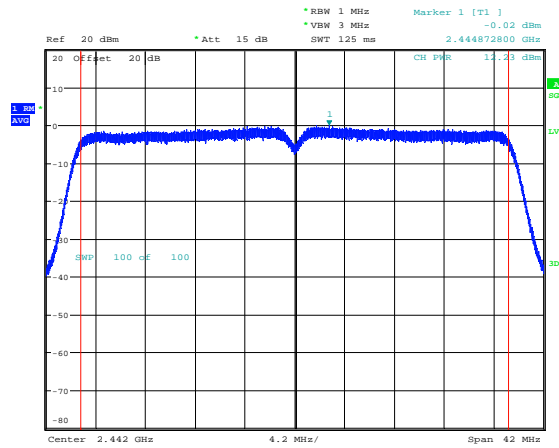
Date: 3.MAY.2012 11:02:15

Conducted carrier power – 802.11n HT40 Channel 3 – Chain 2



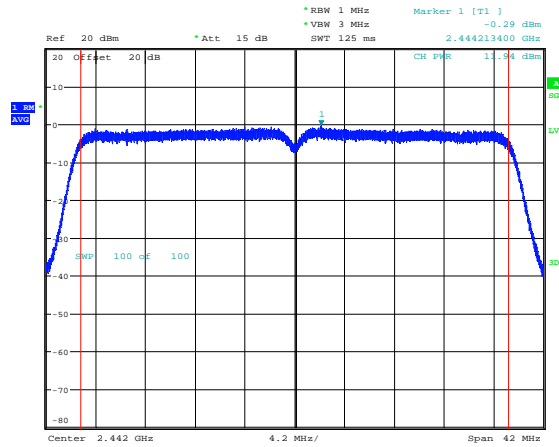
Date: 3.MAY.2012 11:00:01

Conducted carrier power – 802.11n HT40 Channel 5 – Chain 0



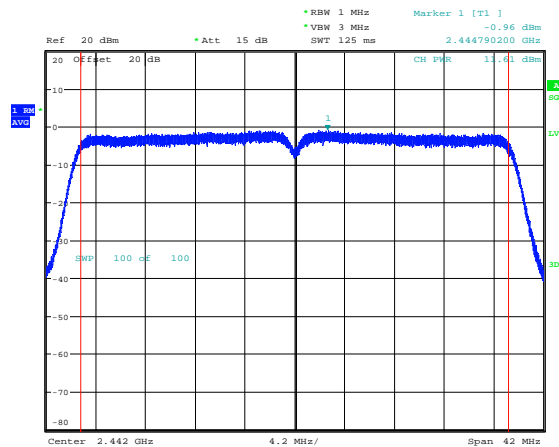
Date: 3.MAY.2012 11:10:56

Conducted carrier power – 802.11n HT40 Channel 5 – Chain 1



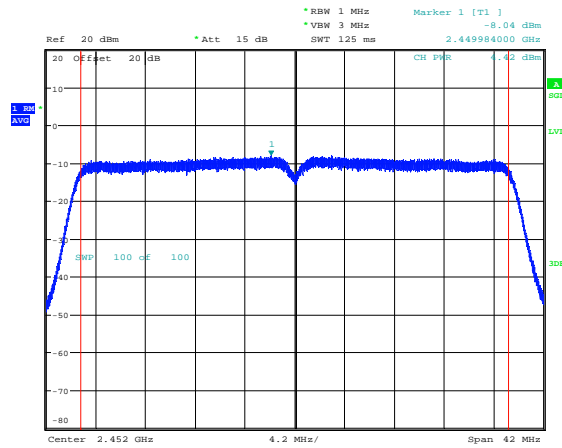
Date: 3.MAY.2012 11:08:08

Conducted carrier power – 802.11n HT40 Channel 5 – Chain 2



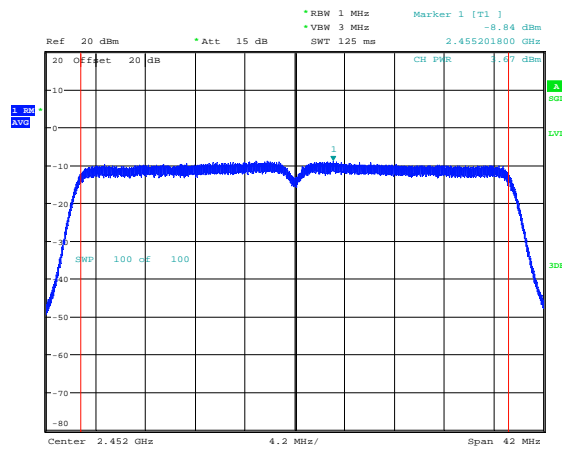
Date: 3.MAY.2012 11:05:59

Conducted carrier power – 802.11n HT40 Channel 7 – Chain 0



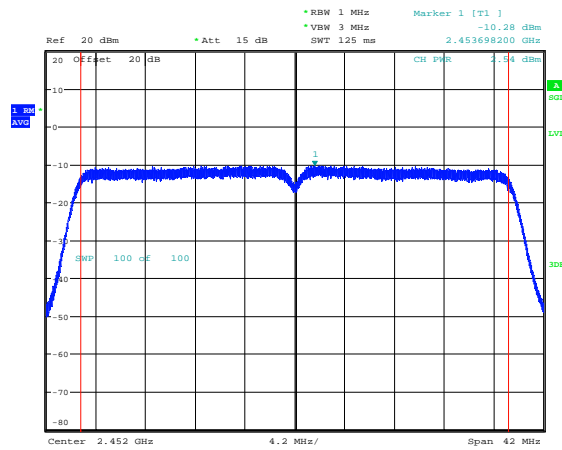
Date: 3.MAY.2012 11:27:50

Conducted carrier power – 802.11n HT40 Channel 7 – Chain 1



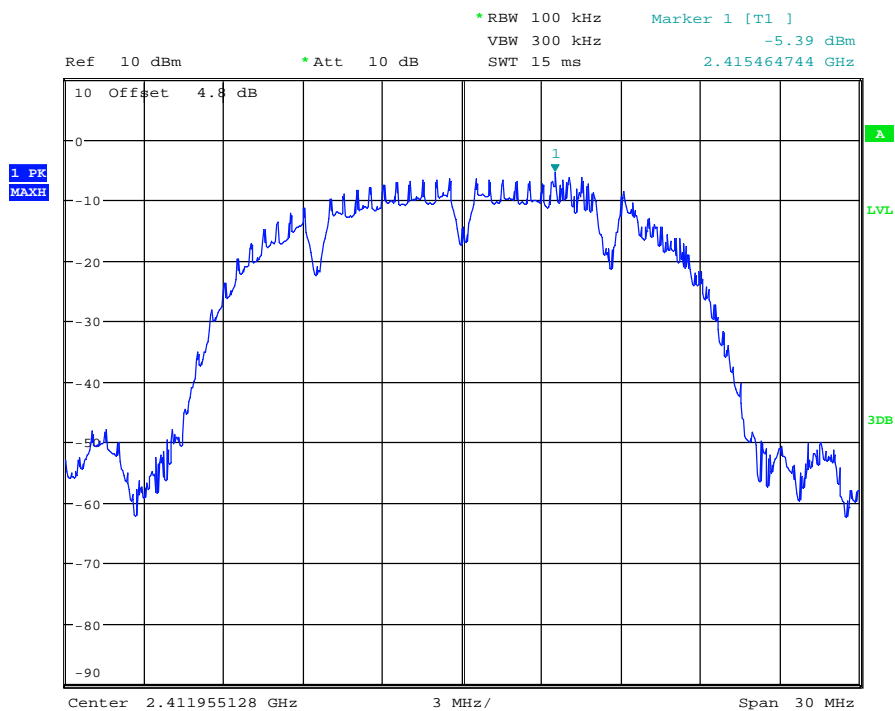
Date: 3.MAY.2012 11:23:37

Conducted carrier power – 802.11n HT40 Channel 7 – Chain 2



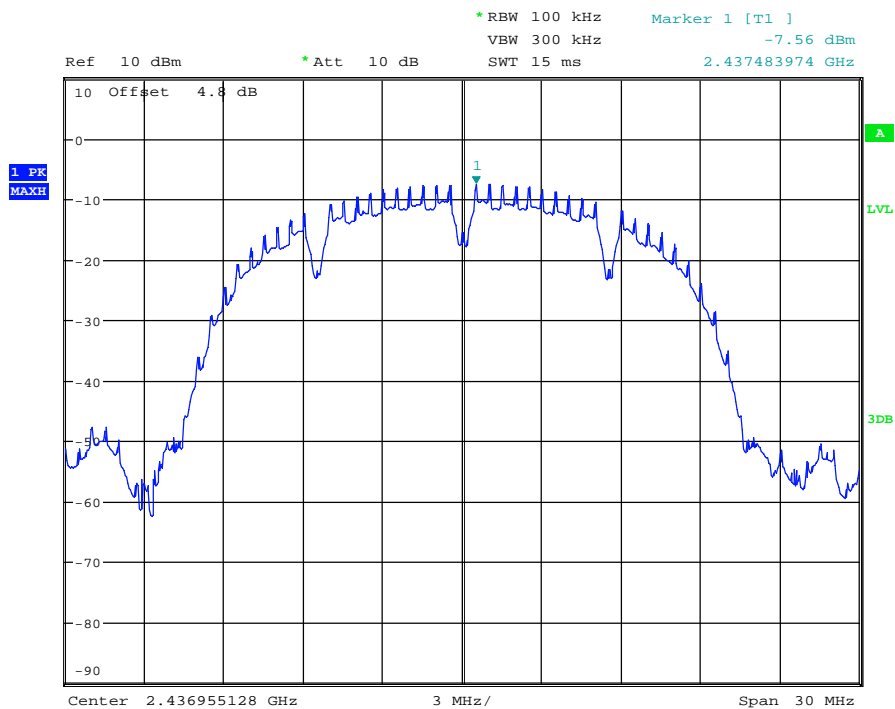
Date: 3.MAY.2012 11:21:32

Conducted power spectral density – 802.11b Channel 1 – Chain 0



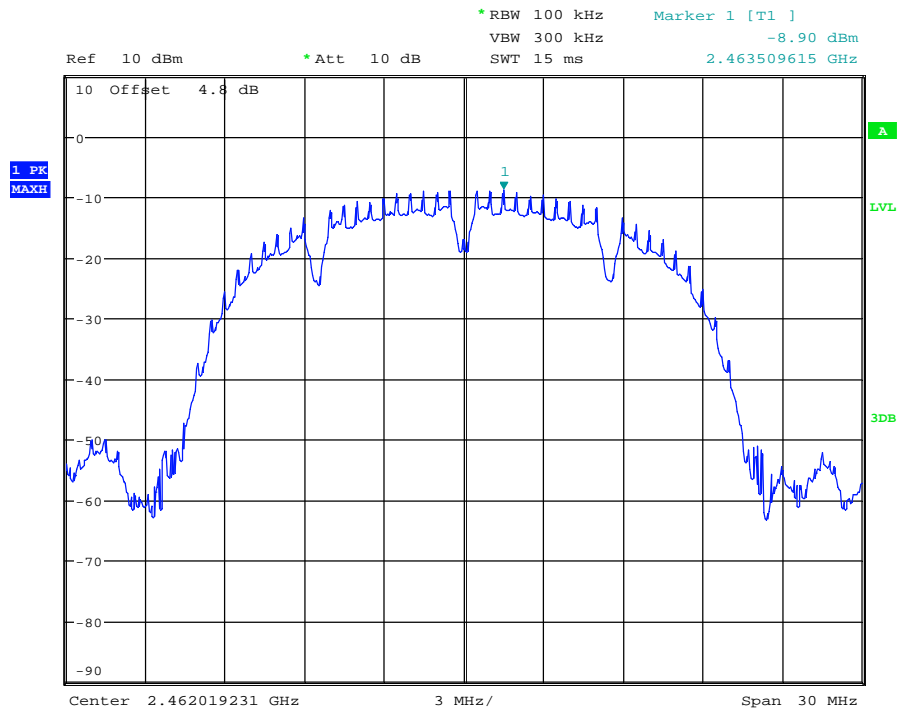
Date: 25.APR.2012 19:29:10

Conducted power spectral density – 802.11b Channel 6– Chain 0



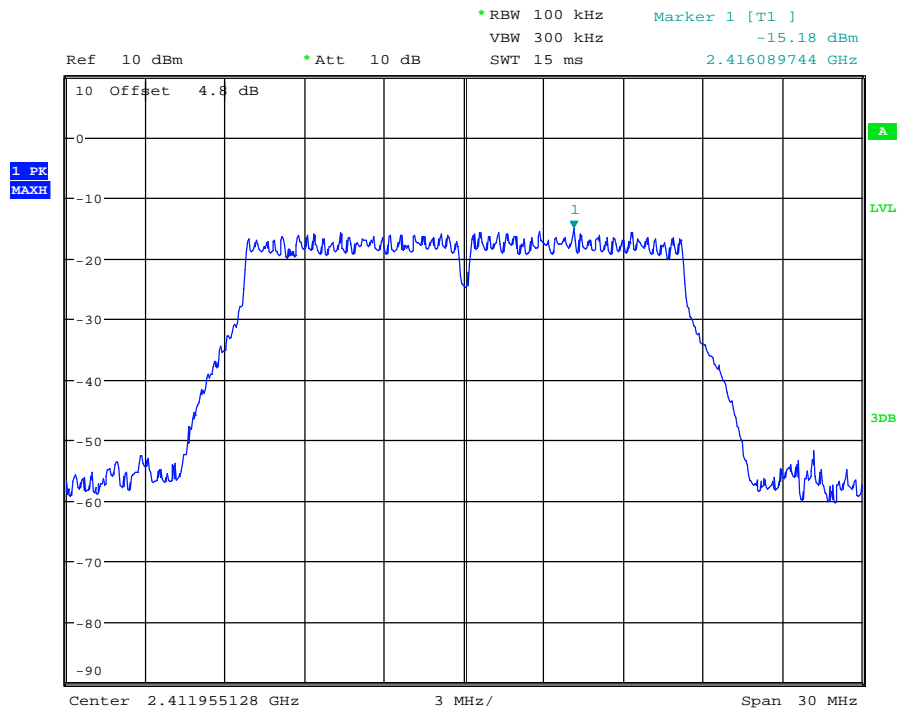
Date: 25.APR.2012 19:40:34

Conducted power spectral density – 802.11b Channel 11– Chain 0



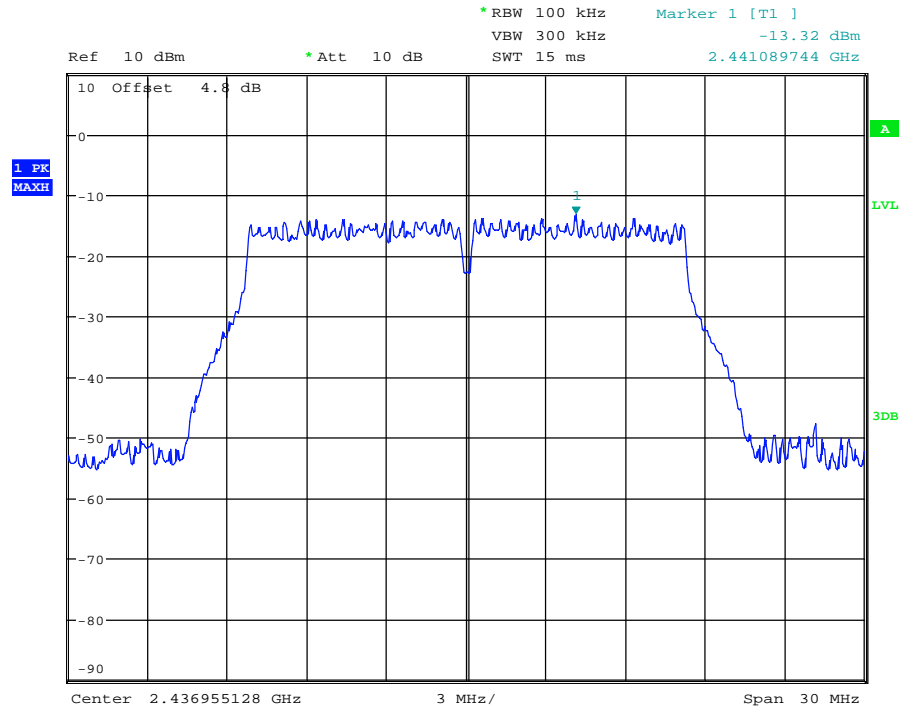
Date: 25.APR.2012 20:05:52

Conducted power spectral density – 802.11g Channel 1– Chain 0



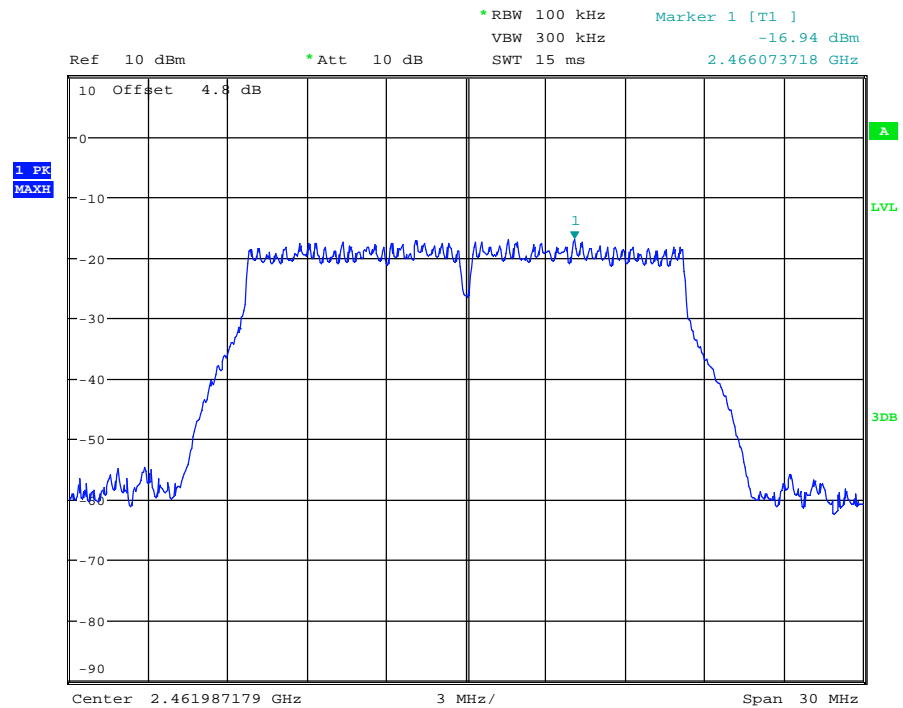
Date: 25.APR.2012 20:24:49

Conducted power spectral density – 802.11g Channel 6– Chain 0



Date: 25.APR.2012 20:32:07

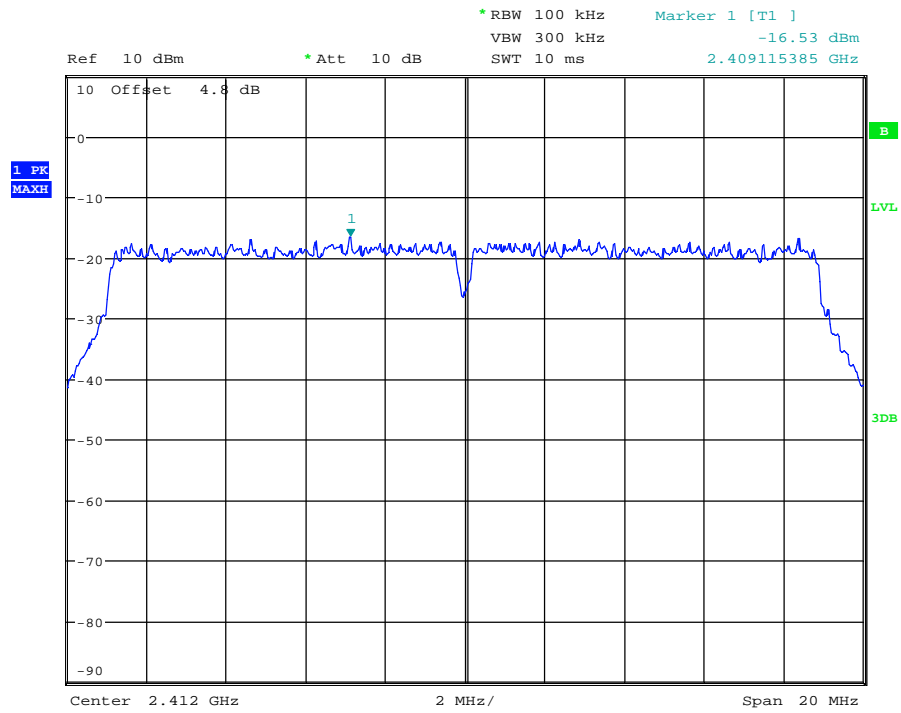
Conducted power spectral density – 802.11g Channel 11– Chain 0



Date: 25.APR.2012 20:41:34

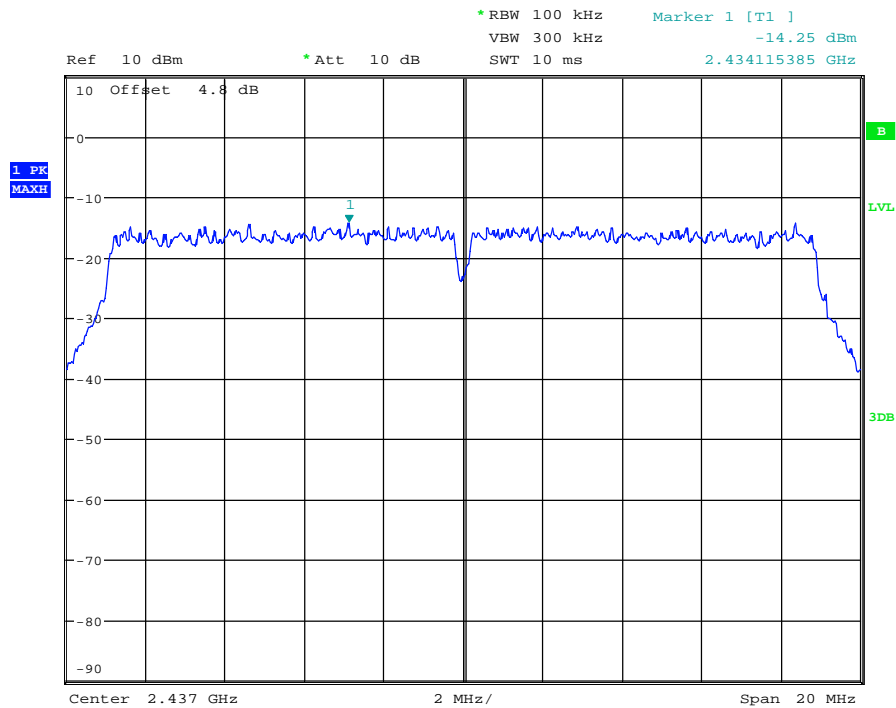


Conducted power spectral density – 802.11n HT20 Channel 1– Chain 0



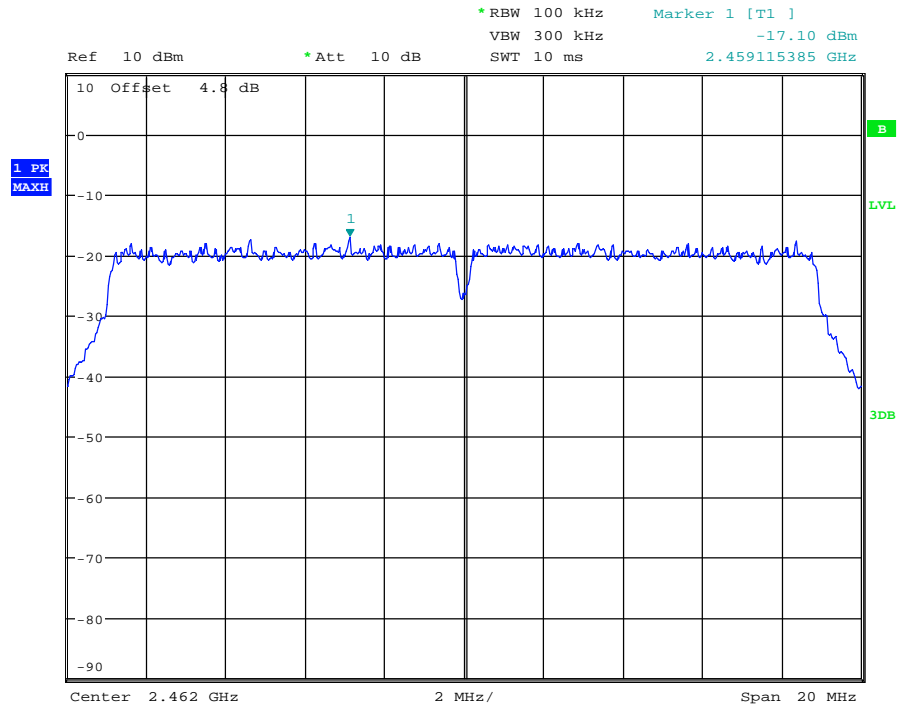
Date: 26.APR.2012 06:44:33

Conducted power spectral density – 802.11n HT20 Channel 6– Chain 0



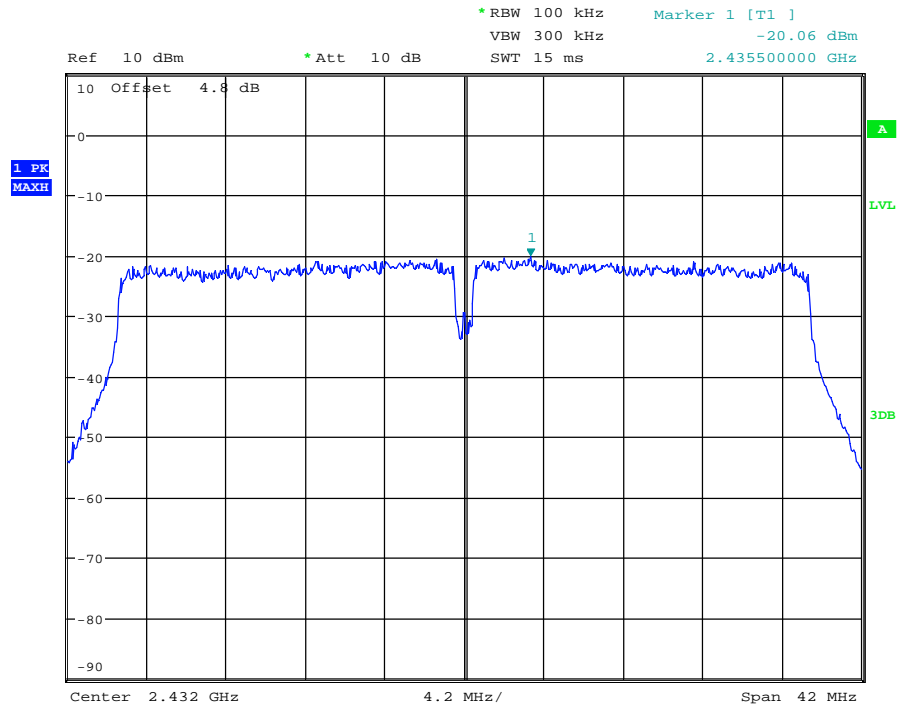
Date: 26.APR.2012 06:45:30

Conducted power spectral density – 802.11n HT20 Channel 11– Chain 0



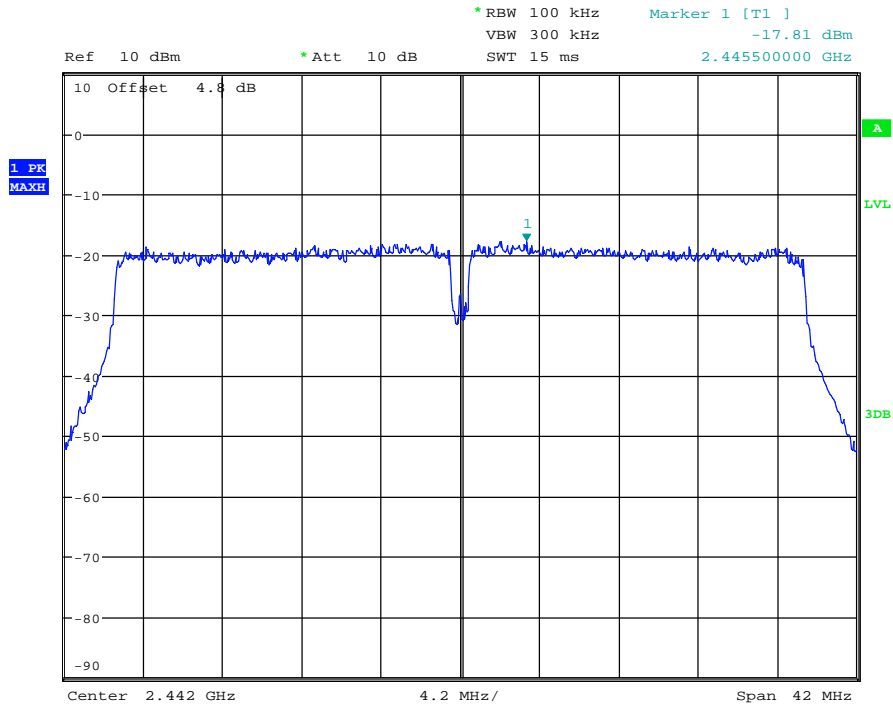
Date: 26.APR.2012 06:46:43

Conducted power spectral density – 802.11n HT40 Channel 3– Chain 0



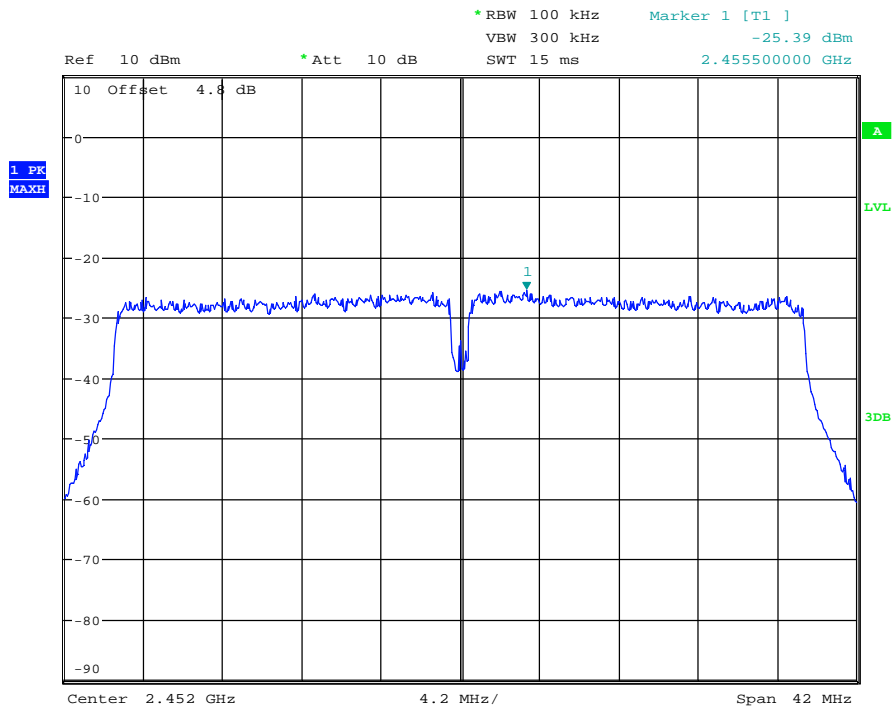
Date: 26.APR.2012 07:49:17

Conducted power spectral density – 802.11n HT40 Channel 5– Chain 0



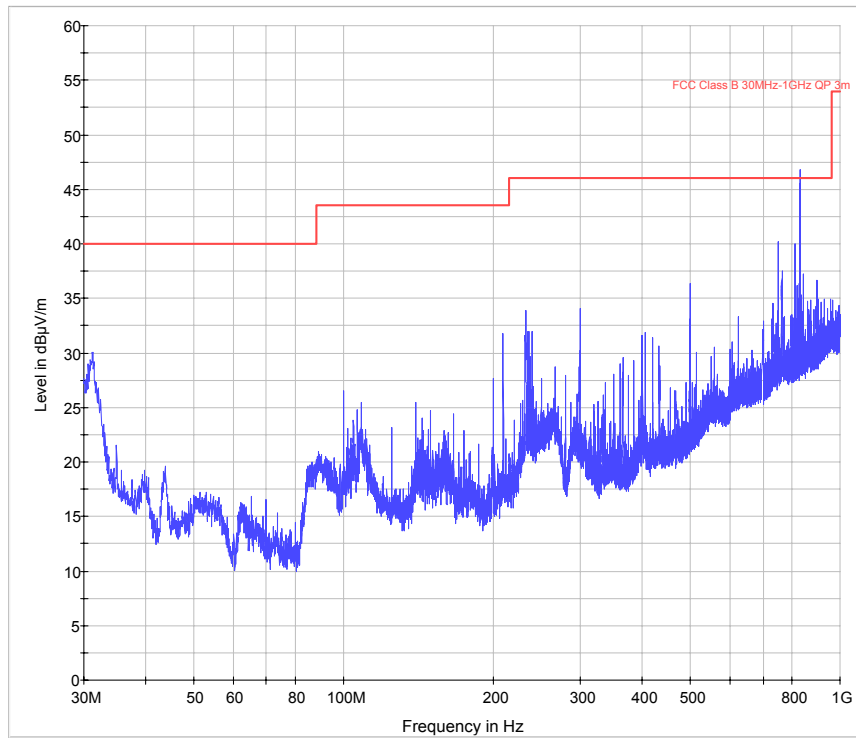
Date: 26.APR.2012 07:50:06

Conducted power spectral density – 802.11n HT40 Channel 7– Chain 0

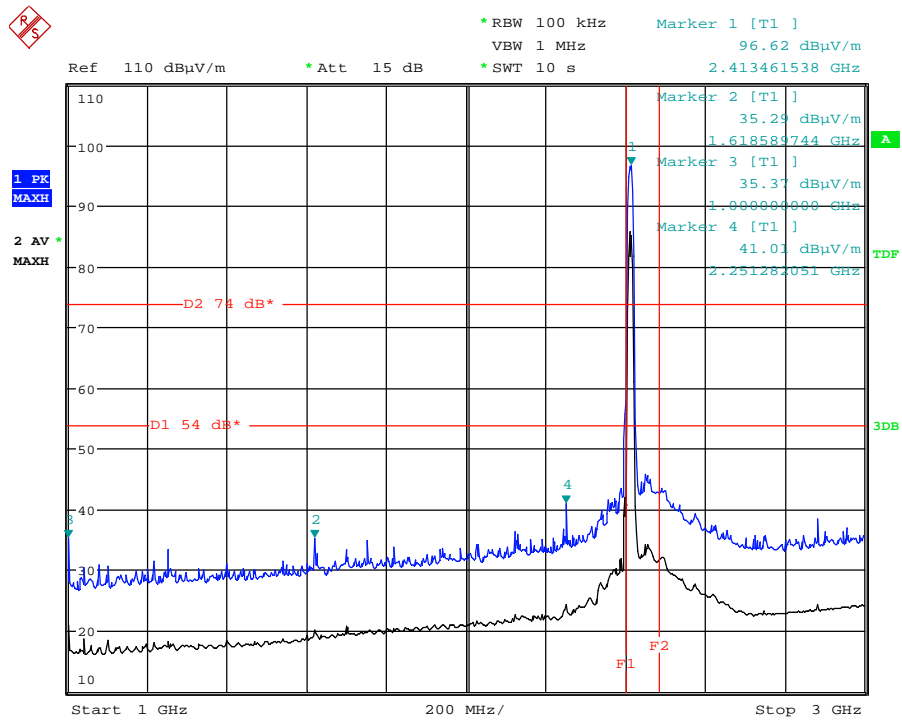


Date: 26.APR.2012 07:50:55

Radiated spurious emissions 30MHz to 1GHz – 802.11b Channel 1

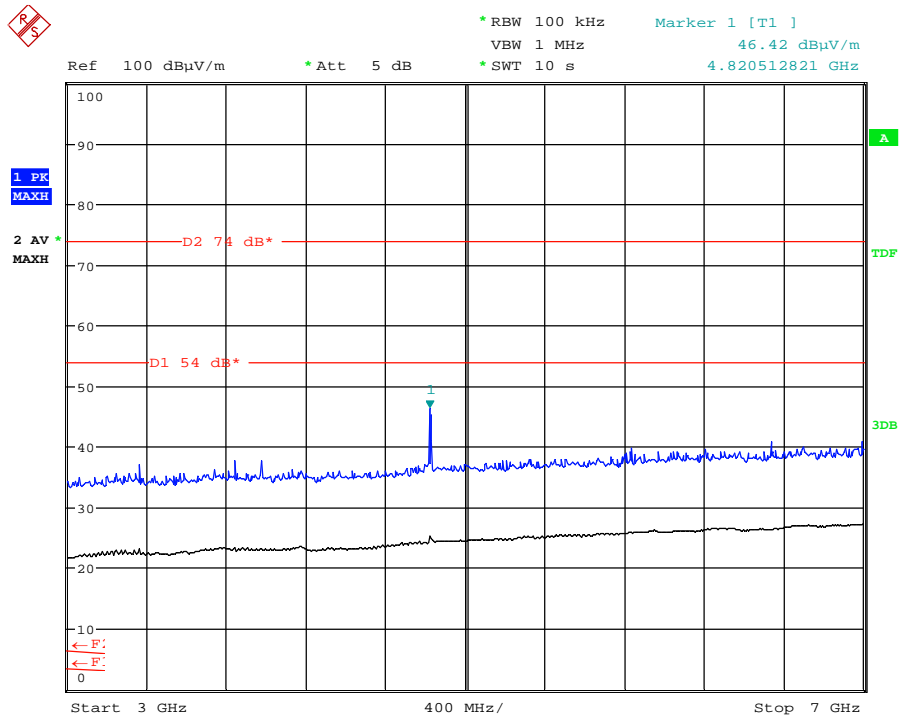


Radiated spurious emissions 1GHz – 3GHz – 802.11b Channel 1



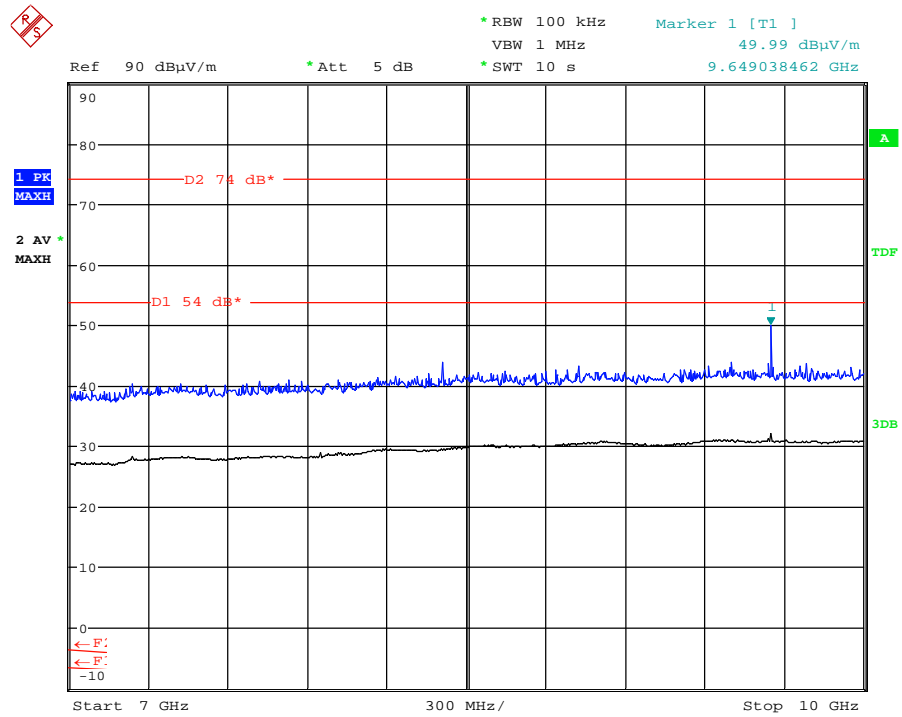
Date: 23.APR.2012 11:20:47

Radiated spurious emissions 3GHz to 7GHz – 802.11b Channel 1



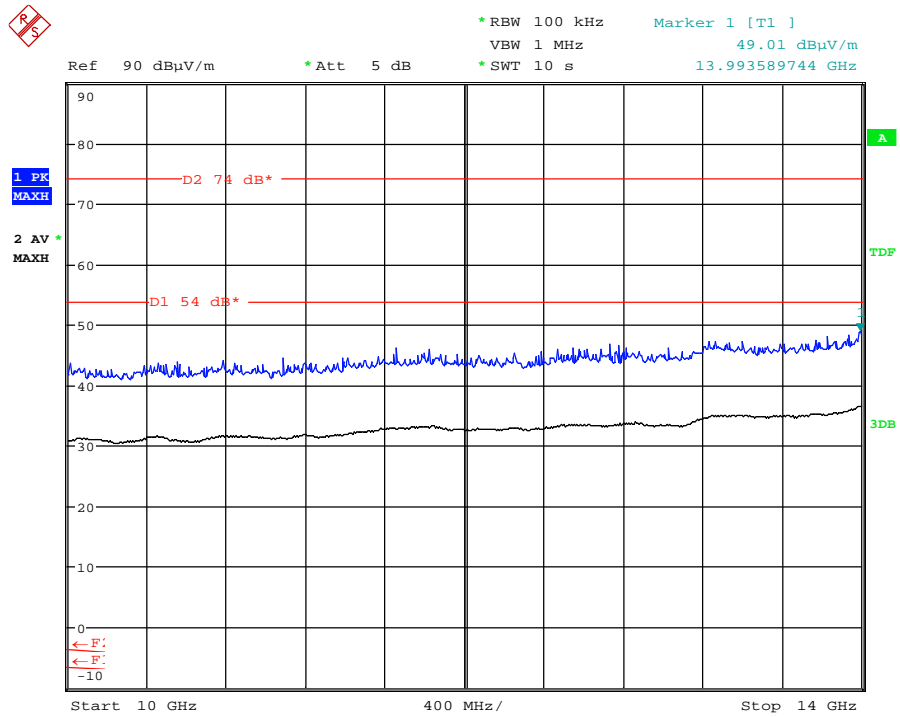
Date: 23.APR.2012 12:00:11

Radiated spurious emissions 7GHz to 10GHz – 802.11b Channel 1



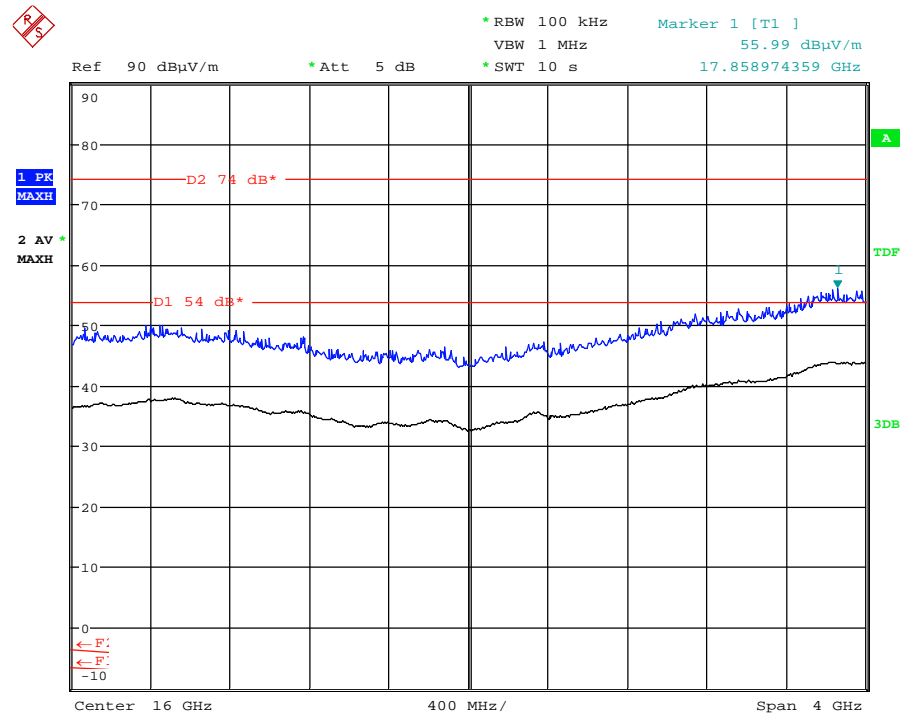
Date: 23.APR.2012 11:53:08

Radiated spurious emissions 10GHz to 14GHz – 802.11b Channel 1



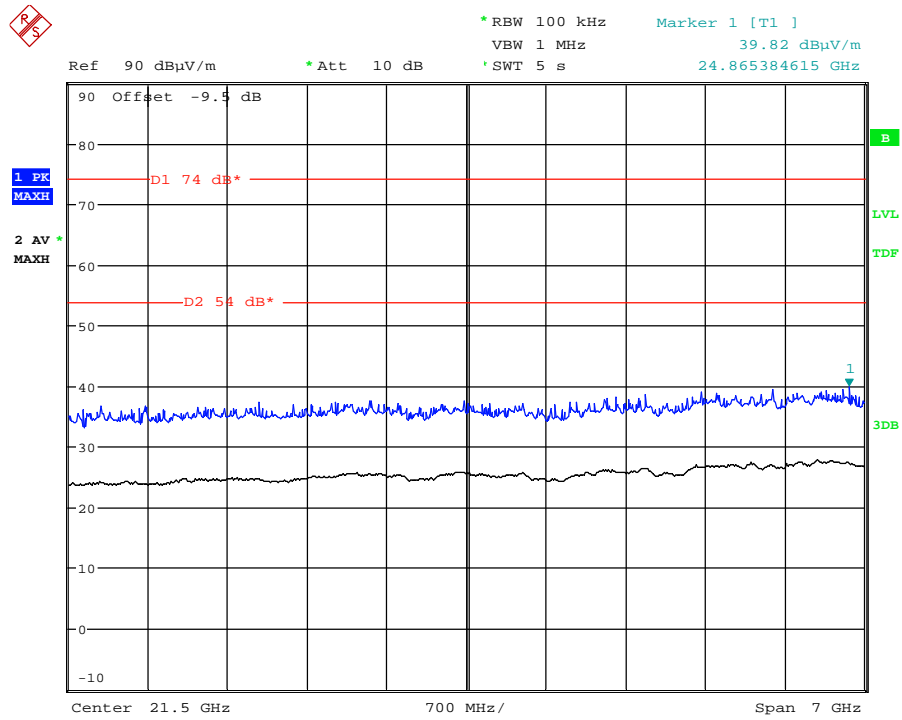
Date: 23.APR.2012 11:52:34

Radiated spurious emissions 14GHz to 18GHz – 802.11b Channel 1



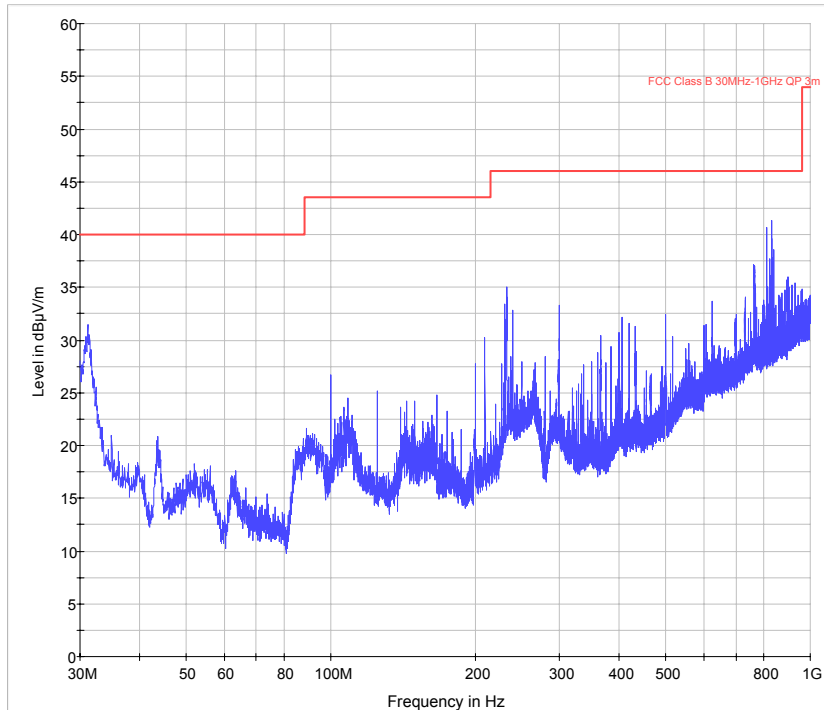
Date: 23.APR.2012 11:51:43

Radiated spurious emissions 18GHz to 25GHz – 802.11b Channel 1

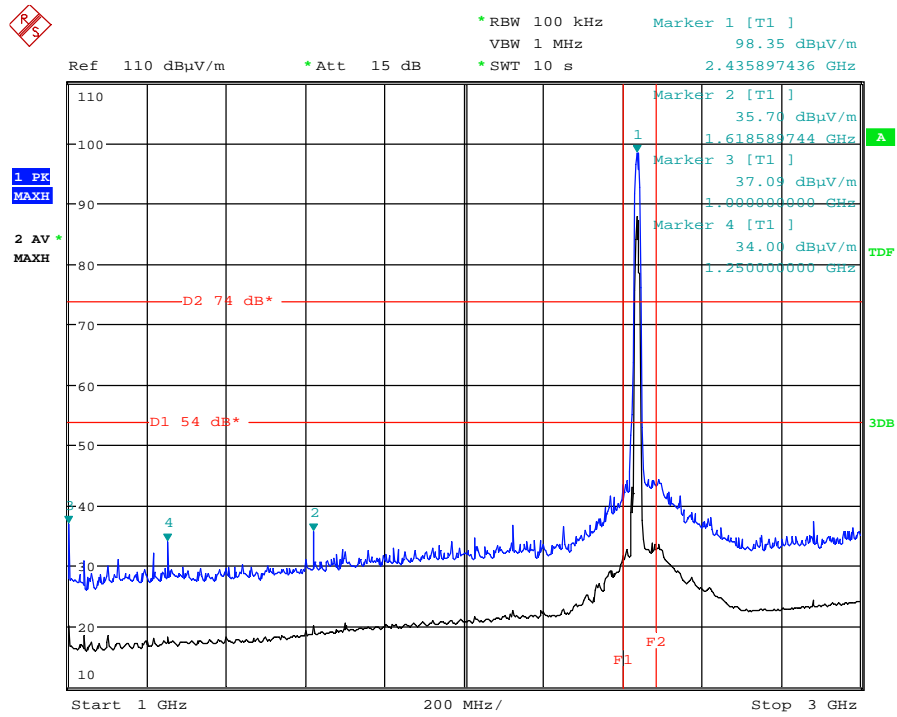


Date: 24.APR.2012 12:48:30

Radiated spurious emissions 30MHz to 1GHz – 802.11b Channel 6

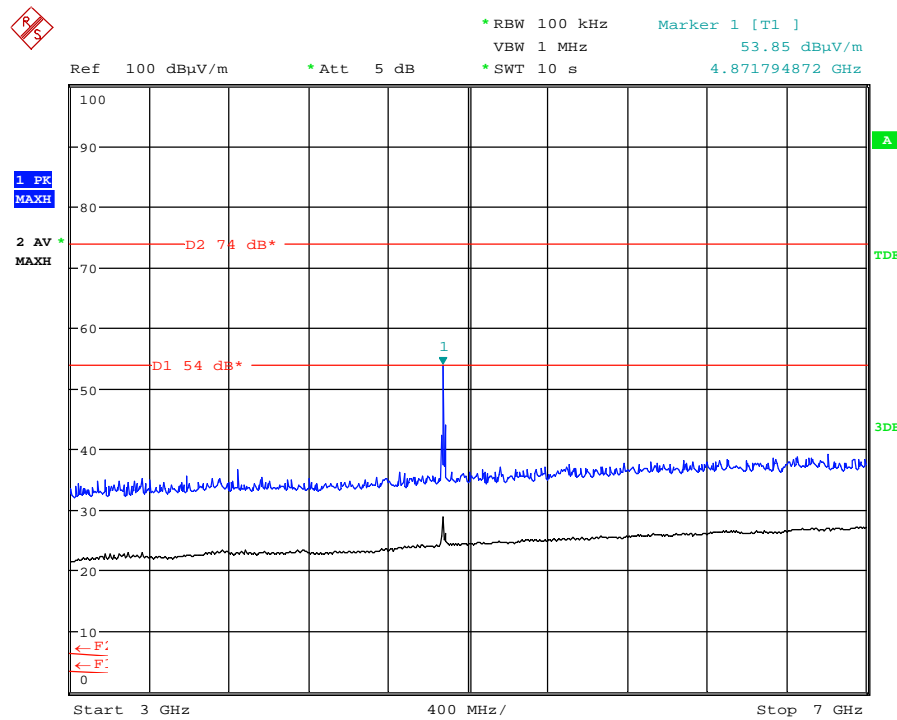


Radiated spurious emissions 1GHz to 3GHz – 802.11b Channel 6



Date: 23.APR.2012 11:08:14

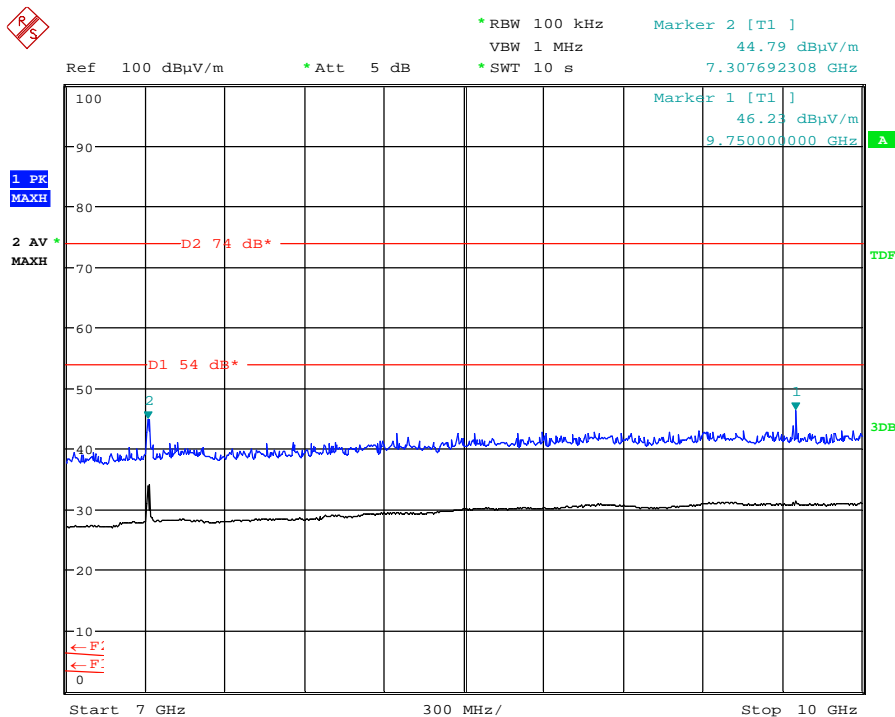
Radiated spurious emissions 3GHz to 7GHz – 802.11b Channel 6



Date: 23.APR.2012 12:01:22

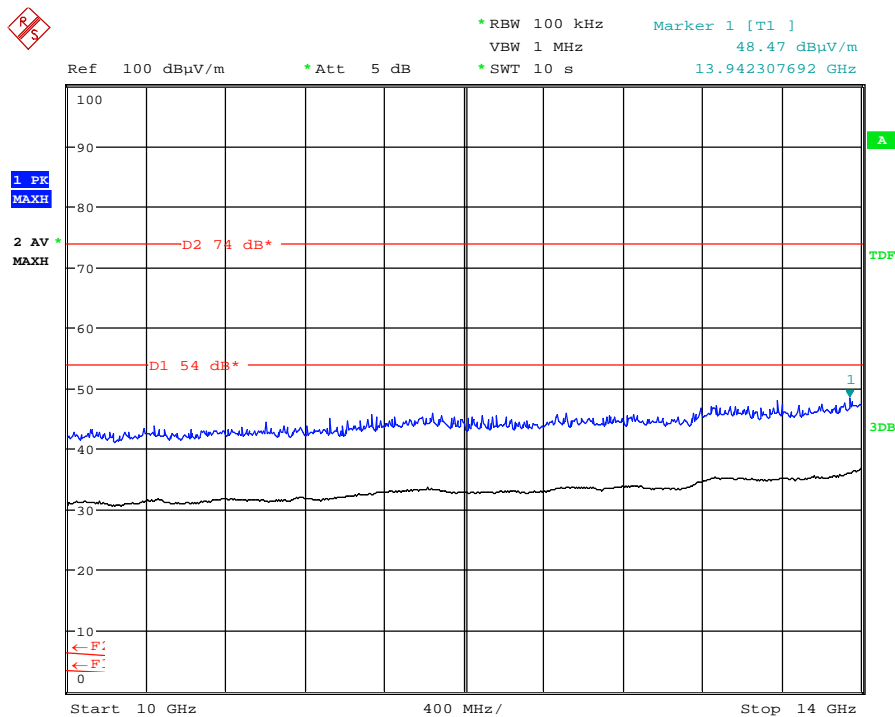


Radiated spurious emissions 7GHz to 10GHz – 802.11b Channel 6



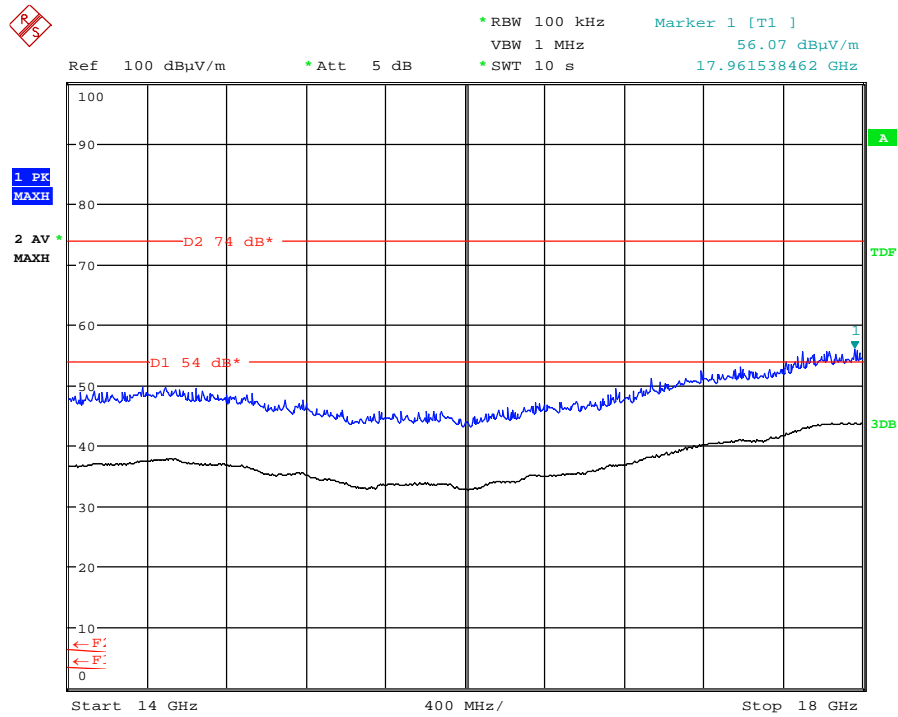
Date: 23.APR.2012 12:02:05

Radiated spurious emissions 10GHz to 14GHz – 802.11b Channel 6



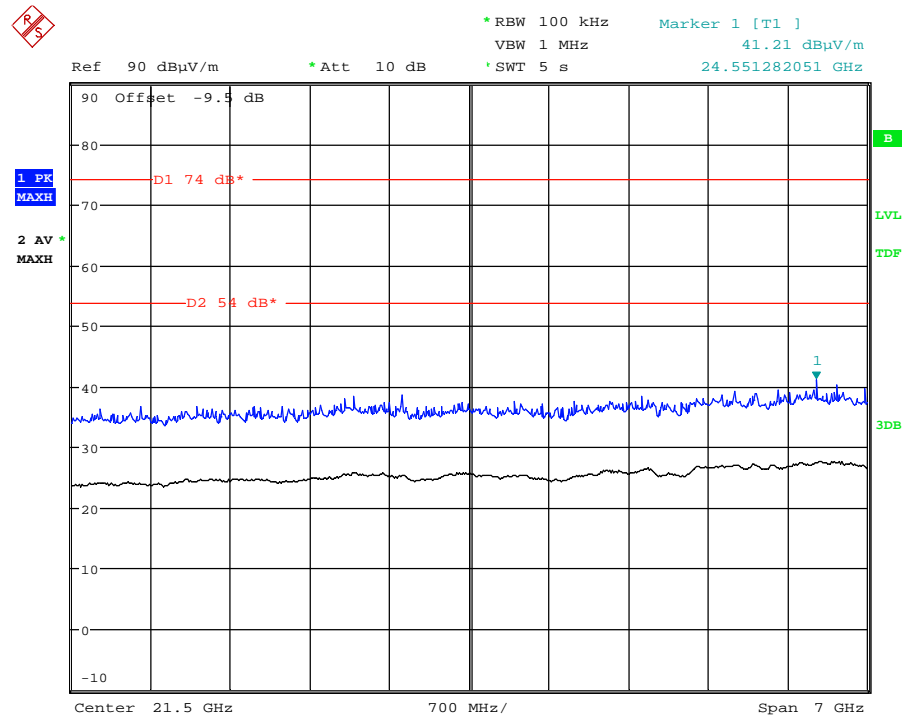
Date: 23.APR.2012 12:02:39

Radiated spurious emissions 14GHz to 18GHz – 802.11b Channel 6



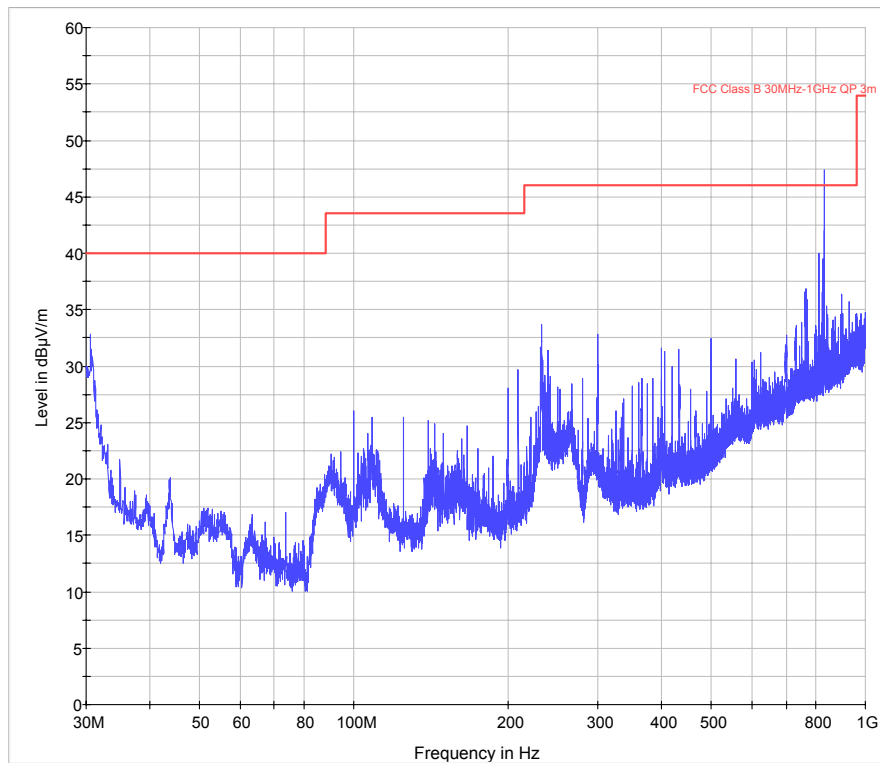
Date: 23.APR.2012 12:03:08

Radiated spurious emissions 18GHz to 25GHz – 802.11b Channel 6

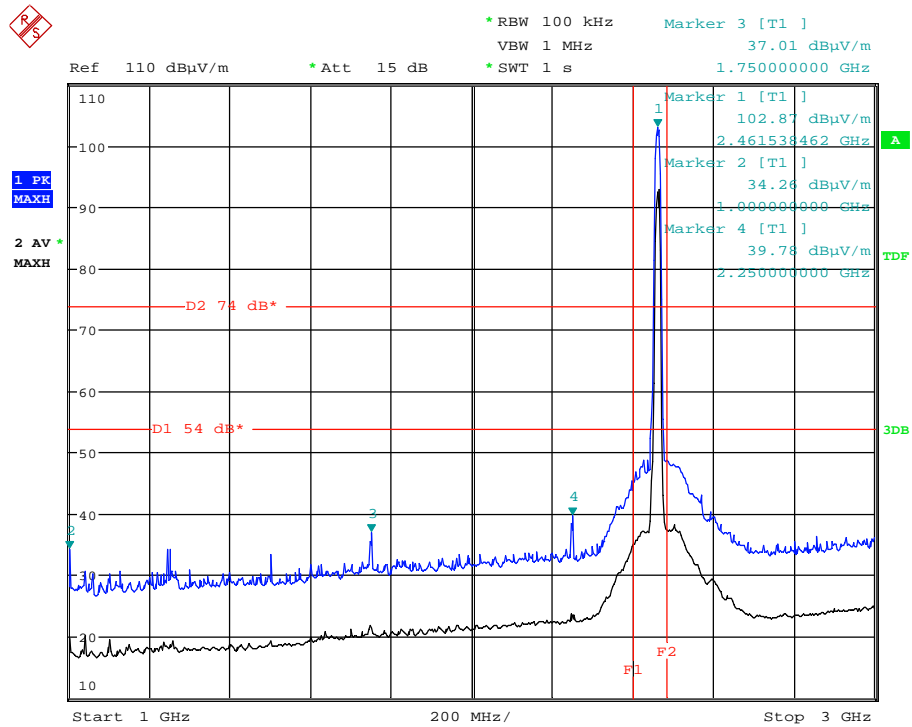


Date: 24.APR.2012 12:49:30

Radiated spurious emissions 30MHz to 1GHz – 802.11b Channel 11

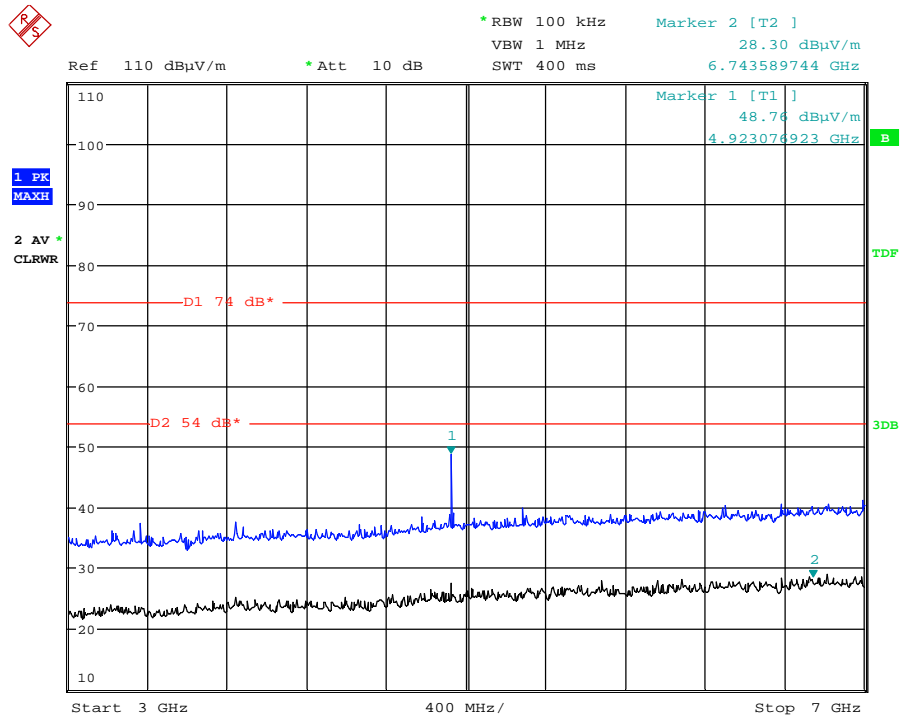


Radiated spurious emissions 1GHz to 3GHz – 802.11b Channel 11



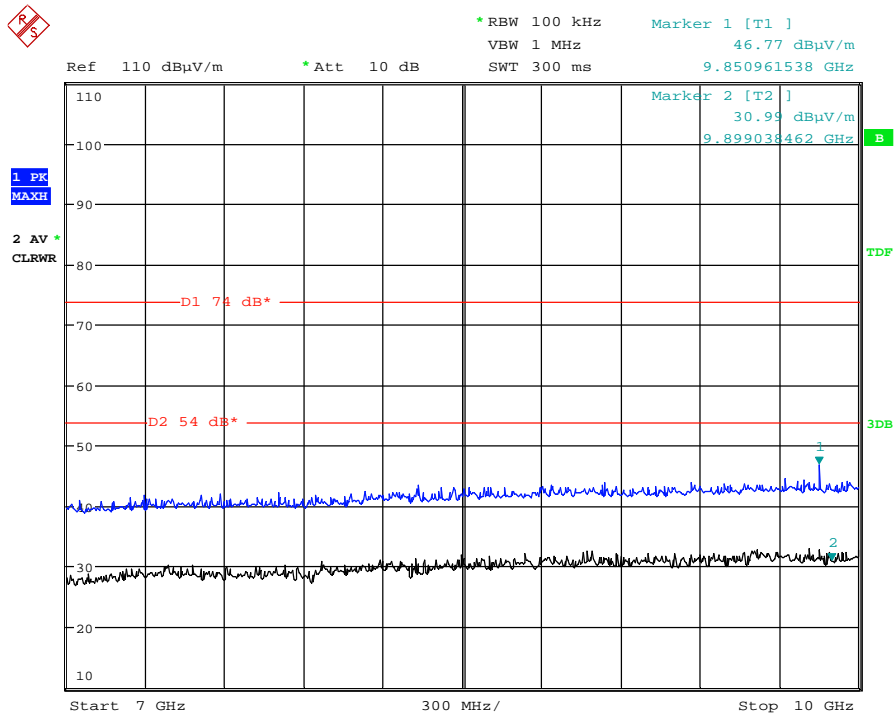
Date: 23.APR.2012 08:08:50

Radiated spurious emissions 3GHz to 7GHz – 802.11b Channel 11



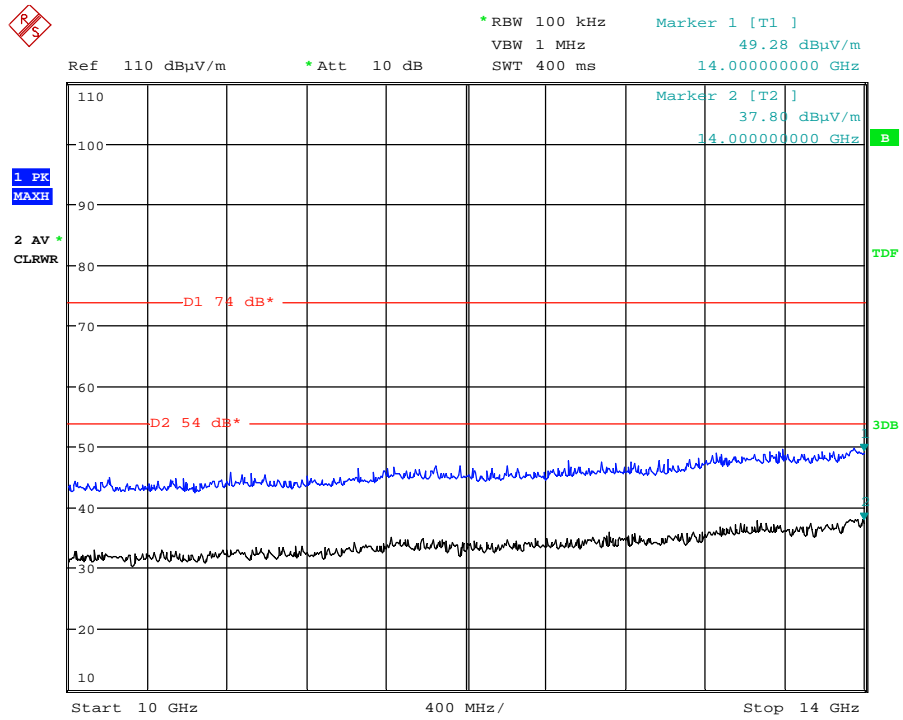
Date: 24.APR.2012 19:07:53

Radiated spurious emissions 7GHz to 10GHz – 802.11b Channel 11



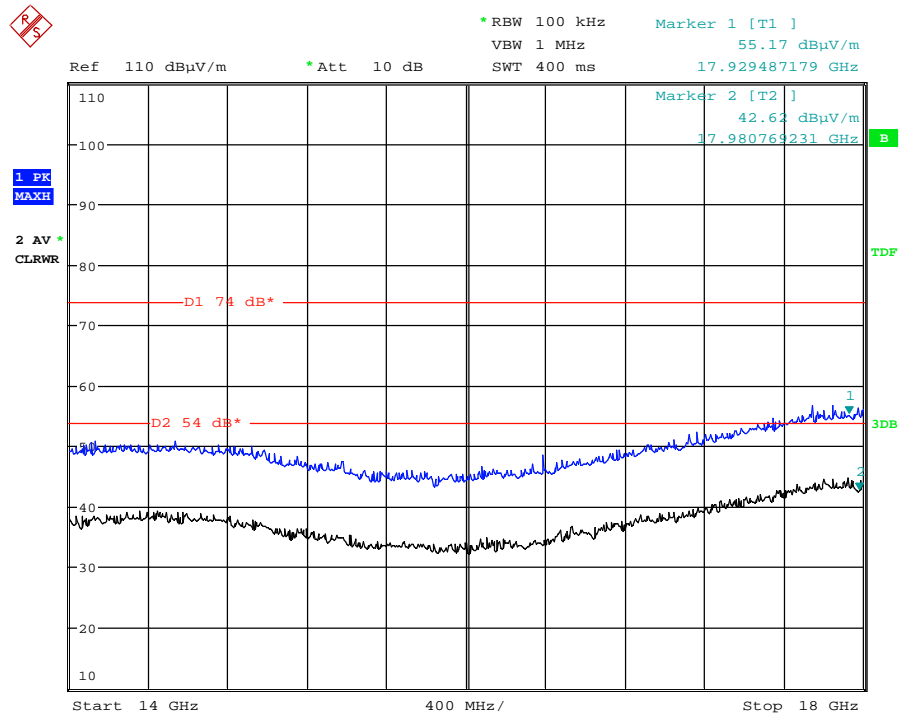
Date: 24.APR.2012 19:05:55

Radiated spurious emissions 10GHz to 14GHz – 802.11b Channel 11



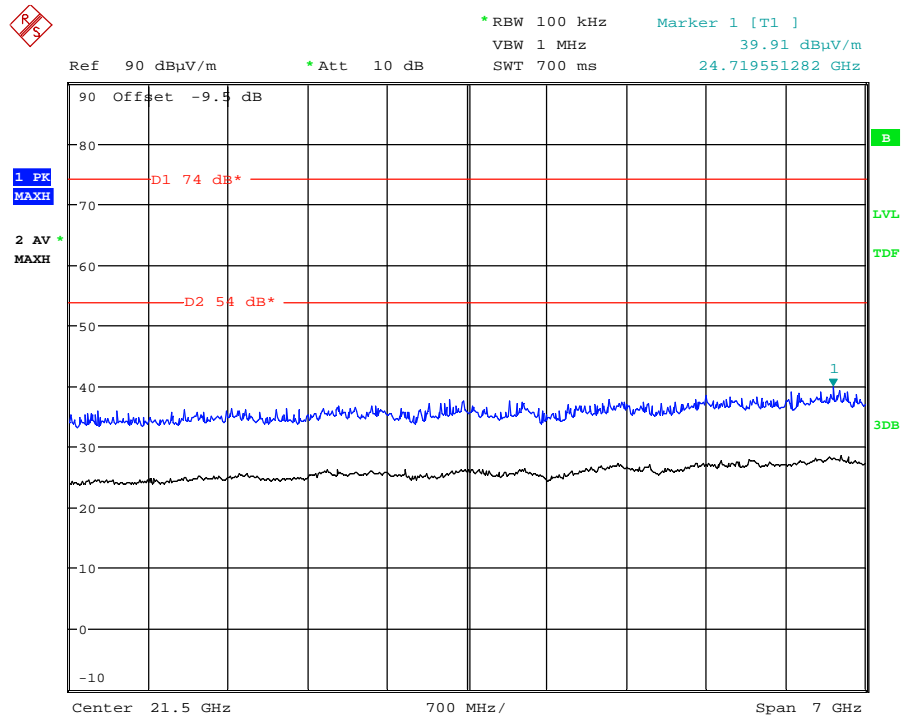
Date: 24.APR.2012 19:03:27

Radiated spurious emissions 14GHz to 18GHz – 802.11b Channel 11



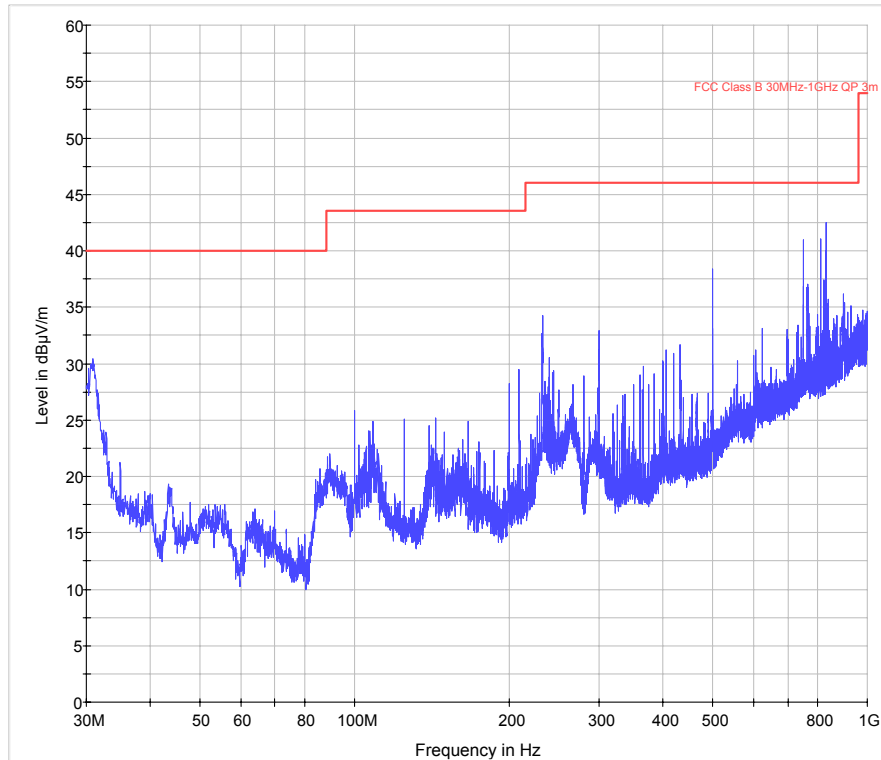
Date: 24.APR.2012 19:01:27

Radiated spurious emissions 18GHz to 25GHz – 802.11b Channel 11

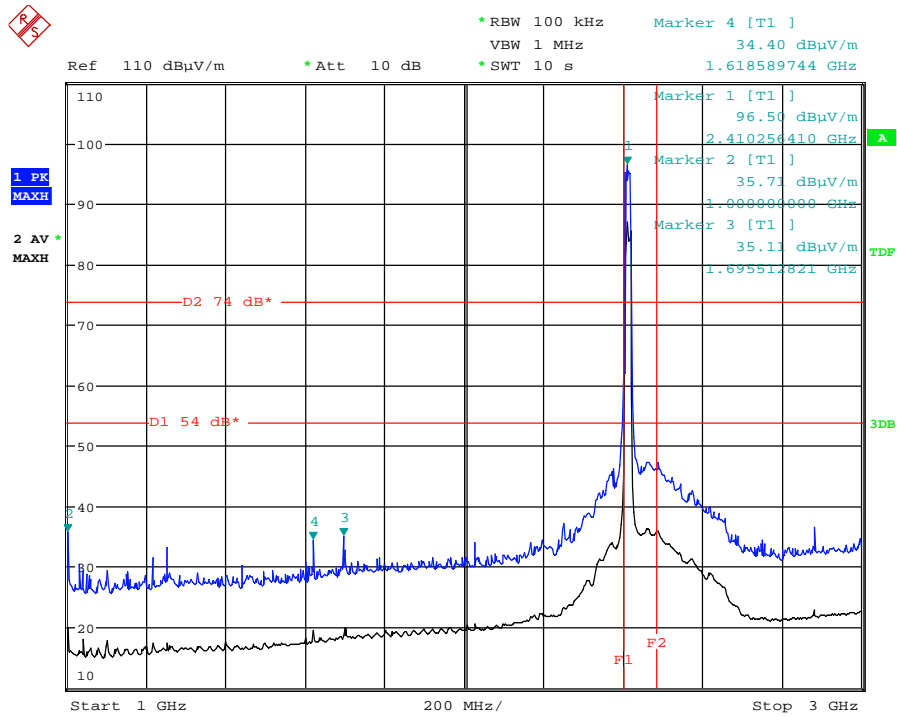


Date: 24.APR.2012 12:57:44

Radiated spurious emissions 30MHz to 1GHz – 802.11g Channel 1

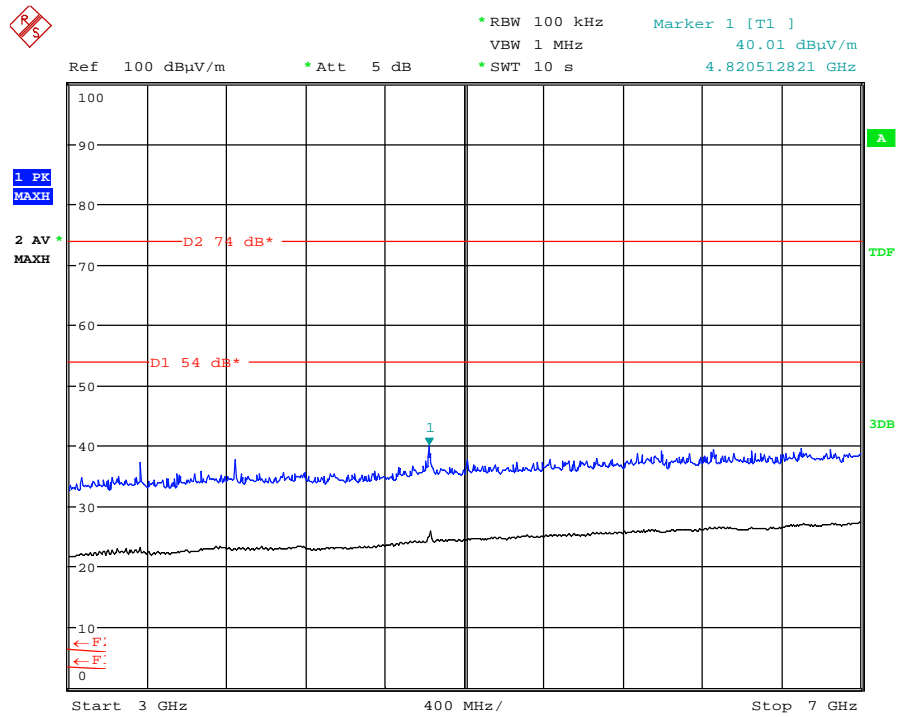


Radiated spurious emissions 1GHz to 3GHz – 802.11g Channel 1



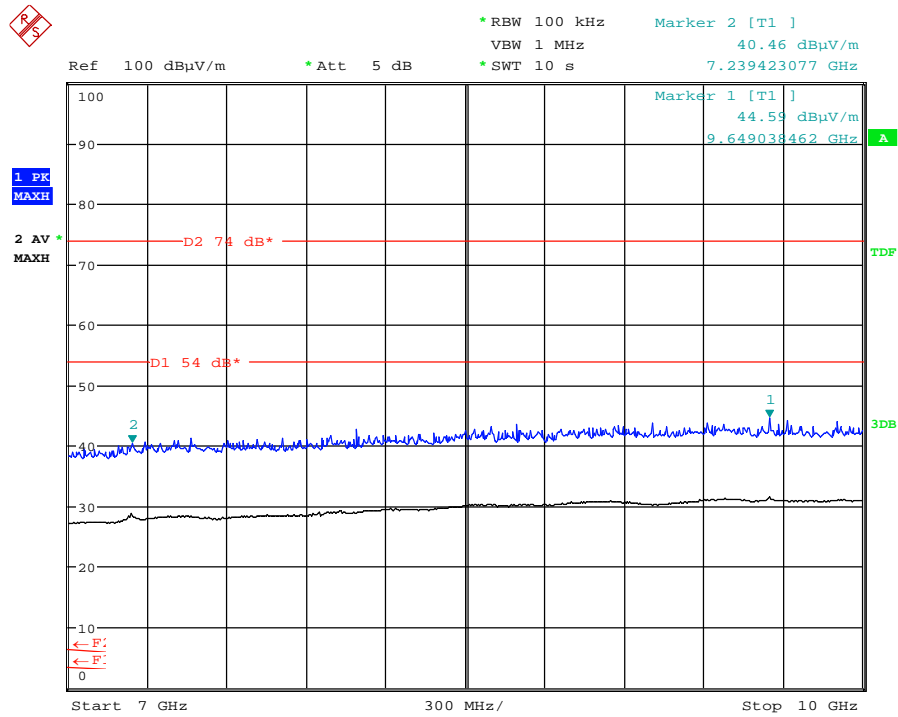
Date: 23.APR.2012 10:52:40

Radiated spurious emissions 3GHz to 7GHz – 802.11g Channel 1



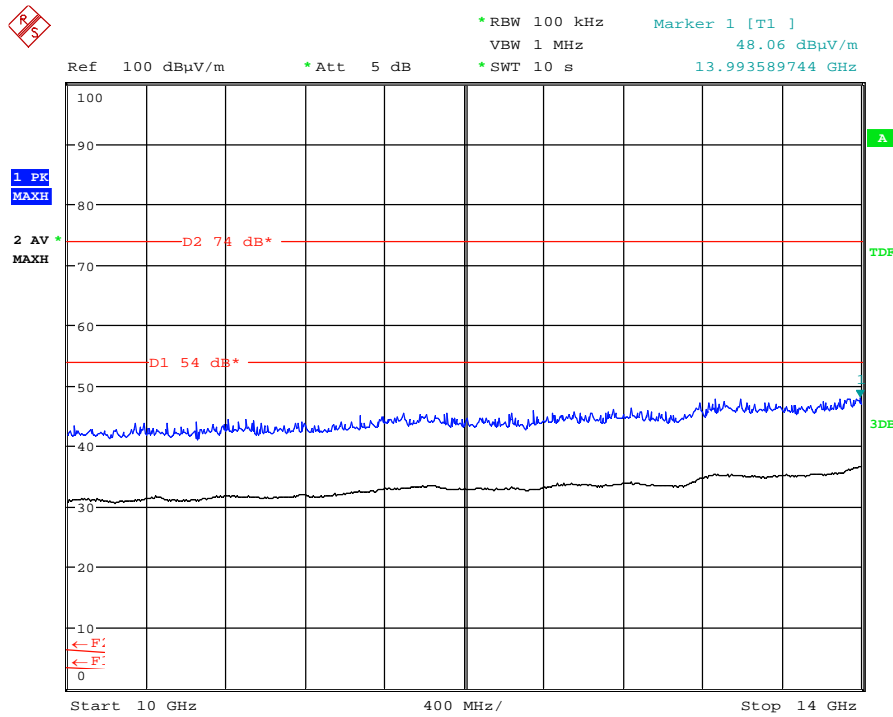
Date: 23.APR.2012 12:18:31

Radiated spurious emissions 7GHz to 10GHz – 802.11g Channel 1



Date: 23.APR.2012 12:19:48

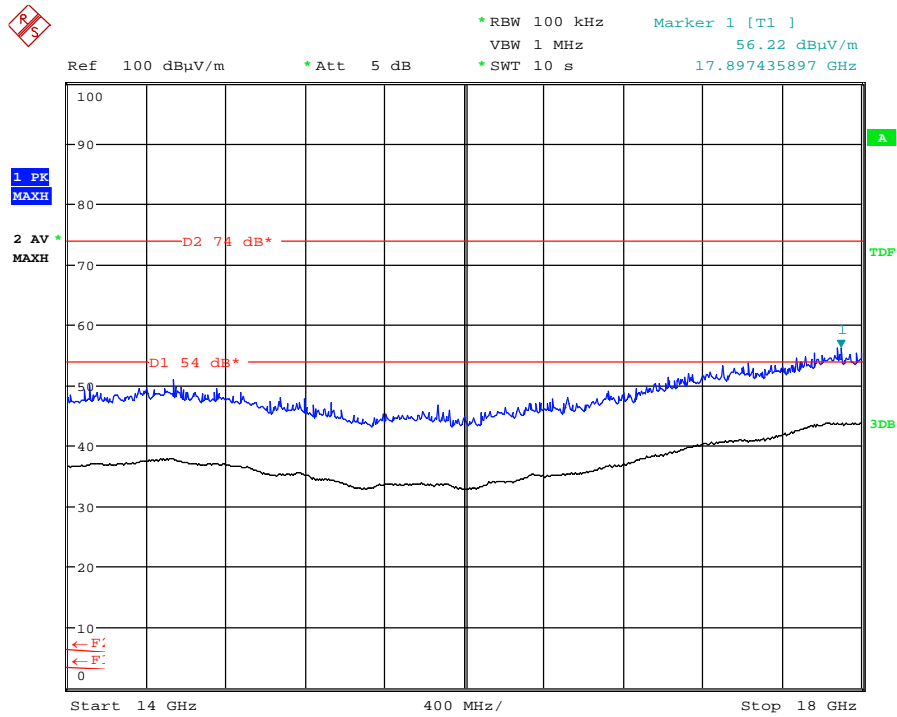
Radiated spurious emissions 10GHz to 14GHz – 802.11g Channel 1



Date: 23.APR.2012 12:20:29

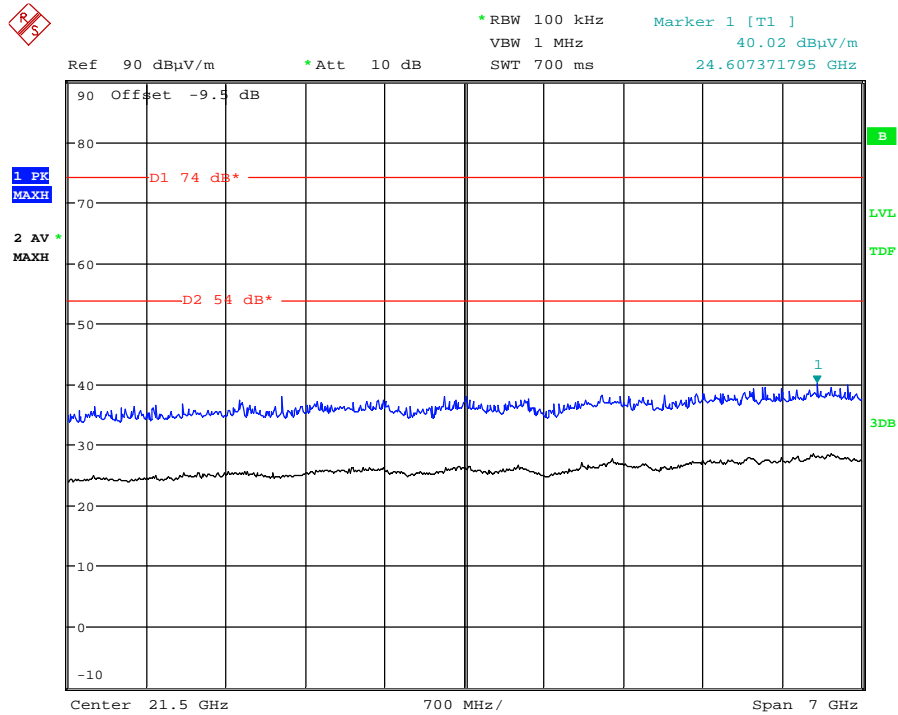


Radiated spurious emissions 14GHz to 18GHz – 802.11g Channel 1



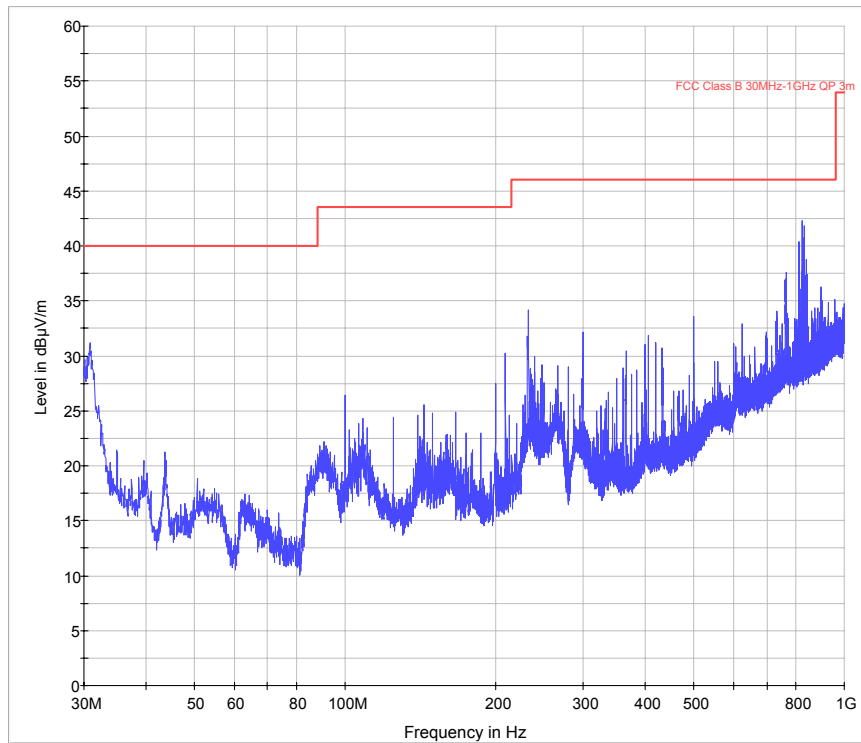
Date: 23.APR.2012 12:21:09

Radiated spurious emissions 18GHz to 25GHz – 802.11g Channel 1

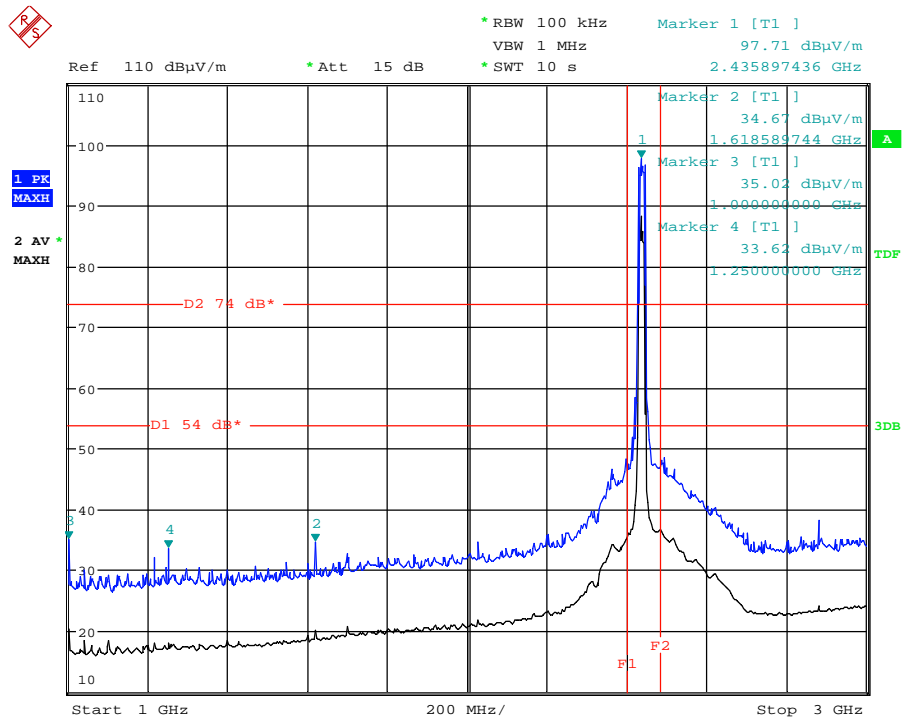


Date: 24.APR.2012 13:03:05

Radiated spurious emissions 30MHz to 1GHz – 802.11g Channel 6

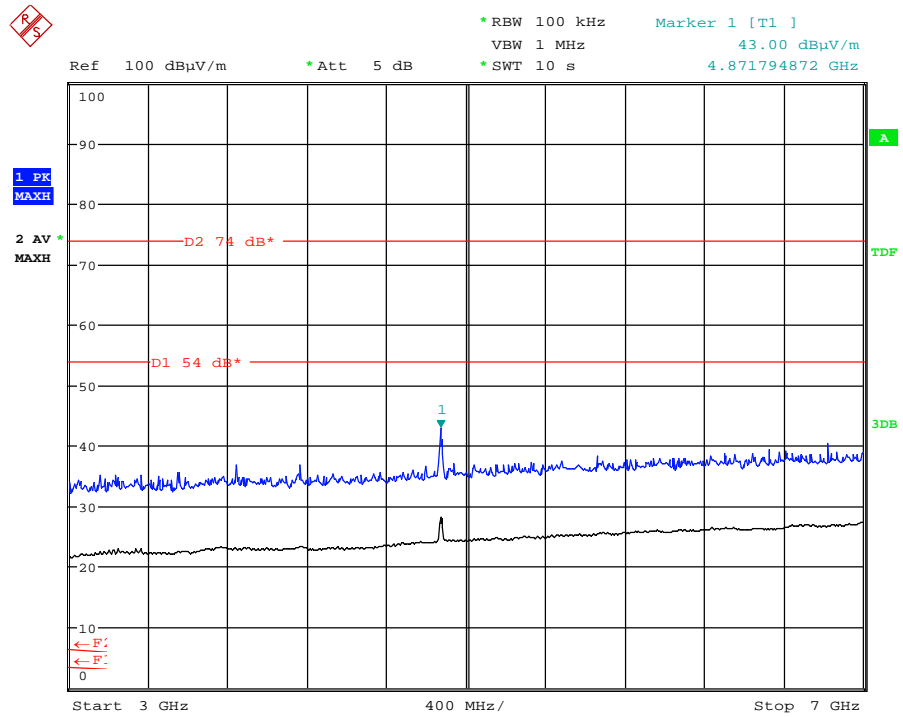


Radiated spurious emissions 1GHz to 3GHz – 802.11g Channel 6



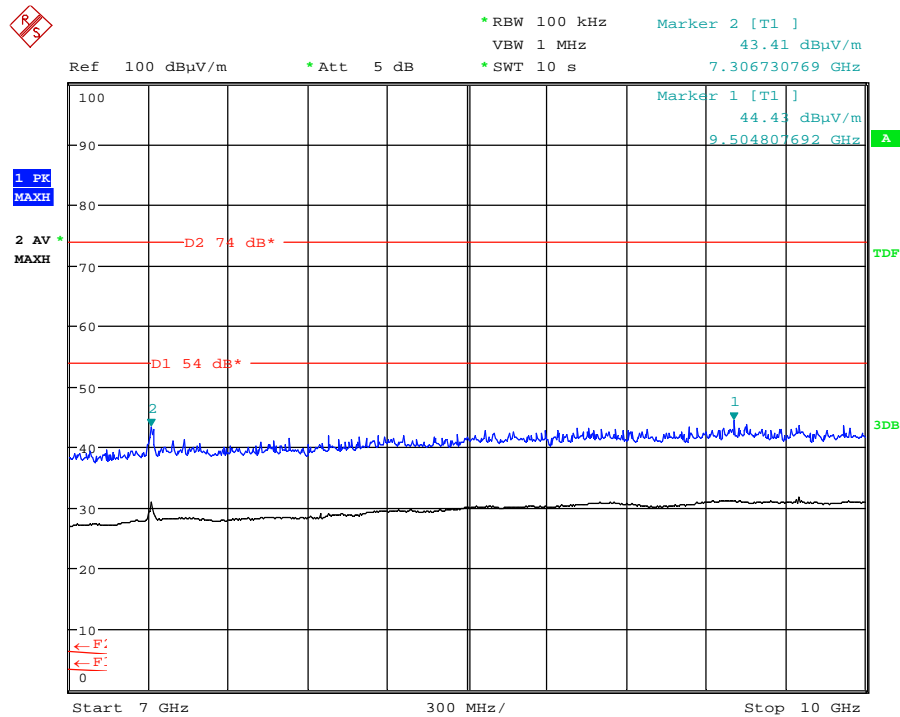
Date: 23.APR.2012 11:06:01

Radiated spurious emissions 3GHz to 7GHz – 802.11g Channel 6



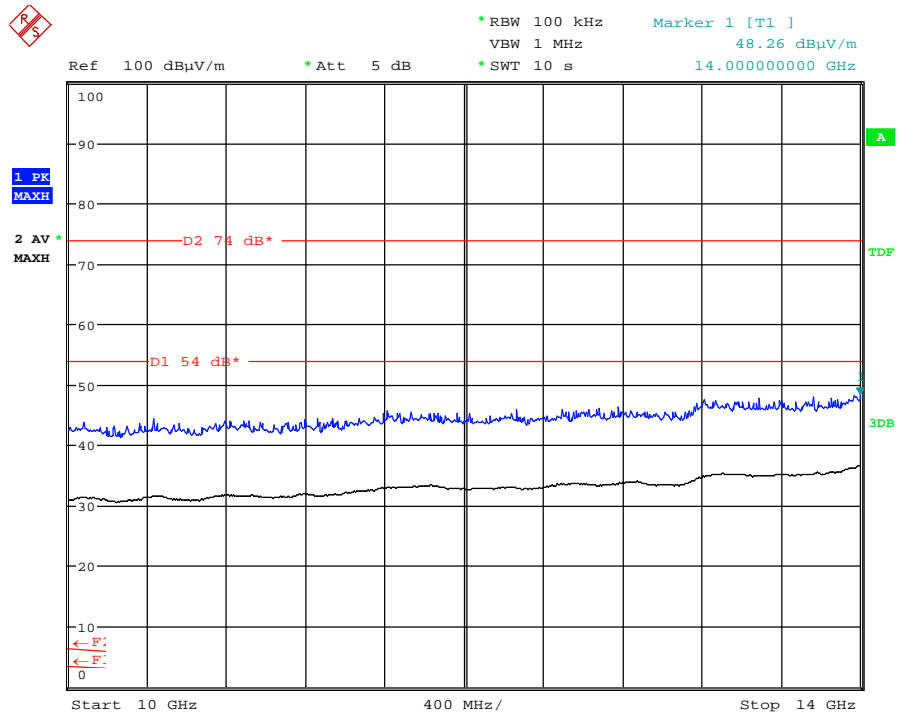
Date: 23.APR.2012 12:16:12

Radiated spurious emissions 7GHz to 10GHz – 802.11g Channel 6



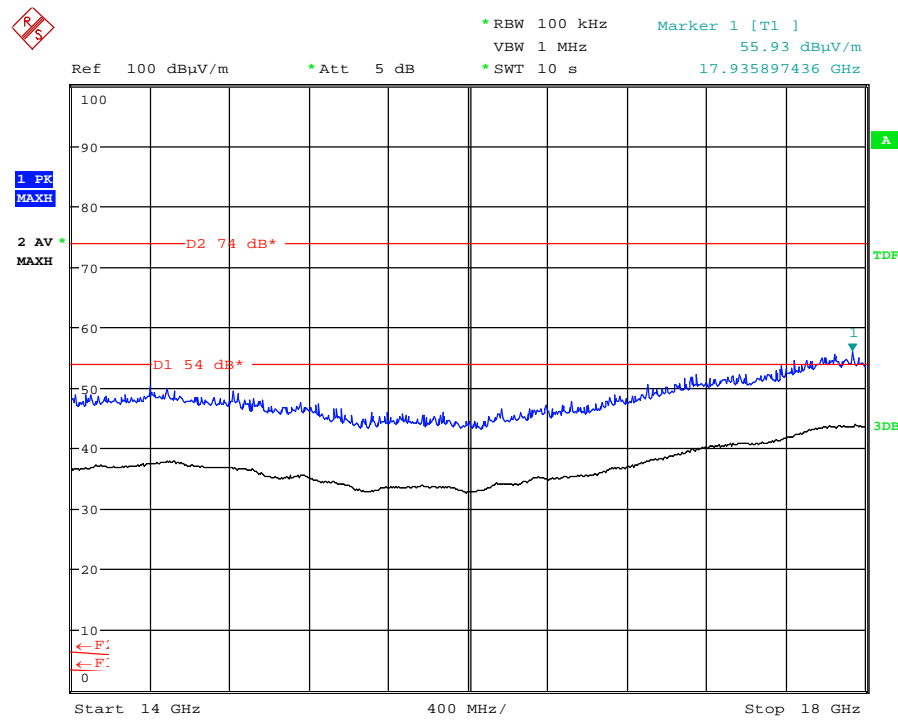
Date: 23.APR.2012 12:15:31

Radiated spurious emissions 10GHz to 14GHz – 802.11g Channel 6



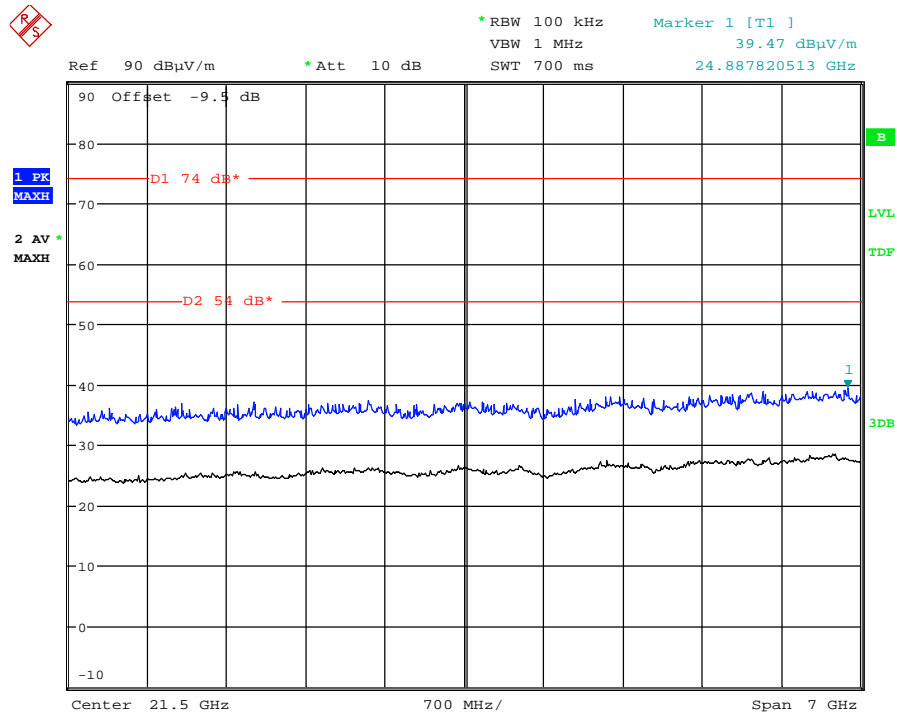
Date: 23.APR.2012 12:14:44

Radiated spurious emissions 14GHz to 18GHz – 802.11g Channel 6



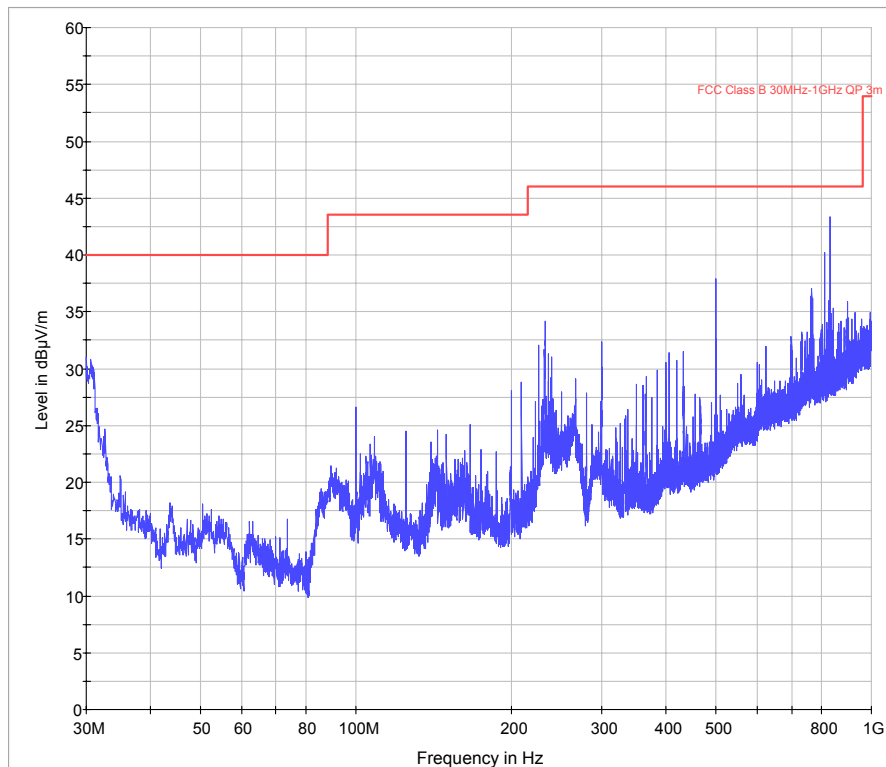
Date: 23.APR.2012 12:13:40

Radiated spurious emissions 18GHz to 25GHz – 802.11g Channel 6

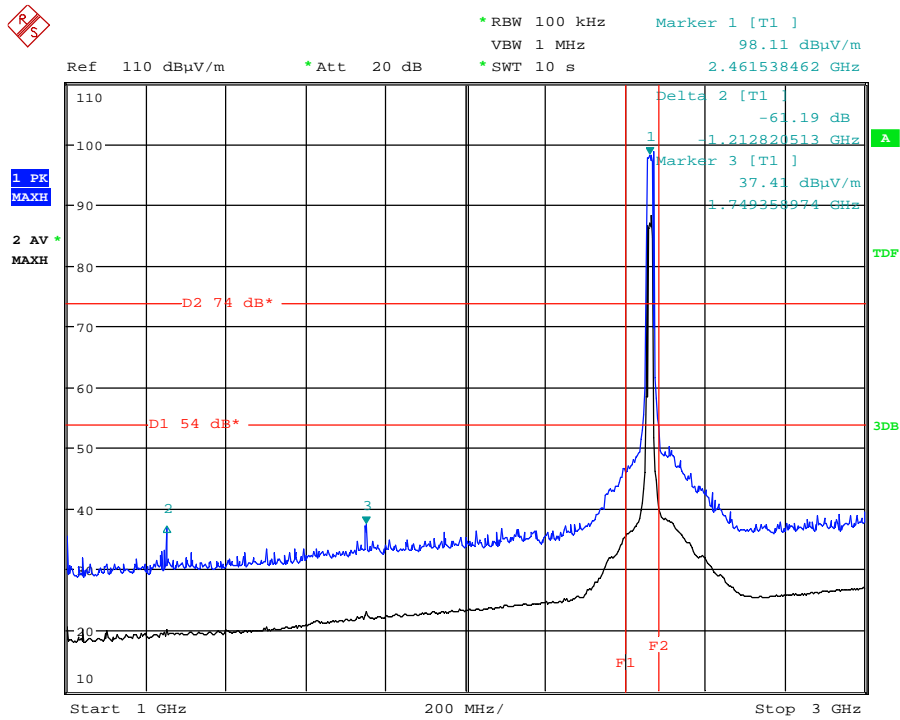


Date: 24.APR.2012 13:01:41

Radiated spurious emissions 30MHz to 1GHz – 802.11g Channel 11

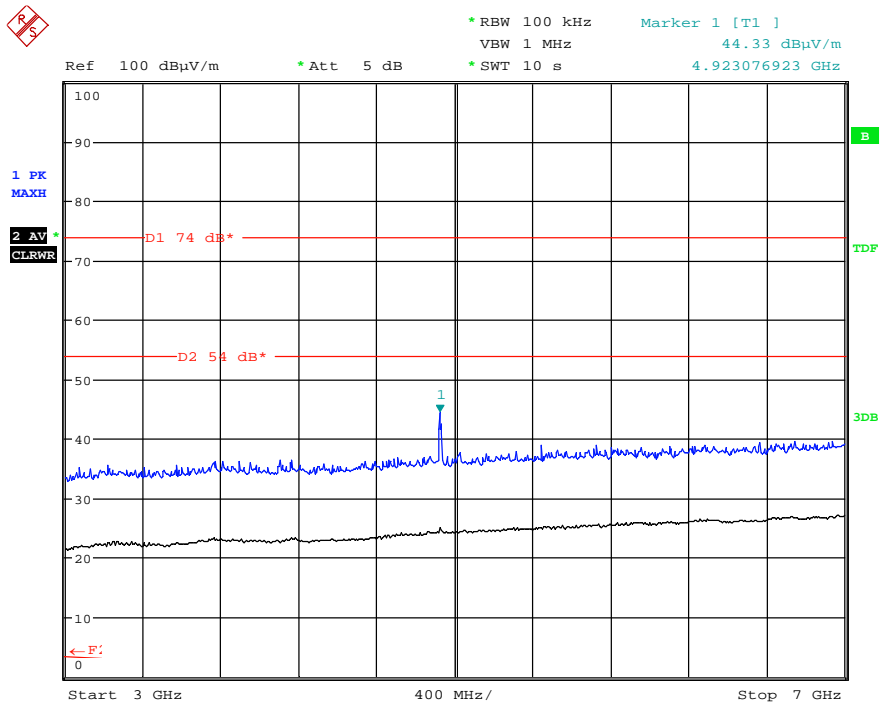


### Radiated spurious emissions 1GHz to 3GHz – 802.11g Channel 11



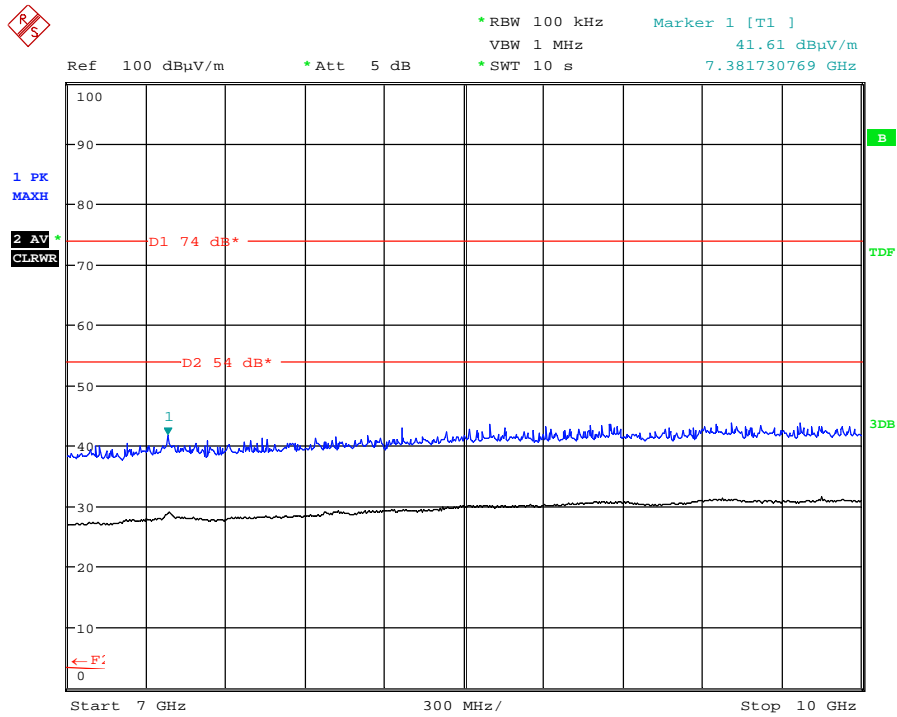
Date: 23.APR.2012 08:31:14

### Radiated spurious emissions 3GHz to 7GHz – 802.11g Channel 11



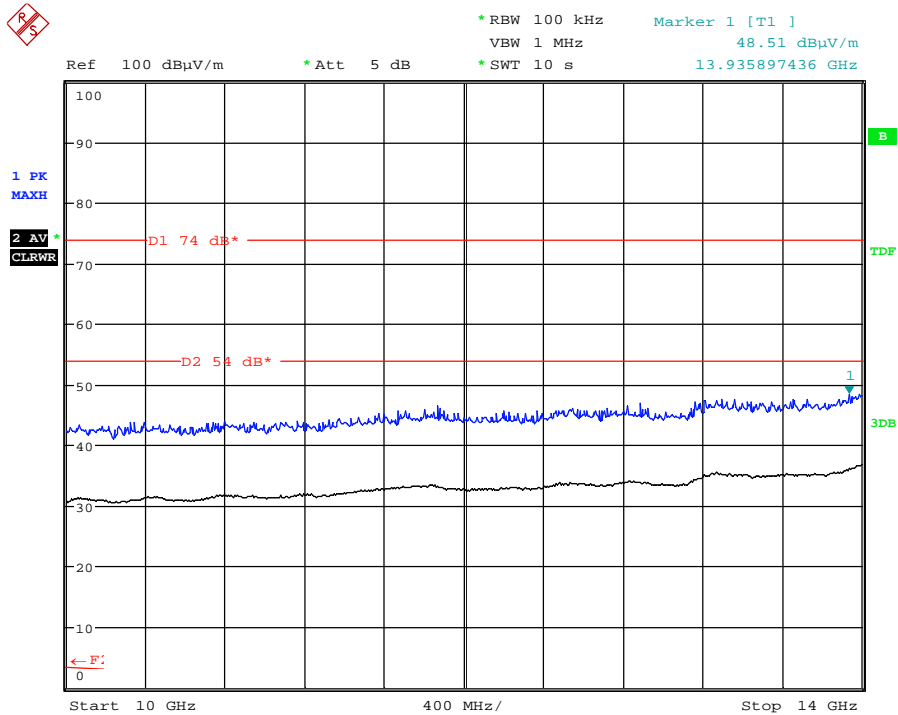
Date: 25.APR.2012 12:30:57

Radiated spurious emissions 7GHz to 10GHz – 802.11g Channel 11



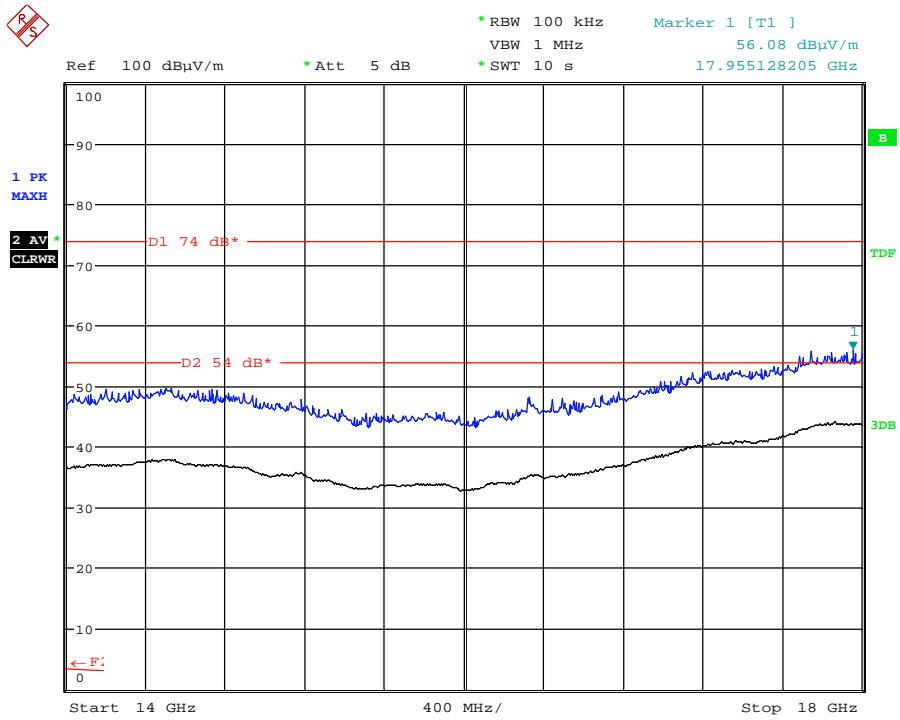
Date: 25.APR.2012 12:31:55

Radiated spurious emissions 10GHz to 14GHz – 802.11g Channel 11



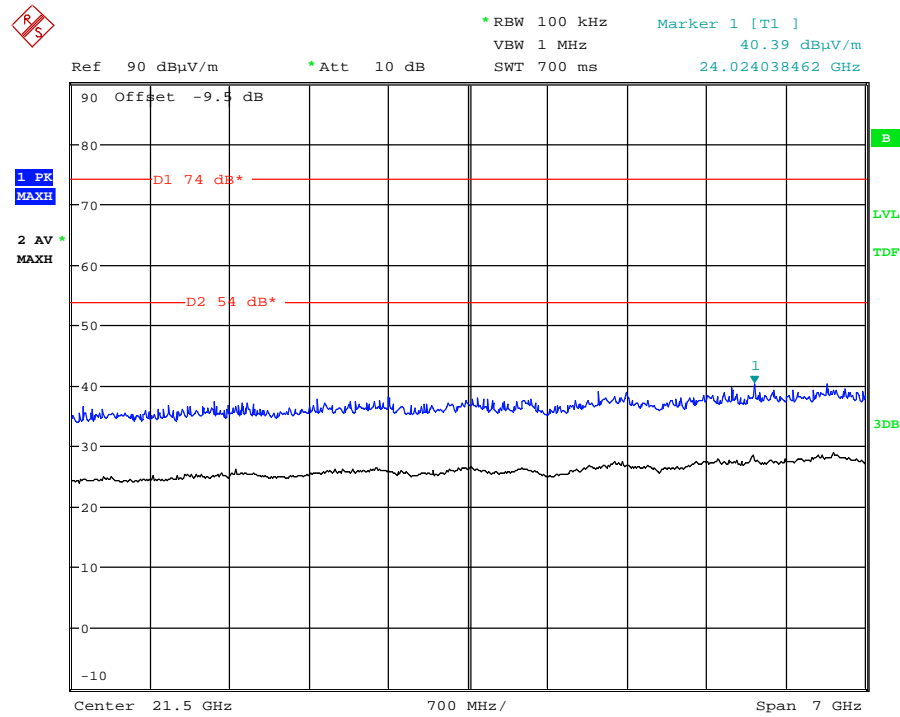
Date: 25.APR.2012 12:32:53

Radiated spurious emissions 14GHz to 18GHz – 802.11g Channel 11



Date: 25.APR.2012 12:33:20

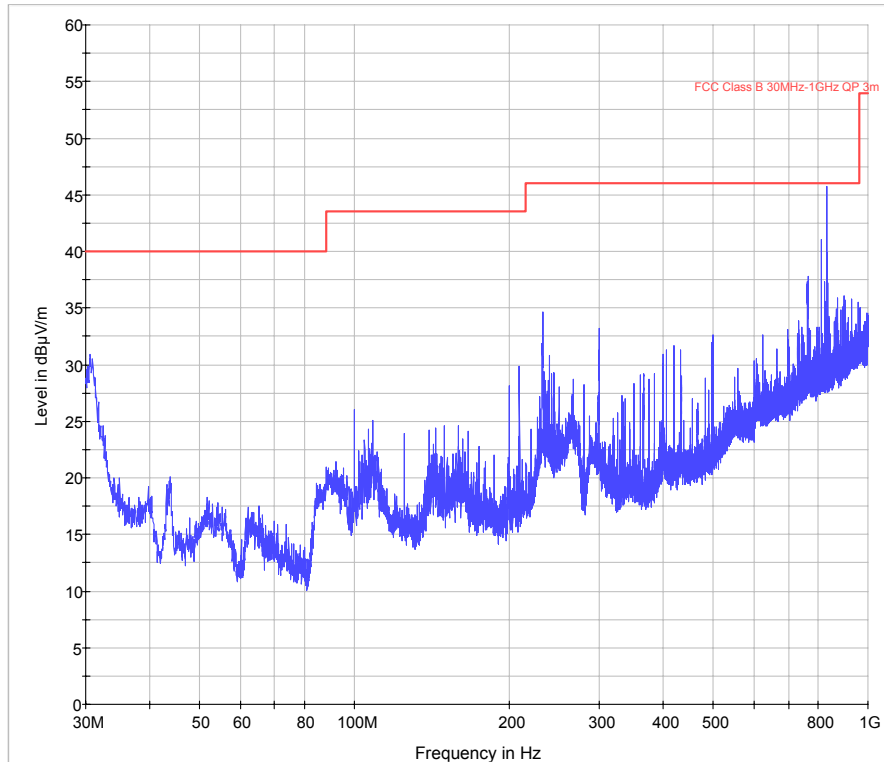
Radiated spurious emissions 18GHz to 25GHz – 802.11g Channel 11



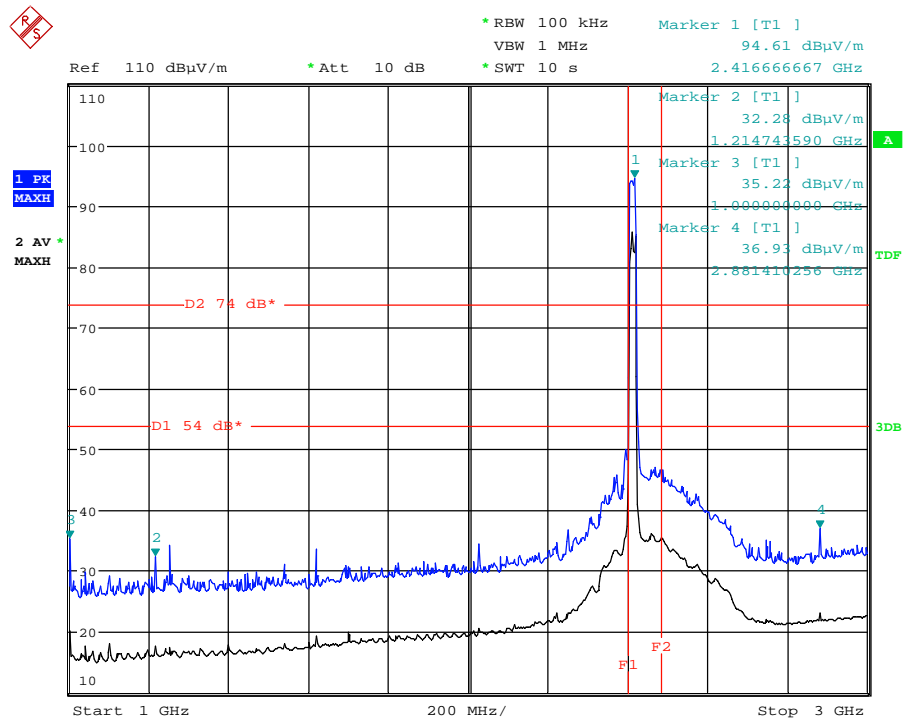
Date: 24.APR.2012 12:59:34



Radiated spurious emissions 30MHz to 1GHz – 802.11n HT20 Channel 1

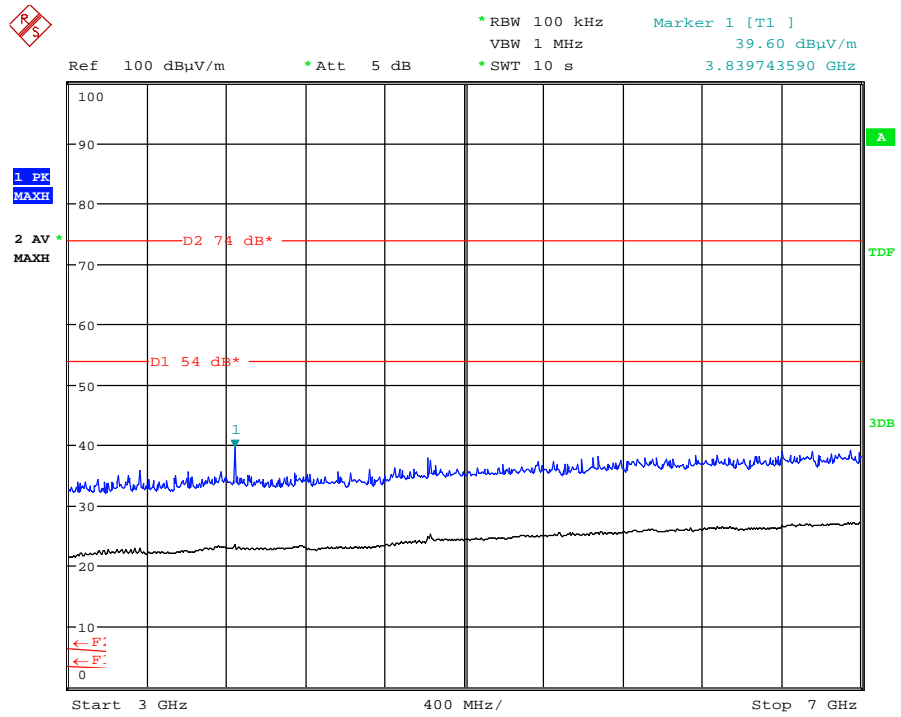


Radiated spurious emissions 1GHz to 3GHz – 802.11n HT20 Channel 1



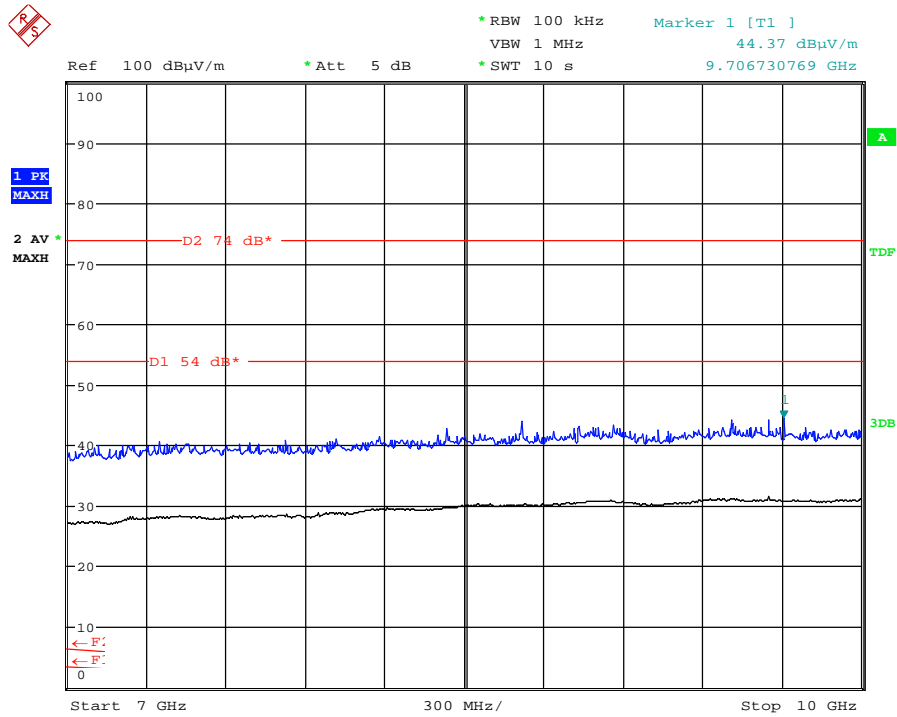
Date: 23.APR.2012 10:49:39

Radiated spurious emissions 3GHz to 7GHz – 802.11n HT20 Channel 1



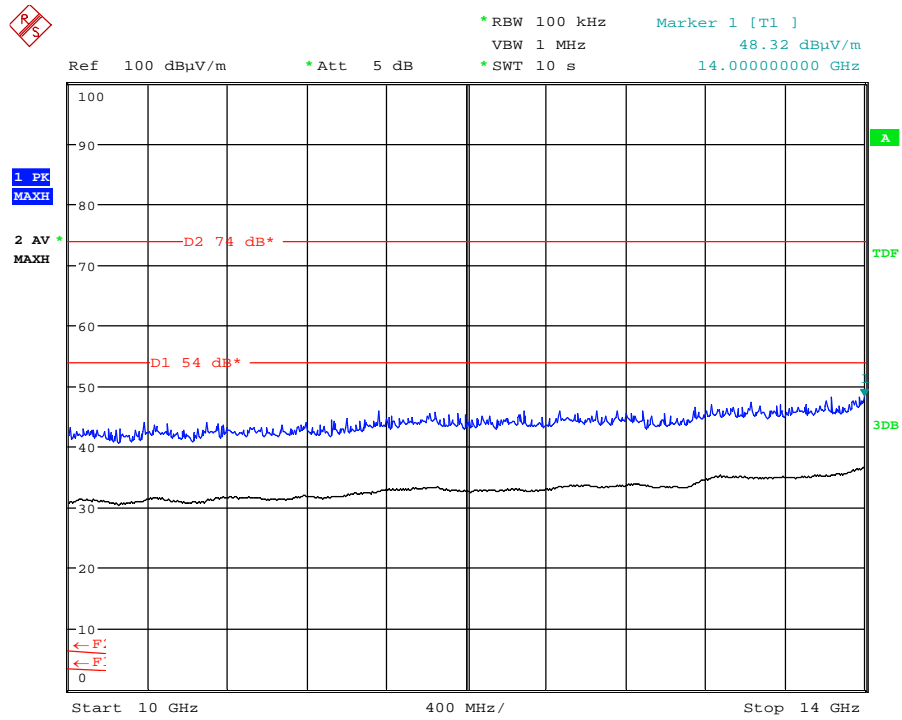
Date: 23.APR.2012 13:09:09

Radiated spurious emissions 7GHz to 10GHz – 802.11n HT20 Channel 1



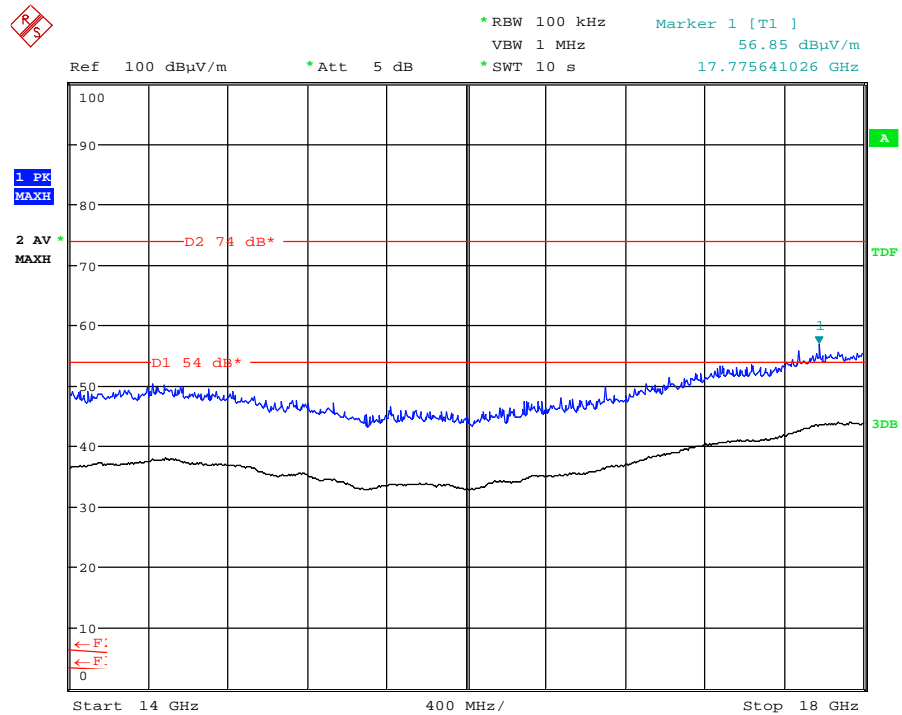
Date: 23.APR.2012 13:08:39

Radiated spurious emissions 10GHz to 14GHz – 802.11n HT20 Channel 1



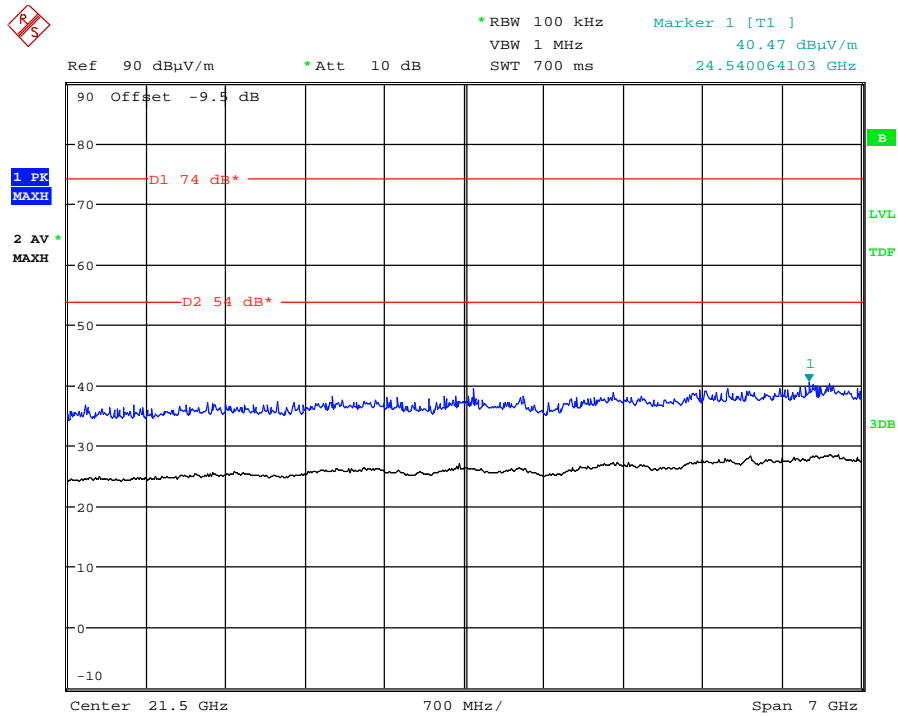
Date: 23.APR.2012 13:08:04

Radiated spurious emissions 14GHz to 18GHz – 802.11n HT20 Channel 1



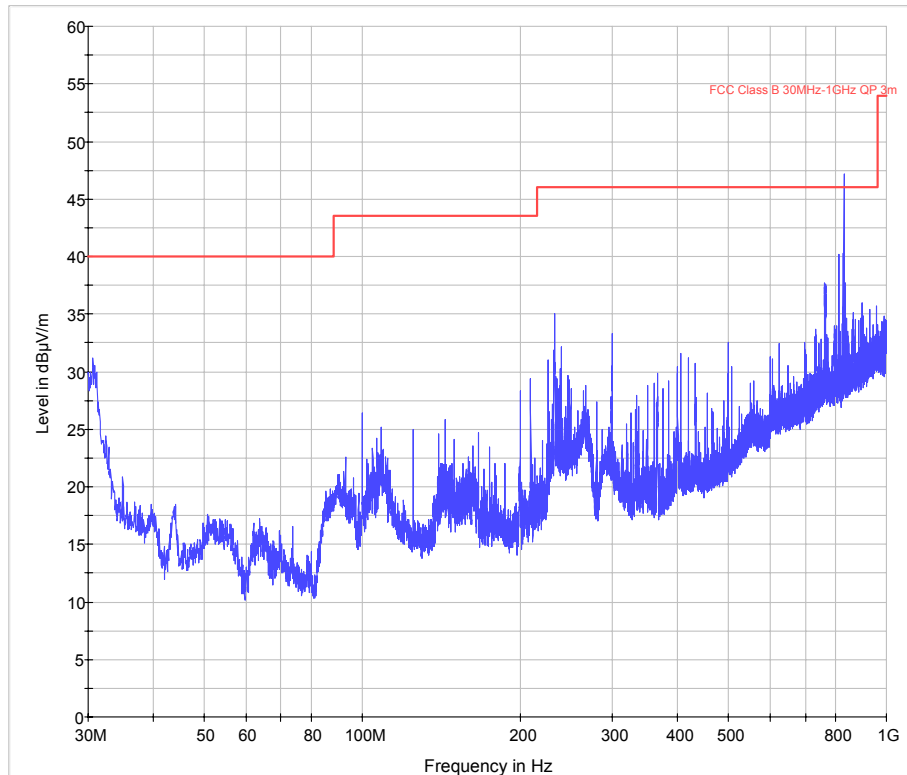
Date: 23.APR.2012 13:07:10

Radiated spurious emissions 18GHz to 25GHz – 802.11n HT20 Channel 1

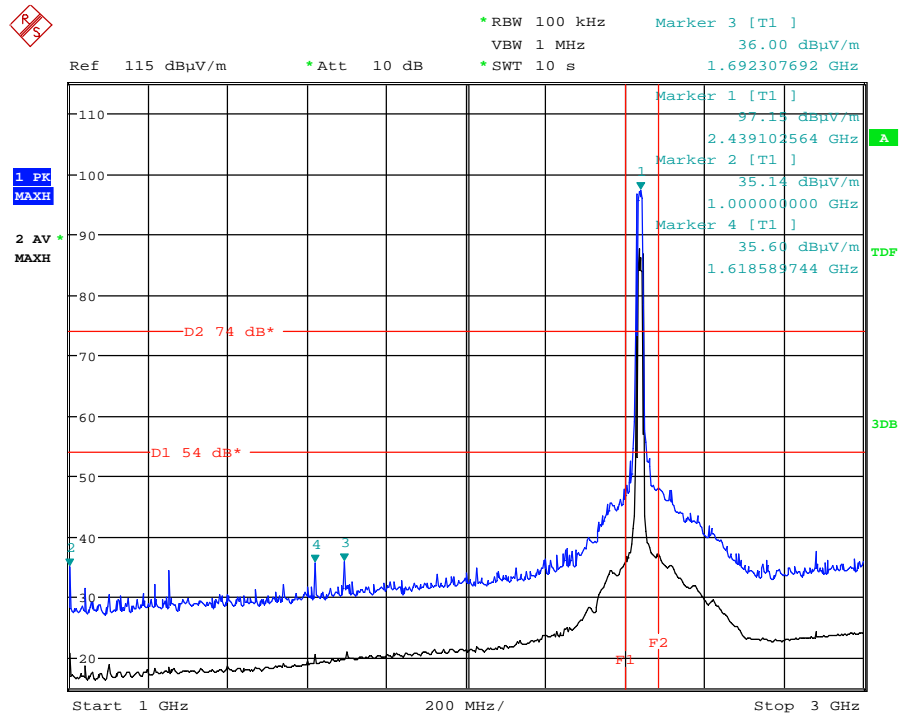


Date: 24.APR.2012 13:07:55

Radiated spurious emissions 30MHz to 1GHz – 802.11n HT20 Channel 6

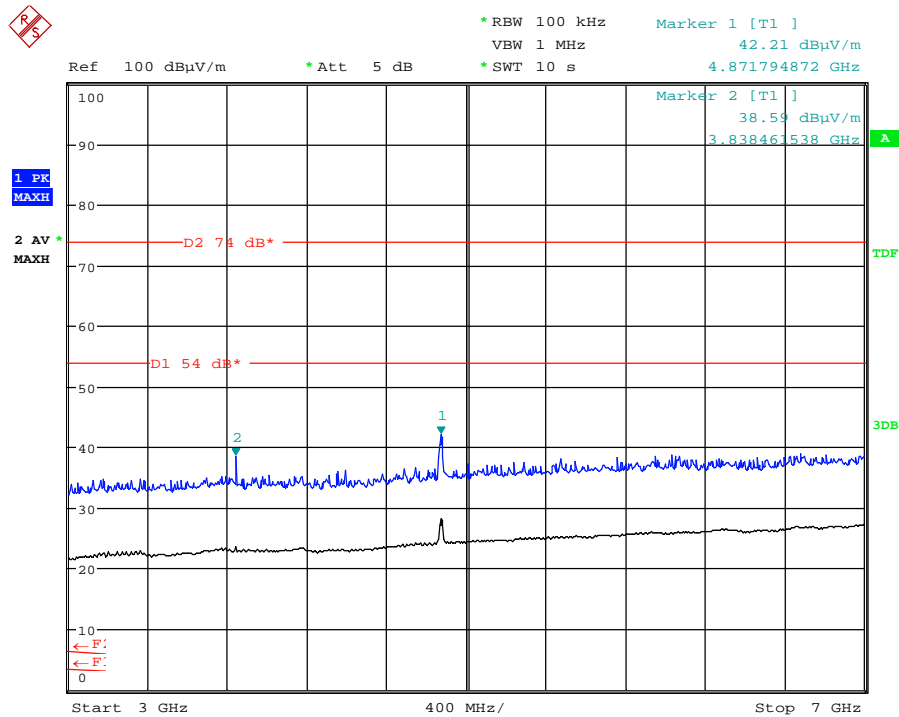


Radiated spurious emissions 1GHz to 3GHz – 802.11n HT20 Channel 6



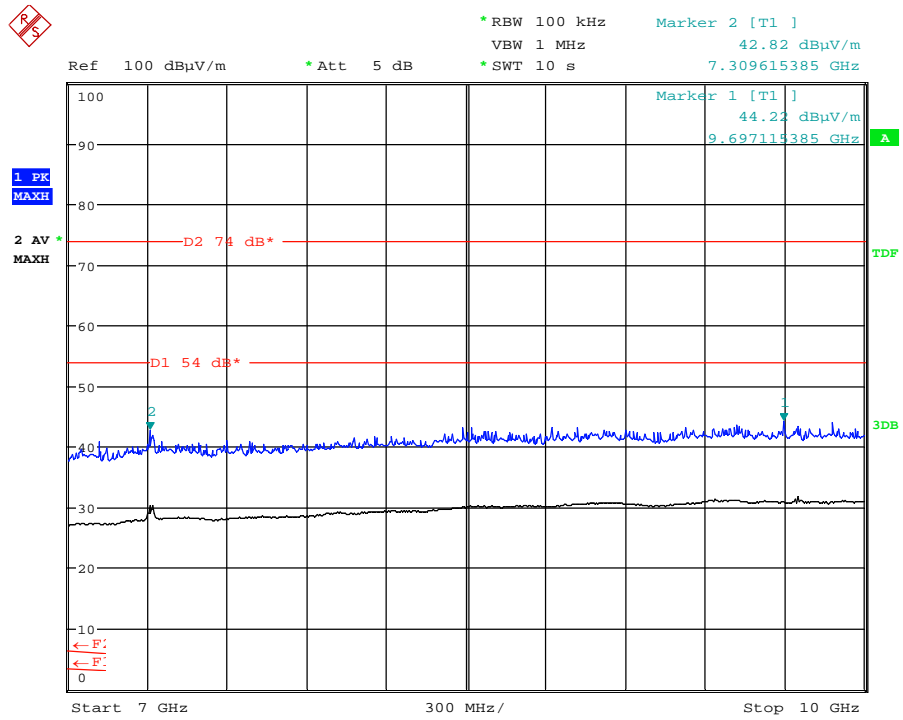
Date: 23.APR.2012 10:16:12

Radiated spurious emissions 3GHz to 7GHz – 802.11n HT20 Channel 6



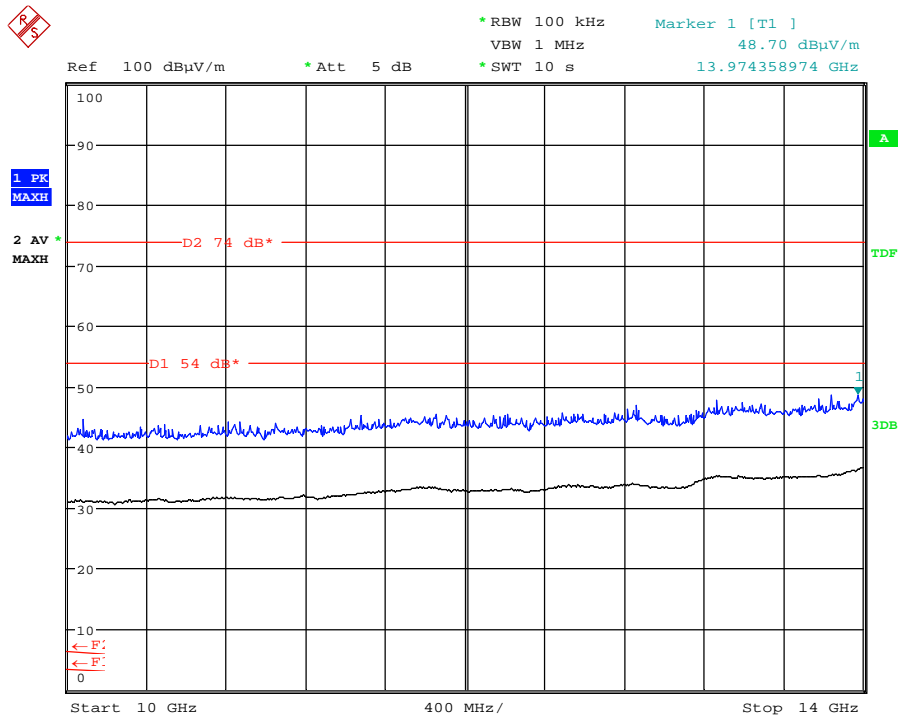
Date: 23.APR.2012 13:10:35

Radiated spurious emissions 7GHz to 10GHz – 802.11n HT20 Channel 6



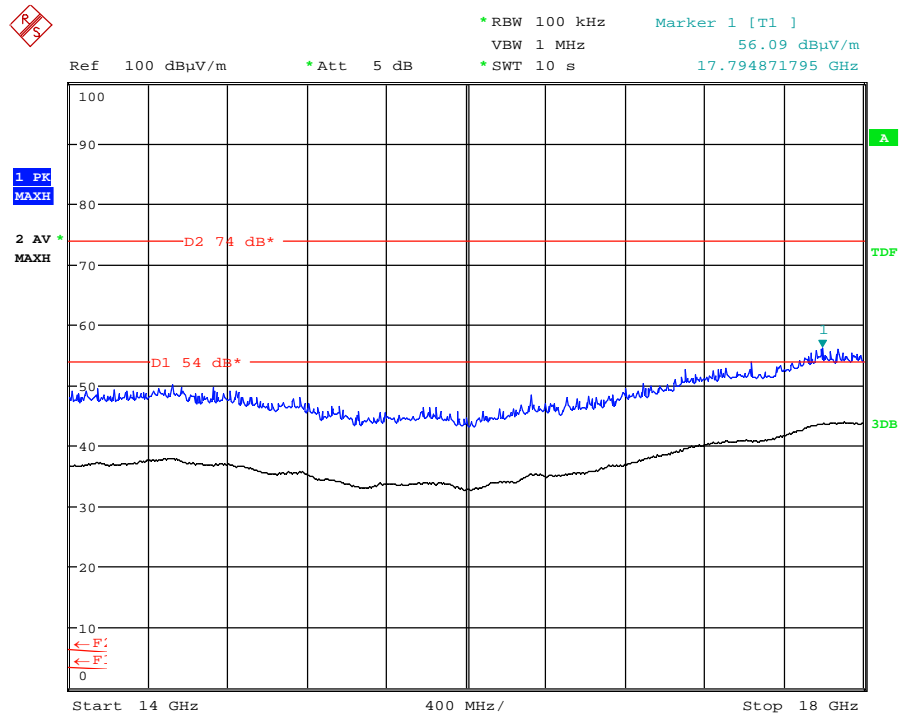
Date: 23.APR.2012 13:11:21

Radiated spurious emissions 10GHz to 14GHz – 802.11n HT20 Channel 6



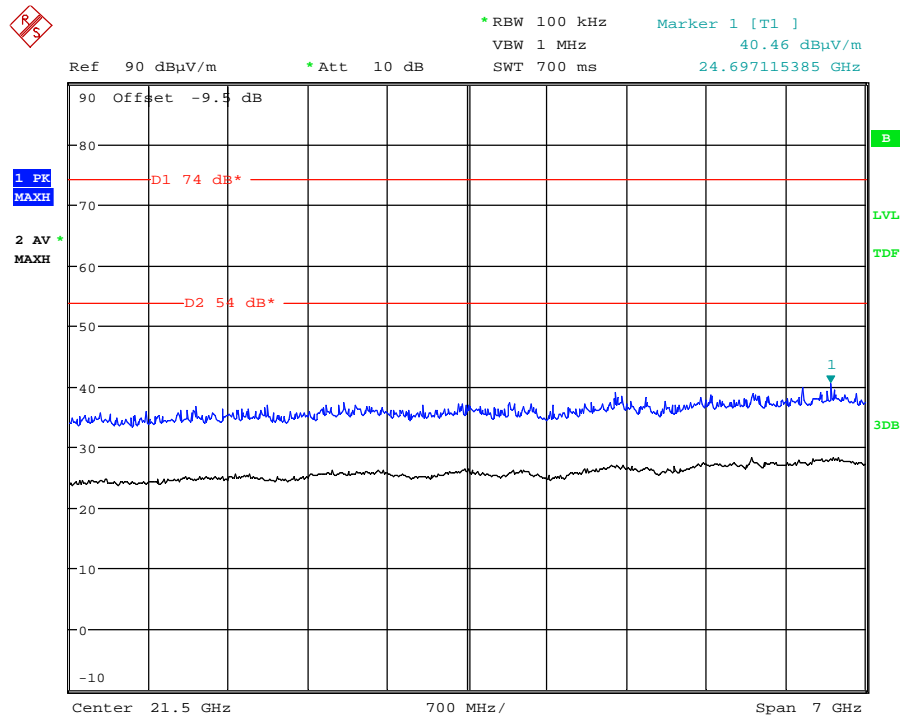
Date: 23.APR.2012 13:11:49

Radiated spurious emissions 14GHz to 18GHz – 802.11n HT20 Channel 6



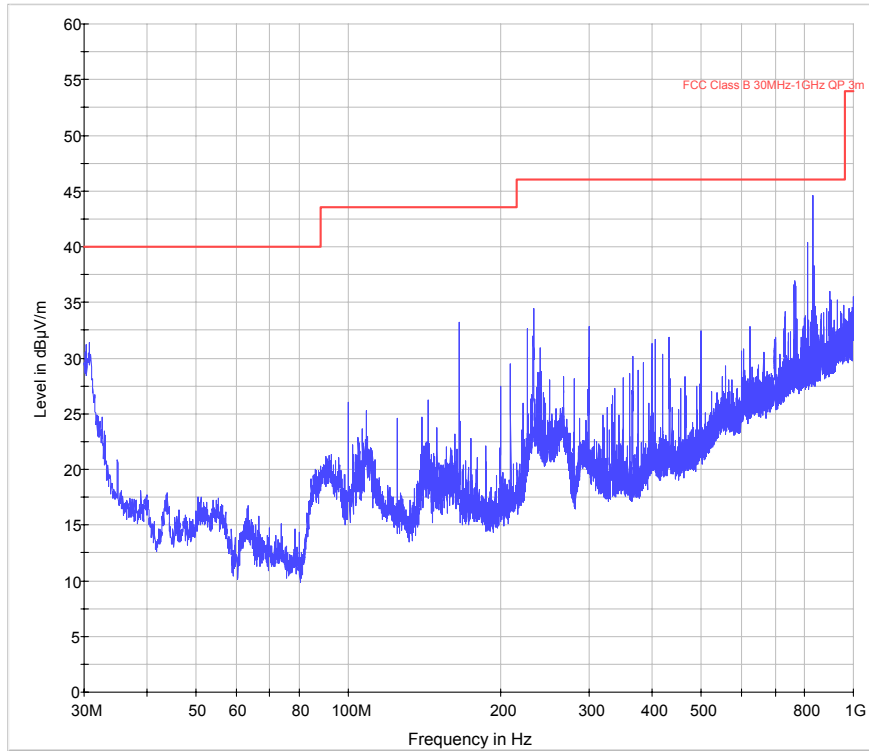
Date: 23.APR.2012 13:12:20

Radiated spurious emissions 18GHz to 25GHz – 802.11n HT20 Channel 6

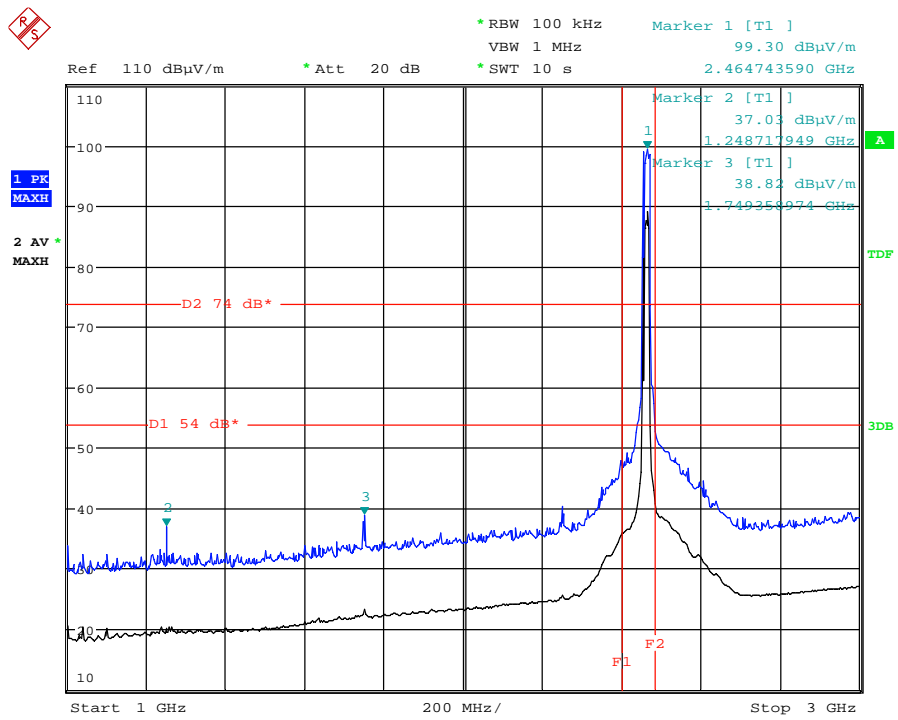


Date: 24.APR.2012 13:08:54

Radiated spurious emissions 30MHz to 1GHz – 802.11n HT20 Channel 11



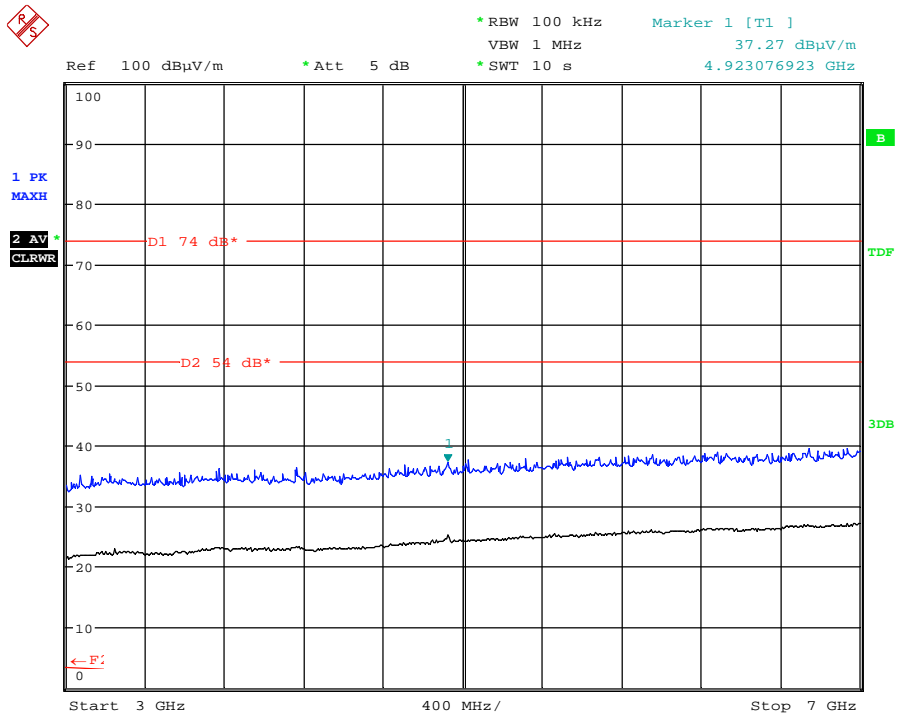
Radiated spurious emissions 1GHz to 3GHz – 802.11n HT20 Channel 11



Date: 23.APR.2012 08:35:37

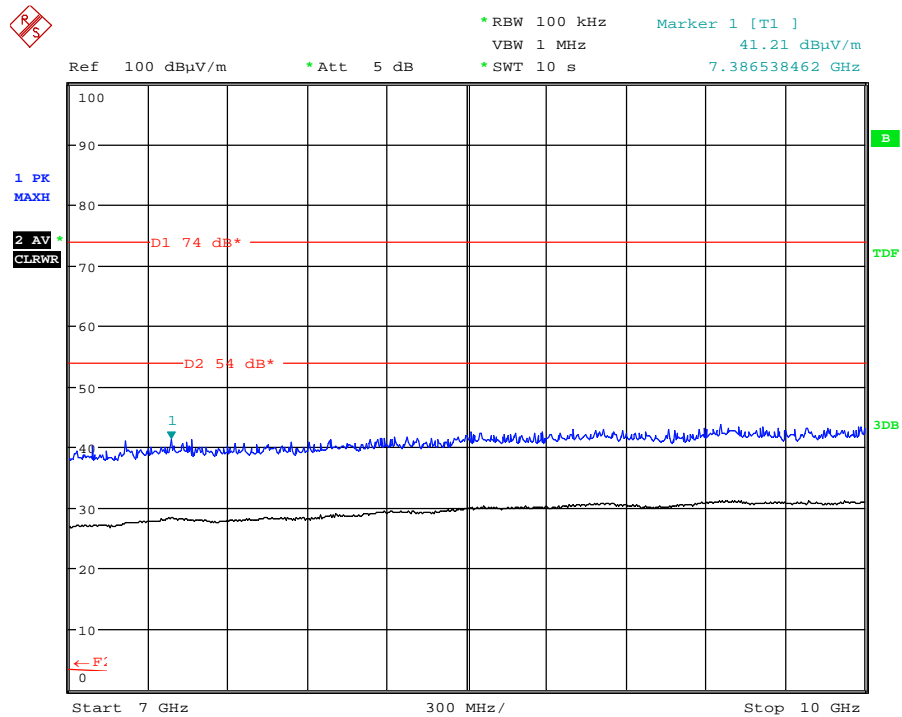


Radiated spurious emissions 3GHz to 7GHz – 802.11n HT20 Channel 11



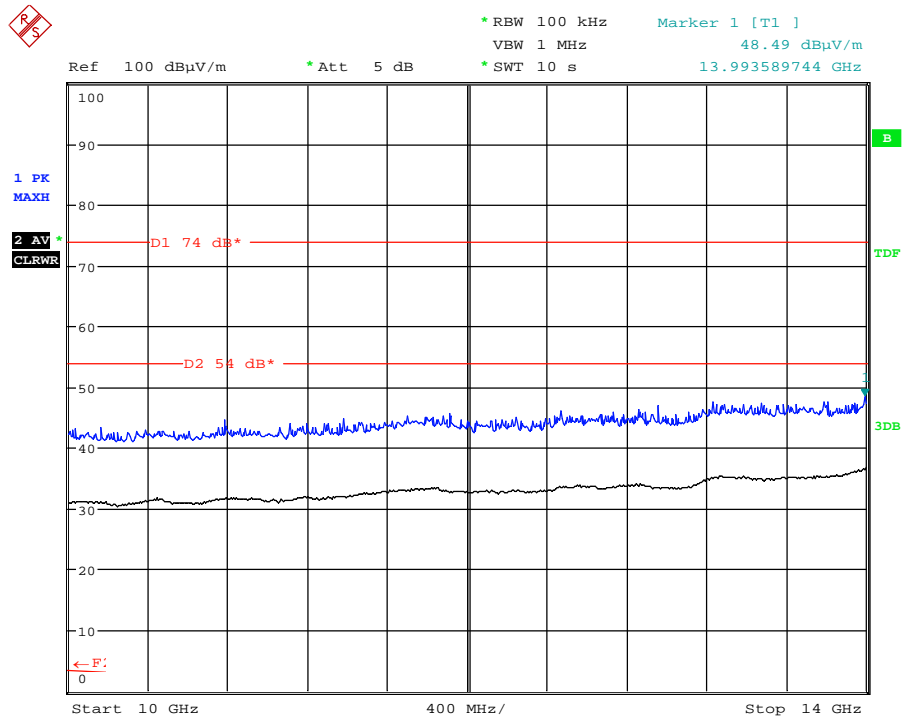
Date: 25.APR.2012 12:29:40

Radiated spurious emissions 7GHz to 10GHz – 802.11n HT20 Channel 11



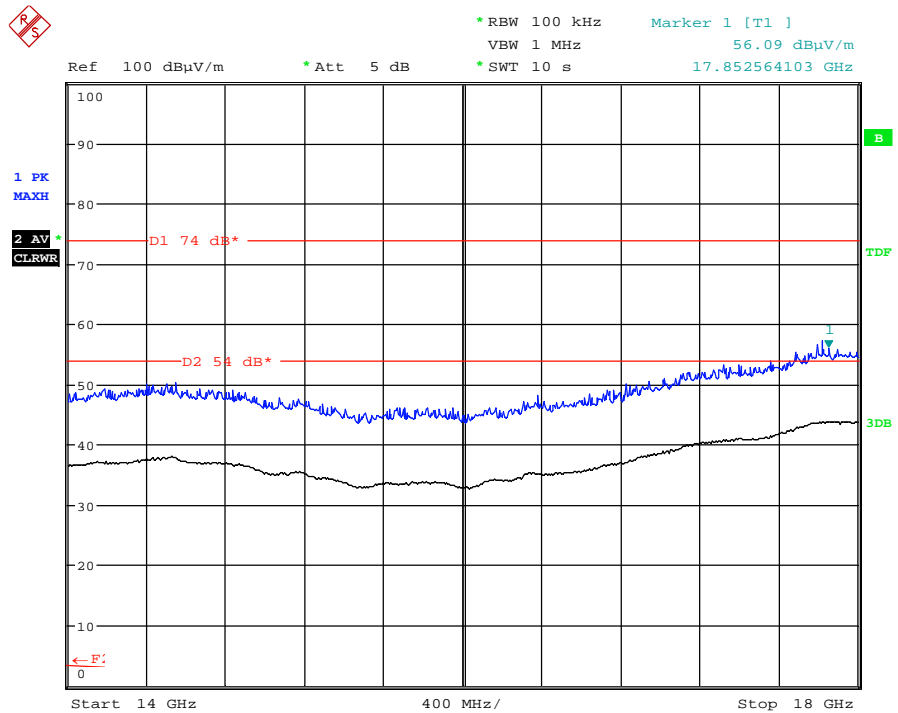
Date: 25.APR.2012 12:27:45

Radiated spurious emissions 10GHz to 14GHz – 802.11n HT20 Channel 11



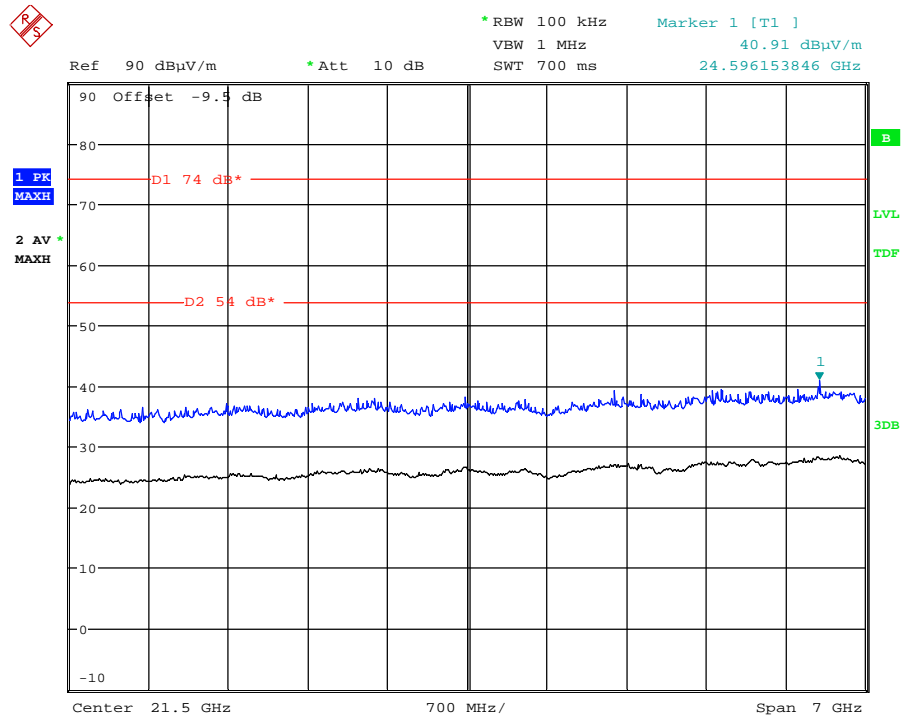
Date: 25.APR.2012 12:26:51

Radiated spurious emissions 14GHz to 18GHz – 802.11n HT20 Channel 11



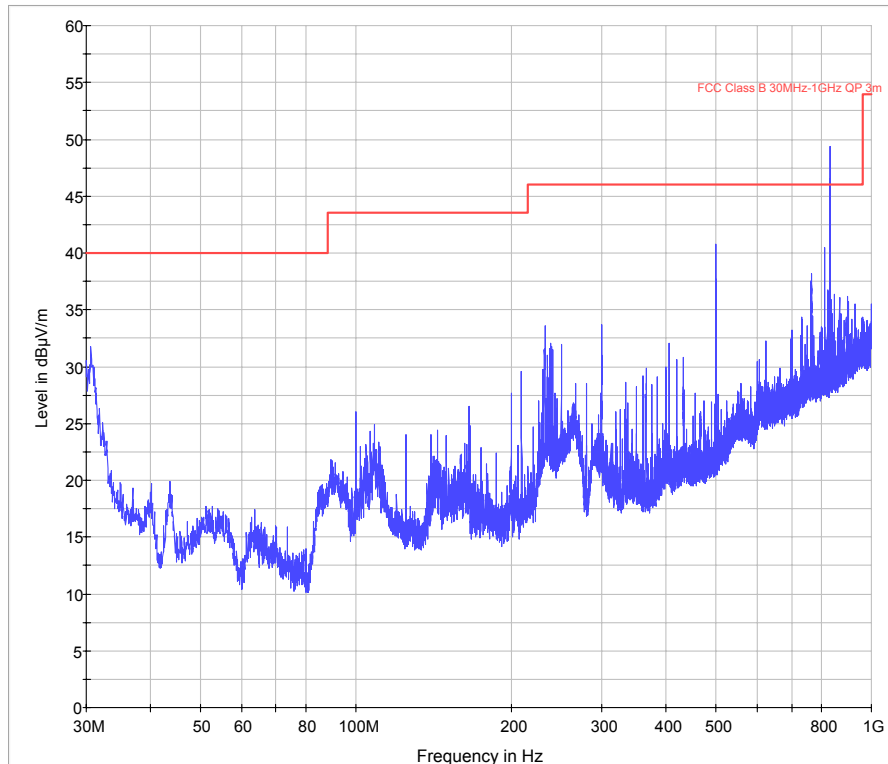
Date: 25.APR.2012 12:26:21

Radiated spurious emissions 18GHz to 25GHz – 802.11n HT20 Channel 11

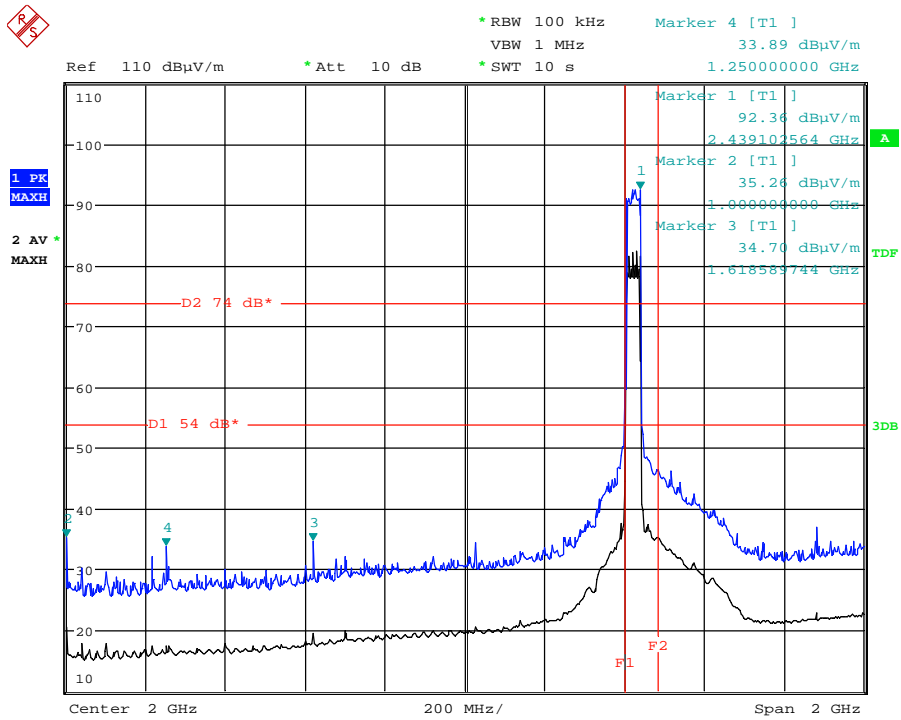


Date: 24.APR.2012 13:13:40

Radiated spurious emissions 30MHz to 1GHz – 802.11n HT40 Channel 3

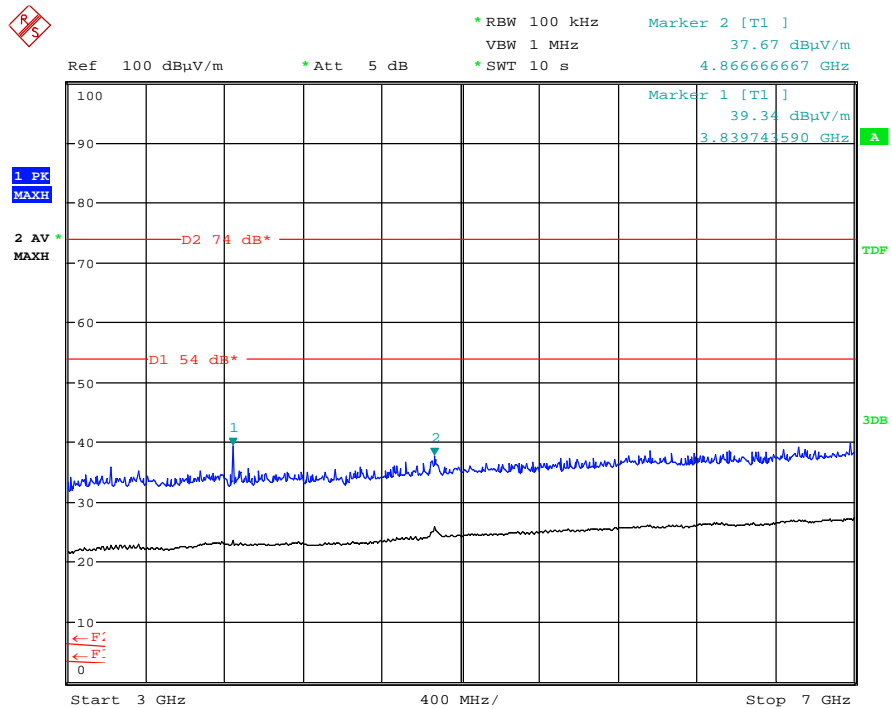


Radiated spurious emissions 1GHz to 3GHz – 802.11n HT40 Channel 3



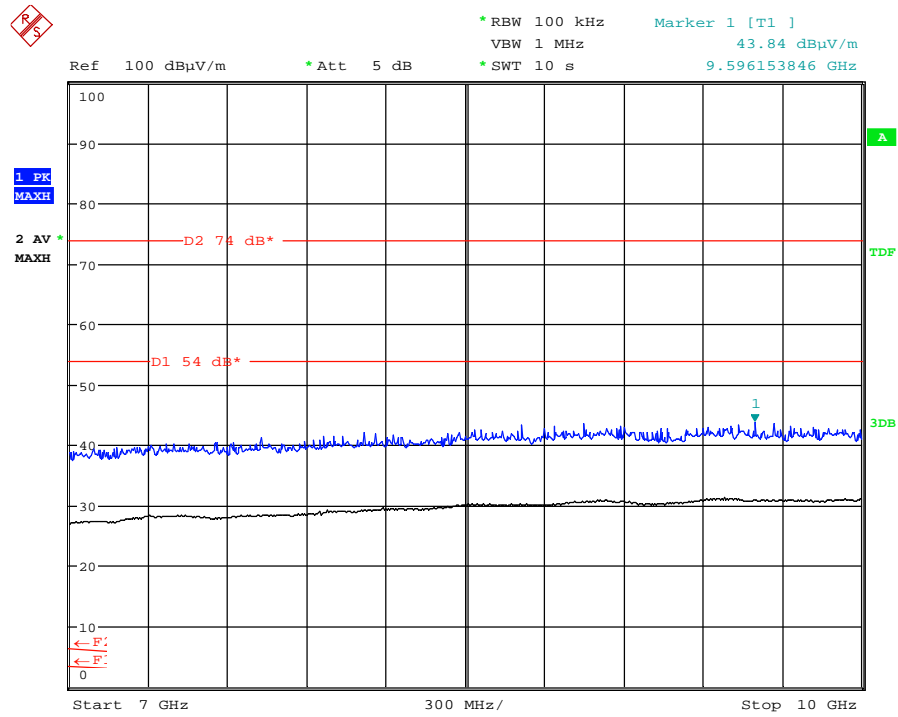
Date: 23.APR.2012 10:02:37

Radiated spurious emissions 3GHz to 7GHz – 802.11n HT40 Channel 3



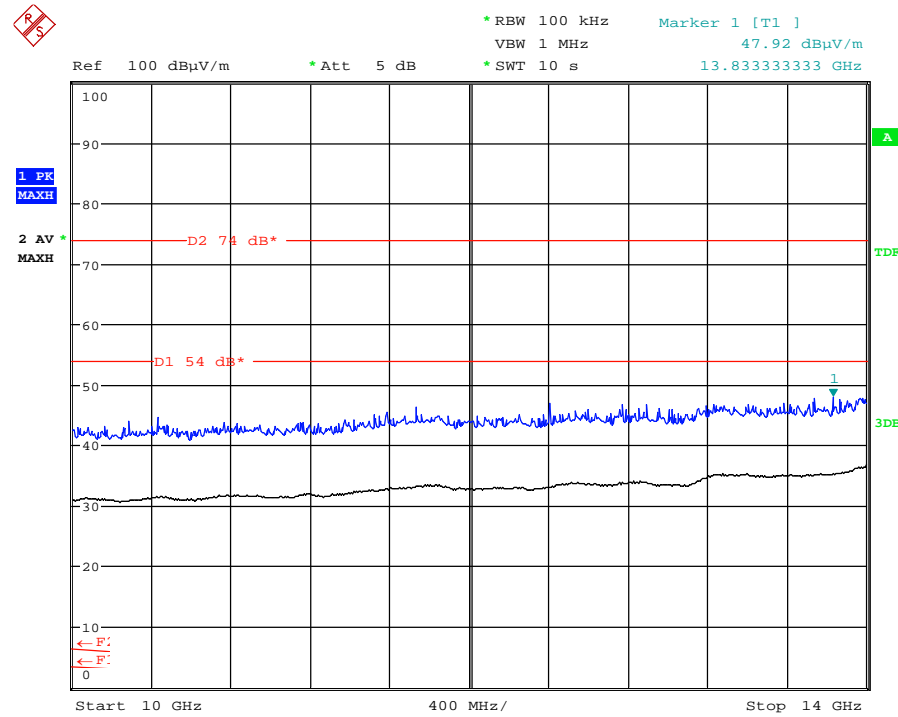
Date: 23.APR.2012 13:30:22

Radiated spurious emissions 7GHz to 10GHz – 802.11n HT40 Channel 3



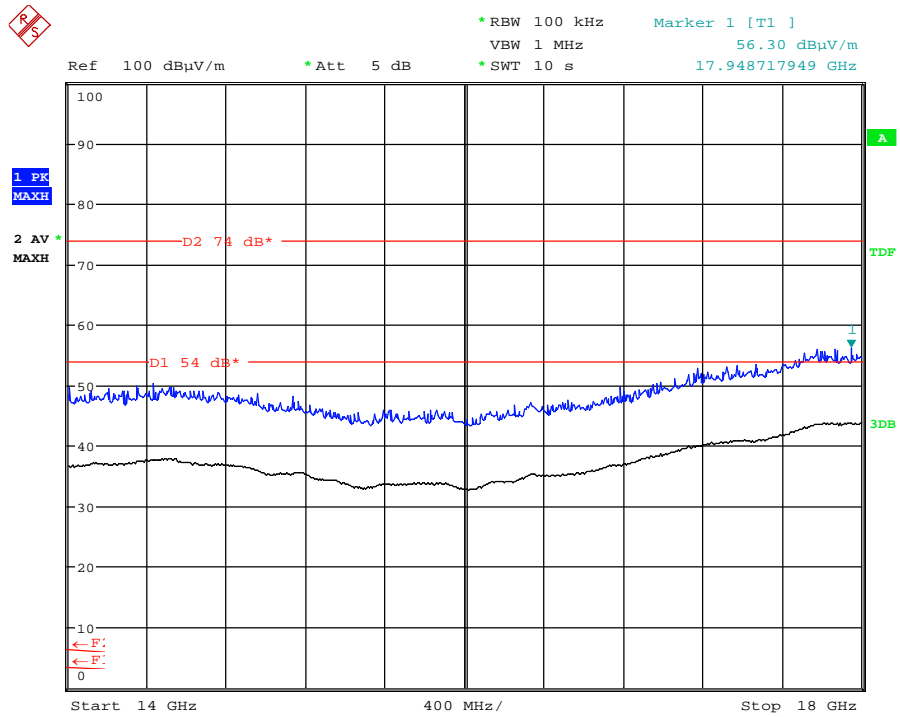
Date: 23.APR.2012 13:30:57

Radiated spurious emissions 10GHz to 14GHz – 802.11n HT40 Channel 3



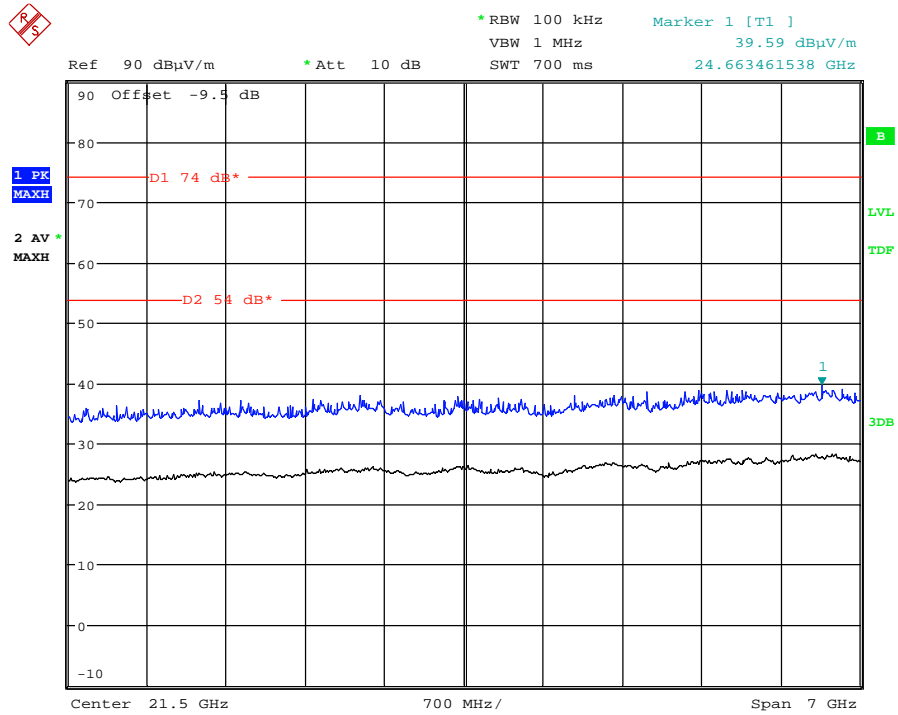
Date: 23.APR.2012 13:31:25

Radiated spurious emissions 14GHz to 18GHz – 802.11n HT40 Channel 3



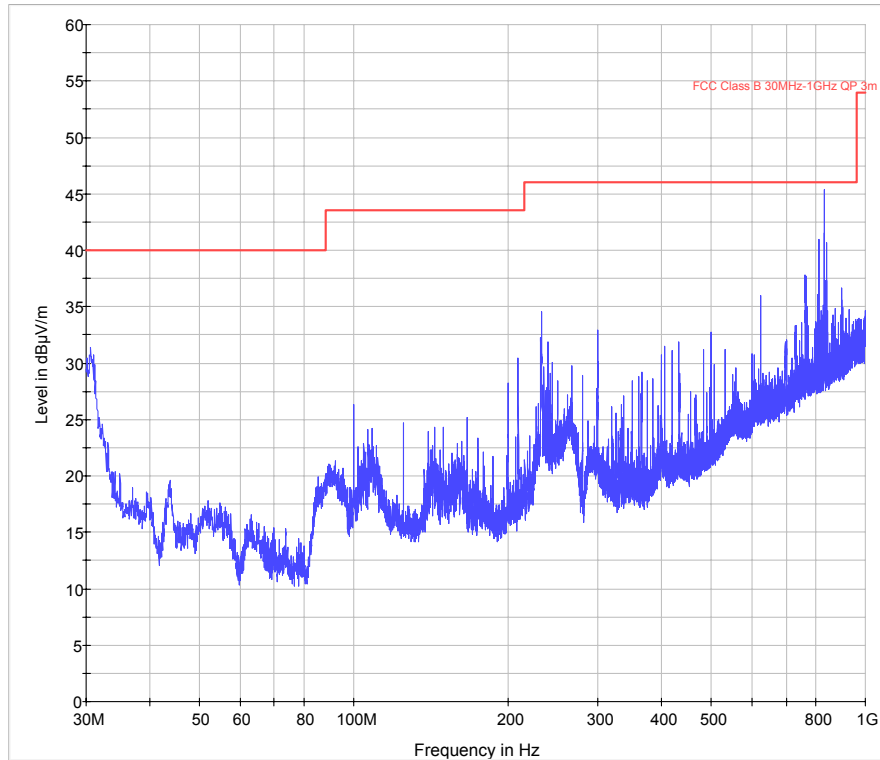
Date: 23.APR.2012 13:31:54

Radiated spurious emissions 18GHz to 25GHz – 802.11n HT40 Channel 3

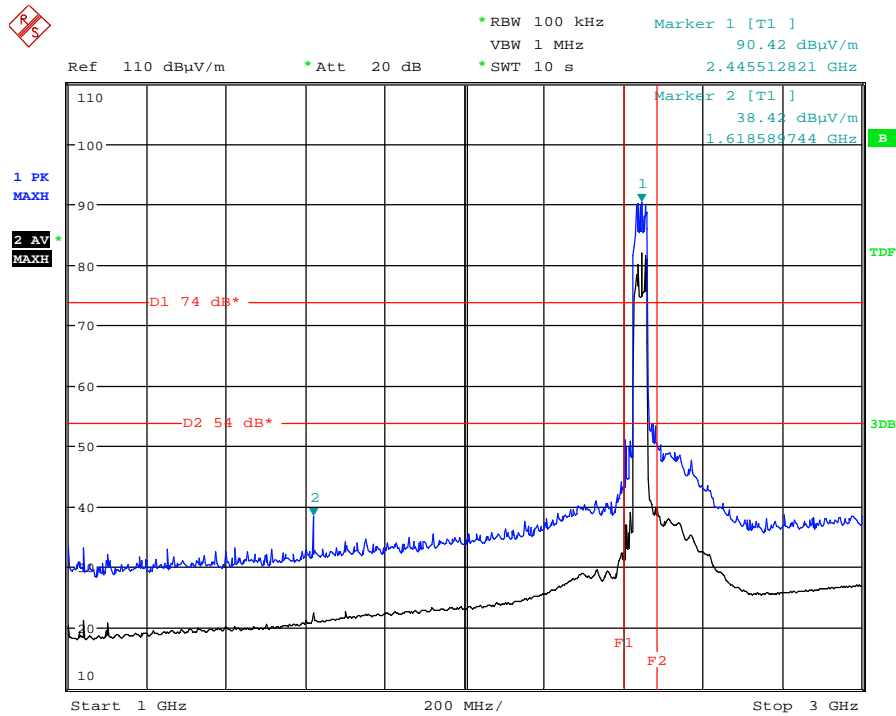


Date: 24.APR.2012 13:20:29

Radiated spurious emissions 30MHz to 1GHz – 802.11n HT40 Channel 5

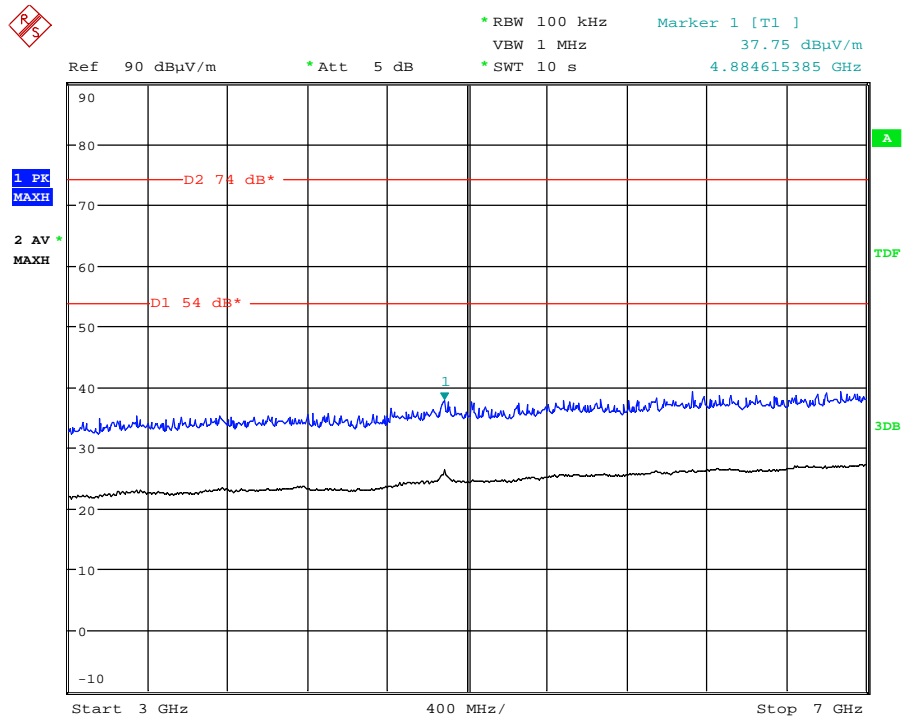


Radiated spurious emissions 1GHz to 3GHz – 802.11n HT40 Channel 5



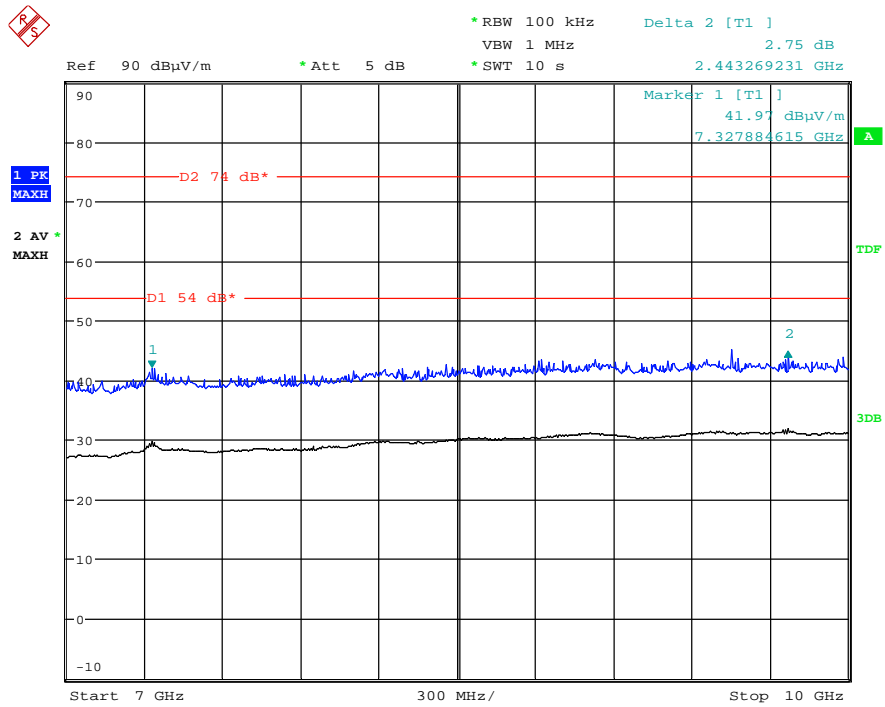
Date: 25.APR.2012 18:31:14

Radiated spurious emissions 3GHz to 7GHz – 802.11n HT40 Channel 5



Date: 26.APR.2012 07:08:17

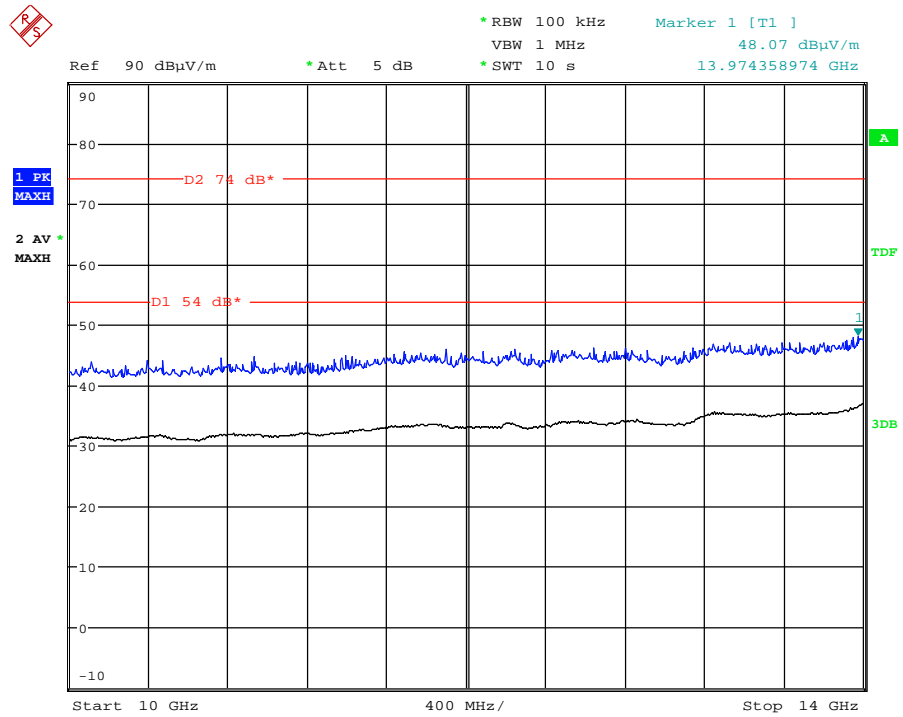
Radiated spurious emissions 7GHz to 10GHz – 802.11n HT40 Channel 5



Date: 26.APR.2012 07:07:39

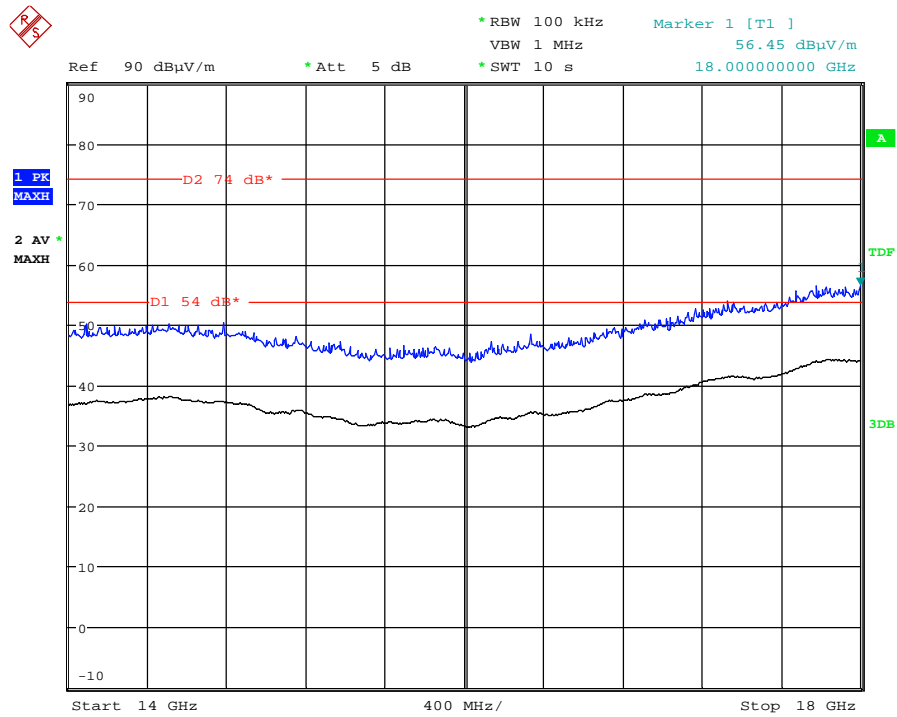


Radiated spurious emissions 10GHz to 14GHz – 802.11n HT40 Channel 5



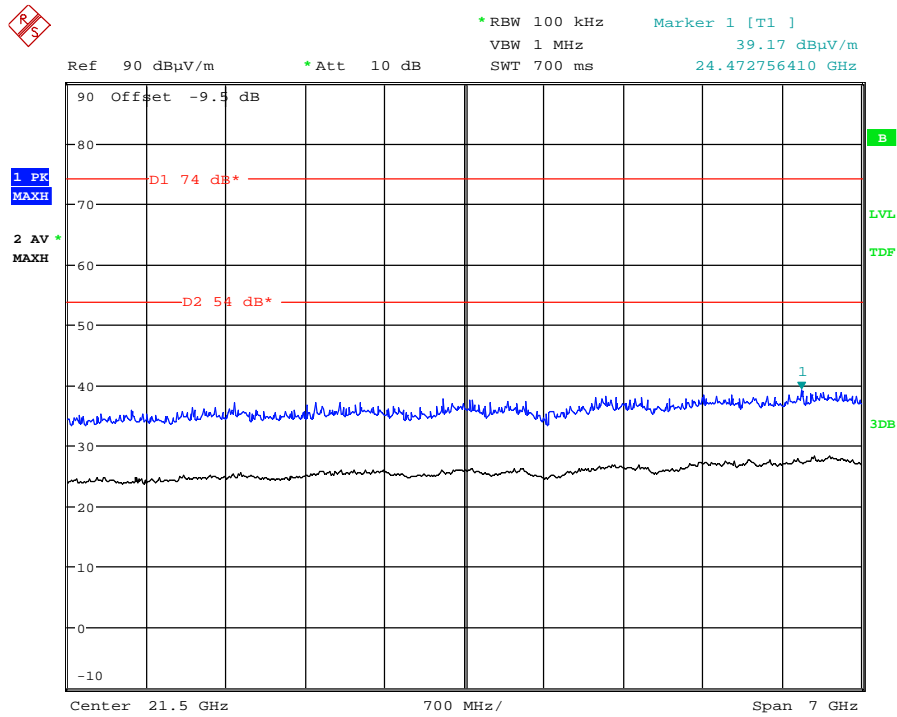
Date: 26.APR.2012 07:06:44

Radiated spurious emissions 14GHz to 18GHz – 802.11n HT40 Channel 5



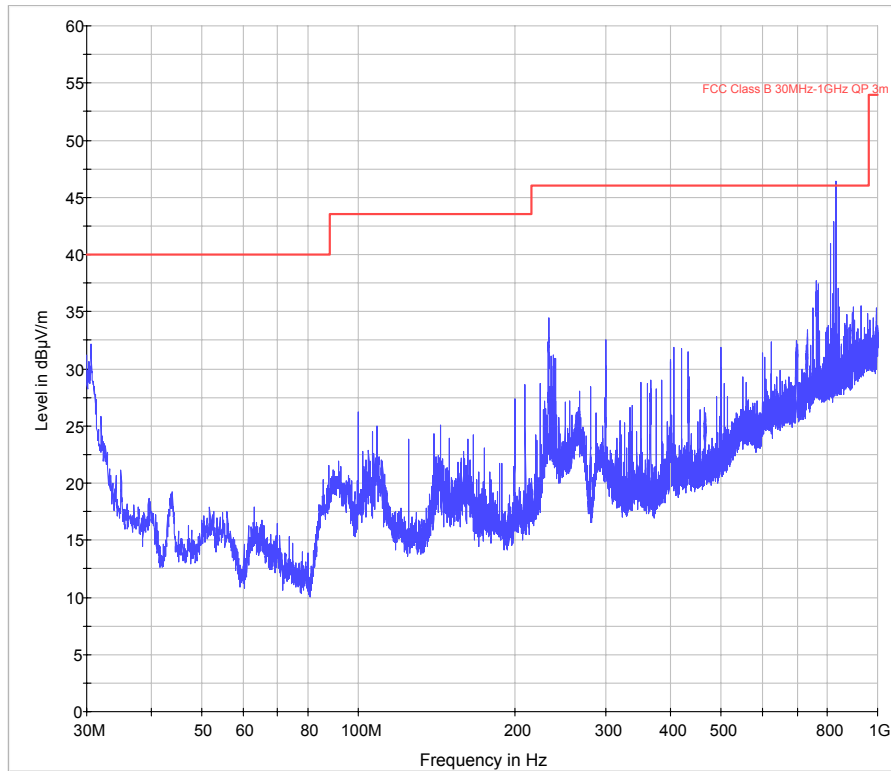
Date: 26.APR.2012 07:06:18

Radiated spurious emissions 18GHz to 25GHz – 802.11n HT40 Channel 5

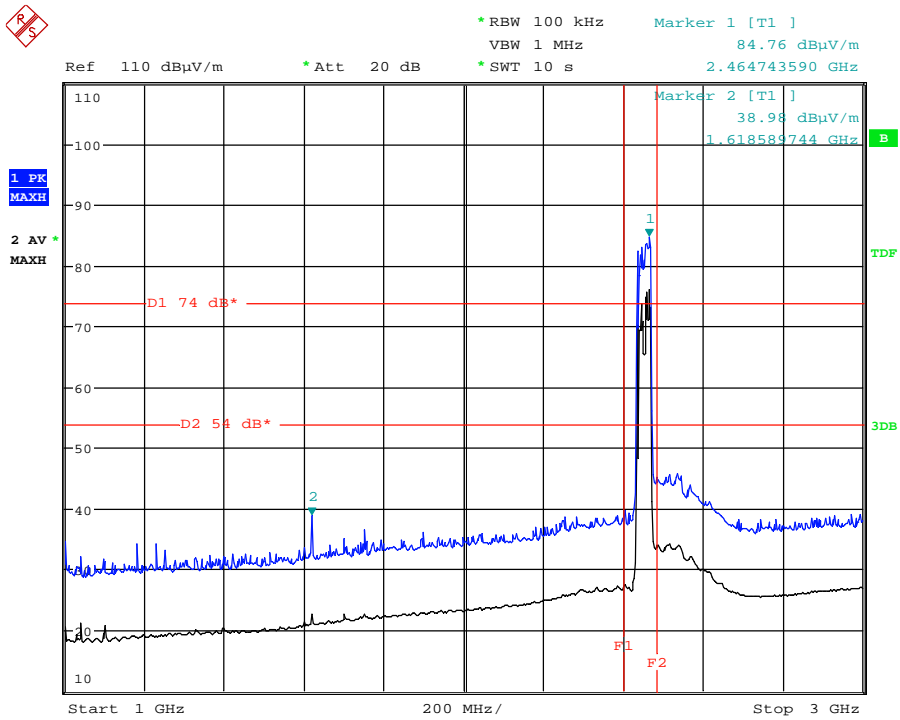


Date: 24.APR.2012 13:17:35

Radiated spurious emissions 30MHz to 1GHz – 802.11n HT40 Channel 7

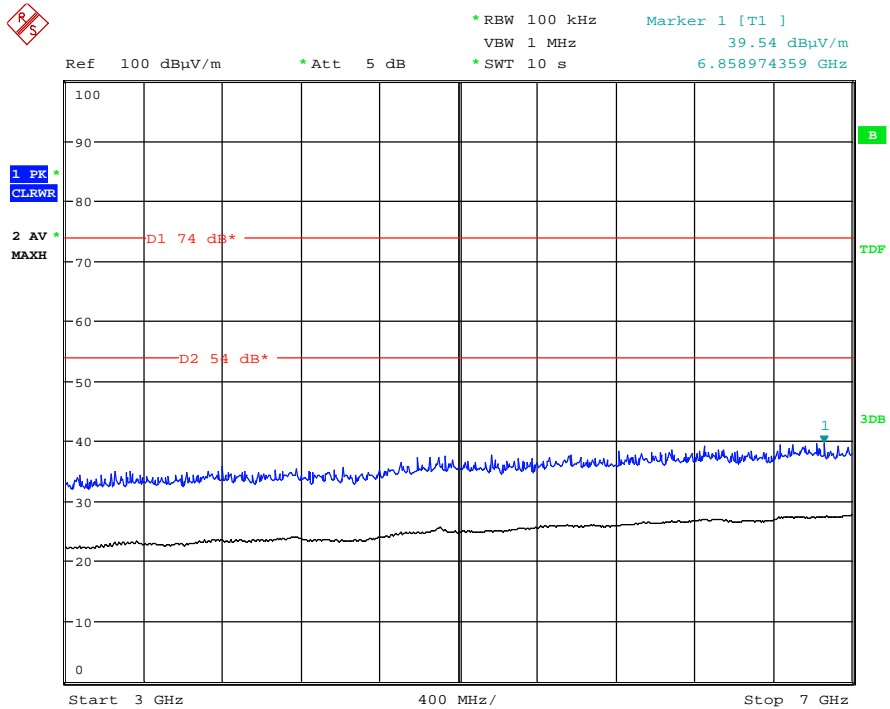


Radiated spurious emissions 1GHz to 3GHz – 802.11n HT40 Channel 7



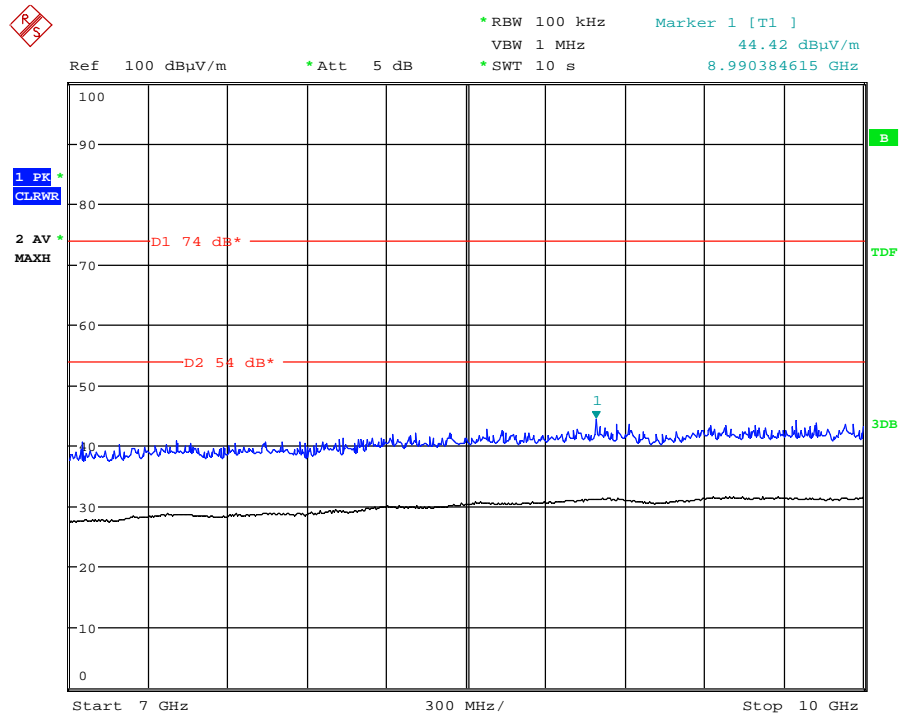
Date: 25.APR.2012 18:28:00

Radiated spurious emissions 3GHz to 7GHz – 802.11n HT40 Channel 7



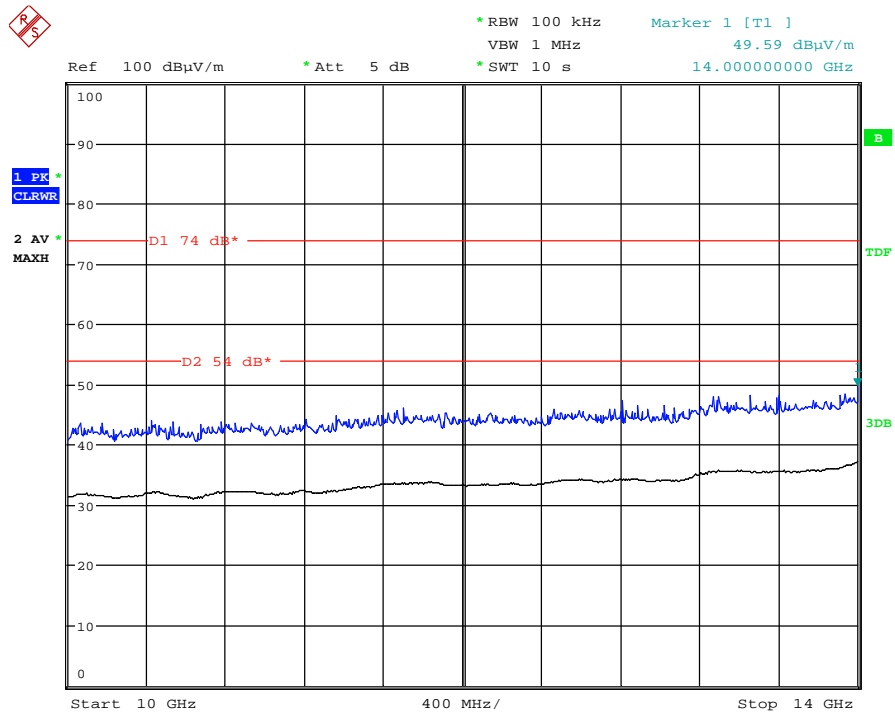
Date: 26.APR.2012 06:52:37

Radiated spurious emissions 7GHz to 10GHz – 802.11n HT40 Channel 7



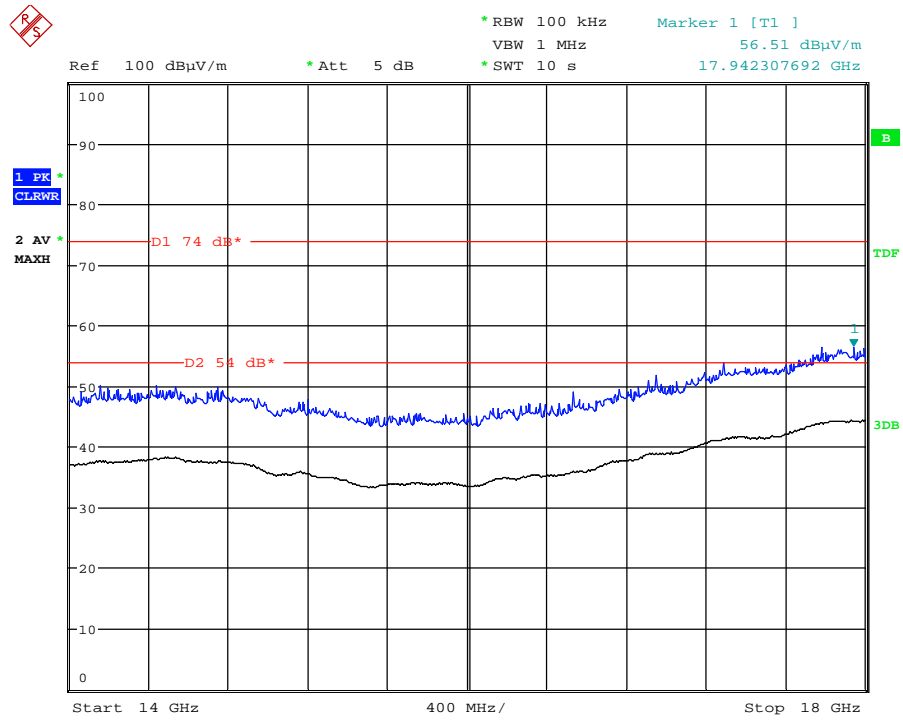
Date: 26.APR.2012 06:53:02

Radiated spurious emissions 10GHz to 14GHz – 802.11n HT40 Channel 7



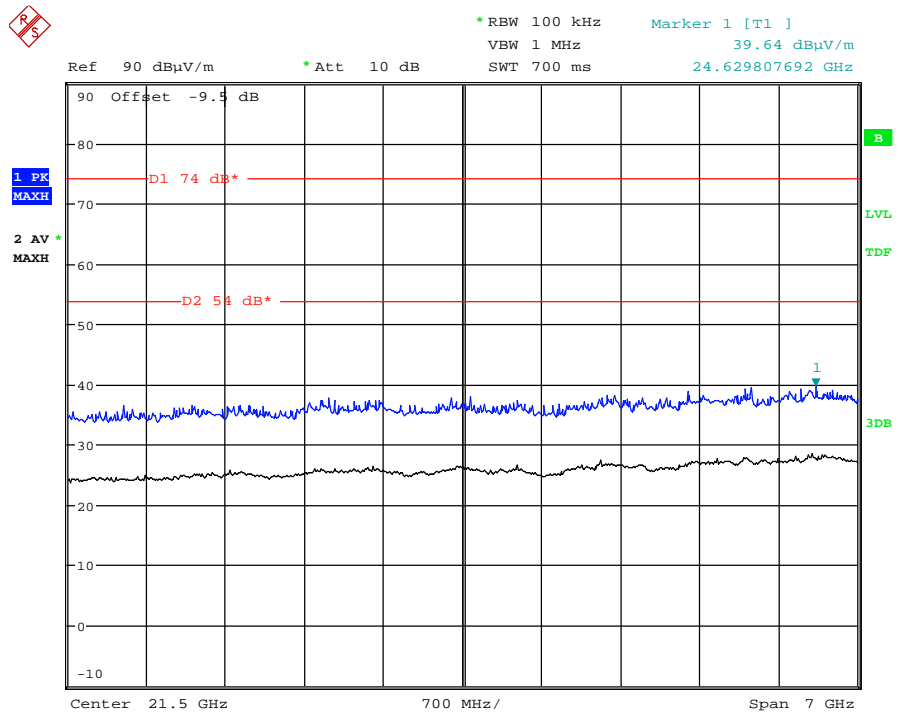
Date: 26.APR.2012 06:54:26

Radiated spurious emissions 14GHz to 18GHz – 802.11n HT40 Channel 7



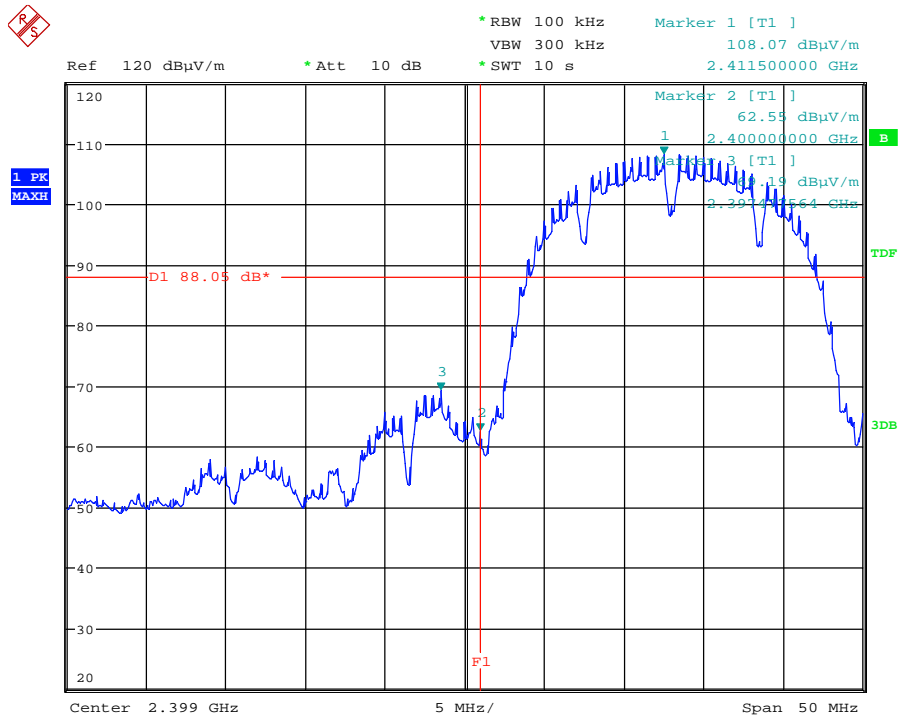
Date: 26.APR.2012 06:54:52

Radiated spurious emissions 18GHz to 25GHz – 802.11n HT40 Channel 7



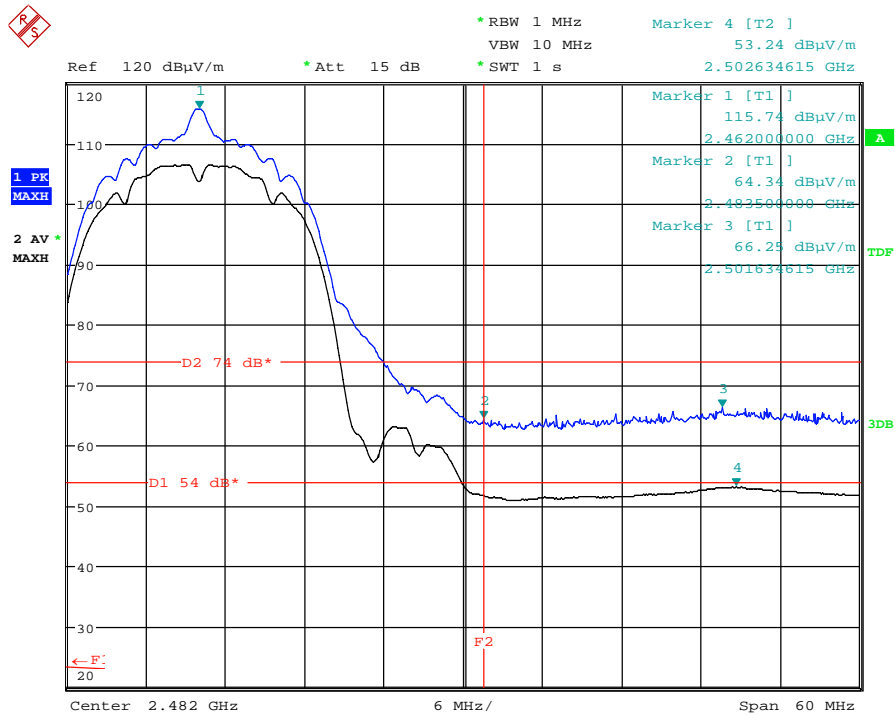
Date: 24.APR.2012 13:15:04

Radiated lower band-edge compliance – 802.11b



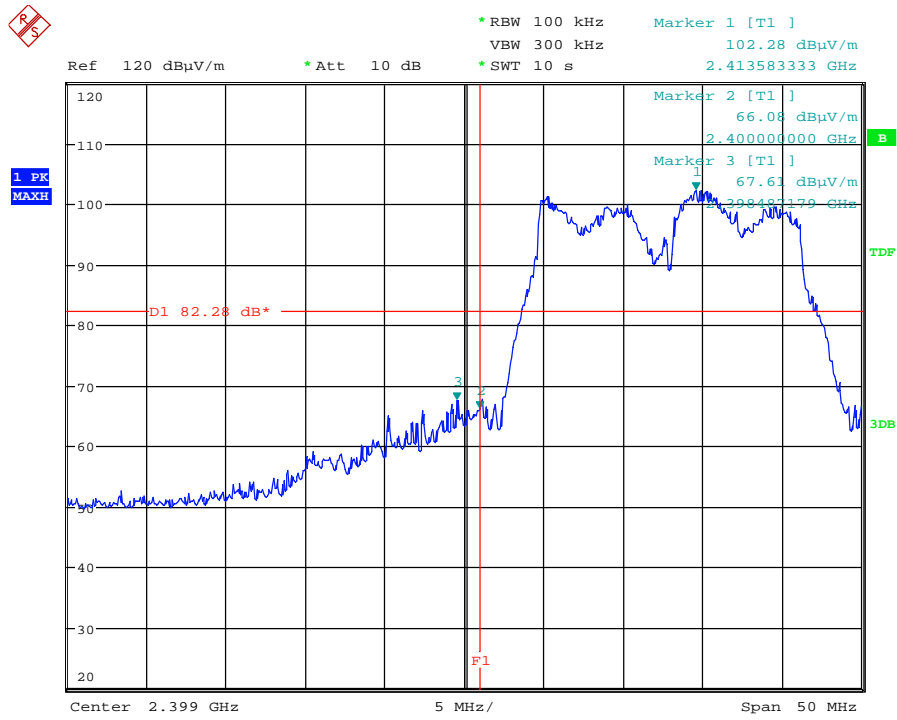
Date: 23.APR.2012 11:17:54

Radiated upper band-edge compliance – 802.11b



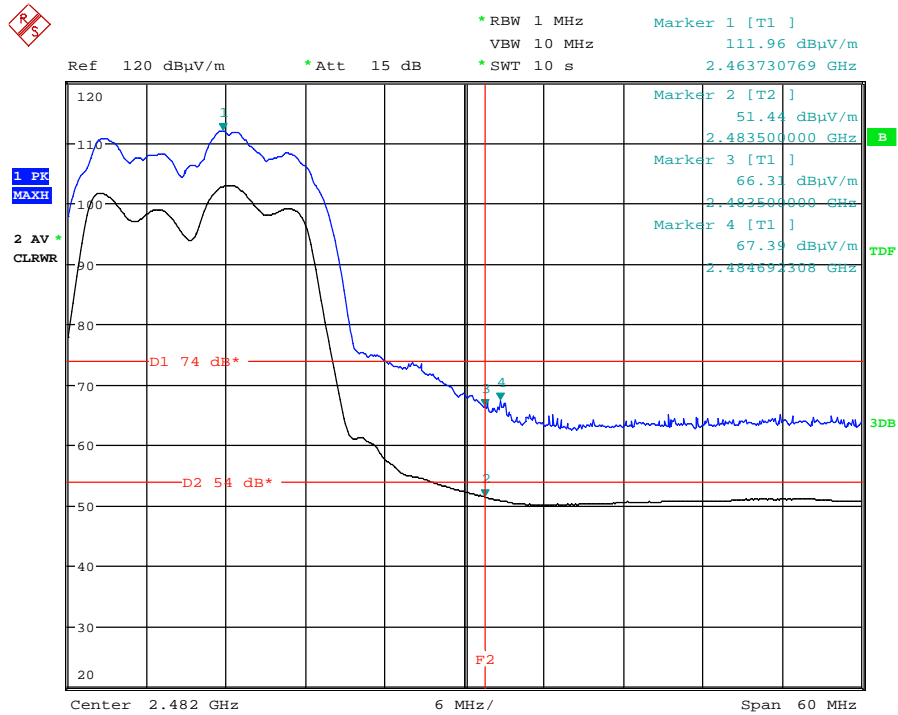
Date: 23.APR.2012 08:12:14

Radiated lower band-edge compliance – 802.11g



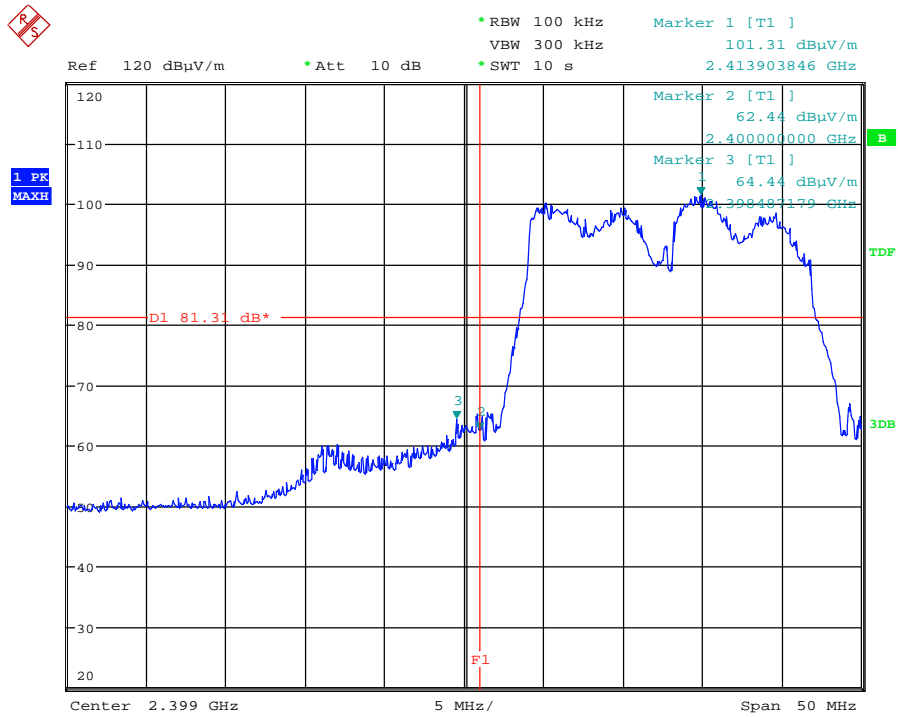
Date: 23.APR.2012 10:56:36

Radiated upper band-edge compliance – 802.11g



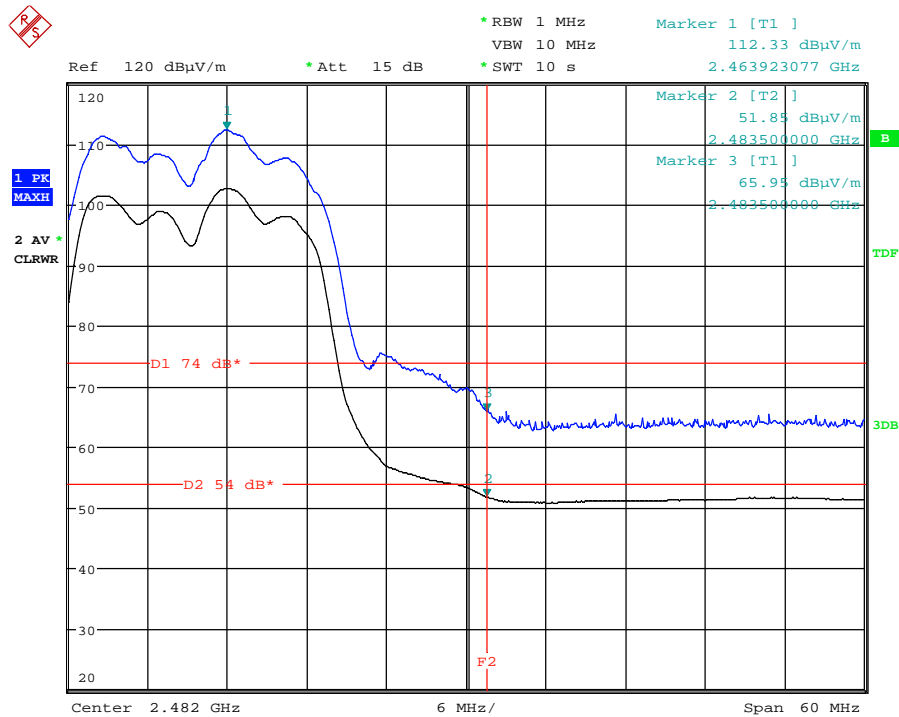
Date: 25.APR.2012 12:14:01

Radiated lower band-edge compliance – 802.11n HT20



Date: 23.APR.2012 10:35:40

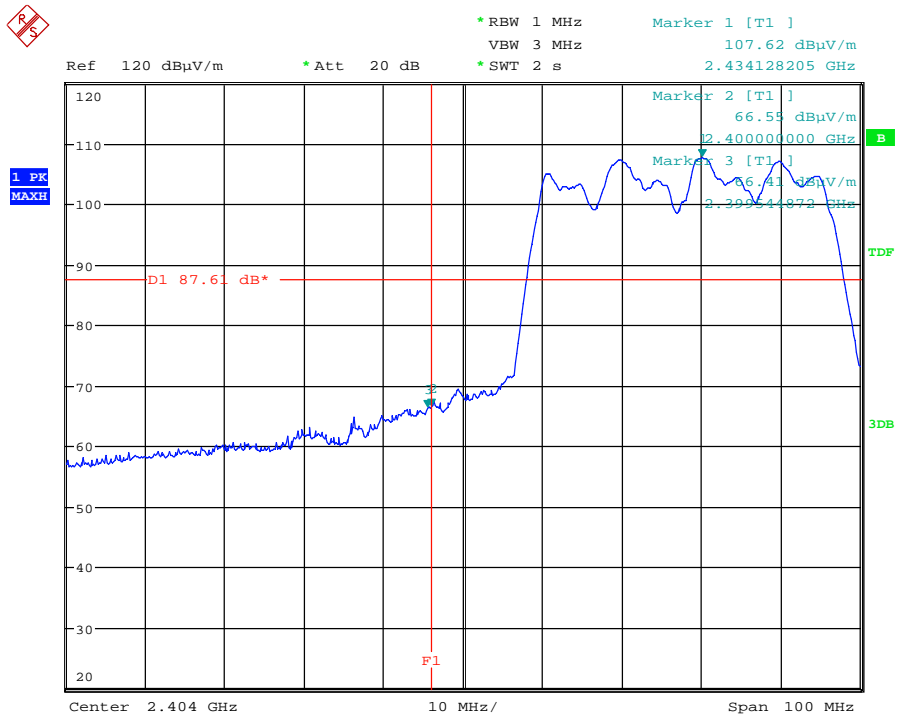
Radiated upper band-edge compliance – 802.11n HT20



Date: 25.APR.2012 12:19:25

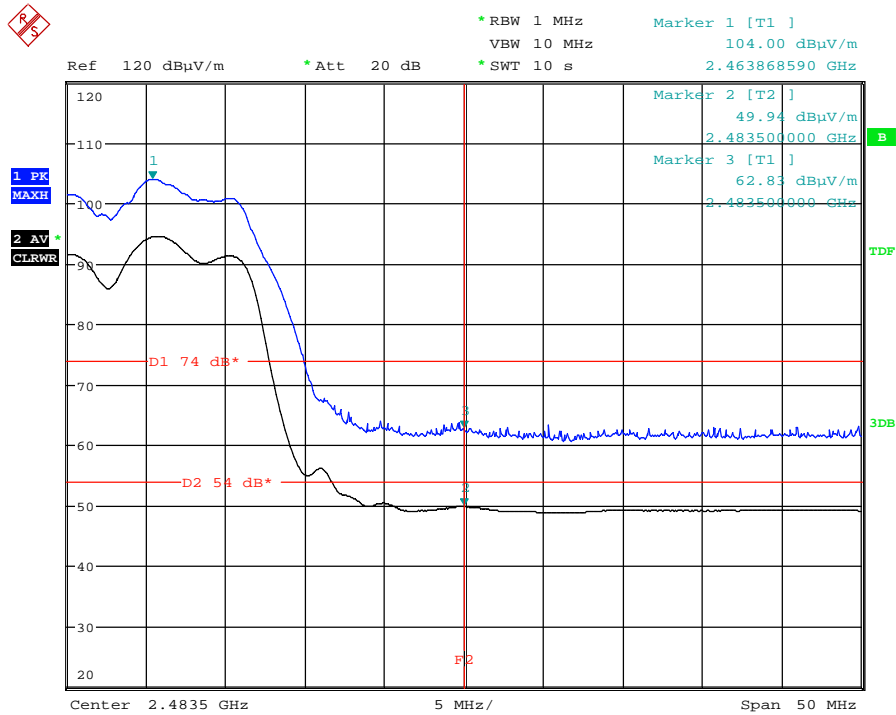


Radiated lower band-edge compliance – 802.11n HT40



Date: 23.APR.2012 13:42:06

Radiated upper band-edge compliance – 802.11n HT40



Date: 25.APR.2012 18:22:03

**Appendix C:****Additional Test and Sample Details**

This appendix contains details of:

1. The samples submitted for testing.
2. Details of EUT operating mode(s)
3. Details of EUT configuration(s) (see below).
4. EUT arrangement (see below).

Throughout testing, the following numbering system is used to identify the sample and its modification state:

**Sample No:** Sxx Mod w

where:

xx	= sample number	eg. S01
w	= modification number	eg. Mod 2

The following terminology is used throughout the test report:

**Support Equipment (SE)** is any additional equipment required to exercise the EUT in the applicable operating mode. Where relevant SE is divided into two categories:

SE in test environment: The SE is positioned in the test environment and is not isolated from the EUT (e.g. on the table top during REFE testing).

SE isolated from the EUT: The SE is isolated via filtering from the EUT. (e.g. equipment placed externally to the ALSR during REFE testing).

**EUT configuration** refers to the internal set-up of the EUT. It may include for example:

- Positioning of cards in a chassis.
- Setting of any internal switches.
- Circuit board jumper settings.
- Alternative internal power supplies.

Where no change in EUT configuration is **possible**, the configuration is described as "single possible configuration".

**EUT arrangement** refers to the termination of EUT ports / connection of support equipment, and where relevant, the relative positioning of samples (EUT and SE) in the test environment.

For further details of the test procedures and general test set ups used during testing please refer to the related document "EMC Test Methods - An Overview", which can be supplied by TRaC Global upon request.

**C1 Test samples**

The following samples of the apparatus were submitted by the client for testing:

<b>Sample No</b>	<b>Description</b>	<b>Identification</b>
S05	A5520N Home Network Gateway	3x Antenna connectors
S11	A5520N Home Network Gateway	None

**C2 EUT operating mode during testing**

During testing, the EUT was exercised as described in the following tables:

<b>Test</b>	<b>Description of Operating Mode</b>
All tests detailed in this report except A8	EUT actively transmitting
Unintentional radiated emissions (A8)	EUT in receive mode

### **C3 EUT Configuration Information**

The EUT was submitted for testing in one single possible configuration.

**C4 List of EUT Ports**

The tables below describe the termination of EUT ports:

<b>Port</b>	<b>Description of Cable Attached</b>	<b>Cable length</b>	<b>Equipment Connected</b>
Power	Shielded power cable	1.5m	Power supply unit
FXS	4 way telephone cable	1.5m	Telephone
WAN	Cat 5e Ethernet cable	2m	Network hub
LAN	Cat 5e Ethernet cable	2m	Notebook computer
USB	None	N/A	Memory stick
DSL	2 way telephone cable	1.5m	DSLAM
Antenna x3*	RF coax cable	0.5m	Spectrum Analyser / 50Ω load

\*Only applicable to S05 in test setup

**C5 Details of Equipment Used**

<b>Ref</b>	<b>Type</b>	<b>Description</b>	<b>Manufacturer</b>	<b>Date Calibrated</b>
REF940	ATS	Ferrite Lined Chamber	Rainford EMC	13/07/2011
TRL138	3115	1-18GHz Horn Antenna	EMCO	08/11/2011
UH191	CBL611/A	Bilog Antenna	Chase	08/11/2010
UH281	FSU46	Spectrum Analyser	R&S	09/02/2012
TRL572	8449B	Pre-ampifier	Agilent	24/11/2010
UH004	ESVS10	E-field Receiver	R&S	12/01/2012
UH396	ENV216	LISN	R&S	12/04/2012

**Appendix D:**

**Additional Information**

No additional information is included within this test report.



**Appendix E:**

**Photographs and Figures**

The following photographs were taken of the test samples:

1. Radiated electric field emissions arrangement
2. Powerline conducted emissions setup

Photograph 1



Photograph 2



