

TRaC Wireless Test Report : 0F3137WUS4

Applicant : Widex A/S

Apparatus : TV DEX, TV CONTROLLER

Specification(s) : CFR47 Part 15 October 2008

Purpose of Test : Certification

FCCID : TTY-TVC

IC ID : 5676B-TVC

Authorised by :



:Radio Product Manager

Issue Date : 17th March 2011

Authorised Copy Number : PDF

Contents

Section 1:	Introduction	3
1.1	General	3
1.2	Tests Requested By	4
1.3	Manufacturer	4
1.4	Apparatus Assessed	4
1.5	Test Result Summary	5
1.6	Notes Relating To The Assessment	6
1.7	Deviations from Test Standards	6
Section 2:	Measurement Uncertainty	7
2.1	Measurement Uncertainty Values	7
Section 3:	Modifications	9
3.1	Modifications Performed During Assessment	9
Appendix A:	Formal Emission Test Results	10
A1	Transmitter Intentional Emission Radiated	11
A2	Radiated Electric Field Emissions	12
A3	Unintentional Radiated Emissions	15
A3	Power Line Conducted Emissions	17
Appendix B:	Supporting Graphical Data	19
Appendix C:	Additional Test and Sample Details	41
Appendix D:	Additional Information	47
Appendix E:	Photographs and Figures	48
Appendix F:	MPE Calculation	51
Appendix G:	Cross Reference FCC Part 15c to IC RSS	52

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.

Test performed by: TRaC Telecoms & Radio []
Unit E
South Orbital Trading Park
Hedon Road
Hull, HU9 1NJ.
United Kingdom.

Telephone: +44 (0) 1482 801801
Fax: +44 (0) 1482 801806

TRaC Telecoms & Radio [X]
Moss View
Nipe Lane
Up Holland
West Lancashire, WN8 9PY
United Kingdom

Telephone: +44 (0) 1695 556666
Fax: +44 (0) 1695 577077

Email: test@tracglobal.com
Web site: <http://www.tracglobal.com>

Tests performed by: D Winstanley

Report author: D Winstanley

This report must not be reproduced except in full without prior written permission from TRaC Telecoms & Radio.

1.2 Tests Requested By

This testing in this report was requested by :

Widex A/S
Nymoellevej 6
DK-3540 Lyngø
Denmark

1.3 Manufacturer

Widex A/S
Nymoellevej 6
DK-3540 Lyngø
Denmark

1.4 Apparatus Assessed

The following apparatus was assessed between: 18th February – 11th March 2011.

TV DEX, TV CONTROLLER

The above equipment was an audio level control device passing audio from the 2.4 GHz link to a hearing aid via a 10.6 MHz link. This report covers the 2.4GHz frequency of operation, the 10.6MHz results can be found in TRaC test report 0F3137WUS3.

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
Spurious Emissions Radiated <1000MHz	Title 47 of the CFR: Part 15 Subpart (c) 15.209	ANSI C63.10	Pass
Spurious Emissions Radiated >1000MHz	Title 47 of the CFR: Part 15 Subpart (c) 15.249 & 15.209	ANSI C63.10	Pass
AC Power conducted emissions	Title 47 of the CFR: Part 15 Subpart (c) 15.207	ANSI C63.10	Pass
Intentional Emission Frequency	Title 47 of the CFR: Part 15 Subpart (c) 15.249	ANSI C63.10	Pass
Intentional Emission Field Strength:	Title 47 of the CFR: Part 15 Subpart (c) 15. 249	ANSI C63.10	Pass
Intentional Emission Band Occupancy	Title 47 of the CFR: Part 15 Subpart (c) 15.215	ANSI C63.10	Pass
Intentional Emission ERP (mW)	Title 47 of the CFR: Part 15 Subpart (c)	ANSI C63.10	N/A
Unintentional Radiated Spurious Emissions	Title 47 of the CFR: Part 15 Subpart (b) 15.109	ANSI C63.10	Pass
Antenna Arrangements Integral:	Title 47 of the CFR: Part 15 Subpart (c) 15.203	-	Pass
Antenna Arrangements External Connector	Title 47 of the CFR: Part 15 Subpart (c) 15.204	-	-
Restricted Bands	Title 47 of the CFR: Part 15 Subpart (c) 15.205	-	-
Maximum Frequency Of Search	Title 47 of the CFR: Part 15 Subpart (c) 15.33	-	-
Extrapolation Factor	Title 47 of the CFR: Part 15 Subpart (c) 15.31(f)	-	-

Abbreviations used in the above table:

CFR : Code of Federal Regulations
REFE : Radiated Electric Field Emissions

ANSI : American National Standards Institution
PLCE : Power Line Conducted 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**

For test data recorded in accordance with note (iii) of Section 2.1 the following measurement uncertainty was calculated:

Radio Testing – General Uncertainty Schedule

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 (Equipment - TRLUH120) = **2.18dB**

Uncertainty in test result (Equipment – TRL05) = **1.08dB**

Uncertainty in test result (Equipment – TRL479) = **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 (Equipment - TRLUH120) = **119ppm**

Uncertainty in test result (Equipment – TRL05) = **0.113ppm**

Uncertainty in test result (Equipment – TRL479) = **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 (Equipment TRL479) Up to 8.1GHz = **3.31dB**

Uncertainty in test result (Equipment TRL479) 8.1GHz – 15.3GHz = **4.43dB**

Uncertainty in test result (Equipment TRL479) 15.3GHz – 21GHz = **5.34dB**

Uncertainty in test result (Equipment TRLUH120) 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%**

[11] Power Line Conduction

Uncertainty in test result = **3.4dB**

[12] Spectrum Mask Measurements

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

[13] Adjacent Sub Band Selectivity

Uncertainty in test result = **1.24dB**

[14] Receiver Blocking – Listen Mode, Radiated

Uncertainty in test result = **3.42dB**

[15] Receiver Blocking – Talk Mode, Radiated

Uncertainty in test result = **3.36dB**

[16] Receiver Blocking – Talk Mode, Conducted

Uncertainty in test result = **1.24dB**

[17] Receiver Threshold

Uncertainty in test result = **3.23dB**

[18] 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 Transmitter Intentional Emission Radiated

Carrier power was verified with the EUT transmitting Test Details:	
Regulation	Title 47 of the CFR: Part15 Subpart (c) 15.249 & 15.215
Measurement standard	ANSI C63.10:2009
EUT sample number	S07
Modification state	0
SE in test environment	None
SE isolated from EUT	None
EUT set up	Refer to Appendix C
Photographs (Appendix F)	Photograph 1

FREQ. (MHz)	MEASUREMENT Rx. READING (dBµV)	CABLE LOSS (dB)	ANT FACTOR (dB/m)	PRE AMP (dB)	FIELD STRENGTH (dBµV/m)	FIELD STRENGTH (mV/m)
2403	96.57	1	28.3	32.4	93.47	47.152
2440	95.48	1	28.3	32.4	92.38	41.591
2480	92.77	1	28.4	32.3	89.87	31.153
Limit value @ fc			50 mV/m			
Band occupancy @ -20 dBc						
FREQ. (MHz)	f lower (MHz)		f higher (MHz)		Band occupancy (MHz)	
2403	2402.408654		2403.722756		1.314	
2440	2438.259615		2440.006410		1.746	
2480	2479.807692		2482.491987		2.684	

- Notes:**
- 1 Results quoted are extrapolated as indicated
 - 2 Receiver detector @ fc = Average, 1MHz RBW
 - 3 When battery powered the EUT was powered with new / fully charged batteries

- Test Method:**
- 1 As per Radio – Noise Emissions, ANSI C63.10
 - 2 Measuring distances 3m
 - 3 EUT 0.8 metre above ground plane
 - 4 Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m.
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthogonal planes.
Maximum results recorded

A2 Radiated Electric Field Emissions

Preliminary scans were performed using a peak detector with the RBW = 100 kHz. The radiated electric field emission test applies to all spurious emissions and harmonics emissions. The maximum permitted field strength is listed in Section 15.209. The EUT was set to transmit as required.

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:	
Regulation	Title 47 of the CFR, Part 15 Subpart (c) Clause 15.209 & 15.249
Measurement standard	ANSI C63.10:2009
Frequency range	9kHz – 1000MHz
EUT sample number	S07
Modification state	0
SE in test environment	S27
SE isolated from EUT	None
EUT set up	Refer to Appendix C
Photographs (Appendix F)	Photograph 2

The worst case radiated emission measurements for spurious emissions are listed below and overleaf:

Test Details: 2403 MHz											
Ref No.	Detector (Pk / AV)	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	Foilter Loss (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
1	Pk	1201.507	58.13	0.7	25.2	32.3	-	51.73	-	385.92	5000
2	Av	1201.507	52.15	0.7	25.2	32.3	-	45.75	-	193.87	500
3	Pk	4806.140	45.53	1.3	32.8	32.3	0.7	48.03	-	252.06	5000
4	Av	4806.140	38.98	1.3	32.8	32.3	0.7	41.48	-	118.58	500
5	Pk	7209.259	44.93	1.5	36.1	32.1	0.8	51.23	-	364.33	5000
6	Av	7209.259	38.25	1.5	36.1	32.1	0.8	44.55	-	168.85	500
7	Pk	9612.217	41.63	1.3	37.9	31.5	0.8	50.13	-	321.00	5000
8	Av	9612.217	30.66	1.3	37.9	31.5	0.8	39.16	-	90.78	500

Radiated Electric Field Emissions Continued

Test Details:	
Regulation	Title 47 of the CFR, Part 15 Subpart (c) Clause 15.209 & 15.249
Measurement standard	ANSI C63.10:2009
Frequency range	9kHz – 1000MHz
EUT sample number	S07
Modification state	0
SE in test environment	S27
SE isolated from EUT	None
EUT set up	Refer to Appendix C
Photographs (Appendix F)	Photograph 2

Test Details: 2440 MHz											
Ref No.	Detector (Pk / AV)	FREQ. (MHz)	MEAS Rx (dBμV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	Foilter Loss (dB)	FIELD ST'GH (dBμV/m)	EXTRAP FACT (dB)	FIELD ST'GH (μV/m)	LIMIT (μV/m)
1	Pk	1219.55	60.32	0.7	25.2	32.3	-	53.92	-	496.59	5000
2	Av	1219.55	54.52	0.7	25.2	32.3	-	48.12	-	254.68	500
3	Pk	4878.14	43.8	1.3	33.1	32.4	0.6	46.40	-	208.93	5000
4	Av	4878.14	36.7	1.3	33.1	32.4	0.6	39.30	-	92.26	500
5	Pk	7317.19	40.64	1.4	36.6	32.1	0.8	47.34	-	232.81	5000
6	Av	7317.19	31.15	1.4	36.6	32.1	0.8	37.85	-	78.07	500
7	Pk	9756.24	40.89	1.8	38.1	31.6	0.6	49.79	-	308.67	5000
8	Av	9756.24	29.82	1.8	38.1	31.6	0.6	38.72	-	86.30	500

Test Details: 2480 MHz											
Ref No.	Detector (Pk / AV)	FREQ. (MHz)	MEAS Rx (dBμV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	Foilter Loss (dB)	FIELD ST'GH (dBμV/m)	EXTRAP FACT (dB)	FIELD ST'GH (μV/m)	LIMIT (μV/m)
1	Pk	1239.99	62.80	0.7	25.2	32.3	-	56.40	-	660.69	5000
2	Av	1239.99	55.57	0.7	25.2	32.3	-	49.17	-	287.41	500
3	Pk	4962.19	43.53	1.4	33.2	32.5	0.5	46.13	-	202.53	5000
4	Av	4962.19	36.45	1.4	33.2	32.5	0.5	39.05	-	89.64	500
5	Pk	7443.25	40.41	1.3	36.7	32.1	0.8	47.11	-	226.73	5000
6	Av	7443.25	30.60	1.3	36.7	32.1	0.8	37.30	-	73.28	500
7	Pk	9924.22	40.16	2.2	38.4	31.3	0.5	49.96	-	314.77	5000
8	Av	9924.22	28.30	2.2	38.4	31.3	0.5	38.10	-	80.35	500

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. For emissions below 30MHz the cable losses are assumed to be negligible.
- 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 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.
- 4 For Frequencies below 1 GHz, RBW= 120 kHz, testing was performed with CISPR16 compliant test receiver with QP detector.

The upper and lower frequency of the measurement range was decided according to 47 CFR Part 15:2008 Clause 15.33(a) and 15.33(a)(1).

Radiated emission limits 47 CFR Part 15: Clause 15.209 for all emissions:

Frequency of emission (MHz)	Field strength $\mu\text{V/m}$	Measurement Distance m	Field strength $\text{dB}\mu\text{V/m}$
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

- (a) Where results have been measured at one distance, and a signal level displayed at another, the results have been extrapolated using the following formula:

$$\text{Extrapolation (dB)} = 20 \log_{10} \left(\frac{\text{measurement distance}}{\text{specification distance}} \right)$$

- (b) The levels may have been rounded for display purposes.
- (c) The following table summarises the effect of the EUT operating mode, internal configuration and arrangement of cables / samples 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		✓		
Effect of Position of EUT cables & samples on emission levels	✓			
(i) Parameter defined by standard and / or single possible, refer to Appendix D (ii) Parameter defined by client and / or single possible, refer to Appendix D (iii) Parameter had a negligible effect on emission levels, refer to Appendix D (iv) Worst case determined by initial measurement, refer to Appendix D				

A3 Unintentional Radiated Emissions

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The radiated electric field emission test applies to all spurious emissions on directly related to the transmitter. The maximum permitted field strength is listed in Section 15.109. The EUT was set to operate in a transmit standby / receive mode.

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:	
Regulation	Title 47 of the CFR, Part 15 Subpart (c) Clause 15.109
Measurement standard	ANSI C63.10:2009
Frequency range	9kHz – 1000MHz
EUT sample number	S07
Modification state	0
SE in test environment	S27
SE isolated from EUT	None
EUT set up	Refer to Appendix C
Photographs (Appendix F)	Photograph 2

The worst case radiated emission measurements for spurious emissions are listed below:

Test Details: 2440 MHz											
Ref No.	Detector (Pk / AV)	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	Filter Loss (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
1	Pk	2747.48	45.06	0.9	29.1	32.6	-	42.46	-	132.74	5000
2	Av	2747.48	40.22	0.9	29.1	32.6	-	37.62	-	76.03	500

Test Details: 2440 MHz											
Ref No.	Detector (Pk / AV)	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	Filter Loss (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
1	Pk	2790.95	43.99	1	29.1	32.5	-	41.59	-	120.09	5000
2	Av	2790.95	38.49	1	29.1	32.5	-	36.09	-	63.75	500

Test Details: 2480 MHz											
Ref No.	Detector (Pk / AV)	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	Filter Loss (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
1	Pk	2837.778	43.00	1	29.2	32.5	-	40.70	-	108.39	5000
2	Av	2837.778	36.13	1	29.2	32.5	-	33.83	-	49.15	500

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. For emissions below 30MHz the cable losses are assumed to be negligible.
- 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 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.
- 4 For Frequencies below 1 GHz, RBW = 120 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

The upper and lower frequency of the measurement range was decided according to 47 CFR Part 15:2008 Clause 15.33(a) and 15.33(a)(1).

Radiated emission limits 47 CFR Part 15: Clause 15.109 for all emissions:

Frequency of emission (MHz)	Field strength $\mu\text{V/m}$	Measurement Distance m	Field strength $\text{dB}\mu\text{V/m}$
30-88	100	3	40.0
88-216	150	3	43.5
216-960	200	3	46.0
Above 960	500	3	54.0

- (a) Where results have been measured at one distance, and a signal level displayed at another, the results have been extrapolated using the following formula:

$$\text{Extrapolation (dB)} = 20 \log_{10} \left(\frac{\text{measurement distance}}{\text{specification distance}} \right)$$

- (b) The levels may have been rounded for display purposes.
- (c) The following table summarises the effect of the EUT operating mode, internal configuration and arrangement of cables / samples 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		✓		
Effect of Position of EUT cables & samples on emission levels	✓			
(i) Parameter defined by standard and / or single possible, refer to Appendix D (ii) Parameter defined by client and / or single possible, refer to Appendix D (iii) Parameter had a negligible effect on emission levels, refer to Appendix D (iv) Worst case determined by initial measurement, refer to Appendix D				

A3 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.

Test Details:	
Regulation	Title 47 of the CFR: Part 15 Subpart (c) Clause 15.107 & 15.207
Measurement standard	ANSI C63.10:2003
Frequency range	150kHz to 30MHz
EUT sample number	S07
Modification state	0
SE in test environment	S27
SE isolated from EUT	None
EUT set up	Refer to Appendix C

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

Results measured using the average detector compared to the average limit

Ref No.	Freq (MHz)	Conductor	Result (dBuV)	Spec Limit (dBuV)	Margin (dB)	Result Summary
1	10.605	Live	46.75	50.00	-3.25	Pass

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

Ref No.	Freq (MHz)	Conductor	Result (dBuV)	Spec Limit (dBuV)	Margin (dB)	Result Summary
1	4.97	Live	36.77	56.00	-19.23	Pass
2	10.605	Live	50.54	60.00	-9.46	Pass

Specification limits :

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

Conducted disturbance at the mains ports.

Frequency range MHz	Limits dB μ V	
	Quasi-peak	Average
0.15 to 0.5	66 to 56 ²	56 to 46 ²
0.5 to 5	56	46
5 to 30	60	50

Notes:

1. The lower limit shall apply at the transition frequency.
2. 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				

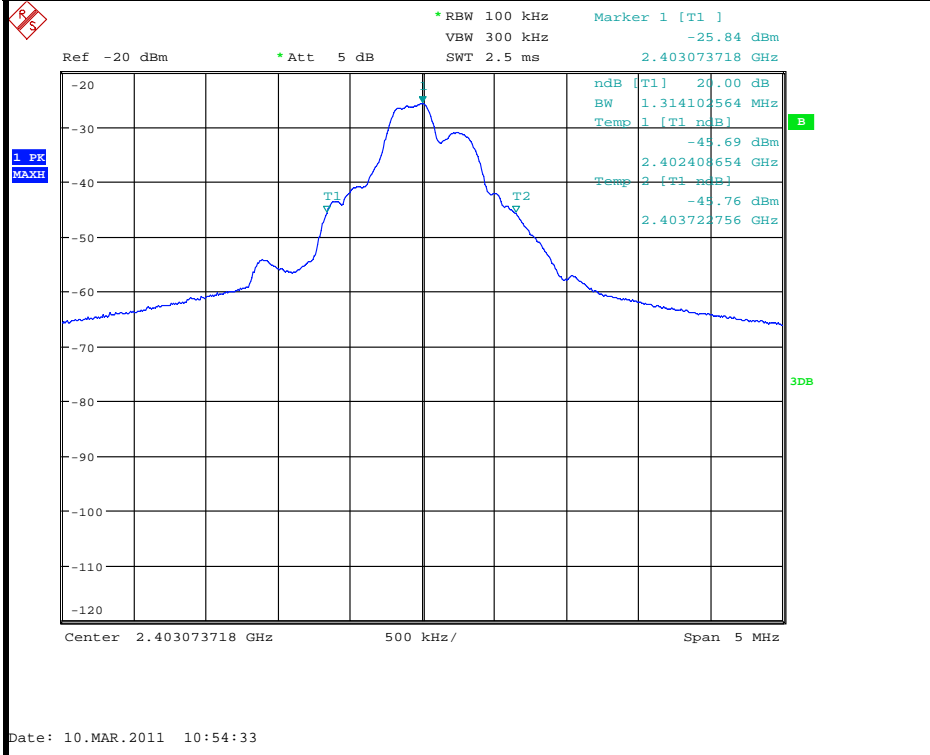
Appendix B:

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.



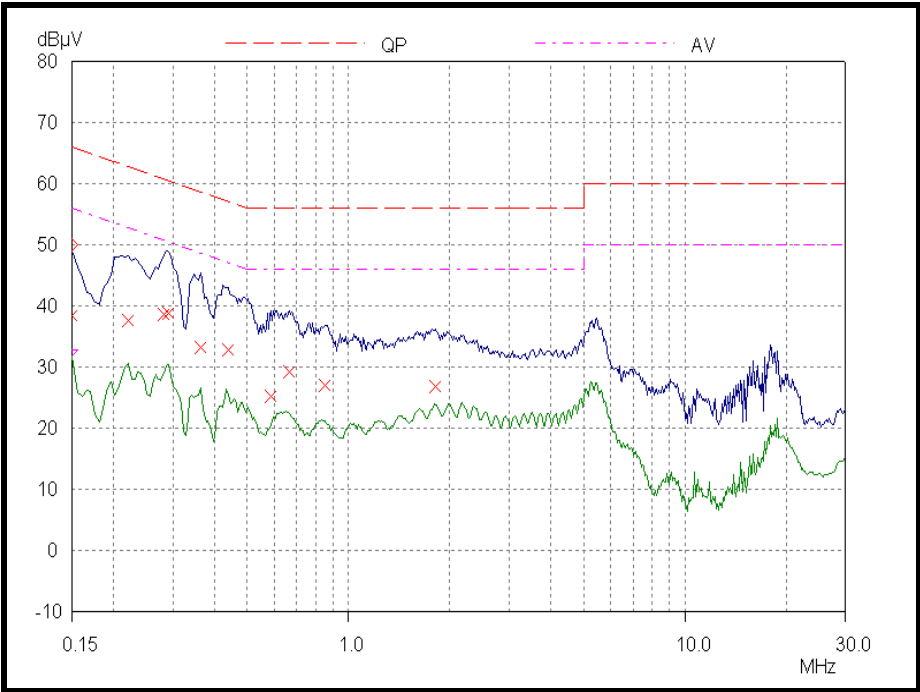
20dB Bandwidth – 2403 MHz



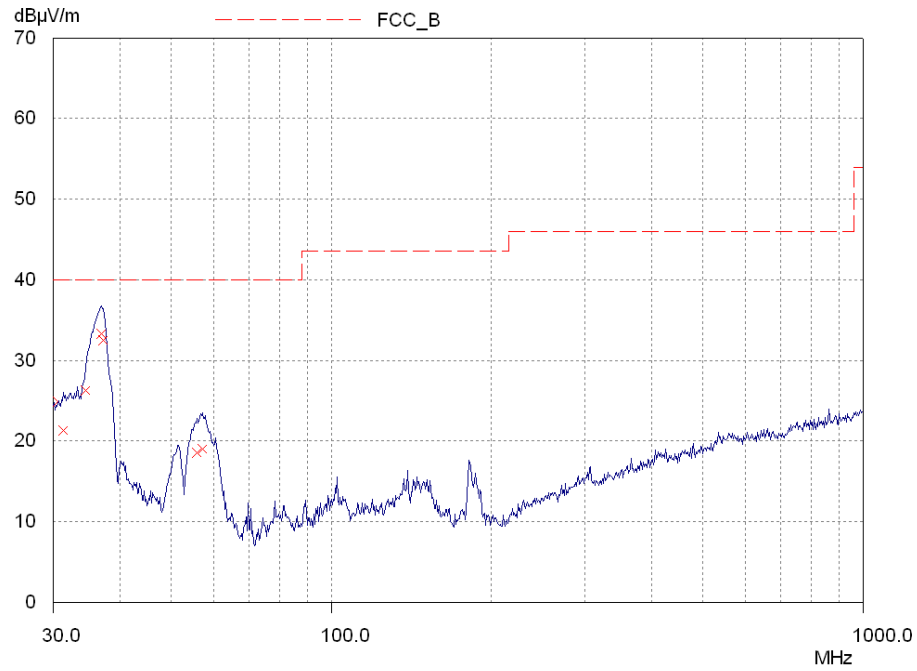
20dB Bandwidth – 2440 MHz



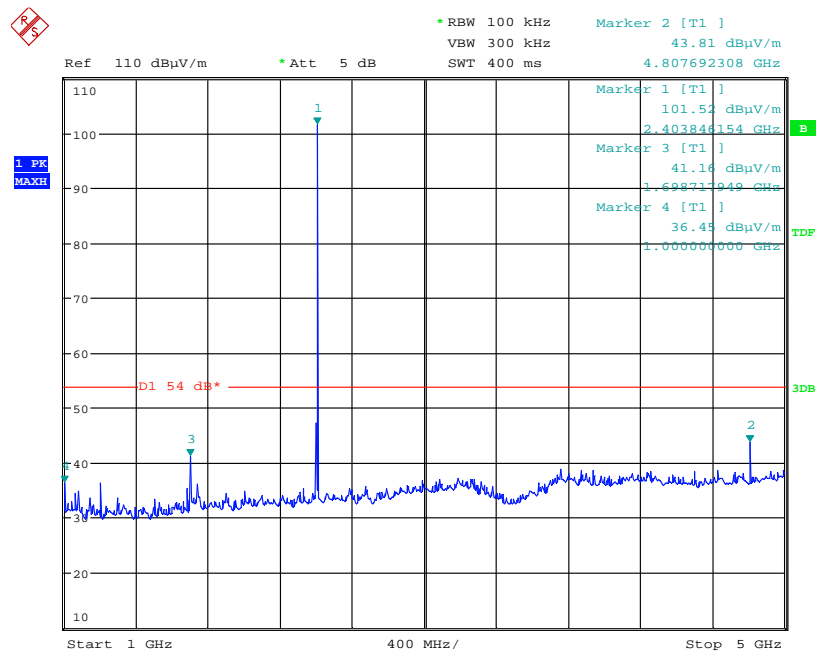
20dB Bandwidth – 2440 MHz



AC Powerline Conduction

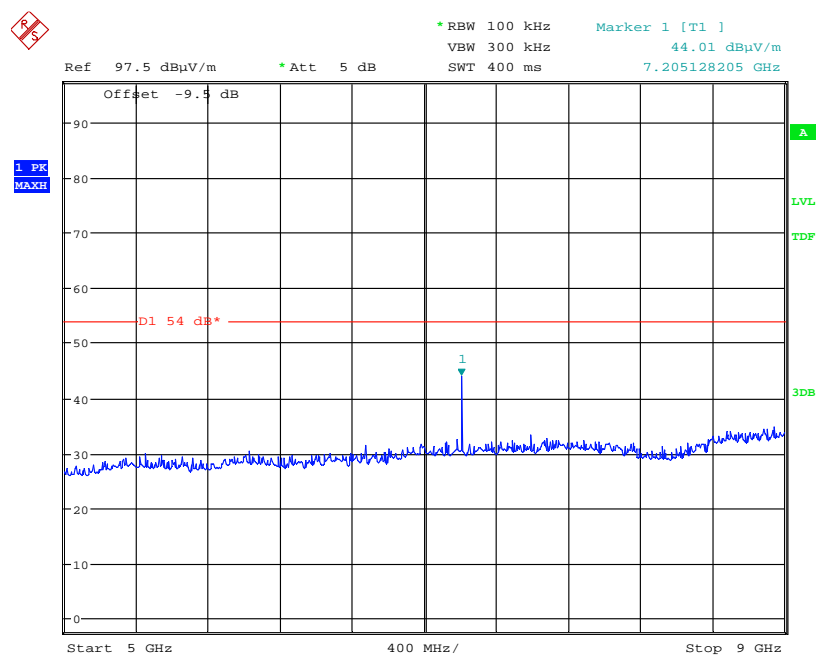


Radiated spurious emissions 30MHz - 1GHz - 2403 MHz



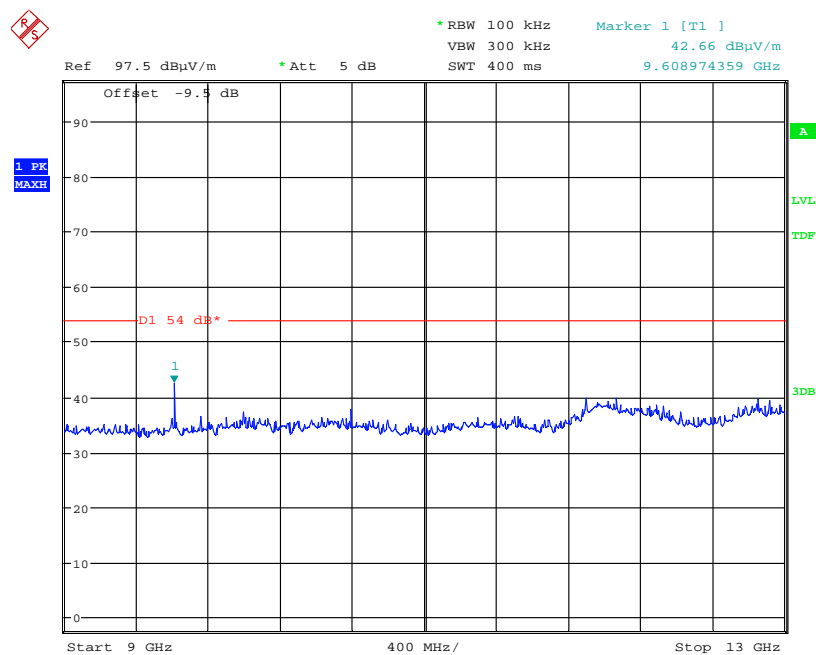
Date: 21.FEB.2011 11:37:42

Radiated spurious emissions 1GHz - 5GHz - 2403 MHz



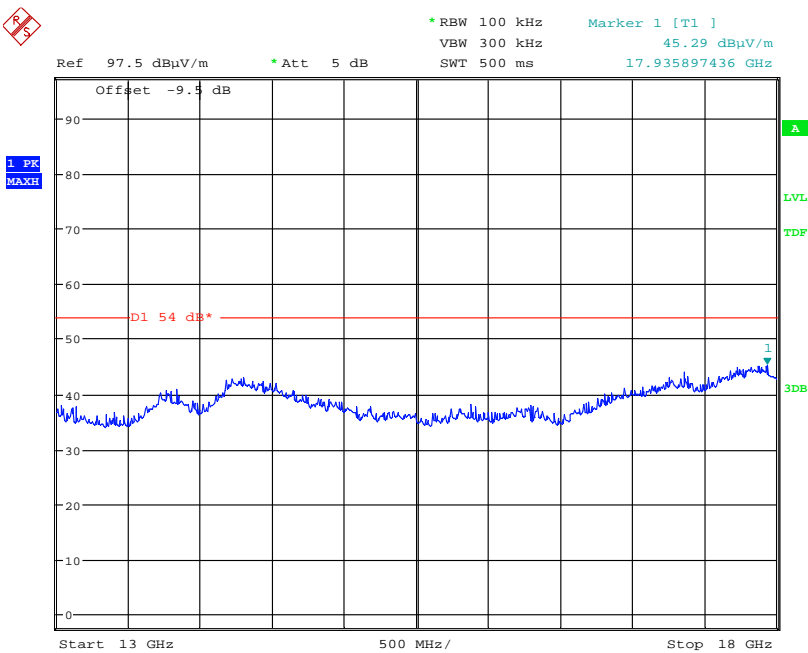
Date: 22.FEB.2011 13:40:36

Radiated spurious emissions 5GHz - 9GHz - 2403 MHz



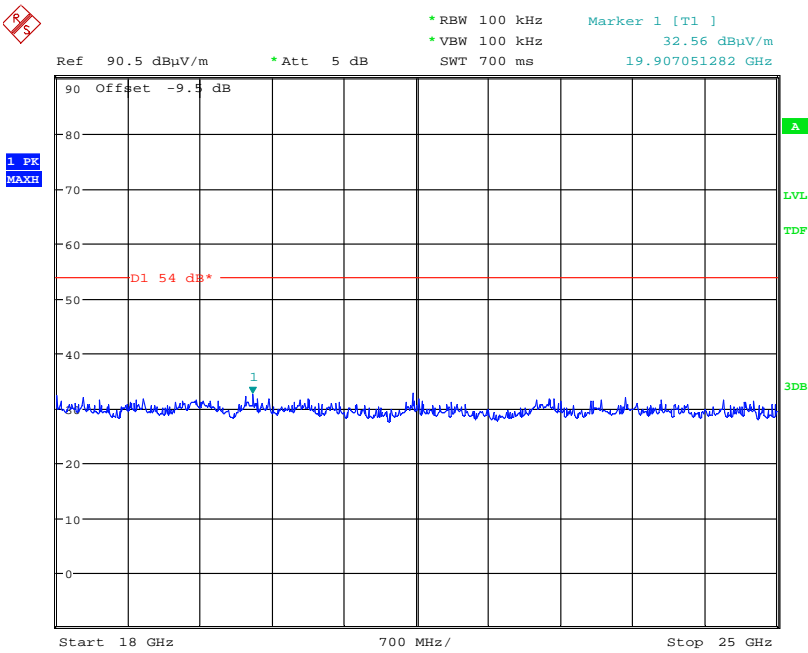
Date: 22.FEB.2011 13:40:18

Radiated spurious emissions 9GHz - 13GHz - 2403 MHz



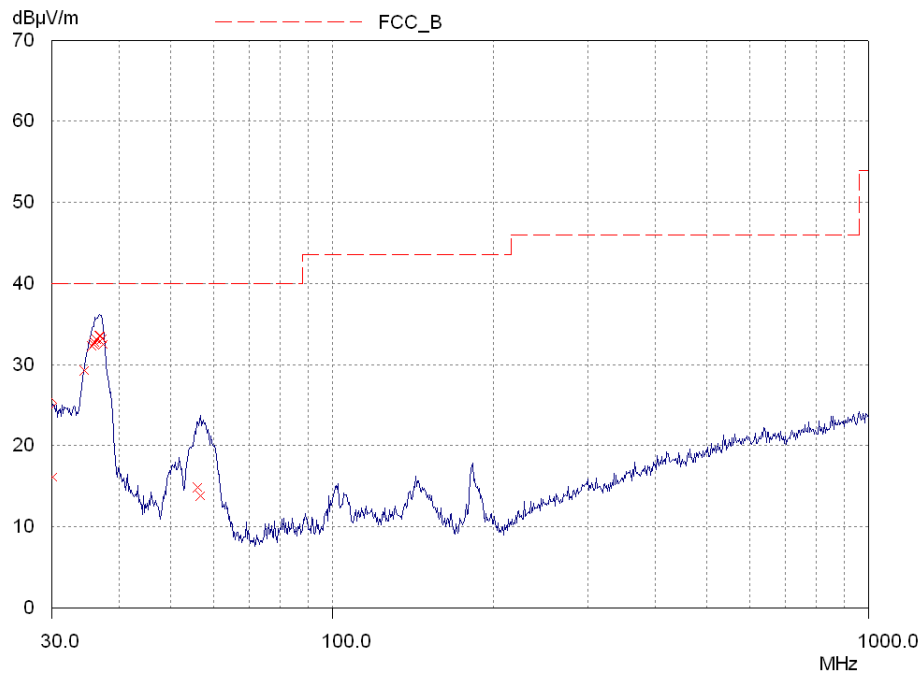
Date: 22.FEB.2011 13:39:45

Radiated spurious emissions 13GHz - 18GHz - 2403 MHz

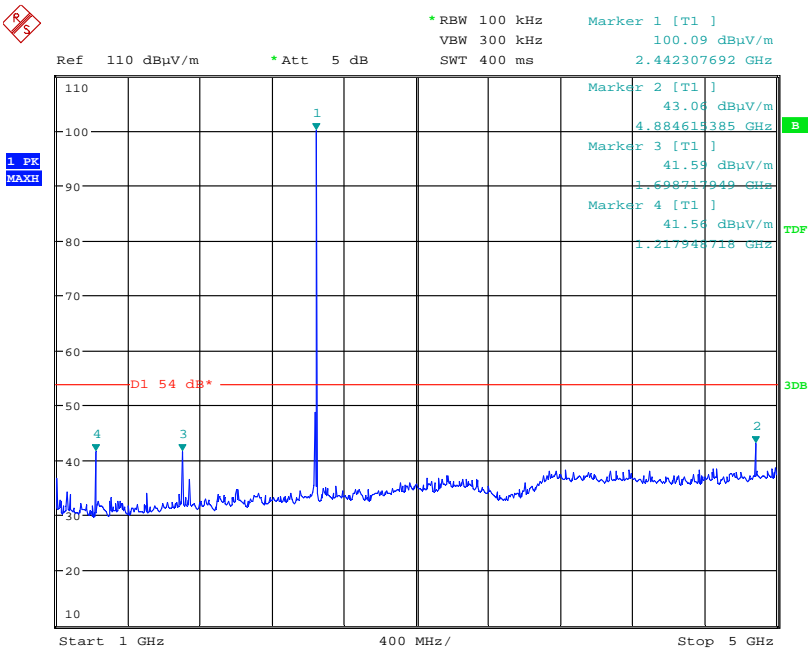


Date: 22.FEB.2011 10:00:41

Radiated spurious emissions 18GHz - 25GHz - 2403 MHz

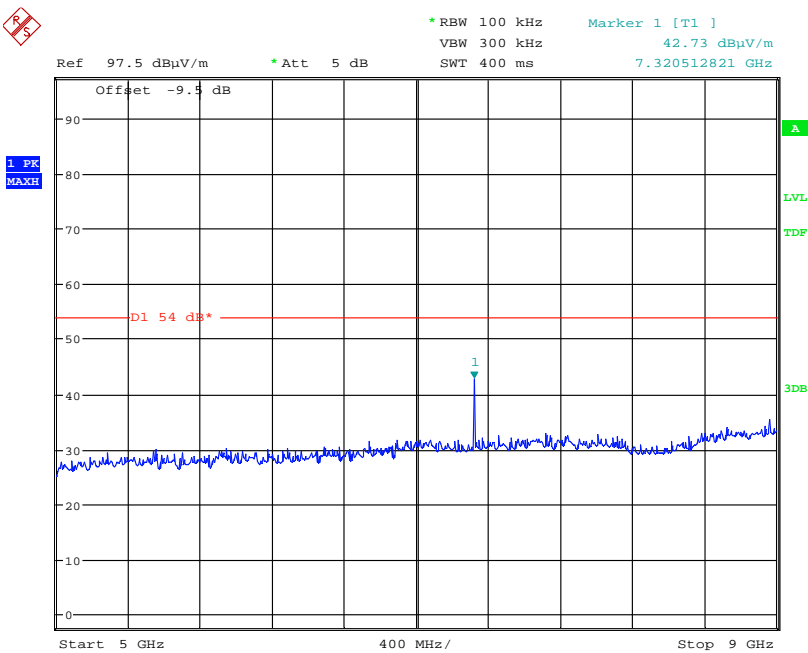


Radiated spurious emissions 30MHz - 1GHz - 2440 MHz



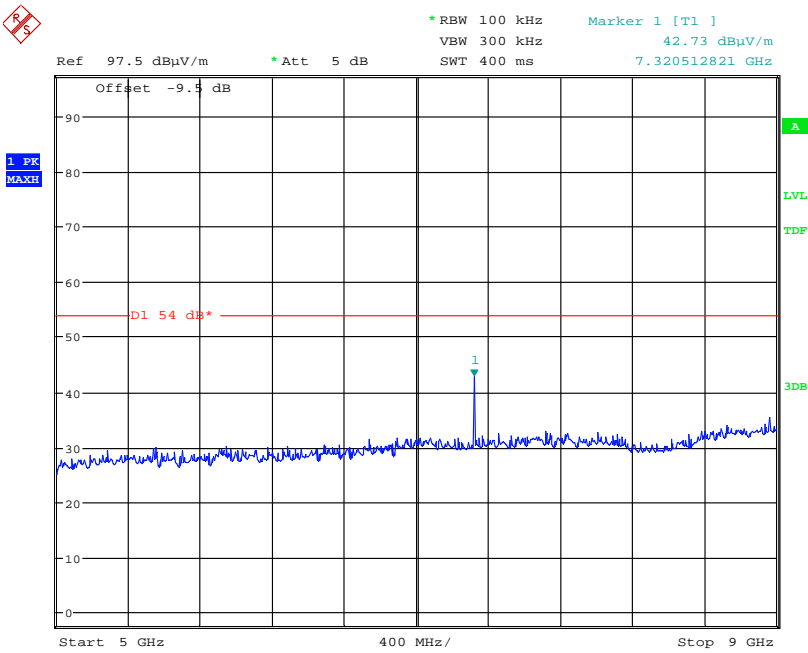
Date: 21.FEB.2011 11:38:37

Radiated spurious emissions 1GHz - 5GHz - 2440 MHz



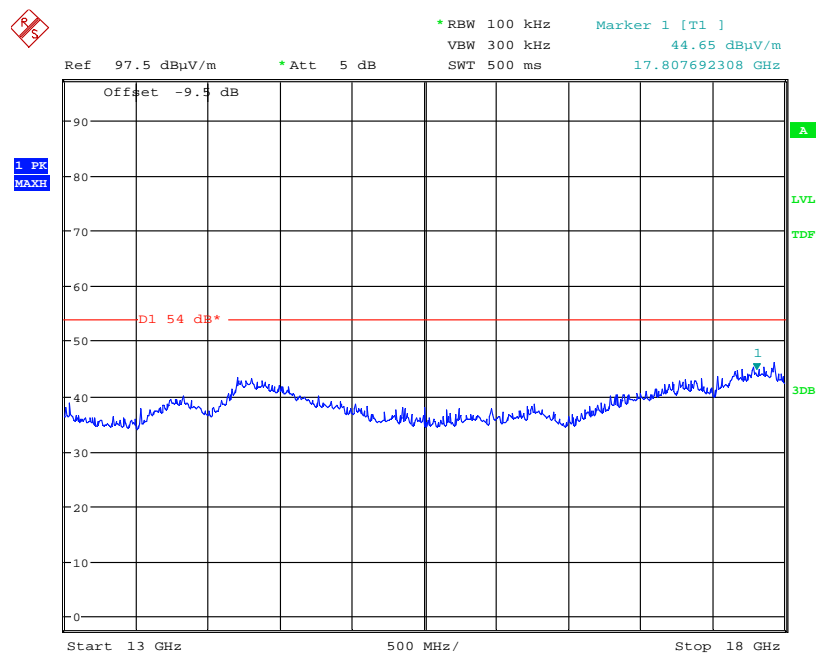
Date: 22.FEB.2011 13:41:14

Radiated spurious emissions 5GHz - 9GHz - 2440 MHz



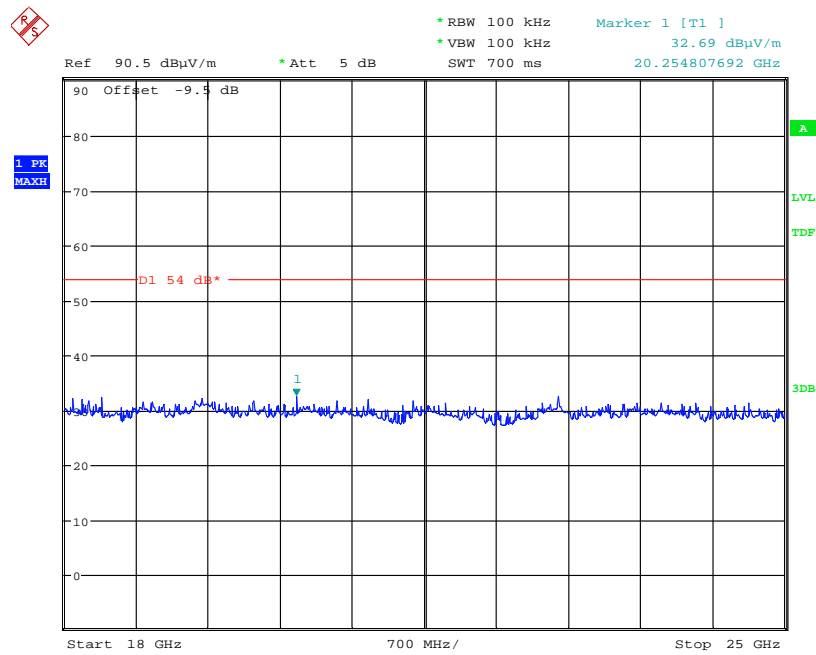
Date: 22.FEB.2011 13:41:14

Radiated spurious emissions 9GHz - 13GHz - 2440 MHz



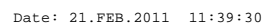
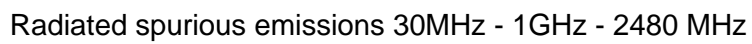
Date: 22.FEB.2011 13:41:59

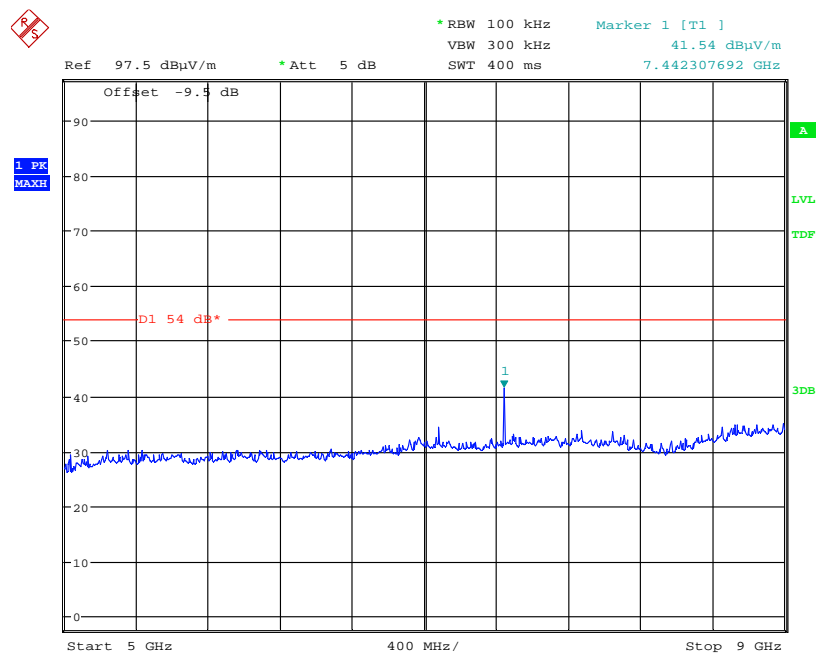
Radiated spurious emissions 13GHz - 18GHz - 2440 MHz



Date: 22.FEB.2011 10:01:19

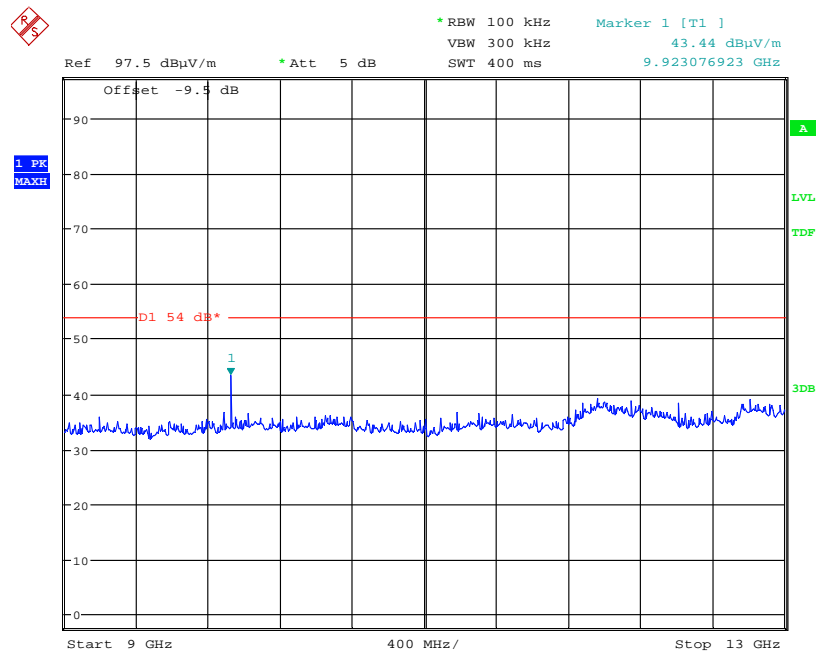
Radiated spurious emissions 18GHz - 25GHz - 2440 MHz





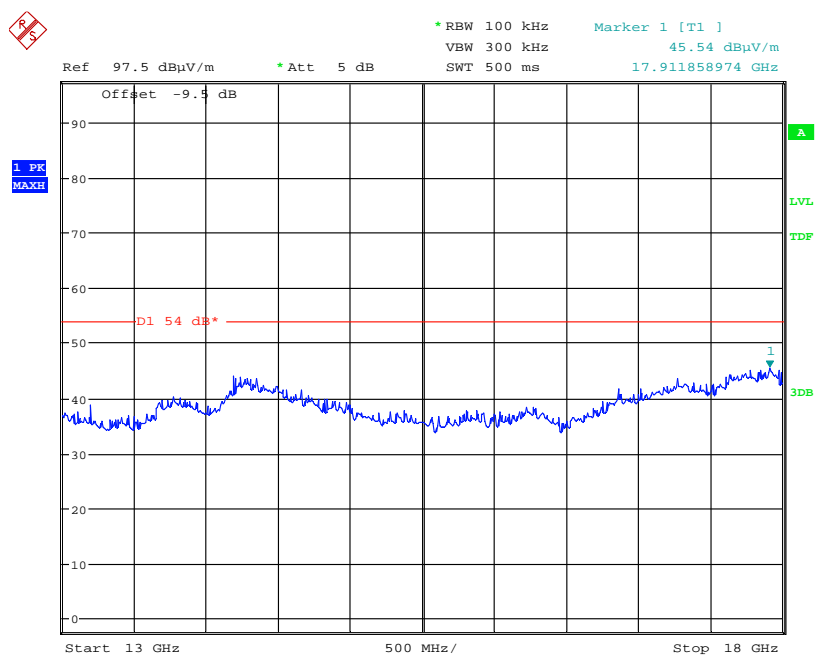
Date: 22.FEB.2011 13:47:47

Radiated spurious emissions 5GHz - 9GHz - 2480 MHz



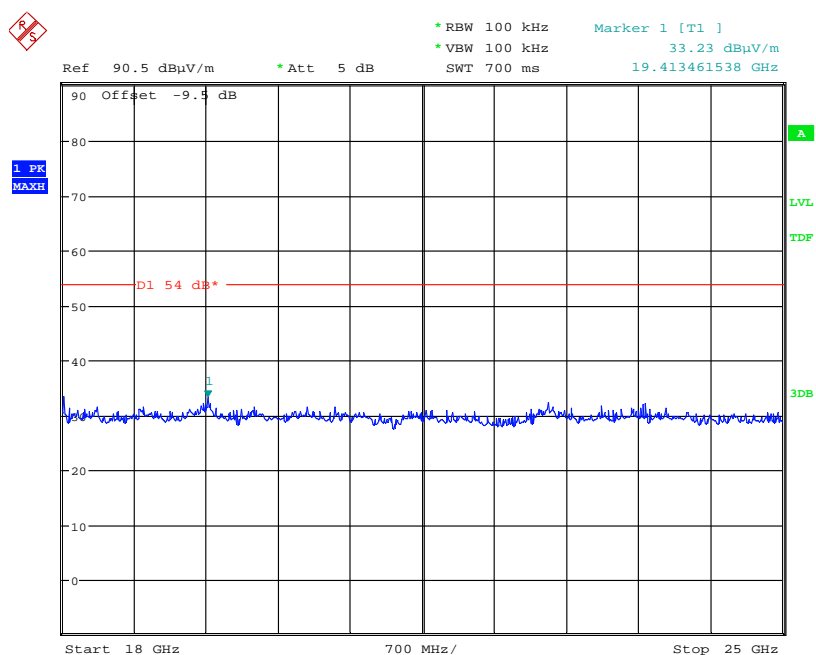
Date: 22.FEB.2011 13:47:07

Radiated spurious emissions 9GHz - 13GHz - 2480 MHz



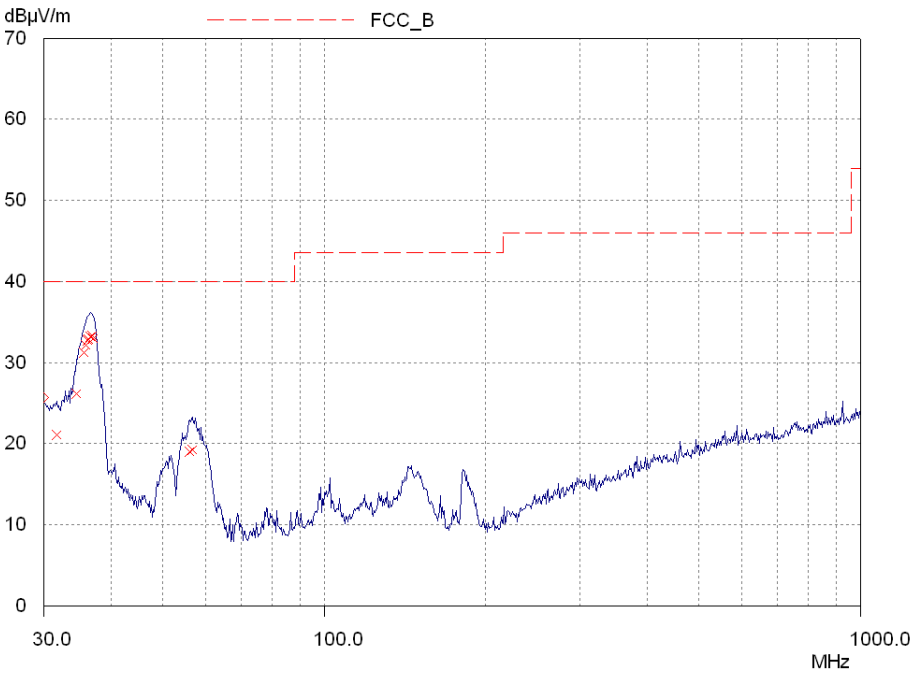
Date: 22.FEB.2011 13:46:50

Radiated spurious emissions 13GHz - 18GHz - 2480 MHz

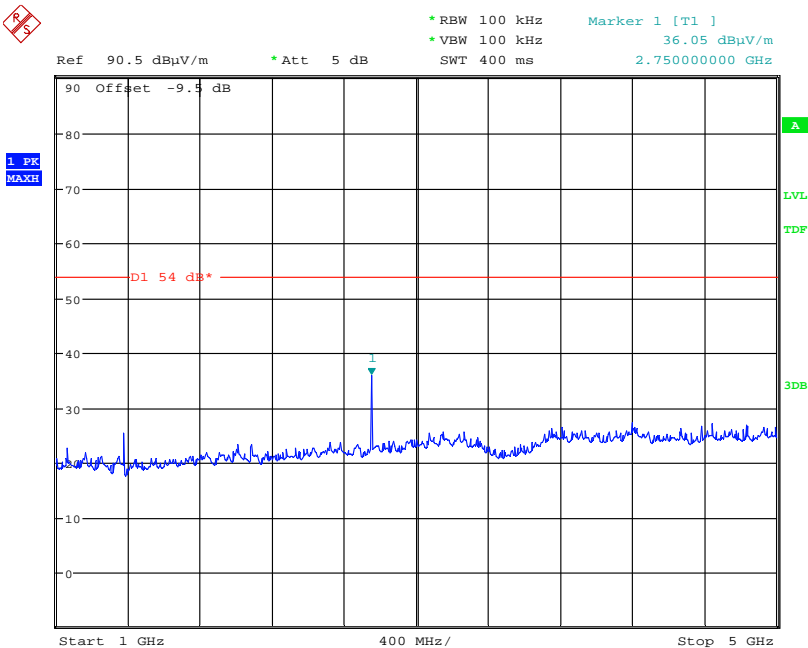


Date: 22.FEB.2011 10:03:52

Radiated spurious emissions 18GHz - 25GHz - 2480 MHz

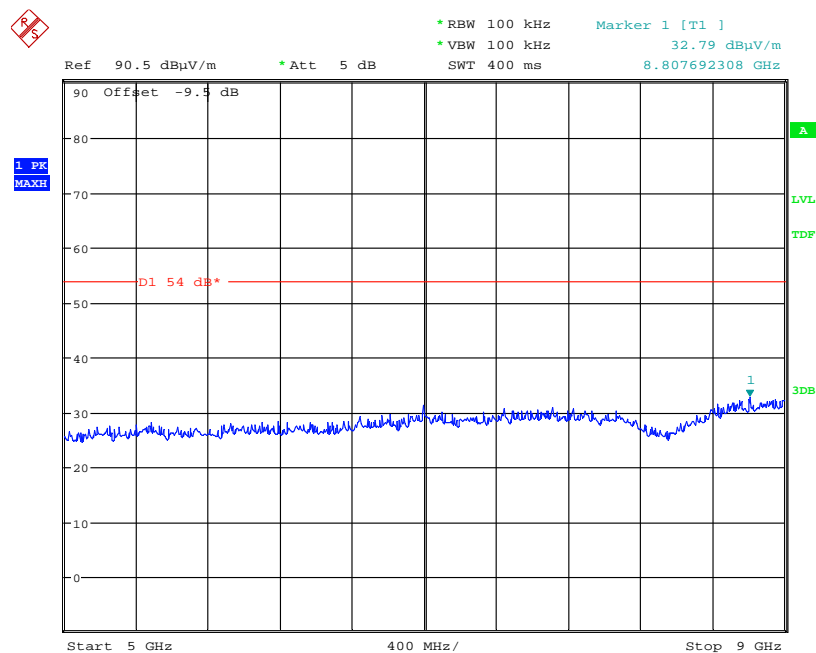


Unintentional Radiated spurious emissions 30MHz - 1GHz - 2403 MHz



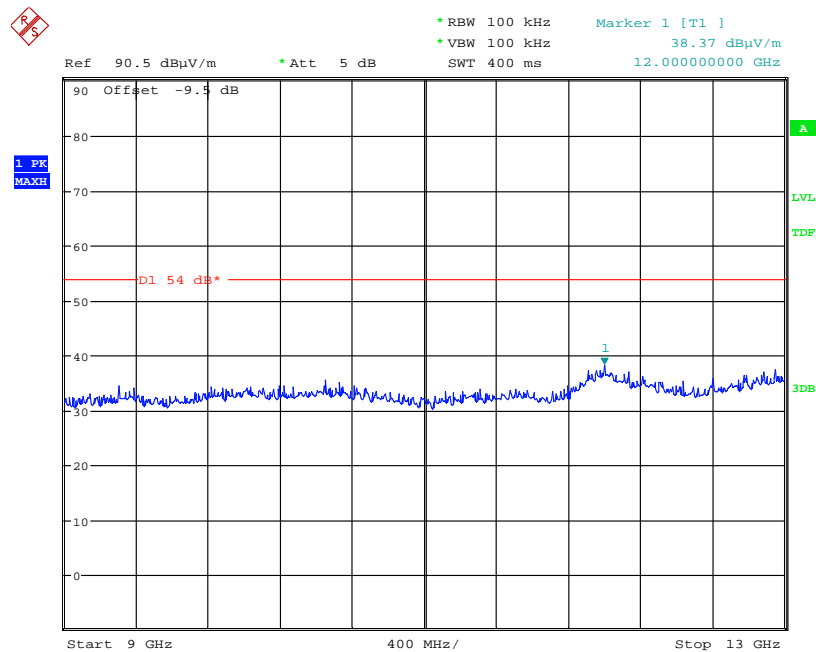
Date: 22.FEB.2011 11:00:55

Unintentional Radiated spurious emissions 1GHz - 5GHz - 2403 MHz



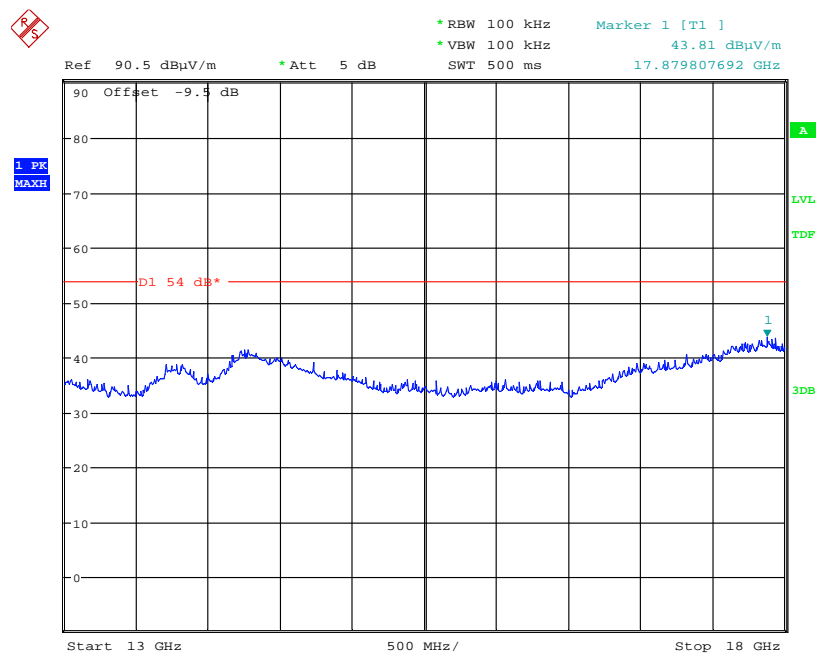
Date: 22.FEB.2011 11:00:34

Unintentional Radiated spurious emissions 5GHz - 9GHz - 2403 MHz



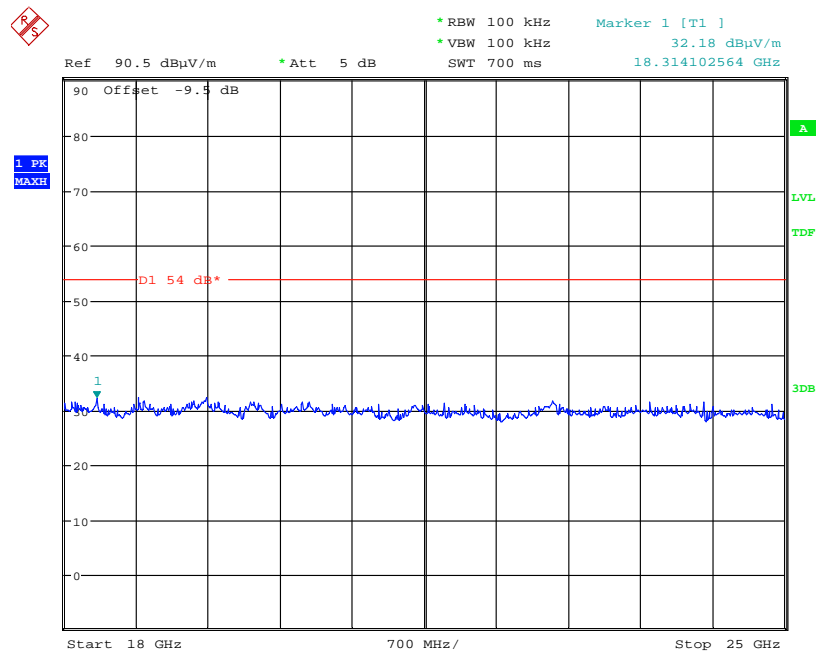
Date: 22.FEB.2011 11:00:13

Unintentional Radiated spurious emissions 9GHz - 13GHz - 2403 MHz



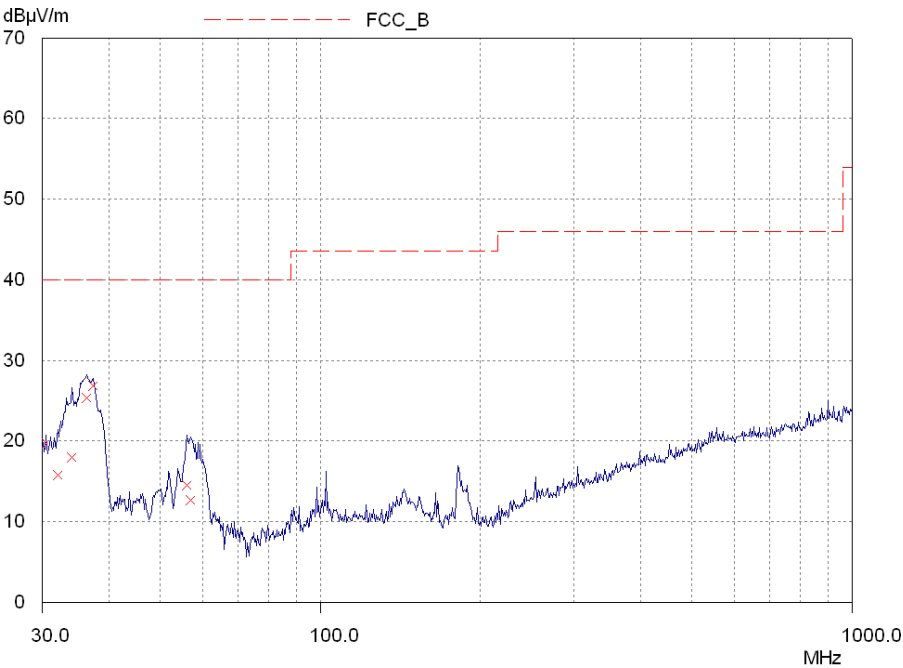
Date: 22.FEB.2011 10:59:54

Unintentional Radiated spurious emissions 13GHz - 18GHz - 2403 MHz

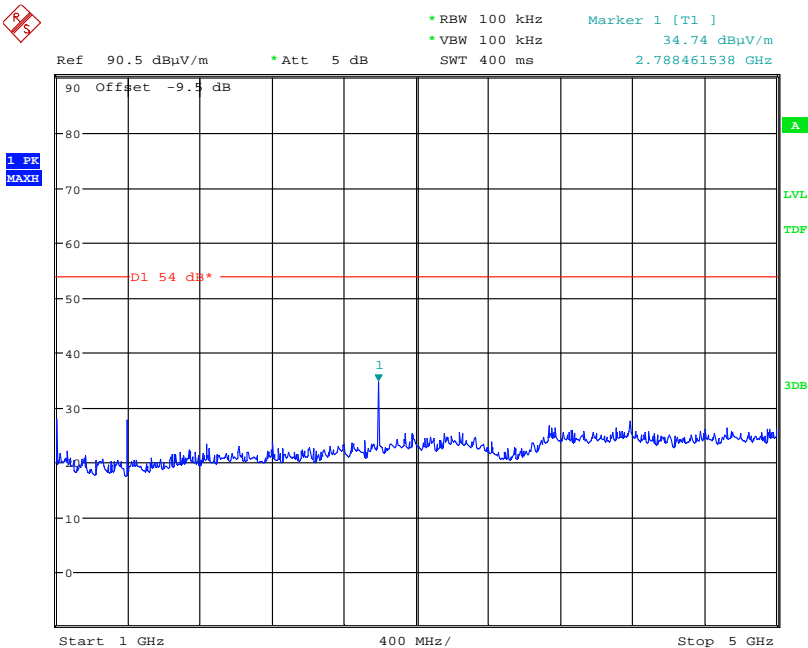


Date: 22.FEB.2011 10:08:52

Unintentional Radiated spurious emissions 18GHz - 25GHz - 2403 MHz

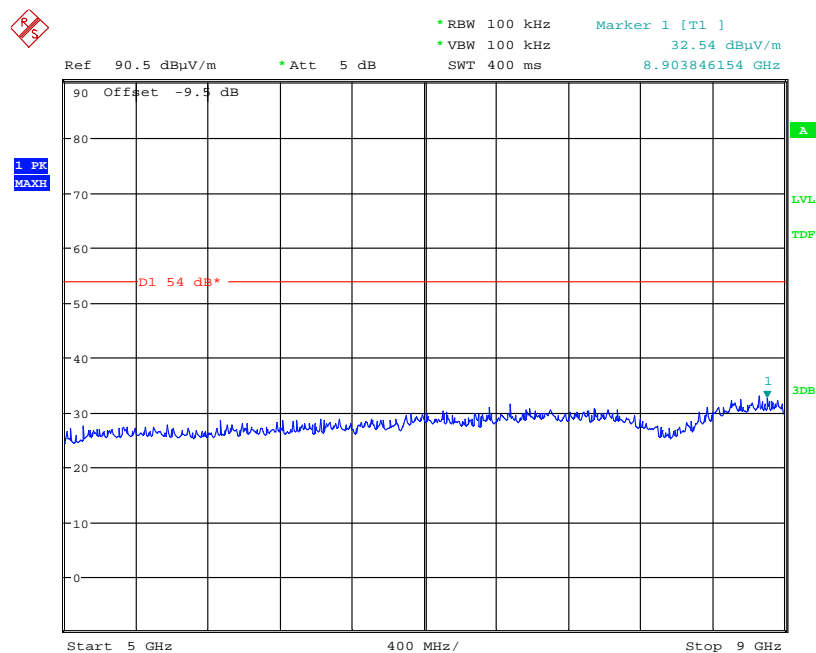


Unintentional Radiated spurious emissions 30MHz - 1GHz - 2440 MHz



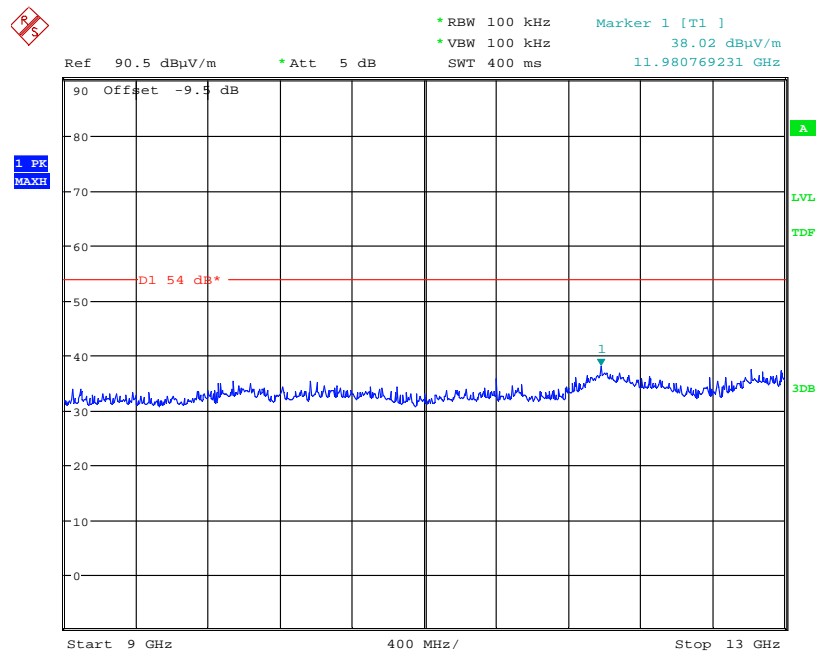
Date: 22.FEB.2011 10:24:38

Unintentional Radiated spurious emissions 1GHz - 5GHz - 2440 MHz



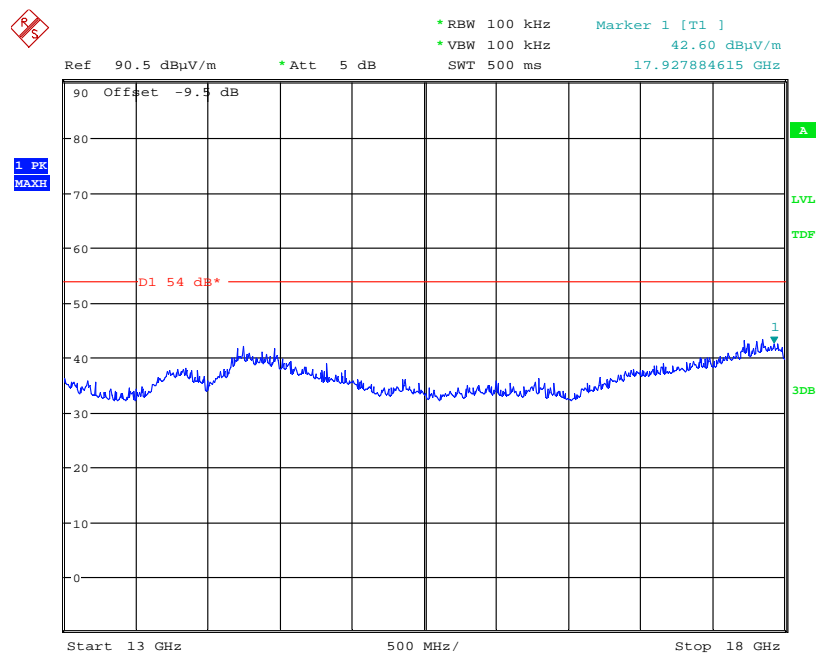
Date: 22.FEB.2011 10:23:48

Unintentional Radiated spurious emissions 5GHz - 9GHz - 2440 MHz



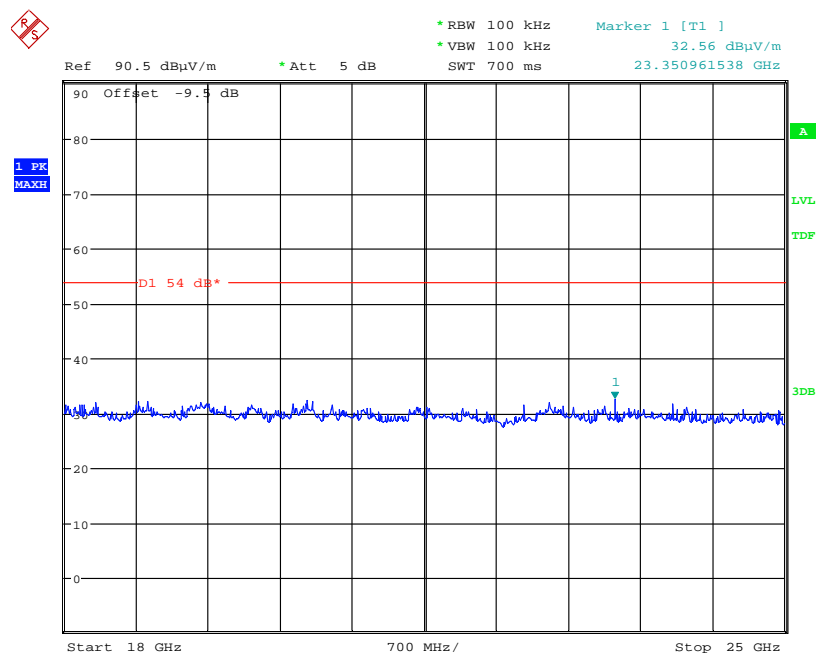
Date: 22.FEB.2011 10:23:28

Unintentional Radiated spurious emissions 9GHz - 13GHz - 2440 MHz



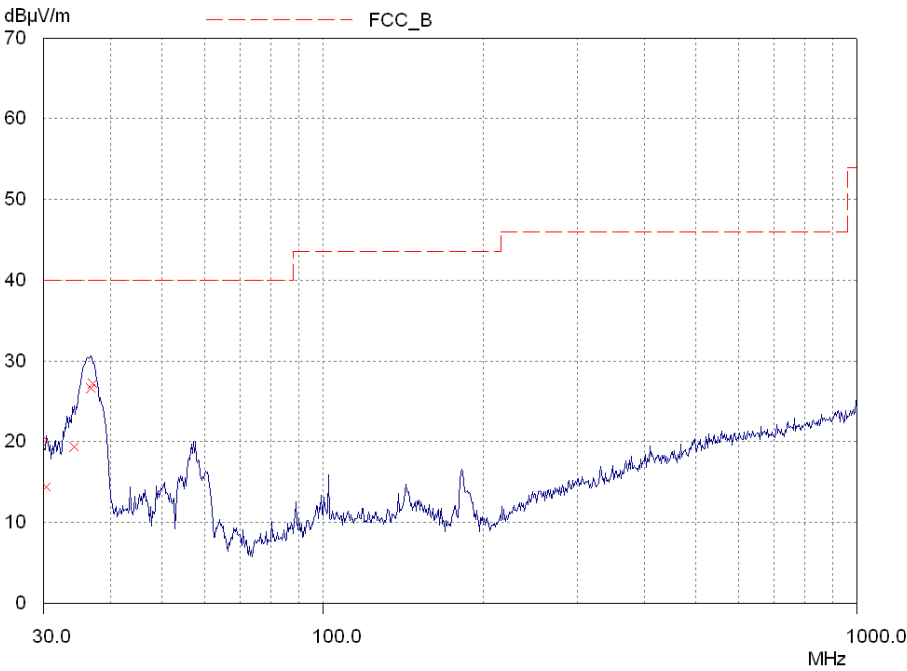
Date: 22.FEB.2011 10:23:09

Unintentional Radiated spurious emissions 13GHz - 18GHz - 2440 MHz

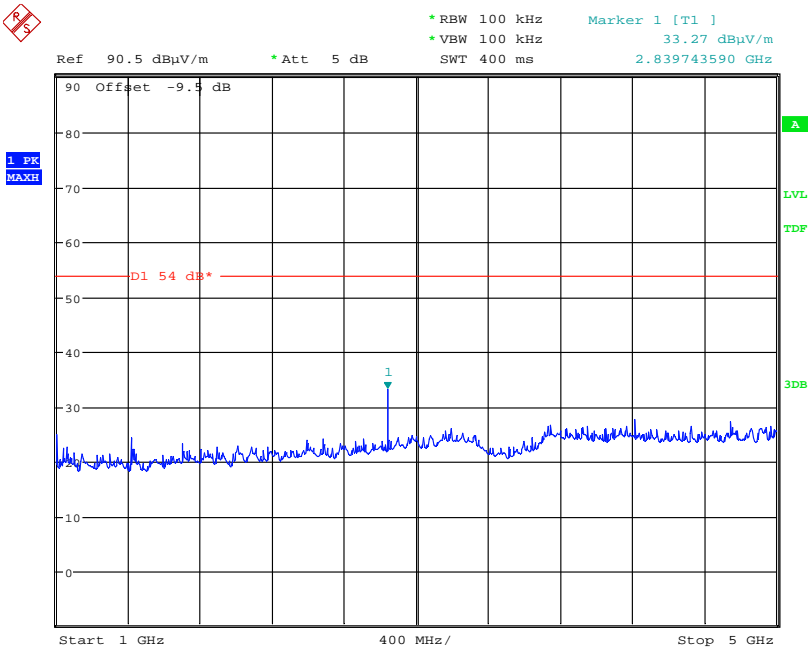


Date: 22.FEB.2011 10:10:07

Unintentional Radiated spurious emissions 18GHz - 25GHz - 2440 MHz

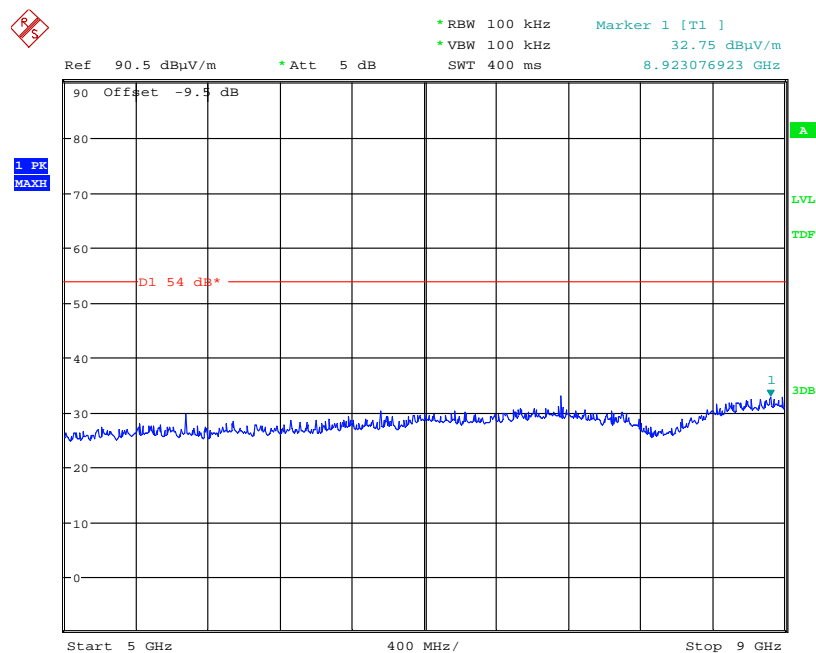


Unintentional Radiated spurious emissions 30MHz - 1GHz - 2480 MHz



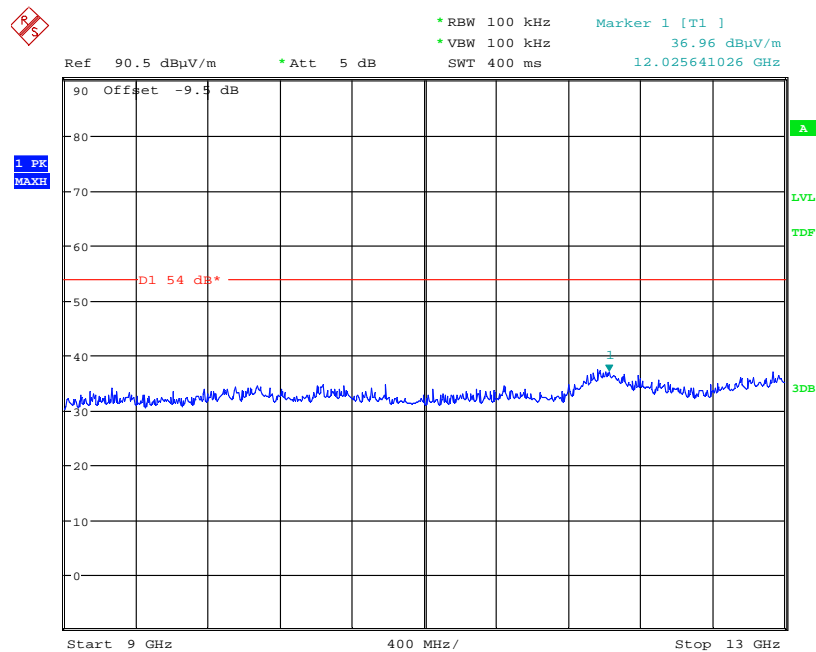
Date: 22.FEB.2011 10:52:51

Unintentional Radiated spurious emissions 1GHz - 5GHz - 2480 MHz



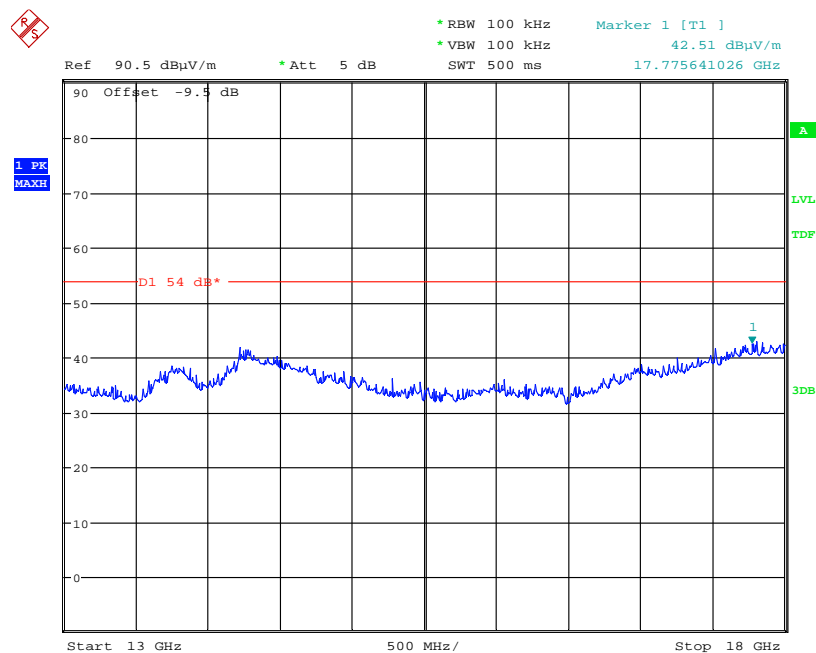
Date: 22.FEB.2011 10:53:13

Unintentional Radiated spurious emissions 5GHz - 9GHz - 2480 MHz



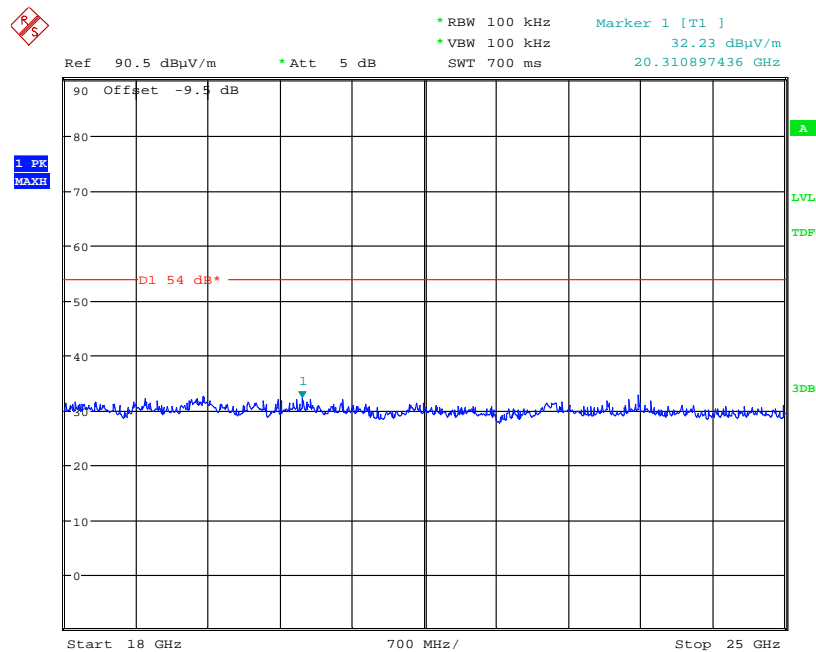
Date: 22.FEB.2011 10:53:30

Unintentional Radiated spurious emissions 9GHz - 13GHz - 2480 MHz



Date: 22.FEB.2011 10:53:49

Unintentional Radiated spurious emissions 13GHz - 18GHz - 2480 MHz



Date: 22.FEB.2011 10:07:00

Unintentional Radiated spurious emissions 18GHz - 25GHz - 2480 MHz

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 it's 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 Telecoms & Radio upon request.

C1) Test samples

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

Sample No.	Description	Identification
S07	TV-Dex, TV-Controller	None
S27	Friwo FW7662M-05	None

The following samples of apparatus were submitted by the client as host, support or drive equipment (auxiliary equipment):

Sample No.	Description	Identification
NONE		

The following samples of apparatus were supplied by TRaC Telecoms & Radio as support or drive equipment (auxiliary equipment):

Identification	Description
NONE	

C2) EUT Operating Mode During Testing.

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

Test	Description of Operating Mode: Transmit
Radiated E-Field (Transmitter carrier output levels dBuV/m)	The EUT was transmitting continuously on maximum at highest middle and lowest operating frequencies as required.
Radiated Spurious emissions (E-Field) at frequencies $\geq 30\text{MHz}$	
AC Powerline Conducted Emissions	
20dB Bandwidth of Emissions	

Test	Description of Operating Mode: Receive mode
AC Powerline Conducted Emissions	The EUT was placed in receive mode (non-transmitting) Mode during the test. Powered by a new battery.
Radiated Spurious emissions (E-Field) frequencies $\geq 30\text{MHz}$ (Receive)	

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:

Sample : S07
Tests : All

Port	Description of Cable Attached	Cable length	Equipment Connected
dc power port	2 Wire Cable	1	Friwo FW7662M_05 (S27)
Antenna port	None	N/A	Integral

C5 Details of Equipment Used

TRAC Ref	Type	Description	Manufacturer	Date Calibrated.
TRLUH281	FSU46	Spectrum Analyser	Rhode & Schwarz	29/01/2010
TRLUH04	ESHS10	Receiver	Rhode & Schwarz	14/12/2010
TRL138	3115	Horn Antenna	Emco	10/09/2009
TRL572	8449B	Pre Amplifier	Agilent	24/11/2010
TRLUH187	ESVS10	Receiver	Rhode & Schwarz	14/12/2010
TRLUH93	CBL6112	BiLog Periodic Antenna	Chase	03/06/2009
TRL07	HFH2	Loop Antenna	Rhode & Schwarz	26/08/2009
TRLUH372	6201-69	30MHz – 1 GHz Pre Amplifier	Watkins Johnson	14/04/2010

Appendix D:

Additional Information

No additional information is included within this test report.

Appendix E:

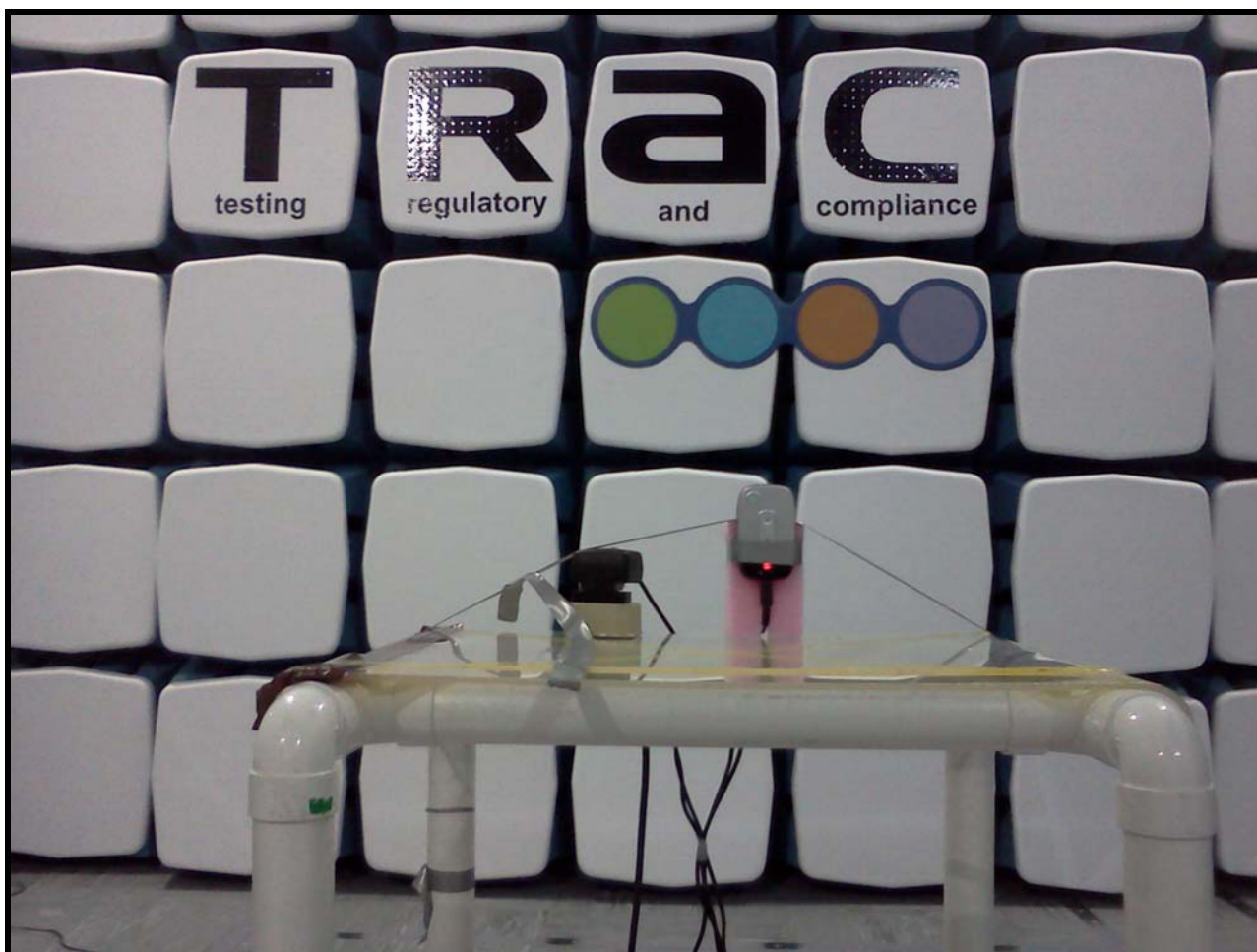
Photographs and Figures

The following photographs were taken of the test samples:

1. Radiated emissions: TV DEX, TV CONTROLLER E Filed
2. Radiated emissions: TV DEX, TV CONTROLLER close Up



Photograph 1



Photograph 2

Appendix F:**MPE Calculation**

OET Bulletin No. 65, Supplement C 01-01

47 CFR §§1.1307 and 2.1091

2.1091 Radio frequency radiation exposure evaluation: mobile devices.

For purposes of these requirements mobile devices are defined by the FCC as transmitters designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimetres is normally maintained between radiating structures and the body of the user or nearby persons. These devices are normally evaluated for exposure potential with relation to the MPE limits. As the 20cm separation specified under FCC rules may not be achievable under normal operation of the EUT, an RF exposure calculation is needed to show the minimum distance required to be less than 1mW/cm² power density limit, as required under FCC rules.

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{EIRP}{4 \pi R^2} \text{ re - arranged} \quad R = \sqrt{\frac{EIRP}{S 4 \pi}}$$

where:

S = power density

R = distance to the centre of radiation of the antenna

EIRP = EUT Maximum power

Note:

The EIRP value was determined using the peak E Field measurement.

Result

Prediction Frequency (MHz)	Maximum EIRP (mW)	Power density limit (S) (mW/cm ²)	Distance (R) cm required to be less than 1mW/cm ²
2403	0.970	1	0.28

Appendix G:**Cross Reference FCC Part 15c to IC RSS**

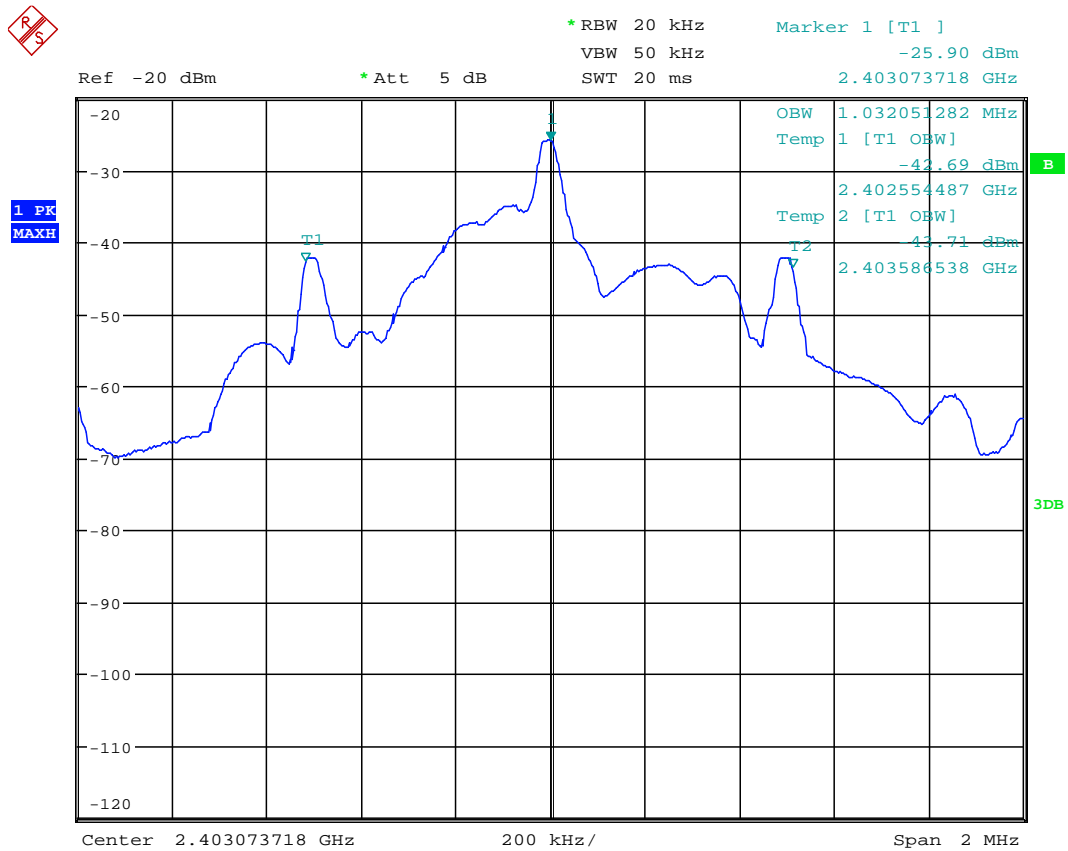
The testing of the TV Controller was carried out to FCC 47CFR Part 15c and the results for this testing can be found in Appendix A of this report.

All measurements were carried out in accordance with ANSI C63.4, 'Methods of Measurements of RF Emissions from low voltage Electrical and Electronic Equipment in the Range 9kHz to 40GHz.

The table below shows the applicable RSS-210 parts and the corresponding FCC 47CFR Part 15 rules for operation in the 2400MHz – 2483.5MHz:

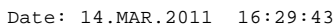
RSS	FCC 47CFR Part 15
RSS-210 A2.9	Part 15.249
RSS-GEN 7.2.5	Part 15.209
RSS-GEN 4.6.1	Part 15.215
RSS-GEN 6.1	Part 15.109
RSS-GEN 7.2.4	Part 15.107/15.207

In addition below is a plot of the 99% emissions bandwidth, as stipulated in Section 4.4.1 of RSS-Gen.

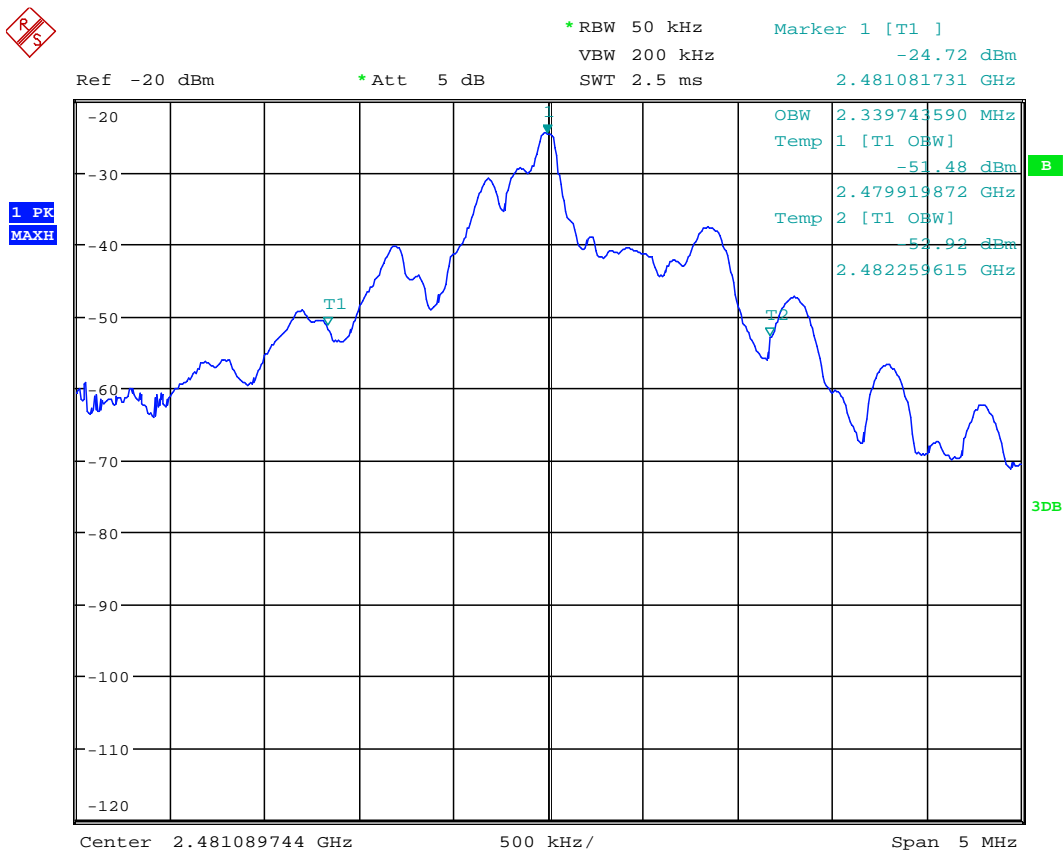


Date: 10.MAR.2011 10:59:15

99% Bandwidth – 2403 MHz



54



Date: 10.MAR.2011 11:32:55

99% Bandwidth – 2480 MHz

