

**TRaC Wireless Test Report** : 0F3137WUS5

**Applicant** : Widex A/S

**Apparatus** : TV DEX, TV BASE

**Specification(s)** : CFR47 Part 15 October 2008

**Purpose of Test** : Certification

**FCCID** : TTY-TVB

**IC ID** : 5676B-TVB

**Authorised by** :



:Radio Product 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 :

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: 18<sup>th</sup> February to 11<sup>th</sup> March 2011.

TV DEX, TV BASE

The above equipment is an audio interface device to transmit audio over a 2.4GHz link.  
The Device is also a charging station for the TV DEX, TV Controller.

## 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
		ATS	: Alternative Test Site
EUT	: Equipment Under Test		
SE	: Support Equipment	Ref	: Reference
		Freq	: Frequency
L	: Live Power Line		
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**

<b>Carrier power was verified with the EUT transmitting Test Details:</b>	
Regulation	Title 47 of the CFR: Part15 Subpart (c) 15.249 & 15.215
Measurement standard	ANSI C63.10:2009
EUT sample number	S01
Modification state	0
SE in test environment	S27
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)
2402	84.19	1	28.3	32.4	81.09	11.33
2440	85.58	1	28.3	32.4	82.48	13.30
2481	80.86	1	28.4	32.3	77.96	7.91
Limit value @ fc			50 mV/m			
Band occupancy @ -20 dBc						
FREQ. (MHz)	f lower (MHz)		f higher (MHz)		Band occupancy (MHz)	
2402	2401.134615		2403.250000		2.115	
2440	2438.509615		2441.697115		3.187	
2481	2479.431090		2482.852564		3.421	

**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	S01
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)	Filter Loss (dB)	FIELD ST'GH (dBμV/m)	EXTRAP FACT (dB)	FIELD ST'GH (μV/m)	LIMIT (μV/m)
1	Pk	4804.176	51.73	1.3	32.8	32.3	0.7	54.23	-9.54	171.59	5000
2	Av	4804.176	35.89	1.3	32.8	32.3	0.7	38.39	-9.54	27.70	500
3	Pk	7206.228	50.37	1.3	37.9	31.5	0.8	56.67	-9.54	227.25	5000
4	Av	7206.228	34.42	1.3	37.9	31.5	0.8	40.72	-9.54	36.22	500

**Radiated Electric Field Emissions Continued**

<b>Test Details:</b>	
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	S01
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

<b>Test Details: 2440 MHz</b>											
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	4880.269	51.50	1.3	33.1	32.4	0.6	54.1	-9.54	169.04	5000
2	Av	4880.269	35.72	1.3	33.1	32.4	0.6	38.32	-9.54	27.48	500
3	Pk	7320.179	48.48	1.4	36.6	32.1	0.8	55.18	-9.54	191.43	5000
4	Av	7320.179	33.74	1.4	36.6	32.1	0.8	40.44	-9.54	35.08	500

<b>Test Details: 2480 MHz</b>											
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	4962.163	51.96	1.4	33.2	32.5	0.5	54.56	-9.54	178.24	5000
2	Av	4962.163	36.13	1.4	33.2	32.5	0.5	38.73	-9.54	28.81	500
3	Pk	7443.397	48.19	1.3	36.7	32.1	0.8	54.89	-9.54	185.14	5000
4	Av	7443.397	33.72	1.3	36.7	32.1	0.8	40.42	-9.54	34.99	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	$2400/F(\text{kHz})$	300	$67.6/F(\text{kHz})$
0.490-1.705	$24000/F(\text{kHz})$	30	$87.6/F(\text{kHz})$
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	S01
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	2747.65	42.96	0.9	29.1	32.6	-	40.36	-	104.23	5000
2	Av	2747.65	37.41	0.9	29.1	32.6	-	34.81	-	55.02	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	2790.993	43.34	1	29.1	32.5	-	40.94	-	111.43	5000
2	Av	2790.993	37.59	1	29.1	32.5	-	35.19	-	57.48	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	43.12	1	29.2	32.5	-	40.82	-	109.90	5000
2	Av	2837.778	37.85	1	29.2	32.5	-	35.55	-	59.91	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	S01
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:

#### EUT on Transmitting Modulated Carrier

##### 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	0.335	Live	30.08	49.33	19.25	Pass
2	0.53	Live	31.1	46	14.9	Pass
3	0.585	Live	44.23	46	1.77	Pass
4	1.00499	Live	27.32	46	18.68	Pass
5	1.225	Live	27.7	46	18.3	Pass
6	1.28	Live	27.75	46	18.25	Pass
7	2.115	Live	26.57	46	19.43	Pass
7	2.115	Live	26.57	46	19.43	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	0.53	Live	38.14	56	17.86	Pass
2	0.585	Live	52.12	56	3.88	Pass
3	1.145	Live	37.85	56	18.15	Pass

**EUT on in normal operation TV Controller seated in charger****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	0.26	Live	33.24	51.43	-18.19	Pass
2	0.31	Live	32.12	49.97	-17.85	Pass
3	0.42	Live	29.67	47.45	-17.78	Pass
4	0.525	Live	39.76	46	-6.24	Pass
5	0.565	Live	42.74	46	-3.26	Pass
6	0.685	Live	32.93	46	-13.07	Pass
7	0.895	Live	33.58	46	-12.42	Pass
8	1.21	Live	31.55	46	-14.45	Pass
9	1.53	Live	31.98	46	-14.02	Pass
10	1.9	Live	34.93	46	-11.07	Pass
11	1.95	Live	33.58	46	-12.42	Pass
12	2.58	Live	30.87	46	-15.13	Pass
13	3.275	Live	29.68	46	-16.32	Pass
14	3.64	Live	29.53	46	-16.47	Pass
15	4.635	Live	27.38	46	-18.62	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	0.42	Live	39.89	57.45	-17.56	Pass
2	0.525	Live	49.33	56	-6.67	Pass
3	0.565	Live	52.61	56	-3.39	Pass
4	0.685	Live	43.96	56	-12.04	Pass
5	0.77	Neutral	40.74	56	-15.26	Pass
6	0.89	Live	43.19	56	-12.81	Pass
7	1.195	Neutral	37.87	56	-18.13	Pass
8	1.24	Live	42.12	56	-13.88	Pass
9	1.255	Live	40.73	56	-15.27	Pass
10	1.52	Neutral	38.42	56	-17.58	Pass
11	1.58	Live	44.03	56	-11.97	Pass
12	2.23	Live	39.32	56	-16.68	Pass
13	2.58	Neutral	38.36	56	-17.64	Pass
14	2.635	Live	42.37	56	-13.63	Pass
15	3.005	Live	42.26	56	-13.74	Pass
16	3.695	Live	40.44	56	-15.56	Pass
17	4.555	Live	37.28	56	-18.72	Pass

**Specification limits :**

Conducted emission limits (47 CFR Part 15.207):

Conducted disturbance at the mains ports.

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:

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				

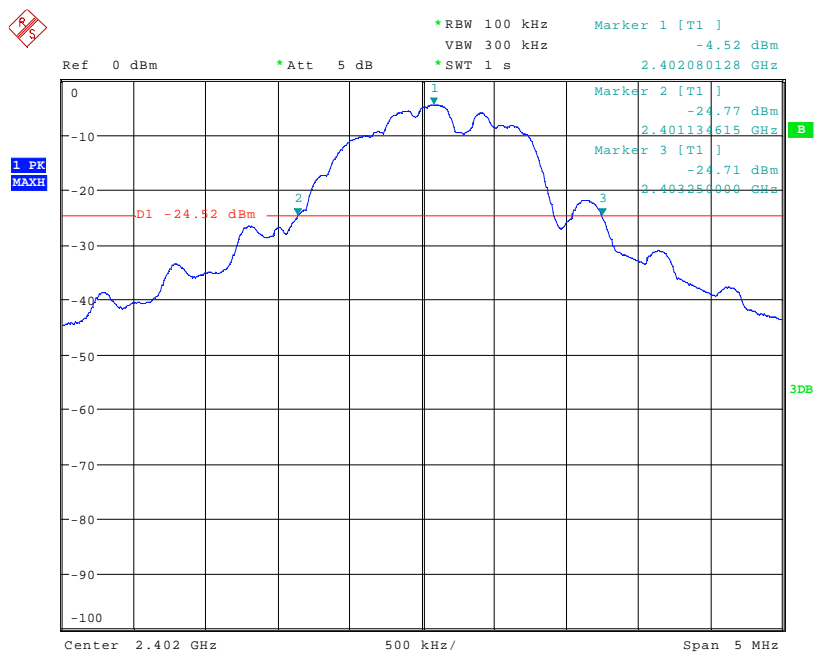
## **Appendix B:**

## **Supporting Graphical Data**

This appendix contains graphical data obtained during testing.

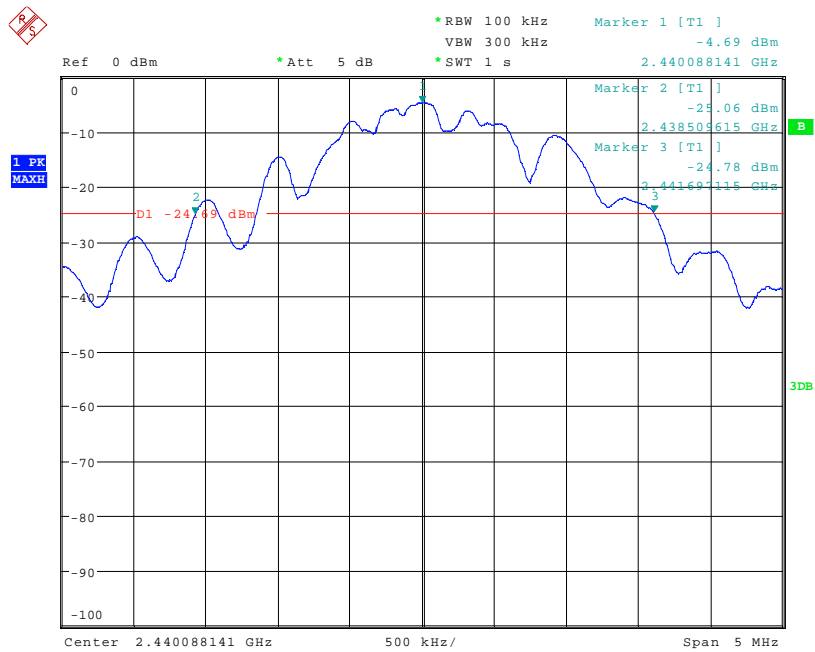
Notes:

- (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.



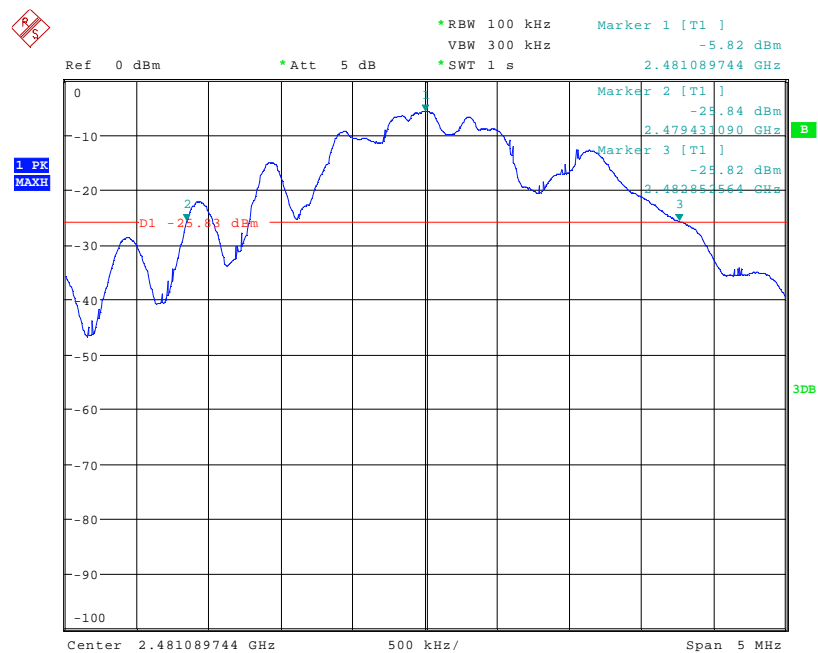
Date: 15.MAR.2011 14:05:58

20dB Bandwidth – 2402 MHz



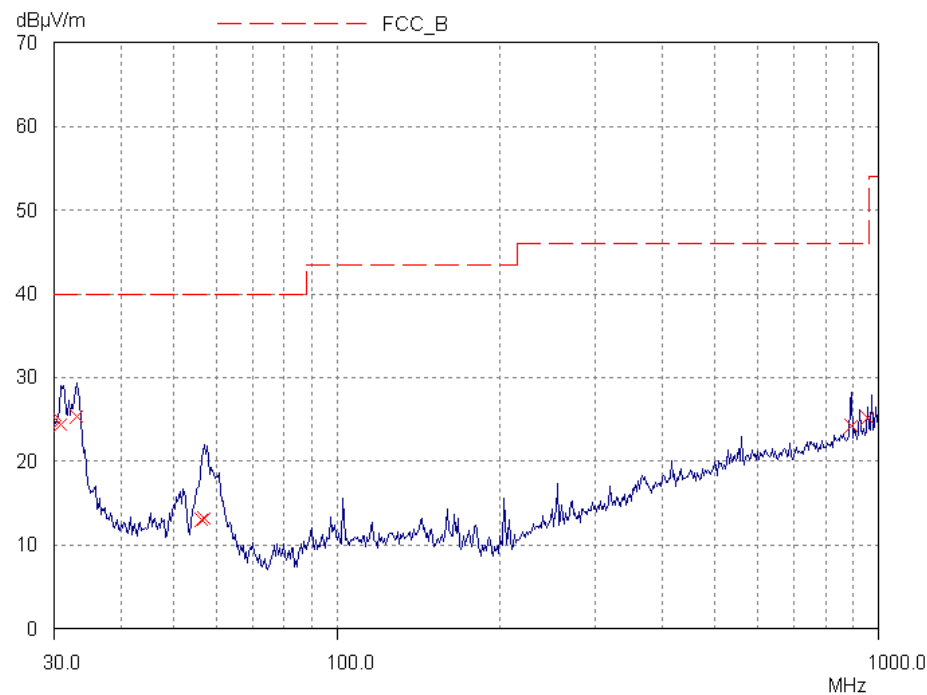
Date: 15.MAR.2011 14:07:12

20dB Bandwidth – 2440 MHz

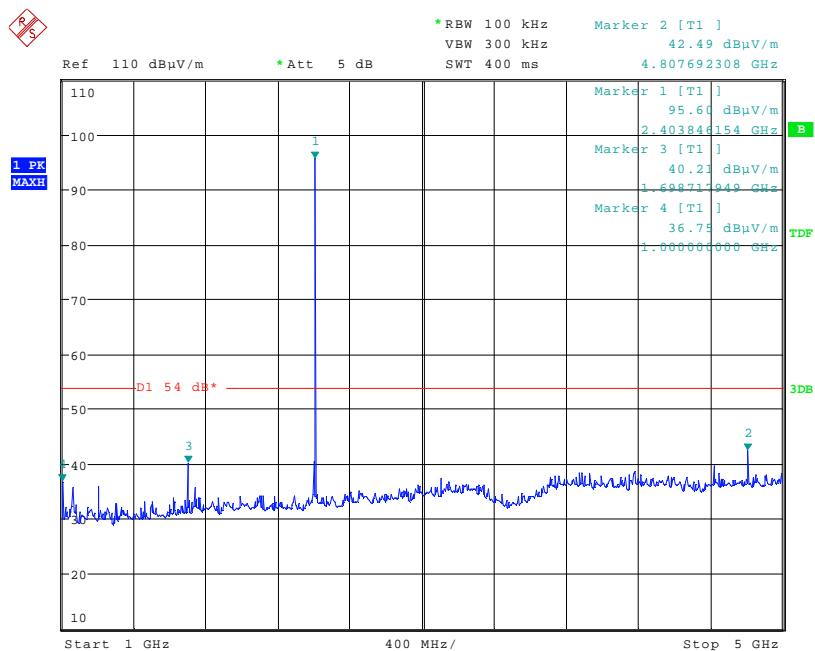


Date: 15.MAR.2011 14:09:54

20dB Bandwidth – 2480 MHz

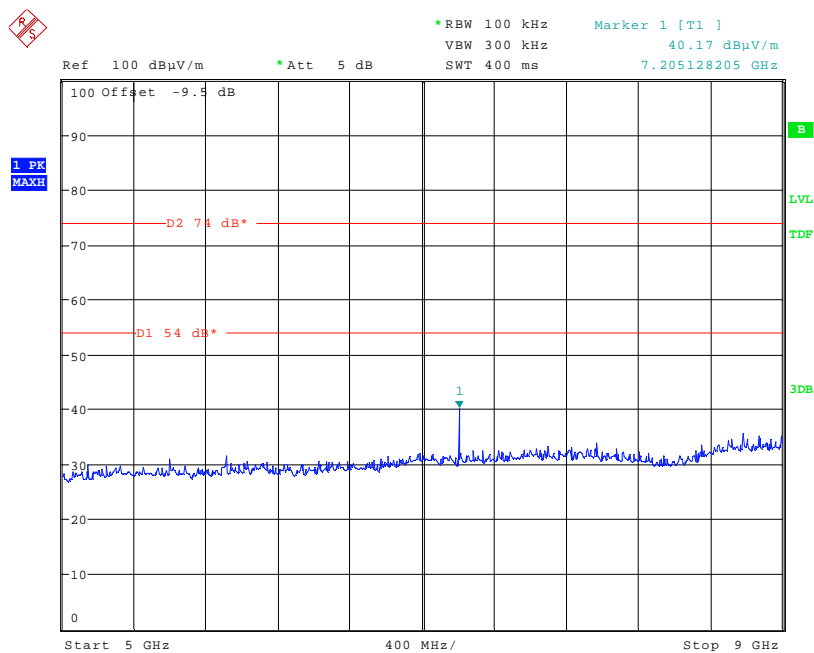


Radiated spurious emissions 30MHz - 1GHz - 2402 MHz



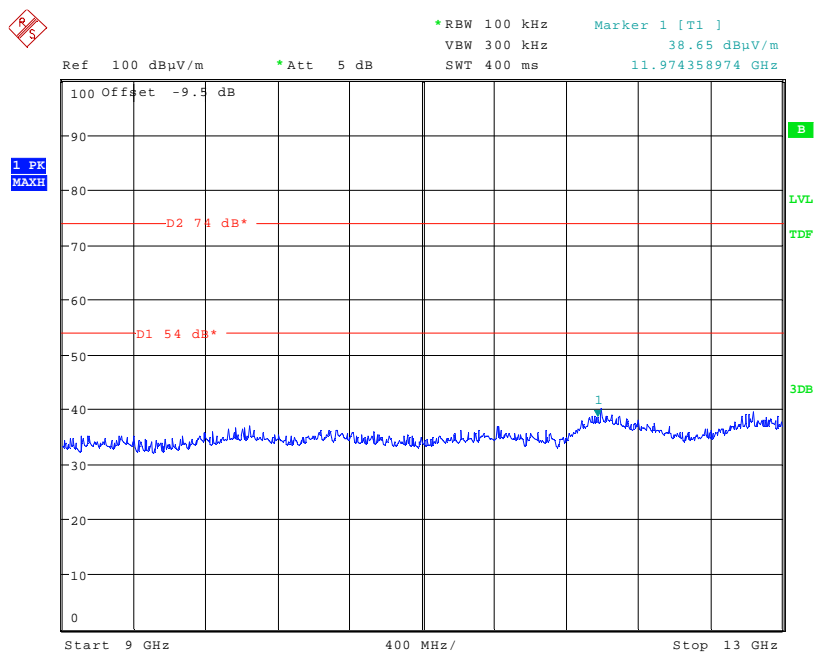
Date: 21.FEB.2011 11:32:24

Radiated spurious emissions 1GHz - 5GHz - 2402 MHz



Date: 21.FEB.2011 16:21:33

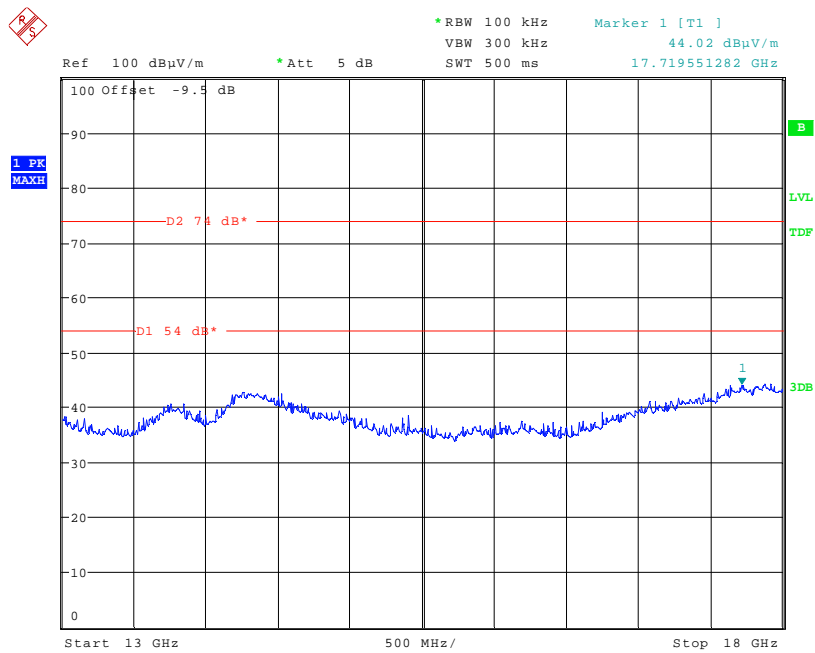
Radiated spurious emissions 5GHz - 9GHz - 2402 MHz



Date: 21.FEB.2011 16:21:55

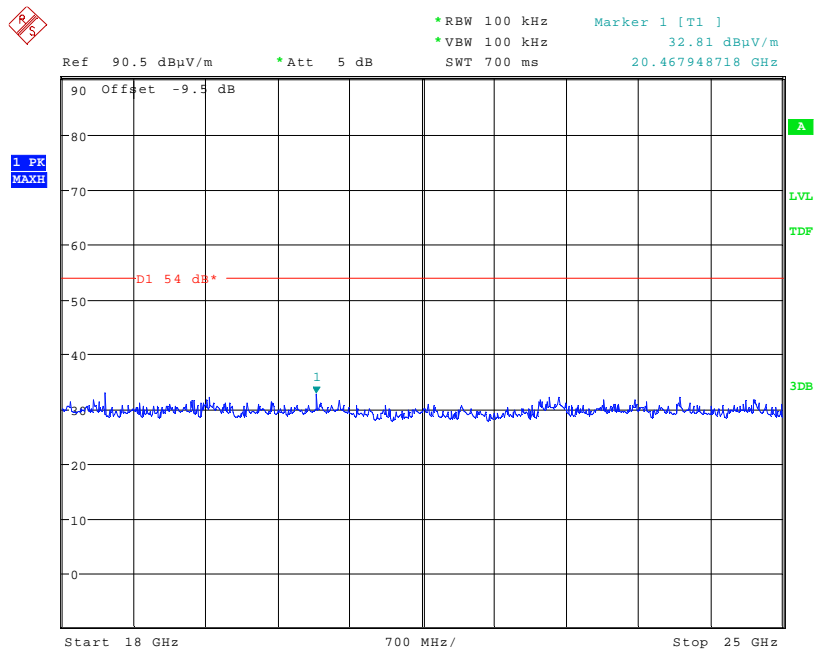
Radiated spurious emissions 9GHz - 13GHz - 2402 MHz





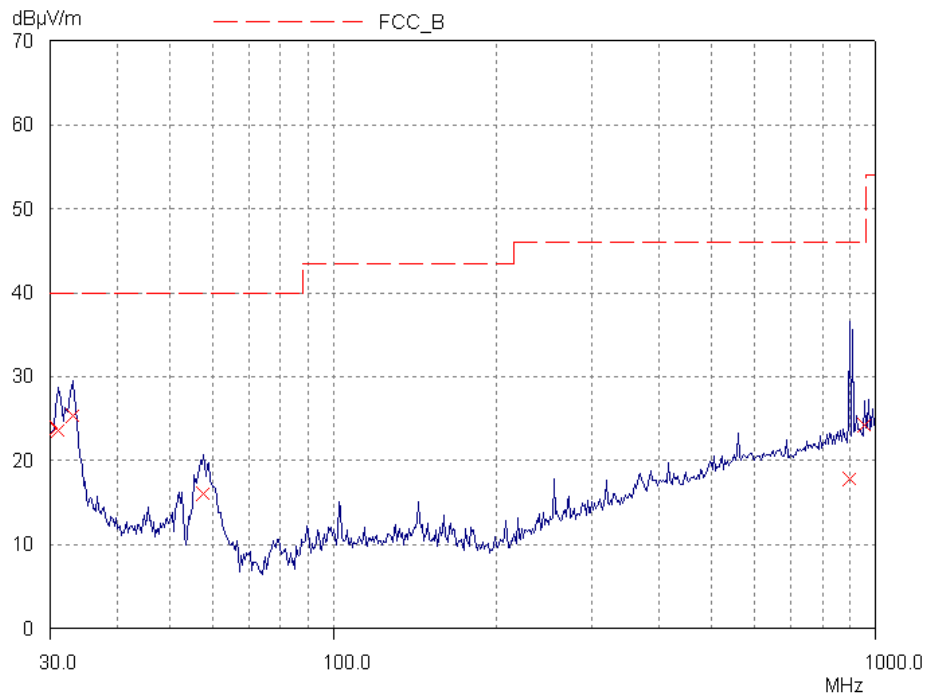
Date: 21.FEB.2011 16:22:17

Radiated spurious emissions 13GHz - 18GHz - 2402 MHz

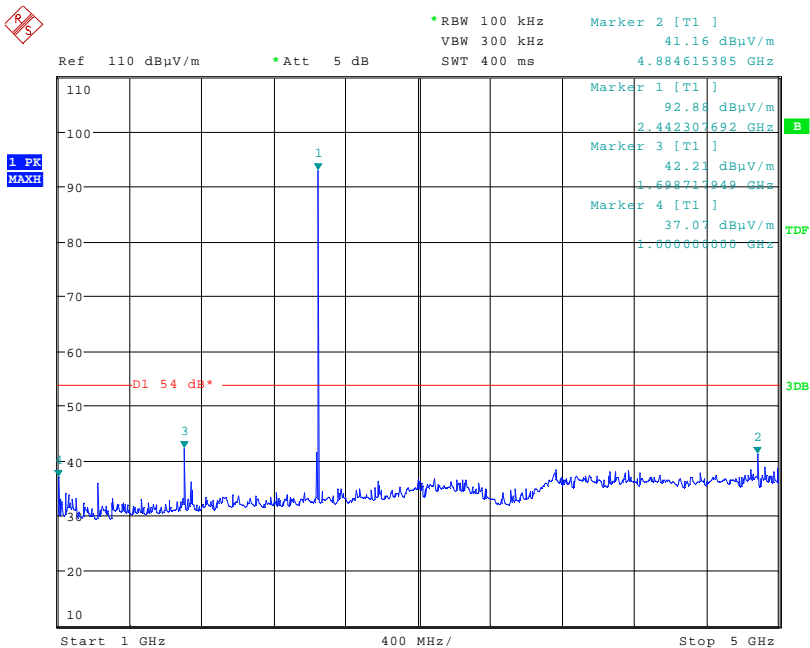


Date: 22.FEB.2011 09:38:33

Radiated spurious emissions 18GHz - 25GHz - 2402 MHz

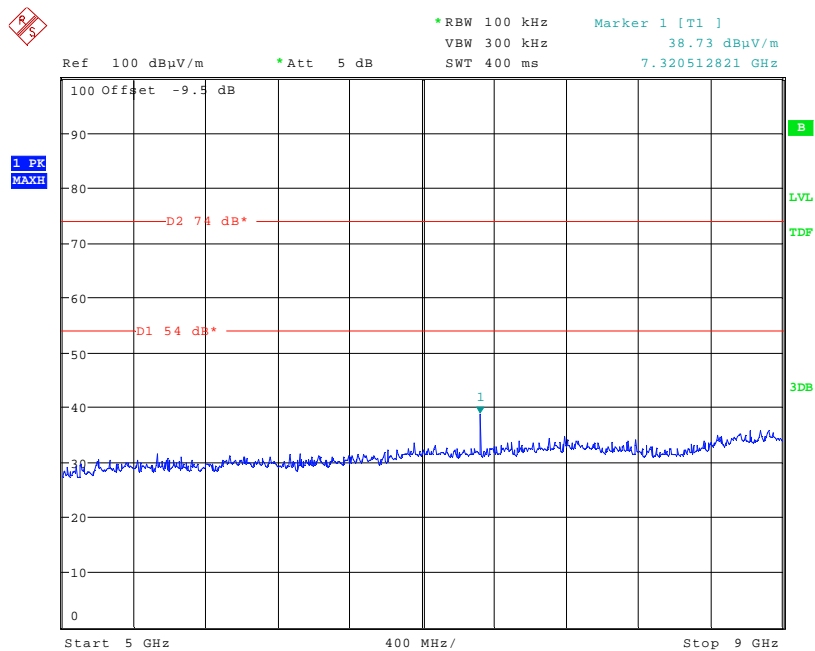


Radiated spurious emissions 30MHz - 1GHz - 2440 MHz



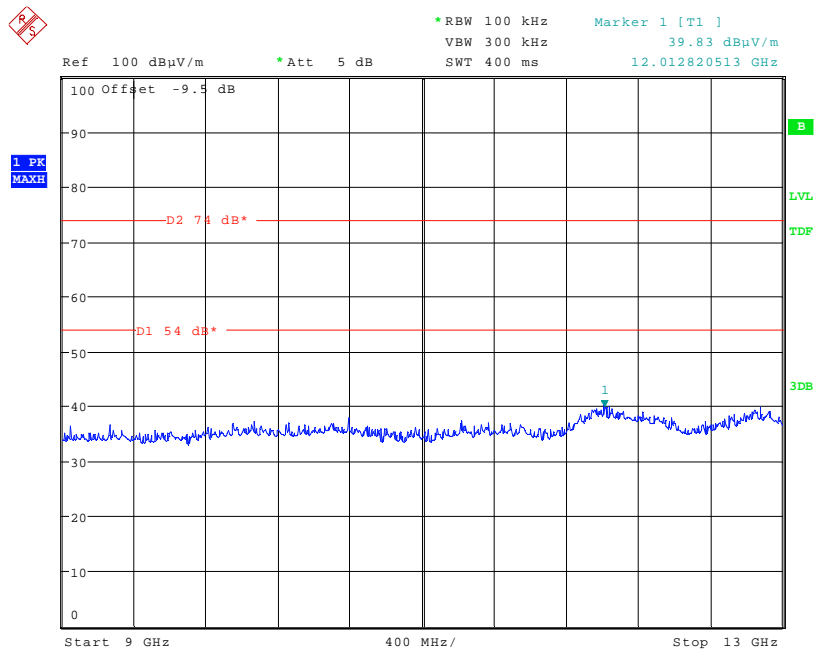
Date: 21.FEB.2011 11:33:10

Radiated spurious emissions 1GHz - 5GHz - 2440 MHz



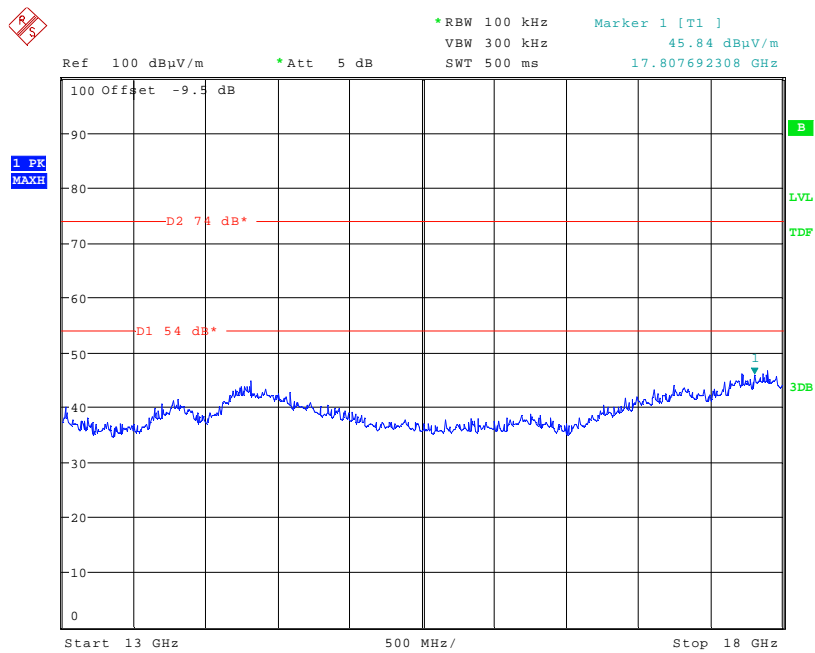
Date: 21.FEB.2011 16:26:37

Radiated spurious emissions 5GHz - 9GHz - 2440 MHz



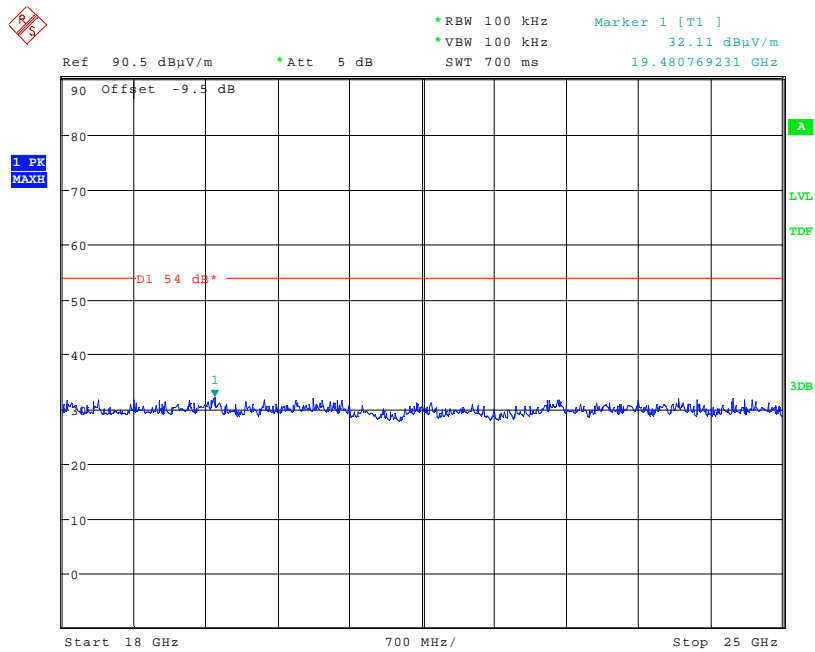
Date: 21.FEB.2011 16:26:05

Radiated spurious emissions 9GHz - 13GHz - 2440 MHz



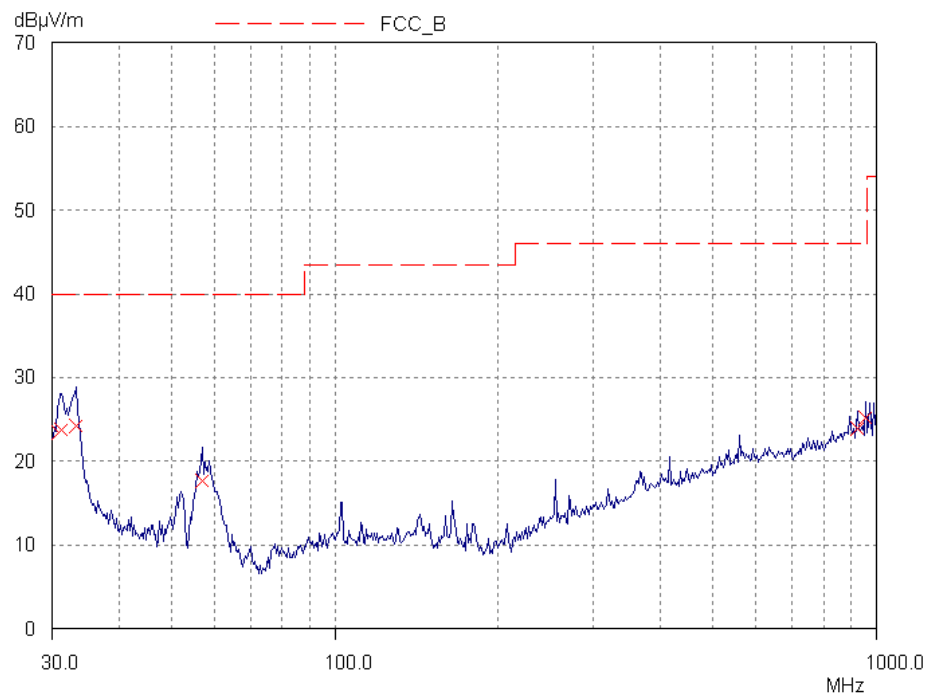
Date: 21.FEB.2011 16:25:39

Radiated spurious emissions 13GHz - 18GHz - 2440 MHz

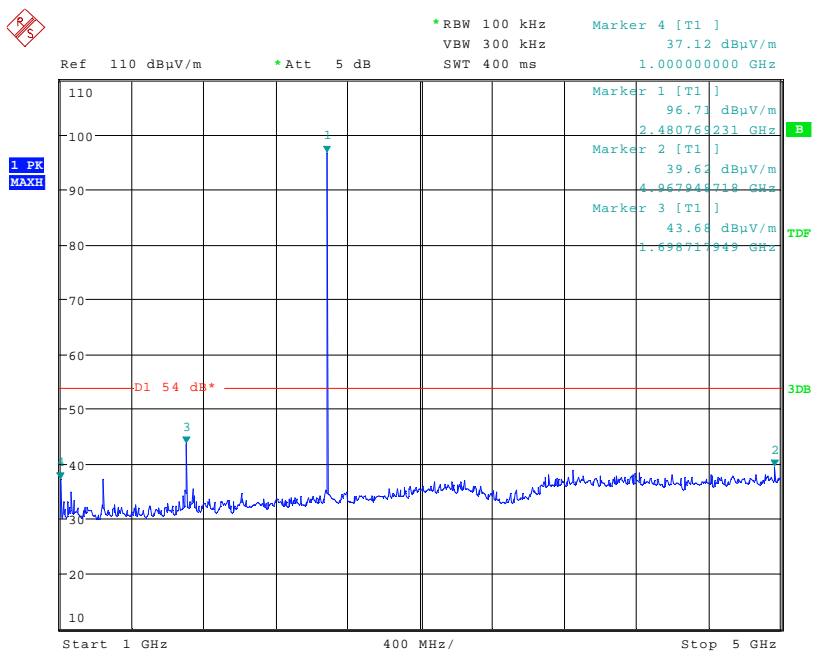


Date: 22.FEB.2011 09:39:08

Radiated spurious emissions 18GHz - 25GHz - 2440 MHz

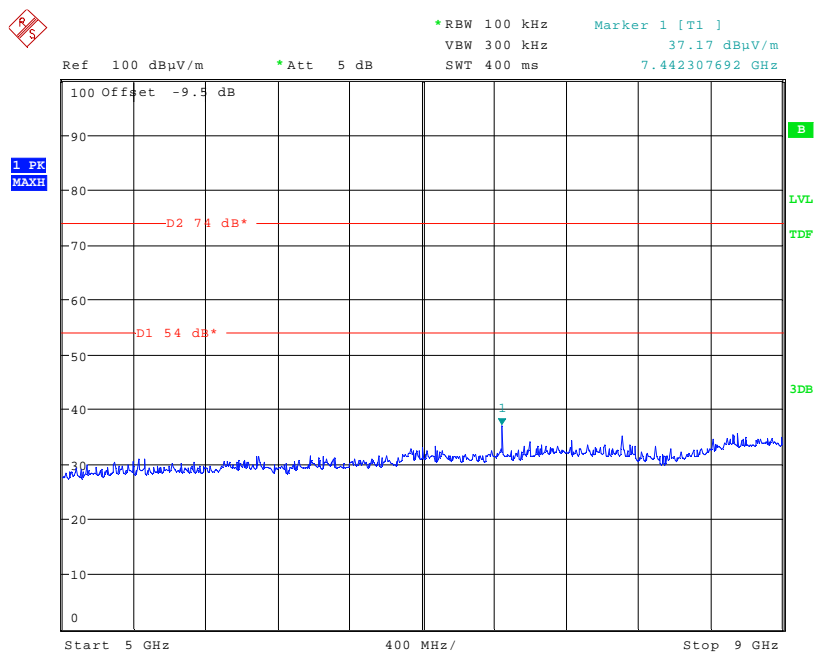


Radiated spurious emissions 30MHz - 1GHz - 2480 MHz



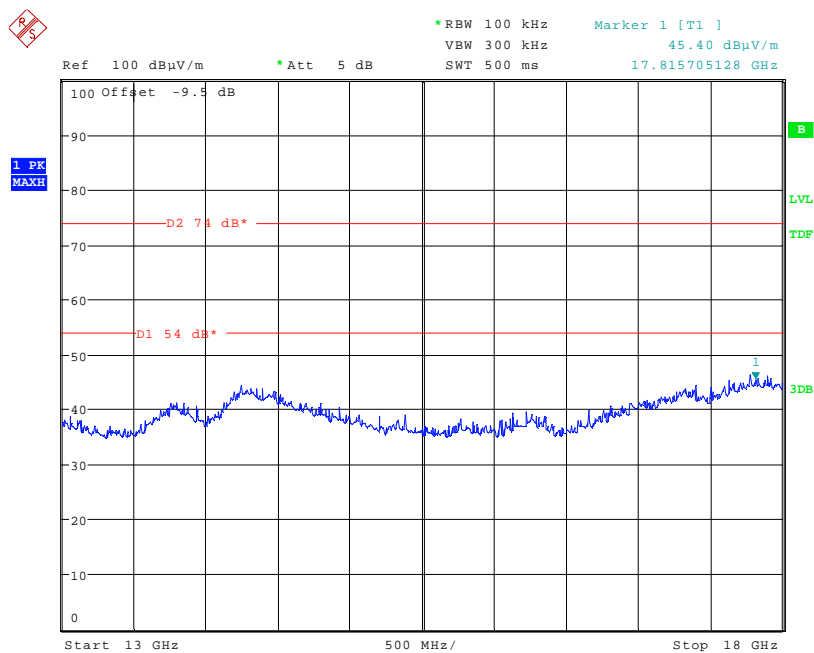
Date: 21.FEB.2011 11:31:39

Radiated spurious emissions 1GHz - 5GHz - 2480 MHz



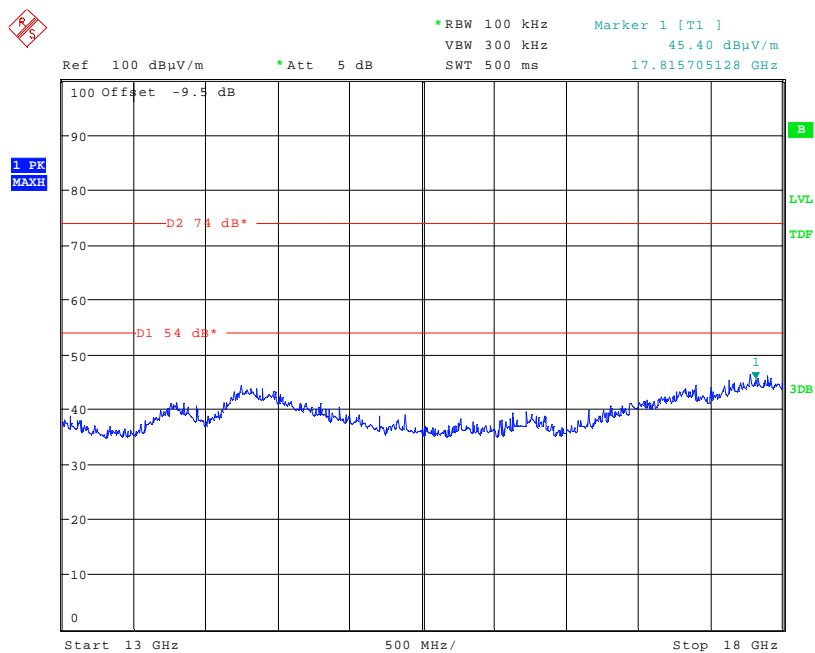
Date: 21.FEB.2011 16:27:17

Radiated spurious emissions 5GHz - 9GHz - 2480 MHz



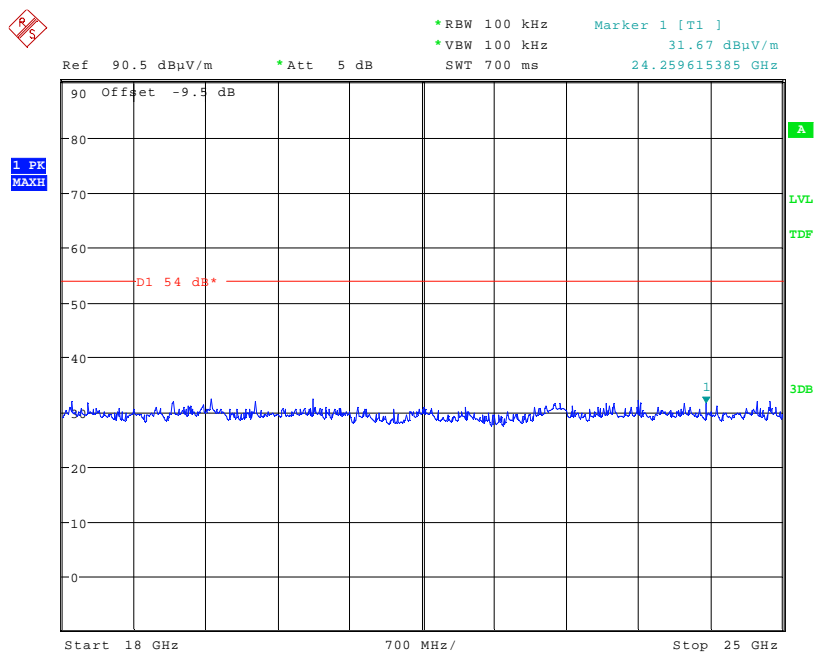
Date: 21.FEB.2011 16:28:25

Radiated spurious emissions 9GHz - 13GHz - 2480 MHz



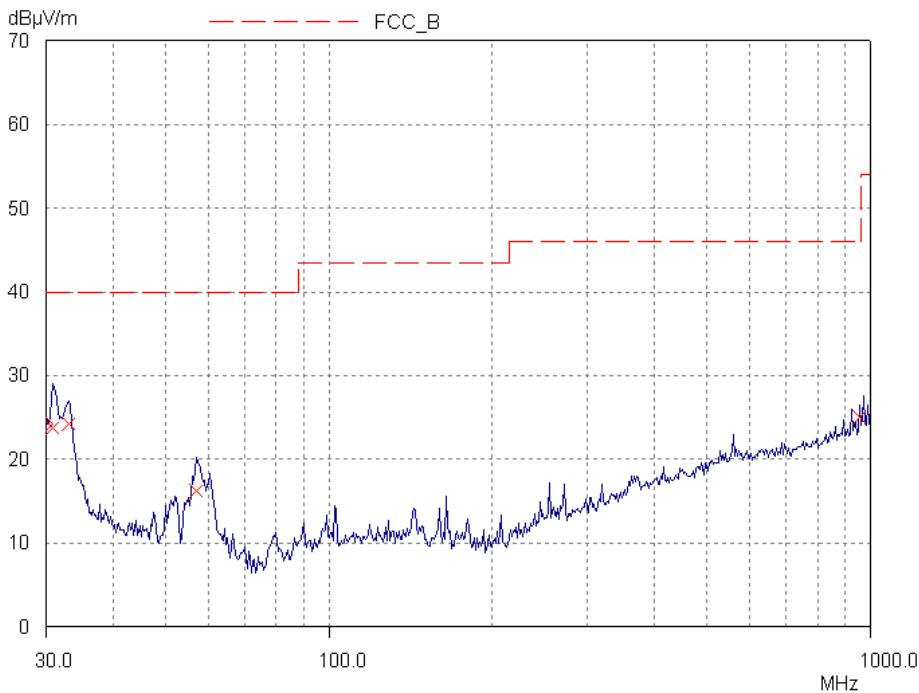
Date: 21.FEB.2011 16:28:25

Radiated spurious emissions 13GHz - 18GHz - 2480 MHz

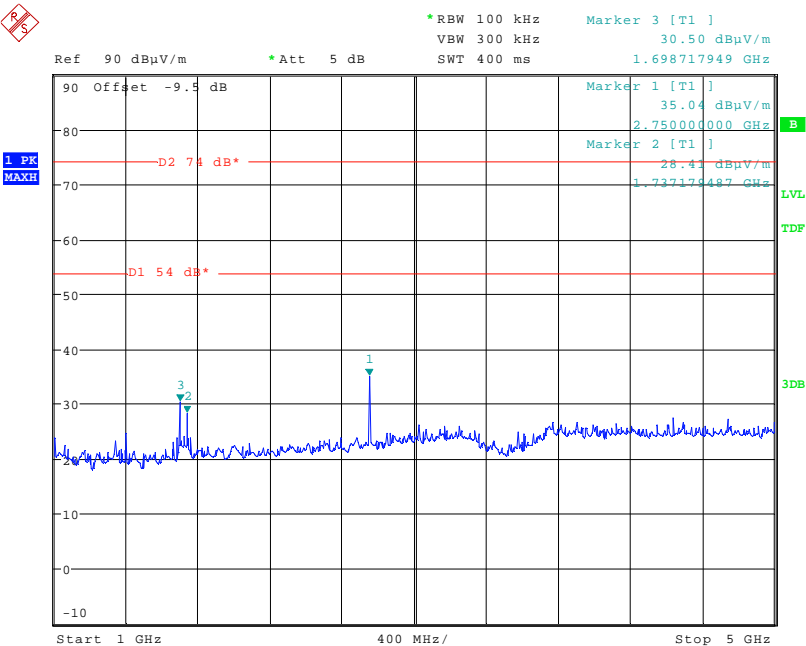


Date: 22.FEB.2011 09:40:25

Radiated spurious emissions 18GHz - 25GHz - 2480 MHz



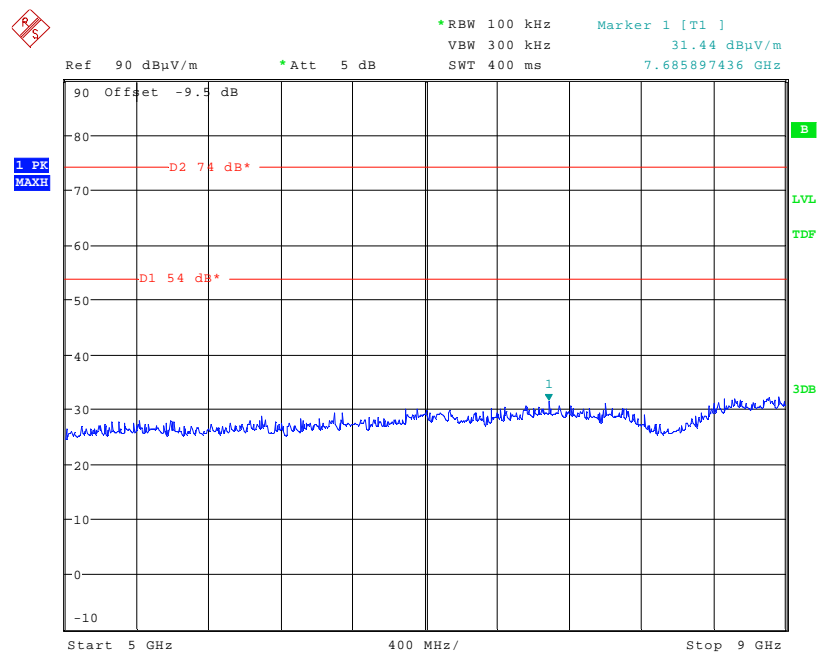
Unintentional Radiated spurious emissions 30MHz - 1GHz - 2402 MHz



Date: 21.FEB.2011 15:38:19

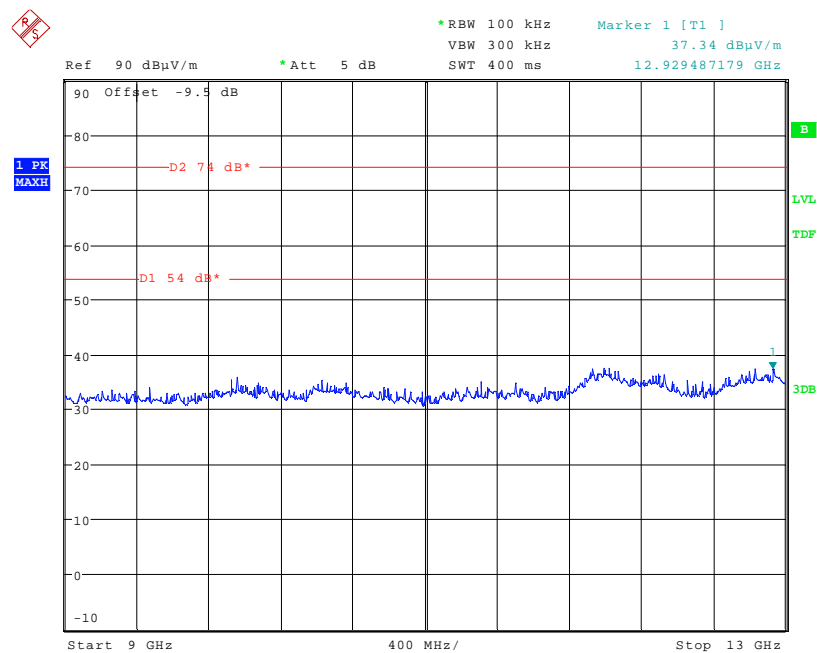
Unintentional Radiated spurious emissions 1GHz - 5GHz - 2402 MHz





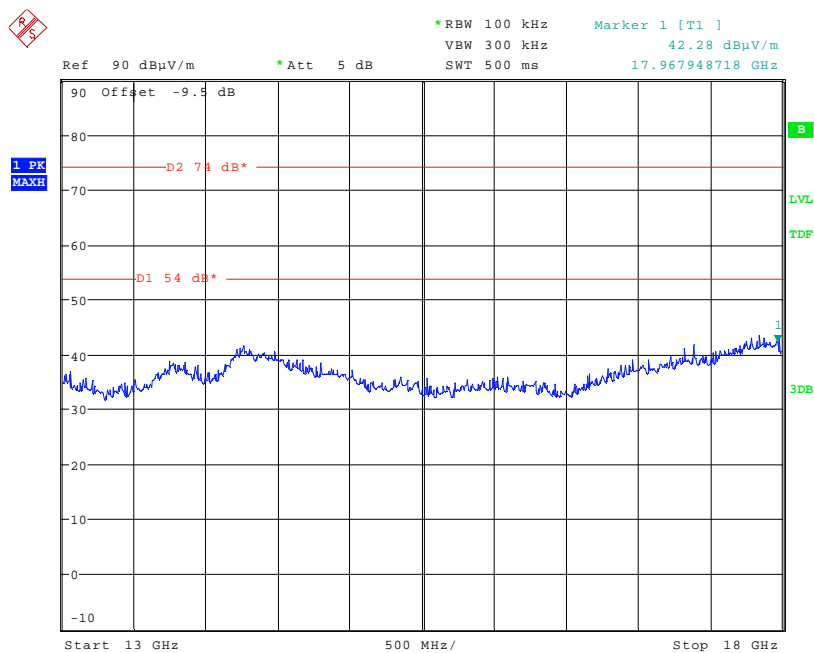
Date: 21.FEB.2011 15:38:39

Unintentional Radiated spurious emissions 5GHz - 9GHz - 2402 MHz



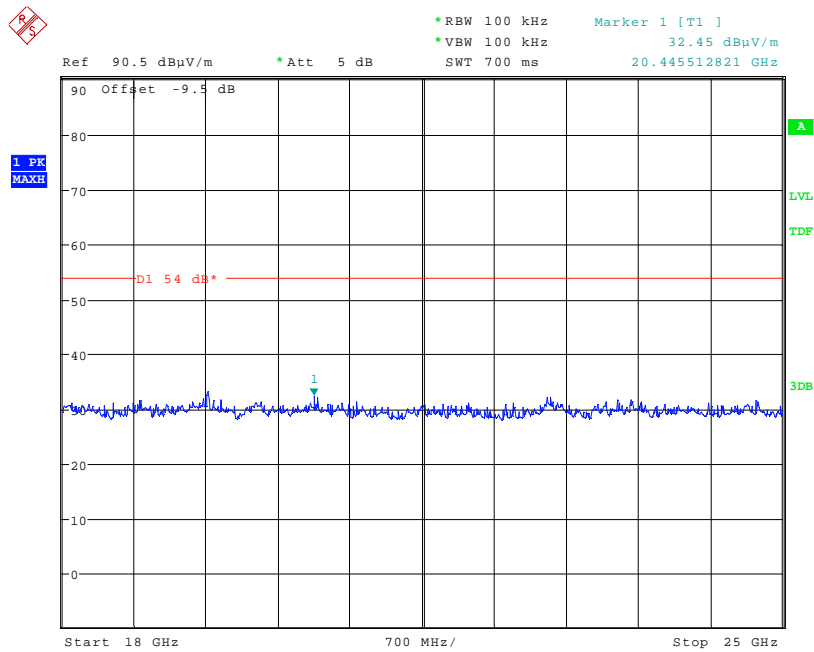
Date: 21.FEB.2011 15:39:01

Unintentional Radiated spurious emissions 9GHz - 13GHz - 2402 MHz



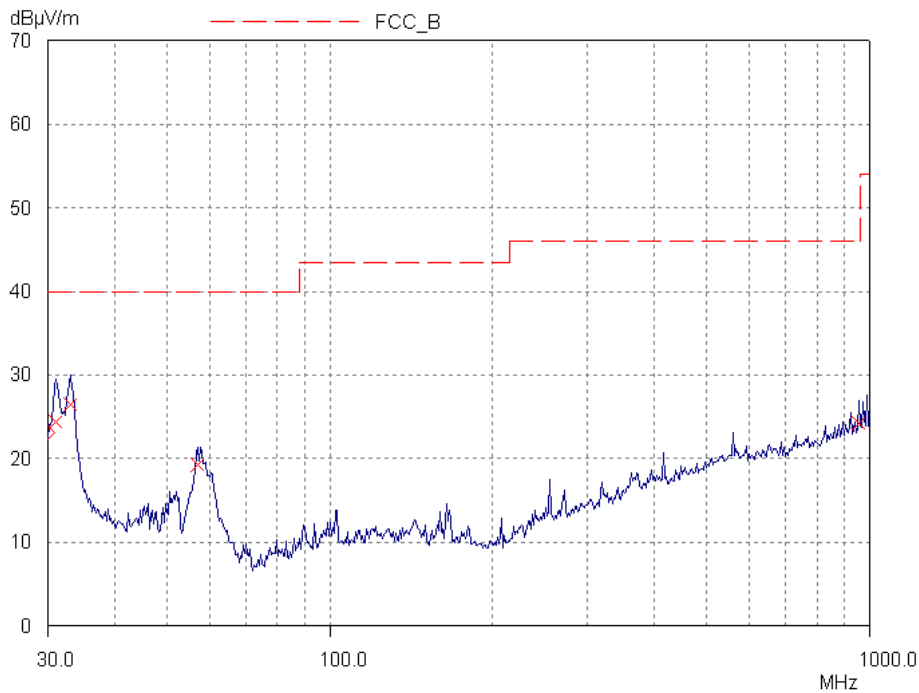
Date: 21.FEB.2011 15:39:22

Unintentional Radiated spurious emissions 13GHz - 18GHz - 2402 MHz

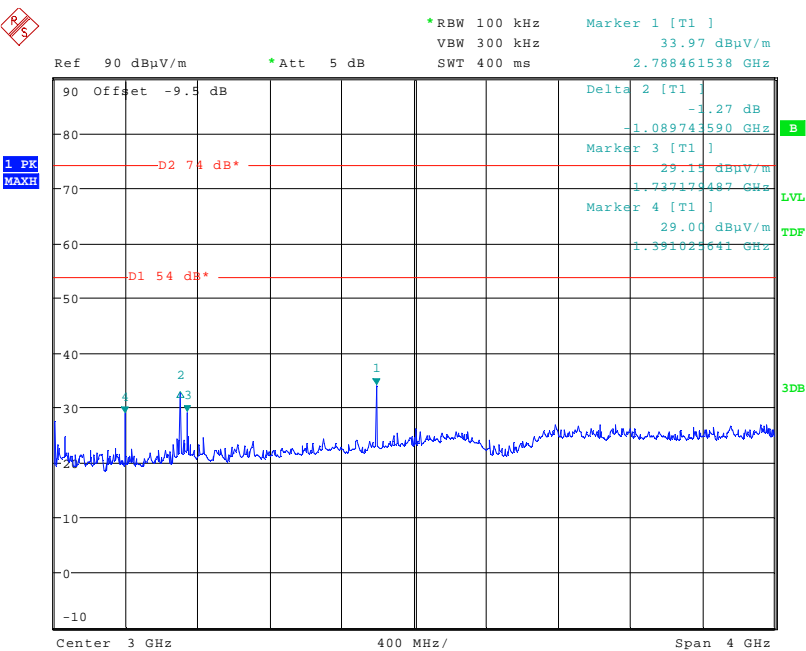


Date: 22.FEB.2011 09:42:38

Unintentional Radiated spurious emissions 18GHz - 25GHz - 2402 MHz

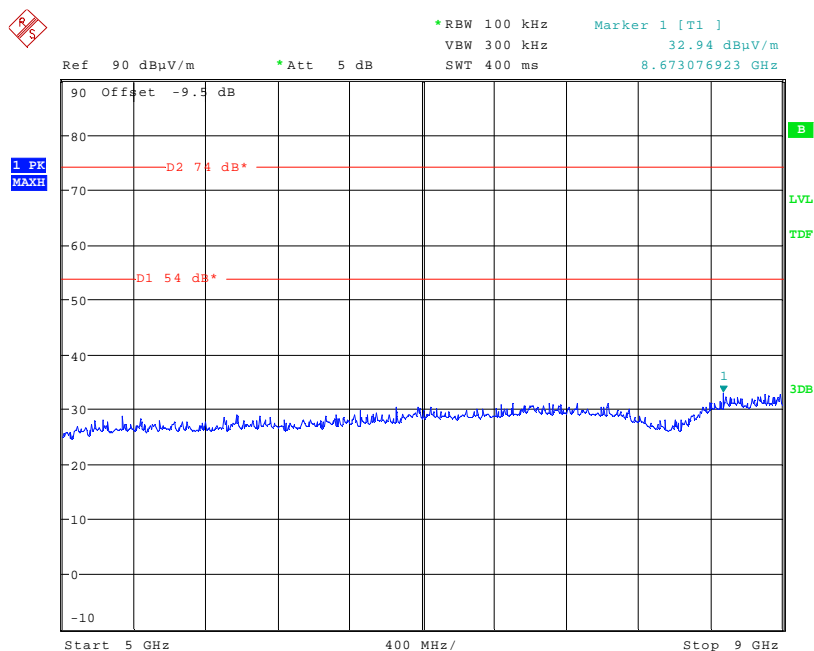


Unintentional Radiated spurious emissions 30MHz - 1GHz - 2440 MHz



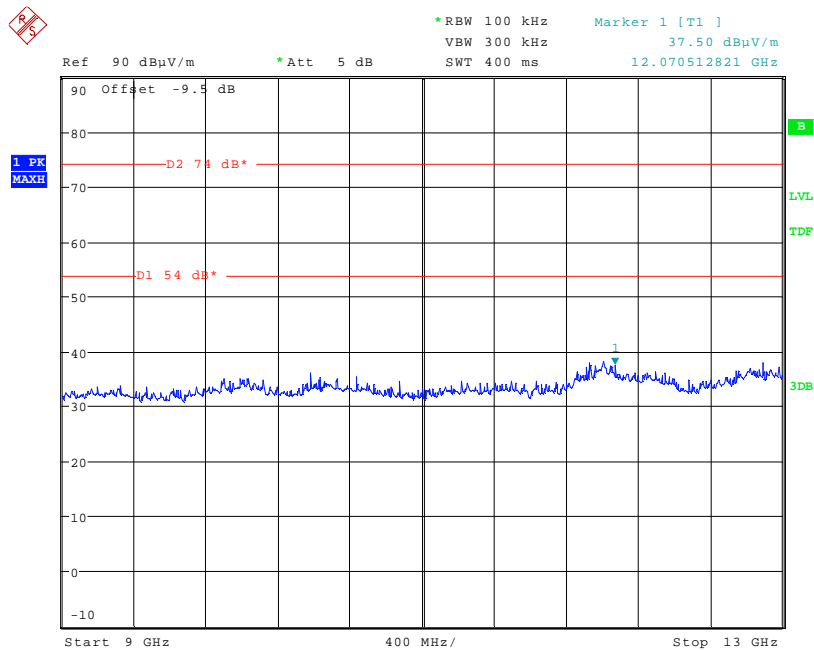
Date: 21.FEB.2011 15:25:48

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



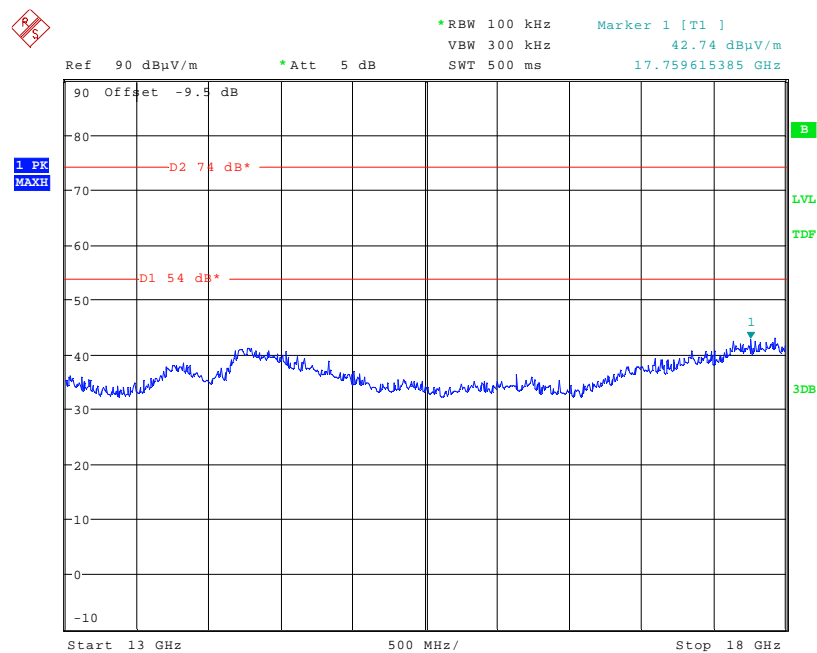
Date: 21.FEB.2011 15:26:23

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



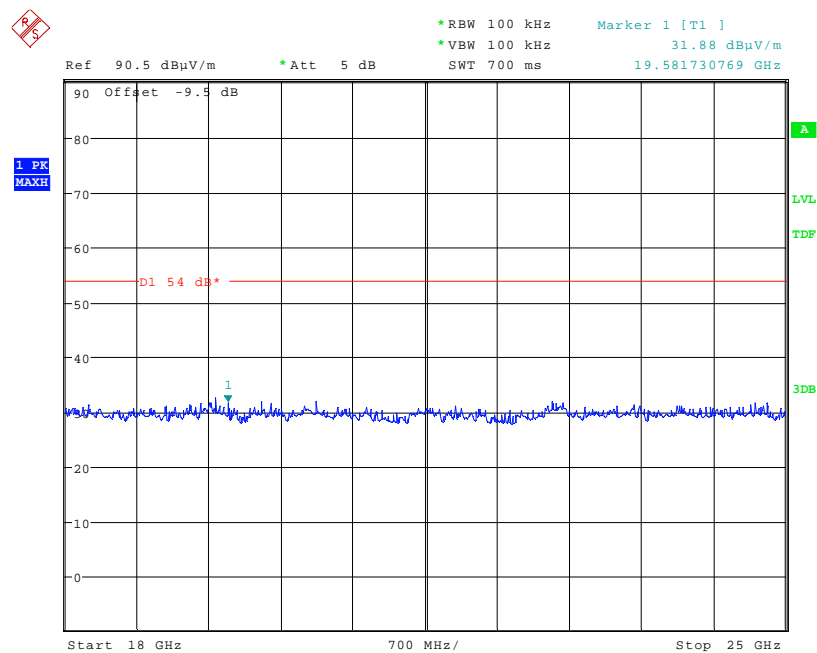
Date: 21.FEB.2011 15:26:51

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



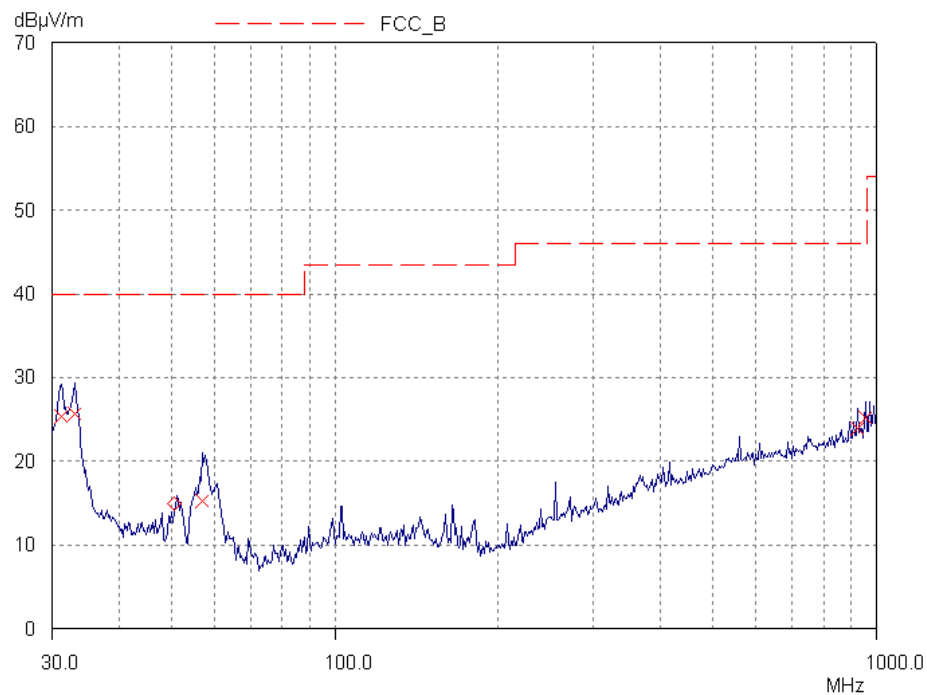
Date: 21.FEB.2011 15:27:29

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

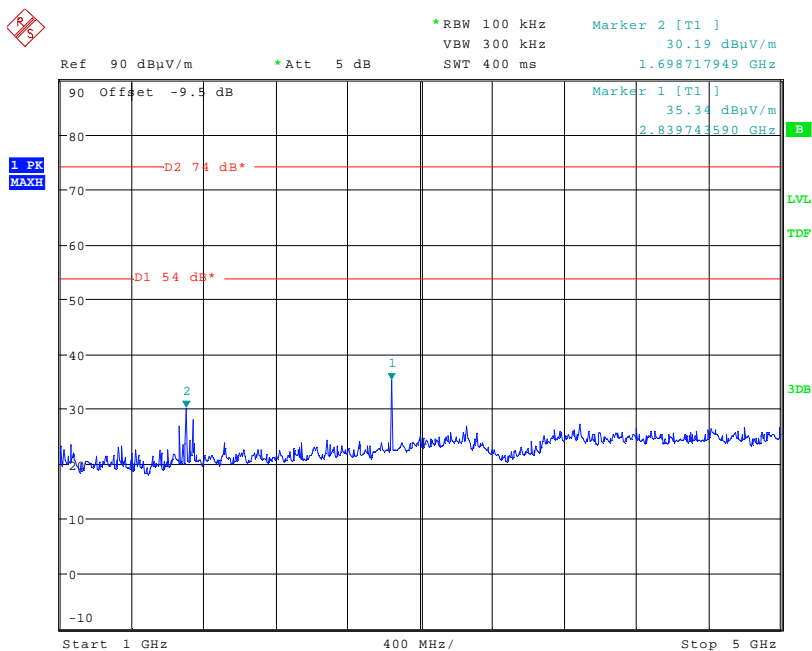


Date: 22.FEB.2011 09:43:12

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

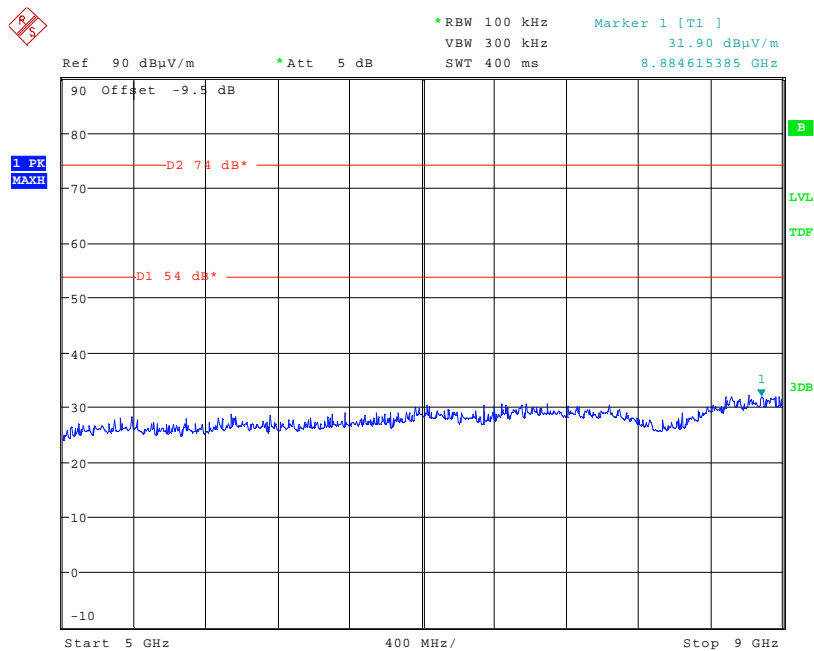


Unintentional Radiated spurious emissions 30MHz - 1GHz - 2480 MHz



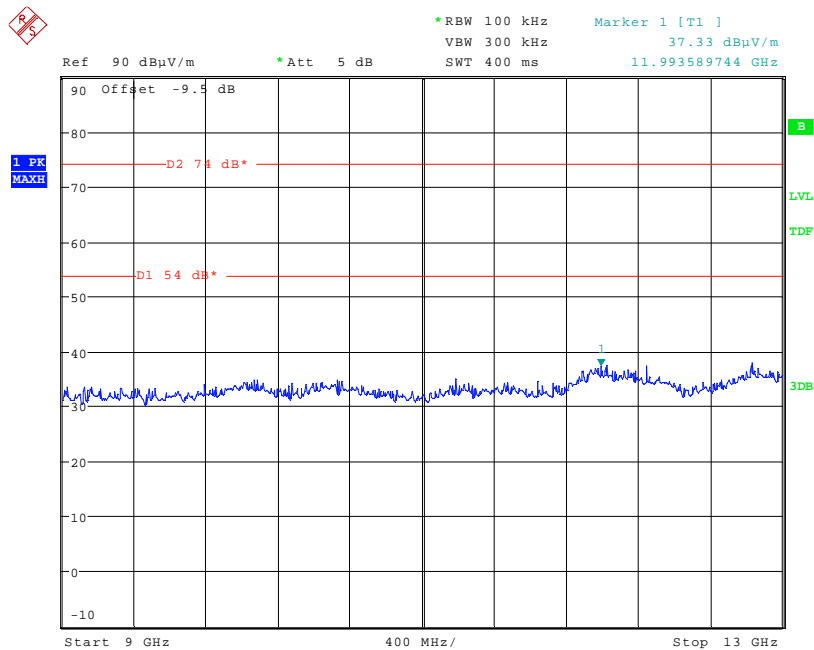
Date: 21.FEB.2011 15:36:39

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



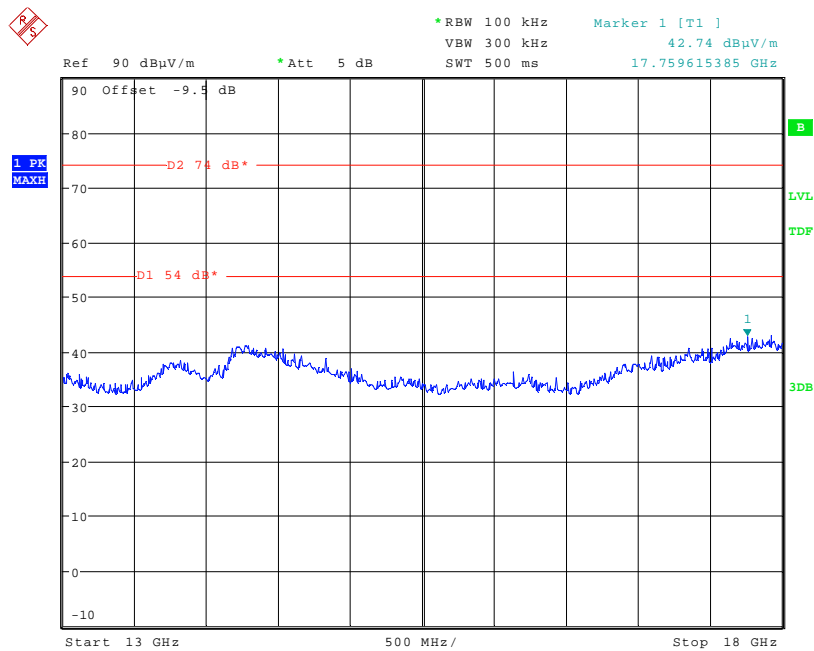
Date: 21.FEB.2011 15:36:18

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



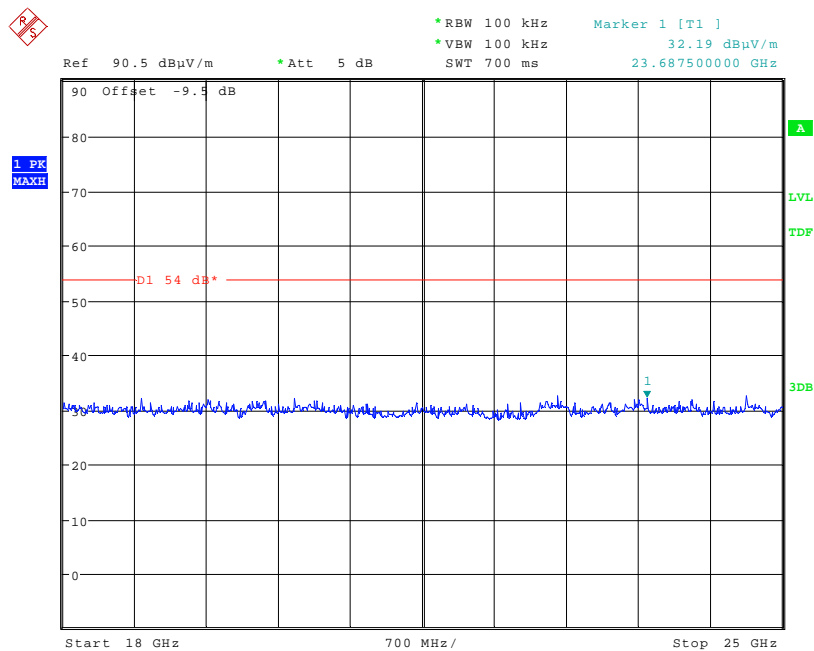
Date: 21.FEB.2011 15:36:03

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



Date: 21.FEB.2011 15:27:29

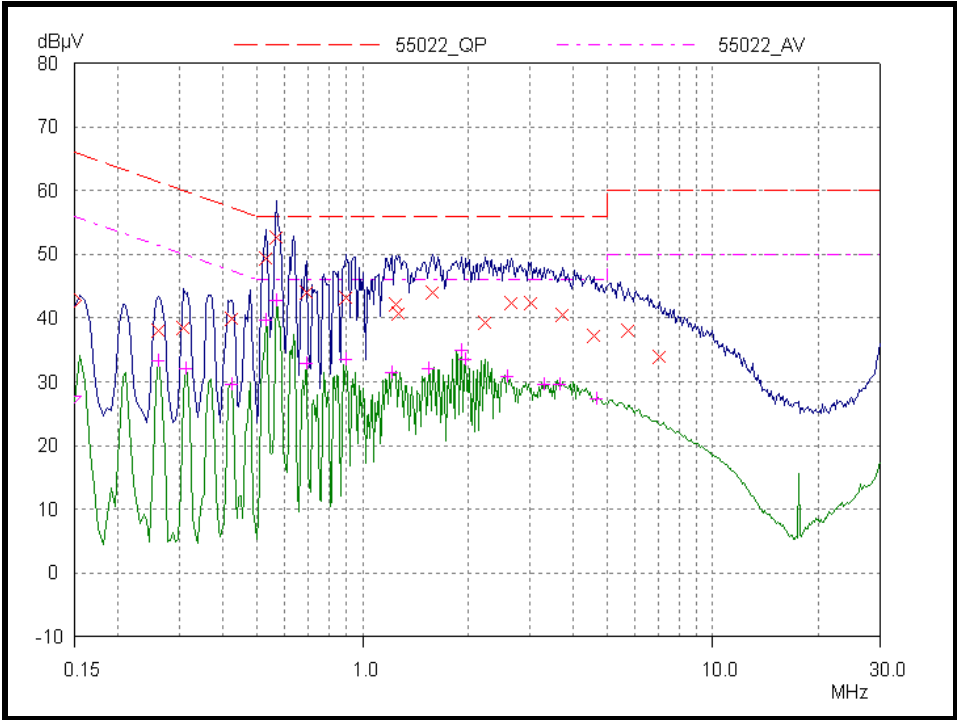
Unintentional Radiated spurious emissions 13GHz - 18GHz - 2480 MHz



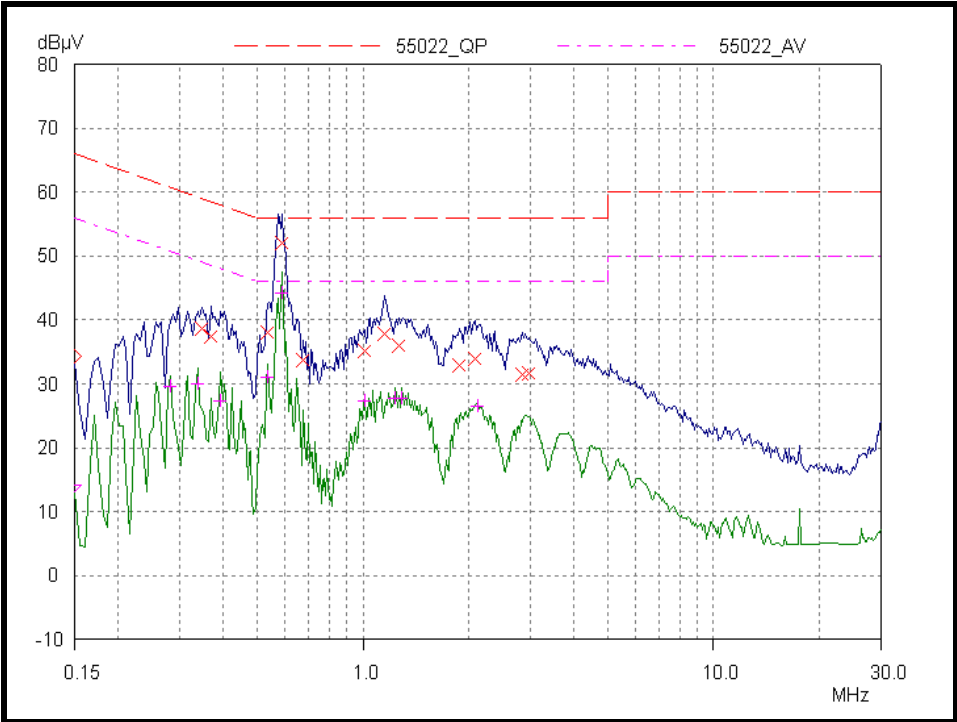
Date: 22.FEB.2011 09:41:04

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





AC Powerline Conduction – Normal Operation



AC Powerline Conduction – Transmit Mode

## 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
S01	TV-Dex, TV-BASE	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.
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 : S01  
Tests : All

Port	Description of Cable Attached	Cable length	Equipment Connected
dc power port	2 Wire Cable	1	Friwo FW7662M_05 (S27)
TV Port	2 Wire Cable	1	Load
Audio	2 Wire Cable	1	Load
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 BASE E Filed
2. Radiated emissions: TV DEX, TV BASE 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/cm<sup>2</sup> 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 <sup>2</sup> )	Distance (R) cm required to be less than 1mW/cm <sup>2</sup>
2440	2.23	1	0.42

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

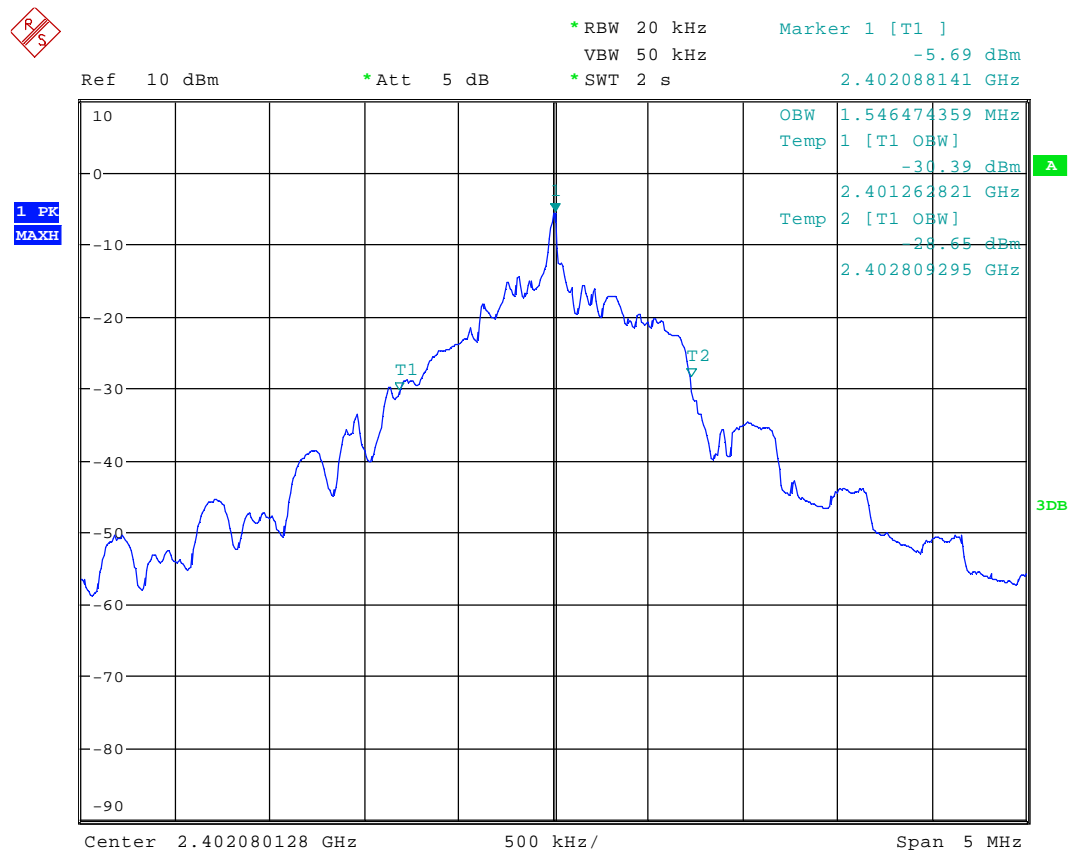
The testing of the TV BASE was carried out to FCC 47CFR Part 15c and the results for this testing can be found in Appendix A of this report.

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:

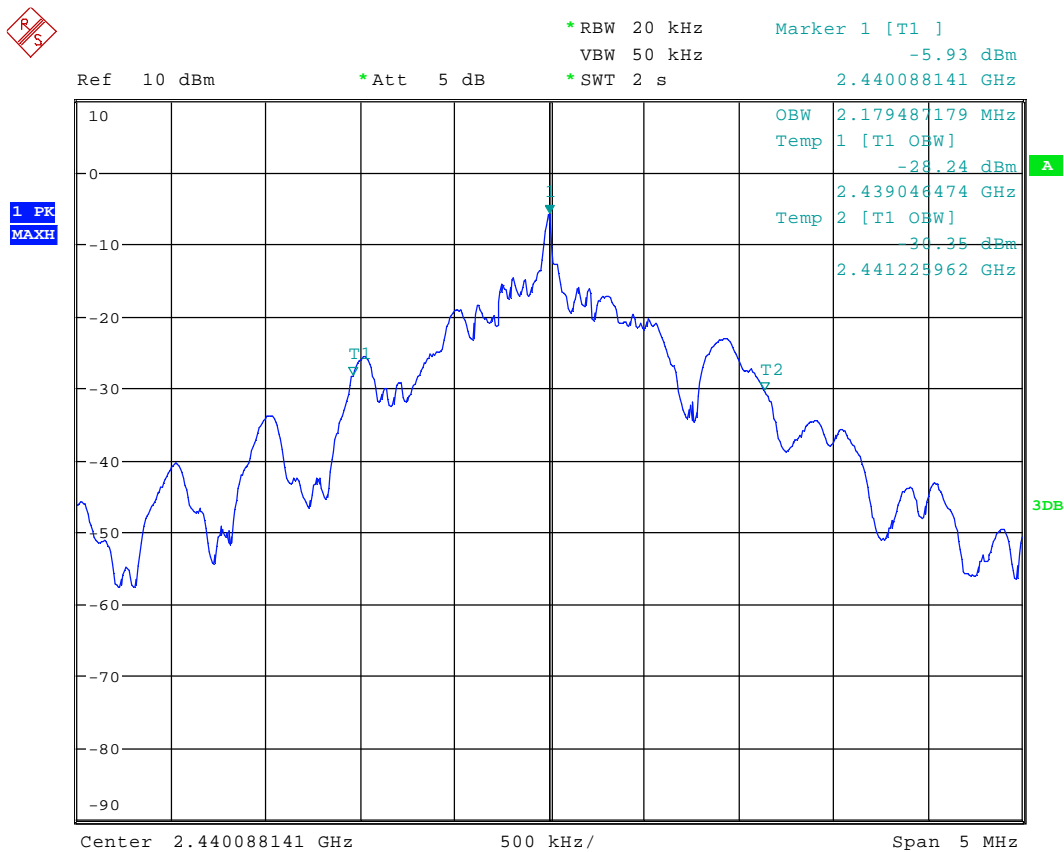
RSS	FCC 47CFR Part 15
RSS-210 A2.9	Part 15.249
RSS-GEN 7.2.5	Part 15.209
RSS-GEN 4.6.1	Part 15.215
RSS-GEN 6.1	Part 15.109
RSS-GEN 7.2.4	Part 15.107/15.207

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



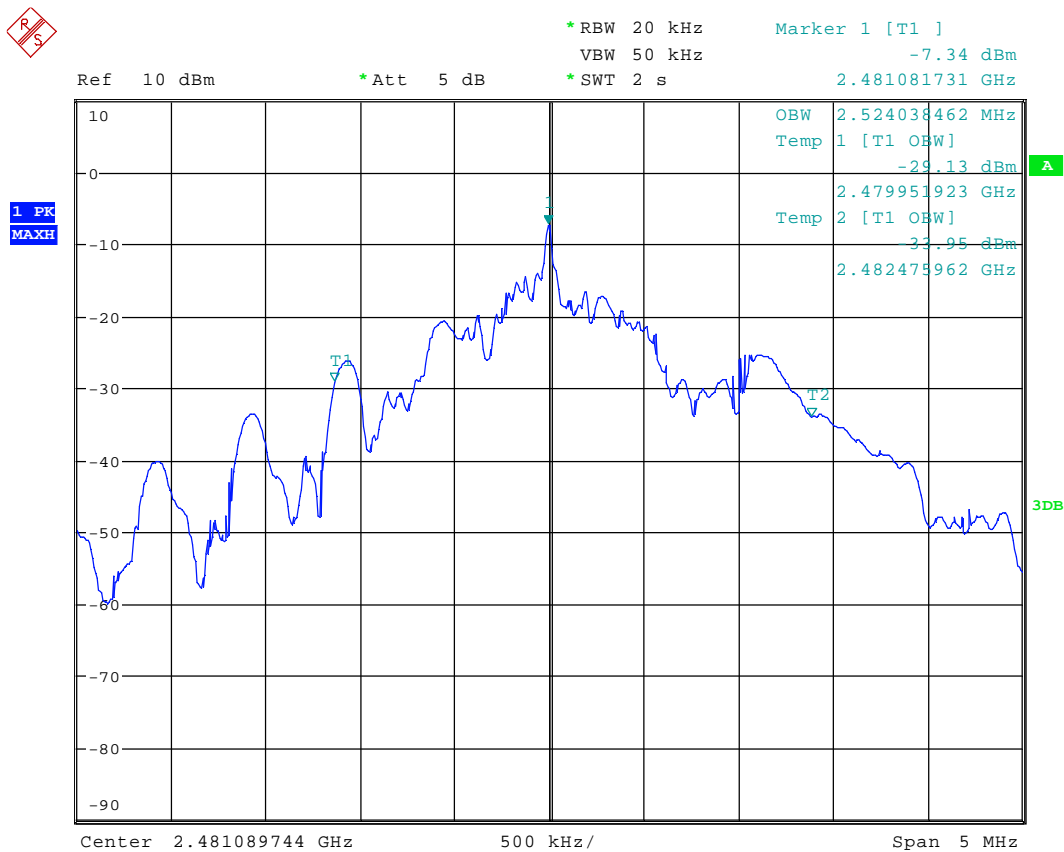
Date: 15.MAR.2011 14:05:19

99% Bandwidth – 2402 MHz



Date: 15.MAR.2011 14:07:51

99% Bandwidth – 2440 MHz



Date: 15.MAR.2011 14:08:39

99% Bandwidth – 2440 MHz



