

# Test report

**KTL EMC Test Report** : 7H0648WUS6

**Applicant** : Avaya Inc.

**Apparatus** : IP Telephone 9670G with Integrated Bluetooth Transceiver (POE)

**Authorised by** :



: M Leach, EMC Principal Engineer.

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## 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 Application of Measurement Uncertainty	7
	2.2 KTL Measurement Uncertainty Values	8
Section 3:	Modifications	9
	3.1 Modifications Performed During Assessment	9
Appendix A:	Formal Emission Test Results	10
	A1 Conducted Fundamental Carrier Power	11
	A2 RF Antenna Conducted Spurious Emissions	12
	A3 Radiated Electric Field Emissions Within The Restricted Band 15.205	14
	A4 Antenna Gain	18
	A5 Radiated Electric Field Emissions – Non Transmitting Mode	19
Appendix B:	Supporting Graphical Data	23
Appendix C:	Additional Test and Sample Details	62
Appendix D:	Additional Information	69
Appendix E:	Calculation of the duty cycle correction factor	71
Appendix F:	Photographs and Figures	72



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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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As Above

This report supersedes KTL report 7H0648WUS4 due to:

- A modification to the Applicant Name.

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## **1.2 Tests Requested By**

This testing in this report was requested by :

Avaya Inc  
307 Middletown-Lincroft Rd.  
Lincroft, NJ 07738-1526  
USA

## **1.3 Manufacturer**

Flextronics International  
Xin Qing Science & Technology Industrial Park  
Jing An Town  
Doumen  
Zhuhai  
Guangdong  
P.R  
China

## **1.4 Apparatus Assessed**

The following apparatus was assessed between 28/10/08 and 06/01/09:

IP Telephone 9670G with Integrated Bluetooth Transceiver.

The above equipment was a Voice over IP Phone fitted with a Bluetooth Module to allow connection with Bluetooth Headsets Powered Over Ethernet (POE).

## 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: 2008, Part 15 Subpart (c) 15.247	ANSI C63.4: 2003	Pass
Radiated spurious emissions Non-Transmitting mode	Title 47 of the CFR: 2008, Part 15 Subpart (b) 15.109	ANSI C63.4: 2003	Pass*
Conducted spurious emissions (Non-restricted bands)	Title 47 of the CFR: 2008, Part 15 Subpart (c) 15.247	Public Notice DA 00-705 March 30, 2000	Pass
Conducted Carrier Power	Title 47 of the CFR :2008, Part 15 Subpart (c) 15.247(b)(2)	Public Notice DA 00-705 March 30, 2000	Pass

\*Marginal results were recorded. See Appendix A for details and Section 2.2 (iii).

Testing was limited to the above tests, as the EUT has previously been tested to the full requirements of FCC 47CFR15.247 using an external dc PSU (see KTL Test Report 7H0648WUS1). As there are no changes to the RF circuitry, the above tests were deemed sufficient.

Abbreviations used in the above table:

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

## 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.

KTL Hull is a listed electromagnetic compatibility Conformance Assessment Body (CAB) for EC access to the US market. (Decision No 3/2000 of the Joint Committee established under the Agreement on Mutual Recognition between the European Community and the United States of America. This decision was effective from 16<sup>th</sup> January 2001).

FCC Facility Registration number (3m semi anechoic chamber) : 90743

## 1.7 Deviations from Test Standards

There were no deviations from the standards tested to.

## Section 2:

## Measurement Uncertainty

### 2.1 Application of Measurement Uncertainty

The following table contains the measurement uncertainties for KTL measurements

The following procedure is used when determining the result of a measurement :

- (i) If specification limits are not exceeded by the measured result, extended by the positive component of the expanded uncertainty interval at a confidence level of 95%, then a pass result is recorded.
- (ii) Where a specification limit is exceeded by the result even when the result is decreased by the negative component of the expanded uncertainty interval, a fail result is recorded.
- (iii) Where measured result is below a limit, but by a margin less than the positive measurement uncertainty component, it is not possible to record a pass based on a 95% confidence level. However, the result indicates that a pass result is more probable than a fail result.
- (iv) Where a measured result is above a limit, but by a margin less than the negative measurement uncertainty component, it is not possible to record a fail based on a 95% confidence level. However the result indicates that a fail is more probable than a pass.

## 2.2 KTL Measurement Uncertainty Values

For the test data recorded in accordance with note (iii) of Section 2.2 the following measurement uncertainty was calculated:

Test type	Quantity	Quantity frequency range	Expanded uncertainty
Radiated electric field emissions 3m alternative test site	Amplitude	30MHz to 300MHz Horizontal	±4.6dB
		30MHz to 300MHz Vertical	±5.1dB
		300MHz to 1000MHz Horizontal	±5.2dB
		300MHz to 1000MHz Vertical	±5.5dB
		1GHz to 18GHz Horizontal and Vertical	±4.1dB



**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
		Freq	: Frequency
		MD	: Measurement Distance
L	: Live Power Line	SD	: Spec Distance
N	: Neutral Power Line		
E	: Earth Power Line	Pol	: Polarisation
		H	: Horizontal Polarisation
Pk	: Peak Detector	V	: Vertical Polarisation
QP	: Quasi-Peak Detector		
Av	: Average Detector	CDN	: Coupling & decoupling network

**A1 Conducted Fundamental Carrier Power**

Conducted carrier power was verified using a peak power meter, the EUT transmitting on its lowest, centre and highest carrier frequency in turn.

Test Details:	
Regulation	Title 47 of the CFR 2008, Part15 Subpart (c) 15.247(b)(1)
EUT sample number	S25
Modification state	0
SE in test environment	S09 and REF838
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Channel No	Channel Frequency (MHz)	Measured Peak Conducted Carrier Power (W)	Limit (W) ≥ 79 channels	Result
0	2402	0.000764	0.125	Pass
39	2441	0.000787		Pass
78	2480	0.000766		Pass

**Notes**

The carrier power was measured whilst varying the supply voltage between 85% and 105% of the nominal supply voltage to S09. No variation in carrier power was observed.

The peak carrier power did not vary between the three modulation modes.

Limit based on relaxed 20 dB Bandwidth requirement of 15.247(a)(1).

**A2 RF Antenna 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 turn.

<b>Test Details</b>	
Regulation	Title 47 of the CFR 2008, Part 15 Subpart (c) Clause 15.247(d) and Clause 15.205
Measurement standard	ANSI C63.4:2003
Frequency range	9 kHz to 25 GHz
EUT sample number	S25
Modification state	0
SE in test environment	S09 and REF838
SE isolated from EUT	None
EUT set up	Refer to Appendix C

No emissions within 20 dB of the tests limits were detected.

**Notes:**

1. The conducted emission limit for emissions outside the restricted bands, defined in 47CFR15.205(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.

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

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

Where:

The maximum peak conducted power was measured using a peak power meter. Please refer to section A1 of this test report.

Limit(dB $\mu$ V)					
Channel No.	Channel Frequency (MHz)	Measured Peak Conducted Carrier Power (W)	Measured Peak Conducted Carrier (dB $\mu$ V)	Measured Peak Conducted Carrier – 20dB (dB $\mu$ V)	Average Emission Limit 15.247(d) Outside the restricted band in 100 kHz RBW (dB $\mu$ V)
0	2402	0.000764	105.830	85.83	65.83
39	2441	0.000787	105.960	85.96	65.96
78	2480	0.000766	105.840	85.84	65.84

**A3 Radiated Electric Field Emissions Within The Restricted Band 15.205**

Preliminary conducted emission testing was performed using a peak detector with the 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 in turn.

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

10m open area test site :       3m alternative test site :

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

<b>Test Details</b>	
Regulation	Title 47 of the CFR 2008, Part 15 Subpart (c) Clause 15.247(d) and Clause 15.205
Measurement standard	ANSI C63.4:2003
Frequency range	30 MHz to 25 GHz
EUT sample number	S25
Modification state	0
SE in test environment	None
SE isolated from EUT	S09 and REF 838
EUT set up	Refer to Appendix C
Photographs (Appendix F)	Photograph 1 and 2

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

Ref No.	Freq (MHz)	Det.	Angle. Deg.	Height (cm)	Pol.	Result (dB $\mu$ V/m)	Spec. Limit (dB $\mu$ V/m)	Margin (dB)	Summary
1	1602.564	Pk	0	100	H	46.2	74.0	-27.8	Pass
2	1602.564	Av	0	100	H	33.6	54.0	-20.4	Pass
3	2390.000	Pk	0	100	H	48.7	74.0	-25.3	Pass
4	2390.000	Av	0	100	H	31.9	54.0	-22.1	Pass
5	2483.500	Pk	0	100	H	41.8	74.0	-32.2	Pass
6	2483.500	Av	0	100	H	33.4	54.0	-20.6	Pass
7	2346.153	Pk	35	100	H	46.1	74.0	-27.9	Pass
8	2346.153	Av	35	100	H	31.9	54.0	-22.1	Pass
9	2390.000	Pk	0	100	H	42.9	74.0	-31.1	Pass
10	2390.000	Av	0	100	H	31.5	54.0	-22.5	Pass
11	2483.500	Pk	16	100	H	45.7	74.0	-28.3	Pass
12	2483.500	Av	16	100	H	32.4	54.0	-21.6	Pass
13	7323.717	Pk	28	100	H	44.9	74.0	-29.1	Pass
14	7323.717	Av	28	100	H	31.0	54.0	-23.0	Pass
15	2384.615	Pk	0	100	H	43.6	74.0	-30.4	Pass
16	2384.615	Av	0	100	H	31.2	54.0	-22.8	Pass
17	2390.000	Pk	0	100	V	46.3	74.0	-27.7	Pass
18	2390.000	Av	0	100	V	30.6	54.0	-23.4	Pass
19	2483.500	Pk	137	100	H	50.9	74.0	-23.1	Pass
20	2483.500	Av	137	100	H	45.7	54.0	-8.3	Pass
21	7443.910	Pk	122	100	H	48.0	74.0	-26.0	Pass
22	7443.910	Av	122	100	H	31.7	54.0	-22.3	Pass

The results above represent the worst-case emissions found at all carrier frequencies and operating modes.

**Notes:**

- 1 Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.4: 2003 section 8.2.1.
- 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 The measurements 2483.5 MHz was made to ensure band edge compliance.
- 4 Demonstration of band edge compliance at 2.4GHz (which lies outside the restricted bands as defined in section 47CFR15.205(a) is contained in section A2, RF Antenna Conducted Spurious Emissions and Appendix B of this test report.
- 5 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.
- 6 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= 1 MHz, VBW = 10 Hz

These settings as per ANSI C63.4 and DA 00-705.

- 7 In accordance with DA 00-705, the average level of the spurious radiated emission may be reduced by the duty cycle correction factor. If the dwell time per channel (refer to the measured channel occupancy time, section A7 of this test report) of the hopping signal is less than 100ms then the average measurement may be further adjusted by the duty cycle correction factor which is derived from

$$20\log_{10}\left(\frac{\text{dwell time}}{100\text{ms}}\right)$$



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

Radiated emission limits (47 CFR 15:2008 Clause 15.209) for emissions falling within the restricted bands defined in 15.205(a):

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	210	3	46.4
Above 960	500	3	54.0

**Notes:**

- (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:

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

The results displayed take into account applicable antenna factors and cable losses.

- (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 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				

#### **A4 Antenna Gain**

The maximum antenna gain for the antenna types to be used with the EUT, as declared by the client, is -1.1 dBi.

**A5 Radiated Electric Field Emissions – Non Transmitting Mode**

Preliminary conducted emission testing was performed using a peak detector with the RBW = 100kHz. The radiated electric field emission test applies to spurious emissions relating to the digital circuitry within the EUT. The maximum permitted field strength is listed in Section 15.109.

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

10m open area test site :       3m alternative test site :

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

<b>Test Details</b>	
Regulation	Title 47 of the CFR 2008, Part 15 Subpart (b) Clause 15.109
Measurement standard	ANSI C63.4:2003
Frequency range	30 MHz to 25 GHz
EUT sample number	S25
Modification state	0
SE in test environment	None
SE isolated from EUT	S09 and REF 838
EUT set up	Refer to Appendix C
Photographs (Appendix F)	Photograph 1 and 2

The worst case radiated emission measurements are listed below:

Ref No.	Freq (MHz)	Det.	Angle. Deg.	Height (cm)	Pol.	Result (dB $\mu$ V/m)	Spec. Limit (dB $\mu$ V/m)	Margin (dB)	Summary
1	30.362	QP	57	100	V	38.2	40.0	-1.8	PASS*
2	30.362	PK	57	100	V	40.2	60.0	-19.8	PASS
3	30.871	QP	216	100	V	37.1	40.0	-2.9	PASS*
4	30.871	PK	216	100	V	36.3	60.0	-23.7	PASS
5	33.333	QP	220	100	V	36.4	40.0	-3.6	PASS*
6	33.333	PK	220	100	V	40.7	60.0	-19.3	PASS
7	34.319	QP	360	100	V	34.9	40.0	-5.1	PASS*
8	34.319	PK	360	100	V	39.8	60.0	-20.2	PASS
9	36.250	QP	360	100	V	31.9	40.0	-8.1	PASS
10	36.250	PK	360	100	V	36.7	60.0	-23.3	PASS
11	40.668	QP	0	100	V	29.3	40.0	-10.7	PASS
12	40.668	PK	0	100	V	32.3	60.0	-27.7	PASS
13	45.817	QP	223	100	V	36.5	40.0	-3.5	PASS*
14	45.817	PK	223	100	V	38.3	60.0	-21.7	PASS
15	47.519	QP	64	100	V	36.4	40.0	-3.6	PASS*
16	47.519	PK	64	100	V	37.8	60.0	-22.2	PASS
17	50.000	QP	360	100	V	34.3	40.0	-5.7	PASS
18	50.000	PK	360	100	V	36.0	60.0	-24.0	PASS
19	52.644	QP	228	100	V	33.9	40.0	-6.1	PASS
20	52.644	PK	228	100	V	37.2	60.0	-22.8	PASS
21	56.096	QP	3	100	V	28.3	40.0	-11.7	PASS
22	56.096	PK	3	100	V	32.1	60.0	-27.9	PASS
23	60.000	QP	0	100	V	22.4	40.0	-17.6	PASS
24	60.000	PK	0	100	V	24.3	60.0	-35.7	PASS
25	68.750	QP	38	100	V	29.1	40.0	-10.9	PASS
26	68.750	PK	38	100	V	31.6	60.0	-28.4	PASS
27	125.000	QP	93	100	V	34.9	43.5	-8.6	PASS
28	125.000	PK	93	100	V	39.3	63.5	-24.2	PASS
29	250.009	QP	276	100	H	39.9	46.0	-6.1	PASS
30	250.009	PK	276	100	H	41.3	66.0	-24.7	PASS
31	374.993	QP	123	100	H	40.8	46.0	-5.2	PASS*
32	374.993	PK	123	100	H	43.5	66.0	-22.5	PASS
33	500.019	QP	37	100	V	42.2	46.0	-3.8	PASS*
34	500.015	PK	37	100	V	47.3	66.0	-18.7	PASS
35	664.557	QP	160	100	H	35.4	46.0	-10.6	PASS
36	664.557	PK	160	100	H	38.2	66.0	-27.8	PASS
37	756.270	QP	144	100	H	39.4	46.0	-6.6	PASS
38	756.270	PK	144	100	H	42.1	66.0	-23.9	PASS
39	800.041	QP	144	100	H	38.5	46.0	-7.5	PASS
40	800.041	PK	144	100	H	40.3	66.0	-25.7	PASS
41	1000.000	QP	116	100	H	44.1	54.0	-9.9	PASS
42	1000.000	PK	116	100	H	46.8	74.0	-27.2	PASS

\*See section 2.2 Note (iii).

No emissions within 20 dB of the tests limits were detected above 1GHz.

- 1 Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.4: 2003 section 8.2.1.
- 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 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= 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= 1 MHz, VBW = 10 Hz

These settings as per ANSI C63.4 and DA 00-705.

**Specification limits :**

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

Radiated emission limits (47 CFR 15:2008 Clause 15.109):

The field strength of radiated emissions from unintentional radiators at a distance of 3m shall not exceed the following values:

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

**Notes:**

- (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:

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

The results displayed take into account applicable antenna factors and cable losses.

- (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 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				

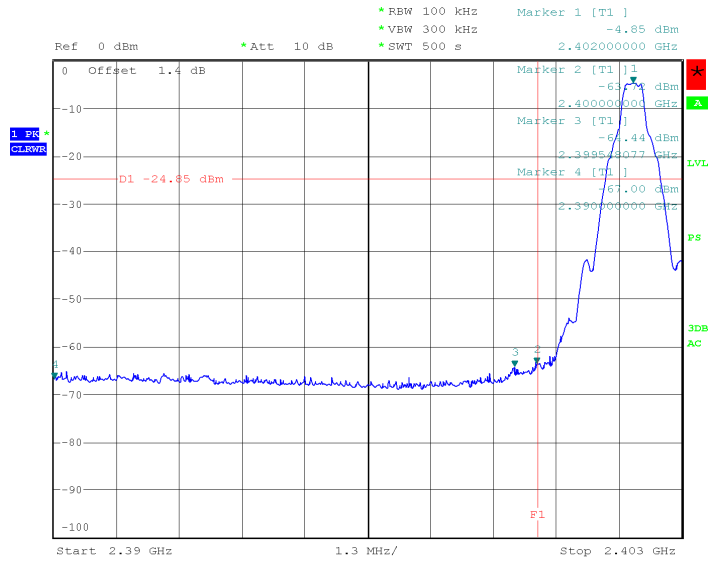
**Appendix B:**

**Supporting Graphical Data**

This appendix contains graphical data obtained during testing.

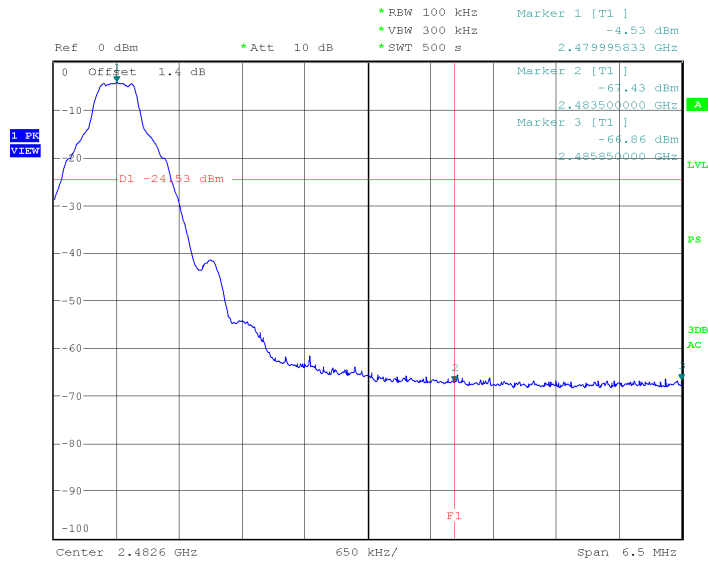
Notes:

- (a) The conducted emissions graphical data in this appendix is preview data. Any emissions detected within the restricted band were formally assessed against the limits in 15.209. For details of formal results, refer to Appendix A and Appendix B.



jivvw  
 Date: 11.DEC.2008 13:16:52

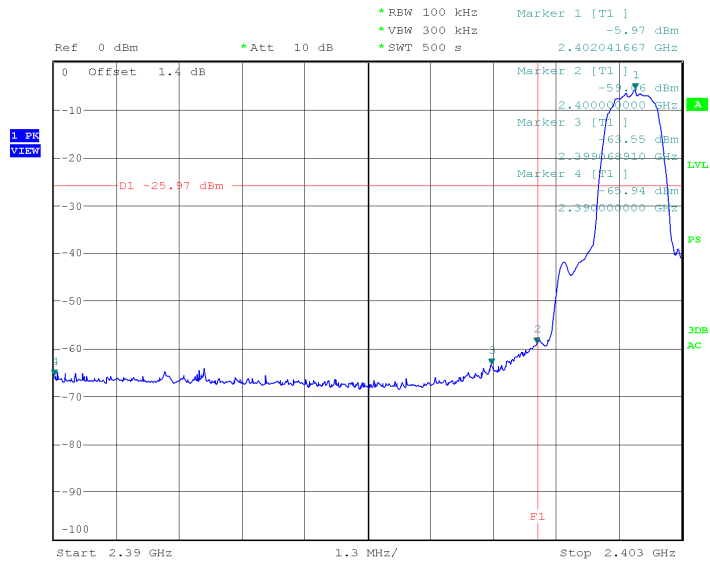
### Lower Band Edge Non-Hopping Mode – 1Mb/s



jivvw  
 Date: 12.DEC.2008 15:38:04

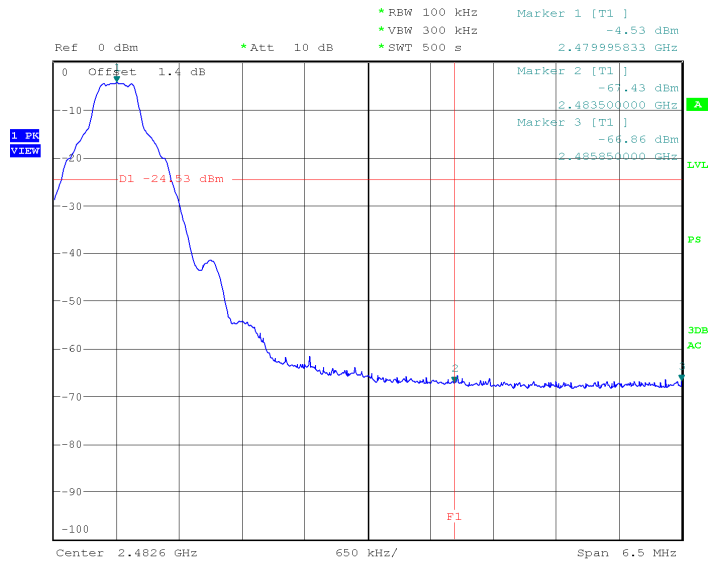
### Upper Band Edge Non-Hopping Mode – 1Mb/s





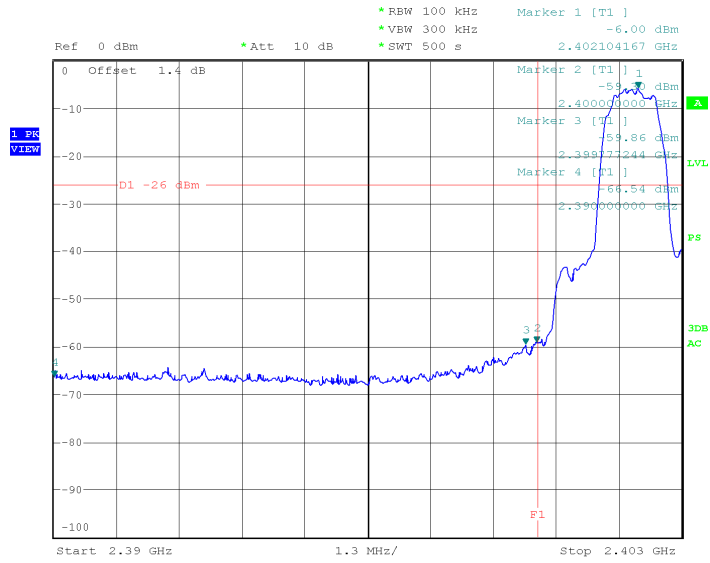
jivvw  
Date: 11.DEC.2008 13:34:17

### Lower Band Edge Non-Hopping Mode – 2Mb/s



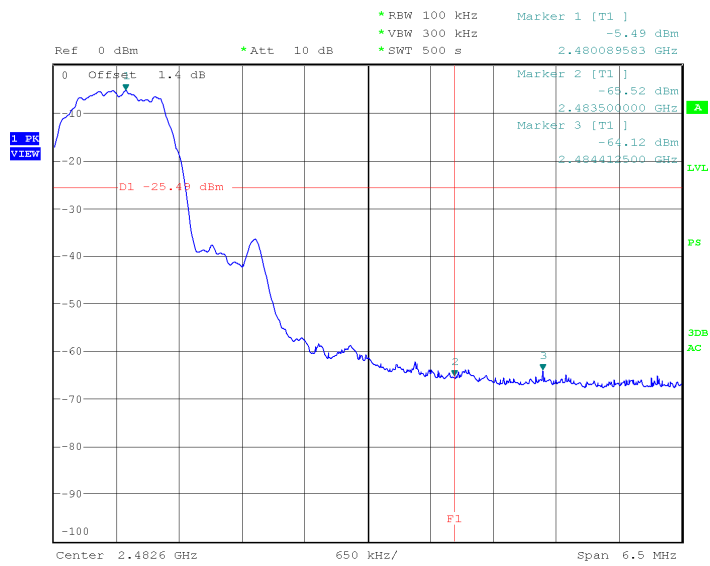
jivvw  
Date: 12.DEC.2008 15:38:04

### Upper Band Edge Non-Hopping Mode – 2Mb/s



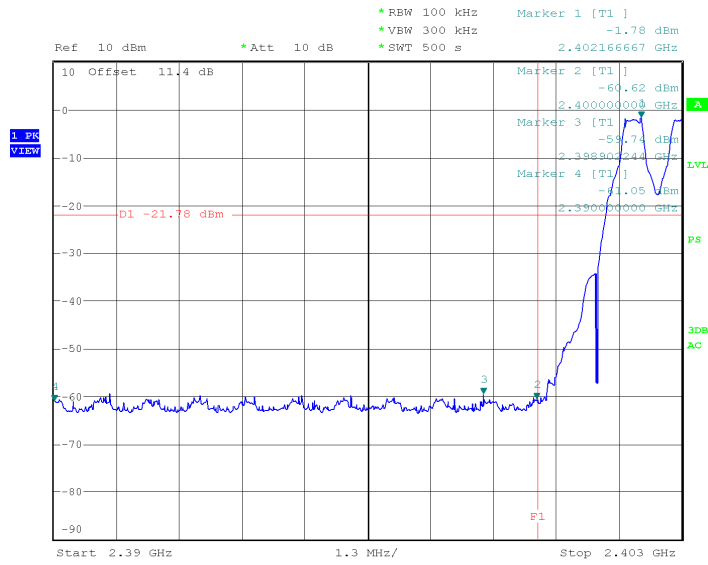
jivvw  
Date: 11.DEC.2008 13:54:26

### Lower Band Edge Non-Hopping Mode - 3Mb/s



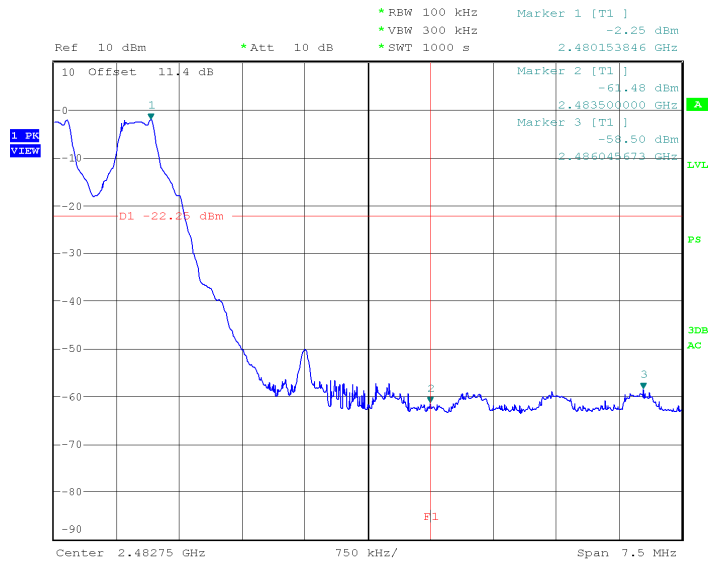
jivvw  
Date: 12.DEC.2008 15:59:08

### Upper Band Edge Non-Hopping Mode - 3Mb/s



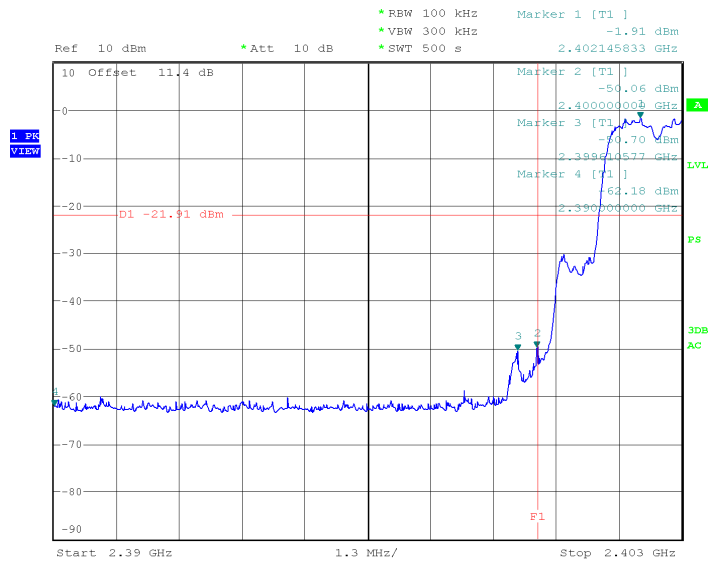
jivvw  
Date: 11.DEC.2008 11:56:41

### Lower Band Edge Hopping Mode – 1Mb/s



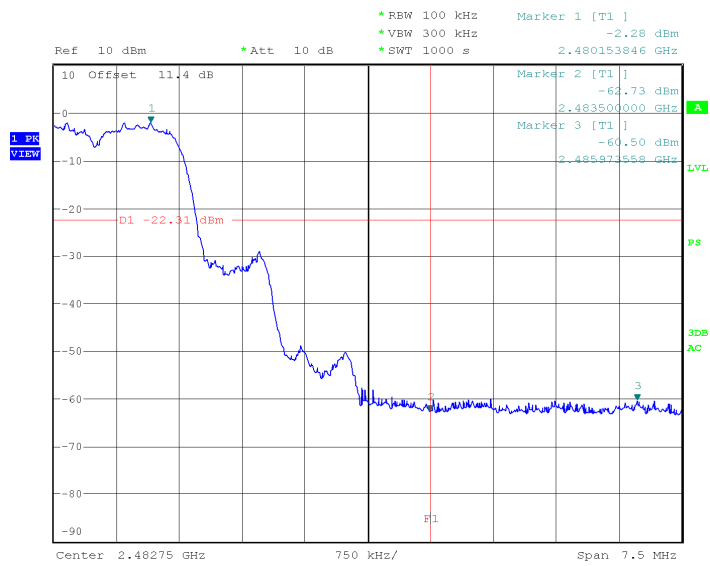
jivvw  
Date: 12.DEC.2008 15:08:51

### Upper Band Edge Hopping Mode – 1Mb/s



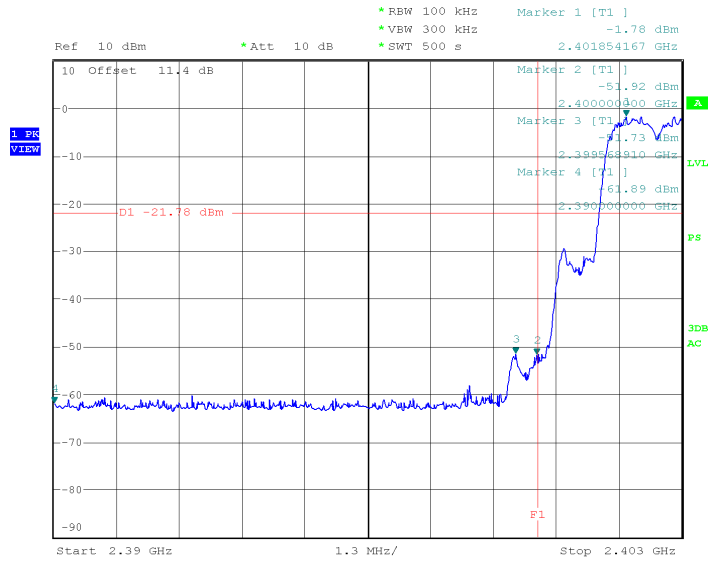
jivvw  
 Date: 11.DEC.2008 12:32:50

### Lower Band Edge Hopping Mode – 2Mb/s



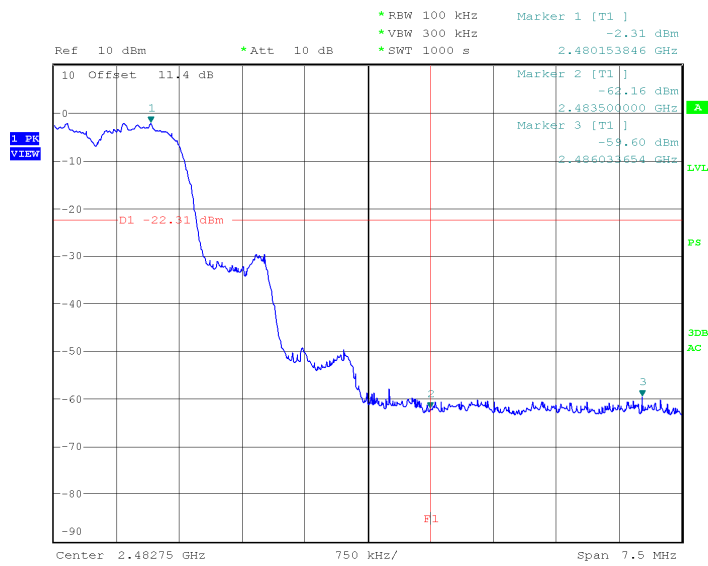
jivvw  
 Date: 12.DEC.2008 14:01:01

### Upper Band Edge Hopping Mode – 2Mb/s



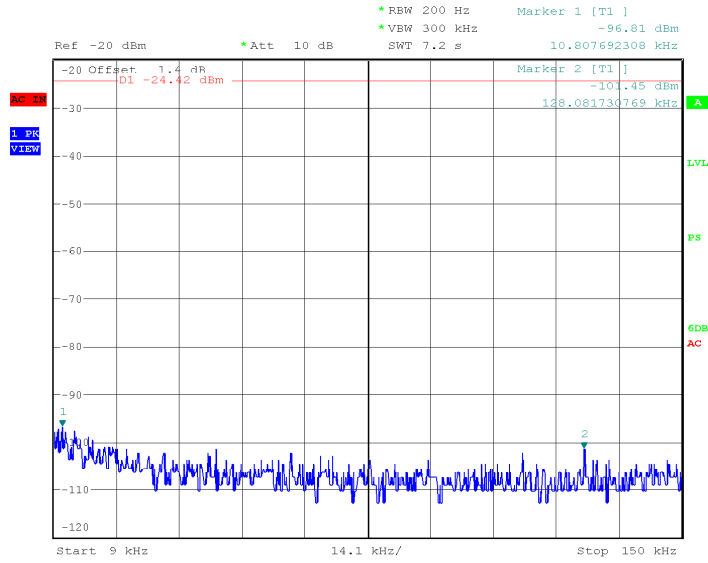
jivvw  
Date: 11.DEC.2008 12:59:33

### Lower Band Edge Hopping Mode – 3Mb/s



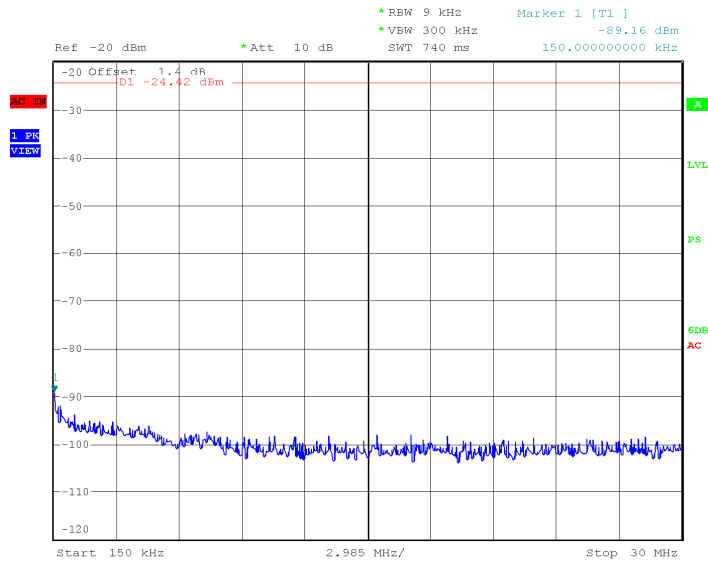
jivvw  
Date: 12.DEC.2008 13:30:03

### Upper Band Edge Hopping Mode – 3Mb/s



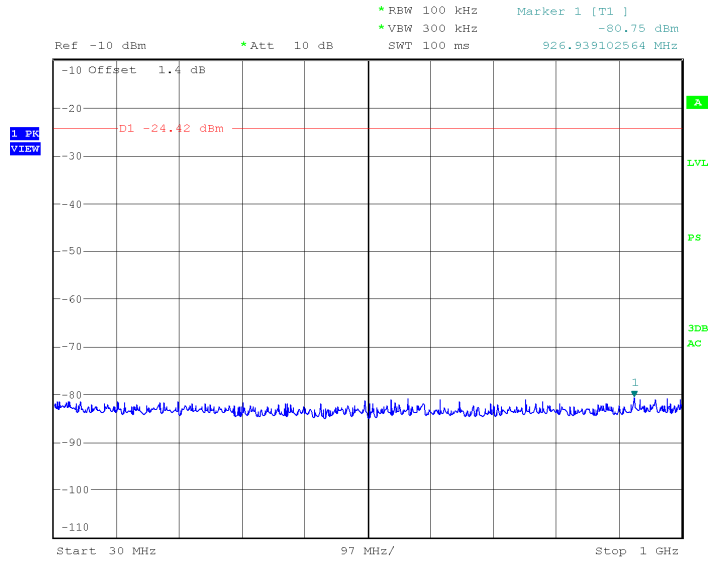
jivvw  
 Date: 10.DEC.2008 17:10:05

Conducted Spurious emissions 9 kHz to 150 kHz – 2402MHz 1Mb/s



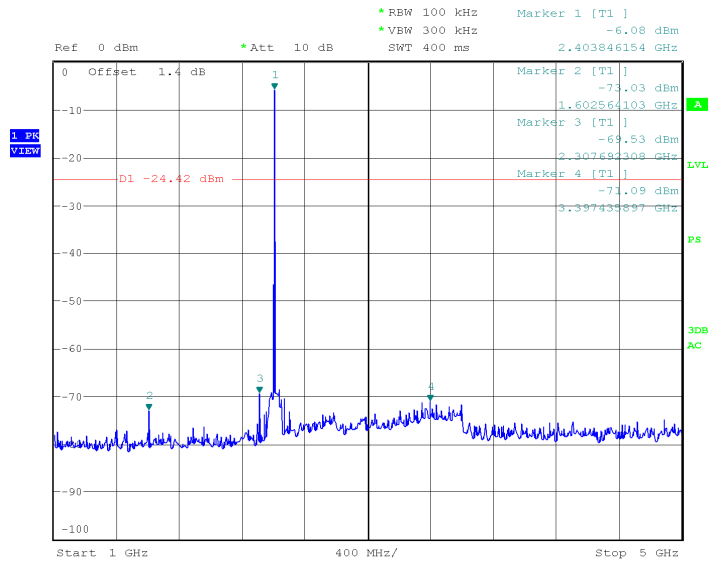
jivvw  
 Date: 10.DEC.2008 17:10:38

Conducted Spurious emissions 150 kHz to 30 MHz – 2402MHz 1Mb/s



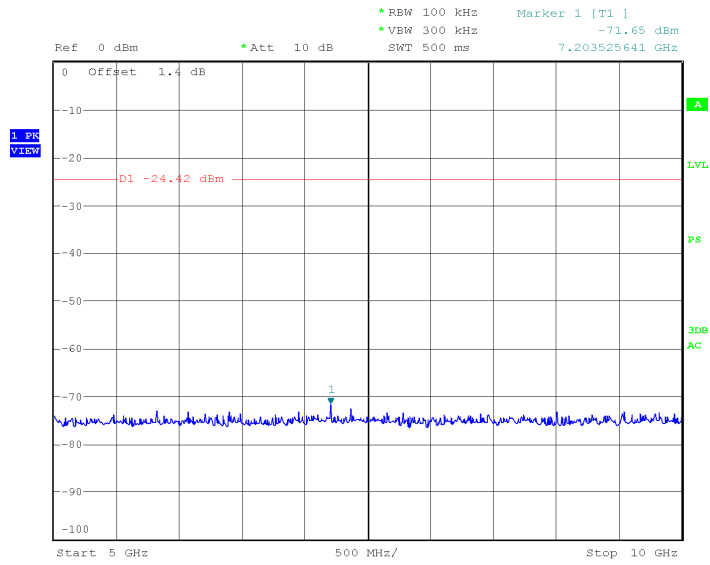
jivvw  
Date: 10.DEC.2008 17:11:58

Conducted Spurious emissions 30 MHz to 1 GHz – 2402MHz 1Mb/s



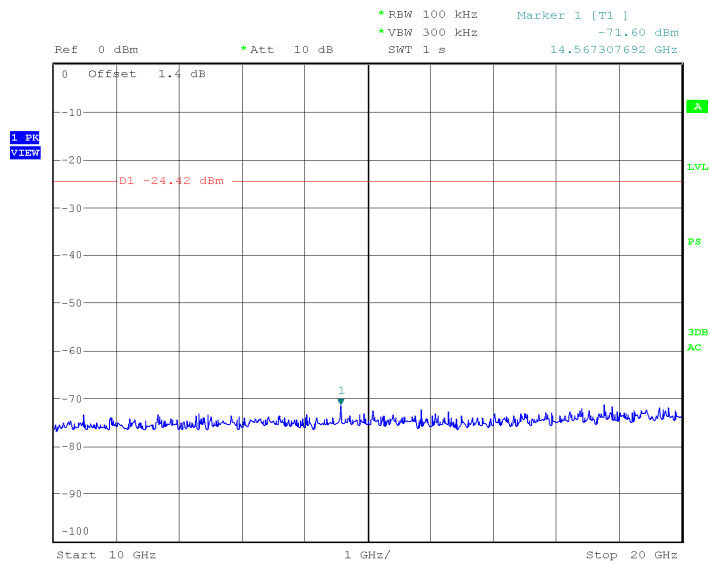
jivvw  
Date: 10.DEC.2008 17:13:56

Conducted Spurious emissions 1 GHz to 5 GHz – 2402MHz 1Mb/s



jivvw  
 Date: 10.DEC.2008 17:14:38

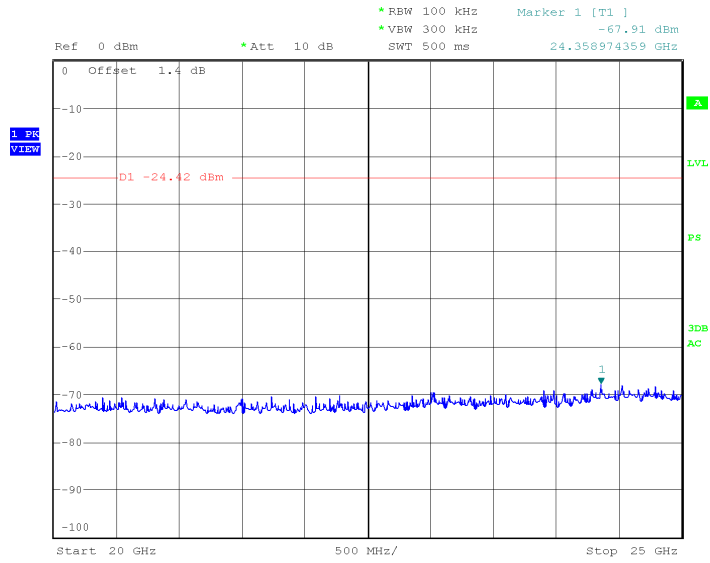
Conducted Spurious emissions 5 GHz to 10 GHz – 2402MHz 1Mb/s



jivvw  
 Date: 10.DEC.2008 17:15:29

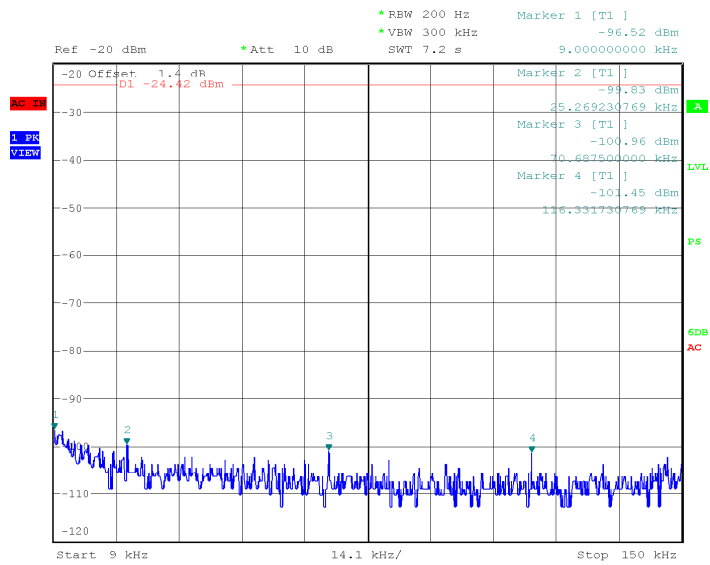
Conducted Spurious emissions 10 GHz to 20 GHz – 2402MHz 1Mb/s





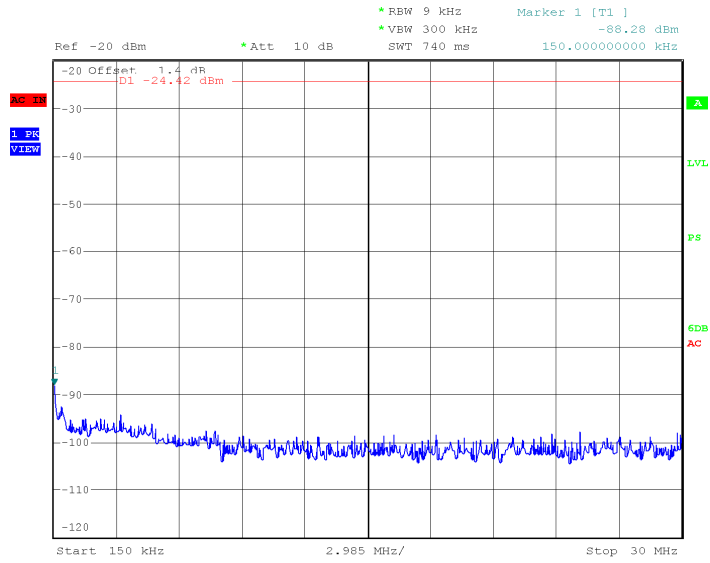
jivvw  
Date: 10.DEC.2008 17:16:05

Conducted Spurious emissions 20 GHz to 25 GHz – 2402MHz 1Mb/s



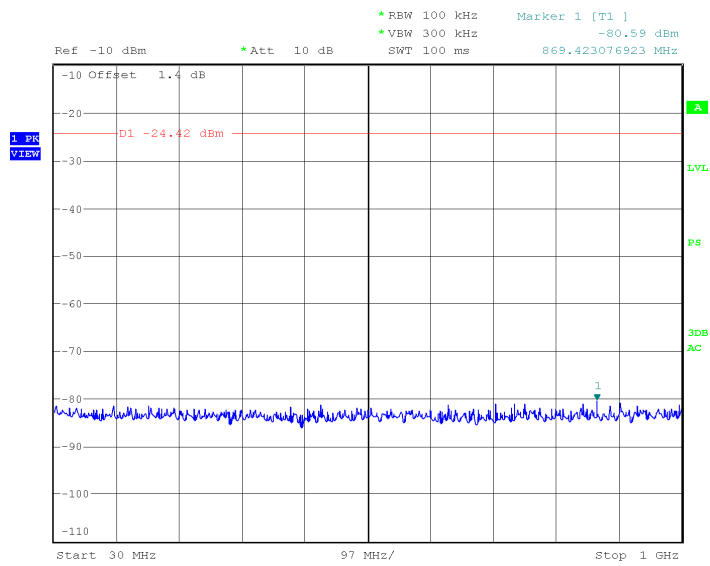
jivvw  
Date: 10.DEC.2008 17:00:55

Conducted Spurious emissions 9 kHz to 150 kHz – 2442MHz 1Mb/s



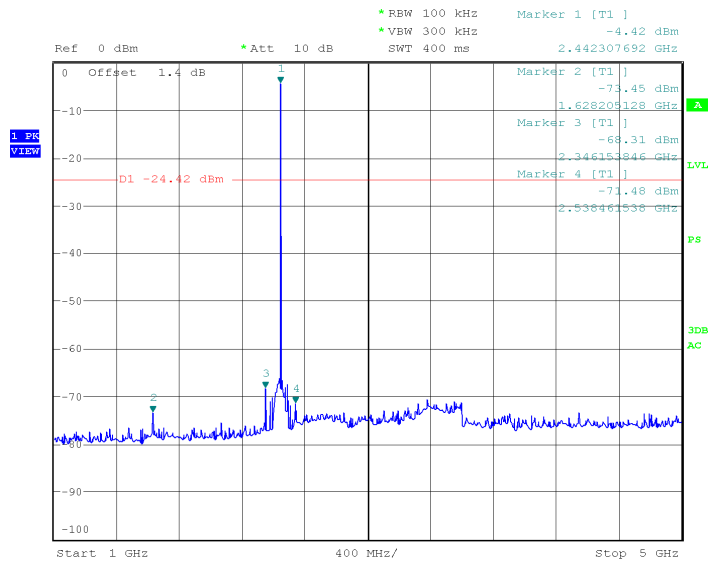
jivvw  
 Date: 10.DEC.2008 17:01:30

Conducted Spurious emissions 150 kHz to 30 MHz – 2442MHz 1Mb/s



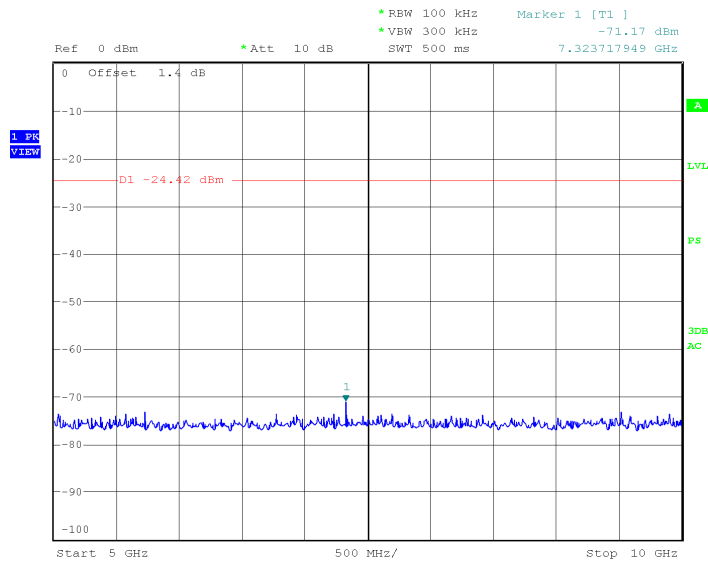
jivvw  
 Date: 10.DEC.2008 17:02:34

Conducted Spurious emissions 30 MHz to 1 GHz – 2442MHz 1Mb/s



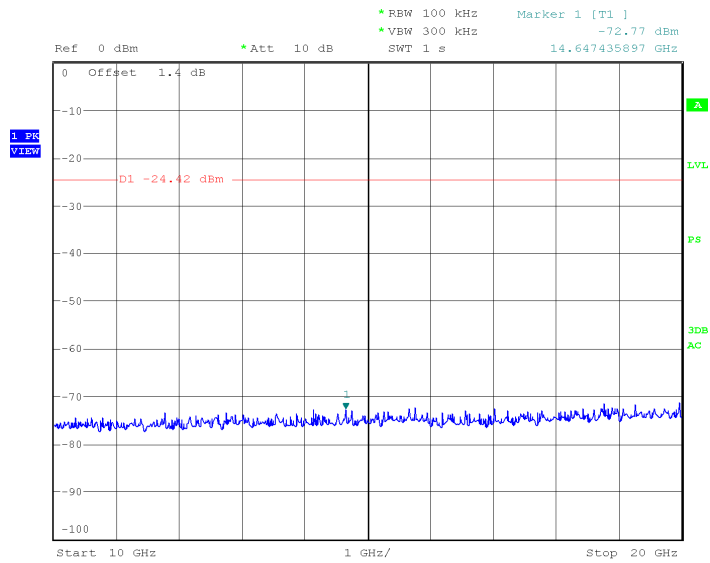
jivvw  
 Date: 10.DEC.2008 16:53:18

Conducted Spurious emissions 1 GHz to 5 GHz – 2442MHz 1Mb/s



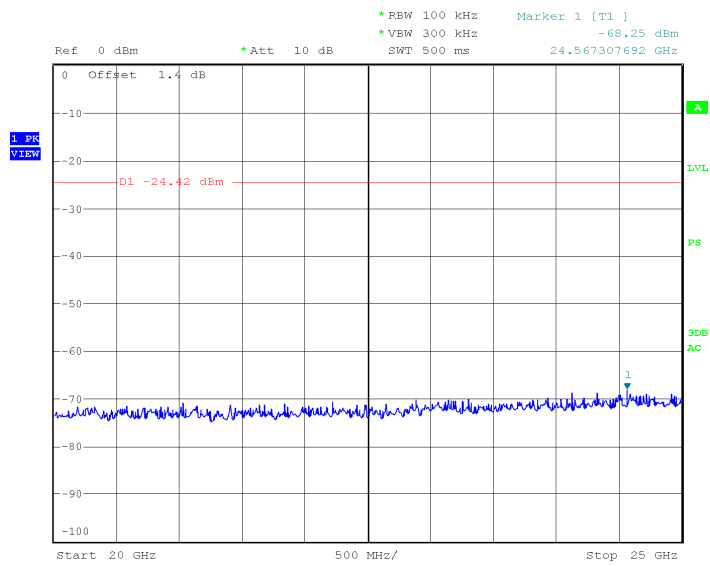
jivvw  
 Date: 10.DEC.2008 16:56:58

Conducted Spurious emissions 5 GHz to 10 GHz – 2442MHz 1Mb/s



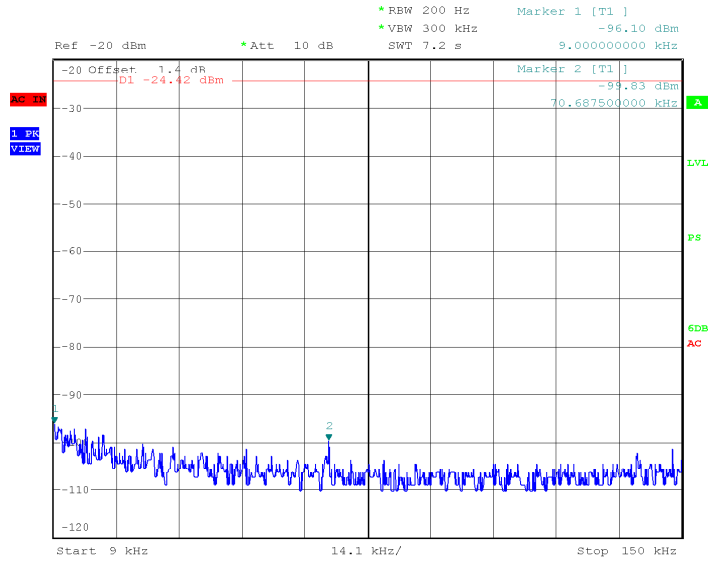
jivvw  
 Date: 10.DEC.2008 16:57:50

Conducted Spurious emissions 10 GHz to 20 GHz – 2442MHz 1Mb/s



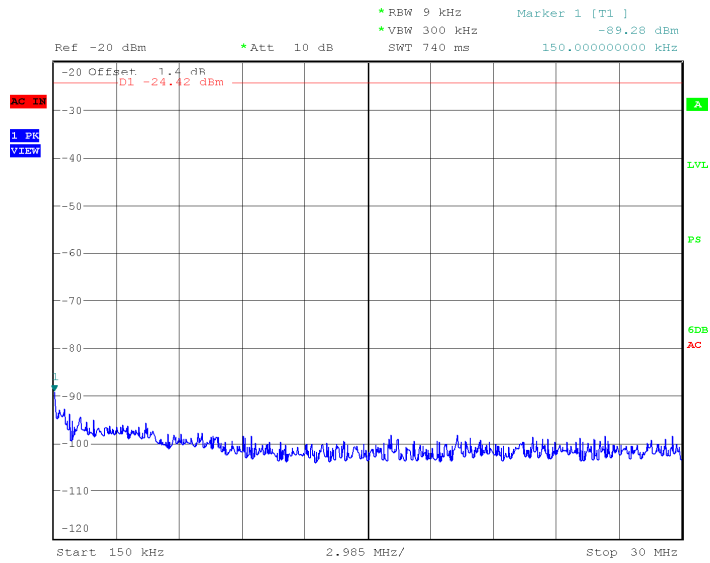
jivvw  
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Conducted Spurious emissions 20 GHz to 25 GHz – 2442MHz 1Mb/s



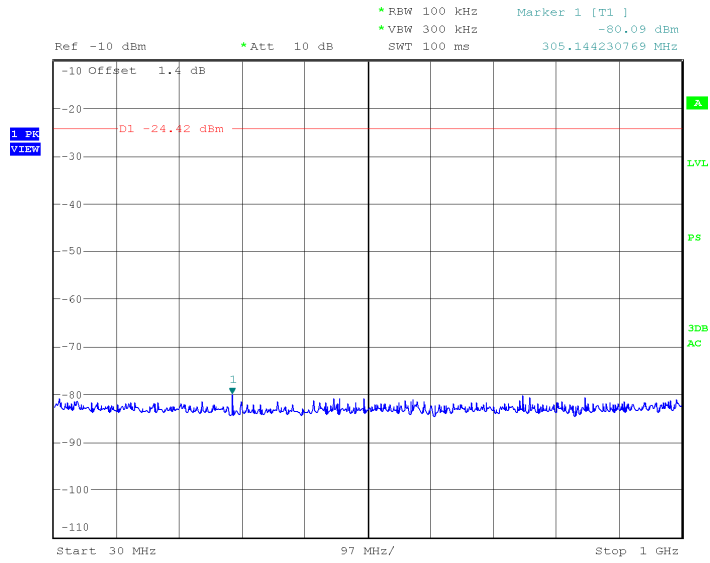
jivvw  
 Date: 10.DEC.2008 17:25:35

Conducted Spurious emissions 9 kHz to 150 kHz – 2480MHz 1Mb/s



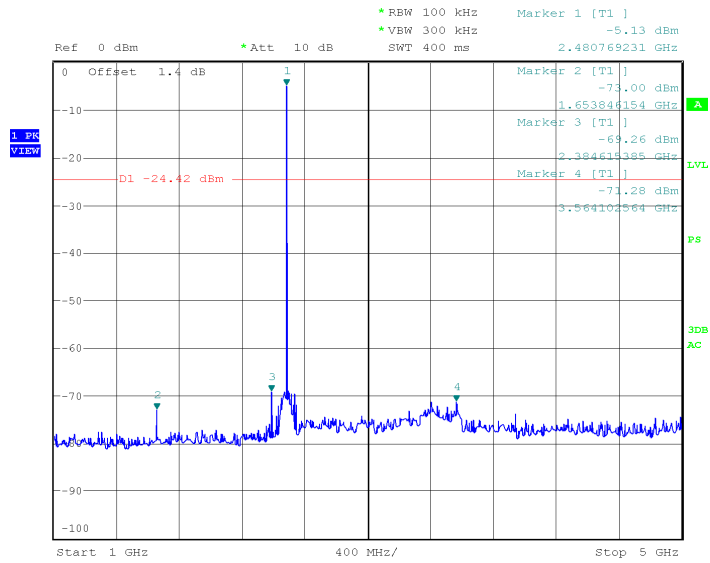
jivvw  
 Date: 10.DEC.2008 17:26:33

Conducted Spurious emissions 150 kHz to 30 MHz – 2480MHz 1Mb/s



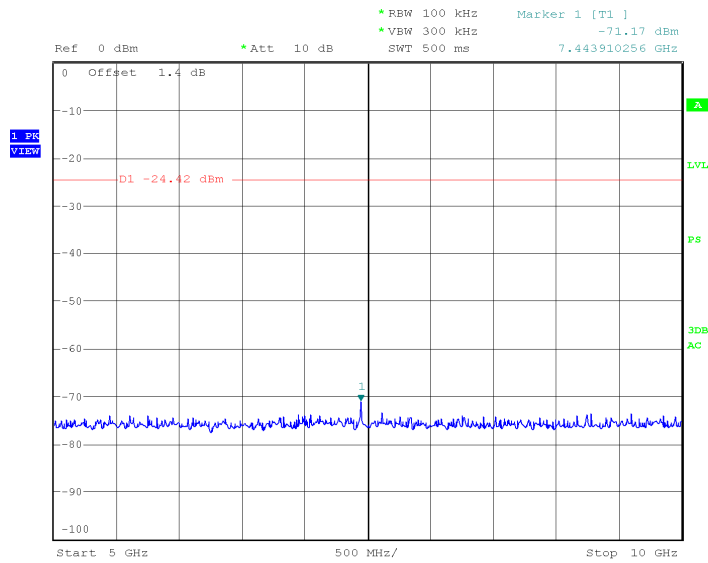
jivvw  
 Date: 10.DEC.2008 17:27:50

Conducted Spurious emissions 30 MHz to 1 GHz – 2480MHz 1Mb/s



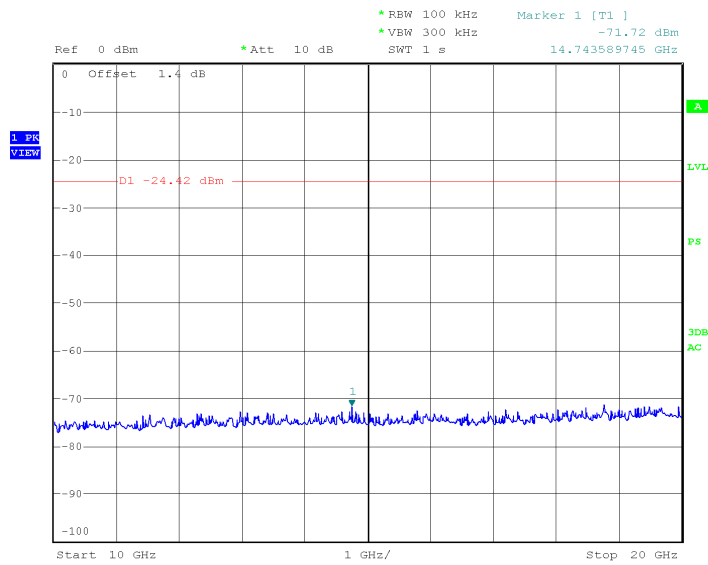
jivvw  
 Date: 10.DEC.2008 17:28:48

Conducted Spurious emissions 1 GHz to 5 GHz – 2480MHz 1Mb/s



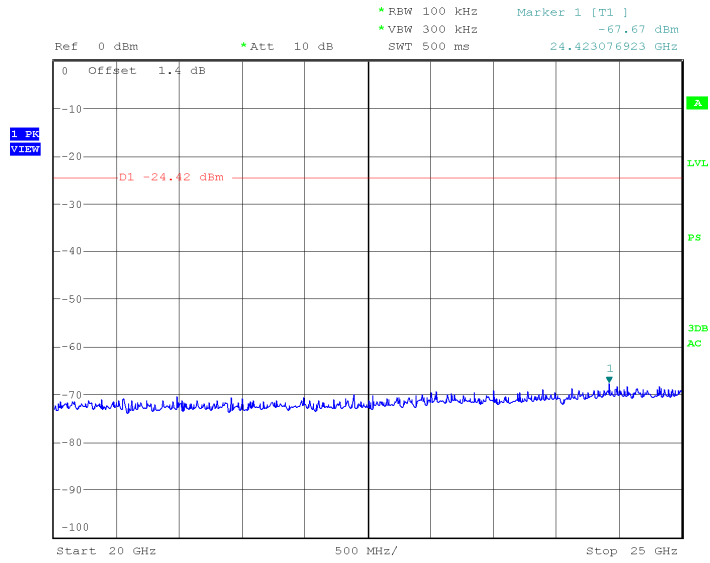
jivvw  
 Date: 10.DEC.2008 17:30:07

Conducted Spurious emissions 5 GHz to 10 GHz– 2480MHz 1Mb/s



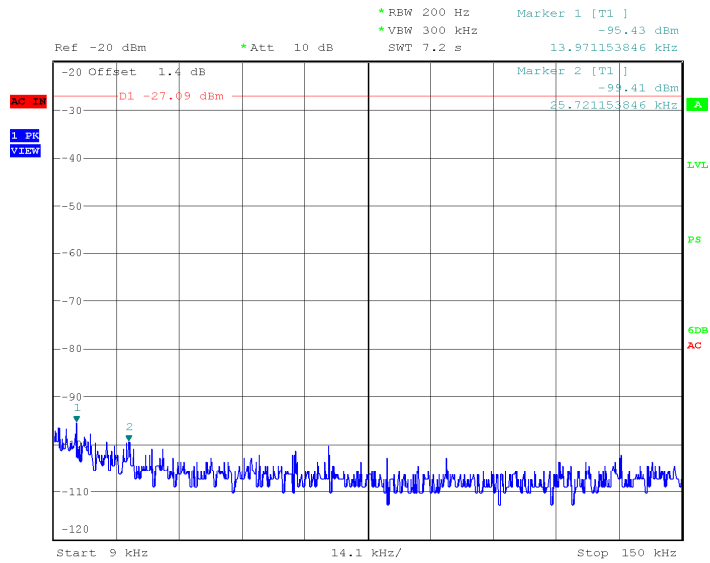
jivvw  
 Date: 10.DEC.2008 17:31:29

Conducted Spurious emissions 10 GHz to 20 GHz– 2480MHz 1Mb/s



jivvw  
 Date: 10.DEC.2008 17:32:02

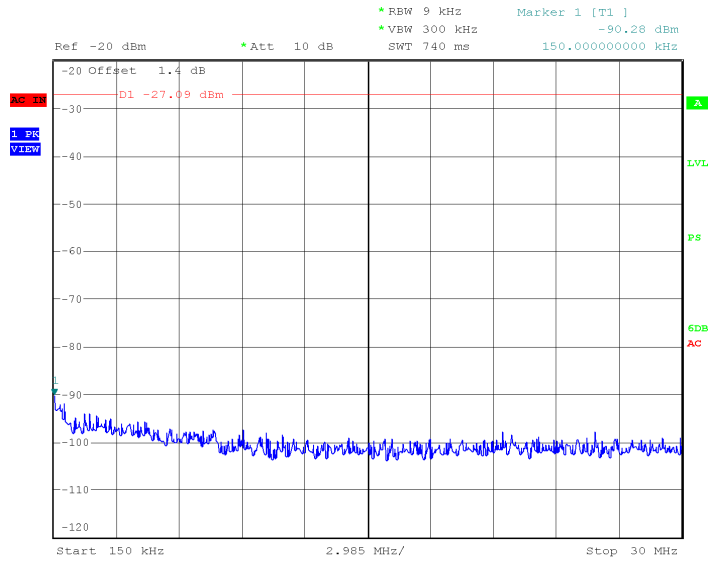
Conducted Spurious emissions 20 GHz to 25 GHz– 2480MHz 1Mb/s



jivvw  
 Date: 10.DEC.2008 15:45:27

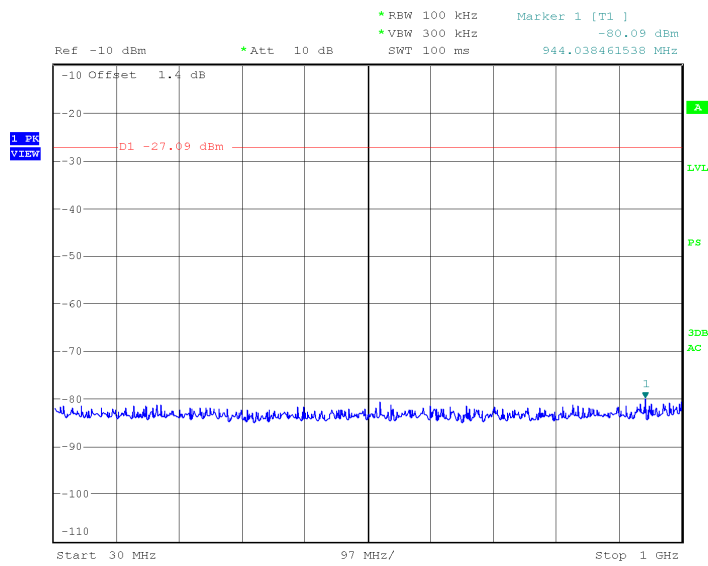
Conducted Spurious emissions 9 kHz to 150 kHz– 2402MHz 2Mb/s





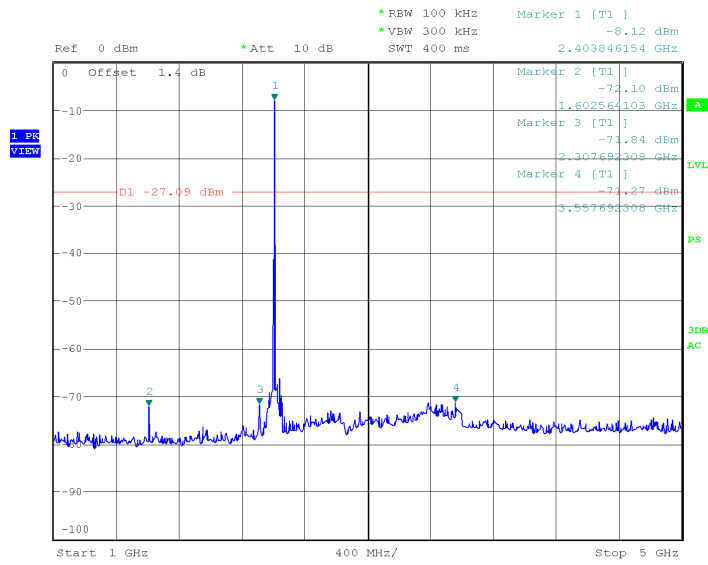
jivvw  
 Date: 10.DEC.2008 15:46:07

Conducted Spurious emissions 150 kHz to 30 MHz– 2402MHz 2Mb/s



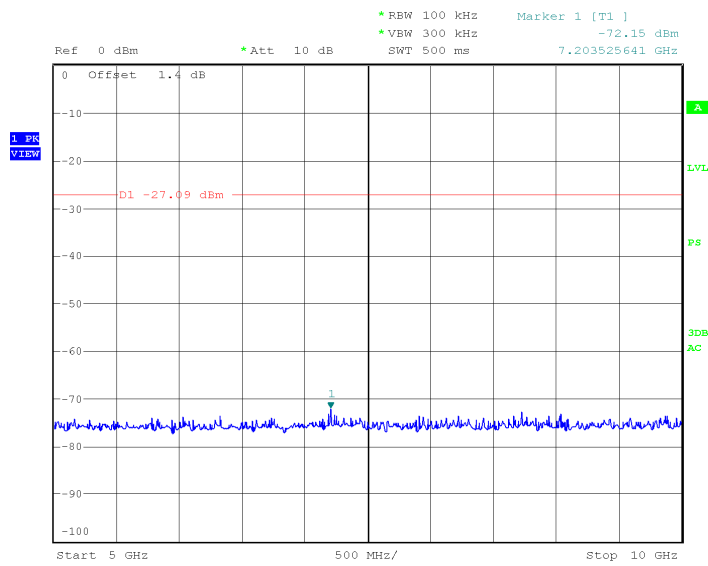
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 Date: 10.DEC.2008 15:47:16

Conducted Spurious emissions 30 MHz to 1 GHz– 2402MHz 2Mb/s



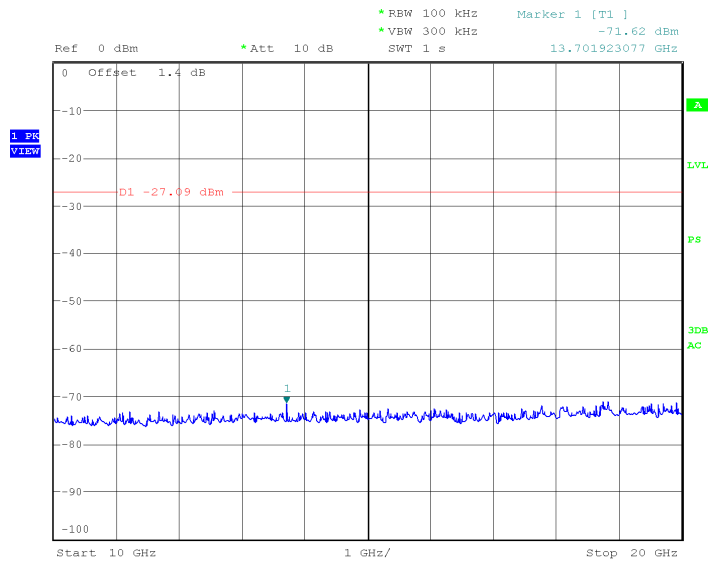
jivvw  
 Date: 10.DEC.2008 15:49:23

Conducted Spurious emissions 1 GHz to 5 GHz– 2402MHz 2Mb/s



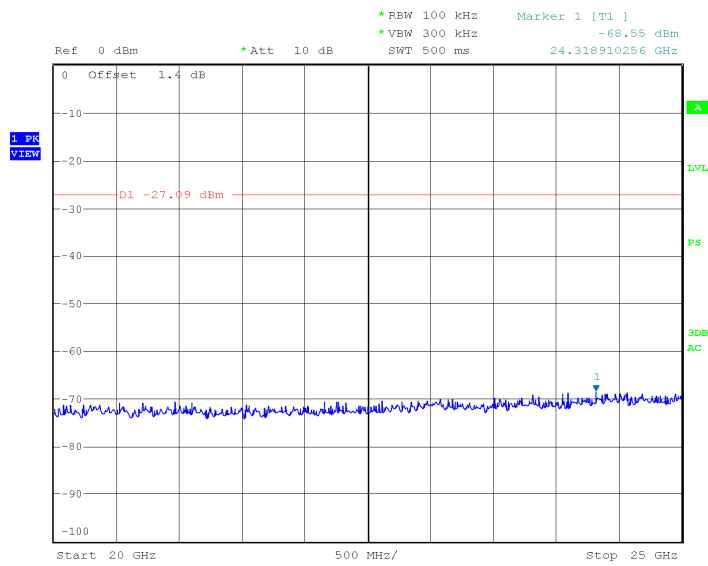
jivvw  
 Date: 10.DEC.2008 15:51:15

Conducted Spurious emissions 5 GHz to 10 GHz– 2402MHz 2Mb/s



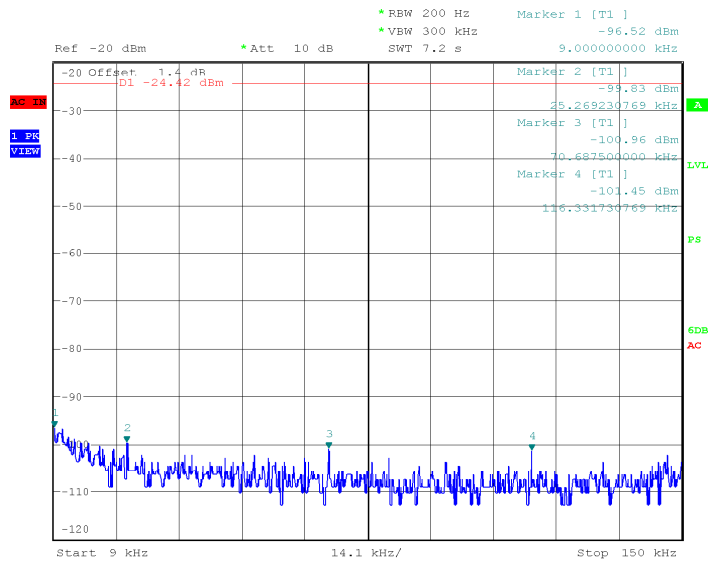
jivvw  
 Date: 10.DEC.2008 15:54:10

Conducted Spurious emissions 10 GHz to 20 GHz– 2402MHz 2Mb/s



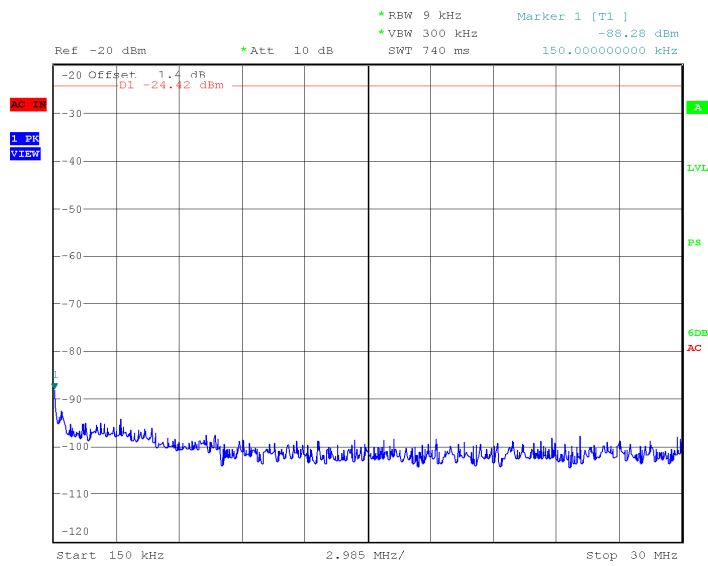
jivvw  
 Date: 10.DEC.2008 15:54:41

Conducted Spurious emissions 20 GHz to 25 GHz– 2402MHz 2Mb/s



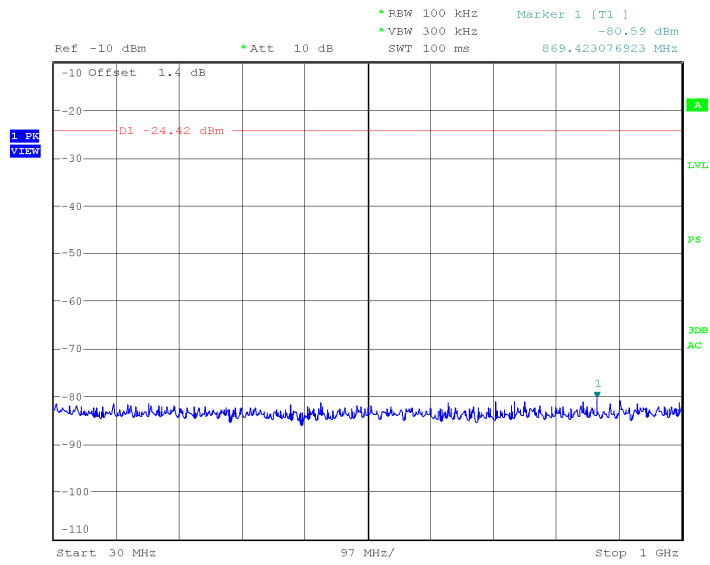
jivvw  
 Date: 10.DEC.2008 17:00:55

Conducted Spurious emissions 9 kHz to 150 kHz– 2442MHz 2Mb/s



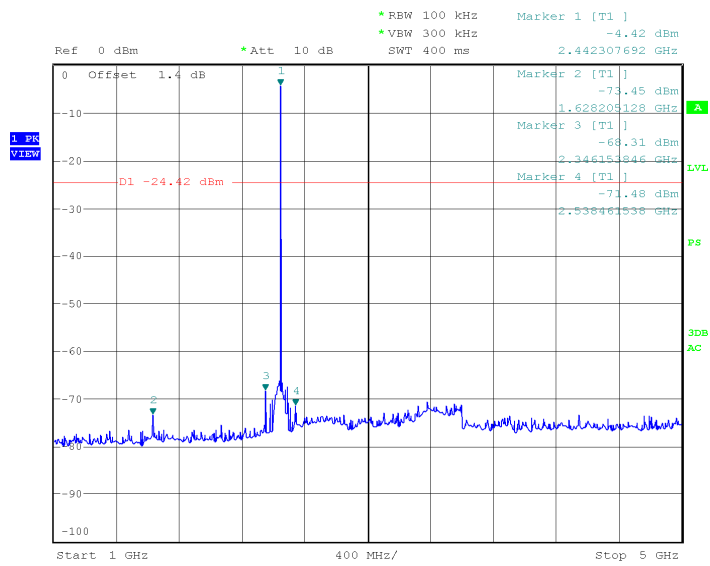
jivvw  
 Date: 10.DEC.2008 17:01:30

Conducted Spurious emissions 150 kHz to 30 MHz– 2442MHz 2Mb/s



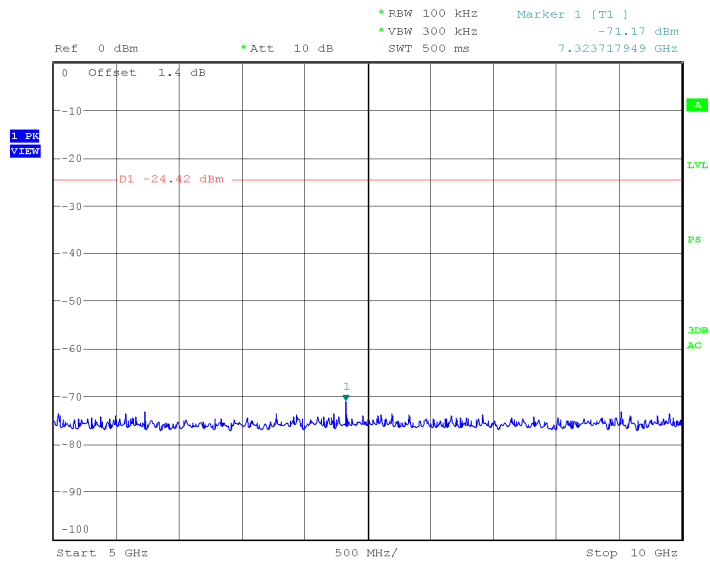
jivvw  
 Date: 10.DEC.2008 17:02:34

Conducted Spurious emissions 30 MHz to 1 GHz– 2442MHz 2Mb/s



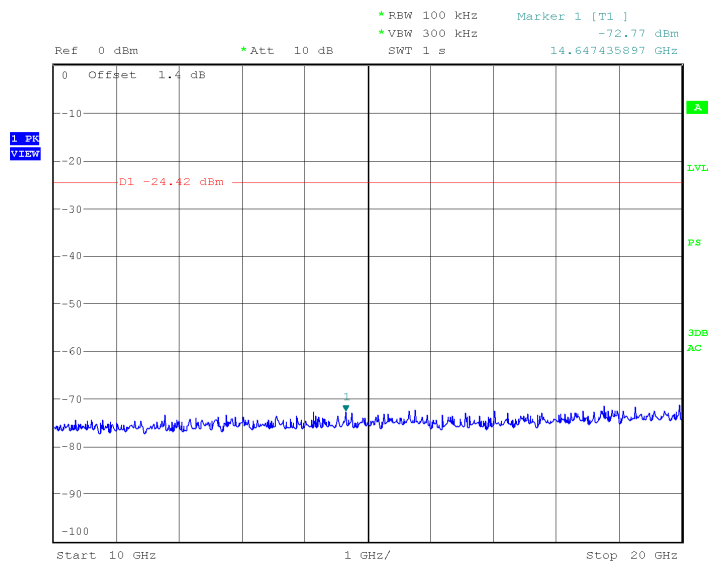
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Conducted Spurious emissions 1 GHz to 5 GHz– 2442MHz 2 Mb/s



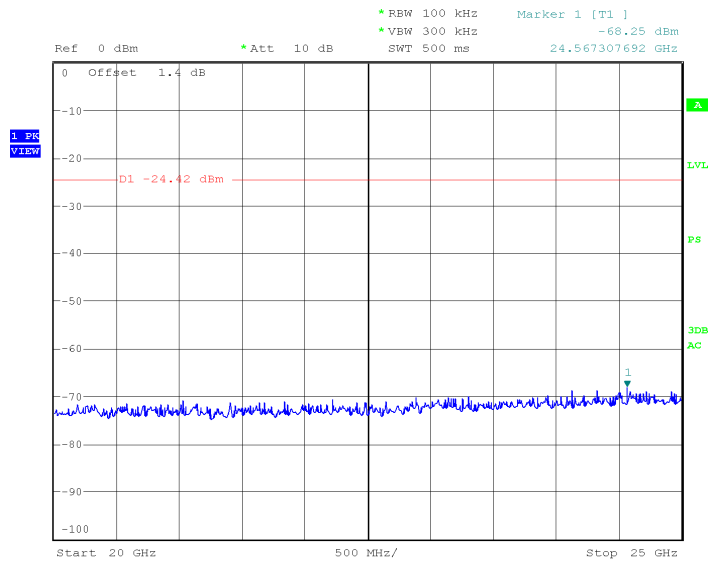
jivvw  
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Conducted Spurious emissions 5 GHz to 10 GHz– 2442MHz 2Mb/s



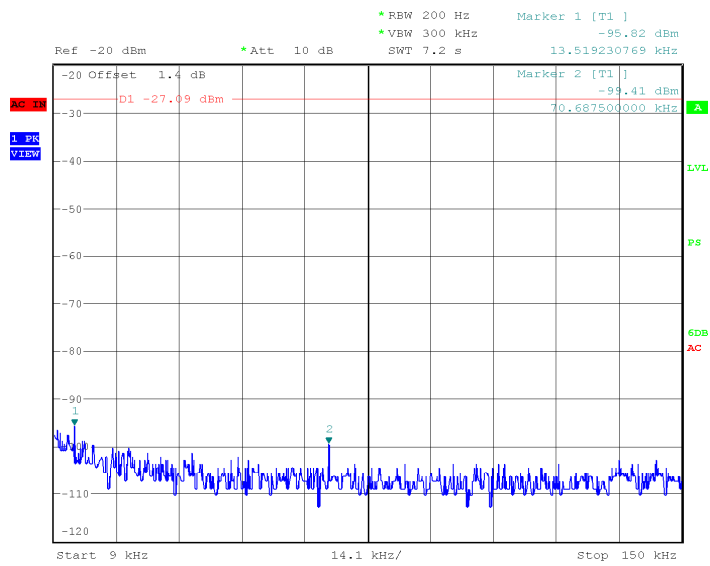
jivvw  
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Conducted Spurious emissions 10 GHz to 20 GHz– 2442MHz 2Mb/s



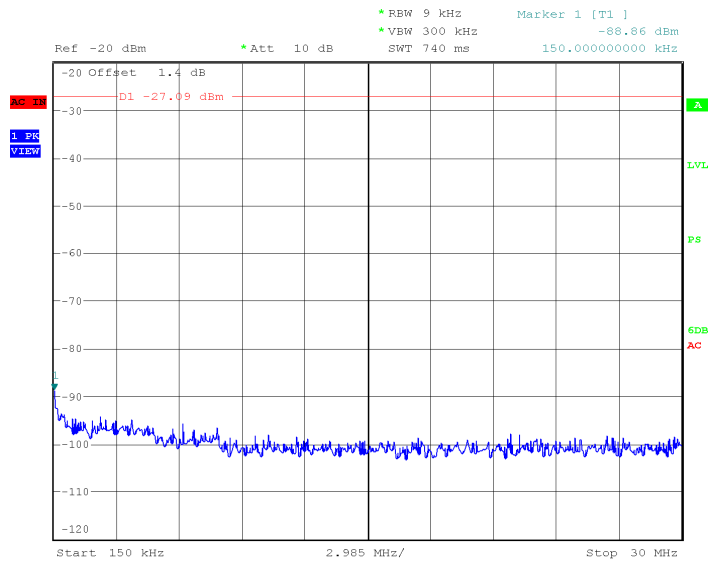
jiVVW  
 Date: 10.DEC.2008 16:58:43

Conducted Spurious emissions 20 GHz to 25 GHz– 2442MHz 2Mb/s



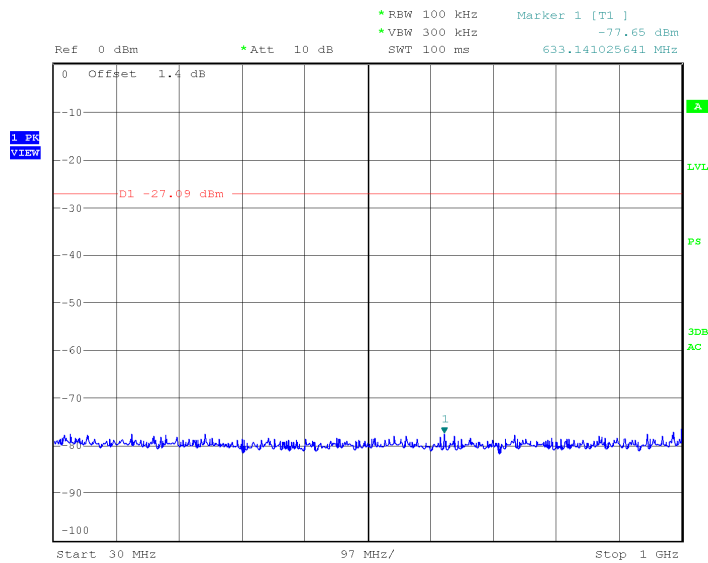
jiVVW  
 Date: 10.DEC.2008 15:09:01

Conducted Spurious emissions 9 kHz to 150 kHz– 2480MHz 2Mb/s



jivvw  
 Date: 10.DEC.2008 15:07:43

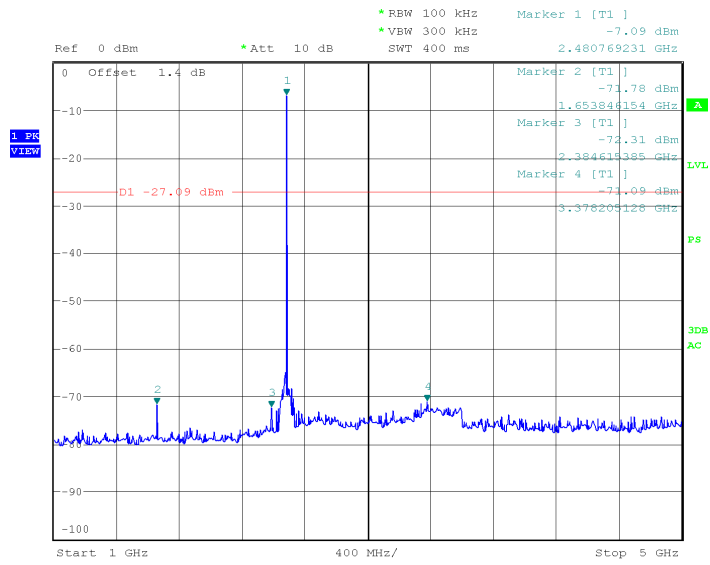
Conducted Spurious emissions 150 kHz to 30 MHz– 2480MHz 2Mb/s



jivvw  
 Date: 10.DEC.2008 15:05:50

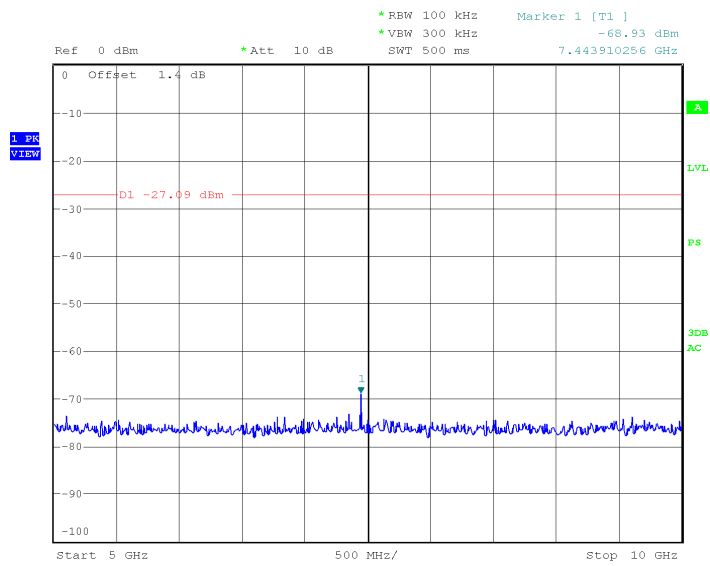
Conducted Spurious emissions 30 MHz to 1 GHz– 2480MHz 2Mb/s





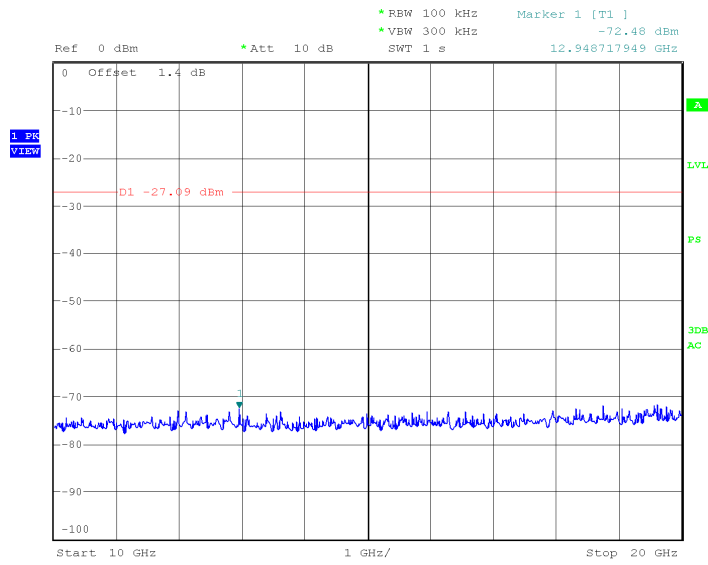
jivvw  
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Conducted Spurious emissions 1 GHz to 5 GHz– 2480MHz 2Mb/s



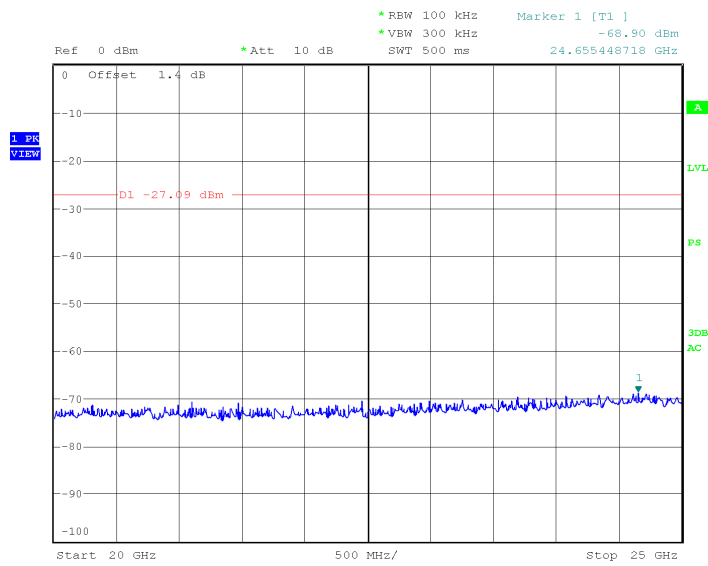
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Conducted Spurious emissions 5 GHz to 10 GHz– 2480MHz 2Mb/s



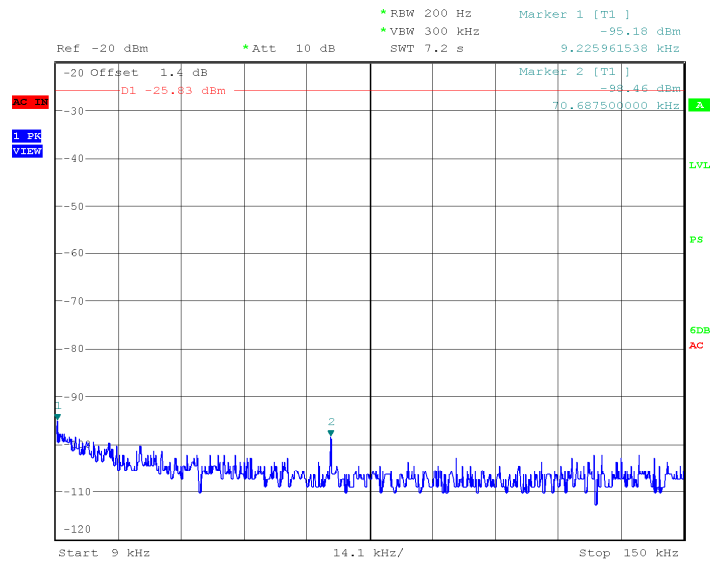
jivvw  
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Conducted Spurious emissions 10 GHz to 20 GHz– 2480MHz 2Mb/s



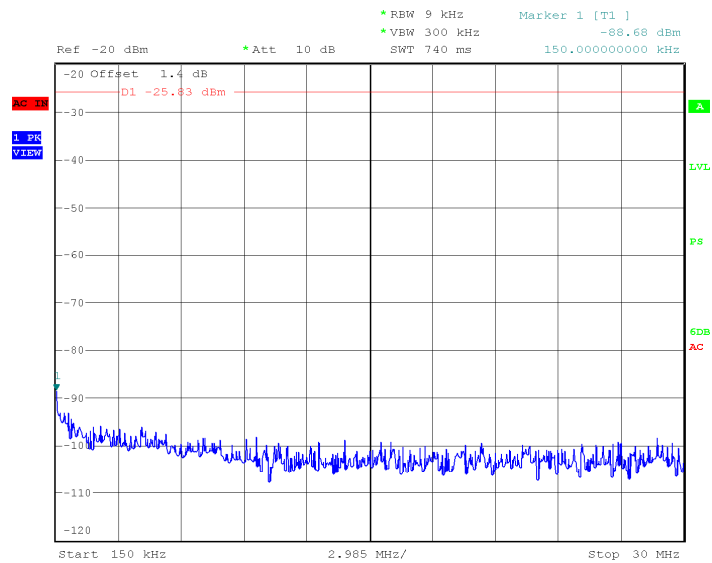
jivvw  
 Date: 10.DEC.2008 15:04:40

Conducted Spurious emissions 20 GHz to 25 GHz– 2480MHz 2Mb/s



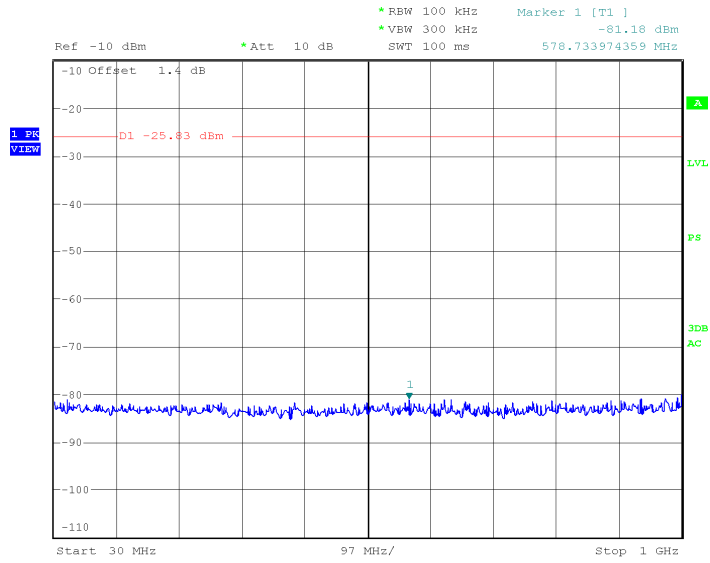
jivvw  
 Date: 10.DEC.2008 13:00:40

Conducted Spurious emissions 9 kHz to 150 kHz– 2402MHz 3Mb/s



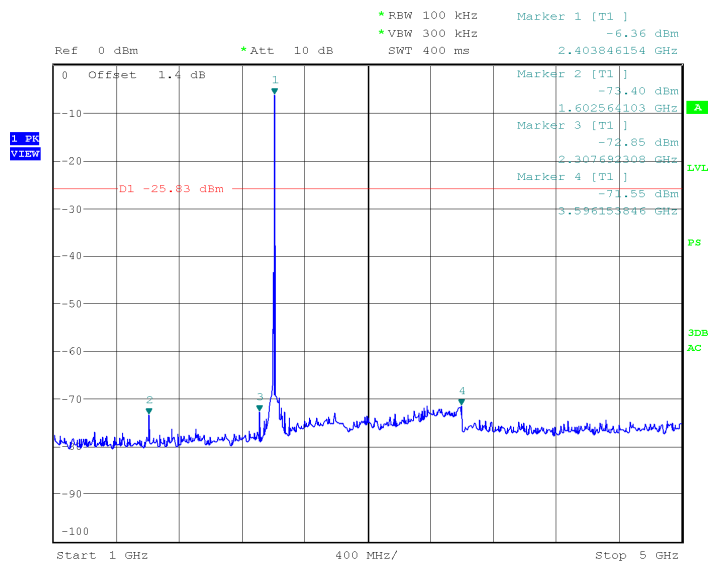
jivvw  
 Date: 10.DEC.2008 13:01:27

Conducted Spurious emissions 150 kHz to 30 MHz– 2402MHz 3Mb/s



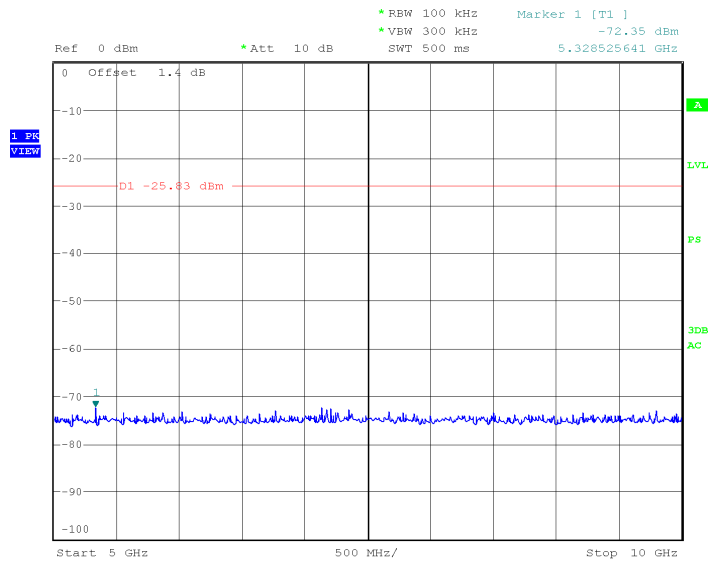
jivvw  
 Date: 10.DEC.2008 13:03:51

Conducted Spurious emissions 30 MHz to 1 GHz– 2402MHz 3Mb/s



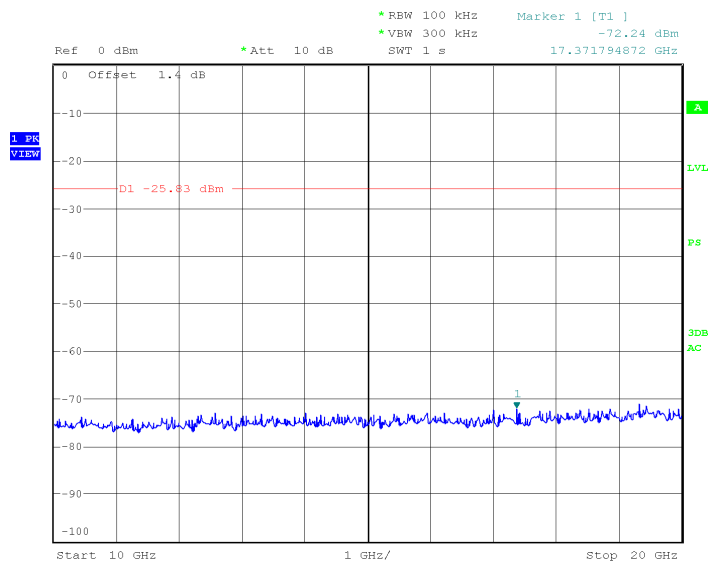
jivvw  
 Date: 10.DEC.2008 13:06:27

Conducted Spurious emissions 1 GHz to 5 GHz– 2402MHz 3Mb/s



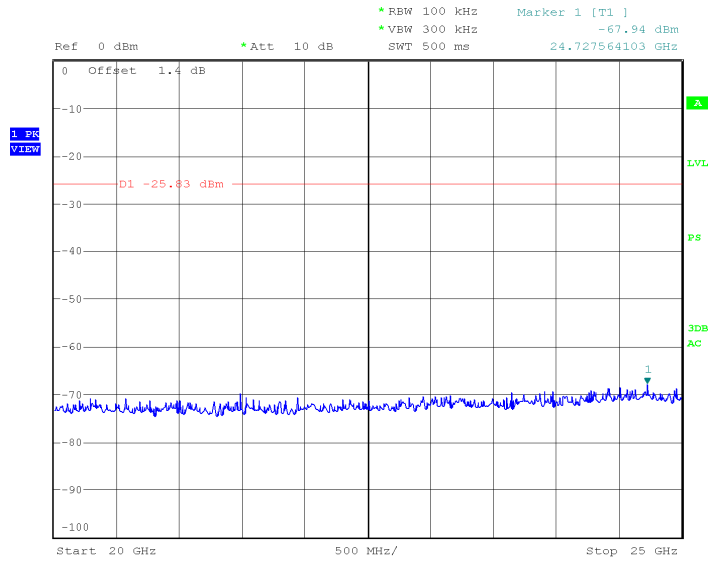
jivvw  
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Conducted Spurious emissions 5 GHz to 10 GHz– 2402MHz 3Mb/s



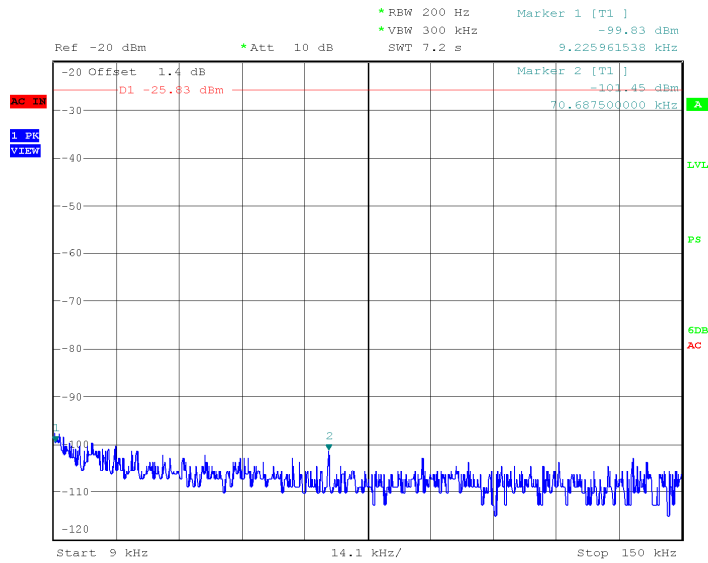
jivvw  
 Date: 10.DEC.2008 13:08:32

Conducted Spurious emissions 10 GHz to 20 GHz– 2402MHz 3Mb/s



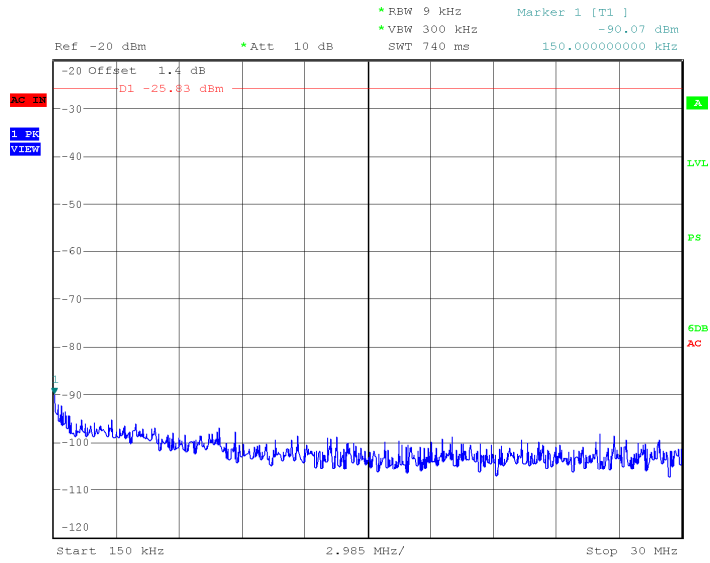
jivvw  
 Date: 10.DEC.2008 13:10:00

Conducted Spurious emissions 20 GHz to 25 GHz– 2402MHz 3Mb/s



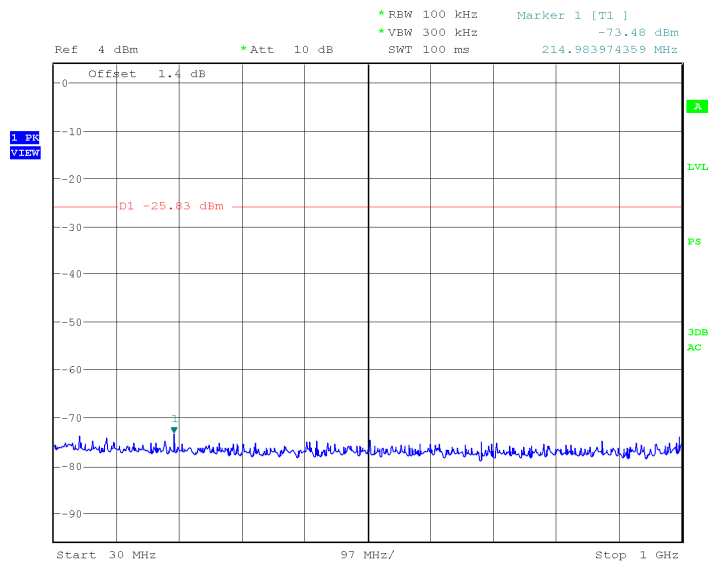
jivvw  
 Date: 10.DEC.2008 12:52:39

Conducted Spurious emissions 9 kHz to 150 kHz– 2442MHz 3Mb/s



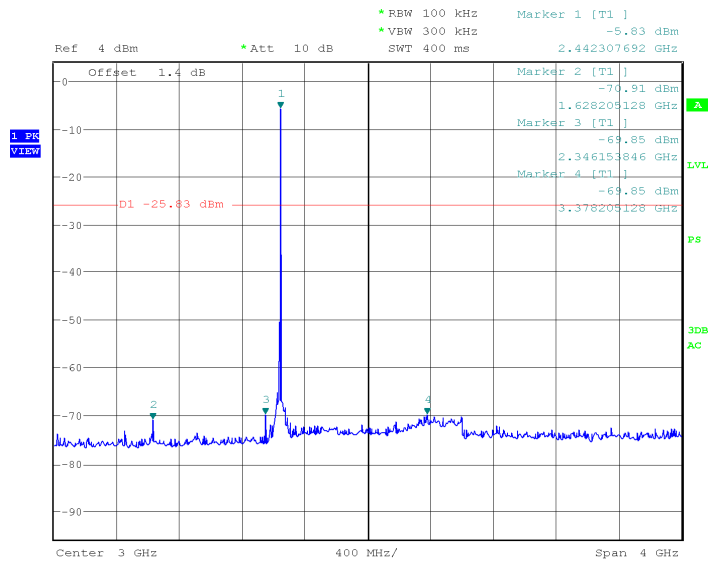
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Conducted Spurious emissions 150 kHz to 30 MHz– 2442MHz 3Mb/s



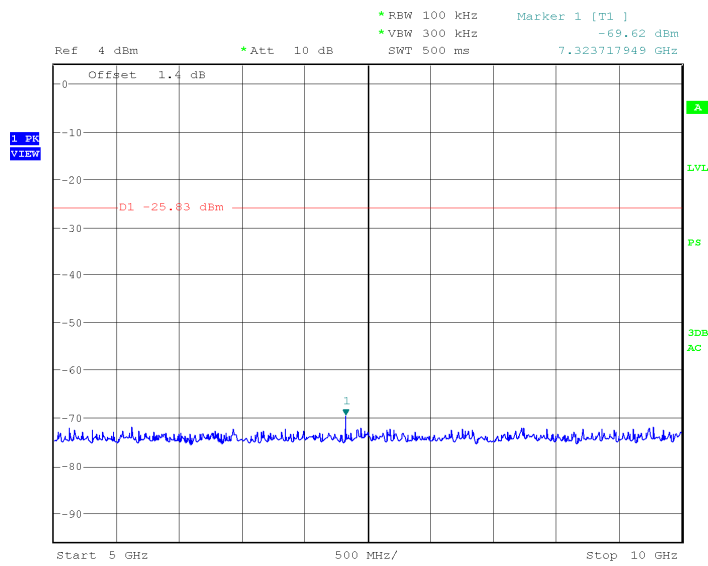
jivvw  
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Conducted Spurious emissions 30 MHz to 1 GHz– 2442MHz 3Mb/s



jivvw  
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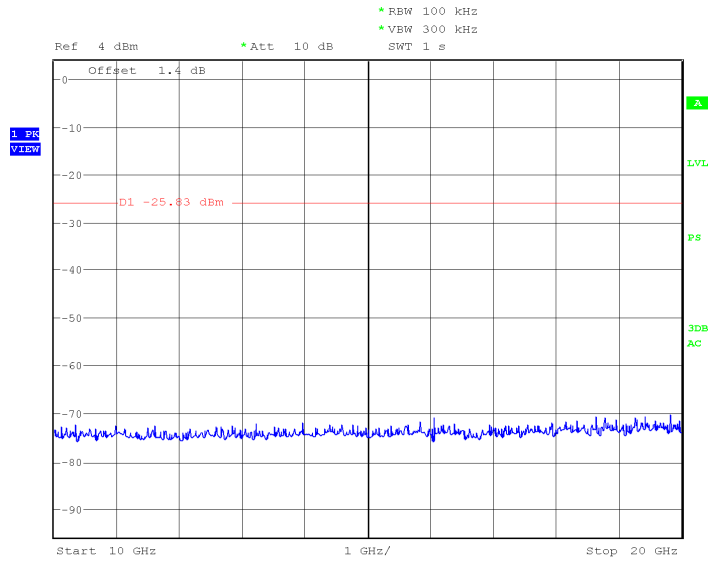
Conducted Spurious emissions 1 GHz to 5 GHz– 2442MHz 3Mb/s



jivvw  
 Date: 10.DEC.2008 12:43:24

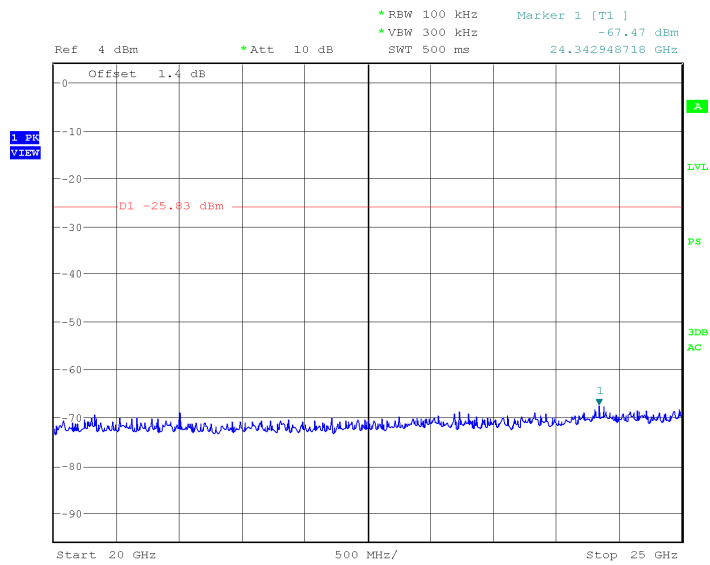
Conducted Spurious emissions 5 GHz to 10 GHz– 2442MHz 3Mb/s





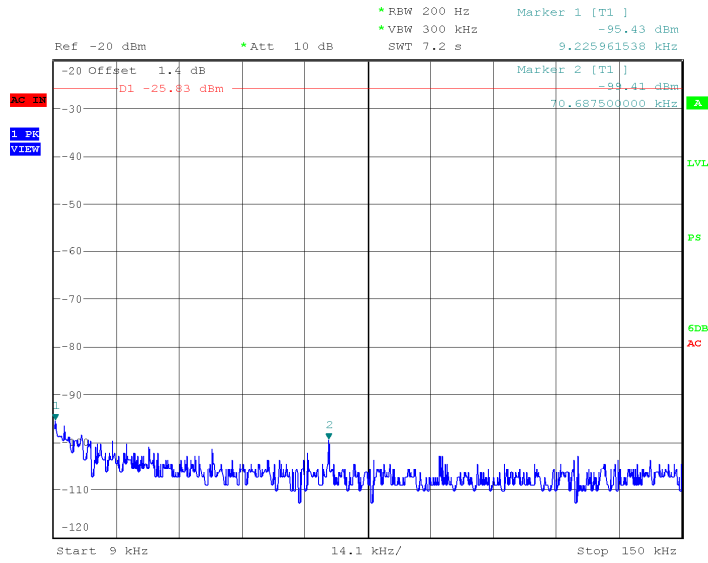
jivvw  
Date: 10.DEC.2008 12:44:33

Conducted Spurious emissions 10 GHz to 20 GHz– 2442MHz 3Mb/s



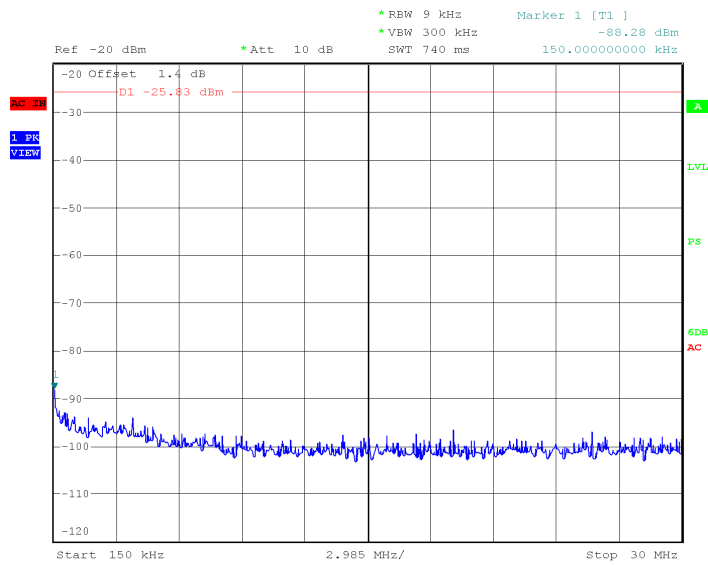
jivvw  
Date: 10.DEC.2008 12:45:25

Conducted Spurious emissions 20 GHz to 25 GHz– 2442MHz 3Mb/s



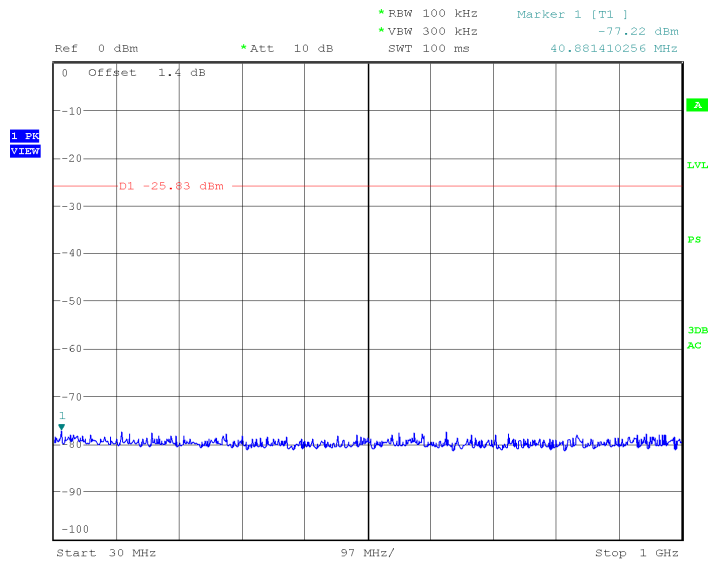
jivvw  
 Date: 10.DEC.2008 13:30:06

Conducted Spurious emissions 9 kHz to 150 kHz– 2480MHz 3Mb/s



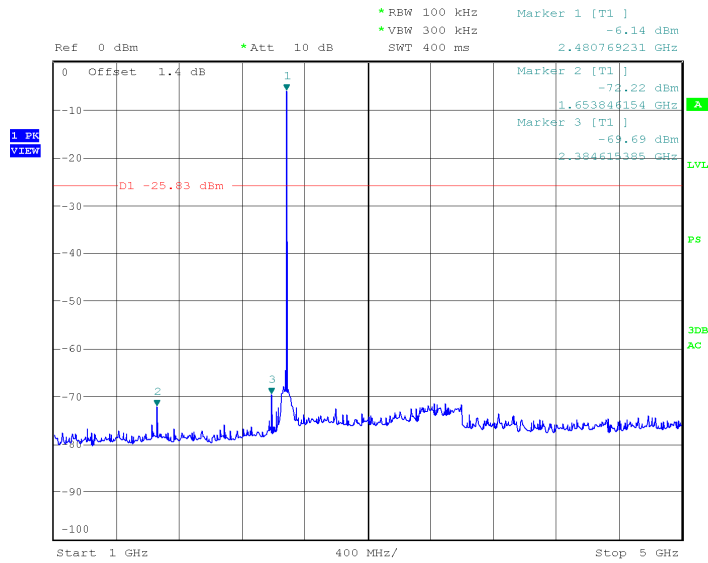
jivvw  
 Date: 10.DEC.2008 13:28:41

Conducted Spurious emissions 150 kHz to 30 MHz– 2480MHz 3Mb/s



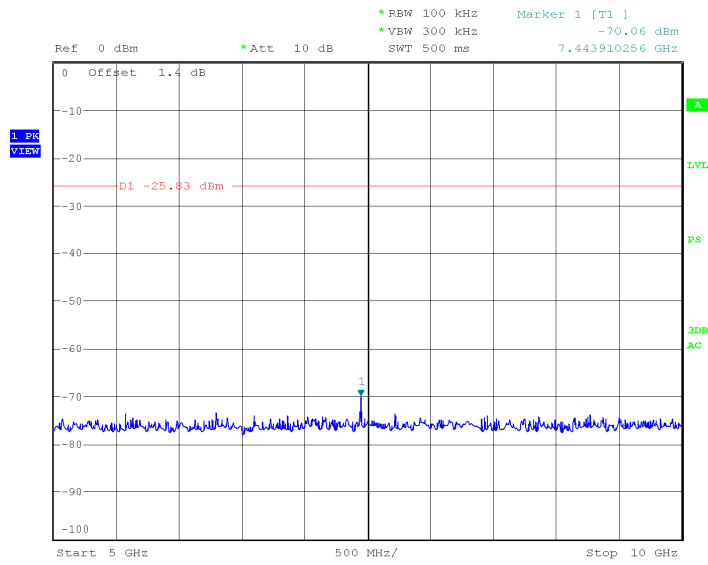
jivvw  
 Date: 10.DEC.2008 13:26:14

Conducted Spurious emissions 30 MHz to 1 GHz– 2480MHz 3Mb/s



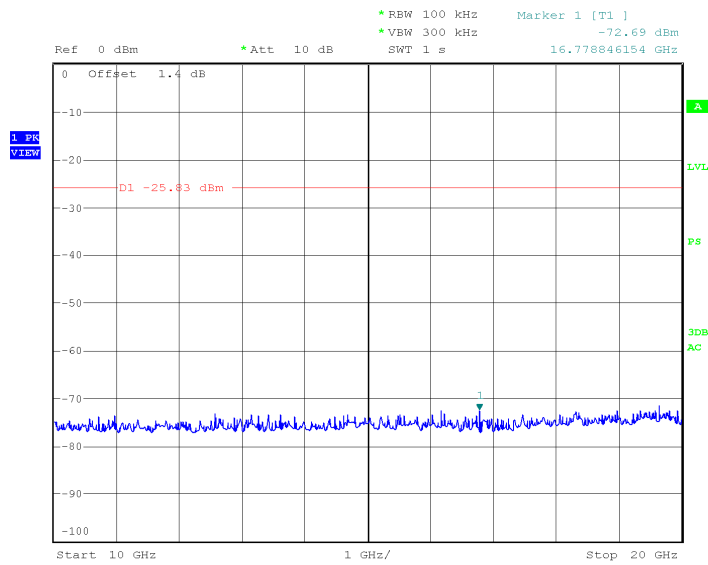
jivvw  
 Date: 10.DEC.2008 13:24:40

Conducted Spurious emissions 1 GHz to 5 GHz– 2480MHz 3Mb/s



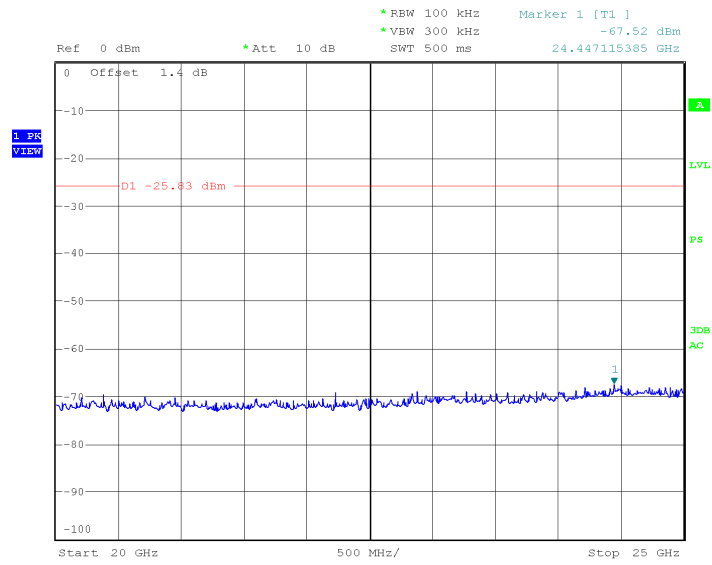
jivvw  
 Date: 10.DEC.2008 13:23:55

Conducted Spurious emissions 5 GHz to 10 GHz– 2480MHz 3Mb/s



jivvw  
 Date: 10.DEC.2008 13:22:29

Conducted Spurious emissions 10 GHz to 20 GHz– 2480MHz 3Mb/s



jivvw  
Date: 10.DEC.2008 13:21:17

Conducted Spurious emissions 20 GHz to 25 GHz– 2480MHz 3Mb/s

**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 KTL upon request.

**C1) Test samples**

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

Sample No.	Description	Identification
S25	IP Telephone 9670G	S/N: 08N 539103931

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

Sample No.	Description	Identification
S09	AVAYA 1152A1 POE Switch	104126824006564

The following samples of apparatus were supplied by KTL as support or drive equipment (auxiliary equipment):

KTL Identification	Description
REF838	Agilent N4010A Bluetooth Test Set
REF1270	VARIAC

**C2) EUT Operating Mode During Testing.**

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

Test	Description of Operating Mode
All tests detailed in this report	The EUT was powered by a POE switch (S09). The EUT was transmitting on maximum power using FHSS over 79 channels with 1 MHz channel spacing using DH5 packets with the following modulations:  1 Mb/s GFSK 2Mb/s $\pi/4$ -DQPSK 3Mb/s 8DPSK

In addition

Test	Description of Operating Mode:
Spurious emissions (radiated and conducted)	The EUT was powered by a POE switch (S09). The EUT active, but non-transmitting.



**C3) EUT Configuration Information.**

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

**C4) List of EUT Ports**

The table below describes the termination of EUT ports:

Sample : S25  
Tests : All

Port	Description of Cable Attached	Cable length	Equipment Connected
PC	Cat 5e STP (POE)	>3m	S09
Ethernet	None	N/A	None
None	N/A	None	None
MOD	Multi core Unscreened	2m	EMC Laptop*
Headset	None	N/A	None
Handset	None	N/A	None
Adaptor interface	None	N/A	None

\* Only connected during setup.

**C5 Details of Equipment Used**

For Radiated Electric Field Emissions 30MHz to 1GHz: (Restricted band 15.205)

RFG No	Type	Description	Manufacturer	Date Calibrated.
274	ATS	Ferrite Lined Chamber	KTL	29/02/08
231	CBL6111	Blue Bilog Antenna (0.03 - 1GHz)	Chase	12/08/08
214	ESAI	Spec Analyser/Test Rxer (LF/HF)	R & S	22/01/08
404	E4407B	Spectrum Analyser	Agilent	07/04/08
127	HP8563E	Spectrum Analyser	HP	17/03/08
REF847	ESU	EMI Test Receiver (Spectrum analyser)	R&S	29/02/08
REF837	PSA E4440A	Spectrum Analyser	Agilent	21/02/08
REF847	ESU	EMI Test Receiver (Spectrum analyser)	R&S	29/02/08
267	N-type	RF coaxial cable (Lab 10)	KTL	28/01/08
270	N-type	RF coaxial cable (Lab 10)	KTL	28/01/08
278	N-type	RF coaxial cable (Lab 10)	KTL	28/01/08

For Radiated Electric Field Emissions 1GHz to 18GHz (Restricted band 15.205)

RFG No	Type	Description	Manufacturer	Date Calibrated
274	ATS	Ferrite Lined Chamber	KTL	11/01/08
129	3115	Horn Antennas	EMCO	29/07/98
130	3115	Horn Antennas	EMCO	29/07/98
307	HP8449B	Microwave Pre-Amp (1-26.5GHz)	HP	18/02/08
650	N-106	Sucoflex uW Cable 3m	Suhner	14/07/08
651	N-106	Sucoflex uW Cable 7m	Suhner	14/07/08
643	ST18/Nm/ Nm/48	48 inch Sucoflex cable	Suhner	18/07/08
404	E4407B	Spectrum Analyser	Agilent	07/04/08
127	HP8563E	Spectrum Analyser	HP	17/03/08
REF847	ESU	EMI Test Receiver (Spectrum analyser)	R&S	29/02/08
REF837	PSA E4440A	Spectrum Analyser	Agilent	21/02/08
244	4478	Bandstop Filter	BSC	N/A (Cal during use)

**Details of Equipment Used Continued:**

For Radiated Electric Field Emissions 18GHz to 26GHz (Restricted band 15.205)

RFG No	Type	Description	Manufacturer	Date Calibrated
274	Lab 10	Large anechoic chamber	KTL	N/A
629	QSH20S20S	Horn antenna	Q-par	02/11/06
630	QSH20S20S	Horn antenna	Q-par	02/11/06
476	60637	50Ω Coax 3m	Semflex	14/04/08
477	60637	50Ω Coax 3m	Semflex	14/04/08
307	8449B	Microwave pre amp	HP	18/02/08
404	E4407B	Spectrum analyser	Agilent	07/04/08
127	HP8563E	Spectrum Analyser	HP	17/03/08
REF847	ESU	EMI Test Receiver (Spectrum analyser)	R&S	29/02/08
REF837	PSA E4440A	Spectrum Analyser	Agilent	21/02/08
138	N-104	Sucoflex uW Cable 2m	Suhner	28/03/07
158	N-106	Sucoflex uW Cable 7m	Suhner	28/03/07
244	4478	Bandstop Filter	BSC	N/A (Cal during use)

For Conducted Emissions

RFG No	Type	Description	Manufacturer	Date Calibrated
404	E4407B	Spectrum Analyser	Agilent	07/04/08
127	HP8563E	Spectrum Analyser	HP	17/03/08
REF847	ESU	EMI Test Receiver (Spectrum analyser)	R&S	29/02/08
REF837	PSA E4440A	Spectrum Analyser	Agilent	21/02/08
244	4478	Bandstop Filter	BSC	N/A (Cal during use)

For Conducted RF power

RFG No	Type	Description	Manufacturer	Date Calibrated
404	E4407B	Spectrum Analyser	Agilent	07/04/08
127	HP8563E	Spectrum Analyser	HP	17/03/08
REF837	PSA E4440A	Spectrum Analyser	Agilent	21/02/08
REF847	ESU	EMI Test Receiver (Spectrum analyser)	R&S	29/02/08
REF 835/836	N1922A & N1911A	Power head and meter	Agilent	08/02/08
031	436A	Power Meter	HP	10/04/08
032	8482A	Power Head (-20 to +20dBm)	HP	10/04/08
171	8481D	Power Head (-20 to -70dBm)	HP	10/04/08
REF470	45	Dual multi-meter	Fluke	21/10/08
REF1270	Variable	VARIAC	KTL	N/A

## Appendix D:

## Additional Information

The following additional information was supplied by the client to support this assessment:

Extract from Antenna Manufacturer's data sheet detailing antenna gain



**PRODUCT: BLUETOOTH®**

Part No. M830300

### Savvi™ Embedded Bluetooth Antennas

2.4–2.5 GHz



Ethertronics' Savvi series of Isolated Magnetic Dipole™ (IMD) antennas deliver on the key needs of device designers for higher functionality and performance in smaller/thinner designs. These innovative antennas provide compelling advantages for Bluetooth enabled cell phones, media players and other mobile devices.





**KEY BENEFITS**

---

**DESIGN ADVANTAGES**

**Best in Class Performance—Smallest Occupied Volume**

- Powerful combination of 85% peak efficiency and simple implementation guidelines.
- Minimal ground clearance and component “keep out” areas. Very low component height.
- High selectivity eliminates the cost for additional filters and frees up board space

**High Tolerance to Frequency Shifts**

- IMD's high RF isolation resists antenna detuning that otherwise can impair reception.
- Single part works for various PCB sizes and layouts.

**Quicker Time-to-Market**

- Fewer design modifications required to pass RF test suite.
- Simpler implementation—no matching networks.

**RoHS Compliant**

- Antennas comply with appropriate RoHS Directives.

**TECHNOLOGY ADVANTAGES**

**Real-World Performance and Implementation**

Ceramic antennas may look alike on the outside, but the important difference is inside. Other antennas may contain simple PIFA or monopole designs that interact with their surroundings, complicating layout or changing performance with use position. Ethertronics' antennas utilize patented IMD technology to deliver a unique size and performance combination.



**Stays in Tune**

High RF isolation means IMD antennas resist detuning regardless of usage position. And one standardized part can typically be placed in a variety of locations.

**Smallest Effective Size**

IMD antennas require a smaller keep-out area for surrounding components, leading to a smaller effective size.

**High Performance**

IMD's high efficiency and simple design rules lower development risk and speed time-to-market without sacrificing performance. Plus, high RF selectivity eliminates the cost and space for band-pass circuitry.

More information is available on our Website at [www.ethertronics.com/resources/](http://www.ethertronics.com/resources/).

**END USER ADVANTAGES**

**Superior Range**

- Greater antenna efficiency means longer range and a better end user experience.

**Exceptional Coverage**

- Better coverage delivers more reliable wireless connections for mobile phones, laptops, stereo headsets, cars, media players, audio systems and more.

**SERVICE AND SUPPORT**

**Extensive RF Experience**

- Our Savvi ceramic antennas are supported by extensive application notes, and when needed, by the expertise of RF engineers who have integrated hundreds of antenna designs into wireless devices.

**Global Operations & Design Support**

- Ethertronics' global operations encompass an integrated network of design centers that provide local customer support.

ETHERTRONICS  
 9605 Scranton Road, Suite 300 | San Diego, CA 92121 - USA | [www.ethertronics.com](http://www.ethertronics.com)  
 tel: +(1) 858.550.3820 | fax: +(1) 858.550.3821 | contact: [info@ethertronics.com](mailto:info@ethertronics.com)

**PRODUCT: Bluetooth® Antenna**

**Ethertronics' Savvi™ Bluetooth Embedded Antenna Specifications**  
 Ethertronics produces a wide variety of standard and custom antennas to meet user needs.  
 Below are the typical specs for a Bluetooth application.

**Electrical Specifications**

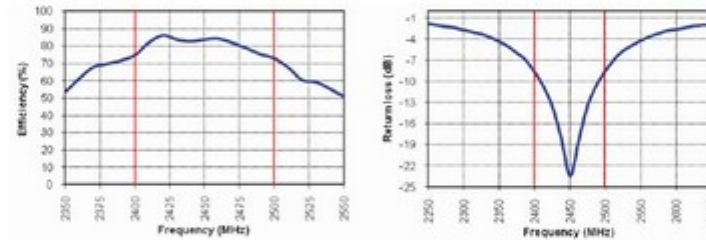
Typical Characteristics  
 (inside an enclosure)

BT Antenna	2.4–2.5 GHz
Average Gain	-1.1 dBi
Average Efficiency	80%
VSWR Match	2.0:1 max
Feed Point Impedance	50 ohms unbalanced
Power Handling	.5 Watt cw
Polarization	Linear

**Mechanical Specifications**

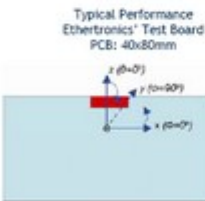
Size	8x3x1.3mm
Mounting	Surface mount
Weight	.2 grams
Packaging	Tape & Reel

**Typical Efficiency, Return Loss**

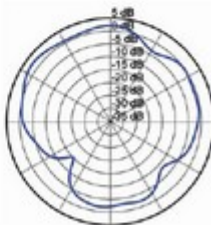


**Antenna Radiation Patterns**

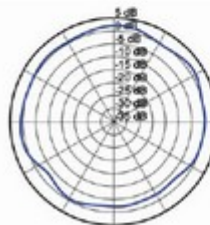
**2.4 GHz Band**



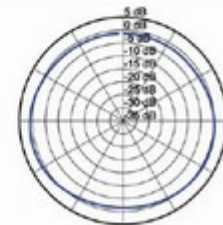
Phi = 0° Plane



Phi = 90° Plane



Theta = 90° Plane



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BT 03-31 RA

**Appendix E: Calculation of the duty cycle correction factor**

Using a spectrum analyser in zero span mode, centred on the fundamental carrier frequency with a RBW of 1MHz and a video Bandwidth of 1MHz the sweep time was set accordingly to capture the pulse train. The transmit pulsewidths and period was measured. A plots of the pulse train is contained in Appendix B of this test report.

If the pulse train was less than 100 ms, including blanking intervals, the duty cycle was calculated by averaging the sum of the pulsewidths over one complete pulse train. However if the pulse train exceeds 100ms then the duty cycle was calculated by averaging the sum of the pulsewidths over the 100ms width with the highest average value. (The duty cycle is the value of the sum of the pulse widths in one period (or 100ms), divided by the length of the period (or 100ms). The duty cycle correction factor was then expressed in dB and the peak emissions adjusted accordingly to give an average value of the emission.

Correction factor dB =  $20 \times (\text{Log}_{10} \text{ Calculated Duty Cycle})$

Therefore the calculated duty cycle was determined:

The pulse train period was greater than >100ms and in as shown from the plots in contained in appendix B of this test report.

Duty cycle =  $\frac{\text{the sum of the highest average value pulsewidths over 100ms}}{100\text{ms}}$

e.g

$$= \frac{7.459\text{ms}}{100\text{ms}} = 0.07459$$

0.07459 or 7.459%

Correction factor (dB) =  $20 \times (\text{Log}_{10} 0.07459) = -22.54\text{dB}$

**Appendix F:**

**Photographs and Figures**

The following photographs were taken of the test samples:

1. Radiated electric field emissions arrangement: front view.
2. Radiated electric field emissions arrangement: rear view.





Photograph 1



Photograph 2



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