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Test of Agcam 2.4GHz Wireless A/V Sender

To FCC 47 CFR Part 15.247 & IC RSS-210

Test Report Serial No; TUVR54-A1 REV B

TEST REPORT

FROM

MiCOM Labs

Test of 2.4 GHz Fixed Wireless Device

To FCC 47 CFR Part15.247 & IC RSS-210

Test Report Serial No.: TUVR54-A1 REV B

This report supersedes TUVR54-A1 REV A

Manufacturer: Dakota Micro Inc.
8659 148th Avenue, SE
Cayuga, North Dakota 58013
USA

Product Function: 2.4GHz Wireless A/V Sender

Copy No: pdf **Issue Date:** 5th April '05

This Test Report is Issued Under the Authority of;

MiCOM Labs, Inc.
3922 Valley Avenue, Suite B
Pleasanton, California 94566, USA
Phone: 925.462.0304
Fax: 925.462.0306
www.micomlabs.com

UKAS TESTING
2106

MiCOM Labs is a UKAS (United Kingdom Accreditation Service)

Accredited Testing Laboratory

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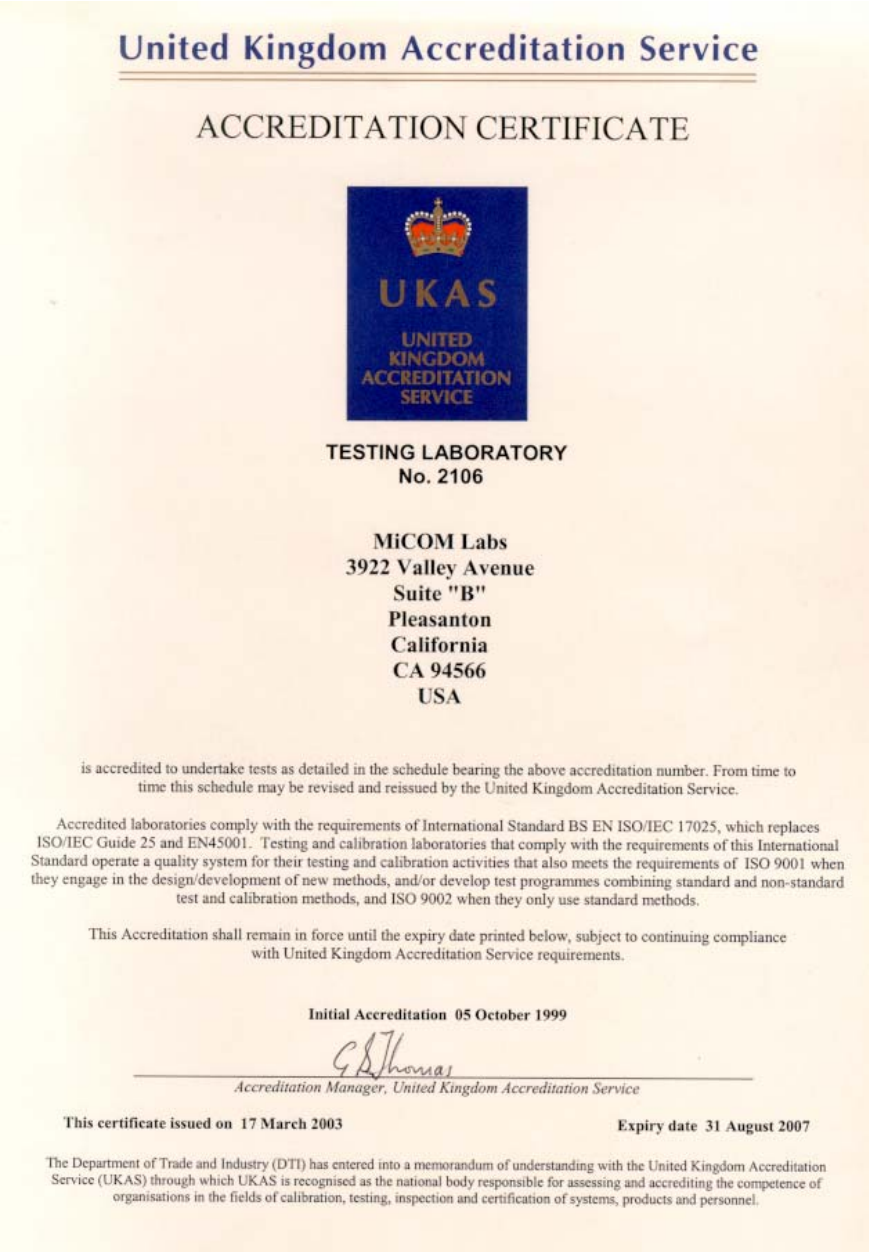
ACCREDITATION & LISTINGS

MiCOM Labs, Inc. an accredited laboratory complies with the international standard BS EN ISO/IEC 17025. The company is accredited by the United Kingdom Accreditation Service (UKAS) www.ukas.org test laboratory number 2106. MiCOM Labs test schedule is available at the following URL;
http://www.ukas.org/testing/lab_detail.asp?lab_id=875&location_id=&vMenuOption=3 .



United Kingdom Accreditation Service

ACCREDITATION CERTIFICATE

UKAS
UNITED KINGDOM ACCREDITATION SERVICE

TESTING LABORATORY
No. 2106

MiCOM Labs
3922 Valley Avenue
Suite "B"
Pleasanton
California
CA 94566
USA

is accredited to undertake tests as detailed in the schedule bearing the above accreditation number. From time to time this schedule may be revised and reissued by the United Kingdom Accreditation Service.

Accredited laboratories comply with the requirements of International Standard BS EN ISO/IEC 17025, which replaces ISO/IEC Guide 25 and EN45001. Testing and calibration laboratories that comply with the requirements of this International Standard operate a quality system for their testing and calibration activities that also meets the requirements of ISO 9001 when they engage in the design/development of new methods, and/or develop test programmes combining standard and non-standard test and calibration methods, and ISO 9002 when they only use standard methods.

This Accreditation shall remain in force until the expiry date printed below, subject to continuing compliance with United Kingdom Accreditation Service requirements.

Initial Accreditation 05 October 1999

G R Thomas
Accreditation Manager, United Kingdom Accreditation Service

This certificate issued on 17 March 2003 Expiry date 31 August 2007

The Department of Trade and Industry (DTI) has entered into a memorandum of understanding with the United Kingdom Accreditation Service (UKAS) through which UKAS is recognised as the national body responsible for assessing and accrediting the competence of organisations in the fields of calibration, testing, inspection and certification of systems, products and personnel.

LISTINGS

MiCOM Labs test facilities are listed by the following organizations;

North America

United States of America
Federal Communications Commission (FCC) Listing #: 102167

Canada
Industry Canada (IC) Listing #: 4143

DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft	22nd February '05	
Rev A	3rd March '05	
Rev B	5th April '05	Update to Section 5.1.6.2 Band edge

1. TEST RESULT CERTIFICATE

Manufacturer:	Dakota Micro Inc. 8659 148th Avenue, SE Cayuga, North Dakota 58013 USA	Tested By:	MiCOM Labs, Inc. 3922 Valley Avenue 'B' Pleasanton California, 94566, USA
EUT:	2.4GHz Wireless A/V Sender	Telephone:	+1 925 462 0304
Model:	DMAC-RH	Fax:	+1 925 462 0306
S/N:	1805		
Test Date(s):	2nd Dec '04 to 11th Feb '05	Website:	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC 47 CFR Part15.247 & IC RSS-210	EQUIPMENT COMPLIES

MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Notes:

1. This document reports conditions under which testing was conducted and the results of testing performed.
2. Details of test methods used have been recorded and kept on file by the laboratory.
3. Test results apply only to the item(s) tested.

Approved & Released for MiCOM Labs, Inc. by:

UKAS TESTING
2106

Graeme Grieve
Quality Manager MiCOM Labs,

Gordon Hurst
President & CEO MiCOM Labs, Inc.

2. REFERENCES AND MEASUREMENT UNCERTAINTY

2.1. Normative References

Ref.	Publication	Year	Title
(i)	FCC 47 CFR Part 15.247	2001	Code of Federal Regulations
(ii)	Industry Canada RSS-210	Issue 5 Nov. 2001	Low Power License-Exempt Radiocommunication Devices (All Frequency Bands)
(iii)	ANSI C63.4	2003	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
(iv)	CISPR 22/ EN 55022	1997 1998	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
(v)	M 3003	Edition 1 Dec. 1997	Expression of Uncertainty and Confidence in Measurements
(vi)	LAB34	Edition 1 Aug 2002	The expression of uncertainty in EMC Testing
(vii)	ETSI TR 100 028	ETSI TR 100 028	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
(viii)	UKAS LAB 1	Edition 4 May 2004	Reference to Accreditation for Laboratories.
(ix)	DTI URN 98/997	1998	Conditions for the use of National Accreditation Marks by UKAS and UKAS Accredited Organizations.

2.2. Test and Uncertainty Procedures

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, listed in the Normative References section of this report.

Measurement uncertainty figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2.

Measurement uncertainties stated are based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 % in accordance with UKAS document M 3003 listed in the Normative References section of this report.

3. PRODUCT DETAILS AND TEST CONFIGURATIONS

3.1. Technical Details

Details	Description
Purpose:	Test of the 2.4 GHz Fixed Wireless Device 2.4GHz Wireless A/V Sender to FCC and Industry Canada regulations
Applicant:	TUV Rheinland of North America Inc 10900 73rd. Avenue, Suite 124 Maple Grove, Minnesota 55369 USA
Manufacturer:	Dakota Micro Inc. 8659 148th Avenue, SE Cayuga, North Dakota 58013 USA
Laboratory performing the tests:	MiCOM Labs, Inc. 3922 Valley Avenue, Suite "B" Pleasanton, California 94566 USA
Test report reference number:	TUVR54-A1 REV B
Date EUT received:	5th November 2004
Standard(s) applied:	FCC 47 CFR Part15.247 & IC RSS-210
Dates of test (from - to):	2nd December 04 to
No of Units Tested:	One Transmitter and one Receiver set
Type of Equipment:	2.4GHz Wireless A/V Sender
Manufacturers Trade Name:	Agcam Ranch Hand
Model:	DMAC-RH
Location for use:	Indoor and outdoor use
Declared Frequency Range(s):	2.4 to 2.4835GHz
Type of Modulation:	Digital
Declared Nominal Output Power:	+20dBm Peak Power
Transmit/Receive Operation:	Simplex
Rated Input Voltage and Current:	Transmitter DC 9-12V/500mA Receiver DC 9-12V/300mA
Operating Temperature Range:	-10ºC to +60ºC
ITU Emission Designator:	14M1D7D
Microprocessor(s) Model:	AW0600-009D
Clock/Oscillator(s):	4MHz
Frequency Stability:	±20ppm
Equipment Dimensions:	Transmitter and Receiver 4"x2.25"x1.25"
Weight:	Transmitter and Receiver 9.4oz (266.5g)
Primary function of equipment:	The Transmitter and Receiver units operate as a pair transmitting A/V signals as part of a remote surveillance system.

3.2. Scope of Test Program

The scope of the test program was to test the 2.4 GHz Ranch Hand Wireless A/V transmitter and receiver against the current FCC and Industry Canada specifications FCC Part 15.247 and IC RSS-210, Normative References (i) & (ii) see Section 2.1.

Agcam Ranch Hand Transmitter

Agcam Ranch Hand Receiver

3.3. Equipment Model(s) and Serial Number(s)

Name	Manufacturer	Model No.	Serial No.
Ranch Hand Transmitter	Agcam	DMAC-RH	1805
Ranch Hand Receiver	Agcam	DMAC-RH	1805
AC Adapter 9VDC 500mA for the Ranch Hand Transmitter	Agcam	DV-9500S	1604
AC Adapter 9VDC 300mA for the Ranch Hand Receiver	DVE	DV-9300SAA	4204

3.4. Antenna Details

Antenna Type	Gain (dBi)	Manufacturer	Model No.	Serial No.
Omni Directional	5dBi	Dakota Micro	DMAC-WA5	None
Omni-directional	8dBi	Dakota Micro	DMAC-WA8	OB0193020059
Yagi	15dBi	Dakota Micro	DMAC-WA15	None

3.5. Cabling and I/O Ports

Number and type of I/O ports. The I/O ports are identical on both the Transmitter and Receiver units.

1. DC Input
2. Video In/Out
3. RCA Audio & Video line jacks (3)

3.6. Test Configurations

Matrix of test configurations

Test Category	Mode	Channel	Frequency (MHz)
Conducted	Transmitter only	1	2,414
		2	2,432
		3	2,450
Radiated	Transmitter and Receiver	1	2,414
		2	2,432
		3	2,450

Worst case plots are provided for each test parameter identified within this report. Plots not included are held on file by the test laboratory and available upon request with client permission.

3.7. Equipment Modifications

The following modifications were required to bring the equipment into compliance:

1. Band Edge Problem
   The original scope of the test program included the testing Channel 4 (2,468MHz). Channel 4 however failed the upper Band Edge requirement at 2.4835 GHz and was dropped altogether. Equipment now operates with the three lower channels.

2. Radiated Emission Problem
   Non-compliant radiated emissions emanated from the power supply within the video camera, 30MHz – 1GHz. Ferrites from ACT CBZ0805-152-40 (1000 Ohms @ 100MHz) DC Resistance 0.45 Ohms, Current rating 400mA were place in series with the +ve and –ve dc supply to reduce the emissions. Emission plots 30MHz – 1GHz are available in Section 8 of this report.

3. Peal Power Spectral Density Problem
   Equipment failed peak power spectral density requirements. Output power was reduced by 5dB to bring the system into compliance. A 5 dB resistor chip attenuator made by International Manufacturing Services, Inc was used to attenuate output power. The transmission line trace on the output pad was cut and the attenuator inserted. A ground connection was soldered to a close ground pad.

   Component Manufacturer: International Manufacturing Services, Inc
   Part #: IMS Part Number: IMS1141-05 dB

3.8. Deviations from the Test Standard

The following deviations from the test standard were required in order to complete the test program:

1. NONE

3.9. Subcontracted Testing or Third Party Data

Radiated emission testing 30 MHz-1 GHz (Section 5.1.6.3 within this report) was subcontracted to the following test facility;

Sanmina-SCI
Homologation Services
EMI Test Laboratory
2305 Mission College Blvd.
Santa Clara, California 95054
USA

Sanmina-SCI, NVLAP (National Voluntary Laboratory Accreditation Program) Lab Code 100411-0 is ISO/IEC 17025 accredited for emission testing 30 MHz-1 GHz.

Sanmina-SCI: FCC Registration Number: **90844**

IC Registration Number: **IC5541**

4. TEST SUMMARY

List of Measurements

The following table represents the list of measurements required under the **FCC CFR47 Part 15.247** and **Industry Canada RSS-210**.

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.247(a)(2) **5.9.1**	6 dB and 99 % Bandwidths	>=500 kHz	Conducted	Complies	5.1.1
15.247(b) **15.31(e)** **6.2.2 (o) (b)**	Peak Output Power Voltage Variation	Shall not exceed 1W Variation of supply voltage 85 % -115 %	Conducted	Complies	5.1.2
15.247(d) **6.2.2 (o) (b)**	Peak Power Spectral Density	Shall not be greater than +8 dBm in any 3 kHz band	Conducted	Complies	5.1.3
15.247(b)(5) **14**	Maximum Permissible Exposure	Exposure to radio frequency energy levels	Conducted	Complies	5.1.4
15.247(c) **15.205(a) / 15.209(a)** **6.2.2 (o) (e1)**	Spurious Emissions (1-26 GHz)	The radiated emission in any 100 kHz of out-band shall be at least 20 dB below the highest in-band spectral density	Conducted	Complies	5.1.5
5.205(a) / 15.209(a) **6.3**	Radiated Emissions	Restricted Bands	Radiated	Complies	5.1.6
	Transmitter Radiated Spurious Emissions	Emissions above 1 GHz		Complies	*5.1.6.1*
	Radiated Band Edge	Band edge results		Complies	*5.1.6.2*
	Radiated Spurious Emissions	Emissions <1 GHz (30M-1 GHz)		Complies	*5.1.6.3*

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.207 **6.6**	AC Wireline Conducted Emissions 150 kHz–30 MHz	Conducted Emissions	Conducted	Complies	5.1.7

Note 1: *Test results reported in this document relate only to the items tested*
Note 2: *The required tests demonstrated compliance as per client declaration of test configuration, monitoring methodology and associated pass/fail criteria*
Note 3: *Section 3.7 Equipment Modifications highlights the equipment modifications that were required to bring the product into compliance with the above test matrix*

5. TEST RESULTS

5.1. Device Characteristics

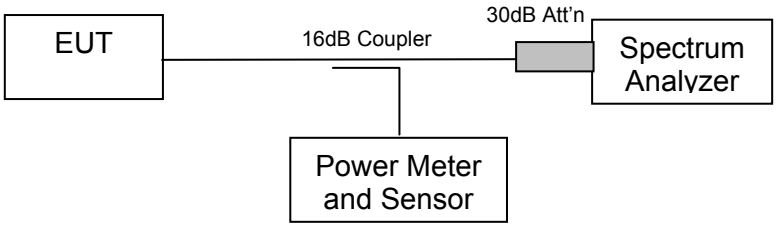
5.1.1. 6 dB and 99 % Bandwidth

FCC, Part 15 Subpart C §15.247(a)(2)
Industry Canada RSS-210 §5.9.1

Test Procedure
The bandwidth at 6 dB and 99 % is measured with a spectrum analyser connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency. Using a 6 dB resolution bandwidth filter setting the spectrum analyzer was set to the following for both 6 dB BW and 99 % BW measurements;

RBW=1 MHz, VBW=2 MHz, Span=50 MHz, Sweep = 200 mS

Test Measurement Set up



Measurement set up for 6 dB and 99 % bandwidth test

Measurement Results for 6 dB and 99 % Operational Bandwidth(s)

Ambient conditions.
Temperature: 19 to 26 °C Relative humidity: 31 to 57 % Pressure: 999 to 1009 mbar

Modulation of the wireless device required attaching the video camera to the video input..

TABLE OF RESULTS – **802.11b 11Mbit/s**

Center Frequency (MHz)	6 dB Bandwidth (MHz)	6 dB Plot #	99 % BW (MHz)	99 % BW Plots
2,414	4.80961924	On file	13.58717435	On file
2,432	4.62925852	On file	13.70741483	On file
2,450	4.86973948	01	14.12825651	02

Specification

Limits

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

Laboratory Measurement Uncertainty for Spectrum Measurement

Measurement uncertainty	±2.81 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of RF Spectrum Mask'	0156, 0193, 0252, 0313, 0314

5.1.2. Peak Output Power

FCC, Part 15 Subpart C §15.247(b)
Industry Canada RSS-210 §6.2.2(o)(b)

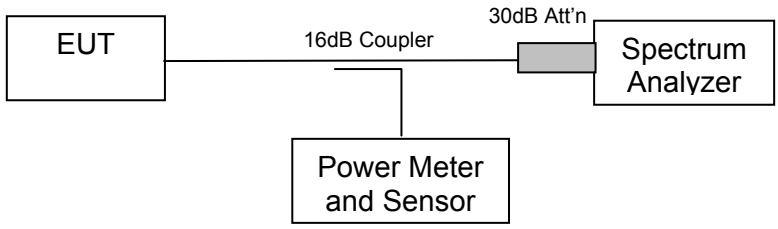
Test Procedure

The transmitter terminal of EUT was connected to the input of the spectrum analyzer set to measure peak power. The resolution filter bandwidth was set to 6 dB, peak detector selected and the analyzer built-in power function was used to measure peak power over the 99 % bandwidth.

Measurements were made while EUT was operating in a modulated state i.e. 100 % duty cycle at the appropriate center frequency.

Spectrum analyzer settings: RBW=1 MHz, VBW=10 MHz, Span=55 MHz, Sweep = 200 mS

Test Measurement Set up



Measurement set up for Transmitter Peak Output Power

Measurement Results for Peak Output Power

Ambient conditions.
Temperature: 19 to 26 °C Relative humidity: 31 to 57 % Pressure: 999 to 1009 mbar

Modulation of the wireless device required attaching the video camera to the video input..

TABLE OF RESULTS – **802.11b 11Mbit/s**

Center Frequency (MHz)	Measurement Bandwidth (MHz)	Peak Power (dBm)	Peak Power Plot #
2,414	14.30862	20.52	03
2,432	14.30862	20.33	On file
2,450	14.30862	20.23	On file

Supply Voltage Variation

The supply voltage was varied between 97.75 VAC and 132.25 VAC. The system operated as intended at either extreme with no change in the above measurement bandwidths.

Antenna Gain - Maximum Permissible Power Level

If transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For antenna greater than 6dBi;-
Maximum permissible peak power = +30dBm - (Antenna Gain – 6dBi)

Antenna Type	Gain (dBi)	Antenna Gain >6 dBi (dB)	Max. Allowable Peak Power (dBm)
Omni Directional	5dBi	0	+30.0
Omni-directional	8dBi	2	+28.0
Yagi	15dBi	9	+21.0

As the maximum conducted Peak Power from the EUT was found to be +20.52dBm all antennas comply with the peak power requirements.

Specification

Limits

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

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

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

§6.2.2(o)(b) For the band 2400-2483.5 MHz, the transmitter output power shall not exceed 1.0 watt

Laboratory Measurement Uncertainty for Power Measurements

Measurement uncertainty	±1.33 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-01 'Measuring RF Output Power'	0156, 0193, 0252, 0313, 0314

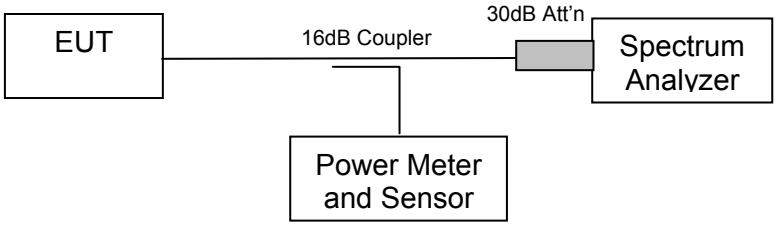
5.1.3. Peak Power Spectral Density

FCC, Part 15 Subpart C §15.247(d)
Industry Canada RSS-210 §6.2.2(o)(b)

Test Procedure
The transmitter output was connected to a spectrum analyser and the maximum level in a 3 kHz bandwidth was measured. A peak value was found over the full emission bandwidth and the frequency span reduced to obtain enhanced resolution. Sweep time => span / 3 kHz with video averaging turned off. The Peak Power Spectral Density is the highest level found across the emission in a 3 kHz resolution bandwidth. Spectrum analyzer settings:

RBW= 3 kHz, VBW=10 kHz, Span=429 kHz, Sweep time=500s, RBW Filter=3 dB

Test Measurement Set up



Measurement set up for Peak Power Spectral Density

Measurement Results for Peak Power Spectral Density

Ambient conditions.
Temperature: 19 to 26 °C Relative humidity: 31 to 57 % Pressure: 999 to 1009 mbar

Radio parameters.
Data Rate(s): 11MBit/s

Modulation of the wireless device required attaching the video camera to the video input..

TABLE OF RESULTS – **802.11b 11Mbit/s**

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)	Plot #
2,414	2,412.7612	+8.00	04
2,432	2,403.7450	+7.71	On file
2,450	2,448.7069	+6.34	On file

Specification

Peak Power Spectral Density Limits

§15.247 (d) For direct sequence systems the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than +8 dBm in any 3 kHz band during any time interval of continuous transmission

RSS-210 §**6.2.2(o)(b)** The transmitter power spectral density (into the antenna) shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0 second duration.

Laboratory Measurement Uncertainty for Spectral Density

Measurement uncertainty	±1.33 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-01 'Measuring RF Output Power'	0156, 0193, 0252, 0313, 0314

5.1.4. Maximum Permissible Exposure

FCC, Part 15 Subpart C §15.247(b)(5)
Industry Canada RSS-210 §14

Calculations for Maximum Permissible Exposure Levels

Power Density = Pd (mW/cm^2) = $EIRP/(4\pi d^2)$

EIRP = P * G

P = Peak output power (mW)

G = Antenna numeric gain (numeric)

d = Separation distance (cm)

Numeric Gain = 10 ^ (G (dBi)/10)

P (worst case) = +**20.52 dBm, 112.7mW,** Antenna Gain = 15.0 dBi / **31.6 numeric**

Because the EUT belongs to the General Population/Uncontrolled Exposure the limit of power density is 1.0 mW/cm^2

Antenna Gain (dBi)	Numeric Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Calculated RF Exposure at d=20cm (mW/cm^2)	Limit (mW/cm^2)
15.0	31.6	+20.52	112.7	0.71	1

Specification

Maximum Permissible Exposure Limits

§15.247 (b)(5) Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency levels in excess of the Commission's guidelines. See §1.1307 (b)(1) of this chapter.

Limit S = 1mW / cm^2 from 1.310 Table 1

Note: for mobile or fixed location transmitters the minimum separation distance is 20cm, even if calculations indicate the MPE distance to be less.

RSS-210 §14 Before equipment certification is granted, the procedures of RSS-102 must be followed concerning exposure of humans to RF fields.

Laboratory Measurement Uncertainty for Power Measurements

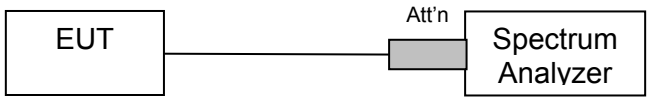
Measurement uncertainty	±1.33 dB

5.1.5. Conducted Spurious Emissions

FCC, Part 15 Subpart C §15.247(c)
Industry Canada RSS-210 §5.9.1, §6.2.2 (o)(e1)

Test Procedure
Conducted emissions were measured at a limit of 20 dB below the highest in-band spectral density measured with a spectrum analyzer connected to the antenna terminal. Emissions at the band edge were measured and recorded. Measurements were made while EUT was operating in transmit mode of operation at the appropriate center frequency.

Test Measurement Set up



Band-edge measurement test configuration

Measurement Results of Conducted Spurious Emissions

Ambient conditions.
Temperature: 19 to 26 °C Relative humidity: 31 to 57 % Pressure: 999 to 1009 mbar

Modulation of the wireless device required attaching the video camera to the video input..

Conducted Band-Edge Results

TABLE OF RESULTS

Center Frequency (MHz)	Band edge Frequency (MHz)	Limit (20 dB below peak of fundamental)	Amplitude @ Band edge (dBm)	Plot #	Margin (dB)
2,414	2,390	+0.60dBm	-43.11	05	23.11
2,450	2,483.5	+0.29dBm	-43.66	06	23.66

Spurious Emissions (1-26 GHz)

Conducted spurious emissions (1-26 GHz) are provided indicated by the following matrix. Measurements were performed with the transmitter tuned to the channel closest to the band-edge being measured. All emissions were maximized during measurement. Limits which were derived from the band-edge measurements provided below are drawn on each plot.

Channel 1

Start Frequency (MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Plot #	Margin (dB)
30	7,000	-38.30	0.21	07	38.51
7,000	12,000	-20.83[1]	0.21	08	21.04
12,000	18,000	-30.66	0.21	09	30.87
18,000	26,000	-30.50	0.21	10	30.71

NOTES

1. Higher band width settings used on the Analyzer resulting in raised noise floor.

Specification

Limits Band-Edge

Lower Limit Band-edge	Upper Limit Band-edge	Limit below highest level of desired power
2,400 MHz	2,483.5 MHz	≥ 20 dB

§**15.247(c)** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or radiated measurement. Attenuation below the general limits specified in §**15.209(a)** is not required.

§**6.2.2 (o)(e1)** In any 100 kHz bandwidth outside the operating frequency bands, between 30 MHz and 5 times the carrier frequency, the unwanted emission spectral density shall be either at least 20 dB below the in-band spectral density, or shall not exceed the levels specified in Table 3, whichever is less stringent.

Laboratory Measurement Uncertainty for Conducted Spurious Emissions

Measurement uncertainty	±2.37 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-05 'Measurement of Spurious Emissions'	0156, 0193, 0252, 0313, 0314

5.1.6. Radiated Emissions

5.1.6.1. Transmitter Radiated Spurious Emissions (above 1 GHz)

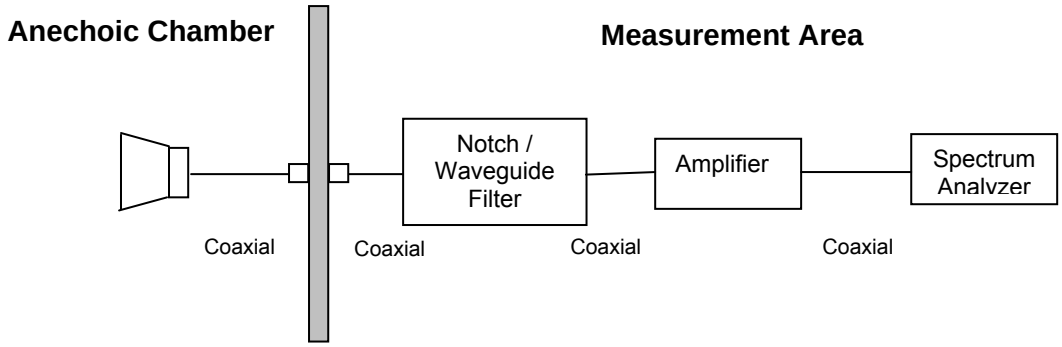
FCC, Part 15 Subpart C §15.247(c)
Industry Canada RSS-210 §6.3

Test Procedure

Radiated emissions above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter or waveguide filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.

All measurements on any frequency or frequencies over 1 MHz are based on the use of measurement instrumentation employing an average detector function. All measurements above 1 GHz were performed using a minimum resolution bandwidth of 1 MHz.

Test Measurement Set up



Measurement set up for Radiated Emission Test

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR - FO

where:

FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss or Waveguide Loss

For example:
Given receiver input reading of 51.5 dBμV; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3 dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

Measurement Results Transmitter Radiated Spurious Emissions above 1 GHz

Ambient conditions.
Temperature: 19 to 26°C Relative humidity: 31 to 57 % Pressure: 999 to 1009 mbar

ANTENNA # 1 **5dBi Omni Directional**

CHANNEL 1 PLOTS 11 & 12

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4827.818	V	46.50	6.95	53.46	54.00	-0.54
4826.411	H	38.08	6.96	45.04	54.00	-8.96
7245.486	V	38.03	9.62	47.65	54.00	-6.35
7244.985	H	39.55	9.62	49.18	54.00	-4.82
9660.539	V	34.76	12.23	47.00	54.00	-7.00
9669.221	H	30.95	12.21	43.17	54.00	-10.83

CHANNEL 2

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4866.573	V	33.00	7.27	40.26	54.00	-13.74
4866.847	H	32.19	7.27	39.45	54.00	-14.55
7293.918	V	38.09	9.83	47.91	54.00	-6.09
7298.587	H	38.73	9.87	48.60	54.00	-5.40
9739.577	V	32.23	12.01	44.24	54.00	-9.76
9739.737	H	32.16	12.01	44.17	54.00	-9.83

CHANNEL 3

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4902.867	V	32.76	7.31	40.07	54.00	-13.93
4902.887	H	32.34	7.31	39.65	54.00	-14.35
7352.451	V	38.29	10.07	48.36	54.00	-5.64
7360.260	H	34.94	10.09	45.03	54.00	-8.97
9808.147	H	32.98	11.87	44.85	54.00	-9.15
9808.613	V	34.37	11.87	46.25	54.00	-7.75

ANTENNA # 2 **8dBi Omni Directional**

CHANNEL 1

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4831.573	V	30.45	6.96	37.42	54	-16.58
4831.852	H	31.86	6.96	38.83	54	-15.17
7247.956	V	38.58	9.62	48.20	54	-5.80
7248.127	H	36.89	9.61	46.51	54	-7.49
9660.900	V	34.69	12.23	46.93	54	-7.07
9661.593	H	32.90	12.23	45.14	54	-8.86

CHANNEL 2 Plots 13 & 14

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4867.172	H	33.5	7.27	40.78	54	-13.22
4867.460	V	32.06	7.28	39.34	54	-14.66
7300.840	V	37.67	9.88	47.56	54	-6.44
7304.176	H	35.85	9.91	45.76	54	-8.24
9728.153	V	35.74	12.10	47.85	54	-6.15
9728.313	H	37.34	12.10	49.44	54	-4.56

CHANNEL 3

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4903.160	H	32.46	7.31	39.76	54	-14.24
4903.327	V	32.01	7.31	39.31	54	-14.69
7354.469	H	37.73	10.07	47.80	54	-6.20
7354.838	V	36.60	10.08	46.68	54	-7.32
9799.567	V	37.86	11.86	49.72	54	-4.28
9809.527	H	33.29	11.88	45.17	54	-8.83

ANTENNA # 3 **15 dBi Yagi**

CHANNEL 1

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4831.106	H	32.26	6.96	39.23	54	-14.77
4837.151	V	29.26	6.98	36.25	54	-17.75
7237.842	H	36.99	9.61	46.60	54	-7.40
7244.665	V	37.51	9.62	47.14	54	-6.86
9661.573	H	31.68	12.23	43.92	54	-10.08
9665.572	V	31.50	12.22	43.73	54	-10.27

CHANNEL 2 PLOTS 15 &16

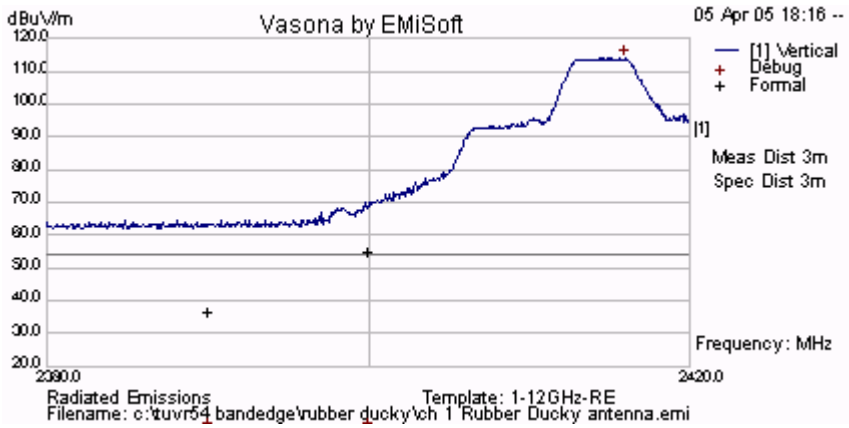
Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4866.707	V	32.66	7.27	39.92	54	-14.08
4866.873	H	32.26	7.27	39.53	54	-14.47
7293.831	H	37.41	9.83	47.23	54	-6.77
7293.838	V	39.33	9.83	49.15	54	-4.85
9740.257	H	32.30	12.00	44.30	54	-9.70
9745.295	V	32.22	11.95	44.17	54	-9.83

CHANNEL 3

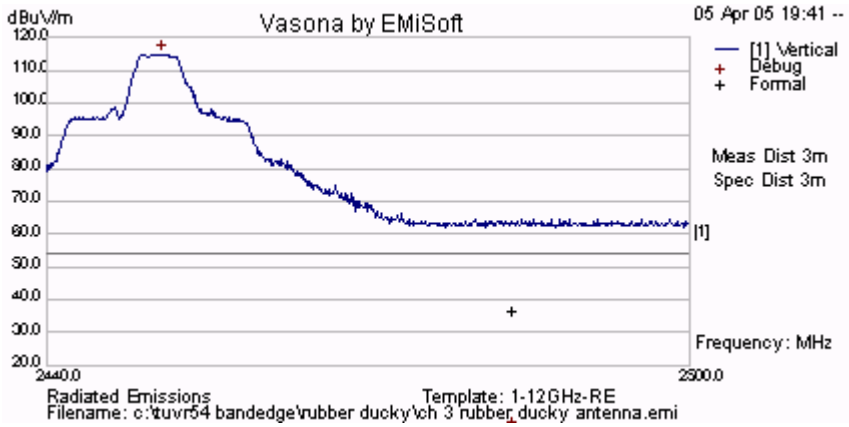
Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4902.760	V	30.02	7.30	37.33	54	-16.67
4909.104	H	28.82	7.31	36.13	54	-17.87
7359.987	H	35.13	10.09	45.22	54	-8.78
7360.553	V	35.33	10.09	45.42	54	-8.58
9803.717	H	34.57	11.87	46.44	54	-7.56
9811.705	V	32.62	11.88	44.49	54	-9.51

5.1.6.2. Radiated Band-Edge – Restricted Bands

ANTENNA # 1 **5dBi Omni Directional**

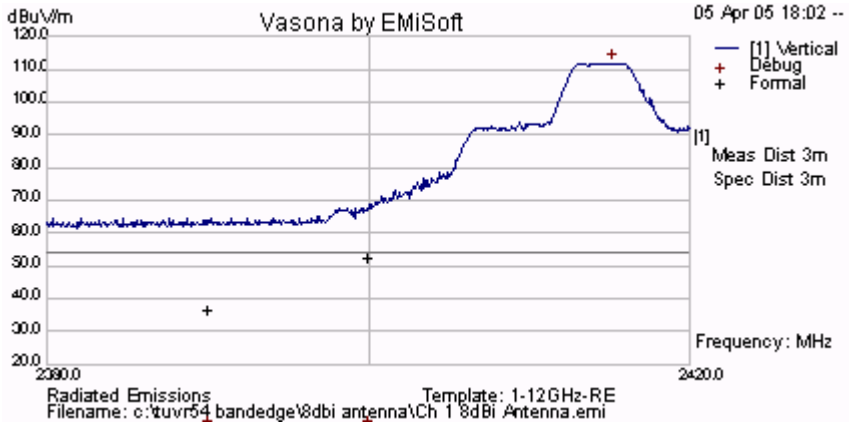


Frequency MHz	Level dBuV/m	Emission Type	Pol	Limit dBµV/m	Margin dB	Pass /Fail
2416	113.87	Peak	V			
2400	52.08	Average Max	V	54	-1.92	Pass
2390	33.32	Average Max	V	54	-20.68	Pass

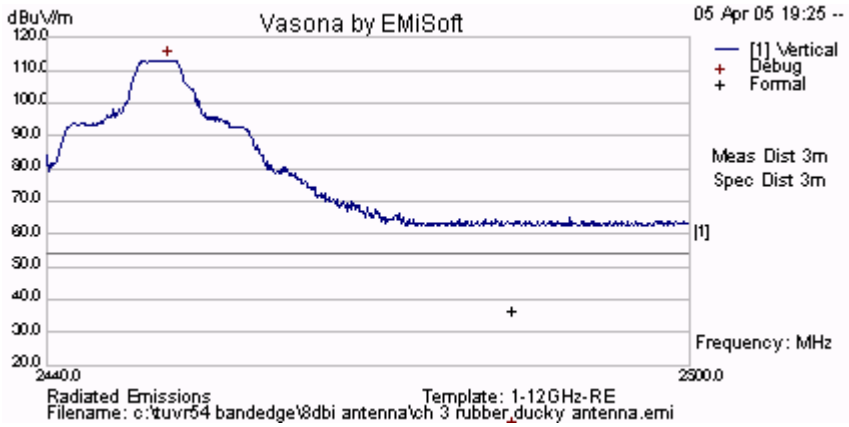


Frequency MHz	Level dBuV/m	Emission Type	Pol	Limit dBµV/m	Margin dB	Pass /Fail
2450.7	114.8	Preview	V			
2483.5	33.3	Average Max	V	54	-20.7	Pass

ANTENNA # 2 **8dBi Omni Directional**

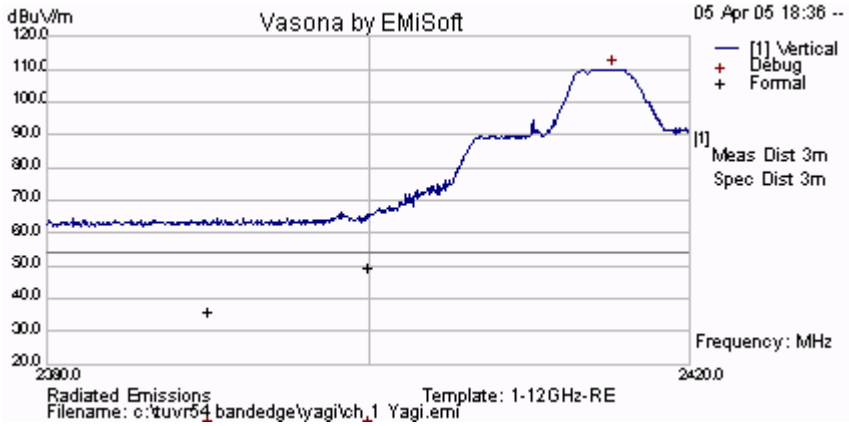


Frequency MHz	Level dBuV/m	Emission Type	Pol	Limit dBµV/m	Margin dB	Pass /Fail
2415.3	111.87	Preview	V			
2400	49.51	Average Max	V	54	-4.49	Pass
2390	33.59	Average Max	V	54	-20.41	Pass

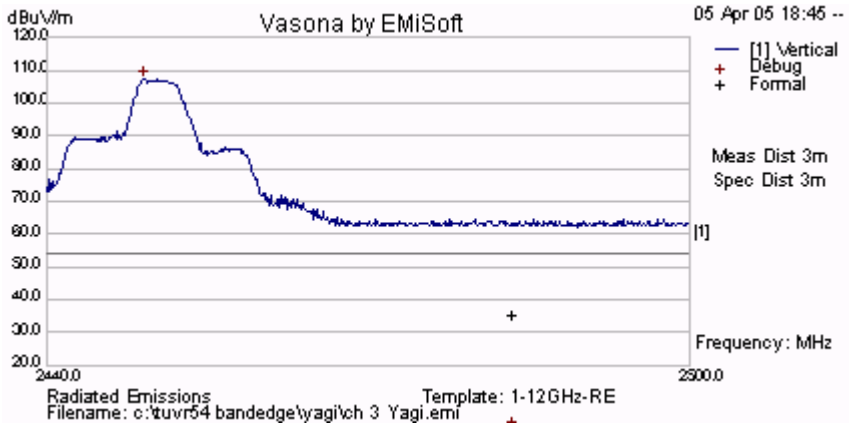


Frequency MHz	Level dBuV/m	Emission Type	Pol	Limit dBµV/m	Margin dB	Pass /Fail
2451.3	113.14	Preview	V			
2483.5	33.49	Average Max	V	54	-20.51	Pass

ANTENNA # 3 **15 dBi Yagi**



Frequency MHz	Level dBuV/m	Emission Type	Pol	Limit dBµV/m	Margin dB	Pass /Fail
2415.3	109.87	Preview	V			
2400	46.52	Average Max	V	54	-7.48	Pass
2390	32.7	Average Max	V	54	-21.3	Pass



Frequency MHz	Level dBuV/m	Emission Type	Pol	Limit dBµV/m	Margin dB	Pass /Fail
2449.1	107.29	Preview	V			
2483.5	32.57	Average Max	H	54	-21.43	Pass

Specification

Limits

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

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

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

Frequency (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Laboratory Measurement Uncertainty for Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of Radiated Emissions'	0088, 0156, 0134, 0304, 0311, 0315, 0310, 0312

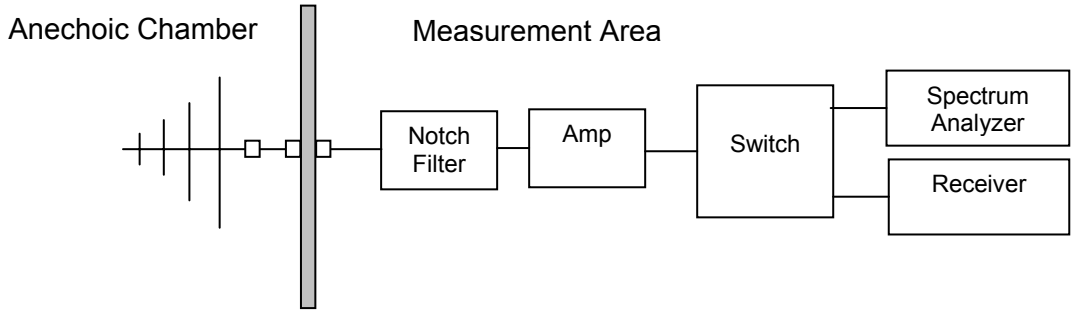
5.1.6.3. Radiated Spurious Emissions (30M-1 GHz)

FCC, Part 15 Subpart C §15.247(c)/ §15.209
Industry Canada RSS-210 §6.2.2(q1)(ii)

Test Procedure

Testing 30M-1 GHz was subcontracted to the company identified in Section 3.9 Subcontracted Testing. Preliminary radiated emissions are measured in the anechoic chamber at a 10-meter distance on every azimuth in both horizontal and vertical polarity. The emissions are recorded with a spectrum analyzer in peak hold mode. Emissions closest to the limits are measured in the quasi-peak mode with the tuned receiver using a bandwidth of 120 kHz. Only the highest emissions relative to the limit are listed. The anechoic chamber test set-up is identified in Section 6 Test Set-Up Photographs.

Test Measurement Set up



Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. In this test facility, the Antenna Factor, Cable Loss, and Amplifier Gains are loaded into the Rohde & Schwarz Receiver and the corrected field strength can be read directly on the receiver.

$$FS = R + AF + CORR$$

where:

FS = Field Strength
R = Measured Receiver Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain

For example:
Given a Receiver input reading of 51.5dBμV; Antenna Factor of 8.5dB; Cable Loss of 1.3dB; Falloff Factor of 0dB, an Amplifier Gain of 26dB and Notch Filter Loss of 1dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100μV/m
48 dBμV/m = 250μV/m

Measurement Results for Spurious Emissions (30 MHz – 1 GHz)

Ambient conditions.
Temperature: 19 to 26 °C Relative humidity: 31 to 57 % Pressure: 999 to 1009 mbar

Radio parameters.
Fully operational system tested transmitter, receiver, video camera and monitor

TABLE OF RESULTS

Freq. (MHz)	Peak (dBuV/m)	QP (dBuV/m)	QP Lmt (dBuV/m)	QP Margin (dB)	Angle (deg)	Height (cm)	Polarity	Total Correc-tion Factor
34.572955	25.85	21.11	29.50	-8.39	132	240	Vert	-15.62
38.132576	29.01	27.06	29.50	-2.44	84	294	Vert	-17.38
57.210630	28.77	27.42	29.50	-2.08	263	194	Vert	-22.85
76.282152	28.09	25.79	29.50	-3.71	69	104	Vert	-23.98
84.027406	26.26	23.23	29.50	-6.27	69	102	Vert	-23.81
85.814115	26.93	24.40	29.50	-5.10	226	103	Vert	-23.69
85.818317	27.59	25.21	29.50	-4.29	68	150	Vert	-23.69
479.01380	34.92	33.73	35.50	-1.77	355	208	Horz	-9.68
814.56373	17.51	14.82	35.50	-20.68	313	396	Horz	-4.27

Specification

Limits

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

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

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

Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Laboratory Measurement Uncertainty for Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB

Traceability

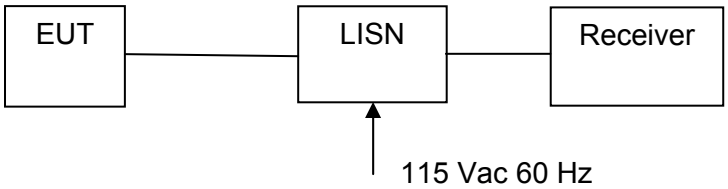
Method	Test Equipment Used
Measurements were made per Sanmina work instruction	8546A HP Receiver and RF Filter, HP Pre-amp, Antenna EMCO Biconilog

5.1.7. AC Wireline Conducted Emissions (150 kHz – 30 MHz)

FCC, Part 15 Subpart C §15.207
Industry Canada RSS-210 §6.6(b), §7.4

Test Procedure
The EUT is configured in accordance with ANSI C63.4. The conducted emissions are measured in a shielded room with a spectrum analyzer in peak hold in the first instance. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation. The highest emissions relative to the limit are listed.

Test Measurement Set up



Measurement set up for AC Wireline Conducted Emissions Test

Measurement Results for AC Wireline Conducted Emissions (150 kHz – 30 MHz)

Ambient conditions.
Temperature: 19 to 26 °C Relative humidity: 31 to 57 % Pressure: 999 to 1009 mbar

Radio parameters.

Modulation of the wireless device required attaching the video camera to the video input..

TABLE OF RESULTS

Transmitter LINE - LIVE

Frequency (MHz)	Peak (dBµV)	QP (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Ave. (dBµV)	Ave. Limit (dBµV)	Ave. Margin (dB)
0.361	48.93	39.06	58.7	-19.64	19.87	48.7	-28.83

Transmitter LINE - Neutral

Frequency (MHz)	Peak (dBµV)	QP (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Ave. (dBµV)	Ave. Limit (dBµV)	Ave. Margin (dB)

There were no emissions for the Neutral line.

Receiver LINE - LIVE

Frequency (MHz)	Peak (dBµV)	QP (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Ave. (dBµV)	Ave. Limit (dBµV)	Ave. Margin (dB)
2.117	46.25	44.2	56	-11.8	32.37	46	-13.63

Receiver LINE - Neutral

Frequency (MHz)	Peak (dBµV)	QP (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Ave. (dBµV)	Ave. Limit (dBµV)	Ave. Margin (dB)
2.124	46.45	44.8	56	-11.2	32.41	46	-13.59

Emission plots are provided in Section 8, Graphical Results

Specification

Limit

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

6.6(b) On any frequency or frequencies within the band of 0.15-30 MHz, the measured RF voltage (CISPR meter) shall not exceed 250 μV, 48 dBμV (across 50 ohms)

Transmitters marketed for use only in a commercial, industrial or business environment and not intended for use in homes are permitted a limit of 1000 μV (60 dBμV, 0.45 - 1.705 MHz) and 3000 μV (69.5 dBμV, 1.705 - 30 MHz).

§15.207 (a) Limit Matrix

The lower limit applies at the boundary between frequency ranges

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

* Decreases with the logarithm of the frequency

Laboratory Measurement Uncertainty for Conducted Emissions

Measurement uncertainty	±2.64 dB

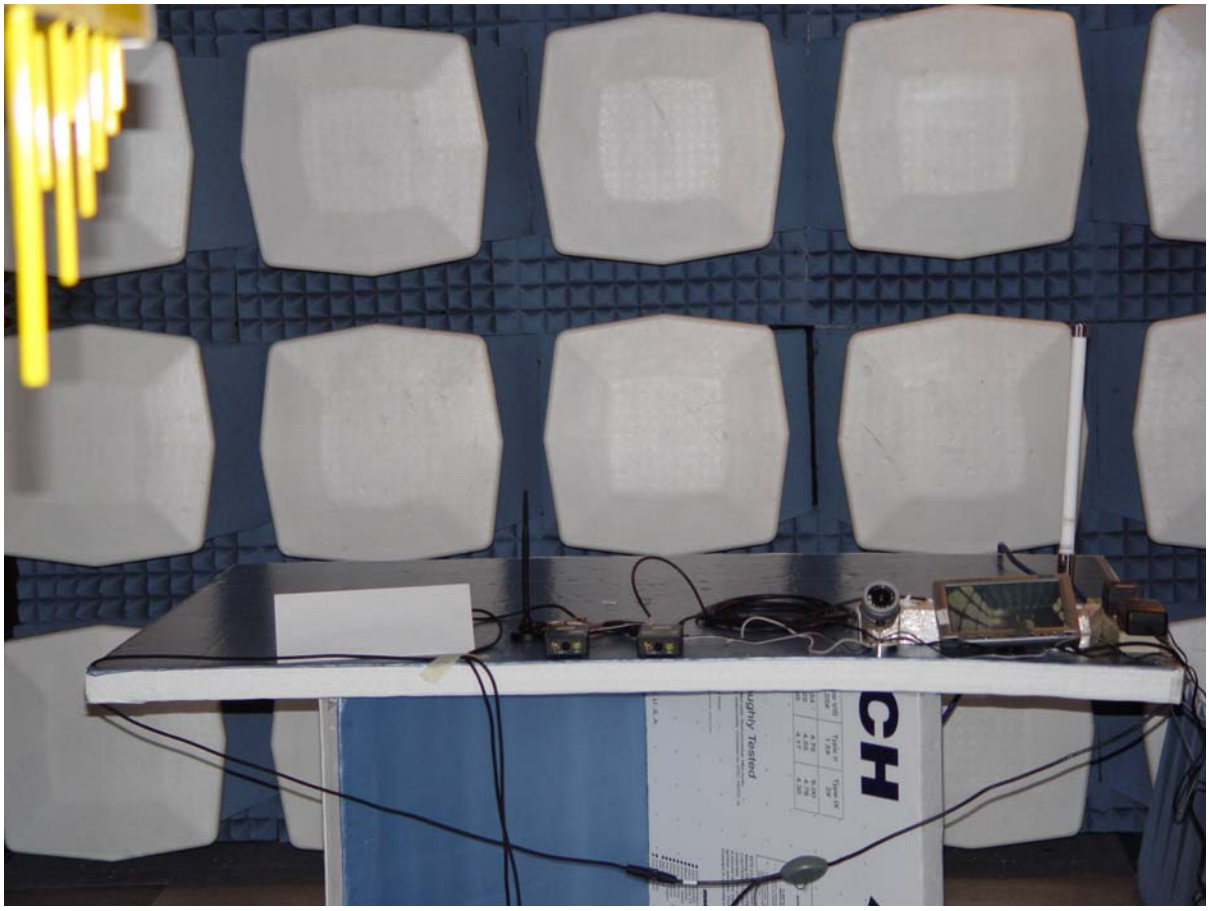
Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-EMC-01 'Measurement of Conducted Emissions'	0156, 0184, 0193, 0190, 0293, 0307

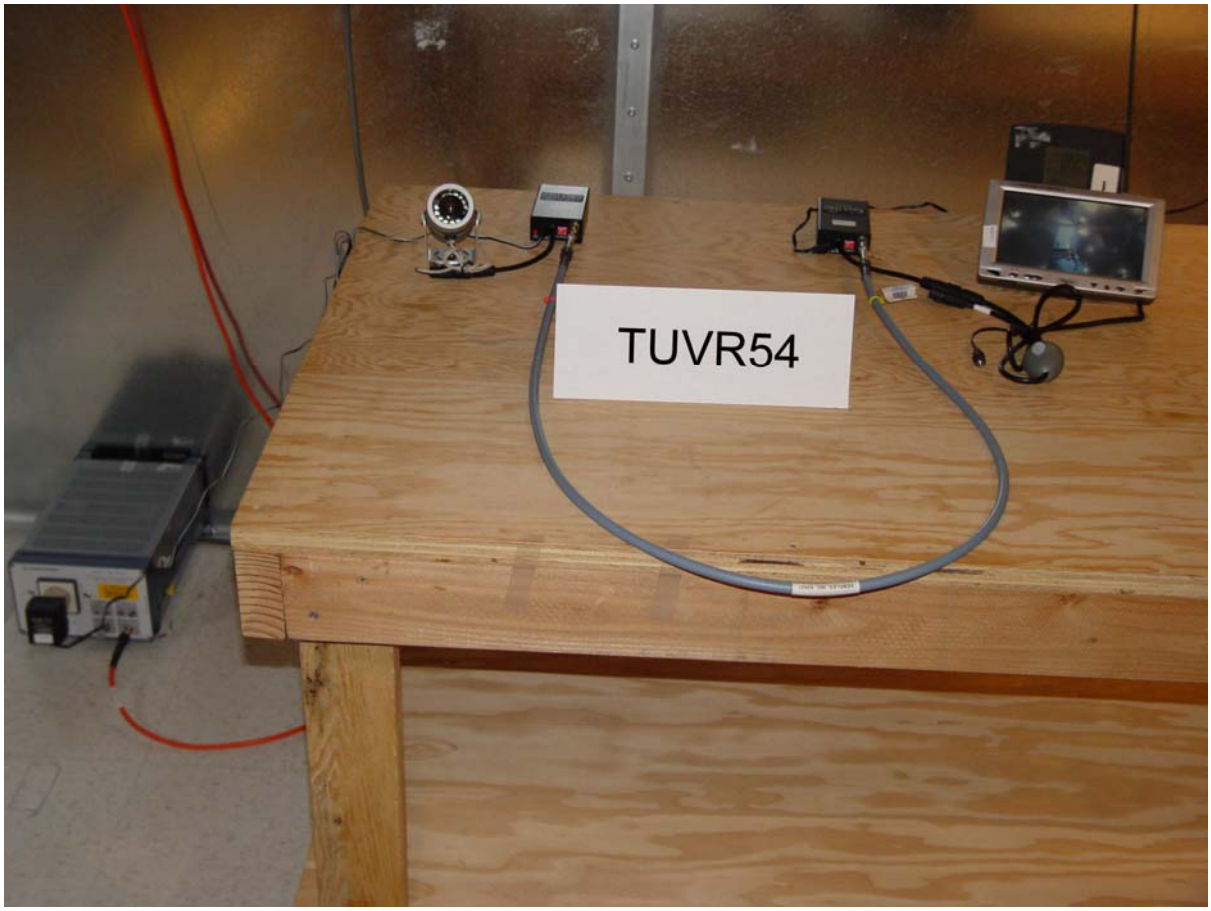
6. TEST SET-UP PHOTOGRAPHS

6.1. Radiated Emissions (30 MHz-1 GHz)

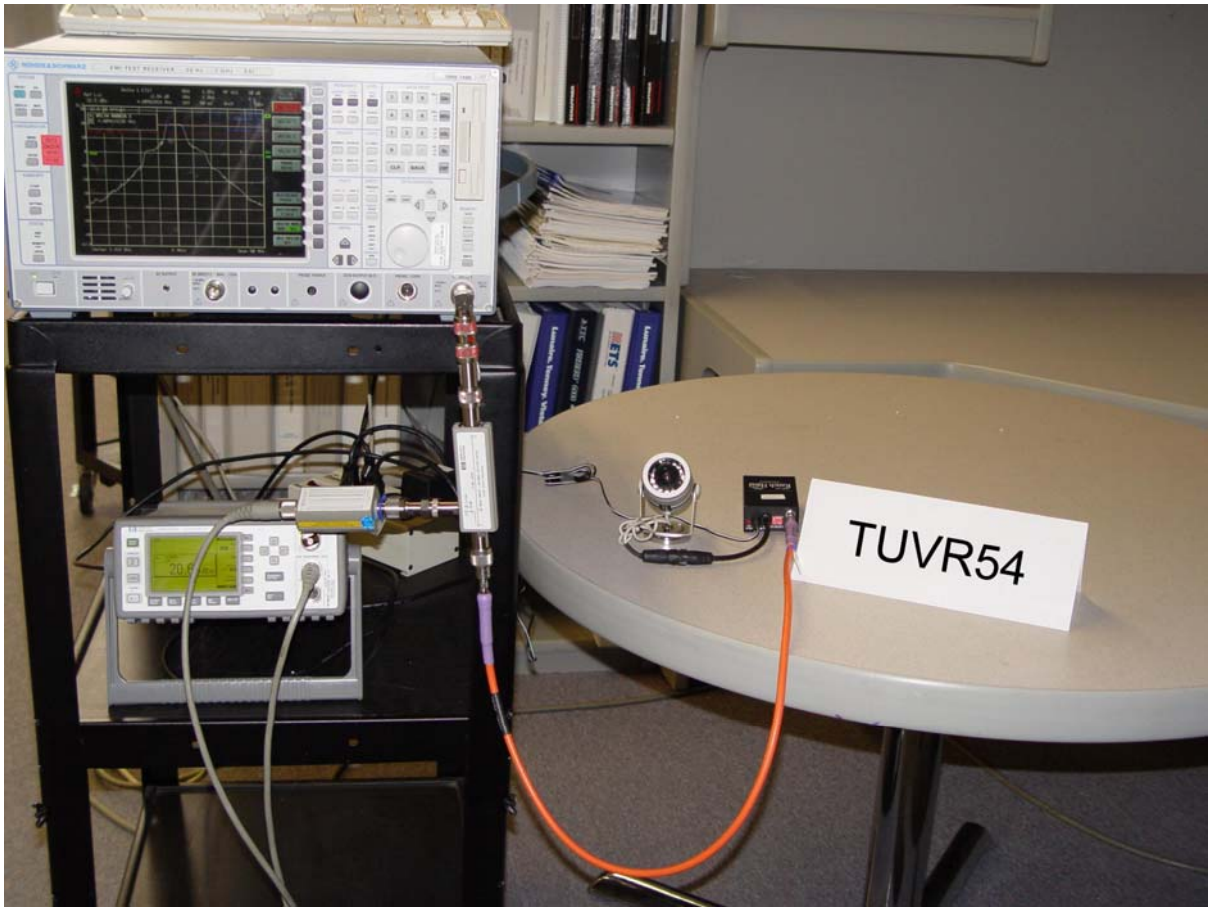
6.2. Spurious Emissions >1 GHz



6.3. Conducted Emissions (150 kHz - 30 MHz)



6.4. General Measurement Test Set-Up



7. TEST EQUIPMENT DETAILS

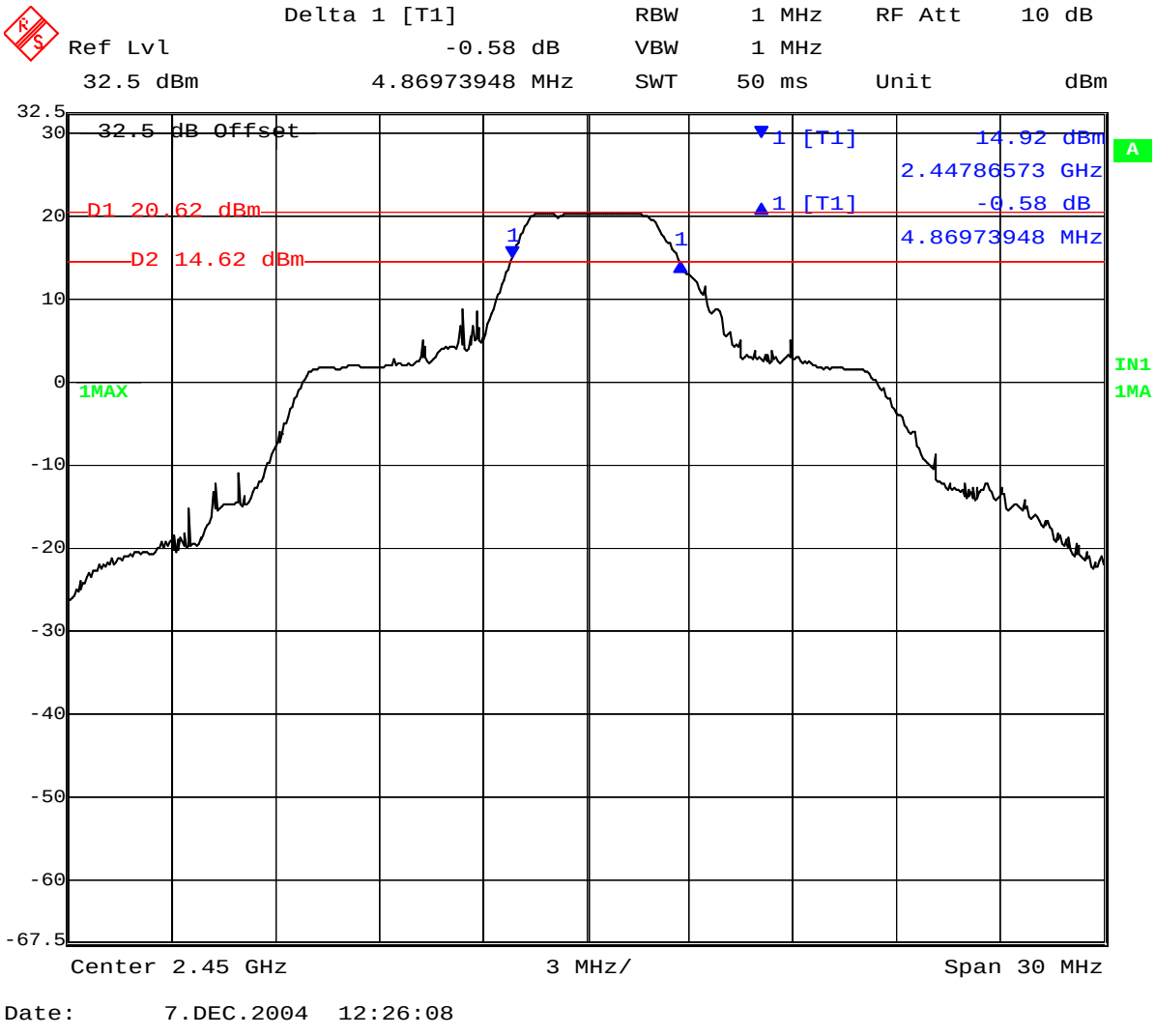
Asset #	Instrument	Manufacturer	Part #	Calibration Due Date	Serial #
0070	Power Meter	Hewlett Packard	437B	13th May '05	3125U13554
0078	Antenna (30M-2GHz)	Schaffner and Chase	CBLG140A	Not Applicable	1195
0088	Spectrum Analyzer	Hewlett Packard	8564E	15th May '05	
0104	1-18GHz Horn Antenna	The Electro-Mechanics Company	3115	12th Aug '05	9205-3882
0107	26.5GHz-40GHz	Northeast Microwave System	261A1599	30th Apr '05	971716-027
0116	Power Sensor	Hewlett Packard	R8485A	16th Mar '05	3318A19694
0134	Amplifier	Com Power	PA 122	1st Sept '05	181910
0145	18GHz-26.5GHz	Millimeter Products	261K	30th Apr '05	595
0156	Barometer /Thermometer	Control Co.	4196	12th Aug '05	E2844
0184	Pulse Limiter	Rhode & Schwartz	ESH3Z2	1st Dec '05	357.8810.52
0190	LISN	Rhode & Schwartz	ESH3Z5	3rd Apr '05	836679/006
0193	EMI Receiver	Rhode & Schwartz	ESI 7	16th Mar '05	838496/007
0213	20-300MHz Antenna	Schwarzbeck	VHBB 9124	6th Apr '05	9124/0257
0250	230MHz-1GHz Antenna	Schwarzbeck	VUSLP9111	6th Apr '05	186
0251	SMA Cable	Megaphase	Sucoflex 104	18th Jun '05	Unknown
0252	SMA Cable	Megaphase	Sucoflex 104	18th Jun '05	Unknown
0253	SMA Cable	Megaphase	Sucoflex 104	18th Jun '05	Unknown
0256	SMA Cable	Megaphase	Sucoflex 104	18th Jun '05	Unknown
0293	BNC Cable	Megaphase	Unknown	18th Jun '05	Unknown
0304	2.4GHz Notch Filter	Micro-Tronics	--	N/A	--
0307	BNC Cable	Megaphase	Unknown	18th Jun '05	Unknown
0310	2m SMA Cable	Micro-Coax	UFA210A-0-0787-3G03G0	16th Dec '05	209089-001
0311	12-18GHz High Pass Filter	CMT	--	--	--
0312	3m SMA Cable	Micro-Coax	UFA210A-1-1181-3G0300	16th Dec '05	209092-001
0313	Coupler	Hewlett Packard	86205A	N/A	1623
0314	30dB N-Type Attenuator	NARDA	32319	N/A	--
0315	17-26.5GHz High Pass Filter	HP	--	--	--

8. GRAPHICAL RESULTS

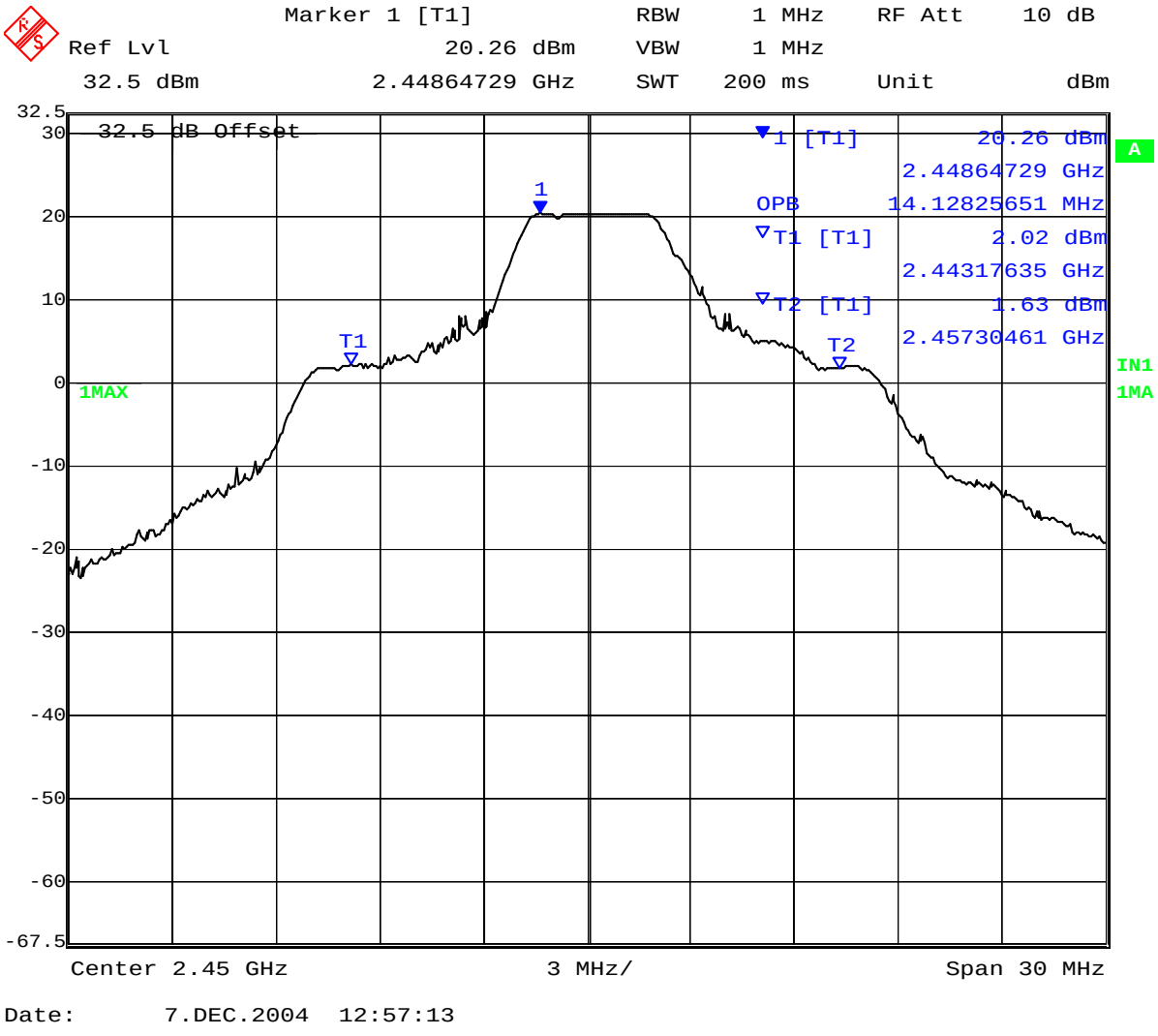
This report contains the following plots as referenced in the test results, Section 5 of this report. Only worst case plots are reported. All additional plots are held on file in the laboratory.

Parameter	Plot No.
Section 5.1.1 6dB Bandwidth	
Channel 3 (2,450MHz)	01
Section 5.1.1 99% Bandwidth	
Channel 3 (2,450MHz)	02
Section 5.1.2 Peak Output Power	
Channel 1 (2,414MHz)	03
Section 5.1.3 Peak Power Spectral Density	
Channel 1 (2,414MHz)	04
Section 5.1.5 Conducted Spurious Emissions	
Lower Band Edge 2,414MHz	05
Upper Band Edge 2,450MHz	06
1-26GHz conducted spurious emissions	
30 – 7,000MHz	07
7,000 - 12,000MHz	08
12,000 – 18,000MHz	09
18,000 – 26,000MHz	10
Section 5.1.6 Radiated Spurious Emissions	
5.1.6.1 Transmitter Radiated Spurious Emissions 1-26GHz	
Antenna 1 Channel 1 1-12GHz	11
Antenna 1 Channel 1 12-18GHz	12
Antenna 2 Channel 2 1-12GHz	13
Antenna 2 Channel 2 12-18GHz	14
Antenna 3 Channel 2 1-12GHz	15
Antenna 3 Channel 2 12-18GHz	16
5.1.6.3 Radiated Spurious Emissions 30M-1GHz	17
Section 5.1.7 AC Wireline Conducted Emissions Live & Neutral	
Transmitter	18
Receiver	19

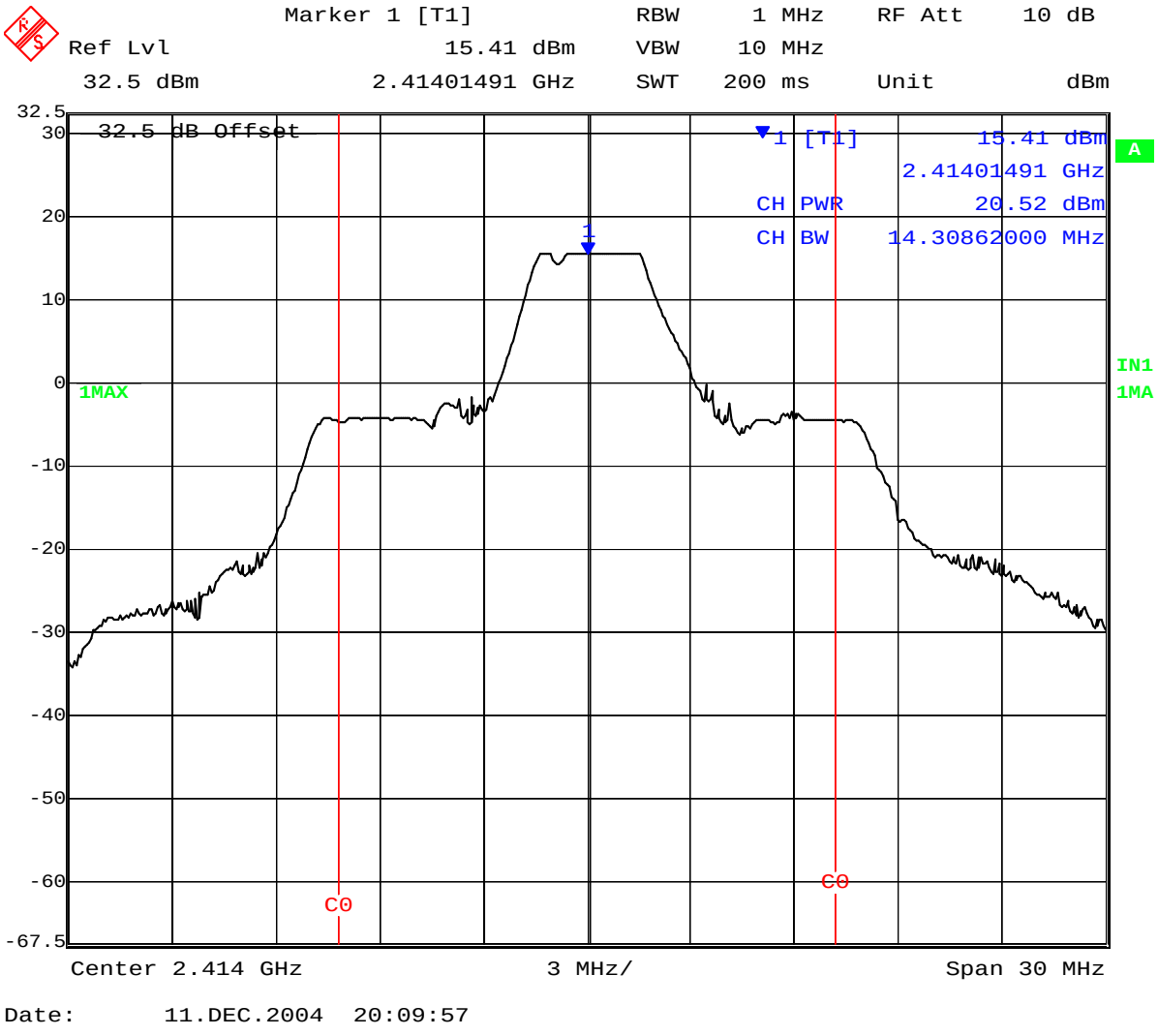
Plot 01 - 6 dB Bandwidth (2,450 MHz)



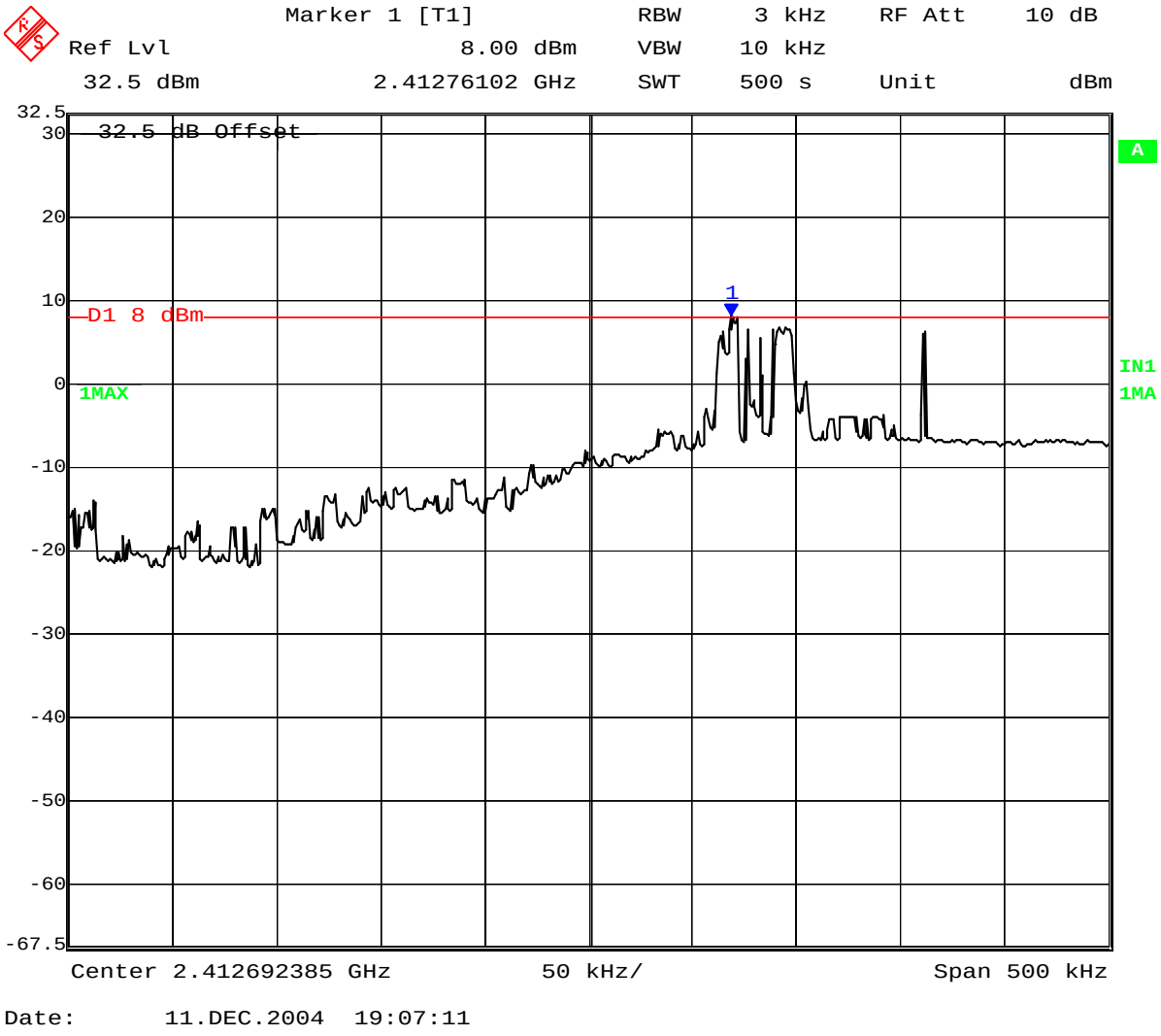
Plot 02 - 99 % Bandwidth (2,450 MHz)



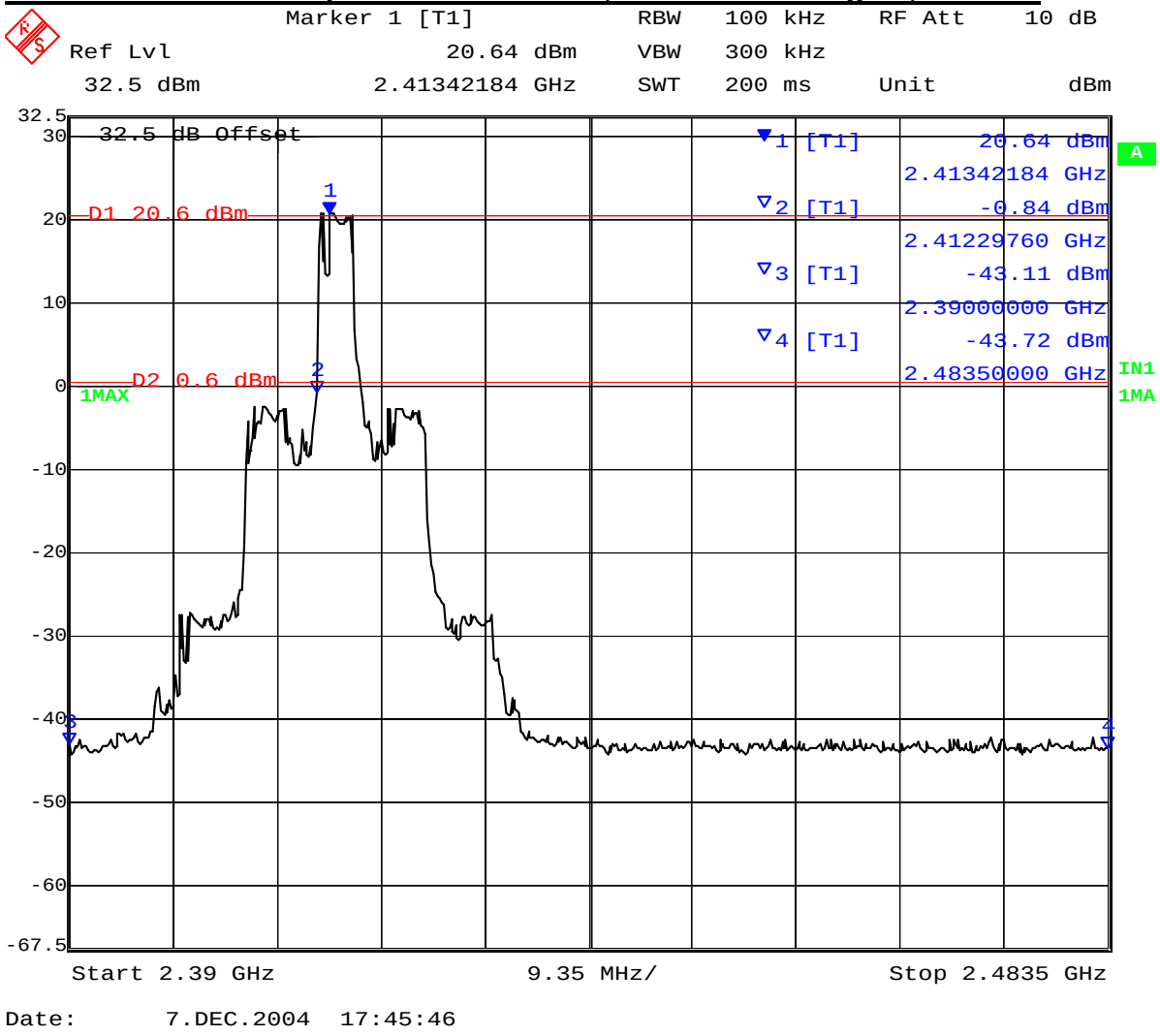
Plot 03 - Peak Output Power (2,414 MHz)



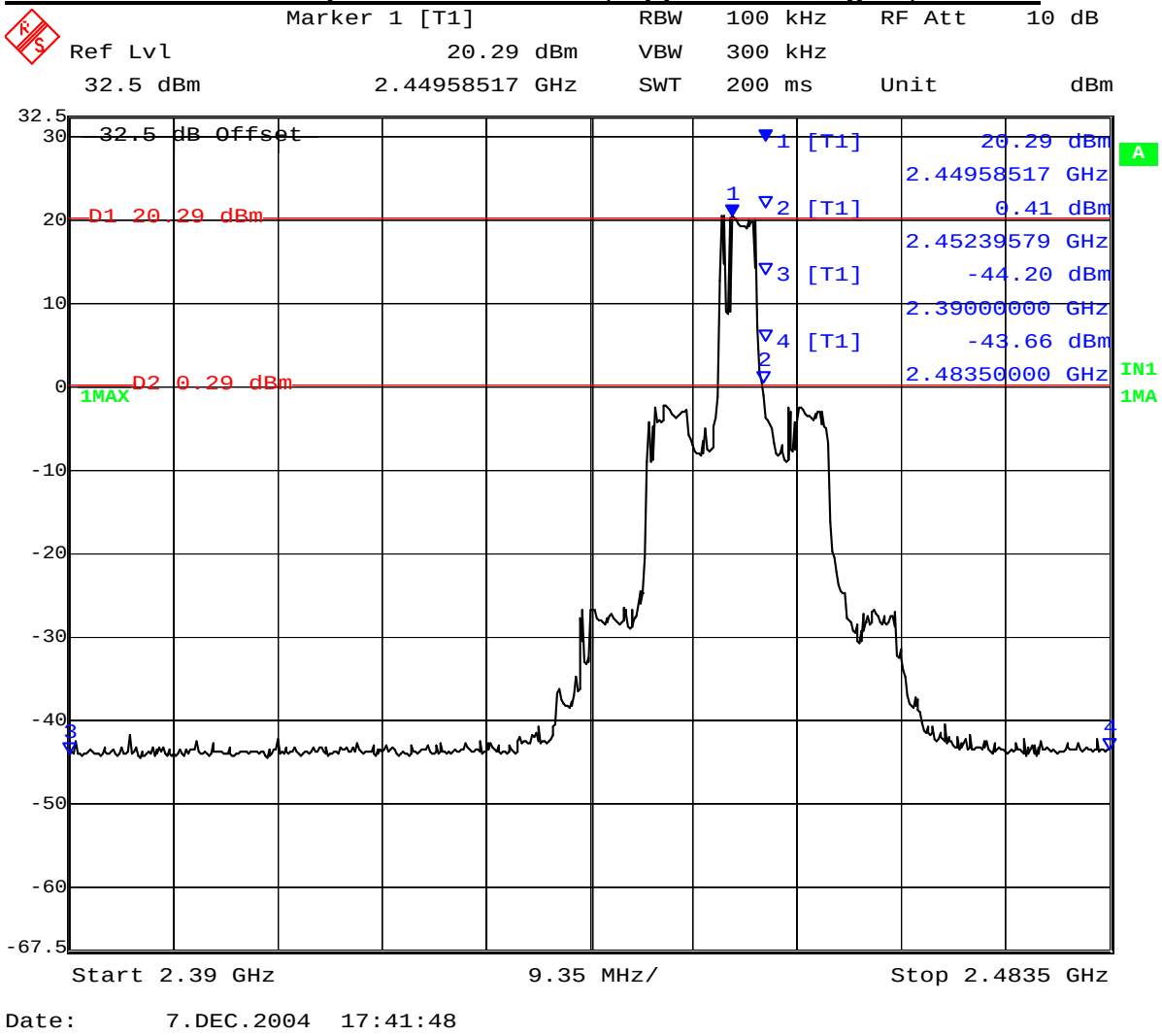
Plot 04 - Peak Power Spectral Density (2,414 MHz)



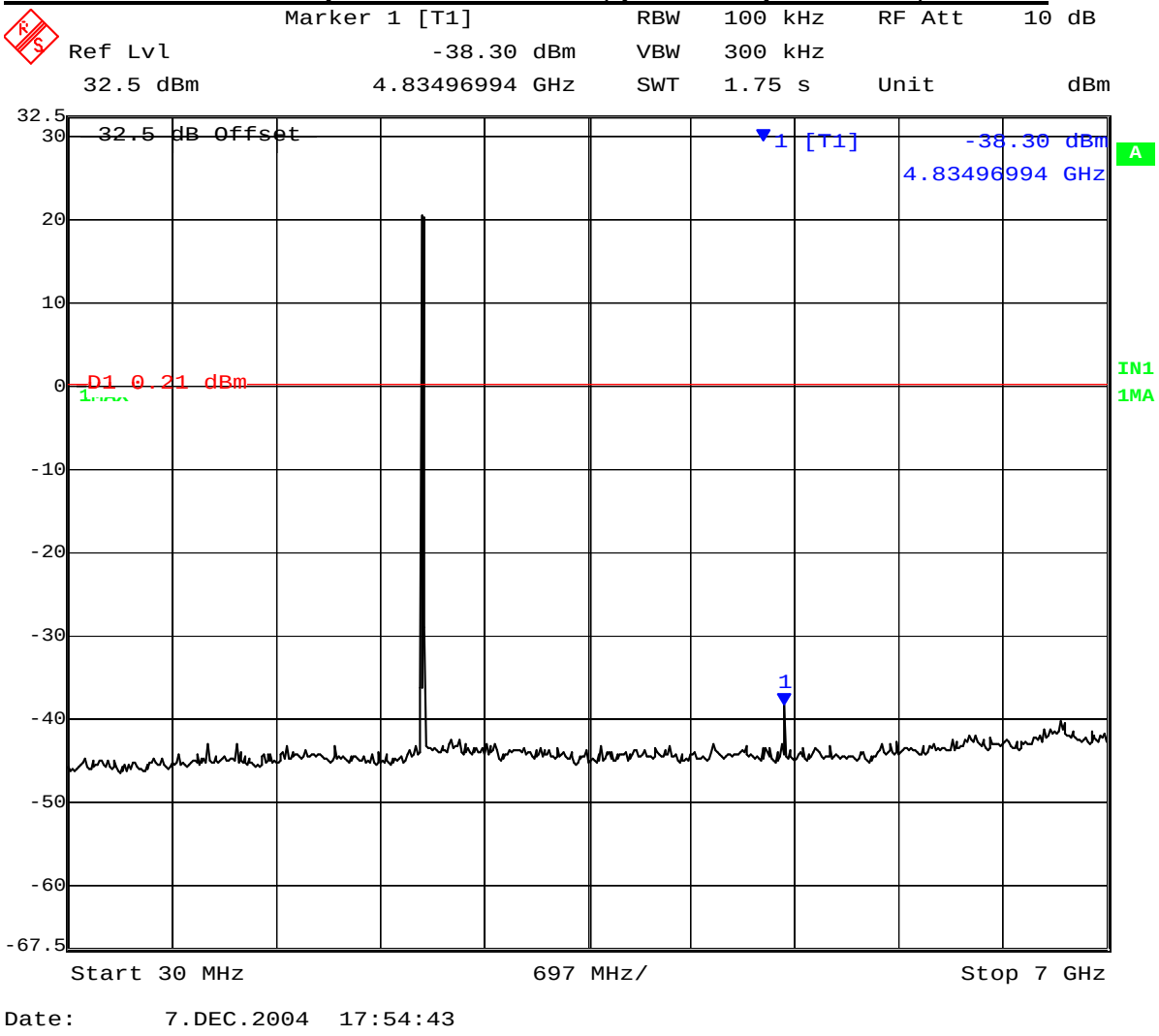
Plot 05 - Conducted Spurious Emissions, Lower Band Edge 2,414 MHz



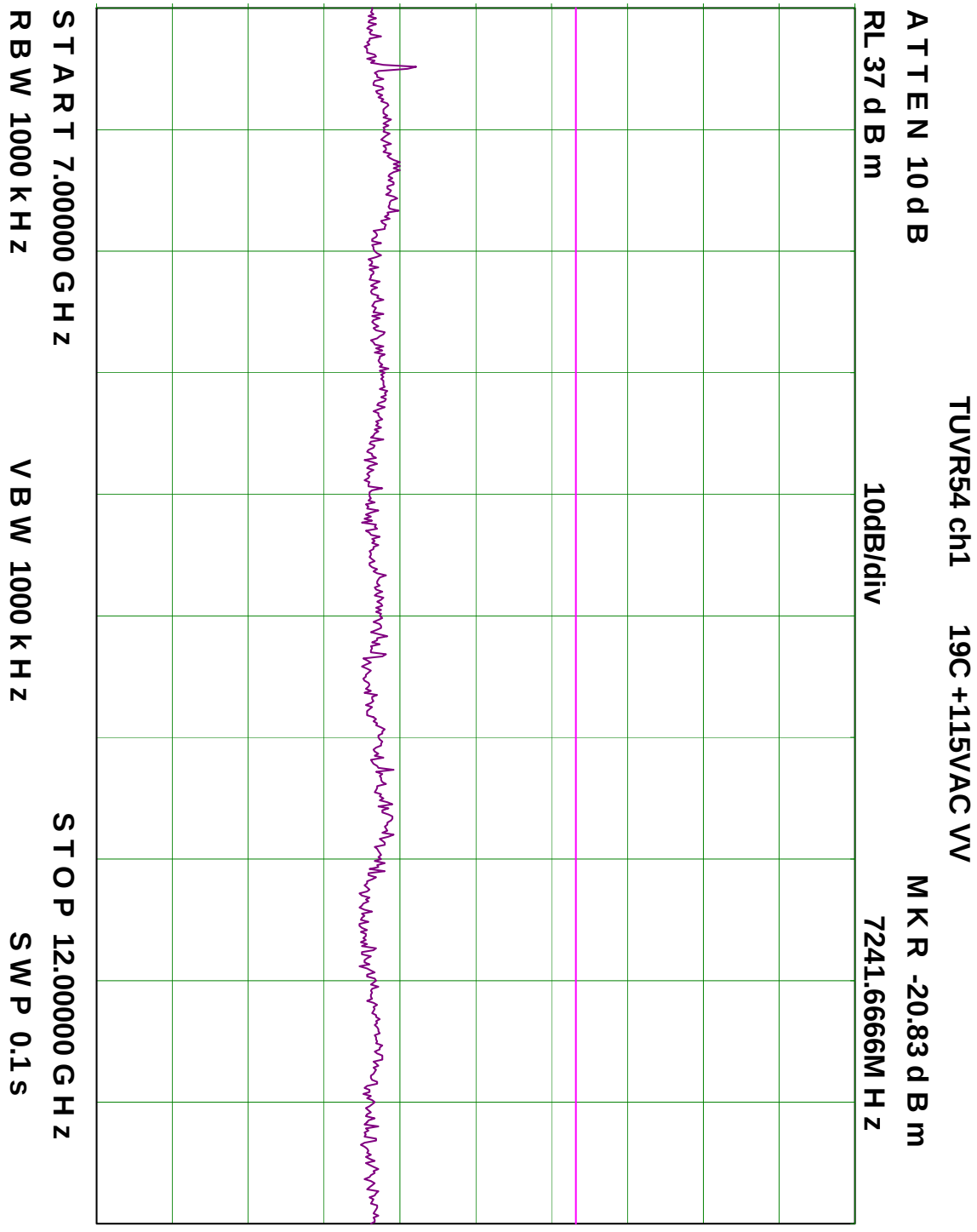
Plot 06 - Conducted Spurious Emissions, Upper Band Edge 2,450 MHz



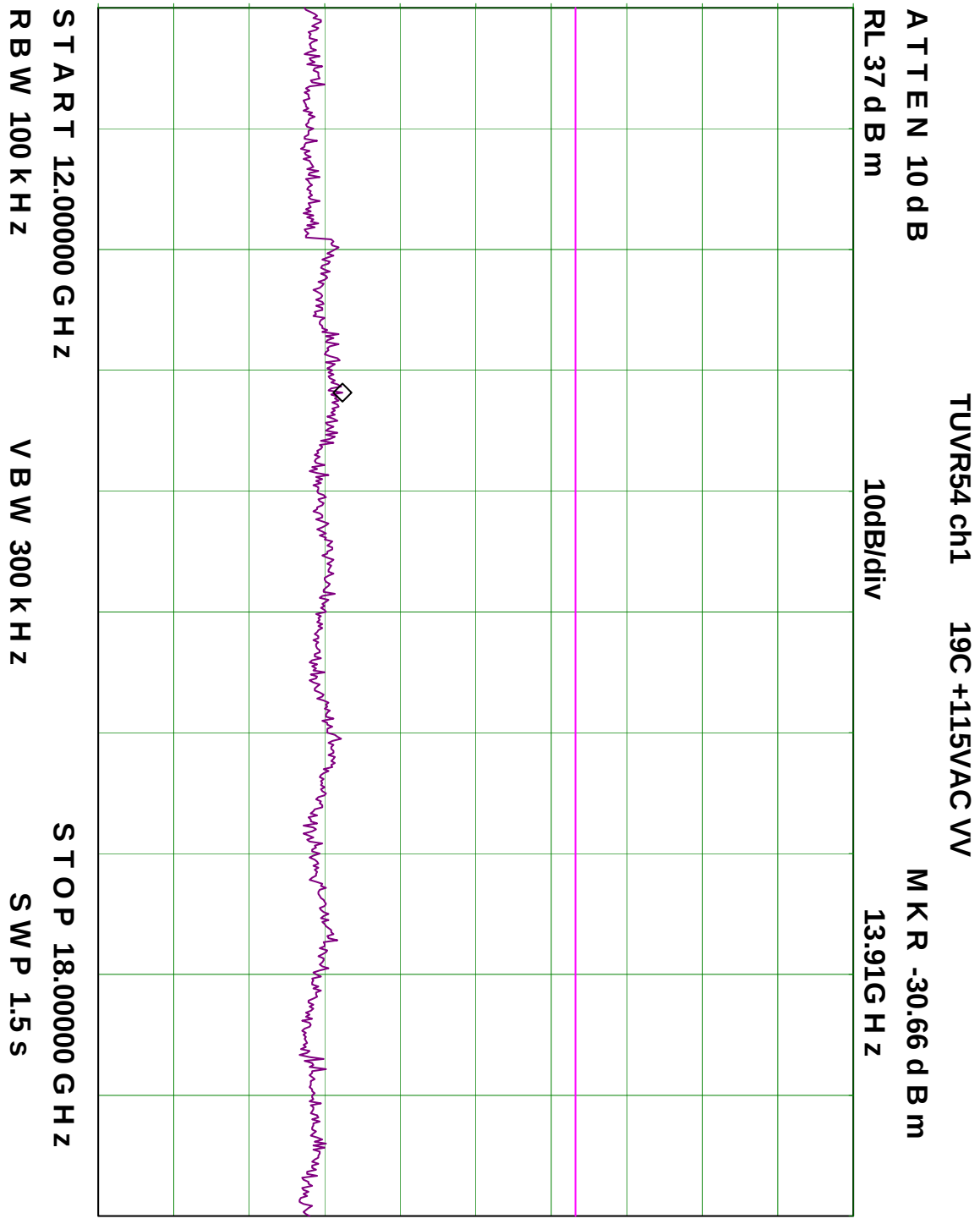
Plot 07 - Conducted Spurious Emissions, (1-26 GHz) 30 MHz-7,000 MHz



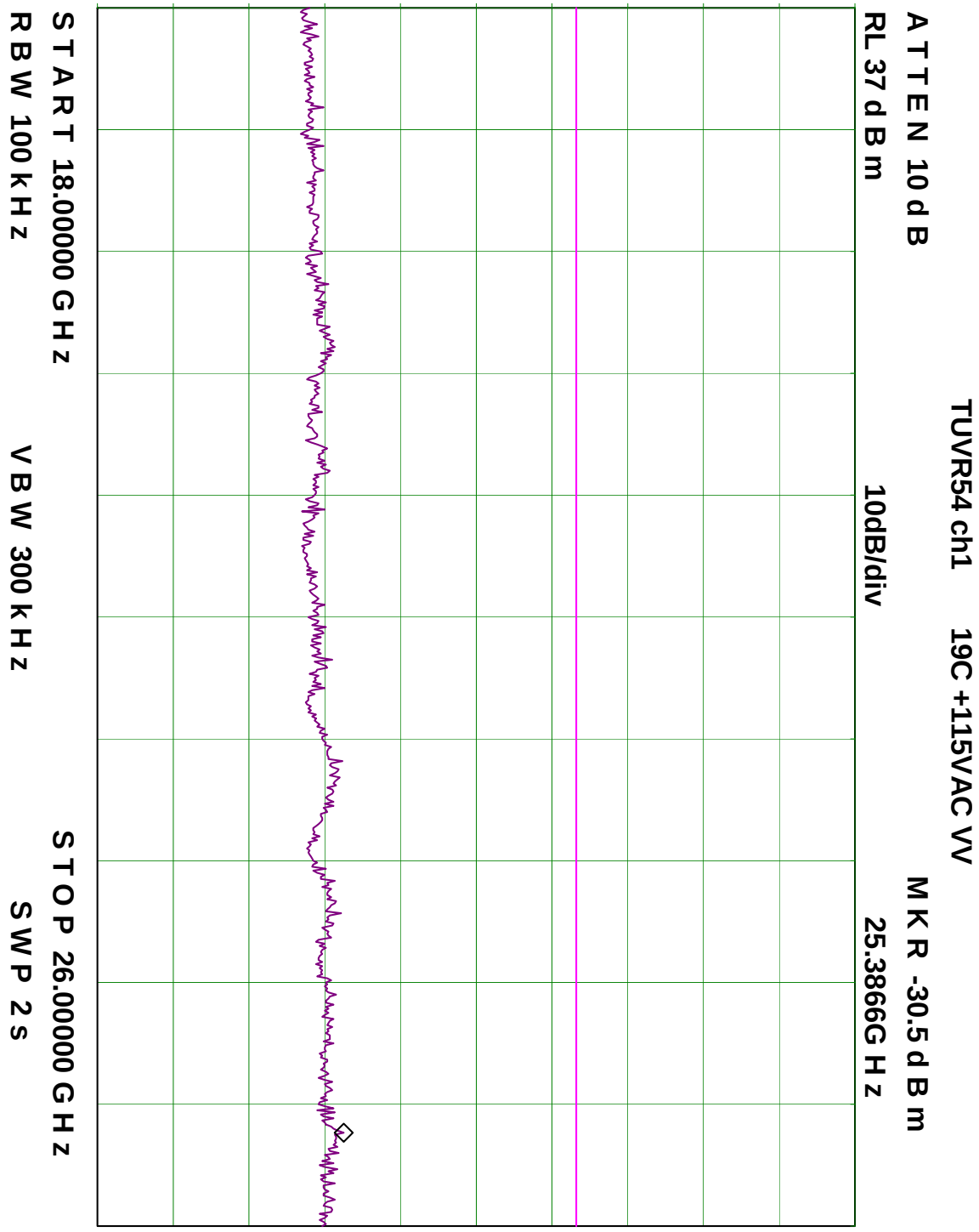
Plot 08 - Conducted Spurious Emissions, (1-26 GHz) 7,000– 12,000 MHz



Plot 09 - Conducted Spurious Emissions, (1-26 GHz) 12,000-18,000 MHz

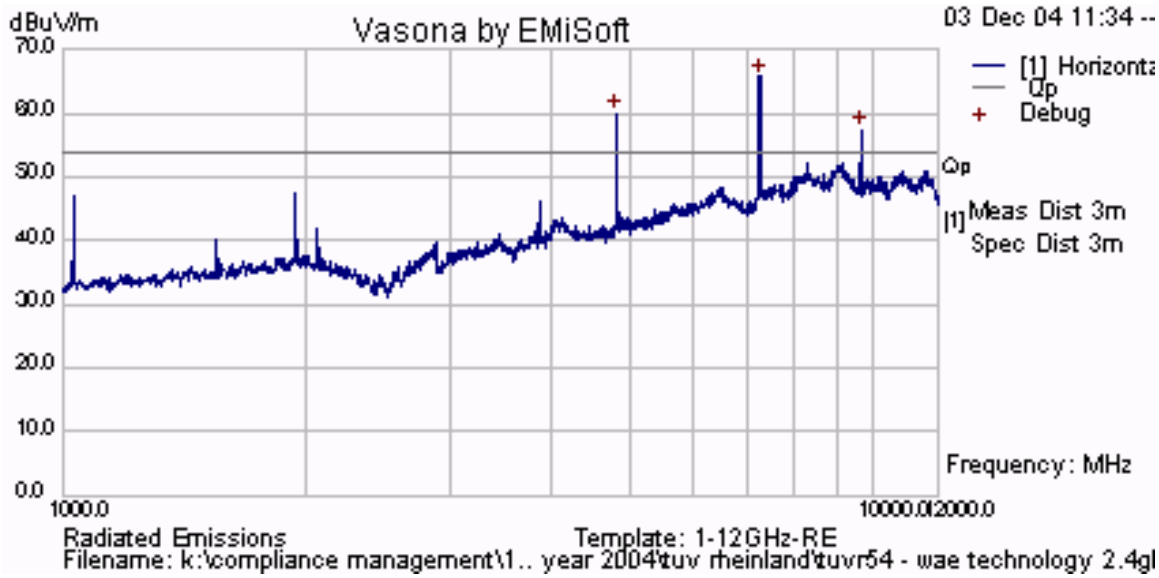


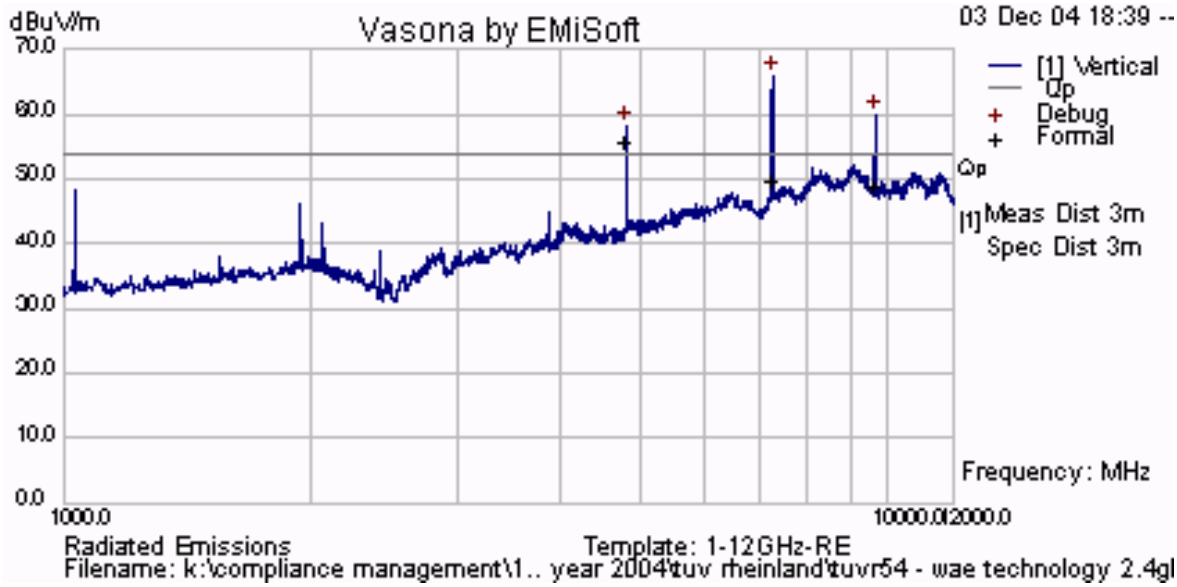
Plot 10 - Conducted Spurious Emissions, (1-26 GHz) 18,000-26,000 MHz



Plot 11 – Antenna 1 Radiated Emissions, Transmitter Spurious CH1 1-12 GHz

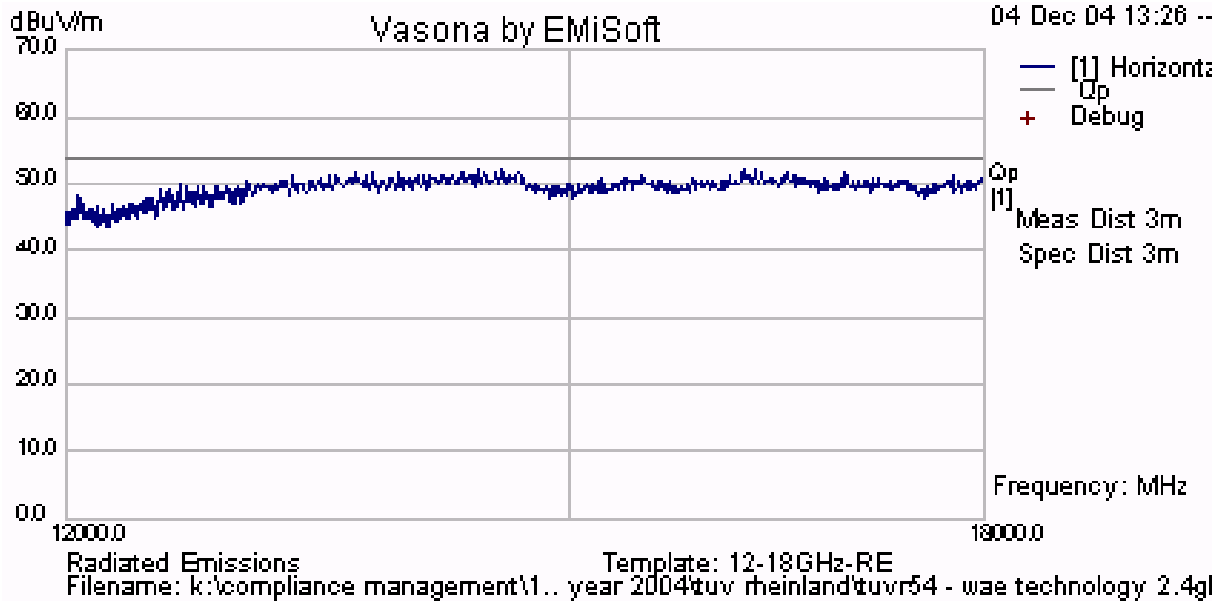
5dBi Omni Directional

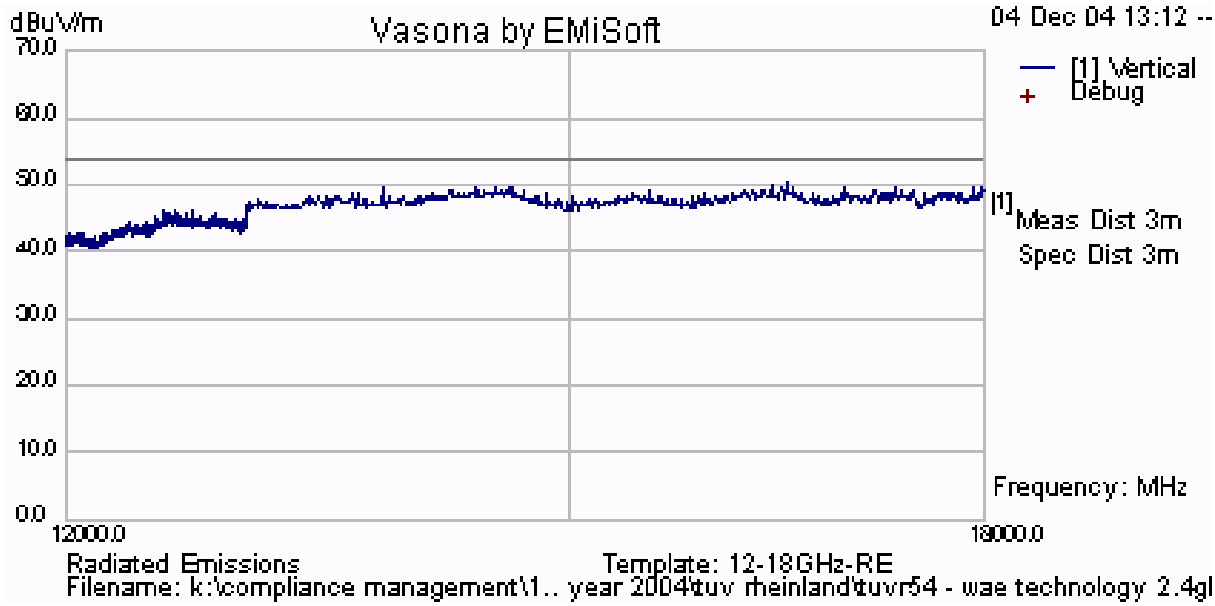




Plot 12 – Antenna 1 Radiated Emissions, Transmitter Spurious CH1 12-18 GHz

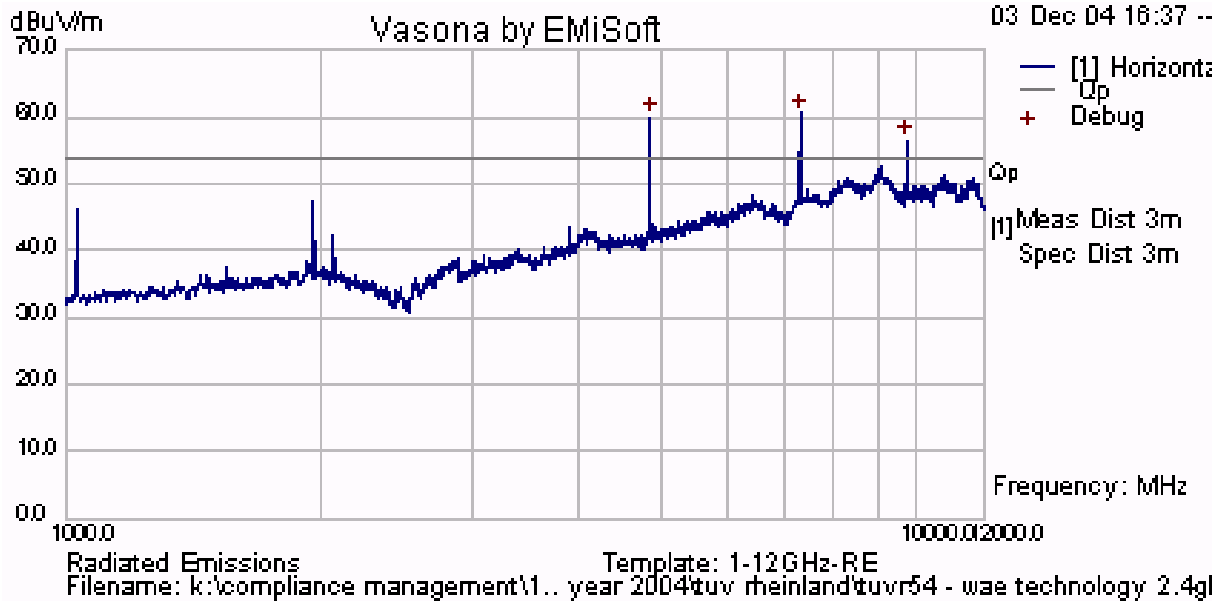
5dBi Omni Directional Channel 1

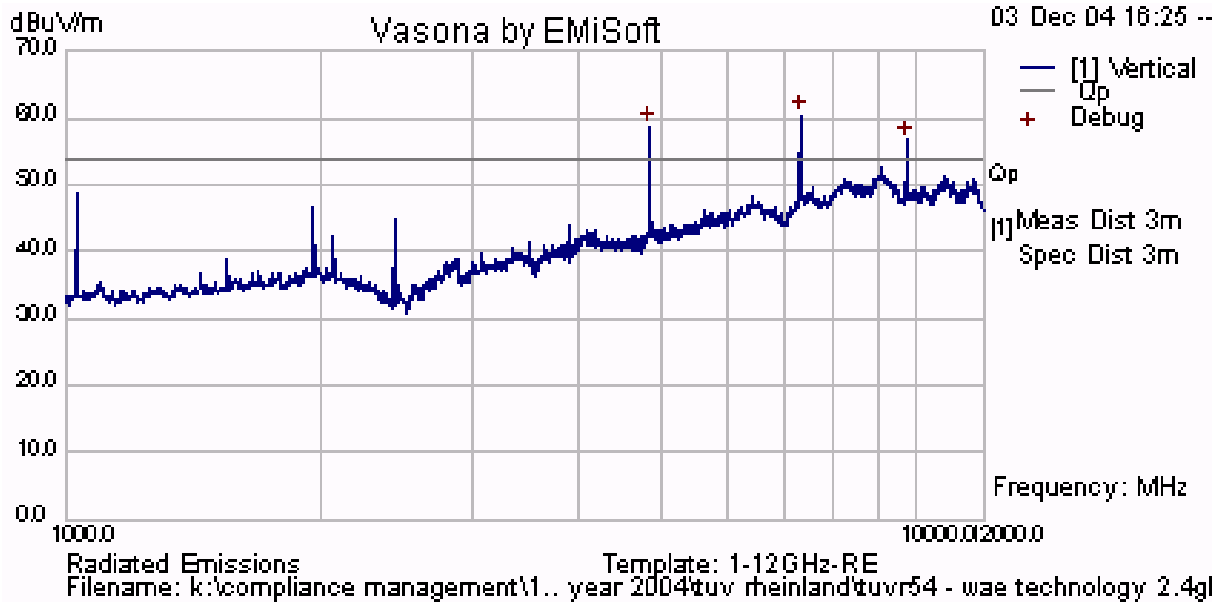




Plot 13 – Antenna 2 Radiated Emissions, Transmitter Spurious CH2 1-12 GHz

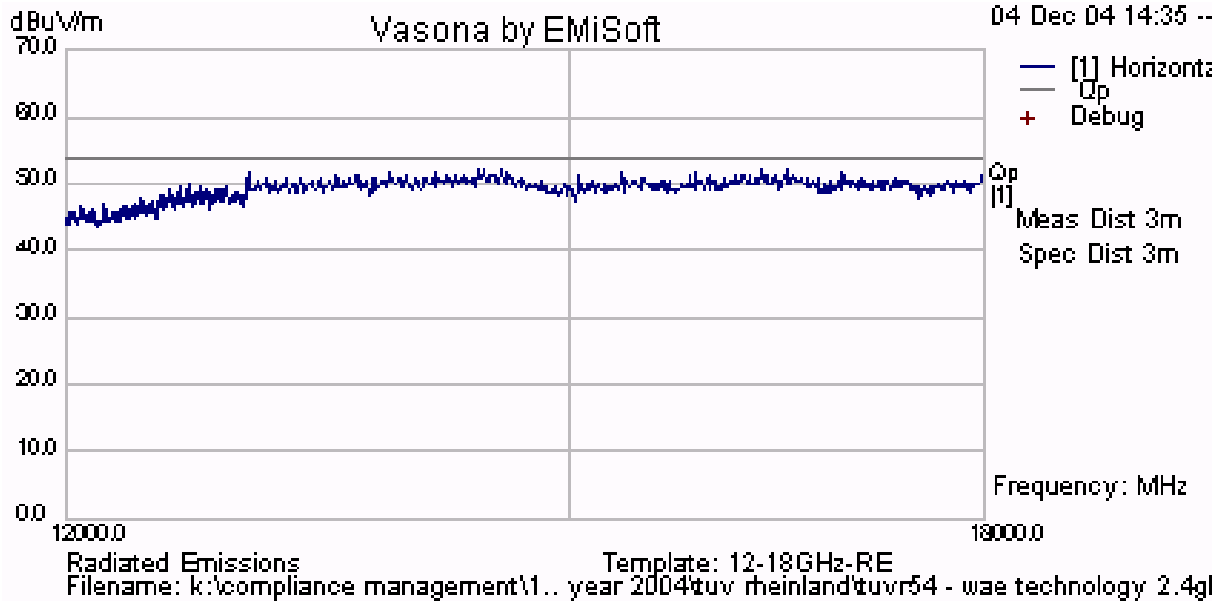
Antenna 2 8dBi Omni Directional Channel 2 Plots 1-12GHz

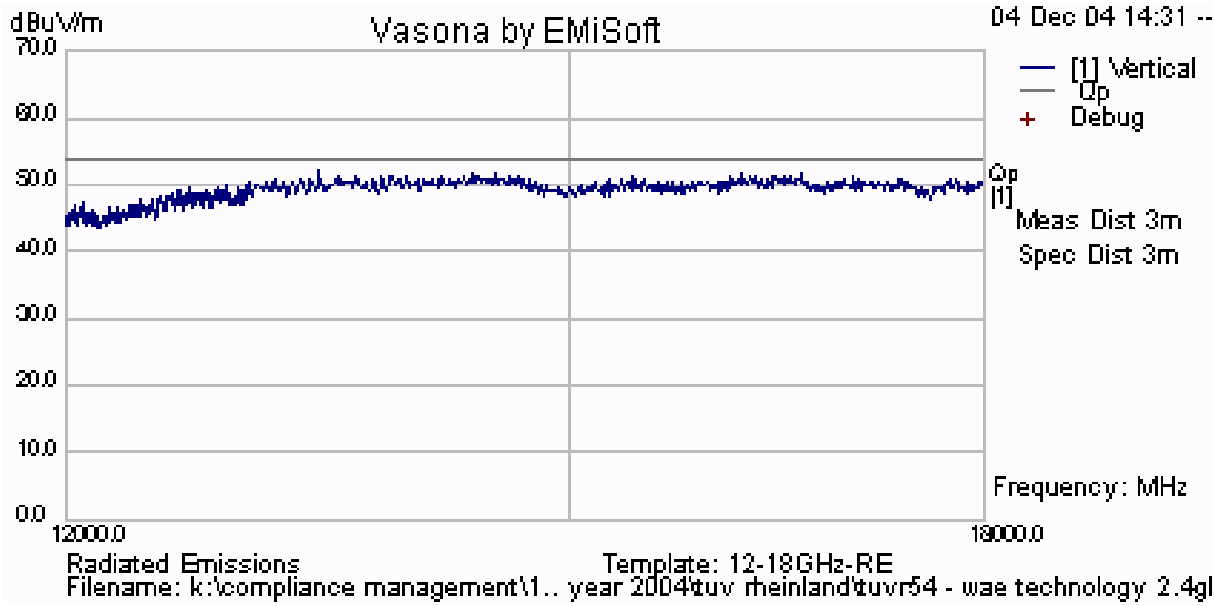




Plot 14 – Antenna 2 Radiated Emissions, Transmitter Spurious CH2 12-18 GHz

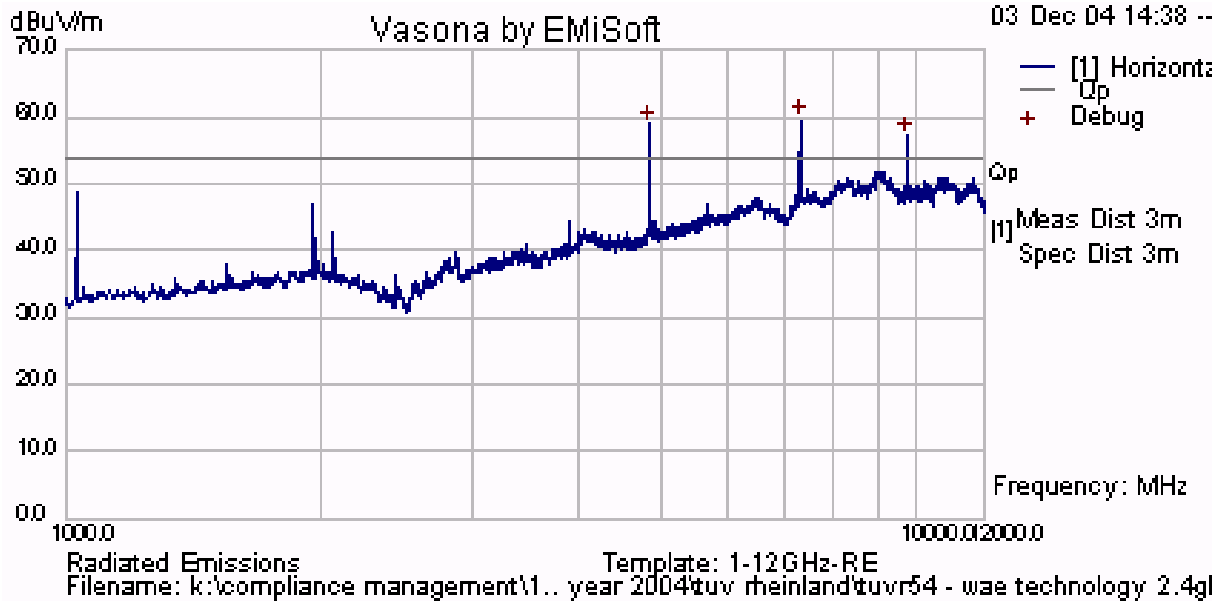
Antenna 2 8dBi Omni Directional Channel 2 Plots 12-18GHz

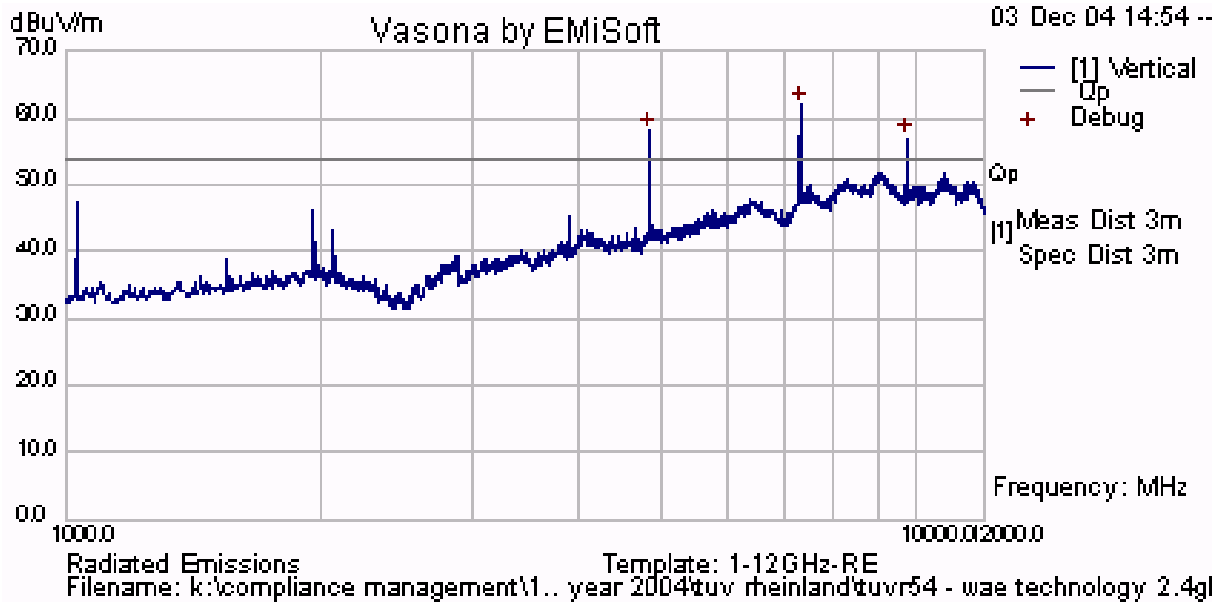




Plot 15 – Antenna 3 Radiated Emissions, Transmitter Spurious CH2 1-12 GHz

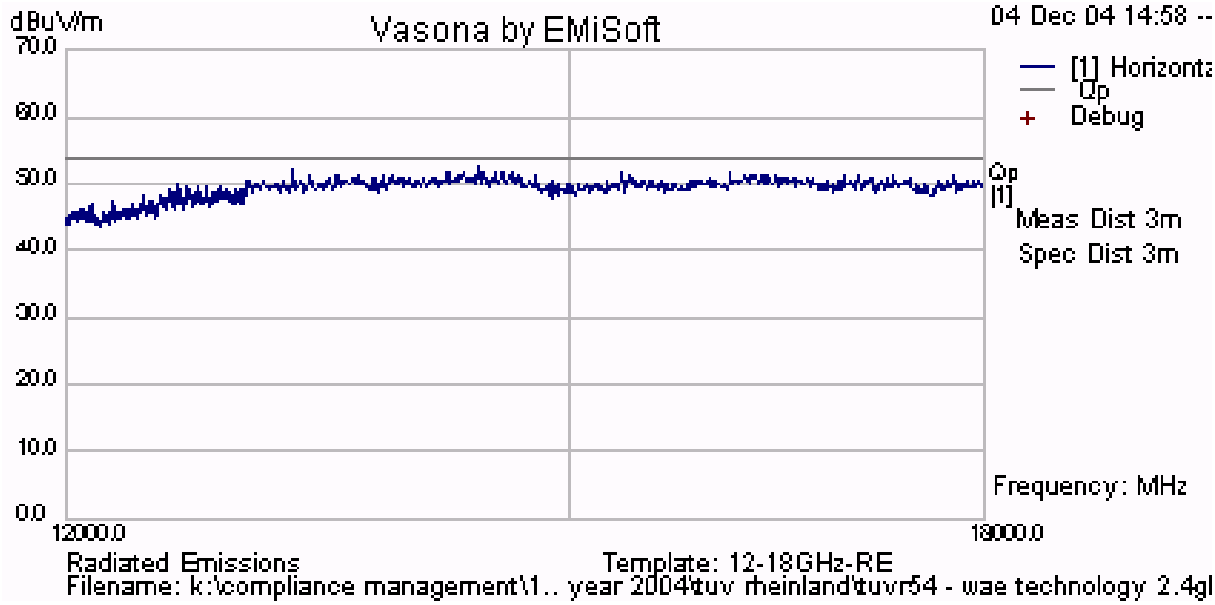
Antenna 3 15dBi Yagi Channel 2 Plots 1-12GHz

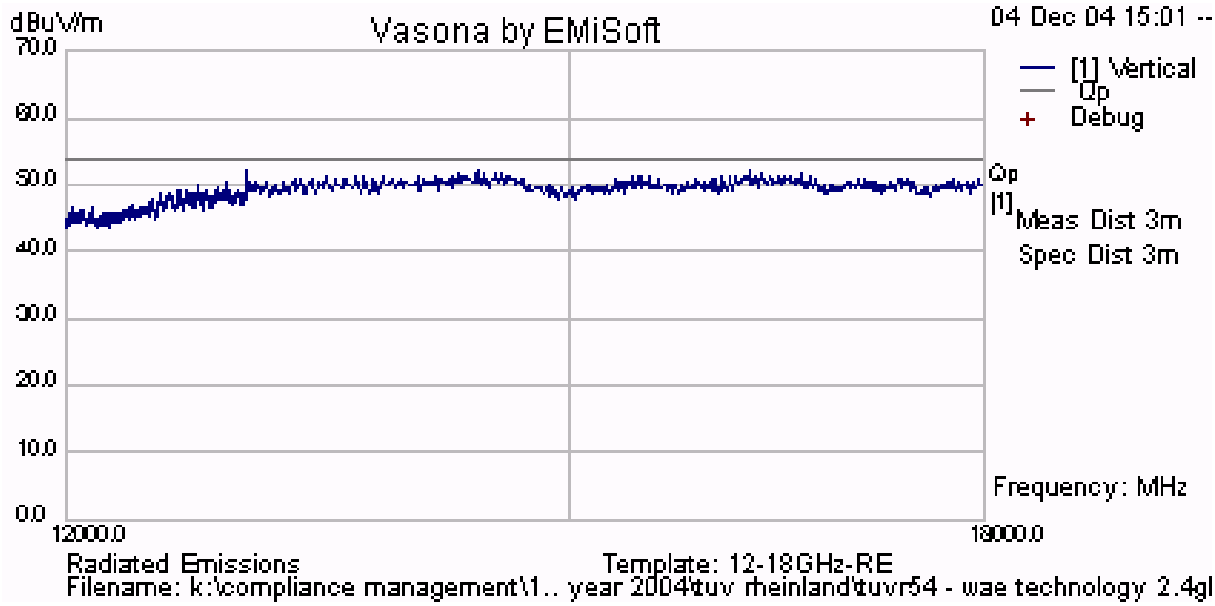




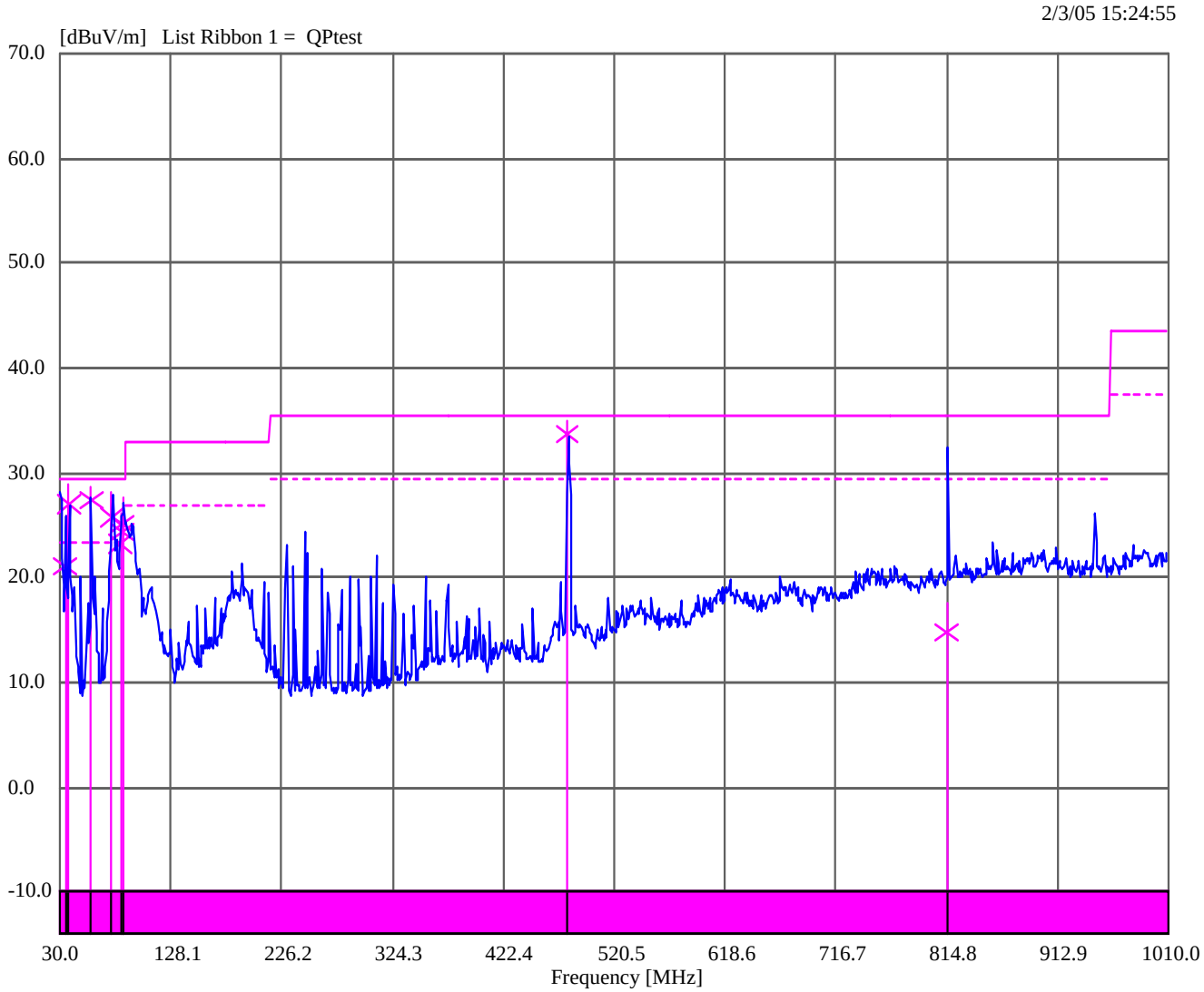
Plot 16 – Antenna 3 Radiated Emissions, Transmitter Spurious CH2 12-18 GHz

Antenna 3 15dBi Yagi Channel 2 Plots 12-18GHz



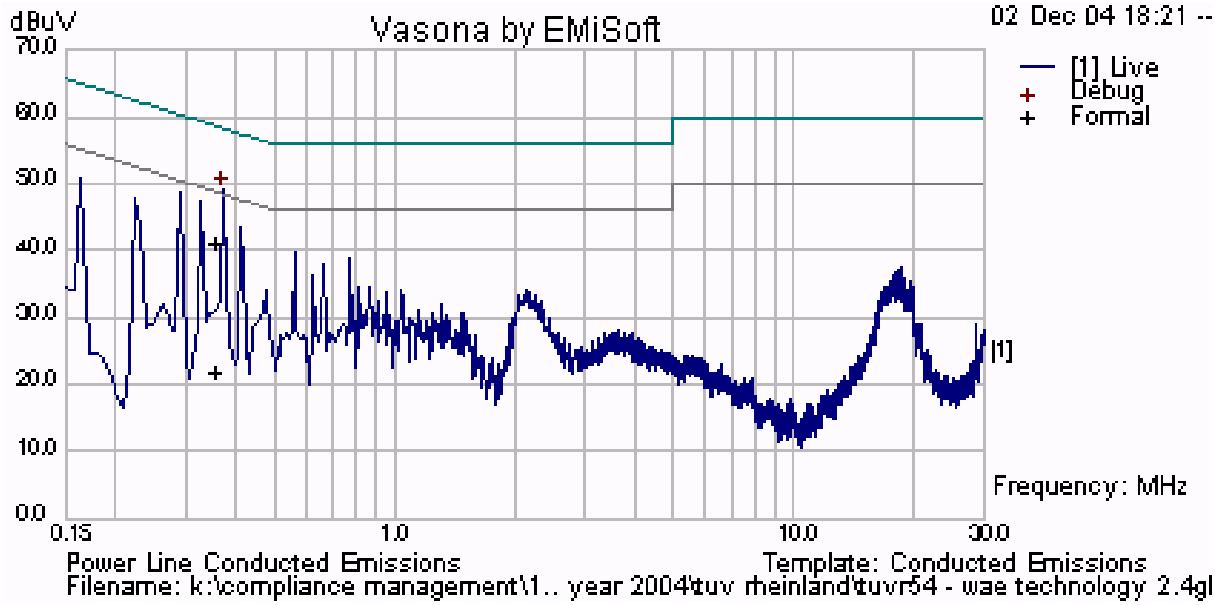


Plot 17 - Radiated Spurious Emissions 30M-1 GHz

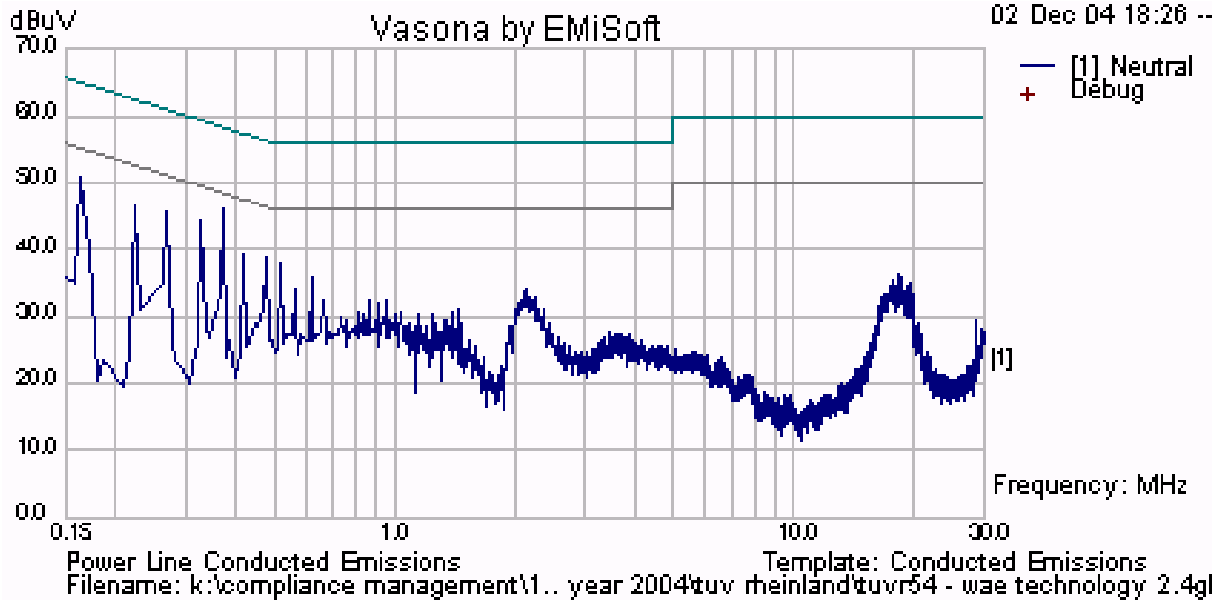


Plot 18 – Transmitter AC Wireline Conducted Emissions

Live Line

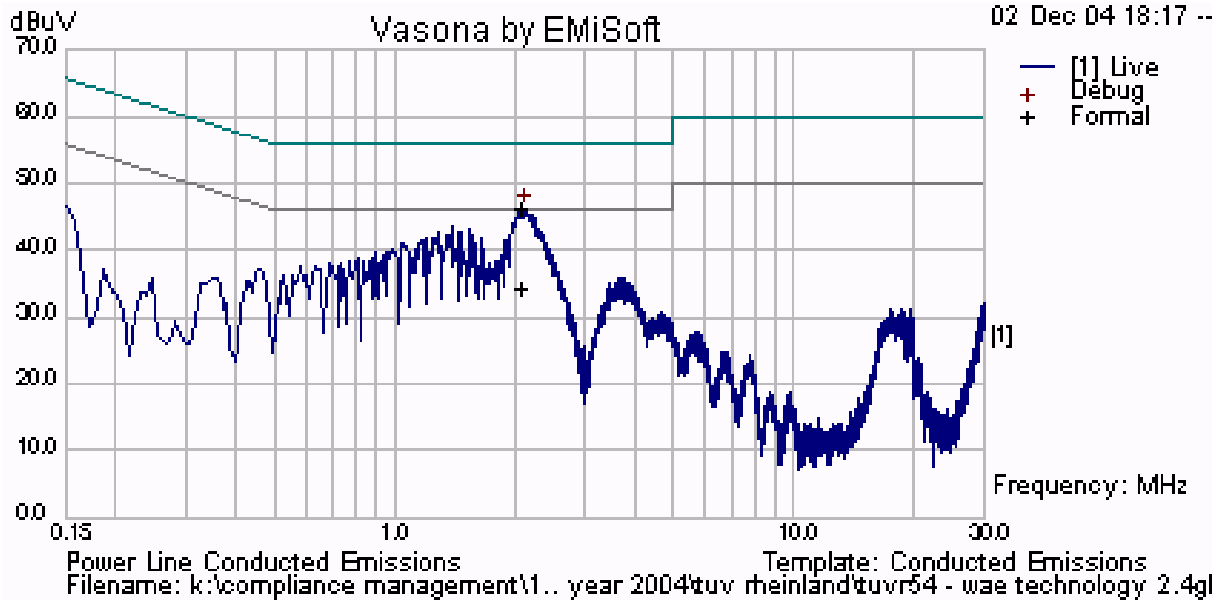


Neutral Line

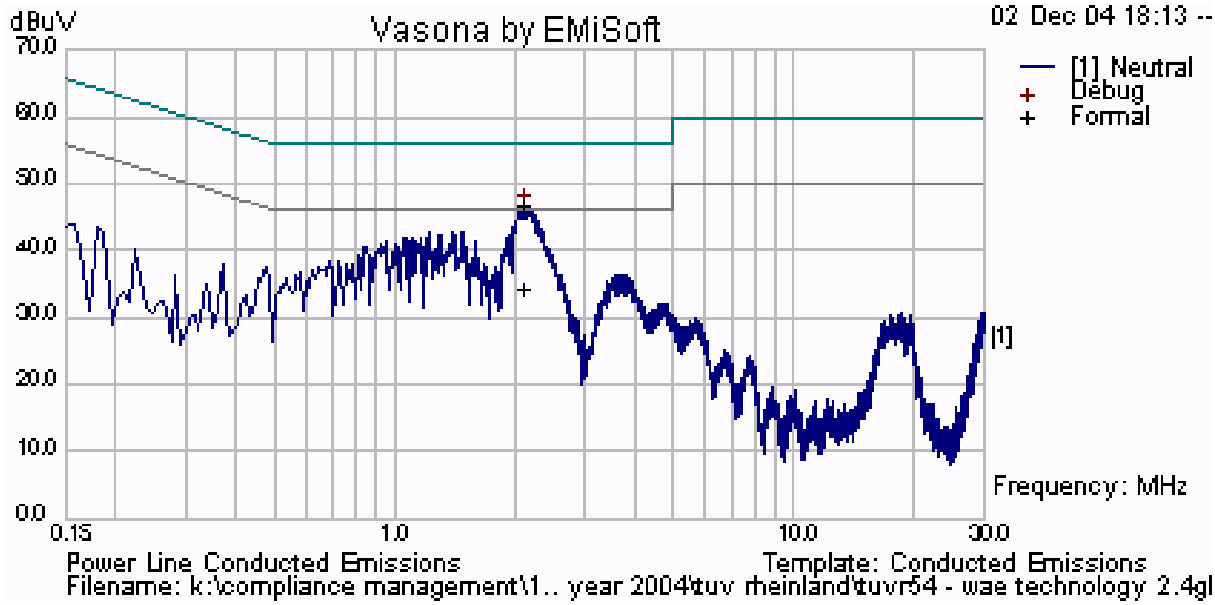


Plot 19 – Receiver AC Wireline Conducted Emissions

Live Line



Neutral Line



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