Test of WiFlyer 802.11b Wireless LAN

To FCC 47 CFR Part 15.247 & IC RSS-210

Test Report Serial No.: ALON01/REV C

TEST REPORT

FROM

Test of WiFlyer 802.11b Wireless LAN

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

Test Report Serial No.: ALON01 REV C

This report supersedes: ALON01 REV B

Company: Always On Wireless
3701 Kirby Drive, Suite 1090
Houston, Texas 77098
USA

Copy No: pdf

Issue date: 4th October '04

This Test Report is Issued Under the Authority

of

MiCOM Labs, Inc.

UKAS (United Kingdom Accreditation Service) Testing Laboratory No. 2016

2106

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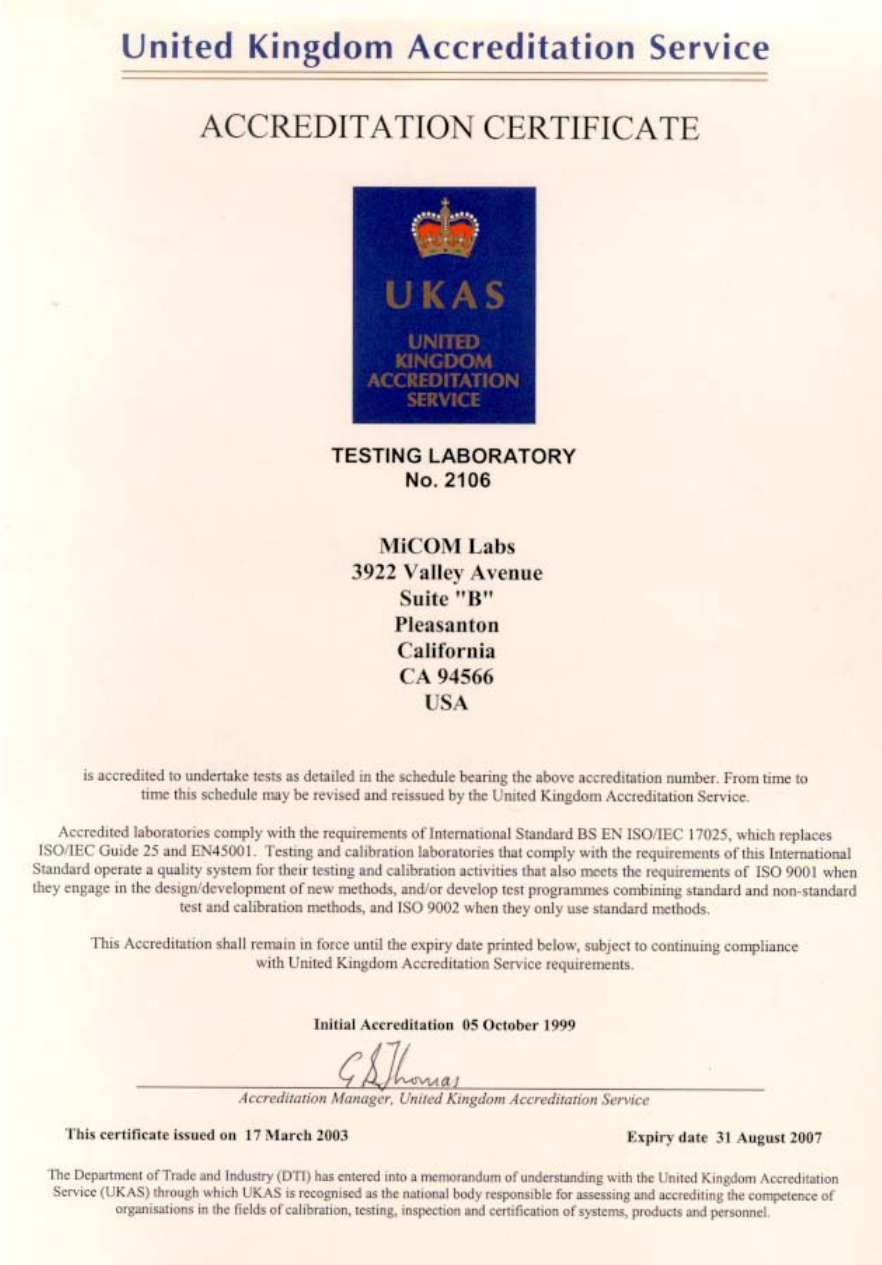
ACCREDITATION

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 S 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
Initial Draft	31st August '04	
Final Draft	17th September '04	
Rev A	22nd September '04	
Rev B	27th September '04	Bookmarks added
Rev C	4th October '04	Included Band Edge Plots

1. TEST RESULT CERTIFICATE

Company Name:	Always On Wireless	Tested By:	MiCOM Labs, Inc.
	3701 Kirby Drive, Suite 1090		3922 Valley Avenue
	Houston, Texas 77098, USA		Suite 'B'
EUT Description:	Product Description		Pleasanton
Model:	WDB20B S/N's: 7, 11, 13		California 94566, USA
Date(s) Tested:	30th July - 25 August '04		Tel: (+1) 925 462 0304

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

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 the test methods used have been recorded and are 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, Inc.

Gordon Hurst
President & CEO MiCOM Labs, Inc.

2. REFERENCES AND MEASUREMENT UNCERTAINTY

2.1. Normative References

Ref.	Publication	Year	Title
(i)	FCC 47 CFR Parts 15.247	2001	Code of Federal Regulations
(ii)	Industry Canada RSS-210	Issue 5 Nov. 2001	Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands)
(iii)	ANSI C63.4	2000	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9KHz to 40GHz
(iv)	CISPR 22/ EN 55022	1997 1998	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
(v)	M 3003 Addition 1	Edit 1 Dec. 1997	Expression of Uncertainty and Confidence in Measurements
(vi)	LAB34	August 2002	Edition 1. 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 URN98/887	1998	Conditions for the use of National Accreditation Marks by UKAS and UKAS Accredited Organizations
(ix)	UKAS Lab 1	Edition 3, June 2001	Reference to Accreditation for Laboratories

2.2. Test and Uncertainty Procedures

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, Normative Reference **(iii)**.

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, Normative Reference **(v)**.

3. PRODUCT DETAILS AND TEST CONFIGURATIONS

3.1. Technical Details

Purpose:	To test the WiFlyer 802.11b Wireless LAN to FCC and Industry Canada regulations
Applicant / Client:	Always On Wireless 3701 Kirby Drive, Suite 1090 Houston, Texas 77098, USA
Company:	As applicant/client
Laboratory performing the tests:	MiCOM Labs, Inc. 3922 Valley Avenue, Suite "B" Pleasanton, California 94566 USA
Test report reference number:	ALON01 REV C
Date EUT received:	30th July '04
Standard(s) applied:	FCC 47 CFR Part15.247 & IC RSS-210
Dates of test (from - to):	30th July - 25 August '04
No of Units Tested:	Three Separate Units
Equipment Category:	Access Point
Manufacturers Trade Name:	WiFlyer
Type of Equipment:	DSSS 802.11b access point
Location for use:	Indoor use only
Full Frequency Range(s):	2.4 – 2.4835GHz
Modulation:	Per 802.11b – DBPSK, DQPSK, CCK
Client Declared Nominal Output Power:	Fixed at +16dBm
Transmit/Receive Operation:	Simplex
Rated Input Voltage and Current:	115Vac/6Vdc @ 0.4amps (worst case)
Temperature Range:	0 to 40ºC
Equipment Dimensions:	80 x 25.4 x 129.5 (mm)
Weight:	185 grams
ITU Emission Designator:	15M8D7D
Microprocessor(s):	Ubicom IP2022/PQ80-120
Clock/Oscillator(s):	4.8MHz, 22MHz, 29.4912MHz
Frequency Stability:	±25ppm/year
Primary Function:	To initiate and receive Data Transmission, Telemetry, Telecommand

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

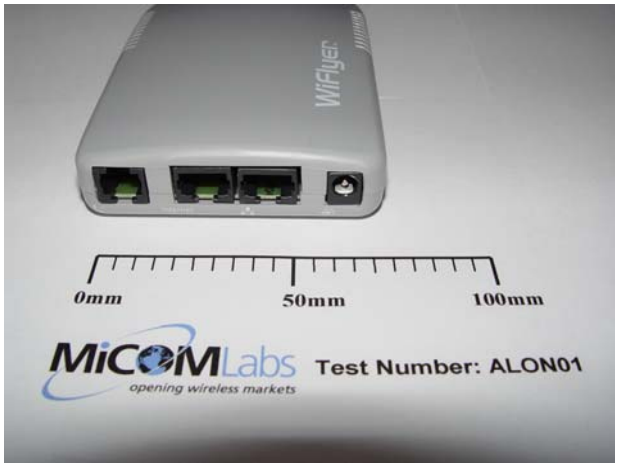
NAME	MODEL No.	SERIAL No.	TYPE	UTILIZATION
WiFlyer 802.11b	WDB20B	7	Preproduction	Radiated Emissions <1GHz
WiFlyer 802.11b	WDB20B	11	Preproduction	Conducted Emissions
WiFlyer 802.11b	WDB20B	13	Preproduction	Conducted RF Testing and Radiated Spurious >1GHz
UNIFIVE PSU	UL305-0610	406-0044293	Production	Radiated & Conducted Emission Testing
UNIFIVE PSU	UL305-0610	406-0044301	Production	Conducted RF Testing and Radiated Spurious >1GHz

3.3. Antenna Details

Antenna Type	Gain (dBi)	Manufacturer	Model No.	Serial No.
Integral	0	Always On Wireless	AN-570-0004-00	Not Available
External Omni	6	Hawking	H-AI6SI	Not Available
External Dipole	6	Hawking	H-AI6SD	Not Available

3.4. WiFlyer 802.11b Wireless LAN

WiFlyer Case Style



WiFlyer Case Rear

WiFlyer with Hawkins 6dBi
Omni Directional Antenna

WiFlyer with Hawkins 6dBi
Dipole Antenna

3.5. Cabling and I/O Ports

Number and type of I/O ports

1. RJ11 PSTN, unscreened
2. RJ45 LAN 10MBit/s, unscreened
3. RJ45 WAN 10MBit/s, unscreened
4. 6Vdc Power Jack, unscreened
5. MCX external antenna socket, screened

3.6. Test Configurations

Matrix of test configurations

Operating Channel	Operating Frequency @ Maximum Power (MHz)	802.11b Data Rates	Data Rate(s) Selected for Test Purposes (Mbit/s)	
			Conducted	Radiated
1	2,412	1, 2, 5.5 11	11	11
6	2,437	1, 2, 5.5 11	11	11
11	2,462	1, 2, 5.5 11	11	11

Only worst case plots are provided for each test parameter are 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. Modifications were only made to serial number 11. S/N's 7 and 13 did not exhibit this modification.

1. AC Wireline Emissions (150KHz-30MHz) - ferrites required on dc power input (live and neutral lines) on the printed circuit board to reduce emissions below the limits specified. Ferrite supplier ACT, model number CBZ0805-800-45

Except for the above modifications which occurred on unit S/N 11 only, client declared all three models were identical for both hardware and software release(s). It is the client's opinion that all measurements taken on equipment without this modification were unaffected. As a result of testing without the modification the unwanted emissions on the dc power lines indicate worst case scenario. Test parameters measured without modification were conducted RF and radiated emission testing, identified in Section 4 Test Summary, test report Sections 5.1.1 through 5.1.6.

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

Radiated emission testing 30MHz-1GHz (Section 5.1.6.2 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, test laboratory NVLAP Lab Code #100411-0 are ISO/IEC 17025 accredited by NVLAP (National Voluntary Laboratory Accreditation Program) in the USA for emission testing 30MHz-1GHz.

4. TEST SUMMARY

List of Measurements

The following table represent 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**	6dB and 99% Bandwidth	>=500KHz	Conducted	Compliant	5.1.1
15.247(b) **6.2.2 (o) (b)**	Peak Output Power	Shall not exceed 1.0 W	Conducted	Compliant	5.1.2
15.247(d) **6.2.2 (o) (b)**	Peak Power Spectral Density	Shall not be greater than +8dBm in any 3kHz band	Conducted	Compliant	5.1.3
15.247(b)(5) **14**	Maximum Permissible Exposure	Exposure to radio frequency energy levels	Conducted	Compliant	5.1.4
15.247(c) **15.205(a) /** **15.209(a)** **6.2.2 (o) (e1)**	Conducted Spurious Emissions (1-26GHz)	The radiated emission in any 100kHz of out-band shall be at least 20dB below the highest in-band spectral density	Conducted	Compliant	5.1.5
5.205(a) / **15.209(a)** **6.3**	Radiated Emissions	Restricted Bands	Radiated	Compliant	5.1.6
	Transmitter Radiated Spurious Emissions	Emissions >1GHz (1-26GHz)			5.1.6.1
	Radiated Spurious Emissions	Emissions <1GHz (30M-1GHz)		CLASS B	5.1.6.2
15.207 **6.6**	AC Wireline Conducted Emissions 150kHz–30MHz	Conducted Emissions	Conducted	Compliant[3]	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: *Test results reported in Section5.1.7 only were obtained with equipment modifications. See Section 3.7 Equipment Modifications*

5. TEST RESULTS

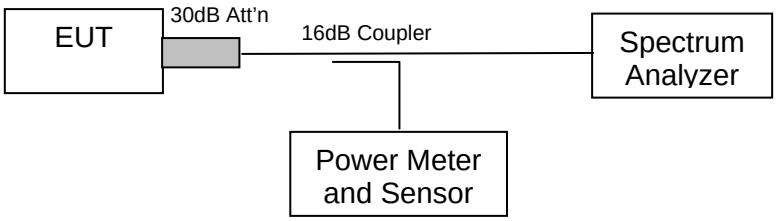
5.1. Device Characteristics

5.1.1. 6dB and 99% Bandwidth

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

Test Procedure
The bandwidth at 6dB and 99% is measured with a spectrum analyser connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate centre frequency. Using a 6dB resolution bandwidth filter the spectrum analyzer was set to the following;
RBW=1MHz, VBW=1MHz, Span=50MHz, Sweep = 200mS

Test Measurement Set up



Measurement set up for 6dB Bandwidth test

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

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

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

TABLE OF RESULTS – **11Mbit/s**

Centre Frequency (MHz)	6dB Bandwidth (MHz)	6dB Plot #	99% BW (MHz)	99% BW Plots
2,412	12.024	ALON01/01	15.8316	ALON01/02
2,437	12.024	On File	15.8316	On File
2,462	11.673	On File	15.8316	On File

Specification

Limits

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

Laboratory Measurement Uncertainty for Spectrum Measurement

Measurement uncertainty	±2.81dB

Traceability

METHOD	TEST EQUIPMENT USED
Measurements were made per work instruction WI-03 'Measurement of RF Spectrum Mask'	0156, 0193, SMA-CBL-03, 30dB Att'n, Directional Coupler

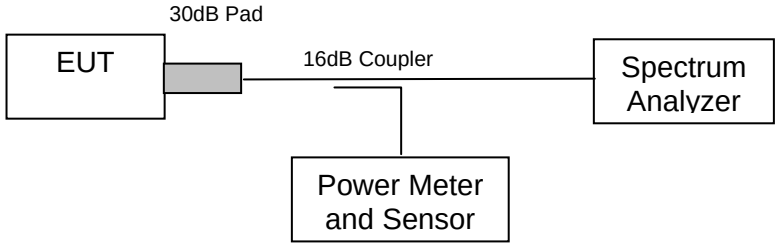
5.1.2. Peak Output Power

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 6dB, peak detector selected and the analyzer built-in power function was used to measure peak power. Measurements were made while EUT was operating in a continuous transmission mode i.e. 100% duty cycle at the appropriate centre frequency.
Spectrum analyzer settings: RBW=1MHz, VBW=10MHz, Span=55MHz, Sweep = 200mS

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

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

TABLE OF RESULTS – **11Mbit/s**

Centre Frequency (MHz)	Duty Cycle (%)	99% Bandwidth (MHz)	Peak Power (dBm)	Limit (dBm)	Plot #	Margin (dB)
2,412	100	15.8316	18.19	+30	ALON01/03	-11.81
2,437	100	15.8316	17.29	+30	On File	-12.71
2,462	100	15.8316	17.93	+30	On File	-12.07

Antenna Gain - Maximum Permissible Power Level

If transmitting antennas of directional gain greater than 6dBi are used, then 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 6dBi.

In all cases the maximum antenna gain is 6dBi or less, therefore maximum power level is +30dBm

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 902-928MHz, 2400-2483.5MHz and 5725-5850MHz 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 6dBi 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 6dBi.

§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	±1.33dB

Traceability

METHOD	TEST EQUIPMENT USED
Measurements were made per work instruction WI-01 'Measuring RF Output Power'	0156, 0193, SMA-CBL-03, 30dB Att'n, Directional Coupler

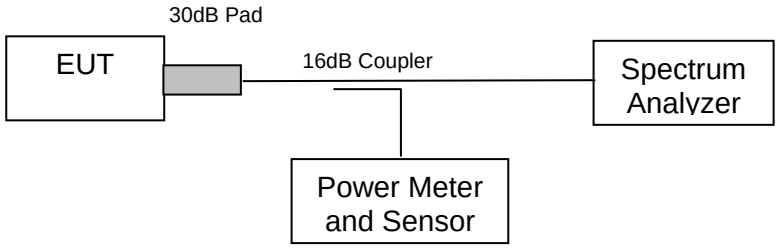
5.1.3. Peak Power Spectral Density

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 3KHz 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 / 3KHz with video averaging turned off. The Peak Power Spectral Density is the highest level found across the emission in a 3KHz resolution bandwidth. Spectrum analyzer settings:

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

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

TABLE OF RESULTS – **11Mbit/s**

Centre Frequency (MHz)	Peak Frequency (MHz)	Spectrum Analyzer PPSD (dBm)	Plot #
2,412	2,414.08	-10.81	On File
2,437	2,437.28	-10.44	On File
2,462	2,461.98	-8.65	ALON01/04

Antenna Gain - Maximum Permissible Peak Power Spectral Density

If transmitting antennas of directional gain greater than 6dBi are used the **Peak Power Spectral Density** of the intentional radiator shall be reduced below the stated values by the amount in dB that the directional gain of the antenna exceeds 6dBi.

In all cases the maximum antenna gain is 6dBi or less, therefore maximum power level is +8dBm

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 +8dBm in any 3KHz 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 Spectral Density

Measurement uncertainty	±1.33dB

Traceability

METHOD	TEST EQUIPMENT USED
Measurements were made per work instruction WI-01 'Measuring RF Output Power'	0156, 0193, SMA-CBL-03, 30dB Att'n, Directional Coupler

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/(4πd^2)

EIRP = P * G

P = Peak output power (mW)

G = Antenna numeric gain (numeric)

d = Separation distance (cm)

P (worst case) = **18.19dBm**

Antenna Gain = 6dBi, **4.19** numeric

Because the EUT belongs to the General Population/Uncontrolled Exposure the limit of power density is 1.0mW/cm^2 and must be operated at a distance of greater then 20cm.

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)
6	4.19	+18.19	65.92	0.055	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	±1.33dB

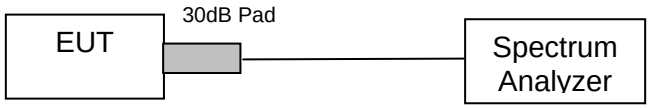
5.1.5. Conducted Spurious Emissions

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

Test Procedure
The band-edge if measured at 20 dB below the highest in-band spectral density measured with a spectrum analyzer connected to the antenna terminal. Measurements were made while EUT was operating in a continuous transmission mode i.e. 100% duty cycle at the appropriate centre frequency.

The spectrum analyzer is set to:
RBW=100kHz, VBW=300kHz, Span=110MHz, Sweep = 200mS

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

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

Band-Edge Results

TABLE OF RESULTS – **11Mbit/s**

Centre Frequency (MHz)	Band edge Frequency (MHz)	Limit @ 20dB below peak	Amplitude @ Band edge (dBm)	Plot #	Margin (dB)
2,412	2,400	-16.1	-29.0	ALON01/05	-12.9
2,437	Ref. only	-17.1	Ref. only	On File	
2,462	2,483.5	-16.71	-43.19	ALON01/06	-26.48

Spurious Emissions (30 MHz-26GHz)

Conducted spurious emissions (1-26GHz) 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 Frequency (MHz)	Start Frequency (MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Plot #	Margin (dB)
2,412	30	2,400	-25.38	-16.10	On File	-9.28
2,412	2,483.5	5,000	-44.33	-16.10	On File	-28.23
2,412	5000	26,000	-42.00	-16.10	On File	-25.90
2,437	30	2,400	-43.68	-17.10	On File	-26.58
2,437	2,483.5	5,000	-45.16	-17.10	On File	-28.03
2,437	5000	26,000	-42.33	-17.10	On File	-25.23
2,462	30	2,400	-44.24	-16.71	ALON01/07	-27.53
2,462	2,483.5	5,000	-24.33	-16.71	ALON01/08	-7.62
2,462	5000	26,000	-42.00	-16.71	ALON01/09	-25.29

Specification

Limits Band-Edge

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

§**15.247(c)** In any 100KHz 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 20dB below that in the 100KHz 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.

Measurement Uncertainty Conducted Spurious Emissions

Measurement uncertainty	±2.37dB

Traceability

METHOD	TEST EQUIPMENT USED
Measurements were made per work instruction WI-05 'Measurement of Spurious Emissions'	0156, 0193, 0088, 0070, 0116, SMA-CBL-03, 30dB Att'n, Directional Coupler

5.1.6. Radiated Emissions

5.1.6.1. Transmitter Radiated Spurious Emissions (30MHz to 26GHz)

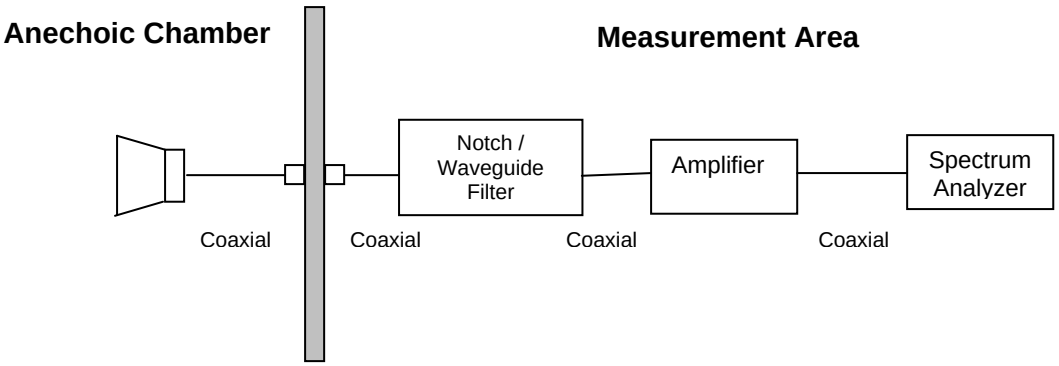
FCC, Part 15 Subpart C §15.247(c)
Industry Canada RSS-210 §6.3

Test Procedure

Preliminary radiated emissions 1 to 26GHz 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. All emissions found are average and reported. Plots of the peak values are report. Depending on the frequency band measured a notch filter or waveguide filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each band. Worst case antenna results are reported.

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

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 51.5dBμV; 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 Transmitter Radiated Spurious Emissions 1GHz – 26.5GHz

Restricted Bands - Band Edge

Raw Band-Edge Data

	ANTENNA TYPE					
	Dipole dBμV		Integral dBμV		OMNI dBμV	
Function	**2,412**	**2,462**	**2,412**	**2,462**	**2,412**	**2,462**
Peak	111.49	111.50	98.58	99.3	110.49	112.44[1]
Average	104.58	104.58	91.26	91.71	103.68	105.86[1]
Delta (dB)	-51.96	-52.93	-51.96	-52.93	-51.96	-52.93[1]
System Gain (dB)	1.04	1.04	1.04	1.04	1.04	1.04

[1]Plots identifying closest emissions to the band edge are provided in Section 8 'Graphical Results'

Corrected Reading
Peak Band Edge Corrected Value ($Peak_{BE}$) = Peak Reading + Gain – Delta
Average Band Edge Corrected Value (Ave_{BE}) = Average Reading + Gain – Delta

Peak Limit – 74dBµV/m
Average Limit - 54dBµV/m

	CORRECTED READING						WORST CASE MARGIN (dB)
$Peak_{BE}$	60.57	59.61	47.66	47.41	59.57	60.55	-13.43
Ave_{BE}	53.61	52.69	40.34	39.82	52.76	53.97	-0.03

Measurement Results Transmitter Radiated Spurious Emissions 1GHz – 26.5GHz

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

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

Transmission: 100% Duty Cycle

Antenna Type: **Integral**
Output Power: **Maximum**

Channel 1 Results

TABLE OF RESULTS

Freq. (MHz)	Polarity (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2,660	H	36.67	1.9	38.57	54.00	-15.43
7,286	H	38.34	8.9	47.24	54.00	-6.76
12,785	H	39.00	11.5	50.50	54.00	-3.50
2,420	V	38.00	1.9	39.90	54.00	-14.10
8,135	V	38.00	8.9	46.90	54.00	-7.10
12,846	V	39.17	11.5	50.67	54.00	-3.33

Channel 6 Results

TABLE OF RESULTS

Freq. (MHz)	Polarity (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2,780	H	37.67	1.9	39.57	54.00	-14.43
8,113	H	38.67	8.9	47.57	54.00	-6.43
12,76	H	39.17	11.5	50.67	54.00	-3.33
2,447	V	39.00	1.9	40.90	54.00	-13.10
8,268	V	38.00	8.9	46.90	54.00	-7.10
12,82	V	39.00	11.5	50.50	54.00	-3.50

Channel 11 Results

TABLE OF RESULTS

Freq. (MHz)	Polarity (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2,220	H	36.50	1.9	38.40	54.00	-15.60
8,087	H	38.67	8.9	47.57	54.00	-6.43
12,87	H	39.00	11.5	50.50	54.00	-3.50
2,467	V	39.00	1.9	40.90	54.00	-13.10
7,402	V	38.17	8.9	47.07	54.00	-6.93
13,49	V	39.67	11.5	51.17	54.00	-2.83

Emission plots for channel 11 worst case are provided, see Section 8 Graphical Results

Antenna Type: **6dBi Dipole Antenna**
Output Power: **Maximum**

Channel 1 Results

TABLE OF RESULTS

Freq. (MHz)	Polarity (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2,413	H	33.67	1.9	35.57	54.00	-18.43
7,454	H	32.50	8.9	41.40	54.00	-12.60
13,558	H	32.84	11.5	44.34	54.00	-9.66
2,420	V	34.00	1.9	35.90	54.00	-18.10
12,608	V	32.17	8.9	41.07	54.00	-12.93
12,680	V	32.34	11.5	43.84	54.00	-10.16

Channel 6 Results

TABLE OF RESULTS

Freq. (MHz)	Polarity (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2,440	H	39.50	1.9	41.40	54.00	-12.60
7,351	H	32.00	8.9	40.90	54.00	-13.10
12,75	H	33.17	11.5	44.67	54.00	-9.33
1,053	V	33.67	1.9	35.57	54.00	-18.43
12,71	V	32.50	8.9	41.40	54.00	-12.60
13,48	V	32.34	11.5	43.84	54.00	-10.16

Channel 11 Results

TABLE OF RESULTS

Freq. (MHz)	Polarity (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1,980	H	39.34	1.9	41.24	54.00	-12.76
12,621	H	32.67	8.9	41.57	54.00	-12.43
13,441	H	32.50	11.5	44.00	54.00	-10.00
1,080	V	33.84	1.9	35.74	54.00	-18.26
12,608	V	32.17	8.9	41.07	54.00	-12.93
1,275	V	32.67	11.5	44.17	54.00	-9.83

Antenna Type: **6dBi Omni Directional Antenna**
Output Power: **Maximum**

Channel 1 Results

TABLE OF RESULTS

Freq. (MHz)	Polarity (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2,420	H	37.67	1.9	39.57	54.00	-14.43
7,260	H	38.00	8.9	46.90	54.00	-7.10
12,76	H	38.50	11.5	50.00	54.00	-4.00
2,787	V	36.84	1.9	38.74	54.00	-15.26
7,247	V	38.67	8.9	47.57	54.00	-6.43
14,24	V	38.17	11.5	49.67	54.00	-4.33

Channel 6 Results

TABLE OF RESULTS

Freq. (MHz)	Polarity (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2,446	H	39.67	1.9	41.57	54.00	-12.43
8,139	H	38.34	8.9	47.24	54.00	-6.67
12,75	H	38.84	11.5	50.34	54.00	-3.66
2,480	V	37.17	1.9	39.07	54.00	-14.93
7,286	V	37.34	8.9	46.24	54.00	-7.76
12,80	V	38.17	11.5	49.67	54.00	-4.33

Channel 11 Results

TABLE OF RESULTS

Freq. (MHz)	Polarity (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2,473	H	40.84	1.9	42.74	54.00	-11.26
7,402	H	37.84	8.9	46.74	54.00	-7.26
12,802	H	38.00	11.5	49.50	54.00	-4.50
2,473	V	38.00	1.9	39.90	54.00	-14.10
8,152	V	38.34	8.9	47.24	54.00	-6.76
12,750	V	37.84	11.5	49.34	54.00	-4.66

RECEIVER SPURIOUS EMISSIONS

Measurement Results Receiver Radiated Spurious Emissions 1GHz – 26.5GHz

TABLE OF RESULTS

Freq. (MHz)	Polarity (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1058.05	V	38.36	-5.64	32.72	54.00	-21.28
1077.79	V	41.27	-5.52	35.75	54.00	-18.25
2284.25	V	36.97	0.28	37.25	54.00	-16.75
4845.90	V	35.55	7.6	43.15	54.00	-10.85
5859.97	H	37.99	9.49	47.48	54.00	-6.52
6520.07	V	35.56	8.79	44.35	54.00	-9.65

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 1000MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, 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)	Measurement Distance (meters)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Measurement Uncertainty Radiated Emissions

Measurement uncertainty (dB)	+5.6/ -4.5

Traceability

METHOD	TEST EQUIPMENT USED
Measurements were made per work instruction WI-EMC-07	0156, 2.4G Notch, 0104, 0145, K-Cbl 11, 5F50N001, 0193

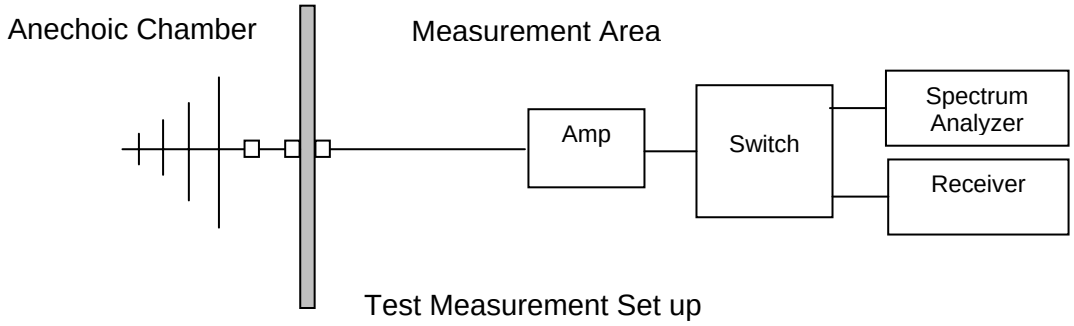
5.1.6.2. Radiated Spurious Emissions (30M-1GHz)

FCC, Part 15 Subpart C §15.407(b)(5)/ §15.209
Industry Canada RSS-210 §6.2.2(q1)(ii)

Test Procedure

Testing 30M-1GHz 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 120kHz. Only the highest emissions relative to the limit are listed. The highest emissions relative to the limit are listed.

The anechoic chamber test set-up is identified in Section 6 Test Set-Up Photographs. The emission plot(s) are identified in Section 8 Graphical Plots.



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 (30MHz – 1GHz)

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

Radio parameters.
Data Rate(s): 11MBit/s
Transmission: 100% Duty Cycle, Maximum Power, Channel 2,437MHz

Unscreened LAN and WAN data cables both carrying data traffic
RJ11 connected and generating noise
Hawking 6dBi Dipole Antenna connected as external antenna

TABLE OF RESULTS

Freq. MHz	Peak dBuV/m	QP dBuV/m	QP Lmt dBuV/m	QP Margin dB	Angle deg	Hgt cm	Pol	Total Correction Factor
39.9976	27.35	24.40	29.50	-5.10	84	294	Vert	-18.52
95.1883	25.29	18.70	33.00	-14.30	185	101	Vert	-22.68
97.9713	23.81	15.27	33.00	-17.73	344	100	Vert	-22.33
139.2209	23.88	14.42	33.00	-18.58	268	99	Vert	-22.46
148.9775	22.95	14.32	33.00	-18.68	134	98	Vert	-21.57
169.2985	24.04	15.12	33.00	-17.88	239	98	Vert	-20.80

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 1000MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, 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)	Measurement Distance (meters)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Measurement Uncertainty Radiated Emissions

Measurement uncertainty (dB)	+5.6/ -4.5

Traceability

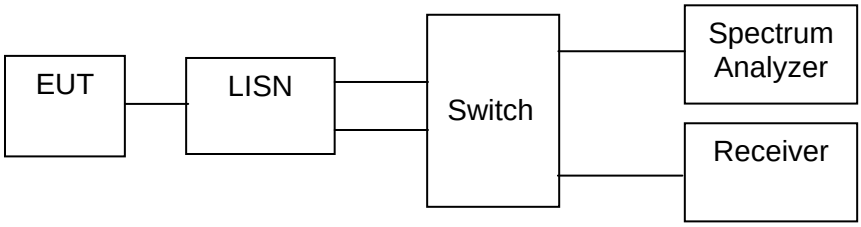
METHOD	TEST EQUIPMENT USED
Measurements were made per Sanmina-SCI work instruction for Radiated Emission Measurement	8546A HP Receiver and RF Filter, HP Pre-amp, Antenna EMCO Biconilog

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

FCC, Part 15 Subpart C §15.407(b)/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 9KHz.

Test Measurement Set up



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

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

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

TABLE OF RESULTS

Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	QP Voltage (dBμV)	Margin (dB)	Phase
0.366	39.290	48.59	--	-9.300	Neutral
0.366	42.165	48.59	--	-6.426	Live
0.550	37.649	46.00	--	-8.351	Neutral
0.550	41.044	46.00	--	-4.956	Live
0.610	39.385	46.00	--	-6.615	Live
0.914	37.459	46.00	--	-8.541	Neutral
0.914	40.120	46.00	--	-5.880	Live
0.918	37.519	46.00	--	-8.481	Live
0.978	37.330	46.00	--	-8.670	Live

Ferrites were required on both the Live and Neutral lines to bring the device into compliance. 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 150KHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μΩ 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 250μV, 48dBμV (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 (60dBμV, 0.45 - 1.705 MHz) and 3000 μV (69.5dBμV, 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

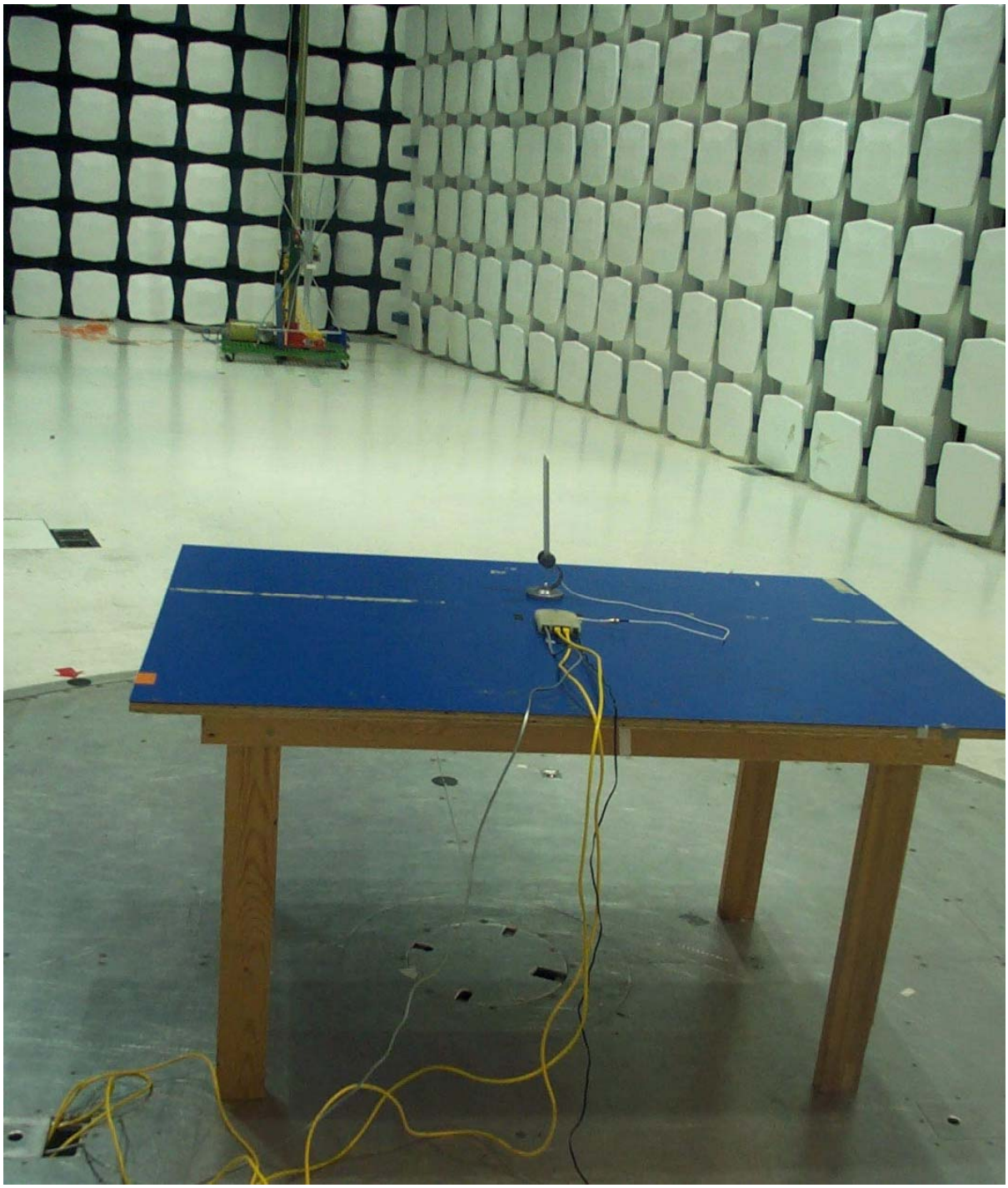
Measurement uncertainty	±2.64dB

Traceability

METHOD	TEST EQUIPMENT USED
Measurements were made per work instruction WI-EMC-01 'Measurement of Conducted Emissions'	0156, 0193, 0190, 15F50B001, 15F0B002

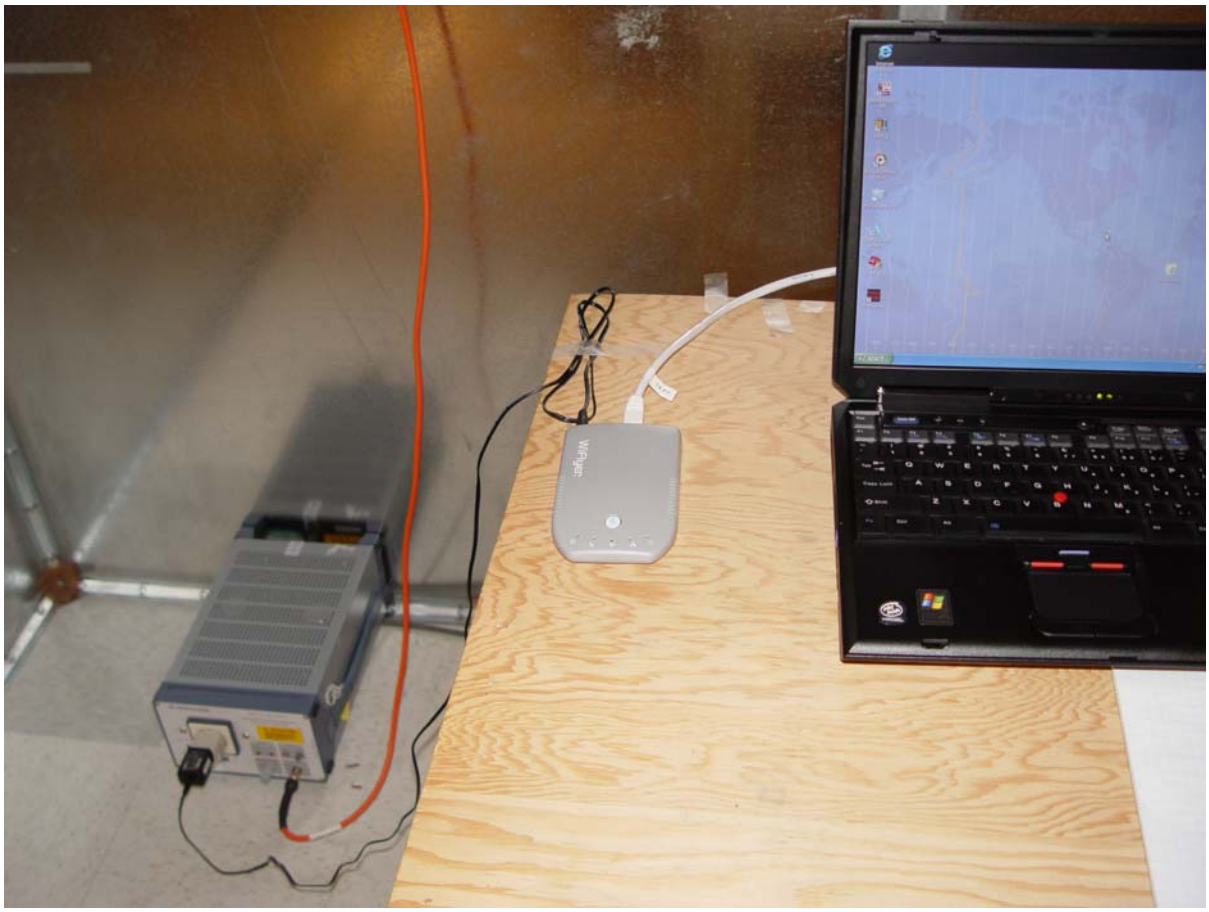
6. TEST SET-UP PHOTOGRAPHS

6.1. Radiated Emissions (30MHz-1GHz)



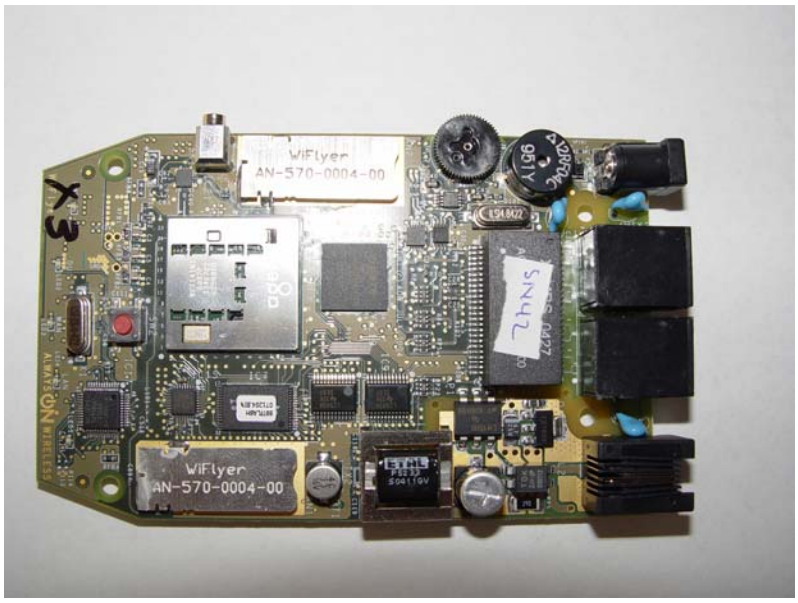
6.2. Spurious Emissions >1GHz

6.3. Conducted Emissions (150KHz - 30MHz)

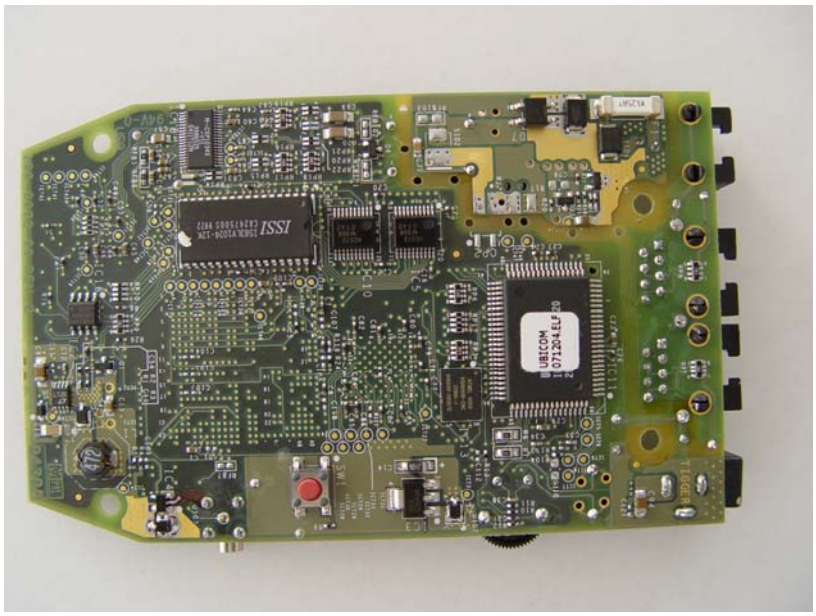


6.4. General Measurement Test Set-Up

6.5. Printed Circuit Board



PCB Top



PCB Underside

6.6. Product Labelling

7. TEST EQUIPMENT DETAILS

Asset #	Instrument	Manufacturer	Model #	Calibration Due Date	Serial #
0156	Barometer /Thermometer	Control Co.	4196	12 Aug '05	E2844
K-CBL 08	SMA Cable	Megaphase	Sucoflex 104	18 Jun '05	Unknown
K-CBL 10	SMA Cable	Megaphase	Sucoflex 104	18 Jun '05	Unknown
K-CBL 11	SMA Cable	Megaphase	Sucoflex 104	18 Jun '05	Unknown
K-CBL 12	SMA Cable	Megaphase	Sucoflex 104	18 Jun '05	Unknown
15F50B001	BNC Cable	Megaphase	Unknown	18 Jun '05	Unknown
15F50B002	BNC Cable	Megaphase	Unknown	18 Jun '05	Unknown
10F50B003	BNC Cable	Megaphase	Unknown	18 Jun '05	Unknown
15F50N001	N-Type Cable	Megaphase	Unknown	18 Jun '05	Unknown
5F50N001	N-Type Cable	Megaphase	Unknown	18 Jun '05	Unknown
3F50N002	N-Type Cable	Megaphase	Unknown	18 Jun '05	Unknown
0078	Antenna (30M-2GHz)	Schaffner and Chase	CBLG140A	Not Applicable	1195
0104	Horn Antenna	The Electro-Mechanics Company	3115	12 Aug '05	9205-3882
0213	20-300MHz Antenna	Schwarzbeck	VHBB 9124	6 Apr '05	9124/0257
0250	230MHz-1GHz Antenna	Schwarzbeck	VUSLP9111	6 Apr '05	186
0145	18GHz-26.5GHz	Millimeter Products	261K	30 Apr '05	595
0107	26.5GHz-40GHz	Millimeter Products	261A	30 Apr '05	599
0193	EMI Receiver	Rhode & Schwartz	ESI 7	16 Mar '05	838496/007
0088	Spectrum Analyzer	Hewlett Packard	8564E	15 May '05	
0190	LISN	Rhode & Schwartz	ESH3Z5	3 Apr '05	836679/006
0070	Power Meter	Hewlett Packard	437B	13 May '05	3125U13554
0116	Power Sensor	Hewlett Packard	R8485A	16 Mar '05	3318A19694
Coupler	Coupler	Hewlett Packard	86205A	N/A	1623
3dB Att'n	3dB N-Type Attenuator	ARRA	N9444-30	N/A	--
30dB Att'n	30dB N-Type Attenuator	NARDA	32319	N/A	--
2.4GHz Notch	Notch Filter	Micro-Tronics	--	N/A	--
W/guide Filter	12.75-17GHz	CMT	--	--	--
W/guide Filter	17-26.5GHz	HP	--	--	--

EQUIPMENT UTILIZED DURING SUBCONTRACT TESTING

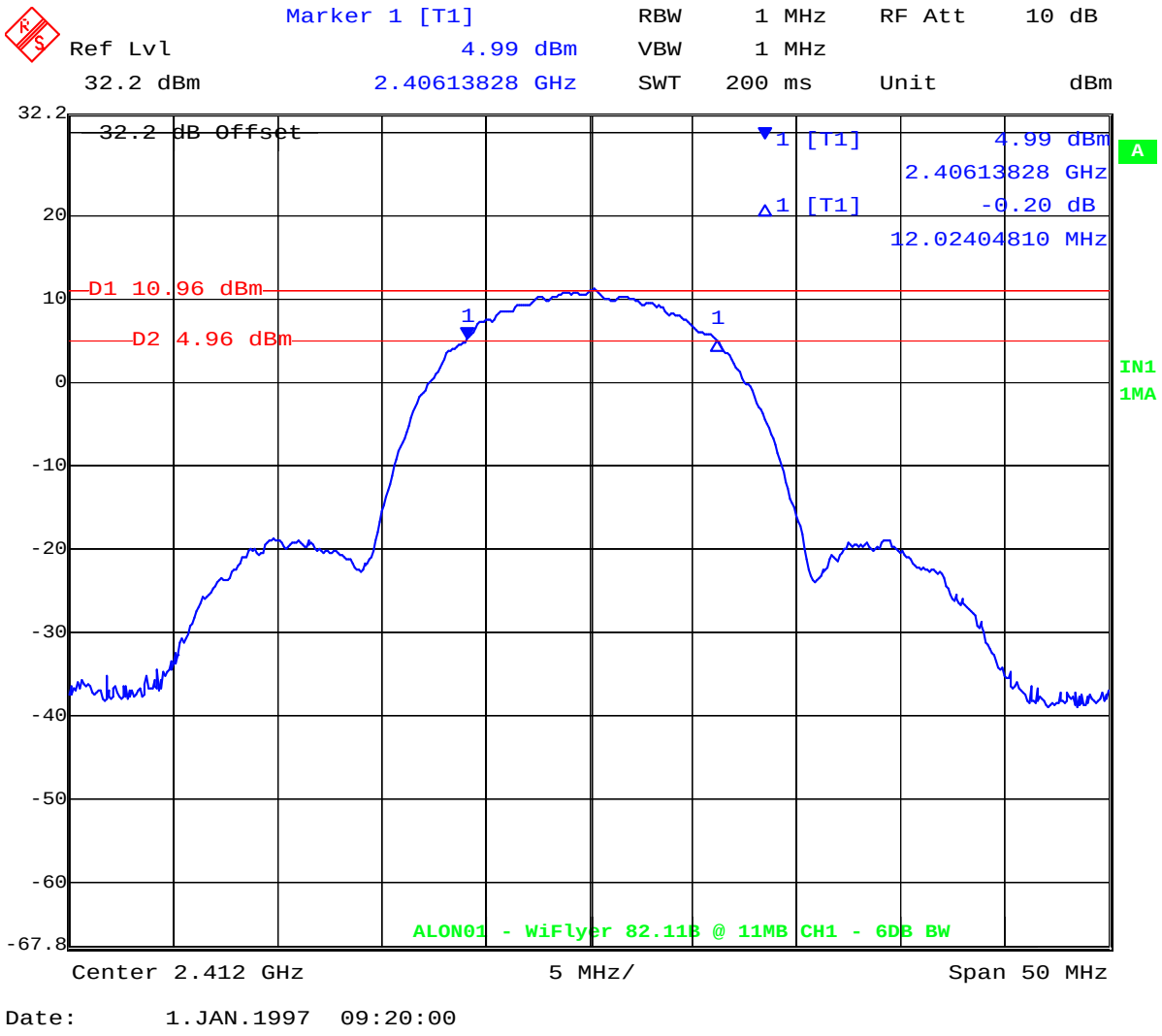
DESCRIPTION	MODEL	SERIAL NUMBER	LAST CAL DATE	CAL DUE DATE
RECEIVERS				
HP 8546A EMI Receiver (Receiver Section) 9Khz–6.5Ghz	85462A	3325A00168	11/17/2003	11/17/2004
HP8546A EMI Receiver (RF Filter Section)	85460A	3330A00174	11/17/2003	11/17/2004
HP 9 KHz – 1 GHz Ant. Pre amp	310N	185516	9/11/2003	9/11/2004
ANTENNAS				
EMCO Biconilog (Imm/ Em))	3142	1117	03/25/2004	03/25/2005

8. GRAPHICAL RESULTS

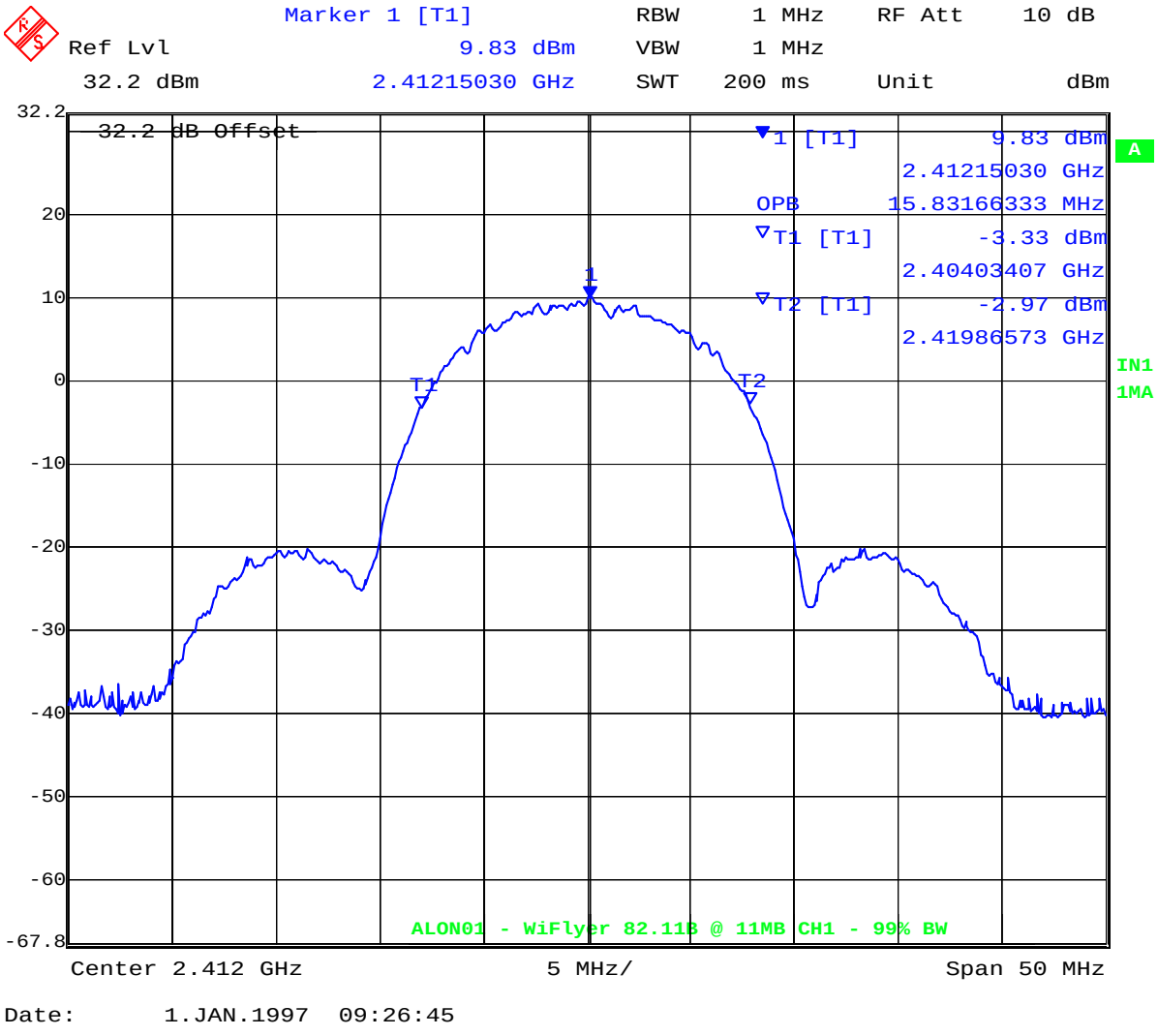
This report contains the following plots as referenced in the test results, Section 5 of this report.

2.4GHz 802.11b	
Parameter	**Plot No.**
Section 5.1.1 6dB Bandwidth (2,412MHz)	ALON01/01
Section 5.1.1 99% Bandwidth (2,412MHz)	ALON01/02
Section 5.1.2 Peak Output Power (2,412MHz)	ALON01/03
Section 5.1.3 Peak Power Spectral Density (2,462MHz)	ALON01/04
Section 5.1.5 Conducted Spurious Emissions	
Lower Band Edge 2,400MHz	ALON01/05
Upper Band Edge 2,483.5MHz	ALON01/06
1-26GHz conducted spurious emissions	
30MHz – 2,400MHz	ALON01/07
2,483.5 – 5,000MHz	ALON01/08
5,000 – 26,000MHz	ALON01/09
Section 5.1.6 Radiated Emissions	
Band Edge Restricted Bands	
Channel 2,462MHz Peak	ALON01/10
Channel 2,462MHz Average	ALON01/11
Channel 2,462MHz Delta	ALON01/12
5.1.6.1 Transmitter Radiated Spurious Emissions 1-26GHz	ALON01/13-20
Receiver Spurious Emissions	ALON01/21
5.1.6.2 Radiated Spurious Emissions 30M-1GHz	ALON01/22
Section 5.1.7 AC Wireline Conducted Emissions	
Live Line	ALON01/23
Neutral Line	ALON01/24

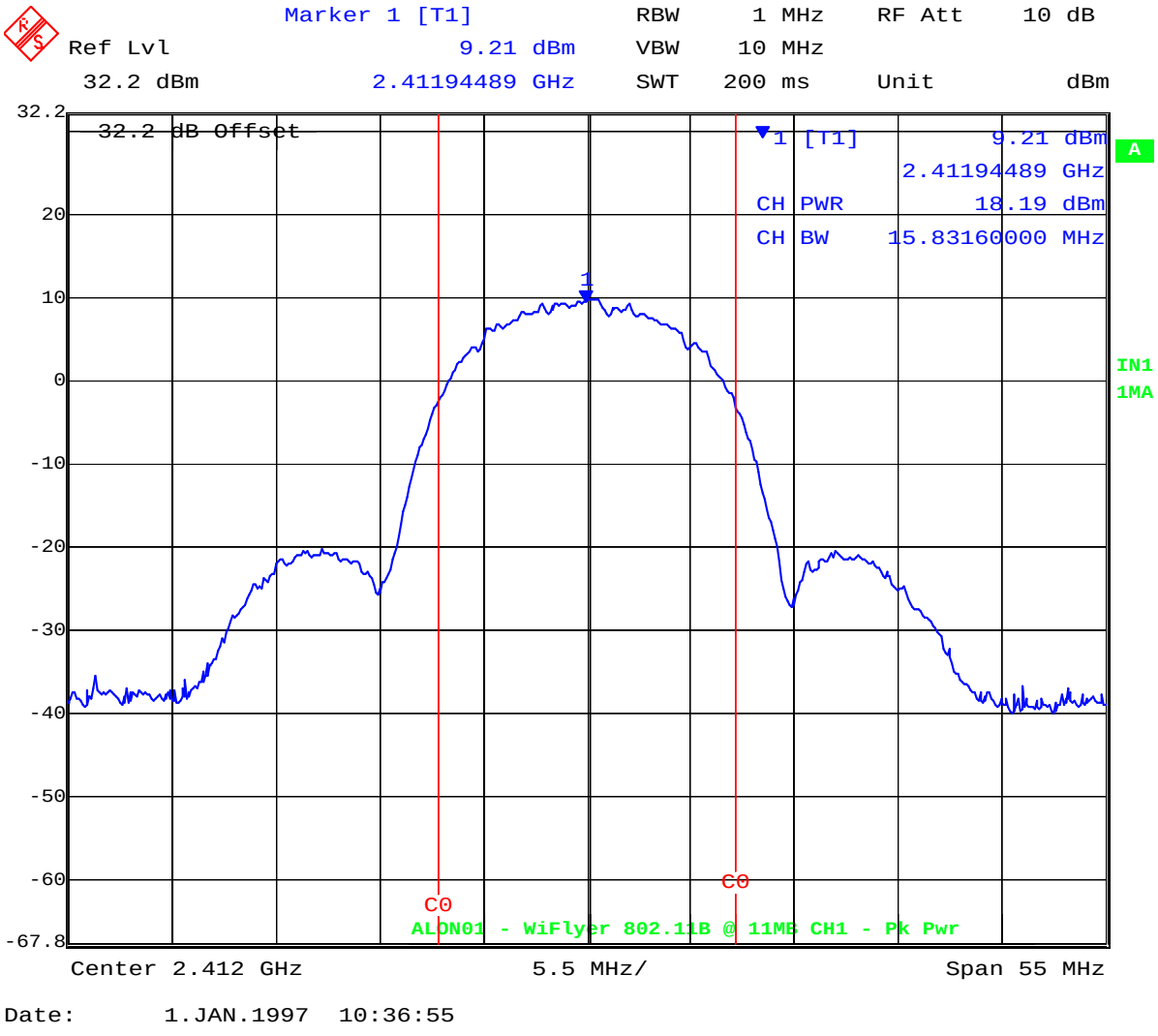
6dB Bandwidth (2,412MHz) - ALON01/01



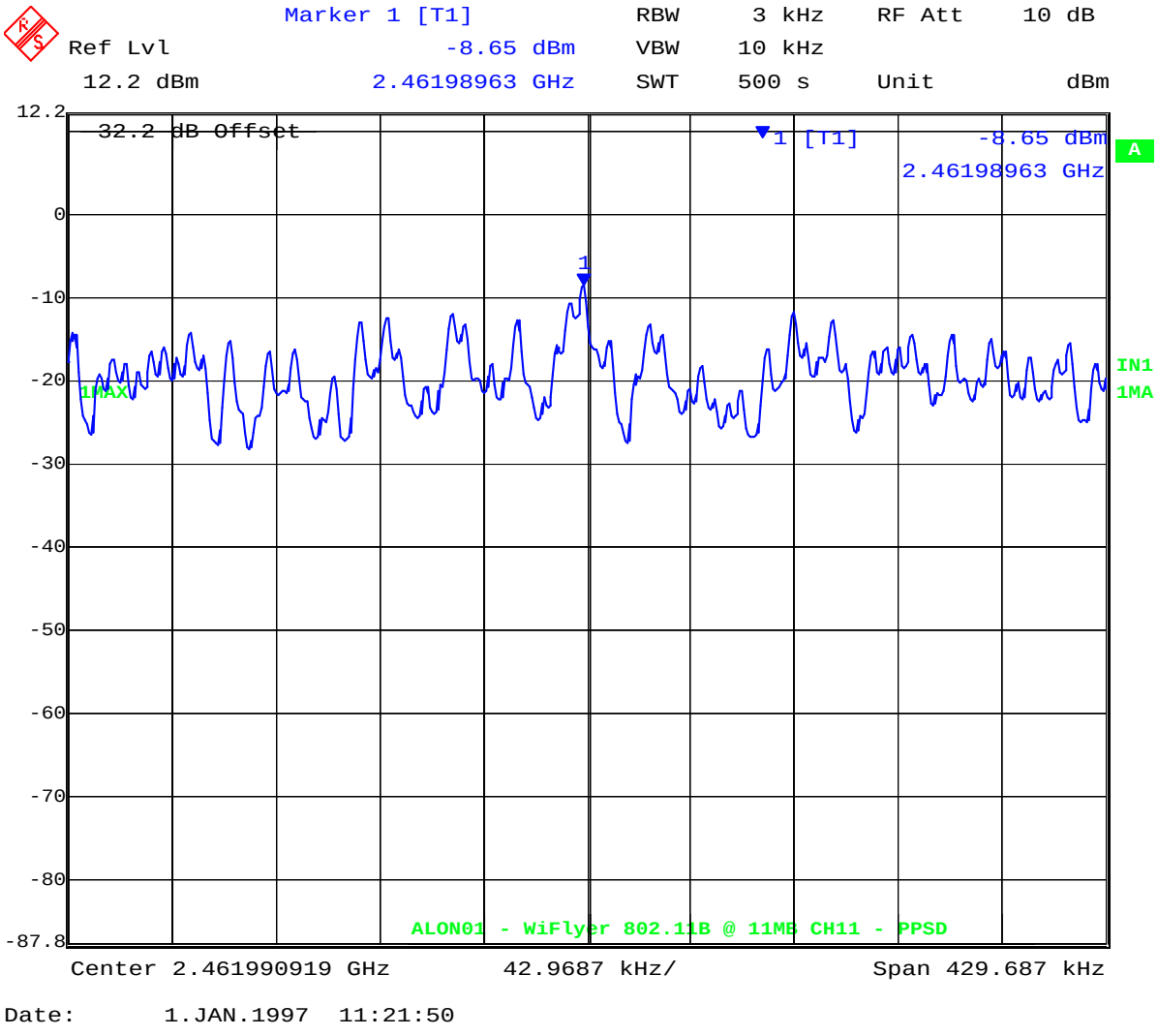
99% Bandwidth (2,412MHz) - ALON01/02



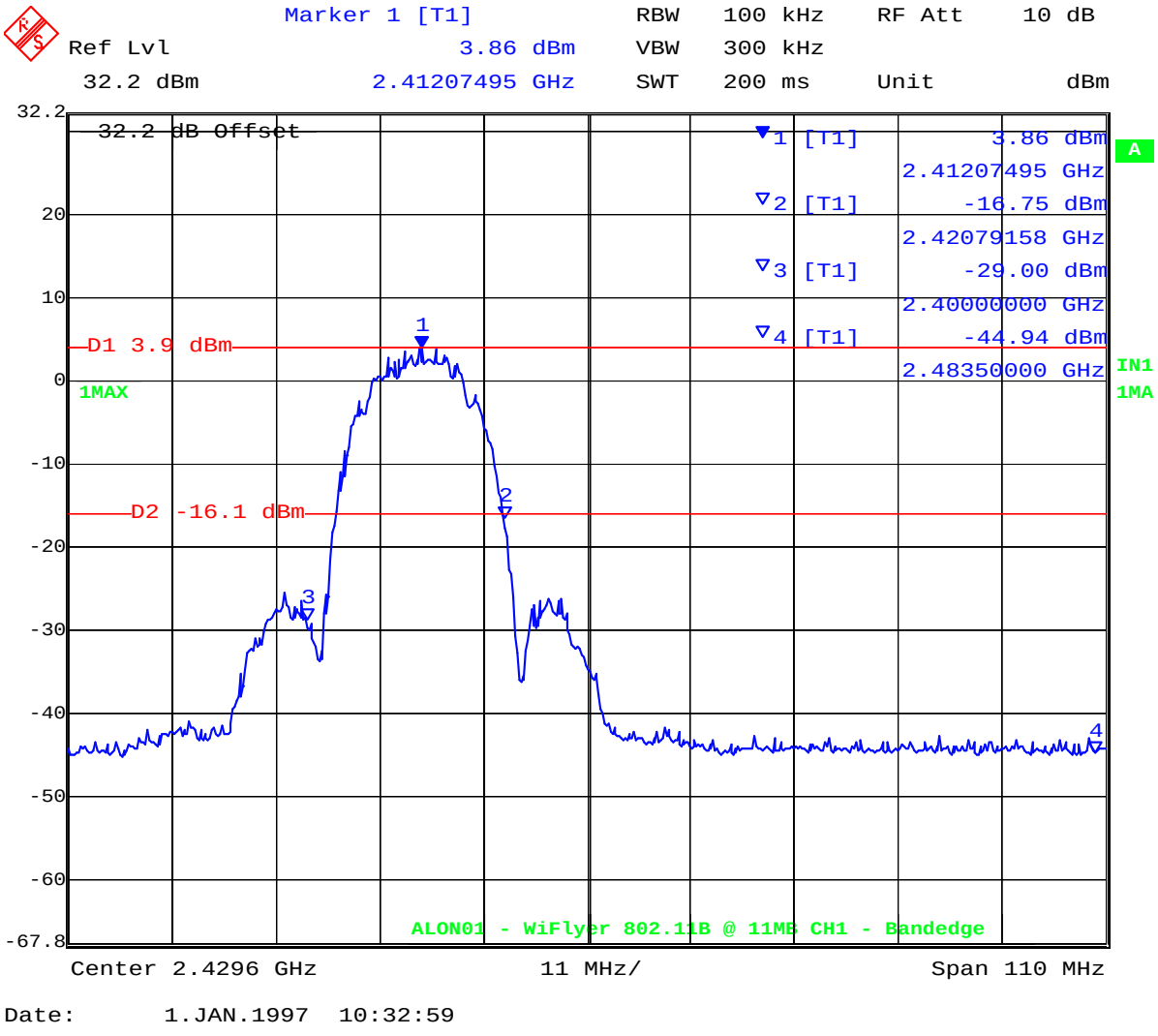
Peak Output Power (2,412MHz) - ALON01/03



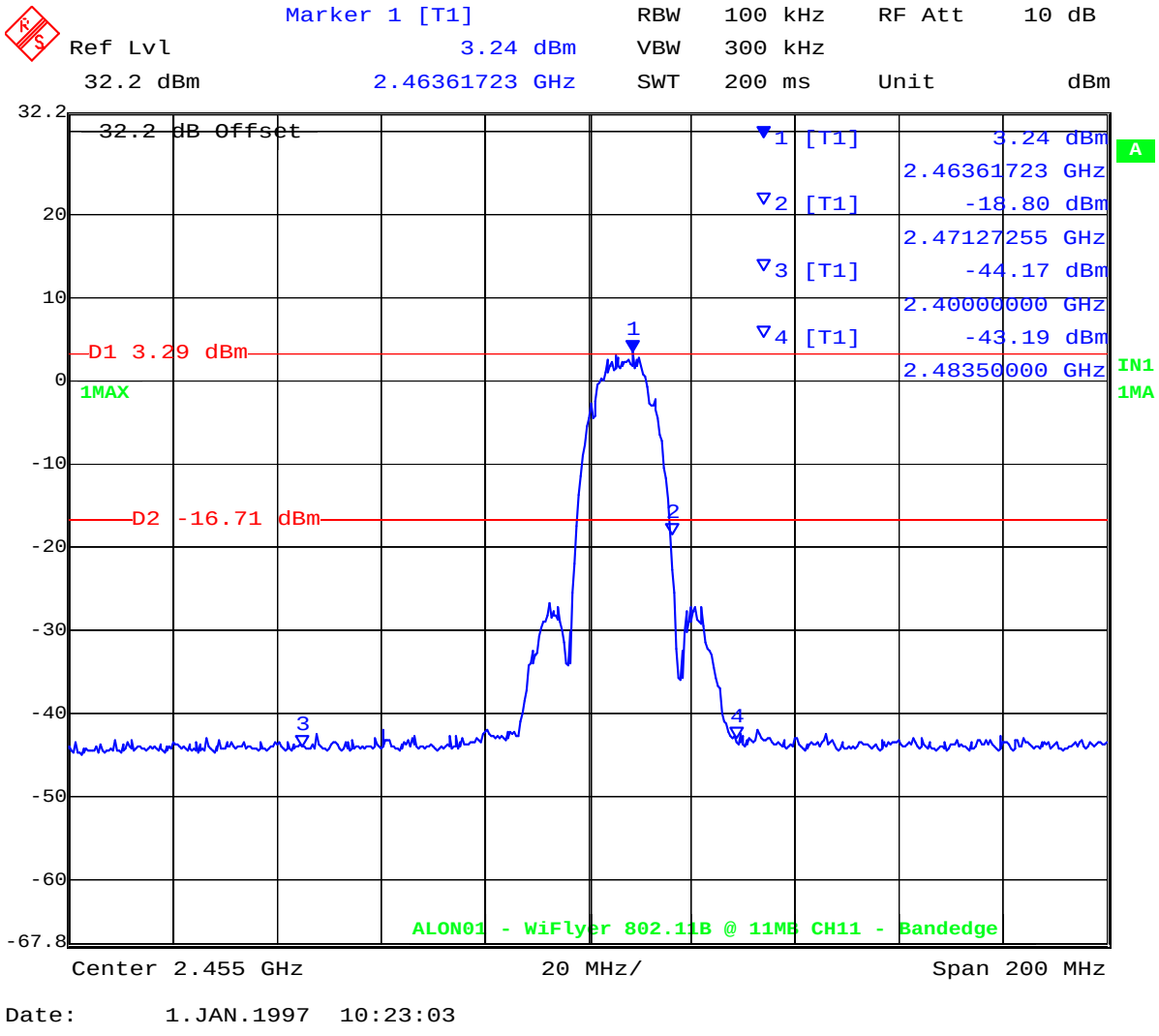
Peak Power Spectral Density (2,462MHz) - ALON01/04



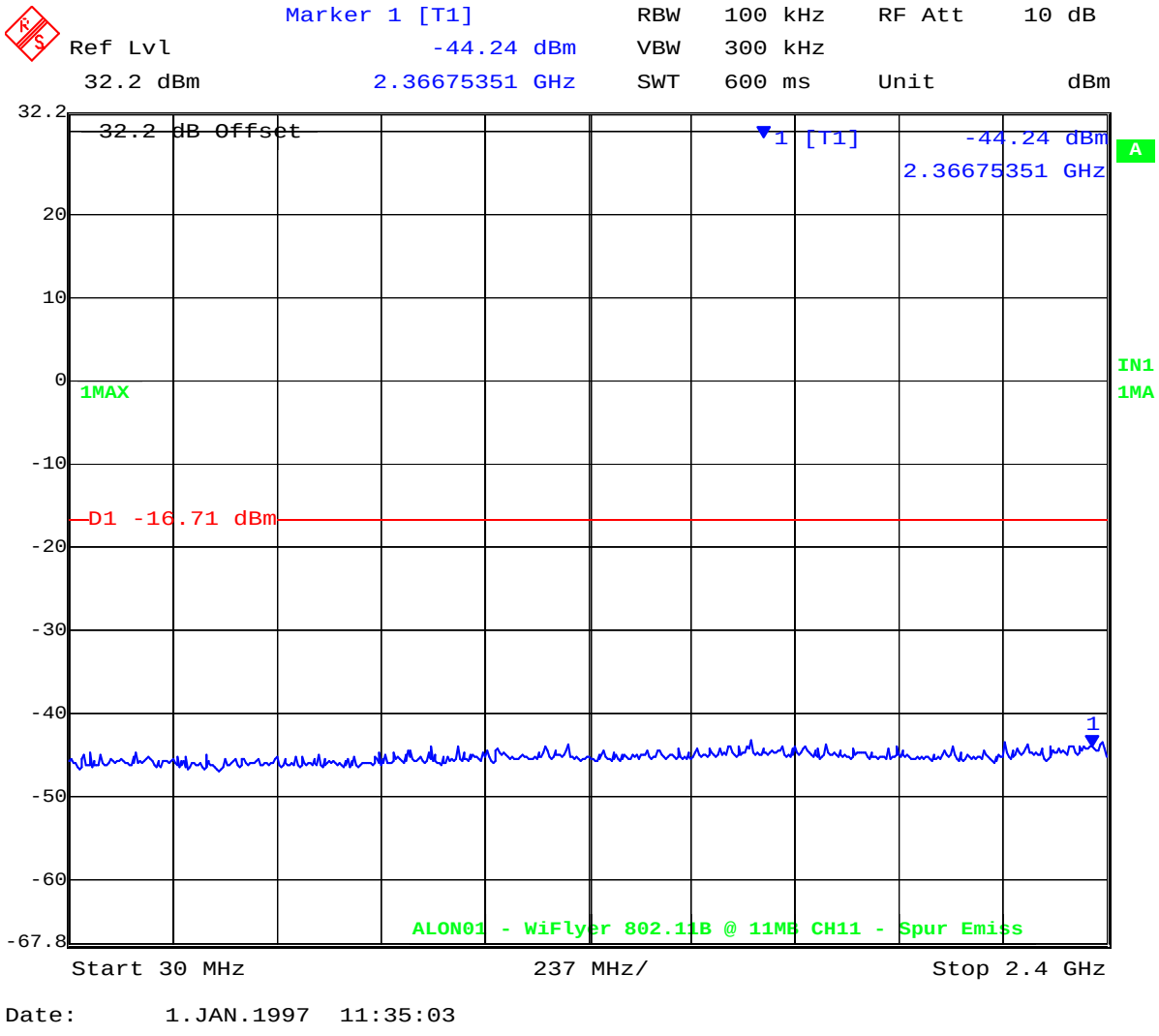
Conducted Spurious Emissions, Lower Band Edge 2,400MHz - ALON01/05



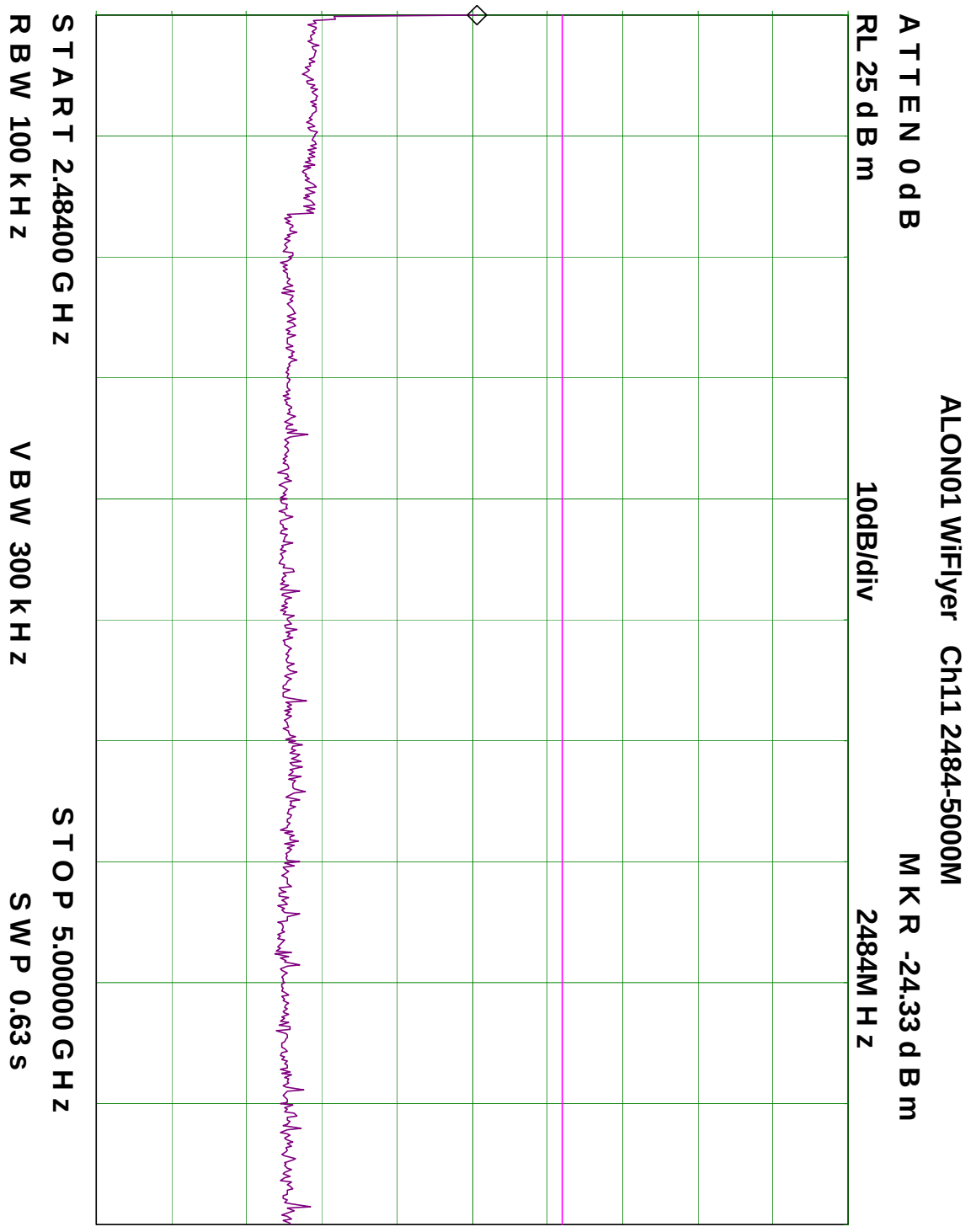
Conducted Spurious Emissions, Upper Band Edge 2,483.5MHz - ALON01/06



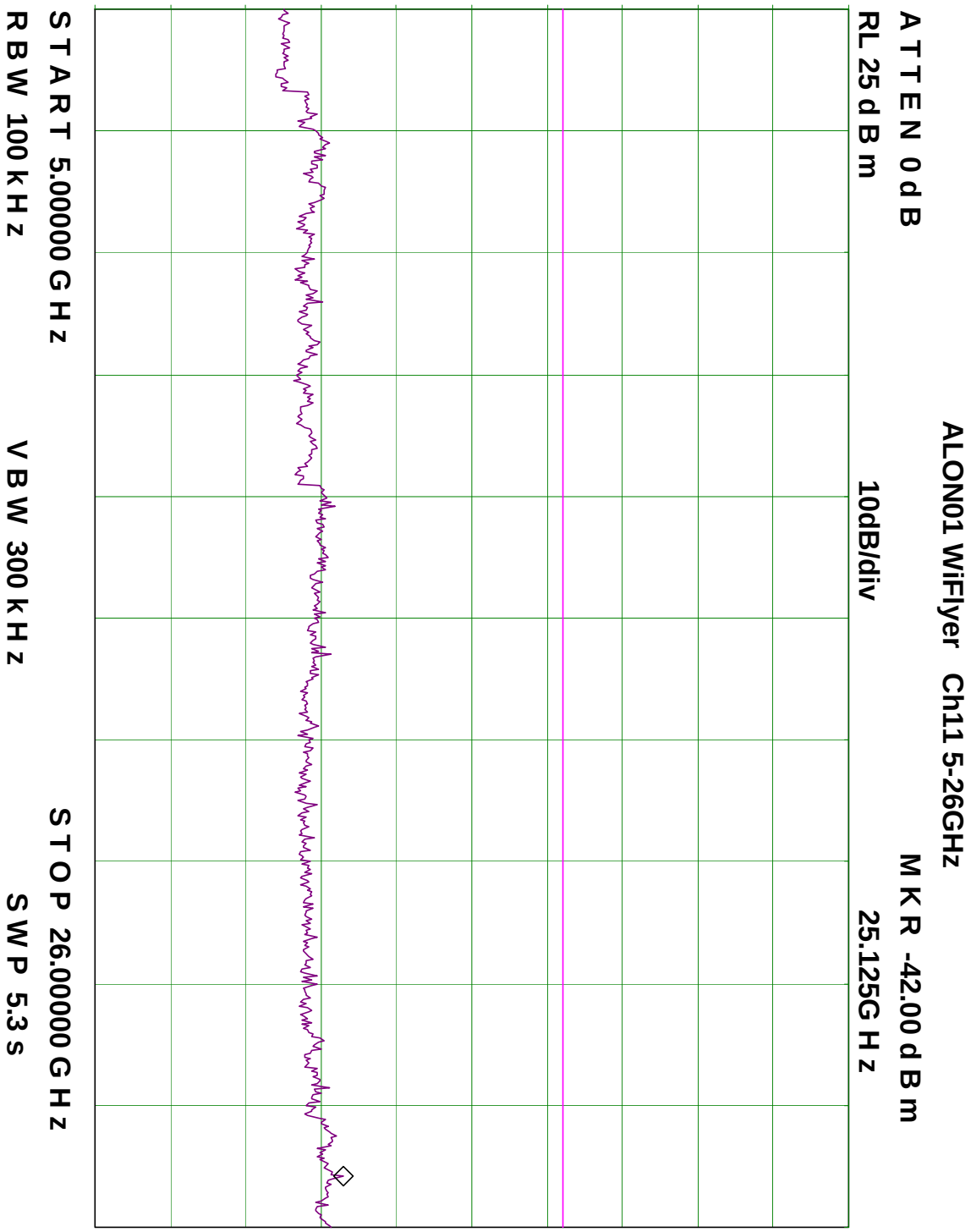
Conducted Spurious Emissions, (30MHz-26GHz) 30MHz-2,400MHz - ALON01/07



Conducted Spurious Emissions, (30MHz-26GHz) 2,483.5–5,000MHz ALON01/08

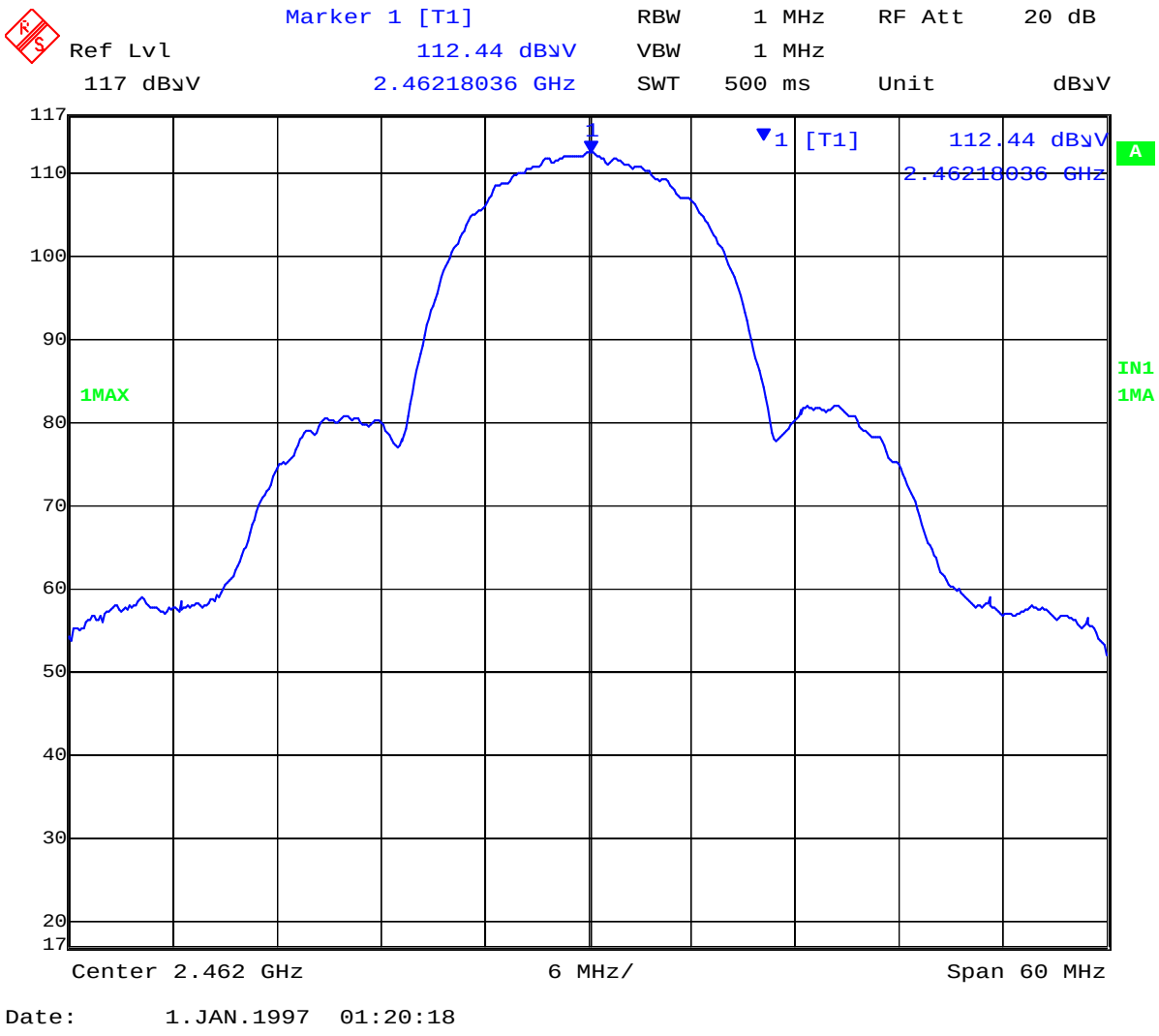


Conducted Spurious Emissions, (30MHz-26GHz) 5,000-26,000MHz ALON01/09

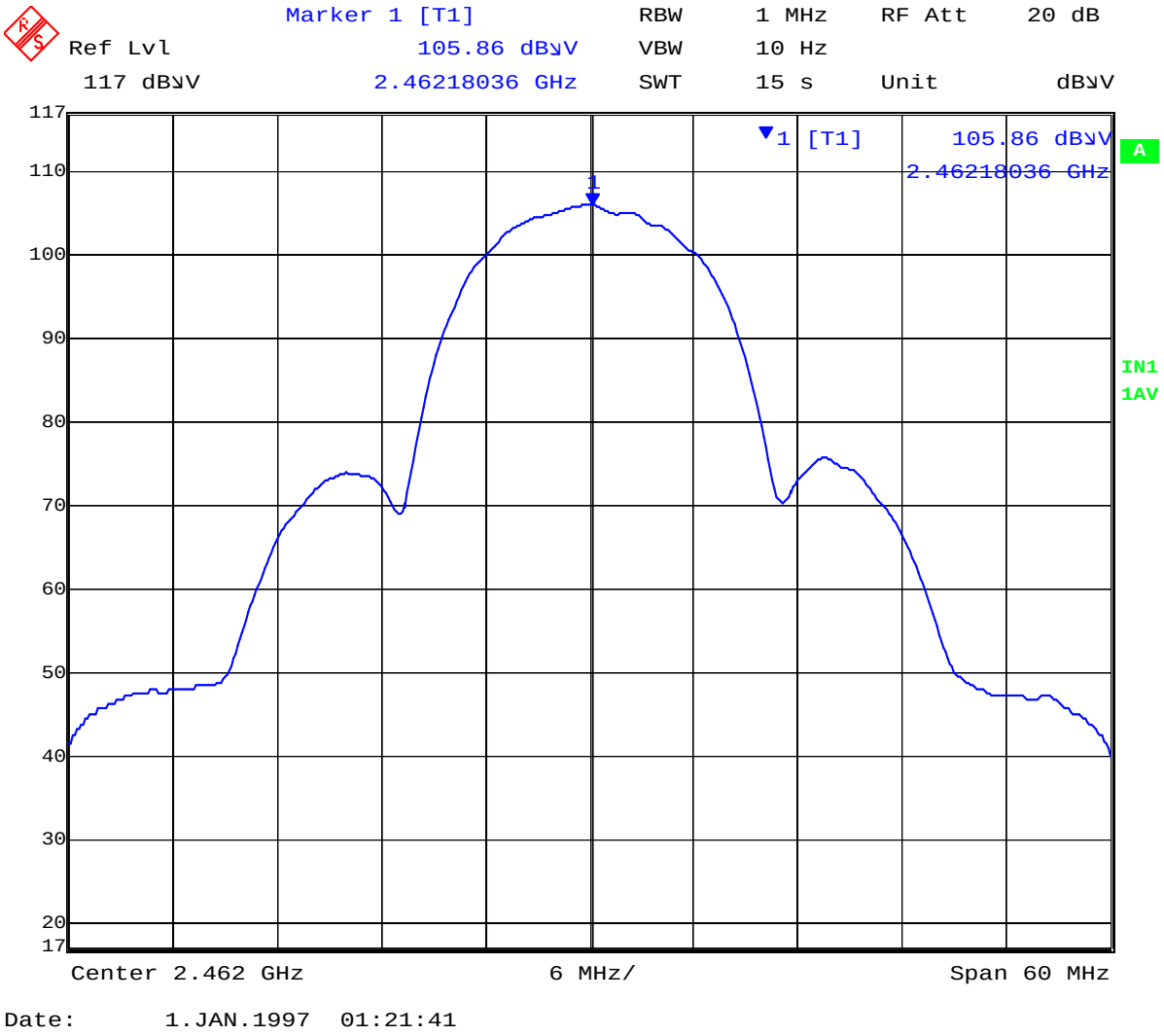


Radiated Band Edge Channel - ALON01/10-12

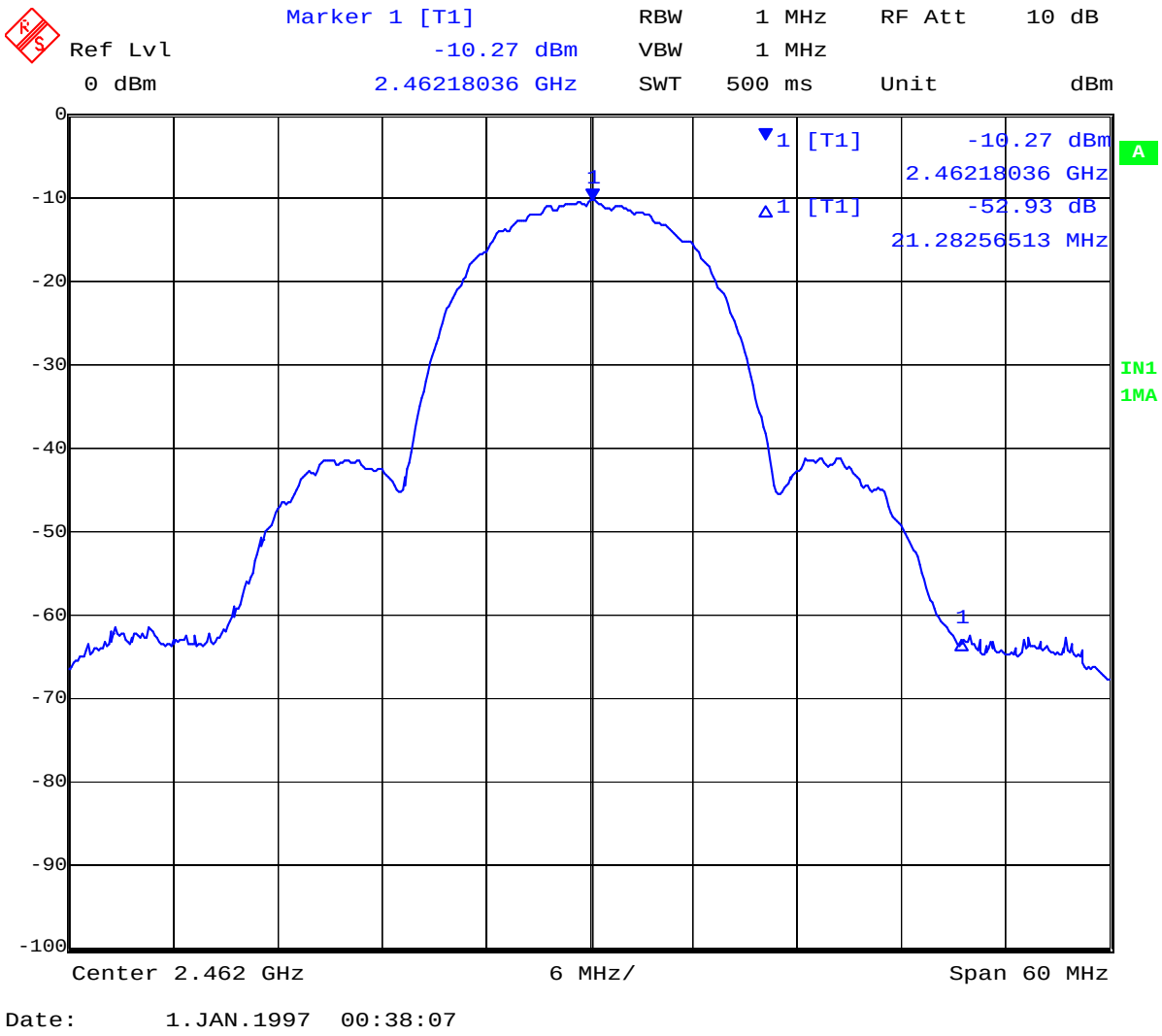
Radiated Band Edge Peak Channel 2,462MHz



Radiated Band Edge Average Channel 2,462MHz

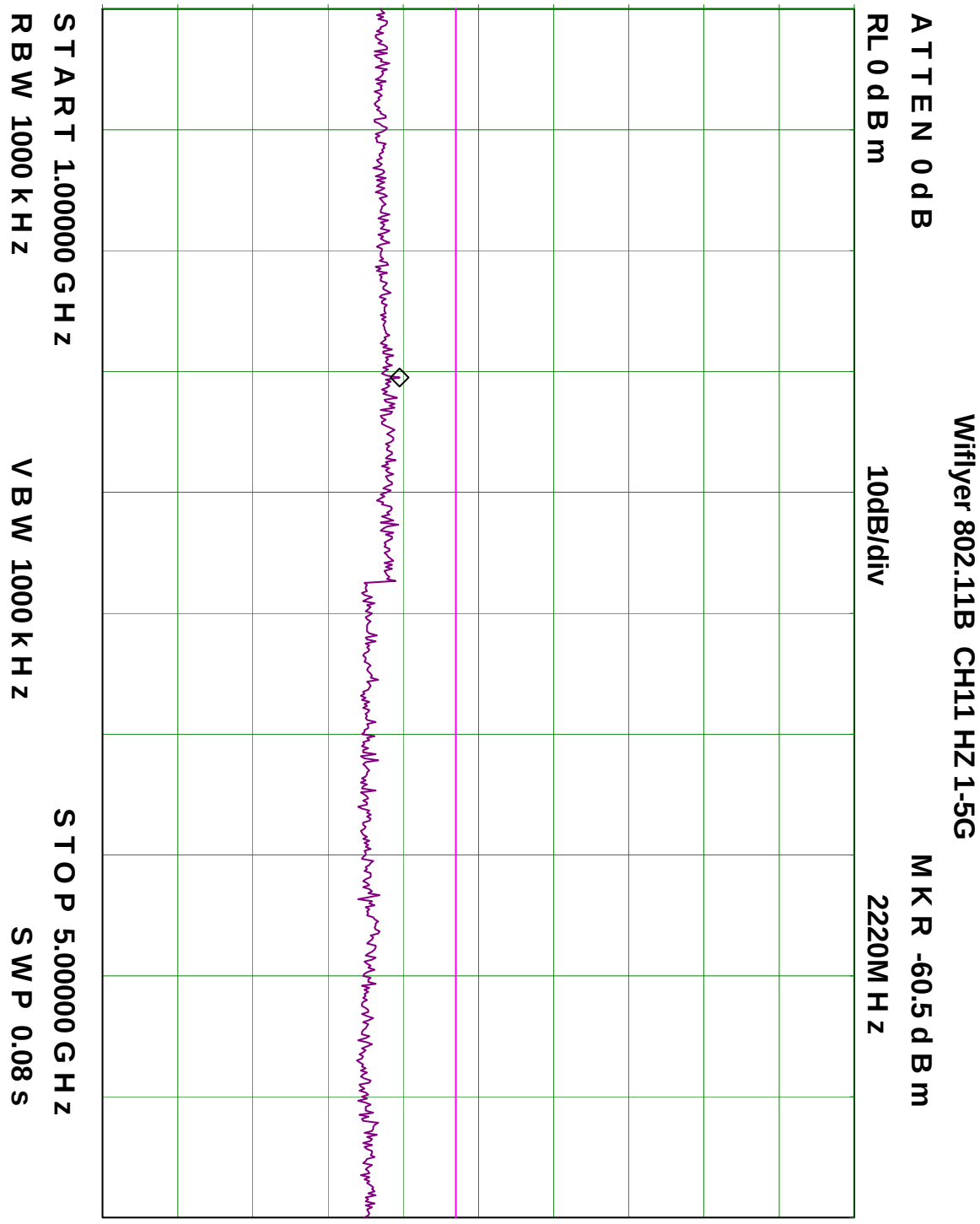


Radiated Band Edge Delta Channel 2,462MHz

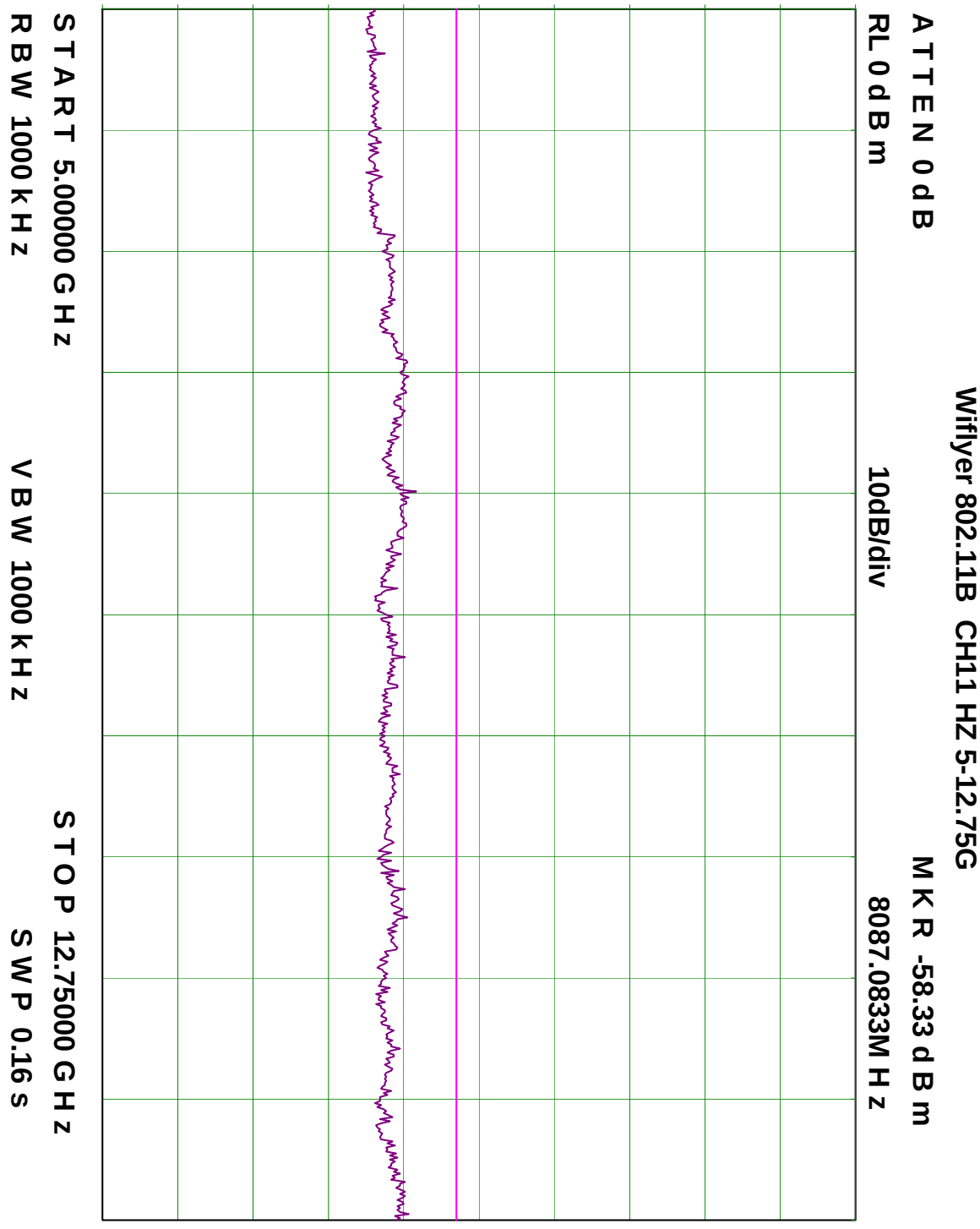


Radiated Emissions, Transmitter Spurious 30MHz to 26GHz - ALON01/13-20

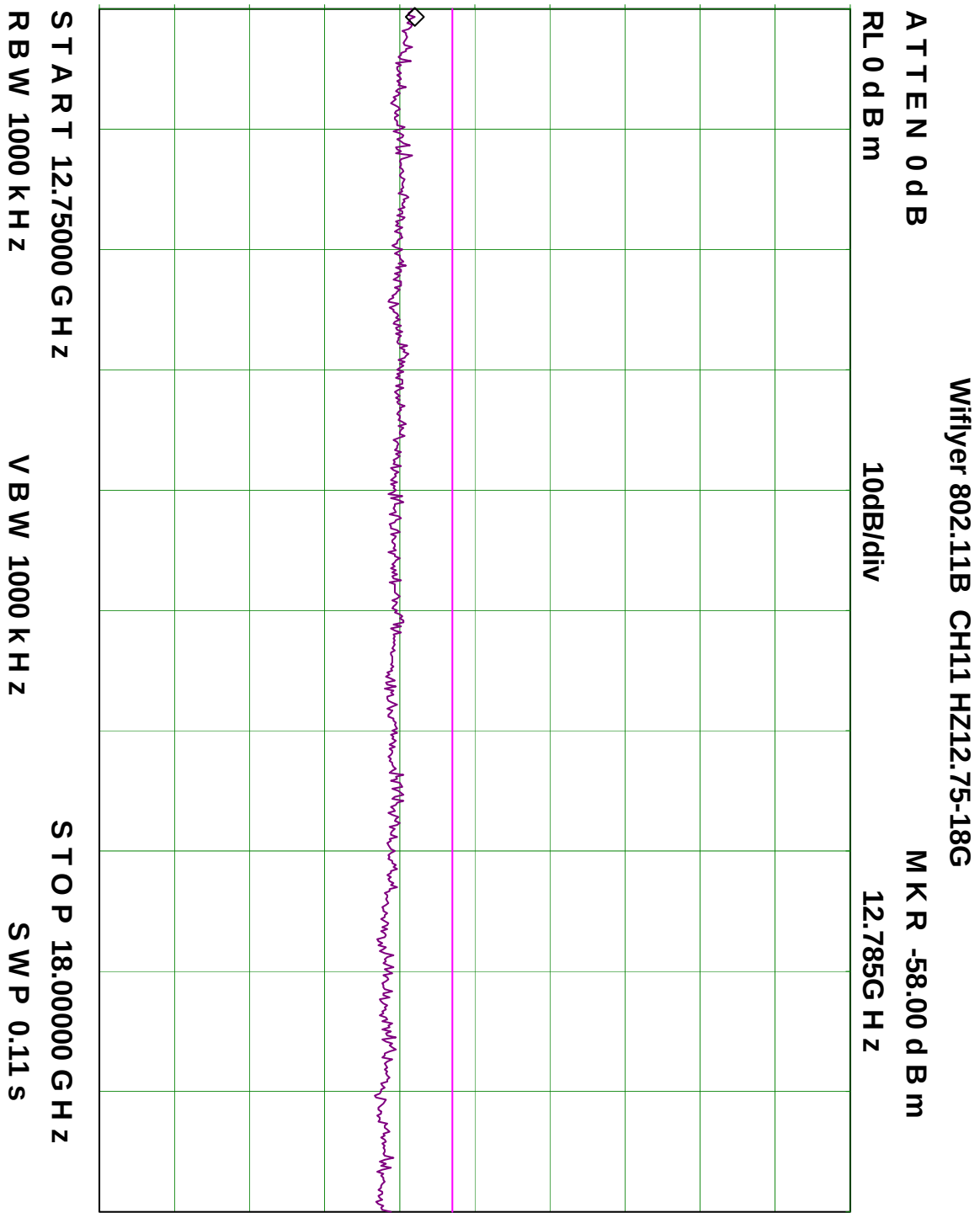
Plot 13 Radiated Emissions, Transmitter Spurious - Channel 11 Horizontal 1-5GHz



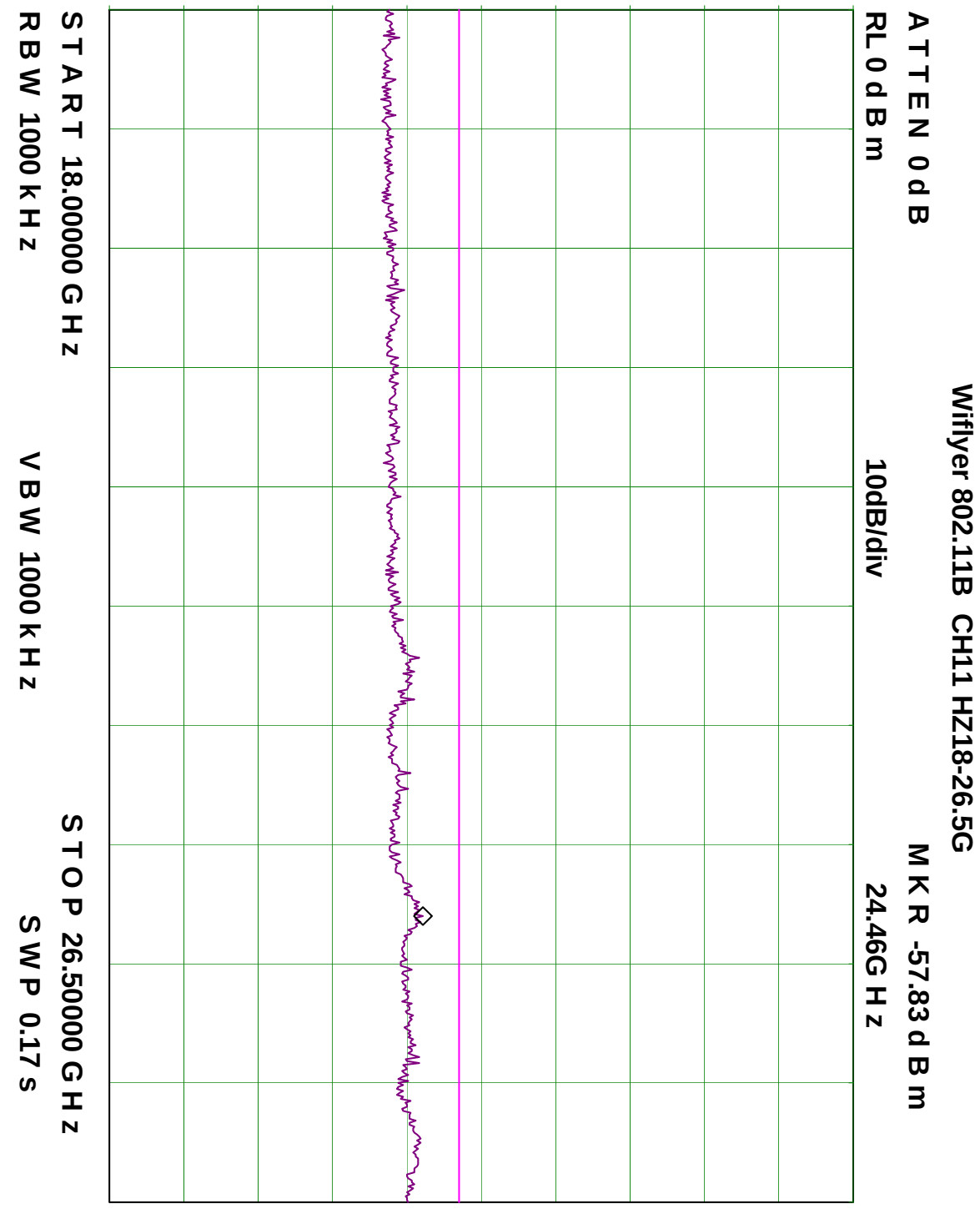
Plot 14 Radiated Emissions, Transmitter Spurious - Channel 11 Horizontal 5-12.75GHz



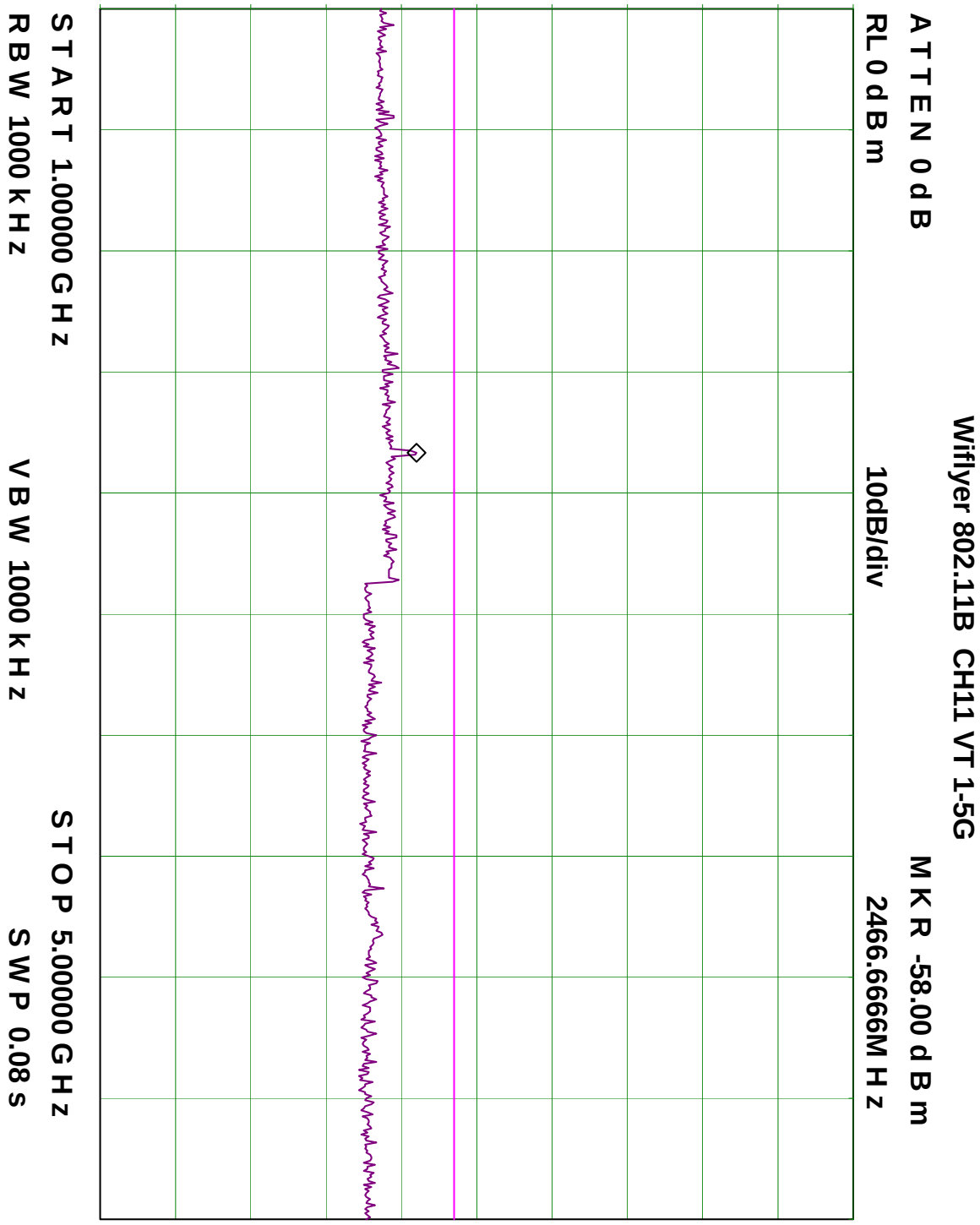
Plot 15 Radiated Emissions, Transmitter Spurious - Channel 11 Horizontal 12.75-18GHz



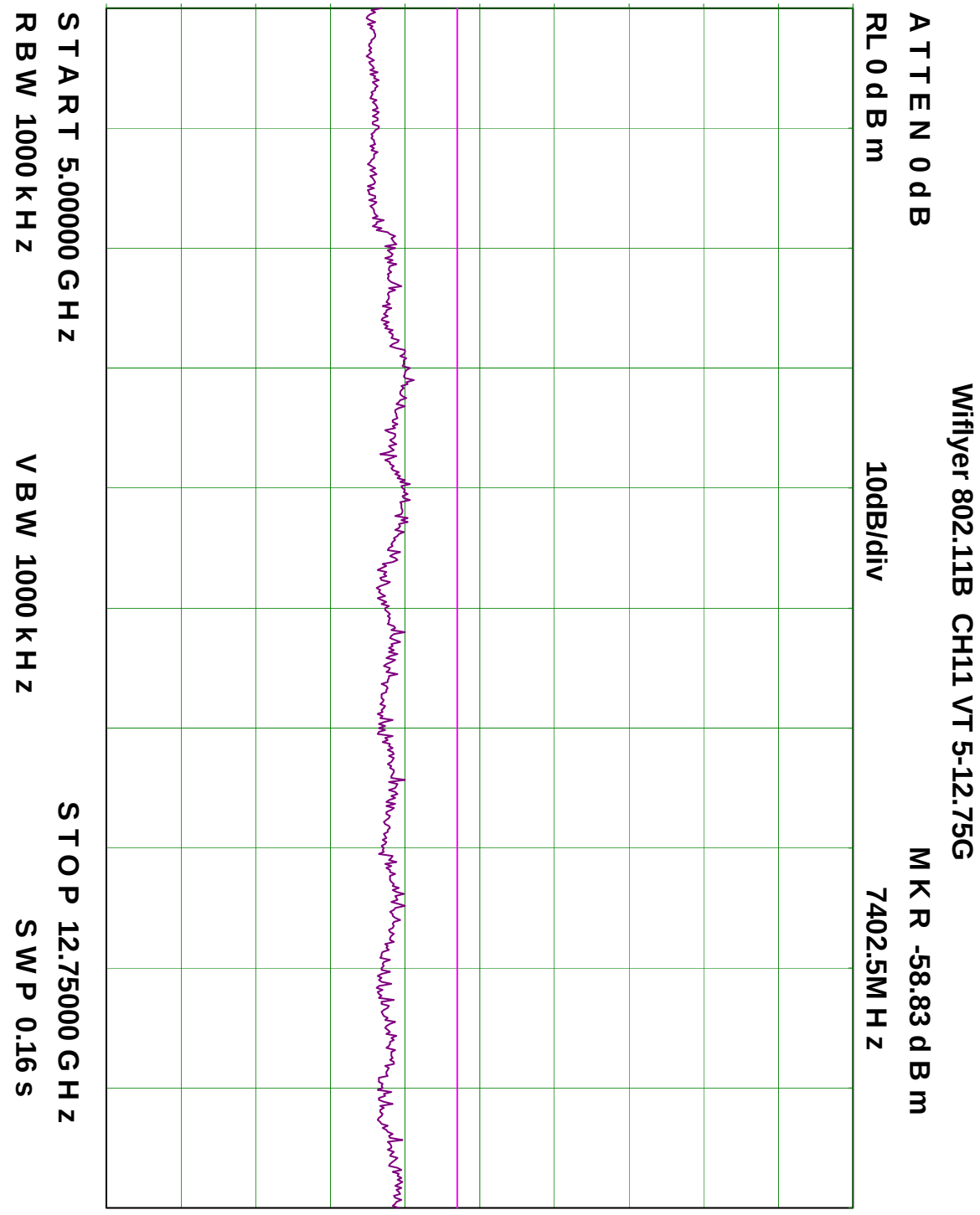
Plot 16 Radiated Emissions, Transmitter Spurious - Channel 11 Horizontal 18-26.5GHz



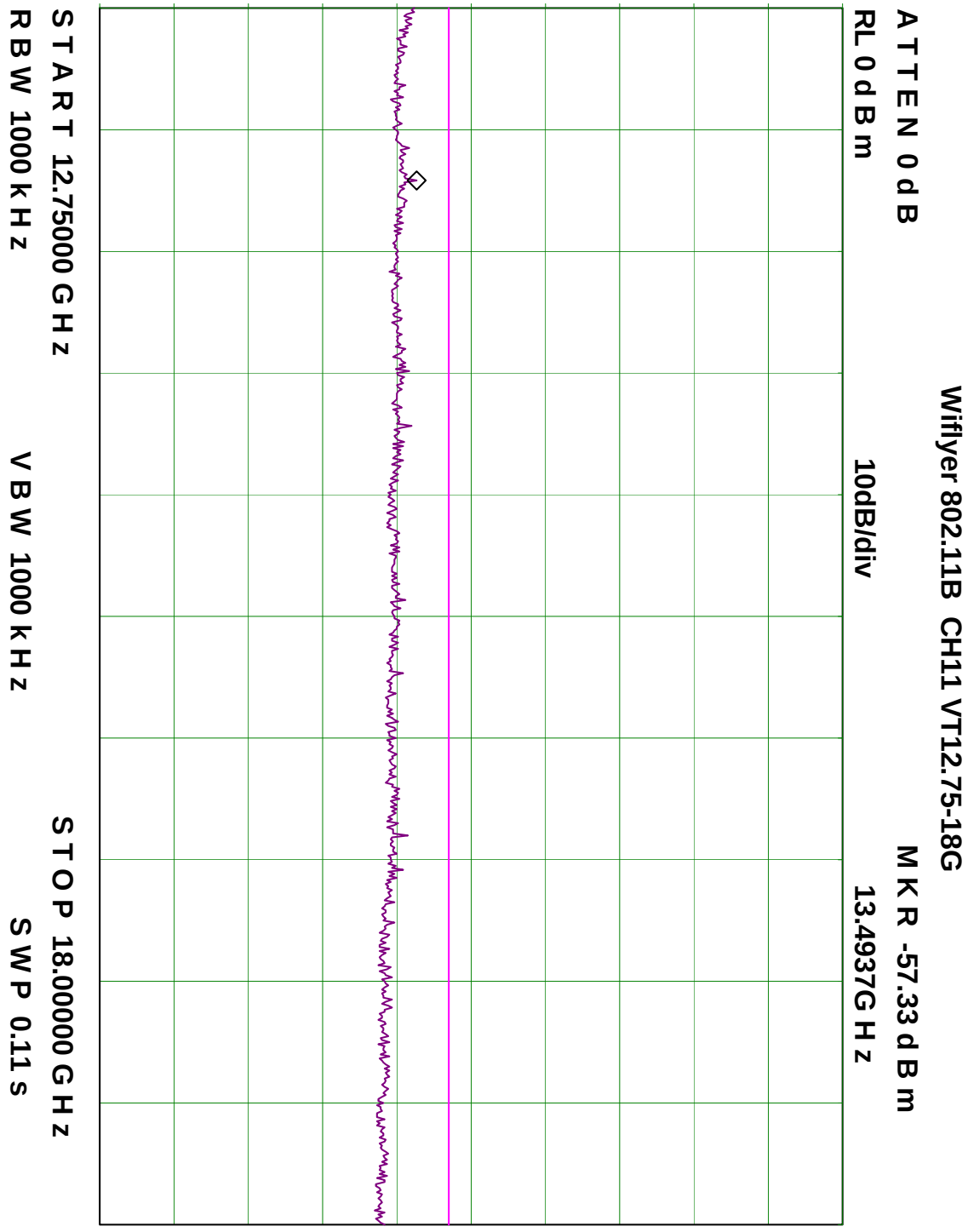
Plot 17 Radiated Emissions, Transmitter Spurious - Channel 11 Vertical 1-5GHz



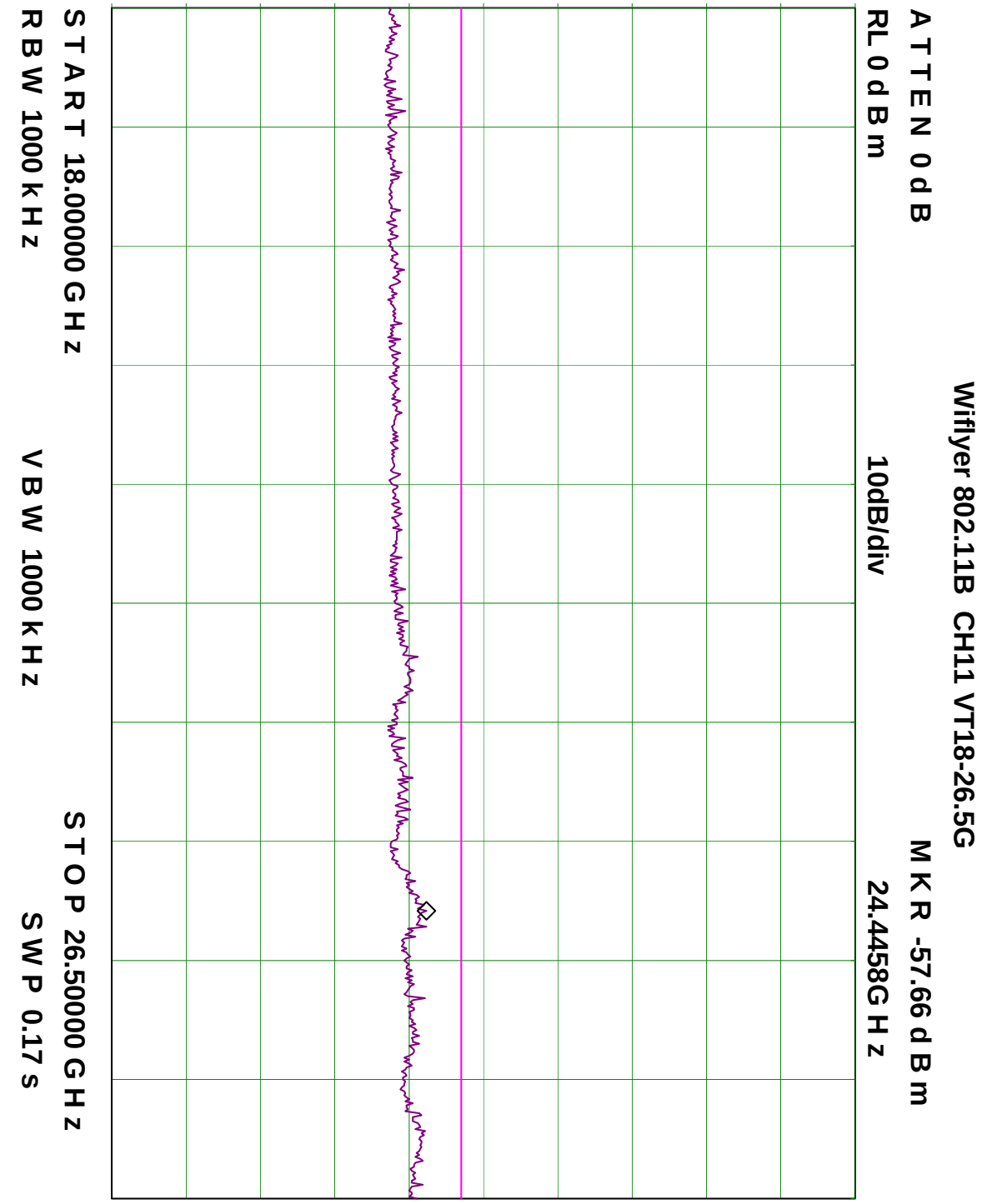
Plot 18 Radiated Emissions, Transmitter Spurious - Channel 11 Vertical 5-12.75GHz



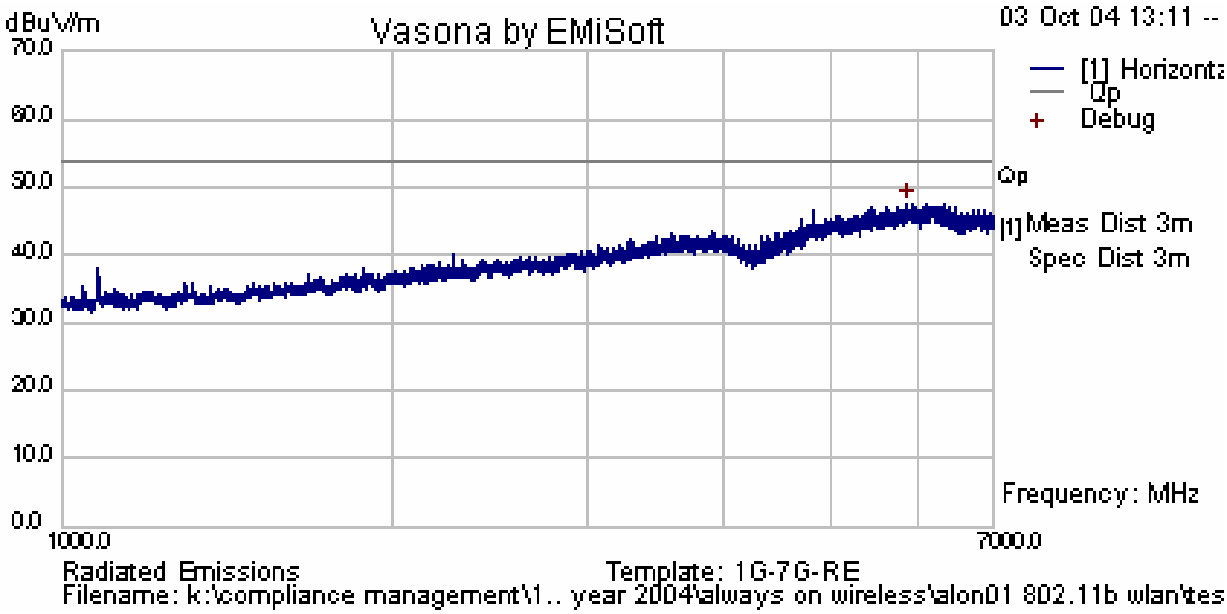
Plot 19 Radiated Emissions, Transmitter Spurious - Channel 11 Vertical 12.75-18GHz



Plot 20 Radiated Emissions, Transmitter Spurious - Channel 11 Vertical 18-26.5GHz

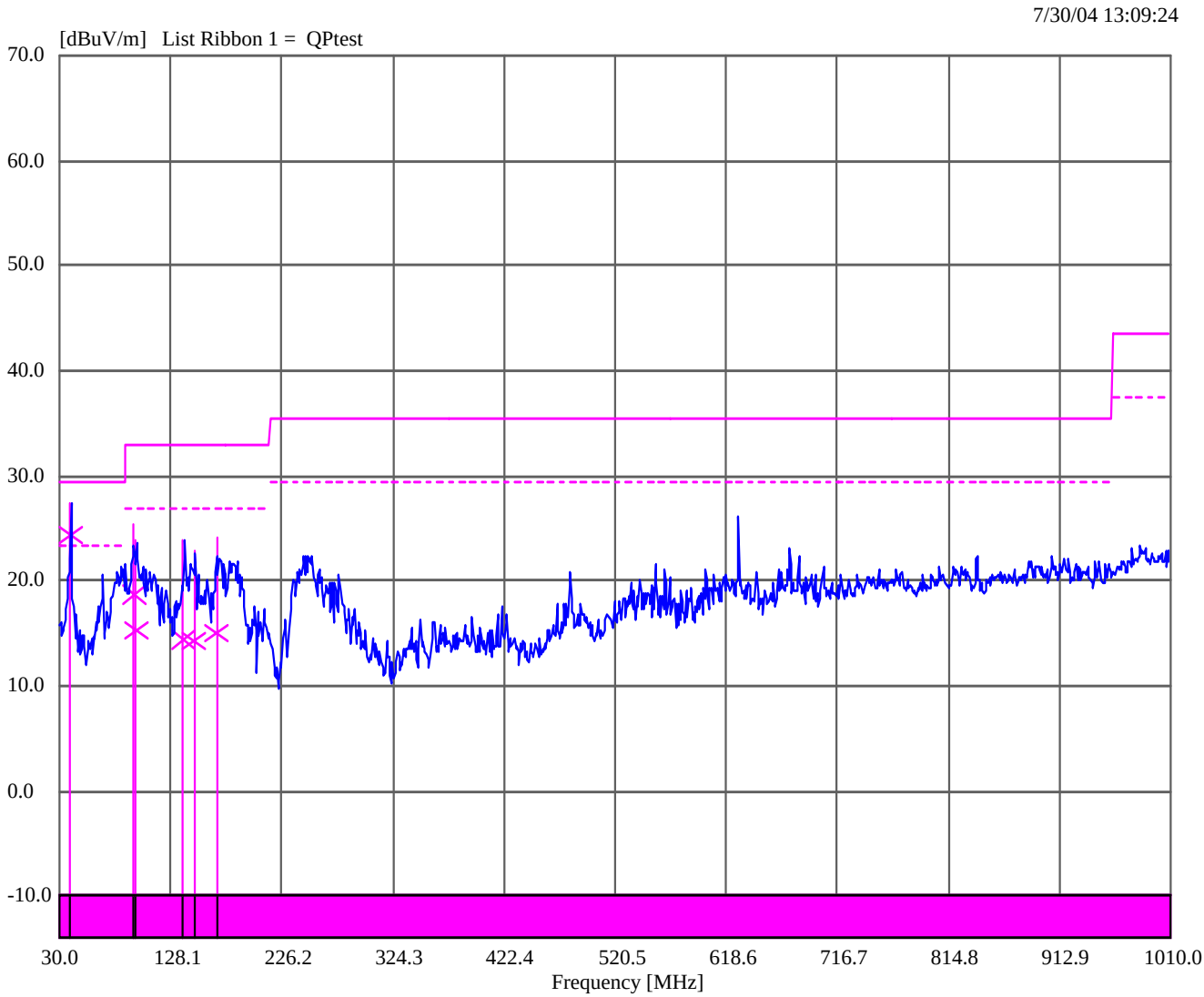


Radiated Emissions, Receiver Spurious ALON01/21

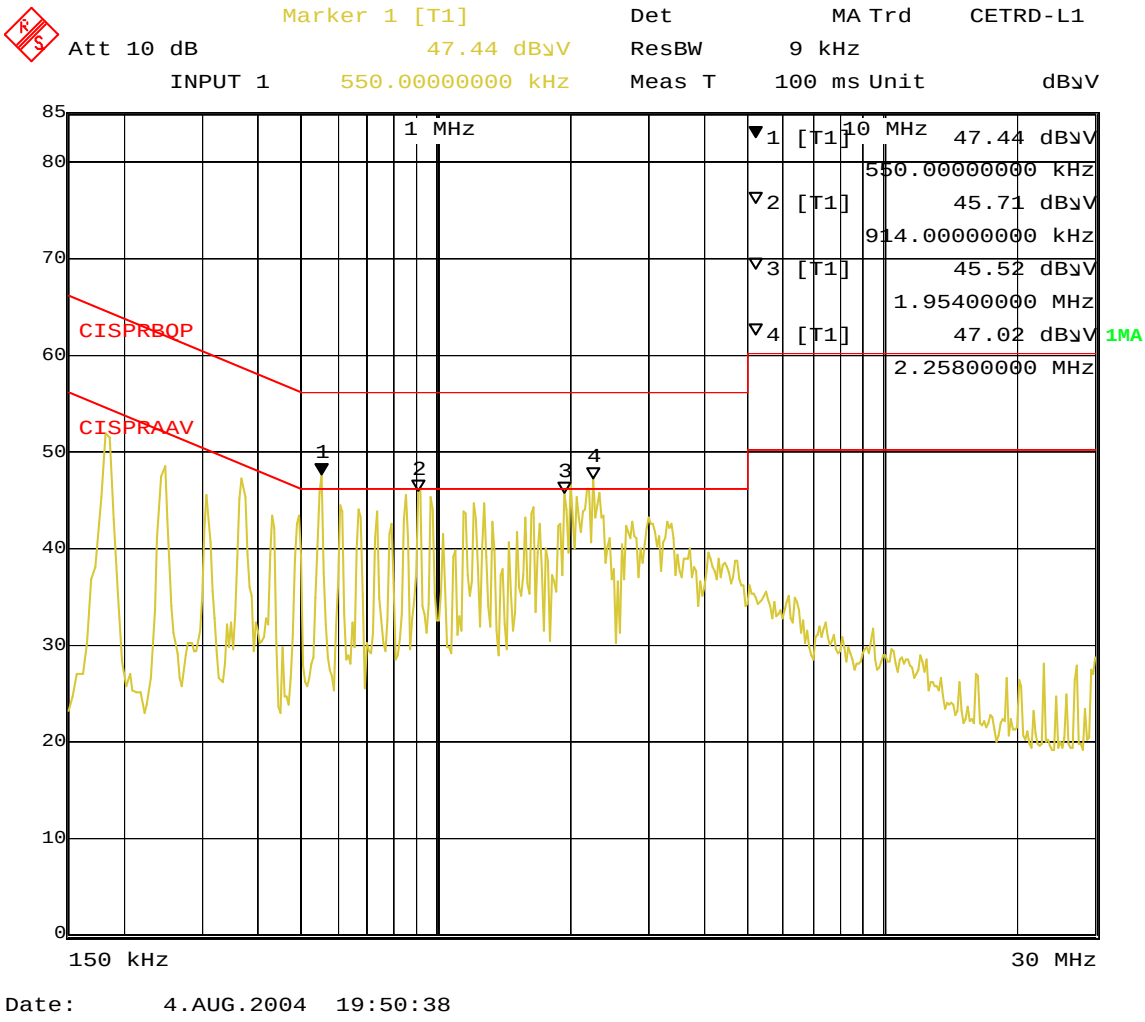


Radiated Spurious Emissions 30M-1GHz - ALON01/22

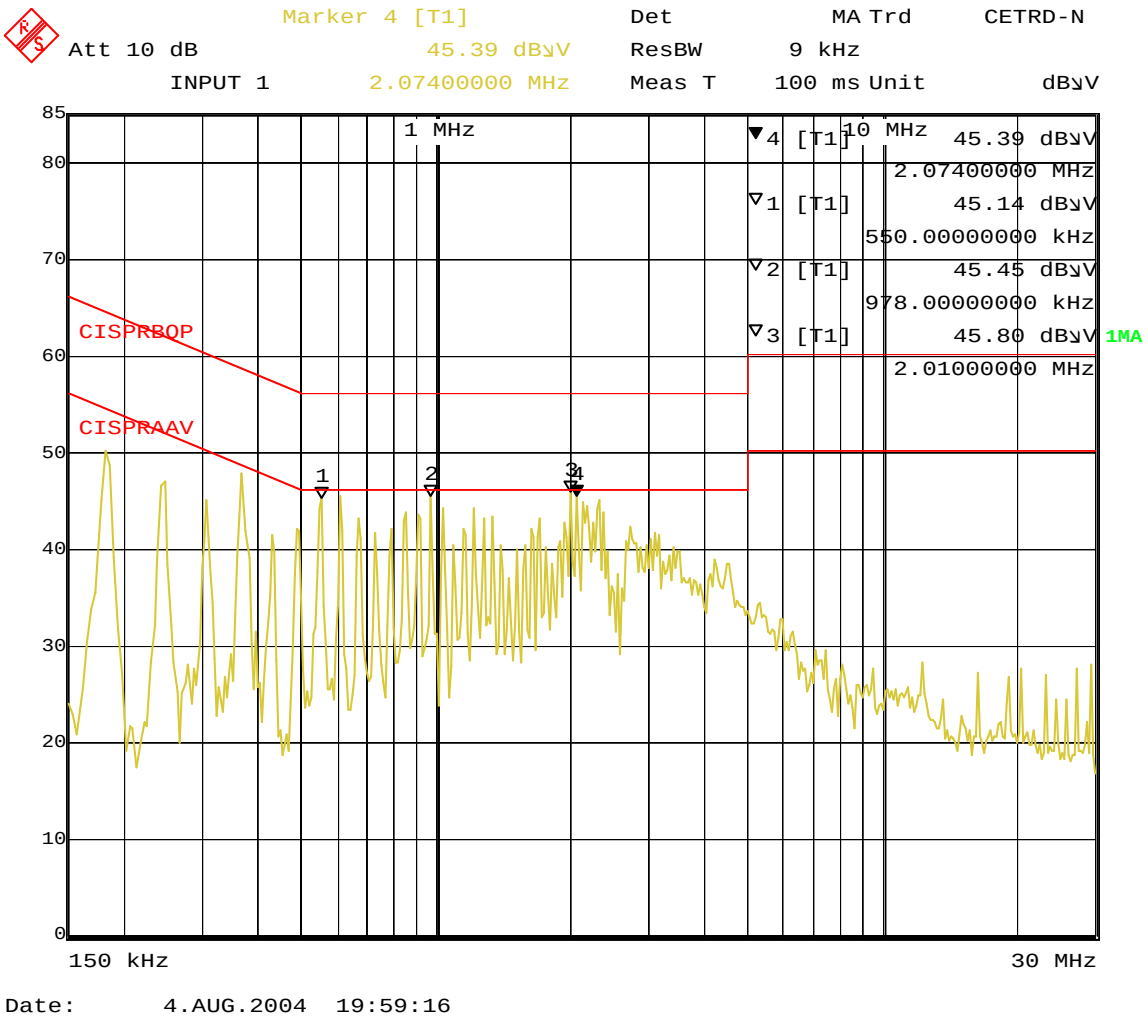
Horizontal and Vertical Polarization



AC Wireline Conducted Emissions (Live Line) - ALON01/23



AC Wireline Conducted Emissions (Neutral Line) - ALON01/24



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