Bookmarks are enabled in this document

Test of CISCO 74-3625, 802.11a Wireless Module

To FCC 47 CFR Part15.407 & IC RSS-210

Test Report Serial No.: TUVR47-A2 REV A

TEST REPORT

FROM

Test of CISCO 74-3624, 802.11a Wireless Module

To FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: TUVR48-A2 Rev A

This report supersedes none

Manufacturer: Cisco Systems
170 W. Tasman Ave
San Jose
California 95134 USA

Product Function: 802.11a/b/g Wireless Access Point

Copy No: pdf **Issue Date:** 9th February '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

2106

MiCOM Labs is a UKAS (United Kingdom Accreditation Service)

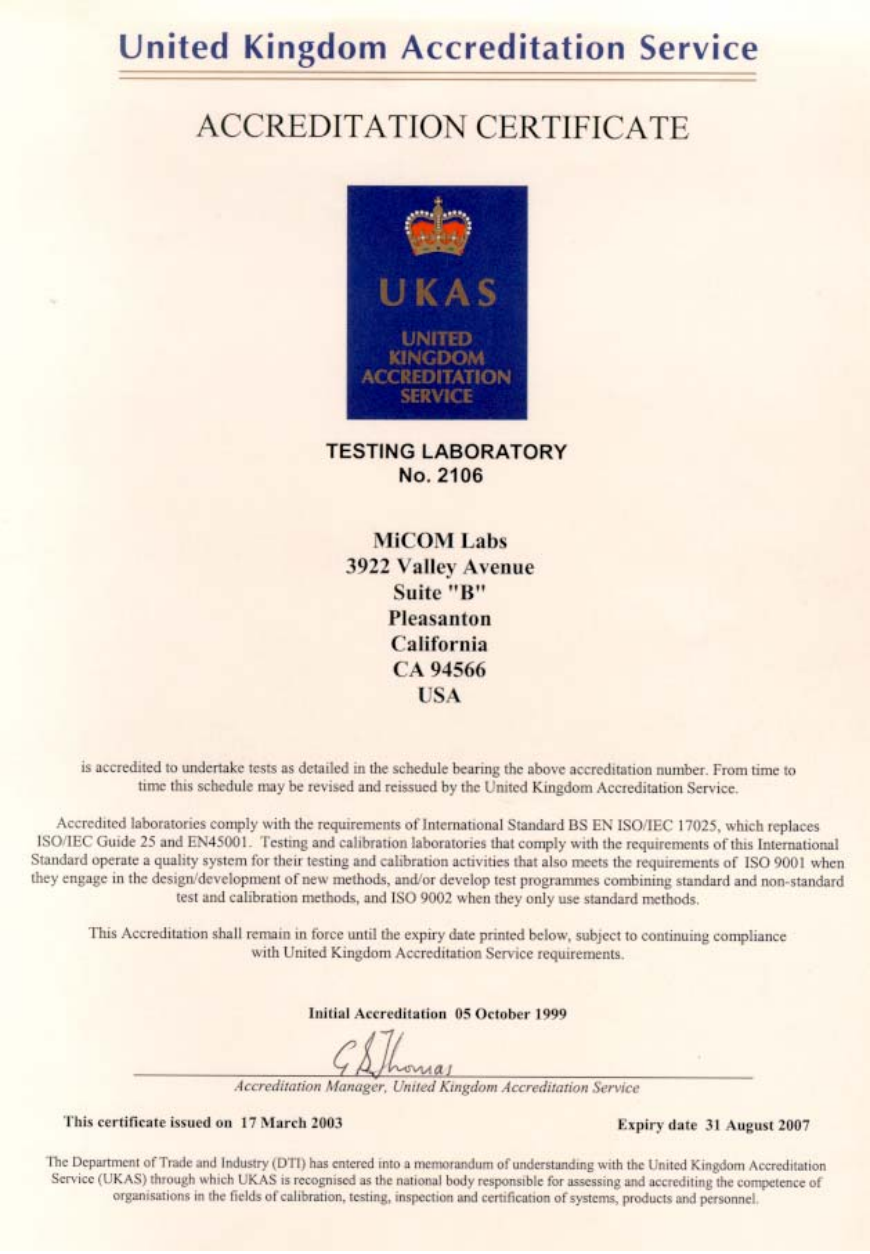
Accredited Test Laboratory

This page has been left intentionally blank

TABLE OF CONTENTS

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	2nd February '05	
Rev A	9th February '05	

1. TEST RESULT CERTIFICATE

Manufacturer:	Cisco Systems 170 W. Tasman Ave San Jose California 95134 USA	Tested By:	MiCOM Labs, Inc. 3922 Valley Avenue 'B' Pleasanton California, 94566, USA
EUT:	802.11a Wireless Module	Tel:	+1 925 462 0304
Model:	CISCO 74-3624	Fax:	+1 925 462 0306
S/N:	Not Available		
Test Date(s):	9th Sept - 14th Jan '04	Website:	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC 47 CFR Part 15.407 & 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, 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 Part 15.407	2004	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 August 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 Organisations.
(x)	FCC Public Notice – DA 02-2138	2002	Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices

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

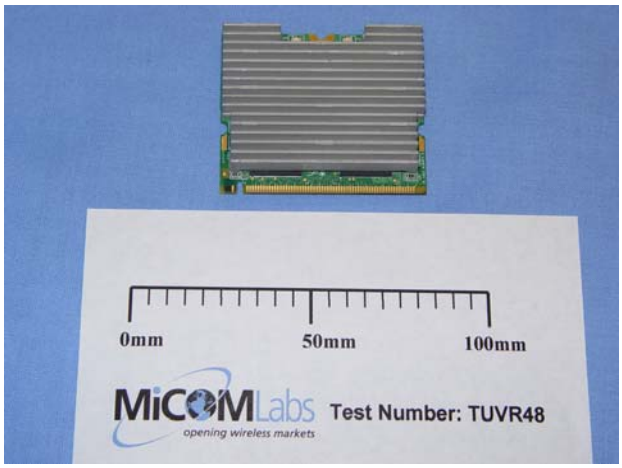
3.1. Technical Details

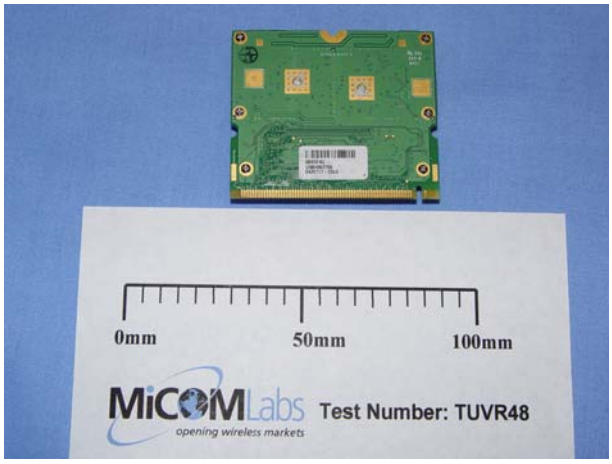
Details	Description
Purpose:	Test of the CISCO 74-3624 to FCC 47 Part 15.407 & and Industry Canada regulations IC RSS-210
Applicant:	TUV Rheinland of N. America 1279 Quarry Lane, Suite A Pleasanton, California 94566 USA
Manufacturer:	Cisco Systems 170 W. Tasman Ave San Jose, California 95134 USA
Laboratory performing the tests:	MiCOM Labs, Inc. 3922 Valley Avenue, Suite "B" Pleasanton, California 94566 USA
Test report reference number:	TUVR48-A2
Date EUT received:	6th September '04
Standard(s) applied:	FCC 47 CFR Part 15.407 & IC RSS-210
Dates of test (from - to):	9th Sept - 14th Jan '04
Type of Equipment:	802.11a/b/g Wireless Access Point
Manufacturers Trade Name:	CISCO 74-3624
Model:	CISCO 74-3624
Location for use:	Indoor use only
Declared Frequency Range(s):	5,180 – 5,320 MHz
Type of Modulation:	Per 802.11a – OFDM
Client Declared Nominal Output Power:	802.11a: +16dBm (40mW)
Transmit/Receive Operation:	Simplex
Rated Input Voltage and Current:	3 Volts DC, 800mA
Operating Temperature Range:	0ºC to +35 ºC
ITU Emission Designator:	802.11a - 18M4W7D
Microprocessor(s) Model:	Atheros AR5213
Clock/Oscillator(s):	40MHz
Frequency Stability:	±20ppm
Equipment Dimensions:	2" x 2.5"
Weight:	0.2lbs
Primary function of equipment:	To initiate and receive data transmissions, telemetry and telecommand

3.2. Scope of Test Program

The scope of the test program was to test the CISCO 74-3624, 802.11a/b/g Wireless Module against the current FCC and Industry Canada specifications FCC Part 15.407 and IC RSS-210, Normative References (i) & (ii).

CISCO 74-3624: 2.4 and 5 GHz 802.11a/b/g Wireless Access Point Module





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

Name	Manufacturer	Model No.	Serial No.
CISCO 74-3624	Foxconn	U58H062T00	N/A

Support Equipment

Name	Description	Model No.	Serial No.
Atheros test box	Host development system	NL5354AP	035057010
Class II AC Adaptor	PSU 120VAC 60Hz	AM-121000	710101040000
IBM Laptop	Computer	600E	78-PKNM0-03/00
IBM AC Adaptor	100-240VAC 50/60Hz	02K6749	ZJ1MN33631NN

3.4. Antenna Details

Antenna Type	Gain (dBi) 2.4GHz/5GHz	Manufacturer	Model No.	Serial No.
Swivel Mount Dipole	2.0 / 5.0	Radial	AIR-ANTM2050D-R	N/A
Ceiling Mount Omni	4.0 / 5.0	Cushcraft	AIR-ANTM4050V-R	N/A
Wallmount Patch	5.5 / 6.0	Cushcraft	AIR-ANTM5560P-R	N/A

3.5. Cabling and I/O Ports

Number and type of I/O ports

1.

3.6. Test Configurations

Matrix of test configurations

Operational Mode (802.11)	Operating Channel	Frequencies (MHz)	Maximum Data Rates (MBit/s)	Data Rate(s) Selected for Test Purposes (Mbit/s)
a	36, 52, 64	5,180 5,260 5,320	54	54

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.

Conducted testing on the Aircard wireless module was not performed in a host device therefore host software was not exercised. Maximum output power was set available via the Atheros software. A host device was used for radiated emission testing, see picture of Atheros host device below.

Conducted Testing – Atheros Host Device
The antennas on the Atheros host device were not utilized for test purposes. These were disconnected internally.

3.7. Equipment Modifications

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

1. NONE

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

Emission testing 30 MHz - 1 GHz and AC Wireline (Section(s) 5.1.8.3 and 5.1.9 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 are ISO/IEC 17025 accredited for emission testing.

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 15.407** and **Industry Canada RSS-210**.

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.407(a) 6.2.2 (q1)	26dB and 99% Emission BW	Emission bandwidth measurement	Conducted	Complies	5.1.1
15.407(a) 6.2.2 (q1)	Peak Transmit Power	Peak Power Measurement	Conducted	Complies	5.1.2
15.407(a) 6.2.2 (q1)	Peak Power Spectral Density	PPSD	Conducted	Complies	5.1.3
15.407(a) (6)	Peak Excursion Ratio	<13dB in any 1MHz bandwidth	Conducted	Complies	5.1.4
15.407(g) 15.31 6.2.2 (q1)(iv)(e)	Frequency Stability	Limits: contained within band of operation at all times.	Manufacturer declaration	Complies	5.1.5
15.407(f) 6.2.2 (q1)(iv)(g)	Radio Frequency Radiation Exposure	Exposure to radio frequency energy levels, Maximum Permissible Exposure (MPE)	Calculation	Complies	5.1.6
15.407(b) (1),(2),(3) 6.2.2 (q1) (ii)	Conducted Spurious Emissions	Spurious emissions above 1GHz (1-40GHz) including band edge	Conducted	Complies	5.1.7

Section(s)	Test Items	Description	Condition	Result	Test Report Section
5.205(a) / 15.209(a) 6.3	Radiated Emissions		Radiated		5.1.8
	Transmitter Radiated Spurious Emissions	Emissions above 1 GHz		Complies	*5.1.8.1*
	Radiated Band Edge	Band edge results		Complies	*5.1.8.2*
	Radiated Emissions	Emissions <1 GHz (30M-1 GHz)		Complies	*5.1.8.3*
15.207 6.6	AC Wireline Conducted Emissions 150 kHz–30 MHz	Conducted Emissions	Conducted	Complies	5.1.9

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

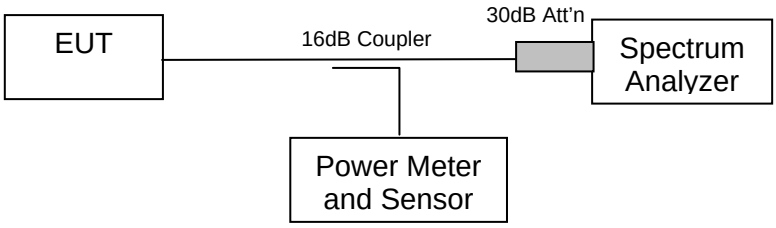
5.1. Device Characteristics

5.1.1. 26 dB and 99 % Bandwidth

FCC, Part 15 Subpart C §15.407(a)
Industry Canada RSS-210 §6.2.2 (q1)

Test Procedure
The bandwidth at 26 dB and 99 % is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency. A 3 dB resolution bandwidth filter was used to make the 26 dB and 99 % BW measurements;

Test Measurement Set up



Measurement set up for 26 dB and 99 % bandwidth test

Measurement Results for 26 dB and 99 % Operational Bandwidth(s)

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

TABLE OF RESULTS – **802.11a 6 Mbit/s**

Center Frequency (MHz)	26dB BW (MHz)	26 dB BW Plot #	99 % BW (MHz)	99 % BW Plot #
5,180	27.2044	On File	18.3967	On File
5,260	27.2044	On File	18.3967	On File
5,320	27.9559	01	18.3967	02

Specification

Limits

§15.407 (a) For the following frequency band the peak transmit power over the following range of operation shall not exceed the lesser of;

(1) 5,150-5,250MHz of 50mW (+17dBm) or 4dBm + 10Log10 B, where B is the 26dB BW in MHz
(2) 5,250-5,350GHz of 250mW (+24dBm) or 11dBm + 10Log10 B, where B is the 26dB BW in MHz

RSS-210 §6.2.2 (q1)(i-iii)

(i) 5,150-5,250MHz (indoor use only) - The maximum equivalent isotropically radiated power (EIRP) shall not exceed 200mW or 10 + 10 Log_{10} B dBm, whichever power is less. B is the 99%* power bandwidth in MHz.

(ii) 5,250-5,350MHz The maximum transmitter power shall not exceed 250mW or 11 + 10 Log_{10} B, dBm, whichever power is less. The maximum EIRP shall not exceed 1.0 watt or 17 + 10Log_{10} B dBm, whichever power is less. B is the 99%* power bandwidth in MHz.

*Note: Section 6.2.2 (q1) (iv) (b) permits the use of a 26dB bandwidth as alternative

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, 0252, 0313, 0314

5.1.2. Peak Transmit Power

FCC, Part 15 Subpart C §15.407(a)
Industry Canada RSS-210 §6.2.2(q)(1)

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 continuous transmission mode i.e. 100 % duty cycle at the appropriate center frequency.

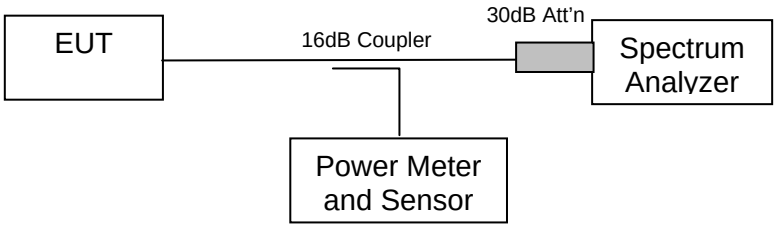
Method 3 in Normative Reference (x) Section 2.1 was implemented to determine module Peak Output Power.

Antenna Gain - Maximum Permissible Peak Transmit Power

If transmitting antennas of directional gain greater than 6 dBi are used the Peak Transmit Power of 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.

As the maximum antenna gain was 2.2 dBi is was not applicable

Test Measurement Set up



Measurement set up for Transmitter Peak Output Power

Measurement Results for Peak Transmit Power

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

Radio parameters.
Data Rate: 6MBit/s, Bit Pattern: Random, Duty Cycle: 100%

Peak Power (EIRP) = conducted power level + antenna gain (dBi)

TABLE OF RESULTS

Center Frequency (MHz)	Measurement Bandwidth (MHz)	Peak Power (dBm)	Plot #
5,180	27.9559	+16.93	03
5,260	27.9559	+22.32	04
5,320	27.9559	+20.47	On File

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 Gains greater than 6dBi

Maximum permissible Peak Power = +30 – (antenna gain - 6) dBm

Antenna Type	Gain (dBi)	Antenna Gain >6 dBi (dB)	Max. Allowable Peak Power (dBm)
Swivel Mount Dipole	5.0	No	+17.0[1] / +24.0[2]
Ceiling Mount Omni	5.0	No	+17.0[1] / +24.0[2]
Wallmount Patch	6.0	No	+17.0[1] / +24.0[2]

[1] - +17dBm for the range 5,150 – 5,250 MHz
[2] - +24dBm for the range 5,250 – 5,350 MHz

PEAK POWER (EIRP) = conducted power level + antenna gain (dBi) dBm

Band 5,150 – 5,250 MHz: Peak Power ($EIRP_{MAX}$) = +16.93 + 6.0 = +22.93 dBm
Band 5,250 – 5,350 MHz: Peak Power ($EIRP_{MAX}$) = +22.32 + 6.0 = +28.32 dBm

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 peak power.

Specification

Limits

§15.407 (a) 1 -3 For the following frequency band the peak transmit power over the following range of operation shall not exceed the lesser of;

(1) 5,150-5,250MHz of 50mW (+17dBm) or 4dBm + 10Log10 B, where B is the 26dB BW in MHz
(2) 5,250-5,350GHz of 250mW (+24dBm) or 11dBm + 10Log10 B, where B is the 26dB BW in MHz

RSS-210 §6.2.2 (q1)(i-iii)

(i) 5,150-5,250MHz (indoor use only) - The maximum equivalent isotropically radiated power (EIRP) shall not exceed 200mW or 10 + 10 Log_{10} B dBm, whichever power is less. B is the 99%* power bandwidth in MHz.

(ii) 5,250-5,350MHz The maximum transmitter power shall not exceed 250mW or 11 + 10 Log_{10} B, dBm, whichever power is less. The maximum EIRP shall not exceed 1.0 watt or 17 + 10Log10 B dBm, whichever power is less. B is the 99%* power bandwidth in MHz.

*Note: Section 6.2.2 (q1) (iv) (b) permits the use of a 26dB bandwidth as alternative

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, 0252, 0313, 0314

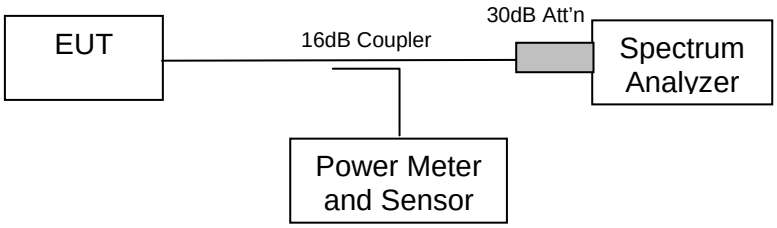
5.1.3. Peak Power Spectral Density

FCC, Part 15 Subpart C §15.407(a)
Industry Canada RSS-210 §6.2.2(q)(1)

Test Procedure
This is an antenna conducted measurement using a spectrum analyzer. The transmitter output is connected to a spectrum analyzer in sample detector mode. The Peak Power Spectral Density is the highest level found across the emission in any 1MHz reference bandwidth.

Method 2 in Normative Reference (x) Section 2.1 was implemented to determine module Peak Power Spectral Density.

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): 6 MBit/s

TABLE OF RESULTS

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)	Plot #
5,180	5,178.246	-4.40	05
5,260	5,261.152	+1.81	06
5,320	5,318.547	+1.35	On File

Antenna Gain - Maximum Permissible Peak Power Spectral Density

If transmitting antennas of directional gain greater than 6 dBi are used the peak power spectral density 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 Gains greater than 6dBi

Maximum permissible Peak Power = +30 – (antenna gain - 6) dBm

Antenna Type	Gain (dBi)	Antenna Gain >6 dBi (dB)	Max. Allowable Peak Power (dBm)
Swivel Mount Dipole	5.0	No	+4.0[1] / +11.0[2]
Ceiling Mount Omni	5.0	No	+4.0[1] / +11.0[2]
Wallmount Patch	6.0	No	+4.0[1] / +11.0[2]

[1] - +4dBm for the range 5,150 – 5,250 MHz
[2] - +11dBm for the range 5,250 – 5,350 MHz

Specification

§15.407 (a) Peak Power Spectral Density shall not exceed the following limits for the frequency bands of interest;

a. 5,150-5,250MHz - +4dBm
b. 5,250-5,350MHz - +11dBm

RSS-210 §6.2.2(q) , the Peak Power Spectral Density shall not exceed the following for each frequency band

c. 5,150-5,250MHz, +10dBm in any 1MHz band
d. 5,250-5,350MHz, +11dBm in any 1MHz band

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, 0252, 0313, 0314

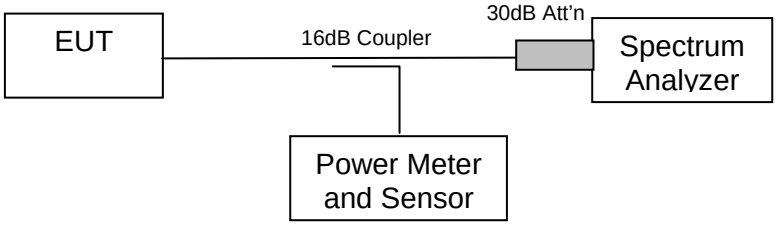
5.1.4. Peak Excursion Ratio

FCC, Part 15 Subpart C §15.407(a)(6)

Test Procedure

This is an antenna conducted measurement using a spectrum analyzer. Method 3 in Normative Reference (x) Section 2.1 was implemented to determine module Peak Excursion Ratio. The Peak Excursion Ratio is the difference in amplitude (dB) between the two traces.

Test Measurement Set up



Measurement set up for Peak Excursion Ratio

Measurement Results for Peak Excursion Ratio

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

TABLE OF RESULTS

Centre Frequency (MHz)	Peak Excursion Ratio (dB)	Plot #
5,180	10.5	ON FILE
5,260	10.6	07
5,320	10.6	ON FILE

Specification

Limits

§15.407 (a)(6) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified in this paragraph) shall not exceed 13dB across any 1MHz bandwidth or the emission bandwidth whichever is less

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, 0252, 0313, 0314

5.1.5. Frequency Stability

FCC, Part 15 Subpart C §15.407(g)
Industry Canada RSS-210 §6.2.2 (q1)(iv)(e)

Test Procedure

The manufacturer of the equipment is responsible for ensuring that the frequency stability is such that emissions are always maintained within the band of operation under all conditions.

Manufacturer Declaration

The frequency stability of the reference oscillator sets the frequency stability of the RF transceiver signals. Therefore all of the RF signals should have ±20ppm stability.
This stability accounts for room temp tolerance of the crystal oscillator circuit, frequency variation across temperature, and crystal ageing.

±20ppm at 5.150GHz translates to a maximum frequency shift of ±103KHz. As the edge of the channels is at least one MHz from either of the band edges, ±103KHz is more than sufficient to guarantee that the intentional emission will remain in the band over the entire operating range of the radio.

5.1.6. Maximum Permissible Exposure

FCC, Part 15 Subpart C §15.407(f)
Industry Canada RSS-210 §6.2.2(q1)(iv)(g)

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) = +**22.32 dBm (170.6mW),** Antenna Gain = 6.0 dBi / **3.98 numeric**

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

Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Calculated RF Exposure at d=20cm (mW/cm^2)	Limit (mW/cm^2)
3.98	+22.32	170.6	0.135	1

Specification

Maximum Permissible Exposure Limits

§1.1093, §2.1091, §2.1093 U-NII devices are subject to the radio frequency radiation exposure requirements within the above paragraphs as appropriate. All equipment shall be considered to operate in a "general population/controlled" environment".

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

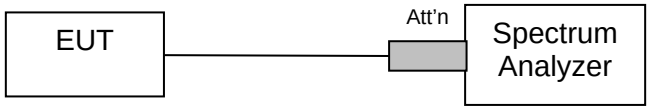
5.1.7. Conducted Spurious Emissions (incl. Band Edge)

FCC, Part 15 Subpart C §15.407(b)(1),(2),(3)
Industry Canada RSS-210 §5.9.1, §6.2.2 (q1)(ii)

Test Procedure

Undesirable emissions are measured with a spectrum analyzer connected directly to the antenna terminal. Measurements on any frequency or frequencies over 1GHz 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. When measuring the emission limits, the nominal carrier frequency was adjusted as close to the upper and lower band edge as the equipment software permitted.

Test Measurement Set up



Band-edge measurement test configuration

Measurement Results for Conducted Spurious Emissions

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

TABLE OF RESULTS

Centre Frequency (MHz)	Band edge Frequency (MHz)	EIRP Limit dBm/MHz	Amplitude @ Band edge dBm/MHz	Plot #	Margin (dB)
5,180	5,150	-27.0	-33.04	08	-6.04
5,320	5,350	-27.0	-37.40	09	-10.40

Spurious Emissions (above 1 GHz)

Conducted spurious emissions (above 1GHz) 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.

TABLE OF RESULTS – **802.11a 54Mbit/s**

LIMIT: -27dBm/MHz

CH #	Start Frequency (MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Plot #	Margin (dB)
36	30	1000	-37.83	On File	-10.83
36	1000	3000	-34.87	On File	-7.87
36	3000	5150	-34.63	On File	-7.63
36	5350	7000	-42.20	On File	-15.2
36	7000	13000	-43.2	On File	-16.2
36	13000	27000	-41.53	On File	-14.53
36	27000	31000	-45.20	On File	-18.2
36	31000	40000	-35.70	On File	-8.7
52	30	1000	-37.85	On File	-10.85
52	1000	3000	-35.24	On File	-8.24
52	3000	5150	-36.67	On File	-9.67
52	5350	7000	-41.86	On File	-14.86
52	7000	13000	-42.53	On File	-15.53
52	13000	27000	-42.36	On File	-15.36
52	27000	31000	-44.86	On File	-17.86
52	31000	40000	-35.86	On File	-8.86
64	30	1000	-37.82	10	-10.82
64	1000	3000	-35.92	11	-8.92
64	3000	5150	-36.74	12	-9.74
64	5350	7000	-30.86	13	-3.86
64	7000	13000	-42.53	14	-15.53
64	13000	27000	-42.36	15	-15.36
64	27000	31000	-45.03	16	-18.03
64	31000	40000	-34.36	17	-7.36

Specification

Limits

Specifically in-line with **15.407 (b) (1)** and **(b)(2)**. All emissions outside of the 5,150-5,350MHz band did not exceed an EIRP of -27dBm/MHz.

Data plots for band-edge requirements are available in Section 8 'Graphical Results'.

§**6.2.2 (o)(e1):** In any 100KHz bandwidth outside the operating frequency bands, either at least 20dB 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	±2.37 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-05 'Measurement of Spurious Emissions'	0156, 0193, 0088, 0252, 0313, 0314

5.1.8. Radiated Emissions

5.1.8.1. Transmitter Radiated Spurious Emissions (above 1 GHz)

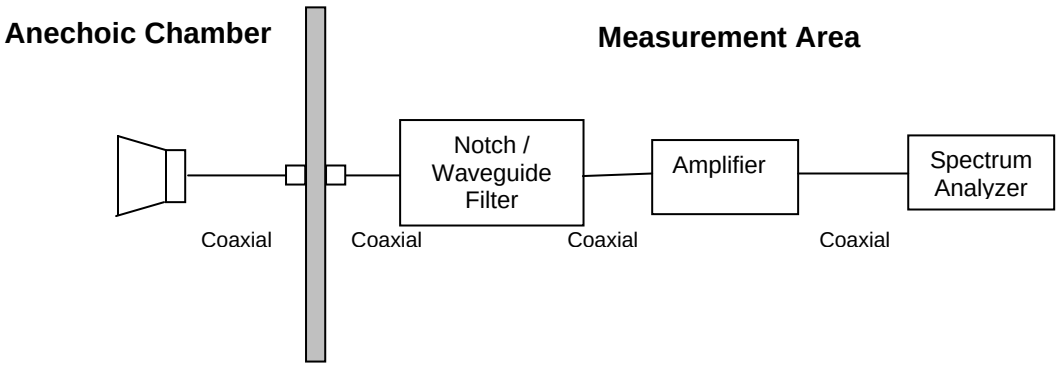
FCC, Part 15 Subpart C §15.205(a)/15.209(a)
Industry Canada RSS-210 §6.3

Test Procedure

Radiated emissions above 1 GHz are measured in an 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 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.

All measurements on any frequency or frequencies over 1 GHz 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

Radio parameters.
Data Rate(s): 54MBit/s
Transmission: Stand alone configuration in Atheros test box

ANTENNA: AIR-ANTM2050D-R Swivel Mount Dipole Antenna

CH.	Freq. (MHz)	Pol. (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)

No emissions were observed close to the limit while operating in 802.11a mode using the **AIR-ANTM2050D-R ANTENNA**

ANTENNA: AIR-ANTM4050V-R Ceiling Mount Omni Antenna

CH.	Freq. (MHz)	Pol. (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)

No emissions were observed close to the limit while operating in 802.11a mode using the **AIR-ANTM4050V-R** antenna

ANTENNA: AIR-ANTM5560P-R Wallmount Patch Antenna

CH.	Freq. (MHz)	Pol. (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)

No emissions were observed close to the limit while operating in 802.11a mode using the **AIR-ANTM5560P-R** antenna

5.1.8.2. Radiated Band-Edge – Restricted Bands

In making band-edge measurements, there can be a problem obtaining meaningful data since a measurement instrument that is tuned to a band-edge frequency may also capture some in-band signals when using the resolution bandwidth (RBW) required by measurement procedure ANSI C63.4. In an effort to compensate for this problem, the following technique sanctioned by the FCC for determining band-edge compliance has been developed.

Equipment was operated on the frequency channel closest to the restricted band in each case.

STEP 1) Perform an in-band field strength measurement of the fundamental emission using the RBW and detector function required by C63.4 and the Rules for the frequency being measured.

STEP 2) Encompass both the peak of the fundamental emission and the band-edge emission under investigation. Set the analyzer RBW to 1 % of the total span, never using a RBW less than 30 kHz. Use a video bandwidth equal to or greater than the RBW. Record the peak levels of the fundamental emission and the relevant band-edge emission. Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not a field strength measurement, it is only a relative measurement to determine how much the emission drops at the band-edge relative to the highest fundamental emission level.

STEP 3) Subtract the delta measured in step (2) from the field strengths measured in step (1). The resultant field strengths (CISPR QP, average, or peak, as appropriate) are then used to determine band-edge compliance as required by either 15.249(c) or 15.205.

STEP 4) You can use the above "delta" measurement technique for measuring emissions that are up to two "standard" bandwidths away from the band-edge, where a "standard" bandwidth is the bandwidth specified by C63.4 for the frequency being measured. For example, for band-edge measurements in the restricted band that begins at 2483.5 MHz, C63.4 specifies a measurement bandwidth of at least 1 MHz. Therefore you may use the "delta" technique for measuring emissions up to 2 MHz removed from the band-edge. Radiated emissions that are removed by more than two bandwidths must be measured in the conventional manner.

Corrected Reading

Corrected Peak Band Edge$_{PBE}$ = Peak Reading + Antenna Gain - Delta

Corrected Average Band Edge$_{ABE}$ = Average Reading + Antenna Gain - Delta

Antenna Gain @ 5 GHz = 35.1 dB/m

Note:

Amplifier gain and cable loss of -27.2 dB was included as the spectrum analyzer offset

ANTENNA: AIR-ANTM2050D-R Swivel Mount Dipole Antenna

Tx Freq. MHz	Restricted Band Frequency MHz	Limit (dBuV/m)	Measured (dBuV/m)	Delta dB	Corrected Reading dBuV/m	Plot #	Margin dB
$5{,}180_{PEAK}$	5,150	74.00	75.05	46.67	63.48	24	-10.52
$5{,}180_{AVE}$	5,150	54.00	39.46	46.67	27.89	24	-26.11
$5{,}320_{PEAK}$	5,350	74.00	70.73	45.92	59.81	25	-14.19
$5{,}320_{AVE}$	5,350	54.00	36.64	45.92	25.82	25	-25.82

ANTENNA: AIR-ANTM4050V-R Ceiling Mount Omni Antenna

Tx Freq. MHz	Restricted Band Frequency MHz	Limit (dBuV/m)	Measured (dBuV/m)	Delta dB	Corrected Reading dBuV/m	Plot #	Margin dB
$5{,}180_{PEAK}$	5,150	74.00	75.45	45.97	64.58	On File	-11.42
$5{,}180_{AVE}$	5,150	54.00	39.06	45.97	28.19	On File	-25.81
$5{,}320_{PEAK}$	5,350	74.00	70.33	44.74	60.69	On File	-13.31
$5{,}320_{AVE}$	5,350	54.00	36.34	44.74	26.70	On File	-27.3

ANTENNA: AIR-ANTM5560P-R Wallmount Patch Antenna

Tx Freq. MHz	Restricted Band Frequency MHz	Limit (dBuV/m)	Measured (dBuV/m)	Delta dB	Corrected Reading dBuV/m	Plot #	Margin dB
$5{,}180_{PEAK}$	5,150	74.00	76.81	47.24	64.67	On File	-9.33
$5{,}180_{AVE}$	5,150	54.00	41.99	47.24	29.85	On File	-24.15
$5{,}320_{PEAK}$	5,350	74.00	72.33	45.68	61.75	On File	-12.25
$5{,}320_{AVE}$	5,350	54.00	38.54	45.68	27.96	On File	-26.04

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	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Measurement Uncertainty Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB

Traceability

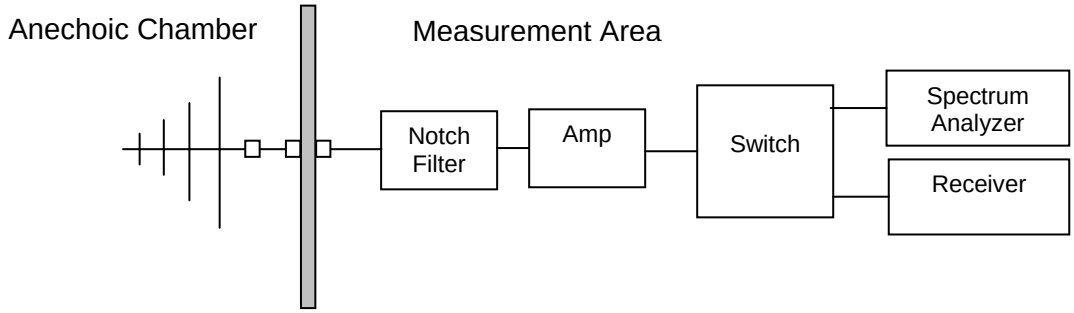
Method	Test Equipment Used
Measurements were made per work instruction WI-EMC-07 ‘Measurement of Spurious Emissions’	0088, 0156, 0134, 0304, 0311, 0315, 0310, 0312

5.1.8.3. Radiated Emissions (30M-1 GHz)

FCC, Part 15 Subpart C §15.207
Industry Canada RSS-210 §6.6

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.
Data Rate(s): 54MBit/s
TRANSMISSION: Aircard was located in a host device and communicating with support equipment

TABLE OF RESULTS

Freq. (MHz)	Peak (dBuV/m)	QP (dBuV/m)	QP Lmt (dBuV/m)	QP Margin (dB)	Angle (deg)	Hgt (cm)	Pol	Total Corr'n Factor
74.9970	34.58	34.45	40.00	-5.55	90	394	Vert	-24.04
124.994	35.60	34.74	40.00	-5.26	311	100	Vert	-23.08
174.998	32.57	30.46	40.00	-9.54	109	102	Vert	-20.22
224.999	33.47	32.80	40.00	-7.20	266	102	Vert	-18.02
525.001	40.73	40.12	47.00	-6.88	40	200	Horz	-8.57
800.001	42.07	39.55	47.00	-7.45	68	102	Horz	-4.43

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	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Measurement Uncertainty Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB

Traceability

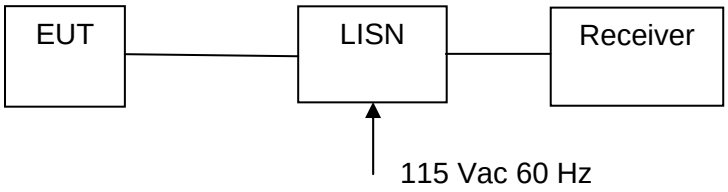
Method	Test Equipment Used
Measurements were made per Sanmina work instruction	8546A HP Receiver and RF Filter, HP Pre-amp, Antenna EMCO Biconilog

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

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, see Section 2.1 Reference (iii). 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.
Data Rate(s): 54MBit/s

TABLE OF RESULTS
LINE - LIVE

Frequency (MHz)	Peak (dBµV)	QP (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Ave. (dBµV)	Ave. Limit (dBµV)	Ave. Margin (dB)
0.585810	45.04	--.--	56.00	--.--	--.--	46.00	--.--
0.708195	45.29	--.--	56.00	--.--	--.--	46.00	--.--
0.955950	45.12	--.--	56.00	--.--	--.--	46.00	--.--
1.141020	43.05	--.--	56.00	--.--	--.--	46.00	--.--
1.242510	43.28	--.--	56.00	--.--	--.--	46.00	--.--
1.367880	43.03	--.--	56.00	--.--	--.--	46.00	--.--

LINE – NEUTRAL

Frequency (MHz)	Peak (dBμV)	QP (dBμV)	QP Limit (dBμV)	QP Margin (dB)	Ave. (dBμV)	Ave. Limit (dBμV)	Ave. Margin (dB)
15.182460	42.20	--.--	60.00	--.--	--.--	50.00	--.--
15.558570	42.06	--.--	60.00	--.--	--.--	50.00	--.--
15.677970	42.77	--.--	60.00	--.--	--.--	50.00	--.--
15.803340	42.24	--.--	60.00	--.--	--.--	50.00	--.--
17.042115	42.38	--.--	60.00	--.--	--.--	50.00	--.--
17.286885	42.35	--.--	60.00	--.--	--.--	50.00	--.--

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	±2.64 dB

Traceability

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

6. TEST SET-UP PHOTOGRAPHS

6.1. Radiated Emissions (30 MHz-1 GHz)

6.2. Spurious Emissions above 1 GHz

6.3. Conducted Emissions (150 kHz - 30 MHz)

6.4. General Measurement Test Set-Up

7. TEST EQUIPMENT DETAILS

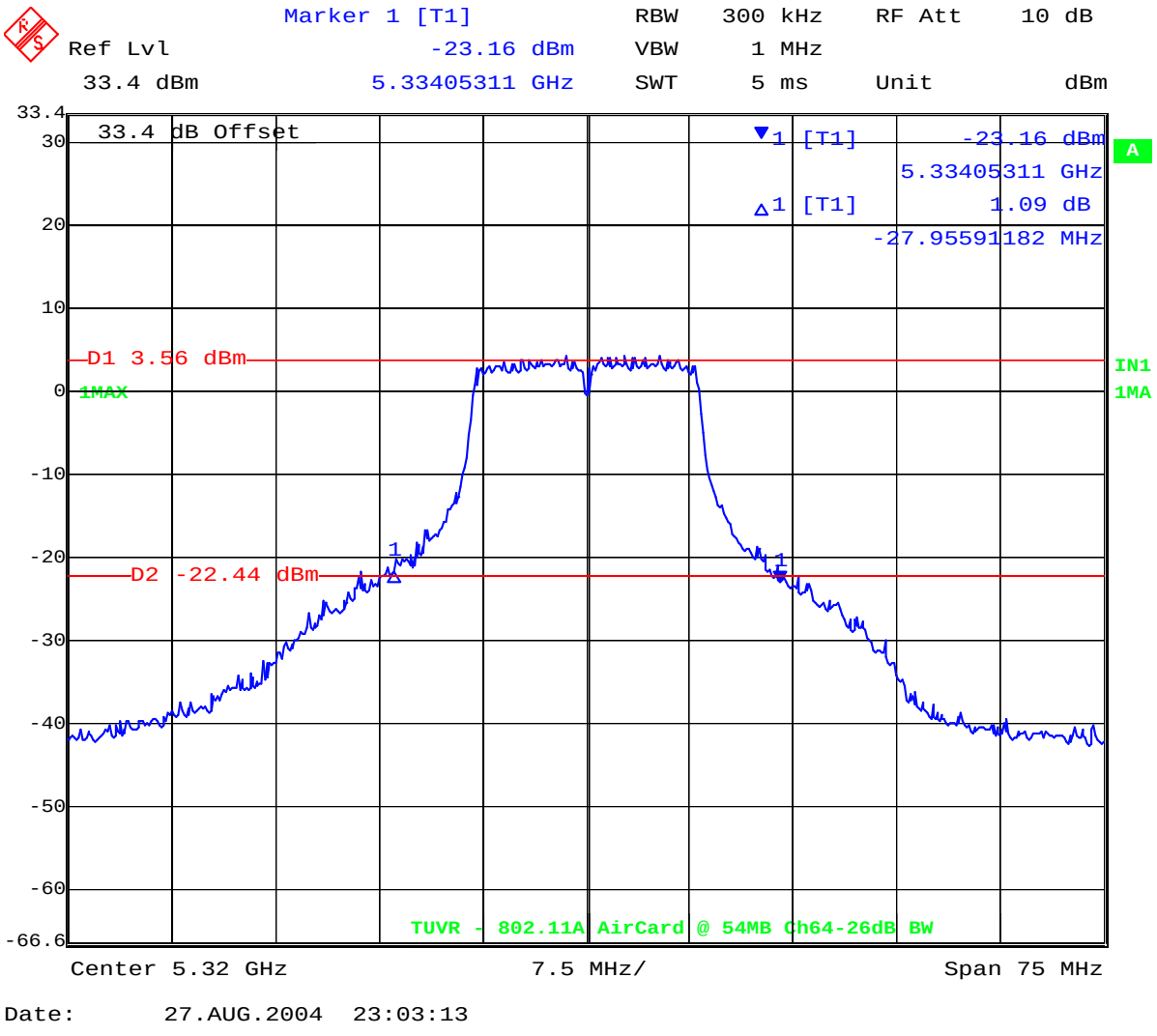
Asset #	Instrument	Manufacturer	Part #	Calibration Due Date	Serial #
0070	Power Meter	Hewlett Packard	437B	13th May '05	3125U13554
0078	Antenna (30M-2GHz)	Schaffner and Chase	CBLG140A	Not Applicable	1195
0088	Spectrum Analyzer	Hewlett Packard	8564E	15th May '05	
0104	1-18GHz Horn Antenna	The Electro-Mechanics 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

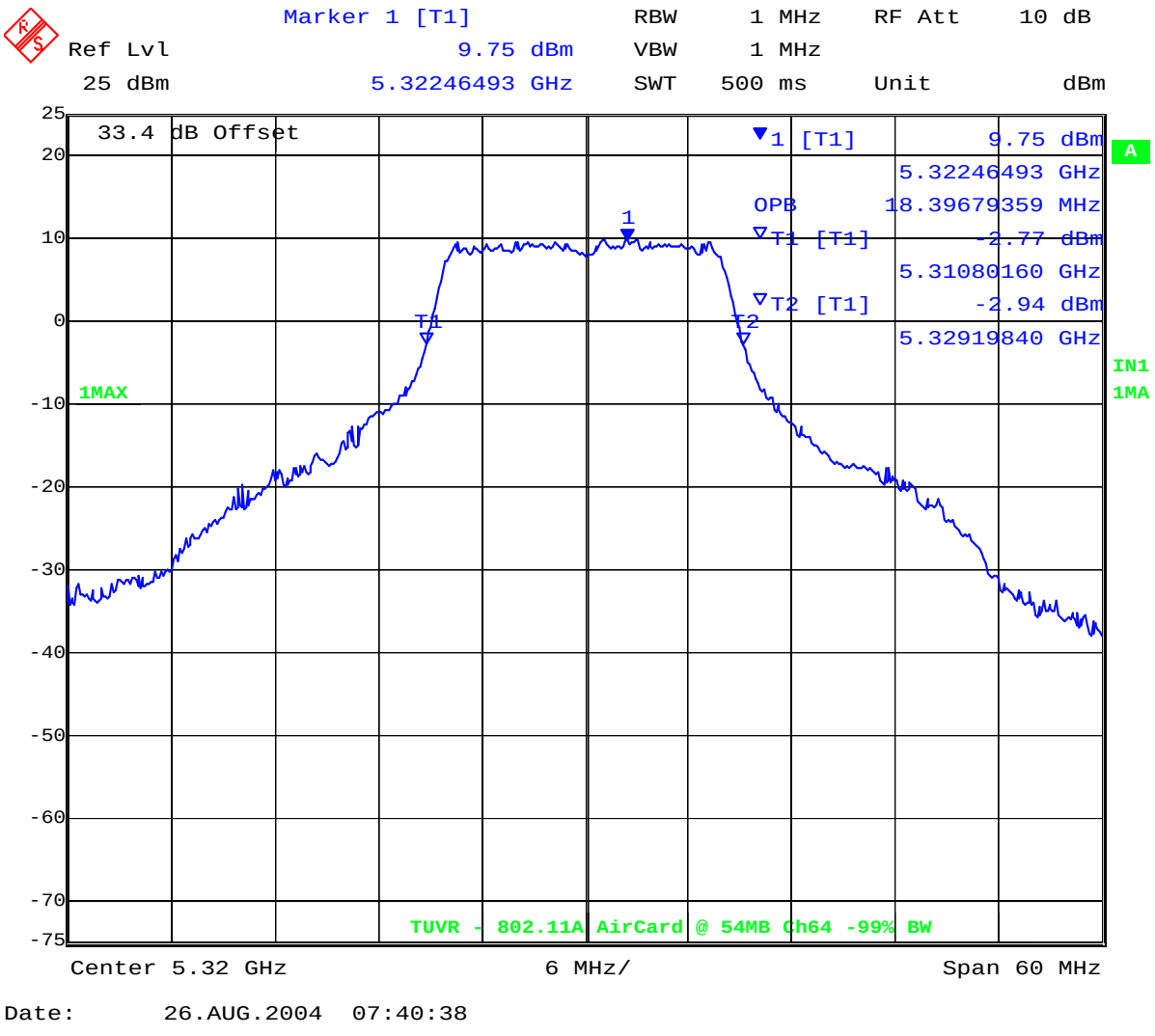
This report contains the following plots as referenced in the test results, Section 5 of this report. Only worst case plots are reported. All additional plots are held on file in the laboratory.

2.4GHz 802.11b/g & 5GHz 802.11a	
Parameter	**Plot No.**
Section 5.1.1 26dB Bandwidth	
Channel 64 (5,320 MHz)	01
Section 5.1.1 99% Bandwidth	
Channel 64 (5,320 MHz)	02
Section 5.1.2 Peak Transmit Power	
Channel 36 (5,180 MHz)	03
Channel 52 (5,260 MHz)	04
Section 5.1.3 Peak Power Spectral Density	
Channel 36 (5,180 MHz)	05
Channel 52 (5,260 MHz)	06
Section 5.1.4 Peak Excursion Ratio	
Channel 52 (5,260 MHz)	07
Section 5.1.7 Conducted Spurious Emissions	
Lower Band Edge 5,150MHz	08
Upper Band Edge 5,350MHz	09
Above 1 GHz conducted spurious emissions	
30 – 1,000 MHz	10
1,000 – 3,000 MHz	11
3,000 – 5,150 MHz	12
5,350 – 7,000 MHz	13
7,000 - 13,000 MHz	14
13,000 – 27,000 MHz	15
27,000 – 31,000 MHz	16
31,000 – 40,000 MHz	17
Section 5.1.8 Radiated Spurious Emissions	
5.1.8.1 Transmitter Radiated Spurious Emissions above 1 GHz	18-20
5.1.8.2 Radiated Band Edge	
Channel 36 Peak, Average, Delta	21
Channel 64 Peak, Average, Delta	22
5.1.8.3 Radiated Spurious Emissions 30M-1GHz	23
Section 5.1.9 AC Wireline Conducted Emissions	
Live & Neutral	24

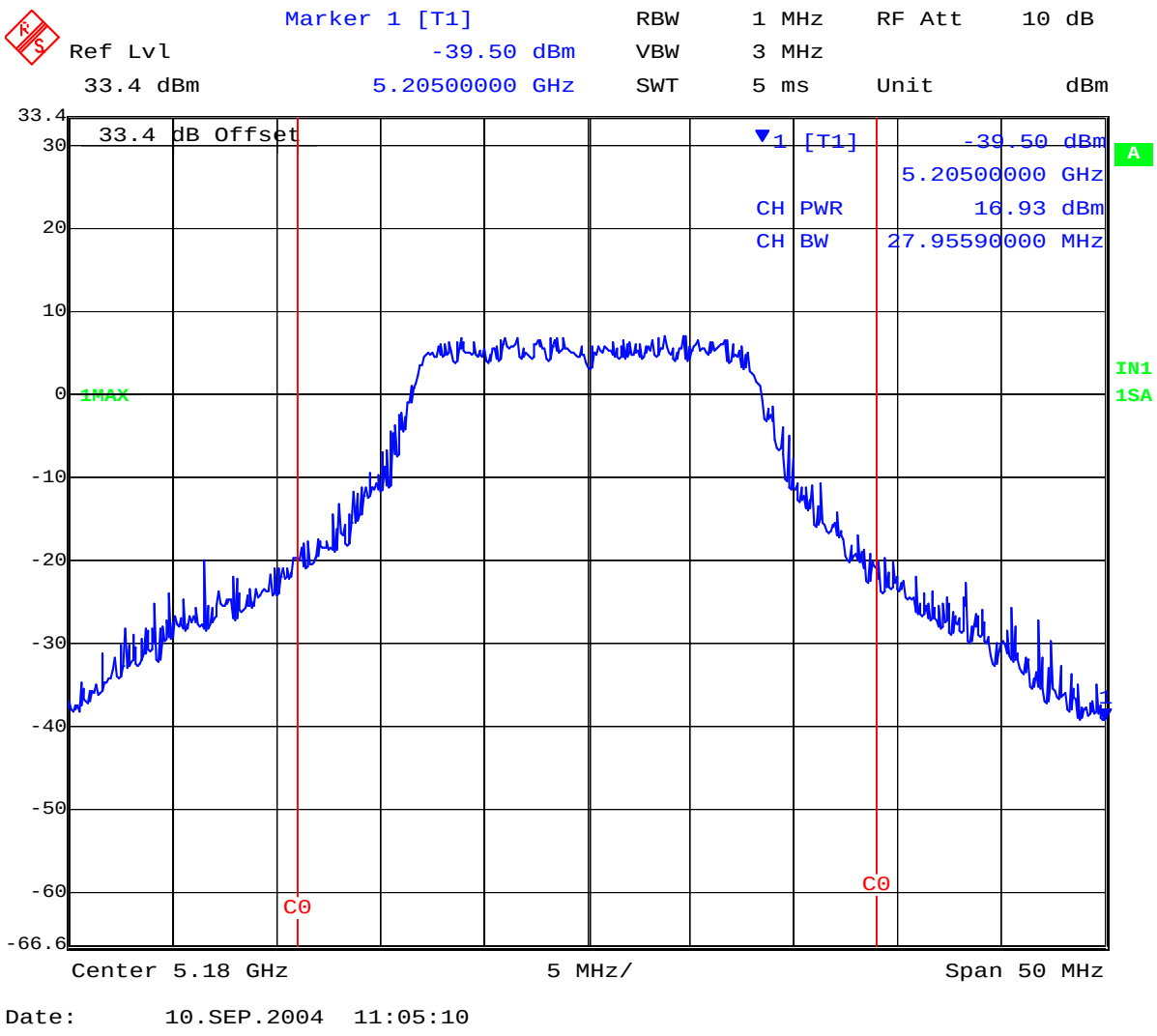
Plot 01 - CH 64 26 dB Bandwidth (5,320 MHz)



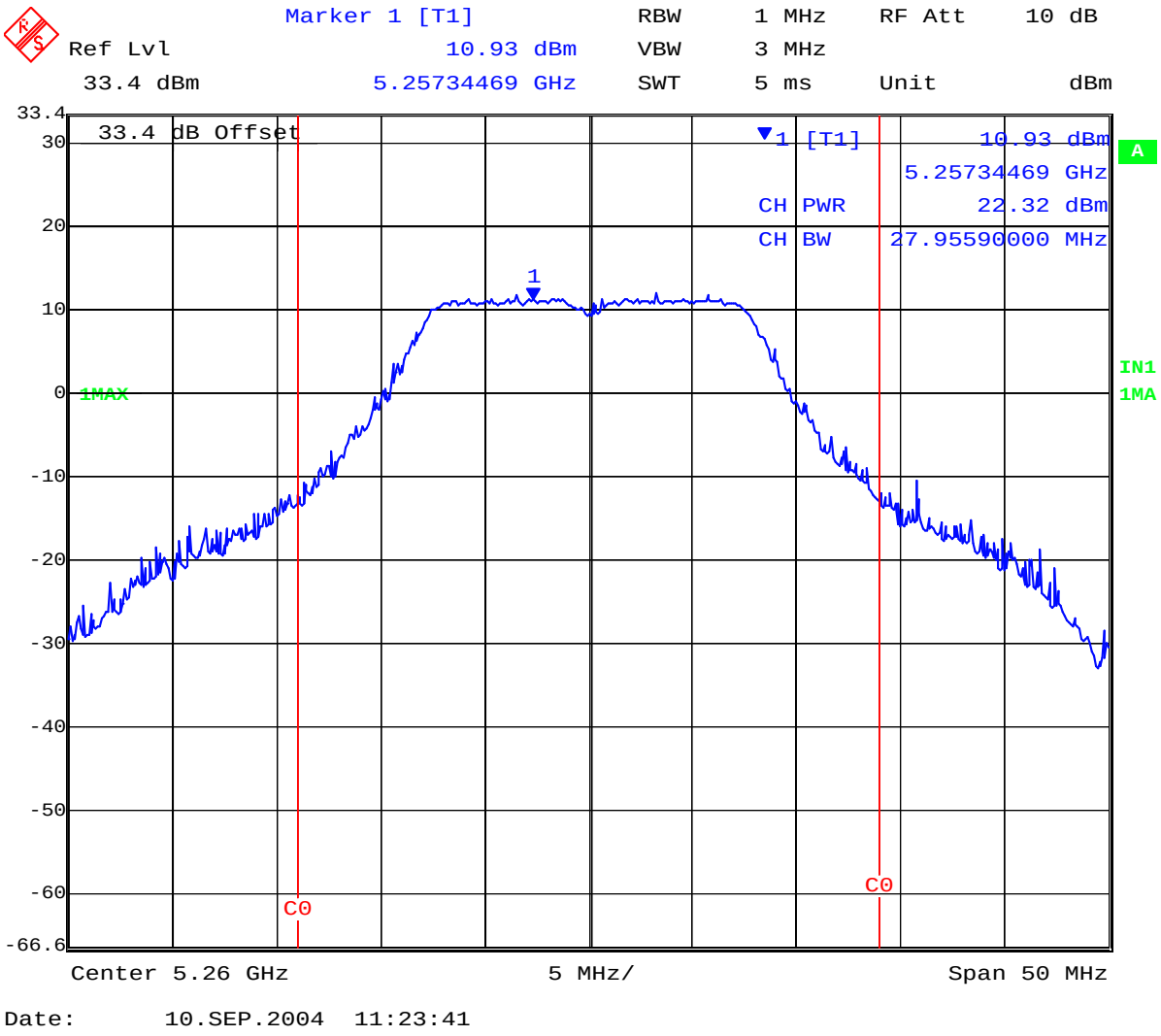
Plot 02 - CH 64 99% Bandwidth (5,320 MHz)



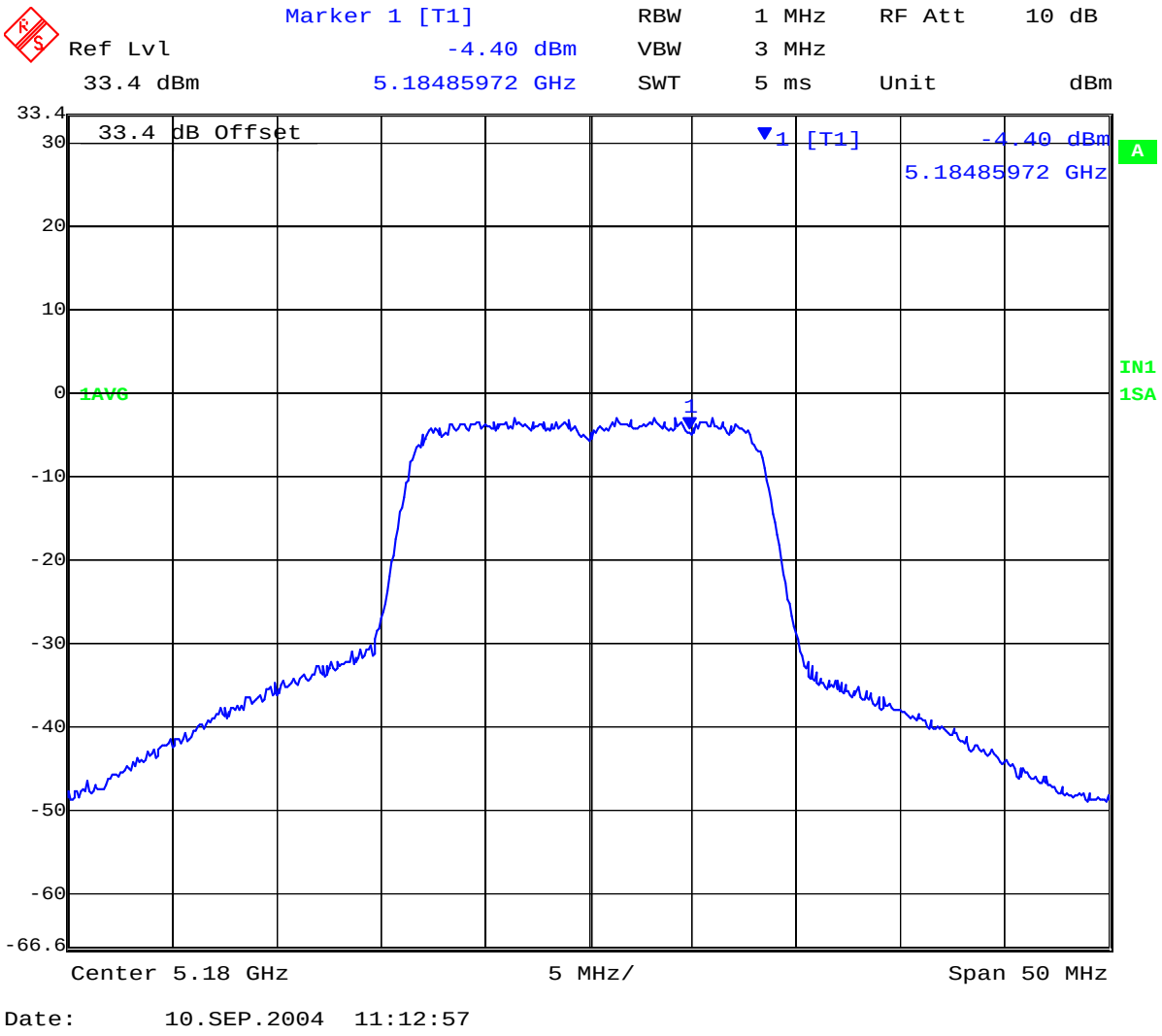
Plot 03 - CH 36 Peak Transmit Power (5,180 MHz)



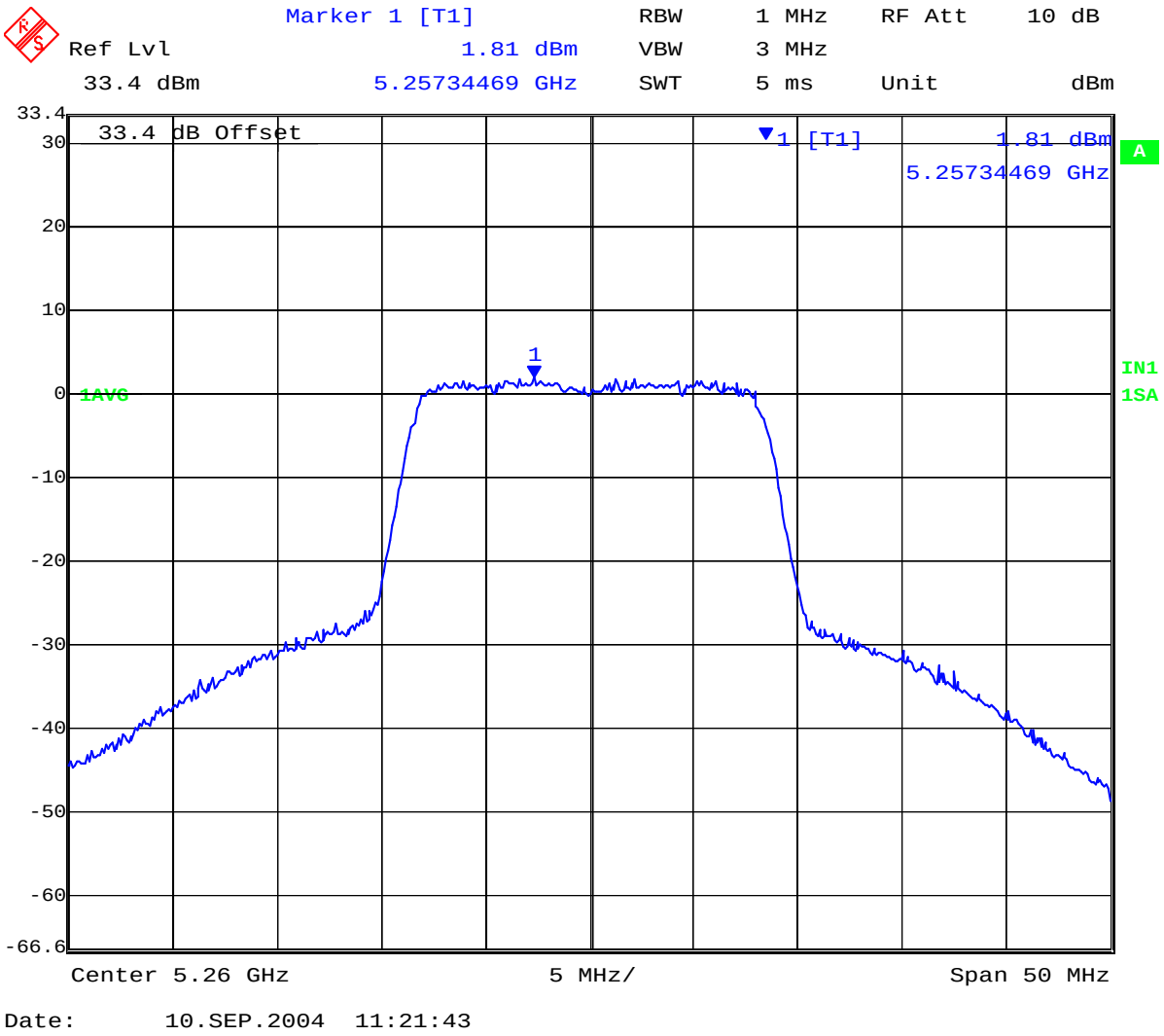
Plot 04 - CH 52 Peak Transmit Power (5,260 MHz)



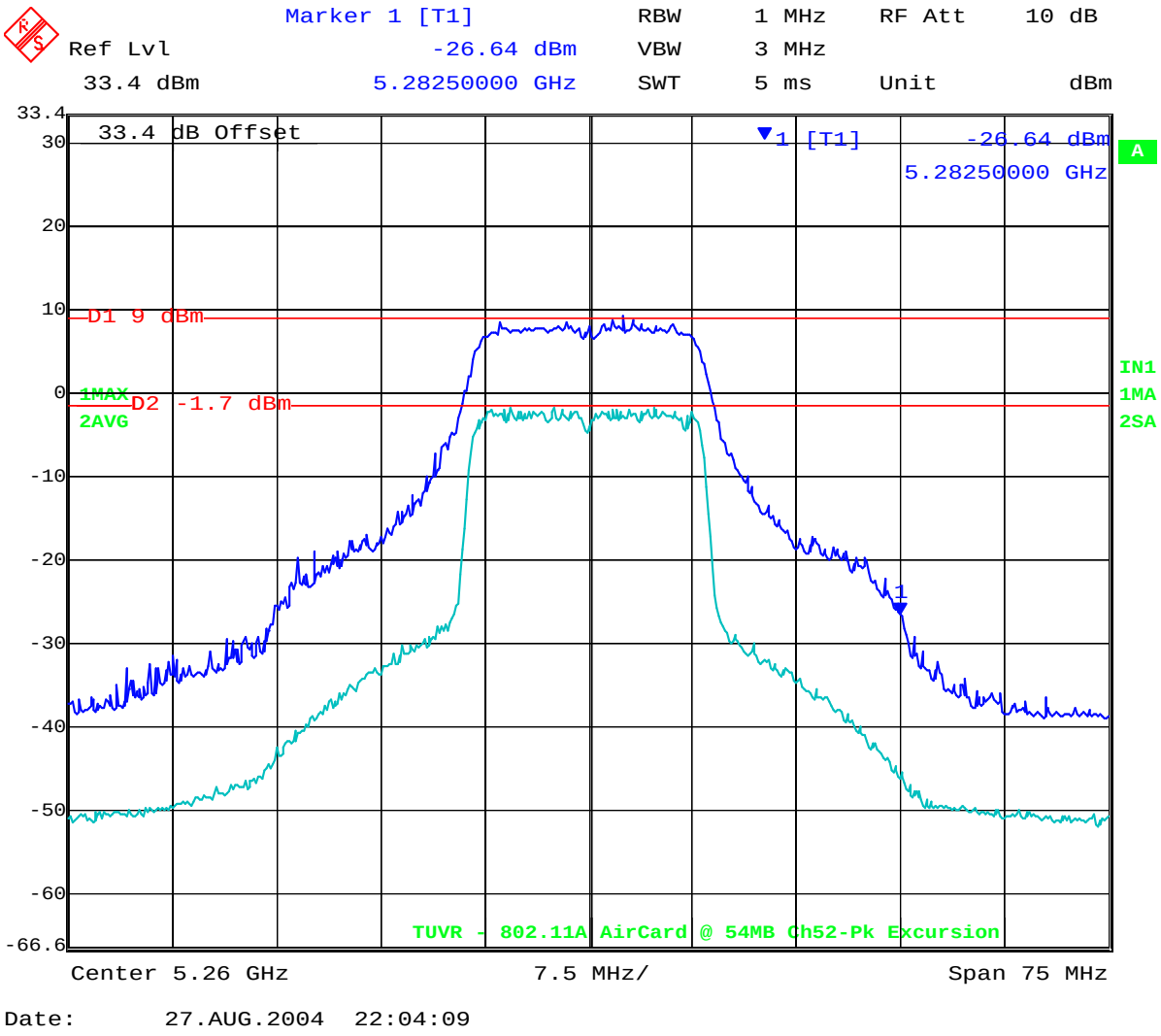
Plot 05 - CH 36 Peak Power Spectral Density (5,180 MHz)



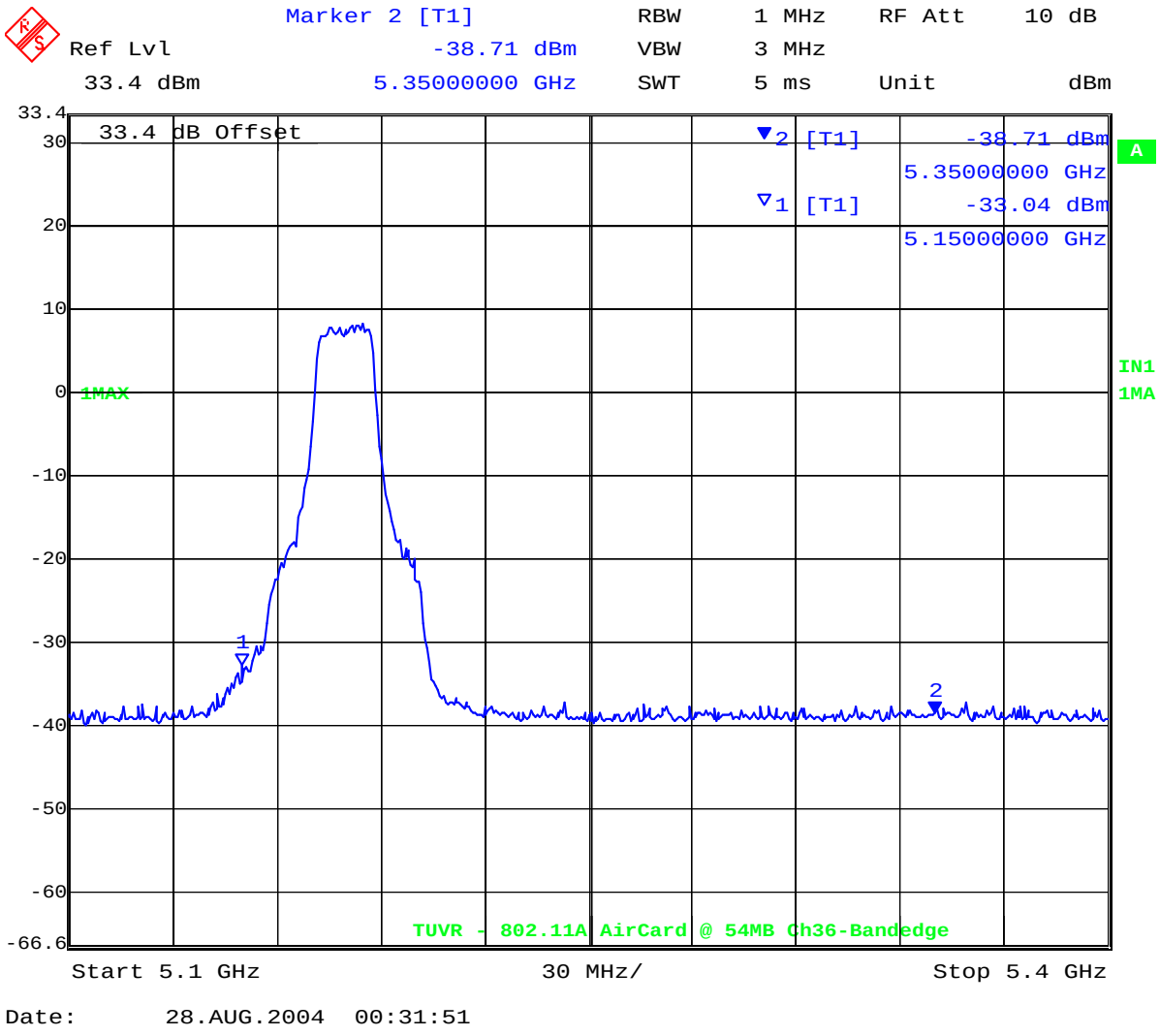
Plot 06 - CH 52 Peak Power Spectral Density (5,260 MHz)



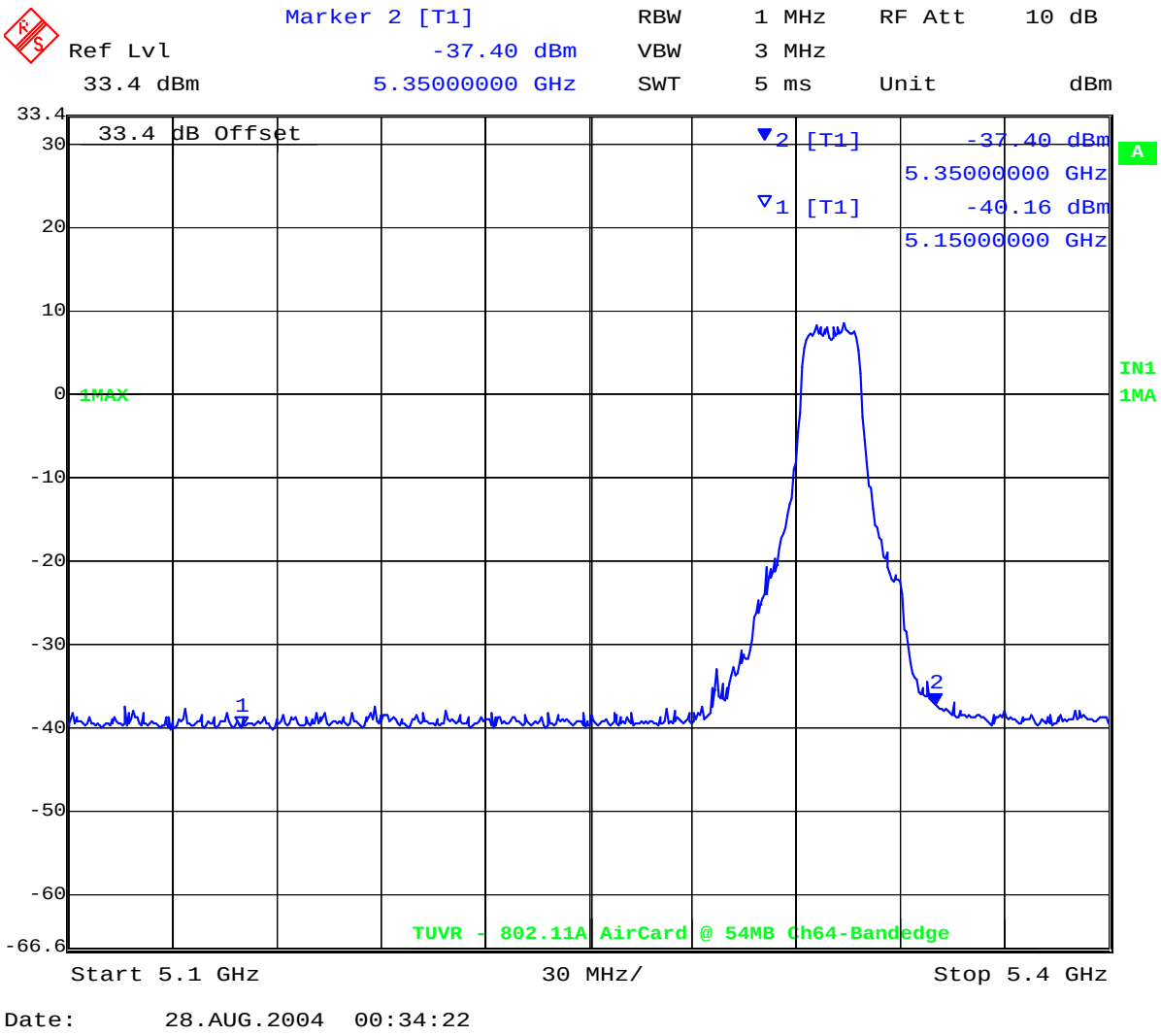
Plot 07 - CH 52 Peak Excursion Ratio (5,260 MHz)



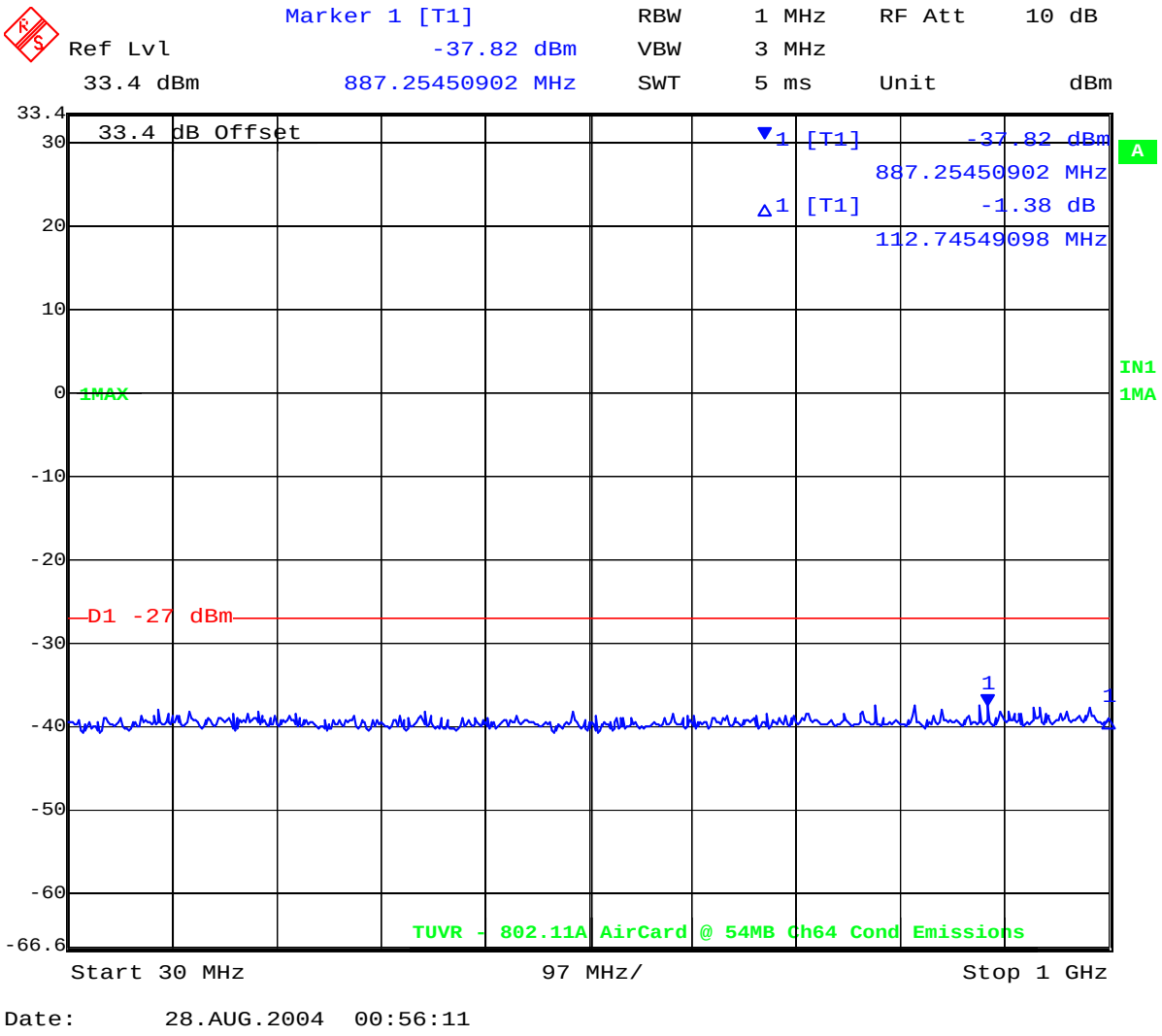
Plot 08 - CH 36 Conducted Band Edge (5,180 MHz)



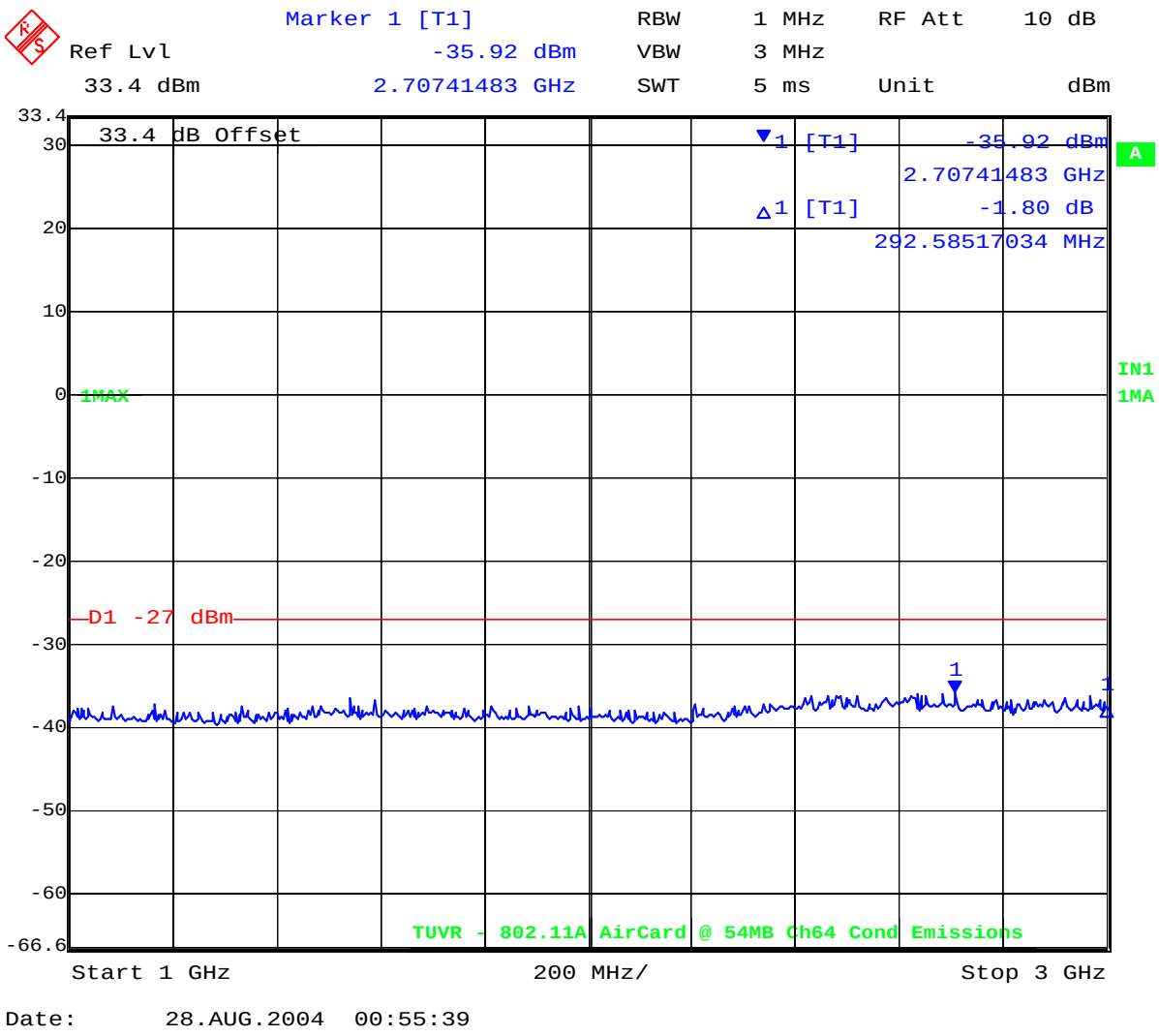
Plot 09 - CH 64 Conducted Band Edge (5,320 MHz)



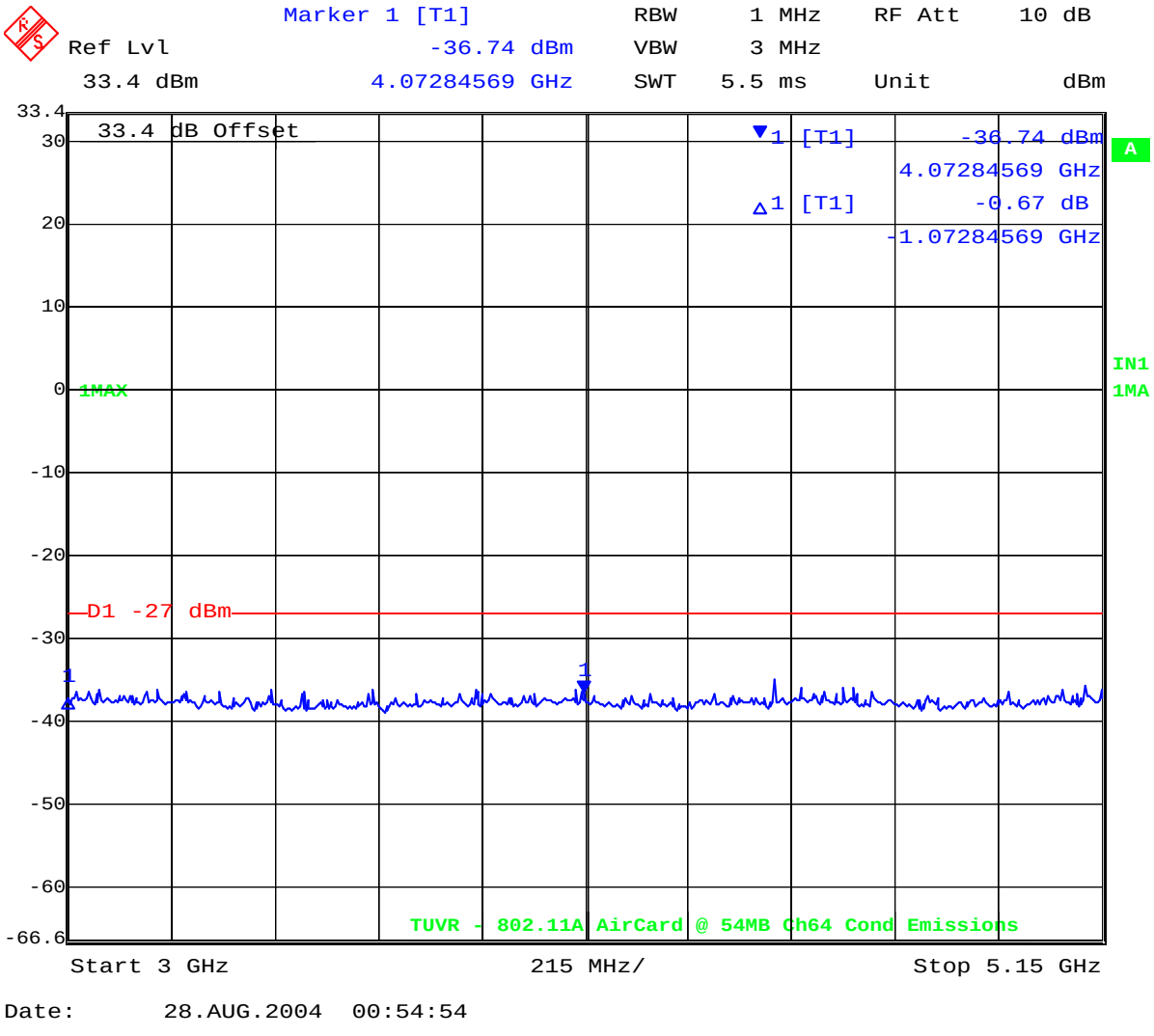
Plot 10 - CH 64 Conducted Spurious Emissions (30 MHz – 1 GHz)



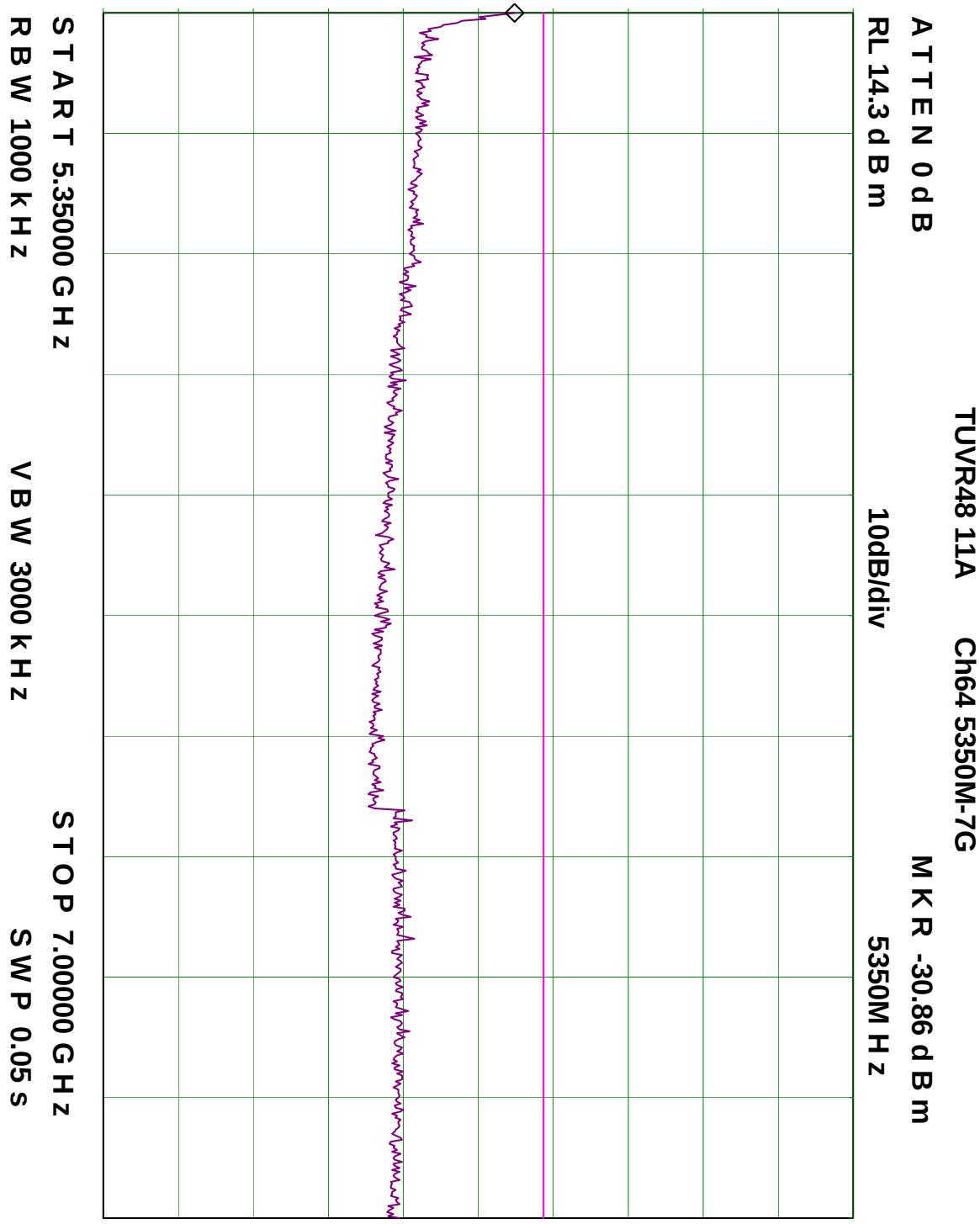
Plot 11 - CH 64 Conducted Spurious Emissions (1 – 3 GHz)



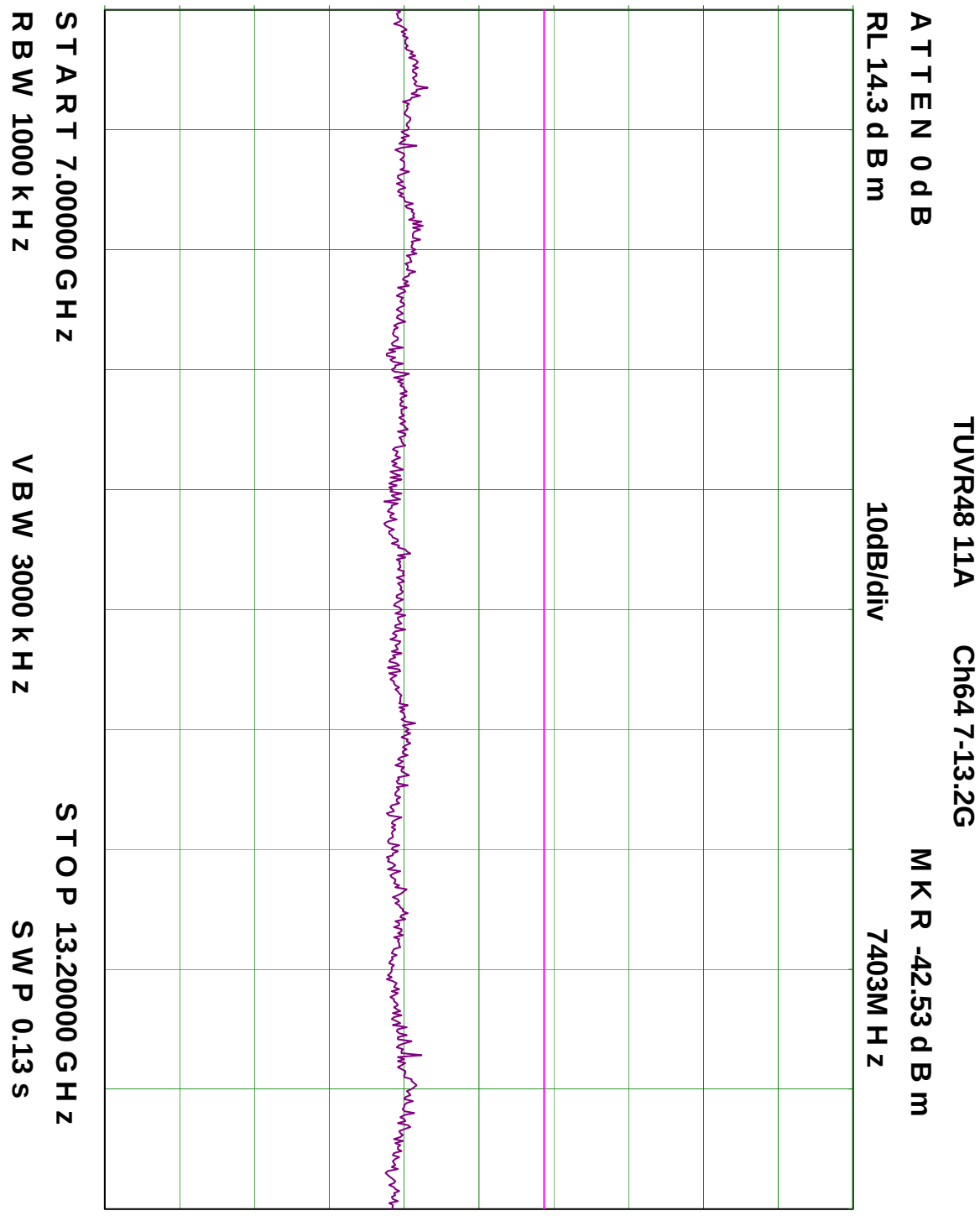
Plot 12 - CH 64 Conducted Spurious Emissions (3 – 5.15 GHz)



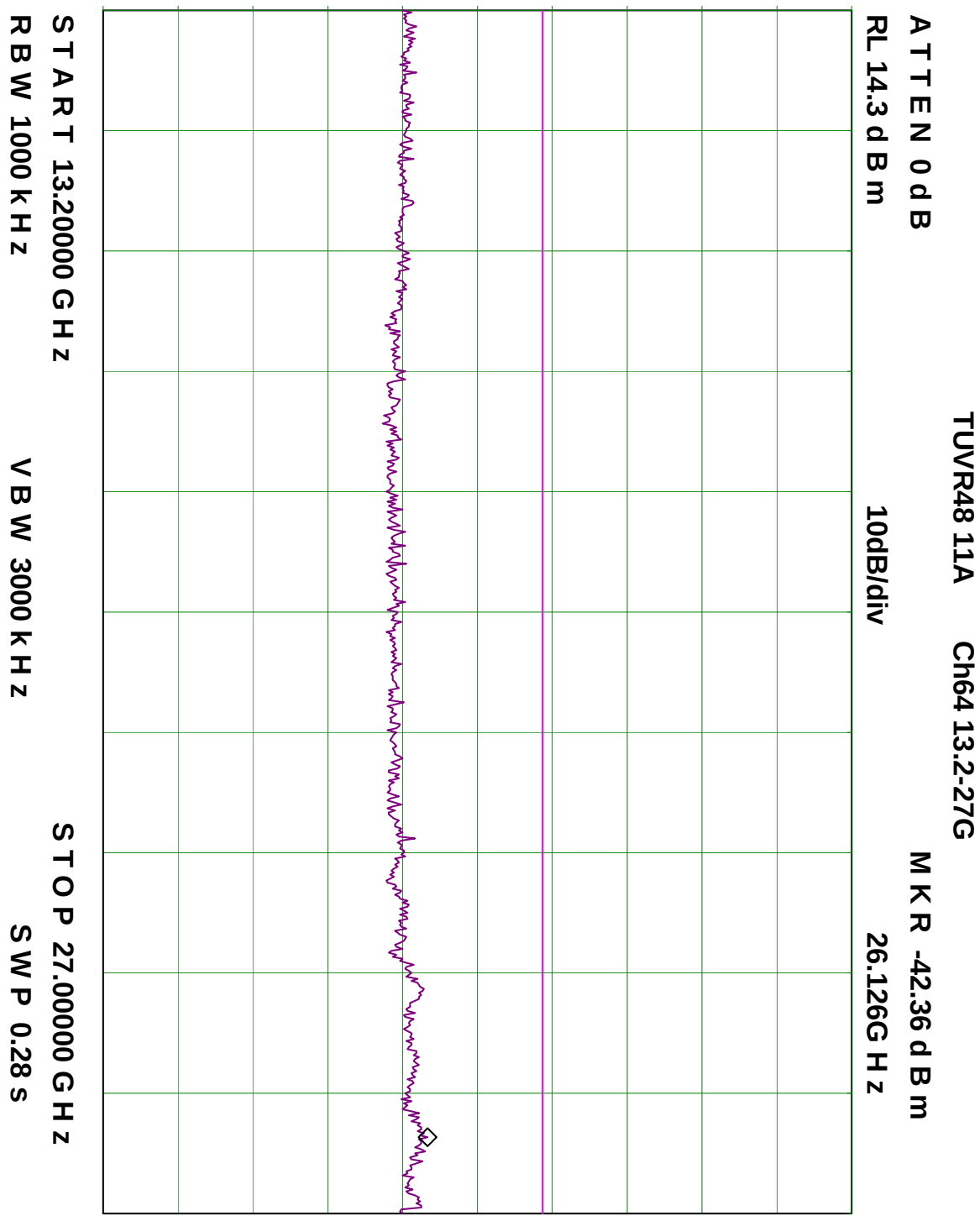
Plot 13 - CH 64 Conducted Spurious Emissions (5.35 – 7 GHz)



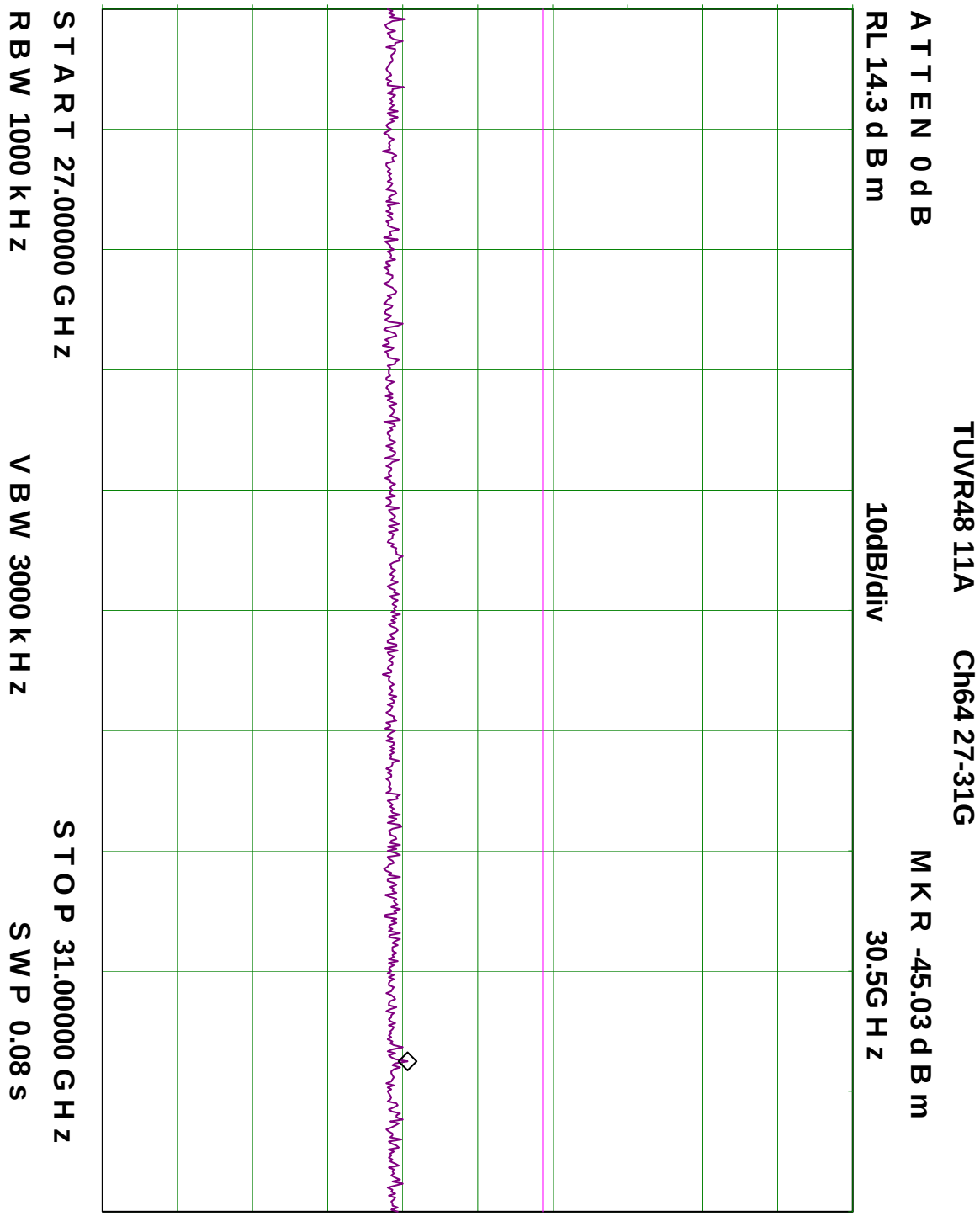
Plot 14 - CH 64 Conducted Spurious Emissions (7 – 13 GHz)



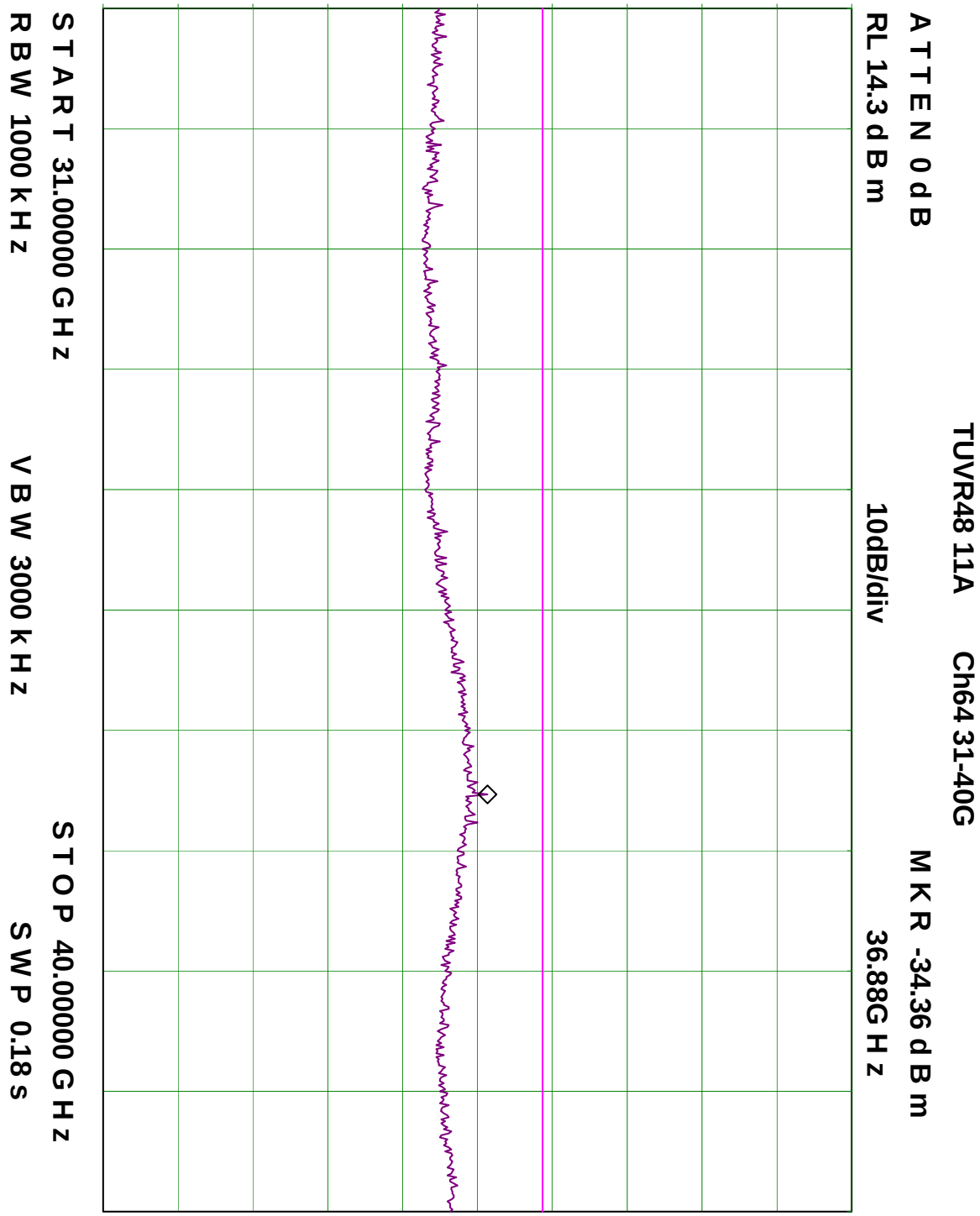
Plot 15 - CH 64 Conducted Spurious Emissions (13 – 27 GHz)



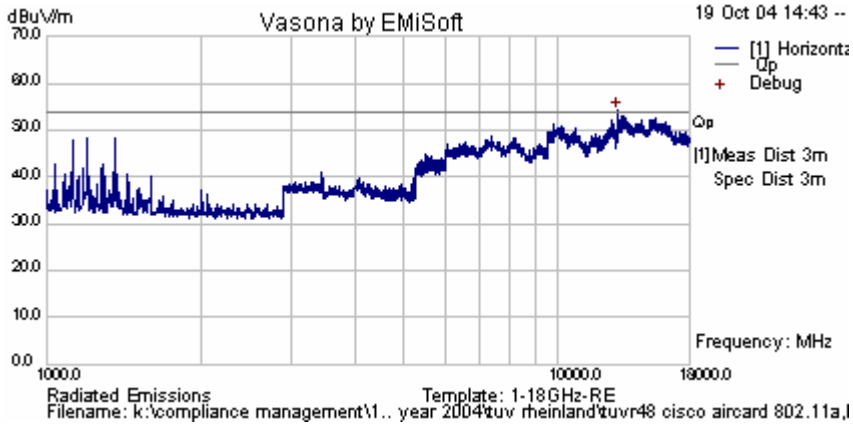
Plot 16 - CH 64 Conducted Spurious Emissions (27 – 31 GHz)

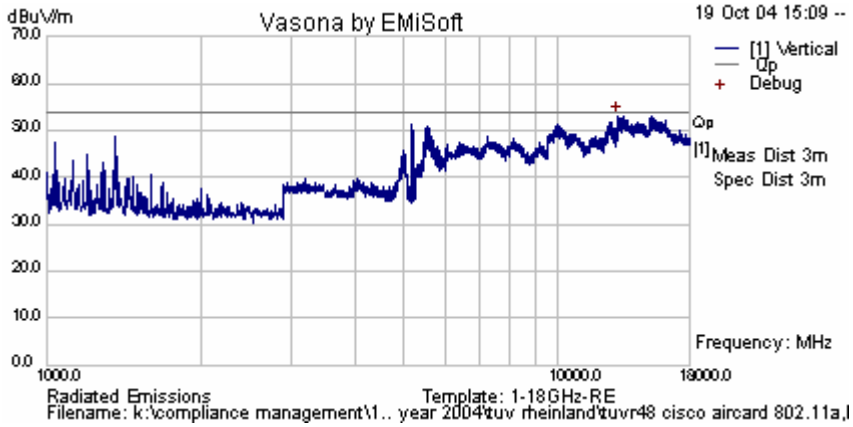


Plot 17 - CH 64 Conducted Spurious Emissions (31 – 40 GHz)

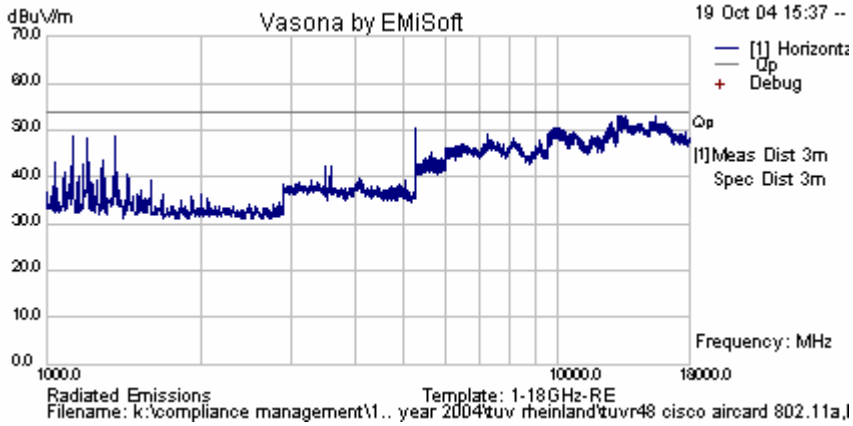


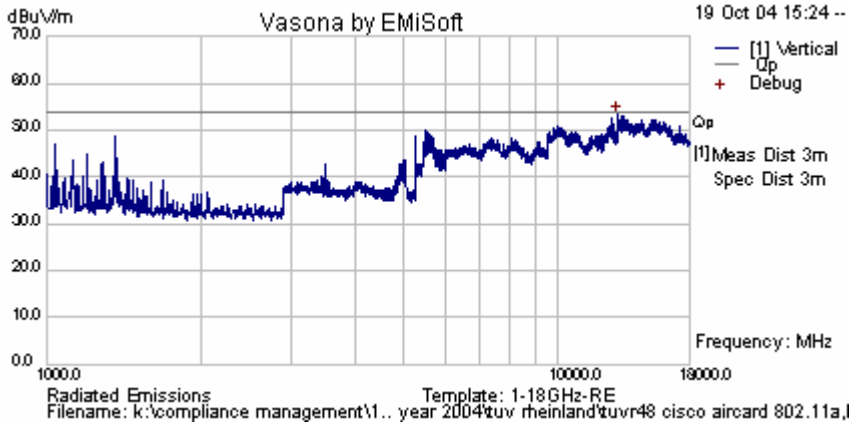
Plot 18 – CH 36 Spurious Emissions (above 1 GHz)



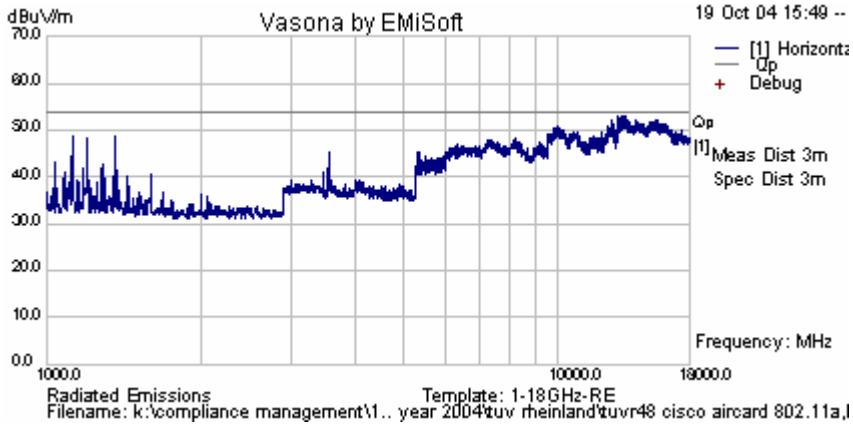


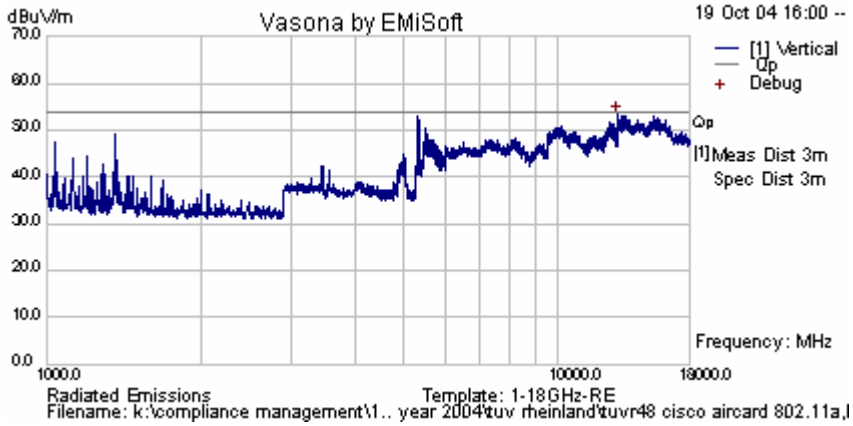
Plot 19 – CH 52 Spurious Emissions (above 1 GHz)



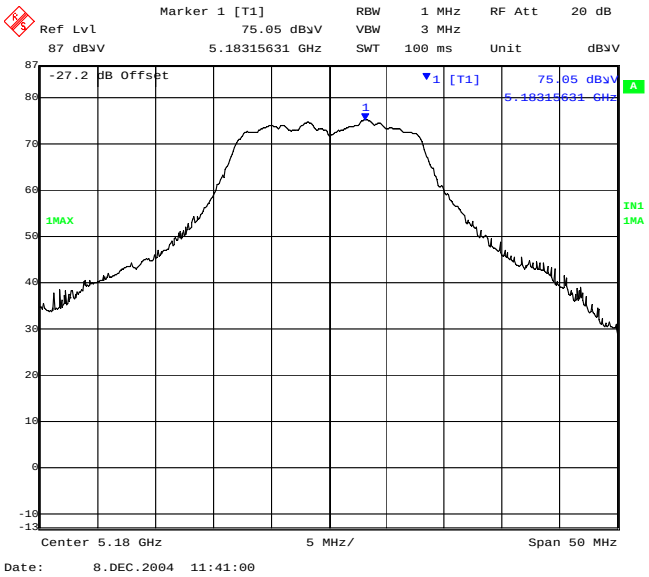


Plot 20 – CH 64 Spurious Emissions (above 1 GHz)

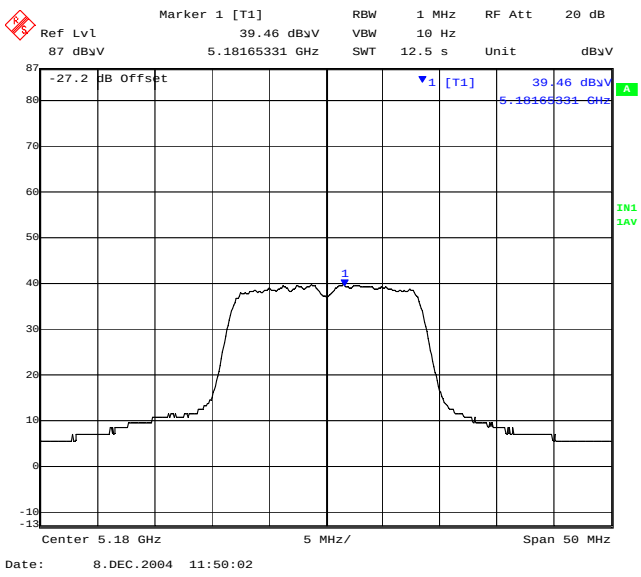




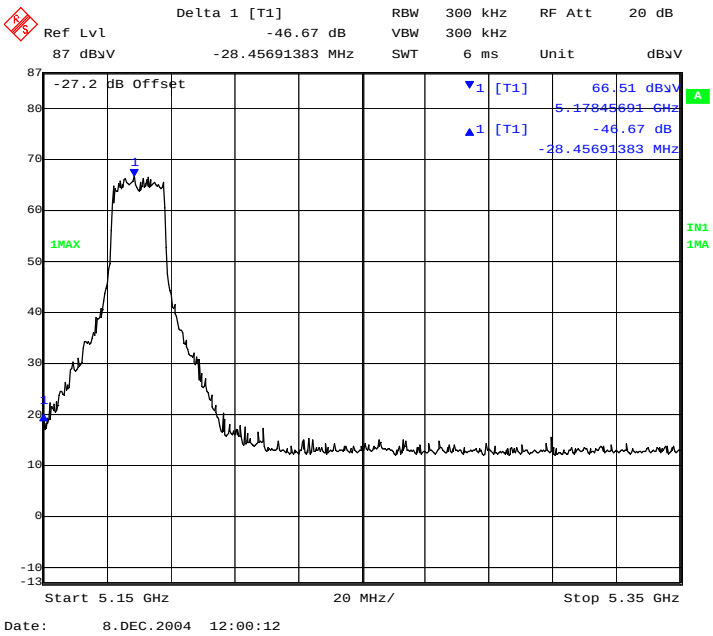
Plot 21 – CH 36 Radiated Band Edge (5,180 MHz)



CH 36 PEAK

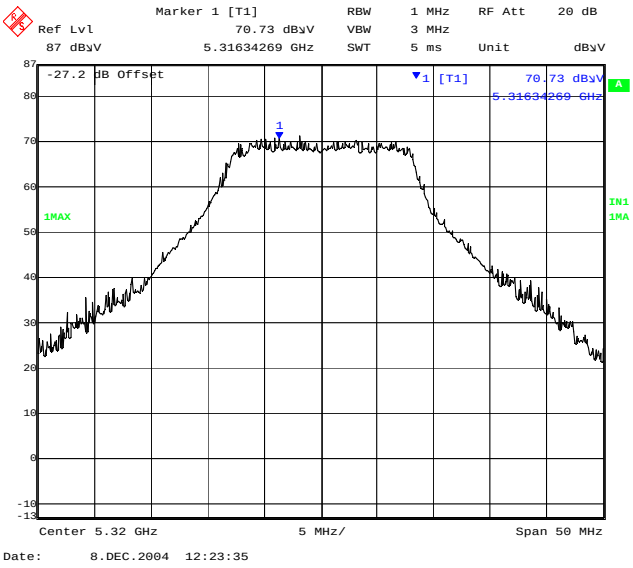


CH 36 AVERAGE

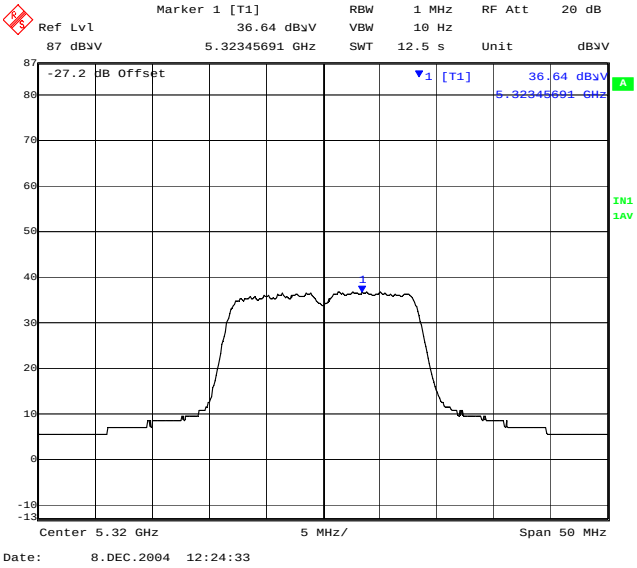


CH 36 DELTA

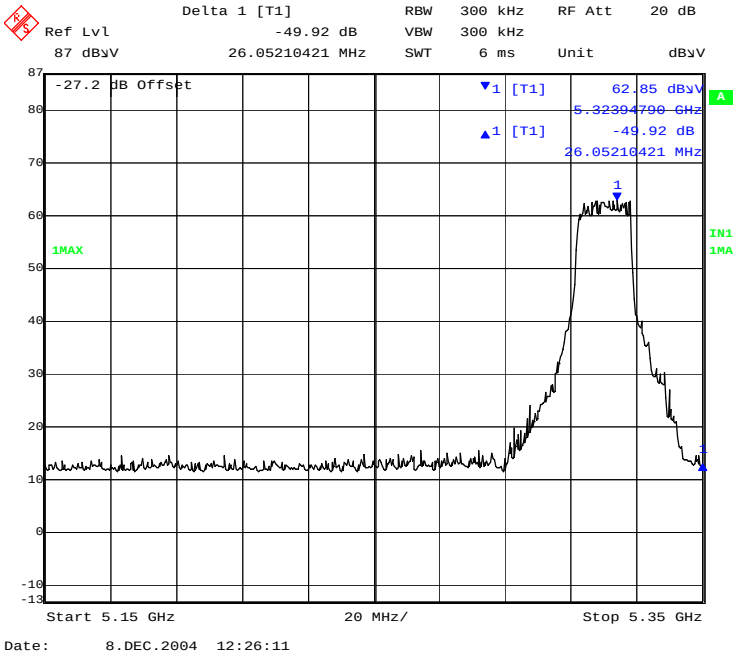
Plot 22 – CH 64 Radiated Band Edge (5,320 MHz)



CH 64 PEAK

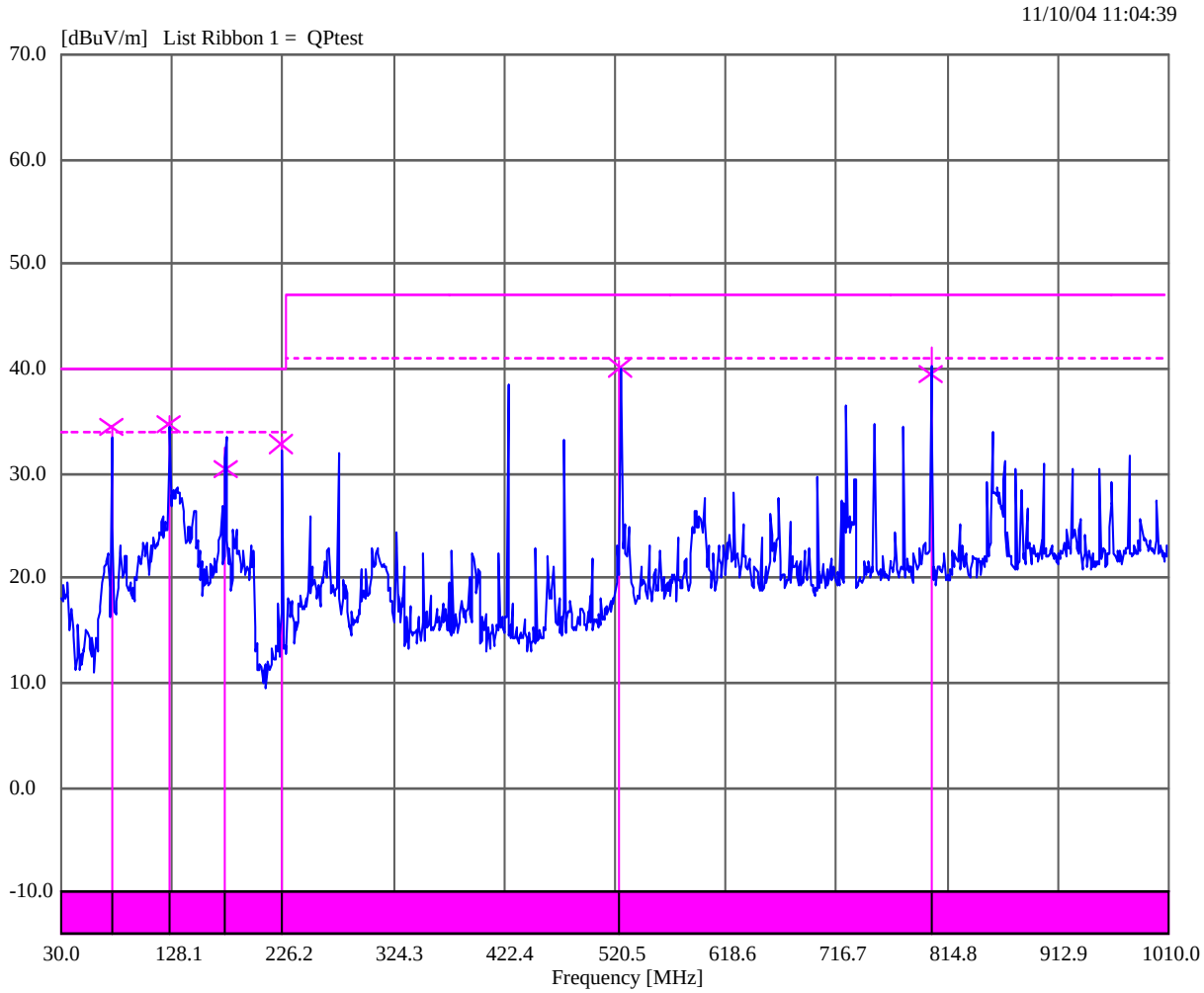


CH 64 AVERAGE



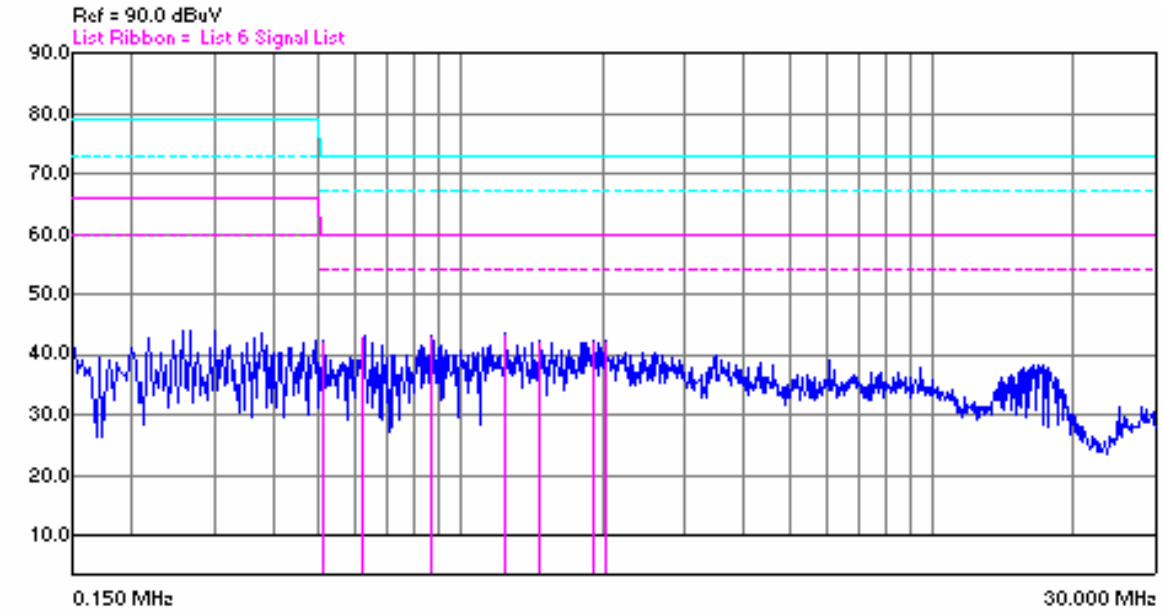
CH 64 DELTA

Plot 23 – Radiated Emissions (30 MHz – 1 GHz)

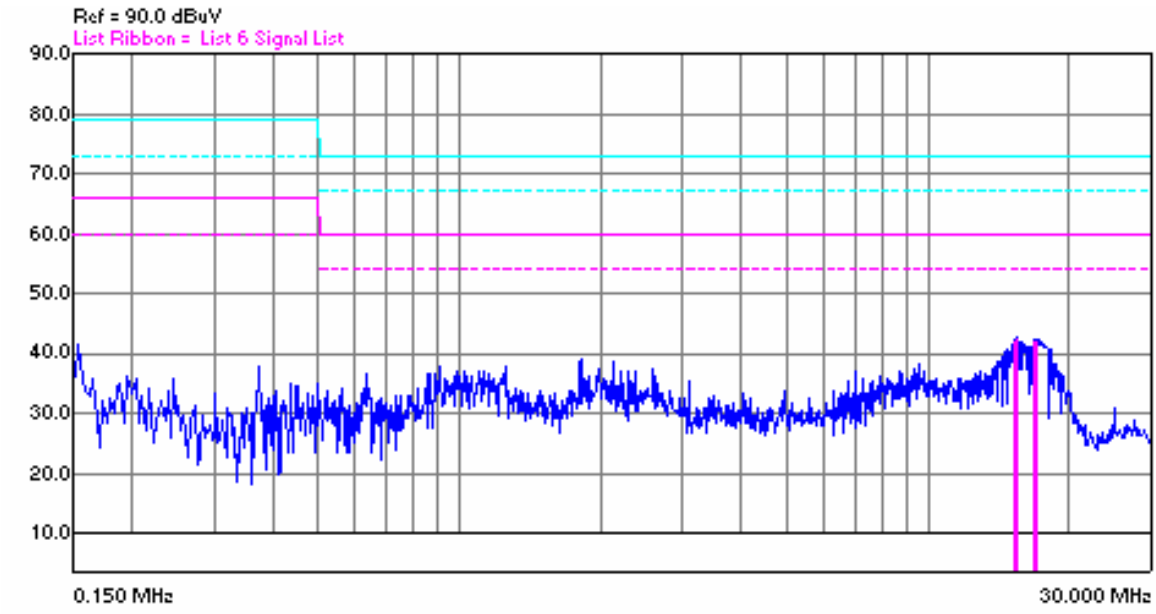


Plot 24 – AC Wireline Emissions

Line: Live



Line: Neutral



3922 Valley Avenue, Suite “B”
Pleasanton, CA 94566, USA
Tel: 1.925.462.0304
Fax: 1.925.462.0306
www.micomlabs.com