Test of SpectraLink 803X Wireless Telephone

To: FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: TUVR89-A5 Rev C

# TEST REPORT

FROM

MiCOM Labs

Test of SpectraLink 803X Wireless Telephone

To: FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: TUVR89-A5 Rev C

Note: this report only contains data with regard to the 5,150 to 5,350 MHz, and 5,470 to 5,725 MHz operational modes of the SpectraLink 803X Wireless Telephone. 2.4 and 5.8 GHz test data are reported in MiCOM Labs test report TUVR89-A4.

This report supersedes TUVR89-A5 Rev B

**Manufacturer:** SpectraLink Corporation
5755 Central Avenue
Boulder, Colorado 80301, USA

**Product Function:** 802.11a/b/g Wireless Telephone

**Copy No:** pdf **Issue Date:** 3rd Nov. '06

**This Test Report is Issued Under the Authority of;**

**MiCOM Labs, Inc.**
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Phone: +1 (925) 462-0304
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A2LA ACCREDITED
CERTIFICATE #2381.01

**MiCOM Labs is an ISO 17025 Accredited Testing Laboratory**

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## ACCREDITATION & LISTINGS

MiCOM Labs, Inc. an accredited laboratory complies with the international standard BS EN ISO/IEC 17025. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-01.pdf

THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION

**ACCREDITED LABORATORY**

A2LA has accredited

**MICOM LABS**
**Pleasanton, CA**

for technical competence in the field of

**Electrical Testing**

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified field of testing.

Presented this 14th day of September 2005.

American Association for Laboratory Accreditation
Corporate SEAL 1978 District of Columbia
A2LA

President
For the Accreditation Council
Certificate Number 2381.01
Valid to: November 30, 2007

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

## LISTINGS

MiCOM Labs test facilities are listed by the following organizations;

***North America***

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

# DOCUMENT HISTORY

| Document History | | |
|---|---|---|
| **Revision** | **Date** | **Comments** |
| Draft | | |
| Rev A | 8th June 2006 | Initial Release Rev A |
| Rev B | 6th Sept. 2006 | Section 3.6 Test Configurations, included duty cycle correction factor |
| Rev C | 3rd Nov. 2006 | i. Results for frequency range 5,470 – 5,725 MHz added<br>ii. Results for Dynamic Frequency Selection (DFS) added<br>iii. Update Test Report with new Client Product number 803X. |
| | | |

# 1. TEST RESULT CERTIFICATE

| | | | |
|---|---|---|---|
| Manufacturer: | SpectraLink Corporation<br>5755 Central Avenue<br>Boulder, Colorado 80301,<br>USA | Tested By: | MiCOM Labs, Inc.<br>440 Boulder Court<br>Suite 200<br>Pleasanton<br>California, 94566, USA |
| EUT: | 802.11a/b/g Wireless Phone | Telephone: | +1 925 462 0304 |
| Model: | 803X | Fax: | +1 925 462 0306 |
| S/N: | 660324736 & 660324699 | | |
| Test Date(s): | 8th April to 12th October '06 | 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.

ACCREDITED
CERTIFICATE #2381.01

**Approved & Released for MiCOM Labs, Inc. by:**

Graeme Grieve
Quality Manager MiCOM Labs,

Gordon Hurst
President & CEO MiCOM Labs, Inc.

# 2. REFERENCES AND MEASUREMENT UNCERTAINTY

## 2.1. Normative References

| Ref. | Publication | Year | Title |
|---|---|---|---|
| **(i)** | FCC 47 CFR Part 15.407 | Feb 2006 | Code of Federal Regulations |
| **(ii)** | FCC 06-96 | June 2006 | Memorandum Opinion and Order |
| **(iii)** | Industry Canada RSS-210 | Issue 6 Sept. 2005 | Low Power License-Exempt Radiocommunication Devices (All Frequency Bands): Category 1 Equipment |
| **(iv)** | Industry Canada RSS-Gen | Issue 1 Sept. 2005 | General Requirements and Information for the Certification of Radiocommunication Equipment |
| **(v)** | 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 |
| **(vi)** | CISPR 22/ EN 55022 | 1997 1998 | Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment |
| **(vii)** | M 3003 | Edition 1 Dec. 1997 | Expression of Uncertainty and Confidence in Measurements |
| **(viii)** | LAB34 | Edition 1 Aug 2002 | The expression of uncertainty in EMC Testing |
| **(ix)** | ETSI TR 100 028 | 2001 | Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics |
| **(x)** | A2LA | 14th September 2005 | Reference to A2LA Accreditation Status – A2LA Advertising Policy |
| **(xi)** | 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 SpectraLink 803X Wireless Telephone in the frequency ranges 5150 to 5350 MHz to FCC Part 15.407 and Industry Canada RSS-210 regulations. |
| Applicant: | As Manufacturer |
| Manufacturer: | SpectraLink Corporation<br>5755 Central Avenue<br>Boulder, Colorado 80301, USA |
| Laboratory performing the tests: | MiCOM Labs, Inc.<br>440 Boulder Court, Suite 200<br>Pleasanton, California 94566 USA |
| Test report reference number: | TUVR89-A5 Rev C |
| Date EUT received: | 7TH April 2006 |
| Standard(s) applied: | FCC 47 CFR Part 15.407 & IC RSS-210 |
| Dates of test (from - to): | 8th April to 23rd May<br>DFS testing 12th October '06 |
| No of Units Tested: | 2 |
| Type of Equipment: | 802.11a/b/g Wireless Telephone |
| Manufacturers Trade Name: | NetLink Wireless Telephone |
| Model: | 803X |
| Location for use: | Indoor |
| Declared Frequency Range(s): | 5,150 – 5,350 MHz |
| Type of Modulation: | Per 802.11a – OFDM |
| Declared Nominal Output Power: | 802.11a: +20dBm |
| EUT Modes of Operation: | 802.11a/b/g |
| Transmit/Receive Operation: | Time Division Duplex |
| Rated Input Voltage and Current: | 3.7 Vdc, current (depending on mode) 200mA Avg/ 800 mA peak |
| Operating Temperature Range: | Declared range -10 to +50ºC |
| ITU Emission Designator: | 802.11a – 17M8W7D |
| Microprocessor(s) Model: | TI TMS320VC5507 |
| Clock/Oscillator(s): | 32.768 KHz, 40 MHz, 48 MHz |
| Frequency Stability: | ±20 ppm max |
| Equipment Dimensions: | 137mm x 52mm x 22mm |
| Weight: | With Ultra battery 0.3 lbs (137 grams) |
| Primary function of equipment: | Wireless Telephone Handset |

## 3.2. Scope of Test Program

The scope of the test program was to test the SpectraLink 803X wireless telephone handset in the frequency ranges 5150 - 5350 MHz and 5470 – 5725 MHz for compliance against FCC 47 CFR Part 15.407, Industry Canada RSS-210 specifications, and the Dynamic Frequency Selection (DFS) requirements of the FCC specification.

Models 802X & 803X
The 802X and 803X phones use common RF components and printed circuit boards. The 803X version of the 802.11abg telephone is a mechanical variation of the 802X telephone.

803X V's 802X Variations

- Dimensions 145mm x 51mm x 22mm (137x52x22 on the 802X telephone)
- Battery contacts are 7mm longer
- The phone side keys are molded into the plastic
- Headset jack cover
- Speaker is 30mm (16mm on the 802X)
- "push to talk" available

As a result of the commonality between the 802X and 803X telephones and to prove compliance with the R&TTE Directive all conducted test results performed on the 802X telephone were used in the generation of this test report.

Testing on the 803X telephone was limited to Radiated Emissions below 1 GHz and AC Wireline Conducted Emissions.

The SpectraLink Phone 803X wireless telephone employs OFDM modulation.

**SpectraLink Corporation**
**803X Wireless Telephone Handset**


Photos of the headsets that were tested in combination with the 803X phone.

PTH200 Headset

H251/N Headset

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

| Type (EUT/ Support) | Equipment Description (Including Brand Name) | Mfr | Model No. | Serial No. |
|---|---|---|---|---|
| EUT | Wireless phone (integral antenna) | SpectraLink | 803X | 660324736 |
| EUT | Wireless phone (RF connector) | SpectraLink | 803X | 660324699 |
| EUT | Phone stand and single battery charger | SpectraLink | PCS1850 | None |
| EUT | Phone stand and dual battery charger | SpectraLink | PCD1850 | None |
| EUT | Headset | Plantronics | PTH200 | None |
| EUT | Headset | Plantronics | H251/N | None |

## 3.4. Antenna Details

1. 0 dBi integral antenna

## 3.5. Cabling and I/O Ports

Number and type of I/O ports

1. 2.4mm socket for headset or earpiece.

## 3.6. Test Configurations

Matrix of test configurations

| Operational Mode (802.11) | Frequencies (MHz) | Maximum Data Rates (MBit/s) | Data Rate(s ) Selected for Test Purposes (Mbit/s) | |
|---|---|---|---|---|
| | | | Conducted | Radiated |
| a | 5,180<br>5,260<br>5,320 | 54 | 12[1] | 12[1] |
| a | 5,500<br>5,600<br>5,700 | 54 | 12[1] | 12[1] |

[1] – Except for DFS these data rates were used to test and exercise the EUT at all times

Matrix of Equipment test configurations

| Telephone Model # | Headsets | | Desktop Phone stand & Battery Charger | |
|---|---|---|---|---|
| | PTH200 | H251/N | Single | Dual |
| 803X | √ | √ | √ | √ |

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

System Duty Cycle

The phones were delivered with a fixed duty cycle. Any emissions (harmonic or otherwise) related to the duty cycle were offset by a correction factor 20*Log (duty cycle). Maximum duty cycle for each operational mode is as follows;

802.11a
Duty Cycle 2.8%, Correction Factor = -31.06

## 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 or Third Party Data

Radiated emissions are tested below and verified above 1 GHz at TUV Rheinland of North America's 10m chamber located at the following address;-

2305 Mission College Blvd.
Santa Clara
California 95054
USA

TUV Rheinland of North America IC Registration Number: IC 4453-1

# 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**.and **Industry Canada RSS-Gen**.

| Section(s) | Test Items | Description | Condition | Result | Test Report Section |
|---|---|---|---|---|---|
| **15.407(a)** **A9.2(2)** **4.4** | 26dB and 99% Emission BW | Emission bandwidth measurement | Conducted | Complies | 5.1.1 |
| **15.407(a)** **A9.2(2)** **4.6** | Transmit Output Power | Power Measurement | Conducted | Complies | 5.1.2 |
| **15.407(a)** **A9.2(2)** | 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** **2.1** **4.5** | Frequency Stability | Limits: contained within band of operation at all times. | Manufacturer declaration | Complies | 5.1.5 |
| **15.407(f)** **5.5** | Radio Frequency Radiation Exposure | Exposure to radio frequency energy levels, Maximum Permissible Exposure (MPE) | SAR testing performed | Complies | 5.1.6 |
| **15.407(b)(2)** **2.2** **2.6** **A9.3(2)** **4.7** | Conducted Spurious Emissions | Spurious emissions above 1GHz (1-40GHz) including band edge | Conducted | Complies | 5.1.7 |

## List of Measurements (continued)

The following table represents the list of measurements required under the **FCC CFR47 Part 15.407** and **Industry Canada RSS-210** and **Industry Canada RSS-Gen**.

| Section(s) | Test Items | Description | Condition | Result | Test Report Section |
|---|---|---|---|---|---|
| **15.407(b)(2)**<br>**15.205(a)**<br>**15.209(a)**<br>**2.2**<br>**2.6**<br>**A9.3(2)**<br>**4.7** | 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* |
| **RSS-GEN**<br>**6** | Receiver Radiated Spurious Emissions | Emissions above 1 GHz | | Complies | *5.1.8.3* |
| **15.407(b)(6)**<br>**15.205(a)**<br>**15.209(a)**<br>**2.2** | Radiated Emissions | Emissions <1 GHz (30M-1 GHz) | | Complies | *5.1.8.4* |
| **15.407(b)(6)**<br>**15.207**<br>**7.2.2** | AC Wireline Conducted Emissions 150 kHz–30 MHz | Conducted Emissions | Conducted | Complies | 5.1.9 |
| **15.407(h)** | DFS Testing | Dynamic Frequency Selection (DFS) | Conducted | Complies | 5.2 |

***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*

# 5. TEST RESULTS

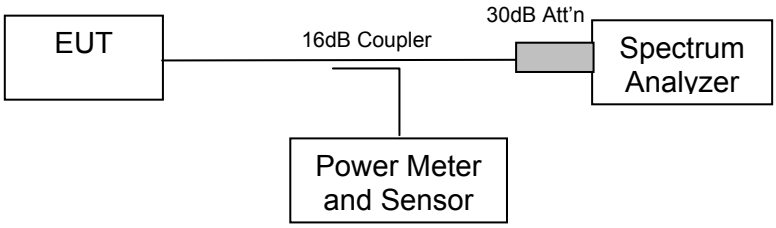
## 5.1. Device Characteristics

### 5.1.1. 26 dB and 99 % Bandwidth

**FCC, Part 15 Subpart C §15.407(a)**
**Industry Canada RSS-210 § A9.2(2)**
**Industry Canada RSS-Gen 4.4**

**Test Procedure**
The bandwidth at 26 dB and 99 % is measured with a spectrum analyser connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency. The spectrum analyzer utilized the 6 dB resolution bandwidth filter for all measurements.

**Test Measurement Set up**




Measurement set up for 6 dB and 99 % bandwidth test

EUT parameters.
Data Rate(s): 802.11a 12 MBit/s,
Power Level: Maximum
Duty Cycle: 100%

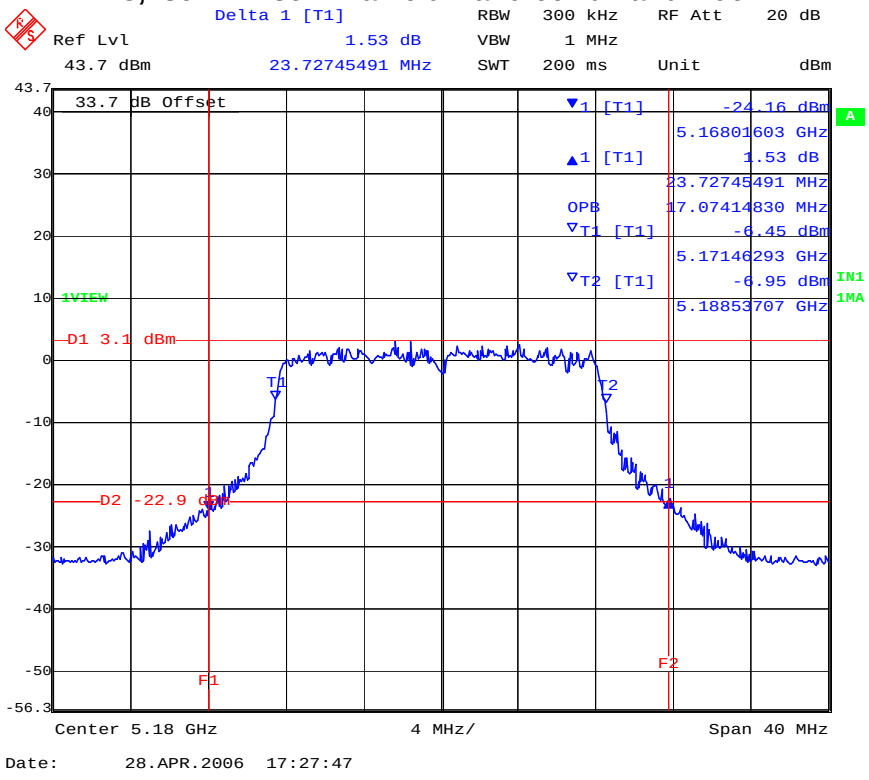
## Measurement Results for 26 dB and 99 % Operational Bandwidth(s)

Ambient conditions.
Temperature: 17 to 23 °C  Relative humidity: 31 to 57 %  Pressure: 999 to 1012 mbar

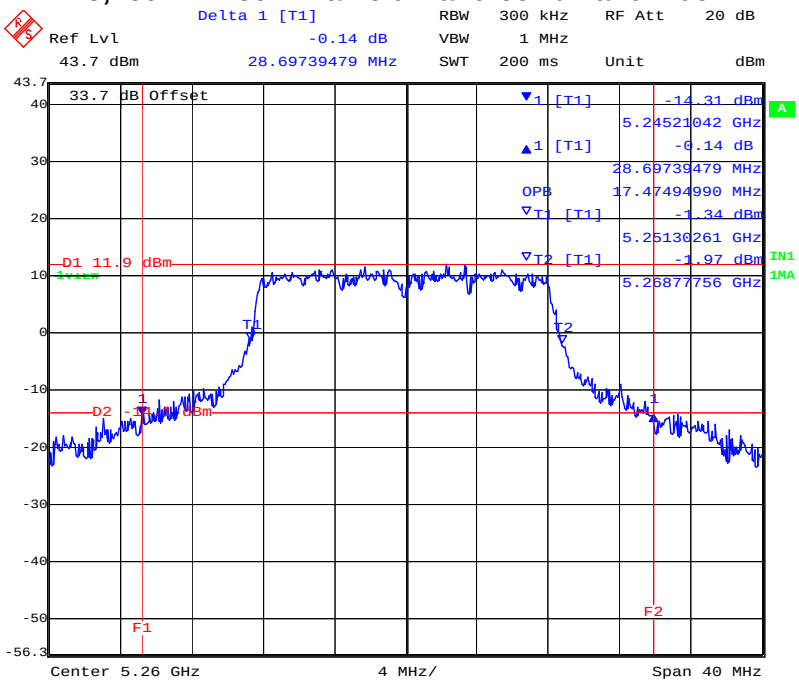
TABLE OF RESULTS – **802.11a**

| Center Frequency (MHz) | 26 dB Bandwidth (MHz) | 99 % BW (MHz) | 26 dB and 99 % BW Plots |
|---|---|---|---|
| 5,180 | 23.7275 | 17.0741 | 01 |
| 5,260 | 28.6973 | 17.4749 | 02 |
| 5,320 | 31.4228 | 17.7956 | 03 |

**Plot 01**
**5,180 MHz 802.11a 26 dB and 99 % Bandwidth**



## Plot 02
## 5,260 MHz 802.11a 26 dB and 99 % Bandwidth




## Plot 03
## 5,320 MHz 802.11a 26 dB and 99 % Bandwidth

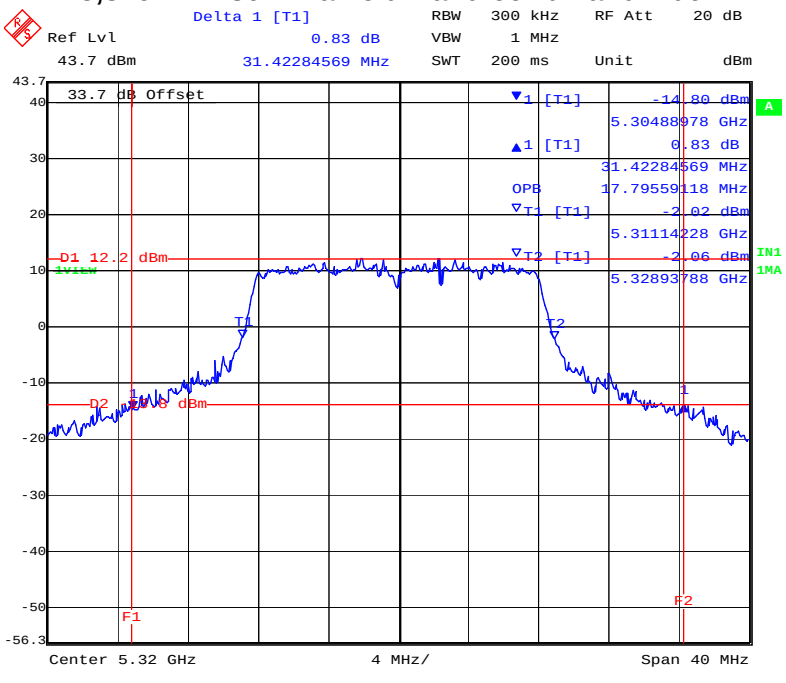
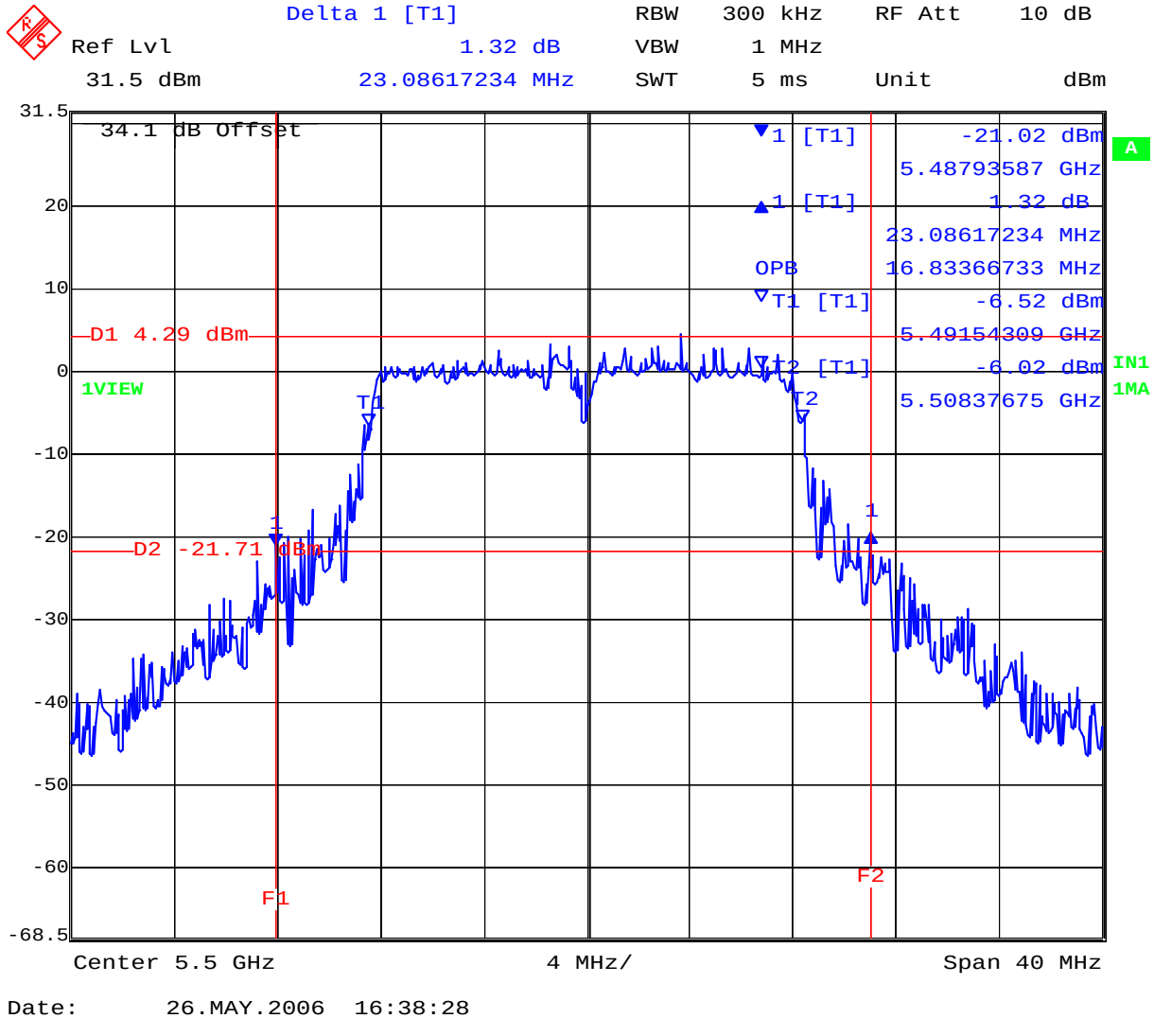


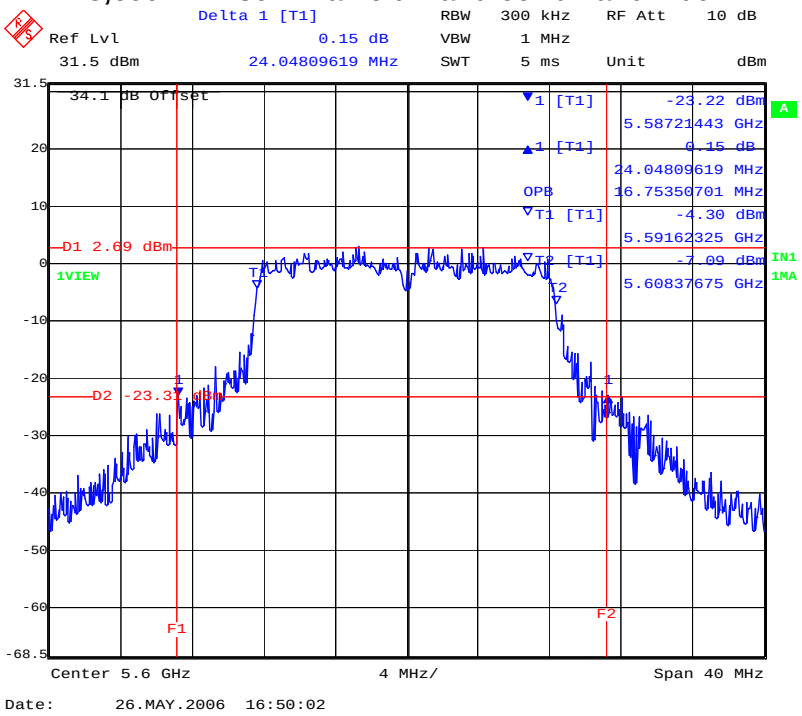
TABLE OF RESULTS – **802.11a**

| Center Frequency (MHz) | 26 dB Bandwidth (MHz) | 99 % BW (MHz) | 26 dB and 99 % BW Plots |
|---|---|---|---|
| 5,500 | 23.0862 | 16.8337 | 05 |
| 5,600 | 24.0481 | 16.7535 | 05 |
| 5,700 | 23.6473 | 16.6733 | 06 |

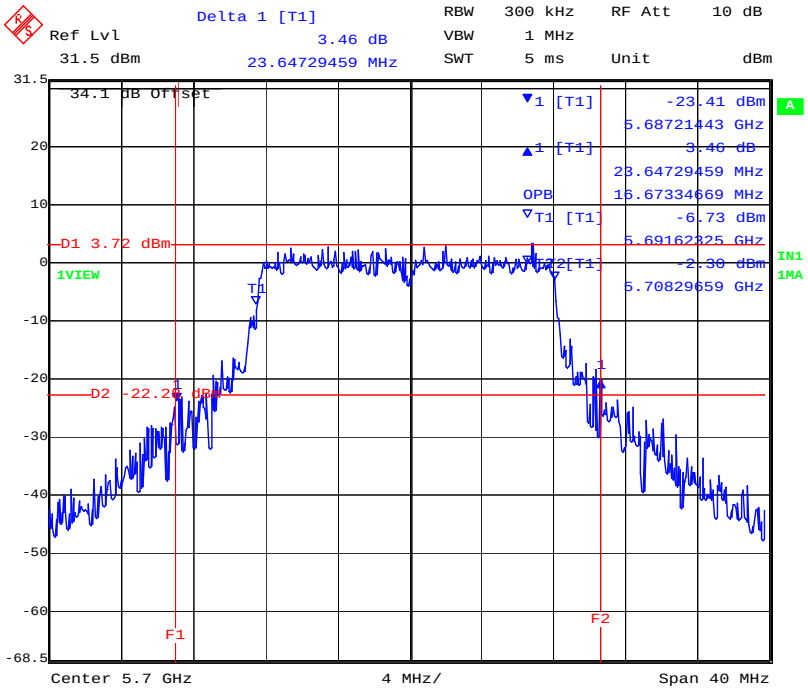
**Plot 04**
**5,500 MHz 802.11a 26 dB and 99 % Bandwidth**



## Plot 05
## 5,600 MHz 802.11a 26 dB and 99 % Bandwidth




## Plot 06
## 5,700 MHz 802.11a 26 dB and 99 % Bandwidth



## Specification

### Limits

**FCC, Part 15 §15.407 (a)(1), (a)(2) and Industry Canada RSS-210 § A9.2(2)**

**(a)(1)** For the band 5.15-5.25 GHz the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or +4 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +4 dBm in any 1 megahertz band.

**(a)(2)** For the 5.25-5.35 GHz band the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or +11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +11 dBm in any 1 megahertz band.

**Industry Canada RSS-Gen 4.4**

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

### Laboratory Measurement Uncertainty for Spectrum Measurement

| | |
|---|---|
| Measurement uncertainty | ±2.81 dB |

### Traceability

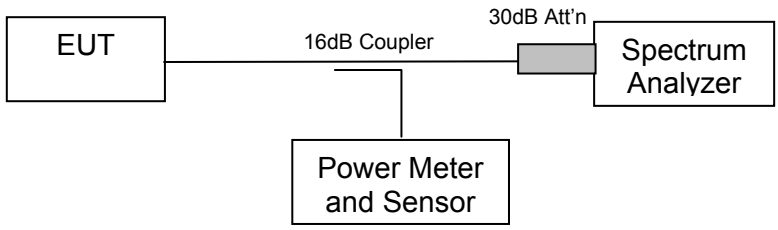
| Method | Test Equipment Used |
|---|---|
| Measurements were made per work instruction WI-03 'Measurement of RF Spectrum Mask' | 0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117 |

### 5.1.2. Transmit Output Power

**FCC, Part 15 Subpart C §15.407(a)**
**Industry Canada RSS-210 §9.9(2)**
**Industry Canada RSS-Gen 4.6**

**Test Procedure**
The transmitter terminal of EUT was connected to the input of the average power meter and the spectrum analyzer. Method #2 as outlined in the FCC's Public Notice (DA 02-2138, August 30, 2002 was used to make all measurements. The results reported include all offsets due to attenuators, cable losses etc.

**Test Measurement Set up**




Measurement set up for Transmitter Output Power

**Maximum Transmit Power**

Limit 5150 – 5250: Lesser of 50 mW (+17dBm) or 4 + 10 Log (B) dBm

| Frequency Range (MHz) | Maximum 26 dB Bandwidth (MHz) | 4 + 10 Log (B) | Limit (dBm) |
|---|---|---|---|
| 5150 – 5250 | 23.7275 | +17.75 dBm | +17 |

Limit 5250 – 5350: Lesser of 250 mW (+24dBm) or 11 + 10 Log (B) dBm

| Frequency Range (MHz) | Maximum 26 dB Bandwidth (MHz) | 11 + 10 Log (B) | Limit (dBm) |
|---|---|---|---|
| 5250 - 5350 | 31.4228 | +25.97 dBm | +24 |

Limit 5470 – 5725: Lesser of 1 W (+30dBm) or 17 + 10 Log (B) dBm

| Frequency Range (MHz) | Maximum 26 dB Bandwidth (MHz) | 17 + 10 Log (B) | Limit (dBm) |
|---|---|---|---|
| 5470 - 5725 | 24.0481 | +30.81 dBm | +30 |

**Measurement Results for Transmit Output Power**
Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

EUT parameters.
Data Rate(s): 802.11a 12 MBit/s,
Power Level: Maximum
Duty Cycle: 100%

TABLE OF RESULTS – **802.11a**

| Center Frequency (MHz) | Maximum Conducted Power (dBm) |
|---|---|
| 5,180 | +9.75 |
| 5,260 | +13.46 |
| 5,320 | +13.36 |

TABLE OF RESULTS – **802.11a**

| Center Frequency (MHz) | Maximum Conducted Power (dBm) |
|---|---|
| 5,500 | +13.35 |
| 5,600 | +13.25 |
| 5,700 | +13.15 |

## Specification

### Limits

**FCC, Part 15 §15.407 (a)(1), (a)(2) and Industry Canada RSS-210 § A9.2(2)**

**(a)(1)** For the band 5.15-5.25 GHz the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or +4 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +4 dBm in any 1 megahertz band.

**(a)(2)** For the 5.25-5.35 GHz band the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or +11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +11 dBm in any 1 megahertz band.

**Industry Canada RSS-210 §A9.2(2)**

For the band 5150-5250 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

For the band 5250-5350 MHz and 5470-5725 MHz, the maximum conducted output power shall not exceed 250 mW or 11 + 10 log10 B, dBm, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

**Industry Canada RSS-Gen 4.4**

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

### Laboratory Measurement Uncertainty for Power Measurements

| | |
|---|---|
| Measurement uncertainty | ±1.33 dB |

### Traceability

| Method | Test Equipment Used |
|---|---|
| Measurements were made per work instruction WI-01 'Measuring RF Output Power' | 0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117 |

### 5.1.3. Peak Power Spectral Density

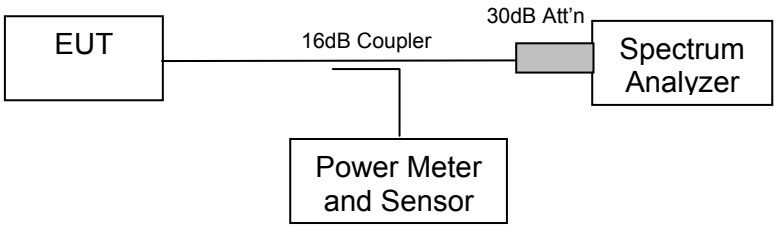
**FCC, Part 15 Subpart C §15.407(a)**
**Industry Canada RSS-210 § A9.2(2)**

**Test Procedure**
The transmitter output was connected to a spectrum analyzer and the peak power spectral density measured. Method 2 Sample Detection and power averaging, specified in FCC document DA 02-2138 (Normative Reference (x) in Section 2.1 'References and Measurement Uncertainty';

"Measurement Procedure Updated for Peak Transmit Power in the Unlicensed National Information Infrastructure (U-NII) Bands."

was used to determine the peak power spectral density of the emission. The Peak Power Spectral Density is the highest level found across the emission in a 1 MHz resolution bandwidth.

**Test Measurement Set up**




Measurement set up for Peak Power Spectral Density

**Measurement Results for Peak Power Spectral Density**

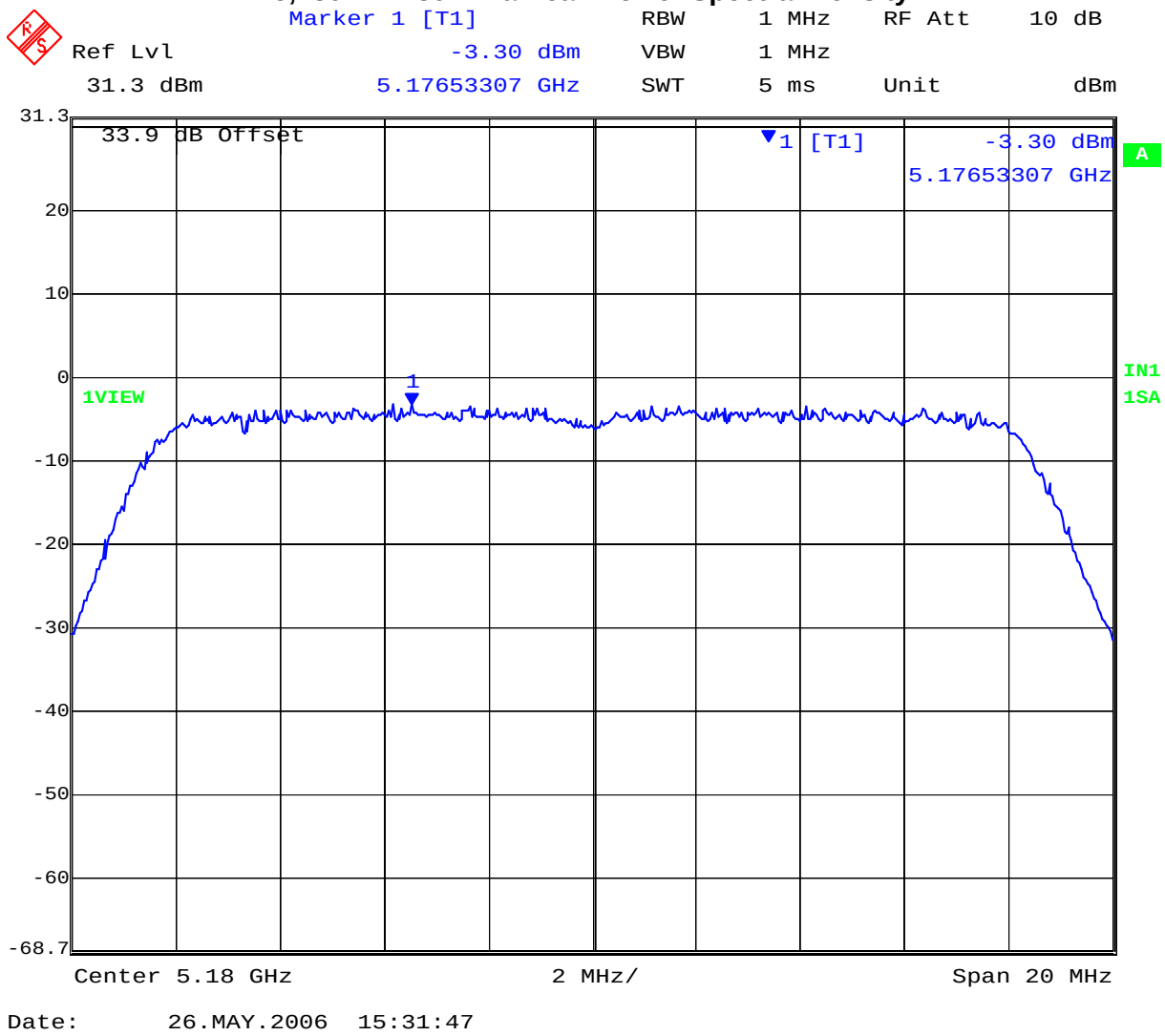
Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

EUT parameters.
Data Rate(s): 802.11a 12 MBit/s,
Power Level: Maximum
Duty Cycle: 100%

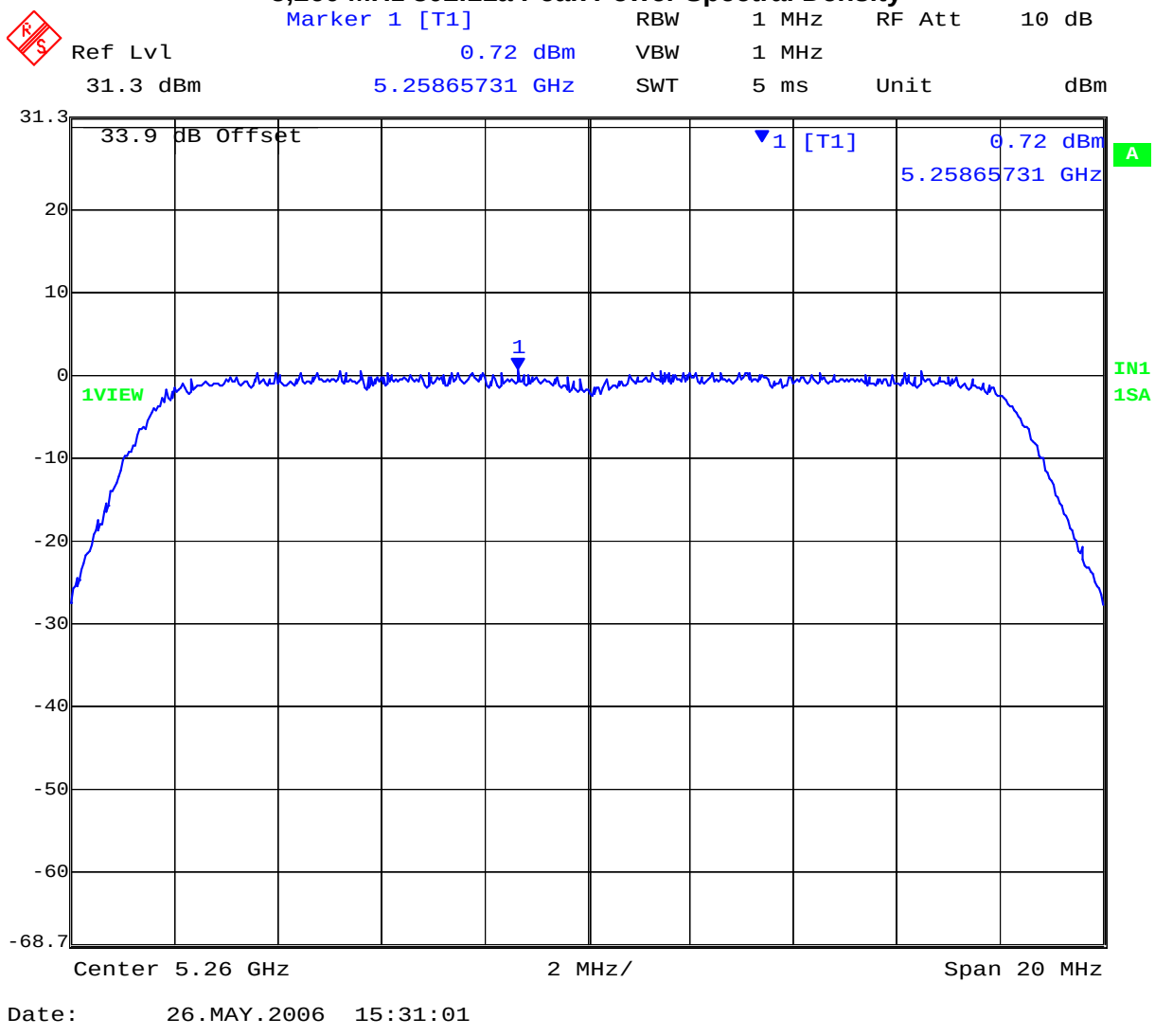
TABLE OF RESULTS – **802.11a**

| Center Frequency (MHz) | Peak Frequency (MHz) | PPSD (dBm) | Plot # |
|---|---|---|---|
| 5,180 | 5176.53307 | -3.30 | 07 |
| 5,260 | 5258.65731 | +0.72 | 08 |
| 5,320 | 5316.01202 | +0.50 | 09 |

**Plot 07**
**5,180 MHz 802.11a Peak Power Spectral Density**



## Plot 08
## 5,260 MHz 802.11a Peak Power Spectral Density



## Plot 09
## 5,320 MHz 802.11a Peak Power Spectral Density

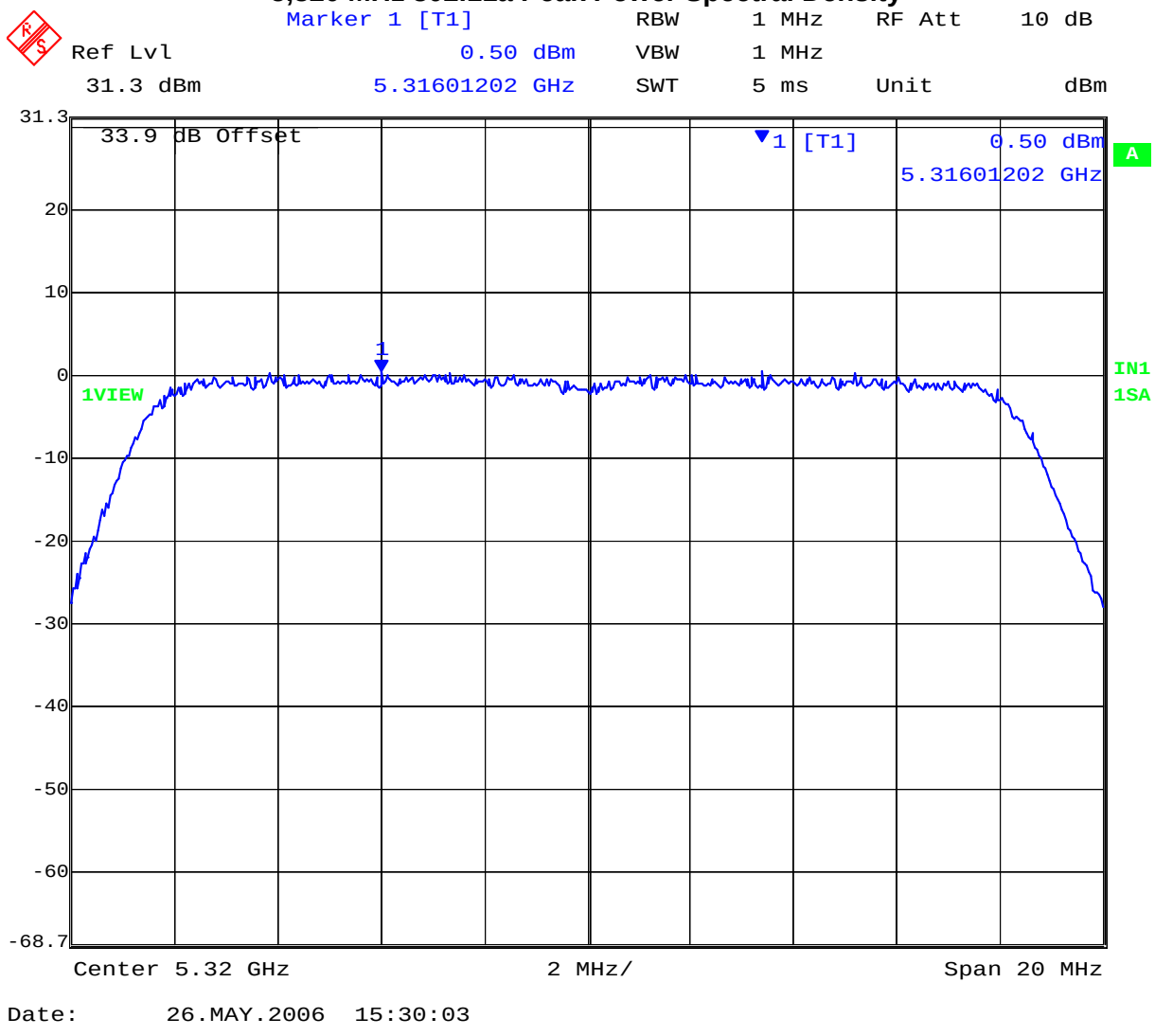
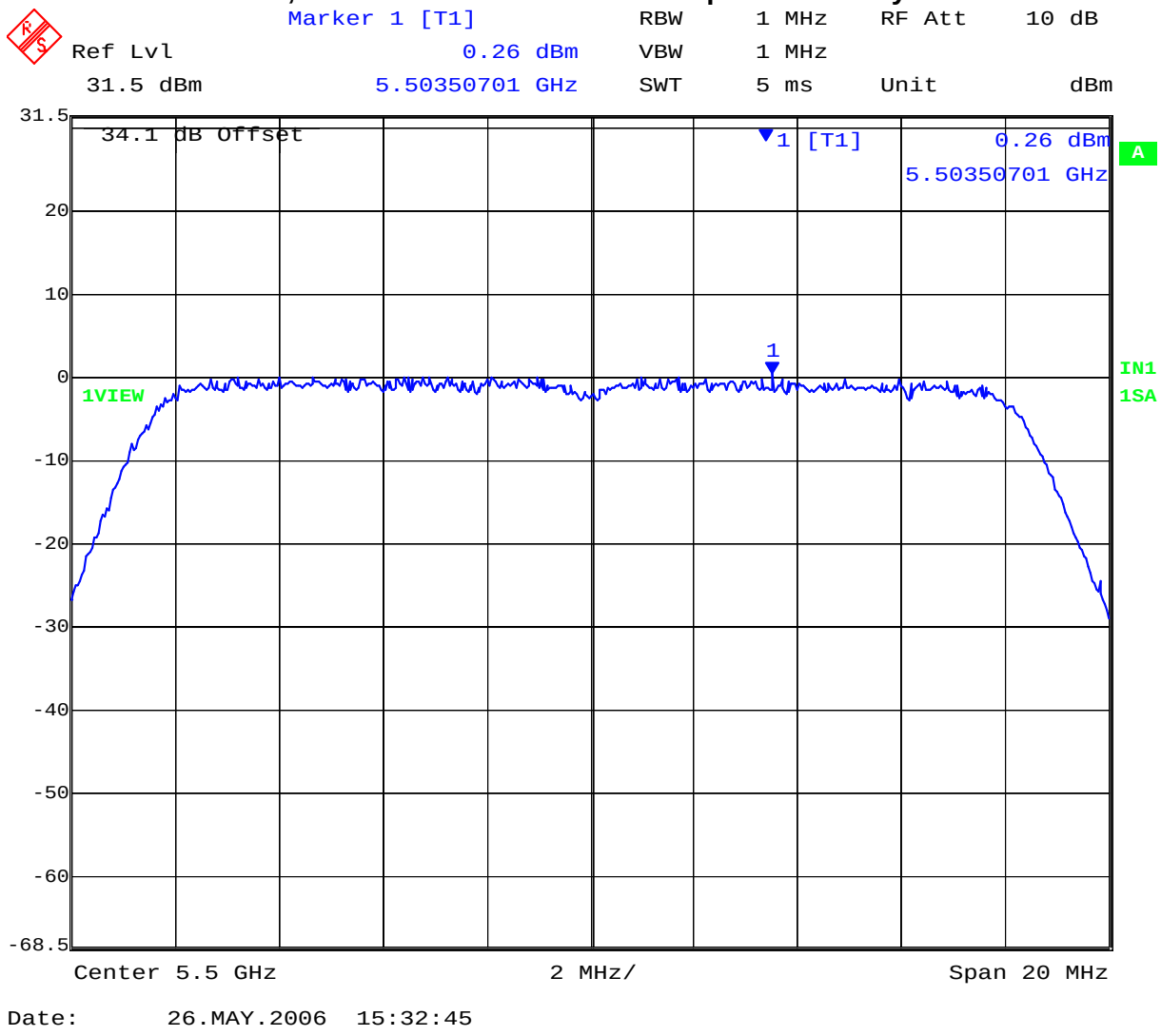


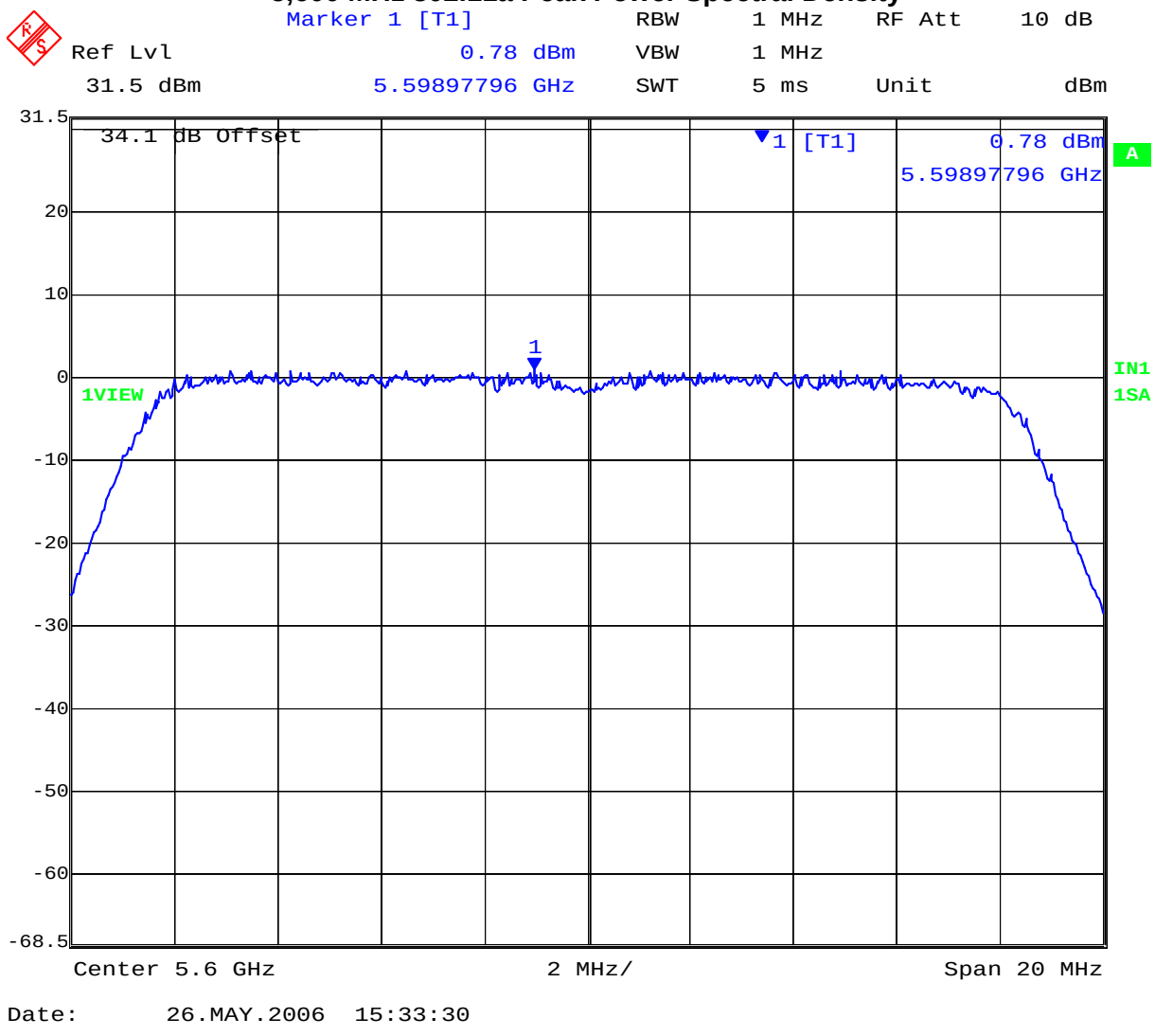
TABLE OF RESULTS – **802.11a**

| Center Frequency (MHz) | Peak Frequency (MHz) | PPSD (dBm) | Plot # |
|---|---|---|---|
| 5,500 | 5503.50701 | +0.26 | 10 |
| 5,600 | 5598.97796 | +0.78 | 11 |
| 5,700 | 5703.06613 | +1.06 | 12 |

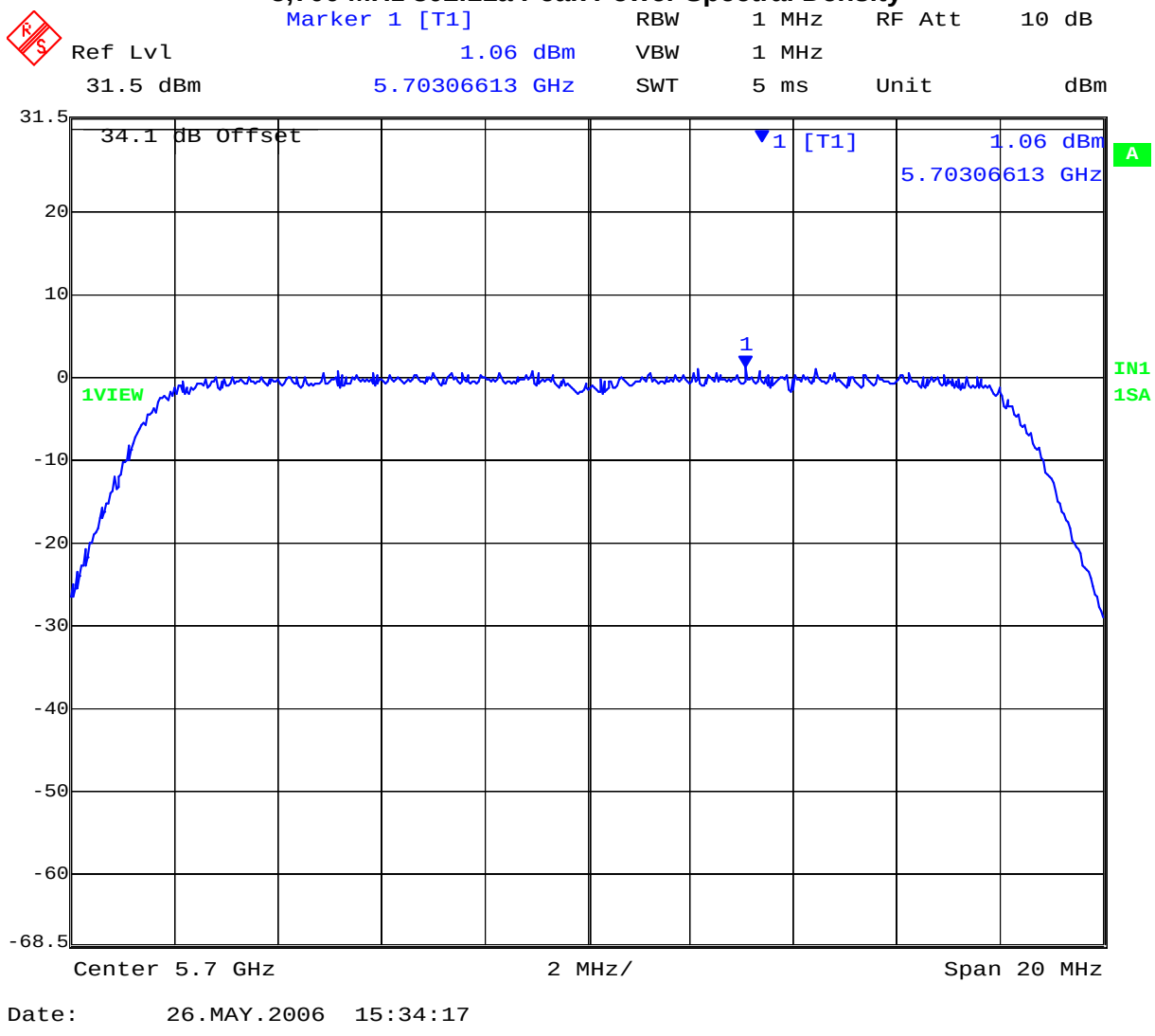
**Plot 10**
**5,500 MHz 802.11a Peak Power Spectral Density**



## Plot 11
## 5,600 MHz 802.11a Peak Power Spectral Density



## Plot 12
## 5,700 MHz 802.11a Peak Power Spectral Density



## Specification

**FCC, Part 15 §15.407 (a)(1), (a)(2)**
**(a)(1)** The peak power spectral density shall not exceed +4 dBm in any 1 megahertz band.

**(a)(2)** The peak power spectral density shall not exceed +11 dBm in any 1 megahertz band.

**Industry Canada RSS-210 § A9.2(1), A9.2(2)**
§ **A9.2(1)** The eirp spectral density shall not exceed +10 dBm in any 1 MHz band

§ **A9.2(2)** The power spectral density shall not exceed +11 dBm in any 1 MHz band

## Laboratory Measurement Uncertainty for Spectral Density

| | |
|---|---|
| Measurement uncertainty | ±1.33 dB |

## Traceability

| Method | Test Equipment Used |
|---|---|
| Measurements were made per work instruction WI-01 'Measuring RF Output Power' | 0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117 |

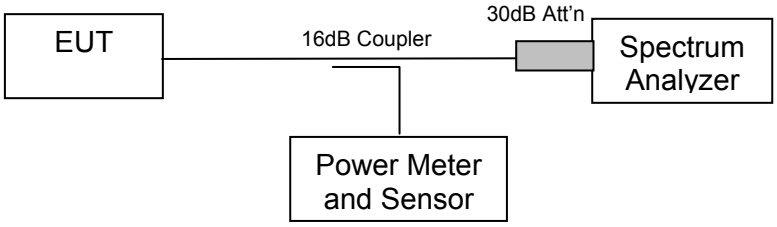
### 5.1.4. Peak Excursion Ratio

**FCC, Part 15 Subpart C §15.407(a)(6)**

**Test Procedure**

This is an antenna conducted measurement using a spectrum analyzer. Method 1 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: 17 to 23 °C Relative humidity: 31 to 57% Pressure: 999 to 1012 mbar

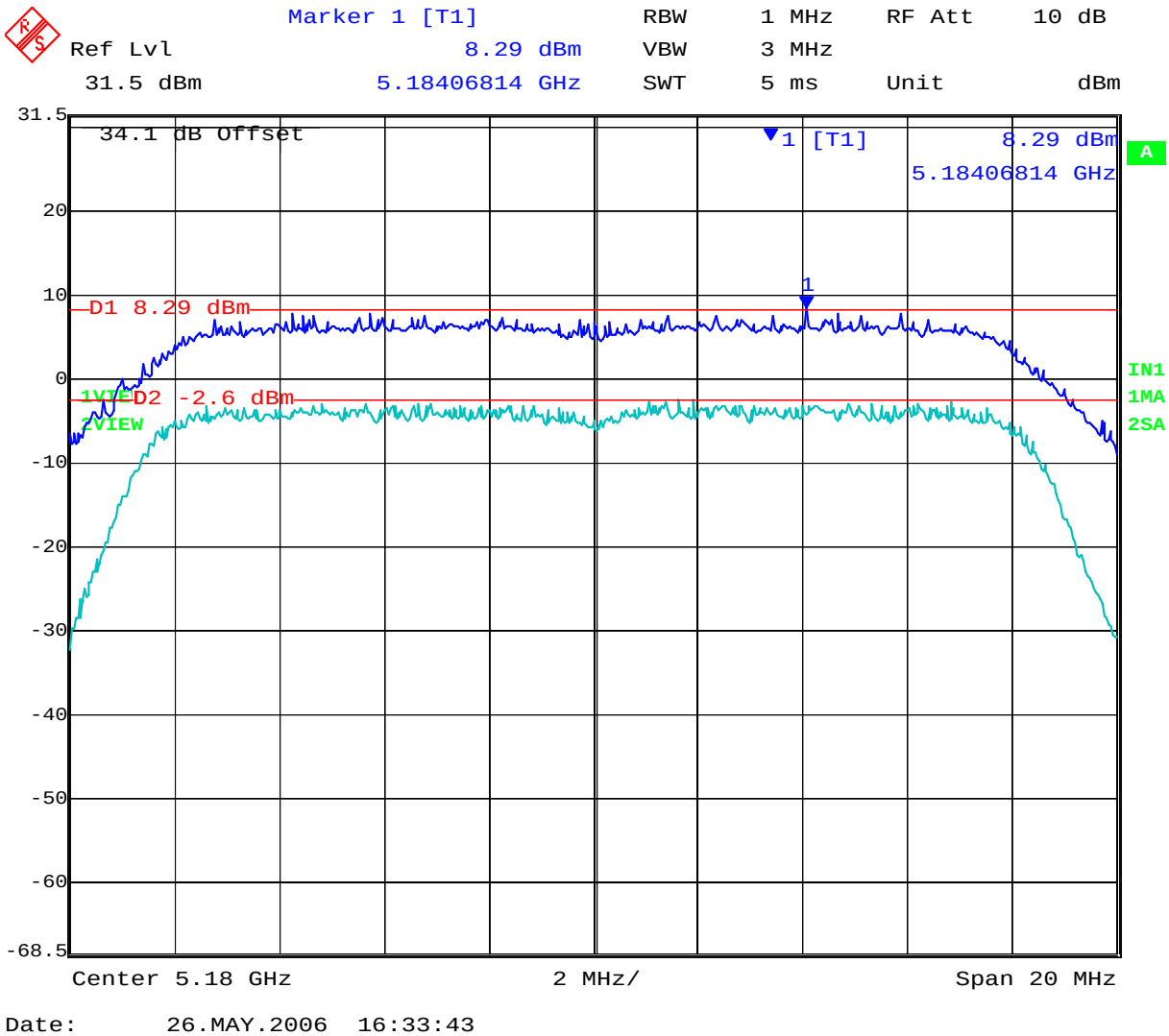
EUT parameters.
Data Rate(s): 802.11a 12 MBit/s,
Power Level: Maximum
Duty Cycle: 100%

TABLE OF RESULTS – **802.11a**

| Centre Frequency (MHz) | Peak Excursion Ratio (dB) | Plot # |
|---|---|---|
| 5,180 | 10.89 | 13 |
| 5,260 | 11.83 | 14 |
| 5,320 | 10.68 | 15 |

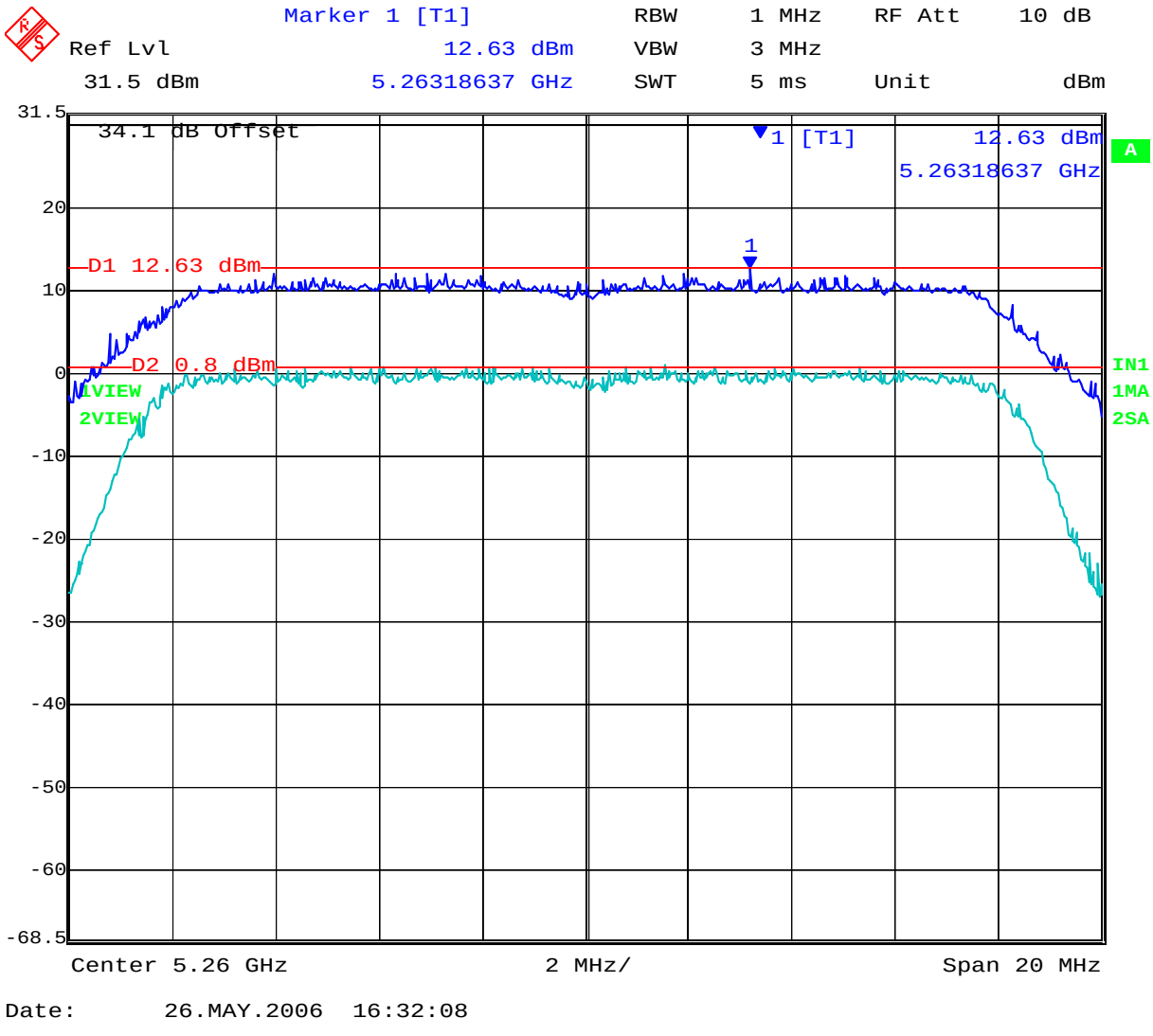
**Plot 13**

**5,180 MHz 802.11a - Peak Excursion Ratio**



## Plot 14

### 5,260 MHz 802.11a - Peak Excursion Ratio



## Plot 15

### 5,320 MHz 802.11a - Peak Excursion Ratio

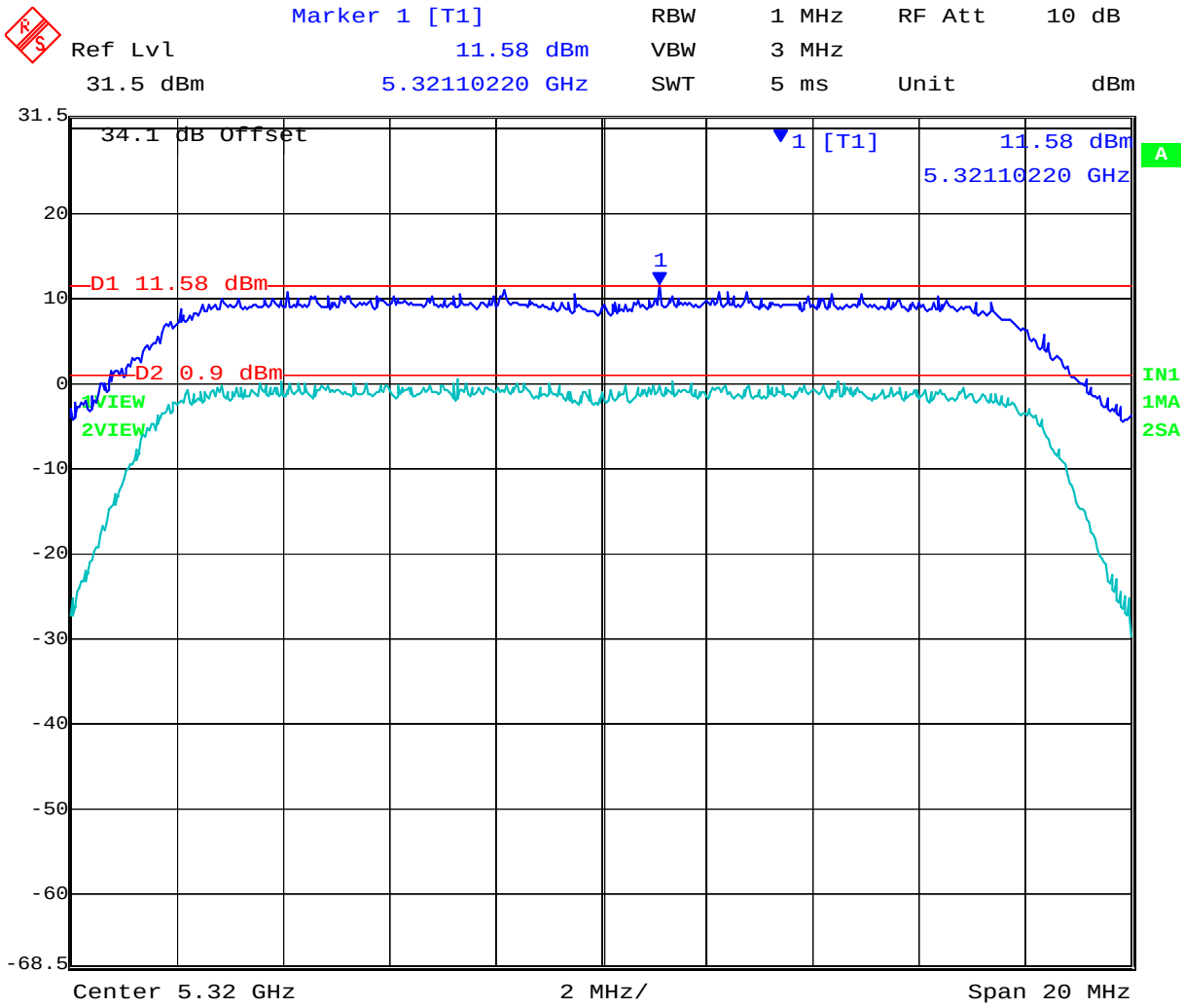
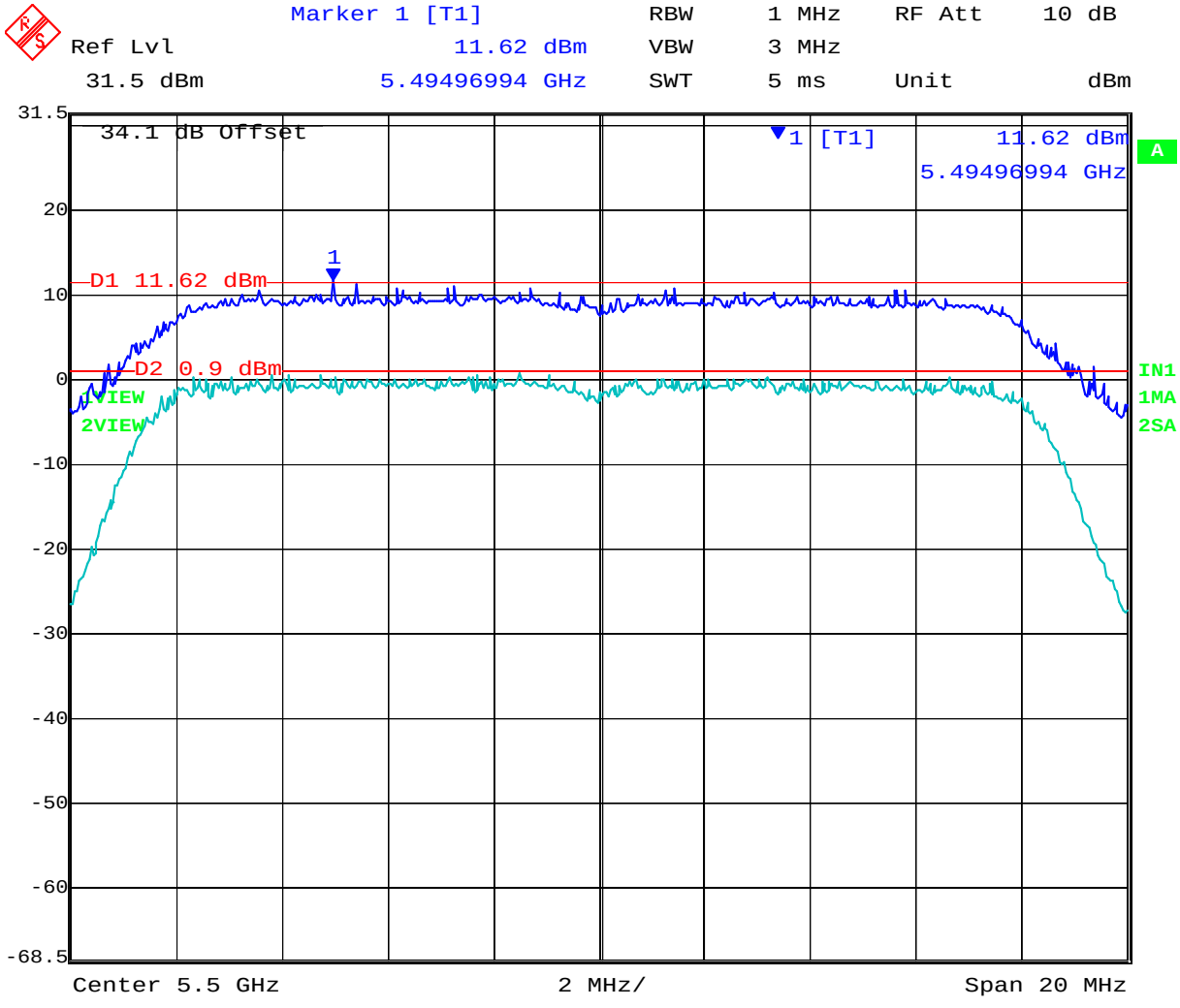


TABLE OF RESULTS – **802.11a**

| Centre Frequency (MHz) | Peak Excursion Ratio (dB) | Plot # |
|---|---|---|
| 5,500 | 10.72 | 16 |
| 5,600 | 9.00 | 17 |
| 5,700 | 10.55 | 18 |

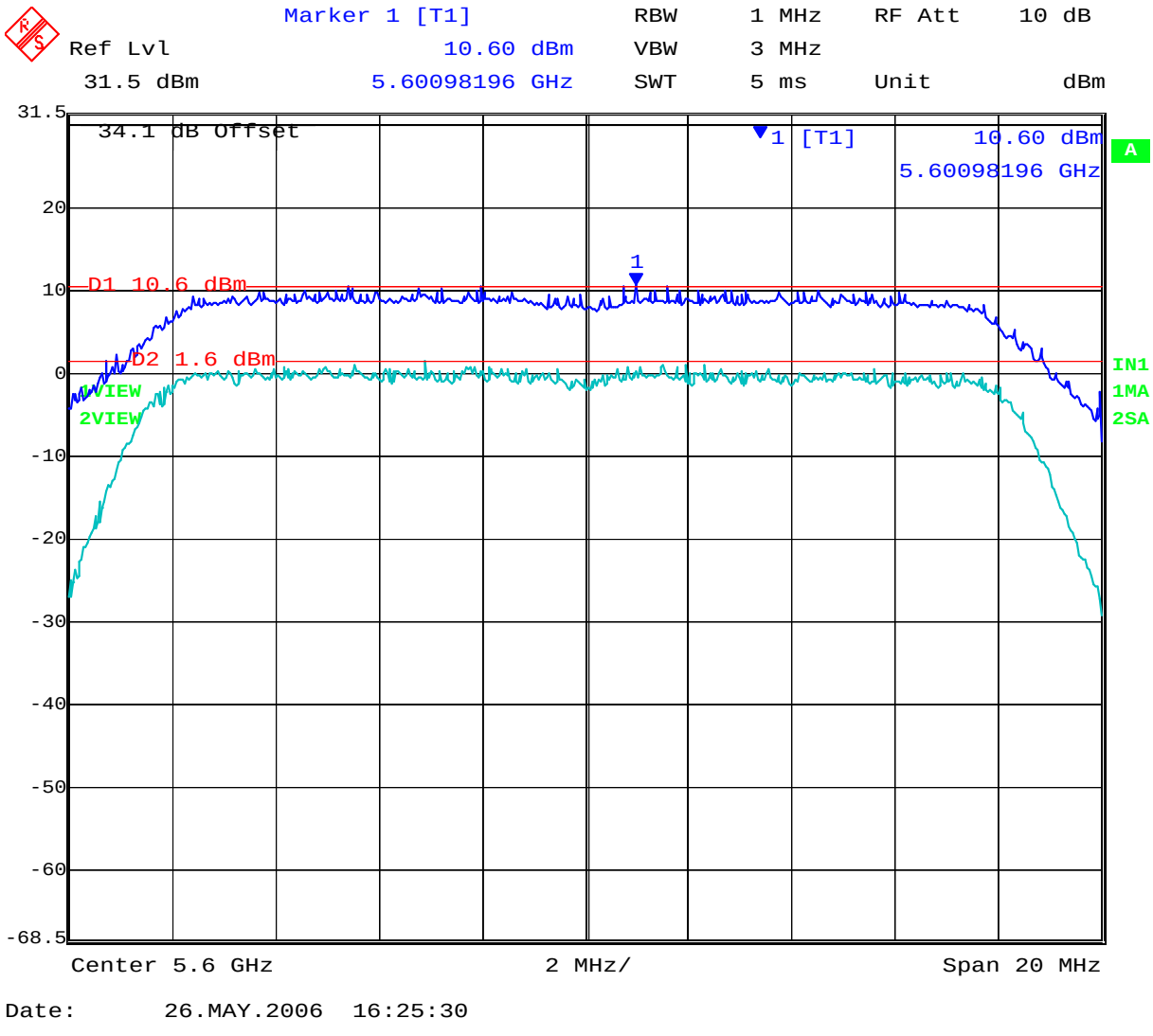
**Plot 16**

**5,500 MHz 802.11a - Peak Excursion Ratio**



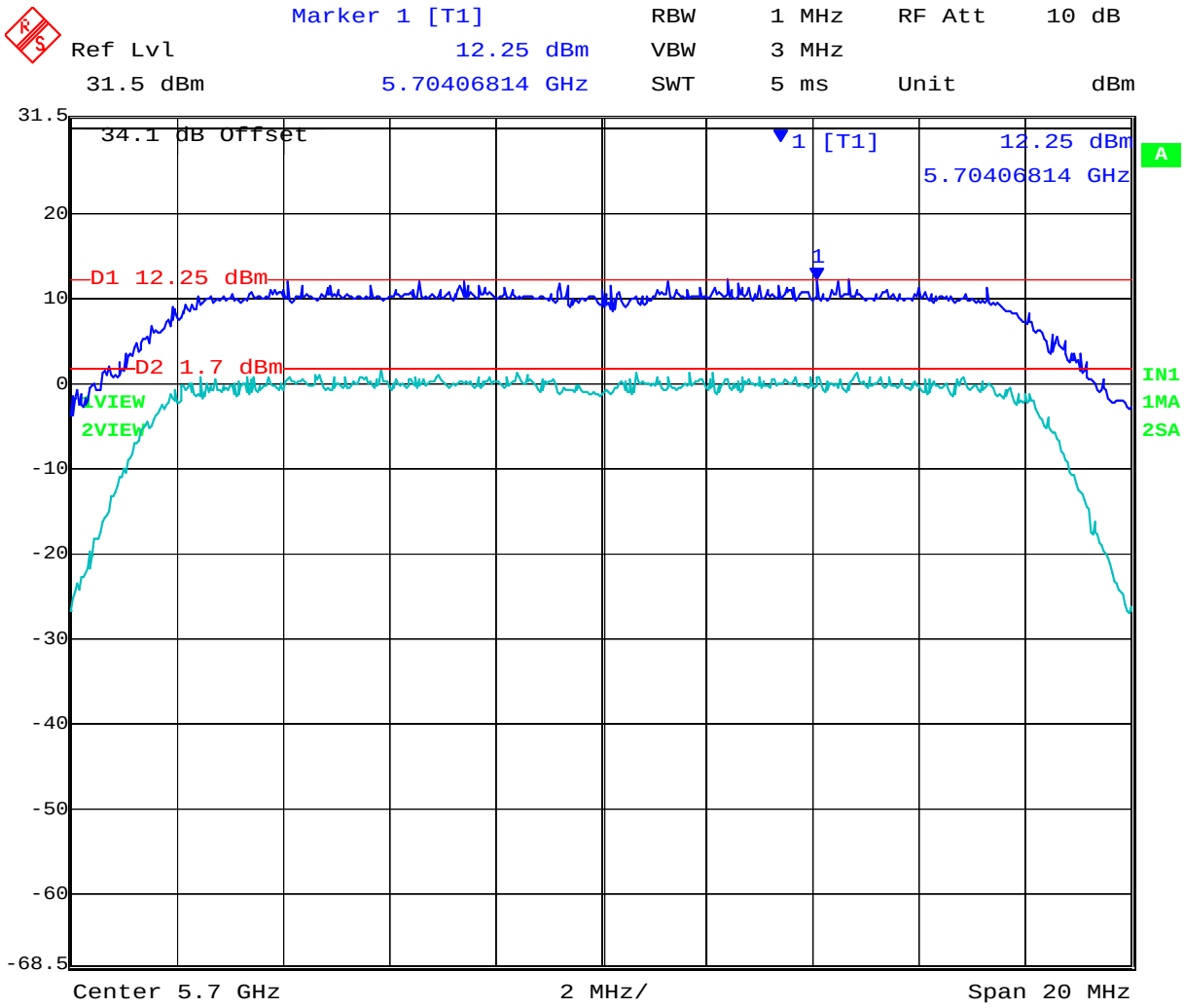
## Plot 17

### 5,600 MHz 802.11a - Peak Excursion Ratio



## Plot 18

### 5,700 MHz 802.11a - Peak Excursion Ratio



## 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' | 0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117 |

### 5.1.5. Frequency Stability

**FCC, Part 15 Subpart C §15.407(g)**
**Industry Canada RSS-210 §2.1**

**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 5.250 GHz translates to a maximum frequency shift of ±105 KHz. As the edge of the channels is at least one MHz from either of the band edges, ±105 KHz is more than sufficient to guarantee that the intentional emission will remain in the band over the entire operating range of the EUT.

## Specification

## Limits

**§15.407 (g)** Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

### 5.1.6. Maximum Permissible Exposure

**FCC, Part 15 Subpart C §15.407(f)**
**Industry Canada RSS-Gen §5.5**

A Specific Absorption Rate (SAR) test report is available for this 802.11a telephone device.

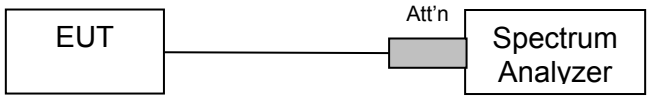
### 5.1.7. Conducted Spurious Emissions

**FCC, Part 15 Subpart C §15.407(b)(2)**
**Industry Canada RSS-210 §A9.3(2); §2.2; §2.6; RSS-Gen §4.7**

**Test Procedure**
Conducted emissions were measured at a EIRP limit of -27 dBm/MHz with a spectrum analyzer connected to the antenna terminal. Emissions at the band edge were measured and recorded. Measurements were made while EUT was operating in transmit mode of operation at the appropriate center frequency.

**Note:** The data in this section along with the data in sections 5.1.8.1 (Transmitter Radiated Spurious emissions) and section 5.1.8.2 (Radiated Band Edge - Restricted Bands) identifies that the EUT is in compliance with the -27dBm/MHz EIRP limit for out of band emissions.

**Test Measurement Set up**




Band-edge measurement test configuration

**Measurement Results of Conducted Spurious Emissions**

Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

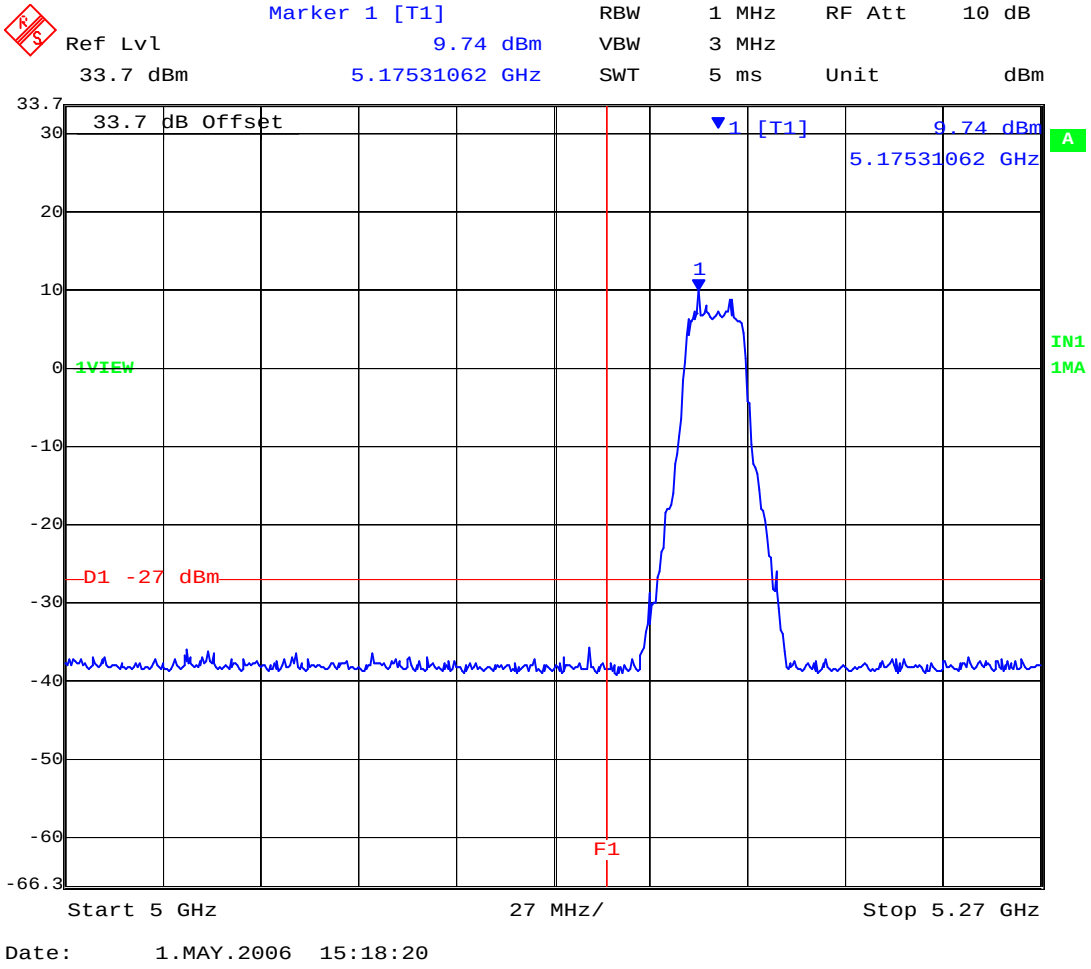
EUT parameters.
Data Rate(s): 802.11a 12 MBit/s,
Power Level: Maximum

## Conducted Band-Edge Results

TABLE OF RESULTS – **802.11a**

| Center Frequency (MHz) | Band edge Frequency (MHz) | Limit (dBm/MHz) | Amplitude @ Band edge (dBm/MHz) | Plot # | Margin (dB) |
|---|---|---|---|---|---|
| 5,180 | 5,150 | -27.00 | -37.00 | 19 | -10.00 |
| 5,320 | 5,350 | -27.00 | -30.00 | 20 | -3.00 |

**Plot 19**
**Conducted Spurious Emissions at the 5,150 MHz Band Edge**



## Plot 20
## Conducted Spurious Emissions at the 5,350 MHz Band Edge

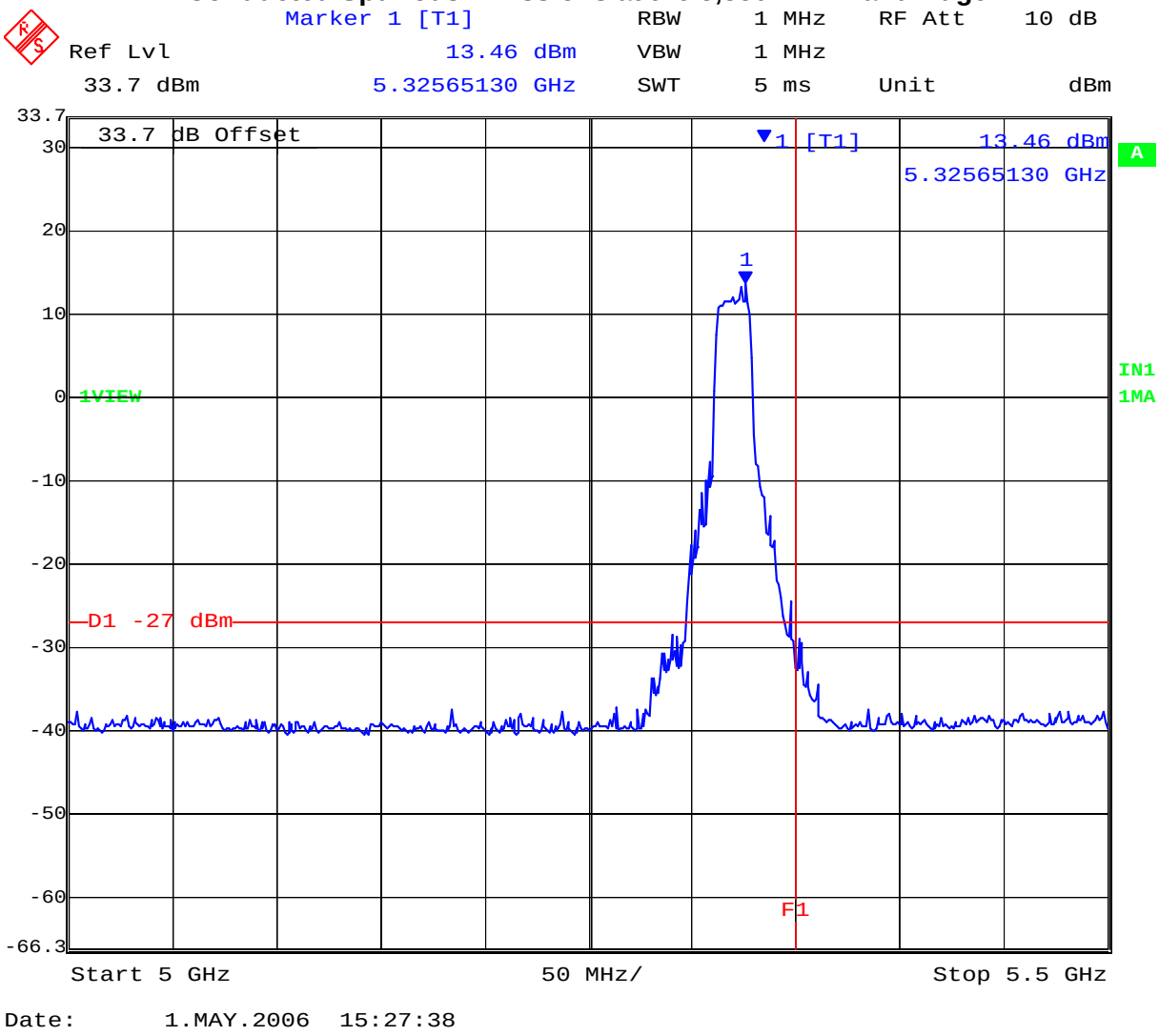
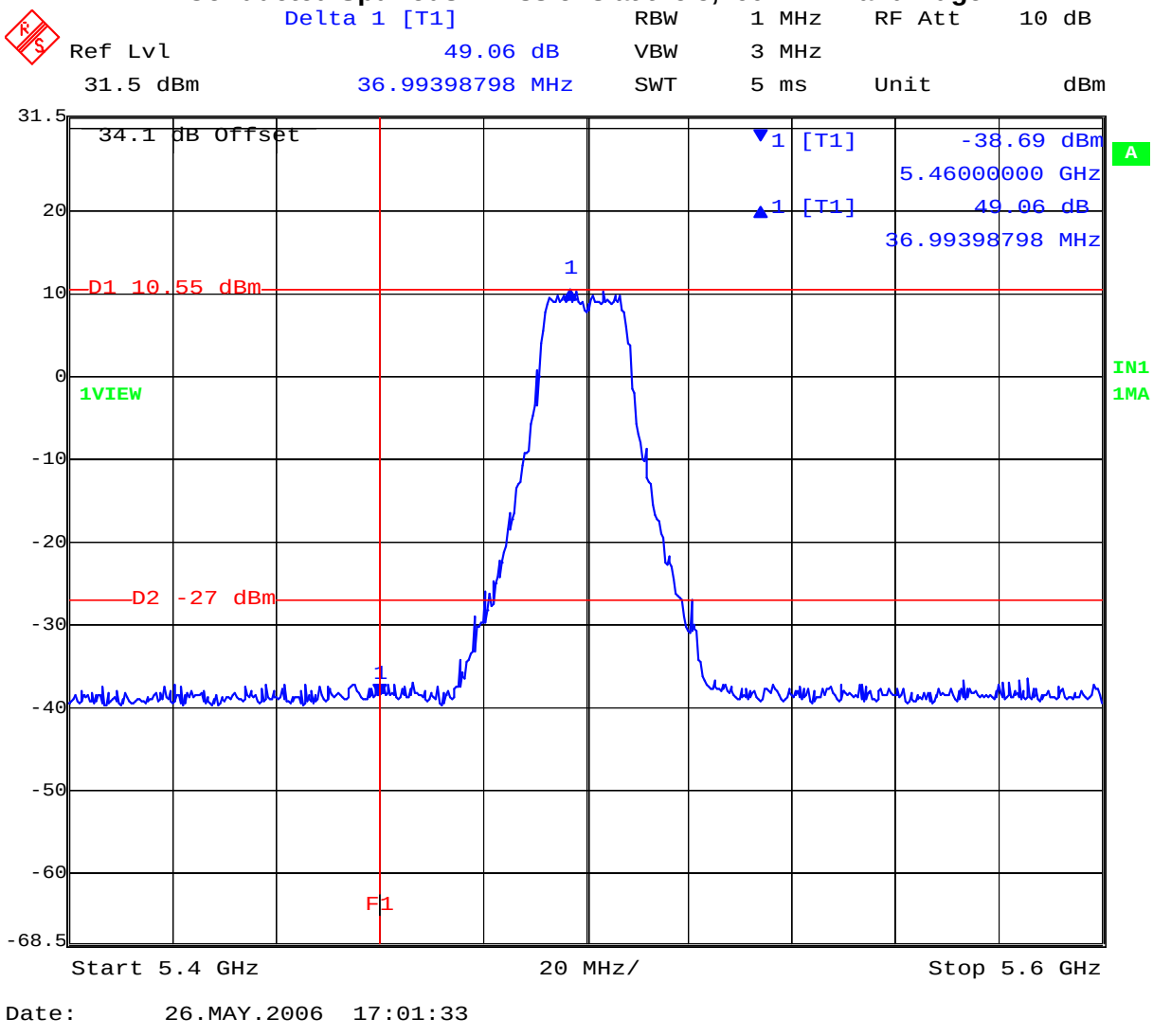


TABLE OF RESULTS – **802.11a**

| Center Frequency (MHz) | Band edge Frequency (MHz) | Limit (dBm/MHz) | Amplitude @ Band edge (dBm/MHz) | Plot # | Margin (dB) |
|---|---|---|---|---|---|
| 5,500 | 5,460 | -27.00 | -38.69 | 21 | -11.69 |

Note; No band edge measurements are required at the upper end of the 5,470 – 5,725 band.

**Plot 21**
**Conducted Spurious Emissions at the 5,460 MHz Band Edge**



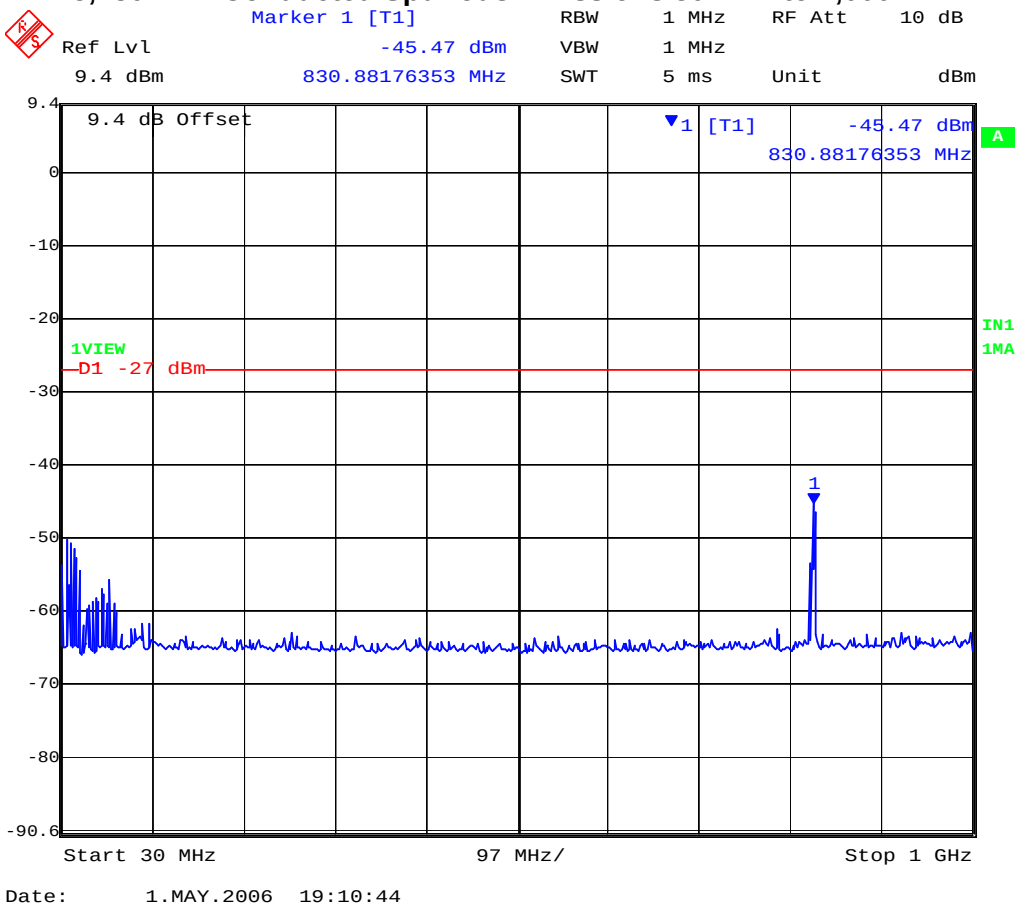
## Spurious Emissions (1-40 GHz)

Conducted spurious emissions (1-40 GHz) are provided indicated by the following matrix. Measurements were performed with the transmitter tuned to the channel closest to the band-edge being measured. All emissions were maximized during measurement. Limit @ -27 dBm are drawn on each plot.

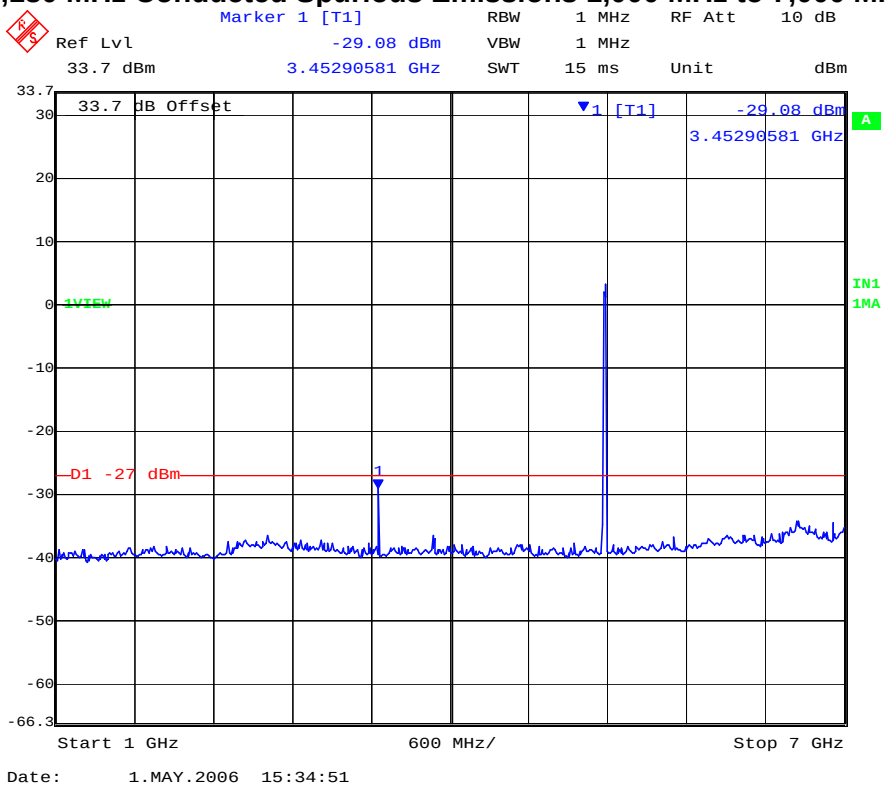
TABLE OF RESULTS – **802.11a**

| Channel Centre Frequency (MHz) | Start Frequency (MHz) | Stop Frequency (MHz) | Maximum Emission Observed (dBm/MHz) | Limit (dBm/MHz) | Plot # | Margin (dB) |
|---|---|---|---|---|---|---|
| 5,180 | 30 | 1,000 | -45.47 | -27.00 | 22 | -18.47 |
| 5,180 | 1,000 | 7,000 | -29.08 | -27.00 | 23 | -2.08 |
| 5,180 | 7,000 | 40,000 | -42.80 | -27.00 | 24 | -15.80 |

**Plot 22 802.11a**
**5,180 MHz Conducted Spurious Emissions 30 MHz to 1,000 MHz**



## Plot 23 802.11a
## 5,180 MHz Conducted Spurious Emissions 1,000 MHz to 7,000 MHz




## Plot 24 802.11a
## 5,180 MHz Conducted Spurious Emissions 7,000 MHz to 40,000 MHz

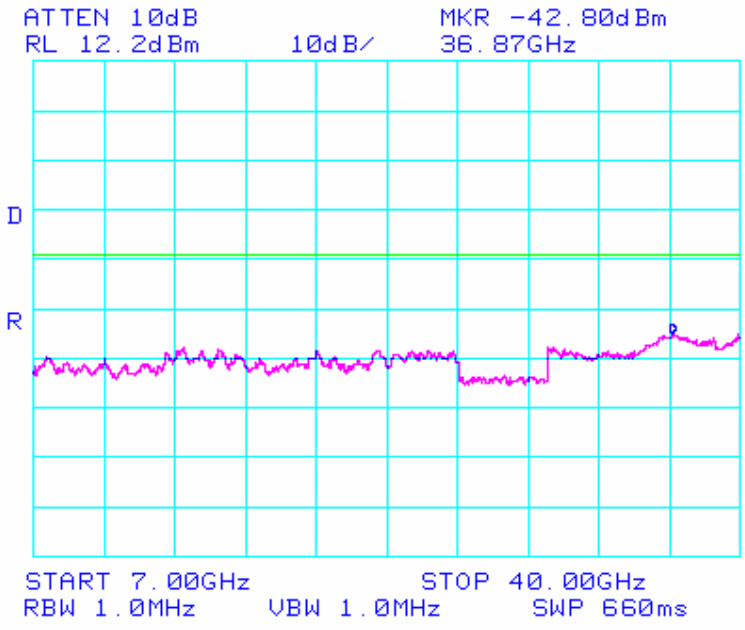
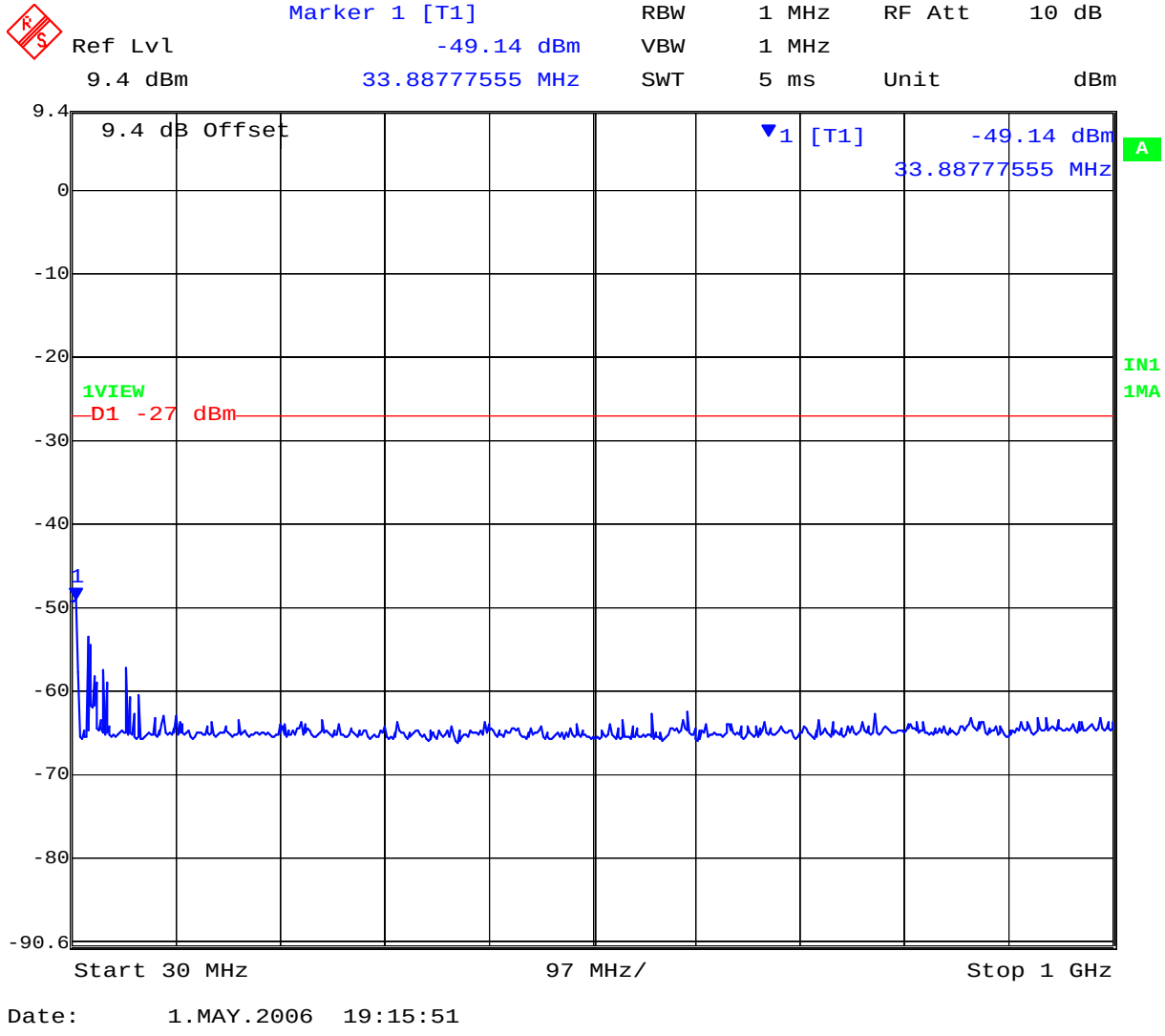


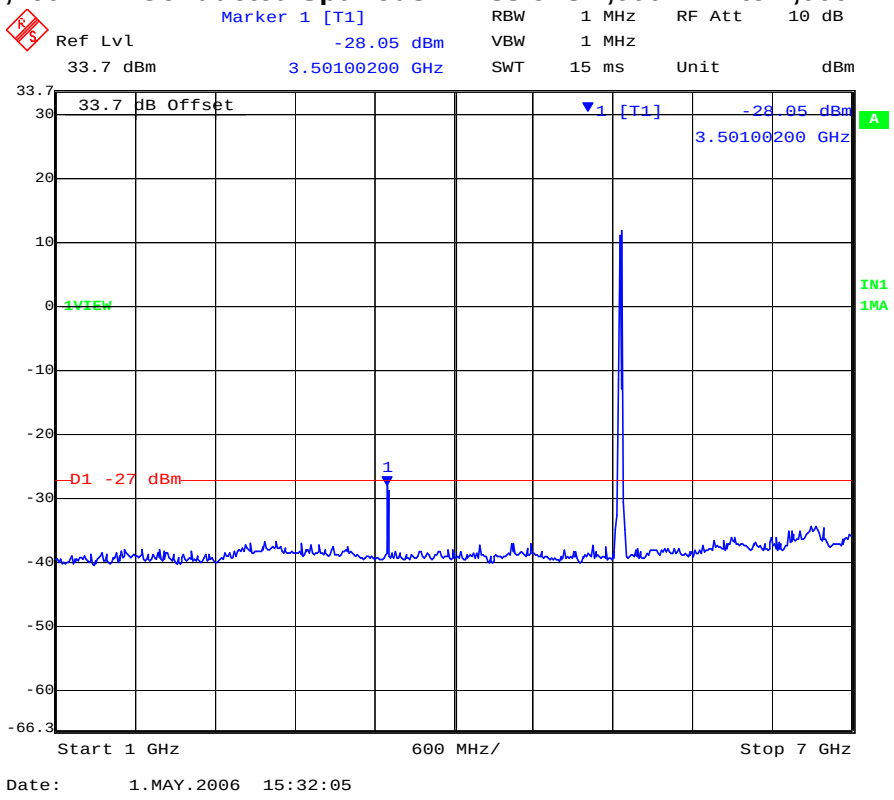
TABLE OF RESULTS – **802.11a**

| Channel Centre Frequency (MHz) | Start Frequency (MHz) | Stop Frequency (MHz) | Maximum Emission Observed (dBm/MHz) | Limit (dBm/MHz) | Plot # | Margin (dB) |
|---|---|---|---|---|---|---|
| 5,260 | 30 | 1,000 | -49.14 | -27.00 | 25 | -22.14 |
| 5,260 | 1,000 | 7,000 | -28.05 | -27.00 | 26 | -1.05 |
| 5,260 | 7,000 | 40,000 | -40.13 | -27.00 | 27 | -13.13 |

**Plot 25 802.11a**
**5,260 MHz Conducted Spurious Emissions 30 MHz to 1,000 MHz**



## Plot 26 802.11a
## 5,260 MHz Conducted Spurious Emissions 1,000 MHz to 7,000 MHz




## Plot 27 802.11a
## 5,260 MHz Conducted Spurious Emissions 7,000 MHz to 40,000 MHz

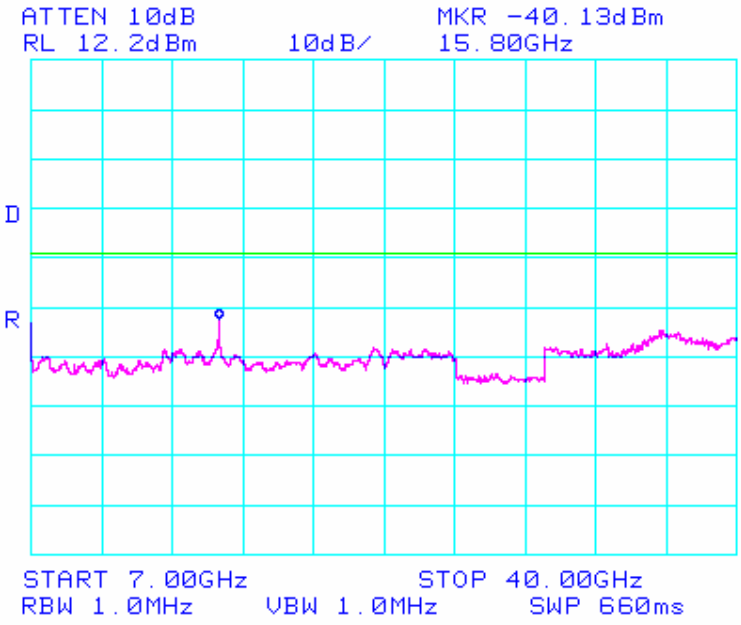
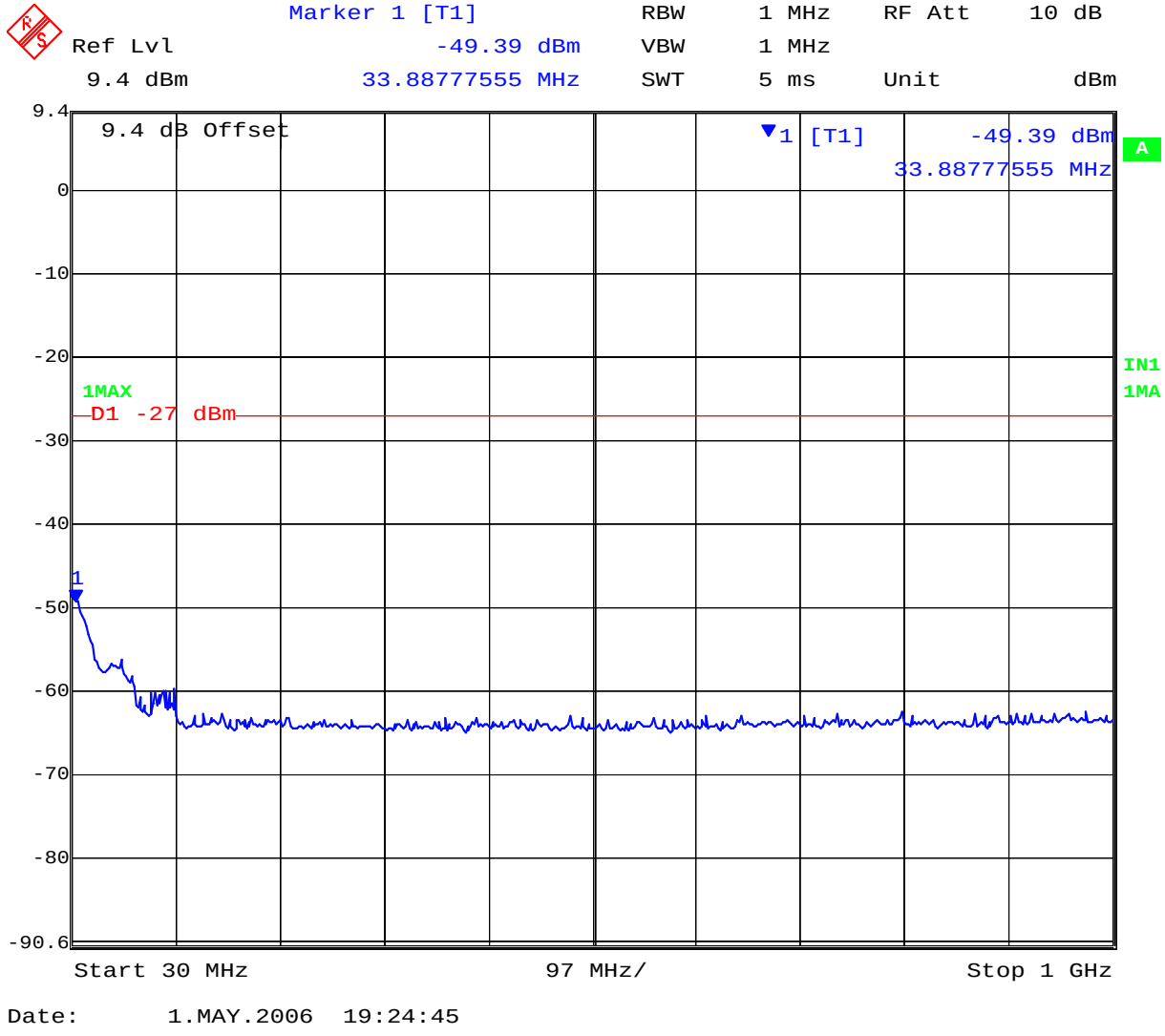


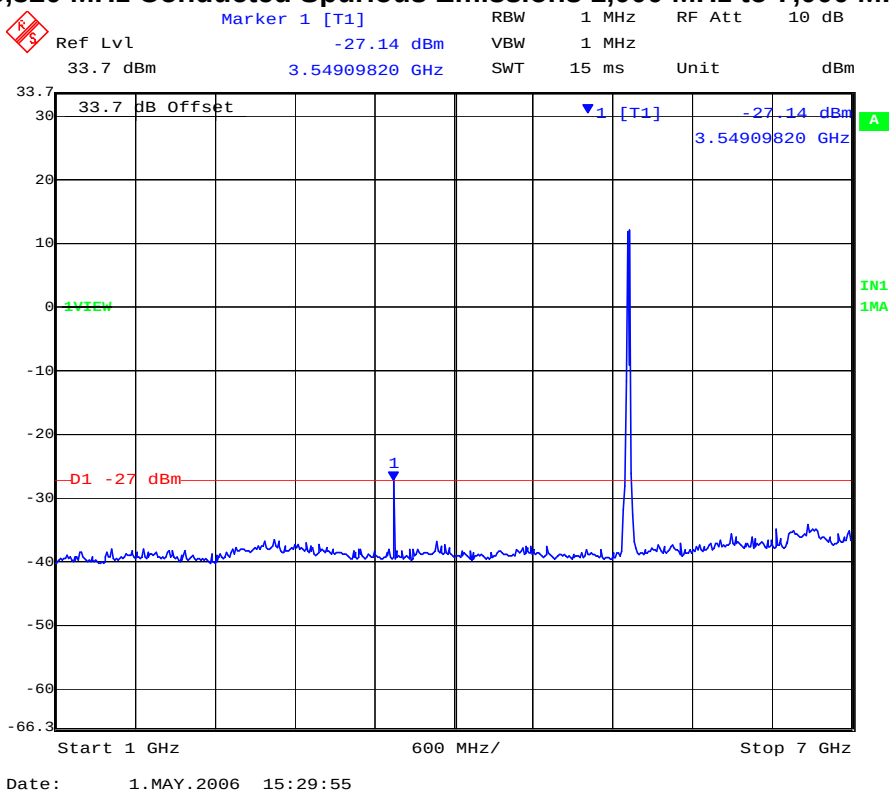
TABLE OF RESULTS – **802.11a**

| Channel Centre Frequency (MHz) | Start Frequency (MHz) | Stop Frequency (MHz) | Maximum Emission Observed (dBm/MHz) | Limit (dBm/MHz) | Plot # | Margin (dB) |
|---|---|---|---|---|---|---|
| 5,320 | 30 | 1,000 | -49.39 | -27.00 | 28 | -22.39 |
| 5,320 | 1,000 | 7,000 | -27.14 | -27.00 | 29 | -0.14 |
| 5,320 | 7,000 | 40,000 | -35.80 | -27.00 | 30 | -8.80 |

**Plot 28 802.11a**
**5,320 MHz Conducted Spurious Emissions 30 MHz to 1,000 MHz**



## Plot 29 802.11a
## 5,320 MHz Conducted Spurious Emissions 1,000 MHz to 7,000 MHz




## Plot 30 802.11a
## 5,320 MHz Conducted Spurious Emissions 7,000 MHz to 40,000 MHz

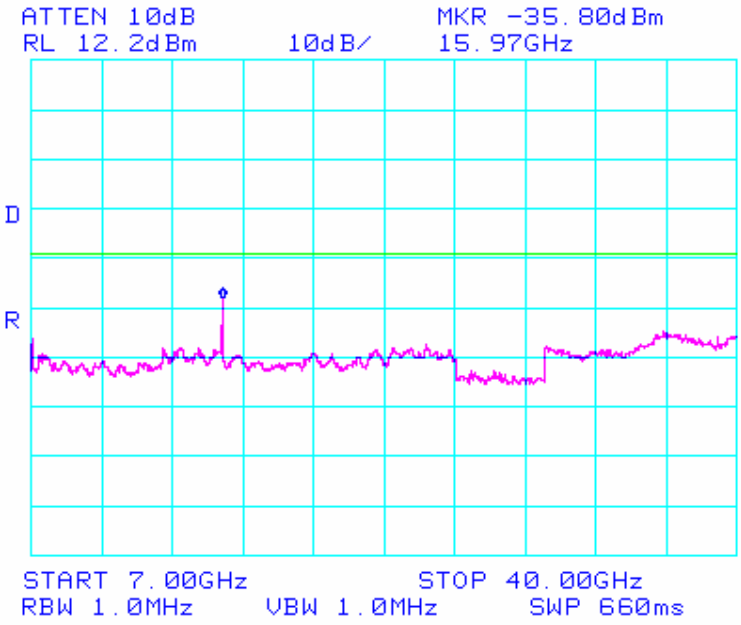
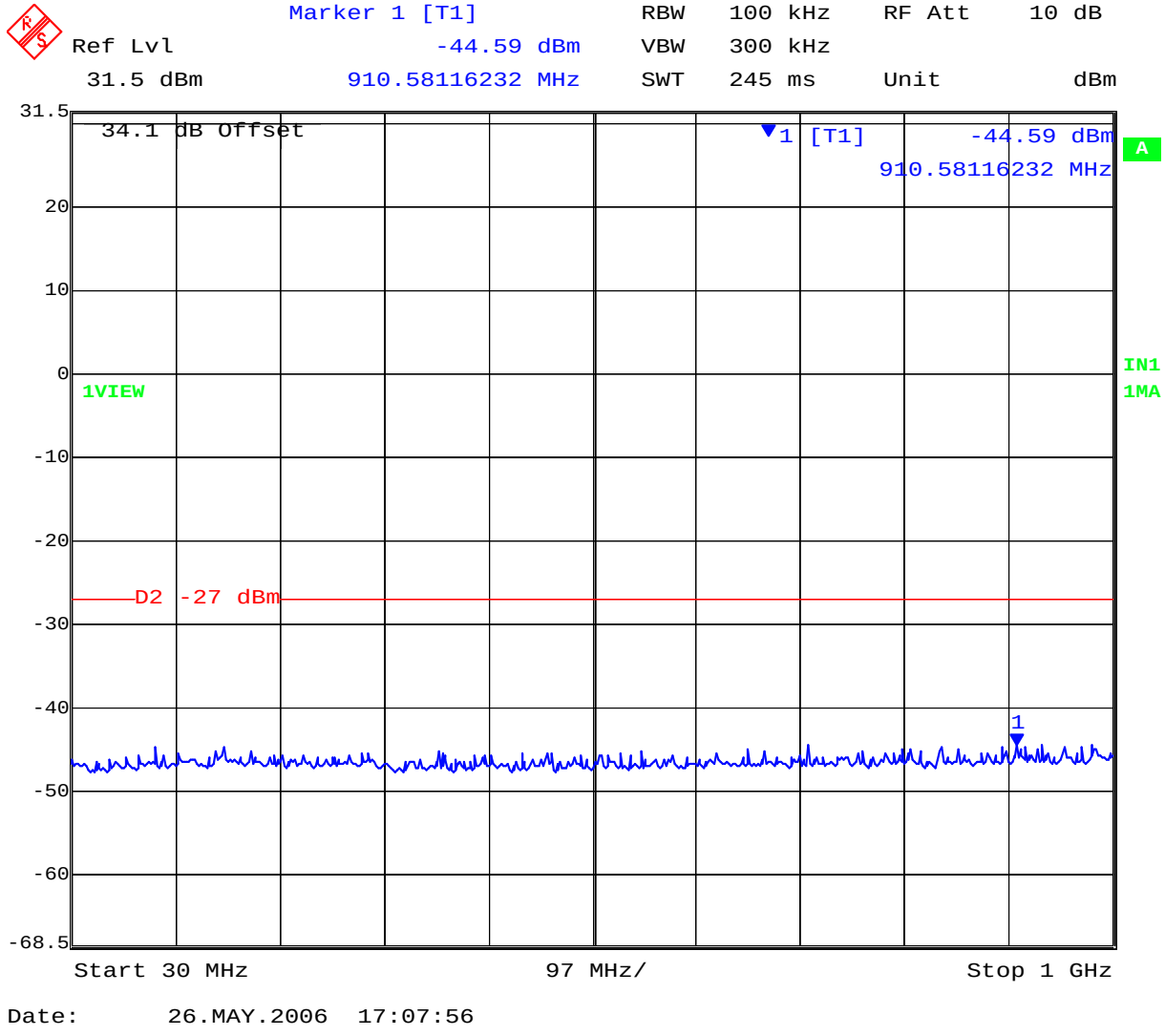


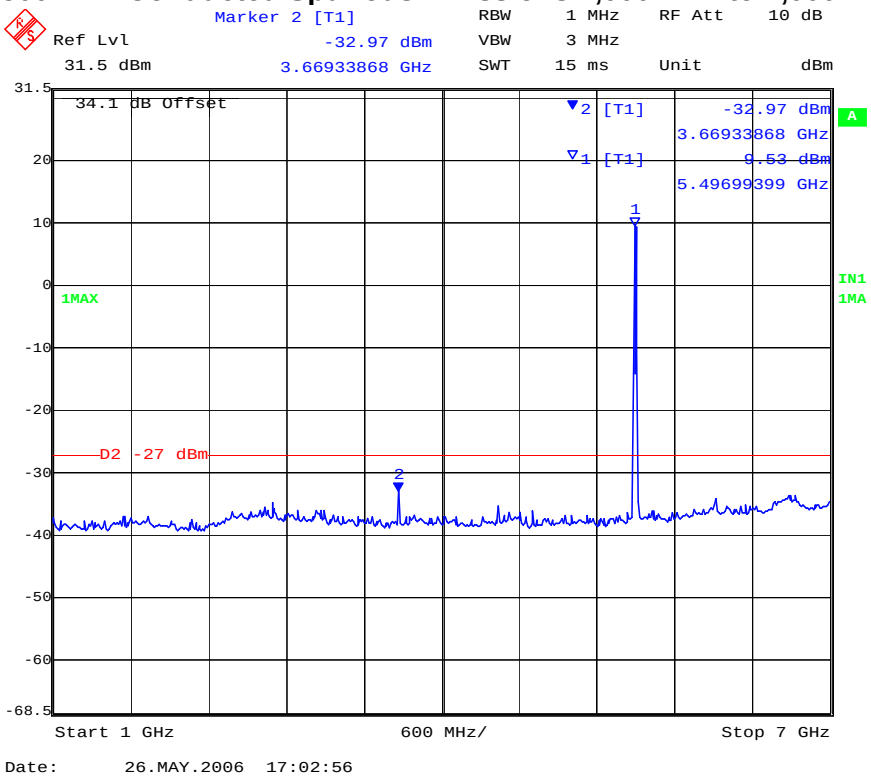
TABLE OF RESULTS – **802.11a**

| Channel Centre Frequency (MHz) | Start Frequency (MHz) | Stop Frequency (MHz) | Maximum Emission Observed (dBm/MHz) | Limit (dBm/MHz) | Plot # | Margin (dB) |
|---|---|---|---|---|---|---|
| 5,500 | 30 | 1,000 | -44.59 | -27.00 | 31 | -17.59 |
| 5,500 | 1,000 | 7,000 | -32.97 | -27.00 | 32 | -5.97 |
| 5,500 | 7,000 | 40,000 | -40.83 | -27.00 | 33 | -13.83 |

**Plot 31 802.11a**
**5,500 MHz Conducted Spurious Emissions 30 MHz to 1,000 MHz**



## Plot 32 802.11a
## 5,500 MHz Conducted Spurious Emissions 1,000 MHz to 7,000 MHz




## Plot 33 802.11a
## 5,500 MHz Conducted Spurious Emissions 7,000 MHz to 40,000 MHz

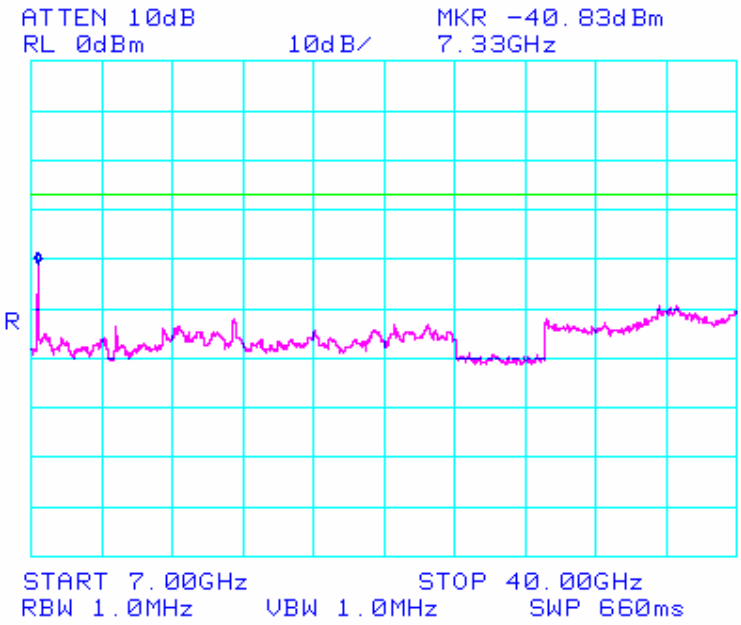
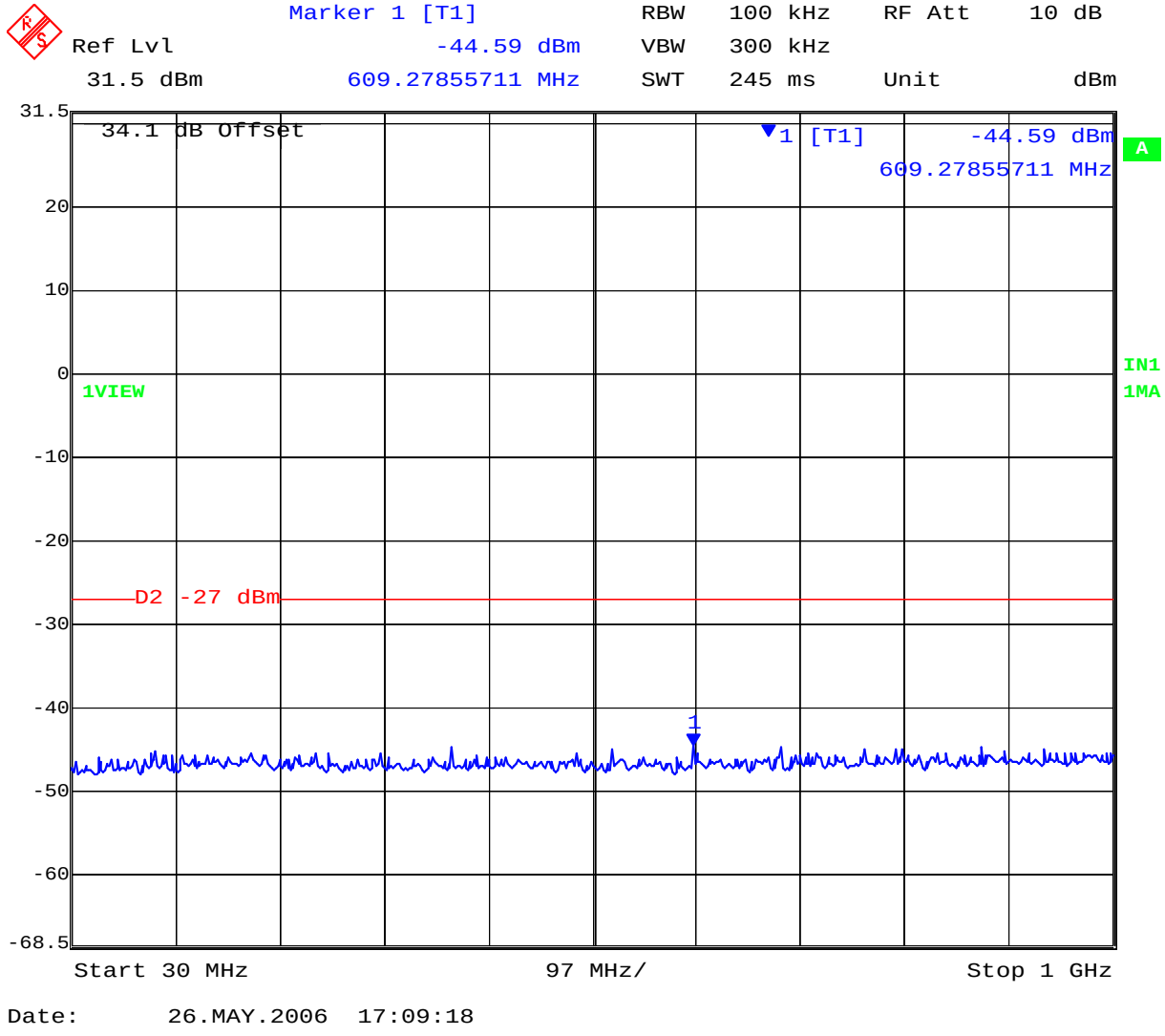


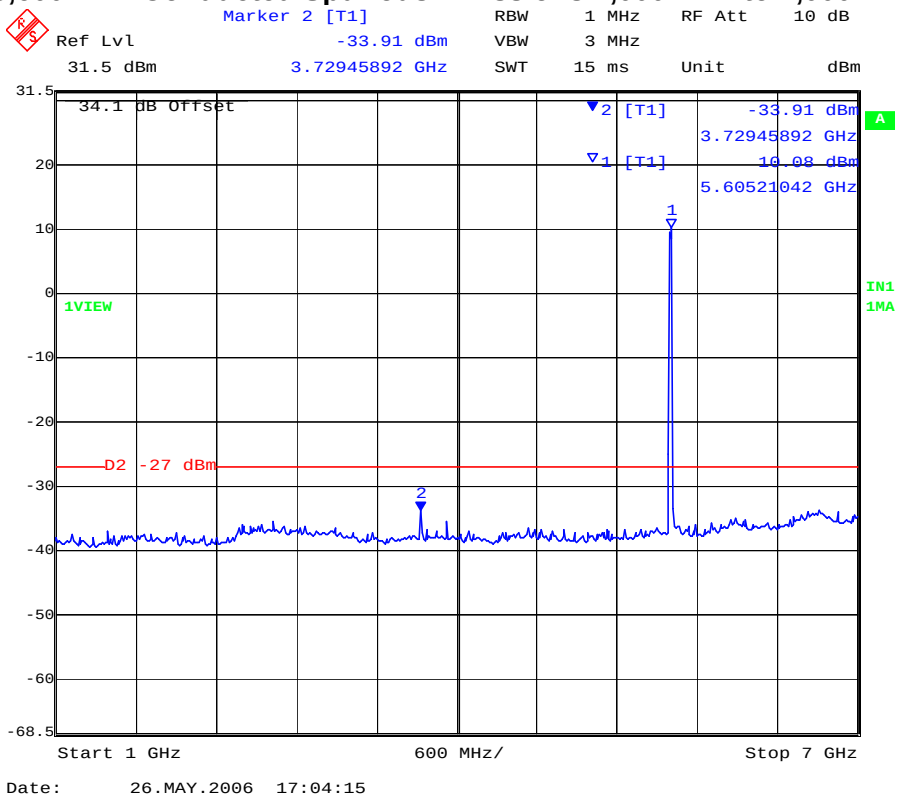
TABLE OF RESULTS – **802.11a**

| Channel Centre Frequency (MHz) | Start Frequency (MHz) | Stop Frequency (MHz) | Maximum Emission Observed (dBm/MHz) | Limit (dBm/MHz) | Plot # | Margin (dB) |
|---|---|---|---|---|---|---|
| 5,600 | 30 | 1,000 | -44.59 | -27.00 | 34 | -17.59 |
| 5,600 | 1,000 | 7,000 | -33.91 | -27.00 | 35 | -6.91 |
| 5,600 | 7,000 | 40,000 | -49.00 | -27.00 | 36 | -22.00 |

**Plot 34 802.11a**
**5,600 MHz Conducted Spurious Emissions 30 MHz to 1,000 MHz**



## Plot 35 802.11a
## 5,600 MHz Conducted Spurious Emissions 1,000 MHz to 7,000 MHz




## Plot 36 802.11a
## 5,600 MHz Conducted Spurious Emissions 7,000 MHz to 40,000 MHz

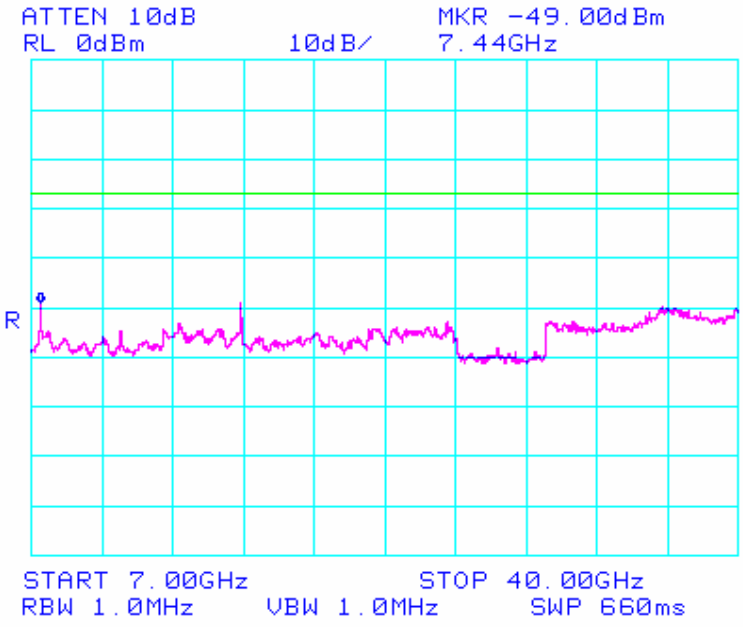
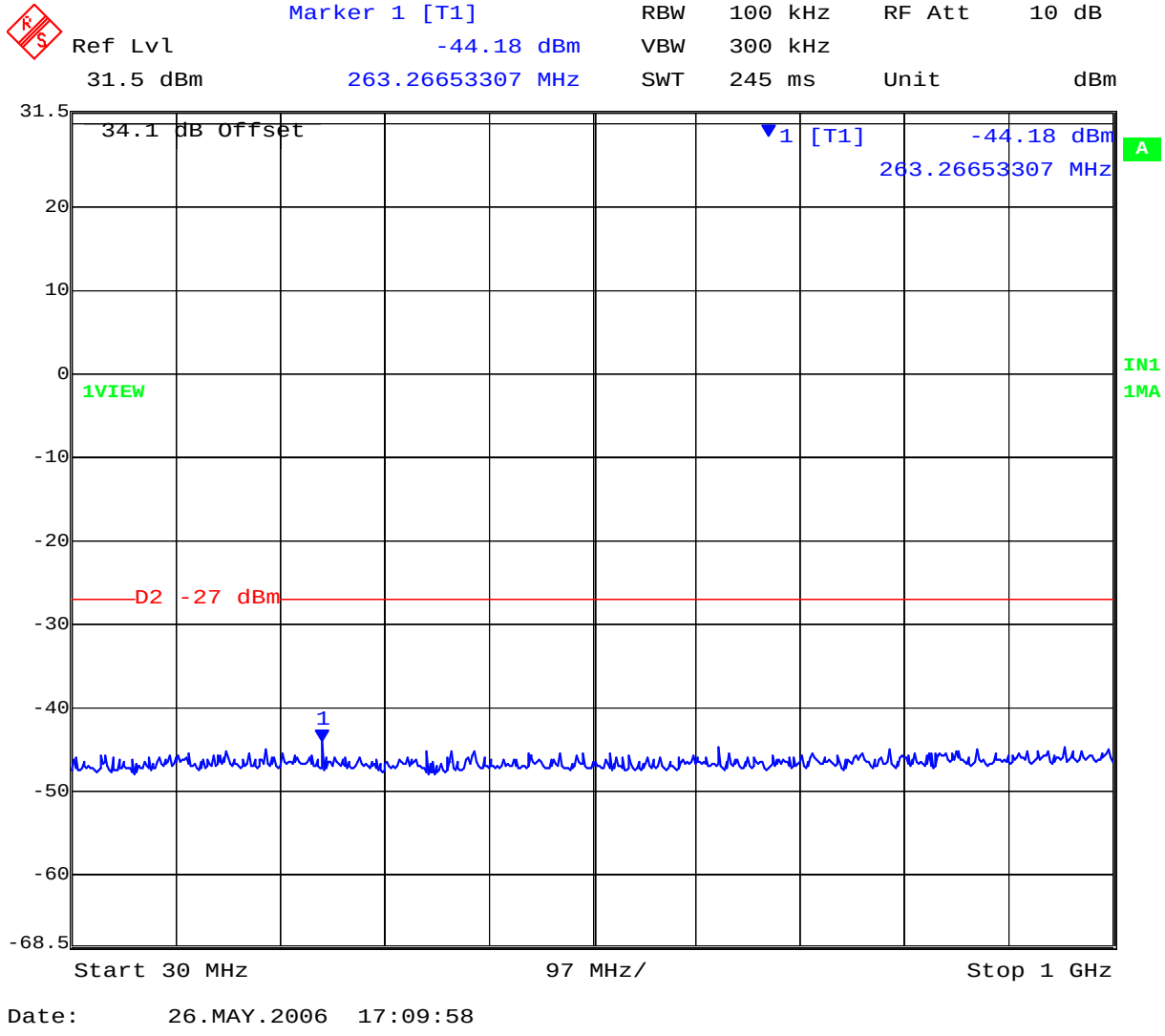


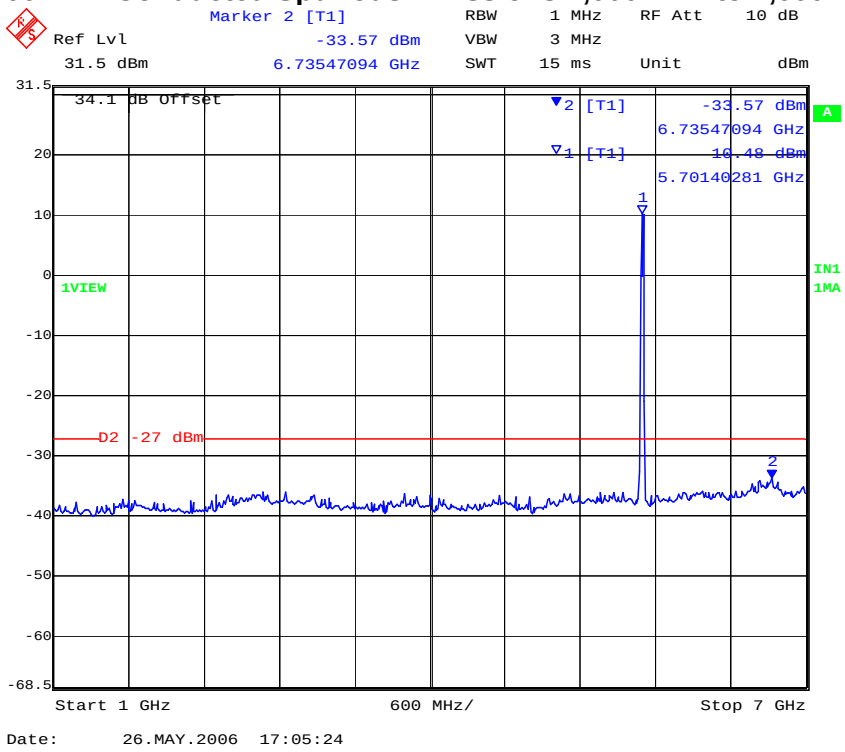
TABLE OF RESULTS – **802.11a**

| Channel Centre Frequency (MHz) | Start Frequency (MHz) | Stop Frequency (MHz) | Maximum Emission Observed (dBm/MHz) | Limit (dBm/MHz) | Plot # | Margin (dB) |
|---|---|---|---|---|---|---|
| 5,700 | 30 | 1,000 | -44.18 | -27.00 | 37 | -17.18 |
| 5,700 | 1,000 | 7,000 | -33.57 | -27.00 | 38 | -6.57 |
| 5,700 | 7,000 | 40,000 | -49.67 | -27.00 | 39 | -22.67 |

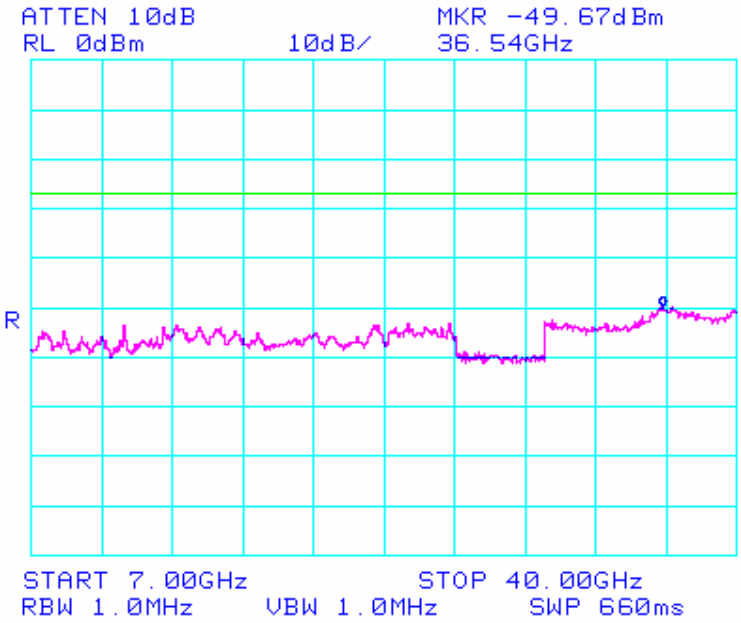
**Plot 37 802.11a**
**5,700 MHz Conducted Spurious Emissions 30 MHz to 1,000 MHz**



## Plot 38 802.11a
## 5,700 MHz Conducted Spurious Emissions 1,000 MHz to 7,000 MHz




## Plot 39 802.11a
## 5,700 MHz Conducted Spurious Emissions 7,000 MHz to 40,000 MHz



## Specification

### Limits

**15.407 (b)(2)**. All emissions outside of the 5,150-5,350MHz band shall not exceed an EIRP of -27dBm/MHz.

**RSS-210 §A9.3(2)** For transmitters operating in the 5250-5350 MHz band, all emissions outside the 5150-5350 MHz band shall not exceed -27 dBm/MHz e.i.r.p.

Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band shall not exceed out of band emission limit of -27 dBm/MHz e.i.r.p. in the 5150-5250 MHz band in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within the 5150-5250 MHz band and shall be labeled “for indoor use only”.

**RSS-Gen §4.7**
The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate of carrier frequency), or from 30 MHz , whichever is the lowest frequency, to the 5$^{th}$ harmonic of the highest frequency generated without exceeding 40 GHz.

### Laboratory Measurement Uncertainty for Conducted Spurious Emissions

| | |
|---|---|
| Measurement uncertainty | ±2.37 dB |

### Traceability

| Method | Test Equipment Used |
|---|---|
| Measurements were made per work instruction WI-05 ‘Measurement of Spurious Emissions’ | 0088, 0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117. |

## 5.1.8. Radiated Emissions

### 5.1.8.1. Transmitter Radiated Spurious Emissions (above 1 GHz)

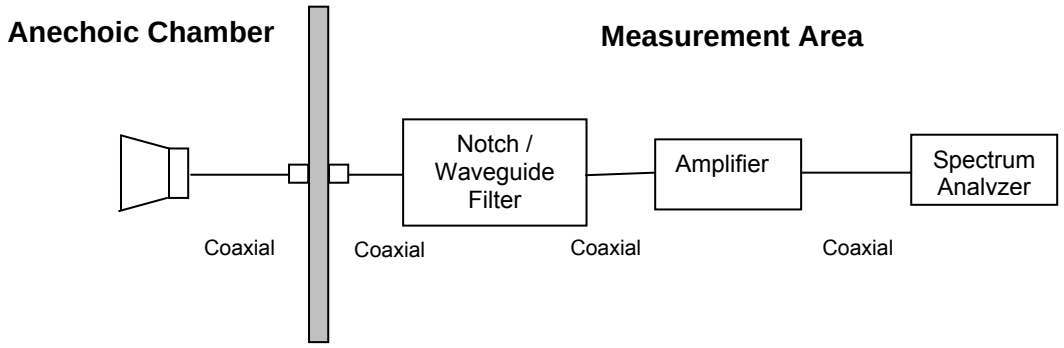
**FCC, Part 15 Subpart C §15.407(b)(2), §15.205(a)/15.209(a)**
**Industry Canada RSS-210 §A9.3(2); §2.2; §2.6; RSS-Gen §4.7**

**Test Procedure**

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

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

**Test Measurement Set up**




Measurement set up for Radiated Emission Test

**Field Strength Calculation**

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

FS = R + AF + CORR - FO

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

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

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

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

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

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

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength;

$E = 1000000 \times \sqrt{30P} / 3$ μV/m, where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

**Note:** The data in this Section along with the data in sections 5.1.7 (Conducted Spurious Emissions) and Section 5.1.8.2 ( Radiated Band Edge - Restricted Bands) identifies that the EUT is in compliance with the -27dBm/MHz EIRP limit for out of band emissions.

Maximum Emissions
It was found that the phone lying flat on the polystyrene table was the worst case orientation for radiated emissions.

**Measurement Results Transmitter Radiated Spurious Emissions above 1 GHz**

Ambient conditions.
Temperature: 17 to 23°C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar
Duty cycle correction factor (20* Log (x) where x = duty cycle has been included in column 'Correction Factor' for Average Field Strength measurements

TABLE OF RESULTS – **802.11a 5,180 MHz Radiated Emissions above 1 GHz**

| Freq. (MHz) | Pol. (H/V) | Raw Reading (dBµV) | Correction Factor (dB) | Corrected Peak Field Strength (dBµV/m) | Peak Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| | | | | | 74 | |

| Freq. (MHz) | Pol. (H/V) | Raw Reading (dBµV) | Correction Factor (dB) | Corrected Field Strength (dBµV/m) | Average Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| | | | | | 54 | |

No emissions observed within 6 dB of the limit

**Plot 40**
**Radiated Emissions for 5,180 MHz**

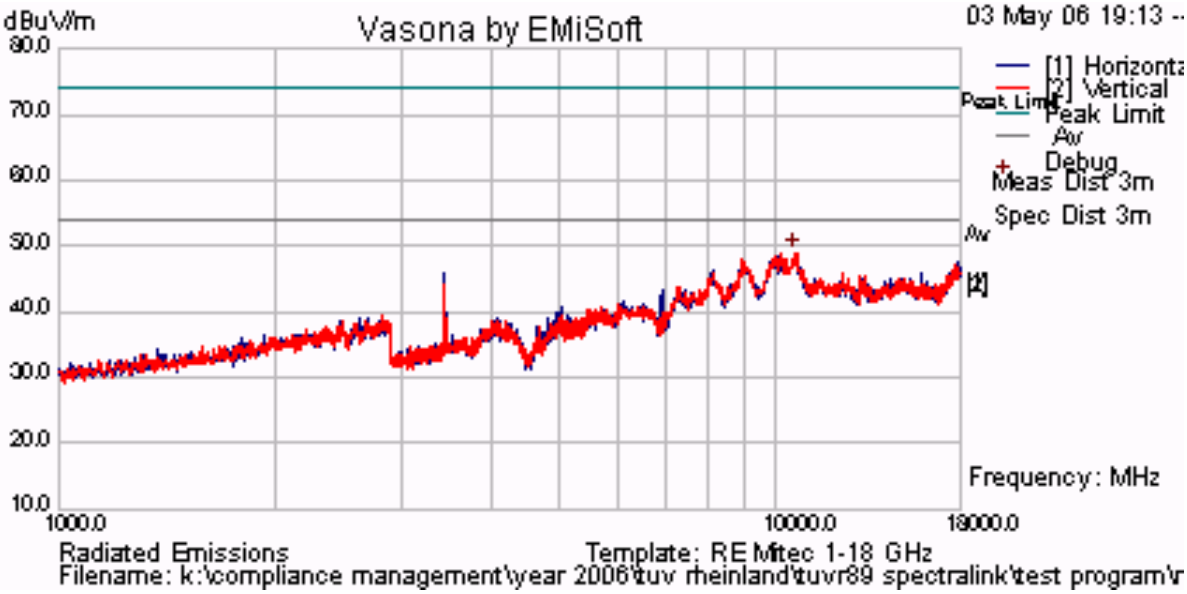


TABLE OF RESULTS – **802.11a 5,260 MHz Radiated Emissions above 1 GHz**

| Freq. (MHz) | Pol. (H/V) | Raw Reading (dBµV) | Correction Factor (dB) | Corrected Average Field Strength (dBµV/m) | Average Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 3509.667 | H | 57.00 | -7.82 | 49.18 | 54 | -4.82 |
| 7026.667 | H | 49.17 | +0.52 | 49.69 | 54 | -4.31 |
| 10526.670 | V | 40.67 | +9.33 | 50.00 | 54 | -4.00 |

As no peak emission were greater that the Average Limit (54 dBµV/m) peak emissions are reported in the above matrix

**Plot 41**
**Radiated Emissions for 5,260 MHz**

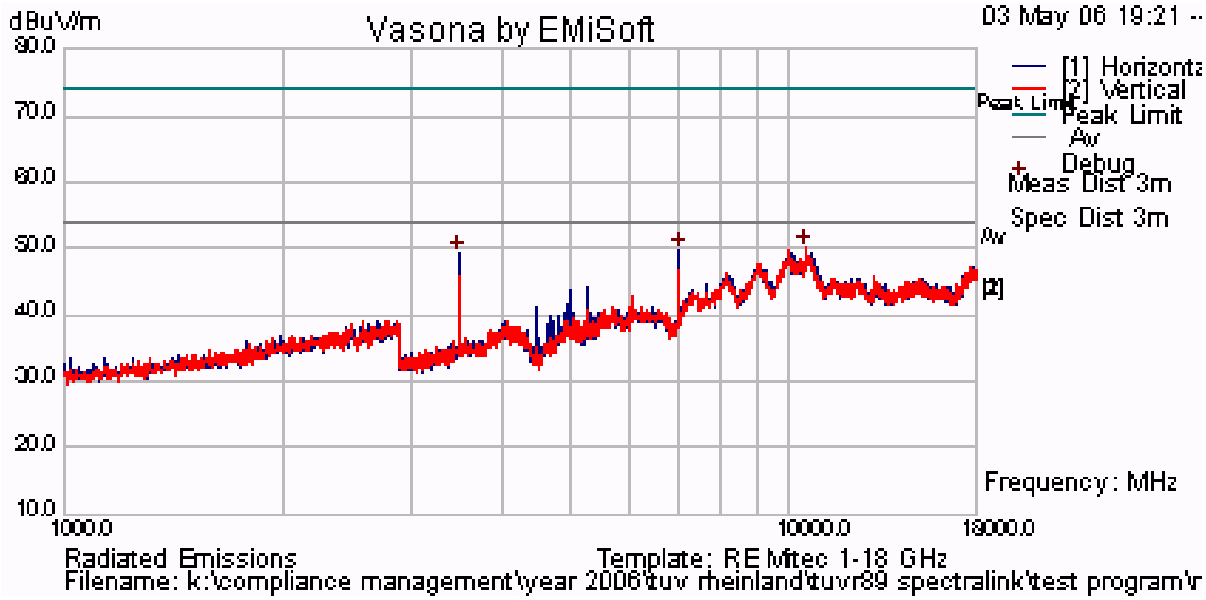


TABLE OF RESULTS – **802.11a 5,320 MHz Radiated Emissions above 1 GHz**

| Freq. (MHz) | Pol. (H/V) | Raw Reading (dBµV) | Correction Factor (dB) | Corrected Field Strength (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 3551.000 | H | 57.17 | -7.61 | 49.56 | 54 | -4.44 |
| 7108.333 | V | 48.50 | +0.96 | 49.46 | 54 | -4.54 |
| 10666.670 | H | 41.00 | +8.90 | 49.90 | 54 | -4.10 |

As no peak emission were greater that the Average Limit (54 dBµV/m) peak emissions are reported in the above matrix

**Plot 42**
**Radiated Emissions for 5,320 MHz**

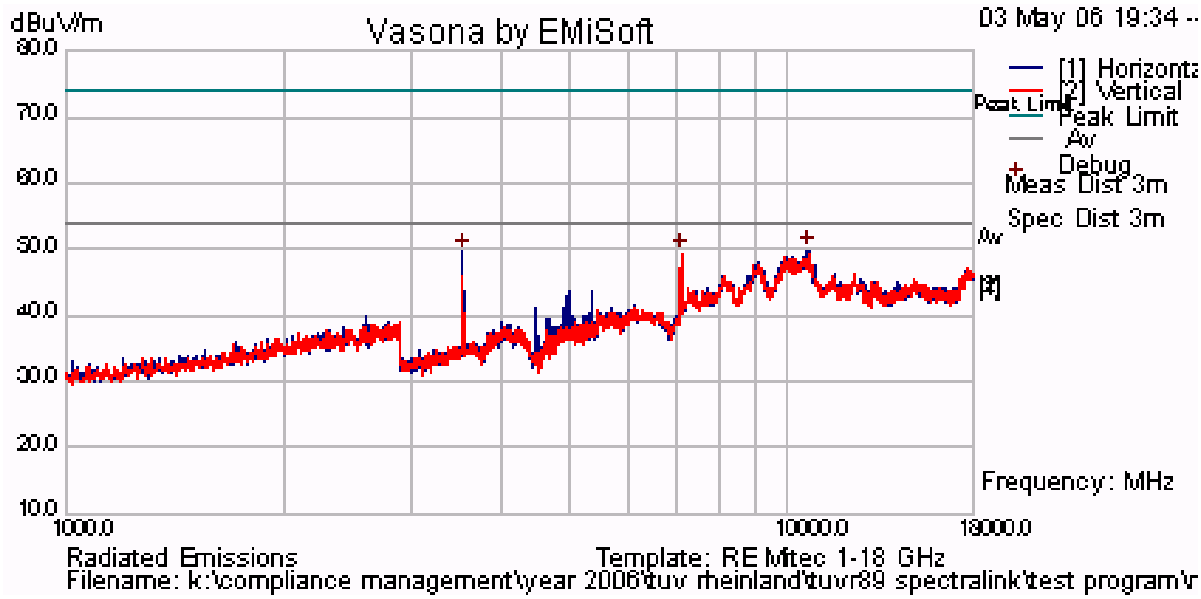


TABLE OF RESULTS – **802.11a 5,500 MHz Radiated Emissions above 1 GHz**

| Freq. (MHz) | Pol. (H/V) | Raw Reading (dBµV) | Correction Factor (dB) | Corrected Field Strength (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 3669.833 | H | 59.17 | -7.20 | 51.97 | 54 | -2.03 |
| 7341.667 | V | 46.34 | +1.72 | 48.06 | 54 | -5.94 |
| 10666.67 | V | 41.67 | +9.00 | 50.57 | 54 | -3.43 |
| 17741.67 | H | 36.00 | +12.19 | 48.19 | 54 | -5.81 |

As no peak emission were greater that the Average Limit (54 dBµV/m) peak emissions are reported in the above matrix

**Plot 43**
**Radiated Emissions for 5,500 MHz**

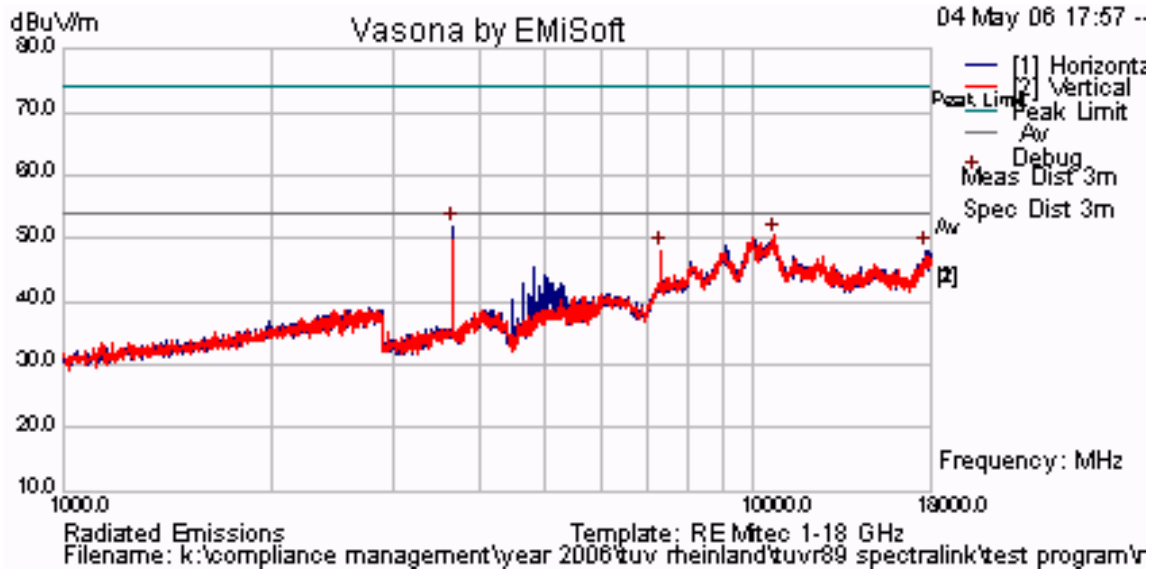


TABLE OF RESULTS – **802.11a 5,600 MHz Radiated Emissions above 1 GHz**

| Freq. (MHz) | Pol. (H/V) | Raw Reading (dBµV) | Correction Factor (dB) | Corrected Field Strength (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 3737.000 | V | 55.67 | -6.97 | 48.70 | 54 | -5.30 |
| 9873.333 | H | 40.00 | +10.20 | 50.20 | 54 | -3.80 |
| 17775.000 | V | 36.00 | +12.32 | 48.32 | 54 | -5.68 |

As no peak emission were greater that the Average Limit (54 dBµV/m) peak emissions are reported in the above matrix

**Plot 44**
**Radiated Emissions for 5,600 MHz**

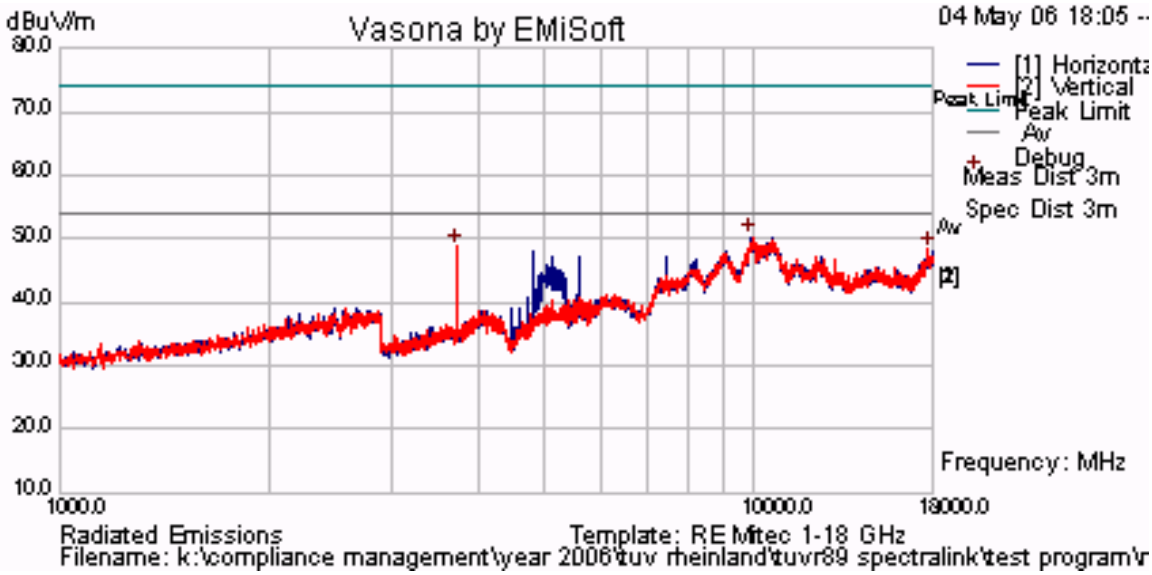
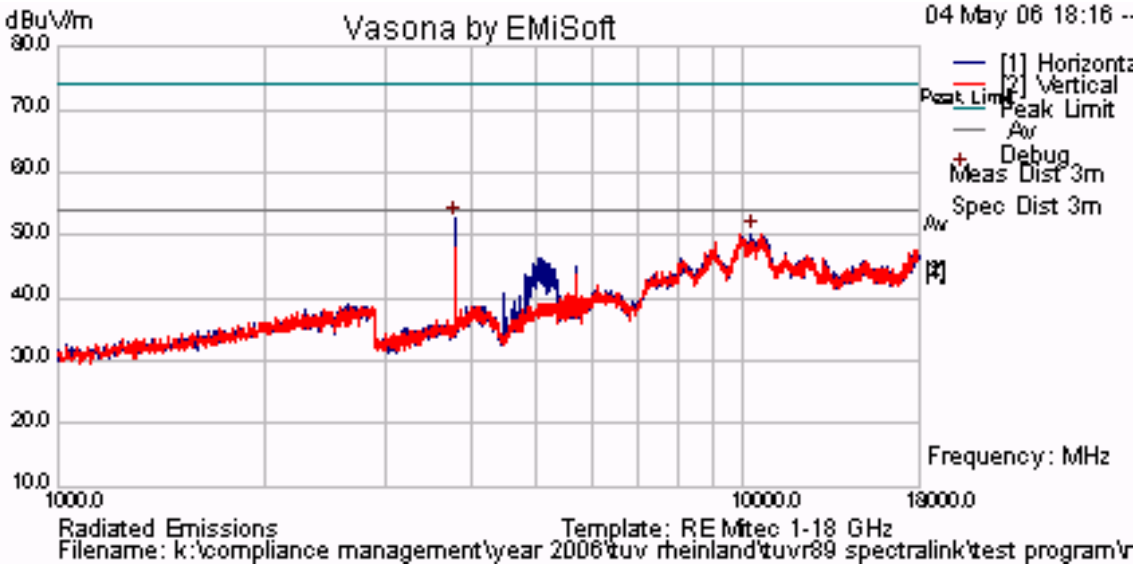


TABLE OF RESULTS – **802.11a 5,700 MHz Radiated Emissions above 1 GHz**

| Freq. (MHz) | Pol. (H/V) | Raw Reading (dBµV) | Correction Factor (dB) | Corrected Field Strength (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 3804.167 | H | 59.34 | -6.77 | 52.57 | 54 | -1.43 |
| 10270.000 | H | 40.17 | +10.09 | 50.26 | 54 | -3.74 |

As no peak emission were greater that the Average Limit (54 dBµV/m) peak emissions are reported in the above matrix

**Plot 45**
**Radiated Emissions for 5,700 MHz**



### 5.1.8.2. Radiated Band-Edge – Restricted Bands

**Lower sub-band 5,150 MHz to 5,350 MHz**

**TABLE OF RESULTS - 802.11a**

| Tx Freq. (MHz) | Restricted Band Frequency (MHz) | Measured (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Plot # |
|---|---|---|---|---|---|
| $5{,}180_{PEAK}$ | 5,150 | 42.03 | 74.00 | -31.97 | 46 |
| $5{,}180_{AVE}$ | 5,150 | 37.78 | 54.00 | -16.22 | 46 |

**Plot 46 802.11a – 5,180 MHz**
**Lower Band Edge Peak Emission = 100.34 dBµV/m**

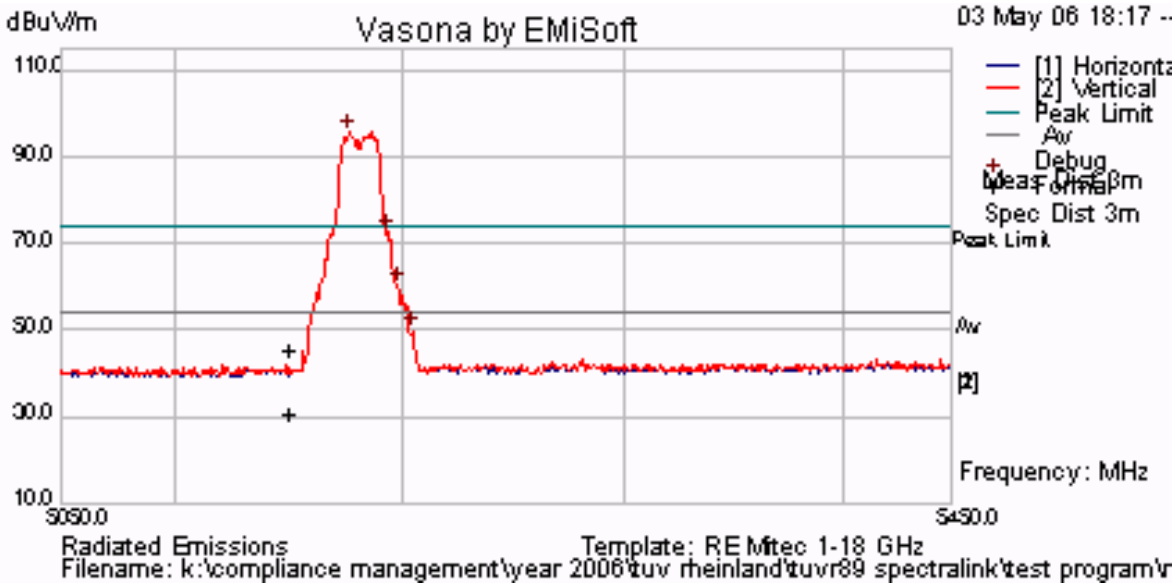
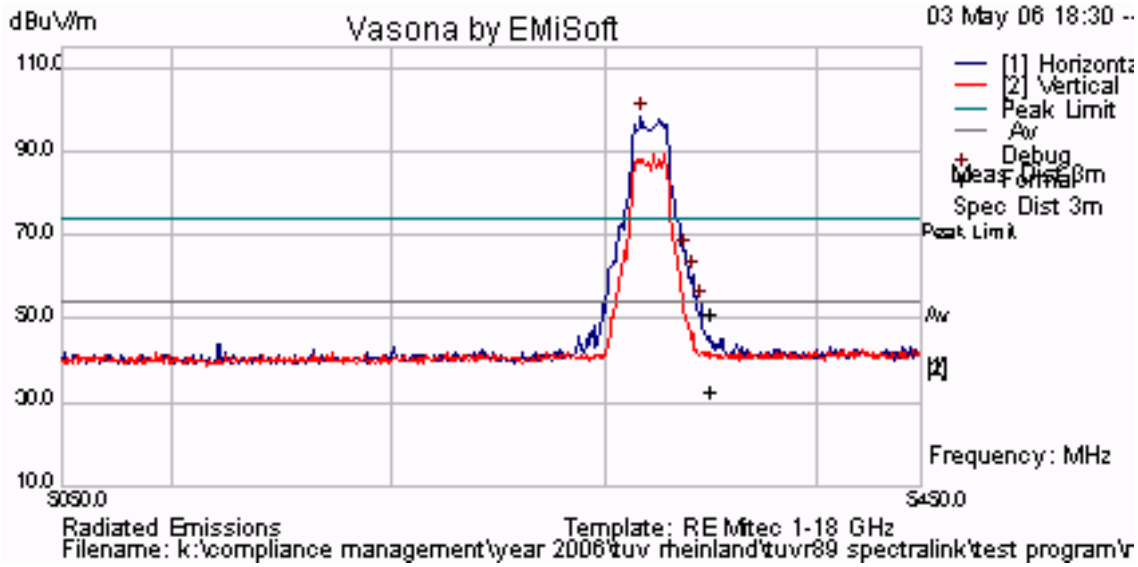


**TABLE OF RESULTS - 802.11a**

| Tx Freq. (MHz) | Restricted Band Frequency (MHz) | Measured (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Plot # |
|---|---|---|---|---|---|
| $5{,}320_{PEAK}$ | 5,350 | 48.05 | 74.00 | -25.95 | 47 |
| $5{,}320_{AVE}$ | 5,350 | 39.43 | 54.00 | -14.57 | 47 |

**Plot 47 802.11a – 5,320 MHz**
**Upper Band Edge Peak Emission = 102.50 dBµV/m**

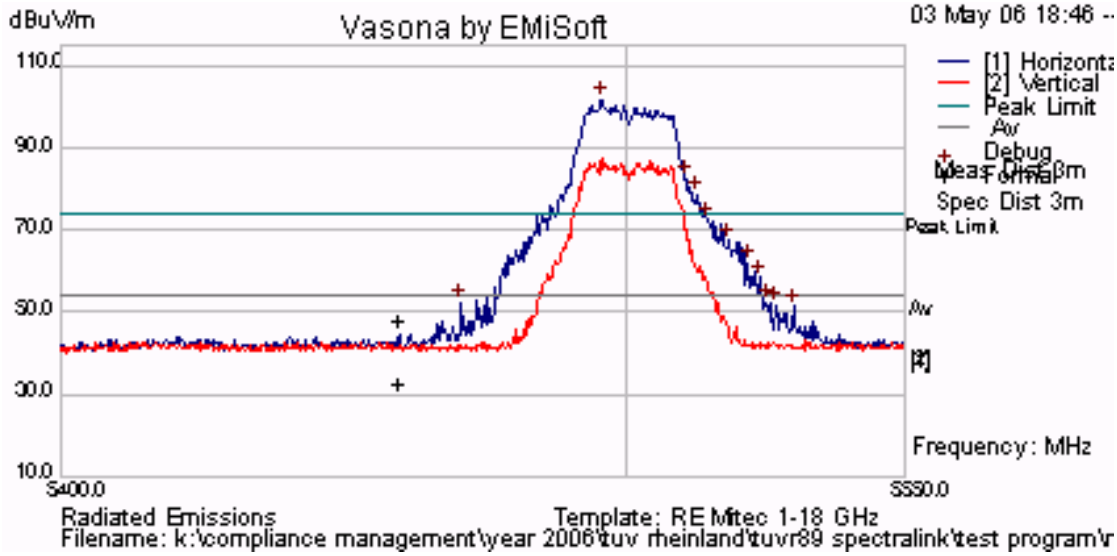


**Lower sub-band 5,470 MHz to 5,725 MHz**

**TABLE OF RESULTS - 802.11a**

| Tx Freq. (MHz) | Restricted Band Frequency (MHz) | Measured (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Plot # |
|---|---|---|---|---|---|
| $5{,}500_{PEAK}$ | 5,460 | 44.54 | 74.00 | -29.46 | 48 |
| $5{,}500_{AVE}$ | 5,460 | 39.26 | 54.00 | -14.74 | 48 |

**Plot 48 802.11a – 5,500 MHz**
**Lower Band Edge Peak Emission = 101.83 dBµV/m**




Note; No band edge measurements are required at the upper end of the 5,470 – 5,725 band.

### 5.1.8.3. Receiver Spurious Emissions above 1 GHz

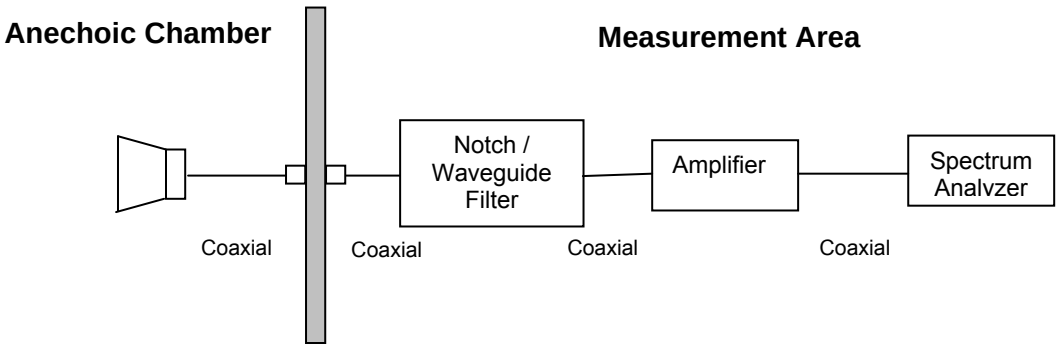
**Industry Canada RSS-Gen §4.8, §6**

**Test Procedure**

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

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

**Test Measurement Set up**




Measurement set up for Radiated Emission Test

**Field Strength Calculation**

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

FS = R + AF + CORR - FO

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

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

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

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

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

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

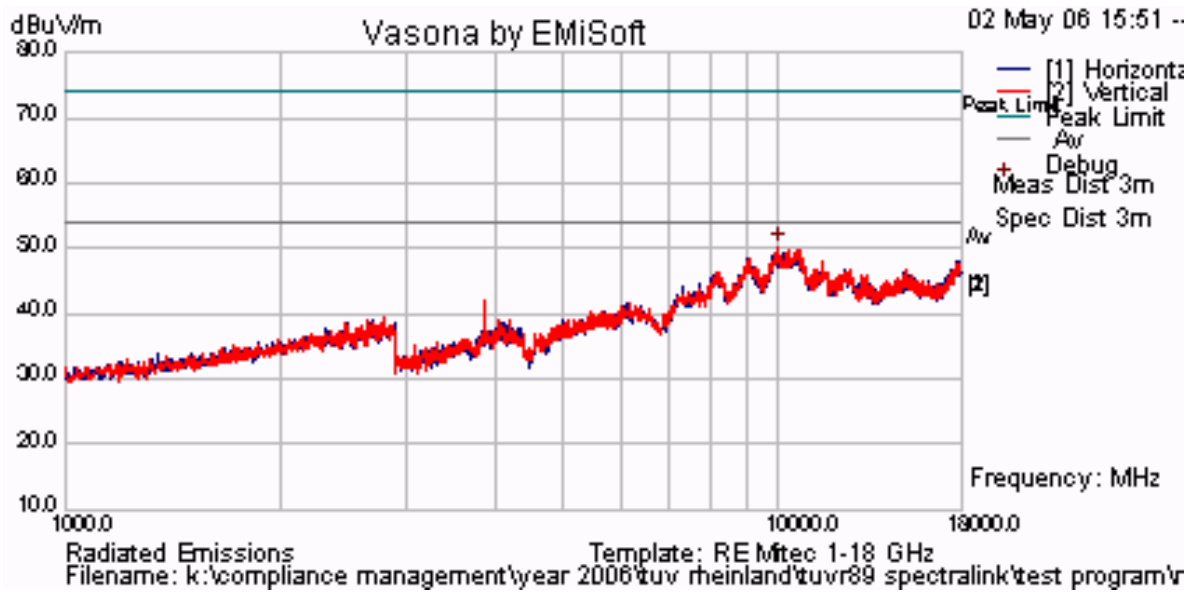
**Receiver Radiated Spurious Emissions above 1 GHz**

**Test Setup - 802.11a**
**Channel 5,260 MHz**

TABLE OF RESULTS –802.11a

| Freq. (MHz) | Pol. (H/V) | Raw Reading (dBµV/m) | Correction Factor (dB) | Corrected Field Strength (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 10001.67 | V | 39.17 | 11.03 | 50.2 | 54 | -3.8 |

**Plot 49**
**Radiated Emissions**



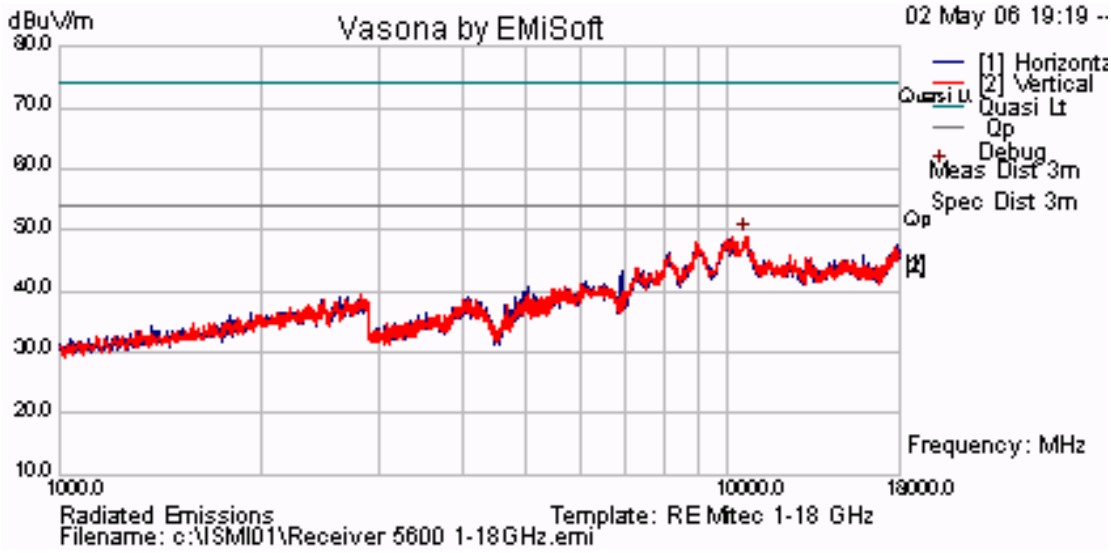
**Receiver Radiated Spurious Emissions above 1 GHz**

**Test Setup - 802.11a**
**Channel 5,600 MHz**

TABLE OF RESULTS –802.11a

| Freq. (MHz) | Pol. (H/V) | Raw Reading (dBµV/m) | Correction Factor (dB) | Corrected Field Strength (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 10608.33 | V | 39.84 | | 48.92 | 54 | -5.08 |

**Plot 50**
**Radiated Emissions**



**Specification**

**Limits**

**15.407 (b)(2)**. All emissions outside of the 5,150-5,350MHz band shall not exceed an EIRP of -27dBm/MHz.

**§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.

**RSS-210 §A9.3(2)** For transmitters operating in the 5250-5350 MHz band, all emissions outside the 5150-5350 MHz band shall not exceed -27 dBm/MHz e.i.r.p. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band shall not exceed out of band emission limit of 27 dBm/MHz e.i.r.p. in the 5150-5250 MHz band in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within the 5150-5250 MHz band and shall be labeled “for indoor use only”.

**RSS-Gen §4.7** The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate of carrier frequency), or from 30 MHz , whichever is the lowest frequency, to the 5$^{th}$ harmonic of the highest frequency generated without exceeding 40 GHz.

**RSS-Gen §6** Receiver Spurious Emission Standard
If a radiated measurement is made, all spurious emissions shall comply with the limits of the following Table. The resolution bandwidth of the spectrum analyzer shall be 100 kHz for spurious emission measurements below 1.0 GHz and 1.0 MHz for measurements above 1.0 GHz

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

### Laboratory Measurement Uncertainty for Radiated Emissions

| | |
|---|---|
| Measurement uncertainty | +5.6/ -4.5 dB |

### Traceability

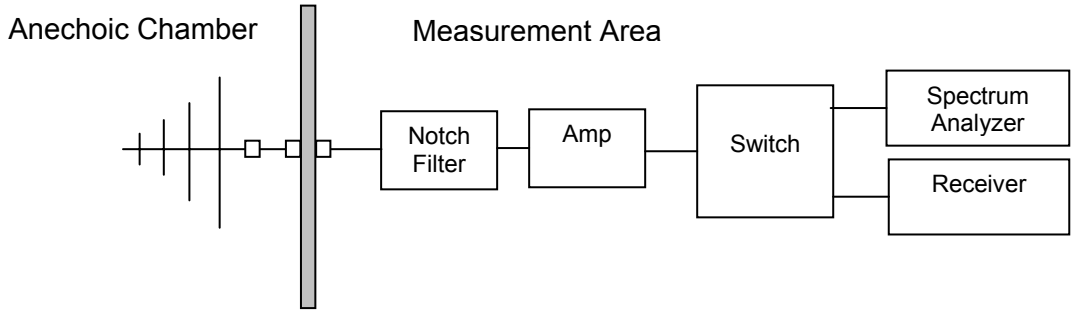
| Method | Test Equipment Used |
|---|---|
| Measurements were made per work instruction WI-03 'Measurement of Radiated Emissions' | 0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312 |

### 5.1.8.4. Radiated Spurious Emissions (30M-1 GHz)

**FCC, Part 15 Subpart C §15.407(b)(6); §15.205(a); §15.209(a)**
**Industry Canada RSS-210 §2.2**

**Test Procedure**
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: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

EUT parameters.
Data Rate(s): 802.11a 12 MBit/s,
Power Level: Maximum
Duty Cycle: 1.45%
Channel: 5180 MHz

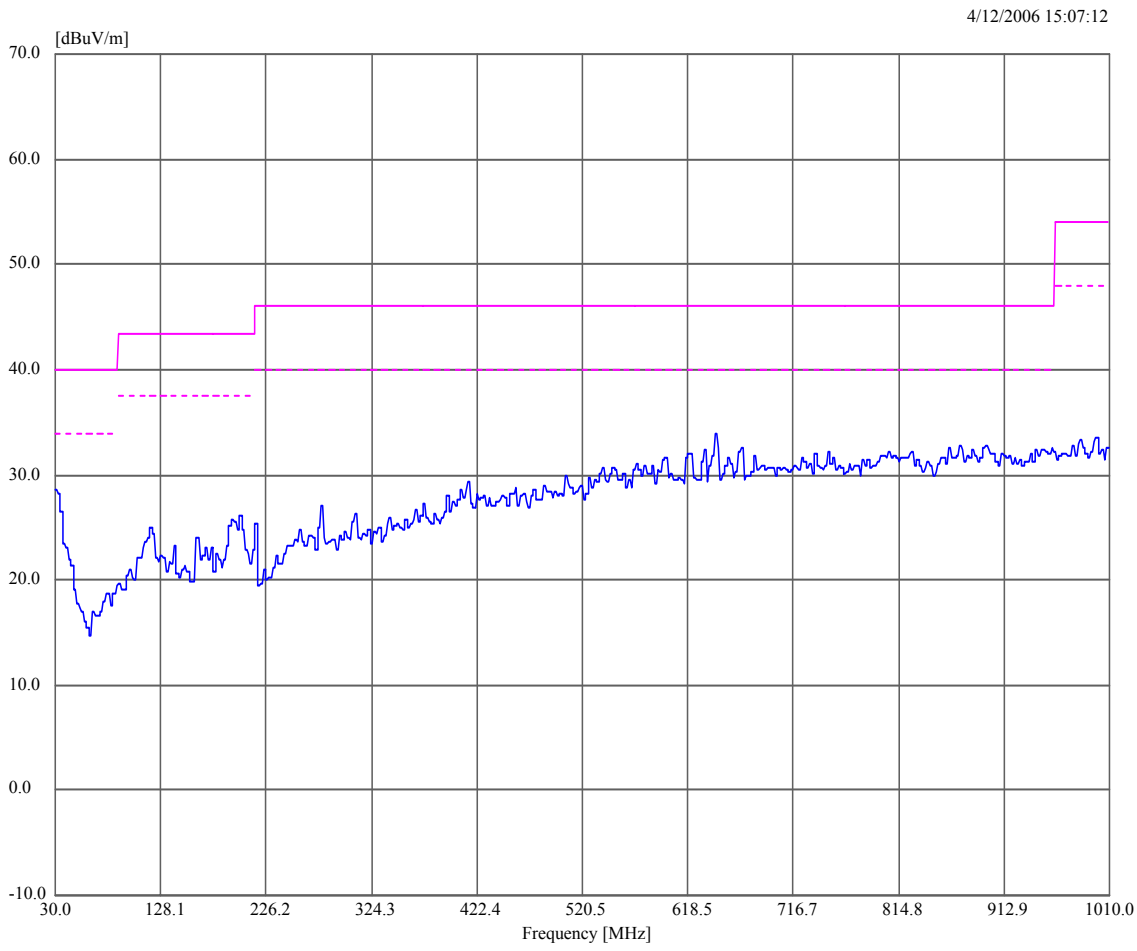
Product: 803X Phone with H251N headset
Operation mode: 5.180 GHz 12 MBit/s max power
Model: Serial # Phone: 660324736 with Dual Charger

TABLE OF RESULTS

| Freq. (MHz) | Peak (dBuV/m) | QP (dBuV/m) | QP Lmt (dBuV/m) | QP Margin (dB) | Angle (deg) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

There were no emissions observed within 6 dB of the limit.

**Plot 51**
**Radiated Spurious Emissions 30 MHz to 1 GHz**



## Specification

### Limits

**§15.407(b)(6)** Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209.

**§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.

**RSS-210 §2.2** refers to Section 2.7 Table 2 below;-

.

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

### Laboratory Measurement Uncertainty for Radiated Emissions

| | |
|---|---|
| Measurement uncertainty | +5.6/ -4.5 dB |

### Traceability

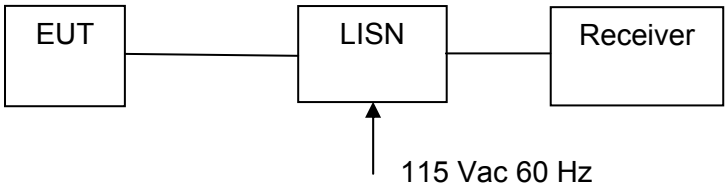
| Method | Test Equipment Used |
|---|---|
| Measurements were made per Sanmina work instruction | 8546A HP Receiver and RF Filter, HP Pre-amp, Antenna EMCO Biconilog |

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

**FCC, Part 15 Subpart C §15.407(b)(6)/15.207**
**Industry Canada RSS-Gen §7.2.2**

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

**Test Measurement Set up**




Measurement set up for AC Wireline Conducted Emissions Test

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

Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

Product: 803X with H251N headset connected
Operation mode: 5.180 GHz 12 MBit/s max power
Model: Serial # Phone: 660324736 with Single Charger

**TABLE OF RESULTS – Live Line**

| Freq (MHz) | Peak (dBµV) | QP (dBµV) | QP Limit (dBµV) | QP Margin (dB) | Ave. (dBµV) | Ave. Limit (dBµV) | Ave. Margin (dB) |
|---|---|---|---|---|---|---|---|
| 0.369326 | 42.44 | --.-- | 58.56 | --.-- | 5.51 | 48.56 | -43.06 |
| 0.402766 | 42.17 | --.-- | 57.82 | --.-- | 5.37 | 47.82 | -42.45 |
| 0.410382 | 42.17 | --.-- | 57.68 | --.-- | 5.31 | 47.68 | -42.36 |
| 0.433516 | 42.12 | --.-- | 57.24 | --.-- | 5.32 | 47.24 | -41.92 |
| 0.440922 | 42.04 | --.-- | 57.10 | --.-- | 5.36 | 47.10 | -41.75 |
| 0.533576 | 41.78 | --.-- | 56.00 | --.-- | 16.96 | 46.00 | -29.04 |

**Plot 52**
**AC Wireline Conducted Emissions – LIVE LINE 150 kHz – 30 MHz)**

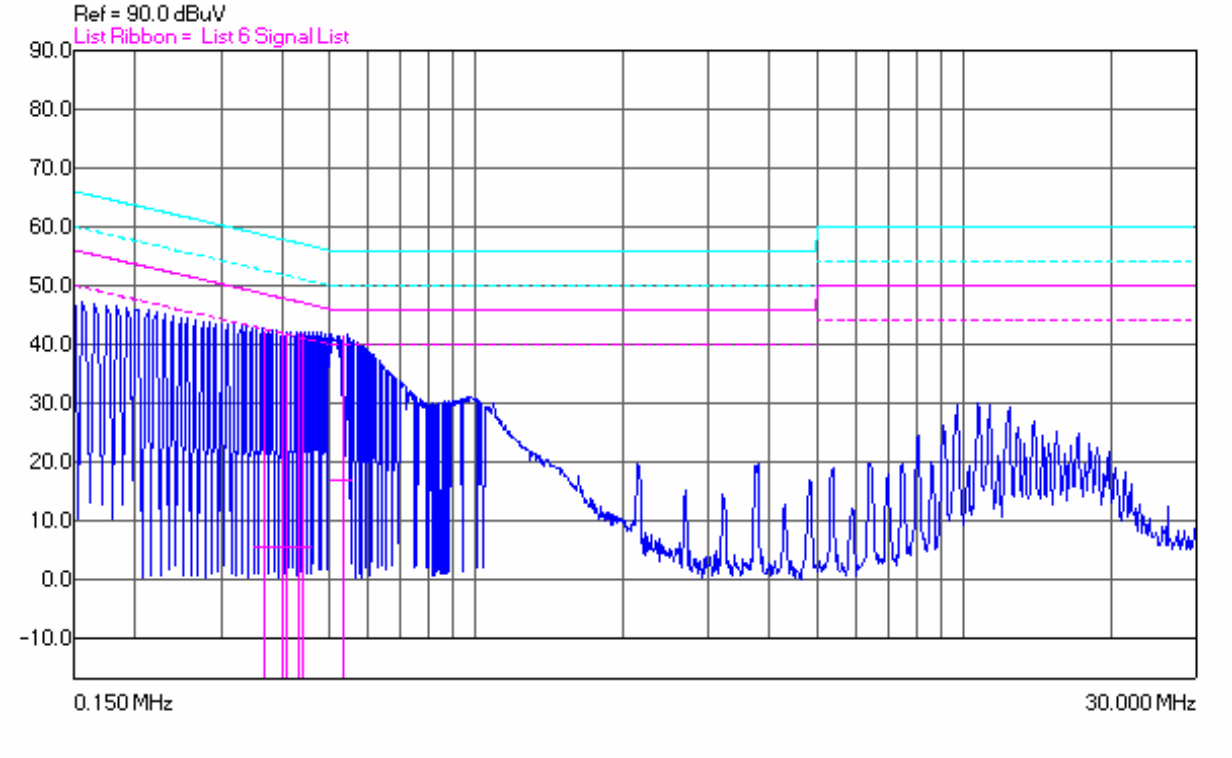
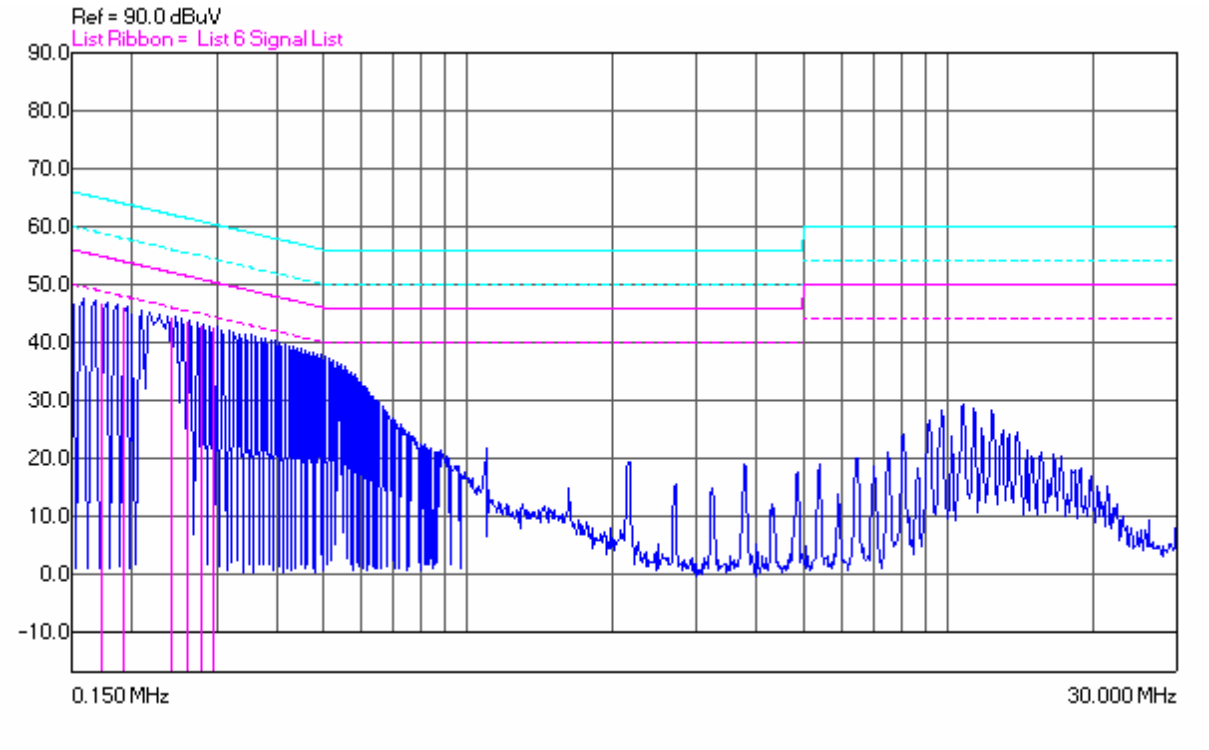


**TABLE OF RESULTS – Neutral Line**

| Freq (MHz) | Peak (dBµV) | QP (dBµV) | QP Limit (dBµV) | QP Margin (dB) | Ave. (dBµV) | Ave. Limit (dBµV) | Ave. Margin (dB) |
|---|---|---|---|---|---|---|---|
| 0.173880 | 46.86 | --.-- | 64.84 | --.-- | --.-- | 54.84 | --.-- |
| 0.191790 | 46.13 | --.-- | 63.97 | --.-- | --.-- | 53.97 | --.-- |
| 0.242535 | 44.36 | --.-- | 62.02 | --.-- | --.-- | 52.02 | --.-- |
| 0.260445 | 43.72 | --.-- | 61.47 | --.-- | --.-- | 51.47 | --.-- |
| 0.278355 | 43.10 | --.-- | 60.93 | --.-- | --.-- | 50.93 | --.-- |
| 0.296265 | 42.61 | --.-- | 60.39 | --.-- | --.-- | 50.39 | --.- |

**Plot 53**
**AC Wireline Conducted Emissions – NEUTRAL LINE 150 kHz – 30 MHz)**



## Specification

### Limit

**§15.407 (b)(6);** Any U-NII devices using an AC power line are required to comply also with the limits set forth in Section 15.207.

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

**RSS-Gen §7.2.2**
The radio frequency voltage that is conducted back into the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table below. The tighter limit applies at the frequency range boundaries.

**§15.207 (a)** and **RSS-Gen §7.2.2** Limit Matrix
The lower limit applies at the boundary between frequency ranges

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

* Decreases with the logarithm of the frequency

### Laboratory Measurement Uncertainty for Conducted Emissions

| | |
|---|---|
| Measurement uncertainty | ±2.64 dB |

### Traceability

| Method | Test Equipment Used |
|---|---|
| Measurements were made per work instruction WI-EMC-01 'Measurement of Conducted Emissions' | 0158, 0184, 0193, 0190, 0293, 0307 |

## 5.2. Dynamic Frequency Selection (DFS)

**Test Procedure**

Channels within the 5,250-5,350MHz and 5,470-5,725 GHz bands were exercised during the test. WLAN test traffic was generated between the Cisco AP and SpectraLink 803X wireless phone handset by continuously transmitting audio data from a land line phone to the SpectraLink 803X using the test set up shown in the diagram below;-

**Measurement Results - Dynamic Frequency Selection (DFS)**

Ambient conditions.
Temperature: 17 to 23 °C  Relative humidity: 31 to 57%  Pressure: 999 to 1012 mbar

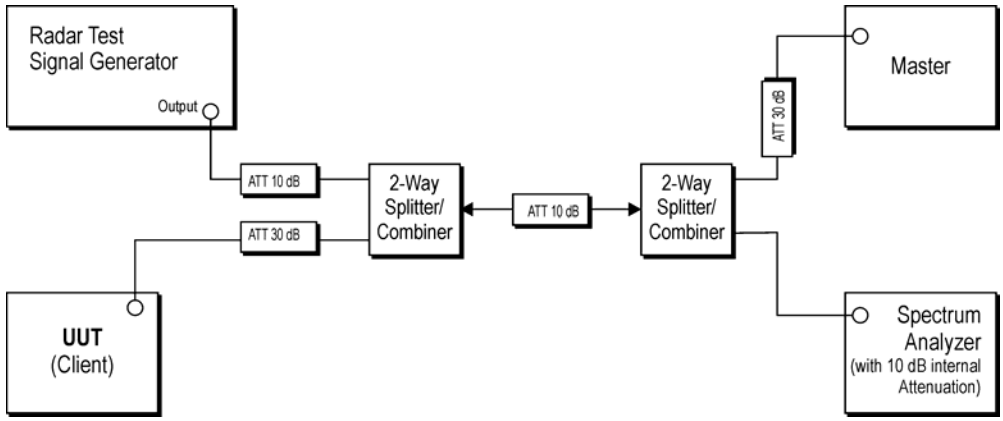
Radio parameters.
Test methodology: Conducted
Device Type: Client

As this device is a client Type 1 fixed radar signature was injected into the host Cisco AP to monitor *Channel Closing Transmission Time* and *Channel Move Time*.

## 5.3. Equipment Model(s) and Serial Number(s)

| Type (EUT/ Support) | Equipment Description (Including Brand Name) | Mfr | Model No. | Serial No. |
|---|---|---|---|---|
| EUT | Wireless phone | SpectraLink | 803X | 660324742 & 660324730 |
| Support | Wireless Access Point AIRONET 802.11a/b/g | Cisco | AIR-AP1242AG-A-K9 | FTX0940B04J |
| Support | Telephone Gateway | SpectraLink | TGA116 | 650302159 |
| Support | NetLink SVP Server | SpectraLink | SVP100 | 660328548 |
| Support | NetLink OAI Gateway | SpectraLink | MOG700 | 660328792 |

**Test Measurement Set up for Client Device with Radar Injection at the Access Point**




The SpectraLink 803X wireless phone does not exceed 27 dBm EIRP so no Transmit Power Control (TPC) is implemented on the product.

### 5.3.1. Interference Threshold values, Master or Client incorporating In-Service Monitoring

| **Maximum Transmit Power** | **Value (see note)** |
|---|---|
| ≥ 200 milliwatt | -64 dBm |
| < 200 milliwatt | -62 dBm |
| Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna | |

### 5.3.2. DFS Response requirement values

| **Parameter** | **Value** |
|---|---|
| *Non-occupancy period* | Minimum 30 minutes |
| *Channel Availability Check Time* | 60 seconds |
| *Channel Move Time* | 10 seconds<br>See Note 1. |
| *Channel Closing Transmission Time* | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period.<br>See Notes 1 and 2. |
| *U-NII Detection Bandwidth* | Minimum 80% of the 99% power bandwidth<br>See Note 3. |

Note 1: The instant that the *Channel Move Time* and the *Channel Closing Transmission Time* begins is as follows:

- For the Short pulse radar Test Signals this instant is the end of the *Burst*.
- For the Frequency Hopping radar Test Signal, this instant is the end of the last radar *Burst* generated.
- For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.

Note 2: The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate *Channel* changes (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the *U-NII Detection Bandwidth* detection test, radar type 1 is used and for each frequency step the minimum percentage of detection is 90%. Measurements are performed with no data traffic.

### 5.3.3. RADAR TEST WAVEFORMS

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

**Short Pulse Radar Test Waveforms**

| Radar Type | Pulse Width (µsec) | PRI (µsec) | Number of Pulses | Minimum Percentage of Successful Detection | Minimum Trials |
|---|---|---|---|---|---|
| 1 | 1 | 1428 | 18 | 60% | 30 |
| 2 | 1-5 | 150-230 | 23-29 | 60% | 30 |
| 3 | 6-10 | 200-500 | 16-18 | 60% | 30 |
| 4 | 11-20 | 200-500 | 12-16 | 60% | 30 |
| Aggregate (Radar Types 1-4) | | | | 80% | 120 |

A minimum of 30 unique waveforms are required for each of the short pulse radar types 2 through 4. For short pulse radar type 1, the same waveform is used a minimum of 30 times. If more than 30 waveforms are used for short pulse radar types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. The aggregate is the average of the percentage of successful detections of short pulse radar types 1-4.

**Long Pulse Radar Test Waveform**

| Radar Type | Pulse Width (µsec) | Chirp Width (MHz) | PRI (µsec) | Number of Pulses per *Burst* | Number of *Bursts* | Minimum Percentage of Successful Detection | Minimum Trials |
|---|---|---|---|---|---|---|---|
| 5 | 50-100 | 5-20 | 1000-2000 | 1-3 | 8-20 | 80% | 30 |

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse radar test signal. If more than 30 waveforms are used for the Long Pulse radar test signal, then each additional waveform must also be unique and not repeated from the previous waveforms.

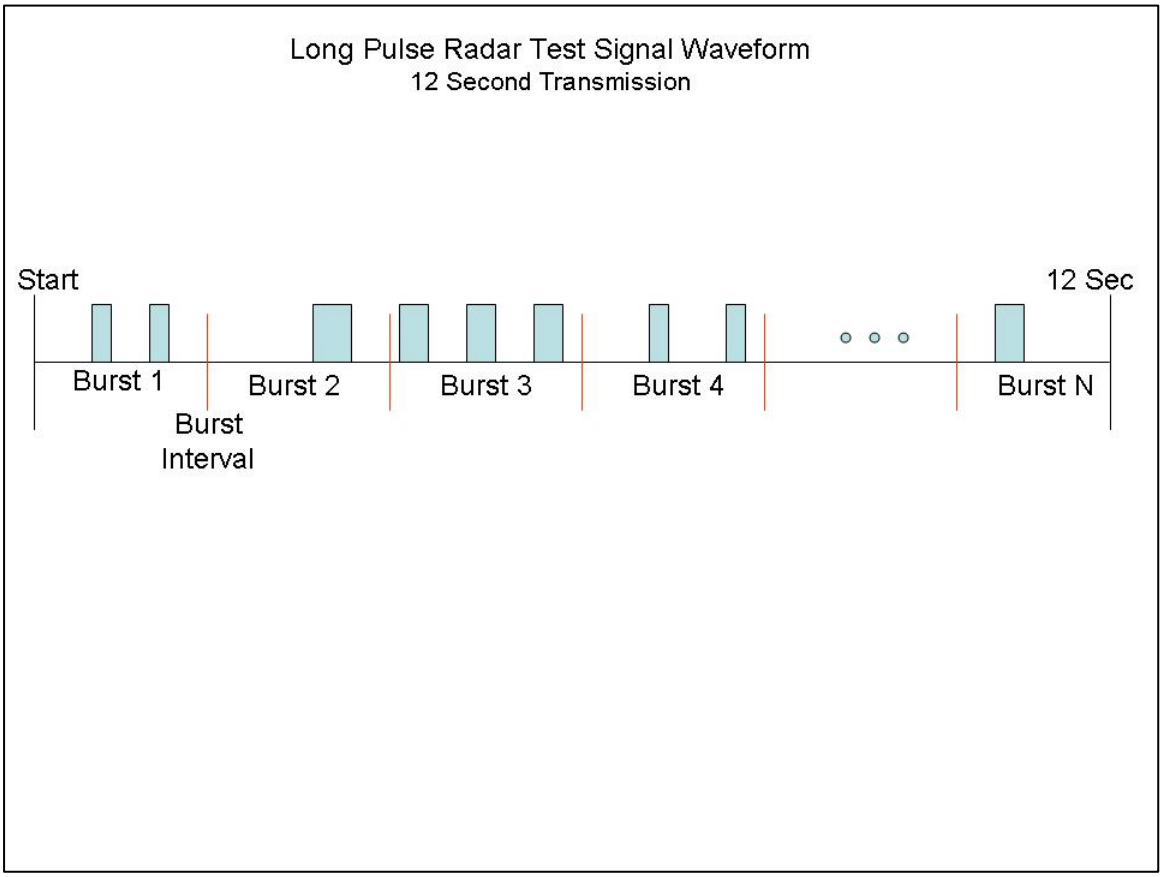
Each waveform is defined as follows:

1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
2) There are a total of 8 to 20 *Bursts* in the 12 second period, with the number of *Bursts* being randomly chosen. This number is *Burst_Count*.
3) Each *Burst* consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each *Burst* within the 12 second sequence may have a different number of pulses.
4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a *Burst* will have the same pulse width. Pulses in different *Bursts* may have different pulse widths.
5) Each pulse has a linear FM chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a *Burst* will have the same chirp width. Pulses in different *Bursts* may have different chirp widths. The chirp is centered on the pulse. For example, with a radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.
6) If more than one pulse is present in a *Burst*, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a *Burst*, the time between the first and second pulses is chosen independently of the time between the second and third pulses.
7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to *Burst_Count*. Each interval is of length (12,000,000 / *Burst_Count*) microseconds. Each interval contains one *Burst*. The start time for the *Burst*, relative to the beginning of the interval, is between 1 and [(12,000,000 / *Burst_Count*) – (Total *Burst* Length) + (One Random PRI Interval)] microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The start time for each *Burst* is chosen independently.

**A representative example of a Long Pulse radar test waveform:**

1) The total test signal length is 12 seconds.
2) 8 *Bursts* are randomly generated for the *Burst_Count*.
3) *Burst* 1 has 2 randomly generated pulses.
4) The pulse width (for both pulses) is randomly selected to be 75 microseconds.
5) The PRI is randomly selected to be at 1213 microseconds.
6) *Bursts* 2 through 8 are generated using steps 3 – 5.
7) Each *Burst* is contained in even intervals of 1,500,000 microseconds. The starting location for Pulse 1, *Burst* 1 is randomly generated (1 to 1,500,000 minus the total *Burst* 1 length + 1 random PRI interval) at the 325,001 microsecond step. *Bursts* 2 through 8 randomly fall in successive 1,500,000 microsecond intervals (i.e. *Burst* 2 falls in the 1,500,001 – 3,000,000 microsecond range).

**Graphical representation of the Long Pulse radar Test Waveform.**



### 5.3.4. Frequency Hopping Radar Test Waveform

**Frequency Hopping Radar Test Waveform**

| Radar Type | Pulse Width (μsec) | PRI (μsec) | Pulses per Hop | Hopping Rate (kHz) | Hopping Sequence Length (msec) | Minimum Percentage of Successful Detection | Minimum Trials |
|---|---|---|---|---|---|---|---|
| 6 | 1 | 333 | 9 | .333 | 300 | 70% | 30 |

For the Frequency Hopping Radar Type, the same *Burst* parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected[i] from the hopping sequence defined by the following algorithm:

The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

### 5.3.5. UNII Detection Bandwidth:

The SpectraLink 803X is a Client device. Therefore the UNII Detection Bandwidth measurement was not required.

### 5.3.6. Non-Occupancy Period

The SpectraLink 803X is a Client device. Therefore the Non-Occupancy Period measurement was not required.

### 5.3.7. Channel Availability Check Time
**FCC §15.407(h)(2)(ii)**

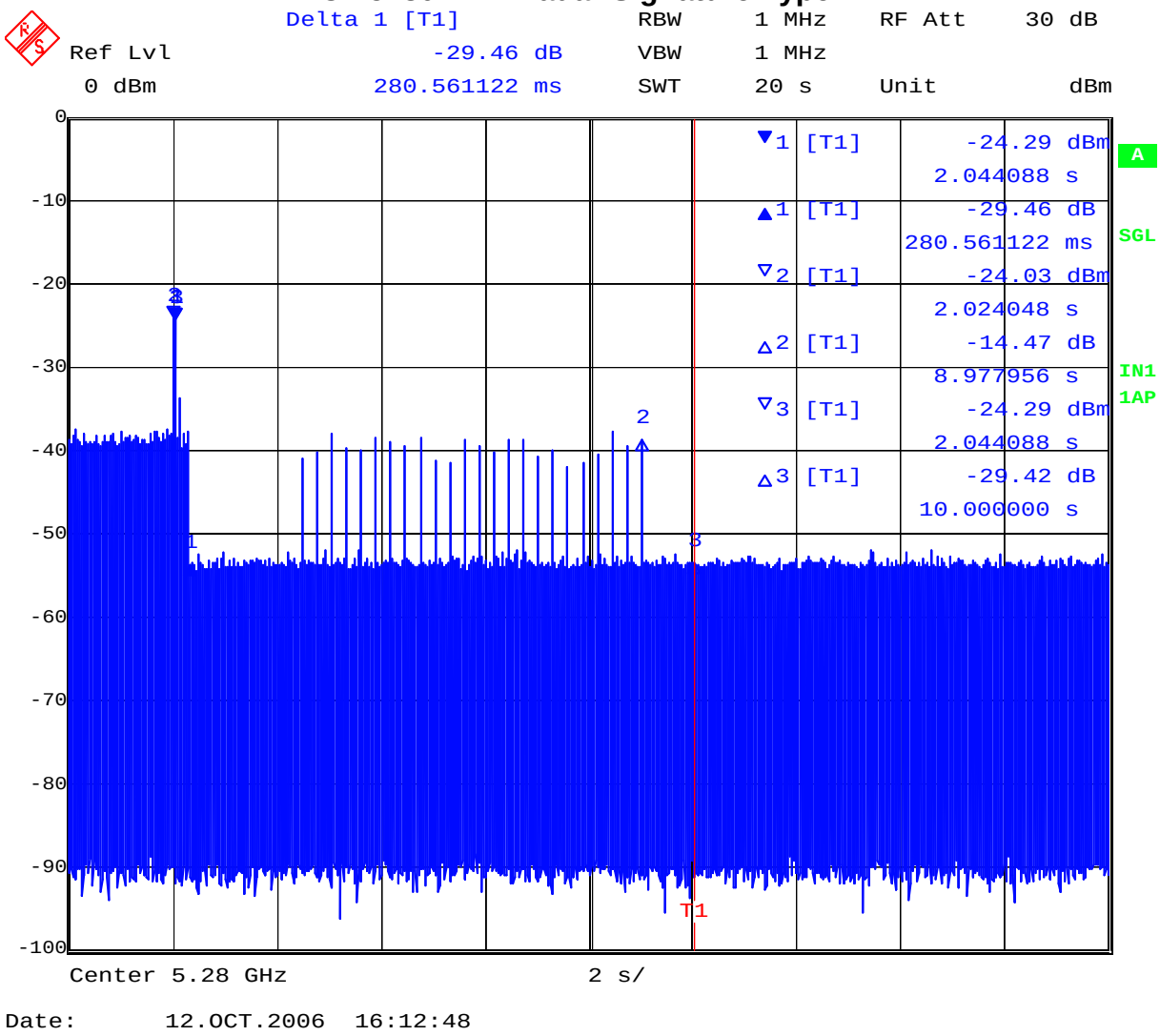
The SpectraLink 803X is a Client device. Therefore the Channel Availability Check Time measurement was not required.

### 5.3.8. Channel Move Time FCC
### FCC §15.407(h)(2)(iii)

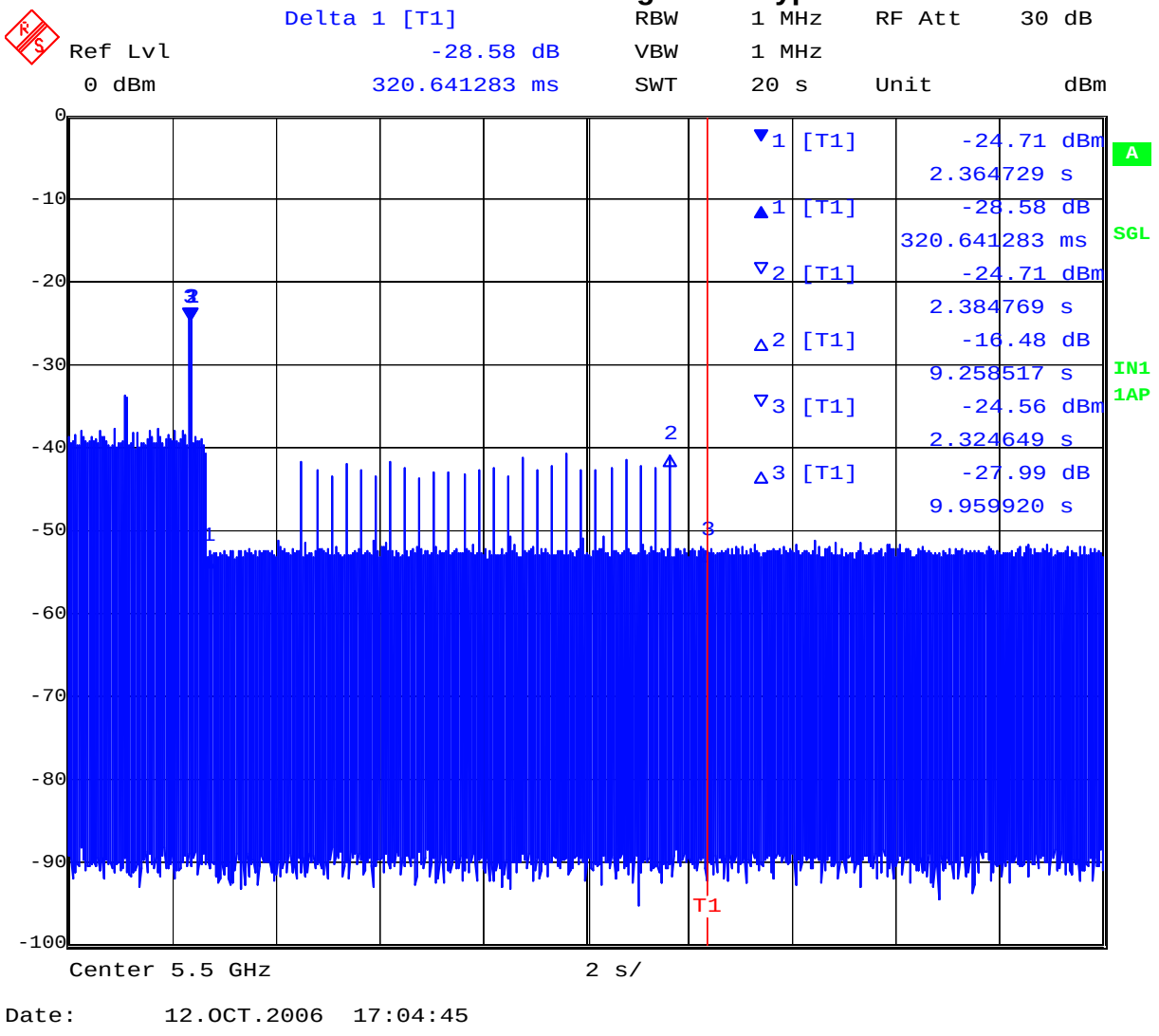
Lower Sub-Band

| Channel (MHz) | Radar Signature | Channel Move Time (seconds) | Limit (seconds) |
|---|---|---|---|
| 5280 | Type 1 | 8.978 | 10 |
| 5500 | Type 1 | 9.258 | 10 |

**Plot 54 Channel Move Time**
**Ch 5280 MHz Radar Signature Type 1**



## Plot 55 Channel Move Time
## Ch 5500 MHz Radar Signature Type 1




Date: 12.OCT.2006 17:04:45

**Channel Closing Transmission Time FCC §15.407(h)(2)(iii)**

The Channel Closing Time is 200 milliseconds plus an aggregate of 60 milliseconds over the remainder of the 10 second Channel Move Time. From the results we can see that the EUT appears to transmit beyond the initial 200 millisecond period, however the EUT is transmitting pulses of data. Each Pulse is 80.16 µSec duration.

The Aggregate Transmission Time = Pw * N

Where N = Number of Pulses Transmitted in remaining 9.8sec Channel Move Time

Pw = Pulse width

**So for the Lower Sub Band 5,250 – 5,350 MHz** the Channel Closing Time equals

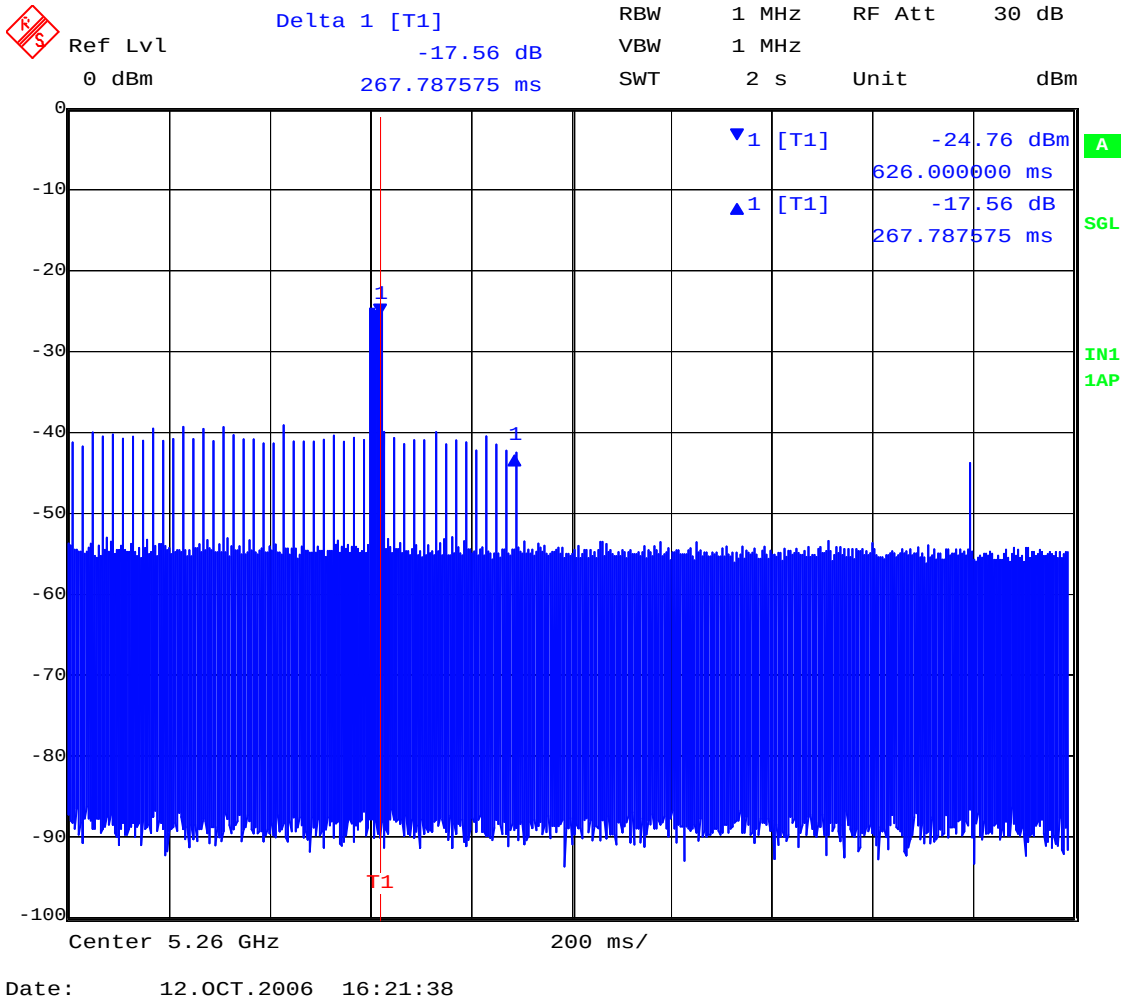
$80.16 \times 10^{-6}$ *27 = 2.16 mSeconds.

**So for the Higher Sub Band 5,470 – 5,725 MHz** the Channel Closing Time equals

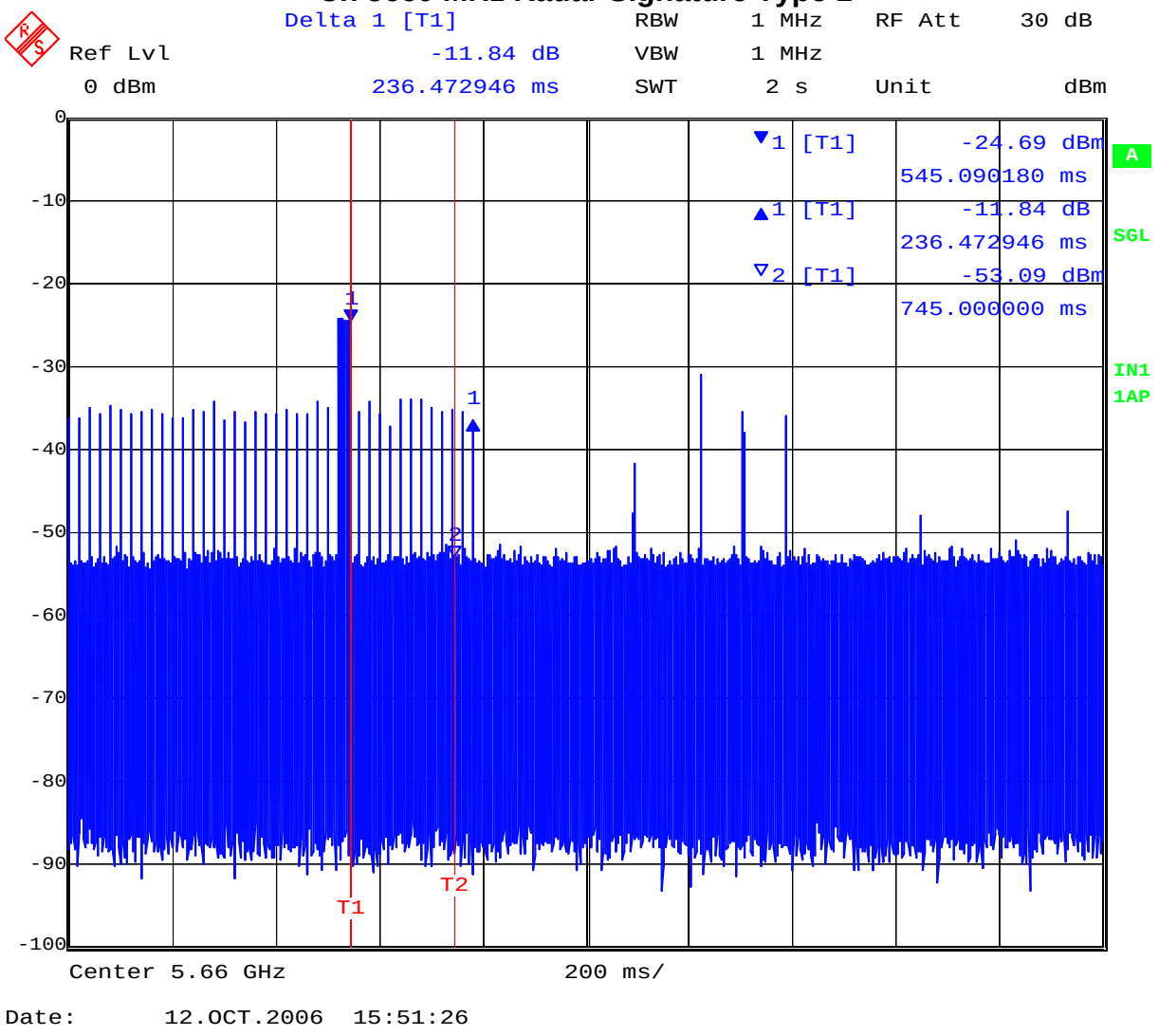
$80.16 \times 10^{-6}$ *32 = 2.56 mSeconds.

| Channel (MHz) | Radar Signature | Channel Closing Transmission Time (mS) | Limit (mS) | Margin (mS) | Plot # |
|---|---|---|---|---|---|
| 5260 | Type 1 | 2.16 | 60 | 57.84 | 55 |
| 5660 | Type 1 | 2.24 | 60 | 57.44 | 56 |

## Plot 56 Channel Closing Period
## Ch 5260 MHz Radar Signature Type 1



## Plot 57 Channel Closing Period
## Ch 5660 MHz Radar Signature Type 1



**Measurement Uncertainty Time/Power**

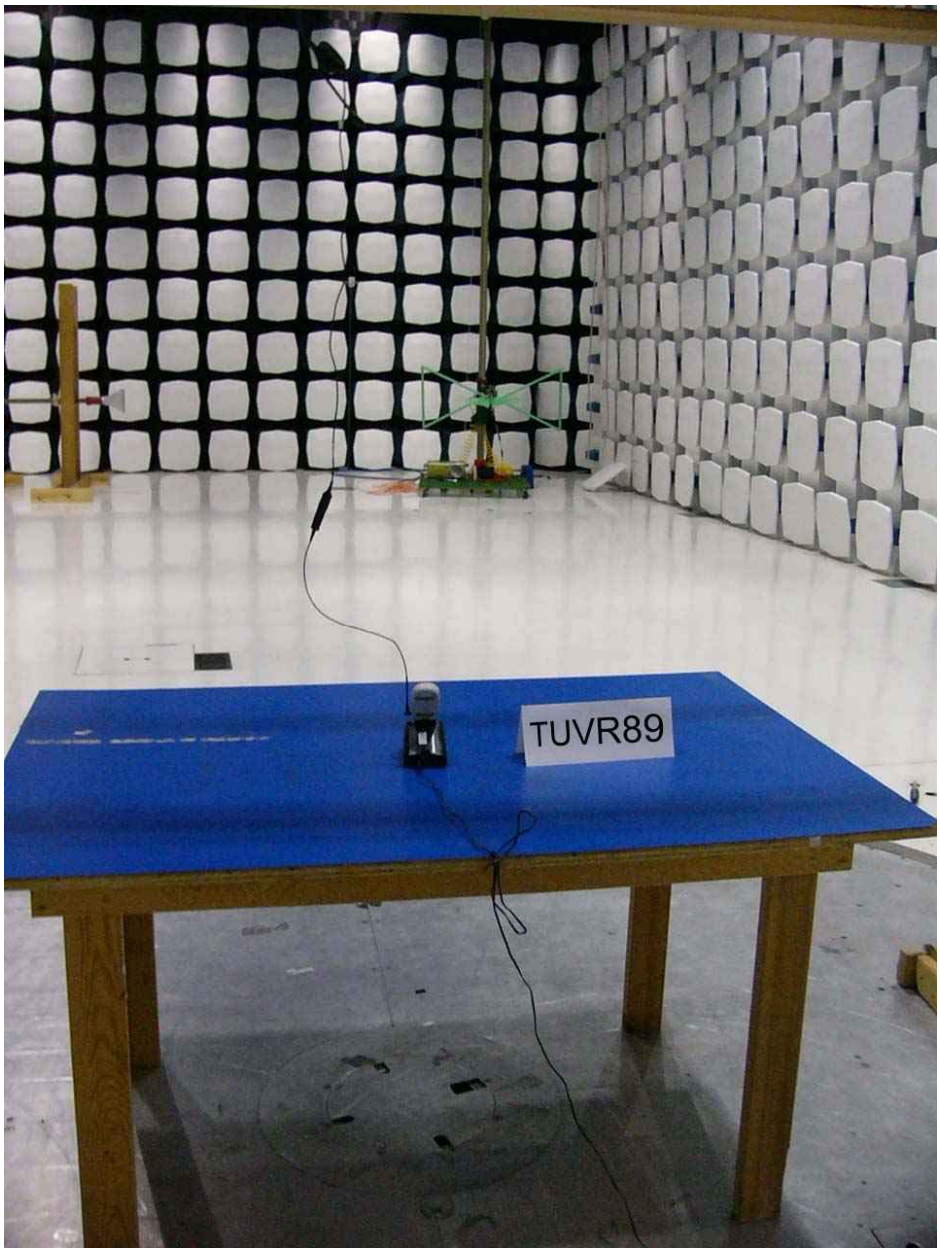
| | |
|---|---|
| Measurement uncertainty | |
| - Time | 4% |
| - Power | 1.33dB |

**Traceability**

| **Test Equipment Used** |
|---|
| 0072, 0083, 0088, 0098, 0223, 0116, 0158, 0313, 0314, 0193, 0252, 0253, 0251, 0256, 0328, 0329 |

# 6. PHOTOGRAPHS

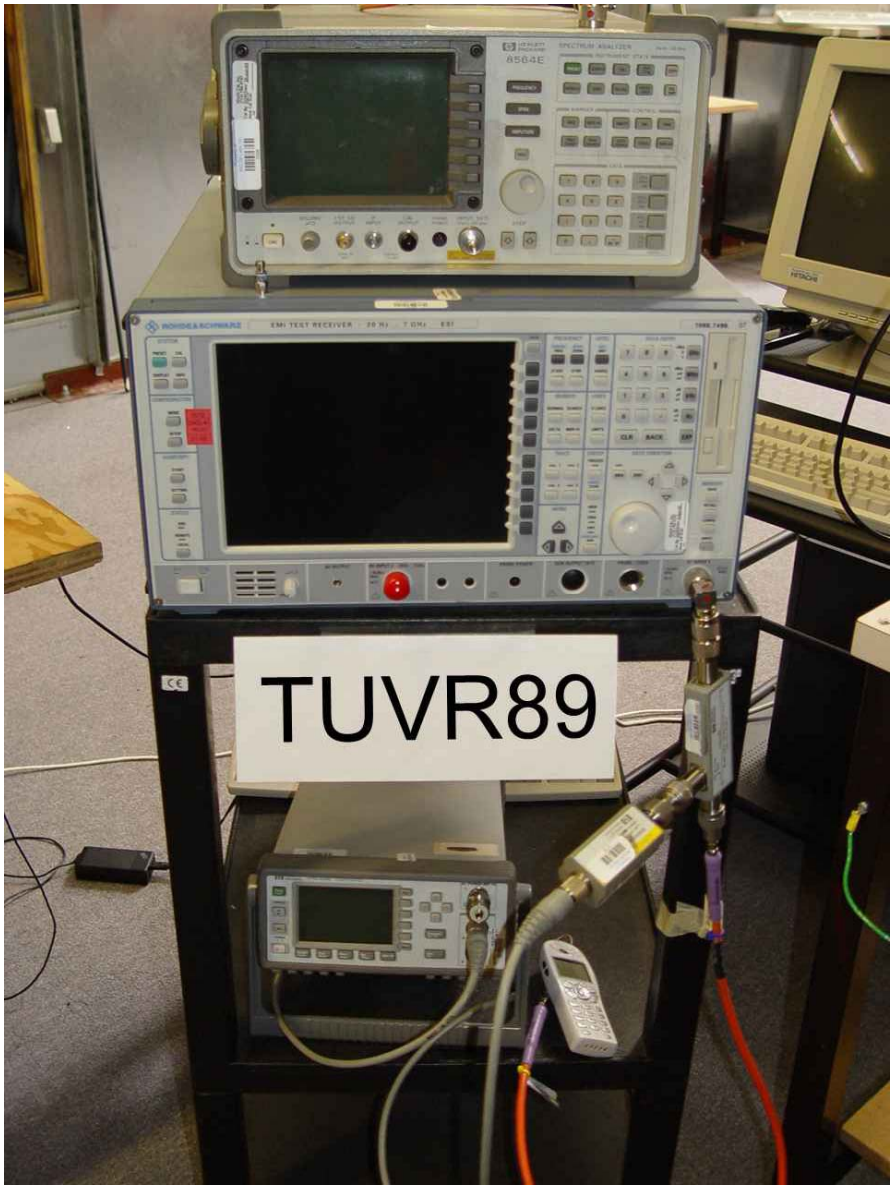
## 6.1. Radiated Emissions (30 MHz-1 GHz)



## 6.2. Spurious Emissions >1 GHz

## 6.3. Conducted Emissions (150 kHz - 30 MHz)

## 6.4. General Measurement Test Set-Up



## 6.5. Dynamic Frequency Selection Test Set-Up

# 7. TEST EQUIPMENT DETAILS

| Asset # | Instrument | Manufacturer | Part # | Serial # |
|---|---|---|---|---|
| 0088 | Spectrum Analyzer | Hewlett Packard | 8564E | 3410A00141 |
| 0104 | 1-18GHz Horn Antenna | The Electro-Mechanics Company | 3115 | 9205-3882 |
| 0134 | Amplifier | Com Power | PA 122 | 181910 |
| 0158 | Barometer /Thermometer | Control Co. | 4196 | E2846 |
| 0193 | EMI Receiver | Rhode & Schwartz | ESI 7 | 838496/007 |
| 0252 | SMA Cable | Megaphase | Sucoflex 104 | None |
| 0310 | 2m SMA Cable | Micro-Coax | UFA210A-0-0787-3G03G0 | 209089-001 |
| 0312 | 3m SMA Cable | Micro-Coax | UFA210A-1-1181-3G0300 | 209092-001 |
| 0313 | Coupler | Hewlett Packard | 86205A | 3140A01285 |
| 0314 | 30dB N-Type Attenuator | ARRA | N9444-30 | 1623 |
| 0070 | Power Meter | Hewlett Packard | 437B | 3125U11552 |
| 0116 | Power Sensor | Hewlett Packard | 8485A | 3318A19694 |
| 0117 | Power Sensor | Hewlett Packard | 8487D | 3318A00371 |
| 0184 | Pulse Limiter | Rhode & Schwartz | ESH3Z2 | 357.8810.52 |
| 0190 | LISN | Rhode & Schwartz | ESH3Z5 | 836679/006 |
| 0293 | BNC Cable | Megaphase | 1689 1GVT4 | 15F50B001 |
| 0307 | BNC Cable | Megaphase | 1689 1GVT4 | 15F50B002 |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