



Certification Test Report

CFR 47 FCC Part 15, Subpart C Section
15.247
Industry Canada RSS 210, Issue 7

Securaplane
WELS Control Unit
Part No. 100-2601-01

FCC ID: WHVWCU1002601
IC: 8158A-WCU1002601
Project Code CG-945

(Report CG-945-RA-2-1)

July 02, 2009

Prepared for: Securaplane Technologies Inc.

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EMC Technologist

Approved by: Nick Kobrosly
Director of Canadian operations

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Report Summary

Test Facility:	National Technical Systems, Canada Product Integrity Laboratory 5151-47 th Street, N.E. Calgary Alberta T3J 3R2
Accreditation Numbers:	0214.22 Electrical 0214.23 Mechanical Accredited by A2LA The American Association for Laboratory Accreditation CLIENTS SERVED: All interested parties FIELDS OF TESTING: Electrical/Electronic, Mechanical/Physical ACCREDITATION DATE:: May 14, 2009 VALID TO: December 31, 2009
Applicant:	Securaplane Technologies 10831 N Navine Drive Tucson, AZ 85737 USA
Customer Representative:	Name: Rod Iverson Phone #: 520-425-8121 Email Address: riverson@securaplane.com

EUT Description

EUT Description	Manufacturer	Model	Revision	Serial Number
Bluetooth device	Securaplane Technologies	WELS Control Unit Part No 100-2601-01	N/A	0812440 PCB G1490

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Test Summary

Appendix	Test/Requirement Description	Deviations* from:			Pass / Fail	Applicable FCC Rule Parts	Applicable Industry Canada Rule Parts
		Base Standard	Test Basis	NTS Procedure			
A	6 dB Bandwidth	No	No	No	Pass	FCC Subpart C 15.247 (a) (2)	RSS 210 Issue 7 A8.2 (a)
B	Occupied Bandwidth	No	No	No	N/A	N/A	RSS-Gen Issue 2 4.6.1
C	Peak Power Output	No	No	No	Pass	FCC Subpart C 15.247 (b) (3)	RSS 210 Issue 7 A8.4 (4)
D	Power Spectral Density	No	No	No	Pass	FCC Subpart C 15.247 (e)	RSS 210 Issue 7 A8.2 (b)
E	Duty Cycle Correction Factor	No	No	No	N/A	FCC Subpart C 15.35 (c)	RSS-Gen Issue 2 4.5
F	Conducted Spurious Emissions	No	No	No	Pass	FCC Subpart C 15.247 (d)	RSS 210 Issue 7 A8.5
G	Conducted Spurious Emissions Band Edge	No	No	No	Pass	FCC Subpart C 15.247 (d)	RSS 210 Issue 7 A8.5
H	Radiated Spurious Emissions Band Edge	No	No	No	Pass	FCC Subpart C 15.247, 15.205	RSS 210 Issue 7 2.6, A8.5
I	Radiated Spurious Emissions (TX)	No	No	No	Pass	FCC Subpart C 15.247, 15.205	RSS 210 Issue 7 2.6, A8.5
J	Radiated Spurious Emissions (RX)	No	No	No	Pass	N/A	RSS-Gen Issue 2 4.10

Test Result: The product presented for testing complied with test requirements as shown above.

Prepared By: _____
Lixin Wang
EMC Technologist

Reviewed By: _____
Glen Moore
EMC / Wireless Manager

Approved By: _____
Alex Mathews
Quality Management Representative

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Register of revisions

Revision	Date	Description of Revisions
1	July 2, 2009	Final release

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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to describe the tests applied by NTS Canada to demonstrate compliance of the WELS Control Unit from Securaplane technologies to FCC Part 15 Subpart C section 15.247 for DTS transmitter and the equivalent sections of Industry Canada's RSS 210, Issue 7

2.0 EUT DESCRIPTION

2.1 CONFIGURATION

Description of EUT

	Name	Part No	Revision	Serial Number
EUT	WELS Control Unit	100-2601-01	N/A	0812440 PCB G1490
Power Supply	120 VAC			
Classification	Base permanent installation			
Antennas	Integral antenna with -2.84 dbi gain External antenna with 2.73 dbi gain			
Modulation	GFSK – Bluetooth Release 2			
EUT Size with Enclosure (H x W x D) (in cm)	13 x 11 x 4.5			
EUT Weight (in kilograms)	Less than 2 kg			
Channels/Frequency Range	Channels 0-78, 2402 MHz -2480 MHz, 1 MHz channel spacing			
FCC 15.203 Antenna connector compliance	This product has an sma connector for the external antenna connection. As this device is sold to one integrator only and is professionally and permanently installed in an Airplane, sma connectors are permitted as per Section 15.203			
Functional Description	The Wireless Emergency Lighting System (WELS) consists of the emergency egress lights and signs controlled by the Securaplane Wireless Control Unit (WCU) part number 100-2601-01. The WCU controls the emergency lighting operation via a wireless data communications bus that is physically a network of identical RF "nodes" communicating in a mesh network collaborative manner to move data throughout the interior of the aircraft while not radiating beyond the wingtip of the aircraft. The WELS WCU operates in the 2.4GHz ISM band using Frequency Hopping Spread Spectrum (FHSS) technology. The operating band lowest frequency is 2402 MHz using 79 individual frequencies spaced 1 MHz apart. The WCU transceiver operates with a printed wiring board antenna or a remote patch antenna selected via an antenna switch controlled by the WCU control software. This test report and approval sought is for the Wireless control unit.			

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2.1.1 EUT POWERS

Voltage	120 VAC 60 Hz
Number of Feeds	1 (1 Hot, 1 Return)

2.2 EUT CABLES

Quantity	Model/Type	Routing		Shielded / Unshielded	Description	Cable Length (m)
		From	To			
1	Power	Power	EUT	Unshielded	power supply cable	1.8

2.3 MODE OF OPERATION DURING TESTS

The Securaplane WCU was tested while Continuous Transmit PRBS mode and Receive modes. The EUT was tuned to a low, middle, and high channel to perform power, occupied bandwidth and spurious/harmonic tests. While transmitting the EUT was setup to operate at the intended maximum power output available to the end user. For all test cases pre-scans were completed in all modes to determine worst case levels. For all applicable radiated tests the EUT was tested in 3 orthogonal planes with worst case antenna positions in all cases

3.0 SUPPORT EQUIPMENT

3.1 CONFIGURATION

Dell Inspiron Laptop computer s/n: TW-0791UH-12800-12G-5260 was used for setting up the EUT. Hyper terminal settings: Bits per second: 115200, Data bits: 8, Parity: None, Stop bits: 1, Flow control: None

Computer was used for configuring the EUT and it was not connected during the tests.

3.2 TEST BED/PERIPHERAL CABLES

NA

4.0 TEST ENVIRONMENT

4.1 NORMAL TEST CONDITIONS

Temperature: 20 – 23 °C
Relative Humidity: 28 – 35 %
Atmospheric pressure: 883 – 890 mbar
Nominal test voltage: 120 VAC 60Hz

The values are the limits registered during the test period.

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APPENDICES

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APPENDIX A: 6 DB BANDWIDTH

A.1. Base Standard & Test Basis

Base Standard	FCC PART 15.247 (a) (2) RSS 210 Issue 7 A8.2 (a)
Test Basis	FCC Publication 558074 RSS-Gen Issue 2 4.6.2
Test Method	FCC Publication 558074 RSS 210 Issue 7 A8.2 (a)

A.2. Specifications

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

A.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
None						

A.4. Test Procedure

Conducted as per FCC Publication 558074

A.5. Test Results

The EUT is in compliance with the requirement as specified above

Antenna	Channel	Frequency (MHz)	6 dB Bandwidth (kHz)
External	0	2402	551.102
	39	2441	551.102
	78	2480	551.102
Integral	0	2402	551.102
	39	2441	551.102
	78	2480	551.102

A.6. Operating Mode During Test

The WELS was tuned to a low, middle and high channel of test mode operating at its highest RF output power. Transmitter tested with pseudo random bit sequence.

A.7. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Lixin Wang
Function: EMC Technologist

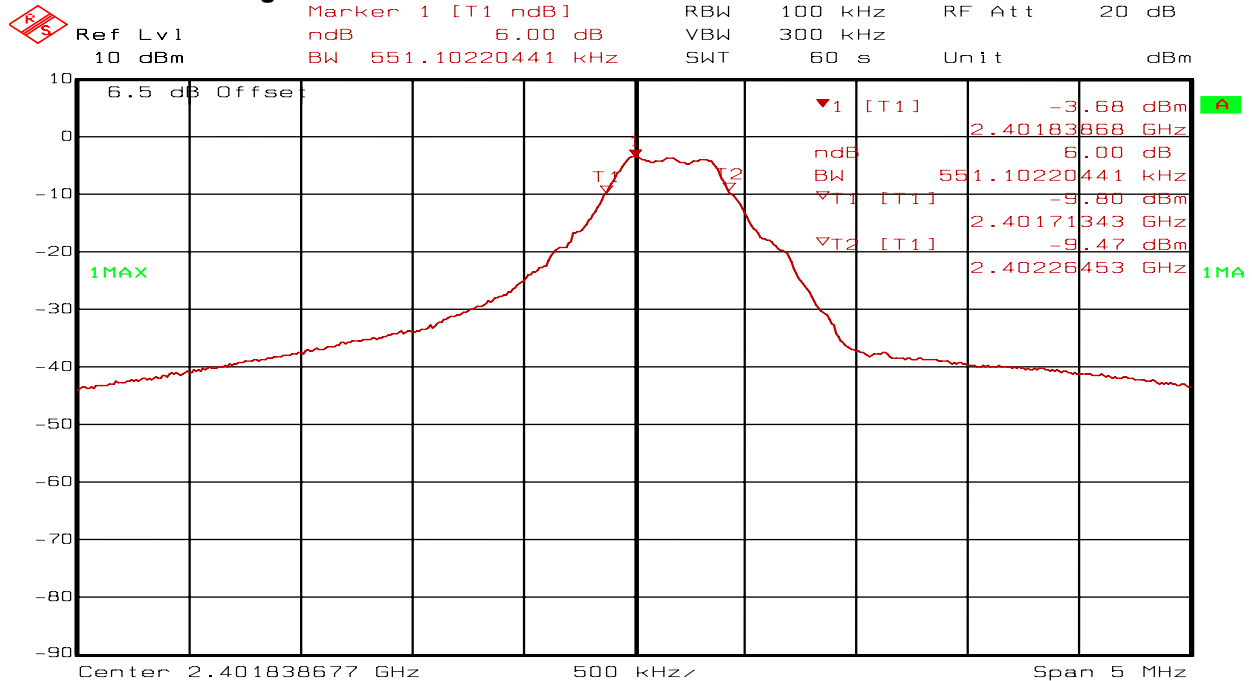
A.8. Test date

Test started: May 13, 2009 Ended: June 8, 2009

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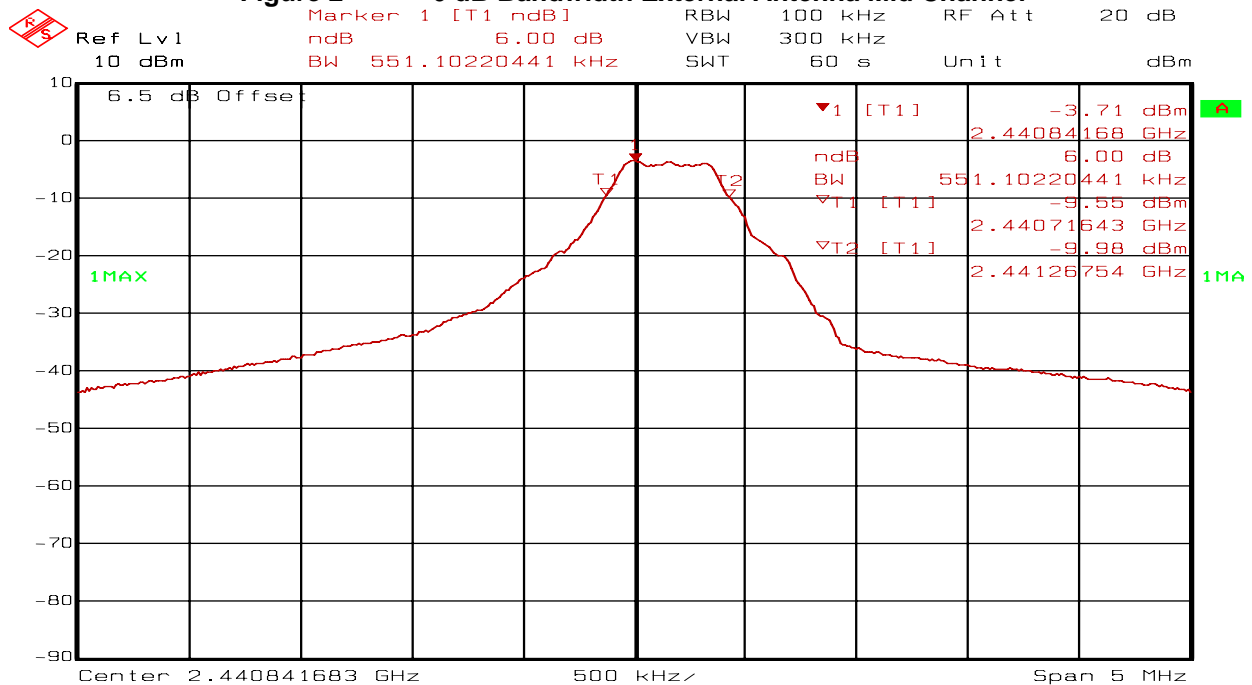
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Figure 1 6 dB Bandwidth External Antenna Low Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch0,Pseudo random bit at default power.Ext ant port.
Date: 13.MAY.2009 11:30:02

Figure 2 6 dB Bandwidth External Antenna Mid Channel

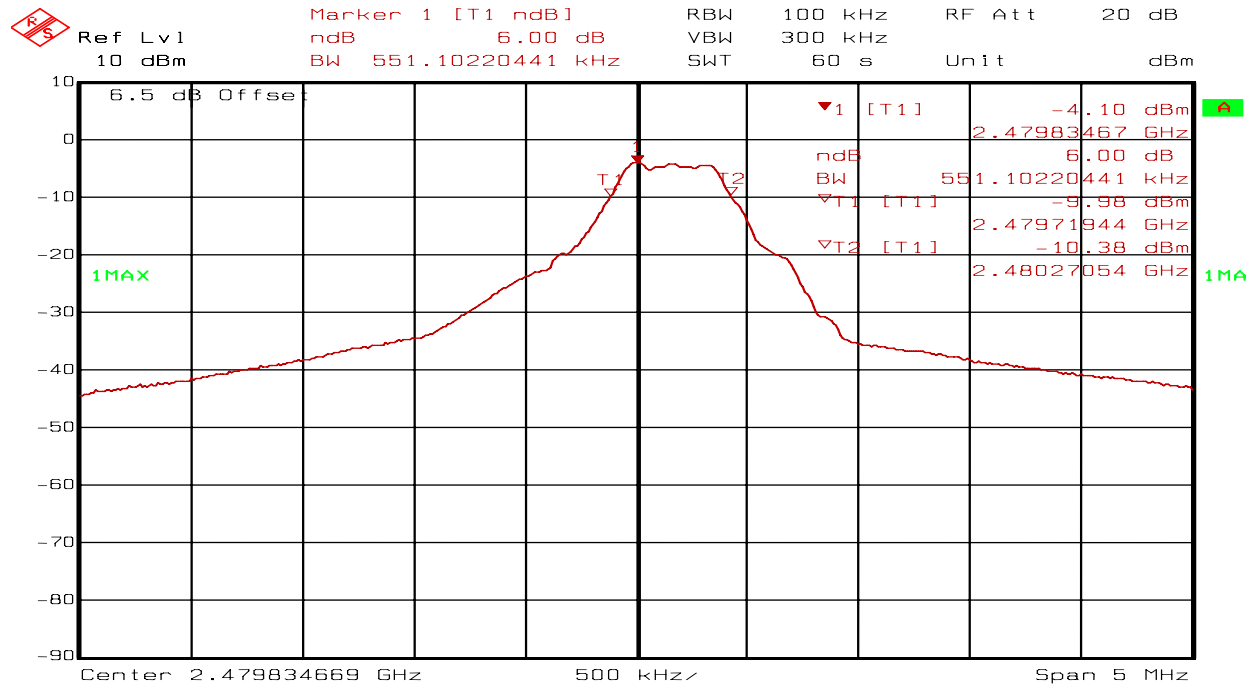


Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch39,Pseudo random bit at default power.Ext ant port.
Date: 13.MAY.2009 11:23:57

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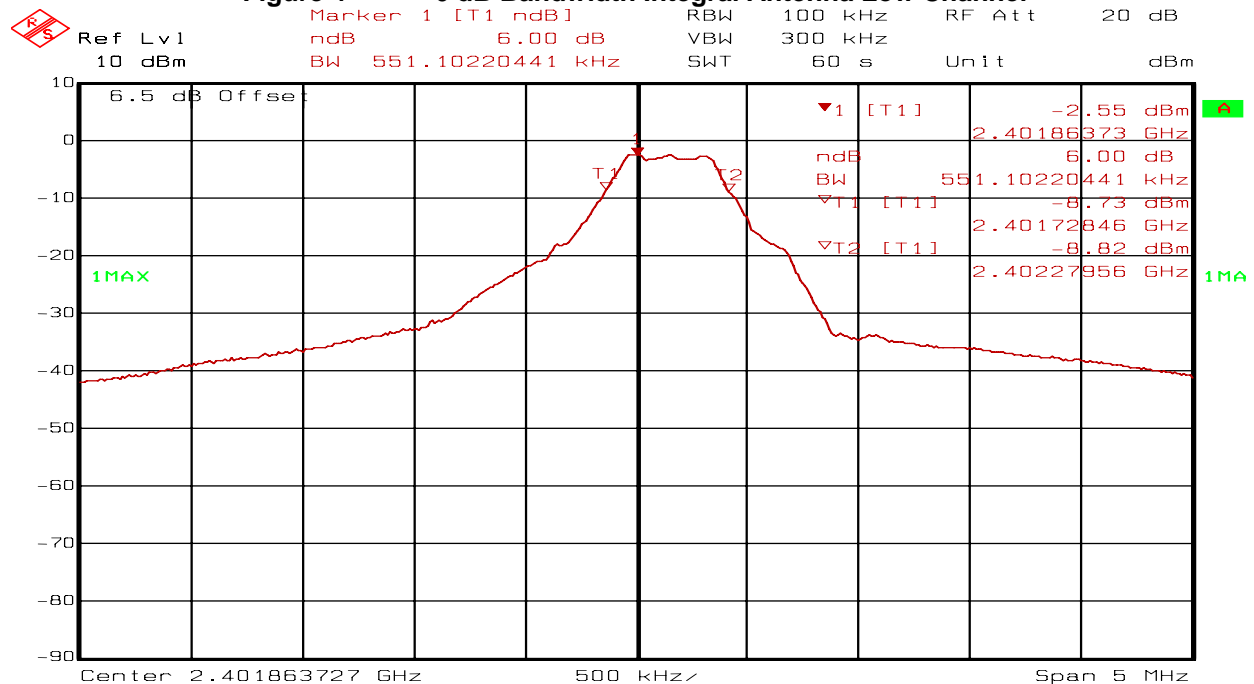
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Figure 3 6 dB Bandwidth External Antenna High Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch78, Pseudo random bit at default power. Ext ant port.
Date: 13.MAY.2009 11:16:47

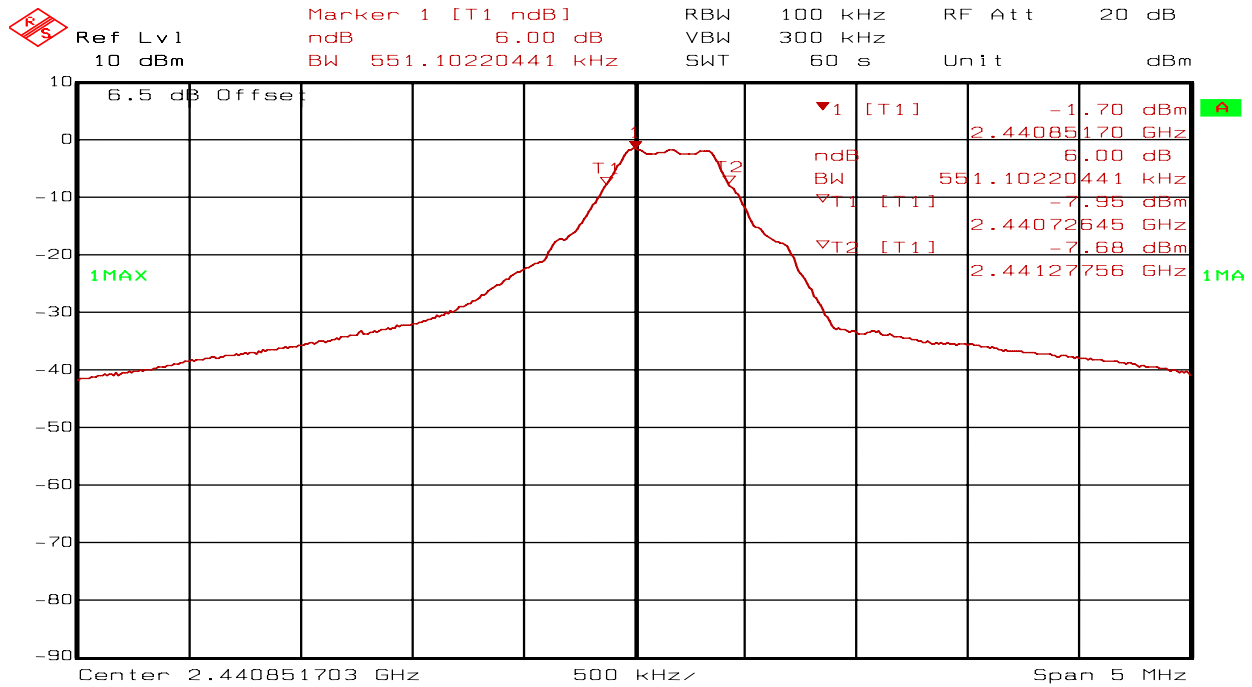
Figure 4 6 dB Bandwidth Integral Antenna Low Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch0, Pseudo random bit at default power. Internal antenna.
Date: 8.JUN.2009 18:24:59

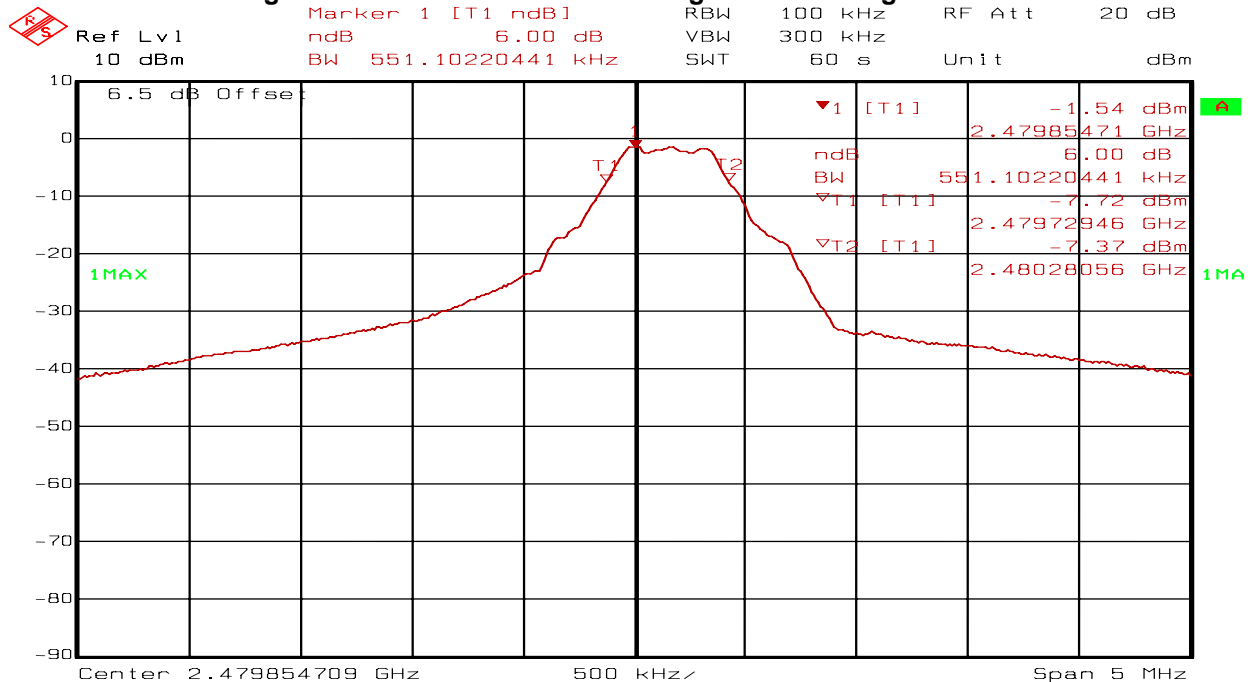
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Figure 5 6 dB Bandwidth Integral antenna Mid Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch39, Pseudo random bit at default power. Internal antenna.
Date: 8.JUN.2009 18:20:05

Figure 6 6 dB Bandwidth Integral antenna High Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch78, Pseudo random bit at default power. Internal antenna.
Date: 8.JUN.2009 18:12:58

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APPENDIX B: OCCUPIED BANDWIDTH

B.1. Base Standard & Test Basis

Base Standard	RSS-Gen Issue 2 4.6.1
Test Basis	RSS-Gen Issue 2 4.6.1
Test Method	RSS-Gen Issue 2 4.6.1

B.2. Specifications

RSS-Gen Issue 2 4.6.1 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.

B.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
None						

B.4. Test Procedure

Conducted as per RSS-Gen Issue 2

B.5. Test Results

Antenna	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
External	0	2402	1.102
	39	2441	1.122
	78	2480	1.152
Integral	0	2402	1.162
	39	2441	1.152
	78	2480	1.062

B.6. Operating Mode During Test

The WELS was tuned to a low, middle and high channel of test mode operating at its highest RF output power. Transmitter tested with pseudo random bit sequence.

B.7. Sample Calculation

NA

B.8. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Lixin Wang
Function: EMC Technologist

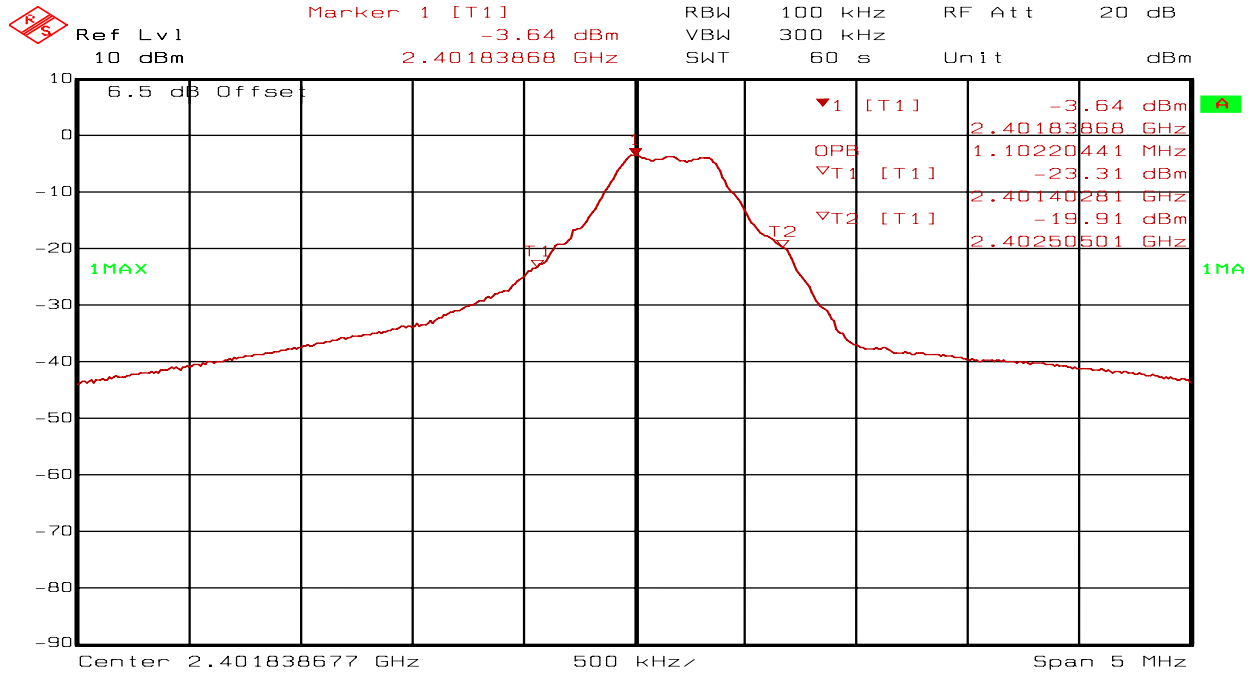
B.9. Test date

Test started: May 13, 2009 Ended: June 11, 2009

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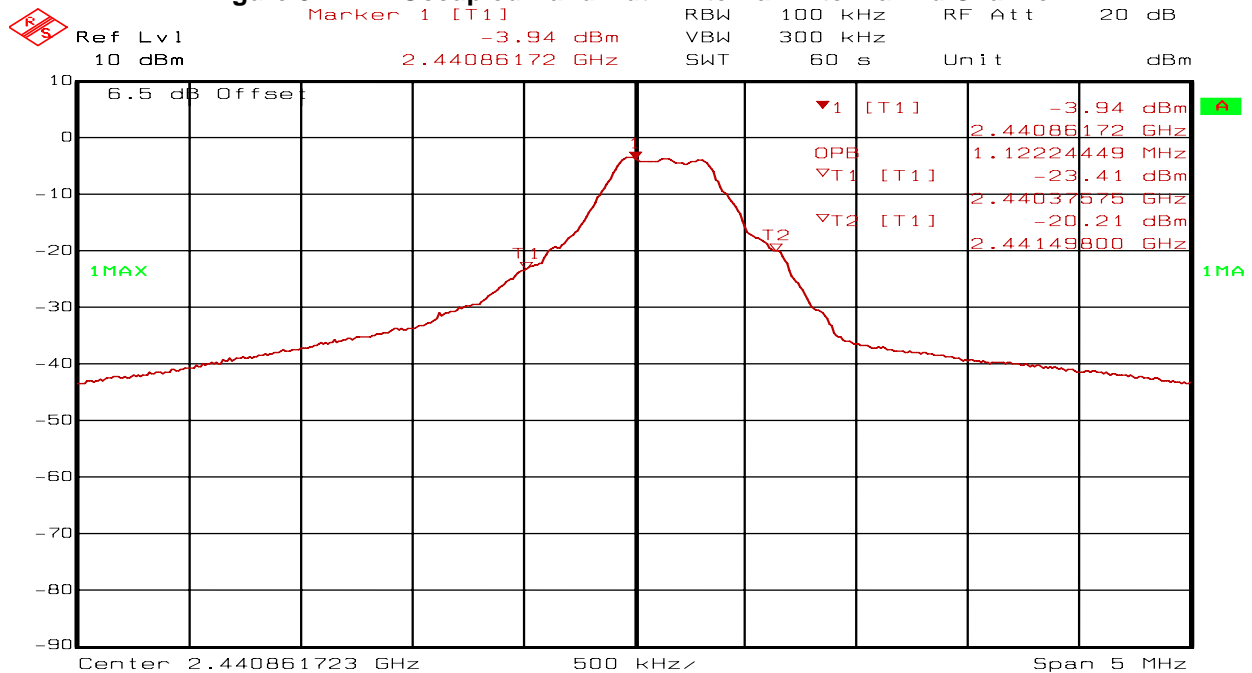
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Figure 7 Occupied Bandwidth External Antenna Low Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch0,Pseudo random bit at default power.Ext ant
port.
Date: 13.MAY.2009 11:32:58

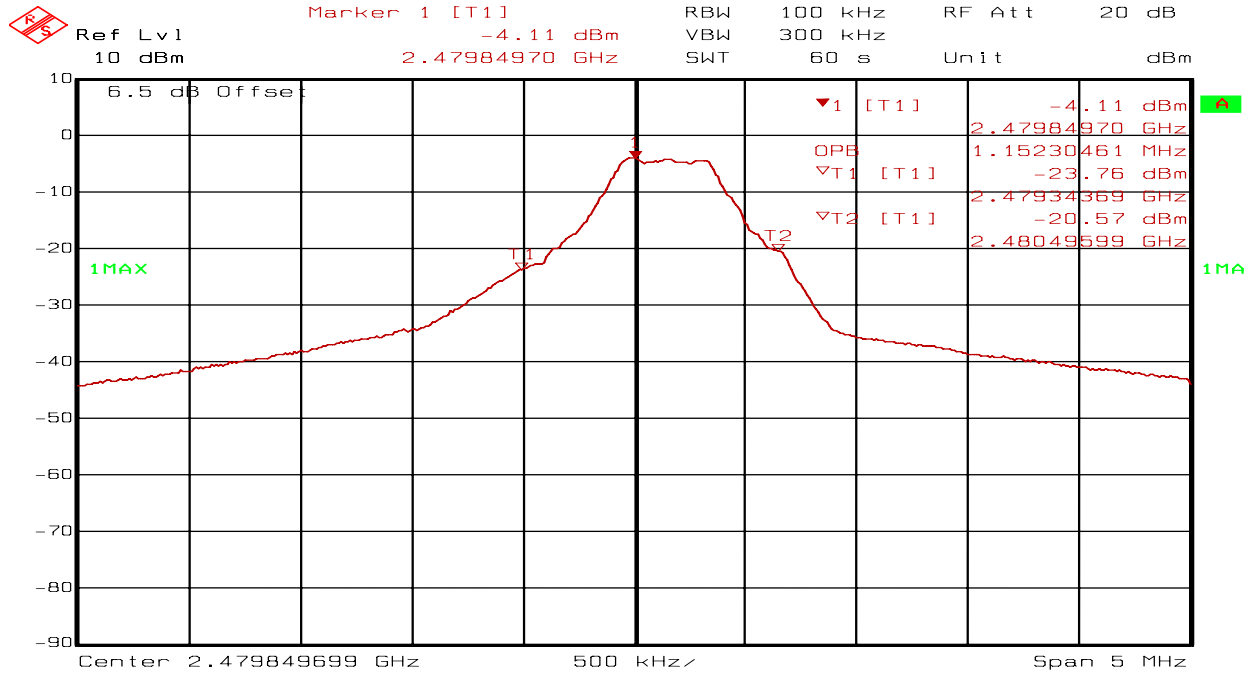
Figure 8 Occupied Bandwidth External Antenna Mid Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch39,Pseudo random bit at default power.Ext ant
port.
Date: 13.MAY.2009 11:38:33

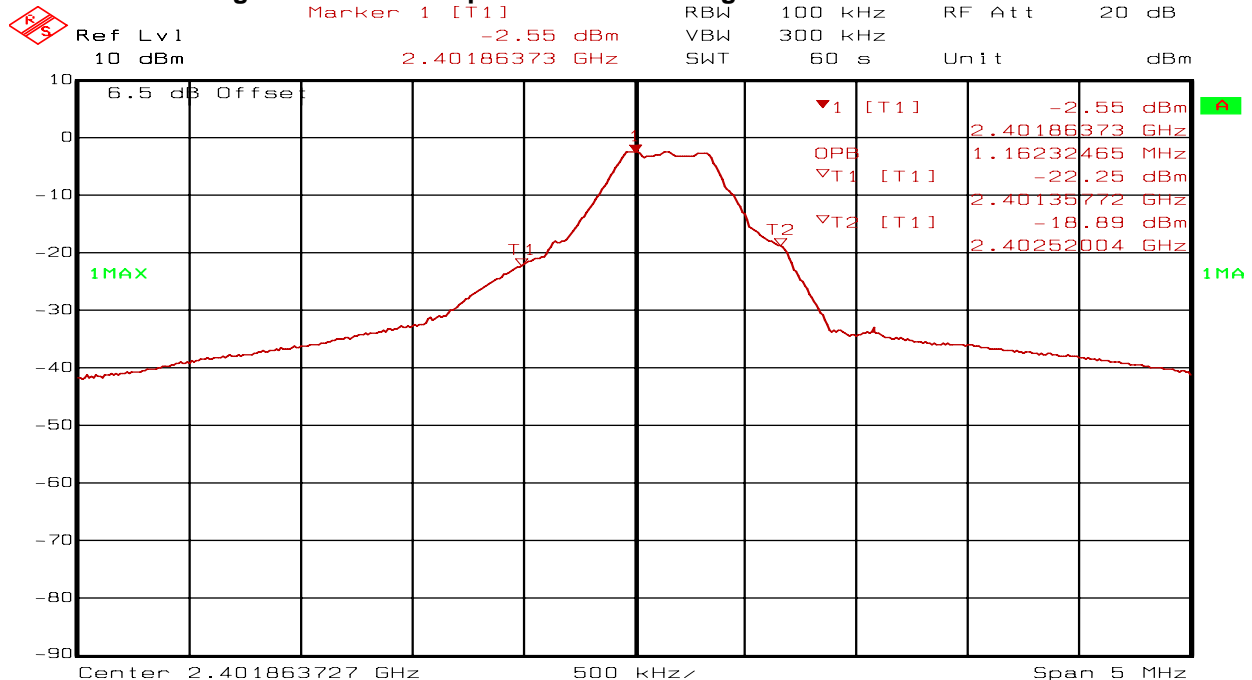
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Figure 9 Occupied Bandwidth External Antenna High Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch78, Pseudo random bit at default power. Ext ant port.
Date: 13.MAY.2009 11:42:12

Figure 10 Occupied Bandwidth Integral Antenna Low Channel

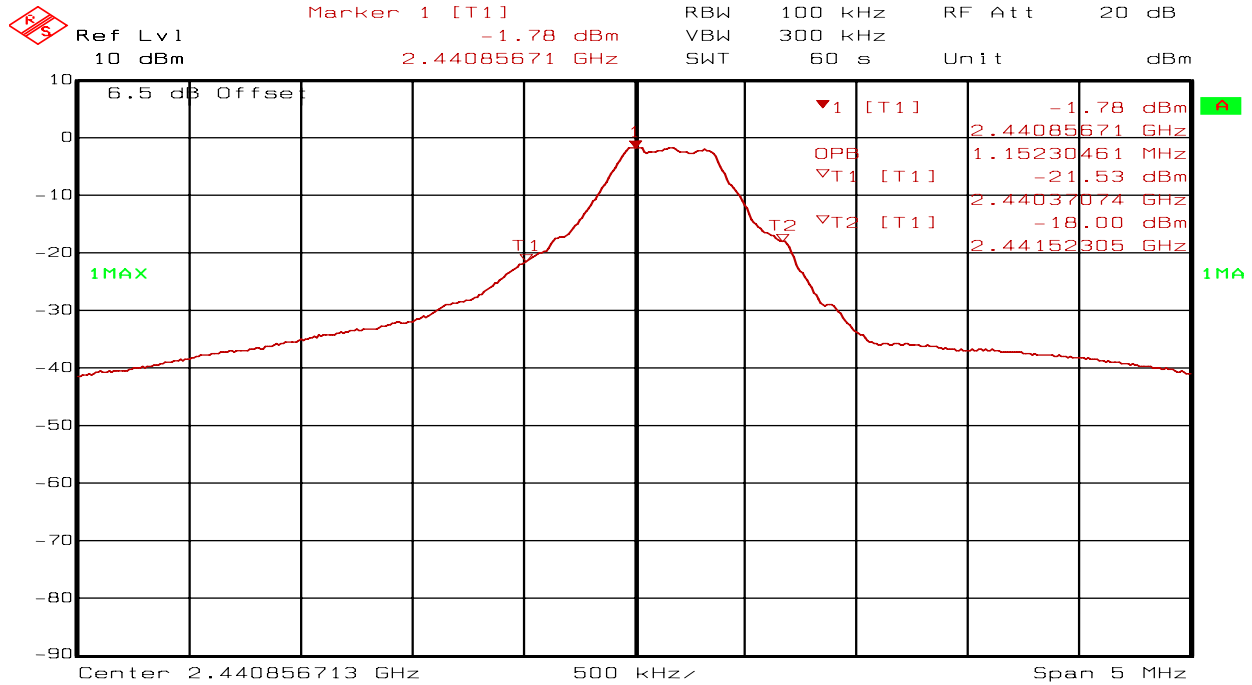


Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch0, Pseudo random bit at default power. Internal antenna.
Date: 8.JUN.2009 18:28:24

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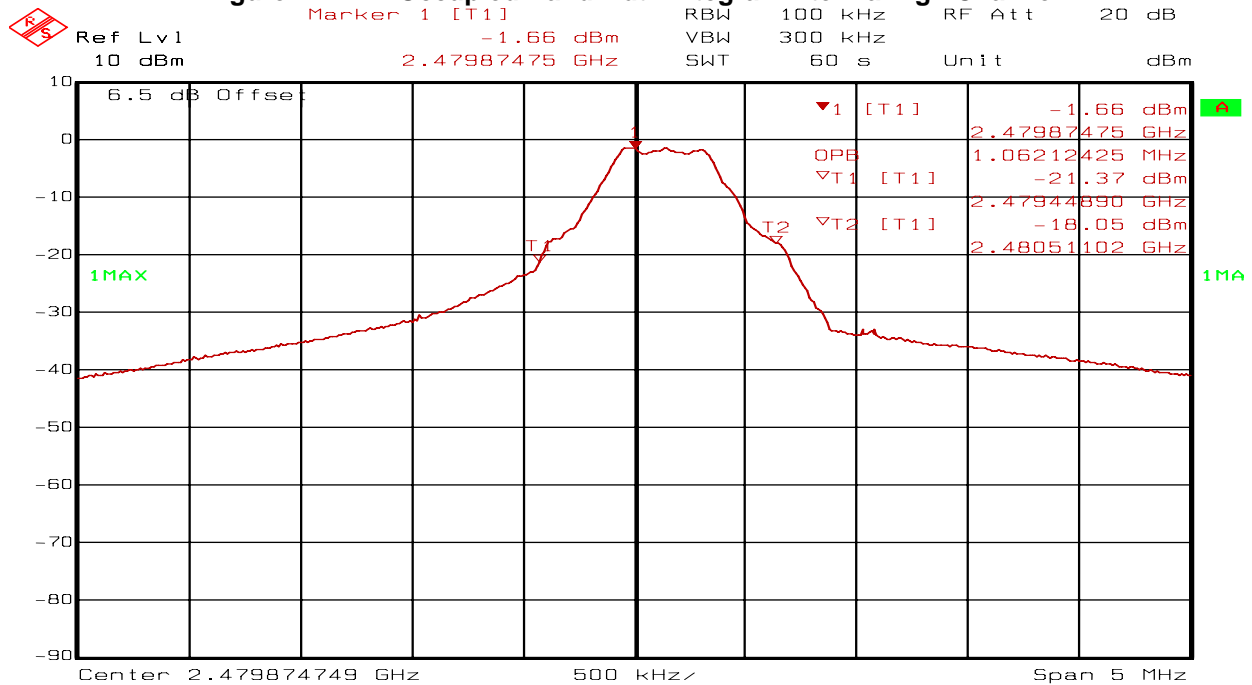
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Figure 11 Occupied Bandwidth Integral Antenna Mid Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch39. Pseudo random bit at default power. Internal antenna.
Date: 11.JUN.2009 17:38:39

Figure 12 Occupied Bandwidth Integral Antenna High Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch78. Pseudo random bit at default power. Internal antenna.
Date: 8.JUN.2009 18:37:54

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APPENDIX C: PEAK POWER OUTPUT

C.1. Base Standard & Test Basis

Base Standard	FCC 15.247 RSS 210 Issue 7 A8.4 (4)
Test Basis	FCC 15.247 as per FCC Publication 558074 RSS-Gen Issue 2 4.8
Test Method	FCC Publication 558074 and RSS-Gen Issue 2 4.8

C.2. Specifications

The maximum peak output power shall not exceed 30 dBm in the 2400 MHz- 2483.5 MHz band

C.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

C.4. Test Procedure

Conducted as per FCC Publication 558074 and RSS-Gen Issue 2 4.8

C.5. Operating Mode During Test

The WELS was tuned to a low, middle and high channel of test mode operating at its highest RF output power. Transmitter tested with pseudo random bit sequence.

C.6. Test Results

Compliant – The maximum peak power was -0.33 dBm

C.7. Sample Calculation

None

C.8. Test Data Summary

Antenna	Channel	Frequency (MHz)	Peak RF power (dBm)
External	0	2403.517	-2.62
	39	2441.613	-2.54
	78	2480.030	-2.54
Integral	0	2402.094	-0.98
	39	2441.658	-0.33
	78	2480.321	-0.71

C.9. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Lixin Wang
Function: EMC Technologist

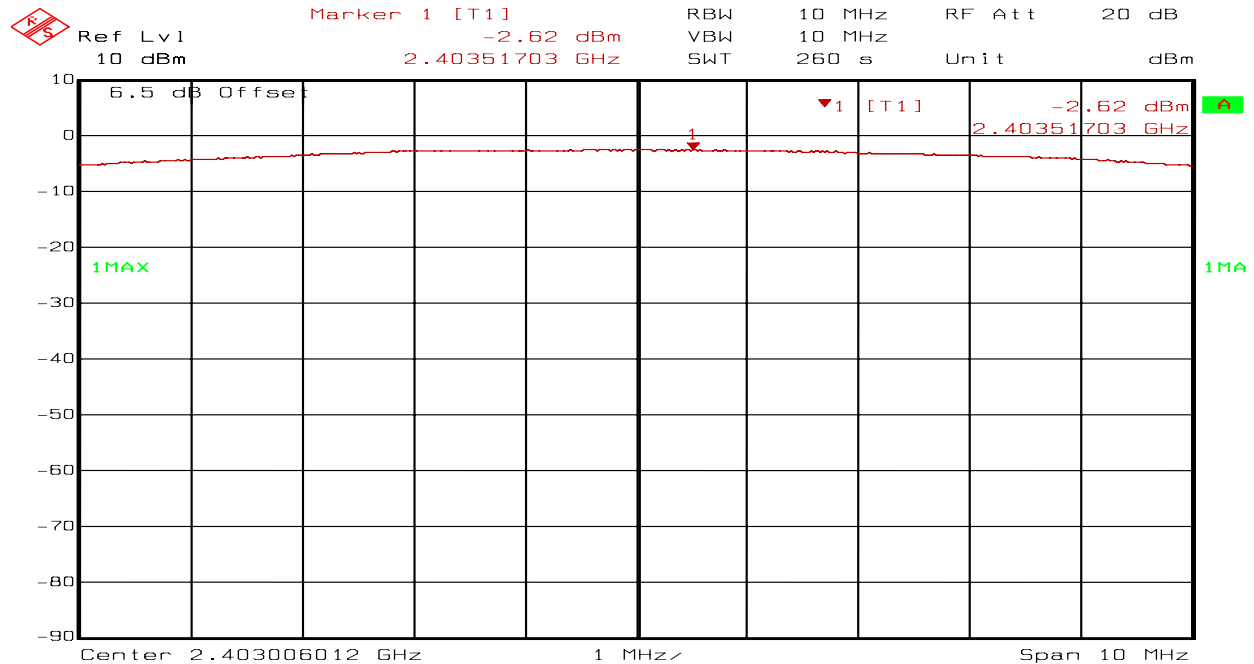
C.10. Test date

Test started: May 13, 2009 Ended: June 11, 2009

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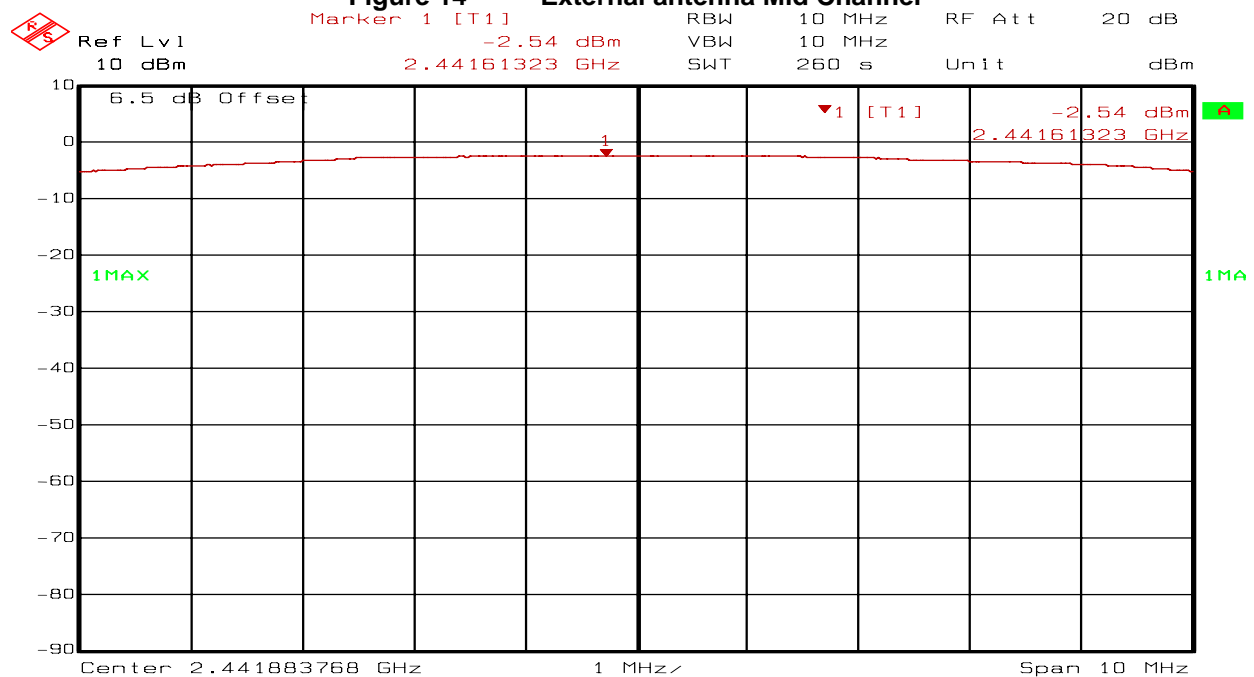
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Figure 13 External Antenna Low Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch0,Pseudo random bit at default power.
Date: 13.MAY.2009 10:35:33

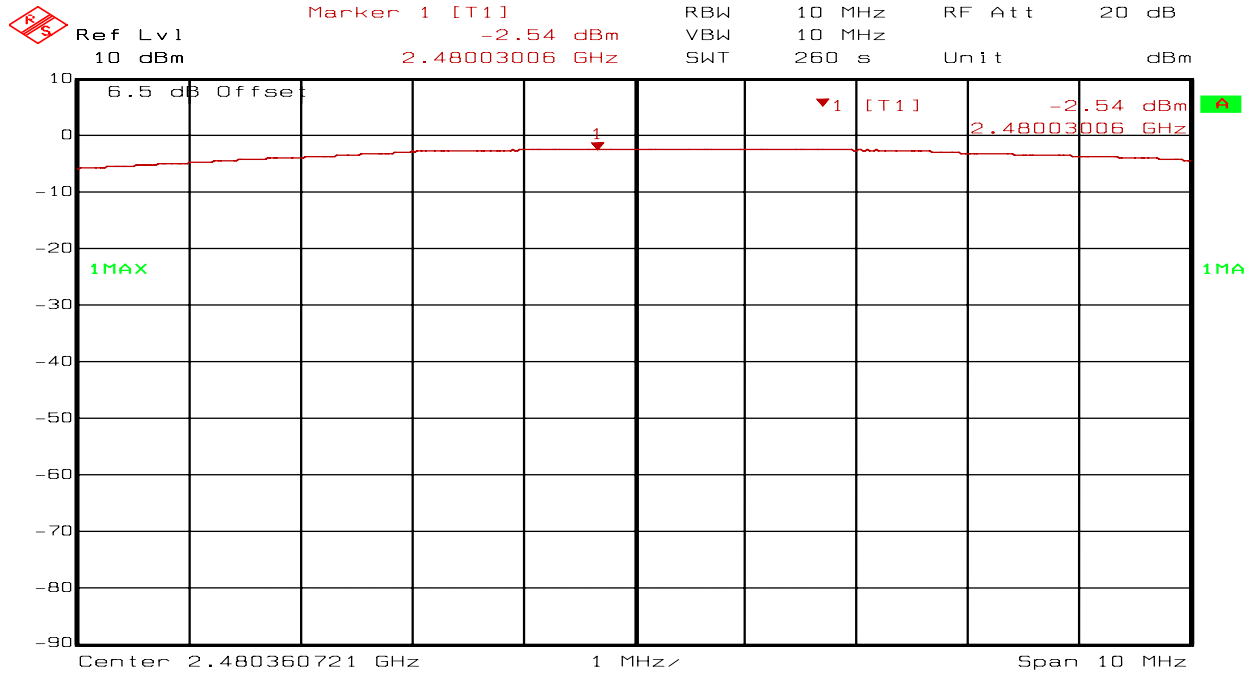
Figure 14 External antenna Mid Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch39,Pseudo random bit at default power.Ext ant
port.
Date: 13.MAY.2009 10:51:02

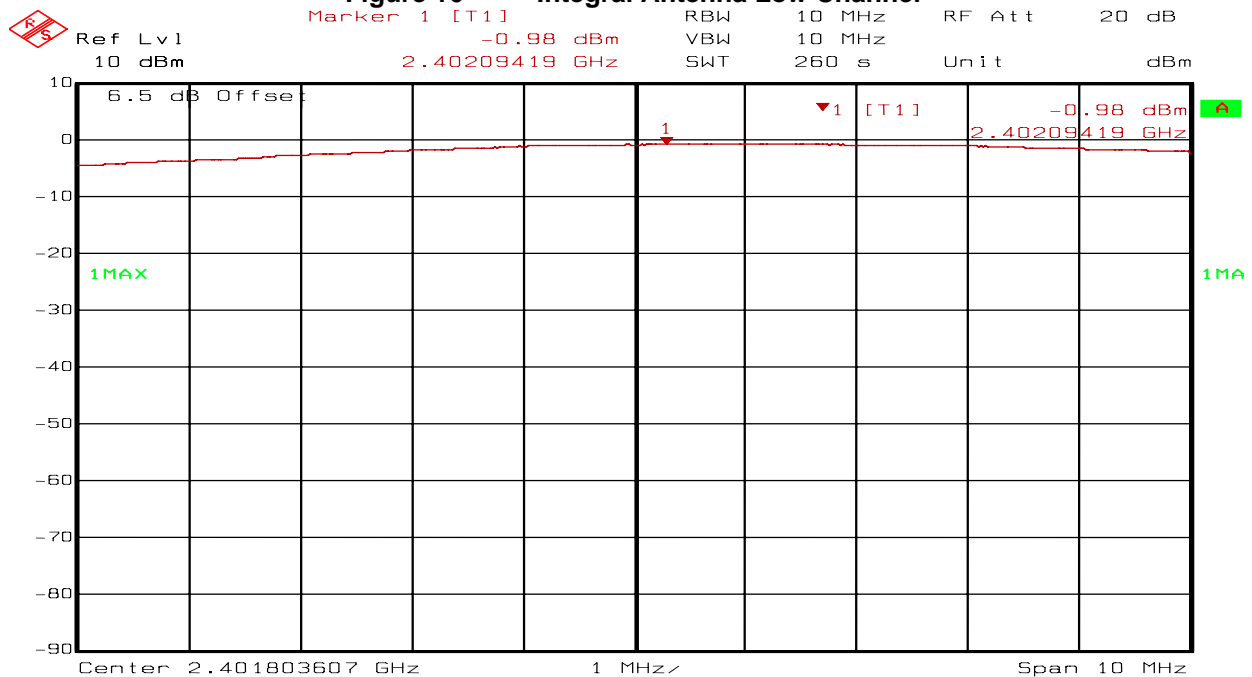
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Figure 15 External Antenna High Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch78, Pseudo random bit at default power. Ext ant
port.
Date: 13.MAY.2009 11:00:08

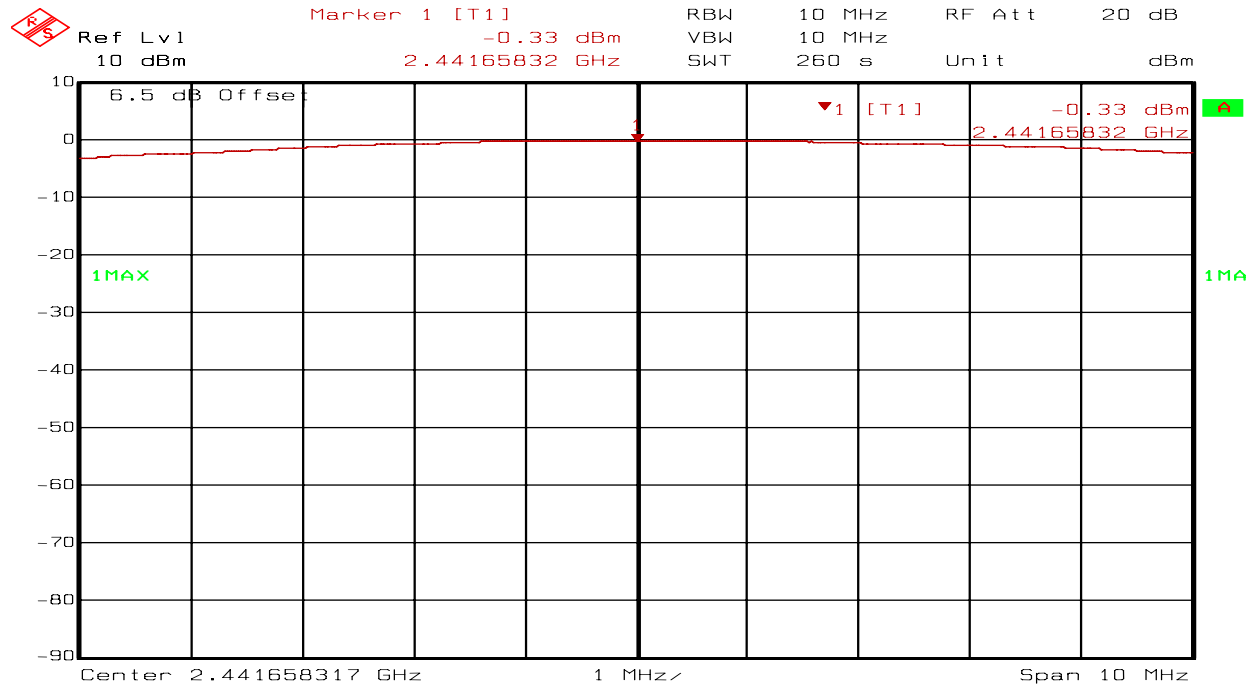
Figure 16 Integral Antenna Low Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch0, Pseudo random bit at default power. Interna
l antenna.
Date: 8.JUN.2009 17:50:11

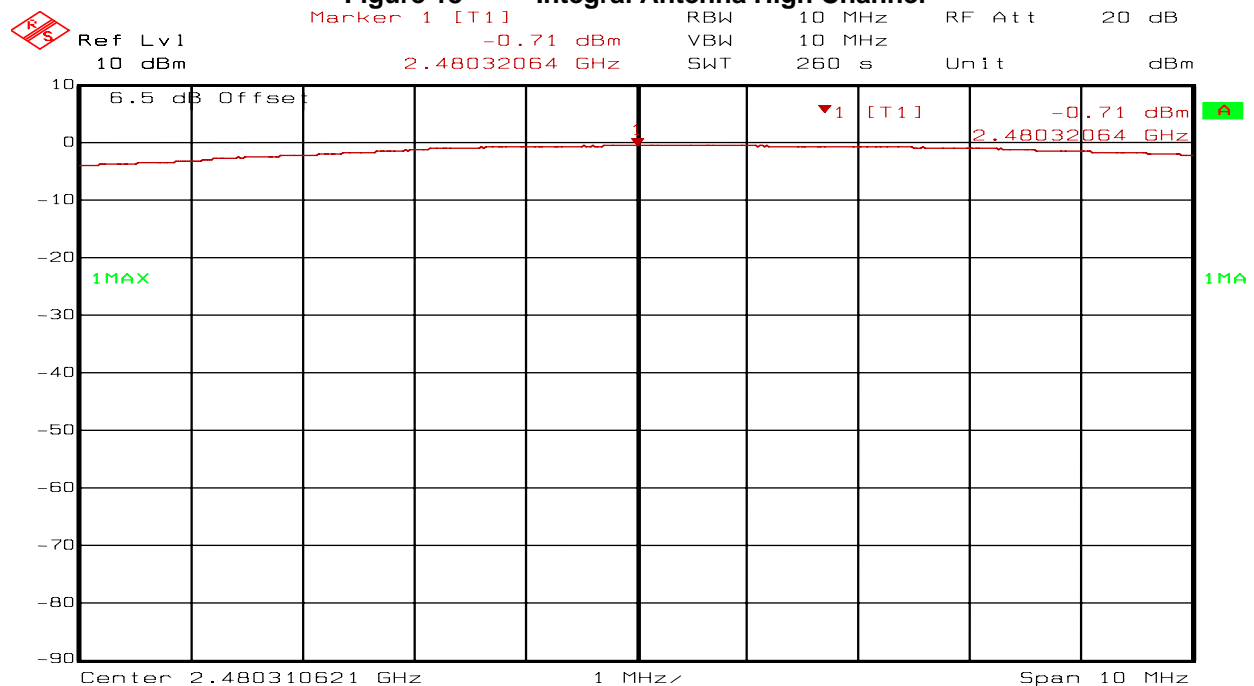
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Figure 17 Integral Antenna Mid Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch39. Pseudo random bit at default power. Internal antenna.
Date: 11.JUN.2009 20:08:01

Figure 18 Integral Antenna High Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch78. Pseudo random bit at default power. Internal antenna.
Date: 8.JUN.2009 18:07:15

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APPENDIX D: POWER SPECTRAL DENSITY**D.1. Base Standard & Test Basis**

Base Standard	FCC 15.247 (e) RSS 210 Issue 7 A8.2 (b)
Test Basis	FCC 15.247 as per FCC Publication 558074 RSS 210 Issue 7 A8.2 (b)
Test Method	FCC Publication 558074 and RSS 210 Issue 7 A8.2 (b)

D.2. Specifications

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

D.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

D.4. Test Procedure

Conducted as per FCC Publication 558074

D.5. Operating Mode During Test

The WELS was tuned to a low, middle and high channel of test mode operating at its highest RF output power. Transmitter tested with pseudo random bit sequence.

D.6. Test Results

Compliant. The maximum measured power spectral density was -12.89 dBm

D.7. Sample Calculation

None

D.8. Test Data Summary

Antenna	Channel	Frequency (MHz)	PSD (dBm)
External	0	2401.854	-12.89
	39	2440.850	-13.05
	78	2479.849	-13.22
Integral	0	2401.843	-14.19
	39	2441.006	-13.42
	78	2479.844	-12.92

D.9. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Lixin Wang
Function: EMC Technologist

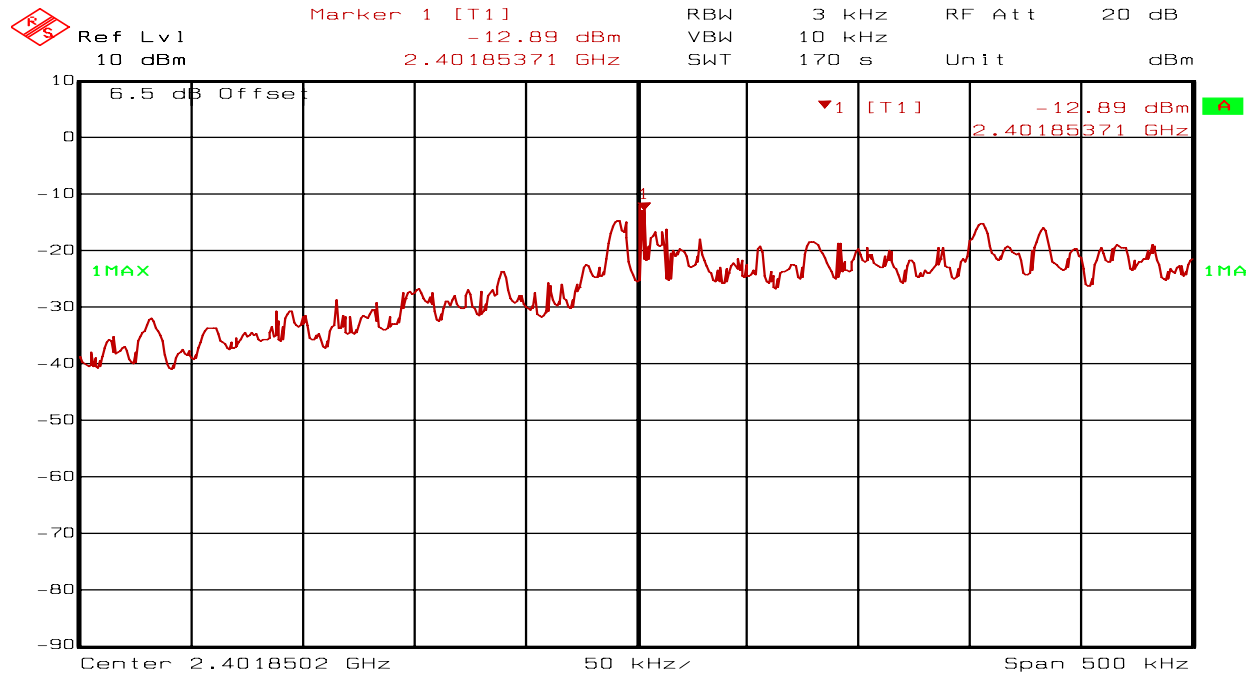
D.10. Test date

Test started: May 13, 2009 Ended: June 8, 2009

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

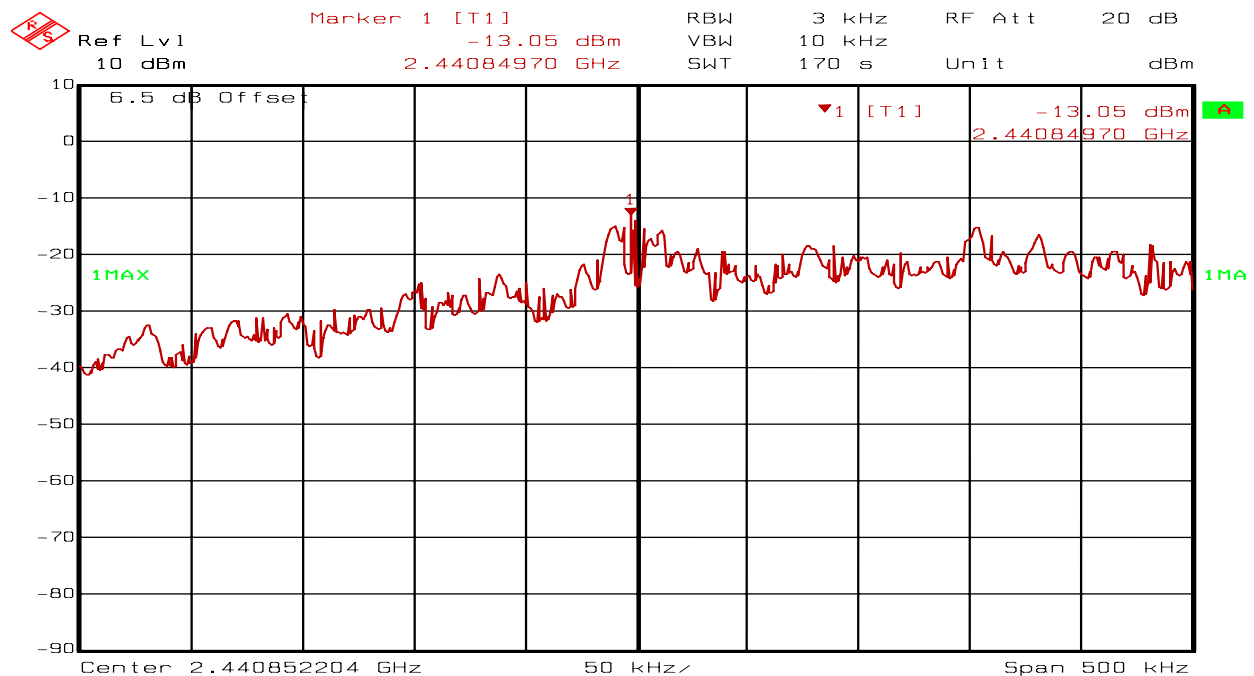
NTS Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-568-6605, Fax: 403-568-6970

Figure 19 External Antenna Low Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch0,Pseudo random bit at default power.Ext ant
port.
Date: 13.MAY.2009 12:20:52

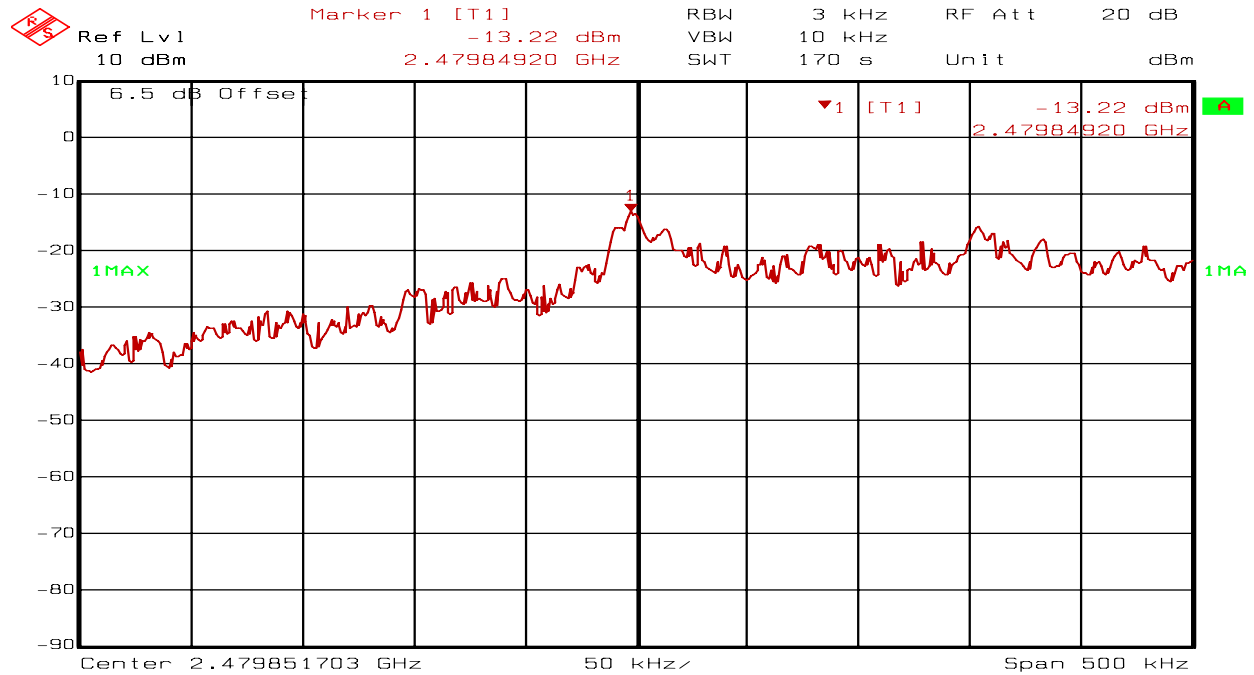
Figure 20 External Antenna Mid Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch39,Pseudo random bit at default power.Ext ant
port.
Date: 13.MAY.2009 12:10:41

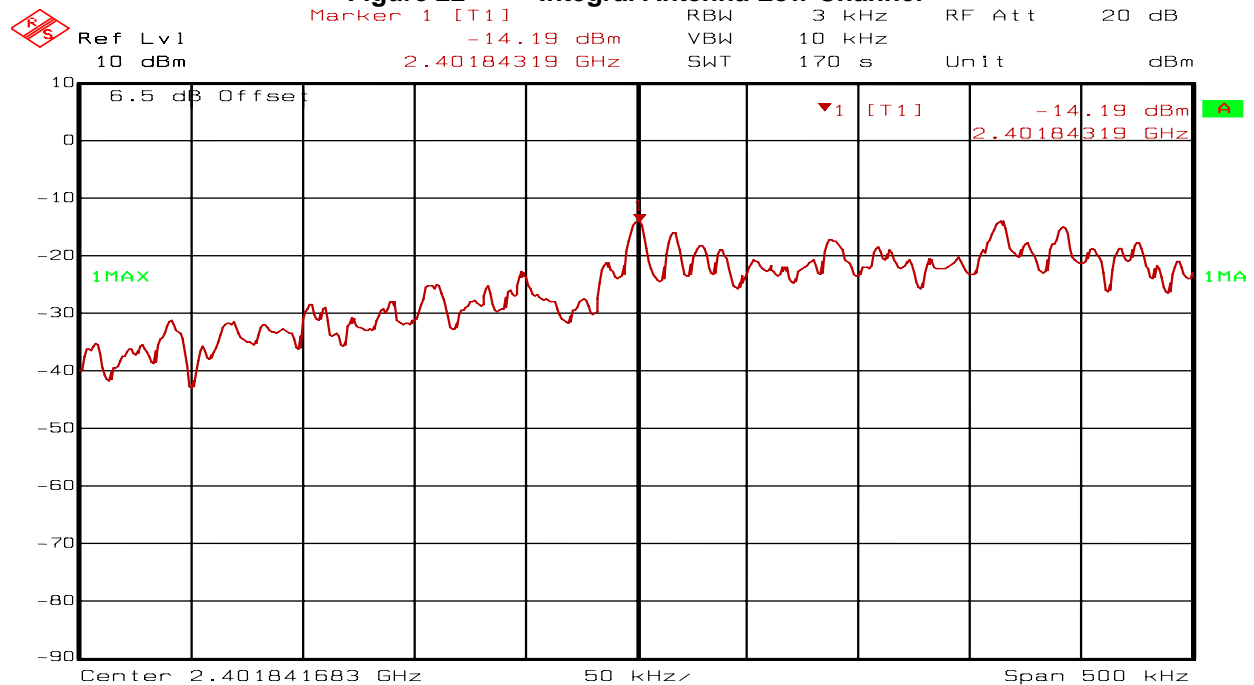
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 21 External Antenna High Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch78, Pseudo random bit at default power. Ext ant port.
Date: 13.MAY.2009 11:56:37

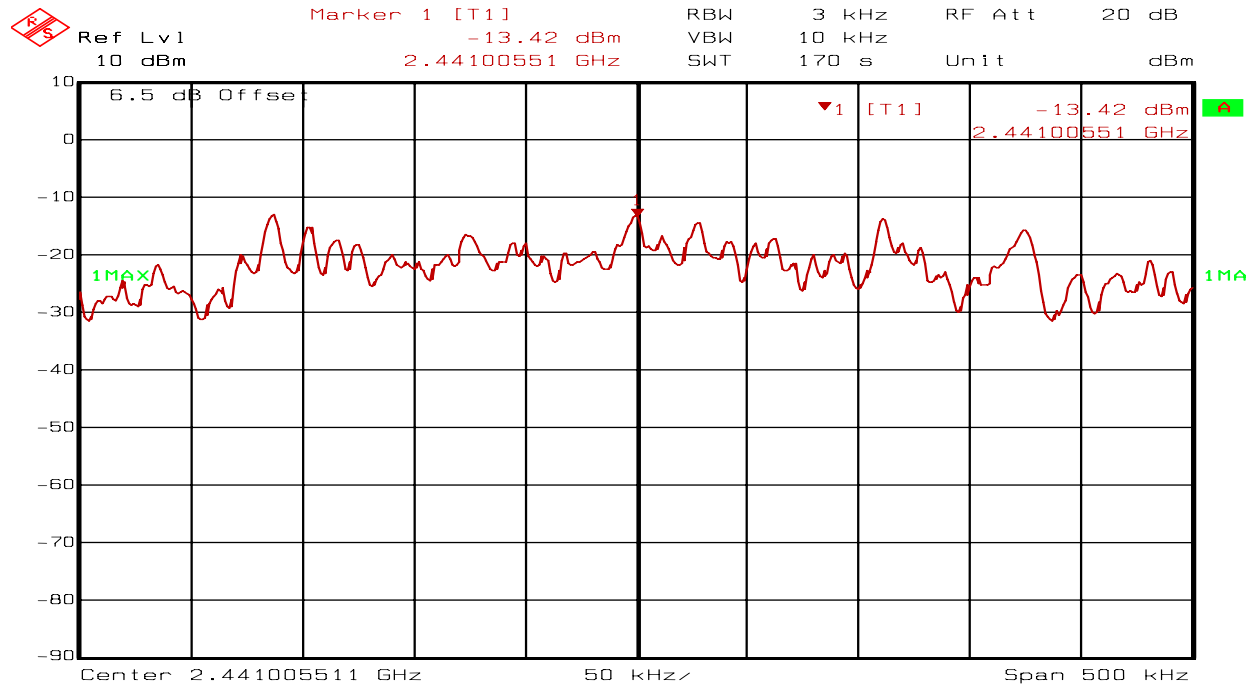
Figure 22 Integral Antenna Low Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch0, Pseudo random bit at default power. Internal antenna.
Date: 8.JUN.2009 19:09:47

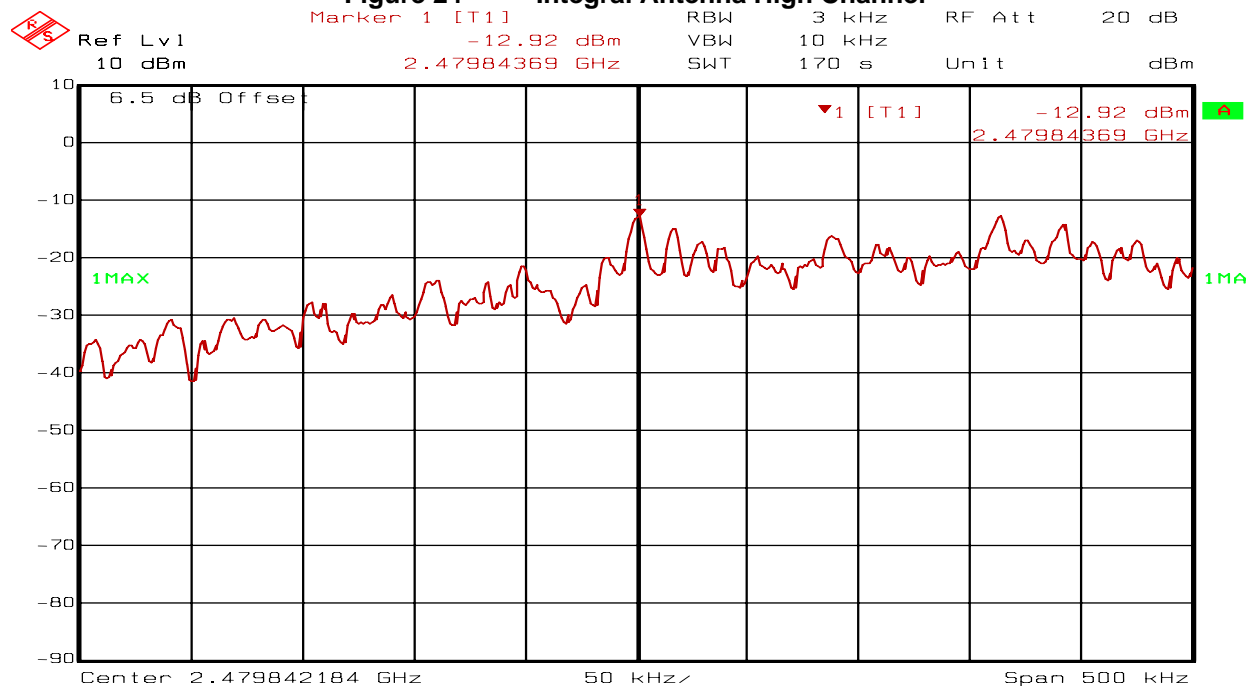
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 23 Integral Antenna Mid Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch39, Pseudo random bit at default power. Internal antenna.
Date: 8.JUN.2009 19:00:29

Figure 24 Integral Antenna High Channel



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch78, Pseudo random bit at default power. Internal antenna.
Date: 8.JUN.2009 18:47:42

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

APPENDIX E: DUTY CYCLE CORRECTION FACTOR

E.1. Base Standard & Test Basis

Base Standard	FCC 15.35 (c) RSS-Gen Issue 2 4.5
Test Basis	FCC 15.35 (c) as per FCC Publication 558074 RSS-Gen Issue 2 4.5
Test Method	Zero span

E.2. Specifications

Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

E.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

E.4. Test Procedure

Conducted with Zero span.

E.5. Operating Mode During Test

The WELS was tuned to a low channel of test mode operating at its default RF output power. Transmitter tested with pseudo random bit sequence.

E.6. Test Results

Hopping rate 1600 1/s

Hopping channels 79

As per the Bluetooth specification the hopping sequence is split evenly between 79 channels, so maximum transmissions on any one channel over 1 second will be

$1600/79 = 20.25$ Hops max on any one channel. For Duty cycle correction factor over a 100 ms period, the number of hops on the channel would be

$20.25/10 = 2.025$ Hops over 100 ms

Duty cycle correction factor will be:

$$= 20 \log \frac{2.025 \times 0.265 \text{ ms}}{100 \text{ ms}}$$

$$\text{DCF} = -45.41 \text{ dB}$$

Therefore the maximum duty cycle correction factor applied is 20 dB

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

NTS Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-568-6605, Fax: 403-568-6970

E.7. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Lixin Wang
Function: EMC Technologist

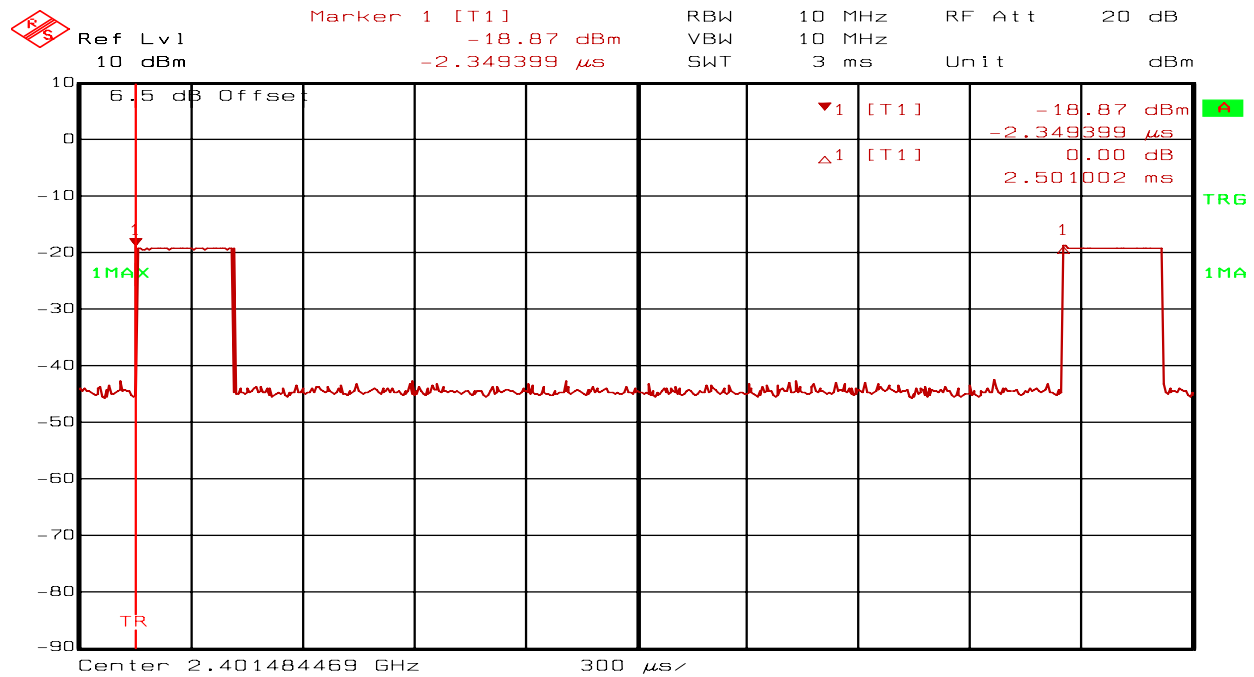
E.8. Test date

Test started: May 13, 2009 Ended: May 13, 2009

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

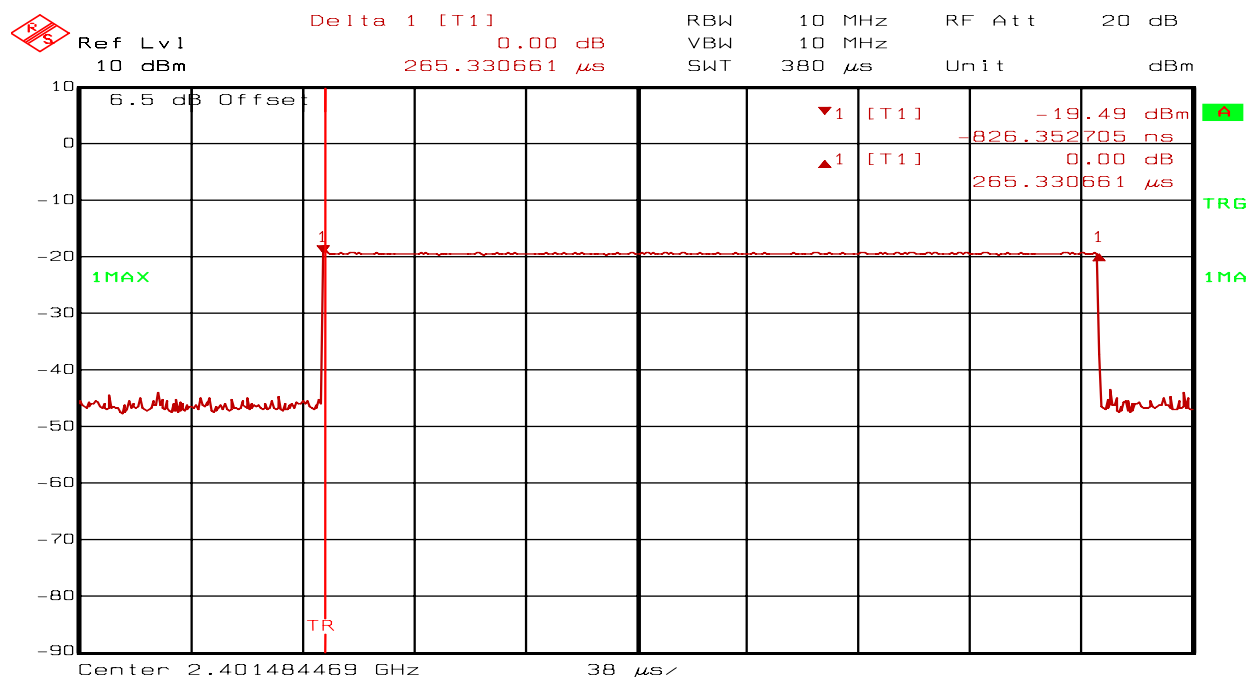
NTS Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-568-6605, Fax: 403-568-6970

Figure 25 Period



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch0,Pseudo random bit at default power.Ext ant
port.
Date: 13.MAY.2009 12:32:26

Figure 26 On Time



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch0,Pseudo random bit at default power.Ext ant
port.
Date: 13.MAY.2009 12:34:11

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

APPENDIX F: CONDUCTED SPURIOUS EMISSIONS

F.1. Base Standard & Test Basis

Base Standards	FCC CFR Title 47 – Telecommunications, Chapter I Part 15.247 (d) RSS-210 Issue 7 A8.5
Test Basis	RF conducted as per FCC Publication 558074 RSS-210 Issue 7 A8.5
Test Method	RF conducted as per FCC Publication 558074 RSS-210 Issue 7 A8.5

F.2. Specifications

FCC Part 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

RSS-210 Issue 7 A8.5 has the same specifications.

F.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

F.4. Test Procedure

Conducted as per FCC Publication 558074

F.5. Operating Mode During Test

The WELS was tuned to a low, middle and high channel of test mode operating at its highest RF output power. Transmitter tested with pseudo random bit sequence.

F.6. Test Results

Compliant,
Worst case spurious emission was 36.70 dB below the carrier at Channel 78.

F.7. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Lixin Wang
Function: EMC Technologist

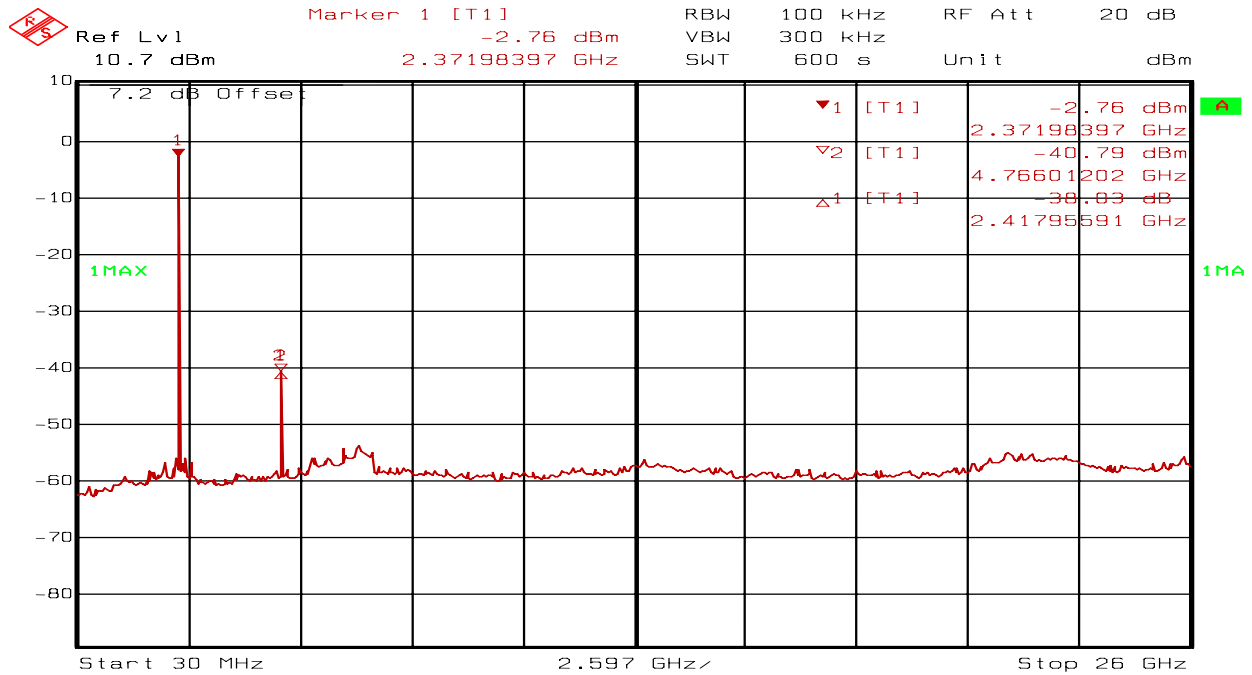
F.8. Test date

Test started: May 13, 2009 Ended: June 11, 2009

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

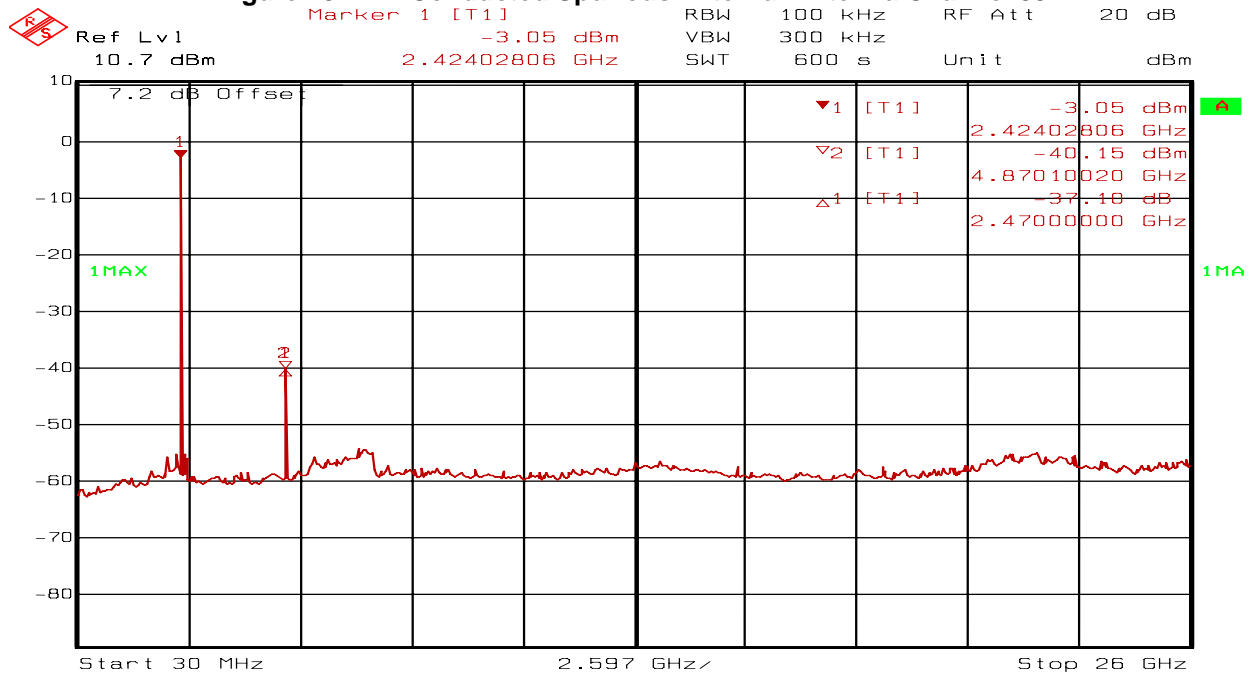
NTS Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-568-6605, Fax: 403-568-6970

Figure 27 Conducted Spurious External Antenna Channel 0



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch0,Pseudo random bit at default power.Ext ant port.
Date: 13.MAY.2009 13:53:05

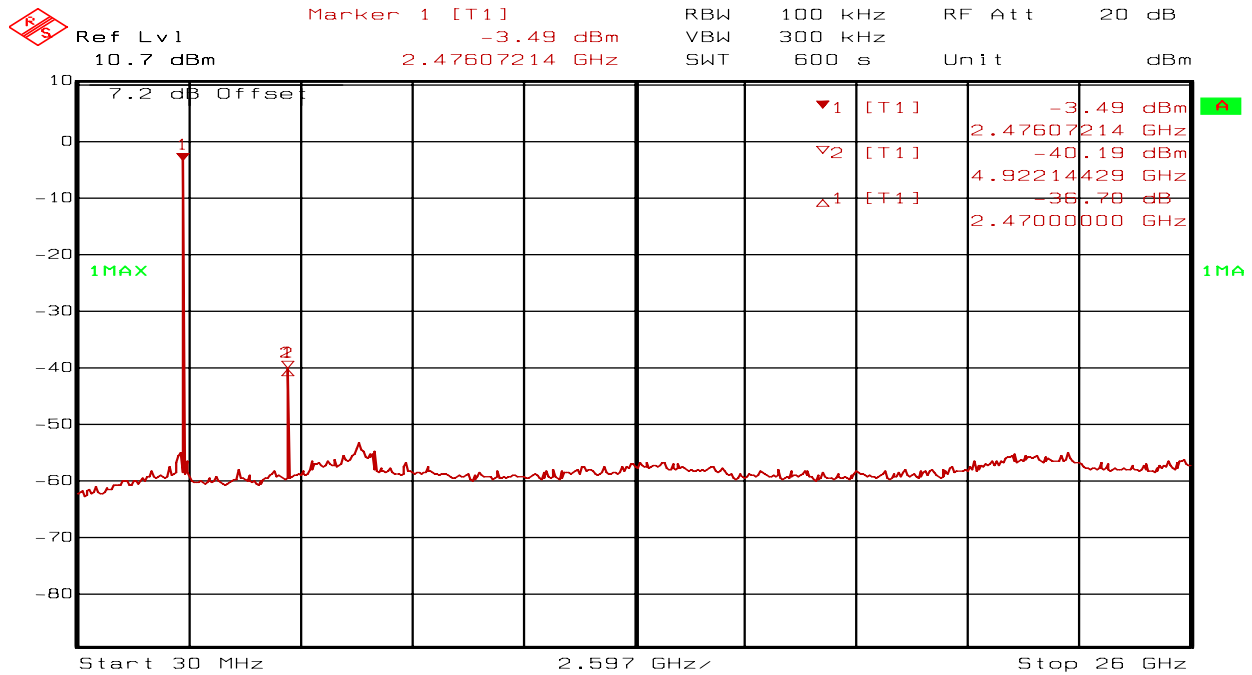
Figure 28 Conducted Spurious External Antenna Channel 39



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch39,Pseudo random bit at default power.Ext ant port.
Date: 13.MAY.2009 14:05:50

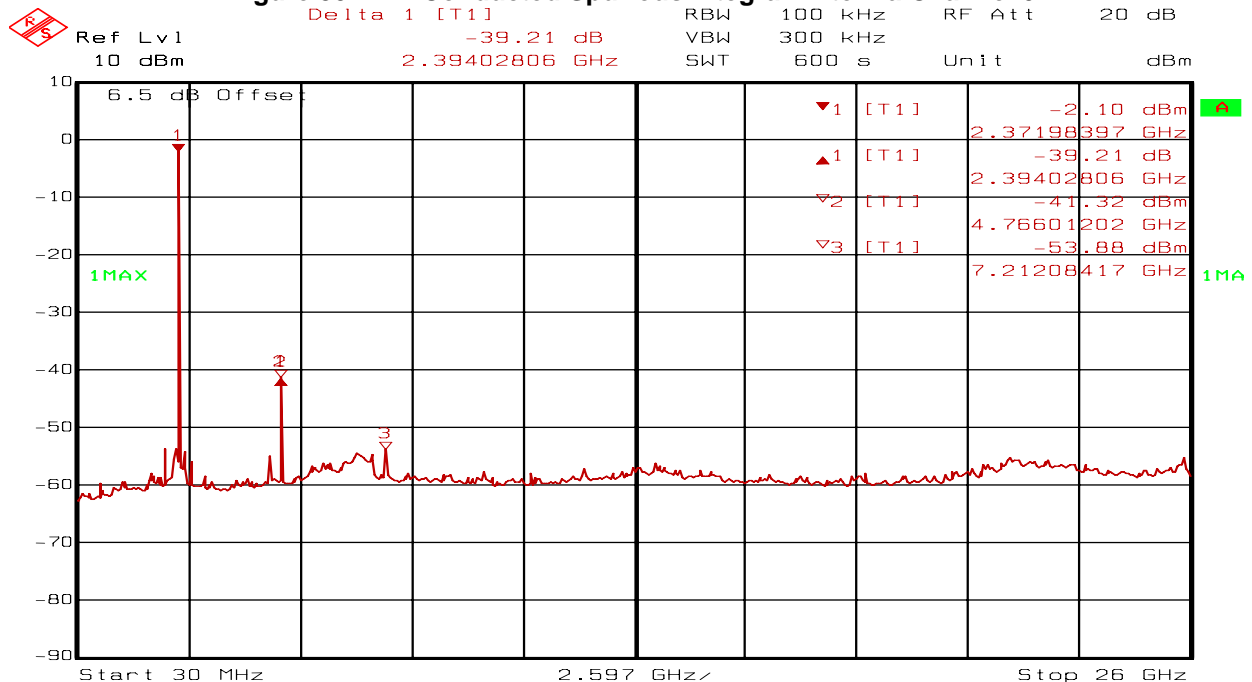
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 29 Conducted Spurious External Antenna Channel 78



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch78, Pseudo random bit at default power. Ext ant port.
Date: 13.MAY.2009 14:18:15

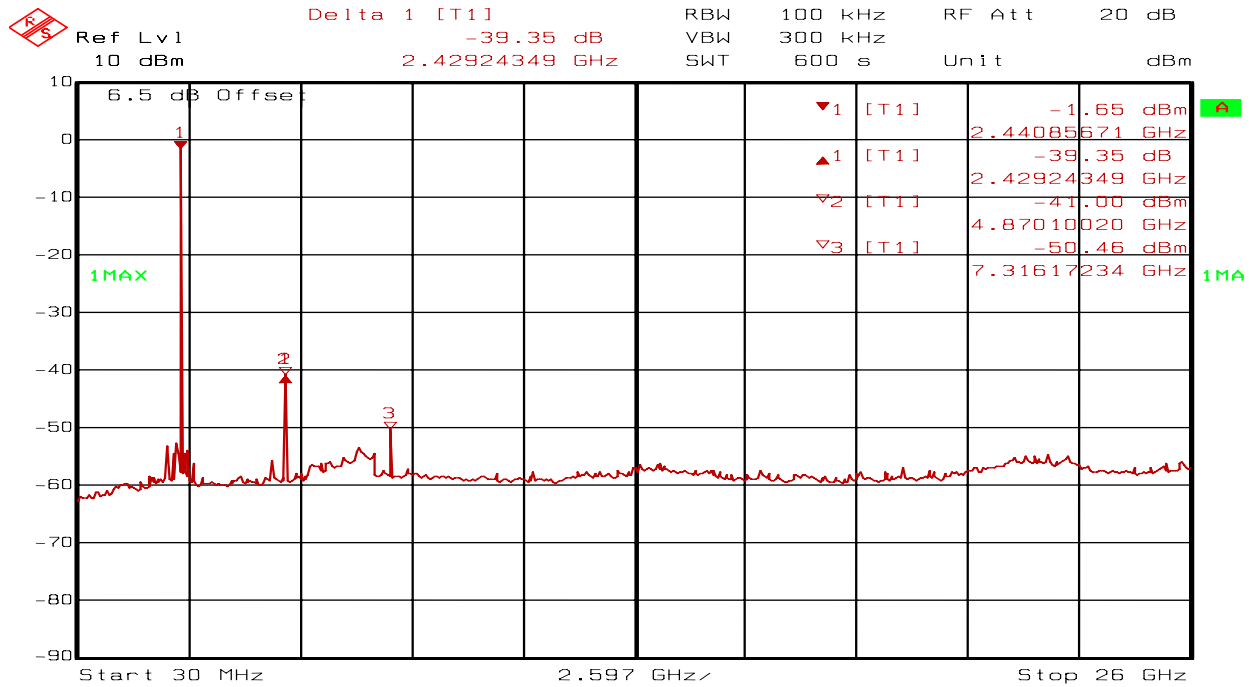
Figure 30 Conducted Spurious Integral Antenna Channel 0



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch0, Pseudo random bit at default power. Internal antenna.
Date: 8.JUN.2009 19:46:19

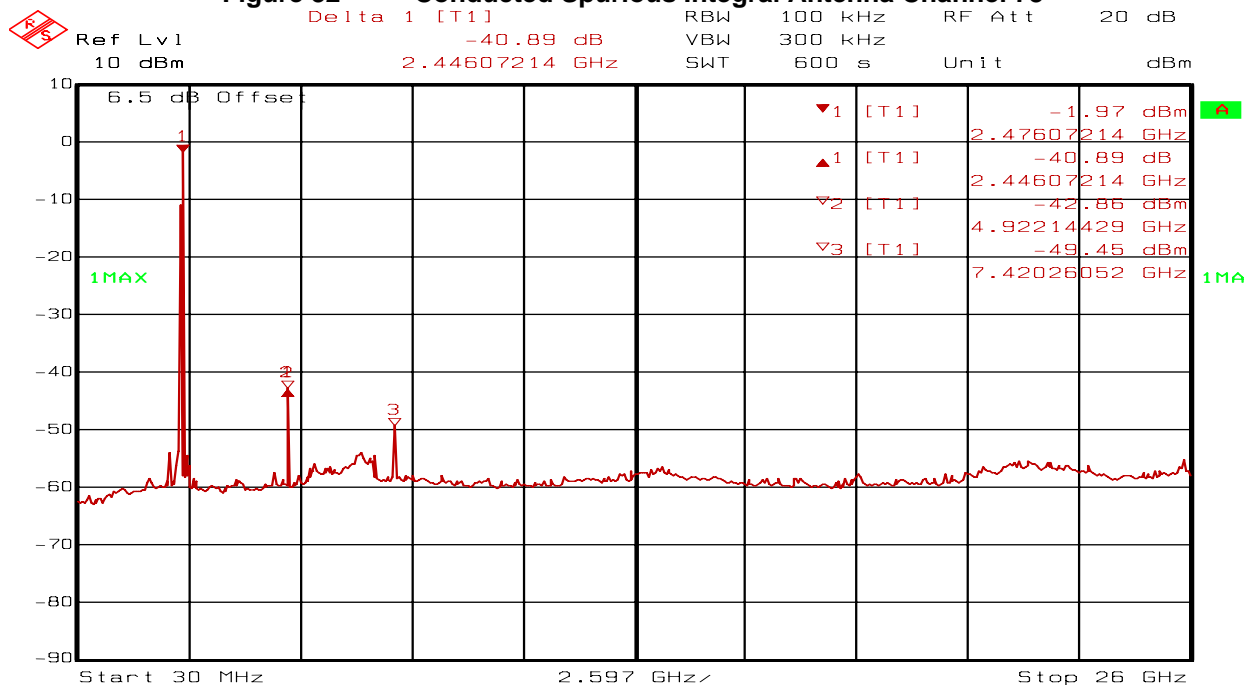
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 31 Conducted Spurious Integral Antenna Channel 39



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch39.Pseudo random bit at default power.Interna
l antenna.
Date: 11.JUN.2009 19:45:19

Figure 32 Conducted Spurious Integral Antenna Channel 78



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch78, Pseudo random bit at default power.Intern
al antenna.
Date: 8.JUN.2009 20:13:22

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

APPENDIX G: CONDUCTED SPURIOUS EMISSIONS BAND EDGE**G.1. Base Standard & Test Basis**

Base Standards	FCC CFR Title 47 – Telecommunications, Chapter I Part 15.247 (d) RSS-210 Issue 7 A8.5
Test Basis	RF conducted as per FCC Publication 558074 RSS-210 Issue 7 A8.5
Test Method	RF conducted as per FCC Publication 558074 RSS-210 Issue 7 A8.5

G.2. Specifications

FCC Part 15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

RSS-210 Issue 7 A8.5 has the same specifications.

G.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

G.4. Test Procedure

Conducted as per FCC Publication 558074

G.5. Operating Mode During Test

The WELS was tuned to a low and high channel of test mode operating at its highest RF output power. Transmitter tested with pseudo random bit sequence.

G.6. Test Results

Compliant

Worst case spurious emission was 35.90 dB below the carrier at Channel 0

G.7. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Lixin Wang
Function: EMC Technologist

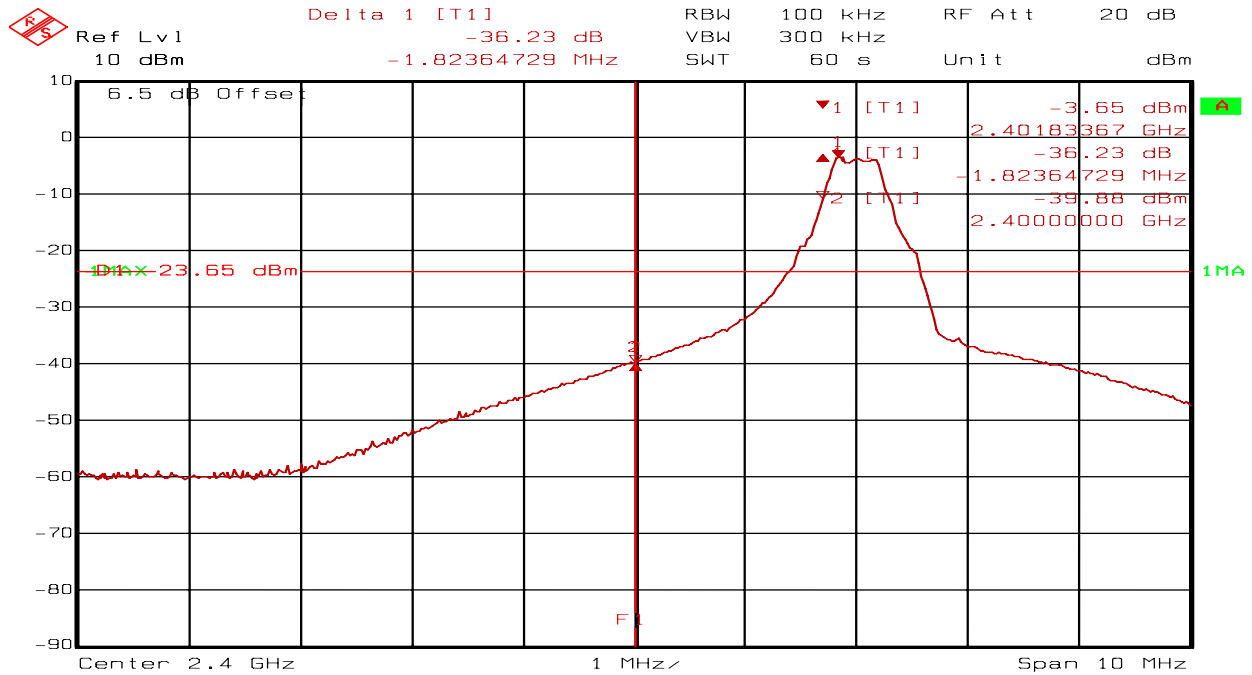
G.8. Test date

Test started: May 13, 2009 Ended: June 8, 2009

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

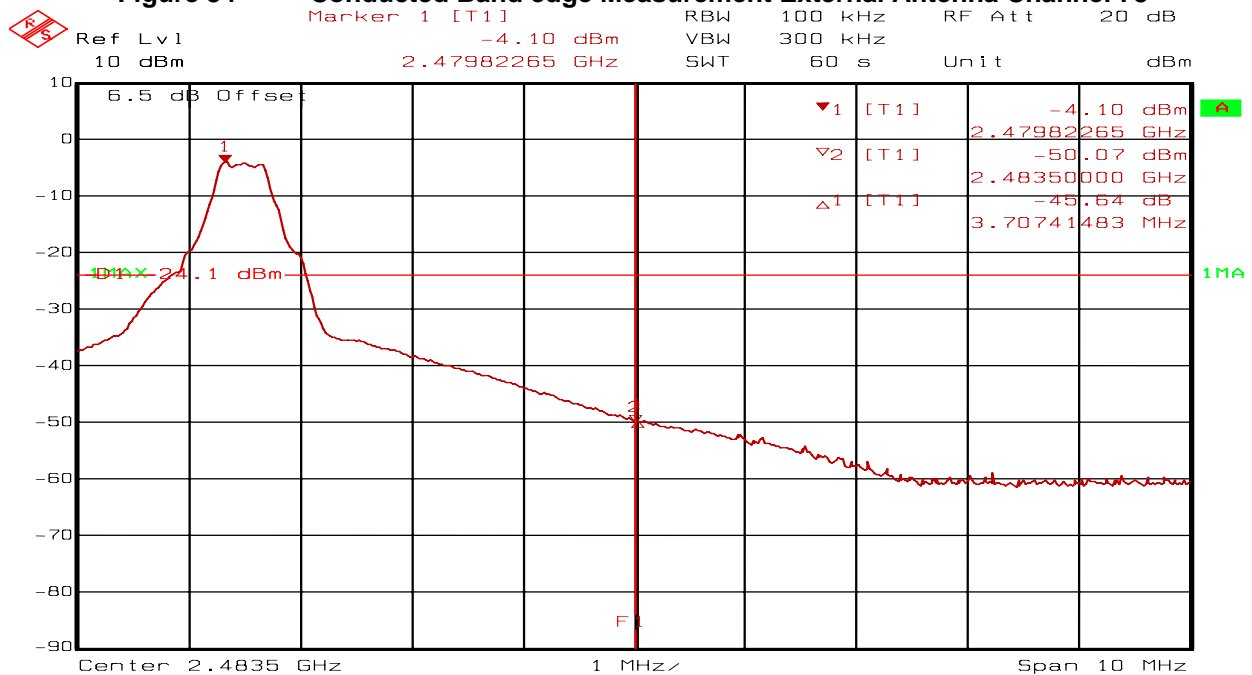
NTS Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-568-6605, Fax: 403-568-6970

Figure 33 Conducted Band edge Measurement External Antenna Channel 0



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch0,Pseudo random bit at default power.Ext ant
port.
Date: 13.MAY.2009 14:39:53

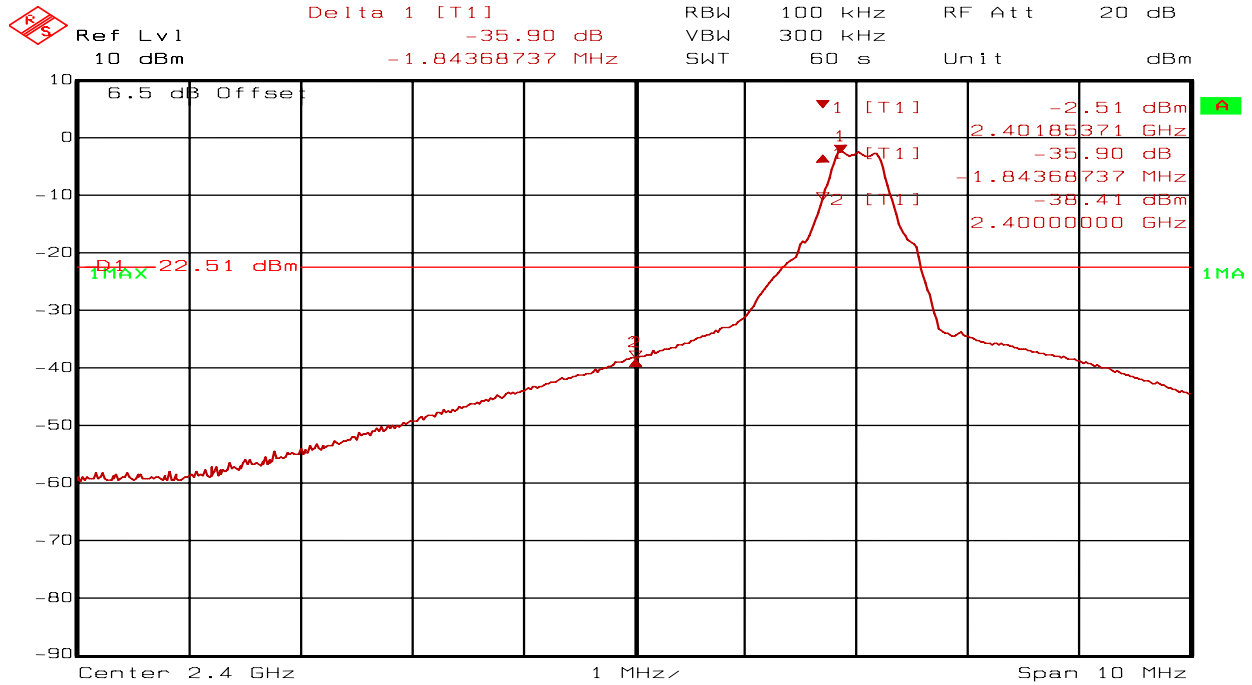
Figure 34 Conducted Band edge Measurement External Antenna Channel 78



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch78,Pseudo random bit at default power.Ext ant
port.
Date: 13.MAY.2009 14:34:48

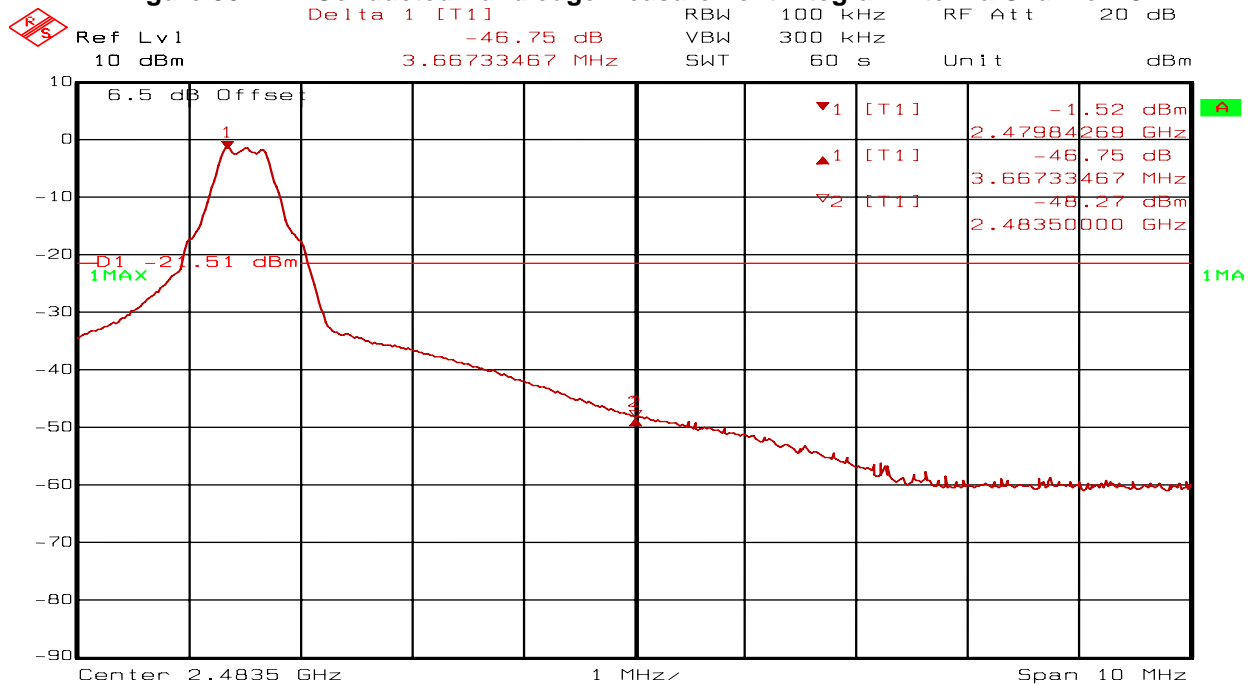
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 35 Conducted Band edge Measurement Integral Antenna Channel 0



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch0, Pseudo random bit at default power. Internal antenna.
Date: 8.JUN.2009 20:38:05

Figure 36 Conducted Band edge Measurement Integral Antenna Channel 78



Title: CG-945 Securaplane WELS
Comment A: Unit 0812440 Ch78, Pseudo random bit at default power. Internal antenna.
Date: 8.JUN.2009 20:26:25

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

APPENDIX H: RADIATED SPURIOUS EMISSIONS BAND EDGE

H.1. Base Standard & Test Basis

Base Standard	FCC CFR Title 47 – Telecommunications, Chapter I Part 15.209 – Radio Frequency Devices, Part 15.205 – Restricted bands of operation RSS 210 Issue 7 A8.5
Test Basis	ANSI C63.4-2003 Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz, FCC Publication 558074
Test Method	NTS Radiated Emissions Test Method SOP CAG EMC 02 and FCC Publication 558074

H.2. Specifications: FCC 15.205 and RSS 210 Issue 7 2.2 Restricted bands of operation.

(a) Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
¹ 0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	N/A
13.36–13.41	N/A	N/A	N/A

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

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

NTS Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-568-6605, Fax: 403-568-6970

H.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

H.4. Test Procedure

FCC Publication 558074:

558074 (c) (2) Radiated emission test: Applies to harmonics/spurs that fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209. A pre-amp (and possibly a high-pass filter) is necessary for this measurement.

For measurements above 1 GHz, set RBW = 1 MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation, use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

FCC Publication 913591:

In making radiated 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) as specified by measurement procedure ANSI C63.4-1992, unless precautions are followed. The following technique may be used for determining band edge compliance in an effort to ensure that the proper precautions are followed.

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

Repeat the measurement with an average detector (i.e., 1 MHz RBW with 10 Hz VBW).

STEP 2 - Choose a spectrum analyzer span that encompasses both the peak of the fundamental emission and the band edge emission under investigation. Set the analyzer RBW to 1% of the total span (but never less than 30 kHz) with a video bandwidth equal to or greater than the RBW. Record the peak levels of the fundamental emission and the relevant band edge emission (i.e., run several sweeps in peak hold mode). 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 the amount by which 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 Section 15.205.

STEP 4 - The above delta measurement technique may be used 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 standard bandwidths must be measured in the conventional manner.

H.5. Operating Mode During Test

The WELS was tuned to a low and high channel of test mode operating at its highest RF output power. Transmitter tested with pseudo random bit sequence.

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

H.6. Test Results

Compliant

Antenna	Channel	Frequency (MHz)	Detector	Carrier Emission Level (dBμV/m)	Band Edge Emission Level (dBμV/m)	Duty cycle Correction Factor (dB)	Marker Delta (dBc)	Band Edge Corrected Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Ext	0	2390.00	PK	N/A	61.24	N/A	N/A	61.24	73.98	12.74
	0	2390.00	AV	N/A	61.24	-20	N/A	41.24	53.98	12.74
	78	2483.50	PK	97.14	71.14	N/A	-44.91	52.23	73.98	21.75
	78	2483.50	AV	97.14	71.14	-20	-44.91	32.23	53.98	21.75
Int	0	2390.00	PK	N/A	61.60	N/A	N/A	61.60	73.98	12.38
	0	2390.00	AV	N/A	61.60	-20	N/A	41.60	53.98	12.38
	78	2483.50	PK	100.82	72.49	N/A	-49.49	51.33	73.98	22.65
	78	2483.50	AV	100.82	72.49	-20	-49.49	31.33	53.98	22.65

The measured emission with the least margin to the limit was 41.60dBuV/m at 2390.00 MHz, There is a 12.38 dB margin to the FCC part 15.209 limit.

EUT is in compliance with FCC part 15.205.

H.7. Sample Calculations

Part 15.209 Average Limit: $500 \mu\text{V/m} @ 3\text{m} = 20 * \text{Log}(500) = 53.98 \text{ dB}\mu\text{V/m}$, Peak limit = $73.98 \text{ dB}\mu\text{V/m}$
Radiated emission level (dBμV/m) = Measured level (dBμV) + Receive antenna factor (dB) + Receive cable loss (dB) – LNA gain (dB)

Peak Band Edge Corrected value (dBμV/m) = Carrier emission level (dBμV/m) – Marker Delta factor (dB) (applied only to Marker-delta method)

Average radiated emission level (dBμV/m) = Peak Band Edge Corrected value (dBμV/m) - Duty cycle correction factor (dB)

H.8. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Lixin Wang
Function: EMC Technologist

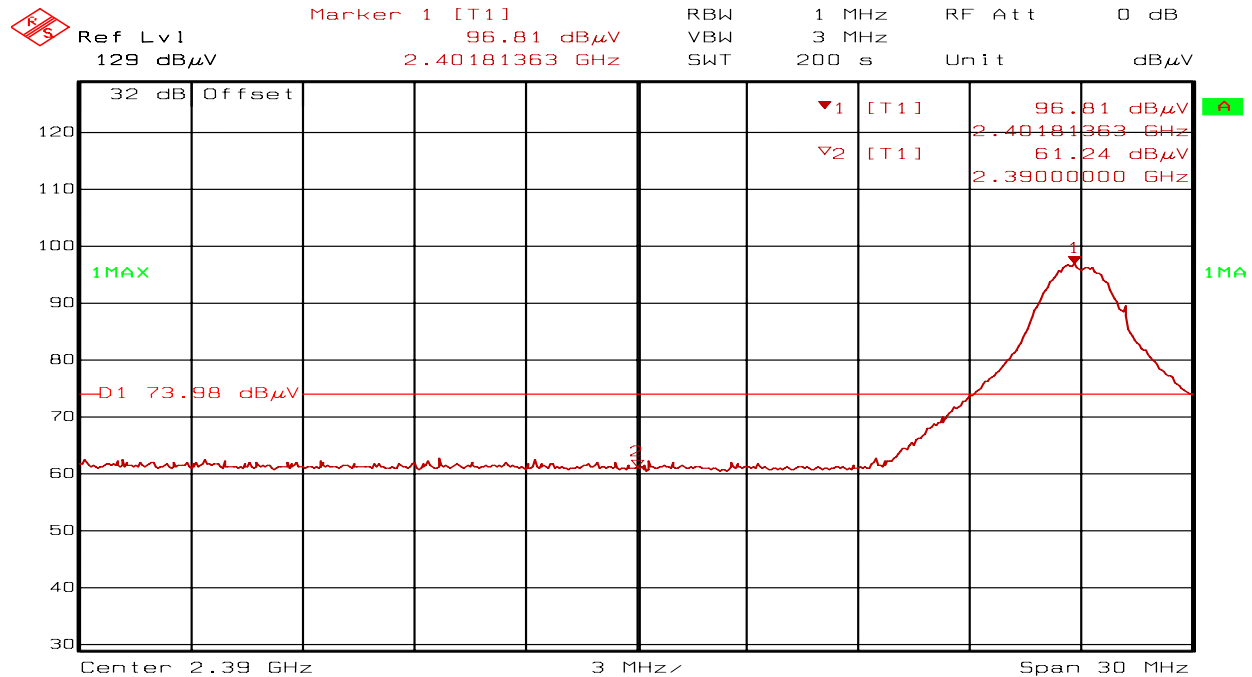
H.9. Test date

Test started: May 19, 2009 Ended: May 20, 2009

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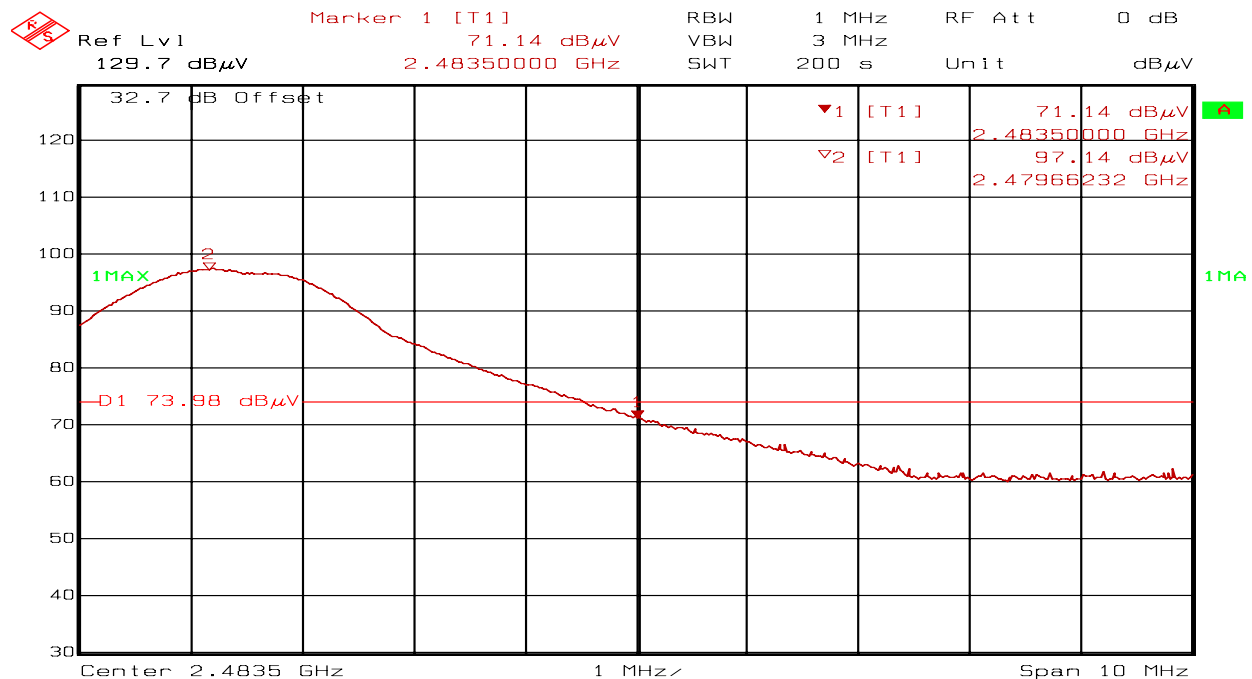
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Figure 37 External Antenna Low Channel Peak



Title: CG-945
Comment A: Unit 0812440.Tx Ch0.Ext Ant.
Date: 20.MAY.2009 14:53:18

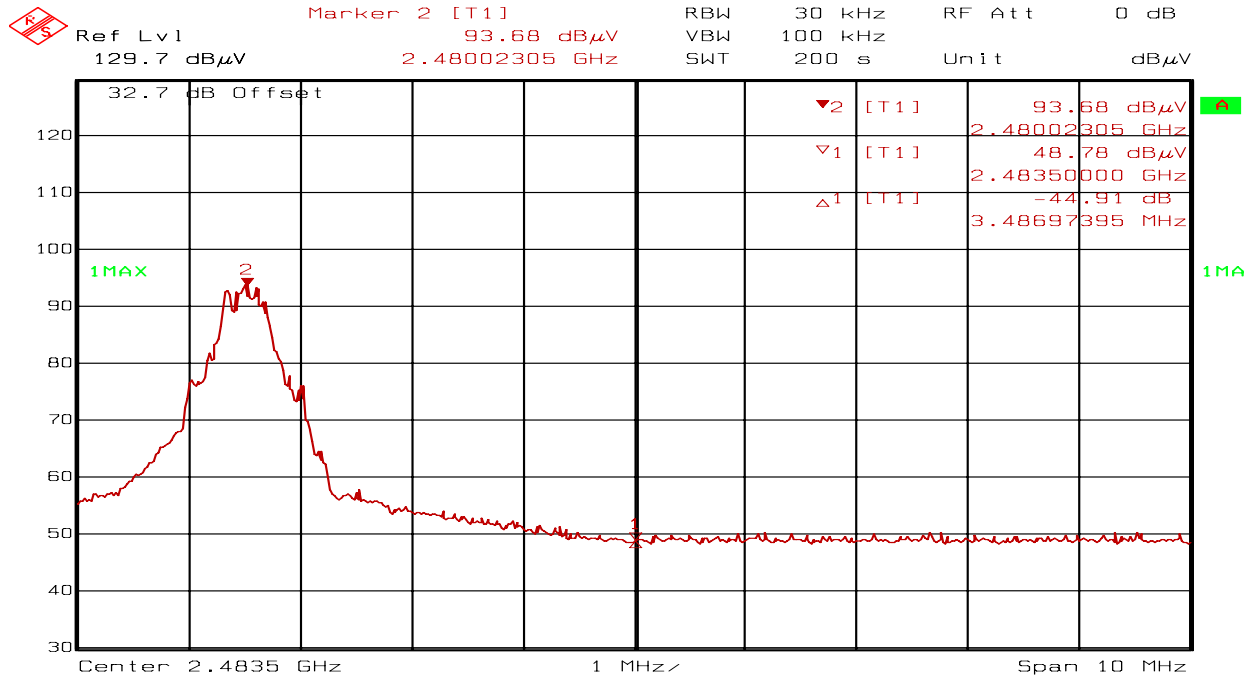
Figure 38 External Antenna High Channel peak



Title: CG-945
Comment A: Unit 0812440.Tx Ch78.External ant.
Date: 20.MAY.2009 14:10:36

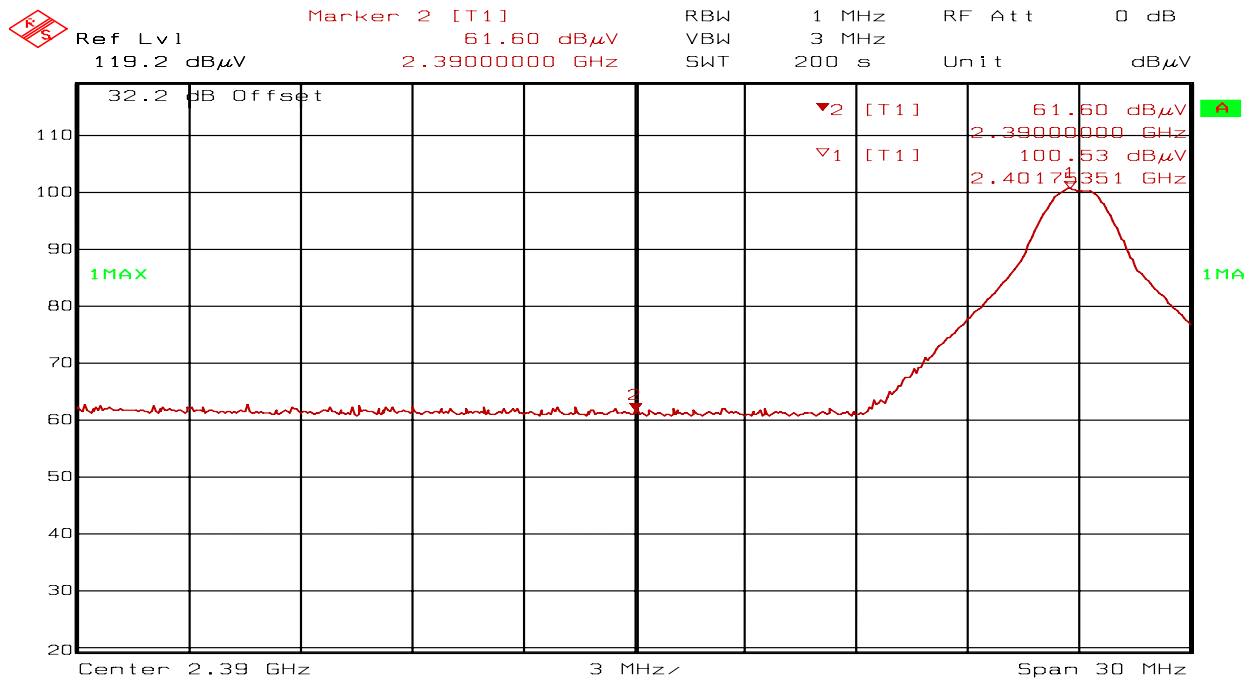
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Figure 39 External Antenna High Channel Marker-Delta



Title: CG-945
Comment A: Unit 0812440. Tx Ch78. External ant.
Date: 20.MAY.2009 14:19:37

Figure 40 Integral Antenna Low Channel Peak

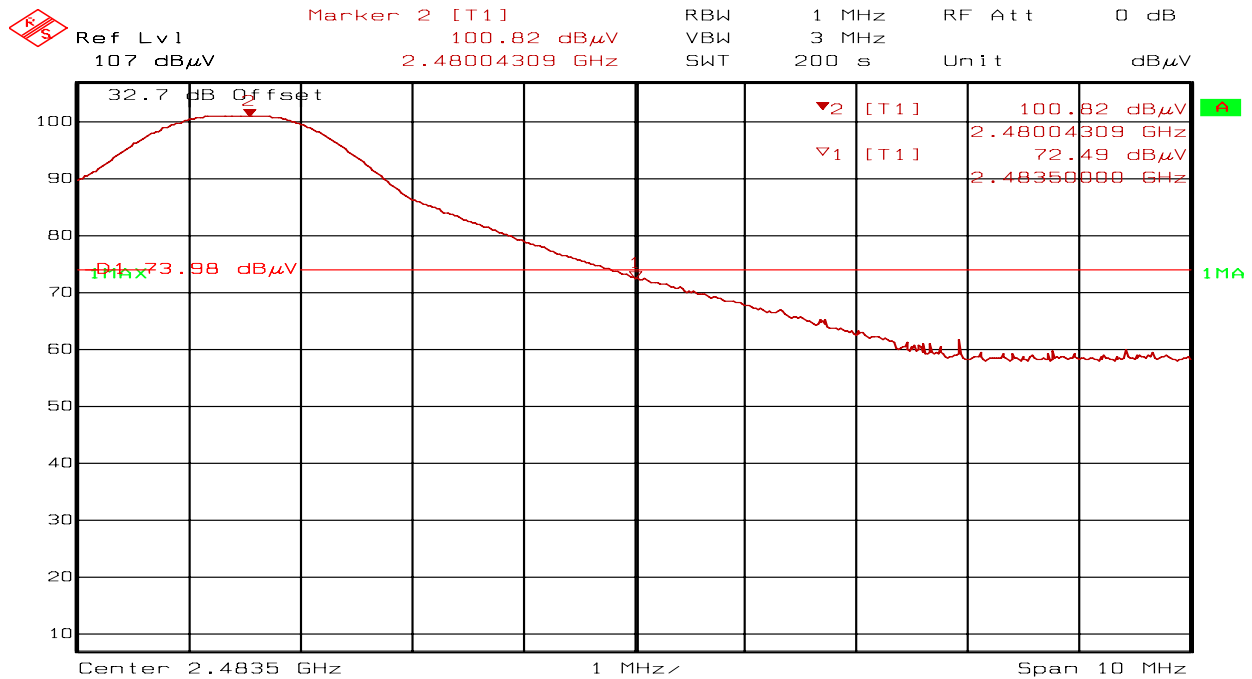


Title: CG-945
Comment A: Unit 0812440. Tx ch 0. Internal ant.
Date: 20.MAY.2009 10:51:46

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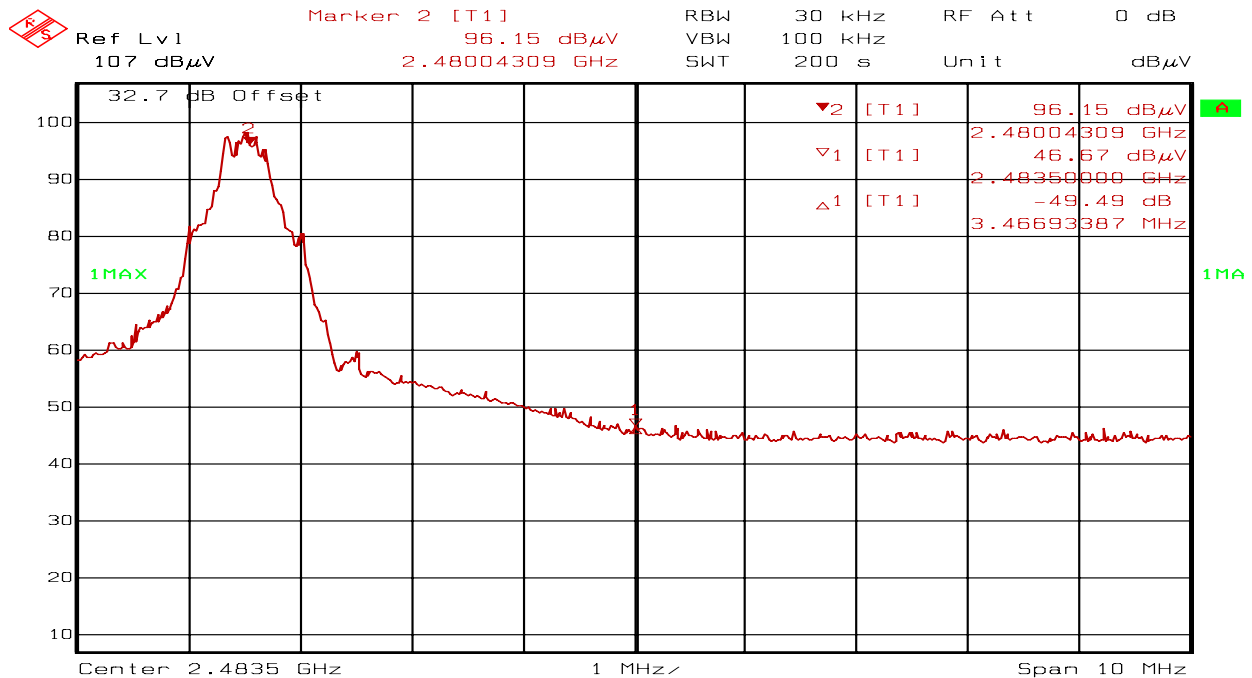
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Figure 41 Integral Antenna High Channel peak



Title: CG-945
Comment A: Unit 0812440.Tx mode Ch 78.Internal ant.
Date: 19.MAY.2009 15:03:41

Figure 42 Integral Antenna High Channel Marker-Delta



Title: CG-945
Comment A: Unit 0812440.Tx mode Ch 78.Internal ant.
Date: 19.MAY.2009 15:09:13

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APPENDIX I: RADIATED SPURIOUS EMISSIONS (TX)

I.1. Base Standard & Test Basis

Base Standard	FCC CFR Title 47 – Telecommunications, Chapter I Part 15.209 – Radio Frequency Devices, Part 15.205 – Restricted bands of operation RSS 210 Issue 7 2.6 and A8.5
Test Basis	ANSI C63.4-2003 Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz, FCC Publication 558074
Test Method	NTS Radiated Emissions Test Method SOP CAG EMC 02 and FCC Publication 558074

I.2. Specifications: FCC 15.205 and RSS 210 Issue 7 2.2 Restricted bands of operation.

(a) Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
¹ 0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	N/A
13.36–13.41	N/A	N/A	N/A

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

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I.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

I.4. Test Procedure

FCC Publication 558074 (c) (2) Radiated emission test Applies to harmonics/spurs that fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209. A pre-amp (and possibly a high-pass filter) is necessary for this measurement. For measurements above 1 GHz, set RBW = 1 MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation, use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

I.5. Operating Mode During Test

The Boeing 787 WELS was tuned to a low, middle and high channel of test mode operating at its default RF output power. Transmitter tested with pseudo random bit sequence. The EUT was continuously modulated

I.6. Sample Calculations

Part 15.209

Average Limit for above 960 MHz = $500 \mu\text{V/m}$ @ 3m = $20 \times \log(500) = 53.98 \text{ dB}\mu\text{V/m}$

Peak Limit for above 960 MHz = Average Limit + 20 (dB) = 73.98 dB $\mu\text{V/m}$

Average radiated emission level (dB $\mu\text{V/m}$) = Peak radiated emission level (dB $\mu\text{V/m}$) + Duty cycle correction factor (-20 dB)

Margin (dB) = Average limit (dB $\mu\text{V/m}$) – Average radiated emission level (dB $\mu\text{V/m}$)

I.7. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Lixin Wang
Function: EMC Technologist

I.8. Test date

Test started: May 19, 2009 Ended: May 21, 2009

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I.9. Test Results

Compliant

EUT Channel	Tx antenna	Test Rx Antenna polarity	Spurious Frequency (MHz)	Duty cycle corr. factor (dB)	Peak radiated emission level (dBuV/m)	Average radiated emission level (dBuV/m)	Peak Limit (dBuV/m)	Average limit (dBuV/m)	Margin (dB)
Channel 0: 2402 MHz	Integral	H-pol	4803.44	-20.00	61.23	41.23	73.98	53.98	12.75
		V-pol	4803.74	-20.00	63.31	43.31	73.98	53.98	10.67
	External	H-pol	4803.65	-20.00	60.55	40.55	73.98	53.98	13.43
		V-pol	4804.10	-20.00	60.11	40.11	73.98	53.98	13.87
Channel 39: 2441 MHz	Integral	H-pol	4881.61	-20.00	61.88	41.88	73.98	53.98	12.10
		V-pol	4881.79	-20.00	62.47	42.47	73.98	53.98	11.51
		H-pol	7322.25	-20.00	58.21	38.21	73.98	53.98	15.77
		V-pol	7322.23	-20.00	65.94	45.94	73.98	53.98	8.04
	External	H-pol	4881.42	-20.00	64.78	44.78	73.98	53.98	9.20
		V-pol	4882.30	-20.00	65.92	45.92	73.98	53.98	8.06
		H-pol	7322.25	-20.00	59.10	39.10	73.98	53.98	14.88
		V-pol	7322.07	-20.00	58.46	38.46	73.98	53.98	15.52
Channel 78: 2480 MHz	Integral	H-pol	4959.63	-20.00	61.73	41.73	73.98	53.98	12.25
		V-pol	4959.77	-20.00	63.25	43.25	73.98	53.98	10.73
		H-pol	7439.21	-20.00	61.45	41.45	73.98	53.98	12.53
		V-pol	7439.17	-20.00	66.16	46.16	73.98	53.98	7.82
	External	H-pol	4959.25	-20.00	63.15	43.15	73.98	53.98	10.83
		V-pol	4959.29	-20.00	65.49	45.49	73.98	53.98	8.49
		H-pol	7439.17	-20.00	58.69	38.69	73.98	53.98	15.29
		V-pol	7439.17	-20.00	58.68	38.68	73.98	53.98	15.30

The measured emission with the least margin to the limit was 46.16dBuV/m at 7439.17 MHz, when the antenna is vertically polarized. There is a 7.82 dB margin to the FCC part 15.209 limit.

EUT is in compliance with FCC part 15.205.

Plots were not provided in order to reduce file size

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APPENDIX J: RADIATED SPURIOUS EMISSIONS (RX)

J.1. Base Standard & Test Basis

Base Standard	RSS Gen Issue 2: 2007 General Requirements and Information for the Certification of Radiocommunication Equipment - Section 4.10
Test Basis	RSS Gen Issue 2: 2007 General Requirements and Information for the Certification of Radiocommunication Equipment - Section 6
Test Method	NTS Radiated Emissions Test Method SOP CAG EMC 02

J.2. Specifications: RSS-Gen Issue 2, 6

Spurious Emission Limits for Receivers

30 – 88 MHz, 100 μ V/m

88 – 216 MHz, 150 μ V/m

216 – 960 MHz, 200 μ V/m

Above 960 MHz, 500 μ V/m

RF radiated measurement at 3 meters distance.

J.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

J.4. Test Procedure

RSS-Gen Issue 2 4.10

Radiated emission measurements are to be performed using a calibrated open-area test site. As an alternative, the conducted measurement method may be used when the antenna is detachable. In such a case, the receiver spurious signal may be measured at the antenna port.

For either method, the search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tuneable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz.

For emissions below 1 GHz, measurements shall be performed using a CISPR quasi-peak detector and the related measurement bandwidth. As an alternative to CISPR quasi-peak measurement, compliance with the emission limit can be demonstrated using measuring equipment employing a peak detector with the same measurement bandwidth as that for CISPR quasi-peak measurements. Above 1 GHz, measurements shall be performed using an average detector and a resolution bandwidth of 300 kHz to 1 MHz.

J.5. Operating Mode During Test

The EUT was powered on in Command mode and set to continuously transmit on low and high channels

J.6. Test Results

EUT is in compliance with RSS-Gen Issue 2.

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Antenna Polarization	Frequency (MHz)	Detector	Radiated emission level (dBμV/m)	Limit type	3m Limit (dBμV/m)	Margin (dB)
V-pol	1296.59	PK	34.00*	Ave	53.98	19.98
H-pol	1000.25	PK	31.22*	Ave	53.98	22.76

* This emission was measured with a peak detector measured at 1 meter distance.

Plots were not provided in order to reduce file size

J.7. Sample Calculations

Sample Calculations

Average Limit for above 960 MHz = $500 \mu\text{V/m}$ @ 3m = $20 \cdot \log(500) = 53.98 \text{ dB}\mu\text{V/m}$

J.8. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Lixin Wang
Function: EMC Technologist

J.9. Test date

Test date: June 2, 2009.

;

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APPENDIX K: MEASUREMENT EQUIPMENT

Descriptions	Manufacturer	Type/Model	Asset #	Cal Due	Cal Date
Digital Barometer / Thermometer	Cole-Parmer	1870	CG0728	30JUN09	30JUN08
Horn Antenna 1 GHz – 18 GHz	EMCO	3115	CG0368	23AUG09	23AUG07
LNA 1 GHz - 18 GHz	Miteq	JSD00121	CG0317	01DEC10	01DEC08
High pass filter > 1000 MHz	MicroTronics	HPM14576	CG0963	N/A	N/A
High pass filter > 2800 MHz	MicroTronics	HPM50111	CG0964	N/A	N/A
Standard Gain Horn 18 GHz – 26.5 GHz	EMCO	3160-09	CG0075	N/A ⁽¹⁾	27NOV01
LNA 18 GHz - 26.5 GHz	Miteq	JSD00119	CG0482	02OCT09	02OCT07
Spectrum Analyzer 9 kHz – 40 GHz	Rohde & Schwarz	FSEK-20	CG0118	01JUL09	01JUL08
EMI Receiver 9 kHz – 40 GHz	Rohde & Schwarz	ESI	CG0109	11DEC09	11DEC08
LNA DC Power Supply	Xantrex	LXO 30-2	CG0493	N/A	N/A
HPIB Extender	HP	37204	CG0110	N/A	N/A
Turntable and Mast Controller	EMCO	2090	CG0161	N/A	N/A
Power Divider	Omni Spectra	FSC 16179	N/A	01NOV09	01NOV08

(1): As per manufacturer recommend, this item does not require periodic calibration. Its electromagnetic performance is almost exclusively depended on the physical dimension of the horn. A thorough mechanical check is all that is needed to guarantee the antenna performance.

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END OF DOCUMENT

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