
**COMPLIANCE WORLDWIDE INC.
TEST REPORT 206-11R1**

**In Accordance with the Requirements of
Federal Communications Commission CFR Title 47 Part 15.249, Subpart C
Industry Canada RSS 310, Issue 3**

**Low Power License-Exempt Radio Communication Devices
Intentional Radiators**

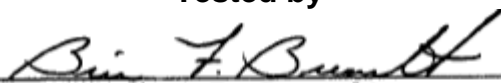
**Issued to
Continental Automotive
ADC Automotive Distance Control Systems GmbH
Peter-Dornier-Str. 10
D-88131 Lindau/Bodensee
Germany**

**for the
SRR2-A Automotive Sensor**

FCC ID: OAYSRR2A

Report Issued on September 2, 2011

Tested by



Brian F. Breault

Reviewed by



Larry K. Stillings

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1. Scope

This test report certifies that the Continental Automotive SRR2-A Automotive Sensor, as tested, meets the FCC Part 15, Subpart C and Industry Canada RSS 310, Issue 3 requirements. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

2. Product Details

- 2.1. **Manufacturer:** Continental Automotive
- 2.2. **Model Number:** SRR2-A Automotive Sensor
- 2.3. **Serial Number:** Sample #385
- 2.4. **Description:** The SRR2-A Automotive Sensor operates in the band of 24.0 to 24.25 GHz and is used for blindspot detection.
- 2.5. **Power Source:** 13.5 Volts DC Nominal (Automotive Application)
- 2.6. **Hardware Rev.:** C0V5b
- 2.7. **Software Rev.:** PSW 5.10.1
- 2.8. **EMC Modifications:** None

3. Product Configuration

3.1. Support Equipment

Device	Manufacture	Model	Serial No.	Comment
Mode Switch Box	Continental Automotive	N/A	2011-01-27 (Creation Date)	Provides all setup functions for the SRR2-A Radar Sensor.

3.2. Cables

Cable Type (See Note)	Length	Shield	From	To
Custom Interface Cable	1 Meter	No	Mode Switch Box	SRR2-A Radar Sensor
Custom Interface Cable	10 Meters	No	Mode Switch Box	SRR2-A Radar Sensor

Note: Continental Automotive provided two cables that are identical in functionality. They only differ in the length. Only one cable is used to interface the SRR2-A Radar Sensor with the Mode Switch Box. The 10 meter cable was provided to allow the configuration of the Mode Switch Box in a remote location.

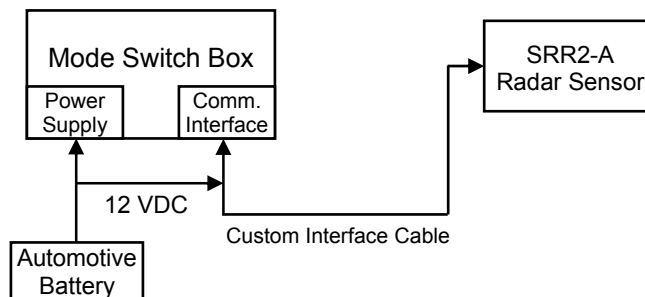
3.3. Operational Characteristics & Software

Continental Automotive provided a Mode Switch Box to control the SRR2-A Radar Sensor. The box provides five operational modes:

- Normal mode, bandwidth 182 MHz
- Normal mode, bandwidth 188 MHz
- CW mode, center frequency
- CW mode, lower frequency
- CW mode, upper frequency

Included with the Mode Switch Box, Continental Automotive provided a six page user's manual that details the setup and the five modes of operation listed above. This manual provides a complete reference for configuring the Mode Switch Box and the SRR2-A Radar Sensor.

3.4. Block Diagram



4. Measurements Parameters

4.1. Measurement Equipment Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
EMI Receiver	Agilent	E7405A	MY45115430	10/22/2011
EMI Receiver	Hewlett Packard	8546A	3330A00115	10/28/2011
Bilog Antenna	Com-Power	AC-220	25509	8/30/2011
Horn Antenna	Electro-Metrics	EM-6961	6337	10/19/2012
Horn Antenna	Com-Power	AH-840	3075	7/20/2012
Microwave Preamplifier	Hewlett Packard	8449B	3008A01323	11/30/2012
DMM / Temperature	Fluke	187	79690058	10/9/2012
Thermal Chamber	Associated Testing	SLHU-1-CRLC	N/A	N/A

4.2. Measurement & Equipment Setup

Test Dates:	4/3/2011 – 6/24/2011
Test Engineers:	Larry Stillings, Brian Breault
Normal Site Temperature (15 - 35°C):	21.6
Relative Humidity (20 -75%RH):	35
Frequency Range:	30 MHz to 100 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	100 kHz - 30 MHz to 1 GHz 1 MHz - Above 1 GHz
EMI Receiver Average Bandwidth:	300 kHz - 30 MHz to 1 GHz 3 MHz - Above 1 GHz
Detector Function:	Peak, Quasi-Peak & Average

4.3. Measurement Procedure

Test measurements were made in accordance FCC Part 15.249, IC RSS-310, Section 3.10 “24-24.25 GHz” License-exempt Radio Apparatus (All Frequency Bands): Category II Equipment.

The test methods used to generate the data in this test report is in accordance with ANSI C63.4: 2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

4.4. Choice of Operating Frequencies

The Continental Automotive SRR2-A Radar Sensor employs a frequency modulated signal centered at 24.15 GHz.

5. Measurements Summary

Test Requirement	FCC Rule Requirement	IC Rule Requirement	Test Report Section	Result	Comment
Antenna Requirement	15.203	RSS-GEN 7.1.4	6.1	Compliant	Unit has an internal PCB antenna.
Radiated Field Strength of Fundamental	15.249 (a),(c)	RSS-310 3.10	6.2	Compliant	
Radiated Field Strength of Harmonics	15.249 (a),(c)	N/A	6.3	Compliant	
Band Edge Measurements	15.249 (d) 15.209	RSS-310 3.10	6.4	Compliant	
Spurious Radiated Emissions	15.249 (d), 15.209	RSS-GEN 4.9	6.5	Compliant	
Occupied Bandwidth	ANSI C63.4 § 13.1.7	N/A	6.6	Compliant	
99% Bandwidth	N/A	RSS-GEN 4.6.1	6.7	Compliant	
Conducted Emissions	15.207	RSS-GEN 7.2.4	N/A	Not Required	DUT uses batteries only.
Public Exposure to Radio Frequency Energy Levels	15.319 (i) 2.1091 FCC OET Bulletin 65	RSS-GEN 5.5, RSS 102	6.9	Compliant	

6. Measurement Data

6.1. Antenna Requirement (Section 15.203, RSS-GEN 7.1.4)

Requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section.

Status: The unit under test employs a permanent, non-user accessible internal PCB antenna.

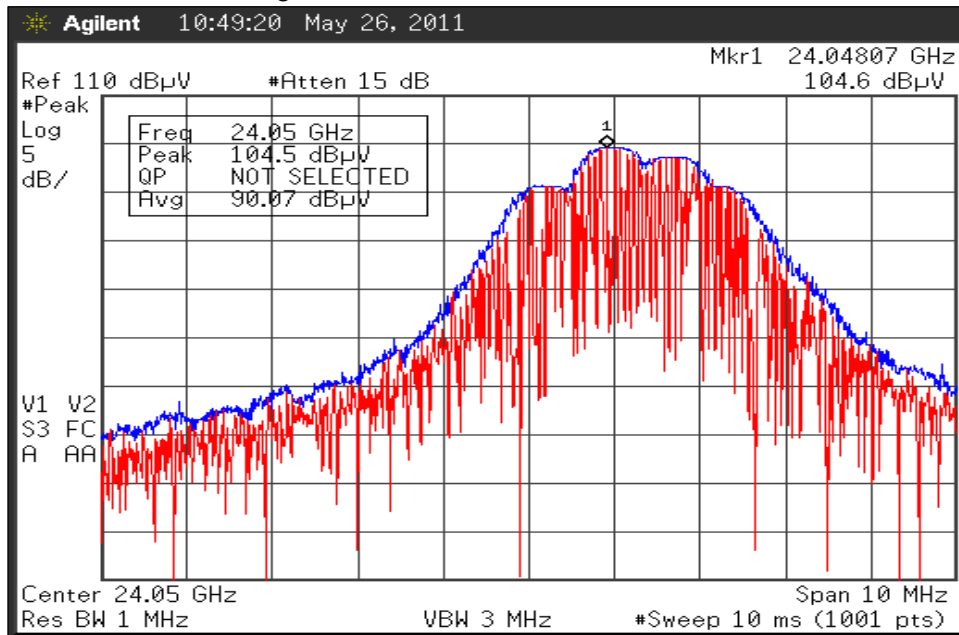
6.2. Radiated Field Strength of Fundamental (15.249, Section (a), (c)), IC RSS-310 3.10

Requirement: The 3 meter field strength of the fundamental emissions from intentional radiators operated within the 24.0 – 24.25 GHz frequency bands shall comply with the following requirement: 250 millivolts/meter (108 dB μ V/m), average mode, (128 dB μ V/m) peak mode measurements.

Freq. (GHz)	Amplitude ¹ (dB μ V/m)		Limit (dB μ V/m)		Avg Margin	Ant Polarity	Ant Height	Turntable Azimuth
	Peak	Avg	Peak	Avg				
24.05	104.5	90.07	128	108	-17.93	V	122	23.2
24.13	105.5	90.49	128	108	-17.51	V	122	23.2
24.24	106.5	89.81	128	108	-18.19	V	122	23.2

¹ All correction factors are included in the measurement values

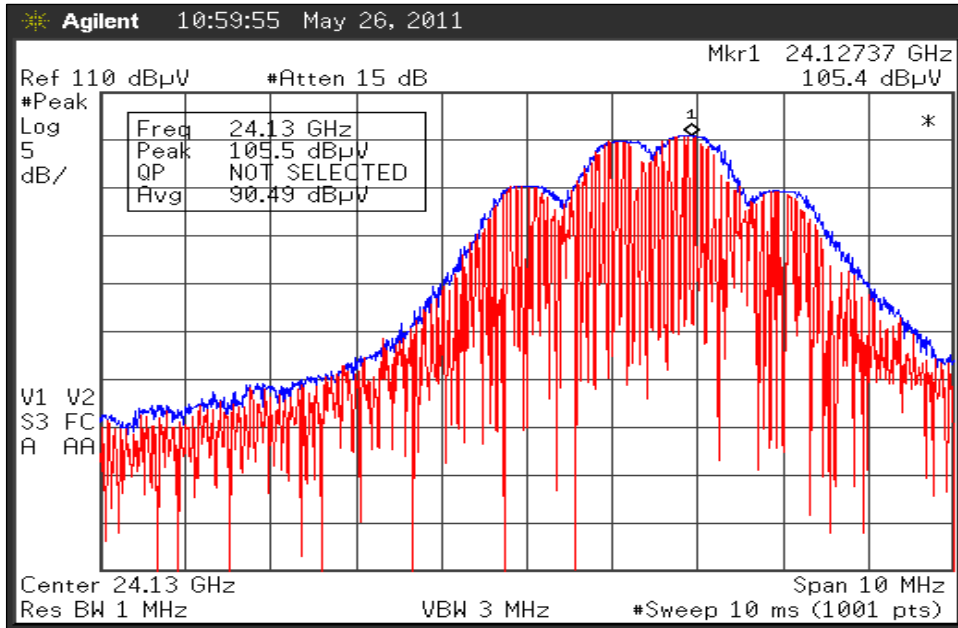
6.2.1. Worst Case Field Strength – Low Part of Channel



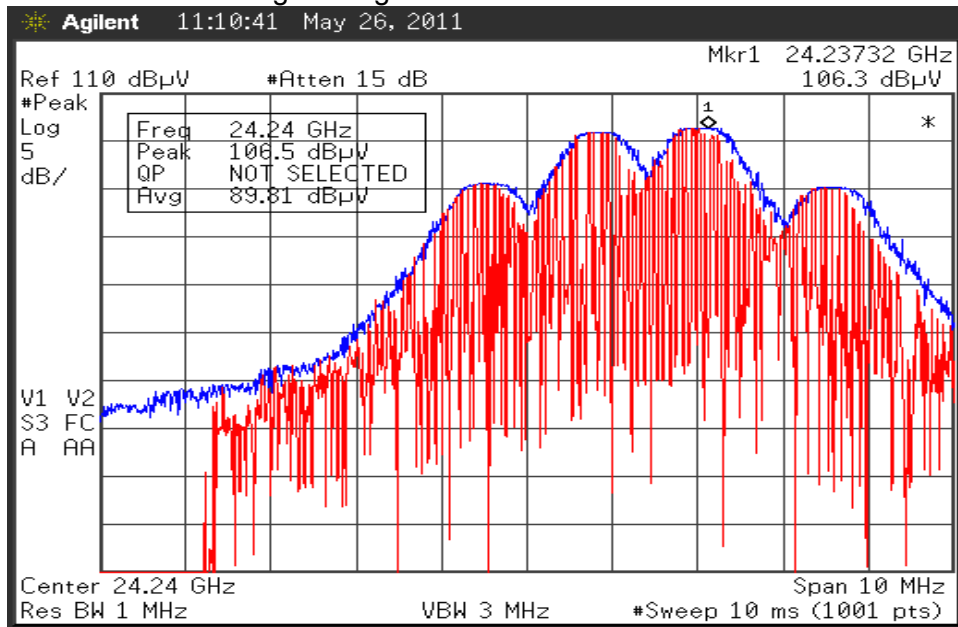
6. Measurement Data (continued)

6.2. Radiated Field Strength of Fundamental (15.249, Section (a), (c)), IC RSS-310 3.10

6.2.2. Worst Case Field Strength – Mid Part of Channel



6.2.3. Worst Case Field Strength – High Part of Channel



6. Measurement Data (continued)

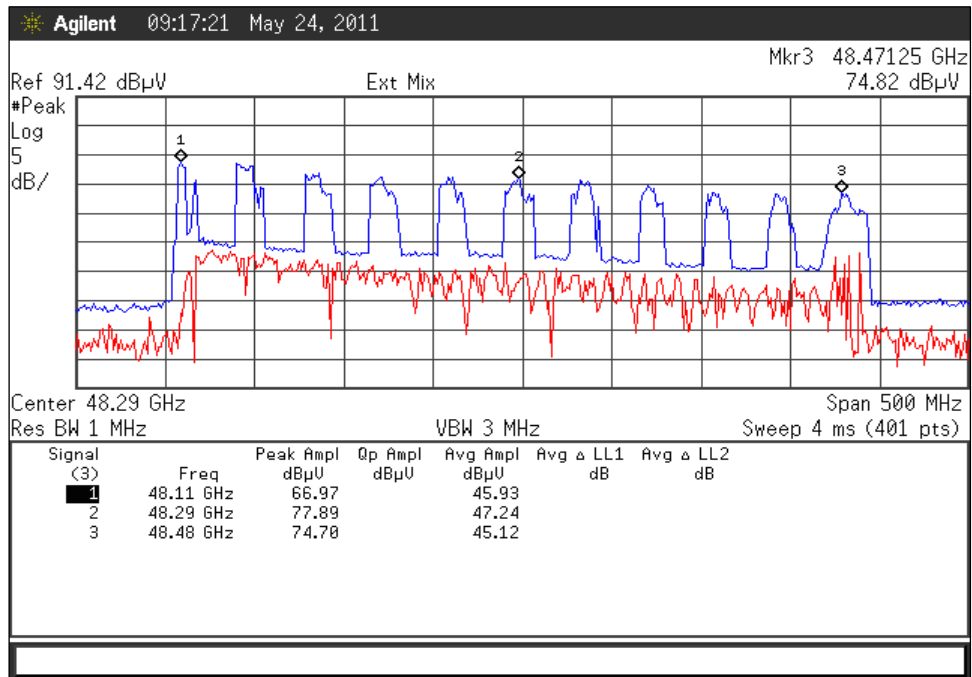
6.3. Radiated Field Strength of Harmonics (15.249, Section (a))

Requirement: The 3 meter field strength of the harmonic emissions from intentional radiators operated within the 24 – 24.25 GHz frequency bands shall comply with the following: 500 microvolts/meter (54 dBµV/m), average mode measurement. Peak field strength may not be greater than 20 dB above the average limit (74 dBµV/m).

6.3.1. Wideband Fundamental

Signal	Freq. (GHz)	Amplitude ¹ (dBµV/m)		Limit (dBµV/m)		Avg Margin	Result
		Peak	Avg	Peak	Avg		
Low	48.11	57.43	36.39	78	58	-21.61	Compliant
Middle	48.29	62.35	37.70	78	58	-20.30	Compliant
High	48.48	59.24	35.58	78	58	-22.42	Compliant

¹Measurements were taken at a distance of 1 meter and extrapolated to 3 meters.



6. Measurement Data (continued)

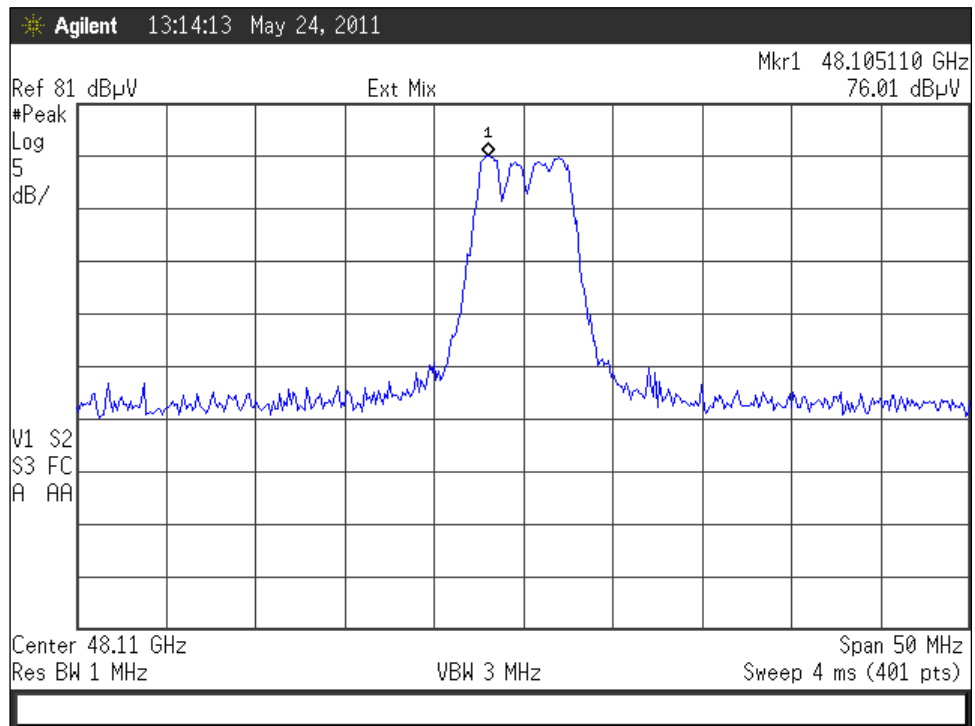
6.3. Radiated Field Strength of Harmonics (15.249, Section (a)),

6.3.1. CW Generated Fundamental

Signal	Freq. (GHz)	Amplitude ¹		Limit		Avg Margin	Result
		(dB μ V/m)		(dB μ V/m)			
		Peak	Avg	Peak	Avg		
Low	48.11	66.47	49.75	78	58	-8.25	Compliant
Middle	48.25	63.98	46.46	78	58	-11.54	Compliant
High	48.47	62.48	45.86	78	58	-12.14	Compliant

¹Measurements were taken at a distance of 1 meter and extrapolated to 3 meters.

6.3.1.1. Low Frequency

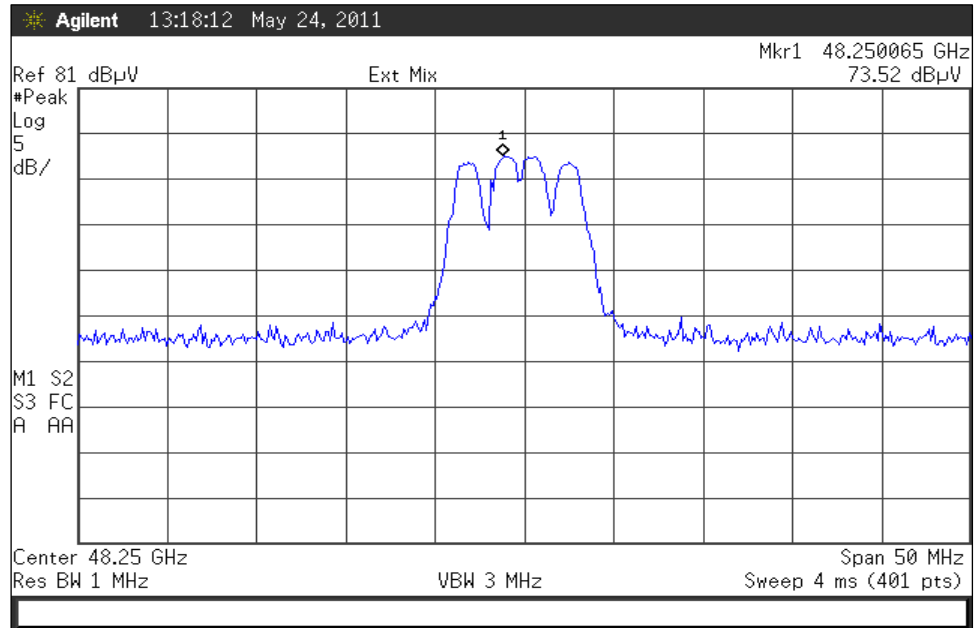


6. Measurement Data (continued)

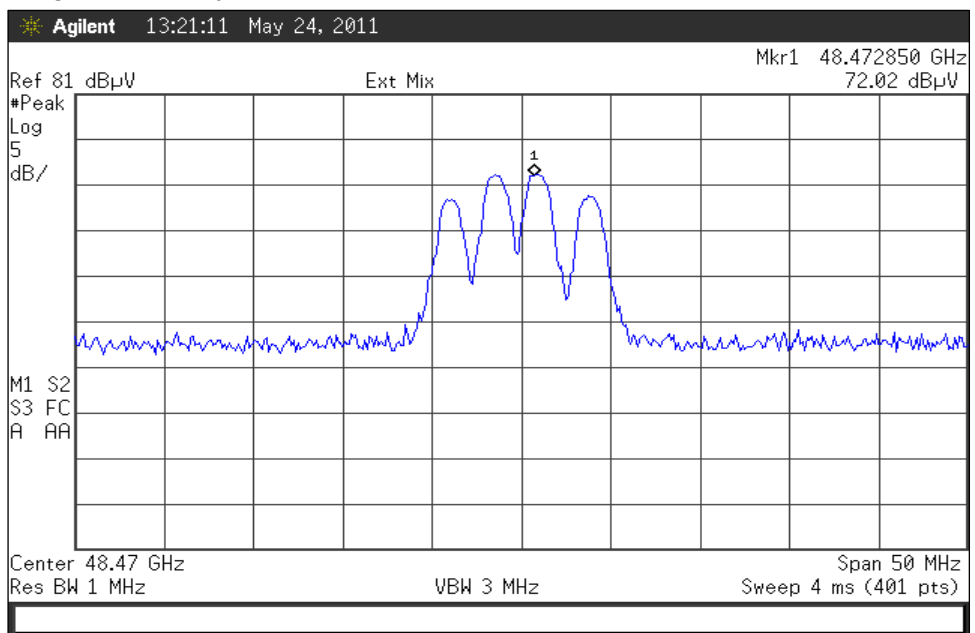
6.3. Radiated Field Strength of Harmonics (15.249, Section (a)),

6.3.1. CW Generated Fundamental

6.3.1.2. Middle Frequency



6.3.1.3. High Frequency



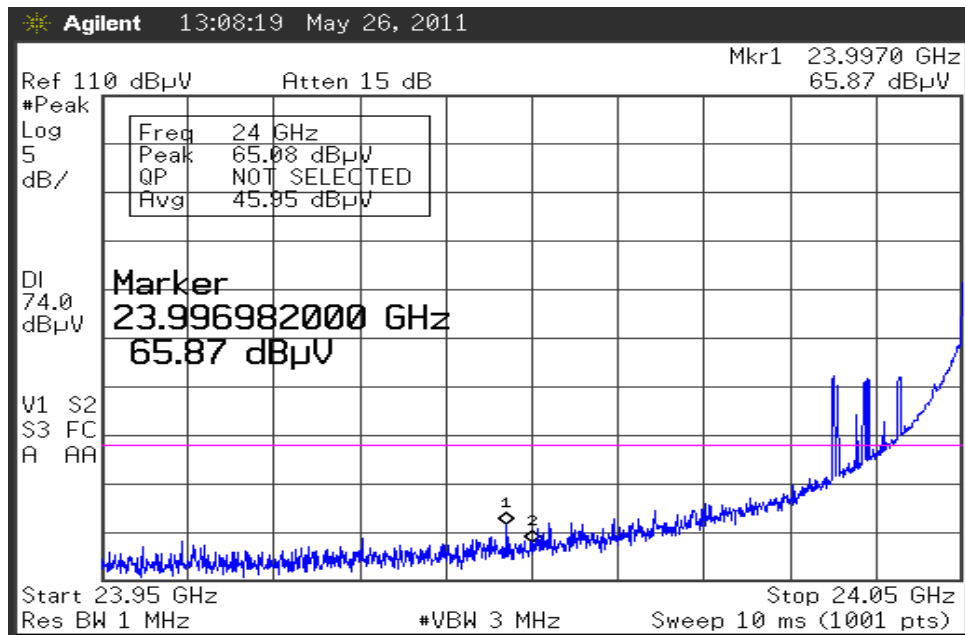
6. Measurement Data (continued)

6.4. Band Edge Measurements

Requirement: Emissions radiated outside of the specified frequency band of 24 GHz to 24.25 GHz, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Frequency (GHz)	Band Edge				Limit		Margin		Result
		Freq GHz	(dB μ V/m)		(dB μ V/m)		(dB)		
			Peak	Avg	Peak	Avg	Peak	Avg	
24.15	Lower	24.00	65.08	45.95	78	58	-12.92	-12.05	Compliant
	Upper	24.25	76.80	50.08	78	58	-1.20	-7.92	Compliant

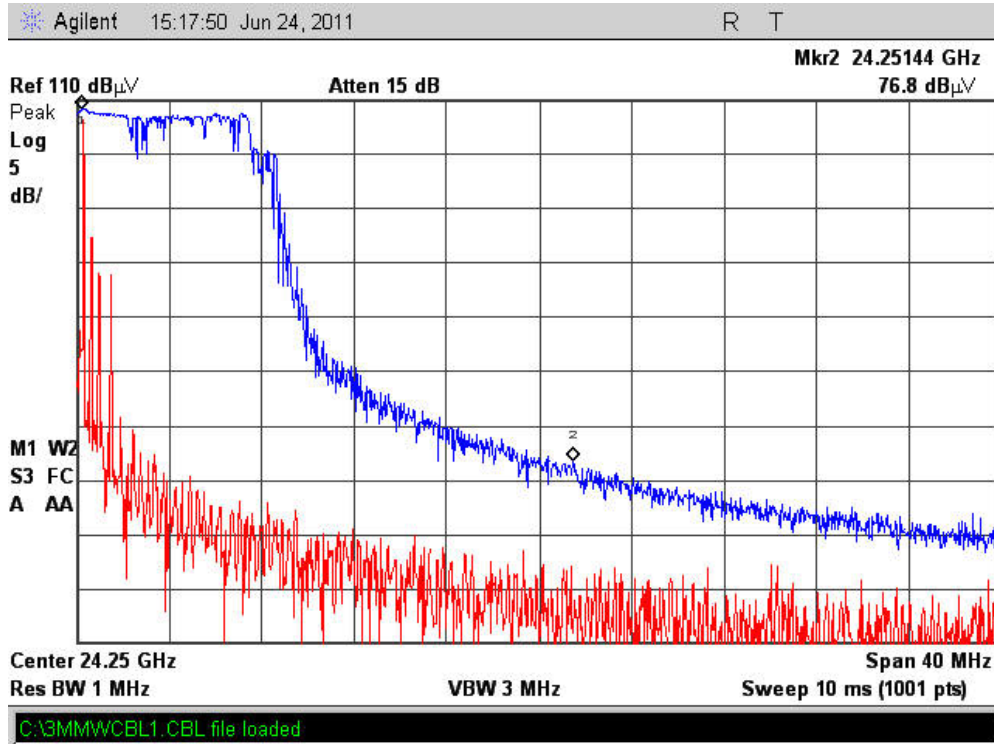
6.4.1. Band Edge Measurements - Lower Band Edge



6. Measurement Data (continued)

6.4. Band Edge Measurements (continued)

6.4.2. Band Edge Measurements - Upper Band Edge



6. Measurement Data (continued)

6.5. Spurious Radiated Emissions, 30 MHz to EUT 10th Harmonic (15.249, Section (d)), IC RSS-GEN

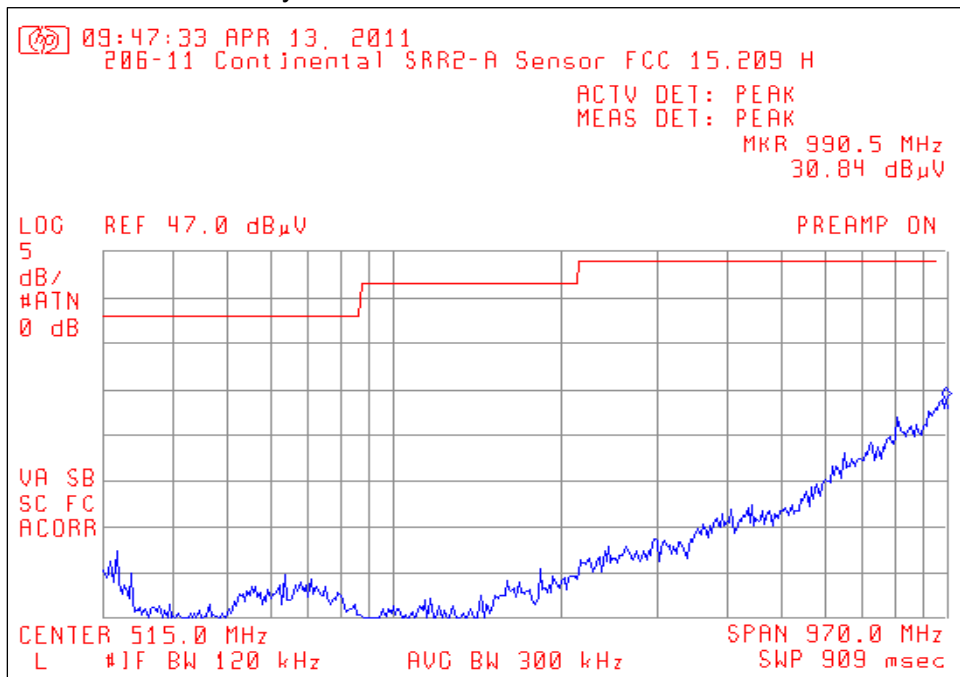
Requirement: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

6.5.1. Regulatory Limit: FCC Part 209, Quasi-Peak

Frequency Range (MHz)	Distance (Meters)	Limit (dBµV/m)
30 to 88	3	40.0
88 to 216	3	43.5
216 to 960	3	46.0
Above 960	3	54.0

6.5.2. Test Results, 30 MHz to 1 GHz

6.5.2.1. Horizontal Polarity¹



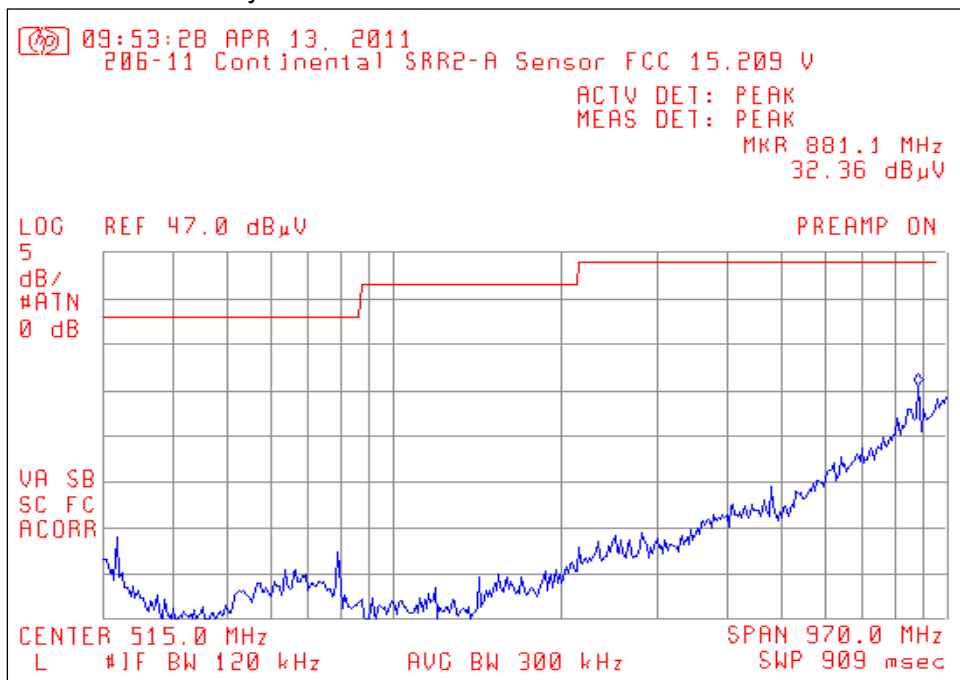
¹ Includes all correction factors.

6. Measurement Data (continued)

6.5. Spurious Radiated Emissions, 30 MHz to EUT 10th Harmonic (15.249, Section (d)), IC RSS-GEN

6.5.2. Test Results, 30 MHz to 1 GHz

6.5.2.2. Vertical Polarity¹



¹ Includes all correction factors.

6.5.3. Test Results, > 1 GHz

There were no measureable emissions above 1 GHz except the harmonic emissions detailed in section 6.3 of this test report.

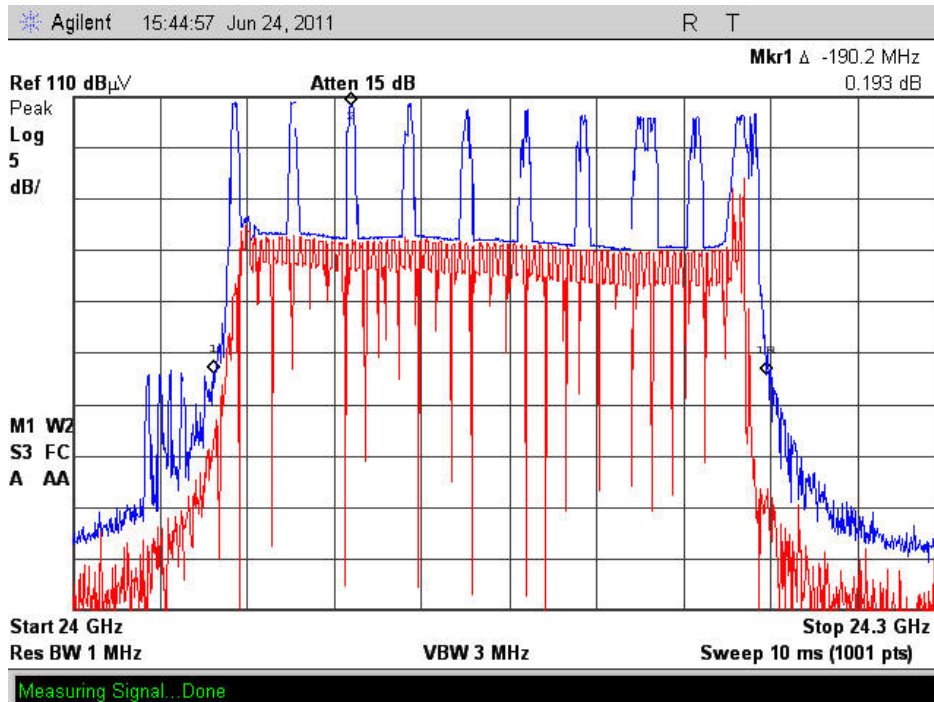
6. Measurement Data (continued)

6.6 26 dB Bandwidth (ANSI C63.4, Section 13.7)

Requirement: The occupied bandwidth measurements on an intentional radiator shall be made in accordance with the requirements outlined in ANSI C63.4-2009, Section 13.7. If no bandwidth requirement is specified by the procuring or regulatory agency, measure the bandwidth at -26 dB with respect to the reference level. The resolution bandwidth was set according to Table 5 in Section 13.7 of ANSI C63.4-2009.

Channel	Channel Frequency	26 dB Power Bandwidth
	MHz	MHz
N/A	24150	190.2

6.6.1. 26 dB Bandwidth Plot



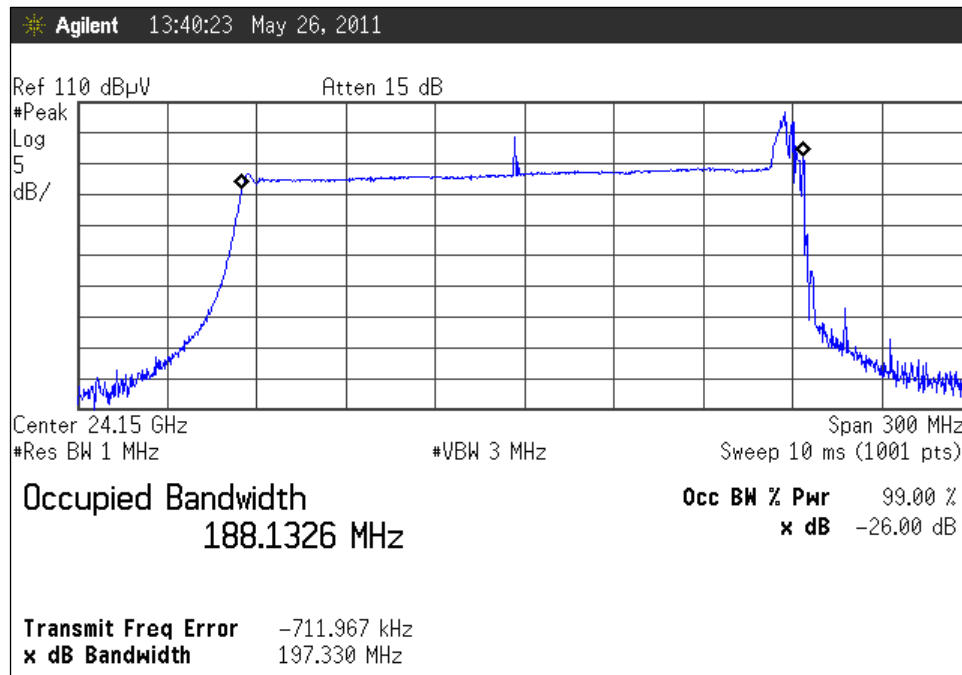
6. Measurement Data (continued)

6.7. 99% Power Bandwidth (RSS GEN 4.6.1)

Requirement: 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.

Channel	Channel Frequency	99% Power Bandwidth
	MHz	MHz
N/A	24150	188.1326

6.7.1. 99% Bandwidth Plot



6. Measurement Data (continued)

6.9. Public Exposure to Radio Frequency Energy Levels (15.247(i) (1.1307 (b)(1)) RSS-GEN 5.5, RSS 102

6.9.1. Note: The following equation is used to determine the output power from the measured worst case field strength:

$$P = \frac{(E \times d)^2}{(30 \times G)}$$

P = the power in Watts.

E = the measured maximum field in V/m

G = the numeric gain of the transmitting antenna over an isotropic radiator.

d = the distance in meters of the field strength measurement.

Channel	Frequency	Peak Field Strength	Distance	Antenna Gain ¹	Measured Output Power
	(GHz)	(dBμV/m)	(m)	(dBi)	(mW)
N/A	24.24	106.50	3.0	12.5	0.7535659

Channel	MPE Distance (cm)	DUT Output Power (dBm)	DUT Antenna Gain (dBi)	Power Density		Limit (mW/cm ²)	Result
				(mW/cm ²)	(W/m ²)		
	(1)	(2)	(3)	(4)		(5)	
N/A	20.0	-1.23	12.5	0.0026659	0.0266595	1	Compliant

$$PD = \frac{OP + AG}{(4 \times \pi \times d^2)}$$

PD = Power Density (mW/cm²)

OP = DUT Output Power (dBm)

AG = DUT Antenna Gain (dBi)

d = MPE Distance (cm)

- Reference CFR 2.1093(b): For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.
- Sections 6.2 of this test report.
- Antenna gain data provided by the client.
- Power density is calculated from field strength measurement and antenna gain.
- Reference CFR 1.1310, Table 1: Limits for Maximum Permissible Exposure (MPE), Section (B): Limits for General Population/Uncontrolled Exposure.

7. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with Federal Communications Commission (FCC) and Industry Canada standards. A description of the test sites is on file with the FCC (registration number **96392**) and Industry Canada (file number **IC 3023A-1**).

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022.

Both sites are designed to test products or systems 1.5 meter W x 1.5 meter L x 2.0 meter H, floor standing or table top.