

# Electromagnetic Compatibility Test Report

*Prepared in accordance with*

**FCC Part 15C and ANSI C63.10**

On

**Motion Detectors**

**RADION Series**

Bosch Security Systems  
130 Perinton Parkway  
Fairport, NY 14450

Prepared by:

**TUV Rheinland of North America, Inc.**

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## Manufacturer's statement - attestation

The manufacturer; Bosch Security Systems, as the responsible party for the equipment tested, hereby affirms:

- a) That they have reviewed and concurs that the test shown in this report are reflective of the operational characteristics of the device for which certification is sought;
- b) That the device in this test report will be representative of production units;
- c) That all changes (in hardware and software/firmware) to the subject device will be reviewed.
- d) That any changes impacting the attributes, functionality or operational characteristics documented in this report will be communicated to the body responsible for approving (certifying) the subject equipment.



**Peter J. Namisnak**

Printed name of official

Signature of official

**130 Perinton Parkway**

**Fairport, NY 14450**

Address

10-26-2012

Date

330-829-3537

585-678-3462

Telephone number

Peter.namisnak@us.bosch.com

Email address of official

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

FCC ID: T3X-RWSSFT



IC: 1249A-RWSSFT

**Report No.:** 31251616.001 RADION Series  
**FCC.doc** Page 3 of 30

<b>Client:</b>	Bosch Security Systems 130 Perinton Parkway Fairport, NY 14450	<b>Contact:</b> Peter Namisnak Tel: 585-678-3462 Fax: 585-289-4263 e-mail: peter.namisnak@us.bosch.com		
<b>Identification:</b>	Motion Detectors	<b>Serial No.:</b>	TS1-12	
<b>Test item:</b>	RADION Series	<b>Date Test Completed:</b>	10/19/2012	
<b>Testing location:</b>	TUV Rheinland of North America 336 Initiative Drive Rochester, NY 14624-6217 U.S.A.	Tel: (585) 426-5555 Fax: 585-568-8338		
<b>Test specification:</b>	Emissions: FCC Part 15.231 Radiated Emissions Std FCC Part 15.209 and 15.205, FCC Part 15.231(b) , FCC Part 15.231(c)			
<b>Test Result:</b>	<b>The above product was found to be Compliant to the above test standard(s)</b>			
<b>tested by:</b> Randall Masline		<b>reviewed by:</b> Cecil Gittens		
<u>30 January 2013</u> <i>Date</i> <i>Name</i> <i>Signature</i>		<u>30 January 2013</u> <i>Date</i> <i>Name</i> <i>Signature</i>		
<b>Other Aspects:</b>	<b>None</b>			
Abbreviations:    OK, Pass, Compliant, Complies = passed Fail, Not Compliant, Does Not Comply = failed N/A = not applicable				
			<b>Industry Canada</b>	<b>VCCI</b>
<b>US5253</b>	<b>Testing Cert.# 3331.04</b>	<b>3466C-1</b>	<b>A-0037</b>	<b>SL2-IN-E-050R</b>

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TÜV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

**TABLE OF CONTENTS**

**1 GENERAL INFORMATION .....5**

1.1 SCOPE .....5

1.2 PURPOSE .....5

1.3 SUMMARY OF TEST RESULTS .....6

**2 LABORATORY INFORMATION .....7**

2.1 ACCREDITATIONS & ENDORSEMENTS .....7

2.2 MEASUREMENT UNCERTAINTY EMISSIONS .....8

2.3 CALIBRATION TRACEABILITY .....9

2.4 MEASUREMENT EQUIPMENT USED .....10

**3 PRODUCT INFORMATION .....11**

3.1 EQUIPMENT MODIFICATIONS .....11

3.2 TEST PLAN .....11

**4 EMISSIONS.....12**

4.1 RADIATED EMISSIONS .....12

4.2 FUNDAMENTAL FIELD STRENGTH AND HARMONIC EMISSIONS .....18

4.3 BANDWIDTH .....22

4.4 99% POWER BANDWIDTH .....24

4.5 RF EXPOSURE MEASUREMENT (MOBILE DEVICE).....26

**APPENDIX A .....28**

**5 TEST PLAN.....28**

5.1 GENERAL INFORMATION .....28

5.2 MODEL(S) NAME .....28

5.3 TYPE OF PRODUCT.....28

5.4 EQUIPMENT UNDER TEST (EUT) DESCRIPTION .....29

5.5 MODIFICATIONS .....29

5.6 PRODUCT ENVIRONMENT .....29

5.7 COUNTRIES .....29

5.8 APPLICABLE DOCUMENTS .....30

EUT MODES OF OPERATION .....30

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TÜV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## 1 General Information

### 1.1 Scope

This report is intended to document the status of conformance with the requirements of the FCC Part 15C and ANSI C63.10 based on the results of testing performed on 10/19/2012 on the Motion Detectors, Model Number. RADION SERIES, manufactured by Bosch Security Systems. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

### 1.2 Purpose

Testing was performed to evaluate the performance of the EUT (Equipment Under Test) in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

### 1.3 Summary of Test Results

<b>Applicant</b>	Bosch Security Systems 130 Perinton Parkway Fairport, NY 14450	<b>Tel</b>	585-678-3462	<b>Contact</b>	Peter Namisnak
		<b>Fax</b>	585-289-4263	<b>e-mail</b>	peter.namisnak@us.bosch.com
<b>Description</b>	Motion Detectors	<b>Model Number</b>	RADION SERIES		
<b>Serial Number</b>	TS1-12	<b>Test Voltage/Freq.</b>	Battery Operated		
<b>Test Date Completed:</b>	10/19/2012	<b>Test Engineer</b>	Randall Masline		
<b>Standards</b>	<b>Description</b>	<b>Severity Level or Limit</b>	<b>Measured</b>	<b>Test Result</b>	
FCC Part 15 subpart C Standard	Radio Frequency Devices - Subpart C: Intentional Radiators	See called out parts below	See Below	Complies	
FCC Part 15.231	Periodic operation in the band 40.66 - 40.70 MHz and above 70 MHz	See Basic Standards Below	See Below	Complies	
FCC Part 15.209 and 15.205	Radiated Emissions	Class B, 30 - 1000 MHz	Limit	Complies	
FCC Part 15.231(a)	Deactivation of Transmitter	EUT is not Manually Operated	Not Required	Complies	
FCC Part 15.231(b)	Field Strength of Fundamental and Spurious Emissions	15.231(b) Table Peak Limit is 101.57 dBuV at 433.42 MHz	85.1 dBuV Peak Field Strength of Fundamental	Complies	
FCC Part 15.231(c)	Bandwidth	Part 15.231(c) 1.08 MHz	444.889 kHz	Complies	
RSS-210 A1.3	99% Occupied Bandwidth	Contained within the Frequency Band	Below Limit	Complies	
FCC Part 15.203	Antenna Requirement		Antenna is permanently mounted	Complies	
FCC Part 2.1093 and RSS-102 Issue 4	RF Exposure	MPE or SAR Requirements (Mobile)	Limit	Complies	

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TÜV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## 2 Laboratory Information

### 2.1 Accreditations & Endorsements

#### 2.1.1 US Federal Communications Commission

TUV Rheinland of North America located at, 336 Initiative Drive, Rochester, NY 14624-6217 is accredited by the commission for performing testing services for the general public on a fee basis. This laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (Registration No 90575). The laboratory scope of accreditation includes: Title 47 CFR Part 15, and 18. The accreditation is updated every 3 years.

#### 2.1.2 A2LA

This is a program which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Standard 17025:2005 (Certificate Number: 3331.04). The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

#### 2.1.3 VCCI

VCCI Accredited test lab. Registration numbers A-0037, R-3673, C-4113, C-4114, C-4115, T-1158, T-1159 G429.

#### 2.1.4 Industry Canada

(Registration No.: 3466C-1) The OATS has been accepted by Industry Canada to perform testing to 3 and to 10m, based on the test procedures described in ANSI C63.4-2009.

#### 2.1.5 BSMI

Registration No.: SL2-IN-E-050R. The BSMI accreditation was obtained by NIST MRA with the BSMI.

#### 2.1.6 Korea

Recognized by Radio Research Agency as an accredited Conformity Assessment Body (CAB) under the terms of Phase I of the APEC TEL.

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

### 2.1.7 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

$$\text{Field Strength (dB}\mu\text{V/m)} = \text{RAW} - \text{AMP} + \text{CBL} + \text{ACF}$$

Where: RAW = Measured level before correction (dB $\mu$ V)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu\text{V/m} = 10^{\frac{\text{dB}\mu\text{V/m}}{20}}$$

#### Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

$$25 \text{ dBuV/m} + 17.5 \text{ dB} - 20 \text{ dB} + 1.0 \text{ dB} = 23.5 \text{ dBuV/m}$$

### 2.2 Measurement Uncertainty Emissions

	<b>U<sub>lab</sub></b>	<b>U<sub>cispr</sub></b>
<b>Radiated Disturbance @ 10m</b>		
30 MHz – 1,000 MHz	4.57 dB	5.2 dB
<b>Conducted Disturbance @ Mains Terminals</b>		
150 kHz – 30 MHz	2.62 dB	3.6 dB
<b>Disturbance Power</b>		
30 MHz – 300 MHz	3.88 dB	4.5 dB

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



### Measurement Uncertainty Immunity

The estimated combined standard uncertainty for radiated emissions measurements is $\pm 4.57$ dB.
---

The estimated combined standard uncertainty for conducted emissions measurements is $\pm 2.62$ dB.
--

The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by a coverage factor of 2. Compliance criteria are not based on measurement uncertainty.

### 2.3 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005. Equipment calibration records are kept on file at the test facility.

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## 2.4 Measurement Equipment Used

Equipment	Manufacturer	Model #	Ref.	Serial #	Last Cal dd/mm/yy	Next Cal dd/mm/yy	Test
Radiated Emissions							
Horn	EMCO	3115	C025	9512-4630	20-Jul-12	20-Jul-13	RE
Horn	EMCO	3115	C031	9812-5635	23-Mar 12	23-Mar 14	RE
BiLog	Chase	CBL6111	C041	1170	12-Sept-12	12-Sept-14	RE
Analyzer w RF Filter Section 85460A	HP	8546A		3325A00134	11-Sept-12	11-Sept-13	RE
Receiver (20Hz-40GHz)	Rohde & Schwarz	ESI(B) 40	C320	839283/005	13-Sept-12	13-Sept-13	RE
Multimeter	Fluke	83	C437	48162892	13-Sept-12	13-Sept-13	RE
Amplifier (18-26.5GHz)	Rohde & Schwarz	TS-PR26	C443	100005	10-Aug- 12	10-Aug- 13	RE
Horn( 18-26.5 GHz)	EMCO	3160-09	C447	03-0338-018	17-Nov-11	17-Nov-12	RE
BiLog	Chase	CBL6111B	C448	2081	22-Feb-12	22-Feb-14	RE
Horn(26.5-40 GHz)	ATM	28-442-6/CAL		G047702-01	31-Aug-11	31-Aug 13	RE
General Laboratory Equipment							
Multimeter	Fluke	87	C445	59890224	13-Sept-12	13-Sept-13	
Multimeter	Fluke	8062A	C452	4715199	13-Sept-12	13-Sept-13	

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TÜV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

### 3 Product Information

#### 3.1 Equipment Modifications

No modifications were needed to bring product into compliance.

#### 3.2 Test Plan

The EUT product information, test configuration, mode of operation, test types, test procedures, test levels, pass/failure criteria, in this report were carried out per the product test plan located in appendix A of this report

The Bosch Radion series is a security system that is made up of various sensors that transmit at 433.42 MHz when an intrusion occurs. The signal is sent to a receiver that is hard wired to a main control panel. The control panel has a wired keypad that is used to alarm and shutoff the system.

The 433.42 MHz transmitter used in all the sensors are identical, preliminary testing was done to confirm that all sensors had the same or similar field strength. After that, the one with the highest field strength was used for the remainder of the transmitter testing. During Radiated Emissions, the entire system was operating and tested to ensure a worst case scenario. Therefore all Radiated Emissions data will be identical.

#### Model Description

RFRC-OPT & RFRC-STR Wireless Receiver

RFRP Wireless Repeater

RKFK-TB & RKFK-FB Wireless Key FOB 2 & 4 button

RFPB-TB & RFPB-SB Wireless Panic Buttons 1 & 2 button

RFUN Wireless Universal Transmitter

RFGB Wireless Glass Break Detector

RFBT Wireless Bill Trap

RFDW-SM & RFDW-RM Wireless Door – Window Contact Surface or Recessed mount

RFIN Wireless Inertia Detector

RFPR-12 Wireless PIR (Passive Infrared) Detector and RFPR-C12 Wireless Curtain PIR Detector

RFDL-11 Wireless Motion Detector Dual PIR 10.525 GHz

RFSM Wireless Smoke Detector

RKFK-A Wireless Keyfob

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## 4 Emissions

### 4.1 Radiated Emissions

This test measures the electromagnetic levels of spurious signals generated by the EUT that radiated from the EUT and may affect the performance of other nearby electronic equipment.

#### 4.1.1 Over View of Test

<b>Results</b>	<b>Complies</b> (as tested per this report)				<b>Date</b>	10/09/2012	
<b>Standard</b>	FCC Part 15.209 and 15.205						
<b>Product Model</b>	RADION SERIES			<b>Serial#</b>	TS1-12		
<b>Configuration</b>	See test plan for details						
<b>Test Set-up</b>	Tested at 10m O.A.T.S. placed on turn-table at 3 meters, see test plans for details						
<b>EUT Powered By</b>	Battery Operated	<b>Temp</b>	21°C	<b>Humidity</b>	48%	<b>Pressure</b>	1021mbar
<b>Frequency Range</b>	30 - 1000 MHz @ 3m						
<b>Perf. Criteria</b>	Class B. (Below Limit)		<b>Perf. Verification</b>	Readings Under Limit			
<b>Mod. to EUT</b>	None		<b>Test Performed By</b>	Randall Masline			

#### 4.1.2 Test Procedure

Radiated FCC emissions tests were performed using the procedures of ANSI C63.10 including methods for signal maximizations and EUT configuration. The photos included with the report show the EUT in its maximized configuration. Further radiated emission tests were performed per the procedures stated in the other emissions standards listed in this report.

The frequency range from 30 - 1000 MHz was investigated for radiated emissions.

Radiated emission testing was first performed at a distance of 3 meters in the semi-anechoic chamber in order to identify the specific frequencies for which these measurements will be made on the 10 m OATS, at a distance of 3 meters.

#### 4.1.3 Deviations

There were no deviations from the test methodology listed in the test plan for the radiated emission test.

#### 4.1.4 Final Test

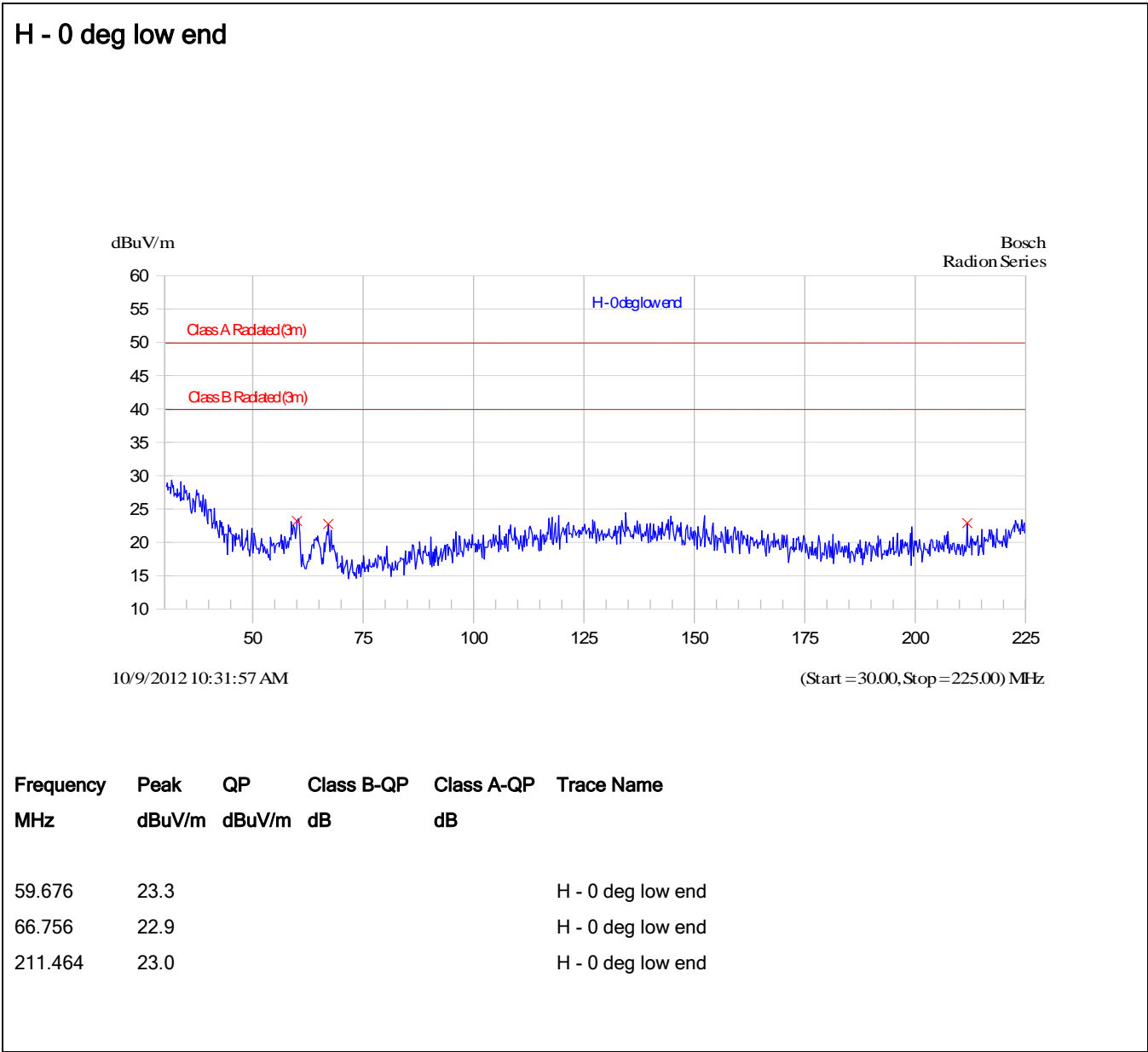
All final radiated emissions measurements were below (in compliance) the limits.

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

### 4.1.5 Final Graphs

NOTES:

**Radiated Emissions Prescan**  
Vertical / Horizontal

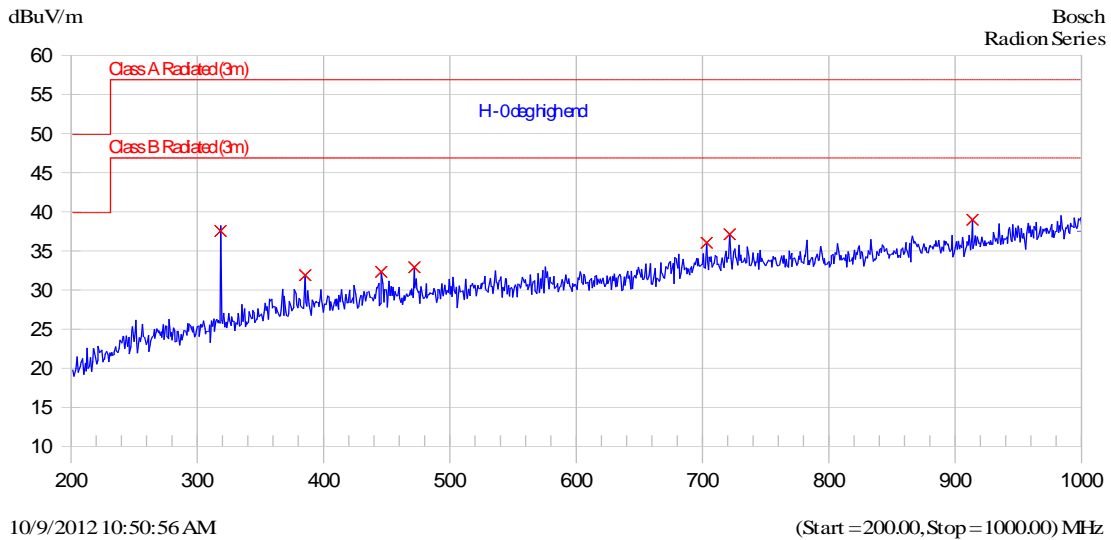


The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

NOTES:

**Radiated Emissions Prescan**  
Vertical / Horizontal

**H - 0 deg high end**

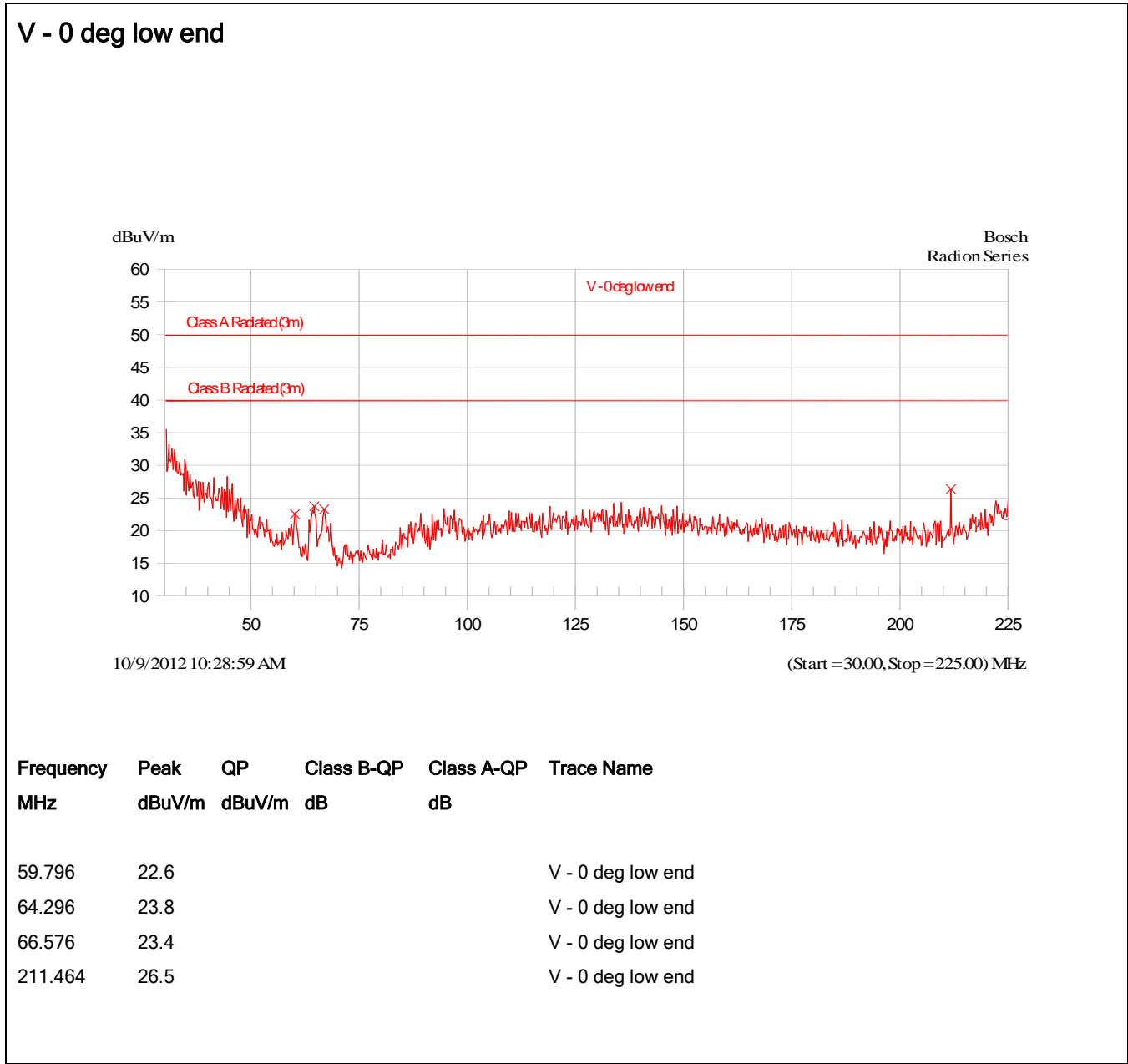


Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
317.120	37.7				H - 0 deg high end
384.104	32.0				H - 0 deg high end
444.308	32.4				H - 0 deg high end
470.516	33.0				H - 0 deg high end
702.008	36.2				H - 0 deg high end
720.056	37.2				H - 0 deg high end
912.440	39.1				H - 0 deg high end

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TÜV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

**NOTES:**

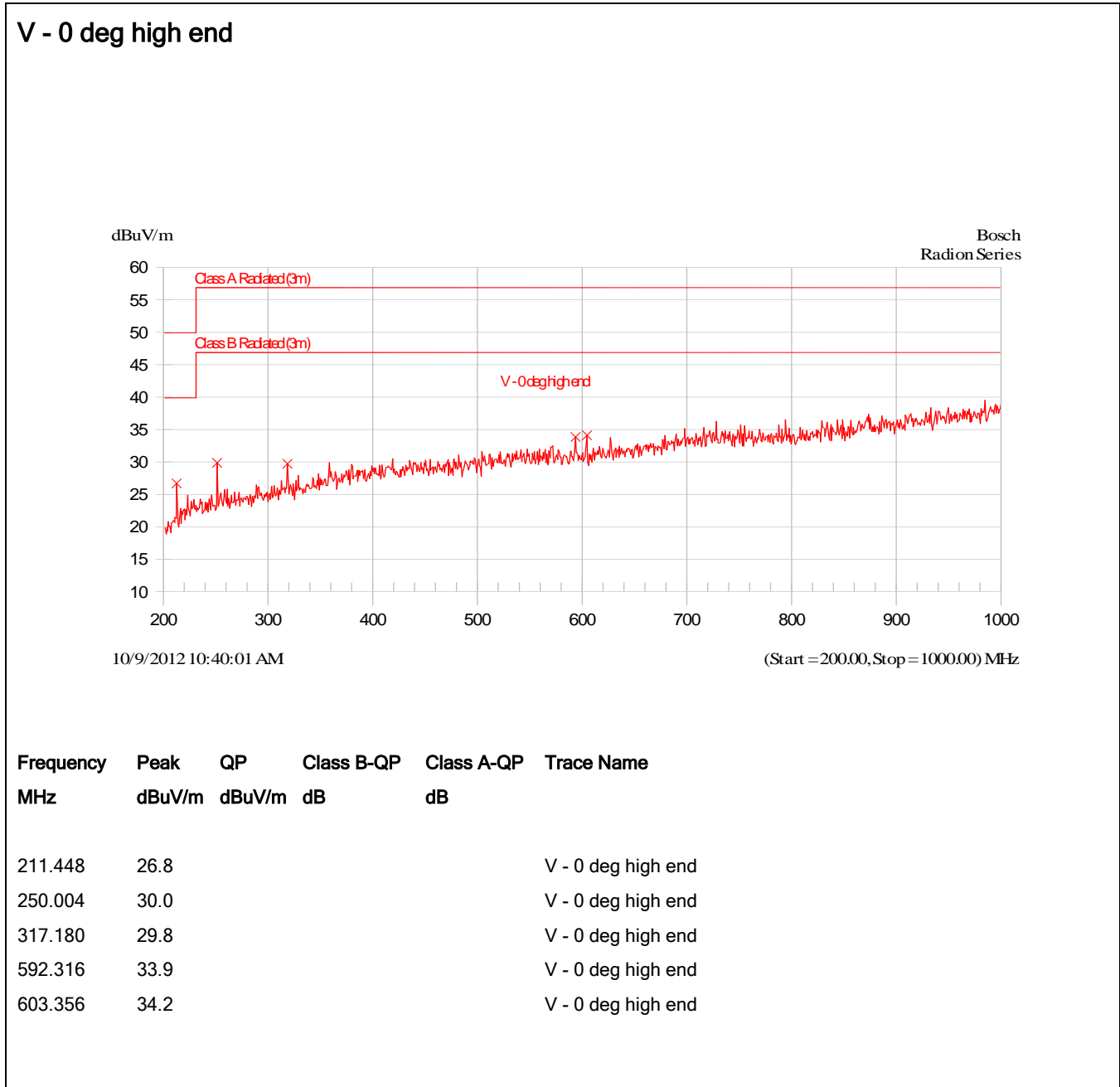
**Radiated Emissions Prescan**  
Vertical / Horizontal



The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TÜV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

NOTES:

**Radiated Emissions Prescan**  
Vertical / Horizontal



The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TÜV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



### 4.1.6 Final Tabulated Data

<b>Radiated Emissions Measurements</b>									
<b>Standard:</b>	Class B/FCC Part 15.209			<b>PRESCAN or FINAL:</b> final			<b>Date:</b> 10/22/2012		
<b>Device Tested:</b>	Bosch Radion Series			<b>Distance:</b> 3m					
Measured Level									
Meas #	Freq (MHz)	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Δ	Result	Antenna Polarization	Angle (degrees)	Antenna Height (meters)	Comment
1	56.6760	35.00	40.00	-5.00	Complied	Horizontal	0	2.50	
2	317.1200	37.00	47.00	-10.00	Complied	Horizontal	0	3.00	
3	384.0000	37.20	47.00	-9.80	Complied	Horizontal	0	1.00	
4	444.3080	38.40	47.00	-8.60	Complied	Horizontal	0	1.00	
5	470.5160	39.50	47.00	-7.50	Complied	Horizontal	0	1.00	
6	720.0560	44.70	47.00	-2.30	Complied	Horizontal	0	1.00	
7	250.0040	36.90	47.00	-10.10	Complied	Vertical	0	1.00	
8	317.8000	35.30	47.00	-11.70	Complied	Vertical	0	1.00	
9	592.3160	41.50	47.00	-5.50	Complied	Vertical	0	1.00	
10	603.3560	41.10	47.00	-5.90	Complied	Vertical	0	1.00	

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TÜV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## 4.2 Fundamental Field Strength and Harmonic Emissions

This test evaluates the field strength of the fundamental and field strength of the spurious emissions.

### 4.2.1 Test Over View

<b>Results</b>	<b>Complies</b> (as tested per this report)						<b>Date</b>	10/10/2012
<b>Standard</b>	FCC Part 15.231(b)							
<b>Product Model</b>	RADION SERIES				<b>Serial#</b>	TS1-12		
<b>Configuration</b>	See test plan for details							
<b>Test Set-up</b>	Tested in anechoic chamber		EUT placed on table		See test plan for details			
<b>EUT Powered By</b>	Battery Operated	<b>Temp</b>	21° C	<b>Humidity</b>	48%	<b>Pressure</b>	1021mbar	
<b>Perf. Criteria</b>	15.231(b) Table (Below Limit)		<b>Perf. Verification</b>		Readings under Limit			
<b>Mod to EUT</b>	None		<b>Test Performed By</b>		Randall Masline			

### 4.2.2 Test Procedure

The EUT was placed on a table 3 meters from the antenna and all 3 orthogonal positions were investigated for highest field strength and highest spurious emissions. The fundamental frequency of the EUT is 433.42 MHz, therefore in addition to the requirements of 15.205 the EUT was tested to meet the following requirements in 15.231(b)

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70.....	2,250.....	225
70-130.....	1,250.....	125
130-174.....	\1\ 1,250 to 3,750	\1\ 125 to 375
174-260.....	3,750.....	375
260-470.....	\1\ 3,750 to 12,500.	\1\ 375 to 1,250
Above 470.....	12,500.....	1,250

### 4.2.3 Deviations

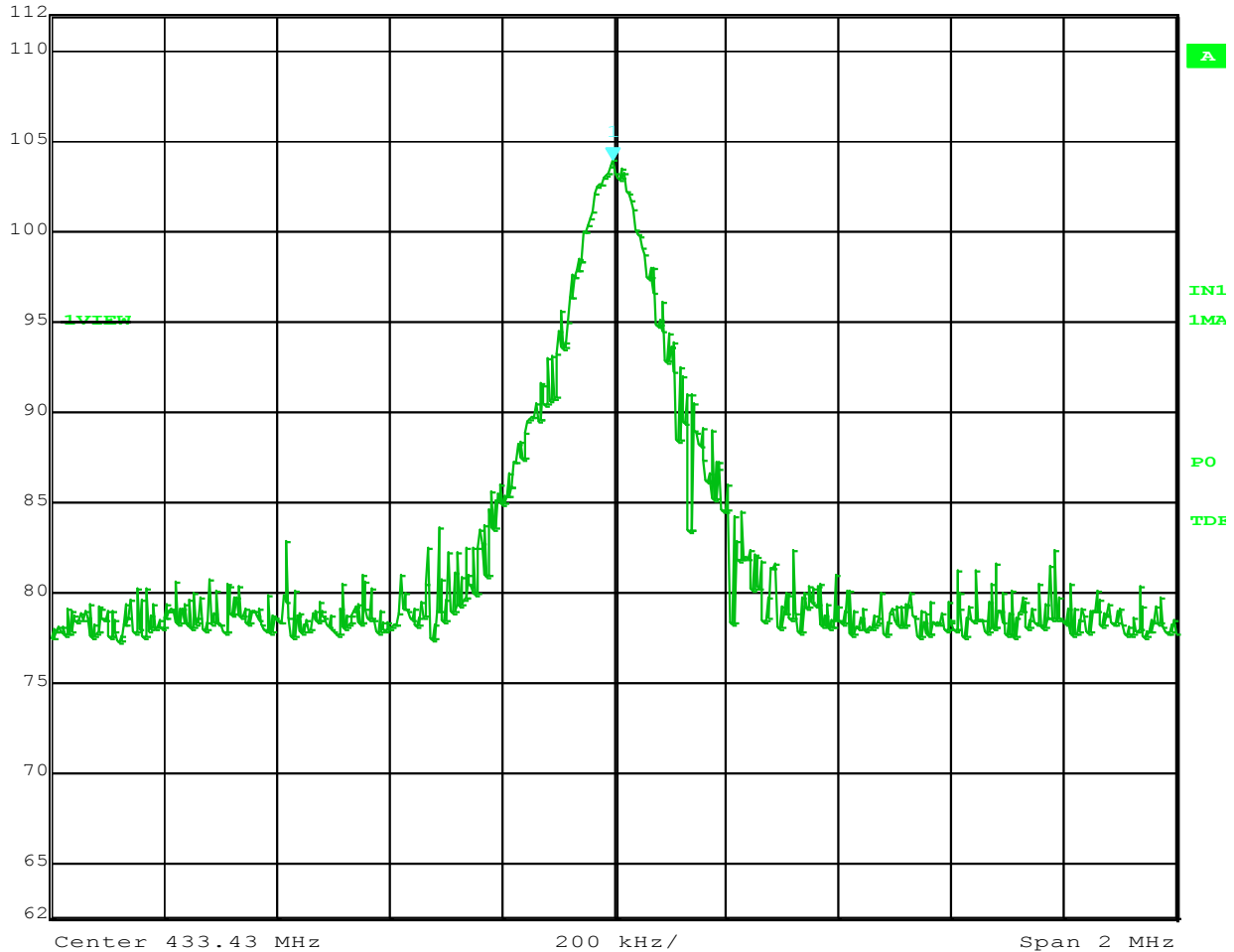
There were no deviations from the test methodology listed in the test plan for the harmonic current emissions test.

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

4.2.4 Final Data



Ref Lvl	112 dB $\mu$ V	Marker 1 [T1]	103.88 dB $\mu$ V	RBW	120 kHz	RF Att	50 dB
			433.42799599 MHz	VBW	300 kHz	Unit	dB $\mu$ V
				SWT	5.5 ms		



Date: 10.OCT.2012 15:34:23

Figure 1 – Peak Field Strength is 103.88 dBuV at 3 meters, Peak Limit is 100.81 dBuV and Average limit is 80.81 dBuV at 433.42 MHz

The Duty Cycle is 15% therefore the duty cycle correction factor is as follows

$$20 \log(0.15) = -16.47$$

Reducing the Peak signal strength from 103.88dBuV – 16.47 dBuV = 87.41 dBuV

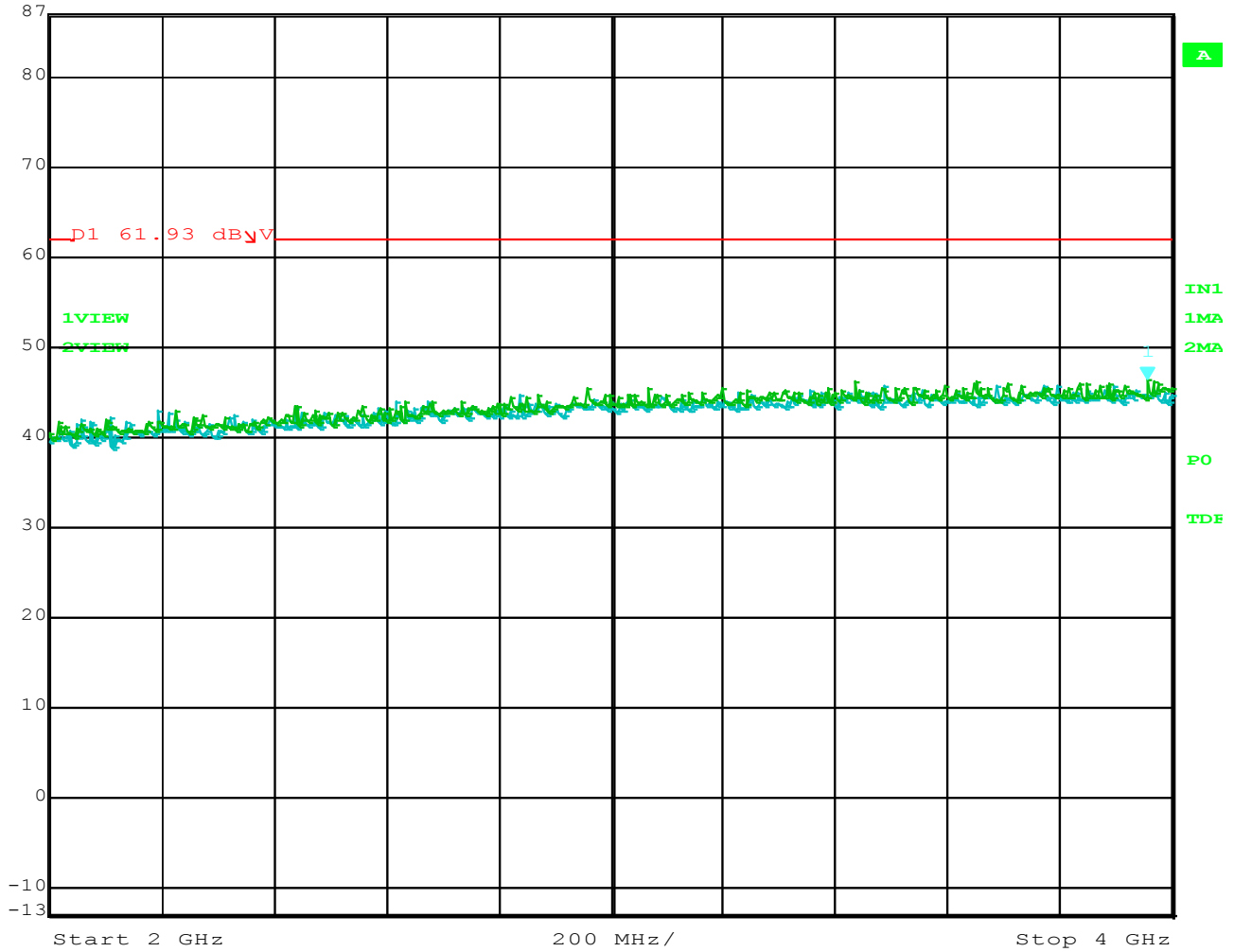
Peak Limit is 100.81 dBuV Pulse Desensitization calculation is required.

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.





Ref Lvl	Marker 1 [T1]	RBW	1 MHz	RF Att	0 dB
87 dB $\mu$ V	46.46 dB $\mu$ V	VBW	3 MHz		
	3.95591182 GHz	SWT	5 ms	Unit	dB $\mu$ V



Date: 23.OCT.2012 16:05:57

Figure 3 – Spurious Emissions (Vertical) 2 to 4 GHz

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TÜV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

### 4.3 Bandwidth

This test measures the Bandwidth of the fundamental emission.

#### 4.3.1 Test Over View

<b>Results</b>	<b>Complies</b> (as tested per this report)				<b>Date</b>	10/10/2012	
<b>Standard</b>	FCC Part 15.231(c)						
<b>Product Model</b>	RADION SERIES			<b>Serial#</b>	TS1-12		
<b>Configuration</b>	See test plan for details						
<b>Test Set-up</b>	Tested in an anechoic chamber EUT placed on table See test plan for details						
<b>EUT Powered By</b>	Battery Operated	<b>Temp</b>	21° C	<b>Humidity</b>	48%	<b>Pressure</b>	1021mbar
<b>Perf. Criteria</b>	Part 15.231(c) (Below Limit)		<b>Perf. Verification</b>		Readings under Limit		
<b>Mod to EUT</b>	None		<b>Test Performed By</b>		Randall Masline		

#### 4.3.2 Test Procedure

Bandwidth measurements were made according to FCC part 15.31 and FCC part 15.231(c).

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

The Fundamental Frequency is 433.42 MHz therefore 0.25% of 433.42 MHz is 1.08 MHz

#### 4.3.3 Deviations

There were no deviations from the test methodology.

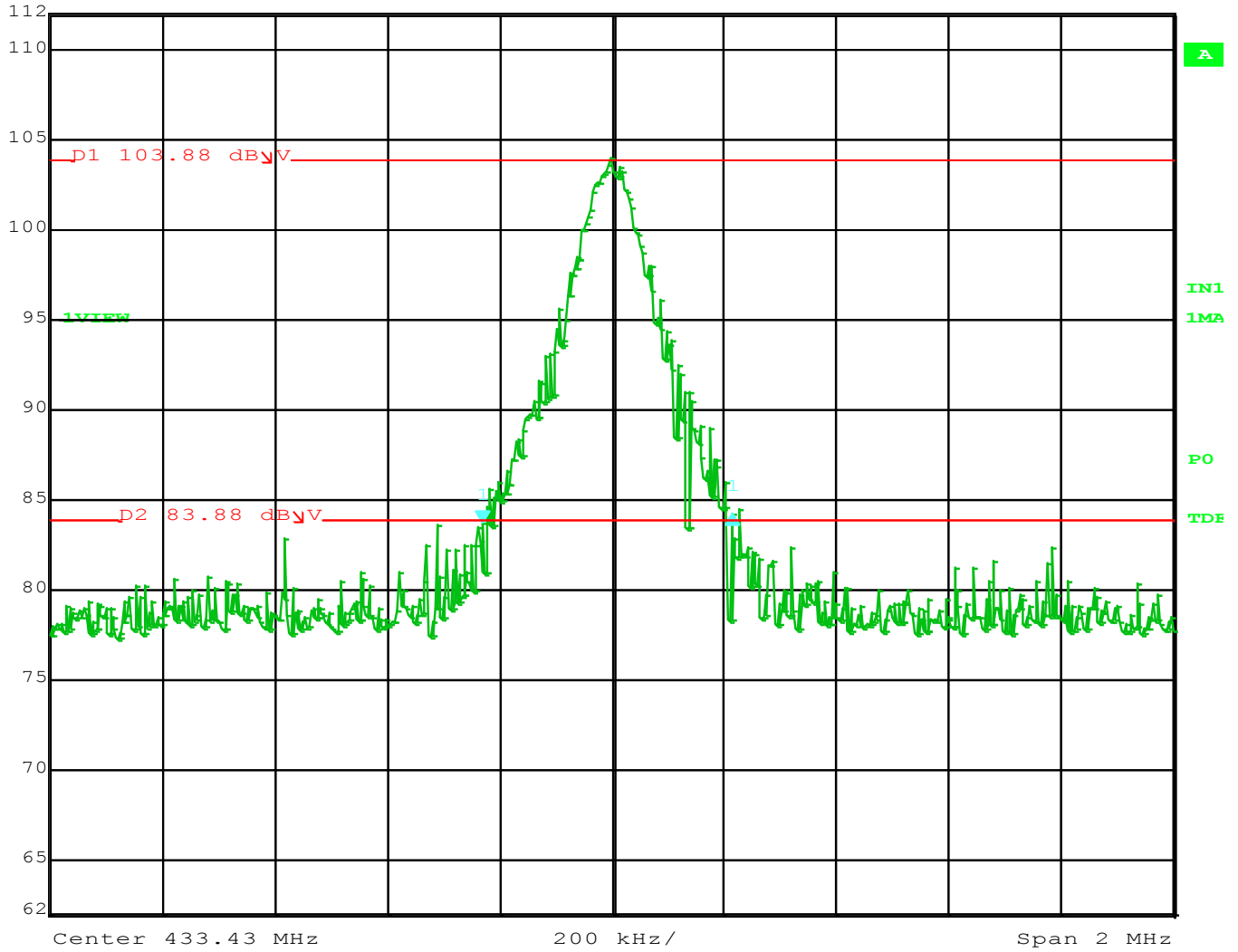
#### 4.3.4 Final Test

All final measurements were within (in compliance) the limits.

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



Ref Lvl	Delta 1 [T1]	RBW	120 kHz	RF Att	50 dB
112 dB $\mu$ V	0.47 dB	VBW	300 kHz		
	444.88977956 kHz	SWT	5.5 ms	Unit	dB $\mu$ V



Date: 10.OCT.2012 15:35:25

Figure 4 – 20 dB Bandwidth is 444.889 kHz

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

#### 4.4 99% Power Bandwidth

For the purpose of Section A1.1, the 99% bandwidth shall be no wider than .25% of the center frequency for devices operating between 70-900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency.

##### 4.4.1 Test Over View

<b>Results</b>	<b>Complies</b> (as tested per this report)				<b>Date</b>	1/28/2013	
<b>Standard</b>	RSS-210 Section A1.1.3						
<b>Product Model</b>	BTA-1			<b>Serial#</b>	TS-1		
<b>Test Set-up</b>	Direct Measurement from antenna port						
<b>EUT Powered By</b>	Battery	<b>Temp</b>	23° C	<b>Humidity</b>	32%	<b>Pressure</b>	1010mbar
<b>Perf. Criteria</b>	(Below Limit)			<b>Perf. Verification</b>	Readings Under Limit		
<b>Mod. to EUT</b>	None			<b>Test Performed By</b>	Randall Masline		

##### 4.4.2 Test Procedure

Using the procedures of RSS-GEN section 4.6.1, the 1 kHz resolution bandwidth is 1% of the 1 MHz span. The Video bandwidth is 3 times that of the resolution bandwidth.

The limit of the bandwidth would be 0.5% of 433.42 MHz is 1.08 MHz. The measured 99% bandwidth is 681.36 kHz.

##### 4.4.3 Deviations

There were no deviations from the test methodology listed in the test plan for the 99% Power bandwidth test.

##### 4.4.4 Final Test

The EUT met the performance criteria requirement as specified in the test plan of this report and in the standards.

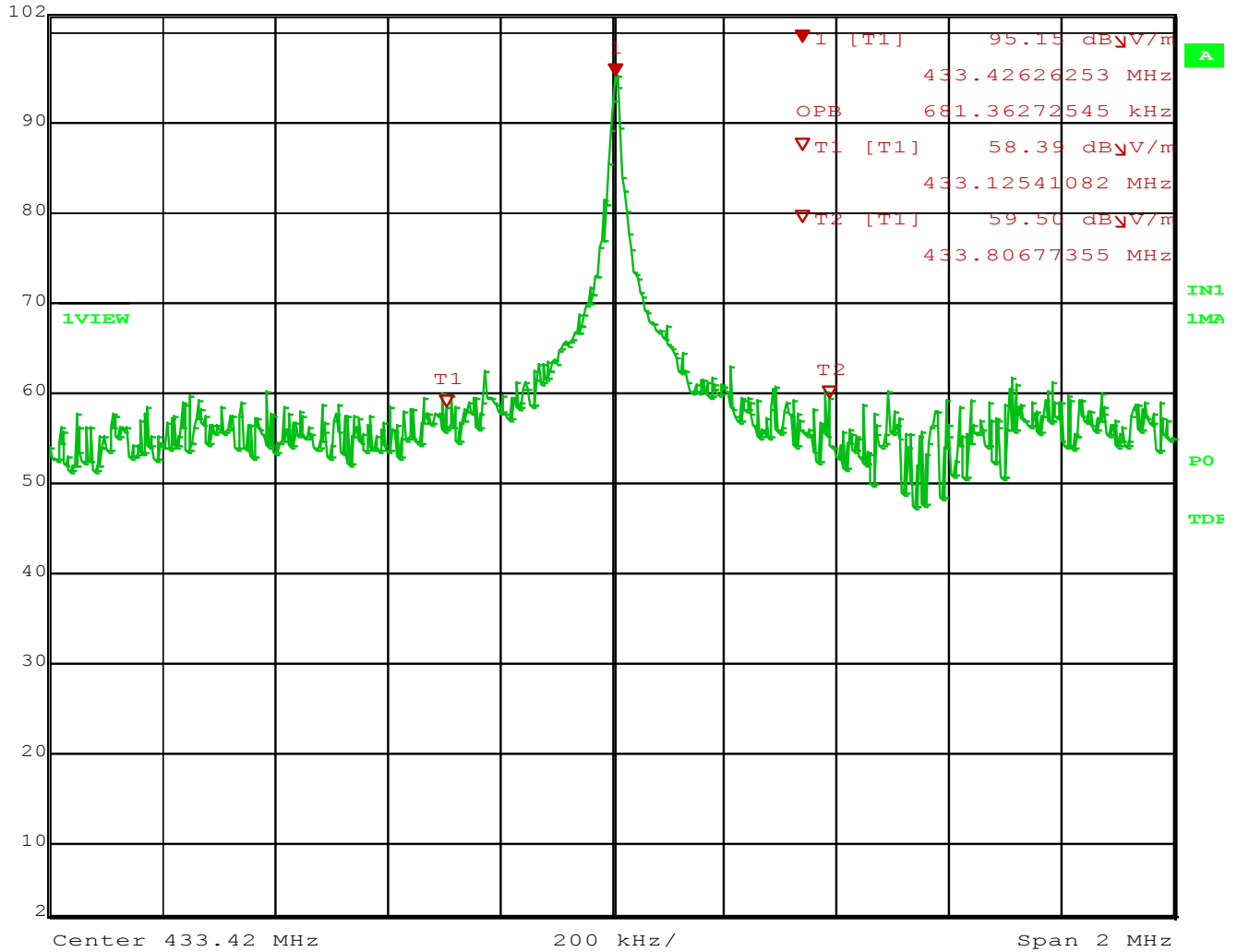
The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



**4.4.5 Final Data**



	Marker 1 [T1]	RBW	10 kHz	RF Att	10 dB
Ref Lvl	95.15 dB $\mu$ V/m	VBW	30 kHz		
102 dB*	433.42626253 MHz	SWT	50 ms	Unit	dB $\mu$ V/m



Date: 28.JAN.2013 17:03:50

Figure 5: 99% Bandwidth = 681.36 kHz

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TÜV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## 4.5 RF Exposure Measurement (Mobile Device)

### 4.5.1 Test Methodology

In this document, we try to prove the safety of radiation harmfulness to the human body for our product. The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The Gain of the antenna used in this product is measured in a Semi-Anechoic Chamber, and also the maximum total power input to the antenna is measured. Through the Friis transmission formula (see section 4.9.6) and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis transmission formula is a far field assumption, the calculated result of that is an over-prediction for near field power density. We will take that as the worst case to specify the safety range.

### 4.5.2 RF Exposure Limit

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3–3.0 .....	614	1.63	*(100)	6
3.0–30 .....	1842f	4.89f	*(900/f <sup>2</sup> )	6
30–300 .....	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3–1.34 .....	614	1.63	*(100)	30
1.34–30 .....	824f	2.19f	*(180/f <sup>2</sup> )	30
30–300 .....	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30

F = Frequency in MHz

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

### 4.5.3 EUT Operating condition

The software provided by Manufacturer enabled the EUT to transmit data at lowest, middle and highest channel individually.

### 4.5.4 Classification

The antenna of the product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance with the antenna should be included in users manual. Therefore, this device is classified as a **Mobile Device**.

### 4.5.5 Test Results

#### 4.5.5.1 Antenna Gain

The maximum Gain measured in Semi-Anechoic Chamber is 1 dBi or 1.26 (numeric).

#### 4.5.5.2 Output Power into Antenna & RF Exposure value at distance 20cm:

Calculations for this report are based on highest power measurement and the highest gain of the antenna. Limit for MPE (from FCC part 1.1310 table 1) is  $f(\text{Mhz}) / 1500 = 0.6 \text{ mW/cm}^2$  for 433.42MHz.

Highest Pout is 0.4mW, highest antenna gain (in linear scale) is 1.26, and R is 20cm.

$P_d = (0.4 * 1.26) / (4 * \pi * 20^2) = 0.0001 \text{ mW/cm}^2$ , which is 0.599 mW/cm<sup>2</sup> below to the limit.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

### 4.5.6 Sample Calculation

The Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where;

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi \approx 3.1416$

$R$  = distance between observation point and center of the radiator in cm

Ref. : David K. Cheng, *Field and Wave Electromagnetics*, Second Edition, Page 640, Eq. (11-133).

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## Appendix A

### 5 Test Plan

This test report is intended to follow this test plan outlined here in unless other wise stated in this here report. The following test plan will give details on product information, standards to be used, test set ups and refer to TUV test procedures. The test procedures will give the steps to be taken when performing the stated test. The product information below came via client, product manual, product itself and or the internet.

#### 5.1 General Information

<b>Client</b>	Bosch Security Systems
<b>Address 1</b>	130 Perinton Parkway
<b>Address 2</b>	Fairport, NY 14450
<b>Contact Person</b>	Peter Namisnak
<b>Telephone</b>	585-678-3462
<b>Fax</b>	585-289-4263
<b>e-mail</b>	peter.namisnak@us.bosch.com

#### 5.2 Model(s) Name

RADION SERIES

#### 5.3 Type of Product

Motion Detectors

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

### 5.4 Equipment Under Test (EUT) Description

The EUT is a security sensor that when alarms, transmits at 433.42 MHz to a receiver that is hard wired to a control panel.

### 5.5 Modifications

No modifications were necessary to meet the requirements.

### 5.6 Product Environment

<input checked="" type="checkbox"/>	<b>Residential</b>	<input checked="" type="checkbox"/>	<b>Hospital</b>
<input checked="" type="checkbox"/>	<b>Light Industrial</b>	<input checked="" type="checkbox"/>	<b>Small Clinic</b>
<input type="checkbox"/>	<b>Industrial</b>	<input checked="" type="checkbox"/>	<b>Doctor's office</b>
<input type="checkbox"/>	<b>Other</b>		

\*Check all that apply

### 5.7 Countries

<input checked="" type="checkbox"/>	<b>USA</b>
<input type="checkbox"/>	<b>Canada</b>

\*Check all that apply

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## 5.8 Applicable Documents

Standards	Description
FCC Part 15.231	Periodic operation in the band 40.66 - 40.70 MHz and above 70 MHz
FCC Part 15.209 and 15.205	Radiated Emissions
FCC Part 15.231(a)	Deactivation of Transmitter
FCC Part 15.231(b)	Field Strength of Fundamental and Sourious Emissions
FCC Part 15.231(c)	Bandwidth

## EUT Modes of Operation

The EUT is operated when a sensor is activated by motion or movement and the transmitter sends a signal to the receiver.

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.