

# Electromagnetic Compatibility Test Report

*Prepared in accordance with*

**FCC Part 15C and ANSI C63.10 and RSS-210**

On

**Wireless Tri-Tech Motion Detector**

**ISW-ZDL1-WP11G**

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 This test report may not be published or duplicated in part without permission of the testing body.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.

FCC ID: T3X-TTMW



IC: 1249A-TTMW

Report No.: 31451444.006\_ZDL1\_11\_FCC.doc

Page 2 of 36

<b>Client:</b>	Bosch Security Systems 130 Perinton Parkway Fairport, NY 14450	Peter Namisnak 585-223-4060 / 585-678-3263 peter.namisnak@us.bosch.com		
<b>Identification:</b>	Wireless Tri-Tech Motion Detector	<b>Serial No.:</b>	TS-1	
<b>Test item:</b>	ISW-ZDL1-WP11G	<b>Date tested:</b>	5/12/2014	
<b>Testing location:</b>	TUV Rheinland of North America 336 Initiative Drive Rochester, NY 14624 U.S.A.	Tel: (585) 426-5555 Fax: (585)-568-8338		
<b>Test specification:</b>	Emissions: FCC Part 15 subpart C, FCC Part 15.209(a) FCC Part 15.205(a), & RSS-210 Issue 8 FCC Part 15.245(a) & RSS-210 Issue 8, FCC Part 15.215(c) FCC Part 2.1093 and RSS-102 Issue 4,			
<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			
10 July 2014	<hr/>	10 July 2014	<hr/>	
<i>Date</i>	<i>Name</i>	<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				
US5253	Testing Cert.# 3331.04	3466C-1	A-0037	SL2-IN-E-050R

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 This test report may not be published or duplicated in part without permission of the testing body.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

5 -12-2014

Date

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 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

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

1.1 ACCREDITATIONS & ENDORSEMENTS ..... 7

1.2 MEASUREMENT UNCERTAINTY EMISSIONS ..... 8

1.3 CALIBRATION TRACEABILITY ..... 9

1.4 MEASUREMENT EQUIPMENT USED ..... 10

**2 PRODUCT INFORMATION ..... 11**

2.1 PRODUCT DESCRIPTION ..... 11

2.2 EQUIPMENT MODIFICATIONS ..... 11

2.3 TEST PLAN ..... 11

**3 EMISSIONS..... 13**

3.1 RADIATED EMISSIONS ..... 13

3.2 FIELD STRENGTH OF FUNDAMENTAL AND HARMONIC EMISSIONS ..... 18

3.3 BAND EDGE REQUIREMENTS ..... 29

3.4 99% POWER BANDWIDTH ..... 31

3.5 RF EXPOSURE MEASUREMENT (MOBILE DEVICE)..... 33

**APPENDIX A ..... 35**

**4 TEST PLAN..... 35**

4.1 GENERAL INFORMATION ..... 35

4.2 MODEL(S) NAME ..... 35

4.3 TYPE OF PRODUCT ..... 35

4.4 EQUIPMENT UNDER TEST (EUT) DESCRIPTION ..... 36

4.5 MODIFICATIONS ..... 36

4.6 PRODUCT ENVIRONMENT ..... 36

4.7 COUNTRIES ..... 36

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 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 and RSS-210 based on the results of testing performed on 5/12/2014 on the Wireless Tri-Tech Motion Detector, Model No. ISW-ZDL1-WP11G, 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>	585-223-4060	<b>Contact</b>	Peter Namisnak
		<b>Fax</b>	585-678-3263	<b>e-mail</b>	peter.namisnak@us.bosch.com
<b>Description</b>	Wireless Tri-Tech Motion Detector	<b>Model Number</b>	ISW-ZDL1-WP11G		
<b>Serial Number</b>	TS-1	<b>Test Voltage/Freq.</b>	Battery		
<b>Test Date Completed:</b>	5/12/2014	<b>Test Engineer</b>	Randall Masline		
<b>Standards</b>	<b>Description</b>	<b>Severity Level or Limit</b>		<b>Criteria</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	<b>Complies</b>
FCC Part 15.209(a) FCC Part 15.205(a), & RSS-210 Issue 8	Radiated Emissions Restricted Bands	Class B, 30 - 1000 MHz		Limit	<b>Complies</b>
FCC Part 15.245(a) & RSS-210 Issue 8	Operation within the bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10500 – 10550MHz and 24075-24175 MHz	2500mv/m Fundamental at 10.525 GHz 25.0mv/m Harmonics		Limit	<b>Complies</b>
FCC Part 15.215(c)	Band Edge Requirements	Per Section 15.215(c) of the standard		Limit	<b>Complies</b>
FCC Part 15.245 and RSS-210 A1.3 Issue 8	99% Occupied Bandwidth	Contained within the Frequency Band		Below Limit	<b>Complies</b>
FCC Part 2.1093 and RSS-102 Issue 4	RF Exposure	MPE or SAR Requirements (Mobile)		Limit	<b>Complies</b>
FCC Part 15.203	Antenna Requirement	Antenna is a PCB type that is permanently mounted			<b>Complies</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 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.

## Laboratory Information

### 1.1 Accreditations & Endorsements

#### 1.1.1 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.

#### 1.1.2 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.

#### 1.1.3 VCCI

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

#### 1.1.4 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.

#### 1.1.5 BSMI

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

#### 1.1.6 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.

### 1.1.7 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 (dB $\mu$ V/m)**

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

### 1.2 Measurement Uncertainty Emissions

Measurement	<i>U<sub>lab</sub></i>	<i>U<sub>cispr</sub></i>
<b>Radiated Disturbance @ 10m</b>		
30 MHz – 1000 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 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.



### Measurement Uncertainty Immunity

The estimated combined standard uncertainty for radiated emissions measurements is $\pm 1.6$ dB.
The estimated combined standard uncertainty for conducted emissions measurements is $\pm 1.2$ 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.

### 1.3 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.

## 1.4 Measurement Equipment Used

Equipment	Manufacturer	Model #	Ref.	Serial #	Last Cal dd/mm/yy	Next Cal dd/mm/yy	Test
<b>Radiated Emissions</b>							
BiLog	Chase	CBL6111	C041	1170	12-Sept-12	12-Sept-14	RE
Horn	EMCO	3115	C025	9512-4630	14-Apr-14	14-Apr-16	RE
Horn	EMCO	3115	C031	9812-5635	14-Apr-14	14-Apr-16	RE
Analyzer w RF Filter Section 85460A	HP	8546A		3325A00134	28-Aug-13	28-Aug-14	RE
Receiver (20Hz-40GHz)	Rohde & Schwarz	ESI(B) 40	C320	839283/005	28-Aug-13	28-Aug-14	RE
Amplifier (1-26.5 GHz.)	Agilent	8449B	C438	3008A01842	27-Aug-13	27-Aug-16	RE
Amplifier 1 - 18GHz	Rohde & Schwarz	TS-PR18	C439	122002/001	27-Aug-13	27-Aug-16	RE
Amplifier (18-26.5GHz)	Rohde & Schwarz	TS-PR26	C443	100005	27-Aug-13	27-Aug-16	RE
ATM Horn and amp 26.5 – 40 GHz	ATM				27-Aug-13	27-Aug-16	RE
Multimeter	Fluke	83	C437	48162892	28-Aug-13	28-Aug-14	RE
BiLog	Chase	CBL6111B	C448	2081	14-Apr-14	14-Apr-16	RE
Field Monitor	Amplifier Research	FM5004		308114	N/A	N/A	RI
<b>General Laboratory Equipment</b>							
Multimeter	Fluke	87	C445	59890224	28-Aug-13	28-Aug-14	
Multimeter	Fluke	8062A	C452	4715199	28-Aug-13	28-Aug-14	
Pressure/Temperature/RH	Extech	SD700	C481	Q668884	28-Aug-13	28-Aug-14	

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 Product Information

### 2.1 Product Description

See Appendix A

### 2.2 Equipment Modifications

No modifications were needed to bring product into compliance.

### 2.3 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 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.



Figure 1 – External Photo of EUT

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.

### 3 Emissions

#### 3.1 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.

##### 3.1.1 Over View of Test

<b>Results</b>	<b>Complies</b> (as tested per this report)				<b>Date</b>	5/12/2014	
<b>Standard</b>	FCC Part 15.209(a) FCC Part 15.205(a), & RSS-210 Issue 8						
<b>Product Model</b>	ISW-ZDL1-WP11G			<b>Serial#</b>	TS-1		
<b>Configuration</b>	See test plan for details						
<b>Test Set-up</b>	Tested on 10m O.A.T.S. at 3 meters, placed on turn-table, see test plans for details						
<b>EUT Powered By</b>	Battery	<b>Temp</b>	22°C	<b>Humidity</b>	47%	<b>Pressure</b>	1026mbar
<b>Frequency Range</b>	30 - 1000 MHz @ 10m						
<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		

##### 3.1.2 Test Procedure

Radiated and 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.

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.

##### 3.1.3 Deviations

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

##### 3.1.4 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.

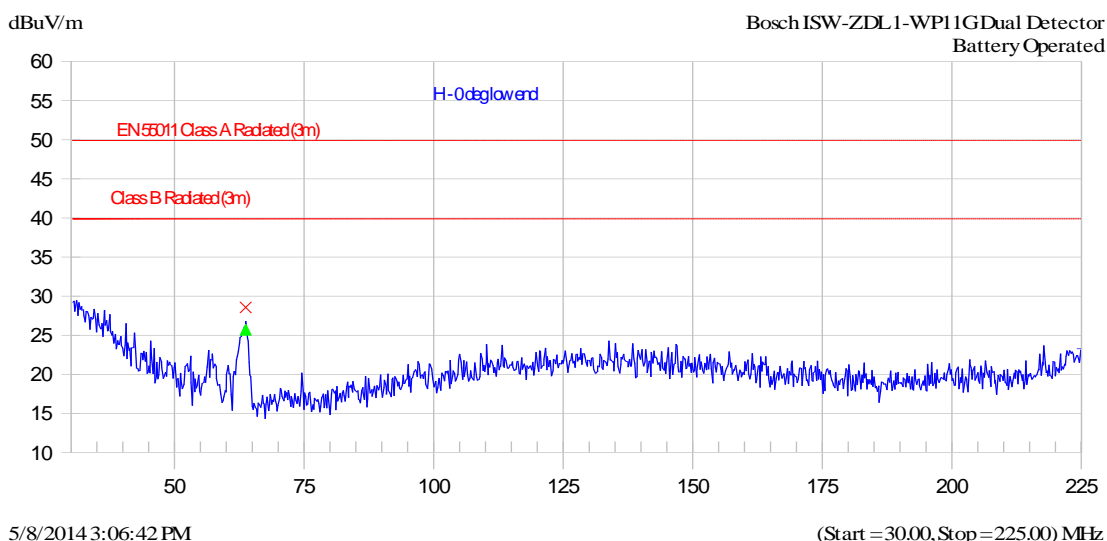
### 3.1.5 Final Graphs

NOTES:

#### Radiated Emissions Prescan

Vertical / Horizontal

#### H - 0 deg low end



Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
63.384	28.7	25.8	-14.2	-24.2	H - 0 deg low end

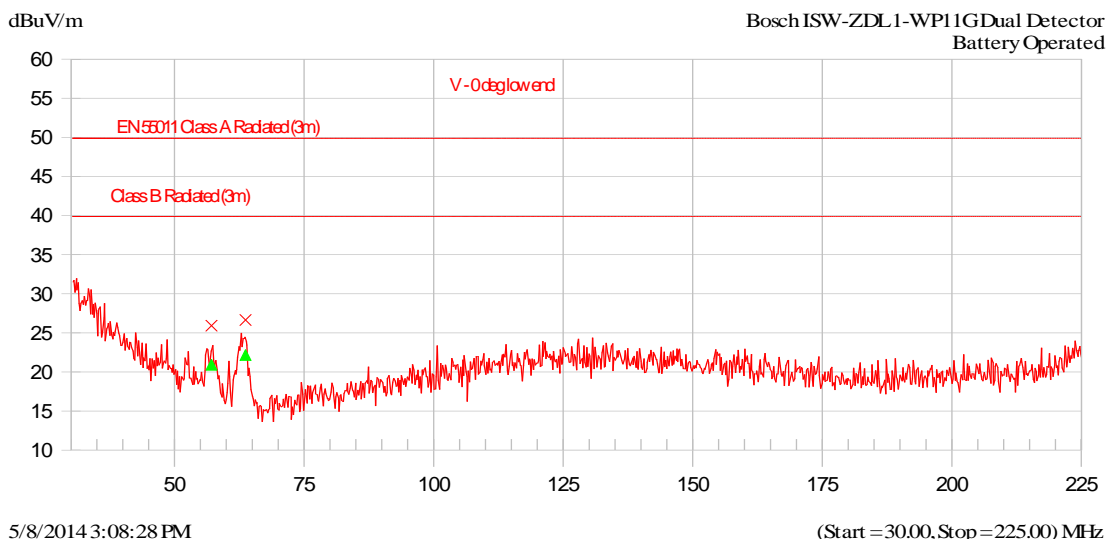
The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any 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

**V - 0 deg low end**



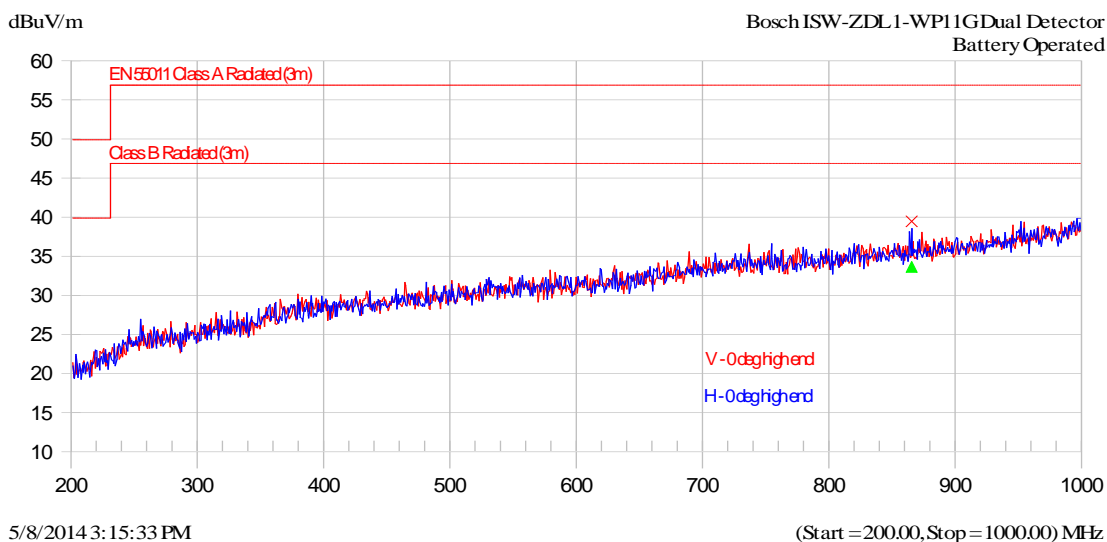
Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
56.778	26.0	21.0	-19.0	-29.0	V - 0 deg low end
63.349	26.8	22.3	-17.7	-27.7	V - 0 deg low end

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 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

**High end**



Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
864.187	39.6	33.7	-13.3	-23.3	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 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.



### 3.1.6 Final Tabulated Data

<b>Radiated Emissions Measurements</b>											
<b>Standard:</b>	47 CFR 15.209(a)						Final	<b>Date:</b> 5/8/2014			
<b>Device Tested:</b>	Bosch						3.0m				
Measured Level											
Meas #	Freq (MHz)	Peak	Average	Peak Limit	Peak Δ	Avg Limit	Avg Δ	Result	Polarization	Angle (degrees)	Antenna Height (meters)
1	63.3840	28.70	24.60	74.00	-45.30	54.00	-29.40	Complied	Horizontal	0	1.00
2	864.1870	39.60	32.30	74.00	-34.40	54.00	-21.70	Complied	Horizontal	0	1.00
3	6933.8000	50.89	42.80	74.00	-23.11	54.00	-11.20	Complied	Horizontal	0	1.00
4	18000.0000	50.16	41.70	74.00	-23.84	54.00	-12.30	Complied	Horizontal	0	1.00
5	39943.8870	38.88	32.50	74.00	-35.12	54.00	-21.50	Complied	Horizontal	0	1.00
6	22136.2720	25.05	21.80	74.00	-48.95	54.00	-32.20	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.

### 3.2 Field Strength of Fundamental and Harmonic Emissions

This test measures the electromagnetic levels of fundamental and spurious signals generated by the EUT that radiated from the EUT.

#### 3.2.1 Test Over View

<b>Results</b>	<b>Complies</b> (as tested per this report)				<b>Date</b>	5/12/2014	
<b>Standard</b>	FCC Part 15.245(a) & RSS-210 Issue 8						
<b>Product Model</b>	ISW-ZDL1-WP11G			<b>Serial#</b>	TS-1		
<b>Configuration</b>	See test plan for details						
<b>Test Set-up</b>	Tested at O.A.T.S.		EUT placed on table		See test plan for details		
<b>EUT Powered By</b>	Battery	<b>Temp</b>	22° C	<b>Humidity</b>	47%	<b>Pressure</b>	1026mbar
<b>Perf. Criteria</b>	2500mv/m (Below Limit)		<b>Perf. Verification</b>		Readings under Limit		
<b>Mod to EUT</b>	None		<b>Test Performed By</b>		Randall Masline		

#### 3.2.2 Test Procedure

Field Strength and 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.

Radiated emission testing measurements will be made on the 10 m OATS, at a 3m distance.

#### 3.2.3 Deviations

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

#### 3.2.4 Final Test

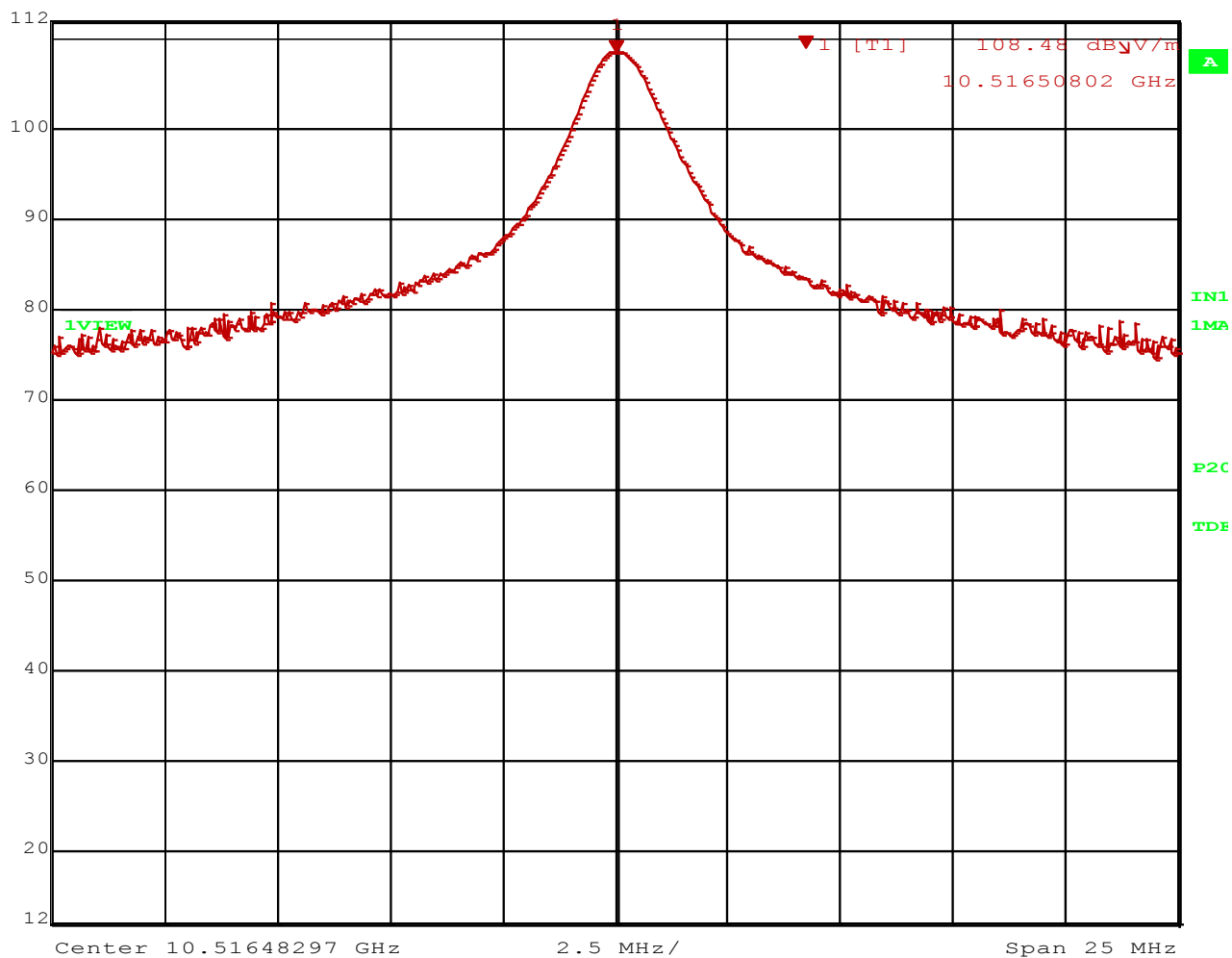
All final radiated emissions measurements were below (in compliance) the limits.

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.

### 3.2.5 Final Data



Ref Lvl	112 dB*	Marker 1 [T1]	108.48 dB $\mu$ V/m	RBW	1 MHz	RF Att	40 dB
			10.51650802 GHz	VBW	1 MHz		
				SWT	1 s	Unit	dB $\mu$ V/m



Date: 9.MAY.2014 13:43:42

Figure 2 – Field Strength of EUT Fundamental at 3 m distance from Antenna - Horizontal

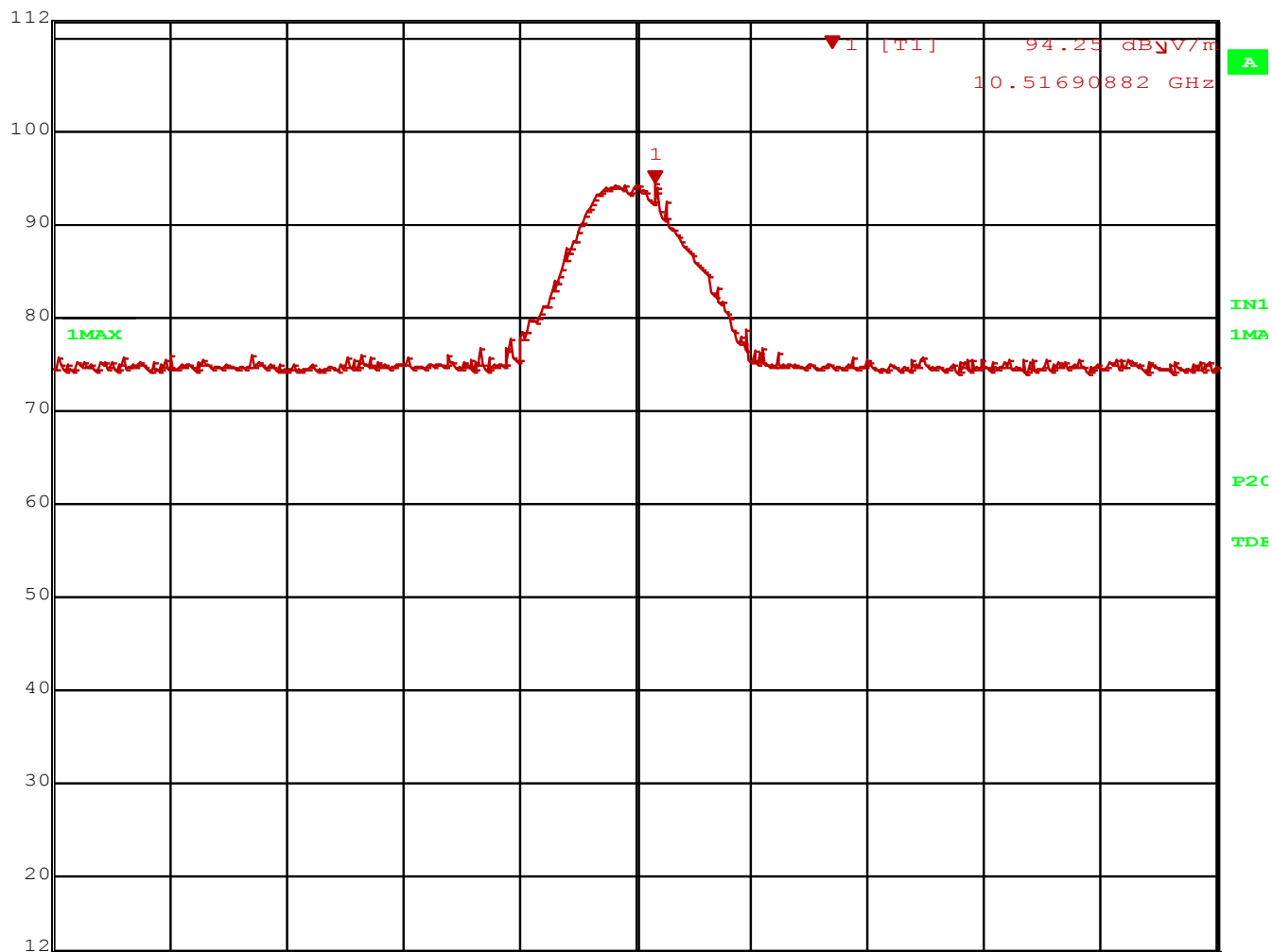
Horizontal was determined highest Emission 108.48dB $\mu$ V/m

Limit is 127.5 dB $\mu$ V

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.



	Marker 1 [T1]	RBW	1 MHz	RF Att	40 dB
Ref Lvl	94.25 dB $\mu$ V/m	VBW	1 MHz		
112 dB*	10.51690882 GHz	SWT	1 s	Unit	dB $\mu$ V/m



Center 10.51648297 GHz      2.5 MHz/      Span 25 MHz

Date: 9.MAY.2014 13:42:58

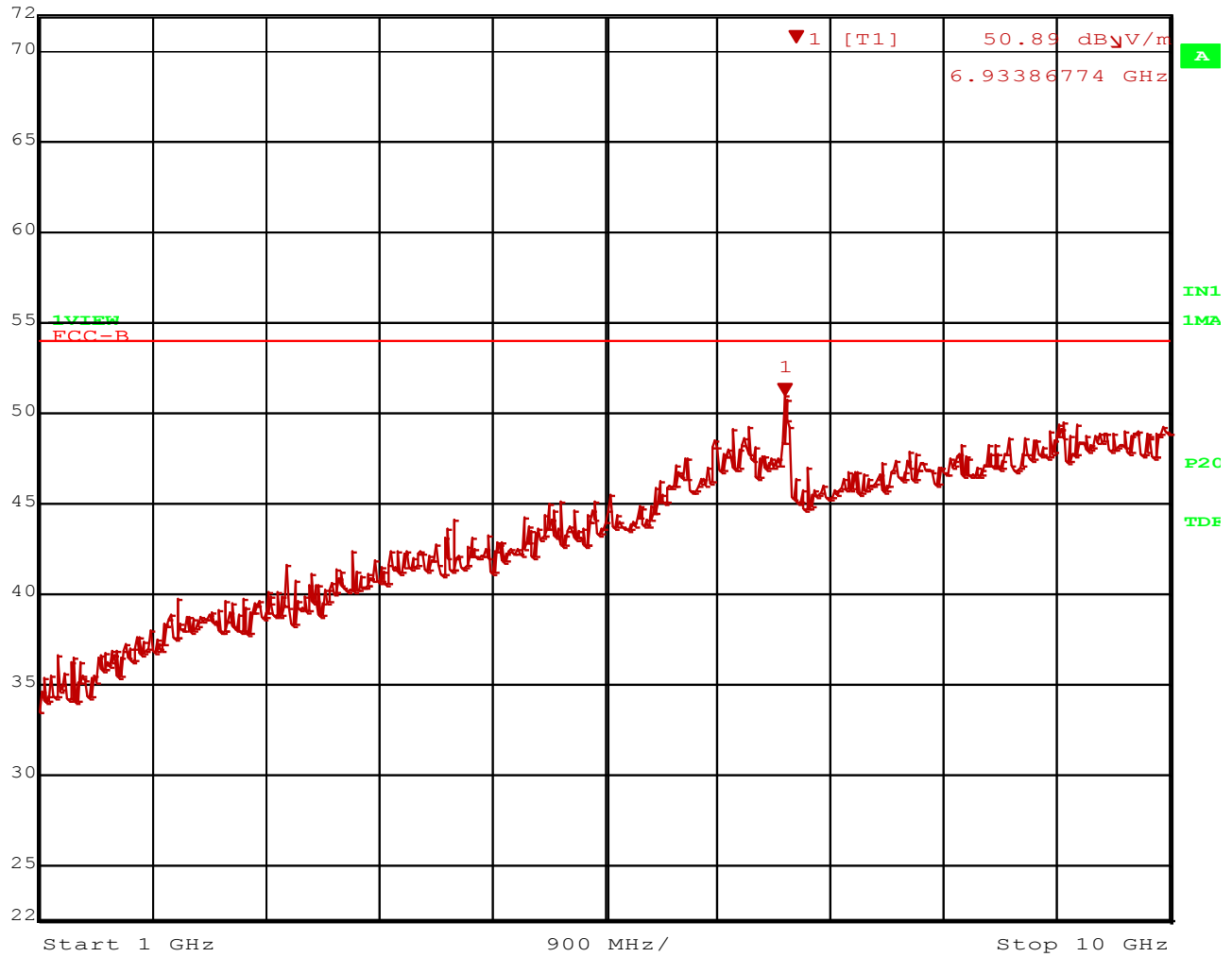
Figure 3 – Field Strength of EUT Fundamental at 3 m distance from Antenna - Vertical

Limit is 127.5 dBuV

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.



Marker 1 [T1]	RBW	1 MHz	RF Att	10 dB
Ref Lvl	50.89 dBµV/m	VBW	1 MHz	
72 dB*	6.93386774 GHz	SWT	1 s	Unit dBµV/m



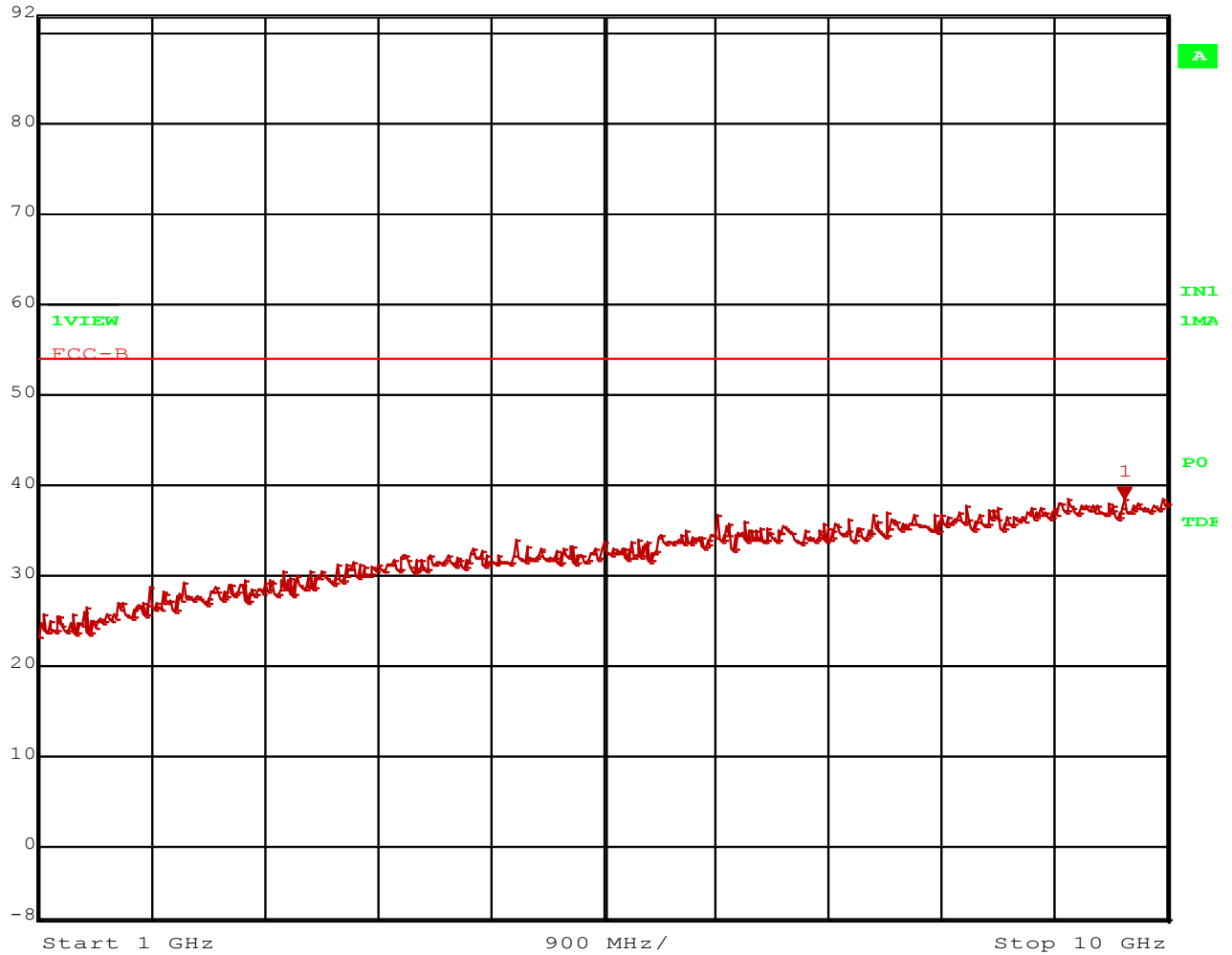
Date: 9.MAY.2014 14:10:35

Figure 4 – Field strength of Harmonic Emissions 1-10 GHz 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.



Marker 1 [T1] RBW 100 kHz RF Att 0 dB  
 Ref Lvl 38.40 dB $\mu$ V/m VBW 100 kHz  
 92 dB\* 9.65731463 GHz SWT 2.25 s Unit dB $\mu$ V/m



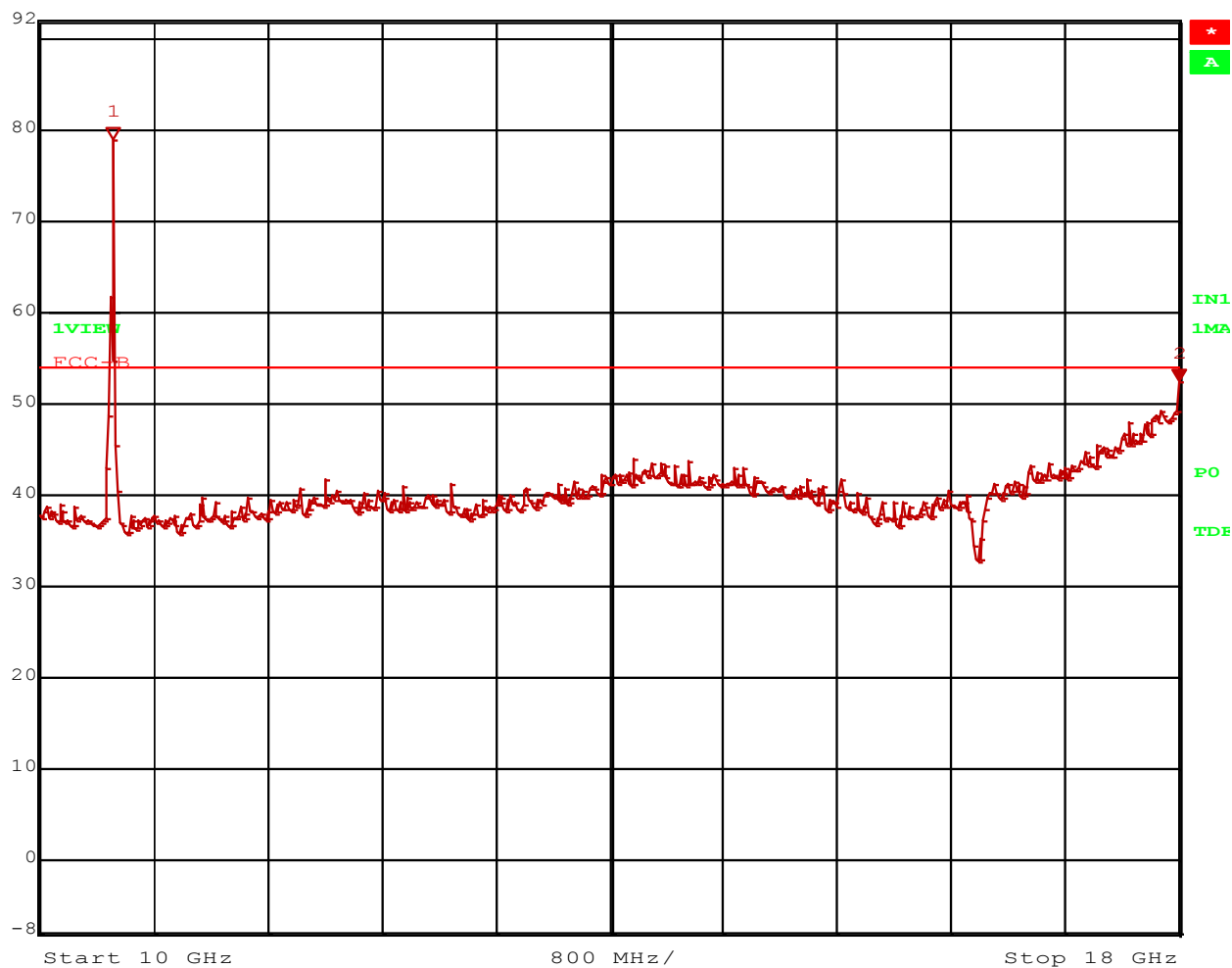
Date: 9.MAY.2014 14:39:57

Figure 5 – Field strength of Harmonic Emissions 1-10 GHz Vertical

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.



Marker 2 [T1] RBW 100 kHz RF Att 0 dB  
Ref Lvl 52.36 dB $\mu$ V/m VBW 100 kHz  
92 dB\* 18.00000000 GHz SWT 2 s Unit dB $\mu$ V/m



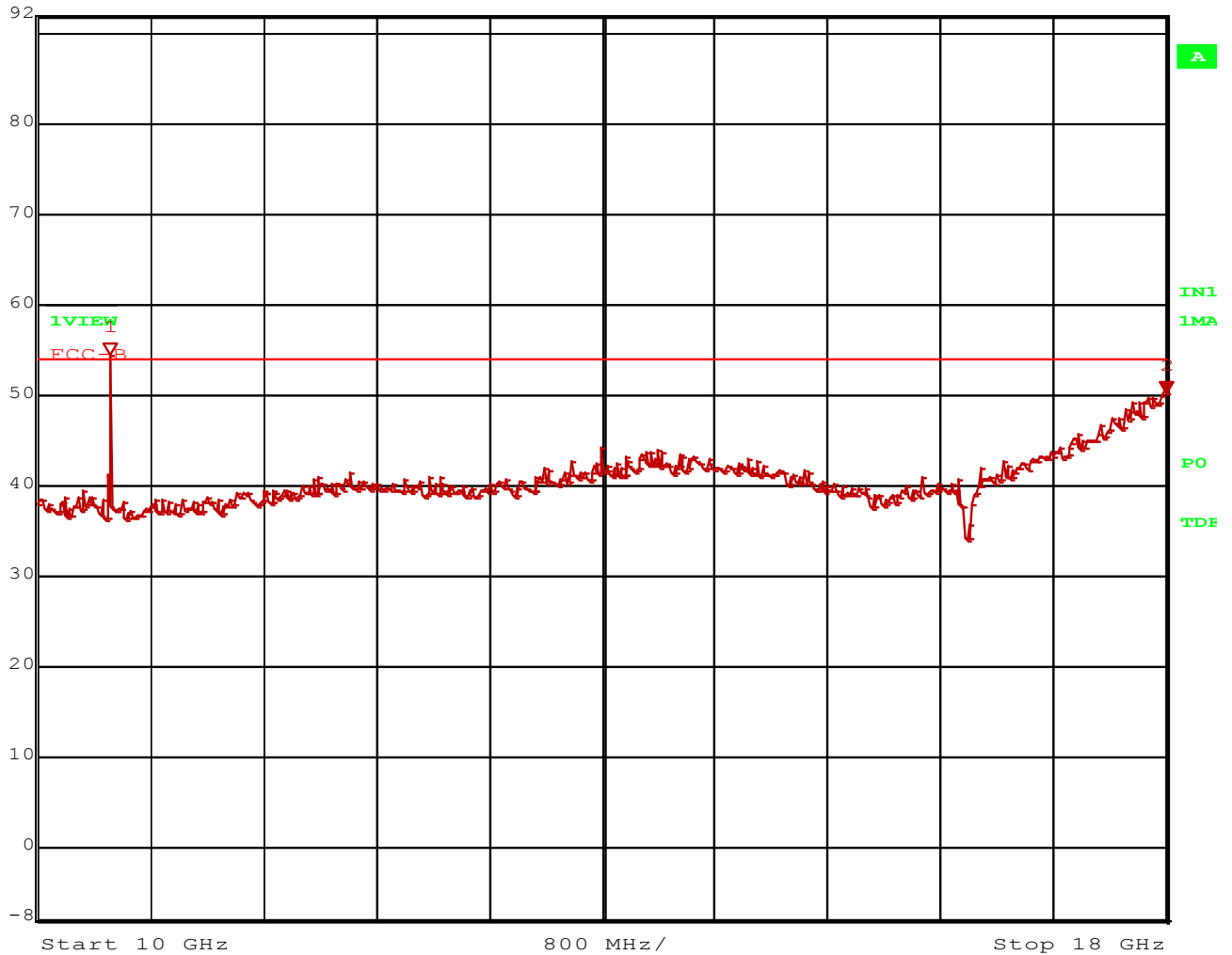
Date: 9.MAY.2014 14:38:29

Figure 6 – Field strength of Harmonic Emissions 10 - 18 GHz – 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.



Marker 2 [T1] RBW 100 kHz RF Att 0 dB  
Ref Lvl 50.16 dBµV/m VBW 100 kHz  
92 dB\* 18.00000000 GHz SWT 2 s Unit dBµV/m



Date: 9.MAY.2014 14:39:10

Figure 7 – Field strength of Harmonic Emissions 10 - 18 GHz - Vertical

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.





Marker 1 [T1]

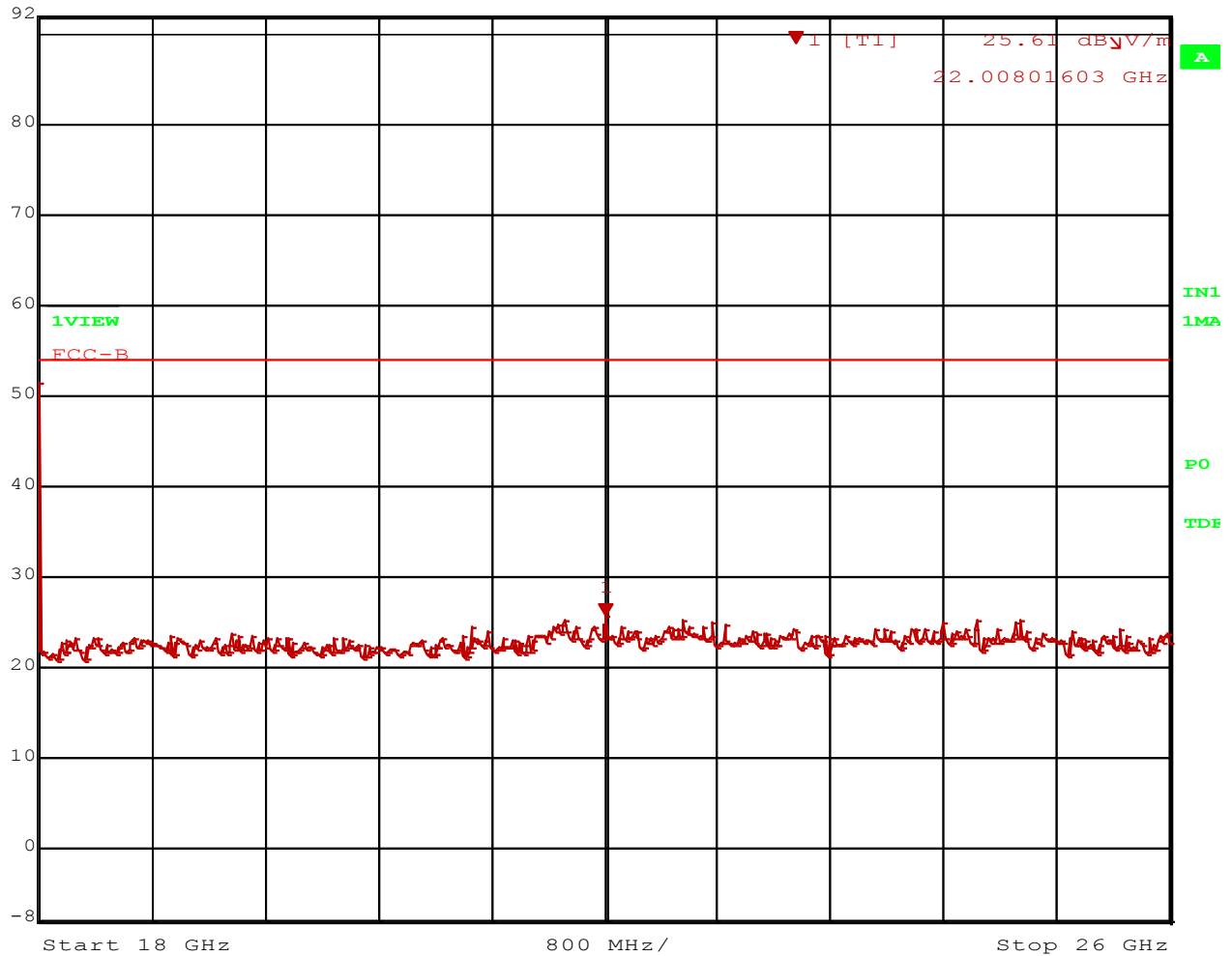
RBW 100 kHz RF Att 0 dB

Ref Lvl 25.61 dB $\mu$ V/m

VBW 100 kHz

92 dB\* 22.00801603 GHz

SWT 2 s Unit dB $\mu$ V/m



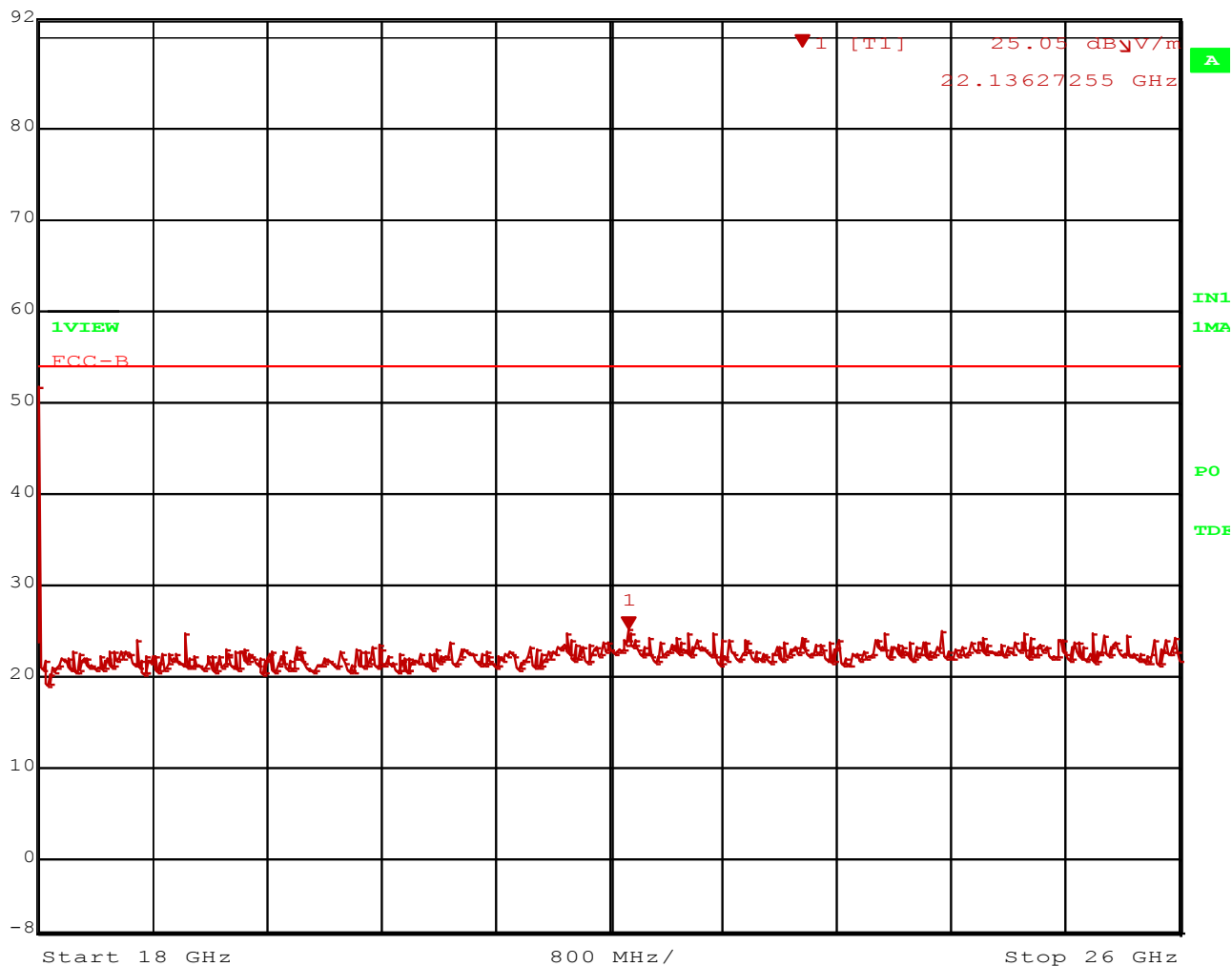
Date: 9.MAY.2014 15:17:25

Figure 8 – Field strength of Harmonic Emissions 18 - 26.5 GHz – 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.



	Marker 1 [T1]	RBW	100 kHz	RF Att	0 dB
Ref Lvl	25.05 dB $\mu$ V/m	VBW	100 kHz		
92 dB*	22.13627255 GHz	SWT	2 s	Unit	dB $\mu$ V/m



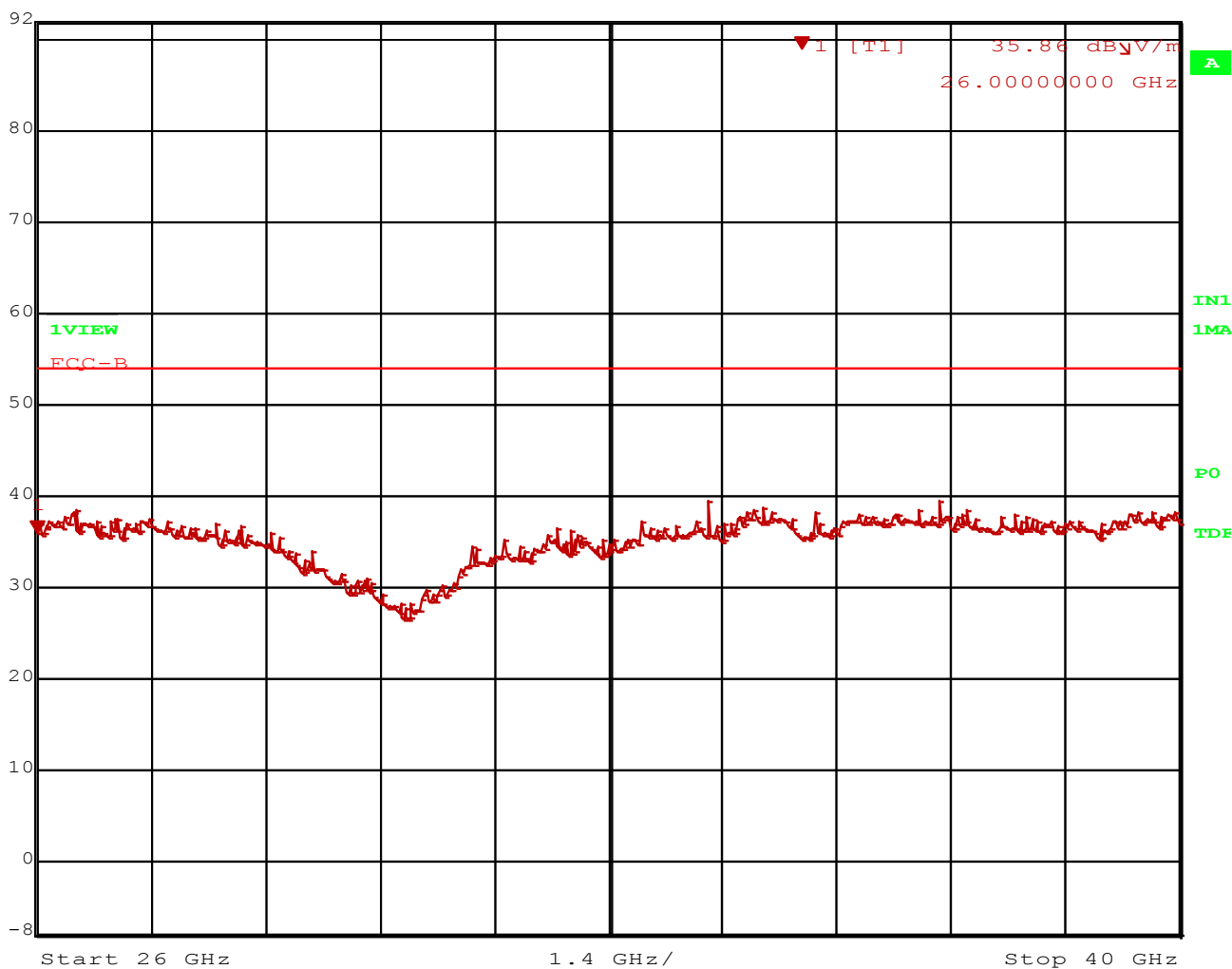
Date: 9.MAY.2014 15:16:29

Figure 9 – Field strength of Harmonic Emissions 18 - 26.5 GHz - Vertical

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	100 kHz	RF Att	0 dB
92 dB*	35.86 dB $\mu$ V/m	VBW	100 kHz		
	26.00000000 GHz	SWT	3.5 s	Unit	dB $\mu$ V/m



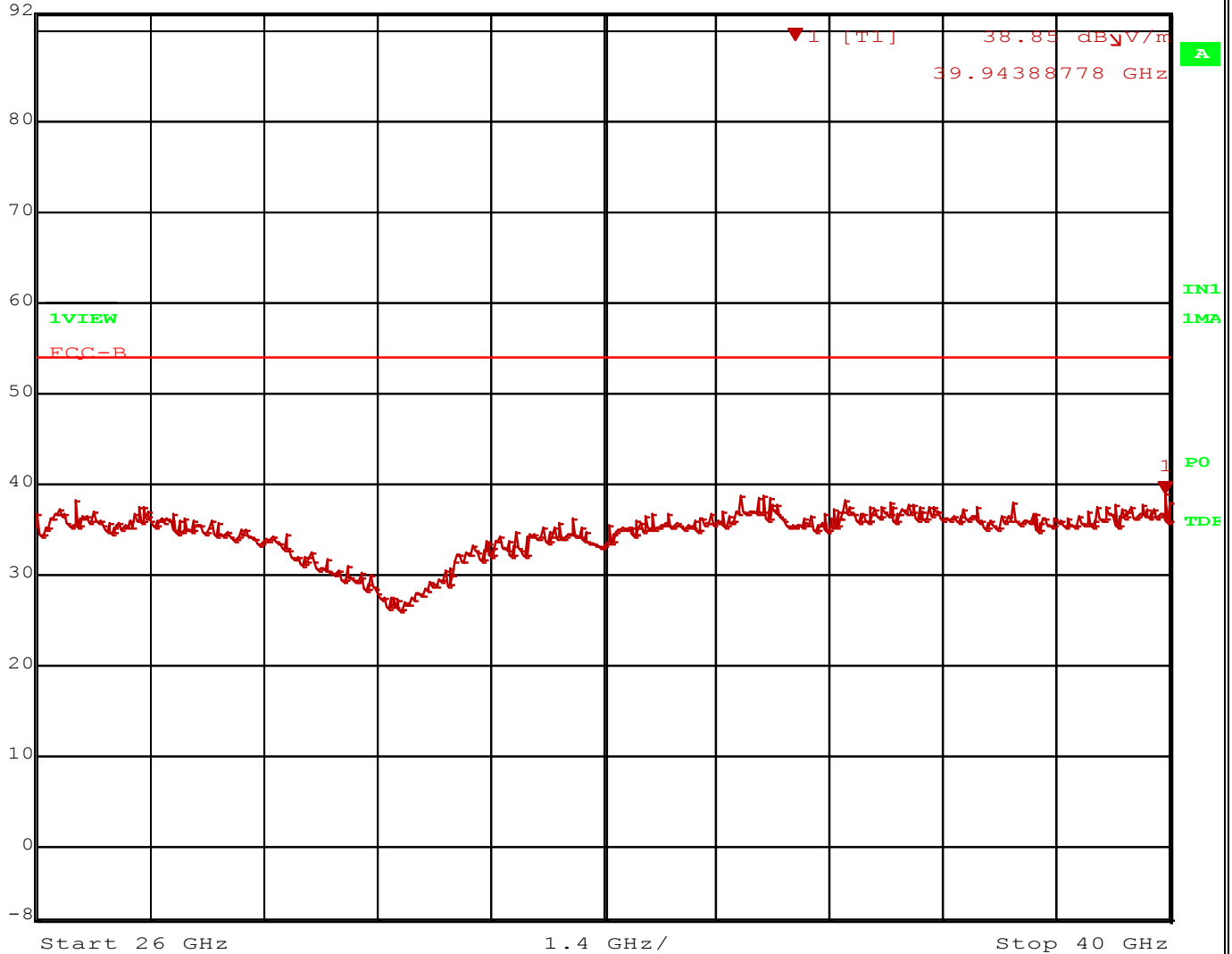
Date: 9.MAY.2014 15:35:58

Figure 10 – Field strength of Harmonic Emissions 26.5 - 40 GHz - 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.



Ref Lvl	Marker 1 [T1]	RBW	100 kHz	RF Att	0 dB
92 dB*	38.85 dB $\mu$ V/m	VBW	100 kHz		
	39.94388778 GHz	SWT	3.5 s	Unit	dB $\mu$ V/m



Date: 9.MAY.2014 15:36:35

Figure 11 – Field strength of Harmonic Emissions 26.5 - 40 GHz - Vertical

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.

### 3.3 Band Edge Requirements

The requirement is to ensure the 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified, is contained within the frequency band designated in the rule section under which the equipment is operated. The designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperatures and supply voltage.

#### 3.3.1 Test Over View

<b>Results</b>	<b>Complies</b> (as tested per this report)				<b>Date</b>	5/12/2014	
<b>Standard</b>	FCC Part 15.215(c)						
<b>Product Model</b>	ISW-ZDL1-WP11G			<b>Serial#</b>	TS-1		
<b>Configuration</b>	See test plan for details						
<b>Test Set-up</b>	Tested in shielded room EUT placed on table See test plan for details						
<b>EUT Powered By</b>	Battery	<b>Temp</b>	22° C	<b>Humidity</b>	47%	<b>Pressure</b>	1026mbar
<b>Perf. Criteria</b>	Per Section 15.215(c) of the standard			<b>Perf. Verification</b>	Readings within the permitted band		
<b>Mod to EUT</b>	None			<b>Test Performed By</b>	Randall Masline		

#### 3.3.2 Test Procedure

The measurement will be made using guidance from ANSI C63.10.

#### 3.3.3 Deviations

There were no deviations from the test methodology.

#### 3.3.4 Final Test

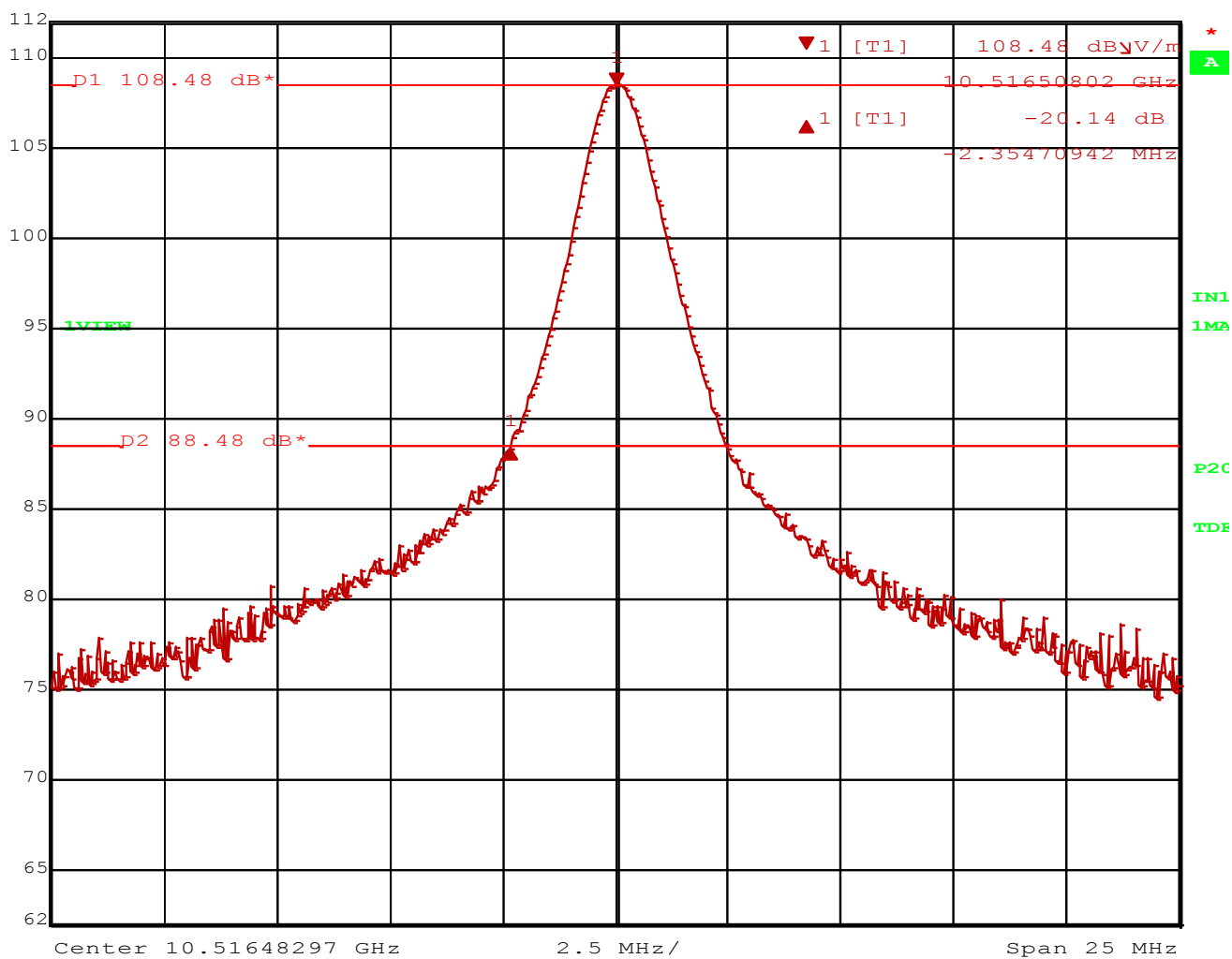
The band edge requirements of the EUT were within the limits specified in the standard.

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.

### 3.3.5 Band Edge Requirement Data



	Delta 1 [T1]	RBW	1 MHz	RF Att	40 dB
Ref Lvl	-20.14 dB	VBW	1 MHz		
112 dB*	-2.35470942 MHz	SWT	1 s	Unit	dBµV/m



Date: 9.MAY.2014 14:01:08

Figure 12 – Band Edge

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.

### 3.4 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.

#### 3.4.1 Test Over View

<b>Results</b>	<b>Complies</b> (as tested per this report)				<b>Date</b>	5/12/2014	
<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		

#### 3.4.2 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 10.525 GHz is 52.625 MHz. The measured 99% bandwidth is 13.06 MHz.

#### 3.4.3 Deviations

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

#### 3.4.4 Final Test

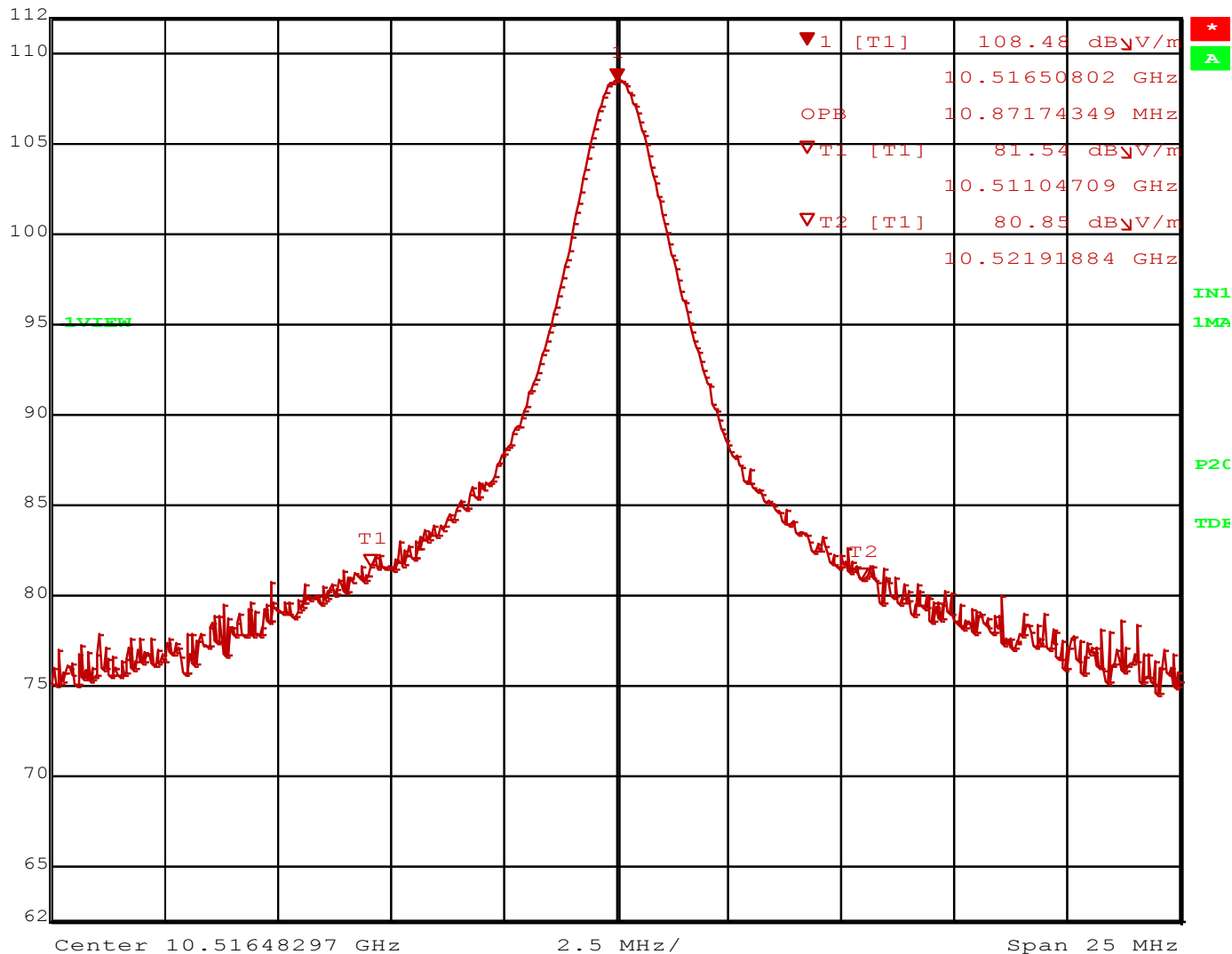
The EUT met the performance criteria requirement as specified in the test plan of this report and in the standards.

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.

3.4.5 Final Data



Marker 1 [T1]	RBW	1 MHz	RF Att	40 dB
Ref Lvl	108.48 dB $\mu$ V/m	VBW	1 MHz	
112 dB*	10.51650802 GHz	SWT	1 s	Unit dB $\mu$ V/m



Date: 9.MAY.2014 13:58:54

Figure 13 – 99% Bandwidth = 10.87 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 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.



### 3.5 RF Exposure Measurement (Mobile Device)

#### 3.5.1 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.

#### 3.5.2 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)

##### 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> )	Average Time (minutes)
<b>(A)Limits For Occupational / Control Exposures</b>				
300-1500	...	...	F/300	6
1500-100,000	...	...	5	6
<b>(B)Limits For General Population / Uncontrolled Exposure</b>				
300-1500	...	...	$f / 1500$	6
1500-100,000	...	...	1.0	30

$f$  = Frequency in MHz

#### 3.5.3 EUT Operating condition

The EUT transmits at a single frequency and at the highest output power.

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.

### 3.5.4 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**.

### 3.5.5 Antenna Gain

The maximum Gain measured in Semi-Anechoic Chamber is 6.0 dBi or 3.981 (numeric).

### 3.5.6 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 1.0 mW/cm<sup>2</sup>

Highest Pout is 5.310mW, highest antenna gain (in linear scale) is 3.981 R is 20cm, and f = 10525 MHz  
 FCC

Note: This calculation is assuming 100% duty cycle, which would not be the case in normal operation.

Uncontrolled Exposures - Limit (W/m <sup>2</sup> ) =	10	
	Pd =	0.042058 W/m <sup>2</sup>
	Uncontrolled Margin to Limit =	9.9579 W/m <sup>2</sup>

#### Industry Canada

Uncontrolled Exposures - Limit (W/m <sup>2</sup> ) =	2.88666667	
	Pd =	0.000013 W/m <sup>2</sup>
	Uncontrolled Margin to Limit =	2.8867 W/m <sup>2</sup>

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

### 3.5.7 Sample Calculation

The Friis transmission formula:  $Pd = (Pout * G) / (4 * \pi * R^2)$

Where;

Pd = power density in mW/cm<sup>2</sup>

Pout = 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

### 4 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.

#### 4.1 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>	585-223-4060
<b>Fax</b>	585-678-3263
<b>e-mail</b>	peter.namisnak@us.bosch.com

#### 4.2 Model(s) Name

ISW-ZDL1-WP11G

#### 4.3 Type of Product

Wireless Tri-Tech Motion Detector

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 Equipment Under Test (EUT) Description

Dual or ISW-ZDL1-WP11G

The Wireless TriTech Wireless Tri-Tech Motion Detector with ZigBee technology is a small, unobtrusive detector that is simple to install and does not require field adjustments.

The detector has a dense zone pattern with 79 zones in eight layers. Passive infrared (PIR) and microwave doppler radar processing provides excellent catch performance with best-in-class false alarm immunity.

Incorporates the following features:

- ZigBee HA2.1 compliant
- First Step Processing (FSP), flexible mounting options, and temperature compensation
- Draft, insect, and pet and animal immunity
- Eight detection layers including look-down zones
- Externally-visible LED indicates test status

#### 4.5 Modifications

No modifications were necessary to meet compliance limits.

#### 4.6 Product Environment

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

\*Check all that apply

#### 4.7 Countries

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