

Electromagnetic Compatibility Test Report

Prepared in accordance with

FCC Part 15C and ANSI C63.10

On

Motion Detector




ISC-PDL1-WC30G

Bosch Security Systems
130 Perinton Parkway
Fairport, NY 14450

Prepared by:

TUV Rheinland of North America, Inc.

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<i>Client:</i>	Bosch Security Systems 130 Perinton Parkway Fairport, NY 14450	Peter Namisnak 585-223-4060 / 585-678-3263 peter.namisnak@us.bosch.com			
<i>Identification:</i>	Motion Detector	<i>Serial No.:</i> TS-1			
<i>Test item:</i>	ISC-PDL1-WC30G	<i>Date tested:</i> 10/26/2012			
<i>Testing location:</i>	TUV Rheinland of North America 336 Initiative Drive Rochester, NY 14624 U.S.A.	Tel: (585) 426-5555 Fax: (585)-568-8338			
<i>Test specification:</i>	Emissions: FCC Part 15 subpart C, FCC Part 15.209(a) FCC Part 15.205(a) FCC Part 15.245(a) , FCC Part 15.215(c) FCC Part 2.1093 and RSS-102 Issue 4,				
<i>Test Result:</i>	The above product was found to be Compliant to the above test standard(s)				
<i>tested by:</i> Randall Masline		<i>reviewed by:</i> Cecil Gittens			
<u>29 January 2013</u> <i>Date</i> <i>Name</i> <i>Signature</i>		<u>29 January 2013</u> <i>Date</i> <i>Name</i> <i>Signature</i>			
<i>Other Aspects:</i>	None				
Abbreviations: OK, Pass, Compliant, Complies = passed Fail, Not Compliant, Does Not Comply = failed N/A = not applicable					
			Industry Canada	VCCI	BSMI
US5253	Testing Cert.# 3331.04	3466C-1	A-0037	SL2-IN-E-050R	

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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

585-678-3462

Telephone number

Peter.namisnak@us.bosch.com

Email address of official

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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 10/26/2012 on the Motion Detector, Model No. ISC-PDL1-WC30G, 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.

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1.3 Summary of Test Results

Applicant	Bosch Security Systems 130 Perinton Parkway Fairport, NY 14450	Tel	585-223-4060	Contact	Peter Namisnak
		Fax	585-678-3263	e-mail	peter.namisnak@us.bosch.com
Description	Motion Detector	Model Number	ISC-PDL1-WC30G		
Serial Number	TS-1	Test Voltage/Freq.	12VDC		
Test Date Completed:	10/26/2012	Test Engineer	Randall Masline		
Standards	Description	Severity Level or Limit		Criteria	Test Result
FCC Part 15 subpart C Standard	Radio Frequency Devices - Subpart C: Intentional Radiators	See called out parts below		See Below	Complies
FCC Part 15.209(a) FCC Part 15.205(a)	Radiated Emissions Restricted Bands	Class B, 30 - 1000 MHz		Limit	Complies
FCC Part 15.245(a)	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	Complies
FCC Part 15.215(c)	Band Edge Requirements	Per Section 15.215(c) of the standard		Limit	Complies
FCC Part 15.245 and RSS-210 A1.3	99% Occupied Bandwidth	Contained within the Frequency Band		Below Limit	Complies
FCC Part 2.1093 and RSS-102 Issue 4	RF Exposure	MPE or SAR Requirements (Mobile)		Limit	Complies

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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.

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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 (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

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

Sample radiated emissions calculation @ 30 MHz

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

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

1.2 Measurement Uncertainty Emissions

Measurement	<i>U_{lab}</i>	<i>U_{cispr}</i>
Radiated Disturbance @ 10m		
30 MHz – 1000 MHz	4.57 dB	5.2 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	2.62 dB	3.6 dB
Disturbance Power		
30 MHz – 300 MHz	3.88 dB	4.5 dB

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Measurement Uncertainty Immunity

The estimated combined standard uncertainty for radiated emissions measurements is ± 1.6 dB.
The estimated combined standard uncertainty for conducted emissions measurements is ± 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.

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1.4 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	

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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

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2.4 System Configuration for testing

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

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Figure 1 – External Photo of EUT

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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

Results	Complies (as tested per this report)				Date	10/10/2012	
Standard	FCC Part 15.209(a) FCC Part 15.205(a)						
Product Model	ISC-PDL1-WC30G			Serial#	TS-1		
Configuration	See test plan for details						
Test Set-up	Tested on 10m O.A.T.S. at 3 meters, placed on turn-table, see test plans for details						
EUT Powered By	12VDC	Temp	22°C	Humidity	47%	Pressure	1026mbar
Frequency Range	30 - 1000 MHz @ 10m						
Perf. Criteria	Class B. (Below Limit)			Perf. Verification	Readings Under Limit		
Mod. to EUT	None			Test Performed By	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.

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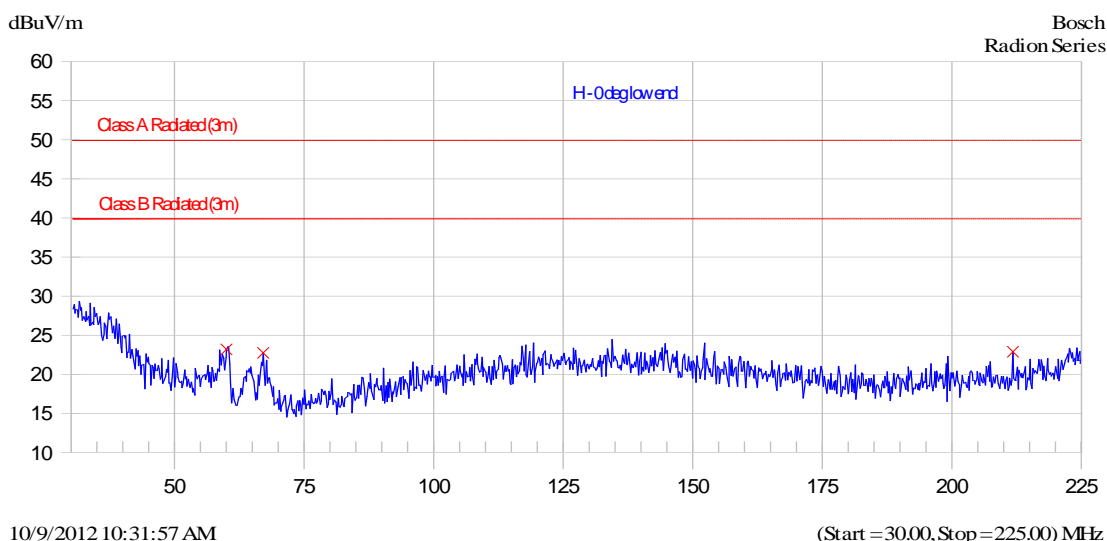
3.1.5 Final Graphs

NOTES:

Radiated Emissions Prescan

Vertical / Horizontal

H - 0 deg low end



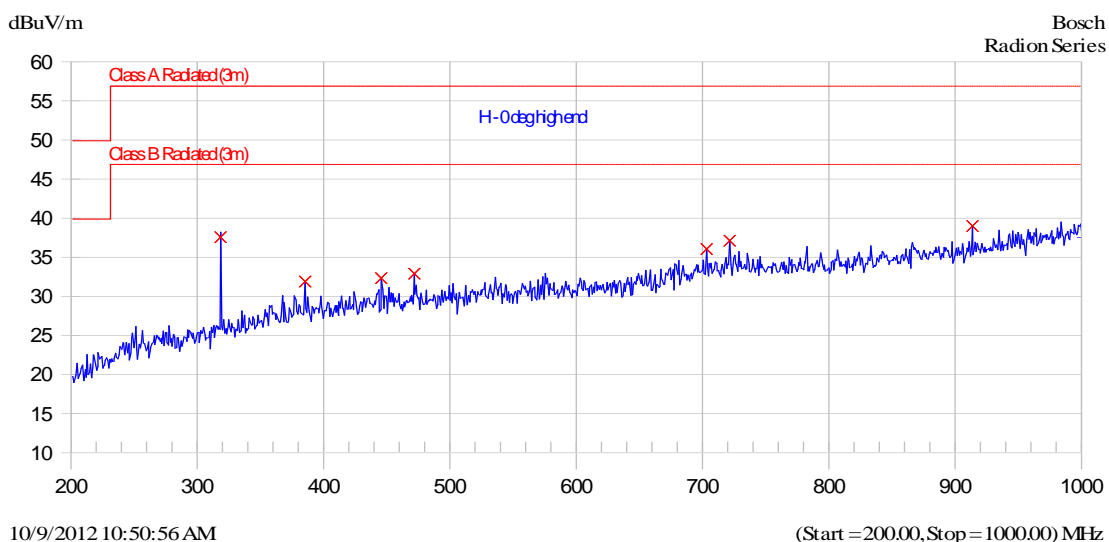
Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
59.676	23.3				H - 0 deg low end
66.756	22.9				H - 0 deg low end
211.464	23.0				H - 0 deg low end

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NOTES:

Radiated Emissions Prescan
Vertical / Horizontal

H - 0 deg high end



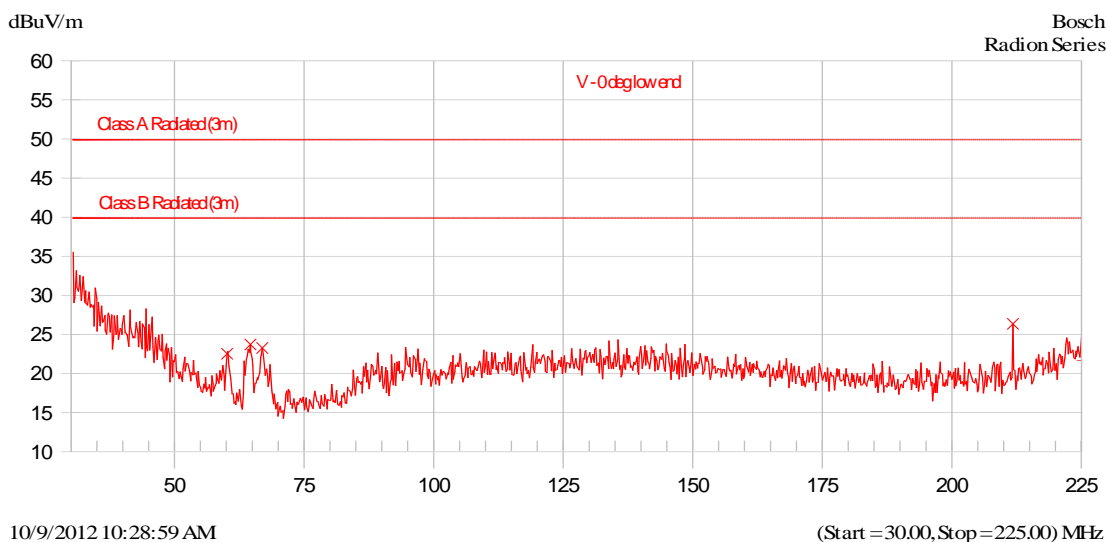
Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
317.120	37.7				H - 0 deg high end
384.104	32.0				H - 0 deg high end
444.308	32.4				H - 0 deg high end
470.516	33.0				H - 0 deg high end
702.008	36.2				H - 0 deg high end
720.056	37.2				H - 0 deg high end
912.440	39.1			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

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NOTES:

Radiated Emissions Prescan
Vertical / Horizontal

V - 0 deg low end



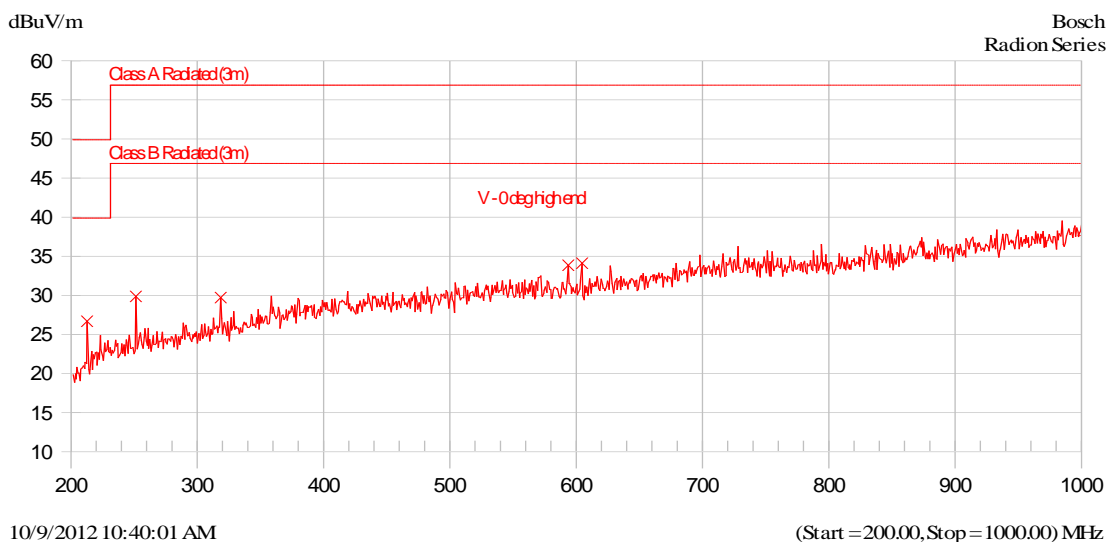
Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
59.796	22.6				V - 0 deg low end
64.296	23.8				V - 0 deg low end
66.576	23.4				V - 0 deg low end
211.464	26.5				V - 0 deg low end

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NOTES:

Radiated Emissions Prescan
Vertical / Horizontal

V - 0 deg high end



Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
211.448	26.8				V - 0 deg high end
250.004	30.0				V - 0 deg high end
317.180	29.8				V - 0 deg high end
592.316	33.9				V - 0 deg high end
603.356	34.2				V - 0 deg high end

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3.1.6 Final Tabulated Data

Radiated Emissions Measurements									
Standard:	Class B/FCC Part 15.209				PRESCAN or FINAL: final			Date: 10/22/2012	
Device Tested:	Bosch Radion Series				Distance: 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	

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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

Results	Complies (as tested per this report)				Date	10/17/2012	
Standard	FCC Part 15.245(a)						
Product Model	ISC-PDL1-WC30G			Serial#	TS-1		
Configuration	See test plan for details						
Test Set-up	Tested at O.A.T.S.		EUT placed on table		See test plan for details		
EUT Powered By	12VDC	Temp	22° C	Humidity	47%	Pressure	1026mbar
Perf. Criteria	2500mv/m (Below Limit)			Perf. Verification	Readings under Limit		
Mod to EUT	None			Test Performed By	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

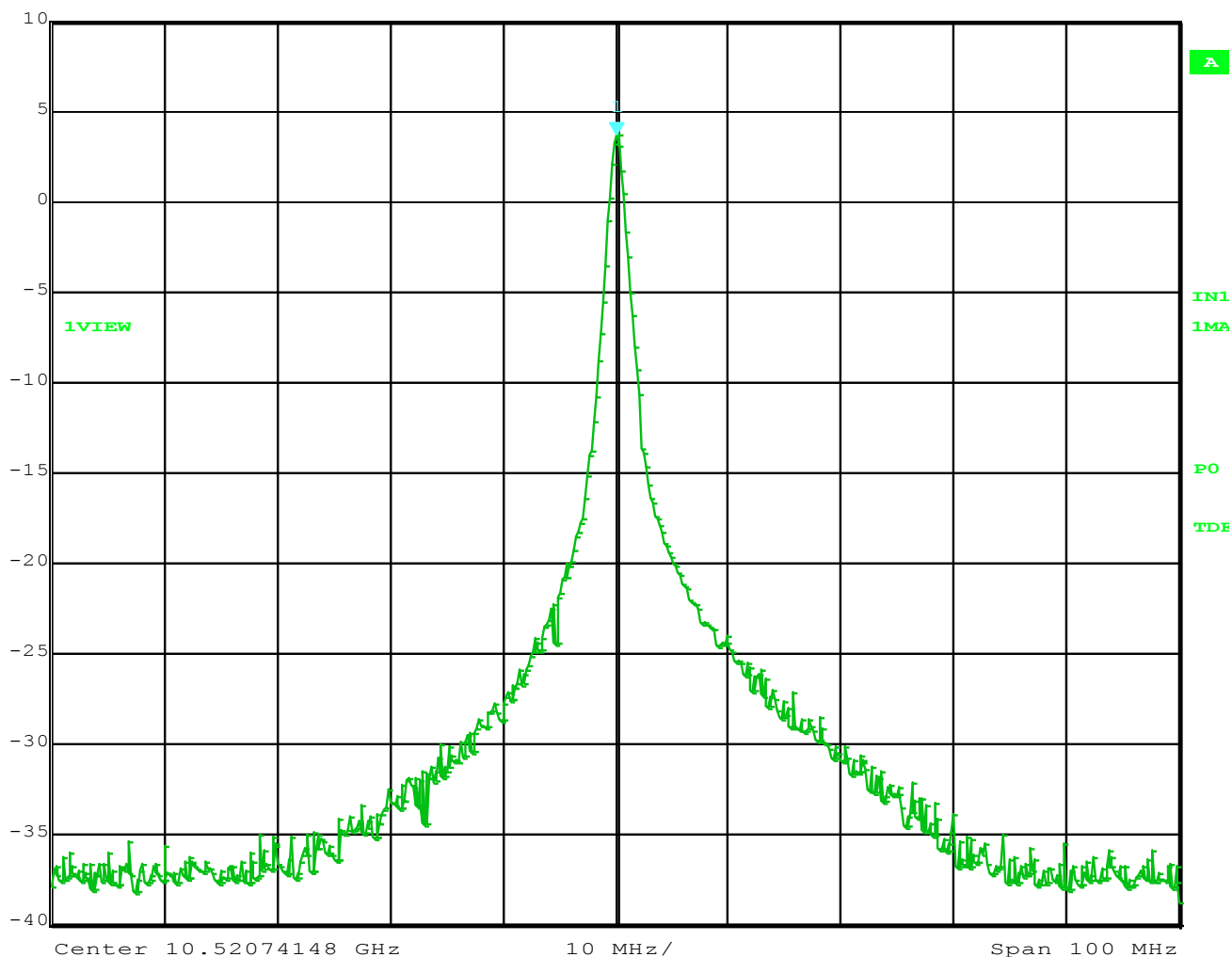
All final radiated emissions measurements were below (in compliance) the limits.

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3.2.5 Final Data



Marker 1 [T1] RBW 1 MHz RF Att 30 dB
 3.70 dBm VBW 3 MHz
 10 dBm 10.52084168 GHz SWT 5 ms Unit dBm



Date: 16.OCT.2012 17:23:04

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

$3.7 \text{ dBm} = 2.3 \text{ mW} = 110.7 \text{ dBuV}$ Limit is 127.5 dBuV

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Marker 1 [T1]

RBW 1 MHz RF Att 30 dB

Ref Lvl

73.61 dB μ V

VBW 3 MHz

122 dB μ V

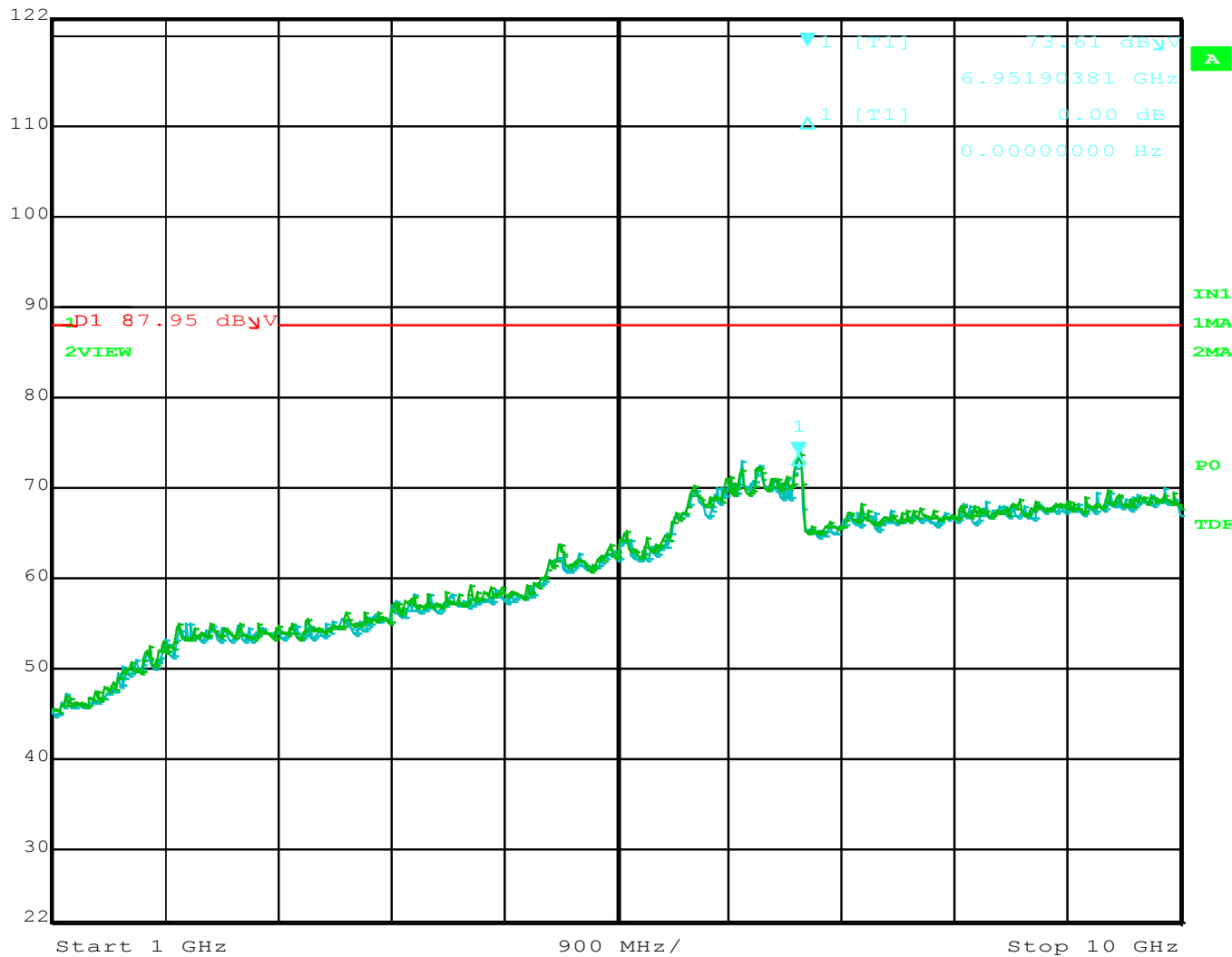
6.95190381 GHz

SWT

90 ms

Unit

dB μ V



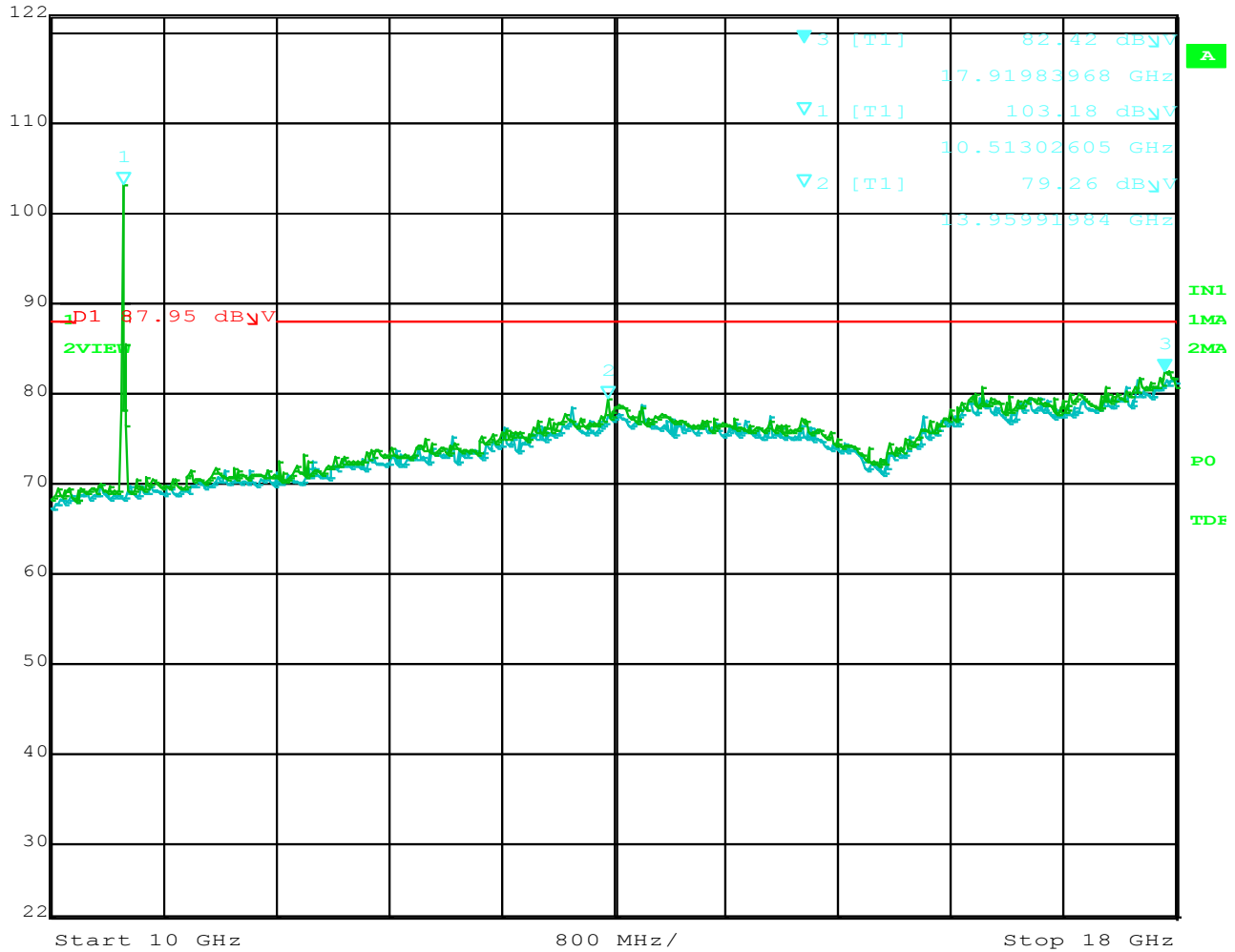
Date: 17.OCT.2012 11:09:35

Figure 3 – Field strength of Harmonic Emissions 1-10 GHz

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Marker 3 [T1] RBW 1 MHz RF Att 30 dB
 Ref Lvl 122 dB μ V 82.42 dB μ V VBW 3 MHz
 17.91983968 GHz SWT 80 ms Unit dB μ V



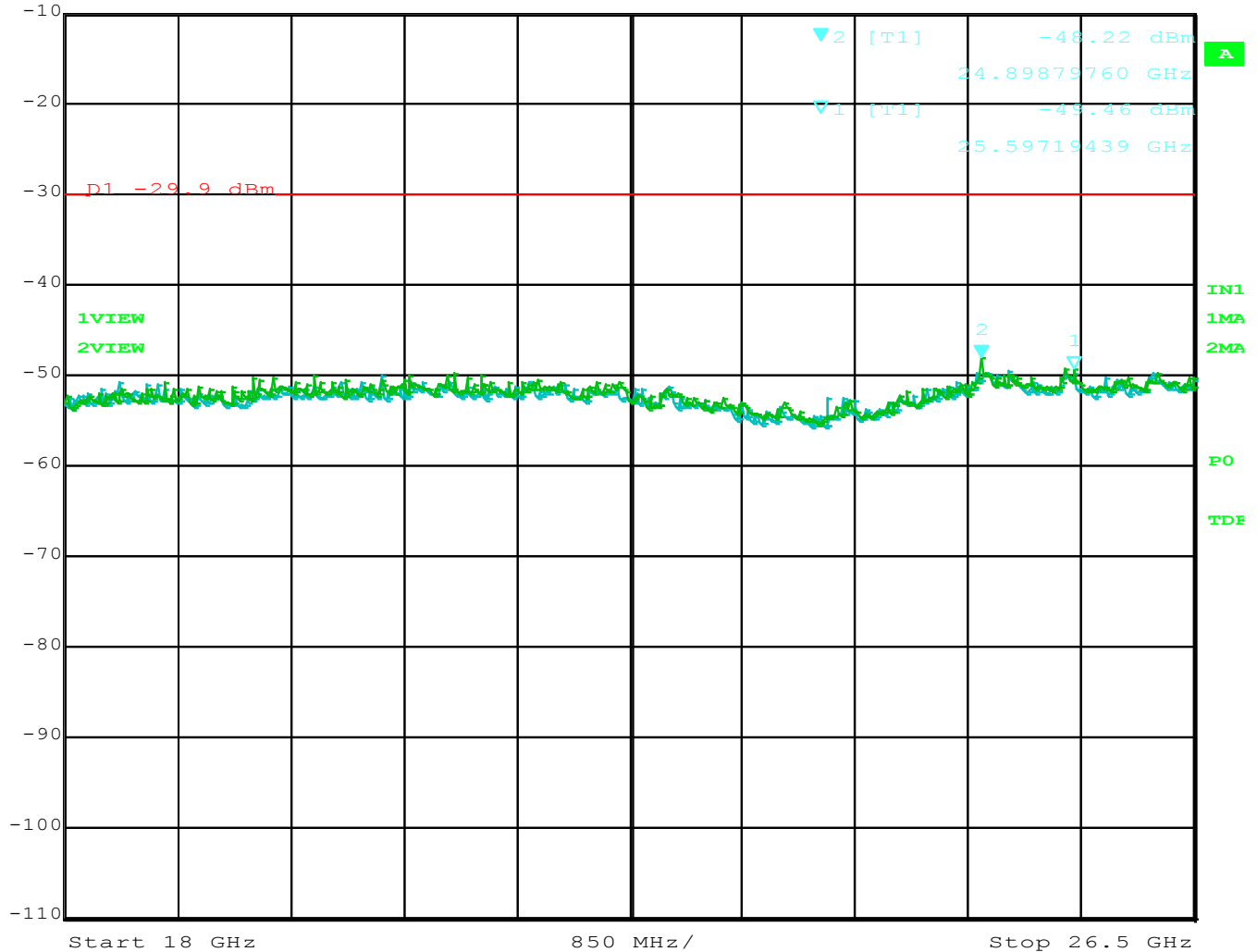
Date: 17.OCT.2012 11:11:46

Figure 4 – Field strength of Harmonic Emissions 10 - 18 GHz

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Marker 2 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl -48.22 dBm VBW 3 MHz
-10 dBm 24.89879760 GHz SWT 86 ms Unit dBm



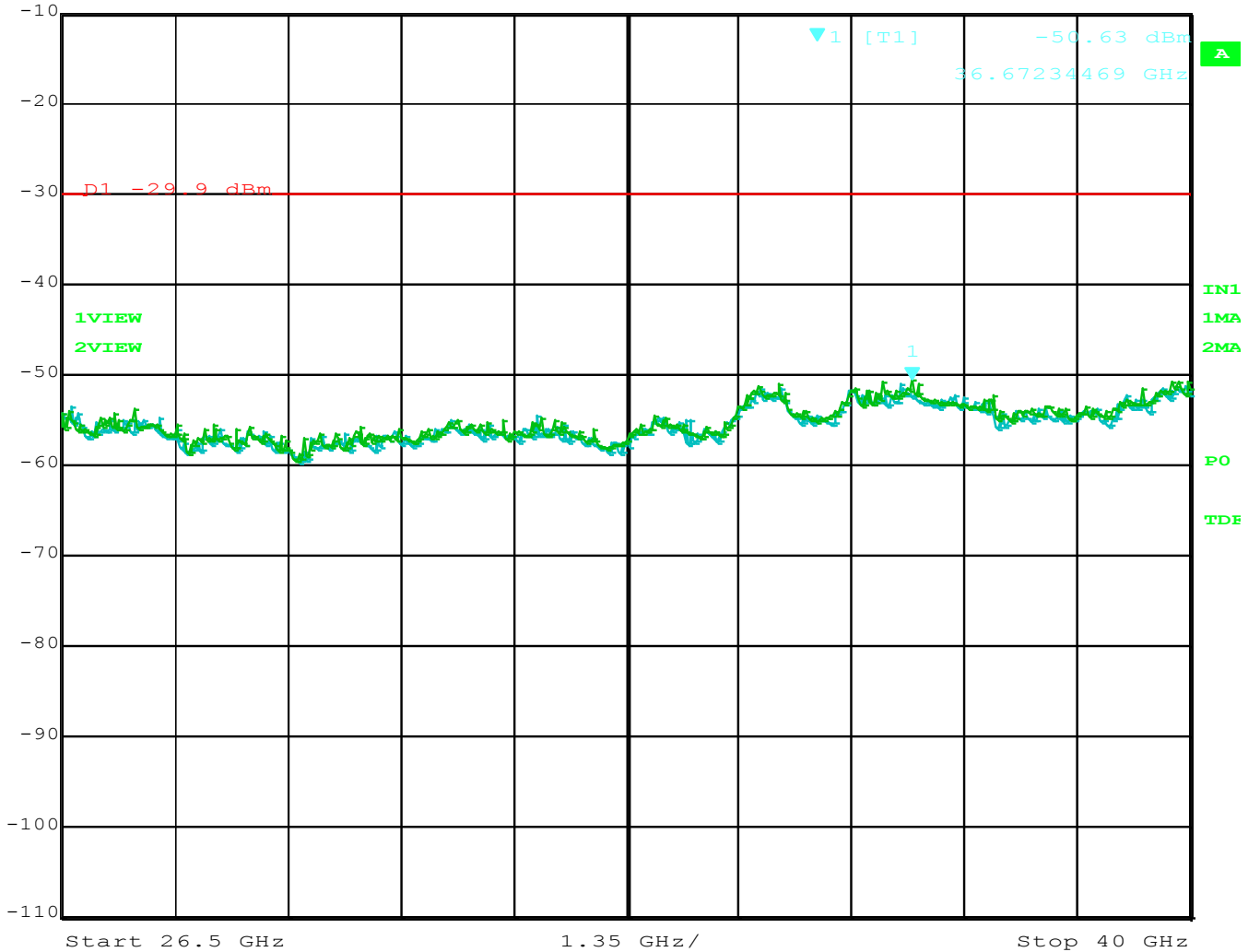
Date: 17.OCT.2012 12:42:29

Figure 5 – Field strength of Harmonic Emissions 18 - 26.5 GHz

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Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl -50.63 dBm VBW 3 MHz
-10 dBm 36.67234469 GHz SWT 205 ms Unit dBm



Date: 17.OCT.2012 12:46:57

Figure 6 – Field strength of Harmonic Emissions 26.5 - 40 GHz

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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

Results	Complies (as tested per this report)				Date	3/9/2011	
Standard	FCC Part 15.215(c)						
Product Model	ISC-PDL1-WC30G			Serial#	TS-1		
Configuration	See test plan for details						
Test Set-up	Tested in shielded room EUT placed on table See test plan for details						
EUT Powered By	12VDC	Temp	22° C	Humidity	47%	Pressure	1026mbar
Perf. Criteria	Per Section 15.215(c) of the standard		Perf. Verification		Readings within the permitted band		
Mod to EUT	None		Test Performed By		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

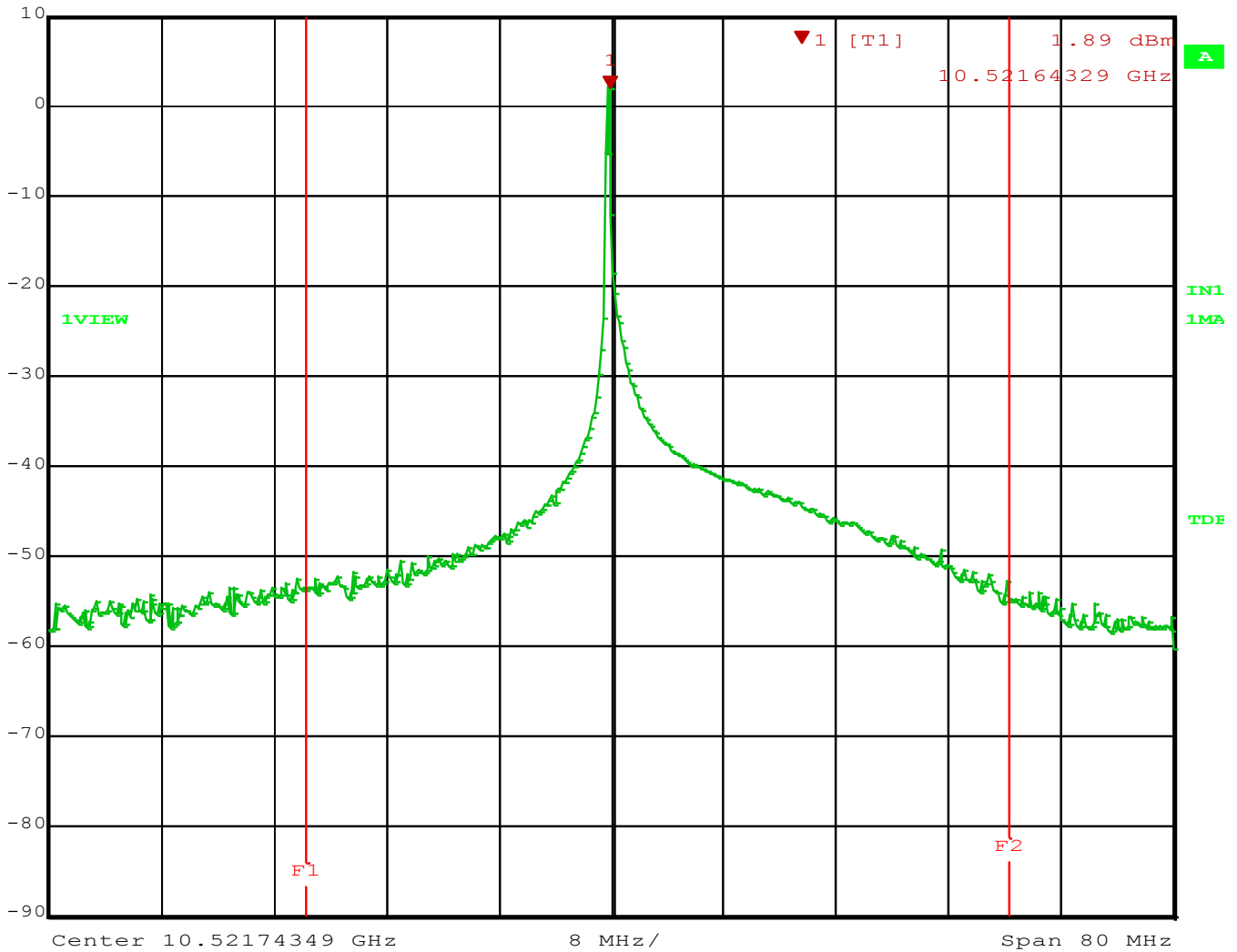
The band edge requirements of the EUT were within the limits specified in the standard.

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3.3.5 Band Edge Requirement Data



Ref Lvl	10 dBm	Marker 1 [T1]	1.89 dBm	RBW	100 kHz	RF Att	20 dB
			10.52164329 GHz	VBW	100 kHz	Unit	dBm
				SWT	20 ms		



Date: 8.MAR.2011 17:30:34

Figure 7 – Band Edge

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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

Results	Complies (as tested per this report)				Date	1/29/2013	
Standard	RSS-210 Section A1.1.3						
Product Model	BTA-1			Serial#	TS-1		
Test Set-up	Direct Measurement from antenna port						
EUT Powered By	Battery	Temp	23° C	Humidity	32%	Pressure	1010mbar
Perf. Criteria	(Below Limit)			Perf. Verification	Readings Under Limit		
Mod. to EUT	None			Test Performed By	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

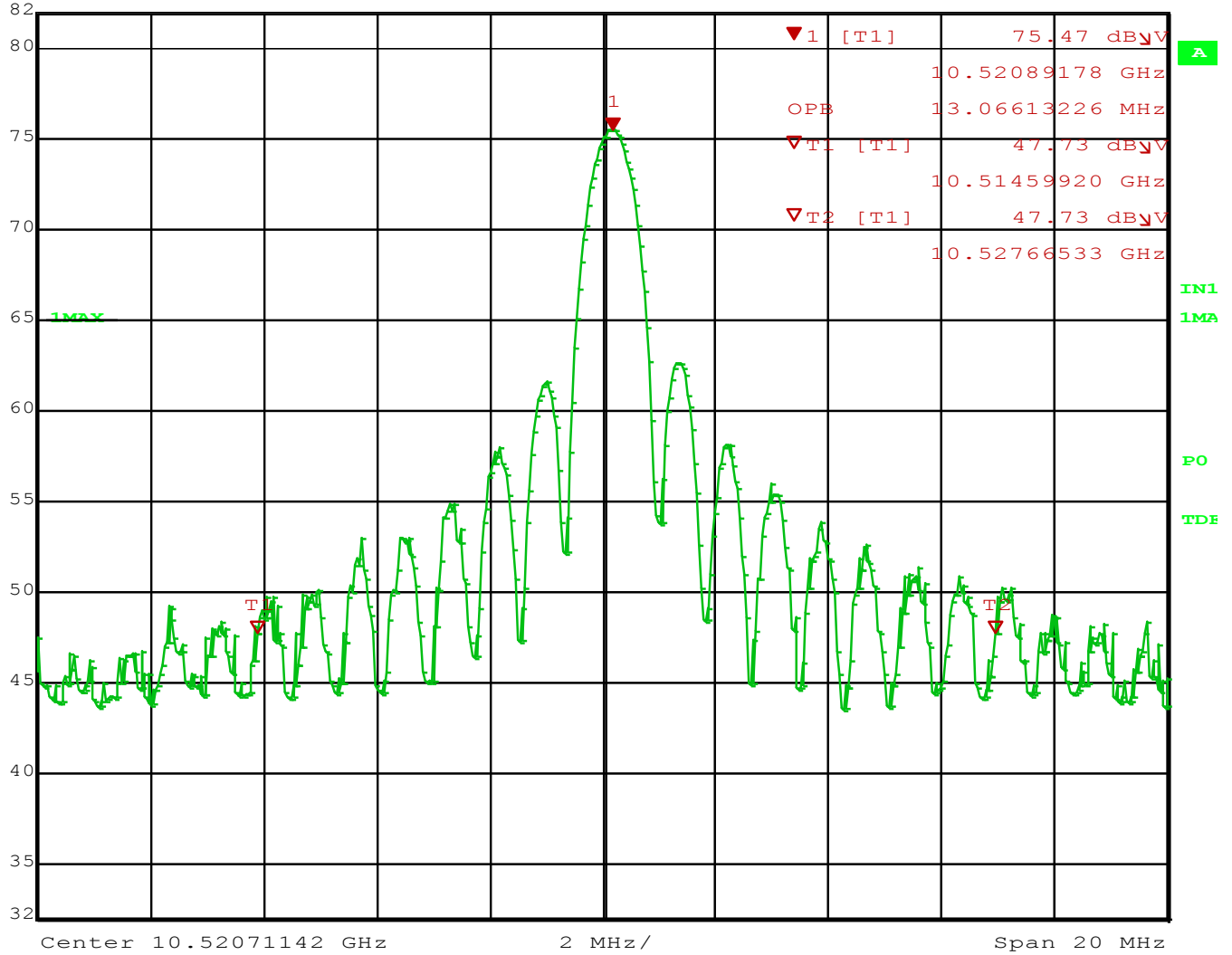
The EUT met the performance criteria requirement as specified in the test plan of this report and in the standards.

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3.4.5 Final Data



Marker 1 [T1] RBW 100 kHz RF Att 10 dB
 Ref Lvl 75.47 dBμV VBW 300 kHz
 82 dBμV 10.52089178 GHz SWT 5 ms Unit dBμV



Date: 28.JAN.2013 17:14:35

Figure 8 – 99% Bandwidth = 13.06 MHz

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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 ²)	Average Time (minutes)
(A)Limits For Occupational / Control Exposures				
300-1500	F/300	6
1500-100,000	5	6
(B)Limits For General Population / Uncontrolled Exposure				
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.

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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 Test Results

3.5.6 Antenna Gain

The maximum Gain measured in Semi-Anechoic Chamber is 5.0 dBi or 3.16 (numeric).

3.5.7 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/cm²

Highest Pout is 11.1mW, highest antenna gain (in linear scale) is 3.16 R is 20cm, and f = 10525 MHz

$P_d = (11.1 * 3.16) / (1600\pi) = \underline{0.006 \text{ mW/cm}^2}$, which is 0.994 mW/cm² below the limit.

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

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

3.5.8 Sample Calculation

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

Where;

P_d = power density in mW/cm²

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).

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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

Client	Bosch Security Systems
Address 1	130 Perinton Parkway
Address 2	Fairport, NY 14450
Contact Person	Peter Namisnak
Telephone	585-223-4060
Fax	585-678-3263
e-mail	peter.namisnak@us.bosch.com

4.2 Model(s) Name

ISC-PDL1-WC30G

4.3 Type of Product

Motion Detector

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4.4 Equipment Under Test (EUT) Description

The EUT is a Combination Microwave/PIR Passive Infra –Red and Microwave Motion Detector operating at 10525 MHz.

4.5 Modifications

No modifications were necessary to meet compliance limits.

4.6 Product Environment

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

*Check all that apply

4.7 Countries

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

*Check all that apply

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4.8 Applicable Documents

Standards	Description
FCC Part 15 subpart C Standard	Radio Frequency Devices - Subpart C: Intentional Radiators
FCC Part 15.209(a) FCC Part 15.205(a)	Radiated Emissions
FCC Part 15.245(a)	Operation within the bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10500 – 10550MHz and 24075-24175 MHz
FCC Part 15.215(c)	Band Edge Requirements
FCC Part 2.1093 and RSS-102 Issue 4	RF Exposure

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4.9 General Product Information

Size	H	13cm	W	6cm	L	6.5cm
Weight	≤1kg		Fork-Lift Needed	No		
Notes						

4.10 EUT Electrical Powered Information

4.10.1 Electrical Power Type

<input type="checkbox"/>	AC	<input checked="" type="checkbox"/>	DC	<input type="checkbox"/>	Batteries	<input type="checkbox"/>	Host -
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4.10.2 Electrical Power Information

Name	Type	Voltage		Frequency	Current	Notes
		min	max			
Main	DC	9	15			
Notes						

4.11 EUT Modes of Operation

The EUT is powered by a 12VDC Battery and goes into continues operation scanning for motion.

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4.12 Electrical Support Equipment

Type	Manufacture	Model	Connected To
Main Panel	Bosch		Keypad
Keypad	Bosch		Main Panel

4.13 Non - Electrical Support Equipment

Item	Notes
Gas	
Water	

4.14 EUT Equipment/Cabling Information

EUT Port	Connected To	Location	Cable Type		
			Length	Shielded	Bead

4.15 EUT Test Program

No test Program, EUT was operational and Scanning.

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