

Electromagnetic Compatibility Test Report

Prepared in accordance with

FCC Part 15C, ANSI C63.10:2009

On

RFID Module with Passive Tag and Bluetooth

HS2R9

JADAK LLC
7279 William Barry Blvd.
North Syracuse, NY 13212

Prepared by:

TUV Rheinland of North America, Inc.

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Manufacturer's statement - attestation

The manufacturer; JADAK LLC, as the responsible party for the equipment tested, hereby affirms:

- a) That he has 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.

Adam Clifford

Printed name of official

Signature of official

**7279 William Barry Blvd.
North Syracuse, New York 13212**

Address

Date

315-218-1315

Telephone number

adam.clifford@jadaktech.com

Email address of official

Report No.:

31562536.004_FCC_HS2R9.doc

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Client:	JADAK LLC 7279 William Barry Blvd. North Syracuse, NY 13212	Contact: Adam Clifford Tel: 315-218-1315 Fax: 315-701-0679 e-mail Adam.Clifford@jadaktech.com		
Identification:	RFID Module with Passive Tag and Bluetooth	Serial No.:	TS-1	
Test item:	HS2R9	Date Test Completed:		9/2/2015
Testing location:	TUV Rheinland of North America 710 Resende Road Webster, NY 14580 U.S.A.	Tel: (585) 645-0125		
Test specification:	Emissions: FCC Part 15.225 Radiated Emissions Std FCC Part 15.209, FCC Part 15.225(b), FCC Part 15.203			
Test Result:	The above product was found to be Compliant to the above test standard(s)			
tested by: Randall Masline		reviewed by: Cecil Gittens		
<u>9 November 2015</u> Date Name Signature		<u>9 November 2015</u> Date Name Signature		
Other Aspects:	None			
Abbreviations: OK, Pass, Compliant, Complies = passed Fail, Not Compliant, Does Not Comply = failed N/A = not applicable				
			Industry Canada	VCCI
US5253	Testing Cert.# 3331.08		482B-1	BSMI
			A-0203	SL2-IN-E-050R

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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, ANSI C63.10:2009 based on the results of testing performed on 9/2/2015 on the RFID Module with Passive Tag and Bluetooth, Model Number. HS2R9, manufactured by JADAK LLC. 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 13.56 MHz Tag is passive. The EUT has a 2.4 GHz BLE Bluetooth Module inside certified under FCC ID: T9JRN4020

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1.3 Summary of Test Results

Applicant	JADAK LLC 7279 William Barry Blvd. North Syracuse, NY 13212	Tel	315-218-1315	Contact	Adam Clifford
		Fax	315-701-0679	e-mail	Adam.Clifford@jadaktech.com
Description	RFID Module with Passive Tag and Bluetooth	Model Number	HS2R9		
Serial Number	TS-1	Test Voltage/Freq.	Powered Via USB		
Test Date Completed:	9/2/2015	Test Engineer	Randall Masline		
Standards	Description	Severity Level or Limit		Measured	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 15.225	Operation in the band 13.110 - 14.010 MHz	See Basic Standards Below		See Below	Complies
FCC Part 15.209	Radiated Emissions	Class B, 9kHz - 1000 MHz Class B 1000 – 2500 MHz		Limit	Complies
FCC Part 15.225(b)	Field Strength of Fundamental and Spurious Emissions	15.225 Limit is 83.9 dBuV at 13.565 MHz at 30m		Limit	Complies
FCC Part 15.207	Conducted Emissions	Class A, 150 kHz - 30 MHz		Limit	Not Applicable
FCC Part 15.225(e)	Frequency Tolerance test.	Frequency contained with +/- 0.01% of operating Frequency -20° to +50° C Voltage Variations from 85% to 115%			Complies
FCC Part 15.203	Antenna Requirement	The Antenna is placed inside a housing that will not allow substitution.			Complies

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2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission

TUV Rheinland of North America located at, 710 Resende Road, Webster, NY 14580 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 (Lab code: 3331.08). 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-0203

2.1.4 Industry Canada

(Registration No.: 482B-1) The 10m Semi-Anechoic Chamber has been accepted by Industry Canada to perform testing to 3 and to 10m, based on the test procedures described in ANSI C63.4-2013.

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.

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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 μ 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 μ V/m)

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

2.2 Measurement Uncertainty Emissions

Per CISPR 16-4-2	Ulab	Ucisp
Radiated Disturbance @ 10m		
30 MHz – 1,000 MHz	4.57 dB	5.2 dB
9 kHz – 30- MHz	4.50 dB	N/A
Radiated Disturbance @ 3m		
1.0 GHz – 6.0 GHz	5.08 dB	5.2 dB
6.0 GHz – 18.0 GHz	5.16 dB	5.5 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	2.62 dB	3.6 dB
Carrier Power Conducted		
9 kHz – 40 GHz	1.588 dB	N/A

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.

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2.4 Measurement Equipment Used

Equipment	Manufacturer	Model #	Ref.	Serial #	Last Cal dd/mm/yy	Next Cal dd/mm/yy	Test
Radiated Emissions							
Receiver (20Hz-40GHz)	Rohde & Schwarz	ESl(B) 40		100090	8-Jul-15	8-Jul-16	RE
Receiver (20Hz-40GHz)	Rohde & Schwarz	ESl(B) 40		100274	4-Aug-15	4-Aug-16	RE
BiLog	Chase	CBL6111	C017	1169	22-Aug-15	22-Nov-15	RE
Horn(1-18 GHz)	ETS	3117		040361	16-Jan-14	16-Jan-16	RE
Horn(18-26.5 GHz)	ETS	3160-09		1275	16-Jan-14	16-Jan-16	RE
Loop Antenna	EMCO	6502		8901-2302	10-Mar-15	10-Mar-17	RE
Multimeter	Fluke	83	C437	48162892	3-Aug-15	3-Aug-16	RE
General Laboratory Equipment							
Multimeter	Fluke	87	C405	49050672	3-Aug-15	3-Aug-16	
Multimeter	Fluke	8062A	C452	4715199	3-Aug-15	3-Aug-16	
Pressure/Temperature/RH	Extech	SD700	C480	Q668876	3-Aug-15	3-Aug-16	

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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.

Worst case measurement are shown in test setup photographs

All antenna factors and cable loss are accounted for in the final measurements

3.3 Colocation Engineering Judgement:

As the field strength of the intentional radiator at 13.56 MHz, Peak Field Strength Parallel Polarity is 27.80 dBuV at 1m.

The limit for 13.553 – 13.567 MHz band is 90.4 dBuV at 3m.

The radiated emission scans indicate there are no interfering issues with the 13.56 MHz and the BLE device operating at 2.4 GHz.

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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

Results	Complies (as tested per this report)					Date	8/18/2015	
Standard	FCC Part 15.209							
Product Model	HS2R9				Serial#	TS-1		
Configuration	Tested in 10m Semi-Anechoic Chamber							
Test Set-up	Tested in 10m Semi-Anechoic Chamber, placed on turn-table at 3 meters, see test plans for details							
EUT Powered By	Powered Via USB	Temp	24°C	Humidity	52%	Pressure	1013mbar	
Frequency Range	9kHz - 1000 MHz @ 3m							
Perf. Criteria	Class B. (Below Limit)			Perf. Verification		Readings Under Limit		
Mod. to EUT	None			Test Performed By		Randall Masline		

4.1.2 Test Procedure

Radiated FCC emissions tests were performed using the procedures of ANSI C63.10:2013 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 9kHz - 1000 MHz was investigated for radiated emissions.

Radiated emission testing was performed at a distance of 3 meters in a 10m semi-anechoic chamber.

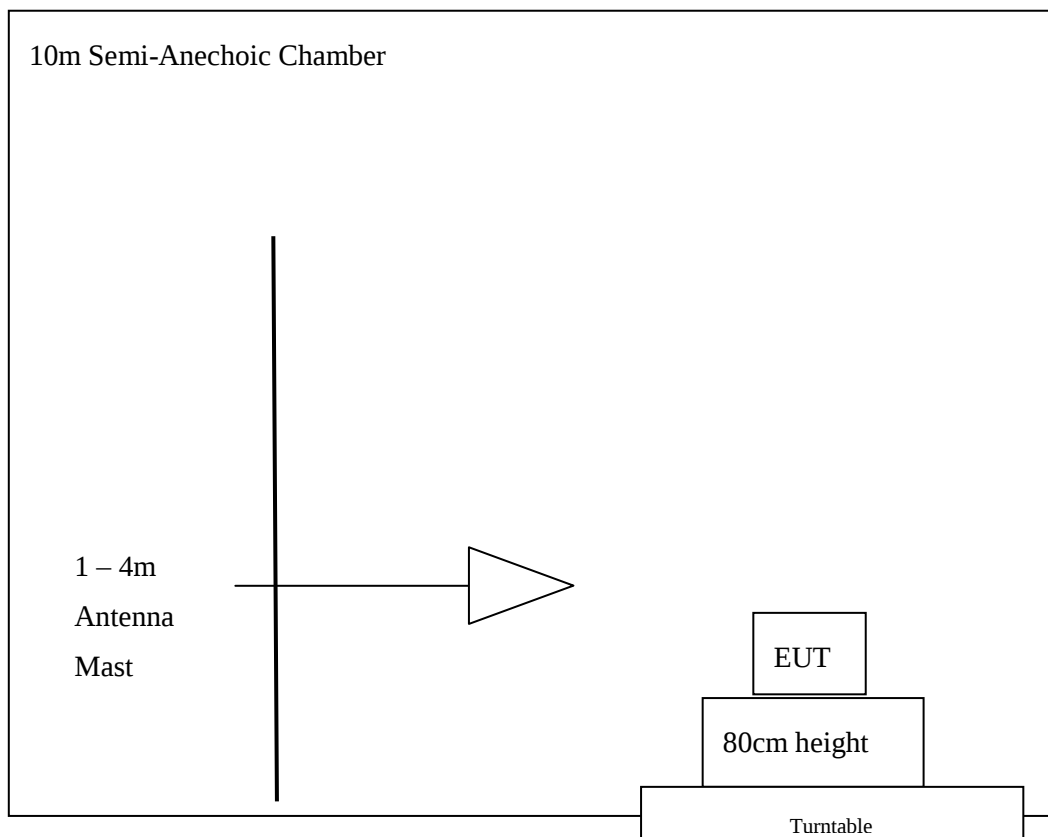
All antenna factors and cable loss are accounted for in the final measurements

All emissions measurements were made with both transmitters operational and transmitting.

4.1.3 Deviations

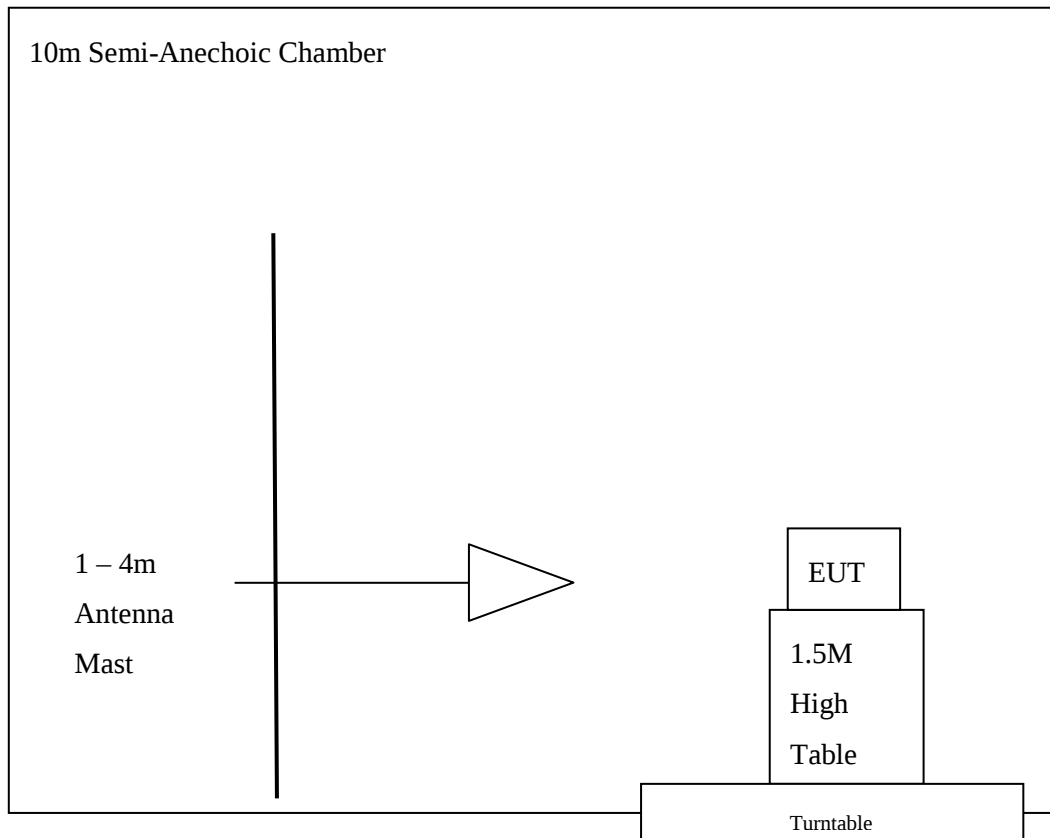
There were no deviations from the test methodology listed in the test plan for the radiated emission test.

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4.1.1 Block Diagram of Test Setup for 9 kHz to 1000 Mhz

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4.1.2 Block Diagram of Test Setup for over 1 GHz

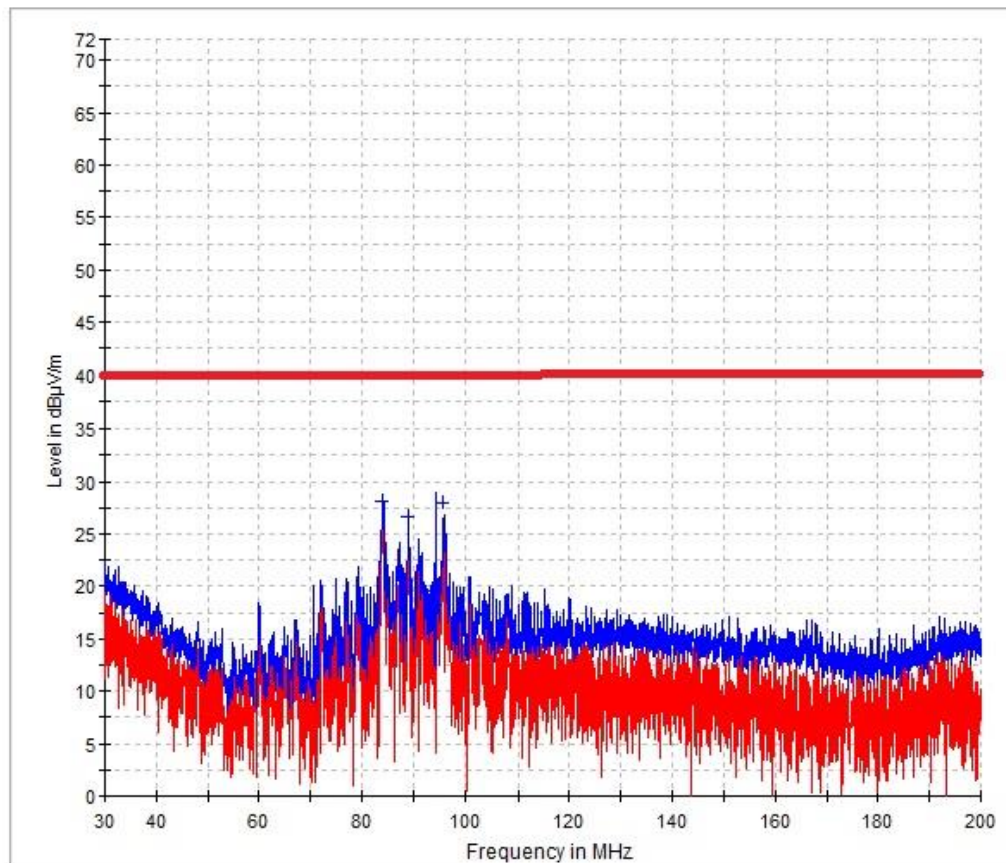


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4.1.1 Final Graphs

NOTES:

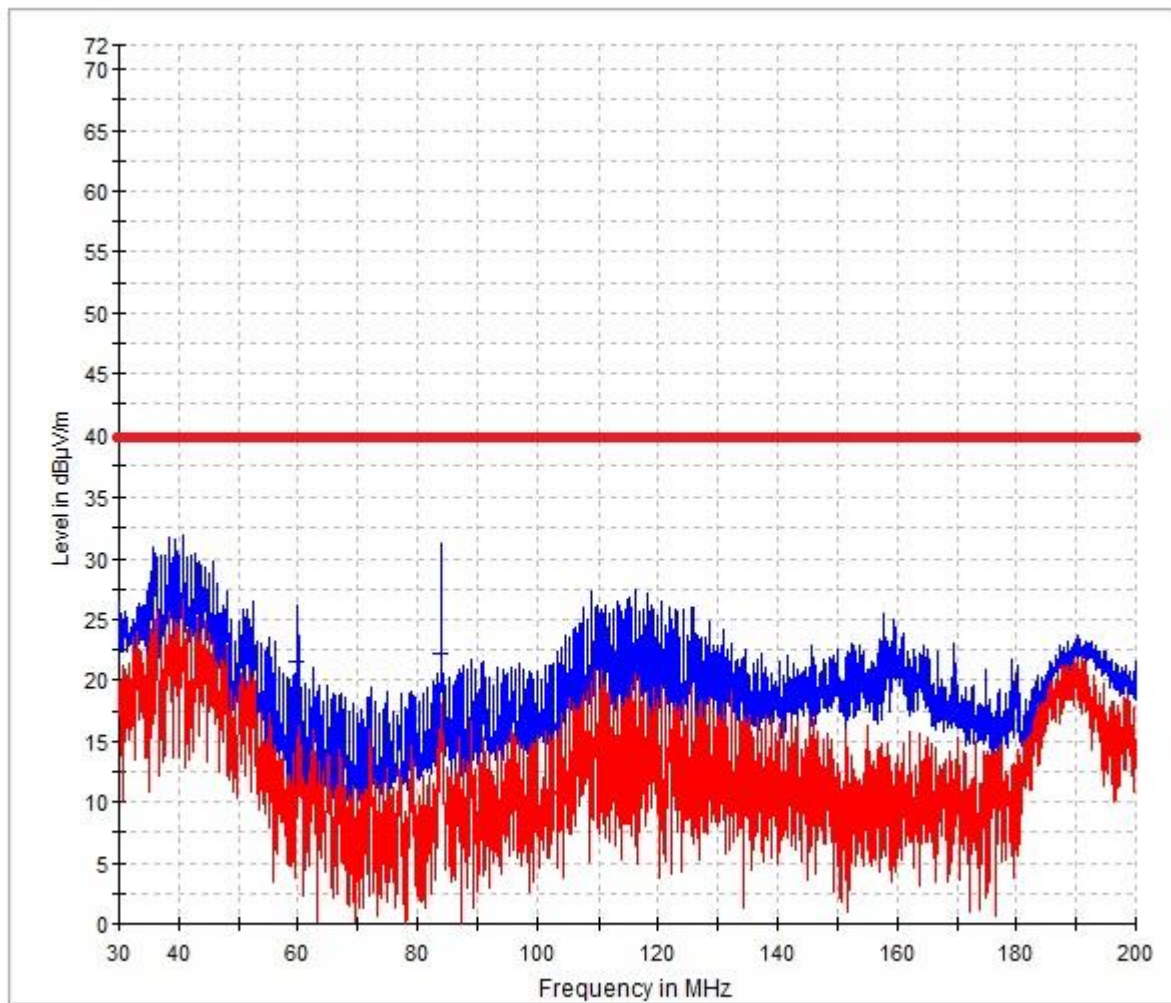
Radiated Emissions Horizontal



Frequency MHz	QuasiPeak dBµV/m	Meas. Time ms	Bandwidth kHz	Height cm	Polarization	Azimuth deg	Corr. dB	Comment
---	---	---	---	---		---	---	
84.080000	28.0	100.0	120.000	150.0	H		-2.0	-9.8
84.080000	28.2	100.0	120.000	150.0	H		-2.0	-9.8
89.040000	26.6	100.0	120.000	150.0	H		-2.0	-9.1
94.480000	18.3	100.0	120.000	150.0	H		-2.0	-8.1
94.480000	19.5	100.0	120.000	150.0	H		-2.0	-8.1
95.880000	27.9	100.0	120.000	150.0	H		-2.0	-7.8

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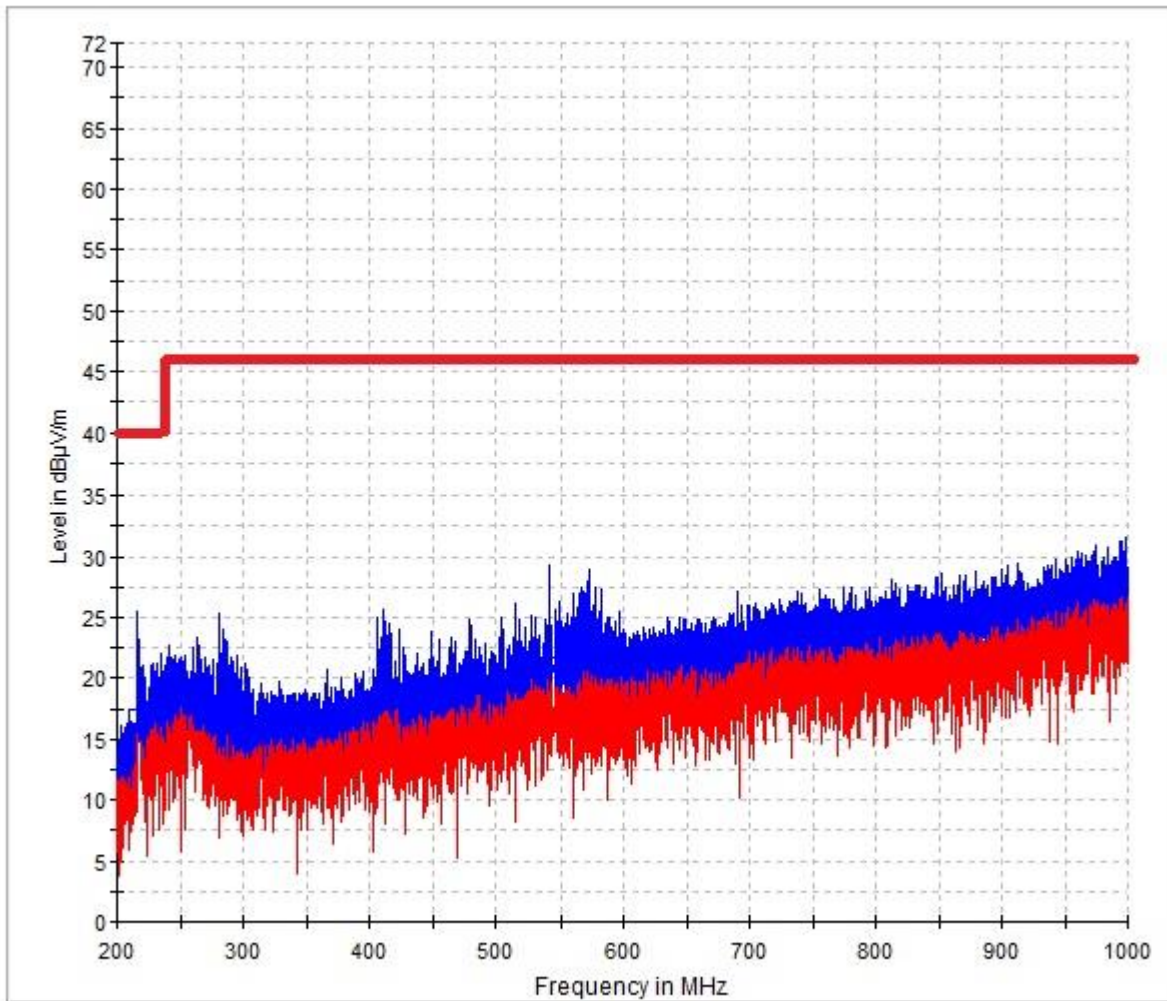
NOTES:

Radiated Emissions
Vertical


Frequency MHz	QuasiPeak dBµV/m	Meas. Time ms	Bandwidth kHz	Height cm	Polarization	Azimuth deg	Corr. dB	Comment
84.000000	22.2	100.0	120.000	150.0	V		2.0	-9.8
60.000000	21.6	100.0	120.000	150.0	V		2.0	-12.6

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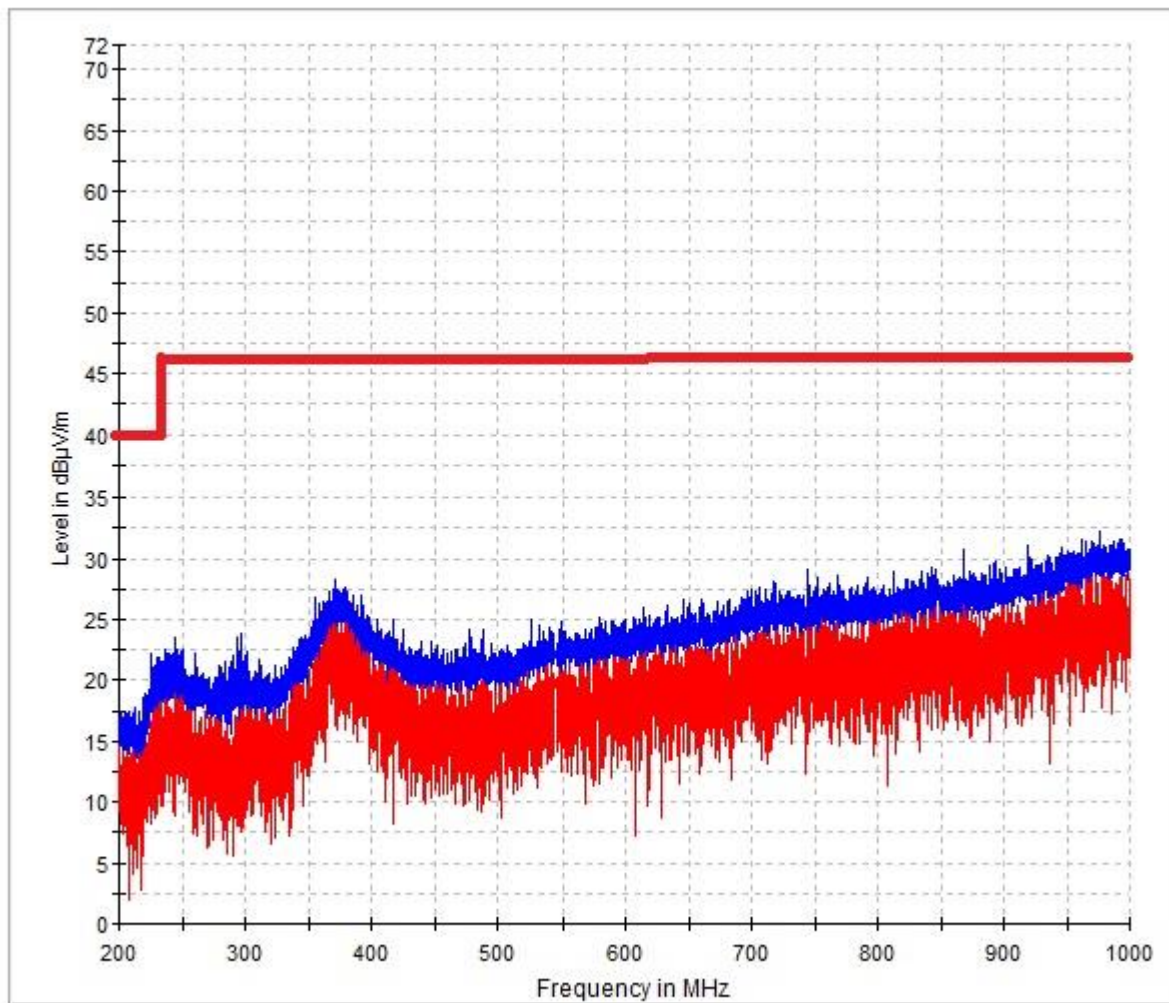
NOTES:

Radiated Emissions
Horizontal


Frequency MHz	QuasiPeak dBµV/m	Meas. Time ms	Bandwidth kHz	Height cm	Polarization	Azimuth deg	Corr. dB	Comment
216.400000	17.5	100.0	120.000	150.0	H		2.0	-5.0
281.200000	18.4	100.0	120.000	150.0	H		2.0	-0.7
410.720000	19.1	100.0	120.000	150.0	H		2.0	3.7
543.200000	21.7	100.0	120.000	150.0	H		2.0	7.0
572.480000	21.5	100.0	120.000	150.0	H		2.0	7.1

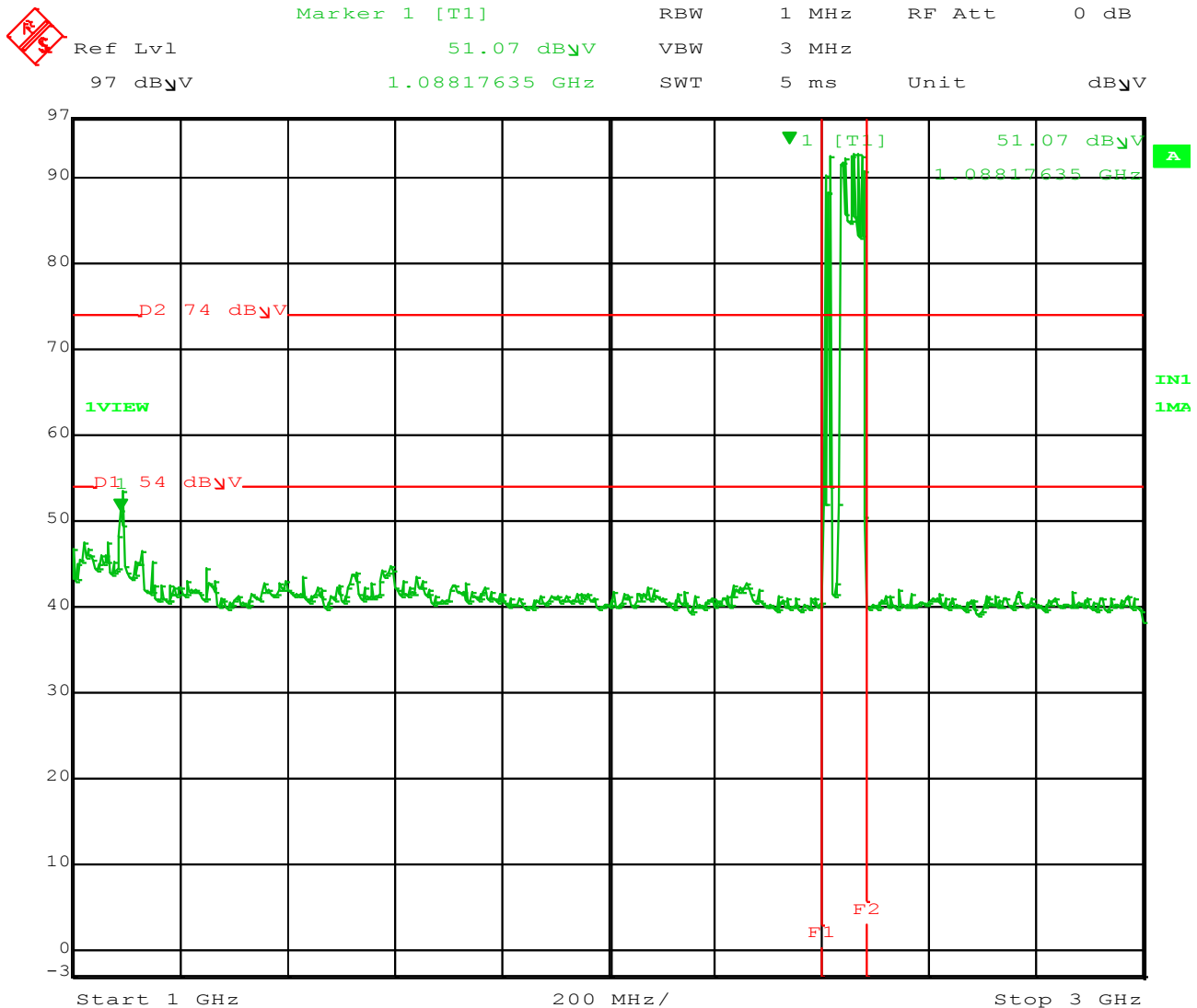
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NOTES:

Radiated Emissions
Vertical


Frequency MHz	QuasiPeak dBµV/m	Meas. Time ms	Bandwidth kHz	Height cm	Polarization	Azimuth deg	Corr. dB	Comment
---	---	---	---	---	---	---	---	---
371.200000	25.3	100.0	120.000	150.0	V	---	2.0	2.2

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Date: 18.AUG.2015 13:46:27

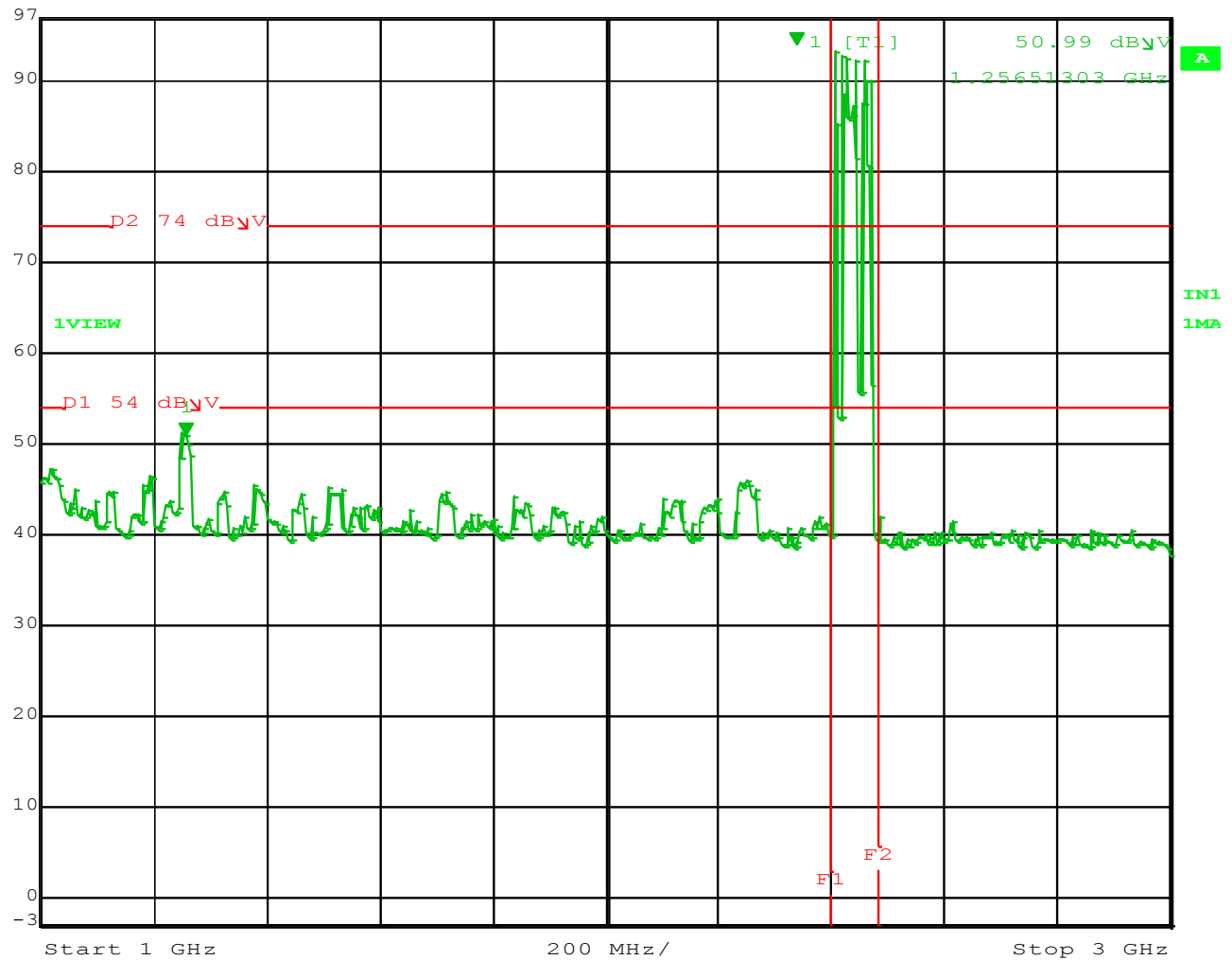
Figure 1 – Bluetooth 2.4 GHz Spurious Emissions Horizontal

Frequency (GHz)	Peak (dBuV)	Avg (dBuV)	Avg Limit (dBuV)	Delta (dB)
1.08817	51.07	45.3	54	8.7

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Marker 1 [T1] RBW 1 MHz RF Att 0 dB
 Ref Lvl 50.99 dBμV VBW 3 MHz
 97 dBμV 1.25651303 GHz SWT 5 ms Unit dBμV



Date: 18.AUG.2015 13:48:25

Figure 2 – Bluetooth 2.4 GHz Spurious Emissions Vertical

Frequency (GHz)	Peak (dBuV)	Avg (dBuV)	Avg Limit (dBuV)	Delta (dB)
1.25613	50.99	46.5	54	7.5

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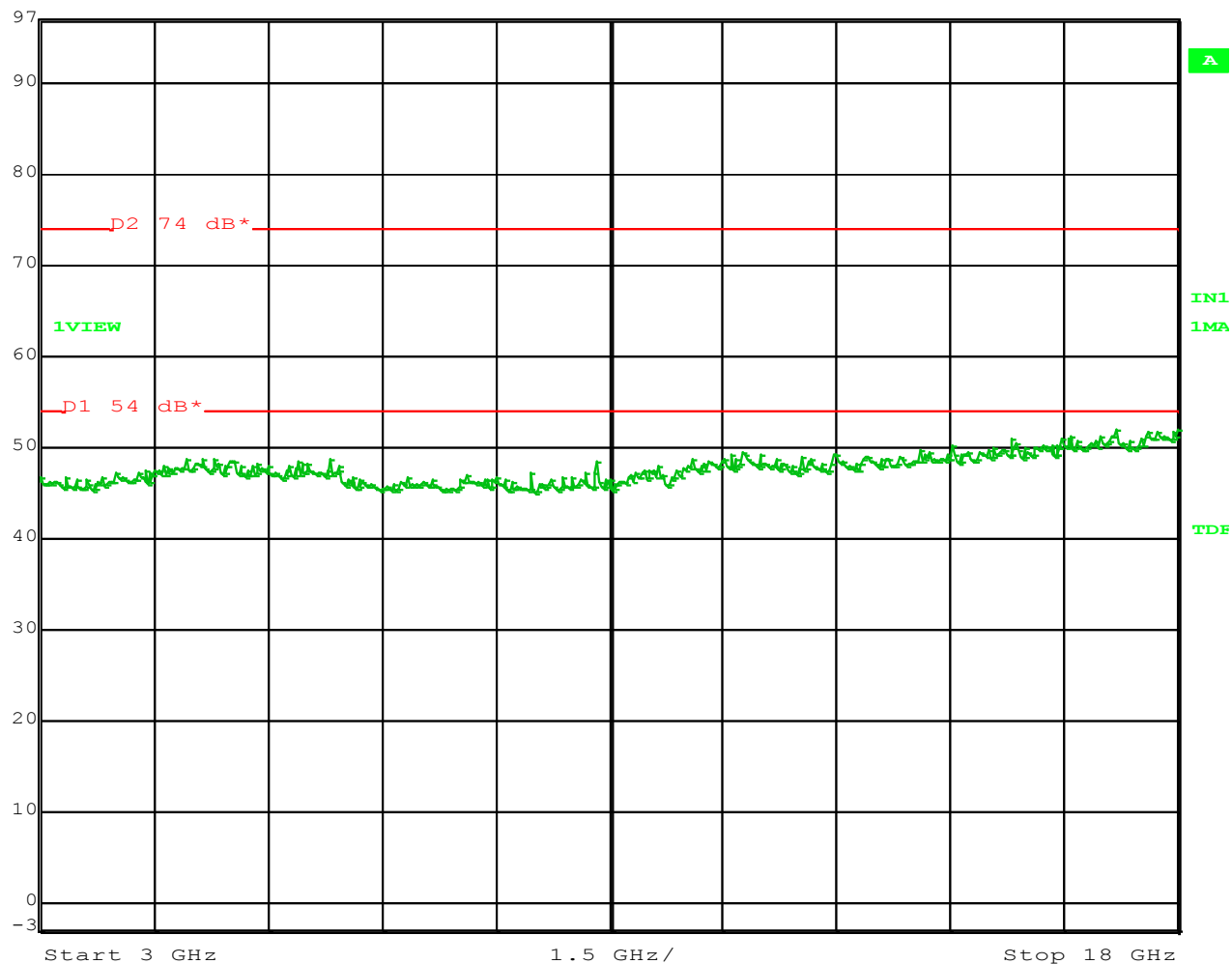
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Ref Lvl
97 dB*

RBW	1 MHz	RF Att	0 dB
VBW	3 MHz		
SWT	150 ms	Unit	dBV/m



Date: 18.AUG.2015 13:51:36

Figure 3 – Bluetooth 2.4 GHz Spurious Emissions Horizontal

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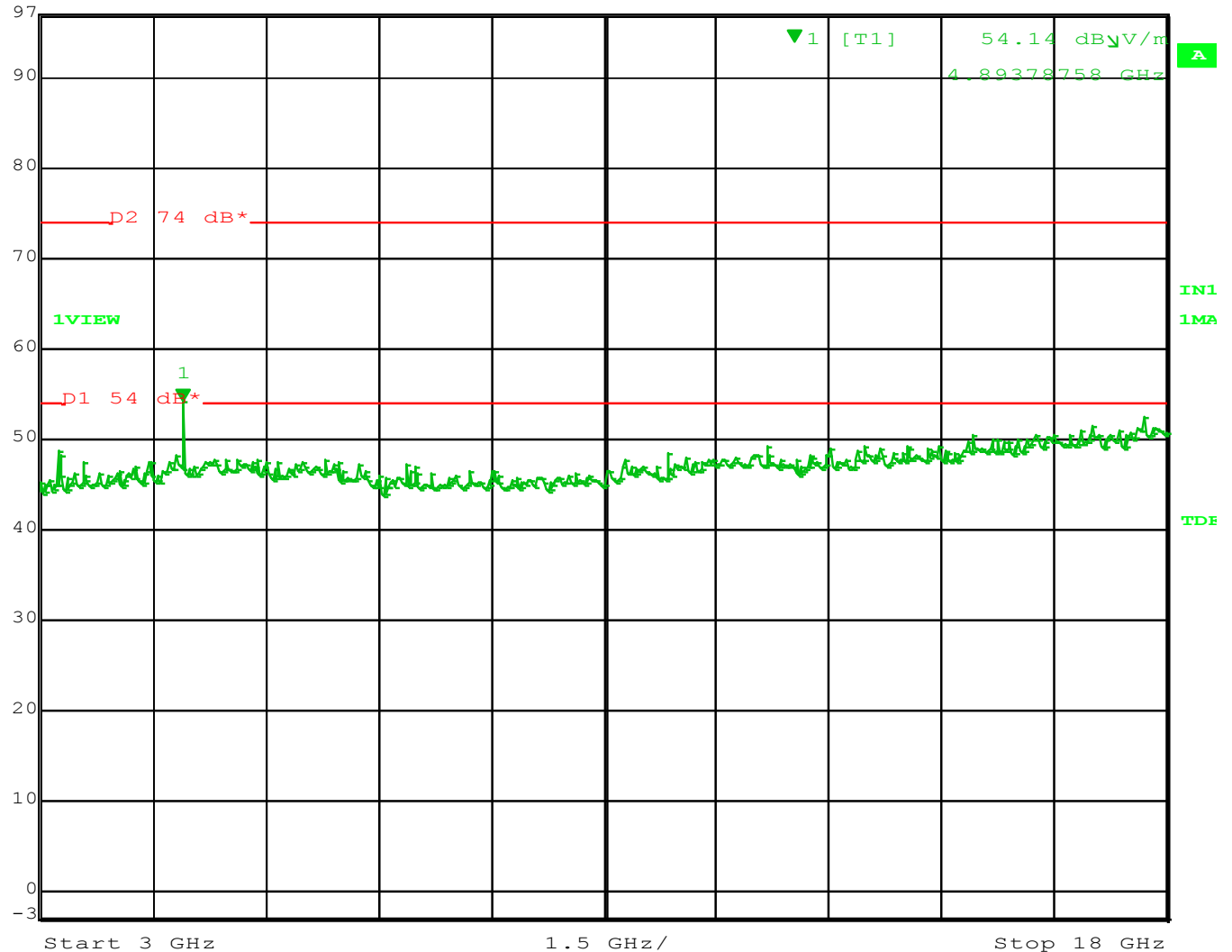
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Marker 1 [T1] RBW 1 MHz RF Att 0 dB
 Ref Lvl 54.14 dBμV/m VBW 3 MHz
 97 dB* 4.89378758 GHz SWT 150 ms Unit dBμV/m



Date: 18.AUG.2015 13:52:19

Figure 4 – Bluetooth 2.4 GHz Spurious Emissions Vertical

Frequency (GHz)	Peak (dBμV)	Avg (dBμV)	Avg Limit (dBμV)	Delta (dB)
4.8937	54.14	48.8	54	5.2

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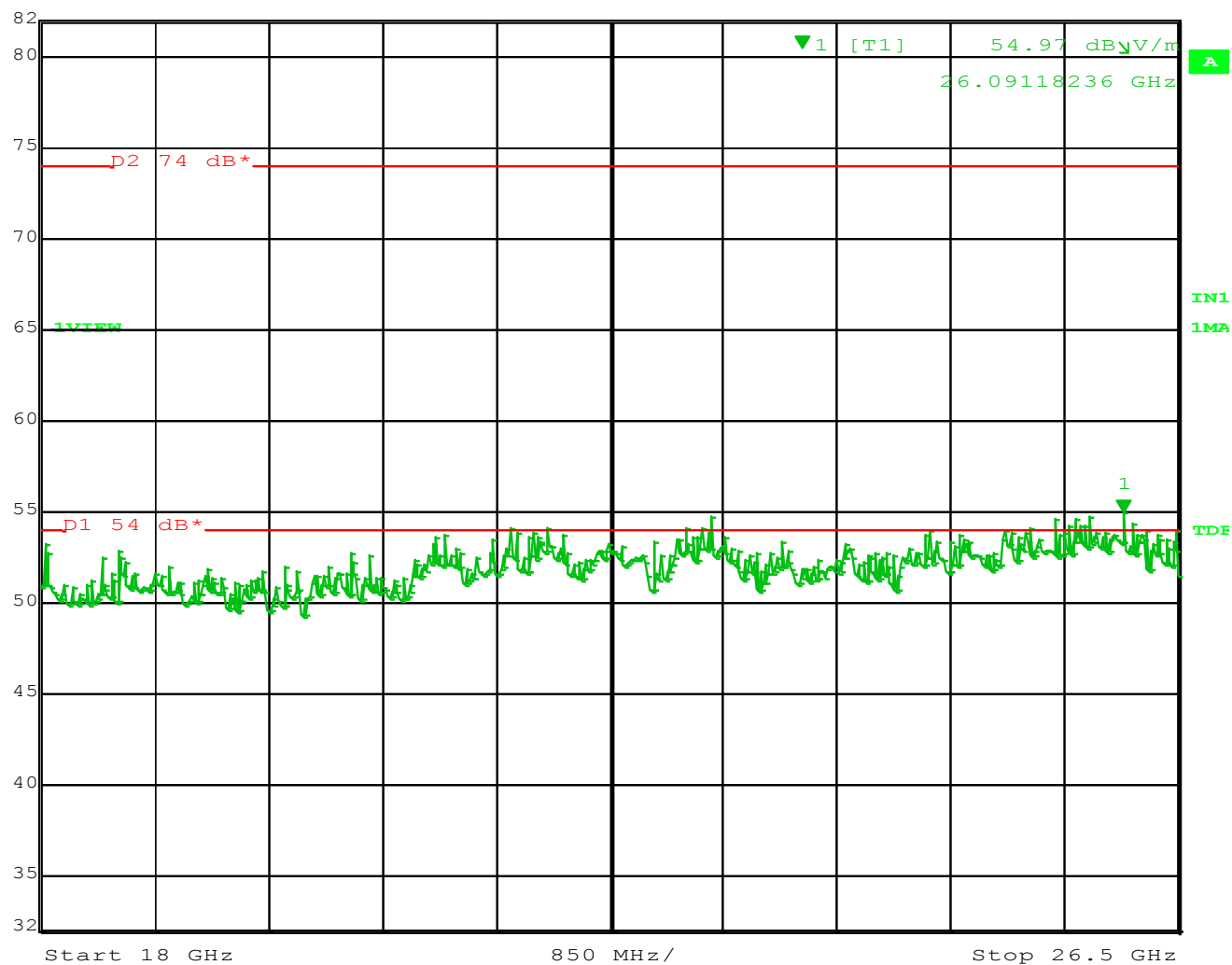
Report No.:

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Marker 1 [T1] RBW 1 MHz RF Att 0 dB
 Ref Lvl 54.97 dB μ V/m VBW 3 MHz
 82 dB* 26.09118236 GHz SWT 86 ms Unit dB μ V/m



Date: 18.AUG.2015 13:54:34

Figure 5 – Bluetooth 2.4 GHz Spurious Emissions Horizontal

Frequency (GHz)	Peak (dB μ V)	Avg (dB μ V)	Avg Limit (dB μ V)	Delta (dB)
26.0911	54.97	46.7	54	7.3

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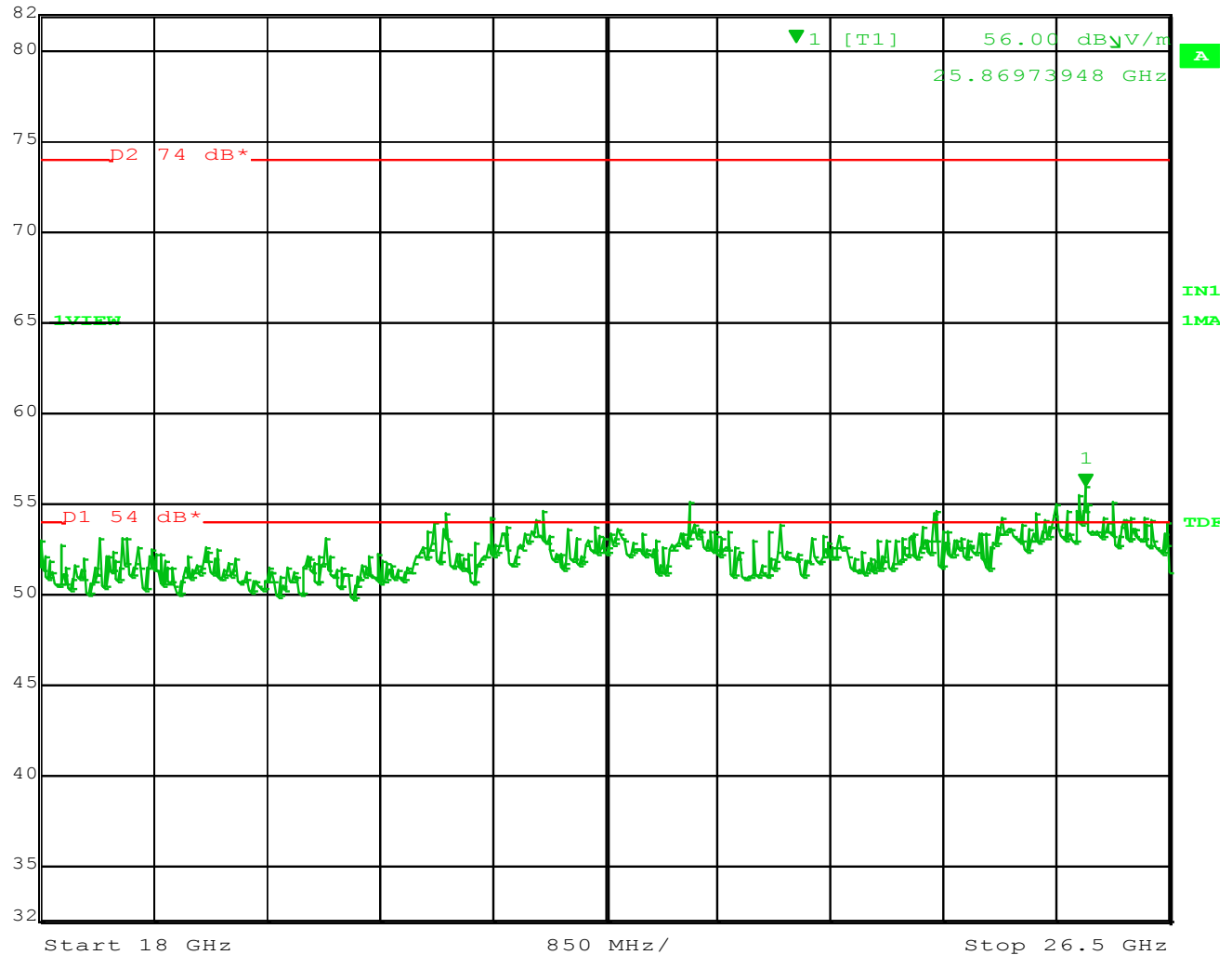
Report No.:

31562536.004_FCC_HS2R9.doc

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Marker 1 [T1] RBW 1 MHz RF Att 0 dB
 Ref Lvl 56.00 dBμV/m VBW 3 MHz
 82 dB* 25.86973948 GHz SWT 86 ms Unit dBμV/m



Date: 18.AUG.2015 13:54:03

Figure 6 – Bluetooth 2.4 GHz Spurious Emissions Vertical

Frequency (GHz)	Peak (dBuV)	Avg (dBuV)	Avg Limit (dBuV)	Delta (dB)
25.8697	56	49.8	54	4.2

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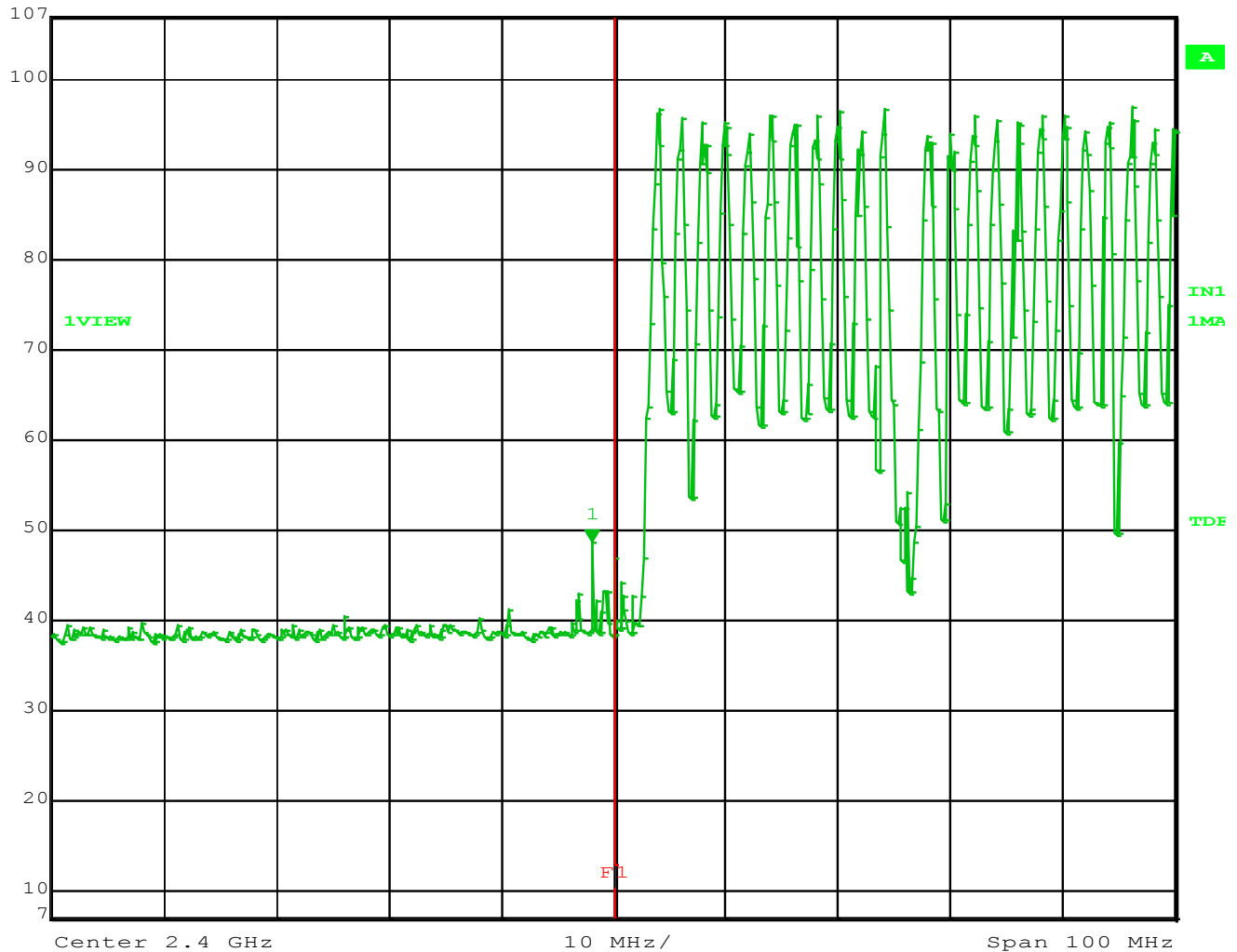
Report No.:

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Marker 1 [T1] RBW 100 kHz RF Att 10 dB
 Ref Lvl 48.56 dB μ V/m VBW 300 kHz
 107 dB* 2.39809619 GHz SWT 25 ms Unit dB μ V/m



Date: 18.AUG.2015 13:30:08

Figure 7 – Bluetooth 2.4 GHz Lower Band Edge

NOTE: Restricted Band is 2310 – 2390 MHz, this spur falls outside of that band

Frequency (GHz)	Peak (dB μ V)	Avg (dB μ V)	Avg Limit (dB μ V)	Delta (dB)
2.3980	48.56	45.2	54	8.8

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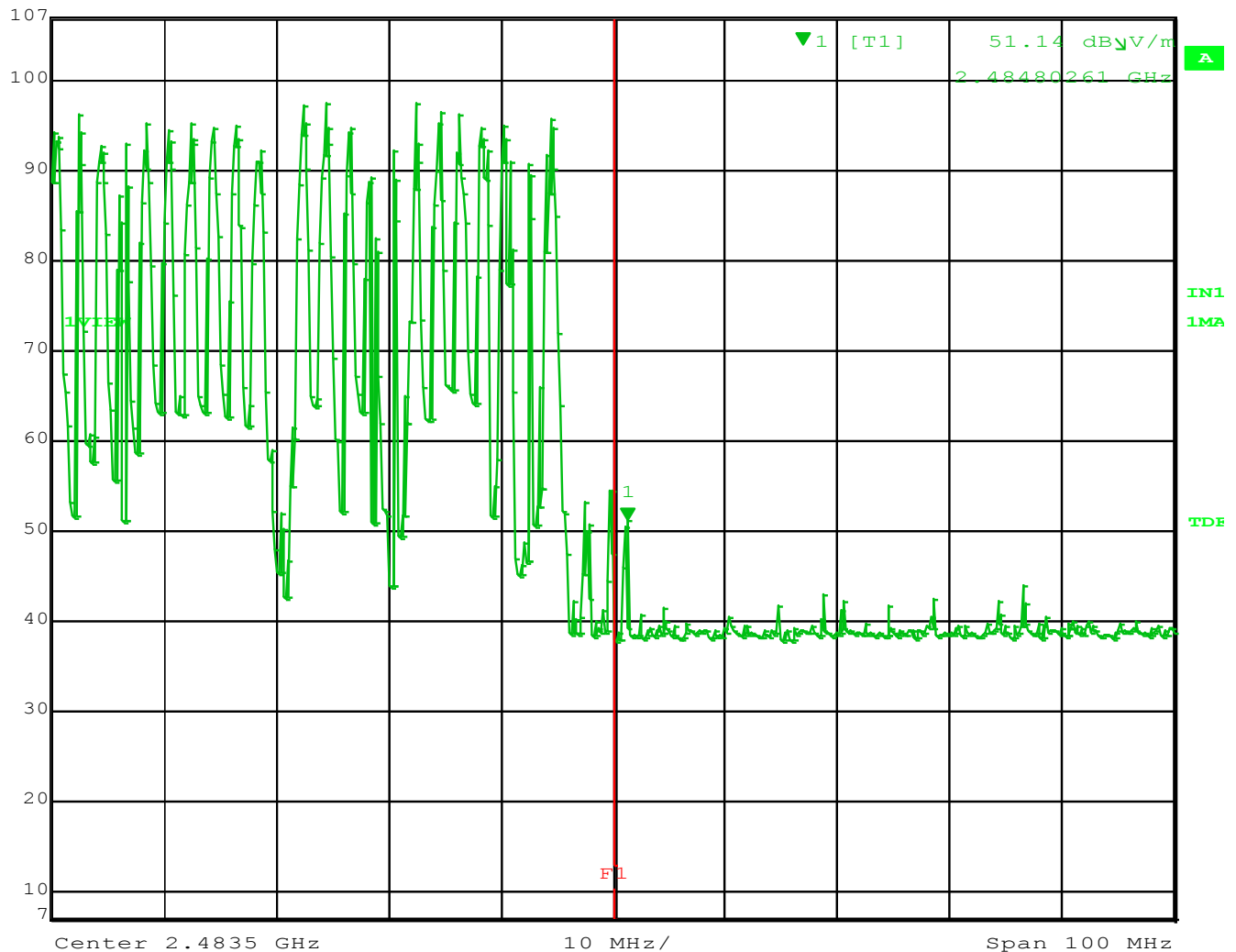
Report No.:

31562536.004_FCC_HS2R9.doc

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Marker 1 [T1] RBW 100 kHz RF Att 10 dB
 Ref Lvl 51.14 dBμV/m VBW 300 kHz
 107 dB* 2.48480261 GHz SWT 25 ms Unit dBμV/m



Date: 18.AUG.2015 13:36:39

Figure 8 – Bluetooth 2.4 GHz Upper Band Edge

Frequency (GHz)	Peak (dBuV)	Avg (dBuV)	Avg Limit (dBuV)	Delta (dB)
2.4848	51.14	46.3	54	8.7

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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

Results	Complies (as tested per this report)					Date	8/18/2015	
Standard	FCC Part 15.225(b)							
Product Model	HS2R9				Serial#	TS-1		
Configuration	Tested in 10m Semi-Anechoic Chamber							
Test Set-up	Tested in 10m Semi-Anechoic chamber EUT placed on table Tested in 10m Semi-Anechoic Chamber							
EUT Powered By	Powered Via USB	Temp	21° C	Humidity	48%	Pressure	1021mbar	
Perf. Criteria	15.225 (Below Limit)			Perf. Verification		Readings under Limit		
Mod to EUT	None			Test Performed By		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.

All antenna factors and cable loss are accounted for in the final measurements

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.

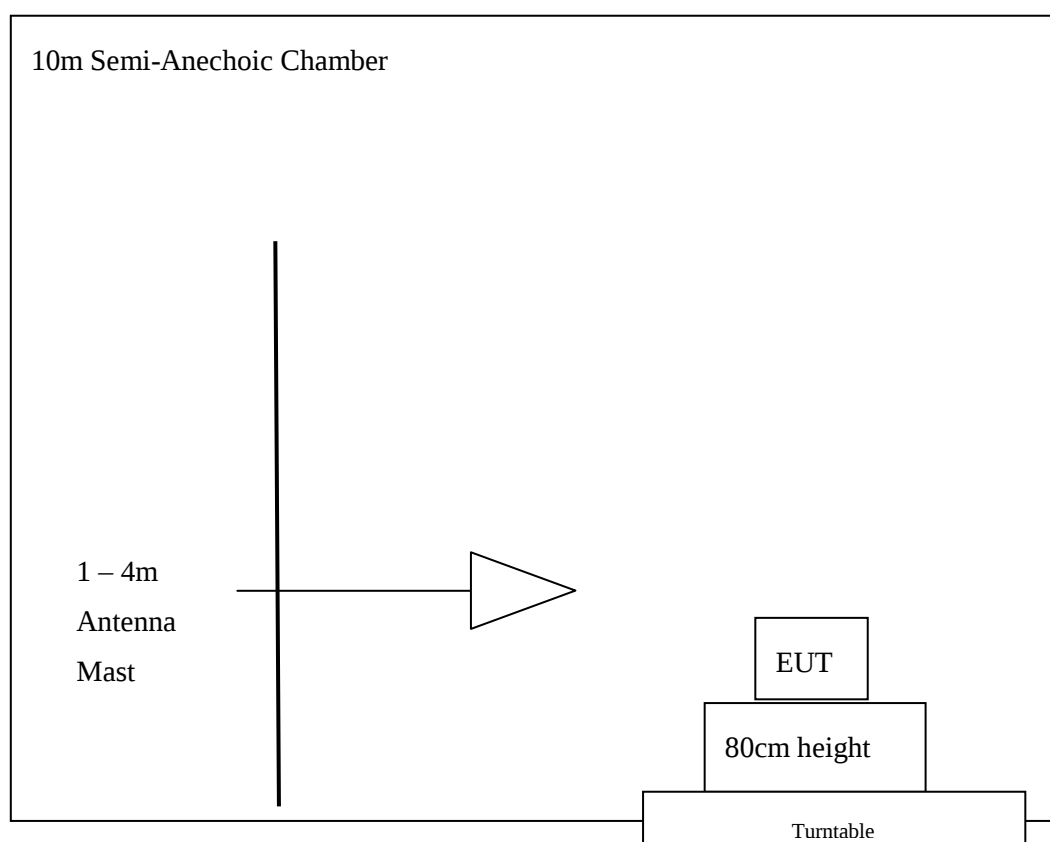
The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TÜV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of the Federal Government.

4.2.4 Final Test

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

Worst case measurement are shown in test setup photographs

4.2.1 Block Diagram of Test Setup for 9 kHz to 1000 Mhz



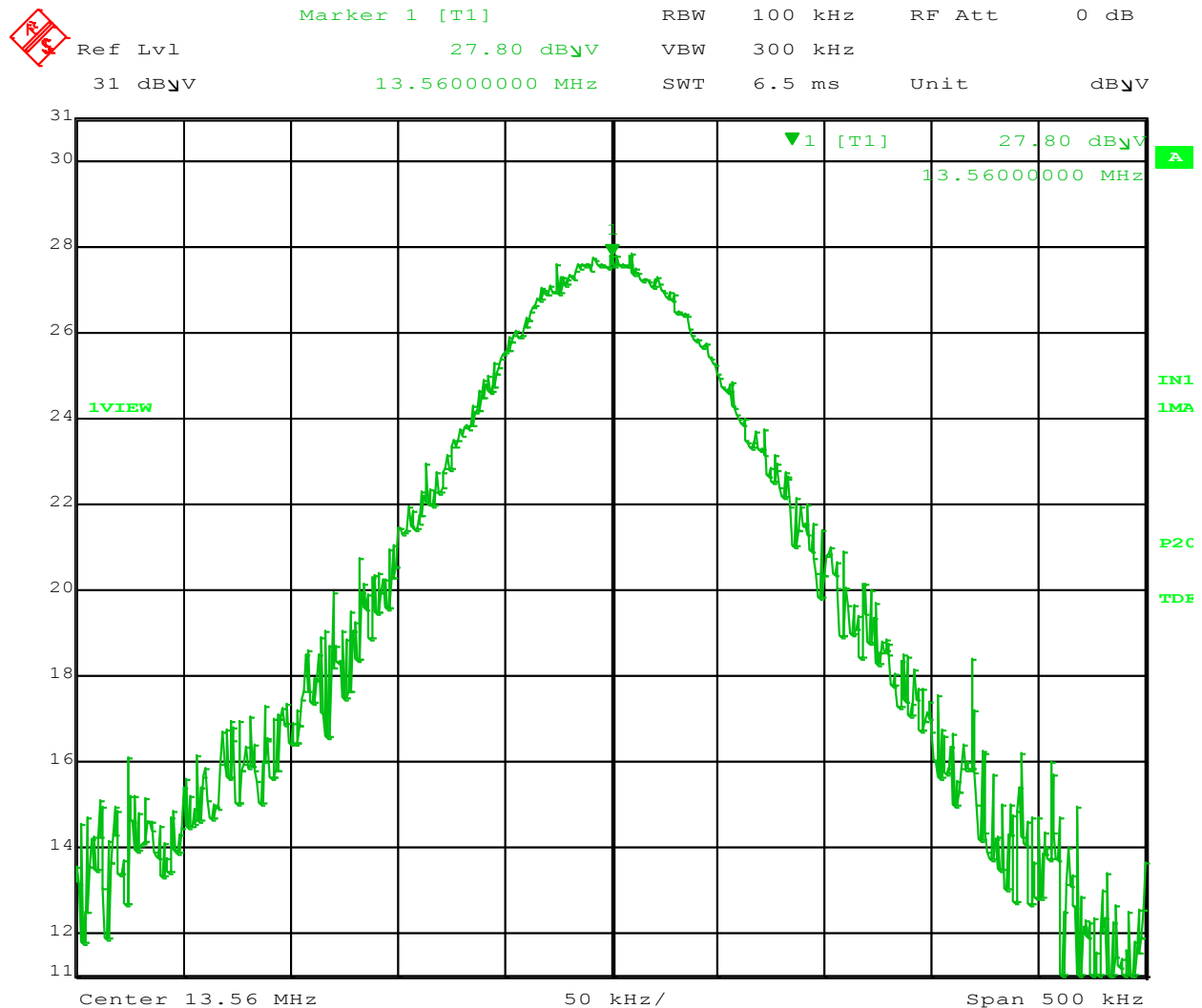
The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself 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 A2LA or any agency of the Federal Government.

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4.2.2 Final Data



Date: 18.AUG.2015 11:27:59

Figure 9 – Peak Field Strength Parallel Polarity is 27.80 dBuV at 1m

NOTE: The limit for 15.225 (b) 13.553 – 13.567 MHz band is 90.4 dBuV at 3m

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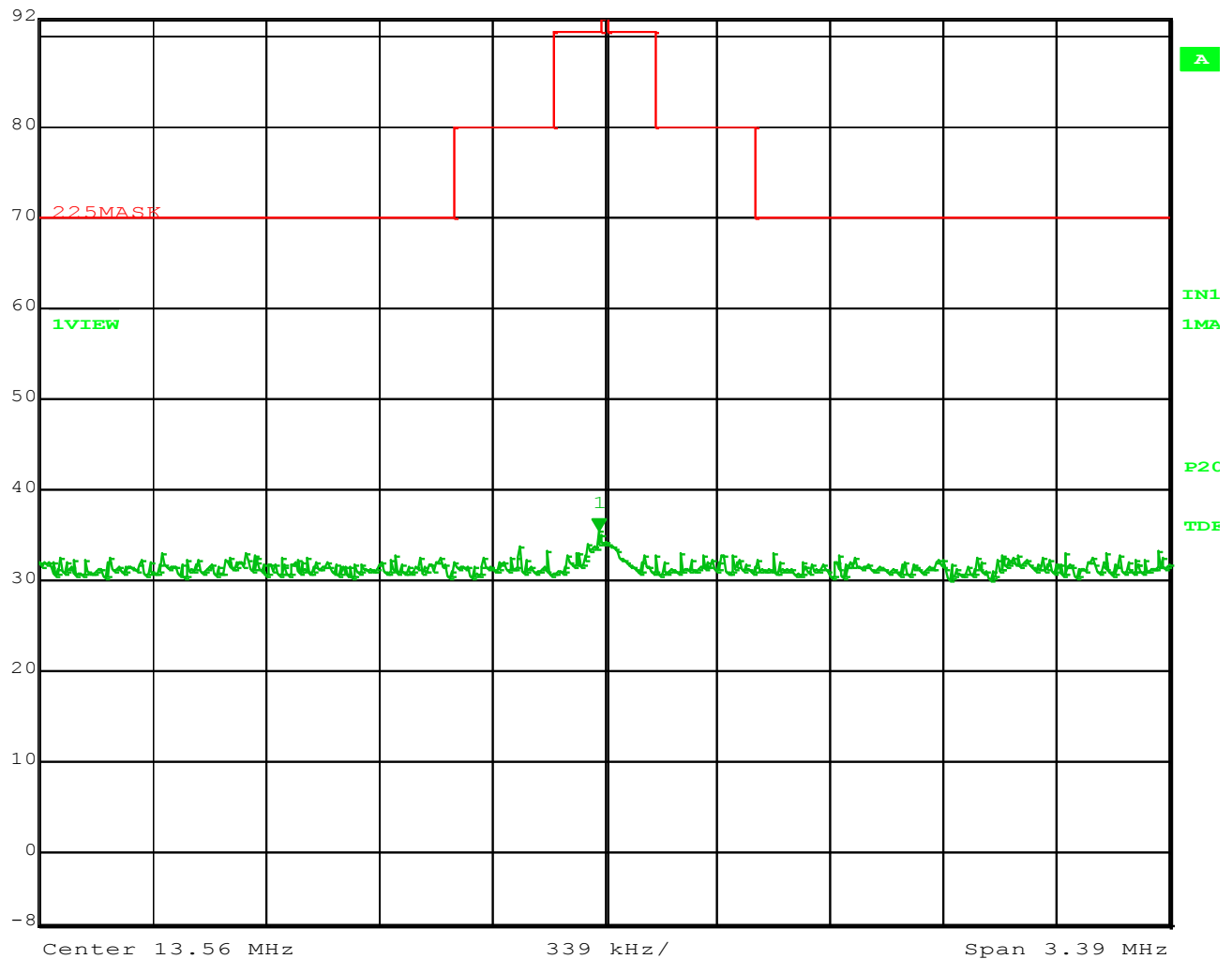
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Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl 35.38 dBV/m VBW 300 kHz
92 dB* 13.54301603 MHz SWT 15 ms Unit dBV/m



Date: 18.AUG.2015 12:52:19

Figure 10 – Mask measured at 1m distance

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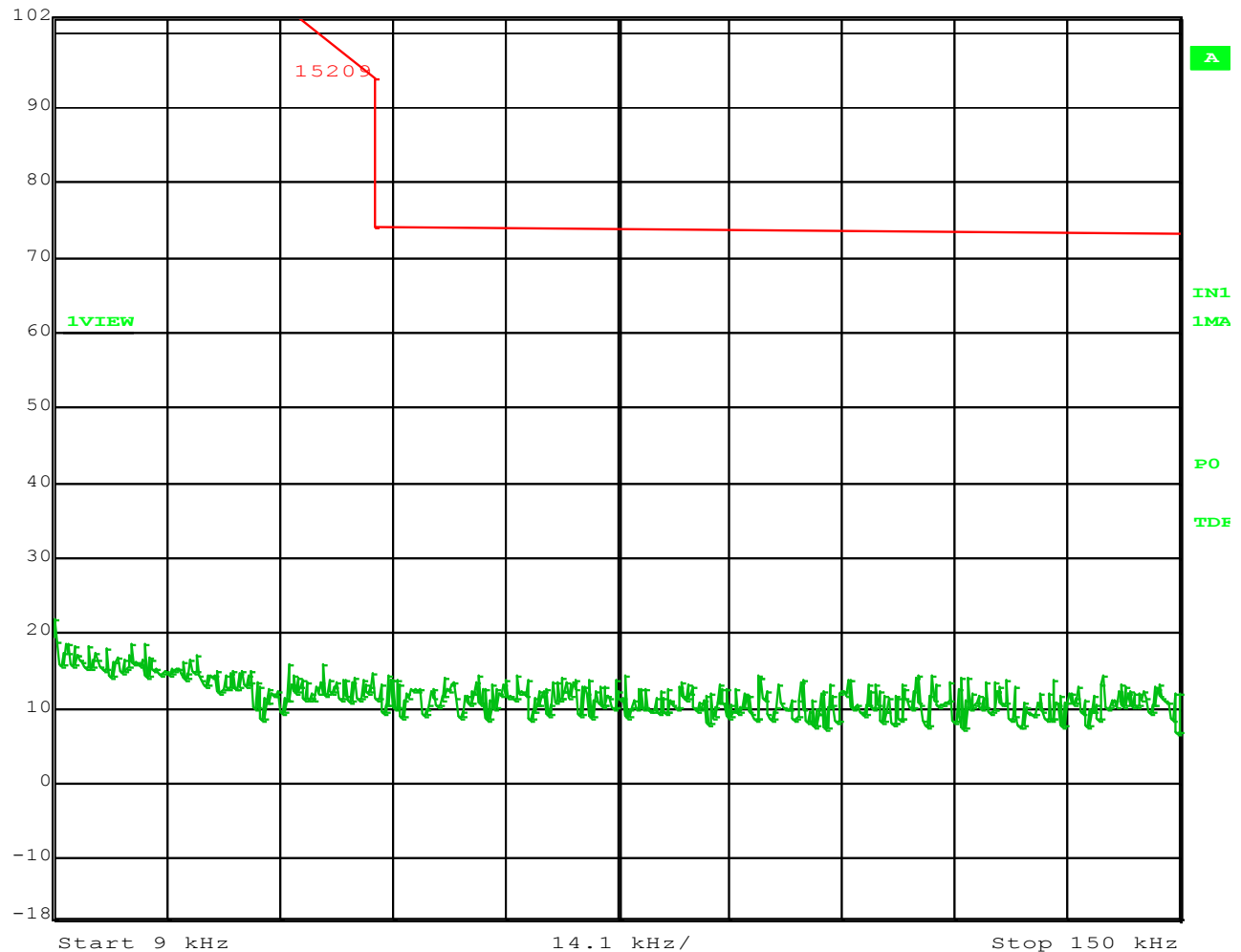
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Ref Lvl
102 dB*

RBW	200 Hz	RF Att	10 dB
VBW	200 Hz		
SWT	18 s	Unit	dBµV/m



Date: 18.AUG.2015 13:01:28

Figure 11 – Spurious Emissions (Parallel) 9 kHz to 150 kHz Measured at 1m distance

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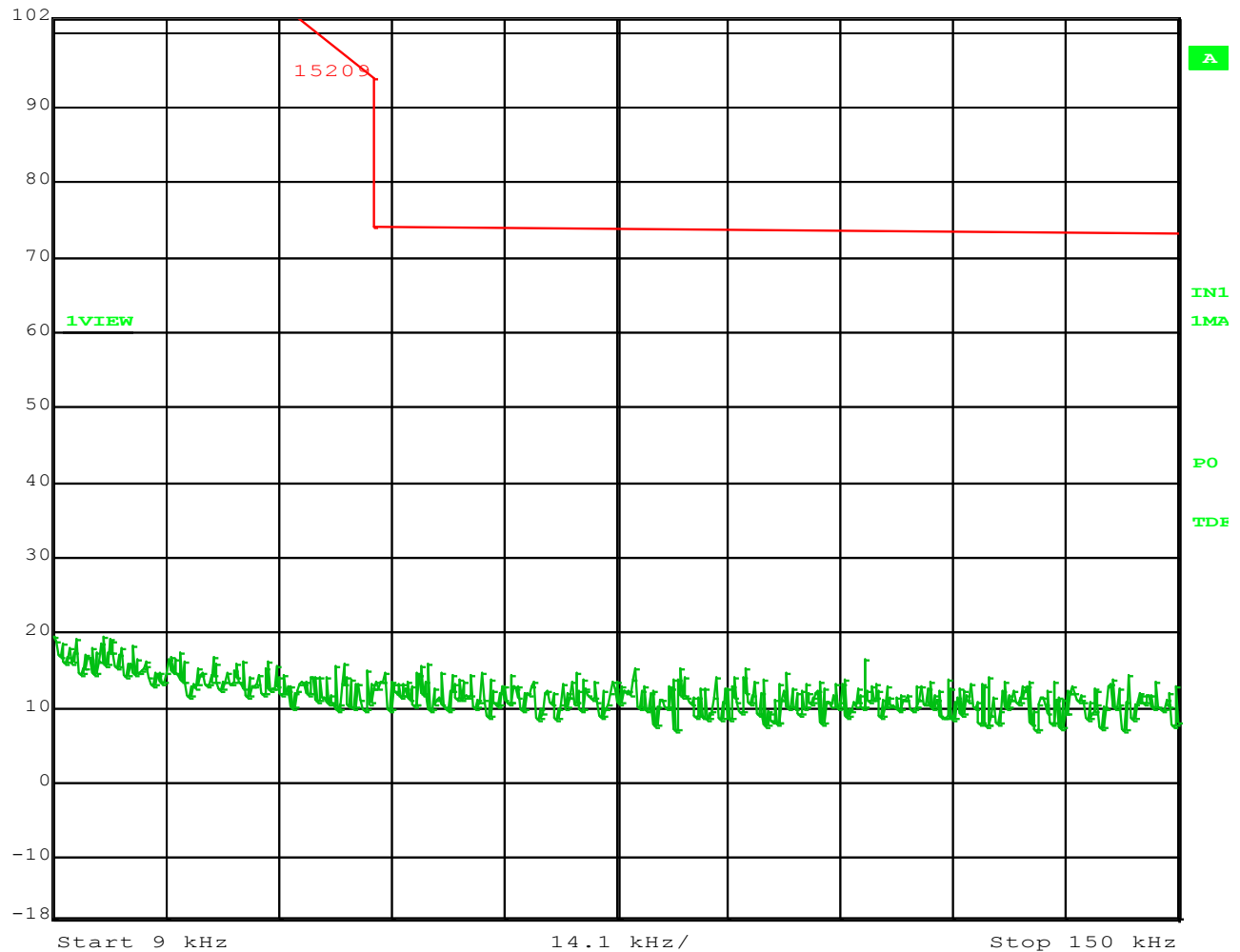
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Ref Lvl
102 dB*

RBW	200 Hz	RF Att	10 dB
VBW	200 Hz		
SWT	18 s	Unit	dBµV/m



Date: 18.AUG.2015 13:02:22

Figure 12 – Spurious Emissions (Perpendicular) 9 kHz to 150 kHz Measured at 1m distance

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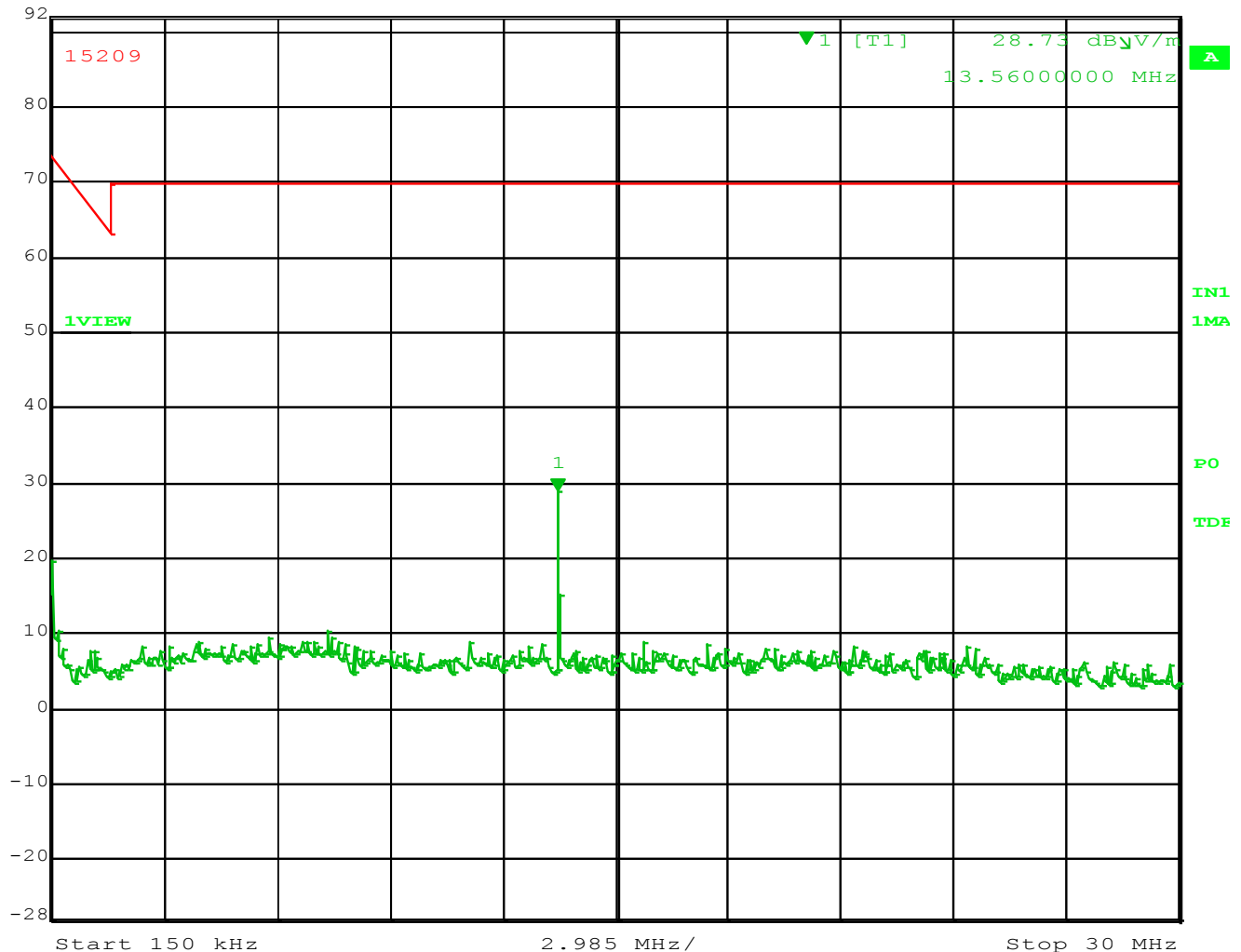
Report No.:

31562536.004_FCC_HS2R9.doc

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Marker 1 [T1] RBW 10 kHz RF Att 0 dB
 Ref Lvl 28.73 dB μ V/m VBW 10 kHz
 92 dB* 13.56000000 MHz SWT 1.15 s Unit dB μ V/m



Date: 18.AUG.2015 13:05:24

Figure 13 – Spurious Emissions (Parallel) 150 kHz to 30 MHz Measured at 1m distance

Frequency (MHz)	Peak	QP	Result
13.560	28.73 dB μ V	FUNDAMENTAL	Complies

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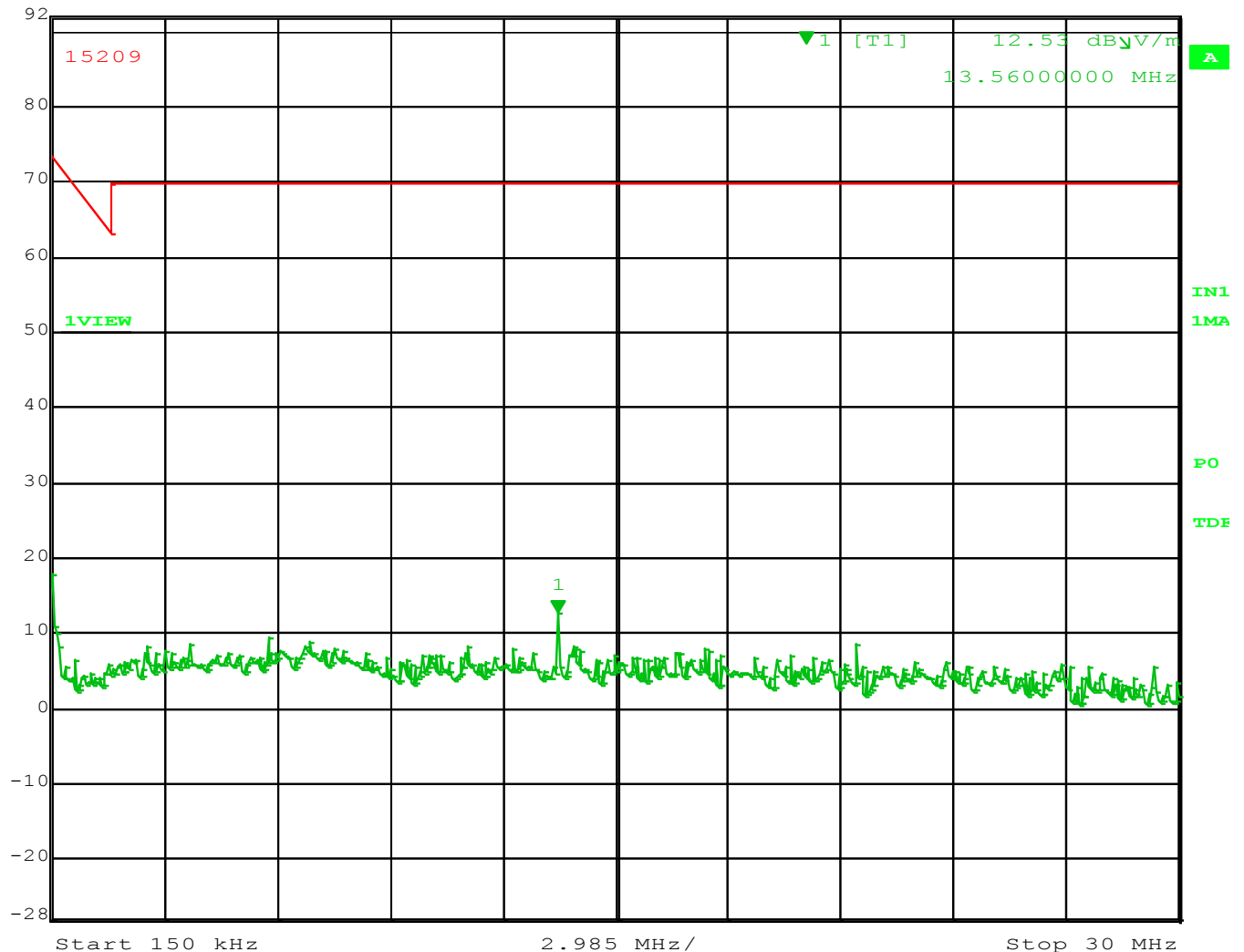
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Marker 1 [T1] RBW 10 kHz RF Att 0 dB
Ref Lvl 12.53 dBV/m VBW 10 kHz
92 dB* 13.56000000 MHz SWT 1.15 s Unit dBV/m



Date: 18.AUG.2015 13:04:36

Figure 14 – Spurious Emissions (Perpendicular) 150 kHz to 30 MHz Measured at 1m distance

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4.1 Frequency Tolerance

This test is to evaluate the performance of the EUT when subjected to Variations in voltage and temperature.

4.1.1 Over View of Test

Results	Complies (as tested per this report)					Date	8/20/2015	
Standard	FCC Part 15.225(e)							
Product Model	HS2R9				Serial#	TS-1		
Configuration	See test plan for details							
Test Set-up	Tested in open area on ground plane . See test plans for details							
EUT Powered By	Powered Via USB	Temp	22° C	Humidity	22%	Pressure	1008mbar	
Mod to EUT	None		Test Performed By		Randall Masline			

4.1.2 Test Procedure

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

All antenna factors and cable loss are accounted for in the final measurements

4.1.3 Acceptable Climatic Conditions

Unless otherwise specified by the committee responsible for the generic or product standard, the climatic conditions in the laboratory shall be within any limits specified for the operation of the EUT and the test equipment by their respective manufacturers.

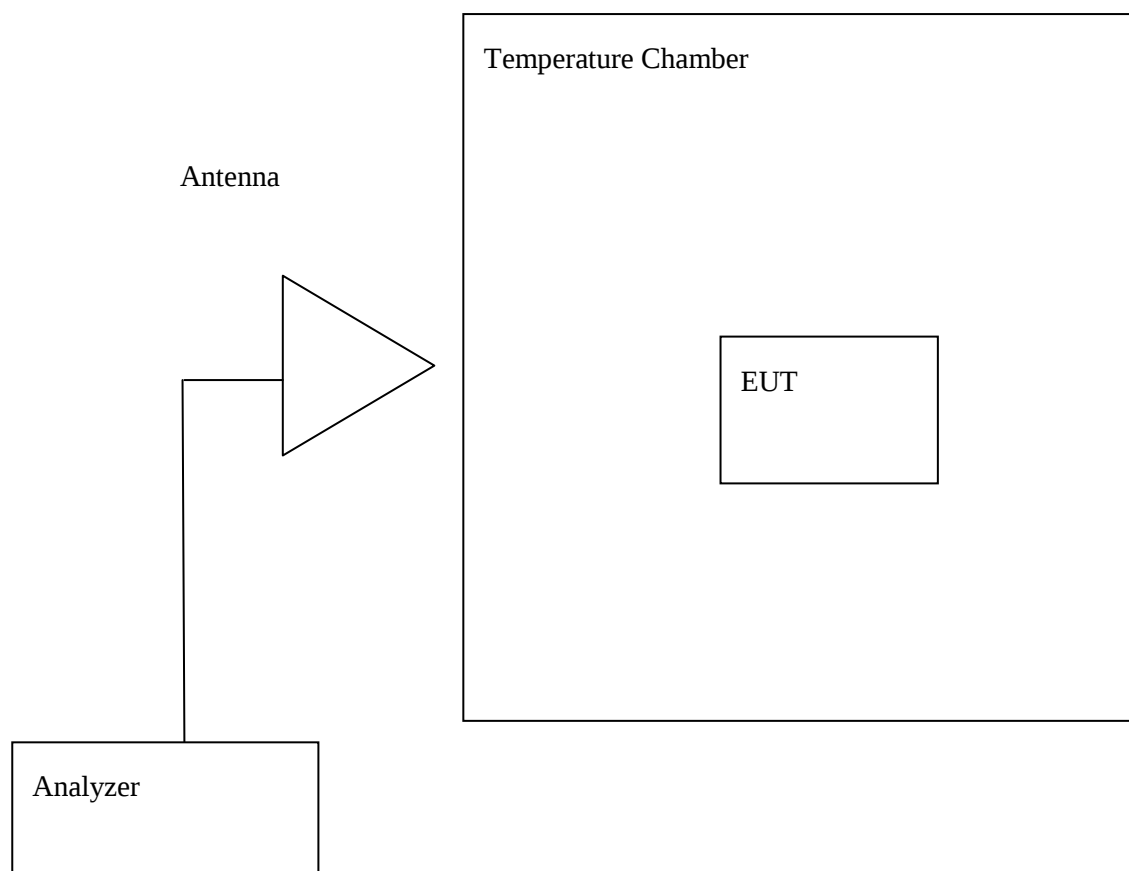
Tests shall not be performed if the relative humidity is so high as to cause condensation on the EUT or the test equipment.

4.1.4 Deviations

There were no deviations from the test methodology listed in the test plan for the Frequency Tolerance test.

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4.1.1 Block Diagram of Test Setup for Frequency Tolerance



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Tolerance of carrier signal at +/- 0.01% for 13.56 MHz

13.558644 MHz to 13.561356 MHz

Temperature	Frequency (MHz)	Result
-20° C	13.5604895	Complies
Nom 22° C	13.5600000	Complies
+55° C	13.5598726	Complies

Voltage Variation	Frequency (MHz)	Result
85% - 102VAC	13.5604895	Complies
Nom 120VAC	13.5600000	Complies
115% - 138VAC	13.5598726	Complies

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5 RF Exposure – FCC - for RFID Device

5.1 Exposure Requirements – FCC KDB # 447498 DO1

FCC KDB # 447498 DO1 V05r02 - Mobile and Portable Device RF Exposure and Procedures and Equipment, Appendix C shows that the SAR Text Exclusion Threshold for a device with a separation distance of ≤ 50 mm at ≤ 100 MHz is 237 mW

5.1.1 Test Procedure

If the antenna is located > 20 cm from the user, then an MPE calculation is acceptable.

If the antenna is located < 20 cm (portable / mobile / hand-held device) from the user, then SAR evaluation is required.

5.1.2 Evaluation

The EUT will be used as a portable device where the antenna will be located less than 20cm from the user, therefore SAR evaluation is required.

5.1.2.1 Evaluation for FCC

FCC 447498 DO1 Mobile Portable RF Exposure V05r02, Appendix C shows that the SAR Text Exclusion Threshold for a device with a worst-case separation distance of < 50 mm and < 100 MHz is 237 mW.

The minimum power that requires SAR testing with a separation distance of 50 mm at < 100 MHz is 237 mW.

The maximum EiRP peak power output of the EUT is: < 0.1 mW

The 0.1 mW EiRP of the EUT is well below the 237 mW power level that requires SAR Testing.

5.1.3 Conclusion

SAR data is not required for FCC

Note: The < 0.1 mW power level includes the 100% Duty Cycle factor.
This is considered to be the absolute worst case.

5.1.4 Calculated EiRP Level

Notes: The EUT does not have a means to make direct measurements.

This EiRP calculation was made using the maximum Peak Field value of 27.80 dB μ V/m at 1m.

The Duty Cycle was at 100%

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5.1.5 Antenna Gain:

The antenna used in the EUT is a Loop antenna which is etched onto a flexible PCB.

According to the manufacturer, the antenna has a theoretical gain of 0 dBi or numeric gain of 1 (unity gain).

The stated Maximum EIRP power of the EUT is < 0.1 mW (100% Duty Cycle)

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6 RF Exposure – FCC for Bluetooth Device

6.1 Exposure Requirements – FCC KDB # 447498 DO1

FCC KDB # 447498 DO1 V05r02 - Mobile and Portable Device RF Exposure and Procedures and Equipment, Appendix A shows that the SAR Text Exclusion Threshold for a device with a separation distance of 5 mm at 2450 MHz is 10 mW

6.1.1 Test Procedure

If the antenna is located > 20cm from the user, then an MPE calculation is acceptable.

If the antenna is located < 20cm (portable / mobile / hand-held device) from the user, then SAR evaluation is required.

6.1.2 Evaluation

The EUT will be used as a portable device where the antenna will be located less than 20cm from the user, therefore SAR evaluation is required.

6.1.2.1 Evaluation for FCC

FCC 447498 DO1 Mobile Portable RF Exposure V05r02, Appendix C shows that the SAR Text Exclusion Threshold for a device with a worst-case separation distance of < 5 mm at 2450 MHz is 10 mW.

The minimum power that requires SAR testing with a separation distance of 5 mm at < 50 MHz is 308 mW.

The maximum EiRP peak power output of the EUT is: 7 mW

The 7 mW EiRP of the EUT is well below the 10 mW power level that requires SAR Testing.

6.1.3 Conclusion

SAR data is not required for FCC

Note: The 7 mW power level includes the 100% Duty Cycle factor.
This is considered to be the absolute worst case.

6.1.4 Calculated EiRP Level

Notes: The EUT does not have a means to make direct measurements.

This EiRP calculation was made using the maximum Peak Field value of 8.21 dBm at 3m.

The Duty Cycle was at 100%

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6.1.5 Antenna Gain:

According to the manufacturer, the antenna has a theoretical gain of -0.23 dBi or numeric gain of 0.95 (unity gain).

The stated Maximum EIRP power of the EUT is 7 mW (100% Duty Cycle)

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Appendix A

7 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.

7.1 General Information

Client	JADAK LLC
Address 1	27279 William Barry Blvd.
Address 2	North Syracuse, NY 13212
Contact Person	Adam Clifford
Telephone	315-218-1315
Fax	315-701-0679
e-mail	Adam.Clifford@jadaktech.com

7.2 Model(s) Name

HS2R9

7.3 Type of Product

RFID Module with Passive Tag and Bluetooth

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7.4 Equipment Under Test (EUT) Description

The Model number HS2R9 is a RFID Module with Passive Tag and Bluetooth that operates at 13.56 MHz

The flexpoint™ HS-2R from JADAK™ is a wireless Bluetooth BLE handheld scanner capable of decoding all major 1d and 2d barcode varieties as well as reading a broad variety of HF RFID tags. The HS-2R consists of a highly configurable area imaging camera, decoding engine, and an HF RFID Transceiver that will communicate via a Bluetooth BLE 4.1 interface.

With a small ergonomic shape, the HS-2R can be used in a wide variety of applications, but is especially designed for Healthcare applications and environments. The HS-2R has a sealed housing that protects it from day to day debris and spills and is built with medical grade plastics that are compatible with popular medical cleansers and disinfectants.

7.5 Modifications

No modifications were necessary to meet the requirements.

7.6 Product Environment

☒	Residential	☐	Hospital
☒	Light Industrial	☐	Small Clinic
☐	Industrial	☐	Doctor's office
☐	Other		

*Check all that apply

7.7 Countries

☒	USA
☐	Canada

*Check all that apply

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7.8 General Product Information

Size	H	3cm	W	5cm	L	14cm
Weight	<1kg		Fork-Lift Needed		No	
Notes						

7.9 EUT Electrical Powered Information

7.9.1 Electrical Power Type

☐	AC	☒	DC	☐	Batteries	☐	Host -
--------------------------	----	-------------------------------------	----	--------------------------	-----------	--------------------------	--------

7.9.2 Electrical Power Information

Name	Type	Voltage		Frequency	Current	Notes
		min	max			
USB Cradle to Laptop		5	5	DC	0.5	
Notes						

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