Test of: Sensus Navicom Smart Controller with Horstmann RF Module FCC ID: YQVHHH002

To: FCC 47 CFR Part 15.247 & IC RSS-210

Test Report Serial No.: SNUS45-U4 Rev A

TEST REPORT

FROM

MiCOM Labs

Test of Sensus Navicom Smart Controller with Horstmann RF Module FCC ID: YQVHHH002

to

To: FCC 47 CFR Part 15.247 & IC RSS-210

Test Report Serial No.: SNUS45-U4 Rev A

Note: As a result of an antenna change this report contains spot check data only.

This report supersedes: NONE

Applicant: Sensus, Inc
8609 Six Forks Rd, 3rd Floor
Raleigh
NC 27615, USA

Product Function: Faulted Circuit Indicator Receiver

Copy No: pdf Issue Date: 22nd January 2015

This Test Report is Issued Under the Authority of;

MiCOM Labs, Inc.
575 Boulder Court
Pleasanton, CA 94566 USA
Phone: +1 (925) 462-0304
Fax: +1 (925) 462-0306
www.micomlabs.com

A2LA ACCREDITED
TESTING CERT #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory

This page has been left intentionally blank

TABLE OF CONTENTS

ACCREDITATION, LISTINGS & RECOGNITION

ACCREDITATION

MiCOM Labs, Inc. an accredited laboratory complies with the international standard BS EN ISO/IEC 17025. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-01.pdf

American Association for Laboratory Accreditation

Accredited Laboratory

A2LA has accredited

MICOM LABS

Pleasanton, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 28th day of February 2014.

President & CEO
For the Accreditation Council
Certificate Number 2381.01
Valid to November 30, 2015

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

RECOGNITION

MiCOM Labs, Inc has widely recognized Electrical testing capabilities. Our international recognition includes Conformity Assessment Body designation by APEC MRA** countries. Our test reports are widely accepted for global type approvals.

Country	Recognition Body	Status	Phase	Identification No.
USA	Federal Communications Commission (FCC)	TCB	-	Listing #: 102167
Canada	Industry Canada (IC)	FCB	APEC MRA 2	Listing #: 4143A
Japan	MIC	CAB	APEC MRA 2	210
	VCCI	--	--	No. 2959
Europe	European Commission	NB	EU MRA	NB 2280
Australia	Australian Communications and Media Authority (ACMA)	CAB	APEC MRA 1	US0159
Hong Kong	Office of the Telecommunication Authority (OFTA)	CAB	APEC MRA 1	
Korea	Ministry of Information and Communication Radio Research Laboratory (RRL)	CAB	APEC MRA 1	
Singapore	Infocomm Development Authority (IDA)	CAB	APEC MRA 1	
Taiwan	National Communications Commission (NCC) Bureau of Standards, Metrology and Inspection (BSMI)	CAB	APEC MRA 1	
Vietnam	Ministry of Communication (MIC)	CAB	APEC MRA 1	

**APEC MRA – Asia Pacific Economic Community Mutual Recognition Agreement.
Is a recognition agreement under which test lab is accredited to regulatory standards of the APEC member countries.
Phase I - recognition for product testing
Phase II – recognition for both product testing and certification
N/A – Not Applicable

**EU MRA – European Union Mutual Recognition Agreement.
Is a recognition agreement under which test lab is accredited to regulatory standards of the EU member countries.

**NB – Notified Body

PRODUCT CERTIFICATION

MiCOM Labs, Inc. is an accredited Product Certification Body per the international standard EN ISO/IEC 17065. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.02. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-02.pdf

United States of America – Telecommunication Certification Body (TCB)
TCB Identifier – US0159

Industry Canada – Certification Body
CAB Identifier – US0159

Europe – Notified Body
Notified Body Identifier - 2280

Japan – Recognized Certification Body (RCB)
RCB Identifier - 210

DOCUMENT HISTORY

Document History		
Revision	**Date**	**Comments**
Draft		
Rev A	22nd January 2015	
Report initially issued as SNUS11-U2		
Rev A	20th January 2011	Initial release.

1. TEST RESULT CERTIFICATE

Applicant:	Sensus, Inc 8609 Six Forks Rd, 3rd Floor Raleigh NC 27615, USA	Tested By:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California, 94566, USA
EUT:	Horstmann RF Module FCC ID: YQVHHH002	Tel:	+1 925 462 0304
Model:	NAVI-FLX9-FRP	Fax:	+1 925 462 0306
S/N:	50403545		
Test Date(s):	14th January 2015	Website:	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC 47 CFR Part 15.247 & IC RSS-210	EQUIPMENT COMPLIES

MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Notes:

1. This document reports conditions under which testing was conducted and the results of testing performed.
2. Details of test methods used have been recorded and kept on file by the laboratory.
3. Test results apply only to the item(s) tested.

Approved & Released for MiCOM Labs, Inc. by:

A2LA ACCREDITED
TESTING CERT #2381.01

Graeme Grieve
Quality Manager MiCOM Labs,

Gordon Hurst
President & CEO MiCOM Labs, Inc.

2. REFERENCES AND MEASUREMENT UNCERTAINTY

2.1. Normative References

Ref.	Publication	Year	Title
(i)	FCC 47 CFR Part 15.247	2012	Code of Federal Regulations
(ii)	FCC 06-96	June 2006	Memorandum Opinion and Order
(iii)	Industry Canada RSS-210	2010	Low Power License-Exempt Radiocommunication Devices (All Frequency Bands): Category 1 Equipment
(iv)	Industry Canada RSS-Gen	2010	General Requirements and Information for the Certification of Radiocommunication Equipment
(v)	ANSI C63.4	2009	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
(vi)	CISPR 22/ EN 55022	2008 2006+A1:2007	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
(vii)	M 3003	Edition 1 Dec. 1997	Expression of Uncertainty and Confidence in Measurements
(viii)	LAB34	Edition 1 Aug 2002	The expression of uncertainty in EMC Testing
(ix)	ETSI TR 100 028	2001	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
(x)	A2LA	9th June 2010	Reference to A2LA Accreditation Status – A2LA Advertising Policy
(xi)	FCC Public Notice – DA 02-2138	2002	Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices

2.2. Test and Uncertainty Procedures

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, listed in the Normative References section of this report.

Measurement uncertainty figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2.

Measurement uncertainties stated are based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 % in accordance with UKAS document M 3003 listed in the Normative References section of this report.

3. PRODUCT DETAILS AND TEST CONFIGURATIONS

3.1. Technical Details

Details	Description
Purpose:	Test of the Sensus Navicomm Rev. A Smart Controller V4.4.00 with Horstmann RF Module in the frequency ranges 2400-2483.5 MHz to FCC Part 15.247 and Industry Canada RSS-210 regulations.
Applicant:	Sensus, Inc 8609 Six Forks Rd, 3rd Floor Raleigh NC 27615, USA
Manufacturer:	As applicant
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton, California 94566 USA
Test report reference number:	SNUS45-U4 Rev A
Standard(s) applied:	FCC 47 CFR Part 15.247 & IC RSS-210
Date EUT received:	7th December 2014
Dates of test (from - to):	14th January 2015
No of Units Tested:	One
Type of Equipment:	Faulted Circuit Indicator Receiver
Applicants Trade Name:	Sensus Navicomm Rev. A Smart Controller V4.4.00
Model(s):	NAVI-FLX9-FRP
Software Release	4.4 00
Location for use:	Outdoor
Declared Frequency Range(s):	2,400 to 2483.5 MHz
Rated Input Voltage and Current AC:	120VAC +/-10% (108VAC-132VAC), 0.1A
Operating Frequency:	60Hz +/- 0.5%
Rated Input Voltage and Current DC:	No DC option for normal operation
Operating Temperature Range ºC:	-30C to +70C
Long Term Frequency Stability:	20 p.p.m.
Equipment Dimensions:	6" x 4" x 8"
Weight:	5lbs
Primary function of equipment:	Remote telemetry device

3.2. Scope of Test Program

As a result of an antenna change within the Sensus Navicomm Rev. A Smart Controller V4.4.00, the test program was to determine whether the EUT continued to be compliant with the standard FCC CFR 47 Subpart 15, 15.247 and RSS-210 Annex 8. A subset of testing was performed and results compared with previous data. The antenna change was from an internal antenna for the 2.4 GHz transmitter to an external monopole: Taoglas GW.71.5153

Sensus Navicomm Rev. A Smart Controller V4.4.00

3.3. Equipment Model(s) and Serial Number(s)

Type (EUT/ Support)	Equipment Description (Including Brand Name)	Mfr	Model No.	Serial No.
EUT	Remote Faulted Circuit Indicator	Sensus	Navicomm	50403545
Radio Module	Horstmann 2.4 GHz Smart Controller FCC ID: YQVHHH002	Horstmann	AN-0409/050710	10001
Radio Module	Sensus FlexNet 900 MHz remote telemetry radio FCC ID: SDBDAFLX	Sensus	DAHAN01 Rev2.02	N/A

3.4. Antenna Details

Antenna Type:	Manufacturer	Model	Gain (dBi)	Frequency Range (MHz)
GSM/GPRS Antenna	Laird	TRA821/18503P	3	821/1850
900 Antenna	Laird	TRAB8903NP	3	821/1850
2.4GHz Antenna	Taoglas	GW.71.5153	3.3	2400-2483.5

3.5. Cabling and I/O Ports

4. The following is a description of the cable and input, output ports available on the EUT.
5.

Type of I/O Ports	Description	Screened (y/n)	Description	Qty	Tested
AC Mains	AC Mains	N	< 1 meter	1	Y
Battery Backup	Battery Backup	N	< 1 meter	1	Y
N-Type	Antenna Port	Y	< 1 meter	1	N
USB type B	Factory Config Port	Y	< 1 meter	1	N

5.1. Equipment Modifications

The following modifications were required to bring the equipment into compliance:

1. NONE

5.2. Deviations from the Test Standard

The following deviations from the test standard were required in order to complete the test program:

1. NONE

5.3. Subcontracted Testing or Third Party Data

1. NONE

6. TEST SUMMARY

List of Measurements

The following table represents the list of measurements required under the **FCC CFR47 Part 15.247** and **Industry Canada RSS-210**.and **Industry Canada RSS-Gen.**

Standard Section(s)	Test Description	Condition	Result	Test Report Section
(d), 15.205, 15.209 **2.2** **RSS-Gen §4.7**	Transmitter Radiated Spurious Emissions	Radiated	Compliant	7.1.1

7. TEST RESULTS

7.1.1. Radiated Emissions

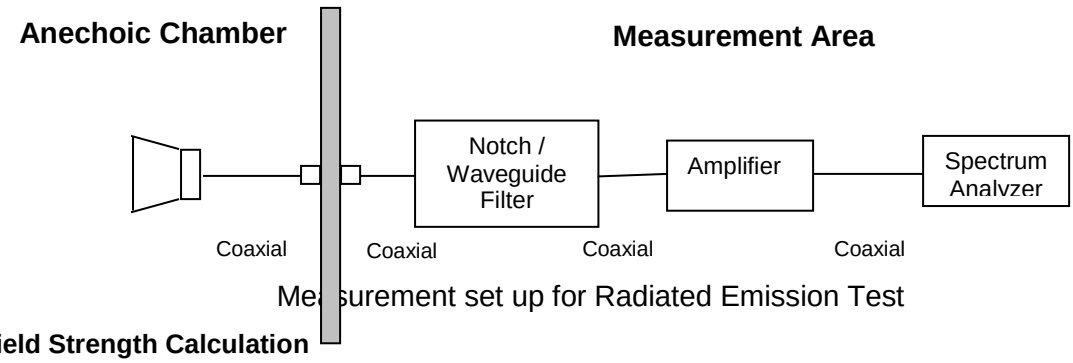
7.1.1.1. Transmitter Radiated Spurious Emissions (above 1 GHz); Peak Field Strength Measurements; and Radiated Band Edge Measurements – Restricted Bands

Test Procedure

Radiated emissions above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter and waveguide filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.

All measurements on any frequency or frequencies over 1 MHz are based on the use of measurement instrumentation employing an average detector function. All measurements above 1 GHz were performed using a minimum resolution bandwidth of 1 MHz.

Test Measurement Set up



Measurement set up for Radiated Emission Test

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR - FO

where: FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss or Waveguide Loss

For example:
Given receiver input reading of 51.5 dBμV; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3 dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength (dBμV/m);

$$E = 1000000 \times \sqrt{30P} / 3 \ \mu V/m$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

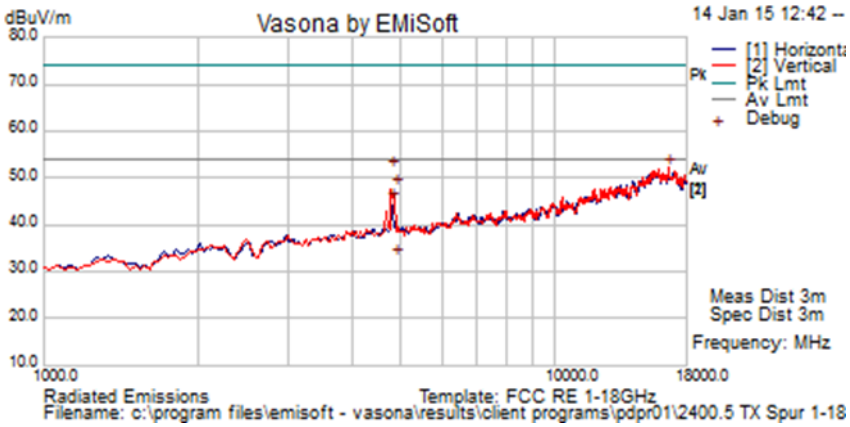
Note: The data in this Section identifies that the EUT is in compliance with the -27dBm/MHz EIRP limit (68.23 dBμV/m) for out of band emissions. All peak emissions are less than 68.23 dB μV/m.

Measurement Results Transmitter Radiated Spurious Emissions above 1 GHz

Ambient conditions.
Temperature: 17 to 23°C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

TX Spur 2400.5

Test Freq.	2400.5 MHz (ch 0)	**Engineer**	JMH
Variant	802.11b; 1 Mbs	**Temp (ºC)**	16
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	42
Power Setting	Max	**Press. (mBars)**	1010
Antenna	monopole	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			



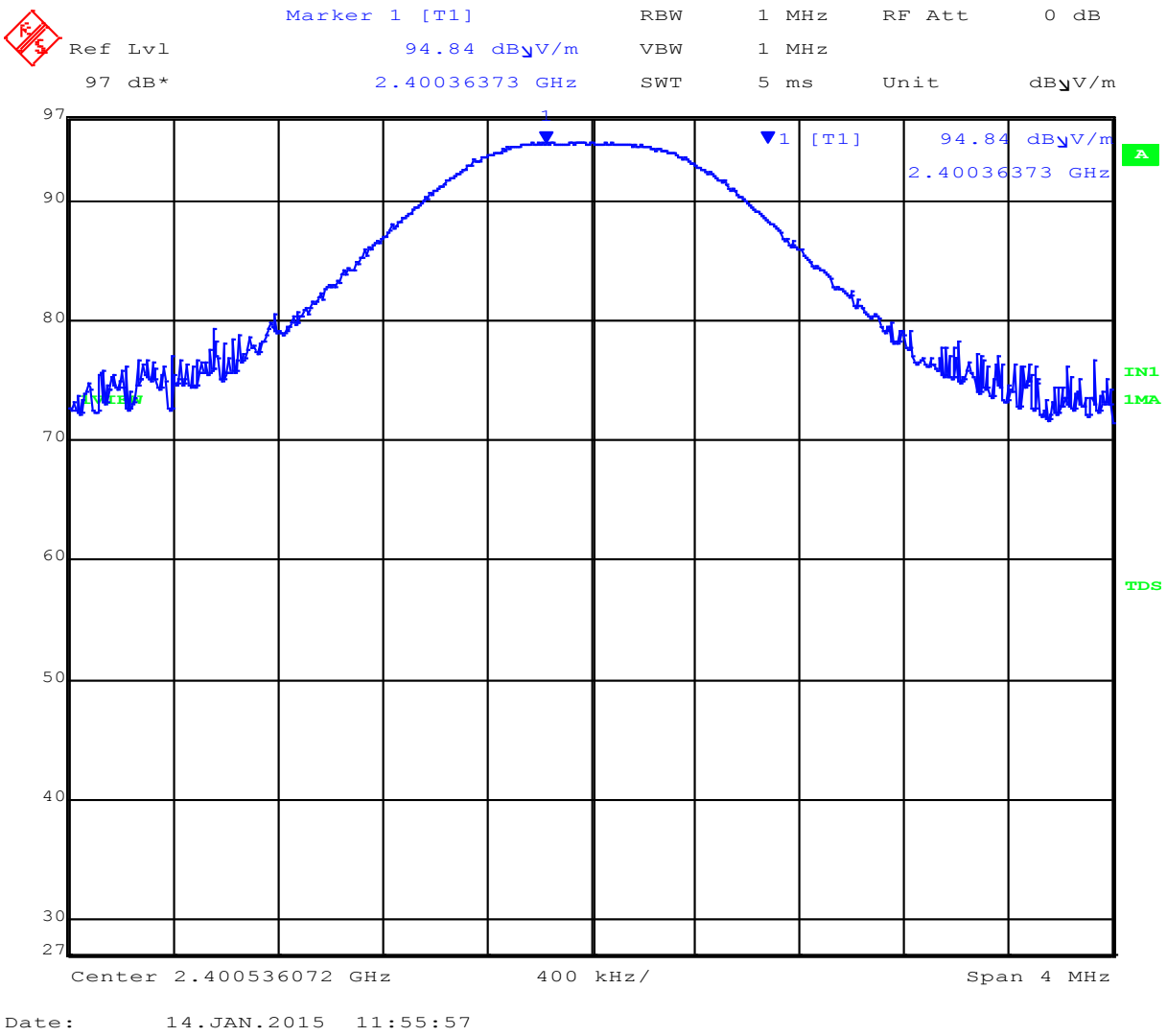
Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4800.666	50.3	5.7	-11.1	44.8	Average Max	V	111	273	54.0	-9.2	Pass	RB
4800.666	57.3	5.7	-11.1	51.8	Peak Max	V	111	273	74.0	-22.2	Pass	RB
4872.440	38.2	5.7	-11.2	32.7	Average Max	V	201	273	54	-21.3	Pass	RB
4872.440	53.3	5.7	-11.2	47.7	Peak Max	V	201	273	74	-26.3	Pass	RB
16637.275	38.7	12.0	1.6	52.2	Peak [Scan]	V	150	0	54	-1.8	Pass	Noise

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

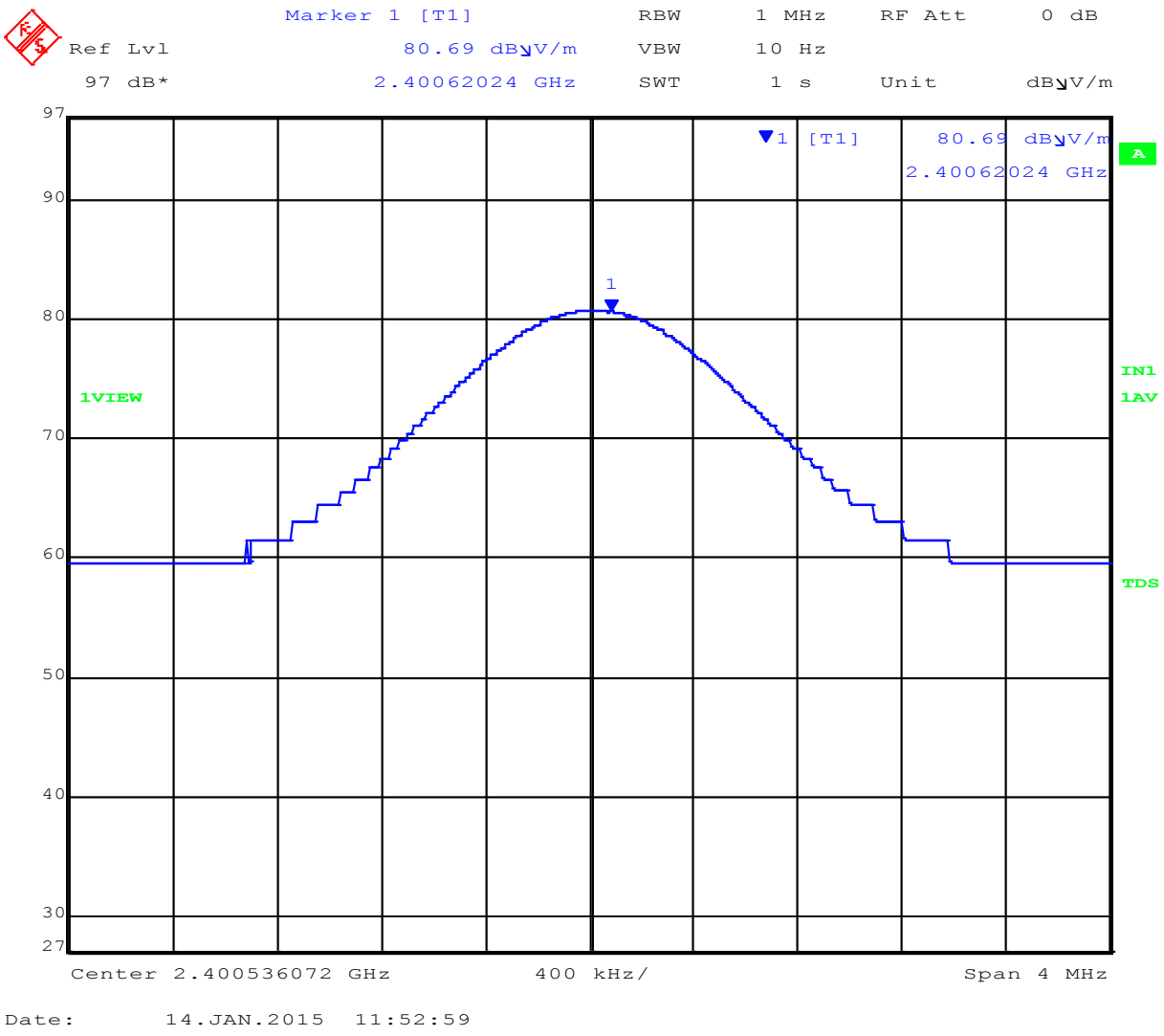
Radiated Band-Edge

2400.5 MHz using Delta Marker Method:
Peak of Fundamental 2400.5 MHz:



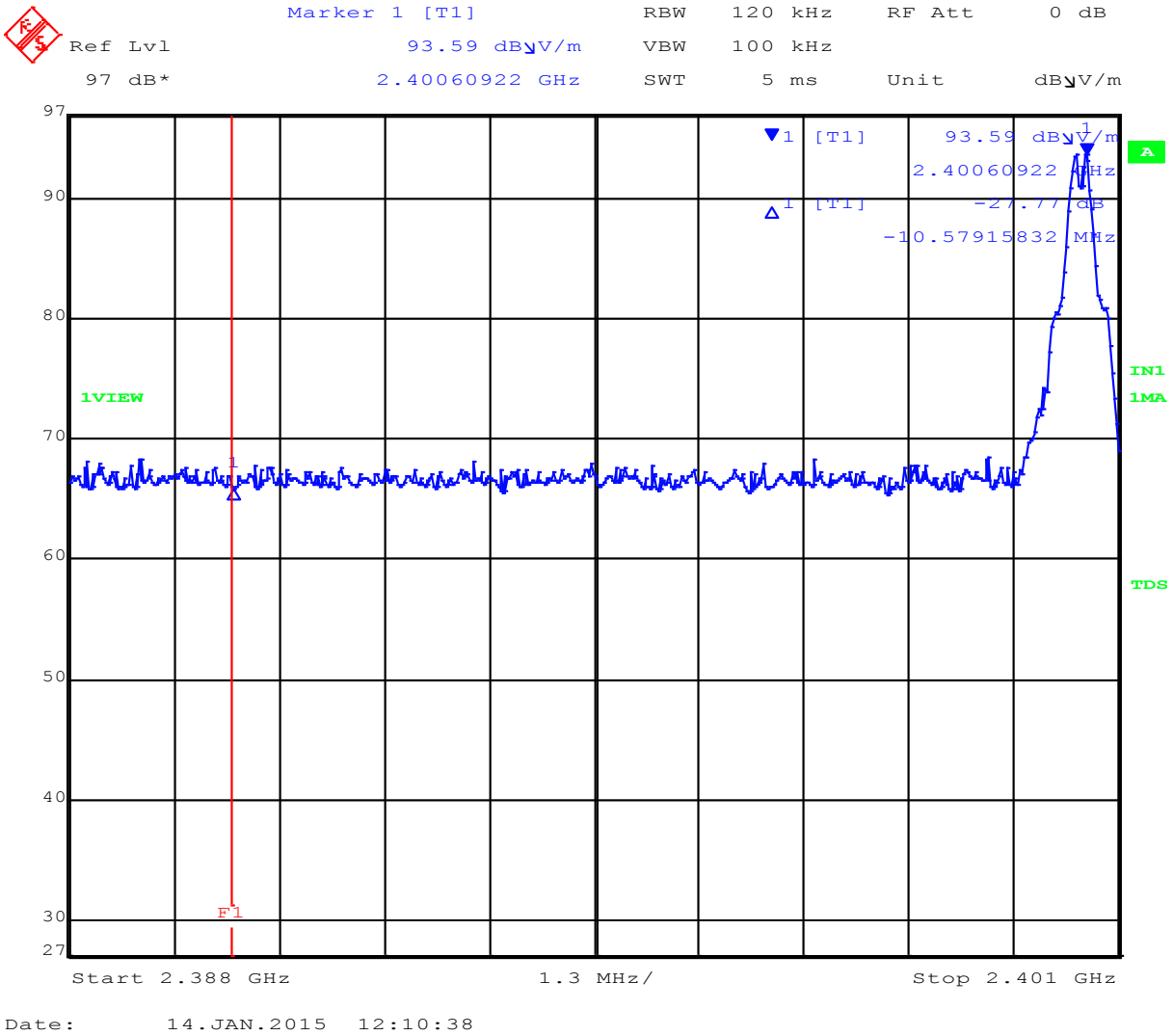
Peak: 94.84 dBµV/m

AVG of Fundamental 2400.5 MHz:



Average: 80.69 dBµV/m

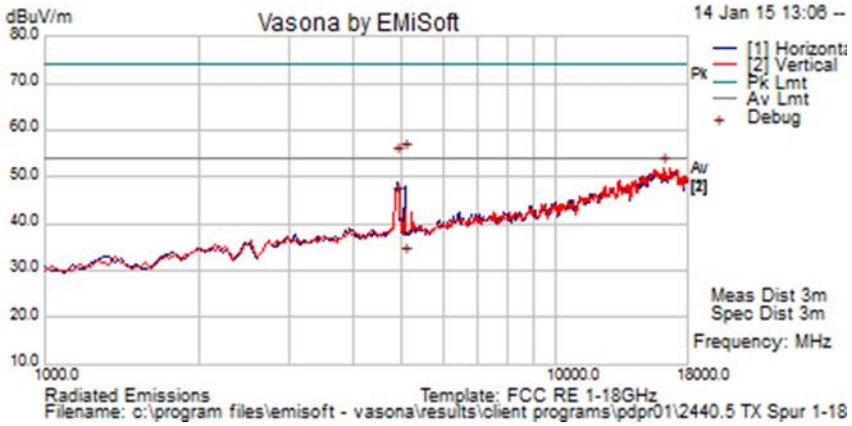
Marker Delta for 2400.5 MHz:



Transmitter has 350 mS burst pulse train so per FCC Part 15.35, direct measurement of Fundamental Absolute Average Voltage applies, no duty cycle correction factor.
Peak of Fundamental = 94.84 dBuV/m Average of Fundamental = 80.69 dBuV/m
Delta Marker: - 27.77 dB
Calculation of Peak Band Edge = 94.84 – 27.77 = 67.07 dBuV/m , margin to 74 dBuV/m = - 6.93
Calculation of AVG Band Edge = 80.69 – 27.77 = 52,92 dBuV/m , margin to 54 dBuV/m = - 1.08

TX Spur 2440.5

Test Freq.	2440.5 MHz (ch 80)	**Engineer**	JMH
Variant	MSK	**Temp (ºC)**	16
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	42
Power Setting	Max	**Press. (mBars)**	1010
Antenna	monopole	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			



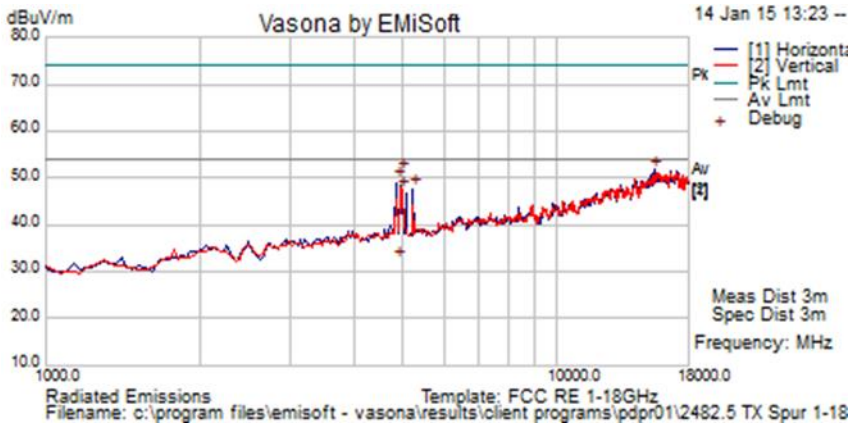
Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4880.970	51.3	5.7	-11.3	45.7	Average Max	H	173	339	54.0	-8.3	Pass	RB
4880.97	59.9	5.7	-11.3	54.3	Peak Max	H	173	339	74.0	-19.7	Pass	RB
5060.259	38.4	5.8	-11.6	32.6	Average Max	H	100	317	54	-21.4	Pass	RB
5060.259	60.7	5.8	-11.6	54.9	Peak Max	H	100	317	74	-19.1	Pass	RB
16194.389	38.9	12.0	1.1	52.0	Peak [Scan]	V	200	0	54	-2.0	Pass	Noise

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

TX Spur 2482.5

Test Freq.	2482.5 MHz (ch 164)	**Engineer**	JMH
Variant	MSK	**Temp (ºC)**	16
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	42
Power Setting	Max	**Press. (mBars)**	1010
Antenna	monopole	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			



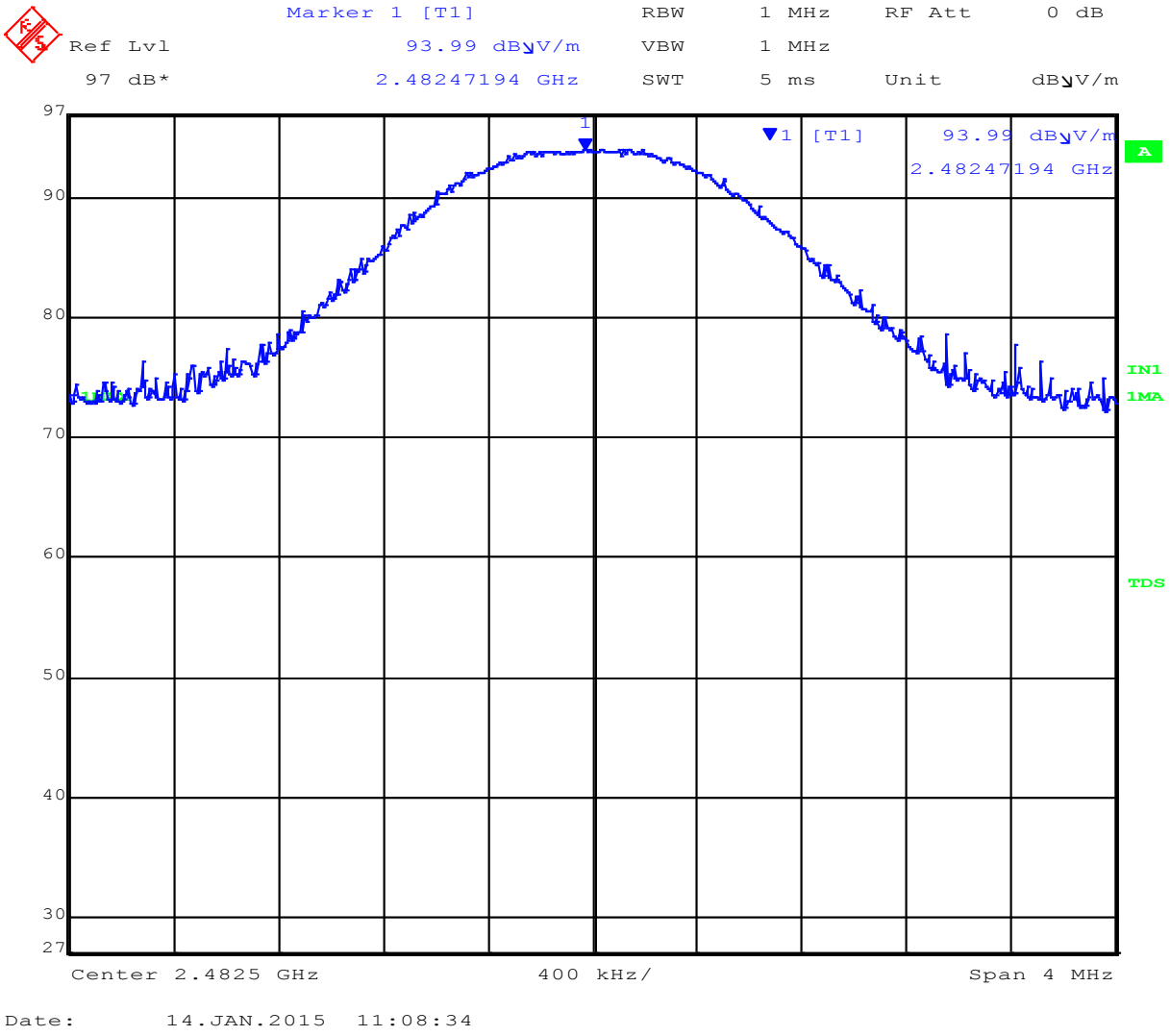
Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4871.374	38.1	5.7	-11.2	32.6	Average Max	H	150	268	54.0	-21.4	Pass	RB
4871.374	55.0	5.7	-11.2	49.4	Peak Max	H	150	268	74.0	-24.6	Pass	RB
4964.679	53.1	5.8	-11.5	47.4	Average Max	H	139	350	54	-6.7	Pass	RB
4964.679	57.1	5.8	-11.5	51.4	Peak Max	H	139	350	74	-22.6	Pass	RB
15478.958	41.1	11.4	-0.9	51.7	Peak [Scan]	H	100	0	54	-2.4	Pass	Noise
5224.638	53.2	5.9	-11.4	47.7	Peak [Scan]	H	98					NRB

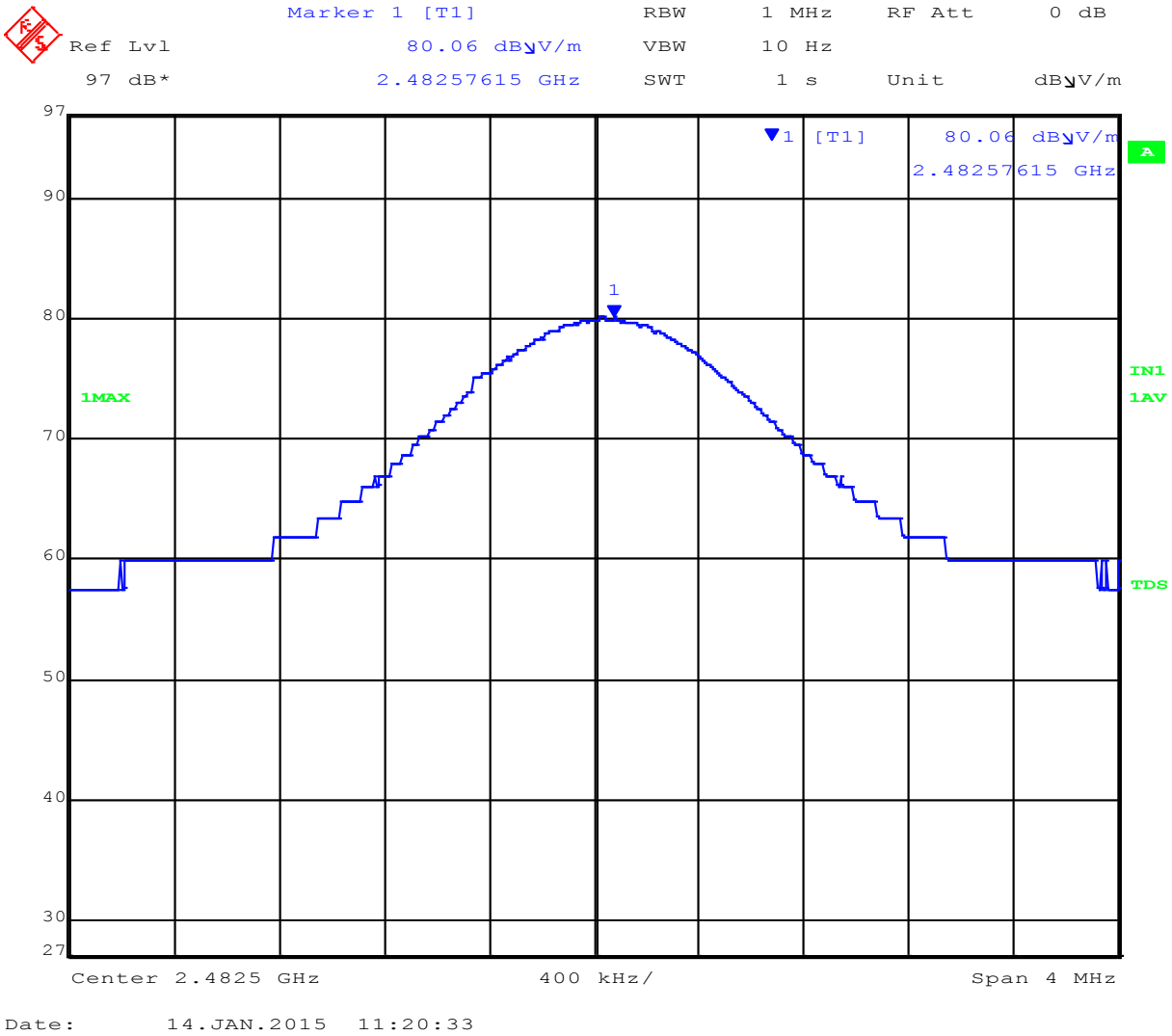
Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Radiated Band-Edge

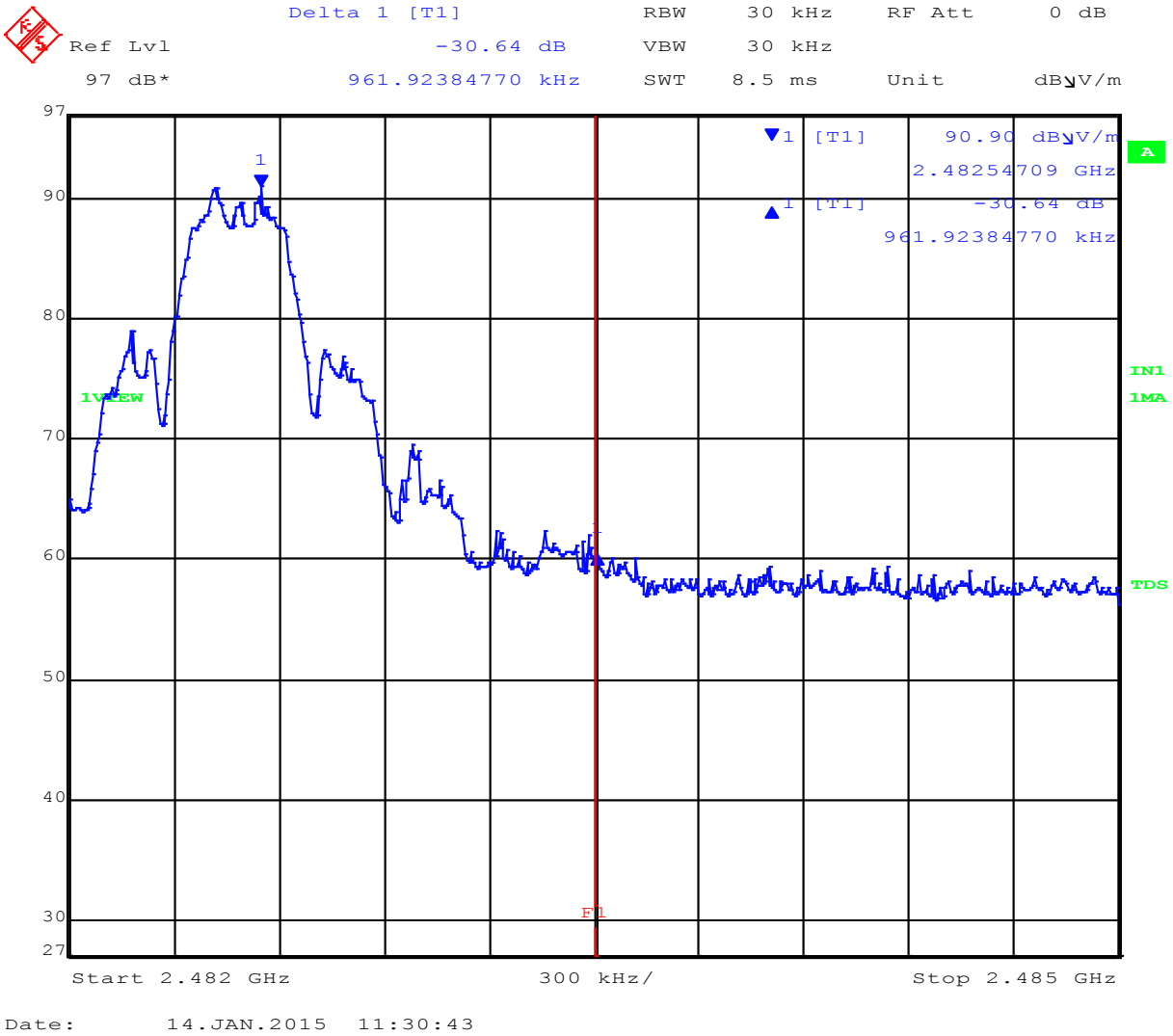
2482.5 MHz using Delta Marker Method:
Peak of Fundamental 2482.5 MHz:



AVG of Fundamental 2482.5 MHz:



Marker Delta for 2482.5 MHz:



Transmitter has 350 mS burst pulse train so per FCC Part 15.35, direct measurement of Fundamental Absolute Average Voltage applies, no duty cycle correction factor.
Peak of Fundamental = 93.99 dBuV/m Average of Fundamental = 80.06 dBuV/m
Delta Marker: - 30.64 dB
Calculation of Peak Band Edge = 93.99 – 30.64 = 63.35 dBuV/m , margin to 74 dBuV/m = - 10.65
Calculation of AVG Band Edge = 80.06 – 27.77 = 30.64 dBuV/m , margin to 49.42 dBuV/m = - 4.58

Specification

Limits

§15.205 (a) Except as shown in paragraph (d) of 15.205 (a), only spurious emissions are permitted in any of the frequency bands listed.

§15.205 (a) Except as shown in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

RSS-Gen §4.7 The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate of carrier frequency), or from 30 MHz , whichever is the lowest frequency, to the 5th harmonic of the highest frequency generated without exceeding 40 GHz.

§15.209 (a) Limit Matrix

Frequency(MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Laboratory Measurement Uncertainty for Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of Radiated Emissions'	0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312

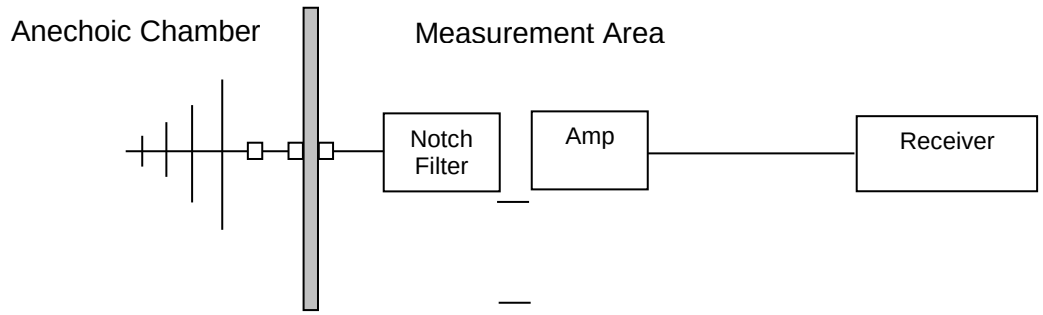
7.1.1.2. Radiated Spurious Emissions (30M-1 GHz)

FCC, Part 15 Subpart C §15.205(a); §15.209(a)
Industry Canada RSS-210 §2.2

Test Procedure

Preliminary radiated emissions are measured in the anechoic chamber at a 10-meter distance on every azimuth in both horizontal and vertical polarity. The emissions are recorded with a spectrum analyzer in peak hold mode. Emissions closest to the limits are measured in the quasi-peak mode with the tuned receiver using a bandwidth of 120 kHz. Only the highest emissions relative to the limit are listed. The anechoic chamber test set-up is identified in Section 6 Test Set-Up Photographs.

Test Measurement Set up



Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. In this test facility, the Antenna Factor, Cable Loss, and Amplifier Gains are loaded into the Rohde & Schwarz Receiver and the corrected field strength can be read directly on the receiver.

$$FS = R + AF + CORR$$

where:

FS = Field Strength
R = Measured Receiver Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain

For example:
Given a Receiver input reading of 51.5dBμV; Antenna Factor of 8.5dB; Cable Loss of 1.3dB; Falloff Factor of 0dB, an Amplifier Gain of 26dB and Notch Filter Loss of 1dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

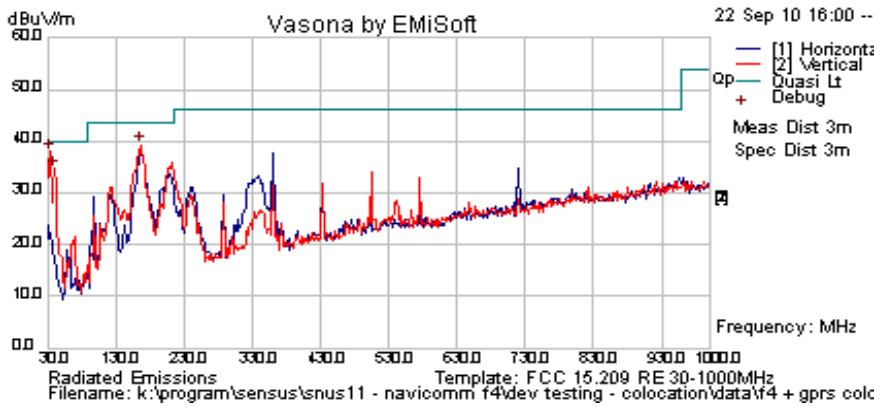
40 dBμV/m = 100μV/m
48 dBμV/m = 250μV/m

Measurement Results for Spurious Emissions (30 MHz – 1 GHz)

Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

Data from previous report, no changes to chassis or internal components:

Test Freq.	N/A	**Engineer**	SB
Variant	Digital Emissions	**Temp (ºC)**	25.5
Freq. Range	30 - 1000 MHz	**Rel. Hum.(%)**	34
Power Setting	120V AC 60 Hz	**Press. (mBars)**	1003
Antenna	Laird and Integral 2.4 GHz		
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
34.629	37.5	3.5	-13.1	27.9	Quasi Max	V	104	0	40	-12.1	Pass	
40.922	44.4	3.6	-17.6	30.4	Quasi Max	V	107	290	40	-9.6	Pass	
166.729	51.6	4.6	-18.8	37.3	Quasi Max	V	98	97	43.5	-6.2	Pass	
359.969	47.3	5.5	-15.1	37.6	Quasi Max	H	106	346	46	-8.4	Pass	
431.960	40.3	5.8	-13.8	32.2	Quasi Max	V	114	7	46	-13.8	Pass	
719.943	36.5	6.8	-9.5	33.8	Quasi Max	H	105	170	46	-12.2	Pass	

Legend: DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency
NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band

Specification

Limits

§15.205 (a) Except as shown in paragraph (d) of 15.205 (a), only spurious emissions are permitted in any of the frequency bands listed.

§15.205 (a) Except as shown in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

RSS-210 §2.2 refers to Section 2.7 Table 2 below;-

Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Laboratory Measurement Uncertainty for Radiated Emissions

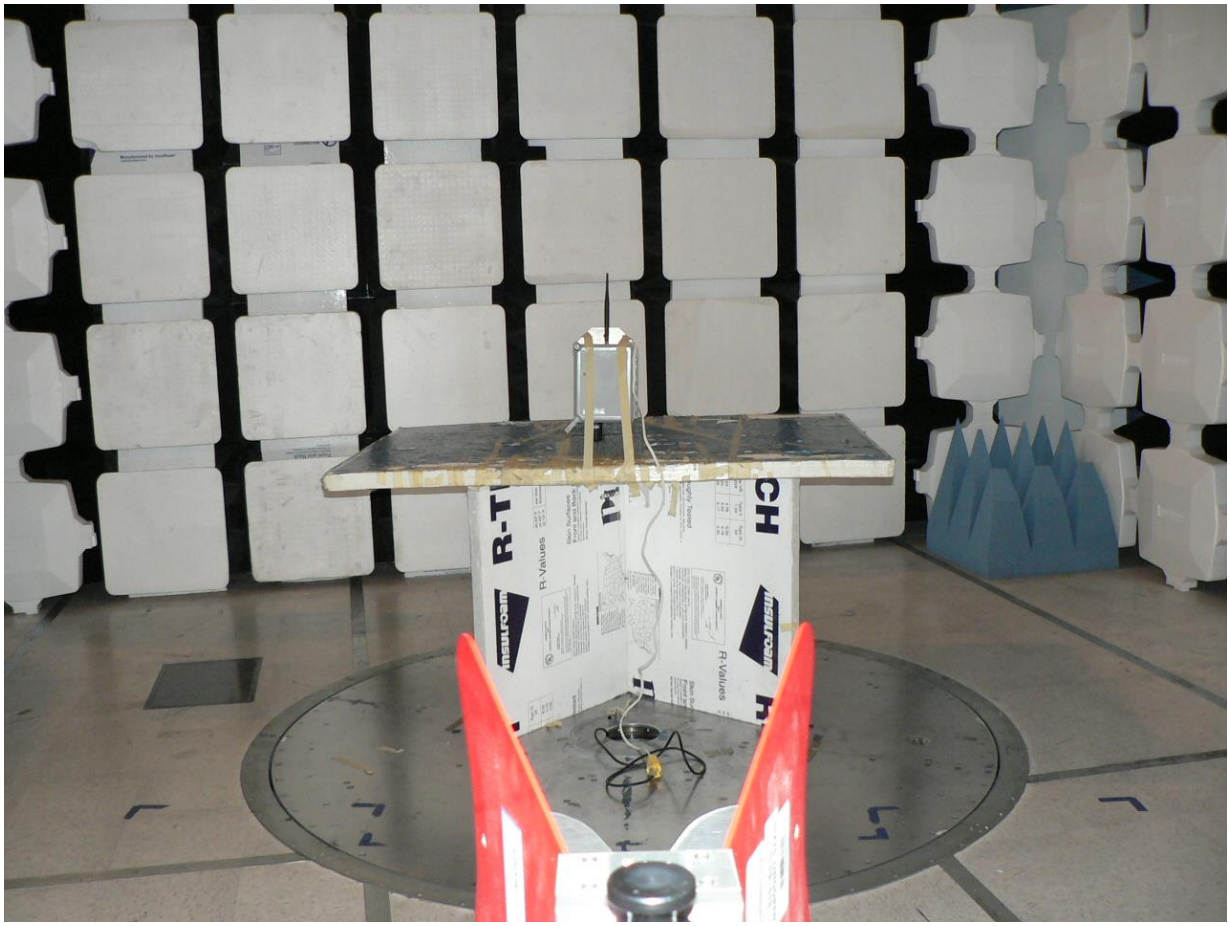
Measurement uncertainty	+5.6/ -4.5 dB

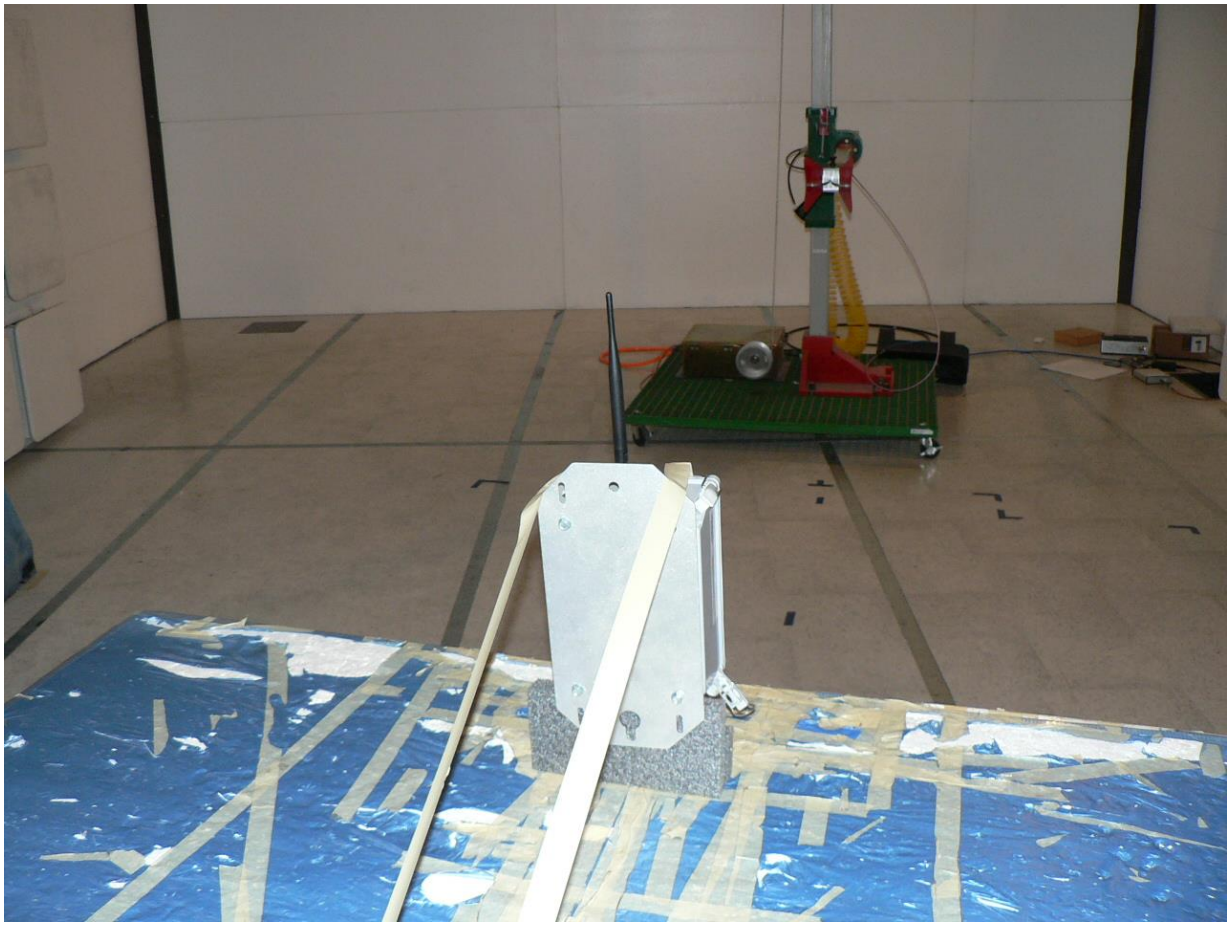
Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of Radiated Emissions'	0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312

8. PHOTOGRAPHS

8.1. Radiated Emissions > 1GHz





9. TEST EQUIPMENT DETAILS

Asset #	Instrument	Manufacturer	Part #	Serial #	Calibration Due Date
104	Antenna Horn 1-18GHz	Electro-Mechanics	3115	9205-3882	26 Jan '15
158	Barometer/ Thermometer	Control Co.	4196	E2846	6 Dec '15
287	EMI Receiver	Rhode & Schwarz	ESIB40	100201	31 Jul 15
307	BNC Cable	Megaphase	1689 1GVT4	15F50B002	N/A
310	SMA Cable	Micro-Coax	UFA210A-0-0787-3G03G0	209089-001	N/A
312	SMA Cable	Micro-Coax	UFA210A-1-1181-3G0300	209092-001	N/A
338	30 - 3000 MHz Antenna	Sunol	JB3	A052907	14 Aug '15
393	Low Pass Filter 1050MHz	Minicircuits	WLFX-1050		N/A
396	Notch Filter 2.4G	Microtronics	BRM50701		N/A
397	Preamp 10-2500 MHz	MiCOM Labs		0397	23 Oct '15
399	Horn Antenna 1-18G	ETS	3117	00154575	10 Oct '15
406	Preamp 1-18 GHz	MiCOM Labs		0406	30 May '15
411	Mast/Turntable Control	Sunol Sciences	SC98V	060199-1D	N/A
413	Mast Controller	Sunol Sciences	TWR95-4	030801-3	N/A
415	Turntable Controller	Sunol Sciences		0415	N/A
416	Gigabit Ethernet Filter	ETS	260366	0416	N/A
0502	EMC Test Software	EMISoft	Vasona	5.0051	N/A

575 Boulder Court
Pleasanton, California 94566, USA
Tel: 1.925.462.0304
Fax: 1.925.462.0306
www.micomlabs.com