



TEST REPORT

Report Number: 101369978MIN-001

Project Number: G101369978

Testing performed on the
RM25WM

FCC ID: LW2RM25WM

Industry Canada ID: 2731A-RM25WM

to

47 CFR Part 15. 247:2010

RSS- 210, Issue 8, 2010

RSS-Gen, Issue 3, 2010

47 CFR, Part 15:2010, §15.107 and §15.109, Class B / ICES-003, Issue 5:2012

For

Emerson Process Management

Test Performed by:
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Test Authorized by:
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Simon Khazon

Date: October 29, 2013

Reviewed by: Richard Blonigen
Richard Blonigen

Date: October 29, 2013

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TABLE OF CONTENTS

1.0 GENERAL DESCRIPTION.....3

1.1 Product Description; Test Facility.....4

1.3 Environmental conditions5

1.4 Measurement uncertainty.....6

1.5 Field Strength Calculation6

2.0 TEST SUMMARY.....7

3.0 TEST CONDITIONS AND RESULTS.....8

3.1 6dB Emission bandwidth (EBW) of the digital modulation8

3.1.1 Emission bandwidth (EBW) of the digital modulation12

3.2 Maximum peak output power16

3.3 Power spectral density20

3.4 Antenna conducted spurious emissions.....24

3.4.1 Antenna conducted band edge compliance34

3.5 Radiated spurious emissions37

3.6 RF Exposure Compliance66

3.7 Transmitter power line conducted emissions67

3.8 Receiver/digital device radiated emissions68

3.9 Digital device conducted emissions83

4.0 TEST EQUIPMENT.....84

1.0 GENERAL DESCRIPTION

Model:	RM25WM
Type of EUT:	2.4GHz Wireless Radio Module
FCC ID:	LW2RM25WM
Industry Canada ID:	2731A-RM25WM
Related Submittal(s) Grants:	None
Company:	Emerson Process Management
Customer:	Mr. Merritt Pulkrabek
Address:	8200 Market Blvd. Chanhassen, MN 55317 USA
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Test Standards:	☒ 47 CFR, Part 15:2010, §15.247 ☒ RSS-210, Issue 8, 20010 ☒ RSS-Gen, Issue 3, 2010 ☒ 47 CFR, Part 15:2010, §15.107 and §15.109, Class B ☒ ICES-003, Issue 5:2012 ☐ Other
Type of radio:	☒ Stand -alone ☒ Module ☐ Hybrid
Date Sample Submitted:	October 17, 2013
Test Work Started:	October 17, 2013
Test Work Completed:	October 23, 2013
Test Sample Conditions:	☐ Damaged ☐ Poor (Usable) ☒ Good



1.1 Product Description; Test Facility

Product Description:	2.4GHz Transceiver Module
Transmitter Type:	☐ FHSS ☒ Digital Modulation ☐ WiFi ☐ Blue Tooth
Operating Frequency Range(s):	From 2400 to 2483.5 MHz
Number of Channels:	15 (channels 0 to 14)
Modulation:	QPSK
Emission Designator:	1M49G7D
Antenna(s) Info:	Antenna 1. Omni directional vertically polarized dipole Gain: 2 dBi Antenna 2. Omni directional vertically polarized dipole Gain: 8 dBi
Power settings:	10 dBm
Antenna Installation:	☐ User ☒ Professional ☒ Factory
Transmitter power configuration:	☒ Internal battery ☐ External power source ☐ 120VAC ☐ 230VAC ☐ 400VAC ☒ 7.2 VDC ☐ Other: Amp. ☐ 50Hz ☐ 60Hz
Special Test Arrangement:	As a hand-held device the EUT was rotated through three orthogonal axes to determine and tested with the maximum emissions
Test Facility Accreditation:	A2LA (Certificate No. 1427.01)
Test Methodology:	Measurements performed according to the procedures in ANSI C63.10-2009 and FCC 558074 D01 DTS Measurement Guidance

1.2 EUT Configuration

The equipment under test was operated during the measurement under the following conditions:

- ☐ - Standby
- ☒ - Continuous transmissions (modulated signal)
- ☐ - Continuous transmissions (un-modulated signal)
- ☒ - Continuous receiving
- ☐ - Test program (customer specific)
- ☐ -

Operating modes of the EUT:

No.	Description
1	Test was performed at low channel, middle channel, and upper channel
2	

Cables:

No.	Type	Length	Designation	Note
1				
2				

Support equipment/Services:

No.	Item	Description
1	Laptop PC	Interface PCB
2	Viator HART interface	USB HART interface to control EUT

1.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

☐ Normal

Temperature:	+15 to +35 ° C
Humidity:	20-75 %
Atmospheric pressure:	86-106 kPa

☐ Extreme

☐ Temperature:	-20 to +50 ° C
☐ Supply voltage:	85% to +115%

1.4 Measurement uncertainty

The expanded uncertainty ($k = 2$) for radiated measurements has been determined to be:

± 4 dB at 10m and ± 5.4 dB at 3m

The expanded uncertainty ($k = 2$) for conducted measurements at antenna terminal has been determined to be:

± 1.0 dB

The expanded uncertainty ($k = 2$) for line conducted measurements has been determined to be:

± 2.6 dB

1.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured emissions reading on the EMI Receiver.

The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where: FS = Field Strength in dB(μ V/m)

RA = Receiver Amplitude in dB(μ V)

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB(m^{-1})

AG = Amplifier Gain in dB

Assume a receiver reading of 48.1 dB(μ V) is obtained. The antenna factor of 7.4 dB(m^{-1}) and cable factor of 1.6 dB is added and amplifier gain of 16.0 dB is subtracted giving field strength of 41.1 dB(μ V/m).

$$RA = 48.1 \text{ dB}(\mu\text{V})$$

$$AF = 7.4 \text{ dB}(m^{-1})$$

$$CF = 1.6 \text{ dB}$$

$$AG = 16.0 \text{ dB}$$

$$FS = RA + AF + CF - AG$$

$$FS = 48.1 + 7.4 + 1.6 - 16.0$$

$$FS = 41.1 \text{ dB}(\mu\text{V}/m)$$

2.0 TEST SUMMARY

Referring to the performance criteria and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards.

TEST SPECIFICATION	TEST PARAMETERS	RESULT
15.247(a) / RSS-210 A8.2	6dB emissions bandwidth of the digital modulation	Pass
15.247(b), (c) / RSS-210 A8.4	Maximum peak output power	Pass
15.247(e) / RSS-210 A8.2	Power spectral density	Pass
15.247(d) / RSS-210 A8.5	Antenna conducted spurious emissions	Pass
15.247(d) / RSS-210 A8.5	Radiated spurious emissions	Pass
15.247(i) / RSS- Gen 5.5	RF Exposure Compliance	Pass
15.207 / RSS-Gen 7.2.2	Transmitter Power Line conducted emissions	N/A
15.109 / ICES-003	Receiver/digital device radiated emissions	Pass
15.107 / ICES-003	Digital device conducted emissions	N/A

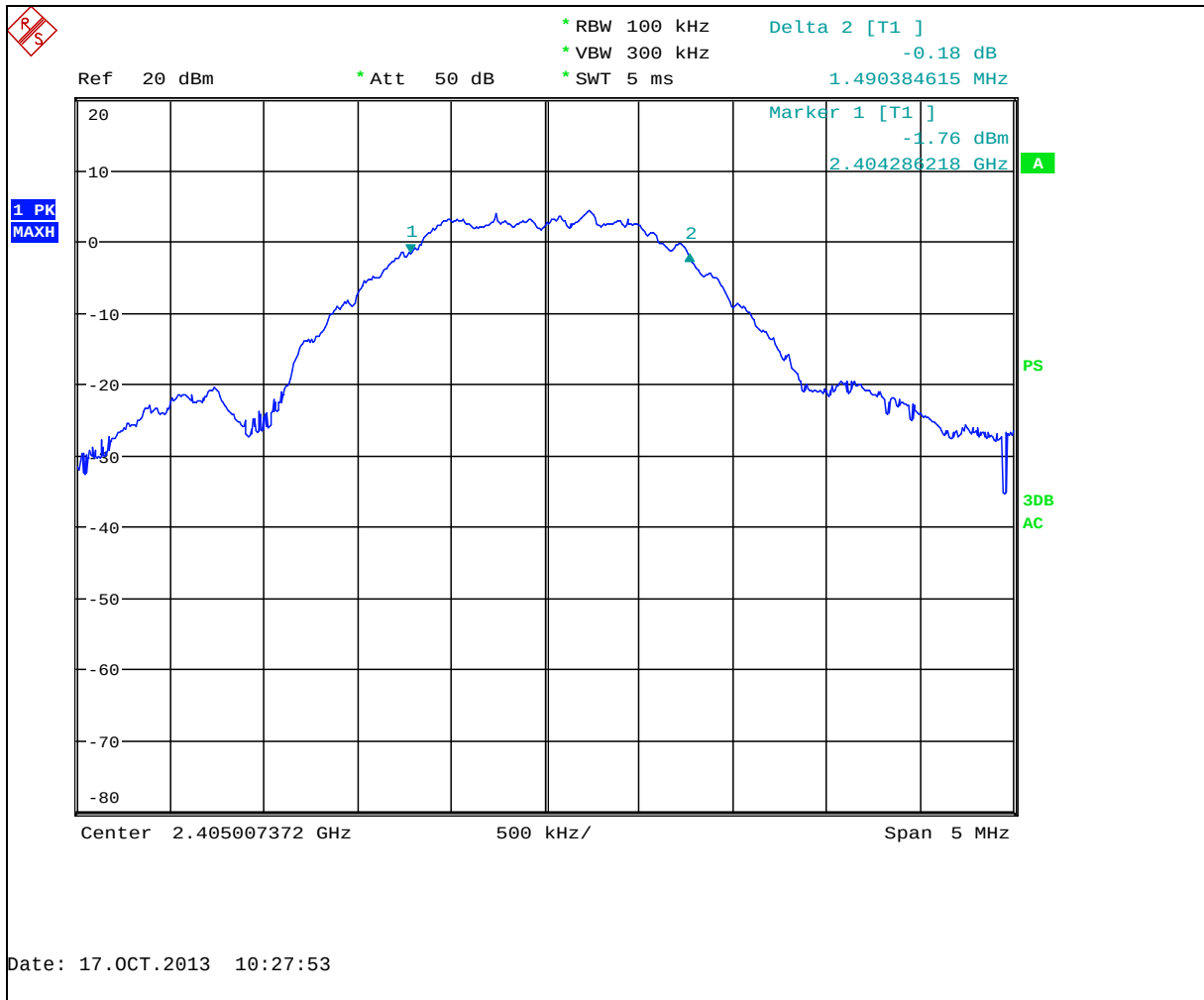


3.0 TEST CONDITIONS AND RESULTS

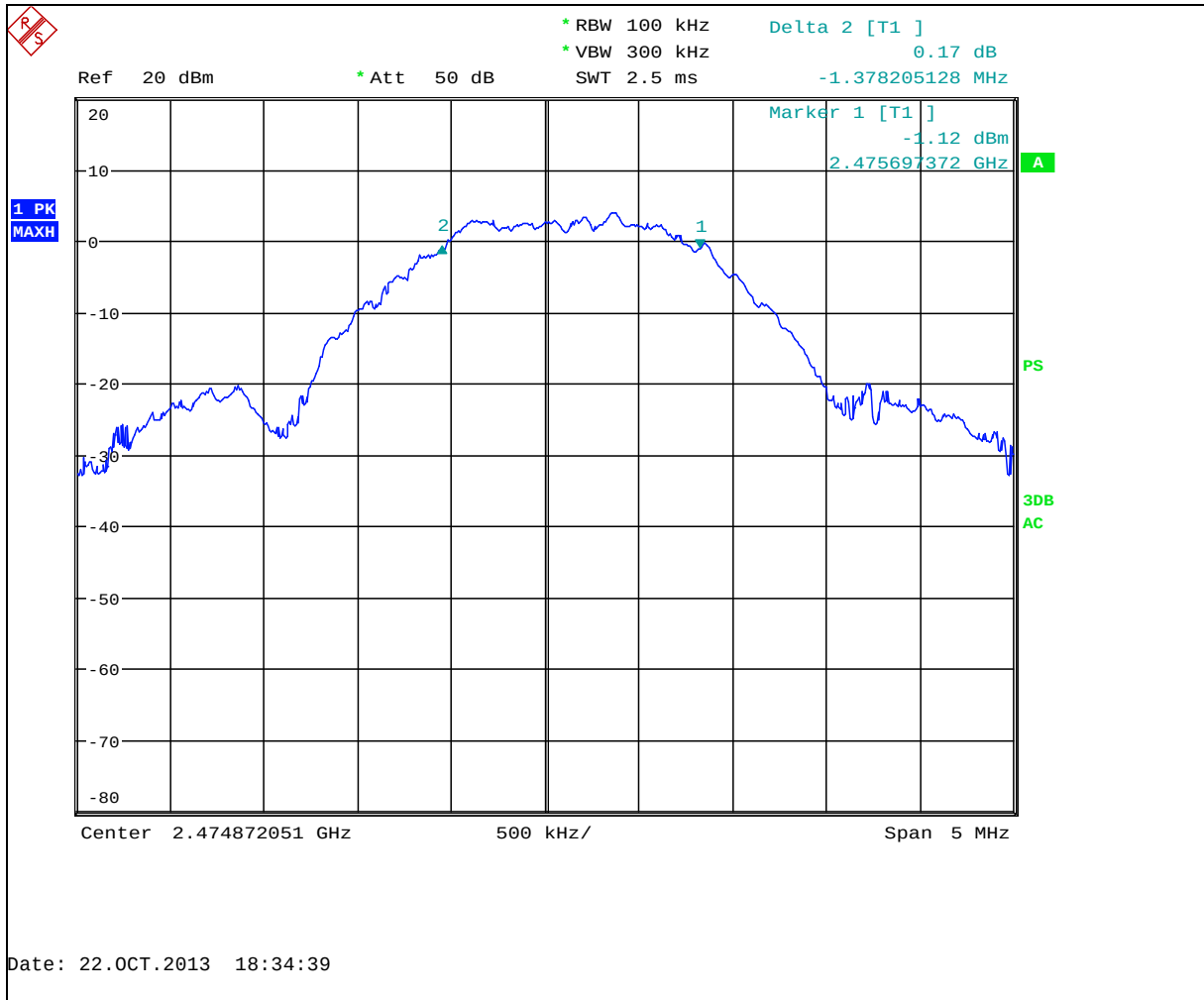
3.1 6dB Emission bandwidth (EBW) of the digital modulation

Low Frequency Channel kHz	Middle Frequency Channel kHz	Upper Frequency Channel kHz	Minimum Bandwidth kHz	Result
1490	1378	1490	500	Pass
RBW: VBW:	☒ 100kHz ☒ 300kHz			

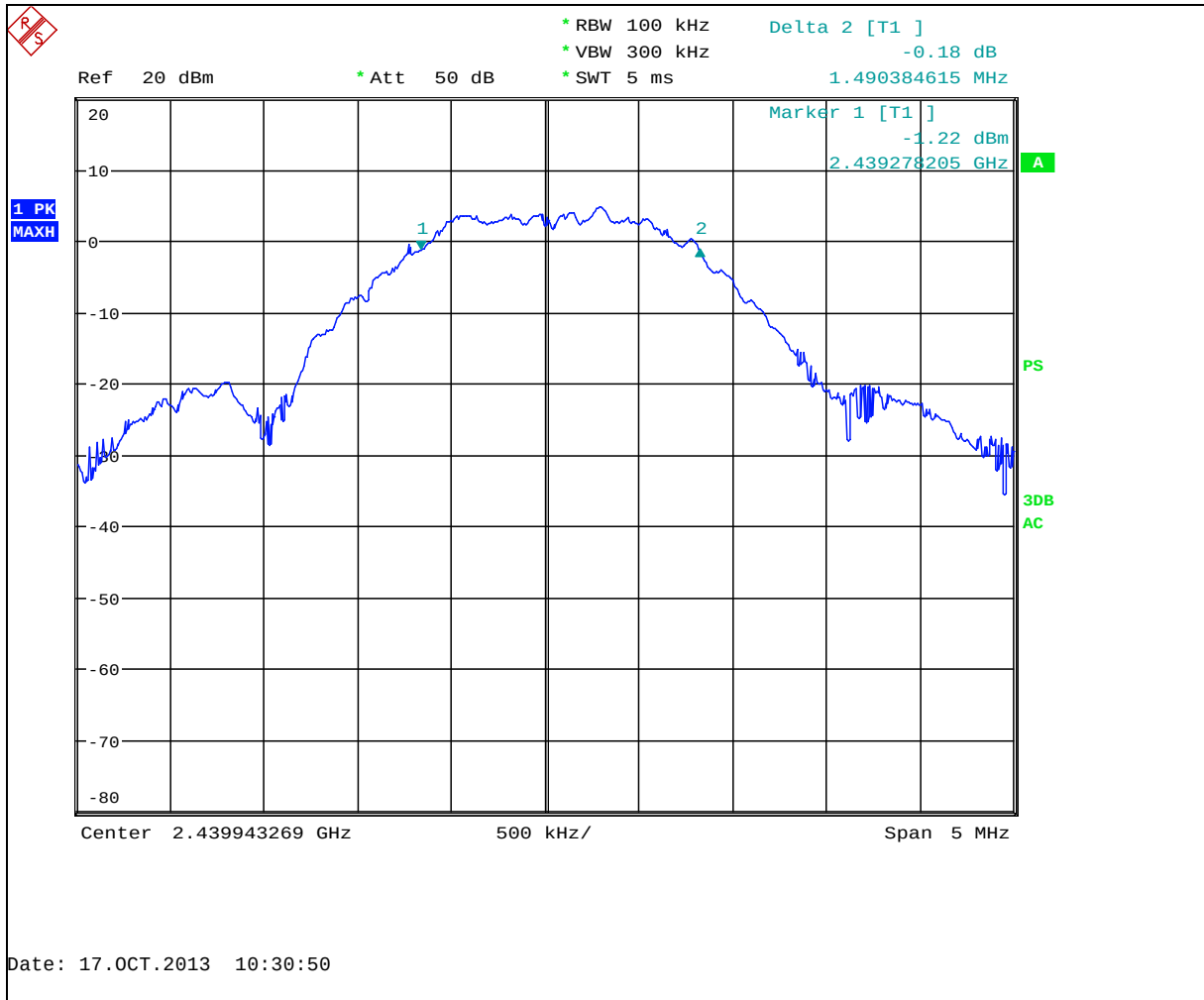
Notes: _____



Graph 3.1.1



Graph 3.1.2



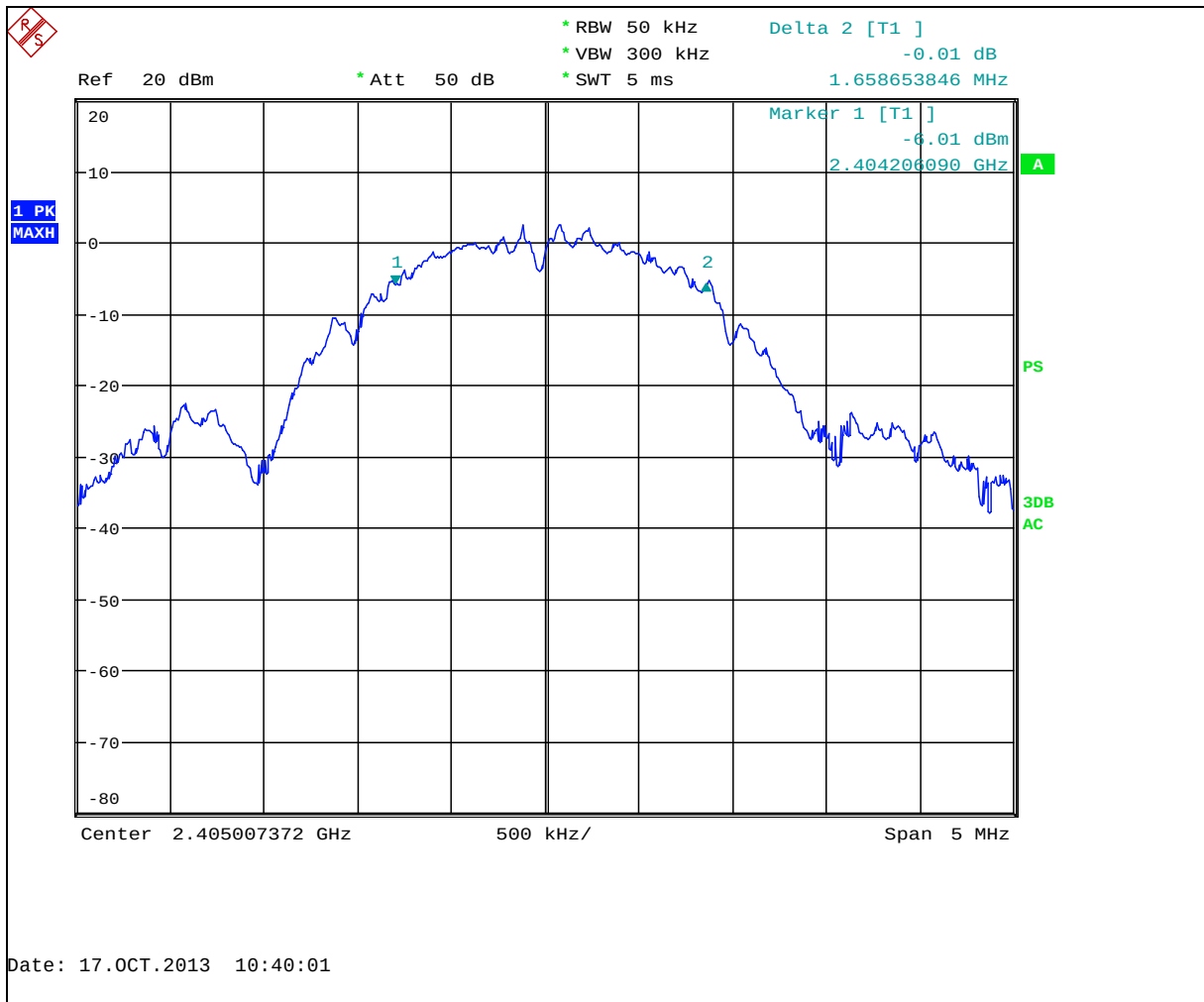
Graph 3.1.3



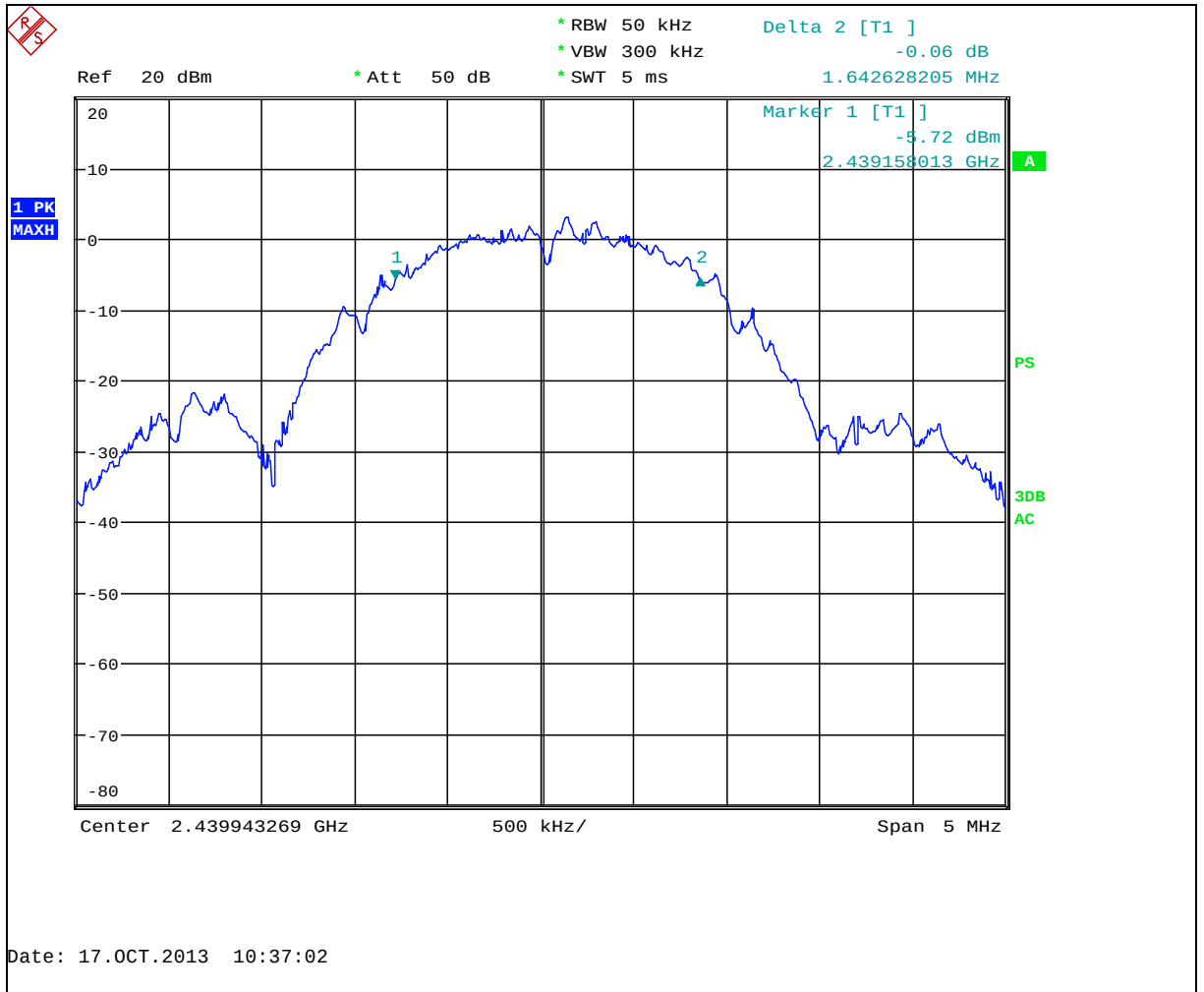
3.1.1 Emission bandwidth (EBW) of the digital modulation

Low Frequency Channel kHz	Middle Frequency Channel kHz	Upper Frequency Channel kHz	Minimum Bandwidth kHz	Result
1658	1642	1618	500	Pass
RBW: ☒ 50kHz ☐ other kHz VBW: ☒ 300kHz ☐ 300kHz ☐ other kHz				

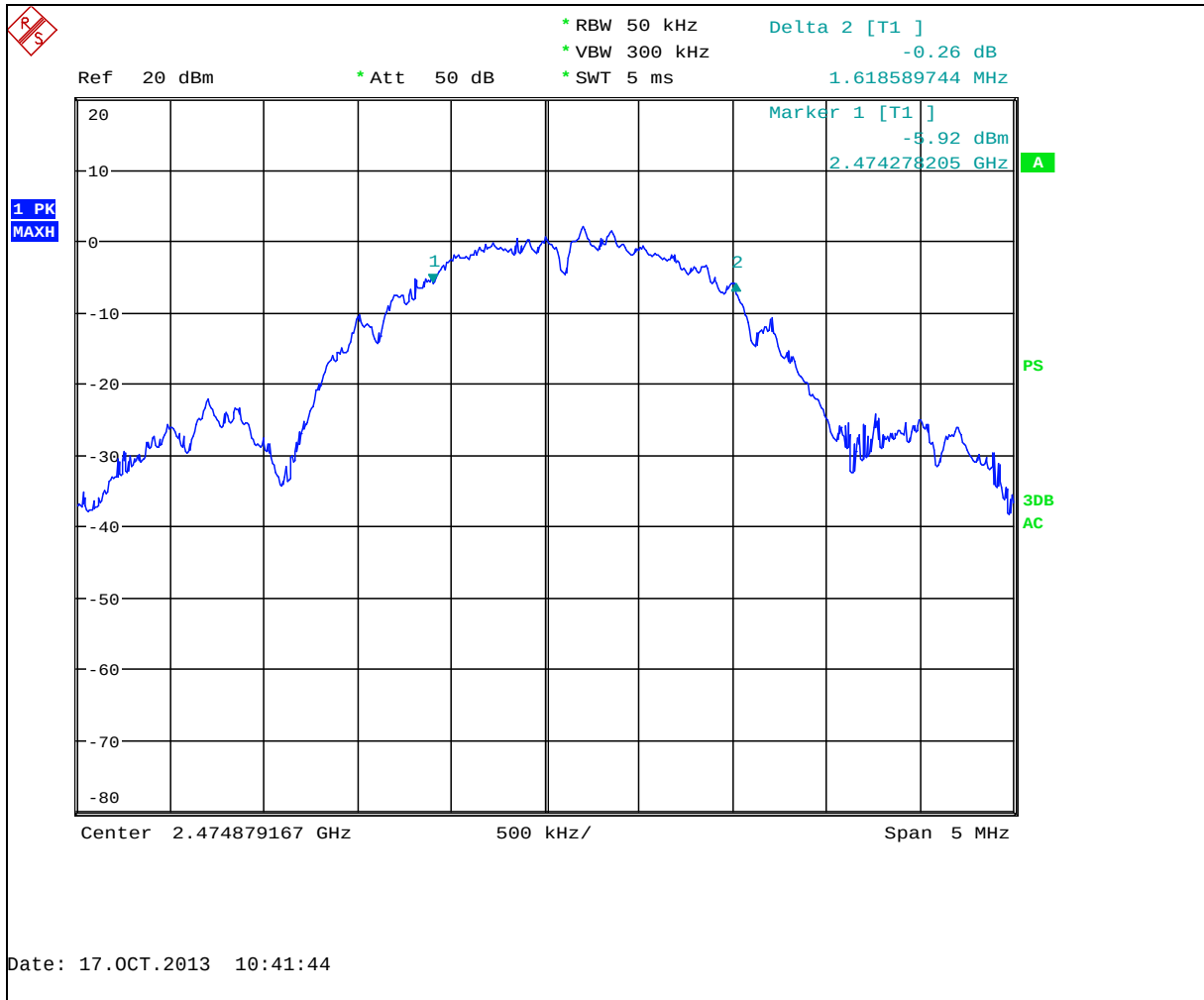
Notes: None



Graph 3.1.4



Graph 3.1.5



Graph 3.1.6



3.2 Maximum peak output power

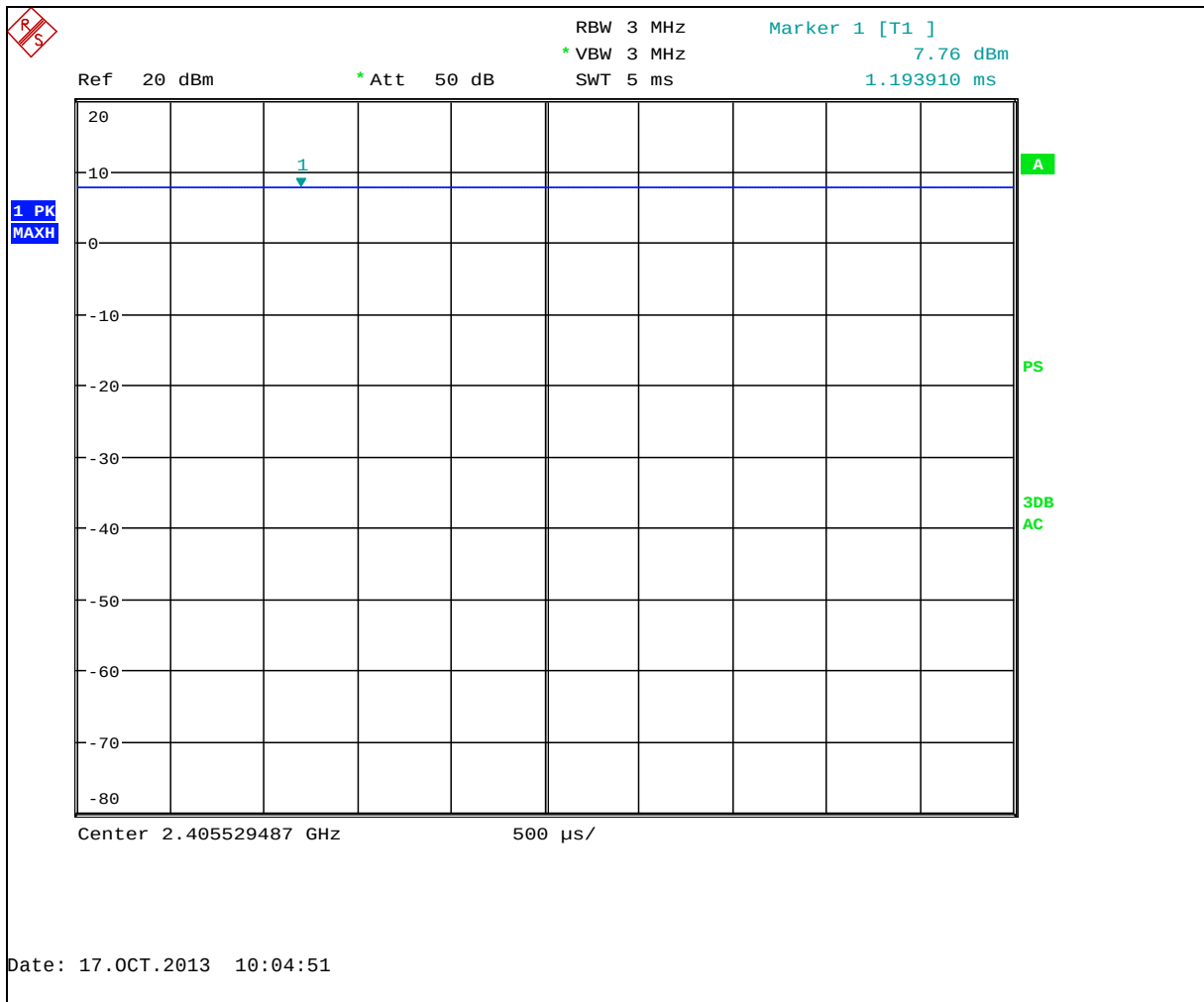
Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: Pass

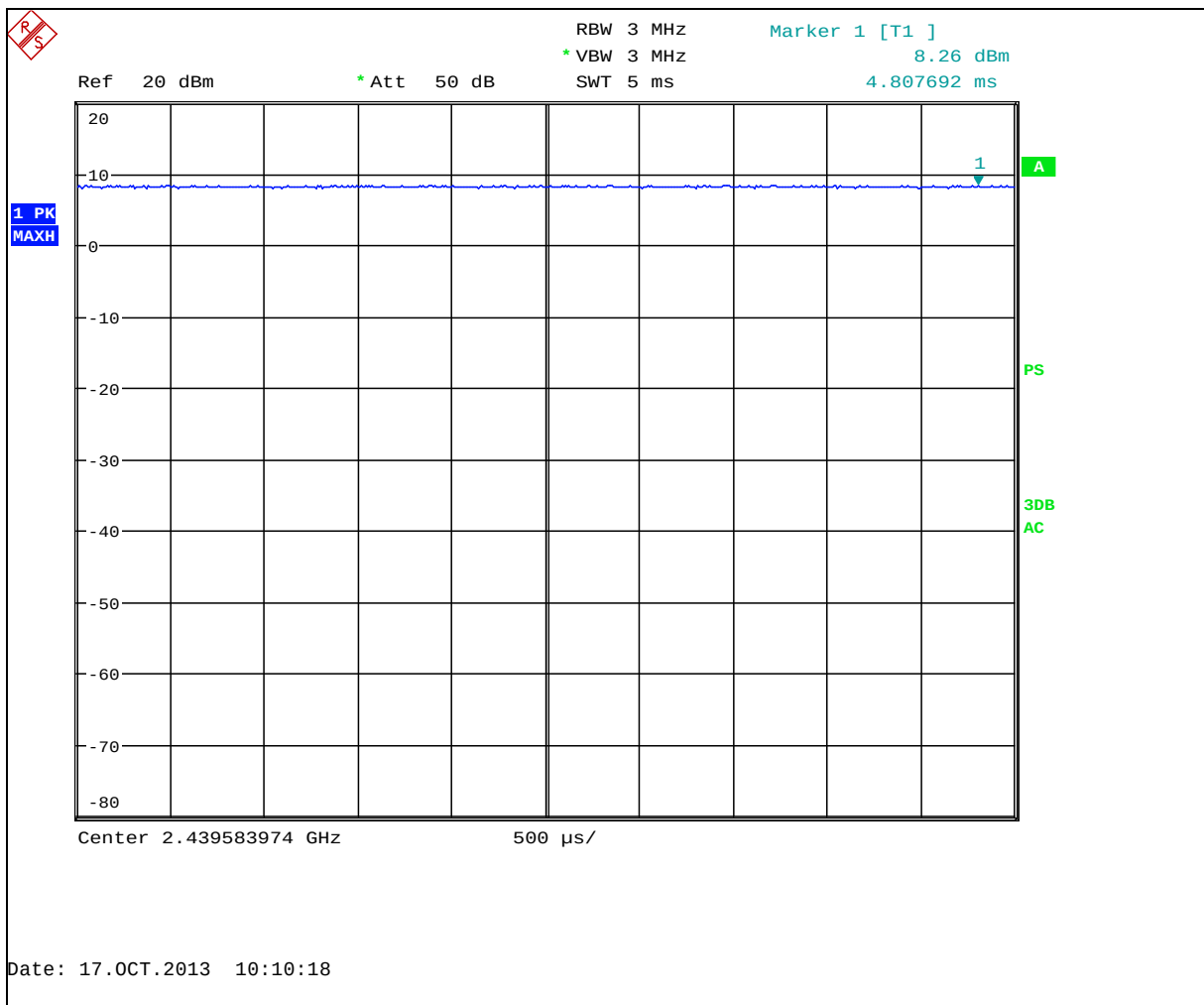
Max. Margin: 19.77dB below the limits

Power Output:	Conducted						
Frequency Range:	☐ 902-928MHz ☒ 2400-2483.5MHz ☐ 5725-5850MHz						
Low Frequency MHz	Measured power dBm	Attenuation dB	Power at Antenna dBm	Power at Antenna W	Limit dBm	Limit Reduction dB	Margin dB
2405.52	7.76	1.3	9.06	0.00805	30	0.67	-20.27
Middle Frequency MHz							
2439.58	8.26	1.3	9.56	0.00904	30	0.67	-19.77
Upper Frequency MHz							
2475.48	7.27	1.3	8.57	0.0072	30	0.67	-20.76
RBW:	☐ 1MHz ☒ 3MHz ☐ 10MHz						
VBW:	☐ 1MHz ☒ 3MHz ☐ 10MHz						
Antenna 1 Gain:	☒ < 6dBi and = 2dBi ☐ >6dBi and = dBi, Output power reduction = 0dB						
Antenna 2 Gain:	☐ < 6dBi ☒ >6dBi and = 8 dBi, Output power reduction = 0.67 dB						

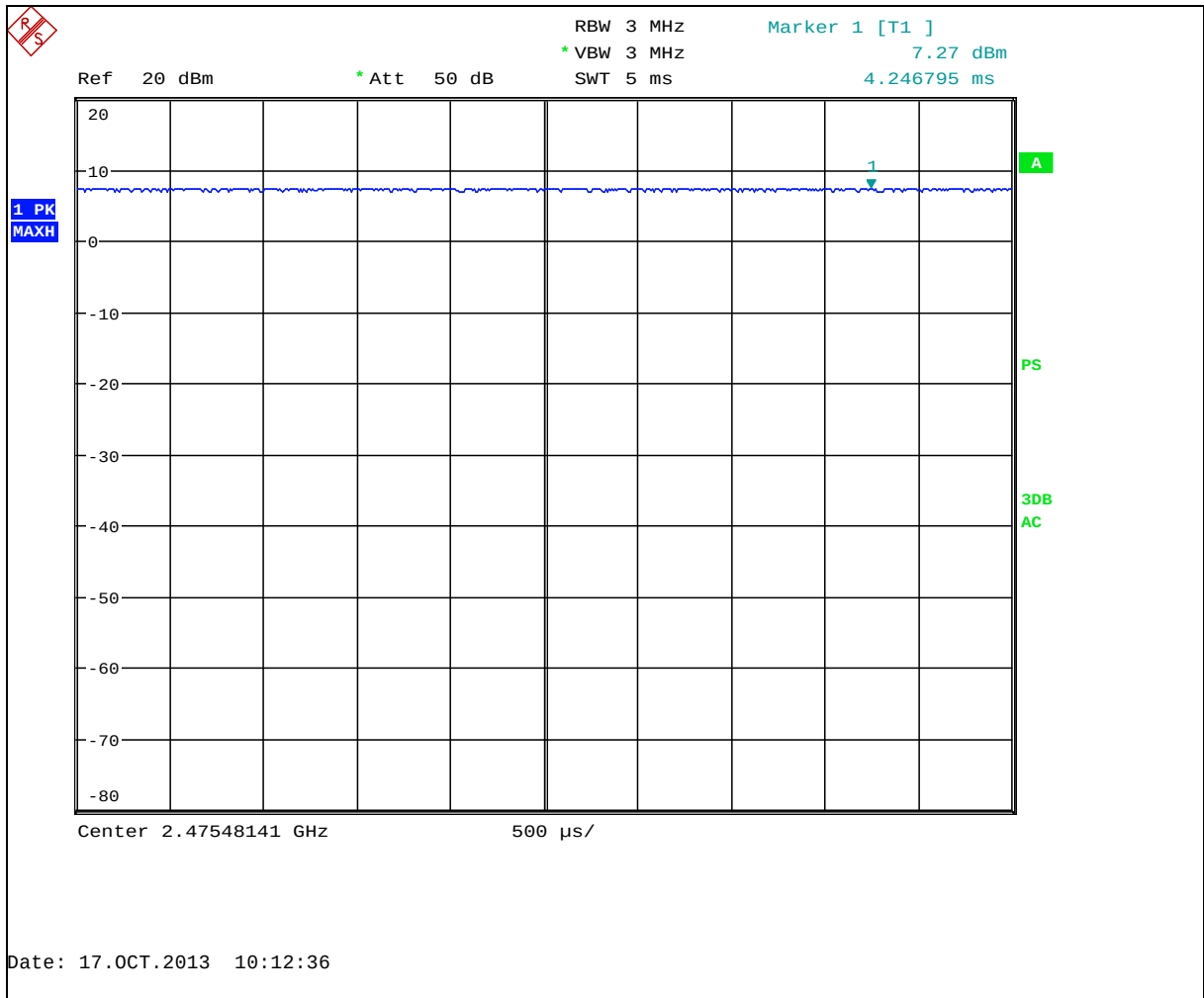
Notes: Attenuation of the RF cable from the Radio to Analyzer was measured of 1.3dB



Graph 3.2.1



Graph 3.2.2

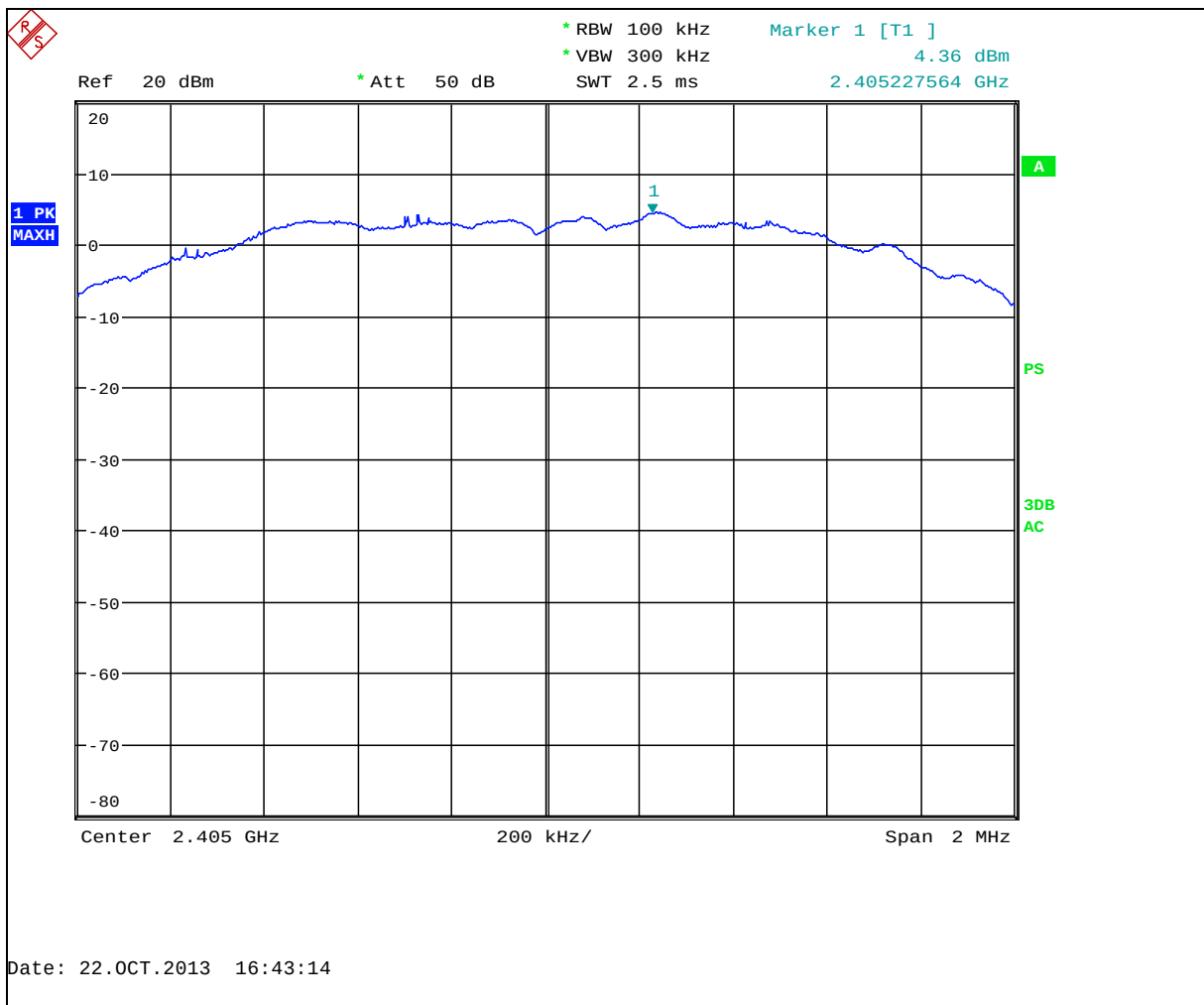


Graph 3.2.3

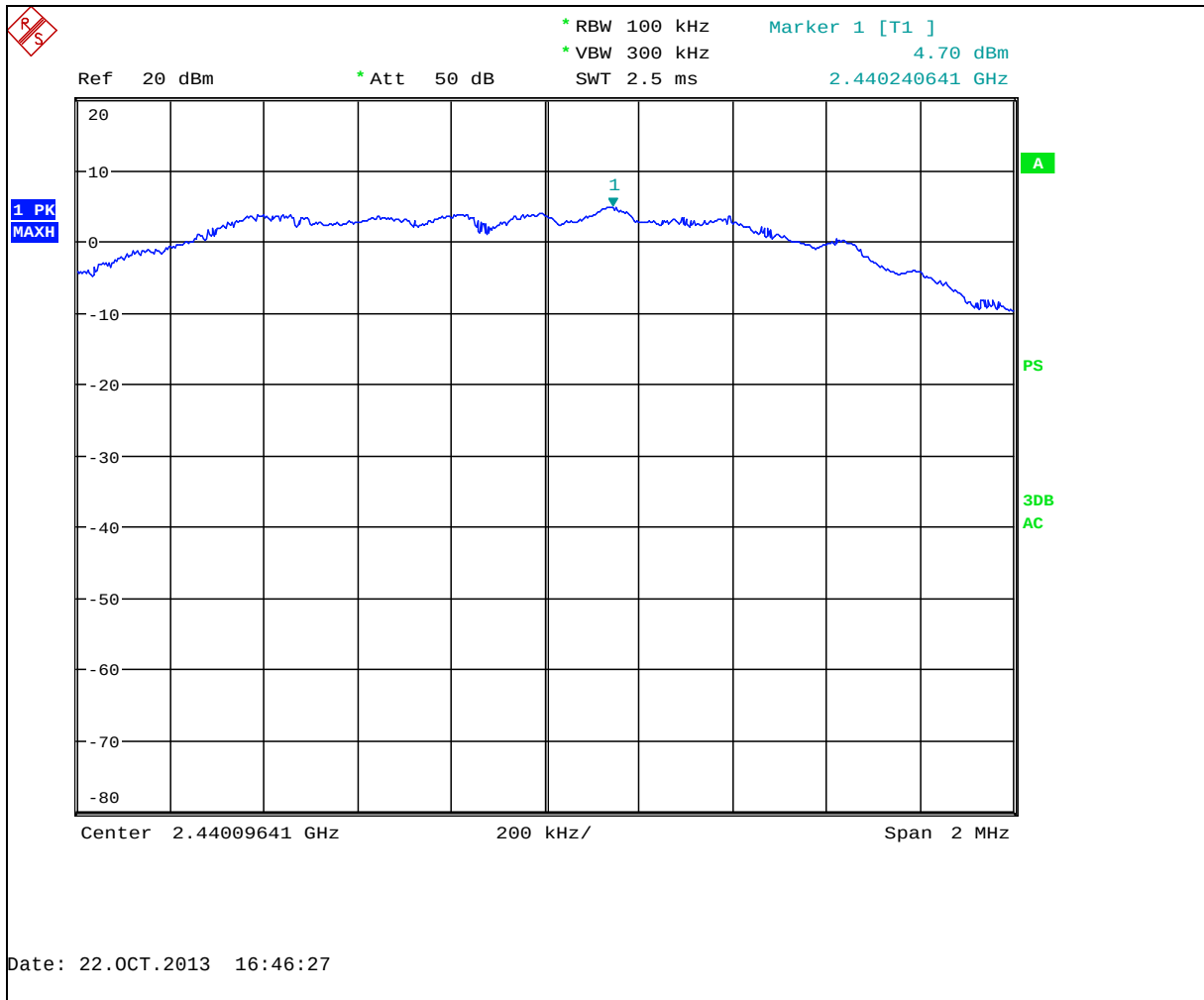
3.3 Power spectral density

Power Output:	☒ Conducted ☐ Radiated				
	Measured Density dBm	Power Spectral Density (dBm) @ RBW 100kHz	Power Spectral Density (dBm) @ RBW 3kHz	Limit dBm	Margin dB
Low Frequency Channel	4.4	5.7	-9.5	8	-16.83
Middle Frequency Channel	4.7	6.0	-9.2	8	-16.53
Upper Frequency Channel	3.8	5.1	-10.8	8	-18.13
Analyzer Settings:	☒ RBW=100KHz ☒ VBW=300KHz ☒ Span=2MHz ☒ Sweep=Auto				
Antenna 1 Gain:	☒ < 6dBi and = 2dBi ☐ >6dBi and = dBi, limit reduction = 0 dB				
Antenna 2 Gain:	☐ < 6dBi and = dBi ☒ >6dBi and = 8 dBi, limit reduction = 0.67 dB				

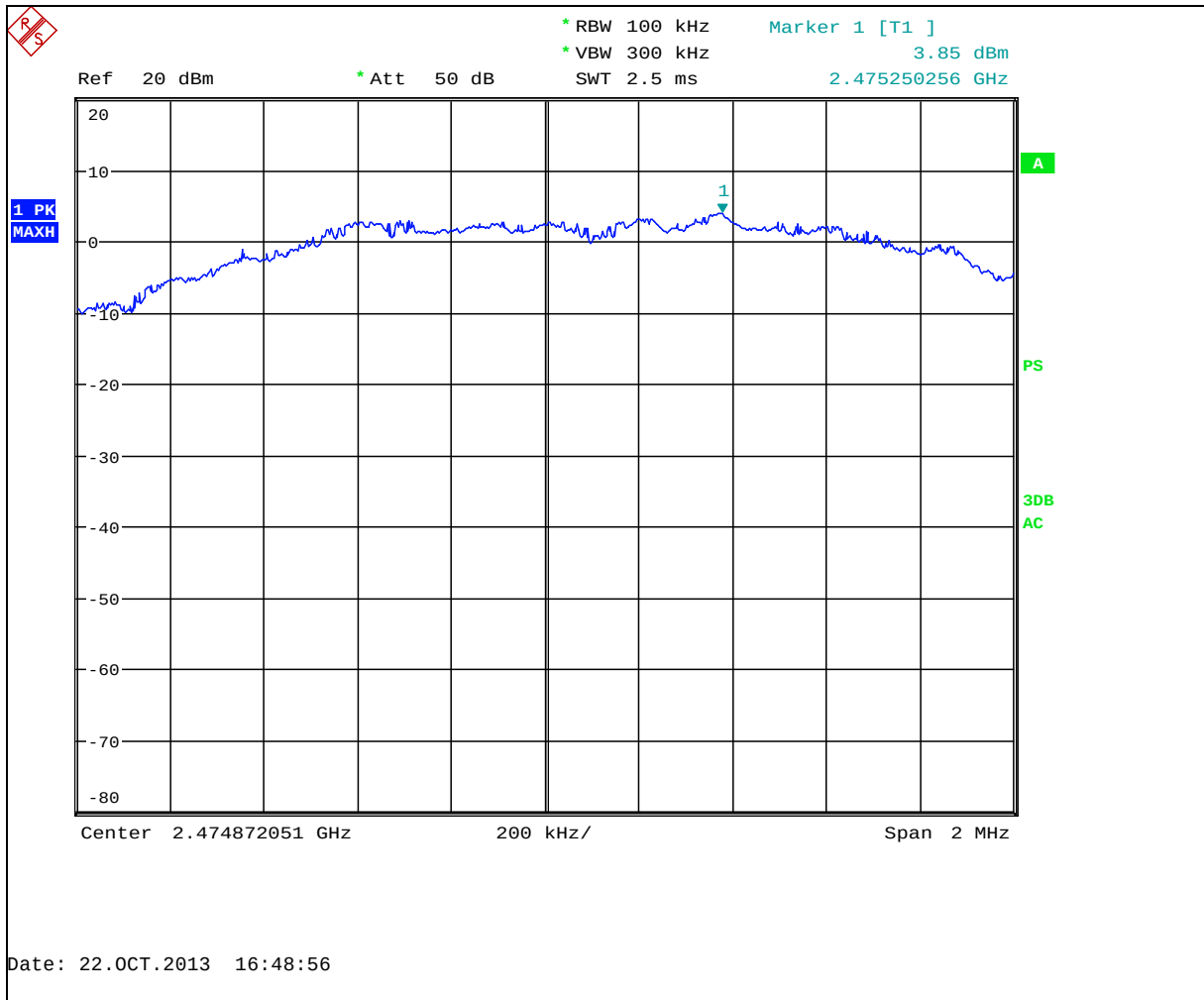
Notes: The Power Spectral Density was calculated adding the cable/attenuator loss of 1.3dB from the measured density value.
The observed power level at RBW=100kHz was adjusted by reducing the measured power by a bandwidth correction factor (BWCF)=15.2dB



Graph 3.3.1



Graph 3.3.2



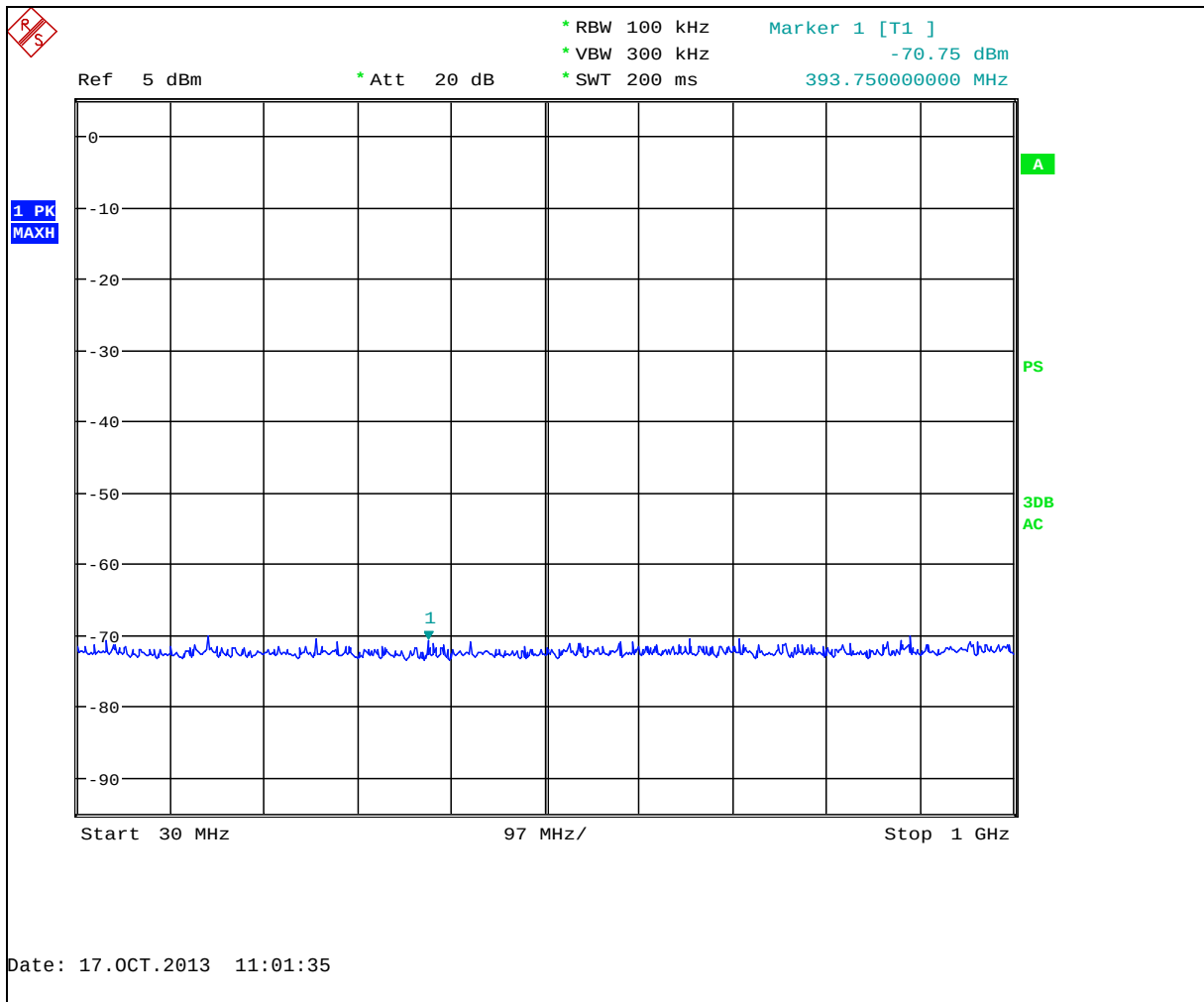
Graph 3.3.3



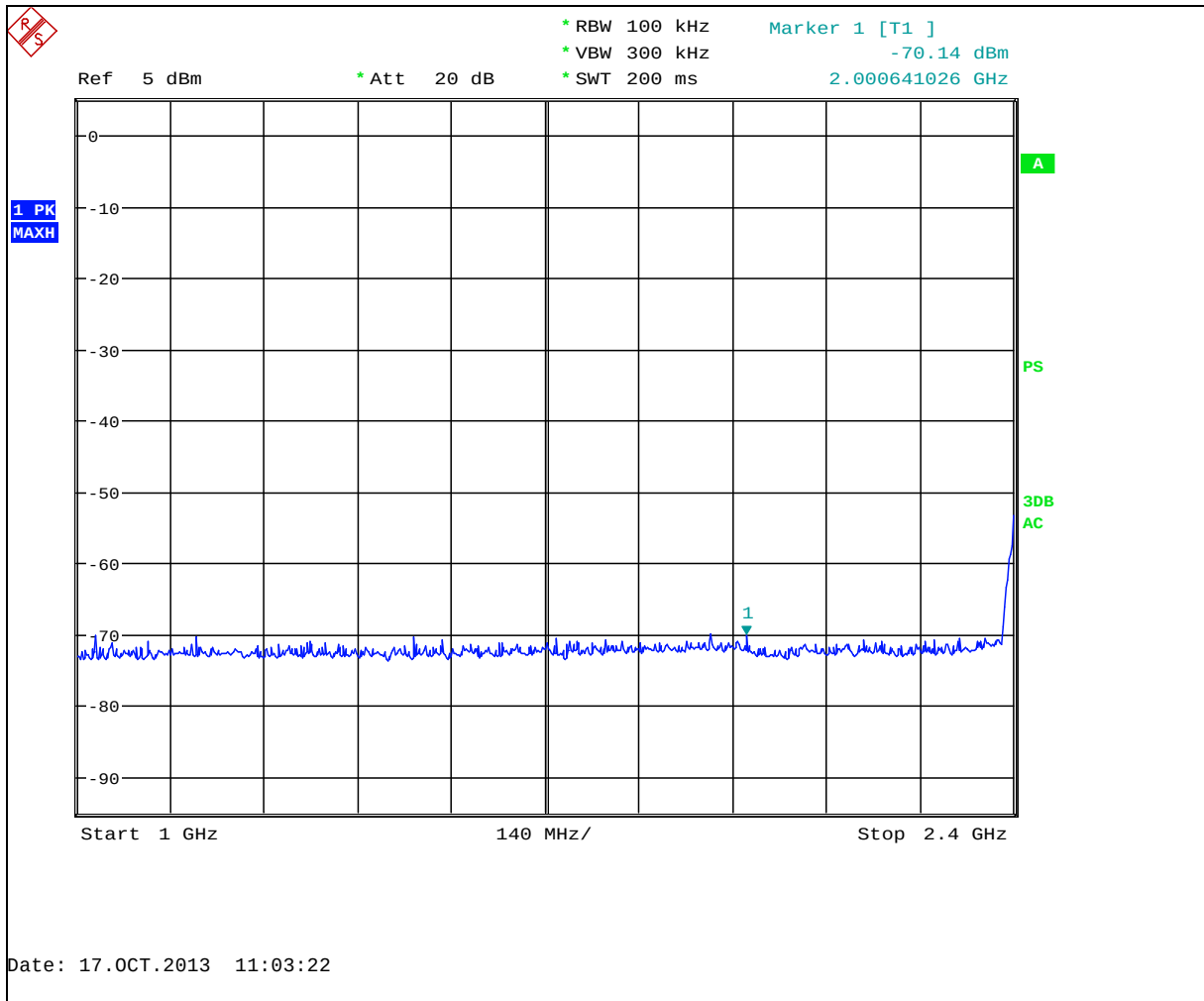
3.4 Antenna conducted spurious emissions

	Minimum Measured Attenuation dB	Minimum Allowed Attenuation dB	Margin dB
Low Frequency Channel	66.7	20	-46.7
Middle Frequency Channel	67.1	20	-47.1
Upper Frequency Channel	65.3	20	-45.3
Analyzer Settings:	☒ RBW=100KHz		
Minimum Allowed Attenuation:	☒ 20dB ☐ 30dB (for digital systems with conducted power measured using RMS averaging over a time interval)		

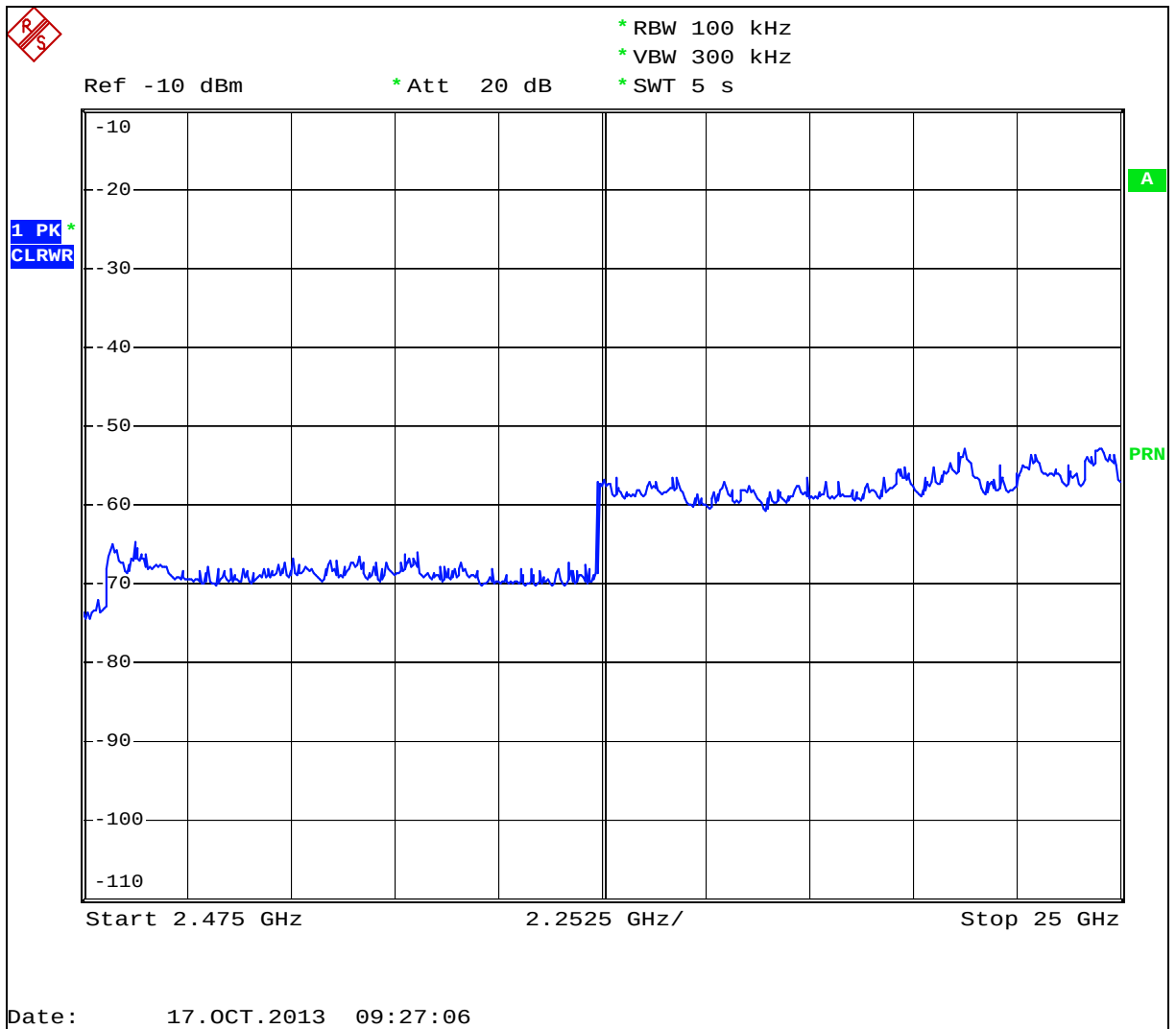
Notes:



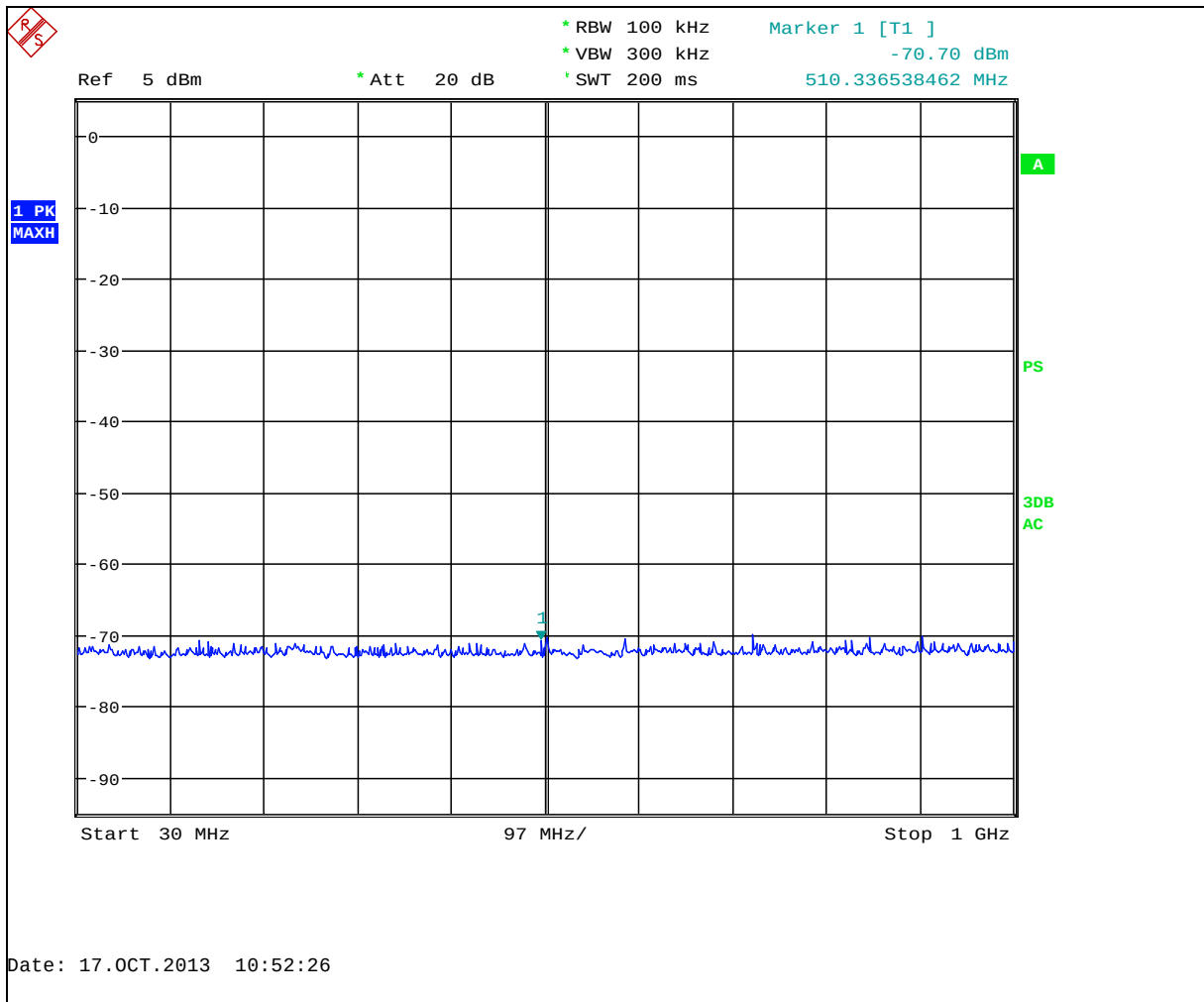
Graph 3.4.1



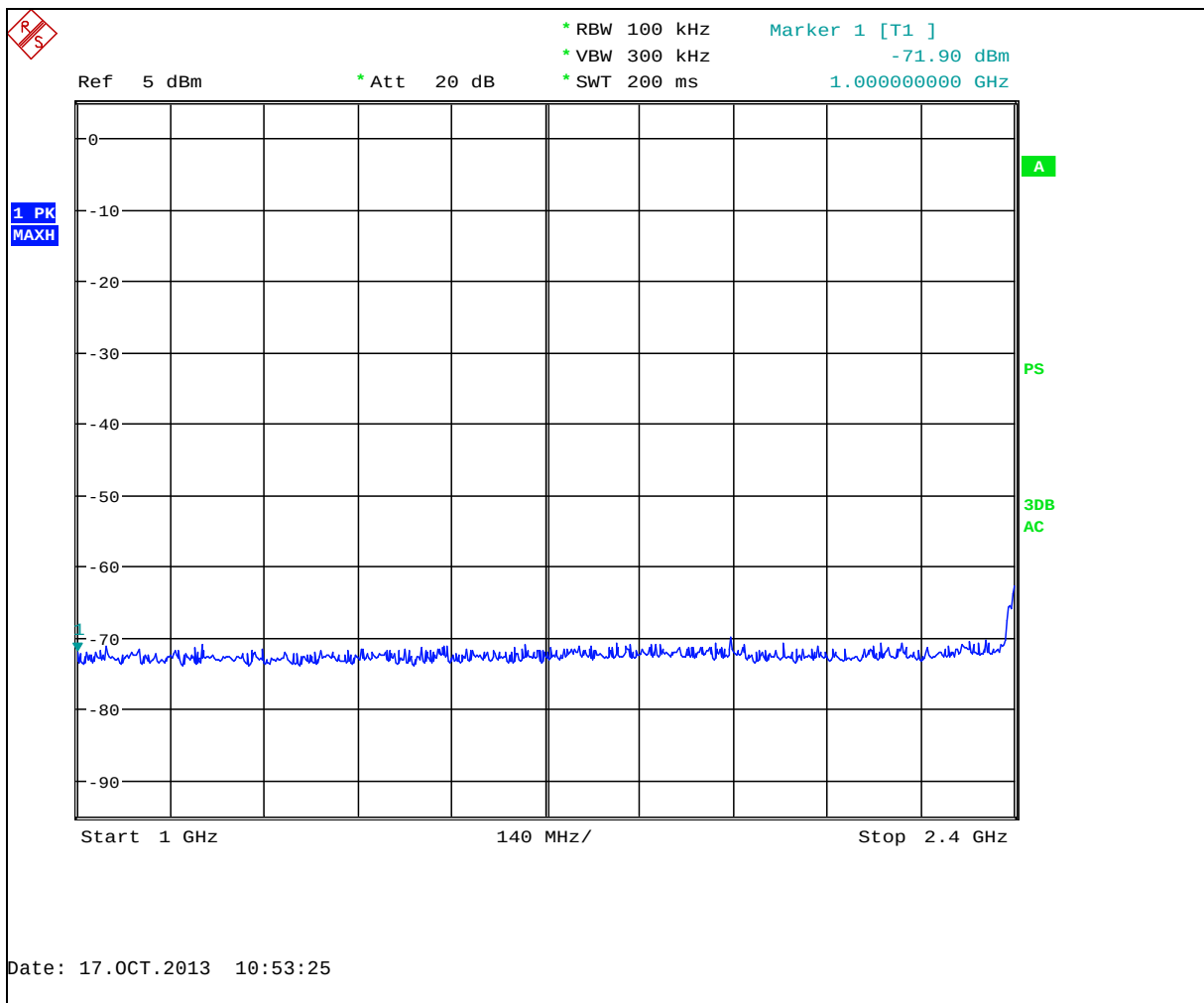
Graph 3.4.2



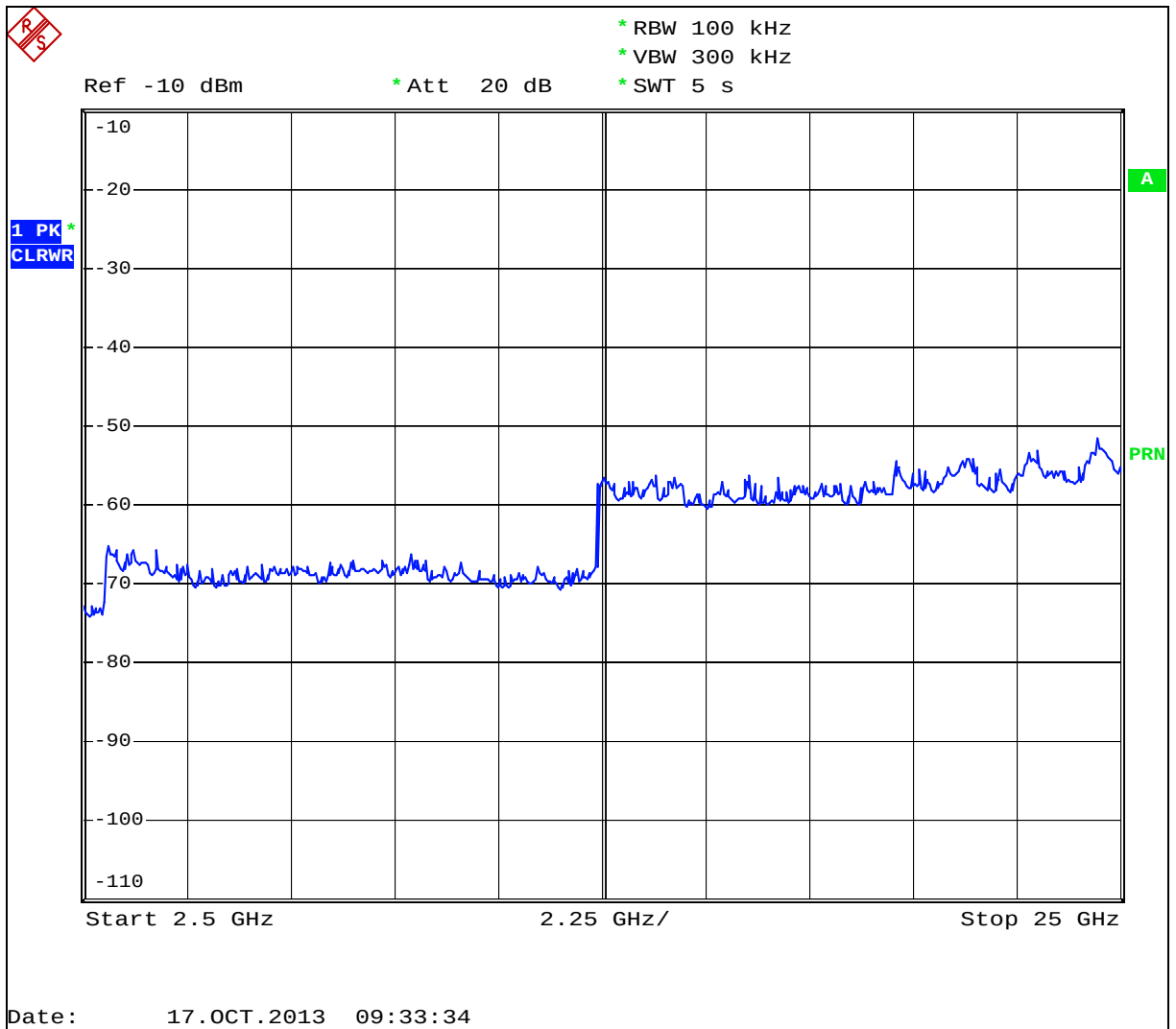
Graph 3.4.3



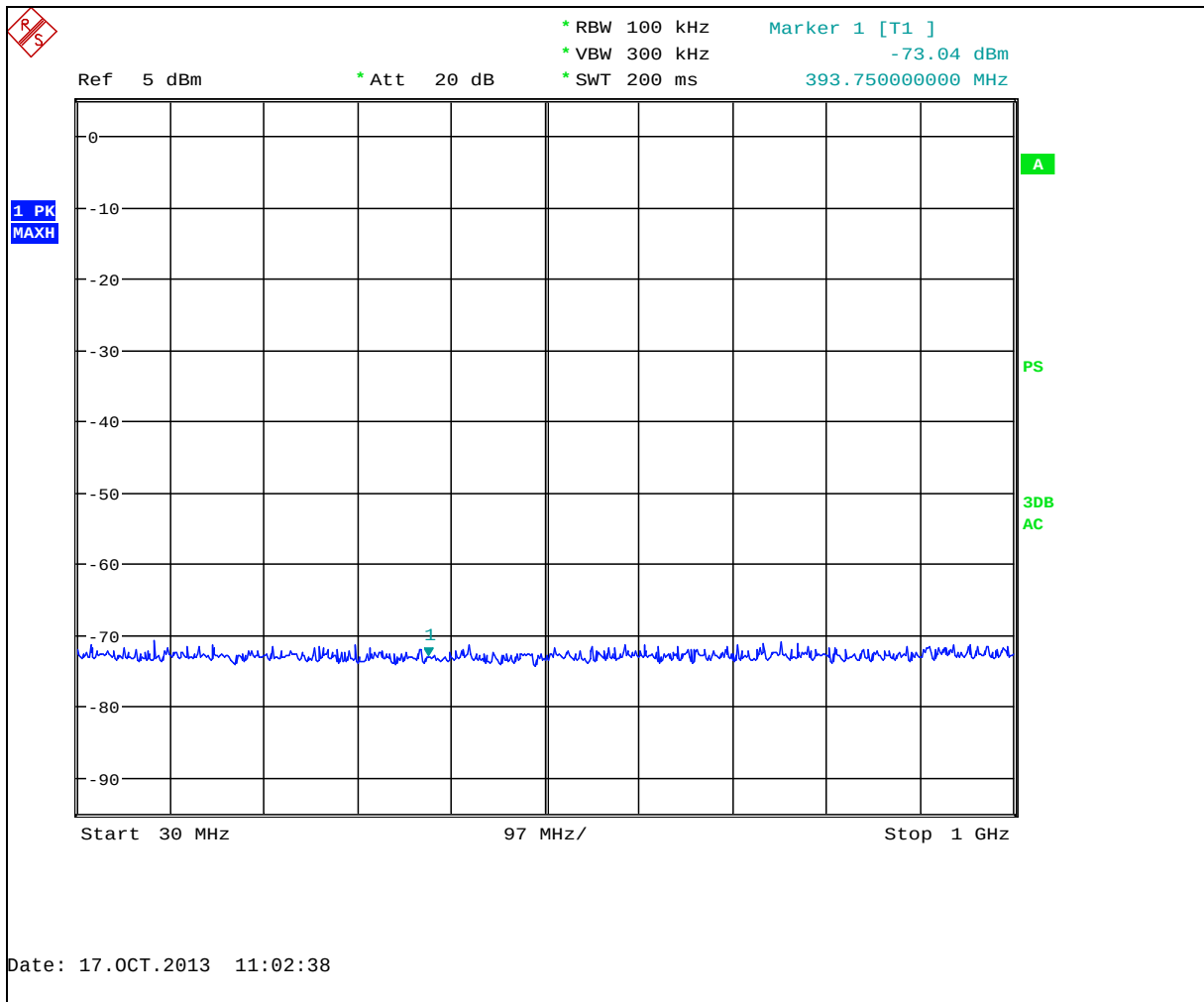
Graph 3.4.4



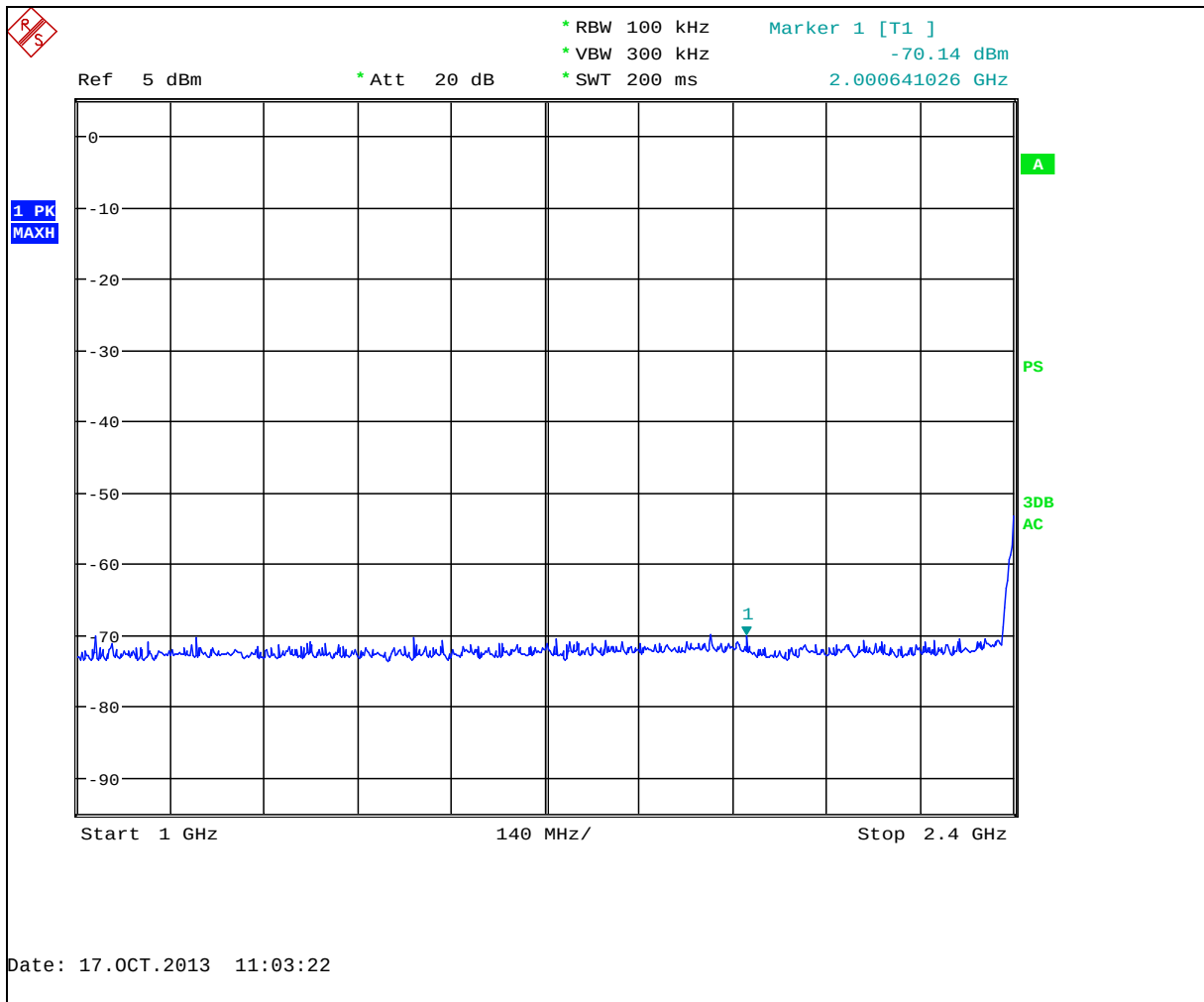
Graph 3.4.5



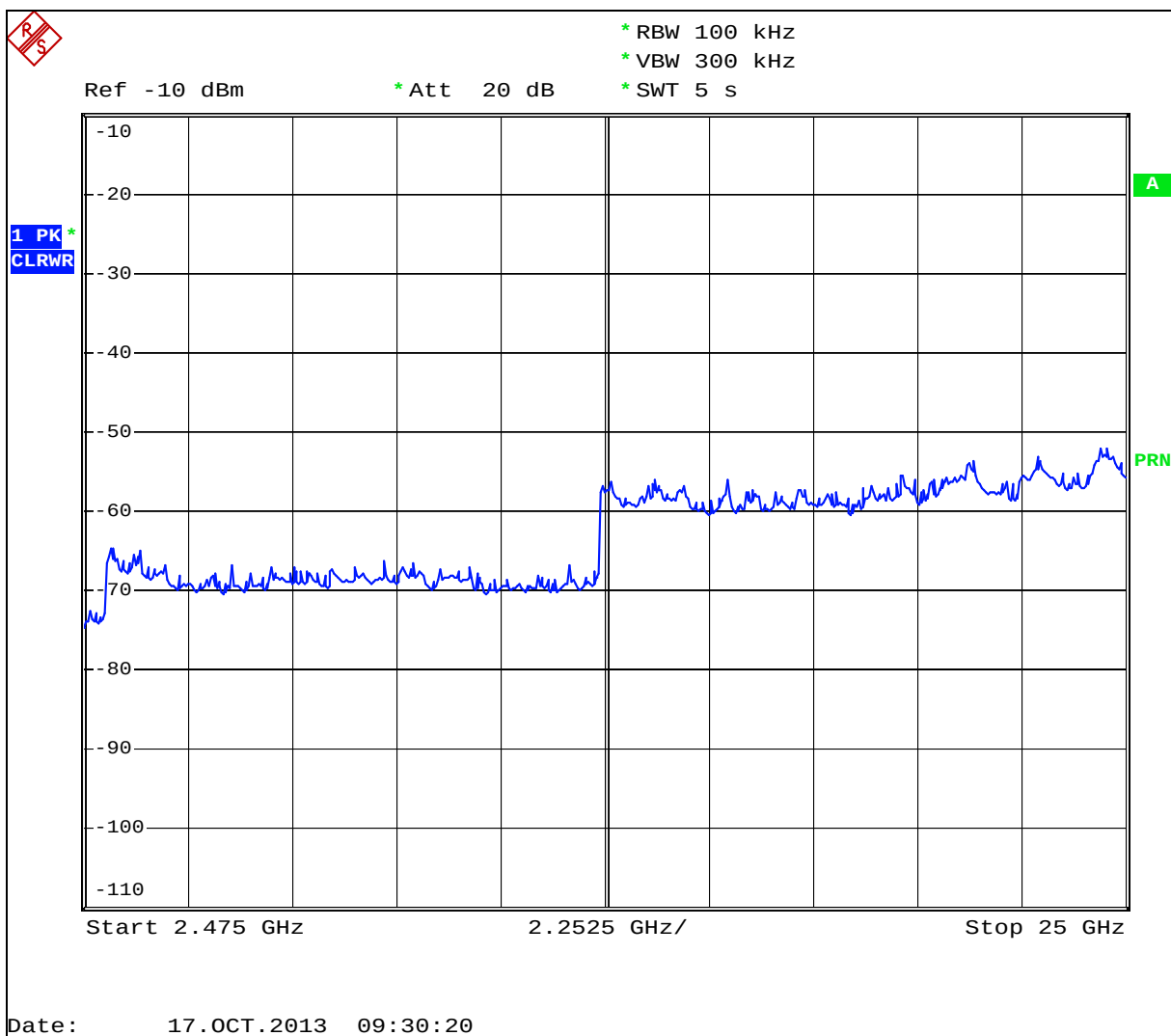
Graph 3.4.6



Graph 3.4.7



Graph 3.4.8

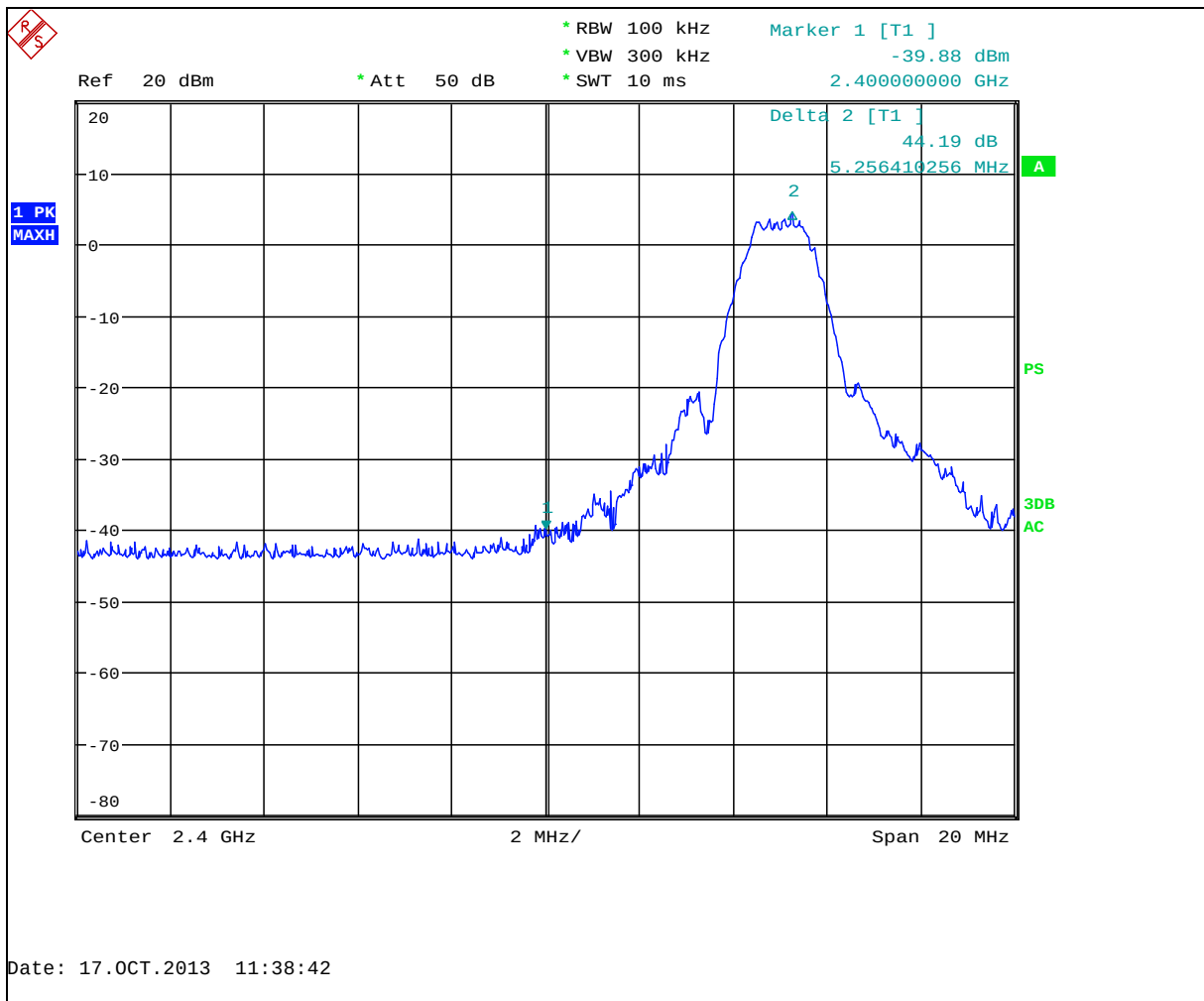


Graph 3.4.9

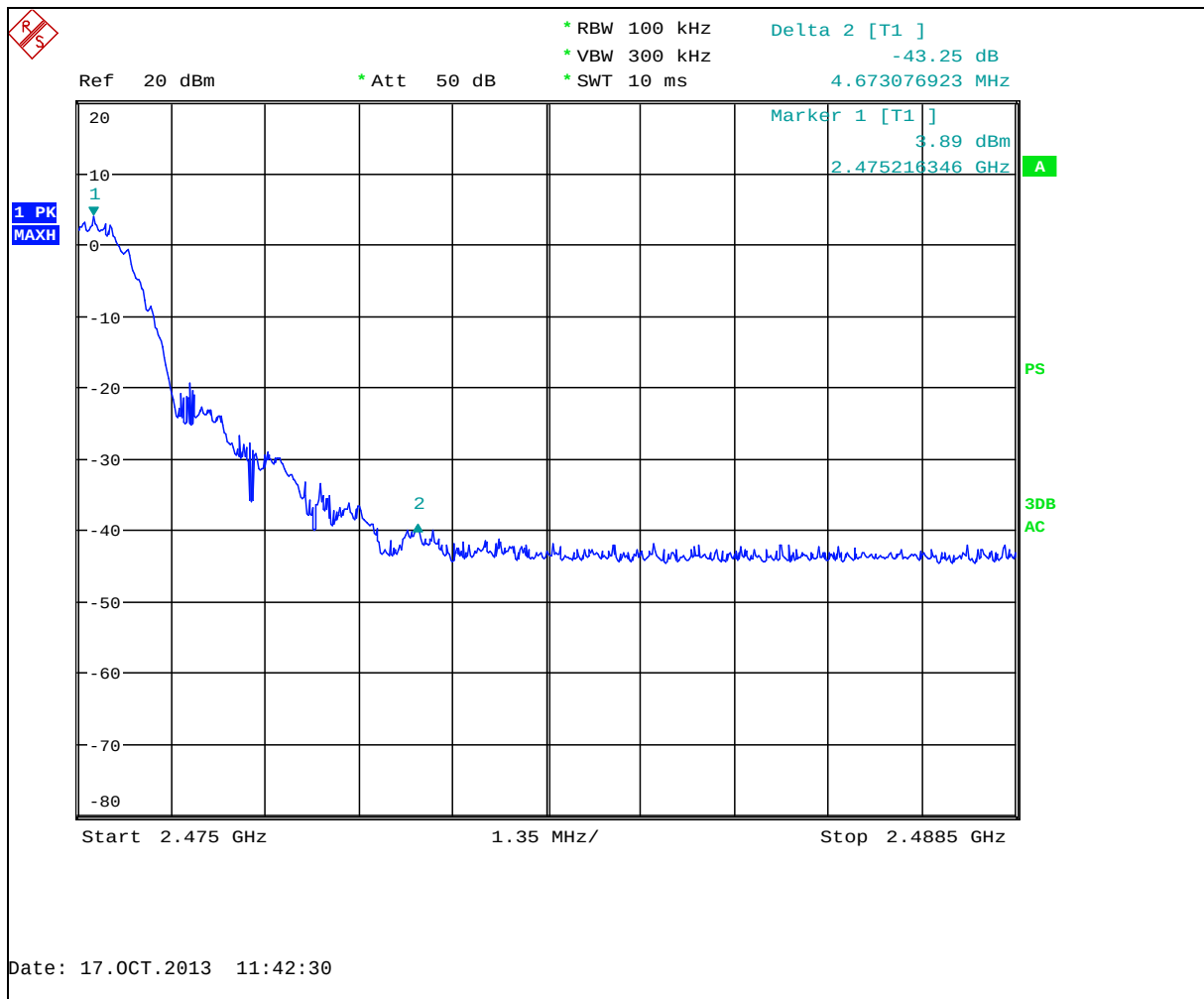
3.4.1 Antenna conducted band edge compliance

Frequency Range:	☐ 902-928MHz ☒ 2400-2483.5MHz ☐ 5725-5850MHz		
	Minimum Measured Attenuation dB	Minimum Allowed Attenuation dB	Margin dB
Low Frequency Channel	39.9	20	-19.9
Upper Frequency Channel	43.3	20	-23.3
Analyzer Settings:	☒ RBW=100KHz		
Minimum Allowed Attenuation:	☒ 20dB ☐ 30dB (for digital systems with conducted power measured using RMS averaging over a time interval)		

Notes: None



Graph 3.4.10



Graph 3.4.11



3.5 Radiated spurious emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: **Pass**

Max. Margin: 0.8dB below the limits for 8dBi Antenna
2.6dB below the limits for 2dBi Antenna

Notes: Emissions at fundamental frequency and spurious emissions not related with transmitter operations were excluded from the Tables.
Testing was performed with 2 dBi Antenna at Low, Middle and Upper channels (See Tables 3.5.1-3.5.2 and Graphs 3.5.1-3.5.24).
Testing was performed with 8 dBi Antenna at Low, Middle and Upper channels (See Tables 3.5.3-3.5.4 and Graphs 3.5.25-3.5.48).

Date:	October 18-22. 2013	Result: Pass
Standard:	FCC part 15.247(d)	
Tested by:	Simon Khazon	
Test Point:	Enclosure with 2dBi Antenna	
Operation mode:	See Page 5	
Note:	Frequency Range 30-1000MHz	

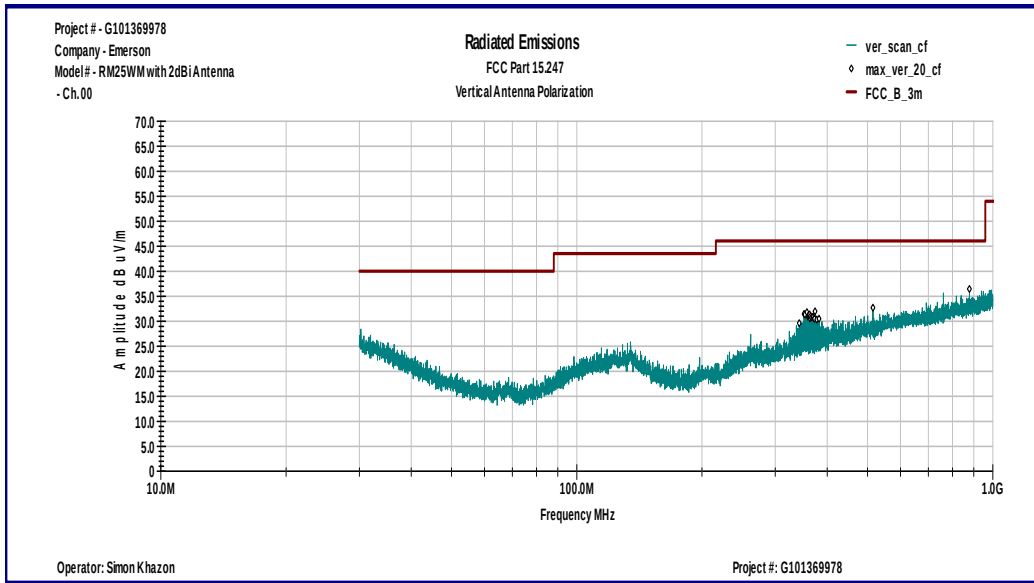
Table 3.5.1

Frequency	Ant. Polarity	Peak Reading dBμV	Total C.F. dB1/m	Total at 3m dBμV/m	Limit dBμV/m	Margin dB
Lower Channel						
351.94 MHz	V	13.8	17.6	31.5	46.0	-14.6
361.06 MHz	V	13.3	17.9	31.1	46.0	-14.9
373.87 MHz	V	14.0	17.9	32.0	46.0	-14.1
515.24 MHz	V	12.2	20.5	32.7	46.0	-13.3
878.75 MHz	V	11.4	25.1	36.4	46.0	-9.6
30.14 MHz	H	7.9	20.1	28.0	40.0	-12.0
33.983 MHz	H	8.5	17.9	26.4	40.0	-13.6
119.43 MHz	H	10.8	13.9	24.7	43.5	-18.8
206.34 MHz	H	9.9	12.3	22.1	43.5	-21.4
Middle Channel						
30.404 MHz	V	8.5	20.0	28.4	40.0	-11.6
128.86 MHz	V	13.9	14.0	27.9	43.5	-15.7
359.31 MHz	V	12.3	17.9	30.2	46.0	-15.8
366.68 MHz	V	12.9	17.8	30.6	46.0	-15.4
31.018 MHz	H	8.2	19.6	27.8	40.0	-12.2
35.334 MHz	H	9.6	17.2	26.8	40.0	-13.2
395.81 MHz	H	11.4	18.6	30.0	46.0	-16.0
Upper Channel						
331.58 MHz	V	14.5	16.8	31.3	46.0	-14.7
350.01 MHz	V	13.8	17.5	31.2	46.0	-14.8
368.43 MHz	V	12.2	17.8	30.0	46.0	-16.0
418.09 MHz	V	10.7	19.7	30.4	46.0	-15.7
32.948 MHz	H	8.4	18.6	27.0	40.0	-13.0
123.69 MHz	H	10.3	14.0	24.2	43.5	-19.3
156.87 MHz	H	9.3	12.2	21.5	43.5	-22.0
172.24 MHz	H	9.5	11.6	21.1	43.5	-22.5

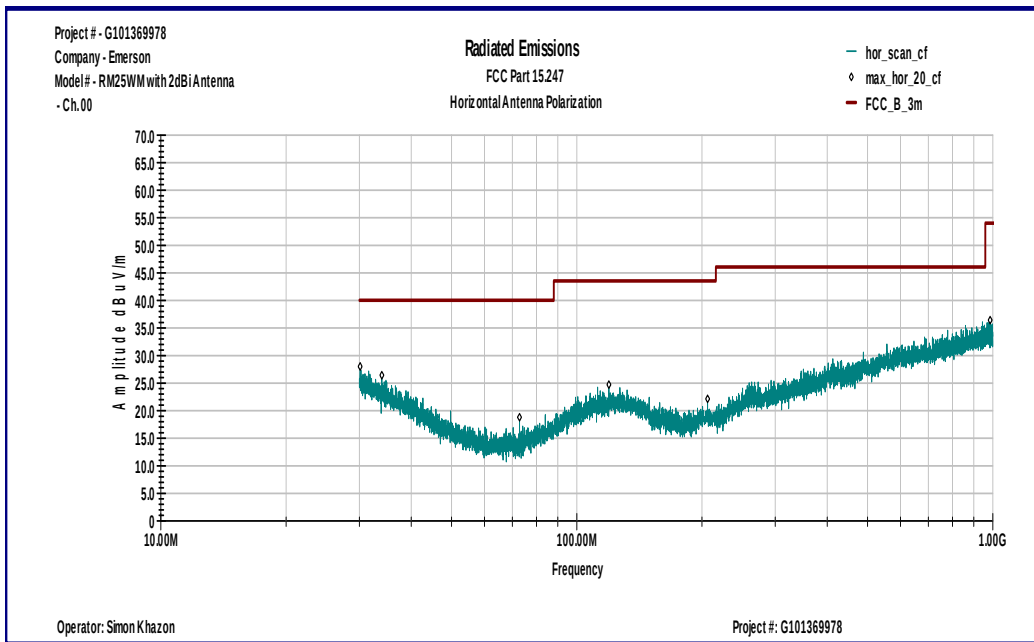
Date:	October 18-22. 2013	Result: Pass
Standard:	FCC part 15.247(d)	
Tested by:	Simon Khazon	
Test Point:	Enclosure with 2dBi Antenna	
Operation mode:	See Page 5	
Note:	Frequency Range 1-26GHz	

Table 3.5.2

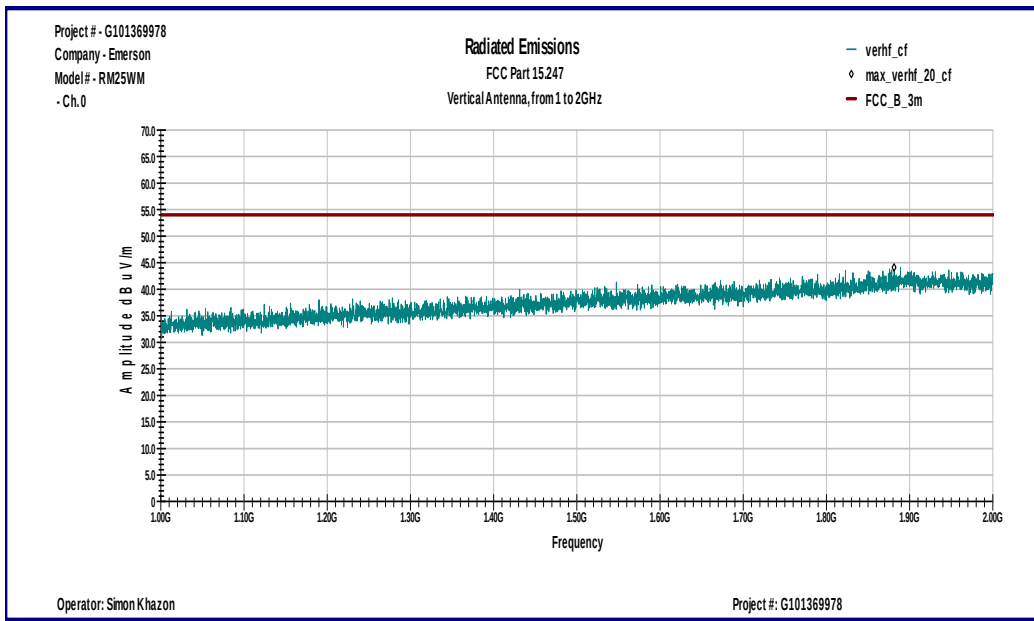
Frequency MHz	Antenna Polarity	Peak Reading dBμV	Total C.F. dB1/m	Pre-Amp. Gain (dB)	Total at 3m dBμV/m	Limit dBμV/m	Margin dB
Lower Channel							
4.808 GHz	V	50.3	37.2	42.0	45.5	54.0	-8.5
7.216 GHz	V	51.9	40.9	41.5	51.3	54.0	-2.7
9.624 GHz	V	40.7	43.9	40.9	43.8	54.0	-10.2
4.816 GHz	H	47.9	37.1	42.0	43.0	54.0	-11.0
7.216 GHz	H	52.2	40.7	41.5	51.4	54.0	-2.6
9.624 GHz	H	42.2	43.8	40.9	45.0	54.0	-9.0
Middle Channel							
4.88 GHz	V	43.9	37.3	42.0	39.2	54.0	-14.8
7.32 GHz	V	48.7	41.2	41.4	48.5	54.0	-5.5
9.768 GHz	V	40.8	44.1	41.1	43.8	54.0	-10.2
4.88 GHz	H	48.3	37.2	42.0	43.5	54.0	-10.5
7.32 GHz	H	50.2	41.0	41.4	49.8	54.0	-4.2
Upper Channel							
4.948 GHz	V	43.9	37.4	42.0	39.4	54.0	-14.6
7.428 GHz	V	44.8	41.5	41.2	45.1	54.0	-8.8
1.8922 GHz	H	14.7	34.5	0.0	49.19	53.98	-4.79
4.952 GHz	H	49.8	37.3	41.9	45.2	54.0	-8.8
7.424 GHz	H	46.5	41.3	41.2	46.5	54.0	-7.4
9.904 GHz	H	40.2	44.2	41.3	43.2	54.0	-10.8



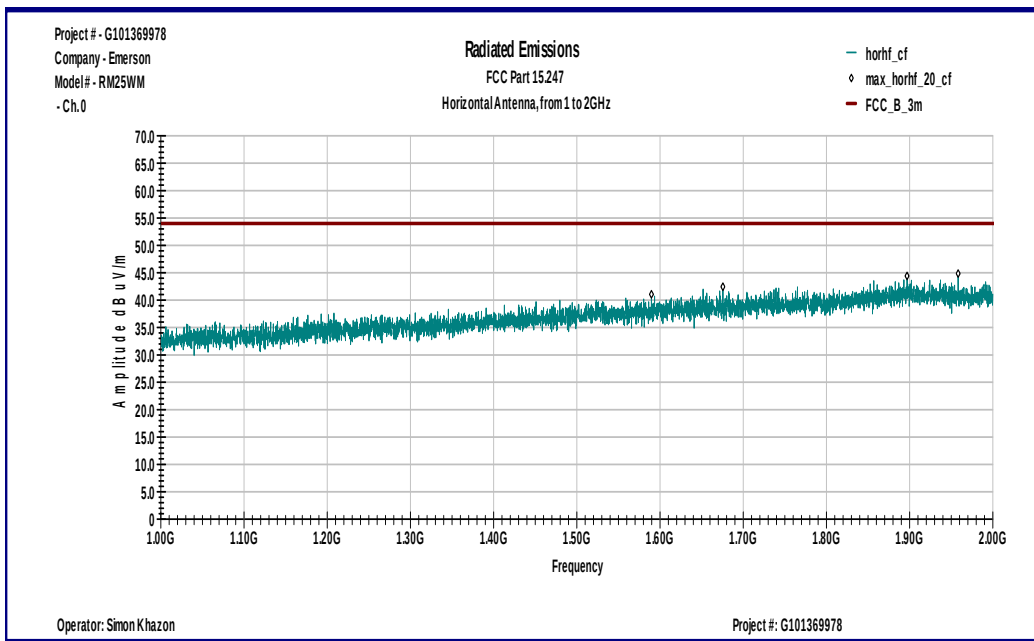
Graph 3.5.1



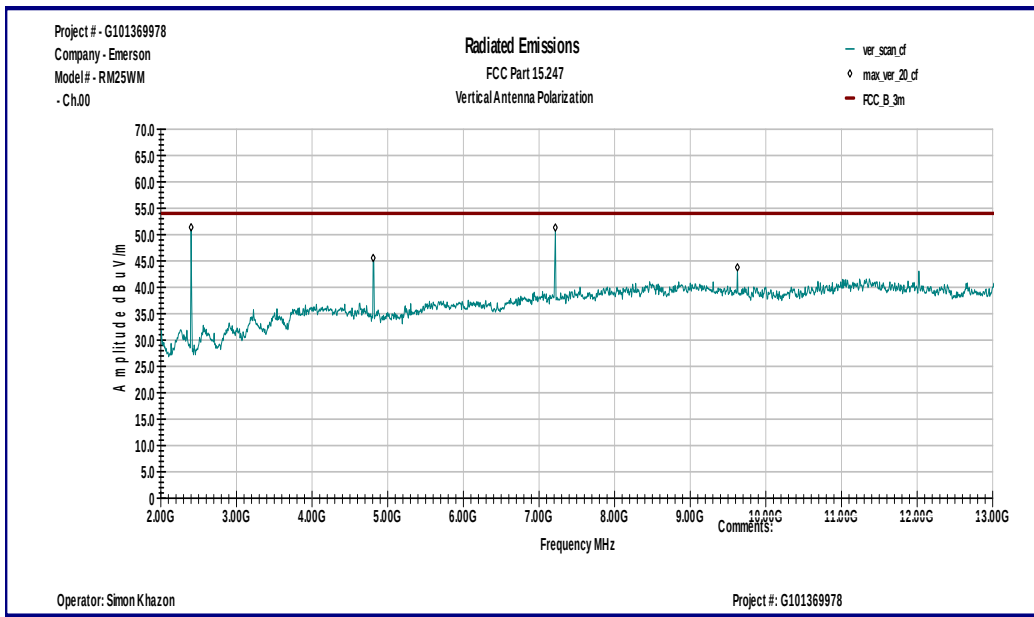
Graph 3.5.2



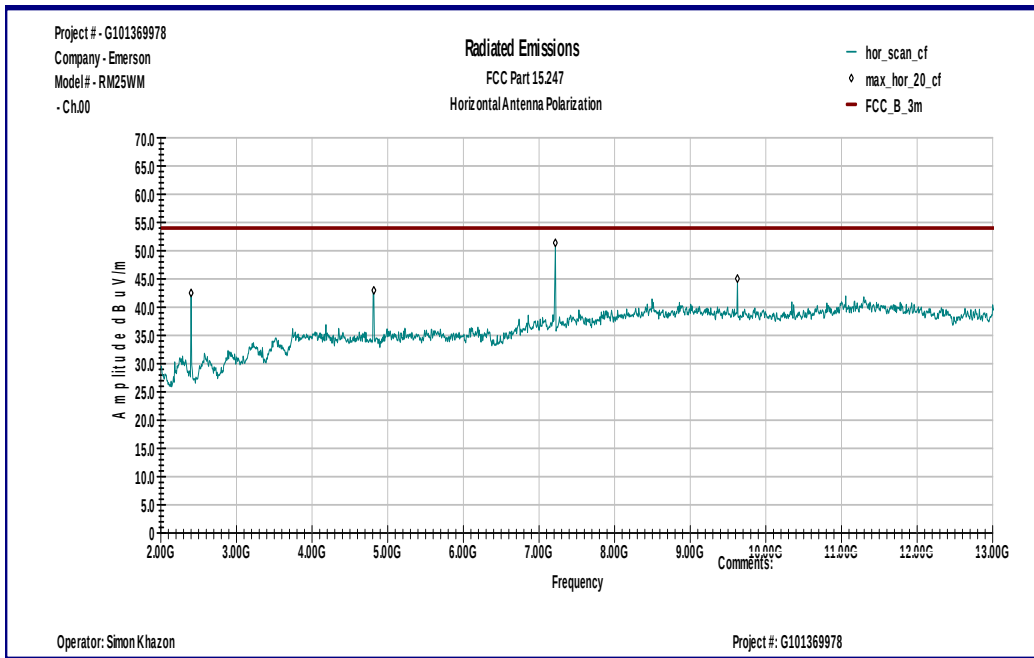
Graph 3.5.3



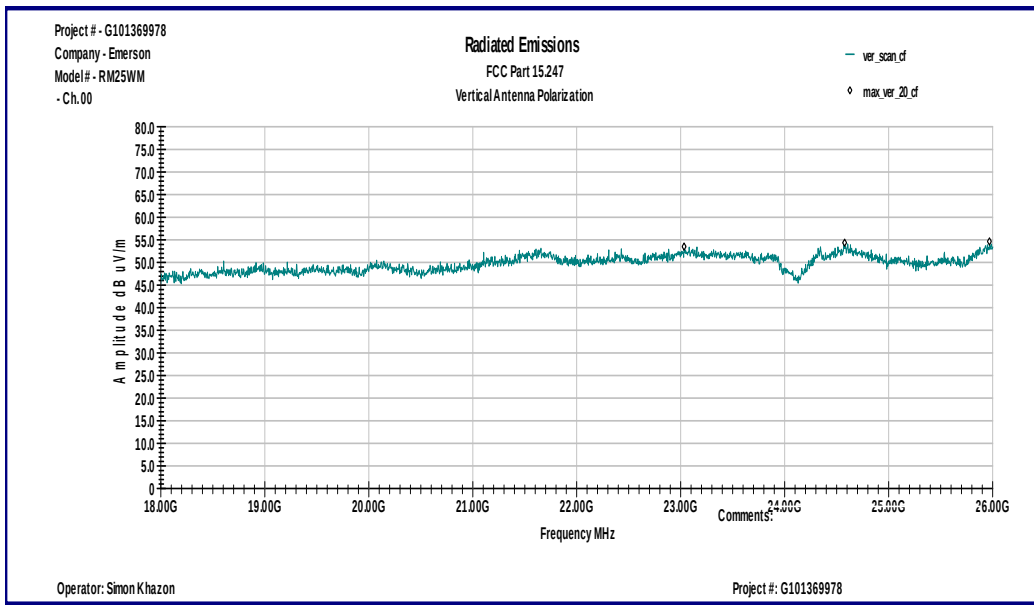
Graph 3.5.4



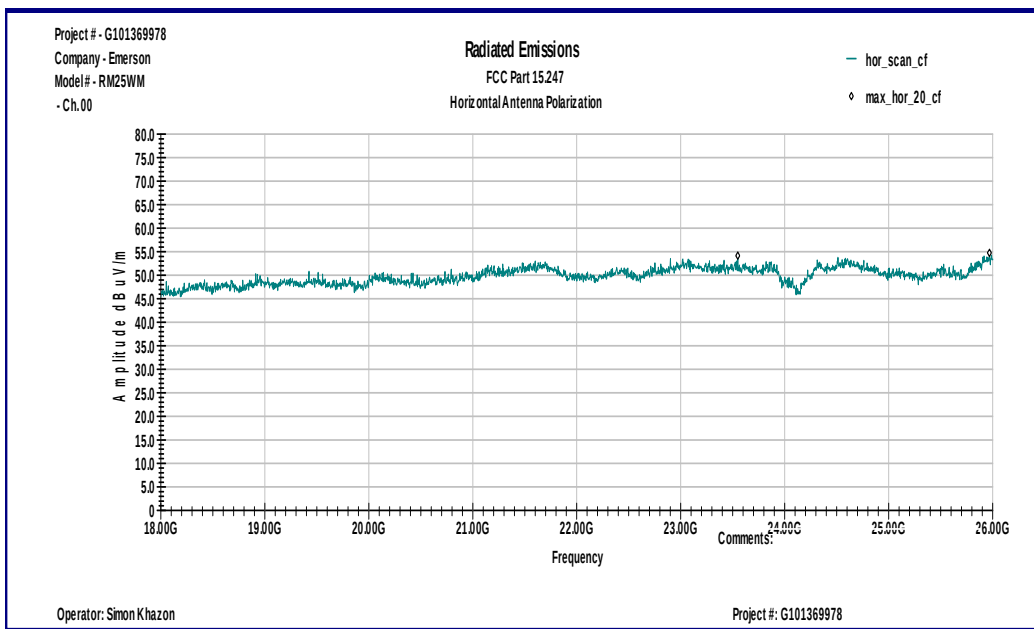
Graph 3.5.5



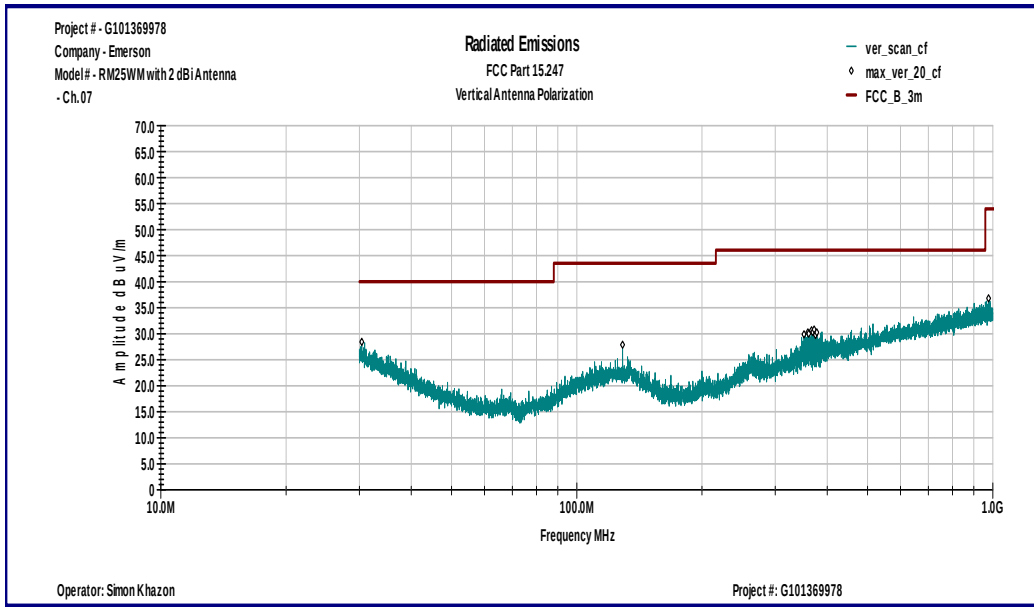
Graph 3.5.6



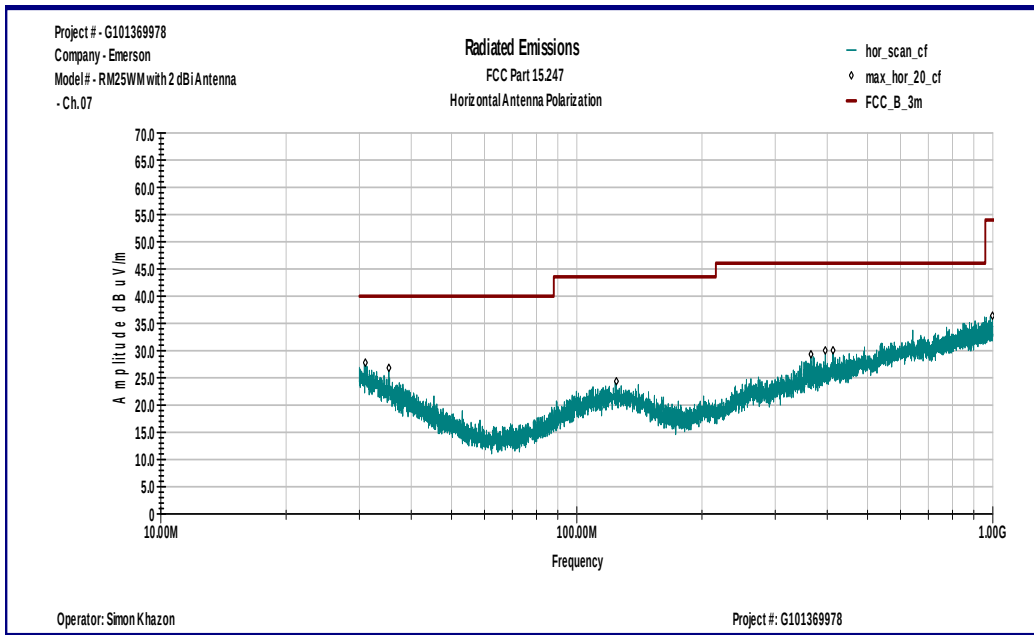
Graph 3.5.7



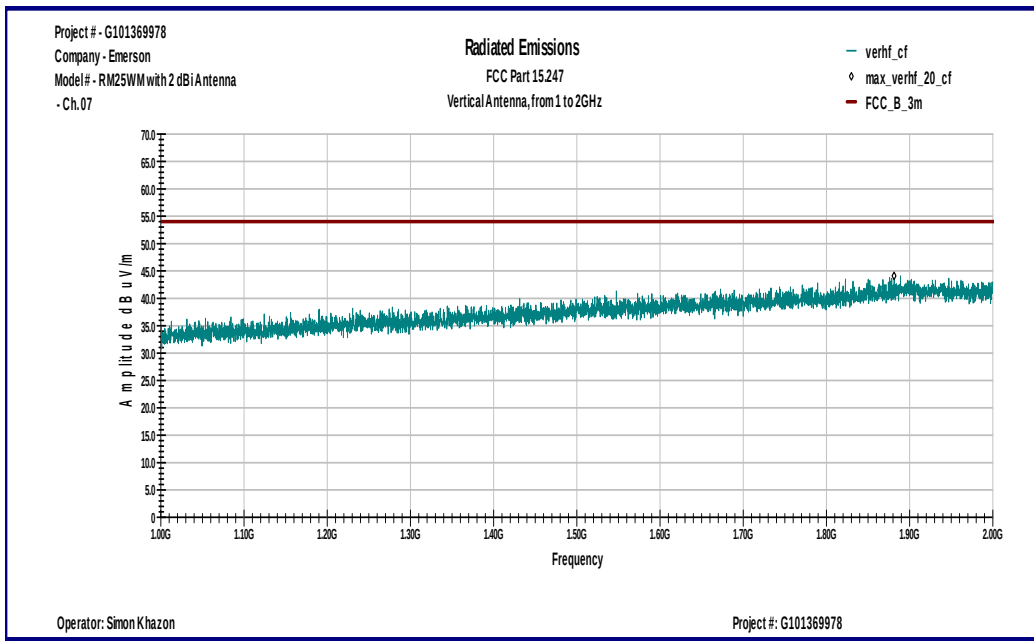
Graph 3.5.8



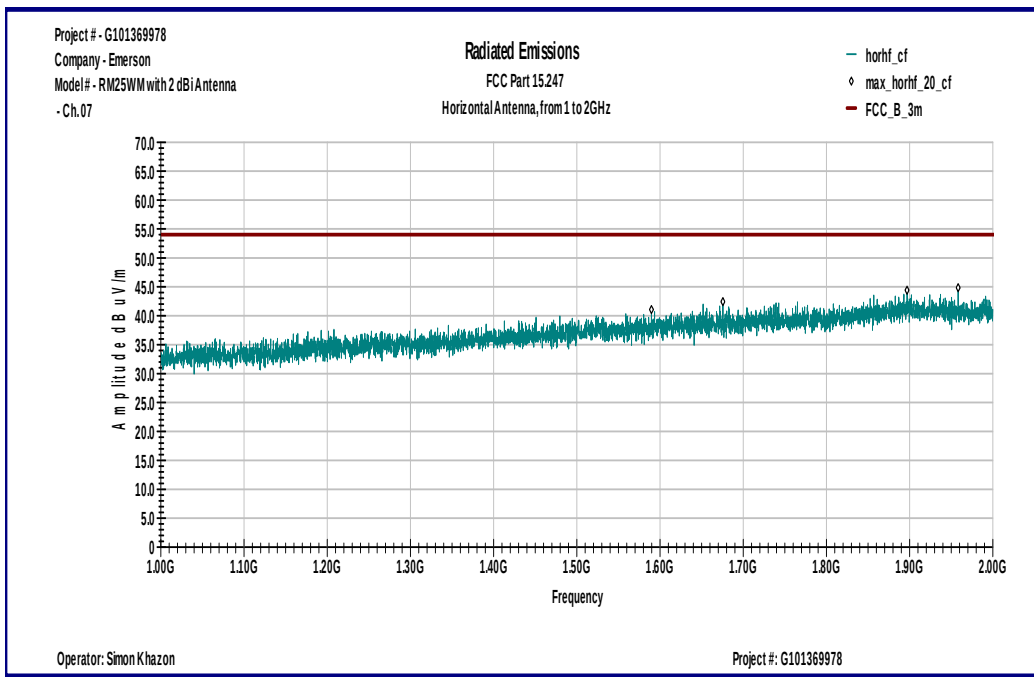
Graph 3.5.9



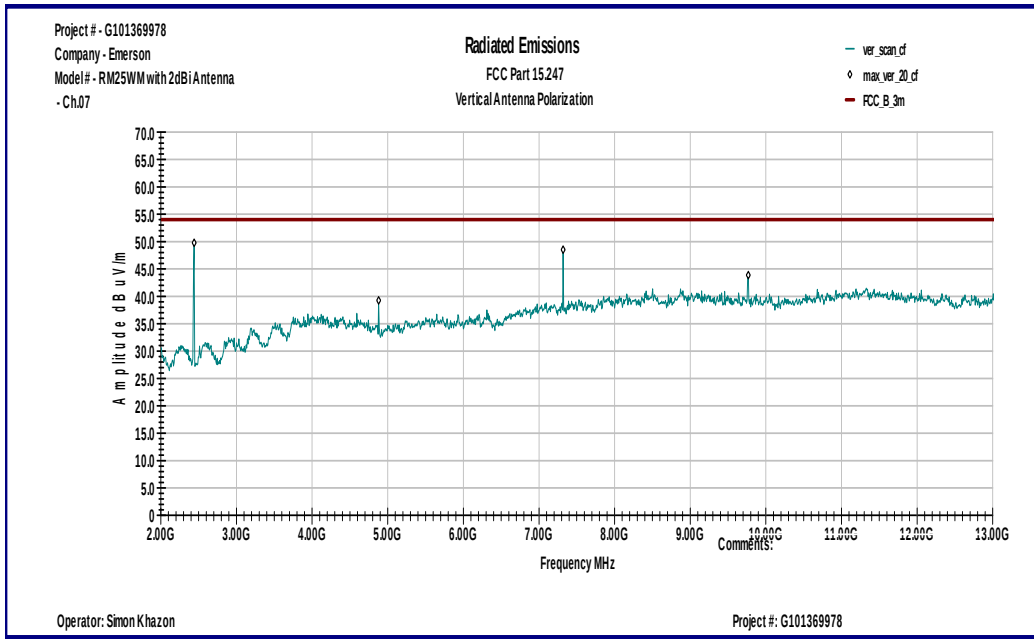
Graph 3.5.10



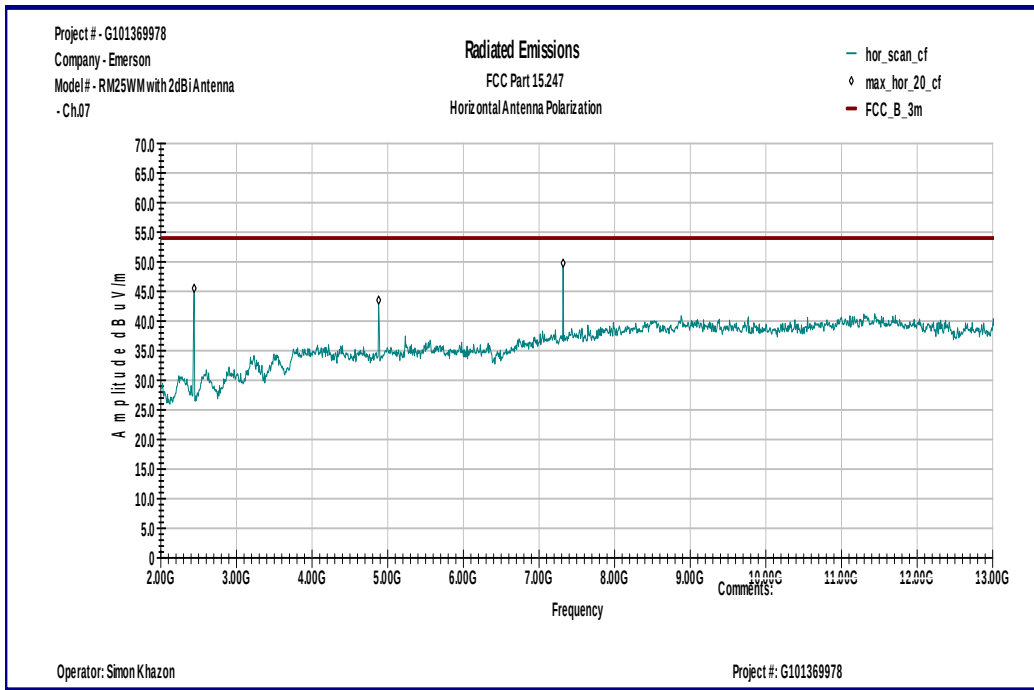
Graph 3.5.11



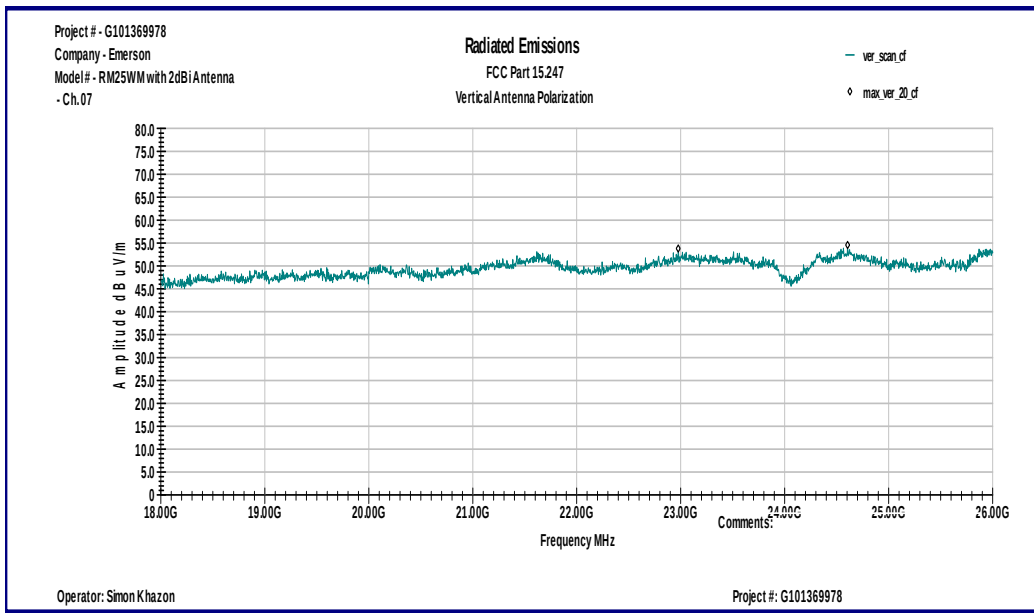
Graph 3.5.12



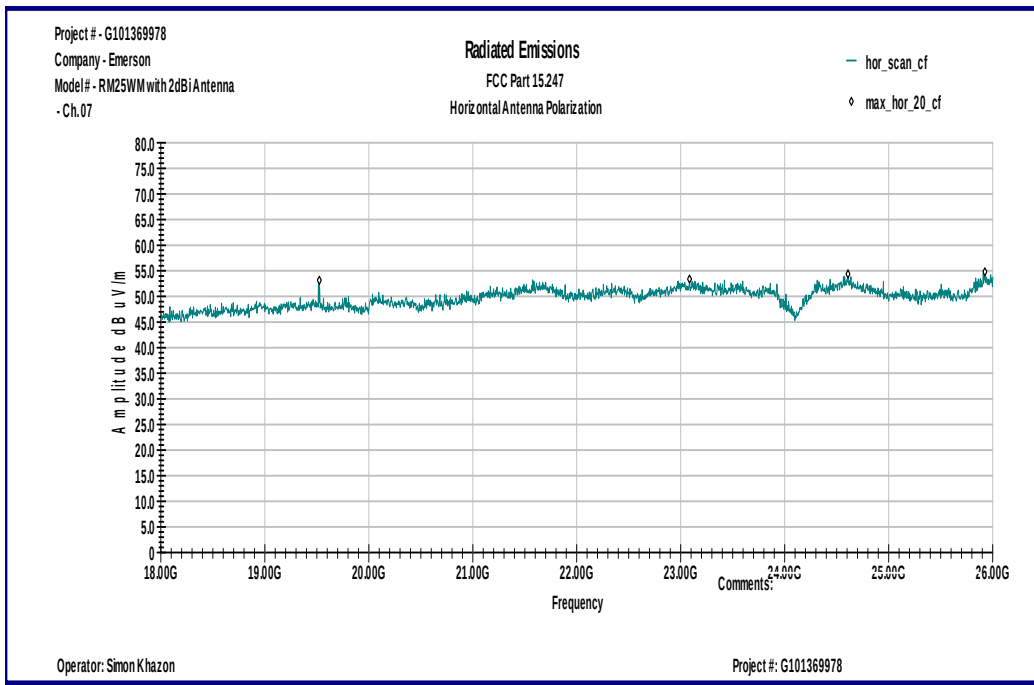
Graph 3.5.13



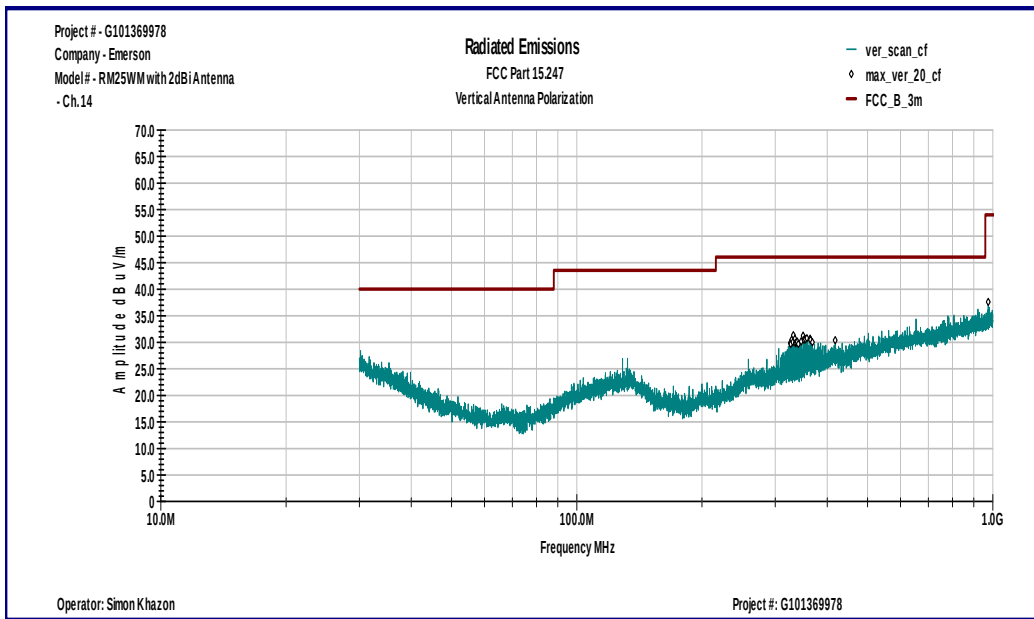
Graph 3.5.14



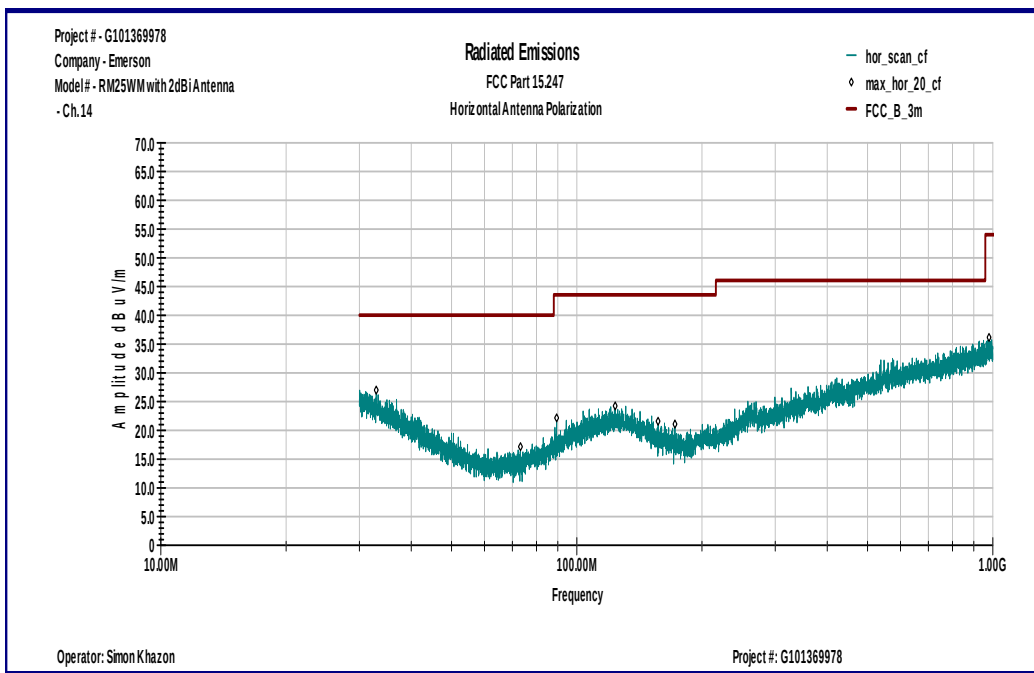
Graph 3.5.15



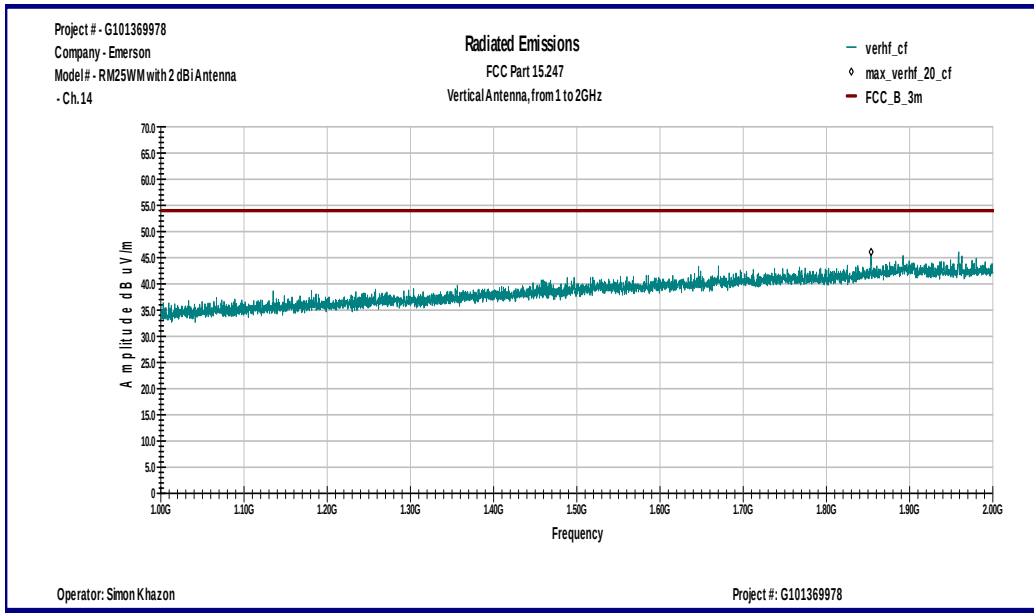
Graph 3.5.16



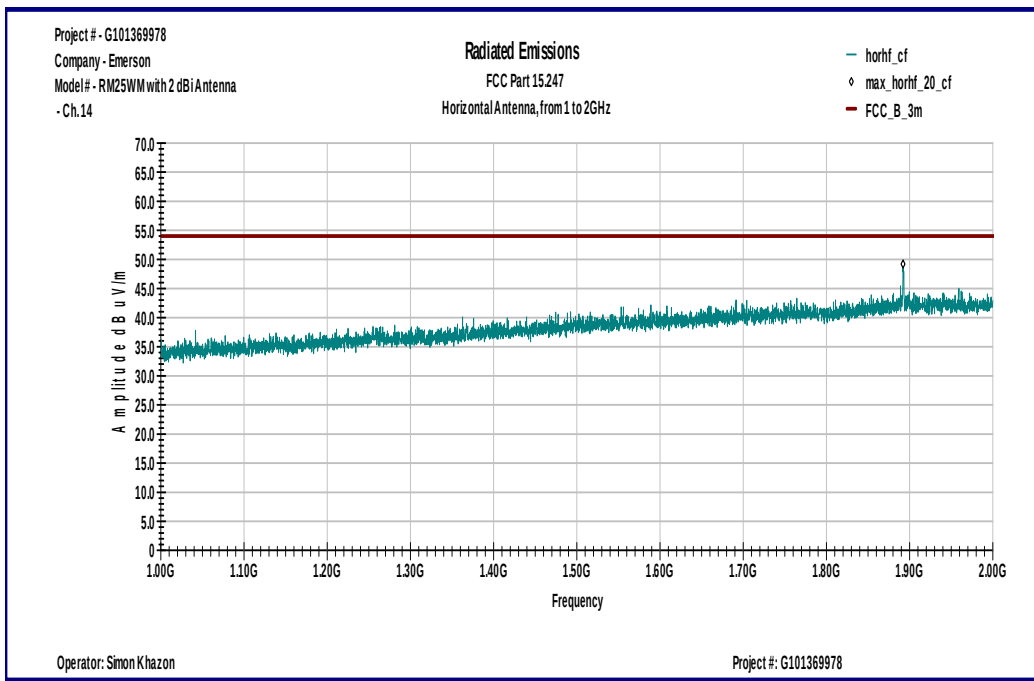
Graph 3.5.17



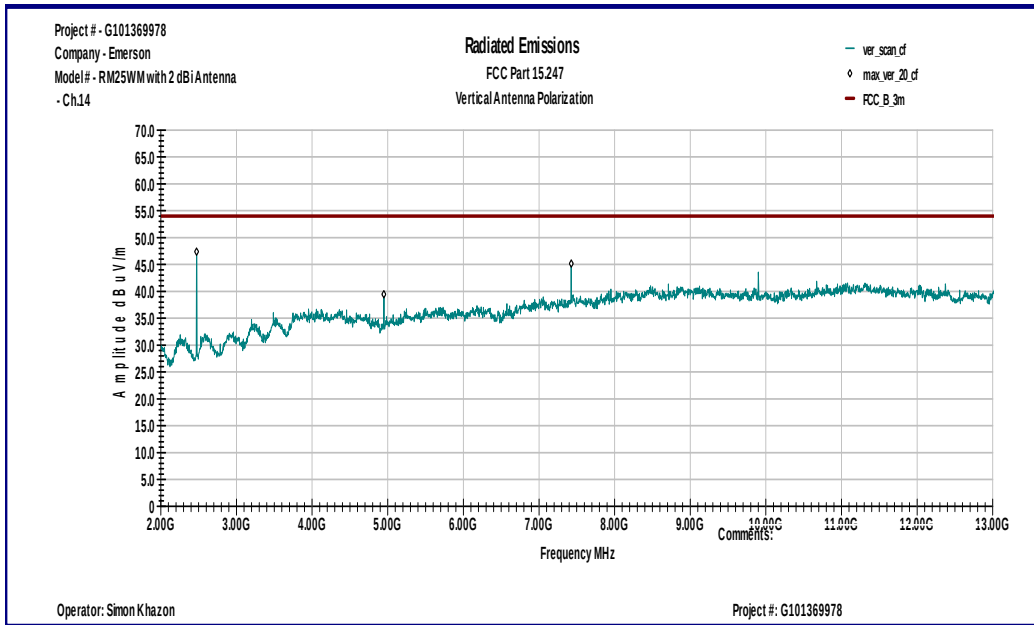
Graph 3.5.18



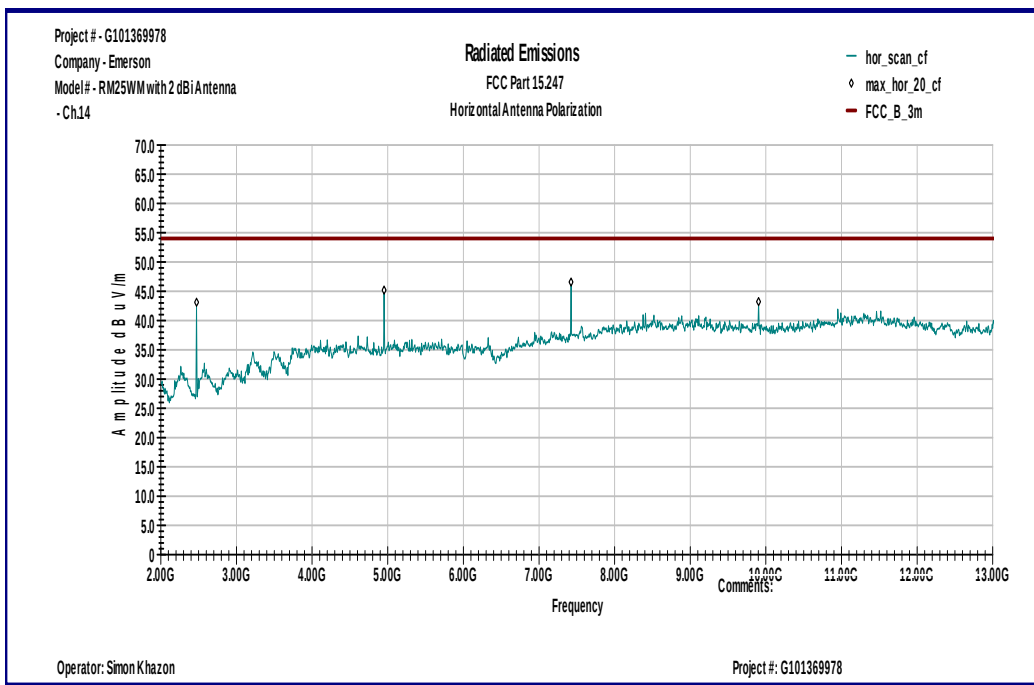
Graph 3.5.19



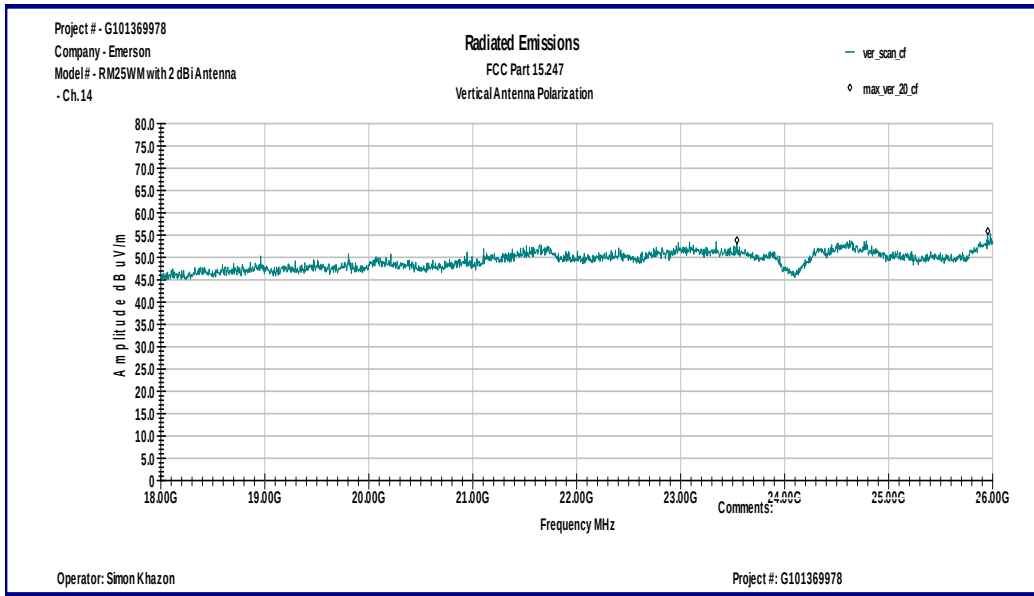
Graph 3.5.20



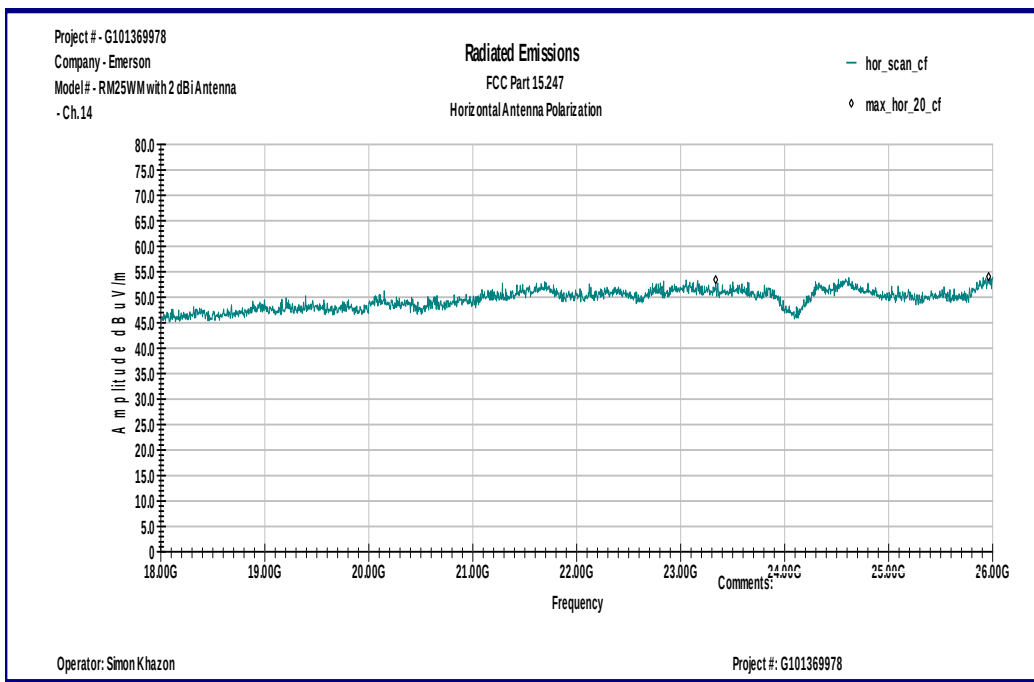
Graph 3.5.21



Graph 3.5.22



Graph 3.5.23



Graph 3.5.24

Date:	October 18-22. 2013	Result: Pass
Standard:	FCC part 15.247(d)	
Tested by:	Simon Khazon	
Test Point:	Enclosure with 8dBi Antenna	
Operation mode:	See Page 5	
Note:	Frequency Range 30-1000MHz	

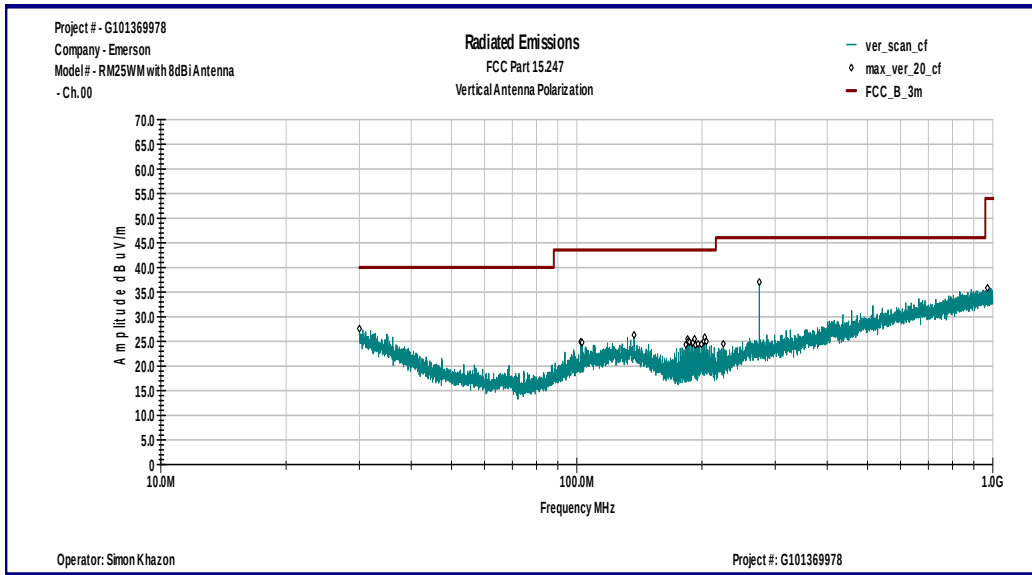
Table 3.5.3

Frequency	Ant. Polarity	Peak Reading dBμV	Total C.F. dB1/m	Total at 3m dBμV/m	Limit dBμV/m	Margin dB
Lower Channel						
30.018 MHz	V	7.4	20.2	27.6	40.0	-12.4
184.68 MHz	V	14.2	11.2	25.5	43.5	-18.1
191.94 MHz	V	14.0	11.5	25.5	43.5	-18.0
274.76 MHz	V	21.6	15.4	37.0	46.0	-9.0
30.211 MHz	H	7.7	20.1	27.8	40.0	-12.2
39.335 MHz	H	10.1	15.0	25.0	40.0	-15.0
420.02 MHz	H	9.7	19.6	29.3	46.0	-16.7
Middle Channel						
30.333 MHz	V	8.2	20.0	28.3	40.0	-11.7
132.43 MHz	V	12.4	13.8	26.1	43.5	-17.4
197.48 MHz	V	13.4	12.0	25.4	43.5	-18.1
201.13 MHz	V	12.5	12.2	24.7	43.5	-18.8
30.035 MHz	H	7.1	20.2	27.3	40.0	-12.7
188.38 MHz	H	15.0	11.3	26.3	43.5	-17.2
195.6 MHz	H	14.7	11.8	26.5	43.5	-17.0
Upper Channel						
30.474 MHz	V	7.9	19.9	27.9	40.0	-12.2
132.43 MHz	V	11.9	13.8	25.7	43.5	-17.8
190.17 MHz	V	13.3	11.4	24.7	43.5	-18.8
197.48 MHz	V	12.5	12.0	24.5	43.5	-19.0
32.071 MHz	H	9.2	18.9	28.1	40.0	-11.9
188.38 MHz	H	15.4	11.3	26.7	43.5	-16.8
462.83 MHz	H	10.3	19.9	30.1	46.0	-15.9

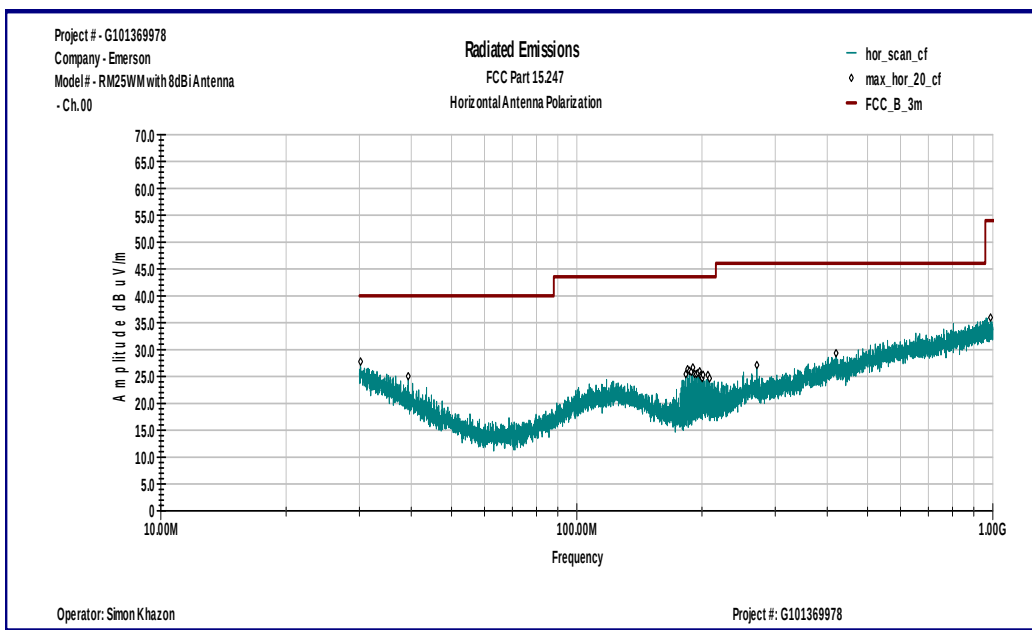
Date:	October 18-22. 2013	Result: Pass
Standard:	FCC part 15.247(d)	
Tested by:	Simon Khazon	
Test Point:	Enclosure with 8dBi Antenna	
Operation mode:	See Page 5	
Note:	Frequency Range 1-26GHz	

Table 3.5.4

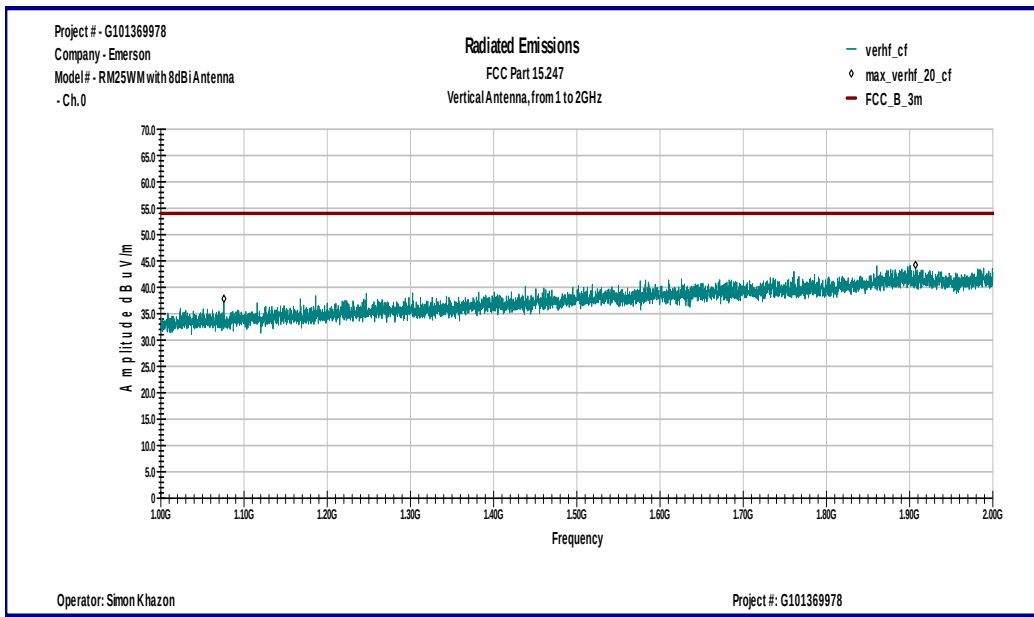
Frequency MHz	Antenna Polarity	Peak Reading dBμV	Total C.F. dB1/m	Pre-Amp. Gain (dB)	Total at 3m dBμV/m	Limit dBμV/m	Margin dB
Lower Channel							
4.816 GHz	V	45.3	37.2	42.0	40.5	54.0	-13.5
7.216 GHz	V	53.8	40.9	41.5	53.2	54.0	-0.8
4.816 GHz	H	46.6	37.1	42.0	41.7	54.0	-12.3
7.216 GHz	H	48.8	40.7	41.5	48.0	54.0	-6.0
Middle Channel							
4.88 GHz	V	45.5	37.3	42.0	40.8	54.0	-13.2
7.32 GHz	V	49.3	41.2	41.4	49.1	54.0	-4.9
9.768 GHz	V	44.6	44.1	41.1	47.6	54.0	-6.4
4.88 GHz	H	49.5	37.2	42.0	44.7	54.0	-9.3
7.32 GHz	H	44.4	41.0	41.4	44.0	54.0	-10.0
11.296 GHz	H	37.7	46.3	41.2	42.8	54.0	-11.1
Upper Channel							
7.424 GHz	V	47.1	41.5	41.2	47.4	54.0	-6.6
9.904 GHz	V	41.0	44.3	41.3	44.1	54.0	-9.9
4.952 GHz	H	48.4	37.3	41.9	43.8	54.0	-10.2
7.424 GHz	H	42.9	41.3	41.2	43.0	54.0	-11.0
9.904 GHz	H	41.1	44.2	41.3	44.01	53.98	-9.97



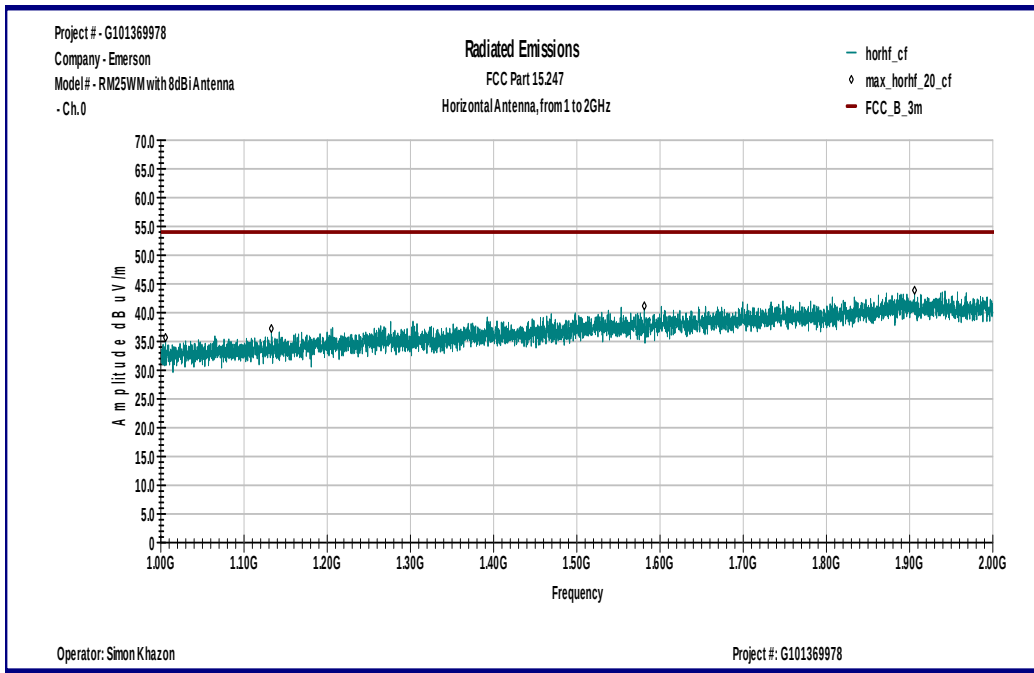
Graph 3.5.25



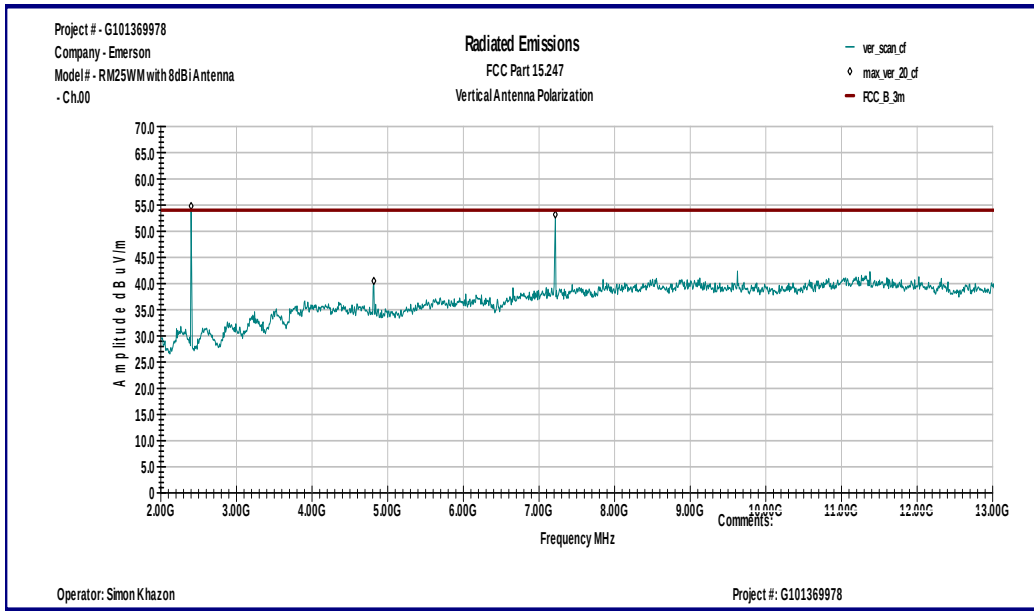
Graph 3.5.26



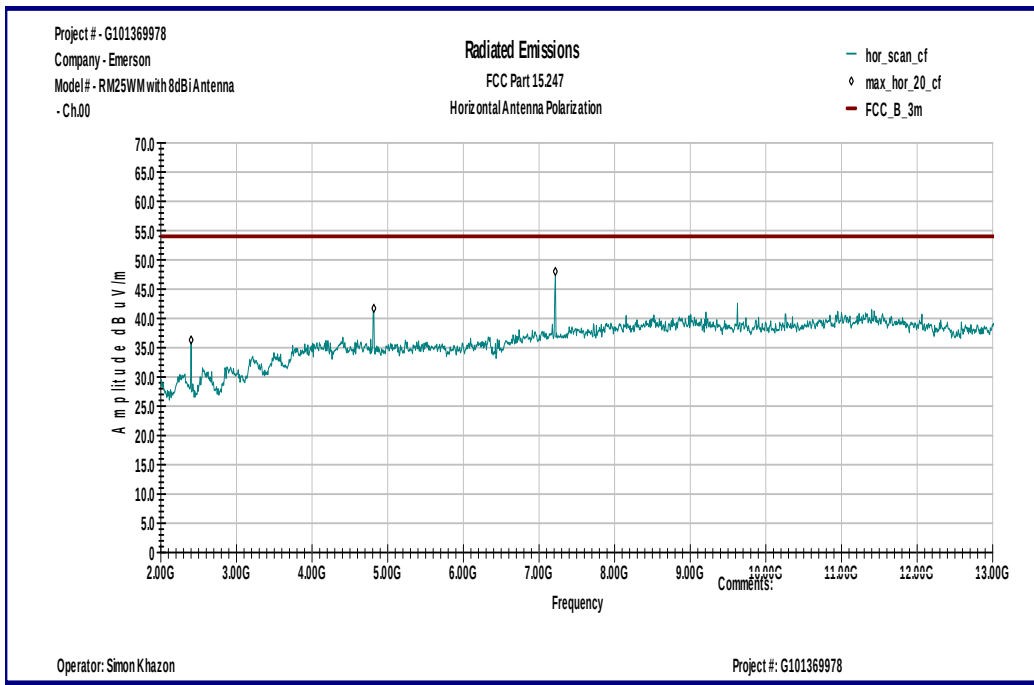
Graph 3.5.27



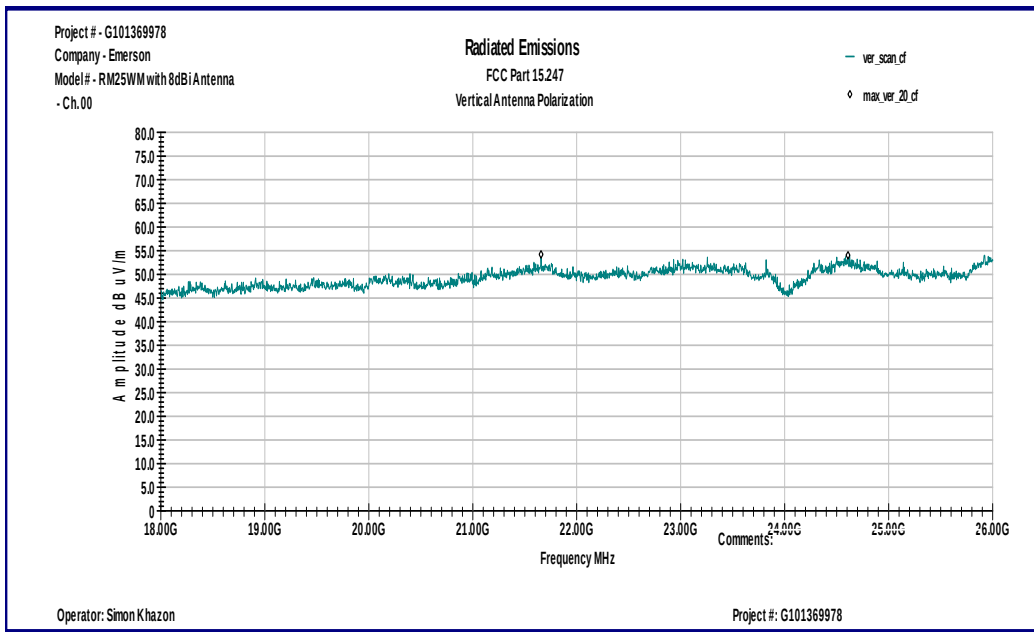
Graph 3.5.28



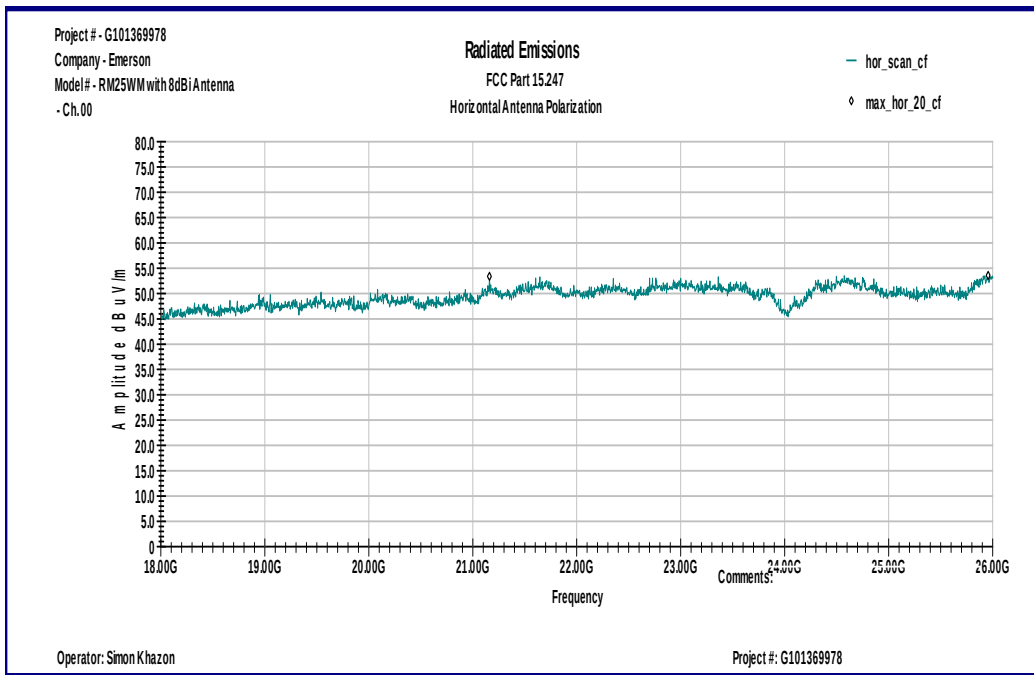
Graph 3.5.29



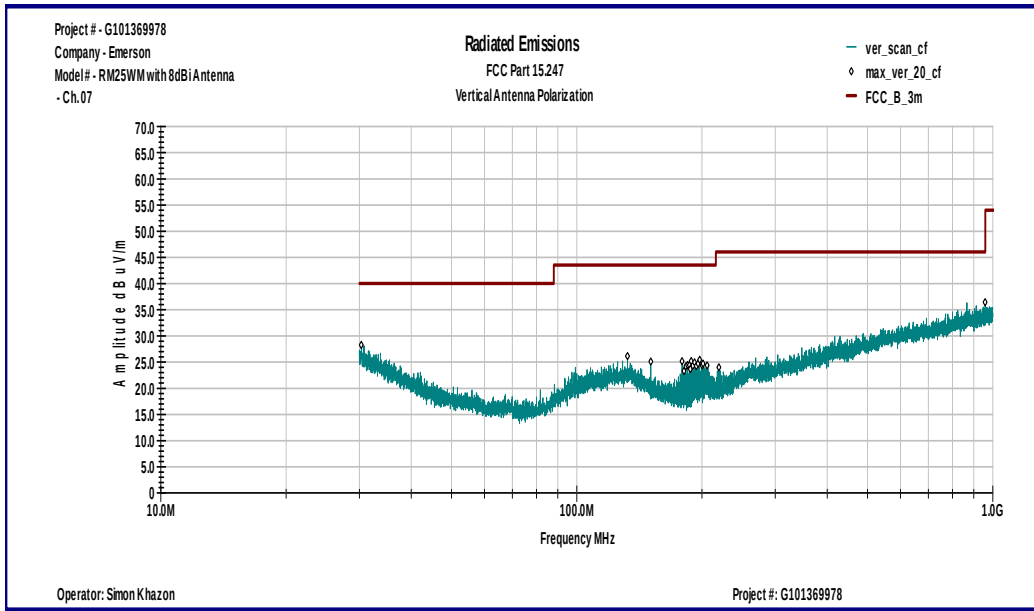
Graph 3.5.30



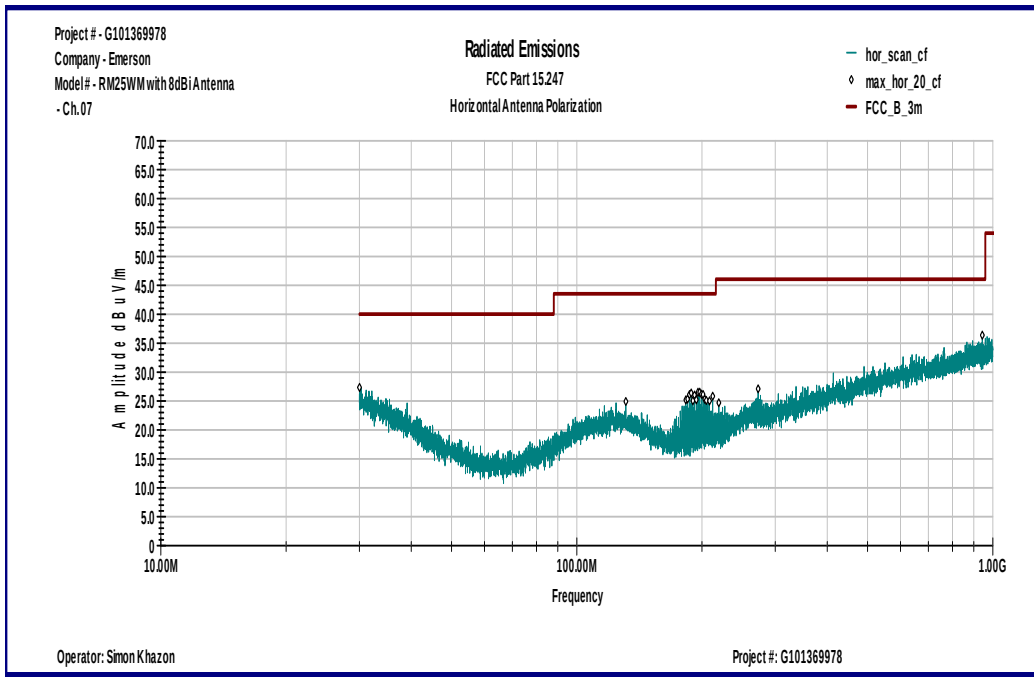
Graph 3.5.31



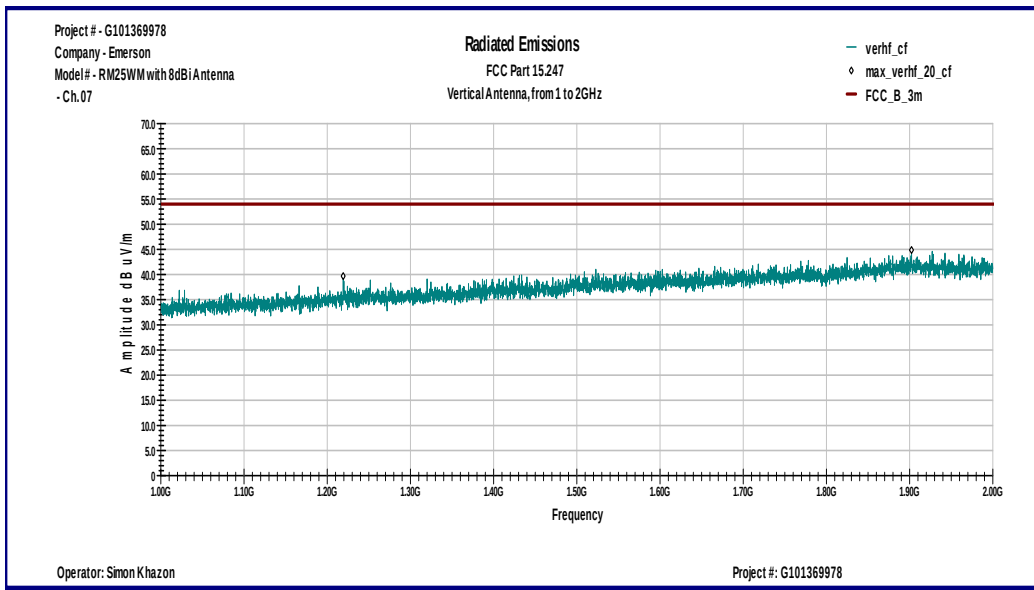
Graph 3.5.32



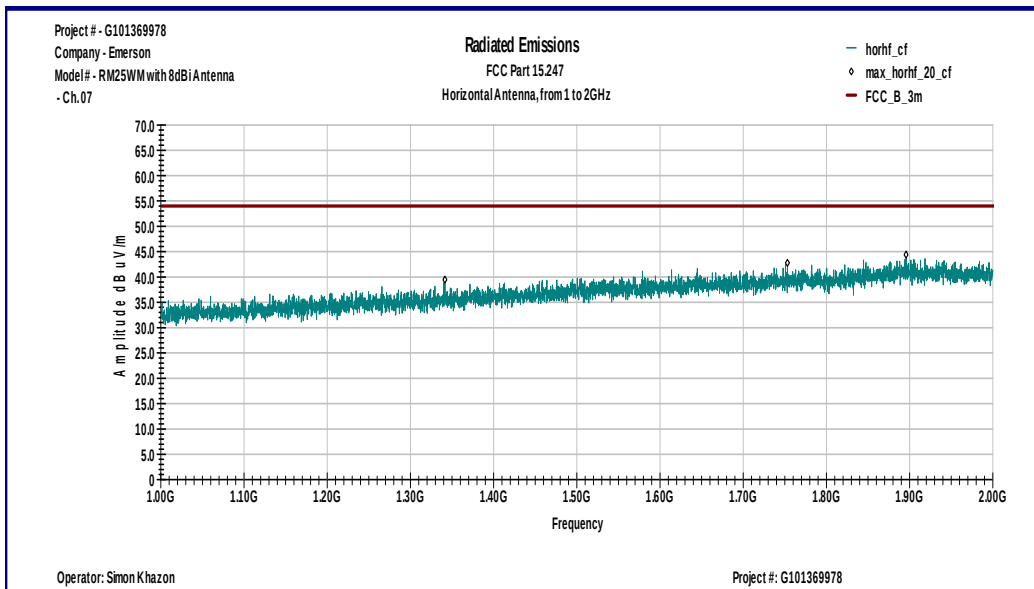
Graph 3.5.33



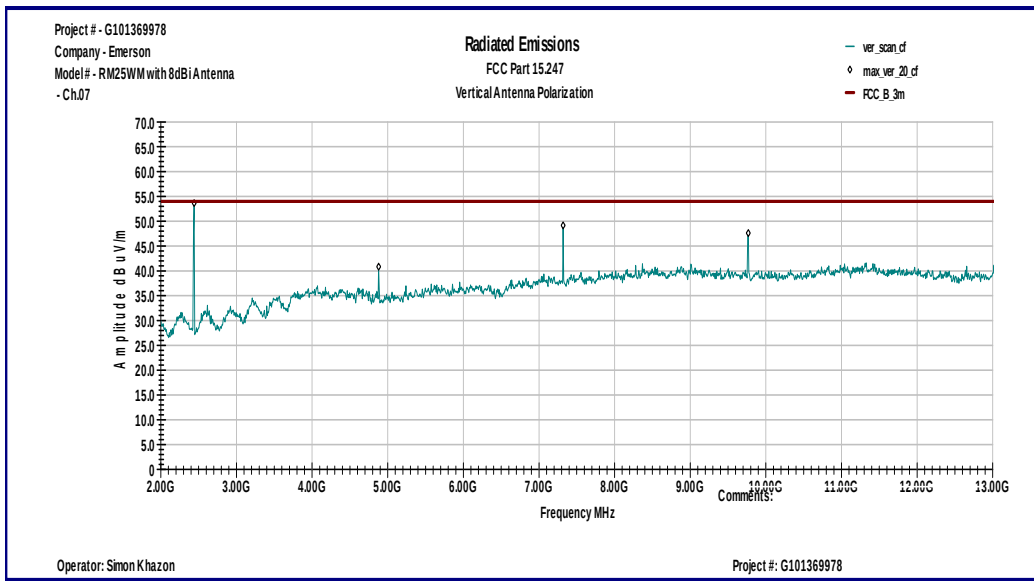
Graph 3.5.34



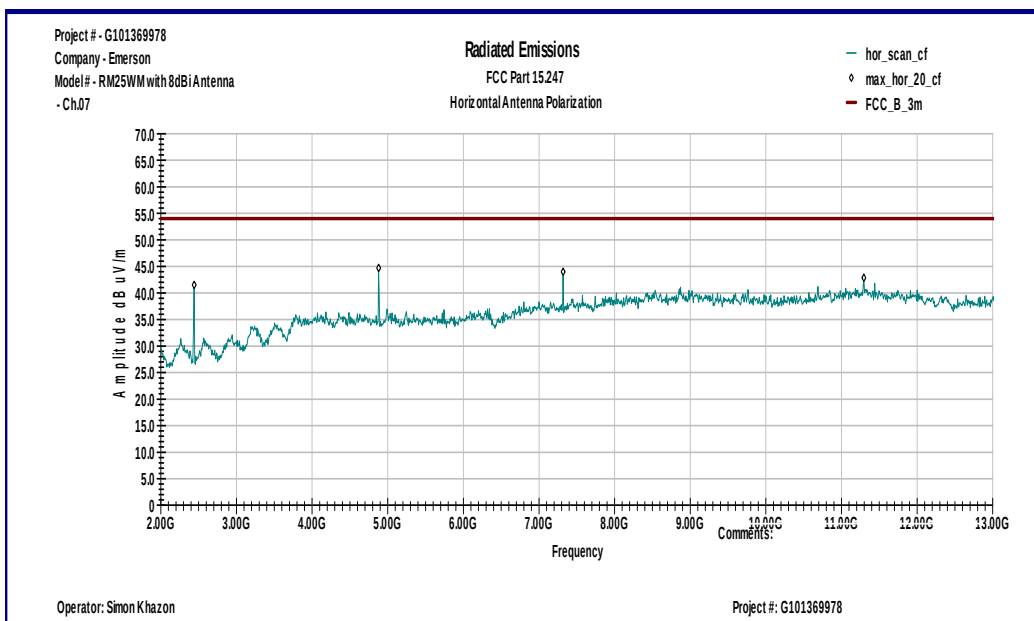
Graph 3.5.35



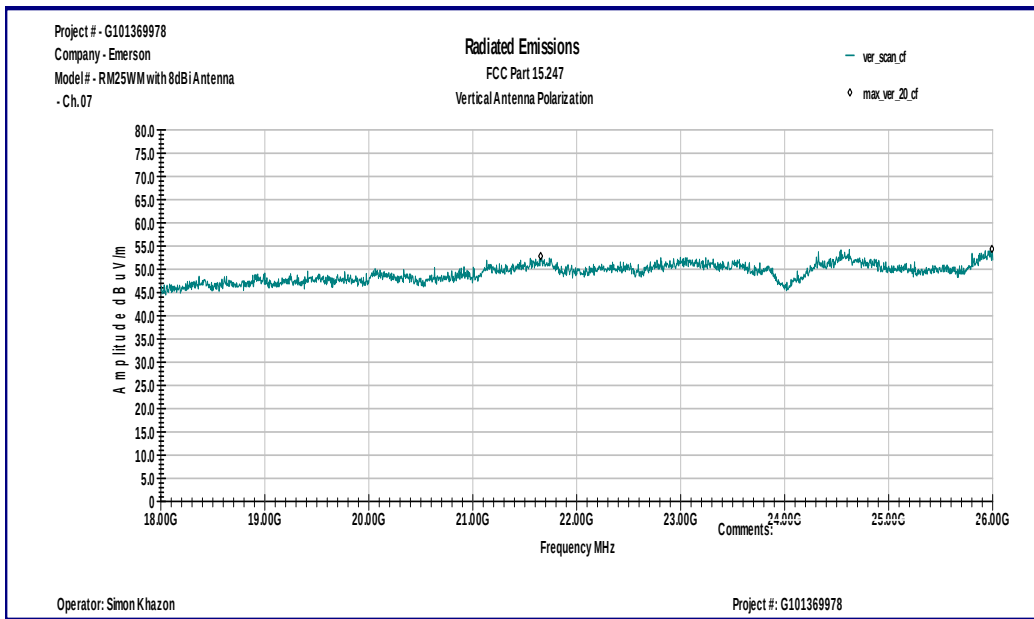
Graph 3.5.36



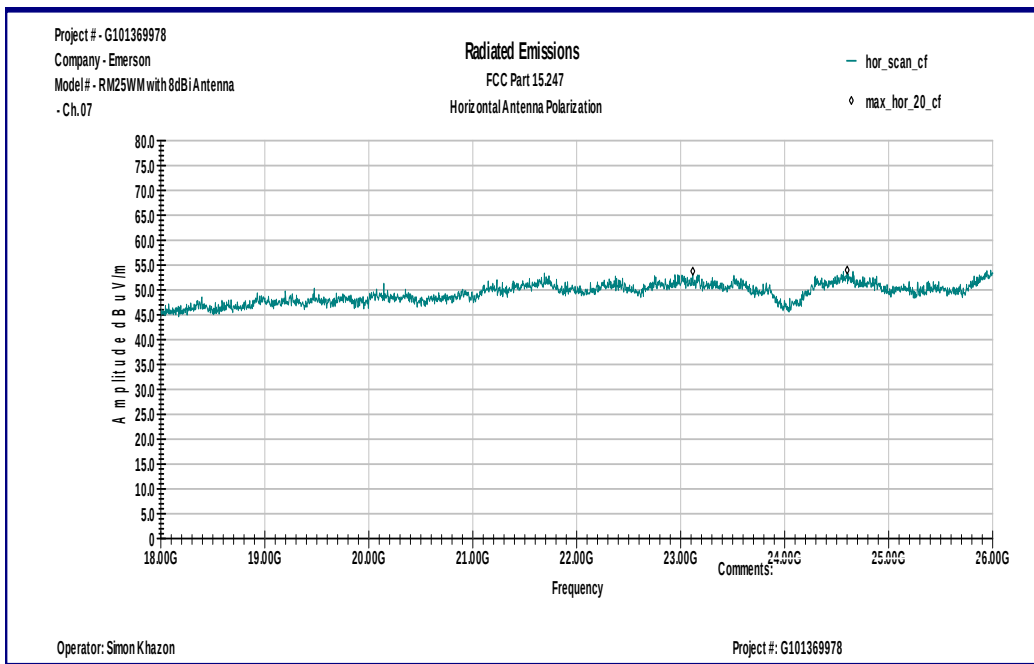
Graph 3.5.37



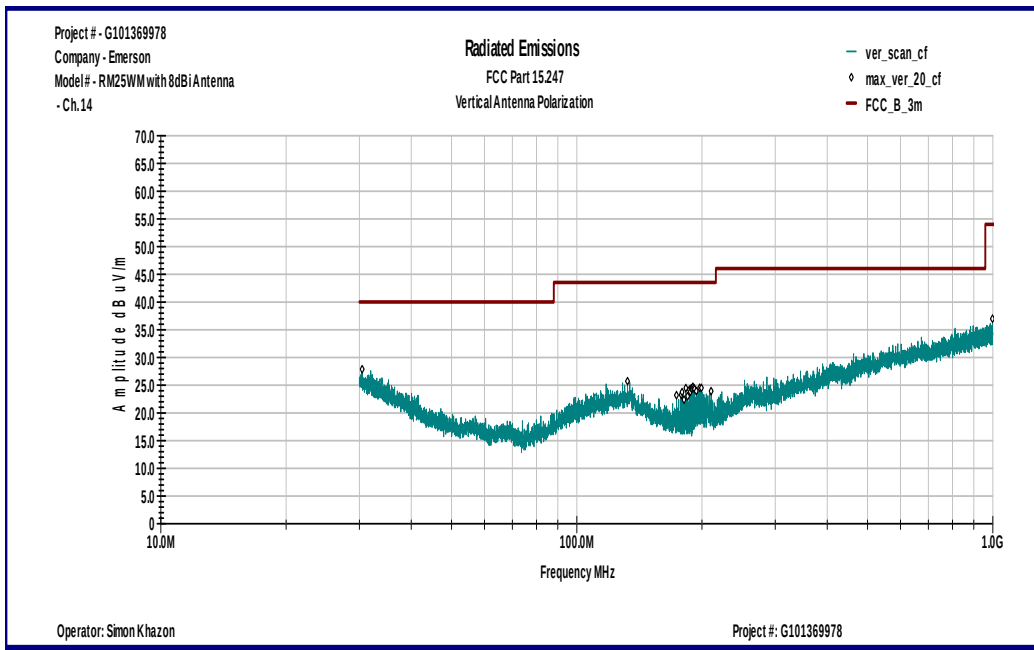
Graph 3.5.38



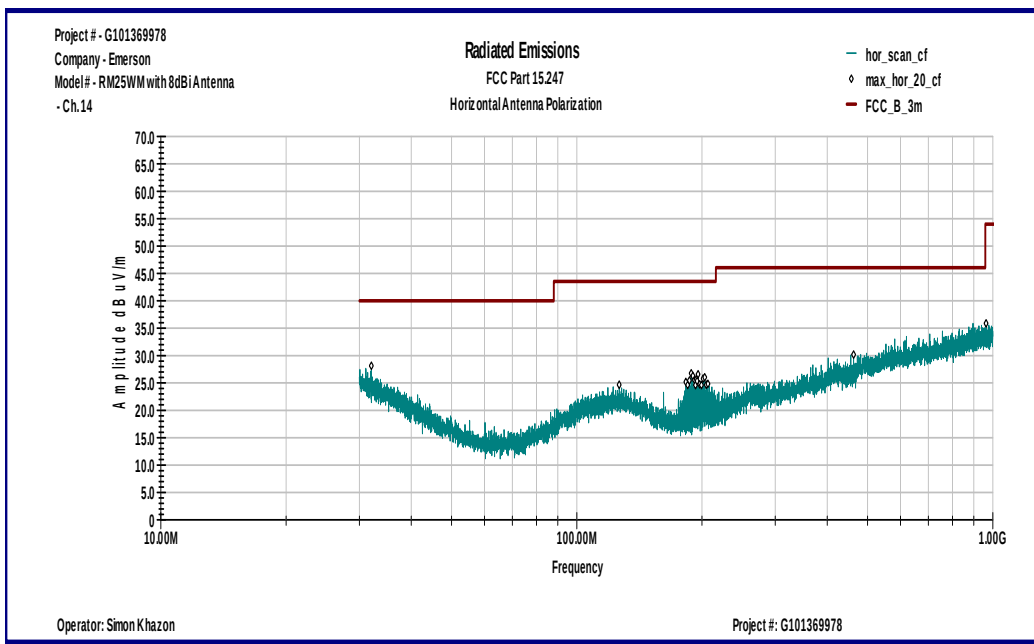
Graph 3.5.39



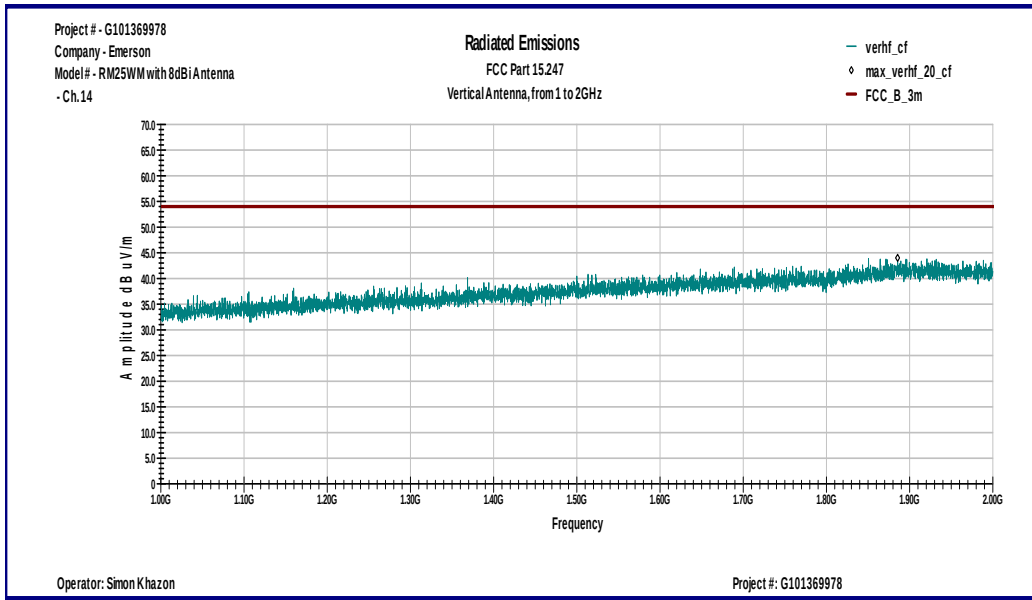
Graph 3.5.40



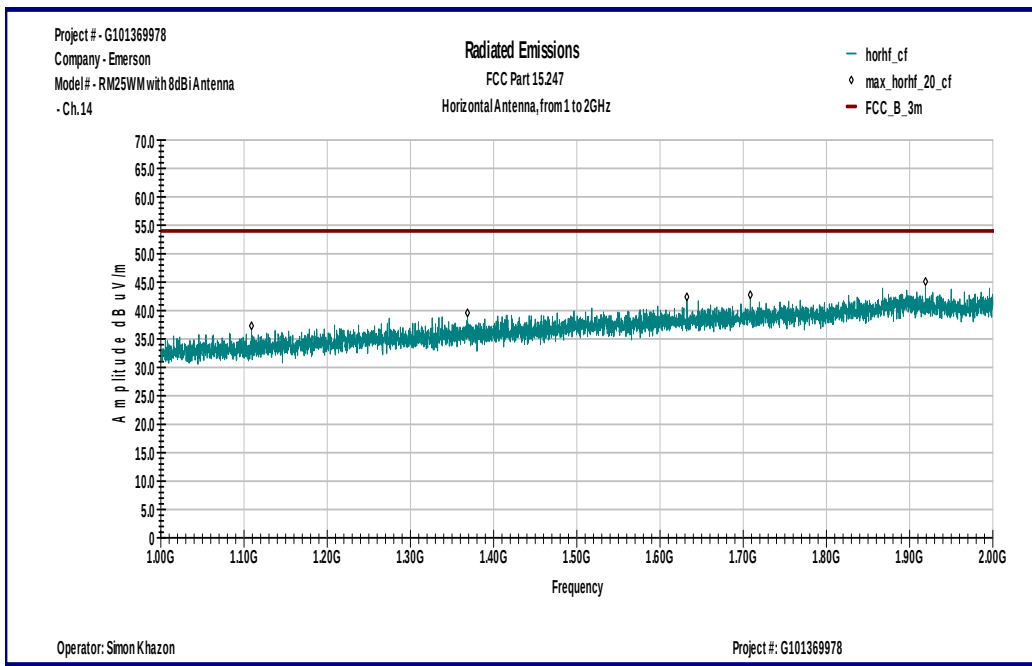
Graph 3.5.41



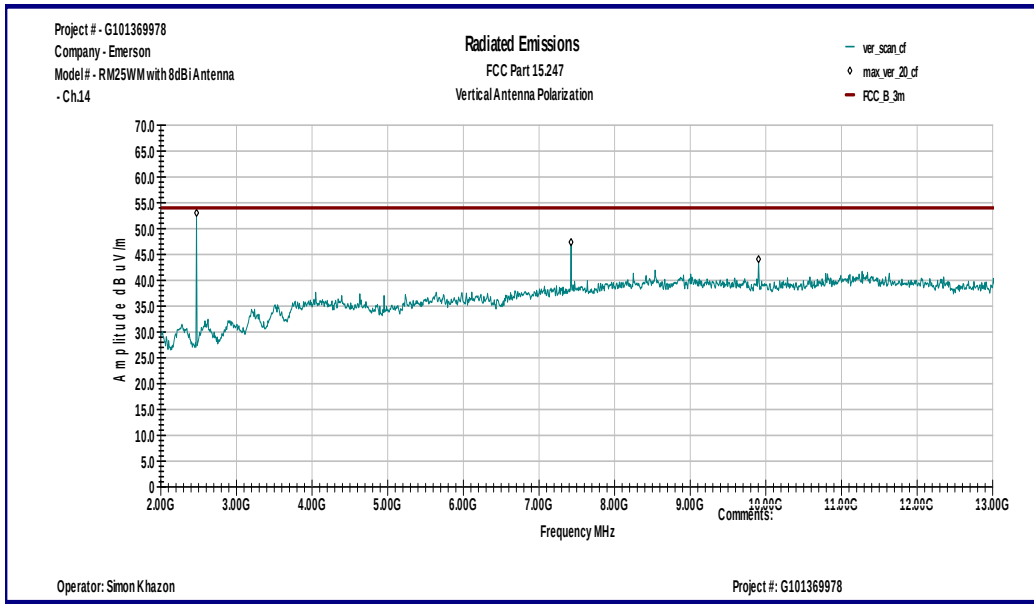
Graph 3.5.42



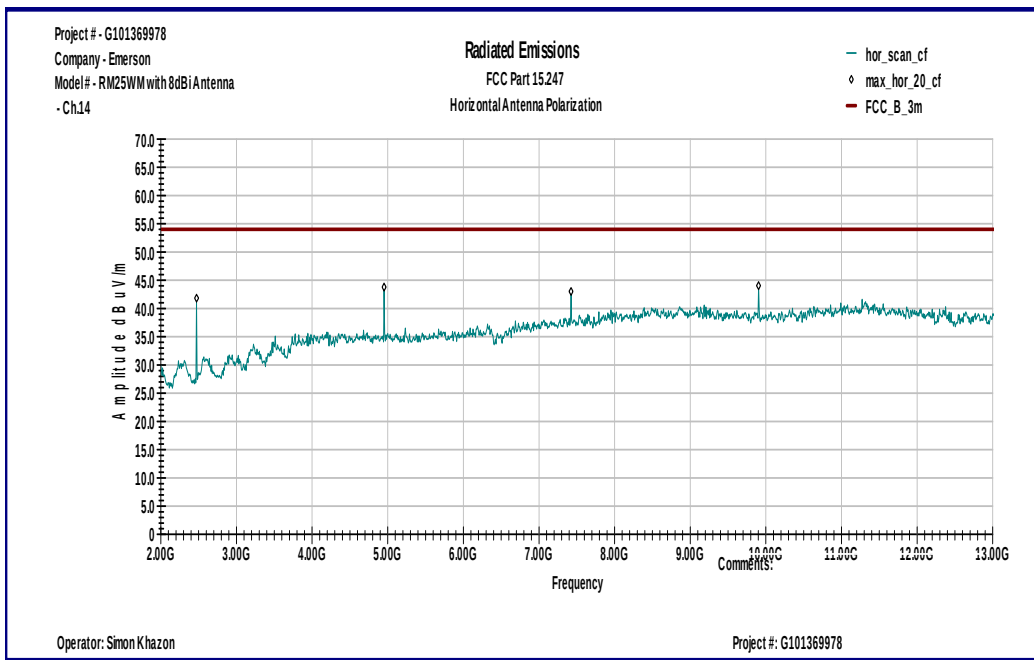
Graph 3.5.43



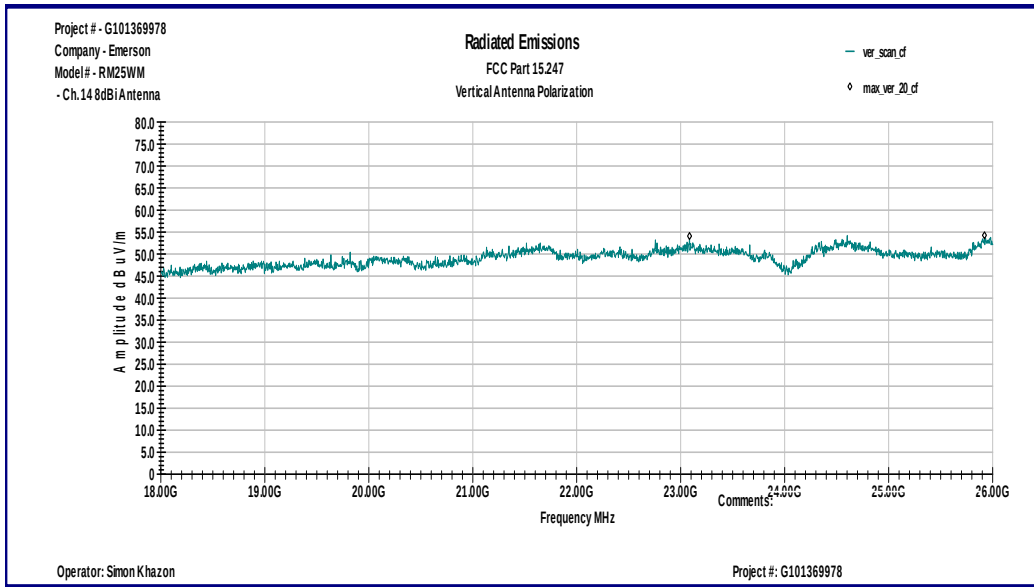
Graph 3.5.44



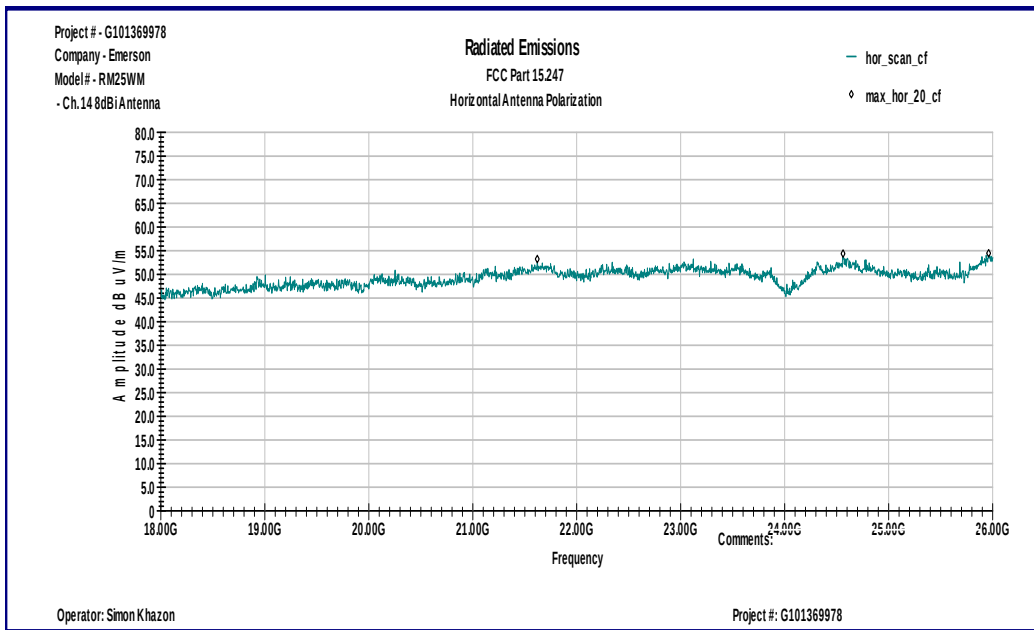
Graph 3.5.45



Graph 3.5.46



Graph 3.5.47



Graph 3.5.48

3.6 RF Exposure Compliance

For 2 dBi Antenna:

The maximum measured antenna conducted power, P is 9.56dBm

The antenna gain, G is 2.0dBi

The maximum EIRP power = P + G

ERP = 9.56+2.0= 11.56dBm, or 0.01432W=14.32mW

The limits for Maximum Permissible Exposure (MPE) for transmitter operating at 2.4Hz, MPE is 1mW/cm², or 10W/m²

S = 10W/m²

The Power Density is related to EIRP with the equation:

$S = \text{EIRP} / 4\pi D^2$, or $10 = 0.01432 / 4\pi D^2$, where D is a separation distance

The minimum safe separation distance, D = 1.06cm, which is below 20cm

For 8 dBi Antenna:

The maximum measured antenna conducted power, P is 9.56dBm

The antenna gain, G is 8.0dBi

The maximum EIRP power = P + G

ERP = 9.56+8.0= 17.56dBm, or 0.05702W=57.02mW

The limits for Maximum Permissible Exposure (MPE) for transmitter operating at 2.4Hz, MPE is 1mW/cm², or 10W/m²

S = 10W/m²

The Power Density is related to EIRP with the equation:

$S = \text{EIRP} / 4\pi D^2$, or $10 = 0.05702 / 4\pi D^2$, where D is a separation distance

The minimum safe separation distance, D = 2.13cm, which is below 20cm

3.7 Transmitter power line conducted emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: N/A

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: dB below the limits

Notes: The EUT is DC powered from internal batteries.

3.8 Receiver/digital device radiated emissions

Test location: ☐ OATS ☒ Anechoic Chamber

Test distance: ☐ 10 meters ☒ 3 meters

Test result: **Pass**

Frequency range: 30MHz-13000MHz

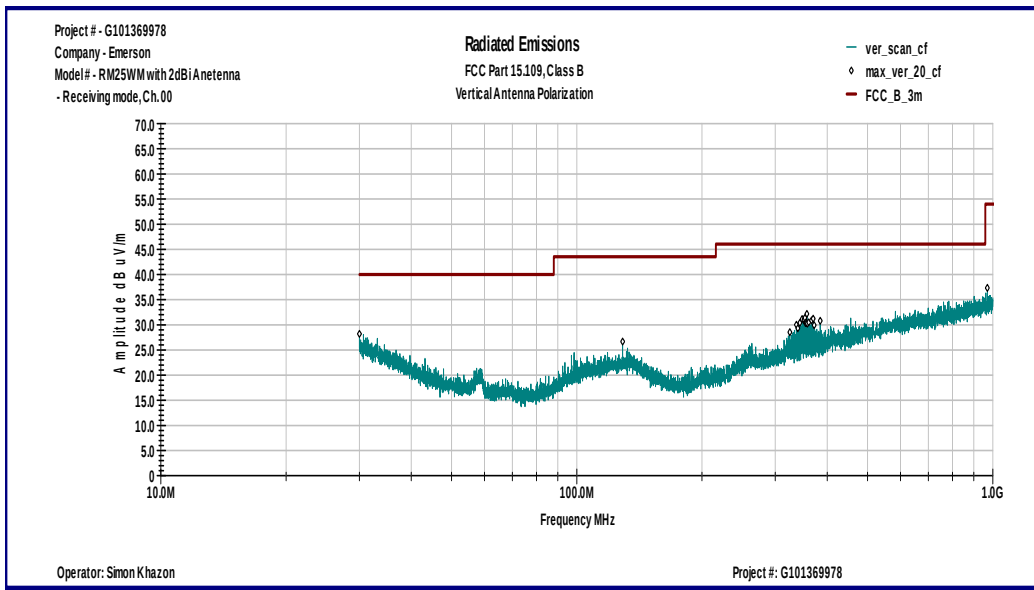
Max. Emissions margin: 11.0dB below the limits

Notes: Signal Generator was used to activate receiver portion of the EUT.
The Signal Generator transmitting frequencies were excluded from the Tables.
No emissions were detected above the ambient noise above 1GHz.
Testing was performed with 2 dBi Antenna at Low, Middle and Upper channels (See Table 3.8.1 and Graphs 3.8.1-3.8.12).
Testing was performed with 8 dBi Antenna at Low, Middle and Upper channels (See Table 3.8.2 and Graphs 3.8.13-3.8.24).

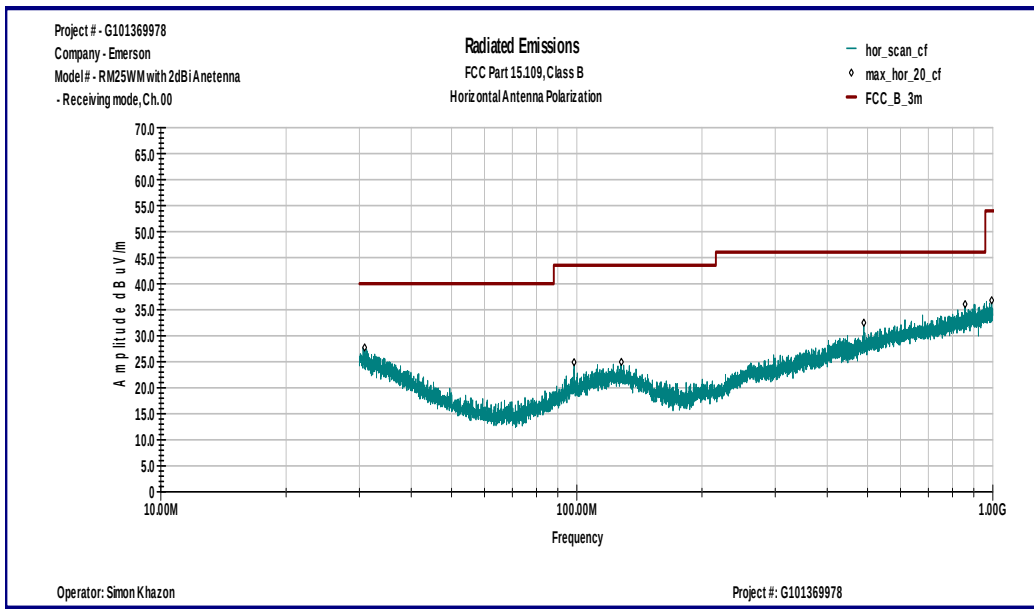
Date:	October 21-23, 2013	Result: Pass
Standard:	FCC Part 15.109, Class B	
Tested by:	Simon Khazon	
Test Point:	Enclosure with 2 dBi Antenna	
Operation mode:	Receiving	
Note:	Frequency Range 30-13000MHz	

Table 3.8.1

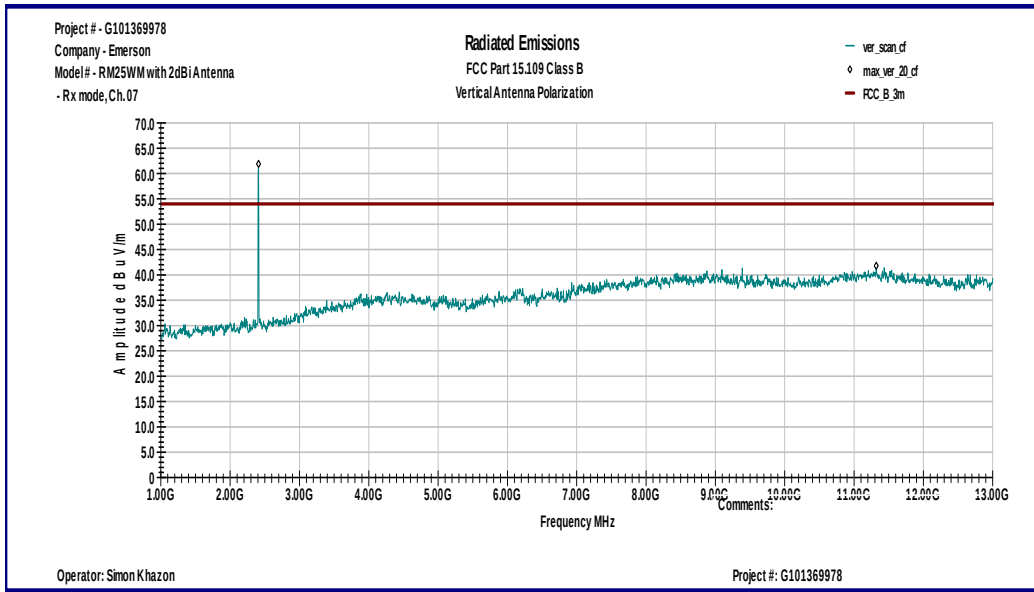
Frequency	Ant. Polarity	Peak Reading dBμV	Total C.F. dB1/m	Total at 3m dBμV/m	Limit dBμV/m	Margin dB
Lower Channel						
30.018 MHz	V	8.0	20.2	28.2	40.0	-11.8
348.25 MHz	V	13.8	17.3	31.1	46.0	-14.9
353.69 MHz	V	13.7	17.7	31.4	46.0	-14.7
370.19 MHz	V	13.4	17.8	31.2	46.0	-14.8
30.895 MHz	H	8.0	19.7	27.7	40.0	-12.3
128.02 MHz	H	11.1	13.9	24.9	43.5	-18.6
489.93 MHz	H	11.9	20.5	32.5	46.0	-13.6
Middle Channel						
31.193 MHz	V	8.8	19.5	28.3	40.0	-11.7
56.362 MHz	V	21.3	7.7	29.0	40.0	-11.0
353.69 MHz	V	13.5	17.7	31.2	46.0	-14.8
359.31 MHz	V	14.2	17.9	32.1	46.0	-13.9
30.842 MHz	H	7.7	19.7	27.5	40.0	-12.5
129.28 MHz	H	10.4	13.9	24.3	43.5	-19.2
239.77 MHz	H	12.4	13.9	26.2	46.0	-19.8
303.68 MHz	H	12.8	16.0	28.9	46.0	-17.2
Upper Channel						
31.105 MHz	V	8.3	19.6	27.9	40.0	-12.1
355.45 MHz	V	14.0	17.8	31.8	46.0	-14.2
359.31 MHz	V	13.9	17.9	31.8	46.0	-14.3
364.75 MHz	V	13.8	17.8	31.6	46.0	-14.4
30.842 MHz	H	8.3	19.7	28.1	40.0	-12.0
98.54 MHz	H	12.2	12.2	24.4	43.5	-19.1
117.36 MHz	H	10.4	13.9	24.3	43.5	-19.3
985.46 MHz	H	9.8	26.2	36.0	54.0	-18.0



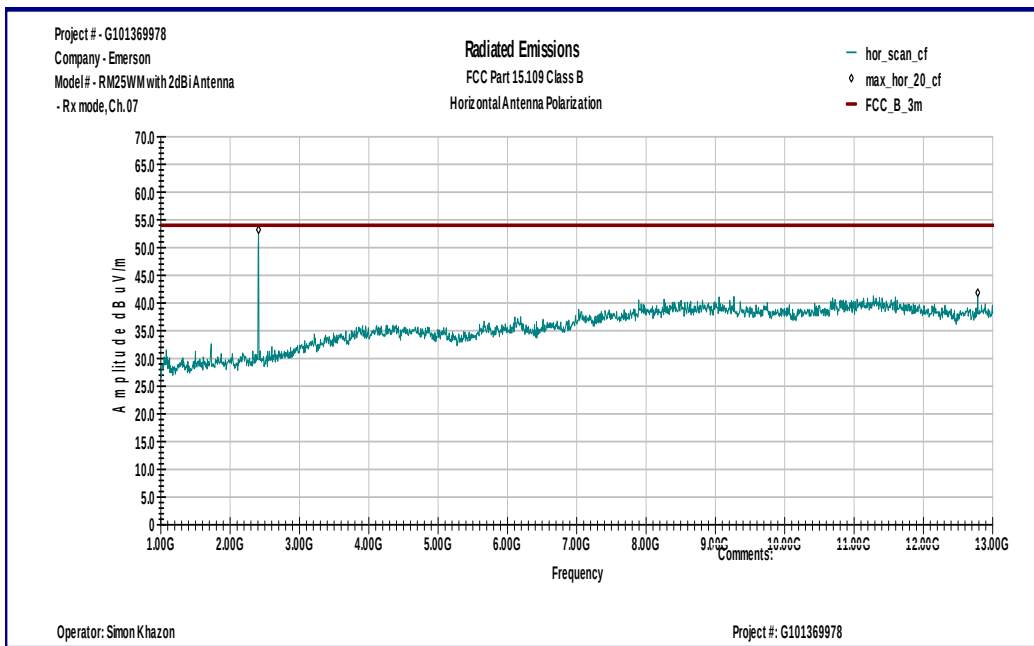
Graph 3.8.1



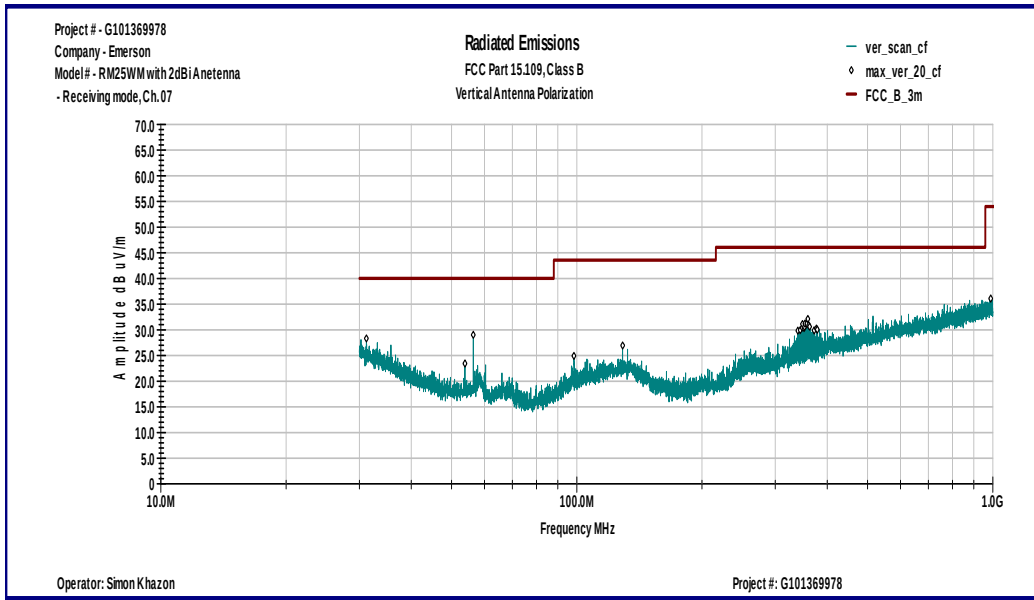
Graph 3.8.2



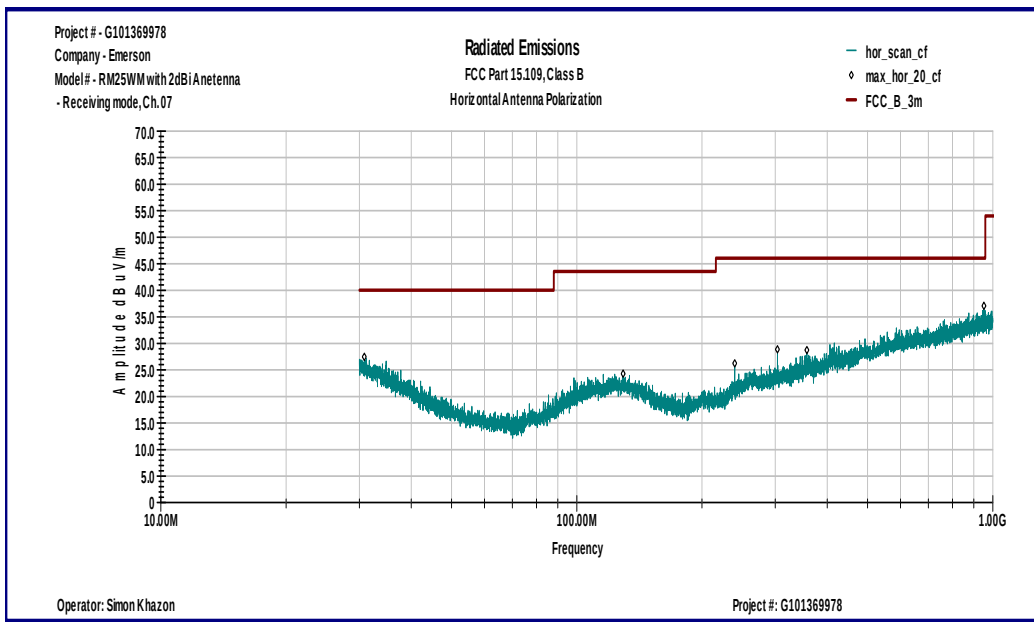
Graph 3.8.3



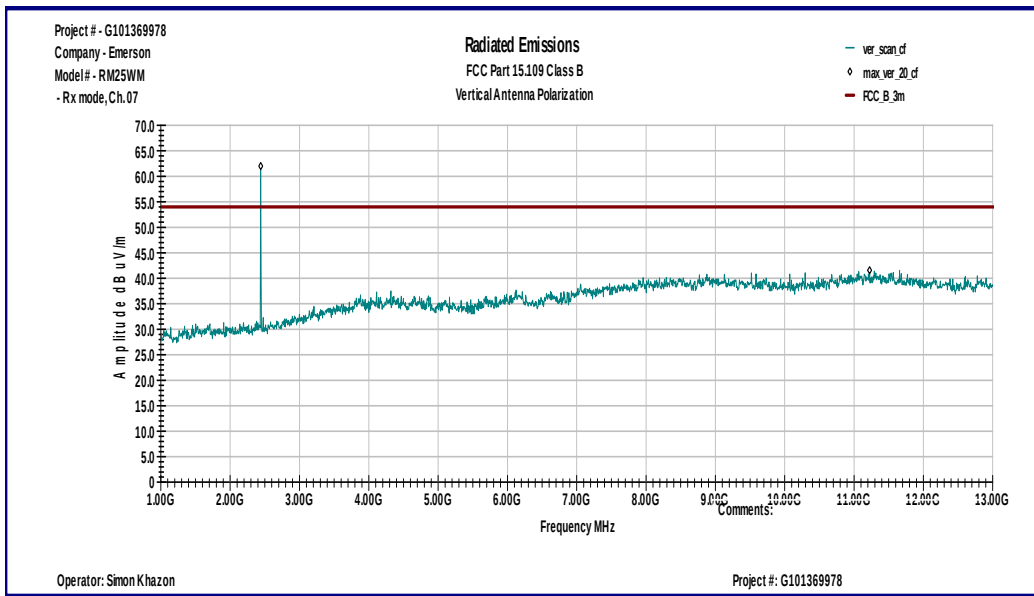
Graph 3.8.4



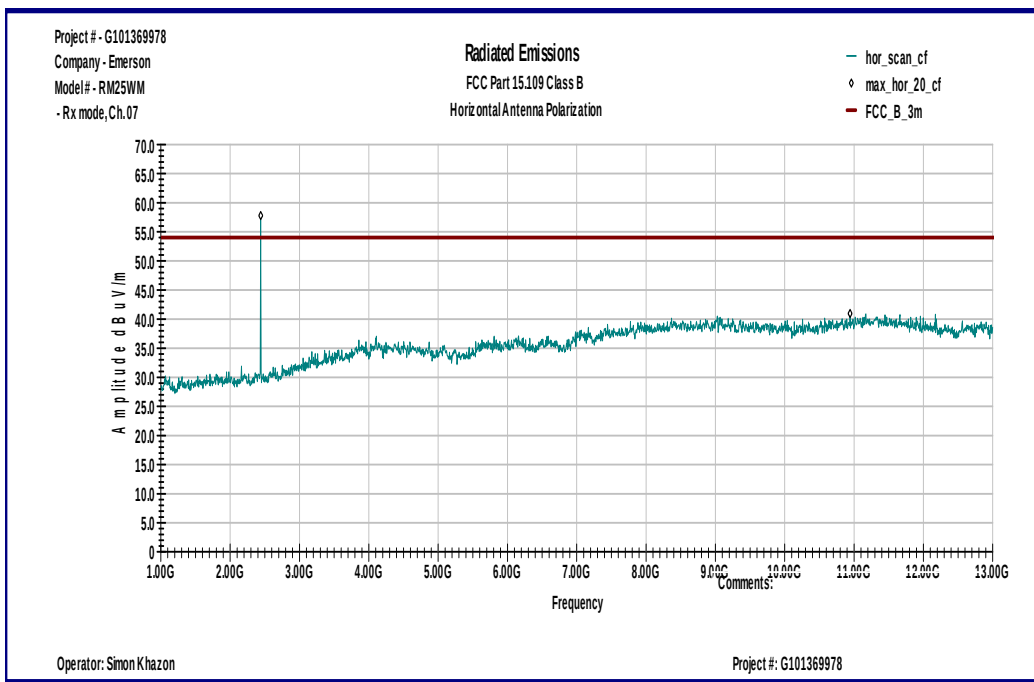
Graph 3.8.5



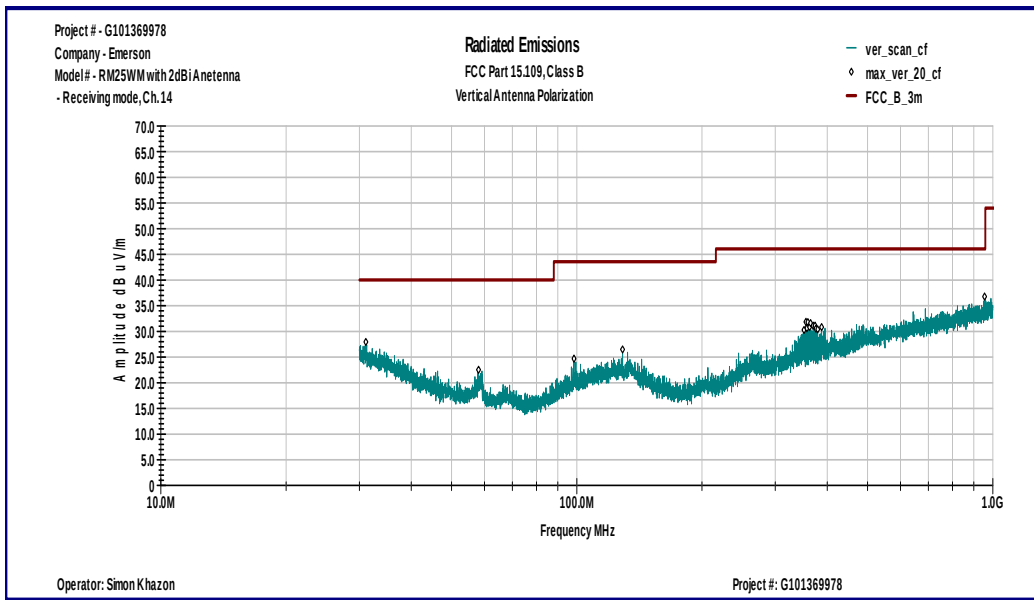
Graph 3.8.6



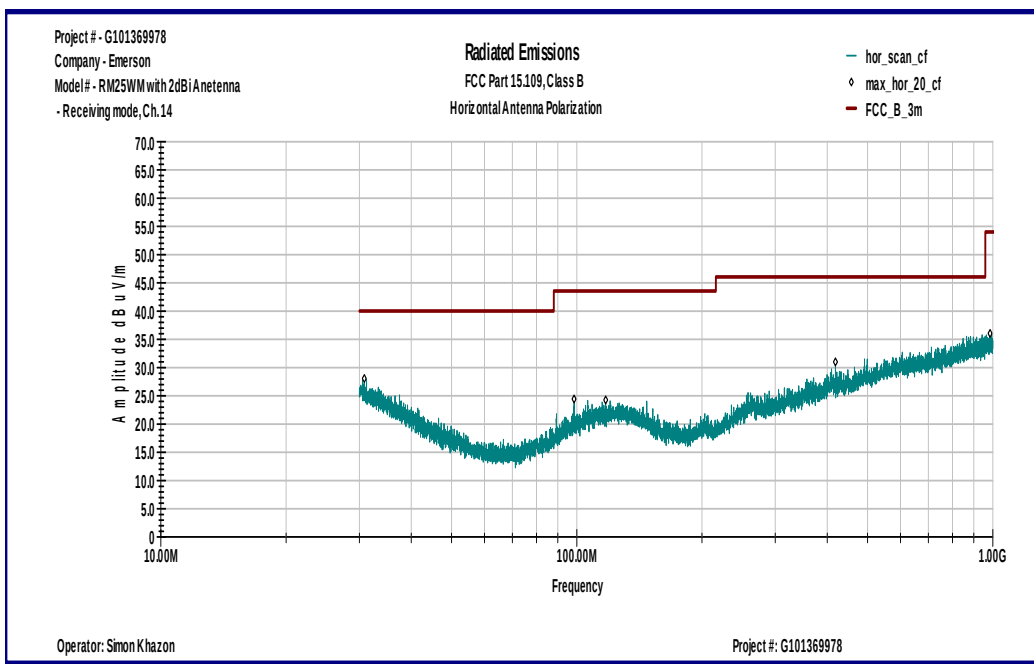
Graph 3.8.7



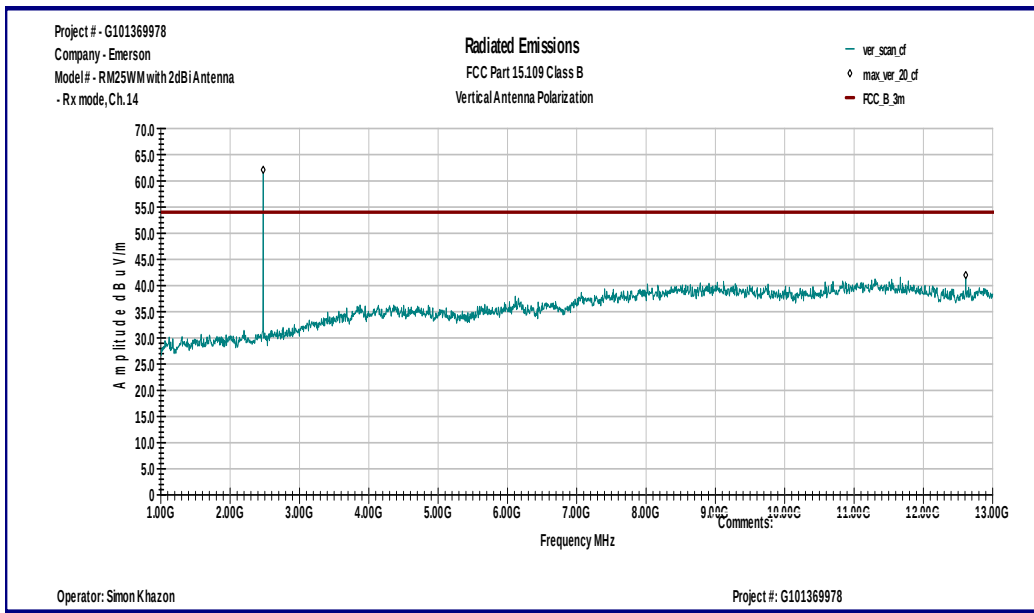
Graph 3.8.8



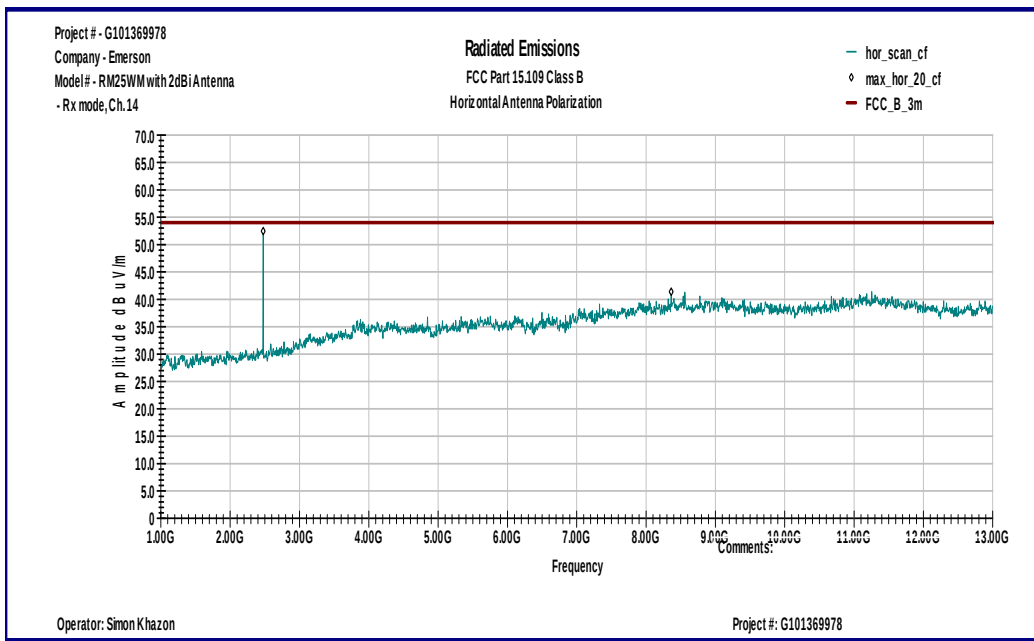
Graph 3.8.9



Graph 3.8.10



Graph 3.8.11

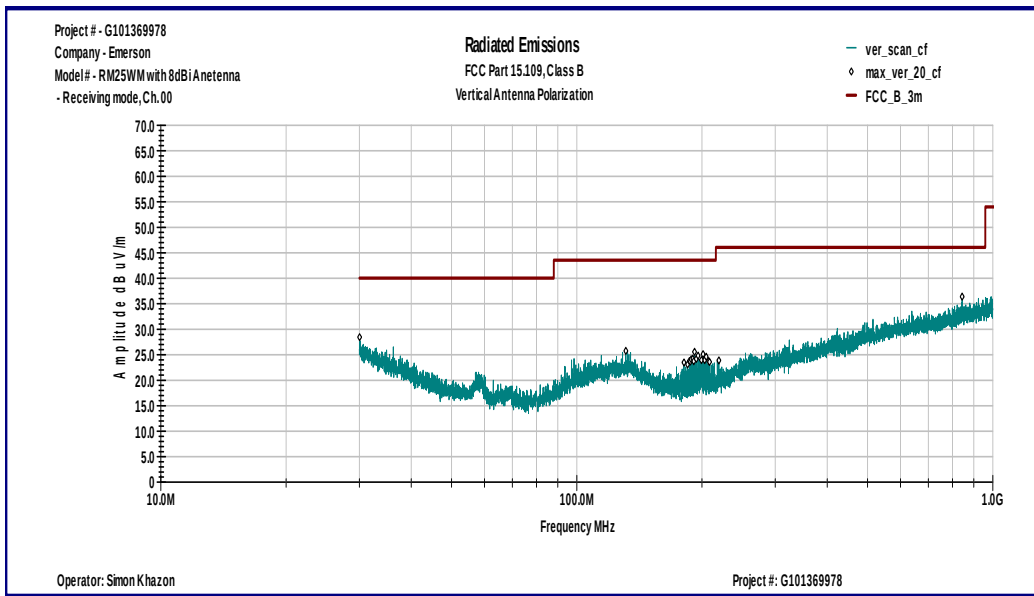


Graph 3.8.12

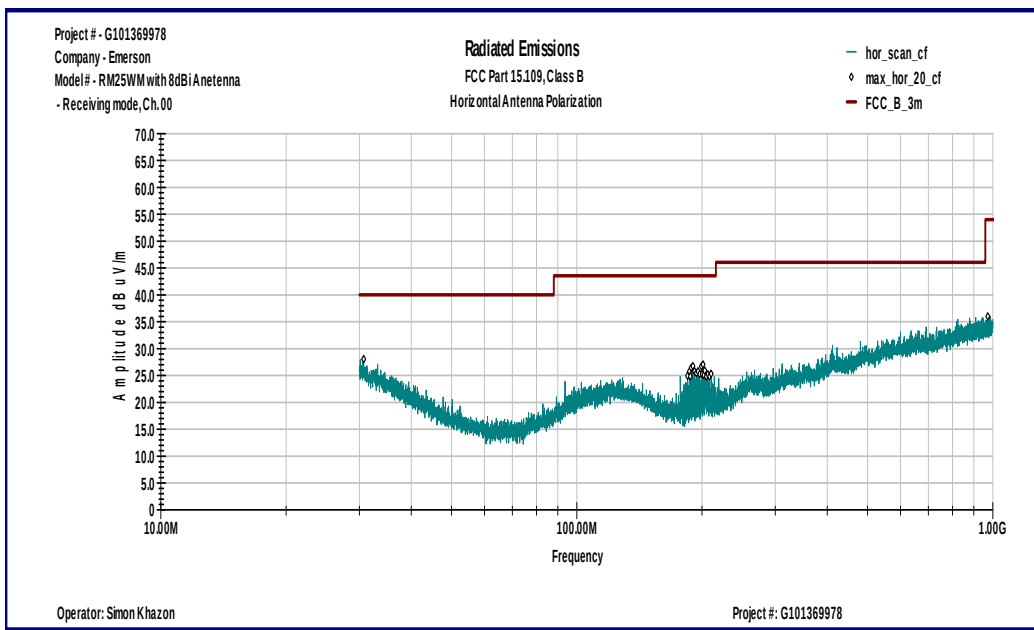
Date:	October 21-23, 2013	Result: Pass
Standard:	FCC Part 15.109, Class B	
Tested by:	Simon Khazon	
Test Point:	Enclosure with 8 dBi Antenna	
Operation mode:	Receiving	
Note:	Frequency Range 30-13000MHz	

Table 3.8.2

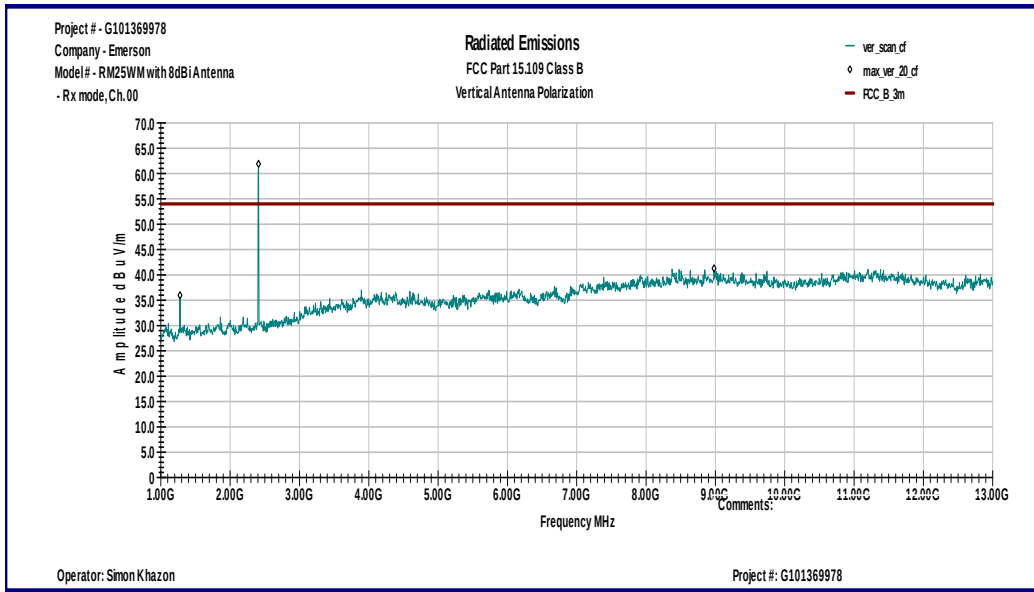
Frequency	Ant. Polarity	Peak Reading dBμV	Total C.F. dB1/m	Total at 3m dBμV/m	Limit dBμV/m	Margin dB
Lower Channel						
30.053 MHz	V	8.2	20.2	28.4	40.0	-11.6
131.24 MHz	V	11.9	13.9	25.7	43.5	-17.8
191.94 MHz	V	14.1	11.5	25.6	43.5	-18.0
201.24 MHz	V	12.8	12.2	25.1	43.5	-18.5
30.737 MHz	H	8.2	19.8	28.0	40.0	-12.0
188.38 MHz	H	15.1	11.3	26.4	43.5	-17.1
190.17 MHz	H	15.4	11.4	26.7	43.5	-16.8
199.36 MHz	H	14.6	12.1	26.7	43.5	-16.8
203.02 MHz	H	13.6	12.3	25.9	43.5	-17.6
Middle Channel						
30.386 MHz	V	7.4	20.0	27.4	40.0	-12.6
56.613 MHz	V	15.1	7.7	22.8	40.0	-17.2
132.43 MHz	V	12.4	13.8	26.1	43.5	-17.4
313.16 MHz	V	12.4	16.3	28.7	46.0	-17.3
30.263 MHz	H	8.3	20.1	28.3	40.0	-11.7
188.38 MHz	H	14.8	11.3	26.1	43.5	-17.4
201.13 MHz	H	14.1	12.2	26.3	43.5	-17.2
Upper Channel						
30.281 MHz	V	7.2	20.1	27.2	40.0	-12.8
132.43 MHz	V	12.4	13.8	26.1	43.5	-17.4
184.68 MHz	V	15.2	11.2	26.5	43.5	-17.1
195.71 MHz	V	13.4	11.8	25.1	43.5	-18.4
30.035 MHz	H	8.5	20.2	28.7	40.0	-11.3
188.38 MHz	H	15.0	11.3	26.4	43.5	-17.2
197.48 MHz	H	15.3	12.0	27.3	43.5	-16.2



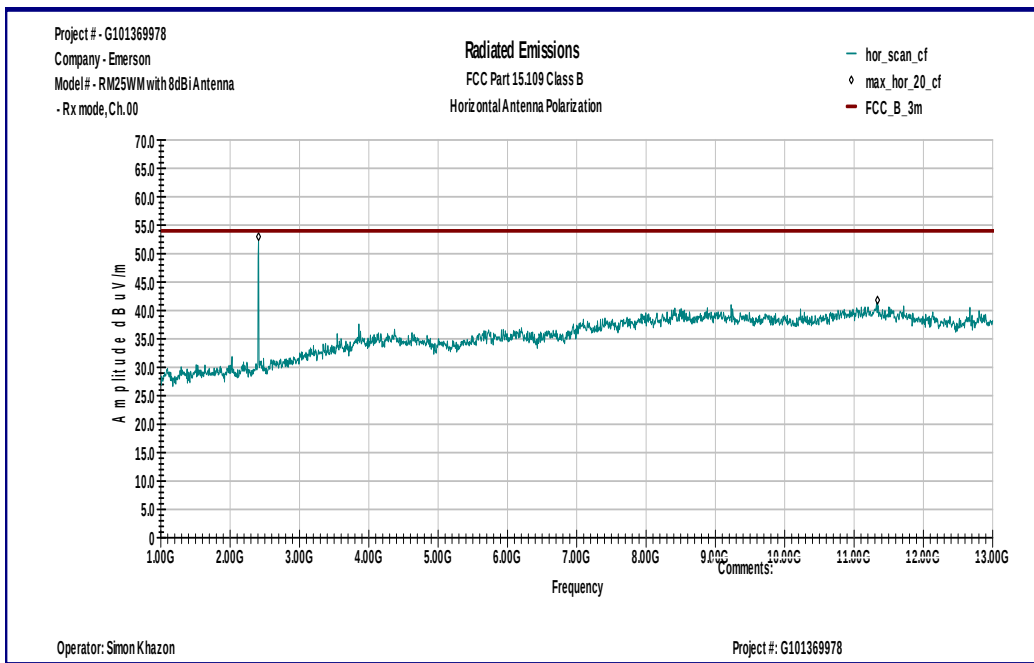
Graph 3.8.13



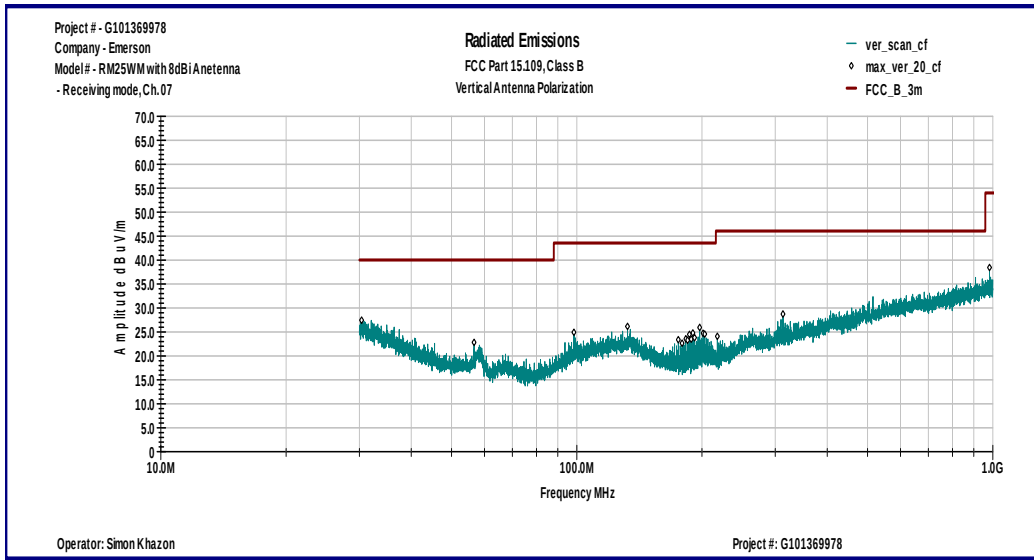
Graph 3.8.14



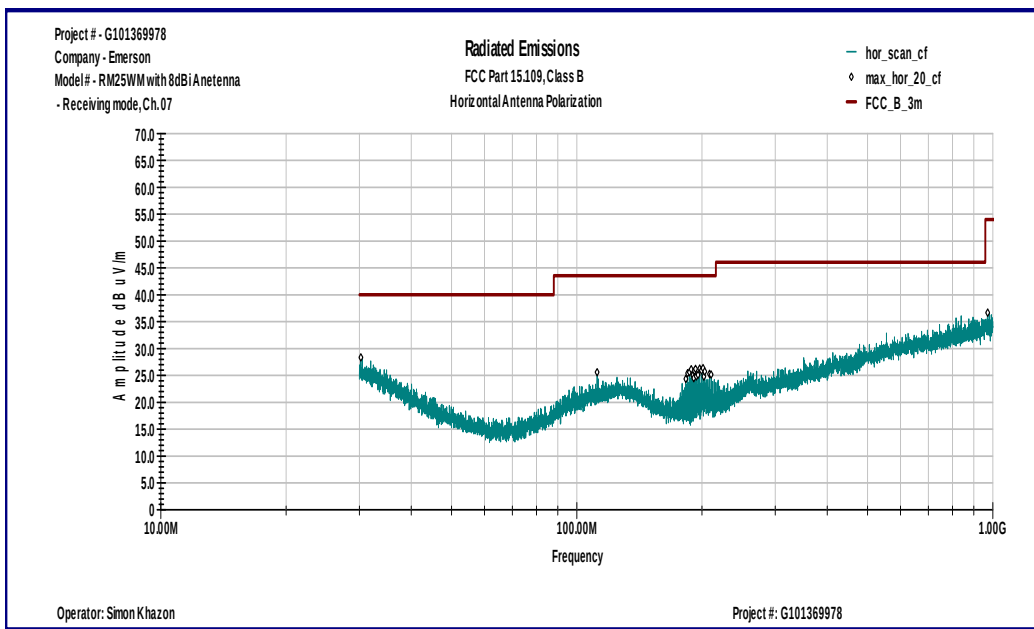
Graph 3.8.15



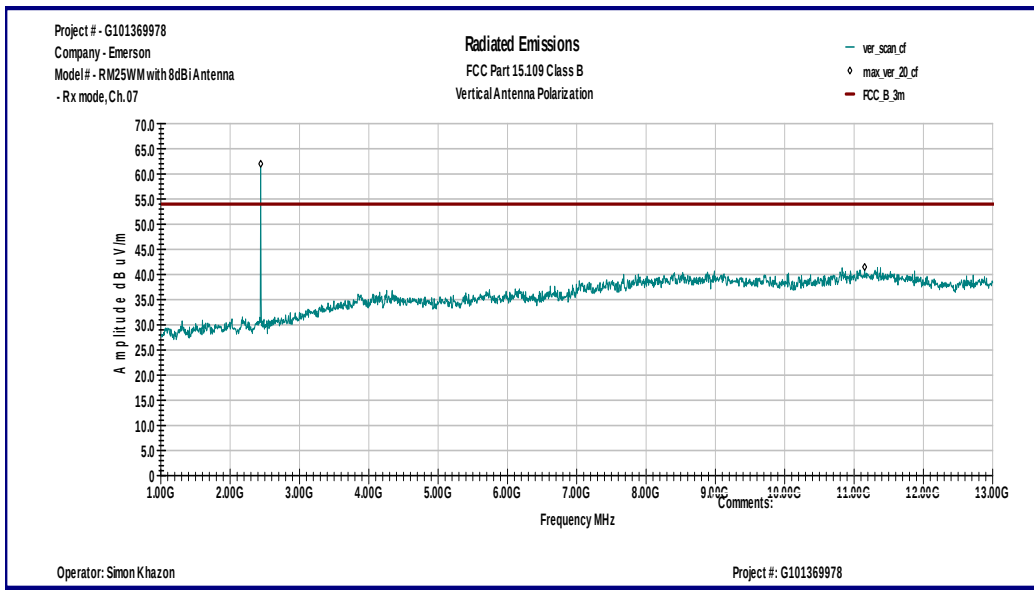
Graph 3.8.16



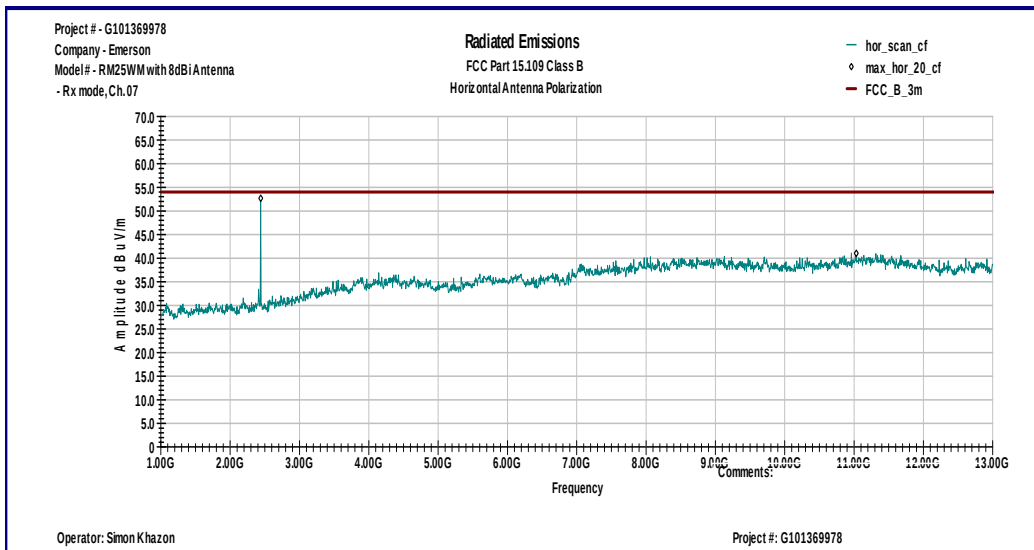
Graph 3.8.17



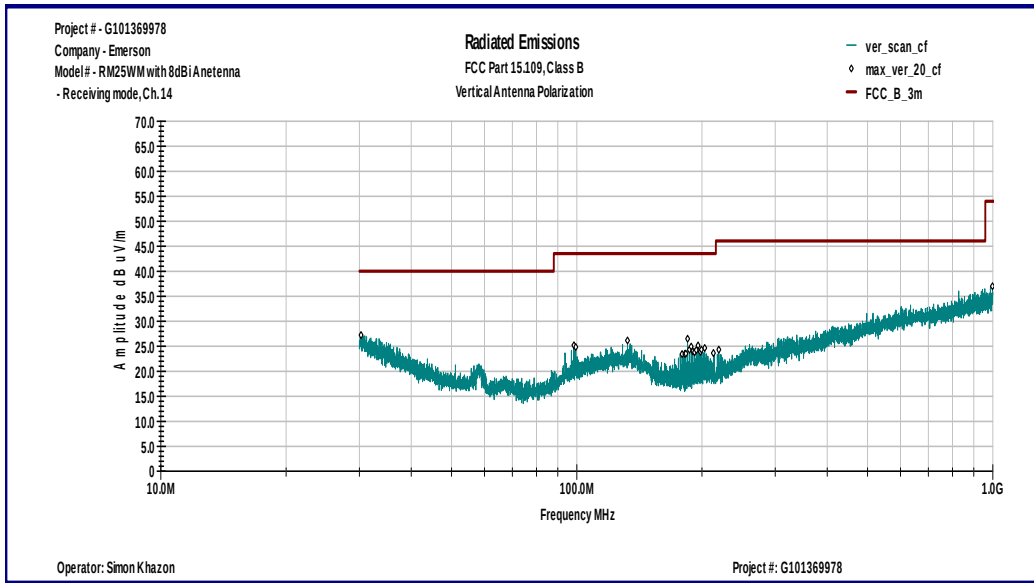
Graph 3.8.18



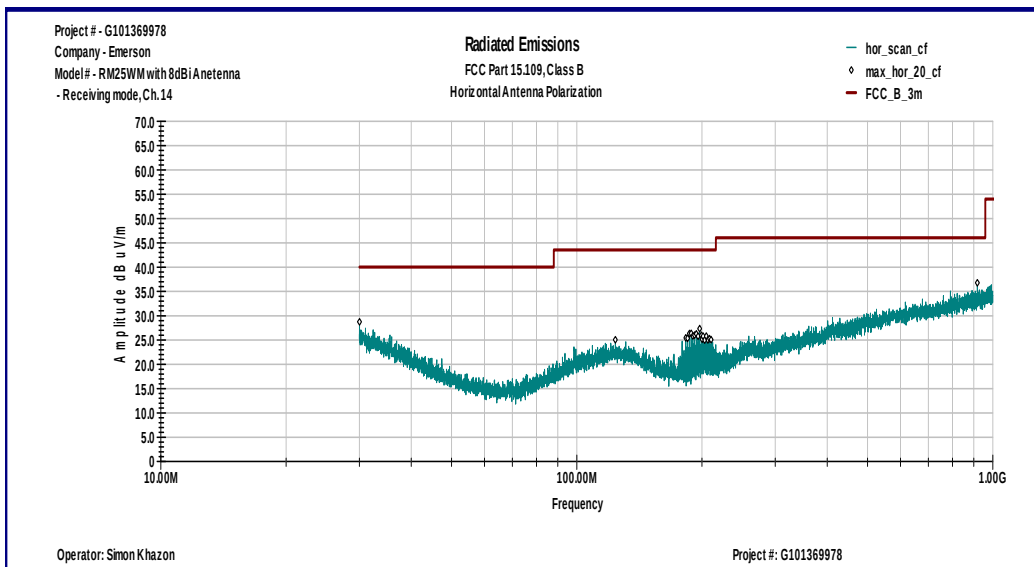
Graph 3.8.19



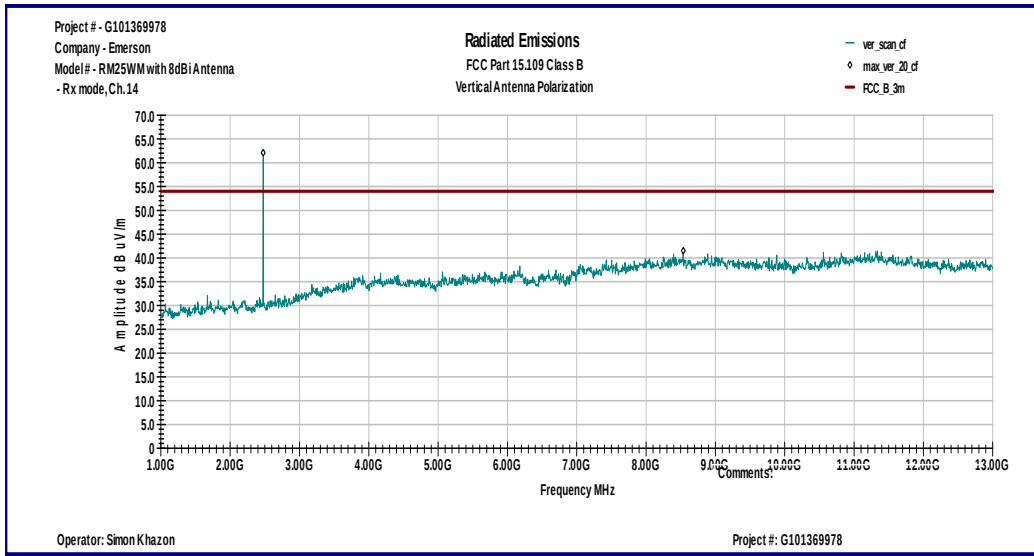
Graph 3.8.20



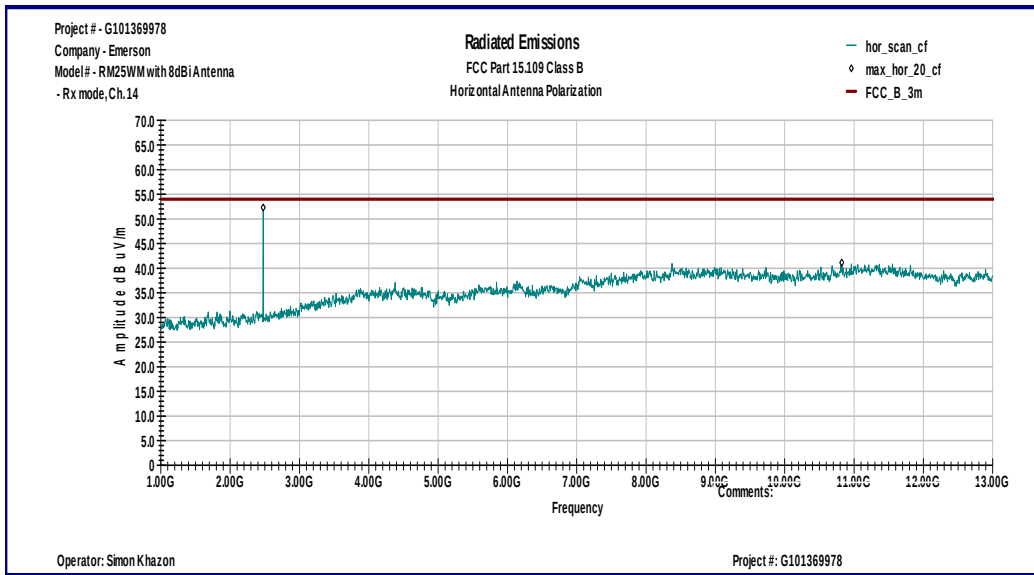
Graph 3.8.21



Graph 3.8.22



Graph 3.8.23



Graph 3.8.24



3.9 Digital device conducted emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: N/A

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: dB below the limits

Notes: The EUT is DC powered from internal batteries.

4.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	INTERTEK ID	CAL DUE	USED
Spectrum Analyzer	R & S	FSP 40	100024	12559	11/29/2013	☒
Spectrum Analyzer	R & S	ESU	100398	25283	12/19/2013	☒
Bicono-Log Antenna	Teseq	CBL6112D	32859	25289	08/30/2014	☒
Waveguide Horn Antenna	EMCO	3116	9904-2423	9705	11/07/2013	☒
Horn Antenna	EMCO	3115	9507-4513	9936	05/28/2014	☒
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1122951	13475	11/01/2013	☒
Pre-Amplifier	MITEQ	AMF-6F-16002600-25-10P	1222383	MIN-0065	11/01/2013	☒
High Pass Filter	Reactel	7HS-4G-S12	0223	015274	VBU	☒
System	Quantum Change	TILE! Instrument Control	Ver. 3.4.K.29	15259	VBU	☒