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Report On

Radio Testing of the
Canberra Industries, Inc.
Seal (Fiber Optic Seal - Part of the Remotely Monitored Seal Array (RMSA) System)

FCC Part 15 Subpart C §15.249

Report No. DI1307733F Rev1 **April 2015**

TÜV SÜD America Inc., 10040 Mesa Rim Road, San Diego, CA 92121
Tel: (858) 678-1400. Website: www.TUVamerica.com

REPORT ON	Radio Testing of the Canberra Industries, Inc. Seal (Fiber Optic Seal - Part of the Remotely Monitored Seal Array (RMSA) System)
TEST REPORT NUMBER	DI1307733F Rev1
PREPARED FOR	Canberra Industries, Inc. 107 Union Valley Rd. Oak Ridge, TN 37830
CONTACT PERSON	Scott Rogers Project Manager (865) 220-6311 scott.rogers@canberra.com
PREPARED BY	Alex Chang **Name** Authorized Signatory Title: EMC/Wireless Test Engineer
APPROVED BY	Ferdinand S. Custodio **Name** Authorized Signatory Title: EMC/Senior Wireless Test Engineer
DATED	April 06, 2015

Revision History

DI1307733F Rev1 Canberra Industries, Inc. Seal (Fiber Optic Seal - Part of the Remotely Monitored Seal Array (RMSA) System)					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
09/08/2014	Initial Release				Ferdinand Custodio
04/06/2015		Rev1	Add alternative model (metal enclosure)	6,8 and 9	Alex Chang

CONTENTS

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

SECTION 1

REPORT SUMMARY

Radio Testing of the
Canberra Industries, Inc.
Seal (Fiber Optic Seal - Part of the Remotely Monitored Seal Array (RMSA) System)

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Canberra Industries, Inc. Seal (Fiber Optic Seal - Part of the Remotely Monitored Seal Array (RMSA) System) to the requirements of FCC Part 15 Subpart C §15.249.

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Canberra Industries, Inc.
Model Number(s)	7078495, 7077194 and 7080883
FCC ID Number	2AA7FRMSA7070822
IC Number	N/A
Serial Number(s)	2012RMSAAS0001, 2012RMSAASFCC01, and 2012RMSAASFCC05
Number of Samples Tested	3
Test Specification/Issue/Date	FCC Part 15 Subpart C §15.249 (October 1, 2013)
Start of Test	April 17, 2014
Finish of Test	July 25, 2014
Name of Engineer(s)	Alex Chang
Related Document(s)	None. Supporting documents for EUT certification are separate exhibits.

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC Part 15 Subpart C §15.249 is shown below.

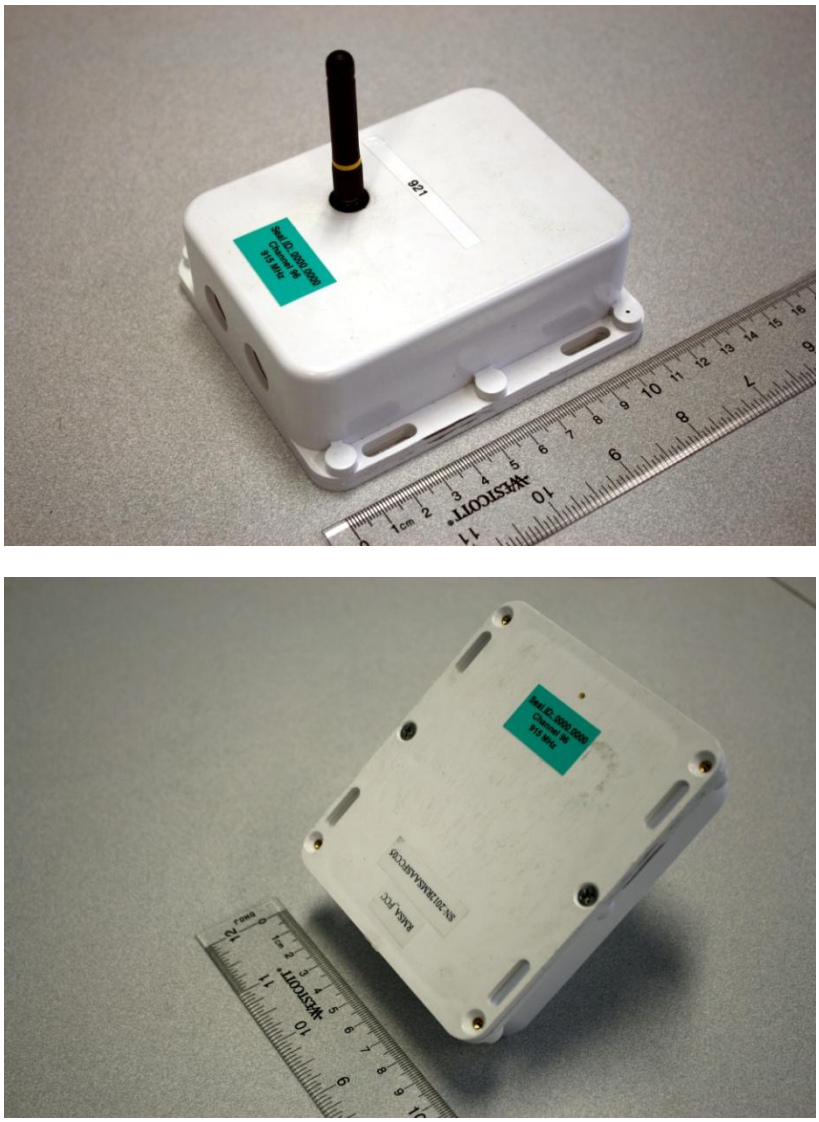
Section	Spec Clause	Test Description	Result	Comments/Base Standard
2.1	§15.207(a)	Conducted Emissions	N/A *	
2.2	§15.215(c)	20 dB Bandwidth	Compliant	
2.3	§15.249(a)	Field Strength Limits for Fundamental And Band Edge	Compliant	
2.4	§15.249(d)	Spurious Radiated Emissions	Compliant	

** Not applicable, EUT is a battery powered device.*

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a Canberra Industries, Inc. Seal (Fiber Optic Seal - Part of the Remotely Monitored Seal Array (RMSA) System) as shown in the photograph below. The RMSA system consists of seals, a translator, a programming card interface as well as the remote review application. The system provides low cost solution for monitoring sealed components. This report covers the models RMSA Seal (7078495) and RMSA Seal alternative metal enclosure (7080883) and RMSA Seal A.S. (7077194). A.S. stands for Authenticated Switch, which includes a magnetic switch plugged into a socket on the board. The magnetic switch is operated by a magnet on another Authenticated Switch as they face each other, so one A.S. magnet is aligned with the other A.S. switch, and vice versa.



Equipment Under Test

1.3.2 EUT General Description

EUT Description	Seal (Fiber Optic Seal - Part of the Remotely Monitored Seal Array (RMSA) System)
Product Name	RMSA Seal and RMSA Seal A.S.
Model Number(s)	7078495, 7077194 and 7080883
Rated Voltage	3.6 VDC Nominal Voltage.
Output Power	93.0 dBµV/m @ 3 meters
Frequency Range	908 MHz to 921 MHz in the 902 MHz to 928 MHz Band
Mode Verified	915 MHz ISM/SRD
Capability	915 MHz ISM/SRD
Channels Verified	Low Channel 908 MHz Mid Channel 915MHz High Channel 921MHz

1.3.3 Antenna Details

Model	ANT-916-CW-RH-SMA
Manufacturer	Linx Technologies Inc.
Antenna Type	Whip, ¼ Wave, Fixed
Antenna Gain	-1.3dBi
Antenna Connector	SMA (Professionally Installed)

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configurations	Description
Default	EUT configured to transmit continuously (100% duty cycle - modulated) at the designated channel.

1.4.2 EUT Exercise Software

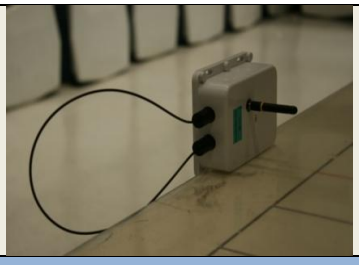
None. No special software was used to exercise the EUT during the investigation. The EUT was provided programmed as a production setup model.

1.4.3 Support Equipment and I/O cables

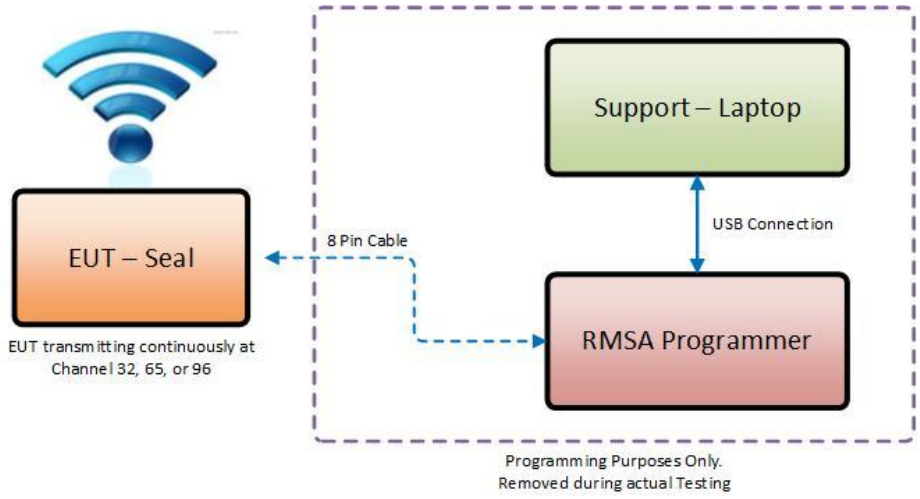
Manufacturer	Equipment/Cable	Description
—	—	—

1.4.4 Worst Case Configuration

For radiated measurements X, Y, and Z orientations were verified. The verification was determined "Y" as worst case configuration.

		
"X" Configuration	***"Y" Configuration***	***"Z" Configuration***

1.4.5 Simplified Test Configuration Diagram



1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number: 2012RMSAAS0001, 2012RMSAASFCC01, and 2012RMSAASFCC05		
Firmware adjustment to mid (65) channel (915MHz), s/n: 2012RMSAASFCC01. The transmit power at 915MHz (mid channel) was lowered from 6.17mW(7.9dBm) to 5.25mW(7.2dBm).	Greg Shafer	04/30/2014

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.
For conducted and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.4-2009. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400 FAX: 858-546 0364

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

Sony Electronics Inc., Building #8 16530 Via Esprillo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: 858 942 5542 FAX: 858-546 0364

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Registration No.: US1146

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US1146.

1.9.2 Industry Canada (IC) Registration No.: 3067A

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego) has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No. 3067A.

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SECTION 2

TEST DETAILS

Radio Testing of the
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Seal (Fiber Optic Seal - Part of the Remotely Monitored Seal Array (RMSA) System)

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

2.1 CONDUCTED EMISSIONS

2.1.1 Specification Reference

Part 15 Subpart C §15.207(a)

2.1.2 Standard Applicable

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

**Decreases with the logarithm of the frequency.*

2.1.3 Equipment Under Test and Modification State

Not performed. EUT is battery operated only.

2.2 20 dB BANDWIDTH

2.2.1 Specification Reference

Part 15 Subpart C §15.215(c)

2.2.2 Standard Applicable

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

2.2.3 Equipment Under Test and Modification State

Serial No: 2012RMSAAS0001, 2012RMSAASFCC01, and 2012RMSAASFCC05 / Default Test Configuration

2.2.4 Date of Test/Initial of test personnel who performed the test

July 21, 2014 / AC

2.2.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.0°C
Relative Humidity	47.7%
ATM Pressure	99.2 kPa

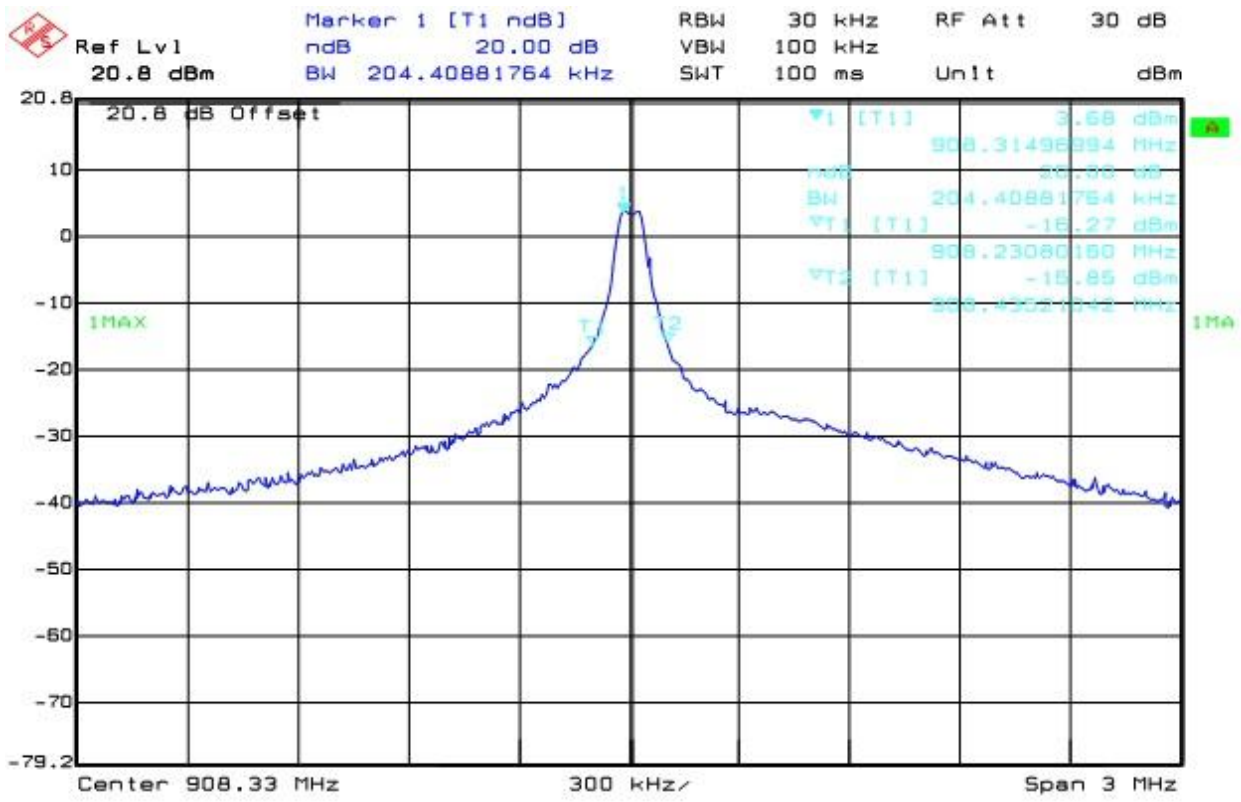
2.2.7 Additional Observations

- This is a conducted test.
- An offset of 20.8dB was added to compensate for the external attenuator and the cable used from the antenna port.
- “n dB down” marker function of the Spectrum Analyzer used.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span, VBW is 3X RBW.
- Sweep is auto.
- Detector is peak.
- Trace is max hold.

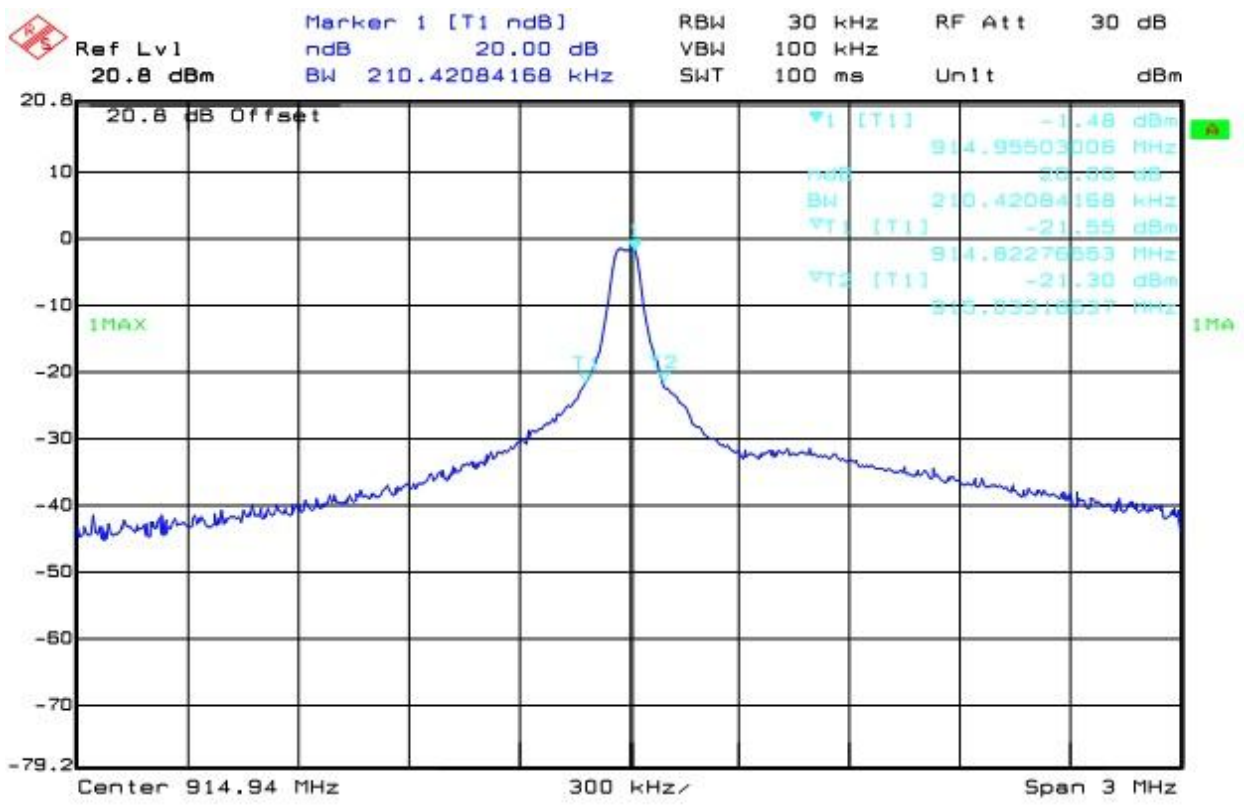
2.2.8 Test Results

Low Channel (908 MHz)	Mid Channel (914 MHz)	High Channel (921 MHz)
204.41 kHz	210.42 kHz	192.38 kHz

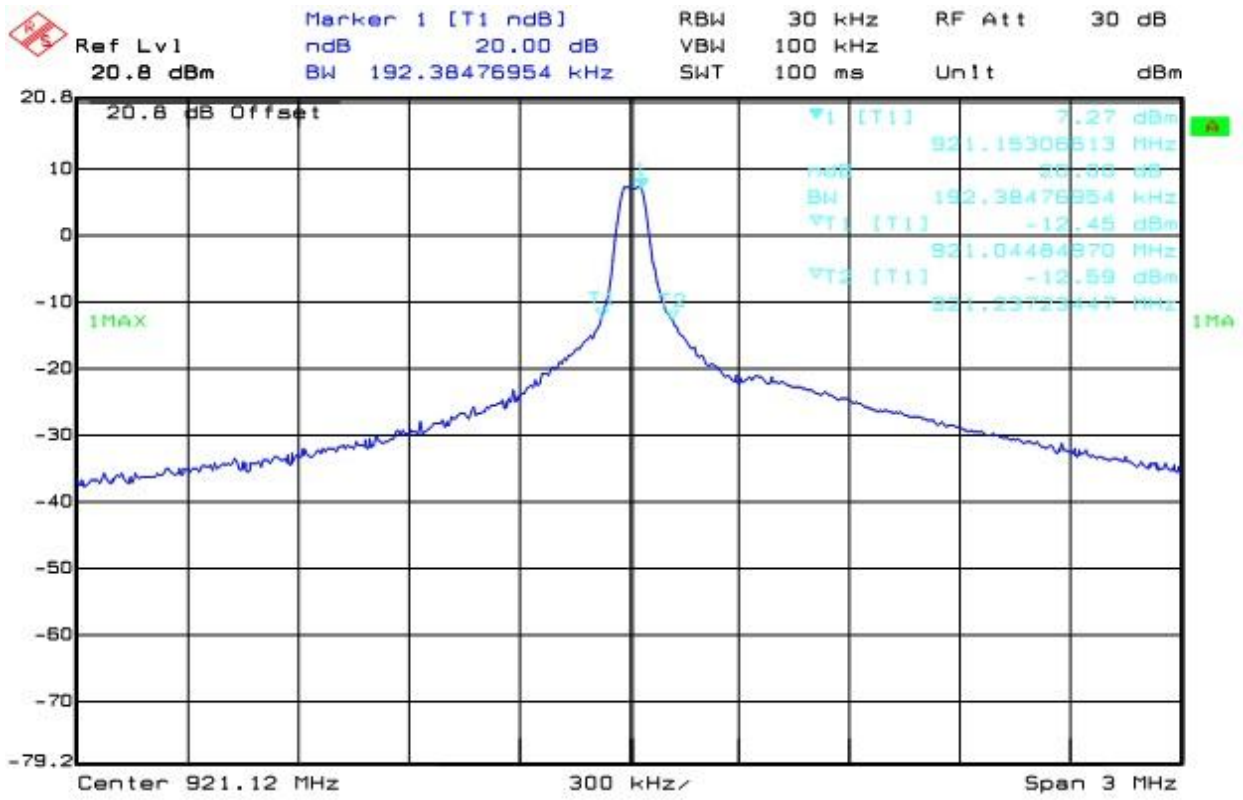
908.00 MHz – (20dB BW/2) = 907.89 MHz (within the frequency band - **Compliant**)
921.00 MHz + (20dB BW/2) = 921.09 MHz (within the frequency band - **Compliant**)



Low Channel


Marker 1 [T1 ndB]
RBW 30 kHz
RF Att 30 dB
Ref Lvl
ndB 20.00 dB
VBW 100 kHz
20.8 dBm
BW 210.42084168 kHz
SWT 100 ms
Unit dBm
20.8 dB Offset
1MAX
Center 914.94 MHz
300 kHz/
Span 3 MHz

Mid Channel



High Channel

2.3 FIELD STRENGTH LIMITS FOR FUNDAMENTAL AND BAND EDGE

2.3.1 Specification Reference

Part 15 Subpart C §15.249(a)

2.3.2 Standard Applicable

(a) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

2.3.3 Equipment Under Test and Modification State

Serial No: 2012RMSAAS0001, 2012RMSAASFCC01, and 2012RMSAASFCC05 / Default Test Configuration

2.3.4 Date of Test/Initial of test personnel who performed the test

July 25, 2014 / AC

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.2°C
Relative Humidity	46.6%
ATM Pressure	99.3 kPa

2.3.7 Additional Observations

- This is a radiated test. The spectrum was measured to the fundamental frequency of low, mid, and high channels.
- Fundamental measurements were performed with a preamp.
- Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.3.8 for sample computation.

2.3.8 Sample Computation (Radiated Emission below and above 1GHz)

Measuring equipment raw measurement (dbµV) **@ 865.996 MHz**			95.2
Correction Factor (dB)	Asset# 1016(cable)	29.5	**-1.1**
	Asset# 1026(cable)	-3.7	
	Asset# 1057(cable)	-1.4	
	Asset# 1187 (preamplifier)	-2.8	
	Asset# 1002 (antenna)	-22.7	
Reported Peak Final Measurement (dbµV/m) @ 865.996 MHz			**94.1**

Measuring equipment raw measurement (dbµV) **@ 2400 MHz**			58.4
Correction Factor (dB)	Asset# 1153 (cable)	3.3	**-4.8**
	Asset# 8628 (preamplifier)	-36.4	
	Asset# 6669 (antenna)	28.3	
Reported Peak Final Measurement (dbµV/m) @ 2400 MHz			**53.6**

2.3.9 Test Results

See attached plots.

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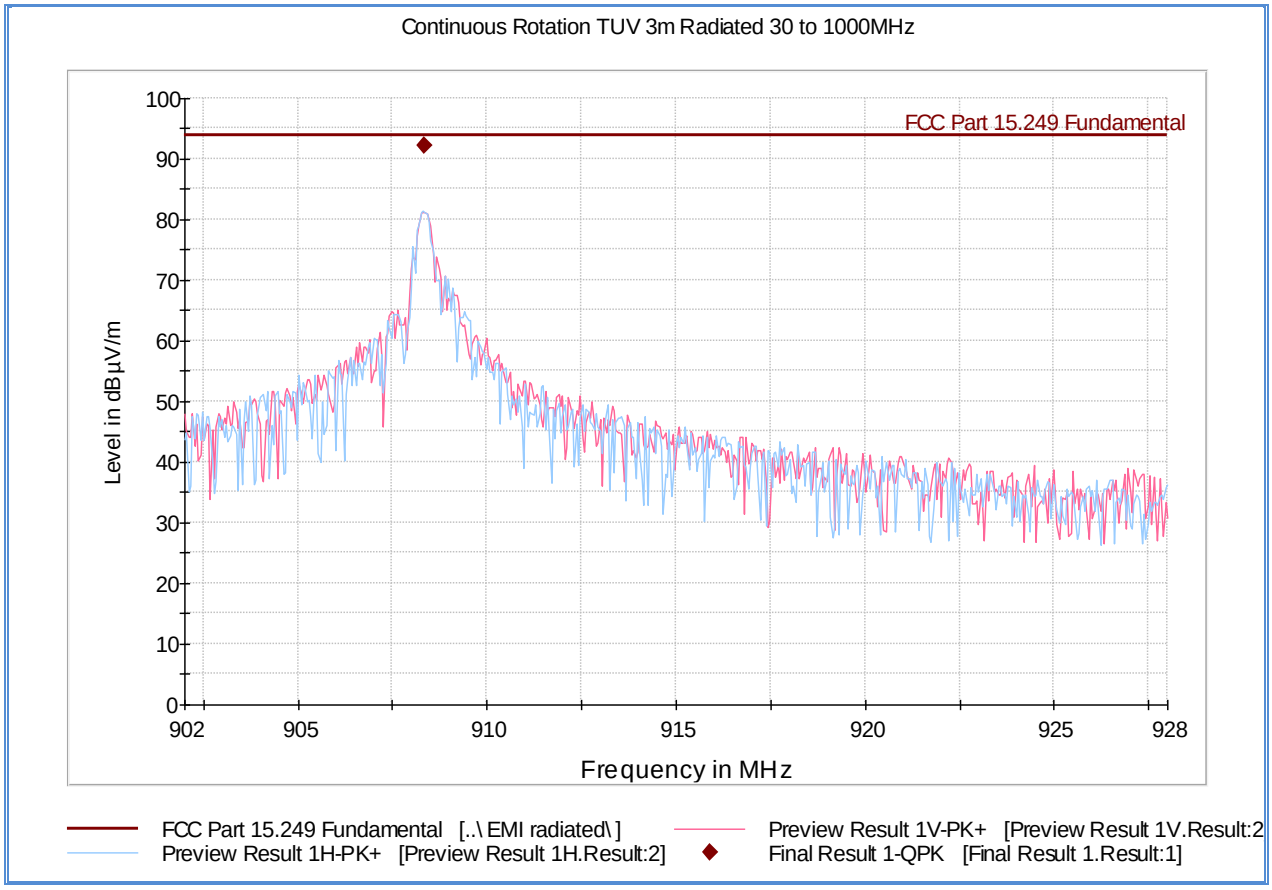
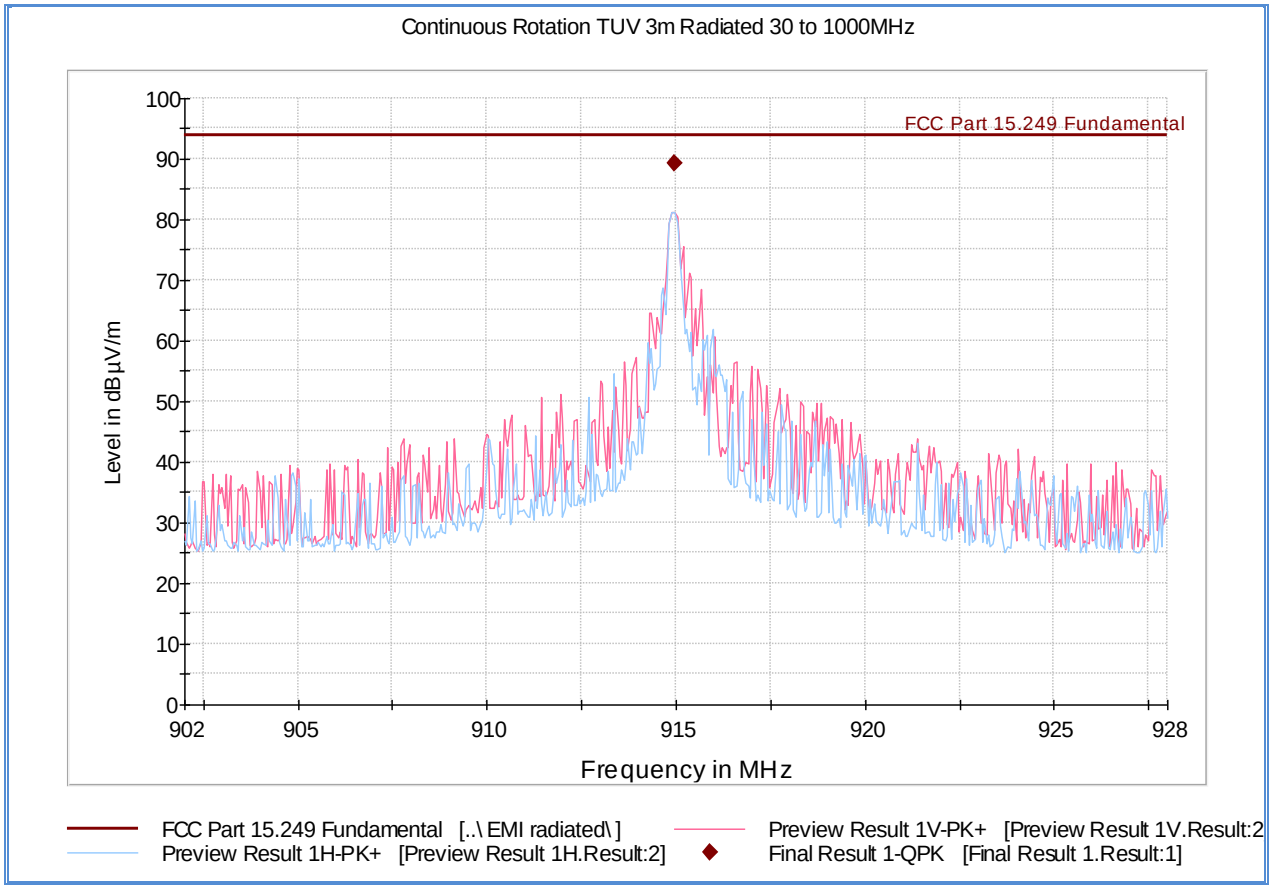
2.3.10 Test Results for Low Channel (Fundamental Emissions)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
908.344609	92.2	1000.0	120.000	150.0	H	71.0	1.9	1.8	94.0

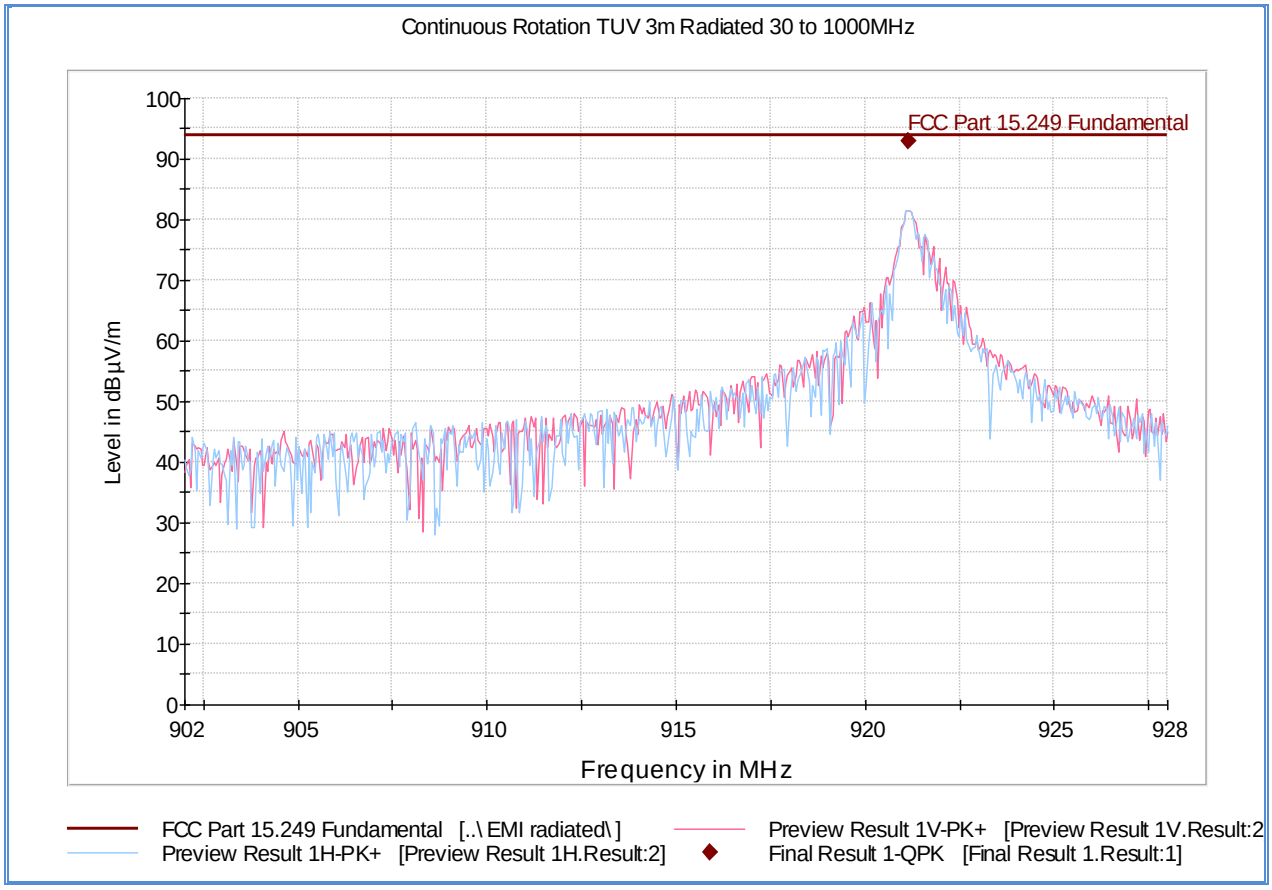
2.3.11 Test Results for Mid Channel (Fundamental Emissions)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
914.961844	89.3	1000.0	120.000	150.0	H	241.0	1.9	4.7	94.0

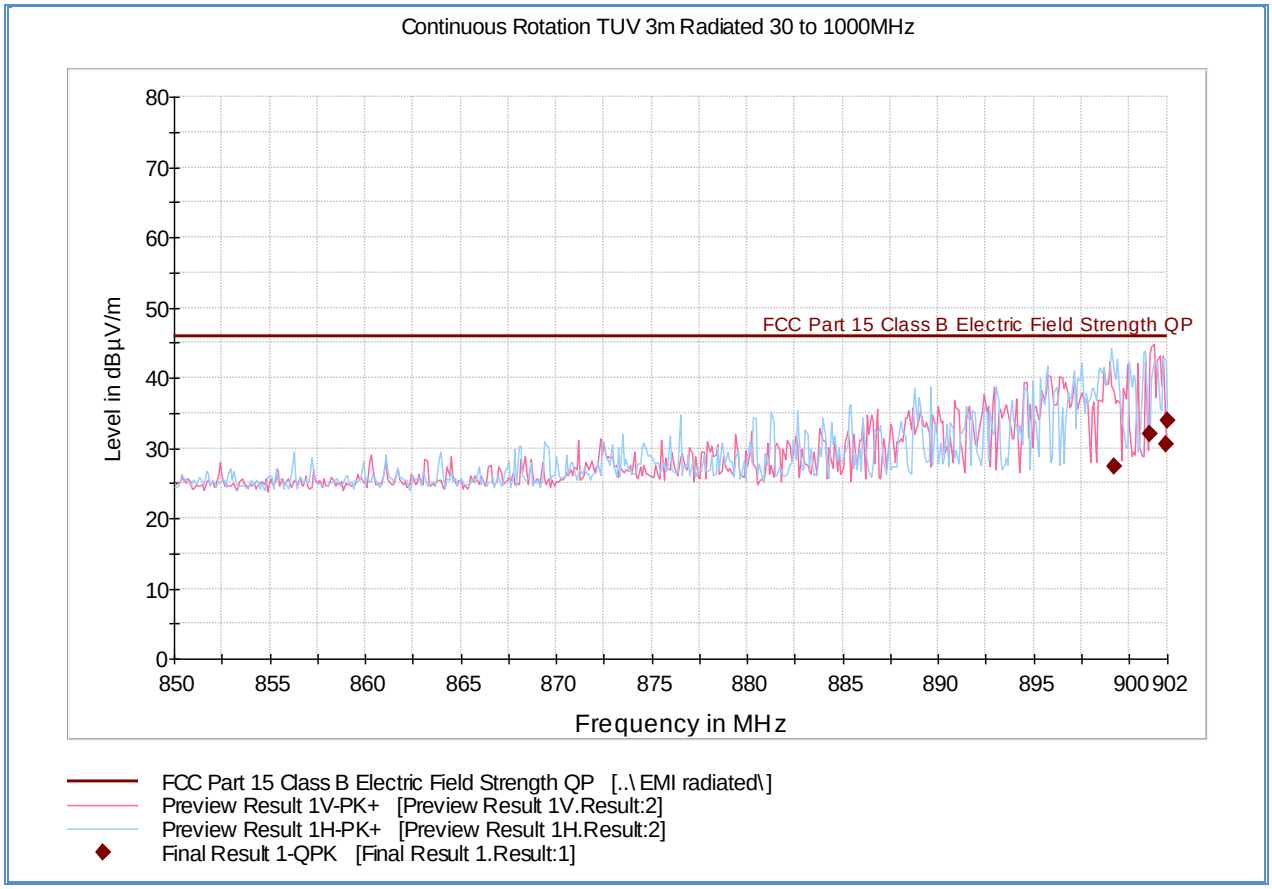
2.3.12 Test Results for High Channel (Fundamental Emissions)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
921.134349	93.0	1000.0	120.000	308.0	V	100.0	2.2	1.0	94.0

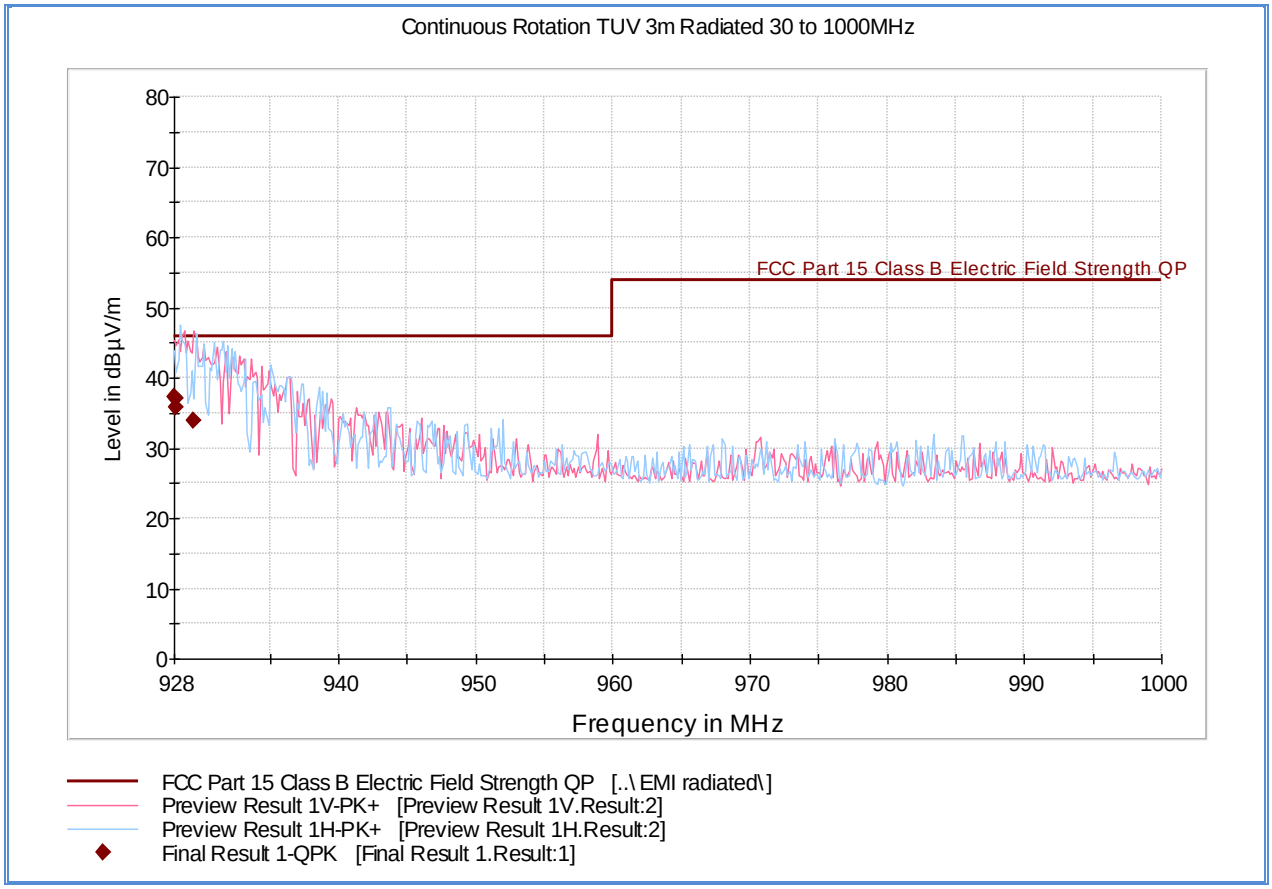
2.3.13 Test Results for Low Channel (Band Edge)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
899.187495	27.4	1000.0	120.000	100.0	V	244.0	2.2	18.6	46.0
901.039038	32.1	1000.0	120.000	133.0	H	314.0	2.2	13.9	46.0
901.950541	30.4	1000.0	120.000	100.0	V	256.0	2.1	15.6	46.0
902.000000	34.0	1000.0	120.000	138.0	H	314.0	2.1	12.0	46.0

2.3.14 Test Results for High Channel (Band Edge)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
928.040000	37.2	1000.0	120.000	150.0	H	107.0	2.3	8.8	46.0
928.080000	37.1	1000.0	120.000	150.0	H	111.0	2.3	8.9	46.0
928.080000	35.7	1000.0	120.000	201.0	V	-2.0	2.3	10.3	46.0
929.352946	33.9	1000.0	120.000	208.0	H	311.0	2.3	12.1	46.0

2.4 SPURIOUS RADIATED EMISSIONS

2.4.1 Specification Reference

Part 15 Subpart C §15.249(d)

2.4.2 Standard Applicable

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

2.4.3 Equipment Under Test and Modification State

Serial No: 2012RMSAAS0001, 2012RMSAASFCC01, and 2012RMSAASFCC05 / Default Test Configuration

2.4.4 Date of Test/Initial of test personnel who performed the test

July 25, 2014 / AC

2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.2°C
Relative Humidity	46.6%
ATM Pressure	99.3 kPa

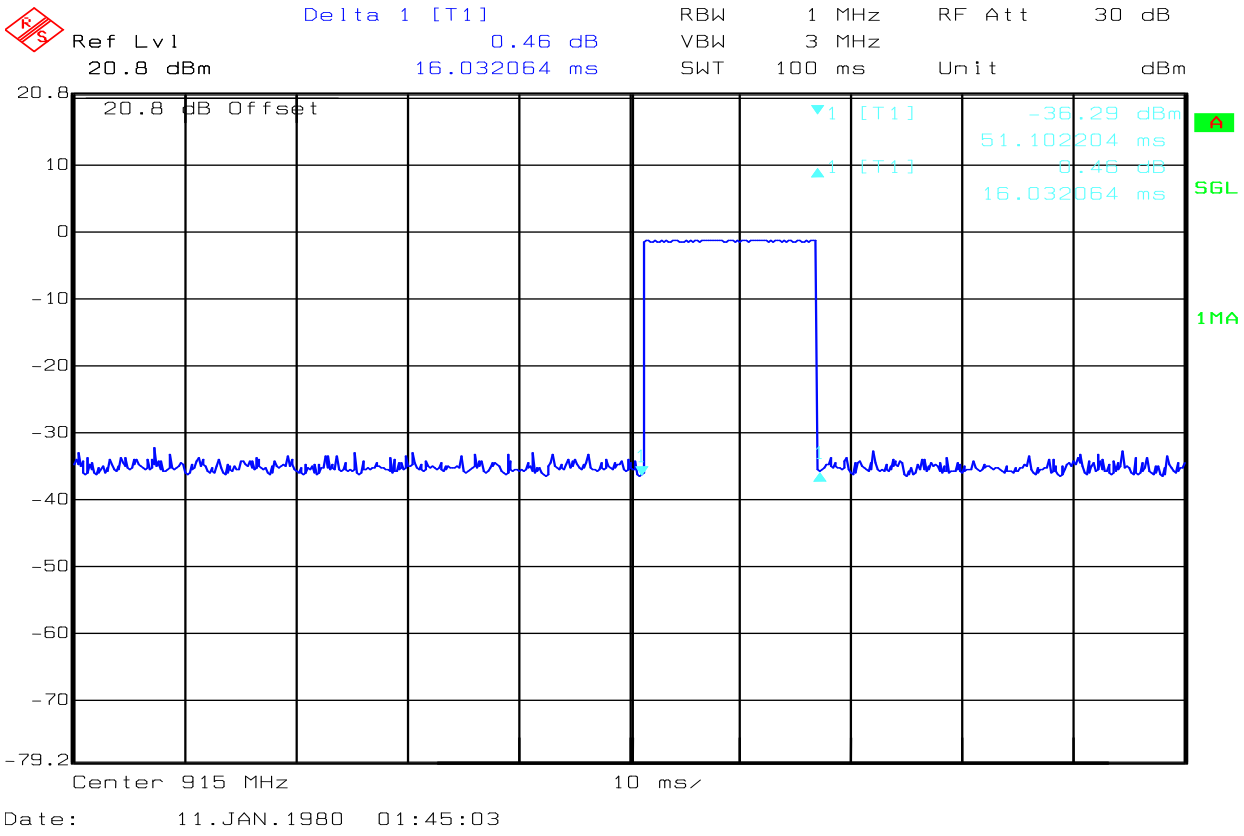
2.4.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 10th harmonic (25GHz). There are no significant emissions observed beyond 18GHz.
- Duty Cycle was used to calculate average compliance based from peak data measurements.
- When calculating Duty Cycle, the EUT was configured to normal operation (actual duty cycle vs. 100% duty cycle when in test mode).
- No significant emission difference between the three channels observed below 1GHz. Data presented is from worst configuration based from fundamental verification ("Y" axis configuration).
- Spurious emission measurements above 1GHz were performed with a notch filter attenuating the fundamental frequencies.
- Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.4.8 for sample computation.

2.4.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (dbµV) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (dbµV/m) @ 30MHz			**11.8**

2.4.9 Duty Cycle Correction Factor Calculation



100ms sweep (representative channel)

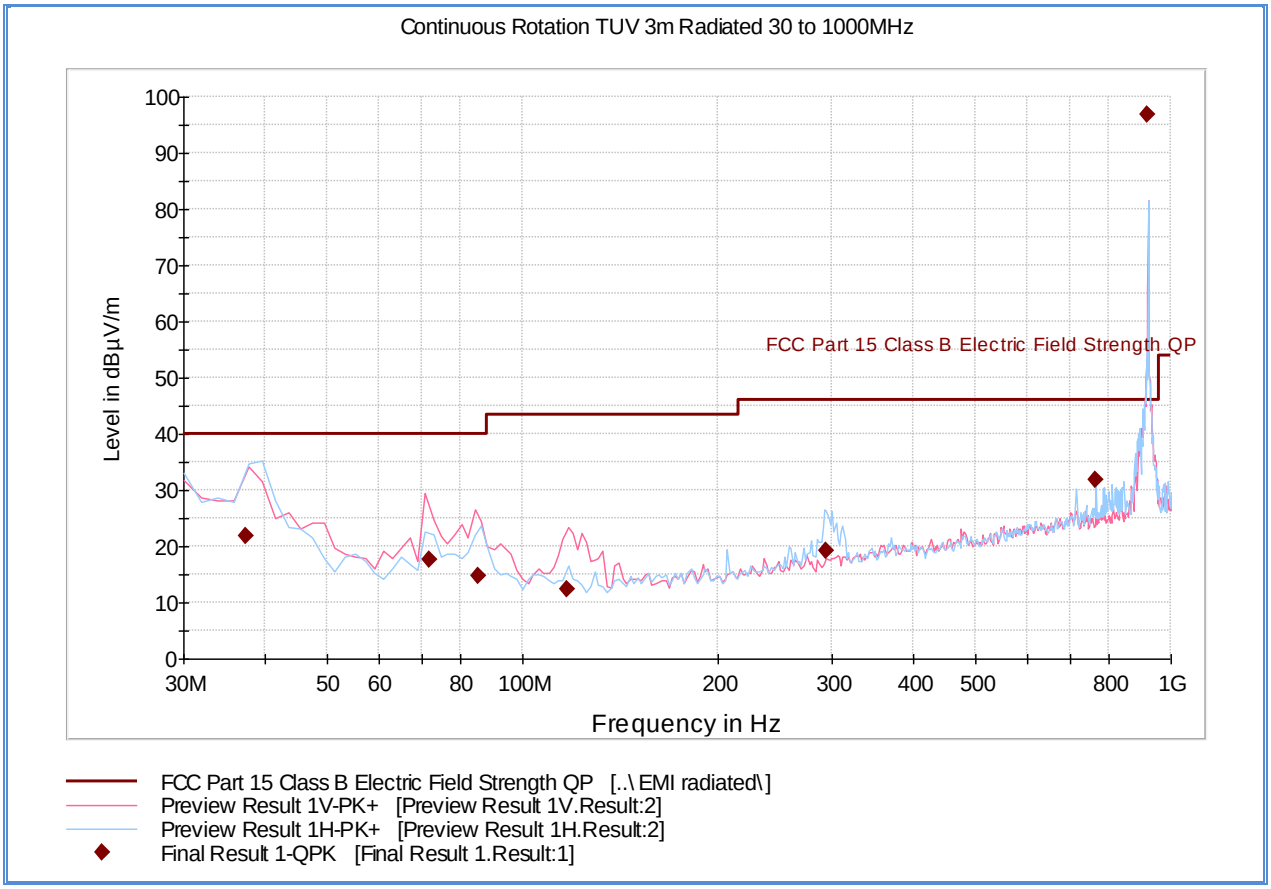
Duty Cycle Calculation: = 16.03ms “On” time per100 ms sweep
Duty Cycle Correction Factor = 20 log (0.01603)
= **-35.90 (Limited to -20dB)**

Sample Calculation for Low Channel = 92.2 dBµV/m Peak @ 3 meters):
= 92.2 dBµV/m + (– 20 dB)
= 72.2 dBµV/m Average @ 3 meters

2.4.1 Test Results

See attached plots.

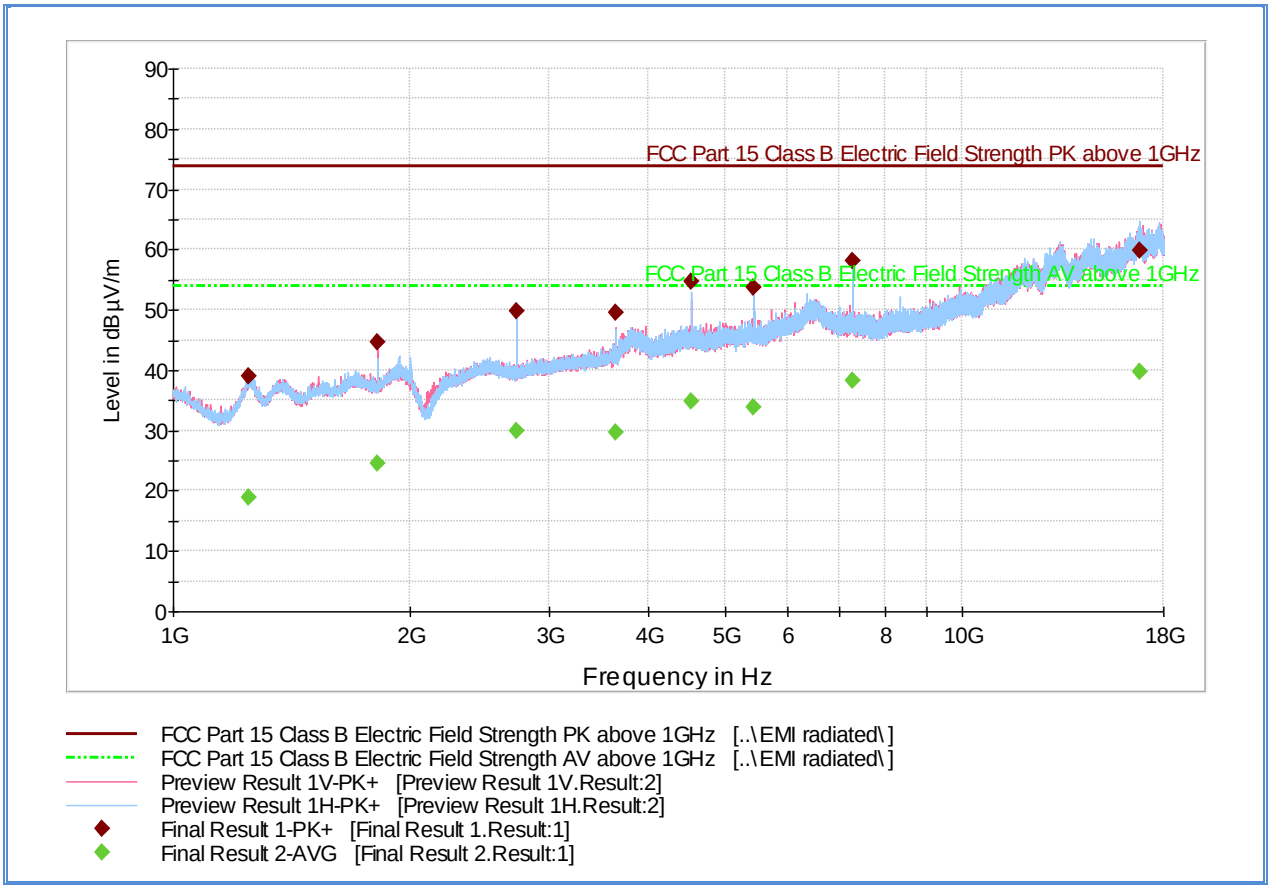
2.4.2 Test Results Below 1GHz (High Channel – Worst Case Configuration)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
37.399439	21.8	1000.0	120.000	383.0	H	9.0	-14.4	18.2	40.0
71.821643	17.5	1000.0	120.000	200.0	V	214.0	-21.4	22.5	40.0
85.372745	14.8	1000.0	120.000	109.0	V	102.0	-20.7	25.2	40.0
116.994950	12.4	1000.0	120.000	100.0	V	239.0	-19.2	31.1	43.5
293.584850	19.2	1000.0	120.000	105.0	H	308.0	-11.9	26.8	46.0
765.133467	31.9	1000.0	120.000	100.0	H	77.0	-0.8	14.1	46.0
921.164489	96.9	1000.0	120.000	250.0	H	155.0	Fundamental		

2.4.3 Test Results Above 1GHz (Low Channel)

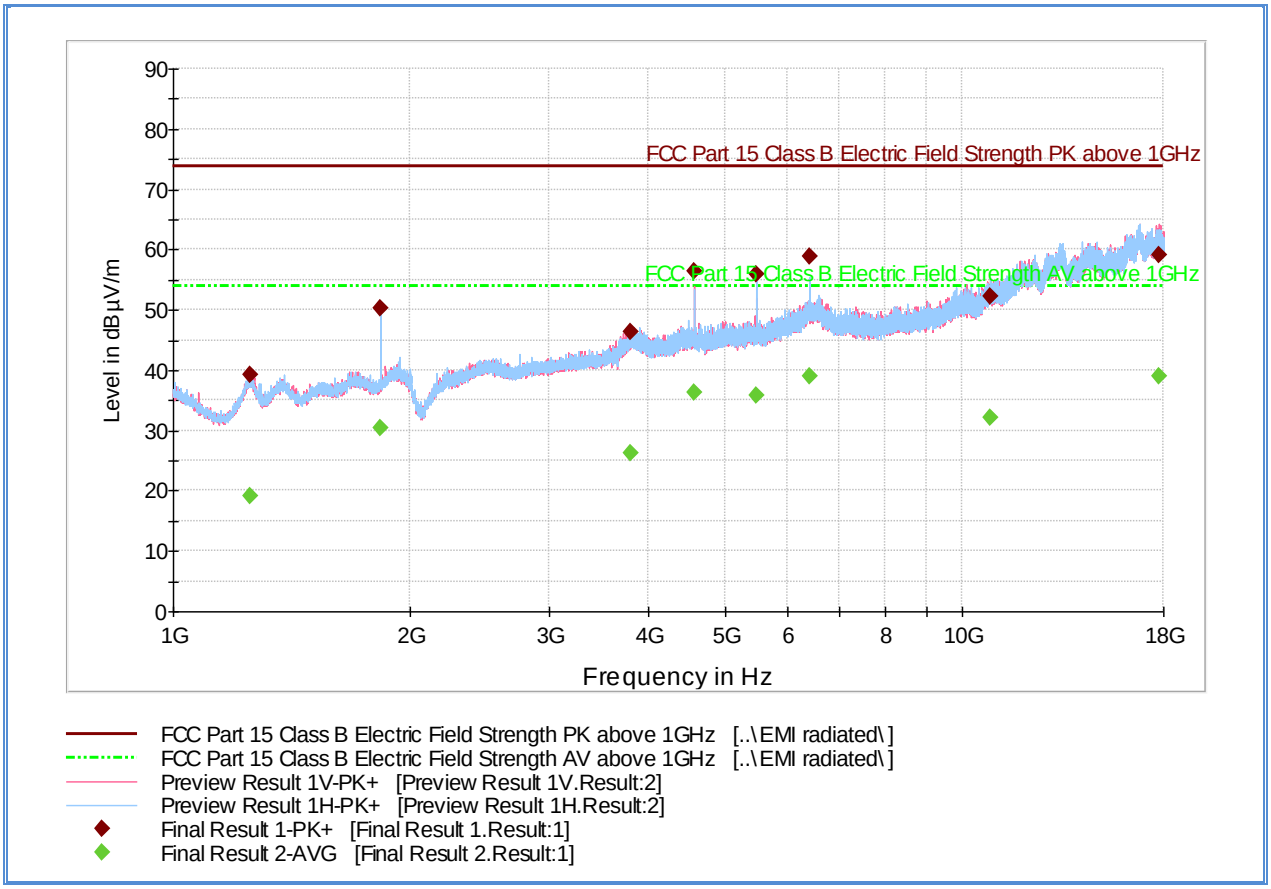


Peak and Average Data

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Peak/Average Margin (dB)	Peak Limit (dBµV	Average Limit (dBµV/
1245.03333	39.0	19.0	1000.	1000.000	386.1	H	20.0	-5.3	34.9	73.9	53.9
1816.76666	44.6	24.6	1000.	1000.000	266.3	V	333.0	-2.8	29.3	73.9	53.9
2725.13333	49.8	29.8	1000.	1000.000	102.8	H	-16.0	-1.0	24.1	73.9	53.9
3633.13333	49.6	29.6	1000.	1000.000	101.7	V	80.0	3.7	24.3	73.9	53.9
4541.50000	54.8	34.8	1000.	1000.000	99.7	H	39.0	6.9	19.1	73.9	53.9
5450.23333	53.8	33.8	1000.	1000.000	277.2	H	110.0	8.9	20.1	73.9	53.9
7266.56666	58.2	38.2	1000.	1000.000	208.5	H	30.0	11.2	15.7	73.9	53.9
16767.0666	59.8	39.8	1000.	1000.000	301.2	H	95.0	25.9	14.1	73.9	53.9

Test Notes: Average data is from Peak data with Duty Cycle Correction Factor applied.
Sample frequency computation:
4541.5 MHz = 54.8 dBµV/m (Peak)
= 54.8 dBµV/m + (-20 dB DCCF)
= 34.8 dBµV/m (Average)

2.4.4 Test Results Above 1GHz (Mid Channel)

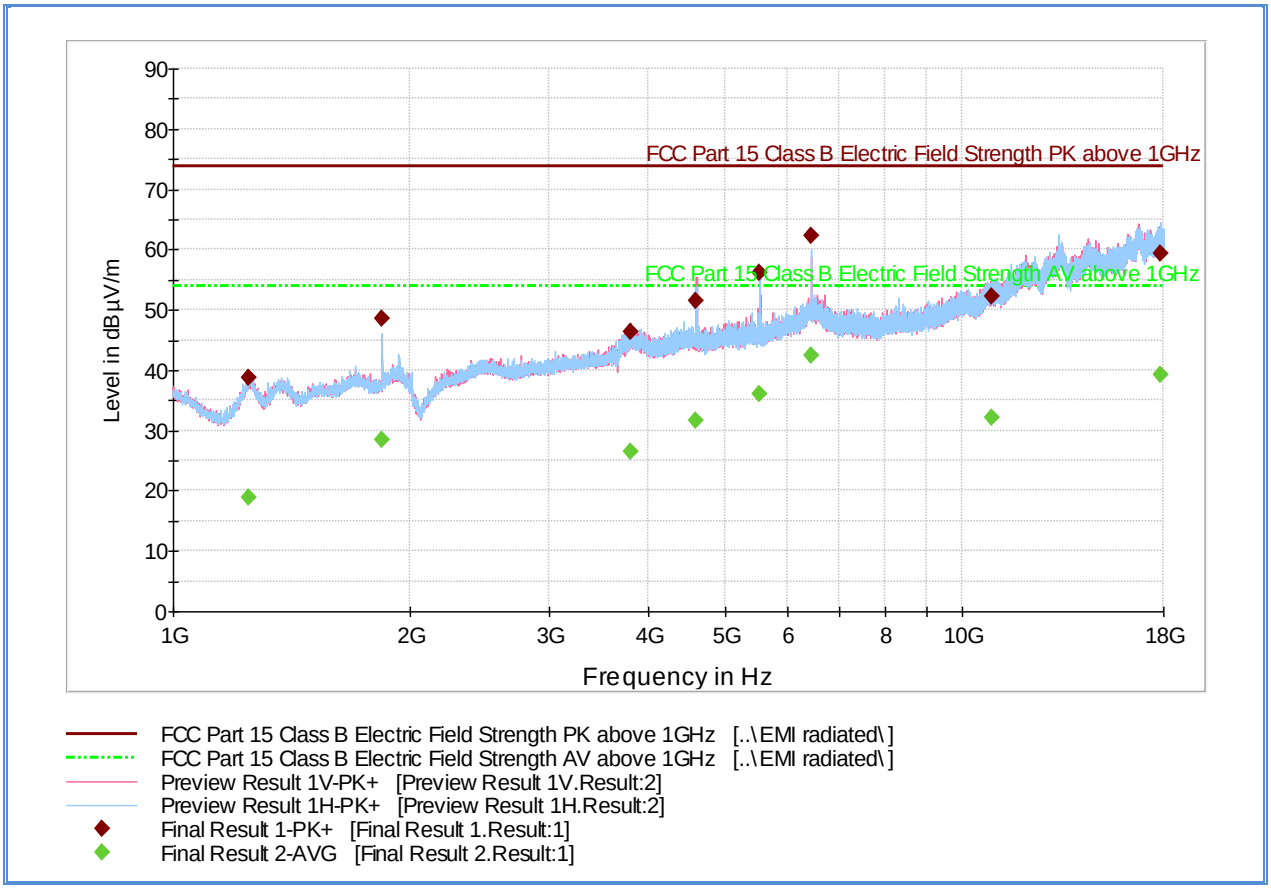


Peak and Average Data

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Peak/Average Margin (dB)	Peak Limit (dBµV	Average Limit (dBµV/
1253.83333	39.2	19.2	1000.	1000.000	178.6	V	50.0	-5.3	34.7	73.9	53.9
1829.80000	50.3	30.3	1000.	1000.000	113.7	H	123.0	-2.6	23.6	73.9	53.9
3803.53333	46.3	26.3	1000.	1000.000	196.5	H	346.0	6.0	27.6	73.9	53.9
4574.73333	56.4	36.4	1000.	1000.000	99.7	H	39.0	7.0	17.5	73.9	53.9
5489.33333	55.8	35.8	1000.	1000.000	345.1	H	305.0	8.9	18.1	73.9	53.9
6404.10000	58.9	38.9	1000.	1000.000	164.6	H	20.0	12.7	15.0	73.9	53.9
10876.9666	52.2	32.2	1000.	1000.000	225.4	V	133.0	16.7	21.7	73.9	53.9
17792.2333	59.1	39.1	1000.	1000.000	202.5	V	7.0	25.8	14.8	73.9	53.9

Test Notes: Average data is from Peak data with Duty Cycle Correction Factor applied.
Sample frequency computation:
4574.7 MHz = 56.4 dBµV/m (Peak)
= 56.4 dBµV/m + (-20 dB DCCF)
= 36.4 dBµV/m (Average)

2.4.5 Test Results Above 1GHz (High Channel)



Peak and Average Data

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Peak/Average Margin (dB)	Peak Limit (dBµV	Average Limit (dBµV/
1245.36666	38.9	18.9	1000.	1000.000	201.5	V	60.0	-5.3	35.0	73.9	53.9
1842.26666	48.4	28.4	1000.	1000.000	113.7	H	223.0	-2.4	25.5	73.9	53.9
3806.33333	46.5	26.5	1000.	1000.000	301.6	V	0.0	6.0	27.4	73.9	53.9
4605.53333	51.6	31.6	1000.	1000.000	147.7	V	186.0	7.0	22.3	73.9	53.9
5526.73333	56.1	36.1	1000.	1000.000	226.4	H	125.0	8.9	17.8	73.9	53.9
6447.73333	62.4	42.4	1000.	1000.000	163.6	H	9.0	12.7	11.5	73.9	53.9
10914.0666	52.1	32.1	1000.	1000.000	186.5	H	77.0	16.8	21.8	73.9	53.9
17811.2666	59.3	39.3	1000.	1000.000	301.2	H	242.0	25.8	14.6	73.9	53.9

Test Notes: Average data is from Peak data with Duty Cycle Correction Factor applied.
Sample frequency computation:
4605.5 MHz = 51.6 dBµV/m (Peak)
= 51.6 dBµV/m + (-20 dB DCCF)
= 31.6 dBµV/m (Average)

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Radiated Test Setup						
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	01/30/14	01/30/16
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	04/03/14	04/03/15
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	04/08/14	04/08/15
1016	Pre-amplifier	PAM-0202	187	PAM	10/08/13	10/08/14
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	07/31/13	07/31/14
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	03/17/14	03/17/15
8817	800MHz to 1GHz Band Notch Filter	BRM50706	019	Micro-Tronics	Verified by 1049	
Conducted Test Setup						
9062	Wireless Communications Test Set	8960 Series 10 (E5515C)	00058717	Agilent	07/02/14	07/02/15
1184	20Hz to 26.5GHz Spectrum Analyzer	FSEM	DE23095	Rhode & Schwarz	06/27/14	06/27/15
Miscellaneous						
7560	Barometer/Temperature /Humidity Transmitter	iBTHX-W	1240476	Omega	01/30/14	01/30/15
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Radiated Emission Measurements (Below 1GHz)

	Contribution	Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	2.41
				Coverage Factor (k):	2
				Expanded Uncertainty:	4.82

3.2.2 Radiated Emission Measurements (Above 1GHz)

	Contribution	Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.70	0.40	0.16
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.37	0.21	0.05
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	2.40
				Coverage Factor (k):	2
				Expanded Uncertainty:	4.81

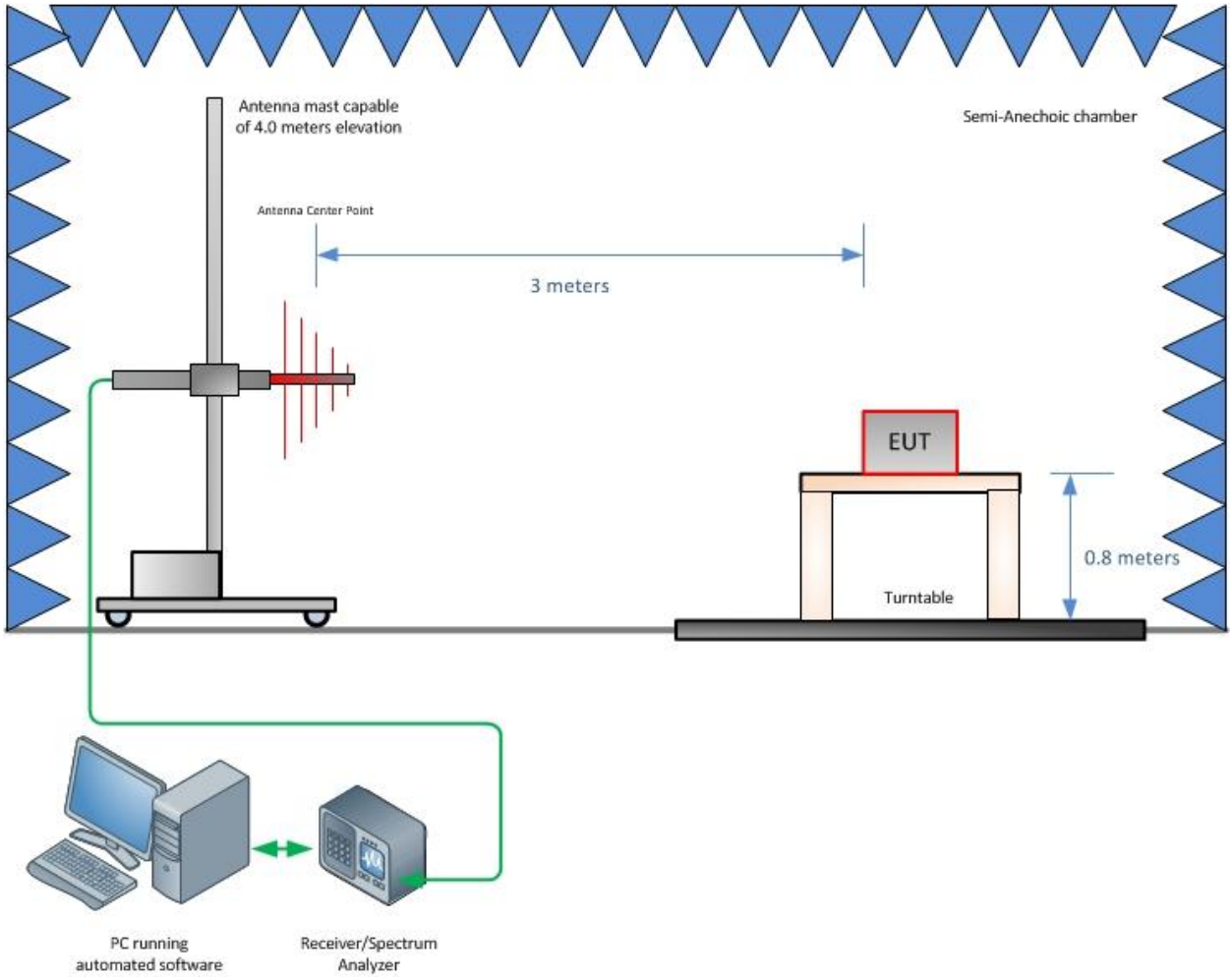
3.2.3 Conducted Antenna Port Measurement

	Contribution	Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.50	0.29	0.08
3	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	0.72
				Coverage Factor (k):	2
				Expanded Uncertainty:	1.45

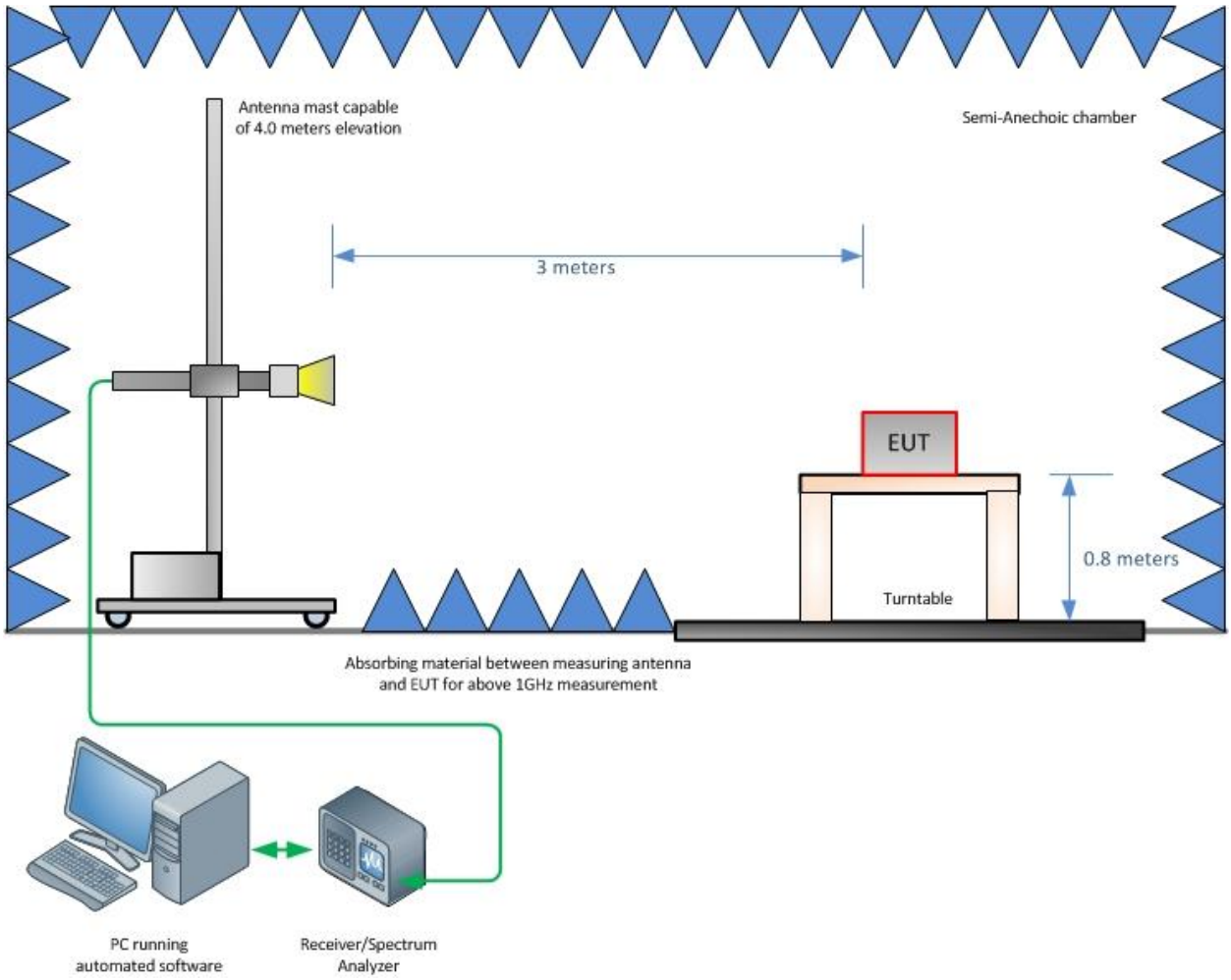
SECTION 4

DIAGRAM OF TEST SETUP

4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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