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Report On

Radio Testing of the
Baltech AG
Model 10115-610 RFID Reader

FCC Part 15 Subpart C §15.207 and §15.209
IC RSS-Gen Issue 4 November 2014

Report No. SD72124699-0217D Rev. 1 March 2017

REPORT ON	EMC Evaluation of the Baltech AG 10115-610 Model No. 10115-610
TEST REPORT NUMBER	SD72124699-0217D Rev. 1
REPORT DATE	March 2017
PREPARED FOR	Baltech AG Lilienthalstr.27 85399 Hallbergmoos Germany
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PREPARED BY	Ferdinand S. Custodio **Name** Authorized Signatory Title: EMC/Senior Wireless Test Engineer
APPROVED BY	Juan Manuel Gonzalez Name Authorized Signatory Title: EMC SL Manager West Region
DATED	March 29, 2017

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

Revision History

SD72124699-0217D Rev. 1 Baltech AG 10115-610 RFID Reader					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
03/29/2017	Initial Release				Juan Manuel Gonzalez
04/04/2017	Initial Release	Rev. 1	Update reference of Model 10117 to Model 10115	9	Ferdinand S. Custodio

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SECTION 1

REPORT SUMMARY

Radio Testing of the
Baltech AG
10115-610

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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Baltech AG RFID Reader to the requirements of the following:

- FCC Part 15 Subpart C §15.207 and §15.209
- IC RSS-Gen Issue 4 November 2014.

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	Baltech AG
Model Number(s)	10115-610
FCC ID Number	OKY10115610A02A
IC Number	7657A-10115610
Serial Number(s)	00000000
Number of Samples Tested	2
Test Specification/Issue/Date	• FCC Part 15 Subpart C §15.207 and §15.209 (October 1, 2016). • RSS-Gen - General Requirements and Information for the Certification of Radio Apparatus (Issue 4, November 2014).
Start of Test	March 06, 2017
Finish of Test	March 13, 2017
Name of Engineer(s)	Ivan Retana 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 §15.207 and §15.209 with cross-reference to RSS-Gen is shown below:

Section	FCC Part 15	RSS	Test Description	Result	Comments/Base Standard
	§15.203 and 204	RSS-Gen 8.3	Antenna Requirements	Compliant	See Test Note[1]
2.1		RSS-Gen 6.6	Occupied Bandwidth	Compliant	
2.2	§15.209(a)	RSS-Gen 8.9	Radiated emission limits; general requirements	Compliant	
2.3	§15.207(a)	RSS-Gen 8.8	Conducted Emissions	Compliant	
		RSS-Gen 7.0	Receiver Spurious Emissions	N/A	See Test Note[2]

Test Note[1]: The EUT uses a permanently attached antenna to the intentional radiator and is considered sufficient evidence to comply with the provisions of this requirement.

Test Note[2]: The EUT does not fall into the category of a Receiver as per RSS-Gen 5.0.

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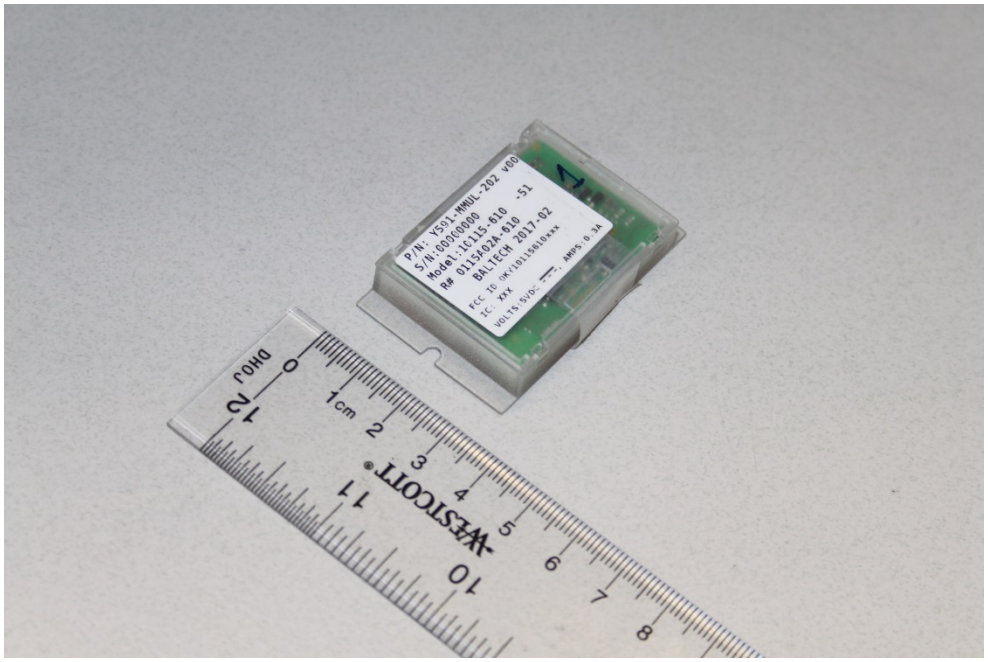
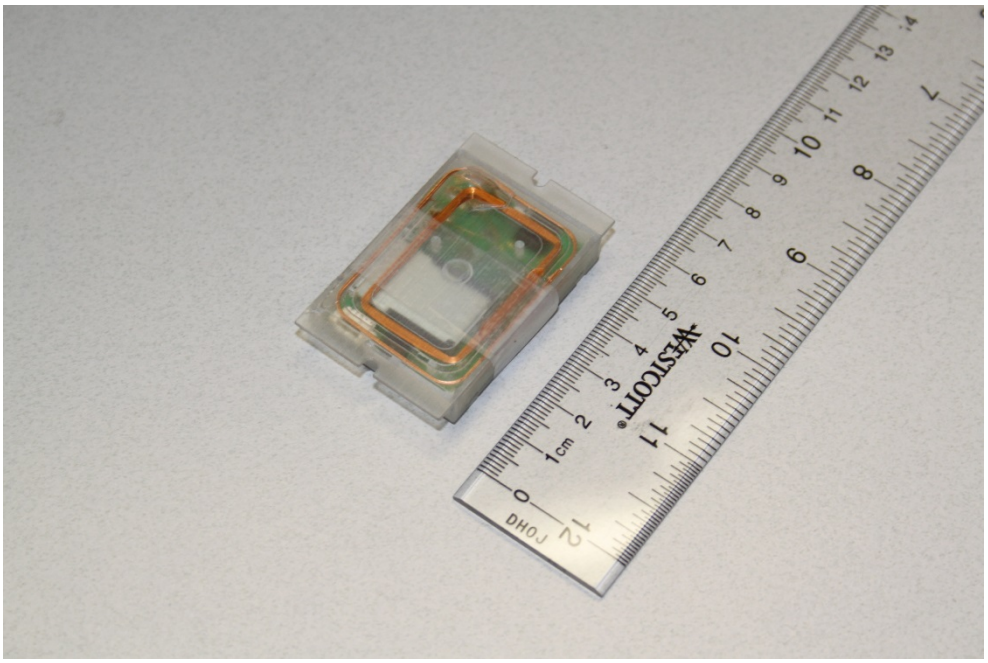
1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a Baltech AG Model no. 10115-610 RFID Reader as shown in the photograph below. The EUT is a USB powered RFID reader supporting 125 kHz and 13.56 MHz. The EUT also supports Bluetooth Smart 4.2 (2402 MHz to 2480 MHz).





Equipment Under Test

1.3.2 EUT General Description

EUT Description	RFID Reader
Model Number(s)	10115-610
Rated Voltage	5VDC (USB)
Type Designation	10115-XYZ-A where X, Y, Z and A may be replaced by any alphanumerical numbers:

Version/HW Revision	10115-100	13.56MHz
	10115-110	
	10115-200	125kHz
	10115-300	125kHz & 13.56MHz
	10115-310	
	10115-400	13.56MHz & BLE
	10115-410	
	10115-500	125kHz & BLE
	10115-510	
	10115-600	125kHz, 13.56MHz & BLE
	10115-610	
The applicant declares the conformity of the variants listed above. The test results are valid for the tested variant 10115-610, and models listed with 125KHz Tx.		

HW	10115-610
FW	1976_Test
Configuration	Auto Read
Host IF	USB
Frequency (Capability)	13.56 MHz, 125 KHz and 2.4 GHz
Mode Verified	125 KHz
Configuration	Auto Read
Bluetooth Smart Transmit Power	3 dBm
Bluetooth Smart Conducted Power	< 9.9 dBm
Bluetooth Smart Antenna Type	Integrated Chip
Bluetooth Smart Antenna Gain	1 dBi

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	*Description*
Default	The EUT operating at 125 kHz and 13.56 MHz sequentially once powered by 5VDC via USB. Additionally BT functionality was turned on during RSE evaluation to verify simultaneous Tx against 15.207 and 15.209 limits.

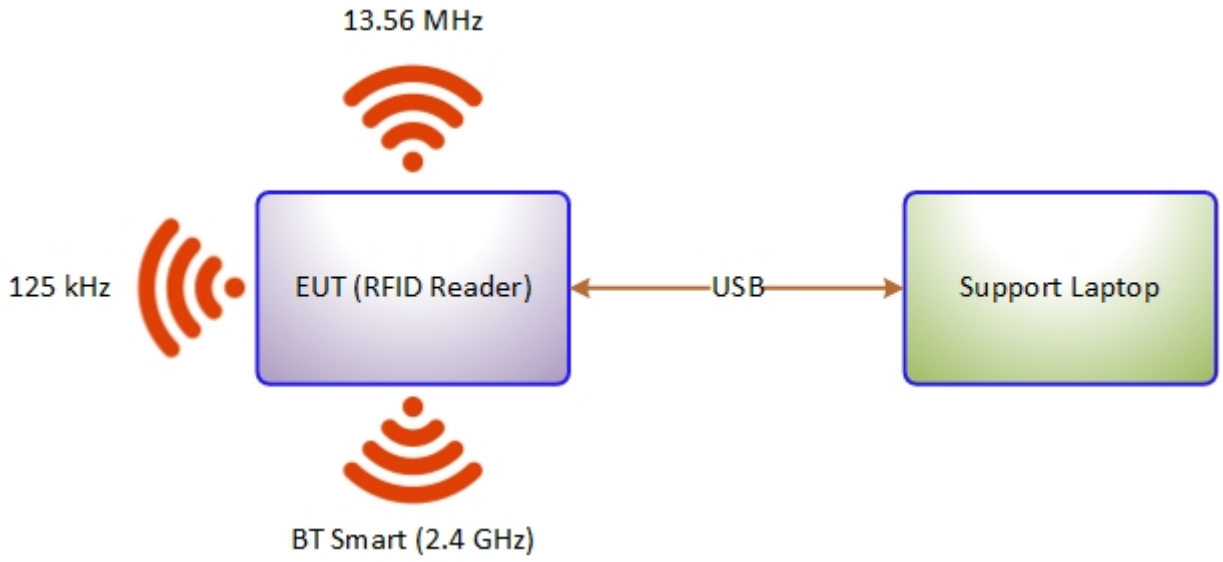
1.4.2 EUT Exercise Software

Testing software (3544_bluetooth_hf_test_tool_1_00_01.exe) was provided by the manufacturer to exercise the Bluetooth function together with the RFID.

1.4.3 Support Equipment and I/O cables

Manufacturer	*Equipment/Cable*	*Description*
-	USB Cable	1.8 meters USB Type A to Molex connector
Lenovo	Support Laptop	X100e Type 3508-2AU S/N LR-CHGDB 10/06
Lenovo	Support AC Adapter for Laptop	M/N 42T4418 S/N 11S42T4418Z1ZGWG28Z0KB

1.4.4 Simplified Test Configuration Diagrams



1.5 DEVIATIONS FROM THE STANDARD

All deviations made during testing from the applicable test standards or test plan are detailed under Section 1.2 of this test report.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number 00000000		
N/A		

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 C63.10-2013. American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

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 C63.10-2013. 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)

16936 Via Del Campo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: 858 678-1400 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 Innovation, Science and Economic Development 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 Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A.

1.9.3 BSMI – Laboratory Code: SL2-IN-E-028R (US0102)

TUV Product Service Inc. (San Diego) is a recognized EMC testing laboratory by the BSMI under the MRA (Mutual Recognition Arrangement) with the United States. Accreditation includes CNS 13438 up to 6GHz.

1.9.4 NCC (National Communications Commission - US0102)

TUV SUD America Inc. (San Diego) is listed as a Foreign Recognized Telecommunication Equipment Testing Laboratory and is accredited to ISO/IEC 17025 (A2LA Certificate No.2955.13) which under APEC TEL MRA Phase 1 was designated as a Conformity Assessment Body competent to perform testing of equipment subject to the Technical Regulations covered under its scope of accreditation including RTTE01, PLMN01 and PLMN08 for TTE type of testing and LP002 for Low-Power RF Device type of testing.

1.9.5 VCCI – Registration No. A-0230

TUV SUD America Inc. (San Diego) is a VCCI registered measurement facility which includes radiated field strength measurement, radiated field strength measurement above 1GHz, mains port interference measurement and telecommunication port interference measurement.

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SECTION 2

TEST DETAILS

Radio Testing of the
Baltech AG
10115-610

2.1 99% EMISSION BANDWIDTH

2.1.1 Specification Reference

RSS-Gen Clause 6.6

2.1.2 Standard Applicable

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.
The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.
The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

2.1.3 Equipment Under Test and Modification State

Serial No: 00000000 / Default Test Configuration

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

March 07, 2017 /IR

2.1.5 Test Equipment Used

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

2.1.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.7 °C
Relative Humidity	44.6 %
ATM Pressure	99.8 kPa

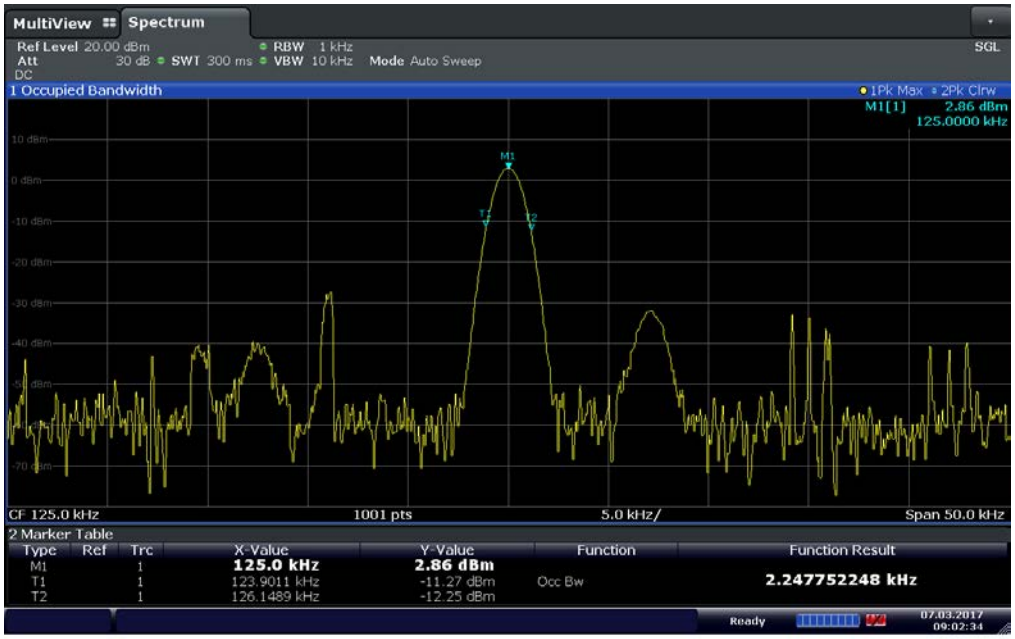
2.1.7 Additional Observations

- This is a radiated test.
- Span is wide enough to capture the channel transmission.
- RBW was set to 1 kHz.
- VBW is 3X RBW.
- Sweep is auto.
- Detector is peak.

- The % Power Bandwidth setting in the spectrum analyzer was set to 99% (default).
- The Channel Bandwidth measurement function of the spectrum analyzer was used for this test.

2.1.8 Test Results (Reporting Purposes Only)

Frequency	99% Emission bandwidth
125 kHz	2.24 kHz



2.2 RADIATED EMISSIONS ; GENERAL REQUIREMENTS

2.2.1 Specification Reference

Part 15 Subpart C §15.209(a) and RSS-Gen 8.9

2.2.2 Standard Applicable

(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:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

2.2.3 Equipment Under Test and Modification State

Serial No: 00000000 / Default Test Configuration

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

March 13, 2017 /AC

2.2.5 Test Equipment Used

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

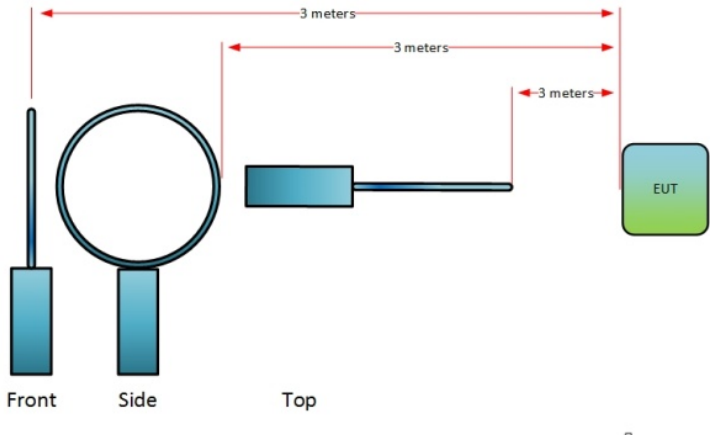
2.2.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.6 °C
Relative Humidity	44.4 %
ATM Pressure	99.9 kPa

2.2.7 Additional Observations

- This is a radiated test. The spectrum was searched from 9 kHz to the 10th harmonic (25 GHz).
- There are no emissions found that do not comply with the restricted bands defined in FCC Part 15 Subpart C, 15.205.
- Prescans were performed to determine the best test antenna orientation with the highest recorded emissions. Verification was performed using "Front" configuration (see the figure below) corresponding to the best antenna orientation as found during the prescans.
- 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 2.1.8 and 2.1.9 for sample computations.



2.2.8 Sample Computation (Radiated Emission 9 kHz to 30 MHz)

Measuring equipment raw measurement (dbµV) @ 9 kHz			25.0
Correction Factor (dB)	Asset# 1057 (cable)	0.1	25.9
	Asset# 8850 (cable)	0.0	
	Asset# 6628 (antenna)	25.8	
	Asset# 1026 (cable)	0.0	
Reported QuasiPeak Final Measurement (dbµV/m) @ 9kHz			**50.9**

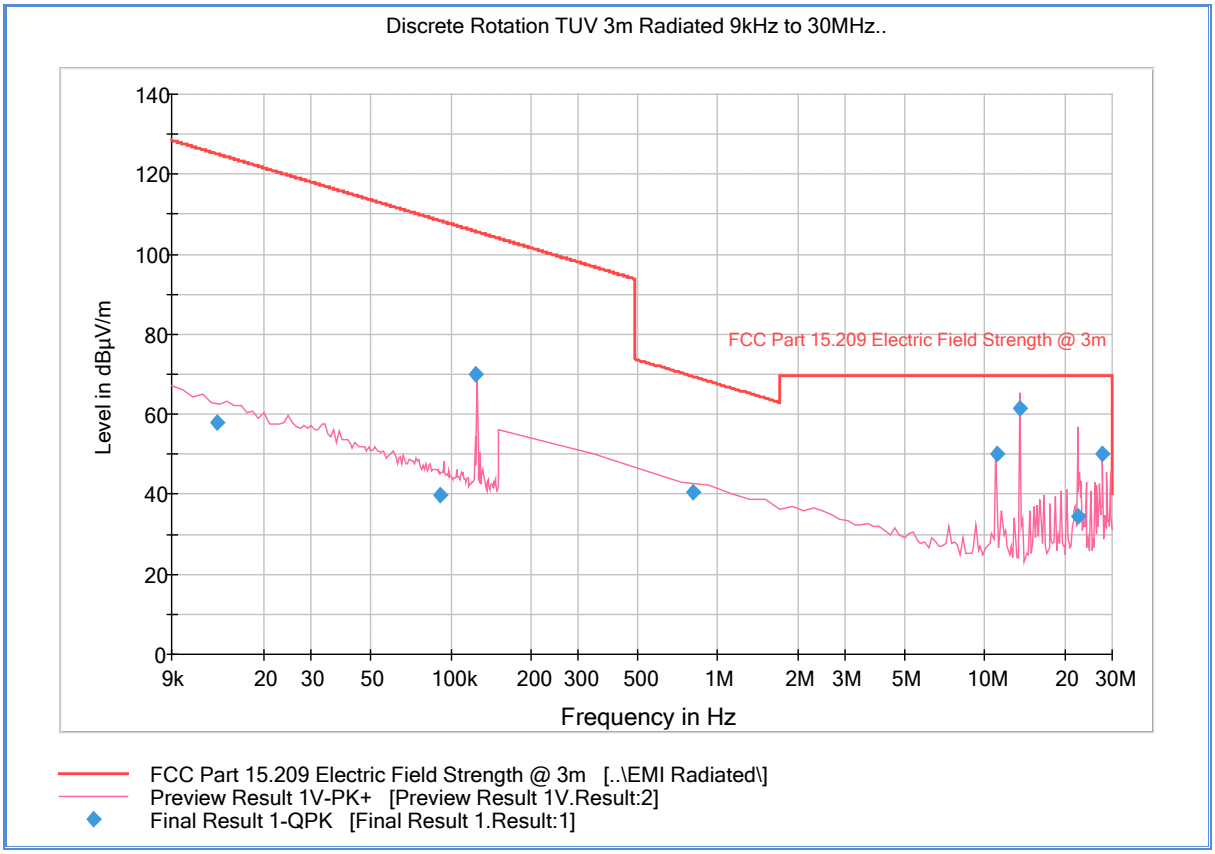
2.2.9 Sample Computation (Radiated Emission 30 MHz to 1 GHz)

Measuring equipment raw measurement (dbµV) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1026 (cable)	0.8	-7.0
	Asset# 1057 (cable)	0.2	
	Asset# 1016 (preamplifier)	-30.8	
	Asset# 8850 (cable)	0.2	
	Asset# 1033 (antenna)	17.2	
	Asset# 8771 (6-dB attenuator)	5.4	
Reported QuasiPeak Final Measurement (dbµV/m) @ 30MHz			**17.4**

2.2.1 Test Results

See attached plots.

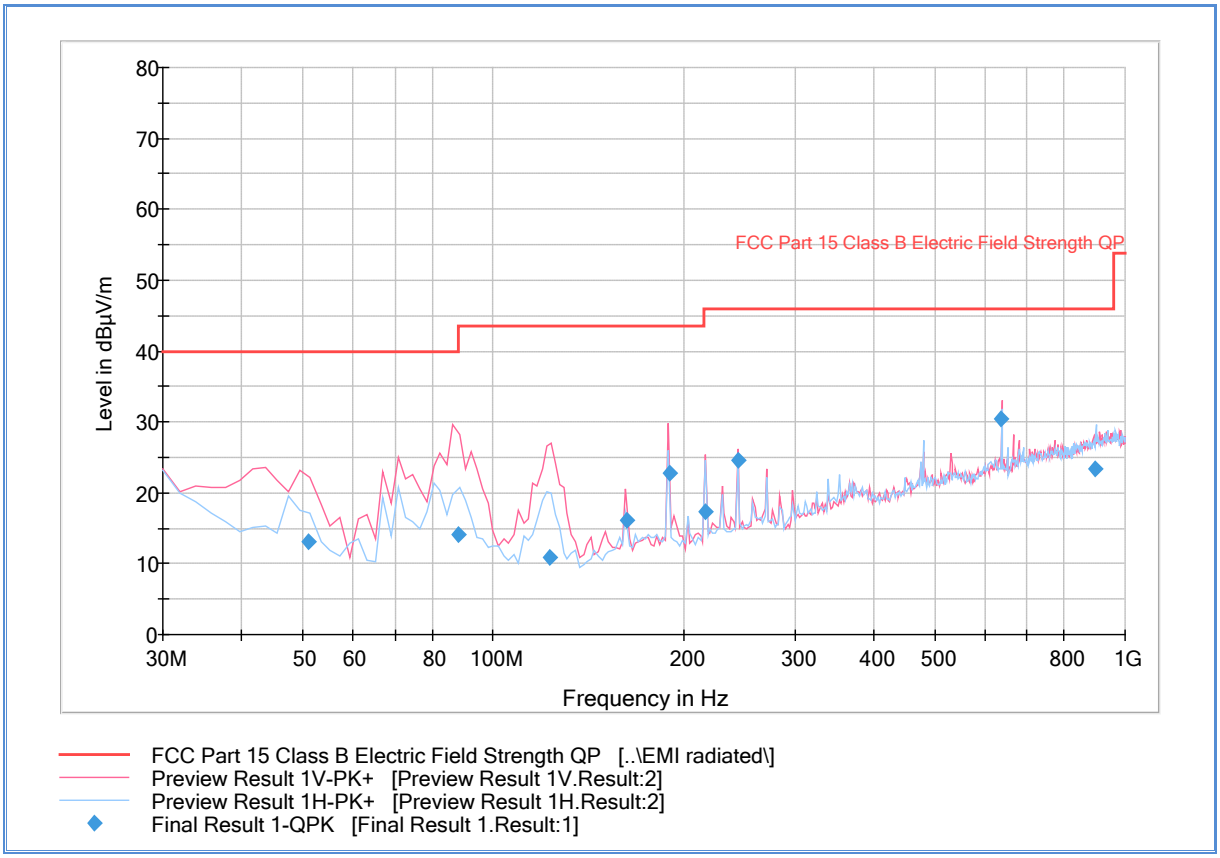
2.2.2 Test Results Below 30MHz



Quasi Peak Data (§15.209 Limits)

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
0.013325	57.8	1000.0	0.200	100.0	V	293.0	15.4	67.3	125.1
0.091149	39.9	1000.0	0.200	100.0	V	68.0	14.5	68.5	108.4
0.124279	69.9	1000.0	0.200	100.0	V	178.0	14.2	66.0	105.7
0.806325	40.5	1500.0	9.000	100.0	V	205.0	14.4	29.0	69.5
11.061546	50.2	1500.0	9.000	100.0	V	345.0	15.4	19.4	69.5
13.561351	61.4	1500.0	9.000	100.0	V	205.0	15.4	8.1	69.5
22.359753	34.5	1500.0	9.000	100.0	V	37.0	15.0	35.0	69.5
27.651026	50.1	1500.0	9.000	100.0	V	189.0	14.2	19.4	69.5

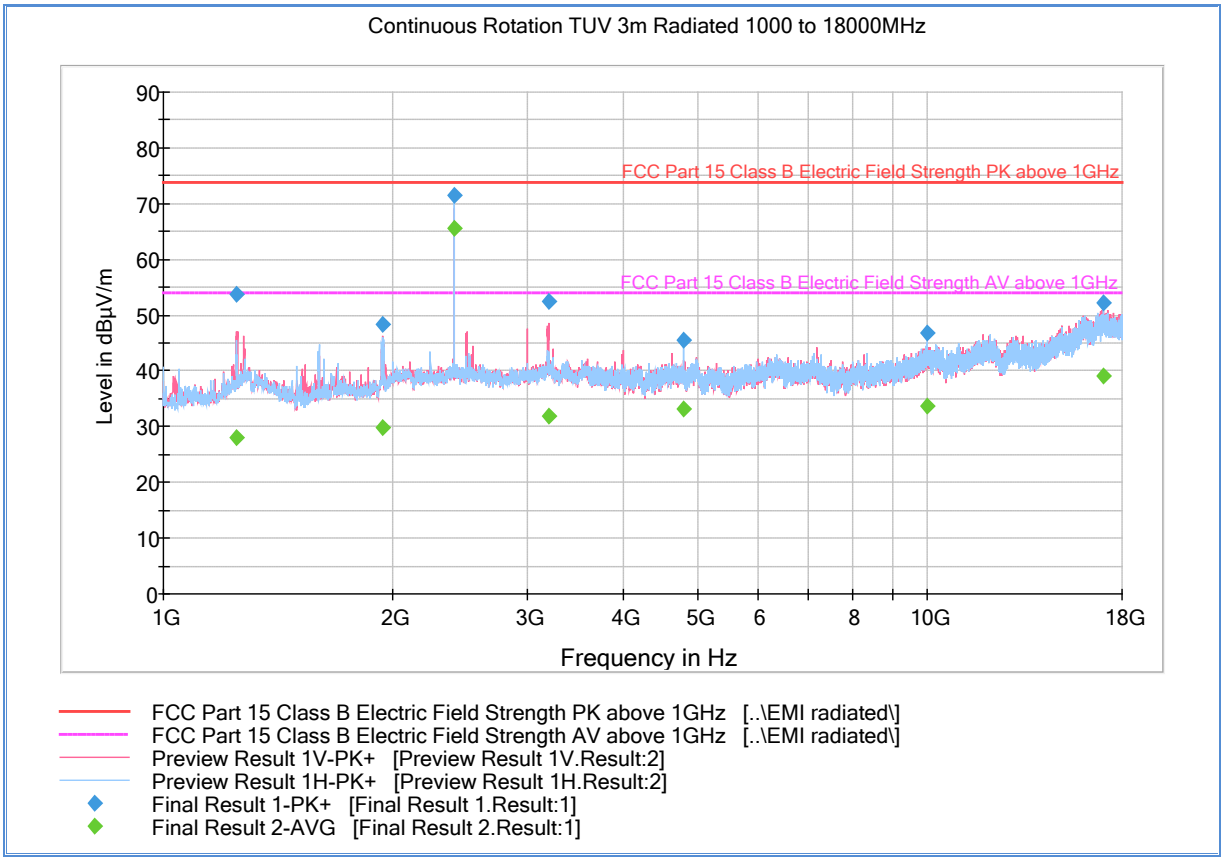
2.2.3 Test Results 30MHz to 1GHz



Quasi Peak Data (§15.209 Limits)

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
51.118878	13.1	1000.0	120.000	100.0	V	344.0	-15.5	26.9	40.0
87.972745	14.1	1000.0	120.000	100.0	V	287.0	-17.1	25.9	40.0
122.746613	11.0	1000.0	120.000	100.0	V	-12.0	-16.7	32.5	43.5
162.664369	16.1	1000.0	120.000	100.0	V	88.0	-13.4	27.4	43.5
189.878798	22.8	1000.0	120.000	100.0	V	215.0	-12.6	20.7	43.5
217.013226	17.4	1000.0	120.000	100.0	V	278.0	-11.5	28.6	46.0
244.067655	24.6	1000.0	120.000	100.0	V	22.0	-9.9	21.4	46.0
637.276874	30.5	1000.0	120.000	100.0	V	195.0	0.9	15.5	46.0
896.517836	23.5	1000.0	120.000	243.0	H	15.0	5.4	22.5	46.0

2.2.4 Test Results above 1GHz



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1249.133333	53.8	1000.0	1000.000	133.7	V	55.0	-5.6	20.1	73.9
1940.300000	48.2	1000.0	1000.000	401.7	V	314.0	-2.2	25.7	73.9
2402.166667	71.6	1000.0	1000.000	102.7	H	170.0	-1.0	Fundamental BT	
3198.700000	52.5	1000.0	1000.000	102.7	V	-1.0	1.2	21.4	73.9
4804.433333	45.6	1000.0	1000.000	159.6	H	189.0	3.4	28.3	73.9
10007.366667	46.8	1000.0	1000.000	146.7	H	234.0	10.2	27.1	73.9
17031.533333	52.2	1000.0	1000.000	151.6	V	5.0	19.6	21.7	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1249.133333	28.0	1000.0	1000.000	133.7	V	55.0	-5.6	25.9	53.9
1940.300000	29.8	1000.0	1000.000	401.7	V	314.0	-2.2	24.1	53.9
2402.166667	65.5	1000.0	1000.000	102.7	H	170.0	-1.0	Fundamental BT	
3198.700000	32.0	1000.0	1000.000	102.7	V	-1.0	1.2	21.9	53.9
4804.433333	33.1	1000.0	1000.000	159.6	H	189.0	3.4	20.8	53.9
10007.366667	33.6	1000.0	1000.000	146.7	H	234.0	10.2	20.3	53.9
17031.533333	39.2	1000.0	1000.000	151.6	V	5.0	19.6	14.7	53.9

Test Notes: No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures. Fundamental of the Bluetooth Smart will be ignored for this test.

2.3 CONDUCTED EMISSIONS

2.3.1 Specification Reference

Part 15 Subpart C §15.207(a) and RSS-Gen 8.8

2.3.2 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.*

2.3.3 Equipment Under Test and Modification State

Serial No: 00000000 / Default Test Configuration

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

March 13, 2017 /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	23.6 °C
Relative Humidity	44.4 %
ATM Pressure	99.9 kPa

2.3.1 Additional Observations

- Measurement was performed on the support laptop where the EUT was connected via USB.
- Termination of the EUT RFID antenna is not possible, the position of the EUT on the test table was adjusted to lessen the influence of the RFID frequencies on the measurements.

- 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 2.2.2 for sample computation.

2.3.2 Sample Computation (Conducted Emission – Quasi Peak)

Measuring equipment raw measurement (dbµV) @ 150kHz			5.5
Correction Factor (dB)	Asset# 8607 (20 dB attenuator)	19.9	20.7
	Asset# 1177 (cable)	0.15	
	Asset# 1176 (cable)	0.35	
	Asset# 7568 (LISN)	0.30	
Reported QuasiPeak Final Measurement (dbµV) @ 150kHz			**26.2**

2.3.3 Test Results

Compliant. See attached plots and tables.

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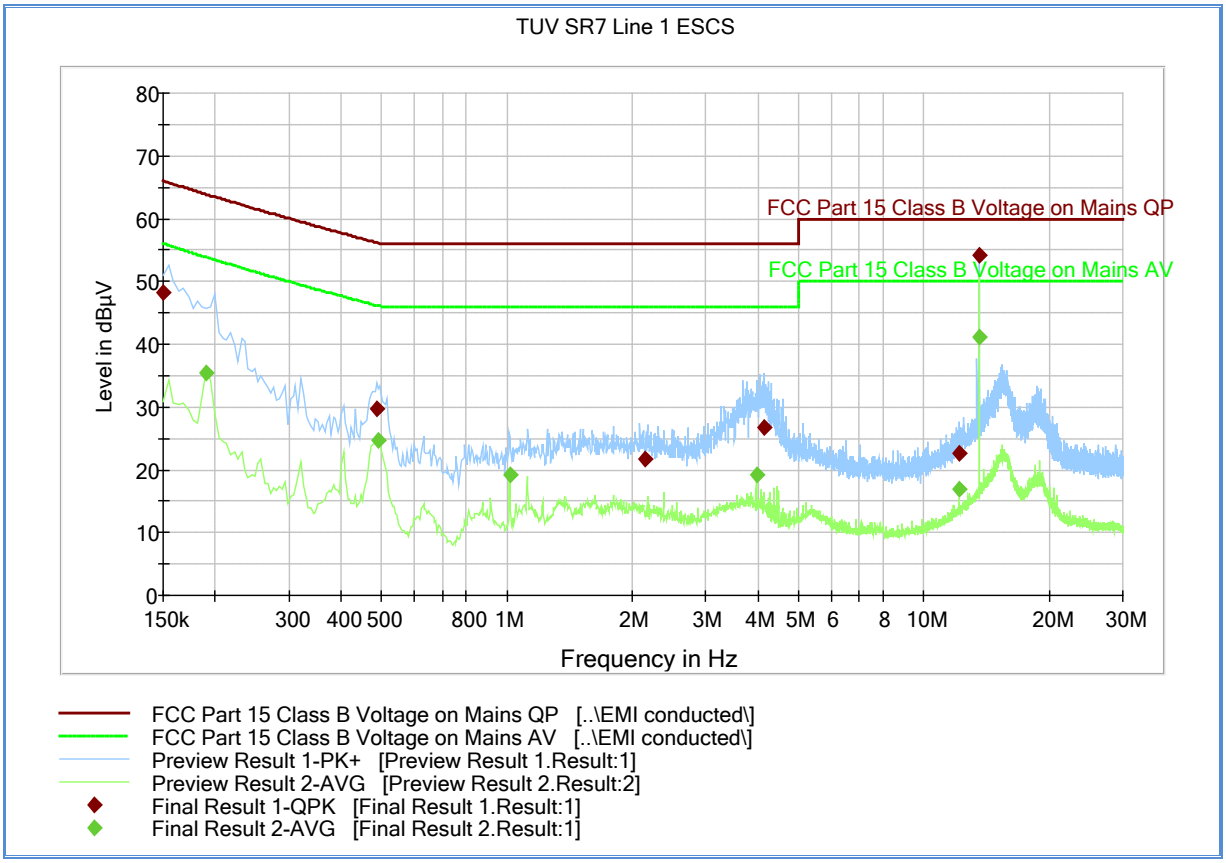
2.3.4 120VAC 60Hz (Line 1)



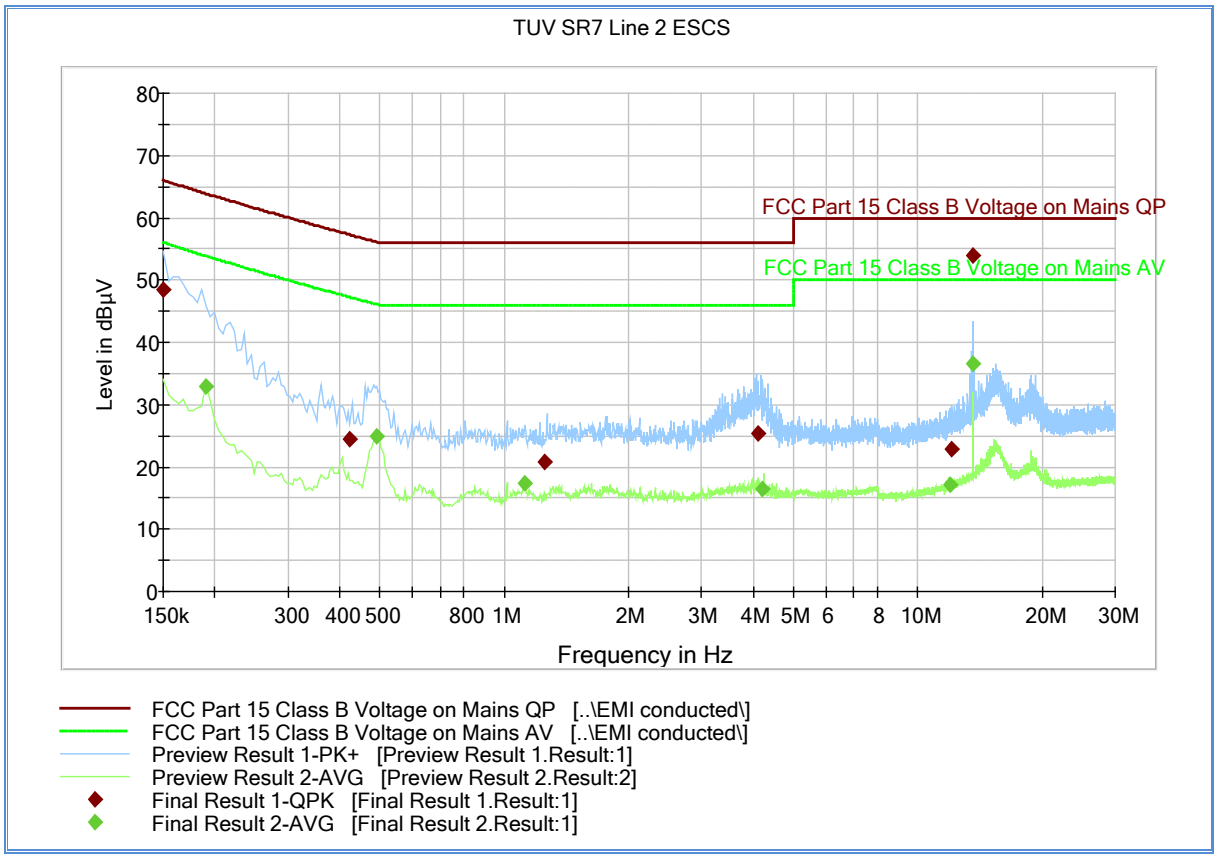
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.150000	48.3	1000.0	9.000	Off	L1	19.9	17.7	66.0
0.487500	29.8	1000.0	9.000	Off	L1	19.9	26.4	56.2
2.148000	21.7	1000.0	9.000	Off	L1	20.0	34.3	56.0
4.155000	26.8	1000.0	9.000	Off	L1	20.3	29.2	56.0
12.165000	22.6	1000.0	9.000	Off	L1	20.5	37.4	60.0
13.560000	54.2	1000.0	9.000	Off	L1	20.5	5.8	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.190500	35.4	1000.0	9.000	Off	L1	19.8	18.4	53.9
0.492000	24.7	1000.0	9.000	Off	L1	19.9	21.4	46.1
1.018500	19.3	1000.0	9.000	Off	L1	19.9	26.7	46.0
3.966000	19.2	1000.0	9.000	Off	L1	20.3	26.8	46.0
12.205500	17.0	1000.0	9.000	Off	L1	20.5	33.0	50.0
13.560000	41.1	1000.0	9.000	Off	L1	20.5	8.9	50.0

2.3.5 120VAC 60Hz (Line 2)



Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.150000	48.5	1000.0	9.000	Off	N	19.9	17.5	66.0
0.424500	24.6	1000.0	9.000	Off	N	19.9	32.7	57.3
1.252500	20.7	1000.0	9.000	Off	N	20.0	35.3	56.0
4.096500	25.5	1000.0	9.000	Off	N	20.3	30.5	56.0
12.111000	22.9	1000.0	9.000	Off	N	20.4	37.1	60.0
13.560000	54.0	1000.0	9.000	Off	N	20.5	6.0	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.190500	32.8	1000.0	9.000	Off	N	19.9	21.0	53.9
0.492000	24.9	1000.0	9.000	Off	N	19.9	21.3	46.1
1.117500	17.4	1000.0	9.000	Off	N	19.9	28.6	46.0
4.195500	16.5	1000.0	9.000	Off	N	20.3	29.5	46.0
12.003000	17.1	1000.0	9.000	Off	N	20.4	32.9	50.0
13.564500	36.5	1000.0	9.000	Off	N	20.5	13.5	50.0

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
Conducted Emissions						
1024	EMI Test Receiver	ESCS 30	847793/001	Rhode & Schwarz	09/07/16	09/07/17
7567	LISN	FCC-LISN-50-25-2-10	120304	Fischer Custom Comm.	11/05/16	11/05/17
8822	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	Verified by 7582 and 7608	
8824	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	Verified by 7582 and 7608	
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	10/26/16	10/26/17
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/02/16	09/02/17
Radiated Emission						
7640	Loop Antenna	AL-130R	121086	Com-Power	11/21/16	11/21/17
1033	Bilog Antenna	3142C	00044556	EMCO	10/11/16	10/11/18
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	10/07/16	10/07/17
1016	Pre-amplifier	PAM-0202	187	PAM	02/09/17	02/09/18
1051	Double-ridged waveguide horn antenna	3115	9408-4329	EMCO	03/21/16	03/21/17
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	03/17/16	03/17/17
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	02/09/17	02/09/18
1003	Signal Generator	SMR-40	1104.0002.40	Rhode & Schwarz	05/16/16	05/16/17
7611	Signal/Spectrum Analyzer	FSW26	102017	Rhode & Schwarz	06/29/16	06/29/17
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	Verified by 1003 and 7582	
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	Verified by 1003 and 7582	
Miscellaneous						
7579	Temperature Chamber	115	151617	TestQuity	08/25/16	08/25/17
6792	Multimeter	3478A	2911A70964	Hewlett Packard	08/29/16	08/29/17
11312	Mini Environmental Quality Meter	850027	CF099-56010-340	Sper Scientific	08/22/16	08/22/17
	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 Measurements (Below 30MHz)

	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
4	Loop Antenna	Rectangular	0.75	0.44	0.19
5	Site	Rectangular	2.70	1.56	2.43
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	1.76
				Coverage Factor (k):	2
				Expanded Uncertainty:	3.53

3.2.2 Radiated Measurements (30 MHz to 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	2.70	1.56	2.43
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	1.78
				Coverage Factor (k):	2
				Expanded Uncertainty:	3.57

3.2.3 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	2.70	1.56	2.43
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	1.78
				Coverage Factor (k):	2
				Expanded Uncertainty:	3.56

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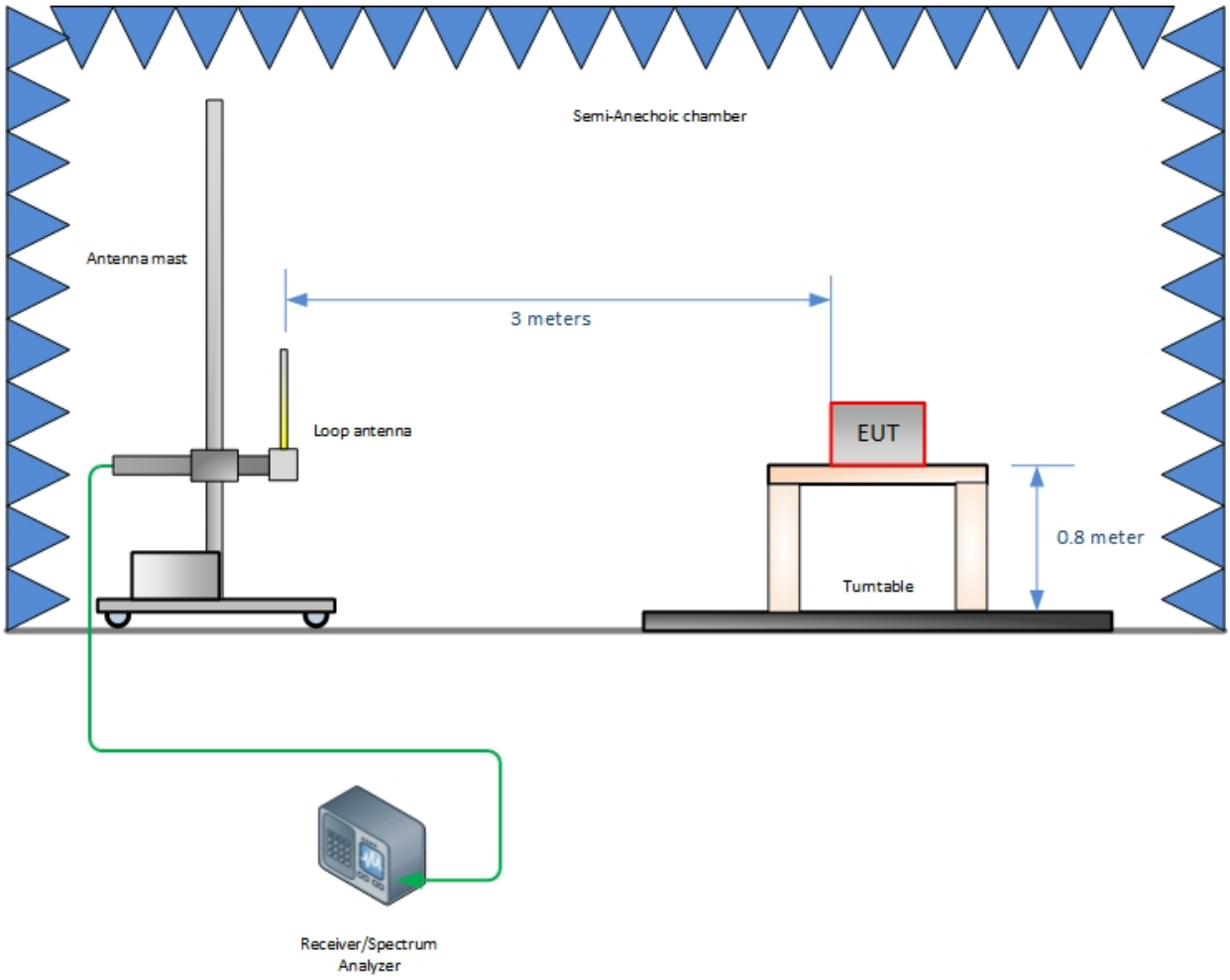
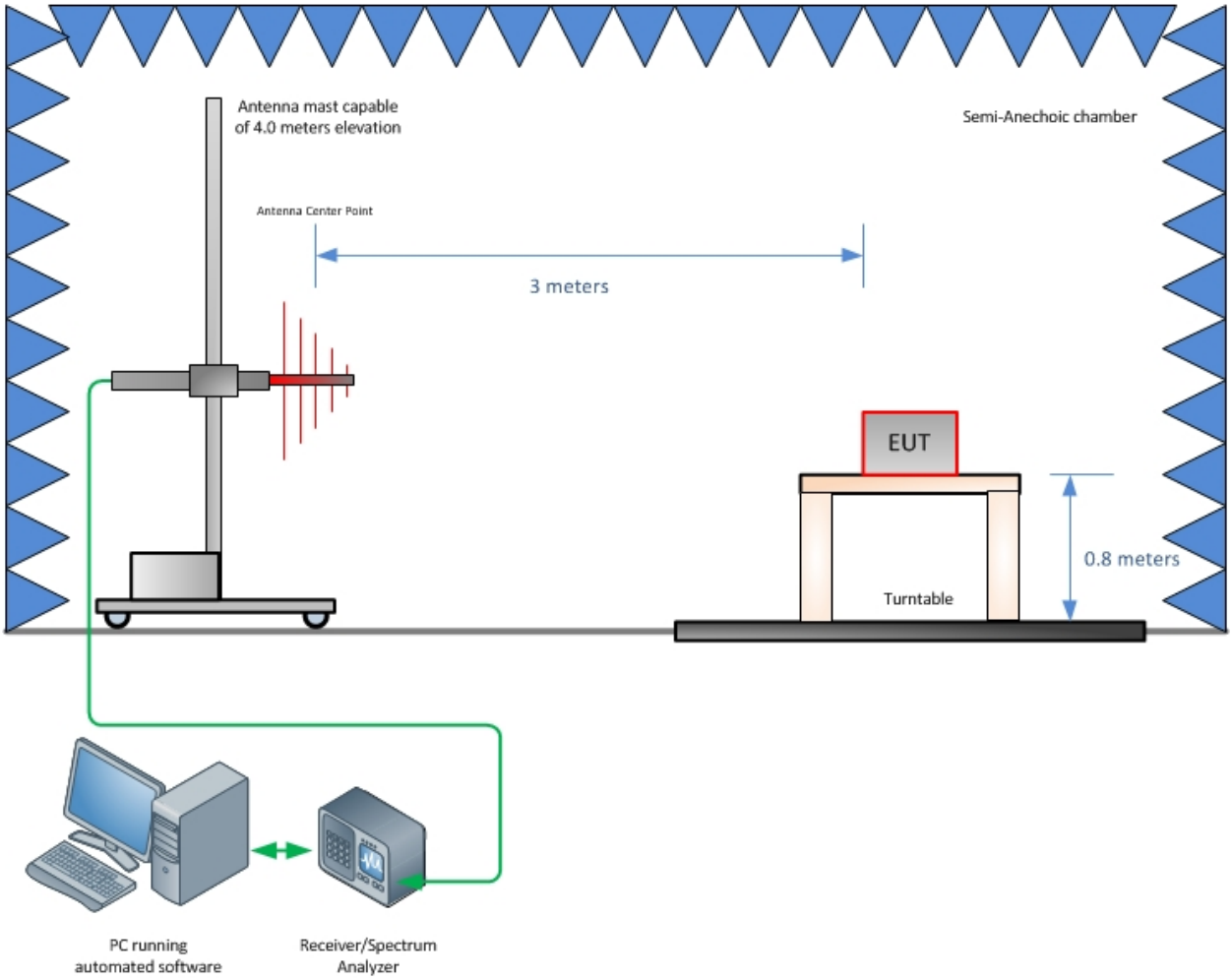
SECTION 4

DIAGRAM OF TEST SETUP

4.1 TEST SETUP DIAGRAM (BELOW 30MHZ)

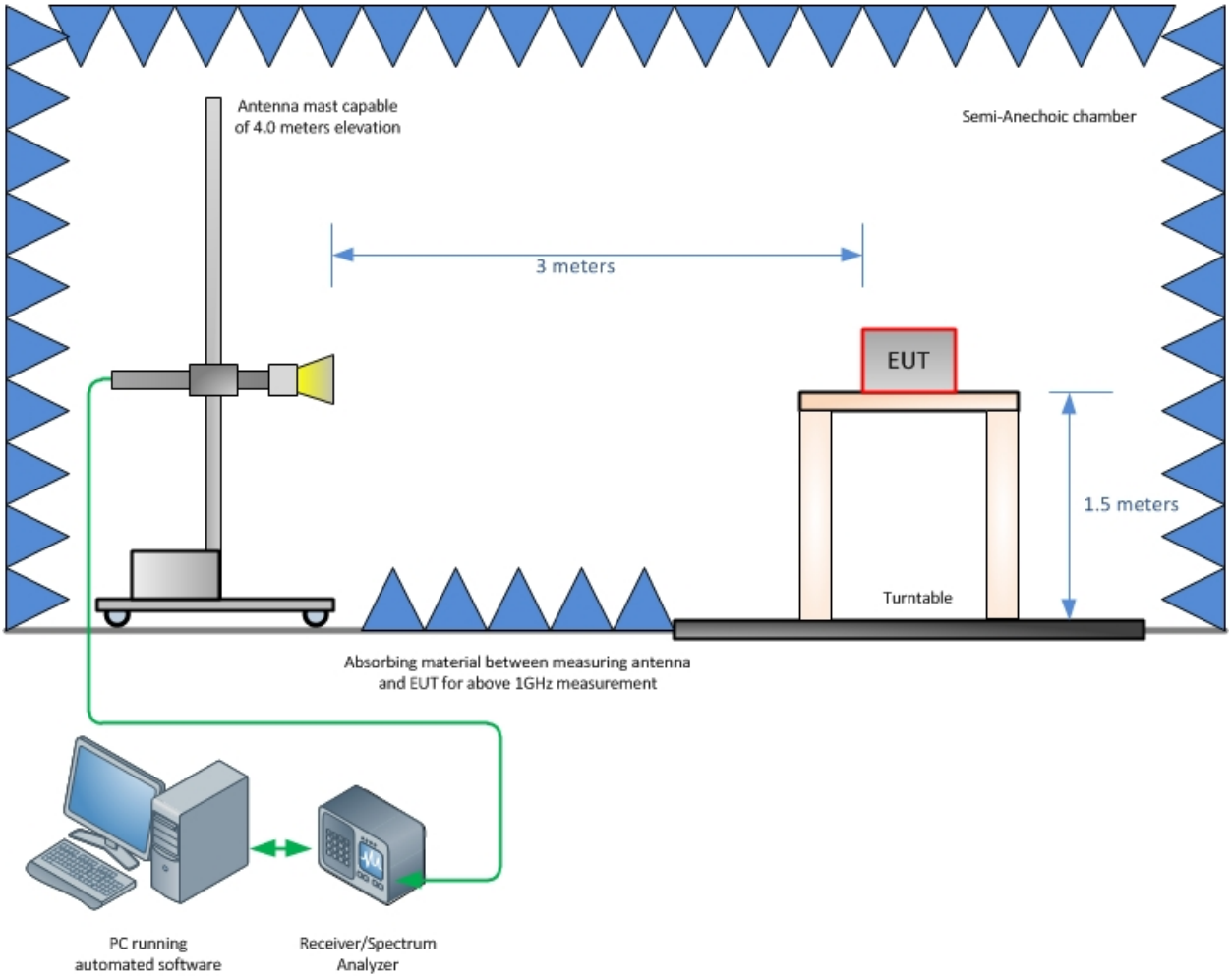


4.2 TEST SETUP DIAGRAM (30MHZ TO 1GHZ)



Radiated Emission Test Setup (Below 1GHz)

4.3 TEST SETUP DIAGRAM (> 1GHZ)



Radiated Emission Test Setup (Above 1GHz)

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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