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Report On

Radio Testing of the
Fortrend Engineering
Model RFT-200 RFID Single Channel Reader/Writer Module

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

Report No. PK72130453-0817B

September 2017


REPORT ON EMC Evaluation of the
Fortrend Engineering
RFID Reader Module Model No. RFT-200


TEST REPORT NUMBER PK72130453-0817B

REPORT DATE September 2017

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DATED September 27, 2017



Revision History

PK72130453-0817B Fortrend Engineering RFID Single Channel Reader/Writer Module					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
09/27/2017	Initial Release				Alex Chang



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SECTION 1

REPORT SUMMARY

Radio Testing of the
Fortrend Engineering
RFID Single Channel Reader/Writer Module

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Fortrend Engineering RFT-200 RFID Single Channel Reader/Writer Module 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	Fortrend Engineering
Model Number(s)	RFID Reader Module
FCC ID Number	2ALBARFIDMODULE
IC Number	N/A
Serial Number(s)	N/A
Number of Samples Tested	2
Test Specification/Issue/Date	<ul style="list-style-type: none">• 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 02, 2017
Finish of Test	September 23, 2017
Name of Engineer(s)	Ferdie Custodio
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 Note¹: The EUT is professionally installed and used primarily with the manufacturer's line of RFID Reader/Writer equipment.

Test Note²: The EUT does not fall into the category of a Receiver as per RSS-Gen 5.0.

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a Fortrend Engineering Model RFT-200 RFID Single Channel Reader/Writer Module. The EUT is primarily used in the manufacturer line of RFID Reader/Writer equipment. The EUT was verified inside a host (RFID-200).

1.3.2 EUT General Description

EUT Description	RFID Single Channel Reader/Writer Module
Model Number(s)	RFT-200
Rated Voltage	5VDC
Frequency (Capability)	134.2 kHz
Mode Verified	134.2 kHz
Modulation	FSK
Measured Field Strength	70.1 dBμV/m @ 3 meters (worst case protocol)
Operating Temperature	-40°C to +85°C
Humidity	<97%RH non-condensing
Communications Interface	RS232
Connector	RJ-11 Connector
Protocol	HEX (2000H) or SECS I/II (2000S)
Size	100 mm W x 50 mm D x 20 mm H
Weight	100 g
Antenna	RFT_ANT-060 (60mm read/write distance)
System Architecture	Point-to-point
Antenna Range	400 to 460 μH (Factory Tuning)

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
Default	Simulated Read/Write using test software provided by the manufacturer. Please refer to Simplified Test Configuration Diagram (Section 1.4.4 of this test report) for the test configuration. For OBW measurements, antenna port was connected directly to the spectrum analyzer. All measurements were performed with HEX (2000H) and SECS I/II (2000S) protocols.

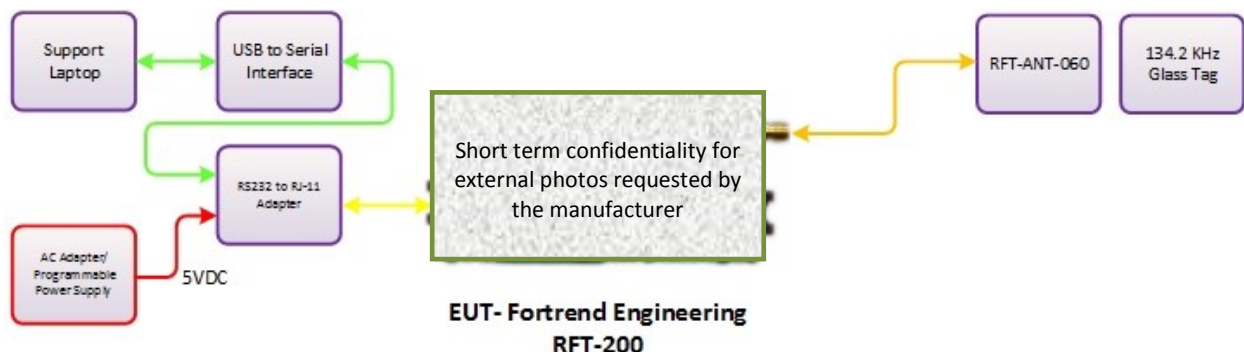
1.4.2 EUT Exercise Software

TI System RFID V2.0 for HEX and CtrlReader for SECS using the Communication Test tab.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Lenovo	Support Laptop (T410S)	P/N 0A31972 S/N R9-92MH0 10/11
LiteOn Technology Corporation	AC Adapter for Support Laptop	Model 42T4430 S/N 11S42T4430Z1ZGWE27AA9X REV G
-	Support AC Adapter	Generic (no brand name) 5VDC 1A
Belkin	Support USB to Serial Interface	M/N F5U257
Fortrend	Support RFID Antenna	M/N RFT-ANT-060
Fortrend	Support Glass Tag	134.2KHz Glass Tag
Hewlett Packard	Support DC Power Supply	M/N E3610A S/N KR51311519
-	Support RS232 to RJ-11 Adapter	2.0 meters with DC input connector

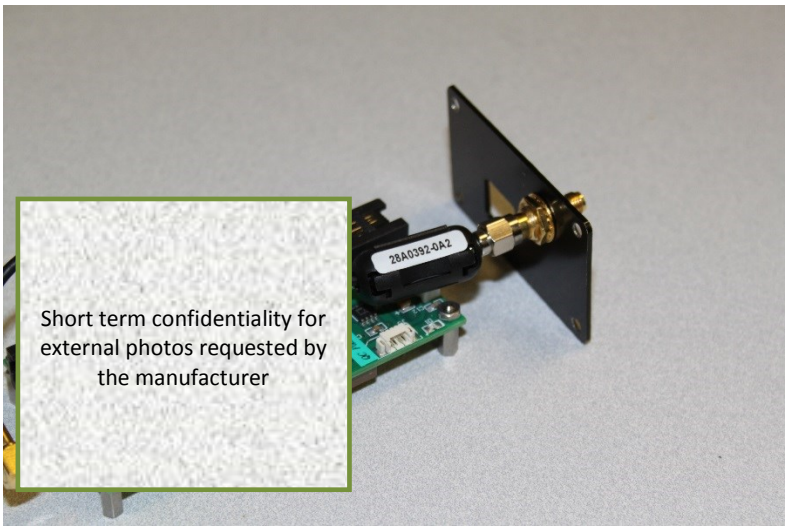
1.4.4 Simplified Test Configuration Diagram



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: N/A		
 <p>Installed a Laird Technologies 28A0392-0A2 100MHz 170Ω Ferrite Clamp On Core on the internal antenna cable of the EUT. This modification improved emissions from 30MHz to 1GHz range.</p>	Ferdie Custodio	09/23/2017

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-1 & 22806-1

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Rancho Bernardo) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A-1.

The 3m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Mira Mesa) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 22806-1.

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.



SECTION 2

TEST DETAILS

Radio Testing of the
Fortrend Engineering
RFID Single Channel Reader/Writer Module



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: N/A / Default Test Configuration

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

April 03, 2017 / FSC

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	26.5 °C
Relative Humidity	36.5 %
ATM Pressure	98.8 kPa

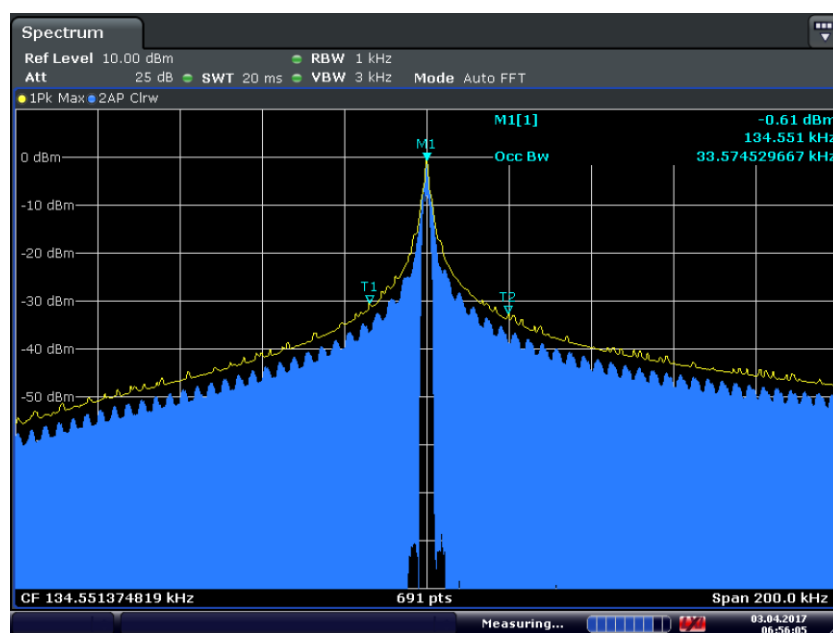
2.1.7 Additional Observations

- This is a conducted 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.

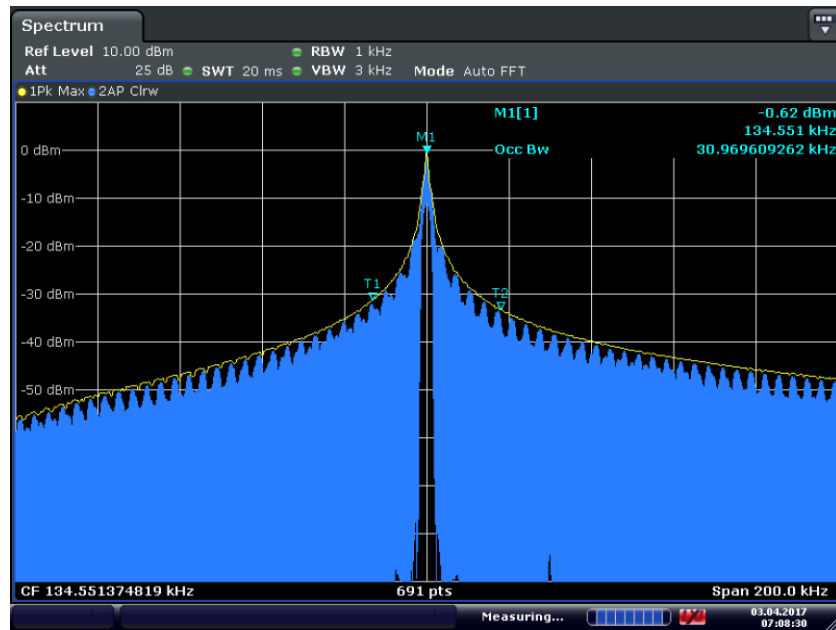
2.1.8 Test Results (Reporting Purposes Only)

Protocol	Frequency	99% Emission bandwidth
HEX (200OH)	134.2 kHz	30.97 kHz
SECS I/II (200OS)	134.2 kHz	33.57 kHz



Date: 3.APR.2017 06:56:05

SECS 99% OBW



Date: 3.APR.2017 07:08:30

HEX 99% OBW



2.2 RADIATED EMISSION LIMITS; 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: N/A / Default Test Configuration

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

September 23, 2017 / FSC

2.2.5 Test Equipment Used

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

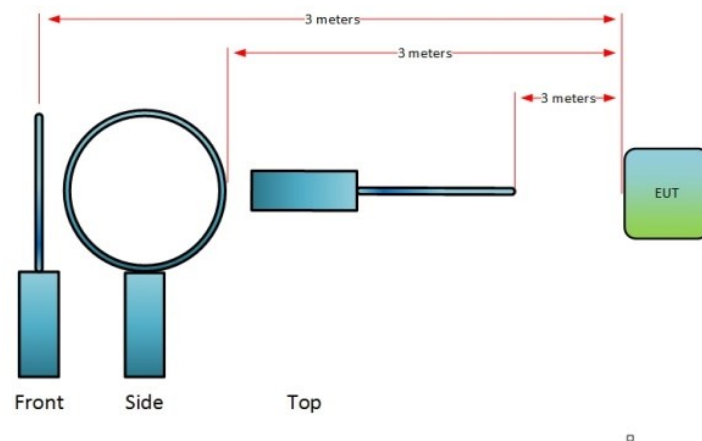
2.2.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.4 °C
Relative Humidity	44.5 %
ATM Pressure	98.6 kPa

2.2.7 Additional Observations

- This is a radiated test. The spectrum was searched from 9 kHz to the 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.
- Only Quasi-Peak results presented (passing margin >20dB) for ranges requiring Average detector.
- Measurement was done using EMC32 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 2.2.8 and 2.2.9 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 Quasi Peak Final Measurement (dBμV/m) @ 9kHz			50.9

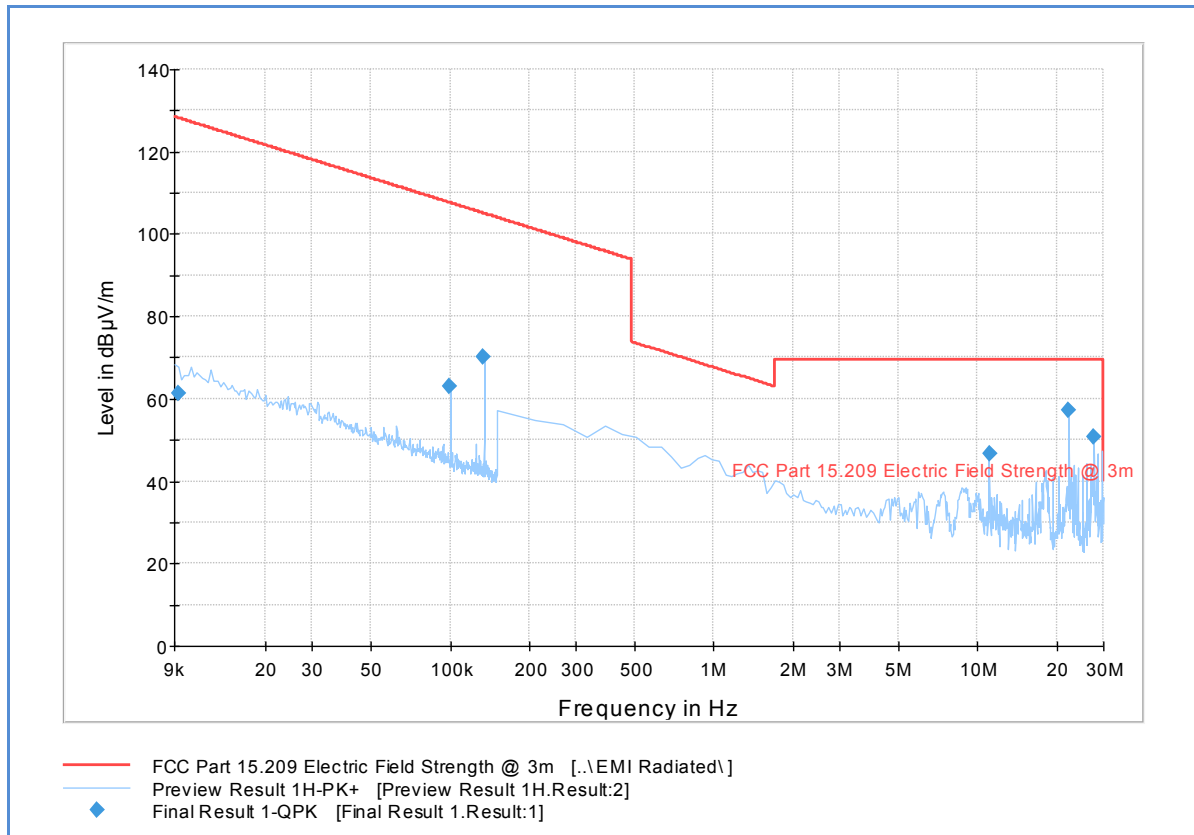
2.2.9 Sample Computation (Radiated Emission 30 MHz to 1 GHz)

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 Quasi Peak Final Measurement (dBμV/m) @ 30MHz			17.4

2.2.1 Test Results

See attached plots.

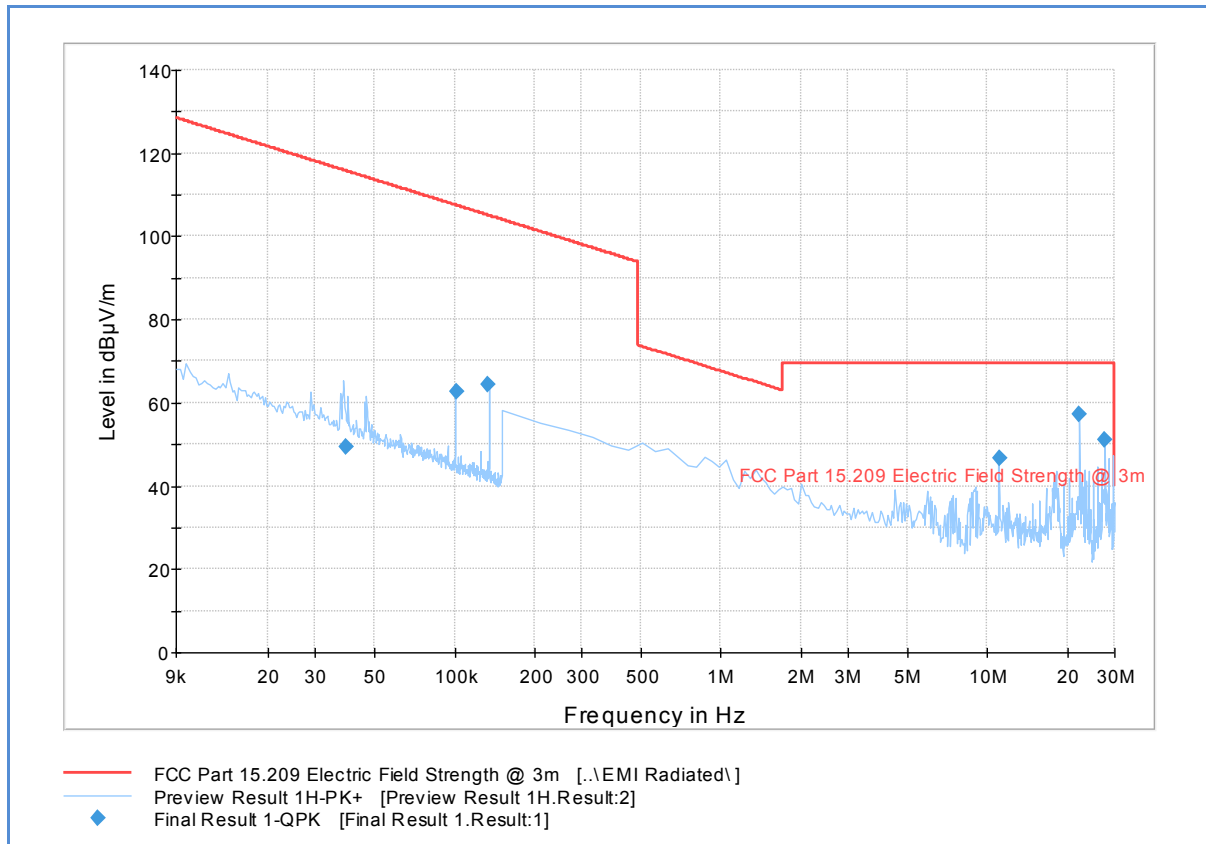
2.2.2 Test Results Below 30MHz (HEX)



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)
0.009391	61.4	1000.0	0.200	100.0	H	-9.0	15.8	66.7	128.1
0.099269	62.9	1000.0	0.200	100.0	H	28.0	14.3	44.8	107.7
0.133741	70.1	1000.0	0.200	100.0	H	272.0	14.2	35.0	105.1
11.058174	46.6	1500.0	9.000	100.0	H	81.0	15.8	22.9	69.5
22.120627	57.3	1500.0	9.000	100.0	H	205.0	15.4	12.2	69.5
27.652034	50.9	1500.0	9.000	100.0	H	15.0	14.6	18.6	69.5

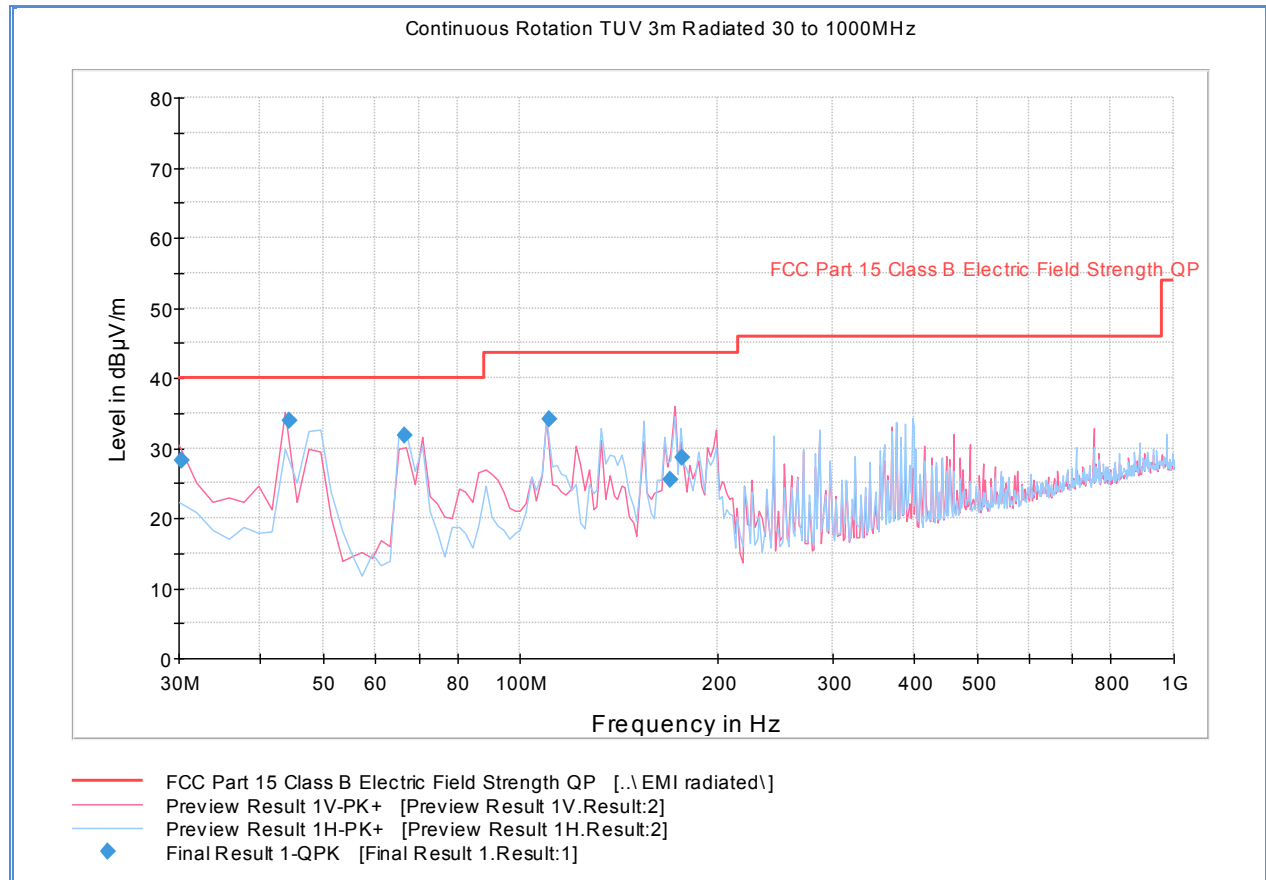
2.2.3 Test Results Below 30MHz (SECS)



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)
0.039387	49.4	1000.0	0.200	100.0	H	97.0	15.1	66.3	115.7
0.101269	62.7	1000.0	0.200	100.0	H	138.0	14.2	44.8	107.5
0.133741	64.4	1000.0	0.200	100.0	H	257.0	14.2	40.7	105.1
11.058174	46.8	1500.0	9.000	100.0	H	103.0	15.8	22.8	69.5
22.120627	57.4	1500.0	9.000	100.0	H	6.0	15.4	12.2	69.5
27.652034	50.9	1500.0	9.000	100.0	H	233.0	14.6	18.6	69.5

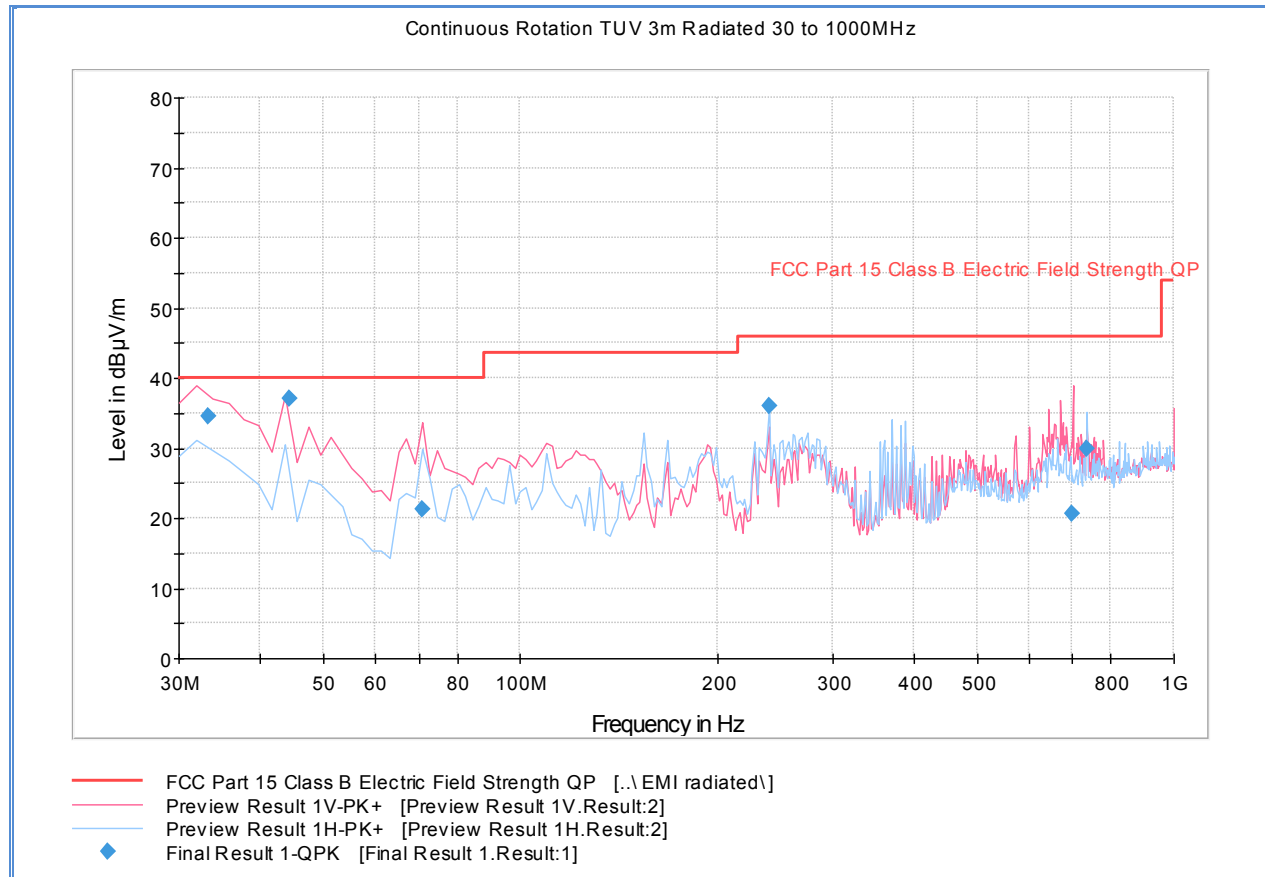
2.2.4 Test Results 30MHz to 1GHz (HEX)



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)
30.280000	28.1	1000.0	120.000	100.0	V	15.0	-7.1	11.9	40.0
44.207214	33.9	1000.0	120.000	115.0	V	9.0	-14.2	6.1	40.0
66.349980	31.9	1000.0	120.000	289.0	H	166.0	-17.9	8.1	40.0
110.579399	34.0	1000.0	120.000	294.0	H	32.0	-16.1	9.5	43.5
169.463808	25.4	1000.0	120.000	100.0	V	280.0	-12.9	18.1	43.5
176.951583	28.6	1000.0	120.000	193.0	H	179.0	-13.0	14.9	43.5

2.2.5 Test Results 30MHz to 1GHz (SECS)



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)
33.240000	34.5	1000.0	120.000	100.0	V	322.0	-9.3	5.5	40.0
44.207214	37.0	1000.0	120.000	100.0	V	304.0	-14.2	3.0	40.0
70.621643	21.4	1000.0	120.000	200.0	V	349.0	-17.7	18.6	40.0
240.019880	36.0	1000.0	120.000	144.0	H	344.0	-10.1	10.0	46.0
699.681283	20.7	1000.0	120.000	150.0	V	62.0	2.2	25.3	46.0
736.855150	29.8	1000.0	120.000	400.0	H	85.0	2.9	16.2	46.0

2.3 CONDUCTED LIMITS

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 μ H/50 ohms line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	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: N/A / Default Test Configuration

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

March 03, 2017 / FSC

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	26.3 °C
Relative Humidity	21.9 %
ATM Pressure	98.9 kPa

2.3.1 Additional Observations

- Measurement was performed using a programmable power supply supplying 5VDC to the EUT.
- Only the worst case test results between the two protocols used are presented. Test results are almost identical between the two protocols.



- Measurement was done using EMC32 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 2.3.2 for sample computation.

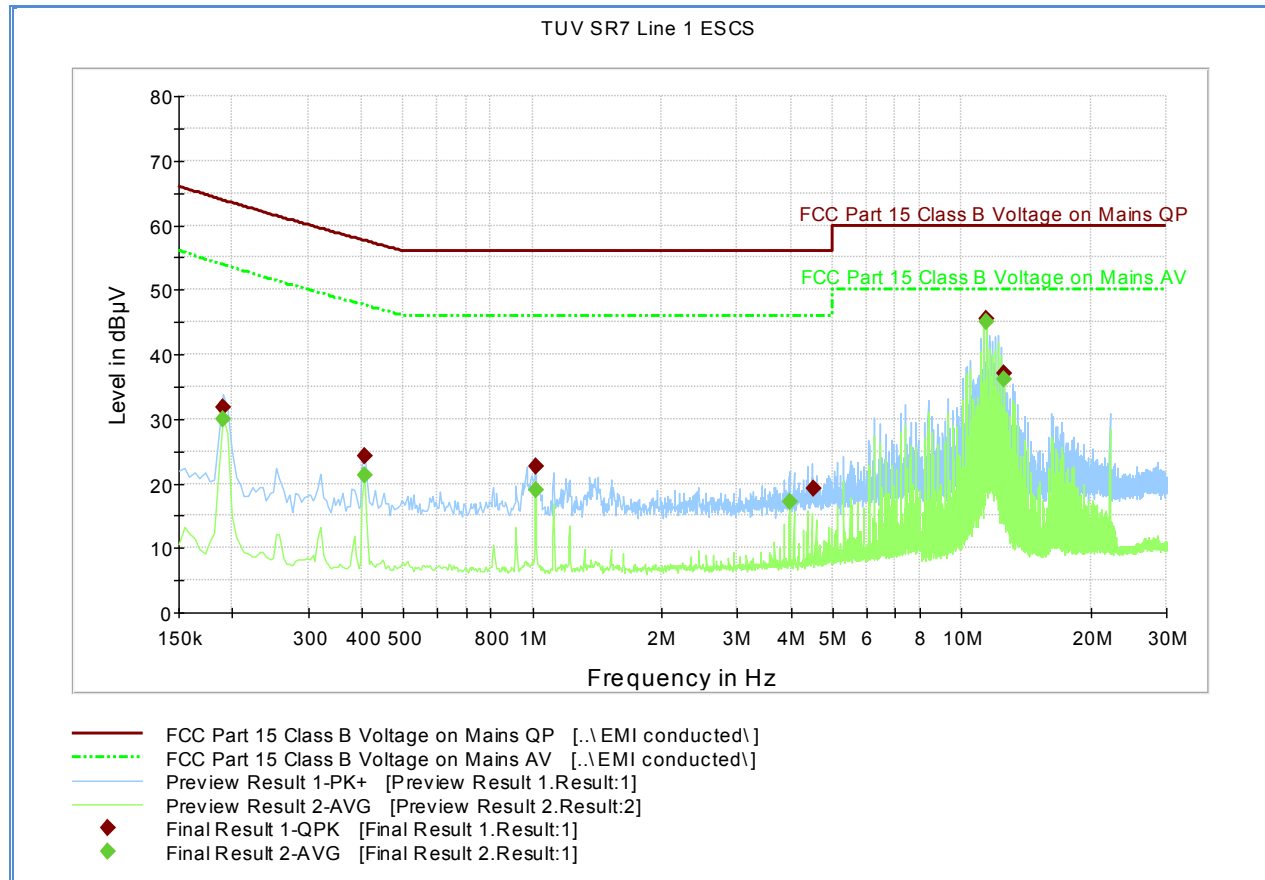
2.3.2 Sample Computation (Conducted Emission – Quasi Peak)

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 Quasi Peak Final Measurement (dBμV) @ 150kHz			26.2

2.3.3 Test Results

Compliant. See attached plots and tables.

2.3.1 120VAC 60Hz (Line 1/Hot)



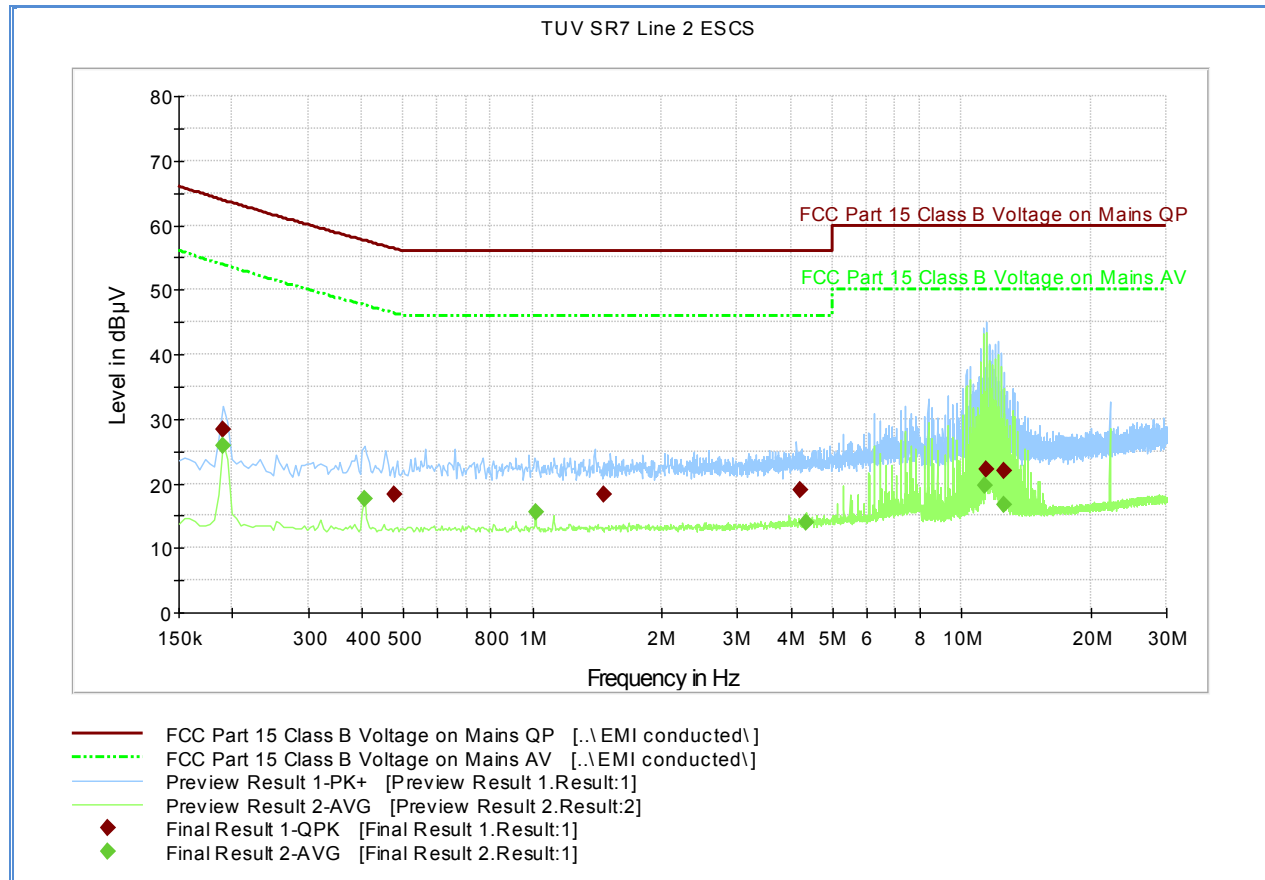
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.190500	31.9	1000.0	9.000	Off	L1	20.1	32.0	63.9
0.406500	24.2	1000.0	9.000	Off	L1	20.0	33.4	57.6
1.018500	22.7	1000.0	9.000	Off	L1	20.0	33.3	56.0
4.528500	19.2	1000.0	9.000	Off	L1	20.1	36.8	56.0
11.395500	45.4	1000.0	9.000	Off	L1	20.2	14.6	60.0
12.529500	37.1	1000.0	9.000	Off	L1	20.2	22.9	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.190500	29.9	1000.0	9.000	Off	L1	20.1	24.0	53.9
0.406500	21.2	1000.0	9.000	Off	L1	20.0	26.4	47.6
1.018500	18.9	1000.0	9.000	Off	L1	20.0	27.1	46.0
3.966000	17.1	1000.0	9.000	Off	L1	20.1	28.9	46.0
11.395500	45.0	1000.0	9.000	Off	L1	20.2	5.0	50.0
12.529500	36.0	1000.0	9.000	Off	L1	20.2	14.0	50.0

2.3.2 120VAC 60Hz (Line 2/Neutral)



Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.190500	28.3	1000.0	9.000	Off	N	20.1	35.6	63.9
0.478500	18.2	1000.0	9.000	Off	N	20.0	38.1	56.3
1.473000	18.2	1000.0	9.000	Off	N	20.0	37.8	56.0
4.200000	19.1	1000.0	9.000	Off	N	20.1	36.9	56.0
11.449500	22.3	1000.0	9.000	Off	N	20.2	37.7	60.0
12.543000	22.0	1000.0	9.000	Off	N	20.2	38.0	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.190500	25.8	1000.0	9.000	Off	N	20.1	28.1	53.9
0.406500	17.5	1000.0	9.000	Off	N	20.0	30.0	47.6
1.018500	15.6	1000.0	9.000	Off	N	20.0	30.4	46.0
4.357500	13.9	1000.0	9.000	Off	N	20.1	32.1	46.0
11.359500	19.6	1000.0	9.000	Off	N	20.2	30.4	50.0
12.547500	16.6	1000.0	9.000	Off	N	20.2	33.4	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	
7643	Signal Analyzer	FSV30	103166	Rhode & Schwarz	03/28/17	03/28/18
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
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	10/26/16	10/26/17
Miscellaneous						
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	Triangular	3.52	1.44	2.07
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					1.66
Coverage Factor (k):					2
Expanded Uncertainty:					3.31

3.2.2 Radiated Measurements (30 MHz to 1GHz)

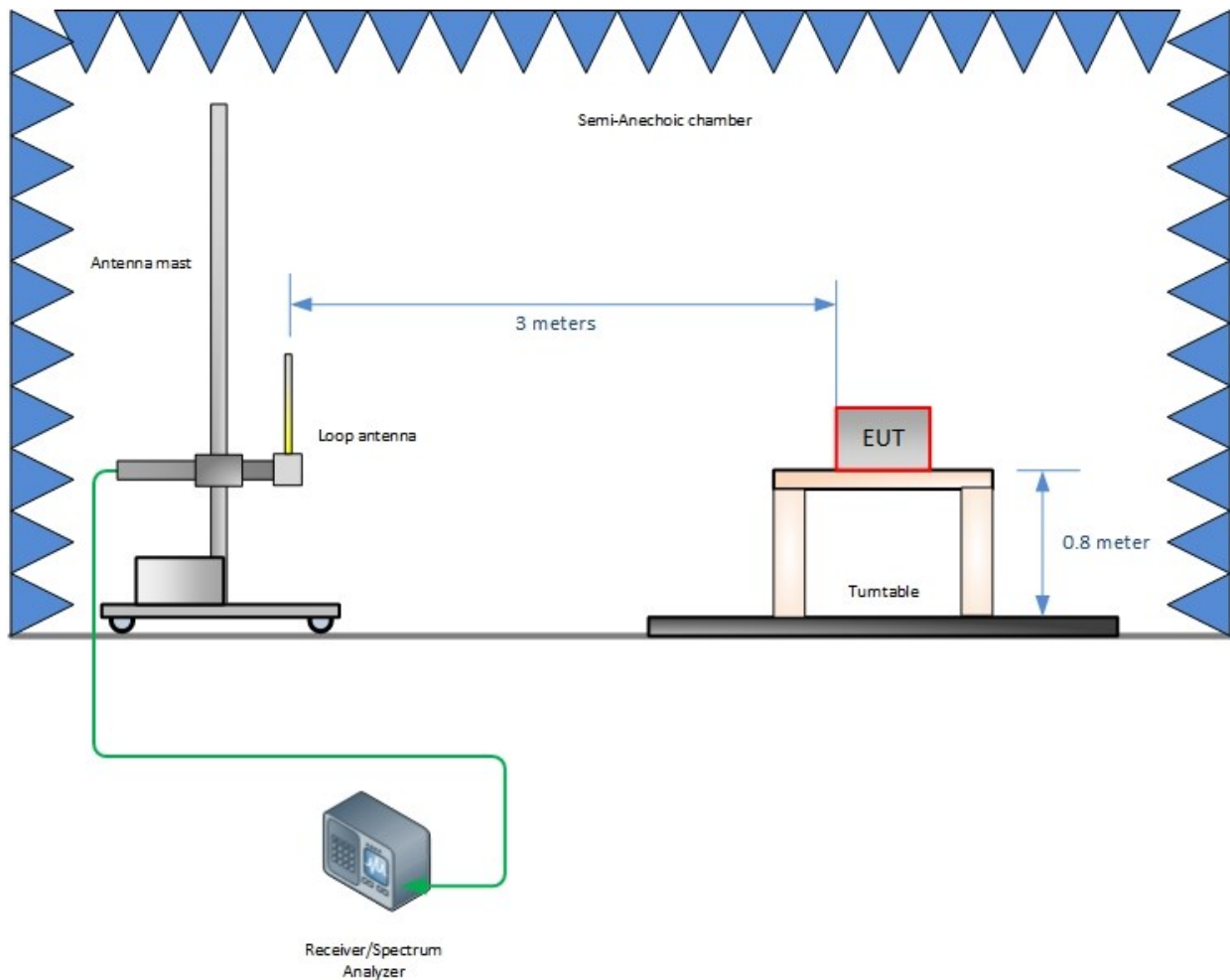
Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamplifier	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Triangular	3.52	1.44	2.07
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					1.68
Coverage Factor (k):					2
Expanded Uncertainty:					3.36



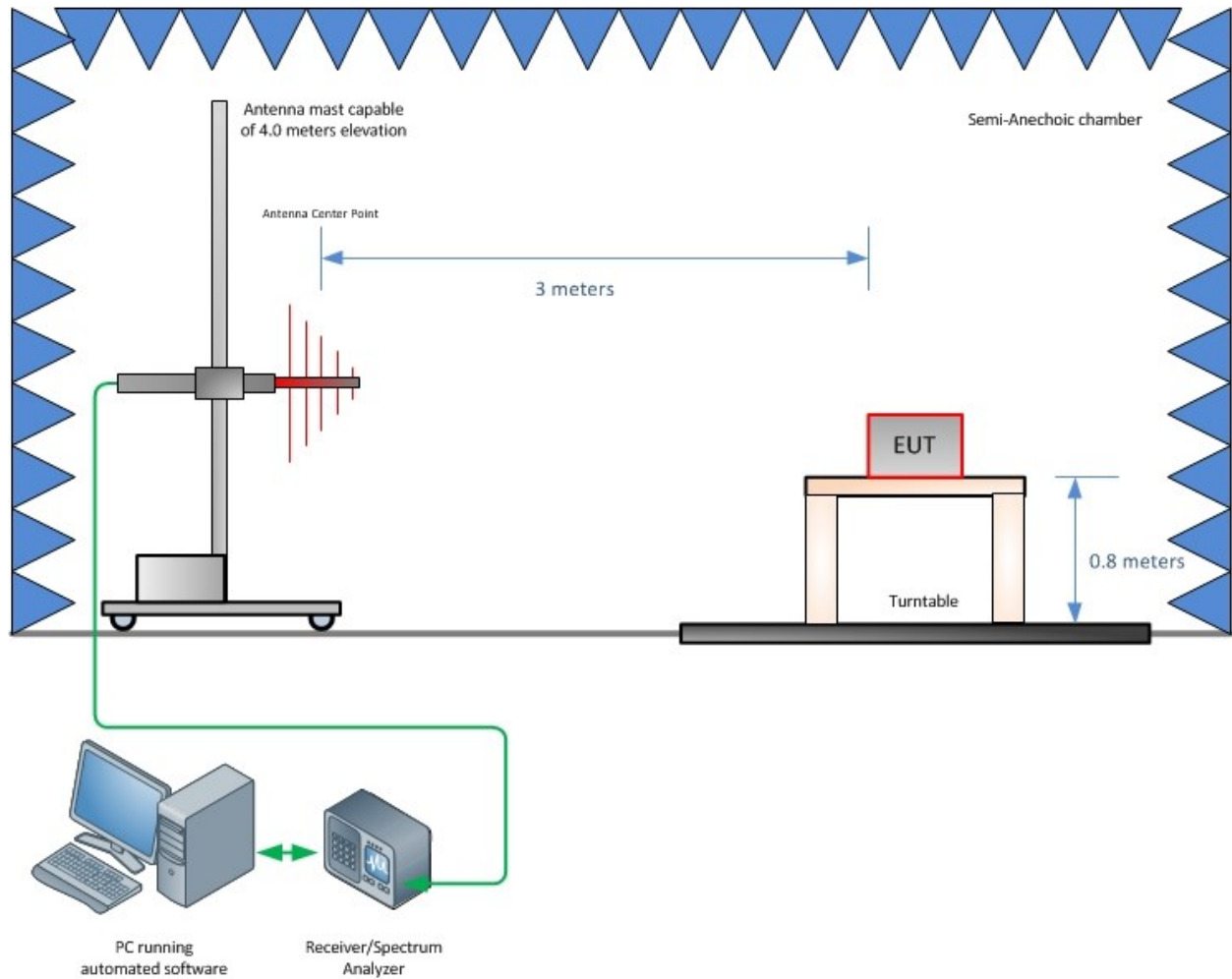
SECTION 4

DIAGRAM OF TEST SETUP

4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 30MHz)



Radiated Emission Test Setup (Below 1GHz)



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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