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Report On

Radio Testing of the AnyDATA Corporation ACT233F 4G Vehicle Tracker with Hotspot

FCC Part 15 Subpart C §15.249 IC RSS-Gen and RSS-210 Issue 9

Report No. SD72130442-0817D

February 2018

Report No. SD72130442-0817D



REPORT ON Radio Testing of the

AnyDATA Corporation

4G Vehicle Tracker with Hotspot

TEST REPORT NUMBER SD72130442-0817D

PREPARED FOR AnyDATA Corporation

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DATED February 13, 2018

Report No. SD72130442-0817D



Revision History

SD72130442-08: AnyDATA Corpor ACT233F 4G Veh		spot			
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SECTION 1

REPORT SUMMARY

Radio Testing of the AnyDATA Corporation ACT233F 4G Vehicle Tracker with Hotspot

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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the AnyDATA Corporation ACT233F 4G Vehicle Tracker with Hotspot 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 AnyDATA Corporation

Model Number(s) ACT233F

FCC ID Number P4M-ACT233F

Serial Number(s) 20160908000172

Number of Samples Tested 1

• FCC Part 15 Subpart C §15.249 (October 1, 2017).

• RSS-210 - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment (Issue 9, November 2017).

 RSS-Gen - General Requirements and Information for the Certification of Radio Apparatus (Issue 4, November 2014).

Start of Test September 01, 2017

Finish of Test September 08, 2017

Name of Engineer(s) Nikolay Shtin

Related Document(s)

None. Supporting documents for EUT certification are separate

exhibits.

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1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC Part 15 Subpart C §15.249 with cross-reference to the corresponding IC RSS standard is shown below.

Section	§15.249 Spec Clause	RSS	Test Description	Result	Comments/Base Standard
-	§15.207(a)	RSS-Gen 7.2.4	Conducted Emissions	N/A*	See Note
2.1	§15.215(c)	RSS-Gen 4.6.3	20 dB Bandwidth	Compliant	
2.3		RSS-Gen 4.6.1	99% Emission Bandwidth	Compliant	
2.3	§15.249(a)	RSS-210 A.1.2(a)	Field Strength Limits for Fundamental and Harmonics	Compliant	
2.4	§15.249(d)	RSS-210 A.1.2(b)	Spurious Radiated Emissions	Compliant	
-	-	RSS-Gen 6.0	Receiver Spurious Emissions	N/A**	

^{*} Not applicable. EUT is battery powered.

^{**} Not applicable. EUT has no Stand-Alone receiver port.



1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was an AnyDATA Corporation **Error! Reference source not found.** 4G Vehicle Tracker with Hotspot as shown in the photograph below. The EUT connects to a vehicle's OBD-II port; it enables remote functions and vehicle tracking through a Smartphone app.







1.3.2 EUT General Description

EUT Description 4G Vehicle Tracker with Hotspot

Model Number(s) ACT233F

Rated Voltage 13.5 VDC Nominal voltage

Output Power 82.8 dB μ V/m @ 3 meters (0.0572 mW EIRP)

Frequency Range 903.425 MHz (single channel) in the 902 MHz to 928 MHz Band

Number of Operating Frequencies 1

Channels Verified 903.425 MHz

Antenna Type (used during

evaluation)

Integral PCB antenna (Complies with Part 15.203 requirements)

Modulation Used FSK



1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
Default	Radiated test setup. EUT transmitting continually through integral antenna at 903.425 MHz with FSK modulation.

1.4.2 EUT Exercise Software

The EUT was programmed with a firmware (FW version: Brisbane_FW_SW01_EW44) enabling test mode. The radio control commands were sent via serial interface from a support Laptop.

1.4.3 Support Equipment and I/O cables

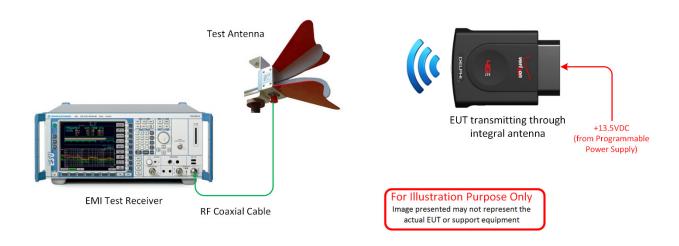
Manufacturer	Equipment/Cable	Description
Dell	Support Laptop	Model Inspiron 640M

1.4.4 Worst Case Configuration

EUT is a mobile device. For radiated measurements X, Y and Z orientations were verified. Worst case orientation is "X".



1.4.5 Simplified Test Configuration Diagram



Note:

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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 20160908000172		
N/A		

The table above details modifications made to the EUT during the test program. 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 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 C63.10-2013. 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: 858 942 5542 Fax: 858 546 0364.

1.9 TEST FACILITY REGISTRATION

1.10 TEST FACILITY REGISTRATION

1.10.1 FCC - Designation 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 Designation is US1146.

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1.10.2 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.

1.10.3 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.

1.10.4 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.

1.10.5 VCCI – Registration No. A-0280 and A-0281

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.

1.10.6 RRA – Identification No. US0102

TUV SUD America Inc. (San Diego) is National Radio Research Agency (RRA) recognized laboratory under Phase I of the APEC Tel MRA.

1.10.7 OFCA - U.S. Identification No. US0102

TUV SUD America Inc. (San Diego) is recognized by Office of the Communications Authority (OFCA) under Appendix B, Phase I of the APEC Tel MRA.

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SECTION 2

TEST DETAILS

Radio Testing of the AnyDATA Corporation ACT233F 4G Vehicle Tracker with Hotspot



2.1 20 DB BANDWIDTH

2.1.1 Specification Reference

Part 15 Subpart C §15.215(c)

2.1.2 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.

2.1.3 Equipment Under Test and Modification State

Serial No: 20160908000172 / Default Test Configuration

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

September 09, 2017/NS

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

Ambient Temperature 26.1°C
Relative Humidity 48.5%
ATM Pressure 100.1 kPa

2.1.7 Additional Observations

- This is a conducted test.
- A peak output reading was taken.
- 20dB bandwidth verified using ndB down BW function of the spectrum analyzer.
- 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.

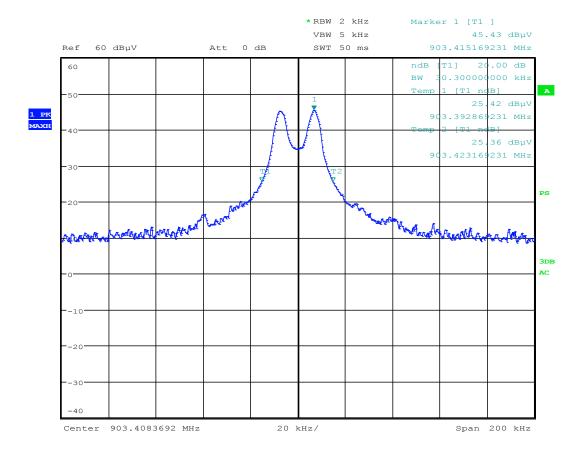


2.1.8 Test Results

Frequency	20dB Bandwidth
903.4084 MHz	30.3 kHz

903.4084 MHz - (20dB BW/2) = 903.39325 MHz (within the frequency band - Compliant) 903.4084 MHz + (20dB BW/2) = 903.42355 MHz (within the frequency band - Compliant)

2.1.9 Test Results



903.425 MHz FSK



2.2 99% EMISSION BANDWIDTH

2.2.1 Specification Reference

RSS-Gen Clause 4.6.1

2.2.2 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.

2.2.3 Equipment Under Test and Modification State

Serial No: 20160908000172 / Default Test Configuration

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

September 09, 2017/NS

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 26.1°C
Relative Humidity 48.5%
ATM Pressure 100.1 kPa

2.2.7 Additional Observations

- This is a radiated test.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span.
- VBW is 3X RBW.

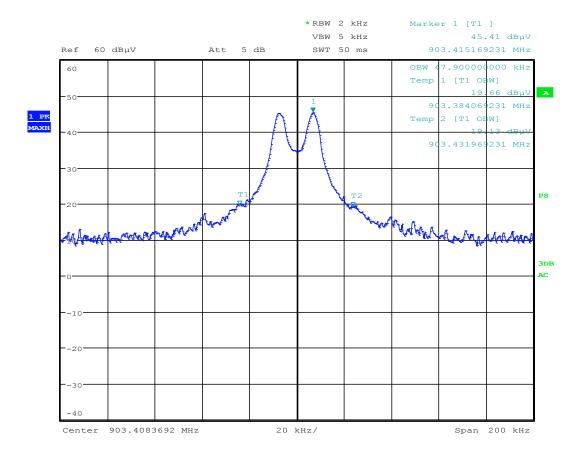


- Sweep is auto.
- Detector is peak.
- The % Power Bandwidth setting in the spectrum analyzer was set to 99% (default).
- The Channel Bandwidth measurement function of the spectrum analyzer was used for this test.

2.2.8 Test Results

Frequency	99% Occupied Bandwidth
903.4084 MHz	47.9 kHz

2.2.9 Test Plots



903.425 MHz FSK

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2.3 FIELD STRENGTH LIMITS FOR FUNDAMENTAL AND HARMONICS

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: 20160908000172 / Default Test Configuration

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

May 05, 2017/NS

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

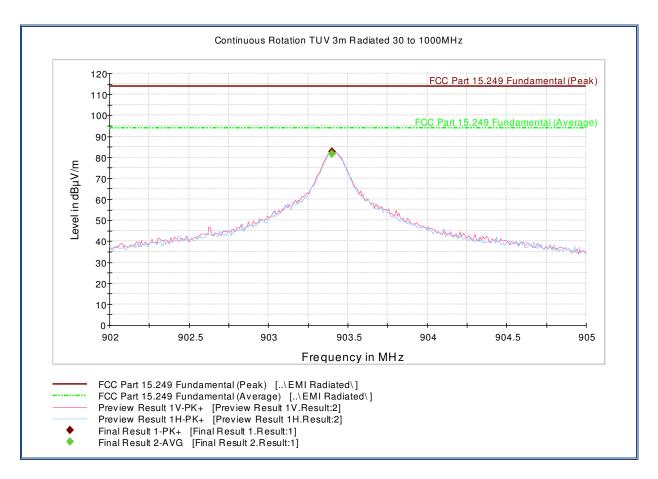
Ambient Temperature 25.7°C
Relative Humidity 48.5%
ATM Pressure 100.6 kPa

2.3.7 Additional Observations

- This is a radiated test. The spectrum was searched from 1GHz to the 10th harmonic (25GHz).
- Harmonics measurements were performed with a notch filter attenuating the fundamental frequency.



2.3.8 Test Results Fundamental



Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
903.400000	82.8	1000.0	120.000	100.0	V	255.0	5.9	31.2	114.0

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
903.400000	81.6	1000.0	120.000	100.0	V	255.0	5.9	12.3	94.0

Test Notes:



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: 20160908000172 / Default Test Configuration

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

May 05, 2017/NS

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

Ambient Temperature 25.7°C
Relative Humidity 48.5%
ATM Pressure 100.6 kPa

2.4.7 Additional Observations

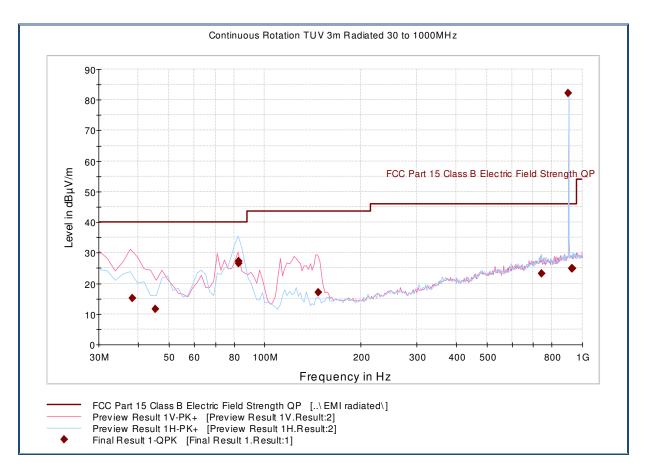
- This is a radiated test. The spectrum was searched from 30MHz to the 10th harmonic (25GHz). There are no emissions observed beyond 18GHz.
- No significant emission observed below 1GHz. Data presented is from worst configuration based on fundamental/harmonics verification ("Y" axis configuration).
- 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 measu	24.4		
Correction Factor (dB)	Asset# 1066 (cable)	0.3	
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	-12.6
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported Quasi Peak Final Meas	11.8		



2.4.9 Test Results Below 1GHz

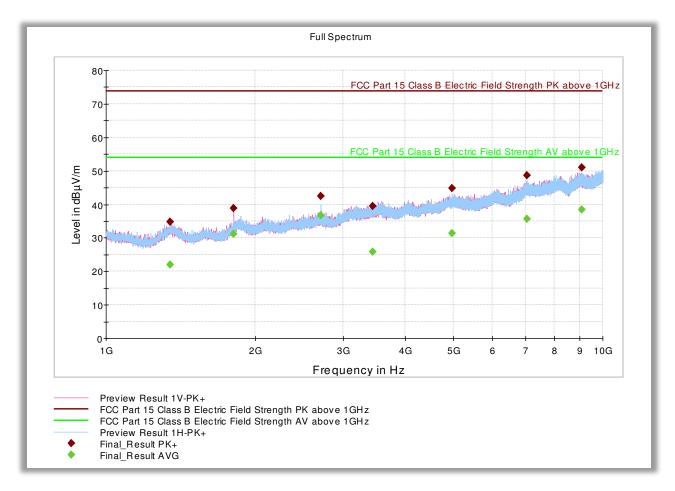


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
38.375551	15.2	1000.0	120.000	127.0	V	22.0	-11.6	24.8	40.0
45.294990	11.5	1000.0	120.000	115.0	V	312.0	-13.6	28.5	40.0
82.764970	27.2	1000.0	120.000	200.0	Н	-15.0	-17.0	12.8	40.0
82.772745	26.5	1000.0	120.000	301.0	Н	342.0	-17.0	13.5	40.0
147.313267	17.0	1000.0	120.000	100.0	٧	186.0	-14.2	26.5	43.5
743.262926	23.2	1000.0	120.000	196.0	Н	-6.0	3.4	22.8	46.0
903.429499	82.2	1000.0	120.000	100.0	٧	256.0	5.9	Fund	amental
926.092265	25.0	1000.0	120.000	400.0	٧	57.0	6.2	21.0	46.0
930.803928	24.9	1000.0	120.000	301.0	Н	78.0	6.1	21.1	46.0



2.4.10 Test Results Above 1GHz



Peak Data

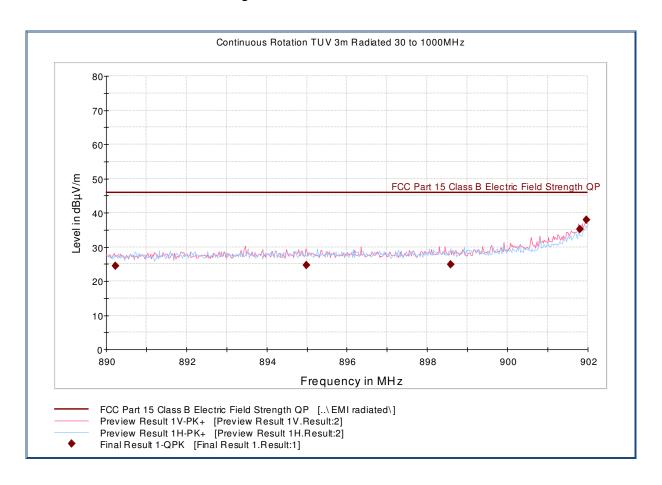
Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1346.29050	34.70	73.90	39.20	1000.0	1000.000	146.7	Н	238.0	-3.3
1806.72316	38.86	73.90	35.04	1000.0	1000.000	200.0	V	117.0	-1.1
2710.10266	42.51	73.90	31.39	1000.0	1000.000	249.7	Н	340.0	2.2
3444.94366	39.47	73.90	34.43	1000.0	1000.000	184.0	Н	253.0	5.4
4980.47816	44.74	73.90	29.16	1000.0	1000.000	170.3	Н	9.0	10.8
7029.25333	48.57	73.90	25.33	1000.0	1000.000	173.7	Н	-13.0	16.1
9066.04000	50.95	73.90	22.95	1000.0	1000.000	324.8	Н	277.0	20.0

Average Data

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1346.29050	21.88	53.90	32.02	1000.0	1000.000	146.7	Н	238.0	-3.3
1806.72316	31.25	53.90	22.65	1000.0	1000.000	200.0	V	117.0	-1.1
2710.10266	36.79	53.90	17.11	1000.0	1000.000	249.7	Н	340.0	2.2
3444.94366	25.88	53.90	28.02	1000.0	1000.000	184.0	Н	253.0	5.4
4980.47816	31.34	53.90	22.56	1000.0	1000.000	170.3	Н	9.0	10.8
7029.25333	35.65	53.90	18.25	1000.0	1000.000	173.7	Н	-13.0	16.1
9066.04000	38.41	53.90	15.49	1000.0	1000.000	324.8	Н	277.0	20.0



2.4.11 Test Results of Lower Band Edge measurement



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)
890.240000	24.4	1000.0	120.000	150.0	V	240.0	5.3	21.6	46.0
894.982926	24.6	1000.0	120.000	100.0	V	145.0	5.5	21.4	46.0
898.588697	24.9	1000.0	120.000	150.0	V	270.0	5.8	21.1	46.0
901.800882	35.1	1000.0	120.000	110.0	V	126.0	5.9	10.9	46.0
901.960000	37.8	1000.0	120.000	120.0	V	102.0	5.9	8.2	46.0

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SECTION 3

TEST EQUIPMENT USED

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3.1 TEST EQUIPMENT USED

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

ID Number (SDGE/SDRB)	Test Equipment	Туре	Serial Number	Manufacturer	Cal Date	Cal Due Date
Radiated Test Se	etup					
7611	Signal/Spectrum Analyzer	FSW26	102017	Rhode & Schwarz	04/25/17	04/25/18
1033	Bilog Antenna	3142C	00044556	EMCO	10/11/16	10/11/18
1016	Pre-amplifier	PAM-0202	187	PAM	10/17/16	10/17/17
7575	Double-ridged waveguide horn antenna	3117	155511	ЕМСО	06/01/17	06/01/18
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	10/07/16	10/07/17
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	07/13/17	07/13/18
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	02/09/17	02/09/18
8922	High-frequency cable	R90-088-200	N/A	Teledyne	02/10/17	02/10/18
1026	High-frequency cable	3M-7/C2	N/A	MicroCoax	04/26/17	04/26/18
8849	High-frequency cable (1-18 GHz)	SAC-26G-6.1	363	A.H.Systems	04/23/17	04/23/18
8771	6dB attenuator	606-06-1F4/DR	N/A	MECA	10/11/17	10/11/18
Miscellaneous						
6708	Multimeter	34401A	US36086974	Hewlett Packard	07/05/17	07/05/18
7554	Barometer/Temperature/Hu midity Transmitter	iBTHX-W	15250268	Omega	01/17/17	01/17/18
9076	DC Power Supply	18020M	P802039	Protek	Verified b	oy 6708
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	Α

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3.2 MEASUREMENT UNCERTAINTY

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

3.2.1 Radiated Measurements (Below 1GHz)

	Contribution	Probability Distribution Type	Probability Distribution Xi	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	3.52	1.44	2.07
6	EUT Setup	Rectangular	1.00	0.58	0.33
			Combined	l Uncertainty (u₅):	1.68
			Co	verage Factor (k):	2
			Expar	nded Uncertainty:	3.36

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	3.00	1.22	1.50
6	EUT Setup	Rectangular	1.00	0.58	0.33
			Combined	d Uncertainty (uc):	1.49
			Co	verage Factor (k):	2
			Expar	nded Uncertainty:	2.99

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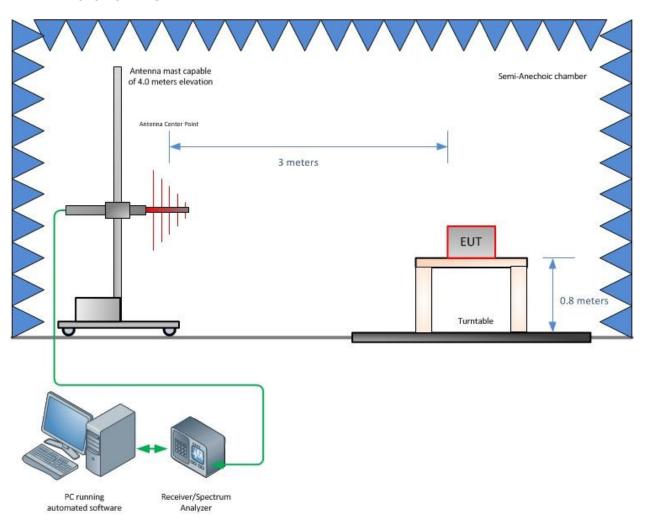


SECTION 4

DIAGRAM OF TEST SETUP

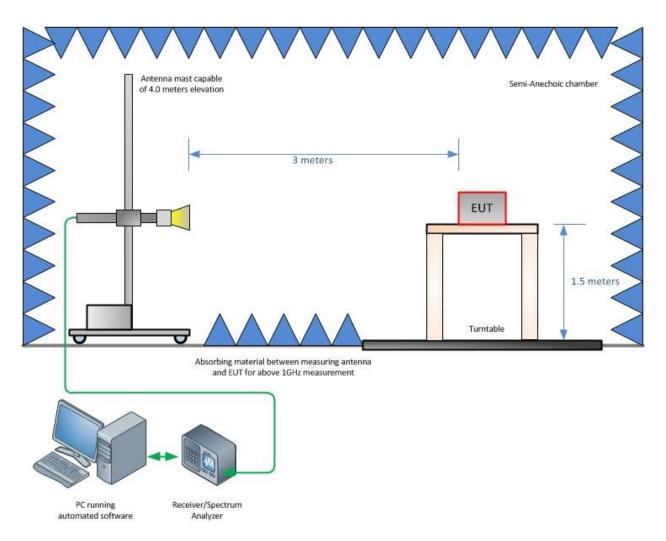


4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)





Radiated Emission Test Setup (Above 1GHz)

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SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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