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Partial Test Report

Concerning:

Spurious Emissions

According:

CFR 47 Part 15.247

RSS-247 Issue 2

EUT Name: Ranger 4.4

Model No.: R44-N11

Prepared for:

Trapeze Software Group, Inc.
5265 Rockwell Drive NE, Cedar Rapids
Iowa 52402, U.S.A.

Prepared by:

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Revisions

Revision No.	Date MM/DD/YYYY	Reason for Change	Author
0	September 14, 2017	Original Document	BMJ
1	October 4, 2017	Updated Model Number to R44-N11	DA

Note: Latest revision report will replace all previous reports.

Manufacturer:	Trapeze Software Group, Inc. 5265 Rockwell Drive NE, Cedar Rapids Iowa 52402, U.S.A.
Requester / Applicant:	Trapeze Software Group, Inc.
Name of Equipment:	Ranger 4.4
Model No.	R44-N11
Type of Equipment:	Intentional Radiator
Application of Regulations:	CFR 47 Part 15.247
Test Dates:	July 17, 2017 to August 22, 2017

Guidance Documents:

Emissions: ANSI C63.10-2013

Test Methods:

Emissions: ANSI C63.10-2013

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in the Executive Summary of this report.

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Bernd Jungbluth	October 4, 2017		
Report written	Date		
Douglas Antioco	October 4, 2017	Arndt Stoecker	October 4, 2017
Test Engineer	Date	Operations Manager	Date

Testing Cert #3331.02 **US1131** **2932M-1**

Table of Contents

1 Executive Summary

1.1 Scope

This report is intended to document the status of conformance with the requirements of the CFR 47 Part 15.247 based on the results of testing performed on July 17, 2017 to August 22, 2017 on the Ranger 4.4 Model R44-N11 manufactured by Trapeze Software Group, Inc.. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report. The 2400 MHz to 2483.5 MHz frequency band is covered in this document.

1.3 Summary of Test Results

Table 1: Summary of Test Results

Bluetooth LE

Test	Test Method ANSI C63.4	Test Parameters (Measured)	Result
Spurious Emission in Transmit Mode	CFR47 15.209, RSS-GEN Sect.8.9	Class B	**Compliant**
Restricted Bands of Operation	CFR47 15.205, RSS GEN Sect.8.10	Class B	**Not Tested***
AC Power Conducted Emission	CFR47 15.207, RSS-GEN Sect.8.8	Class B	**Not Tested***
6dB and 99% Occupied Bandwidth	CFR47 15.247 (a2), RSS 247 Sect. 5.2.1	See plots	**Not Tested***
Maximum Output Power	CFR47 15.247 (b), RSS 247 Sect. 5.4.4	See plots	**Not Tested***
Peak Power Spectral Density	CFR47 15.247 (e), RSS 247 Sect. 5.2.2	See plots	**Not Tested***
Out of Band Emission	CFR47 15.247 (d), RSS 247 Sect.5.5	See plots	**Not Tested***

*This Partial Test report concerns only spurious emission measurements

Bluetooth EDR/BDR

Test	Test Method ANSI C63.4:2014/ ANSI C63.10:2013	Test Parameters	Result
Spurious Emission in Transmitted Mode	CFR47 15.209, RSS-Gen Sect.8.9	Class B	**Complied**
Restricted Bands of Operation	CFR47 15.205, RSS-Gen Sect.8.10	Class B	**Not Tested***
AC Power Conducted Emission	CFR47 15.207, RSS-GenSect.8.8	Class B	**Not Tested***
Occupied Bandwidth	CFR 47 15.247(a1), RSS Gen Sect. 6.6 & RSS 247 Sect.5.1(a)	See plots	**Not Tested***
Channel Separation	CFR47 15.247 (a1), RSS 247 Sect. 5.1(b)	See plots	**Not Tested***
Number of Hopping Channels	CFR47 15.247 (a1), RSS 247 Sect. 5.1(d)	See plots	**Not Tested***
Average time occupancy of Channel	CFR47 15.247 (a1), RSS 247 Sect. 5.1(d)	See plots	**Not Tested***
Maximum Transmitted Power	CFR47 15.247 (b1), RSS 247 Sect. 5.4(b)	See plots	**Not Tested***
Out of Band Emission	CFR47 15.247 (d), RSS 247 Sect. 5.5	See plots	**Not Tested***
RF Exposure for General Population	CFR47 15.247 (i), 2.1091	See plots	**Not Tested***

*This Partial Test report concerns only spurious emission measurements

1.4 Special Accessories

No special accessories were necessary in order to achieve compliance.

1.5 Equipment Modifications

None

2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission

TUV Rheinland of North America at 1279 Quarry Ln, Pleasanton, CA 94566 is recognized by the commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (US1131). The laboratory scope of accreditation includes: Title 47 CFR Parts 15, 18, and 90. The accreditation is updated every 3 years.

2.1.2 NIST / A2LA

TUV Rheinland of North America is accredited by the National Voluntary Laboratory Accreditation Program, which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Guide 17025:1999 and ISO 9002 (Lab Code Testing Cert #3331.02). The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

2.1.3 Acceptance by Mutual Recognition Arrangement

The United States has an established agreement with specific countries under the Asia Pacific Laboratory Accreditation Corporation (APLAC) Mutual Recognition Arrangement. Under this agreement, all TUV Rheinland at 1279 Quarry Ln, Pleasanton, CA 94566 test results and test reports within the scope of the laboratory NIST / A2LA accreditation will be accepted by each member country.

2.2 Test Facilities

All of the test facilities are located at 1279 Quarry Lane, Pleasanton, California 94566, USA. The 2305 Mission College, Santa Clara, 95054, USA location is considered a Pleasanton annex.

2.2.1 Emission Test Facility

The Semi-Anechoic chamber and AC Line Conducted measurement facility used to collect the radiated and conducted data has been constructed in accordance with ANSI C63.7:1992. The site has been measured in accordance with and verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2014, at a test distance of 3 and 5 meters. The site is listed with the FCC and accredited by A2LA (Lab Code Testing Cert #3331.02). The 3/5-meter semi-anechoic chamber used to collect the radiated data has been verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2014, at a test distance of 3 meter and 5 meters. A report detailing this site can be obtained from TUV Rheinland of North America.

2.3 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

The Combined Standard Uncertainty is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities; it is equal to the positive square root of the sum of the variances or co-variances of these other quantities, weighted according to how the measurement result varies with changes in these quantities. The term *standard uncertainty* is the result of a measurement expressed as a standard deviation.

2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBμV/m) = RAW - AMP + CBL + ACF

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

25 dBuV/m + 17.5 dB – 20 dB + 1.0 dB = 23.5 dBuV/m

2.3.2 Measurement Uncertainty

Per CISPR 16-4-2	U_{lab}	U_{cispr}
Radiated Disturbance @ 10 meters		
30 – 1,000 MHz	2.25 dB	4.51 dB
Radiated Disturbance @ 3 meters		
30 – 1,000 MHz	2.26 dB	4.52 dB
1 – 6 GHz	2.12 dB	4.25 dB
6 – 18 GHz	2.47 dB	4.93 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	1.09 dB	2.18 dB
Disturbance Power		
30 MHz – 300 MHz	3.92 dB	4.3 dB

2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005. Equipment calibration records are kept on file at the test facility.

3 Product Information

3.1 Product Description

Rugged and Compact Vehicular Computer.

3.2 Equipment Configuration

A description of the equipment configuration is given in the Test Plan Section (Section 6). The EUT was tested as called for in the test standard and was configured and operated in a manner consistent with its intended use. The EUT was connected to rated power and allowed to reach intended operating conditions. The placement of the EUT system components was guided by the test standard and selected to represent typical installation conditions.

In the case of a EUT that can operate in more than one configuration, preliminary testing was performed to determine the configuration that produced maximum radiation.

The final configuration was selected to produce the worst case radiation for emissions testing.

3.3 Operating Mode

A description of the operation mode is given in the Test Plan Section (Section 6).

The final operating mode was selected to produce the worst case radiation for emissions testing.

3.4 Unique Antenna Connector

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of CFR47 Parts 15.211, 15.213, 15.217, 15.219, or 15.221.

3.4.1 Results

The Ranger 4.4 employs a single integral antenna inaccessible to the end user. The antenna has a declared maximum gain of -4 dBi.

Refer to Table 9 for additional antenna information.

4 Emissions

Testing was performed in accordance with CFR 47 Part 15.247. These test methods are listed under the laboratory's A2LA Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Procedures described in section 8 of the standard were used.

4.1 Transmitter Radiated Spurious Emissions

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmit mode; per requirement of CFR47 15.205, 15.209, 15.247, RSS-Gen.

4.1.1 Test Methodology

4.1.1.1 Preliminary Test

For 3.5-18GHz Measurements

A test program (Vasona) that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 1 MHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

For All Other Ranges

A test program (EMC32) that controls instrumentation and data logging was used to automate the preliminary RF emissions test procedure. The frequency range of interest was divided into sub-ranges. For each sub-range peak emission data was recorded and plotted while the turntable was rotated 360° in 90° steps and the measurement antenna was rotated in horizontal and vertical antenna polarization.

Preliminary emission profile testing was performed inside a semi-anechoic chamber. The EUT was placed on a non-conductive table 80 cm above the floor for emissions less than 1 GHz and 150cm above the floor for emissions greater than 1 GHz. The EUT was positioned as shown in the setup photographs. The measurement antenna was placed at a distance of 3m.

4.1.1.2 Final Test

Final testing was performed on an NSA compliant test site.

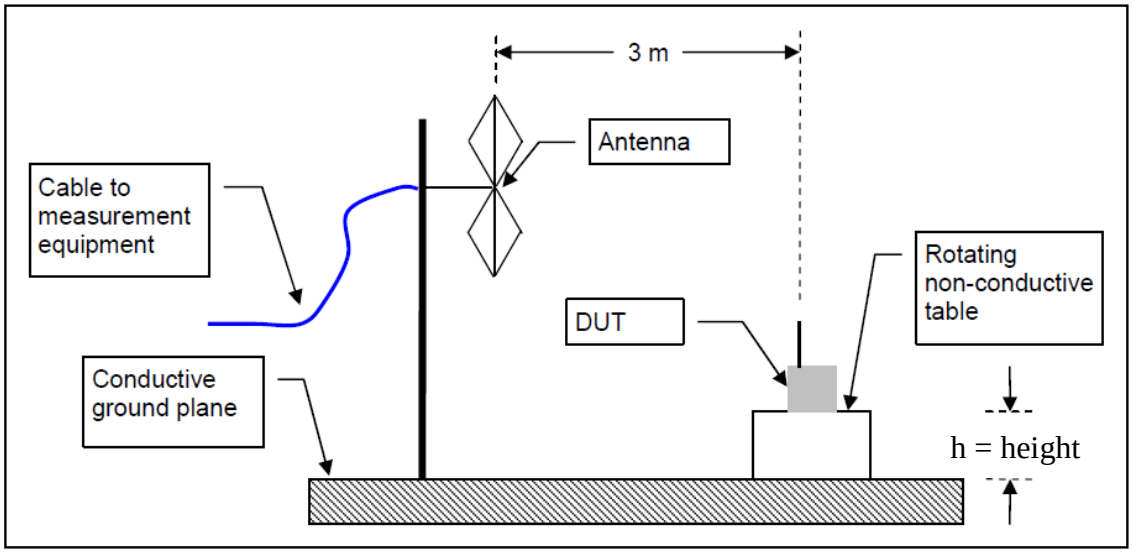
For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. Emissions within 6 dB of the limit were measured.

The final scans were performed on the worst EUT axis for three operating channels in the operating mode with the highest power.

4.1.1.3 Deviations

None.

Test Setup:



Where h = 80cm for <1GHz and 150cm for >1GHz

4.1.2 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209.

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

All harmonics and spurious emission which are outside of the restricted band shall be 20dB below the in-band emission.

4.1.3 Test Results

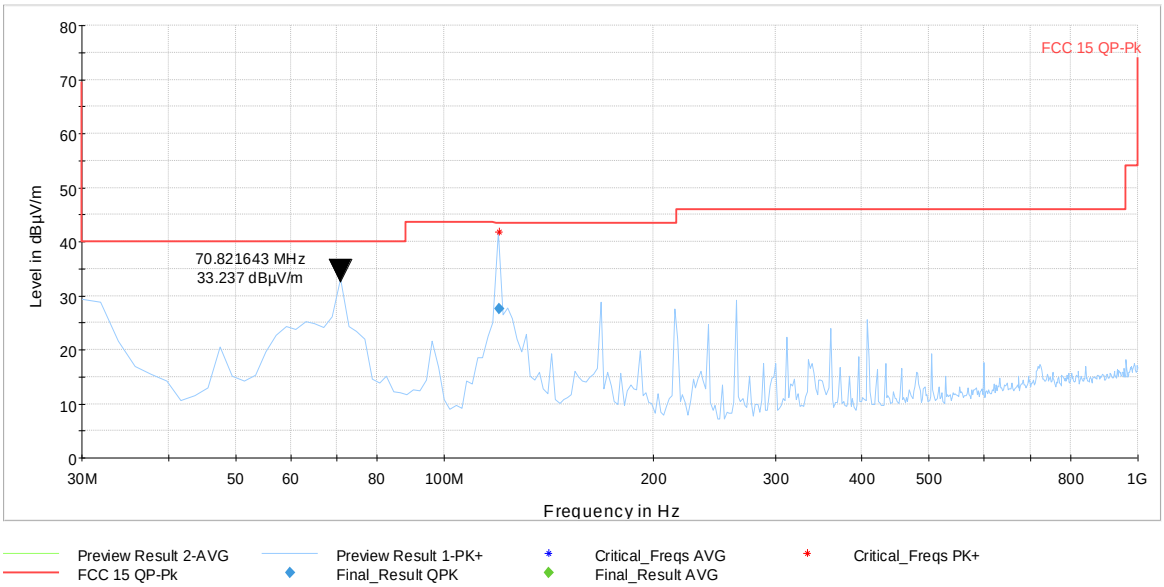
The final measurement data was taken under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and test plan.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Bluetooth:

Radiated Emissions – BT DH5 CH0			
EUT Name	Ranger 4.4	**Date**	07/17/2017-08/22/2017
EUT Model	R44-N11	**Temp / Hum in**	23°C / 38%rh
EUT Serial	356961070012789	**Voltage Input**	12 VDC
EUT Config.	1 MB/s	**RBW/ VBW**	<150kHz: 300Hz/1kHz
Standard	CFR 47 Part 15.209		150kHz – 30 MHz: 10kHz/30kHz
Dist/Ant Used	3m		>30Mhz: 1Mhz/3MHz
		Test Engineer	Douglas Antioco

30 MHz – 1 GHz for CH0

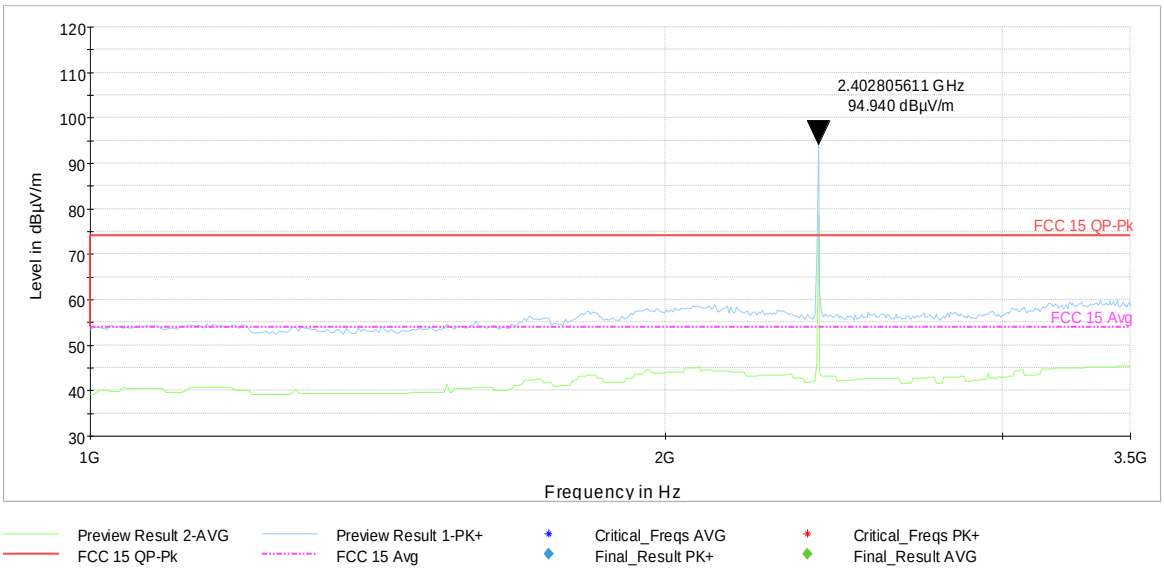


Frequency (MHz)	QP (dBuV/m)	Polarization	Azimuth (°)	Height (cm)	Limit (dBuV/m)	Margin (dB)	Result
119.9	27.6	V	211	100	43.5	15.9	Pass

Radiated Emissions – BT DH5 CH0

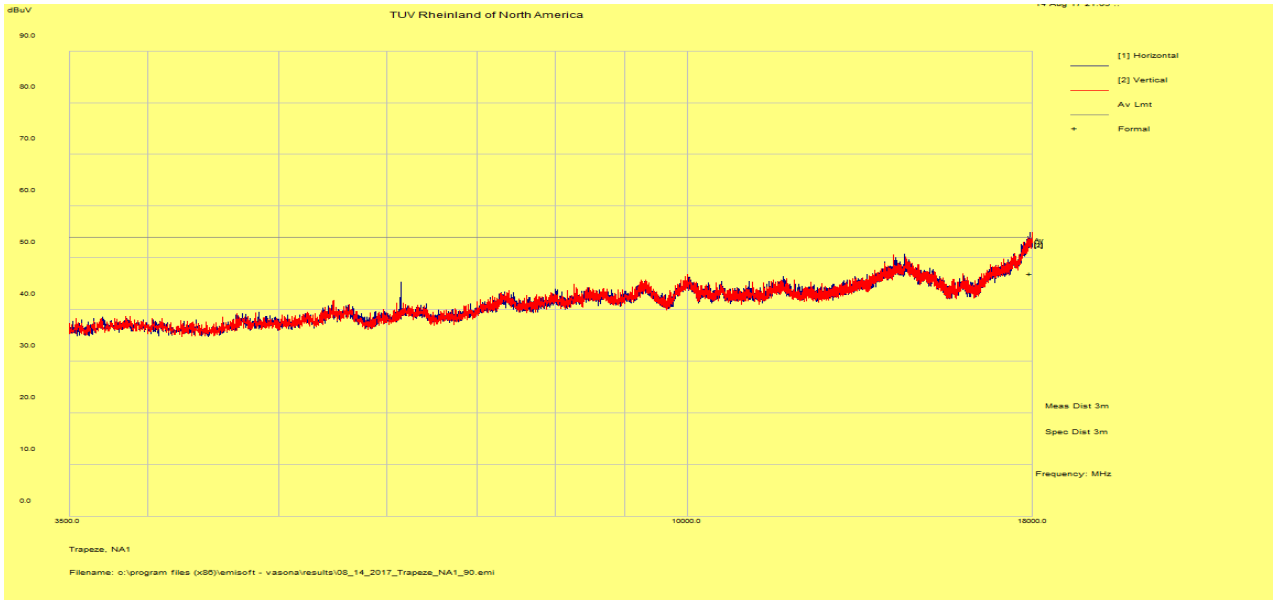
EUT Name	Ranger 4.4	**Date**	07/17/2017-08/22/2017
EUT Model	R44-N11	**Temp / Hum in**	23°C / 38%rh
EUT Serial	356961070012789	**Voltage Input**	12 VDC
EUT Config.	1 MB/s	**RBW/ VBW**	<150kHz: 300Hz/1kHz
Standard	CFR 47 Part 15.209		150kHz – 30 MHz: 10kHz/30kHz
Dist/Ant Used	3m		>30Mhz: 1Mhz/3MHz
		Test Engineer	Douglas Antioco

1 GHz – 3.5 GHz for CH0



Note: Peak above the limit is the uplink carrier frequency.

3.5 GHz – 18 GHz for CH0



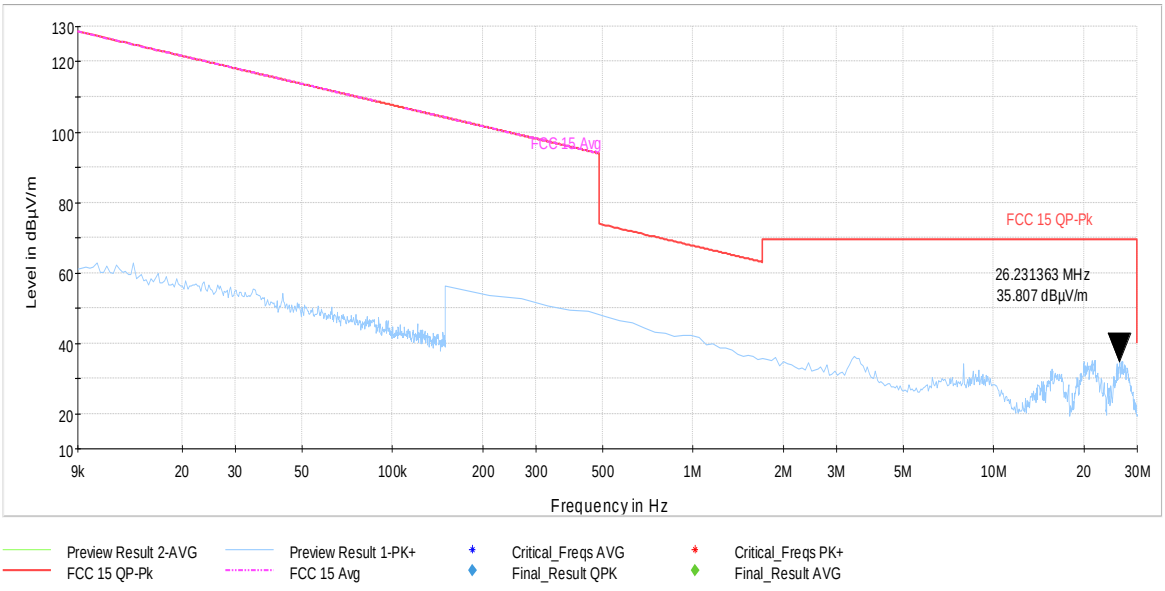
Note: EUT at 0 degree as worst case, not positioner utilized.

Frequency	Detector	Polarity	Raw	Corrected	Height	Azimuth	Limit	Margin	Result
MHz		H/V	dBuV/m	dBuV/m	cm	deg	dBuV/m	dB	
17890.45	Average Max	H	24.92	46.83	211	146	54.00	7.17	Pass

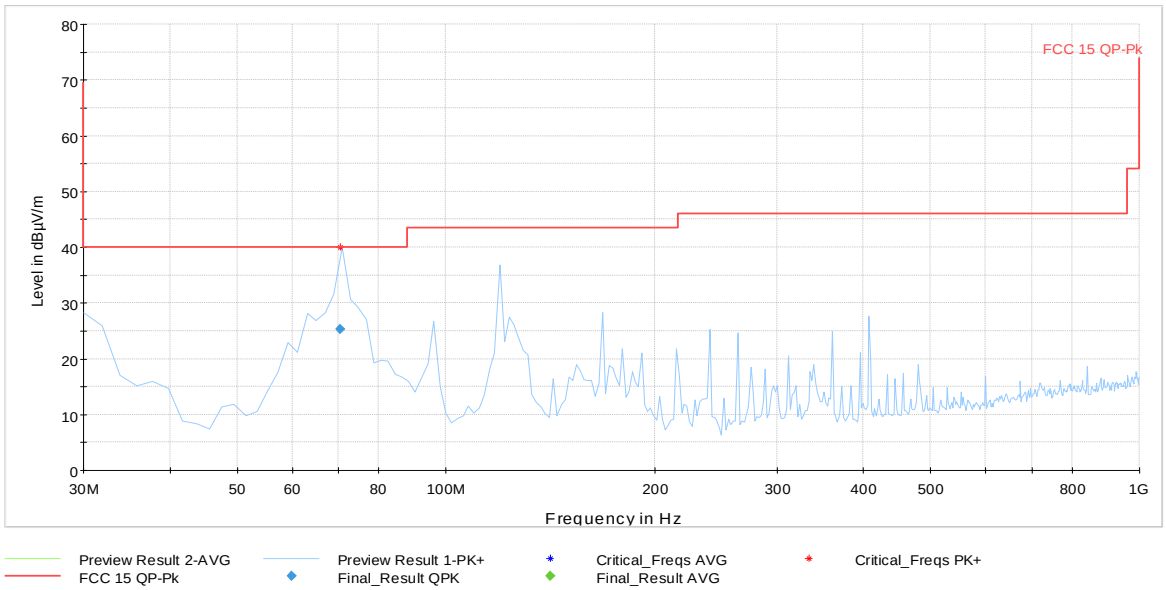
Radiated Emissions – BT DH5 CH39

EUT Name	Ranger 4.4	**Date**	August 10, 2017
EUT Model	R44-N11	**Temp / Hum in**	23°C / 38%rh
EUT Serial	356961070012789	**Voltage Input**	12 VDC
EUT Config.	1 MB/s	**RBW/ VBW**	<150kHz: 300Hz/1kHz
Standard	CFR 47 Part 15.209		150kHz – 30 MHz: 10kHz/30kHz
Dist/Ant Used	3m		>30Mhz: 1Mhz/3MHz
		Test Engineer	Douglas Antioco

9 kHz – 30 MHz for CH39



30 MHz – 1 GHz for CH39

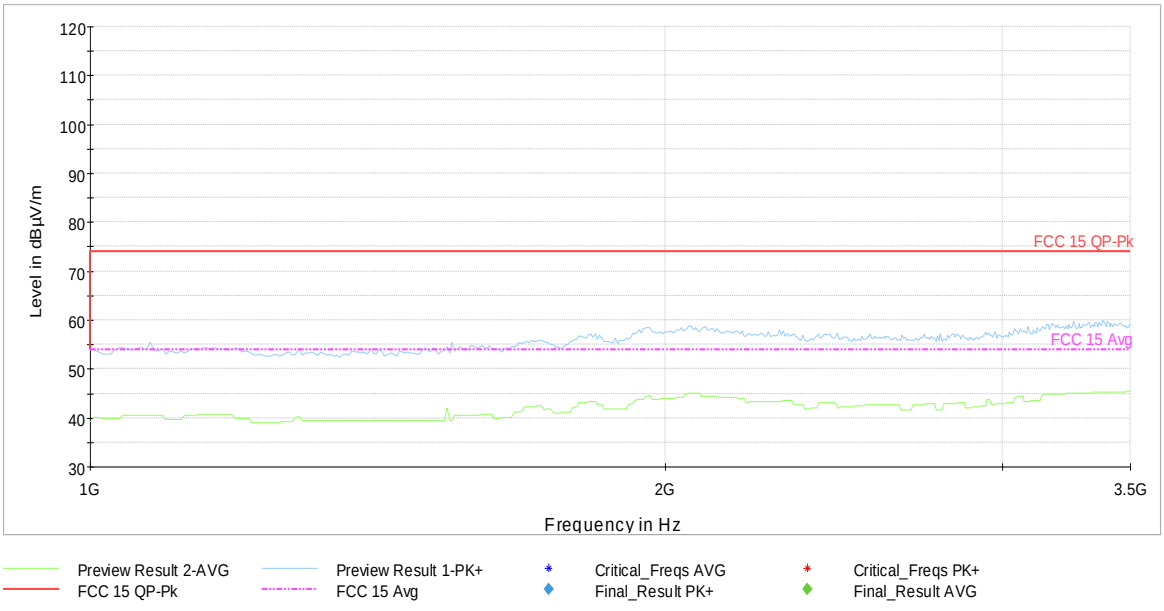


Frequency (MHz)	QP (dBuV/m)	Polarization	Azimuth (°)	Height (cm)	Limit (dBuV/m)	Margin (dB)	Result
70.4	25.3	V	148	100	40	14.7	Pass

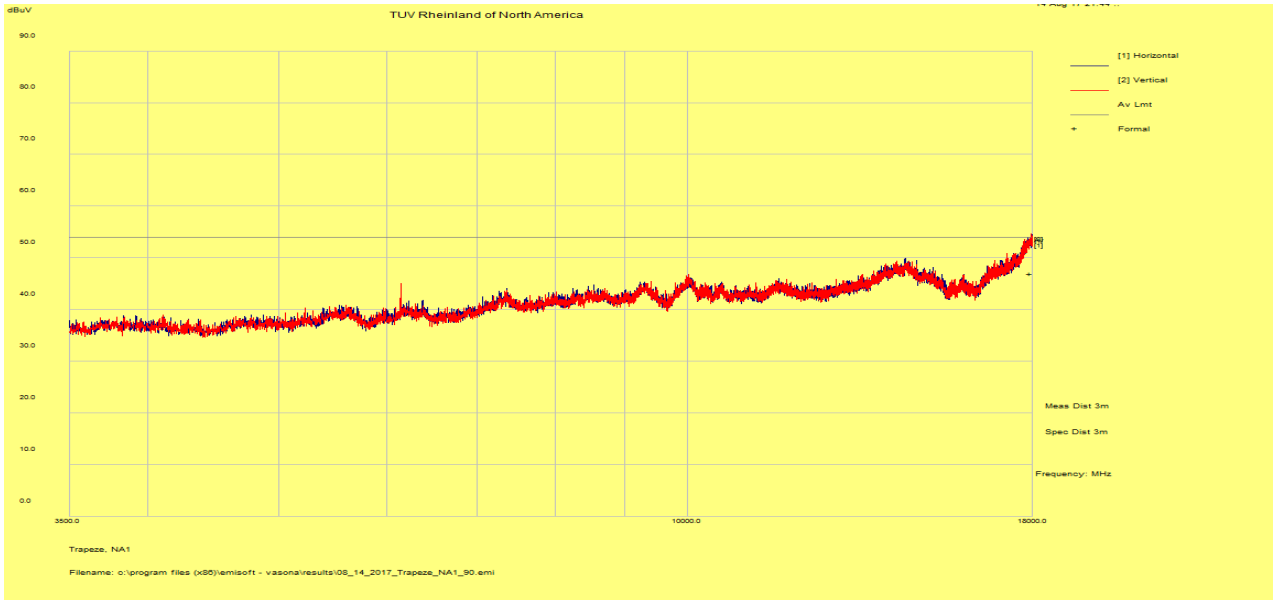
Radiated Emissions – BT DH5 CH39

EUT Name	Ranger 4.4	**Date**	07/17/2017-08/22/2017
EUT Model	R44-N11	**Temp / Hum in**	23°C / 38%rh
EUT Serial	356961070012789	**Voltage Input**	12 VDC
EUT Config.	1 MB/s	**RBW/ VBW**	<150kHz: 300Hz/1kHz
Standard	CFR 47 Part 15.209		150kHz – 30 MHz: 10kHz/30kHz
Dist/Ant Used	3m		>30Mhz: 1Mhz/3MHz
		Test Engineer	Douglas Antioco

1 GHz – 3.5 GHz for CH39



3.5 GHz – 18 GHz for Channel CH39



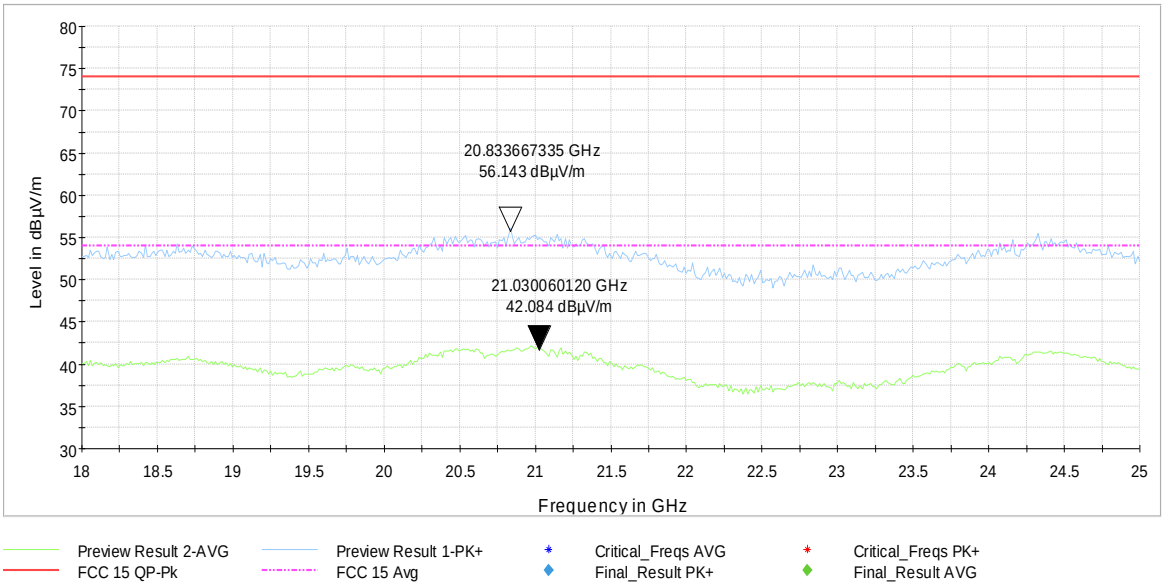
Note: EUT at 90 degree as worst case, not positioner utilized.

Frequency	Detector	Polarity	Raw	Corrected	Height	Azimuth	Limit	Margin	Result
MHz		H/V	dBuV/m	dBuV/m	cm	deg	dBuV/m	dB	
17937.73	Average Max	V	24.97	47.01	205	44	54.00	7.00	Pass

Radiated Emissions – BT DH5 CH39

EUT Name	Ranger 4.4	**Date**	07/17/2017-08/22/2017
EUT Model	R44-N11	**Temp / Hum in**	23°C / 38%rh
EUT Serial	356961070012789	**Voltage Input**	12 VDC
EUT Config.	1 MB/s	**RBW/ VBW**	<150kHz: 300Hz/1kHz
Standard	CFR 47 Part 15.209		150kHz – 30 MHz: 10kHz/30kHz
Dist/Ant Used	3m		>30Mhz: 1Mhz/3MHz
		Test Engineer	Douglas Antioco

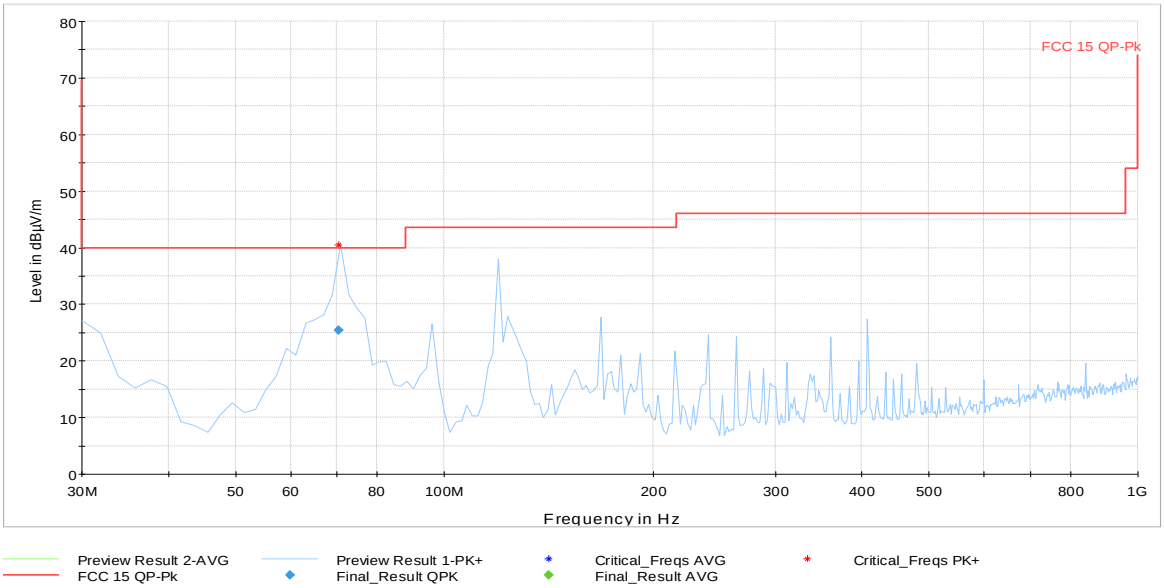
18 MHz – 25 GHz for CH39



Radiated Emissions – BT DH5 CH78

EUT Name	Ranger 4.4	**Date**	07/17/2017-08/22/2017
EUT Model	R44-N11	**Temp / Hum in**	23°C / 38%rh
EUT Serial	356961070012789	**Line AC / Freq**	120 VAC
EUT Config.	1 MB/s	**RBW/ VBW**	<150kHz: 300Hz/1kHz
Standard	CFR 47 Part 15.209		150kHz – 30 MHz: 10kHz/30kHz
Dist/Ant Used	3m		>30Mhz: 1Mhz/3MHz
		Test Engineer	Douglas Antioco

30 MHz – 1 GHz for CH78



Frequency (MHz)	QP (dBuV/m)	Polarization	Azimuth (°)	Height (cm)	Limit (dBuV/m)	Margin (dB)	Result
70.4	25.4	V	151	100	40	14.6	Pass

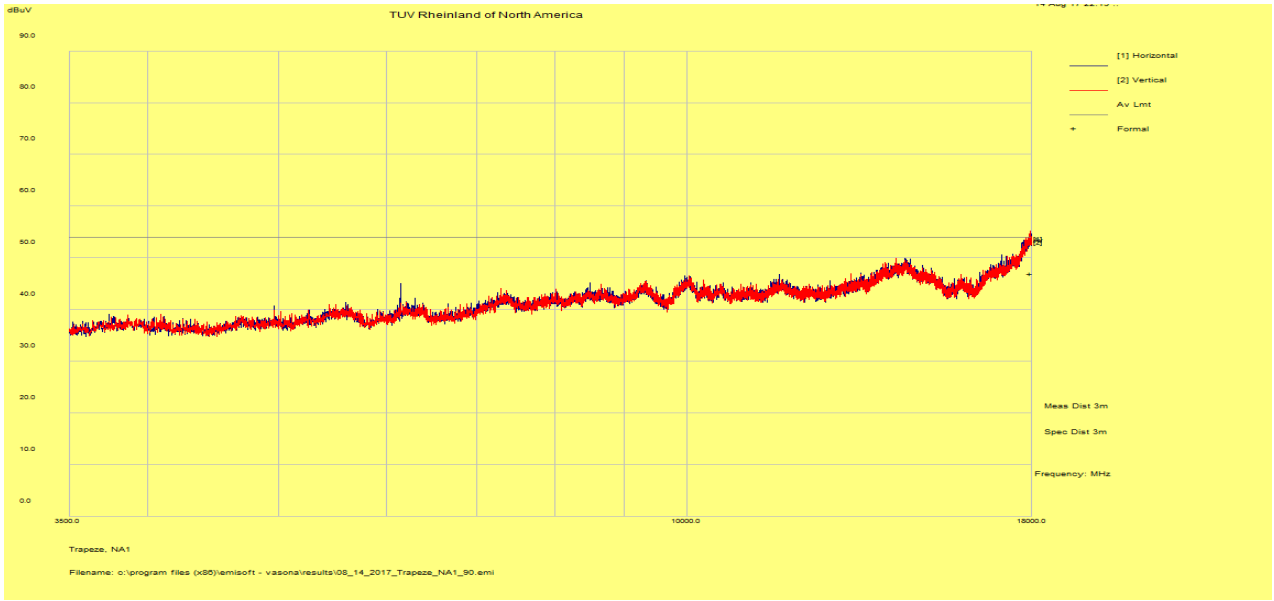
Radiated Emissions – BT DH5 CH78

EUT Name	Ranger 4.4	**Date**	07/17/2017-08/22/2017
EUT Model	R44-N11	**Temp / Hum in**	23°C / 38%rh
EUT Serial	356961070012789	**Voltage Input**	12 VDC
EUT Config.	1 MB/s	**RBW/ VBW**	<150kHz: 300Hz/1kHz
Standard	CFR 47 Part 15.209		150kHz – 30 MHz: 10kHz/30kHz
Dist/Ant Used	3m		>30Mhz: 1Mhz/3MHz
		Test Engineer	Douglas Antioco

1 GHz – 3.5 GHz for CH78

Note: Peak above the limit is the uplink carrier frequency.

3.5 GHz – 18 GHz for CH78



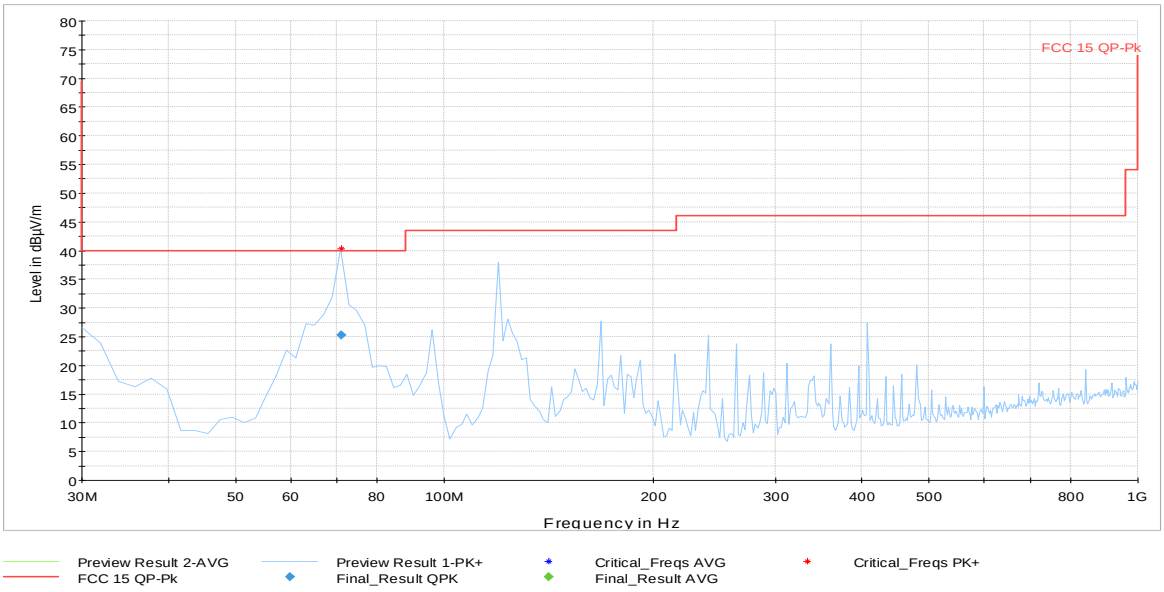
Note: EUT at 90 degree as worst case, not positioner utilized.

Frequency	Detector	Polarity	Raw	Corrected	Height	Azimuth	Limit	Margin	Result
MHz		H/V	dBuV/m	dBuV/m	cm	deg	dBuV/m	dB	
17955.36	Average Max	V	24.91	46.99	184	136	54.00	-7.01	Pass

BLE:

Radiated Emissions – BLE CH0			
EUT Name	Ranger 4.4	**Date**	07/17/2017-08/22/2017
EUT Model	R44-N11	**Temp / Hum in**	23°C / 38%rh
EUT Serial	356961070012789	**Voltage Input**	12 VDC
EUT Config.	1 MB/s	**RBW/ VBW**	<150kHz: 300Hz/1kHz
Standard	CFR 47 Part 15.209		150kHz – 30 MHz: 10kHz/30kHz
Dist/Ant Used	3m		>30Mhz: 1Mhz/3MHz
		Test Engineer	Douglas Antioco

30 MHz – 1 GHz for CH0

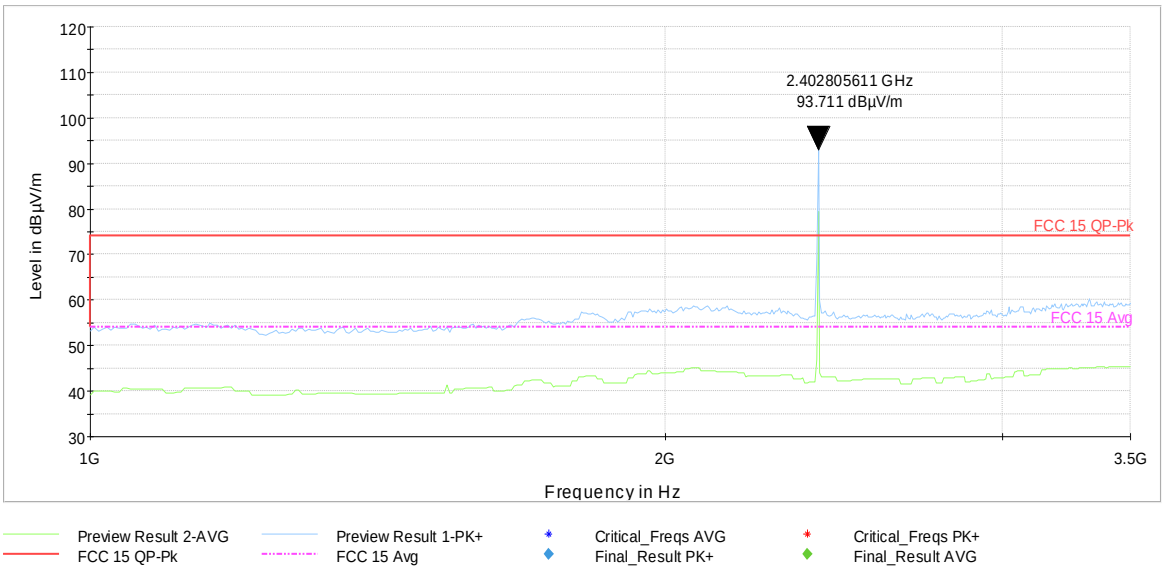


Frequency (MHz)	QP (dBuV/m)	Polarization	Azimuth (°)	Height (cm)	Limit (dBuV/m)	Margin (dB)	Result
71.1	25.2	V	154	100	40	14.8	Pass

Radiated Emissions – BLE CH0

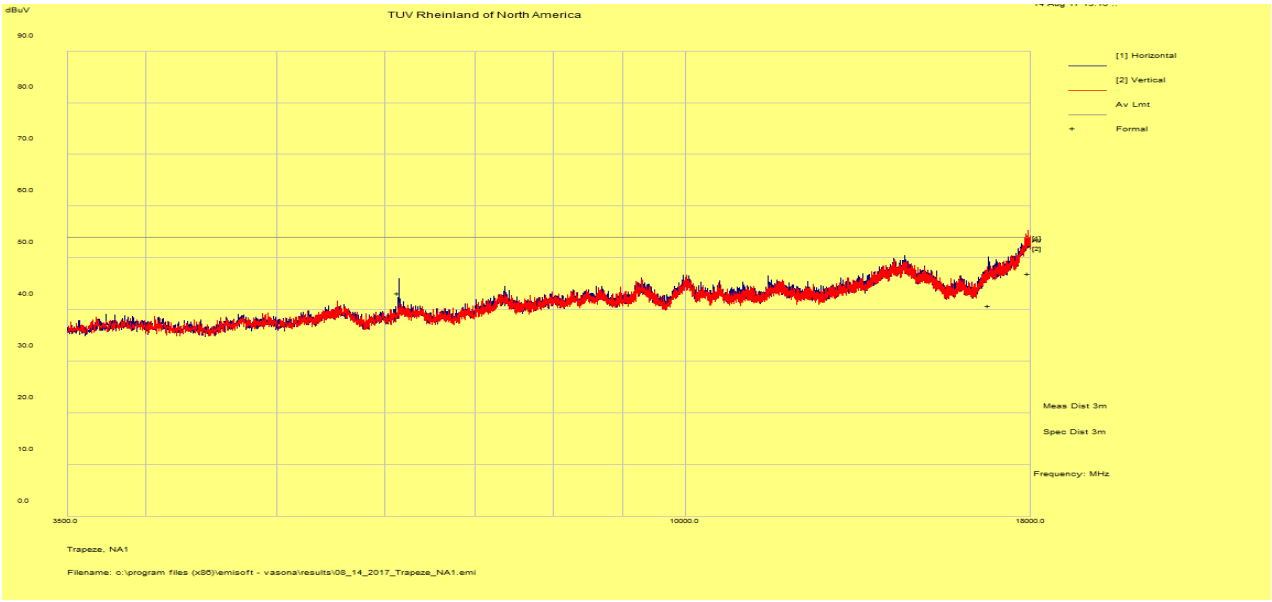
EUT Name	Ranger 4.4	**Date**	07/17/2017-08/22/2017
EUT Model	R44-N11	**Temp / Hum in**	23°C / 38%rh
EUT Serial	356961070012789	**Voltage Input**	12 VDC
EUT Config.	1 MB/s	**RBW/ VBW**	<150kHz: 300Hz/1kHz
Standard	CFR 47 Part 15.209		150kHz – 30 MHz: 10kHz/30kHz
Dist/Ant Used	3m		>30Mhz: 1Mhz/3MHz
		Test Engineer	Douglas Antioco

1 GHz – 3.5 GHz for CH0



Note: Peak above the limit is the uplink carrier frequency.

3.5 GHz – 18 GHz for CH0



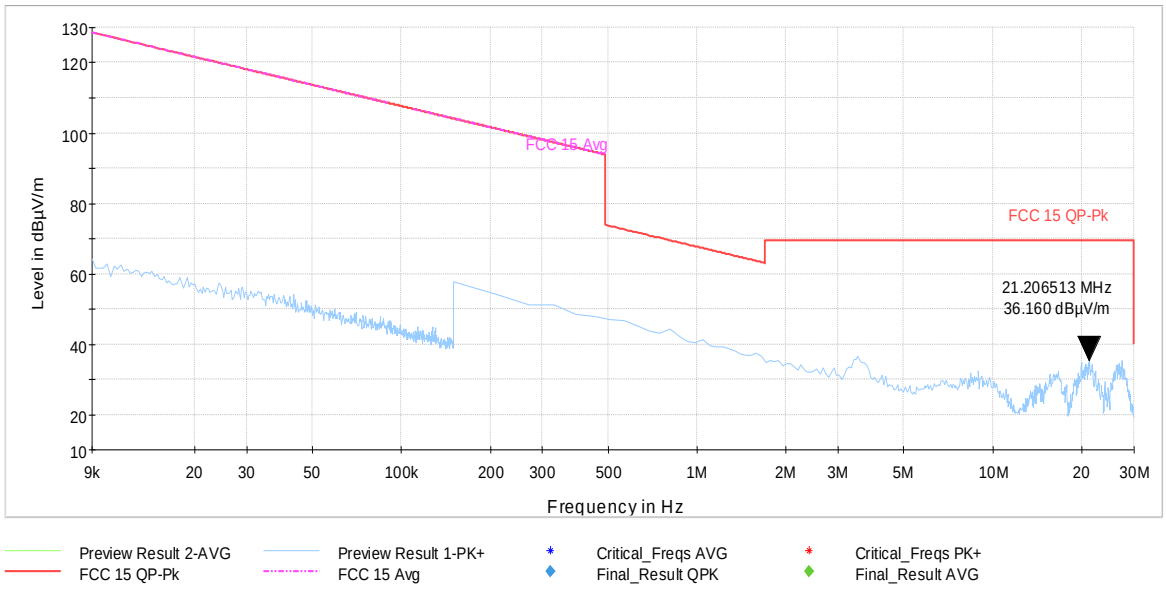
Note: EUT at 90 degree as worst case, not positioner utilized.

Frequency	Detector	Polarity	Raw	Corrected	Height	Azimuth	Limit	Margin	Result
MHz		H/V	dBuV/m	dBuV/m	cm	deg	dBuV/m	dB	
17920.26	Average Max	V	24.95	46.96	344	360	54.00	-7.04	Pass

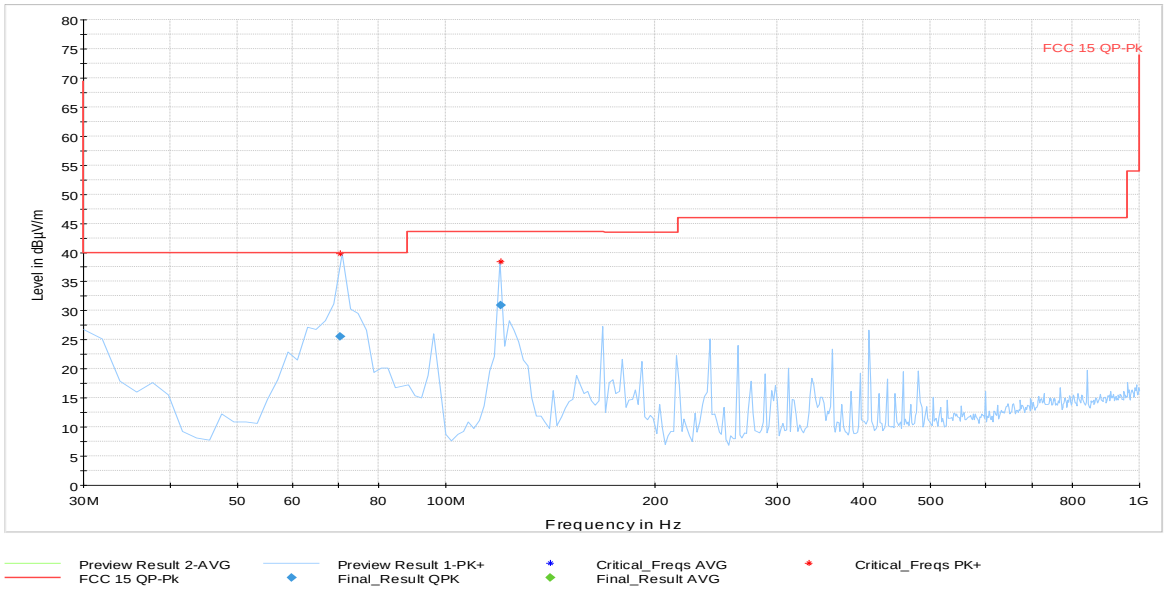
Radiated Emissions – BLE CH19

EUT Name	Ranger 4.4	**Date**	07/17/2017-08/22/2017
EUT Model	R44-N11	**Temp / Hum in**	23°C / 38%rh
EUT Serial	356961070012789	**Voltage Input**	12 VDC
EUT Config.	1 MB/s	**RBW/ VBW**	<150kHz: 300Hz/1kHz
Standard	CFR 47 Part 15.209		150kHz – 30 MHz: 10kHz/30kHz
Dist/Ant Used	3m		>30Mhz: 1Mhz/3MHz
		Test Engineer	Douglas Antioco

9 kHz – 30 MHz for CH19



30 MHz – 1 GHz for CH19

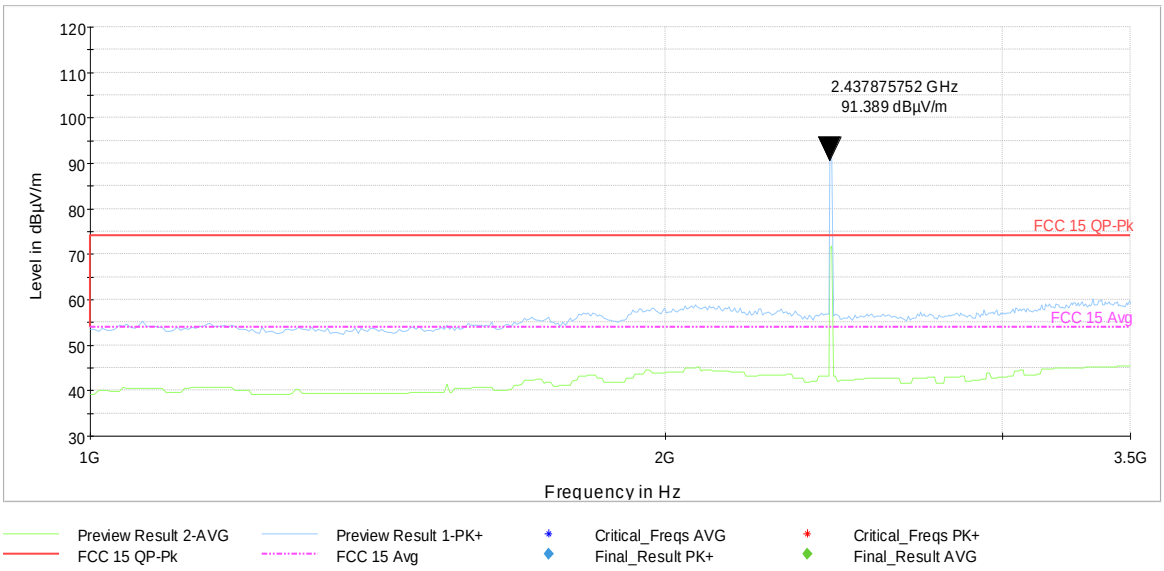


Frequency (MHz)	QP (dBuV/m)	Polarization	Azimuth (°)	Height (cm)	Limit (dBuV/m)	Margin (dB)	Result
70.4	25.6	V	157	100	40.0	14.5	Pass
120.0	30.9	V	212	100	43.5	12.6	Pass

Radiated Emissions – BLE CH19

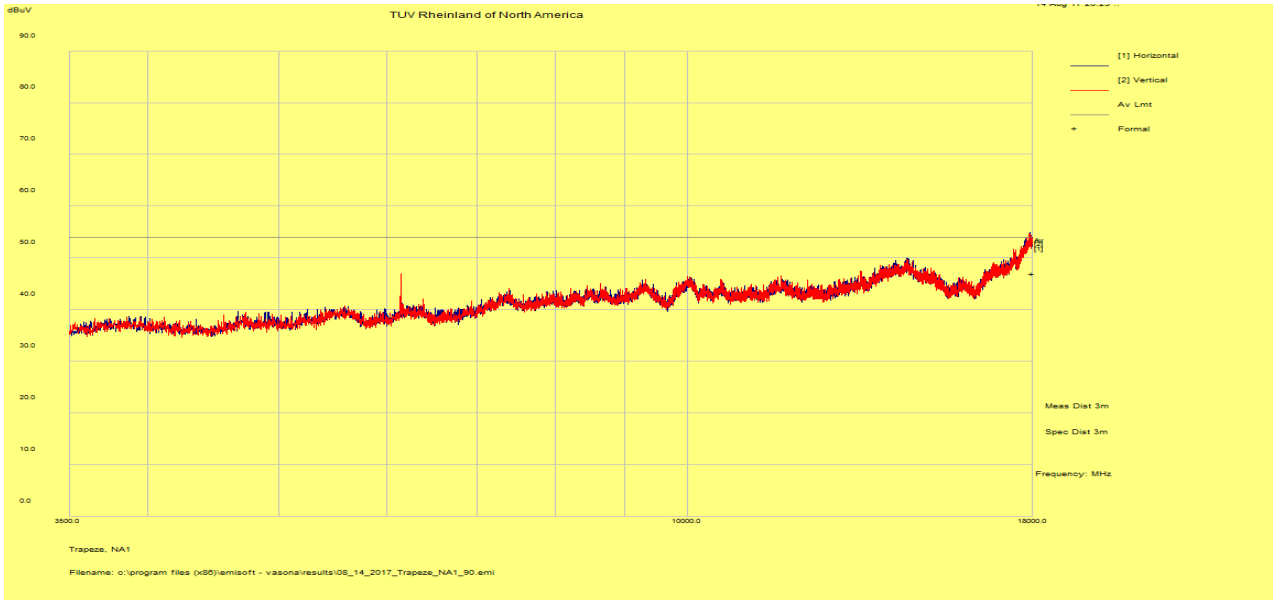
EUT Name	Ranger 4.4	**Date**	07/17/2017-08/22/2017
EUT Model	R44-N11	**Temp / Hum in**	23°C / 38%rh
EUT Serial	356961070012789	**Voltage Input**	12 VDC
EUT Config.	1 MB/s	**RBW/ VBW**	<150kHz: 300Hz/1kHz
Standard	CFR 47 Part 15.209		150kHz – 30 MHz: 10kHz/30kHz
Dist/Ant Used	3m		>30Mhz: 1Mhz/3MHz
		Test Engineer	Douglas Antioco

1 GHz – 3.5 GHz for CH19



Note: Peak above the limit is the uplink carrier frequency.

3.5 GHz – 18 GHz for Channel CH19



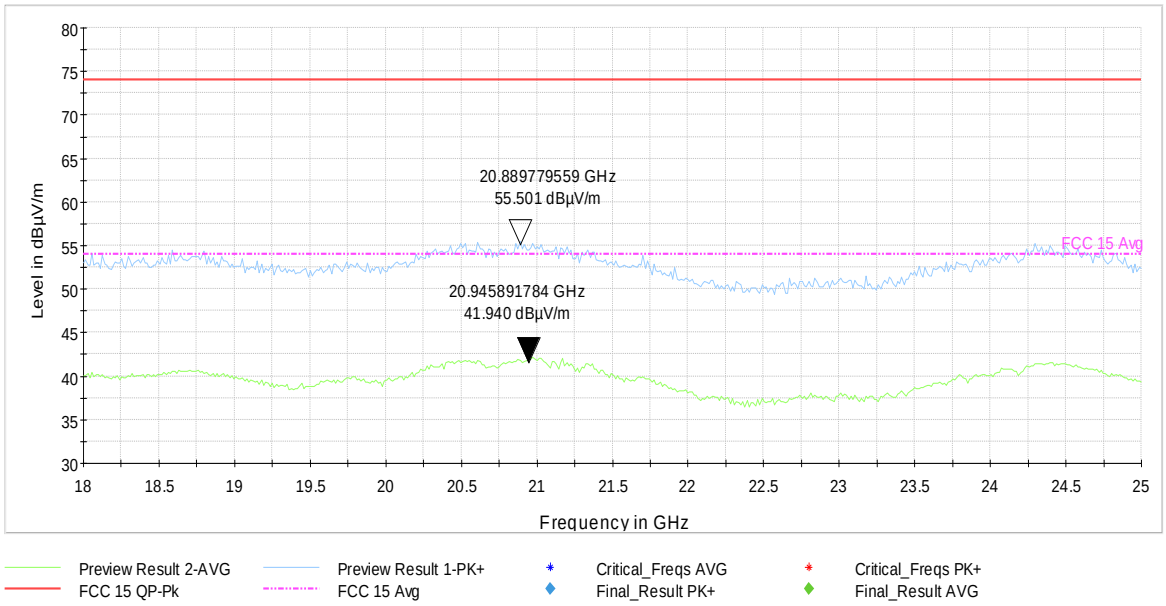
Note: EUT at 90 degree as worst case, not positioner utilized.

Frequency	Detector	Polarity	Raw	Corrected	Height	Azimuth	Limit	Margin	Result
MHz		H/V	dBuV/m	dBuV/m	cm	deg	dBuV/m	dB	
17983.27	Average Max	V	24.82	47.05	269	112	54.00	-6.95	Pass

Radiated Emissions – BLE CH19

EUT Name	Ranger 4.4	**Date**	07/17/2017-08/22/2017
EUT Model	R44-N11	**Temp / Hum in**	23°C / 38%rh
EUT Serial	356961070012789	**Voltage Input**	12 VDC
EUT Config.	1 MB/s	**RBW/ VBW**	<150kHz: 300Hz/1kHz
Standard	CFR 47 Part 15.209		150kHz – 30 MHz: 10kHz/30kHz
Dist/Ant Used	3m		>30Mhz: 1Mhz/3MHz
		Test Engineer	Douglas Antioco

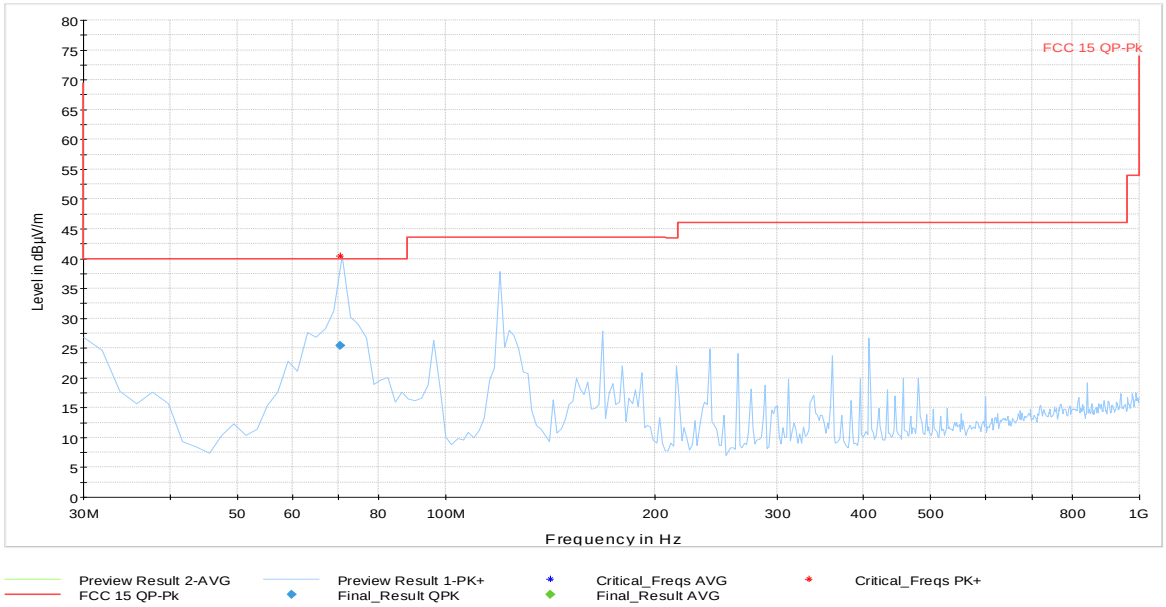
18 MHz – 25 GHz for CH19



Radiated Emissions – BLE CH39

EUT Name	Ranger 4.4	**Date**	07/17/2017-08/22/2017
EUT Model	R44-N11	**Temp / Hum in**	23°C / 38%rh
EUT Serial	356961070012789	**Voltage Input**	12 VDC
EUT Config.	1 MB/s	**RBW/ VBW**	<150kHz: 300Hz/1kHz
Standard	CFR 47 Part 15.209		150kHz – 30 MHz: 10kHz/30kHz
Dist/Ant Used	3m		>30Mhz: 1Mhz/3MHz
		Test Engineer	Douglas Antioco

30 MHz – 1 GHz for CH39

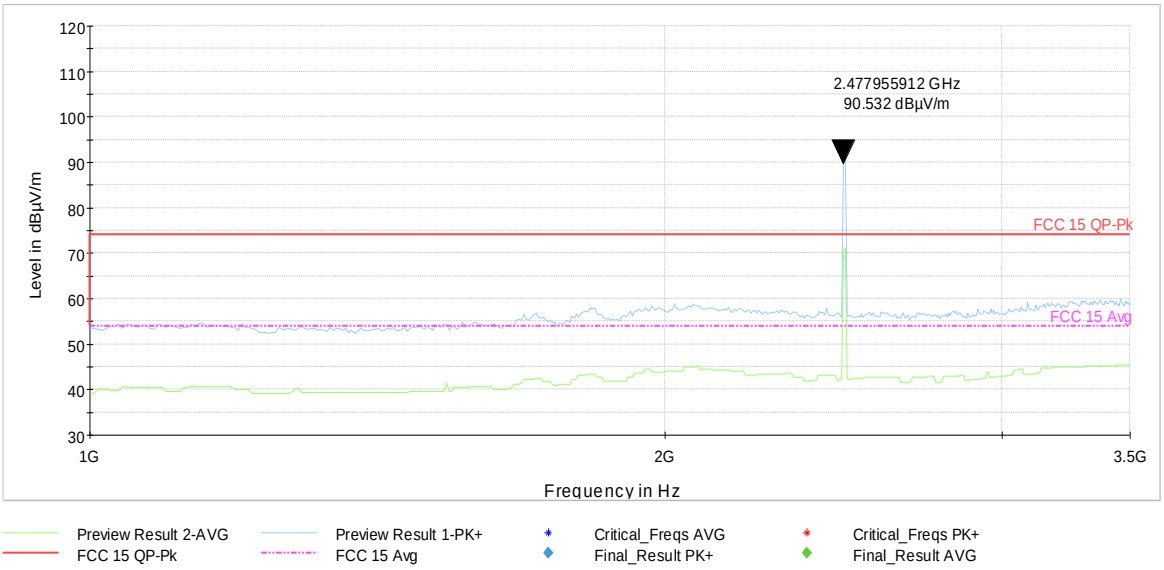


Frequency (MHz)	QP (dBuV/m)	Polarization	Azimuth (°)	Height (cm)	Limit (dBuV/m)	Margin (dB)	Result
70.4	25.4	V	156	100	40	14.60	Pass

Radiated Emissions – BLE CH39

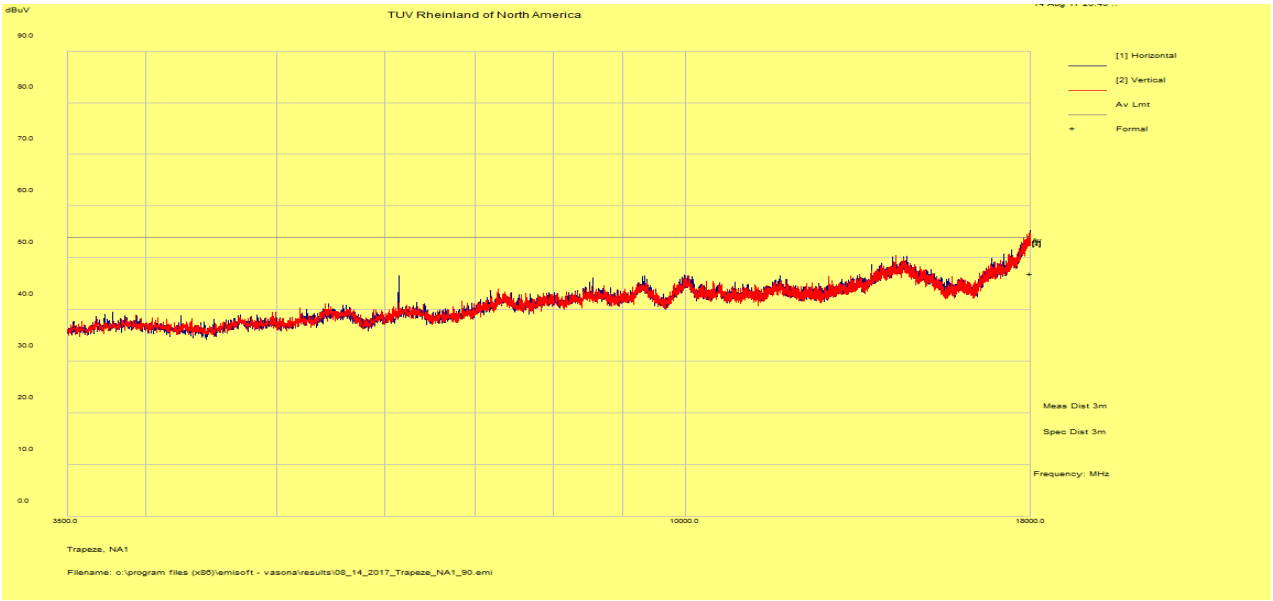
EUT Name	Ranger 4.4	**Date**	07/17/2017-08/22/2017
EUT Model	R44-N11	**Temp / Hum in**	23°C / 38%rh
EUT Serial	356961070012789	**Voltage Input**	12 VDC
EUT Config.	1 MB/s	**RBW/ VBW**	<150kHz: 300Hz/1kHz
Standard	CFR 47 Part 15.209		150kHz – 30 MHz: 10kHz/30kHz
Dist/Ant Used	3m		>30Mhz: 1Mhz/3MHz
		Test Engineer	Douglas Antioco

1 GHz – 3.5 GHz for CH39



Note: Peak above the limit is the uplink carrier frequency.

3.5 GHz – 18 GHz for CH39



Note: EUT at 90 degree as worst case, not positioner utilized.

Frequency	Detector	Polarity	Raw	Corrected	Height	Azimuth	Limit	Margin	Result
MHz		H/V	dBuV/m	dBuV/m	cm	deg	dBuV/m	dB	
17952.82	Average Max	H	24.91	46.97	261	0	54.00	-7.03	Pass

5 Test Equipment List

5.1 Equipment List

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yyyy	Next Cal mm/dd/yyyy
Test Software	Rohde & Schwarz	EMC32 v.10.20.01	N/A	N/A	
Test Software (3.5-18GHz)	EMIsoft	Version 5.0	N/A	N/A	
Signalling antenna	Commscope	CELLMAX-D-CPUSE	L011504152918	N/A	
Maturo Control Unit	Maturo	SCU	246/20571216	N/A	
Maturo EUT Positioner	Maturo	TD1.5-10kg	087/20571216	N/A	
3.5 GHz High Pass Filter	Hewlett Packard	84300-80038	820004	N/A (See Note)	
1.6GHz Low Pass Filter	K & L Microwave, Inc	8L120-X1600-0/09135-0249	UA691-35	N/A (See Note)	
DC Block	Mini-Circuits	UNAT-1+	VUU83701027	N/A (See Note)	
Amplifier	Sonoma	310N	185516	01/02/2017	01/02/2018
Amplifier	Rohde & Schwarz	TS-PR18	100019/3545.7008.03	01/12/2017	01/12/2018
Active Loop Antenna	EMCO	6502	00062531	05/17/2017	05/17/2019
Bilog Antenna	Sunol Sciences	JB3	A061907	08/04/2016	08/04/2018
Horn Antenna (1-18GHz)	EMCO	3115	9710-5301	10/08/2015	10/08/2017
Horn Antenna (18-26GHz)	Com-Power	AHA-840	105005	05/26/2017	05/26/2019
EMI Receiver	Rohde & Schwarz	ESIB40	100180	01/12/2017	01/12/2018
EMI Receiver	Agilent				
Spectrum Analyzer	Rohde & Schwarz	FSL 6	100169	01/13/2017	01/13/2018
Thermometer	VWR	61161-378	160702310	08/15/2015	08/15/2018

Note: Equipment is characterized before use.

6 EMC Test Plan

6.1 Introduction

This section provides a description of the Equipment Under Test (EUT), configurations, operating conditions, and performance acceptance criteria. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing.

6.2 Customer

Table 2: Customer Information

Company Name	Trapeze Software Group, Inc.
Address	5265 Rockwell Drive NE, Cedar Rapids
City, State, Zip	Iowa 52402, U.S.A.
Country	USA

6.3 Equipment Under Test (EUT)

Table 3: EUT Specifications

EUT Specification	
Voltage Input	12 VDC
Number of Antenna Feeds:	Bluetooth EDR/BDR: Transmit: 1, Receive: 1 / Bluetooth Low Energy: Transmit: 1, Receive: 1
Hardware Version	4.4
RF Software Version	1.04P
Radio Evaluated	Bluetooth EDR/BDR, Bluetooth Low Energy
Transmit Frequency Band	2400-2484.5MHz
Max. Power Output for Technology	6.99 dBm (Declared by Manufacturer)
Antenna Gain	-4 dBi
Antenna Type	Chip Antenna
Modulation Type	Bluetooth EDR/BDR: GFSK, 8DPSK, π/4 DQPSK / Bluetooth Low energy: GFSK
Type of Equipment	☒ Table Top ☐ Wall-mount ☐ Floor standing cabinet ☐ Other:

Table 4: Antenna Information

Number	Antenna Type	Description	Max Gain (dBi)
1	Internal	Chip	-4

Table 5: Support Equipment

Equipment	Manufacturer	Model	Serial	Used for
Laptop	Lenovo	75Y4442	R9-AXV2F 11/01	Configure channel
AC to DC Converter	V-Infinity	ETSA120500UD	-	To provide power to EUT
Note: None.				

Table 6: Description of Sample used for Testing

Device	Serial/IMEI	Configuration	Used For
R44-N11	356961070012789	Radiated Sample	Radiated Emissions

Table 7 Accessory Equipment

Equipment	Manufacturer	Model	Serial Number
N/A	N/A	N/A	N/A

6.4 Testing Notes:

The EUT's BT EDR/BDR and LE radios were stimulated for continuous transmission on all applicable channels and modulations via scripts that were toggled by a laptop through the software program CSR BlueSuite3.

For the BT EDR/BDR radio, only GFSK modulation was evaluated since the previously certified module's report shows that this mode has the highest output power which is considered the worst case mode of operation.

END OF REPORT