



Test Report Serial Number:

45461578 R1.0

Test Report Date:

8 November 2020

Project Number:

1486

EMC Test Report - New Certification

Applicant:



RIMEX Supply Ltd.
5929 274 Street
Langley, BC, Canada
V4W 0B8

FCC ID:

RHC-TRS-S120

Product Model Number / HVIN

TRS-SENSOR-DRY /A

TRS-SENSOR-DIA /A

IC Registration Number

4719A-TRSS120

Product Name / PMN

TyreSense

In Accordance With:

CFR Title 47, Part 15 Subpart C (§15.249)

Part 15 Low Power Communication Device Transmitter (DXX)

RSS-Gen, RSS-210 Issue 10

Licence-Exempt Radio Apparatus: Category I Equipment

Low Power Device (902-928MHz)

Approved By:

Ben Hewson, President
Celltech Labs Inc.
21-364 Lougheed Rd.
Kelowna, BC, V1X 7R8
Canada



**Industry
Canada**



Test Lab Certificate: 2470.01

IC Registration 3874A-1

FCC Registration: CA3874

This report shall not be reproduced in any form without the expressed written consent of Celltech Labs Inc.

© 2020 Celltech Labs Inc.

Table of Contents

1.0 DOCUMENT CONTROL	4
2.0 CLIENT AND DUT INFORMATION	5
3.0 SCOPE	6
4.0 TEST RESULT SUMMARY	7
5.0 NORMATIVE REFERENCES	8
6.0 FACILITIES AND ACCREDITATIONS	9
7.0 FUNDAMENTAL FIELD STRENGTH	10
8.0 OCCUPIED BANDWIDTH	16
9.0 20DB BANDWIDTH AND BAND EDGE	18
10.0 RESTRICTED BAND	22
APPENDIX A – TEST SETUP DRAWINGS AND EQUIPMENT	38
APPENDIX B – EQUIPMENT LIST AND CALIBRATION	41
APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY	42
END OF REPORT	42

Table of Plots

Plot 7.1 – Field Strength, Peak, Horizontal	11
Plot 7.2 – Field Strength, RMS, Horizontal	12
Plot 7.3 – Field Strength, Peak, Vertical	13
Plot 7.4 – Field Strength, RMS, Vertical	14
Plot 8.1 – Occupied Bandwidth	17
Plot 9.1 – 20dB Bandwidth	19
Plot 9.2 – Band Edge	20
Plot 10.1 – Restricted Band, 9kHz – 30MHz, Front	23
Plot 10.2 – Restricted Band, 9kHz – 30MHz, Side	24
Plot 10.3 – Restricted Band, 30 - 1000MHz, Horizontal	25
Plot 10.4 – Restricted Band, 30 - 1000MHz, Vertical	26
Plot 10.5 – Restricted Band, 2 nd Harmonic, Horizontal	27
Plot 10.6 – Restricted Band, 2 nd Harmonic, Vertical	28
Plot 10.7 – Restricted Band, 3 rd Harmonic, Horizontal	29
Plot 10.8 – Restricted Band, 3 rd Harmonic, Vertical	30
Plot 10.9 – Restricted Band, 4 th Harmonic, Horizontal	31
Plot 10.10 – Restricted Band, 4 th Harmonic, Vertical	32
Plot 10.11 – Restricted Band, 5 th Harmonic, Horizontal	33
Plot 10.12 – Restricted Band, 5 th Harmonic, Vertical	34
Plot 10.13 – Restricted Band, 6 th Harmonic, Horizontal	35
Plot 10.14 – Restricted Band, 6 th Harmonic, Vertical	36

Table of Tables

Table 7.1 - Summary of Field Strength Evaluation	15
Table 8.1 - Summary of Occupied Bandwidth Evaluation	17
Table 9.1 - Summary of 20dB Bandwidth and Band Edge Evaluation	21
Table 10.1 - Summary of Restricted Band Evaluation	37
Table A.1 – Setup - Radiated Emissions Equipment	38

Table of Figures

Figure A.1 – Test Setup Radiated Emissions Measurements 9kHz – 30MHz	39
Figure A.2 – Test Setup Radiated Emissions Measurements 30 - 1000MHz	39
Figure A.3 – Test Setup Radiated Emissions Measurements 30 - 1000MHz Signal Substitution	40
Figure A.4 – Test Setup Radiated Emissions Measurements 1-18GHz	40

1.0 DOCUMENT CONTROL
Revision History

Samples Tested By:	Art Voss, P.Eng.	Date(s) of Evaluation:	9 July - 30 October, 2020	
Report Prepared By:	Art Voss, P.Eng.	Report Reviewed By:	Ben Hewson	
Report Revision	Description of Revision	Revised Section	Revised By	Revision Date
0.1	Draft Release	n/a	Art Voss	6 November 2020
1.0	Initial Release	n/a	Art Voss	8 November 2020

2.0 CLIENT AND DUT INFORMATION

Client Information	
Applicant Name (FCC)	RIMEX Supply Ltd.
Applicant Address (FCC)	5929 274 Street Langley, BC, V4W 0B8 Canada
Applicant Name (ISED)	RIMEX Supply Ltd.
Applicant Address (ISED)	5929 274 Street Langley, BC, V4W 0B8 Canada
DUT Information	
Device Identifier(s):	FCC ID: RHC-TRS-S120
	IC ID: 4719A-TRSS120
Device Type:	Mobile Low Power Digital Transmitter
Device Model(s) / HVIN:	TRS-SENSOR-DRY/A
	TRS-SENSOR-DIA/A
Device Marketing Name / PMN:	TyreSense
Firmware Version ID Number / FVIN:	-
Host Marketing Name / HMN:	-
Test Sample Serial No.:	T/A Sample - Identical Prototype
Equipment Class (FCC):	Part 15 Low Power Transmitter (DXX)
Equipment Class (ISED):	Low Power Device (902-928MHz)
Transmit Frequency Range:	916.48MHz
Test Channels:	1 Channel
Manuf. Max. Rated Output Power:	4dBm
Manuf. Max. Rated BW/Data Rate:	n/a
Antenna Make and Model:	Internal PCB Loop
Antenna Type and Gain:	1dBi
Modulation:	FSK
Mode:	Simplex
Emission Designator:	See Section 8.0
DUT Power Source:	3VDC Primary Li-Ion
Deviation(s) from standard/procedure:	None
Modification of DUT:	None

3.0 SCOPE

Preface:

This Certification Report was prepared on behalf of:

RIMEX Supply Ltd.

,(the '*Applicant*"), in accordance with the applicable Federal Communications Commission (FCC) CFR 47 and Innovation, Scientific and Economic Development (ISED) Canada rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and ,unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

Device:

The TRS-SENSOR-DIA /A and TRS-SENSOR-DRY /A are vehicular tire mounted sensor devices incorporating a 916MHz low power transmitter. The sensors transmit heavy equipment tire pressure and other tire paramters to a receiver located in the cab of the vehicle. The two sensors variants are similar in nature with the exception of form factor. The transmitters of the two sensor variants are identical in all aspects.

Requirement:

In accordance with FCC and ISED *Rules* , this *Equipment* is subject to certification to FCC 47 CFR §15.249 and ISED RSS-210. This *Equipment* is considered Mobile Equipment. As per FCC 47 CFR §2.1091 and Canada Health Safety Code 6 an RF Exposure (MPE) evaluation is required for this *Equipment* and the results of the RF Exposure (MPE) evaluation appear in a separate report.

Application:

This is an application for FCC and ISED Certification

4.0 TEST RESULT SUMMARY

TEST SUMMARY						
Section	Description of Test	Procedure Reference	Applicable Rule Part(s) FCC	Applicable Rule Part(s) ISED	Test Date	Result
7.0	Field Strength (Fundamental)	ANSI C63.10-2013 KDB 558074 D01v05	§15.249(a)(e)	RSS-Gen (6.12) RSS-210 (B.10)	7 July 2020	Pass
8.0	Occupied Bandwidth	ANSI C63.10-2013 KDB 558074 D01v05	§2.1049	RSS-Gen (6.7)	25 Sep 2020	Pass
9.0	20dB Bandwidth / Band Edge	ANSI C63.10-2013 KDB 558074 D01v05	§15.249(a)(e) §15.215(c)	RSS-Gen (6.12) RSS-210 (B.10)	25 Sep 2020	Pass
10.0	Restricted Bands	ANSI C63.10-2013 KDB 558074 D01v05	§15.249(d)(e) §15.209	RSS-Gen (8.10)	23 Sep 2020	Pass

Test Station Day Log					
Date	Ambient Temp (°C)	Relative Humidity (%)	Barometric Pressure (kPa)	Test Station	Tests Performed Section(s)
10 July 2020	20.0	46	101.9	OATS	7.0
23 Sep 2020	15.0	77	101.0	OATS	10.0
25 Sep 2020	21.0	17	101.2	SAC	8.0, 9.0

EMC - EMC Test Bench

SAC - Semi-Anechoic Chamber

OATS - Open Area Test Site

TC - Temperature Chamber

LISN - LISN Test Area

ESD - ESD Test Bench

IMM - Immunity Test Area

RI - Radiated Immunity Chamber

I attest that the data reported herein is true and accurate within the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements were performed in accordance with accepted practices or procedures; and that all tests and measurements were performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client which were not adjusted, modified or altered in any manner whatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance with ISO/IEC 17025.



 Art Voss, P.Eng.
 Technical Manager
 Celltech Labs Inc.

8 November 2020

Date



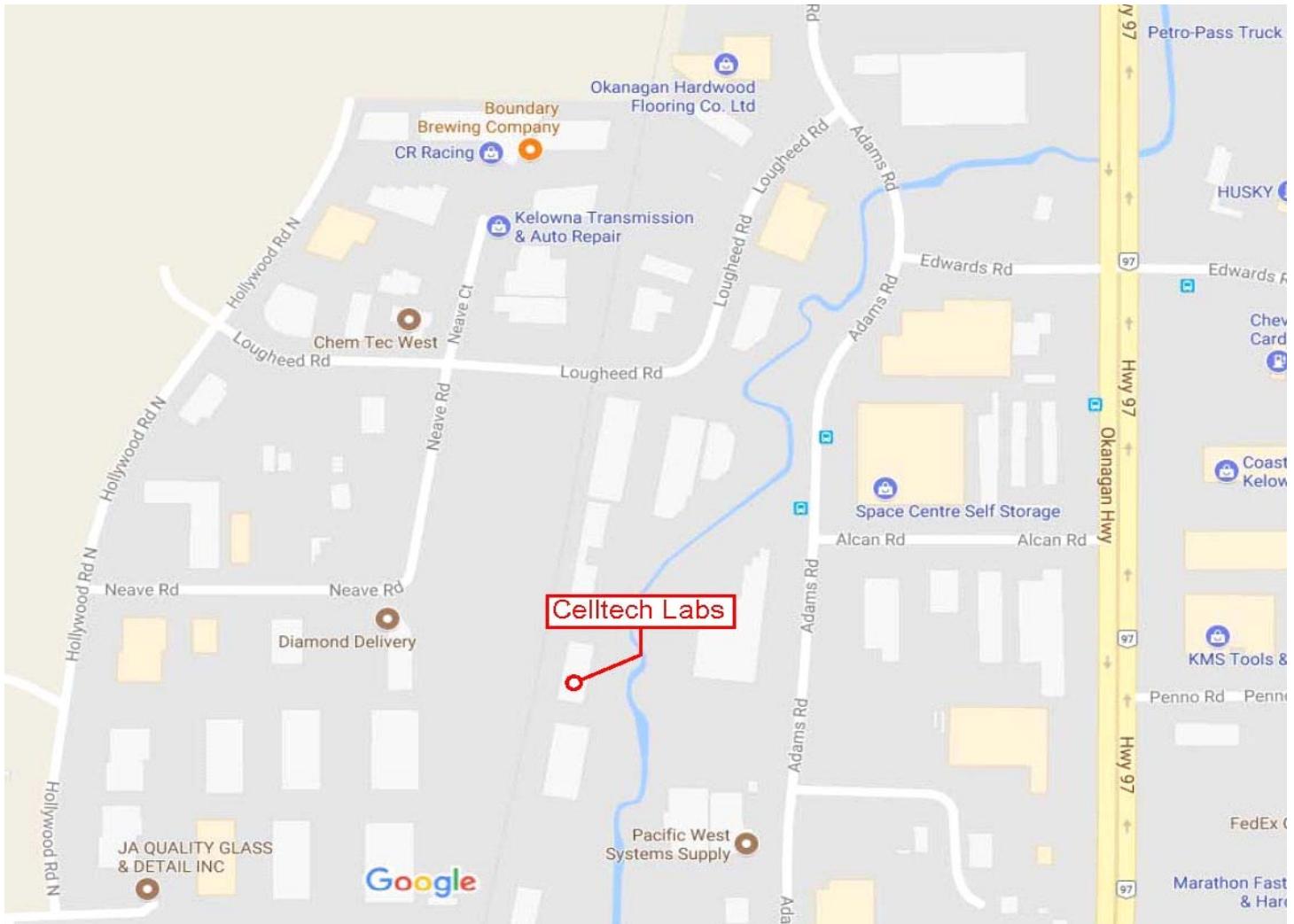
5.0 NORMATIVE REFERENCES

Normative References	
ISO/IEC 17025:2017	General requirements for the competence of testing and calibration laboratories
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
CFR	Code of Federal Regulations Title 47: Telecommunication Part 2: Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
CFR	Code of Federal Regulations Title 47: Telecommunication Part 15: Radio Frequency Devices Sub Part C (15.249) Intentional Radiators
CFR	Code of Federal Regulations Title 47: Telecommunication Part 15: Radio Frequency Devices Subpart B: Unintentional Radiators
ISED	Innovation, Science and Economic Development Canada RSS-Gen Issue 5: Spectrum Management and Telecommunications Radio Standards Specification Amendment 1 (March 2019) General Requirements and Information for the Certification of Radiocommunication Equipment
ISED	Innovation, Science and Economic Development Canada RSS-210 Issue 10: Spectrum Management and Telecommunications Radio Standards Specification Amendment (April 2020) Licence-Exempt Radio Apparatus: Category I Equipment

6.0 FACILITIES AND ACCREDITATIONS

Facility and Accreditation:

The facilities used to evaluate this device outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site (OATS) conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number CA3874A-1 and Industry Canada under Test Site File Number IC 3874A-1. Celltech is accredited to ISO 17025, through accrediting body A2LA and with certificate 2470.01.



7.0 FUNDAMENTAL FIELD STRENGTH

Test Procedure

Normative Reference	FCC 47 CFR §2.1046, §15.249, RSS-210 ANSI C63.10 (11.9.2.2.6)
---------------------	--

Limits

§15.249(a)	Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz. (a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following: 2400-2483.5MHz, Fundamental Field Strength: 50mV/m, Harmonic: 500uV/m
RSS-210 B.10(a)	Bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz and 24-24.25 GHz (a) The field strength of fundamental and harmonic emissions measured at 3 m shall not exceed the limits in table B2. 2400-2483.5MHz, Fundamental Field Strength: 50mV/m, Harmonic: 500uV/m

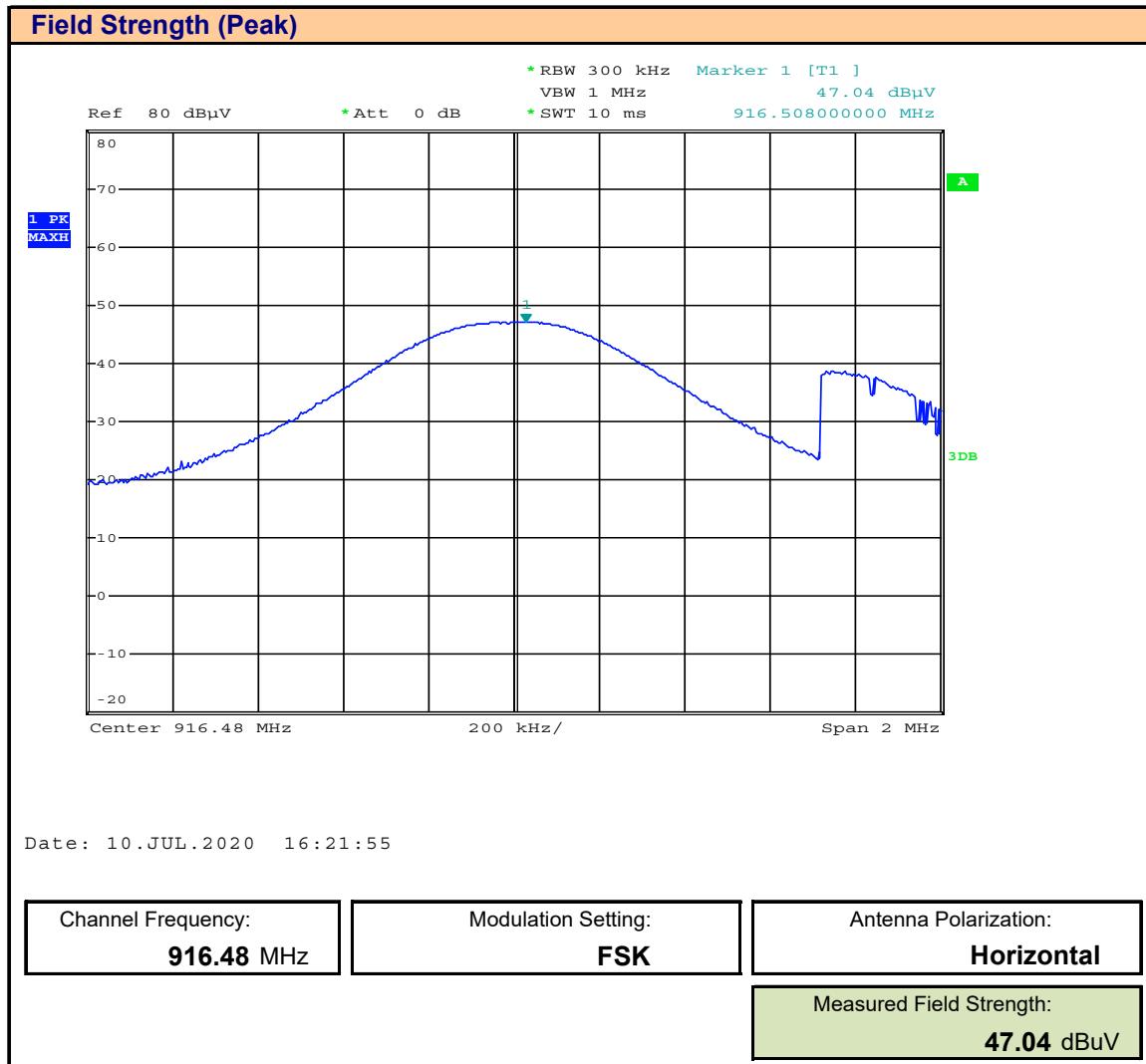
General Procedure

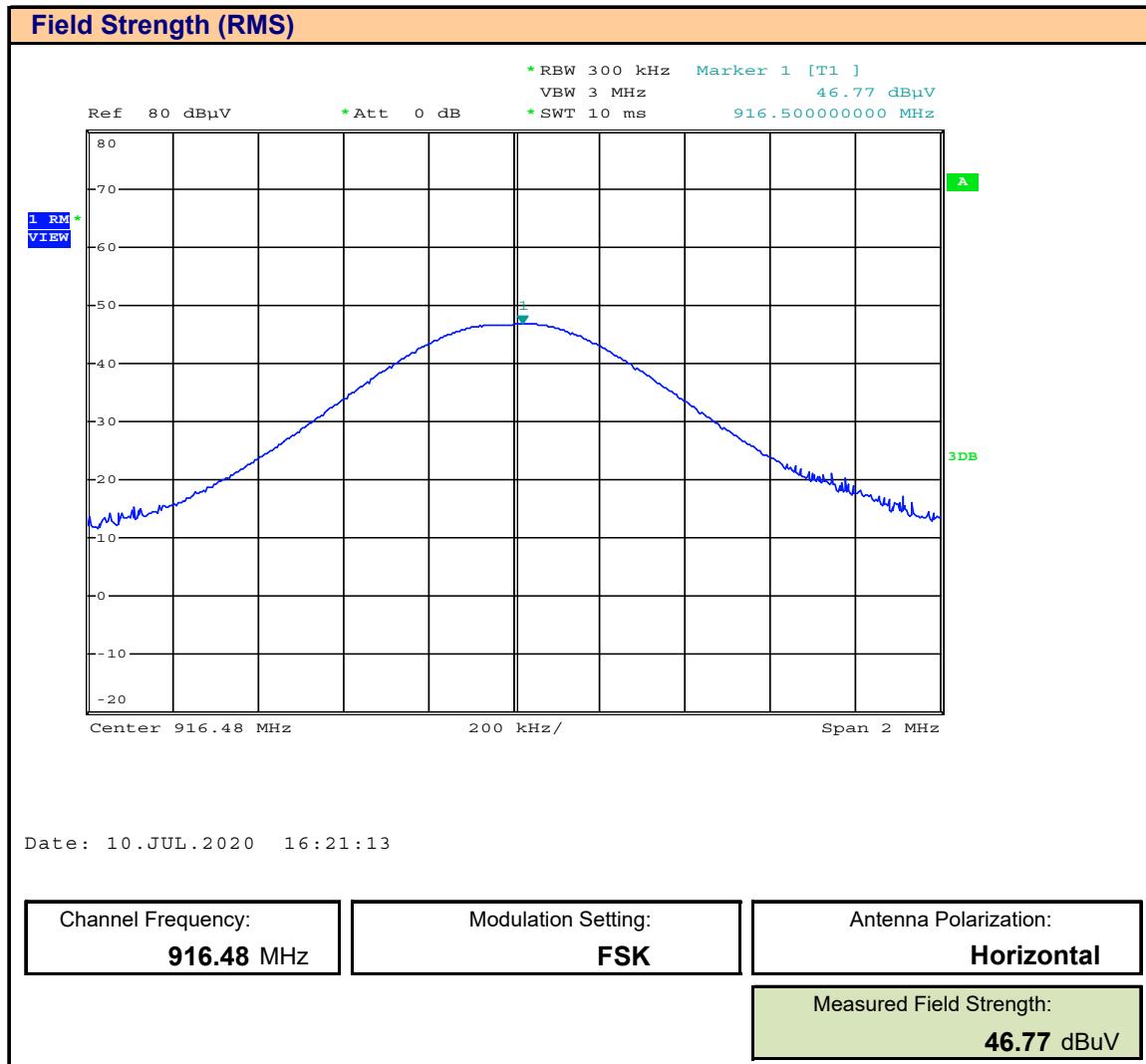
C63.10 (6.5.4)	6.5.4 Final radiated emission tests Using the orientation and equipment arrangement of the EUT, and based on the measurement results found during the exploratory measurement in 6.5.3, the EUT arrangement, appropriate modulation, and modes of operation that produce the emissions that have the highest amplitude relative to the limit shall be selected for the final measurement. The final measurement shall follow all the procedures in 6.3 with the EUT operating on frequencies per 5.6. For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable) and the frequency and amplitude of the six highest spurious emissions relative to the limit; emissions more than 20 dB below the limit do not need to be reported. Measurements are performed with the EUT rotated from 0° to 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Variations in cable or wire placement shall be explored to maximize the measured emissions.
----------------	--

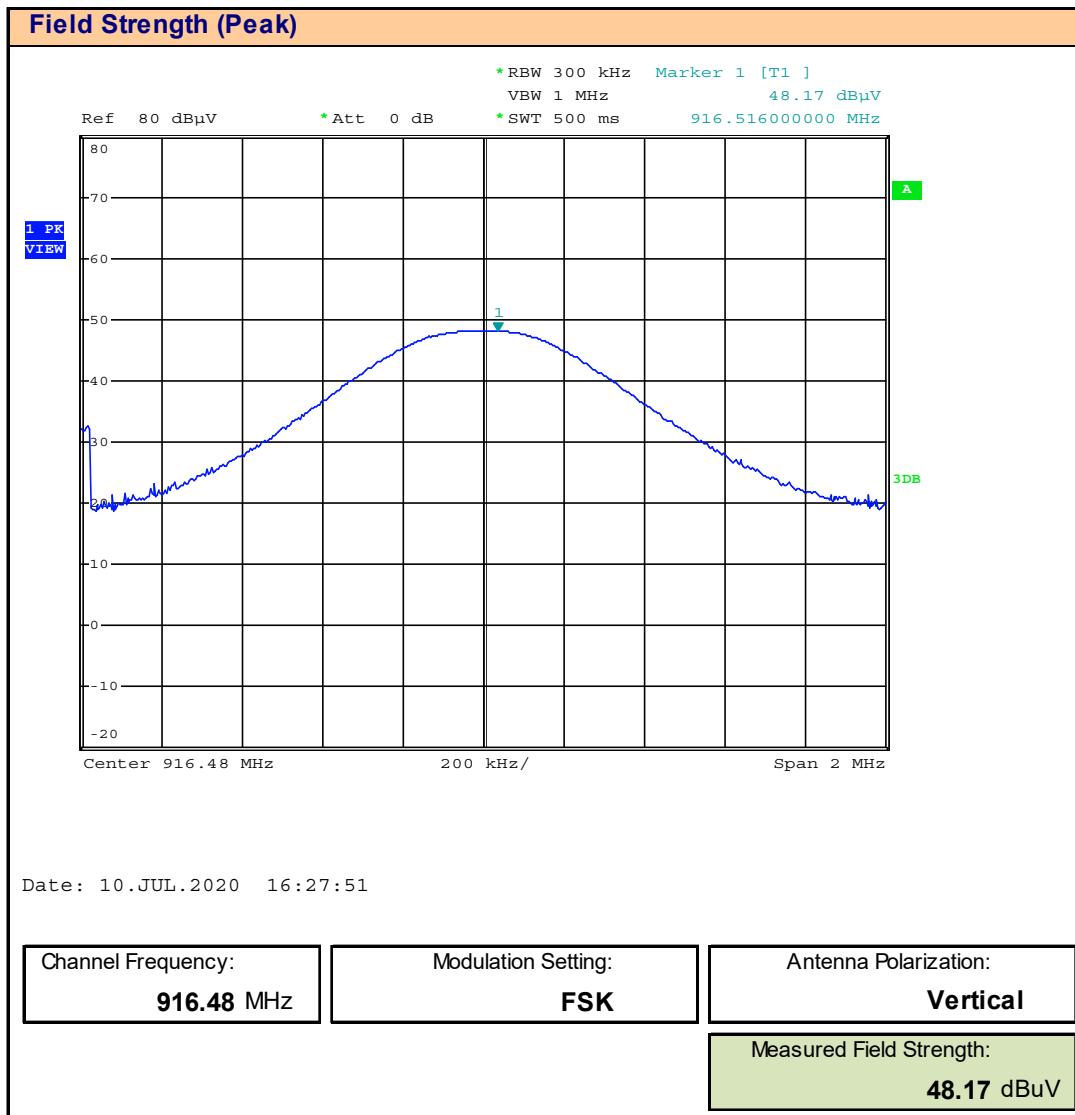
Test Setup	Appendix A	Figure A.2
------------	------------	------------

Measurement Procedure

The DUT place on a 80cm high turntable on an Open Area Test Site (OATS) at a distance of 3m from the measurement antenna. The DUT was set to transmit at maximum power and duty cycle. The DUT was rotated 360 degrees and scanned with the receive antenna elevated from 1 to 4m. The emissions were measured and recorded.

Plot 7.1 – Field Strength, Peak, Horizontal


Plot 7.2 – Field Strength, RMS, Horizontal


Plot 7.3 – Field Strength, Peak, Vertical


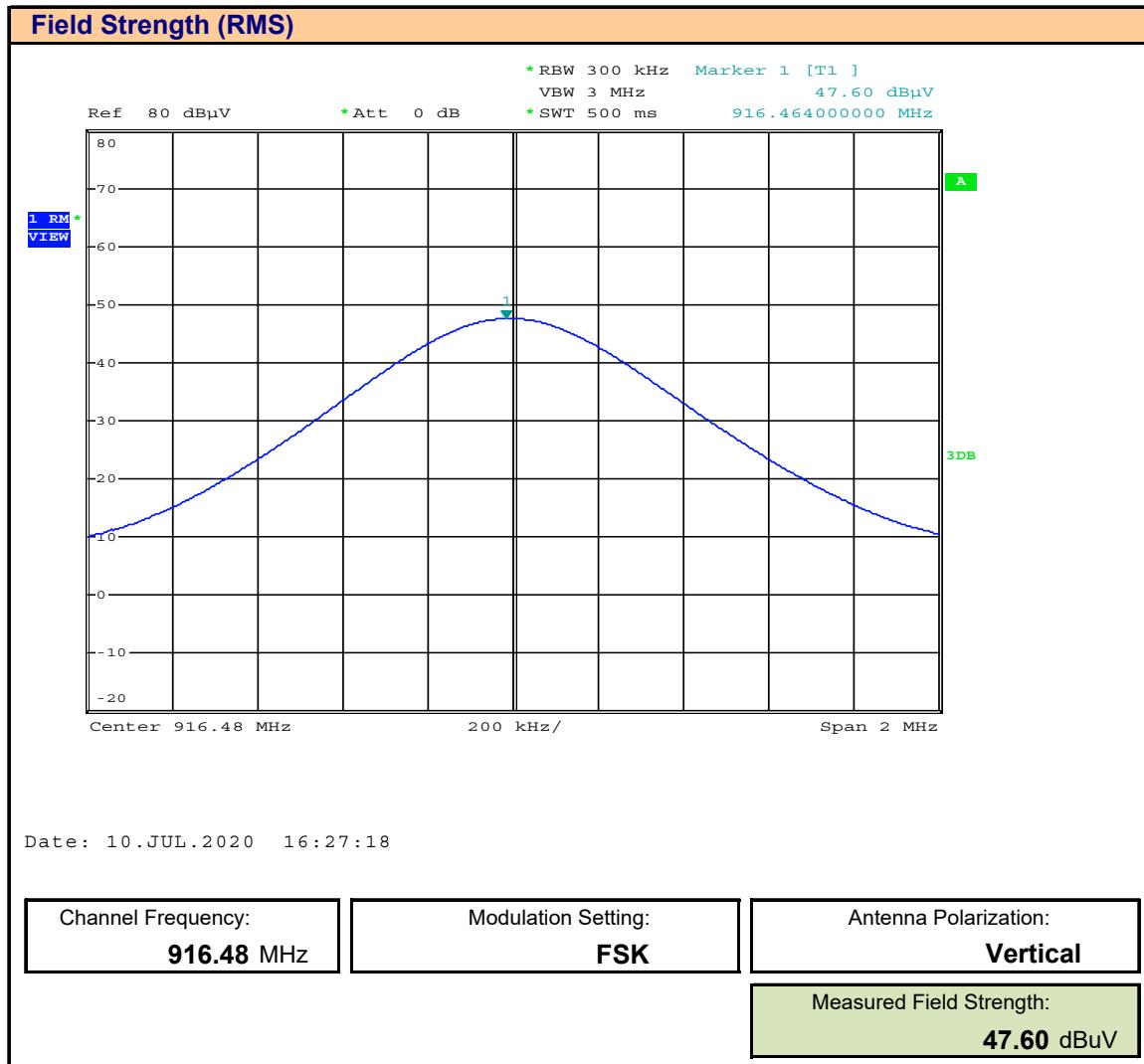
Plot 7.4 – Field Strength, RMS, Vertical


Table 7.1 - Summary of Field Strength Evaluation

FCC §15.249(a), RSS-210 Radiated Field Strength									
Frequency (MHz)	Modulation	Detector	Antenna Polarization	Measured Field Strength [FS _{Meas}] (dBuV @ 3m)	Cable Loss [L _c] (dBm)	Receive Antenna [ACF] (dB)	Corrected Field Strength [FS _{Corr}] (dBuV @3m)	Limit (dBuV)	Margin (dB)
916.48	FSK	Peak	Horizontal	47.04	5.6	29.6	82.24	114.0	31.8
			Vertical	48.17			83.37		30.6
		RMS	Horizontal	46.77			81.97	94.0	12.0
			Vertical	47.60			82.80		11.2
							Result:	Complies	

$$FS_{Corr} = FS_{Meas} + ACF + L_c$$

$$Margin = Limit - FS_{Corr}$$

(1) The output power is factory set to maximum

8.0 OCCUPIED BANDWIDTH

Test Procedure

Normative Reference	FCC 47 CFR §2.1049, RSS-Gen (6.1.2)
	ANSI C63.10 (6.9.3)

General Procedure

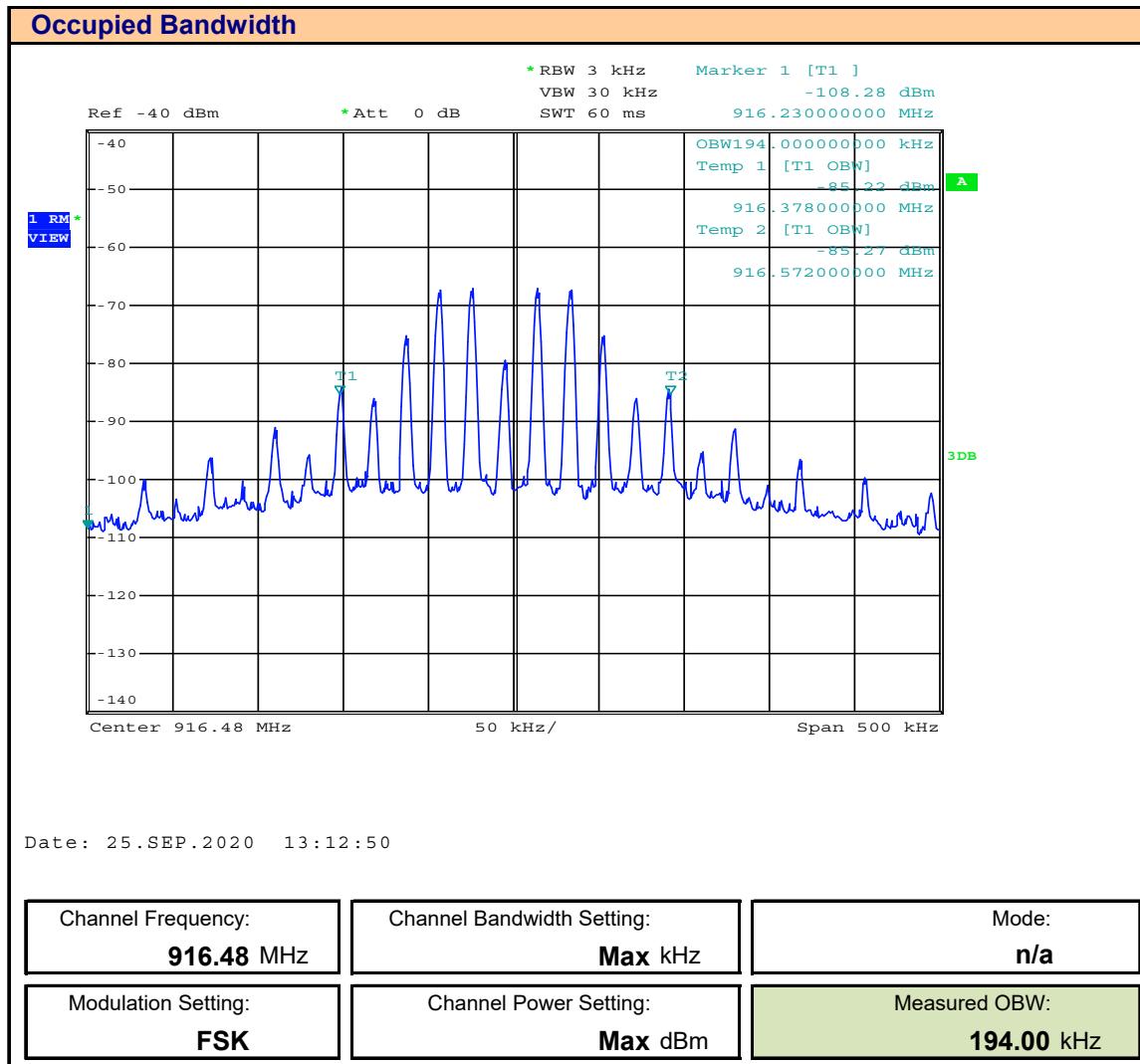
C63.10 (6.9.3)	<p>6.9.3 Occupied bandwidth—power bandwidth (99%) measurement procedure</p> <p>The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:</p> <ul style="list-style-type: none"> a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (\text{OBW}/\text{RBW})]$ below the reference level. Specific guidance is given in 4.1.5.2. d) Step a) through step c) might require iteration to adjust within the specified range. e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used. f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
----------------	---

Test Setup

Appendix A - Figure A.1

Measurement Procedure

The DUT was placed on a turntable on an Open Area Test Site (OATS). The SA was configured as described above using the 99% Occupied Bandwidth function. The output power of the DUT was set to the manufacturer's highest output power setting at the nominal transmit frequency. The 99% Occupied Bandwidth was measured and recorded.

Plot 8.1 – Occupied Bandwidth

Table 8.1 - Summary of Occupied Bandwidth Evaluation

Occupied Bandwidth Measurements				
Frequency (MHz)	Bandwidth Setting (MHz)	Modulation	Measured OBW (kHz)	Emission Designator
916.48	Max	FKS	194	194KF1D

9.0 20DB BANDWIDTH AND BAND EDGE

Test Procedure

Normative Reference	FCC 47 CFR §2.1051, §15.215 ANSI C63.10 (6.10.3)
----------------------------	---

Limits

§15.215(c)	Additional provisions to the general radiated emission limitations. (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.
------------	---

General Procedure

C63.10 (6.3.10)	6.10.3 Unlicensed wireless device operational configuration Set the EUT to operate at 100% duty cycle or equivalent “normal mode of operation.” ⁵⁴ Testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band. ⁵⁵ Testing shall be performed for each frequency with every applicable unlicensed wireless device configuration. If more than one power output level is available, then testing shall be done with the appropriate maximum power output for each antenna combination or modulation, as recorded in the unlicensed wireless device conducted power measurement results. The highest gain of each antenna type shall be used for this test.
-----------------	--

⁵⁴ For unlicensed wireless devices unable to be configured for 100% duty cycle even in test mode, configure the system for the longest duration duty cycle supported.

⁵⁵ Some radios operating, for example, in the 2.4 GHz band, have hardware capability to operate at frequencies outside the band permitted by the regulatory authority. Testing shall only be done at the lowest and highest frequencies within the allowed frequency band (see Annex A for examples of regulatory requirements and frequency ranges).

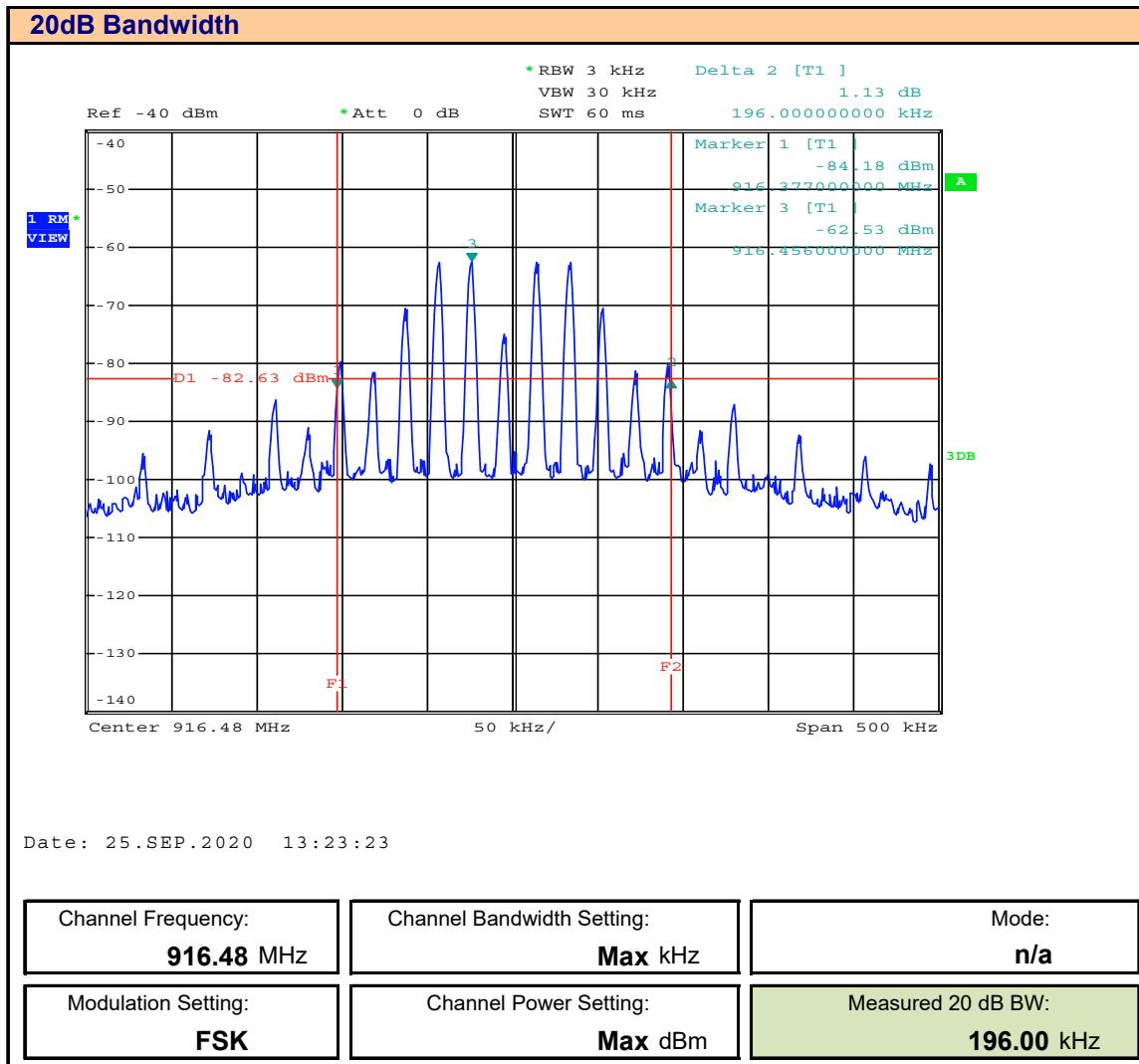
Test Setup

Appendix A

Figure A.1

Measurement Procedure

The DUT was placed on a turntable on an Open Area Test Site (OATS). The SA was configured as described above using the 20dB Bandwidth function. The output power of the DUT was set to the manufacturer's highest output power setting at the nominal transmit frequency. The 20dB Bandwidth was measured and recorded.

Plot 9.1 – 20dB Bandwidth


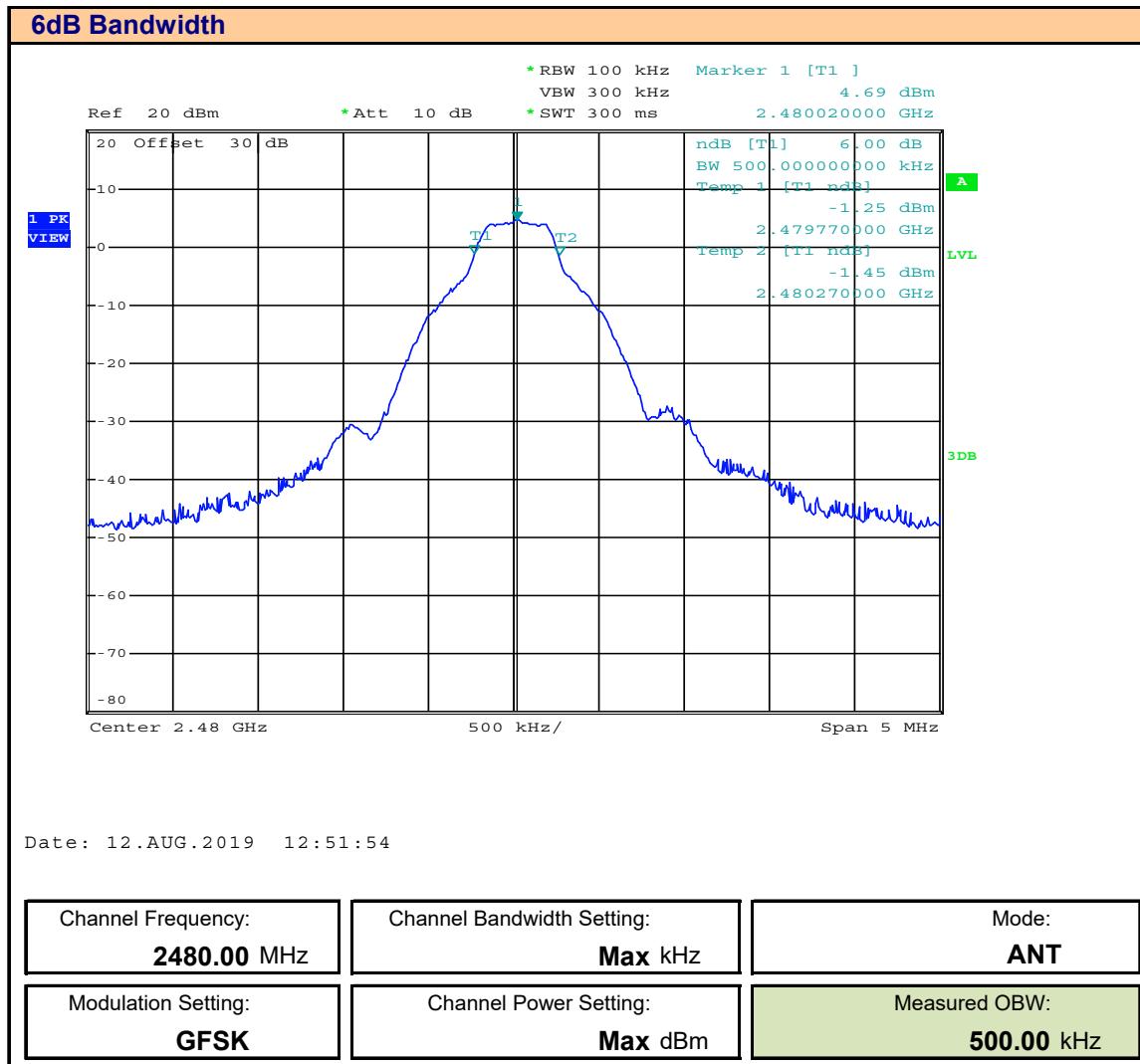
Plot 9.2 – Band Edge


Table 9.1 - Summary of 20dB Bandwidth and Band Edge Evaluation

20dB Bandwidth Measurements			
Frequency (MHz)	Bandwidth Setting (MHz)	Modulation	Measured 20dB BW (kHz)
916.48	Max	FSK	196

20dB BW Band Edge						
Frequency (MHz)	Bandwidth Setting (MHz)	Modulation	Fundamental Emission (dBm)	Band Edge Emission (dBm)	Limit [Limit] (dBm)	Margin Emission (dB)
916.48	Max	FSK	-55.9	-95.2	-75.9	19.3

Limit = Fundamental Emission - 20dB

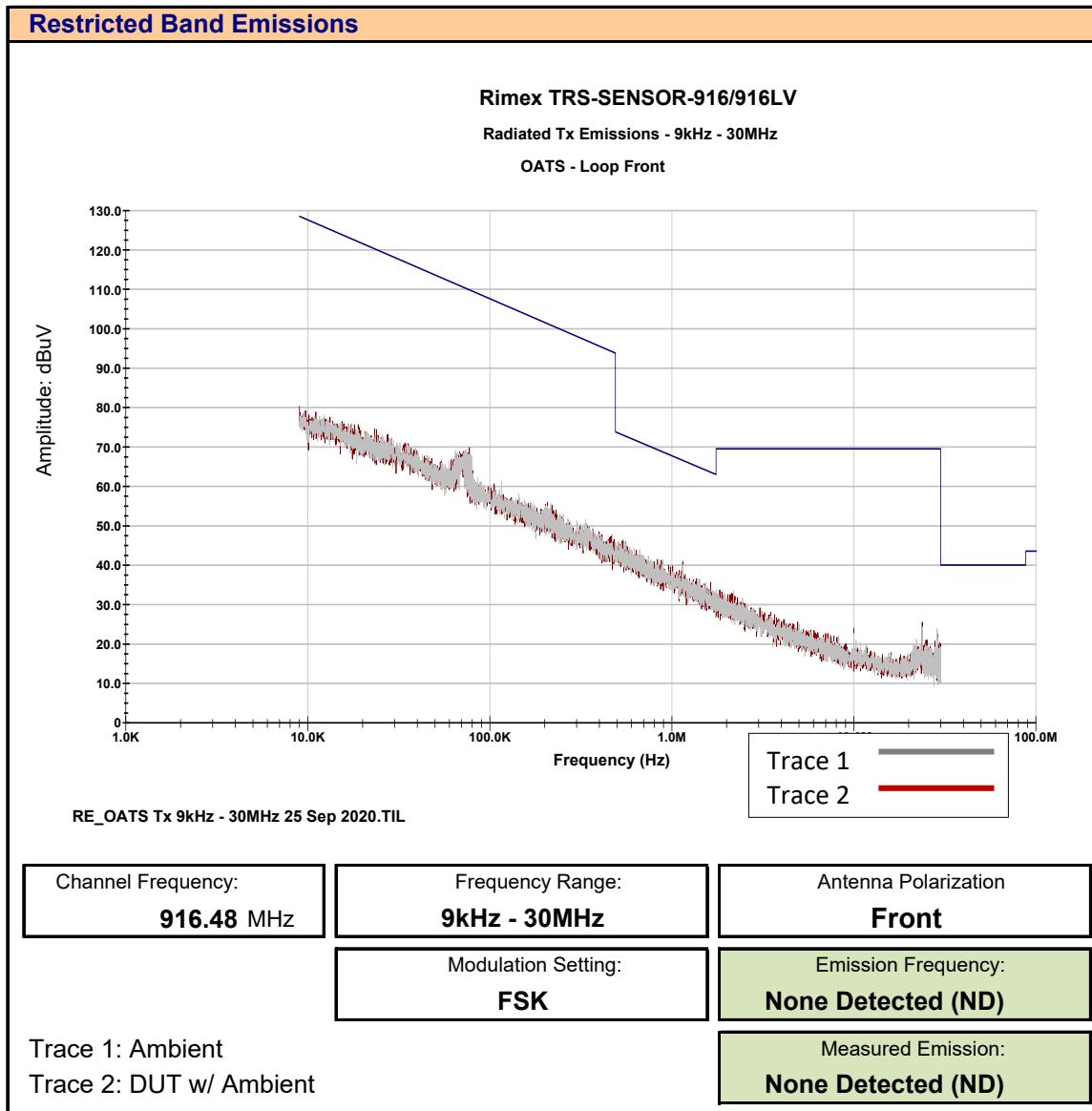
Margin = Limit - Band Edge Emission

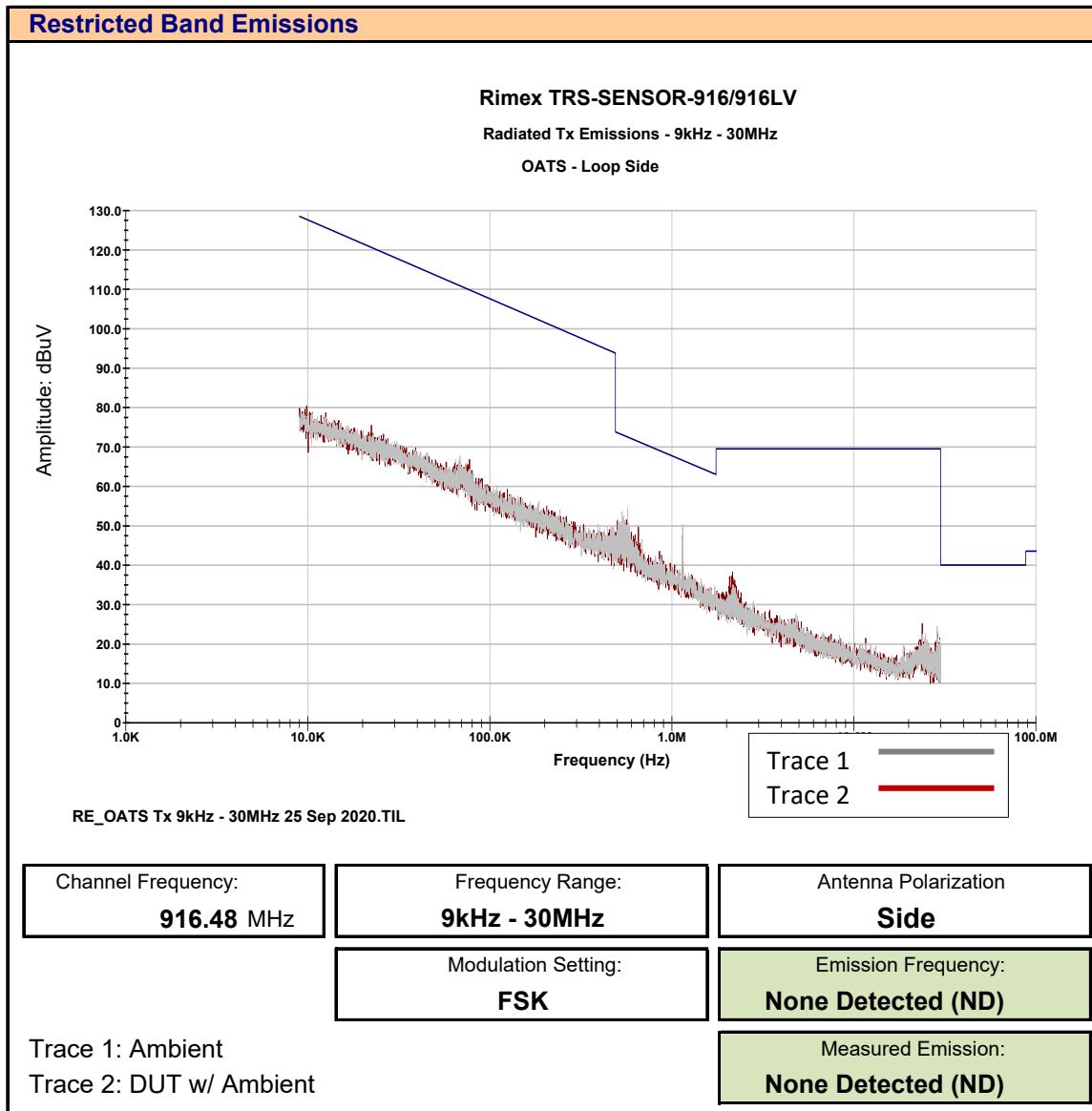
10.0 RESTRICTED BAND
Test Procedure

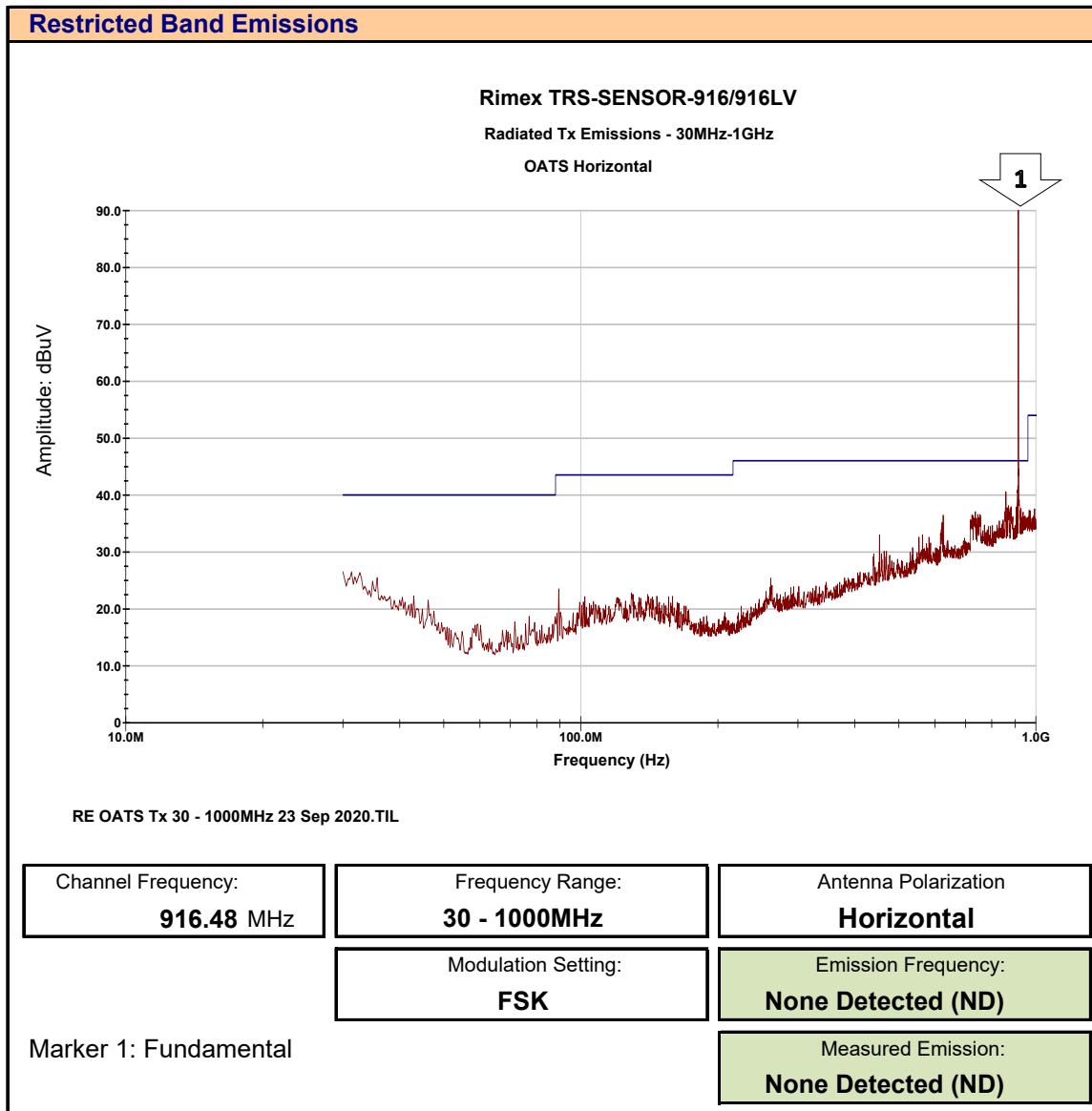
Normative Reference	FCC 47 CFR §2.1051, §15.249(d), §15.209(a), RSS-GEN (8.10) ANSI C63.10 (11.12)
----------------------------	---

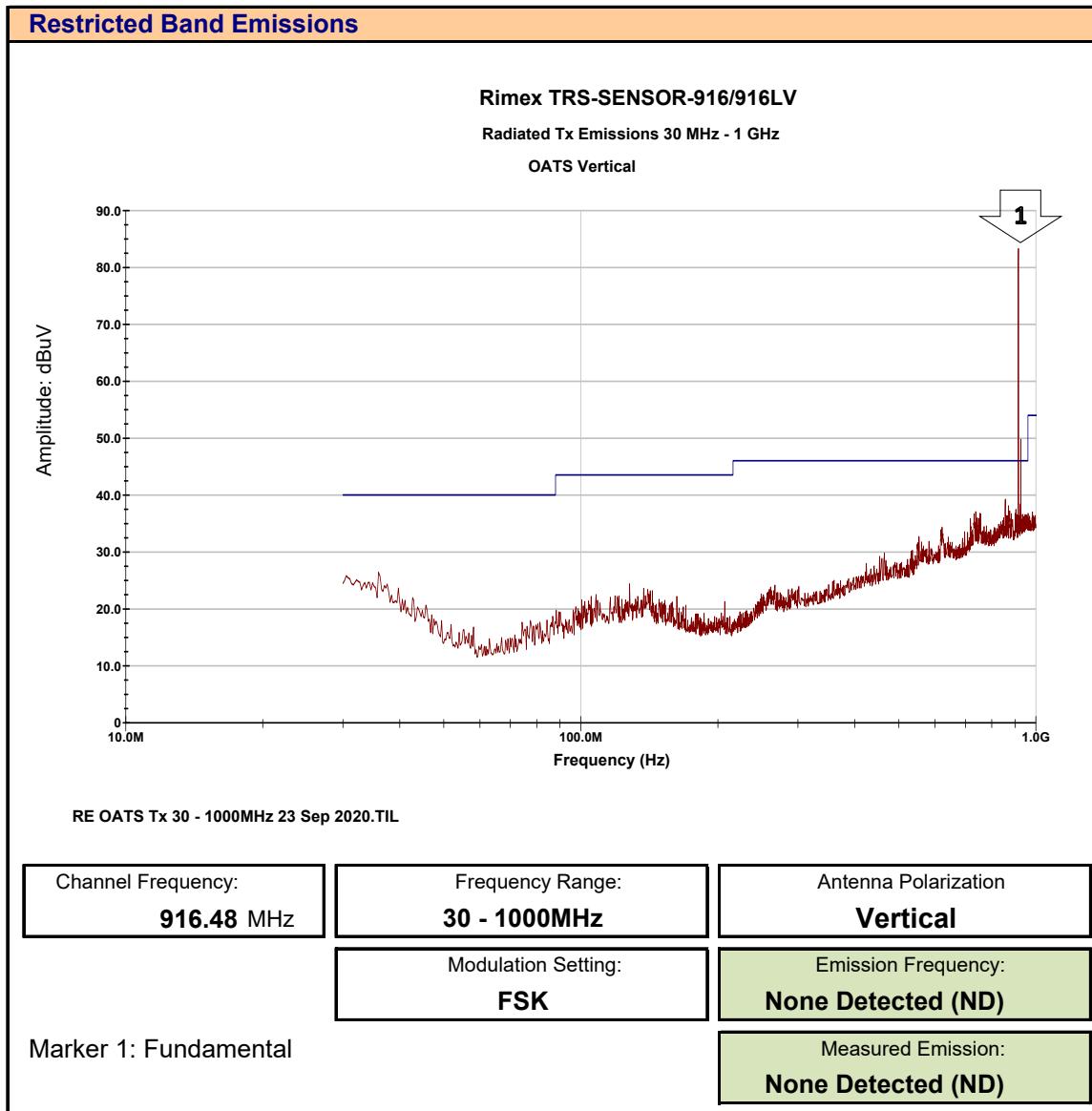
Limits

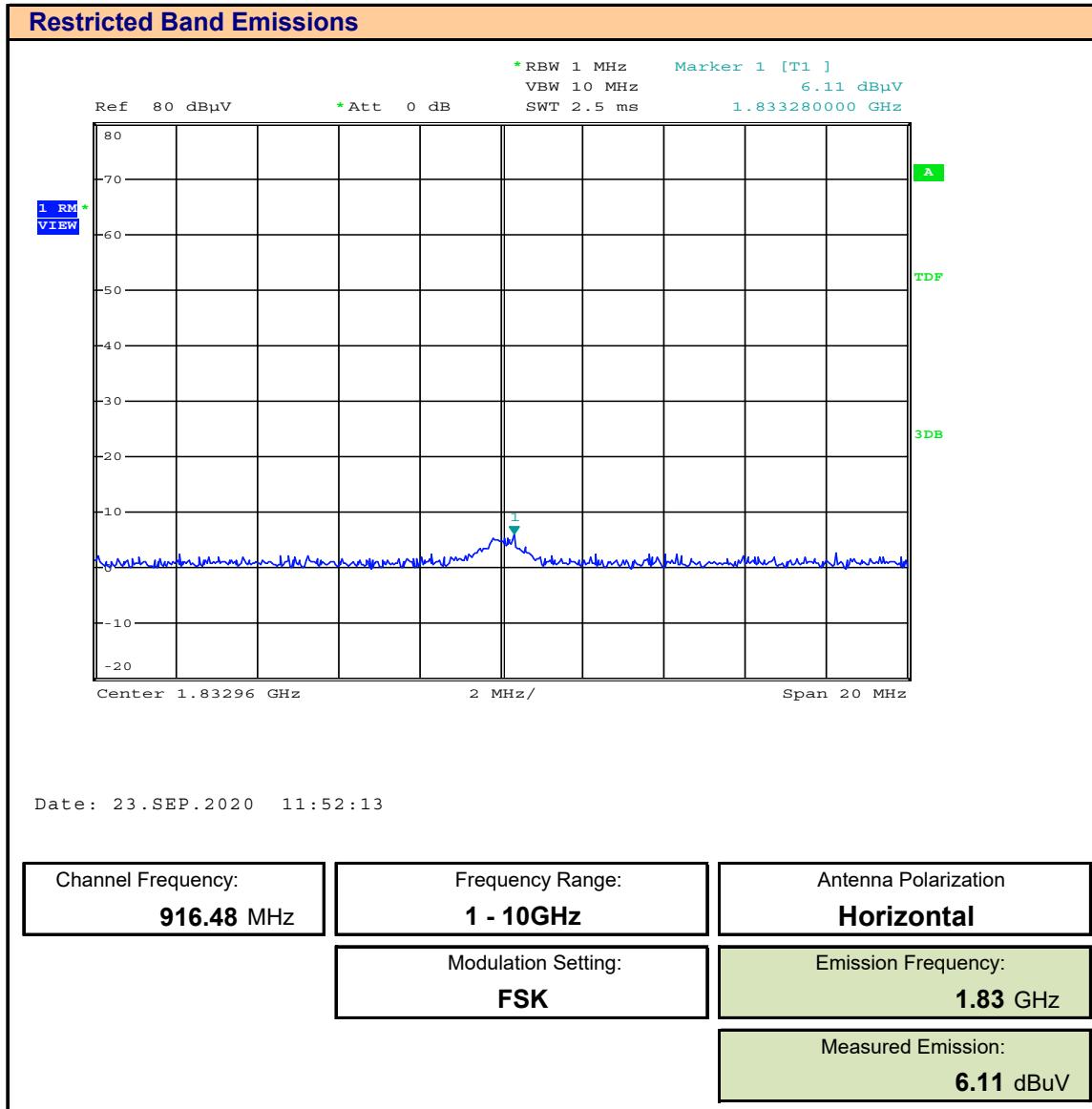
47 CFR §15.249(d)	(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.																
47 CFR §15.209(a)	<p>§15.209 Radiated emission limits; general requirements.</p> <p>(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:</p> <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>Field Strength (microvolts/meter)</th> </tr> </thead> <tbody> <tr> <td>0.009 - 0.490</td> <td>2400/F (kHz) @300m</td> </tr> <tr> <td>0.490 - 1.705</td> <td>24000/F (kHz) @30m</td> </tr> <tr> <td>1.705 - 30</td> <td>30 @ 30m</td> </tr> <tr> <td>30 - 88</td> <td>100 @3m</td> </tr> <tr> <td>88 - 216</td> <td>150 @3m</td> </tr> <tr> <td>216 - 960</td> <td>200 @3m</td> </tr> <tr> <td>Above 960</td> <td>500 @3m</td> </tr> </tbody> </table>	Frequency (MHz)	Field Strength (microvolts/meter)	0.009 - 0.490	2400/F (kHz) @300m	0.490 - 1.705	24000/F (kHz) @30m	1.705 - 30	30 @ 30m	30 - 88	100 @3m	88 - 216	150 @3m	216 - 960	200 @3m	Above 960	500 @3m
Frequency (MHz)	Field Strength (microvolts/meter)																
0.009 - 0.490	2400/F (kHz) @300m																
0.490 - 1.705	24000/F (kHz) @30m																
1.705 - 30	30 @ 30m																
30 - 88	100 @3m																
88 - 216	150 @3m																
216 - 960	200 @3m																
Above 960	500 @3m																

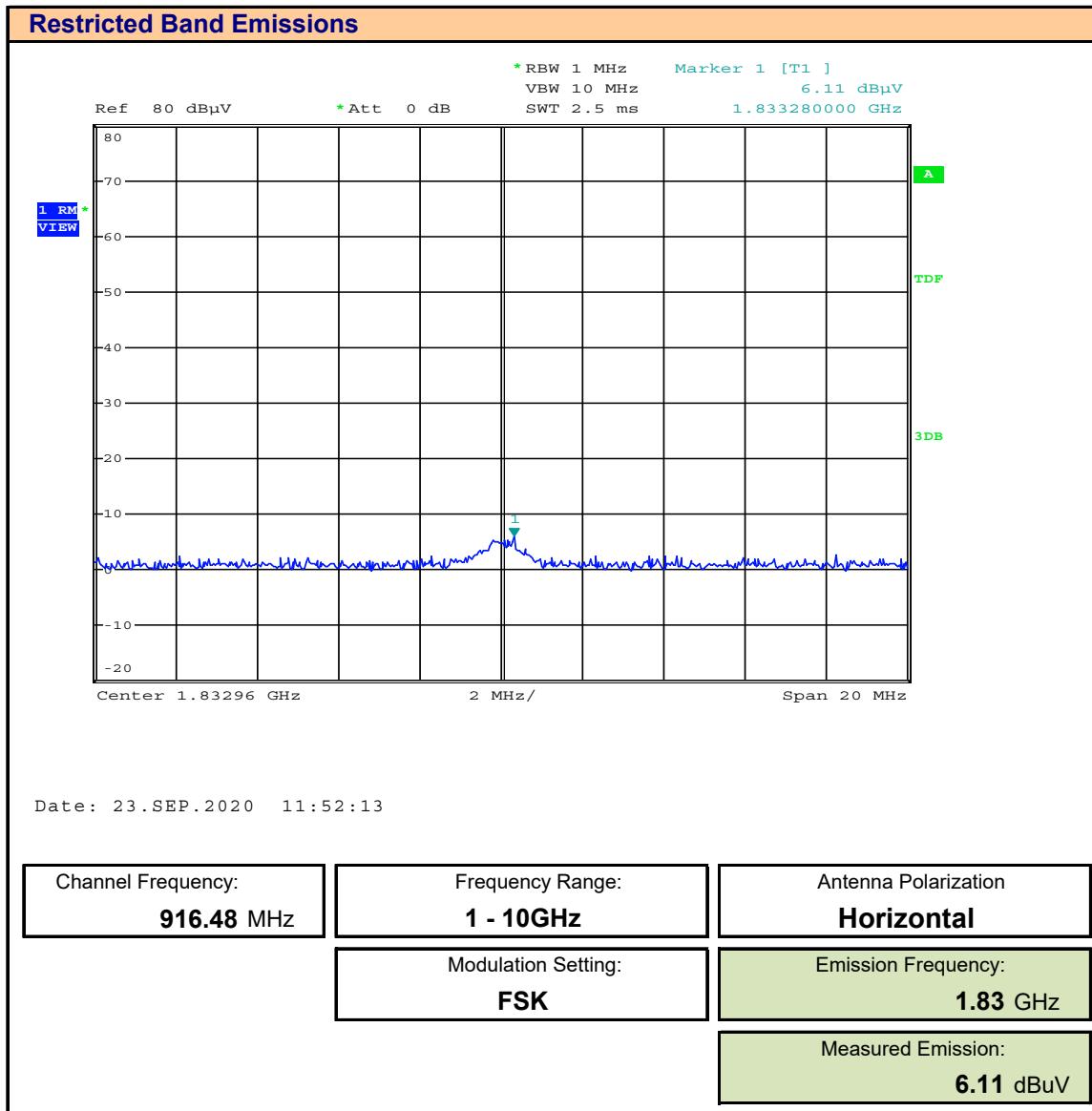
Plot 10.1 – Restricted Band, 9kHz – 30MHz, Front


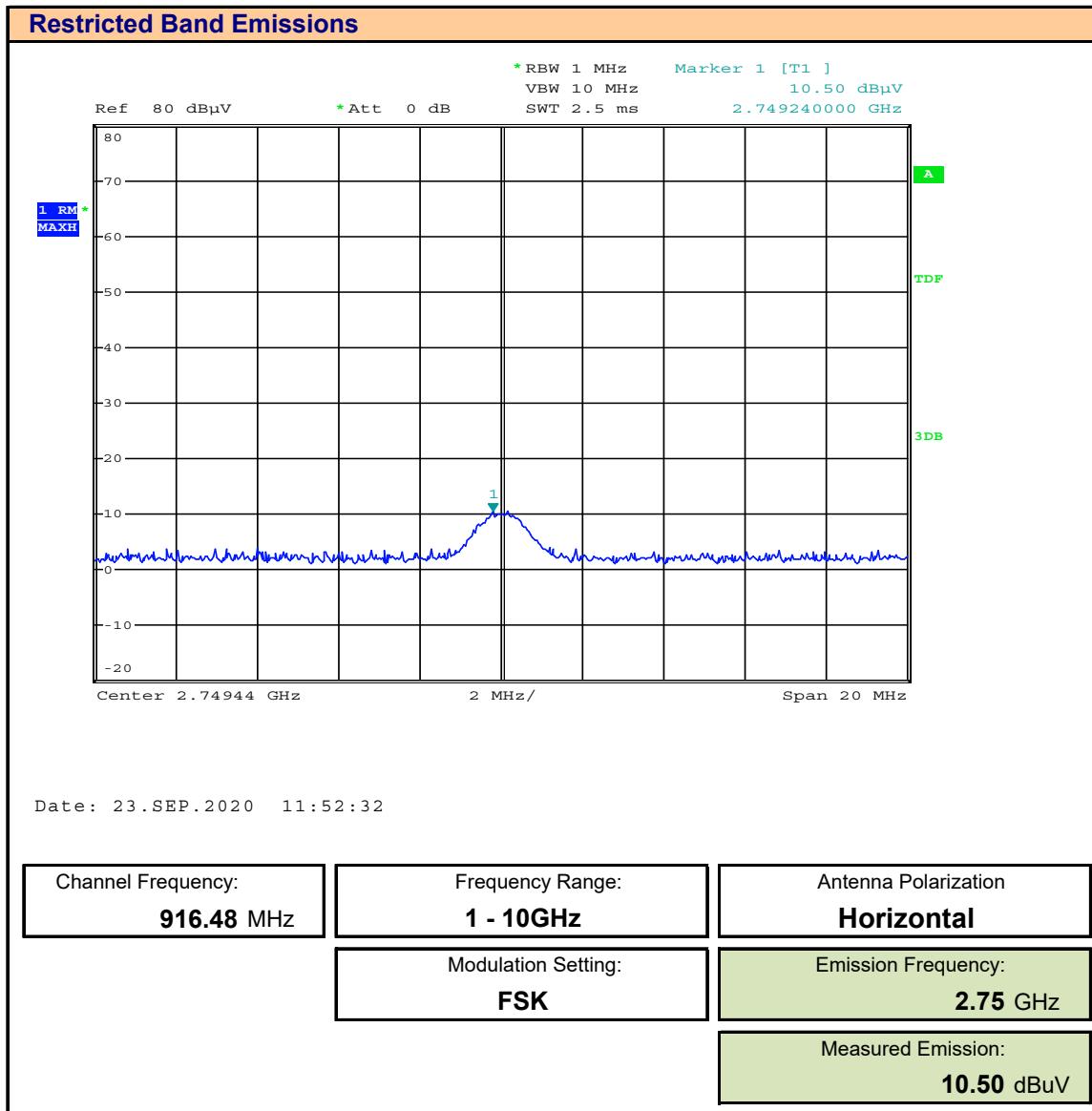
Plot 10.2 – Restricted Band, 9kHz – 30MHz, Side


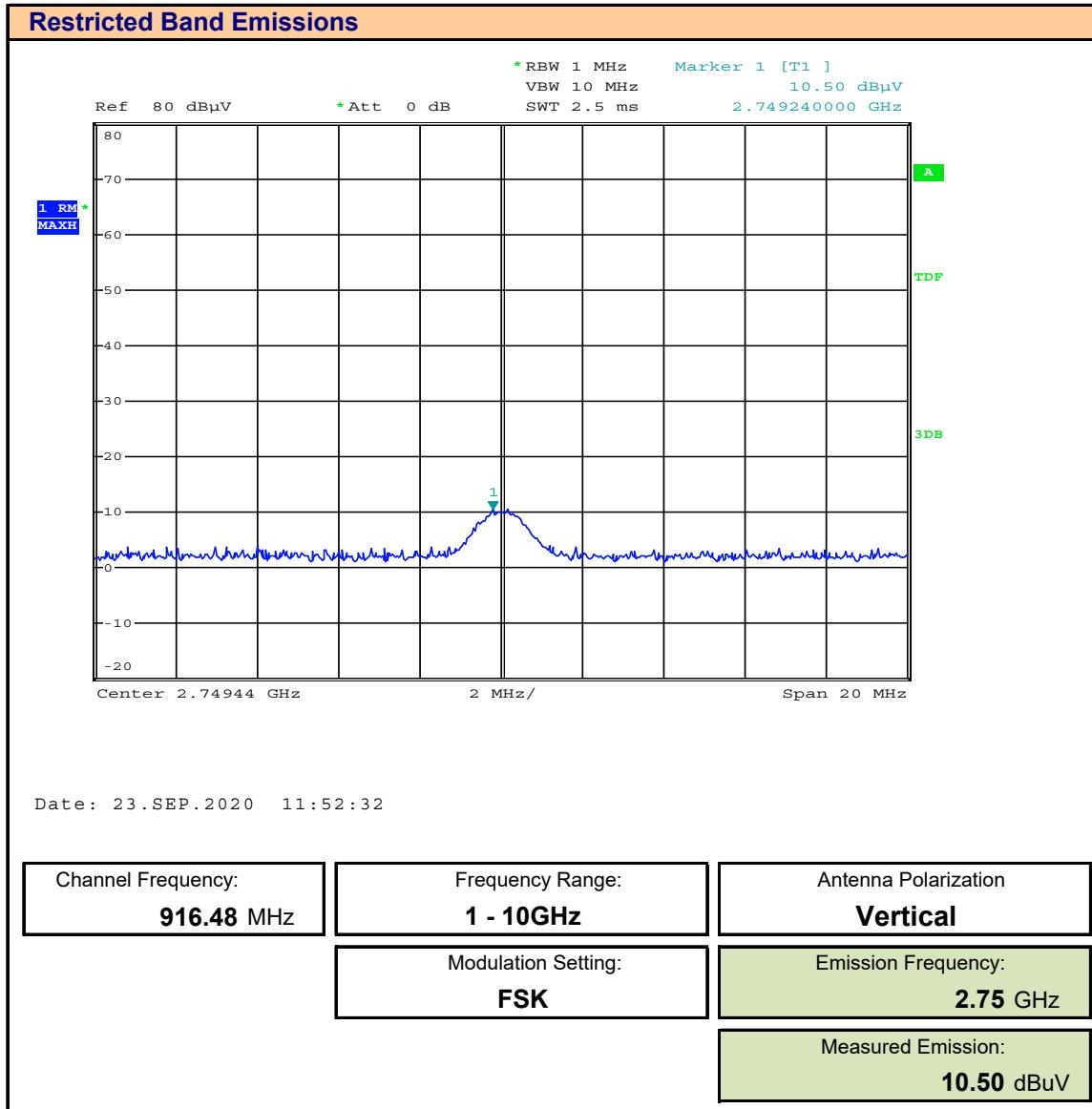
Plot 10.3 – Restricted Band, 30 - 1000MHz, Horizontal


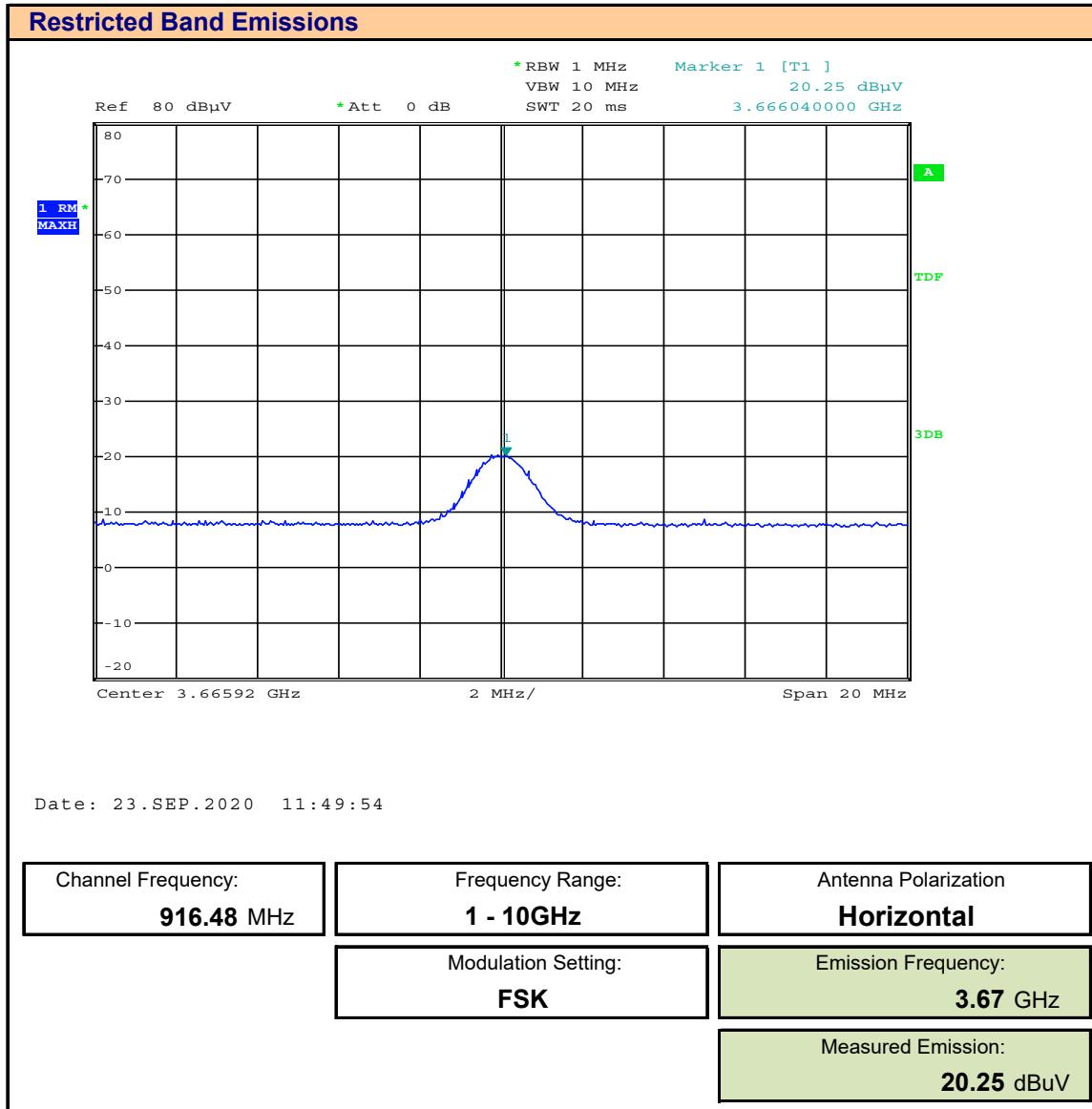
Plot 10.4 – Restricted Band, 30 - 1000MHz, Vertical


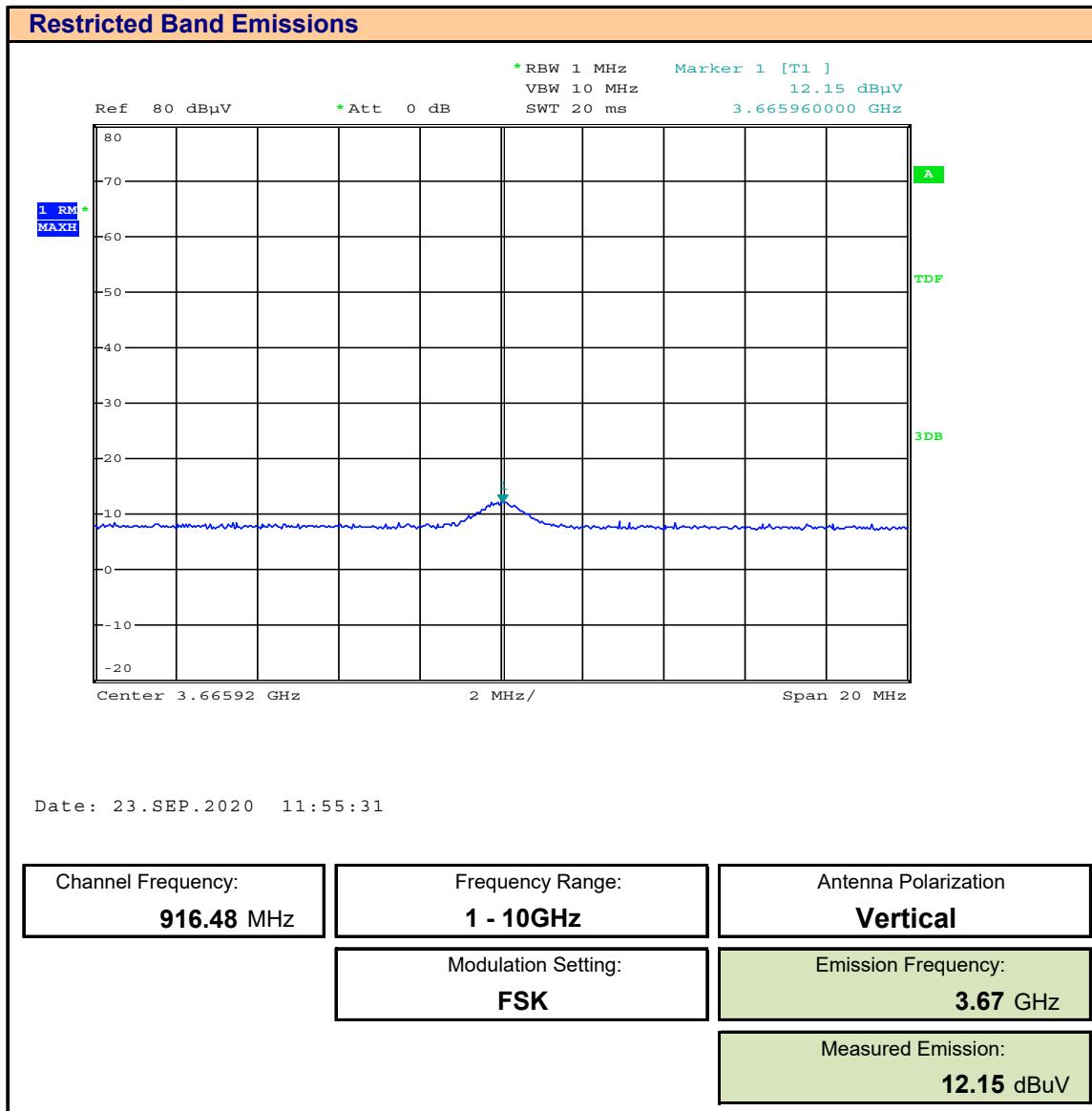
Plot 10.5 – Restricted Band, 2nd Harmonic, Horizontal


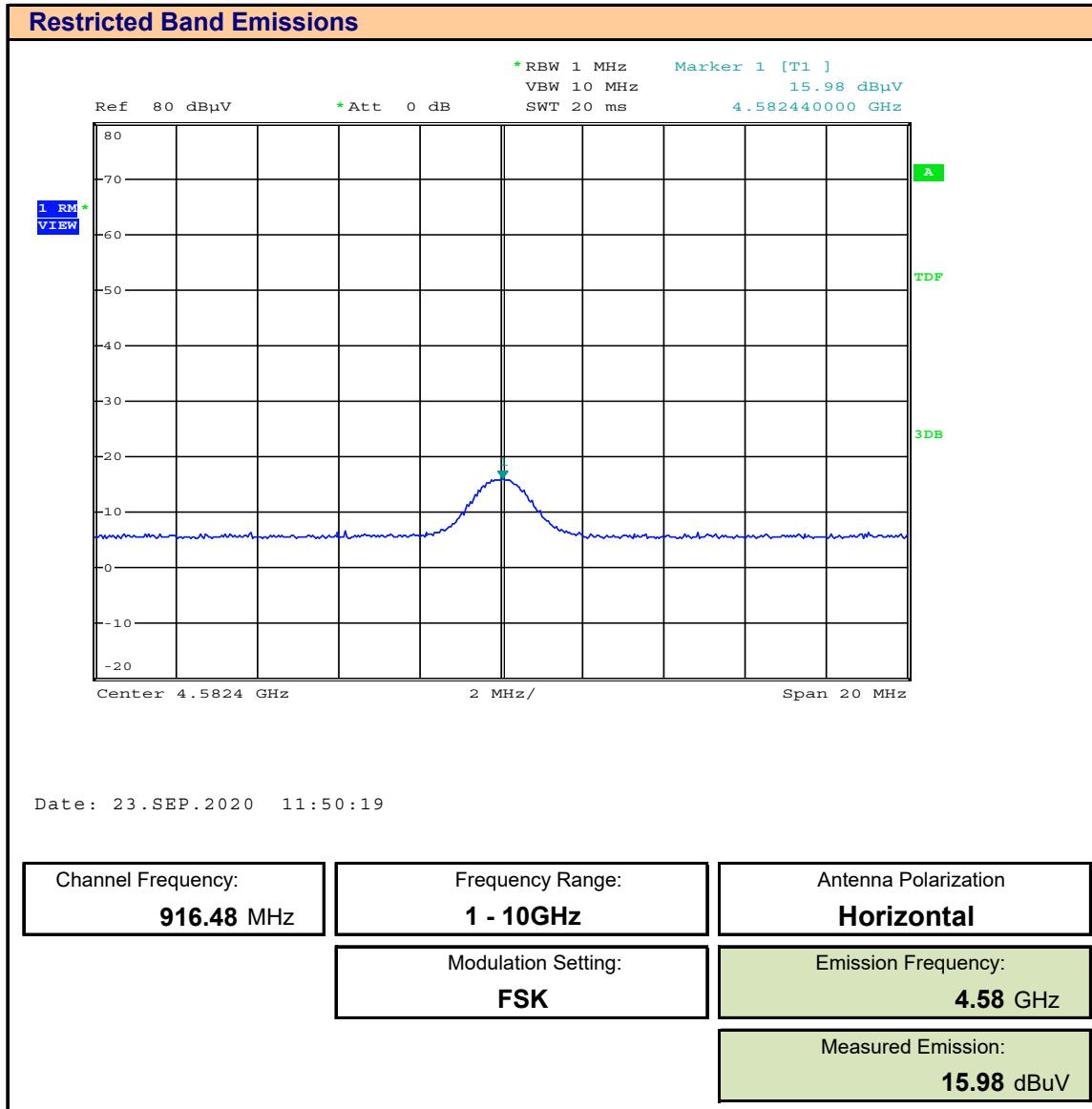
Plot 10.6 – Restricted Band, 2nd Harmonic, Vertical


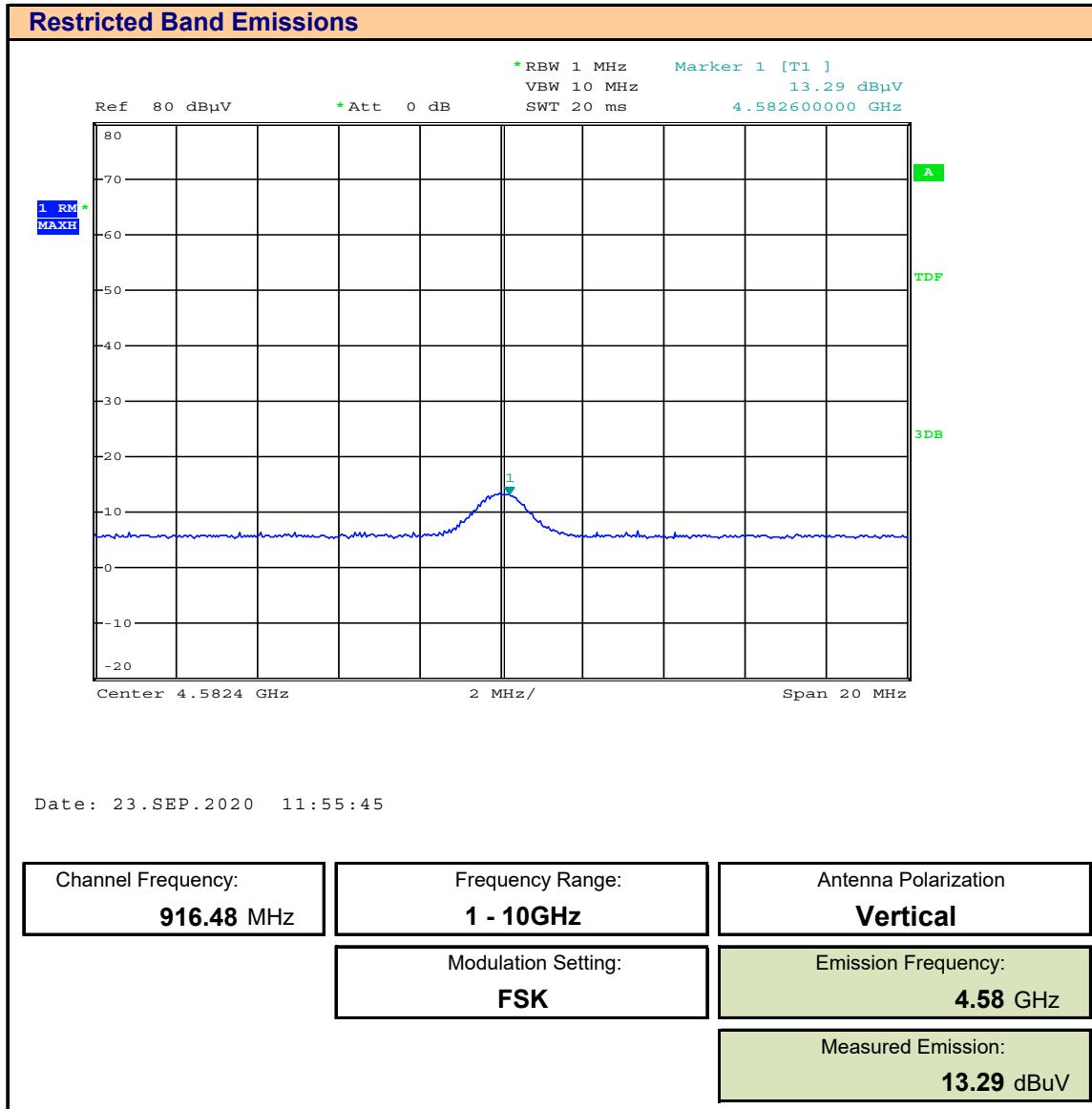
Plot 10.7 – Restricted Band, 3rd Harmonic, Horizontal


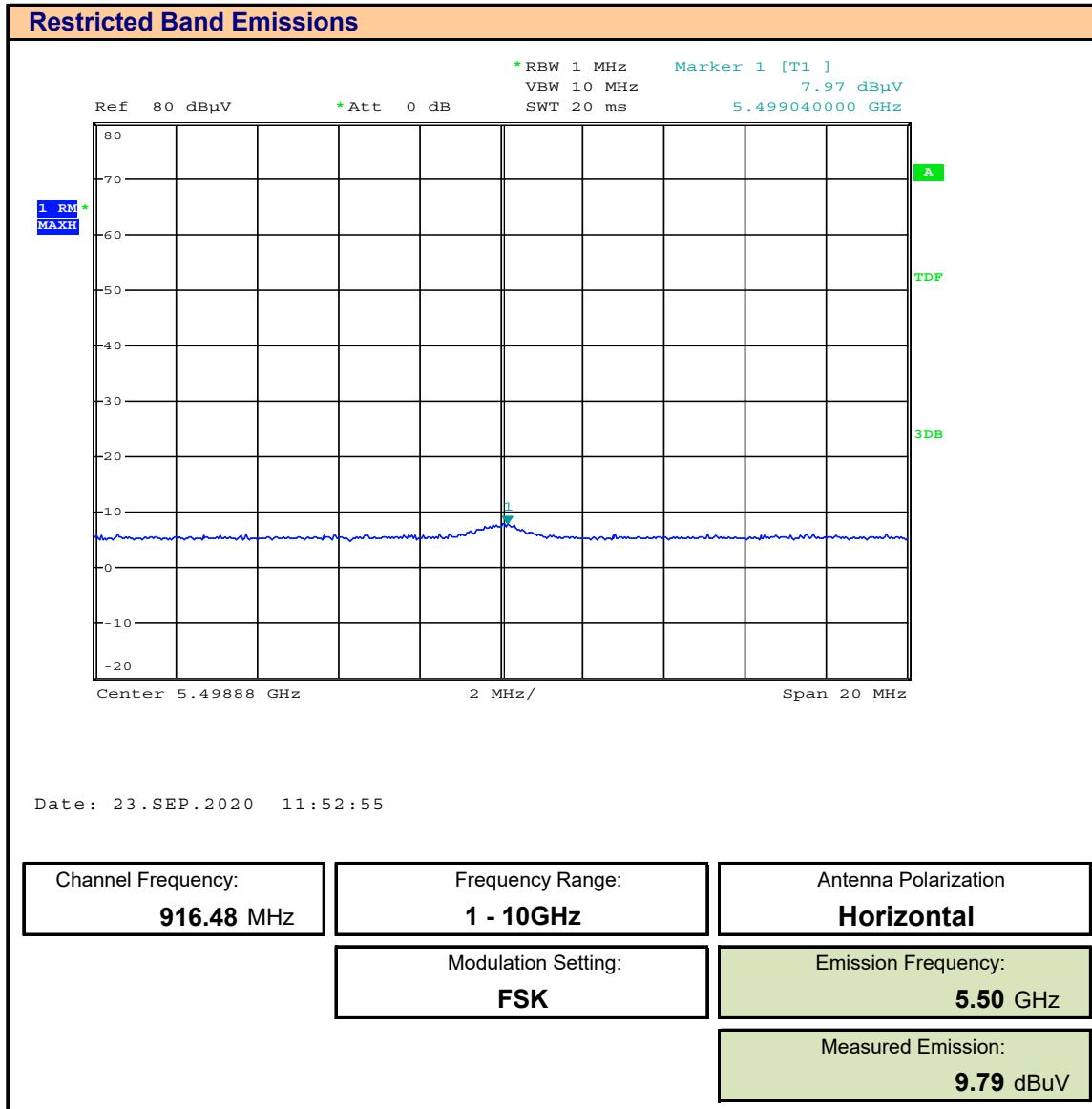
Plot 10.8 – Restricted Band, 3rd Harmonic, Vertical


Plot 10.9 – Restricted Band, 4th Harmonic, Horizontal


Plot 10.10 – Restricted Band, 4th Harmonic, Vertical


Plot 10.11 – Restricted Band, 5th Harmonic, Horizontal


Plot 10.12 – Restricted Band, 5th Harmonic, Vertical


Plot 10.13 – Restricted Band, 6th Harmonic, Horizontal


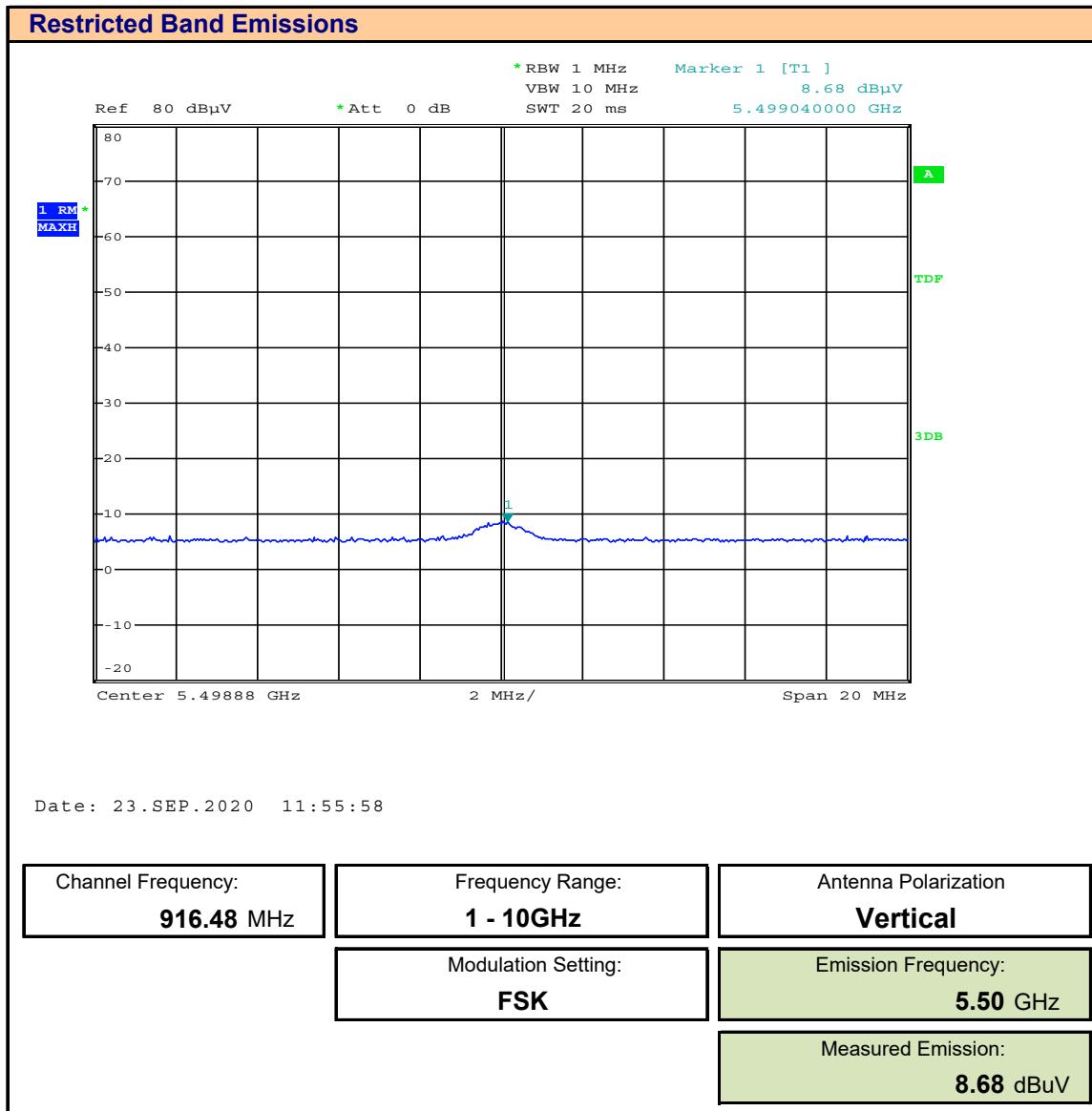
Plot 10.14 – Restricted Band, 6th Harmonic, Vertical


Table 10.1 - Summary of Restricted Band Evaluation

Measurement Results									
Frequency Range	Modulation	Antenna	Emission Frequency	Measured Emission [E _{Meas}] (dBm)	Rec'v Antenna Gain [G _R] (dBi)	Cable Loss [L _C] (dB)	Field Strength [E] (dBuV/m @ 3m)	Worst Case Limit [A _L] (dBuV @ 3m)	Margin (dB)
9kHz - 30MHz	FSK	Horizontal	Front	ND	ND	-	ND	n/a	n/a
30-1000MHz				ND	ND	-	ND	n/a	n/a
			1.83GHz	6.11	26.73	1.00	33.84	54.0	20.16
			2.75GHz	10.50	28.75	1.28	40.53		13.47
1 - 10GHz			3.67GHz	20.25	31.45	1.62	53.32		0.68
			4.58GHz	15.98	32.20	2.51	50.69		3.31
			5.5GHz	9.79	34.00	3.68	47.47		6.53
9kHz - 30MHz		Vertical	Side	ND	ND	-	ND	n/a	n/a
30-1000MHz				ND	ND	-	ND	n/a	n/a
			1.83GHz	9.93	26.73	1.00	37.66	54.0	16.34
			2.75GHz	10.50	28.75	1.28	40.53		13.47
1 - 10GHz			3.67GHz	12.15	31.45	1.62	45.22		8.78
			4.58GHz	13.29	32.20	2.51	48.00		6.00
			5.5GHz	8.68	34.00	3.68	46.36		7.64
Results:								Complies	

 Field Strength [E] = [E_{MEAS}] + [G_R] + [L_C]

 Margin = [A_L] - [E]

APPENDIX A – TEST SETUP DRAWINGS AND EQUIPMENT
Table A.1 – Setup - Radiated Emissions Equipment

Equipment List				
Asset Number	Manufacturer	Model Number	Serial Number	Description
00050	Chase	CBL-6111A	1607	Bilog Antenna
00034	ETS	3115	6267	Double Ridged Guide Horn
00035	ETS	3115	6276	Double Ridged Guide Horn
00085	EMCO	6502	9203-2724	Loop Antenna
00333	HP	85685A	3010A01095	RF Preselector
00049	HP	85650A	2043A00162	Quasi-peak Adapter
00051	HP	8566B	2747A05510	Spectrum Analyzer
00241	R&S	FSU40	100500	Spectrum Analyzer
00005	HP	8648D	3847A00611	Signal Generator
00265	Miteq	JS32-00104000-58-5P	1939850	Microwave L/N Amplifier
00071	EMCO	2090	9912-1484	Multi-Device Controller
00072	EMCO	2075	0001-2277	Mini-mast
00073	EMCO	2080	0002-1002	Turn Table
00234	WWR	61161-378	140320430	Temp/Humidity Meter
00263B	Koaxis	KP10-1.00M-TD	263B	1m Armoured Cable
00264	Koaxis	KP10-7.00M-TD	264	7m Armoured Cable
00275	TMS	LMR400	n/a	25m Cable
00276	TMS	LMR400	n/a	4m Cable
00277	TMS	LMR400	n/a	4m Cable
00278	TILE	34G3	n/a	TILE Test Software

Figure A.1 – Test Setup Radiated Emissions Measurements 9kHz – 30MHz

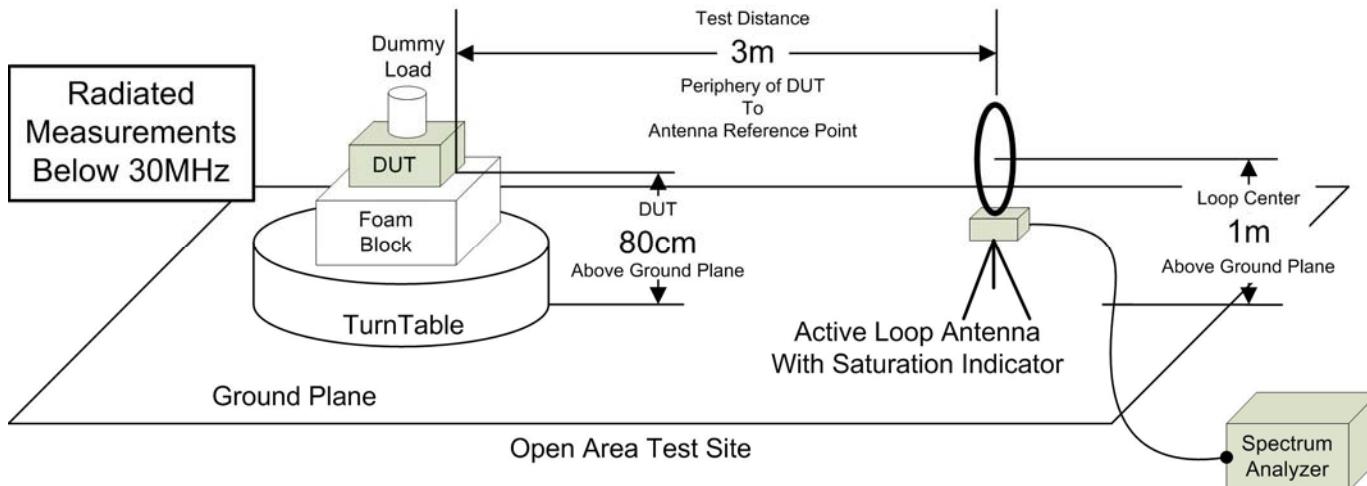


Figure A.2 – Test Setup Radiated Emissions Measurements 30 - 1000MHz

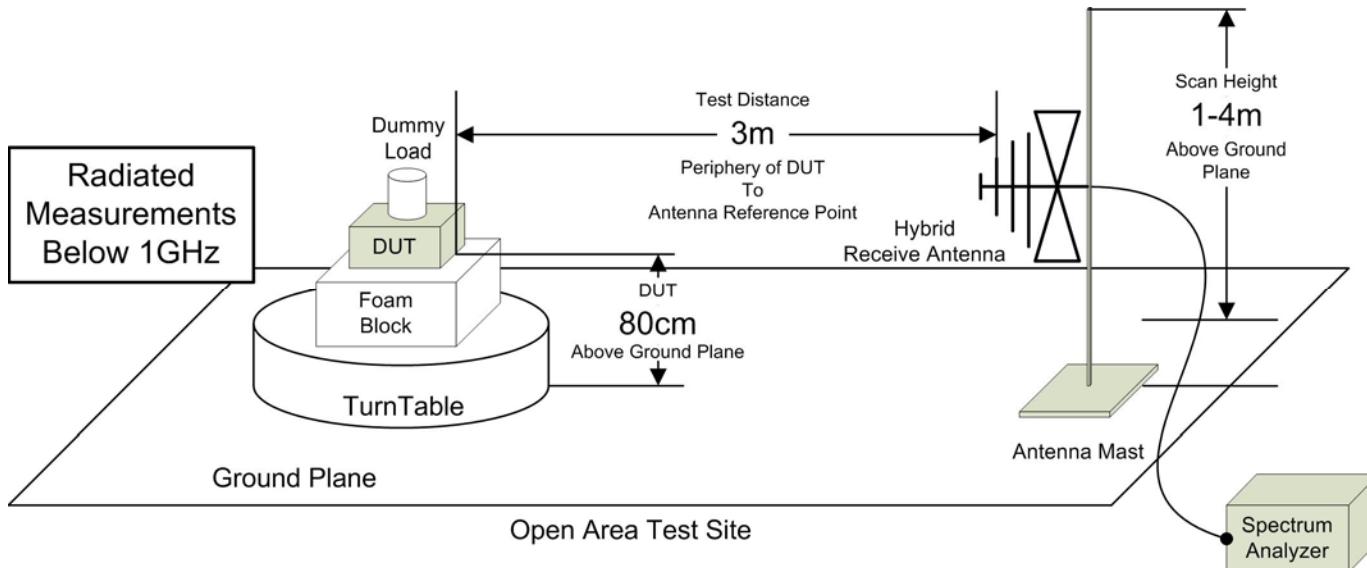
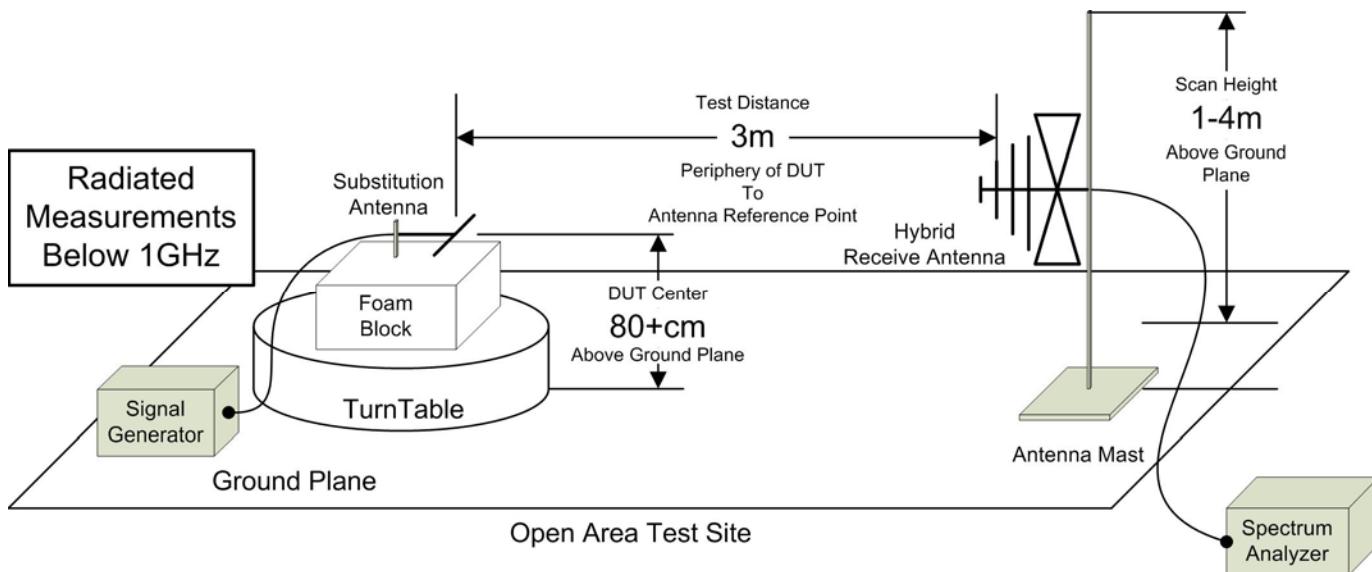
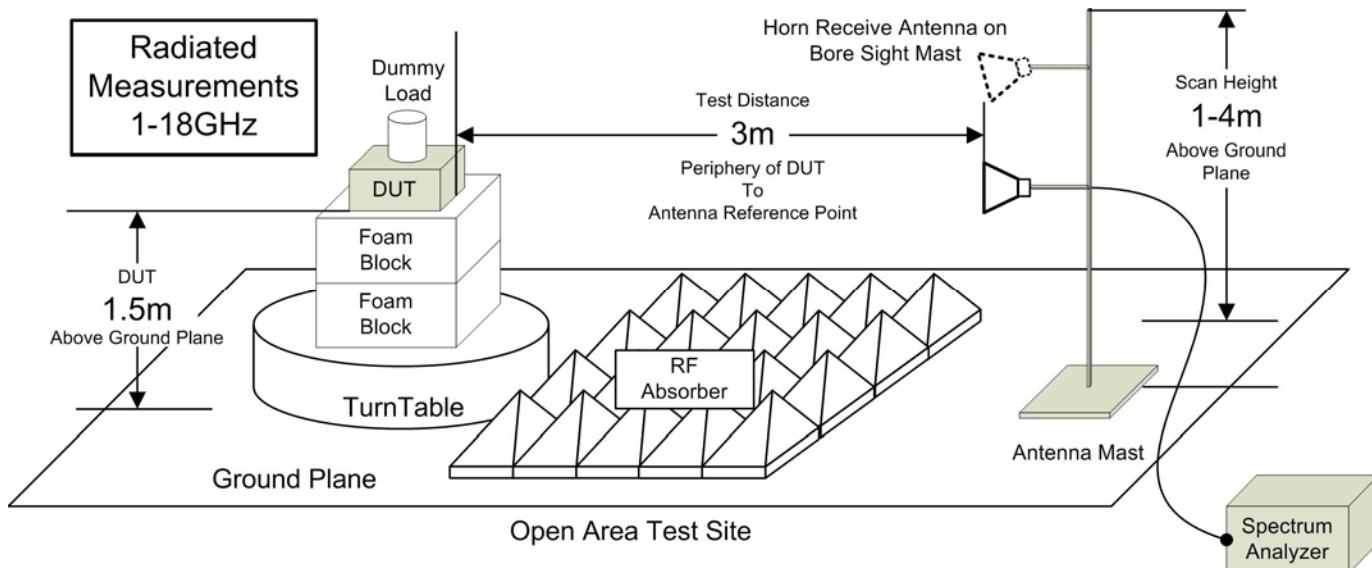


Figure A.3 – Test Setup Radiated Emissions Measurements 30 - 1000MHz Signal Substitution

Figure A.4 – Test Setup Radiated Emissions Measurements 1-18GHz


APPENDIX B – EQUIPMENT LIST AND CALIBRATION

Equipment List							
Asset Number	Manufacturer	Model Number	Serial Number	Description	Last Calibrated	Calibration Interval	Calibration Due
00050	Chase	CBL-6111A	1607	Bilog Antenna	3 Jan 2019	Triennial	3 Jan 2022
00034	ETS	3115	6267	Double Ridged Guide Horn	26 Nov 2018	Triennial	26 Nov 2021
00035	ETS	3115	6276	Double Ridged Guide Horn	22 Mar 2019	Triennial	21 Mar 2022
00085	EMCO	6502	9203-2724	Loop Antenna	11 Jun 2019	Triennial	11 Jun 2022
00333	HP	85685A	3010A01095	RF Preselector	23 Jun 2020	Triennial	30 Jun 2023
00049	HP	85650A	2043A00162	Quasi-peak Adapter	23 Jun 2020	Triennial	23 Jun 2023
00051	HP	8566B	2747A05510	Spectrum Analyzer	23 Jun 2020	Triennial	23 Jun 2023
00241	R&S	FSU40	100500	Spectrum Analyzer	15 May 2018	Triennial	15 May 2021
00005	HP	8648D	3847A00611	Signal Generator	23 Jun 2020	Triennial	23 Jun 2023
00071	EMCO	2090	9912-1484	Multi-Device Controller	n/a	n/a	n/a
00072	EMCO	2075	0001-2277	Mini-mast	n/a	n/a	n/a
00073	EMCO	2080	0002-1002	Turn Table	n/a	n/a	n/a
00234	VWR	61161-378	140320430	Temp/Humidity Meter	New	Triennial	New
00064	NARDA	3020A	n/a	Bi-Directional Coupler	COU	n/a	COU
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable	COU	n/a	COU
00263B	Koaxis	KP10-1.00M-TD	263B	1m Armoured Cable	COU	n/a	COU
00264	Koaxis	KP10-7.00M-TD	264	7m Armoured Cable	COU	n/a	COU
00278	TILE	34G3	n/a	TILE Test Software	NCR	n/a	NCR

NCR: No Calibration Required

COU: Calibrate On Use

APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY
CISPR 16-4 Measurement Uncertainty (U_{LAB})

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence interval using a coverage factor of $k=2$

30MHz - 200MHz

$U_{LAB} = 5.14\text{dB}$ $U_{CISPR} = 6.3\text{dB}$

200MHz - 1000MHz

$U_{LAB} = 5.90\text{dB}$ $U_{CISPR} = 6.3\text{dB}$

1GHz - 6GHz

$U_{LAB} = 4.80\text{dB}$ $U_{CISPR} = 5.2\text{dB}$

6GHz - 18GHz

$U_{LAB} = 5.1\text{dB}$ $U_{CISPR} = 5.5\text{dB}$

If the calculated uncertainty U_{lab} is **less** than U_{CISPR} then:

1 Compliance is deemed to occur if **NO** measured disturbance exceeds the disturbance limit

2 Non-Compliance is deemed to occur if **ANY** measured disturbance **EXCEEDS** the disturbance limit

If the calculated uncertainty U_{lab} is **greater** than U_{CISPR} then:

3 Compliance is deemed to occur if **NO** measured disturbance, increased by $(U_{lab} - U_{CISPR})$, exceeds the disturbance limit

4 Non-Compliance is deemed to occur if **ANY** measured disturbance, increased by $(U_{lab} - U_{CISPR})$, **EXCEEDS** the disturbance limit

END OF REPORT