Test Report

Report No.:	MTi240911007-01E4
Date of issue:	2024-11-21
Applicant:	Emlid Tech Kft
Product:	RTK GNSS receiver
Model(s):	RRS-2P
FCC ID:	2BAYERCH204

Shenzhen Microtest Co., Ltd.

http://www.mtitest.cn

Address: 101, No. 7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China.
Tel: 0755-88850135-1439 Mobile: 131-4343-1439 (Wechat same number) Web: http://www.mtitest.cn E-mail: mti@51mti.com

Instructions

1. This test report shall not be partially reproduced without the written consent of the laboratory.

2. The test results in this test report are only responsible for the samples submitted

3. This test report is invalid without the seal and signature of the laboratory.

4. This test report is invalid if transferred, altered, or tampered with in any form without authorization.

5. Any objection to this test report shall be submitted to the laboratory within 15 days from the date of receipt of the report.

Table of contents

Test Result Certification	
Applicant:	Emlid Tech Kft
Address:	1138 Budapest, Esztergomi way 31-39, HUB 3 building, 5 floor Hungary (Republic Of)
Manufacturer:	Ningbo High-tech Zone Ladder Science co., Ltd
Address:	Building#3, Units 4-1, 5-1, 6-1, Zone D, Zhizao Port, No.215 Qingyi Road, Ningbo High-Tech Zone, Zhejiang Province, China
Factory:	Ningbo High-tech Zone Ladder Science co., Ltd
Address:	Building#3, Units 4-1, 5-1, 6-1, Zone D, Zhizao Port, No.215 Qingyi Road, Ningbo High-Tech Zone, Zhejiang Province, China
Product description	
Product name:	RTK GNSS receiver
Trademark:	EMLID
Model name:	RRS-2P
Series Model(s):	N/A
Standards:	47 CFR Part 15.247
Test Method:	ANSI C63.10-2013 KDB 558074 D01 15.247 Meas Guidance v05r02
Date of Test	
Date of test:	2024-10-30 to 2024-11-21
Test result:	Pass

Test Engineer	:	James Qin
		(James Qin)
Reviewed By	:	David. Lee
		(David Lee)
Approved By	:	Leon chen
		(Leon Chen)

1 General Description

1.1 Description of the EUT

Product name:	RTK GNSS receiver
Model name:	RRS-2P
Series Model(s):	N/A
Model difference:	N/A
Electrical rating:	Input: 5VDC 3A Battery: DC 6.4V, 6400mAh
Accessories:	N/A
Hardware version:	REV-B
Software version:	v31.8
Test sample(s) number:	MTi240911007-01S1001
RF specification	
Operating frequency range:	903~927MHz
Modulation type:	LoRa
Antenna(s) type:	Glue stick antenna
Antenna(s) gain:	2.02 dBi

1.2 Description of test modes

No.	Emission test modes
Mode1	TX- LoRa

1.2.1 Operation channel list

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	903	2	915	3	927

Test Channel List
Operation Band:

Lowest Channel (LCH) (MHz)	Middle Channel (MCH) (MHz)	Highest Channel (HCH) (MHz)
903	915	927

Note: The test software provided by manufacturer is used to control EUT for working in engineering mode, that enables selectable channel, and capable of continuous transmitting mode.

Test Software: Serial port tools
For power setting, refer to below table.

Mode	903MHz	915MHz	927MHz
LoRa	18	18	18

1.3 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15°C ~ 35°C
Humidity:	20% RH ~ 75% RH
Atmospheric pressure:	98 kPa ~ 101 kPa

1.4 Description of support units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Support equipment list			
Description	Model	Serial No.	Manufacturer
Laptop	e485	/	Lenovo
Support cable list			
Description	Length (m)	From	To
/	/	/	/

1.5 Measurement uncertainty

Measurement	Uncertainty
Occupied channel bandwidth	±3 %
RF output power, conducted	±1 dB
Power Spectral Density, conducted	±1 dB
Unwanted Emissions, conducted	±1 dB
Radiated spurious emissions (above 1GHz)	±5.3dB
Radiated spurious emissions (9kHz~30MHz)	±4.3dB
Radiated spurious emissions (30MHz~1GHz)	±4.7dB
Temperature	±1 °C
Humidity	± 5 %

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

2 Summary of Test Result

No.	Item	Requirement	Result
1	Antenna requirement	47 CFR 15.203	Pass
2	Occupied Bandwidth	47 CFR 15.247(a)(2)	Pass
3	Maximum Conducted Output Power	47 CFR 15.247(b)(3)	Pass
4	Power Spectral Density	47 CFR 15.247(e)	Pass
5	RF conducted spurious emissions and band edge measurement	47 CFR 15.247(d), 15.209, 15.205	Pass
6	Radiated emissions (below 1GHz)	47 CFR 15.247(d), 15.209, 15.205	Pass
7	Radiated emissions (above 1GHz)	47 CFR 15.247(d), 15.209, 15.205	Pass
8	Conducted Emission at AC power line	47 CFR 15.207(a)	Pass

Note: Both power supply modes have been tested, but only the worst working mode is reflected in the report, and the worst mode is battery powered mode

3 Test Facilities and accreditations

3.1 Test laboratory

Test laboratory:	Shenzhen Microtest Co., Ltd.
Test site location:	101, No.7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Telephone:	(86-755)88850135
Fax:	(86-755)88850136
CNAS Registration No.:	CNAS L5868
FCC Registration No.:	448573
IC Registration No.:	21760
CABID:	CN0093

4 List of test equipment

No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
Occupied Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in non-restricted frequency bands						
1	Wideband Radio Communication Tester	Rohde&schwarz	CMW500	149155	2024-03-20	2025-03-19
2	ESG Series Analog Ssignal Generator	Agilent	E4421B	GB40051240	2024-03-21	2025-03-20
3	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2024-03-21	2025-03-20
4	Synthesized Sweeper	Agilent	83752A	3610A01957	2024-03-21	2025-03-20
5	MXA Signal Analyzer	Agilent	N9020A	MY50143483	2024-03-21	2025-03-20
6	RF Control Unit	Tonscend	JS0806-1	19D8060152	2024-03-21	2025-03-20
7	Band Reject Filter Group	Tonscend	JS0806-F	19D8060160	2024-03-21	2025-03-20
8	ESG Vector Signal Generator	Agilent	N5182A	MY50143762	2024-03-20	2025-03-19
9	DC Power Supply	Agilent	E3632A	MY40027695	2024-03-21	2025-03-20
Band edge emissions (Radiated) Emissions in frequency bands (above 1GHz)						
1	EMI Test Receiver	Rohde&schwarz	ESCI7	101166	2024-03-20	2025-03-19
2	Double Ridged Broadband Horn Antenna	schwarabeck	BBHA 9120 D	2278	2023-06-17	2025-06-16
3	Amplifier	Agilent	8449B	3008A01120	2024-03-20	2025-03-19
4	MXA signal analyzer	Agilent	N9020A	MY54440859	2024-03-21	2025-03-20
5	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2024-03-21	2025-03-20
6	Horn antenna	Schwarzbeck	BBHA 9170	00987	2023-06-17	2025-06-16
7	Pre-amplifier	Space-Dtronics	EWLAN1840 G	210405001	2024-03-21	2025-03-20
Emissions in frequency bands (below 1GHz)						
1	EMI Test Receiver	Rohde&schwarz	ESCI7	101166	2024-03-20	2025-03-19
2	TRILOG Broadband Antenna	schwarabeck	VULB 9163	9163-1338	2023-06-11	2025-06-10
3	Amplifier	Hewlett-Packard	8447F	3113A06184	2024-03-20	2025-03-19
4	Active Loop Antenna	Schwarzbeck	FMZB 1519 B	00066	2024-03-23	2025-03-22
Conducted Emission at AC power line						
1	EMI Test Receiver	Rohde&schwarz	ESCI3	101368	2024-03-20	2025-03-19
2	Artificial mains network	Schwarzbeck	NSLK 8127	183	2024-03-21	2025-03-20
3	Artificial Mains Network	Rohde & Schwarz	ESH2-Z5	100263	2024-03-20	2025-03-19

5 Evaluation Results (Evaluation)

5.1 Antenna requirement

Test Requirement:	Refer to 47 CFR Part 15.203, 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.

5.1.1 Conclusion:

The antenna of the EUT is permanently attached.
The EUT complies with the requirement of FCC PART 15.203.

6 Radio Spectrum Matter Test Results (RF)

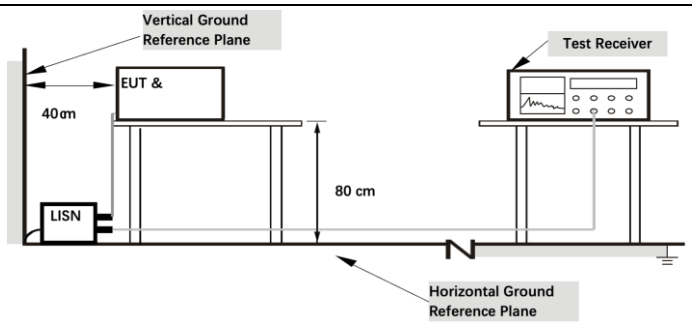
6.1 Conducted Emission at AC power line

Test Requirement:	Refer to 47 CFR 15.207(a), Except as shown in paragraphs (b)and (c)of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).
Test Limit:	Frequency of emission (MHz) / Conducted limit (dBμV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 *Decreases with the logarithm of the frequency.
Test Method:	ANSI C63.10-2013 section 6.2
Procedure:	Refer to ANSI C63.10-2013 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices

6.1.1 E.U.T. Operation:

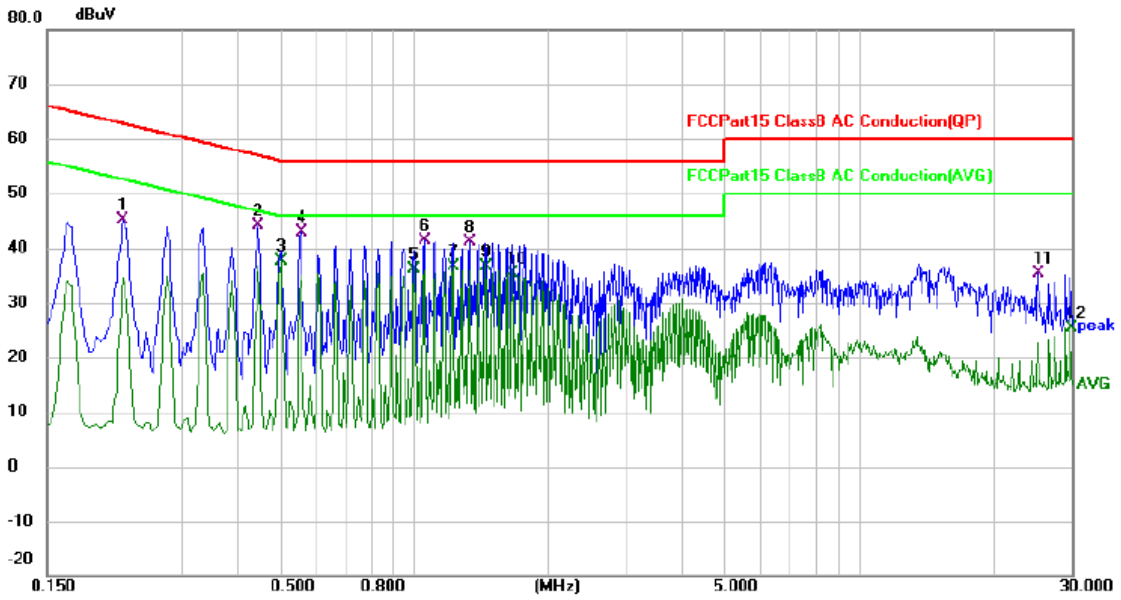
Operating Environment:					
Temperature:	25 °C	Humidity:	56 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.1.2 Test Setup Diagram:



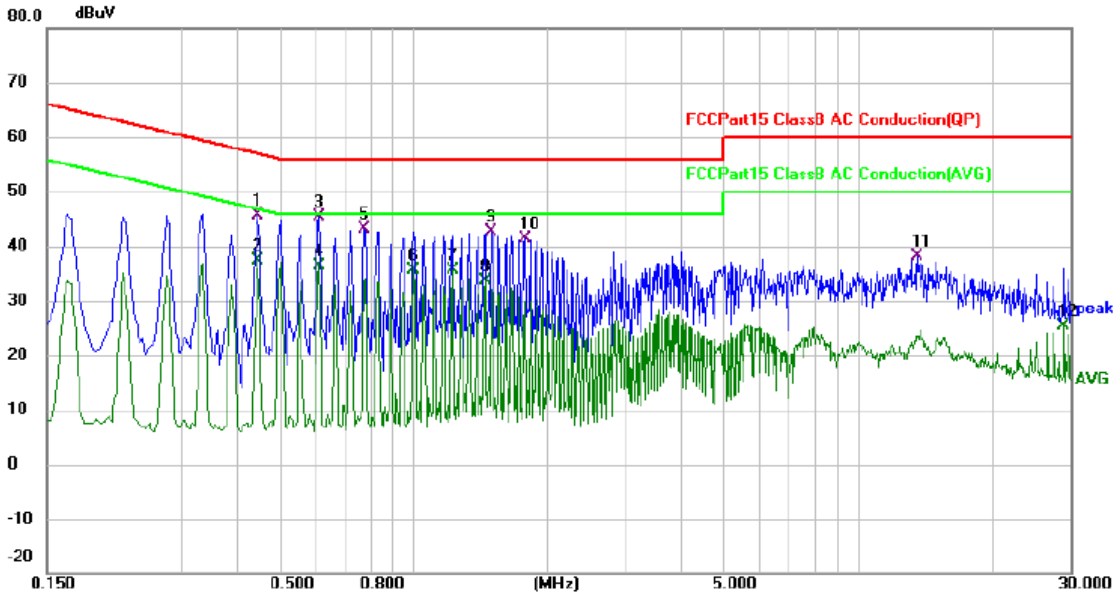
6.1.3 Test Data:

Mode1 / Line: Line / CH: L



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2220	34.80	10.31	45.11	62.74	-17.63	QP	
2		0.4460	33.84	10.41	44.25	56.95	-12.70	QP	
3	*	0.5020	27.10	10.43	37.53	46.00	-8.47	AVG	
4		0.5580	32.56	10.44	43.00	56.00	-13.00	QP	
5		1.0020	25.63	10.54	36.17	46.00	-9.83	AVG	
6		1.0580	30.84	10.54	41.38	56.00	-14.62	QP	
7		1.2260	26.08	10.54	36.62	46.00	-9.38	AVG	
8		1.3340	30.60	10.55	41.15	56.00	-14.85	QP	
9		1.4460	25.99	10.54	36.53	46.00	-9.47	AVG	
10		1.6700	24.88	10.54	35.42	46.00	-10.58	AVG	
11		25.1620	24.37	10.97	35.34	60.00	-24.66	QP	
12		29.7380	14.56	10.85	25.41	50.00	-24.59	AVG	

Mode1 / Line: Neutral / CH: L



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4460	35.24	10.41	45.65	56.95	-11.30	QP	
2	*	0.4460	26.99	10.41	37.40	46.95	-9.55	AVG	
3		0.6140	35.00	10.46	45.46	56.00	-10.54	QP	
4		0.6140	25.88	10.46	36.34	46.00	-9.66	AVG	
5		0.7780	32.72	10.49	43.21	56.00	-12.79	QP	
6		1.0020	25.03	10.54	35.57	46.00	-10.43	AVG	
7		1.2260	25.00	10.54	35.54	46.00	-10.46	AVG	
8		1.4500	23.00	10.54	33.54	46.00	-12.46	AVG	
9		1.5020	32.05	10.55	42.60	56.00	-13.40	QP	
10		1.7820	30.73	10.55	41.28	56.00	-14.72	QP	
11		13.5700	27.20	10.88	38.08	60.00	-21.92	QP	
12		28.9740	14.53	10.87	25.40	50.00	-24.60	AVG	

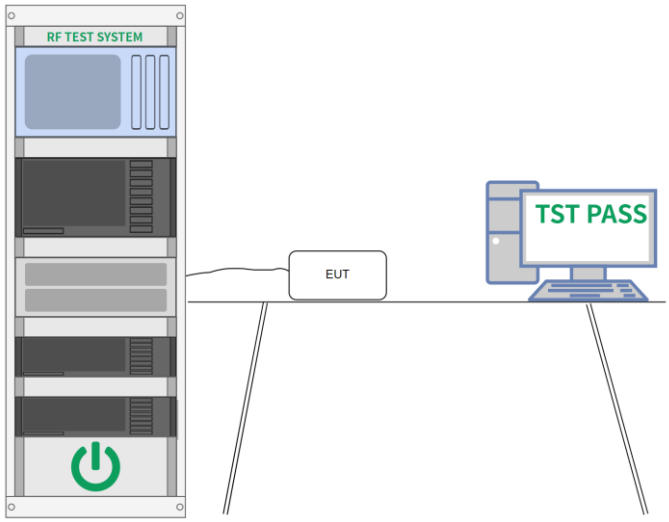
6.2 Occupied Bandwidth

Test Requirement:	47 CFR 15.247(a)(2)
Test Limit:	Refer to 47 CFR 15.247(a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Method:	ANSI C63.10-2013, section 11.8 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	a) Set RBW = 100 kHz. b) Set the VBW >= [3 × RBW]. c) Detector = peak. d) Trace mode = max hold. e) Sweep = auto couple. f) Allow the trace to stabilize. g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23 °C	Humidity:	59 %	Atmospheric Pressure:	99 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.2.2 Test Setup Diagram:



6.2.3 Test Data:

Please Refer to Appendix for Details.

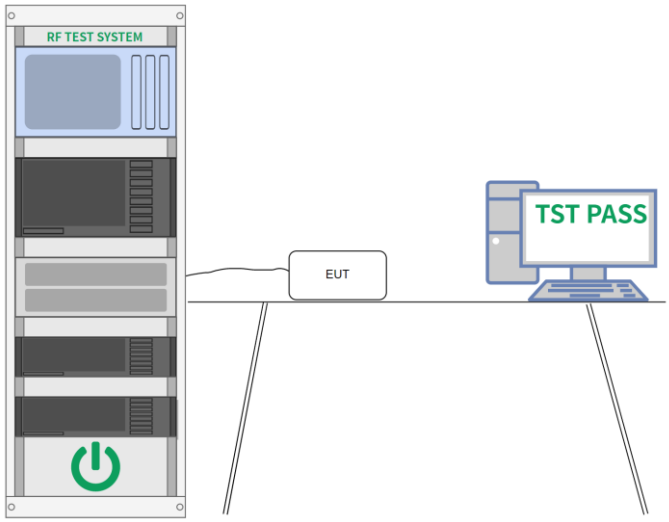
6.3 Maximum Conducted Output Power

Test Requirement:	47 CFR 15.247(b)(3)
Test Limit:	Refer to 47 CFR 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
Test Method:	ANSI C63.10-2013, section 11.9.1 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013, section 11.9.1 Maximum peak conducted output power

6.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23 °C	Humidity:	59 %	Atmospheric Pressure:	99 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.3.2 Test Setup Diagram:



6.3.3 Test Data:

Please Refer to Appendix for Details.

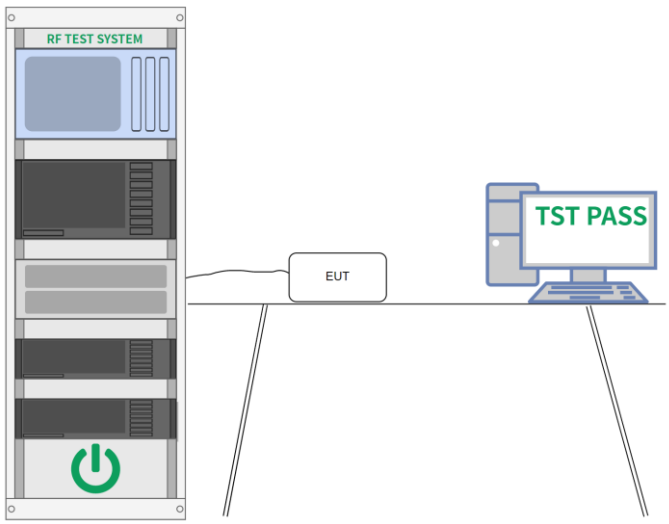
6.4 Power Spectral Density

Test Requirement:	47 CFR 15.247(e)
Test Limit:	Refer to 47 CFR 15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
Test Method:	ANSI C63.10-2013, section 11.10 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013, section 11.10, Maximum power spectral density level in the fundamental emission

6.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23 °C	Humidity:	59 %	Atmospheric Pressure:	99 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.4.2 Test Setup Diagram:



6.4.3 Test Data:

Please Refer to Appendix for Details.

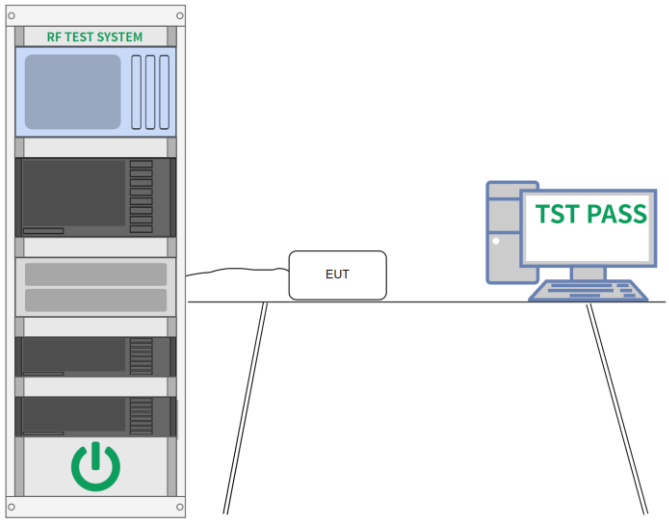
6.5 RF conducted spurious emissions and band edge measurement

Test Requirement:	47 CFR 15.247(d), 15.209, 15.205
Test Limit:	Refer to 47 CFR 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Method:	ANSI C63.10-2013 section 11.11 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013 Section 11.11.1, Section 11.11.2, Section 11.11.3

6.5.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23 °C	Humidity:	59 %	Atmospheric Pressure:	99 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.5.2 Test Setup Diagram:



6.5.3 Test Data:

Please Refer to Appendix for Details.

6.6 Radiated emissions (below 1GHz)

Test Requirement:	Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`
Test Limit:	

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.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

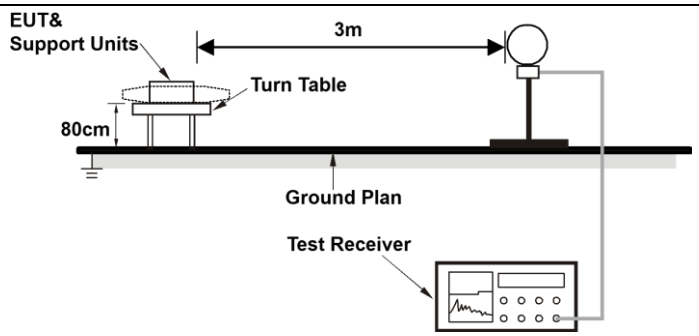
Test Method:	ANSI C63.10-2013 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013 section 6.6.4

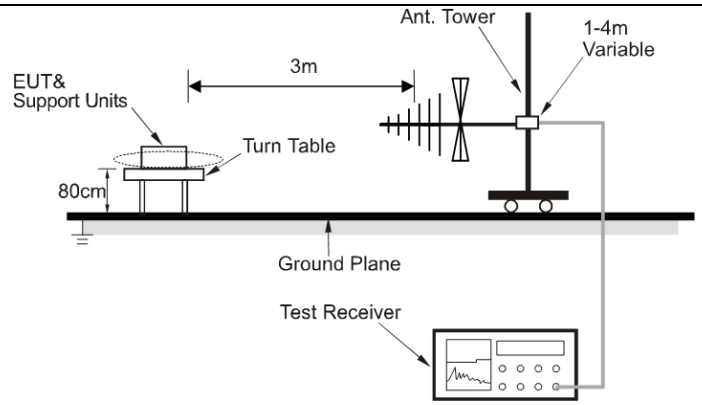
6.6.1 E.U.T. Operation:

Operating Environment:					
Temperature:	26 °C	Humidity:	54 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1				
Final test mode:	All of the listed pre-test mode were tested, only the data of the worst mode (Mode1) is recorded in the report				

Note:
The amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported.
All modes of operation of the EUT were investigated, and only the worst-case results are reported.
There were no emissions found below 30MHz within 20dB of the limit.

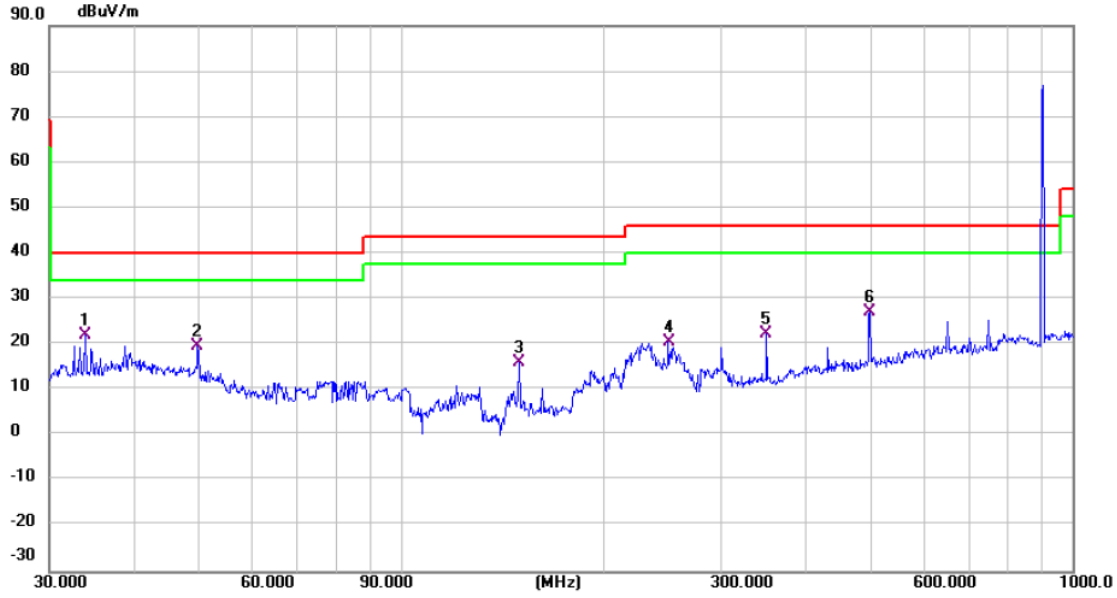
6.6.2 Test Setup Diagram:




Ant. Tower
1-4m
Variable
3m
EUT&
Support Units
Turn Table
80cm
Ground Plane
Test Receiver

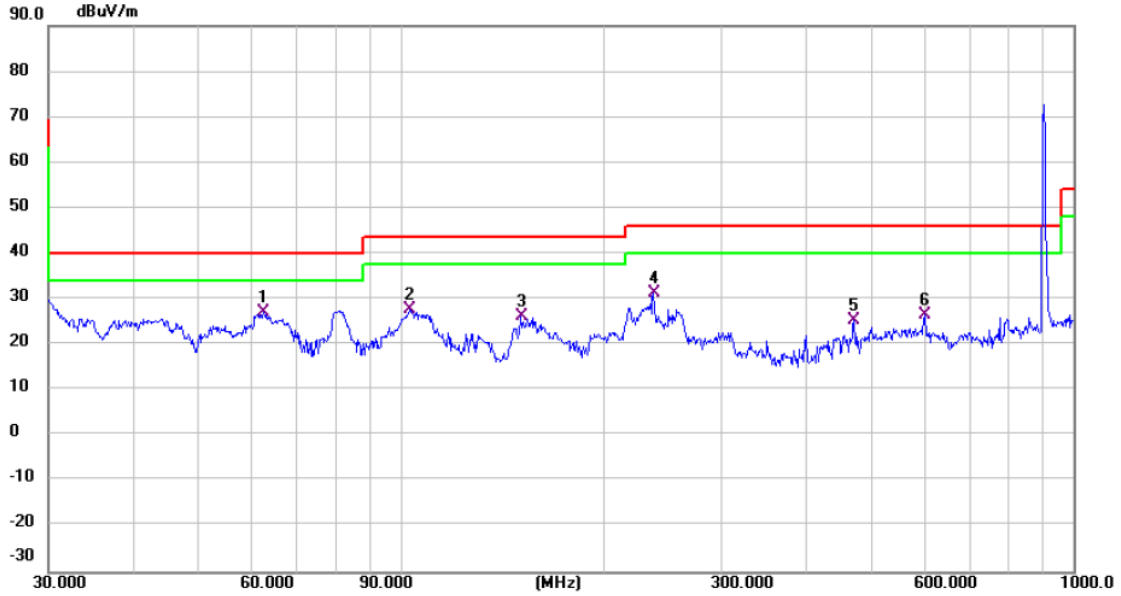
6.6.3 Test Data:

Mode1 / Polarization: Horizontal / CH: L



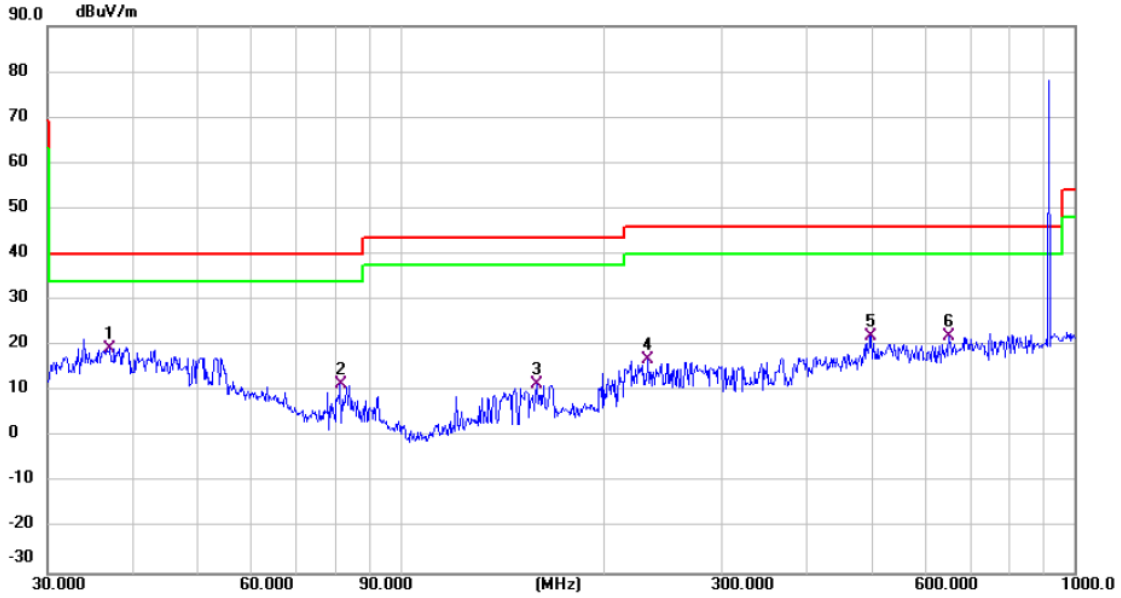
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	33.9172	36.22	-14.21	22.01	40.00	-17.99	QP	
2		49.8813	35.26	-15.69	19.57	40.00	-20.43	QP	
3		150.0107	36.15	-20.18	15.97	43.50	-27.53	QP	
4		250.3010	35.88	-15.36	20.52	46.00	-25.48	QP	
5		350.4766	38.01	-15.56	22.45	46.00	-23.55	QP	
6		499.4245	41.34	-14.26	27.08	46.00	-18.92	QP	

Mode1 / Polarization: Vertical / CH: L



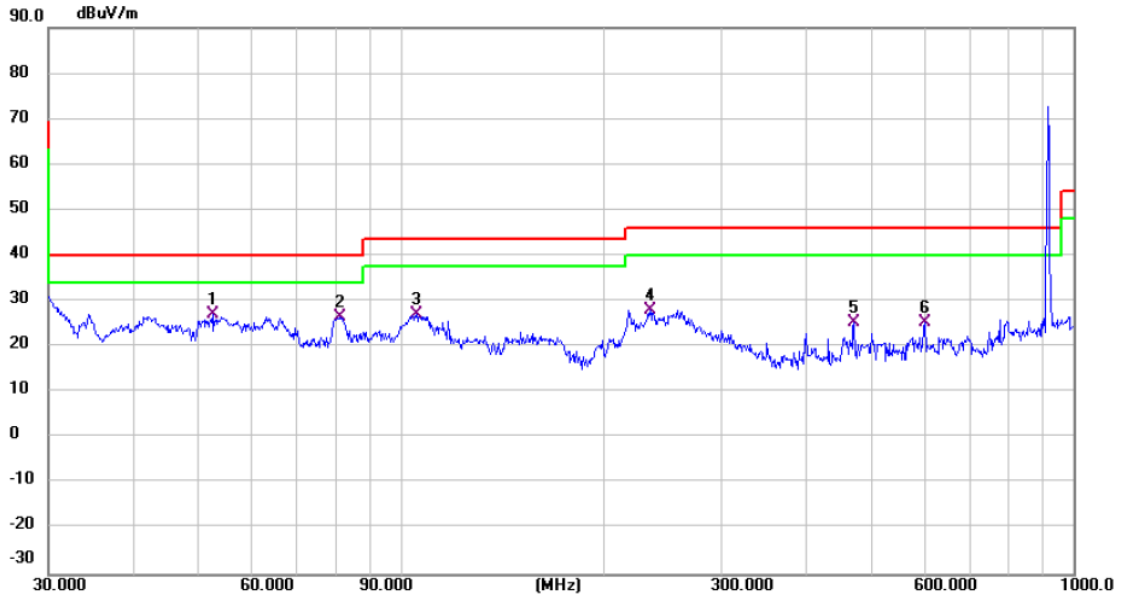
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	62.6505	48.44	-21.19	27.25	40.00	-12.75	QP	
2		103.0800	43.66	-16.04	27.62	43.50	-15.88	QP	
3		151.0664	43.27	-17.16	26.11	43.50	-17.39	QP	
4		237.4758	50.90	-19.48	31.42	46.00	-14.58	QP	
5		472.1759	39.24	-13.94	25.30	46.00	-20.70	QP	
6		601.4265	36.85	-10.44	26.41	46.00	-19.59	QP	

Mode1 / Polarization: Horizontal / CH: M



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	37.1548	34.05	-14.62	19.43	40.00	-20.57	QP	
2		81.4968	34.74	-23.19	11.55	40.00	-28.45	QP	
3		159.2249	32.22	-20.70	11.52	43.50	-31.98	QP	
4		233.3486	31.74	-14.93	16.81	46.00	-29.19	QP	
5		499.4245	36.34	-14.26	22.08	46.00	-23.92	QP	
6		651.9415	32.35	-10.19	22.16	46.00	-23.84	QP	

Mode1 / Polarization: Vertical / CH: M

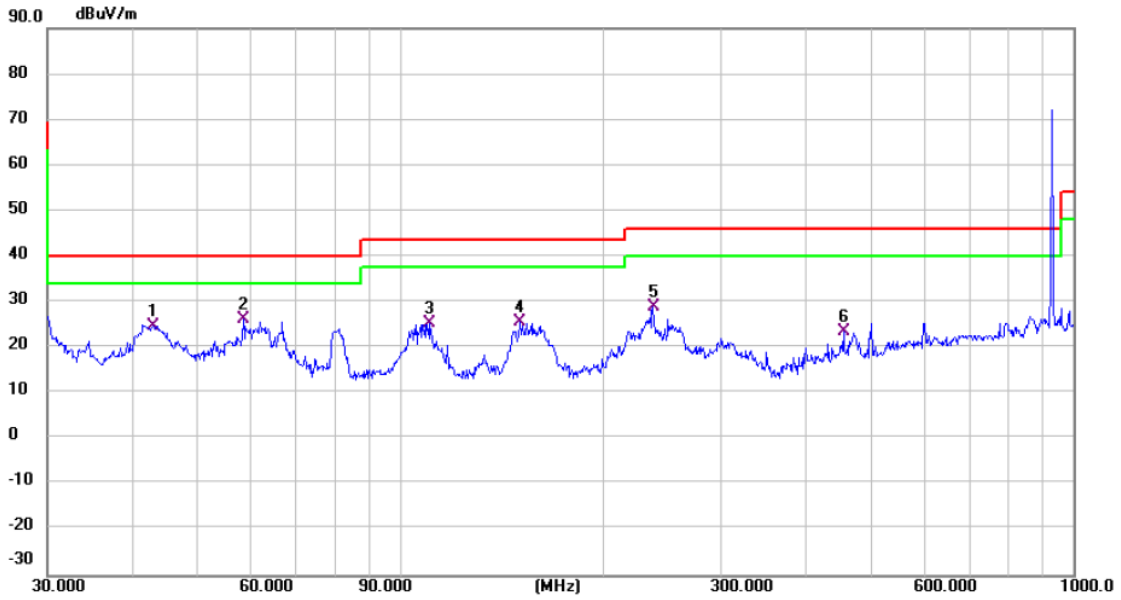


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	52.5752	48.37	-21.35	27.02	40.00	-12.98	QP	
2		81.2116	41.49	-14.94	26.55	40.00	-13.45	QP	
3		105.6414	44.88	-17.74	27.14	43.50	-16.36	QP	
4		234.9909	47.84	-19.75	28.09	46.00	-17.91	QP	
5		472.1759	39.24	-13.94	25.30	46.00	-20.70	QP	
6		601.4265	35.85	-10.44	25.41	46.00	-20.59	QP	

Mode1 / Polarization: Horizontal / CH: H

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		38.8877	31.79	-14.23	17.56	40.00	-22.44	QP	
2		83.5220	33.47	-23.66	9.81	40.00	-30.19	QP	
3		151.5971	31.61	-20.31	11.30	43.50	-32.20	QP	
4		254.7281	31.72	-15.89	15.83	46.00	-30.17	QP	
5		499.4245	36.84	-14.26	22.58	46.00	-23.42	QP	
6	*	750.1082	33.95	-7.70	26.25	46.00	-19.75	QP	

Mode1 / Polarization: Vertical / CH: H



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		43.0504	48.76	-24.13	24.63	40.00	-15.37	QP	
2	*	58.6126	47.79	-21.67	26.12	40.00	-13.88	QP	
3		110.9569	41.76	-16.52	25.24	43.50	-18.26	QP	
4		151.0663	42.77	-17.16	25.61	43.50	-17.89	QP	
5		237.4756	48.40	-19.48	28.92	46.00	-17.08	QP	
6		455.9057	37.74	-14.25	23.49	46.00	-22.51	QP	

6.7 Radiated emissions (above 1GHz)

Test Requirement:	In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`
Test Limit:	

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

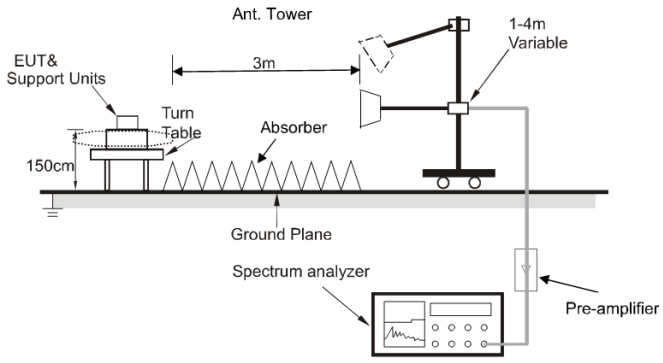
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Test Method:	ANSI C63.10-2013 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013 section 6.6.4

6.7.1 E.U.T. Operation:

Operating Environment:					
Temperature:	26 °C	Humidity:	54 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1				
Final test mode:	All of the listed pre-test mode were tested, only the data of the worst mode (Mode1) is recorded in the report				
Note: Test frequency are from 1GHz to 25GHz, the amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported. All modes of operation of the EUT were investigated, and only the worst-case results are reported.					

6.7.2 Test Setup Diagram:



6.7.3 Test Data:

Mode1 / Polarization: Horizontal / CH: L

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		1806.000	49.05	-7.10	41.95	74.00	-32.05	peak
2		1806.000	47.42	-7.10	40.32	54.00	-13.68	AVG
3		2709.000	55.10	-4.02	51.08	74.00	-22.92	peak
4	*	2709.000	53.70	-4.02	49.68	54.00	-4.32	AVG
5		3612.000	42.84	-2.10	40.74	74.00	-33.26	peak
6		3612.000	44.95	-2.10	42.85	54.00	-11.15	AVG

Mode1 / Polarization: Vertical / CH: L

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		1806.000	47.54	-7.10	40.44	74.00	-33.56	peak
2		1806.000	46.22	-7.10	39.12	54.00	-14.88	AVG
3		2709.000	45.43	-4.02	41.41	74.00	-32.59	peak
4	*	2709.000	44.29	-4.02	40.27	54.00	-13.73	AVG
5		3612.000	43.94	-2.10	41.84	74.00	-32.16	peak
6		3612.000	42.26	-2.10	40.16	54.00	-13.84	AVG

Mode1 / Polarization: Horizontal / CH: M

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		1830.000	51.30	-6.87	44.43	74.00	-29.57	peak
2		1830.000	50.12	-6.87	43.25	54.00	-10.75	AVG
3		2745.000	51.55	-3.79	47.76	74.00	-26.24	peak
4	*	2745.000	50.36	-3.79	46.57	54.00	-7.43	AVG
5		3660.000	42.45	-1.83	40.62	74.00	-33.38	peak
6		3660.000	41.42	-1.83	39.59	54.00	-14.41	AVG

Mode1 / Polarization: Vertical / CH: M

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		1830.000	47.74	-6.87	40.87	74.00	-33.13	peak
2		1830.000	46.44	-6.87	39.57	54.00	-14.43	AVG
3		2745.000	47.12	-3.79	43.33	74.00	-30.67	peak
4	*	2745.000	45.96	-3.79	42.17	54.00	-11.83	AVG
5		3660.000	43.17	-1.83	41.34	74.00	-32.66	peak
6		3660.000	42.21	-1.83	40.38	54.00	-13.62	AVG

Mode1 / Polarization: Horizontal / CH: H

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		1854.000	48.18	-6.68	41.50	74.00	-32.50	peak
2		1854.000	46.25	-6.68	39.57	54.00	-14.43	AVG
3		2781.000	54.69	-3.76	50.93	74.00	-23.07	peak
4	*	2781.000	53.63	-3.76	49.87	54.00	-4.13	AVG
5		3708.000	44.38	-2.03	42.35	74.00	-31.65	peak
6		3708.000	42.39	-2.03	40.36	54.00	-13.64	AVG

Mode1 / Polarization: Vertical / CH: H

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		1854.000	45.56	-6.68	38.88	74.00	-35.12	peak
2		1854.000	43.25	-6.68	36.57	54.00	-17.43	AVG
3		2781.000	44.34	-3.76	40.58	74.00	-33.42	peak
4		2781.000	42.35	-3.76	38.59	54.00	-15.41	AVG
5		3708.000	45.92	-2.03	43.89	74.00	-30.11	peak
6	*	3708.000	43.70	-2.03	41.67	54.00	-12.33	AVG

Calculation formula:

Measurement (dBμV/m) = Reading Level (dBμV) + Correct Factor (dB)

Over (dB) = Measurement (dBμV/m) – Limit (dBμV/m)

Correct Factor (dB)= Antenna Factor+ Cable loss- Amplifier gain

Photographs of the test setup

Refer to Appendix - Test Setup Photos.

Photographs of the EUT

Refer to Appendix - EUT Photos

Appendix

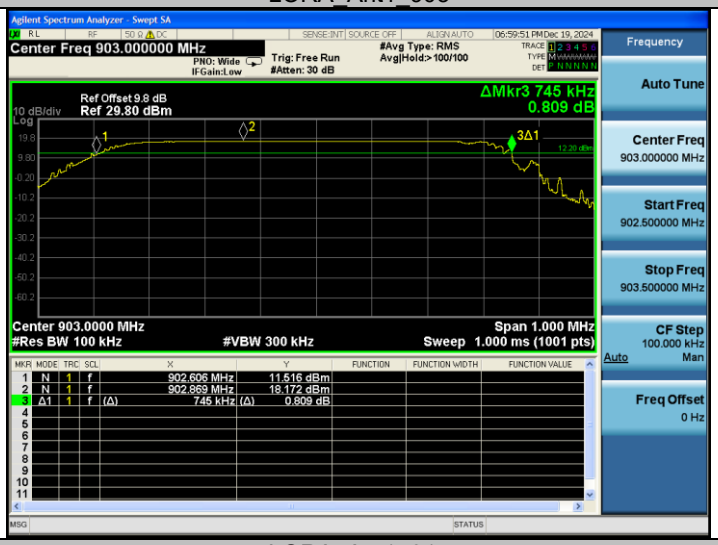
7 Appendix A: DTS Bandwidth

Test Result

Test Mode	Antenna	Frequency [MHz]	DTS BW [MHz]	Limit [MHz]	Verdict
LORA	Ant1	903	0.745	0.5	PASS
		915	0.702	0.5	PASS
		927	0.703	0.5	PASS

Test Graphs

LORA_Ant1_903



LORA_Ant1_915

LORA_Ant1_927

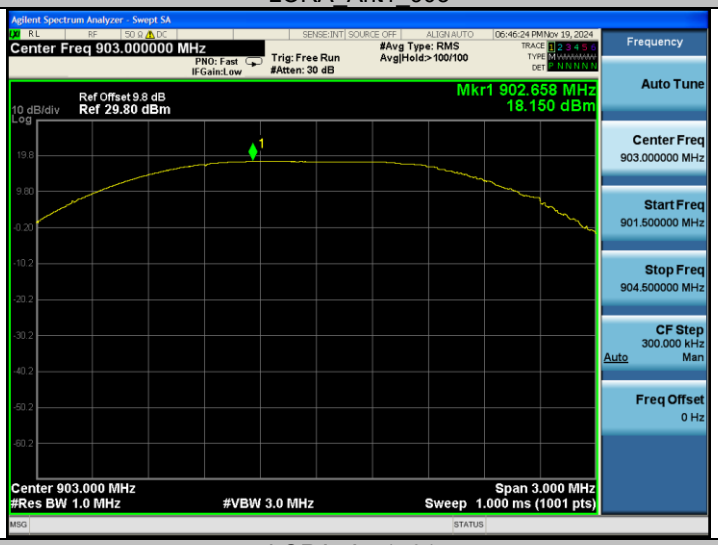
8 Appendix C: Maximum conducted output power

Test Result

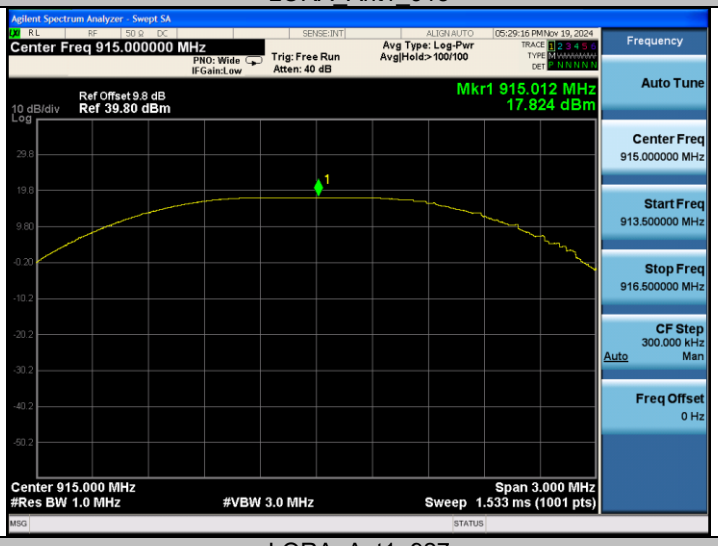
Test Mode	Antenna	Frequency [MHz]	Conducted Peak Power [dBm]	Conducted Limit [dBm]	Verdict
LORA	Ant1	903	18.15	≤30	PASS
		915	17.824	≤30	PASS
		927	18.128	≤30	PASS

Test Graphs

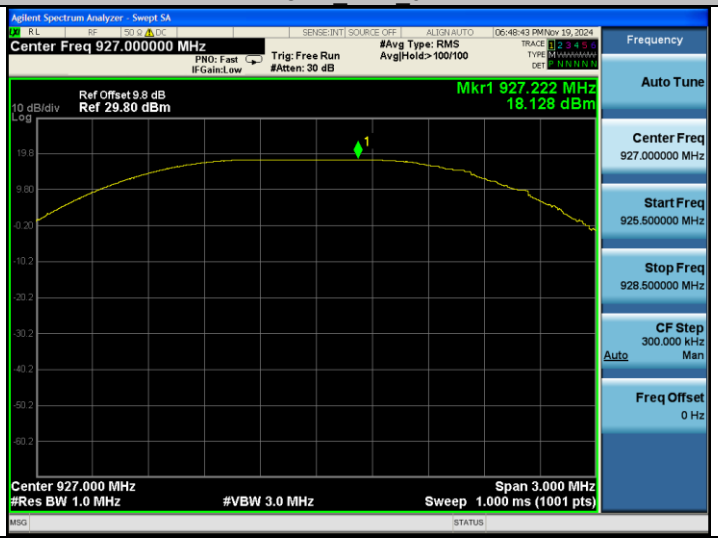
LORA_Ant1_903



LORA_Ant1_915



LORA_Ant1_927



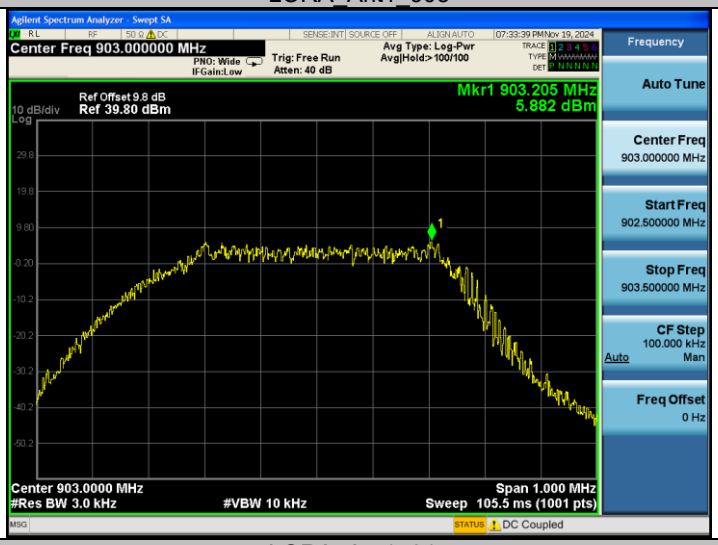
9 Appendix D: Maximum power spectral density

Test Result

Test Mode	Antenna	Frequency [MHz]	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
LORA	Ant1	903	5.882	≤8.00	PASS
		915	5.591	≤8.00	PASS
		927	5.831	≤8.00	PASS

Test Graphs

LORA_Ant1_903

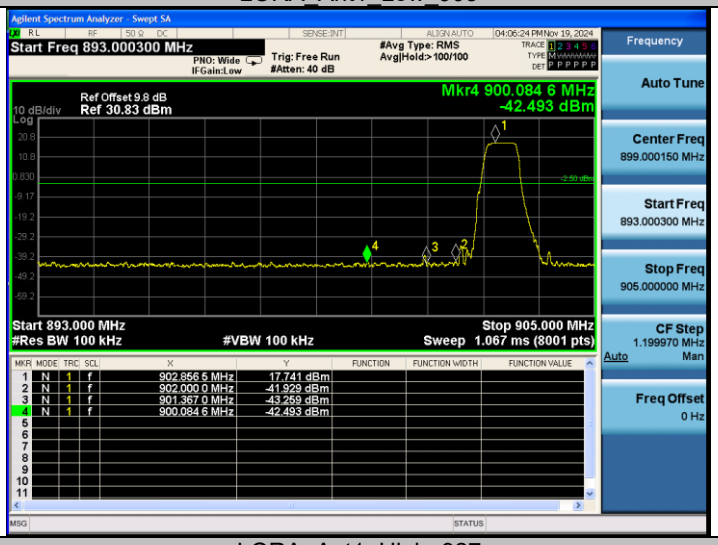
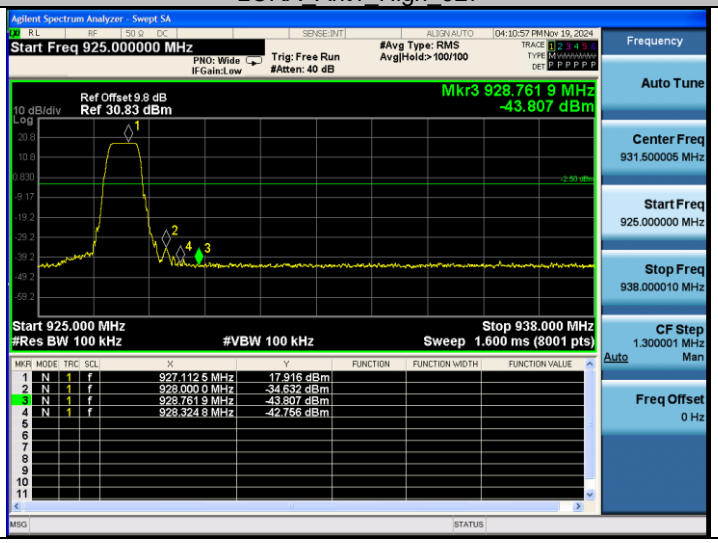


LORA_Ant1_915

LORA_Ant1_927

10 Appendix E: Band edge measurements

Test Graphs

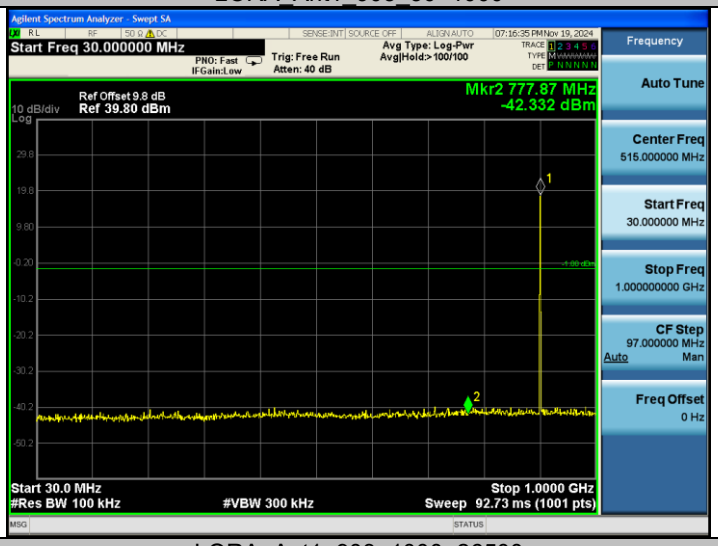
LORA_Ant1_Low_903

LORA_Ant1_High_927


11 Appendix F: Conducted Spurious Emission

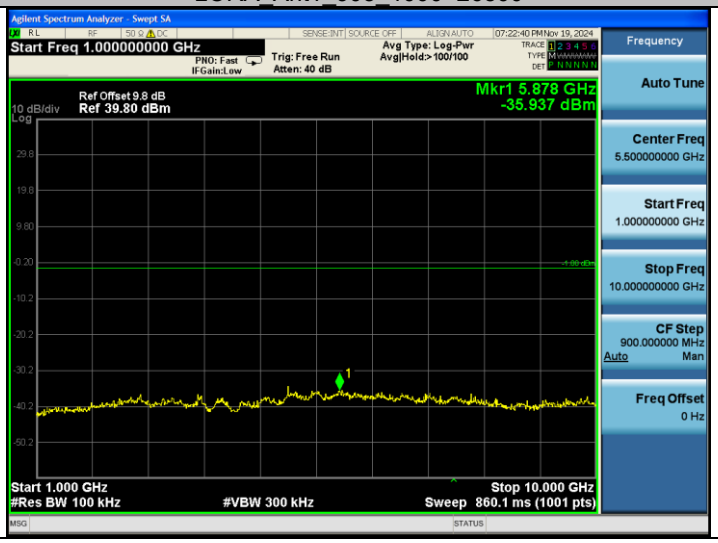
Test Graphs

LORA_Ant1_903_0~Reference

LORA_Ant1_903_30~1000

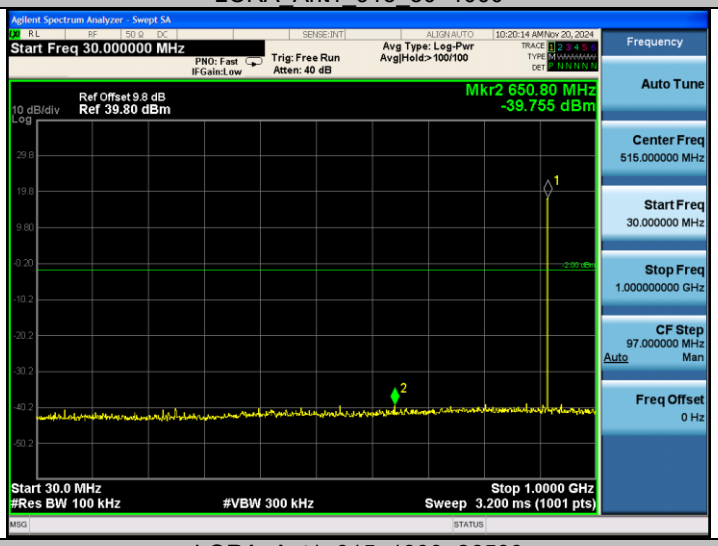


LORA_Ant1_903_1000~26500

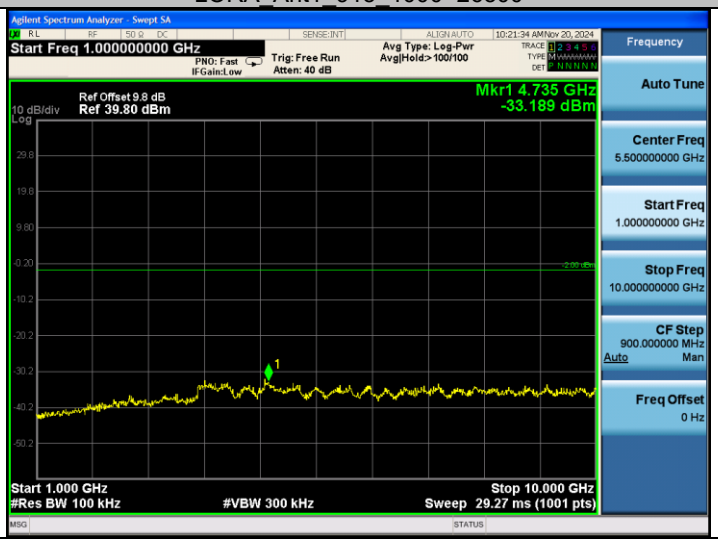


LORA_Ant1_915_0~Reference

LORA_Ant1_915_30~1000

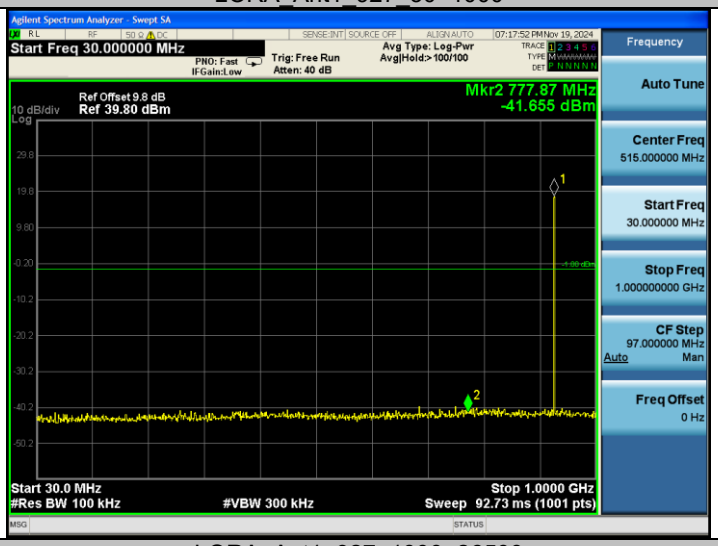


LORA_Ant1_915_1000~26500

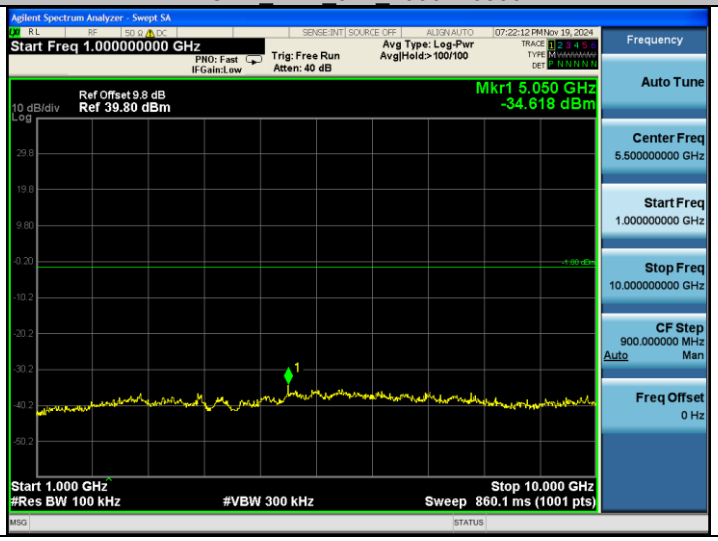


LORA_Ant1_927_0~Reference

LORA_Ant1_927_30~1000



LORA_Ant1_927_1000~26500



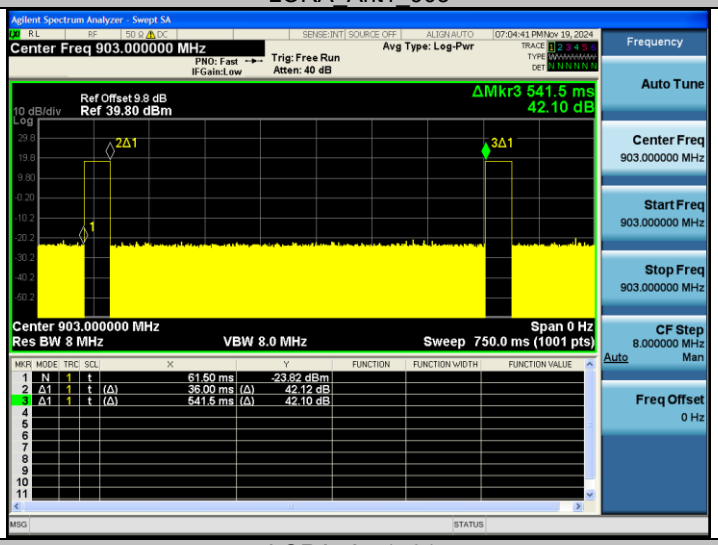
12 Appendix G: Duty Cycle

Test Result

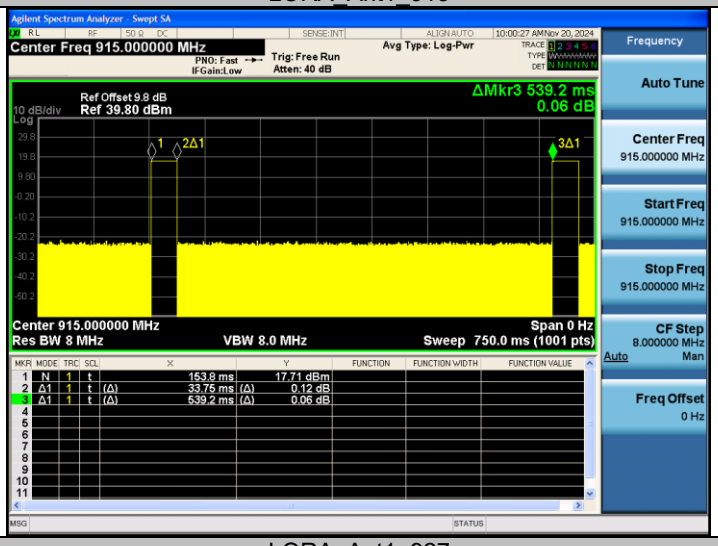
Test Mode	Antenna	Frequency [MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
LORA	Ant1	903	36	541.5	6.65	2.08
		915	33.75	539.2	6.26	2.08
		927	34.5	538.5	6.41	2.08

Test Graphs

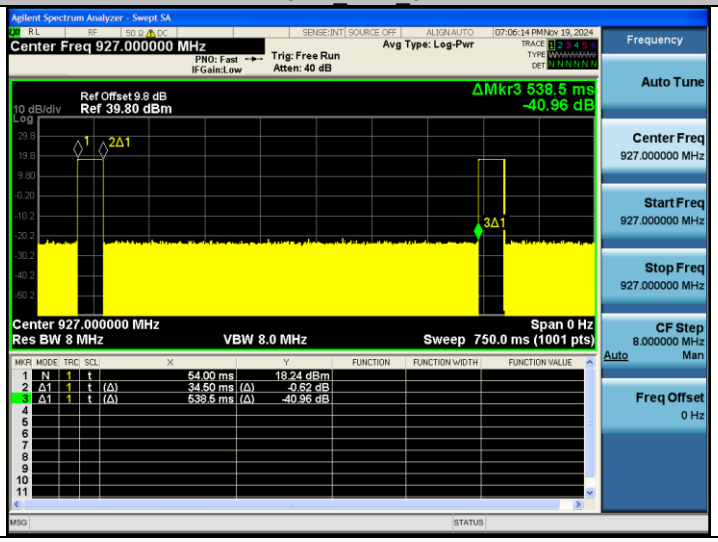
LORA_Ant1_903



LORA_Ant1_915



LORA_Ant1_927



----End of Report----