

FCC REPORT

Applicant: Shanghai Wendtech Information Technology Co.,Ltd

Address of Applicant: No.8 Xiushan Rd, Chongming District,Shanghai, China 200233

Equipment Under Test (EUT)

Product Name: LoRa Module

Model No.: WT5518

Trade mark: Wendtech

FCC ID: 2AYSD-WT5518

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Date of sample receipt: 21 Feb., 2021

Date of Test: 21 Feb., to 24 Mar., 2021

Date of report issued: 25 Mar., 2021

Test Result: PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the JYT product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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2 Version

Version No.	Date	Description
00	11 Mar., 2021	Original
01	19 Mar., 2021	Update Page 9, 12, 13, 17 ,24
02	25 Mar., 2021	- Added conducted emissions test data on page 10/11. - Added conducted emissions test setup photo on page 33.

Tested by:



Test Engineer

Date:

25 Mar., 2021

Reviewed by:



Project Engineer

Date:

25 Mar., 2021

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Test Summary

Test Items	Section in CFR 47	Result
Antenna requirement	15.203 & 15.247 (b)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.247 (b)(3)	Pass
6dB Emission Bandwidth 99% Occupied Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247 (d)	Pass
Spurious Emission	15.205 & 15.209	Pass
Remark: 1. Pass: The EUT complies with the essential requirements in the standard. 2. N/A: Not Applicable. 3. The cable insertion loss used by "RF Output Power" and other conduction measurement items is 0.5dB (provided by the customer).		
Test Method:	ANSI C63.10-2013 KDB 558074 D01 15.247 Meas Guidance v05r02	

4 General Information

4.1 Client Information

Applicant:	Shanghai Wendtech Information Technology Co.,Ltd
Address:	No.8 Xiushan Rd, Chongming District, Shanghai, China 200233
Manufacturer:	Shanghai Wendtech Information Technology Co.,Ltd
Address:	No.8 Xiushan Rd, Chongming District, Shanghai, China 200233

4.2 General Description of E.U.T.

Product Name:	LoRa Module
Model No.:	WT5518
Operation Frequency:	902~928 MHz
Channel numbers:	1
Modulation technology:	LoRa
Antenna Type:	HELIX Antenna
Antenna gain:	0 dBi
Power supply:	CR 17345 3V *2
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

Operation Frequency each of channel	
Channel	Frequency
1	915MHz

4.3 Test environment and mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
Transmitting mode	Keep the EUT in continuous transmitting with modulation
Radiated Emission: The sample was placed 0.8m (below 1GHz)/1.5m (above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. Duty cycle setting during the transmission is 100% with maximum power setting for all modulations.	

4.4 Description of Support Units

The EUT has been tested as an independent unit.

4.5 Measurement Uncertainty

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±1.60 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±3.12 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.32 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.16 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±3.20 dB (k=2)

4.6 Additions to, deviations, or exclusions from the method

No

4.7 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations: ● FCC - Designation No.: CN1211 JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551. ● ISED – CAB identifier.: CN0021 The 3m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1. ● A2LA - Registration No.: 4346.01 This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf
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4.8 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.

Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.

Tel: +86-755-23118282, Fax: +86-755-23116366

Email: info@ccis-cb.com, Website: <http://www.ccis-cb.com>

4.9 Test Instruments list

Radiated Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	ETS	9m*6m*6m	966	01-19-2021	01-18-2024
Loop Antenna	SCHWARZBECK	FMZB1519B	044	03-07-2020	03-06-2021
				03-07-2021	03-06-2022
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-07-2020	03-06-2021
				03-03-2021	03-02-2022
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-07-2020	03-06-2021
				03-03-2021	03-02-2022
Horn Antenna	SCHWARZBECK	BBHA9120D	1805	06-18-2020	06-17-2021
EMI Test Software	AUDIX	E3	Version: 6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-07-2020	03-06-2021
				03-07-2021	03-06-2022
Pre-amplifier	CD	PAP-1G18	11804	03-07-2020	03-06-2021
				03-07-2021	03-06-2022
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-05-2020	03-04-2021
				03-05-2021	03-04-2022
Spectrum analyzer	Rohde & Schwarz	FSP40	100363	11-18-2019	11-17-2020
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-05-2020	03-04-2021
				03-05-2021	03-04-2022
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-07-2020	03-06-2021
				03-07-2021	03-06-2022
Cable	MICRO-COAX	MFR64639	K10742-5	03-07-2020	03-06-2021
				03-07-2021	03-06-2022
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-07-2020	03-06-2021
				03-07-2021	03-06-2022
RF Switch Unit	MWRFTTEST	MW200	N/A	N/A	N/A
Test Software	MWRFTTEST	MTS8200	Version: 2.0.0.0		

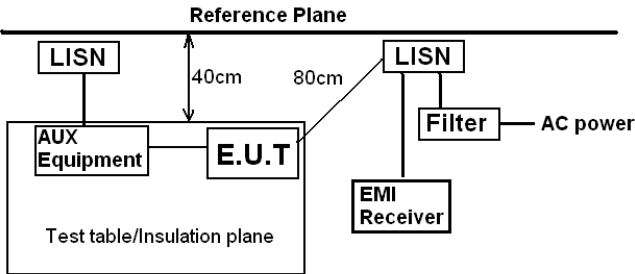
Conducted method:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
Spectrum Analyzer	Agilent	N9020A	MY50510123	11-16-2020	11-15-2021
Vector Signal Generator	Agilent	N5182A	MY49060014	11-16-2020	11-15-2021
Signal Generator	Rohde & Schwarz	SMR20	1008100050	03-03-2021	03-02-2022
Simulated Station	Rohde & Schwarz	CMW500	140493	06-18-2020	06-17-2021
RF Control Box	MWRFT-test	MW200-RFCB	MW201013JYT	N/A	N/A
Automatic Filter Box	MWRFT-test	MW200-SFCB	MW201019JYT	N/A	N/A
Test Software	MWRFT-test	MTS8200	Version: 2.0.0.0		
DC Power Supply	XinNuoEr	WYK-10020K	1409050110020	09-23-2020	09-22-2021
Temperature Humidity Chamber	Zhongzhi	CZ-C-150D	ZH16491	09-23-2020	09-22-2021

5 Test results and Measurement Data

5.1 Antenna requirement:

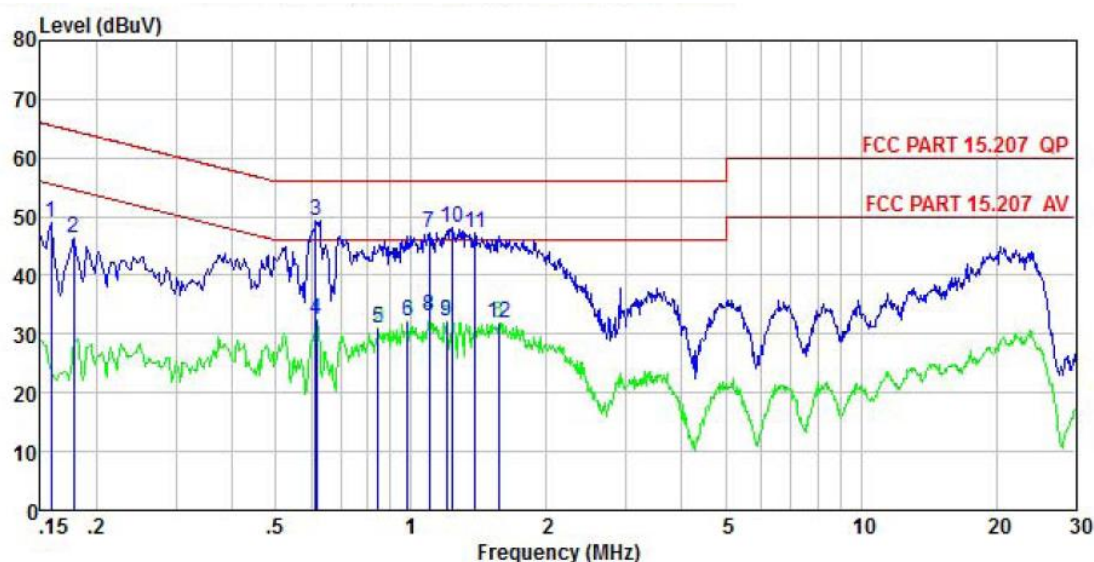
Standard requirement:	FCC Part 15 C Section 15.203 /247(b)
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, 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. 15.247(b) (4) requirement: (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
E.U.T Antenna:	
The RFID antenna is a HELIX antenna which cannot replace by end-user, the best-case gain of the antenna is 0 dBi.	

5.2 Conducted Emissions

Test Requirement:	FCC Part 15 C Section 15.207		
Test Frequency Range:	150 kHz to 30 MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		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 setup:	 <i>Remark</i> E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m		
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10(latest version) on conducted measurement.		
Test Instruments:	Refer to section 5.9 for details		
Test mode:	Hopping mode		
Test results:	Passed		

Measurement Data:

Product name:	LoRa Module	Product model:	WT5518
Test by:	Yayo	Test mode:	Lora mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Line
Test voltage:	AC 120 V/60 Hz	Environment:	Temp: 22.5℃ Humi: 55%

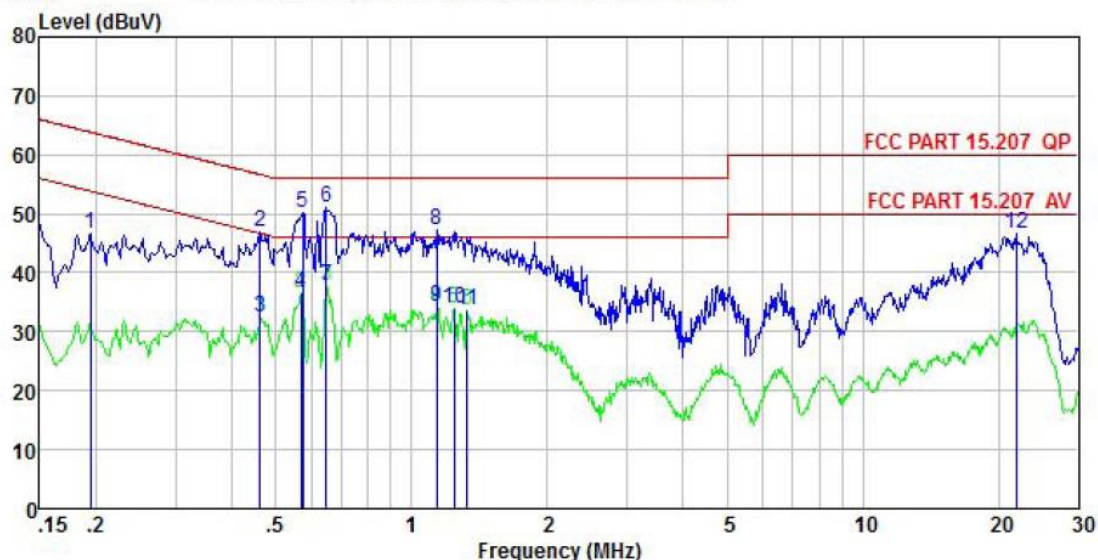


	Freq	Read Level	LISN Factor	Aux Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.158	49.74	-0.57	-0.07	0.01	49.11	65.56	-16.45	QP
2	0.178	47.10	-0.58	-0.12	0.01	46.41	64.59	-18.18	QP
3	0.614	50.07	-0.49	-0.38	0.02	49.22	56.00	-6.78	QP
4	0.617	33.32	-0.49	-0.38	0.02	32.47	46.00	-13.53	Average
5	0.844	31.47	-0.58	0.05	0.04	30.98	46.00	-15.02	Average
6	0.984	32.36	-0.62	0.42	0.05	32.21	46.00	-13.79	Average
7	1.100	47.48	-0.61	0.36	0.07	47.30	56.00	-8.70	QP
8	1.100	33.15	-0.61	0.36	0.07	32.97	46.00	-13.03	Average
9	1.197	32.39	-0.59	0.26	0.09	32.15	46.00	-13.85	Average
10	1.229	48.32	-0.59	0.23	0.10	48.06	56.00	-7.94	QP
11	1.388	47.50	-0.57	0.09	0.13	47.15	56.00	-8.85	QP
12	1.568	32.41	-0.55	-0.04	0.15	31.97	46.00	-14.03	Average

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Aux Factor + Cable Loss.

Product name:	LoRa Module	Product model:	WT5518
Test by:	Yayo	Test mode:	Lora mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 120 V/60 Hz	Environment:	Temp: 22.5℃ Humi: 55%

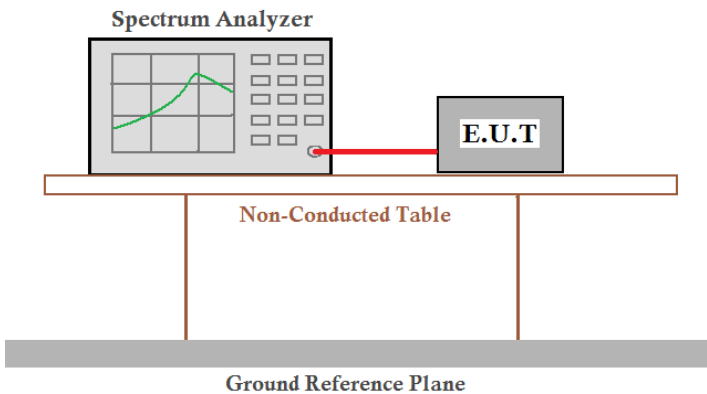


	Freq	Read	LISN	Aux	Cable	Level	Limit	Over	
	MHz	Level	Factor	Factor	Loss	dBuV	Line	Limit	Remark
		dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.194	47.32	-0.67	0.00	0.03	46.68	63.84	-17.16	QP
2	0.461	47.51	-0.64	0.00	0.03	46.90	56.67	-9.77	QP
3	0.461	33.02	-0.64	0.00	0.03	32.41	46.67	-14.26	Average
4	0.570	37.24	-0.65	0.03	0.02	36.64	46.00	-9.36	Average
5	0.573	50.80	-0.65	0.03	0.02	50.20	56.00	-5.80	QP
6	0.647	51.66	-0.64	0.04	0.02	51.08	56.00	-4.92	QP
7	0.647	38.24	-0.64	0.04	0.02	37.66	46.00	-8.34	Average
8	1.135	47.71	-0.69	0.10	0.08	47.20	56.00	-8.80	QP
9	1.135	34.73	-0.69	0.10	0.08	34.22	46.00	-11.78	Average
10	1.242	34.36	-0.69	0.11	0.10	33.88	46.00	-12.12	Average
11	1.331	34.00	-0.69	0.12	0.12	33.55	46.00	-12.45	Average
12	21.830	47.24	-1.30	0.43	0.16	46.53	60.00	-13.47	QP

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Aux Factor + Cable Loss.

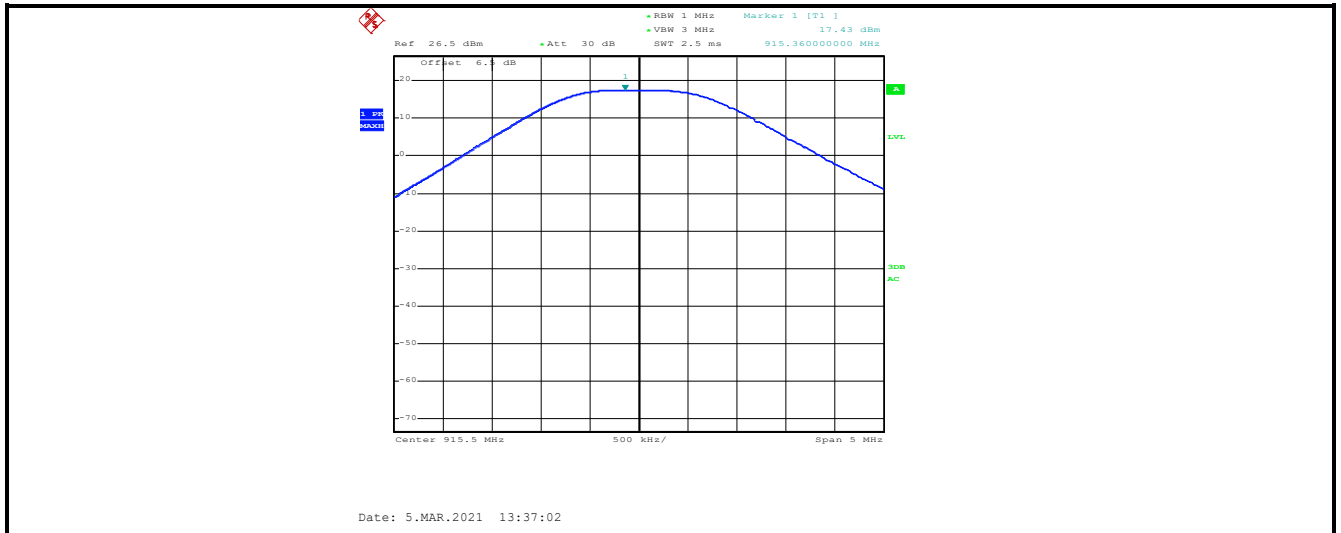
5.3 Conducted Output Power

Test Requirement:	FCC Part 15 C Section 15.247 (b)(3)
Limit:	30dBm
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.
Test Instruments:	Refer to section 5.9 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

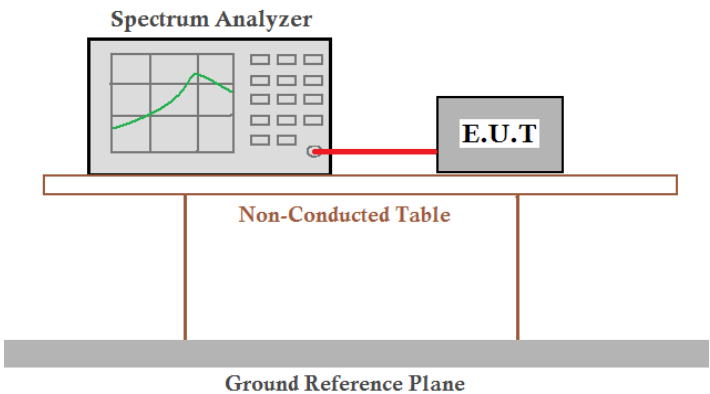
Measurement Data:

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit(dBm)	Result
915	17.43	30.00	Pass

Test plot as follows:



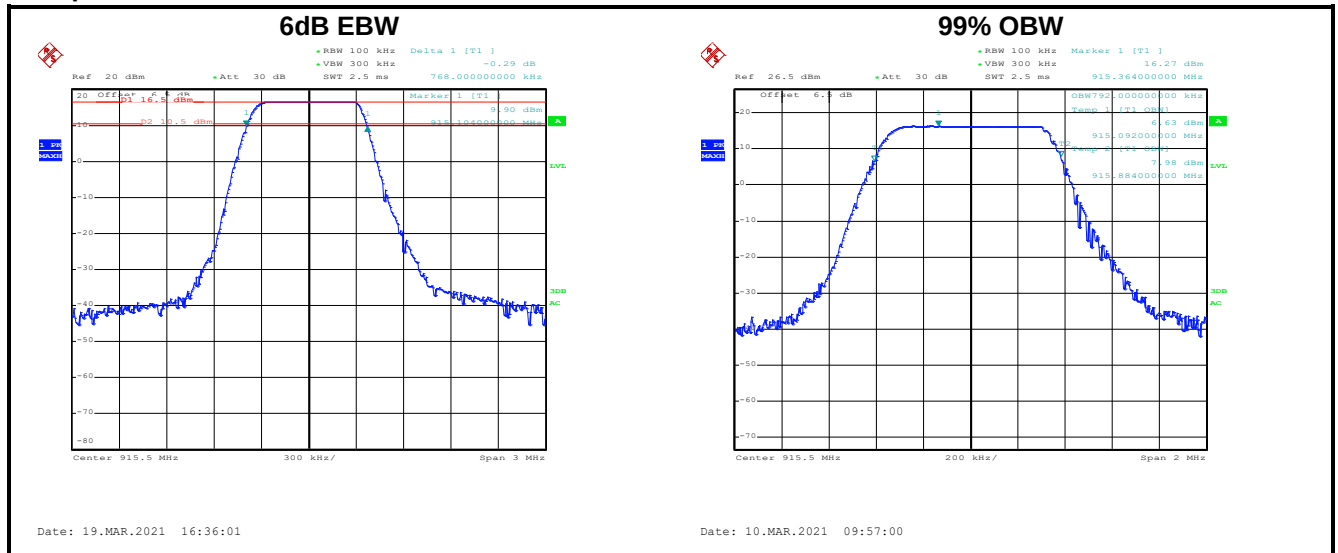
5.4 Occupy Bandwidth

Test Requirement:	FCC Part 15 C Section 15.247 (a)(2)
Limit:	>500kHz
Test setup:	
Test Instruments:	Refer to section 5.9 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

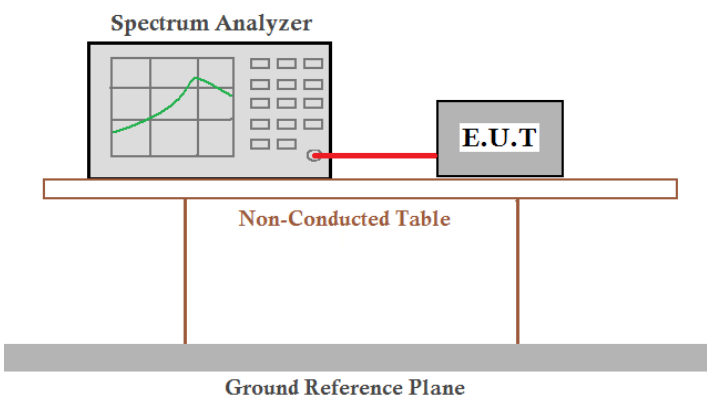
Measurement Data:

Test Frequency (MHz)	6dB Emission Bandwidth (MHz)	Limit(kHz)	Result
915	0.768	>500	Pass
Test Frequency (MHz)	99% Occupy Bandwidth (MHz)	Limit(kHz)	Result
915	0.792	N/A	N/A

Test plot as follows:



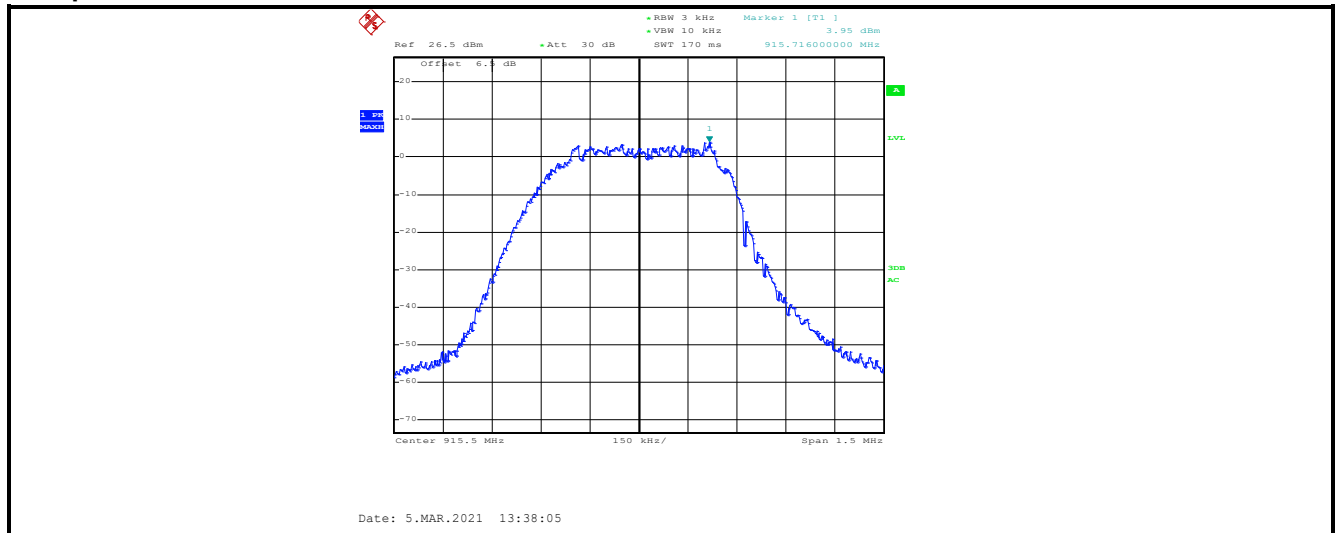
5.5 Power Spectral Density

Test Requirement:	FCC Part 15 C Section 15.247 (e)
Limit:	8 dBm/3kHz
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.
Test Instruments:	Refer to section 5.9 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data:

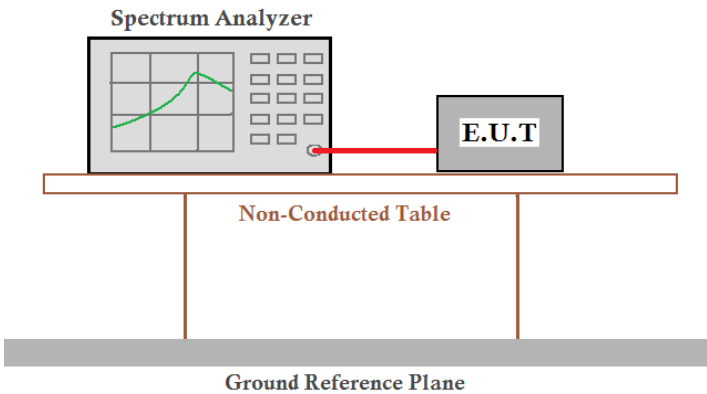
Test Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
915	3.95	8.00	Pass

Test plots as follow:

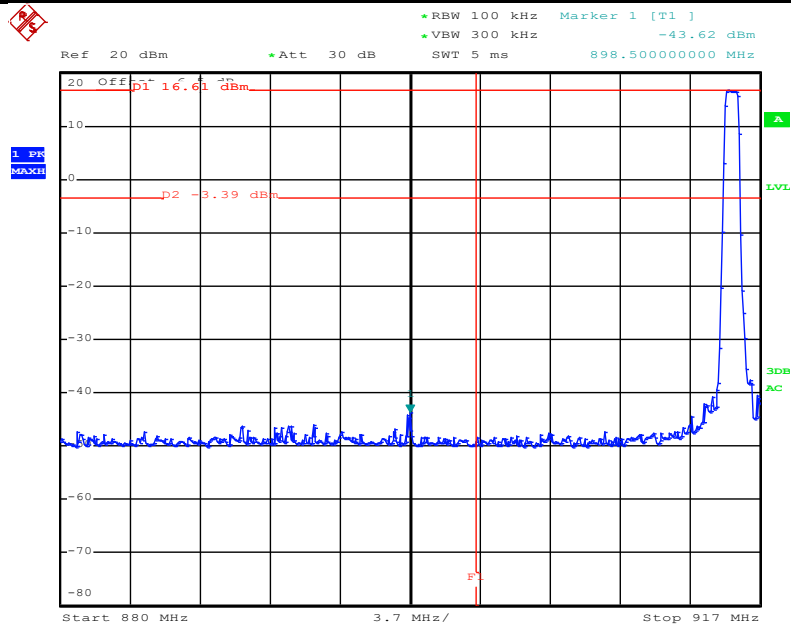


5.6 Band Edge

5.6.1 Conducted Emission Method

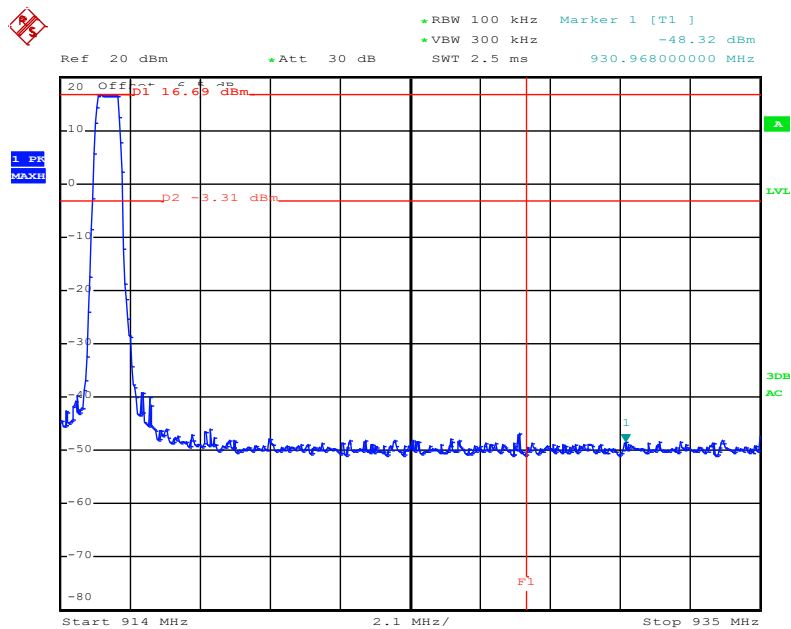
Test Requirement:	FCC Part 15 C Section 15.247 (d)
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	 The diagram illustrates the test setup for conducted emission measurement. A Spectrum Analyzer is connected via a red cable to an E.U.T (Equipment Under Test). Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.
Test Instruments:	Refer to section 5.9 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test plots as follow:



Date: 19.MAR.2021 16:37:26

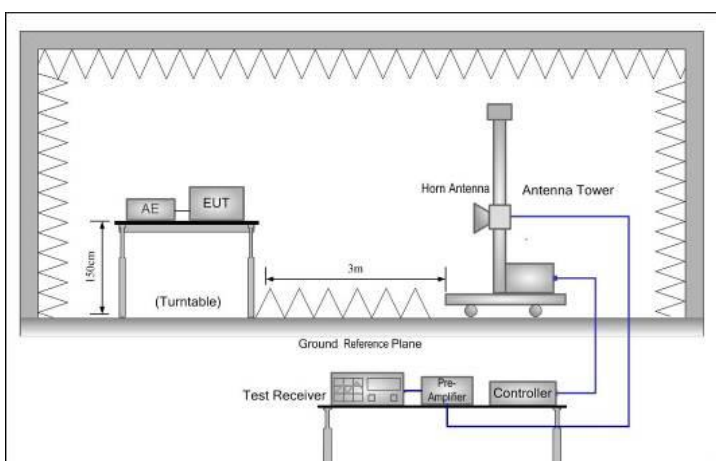
Lowest channel



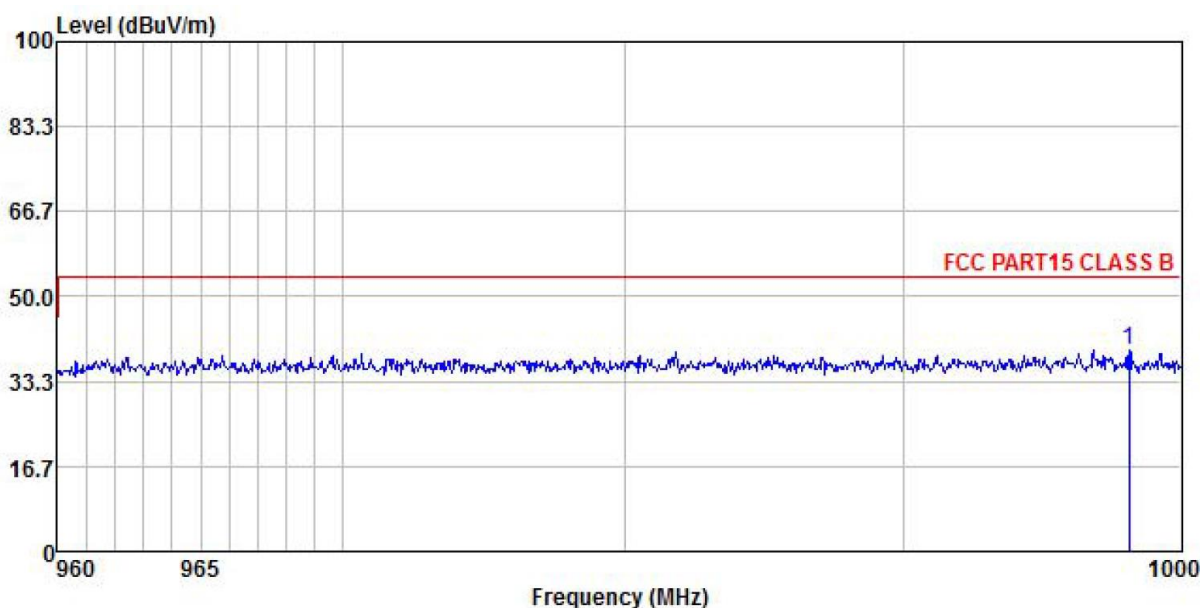
Date: 19.MAR.2021 16:38:25

Highest channel

5.6.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C Section 15.205 and 15.209				
Test Frequency Range:	2310 MHz to 2390 MHz and 2483.5MHz to 2500 MHz				
Test Distance:	3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
RMS		1MHz	3MHz	Average Value	
Limit:	Frequency	Limit (dBuV/m @3m)		Remark	
	Above 1GHz	54.00		Average Value	
		74.00		Peak Value	
Test Procedure:	1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.				
Test setup:					
Test Instruments:	Refer to section 5.9 for details				
Test mode:	Refer to section 5.3 for details				
Test results:	Passed				

Product Name:	LoRa Module	Product Model:	WT5518
Test By:	Yaro	Test mode:	Lora Tx mode
Test Channel:	Lowest channel	Polarization:	Vertical
Test Voltage:	CR 17345 3V	Environment:	Temp: 24℃ Humi: 57%

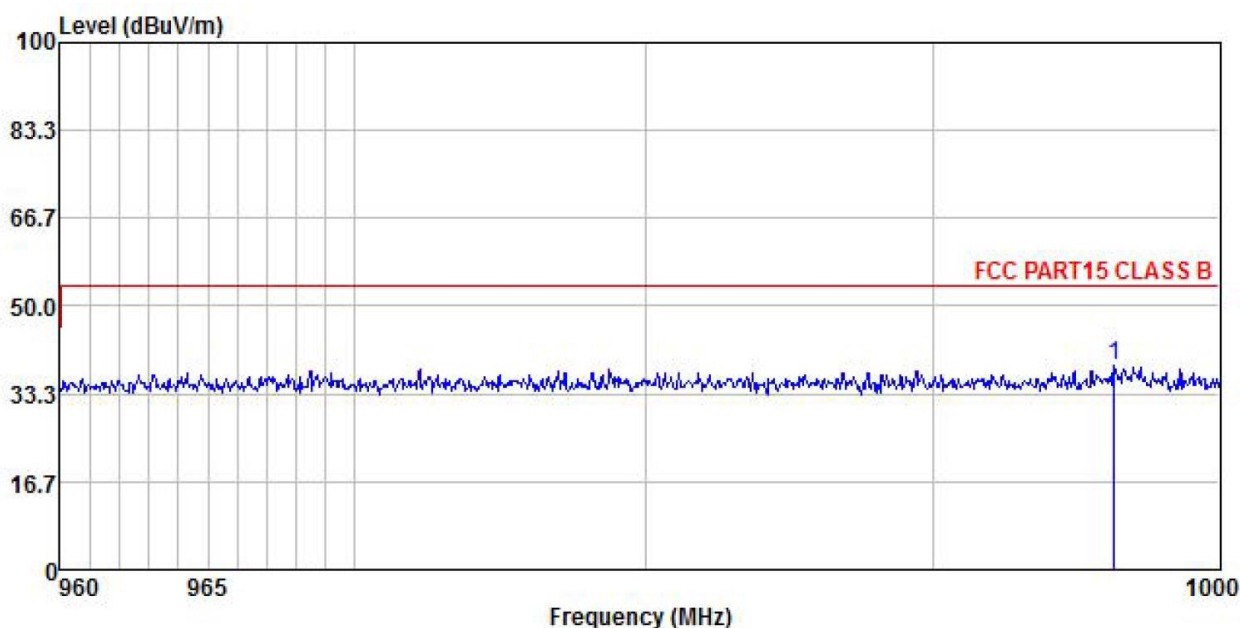


	Freq	ReadAntenna	Cable	Aux	Preamp	Level	Limit	Over	Remark
	MHz	Level	Factor	Loss	Factor	Factor	dBuV/m	dBuV/m	dB
		dBuV	dB/m	dB	dB	dB	dBuV/m	dBuV/m	dB
1	998.124	16.40	23.08	0.00	0.00	0.00	39.48	54.00	-14.52

Remark:

- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
- The emission levels of other frequencies are lower than the limit 20dB and not show in test report.

Product Name:	LoRa Module	Product Model:	WT5518
Test By:	Yaro	Test mode:	Lora Tx mode
Test Channel:	Lowest channel	Polarization:	Horizontal
Test Voltage:	CR 17345 3V	Environment:	Temp: 24℃ Humi: 57%

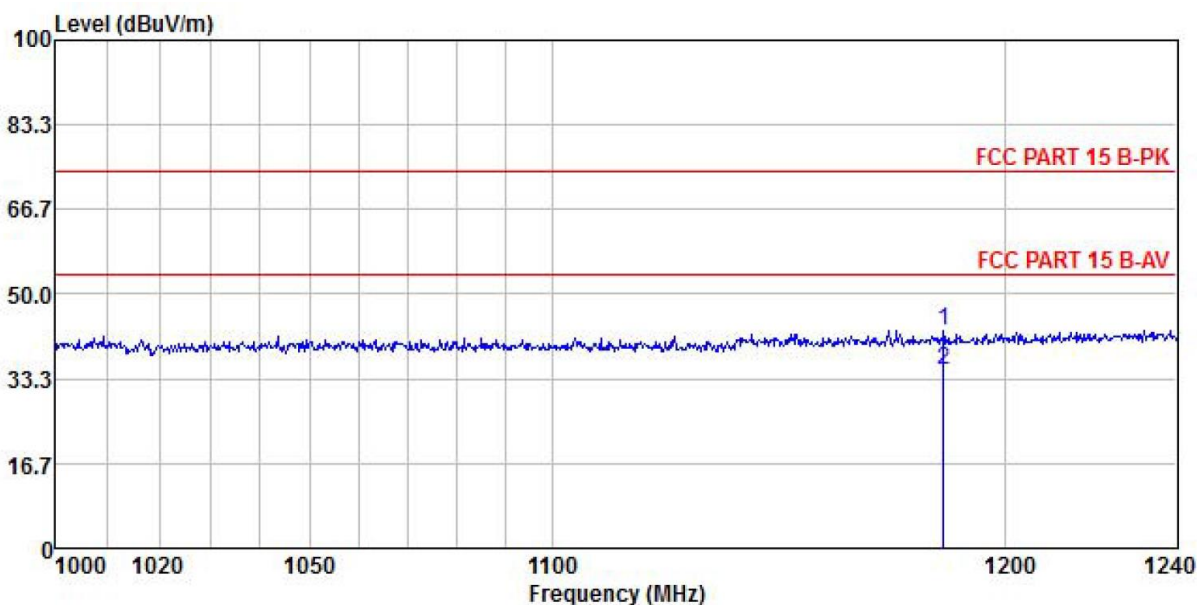


	ReadAntenna	Cable	Aux	Preamp		Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 996.292	15.75	23.08	0.00	0.00	0.00	38.83	54.00	-15.17

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are lower than the limit 20dB and not show in test report.

Product Name:	LoRa Module	Product Model:	WT5518
Test By:	Yaro	Test mode:	Lora Tx mode
Test Channel:	Highest channel	Polarization:	Vertical
Test Voltage:	CR 17345 3V	Environment:	Temp: 24℃ Huni: 57%

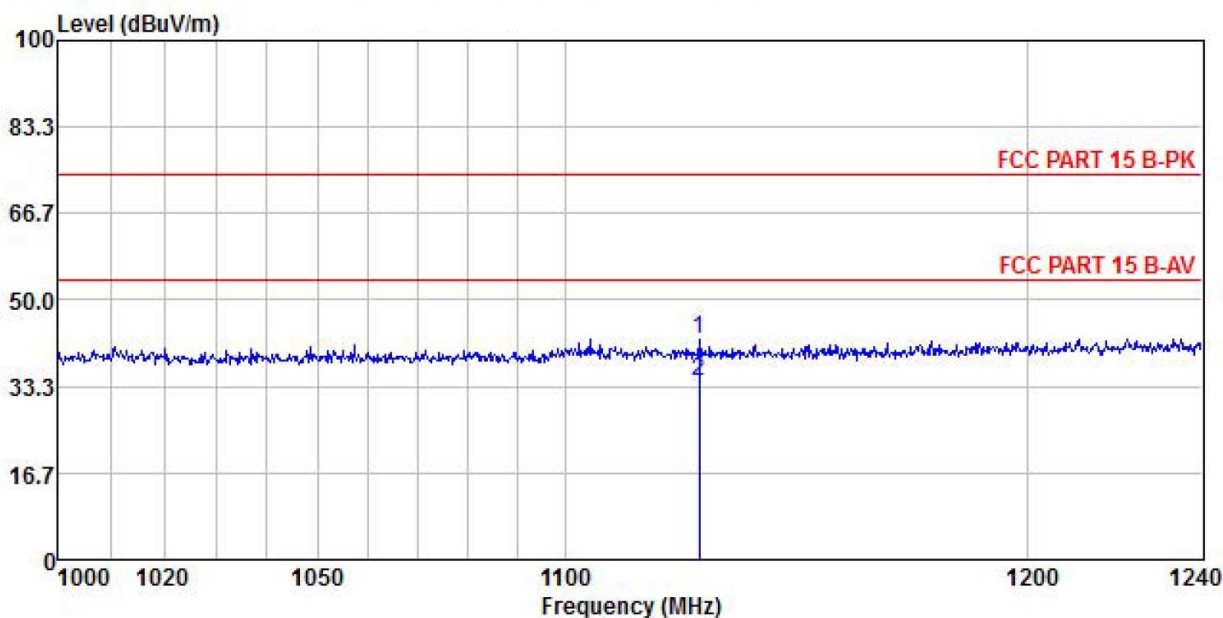


	Freq	Read	Antenna	Cable	Aux	Preamp	Level	Limit	Over	Remark
	MHz	Level	Factor	Loss	Factor	Factor	Level	Line	Limit	
		dBuV	dB/m	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	1185.741	18.65	24.29	0.00	0.00	0.00	42.94	74.00	-31.06	Peak
2	1185.741	10.83	24.29	0.00	0.00	0.00	35.12	54.00	-18.88	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are lower than the limit 20dB and not show in test report.

Product Name:	LoRa Module	Product Model:	WT5518
Test By:	Yaro	Test mode:	Lora Tx mode
Test Channel:	Highest channel	Polarization:	Horizontal
Test Voltage:	CR 17345 3V	Environment:	Temp: 24℃ Humi: 57%



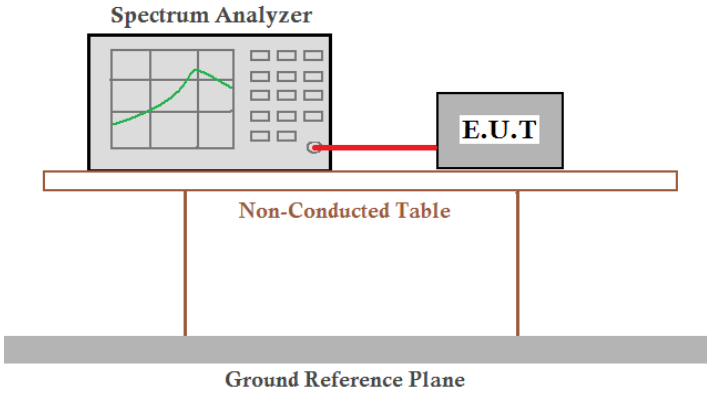
	Freq	ReadAntenna	Cable	Aux	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Factor	Line	Limit	Remark
		dBuV	dB/m	dB	dB	dB	dBuV/m	dBuV/m	dB
1	1128.018	18.14	24.27	0.00	0.00	0.00	42.41	74.00	-31.59 Peak
2	1128.018	10.16	24.27	0.00	0.00	0.00	34.43	54.00	-19.57 Average

Remark:

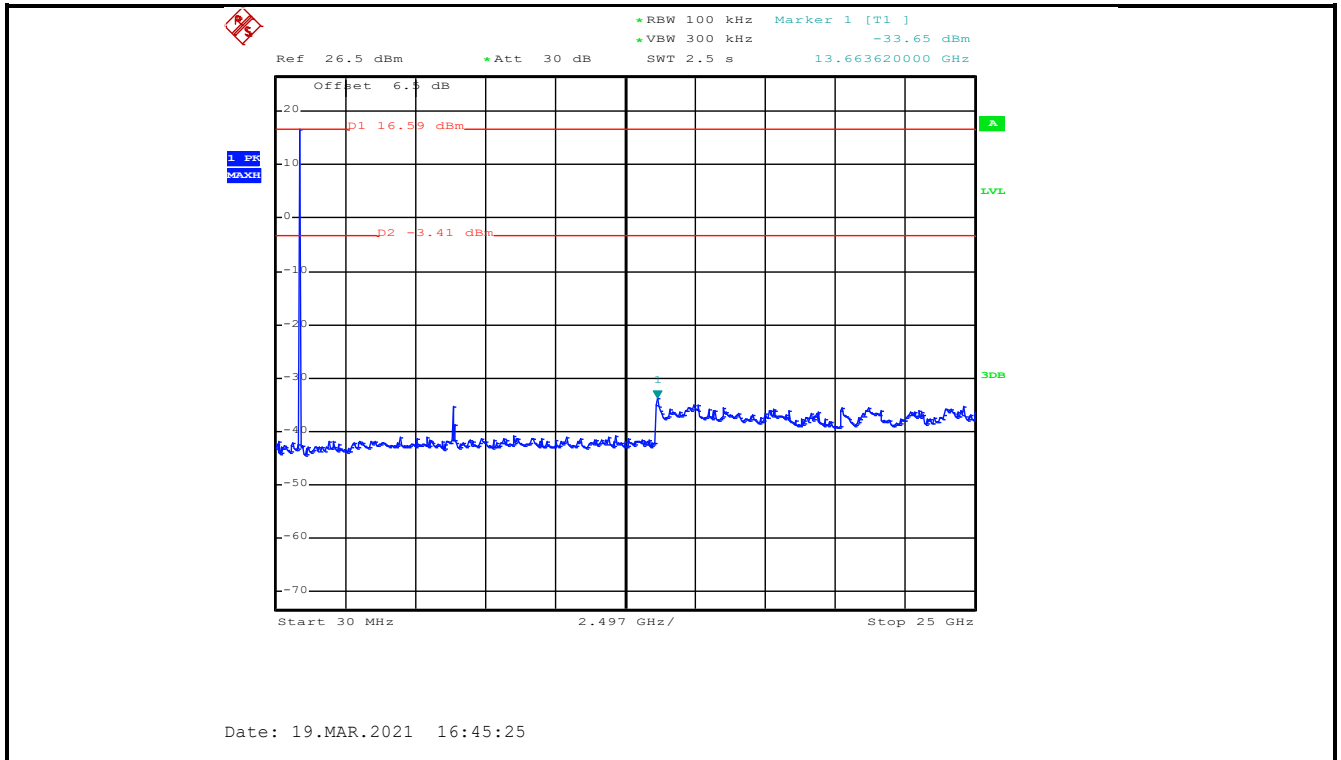
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are lower than the limit 20dB and not show in test report.

5.7 Spurious Emission

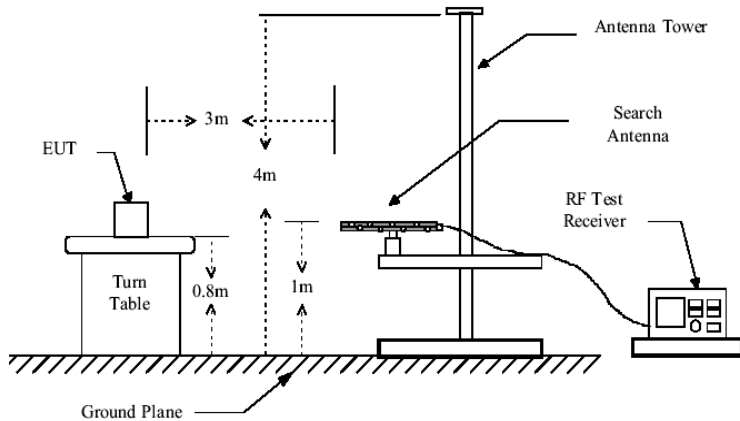
5.7.1 Conducted Emission Method

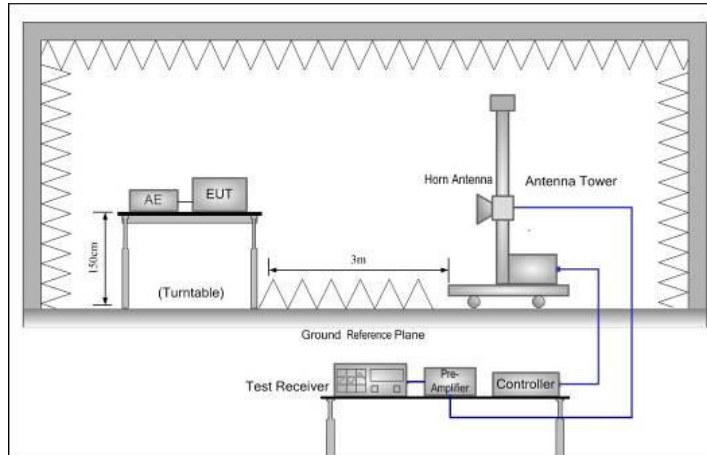
Test Requirement:	FCC Part 15 C Section 15.247 (d)
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	 The diagram illustrates the test setup for conducted emission measurements. A Spectrum Analyzer is connected to the Equipment Under Test (E.U.T.) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by two vertical legs and sits on a Ground Reference Plane, which is represented by a thick grey bar at the bottom of the diagram.
Test Instruments:	Refer to section 5.9 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test plot as follows:



5.7.2 Radiated Emission Method

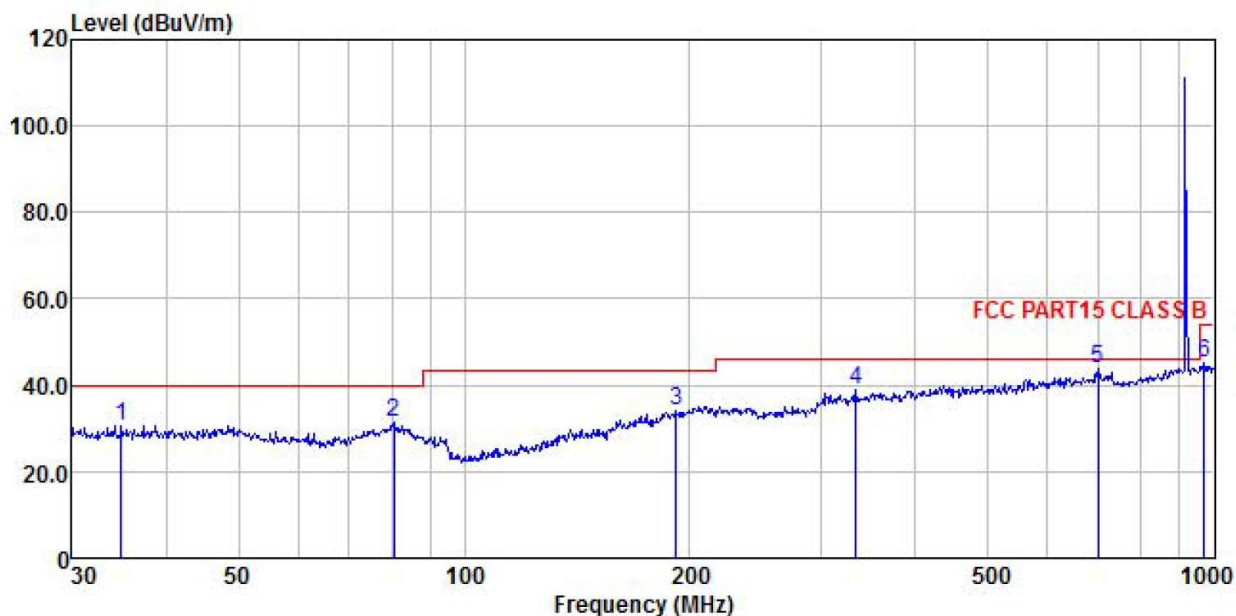
Test Requirement:	FCC Part 15 C Section 15.205 and 15.209				
Test Frequency Range:	9kHz to 25GHz				
Test Distance:	3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak RMS	1MHz 1MHz	3MHz 3MHz	Peak Value Average Value
Limit:	Frequency		Limit (dBuV/m @3m)		Remark
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Above 1GHz		54.0 74.0		Average Value Peak Value
Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8m(below 1GHz)/1.5m(above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.				
Test setup:	Below 1GHz  Above 1GHz				



Test Instruments:	Refer to section 5.9 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed
Remark:	1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case. 2. 9 kHz to 30MHz is lower than the limit 20dB, so only shows the data of above 30MHz in this report.

Measurement Data (worst case):
Below 1GHz:

Product Name:	LoRa Module	Product Model:	WT5518
Test By:	Yaro	Test mode:	Lora Tx mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Vertical
Test Voltage:	CR 17345 3V	Environment:	Temp: 24℃ Humi: 57%

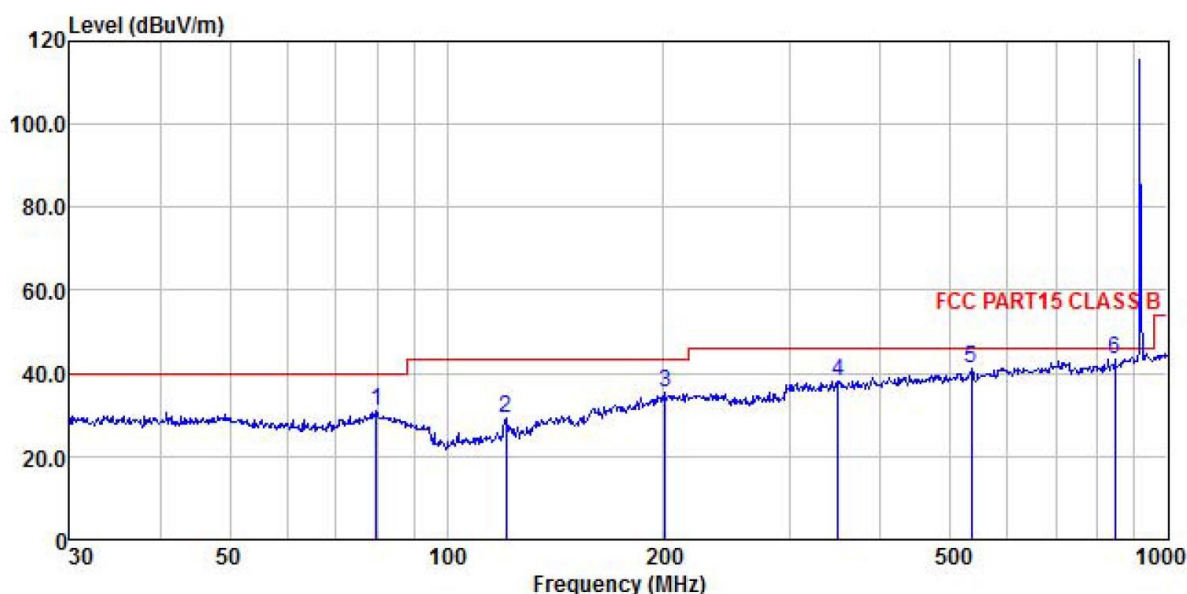


	Freq	ReadAntenna	Cable	Aux	Preamp	Level	Limit	Over	Remark
	MHz	Level	Factor	Loss	Factor	Factor	Line	Limit	
		dBuV	dB/m	dB		dB	dBuV/m	dB	
1	34.882	17.70	12.58	0.39	0.00	0.00	30.67	40.00	-9.33 QP
2	80.644	18.28	12.66	0.69	0.00	0.00	31.63	40.00	-8.37 QP
3	191.745	15.20	17.55	1.37	0.00	0.00	34.12	43.50	-9.38 QP
4	332.519	18.27	18.77	1.85	0.00	0.00	38.89	46.00	-7.11 QP
5	699.305	20.30	20.50	2.83	0.00	0.00	43.63	46.00	-2.37 QP
6	968.934	18.64	22.92	3.55	0.00	0.00	45.11	54.00	-8.89 QP

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are lower than the limit 20dB and not show in test report.
3. The Aux Factor is a notch filter switch box loss, this item is not used.

Product Name:	LoRa Module	Product Model:	WT5518
Test By:	Yaro	Test mode:	Lora Tx mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	CR 17345 3V	Environment:	Temp: 24℃ Humi: 57%



	Freq	Read	Antenna	Cable	Aux	Preamp	Level	Limit	Over	Remark
	MHz	Level	Factor	Loss	Factor	Factor	Level	Line	Limit	
	MHz	dBuV	dB/m	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	79.800	17.74	12.73	0.69	0.00	0.00	31.16	40.00	-8.84	QP
2	120.699	17.60	10.82	0.90	0.00	0.00	29.32	43.50	-14.18	QP
3	200.688	15.55	18.30	1.43	0.00	0.00	35.28	43.50	-8.22	QP
4	349.250	17.60	18.80	1.89	0.00	0.00	38.29	46.00	-7.71	QP
5	533.832	19.16	19.54	2.43	0.00	0.00	41.13	46.00	-4.87	QP
6	845.088	18.81	21.34	3.21	0.00	0.00	43.36	46.00	-2.64	QP

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamp Factor.
2. The emission levels of other frequencies are lower than the limit 20dB and not show in test report.
3. The Aux Factor is a notch filter switch box loss, this item is not used.

Above 1GHz

Detector: Peak Value									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Aux Factor (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1831.00	71.92	25.33	7.82	0.00	54.71	50.36	74.00	-23.64	Vertical
1831.00	74.35	25.33	7.82	0.00	54.71	52.79	74.00	-21.21	Horizontal
Detector: Average Value									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Aux Factor (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1831.00	61.88	25.33	7.82	0.00	54.71	40.32	54.00	-13.68	Vertical
1831.00	64.36	25.33	7.82	0.00	54.71	42.80	54.00	-11.20	Horizontal
Remark: 1. Final Level =Receiver Read level + Antenna Factor + Cable Loss + Aux Factor – Preamplifier Factor. 2. The emission levels of other frequencies are lower than the limit 20dB and not show in test report.									