Test Report

Verified code: 401451

Report No.:E202110111758-1-G1

Customer:	Wifx Sarl
Address:	Avenue des Sciences 2, 1400 Yverdon-les-Bains, Switzerland
Sample Name:	Wifx L1
Sample Model:	Wifx L1
Receive Sample Date:	Nov.12,2021
Test Date:	Nov.13,2021 ~ Apr.27,2022
Reference Document:	CFR 47, FCC Part 15 Subpart C RADIO FREQUENCY DEVICES:Subpart C—Intentional Radiators
Test Result:	Pass

Prepared by: Reviewed by: Approved by:

GUANGZHOU GRG METROLOGY & TEST CO., LTD

Issued Date: 2022-07-12

GUANGZHOU GRG METROLOGY & TEST CO., LTD.
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Statement

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4. If there is any objection concerning the report, please inform us within 15 days from the date of receiving the report.

5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E202110111758-1	Original Issue	2022/05/18
2.0	E202110111758-1-G1	Update	2022/07/11

Version 2.0:

1. Update antenna specification: External antenna with SMA connector, 5dBi(Max) to External antenna with N connector, 5dBi (Max).
2. This report instead the report E202110111758-1, and from the date of issuance of this report, the report which being replaced become invalid.

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1. TEST RESULT SUMMARY

Technical Requirements		
FCC 47 CFR Part 15 Subpart C 15.247 ANSI C63.10-2013 KDB 558074 D01 15.247 measurement guidance v05r02		
Limit / Severity	**Item**	**Result**
§15.203	Antenna Requirement	Pass
§15.207(a)	Conducted Emission	Pass
§15.247(d)&15.205 &15.209	Radiated Spurious Emission and bandedge emissions	Pass
§15.247(b)(3)	Maximum conducted Output Power	Pass
§15.247(e)	Power Spectral Density	Pass
§15.247(a)(2)	6dB bandwidth	Pass
§15.247(d)	Conducted band edges and Spurious Emission	Pass

The EUT has one antenna. The antenna is External antenna with N connector.
The max gain of antenna is 5dBi.which accordance 15.203.is considered sufficient to comply with the provisions of this section.

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2. GENERAL DESCRIPTION OF EUT

2.1 APPLICANT

Name:	Wifx Sarl
Address:	Avenue des Sciences 2, 1400 Yverdon-les-Bains, Switzerland

2.2 MANUFACTURER

Name:	Wifx Sarl
Address:	Avenue des Sciences 2, 1400 Yverdon-les-Bains, Switzerland

2.3 FACTORY

Name:	Gugler Elektronik AG
Address:	Rte de Chesalles 62, 1723 Marly 1, Switzerland

2.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment:	Wifx L1
Model No.:	Wifx L1
Adding Model:	/
Trade Name:	Wifx
FCC ID:	2APAZ-WGW-L02-01
Power supply:	Input: DC 10V-48V 800mA-170mA (800mA max for DC 10V input, 350mA max for DC 24V input, 170mA for DC 48V input)
Adapter:	Model:HNP 121-240L6 Input:100-240V~50/60Hz 0.45A, Output:24.0V ⎓0.5A 12.0W
Frequency Range:	923.3 ~ 927.5MHz
Transmit Power:	24.518dBm(Average)
Modulation type:	LoRa
Antenna Specification:	External antenna with N connector, 5dBi (Max)
Temperature Range:	-30℃ ~ +70℃
Hardware Version:	1.0
Software Version:	1.4.0-certification.3
Sample No:	E202110111758-0001
Note:	The USB type-C connection should be used exclusively for service administration /configuration and should not be left connected during normal use.

2.5 CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00*	923.3	01	923.9	02	924.5	03	925.1
04	925.7	05	926.3	06	926.9	07*	927.5

*is the tested channel.

2.6 TEST OPERATION MODE

Mode No.	Description of the modes
1	fixed frequency transmitting

2.7 LOCAL SUPPORTIVE

Name of Equipment	Manufacturer	Model	Serial Number	Note
Cable				
DC cable(No.1)	/	/	/	Contain Ferrite magnetic ring & Shielded, 1.5m
RJ45 cable(No.2)	/	/	/	Shielded, 2.0m

Test software:

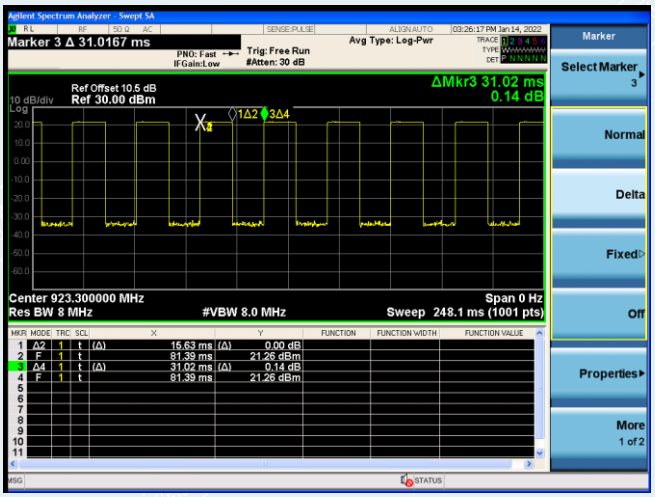
Software version	Test level
Putty	3

2.8 EUT TEST SETUP

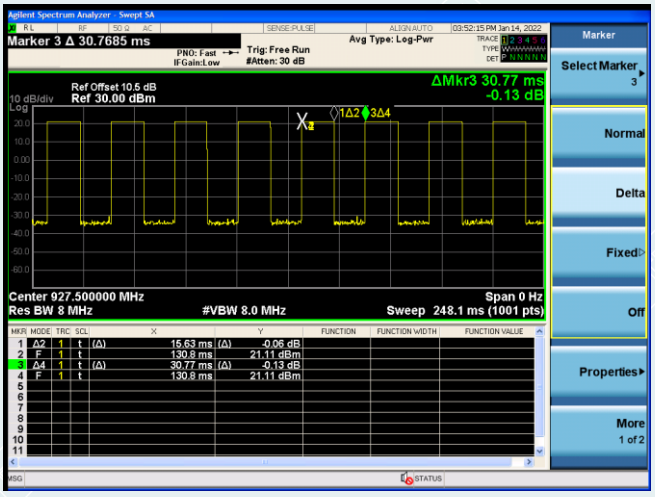
2.9 DUTY CYCLE

Frequency(MHz)	ON Time[ms]	Period[ms]	DC [%]	T [s]
923.3	15.63	31.02	50.39	0.01563
927.5	15.63	30.77	50.80	0.01563

923.3MHz



927.5MHz



3. LABORATORY AND ACCREDITATIONS

3.1 LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

Add	:	No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District Shenzhen, 518110, People's Republic of China
P.C.	:	518110
Tel	:	0755-61180008
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3.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	A2LA(Certificate #2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	ISED (Company Number: 24897，CAB identifier:CN0069)
USA	FCC (Registration Number: 759402，Designation Number:CN1198)

Copies of granted accreditation certificates are available for downloading from our web site, http://www.grgtest.com

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3.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement		Frequency	Uncertainty
Radiated Emission	Horizontal	9kHz～30MHz	4.46dB
		30MHz～1000MHz	4.3dB
		1GHz～10GHz	5.6dB
	Vertical	9kHz～30MHz	4.46dB
		30MHz～1000MHz	4.3dB
		1GHz～10GHz	5.6dB
Conduction Emission		9kHz～150kHz	2.8 dB
		150kHz～10MHz	2.8 dB
		10MHz～30MHz	2.2 dB

Measurement	Uncertainty
RF frequency	6.0×10^{-6}
RF power conducted	0.78 dB
Occupied channel bandwidth	0.4 dB
Unwanted emission, conducted	0.68 dB
Humidity	6 %
Temperature	2℃

This uncertainty represents an expanded uncertainty factor of *k*=2.

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4. LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Conducted Emissions				
EMI TEST RECEIVER	R&S	ESCI	100783	2022-09-13
LISN(EUT)	R&S	ENV216	101543	2022-09-14
Test S/W	EZ	CCS-3A1-CE		
Radiated Spurious Emission&Restricted bands of operation				
Loop Antenna	TESEQ	HLA6121	52599	2023-04-02
Bi-log Antenna	Schwarzbeck	VULB9160	VULB9160-3402	2022-10-27
Spectrum Analyzer	Agilent	N9020B	MY57120179	2022-08-08
Horn Antenna	Schwarzbeck	BBHA9120D (1201)	02143	2022-10-22
Preamplifiers	Tonscend	TAP01018048	AP20E8060075	2022-06-07
Test S/W	Tonscend	JS36-RE/2.5.1.5		
6dB Bandwidth				
Spectrum Analyzer	Agilent	N9010A	MY55370330	2022-11-08
Maximum Conducted Output Power				
Spectrum Analyzer	Agilent	N9010A	MY55370330	2022-11-08
Conducted band edges and Spurious Emission				
Spectrum Analyzer	Agilent	N9010A	MY55370330	2022-11-08
Power Spectral Density				
Spectrum Analyzer	Agilent	N9010A	MY55370330	2022-11-08

Note: The calibration interval of the above test instruments is 12 months.

5. CONDUCTED EMISSION MEASUREMENT

5.1 LIMITS

Frequency range	Limits (dBμV)	
	Quasi-peak	Average
150kHz～0.5MHz	66～56	56～46
0.5 MHz～5 MHz	56	46
5 MHz～30 MHz	60	50

NOTE: (1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases in line with the logarithm of the frequency in the range of 150 kHz to 0.5MHz.

5.2 TEST PROCEDURES

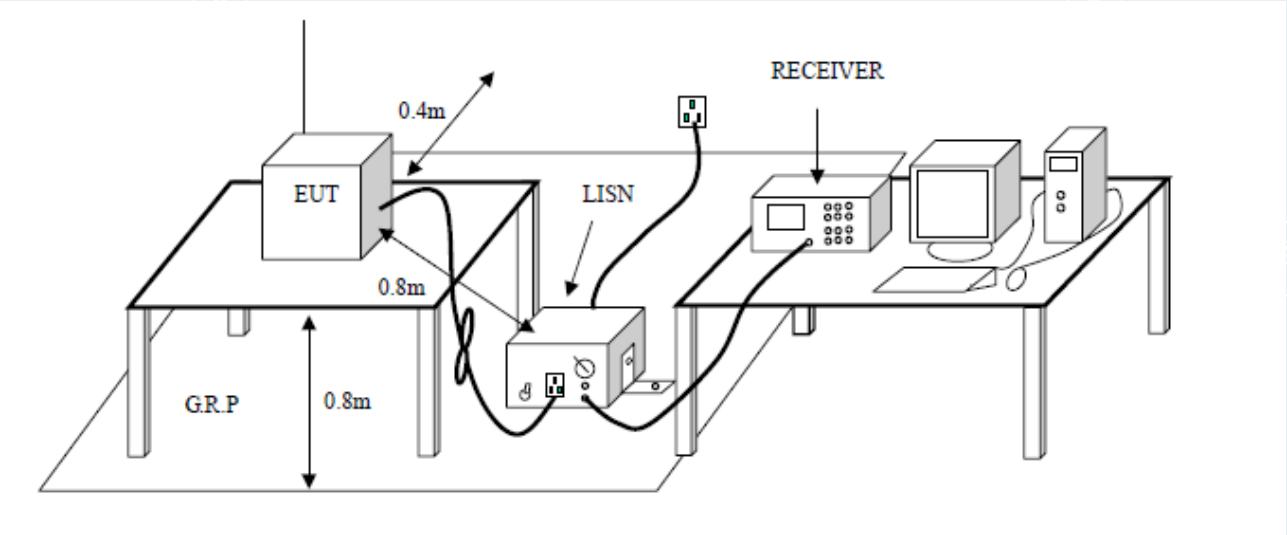
Procedure of Preliminary Test

Test procedures follow ANSI C63.10:2013.
For measurement of the disturbance voltage the equipment under test (EUT) is connected to the power supply mains and any other extended network via one or more artificial network(s). An EUT, whether intended to be grounded or not, and which is to be used on a table is configured as follows:
– Either the bottom or the rear of the EUT shall be at a controlled distance of 40 cm from a reference ground plane. This ground plane is normally the wall or floor of a shielded room. It may also be a grounded metal plane of at least 2 m by 2 m. This is physically accomplished as follows:
1) place the EUT on a table of non-conducting material which is at least 80 cm high. Place the EUT so that it is 40 cm from the wall of the shielded room, or
2) place the EUT on a table of non-conducting material which is 40 cm high so that the bottom of the EUT is 40 cm above the ground plane;
– All other conductive surfaces of the EUT shall be at least 80 cm from the reference ground plane;
– The EUT are placed on the floor that one side of the housings is 40 cm from the vertical reference ground plane and other metallic parts;
– Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 cm to 40 cm long, hanging approximately in the middle between the ground plane and the table.
– I/O cables that are connected to a peripheral shall be bundled in the centre. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.
The test mode(s) described in Item 2.6 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.6 producing the highest emission level.The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

5.3 TEST SETUP



5.4 DATA SAMPLE

Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XXXX	32.69	25.65	11.52	44.21	37.17	65.78	55.79	-21.57	-18.62	Pass

Factor = Insertion loss of LISN + Cable Loss
Result = Quasi-peak Reading/ Average Reading + Factor
Limit =Limit stated in standard
Margin = Result (dBuV) – Limit (dBuV)

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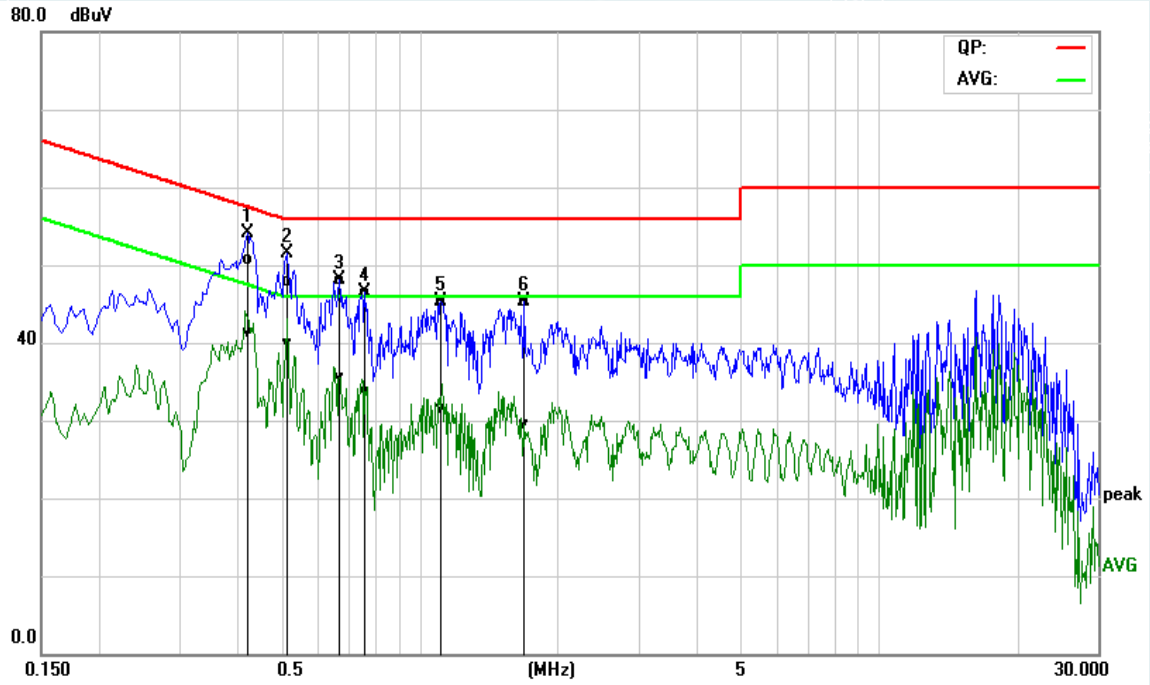
5.5 TEST RESULTS

Recorded the worst case lowest channel 923.3MHz test results in the report.

EUT Name	Wifx L1	Model	Wifx L1
Environmental Conditions	23.1℃/45%RH	Test Mode	Mode 1
Tested By	Tang Shenghui	Line	L
Tested Date	2022-04-27	Test Voltage	AC120V/60Hz

(The chart below shows the highest readings taken from the final data.)



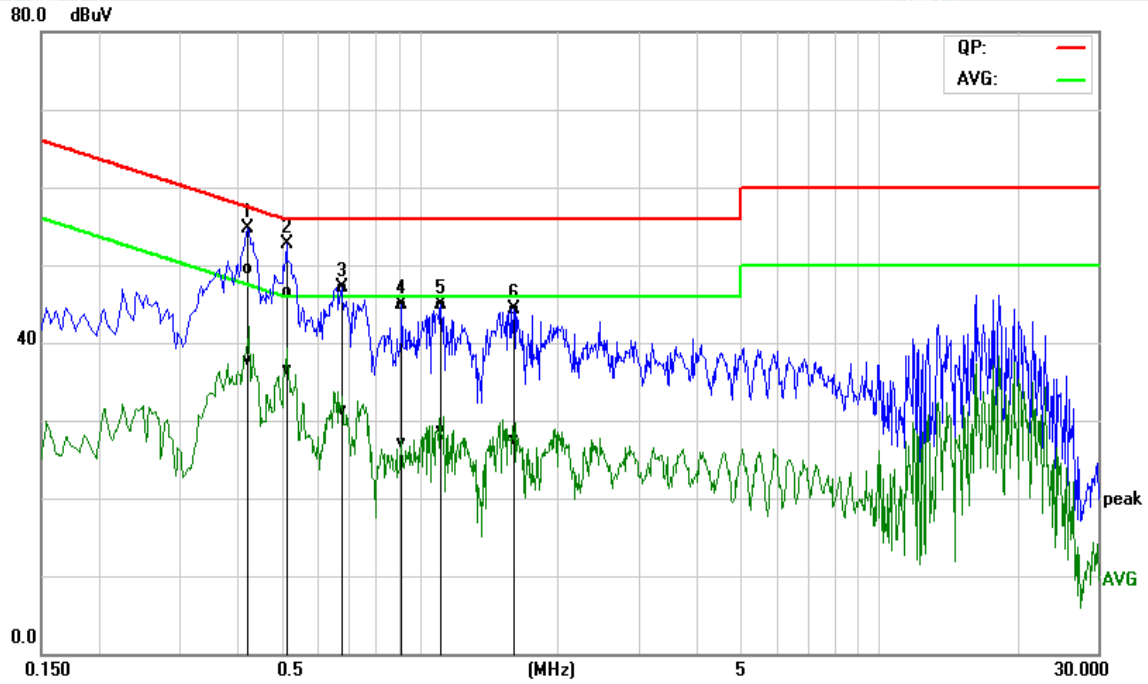
No.	Frequency	Quasi Peak reading	Average reading	Correction factor	Quasi Peak result	Average result	Quasi Peak limit	Average limit	Quasi Peak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1*	0.4253	41.16	31.73	9.57	50.73	41.30	57.34	47.34	-6.61	-6.04	Pass
2	0.5113	38.41	30.28	9.57	47.98	39.85	56.00	46.00	-8.02	-6.15	Pass
3	0.6700	38.47	25.86	9.57	48.04	35.43	56.00	46.00	-7.96	-10.57	Pass
4	0.7620	36.90	24.20	9.57	46.47	33.77	56.00	46.00	-9.53	-12.23	Pass
5	1.1140	35.63	21.97	9.59	45.22	31.56	56.00	46.00	-10.78	-14.44	Pass
6	1.6900	35.65	19.93	9.60	45.25	29.53	56.00	46.00	-10.75	-16.47	Pass

REMARKS: *L = Live Line*

Pre-scan all mode and recorded the worst case results in this report lowest channel.

EUT Name	Wifx L1	Model	Wifx L1
Environmental Conditions	23.1℃/45%RH	Test Mode	Mode 1
Tested By	Tang Shenghui	Line	N
Tested Date	2022-04-27	Test Voltage	AC120V/60Hz

(The chart below shows the highest readings taken from the final data.)



No.	Frequency	Quasi Peak reading	Average reading	Correction factor	Quasi Peak result	Average result	Quasi Peak limit	Average limit	Quasi Peak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1*	0.4256	39.90	27.97	9.67	49.57	37.64	57.34	47.34	-7.77	-9.70	Pass
2	0.5166	36.81	26.73	9.70	46.51	36.43	56.00	46.00	-9.49	-9.57	Pass
3	0.6780	37.39	21.63	9.66	47.05	31.29	56.00	46.00	-8.95	-14.71	Pass
4	0.9140	35.24	17.47	9.64	44.88	27.11	56.00	46.00	-11.12	-18.89	Pass
5	1.1140	35.20	19.15	9.63	44.83	28.78	56.00	46.00	-11.17	-17.22	Pass
6	1.6019	34.67	17.85	9.62	44.29	27.47	56.00	46.00	-11.71	-18.53	Pass

REMARKS: *N = Neutral Line.*
Pre-scan all mode and recorded the worst case results in this report lowest channel.

6. RADIATED SPURIOUS EMISSIONS AND BANDEDGE EMISSIONS

6.1 LIMITS

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.

Frequency (MHz)	Quasi-peak(μV/m)	Measurement distance(m)	Quasi-peak(dBμV/m)@distance 3m
0.009-0.490	2400/F(kHz)	300	128.5~93.8
0.490-1.705	24000/F(kHz)	30	73.8~63
1.705-30.0	30	30	69.5
30 ~ 88	100	3	40
88~216	150	3	43.5
216 ~ 960	200	3	46
Above 960	500	3	54

NOTE:

(1) The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

(2) The lower limit shall apply at the transition frequencies.

For bandedge emissions:

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.

6.2 TEST PROCEDURES

1) Sequence of testing 9kHz to 30MHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0 °to 360 °.

--- The antenna height is 1.0 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the pre measurement the software maximizes by rotating the turntable position (0 °to 360 °) and by rotating the elevation axes (0 °to 360 °).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QP detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement and the limit will be stored.

2) Sequence of testing 30MHz to 1GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0 °to 360 °.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 4 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable rotates from 0 °to 360 °and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1GHz to 10GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0 °to 360 °.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 4 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable rotates from 0 °to 360 °and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement with marked maximum final measurements and the limit will be stored.

Pre measurement:

--- The antenna is moved spherical over the EUT in different polarisations of the antenna.

Final measurement:

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.
--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

NOTE:
(a).The frequency from 9kHz to 150kHz, Set RBW=300Hz(for Peak & AVG), VBW=300Hz(for Peak & AVG). The frequency from 150kHz to 30MHz, Set RBW=9kHz, VBW=9kHz, (for QP Detector).
(b).The frequency from 30MHz to 1GHz, Set RBW=120kHz, VBW=300kHz, (for QP Detector).
(c).The frequency above 1GHz, for Peak detector: Set RBW=1MHz,VBW=3MHz.
(d). The frequency above 1GHz, for Avg detector: Set RBW=1MHz, if the EUT is configured to transmit with duty cycle ≥98%, set VBW≤RBW/100 (i.e.,10kHz) but not less than 10Hz. Where duty cycle is defined in section 2.9. If the EUT duty cycle is ＜98%， set VBW≥1/T, Where T is defined in section 2.9.

6.3 TEST SETUP

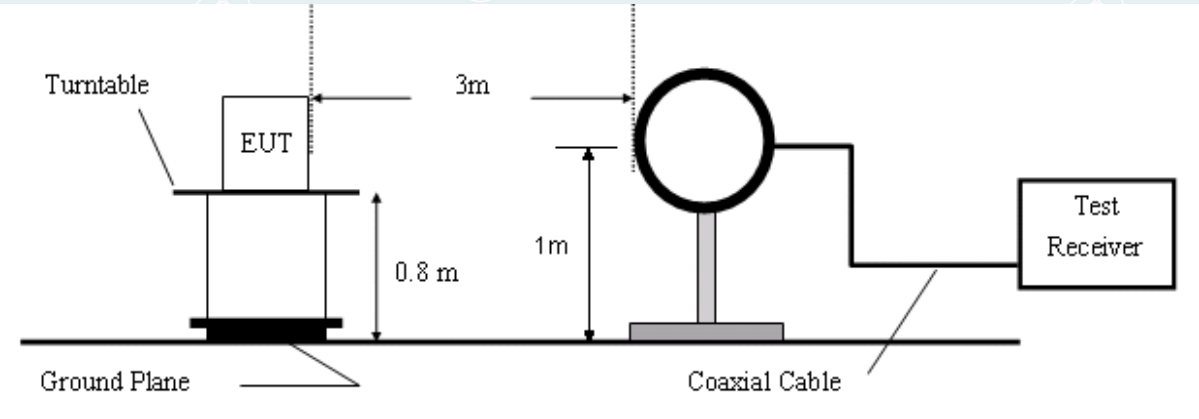


Figure 1. 9kHz to 30MHz radiated emissions test configuration

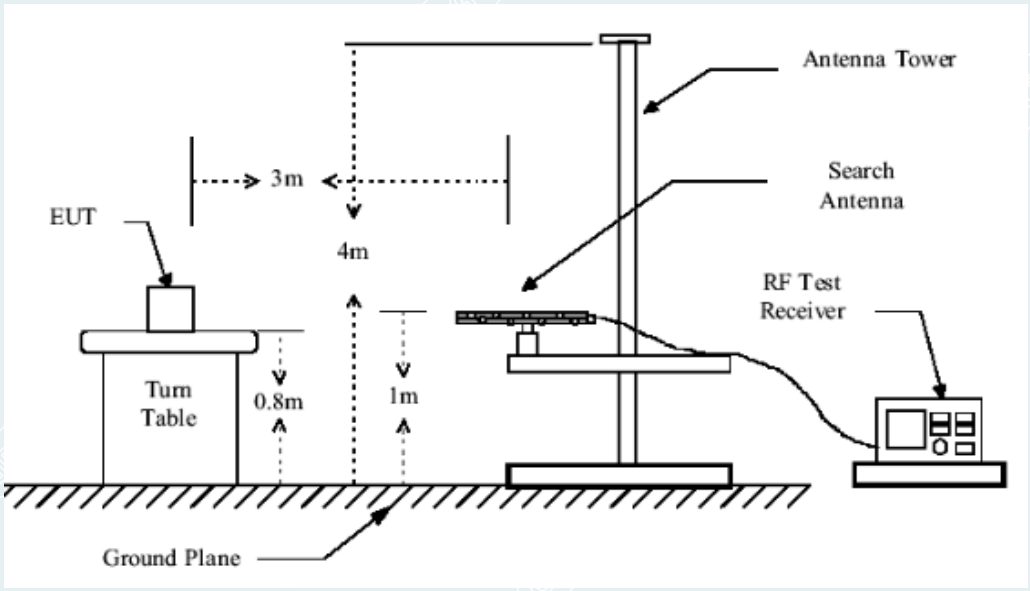


Figure 2. 30MHz to 1GHz radiated emissions test configuration

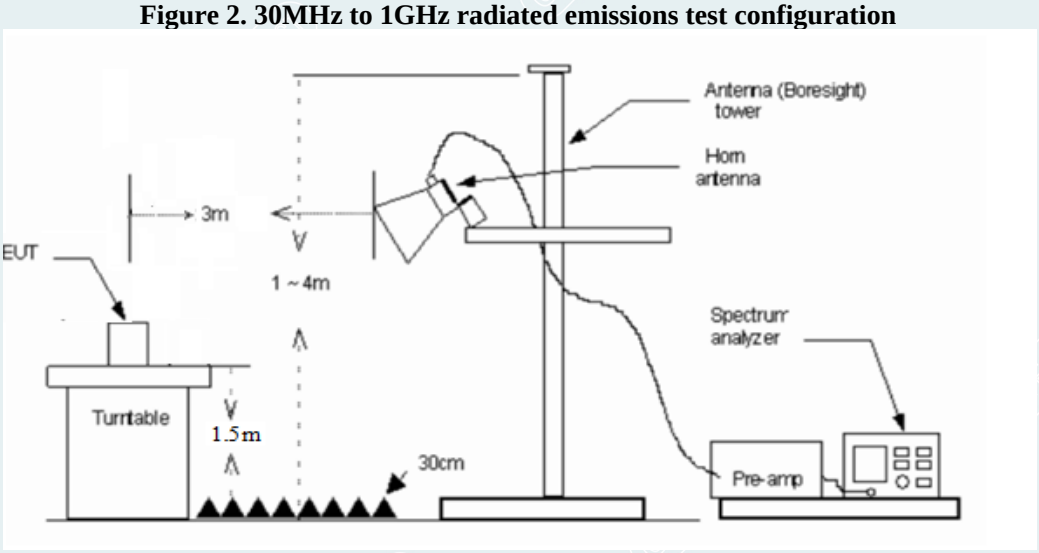


Figure 3. 1GHz to 10GHz radiated emissions test configuration

6.4 DATA SAMPLE

30MHz to 1GHz

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Pole
xxx	xxx	37.06	-15.48	21.58	40.00	-18.42	QP	Vertical

1GHz-10GHz

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Pole
xxx	xxx	65.45	-11.12	54.33	74.00	-19.67	Peak	Vertical
xxx	xxx	63.00	-11.12	51.88	54.00	-2.12	AVG	Vertical

Frequency (MHz) = Emission frequency in MHz

Ant.Pol. (H/V) = Antenna polarization

Reading (dBuV) = Uncorrected Analyzer / Receiver reading

Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain

Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)

Limit (dBuV/m) = Limit stated in standard

Margin (dB) = Remark Result (dBuV/m) – Limit (dBuV/m)

Peak = Peak Reading

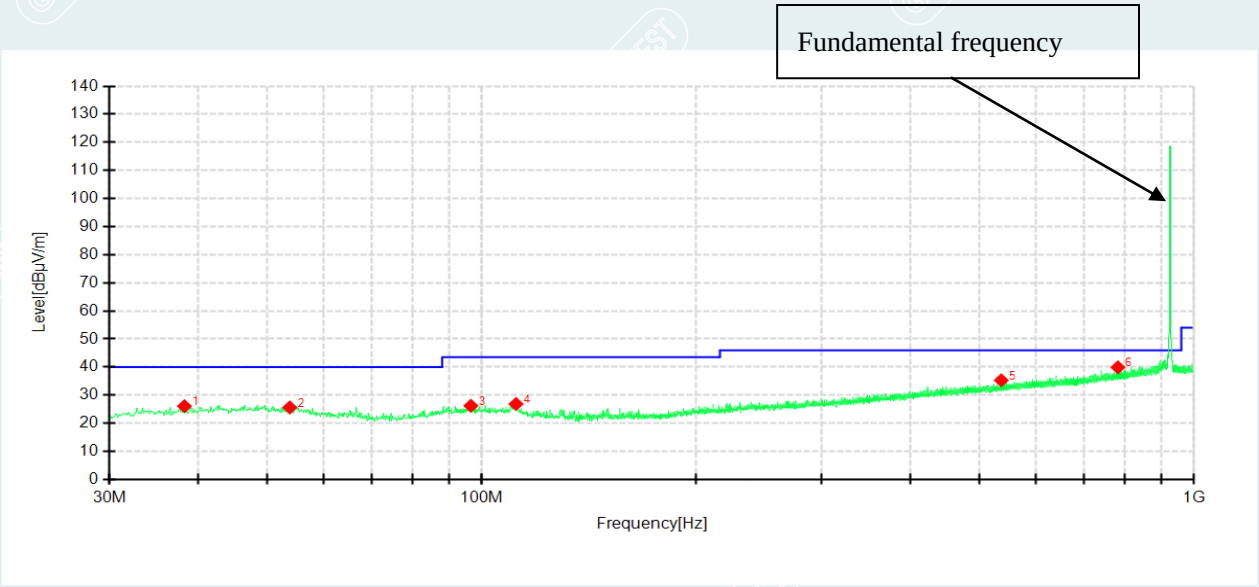
QP = Quasi-peak Reading

AVG = Average Reading

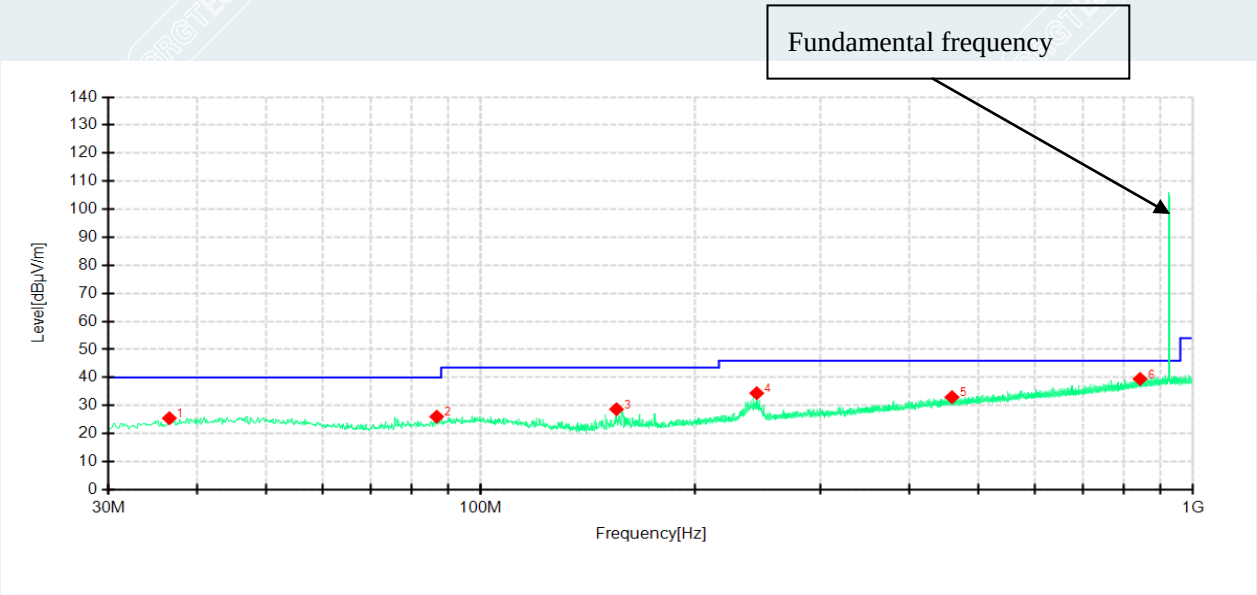
6.5 TEST RESULTS

Below 1GHz

Equipment:	Wifx L1	Test Date	2022-02-11
Model No.:	Wifx L1	Test Engineer:	Lu Qiang
Mode:	TX	Frequency:	927.5MHz
Test Voltage:	AC 120V/60Hz	Environmental Conditions:	25℃/60%RH



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	38.2450	39.58	26.07	-13.51	40.00	13.93	100	210	Vertical
2	53.7650	38.89	25.62	-13.27	40.00	14.38	100	232	Vertical
3	96.5663	39.26	26.22	-13.04	43.50	17.28	100	13	Vertical
4	111.7225	40.54	26.87	-13.67	43.50	16.63	100	84	Vertical
5	536.4613	40.13	35.29	-4.84	46.00	10.71	200	177	Vertical
6	782.1138	40.99	39.92	-1.07	46.00	6.08	100	204	Vertical



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.5475	39.38	25.48	-13.90	40.00	14.52	100	215	Horizontal
2	86.7450	40.11	26.03	-14.08	40.00	13.97	200	216	Horizontal
3	155.1300	44.74	28.67	-16.07	43.50	14.83	100	237	Horizontal
4	244.1275	46.68	34.40	-12.28	46.00	11.60	100	177	Horizontal
5	458.8613	39.57	32.99	-6.58	46.00	13.01	100	106	Horizontal
6	842.9813	39.49	39.48	-0.01	46.00	6.52	200	265	Horizontal

Remark:

1 No emission found between lowest internal used/generated frequency to 30MHz.
2 Pre-scan all mode and recorded the worst case results in this report (TX-High Channel)
3 Measuring frequencies from 9kHz to the 1GHz.
4 Radiated emissions measured in frequency range from 30MHz to 1GHz were made with an instrument using Peak/Quasi-peak detector mode.
5 Data of measurement within this frequency range in the table above the reading of PK detector are more 6dB than QP limit, therefore it's unnecessary to performed QP scan.
6 The IF bandwidth of SPA between 30MHz to 1GHz was 120kHz.

1GHz-10GHz:

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Equipment:	Wifx L1	Test Date	2022-02-11
Model No.:	Wifx L1	Test Engineer:	Lu Qiang
Mode:	TX	Frequency:	923.3MHz
Test Voltage:	AC 120V/60Hz	Environmental Conditions:	25℃/60%RH

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1204.7756	60.80	36.40	-24.40	74.00	37.60	100	343	Horizontal
2	1330.7913	62.17	38.46	-23.71	74.00	35.54	100	21	Horizontal
3	1846.1058	67.59	46.23	-21.36	74.00	27.77	100	301	Horizontal
4	2000.2500	61.51	41.28	-20.23	74.00	32.72	200	359	Horizontal
5	4919.9900	50.82	41.41	-9.41	74.00	32.59	100	28	Horizontal
6	5995.6245	57.53	50.31	-7.22	74.00	23.69	200	277	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1163.1454	68.28	43.69	-24.59	74.00	30.31	200	272	Vertical
2	1847.2309	81.14	59.78	-21.36	74.00	14.22	200	198	Vertical
3	1993.4992	67.98	47.67	-20.31	74.00	26.33	100	359	Vertical
4	2675.3344	57.44	39.74	-17.70	74.00	34.26	200	299	Vertical
5	3331.2914	56.03	39.91	-16.12	74.00	34.09	200	279	Vertical
6	5998.9999	52.42	45.20	-7.22	74.00	28.80	200	116	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1846.6398	-21.35	72.27	50.92	54.00	3.08	190	184	Vertical

Equipment:	Wifx L1	Test Date	2022-02-11
Model No.:	Wifx L1	Test Engineer:	Lu Qiang
Mode:	TX	Frequency:	927.5MHz
Test Voltage:	AC 120V/60Hz	Environmental Conditions:	25℃/60%RH

Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1159.7700	60.34	35.73	-24.61	74.00	38.27	100	243	Horizontal
2	1855.1069	64.88	43.50	-21.38	74.00	30.50	200	212	Horizontal
3	2661.8327	55.49	37.73	-17.76	74.00	36.27	200	75	Horizontal
4	3618.2023	55.20	40.93	-14.27	74.00	33.07	200	178	Horizontal
5	6207.1509	49.15	43.42	-5.73	74.00	30.58	200	14	Horizontal
6	9513.9392	45.67	48.55	2.88	74.00	25.45	200	157	Horizontal

Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1167.6460	65.73	41.16	-24.57	74.00	32.84	100	310	Vertical
2	1663.8330	62.10	39.84	-22.26	74.00	34.16	200	326	Vertical
3	1855.1069	79.05	57.67	-21.38	74.00	16.33	200	97	Vertical
4	2997.1246	59.70	42.66	-17.04	74.00	31.34	100	263	Vertical
5	3613.7017	57.54	43.28	-14.26	74.00	30.72	200	222	Vertical
6	5566.9459	52.22	43.70	-8.52	74.00	30.30	100	206	Vertical

AV Final Data List

NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1855.1069	-21.37	68.14	46.77	54.00	7.23	198	82	Vertical

Remark:

1 Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

2 Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.

3 Average test would be performed if the peak result were greater than the average limit or as required by the applicant.

4 Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

7. 6dB BANDWIDTH

7.1 LIMITS

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

7.2 TEST PROCEDURES

1) Remove the antenna from the EUT, and then by a attenuator connected to the spectrum analyzer**.**
2) Set resolution bandwidth (RBW) = 100kHz.Set the video bandwidth (VBW) ≥ 3 x RBW.
3) Detector = Peak. Trace mode = Max hold. Sweep = auto couple. Allow the trace to stabilize, record 6dB bandwidth value.
4) Repeat above procedures until all frequencies measured were complete.

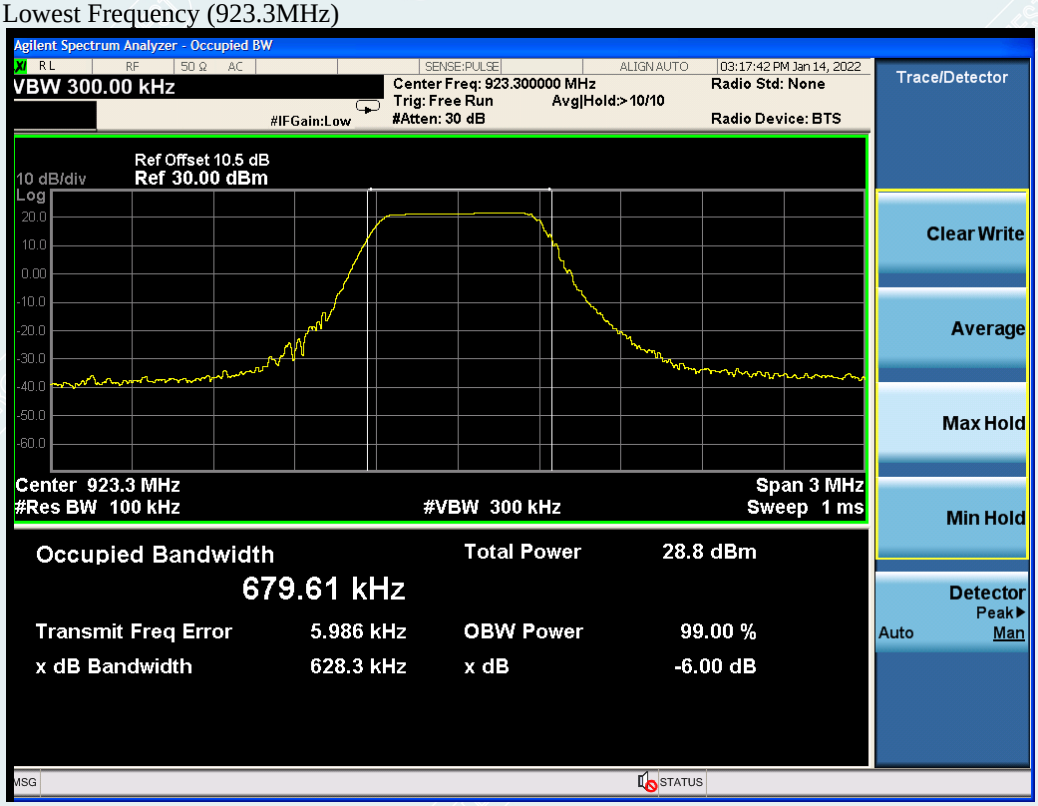
7.3 TEST SETUP

7.4 TEST RESULTS

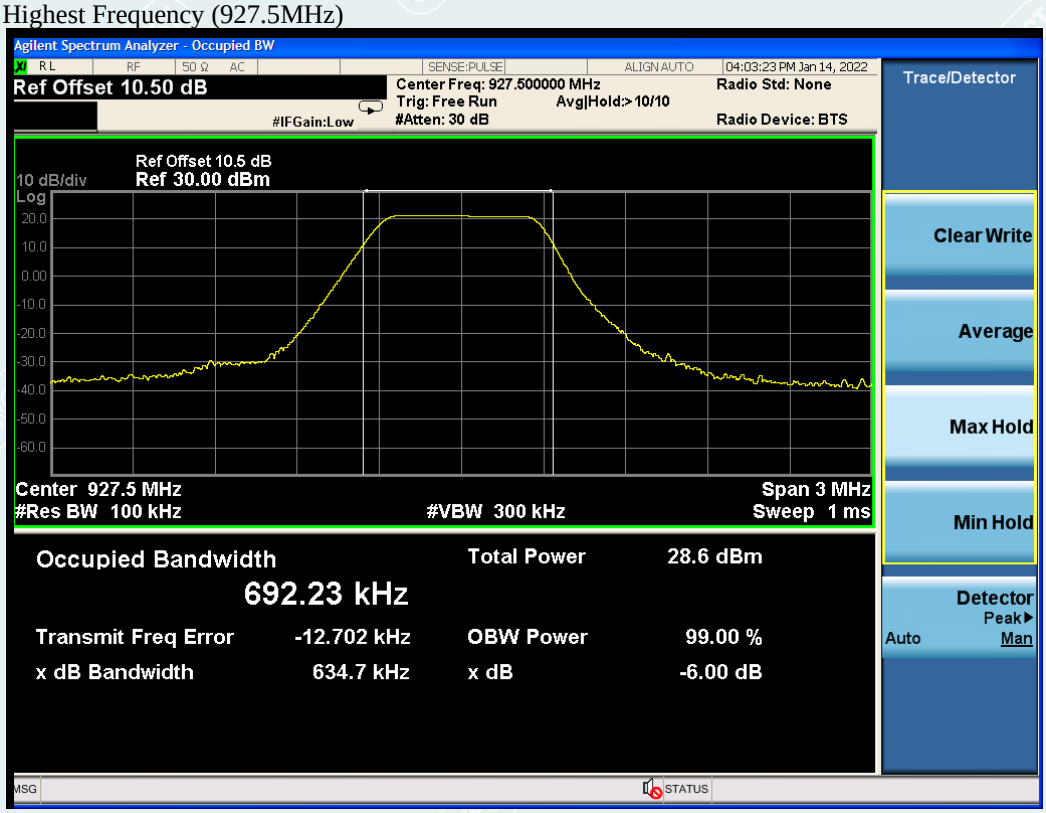
Equipment:	Wifx L1	Test Date	2022-01-14
Model No.:	Wifx L1	Test Engineer:	Huang Lifang
Mode:	TX	Test Voltage:	AC 120V/60Hz
Environment conditions:	23.1℃/53%RH	/	/

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Lowest	923.3	628.3	≥500	PASS
Highest	927.5	634.7		PASS

Lowest Frequency (923.3MHz)



Highest Frequency (927.5MHz)



8. MAXIMUM CONDUCTED OUTPUT POWER

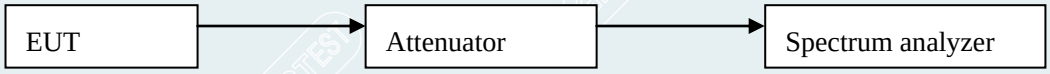
8.1 LIMITS

The maximum conducted output power is 1W.

8.2 TEST PROCEDURES

1) RF output of EUT was connected to the spectrum analyzer by attenuator.The path loss was compensated to the results for each measurement.
2) Set to the maximum power setting and enable the EUT transmit continuously.
3) Measure the conducted output power and record the results in the test report.

8.3 TEST SETUP



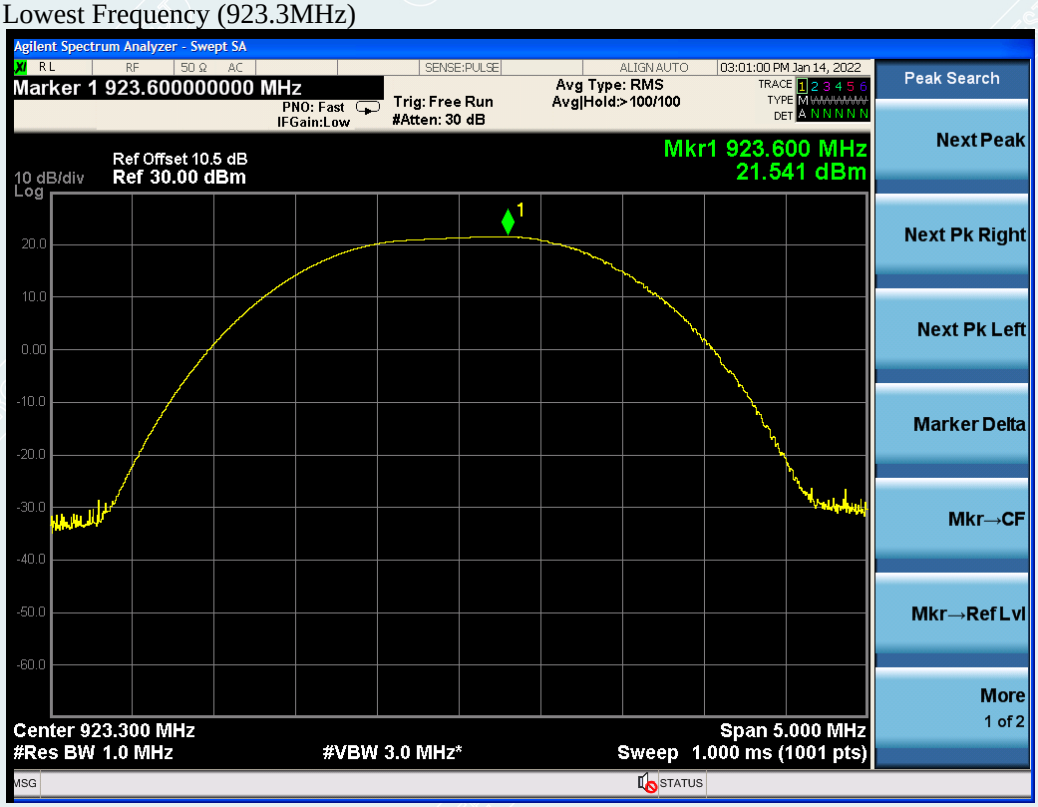
8.4 TEST RESULTS

Equipment:	Wifx L1	Test Date	2022-01-14
Model No.:	Wifx L1	Test Engineer:	Huang Lifang
Mode:	TX	Test Voltage:	AC 120V/60Hz
Environment conditions:	23.1℃/53%RH	/	/

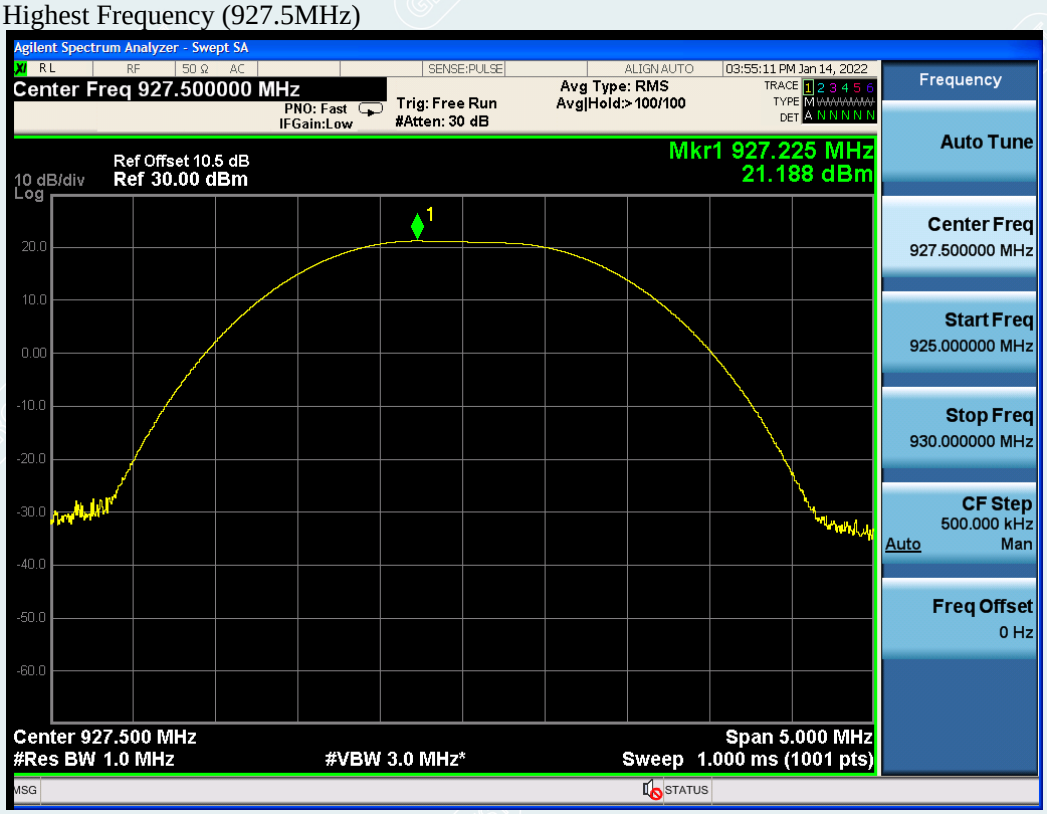
Channel	Frequency (MHz)	Reading results (dBm)	Duty factor	Conducted output power (dBm)	Limit	Peak/ Average	Result
Lowest	923.3	21.541	2.977	24.518	1W (30dBm)	Average	Pass
Highest	927.5	21.188	2.941	24.129			Pass

Note: 923.3MHz test results=21.541+Duty factor=21.541+10*LOG(1/0.5039)=21.541+2.977=24.518dBm
927.5MHz test results=21.188+Duty factor=21.188+10*LOG(1/0.5080)=21.188+2.941=24.129dBm

Lowest Frequency (923.3MHz)



Highest Frequency (927.5MHz)



9. POWER SPECTRAL DENSITY

9.1 LIMITS

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.

9.2 TEST PROCEDURES

1) Remove the antenna from the EUT, and then by a attenuator connected to the spectrum analyzer.
2) Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a attenuator. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3) Set the analyzer span to 1.5 times the DTS bandwidth. Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz. Set the VBW ≥ [3 × RBW]. Detector = RMS. Sweep time = auto couple. Trace mode =Average hold. Allow trace to fully stabilize. Use the peak marker function to determine the maximum amplitude level within the RBW. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.
4) Repeat above procedures until all frequencies measured were complete.

9.3 TEST SETUP

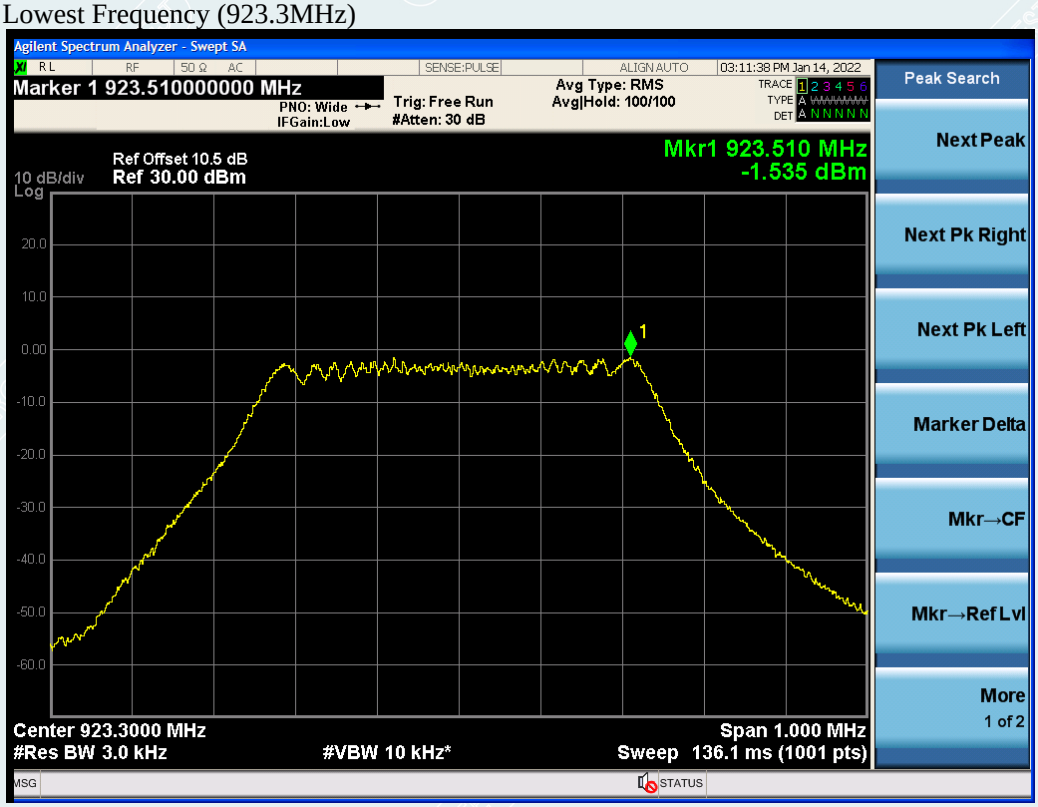
9.4 TEST RESULTS

Equipment:	Wifx L1	Test Date	2022-01-14
Model No.:	Wifx L1	Test Engineer:	Huang Lifang
Mode:	TX	Test Voltage:	AC 120V/60Hz
Environment conditions:	23.1℃/53%RH	/	/

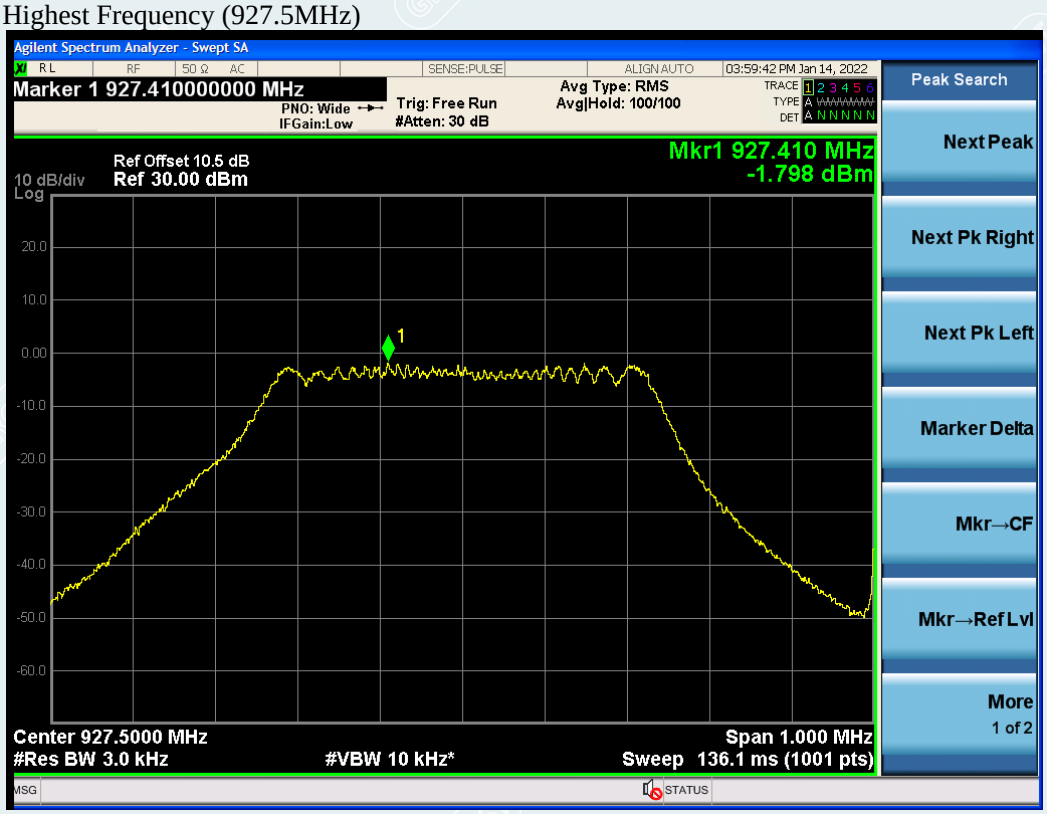
Channel	Frequency (MHz)	Reading results (dBm/3kHz)	Duty factor	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Test Result
Lowest	923.3	-1.535	2.977	1.442	8.00	PASS
Highest	927.5	-1.798	2.941	1.143		PASS

Note: 923.3MHz test results=-1.535+Duty factor=-1.535+10*LOG(1/0.5039)=-1.535+2.977=1.442dBm/3kHz
927.5MHz test results=-1.798+Duty factor=-1.798+10*LOG(1/0.5080)=-1.798+2.941=1.143dBm/3kHz

Lowest Frequency (923.3MHz)



Highest Frequency (927.5MHz)



10. CONDUCTED BAND EDGES AND SPURIOUS EMISSIONS

10.1 LIMITS

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.

10.2 TEST PROCEDURES

Test procedures follow KDB 558074 D01 15.247 measurement guidance v05r02.

1) Remove the antenna from the EUT and then by a attenuator connected to the spectrum.
2) Set the spectrum analyzer: RBW =100kHz; VBW =300kHz, Frequency range = 30MHz to 10GHz; Sweep = auto; Detector = Peak. Trace = Max hold.
3) Measure and record the results in the test report.
4) The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

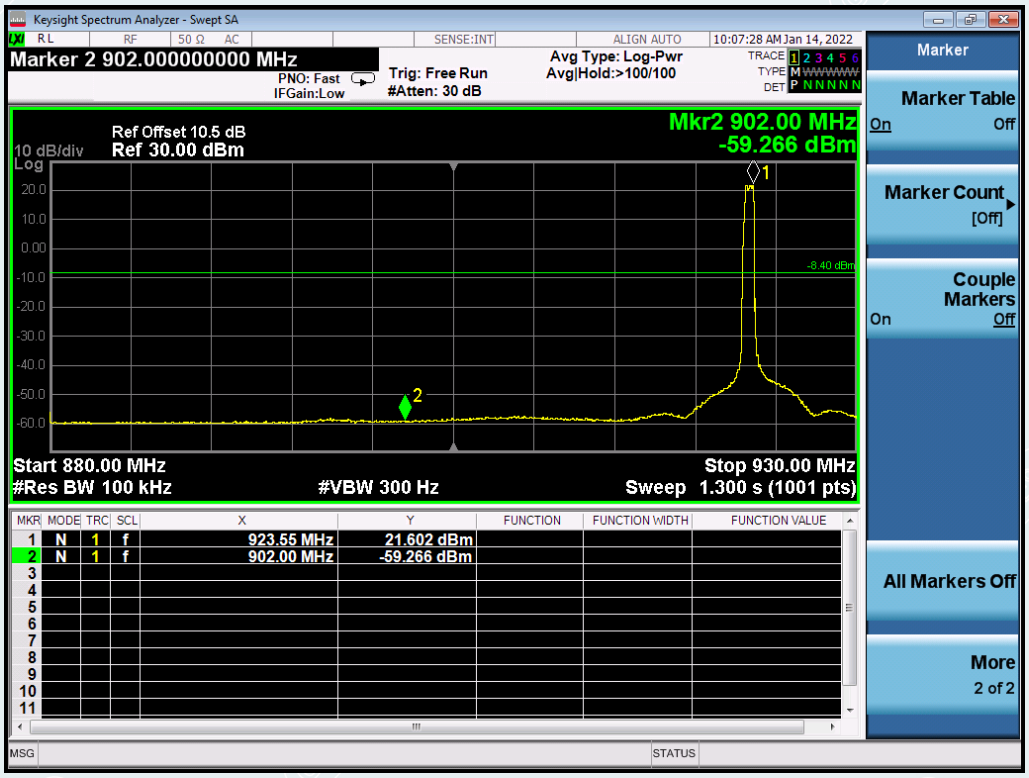
10.3 TEST SETUP

---------- **The following blanks** ----------

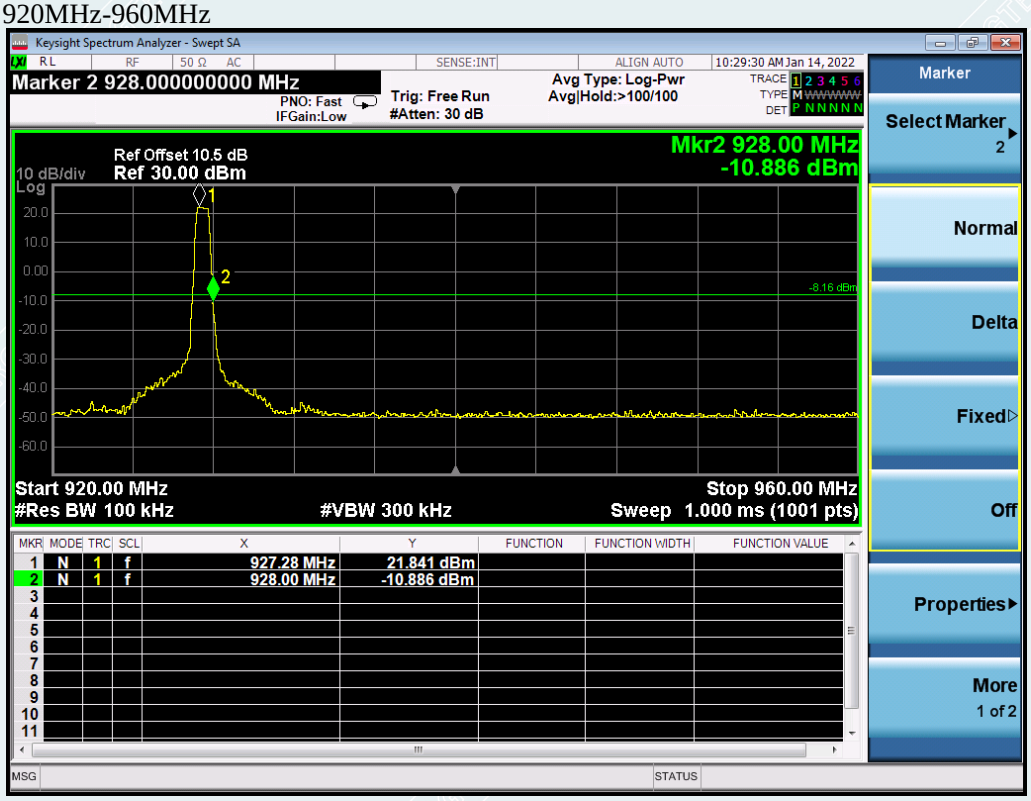
10.4 TEST RESULTS

Equipment:	Wifx L1	Test Date	2022-01-14
Model No.:	Wifx L1	Test Engineer:	Huang Lifang
Mode:	TX	Test Voltage:	AC 120V/60Hz
Environment conditions:	23.1℃/53%RH	/	/

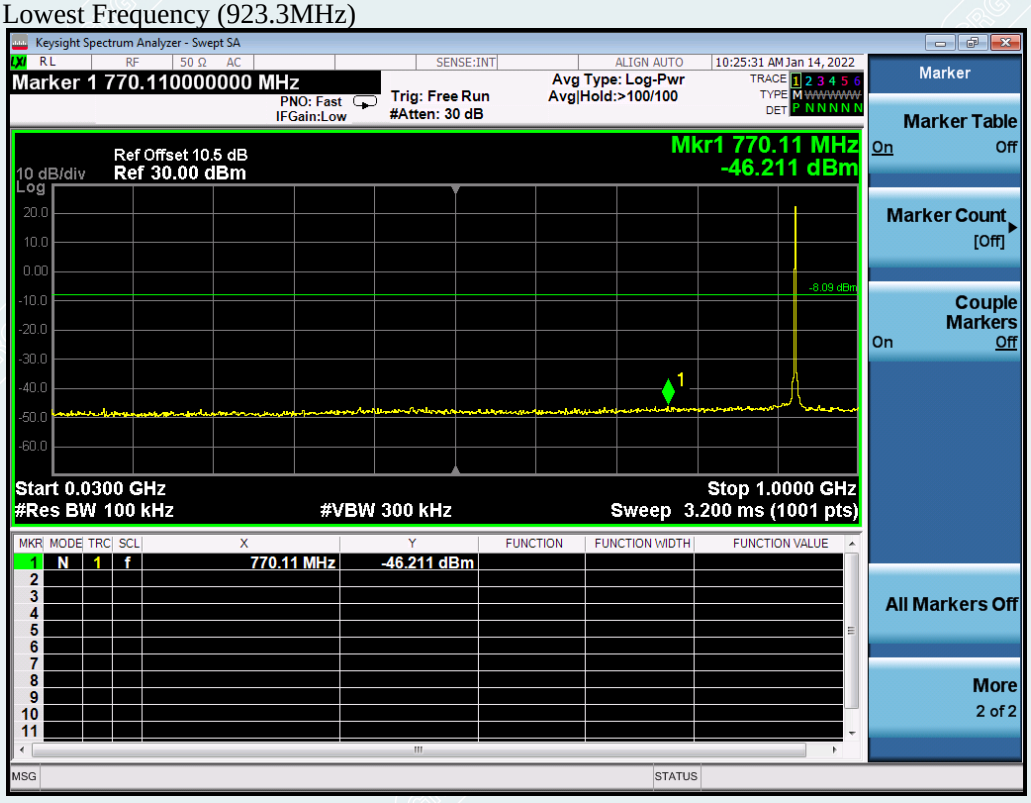
Conducted Bandedge emissions:
Lowest Frequency (923.3MHz)
880MHz-930MHz

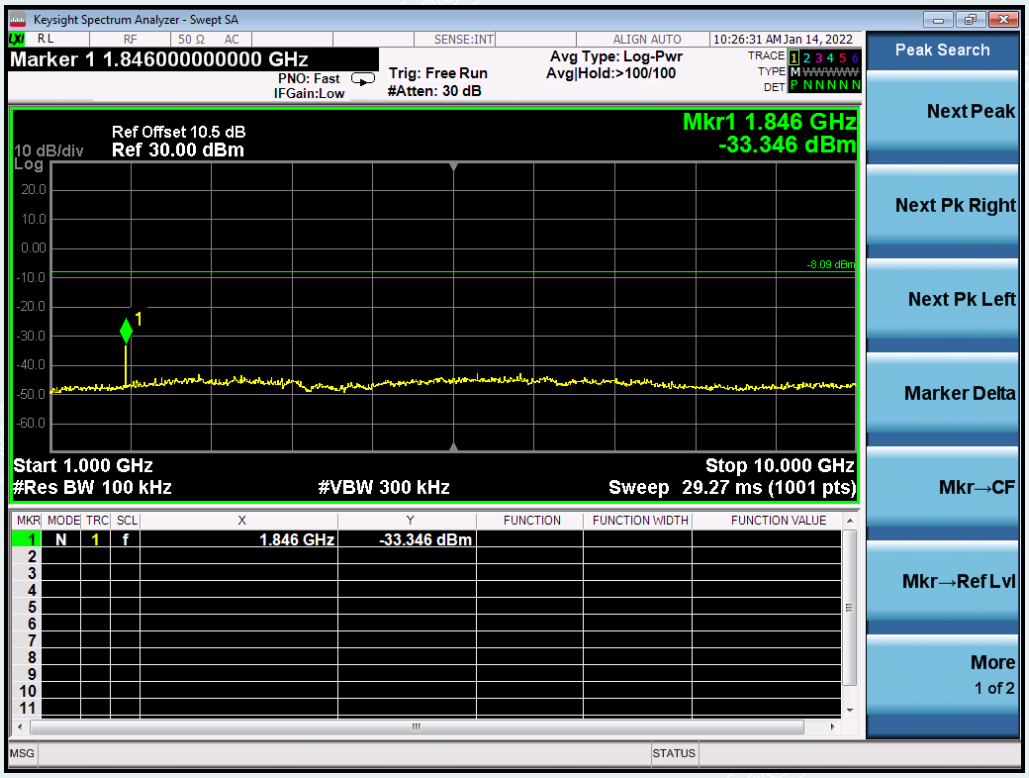


Highest Frequency (927.5MHz)
920MHz-960MHz

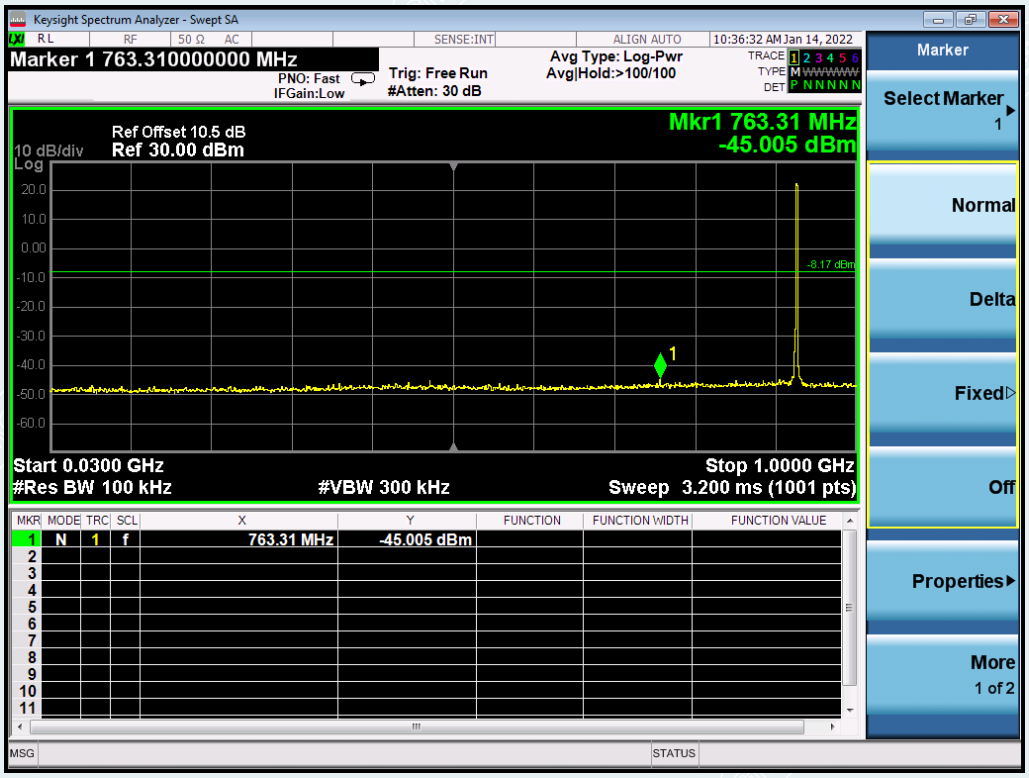


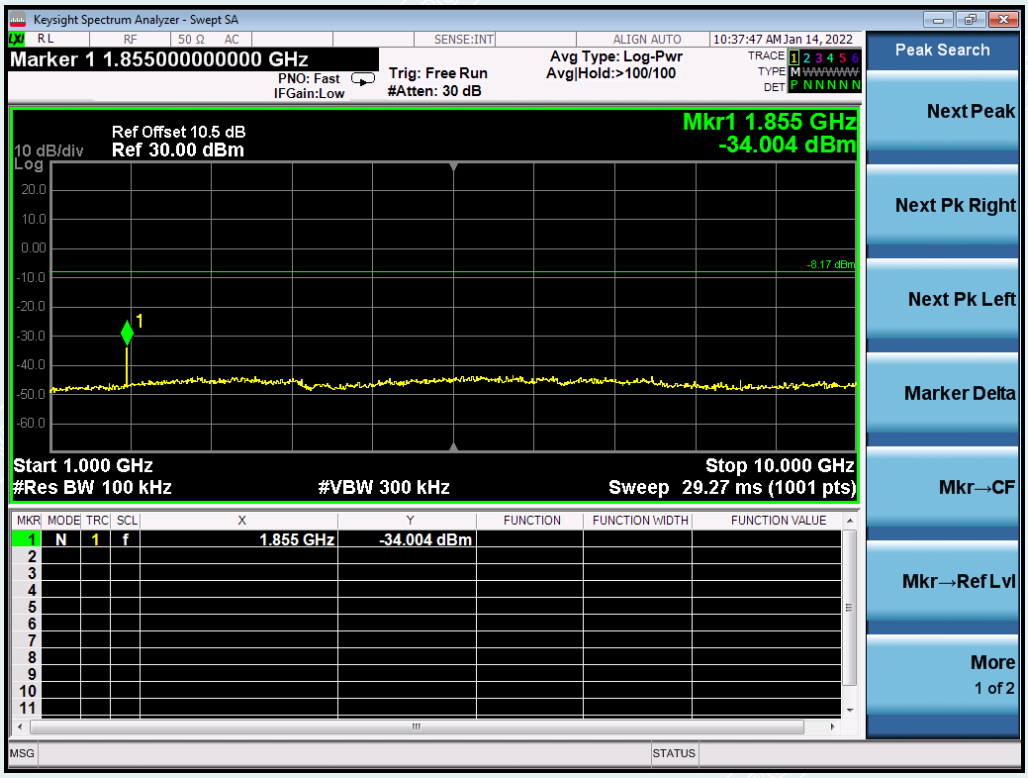
Conducted spurious emissions:
Lowest Frequency (923.3MHz)





Highest Frequency (927.5MHz)





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APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM

Please refer to the attached document E202110111758-10-test setup photo.

APPENDIX B. PHOTOGRAPH OF THE EUT

Please refer to the attached document E202110111758-11-EUT Photo.

---------- End of Report ----------