中认信通
CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)

ACCREDITED
TESTING LABORATORY
CERTIFICATE # 6356.01

TEST REPORT

Applicant: **Hengdian Group Tospo Lighting Co., Ltd.**

Address: Hengdian Electronic Industrial Zone, Dongyang City, Zhejiang Province, P.R.China

FCC ID: **2AZJ6TPXXEDC110**

IC: **26082-TPXXEDC110**

HVIN: **CPXC 2X2 TUWH 120 M4,**
CPXC 2X4 TUWH 120 M2

Product Name: **LED CPX Smart Panel Light**

Model: **CPXC 2X2 TUWH 120 M4,**
CPXC 2X4 TUWH 120 M2

Standard(s): **47 CFR Part 15, Subpart C(15.249)**
RSS-210 Issue 10, December 2019, Amendment (April 2020)
RSS-Gen, Issue 5, February 2021 Amendment 2
ANSI C63.10-2013

The above equipment has been tested and found compliant with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: **CR22040012-00M1**

Date Of Issue: **2022-07-18**

Reviewed By: **Sun Zhong**

Sun Zhong

Title: Manager

Test Laboratory: **China Certification ICT Co., Ltd (Dongguan)**
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Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 442868, the FCC Designation No. : CN1314.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0123.

Declarations

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "▲". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	CR22040012-00	Original Report	2022-05-16
1	CR22040012-00M1	Revised Report	2022-07-18

Note: Add an HVIN number：CPXC 2X4 TUWH 120 M2.

This report is to supersede the test report CR22040012-00 which issued on 2022-05-16.
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1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	LED CPX Smart Panel Light
EUT Model:	CPXC 2X2 TUWH 120 M4
Multiple Model(s):	CPXC 2X4 TUWH 120 M2
Operation Frequency:	5730-5870 MHz
Modulation Type:	CW
Rated Input Voltage:	DC 120V
Serial Number:	CR22040012-RF-S1
EUT Received Date:	2022.4.19
EUT Received Status:	Good
Note: The Multiple models are electronically identical with Test model, please refer to the declaration letter for more detail, which was provided by manufacturer.	

Operation Frequency Detail:

Sweep Start Frequency (MHz)	**Sweep Stop Frequency (MHz)**
5730	5870
Per section 15.31(m) or RSS-Gen 6.9, the below frequencies were performed the test as below:	
Test Frequency	**Frequency (MHz)**
Lowest	5730
Middle	5800
Highest	5870

Antenna Information Detail▲:

Antenna Manufacturer	**Antenna Type**	**input impedance (Ohm)**	**Antenna Gain /Frequency Range**	**§15.203 RSS-Gen Requirement**
Hengdian Group Tospo Lighting Co., Ltd.	PCB	50	2.3 dBi/5.7~5.9GHz	**Compliance**
The Method of §15.203 Compliance: ☒Antenna must be permanently attached to the unit. ☐Antenna must use a unique type of connector to attach to the EUT. ☐Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.				

Accessory Information:

No Accessory.

1.2 Description of Test Configuration

1.2.1 EUT Operation Condition:

EUT Operation Mode:	The system was configured for testing in Engineering Mode, which was provided by the manufacturer.
Equipment Modifications:	No
EUT Exercise Software:	No
Engineering Mode was provided by manufacturer▲. The maximum power was configured default setting.	

1.2.2 Support Equipment List and Details

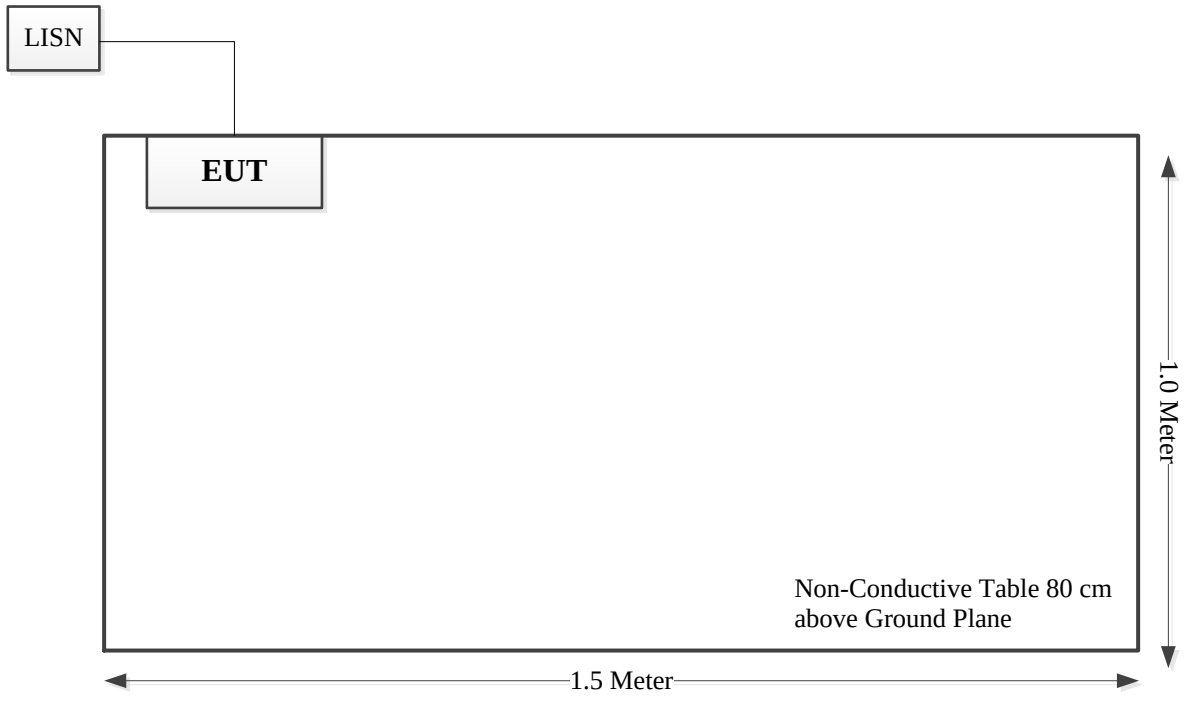
Manufacturer	Description	Model	Serial Number
/	/	/	/

1.2.3 Support Cable List and Details

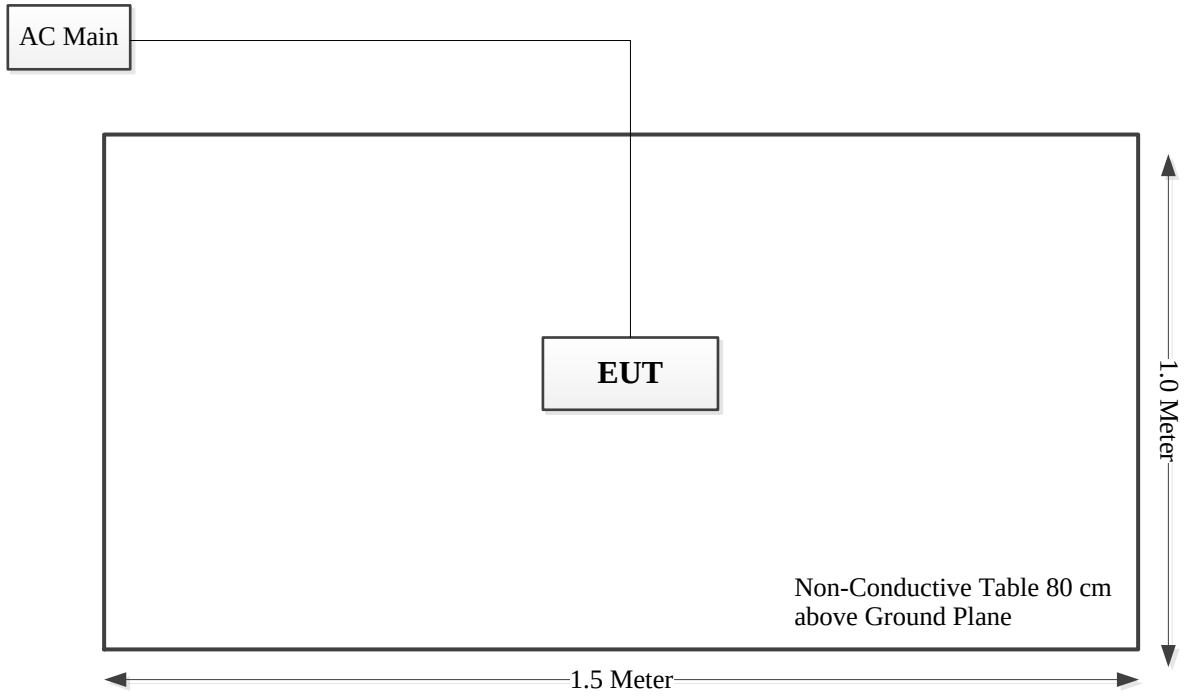
Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Power Cable	No	No	1.3	EUT	LISN

1.2.4 Block Diagram of Test Setup

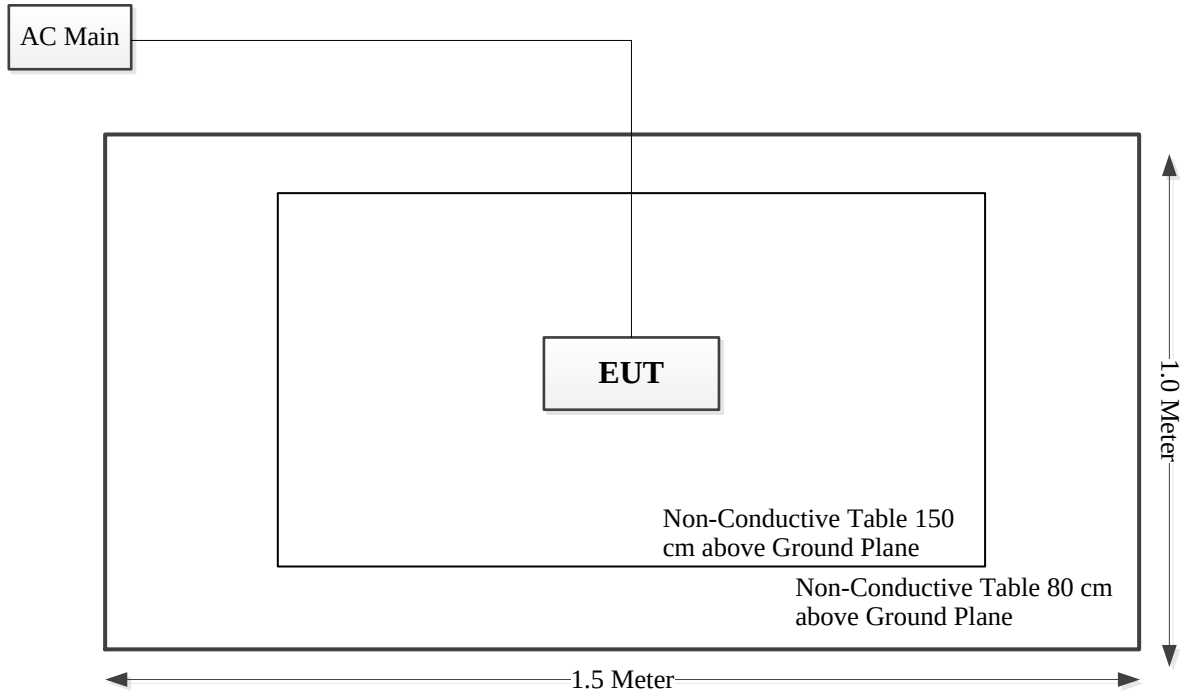
Conduction Emissions:



Radiated Emissions:
Below 1GHz:



Above 1GHz:


AC Main
EUT
Non-Conductive Table 150 cm above Ground Plane
Non-Conductive Table 80 cm above Ground Plane
1.0 Meter
1.5 Meter

1.3 Measurement Uncertainty

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
Unwanted Emissions, radiated	30M~200MHz: 4.15 dB,200M~1GHz: 5.61 dB,1G~6GHz: 5.14 dB, 6G~18GHz: 5.93 dB,18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	2.8 dB (150 kHz to 30 MHz)

2. SUMMARY OF TEST RESULTS

Standard(s)/Rule(s)	Description of Test	Result
§15.203 RSS-GEN Clause 6.8	Antenna Requirement	Compliant
§15.207(a) RSS-Gen Clause 8.8	Conduction Emissions	Compliant
15.205, §15.209, §15.249 RSS-Gen Clause 8.10 RSS-210 Annex B B.10	Radiated Emissions	Compliant
§15.215 (c)	20 dB Bandwidth	Compliant
RSS-Gen Clause 6.7	99% Occupied Bandwidth	Compliant
§1.1307	RF Exposure Evaluation	Compliant
RSS-102 Clause 2.5.2	Exemption Limits For Routine Evaluation-RF Exposure Evaluation	Compliant

3. REQUIREMENTS AND TEST PROCEDURES

3.1 AC Line Conducted Emissions

3.1.1 Applicable Standard

FCC §15.207(a).

(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). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

	Conducted limit (dBμV)	
Frequency of emission (MHz)	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.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 μV within the frequency band 535-1705 kHz, as measured using a 50 μH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtainig their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

RSS-Gen Clause 8.8

Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4, as measured using a 50 μH / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.
For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in table 4 shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

Table 4 – AC power-line conducted emissions limits

Frequency (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56[1]	56 to 46[1]
0.5 – 5	56	46
5 – 30	60	50

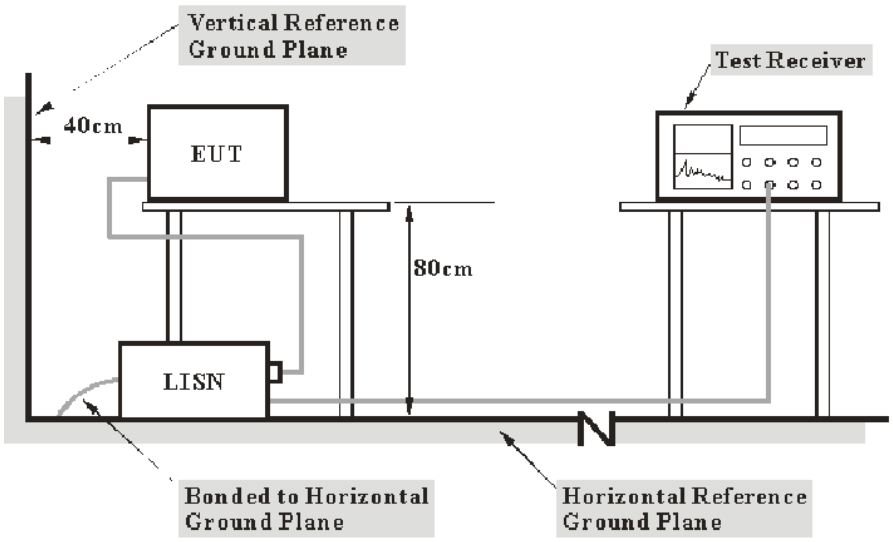
Note 1: The level decreases linearly with the logarithm of the frequency.

For an EUT with a permanent or detachable antenna operating between 150 kHz and 30 MHz, the AC power-line conducted emissions must be measured using the following configurations:

(a) Perform the AC power-line conducted emissions test with the antenna connected to determine compliance with the limits of table 4 outside the transmitter's fundamental emission band.

(b) Retest with a dummy load instead of the antenna to determine compliance with the limits of table 4 within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network that simulates the antenna in the fundamental frequency band.

3.1.2 EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207, RSS-Gen limits.

The spacing between the peripherals was 10 cm.

The adapter or EUT was connected to the main LISN with a 120 V/60 Hz AC power source.

3.1.3 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

3.1.4 Test Procedure

During the conducted emission test, the EUT was connected to the outlet of the first LISN.

The frequency and amplitude of the six highest ac power-line conducted emissions relative to the limit, measured over all the current-carrying conductors of the EUT power cords, and the operating frequency or frequency to which the EUT is tuned (if appropriate), should be reported, unless such emissions are more than 20 dB below the limit. AC power-line conducted emissions measurements are to be separately carried out only on each of the phase ("hot") line(s) and (if used) on the neutral line(s), but not on the ground [protective earth] line(s). If less than six emission frequencies are within 20 dB of the limit, then the noise level of the measuring instrument at representative frequencies should be reported. The specific conductor of the power-line cord for each of the reported emissions should be identified. Measure the six highest emissions with respect to the limit on each current-carrying conductor of each power cord associated with the EUT (but not the power cords of associated or peripheral equipment that are part of the test configuration). Then, report the six highest emissions with respect to the limit from among all the measurements identifying the frequency and specific current-carrying conductor identified with the emission. The six highest emissions should be reported for each of the current-carrying conductors, or the six highest emissions may be reported over all the current-carrying conductors.

3.1.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor
Factor = attenuation caused by cable loss + voltage division factor of AMN

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

3.2 Radiated Emissions

3.2.1 Applicable Standard

As per FCC §15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC §15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

RSS-210, Annex B, B.10

Devices shall comply with the following requirements:

(a) The field strength of fundamental and harmonic emissions measured at 3 m shall not exceed the limits in table B2.

Table B2 — Field strength limits at various frequencies

Frequency bands (MHz)	Field strength (mV/m)	
	Fundamental emissions	Harmonic emissions
902-928	50	0.5
2400-2483.5	50	0.5
5725-5875	50	0.5
24000-24250	250	2.5

The field strength shall be measured using an average detector, except for the fundamental emission in the frequency band 902-928 MHz, which is based on measurements using an

International Special Committee on Radio Interference (CISPR) quasi-peak detector.

(b) Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in RSS-Gen, whichever is less stringent

Table A1 — Permissible field strength limits for momentarily operated devices

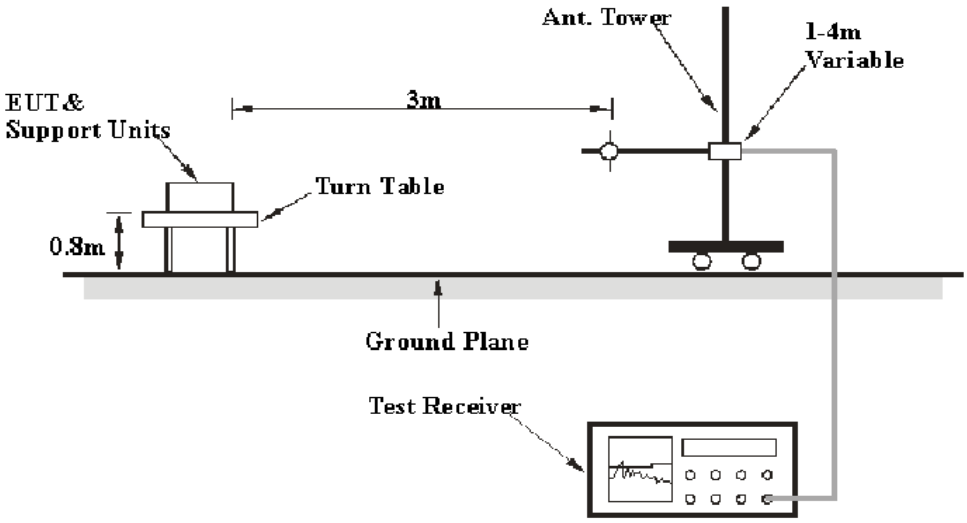
Fundamental frequency (MHz), excluding restricted frequency bands specified in RSS-Gen	Field strength of the fundamental emissions (µV/m at 3 m)
70-130	1,250
130-174	1,250 to 3,750*
174-260**	3,750
260-470**	3,750 to 12,500*
Above 470	12,500

* Linear interpolation with frequency, f, in MHz:
- For 130-174 MHz: Field Strength (µV/m) = (56.82 x f)-6136
- For 260-470 MHz: Field Strength (µV/m) = (41.67 x f)-7083

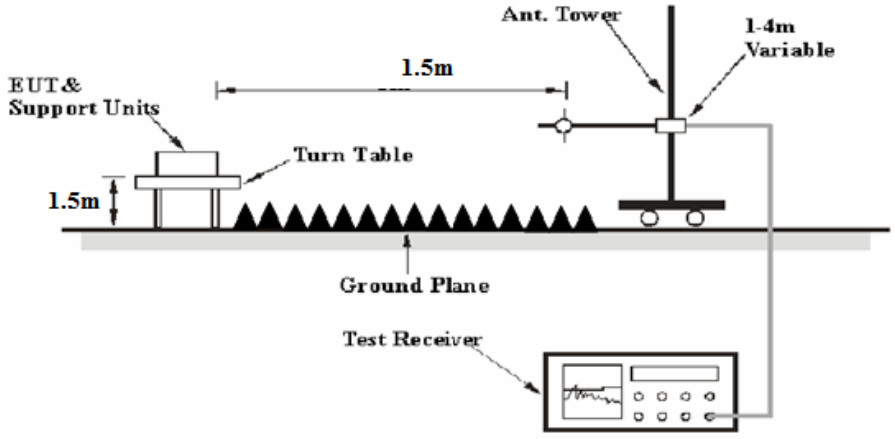
** Frequency bands 225-328.6 MHz and 335.4-399.9 MHz are designated for the exclusive use of the Government of Canada. Manufacturers should be aware of possible harmful interference and degradation of their licence-exempt radio equipment in these frequency bands.

3.2.2 EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emissions were performed in the 3 meters distance, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209 and FCC 15.249, RSS-Gen limits.

3.2.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	AV

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

3.2.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz - 1 GHz, peak and average detection modes for frequencies above 1 GHz.

According to C63.10, the above 1G test result shall be extrapolated to the specified distance using an extrapolation Factor of 20dB/decade from 3m to 1.5m
Distance extrapolation Factor =20 log (specific distance [3m]/test distance [1.5m]) dB= 6.02 dB

All emissions under the average limit and under the noise floor have not recorded in the report.

3.2.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Factor = Antenna Factor + Cable Loss- Amplifier Gain

For 30MHz-1GHz:
Result = Reading + Factor

For 1GHz-40GHz
Result = Reading + Factor-Distance extrapolation Factor

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

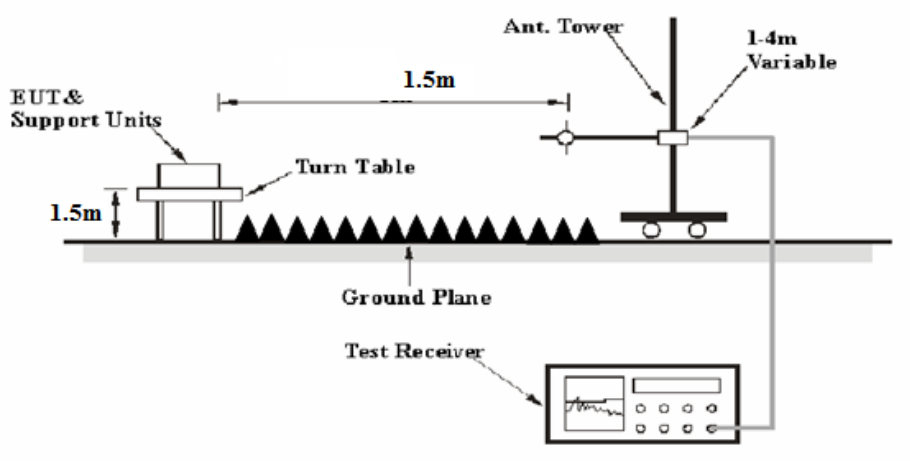
3.3 20 dB Emission Bandwidth:

3.3.1 Applicable Standard

FCC §15.215

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

3.3.2 EUT Setup



3.3.3Test Procedure

1. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
2. Repeat above procedures until all frequencies measured were complete.

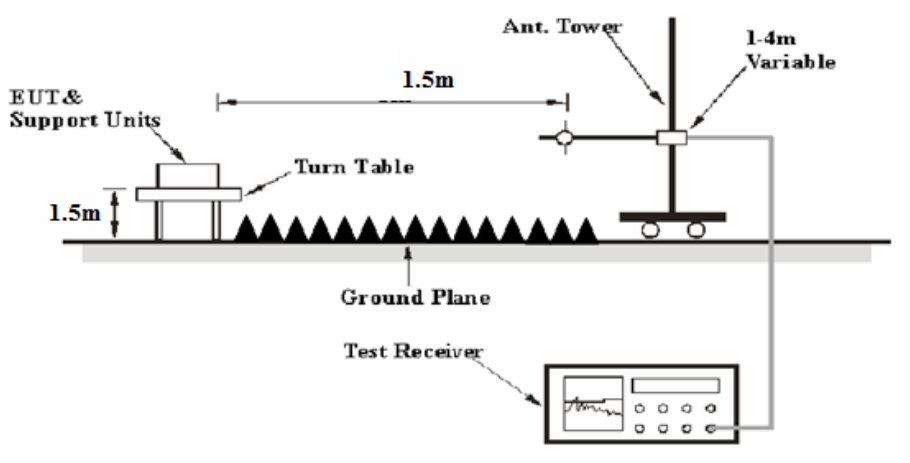
3.4 99% Occupied Bandwidth:

3.4.1 Applicable Standard

RSS-Gen Clause 6.7

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

3.4.2 EUT Setup



3.4.3Test Procedure

a) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, unless otherwise specified by the applicable requirement.
b) Set the video bandwidth (VBW) ≥ 3×RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) use the 99% Occupied bandwidth function to test the bandwidth.

3.5 Antenna Requirement

3.5.1 Applicable Standard

FCC §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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.
c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

RSS-GEN Clause 6.8

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).
When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.
The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.
For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:
This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

3.5.2 Judgment

Please refer to the Antenna Information detail in Section 1.

4. Test DATA AND RESULTS

4.1 AC Line Conducted Emissions

Serial Number:	CR22040012-RF-S1	Test Date:	2022-04-28
Test Site:	CE	Test Mode:	Transmitting (low chanel was the wort)
Tester:	Nick Tang	Test Result:	Pass

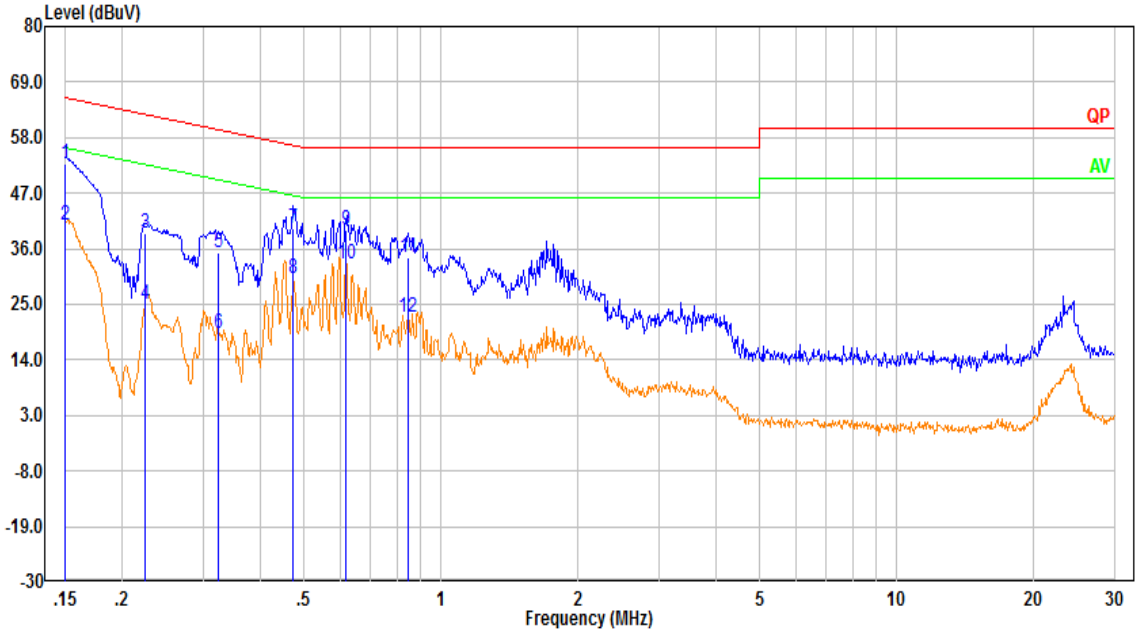
Environmental Conditions:					
Temperature: (℃)	27.8	Relative Humidity: (%)	68	ATM Pressure: (kPa)	101

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	LISN	ENV216	101134	2022-04-01	2023-03-31
R&S	EMI Test Receiver	ESR3	102726	2021-07-22	2022-07-21
MICRO-COAX	Coaxial Cable	UTIFLEX	C-0200-01	2021-08-08	2022-08-07
Audix	Test Software	E3	190306 (V9)	N/A	N/A

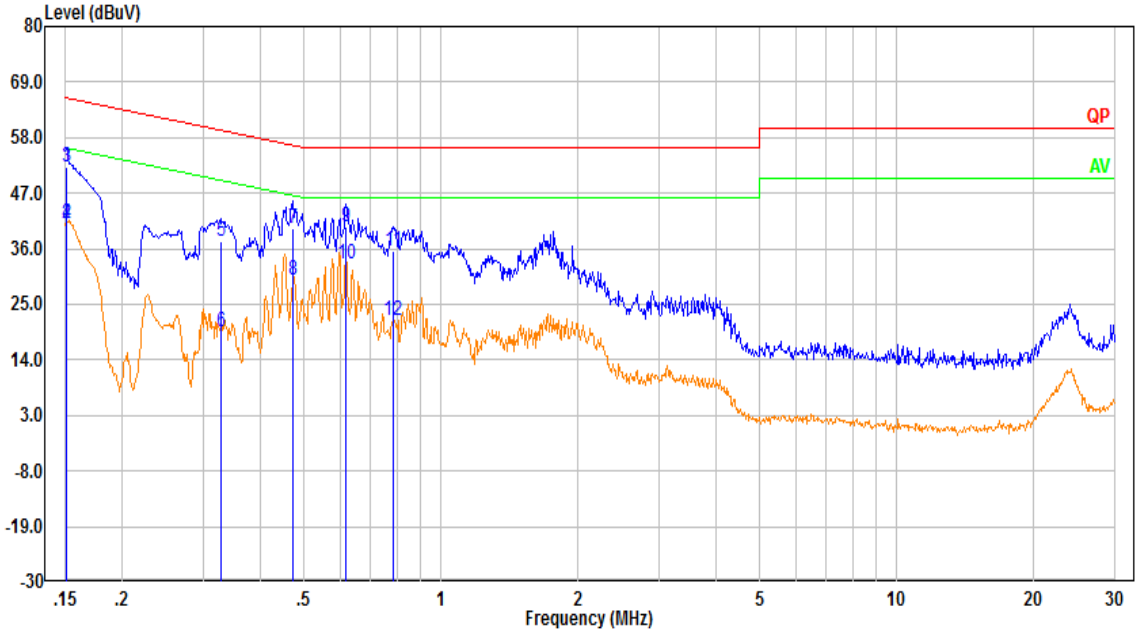
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

CPXC 2X2 TUWH 120 M4
Line:



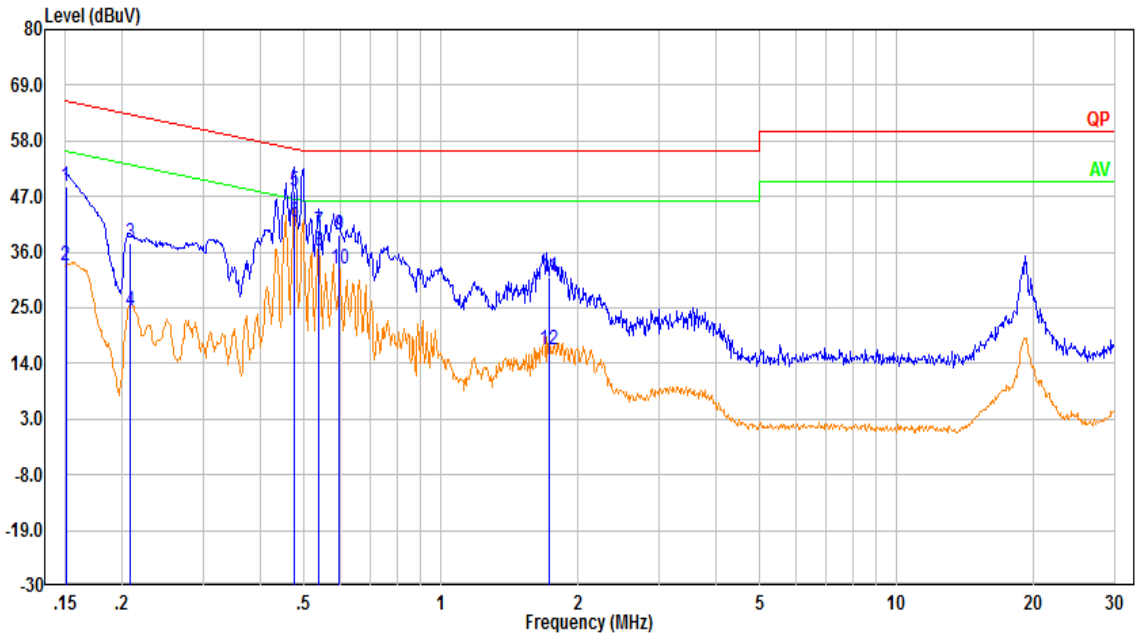
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.150	43.26	9.61	52.87	66.00	13.13	QP
2	0.150	30.92	9.61	40.53	56.00	15.47	Average
3	0.224	29.56	9.61	39.17	62.68	23.51	QP
4	0.224	15.40	9.61	25.01	52.68	27.67	Average
5	0.325	25.72	9.61	35.33	59.57	24.24	QP
6	0.325	9.77	9.61	19.38	49.57	30.19	Average
7	0.474	30.36	9.61	39.97	56.44	16.47	QP
8	0.474	20.41	9.61	30.02	46.44	16.42	Average
9	0.620	30.01	9.62	39.63	56.00	16.37	QP
10	0.620	23.46	9.62	33.08	46.00	12.92	Average
11	0.844	24.51	9.62	34.13	56.00	21.87	QP
12	0.844	12.96	9.62	22.58	46.00	23.42	Average

Neutral:



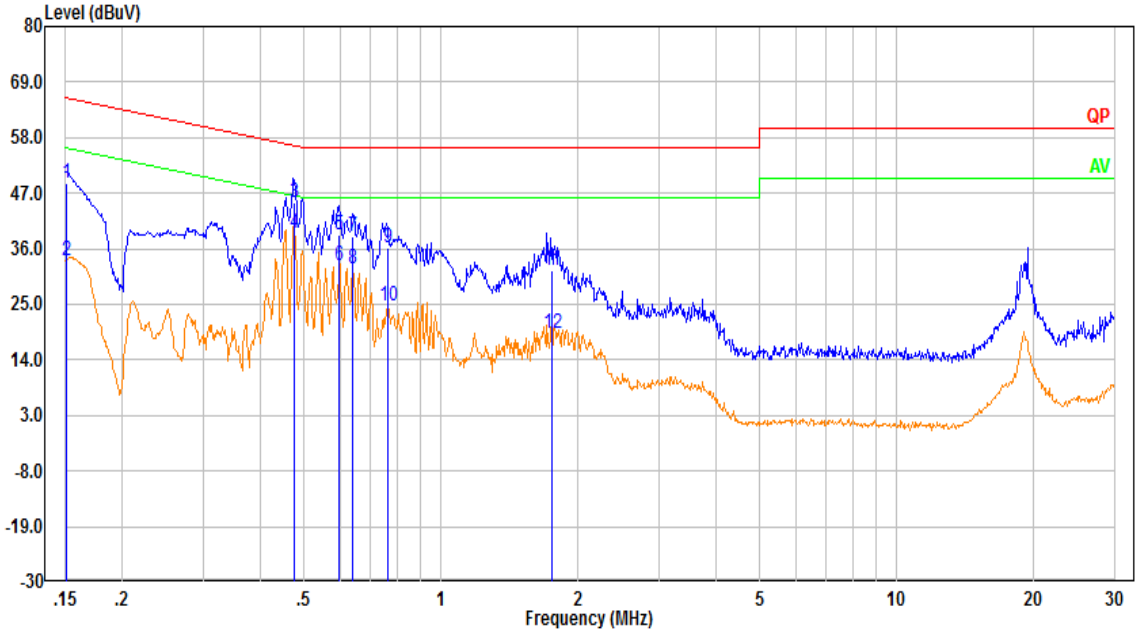
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.151	42.51	9.61	52.12	65.97	13.85	QP
2	0.151	31.25	9.61	40.86	55.97	15.11	Average
3	0.151	42.48	9.61	52.09	65.96	13.87	QP
4	0.151	31.33	9.61	40.94	55.96	15.02	Average
5	0.330	27.92	9.61	37.53	59.46	21.93	QP
6	0.330	10.07	9.61	19.68	49.46	29.78	Average
7	0.472	30.32	9.61	39.93	56.47	16.54	QP
8	0.472	20.07	9.61	29.68	46.47	16.79	Average
9	0.617	30.73	9.62	40.35	56.00	15.65	QP
10	0.617	23.36	9.62	32.98	46.00	13.02	Average
11	0.783	25.86	9.62	35.48	56.00	20.52	QP
12	0.783	12.29	9.62	21.91	46.00	24.09	Average

CPXC 2X4 TUWH 120 M2
Line:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.150	39.47	9.61	49.08	66.00	16.92	QP
2	0.150	23.55	9.61	33.16	56.00	22.84	Average
3	0.208	28.34	9.61	37.95	63.29	25.34	QP
4	0.208	14.86	9.61	24.47	53.29	28.82	Average
5	0.476	38.53	9.61	48.14	56.41	8.27	QP
6	0.476	32.37	9.61	41.98	46.41	4.43	Average
7	0.539	30.35	9.61	39.96	56.00	16.04	QP
8	0.539	26.49	9.61	36.10	46.00	9.90	Average
9	0.598	29.74	9.62	39.36	56.00	16.64	QP
10	0.598	22.97	9.62	32.59	46.00	13.41	Average
11	1.722	21.58	9.63	31.20	56.00	24.80	QP
12	1.722	7.19	9.63	16.82	46.00	29.18	Average

Neutral:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.150	39.40	9.61	49.01	65.99	16.98	QP
2	0.150	23.93	9.61	33.54	55.99	22.45	Average
3	0.477	35.57	9.61	45.18	56.39	11.21	QP
4	0.477	29.38	9.61	38.99	46.39	7.40	Average
5	0.599	28.98	9.62	38.60	56.00	17.40	QP
6	0.599	23.21	9.62	32.83	46.00	13.17	Average
7	0.641	28.78	9.62	38.40	56.00	17.60	QP
8	0.641	22.37	9.62	31.99	46.00	14.01	Average
9	0.762	26.62	9.62	36.24	56.00	19.76	QP
10	0.762	15.19	9.62	24.81	46.00	21.19	Average
11	1.746	22.23	9.63	31.85	56.00	24.15	QP
12	1.746	9.76	9.63	19.39	46.00	26.61	Average

4.2 Radiation Spurious Emissions

Serial Number:	CR22040012-RF-S1	Test Date:	2022-05-06
Test Site:	966-2	Test Mode:	Transmitting
Tester:	Veyo Zhang	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.1	Relative Humidity: (%)	71	ATM Pressure: (kPa)	100.7

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Antenna	JB6	A082520-5	2020-10-19	2023-10-18
R&S	EMI Test Receiver	ESR3	102724	2021-07-22	2022-07-21
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0470-02	2021-07-18	2022-07-17
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0780-01	2021-07-18	2022-07-17
Sonoma	Amplifier	310N	186165	2021-07-18	2022-07-17
Audix	Test Software	E3	201021 (V9)	N/A	N/A
ETS-Lindgren	Horn Antenna	3115	9912-5985	2020-10-13	2023-10-12
R&S	Spectrum Analyzer	FSV40	101591	2021-07-22	2022-07-21
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2021-08-08	2022-08-07
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2021-08-08	2022-08-07
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2021-11-10	2022-11-09
PASTERNACK	Horn Antenna	PE9852/2F-20	112002	2021-02-05	2023-02-04
PASTERNACK	Horn Antenna	PE9850/2F-20	072001	2021-02-05	2024-02-04
AH	Preamplifier	PAM-1840VH	190	2021-11-19	2022-11-18
MICRO-COAX	Coaxial Cable	UFB142A-1-2362-200200	235772-001	2021-08-08	2022-08-07
E-Microwave	Band Rejection Filter	5150-5850MHz	OE01902423	2021-08-08	2022-08-07

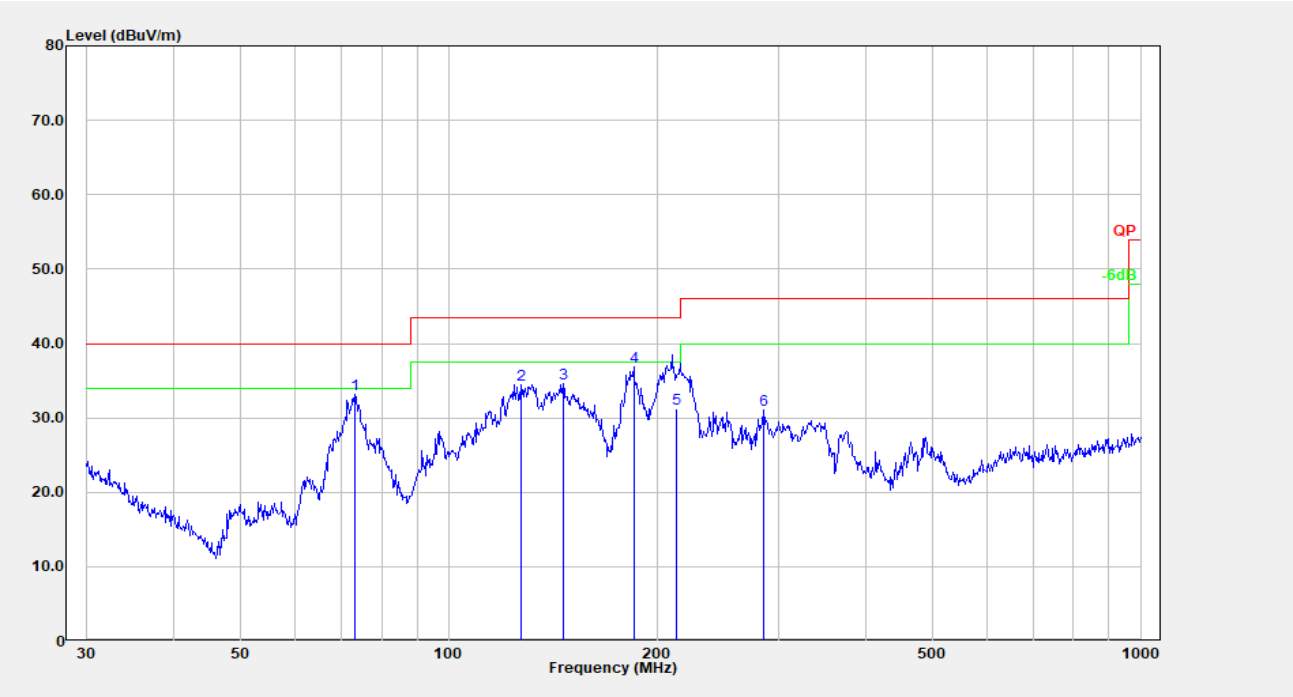
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Please refer to the below table and plots.

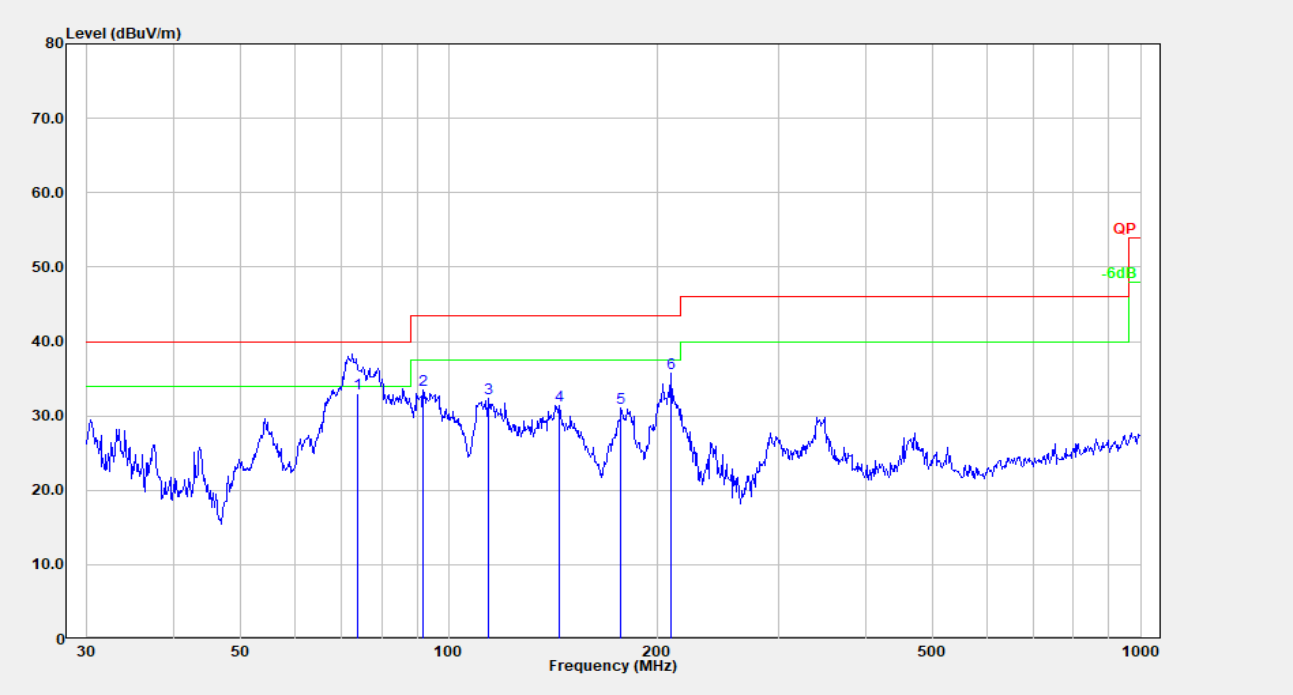
Note: The device can be mounted in multiple orientations, test was performed with X,Y, Z Axis according to C63.10 figure 8, the worst orientation was photographed and it`s data was recorded.

Test Data:
1) 30MHz-1GHz(low channel was the worst):
CPXC 2X4 TUWH 120 M2
Horizontal:



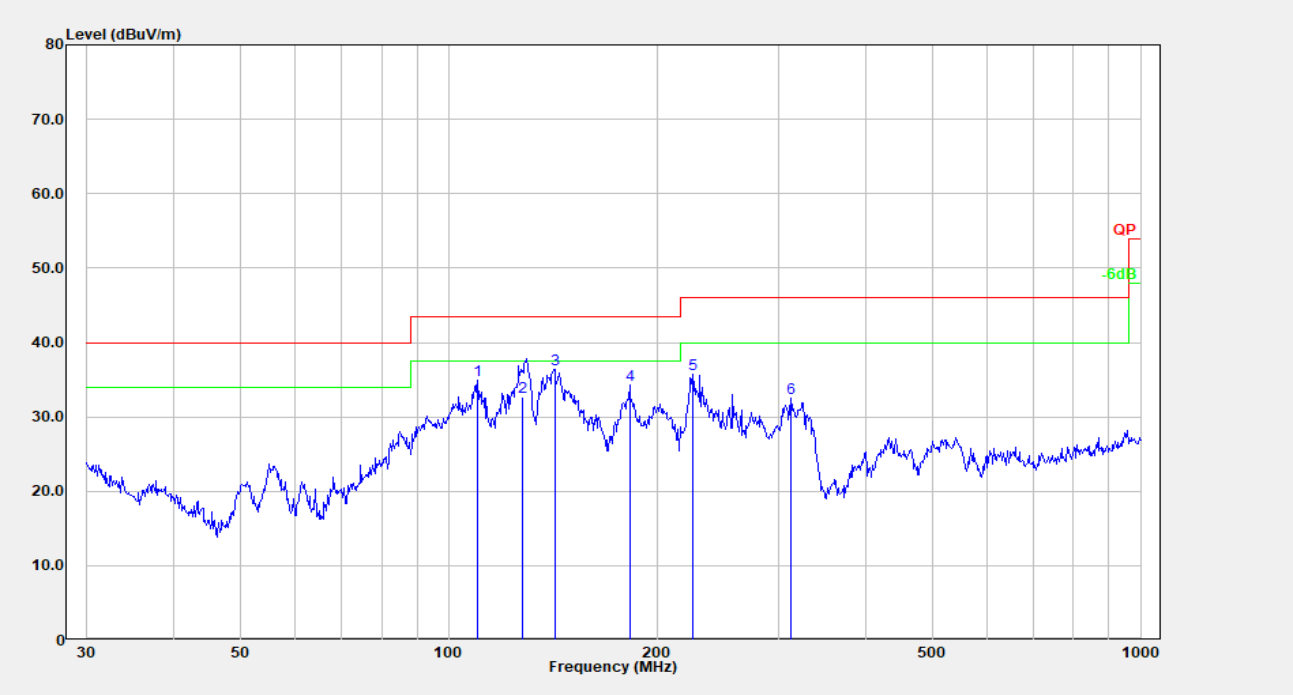
No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	73.103	50.14	-16.99	33.15	40.00	6.85	Peak
2	127.218	46.07	-11.60	34.47	43.50	9.03	Peak
3	146.374	46.84	-12.23	34.61	43.50	8.89	Peak
4	185.138	50.64	-13.71	36.93	43.50	6.57	Peak
5	213.087	43.89	-12.72	31.17	43.50	12.33	QP
6	284.977	42.68	-11.54	31.14	46.00	14.86	Peak

Vertical:



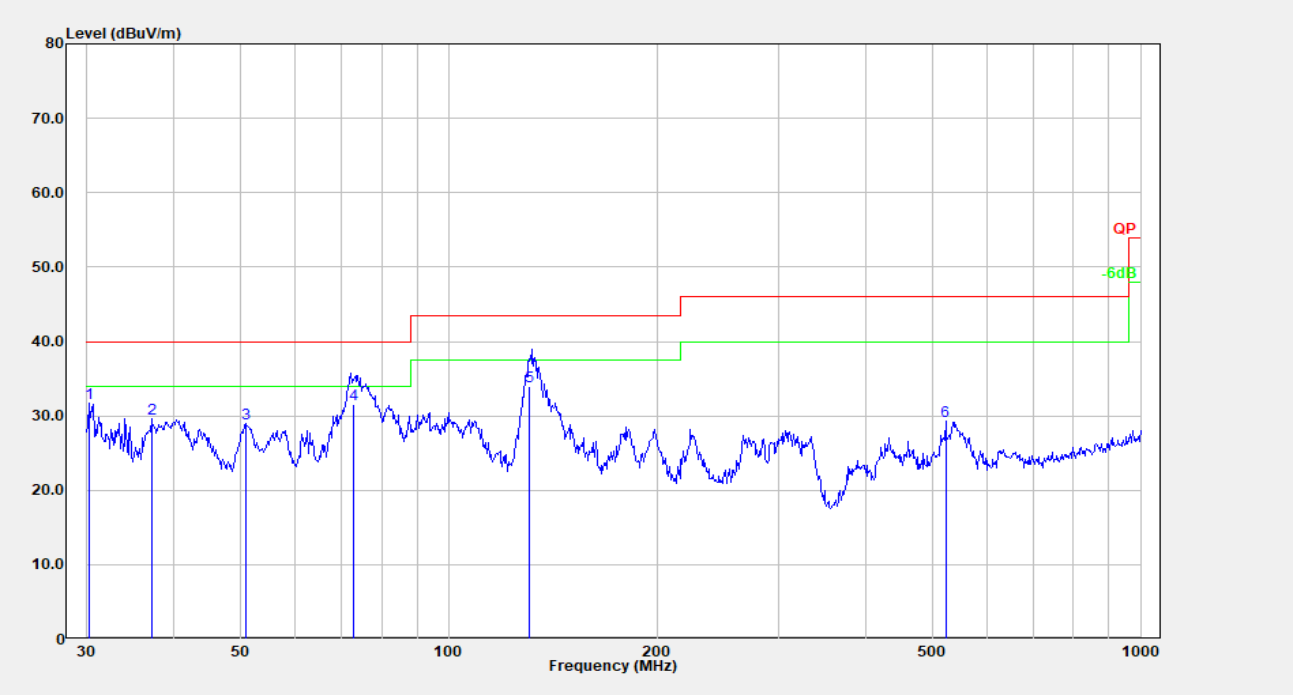
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	73.839	50.14	-17.12	33.02	40.00	6.98	QP
2	91.816	50.21	-16.74	33.47	43.50	10.03	Peak
3	114.114	44.56	-12.23	32.33	43.50	11.17	Peak
4	144.335	43.59	-12.20	31.39	43.50	12.11	Peak
5	177.509	44.71	-13.65	31.06	43.50	12.44	Peak
6	209.313	48.30	-12.59	35.71	43.50	7.79	Peak

CPXC 2X2 TUWH 120 M4
Horizontal:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	110.182	47.47	-12.58	34.89	43.50	8.61	Peak
2	127.828	44.29	-11.54	32.75	43.50	10.75	QP
3	142.324	48.61	-12.16	36.45	43.50	7.05	Peak
4	182.559	48.07	-13.75	34.31	43.50	9.19	Peak
5	225.308	48.77	-13.05	35.72	46.00	10.28	Peak
6	312.179	43.31	-10.81	32.50	46.00	13.50	Peak

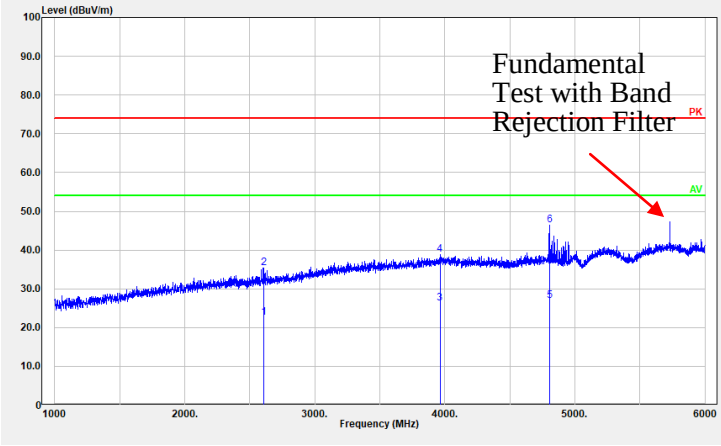
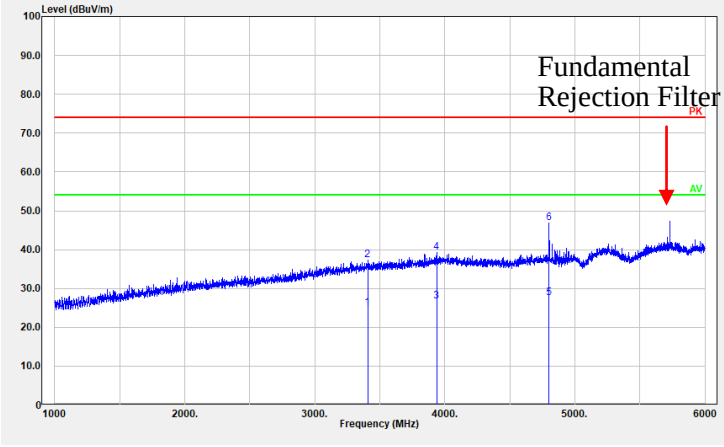
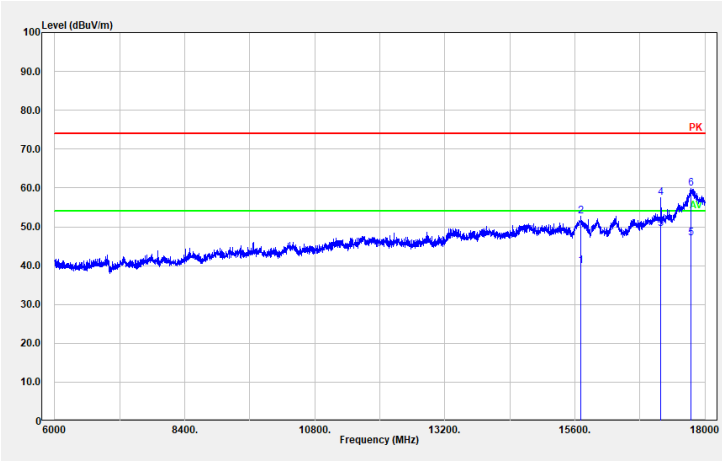
Vertical:

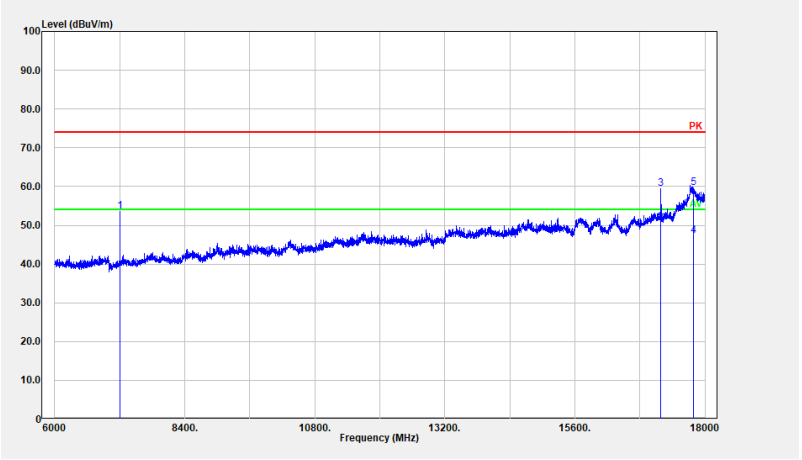
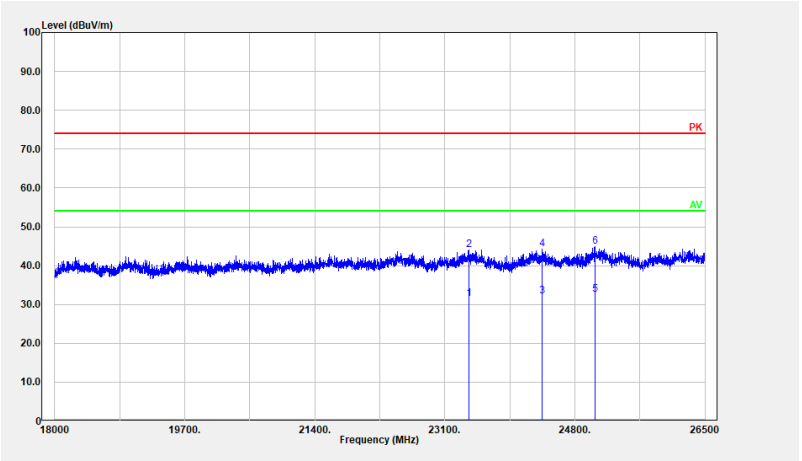
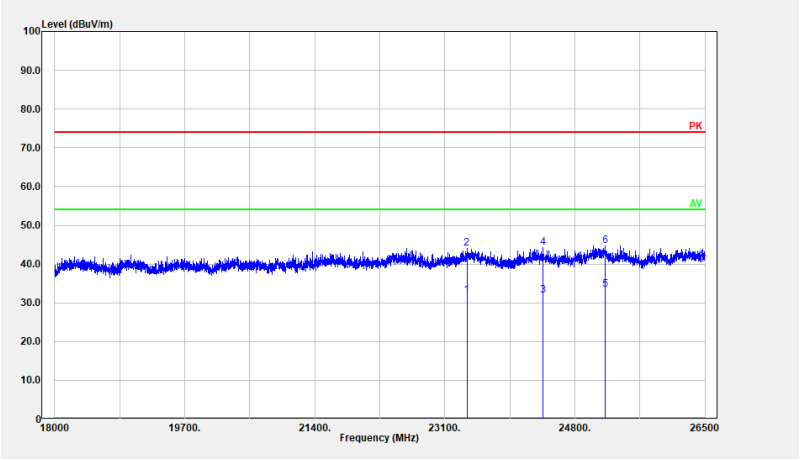


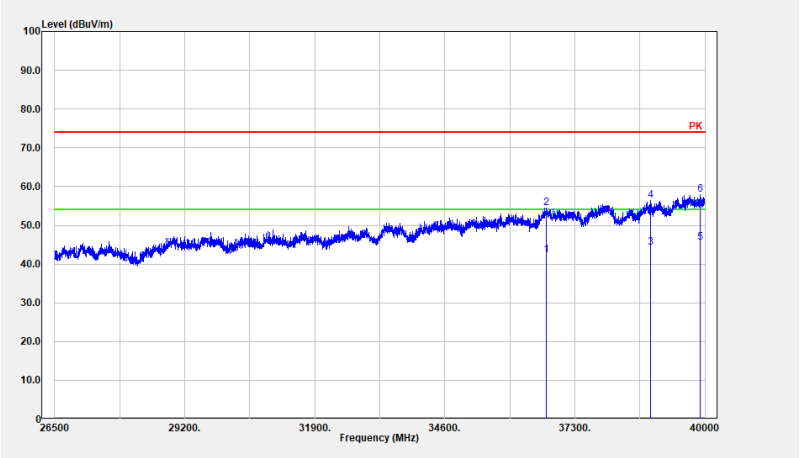
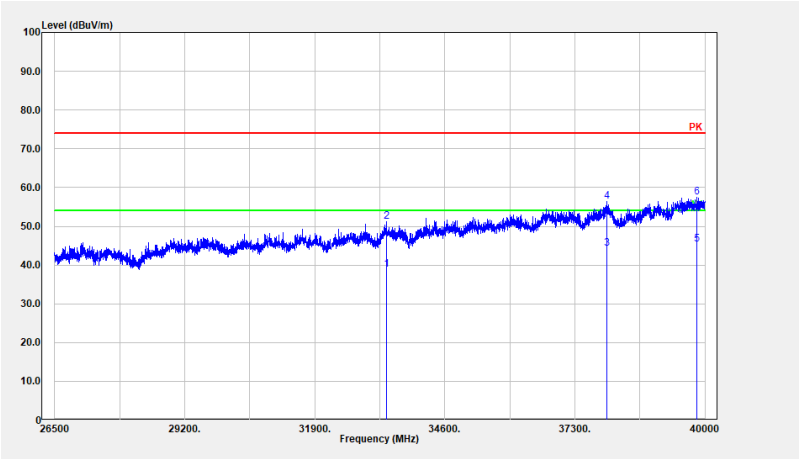
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	30.211	35.71	-3.95	31.75	40.00	8.25	Peak
2	37.155	38.89	-9.30	29.59	40.00	10.41	Peak
3	50.942	46.36	-17.43	28.93	40.00	11.07	Peak
4	72.957	48.48	-16.97	31.51	40.00	8.49	QP
5	130.583	45.49	-11.57	33.91	43.50	9.59	QP
6	522.718	35.35	-6.10	29.25	46.00	16.75	Peak

2) 1GHz-40GHz(CPXC 2X2 TUWH 120 M4 was the worst**):**

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 5730Hz							
5730.00	54.87	PK	H	39.47	88.32	113.98	25.66
5730.00	54.35	AV	H	39.47	87.80	93.98	6.18
5730.00	55.04	PK	V	39.47	88.49	113.98	25.49
5730.00	54.47	AV	V	39.47	87.92	93.98	6.06
5725.00	30.93	PK	V	39.48	64.39	74.00	9.61
5725.00	17.96	AV	V	39.48	51.42	54.00	2.58
11460.00	33.15	PK	V	20.76	47.89	74.00	26.11
11460.00	20.67	AV	V	20.76	35.41	54.00	18.59
17190.00	38.64	PK	V	26.52	59.14	74.00	14.86
17190.00	31.47	AV	V	26.52	51.97	54.00	2.03
4802.00	41.60	PK	V	10.91	46.49	74.00	27.51
4802.00	22.34	AV	V	10.91	27.23	54.00	26.77
7203.00	45.35	PK	V	14.19	53.52	74.00	20.48
7203.00	27.02	AV	V	14.19	35.19	54.00	18.81
Middle Channel: 5800Hz							
5800.00	54.38	PK	H	39.43	87.79	113.98	26.19
5800.00	53.80	AV	H	39.43	87.21	93.98	6.77
5800.00	54.72	PK	V	39.43	88.13	113.98	25.85
5800.00	54.19	AV	V	39.43	87.60	93.98	6.38
11600.00	33.49	PK	V	20.91	48.38	74.00	25.62
11600.00	21.27	AV	V	20.91	36.16	54.00	17.84
17400.00	33.99	PK	V	28.23	56.20	74.00	17.80
17400.00	21.68	AV	V	28.23	43.89	54.00	10.11
4867.00	43.19	PK	V	11.02	48.19	74.00	25.81
4867.00	23.58	AV	V	11.02	28.58	54.00	25.42
7240.00	43.74	PK	V	14.47	52.19	74.00	21.81
7240.00	25.38	AV	V	14.47	33.83	54.00	20.17
High Channel: 5870Hz							
5870.00	54.02	PK	H	39.58	87.58	113.98	26.40
5870.00	53.61	AV	H	39.58	87.17	93.98	6.81
5870.00	54.40	PK	V	39.58	87.96	113.98	26.02
5870.00	53.97	AV	V	39.58	87.53	93.98	6.45
5875.00	31.91	PK	V	39.60	65.49	74.00	8.51
5875.00	18.28	AV	V	39.60	51.86	54.00	2.14
11740.00	35.24	PK	V	21.15	50.37	74.00	23.63
11740.00	22.98	AV	V	21.15	38.11	54.00	15.89
17610.00	36.39	PK	V	29.63	60.00	74.00	14.00
17610.00	26.54	AV	V	29.63	50.15	54.00	3.85
4959.00	39.65	PK	V	11.23	44.86	74.00	29.14
4959.00	21.74	AV	V	11.23	26.95	54.00	27.05
7278.00	41.67	PK	V	14.70	50.35	74.00	23.65
7278.00	23.19	AV	V	14.70	31.87	54.00	22.13

Test Plots(Worst for Low Channel)	
1GHz-6GHz Horizontal	
1GHz-6GHz Vertical	
6GHz-18GHz Horizontal	

Test Plots(Worst for Low Channel)	
6GHz-18GHz Vertical	
18GHz-26.5GHz Horizontal	
18GHz-26.5GHz Vertical	

Test Plots(Worst for Low Channel)	
26.5GHz-40GHz Horizontal	
26.5GHz-40GHz Vertical	

4.3 20 dB Emission Bandwidth:

Serial Number:	CR22040012-RF-S1	Test Date:	2022.7.18
Test Site:	966-1	Test Mode:	Transmit
Tester:	Nick Tang	Test Result:	N/A

Environmental Conditions:					
Temperature: (℃)	25.3	Relative Humidity: (%)	63	ATM Pressure: (kPa)	100

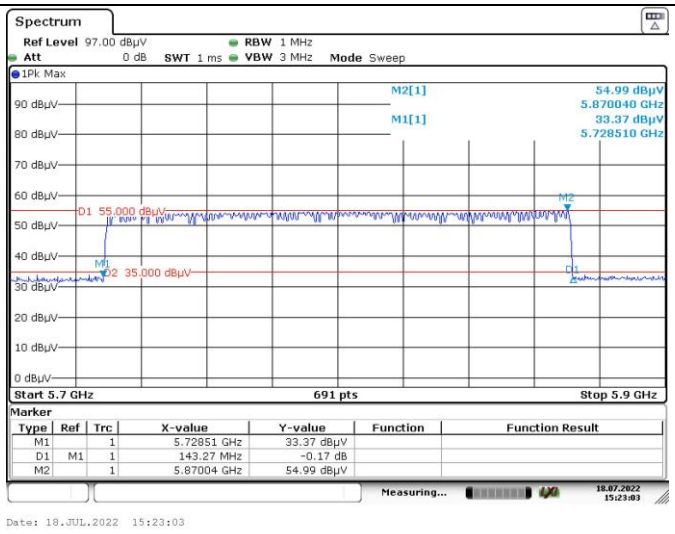
Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
ETS-Lindgren	Horn Antenna	3115	9912-5985	2020-10-13	2023-10-12
R&S	Spectrum Analyzer	FSV40	101591	2021-07-22	2022-07-21
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2021-08-08	2022-08-07
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2021-08-08	2022-08-07
Audix	Test Software	E3	201021 (V9)	N/A	N/A

**** Statement of Traceability:*** *China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Test Mode	20 dB Bandwidth (MHz)
Sweep Mode	143.27MHz

20dB Emission Bandwidth	
Low Channel	

4.4 99% Occupied Bandwidth:

Serial Number:	CR22040012-RF-S1	Test Date:	2022.7.18
Test Site:	966-1	Test Mode:	Transmit
Tester:	Nick Tang	Test Result:	N/A

Environmental Conditions:					
Temperature: (℃)	25.3	Relative Humidity: (%)	63	ATM Pressure: (kPa)	100

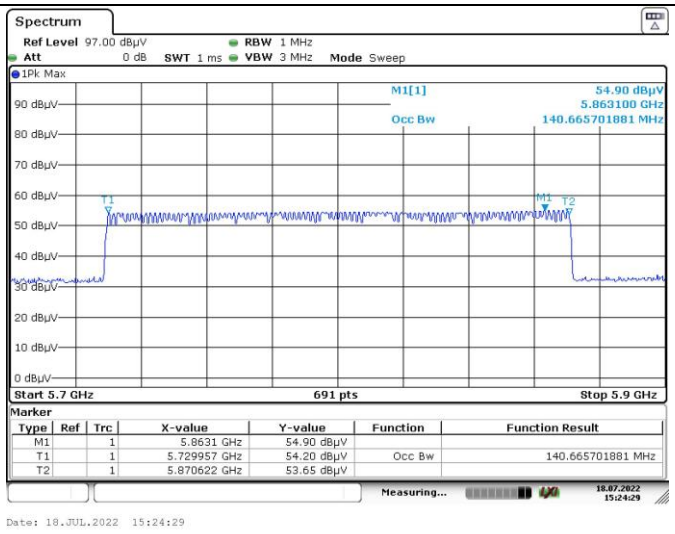
Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
ETS-Lindgren	Horn Antenna	3115	9912-5985	2020-10-13	2023-10-12
R&S	Spectrum Analyzer	FSV40	101591	2021-07-22	2022-07-21
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2021-08-08	2022-08-07
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2021-08-08	2022-08-07
Audix	Test Software	E3	201021 (V9)	N/A	N/A

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Test Mode	99% Bandwidth (MHz)
Sweep Mode	140.666

99% Emission Bandwidth	
	

5. RF EXPOSURE EVALUATION

5.1 RF Exposure Evaluation

5.1.1 Applicable Standard

FCC §1.1307(b)(3)(i)(A)

a single RF source is exempt RF device (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 mW, regardless of separation distance.

5.1.2 Procedure

According to §1.1307(b)(3)(ii)(B)

Simultaneous Transmission with both SAR-based and MPE-Based Test Exemptions

This case is described in detail in § 1.1307(b)(3)(ii)(B) and covers the situations where both SAR-based and MPE-based exemption may be considered for test exemption in fixed, mobile, or portable device exposure conditions. For these cases, a device with multiple RF sources transmitting simultaneously will be considered an RF exempt device if the condition of Formula (1) is satisfied.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1 \qquad (1)$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of this section for P_{th}, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

P_i = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

$P_{th,i}$ = the exemption threshold power (P_{th}) according to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

ERP_j = the ERP of fixed, mobile, or portable RF source j.

$ERP_{th,j}$ = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least $\lambda/2\pi$ according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

$Evaluated_k$ = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

$Exposure\ Limit_k$ = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from § 1.1310 of this chapter.

5.1.3 Measurement Result

Radio	Frequency (MHz)	λ/2Π (mm)	Distance (mm)	Exemption ERP (mW)	Maximum ERP including Tune-up Tolerance	
					(dBm)	(mW)
BLE	2402-2480	19.88	200	768	5.55	3.59
Zigbee	2405-2480	19.85	200	768	4.55	2.85
SRD	5730-5870	8.33	200	768	-8.35	0.15

SRD and BLE or Zigbee can transmit simultaneously.

$$\sum_{i=1}^{a}\frac{P_i}{P_{\mathrm{th},i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{\mathrm{th},j}}+\sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k}$$

$=ERP_{BLE} / ERP_{th} + ERP_{SRD} / ERP_{th}$

$=3.59/768 + 0.15/768$

$=0.005$

< 1.0

Result: The device meet FCC MPE at 20 cm distance.

5.2 Exemption Limits For Routine Evaluation – RF Exposure Evaluation

5.2.1 Applicable Standard

According to RSS-102 §4Table 4, RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10[21]	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142f^{0.3417}$	$0.008335f^{0.3417}$	$0.02619f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

Calculated Formulary:

Predication of MPE limit at a given distance
$S = PG/4\pi R^2$= power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \le 1$$

5.2.2 Calculated Result

Mode	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (W/m^2)	MPE Limit (W/m^2)
		(dBi)	(numeric)	(dBm)	(mW)			
BLE	2402-2480	-0.80	0.83	8.5	7.08	20	0.012	5.35
ZigBee	2405-2480	-0.80	0.83	7.5	5.62	20	0.009	5.36
SRD	5730-5870	2.30	1.70	-8.5	0.14	20	0.0005	9.69

The SRD and BLE or Zigbee can transmit simultaneously:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$=S_{BLE}/S_{limit\text{-}BLE}+ S_{SRD}/S_{limit\text{-}SRD}$

=0.012/5.35+0.0005/9.69

=0.002

< 1.0

Result: The device meet MPE requirement at 20 cm distance

===== END OF REPORT =====