



中认信通

CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)



TEST REPORT

Applicant: Speed Well International Industrial Ltd.

Address: 2/F, West Wing, 822 Lai Chi Kok Road, Cheung Sha Wan, Kowloon, Hong Kong

FCC ID: 2AVYA-AF24G23

IC: 26033-82902

HVIN: 82902

Product Name: KRAKATOA DRAGON

Model: 82902

**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: CR230310607-00

Date Of Issue: 2023/3/23

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Title: Manager

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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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CONTENTS

TEST FACILITY	2
DECLARATIONS.....	2
1. GENERAL INFORMATION	5
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	5
1.2 DESCRIPTION OF TEST CONFIGURATION.....	6
1.2.2 Support Equipment List and Details	6
1.2.3 Support Cable List and Details	6
1.2.4 Block Diagram of Test Setup.....	6
1.3 MEASUREMENT UNCERTAINTY	7
2. SUMMARY OF TEST RESULTS	8
3. REQUIREMENTS AND TEST PROCEDURES	9
3.1 AC LINE CONDUCTED EMISSIONS.....	9
3.1.1 Applicable Standard.....	9
3.1.2 EUT Setup.....	11
3.1.3 EMI Test Receiver Setup	11
3.1.4 Test Procedure	12
3.1.5 Corrected Amplitude & Margin Calculation.....	12
3.2 RADIATED EMISSIONS	13
3.2.1 Applicable Standard.....	13
3.2.2 EUT Setup.....	14
3.2.3 EMI Test Receiver & Spectrum Analyzer Setup	15
3.2.4 Test Procedure	15
3.2.5 Corrected Amplitude & Margin Calculation.....	16
3.3 20 dB EMISSION BANDWIDTH:	17
3.3.1 Applicable Standard.....	17
3.3.2 EUT Setup.....	17
3.3.3 Test Procedure	17
3.4 99% OCCUPIED BANDWIDTH:	18
3.4.1 Applicable Standard.....	18
3.4.2 EUT Setup.....	18
3.4.3 Test Procedure	18
3.5 ANTENNA REQUIREMENT.....	19
3.5.1 Applicable Standard.....	19
3.5.2 Judgment.....	19
4. Test DATA AND RESULTS	20
4.1 AC LINE CONDUCTED EMISSIONS.....	20
4.2 RADIATION SPURIOUS EMISSIONS	21
4.3 20 dB EMISSION BANDWIDTH:	27
4.4 99% OCCUPIED BANDWIDTH:	29

5. RF EXPOSURE EVALUATION	31
5.1 1-MW TEST EXEMPTION	31
5.1.1 APPLICABLE STANDARD.....	31
5.1.2 MEASUREMENT RESULT.....	31
5.2 EXEMPTION LIMITS FOR ROUTINE EVALUATION – SAR EVALUATION	32
5.2.1 APPLICABLE STANDARD.....	32
5.2.2 MEASUREMENT RESULT.....	32

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	KRAKATOA DRAGON
EUT Model:	82902
Operation Frequency:	2405-2475 MHz
Modulation Type:	FSK
Rated Input Voltage:	DC3V from Battery
Serial Number:	22U7-2
EUT Received Date:	2023/3/11
EUT Received Status:	Good

Operation Frequency Detail:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2405	3	2475
2	2440	/	/
Per section 15.31(m) or RSS-Gen 6.9, the below frequencies were performed the test as below:			
Test Frequency		Frequency (MHz)	
Lowest		2405	
Middle		2440	
Highest		2475	

Antenna Information Detail▲:

Antenna Type	input impedance (Ohm)	Antenna Gain /Frequency Range	§15.203 & RSS-Gen Requirement
Wire	50	0.9 dBi/2.4~2.5GHz	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

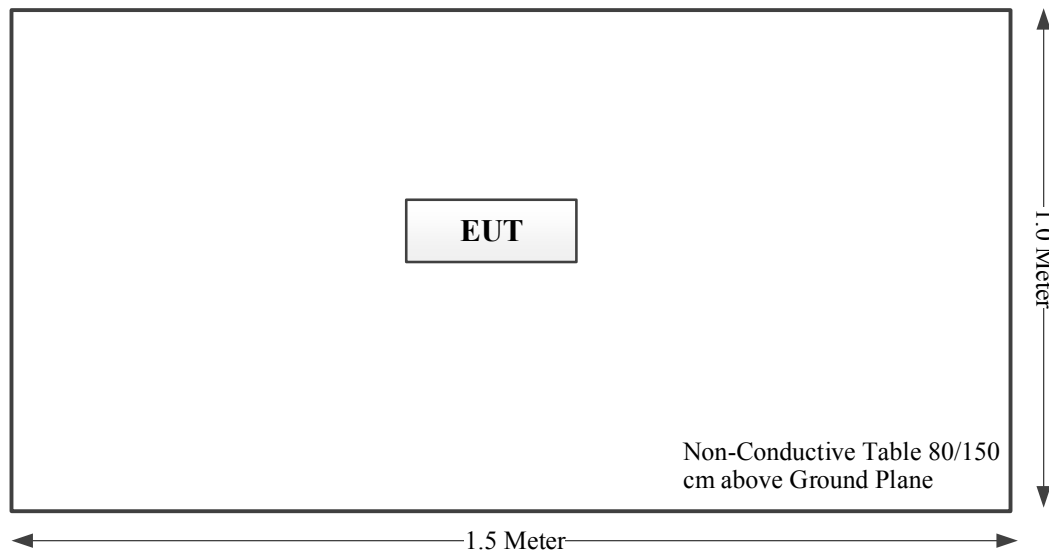
Manufacturer	Description	Model	Serial Number
/	/	/	/

1.2.3 Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
/	/	/	/	/	/

1.2.4 Block Diagram of Test Setup

Spurious emissions:



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	$\pm 5\%$
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	$\pm 1^{\circ}\text{C}$
Humidity	$\pm 5\%$
DC and low frequency voltages	$\pm 0.4\%$
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	Not applicable
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 2.5.1	Exemption Limits For Routine Evaluation-SAR 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 μ H/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.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	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 μ V within the frequency band 535-1705 kHz, as measured using a 50 μ H/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, obtaining 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 μ H / 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 (dB μ V)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 ¹	56 to 46 ¹
0.5 – 5	56	46
5 – 30	60	50

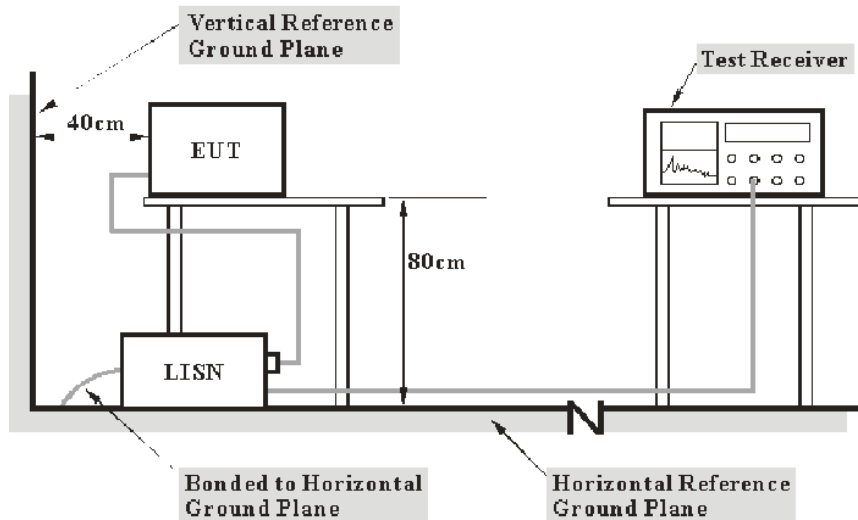
Note 1: The level decreases linearly with the logarithm of the frequency.

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

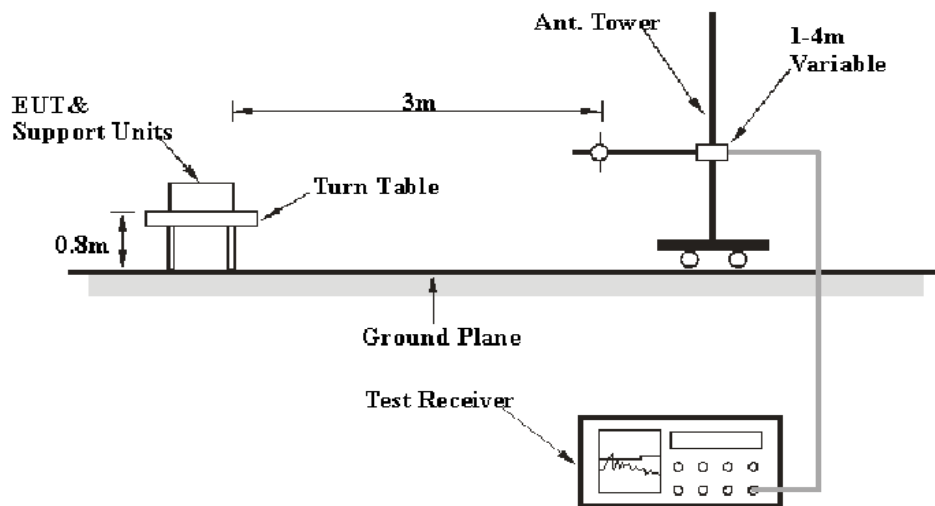
The field strength shall be measured using an average detector, except for the fundamental emission in the frequency band 902-928 MHz, which is based on measurements using an

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

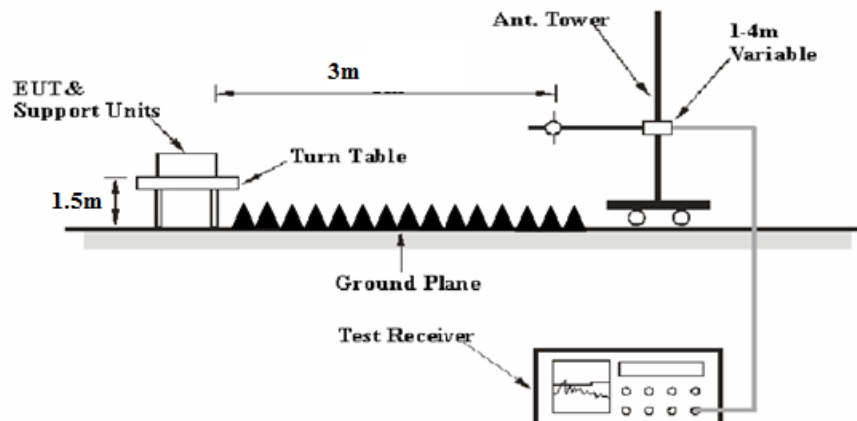
- (b) Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in [RSS-Gen](#), whichever is less stringent

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 25 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.

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

Result = Reading + 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

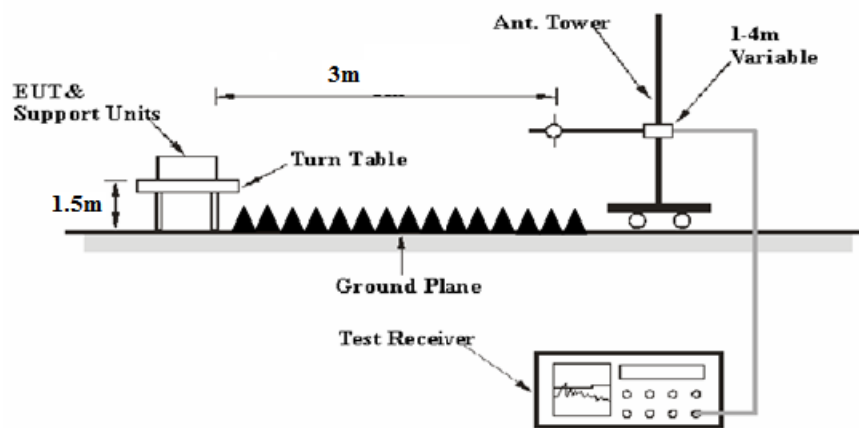
3.3 20 dB Emission Bandwidth:

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



3.3.3 Test 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.

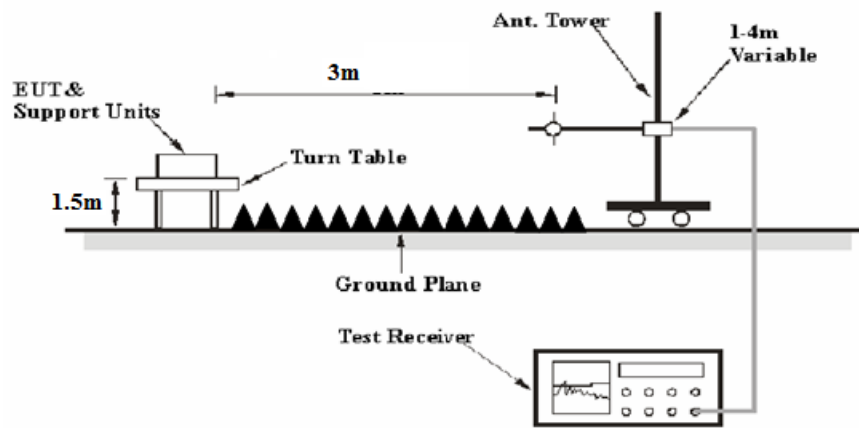
3.4 99% Occupied Bandwidth:

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



3.4.3 Test Procedure

- 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.
- Set the video bandwidth (VBW) $\geq 3 \times \text{RBW}$.
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- 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

Not Applicable, the device was powered by battery when operating.

4.2 Radiation Spurious Emissions

Serial Number:	22U7-2	Test Date:	2023/3/19~2023/3/20
Test Site:	966-2/966-1	Test Mode:	Transmitting
Tester:	Carl Xue, coco Tian	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	24.6~25	Relative Humidity: (%)	46~60	ATM Pressure: (kPa)	100.6~101.7
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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	2022/07/15	2023/07/14
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0470-02	2022/07/17	2023/07/16
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0780-01	2022/07/17	2023/07/16
Sonoma	Amplifier	310N	186165	2022/07/17	2023/07/16
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	2022/07/15	2023/07/14
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2022/08/07	2023/08/06
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2022/08/07	2023/08/06
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2022/11/09	2023/11/08
PASTERNAK	Horn Antenna	PE9852/2F-20	112002	2021/02/05	2024/02/04
AH	Preamplifier	PAM-1840VH	190	2022/11/09	2023/11/08
MICRO-COAX	Coaxial Cable	UFB142A-1-2362-200200	235772-001	2022/08/07	2023/08/06
E-Microwave	Band Rejection Filter	2400-2483.5MHz	OE01902424	2022/08/07	2023/08/06
Mini Circuits	High Pass Filter	VHF-6010+	31119	2022/08/07	2023/08/06

* 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.

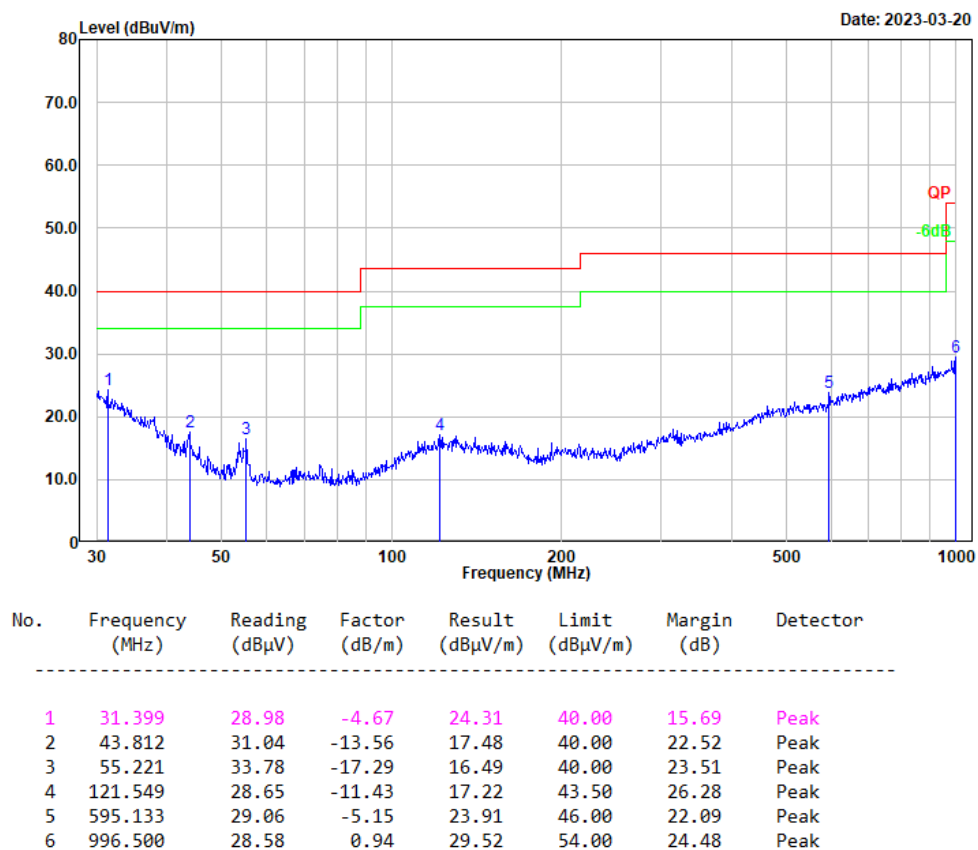
Note: The device can be mounted in multiple orientations, test was performed with X,Y, Z Axis according to C63.10 figure 8, the worst orientation was photographed and it's data was recorded.

Test Data:

1) 30MHz-1GHz(Middle channel was the worst):

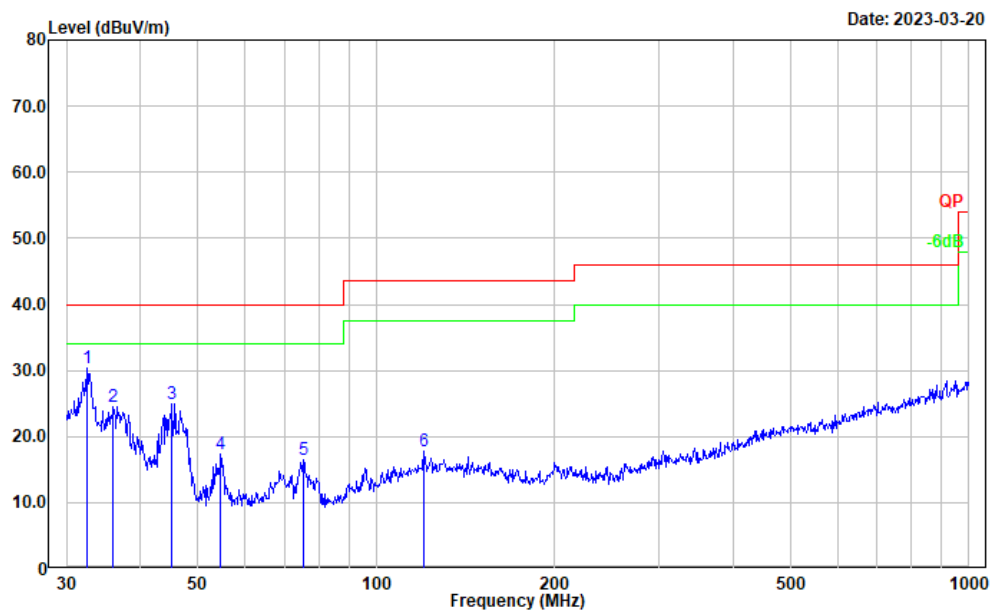
Horizontal:

Test Mode: Transmitting
Polarization: horizontal
Note:



Vertical:

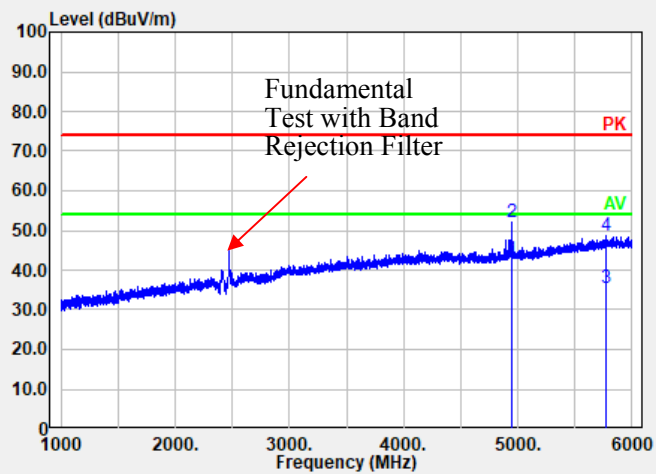
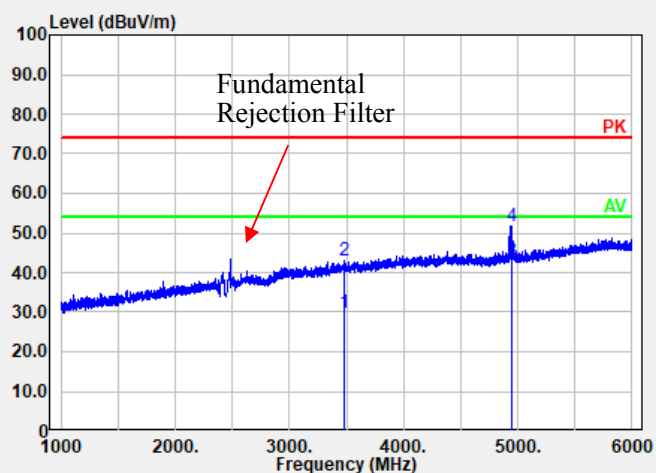
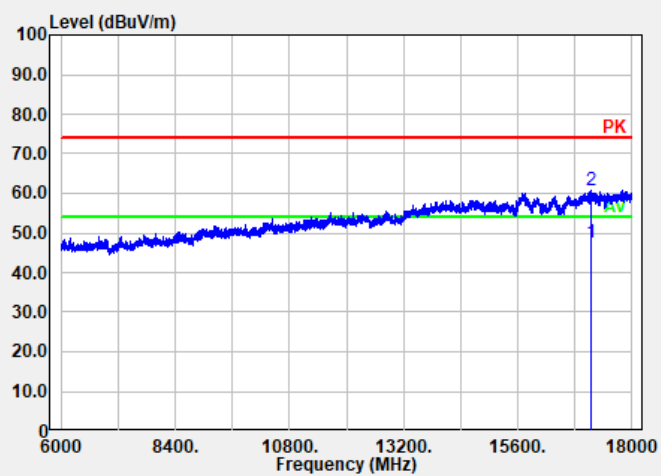
Test Mode: Transmitting
Polarization: vertical
Note:

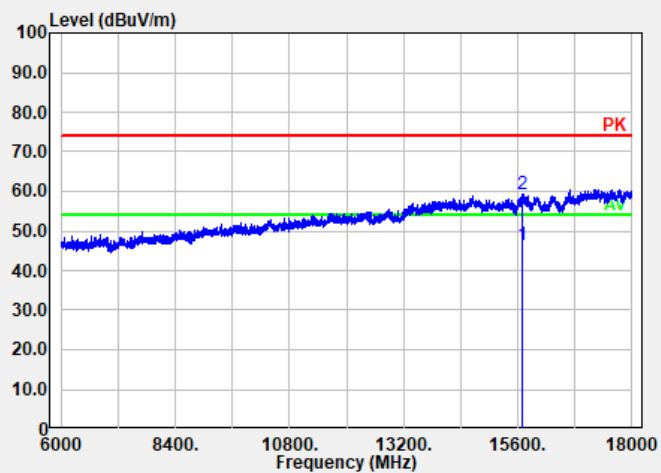
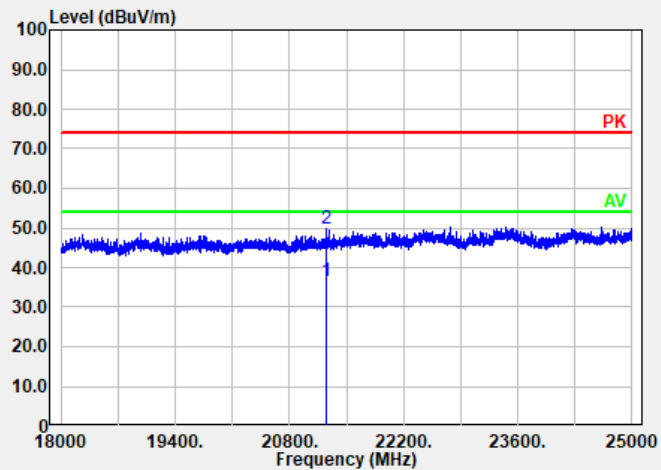
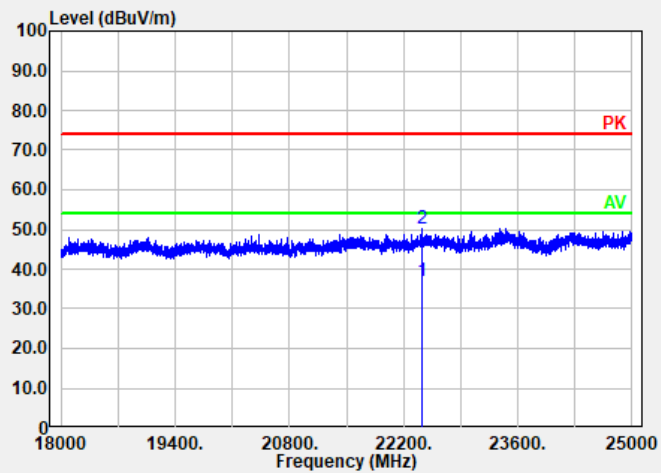


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	32.520	35.91	-5.54	30.37	40.00	9.63	Peak
2	36.001	32.84	-8.24	24.60	40.00	15.40	Peak
3	45.217	39.32	-14.36	24.96	40.00	15.04	Peak
4	54.643	34.62	-17.27	17.35	40.00	22.65	Peak
5	75.182	33.54	-16.95	16.59	40.00	23.41	Peak
6	120.277	29.16	-11.44	17.72	43.50	25.78	Peak

2) 1GHz-25GHz:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 2405MHz							
2405.000	36.42	PK	H	31.51	67.93	113.98	46.05
2405.000	23.31	AV	H	31.51	54.82	93.98	39.16
2405.000	33.53	PK	V	31.51	65.04	113.98	48.94
2405.000	20.46	AV	V	31.51	51.97	93.98	42.01
2400.000	26.35	PK	H	31.50	57.85	74.00	16.15
2400.000	14.42	AV	H	31.50	45.92	54.00	8.08
4810.000	39.48	PK	H	10.92	50.40	74.00	23.60
4810.000	30.81	AV	H	10.92	41.73	54.00	12.27
7215.000	33.46	PK	H	14.28	47.74	74.00	26.26
7215.000	20.56	AV	H	14.28	34.84	54.00	19.16
Middle Channel: 2440MHz							
2440.000	37.03	PK	H	31.60	68.63	113.98	45.35
2440.000	24.39	AV	H	31.60	55.99	93.98	37.99
2440.000	34.16	PK	V	31.60	65.76	113.98	48.22
2440.000	22.35	AV	V	31.60	53.95	93.98	40.03
4880.000	39.77	PK	H	11.07	50.84	74.00	23.16
4880.000	30.58	AV	H	11.07	41.65	54.00	12.35
7320.000	33.42	PK	H	14.80	48.22	74.00	25.78
7320.000	20.57	AV	H	14.80	35.37	54.00	18.63
High Channel: 2475MHz							
2475.000	36.84	PK	H	31.64	68.48	113.98	45.50
2475.000	24.57	AV	H	31.64	56.21	93.98	37.77
2475.000	34.26	PK	V	31.64	65.90	113.98	48.08
2475.000	22.53	AV	V	31.64	54.17	93.98	39.81
2483.500	27.05	PK	H	31.64	58.69	74.00	15.31
2483.500	14.14	AV	H	31.64	45.78	54.00	8.22
4950.000	40.35	PK	H	11.24	51.59	74.00	22.41
4950.000	31.64	AV	H	11.24	42.88	54.00	11.12
7425.000	33.69	PK	H	15.14	48.83	74.00	25.17
7425.000	20.75	AV	H	15.14	35.89	54.00	18.11

Test Plots(Worst for Low Channel)1GHz-6GHz
Horizontal1GHz-6GHz
Vertical6GHz-18GHz
Horizontal

Test Plots(Worst for Low Channel)6GHz-18GHz
Vertical18GHz-25GHz
Horizontal18GHz-25GHz
Vertical

4.3 20 dB Emission Bandwidth:

Serial Number:	22U7-2	Test Date:	2023/3/19
Test Site:	966-1	Test Mode:	Transmitting
Tester:	coco Tian	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	25	Relative Humidity: (%)	60	ATM Pressure: (kPa)	101.7
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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	2022/07/15	2023/07/14
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2022/08/07	2023/08/06
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2022/08/07	2023/08/06
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2022/11/09	2023/11/08
Audix	Test Software	E3	201021 (V9)	N/A	N/A

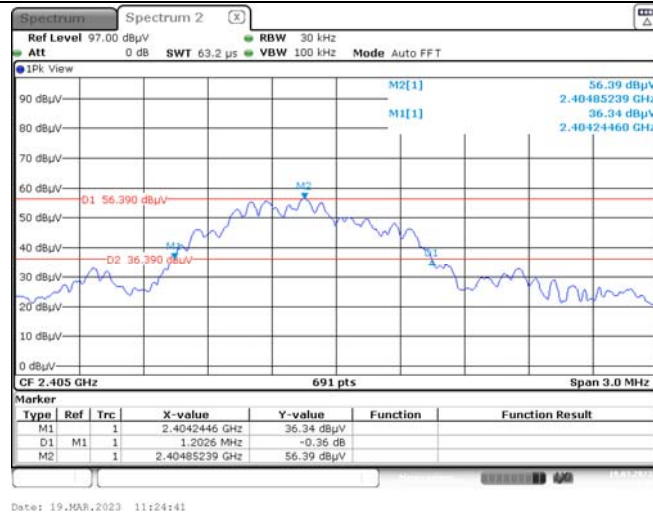
*** Statement of Traceability:** China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:

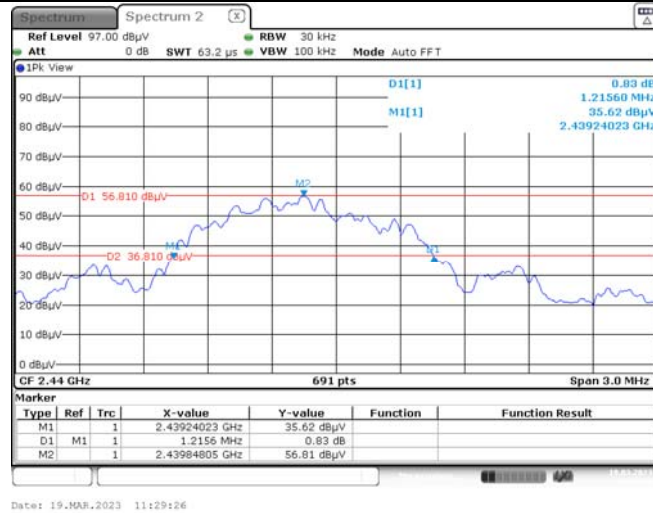
Test Channel	Test Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2405	1.2026
Middle	2440	1.2156
High	2475	1.2113

20dB Emission Bandwidth

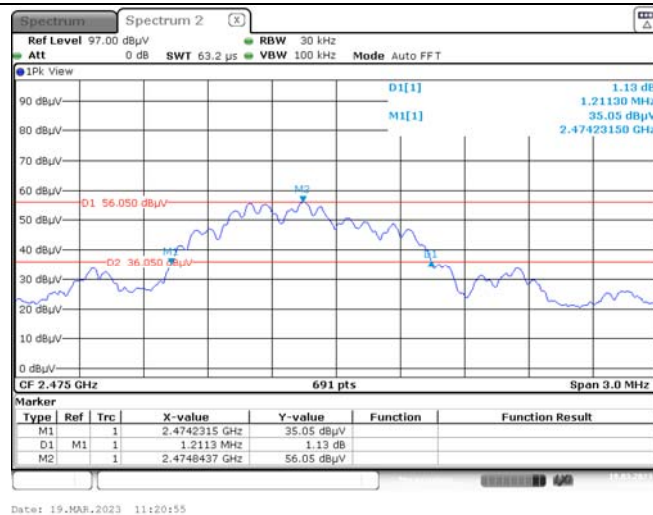
Low Channel



Middle Channel



High Channel



4.4 99% Occupied Bandwidth:

Serial Number:	22U7-2	Test Date:	2023/3/19
Test Site:	966-1	Test Mode:	Transmit
Tester:	coco Tian	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	25	Relative Humidity: (%)	60	ATM Pressure: (kPa)	101.7
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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	2022/07/15	2023/07/14
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2022/08/07	2023/08/06
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2022/08/07	2023/08/06
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2022/11/09	2023/11/08
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 Channel	Test Frequency (MHz)	99% Bandwidth (MHz)
Low	2405	1.177
Middle	2440	1.207
High	2475	1.216

99% Emission Bandwidth

Low Channel



Middle Channel



High Channel



5. RF EXPOSURE EVALUATION

5.1 1-mW Test Exemption

5.1.1 Applicable Standard

According to 447498 D04 Interim General RF Exposure Guidance v01, clause 2.1.2- 1-mW Test Exemption:

Per §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.

This exemption applies to all operating configurations and exposure conditions, for the frequency range 100 kHz to 100 GHz, regardless of fixed, mobile, or portable device exposure conditions. This is a standalone exemption, and it cannot be applied in conjunction with any other test exemption.

5.1.2 Measurement Result

Radio	Frequency (MHz)	Maximum EIRP (dBm)	Maximum ERP		1-mW Test Exemption
			dBm	mW	
SRD	2405-2475	-26.57	-28.72	0.001	Compliant

Note:

1. chose the maximum power to do RF exposure analysis.
2. This device maximum E-Field level is 68.63 dBμV/m at 3m, so the EIRP power is -26.57 dBm.
3. $EIRP(dBm) = \text{Field Strength of Fundamental}(dBuV/m) - 95.2 (dB)$

Result: Compliant. RF Exposure is exemption.

5.2 Exemption Limits for Routine Evaluation – SAR Evaluation

5.2.1 Applicable Standard

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5.

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance⁴⁵

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤ 5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

5.2.2 Measurement Result

$E[\text{dB}\mu\text{V/m}] = \text{EIRP}[\text{dBm}] + 95.2$, for $d = 3 \text{ m}$.

The maximum field strength of fundamental is 68.63 dB $\mu\text{V/m}$ at 3m, so EIRP is -26.57 dBm(0.002mW).

The exemption power(P) limits for routine evaluation in 2405-2475MHz is:

$$(2475-2450)/(3500-2450)=(P-4)/(2-4)$$

$$\Rightarrow P=3.95 \text{ mW}@2475 \text{ MHz}$$

$$> 0.002 \text{ mW}$$

So the stand-alone SAR evaluation can be exempted.

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