



中认信通

CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)



TEST REPORT

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FCC ID: 2AOKB-T8531

IC: 23451-T8531

HVIN: T8531

Product Name: eufy Security Video Smart Lock E330

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: CR230951436-00C

Date Of Issue: 2023/10/10

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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
1.0	CR230951436-00C	Original Report	2023/10/10

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	eufy Security Video Smart Lock E330
EUT Model:	T8531
Operation Frequency:	24059-24240MHz
Modulation Type:	FMCW
Rated Input Voltage:	DC3.6V from battery
Serial Number:	2AU0-1
EUT Received Date:	2023/9/4
EUT Received Status:	Good

Operation Frequency Detail:

Sweep Start Frequency (MHz)	Sweep Stop Frequency (MHz)
24059	24240
Per section 15.31(m), the below frequencies were performed the test as below:	
Test Frequency	Frequency (MHz)
Lowest	24059
Middle	24149
Highest	24240

Antenna Information Detail ▲:

Antenna Manufacturer	Antenna Type	Frequency Range	Antenna Gain
SOCIONEXT	Chip integrated antenna	24.00~24.25GHz	2dBi
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:

Accessory Description	Manufacturer	Model	Parameters
/	/	/	/

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

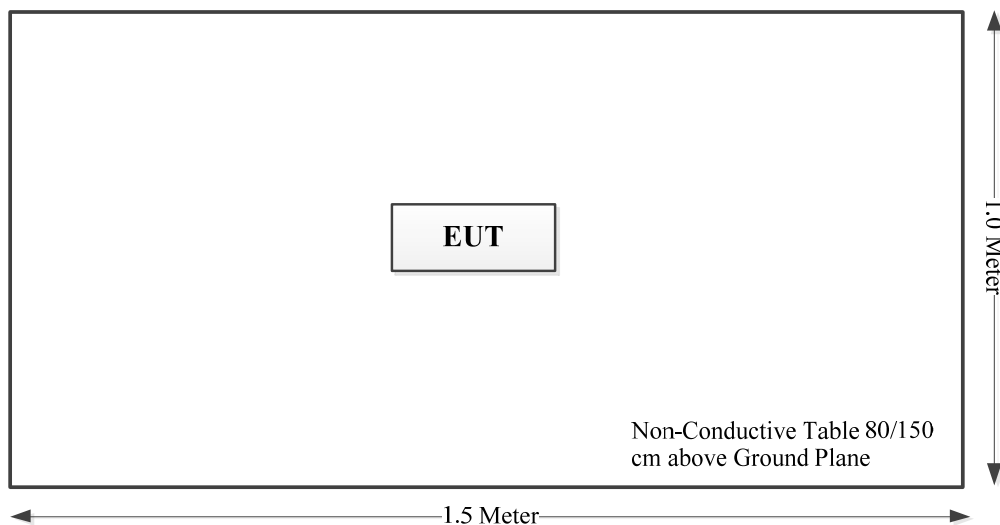
Manufacturer	Description	Model	Serial Number
/	/	/	/

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

Radiated 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

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

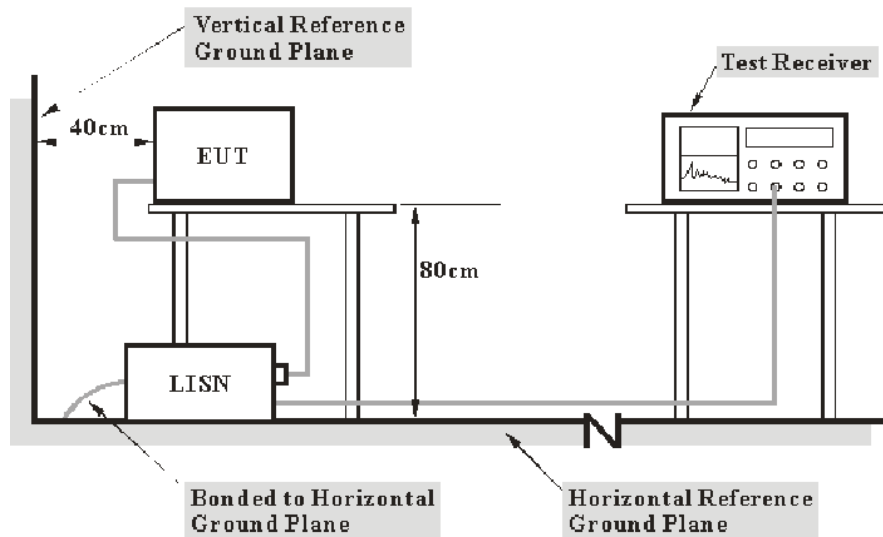
Note 1: The level decreases linearly with the logarithm of the frequency.

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.

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

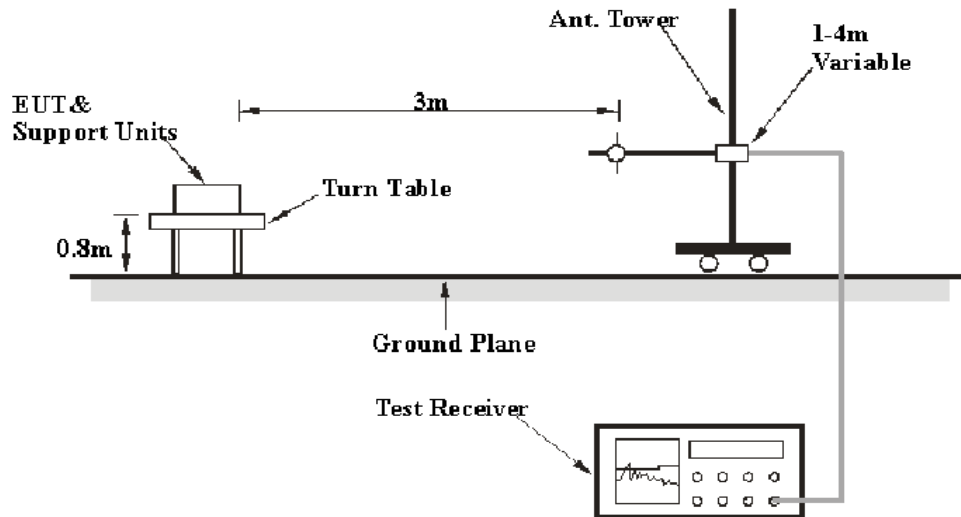
The field strength shall be measured using an average detector, except for the fundamental emission in the frequency band 902-928 MHz, which is based on measurements using an

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

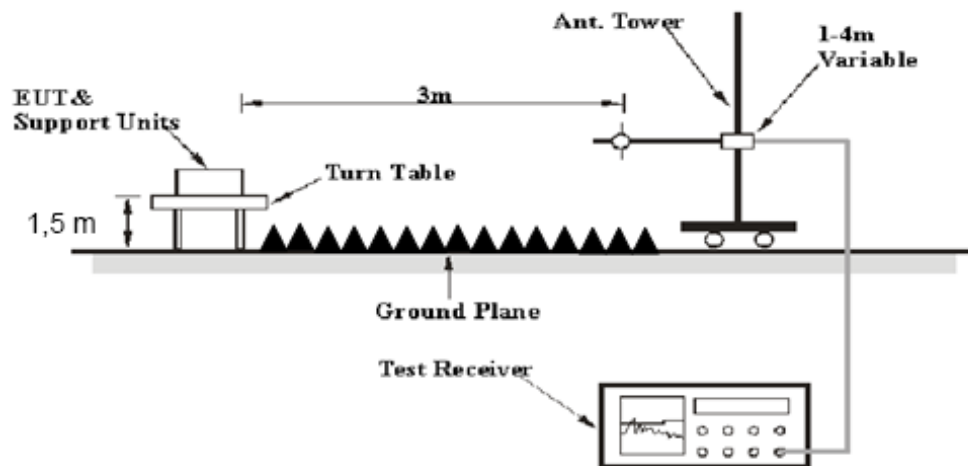
- (b) Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in [RSS-Gen](#), whichever is less stringent

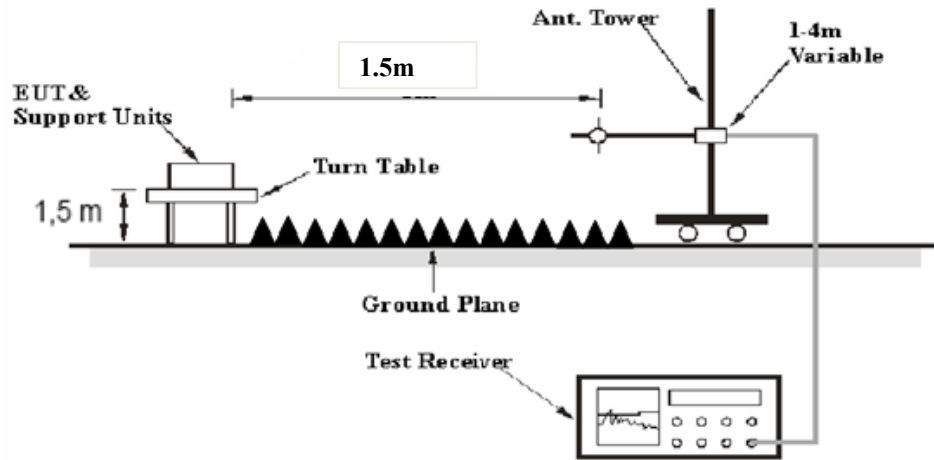
3.2.2 EUT Setup

Below 1GHz:



1-26.5GHz:



26.5-40 GHz:**Above 40GHz:**

The antenna is scanned around the entire perimeter surface of the EUT, in both horizontal and vertical polarizations, at the distance of 1.0 m from 40 GHz to 90 GHz, and 0.5 m from 90 GHz to 100 GHz.

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 limits.

3.2.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 100 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 26.5-40GHz test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 1.5m

Distance extrapolation factor = $20 \log (\text{specific distance [3m]}/\text{test distance [1.5m]})$ 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

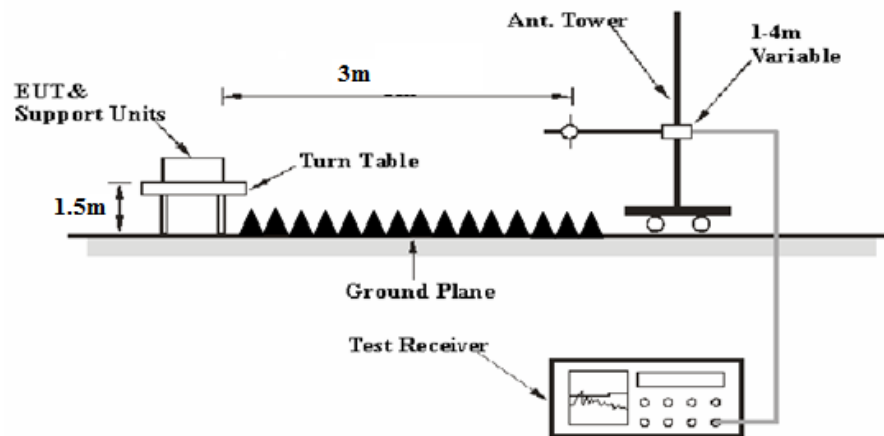
3.3 20 dB Emission Bandwidth:

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



3.3.3 Test Procedure

According to ANSI C63.10-2013 Section 6.9.2

- The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
- The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.
- Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (\text{OBW}/\text{RBW})]$ below the reference level. Specific guidance is given in 4.1.5.2
- Steps a) through c) might require iteration to adjust within the specified tolerances.
- The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “-xx dB down” requirement; that is, if the requirement calls for measuring the -20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.
- Set detection mode to peak and trace mode to max hold.
- Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

- h) Determine the “-xx dB down amplitude” using [(reference value) - xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.
- i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).
- j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “-xx dB down amplitude” determined in step h). If a marker is below this “-xx dB down amplitude” value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “-xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.
- k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

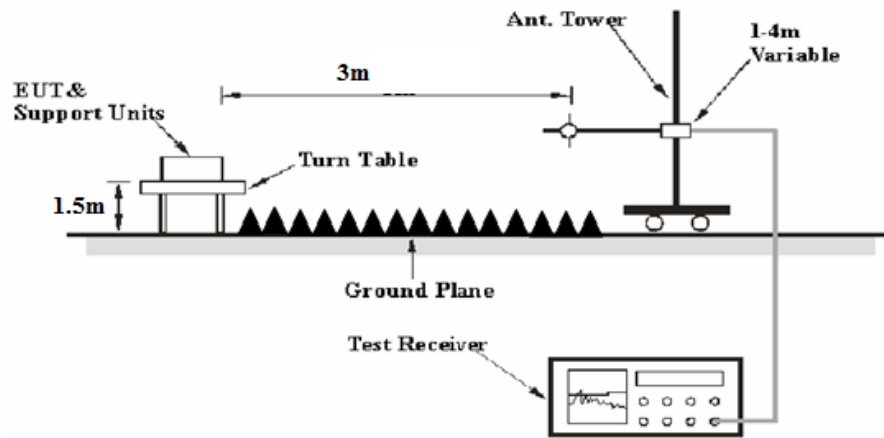
3.4 99% Occupied Bandwidth:

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

According to ANSI C63.10-2013 Section 6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

- The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.5.2.
- Step a) through step c) might require iteration to adjust within the specified range.
- Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

- g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
- h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

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 ISSED 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:	2AU0-1	Test Date:	2023/09/12~2023/09/24
Test Site:	966-1/966-2	Test Mode:	Transmitting
Tester:	Carl Xue, coco Tian	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	25.6~26.3	Relative Humidity: (%)	64	ATM Pressure: (kPa)	100~100.5
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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	2023/03/31	2024/03/30
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0470-02	2023/07/16	2024/07/15
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0780-01	2023/07/16	2024/07/15
Sonoma	Amplifier	310N	186165	2023/07/16	2024/07/15
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	2023/03/31	2024/03/30
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2023/08/06	2024/08/05
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2023/08/06	2024/08/05
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2022/11/09	2023/11/08
Audix	Test Software	E3	201021 (V9)	N/A	N/A
PASTERNAK	Horn Antenna	PE9852/2F-20	112002	2021/02/05	2024/02/04
Quinstar	Preamplifier	QLW-18405536-JO	15964001005	2023/09/15	2024/09/14
MICRO-COAX	Coaxial Cable	UFB142A-1-2362-200200	235772-001	2023/08/06	2024/08/05
PASTERNAK	Horn Antenna	PE9850/2F-20	072001	2021/02/5	2024/02/4
OML	Harmonic Mixer	WR19/M19HWD	U60314-1	2020/10/16	2023/10/15
OML	Horn Antenna	M19RH	11648-03	2020/10/16	2023/10/15
OML	Harmonic Mixer	WR12/M12HWD	E60119-1	2020/10/17	2023/10/16
OML	Horn Antenna	M12RH	E60119-2	2020/10/18	2023/10/17
OML	Harmonic Mixer	WR08/M08HWD	F60315-1	2020/10/22	2023/10/21
OML	Horn Antenna	M08RH	F60315-2	2020/10/24	2023/10/23

* 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.

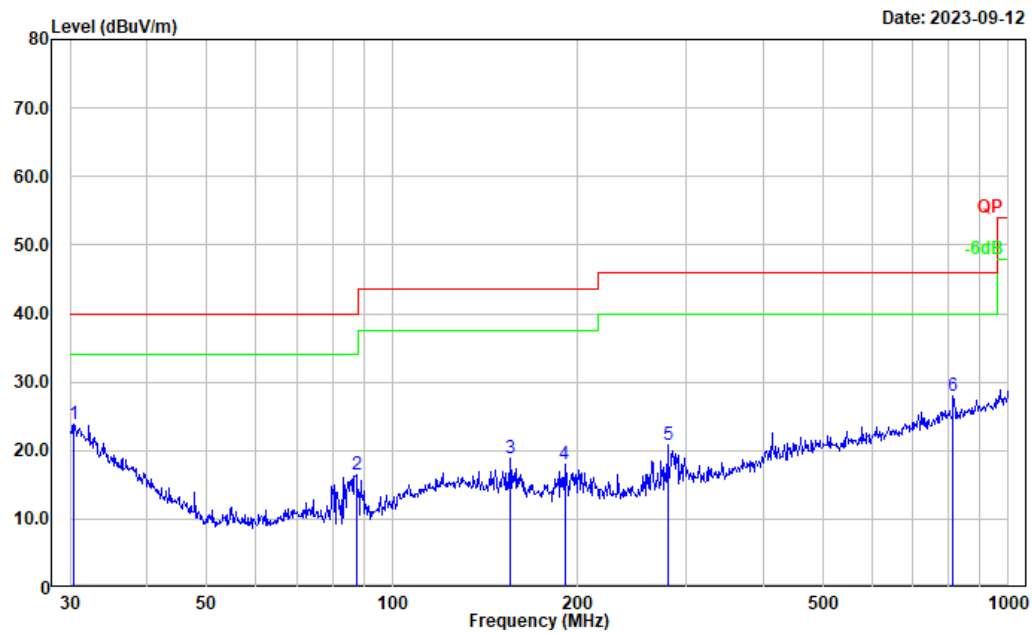
1) 30MHz-1GHz maximum output power mode (High channel):

Project No.: CR230951436-RF

Tester: Carl Xue

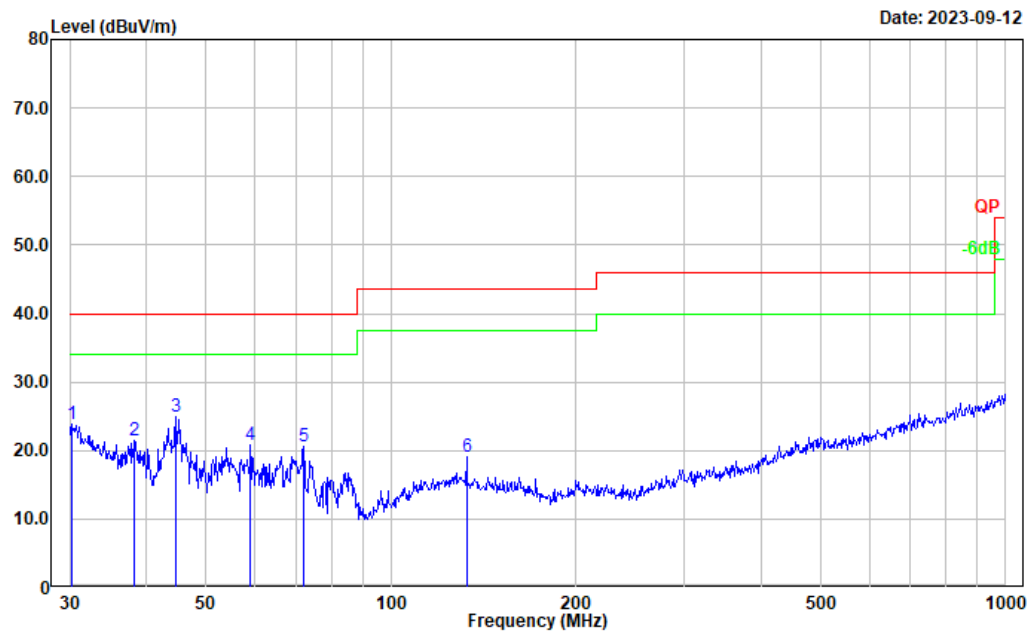
Polarization: horizontal

Note:



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	30.424	27.71	-3.93	23.78	40.00	16.22	Peak
2	87.418	33.49	-17.07	16.42	40.00	23.58	Peak
3	155.364	30.97	-12.06	18.91	43.50	24.59	Peak
4	190.405	31.30	-13.41	17.89	43.50	25.61	Peak
5	280.024	32.38	-11.66	20.72	46.00	25.28	Peak
6	813.112	29.76	-1.85	27.91	46.00	18.09	Peak

Project No.: CR230951436-RF
Tester: Carl Xue
Polarization: vertical
Note:



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	30.211	27.59	-3.76	23.83	40.00	16.17	Peak
2	38.212	31.46	-9.91	21.55	40.00	18.45	Peak
3	44.743	38.93	-14.08	24.85	40.00	15.15	Peak
4	59.025	38.20	-17.41	20.79	40.00	19.21	Peak
5	72.084	37.36	-16.69	20.67	40.00	19.33	Peak
6	132.685	30.49	-11.48	19.01	43.50	24.49	Peak

2) 1GHz-40GHz:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Test Frequency: 24059 MHz							
24059.000	90.54	PK	H	5.59	96.13	127.96	31.83
24059.000	89.42	AV	H	5.59	95.01	107.96	12.95
24059.000	86.17	PK	V	5.59	91.76	127.96	36.20
24059.000	85.21	AV	V	5.59	90.80	107.96	17.16
24000.000	50.86	PK	H	5.52	56.38	74.00	17.62
24000.000	38.26	AV	H	5.52	43.78	54.00	10.22
1740.37	32.27	PK	H	0.92	33.19	74.00	40.81
1740.37	19.39	AV	H	0.92	20.31	54.00	33.69
23405.67	51.89	PK	H	6.03	57.92	74.00	16.08
23405.67	38.97	AV	H	6.03	45.00	54.00	9.00
39581.60	52.08	PK	H	15.81	61.87	74.00	12.13
39581.60	39.32	AV	H	15.81	49.11	54.00	4.89
Test Frequency: 24149 MHz							
24149.000	90.61	PK	H	5.69	96.30	127.96	31.66
24149.000	89.32	AV	H	5.69	95.01	107.96	12.95
24149.000	80.62	PK	V	5.69	86.31	127.96	41.65
24149.000	79.19	AV	V	5.69	84.88	107.96	23.08
1741.48	32.36	PK	H	0.93	33.29	74.00	40.71
1741.48	19.18	AV	H	0.93	20.11	54.00	33.89
23409.88	52.09	PK	H	6.03	58.12	74.00	15.88
23409.88	39.11	AV	H	6.03	45.14	54.00	8.86
39584.70	52.43	PK	H	15.80	62.21	74.00	11.79
39584.70	39.50	AV	H	15.80	49.28	54.00	4.72
Test Frequency: 24240 MHz							
24240.000	90.83	PK	H	5.79	96.62	127.96	31.34
24240.000	89.37	AV	H	5.79	95.16	107.96	12.80
24240.000	82.79	PK	V	5.79	88.58	127.96	39.38
24240.000	81.43	AV	V	5.79	87.22	107.96	20.74
24250.000	58.38	PK	H	5.80	64.18	74.00	9.82
24250.000	46.21	AV	H	5.80	52.01	54.00	1.99
17404.54	32.49	PK	H	28.25	60.74	74.00	13.26
17404.54	19.85	AV	H	28.25	48.10	54.00	5.90
23422.38	52.46	PK	H	6.03	58.49	74.00	15.51
23422.38	39.48	AV	H	6.03	45.51	54.00	8.49
39600.30	52.88	PK	H	15.74	62.60	74.00	11.40
39600.30	39.95	AV	H	15.74	49.67	54.00	4.33

Result = Reading + Factor- Distance extrapolation Factor

For 26.5-40GHz:

Distance extrapolation Factor = $20 \log (\text{specific distance [3m]}/\text{test distance [1.5m]}) \text{ dB} = 6.02 \text{ dB}$

3) 40GHz-100GHz:

Frequency (GHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Test Frequency: 24.059 GHz							
48.118	36.21	PK	H	40.06	66.73	87.96	21.23
48.118	23.19	AV	H	40.06	53.71	67.96	14.25
48.118	35.41	PK	V	40.06	65.93	87.96	22.03
48.118	22.37	AV	V	40.06	52.89	67.96	15.07
72.177	44.10	PK	H	43.81	78.37	87.96	9.59
72.177	30.88	AV	H	43.81	65.15	67.96	2.81
72.177	43.76	PK	V	43.81	78.03	87.96	9.93
72.177	30.11	AV	V	43.81	64.38	67.96	3.58
96.236	48.46	PK	H	45.88	78.78	87.96	9.18
96.236	35.21	AV	H	45.88	65.53	67.96	2.43
96.236	47.98	PK	V	45.88	78.30	87.96	9.66
96.236	35.02	AV	V	45.88	65.34	67.96	2.62
Test Frequency: 24.149 GHz							
48.298	36.45	PK	H	40.08	66.99	87.96	20.97
48.298	23.54	AV	H	40.08	54.08	67.96	13.88
48.298	35.78	PK	V	40.08	66.32	87.96	21.64
48.298	22.83	AV	V	40.08	53.37	67.96	14.59
72.447	44.06	PK	H	43.85	78.37	87.96	9.59
72.447	30.91	AV	H	43.85	65.22	67.96	2.74
72.447	43.88	PK	V	43.85	78.19	87.96	9.77
72.447	30.37	AV	V	43.85	64.68	67.96	3.28
96.596	48.71	PK	H	45.92	79.07	87.96	8.89
96.596	35.46	AV	H	45.92	65.82	67.96	2.14
96.596	48.16	PK	V	45.92	78.52	87.96	9.44
96.596	35.18	AV	V	45.92	65.54	67.96	2.42
Test Frequency: 24.24 GHz							
48.480	36.84	PK	H	40.11	67.41	87.96	20.55
48.480	23.92	AV	H	40.11	54.49	67.96	13.47
48.480	36.07	PK	V	40.11	66.64	87.96	21.32
48.480	23.11	AV	V	40.11	53.68	67.96	14.28
72.720	44.21	PK	H	43.89	78.56	87.96	9.40
72.720	30.94	AV	H	43.89	65.29	67.96	2.67
72.720	43.12	PK	V	43.89	77.47	87.96	10.49
72.720	30.01	AV	V	43.89	64.36	67.96	3.60
96.960	48.43	PK	H	45.97	78.84	87.96	9.12
96.960	35.51	AV	H	45.97	65.92	67.96	2.04
96.960	48.22	PK	V	45.97	78.63	87.96	9.33
96.960	35.36	AV	V	45.97	65.77	67.96	2.19

Result = Reading + Factor- Distance extrapolation Factor

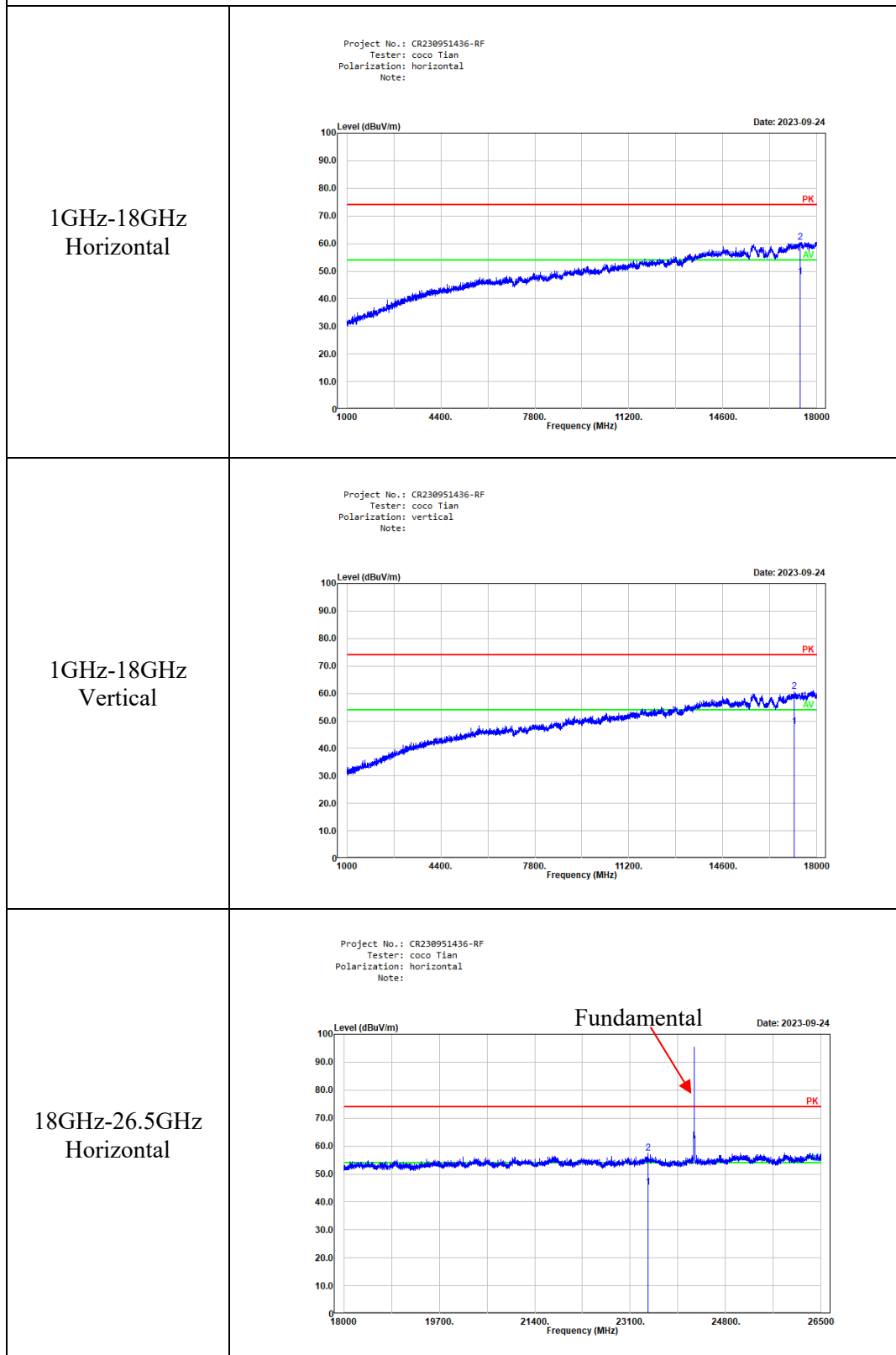
For 40-90GHz:

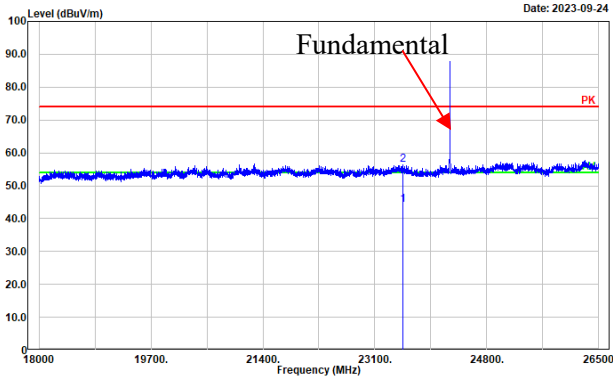
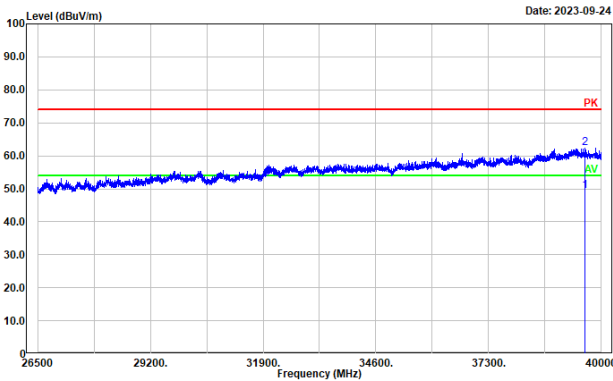
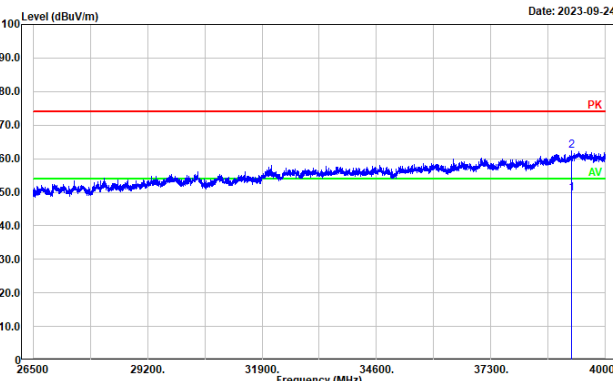
Distance extrapolation Factor = $20 \log (\text{specific distance [3m]}/\text{test distance [1m]})$ dB= 9.54 dB

For 90-100GHz:

Distance extrapolation Factor = $20 \log (\text{specific distance [3m]}/\text{test distance [0.5m]})$ dB= 15.56 dB

Test Plots (Worst for Middle Frequency)



18GHz-26.5GHz Vertical	Project No.: CR230951436-RF Tester: coco Tian Polarization: vertical Note: Date: 2023-09-24 
26.5GHz-40GHz Horizontal	Project No.: CR230951436-RF Tester: coco Tian Polarization: horizontal Note: Date: 2023-09-24 
26.5GHz-40GHz Vertical	Project No.: CR230951436-RF Tester: coco Tian Polarization: vertical Note: Date: 2023-09-24 

4.3 20 dB Emission Bandwidth:

Serial Number:	2AU0-1	Test Date:	2023/09/24
Test Site:	966-1	Test Mode:	Transmitting
Tester:	coco Tian	Test Result:	N/A

Environmental Conditions:

Temperature: (°C)	26.3	Relative Humidity: (%)	64	ATM Pressure: (kPa)	100.5
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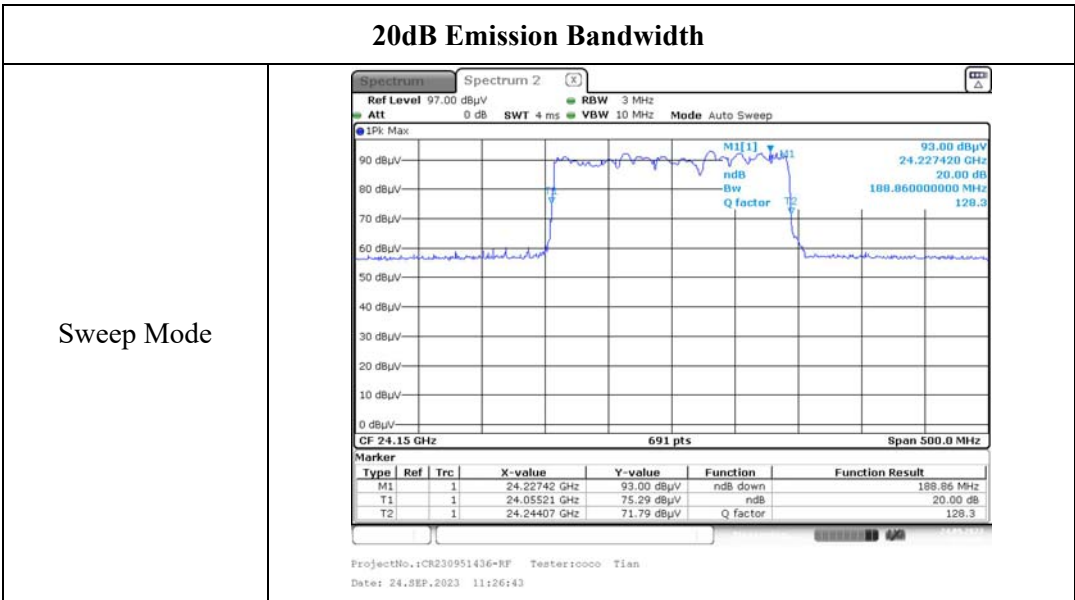
Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101591	2023/03/31	2024/03/30
PASTERNAK	Horn Antenna	PE9852/2F-20	112002	2021/02/05	2024/02/04
Quinstar	Preamplifier	QLW-18405536-JO	15964001005	2023/09/15	2024/09/14
MICRO-COAX	Coaxial Cable	UFB142A-1-2362-200200	235772-001	2023/08/06	2024/08/05

*** 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	188.860



4.4 99% Occupied Bandwidth:

Serial Number:	2AU0-1	Test Date:	2023/09/24
Test Site:	966-1	Test Mode:	Transmitting
Tester:	coco Tian	Test Result:	N/A

Environmental Conditions:

Temperature: (°C)	26.3	Relative Humidity: (%)	64	ATM Pressure: (kPa)	100.5
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Test Equipment List and Details:

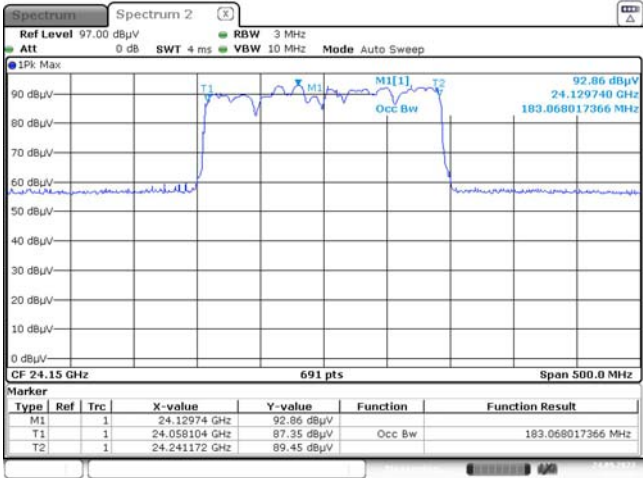
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101591	2023/03/31	2024/03/30
PASTERNAK	Horn Antenna	PE9852/2F-20	112002	2021/02/05	2024/02/04
Quinstar	Preamplifier	QLW-18405536-JO	15964001005	2023/09/15	2024/09/14
MICRO-COAX	Coaxial Cable	UFB142A-1-2362-200200	235772-001	2023/08/06	2024/08/05

*** 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% Occupied Bandwidth (MHz)
Sweep Mode	183.068

99% Emission Bandwidth



ProjectNo.:CR230951436-RF Tester:roooo Tian
Date: 24.SEP.2023 12:12:31

5. EUT PHOTOGRAPHS

Please refer to the attachment CR230951436-EXP EUT EXTERNAL PHOTOGRAPHS and
CR230951436-INP EUT INTERNAL PHOTOGRAPHS

6. TEST SETUP PHOTOGRAPHS

Please refer to the attachment CR230951436-00C-TSP TEST SETUP PHOTOGRAPHS.

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