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

ACCREDITED
TESTING LABORATORY
CERTIFICATE # 6356.01

TEST REPORT

Applicant: **Flyability SA**

Address: EPFL INNOVATION PARK BLDG C, Lausanne Switzerland

FCC ID: **2AL7M-MAGICKAYAKD2**

Product Name: **ELIOS 2**

Standard(s): **47 CFR Part 15, Subpart C(15.247)**
ANSI C63.10-2013
KDB 558074 D01 15.247 Meas Guidance v05r02

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

Report Number: **CR21100119-00**

Date Of Issue: **2021-11-26**

Reviewed By: **Sun Zhong**

Sun Zhong

Title: Manager

Test Laboratory: **China Certification ICT Co., Ltd (Dongguan)**
No. 113, Pingkang Road, Dalang Town, Dongguan,
Guangdong, China
Tel: +86-769-82016888

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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1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	ELIOS 2
EUT Model:	107324
Operation Frequency:	4MHz Mode:2405-2479 MHz 8MHz Mode:2407-2477 MHz
Maximum Average Output Power (Conducted):	28.45 dBm
Modulation Type:	OFDM
Rated Input Voltage:	DC 19.0V from battery or DC 21V from adapter
Serial Number:	CR21100119-RF-S1
EUT Received Date:	2021.10.27
EUT Received Status:	Good

Operation Frequency Detail:

For 4MHz Mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2405	39	2443
2	2406	…	…
…	…	…	…
…	…	74	2478
37	2441	75	2479
38	2442	/	/

Per section 15.31(m), the lowest frequency, middle frequency, and highest frequency were performed the test as below:

Test Channel	Frequency (MHz)
Lowest	2405
Middle	2442
Highest	2479
Per the power test, the additional test should be performed with conducted output power test and radiation bandedge test.	

For 8MHz Mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2407	37	2443
2	2408	…	…
…	…	…	…
…	…	70	2476
35	2441	71	2477
36	2442	/	/

Per section 15.31(m), the lowest frequency, middle frequency, and highest frequency were performed the test as below:

Test Channel	Frequency (MHz)
Lowest	2407
Middle	2442
Highest	2477
Per the power test, the additional test should be performed with conducted output power test and radiation bandedge test.	

Antenna Information Detail▲:

Antenna Chain	Manufacturer	Antenna Type	input impedance (Ohm)	Antenna Gain /Frequency Range	§15.203 Requirement
0	Flyability SA	Monopole	50	3.0 dBi/ 2.4~2.5GHz	**Compliance**
1	Flyability SA	Monopole	50	3.0 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:

Accessory Description	Manufacturer	Model	Parameters
Adapter	Flyability SA	FY2105000	Input: 100-240V~50/60Hz 1.5A 150V/A Output: 21V 5A

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:	IP Control
The software " IP Control "was provided by manufacturer. The power was configured to the maximum power per test purpose, the setting was provided by the manufacturer▲, please refer to the power test section.	
The device supports SISO and MIMO in all modes, per pretest, MIMO was the worst mode and reported in this report.	

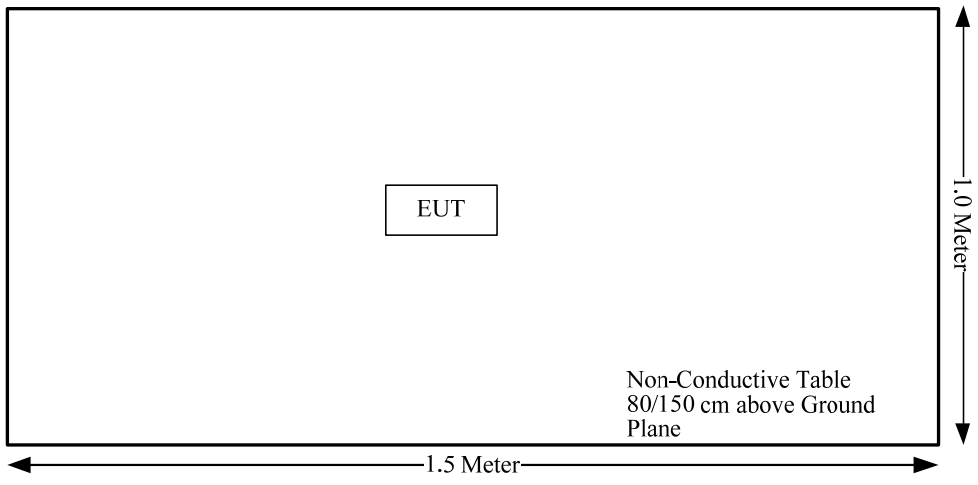
1.2.2 Support Equipment List and Details

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



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 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
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
Unwanted Emissions, conducted	±1.26 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) Section	Test Items	Result	Note
§15.207(a)	AC line conducted emissions	Not applicable	The device was powered by battery when operating
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance	/
§15.247 (a)(2)	6 dB Bandwidth	Compliance	/
§15.247(b)(3)	Maximum Conducted Output Power	Compliance	/
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance	/
§15.247(e)	Power Spectral Density	Compliance	/
§15.203	Antenna Requirement	Compliance	/
§15.247 (i) & §1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliance	/

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:

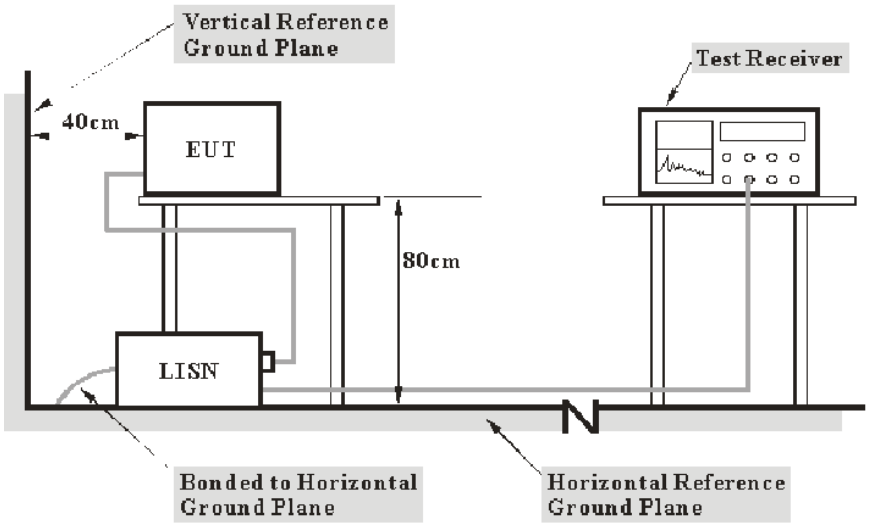
(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(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.

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 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

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 Radiation Spurious Emissions

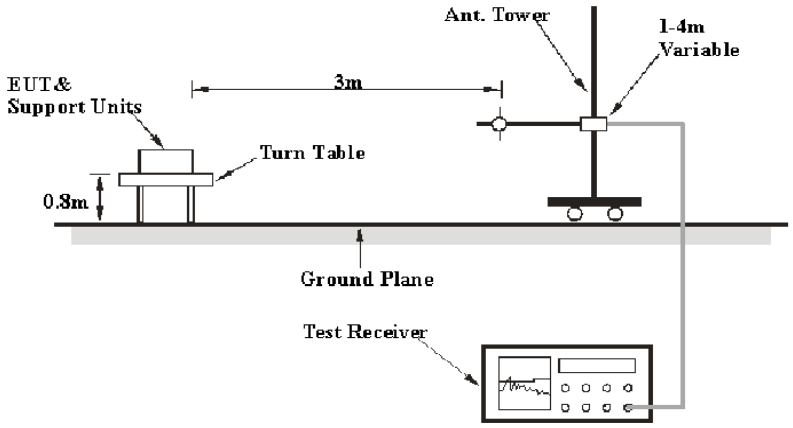
3.2.1 Applicable Standard

FCC §15.247 (d);

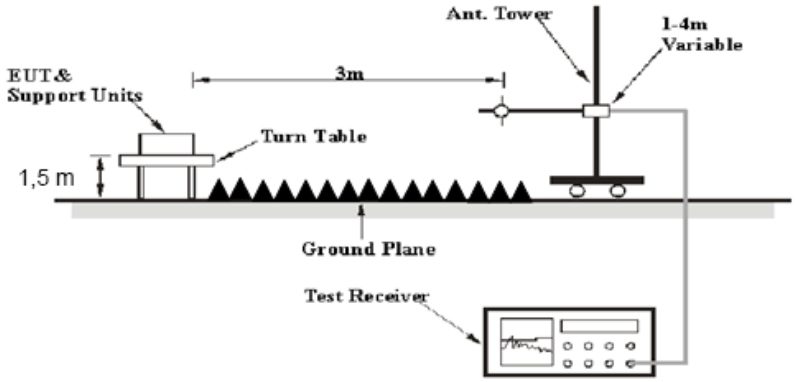
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

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 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

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:

30MHz-1000MHz:

Measurement	RBW	Video B/W	IF B/W
QP	120 kHz	300 kHz	120kHz

1GHz- 25GHz:

Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
AV	>98%	1MHz	10 Hz
	<98%	1MHz	1/T

Note: T is minimum transmission duration

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.

3.2.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor
Factor = Antenna Factor + Cable Loss- Amplifier Gain

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

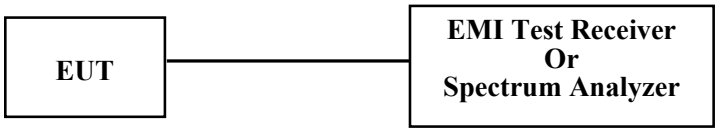
3.3 6 dB Emission Bandwidth:

3.3.1 Applicable Standard

FCC §15.247 (a)(2)

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

3.3.2 EUT Setup



3.3.3Test Procedure

According to ANSI C63.10-2013 Section 11.8

a) Set RBW = 100 kHz.
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) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

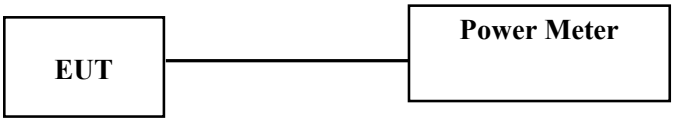
3.4 Maximum conducted output power:

3.4.1 Applicable Standard

FCC §15.247 (b)(3)

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

3.4.2 EUT Setup



3.4.3Test Procedure

According to ANSI C63.10-2013 Section 11.9.1.3, and(or) ANSI C63.10-2013 Section 11.9.2.3.1

PKPM1 Peak power meter method

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

a) Set the EUT in transmitting mode.
b) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to test equipment.
c) Add a correction factor to the display.
d) Set the power meter to test peak output power, record the result.

Method AVGPM

Method AVGPM is a measurement using an RF average power meter, as follows:

a) As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied:
1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
b) If the transmitter does not transmit continuously, measure the duty cycle, D, of the transmitter output signal as described in 11.6.
c) Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
d) Adjust the measurement in dBm by adding [10 log (1 / D)], where D is the duty cycle.

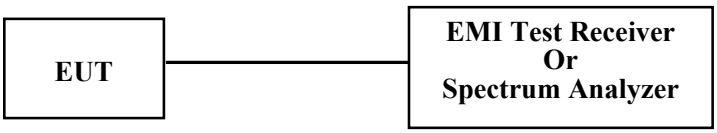
3.5 Maximum power spectral density:

3.5.1 Applicable Standard

FCC §15.247 (e)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

3.5.2 EUT Setup



3.5.3Test Procedure

According to ANSI C63.10-2013 Section 11.10.2

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ [3 · RBW].
e) Detector = Peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

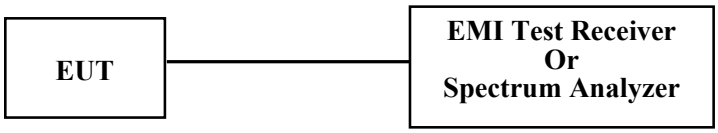
3.6 100 kHz Bandwidth of Frequency Band Edge:

3.6.1 Applicable Standard

FCC §15.247 (d);

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

3.6.2 EUT Setup



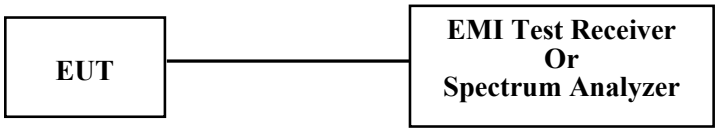
3.6.3 Test Procedure

According to ANSI C63.10-2013 Section 11.11

a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector =RMS.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

3.7 Duty Cycle:

3.7.1 EUT Setup



3.7.2Test Procedure

According to ANSI C63.10-2013 Section 11.6

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:
1) Set the center frequency of the instrument to the center frequency of the transmission.
2) Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.
3) Set VBW ≥ RBW. Set detector = peak or average.
4) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if T ≤ 16.7 μs.)

3.8 Antenna Requirement

3.8.1 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 use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

3.8.2 Judgment

Please refer to the Antenna Information detail in Section 1.

4. Test DATA AND RESULTS

4.1 AC Line Conducted Emissions

Not applicable.

4.2 Radiation Spurious Emissions

Serial Number:	CR21100119-RF-S1	Test Date:	2021-11-24~2021-11-25
Test Site:	966-1,966-2	Test Mode:	Transmitting
Tester:	Great Qiao, Carl Liang	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	18.6~21.7	Relative Humidity: (%)	44~52	ATM Pressure: (kPa)	101.4~101.7

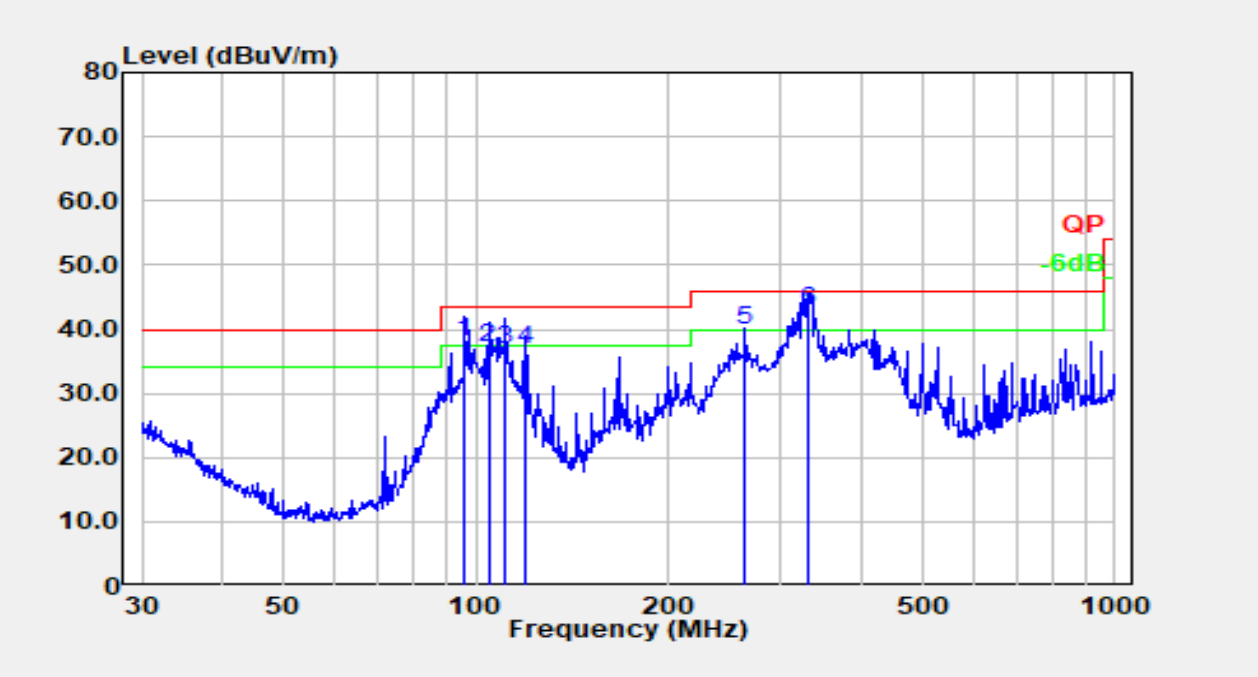
Test Equipment List and Details:

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
PASTERNACK	Horn Antenna	PE9852/2F-20	112002	2021-02-05	2023-02-04
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
MICRO-COAX	Coaxial Cable	UFB142A-1-2362-200200	235772-001	2021-08-08	2022-08-07
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2021-11-10	2022-11-09
AH	Preamplifier	PAM-1840VH	190	2021-11-19	2022-11-18
E-Microwave	Band Rejection Filter	2400-2483.5MHz	OE01902424	2021-08-08	2022-08-07
Mini Circuits	High Pass Filter	VHF-6010+	31119	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).*

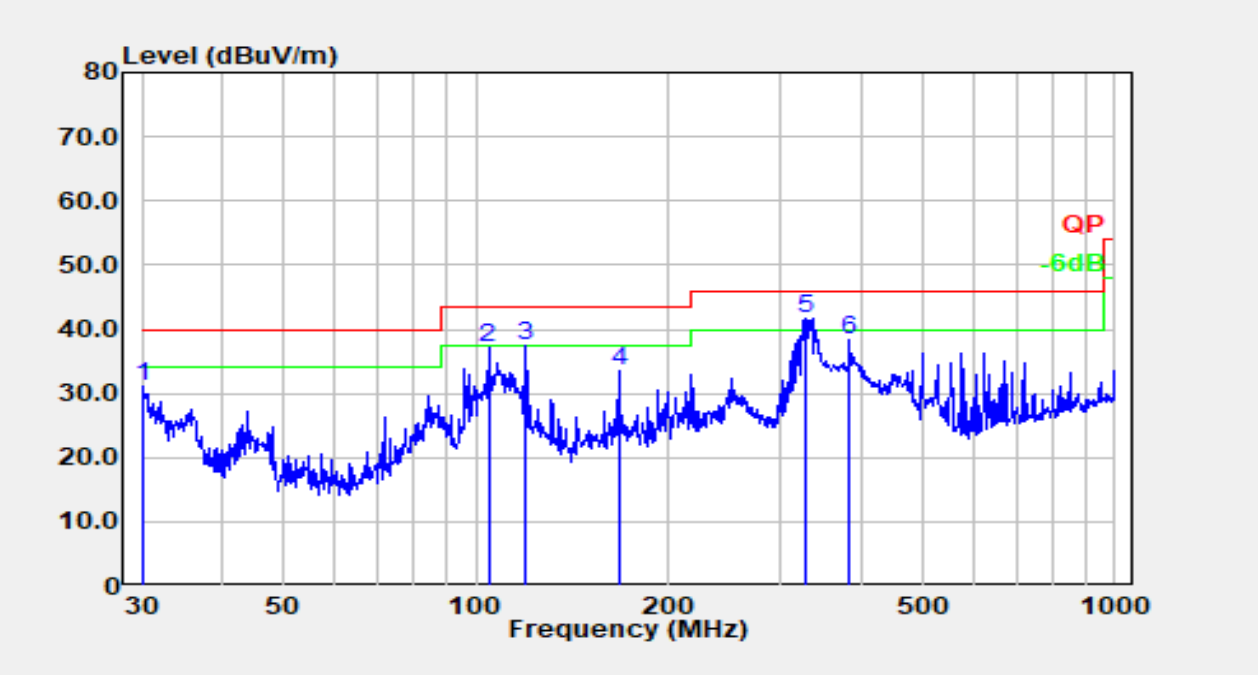
1) 30MHz-1GHz(4M Low channel was the worst)

Horizontal:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	96.099	53.58	-15.57	38.01	43.50	5.49	QP
2	104.536	50.80	-13.69	37.11	43.50	6.39	QP
3	111.347	49.19	-12.48	36.71	43.50	6.79	QP
4	119.856	48.71	-11.75	36.96	43.50	6.54	QP
5	262.896	52.43	-12.53	39.90	46.00	6.10	Peak
6	330.195	53.30	-10.40	42.90	46.00	3.10	QP

Vertical:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	30.105	34.89	-3.87	31.02	40.00	8.98	Peak
2	104.536	50.90	-13.69	37.20	43.50	6.30	Peak
3	119.856	49.17	-11.75	37.42	43.50	6.08	Peak
4	167.824	46.44	-12.96	33.47	43.50	10.03	Peak
5	326.740	52.31	-10.54	41.77	46.00	4.23	QP
6	383.932	47.74	-9.26	38.48	46.00	7.52	Peak

2) 1-25GHz:
4M

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 2405 MHz							
2405.00	80.87	PK	H	31.51	112.38	N/A	N/A
2405.00	70.68	AV	H	31.51	102.19	N/A	N/A
2405.00	83.11	PK	V	31.51	114.62	N/A	N/A
2405.00	74.35	AV	V	31.51	105.86	N/A	N/A
2390.00	28.13	PK	V	31.46	59.59	74.00	14.41
2390.00	14.07	AV	V	31.46	45.53	54.00	8.47
4810.00	35.09	PK	V	10.92	46.01	74.00	27.99
4810.00	22.87	AV	V	10.92	33.79	54.00	20.21
7215.00	34.46	PK	V	14.28	48.74	74.00	25.26
7215.00	22.28	AV	V	14.28	36.56	54.00	17.44
2406 MHz							
2406.00	83.11	PK	V	31.52	114.63	N/A	N/A
2406.00	74.35	AV	V	31.52	105.87	N/A	N/A
2390.00	27.95	PK	V	31.46	59.41	74.00	14.59
2390.00	15.02	AV	V	31.46	46.48	54.00	7.52
2407 MHz							
2407.00	88.97	PK	V	31.52	120.49	N/A	N/A
2407.00	79.56	AV	V	31.52	111.08	N/A	N/A
2390.00	27.59	PK	V	31.46	59.05	74.00	14.95
2390.00	15.69	AV	V	31.46	47.15	54.00	6.85
2408 MHz							
2408.00	89.16	PK	V	31.52	120.68	N/A	N/A
2408.00	79.69	AV	V	31.52	111.21	N/A	N/A
2390.00	30.21	PK	V	31.46	61.67	74.00	12.33
2390.00	19.87	AV	V	31.46	51.33	54.00	2.67
Middle Channel: 2442 MHz							
2442.00	87.92	PK	H	31.61	119.53	N/A	N/A
2442.00	78.51	AV	H	31.61	110.12	N/A	N/A
2442.00	89.78	PK	V	31.61	121.39	N/A	N/A
2442.00	80.06	AV	V	31.61	111.67	N/A	N/A
4884.00	44.67	PK	V	11.08	55.75	74.00	18.25
4884.00	34.82	AV	V	11.08	45.90	54.00	8.10
7326.00	44.22	PK	V	14.79	59.01	74.00	14.99
7326.00	36.92	AV	V	14.79	51.71	54.00	2.29
2380.00	48.51	PK	V	3.44	51.95	74.00	22.05
2380.00	43.12	AV	V	3.44	46.56	54.00	7.44
2473 MHz							
2473.00	89.65	PK	V	31.64	121.29	N/A	N/A
2473.00	79.85	AV	V	31.64	111.49	N/A	N/A
2483.50	35.28	PK	V	31.64	66.92	74.00	7.08
2483.50	16.58	AV	V	31.64	48.22	54.00	5.78
2474 MHz							
2474.00	85.95	PK	V	31.64	117.59	N/A	N/A
2474.00	76.84	AV	V	31.64	108.48	N/A	N/A
2483.50	37.88	PK	V	31.64	69.52	74.00	4.48
2483.50	17.65	AV	V	31.64	49.29	54.00	4.71

2475 MHz							
2475.00	76.58	PK	V	31.64	108.22	N/A	N/A
2475.00	66.87	AV	V	31.64	98.51	N/A	N/A
2483.50	37.25	PK	V	31.64	68.89	74.00	5.11
2483.50	18.96	AV	V	31.64	50.60	54.00	3.40
2476 MHz							
2476.00	72.13	PK	V	31.64	103.77	N/A	N/A
2476.00	61.35	AV	V	31.64	92.99	N/A	N/A
2483.50	36.58	PK	V	31.64	68.22	74.00	5.78
2483.50	19.57	AV	V	31.64	51.21	54.00	2.79
2477 MHz							
2477.00	66.58	PK	V	31.64	98.22	N/A	N/A
2477.00	56.98	AV	V	31.64	88.62	N/A	N/A
2483.50	37.62	PK	V	31.64	69.26	74.00	4.74
2483.50	19.86	AV	V	31.64	51.50	54.00	2.50
2478 MHz							
2478.00	64.36	PK	V	31.64	96.00	N/A	N/A
2478.00	55.31	AV	V	31.64	86.95	N/A	N/A
2483.50	36.58	PK	V	31.64	68.22	74.00	5.78
2483.50	19.57	AV	V	31.64	51.21	54.00	2.79
2479 MHz							
2479.00	63.36	PK	H	31.64	95.00	N/A	N/A
2479.00	54.26	AV	H	31.64	85.90	N/A	N/A
2479.00	64.58	PK	V	31.64	96.22	N/A	N/A
2479.00	55.21	AV	V	31.64	86.85	N/A	N/A
2483.50	37.08	PK	V	31.64	68.72	74.00	5.28
2483.50	19.99	AV	V	31.64	51.63	54.00	2.37
4958.00	35.57	PK	V	11.23	46.80	74.00	27.20
4958.00	23.69	AV	V	11.23	34.92	54.00	19.08
7437.00	34.14	PK	V	15.23	49.37	74.00	24.63
7437.00	22.31	AV	V	15.23	37.54	54.00	16.46

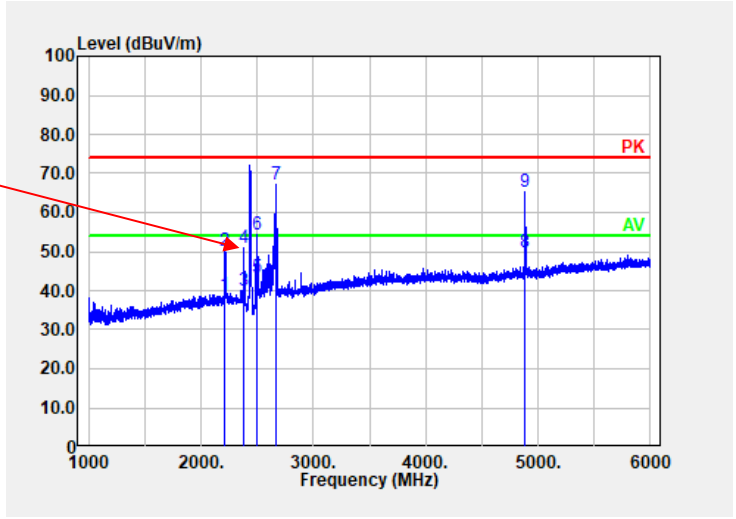
8M

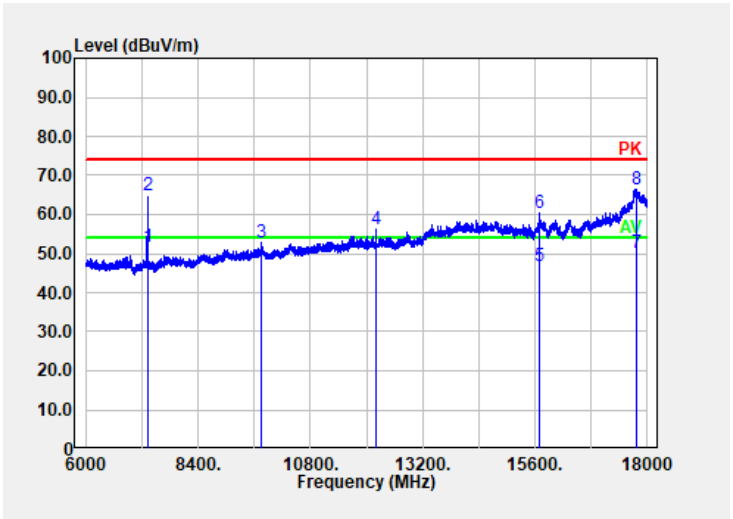
Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 2407 MHz							
2407.00	74.09	PK	H	31.52	105.61	N/A	N/A
2407.00	62.25	AV	H	31.52	93.77	N/A	N/A
2407.00	74.71	PK	V	31.52	106.23	N/A	N/A
2407.00	63.21	AV	V	31.52	94.73	N/A	N/A
2390.00	29.78	PK	V	31.46	61.24	74.00	12.76
2390.00	19.04	AV	V	31.46	50.50	54.00	3.50
4814.00	37.52	PK	V	10.93	48.45	74.00	25.55
4814.00	25.16	AV	V	10.93	36.09	54.00	17.91
7221.00	35.28	PK	V	14.33	49.61	74.00	24.39
7221.00	23.41	AV	V	14.33	37.74	54.00	16.26
2408 MHz							
2408.00	76.98	PK	V	31.52	108.50	N/A	N/A
2408.00	66.79	AV	V	31.52	98.31	N/A	N/A
2390.00	31.25	PK	V	31.46	62.71	74.00	11.29
2390.00	19.98	AV	V	31.46	51.44	54.00	2.56
2409 MHz							
2409.00	86.95	PK	V	31.52	118.47	N/A	N/A
2409.00	76.47	AV	V	31.52	107.99	N/A	N/A
2390.00	29.82	PK	V	31.46	61.28	74.00	12.72
2390.00	18.79	AV	V	31.46	50.25	54.00	3.75
2410 MHz							
2410.00	91.80	PK	V	31.53	123.33	N/A	N/A
2410.00	80.11	AV	V	31.53	111.64	N/A	N/A
2390.00	30.33	PK	V	31.46	61.79	74.00	12.21
2390.00	19.39	AV	V	31.46	50.85	54.00	3.15
Middle Channel: 2442 MHz							
2442.00	91.86	PK	H	31.61	123.47	N/A	N/A
2442.00	79.61	AV	H	31.61	111.22	N/A	N/A
2442.00	92.40	PK	V	31.61	124.01	N/A	N/A
2442.00	79.68	AV	V	31.61	111.29	N/A	N/A
4884.00	55.68	PK	V	11.08	66.76	74.00	7.24
4884.00	39.83	AV	V	11.08	50.91	54.00	3.09
7326.00	50.88	PK	V	14.79	65.67	74.00	8.33
7326.00	37.16	AV	V	14.79	51.95	54.00	2.05
9768.00	34.69	PK	V	18.55	53.24	94.01	40.77
12210.00	36.74	PK	V	21.35	58.09	74.00	15.91
12210.00	36.74	PK	V	21.35	47.69	54.00	6.31
2660.00	62.35	PK	V	4.50	66.85	94.01	27.16
1083.00	53.69	PK	V	-2.26	51.43	74.00	22.57
1083.00	35.64	AV	V	-2.26	33.38	54.00	20.62
2492.00	55.34	PK	V	3.62	58.96	74.00	15.04
2492.00	44.35	AV	V	3.62	47.97	54.00	6.03
2378.00	50.49	PK	V	3.43	53.92	74.00	20.08
2378.00	38.76	AV	V	3.43	42.19	54.00	11.81
2215.00	43.69	PK	V	2.97	46.66	74.00	27.34
2215.00	31.27	AV	V	2.97	34.24	54.00	19.76

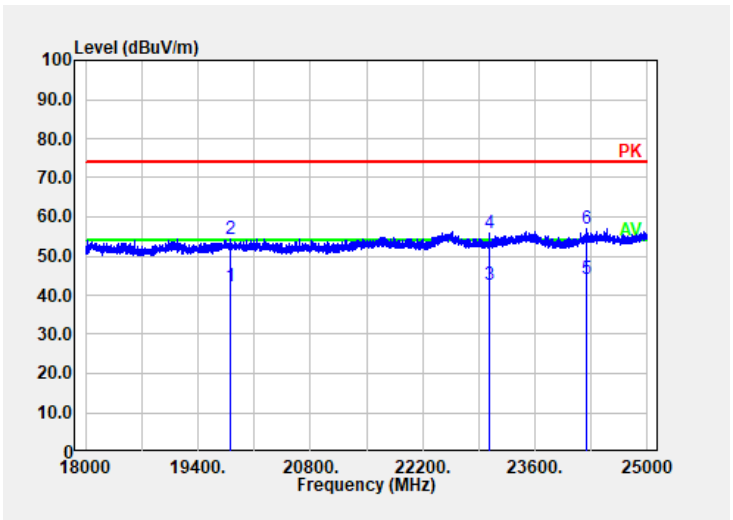
2470 MHz							
2470.00	92.01	PK	V	31.64	123.65	N/A	N/A
2470.00	80.11	AV	V	31.64	111.75	N/A	N/A
2483.50	34.02	PK	V	31.64	65.66	74.00	8.34
2483.50	19.28	AV	V	31.64	50.92	54.00	3.08
2471 MHz							
2471.00	88.74	PK	V	31.64	120.38	N/A	N/A
2471.00	79.56	AV	V	31.64	111.20	N/A	N/A
2483.50	37.25	PK	V	31.64	68.89	74.00	5.11
2483.50	20.32	AV	V	31.64	51.96	54.00	2.04
2472 MHz							
2472.00	75.69	PK	V	31.64	107.33	N/A	N/A
2472.00	65.72	AV	V	31.64	97.36	N/A	N/A
2483.50	36.85	PK	V	31.64	68.49	74.00	5.51
2483.50	20.11	AV	V	31.64	51.75	54.00	2.25
2473 MHz							
2473.00	72.14	PK	V	31.64	103.78	N/A	N/A
2473.00	61.68	AV	V	31.64	93.32	N/A	N/A
2483.50	34.25	PK	V	31.64	65.89	74.00	8.11
2483.50	19.58	AV	V	31.64	51.22	54.00	2.78
2474 MHz							
2474.00	70.41	PK	V	31.64	102.05	N/A	N/A
2474.00	61.25	AV	V	31.64	92.89	N/A	N/A
2483.50	37.44	PK	V	31.64	69.08	74.00	4.92
2483.50	20.46	AV	V	31.64	52.10	54.00	1.90
High Channel: 2477 MHz							
2477.00	61.35	PK	H	31.64	92.99	N/A	N/A
2477.00	52.69	AV	H	31.64	84.33	N/A	N/A
2477.00	62.64	PK	V	31.64	94.28	N/A	N/A
2477.00	52.57	AV	V	31.64	84.21	N/A	N/A
2483.50	39.86	PK	V	31.64	71.50	74.00	2.50
2483.50	22.03	AV	V	31.64	53.67	54.00	0.33
4954.00	35.86	PK	V	11.24	47.10	74.00	26.90
4954.00	23.07	AV	V	11.24	34.31	54.00	19.69
7431.00	34.33	PK	V	15.18	49.51	74.00	24.49
7431.00	22.21	AV	V	15.18	37.39	54.00	16.61

Worst Test plots(8M Middle channel was the worst)
Horizontal:

Fundamental Test with Band Rejection Filter

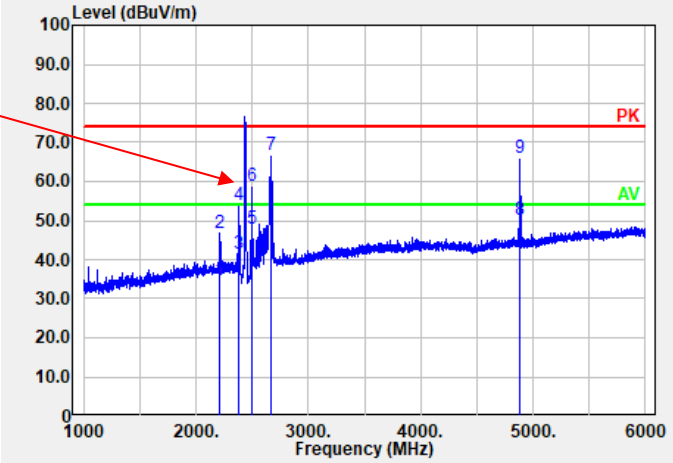


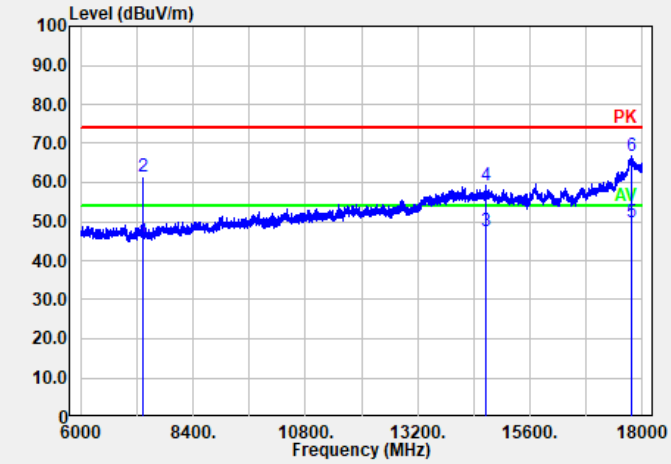


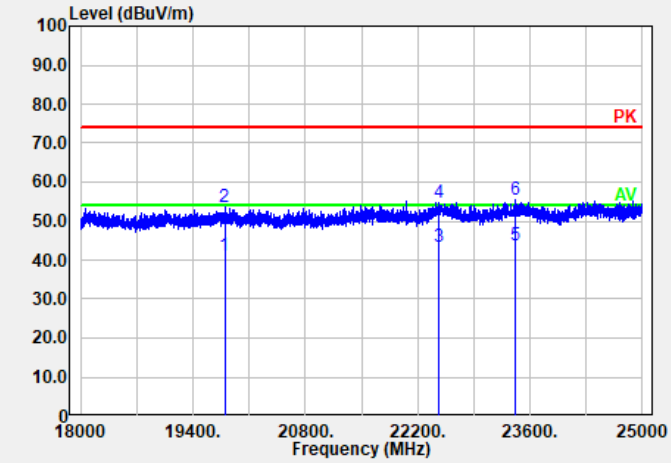


Vertical:

Fundamental Test with Band Rejection Filter







4.3 6 dB Emission Bandwidth:

Serial Number:	CR21100119-RF-S1	Test Date:	2021/11/26
Test Site:	RF	Test Mode:	Transmitting
Tester:	Aaron Lv	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.9	Relative Humidity: (%)	60	ATM Pressure: (kPa)	101.3

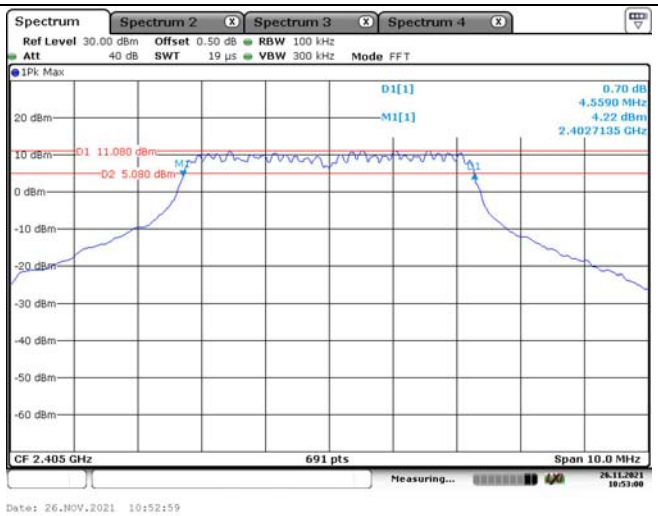
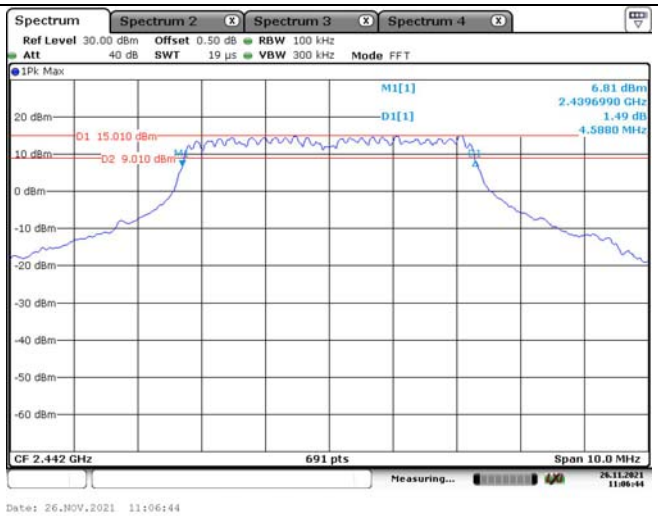
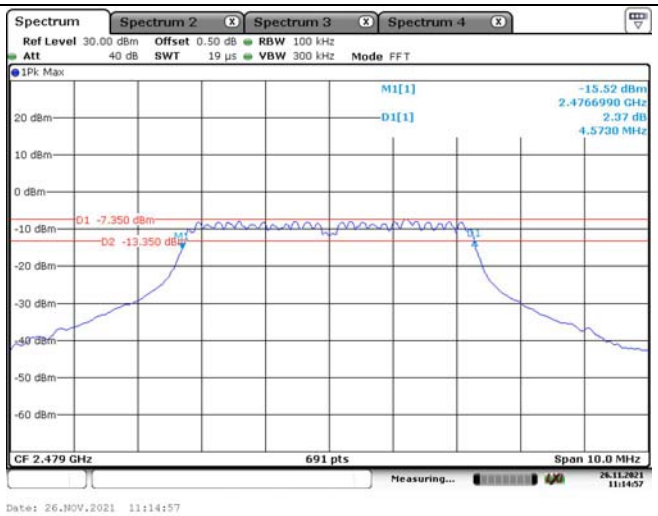
Test Equipment List and Details:

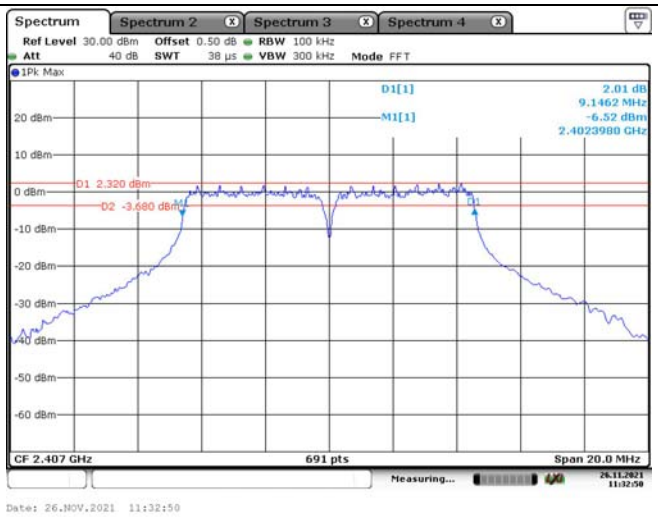
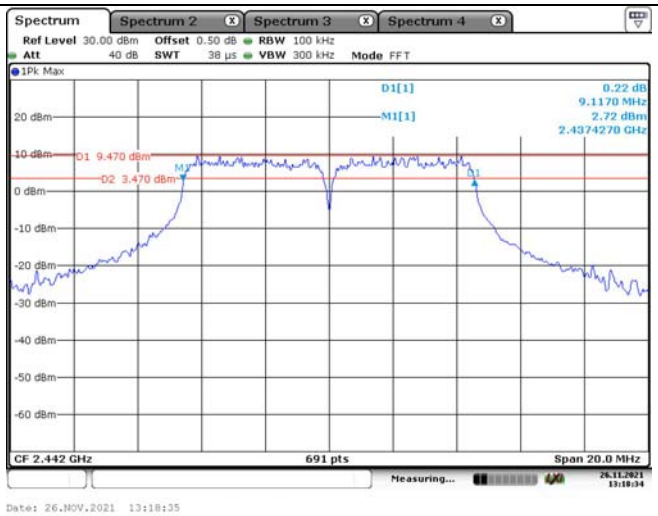
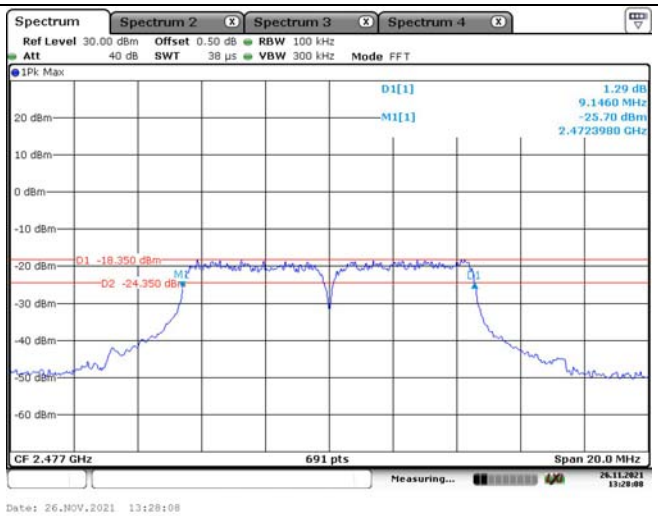
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101474	2021/7/22	2022/7/21
Mini-Circuits	DC Block	BLK-18-S+	1554403	Each time	N/A
zhuoxiang	Coaxial Cable	SMA-178	211003	Each time	N/A

** 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 Modes	Test Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
4M	2405	4.559	0.5
	2442	4.588	0.5
	2479	4.573	0.5
8M	2407	9.146	0.5
	2442	9.117	0.5
	2477	9.146	0.5
Note: Test only was performed at Chain 0.			

6dB Emission Bandwidth	
4M Lowest Channel	
4M Middle Channel	
4M Highest Channel	

6dB Emission Bandwidth	
8M Lowest Channel	
8M Middle Channel	
8M Highest Channel	

4.4 Maximum conducted output power:

Serial Number:	CR21100119-RF-S1	Test Date:	2021/11/26
Test Site:	RF	Test Mode:	Transmitting
Tester:	Aaron Lv	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.9	Relative Humidity: (%)	60	ATM Pressure: (kPa)	101.3

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	USB Wideband Power Sensor	U2021XA	MY54080015	2021/7/22	2022/7/21
eastsheep	Coaxial Attenuator	2W-SMA-JK-18G	21060301	Each time	N/A
zhuoxiang	Coaxial Cable	SMA-178	211003	Each time	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 Modes	Test Frequency (MHz)	Maximum Conducted Average Output Power (dBm)			Limit (dBm)	Power Level Setting
		Chain 0	Chain 1	Total		
4M	2405	12.33	15.76	17.39	30	23
	2406	12.24	15.87	17.43	30	23
	2407	19.51	23.47	24.94	30	26
	2408	24.45	25.15	27.82	30	30
	2442	24.76	25.35	**28.08**	30	30
	2473	24.35	25.26	27.84	30	30
	2474	19.15	24.69	25.76	30	20
	2475	9.08	13.89	15.13	30	20
	2476	4.72	8.56	10.06	30	16
	2477	-0.45	4.03	5.35	30	11
	2478	-3.25	0.62	2.11	30	7
	2479	-6.68	0.28	1.08	30	7
8M	2407	7.19	11.53	12.89	30	23
	2408	8.29	12.05	13.58	30	23
	2409	14.58	23.03	23.61	30	26
	2410	24.68	25.36	28.04	30	30
	2442	25.29	25.58	**28.45**	30	30
	2470	25.15	25.45	28.31	30	30
	2471	15.44	23.94	24.51	30	26
	2472	5.48	9.91	11.25	30	20
	2473	2.73	7.01	8.39	30	18
	2474	1.01	4.87	6.37	30	16
	2475	-7.53	-3.92	-2.35	30	7
	2476	-7.59	-4.01	-2.43	30	7
	2477	-7.87	-4.03	-2.53	30	7

Note: The device employed Cyclic Delay Diversity (CDD) transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leqslant 4$

Antenna Gain:	3.00	dBi	Directional gain:	3.00	dBi

4.5 Maximum power spectral density:

Serial Number:	CR21100119-RF-S1	Test Date:	2021/11/26
Test Site:	RF	Test Mode:	Transmitting
Tester:	Aaron Lv	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.9	Relative Humidity: (%)	60	ATM Pressure: (kPa)	101.3

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101474	2021/7/22	2022/7/21
Mini-Circuits	DC Block	BLK-18-S+	1554403	Each time	N/A
zhuoxiang	Coaxial Cable	SMA-178	211003	Each time	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).*

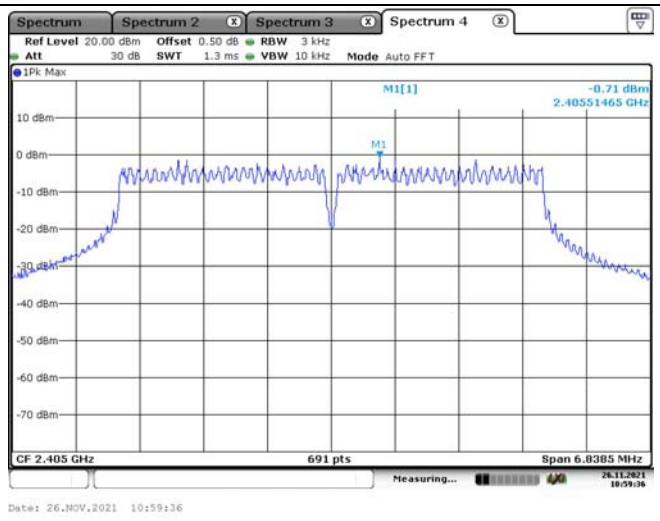
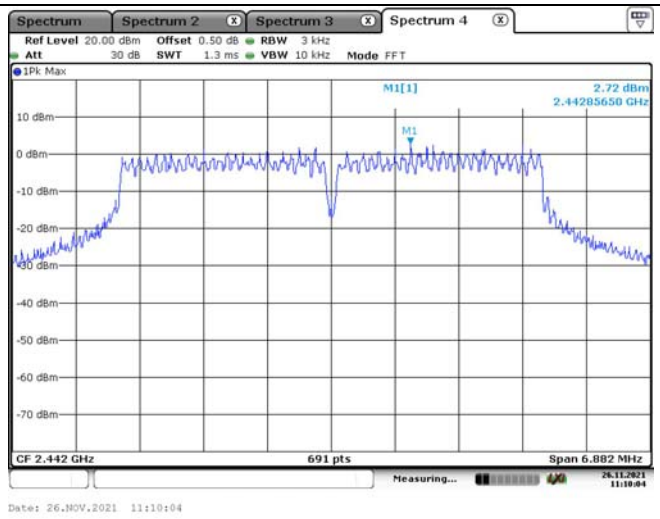
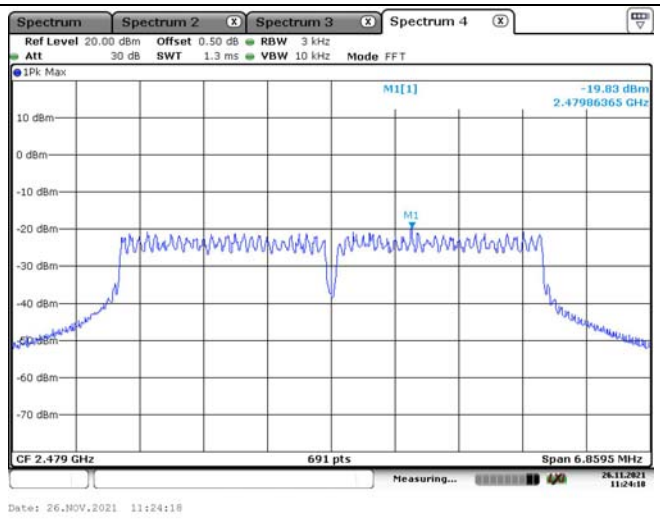
Test Data:

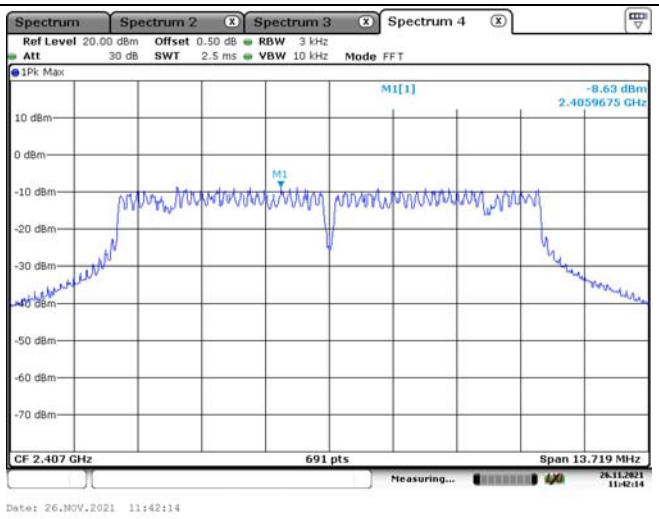
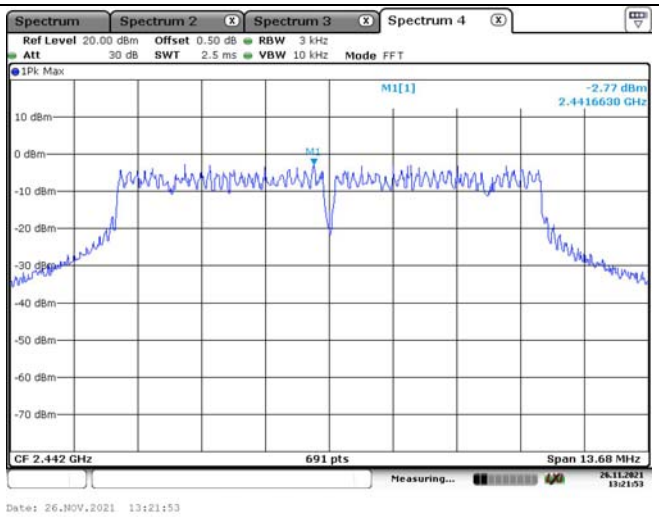
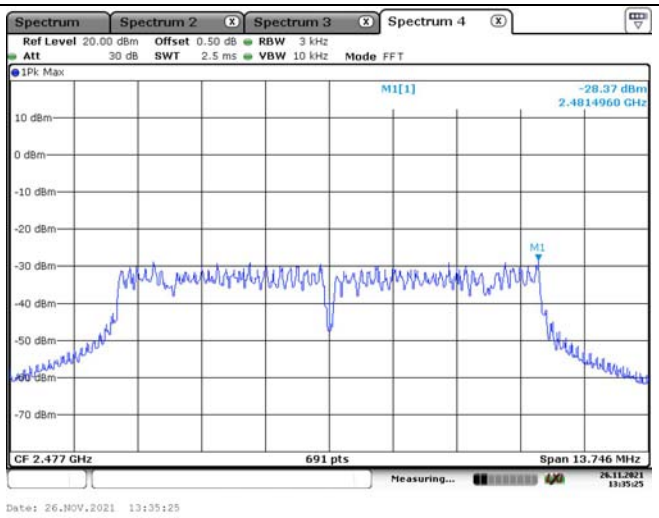
Test Modes	Test Frequency (MHz)	Maximum Power Spectral Density (dBm/3kHz)			Limit (dBm/3kHz)
		Chain 0	Chain 1	Total	
4M	2405	-0.71	0.56	2.98	8.0
	2442	2.72	3.04	5.89	8.0
	2479	-19.83	-13.57	-12.65	8.0
8M	2407	-8.63	-5.18	-3.56	8.0
	2442	-2.77	-2.79	0.23	8.0
	2477	-28.37	-25.59	-23.75	8.0

Note: The device employed Cyclic Delay Diversity (CDD) transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices:
Array Gain = 10 log(N_{ANT}/N_{SS}) dB

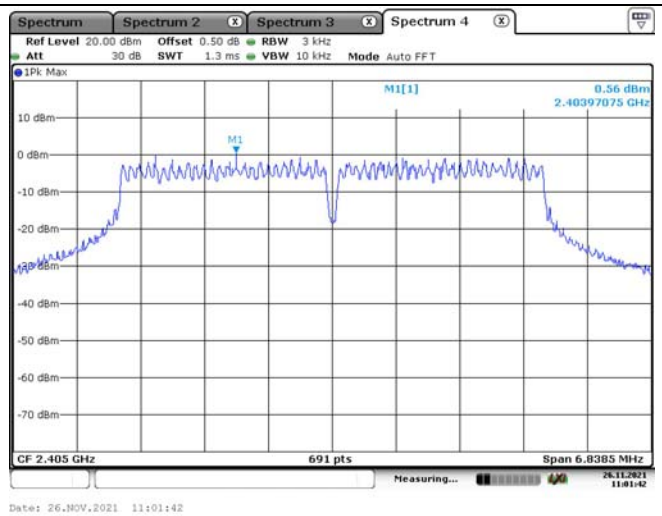
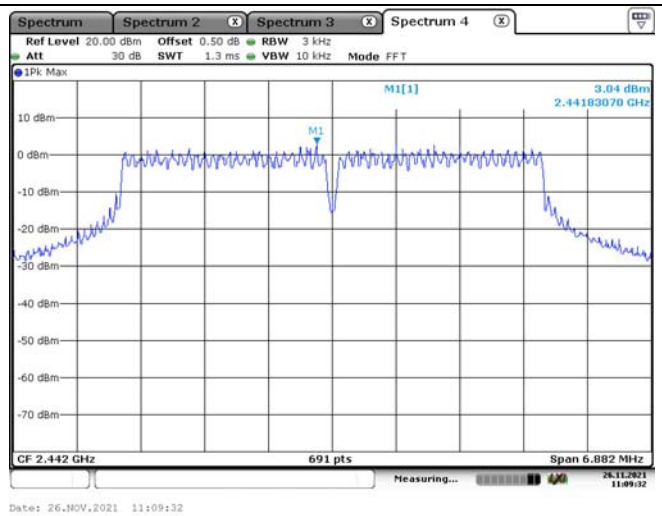
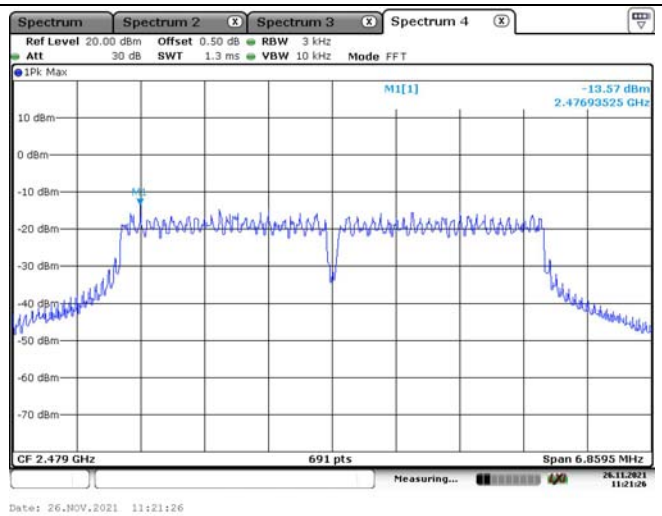
Antenna Gain:	3.00	dBi	Directional gain:	6.00	dBi

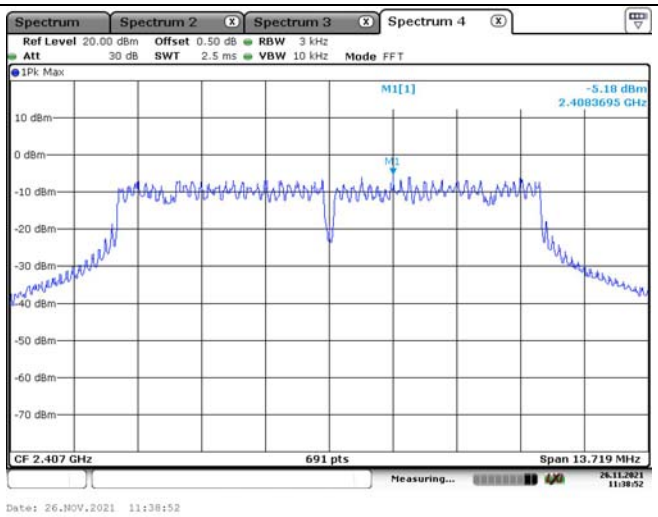
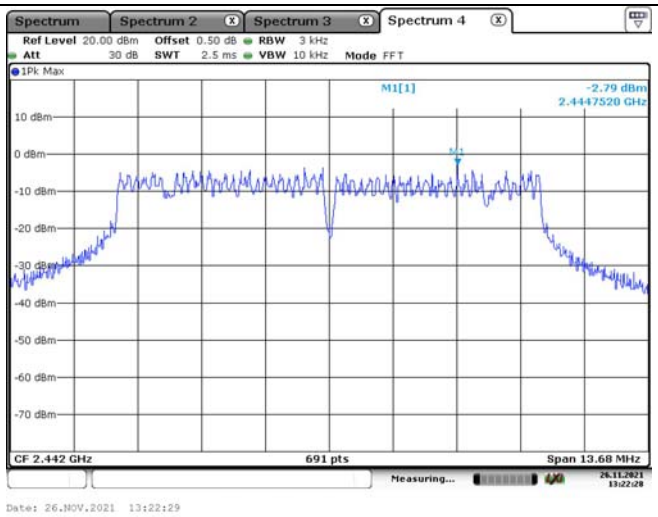
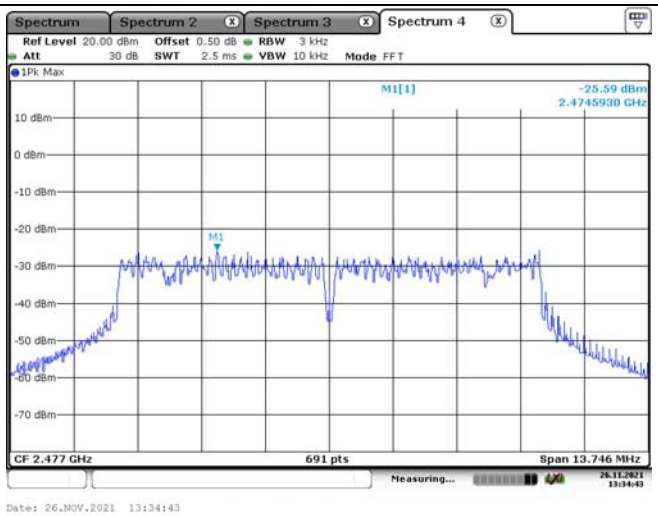
Chain 0

Maximum power spectral density	
4M Lowest Channel	
4M Middle Channel	
4M Highest Channel	

Maximum power spectral density	
8M Lowest Channel	
8M Middle Channel	
8M Highest Channel	

Chain 1

Maximum power spectral density	
4M Lowest Channel	
4M Middle Channel	
4M Highest Channel	

Maximum power spectral density	
8M Lowest Channel	
8M Middle Channel	
8M Highest Channel	

4.6 100 kHz Bandwidth of Frequency Band Edge:

Serial Number:	CR21100119-RF-S1	Test Date:	2021/11/26
Test Site:	RF	Test Mode:	Transmitting
Tester:	Aaron Lv	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.9	Relative Humidity: (%)	60	ATM Pressure: (kPa)	101.3

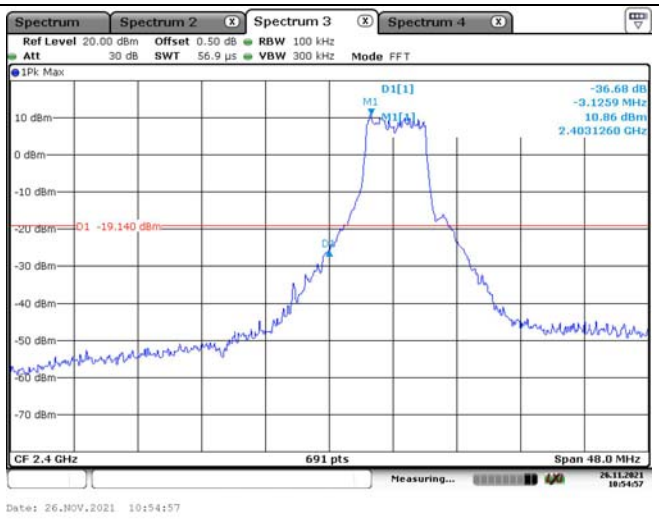
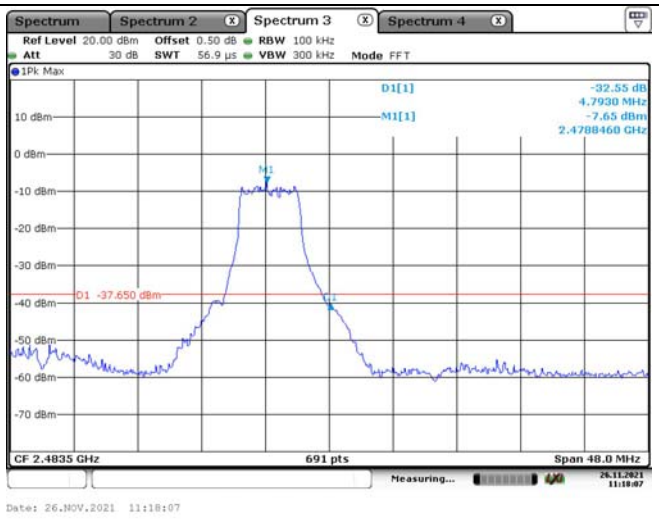
Test Equipment List and Details:

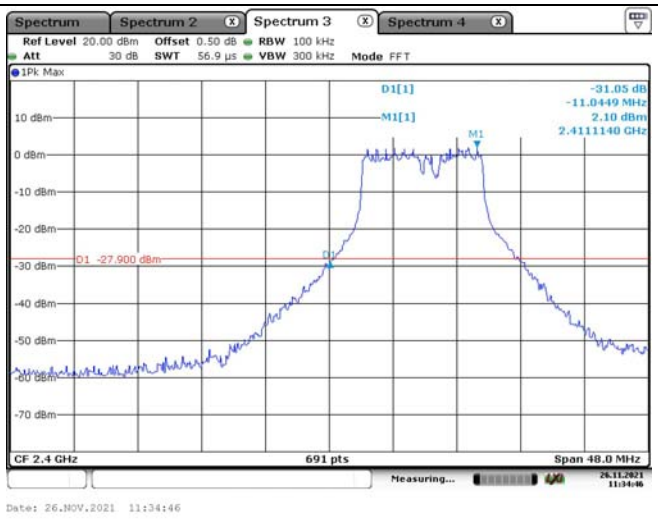
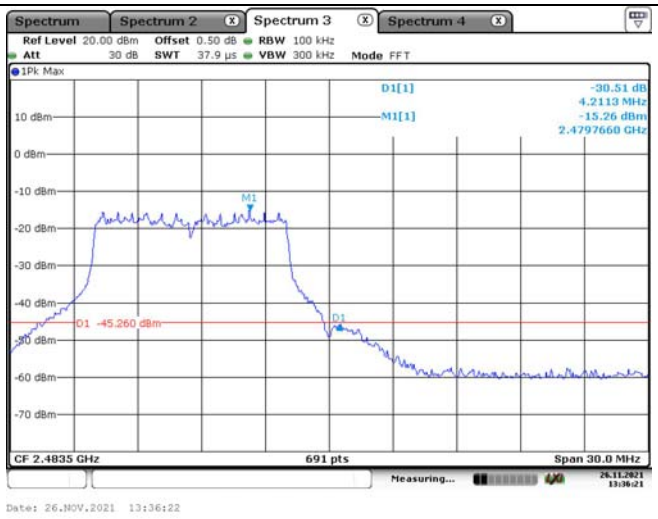
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101474	2021/7/22	2022/7/21
Mini-Circuits	DC Block	BLK-18-S+	1554403	Each time	N/A
zhuoxiang	Coaxial Cable	SMA-178	211003	Each time	N/A

** 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).*

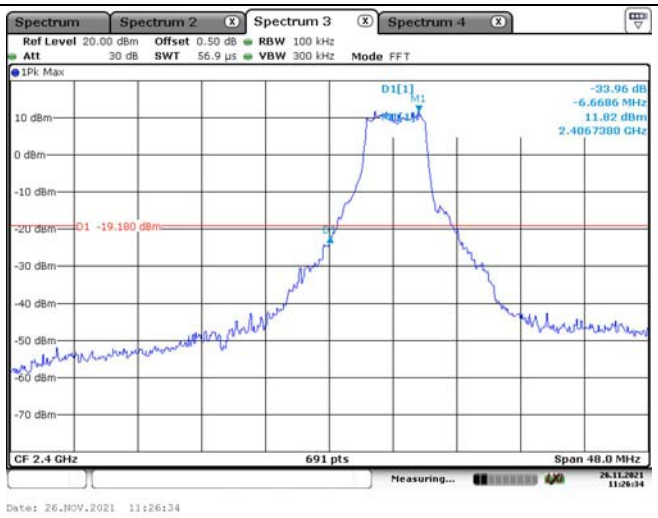
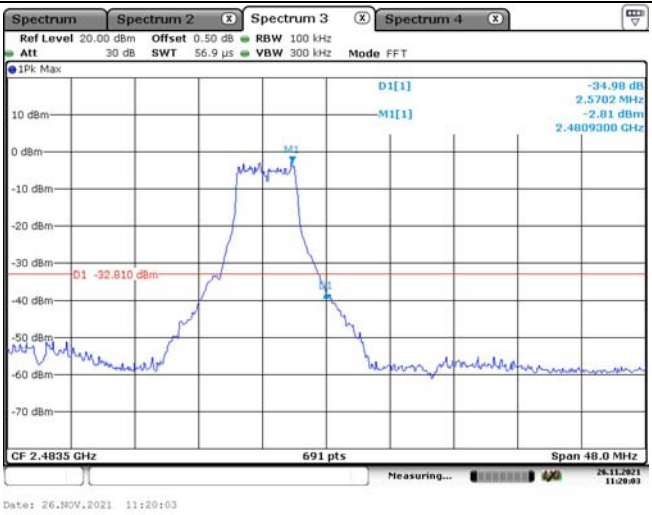
Test Data:

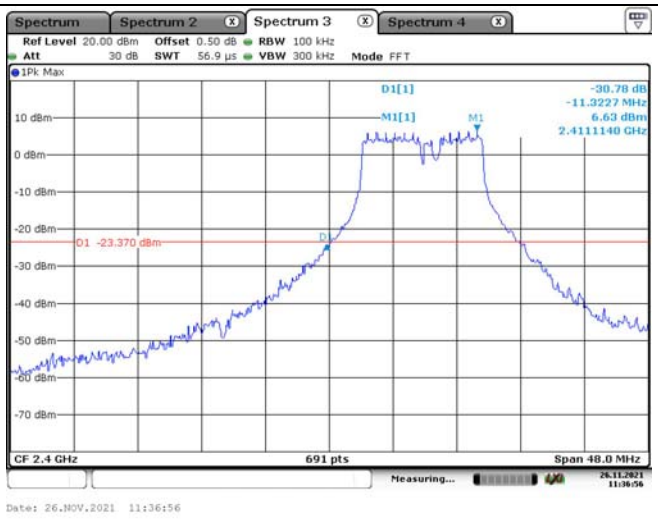
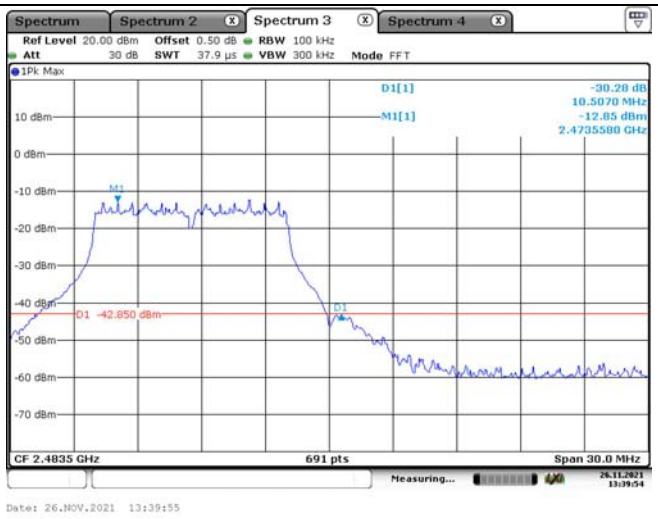
Chain 0

100 kHz Bandwidth of Frequency Band Edge	
4M Lowest Band edge	
4M Highest Band edge	

100 kHz Bandwidth of Frequency Band Edge	
8M Lowest Band edge	
8M Highest Band edge	

Chain 1

100 kHz Bandwidth of Frequency Band Edge	
4M Lowest Band edge	
4M Highest Band edge	

100 kHz Bandwidth of Frequency Band Edge	
8M Lowest Band edge	
8M Highest Band edge	

4.7 Duty Cycle:

Serial Number:	CR21100119-RF-S1	Test Date:	2021/11/26
Test Site:	RF	Test Mode:	Transmitting
Tester:	Aaron Lv	Test Result:	N/A

Environmental Conditions:					
Temperature: (℃)	25.9	Relative Humidity: (%)	60	ATM Pressure: (kPa)	101.3

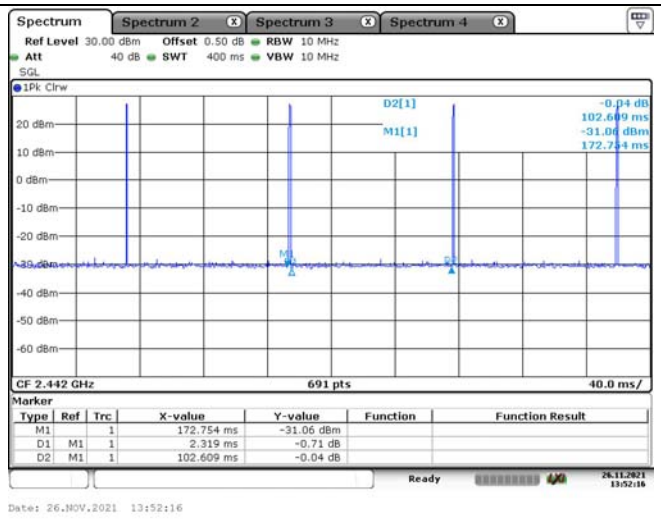
Test Equipment List and Details:

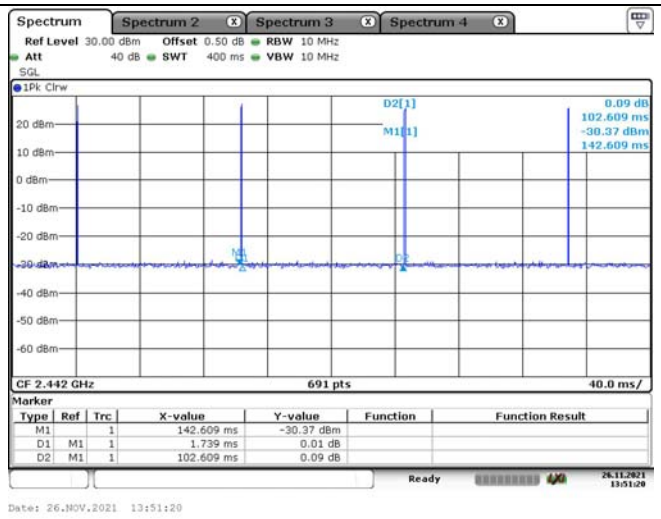
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101474	2021/7/22	2022/7/21
Mini-Circuits	DC Block	BLK-18-S+	1554403	Each time	N/A
zhuoxiang	Coaxial Cable	SMA-178	211003	Each time	N/A

** 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 Modes	Ton (ms)	Ton+off (ms)	Duty cycle (%)
4M	2.319	102.609	2.26
8M	1.739	102.609	1.69

Duty Cycle	
4M	

Duty Cycle	
8M	

5. RF EXPOSURE EVALUATION

5.1 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

5.1.1 Applicable Standard

FCC §15.247 (i) & §1.1310 & §2.1091

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §1.1307(b)(1) of this chapter.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

5.1.2 Procedure

Prediction of power density at the distance of the applicable MPE limit
$S = PG/4\pi R^2$ = 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);

5.1.3 Calculated Result

Modes	**Antenna Gain**		**Conducted output power including Tune-up Tolerance**		**Evaluation Distance (cm)**	**Power Density (mW/cm^2)**	**MPE Limit (mW/cm^2)**
	(dBi)	**(numeric)**	**(dBm)**	**(mW)**			
4M/8M	3	2.00	29	794.33	20.00	0.32	1.0

Result: The device meet FCC MPE at 20 cm distance

******* END OF REPORT *******