

FCC PART 15.231

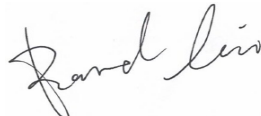
TEST REPORT

For

PHAETON MANUFACTURING LLC.

69 South Jinshajiang Road, Economic Development District, Nantong City, Jiangsu Province, China

FCC ID: 2ADTHHTTPHL001

Report Type: Original Report	Product Name: HUB LIGHT
Report Number: <u>RKSB250919001-00B</u>	
Report Date: <u>2025-10-28</u>	
Reviewed By:	<u>Bard Liu</u> 
Approved By:	<u>Kyle Xu</u> 
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Kunshan). This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, or any agency of the U.S. Government.

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REPORT REVISION HISTORY

Number of Revisions	Report No.	Version	Issue Date	Description
0	RKSB250919001-00B	R1V1	2025-10-28	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	PHAETON MANUFACTURING LLC.
Product Name:	HUB LIGHT
Tested Model:	UPS009001DC5V
Power Supply:	DC 6V from battery
RF Function:	SRD
Operating Band/Frequency:	433.91 MHz
Field Strength of Fundamental	74.87 dB μ V/m
Channel Number:	1
Modulation Type:	OOK
Antenna Type:	PCB Antenna

All measurement and test data in this report was gathered from production sample serial number: RKS250919001-1 (Assigned by the BACL (Kunshan). The EUT supplied by the applicant was received on 2025-09-19.)

Objective

This test report is prepared for *PHAETON MANUFACTURING LLC*. All the test measurements were performed according to the measurement procedure described in ANSI C63.10-2020+Cor.1-2023.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.209, 15.35(c) and 15.231 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2020 +Cor.1-2023, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19 dB
RF conducted test with spectrum		0.9 dB
Radiated emission	9 kHz~150 kHz	3.8 dB
	150 kHz~30 MHz	3.4 dB
	30 MHz~1 GHz	6.11 dB
	1 GHz~6 GHz	4.45 dB
	6 GHz~18 GHz	5.23 dB
Occupied Bandwidth		0.5 kHz
Temperature		1.0 °C
Humidity		6%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) is accredited in accordance with ISO/IEC 17025:2017 by NVLAP (Lab code: 600338-0), and the lab has been recognized as the FCC accredited lab under the KDB 974614 D01, the FCC Designation No.: CN5055.

SYSTEM TEST CONFIGURATION

Justification

Channel List:

Channel	Frequency (MHz)
1	433.91

EUT Exercise Software

Engineering Mode was provided by manufacturer★. The maximum power was configured default setting.

Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

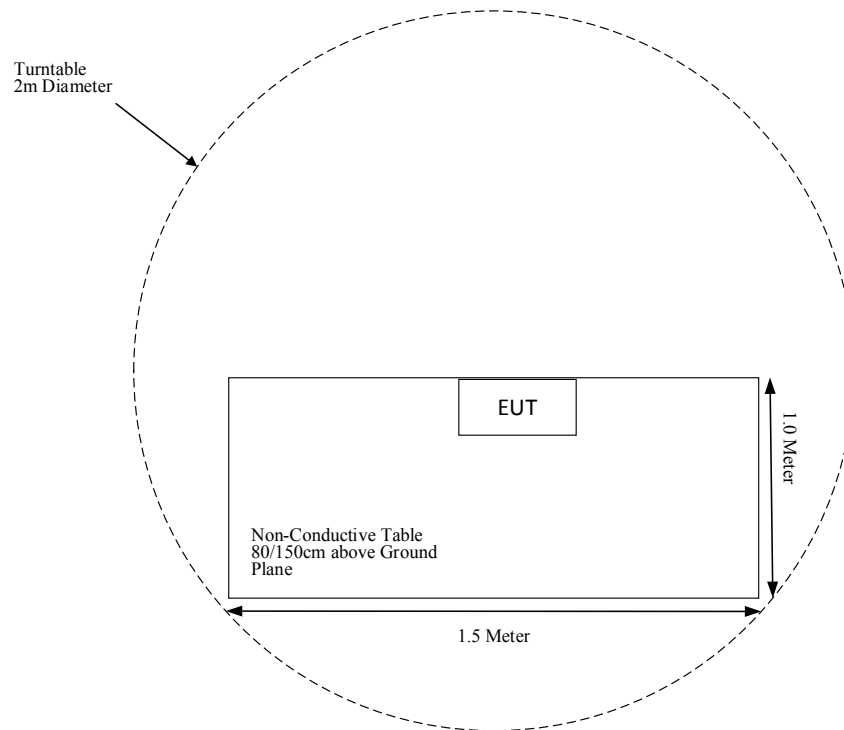
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

Cable Description	Length (m)	From Port	To Port
/	/	/	/

Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz & Abve 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207(a)	Conducted Emissions	Not Applicable (See Note)
§15.205, §15.209, §15.231(b)	Radiated Emissions	Compliant
§15.231 (a) (2)	Deactivation	Compliant
§15.231 (c)	20dB Emission Bandwidth	Compliant
§1.1307	RF Exposure Evaluation	Compliant

Note: The EUT is powered by battery.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test, Bandwidth Test and Deactivation Testing (Chamber 1#)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2025-04-09	2026-04-08
Sunol Sciences	Hybrid Antenna	JB3	A090314-1	2024-11-08	2027-11-07
Narda	6dB Attenuator	773-6	10690812-2-1	2024-11-08	2027-11-07
Sonoma Instrument	Amplifier	310N	171205	2025-04-09	2026-04-08
BACL	Active Loop Antenna	1313-1A	4041511	2024-11-22	2027-11-21
Rohde & Schwarz	Spectrum Analyzer	FSU26	200103	2025-04-09	2026-04-08
MICRO-COAX	Coaxial Cable	Cable-8	008	2025-04-09	2026-04-08
MICRO-COAX	Coaxial Cable	Cable-9	009	2025-04-09	2026-04-08
MICRO-COAX	Coaxial Cable	Cable-10	010	2025-04-09	2026-04-08
Rohde & Schwarz	Test Software	EMC32	100361	N/A	N/A
Radiated Emission Test (Chamber 2#)					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207/040	2025-04-09	2026-04-08
ETS-LINDGREN	Horn Antenna	3115	9207-3900	2024-11-03	2027-11-02
A.H.Systems,inc	Amplifier	PAM-0118P	512	2025-04-09	2026-04-08
MICRO-COAX	Coaxial Cable	Cable-11	011	2025-04-09	2026-04-08
MICRO-COAX	Coaxial Cable	Cable-12	012	2025-04-09	2026-04-08
MICRO-COAX	Coaxial Cable	Cable-13	013	2025-04-09	2026-04-08
Rohde & Schwarz	Test Software	EMC32	100361	N/A	N/A

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

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.

Antenna Connected Construction

The EUT has a PCB antenna which was permanently attached, fulfill the requirement of this section. Please refer to EUT photos.

Result: Compliant.

FCC §15.205, §15.209, §15.231 (b) - RADIATED EMISSIONS**Applicable Standard**

FCC §15.205, §15.209, §15.231 (b)

According to FCC §15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750 ★	125 to 375 ★
174-260	3750	375
260-470	3750 to 12500 ★	375 to 1250 ★
Above 470	12500	1250

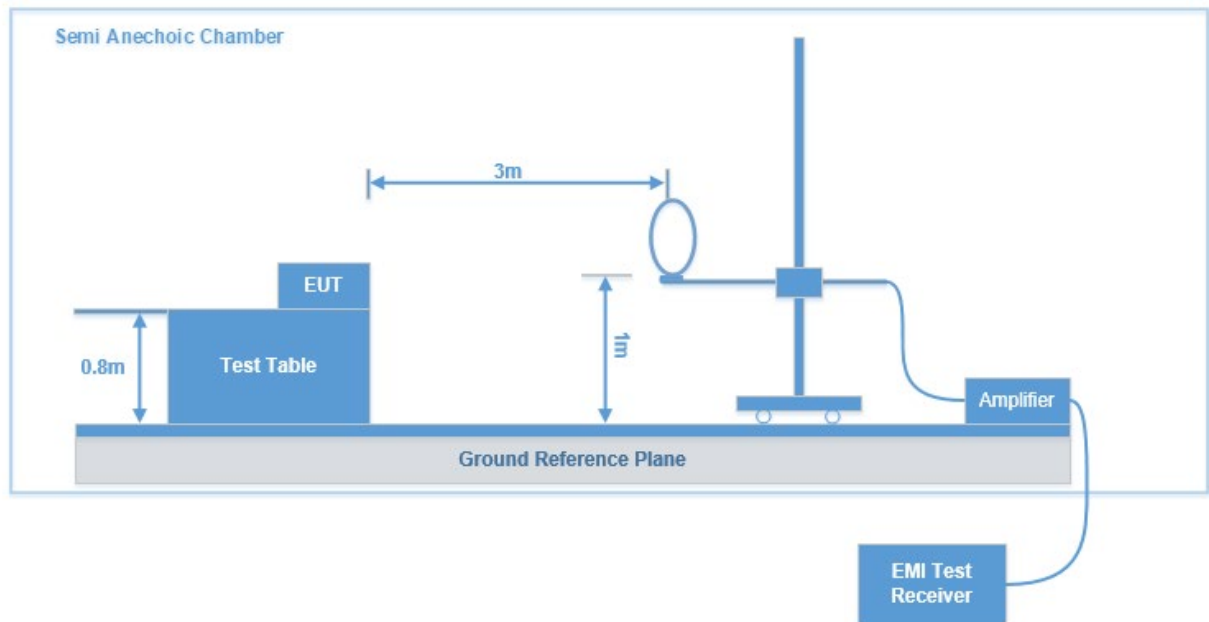
(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

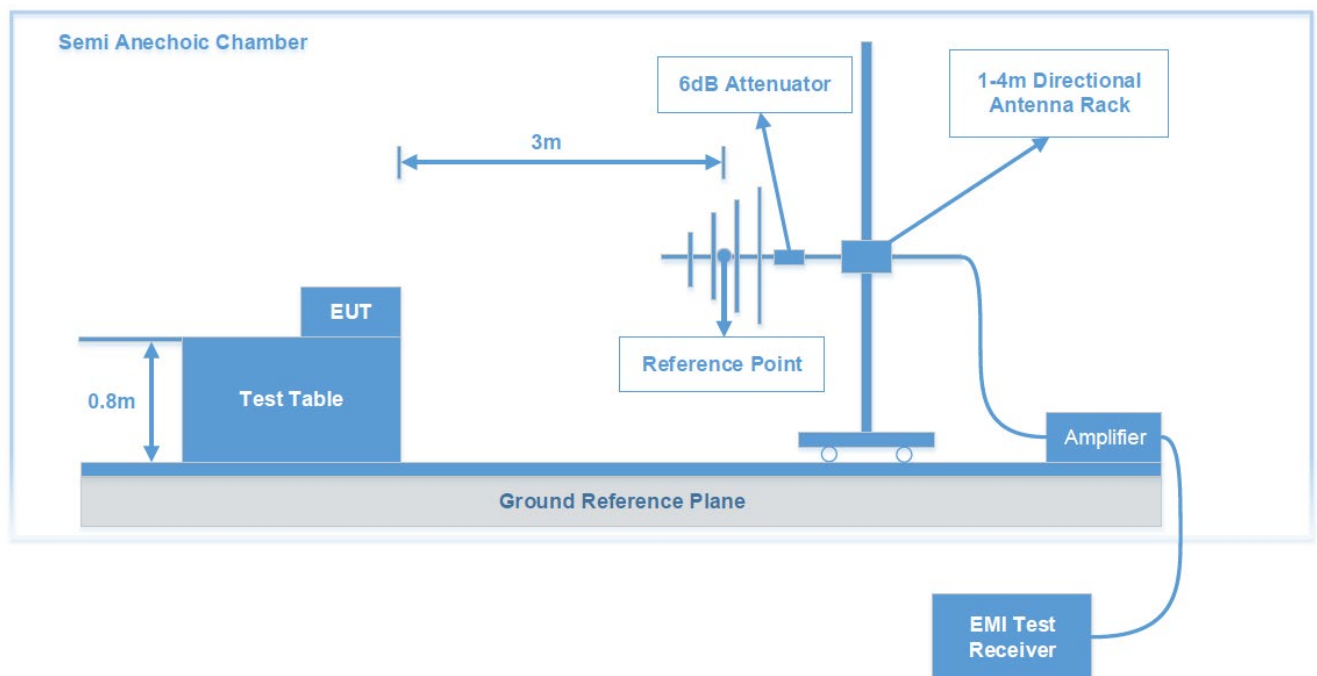
(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

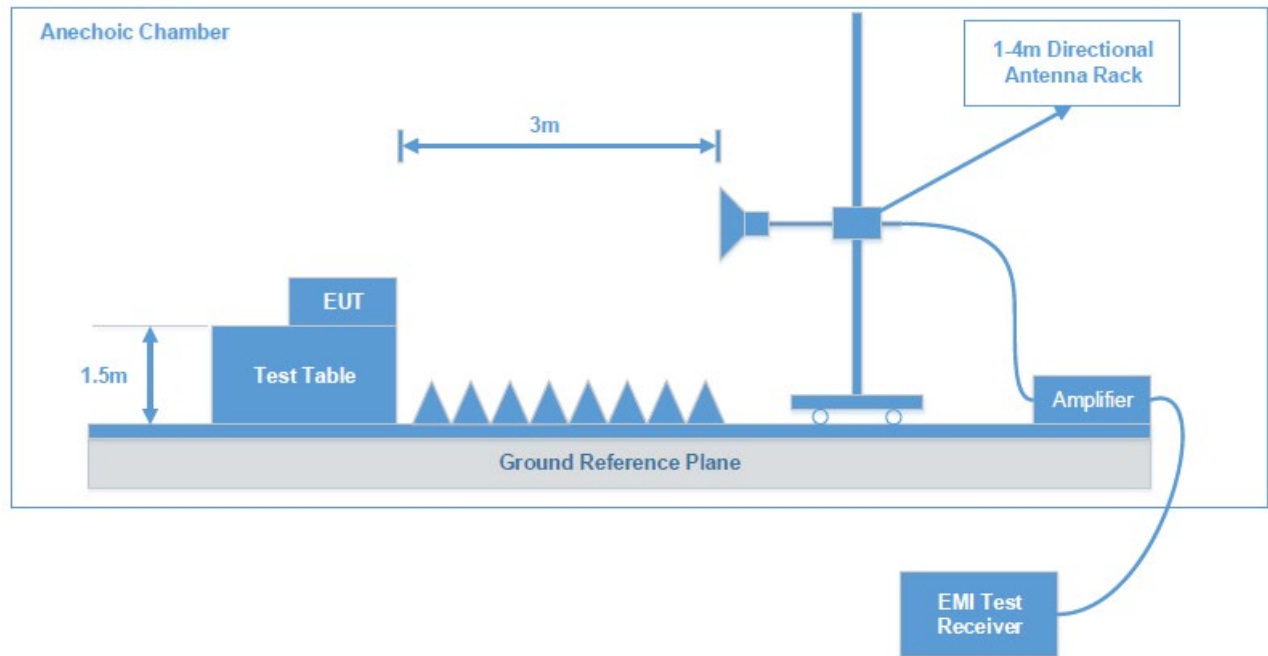
Test System Setup

9 kHz-30 MHz:



30 MHz-1 GHz:



Above 1 GHz:

The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2020 +Cor.1-2023. The specification used was the FCC 15 § 15.209, 15.205 and 15.231.

EMI Test Receiver Setup

The system was investigated from 9 kHz to 5 GHz.

During the radiated emission test, the EMI test Receiver was set with the following configurations:

Frequency Range	RBW	VBW	IF B/W	Measurement	Detector
9 kHz – 150 kHz	200 Hz	1 kHz	200 Hz	Peak/QP/Average	Peak/QP/Average
150 kHz – 30 MHz	9 kHz	30 kHz	9 kHz	Peak/QP/Average	Peak/QP/Average
30 MHz – 1000 MHz	100 kHz	300 kHz	/	Peak	Peak
	/	/	120 kHz	QP	QP
ABOVE 1GHz	1MHz	3 MHz	/	Peak	Peak

For 9 kHz-30 MHz test, the lowest height of the magnetic antenna shall be 1 m above the ground and three antenna orientations (parallel, perpendicular, and ground-parallel) shall be measured.

Test Procedure

Maximizing procedure was performed on at least six (6) highest emissions to ensure that the EUT complied with all installation combinations.

If the measured peak level of the emissions that the measuring receiver reading level plus corrected factor is at least 6 dB below the QP emission limit, there's no need to record the measured QP level of the emissions in the report.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude (dBμV/m) = Meter Reading (dBμV) + Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV/m)

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.205, §15.209, §15.231 (b).

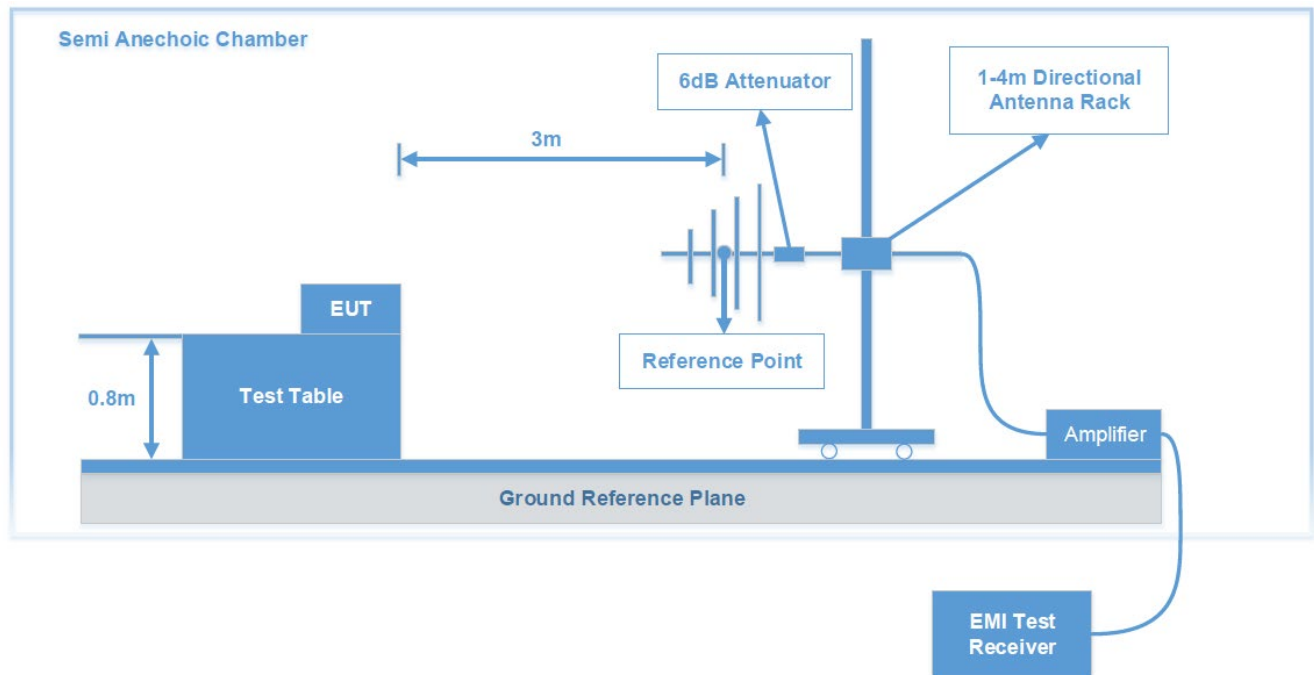
Test Data: See Appendix

FCC §15.231(a) (2) - DEACTIVATION TESTING

Applicable Standard

Per FCC §15.231(a), (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Test System Setup



Test Procedure

1. With the EUT's antenna attached, the waveform was received by the test antenna which was connected to the spectrum analyzer.
2. Set center frequency of spectrum analyzer=operating frequency.
3. Set the spectrum analyzer as RBW=100k VBW=300k Span=0Hz.
4. Repeat above procedures until all frequency measured was complete.

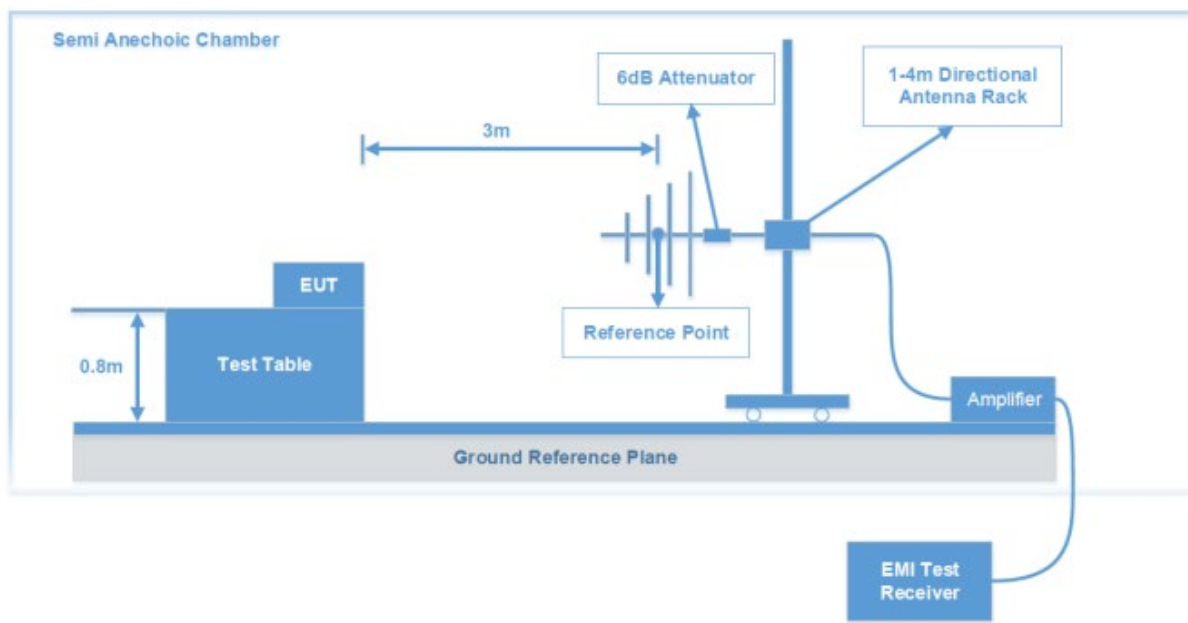
Test Data: See Appendix

FCC §15.231(c) - 20dB EMISSION BANDWIDTH TESTING

Applicable Standard

Per 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test System Setup



Test Procedure

With the EUT's antenna attached, the waveform was received by the test antenna which was connected to the spectrum analyzer, plot the 20 dB bandwidth.

Test Data: See Appendix

RF EXPOSURE EVALUATION

Applicable Standard

§1.1307(b)(3)(i) For single RF sources (*i.e.*, any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A).

Frequency (MHz)	Maximum EIRP (dBm)	Maximum EIRP mW	1-mW Test Exemption
433.91	-20.33	0.009	Compliant

Note:

1. Chose the maximum power to do RF exposure evaluation analysis.
2. This device maximum E-Field level is 74.87 dB μ V/m at 3m, so the EIRP power is -20.33 dBm.
3. P_{out} EIRP (dBm) = Field Strength of Fundamental (dB μ V/m)-95.2 for $d=3m$.

Result: Compliant. RF Exposure is exemption.

APPENDIX - TEST DATA

RADIATED EMISSIONS

Environmental Conditions & Test Information

Test Item:	RADIATED EMISSIONS		
	9kHz – 30MHz	30MHz - 1GHz	Above 1 GHz
Test Date:	2025-10-16	2025-10-13	2025-10-28
Temperature:	26°C	24.1°C	20.9 °C
Relative Humidity:	48 %	54 %	49%
ATM Pressure:	102.0 kPa	101.5 kPa	102.9 kPa
Test Result:	Pass	Pass	Pass
Test Engineer:	Scarf Yang	Scarf Yang	Destine Hu

Test Result: Compliant

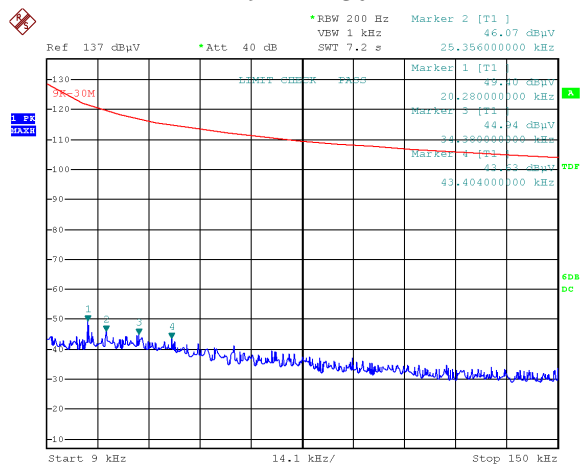
EUT operation mode: Transmitting

After pre-scan in the X, Y and Z axes of orientation, the worst case is below:

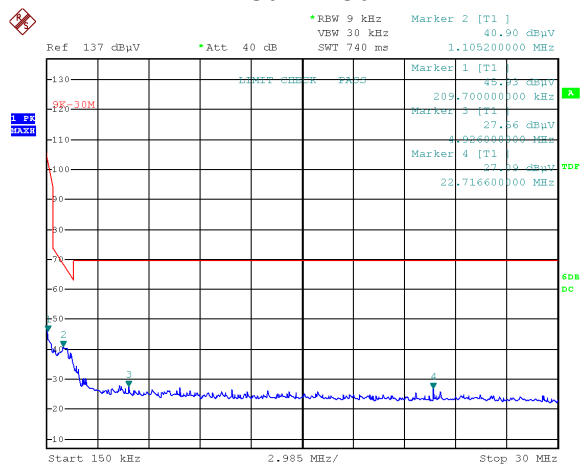
9 kHz-30MHz:

Parallel(worst case)

9kHz-150kHz



150kHz-30MHz



Project No.RKSB250919001
Date: 16.OCT.2025 19:20:33

Tester:Scarff Yang

Project No.RKSB250919001
Date: 16.OCT.2025 19:28:51

Tester:Scarff Yang

9kHz-150kHz

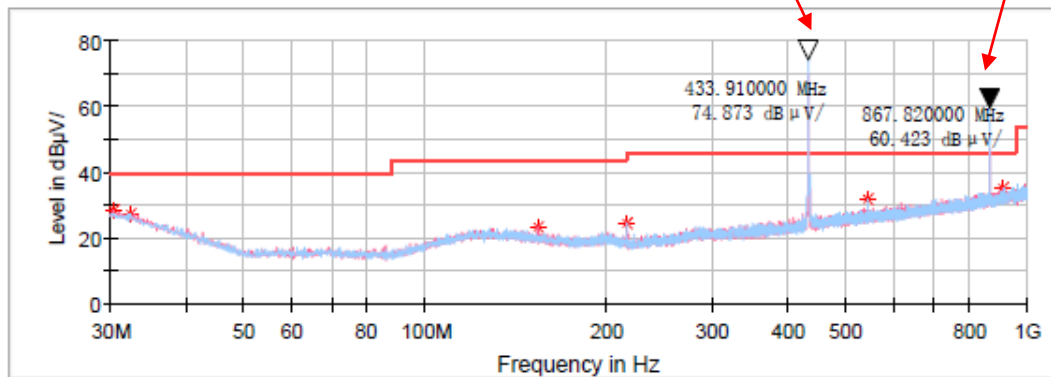
Frequency (MHz)	Corrected Amplitude (dBμV/m) @3m	Detector PK/QP/Ave.	Corrected Factor (dB/m)	Limit (dBμV/m) @3m	Margin (dB)
0.02028	49.4	PK	-0.56	121.46	72.06
0.025356	46.07	PK	-0.59	119.52	73.45
0.03438	44.94	PK	-1.31	116.88	71.94
0.043404	43.63	PK	-2.76	114.85	71.22

150kHz-30MHz

Frequency (MHz)	Corrected Amplitude (dBμV/m) @3m	Detector PK/QP/Ave.	Corrected Factor (dB/m)	Limit (dBμV/m) @3m	Margin (dB)
0.20970	45.93	PK	-13.872	101.17	55.24
1.10520	40.90	PK	-27.957	66.74	25.84
4.92600	27.56	PK	-32.049	69.54	41.98
22.71660	27.09	PK	-33.359	69.54	42.45

30 MHz-1 GHz:**Common Information**

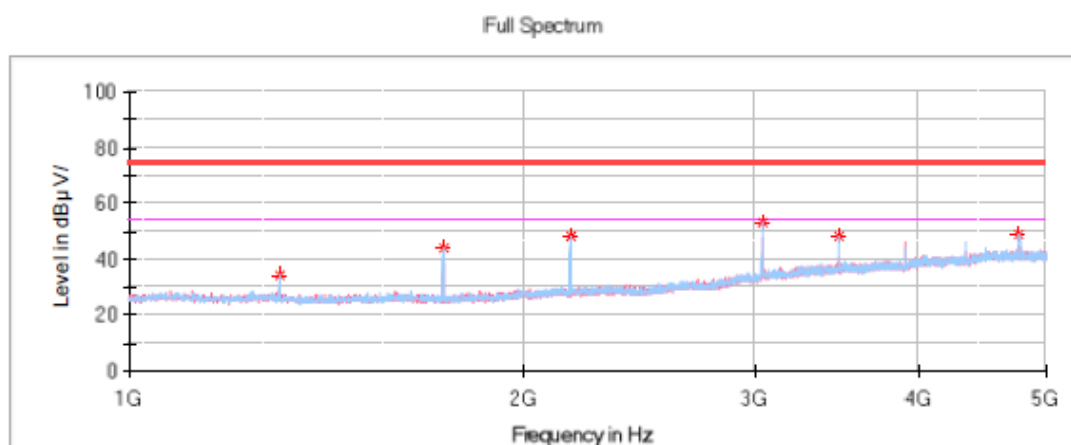
Project No: RKSB250919001
EUT Model: UPS009001DC5V
Test Mode: Transmitting
Standard: FCC Part 15.231&FCC Part 15.205&FCC Part 15.209
Test Equipment: ESCI, JB3, 310N
Receiver Setting: RBW: 100 kHz, VBW: 300 kHz, Sweep Time: Auto 24.1°
Temperature: 54%
Humidity: 101.5Pa
Barometric Pressure: Scarf Yang
Test Engineer: 2025/10/13
Test Date:

**Critical_Freqs**

Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
30.363750	28.24	40.00	11.76	V	-5.0
32.425000	27.08	40.00	12.92	H	-6.3
153.553750	23.48	43.50	20.02	V	-11.8
216.967500	24.36	43.50	19.14	H	-13.3
433.910000	74.87	80.83	5.96	H	-7.1
542.402500	31.56	46.00	14.44	H	-4.8
867.820000	60.42	60.83	0.41	H	0.4
909.305000	34.96	46.00	11.04	V	1.2

Above 1 GHz:**Common Information**

Project No.: RKS250919001
 EUT Model: UPS009001DC5V
 Test Mode: Transmitting
 Standard: FCC Part 15.231& FCC Part 15.205& FCC Part 15.209
 Test Equipment: ESU40,3115,PAM-0118P
 Receiver Setting: RBW: 1MHz, VBW: 3MHz, Sweep Time: Auto
 Temperature: 20.9℃
 Humidity: 49%
 Atmospheric Pressure: 102.9kPa
 Test Engineer: Destine Hu
 Test Date: 2025/10/28

**Critical Freqs**

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1301.600000	34.45	---	74.00	39.55	H	-14.1
1735.200000	44.26	---	74.00	29.74	H	-11.8
2169.600000	48.30	---	74.00	25.70	H	-9.8
3036.000000	53.01	---	74.00	20.99	H	-7.9
3472.000000	48.35	---	74.00	25.65	H	-6.4
4773.600000	48.71	---	74.00	25.29	H	-3.5

Note: The test result of peak was less than 20dB below the limit, so just peak values were recorded.

DEACTIVATION TESTING

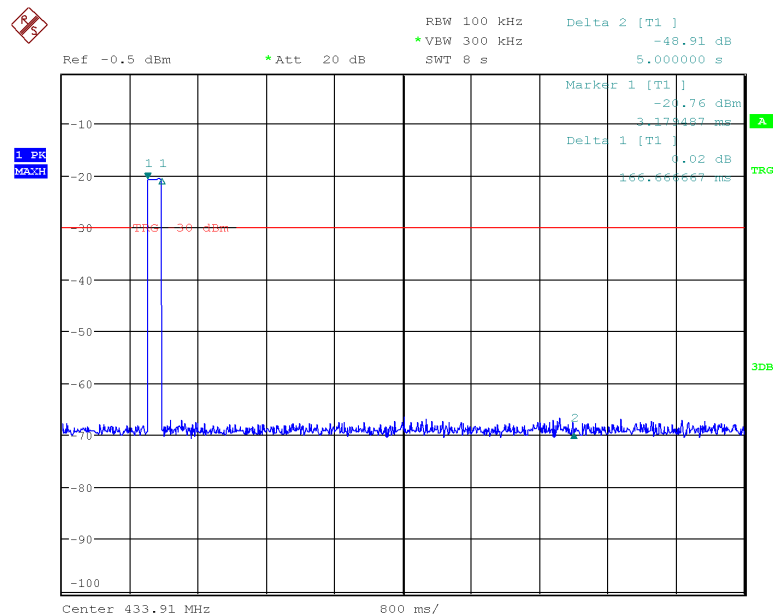
Environmental Conditions & Test Information

Test Date:	2025-10-14
Temperature:	25 °C
Relative Humidity:	55%
ATM Pressure:	101.5 kPa
Test Result:	Pass
Test Engineer:	Neil Zhou

Test mode: Transmitting

Channel Frequency (MHz)	Limit (s)	Result
433.91	<5	Pass

$T_{stop} < 5s$



ProjectNo.:RKSB250919001 Tester:Neil Zhou
Date: 14.OCT.2025 10:09:49

20 dB EMISSION BANDWIDTH TESTING

Environmental Conditions & Test Information

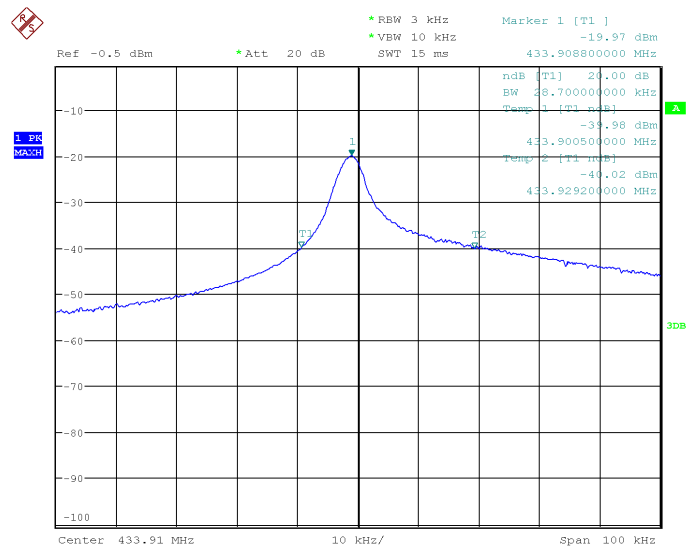
Test Date:	2025-10-14
Temperature:	25 °C
Relative Humidity:	55%
ATM Pressure:	101.5 kPa
Test Result:	Pass
Test Engineer:	Neil Zhou

Test Mode: Transmitting

Channel Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Result
433.91	28.70	1084.775	Pass

Note: Limit = 0.25% * Center Frequency = 0.25% * 433.91 MHz = 1084.775 kHz

20 dB Emission Bandwidth



ProjectNo.:RKSB250919001 Tester:Neil Zhou
Date: 14.OCT.2025 10:03:28

EUT PHOTOGRAPHS

Please refer to the attachment EXHIBIT A - EUT EXTERNAL PHOTOGRAPHS and EXHIBIT B - EUT INTERNAL PHOTOGRAPHS.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment EXHIBIT C - TEST SETUP PHOTOGRAPHS.

Declarations

1. The laboratory is not responsible for the authenticity of any information provided by the applicant. Information from the applicant that may affect test results is marked with “★”.
2. The test data was only valid for the test sample(s).
3. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.
4. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
5. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor $k=2$ with the 95.45% confidence interval.

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