Test Report

Test Report No.: CQC-IVTS-2022-T34

Product Name	IP Video Door Station
Model Number	D21x Rev. 1.7
Applicant	Bird Home Automation GmbH
Approval Types	FCC ID: 2AD99B006D IC: 20208-B006D

CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd.

National Quality Inspection and Testing Center for Internet of Vehicles Products

TEST REPORT DECLARATION

Equipment under Test	:	IP Video Door Station
Model /Type	:	D21x Rev. 1.7
Listed Models	:	N/A
Applicant	:	Bird Home Automation GmbH
Address	:	Uhlandstr. 165, 10719 Berlin, Germany
Manufacturer	:	Bird Home Automation GmbH
Address	:	Uhlandstr. 165, 10719 Berlin, Germany

The EUT described above is tested by CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd. to determine the maximum emissions from the EUT. CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd. is assumed full responsibility for the accuracy of the test results.

Project Engineer:	Yankun Wang (Yankun Wang 王炎坤)	Date: 2022-7-12
Checked by:	Haohao Li (Haohao Li 李昊昊)	Date: 2022-7-12
Approved by:	Wenliang (Wenliang Li 李文亮)	Date: 2022-7-12

中认英联网技术服务(深圳)有限公司 检验检测专用章 (1)

Contents

1. TEST STANDARDS

The tests were performed according to following standards: The equipment under test (EUT) has been tested at CQC-IVTS's (own or subcontracted) laboratories according to the leading reference documents giving table below:

No	Identify	Document Title	Version/Date
1	47 CRF Part 15 Subpart C, Section 15.245	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 – Radio frequency devices - Operation within the bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10500-10550 MHz, and 24075-24175 MHz.	7/07/2022
2	RSS-210 Annex F	Licence-Exempt Radio Apparatus: Category I Equipment - Devices operating in the bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10.5-10.55 GHz, 24.075-24.175 GHz and 33.4-36 GHz	Issue 10/December 2019
3	RSS-Gen	General Requirements for Compliance of Radio Apparatus	Issue 5/ April 2018
4	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014
5	ANSI C63.10	American National Standard for Testing Unlicensed Wireless Devices	2013

2 . SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	June 28, 2022
Testing commenced on	:	July 1, 2022
Testing concluded on	:	July 11, 2022

2.2. Product Description

Product Name:	IP Video Door Station
Model/Type reference:	D21x Rev.1.7
HMN:	-/-
PMN:	IP Video Door Station
HVIN:	D21x Rev.1.7
FVIN:	-/-
MAC:	1CCAE373C1E
EAN:	4260423868113
Hardware version:	1.00
Software version:	-/-
Frequency range:	24.075 – 24.175 GHz
Nominal Frequency:	24.125 GHz
Number of channels:	1 (Fxied)
Modulation type:	No modulation (CW only)
Antenna:	Integrated patch antenna
Antenna gain:	Maximum peak value is 7.1 dBi
Specified rated output power:	Maximum output power is 17 dBm
Power supply:	DC 48V from POE
FCC classification:	FDS
IC classification:	Motion sensor device
Emission designator:	N0N

2.3. EUT operation mode

EUT operating mode no	Description of operating modes	Additional information
op. 1	Continuously transmitting and receiving mode	Carrier modulation (normal mode). 24.125 GHz, a continuous wave with 100% duty cycle

*: declared by the applicant

2.4. Modifications

No modifications were implemented to meet testing criteria

2.5. Test Item (Equipment Under Test) Description*

Short designation	EUT Name	EUT Description	Serial number	Hardware status	Software status
EUT A	IP Video Door Station	D21x Rev. 1.7	-/-	1.00	-/-
EUT B					

*: declared by the applicant. According to customers information EUTs A and B are the same devices.

2.6. Auxiliary Equipment (AE) Description

AE short designation	EUT Name (if available)	EUT Description	Serial number (if available)	Software (if used)
AE 1	Power adapter	Input: 100-240V 50/60Hz 0.4A Output: DC 48V, 1A	UT42-480100W	-/-
AE 2	POE	A1092	-/-	-/-
AE 3	RJ45 Network Cable	Length: 2m	-/-	-/-

*: declared by the applicant.

2.7. Test Item Set-ups Description

set. 1	EUT A + AE 1 + AE 2 + AE 3	EUT operating mode 1

2.8. Test Conditions*

Temperature, [°C]		Voltage, [V]	
T_{nom}	25.0	V_{nom}	48.00
T_{min}	-/-	V_{min}	-/-
T_{max}	-/-	V_{max}	-/-

*: declared by the applicant

2.9. Additional Information

Test items differences	None
Additional application considerations to test a component or sub-assembly	none

2.10. Test Location

Location 1

Company:	CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd.
Address:	Building G5, TCL International E City, Xili Street, Nanshan District, Shenzhen, China
Post code:	518112
Contact Person:	Wenliang Li
Telephone:	+86-755-8618 9654
e-Mail:	liwenliang@cqc.com.cn

2.11. Abnormalities from Standard Conditions

None

2.12. Possible verdicts of the results

Test sample meets the requirements	P (PASS) ± the measured value is below the acceptance limit, AL = TL
Test sample does not meet the requirements	F (FAIL) ± the measured value is above the acceptance limit, AL = TL
Test case does not apply to the test sample	N/A (Not applicable)
Test case not performed	N/P (Not performed)

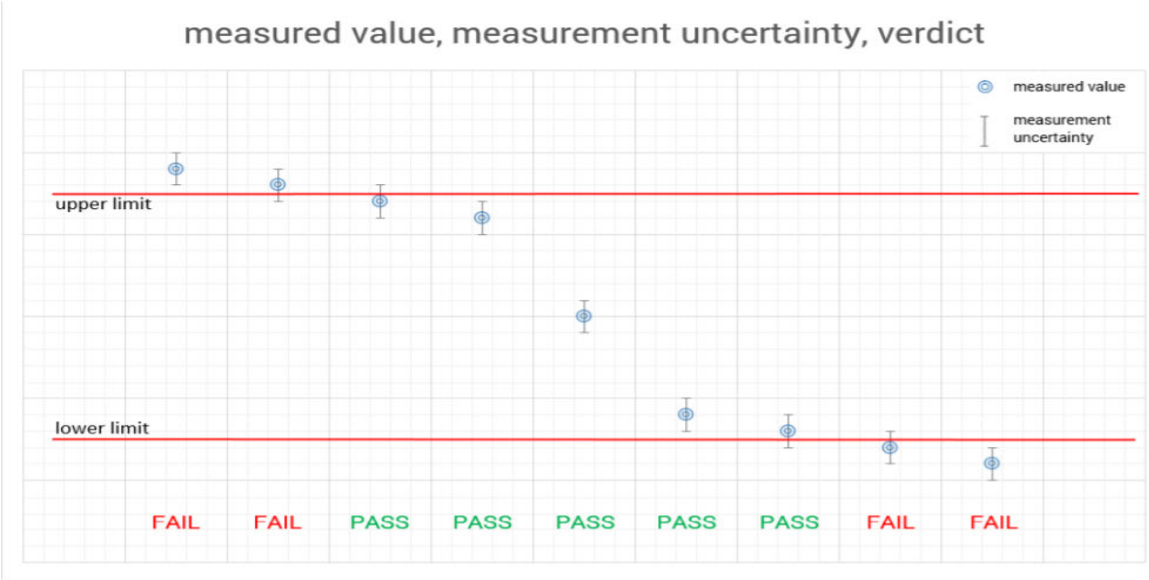
2.13. Formula for determination of correction values (E_C)

$E_C = E_R + AF + C_L + D_F - G_A$ (1)
$M = L_T - E_C$ (2)

E_C = Electrical field ± corrected value
E_R = Receiver reading
M = Margin
L_T = Limit
AF = Antenna factor
C_L = Cable loss
D_F = Distance correction factor (if used)
G_A = Gain of pre-amplifier (if used)
All units are dB-units, positive margin means value is below limit.

2.14. Reporting Statements of Conformity – Decision Rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed. The measurement uncertainty is mentioned in this test report, see chapter 9, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong."



3. TEST ENVIRONMENT

3.1. Address of the test laboratory

CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd.
Building G5, TCL International E City, Xili Street, Nanshan District, Shenzhen, China
CQC-IVTS CNAS Registration No. CNAS L15614; A2LA Certification Number: 6645.01;

3.2. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25℃
Lative Humidity	55 %
Air Pressure	989 hPa

3.3. Test Description

Test Specification Clause	Test Case	Temperature Condition	Power Supply	Pass	Fail	NA	NP	Results
§15.245(b) RSS-210 F.1 RSS-Gen	Field strength of emissions (wanted signal)	Nominal	Nominal	☒	☐	☐	☐	
§15.245(c)	Occupied bandwidth (20dB)	Nominal	Nominal	☒	☐	☐	☐	
§2.1049 RSS-Gen	Occupied bandwidth (99%)	Nominal	Nominal	☒	☐	☐	☐	
§15.209(a) §15.245(b)(1)(2)(3) RSS-210 F.2.1 RSS-Gen	Field strength of emissions (spurious & harmonics)	Nominal	Nominal	☒	☐	☐	☐	
§15.203 RSS-Gen	Antenna requirement	-/-	-/-	☒	☐	☐	☐	

Remark:1. NA means “not applicable”; NP means Not Performed;
2.The measurement uncertainty is not included in the test result.

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01” Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1” and TR-100028-02 “Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 “ and is documented in the CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd..quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd.:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.90 dB	(1)
Radiated Emission	1~6GHz	4.20 dB	(1)
Radiated Emission	6~18GHz	4.50 dB	(1)
Radiated Emission	18-40GHz	5.42 dB	(1)
Radiated Emission	Above 40 GHz	5.50 dB	(1)
Conducted Disturbance	0.15~30MHz	3.30 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.5. Equipments Used during the Test

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Equipment No.	Last Cal.	Cal.Due
1	EMI Test Receiver	R&S	ESW26	CQC-IVTS-E-JC02	2021/09/02	2022/09/01
2	Artificial Mains	R&S	ENV216	CQC-IVTS-E-JC16	2021/09/04	2022/09/03
3	Artificial Mains	R&S	ENV4200	CQC-IVTS-E-JC17	2021/09/04	2022/09/03
4	EMI Test Software	R&S	EMC32	N/A	N/A	N/A

Radiated Emission						
Item	Test Equipment	Manufacturer	Model No.	Equipment No.	Last Cal.	Cal.Due
1	EMI Test Receiver	R&S	ESW26	103003	2021/09/02	2022/09/01
2	Spectrum Analyzer	R&S	FSW43	10182	2021/09/04	2022/09/03
3	Ultra-Broadband Antenna	Schwarzbeck	VULB9168	1291	2021/09/05	2022/09/04
4	Horn Antenna	ETS-Lindgren	3117	102732	2021/09/05	2022/09/04
5	Amplifier	R&S	SCU01F	100369	2021/09/02	2022/09/01
6	Amplifier	R&S	SCU18F	100868	2021/09/02	2022/09/01
7	Amplifier	R&S	SCU26F	100781	2021/09/02	2022/09/01
8	Horn Antenna	Schwarzbek	9170	790	2021/09/02	2022/09/01
9	EMI Test Software	R&S	EMC32	N/A	N/A	N/A
10	TC-RSE60	R&S	Receive Unit	1538.5700.02	N/A	N/A
11	TC-RSE140	R&S	Receive Unit	1538.5723.02	N/A	N/A
12	TC-RSE90	R&S	Receive Unit	1538.5752.03	N/A	N/A
13	Signal Generator	R&S	SMW200A	170436	2021/09/02	2022/09/01
14	TC-MX90	R&S	Multiplier Unit	1538.5752.02	N/A	N/A
15	Antenna Mast	Maturo	BAM4.0	N/A	N/A	N/A
16	Turntable	Maturo	TT3.5	N/A	N/A	N/A

4. TEST CONDITIONS AND RESULTS

4.1. Field Strength of Emissions

4.1.1. LIMITS

(a) According to § 15.245(b) and RSS-210 F.1 (a): The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
902 – 928	500	1.6
2435 – 2465	500	1.6
5785 – 5815	500	1.6
10500 – 10550	2500	25.0
24075 – 24175	2500	25.0

(b) Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in § 15.205 and RSS-Gen, shall not exceed the field strength limits shown in § 15.209 and RSS-Gen. Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:

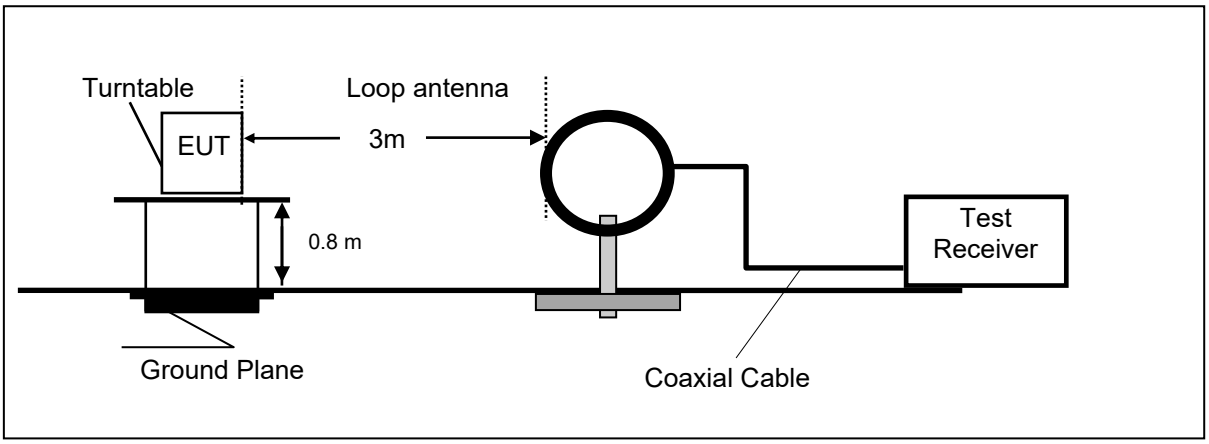
(i) For the second and third harmonics of field disturbance sensors operating in the 24075-24175 MHz band and for other field disturbance sensors designed for use only within a building or to open building doors, 25.0 mV/m.
(ii) For all other field disturbance sensors, 7.5 mV/m.
(iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands, other than the second and third harmonics from devices operating in the 24075-24175 MHz band, fully comply with the limits given in § 15.209 and RSS-Gen. Continuous operation of field disturbance sensors designed to be used in farm equipment, vehicles such as fork lifts that are intended primarily for use indoors or for very specialized operations, or railroad locomotives, railroad cars and other equipment which travels on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration (e.g., putting a vehicle into reverse gear, activating a turn signal, etc.).

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

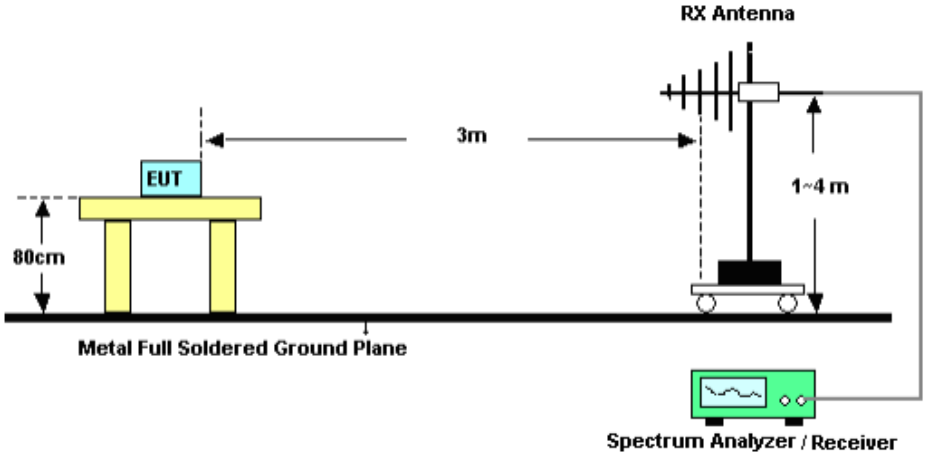
(c) Field strength limits are specified at a distance of 3 meters.
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209 and RSS-Gen, whichever is the lesser attenuation.
(e) The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in § 15.35 and RSS-Gen for limiting peak emissions apply.

4.1.2. TEST CONFIGURATION

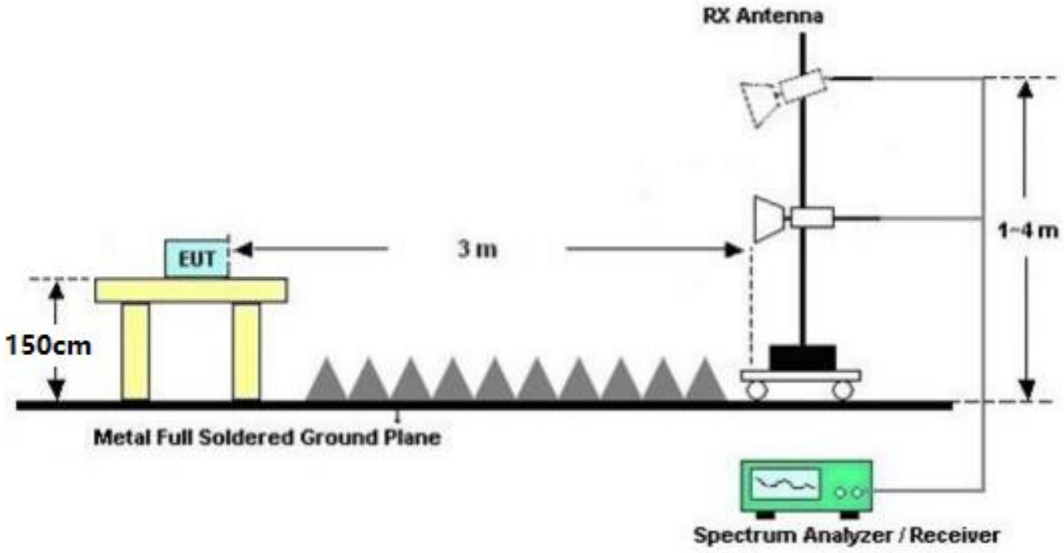
(a) Frequency range 9 KHz – 30MHz



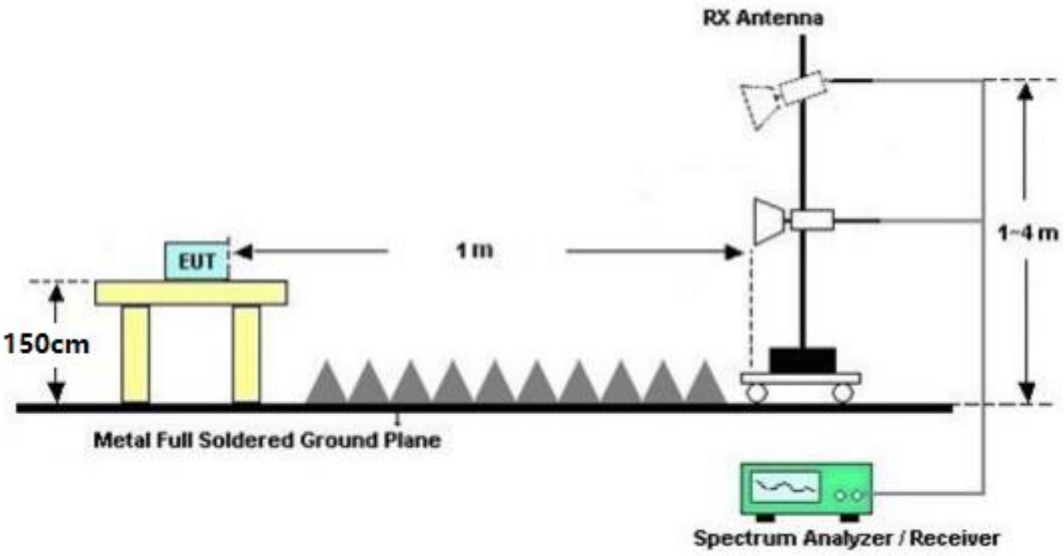
(b) Radiated emission test set-up, frequency range: 30 - 1000MHz



(c) Radiated emission test set-up, frequency range 1GHz – 18 GHz



(d) Radiated emission test set-up, frequency range above 18GHz



4.1.3. TEST PROCEDURE

4.1.3.1 Sequence of testing radiated spurious 9 KHz to 30 MHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 3m (see ANSI C63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0 degree to 360 degree.
- The antenna height is 1.5m.
- Set RBW = 200 Hz / VBW = 1 KHz, sweep time: Auto
- At each turntable position the anzlyer sweeps with position-peak detector to find the maximum of all emissions.

Final measurement

- Identified emissions during the premeaurement are maximized by the software by rotating the turntable from 0 degree to 360 degree.
- The final measurement is done in the position (turntable and elevation) causing the highest emissions with quasi-peak (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, conrrection factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

4.1.3.2 Sequence of testing radiated spurious 30 MHz to 1 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 0.8 m height is used, which is placed on the ground plance.
- If the EUT is a floor standing device, it is placed directly on the ground plane.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 3m (see ANSI C63.4) – see test details.
- EUT is set into operation.

Premeasurement
- The turntable rotates from 0 degree to 360 degree.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set RBW = 120 KHz / VBW = 1 MHz, sweep time: Auto
- At each turntable position the anzlyer sweeps with position-peak detector to find the maximum of all emissions.

Final measurement
- The final neasurement us perormed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, conrrection factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

4.1.3.3 Sequence of testing radiated spurious 1 GHz to 18 GHz

Setup
- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turntable.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 3m (see ANSI C63.4) – see test details.
- EUT is set into operation.

Premeasurement
- The turntable rotates from 0 degree to 360 degree.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Peak for Peak, RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Average for Average.
- At each turntable position the anzlyer sweeps with position-peak detector to find the maximum of all emissions.

Final measurement
- The final neasurement us perormed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable and antenna height between 1 and 4 m.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the height emissions with Peak and Average detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, conrrection factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

4.1.3.4 Sequence of testing radiated spurious above 18 GHz

Setup
- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turntable.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 1m (see ANSI C63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0 degree to 360 degree.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Peak for Peak, RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Average for Average.
- At each turntable position the anzlyer sweeps with position-peak detector to find the maximum of all emissions.

Final measurement

- The final neasurement us perormed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable and antenna height between 1 and 4 m.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the height emissions with Peak and RMS detector (as described in ANSI C 63.4).
- All final levels should consider distance conversion factor as format: Final values (3 m) = Measurement values (1 m) + Distance conversion factor
  Distance conversion factor = 20 x Log_{10} (d/3), where d = measurement distance in m
  - Distance conversion factor = 20 x Log_{10} (1/3) = -10.0 [dB]
- Final levels, frequency, measuring time, bandwidth, turntable position, conrrection factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

4.1.3.5 Sequence of testing radiated spurious above 40 GHz with external mixers

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turntable.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 1m (see ANSI C63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0 degree to 360 degree.
- The antenna with external mixer is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Peak for Peak, RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Average for Average.
- At each turntable position the anzlyer sweeps with position-peak detector to find the maximum of all emissions.

Final measurement

- The final neasurement us perormed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable and antenna height between 1 and 4 m.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the height emissions with Peak and RMS detector (as described in ANSI C 63.4).
- All final levels should consider distance conversion factor as format: Final values (3 m) = Measurement values (1 m) + Distance conversion factor
  Distance conversion factor = 20 x Log_{10} (d/3), where d = measurement distance in m
  - Distance conversion factor = 20 x Log_{10} (1/3) = -10.0 [dB]
- Final levels, frequency, measuring time, bandwidth, turntable position, conrrection factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

4.1.4. FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS (dBuV/m) = RA (dBuV) + AF (dB/m) + CL (dB) – AG (dB)

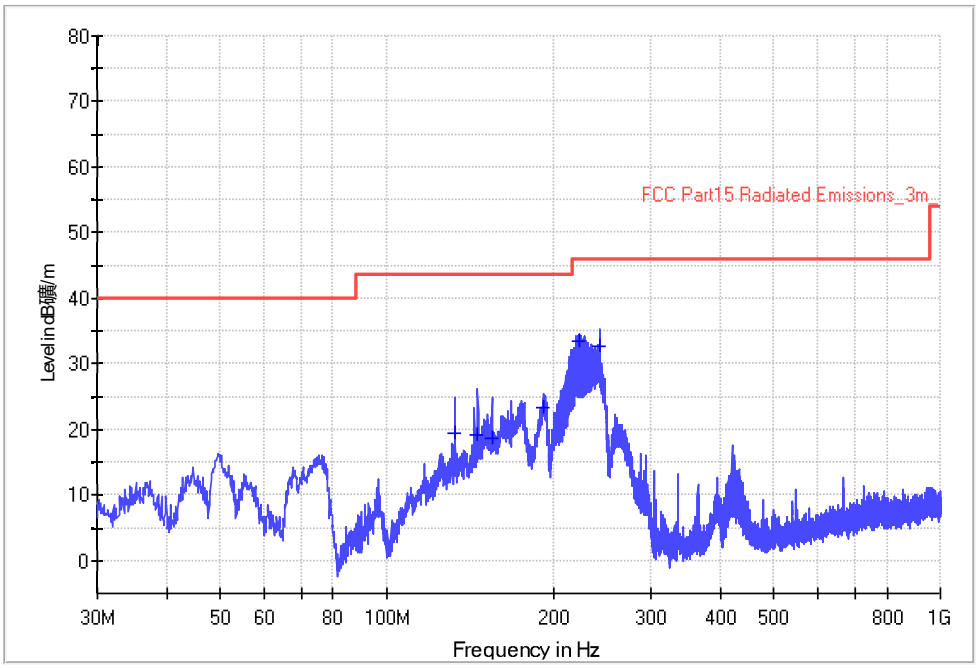
Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

4.1.5. TEST RESULTS

PASS

Test Condictions	EUT/Antenna Orientation	Maximum Field Strength [dBuV/m @ 3m]				Test Results
		Peak	Peak Limit	Average	Average Limit	
T_{nom} / V_{nom}	X/H&V	104.00	148.00	103.32	128.00	PASS

Plots No. 1: 30 MHz to 1 GHz, Horizontal / Vertical Polarization



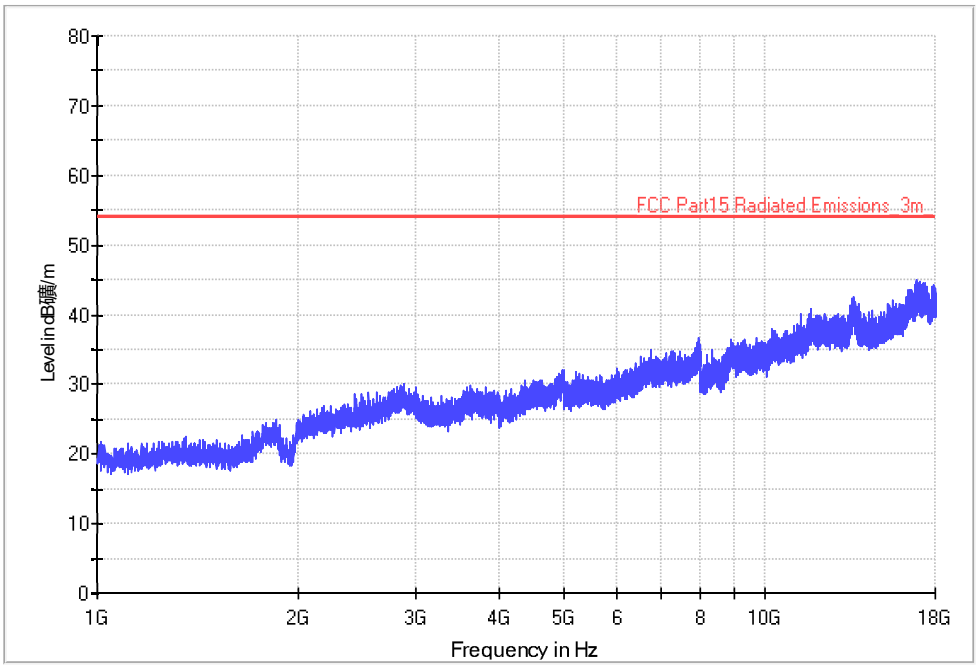
Limit and Margin

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Corr. (dB/m)	Margin - QPK (dB)
132.720000	---	19.5	1000.0	120.000	155.0	H	-30.8	24.0
146.000000	---	19.2	1000.0	120.000	155.0	H	-29.9	24.3
154.840000	---	18.6	1000.0	120.000	155.0	H	-29.6	24.9
191.800000	---	23.4	1000.0	120.000	155.0	H	-33.4	20.1
223.120000	---	33.5	1000.0	120.000	155.0	H	-32.9	12.5
243.000000	---	32.7	1000.0	120.000	155.0	H	-32.1	13.3

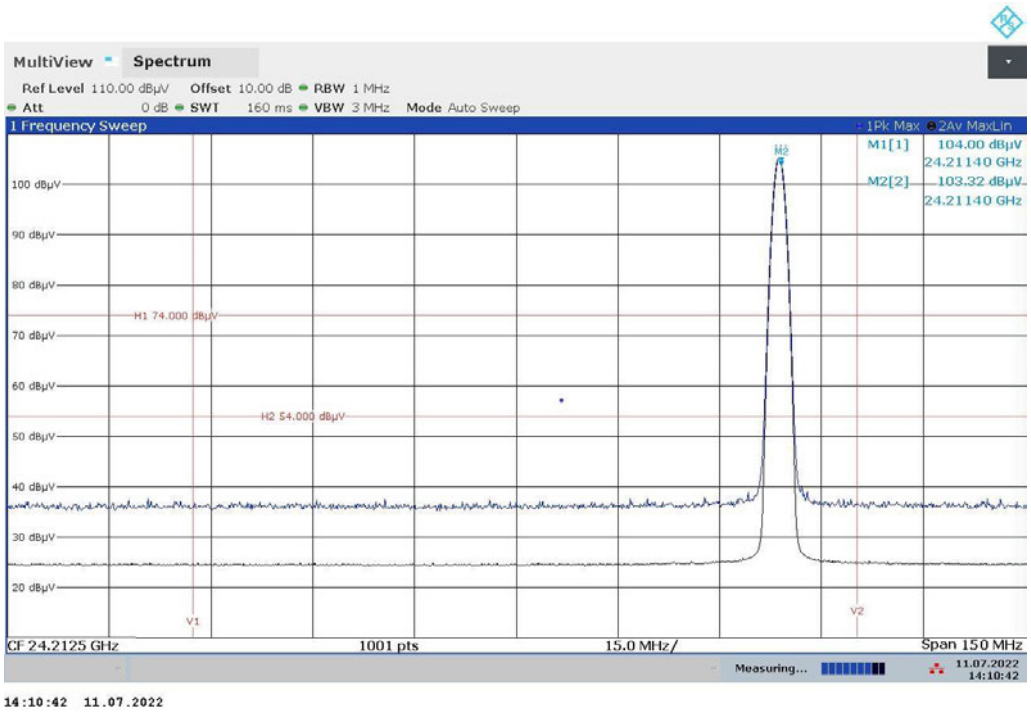
(continuation of the "Limit and Margin" table from column 15 ...)

Frequency (MHz)	Limit - QPK (dBµV/m)	Comment
132.720000	43.5	
146.000000	43.5	
154.840000	43.5	
191.800000	43.5	
223.120000	46.0	
243.000000	46.0	

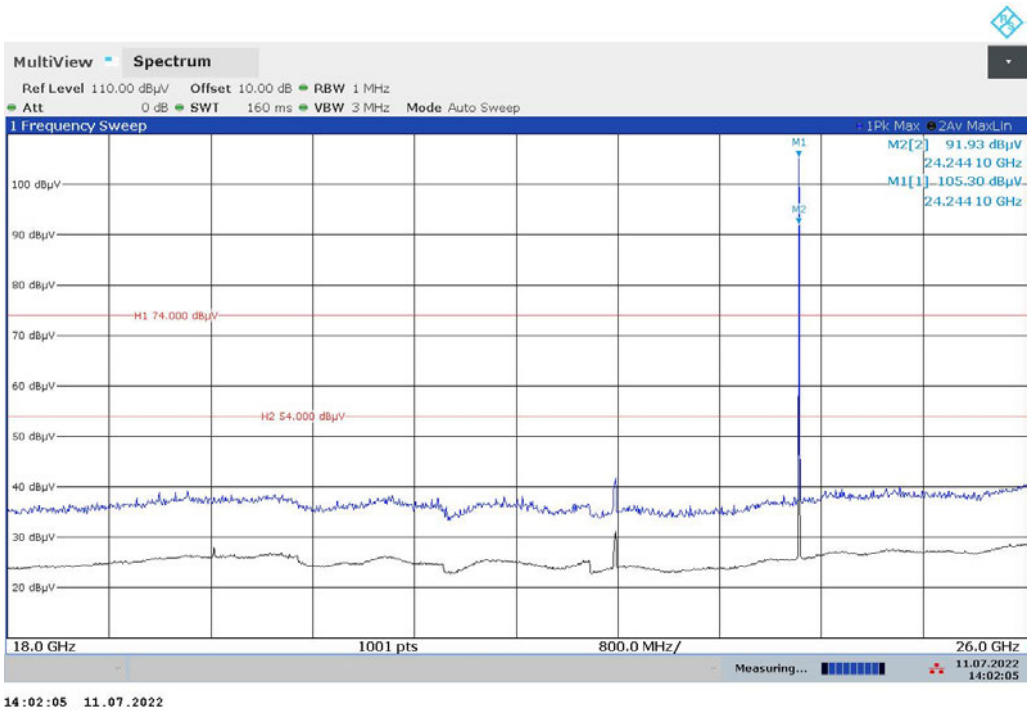
Plots No. 2: 1 GHz to 18 GHz, Horizontal / Vertical Polarization



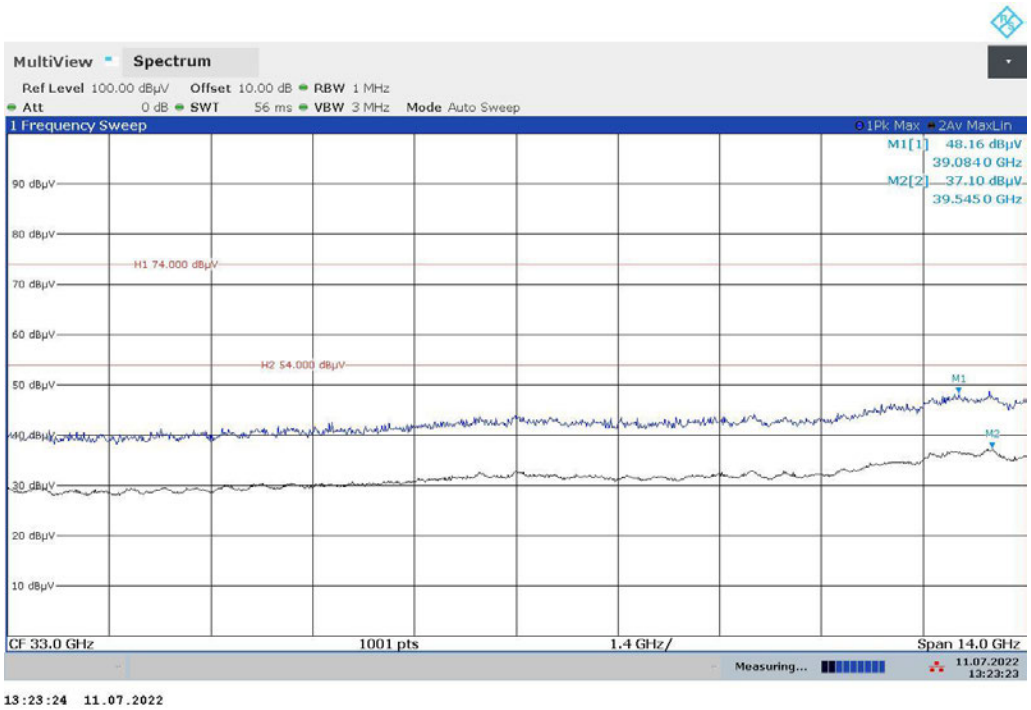
Plots No. 3: Radiated Band-Edge & Maximum Field Strength, Horizontal / Vertical Polarization



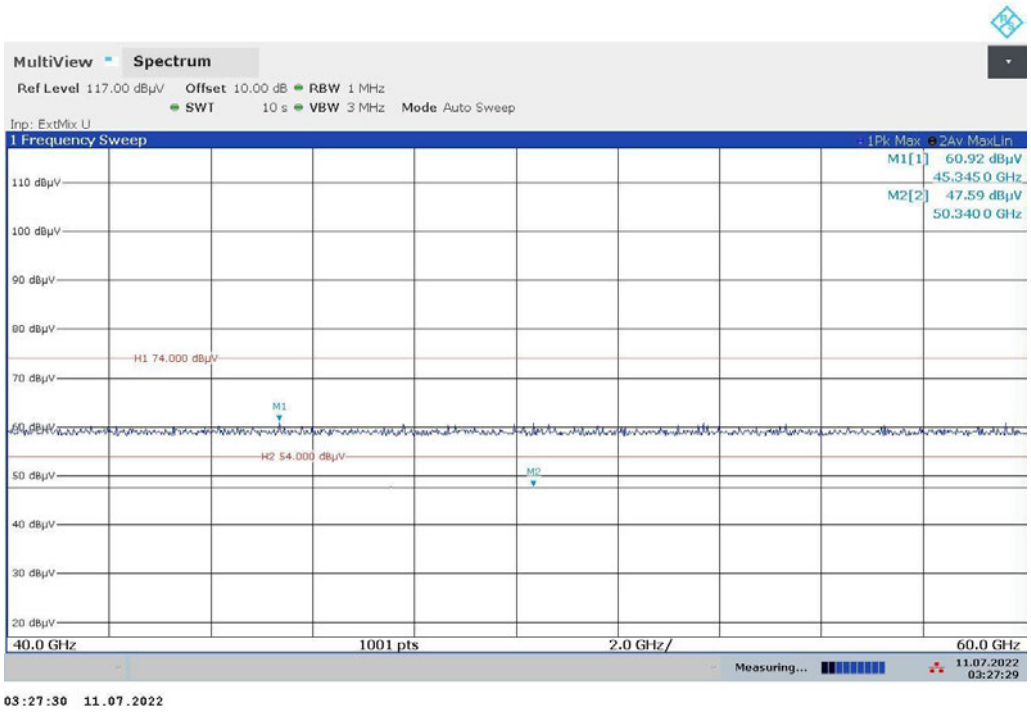
Plots No. 4: 18 GHz to 26 GHz, Horizontal / Vertical Polarization



Plots No. 5: 26 GHz to 40 GHz, Horizontal / Vertical Polarization

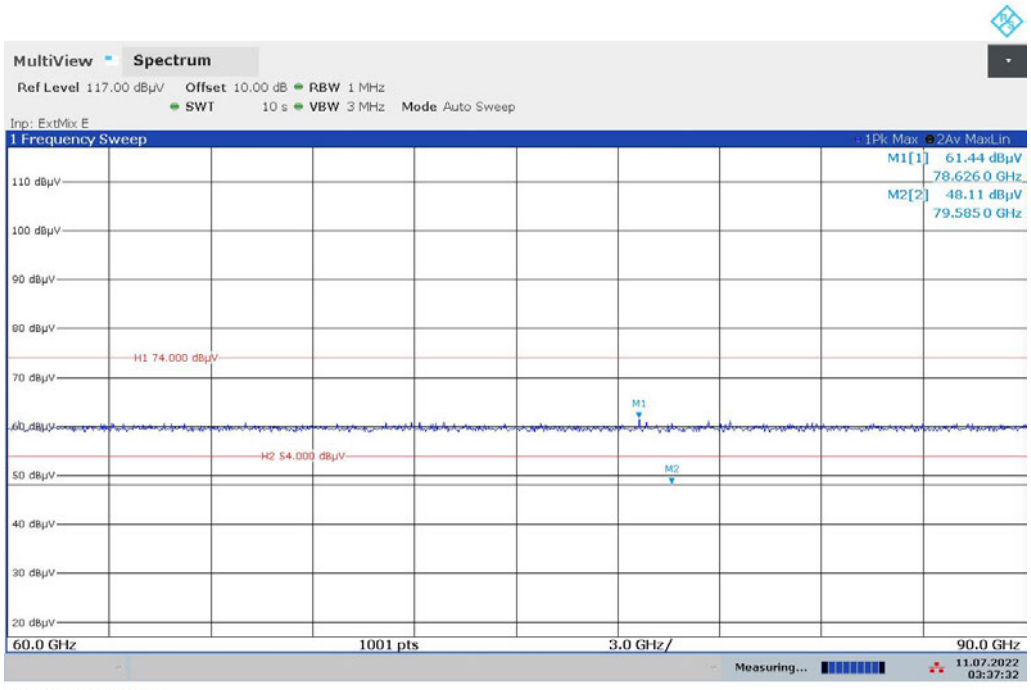


Plots No. 6: 40 GHz to 60 GHz, Horizontal / Vertical Polarization



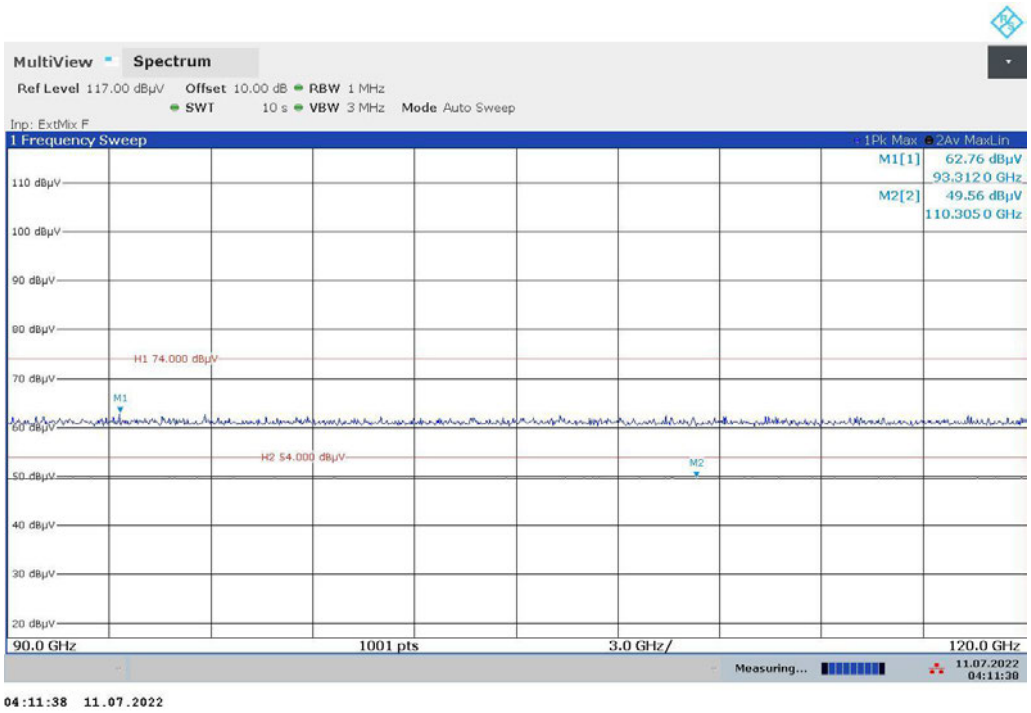
03:27:30 11.07.2022

Plots No. 7: 60 GHz to 90 GHz, Horizontal / Vertical Polarization



03:37:32 11.07.2022

Plots No. 8: 90 GHz to 120 GHz, Horizontal / Vertical Polarization



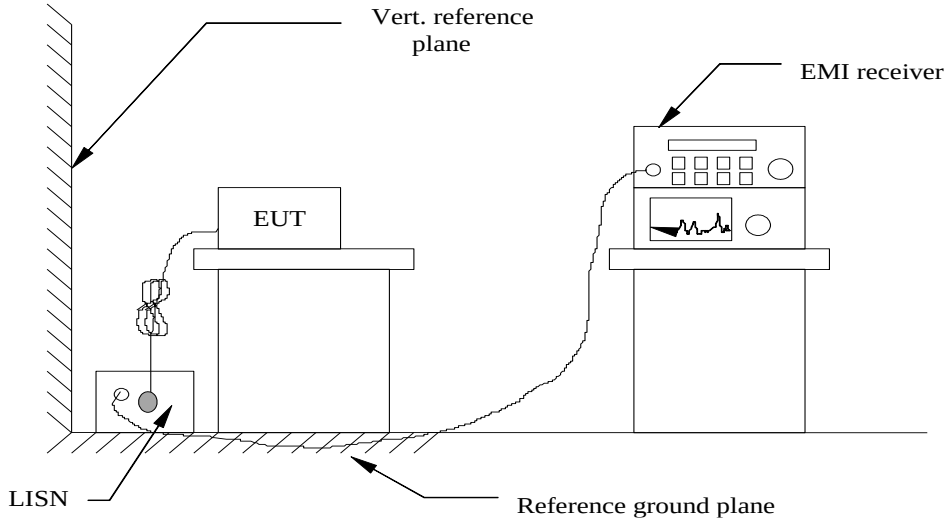
4.2. AC Conducted Emission

4.2.1. LIMITS OF DISTURBANCE

According to RSS Gen 8.8 and § 15.207(a) Line Conducted Emission Limits is as following:

Frequency range (MHz)	Limit (dBuV)	
	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.		

4.2.2. TEST CONFIGURATION



4.2.3. TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
2. Support equipment, if needed, was placed as per ANSI C63.10-2013
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
4. The EUT received DC 12V power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipment received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50-ohm load; the second scan had Line 1 connected to a 50-ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

4.2.4. DISTURBANCE CALCULATION

The AC mains conducted disturbance is calculated by adding the 10dB Pulse Limiter and Cable Factor and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

CD (dBuV) = RA (dBuV) + PL (dB) + CL (dB)

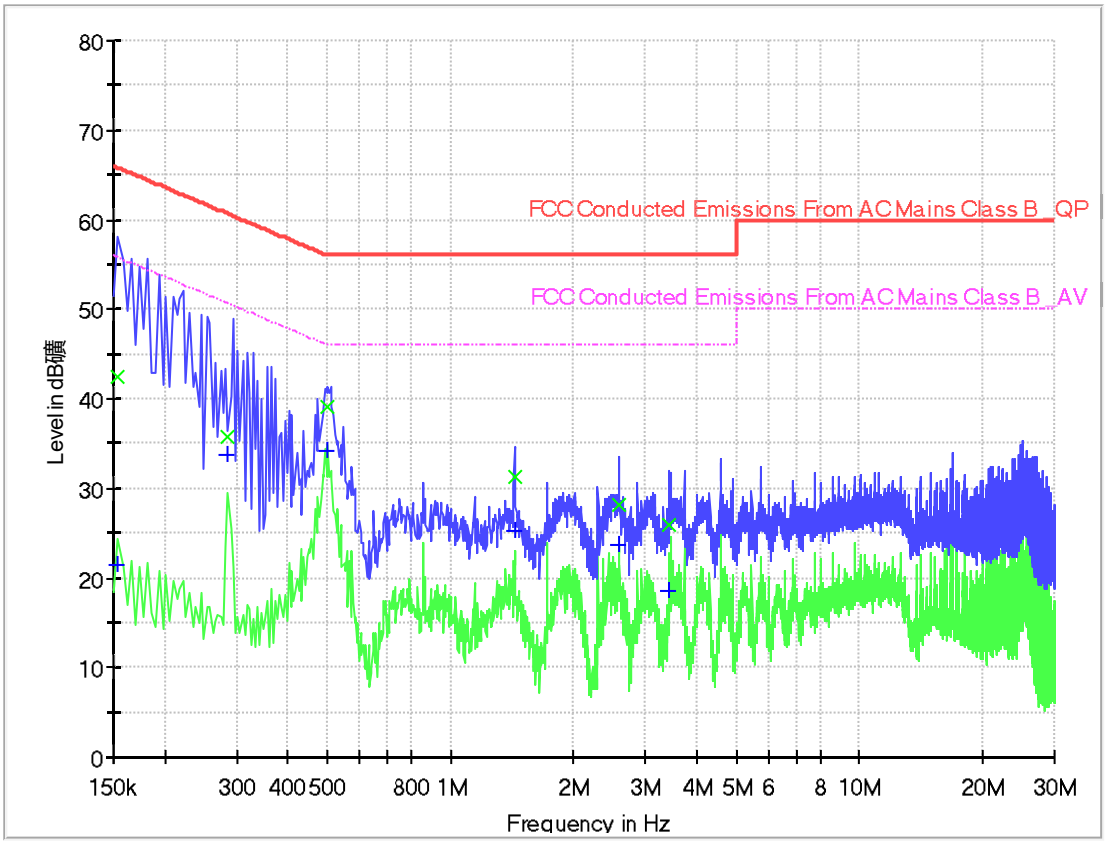
Where CD = Conducted Disturbance	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	PL = 10 dB Pulse Limiter Factor

4.2.5. TEST RESULTS

PASS

Remark:
1. Measured both 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz power supply only reported worst case at 120 VAC, 60 Hz as below:.

Plots No. 9: Neutral Line



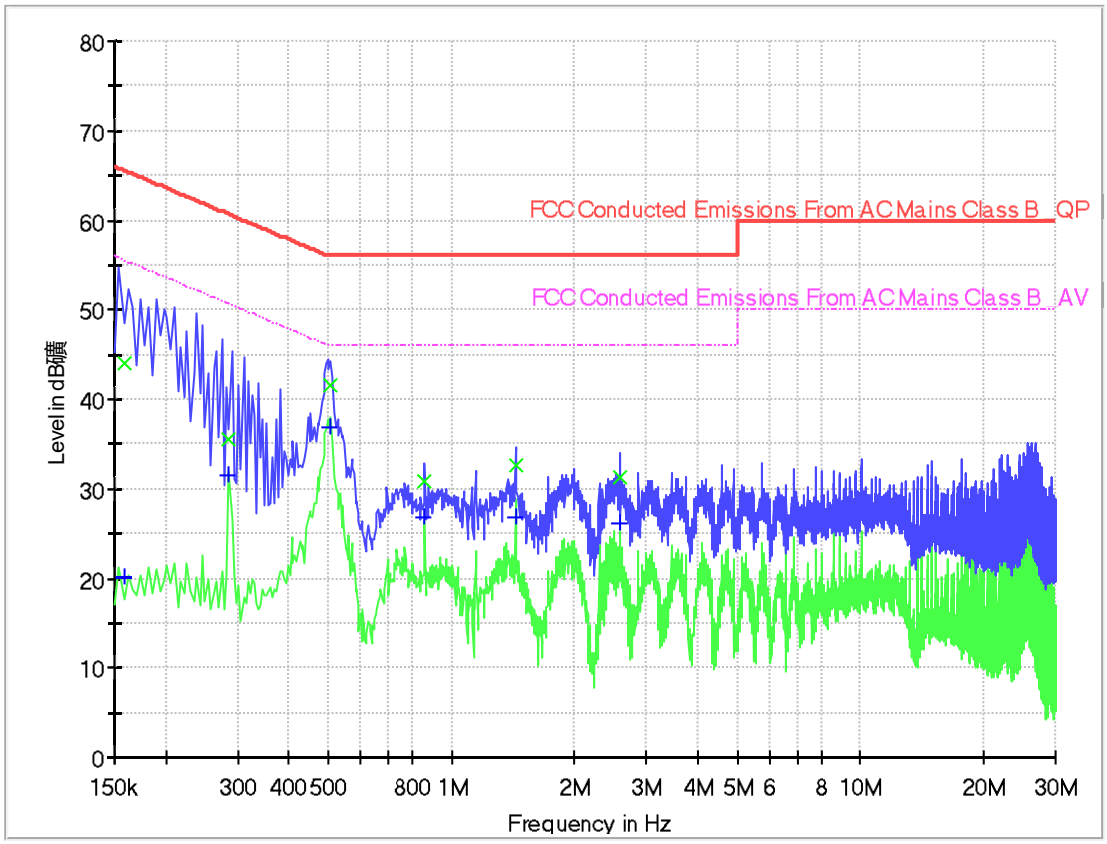
Limit and Margin

Frequency (MHz)	MaxPeak (dBµV)	QuasiPeak (dBµV)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.154000	---	42.5	21.4	10.0	9.000	LOCAL	OFF	9.6
0.286000	---	35.7	33.8	10.0	9.000	LOCAL	OFF	9.7
0.502000	---	39.0	34.1	10.0	9.000	LOCAL	OFF	9.8
1.434000	---	31.2	25.3	10.0	9.000	LOCAL	OFF	9.9
2.578000	---	28.1	23.6	10.0	9.000	LOCAL	OFF	10.0
3.438000	---	25.9	18.7	10.0	9.000	LOCAL	OFF	10.1

(continuation of the "Limit and Margin" table from column 14 ...)

Frequency (MHz)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - AVG (dB)	Limit - AVG (dBµV)	Comment
0.154000	23.3	65.8	34.4	55.8	
0.286000	25.0	60.6	16.8	50.6	
0.502000	17.0	56.0	11.9	46.0	
1.434000	24.8	56.0	20.7	46.0	
2.578000	28.0	56.0	22.4	46.0	
3.438000	30.1	56.0	27.4	46.0	

Plots No. 10: Phase Line



Limit and Margin

Frequency (MHz)	MaxPeak (dBµV)	QuasiPeak (dBµV)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.158000	---	44.1	20.1	10.0	9.000	LOCAL	OFF	9.6
0.286000	---	35.6	31.5	10.0	9.000	LOCAL	OFF	9.7
0.506000	---	41.5	36.8	10.0	9.000	LOCAL	OFF	9.8
0.862000	---	30.9	26.9	10.0	9.000	LOCAL	OFF	9.8
1.434000	---	32.6	26.8	10.0	9.000	LOCAL	OFF	9.9
2.582000	---	31.4	26.1	10.0	9.000	LOCAL	OFF	10.0

(continuation of the "Limit and Margin" table from column 14 ...)

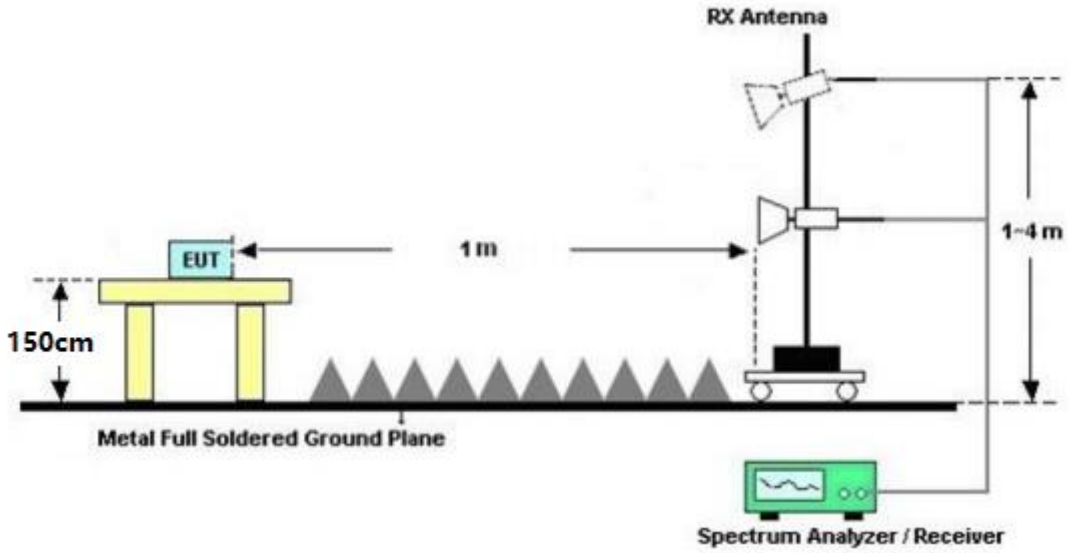
Frequency (MHz)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - AVG (dB)	Limit - AVG (dBµV)	Comment
0.158000	21.5	65.6	35.5	55.6	
0.286000	25.1	60.6	19.1	50.6	
0.506000	14.5	56.0	9.2	46.0	
0.862000	25.1	56.0	19.1	46.0	
1.434000	23.4	56.0	19.3	46.0	
2.582000	24.6	56.0	19.9	46.0	

4.3. Occupied Bandwidth (99% Bandwidth)

4.3.1. LIMITS

The occupied bandwidth is defined as the 99% bandwidth.
According to § 2.1049 and RSS-Gen section 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.

4.3.2. TEST CONFIGURATION



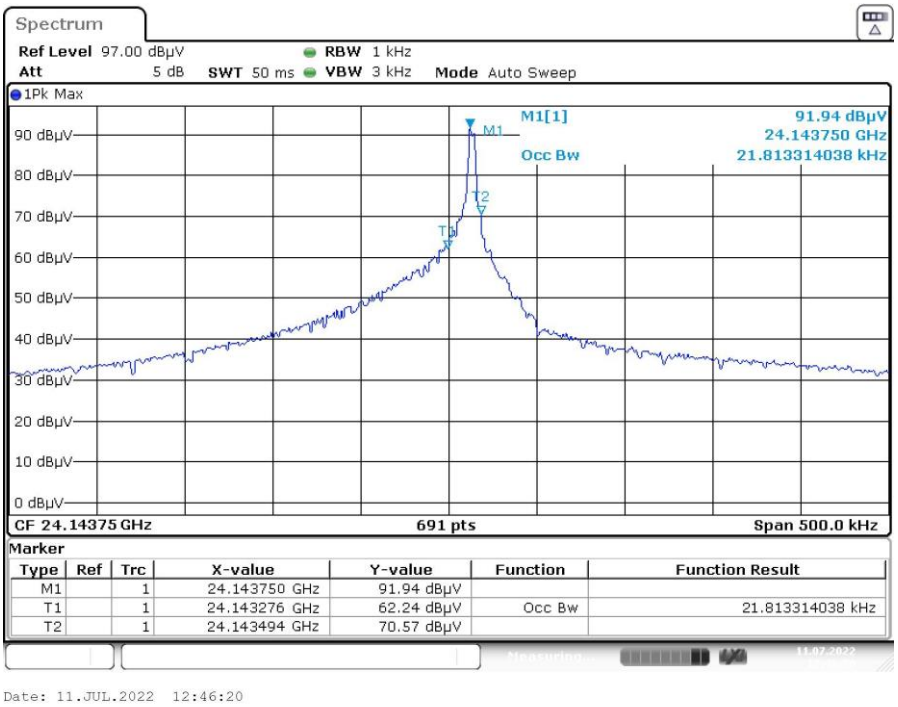
4.3.3. TEST PROCEDURE

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turntable.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 1m (see ANSI C63.4) – see test details.
- EUT is set into operation.
- The turntable rotates from 0 degree to 360 degree.
- The antenna with external mixer is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set the resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

4.3.4. TEST RESULTS

Test Condictions	EUT/Antenna Orientation	Occupied Bandwidth (99%) [KHz]	Test Results
T_{nom} / V_{nom}	X/H&V	21.83	PASS

Plots No. 11: 99% Occupied Bandwidth, Horizontal / Vertical Polarization



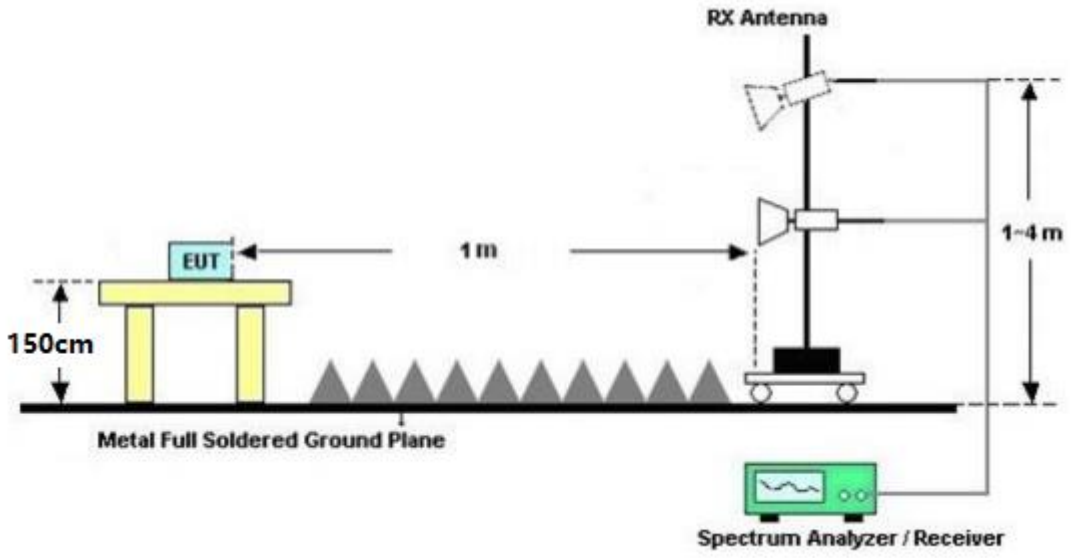
Notes: The RBW was set to 4.58% of OBW. (1 KHz / 21.813 KHz) x 100% = 4.58 %

4.4. 20dB Bandwidth

4.4.1. LIMITS

According to § 15.215 (c): 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. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

4.4.2. TEST CONFIGURATION



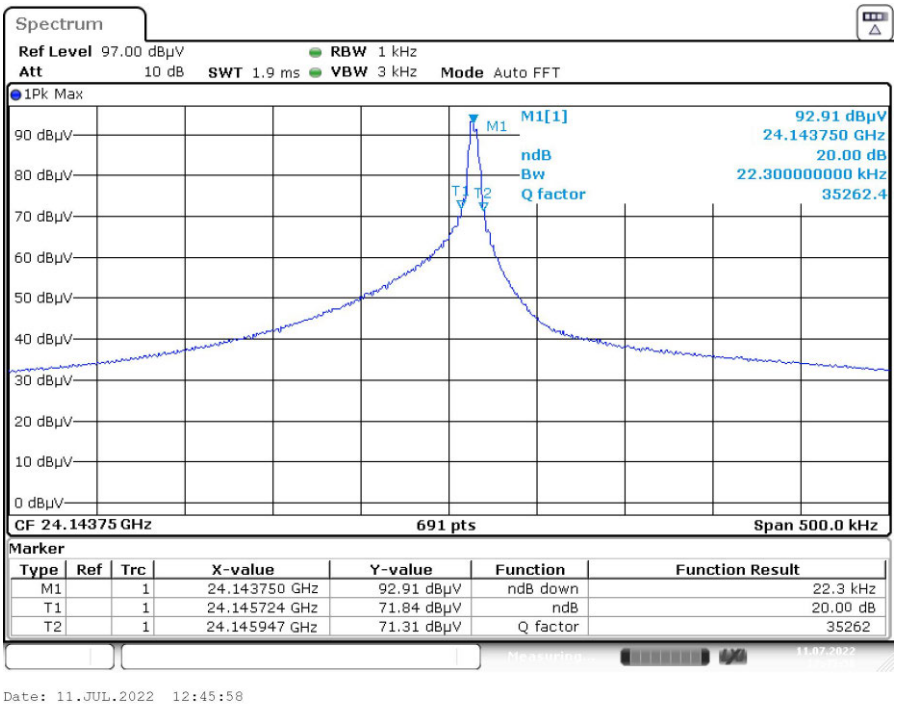
4.4.3. TEST PROCEDURE

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turntable.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measuremet distance is 1m (see ANSI C63.4) – see test details.
- EUT is set into operation.
- The turntable rotates from 0 degree to 360 degree.
- The antenna with external mixer is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set the resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

4.4.4. TEST RESULTS

Test Condictions	EUT/Antenna Orientation	20dB Bandwidth					Test Results
		F_L [GHz]	F_L Limit [GHz]	F_H [GHz]	F_H Limit [GHz]	20dB Bandwidth [KHz]	
T_{nom} / V_{nom}	X/H&V	24.145724	24.0850	24.145947	24.1650	22.30	PASS

Plots No. 12: 20dB Bandwidth, Horizontal / Vertical Polarization



Notes: The 20 dB bandwidth of the emission is contained within the frequency band.

4.5. Antenna Requirement

4.5.1. REQUIREMENT

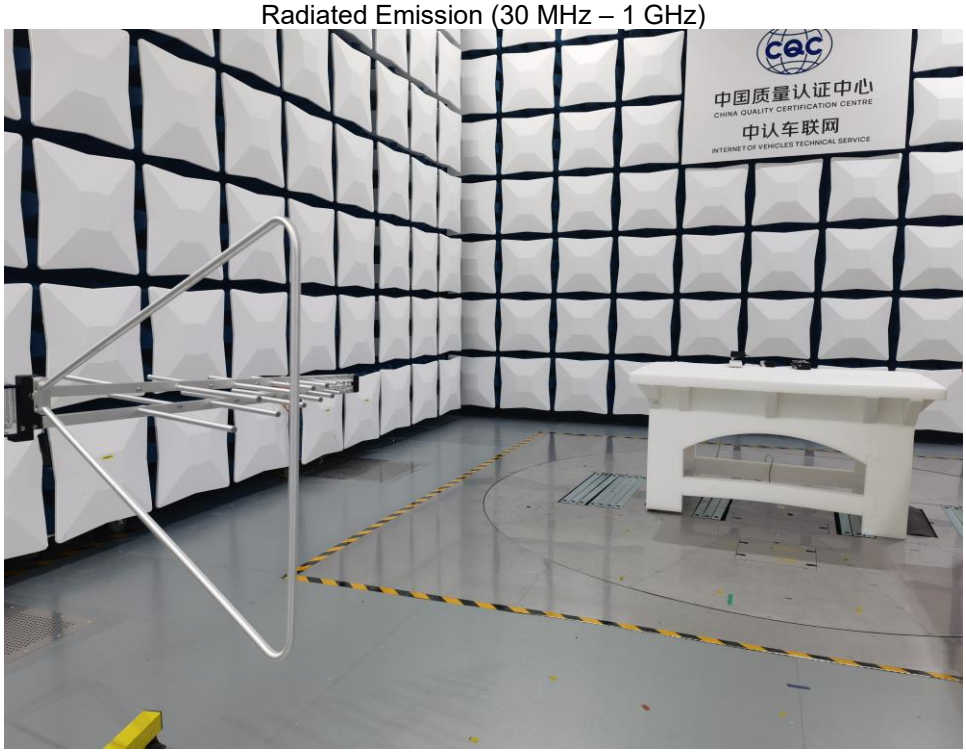
According to § 15.203 and RSS-Gen: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, 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

4.5.2. VERDICT

The EUT has an internal antenna which is not user accessible. Hence it compliances with the antenna requirements.

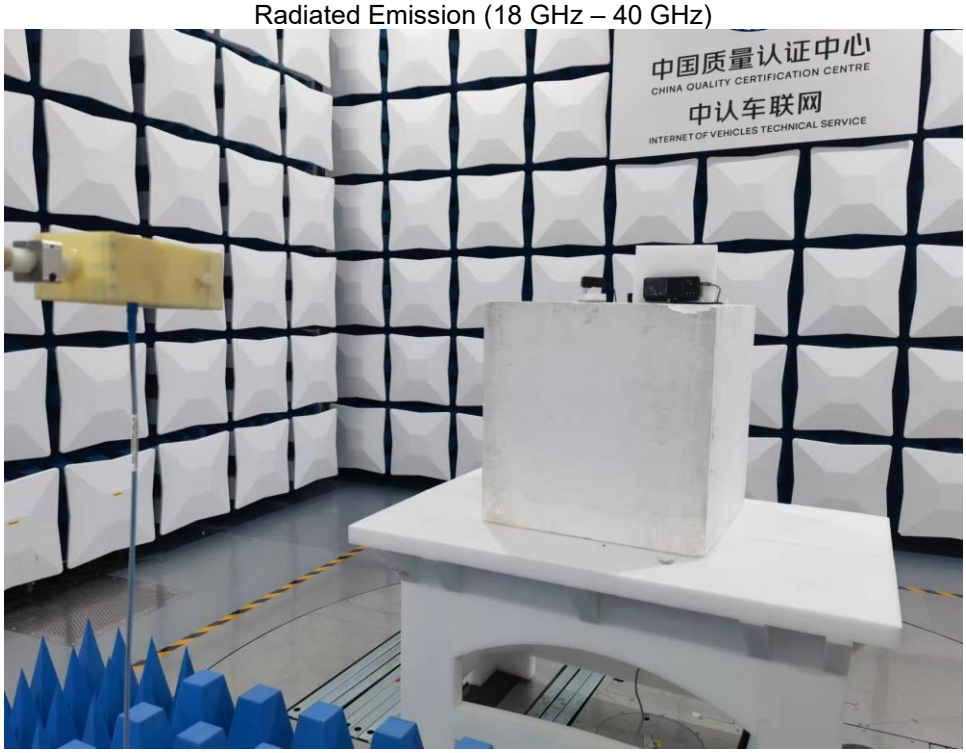
5. Test Set-up Photos of the EUT

Radiated Emission (30 MHz – 1 GHz)



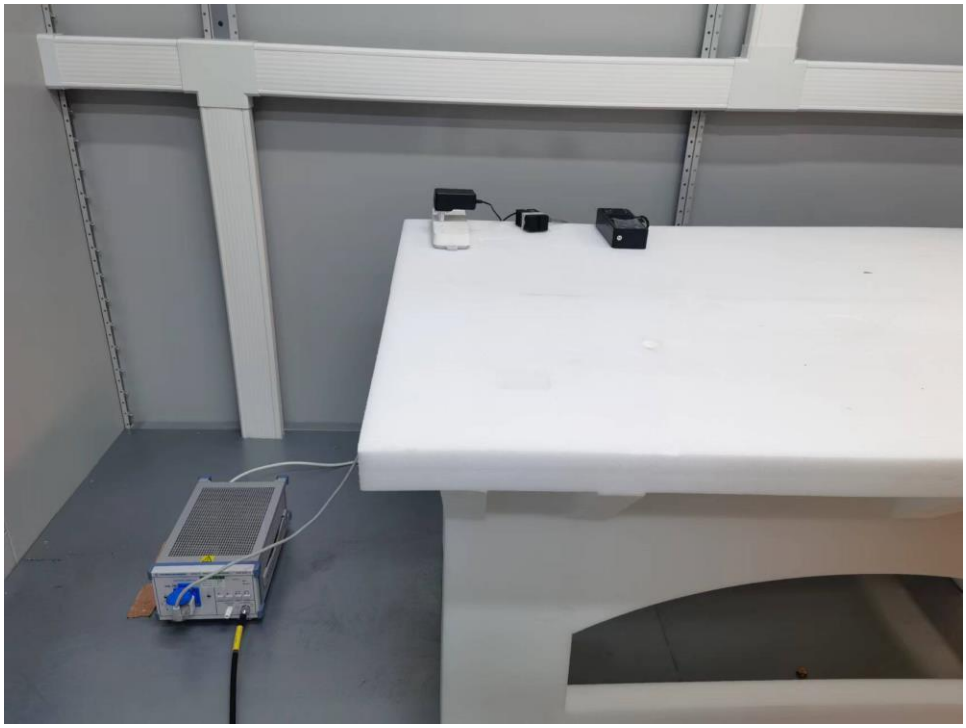
Radiated Emission (1 GHz – 18 GHz)

Radiated Emission (18 GHz – 40 GHz)



Radiated Emission (Above 40 GHz)

Conducted Disturbance



6. External and Internal Photos of the EUT

External Photos


LAN/POE
RELAY
RELAY
EXT


Rev
1.1
立讯检测股份
LCS Testing Lab


立讯检测股份
LCS Testing Lab


LCS Testing Lab


UP
INSIDE
LCS Testing Lab


UP
INSIDE
Model: D21x
Product name: IP Video Door Station
FCC ID: 2AD99B006D
IC: 20208-B006D
Contains K-Band Doppler Sensor Module (Mtsystem Sensor) FCC ID: 2ACUJR4263. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device interference received, including interference that may cause undesired operation.
EN: Please read the product manual thoroughly before installation.
Please assign the email address of the owner of this device using the DoorBird App (Settings -> Administration), in case you need to recover the login credentials.
DE: Bitte lesen Sie die Produktanleitung sorgfältig vor der Installation.
Bitte weisen Sie dem Gerät die Emailadresse des Besitzers zu, unter Verwendung der DoorBird App (Einstellungen -> Administration), für den Fall, dass Sie die Logindaten wiederherstellen müssen.


DoorBird
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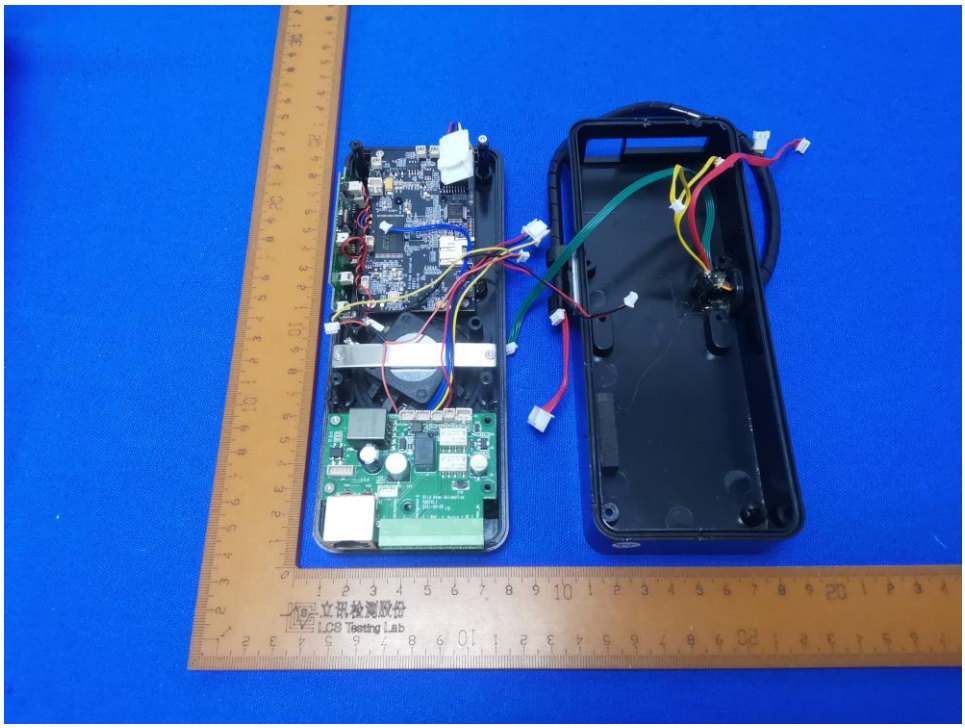
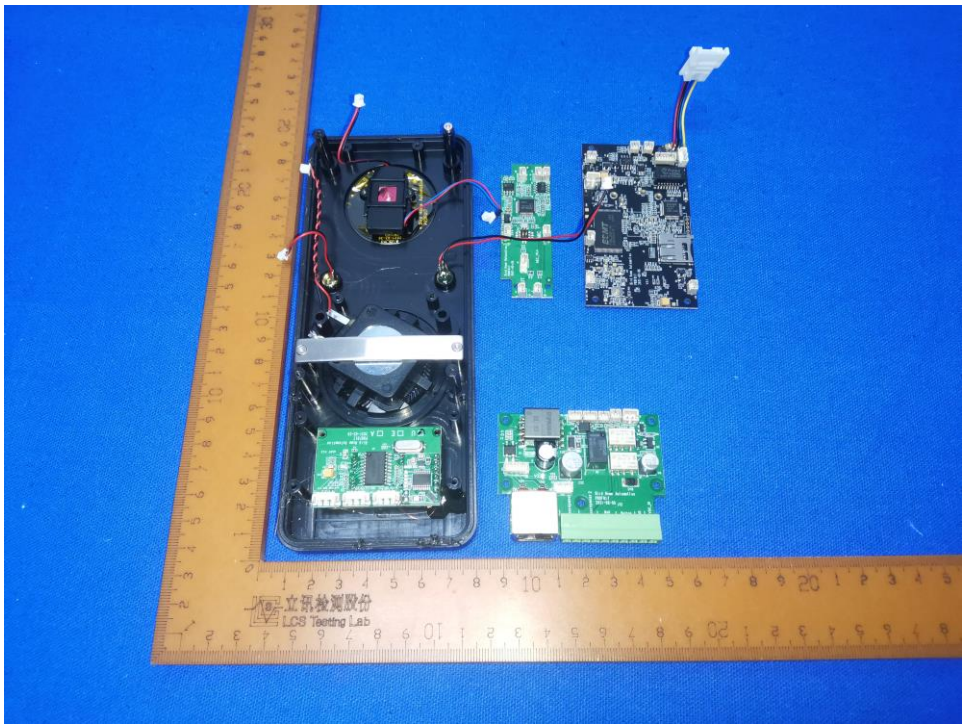
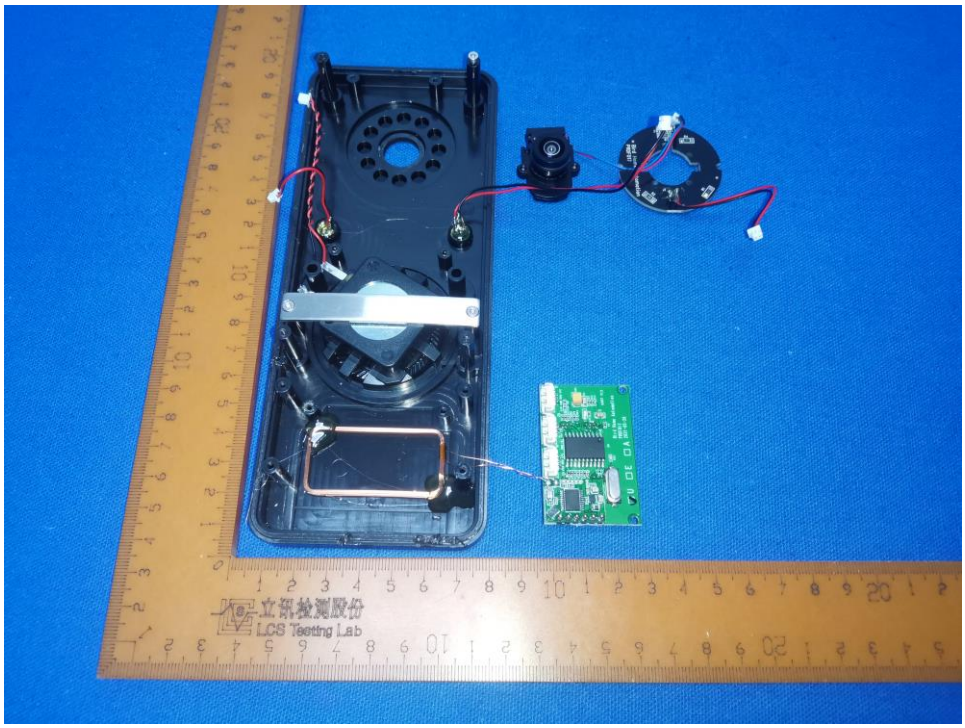
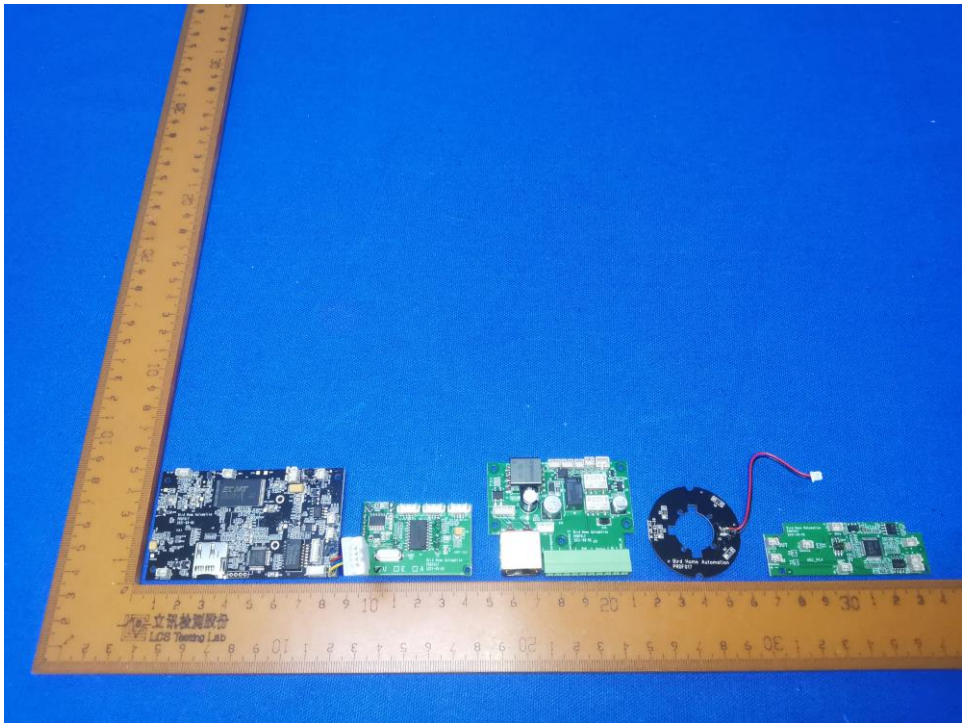
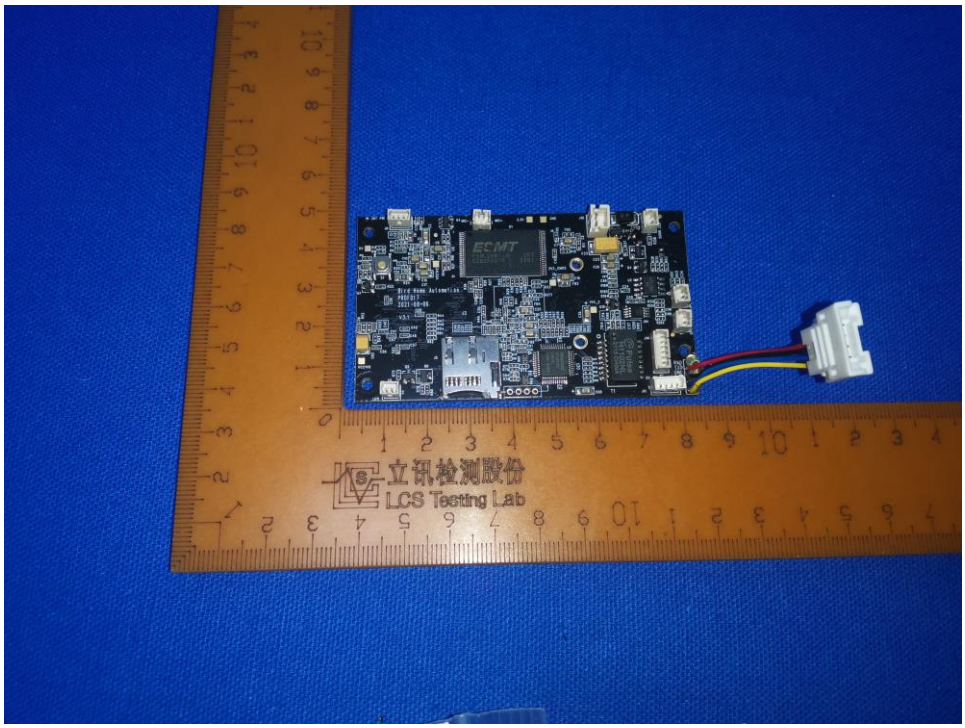
Internal Photos

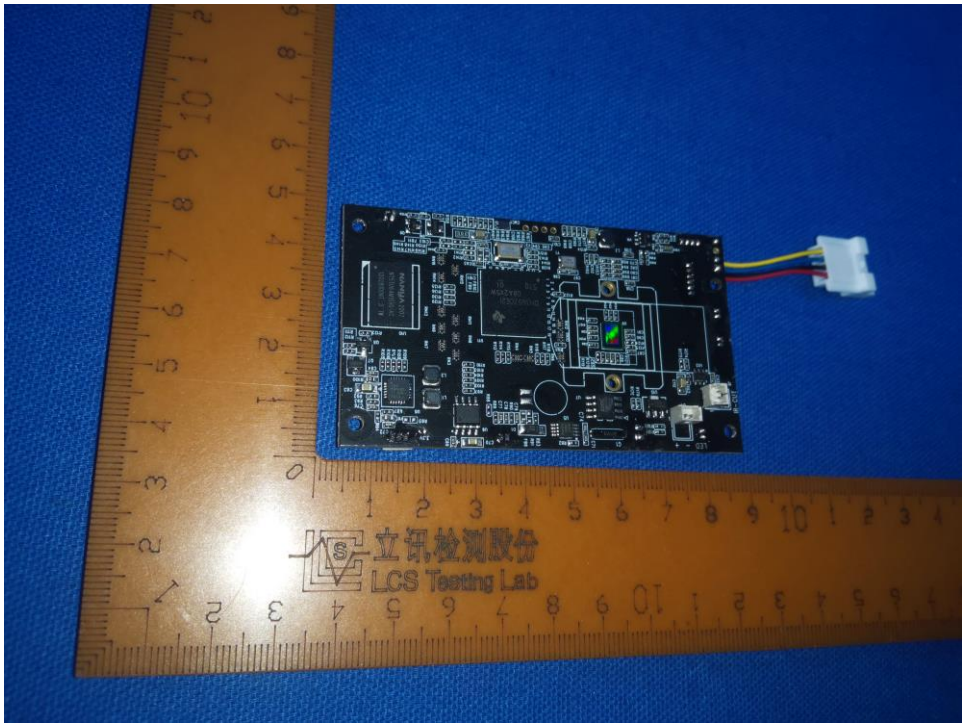


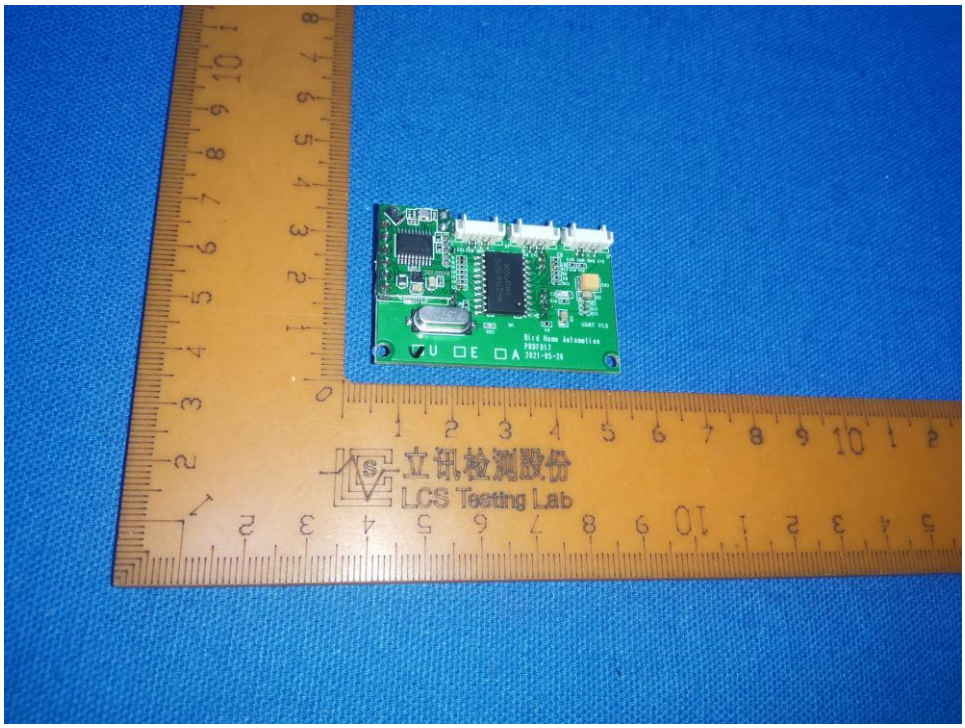


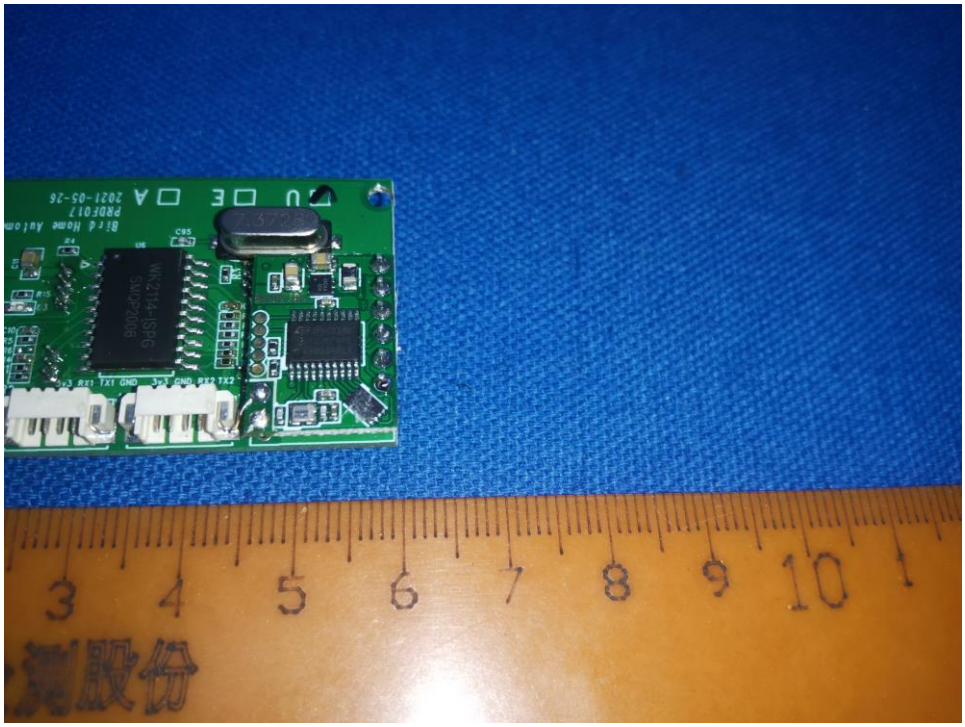


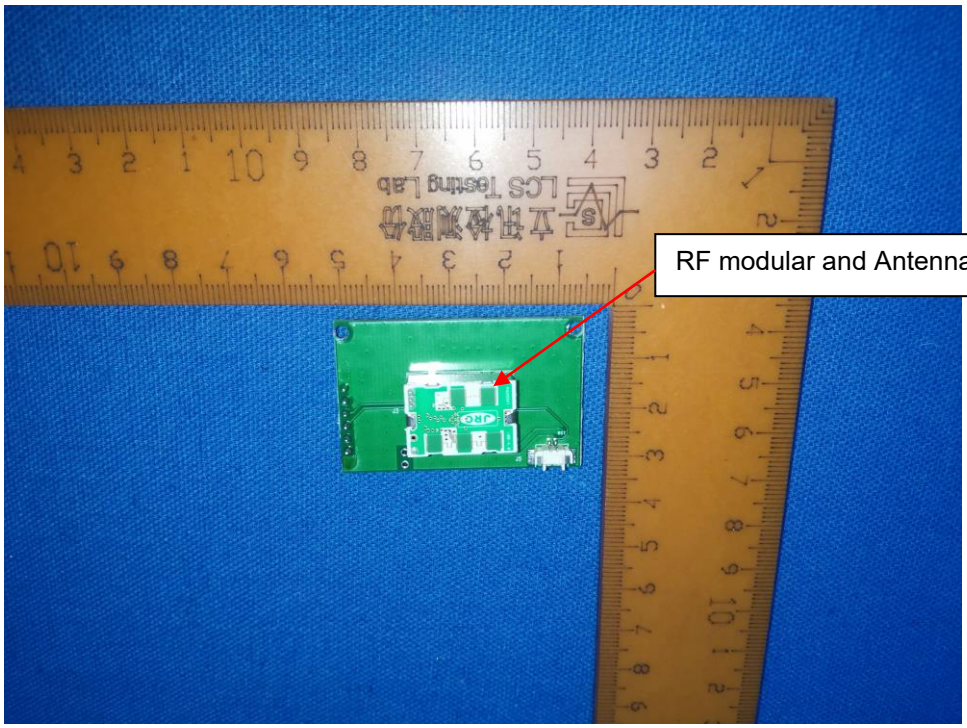


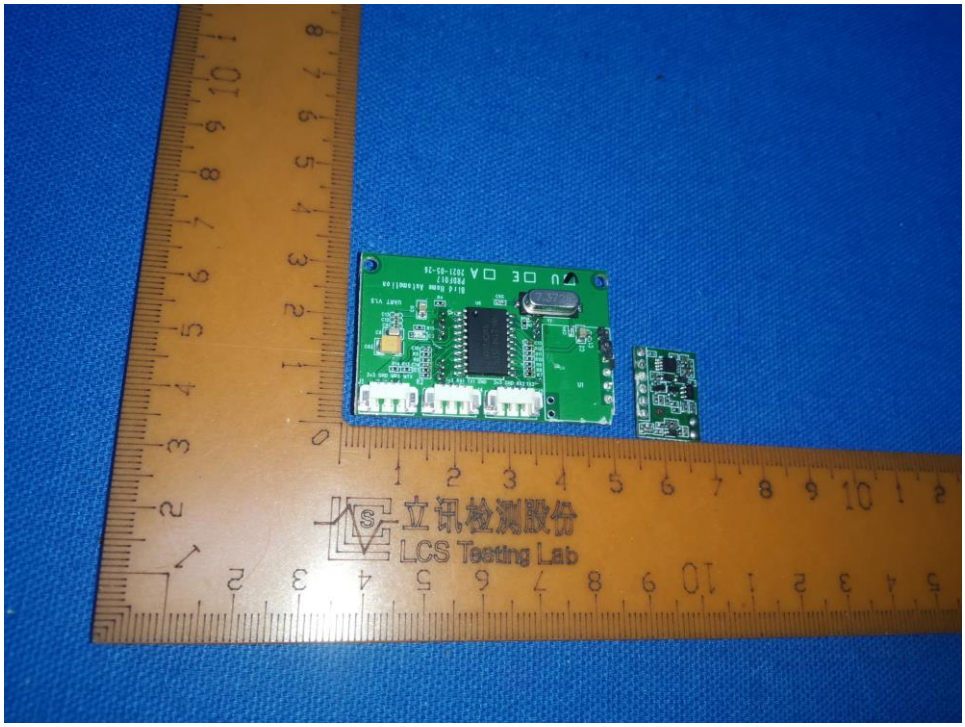

立讯检测股份
LCS Testing Lab

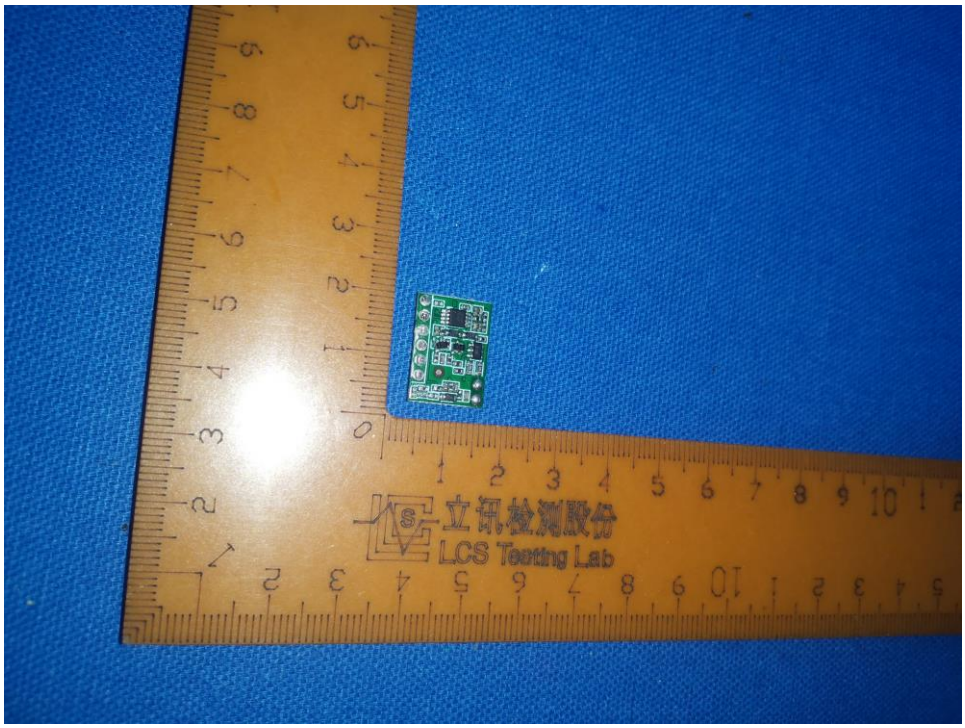

立讯检测股份
LCS Testing Lab

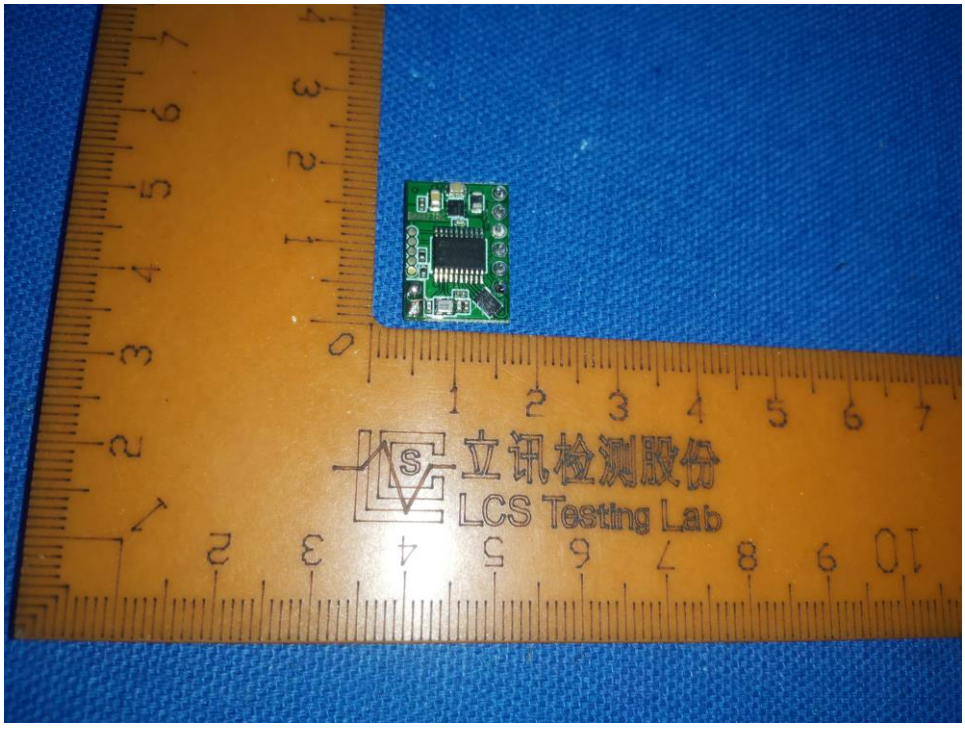

立讯检测股份
LCS Testing Lab

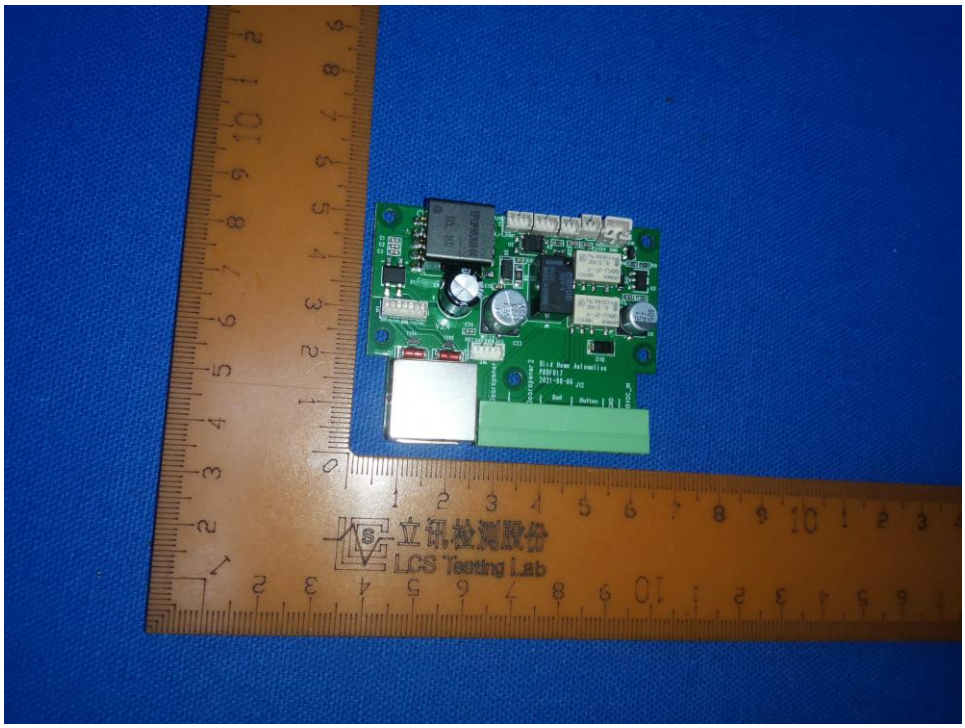


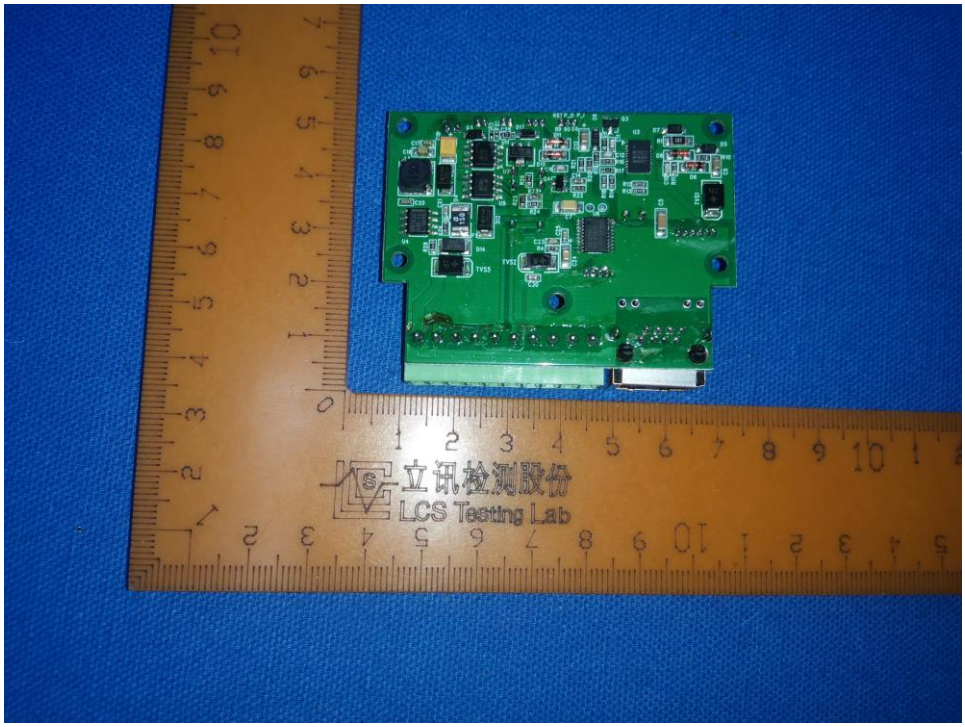

RF modular and Antenna

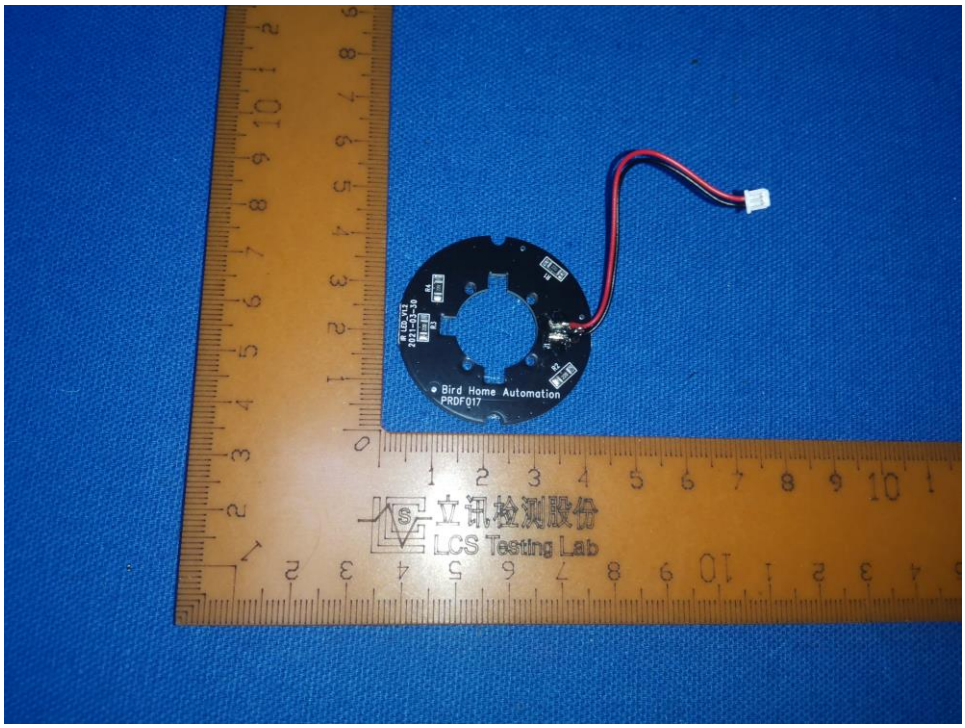

立讯检测股份
LCS Testing Lab

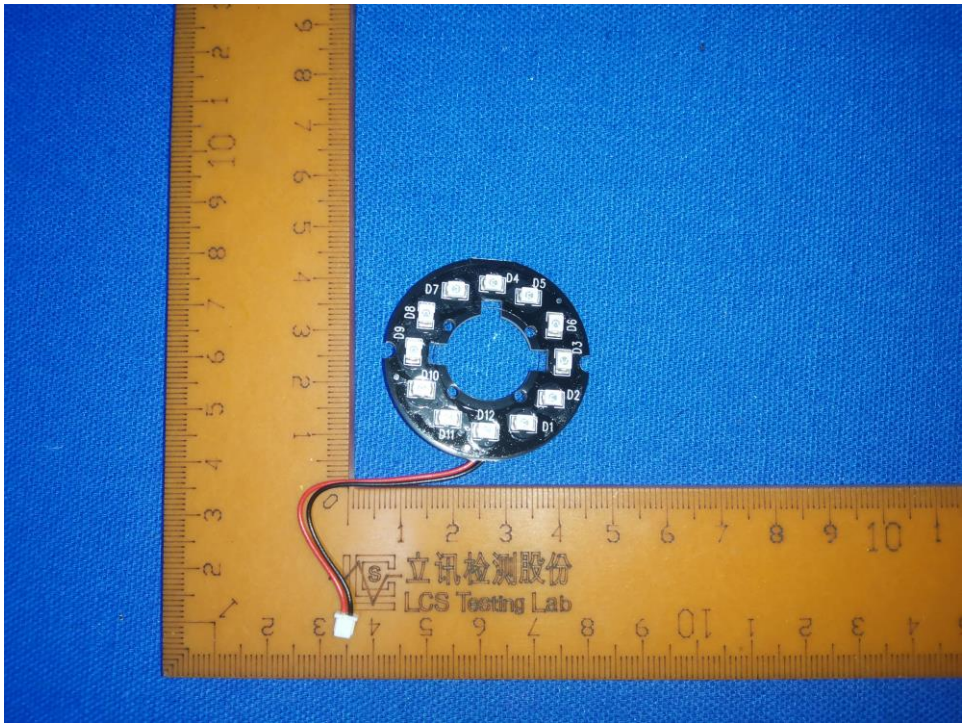

立讯检测股份
LCS Testing Lab

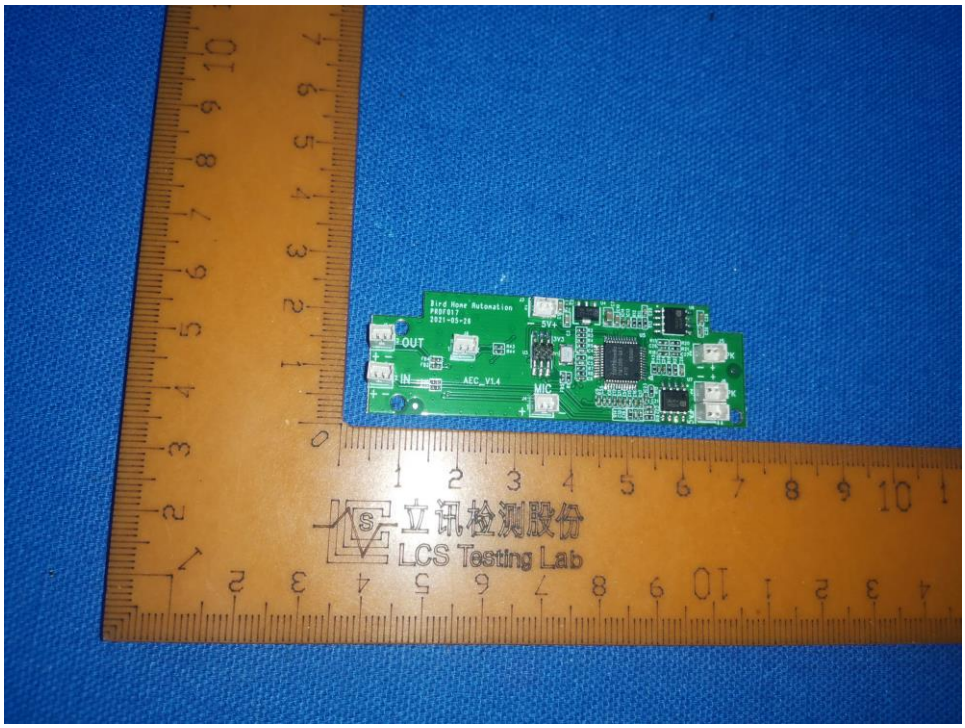

立讯检测股份
LCS Testing Lab

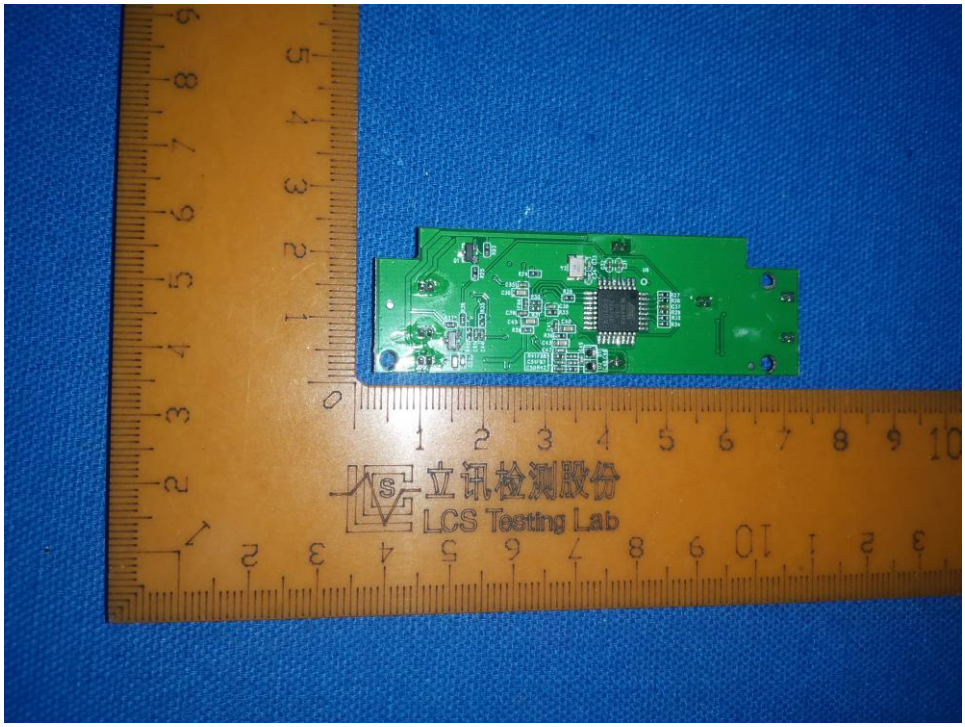

立讯检测股份
LCS Testing Lab


立讯检测股份
LCS Testing Lab


Bird Home Automation
PRDF017
立讯检测股份
LCS Testing Lab


D7
D4
D5
D8
D6
D9
D3
D10
D2
D12
D1
D11
立讯检测股份
LCS Testing Lab


OUT
IN
AEC_V1.4
MIC
立讯检测股份
LCS Testing Lab


立讯检测股份
LCS Testing Lab

Revision History

Revision	Issue Date	Revisions	Revised By
1.0	2022-07-12	Original Issue	Wenliang Li

********** End of Report **********

DECLARATION

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.
If you have any questions on this report, please contact us within 15 days after issue this report.

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