EMC Test Report

For

Beijing InHand Networks Technology Co., Ltd.

Test Standards:	FCC 47 CFR Part 15 Subpart B
Product Description:	Industrial Ethernet Switch
Tested Model:	ISM5012D
Additional Model:	ISM2008D,ISM2012D,ISE2016D,ISM3010D,ISM3012D,ISM3312D,ISM3016D,ISE5009D,ISE5010D,ISE5310D,ISM5010D,ISM5310D,ISE5012D,ISE5312D,ISM5020D,ISM5312D,ISE5016D,ISM5016D ,ISM6012D,ISM7010D,ISM7012D,ISM7016D
Classification:	Supplier's Declaration of Conformity
Report No.:	EC2203002E02
Tested Date:	2022-03-02 to 2022-04-12
Issued Date:	2022-04-26
Prepared By:	Jerry Liu / Engineer
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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	2022.04.26	Valid	Original Report

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Summary of Test Result

FCC Rule	Description	Limit	Result
15.107	AC Conducted Emission	< 15.107 limits	N/A
15.109	Radiated Emission	< 15.109 limits	Pass

1 Test Laboratory

1.1 Test facility

CNAS (accreditation number: L11138)

Hunan Ecloud Testing Technology Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (Designation number: CN1244 , Test Firm Registration Number: 793308)

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

ISED(CAB identifier: CN0012, ISED#:24347)

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the Wireless Device Testing Laboratories list of innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements.

A2LA (Certificate Code : 4895.01)

Hunan Ecloud Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

2 General Description

2.1 Applicant

Beijing InHand Networks Technology Co., Ltd.
Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing

2.2 Manufacturer

Beijing InHand Networks Technology Co., Ltd.
Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing

2.3 General Description Of EUT

Product	Industrial Ethernet Switch
Model NO.	ISM5012D
Additional NO.	ISM2008D,ISM2012D,ISE2016D,ISM3010D,ISM3012D,ISM3312D,ISM3016D,ISE5009D,ISE5010D,ISE5310D,ISM5010D,ISM5310D,ISE5012D,ISE5312D,ISM5020D,ISM5312D,ISE5016D,ISM5016D ,ISM6012D,ISM7010D,ISM7012D,ISM7016D
Difference Description	For more details, see Appendix C. According to the Declaration letter, we choose model ISM5012D to perform all the tests.
Nominal Voltage	DC 18-60V
Test Voltage	DC:24V
Highest Frequency	125MHz
Equipment Category	Class A

NOTE: For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2.4 Modification of EUT

No modifications are made to the EUT during all test items.

2.5 Support equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Serial Number
1.	Notebook Computer	Lenovo	Xiaoxin chao5000	SDOC	PF0QPQMH
2.	Notebook Computer	Lenovo	ThinkPad E580	SDOC	PF-12XLH6
3.	Fiber Module	/	SFP Transceiver	/	FIB200623082
4.	Fiber Module	/	SFP Transceiver	/	FIB200623129
5.	Fiber Module	/	SFP Transceiver	/	FIB200623104
6.	Fiber Module	/	SFP Transceiver	/	FIB200623131

2.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR Part 15 Subpart B
- ANSI C63.4-2014

3 Test Configuration of Equipment Under Test

3.1 Descriptions of Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.Frequency range investigated: conduction (150 kHz to 30 MHz).

Radiated:

(a) For unintentional radiators:

Including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

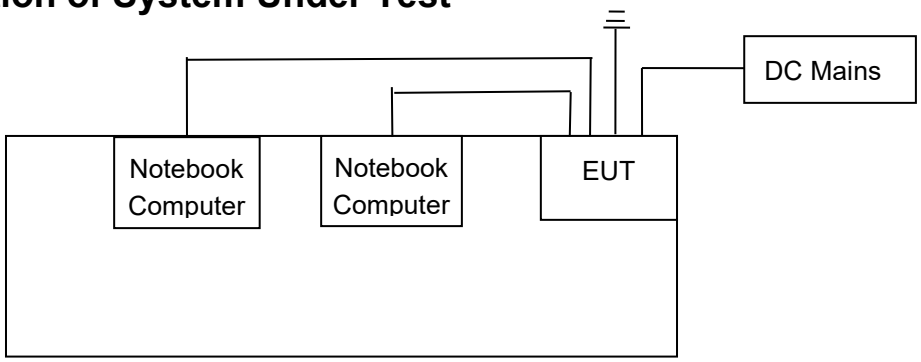
Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705-108	1000.
108-500	2000.
500-1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

Details of Test line Items
Radiated Emissions
Mode 1 ： Working<Fig.1>

mode of all test items

Test items	mode
Radiated Emission	Mode 1

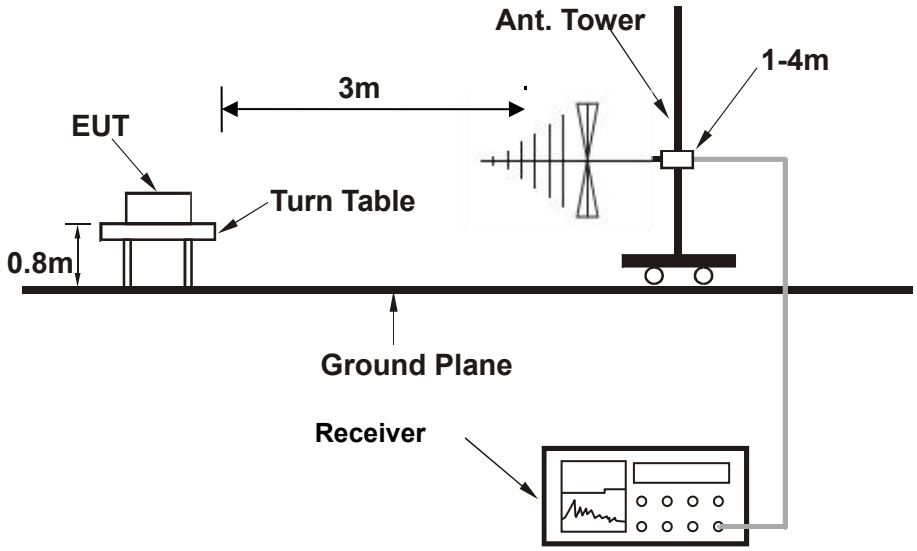
3.2 Connection of System Under Test



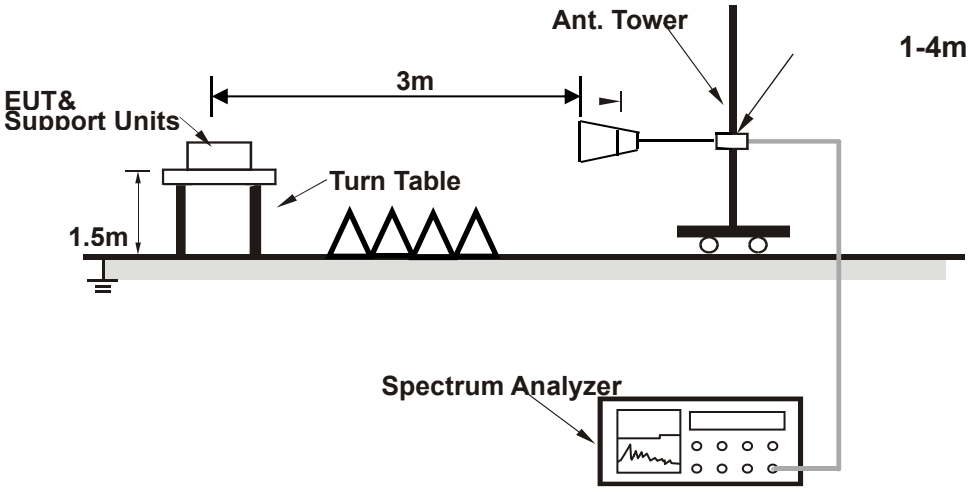
<Fig.1>

3.3 Test Setup

Setup diagram for Radiation(Below 1G) Test



Setup diagram for Radiation (Above1G) Test



4 Test Result

4.1 Radiated Emission Measurement

4.1.1 Limit of Radiated Emission

The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

Frequency range (MHz)	Distance (Meters)	Field Strength (microvolts/meter)
30 ~ 88	10	90
88~216	10	150
216-960	10	210
Above 960	10	300

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and periphery of the EUT.

(3) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function, unless otherwise specified.

(4) Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

4.1.2 Test Procedures

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual.

2. Support equipment, if needed, was placed as per FCC 15B.All I/O cables were positioned to simulate typical actual usage as per FCC 15B.

3. The EUT was placed on a turntable with 0.8 meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.

6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).

7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values

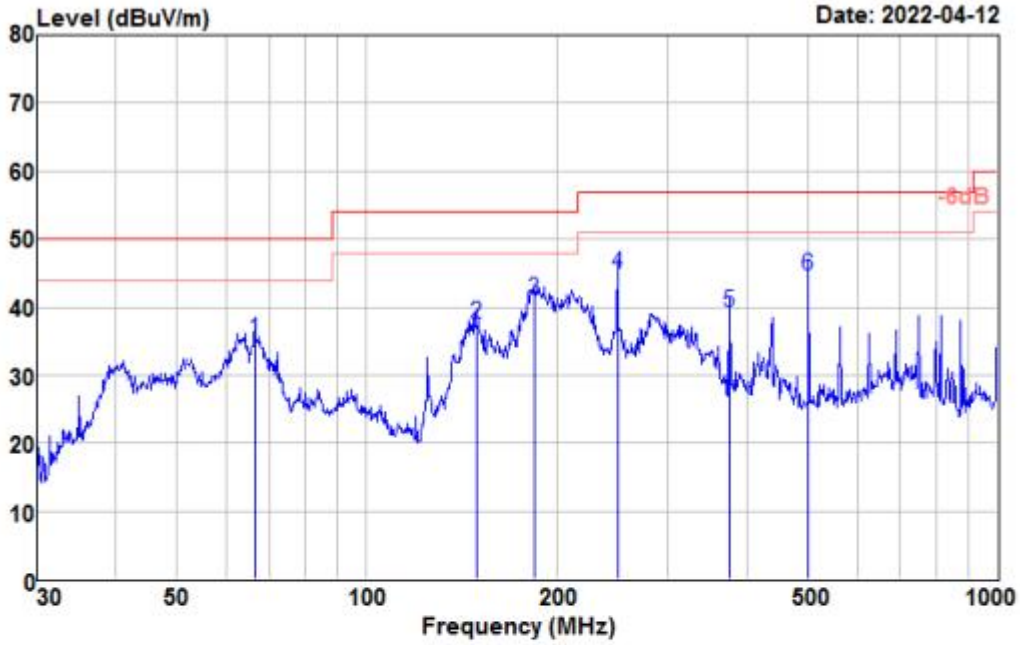
of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.

4.1.3 Test Result of Radiated Emission

Test Mode :	Mode1	**Temperature :**	22°C
Test Engineer :	Jerry Liu	**Relative Humidity :**	55%
Test Distance :	3m	**Polarization :**	Horizontal
Test Voltage :	DC24V	**Model :**	ISM5012D

■ Emission level (dBμV/m) = 20 log Emission level (μV/m)

■ Corrected Reading: Antenna Factor + Cable Loss + Reading Level - Preamp Factor = Level

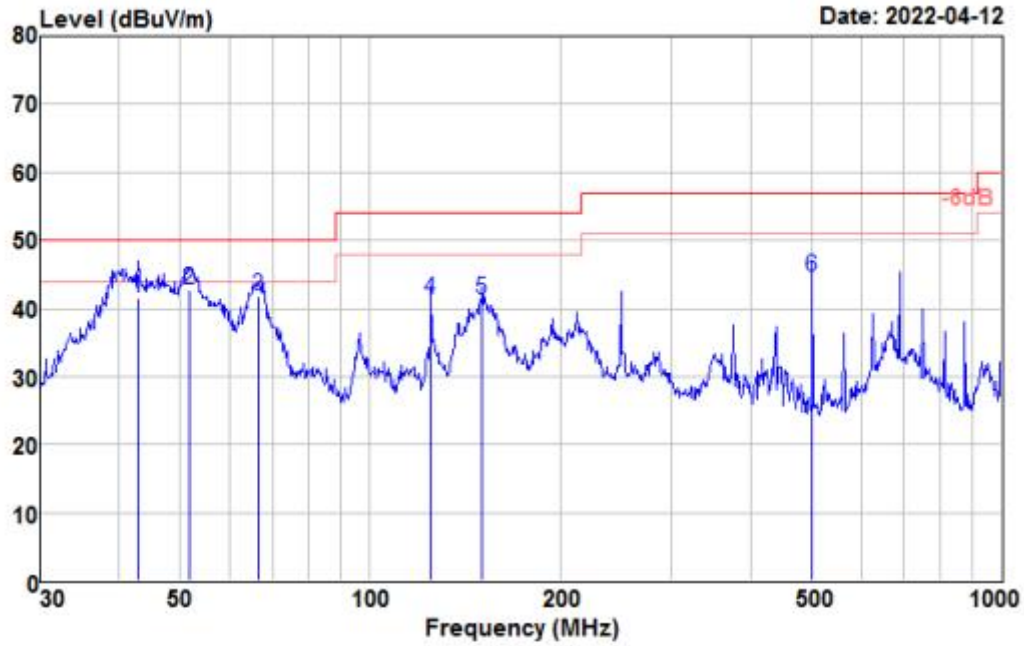


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
66.499	53.01	13.22	1.51	32.65	35.09	50.00	-14.91	QP
149.486	53.47	14.41	2.35	32.66	37.57	54.00	-16.43	QP
185.138	59.32	11.78	2.61	32.67	41.04	54.00	-12.96	QP
250.301	62.80	11.69	3.06	32.65	44.90	57.00	-12.10	QP
375.939	53.44	14.71	3.77	32.72	39.20	57.00	-17.80	QP
501.179	56.04	16.96	4.49	32.84	44.65	57.00	-12.35	QP

Test Mode :	Mode1	Temperature :	22°C
Test Engineer :	Jerry Liu	Relative Humidity :	51%
Test Distance :	3m	Polarization :	Vertical
Test Voltage :	DC24V	Model :	ISM5012D

■ Emission level (dBμV/m) = 20 log Emission level (μV/m)

■ Corrected Reading: Antenna Factor + Cable Loss + Reading Level - Preamp Factor = Level

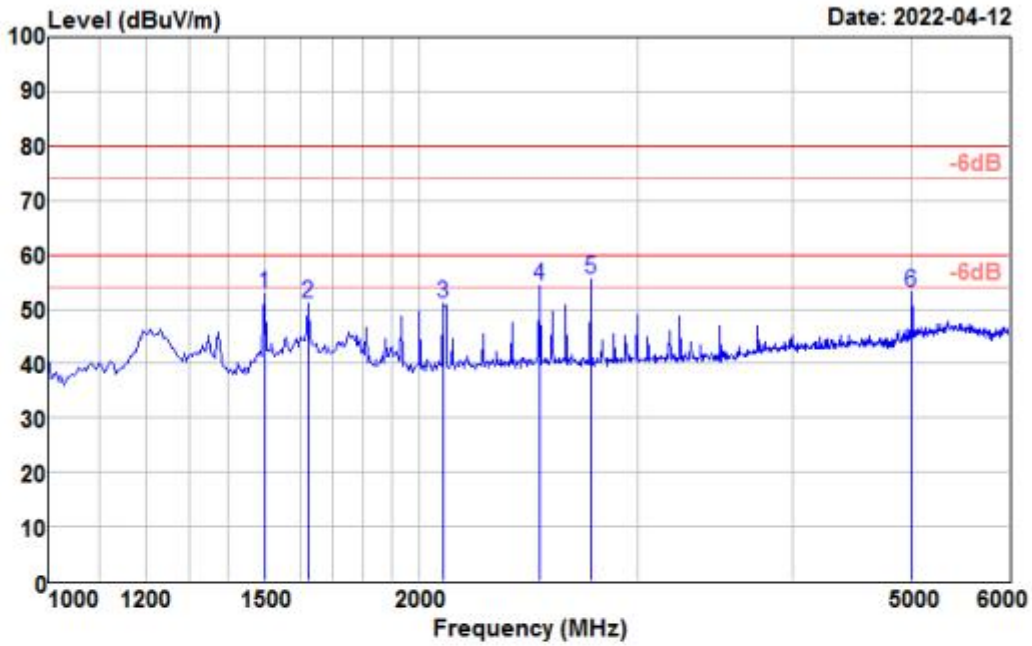


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
42.900	58.10	14.96	1.24	32.65	41.65	50.00	-8.35	QP
51.843	58.69	15.38	1.36	32.65	42.78	50.00	-7.22	QP
66.733	59.89	13.14	1.51	32.65	41.89	50.00	-8.11	QP
125.007	59.74	12.09	2.11	32.66	41.28	54.00	-12.72	QP
150.538	57.16	14.42	2.36	32.67	41.27	54.00	-12.73	QP
501.179	56.06	16.96	4.49	32.84	44.67	57.00	-12.33	QP

Test Mode :	Mode1	Temperature :	22°C
Test Engineer :	Jerry Liu	Relative Humidity :	55%
Test Distance :	3m	Polarization :	Horizontal
Test Voltage :	DC24V	Model :	ISM5012D

■ Emission level (dBμV/m) = 20 log Emission level (μV/m)

■ Corrected Reading: Antenna Factor + Cable Loss + Reading Level - Preamp Factor = Level

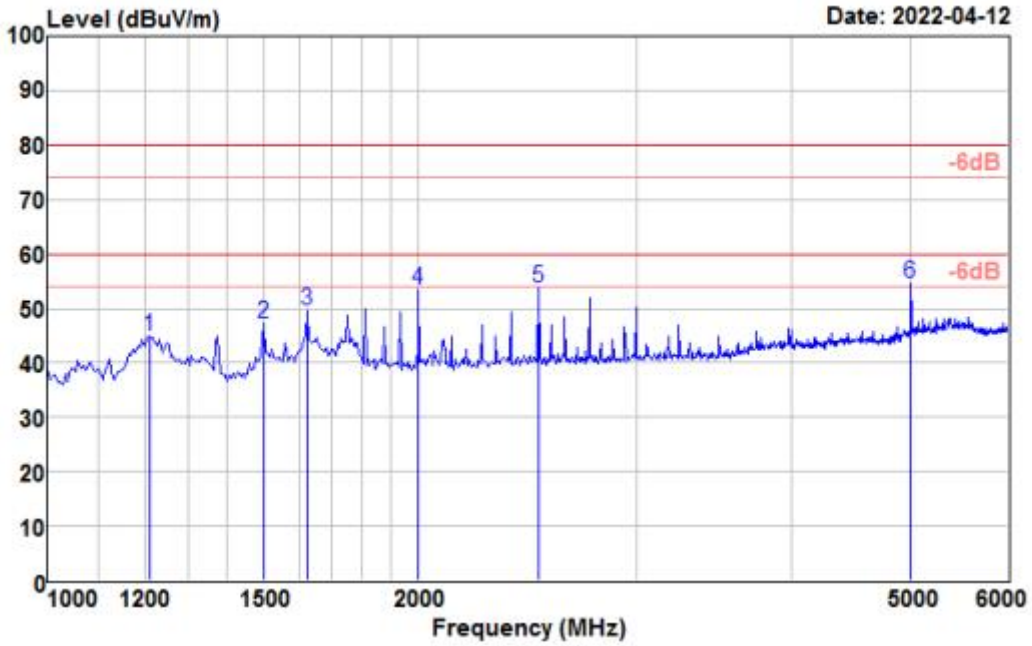


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
1500.000	85.03	24.90	3.14	60.35	52.72	80.00	-27.28	Peak
1625.000	82.68	25.35	3.30	60.26	51.07	80.00	-28.93	Peak
2090.000	80.21	26.90	3.74	59.92	50.93	80.00	-29.07	Peak
2500.000	81.76	27.80	4.19	59.55	54.20	80.00	-25.80	Peak
2750.000	82.54	28.00	4.35	59.32	55.57	80.00	-24.43	Peak
5000.000	73.02	31.20	7.92	59.00	53.14	80.00	-26.86	Peak

Test Mode :	Mode1	Temperature :	22°C
Test Engineer :	Jerry Liu	Relative Humidity :	55%
Test Distance :	3m	Polarization :	Vertical
Test Voltage :	DC24V	Model :	ISM5012D

■ Emission level (dBμV/m) = 20 log Emission level (μV/m)

■ Corrected Reading: Antenna Factor + Cable Loss + Reading Level - Preamp Factor = Level



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
1210.000	78.34	24.32	2.88	60.55	44.99	80.00	-35.01	Peak
1500.000	79.53	24.90	3.14	60.35	47.22	80.00	-32.78	Peak
1625.000	81.28	25.35	3.30	60.26	49.67	80.00	-30.33	Peak
2000.000	83.21	26.70	3.56	60.00	53.47	80.00	-26.53	Peak
2500.000	81.32	27.80	4.19	59.55	53.76	80.00	-26.24	Peak
5000.000	74.57	31.20	7.92	59.00	54.69	80.00	-25.31	Peak

5 List of Measuring Equipment

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
EMI Test Receiver	R&S	ESR-3	102144	2021-12-30	2022-12-29
Amplifier	Sonoma	310	363917	2021-12-29	2022-12-28
Broadband Antenna	Schwarzbeck	VULB 9168	9168-757	2020-09-27	2023-09-26
Spectrum Analyzer	R&S	FSV 30	103728	2021-12-30	2022-12-29
Amplifier	HuaYi	ITI-010180G50B	20042201	2021-12-30	2022-12-29
Horn Antenna	Schwarz beck	BBHA 9120 D	1677	2020-02-14	2023-02-13
EMI Test Software	Audix	E3	N/A	N/A	N/A

N/A: Not applicable.

6 Uncertainty of Evaluation

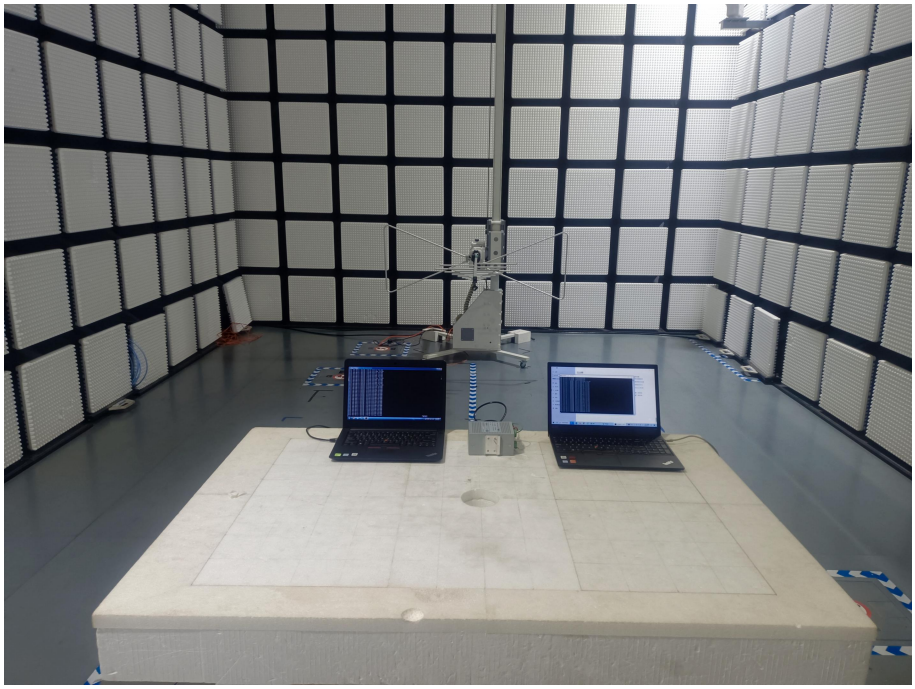
Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.42dB
Radiated emission	30MHz ~1GHz	5.28dB
Radiated emission	1GHz ~ 6GHz	4.89dB

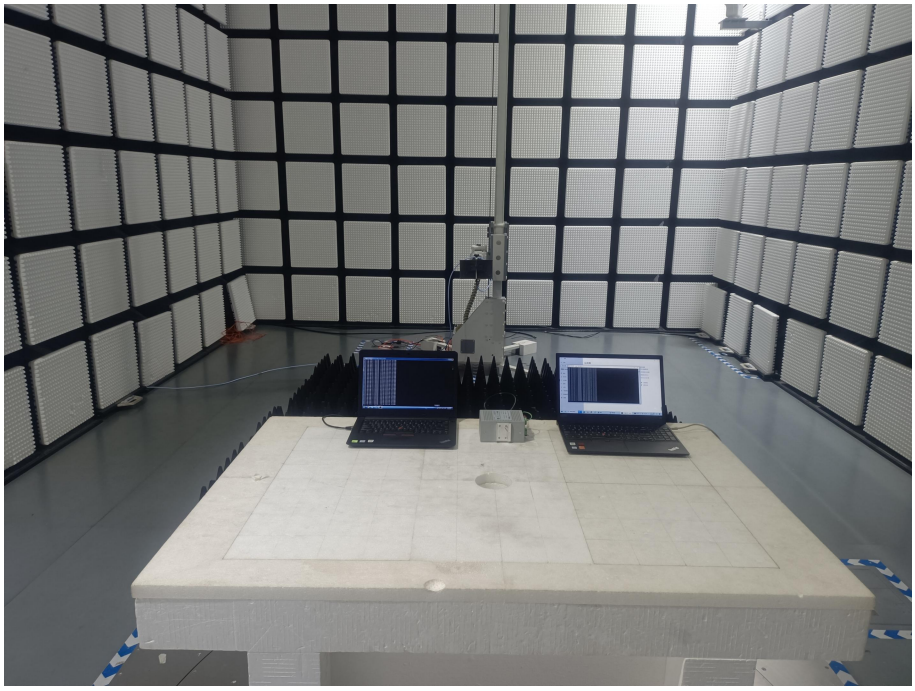
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Appendix A - Setup Photographs

Radiated Emission Test Setup(Below 1GHz)

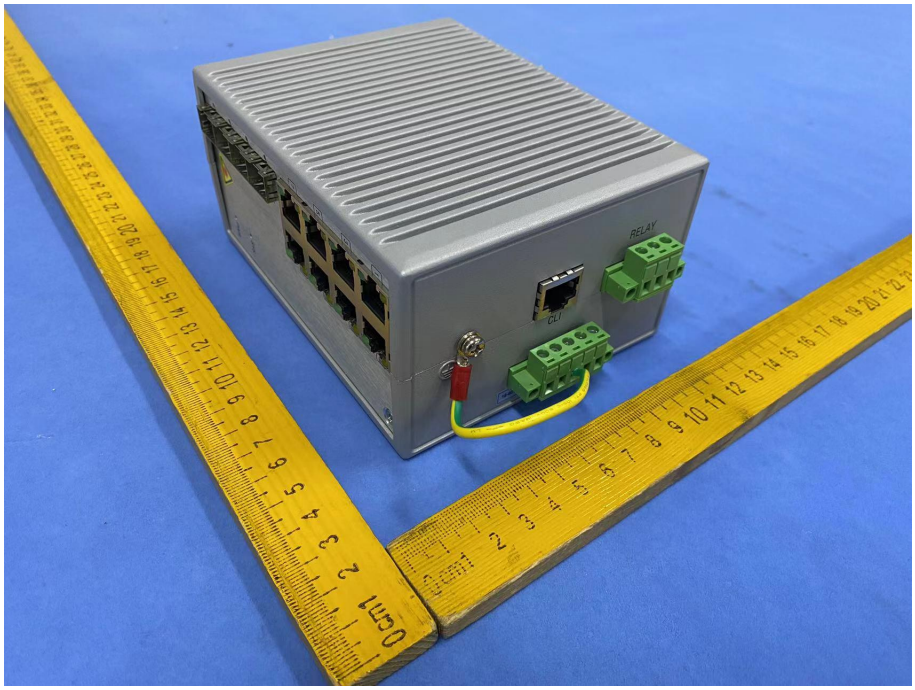


Radiated Emission Test Setup(Above 1GHz)

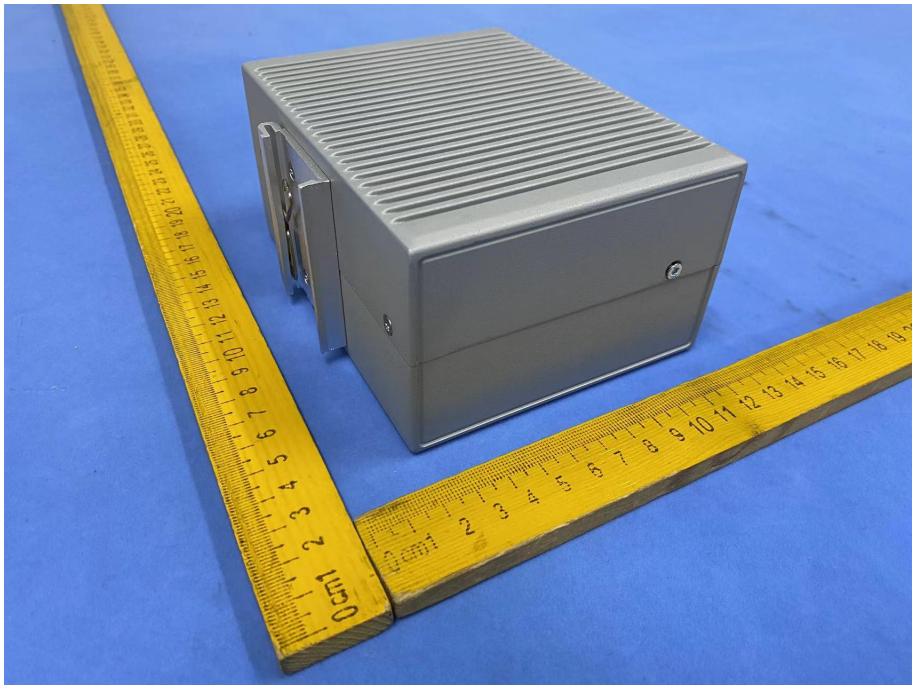


Appendix B - PHOTOGRAPHS OF EUT

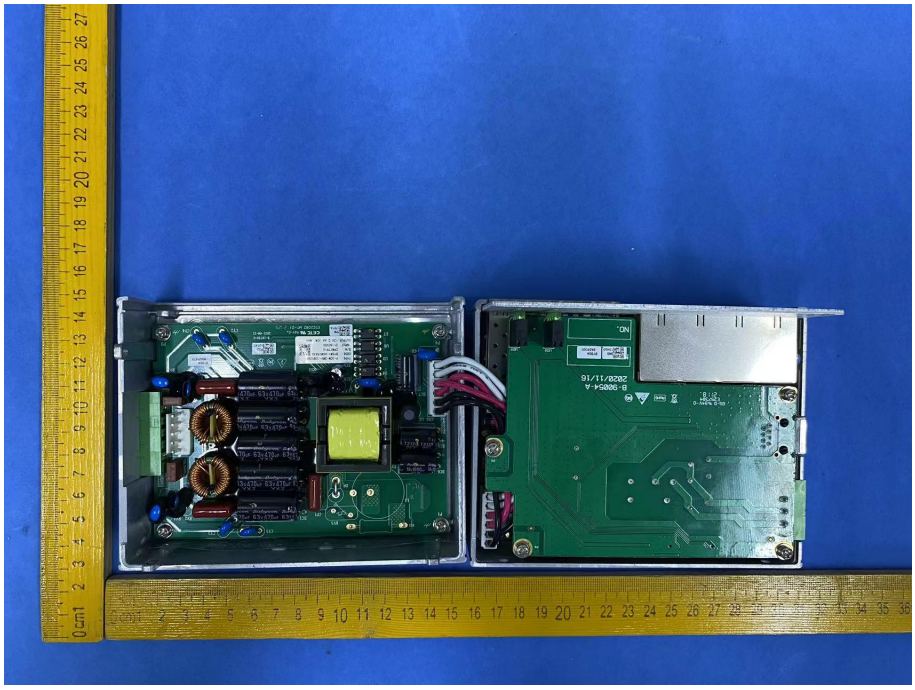
EUT All View



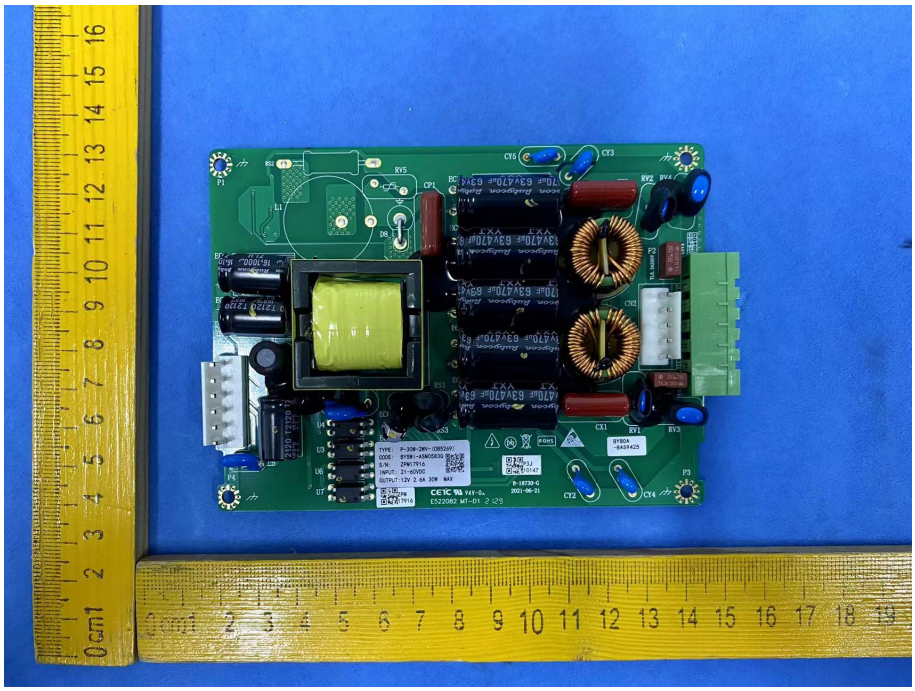
EUT Top View



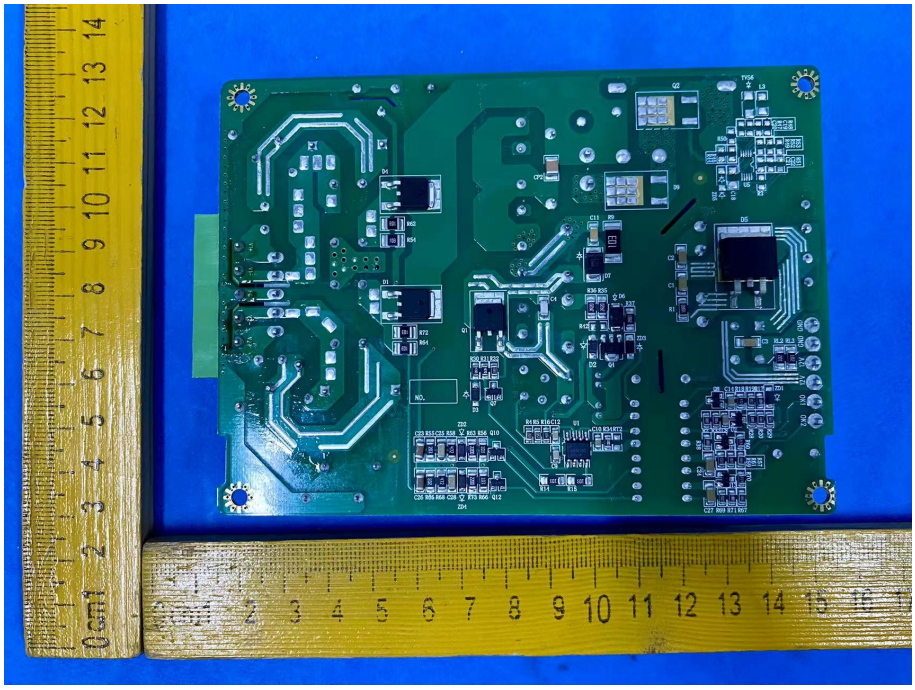
EUT Uncover View



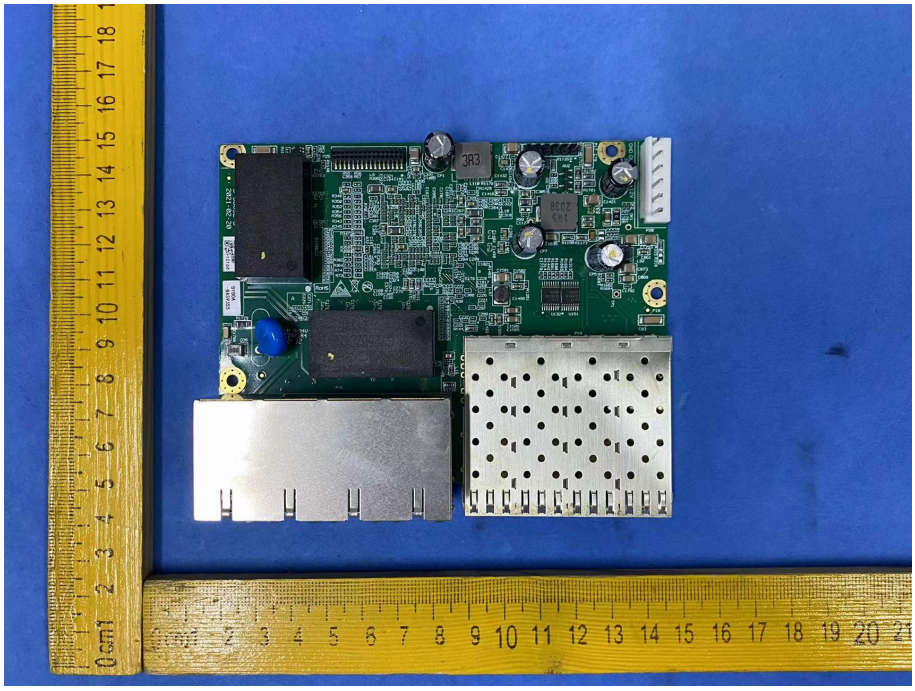
Main Board Top View



Main Board Bottom View

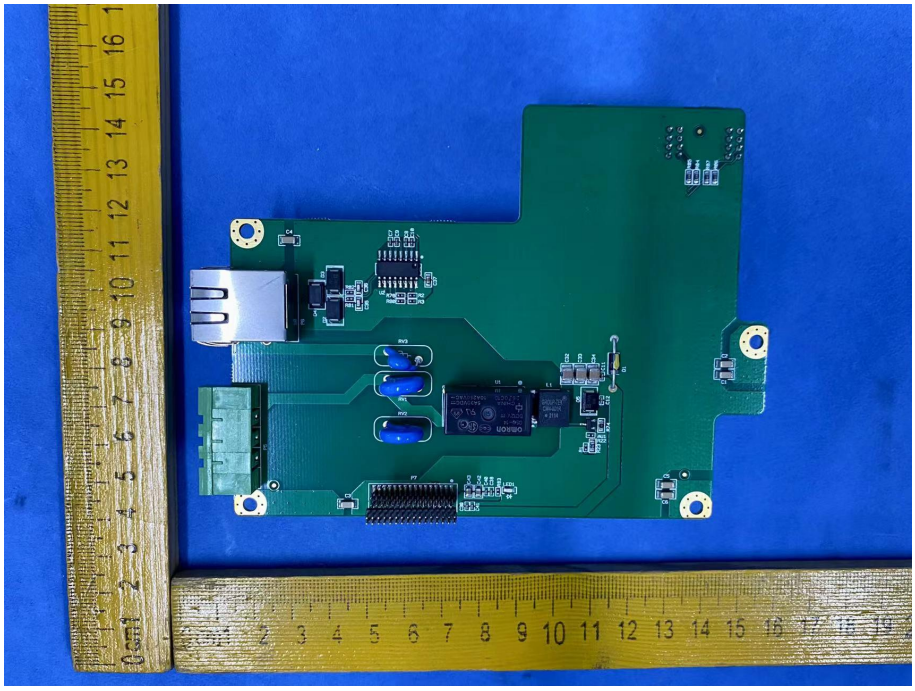


Main Board Top View

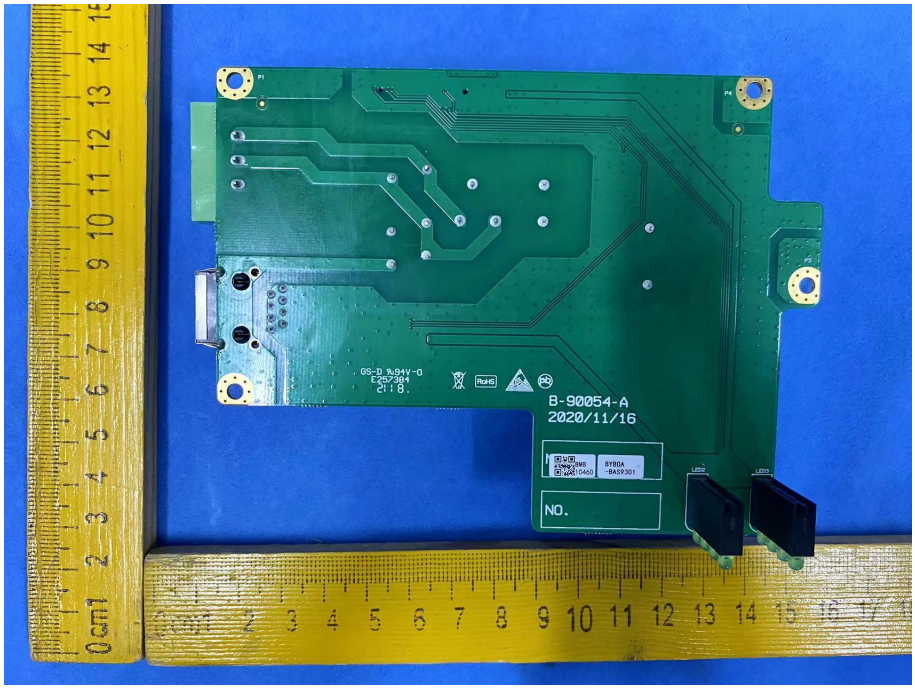


Main Board Bottom Vie

Main Board Top View



Main Board Bottom View



Appendix C - DECLARATION OF SIMILARITY

Declaration letter

Beijing InHand Networks Technology Co., Ltd.

Dear Sir,

For our business issue and marketing requirement, we would like to list different models numbers on the CE/FCC certificates and reports, as following:

Test Model No.: ISM5012D

Series Models NO:

ISM2008D,ISM2012D,ISE2016D,ISM3010D,ISM3012D,ISM3312D,ISM3016D

ISE5009D,ISE5010D,ISE5310D,ISM5010D,ISM5310D,ISE5012D,ISE5312D,

ISM5312D,ISE5016D,ISM5016D,ISM5020D,ISM6012D,ISM7010D,ISM7012D

ISM7016D

The twenty-three models are the same in these: Hardware design. The final number of each product model represents the number of network ports in the product. The appearance of the product varies with the number of network ports. ISM5012D has 12 ports, and this model has the largest output power. The product models with same final number are original product applied in different markets and industries.

Thank you!

Signature: Jichi Gu

Printed name/title:Jichi Gu/ EMC engineer

Address: Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing

----------End of the report----------