

EMC

TEST REPORT

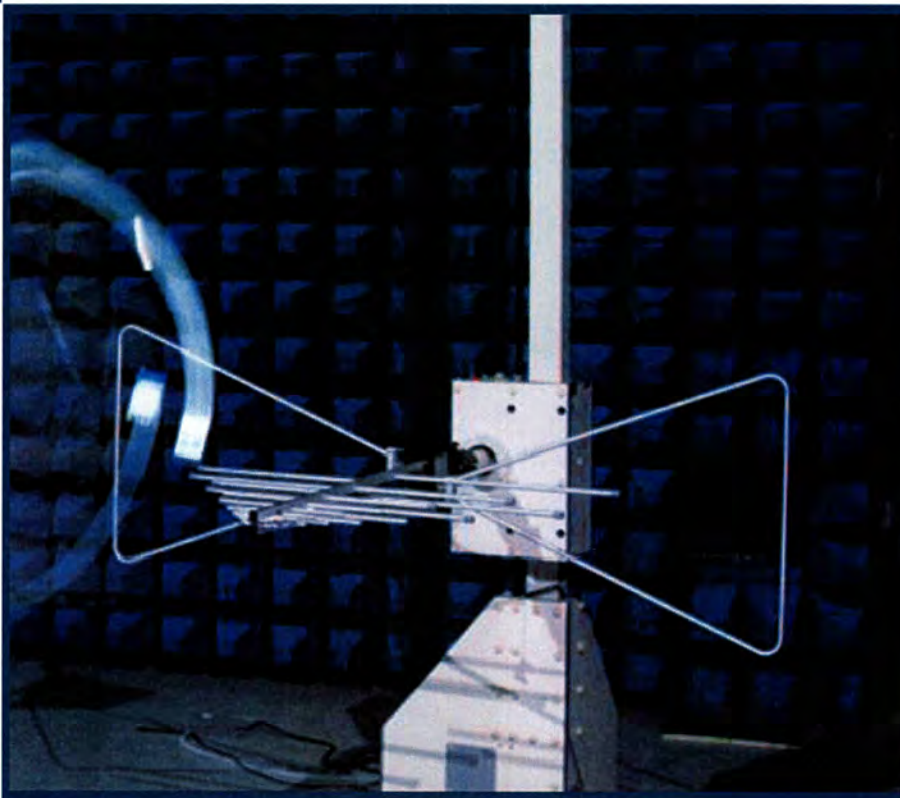
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
Computer

ISSUED TO
Advantech Co., Ltd.

NO.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114,
Taiwan



Tested by: Xia Long
Xia Long

Date: Nov. 24, 2021

Approved by: [Signature]
Liao Jianming
(Technical Director)

Date: Nov. 24, 2021

Report No.: BL-EC2190969-401
EUT Name: Computer
Model Name: DLT-V7215P+(refer section 2.4)
Brand Name: ADVANTECH DLOG
Test Standard: 47 CFR Part 15 Subpart B

Test Conclusion: Pass
Test Date: Oct. 11, 2021 ~ Oct. 22, 2021
Date of Issue: Nov. 24, 2021

NOTE: This test report of test results only related to testing samples, which can be duplicated completely for the legal use with the approval of the applicant; it shall not be reproduced except in full, without the written approval of Shenzhen BALUN Technology Co., Ltd. Any objections should be raised within thirty days from the date of issue. To validate the report, please contact us.

Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Nov. 24, 2021</u>	<u>Initial Issue</u>

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co.,Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co.,Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Laboratory Condition

Ambient Temperature	23°C to 25°C
Ambient Relative Humidity	50% to 55%
Ambient Pressure	100 kPa to 102 kPa

1.4 Announce

- (1) The test report refer to the BALUN report mode v7.1.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
- (7) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Advantech Co., Ltd.
Address	NO.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114, Taiwan

2.2 Manufacturer Information

Manufacturer	Advantech Co., Ltd.
Address	NO.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114, Taiwan

2.3 Factory Information

Factory	Advantech Co.,Ltd.
Address	No. 27-3, Wende Rd., Guishan Dist., Taoyuan City 333, Taiwan

2.4 General Description for Equipment under Test (EUT)

EUT Name	Computer
Model Name Under Test	DLT-V7215P+
Series Model Name	DLT-V7210XXXXXXXXXX, DLT-V7212XXXXXXXXXX, DLT-V7215XXXXXXXXXX (X can be 0-9, A-Z, a-z, any symbol, blank or nothing)
Description of Model name differentiation	The difference between the three series models is a different screen size, All models have two internal antennas and one external antenna.
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Key Component List

Component	Brand	Model	Specification
BT&Wi-Fi moudle	SPARKLAN	WPEQ-261ACN(BT)	N/A
	Intel	9260NGW	N/A
Note: All the BT&Wi-Fi moudle are tested, only the worst data of WPEQ-261ACN(BT) in the report.			

2.6 Ancillary Equipment

Ancillary Equipment 1	Antenna 1	
Ancillary Equipment 2	Antenna 2	
Ancillary Equipment 5	DC Power Line	
	Length (Approx.)	2.9 m

2.7 Technical Information

Network and Wireless connectivity	2G Network GPRS/EDGE 900/1800 MHz
	3G Network WCDMA/HSDPA/HSUPA Band 1/2/5/8
	4G Network FDD LTE Band 1/2/3/4/5/7/8/12/20
	TDD LTE Band 38/40/41
	Bluetooth, 2.4G WIFI, 5G Wi-Fi, 5.8G SRD, GPS, GLONASS

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15 Subpart B	Unintentional Radiators
2	ANSI C63.4-2014	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

3.2 Verdict

No.	Description	FCC Rule	Test Verdict	Result
1	Radiated Emission	15.109	Pass	Annex A .1
2	Conducted Emission, AC Ports	15.107	Pass	Annex A .2

Note: The only difference between the EUT (test samples in this report) and testing sample of report BL-EC1980077-401, which was issued by Shenzhen BALUN Technology Co., Ltd. Oct. 29, 2019 as below:

1. Added a screen,so added test of Radiated Emission in the report, other test data please refer to report BL-EC1980077-401, which was issued by Shenzhen BALUN Technology Co., Ltd. Oct. 29, 2019.

3.3 Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Conducted emissions (9 kHz-30 MHz)	2.96 dB
Radiated emissions (30 MHz-1 GHz)	3.67 dB
Radiated emissions (1 GHz-18 GHz)	3.57 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

Environment Parameter	Selected Values During Tests			
	Temperature	Voltage	Relative Humidity	Ambient Pressure
Normal Temperature, Normal Voltage (NTNV)	23°C to 25°C	DC 24V	50% to 55%	100 kPa to 102 kPa

4.2 Test Equipment List

Radiated Emission Test For Frequency Below 1 GHz (10 m)						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2021.06.01	2022.05.31	☐
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9168	9168-0883	2020.05.11	2022.05.10	☐
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60*7.35m	N/A	2018.08.08	2021.08.07	☐
Test Software	BALUN	BL410_E	V19.918	--	--	☐

Radiated Emission Test For Frequency Below 1 GHz (3 m)						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2021.09.13	2022.09.12	☒
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-624	2019.07.02	2022.07.01	☒
Anechoic Chamber	YIHENG	9m*6m*6m	N/A	2018.07.18	2022.07.17	☒
Test Software	BALUN	BL410_E	V19.918	--	--	☒

Radiated Emission Test For Frequency 1 GHz-18 GHz						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2021.09.13	2022.09.12	☒
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1917	2019.07.02	2022.07.01	☒
Anechoic Chamber	YIHENG	9m*6m*6m	N/A	2018.07.18	2022.07.17	☒
Test Software	BALUN	BL410_E	V19.918	--	--	☒

Conducted disturbance Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9010B	MY57110309	2021.06.01	2022.05.31	☐
LISN	SCHWARZBECK	NSLK 8127	8127-687	2021.06.08	2022.06.07	☐
Shielded Enclosure	YiHeng Electronic Co., Ltd	3.4m*3.1m*2.8m	N/A	2018.08.16	2022.08.15	☐
Test Software	BALUN	BL410_E	V19.918	--	--	☐

4.3 Test Enclosure list

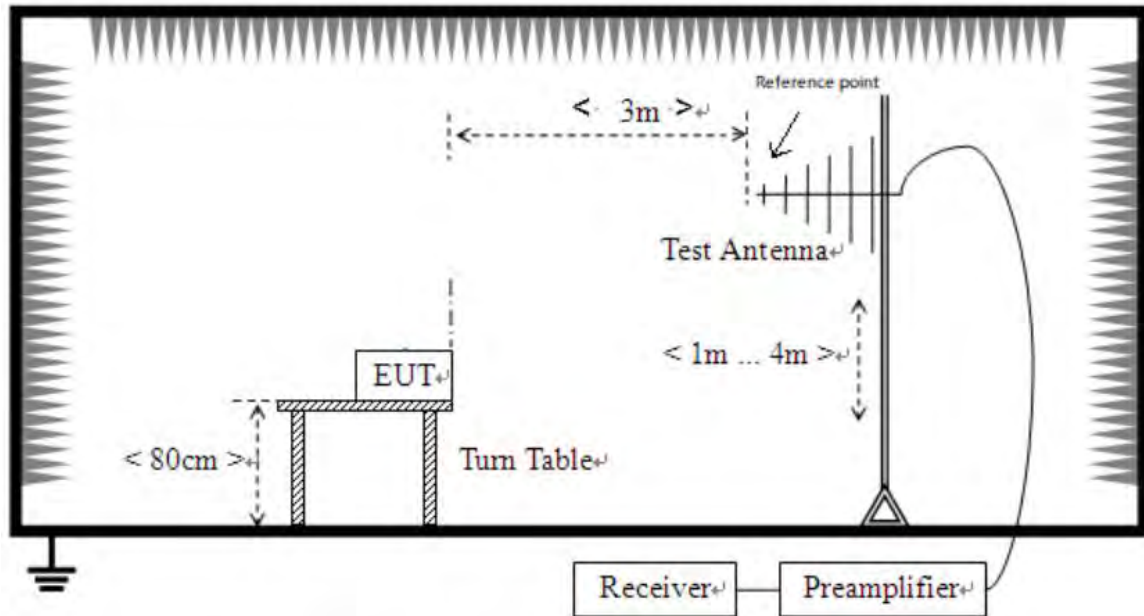
Description	Manufacturer	Model	Serial No.	Length	Description	Use
Laptop	ThinkPad	ThinkPad E485	N/A	N/A	N/A	☒
Keyboard	DELL	N/A	N/A	N/A	N/A	☒
Mouse	DELL	N/A	N/A	N/A	N/A	☒
Hard disk	Newsmy	N/A	N/A	N/A	N/A	☒
DC Power Supply	N/A	IT6722A	80225907374 7510110	N/A	N/A	☒
RJ45 Cable	N/A	N/A	N/A	1.5 m	N/A	☒

4.4 Test Configurations

Test Configurations (TC) No.	Description
TC01	<u>The Full System Test Mode</u> EUT + DC Power Line + DC Power Supply + Laptop + Antenna 1 + Antenna 2 + Keyboard + Mouse + Hard disk+ RJ45 Cable

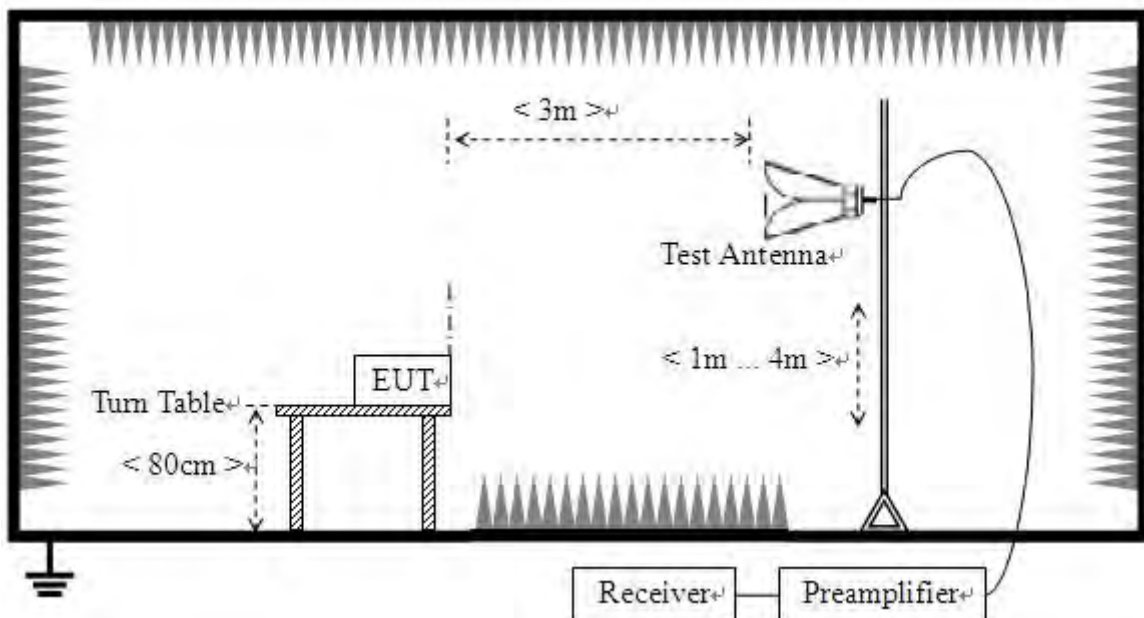
4.5 Test Setups

Test Setup 1



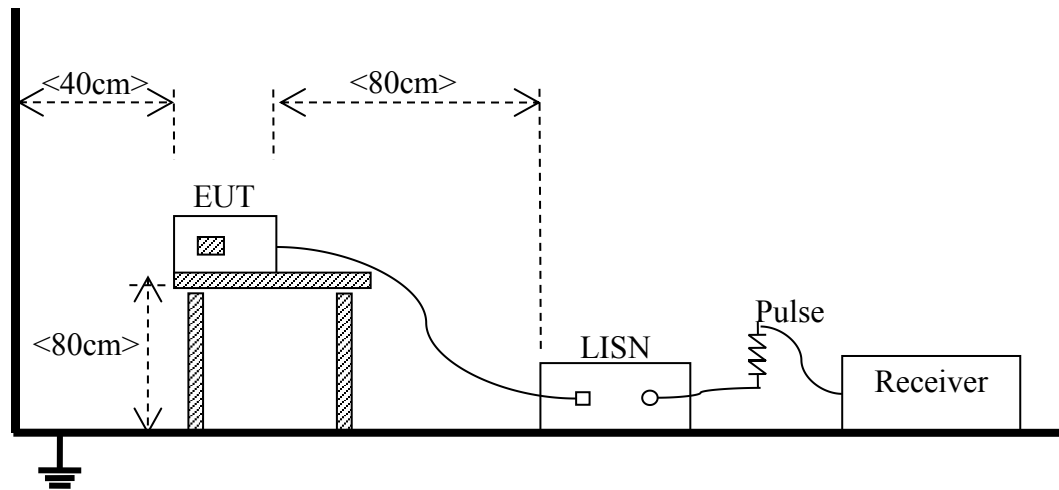
(For Radiated Emission Test (30 MHz-1 GHz))

Test Setup 2



(For Radiated Emission Test (above 1 GHz))

Test Setup 3



(For Conducted Emission, AC Ports Test)

4.6 Test Conditions

Test Case	Test Conditions	
Radiated Emission	Test Env.	NTNV
	Test Setup	Test Setup 1&2
	Test Configuration	TC01
Conducted Emission, AC Ports	Test Env.	NTNV
	Test Setup	Test Setup 3
	Test Configuration	TC01

5 TEST ITEMS

5.1 Emission Tests

5.1.1 Radiated Emission

5.1.1.1 Limit

Frequency range (MHz)	Class B (at 10 m)	Class B (at 3 m)		Class A (at 10 m)		Class A (at 3 m)
	Field Strength (dB μ V/m)	Field Strength (μ V/m)	Field Strength (dB μ V/m)	Field Strength (μ V/m)	Field Strength (dB μ V/m)	Field Strength (dB μ V/m)
30 - 88	30	100	40	90	39	49
88 - 216	33.5	150	43.5	150	43.5	53.5
216 - 960	36	200	46	210	46.4	56.4
Above 960	44	500	54	300	49.5	59.5

NOTE:

- 1) Field Strength (dB μ V/m) = 20*log [Field Strength (μ V/m)].
- 2) In the emission tables above, the tighter limit applies at the band edges.

5.1.1.2 Test Setup

Refer to 4.5 section (test setup 1 to test setup 2) for radiated emission test, the photo of test setup please refer to ANNEX B.

5.1.1.3 Test Procedure

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

An initial pre-scan was performed in the chamber using the EMI Receiver in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bi-Log antenna with 2 orthogonal polarities.

5.1.1.4 Test Result

Please refer to ANNEX A.1.

NOTE:

1. Results (dB μ V/m) = Reading (dB μ V) + Factor (dB/m)

The reading level is calculated by software which is not shown in the sheet

2. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain (dB)

3. Over limit = Results – Limit.

5.1.2 Conducted Emission

5.1.2.1 Test Limit

Frequency range (MHz)	Class A	
	Quasi-peak (dB μ V)	Average (dB μ V)
0.15 - 0.50	79	66
0.50 - 30	73	60

Frequency range (MHz)	Class B	
	Quasi-peak (dB μ V)	Average (dB μ V)
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:

- 1) The lower limit shall apply at the band edges.
- 2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

5.1.2.2 Test Setup

Refer to 4.5 section test (test setup 3) for conducted emission, the photo of test setup please refer to ANNEX B.

5.1.2.3 Test Procedure

The EUT is connected to the power mains through a LISN which provides 50 Ω /50 μ H of coupling impedance for the measuring instrument. The test frequency range is from 150 kHz to 30 MHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels that are more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

5.1.2.4 Test Result

Please refer to ANNEX A.2.

NOTE:

1. Results (dB μ V) = Reading (dB μ V) + Factor (dB)

The reading level is calculated by software which is not shown in the sheet

2. Factor = Insertion loss + Cable loss

3. Over limit = Results – Limit.

ANNEX A TEST RESULTS

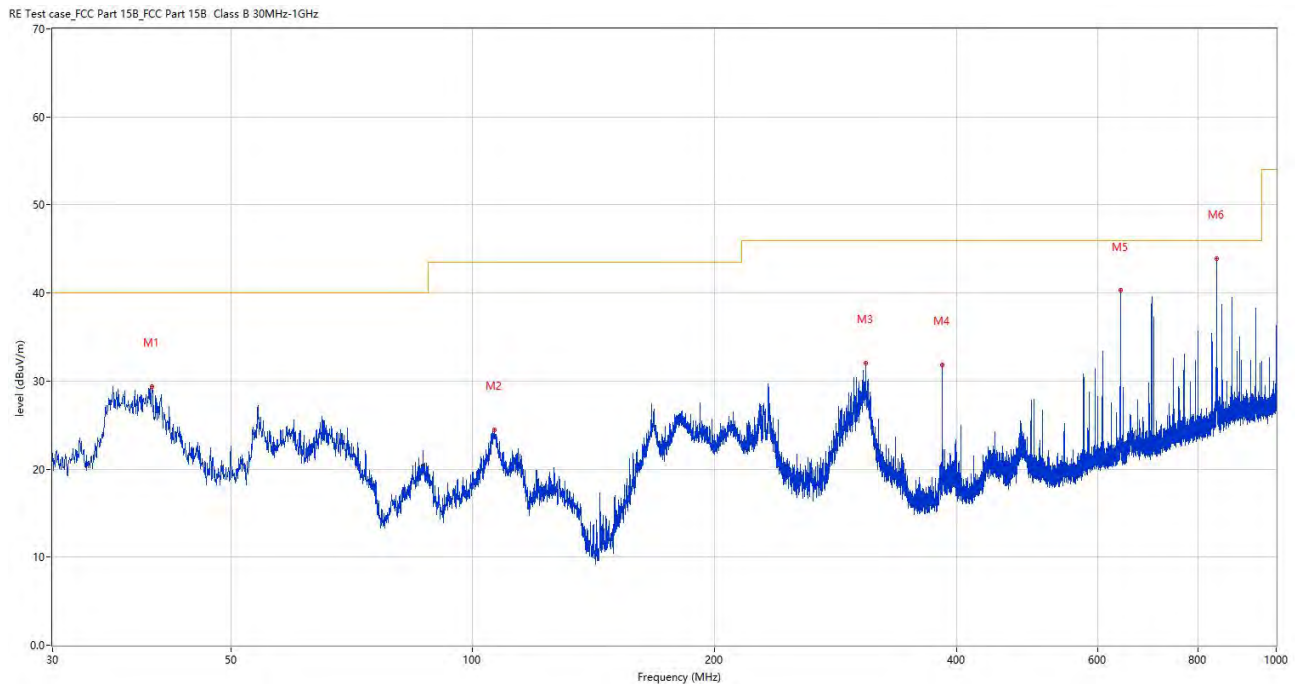
A.1 Radiated Emission

Note 1: The symbol of “--” in the table which means not application.

Note 2: For the test data above 1 GHz, according the ANSI C63.4-2014, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

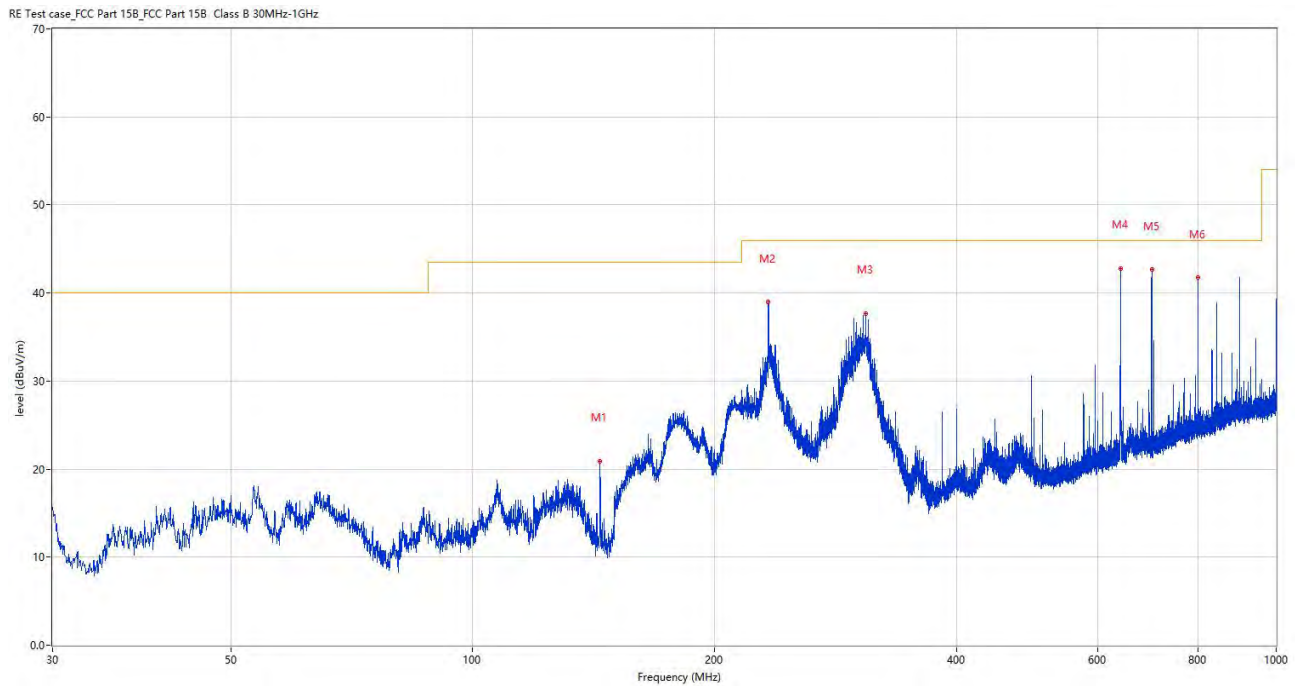
Test Data and Plots

A.1.1 Test Antenna Vertical, 30 MHz – 1 GHz



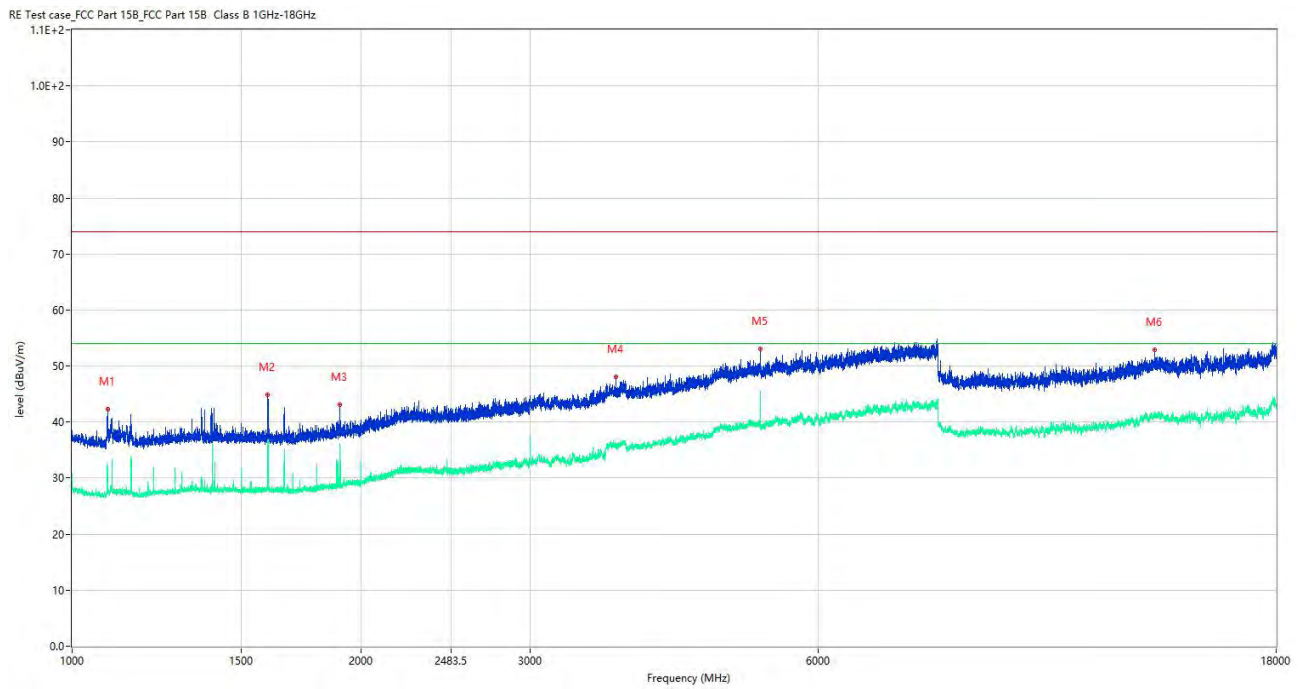
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	39.894	29.35	-27.30	40.0	-10.65	Peak	200.00	100	Vertical	Pass
2	106.533	24.50	-27.89	43.5	-19.00	Peak	354.00	100	Vertical	Pass
3	308.535	32.07	-23.95	46.0	-13.93	Peak	33.00	200	Vertical	Pass
4	383.953	31.82	-21.98	46.0	-14.18	Peak	53.00	200	Vertical	Pass
5	640.033	40.28	-16.27	46.0	-5.72	Peak	211.00	200	Vertical	Pass
6	843.539	43.93	-12.68	46.0	-2.07	Peak	201.00	100	Vertical	Pass

A.1.2 Test Antenna Horizontal, 30 MHz – 1 GHz



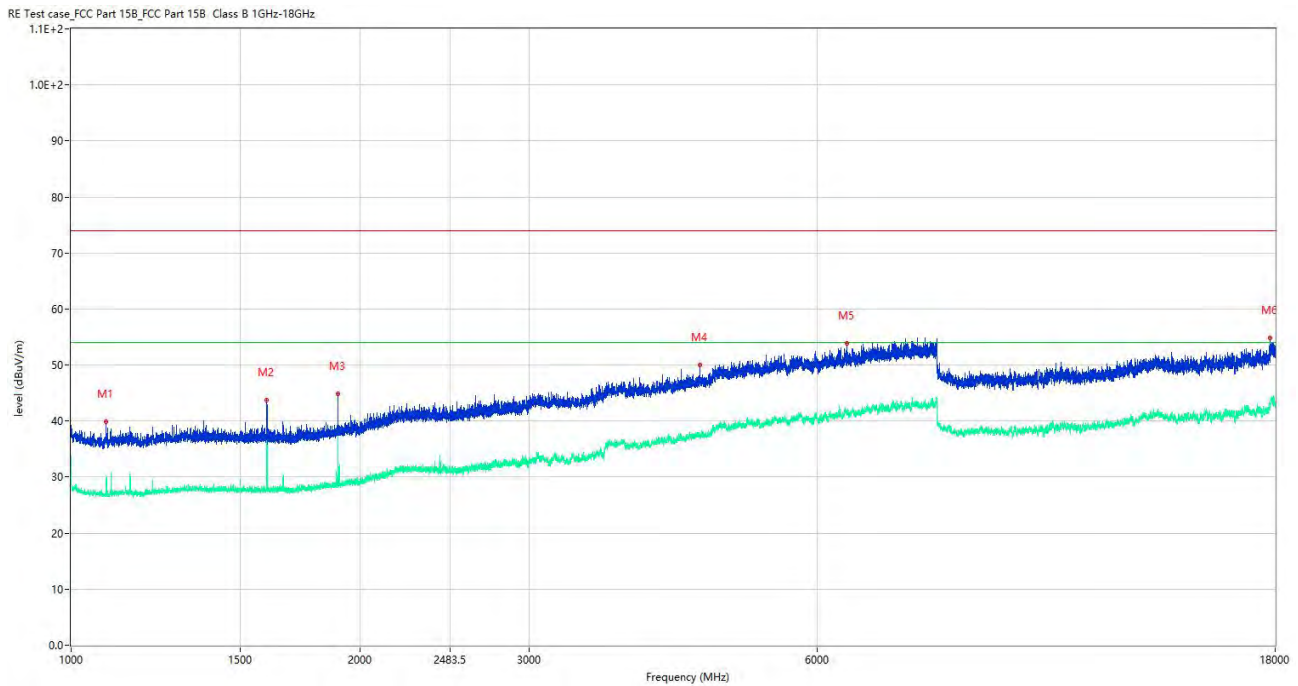
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	144.024	20.89	-31.82	43.5	-22.61	Peak	279.00	200	Horizontal	Pass
2	233.361	38.95	-25.84	46.0	-7.05	Peak	103.00	100	Horizontal	Pass
3	308.390	37.63	-23.95	46.0	-8.37	Peak	95.00	100	Horizontal	Pass
4	639.839	42.74	-16.28	46.0	-3.26	Peak	122.00	200	Horizontal	Pass
5	699.979	42.65	-15.20	46.0	-3.35	Peak	245.00	100	Horizontal	Pass
6	799.986	41.75	-13.18	46.0	-4.25	Peak	142.00	100	Horizontal	Pass

A.1.3 Test Antenna Vertical, 1 GHz – 18 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1088.750	42.25	-16.89	74.0	-31.75	Peak	49.00	100	Vertical	Pass
1**	1088.750	30.93	-16.89	54.0	-23.07	AV	49.00	100	Vertical	Pass
2	1600.250	44.80	-16.57	74.0	-29.20	Peak	162.00	100	Vertical	Pass
2**	1600.250	37.40	-16.57	54.0	-16.60	AV	162.00	100	Vertical	Pass
3	1900.000	43.04	-15.64	74.0	-30.96	Peak	150.00	100	Vertical	Pass
3**	1900.000	35.45	-15.64	54.0	-18.55	AV	150.00	100	Vertical	Pass
4	3691.250	48.14	-4.63	74.0	-25.86	Peak	69.00	100	Vertical	Pass
4**	3691.250	35.47	-4.63	54.0	-18.53	AV	69.00	100	Vertical	Pass
5	5216.250	53.05	-1.32	74.0	-20.95	Peak	0.00	100	Vertical	Pass
5**	5216.250	39.33	-1.32	54.0	-14.67	AV	0.00	100	Vertical	Pass
6	13448.750	52.84	0.47	74.0	-21.16	Peak	295.00	100	Vertical	Pass
6**	13448.750	40.97	0.47	54.0	-13.03	AV	295.00	100	Vertical	Pass

A.1.4 Test Antenna Horizontal, 1 GHz – 18 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1088.000	39.86	-16.88	74.0	-34.14	Peak	290.00	126	Horizontal	Pass
1**	1088.000	29.61	-16.88	54.0	-24.39	AV	290.00	126	Horizontal	Pass
2	1600.250	43.68	-16.57	74.0	-30.32	Peak	19.00	126	Horizontal	Pass
2**	1600.250	36.49	-16.57	54.0	-17.51	AV	19.00	126	Horizontal	Pass
3	1897.000	44.86	-15.67	74.0	-29.14	Peak	0.00	126	Horizontal	Pass
3**	1897.000	28.62	-15.67	54.0	-25.38	AV	0.00	126	Horizontal	Pass
4	4520.000	49.97	-3.32	74.0	-24.03	Peak	63.00	126	Horizontal	Pass
4**	4520.000	37.03	-3.32	54.0	-16.97	AV	63.00	126	Horizontal	Pass
5	6436.875	53.90	-0.41	74.0	-20.10	Peak	70.00	126	Horizontal	Pass
5**	6436.875	41.75	-0.41	54.0	-12.25	AV	70.00	126	Horizontal	Pass
6	17797.501	54.85	0.57	74.0	-19.15	Peak	76.00	126	Horizontal	Pass
6**	17797.501	43.11	0.57	54.0	-10.89	AV	76.00	126	Horizontal	Pass

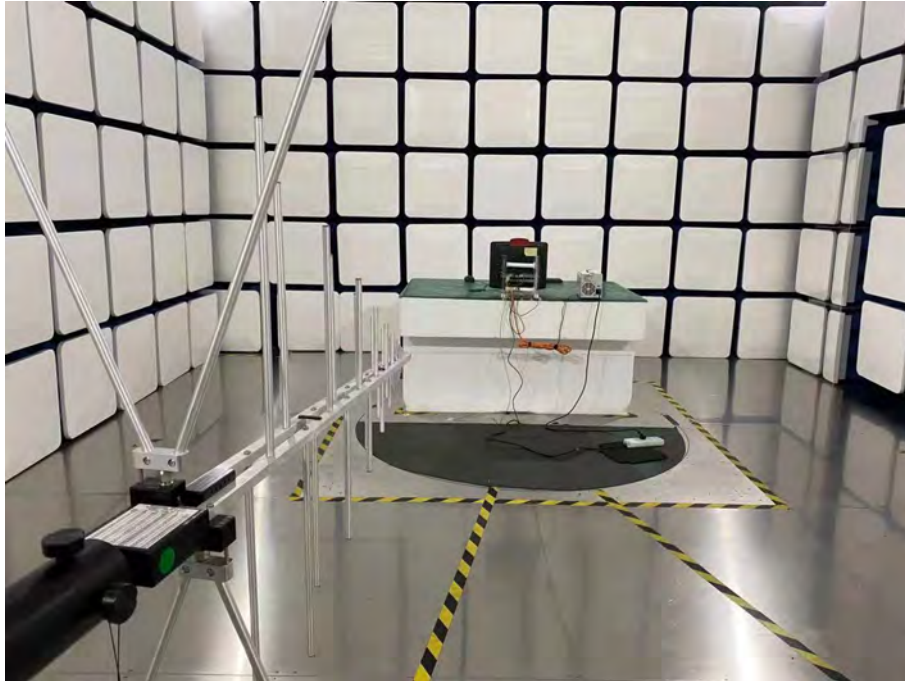
A.2 Conducted Emission

N/A

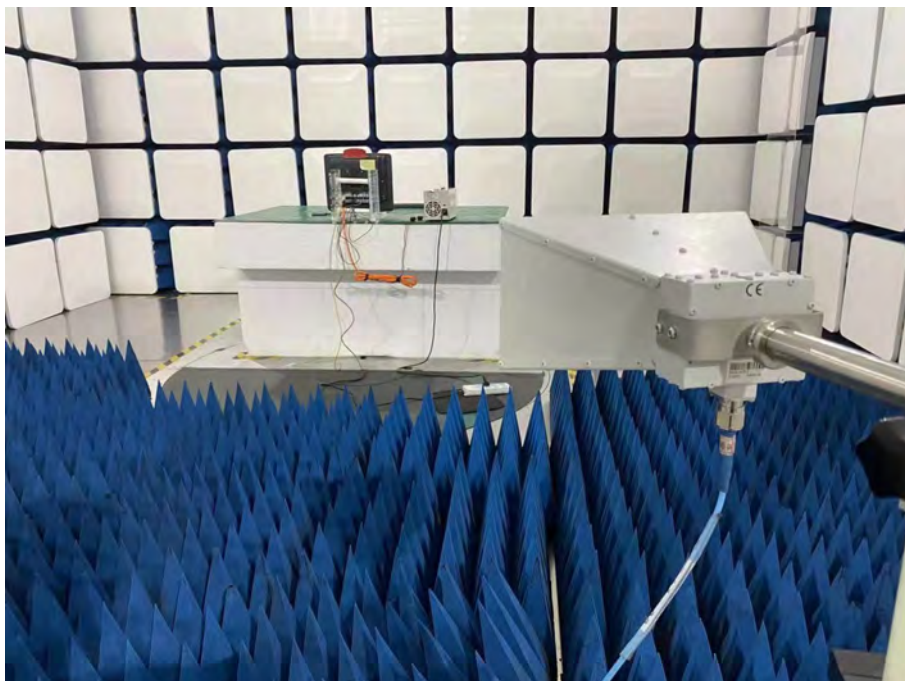
ANNEX B TEST SETUP PHOTOS

B.1 Radiated Emission

Below 1 GHz



Above 1 GHz



Close-up Photo

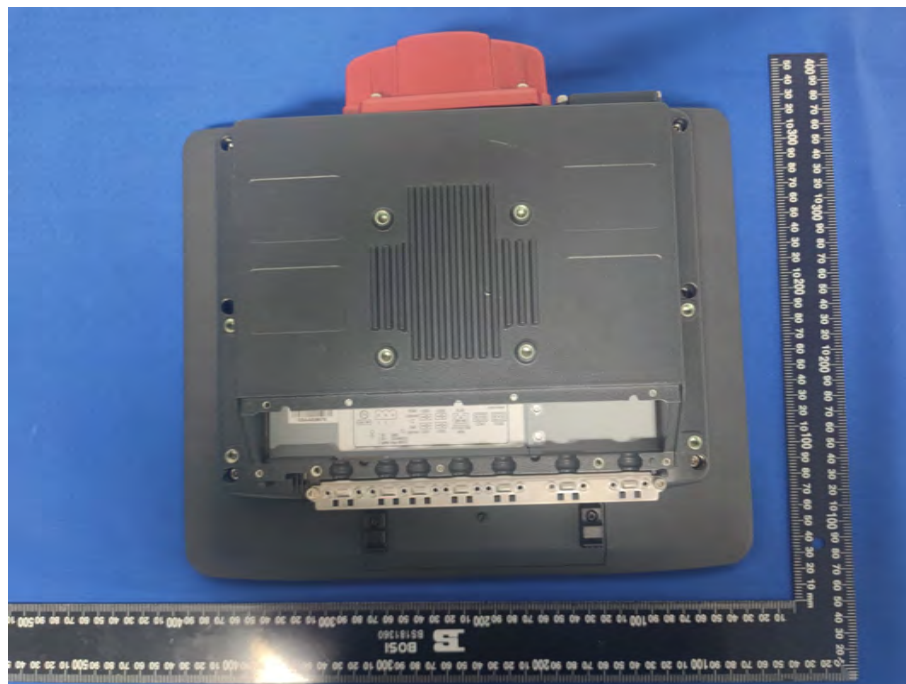


ANNEX C EUT EXTERNAL PHOTOS

MAIN BOX FRONT VIEW OF EUT



MAIN BOX REAR VIEW OF EUT



MAIN BOX LEFT VIEW OF EUT



MAIN BOX RIGHT VIEW OF EUT



MAIN BOX FRONT VIEW OF EUT



MAIN BOX BEHIND VIEW OF EUT



POWER CABLE OF EUT

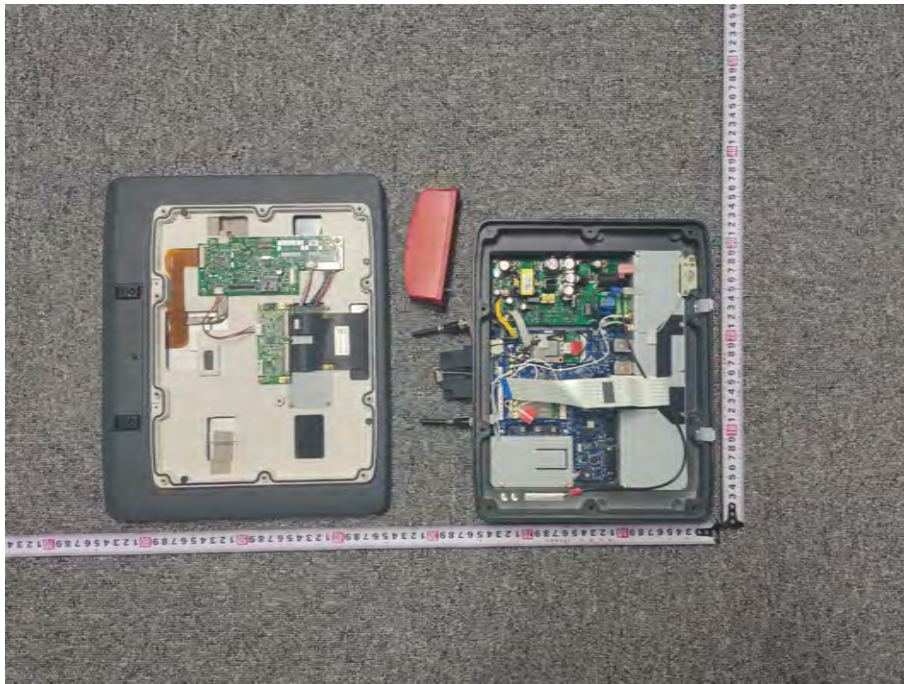


ANTENNA1 OF EUT

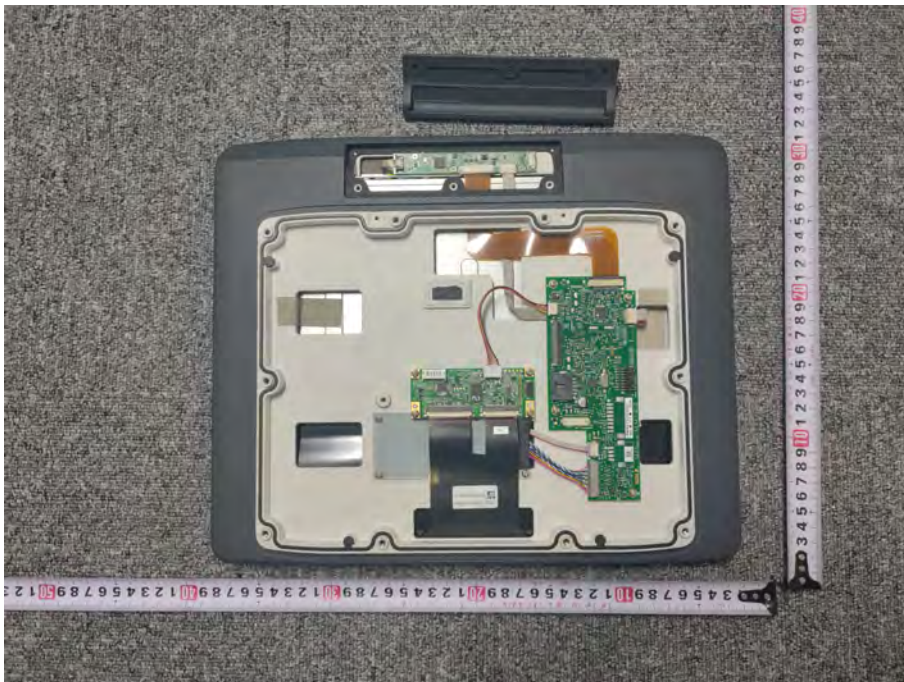


ANNEX D EUT INTERNAL PHOTOS

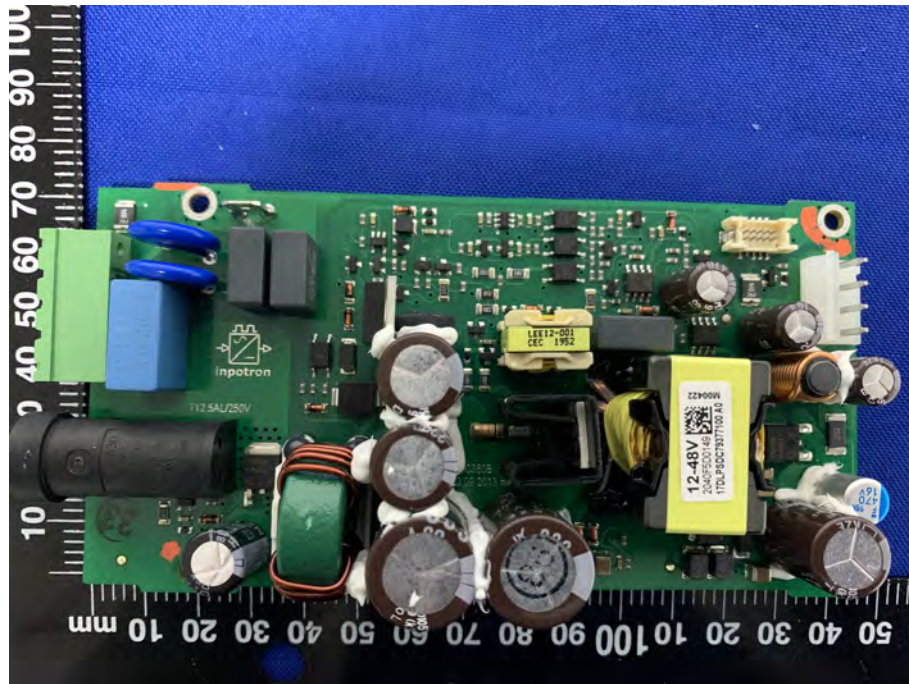
EUT UNCOVER VIEW



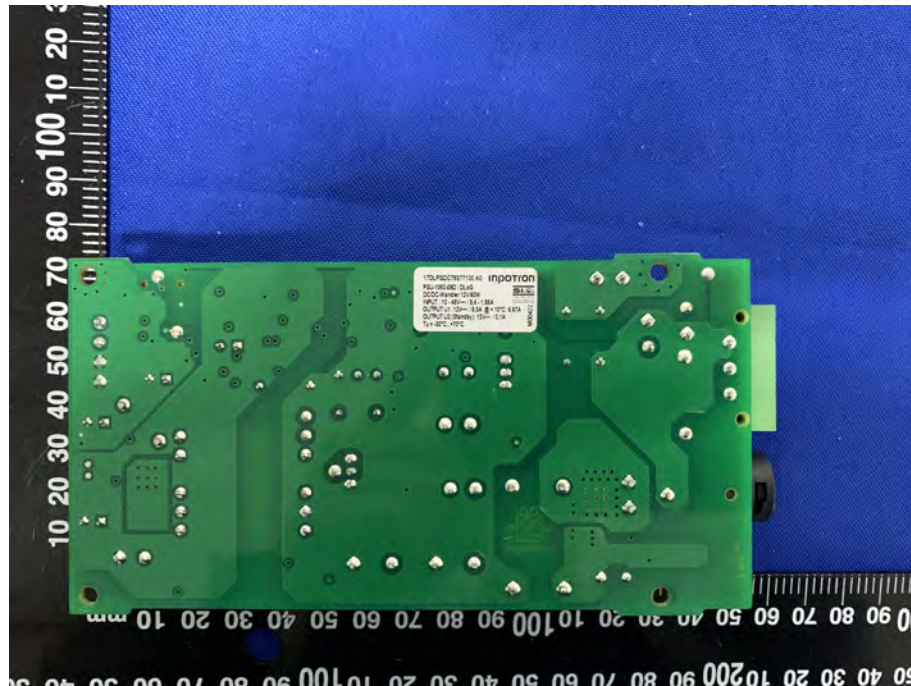
EUT UNCOVER VIEW



MAIN BOARD TOP VIEW



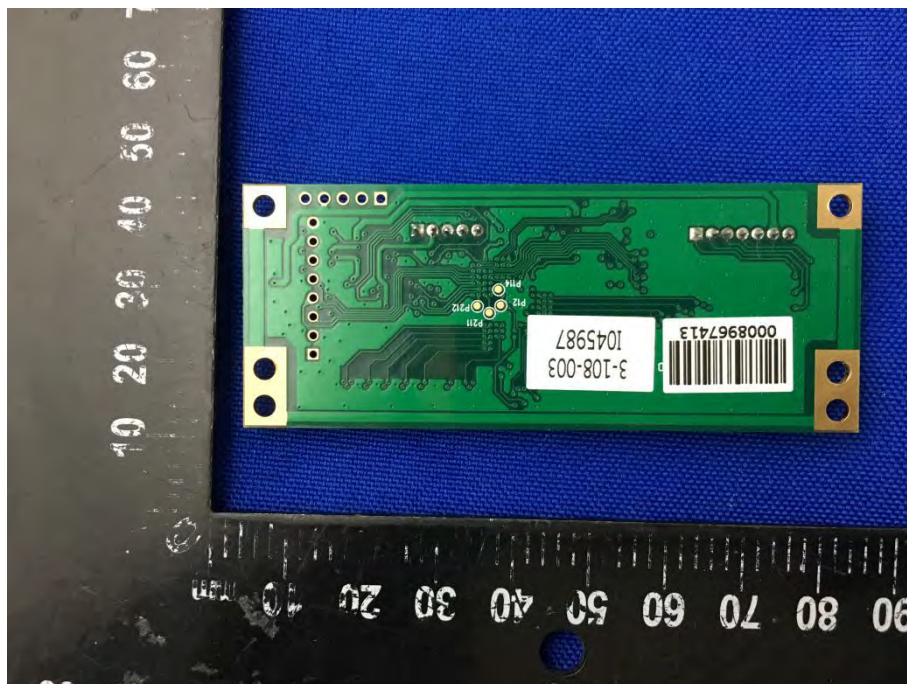
MAIN BOARD BOTTOM VIEW



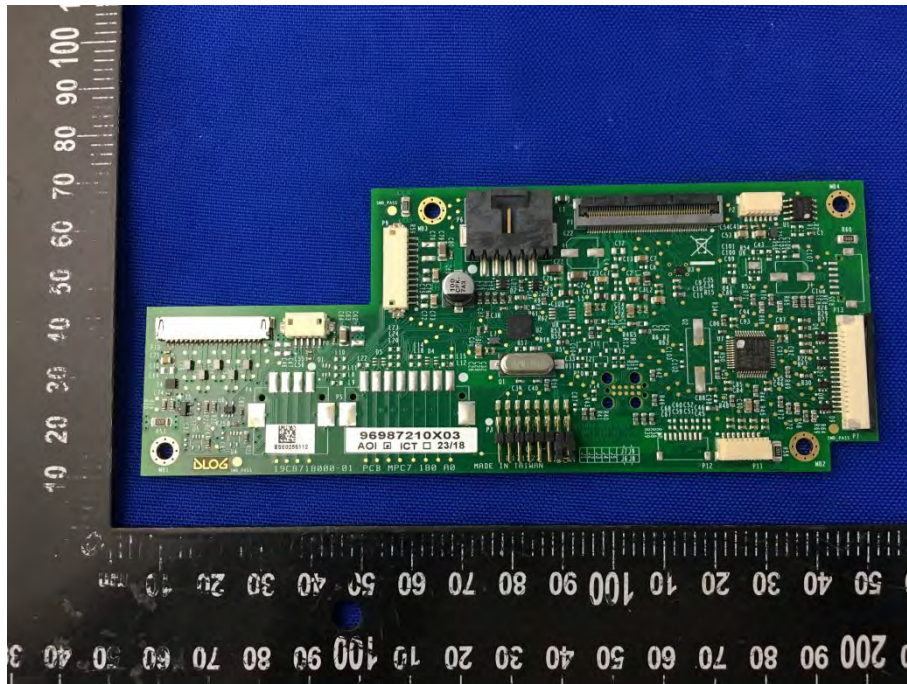
MAIN BOARD TOP VIEW



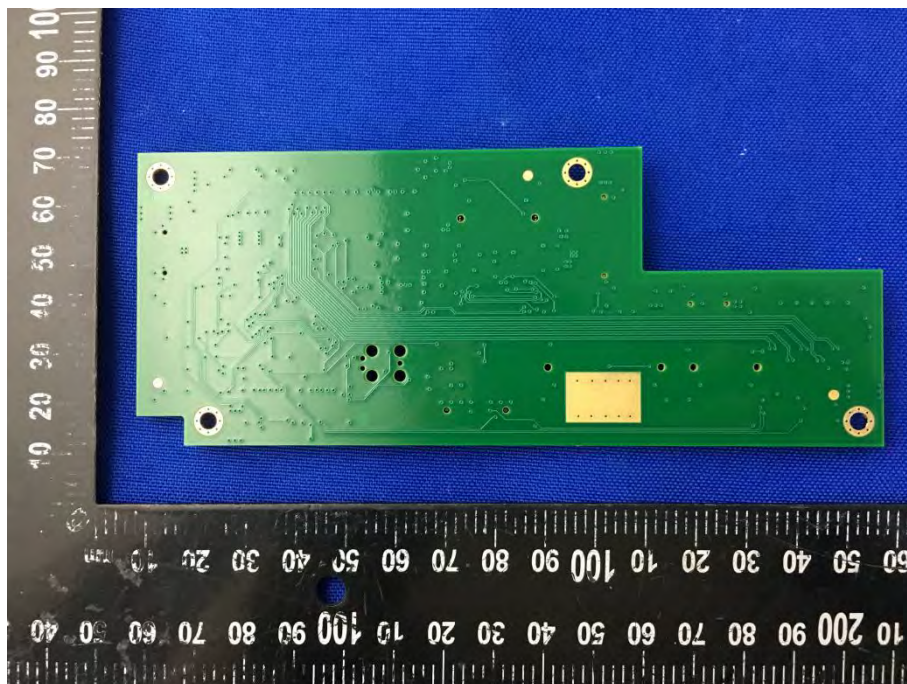
MAIN BOARD BOTTOM VIEW



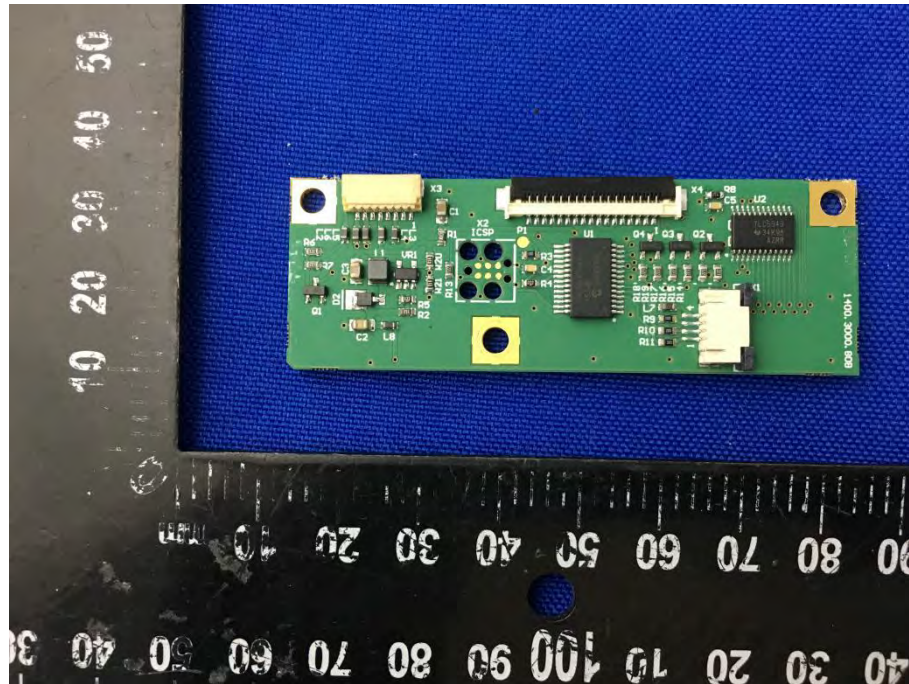
MAIN BOARD TOP VIEW



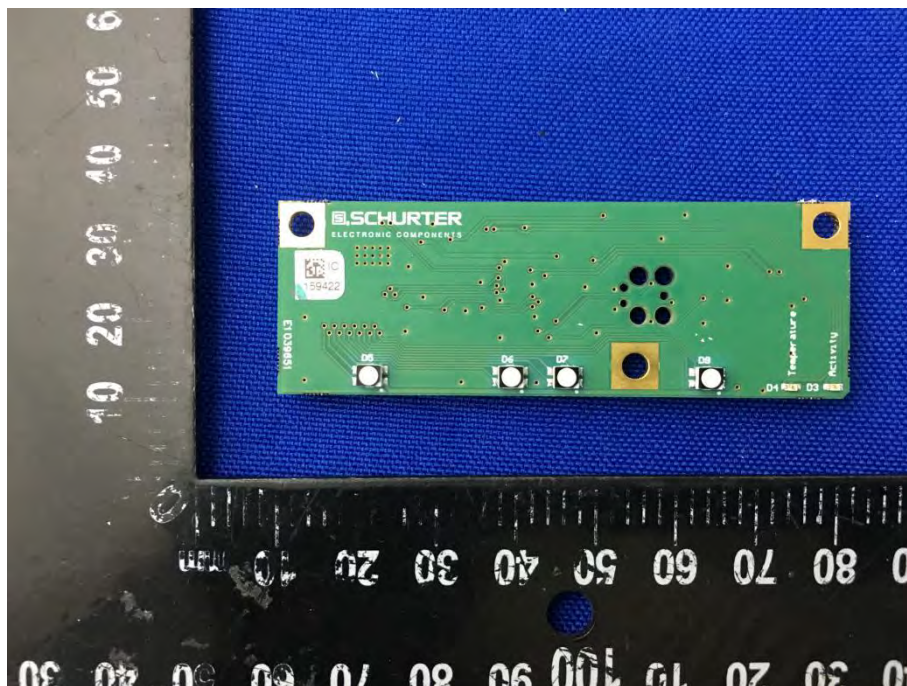
MAIN BOARD BOTTOM VIEW



MAIN BOARD TOP VIEW



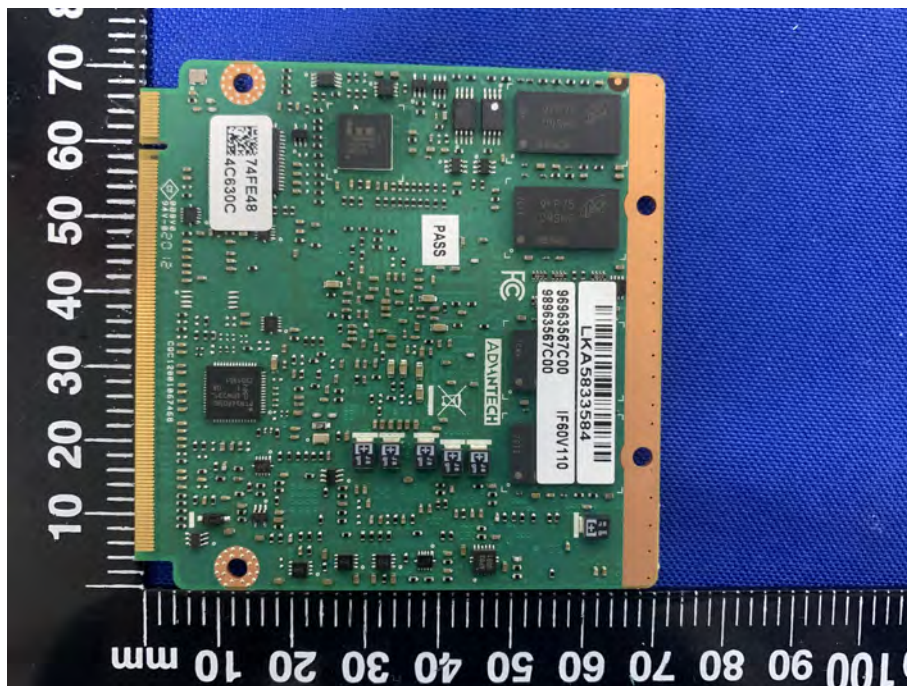
MAIN BOARD BOTTOM VIEW



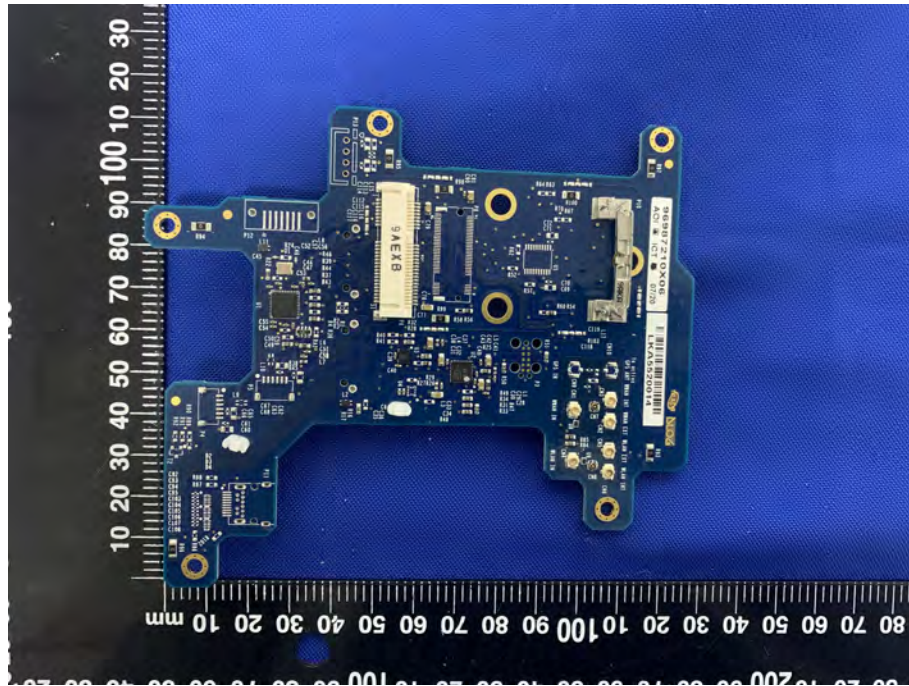
MAIN BOARD TOP VIEW



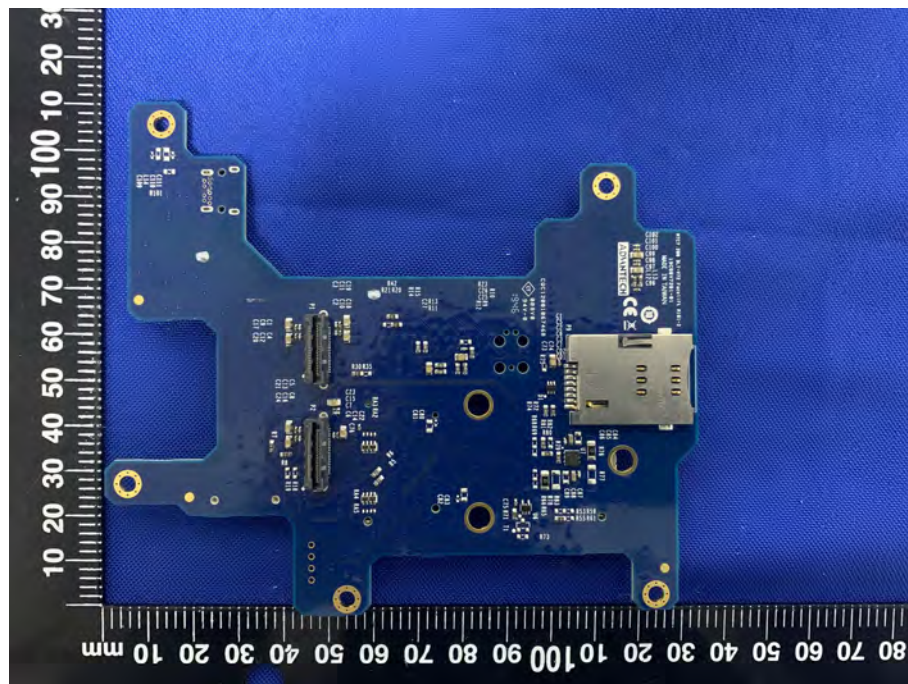
MAIN BOARD BOTTOM VIEW



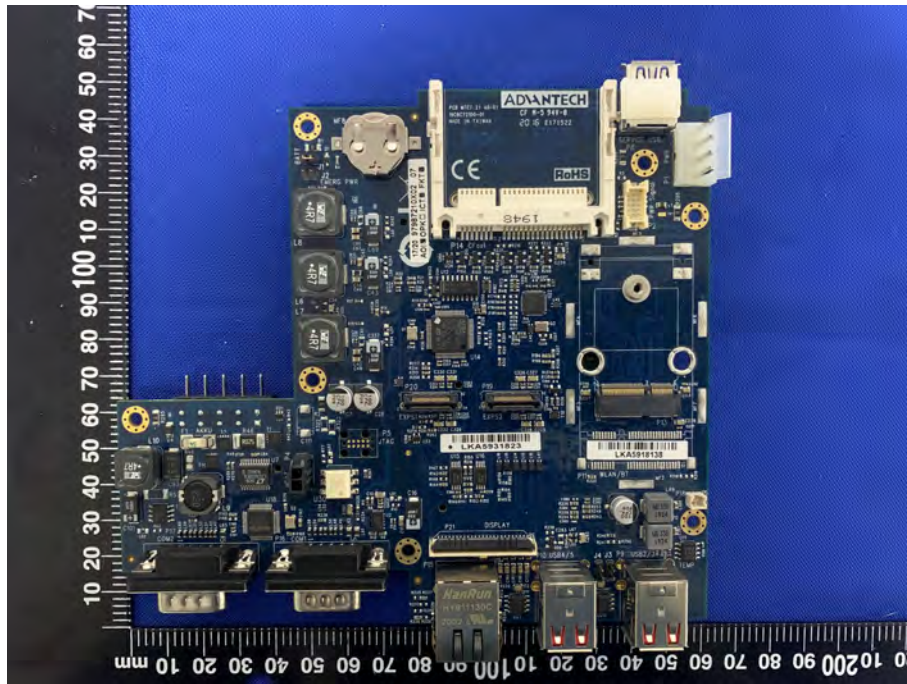
MAIN BOARD TOP VIEW



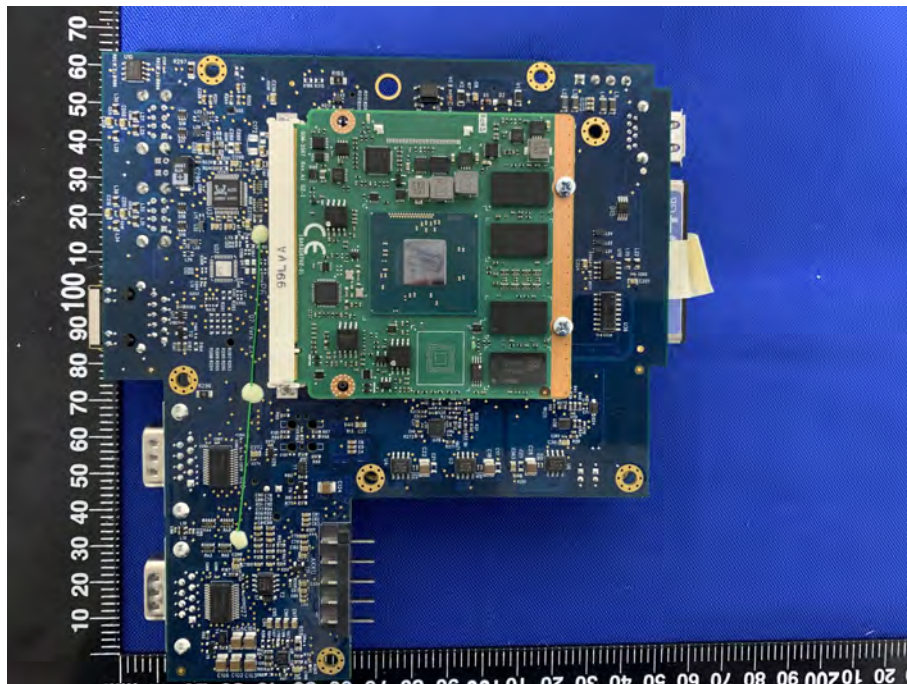
MAIN BOARD BOTTOM VIEW



MAIN BOARD TOP VIEW



MAIN BOARD BOTTOM VIEW



MAIN BOARD TOP VIEW



MAIN BOARD BOTTOM VIEW



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