

FCC PART 15C TEST REPORT FOR CERTIFICATION
On Behalf of

Mitek Corp

4 Channels amplifier, 2 Channels amplifier

Model Number: Z4-B, Z2-B

FCC ID : 2AAOY-Z24

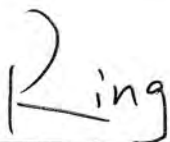
Prepared for:	Mitek Corp
	1 Mitek Plaza, Winslow, Illinois 61089, United States
Prepared By:	EST Technology Co., Ltd.
	Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China
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Report Number:	ESTE-R1905134
Date of Test:	Jan. 18 ~ Mar. 22, 2019
Date of Report:	Mar. 26, 2019

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Test Report Verification

Applicant:	Mitek Corp		
Address:	1 Mitek Plaza, Winslow, Illinois 61089, United States		
Manufacturer:	Integrity Electronic Co., Ltd		
Address:	No. 68, Huanghe Road, Fenghuanggang, Tangxia Town, Dongguan City, Guangdong Province, China		
E.U.T:	4 Channels amplifier, 2 Channels amplifier		
Model Number:	Z4-B, Z2-B (The two models differ in power amplifier circuits, but the RF circuitry is identical.)		
Power Supply:	DC 24V From Adapter Input AC 100-240V ~50/60Hz		
Test Voltage:	DC 24V From Adapter Input AC 120V/60Hz DC 24V From Adapter Input AC 240V/60Hz		
Trade Name:	ATLAS SOUND	Serial No.:	-----
Date of Receipt:	Jan. 18, 2019	Date of Test:	Jan. 18 ~ Mar. 22, 2019
Test Specification:	FCC Rules and Regulations Part 15 Subpart C:2018 ANSI C63.10:2013		
Test Result:	The device described above is tested by EST Technology Co., Ltd.. The measurement results were contained in this test report and EST Technology Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the FCC Rules and Regulations Part 15 Subpart C requirements. This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd. Date: Mar. 26, 2019		
Prepared by:	Reviewed by:	Approved by:	
 _____ Ring / Assistant	 _____ Tony / Engineer	 _____ Keeman Hu / Manager	
Other Aspects:	None.		
<i>Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested</i>			
<i>This test report is based on a single evaluation of one sample of above mentioned products ,It is not permitted to be duplicated in extracts without written approval of EST Technology Co., Ltd.</i>			

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Product Name	:	4 Channels amplifier, 2 Channels amplifier
FCC ID	:	2AAOY-Z24
Model Number	:	Z4-B, Z2-B
Operation frequency	:	915MHz
Number of channel	:	1
Antenna	:	Internal antenna, 2dBi gain
Modulation	:	FSK
Sample Type	:	Prototype production

2. SUMMARY OF TEST

2.1. Summary of test result

Description of Test Item	Standard	Results
Power Line Conducted Emissions	FCC Part 15C: 15.207 ANSI C63.10-2013	PASS
Radiated Emission Test	FCC Part 15C: 15.205 FCC Part 15C: 15.209 FCC Part 15C: 15.249 (a)(d) ANSI C63.10-2013	PASS
20 dB Bandwidth Test	FCC Part 15: 15.215 ANSI C63.10-2013	PASS
Band Edge Compliance Test	FCC Part 15C: 15.205 FCC Part 15C: 15.209 FCC Part 15C: 15.249 (a)(d) ANSI C63.10-2013	PASS
Antenna requirement	FCC Part 15: 15.203	PASS
N/A is an abbreviation for Not Applicable. Z4-B and Z2-B both tested, and The report shows only the worst models.		

2.2. Test Facilities

EMC Lab

: Certificated by CNAS, CHINA
Registration No.: L5288
Date of registration: November 13, 2017

Certificated by FCC, USA
Designation Number: CN1215
Test Firm Registration Number: 722932
Date of registration: November 21, 2017

Certificated by A2LA, USA
Registration No.: 4366.01
Date of registration: November 07, 2017

Certificated by Industry Canada
CAB identifier No.: CN0035
Date of registration: January 04, 2019

Certificated by VCCI, Japan
Registration No.: R-13663; C-14103
Date of registration: July 25, 2017
This Certificate is valid until: July 24, 2020

Certificated by TUV Rheinland, Germany
Registration No.: UA 50413872 0001
Date of registration: July 31, 2018

Certificated by TUV/PS, Shenzhen
Registration No.: SCN1017
Date of registration: January 27, 2011

Certificated by Intertek ETL SEMKO
Registration No.: 2011-RTL-L2-64
Date of registration: April 28, 2011

Certificated by Nemko, Hong Kong
Registration No.: 175193
Date of registration: May 4, 2011

Name of Firm : EST Technology Co., Ltd.

Site Location : Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China

2.3. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	$\pm 3.48\text{dB}$
Uncertainty for spurious emissions test (30MHz-1GHz)	$\pm 4.60\text{ dB(Polarize: H)}$
	$\pm 4.68\text{ dB(Polarize: V)}$
Uncertainty for spurious emissions test (1GHz to 18GHz)	$\pm 4.96\text{dB}$
Uncertainty for radio frequency	7×10^{-8}
Uncertainty for conducted RF Power	0.20dB
Uncertainty for Power density test	0.26dB

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

2.4. Assistant equipment used for test

2.4.1. Adapter(For Z4-B)

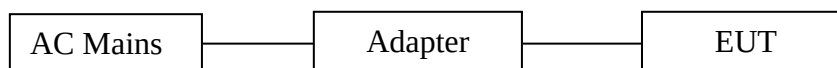
M/N	:	GM130-2400500-D
Input	:	AC 100-240V, 50/60Hz, 2.5A
Output	:	DC 24V/5A

2.4.2. Adapter(For Z2-B)

M/N	:	GM60-240250-D
Input	:	AC 100-240V, 50/60Hz, 2.0A
Output	:	DC 24V/2.5A

2.5. Block Diagram

For radiated emissions test: EUT was placed on a turn table, which is 0.8 or 1.5 meter high above ground. EUT was set into TX test mode by software.



(EUT: 4 Channels amplifier, 2 Channels amplifier)

2.6. Test mode

The test software was used to control EUT work in Continuous TX mode.

Mode	Frequency
TX	915MHz

2.7. Channel List

Channel No.	Frequency (MHz)
1	915

2.8. Test Equipment

2.8.1. For conducted emission test

Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESHS30	832354	CEPREI	June 15,18	1 Year
Artificial Mains Network	Rohde & Schwarz	ENV216	101260	CEPREI	June 15,18	1 Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	101100	CEPREI	June 15,18	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

2.8.2. For radiated emission test(9 kHz-30MHz)

Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESR7	101780	CEPREI	June 15,18	1 Year
Active Loop Antenna	SCHWARZB ECK	FMZB 1519B	1519B-088	N/A	Aug. 01,18	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

2.8.3. For radiated emission test(30-1000MHz)

Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESR7	101780	CEPREI	June 15,18	1 Year
Bilog Antenna	Teseq	CBL 6111D	27090	CEPREI	June 15,18	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

2.8.4. For radiated emission test(above 1GHz)

Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
Horn Antenna	SCHWARZB ECK	BBHA 9120 D	BBHA912 0D1002	CEPREI	June 18,18	1 Year
Horn Antenna	SCHWARZB ECK	BBHA9170	BBHA917 0242	CEPREI	June 18,18	1Year
Signal Amplifier	SCHWARZB ECK	BBV9718	9718-212	CEPREI	June 15,18	1 Year
Spectrum Analyzer	Rohde &Schwarz	FSV	103173	CEPREI	June 15,18	1 Year
PSA Series Spertrum Analyzer	Agilent	E4447A	MY50180 031	CEPREI	June 15,18	1Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

3. POWER LINE CONDUCTED EMISSIONS

3.1. Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

3.2. Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT was charged from PC's USB port which connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#).. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10:2013 on Conducted Emission Test.

The bandwidth of test receiver (R & S ESHS30) is set at 10kHz.

The frequency range from 150kHz to 30MHz is checked.

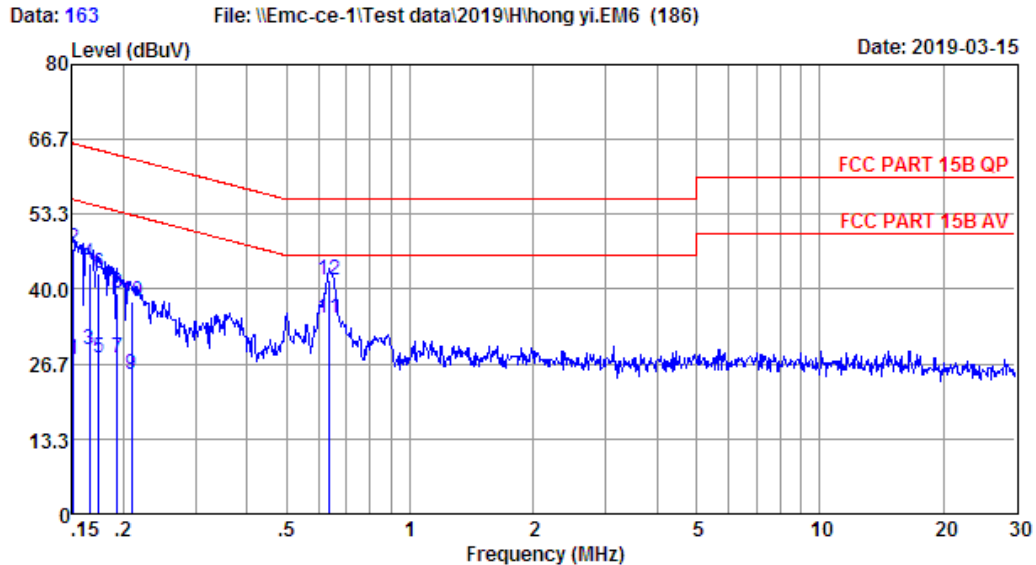
3.3. Test Result

PASS. (All emissions not reported below are too low against the prescribed limits.)

3.4. Test data

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Site no : 844 Shield Room Data no. : 163
Env. / Ins. : Temp:23.5'C Humi:52.3% Press:101.50kPa INE Phase : NEUTRAL
Limit : FCC PART 15B QP
Engineer : Viking
EUT : 4 Channels amplifier
Power : DC 24V From Adapter Input AC 120V/60Hz
M/N : 24-B
Test Mode : TX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.15	9.50	9.69	8.20	27.39	55.96	28.57	Average
2	0.15	9.50	9.69	28.02	47.21	65.96	18.75	QP
3	0.17	9.50	9.69	10.01	29.20	55.21	26.01	Average
4	0.17	9.50	9.69	25.28	44.47	65.21	20.74	QP
5	0.17	9.53	9.77	8.34	27.64	54.77	27.13	Average
6	0.17	9.53	9.77	23.45	42.75	64.77	22.02	QP
7	0.19	9.53	9.77	8.43	27.73	53.89	26.16	Average
8	0.19	9.53	9.77	19.97	39.27	63.89	24.62	QP
9	0.21	9.53	9.84	5.42	24.79	53.23	28.44	Average
10	0.21	9.53	9.84	18.34	37.71	63.23	25.52	QP
11	0.64	9.56	9.92	15.23	34.71	46.00	11.29	Average
12	0.64	9.56	9.92	22.19	41.67	56.00	14.33	QP

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. If the average limit is met when using a quasi-peak detector,
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.

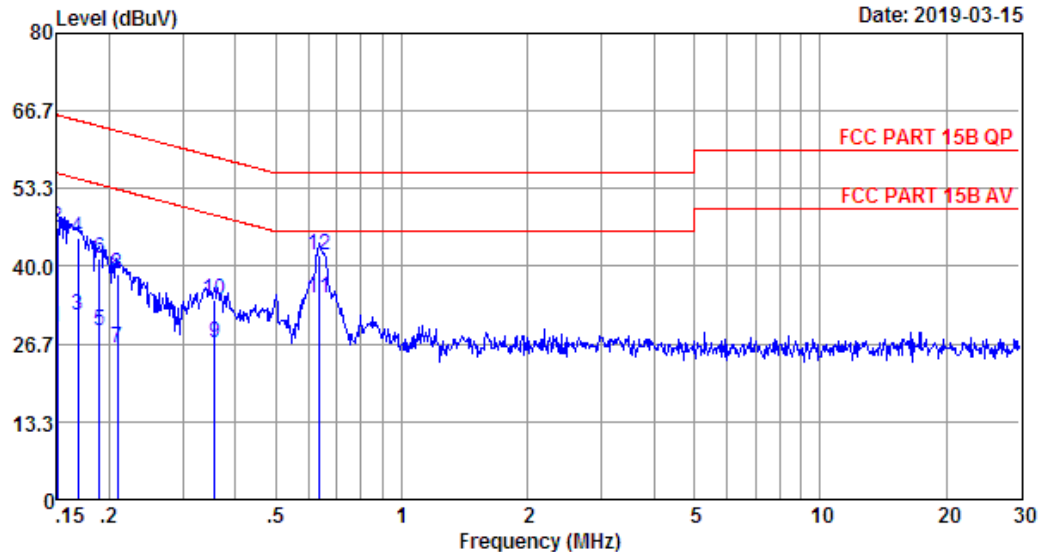
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Data: 165

File: \\Emc-ce-1\Test data\2019\Hihong yi.EM6 (186)

Date: 2019-03-15



Site no : 844 Shield Room Data no. : 165
 Env. / Ins. : Temp:23.5'C Humi:52.3% Press:101.50kPa INE Phase : LINE
 Limit : FCC PART 15B QP
 Engineer : Viking
 EUT : 4 Channels amplifier
 Power : DC 24V From Adapter Input AC 120V/60Hz
 M/N : Z4-B
 Test Mode : TX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.15	9.59	9.69	10.20	29.48	56.00	26.52	Average
2	0.15	9.59	9.69	27.33	46.61	66.00	19.39	QP
3	0.17	9.59	9.69	12.20	31.48	55.03	23.55	Average
4	0.17	9.59	9.69	25.59	44.87	65.03	20.16	QP
5	0.19	9.60	9.77	9.43	28.80	54.06	25.26	Average
6	0.19	9.60	9.77	22.10	41.47	64.06	22.59	QP
7	0.21	9.61	9.84	6.67	26.12	53.23	27.11	Average
8	0.21	9.61	9.84	19.14	38.59	63.23	24.64	QP
9	0.36	9.63	9.92	7.43	26.98	48.78	21.80	Average
10	0.36	9.63	9.92	14.67	34.22	58.78	24.56	QP
11	0.63	9.63	9.92	14.95	34.50	46.00	11.50	Average
12	0.63	9.63	9.92	22.30	41.85	56.00	14.15	QP

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
 2. Margin= Limit - Emission Level.
 3. If the average limit is met when using a quasi-peak detector,
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

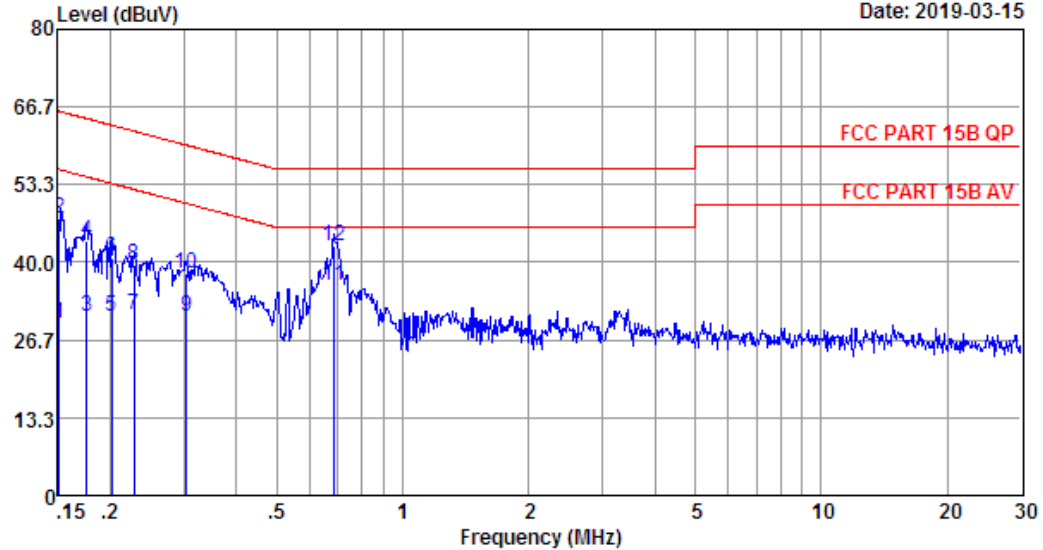
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Data: 167

File: \\Emc-ce-1\Test data\2019\Hihong yi.EM6 (186)

Date: 2019-03-15



Site no : 844 Shield Room Data no. : 167
 Env. / Ins. : Temp:23.5'C Humi:52.3% Press:101.50kPa INE Phase : LINE
 Limit : FCC PART 15B QP
 Engineer : Viking
 EUT : 4 Channels amplifier
 Power : DC 24V From Adapter Input AC 240V/60Hz
 M/N : Z4-B
 Test Mode : TX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.15	9.59	9.69	10.20	29.48	55.96	26.48	Average
2	0.15	9.59	9.69	28.39	47.67	65.96	18.29	QP
3	0.18	9.60	9.77	11.43	30.80	54.68	23.88	Average
4	0.18	9.60	9.77	24.28	43.65	64.68	21.03	QP
5	0.20	9.60	9.77	11.33	30.70	53.54	22.84	Average
6	0.20	9.60	9.77	21.48	40.85	63.54	22.69	QP
7	0.23	9.61	9.84	11.67	31.12	52.52	21.40	Average
8	0.23	9.61	9.84	20.12	39.57	62.52	22.95	QP
9	0.30	9.62	9.92	11.30	30.84	50.15	19.31	Average
10	0.30	9.62	9.92	18.49	38.03	60.15	22.12	QP
11	0.68	9.63	9.92	16.60	36.15	46.00	9.85	Average
12	0.68	9.63	9.92	23.30	42.85	56.00	13.15	QP

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
 2. Margin= Limit - Emission Level.
 3. If the average limit is met when using a quasi-peak detector,
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

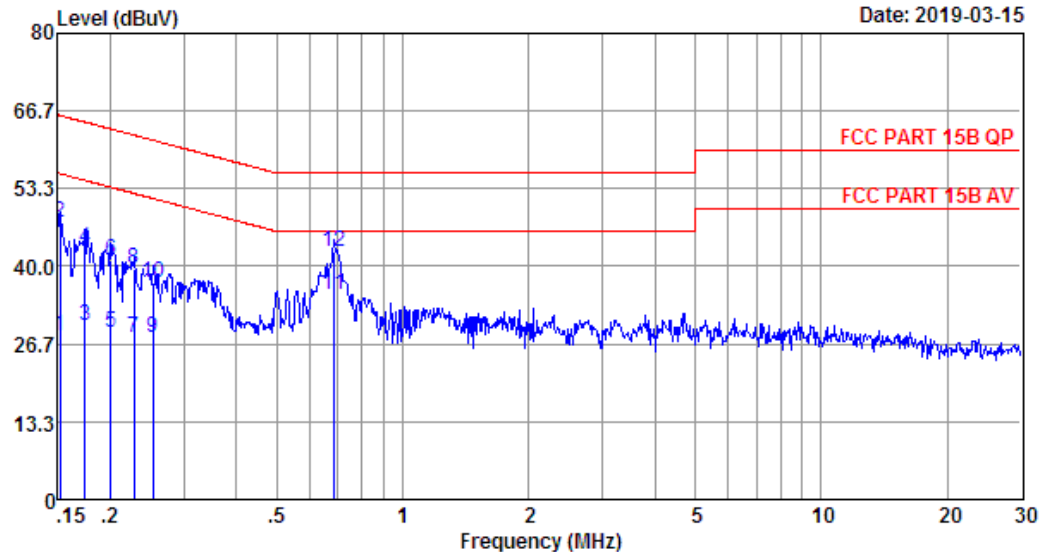
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Data: 169

File: \\Emc-ce-1\Test data\2019\Hihong yi.EM6 (186)

Date: 2019-03-15



Site no : 844 Shield Room Data no. : 169
 Env. / Ins. : Temp:23.5'C Humi:52.3% Press:101.50kPa INE Phase : NEUTRAL
 Limit : FCC PART 15B QP
 Engineer : Viking
 EUT : 4 Channels amplifier
 Power : DC 24V From Adapter Input AC 240V/60Hz
 M/N : Z4-B
 Test Mode : TX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.15	9.50	9.69	9.00	28.19	55.91	27.72	Average
2	0.15	9.50	9.69	28.22	47.41	65.91	18.50	QP
3	0.17	9.53	9.77	10.43	29.73	54.77	25.04	Average
4	0.17	9.53	9.77	23.93	43.23	64.77	21.54	QP
5	0.20	9.53	9.77	9.34	28.64	53.58	24.94	Average
6	0.20	9.53	9.77	21.79	41.09	63.58	22.49	QP
7	0.23	9.53	9.84	8.42	27.79	52.52	24.73	Average
8	0.23	9.53	9.84	20.12	39.49	62.52	23.03	QP
9	0.25	9.53	9.92	8.41	27.86	51.64	23.78	Average
10	0.25	9.53	9.92	17.76	37.21	61.64	24.43	QP
11	0.68	9.56	9.92	15.75	35.23	46.00	10.77	Average
12	0.68	9.56	9.92	23.13	42.61	56.00	13.39	QP

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
 2. Margin= Limit - Emission Level.
 3. If the average limit is met when using a quasi-peak detector,
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

4. RADIATED EMISSIONS

4.1. Limit

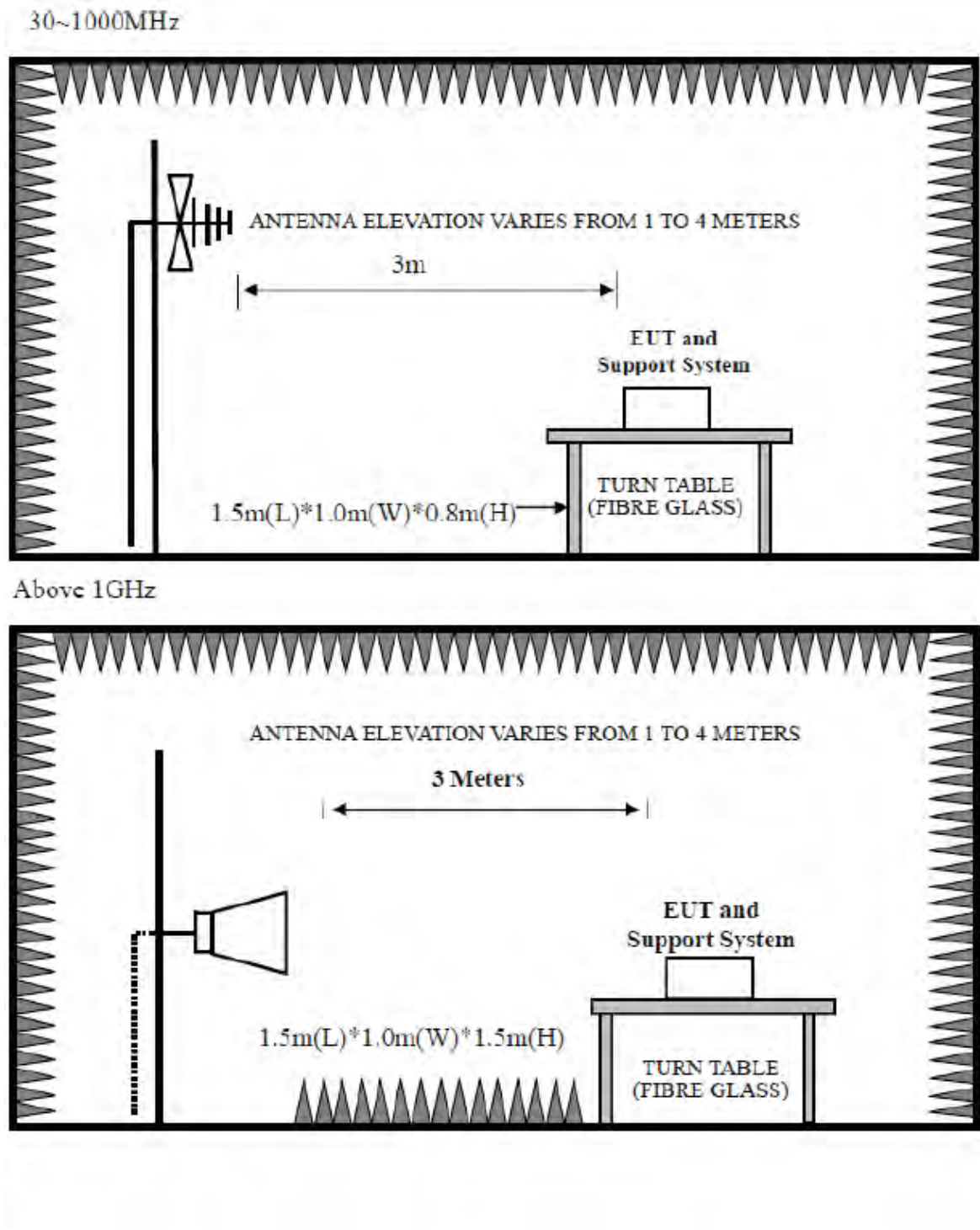
FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

Remark : (1) Emission level $\text{dB}\mu\text{V} = 20 \log$ Emission level $\mu\text{V/m}$

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system

4.2. Block Diagram of Test setup



4.3. Test Procedure

EUT was placed on a turn table, which is 0.8 meter high above ground for 30~1000MHz test, and which is 1.5 meter high above ground for above 1GHz test. The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 1MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz

PEAK detector, 1MHz/1MHz for PAEK measurement,

PEAK detector, 1MHz/10Hz for Average measurement

The frequency range from 30MHz to 10th harmonic (25GHz) are checked.

The EUT position(X.-axis, Y-axis, Z-axis) were checked and worse case was happened in Y-axis position. So Y-axis position was chose for find measurement.

4.4. Test Result

Pass

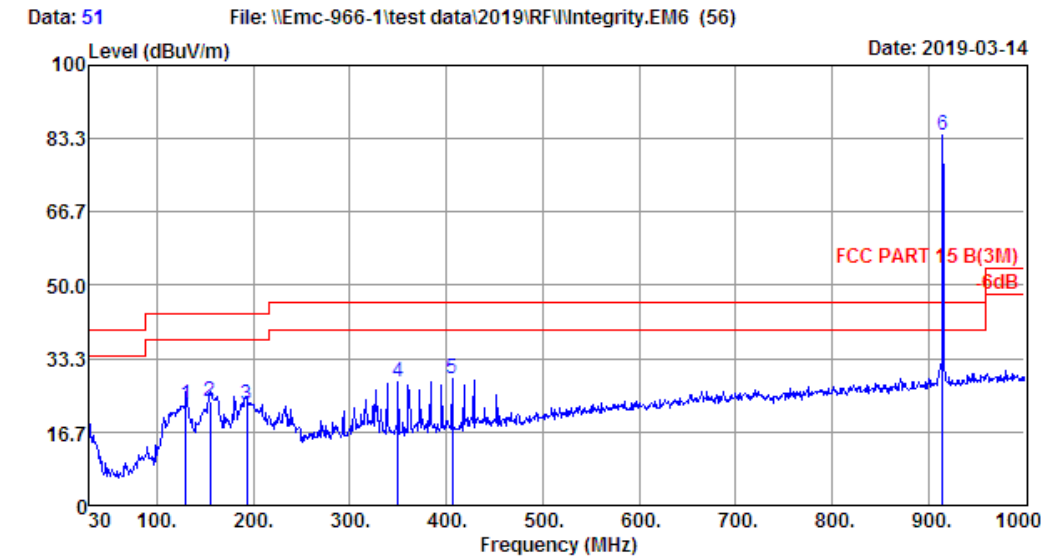
Note: 1、 For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

4.5. Test Data

30 MHz – 1000 MHz

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Site no. : 1# 966 Chamber Data no. : 51
Dis. / Ant. : 3m 37062 Ant. pol. : HORIZONTAL
Limit : FCC PART 15 B(3M)
Env. / Ins. : Temp:23.5';Humi:52.4%;Press:101.52kPa
Engineer : Viking
EUT : 4 Channels amplifier
Power : DC 24V From Adapter Input AC 120V/60Hz
M/N : Z4-B
Test Mode : TX 915MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	129.91	11.80	0.98	10.18	22.96	43.50	20.54	QP
2	155.13	11.30	1.12	11.37	23.79	43.50	19.71	QP
3	192.96	8.72	1.27	12.81	22.80	43.50	20.70	QP
4	350.10	15.30	2.11	10.60	28.01	46.00	17.99	QP
5	406.36	16.23	2.14	10.49	28.86	46.00	17.14	QP
6	914.64	23.99	3.97	56.24	84.20	46.00	-38.20	Peak

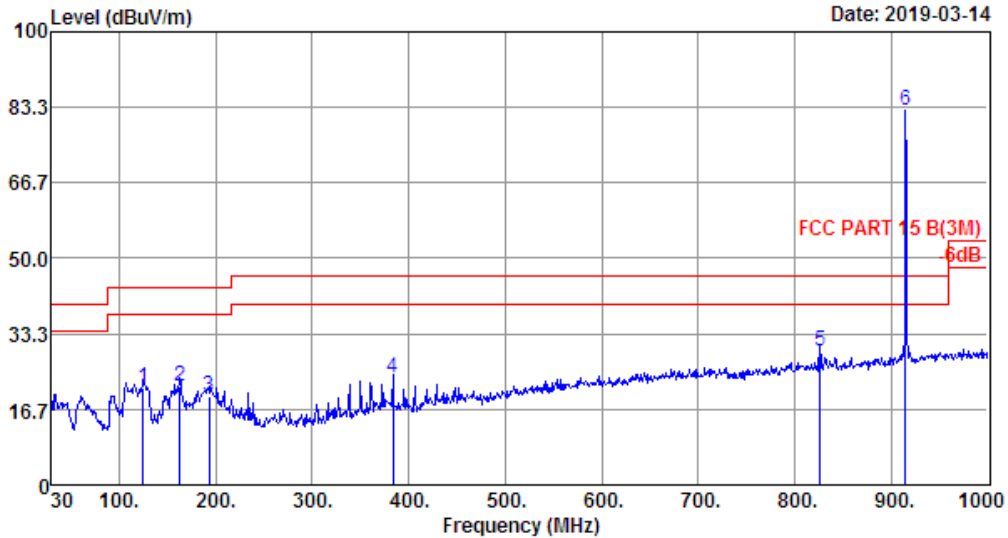
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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Data: 52 File: \\Emc-966-1\test data\2019\RF\Integrity.EM6 (56)

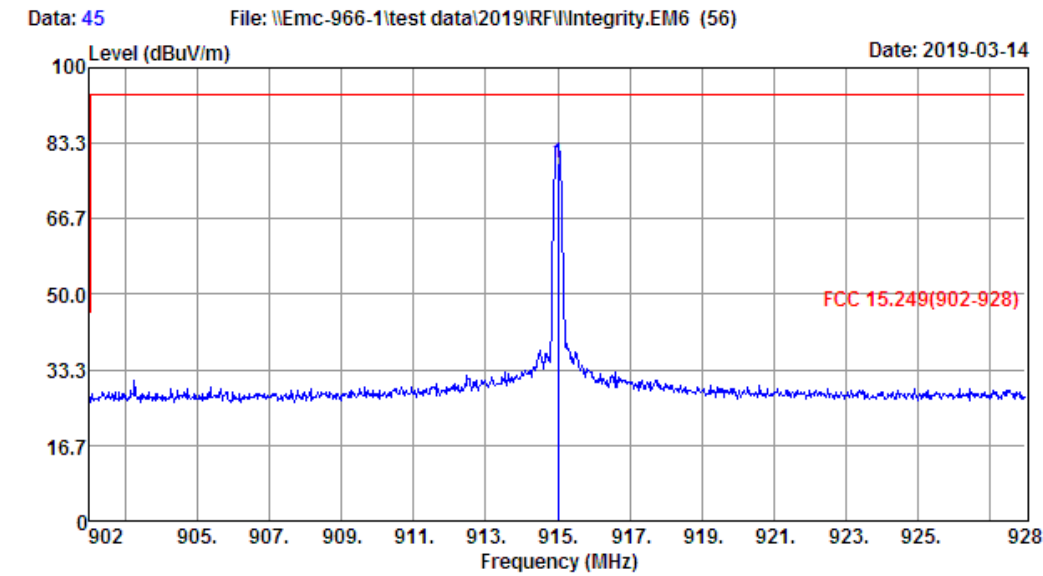
Date: 2019-03-14



Site no. : 1# 966 Chamber Data no. : 52
 Dis. / Ant. : 3m 37062 Ant. pol. : VERTICAL
 Limit : FCC PART 15 B(3M)
 Env. / Ins. : Temp:23.5';Humi:52.4%;Press:101.52kPa
 Engineer : Viking
 EUT : 4 Channels amplifier
 Power : DC 24V From Adapter Input AC 120V/60Hz
 M/N : 24-B
 Test Mode : TX 915MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	125.06	11.60	0.95	8.73	21.28	43.50	22.22	QP
2	162.89	10.72	1.16	9.75	21.63	43.50	21.87	QP
3	192.96	8.72	1.27	9.63	19.62	43.50	23.88	QP
4	384.05	15.84	2.13	5.48	23.45	46.00	22.55	QP
5	826.37	23.20	3.71	2.62	29.53	46.00	16.47	QP
6	914.64	23.99	3.97	54.88	82.84	46.00	-36.84	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.



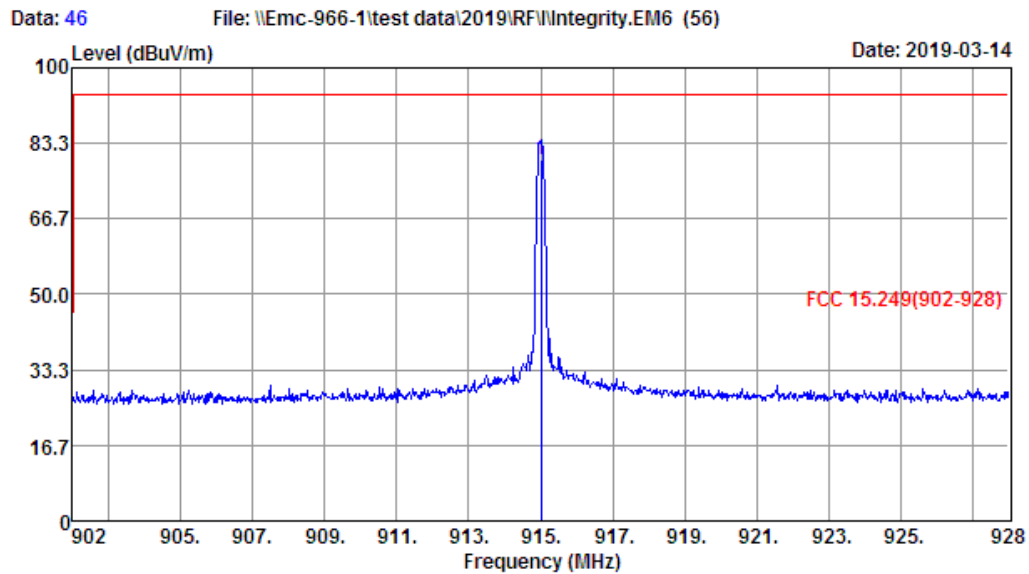
Site no. : 1# 966 Chamber Data no. : 45
Dis. / Ant. : 3m 37062 Ant. pol. : VERTICAL
Limit : FCC 15.249(902-928)
Env. / Ins. : Temp:23.5';Humi:52.4%;Press:101.52kPa
Engineer : Viking
EUT : 4 Channels amplifier
Power : DC 24V From Adapter Input AC 120V/60Hz
M/N : Z4-B
Test Mode : TX 915MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	915.00	23.99	3.97	50.95	78.91	94.00	15.09	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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Site no. : 1# 966 Chamber Data no. : 46
 Dis. / Ant. : 3m 37062 Ant. pol. : HORIZONTAL
 Limit : FCC 15.249(902-928)
 Env. / Ins. : Temp:23.5';Humi:52.4%;Press:101.52kPa
 Engineer : Viking
 EUT : 4 Channels amplifier
 Power : DC 24V From Adapter Input AC 120V/60Hz
 M/N : 24-B
 Test Mode : TX 915MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	915.00	23.99	3.97	51.66	79.62	94.00	14.38	QP

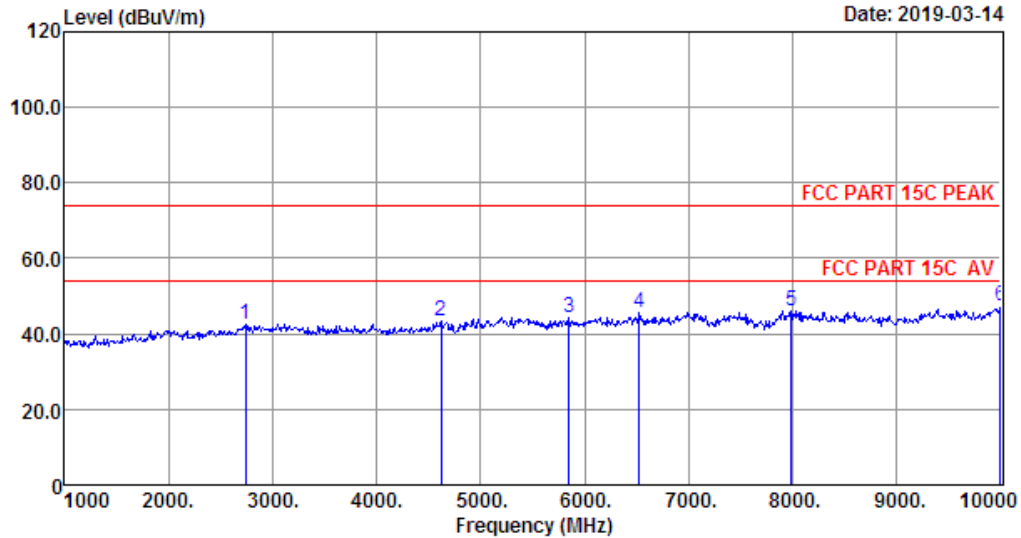
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.

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Data: 13 File: \\Emc-966-1\test data\2019\RF\Integrity.EM6 (56)

Date: 2019-03-14



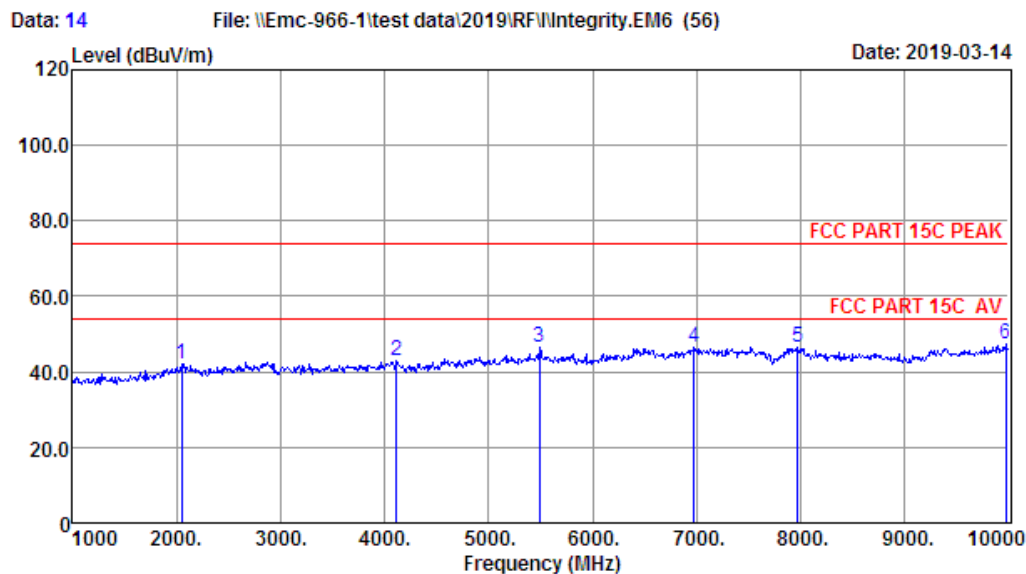
Site no. : 1# 966 Chamber Data no. : 13
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.5';Humi:52.4%;Press:101.52kPa
Engineer : Viking
EUT : 4 Channels amplifier
Power : DC 24V From Adapter Input AC 120V/60Hz
M/N : Z4-B
Test Mode : TX 915MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2737.00	27.96	3.11	34.58	46.07	42.56	74.00	31.44	Peak
2	4618.00	30.51	4.34	34.66	43.01	43.20	74.00	30.80	Peak
3	5851.00	32.83	5.20	34.44	40.68	44.27	74.00	29.73	Peak
4	6526.00	34.64	5.85	34.51	39.50	45.48	74.00	28.52	Peak
5	7984.00	36.50	6.49	34.50	37.57	46.06	74.00	27.94	Peak
6	10000.00	38.50	6.76	34.60	36.67	47.33	74.00	26.67	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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Site no. : 1# 966 Chamber Data no. : 14
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : Temp:23.5';Humi:52.4%;Press:101.52kPa
 Engineer : Viking
 EUT : 4 Channels amplifier
 Power : DC 24V From Adapter Input AC 120V/60Hz
 M/N : Z4-B
 Test Mode : TX 915MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2044.00	26.75	2.66	34.79	47.46	42.08	74.00	31.92	Peak
2	4114.00	29.49	4.05	34.61	43.92	42.85	74.00	31.15	Peak
3	5491.00	32.86	4.90	34.55	43.08	46.29	74.00	27.71	Peak
4	6976.00	35.76	5.91	34.60	39.56	46.63	74.00	27.37	Peak
5	7975.00	36.49	6.44	34.50	38.10	46.53	74.00	27.47	Peak
6	9973.00	38.47	6.75	34.60	36.65	47.27	74.00	26.73	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.

5. 20 DB BANDWIDTH

5.1. Test Procedure

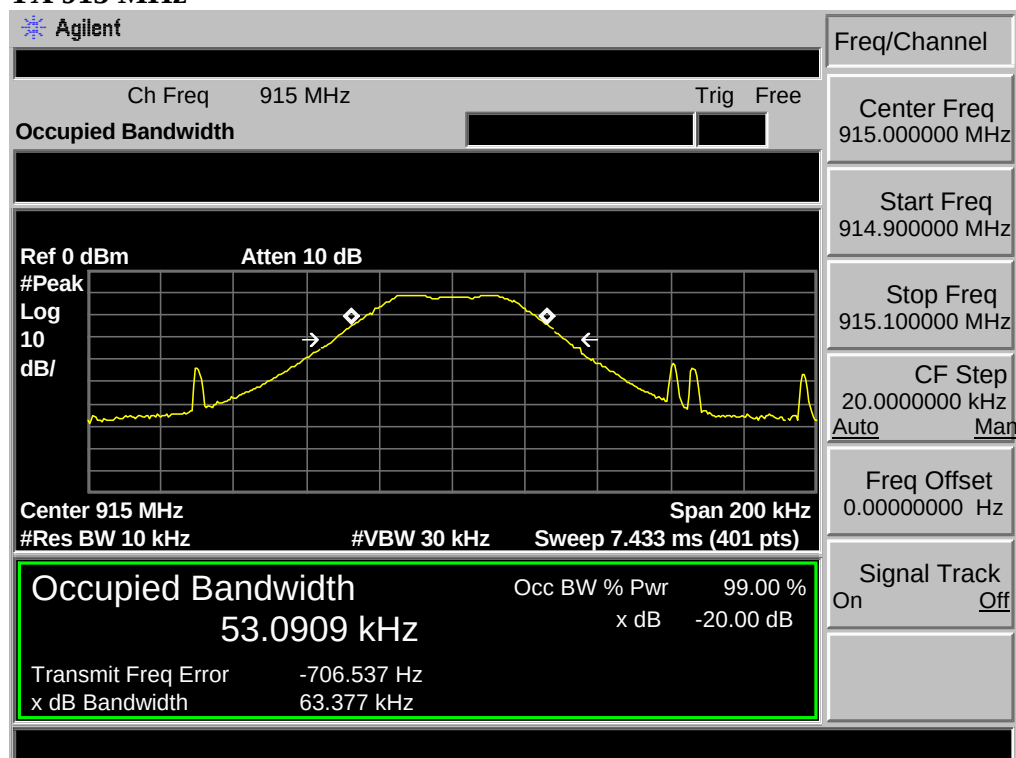
The transmitter output was coupled to a spectrum analyzer via a antenna. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 10kHz RBW and 30kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

5.2. Test Result

EUT: 4 Channels amplifier				
M/N: Z4-B				
Test date: 2019-03-12		Test site: RF site	Tested by: Viking	
Mode	Freq (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Conclusion
TX	915	63.377	/	PASS

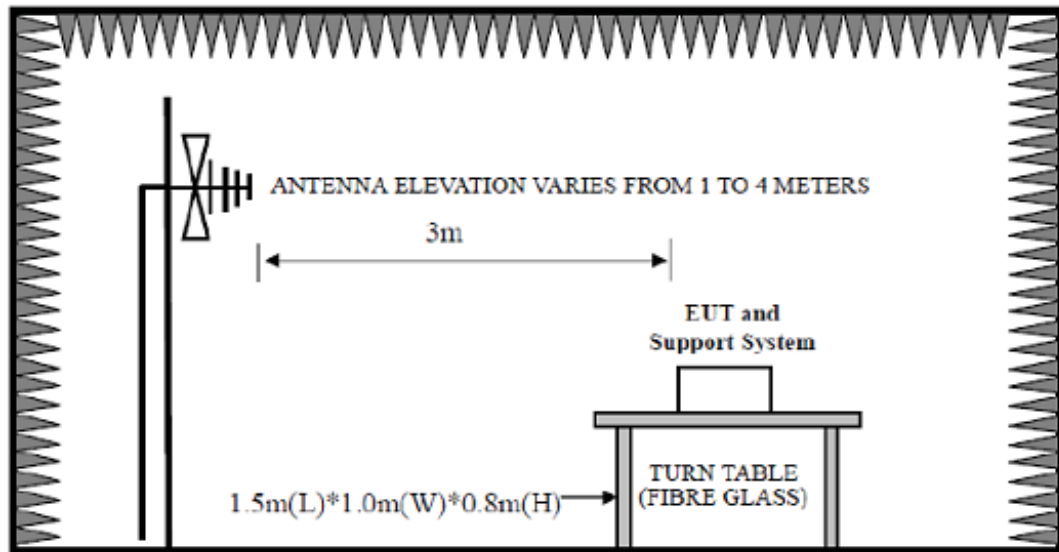
5.3. Test Data

TX 915 MHz



6. BAND EDGE COMPLIANCE

6.1. Block Diagram of Test setup



6.2. Test Procedure

EUT was placed on a turn table, which is 0.8 meter high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

The bandwidth of the EMI test receiver is set at 120kHz.

The EUT position(X.-axis, Y-axis, Z-axis) were checked and worse case was happened in Y-axis position. So Y-axis position was chose for find measurement.

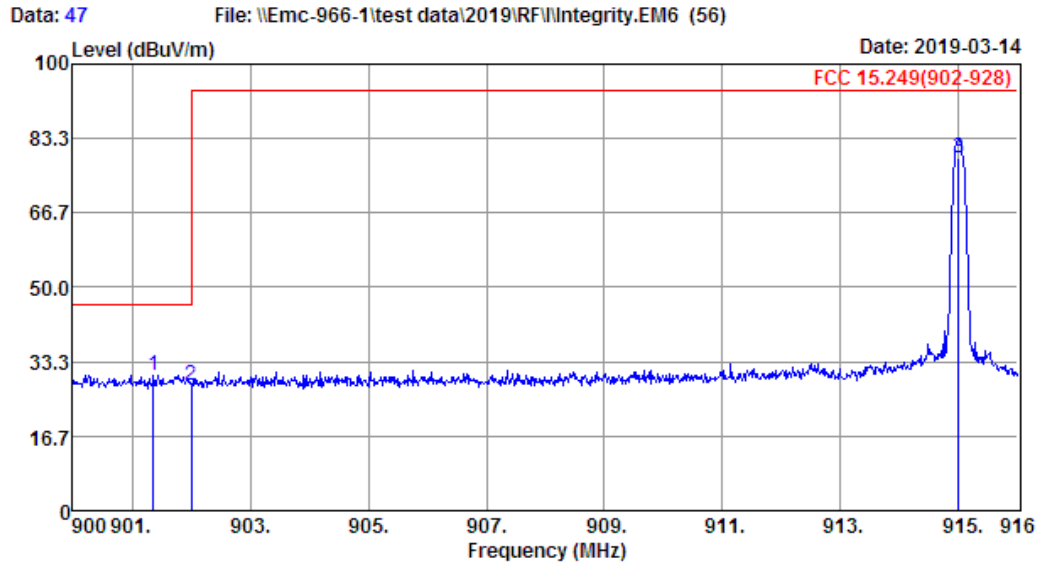
6.3. Test Result

Pass.

6.4. Test Data

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Site no. : 1# 966 Chamber Data no. : 47
 Dis. / Ant. : 3m 37062 Ant. pol. : HORIZONTAL
 Limit : FCC 15.249(902-928)
 Env. / Ins. : Temp:23.5'; Humi:52.4%; Press:101.52kPa
 Engineer : Viking
 EUT : 4 Channels amplifier
 Power : DC 24V From Adapter Input AC 120V/60Hz
 M/N : Z4-B
 Test Mode : TX 915MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	901.36	23.72	3.90	2.82	30.44	46.00	15.56	QP
2	902.00	23.74	3.89	0.38	28.01	46.00	17.99	QP
3	915.00	23.99	3.97	51.17	79.13	94.00	14.87	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.

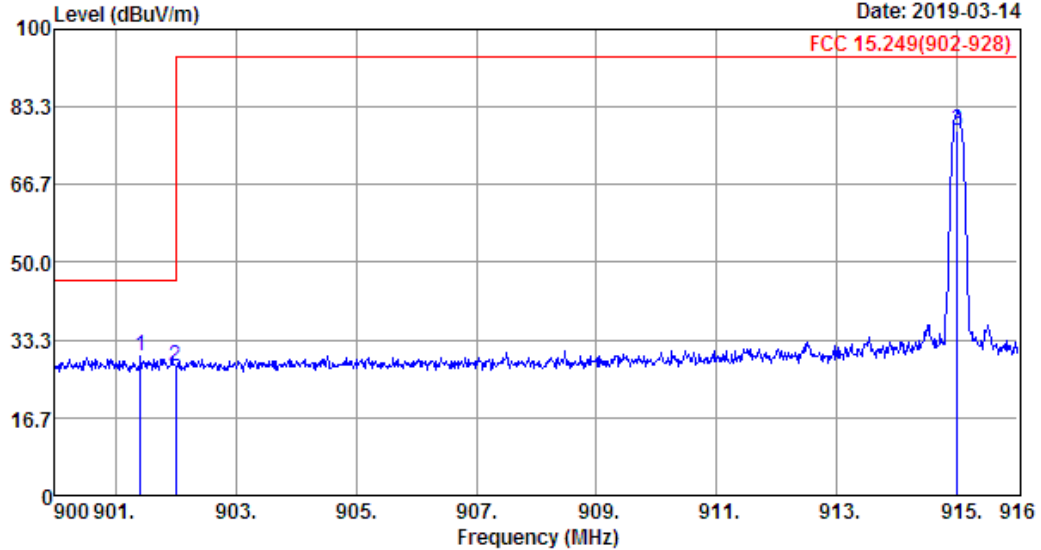
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Data: 48

File: \\Emc-966-1\\test data\\2019\\RF\\Integrity.EM6 (56)

Date: 2019-03-14



Site no. : 1# 966 Chamber Data no. : 48
 Dis. / Ant. : 3m 37062 Ant. pol. : VERTICAL
 Limit : FCC 15.249(902-928)
 Env. / Ins. : Temp:23.5';Humi:52.4%;Press:101.52kPa
 Engineer : Viking
 EUT : 4 Channels amplifier
 Power : DC 24V From Adapter Input AC 120V/60Hz
 M/N : 24-B
 Test Mode : TX 915MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	901.42	23.72	3.90	2.18	29.80	46.00	16.20	QP
2	902.00	23.74	3.89	0.18	27.81	46.00	18.19	QP
3	915.00	23.99	3.97	50.30	78.26	94.00	15.74	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.

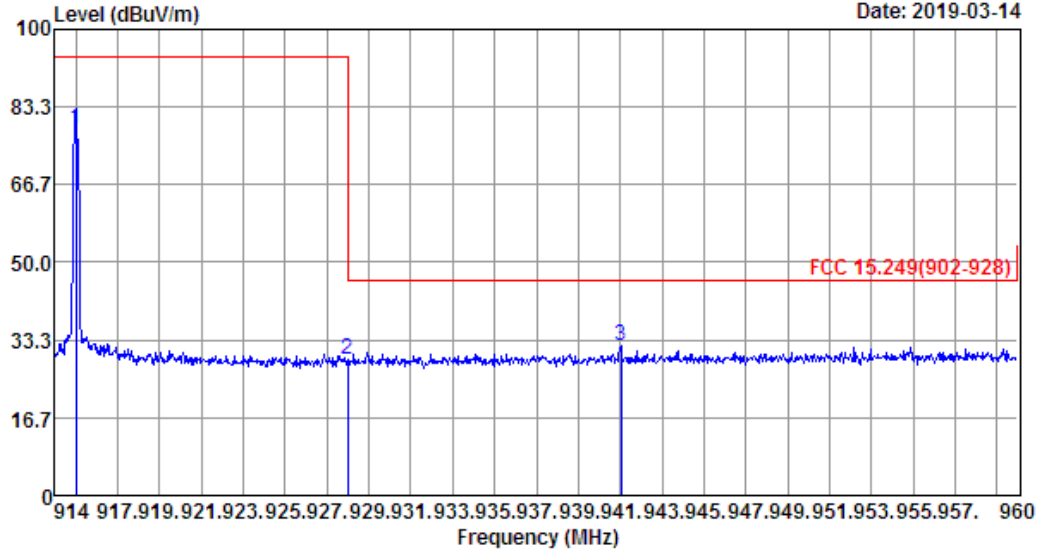
EST Technology

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Data: 49

File: \\Emc-966-1\\test data\\2019\\RF\\Integrity.EM6 (56)

Date: 2019-03-14



Site no. : 1# 966 Chamber Data no. : 49
 Dis. / Ant. : 3m 37062 Ant. pol. : VERTICAL
 Limit : FCC 15.249(902-928)
 Env. / Ins. : Temp:23.5';Humi:52.4%;Press:101.52kPa
 Engineer : Viking
 EUT : 4 Channels amplifier
 Power : DC 24V From Adapter Input AC 120V/60Hz
 M/N : 24-B
 Test Mode : TX 915MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	915.00	23.99	3.97	50.56	78.52	94.00	15.48	QP
2	928.00	24.18	4.13	0.83	29.14	46.00	16.86	QP
3	941.05	24.51	4.38	3.07	31.96	46.00	14.04	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.

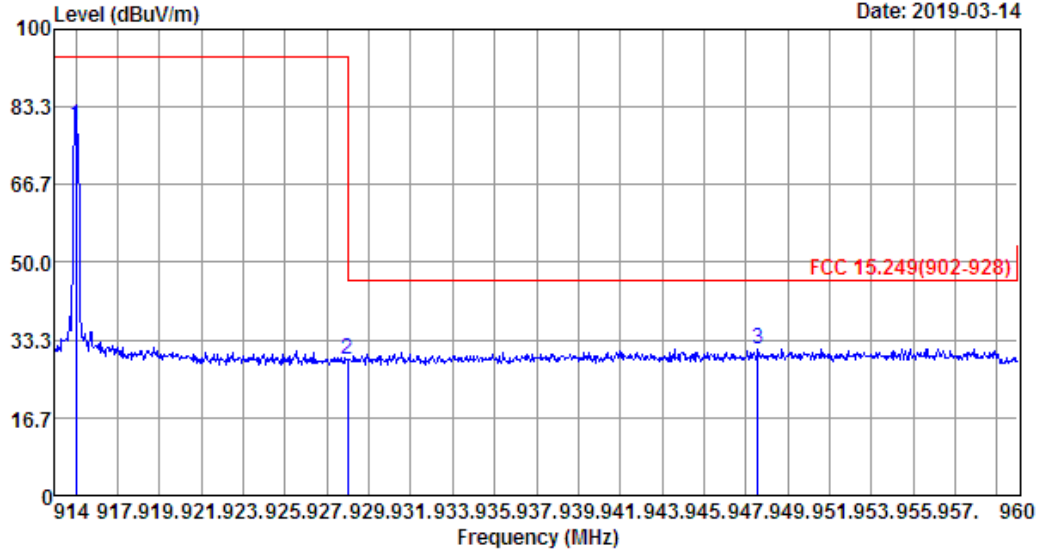
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Data: 50

File: \\Emc-966-1\\test data\\2019\\RF\\Integrity.EM6 (56)

Date: 2019-03-14



Site no. : 1# 966 Chamber Data no. : 50
 Dis. / Ant. : 3m 37062 Ant. pol. : HORIZONTAL
 Limit : FCC 15.249(902-928)
 Env. / Ins. : Temp:23.5';Humi:52.4%;Press:101.52kPa
 Engineer : Viking
 EUT : 4 Channels amplifier
 Power : DC 24V From Adapter Input AC 120V/60Hz
 M/N : 24-B
 Test Mode : TX 915MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	915.00	23.99	3.97	51.37	79.33	94.00	14.67	QP
2	928.00	24.18	4.13	0.70	29.01	46.00	16.99	QP
3	947.58	24.58	4.49	2.47	31.54	46.00	14.46	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.

7. ANTENNA REQUIREMENTS

7.1. Limit

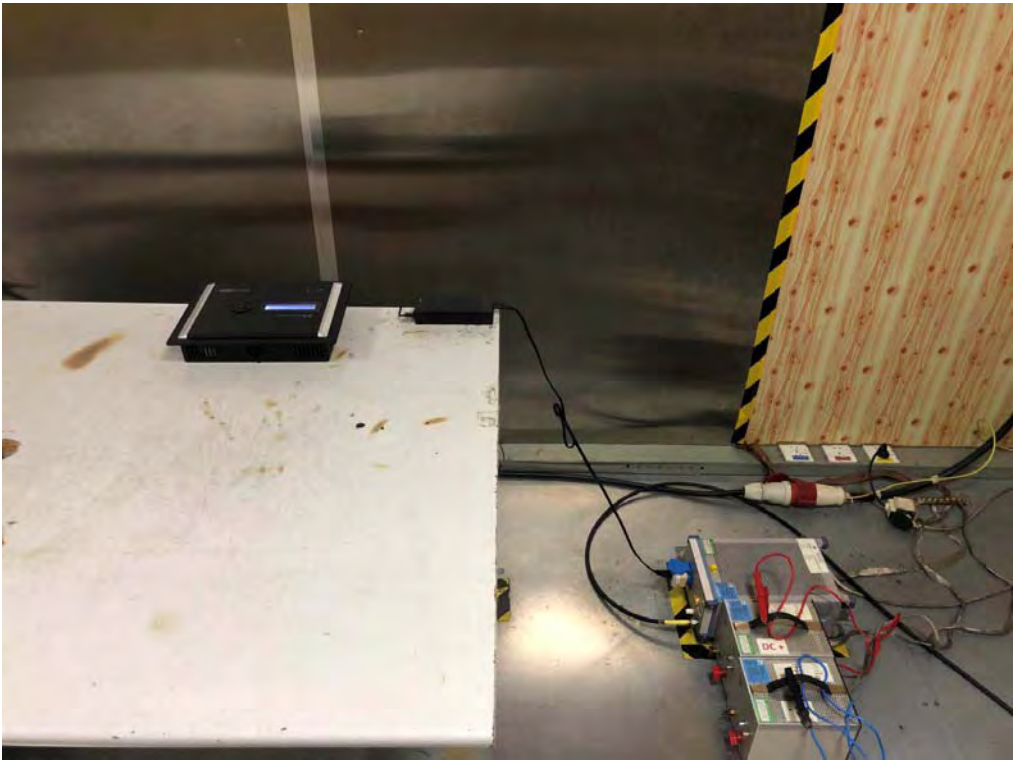
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.249 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

7.2. Result

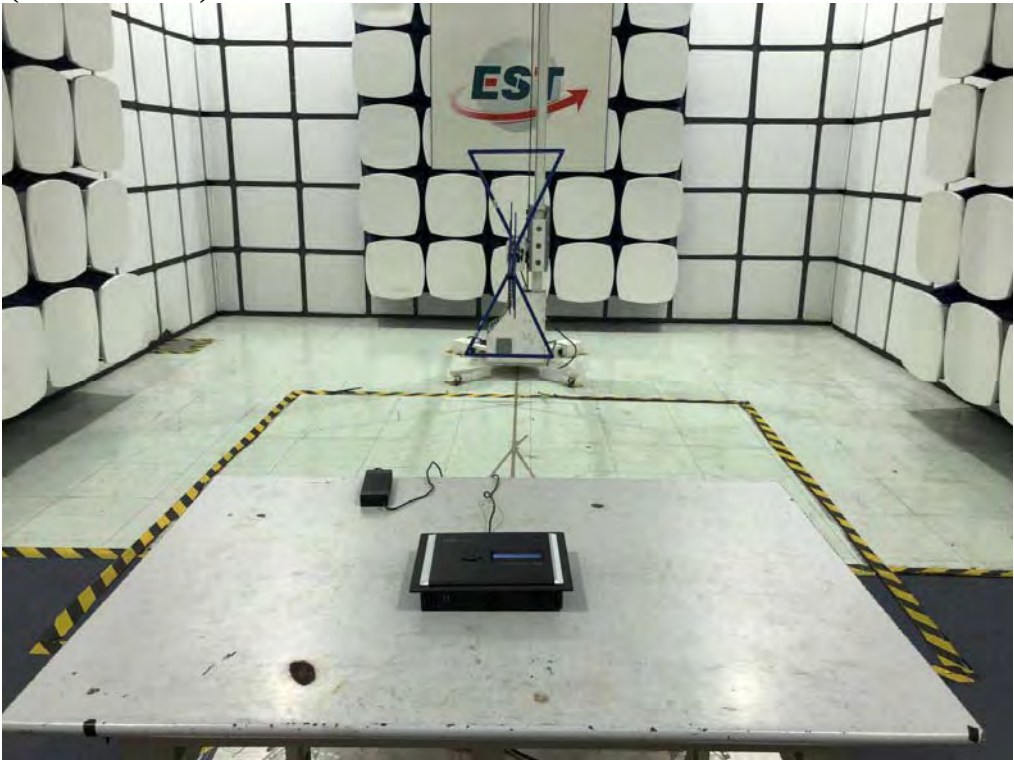
The antennas used for this product are Internal antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 2dBi.

8. TESTSETUP PHOTO

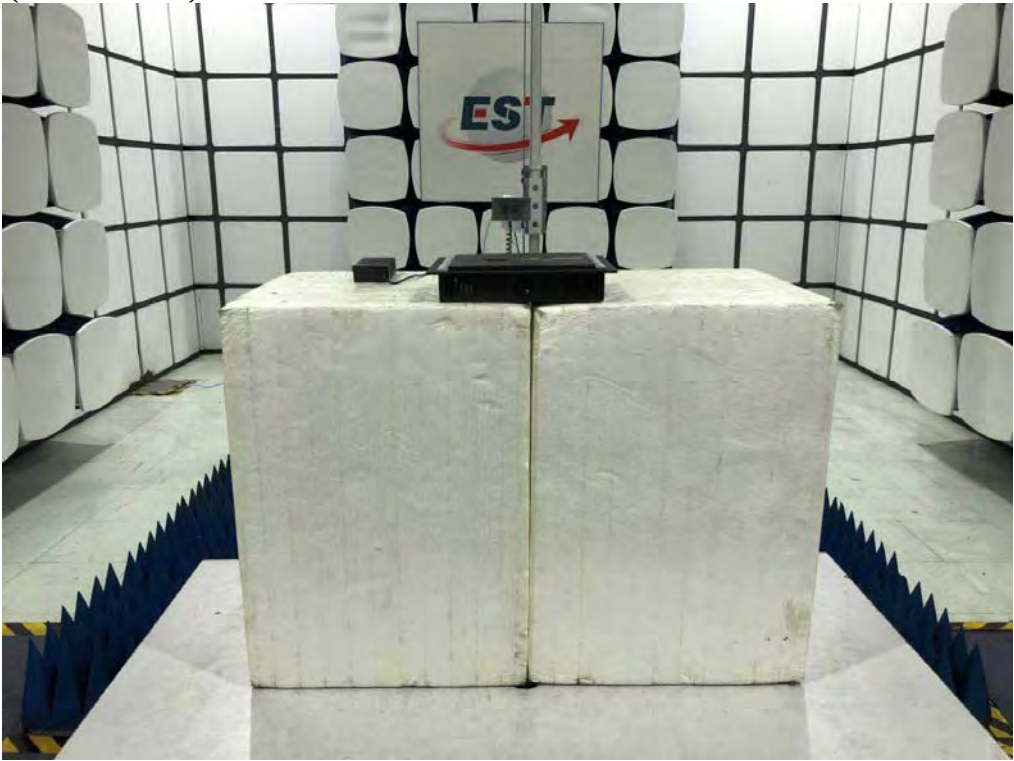
Conducted Test



Radiated Test (30-1000 MHz)

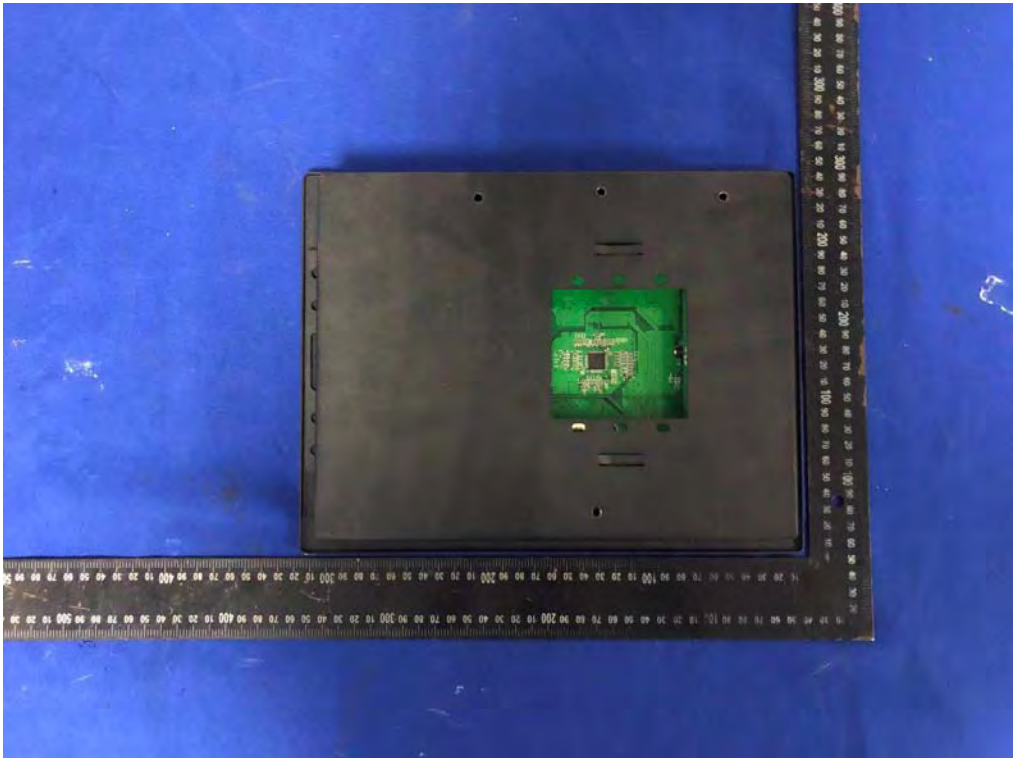


Radiated Test (Above 1GHz)



9. PHOTO OF EUT

External Photos
M/N: Z4-B



External Photos
M/N: Z4-B



External Photos
M/N: Z4-B



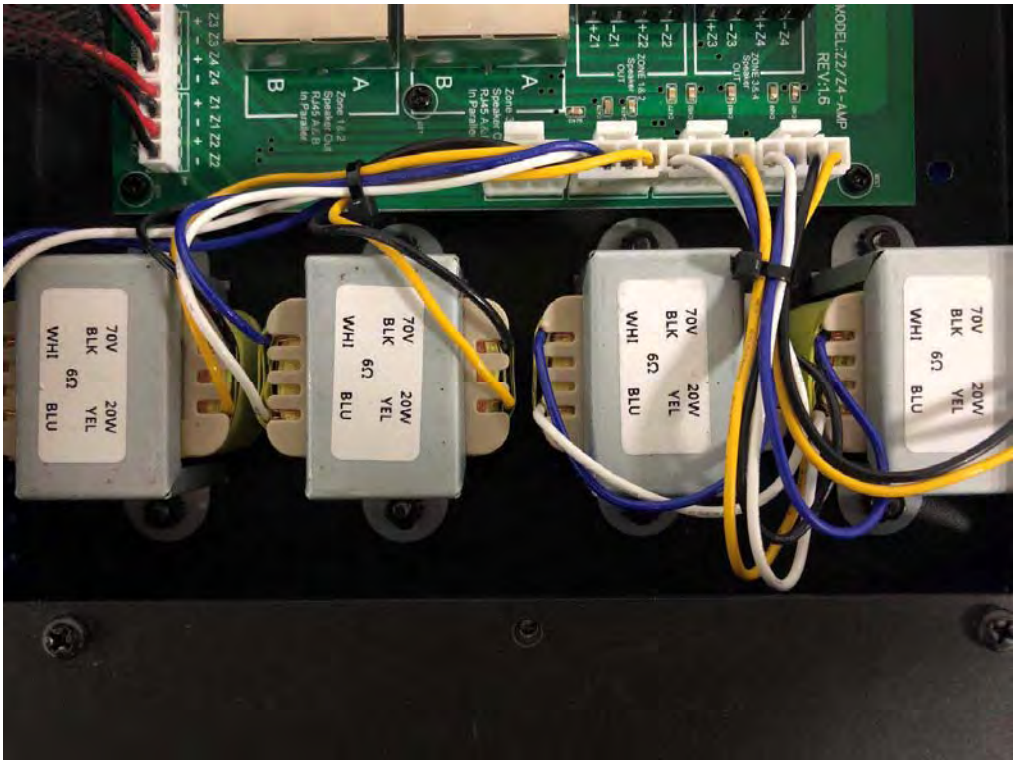
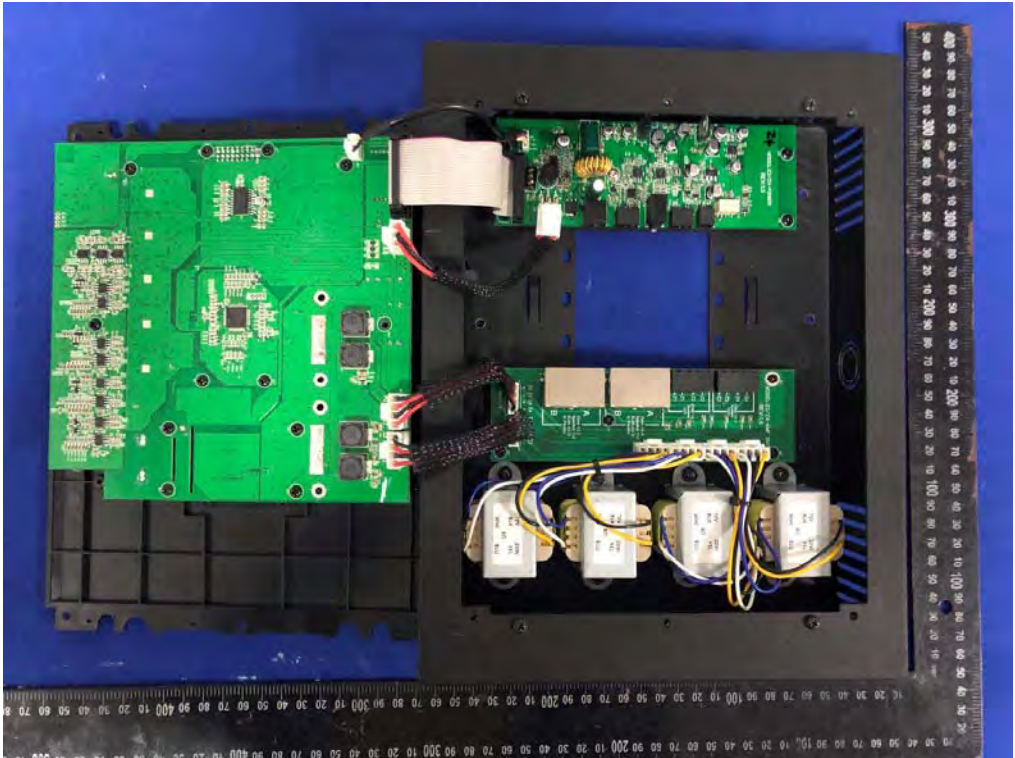
External Photos
M/N: Z4-B



External Photos
M/N: Z4-B



Internal Photos
M/N: Z4-B



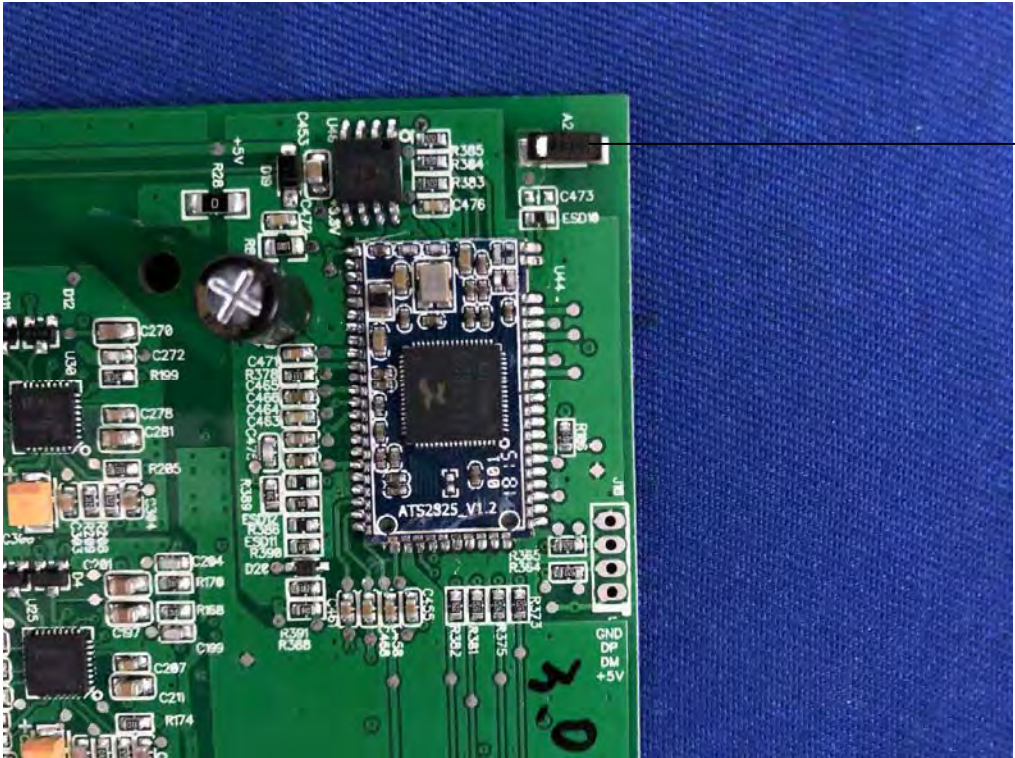
Internal Photos
M/N: Z4-B



Internal Photos
M/N: Z4-B

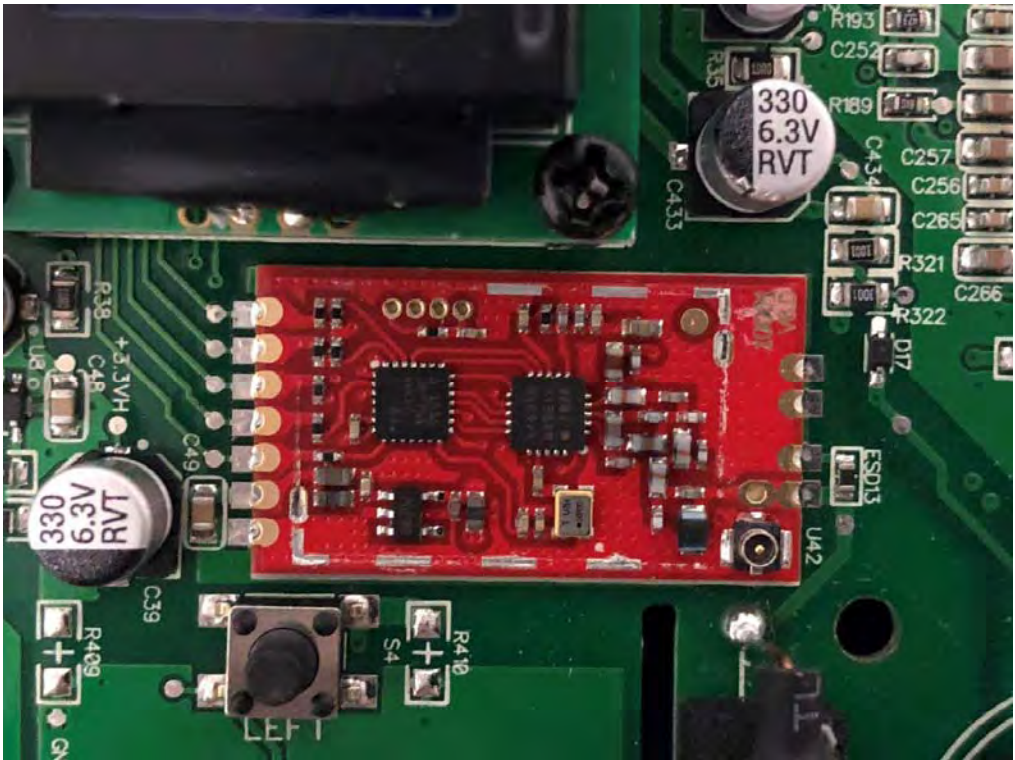


UHF
Antenna

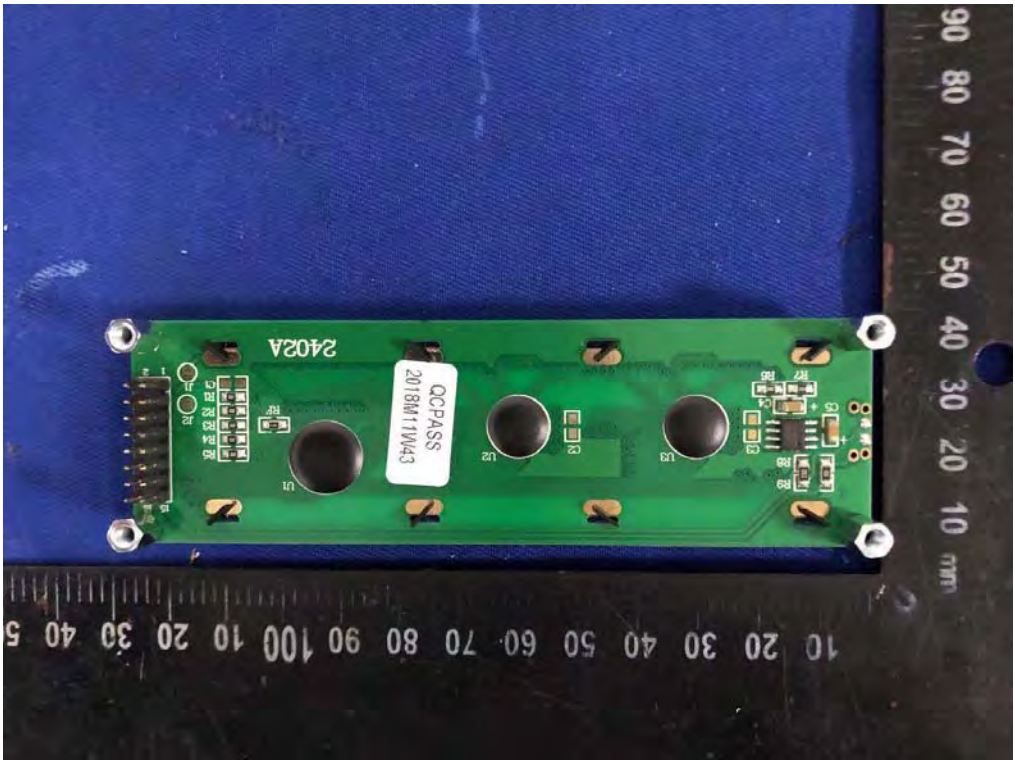
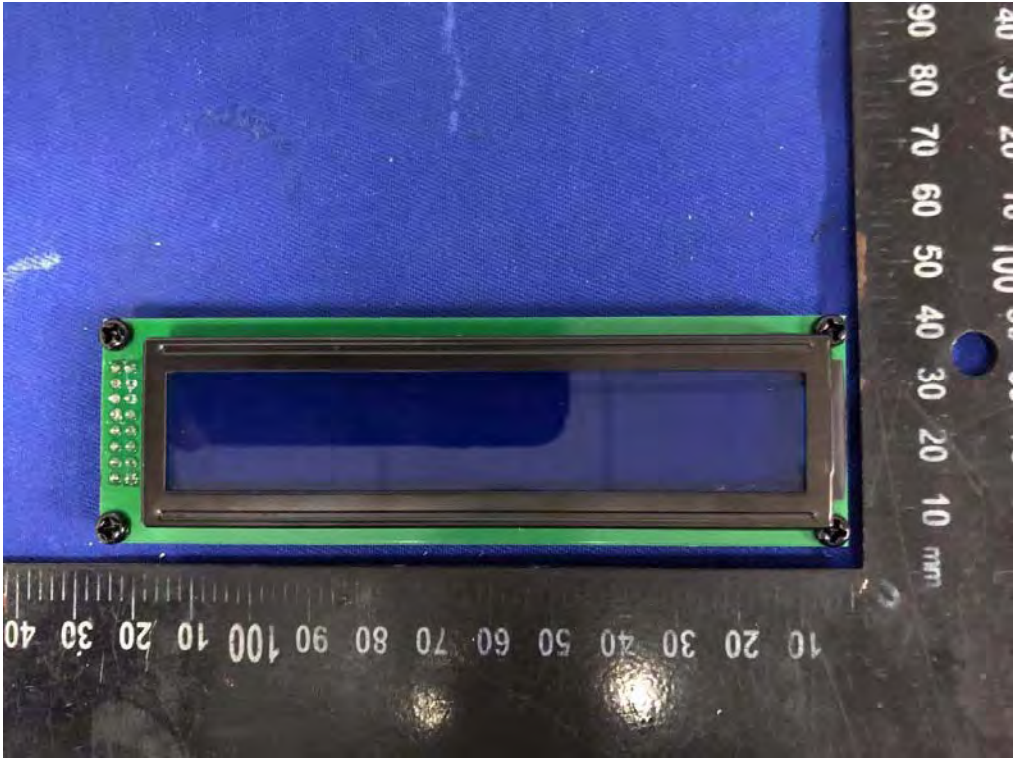


Bluetooth
Antenna

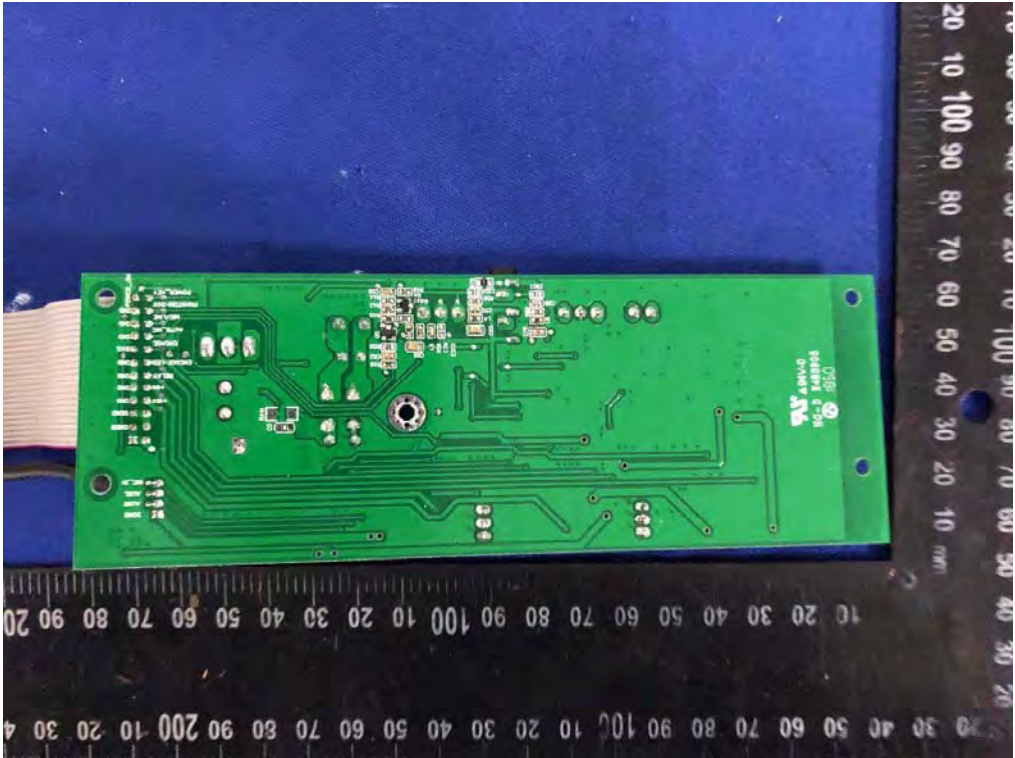
Internal Photos
M/N: Z4-B



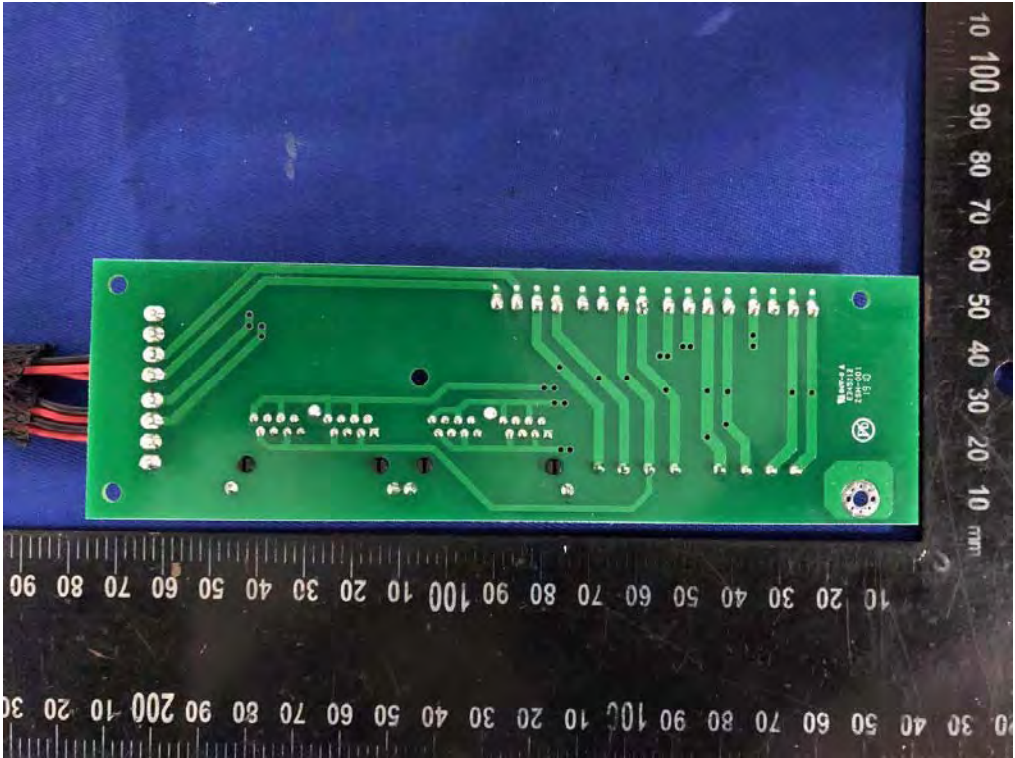
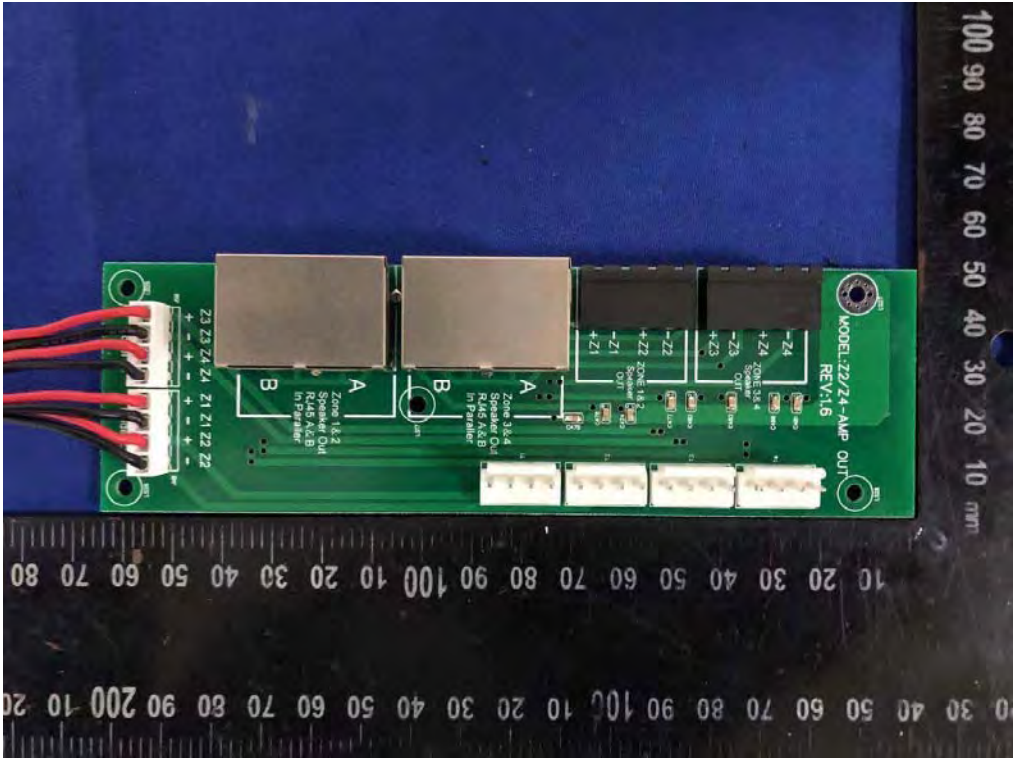
Internal Photos
M/N: Z4-B



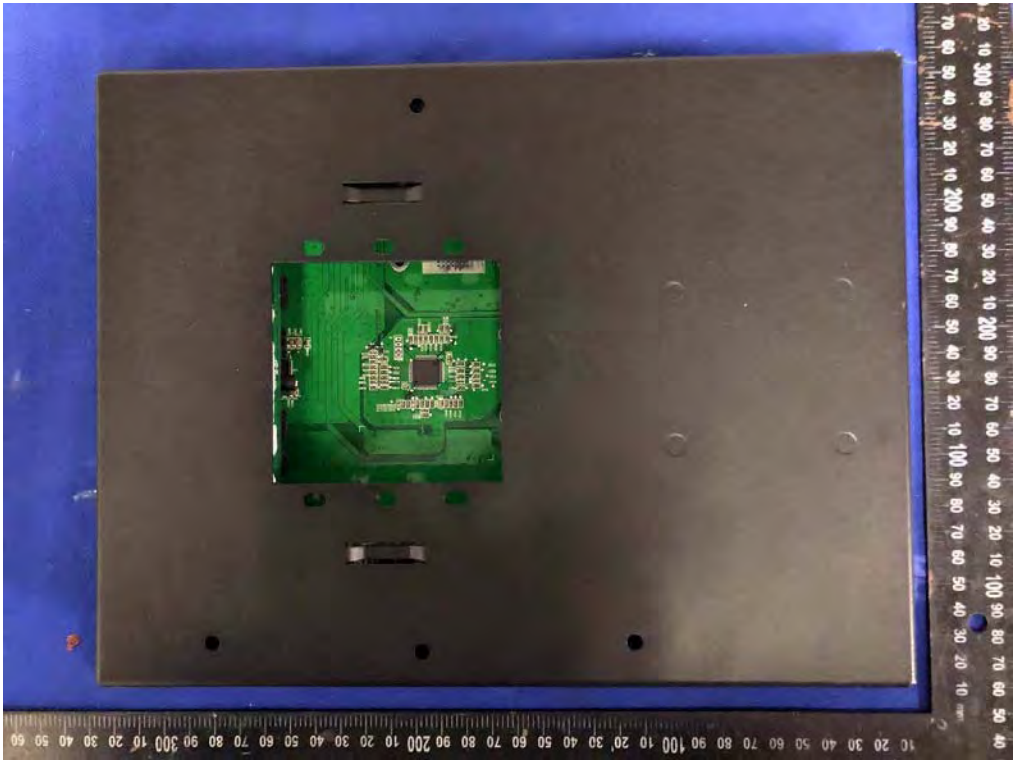
Internal Photos
M/N: Z4-B



Internal Photos
M/N: Z4-B



External Photos
M/N: Z2-B



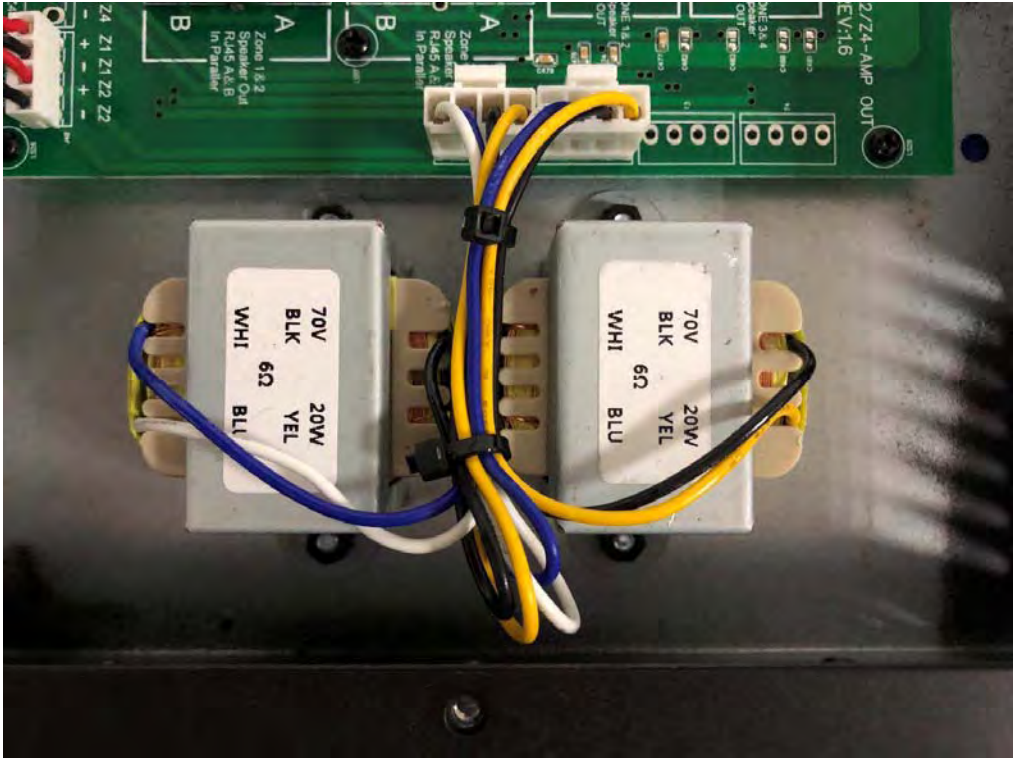
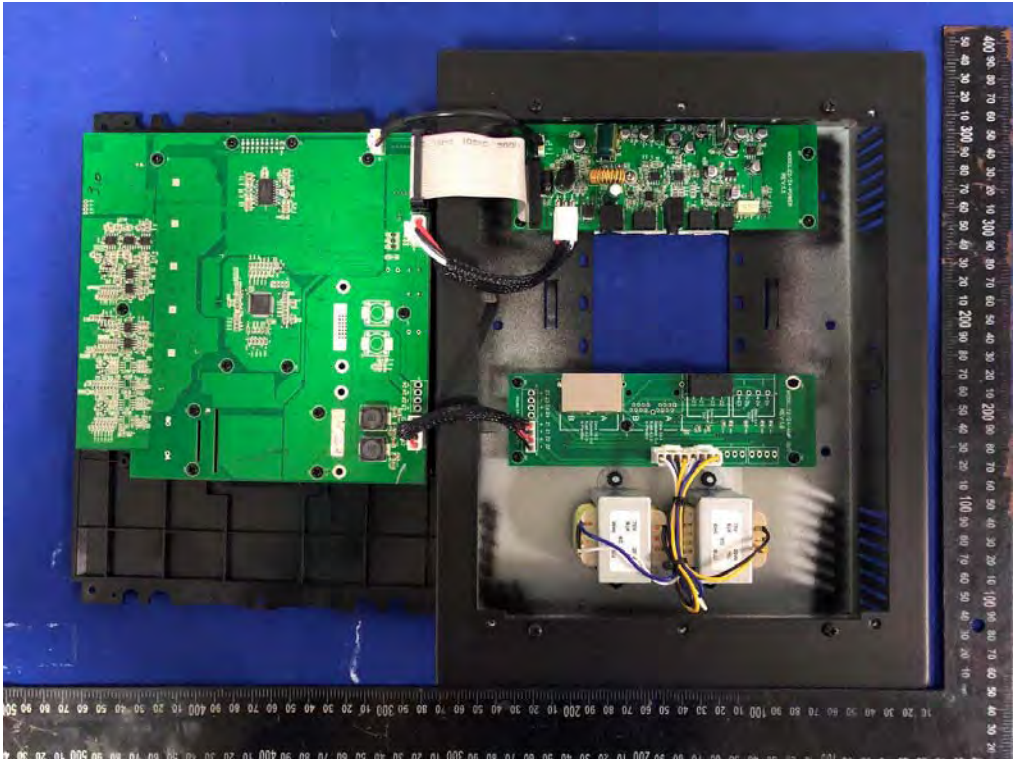
External Photos
M/N: Z2-B



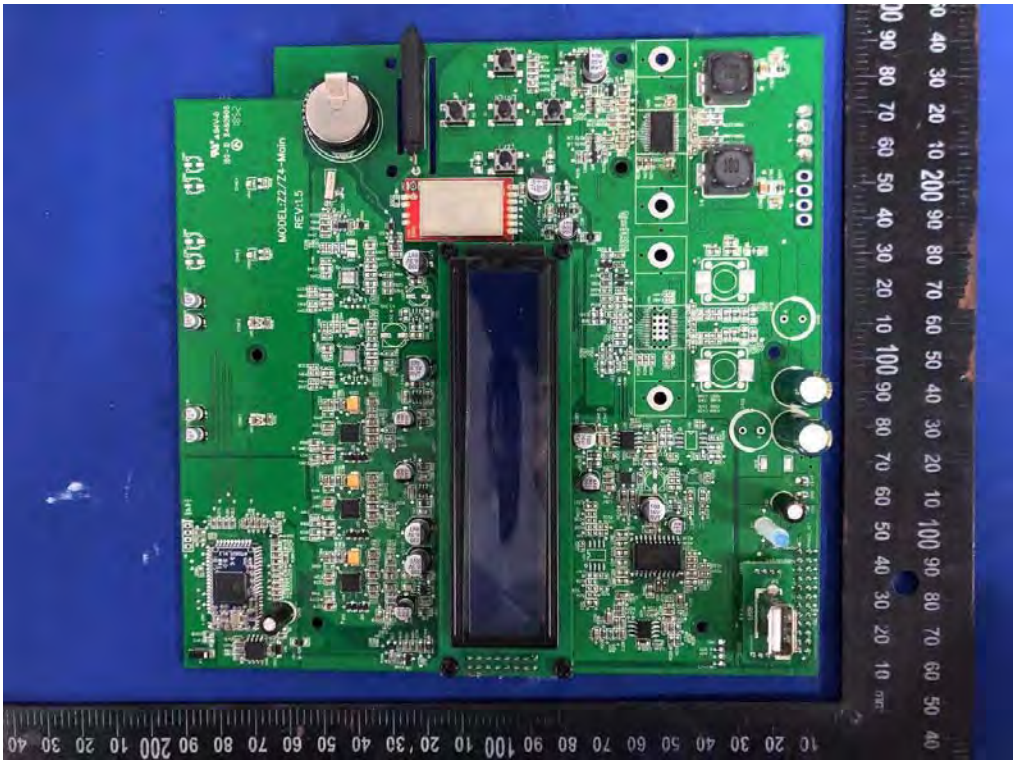
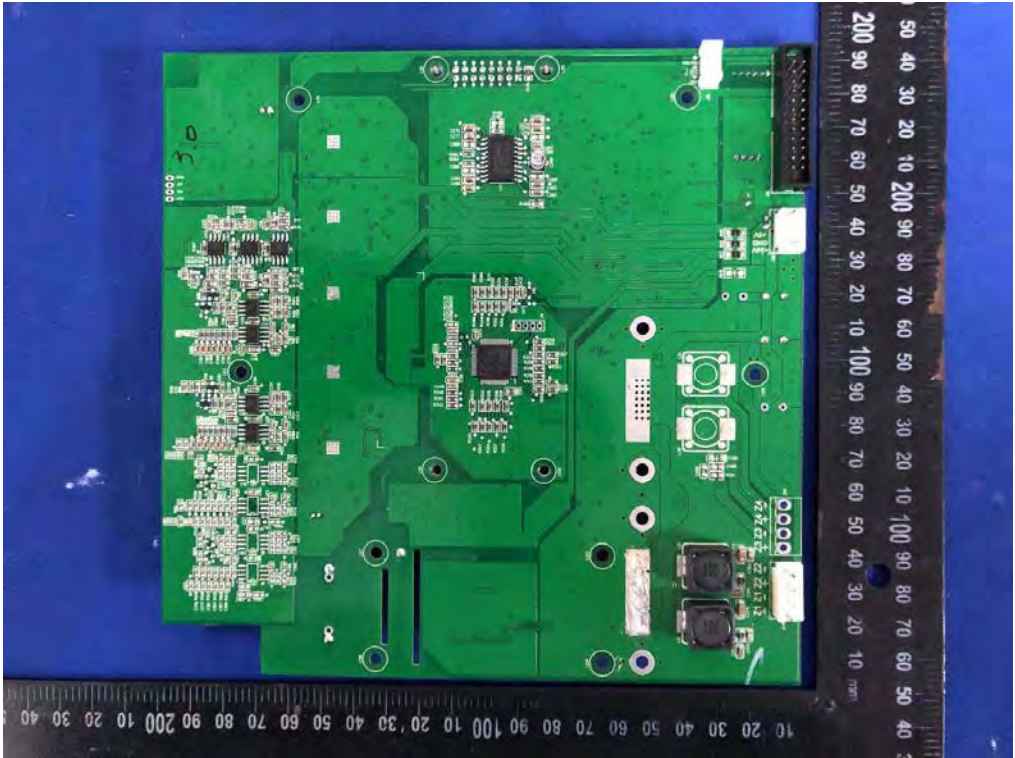
External Photos
M/N: Z2-B



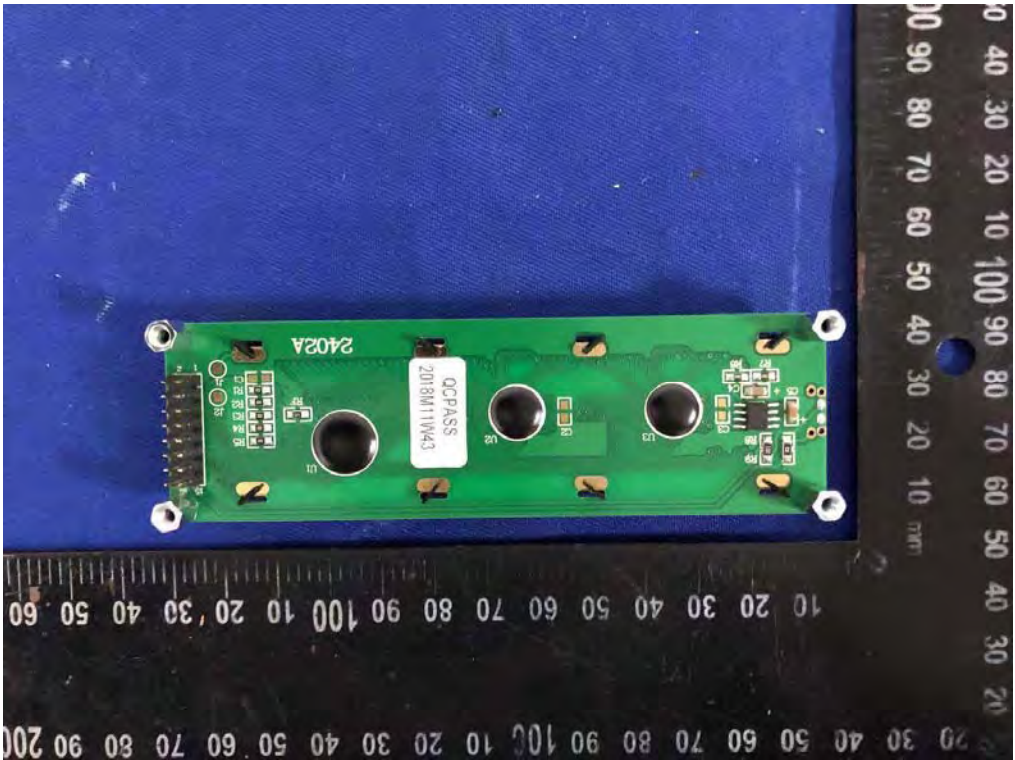
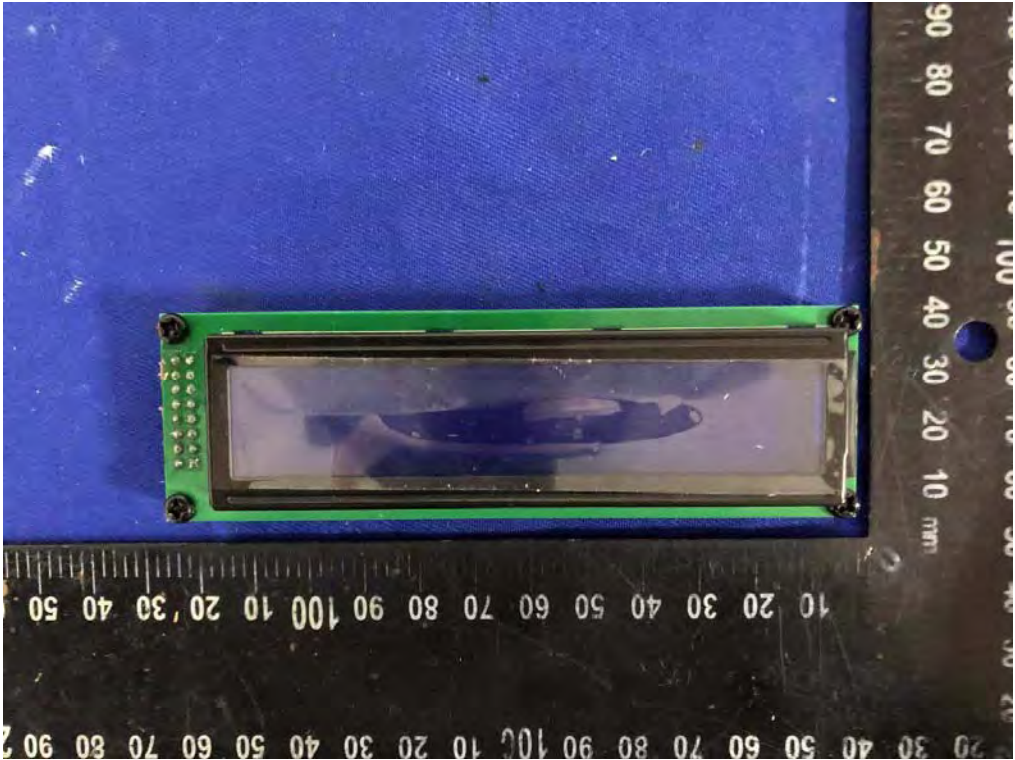
Internal Photos
M/N: Z2-B



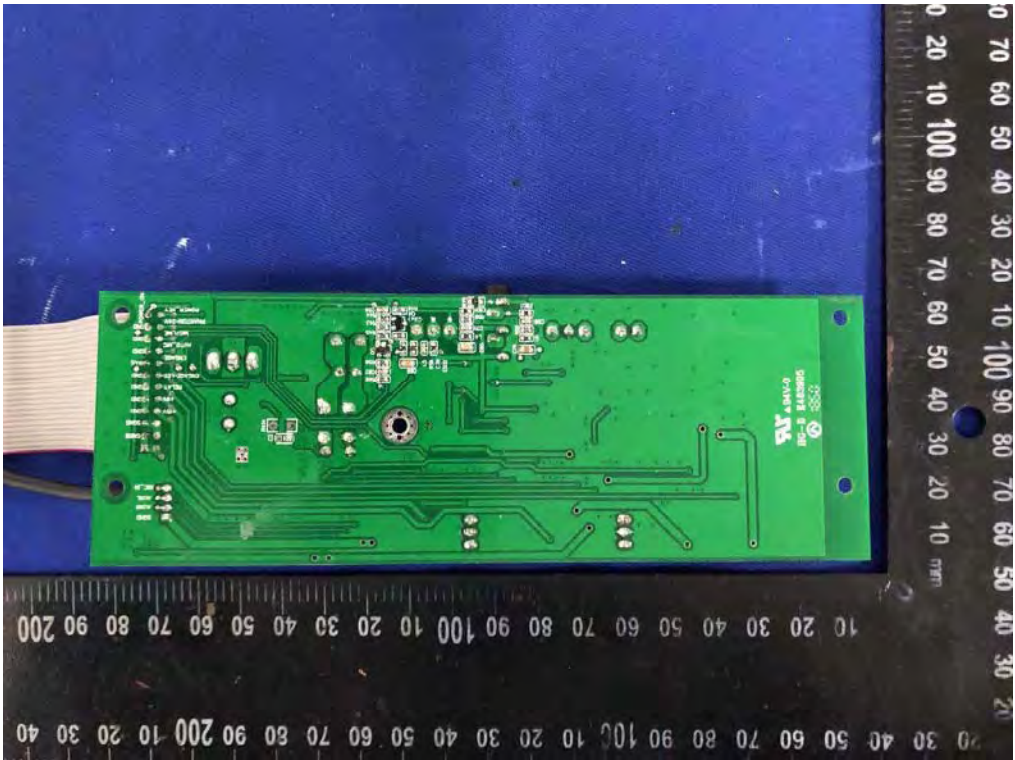
Internal Photos
M/N: Z2-B



Internal Photos
M/N: Z2-B



Internal Photos
M/N: Z2-B



Internal Photos
M/N: Z2-B

