



TESTING LABORATORY
CERTIFICATE#4323.01



FCC PART 15B

TEST REPORT

For

AKUVOX (XIAMEN) NETWORKS CO., LTD.

10/F, No.56, Software Park II , Xiamen, China

FCC ID: 2AHCR-X916S

Report Type:	Product Type:
Original Report	Door Phone
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Report Number:	RXM201016050-00A
Report Date:	2021-03-29
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	AKUVOX (XIAMEN) NETWORKS CO., LTD.
Test Model	X916S
Product	Door Phone
Rate Voltage	DC 24 power by adapter or DC 48V power by POE
*Highest Operation Frequency	2480 MHz

Adapter Information:

Model: SW-0692

Input: AC100-240V, 2.0A, 50~60Hz

Output: DC24V, 2.5A

**Note: The highest operation frequency was declared by the applicant.*

**All measurement and test data in this report was gathered from production sample serial number: RXM201016050-1. (Assigned by the BACL. The EUT supplied by the applicant was received on 2020-10-16.)*

Objective

This report is prepared on behalf of *AKUVOX (XIAMEN) NETWORKS CO., LTD.* in accordance with Part 2-Subpart J, and Part 15-Subparts A and B of the Federal Communication Commission's rules.

The objective of the manufacturer is to determine the compliance of EUT with FCC Part 15, Class B device.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS submittal with FCC ID: 2AHCR-X916S

FCC Part 15.247 DSS submittal with FCC ID: 2AHCR-X916S

FCC Part 15.225 DXX submissions with FCC ID: 2AHCR-X916S

Test Methodology

All measurements contained in this report were conducted with 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.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

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

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical mode (as normally used by a typical user).

Test Mode 1: Adapter power supply + LAN Link

Test Mode 2: POE power supply + LAN Link

EUT Exercise Software

No exercise software was used to test.

Special Accessories

No special accessory was used.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
NETGEAR	POE	GS308P	/
NETGEAR	POE Adapter	2ABF060R	/
ASUS	monitor	VG249	/
DELL	Notebook	E7440	/

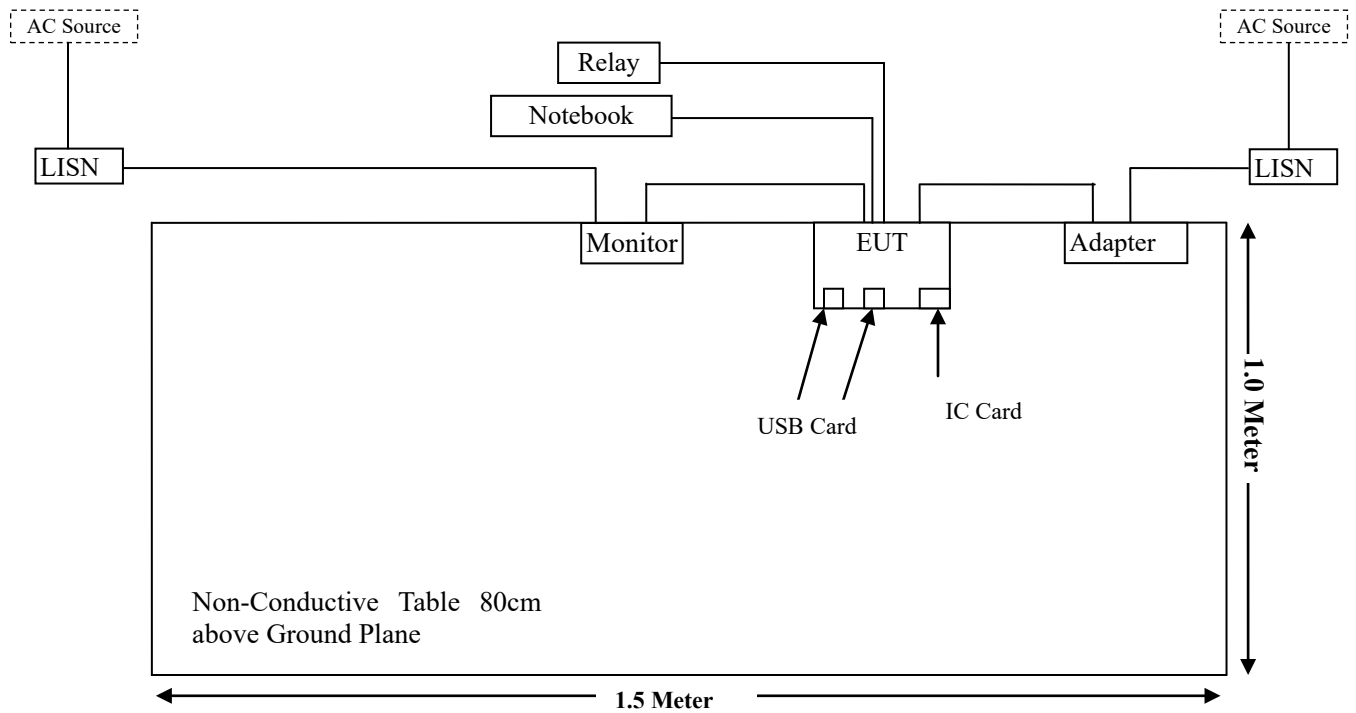
External I/O Cable

Cable Description	Length (m)	From	To
RJ45 Cable	1.0	EUT	Notebook
Signal Cable	1.0	EUT	Relay
HDMI Cable	0.8	EUT	monitor
Power Cable 1	0.8	EUT	adapter
Power Cable 2	1.2	EUT	POE
Power Cable 3	1.0	POE	adapter
Power Cable 4	1.0	adapter	LISN/AC source

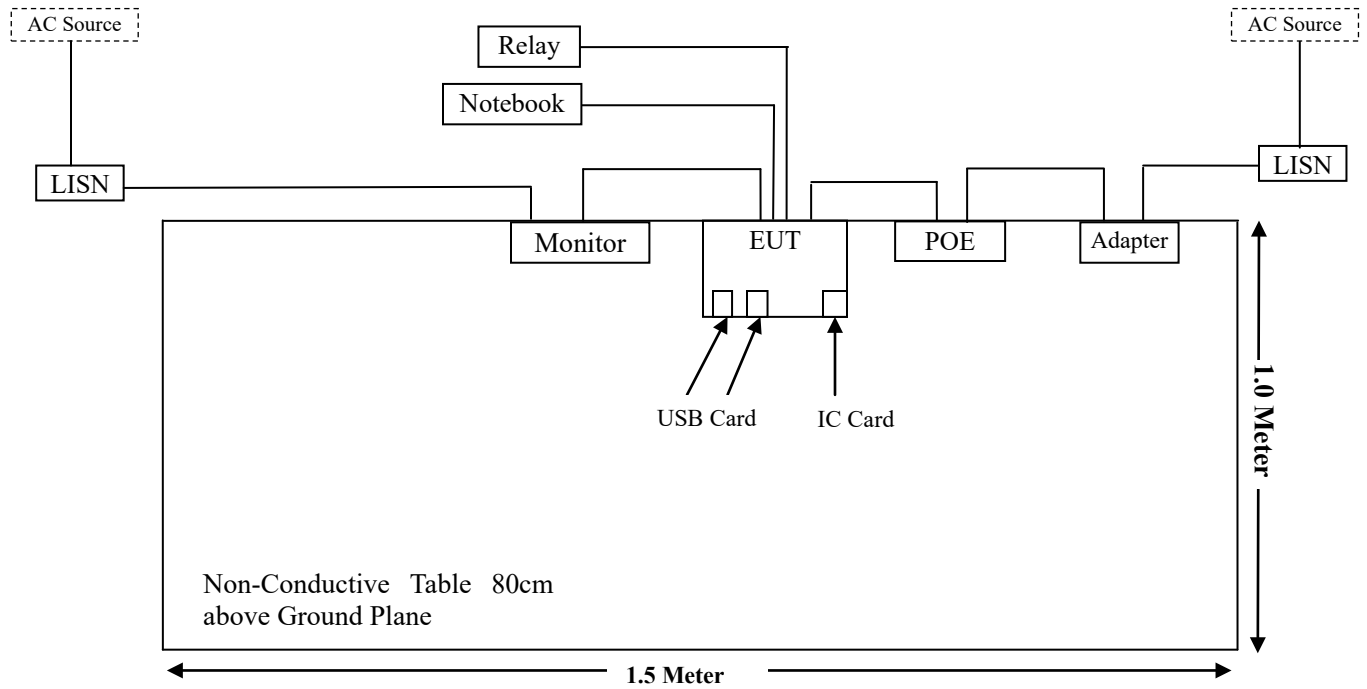
Block Diagram of Test Setup

For Conducted Emissions:

Test Mode 1:

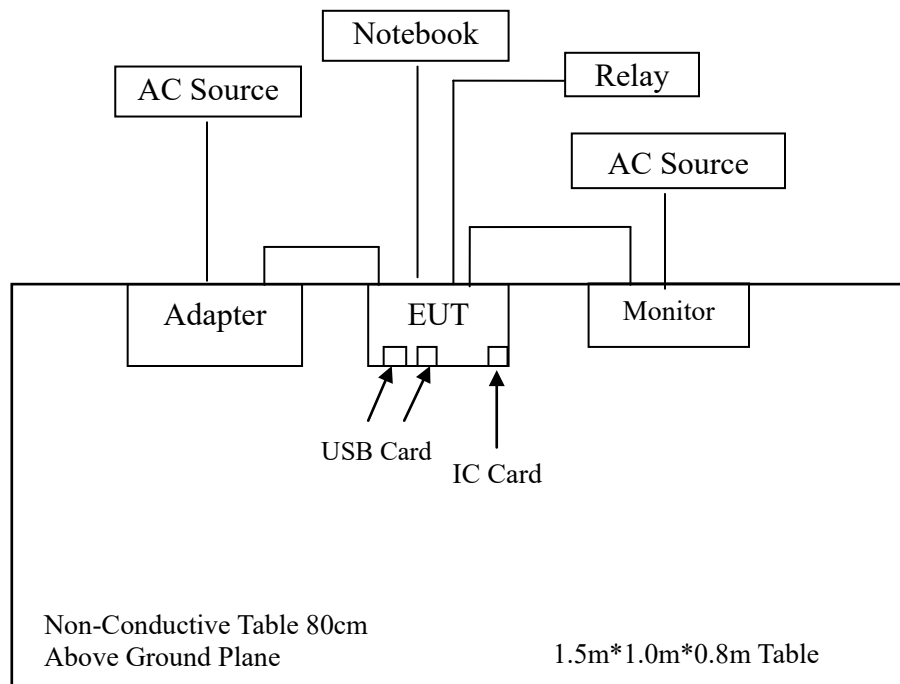


Test Mode 2:

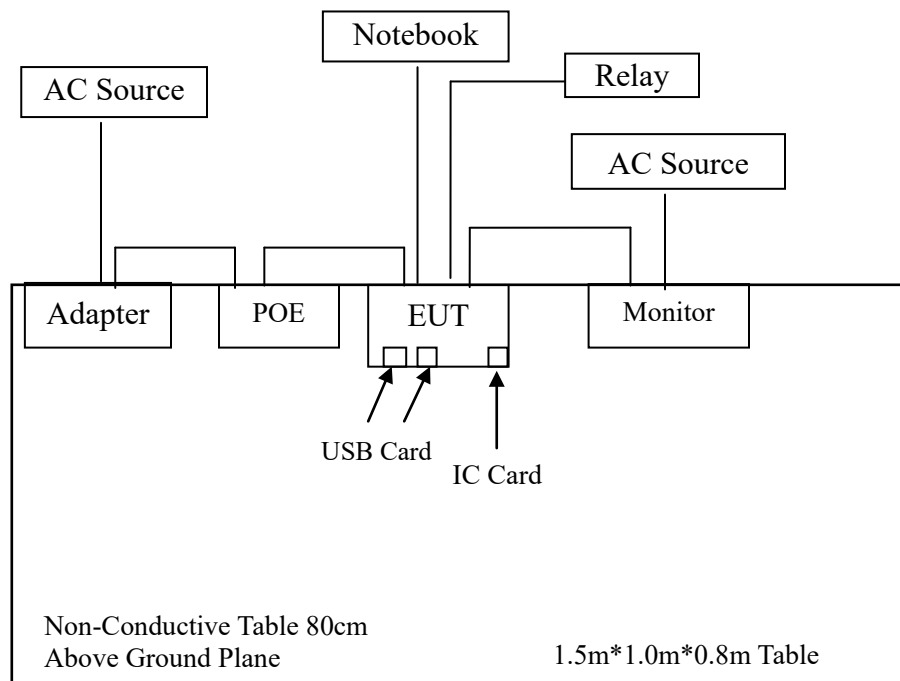


For Radiated Emissions:

Test mode 1:



Test Mode 2:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	Conducted Emissions	Compliant
§15.109	Radiated Emissions	Compliant

FCC §15.107 - CONDUCTED EMISSIONS

Applicable Standard

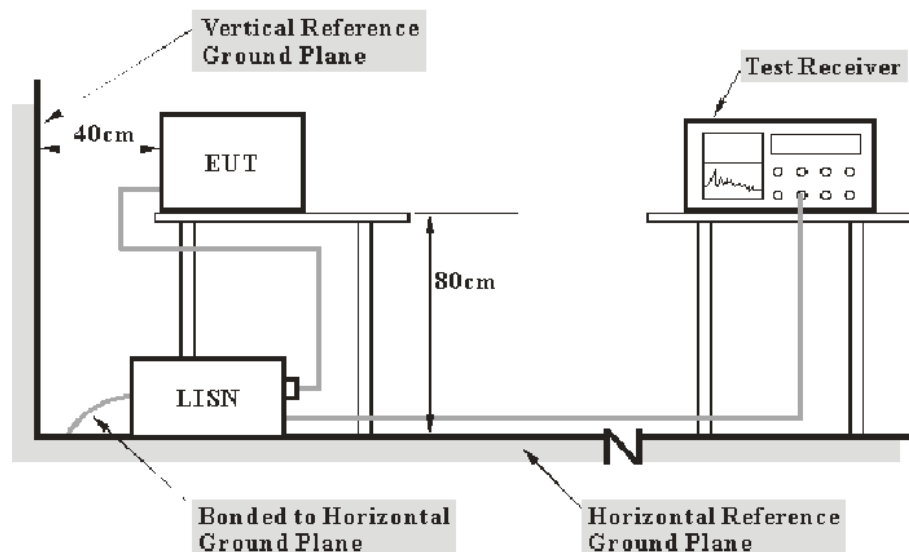
According to FCC§15.107

Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN and receiver, LISN voltage division factor, LISN VDF frequency interpolation and receiver related input quantities, etc.

Item		Terminal	Measurement Uncertainty	U_{cispr}
Conducted Emission	150kHz~30MHz	AC Mains	3.19 dB	3.4 dB

EUT Setup



- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.4-2014. The related limit was specified in FCC Part 15.107 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03 -101746-zn	2020-07-28	2021-07-27
Rohde & Schwarz	LISN	ENV216	101115	2020-11-27	2021-11-26
COM-POWER	LISN	LI-3P-132	20200002	2020-11-27	2021-11-26
Audix	Test Software	e3	V9	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-15	015	2020-08-15	2021-08-14
Rohde & Schwarz	Pulse limiter	ESH3-Z2	100552	2020-08-10	2021-08-09

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

Factor & Over Limit Calculation

The Factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Attenuator. The basic equation is as follows:

$$\text{Factor (dB)} = \text{LISN VDF (dB)} + \text{Cable Loss (dB)} + \text{Attenuator (dB)}$$

The “**Over Limit**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit of 7 dB means the emission is 7 dB above the limit. The equation for Over Limit calculation is as follows:

$$\text{Over Limit (dB)} = \text{Read level (dB}\mu\text{V)} + \text{Factor (dB)} - \text{Limit (dB}\mu\text{V)}$$

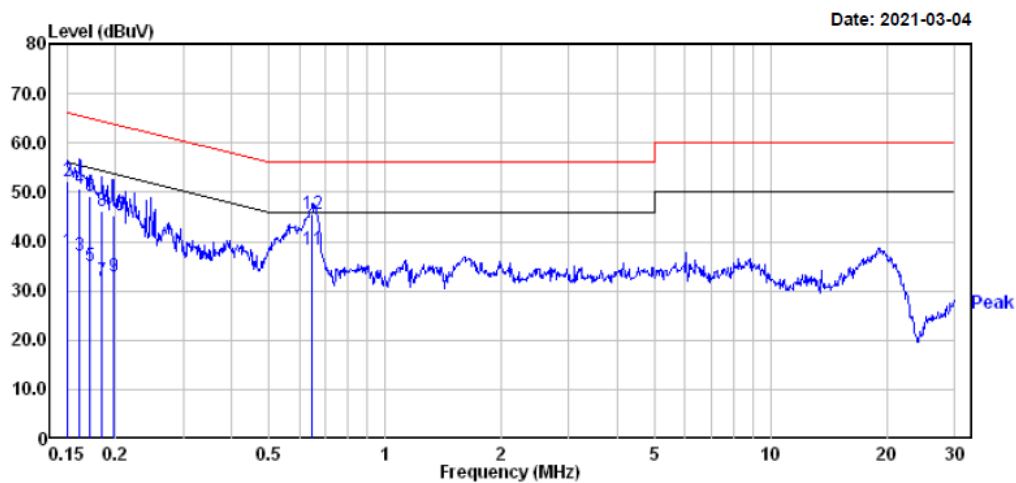
Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	101.0 kPa

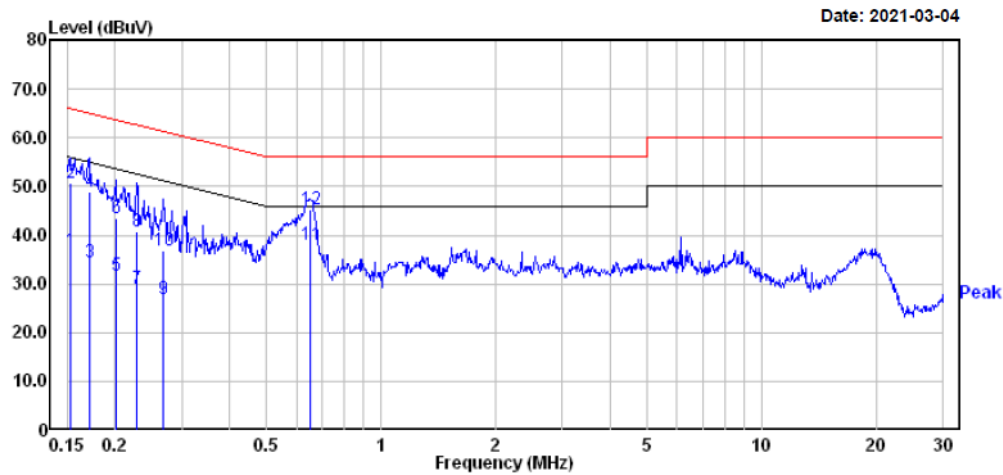
The testing was performed by Kaka Lei on 2021-03-04.

Test mode 1:

Line:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.150	18.10	19.82	37.92	56.00	-18.08	Average
2	0.150	32.40	19.82	52.22	66.00	-13.78	QP
3	0.162	17.30	19.83	37.13	55.38	-18.25	Average
4	0.162	31.00	19.83	50.83	65.38	-14.55	QP
5	0.172	15.20	19.83	35.03	54.86	-19.83	Average
6	0.172	29.40	19.83	49.23	64.86	-15.63	QP
7	0.184	12.31	19.82	32.13	54.28	-22.15	Average
8	0.184	26.41	19.82	46.23	64.28	-18.05	QP
9	0.198	13.20	19.82	33.02	53.71	-20.69	Average
10	0.198	25.50	19.82	45.32	63.71	-18.39	QP
11	0.647	18.60	19.75	38.35	46.00	-7.65	Average
12	0.647	25.70	19.75	45.45	56.00	-10.55	QP

Neutral:

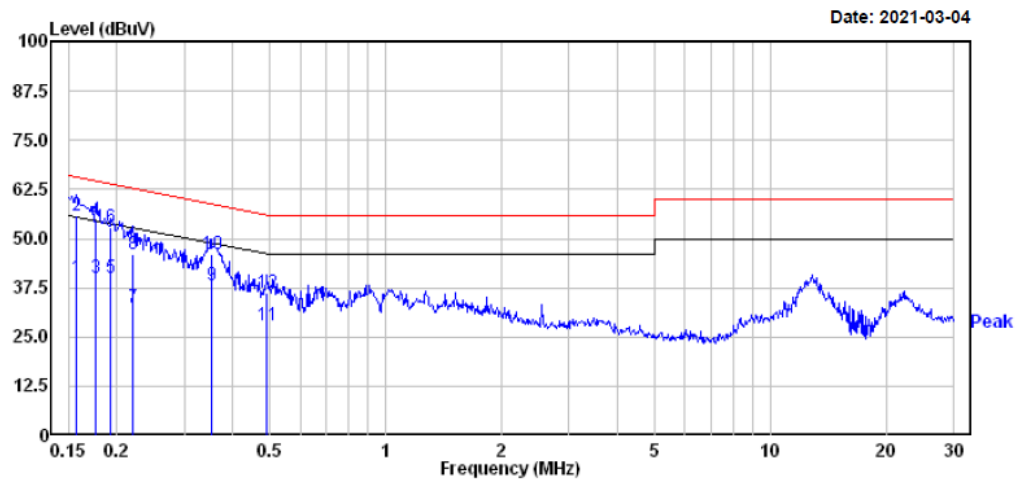
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.152	17.00	19.82	36.82	55.87	-19.05	Average
2	0.152	31.00	19.82	50.82	65.87	-15.05	QP
3	0.171	14.60	19.83	34.43	54.90	-20.47	Average
4	0.171	29.00	19.83	48.83	64.90	-16.07	QP
5	0.201	11.80	19.82	31.62	53.58	-21.96	Average
6	0.201	23.70	19.82	43.52	63.58	-20.06	QP
7	0.228	9.20	19.82	29.02	52.52	-23.50	Average
8	0.228	21.00	19.82	40.82	62.52	-21.70	QP
9	0.267	6.90	19.82	26.72	51.20	-24.48	Average
10	0.267	17.00	19.82	36.82	61.20	-24.38	QP
11	0.651	18.40	19.75	38.15	46.00	-7.85	Average
12	0.651	25.60	19.75	45.35	56.00	-10.65	QP

Note:

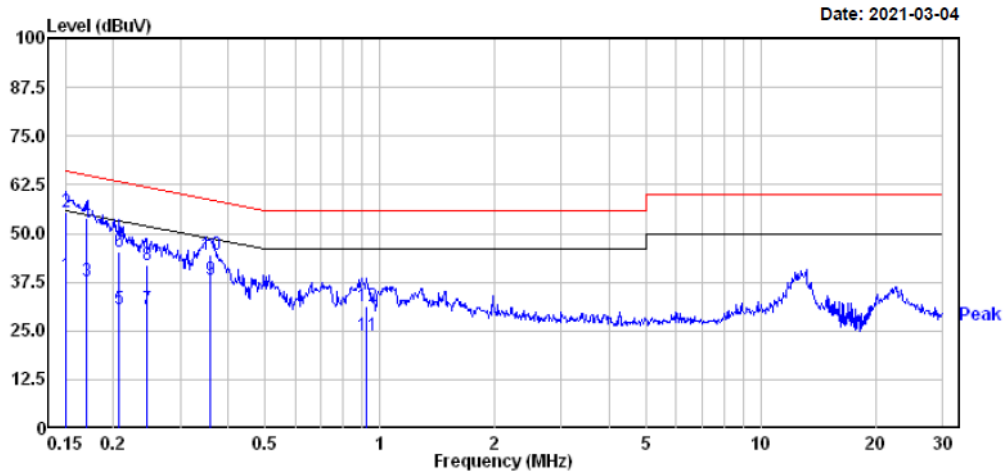
- 1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
- 2) Over Limit (dB) = Read level (dBuV) + Factor (dB) - Limit (dBuV)

Test mode 2:

Line:



		Read			Limit	Over	
	Freq	Level	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.156	20.30	19.82	40.12	55.65	-15.53	Average
2	0.156	35.90	19.82	55.72	65.65	-9.93	QP
3	0.176	20.30	19.83	40.13	54.68	-14.55	Average
4	0.176	34.90	19.83	54.73	64.68	-9.95	QP
5	0.193	20.30	19.82	40.12	53.89	-13.77	Average
6	0.193	32.90	19.82	52.72	63.89	-11.17	QP
7	0.221	12.80	19.82	32.62	52.79	-20.17	Average
8	0.221	26.30	19.82	46.12	62.79	-16.67	QP
9	0.352	18.29	19.81	38.10	48.91	-10.81	Average
10	0.352	26.29	19.81	46.10	58.91	-12.81	QP
11	0.492	8.30	19.76	28.06	46.14	-18.08	Average
12	0.492	16.30	19.76	36.06	56.14	-20.08	QP

Neutral:

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.150	19.50	19.82	39.32	56.00	-16.68	Average
2	0.150	35.80	19.82	55.62	66.00	-10.38	QP
3	0.169	18.00	19.83	37.83	54.99	-17.16	Average
4	0.169	34.30	19.83	54.13	64.99	-10.86	QP
5	0.207	10.70	19.82	30.52	53.32	-22.80	Average
6	0.207	25.60	19.82	45.42	63.32	-17.90	QP
7	0.244	10.80	19.82	30.62	51.95	-21.33	Average
8	0.244	22.20	19.82	42.02	61.95	-19.93	QP
9	0.360	18.49	19.80	38.29	48.74	-10.45	Average
10	0.360	24.59	19.80	44.39	58.74	-14.35	QP
11	0.923	3.90	19.75	23.65	46.00	-22.35	Average
12	0.923	11.50	19.75	31.25	56.00	-24.75	QP

Note:

- 1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
- 2) Over Limit (dB) = Read level (dBuV) + Factor (dB) - Limit (dBuV)

FCC §15.109 - RADIATED EMISSIONS

Applicable Standard

FCC §15.109

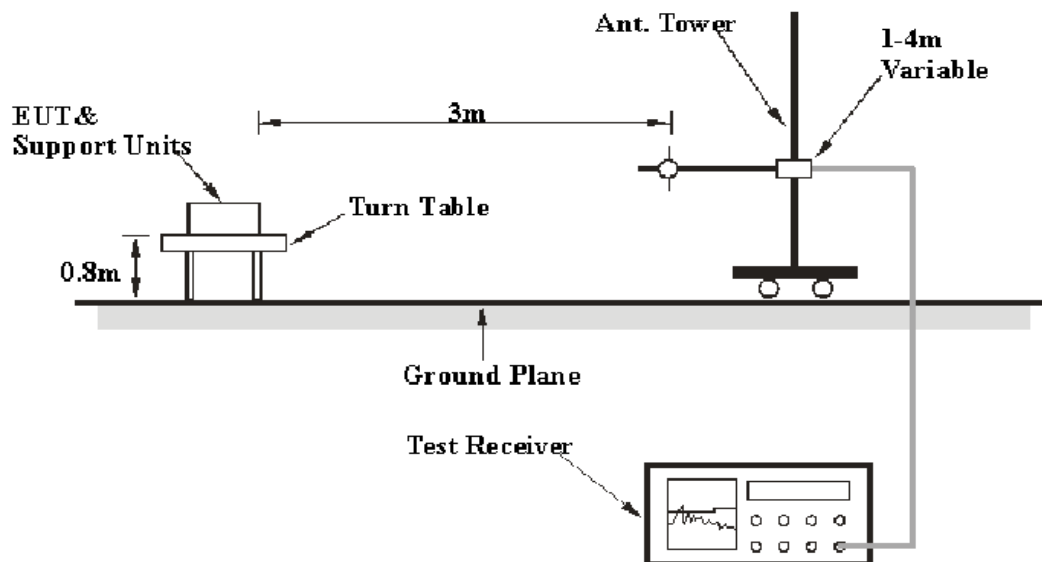
Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average) and system repeatability.

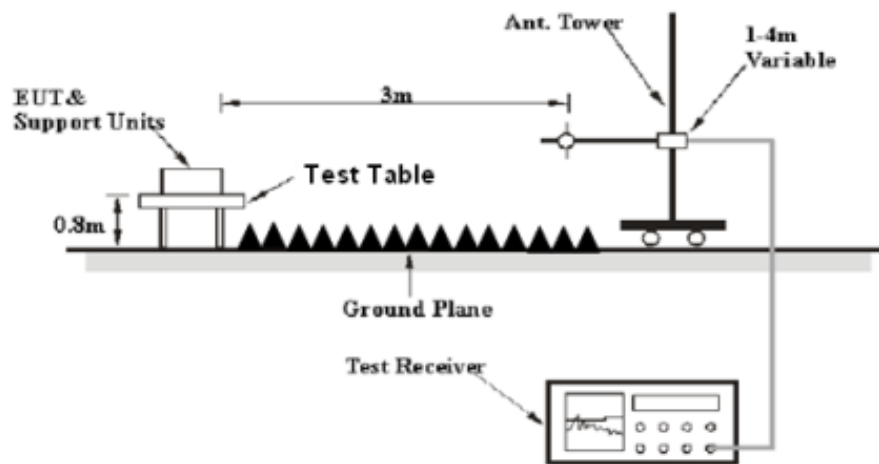
Item		Measurement Uncertainty	$U_{\text{cisp}}r$
Radiated Emissions	30MHz~1GHz	6.11dB	6.3 dB
	1GHz~6GHz	4.45dB	5.2 dB

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2014. The specification used was the FCC Part 15.109 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 12.5 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Detector Type
30MHz - 1000 MHz	120 kHz	300 kHz	120kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	Peak
	1MHz	3 MHz	1 MHz	AVG

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
A.H. Systems,inc.	Amplifier	PAM-0118P	512	2020-02-20	2021-02-19
Sonoma Instrument	Amplifier	310N	171205	2020-08-14	2021-08-13
ETS	Horn Antenna	3115	9311-4159	2020-07-15	2023-07-14
Sunol Sciences	Hybrid Antenna	JB3	A090314-2	2020-01-07	2023-01-06
Champrotek	Chamber1#	3m-SAC 966	N/A	2019-05-08	2022-05-07
Albatross	Chamber 2#	3m-SAC 966	N/A	2019-05-08	2022-05-07
Rohde & Schwarz	EMI Test Receiver	ESU40	100207/040	2020-04-01	2021-03-31
Rohde & Schwarz	Auto test Software	EMC32	100361	N/A	N/A
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2020-11-27	2021-11-26
MICRO-COAX	Coaxial Cable	Cable-4	004	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-5	005	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-8	008	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2020-08-15	2021-08-14

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

Corrected Amplitude & Margin Calculation

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

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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

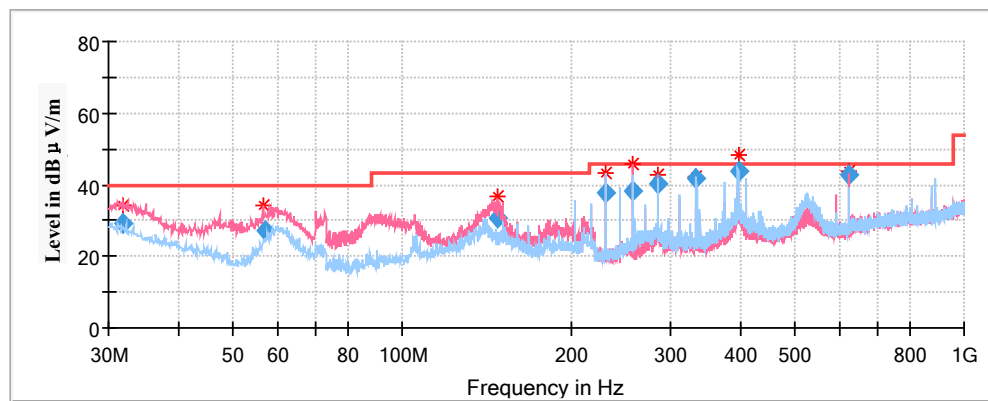
$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	101.0 kPa

The testing was performed by Kaka Lei on 2021-03-04.

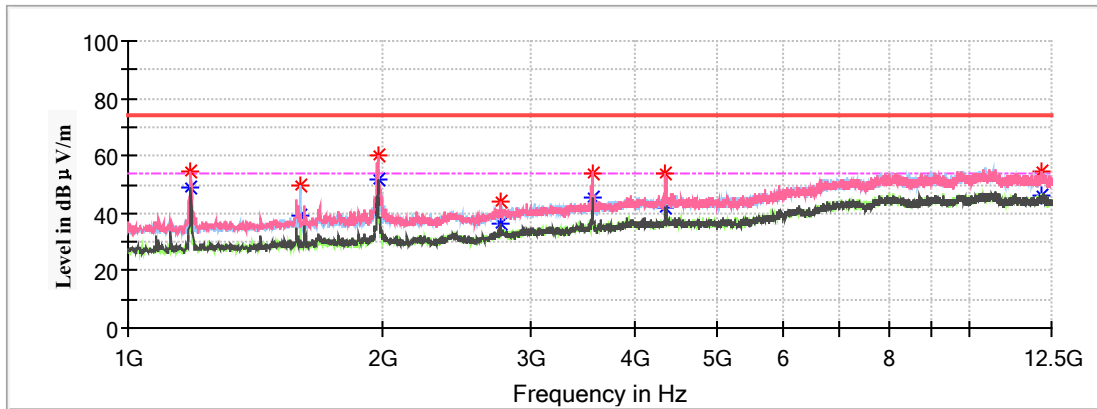
Test model:

1) Below 1GHz:

Frequency (MHz)	Corrected Amplitude	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
	QuasiPeak (dBμV/m)						
31.753000	29.34	40.00	10.66	100.0	V	38.0	-5.0
56.923900	26.93	40.00	13.07	100.0	V	128.0	-15.0
147.311800	30.62	43.50	12.88	100.0	V	230.0	-12.1
230.172500	37.94	46.00	8.06	200.0	H	293.0	-13.1
257.425200	38.31	46.00	7.69	100.0	H	324.0	-12.3
284.788550	40.47	46.00	5.53	100.0	V	0.0	-11.4
334.114500	41.83	46.00	4.17	100.0	H	110.0	-9.9
395.955600	43.92	46.00	2.08	100.0	H	330.0	-8.1
624.993550	42.84	46.00	3.16	100.0	V	170.0	-4.2
31.753000	29.34	40.00	10.66	100.0	V	38.0	-5.0

2) Above 1 GHz:

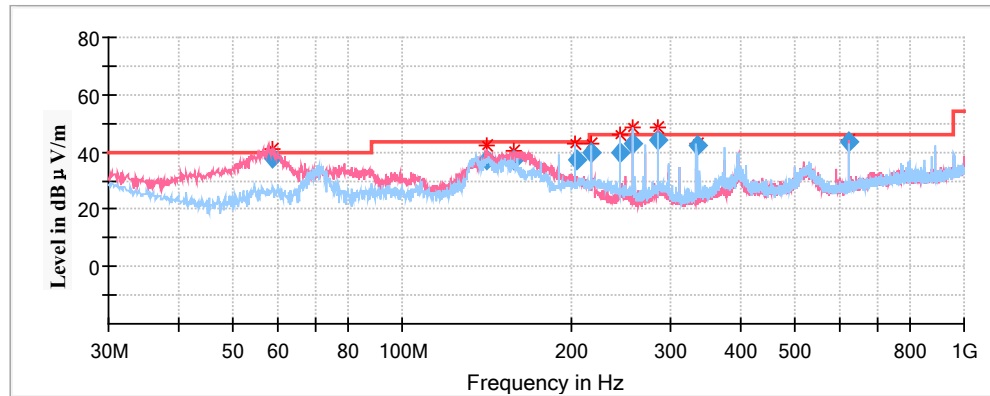
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
	MaxPeak (dBμV/m)	Average (dBμV/m)						
1187.450000	---	48.62	54.00	5.38	200.0	V	97.0	-11.3
1187.450000	54.77	---	74.00	19.23	200.0	V	97.0	-11.3
1599.150000	---	39.05	54.00	14.95	200.0	H	219.0	-9.1
1599.150000	49.62	---	74.00	24.38	200.0	H	219.0	-9.1
1979.800000	---	51.77	54.00	2.23	100.0	V	0.0	-7.7
1979.800000	60.36	---	74.00	13.64	100.0	V	0.0	-7.7
2771.000000	---	36.47	54.00	17.53	100.0	V	111.0	-4.4
2771.000000	43.88	---	74.00	30.12	100.0	V	111.0	-4.4
3562.200000	---	45.48	54.00	8.52	100.0	V	15.0	-1.5
3562.200000	53.94	---	74.00	20.06	100.0	V	15.0	-1.5
4352.250000	---	41.98	54.00	12.02	100.0	V	132.0	0.8
4352.250000	53.79	---	74.00	20.21	100.0	V	132.0	0.8

Test mode2:

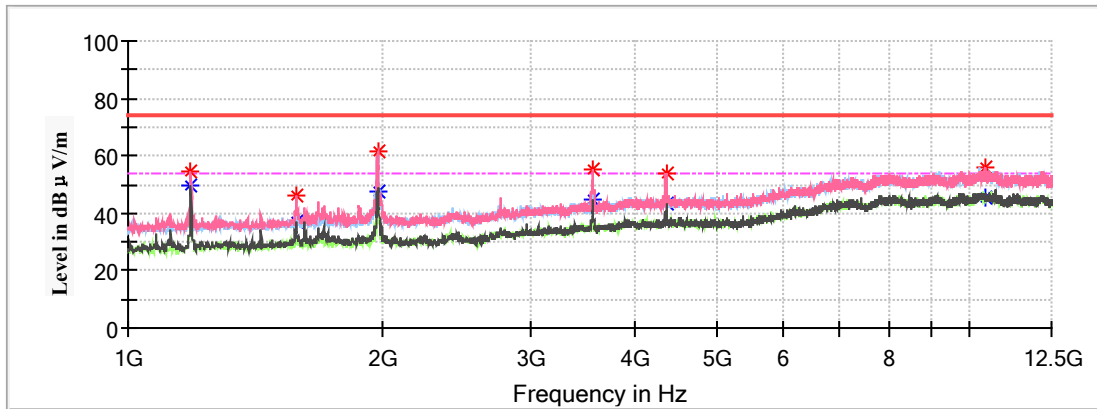
1) Below 1GHz:



Frequency (MHz)	Corrected Amplitude	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
	QuasiPeak (dB μ V/m)						
58.582350	37.57	40.00	2.43	100.0	V	165.0	-14.5
141.723250	37.32	43.50	6.18	100.0	V	284.0	-11.3
157.974800	37.47	43.50	6.03	100.0	V	0.0	-13.6
204.480100	37.08	43.50	6.42	100.0	H	39.0	-11.2
216.986400	39.89	46.00	6.11	200.0	H	61.0	-12.4
244.887100	39.50	46.00	6.50	100.0	V	152.0	-12.7
256.735500	42.90	46.00	3.10	100.0	H	154.0	-12.3
285.579050	43.93	46.00	2.07	100.0	H	94.0	-11.3
334.123200	41.98	46.00	4.02	100.0	H	269.0	-9.9
625.001350	43.32	46.00	2.68	100.0	V	189.0	-4.2

2) Above 1 GHz:

Full Spectrum



Frequency (MHz)	Corrected Amplitude		Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
	MaxPeak (dBμV/m)	Average (dBμV/m)						
1187.450000	---	49.96	54.00	4.04	200.0	V	187.0	-11.3
1187.450000	54.60	---	74.00	19.40	200.0	V	187.0	-11.3
1583.050000	---	36.96	54.00	17.04	100.0	V	0.0	-9.1
1583.050000	46.47	---	74.00	27.53	100.0	V	0.0	-9.1
1978.650000	---	47.53	54.00	6.47	100.0	V	111.0	-7.7
1978.650000	61.59	---	74.00	12.41	100.0	V	111.0	-7.7
3562.200000	---	44.94	54.00	9.06	100.0	V	15.0	-1.5
3562.200000	55.39	---	74.00	18.61	100.0	V	15.0	-1.5
4359.150000	---	43.17	54.00	10.83	100.0	V	111.0	0.8
4359.150000	53.60	---	74.00	20.40	100.0	V	111.0	0.8
10424.250000	---	45.71	54.00	8.29	100.0	H	104.0	12.8
10424.250000	55.73	---	74.00	18.27	100.0	H	104.0	12.8

Declarations

- 1: BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.
- 2: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
- 3: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
- 4: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
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*******END OF REPORT*******