

FCC PART 15B TEST REPORT

For

Shopify Inc.

151 O'Connor Street, Ground Floor, Ottawa, Ontario, Canada

FCC ID: 2AY2DS2004

Report Type: Original Report	Product Type: POS tablet
Test Engineer: Dean Zhou	<i>Dean Zhou</i>
Report Number: RKSA210419002-00A	
Report Date: 2021-04-30	
Reviewed By: Oscar Ye EMC Manager	<i>Oscar Ye</i>
Prepared By: Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn	

TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY	3
TEST FACILITY	4
SYSTEM TEST CONFIGURATION.....	5
JUSTIFICATION	5
EUT EXERCISE SOFTWARE	5
SPECIAL ACCESSORIES.....	5
EQUIPMENT MODIFICATIONS	5
SUPPORT EQUIPMENT LIST AND DETAILS	5
EXTERNAL I/O CABLE.....	5
SUMMARY OF TEST RESULTS.....	7
FCC §15.107 - CONDUCTED EMISSIONS	8
APPLICABLE STANDARD	8
MEASUREMENT UNCERTAINTY	8
EUT SETUP.....	8
EMI TEST RECEIVER SETUP.....	9
TEST PROCEDURE	9
TEST EQUIPMENT LIST AND DETAILS.....	9
TEST DATA	10
FCC §15.109 - RADIATED EMISSIONS	14
APPLICABLE STANDARD	14
MEASUREMENT UNCERTAINTY	14
EUT SETUP.....	14
EMI TEST RECEIVER SETUP.....	15
TEST PROCEDURE	15
TEST EQUIPMENT LIST AND DETAILS.....	16
CORRECTED AMPLITUDE & MARGIN CALCULATION	16
TEST DATA	17

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Shopify Inc.
Test Model	S2004
Product	POS tablet
Rate Voltage	DC 3.85V from battery and DC 5V from external power supply
Highest Operation Frequency	5825 MHz

Note: The Highest Operation Frequency was provided by applicant.*

All measurement and test data in this report was gathered from production sample serial number: RKSA210419002-1. (Assigned by the BACL. The EUT supplied by the applicant was received on 2021-04-19)

Objective

This report is prepared on behalf of *Shopify Inc.* 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 submissions with FCC ID: 2AY2DS2004

FCC Part 15.247 DSS submissions with FCC ID: 2AY2DS2004

FCC Part 15.407 NII submissions with FCC ID: 2AY2DS2004

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: Normal working& Charging by Adapter

Test mode 2: USB Data transmission

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

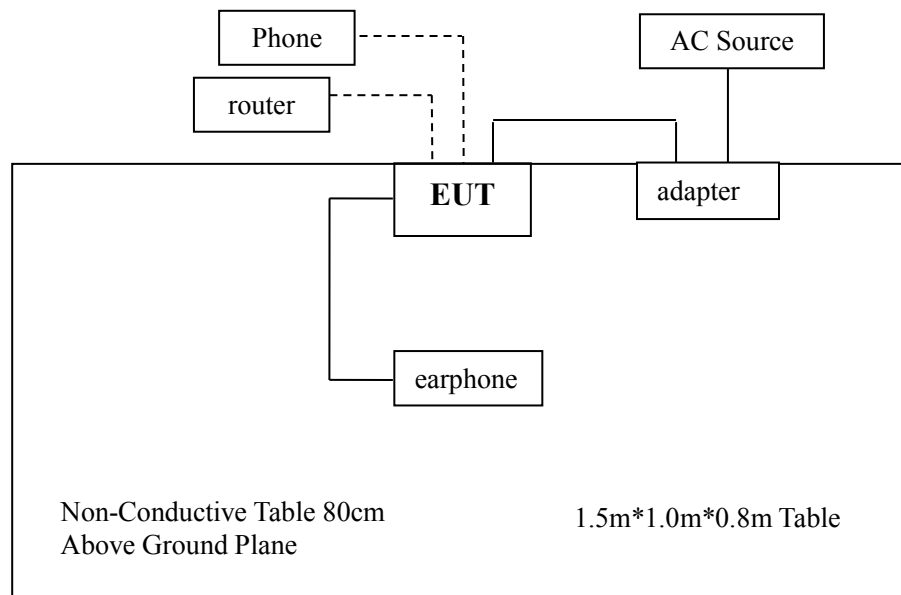
Manufacturer	Description	Model	Serial Number
TP-LINK	router	TL-WDR5620	/
DELL	notebook	E6410	/
BOLD	earphone	/	/
Apple	phone	ML7J2CH/A	/
TIANYIN	adapter	TPA-23A050200UU01	/

External I/O Cable

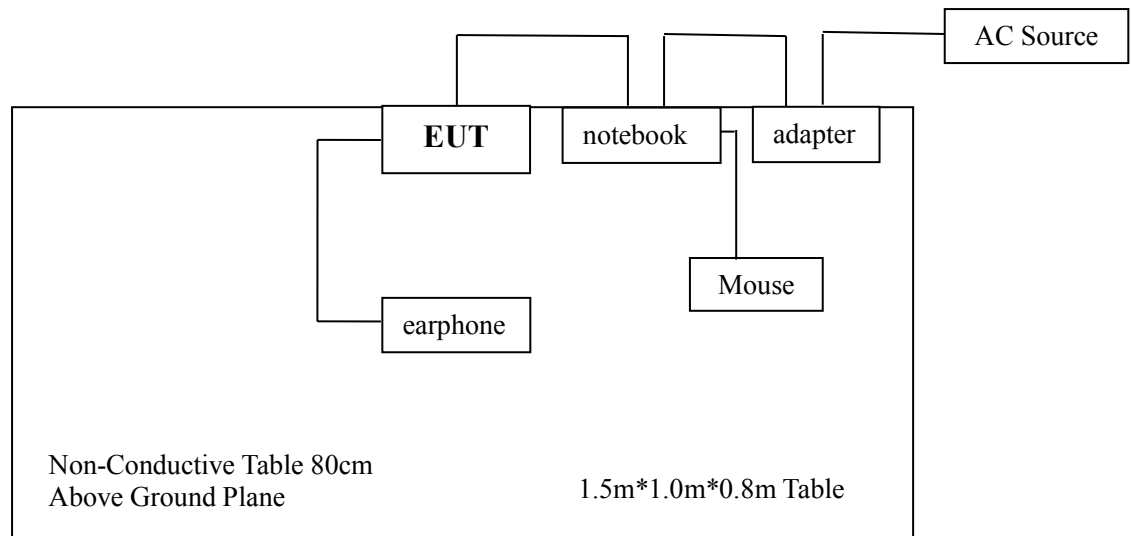
Cable Description	Length (m)	Port From	To Port
Power Cable 1	1.0	EUT	adapter
Power Cable 2	1.0	EUT	notebook
Power Cable 3	1.0	notebook	adapter
Power Cable 4	1.0	adapter	AC Source
Audio Cable	1.0	EUT	earphone

Block Diagram of Radiated Test Setup

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

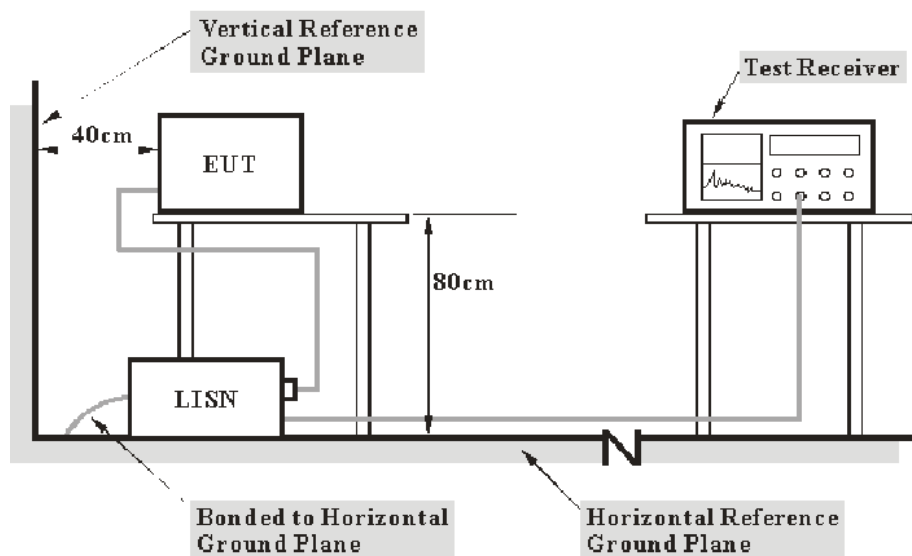
According to FCC§15.107

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
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:

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

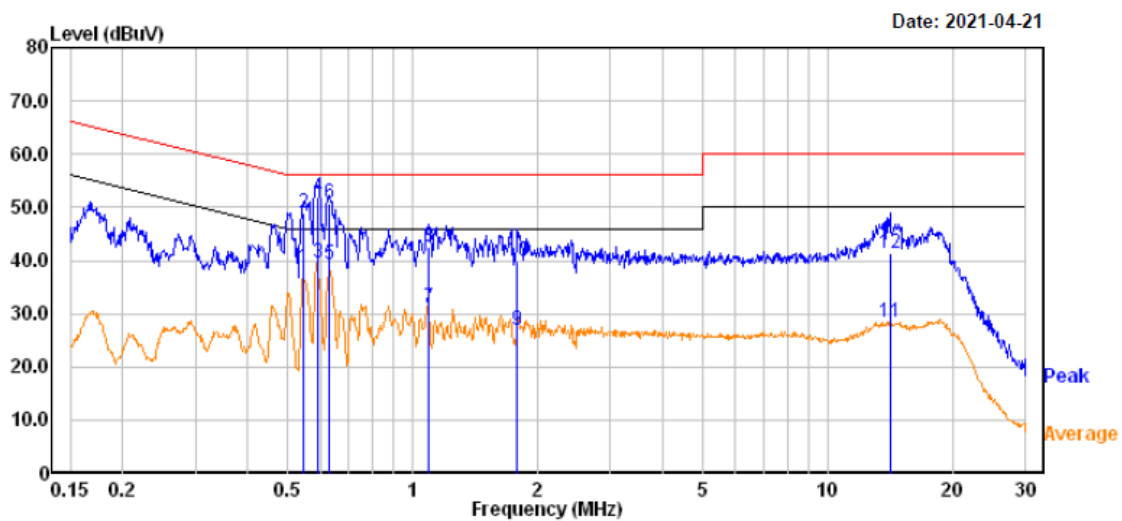
Test Data**Environmental Conditions**

Temperature:	23.3°C
Relative Humidity:	55 %
ATM Pressure:	101.3 kPa

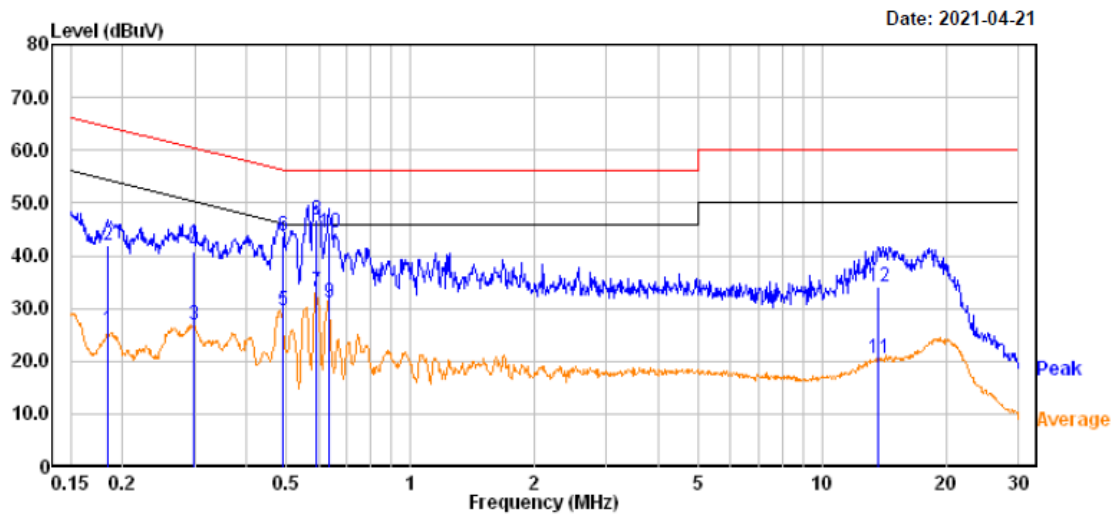
The testing was performed by Dean Zhou on 2021-04-21.

Test mode 1:

Line:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.548	19.00	19.75	38.75	46.00	-7.25	Average
2	0.548	29.20	19.75	48.95	56.00	-7.05	QP
3	0.594	19.90	19.75	39.65	46.00	-6.35	Average
4	0.594	32.30	19.75	52.05	56.00	-3.95	QP
5	0.627	19.60	19.75	39.35	46.00	-6.65	Average
6	0.627	30.90	19.75	50.65	56.00	-5.35	QP
7	1.096	11.31	19.81	31.12	46.00	-14.88	Average
8	1.096	22.81	19.81	42.62	56.00	-13.38	QP
9	1.786	7.00	19.84	26.84	46.00	-19.16	Average
10	1.786	20.00	19.84	39.84	56.00	-16.16	QP
11	14.134	8.80	19.62	28.42	50.00	-21.58	Average
12	14.134	21.60	19.62	41.22	60.00	-18.78	QP

Neutral:

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.184	6.10	19.83	25.93	54.30	-28.37	Average
2	0.184	22.00	19.83	41.83	64.30	-22.47	QP
3	0.297	6.90	19.83	26.73	50.33	-23.60	Average
4	0.297	21.00	19.83	40.83	60.33	-19.50	QP
5	0.489	9.80	19.76	29.56	46.19	-16.63	Average
6	0.489	24.00	19.76	43.76	56.19	-12.43	QP
7	0.591	13.60	19.75	33.35	46.00	-12.65	Average
8	0.591	27.10	19.75	46.85	56.00	-9.15	QP
9	0.633	11.20	19.75	30.95	46.00	-15.05	Average
10	0.633	24.60	19.75	44.35	56.00	-11.65	QP
11	13.717	0.90	19.61	20.51	50.00	-29.49	Average
12	13.717	14.50	19.61	34.11	60.00	-25.89	QP

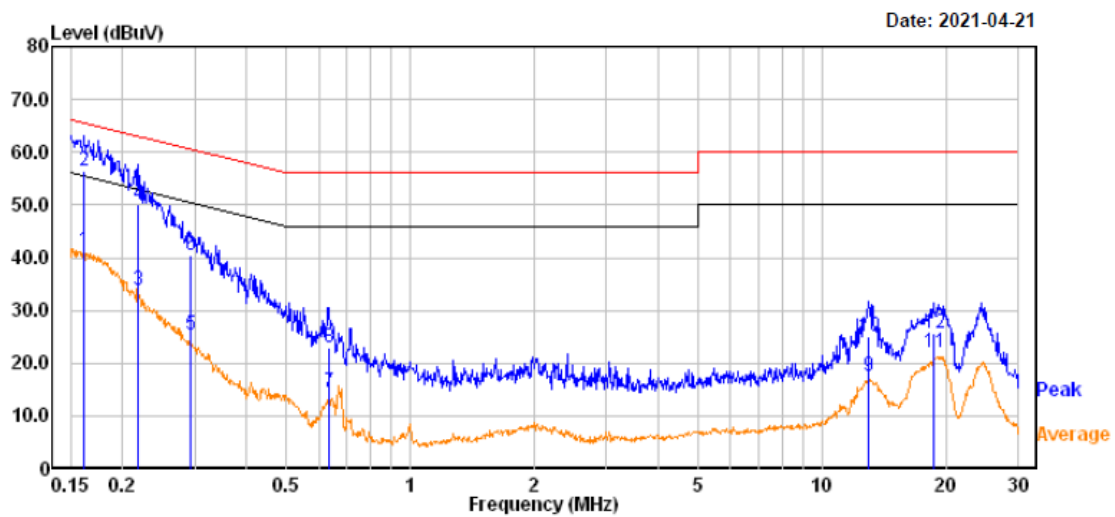
Note:

1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Attenuator (dB)

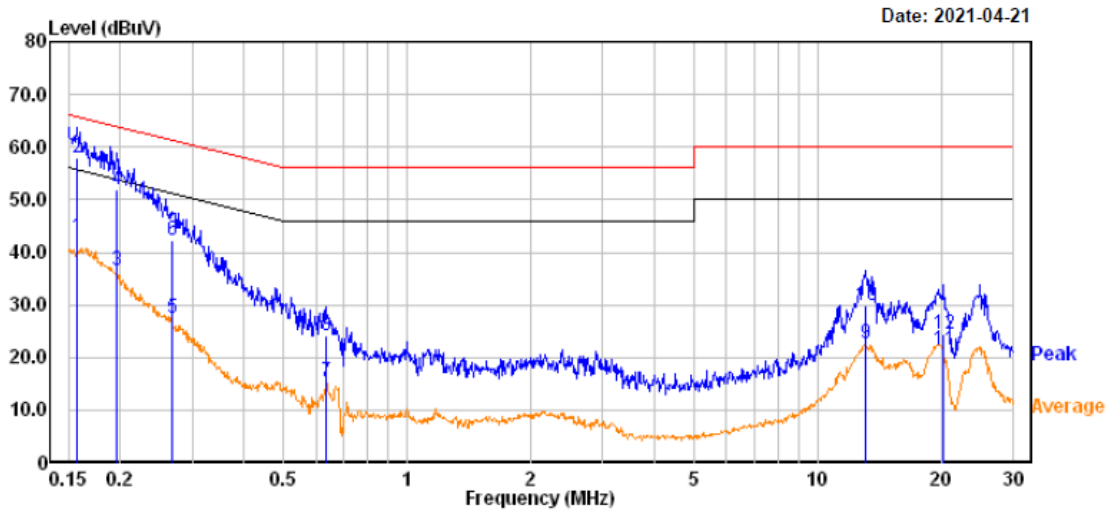
2) Over Limit (dB) = Read level (dBuV) + Factor (dB) - Limit (dBuV)

Test mode 2:

Line:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.162	21.50	19.83	41.33	55.38	-14.05	Average
2	0.162	36.70	19.83	56.53	65.38	-8.85	QP
3	0.218	13.90	19.82	33.72	52.90	-19.18	Average
4	0.218	30.40	19.82	50.22	62.90	-12.68	QP
5	0.294	5.40	19.83	25.23	50.41	-25.18	Average
6	0.294	20.50	19.83	40.33	60.41	-20.08	QP
7	0.633	-5.30	19.75	14.45	46.00	-31.55	Average
8	0.633	3.10	19.75	22.85	56.00	-33.15	QP
9	12.986	-2.10	19.60	17.50	50.00	-32.50	Average
10	12.986	5.60	19.60	25.20	60.00	-34.80	QP
11	18.684	2.11	19.87	21.98	50.00	-28.02	Average
12	18.684	5.81	19.87	25.68	60.00	-34.32	QP

Neutral:

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.157	22.90	19.82	42.72	55.63	-12.91	Average
2	0.157	38.20	19.82	58.02	65.63	-7.61	QP
3	0.196	16.70	19.82	36.52	53.76	-17.24	Average
4	0.196	32.20	19.82	52.02	63.76	-11.74	QP
5	0.269	7.70	19.82	27.52	51.16	-23.64	Average
6	0.269	22.30	19.82	42.12	61.16	-19.04	QP
7	0.633	-4.30	19.75	15.45	46.00	-30.55	Average
8	0.633	4.40	19.75	24.15	56.00	-31.85	QP
9	13.116	3.10	19.60	22.70	50.00	-27.30	Average
10	13.116	10.40	19.60	30.00	60.00	-30.00	QP
11	20.337	1.40	19.94	21.34	50.00	-28.66	Average
12	20.337	4.60	19.94	24.54	60.00	-35.46	QP

Note:

1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Attenuator (dB)

2) Over Limit (dB) = Read level (dBuV) + Factor (dB) - Limit (dBuV)

FCC §15.109 - RADIATED EMISSIONS

Applicable Standard

FCC §15.109

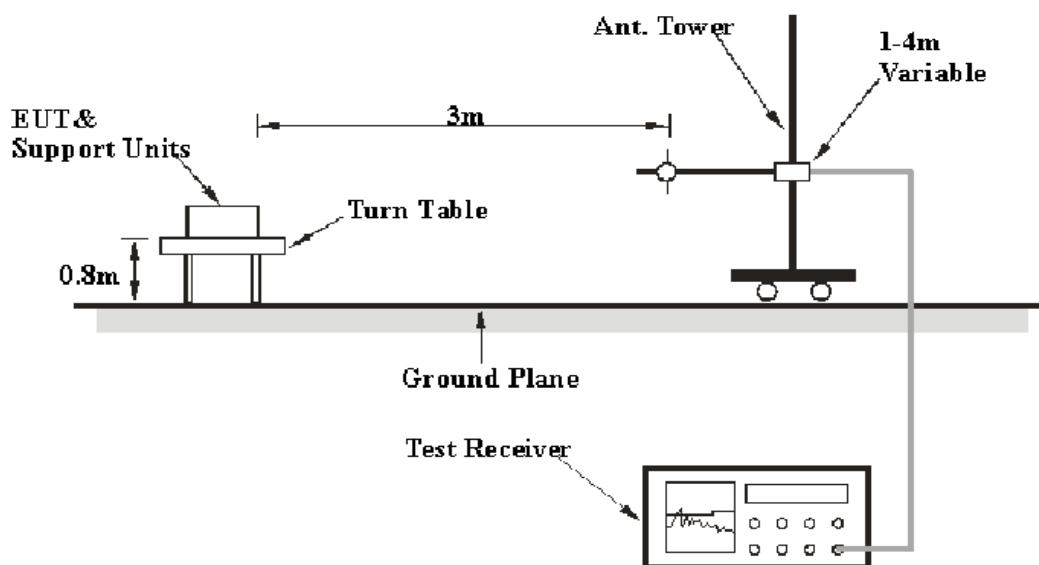
Measurement Uncertainty

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.

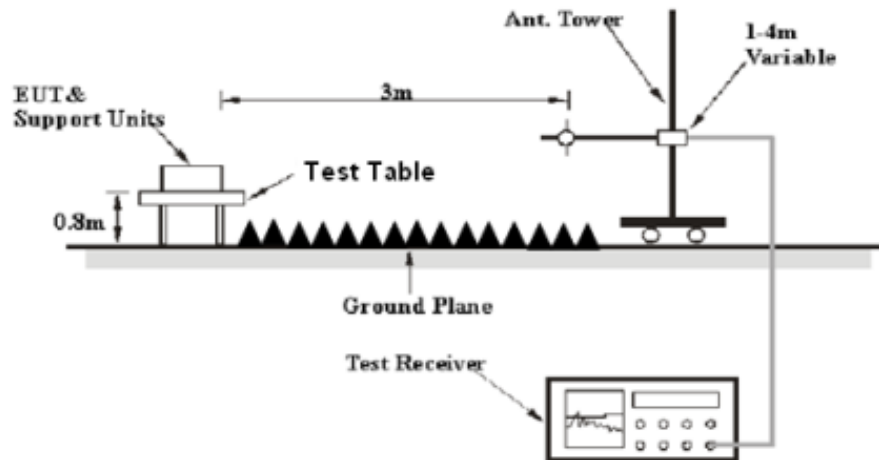
Item		Measurement Uncertainty	$U_{\text{cisp}}r$
Radiated Emissions	30MHz~1GHz	6.11dB	6.3 dB
	1GHz~6GHz	4.68dB	5.2 dB
	6 GHz~18 GHz	5.23dB	5.5 dB
	18GHz up	4.88dB	N/A

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 30 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/ Peak
Above 1 GHz	1 MHz	3 MHz	/	Peak
	1MHz	10 Hz	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
Sonoma Instrument	Amplifier	310N	171205	2020-08-14	2021-08-13
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2020-11-27	2021-11-26
Champrotek	Chamber1#	3m-SAC 966	N/A	2019-05-08	2022-05-07
Sunol Sciences	Hybrid Antenna	JB3	A090314-2	2020-01-07	2023-01-06
Rohde & Schwarz	Auto test Software	EMC32	100361	N/A	N/A
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
A.H. Systems, inc.	Amplifier	PAM-0118P	512	2020-08-14	2021-08-13
Albatross	Chamber 2#	3m-SAC 966	N/A	2019-05-08	2022-05-07
ETS	Horn Antenna	3115	9311-4159	2020-07-15	2023-07-14
Rohde & Schwarz	EMI Test Receiver	ESU40	100207/040	2021-03-16	2022-03-15
Rohde & Schwarz	Auto test Software	EMC32	100361	N/A	N/A
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

* **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:

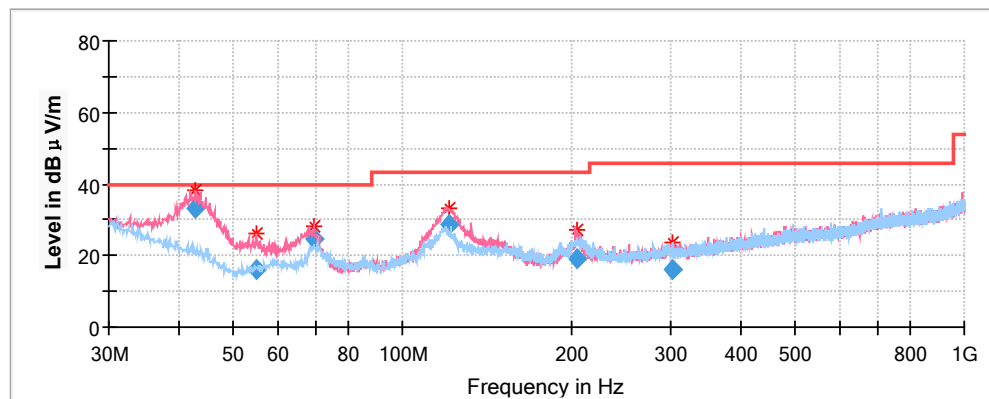
$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Data**Environmental Conditions**

Temperature:	23.3°C
Relative Humidity:	55 %
ATM Pressure:	101.2 kPa

The testing was performed by Dean Zhou on 2021-04-22.

Test mode 1:

1) 30MHz ~ 1GHz:

Frequency (MHz)	Corrected Amplitude	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
	QuasiPeak (dBμV/m)						
42.851900	33.13	40.00	6.87	100.0	V	148.0	-13.1
54.845250	15.99	40.00	24.01	100.0	V	330.0	-16.0
69.606950	24.75	40.00	15.25	100.0	V	0.0	-16.7
120.959450	28.80	43.50	14.70	100.0	V	202.0	-10.8
204.841900	19.27	43.50	24.23	100.0	V	226.0	-12.0
302.842450	16.31	46.00	29.69	100.0	H	216.0	-10.7

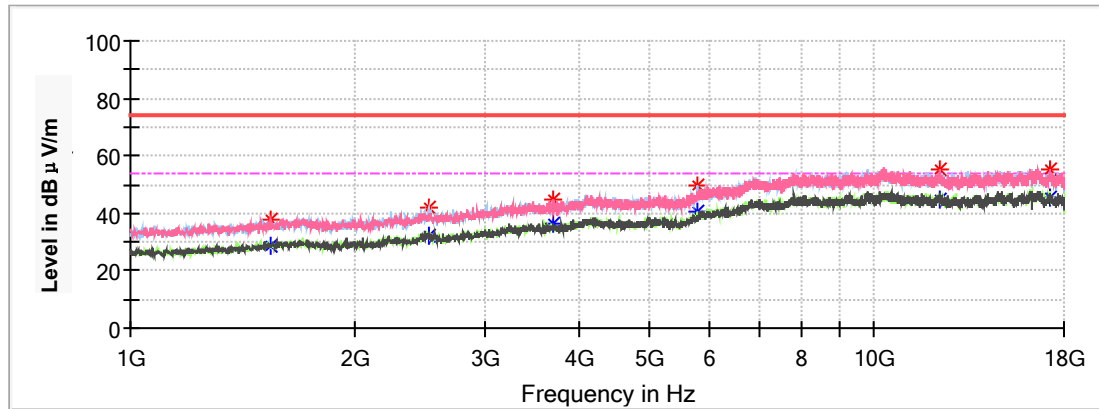
Note:

1) Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

2) Margin = Limit - Corrected Amplitude

2) 1GHz-18GHz:

Full Spectrum



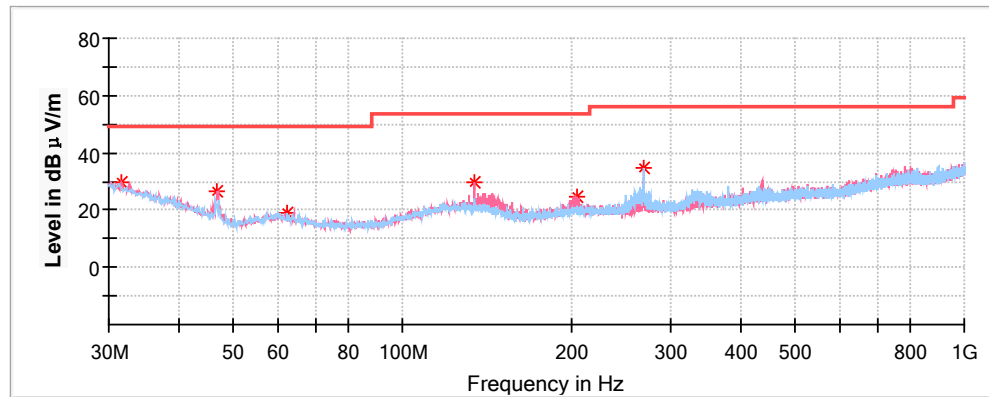
Frequency (MHz)	Corrected Amplitude		Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
	Max Peak (dBμV/m)	Average (dBμV/m)						
1547.400000	---	28.96	54.00	25.04	100.0	H	147.0	-9.2
1547.400000	37.60	---	74.00	36.40	100.0	H	147.0	-9.2
2513.000000	---	32.31	54.00	21.69	100.0	V	230.0	-5.7
2513.000000	42.30	---	74.00	31.70	100.0	V	230.0	-5.7
3703.000000	45.08	---	74.00	28.92	100.0	V	51.0	-0.9
3703.000000	---	36.04	54.00	17.96	100.0	V	51.0	-0.9
5800.000000	---	40.54	54.00	13.46	100.0	H	147.0	3.9
5800.800000	49.31	---	74.00	24.69	100.0	H	147.0	3.9
12279.500000	---	44.75	54.00	9.25	100.0	H	147.0	11.6
12279.500000	55.42	---	74.00	18.58	100.0	H	147.0	11.6
17233.300000	---	45.37	54.00	8.63	100.0	H	337.0	11.5
17233.300000	54.97	---	74.00	19.03	100.0	H	337.0	11.5

Note:

- 1) Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain
- 2) Margin = Limit - Corrected Amplitude

Test mode 2:

1) 30MHz ~ 1GHz:



Frequency (MHz)	Corrected Amplitude	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
	MaxPeak (dBμV/m)						
31.697500	29.41	49.00	19.59	100.0	V	286.0	-4.8
46.732500	26.78	49.00	22.22	100.0	V	69.0	-15.0
62.373750	19.04	49.00	29.96	200.0	H	334.0	-15.0
134.153750	29.85	53.50	23.65	100.0	V	352.0	-11.4
203.993750	24.94	53.50	28.56	100.0	V	41.0	-12.0
268.256250	34.65	56.40	21.75	100.0	H	98.0	-11.5

Note:

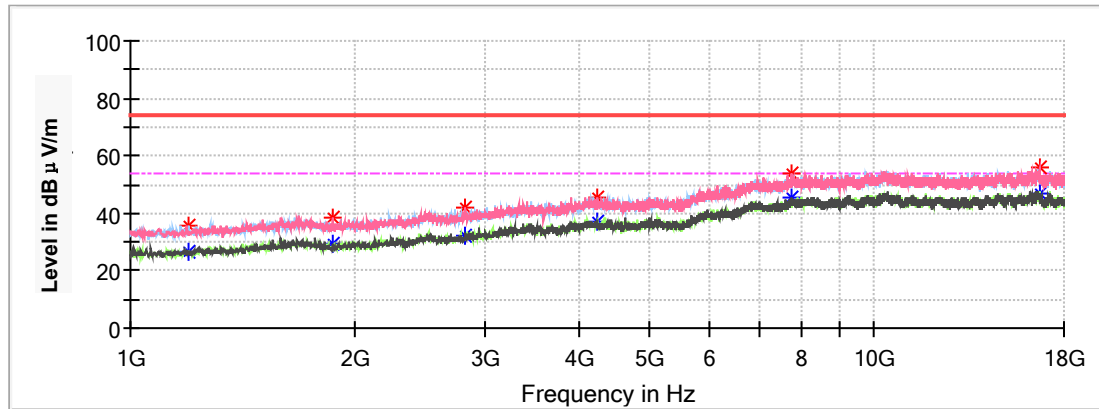
1) Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

2) Margin = Limit - Corrected Amplitude

3) The PK values of the emissions are 6dB below the QP Limit, So the QP values of the emissions were not recorded.

2) 1GHz-18GHz:

Full Spectrum



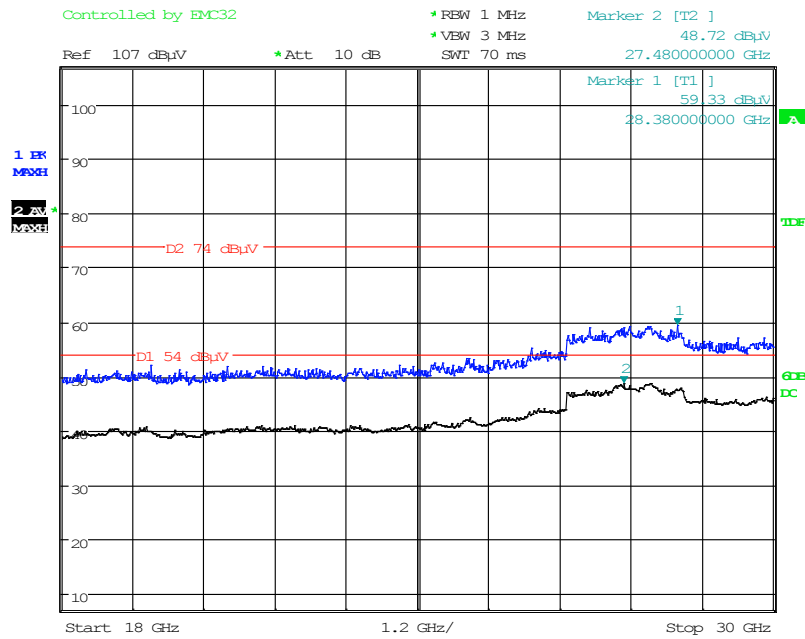
Frequency (MHz)	Corrected Amplitude		Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
	Max Peak (dBμV/m)	Average (dBμV/m)						
1197.200000	---	26.33	54.00	27.67	100.0	H	280.0	-11.3
1197.200000	35.91	---	74.00	38.09	100.0	H	280.0	-11.3
1872.100000	---	29.55	54.00	24.45	100.0	V	134.0	-8.1
1872.100000	38.31	---	74.00	35.69	100.0	V	134.0	-8.1
2824.100000	---	32.35	54.00	21.65	200.0	H	344.0	-4.1
2824.100000	41.99	---	74.00	32.01	200.0	H	344.0	-4.1
4245.300000	---	37.04	54.00	16.96	200.0	H	306.0	0.7
4245.300000	45.79	---	74.00	28.21	200.0	H	306.0	0.7
7738.800000	---	45.21	54.00	8.79	100.0	V	69.0	10.0
7738.800000	53.83	---	74.00	20.17	100.0	V	69.0	10.0
16661.500000	55.95	---	74.00	18.05	200.0	V	18.0	11.9
16661.500000	---	46.72	54.00	7.28	200.0	V	18.0	11.9

Note:

- 1) Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain
 2) Margin = Limit - Corrected Amplitude

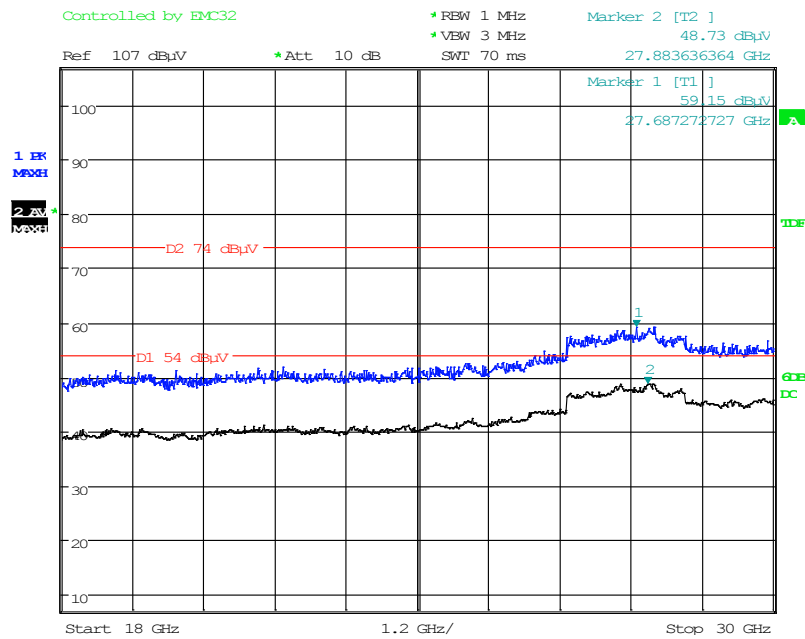
3) 18GHz-30GHz:

Horizontal:



Date: 22.APR.2021 13:16:40

Vertical:



Date: 22.APR.2021 13:25:55

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.
- 5: This report cannot be reproduced except in full, without prior written approval of the Company.
- 6: This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

*******END OF REPORT*******