



FCC PART 15B

MEASUREMENT AND TEST REPORT

For

Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District,
Shenzhen, 518129, P.R.C

FCC ID: QISAP2030DN

Report Type: Original Report	Product Type: Wireless LAN Access Point
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Report Number: RKS161113001-00A	
Report Date: 2016-12-07 Jesse huang	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The Huawei Technologies Co., Ltd 's product, model number: AP2030DN (FCC ID: QISAP2030DN) or the "EUT" in this report was a Wireless LAN Access Point, which was measured approximately: 25 mm (H)x 140 mm(W) x 86 mm(D), rated input voltage: DC voltage supplied From Adapter or PoE. The highest operation frequency is 5825MHz.

Adapter information:

Brand :HUAWEI

Model:HUAWEI/HW-120200U1W

AC INPUT: 100-240V, 0.8A,50-60Hz

DC OUTPUT: 12V, 2.0A

Manufacture information:

Huawei Technologies Co., Ltd / administration Building ,Headquarters of Huawei Technologies Co., Ltd .,
Bantian,longgang District,Shenzhen,518129,P.R.C,China

**All measurement and test data in this report was gathered from production sample serial number: 20161018001.
(Assigned by the BACL. The EUT supplied by the applicant was received on 2016-10-18)*

Objective

This report is prepared on behalf of Huawei Technologies Co., Ltd. in accordance with Part 2-Subpart J, and Part 15-Subparts A and B of the Federal Communication Commissions rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS and FCC Part 15.407 NII submission with FCC ID: QISAP2030DN.

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

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.:815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

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

Test mode1: Transmit of Adapter mode
Test mode2: Transmit of POE mode

EUT Exercise Software

Laptop exercise 'ping.exe'.

Special Accessories

No special accessory was used.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

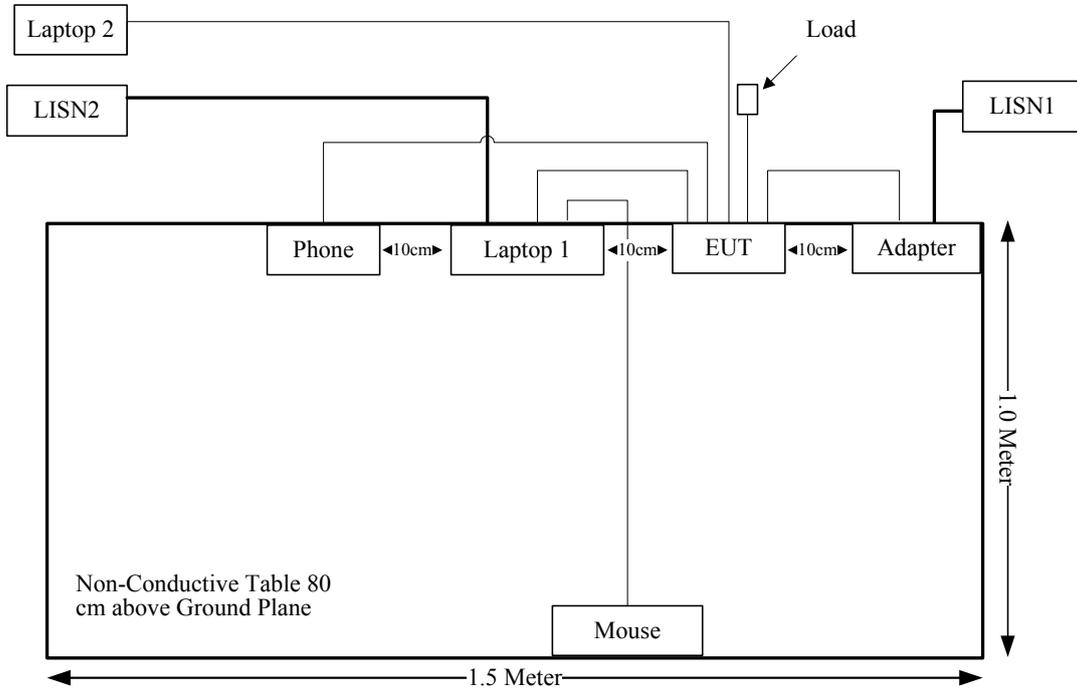
Manufacturer	Description	Model	Serial Number
HP	Laptop 1	5600U	5CG6240ZH1
DELL	Laptop 2	D420	0002530
N/A	Load	N/A	N/A
DELL	Mouse	MS116p	CN-009NK2-73826-64 R-002N
AVAYA	Phone	6408D+	041611141185

External I/O Cable

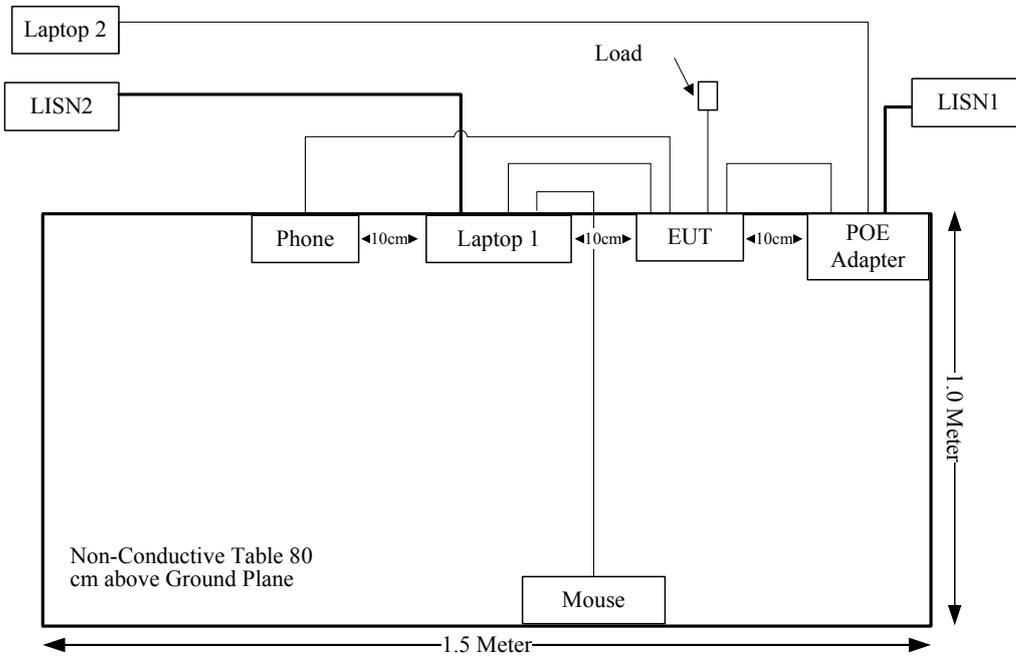
Cable Description	Length (m)	From/Port	To
Un-shielding RJ 45 Cable	1.8	EUT	Laptop 1
Un-shielding RJ 45 Cable	1.0	EUT POE Port	POE Adapter
Un-shielding DC Cable	0.8	Adapter	EUT
Un-shielding RJ 11Cable	1.8	EUT	Phone
Shielding USB Cable	0.8	Laptop 1	Mouse
Un-shielding RJ 45 Cable*3	0.8	EUT	Load

Block Diagram of Radiated Test Setup

Test Model: Adapter mode



Test Model: POE mode



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Emissions	Compliance

FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

According to FCC§15.107

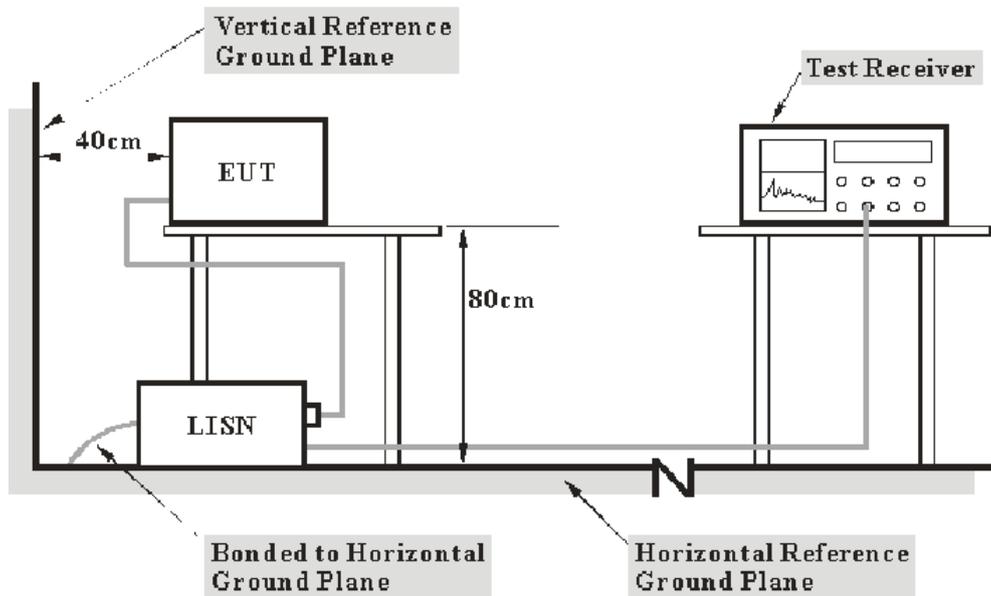
Measurement Uncertainty

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

Based on CISPR 16-4-2:2011+A1-2014, the expanded combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Kunshan) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report.

Port	Expanded Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)
CAT 3	3.70 dB (k=2, 95% level of confidence)
CAT 5	3.86 dB (k=2, 95% level of confidence)
CAT 6	4.64 dB (k=2, 95% level of confidence)

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.

The EUT was connected to an AC 120V/60 Hz power source.

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

During the conducted emission test, the EUT was connected to the outlet of the LISN.

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

All final data was recorded in the Quasi-peak and average detection mode.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	934115/007	2015-11-11	2016-11-10
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2015-11-12	2016-11-11
Rohde & Schwarz	LISN	ESH3-Z5	892239/018	2016-06-23	2017-06-22
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2016-09-16	2017-09-15
Rohde & Schwarz	CE Test software	EMC 32	V 09.10.0	--	--
MICRO-COAX	Coaxial line	UFB-293B-1-0 480-50X50	97F0173	2016-10-01	2017-10-01

* **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 Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB 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 Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.107 Class B, the worst margin reading as below:

17.43 dB at 0.455000 MHz in the Neutral conducted mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data

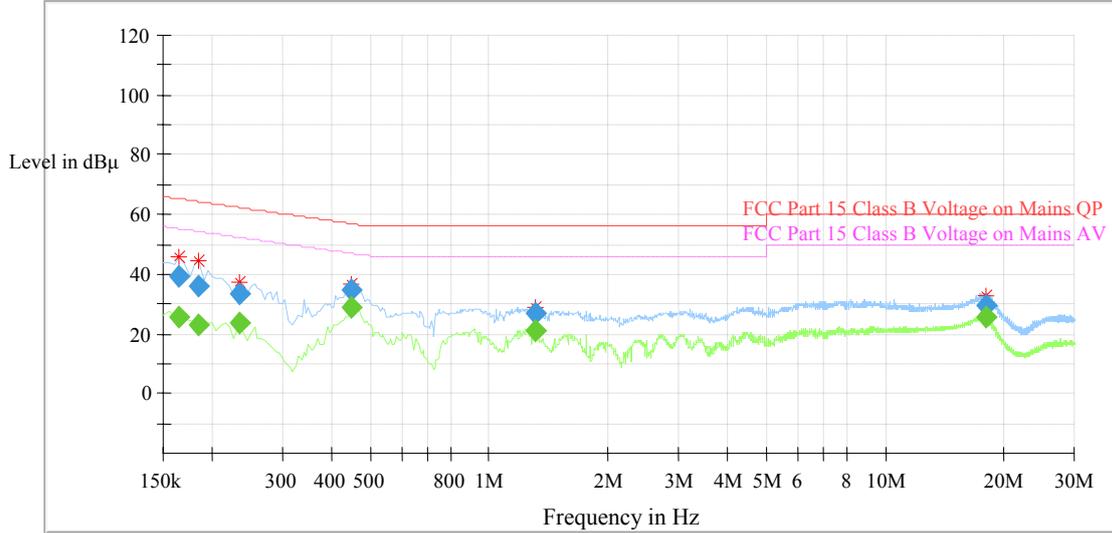
Environmental Conditions

Temperature:	25°C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Phil Zhu on 2016-10-25.

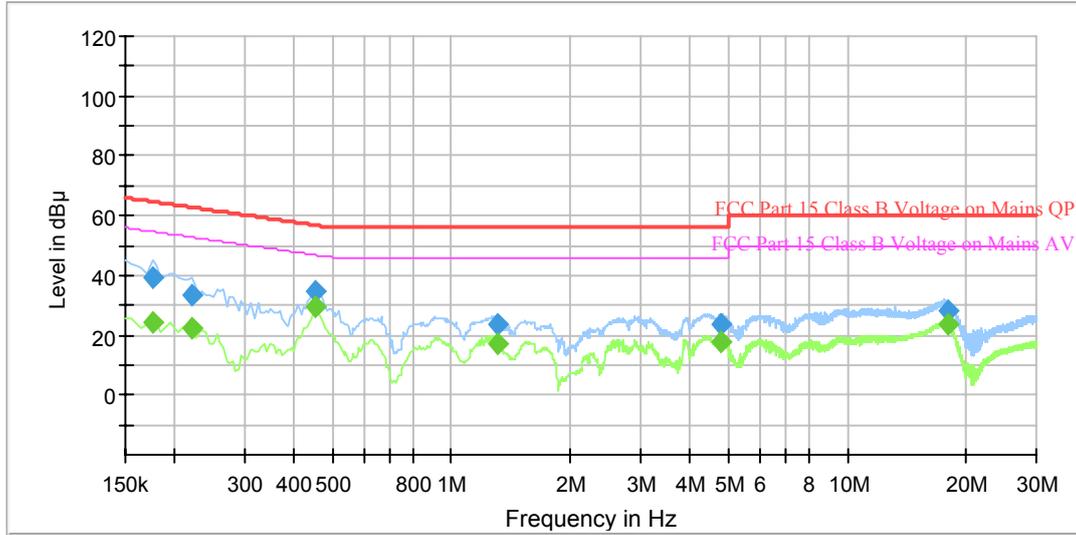
Test Model: Adapter Mode

Line



Frequency (MHz)	Corrected Amplitude		Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
	QuasiPeak (dBμV)	Average (dBμV)				
0.165000	---	25.46	55.21	29.75	L1	10.3
0.165000	39.36	---	65.21	25.85	L1	10.3
0.185000	---	22.98	54.26	31.28	L1	10.3
0.185000	36.23	---	64.26	28.03	L1	10.3
0.235000	---	23.46	52.27	28.81	L1	10.3
0.235000	33.68	---	62.27	28.59	L1	10.3
0.450000	---	28.73	46.88	18.15	L1	10.3
0.450000	34.41	---	56.88	22.47	L1	10.3
1.300000	---	21.04	46.00	24.96	L1	10.3
1.300000	26.60	---	56.00	29.40	L1	10.3
17.900000	---	25.66	50.00	24.34	L1	10.5
17.900000	29.62	---	60.00	30.38	L1	10.5

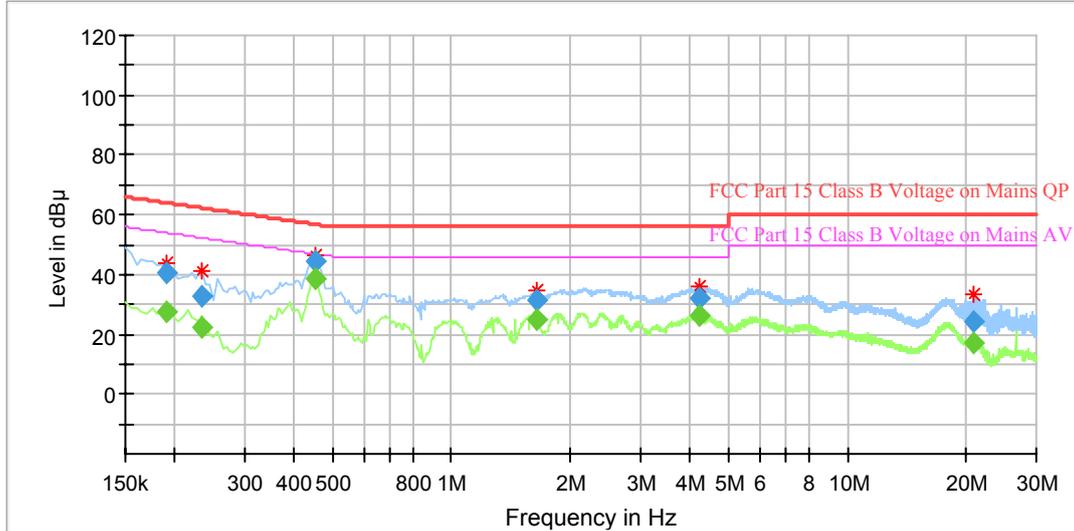
Neutral



Frequency (MHz)	Corrected Amplitude		Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
	QuasiPeak (dBμV)	Average (dBμV)				
0.175000	---	24.34	54.72	30.38	N	10.3
0.175000	39.00	---	64.72	25.72	N	10.3
0.220000	---	22.63	52.82	30.19	N	10.3
0.220000	33.18	---	62.82	29.64	N	10.3
0.455000	---	29.35	46.78	17.43	N	10.3
0.455000	34.57	---	56.78	22.21	N	10.3
1.310000	---	16.81	46.00	29.19	N	10.3
1.310000	23.45	---	56.00	32.55	N	10.3
4.780000	---	17.91	46.00	28.09	N	10.6
4.780000	23.31	---	56.00	32.69	N	10.6
17.905000	---	23.83	50.00	26.17	N	10.5
17.905000	28.22	---	60.00	31.78	N	10.5

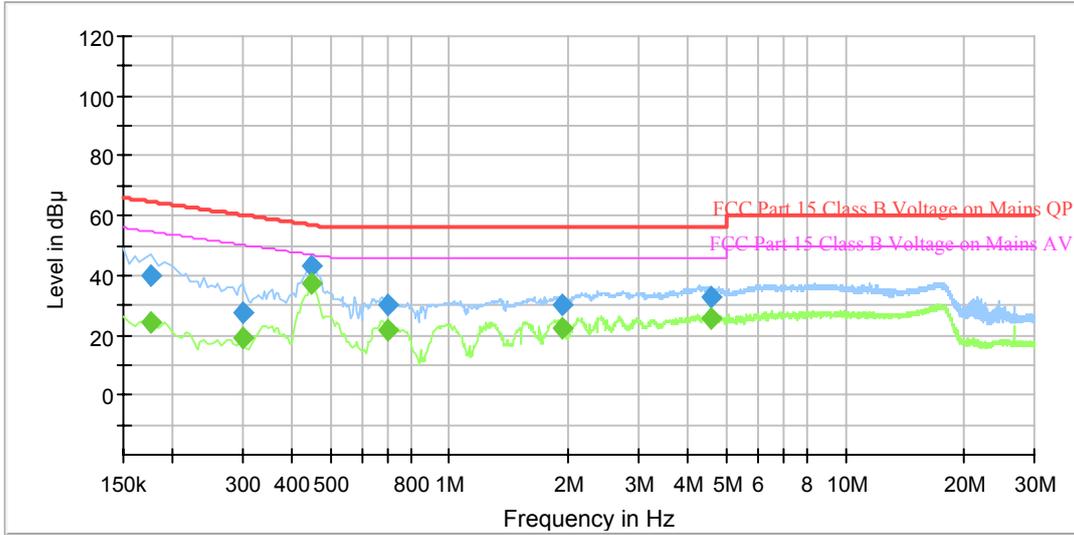
Test Model: POE Mode

Line



Frequency (MHz)	Corrected Amplitude		Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
	QuasiPeak (dBµV)	Average (dBµV)				
0.190000	---	27.43	54.04	26.61	L1	10.3
0.190000	40.31	---	64.04	23.73	L1	10.3
0.235000	---	22.01	52.27	30.26	L1	10.3
0.235000	32.96	---	62.27	29.31	L1	10.3
0.455000	---	38.44	46.78	8.34	L1	10.3
0.455000	44.75	---	56.78	12.03	L1	10.3
1.640000	---	24.62	46.00	21.38	L1	10.3
1.640000	31.46	---	56.00	24.54	L1	10.3
4.245000	---	25.96	46.00	20.04	L1	10.5
4.245000	32.28	---	56.00	23.72	L1	10.5
20.900000	---	17.25	50.00	32.75	L1	10.5
20.900000	24.43	---	60.00	35.57	L1	10.5

Neutral



Frequency (MHz)	Corrected Amplitude		Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
	QuasiPeak (dBμV)	Average (dBμV)				
0.175000	---	24.21	54.72	30.51	N	10.3
0.175000	40.05	---	64.72	24.67	N	10.3
0.300000	---	19.37	50.24	30.87	N	10.3
0.300000	27.85	---	60.24	32.39	N	10.3
0.450000	---	37.01	46.88	9.87	N	10.3
0.450000	42.92	---	56.88	13.96	N	10.3
0.695000	---	21.48	46.00	24.52	N	10.3
0.695000	30.44	---	56.00	25.56	N	10.3
1.915000	---	22.57	46.00	23.43	N	10.4
1.915000	30.16	---	56.00	25.84	N	10.4
4.575000	---	25.51	46.00	20.49	N	10.5
4.575000	32.61	---	56.00	23.39	N	10.5

FCC §15.109 - RADIATED EMISSIONS

Applicable Standard

FCC §15.109

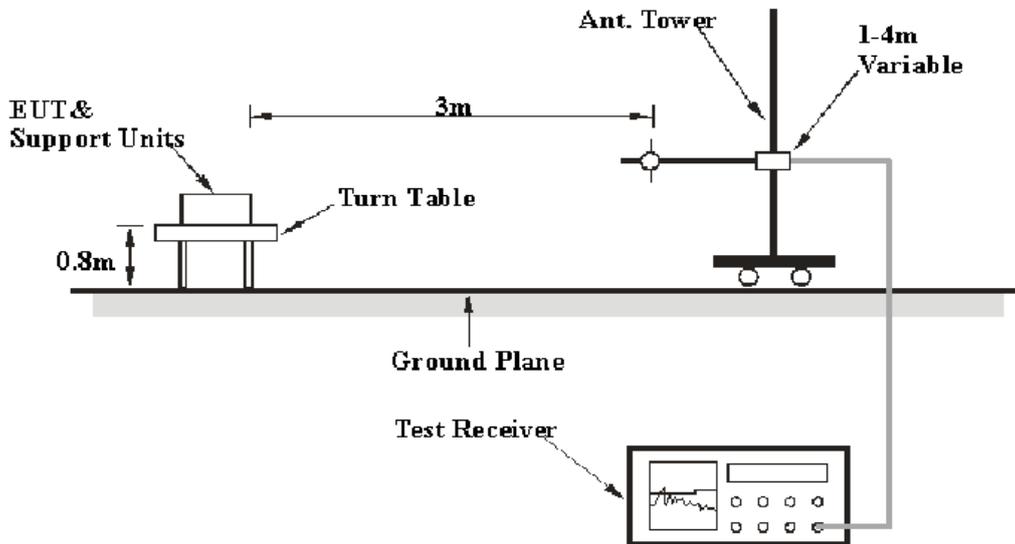
Measurement Uncertainty

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.

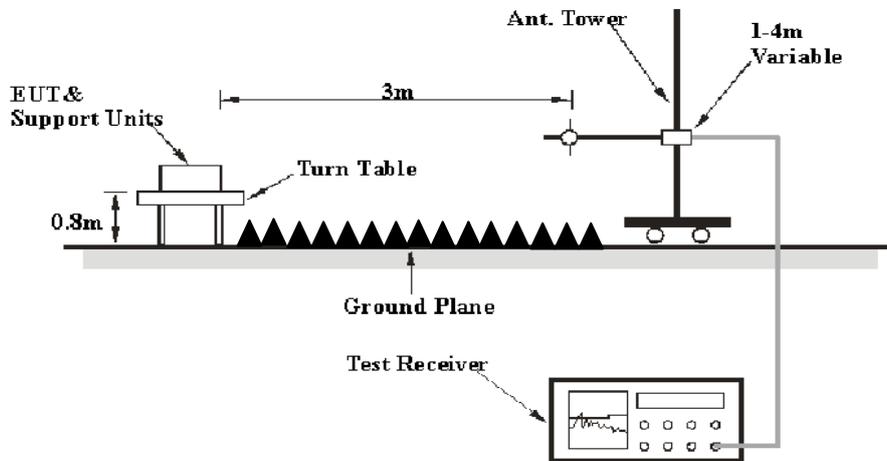
Based on CISPR 16-4-2:2011+A1-2014, the expanded combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Kunshan) is shown in below table. And the uncertainty will not be taken into consideration for the test data recorded in the report

Frequency	Polarity	Measurement uncertainty
30 MHz~200 MHz	Horizontal	4.62 dB (k=2, 95% level of confidence)
	Vertical	4.54 dB (k=2, 95% level of confidence)
200 MHz~1 GHz	Horizontal	4.84 dB (k=2, 95% level of confidence)
	Vertical	5.91 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	Horizontal/Vertical	4.68 dB (k=2, 95% level of confidence)
Above 6 GHz	Horizontal/Vertical	4.92 dB (k=2, 95% level of confidence)

EUT Setup



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.

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
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
1GHz-26GHz	1MHz	3MHz	-	PK
	1MHz	1Hz	-	AV

Test Procedure

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

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sonoma Instrument	Amplifier	330	171377	2016-09-16	2017-09-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2015-11-12	2016-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2017-01-08
ETS	Horn Antenna	3115	6229	2016-01-11	2017-01-10
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Mini	Pre-amplifier	AFS42-00101800	2001270	2016-09-08	2017-09-07
champrotek	Chamber	Chamber A	V 09.10.0	-	-
R&S	Auto test Software	EMC32	V 09.10.0	-	-
MICRO-COAX	Coaxial line	UFB-293B-1-0480-50X50	97F0173	2016-10-01	2017-10-01
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-01-11	2017-01-10
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2016-07-04	2017-07-03

* **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 Results Summary

According to the data in the following table, the EUT complied with the FCC §15.109 Class B, with the worst margin reading of:

5.27 dB at 125.005950 MHz in the Horizontal polarization mode (Test Modell (worst case))

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data

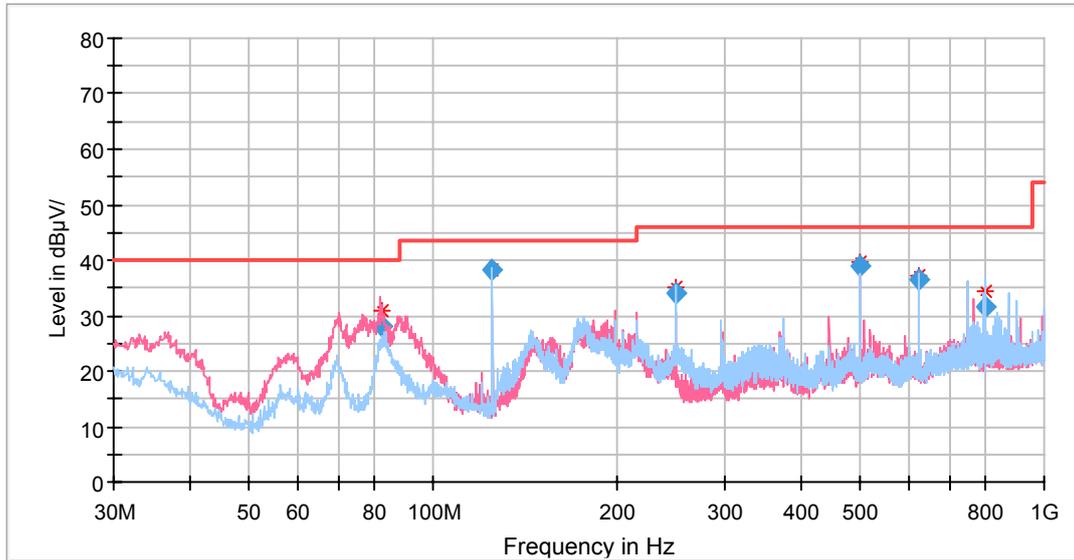
Environmental Conditions

Temperature:	27 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Phil Zhu on 2016-10-25.

Test Model : Adapter mode

1)30MHz ~ 1GHz



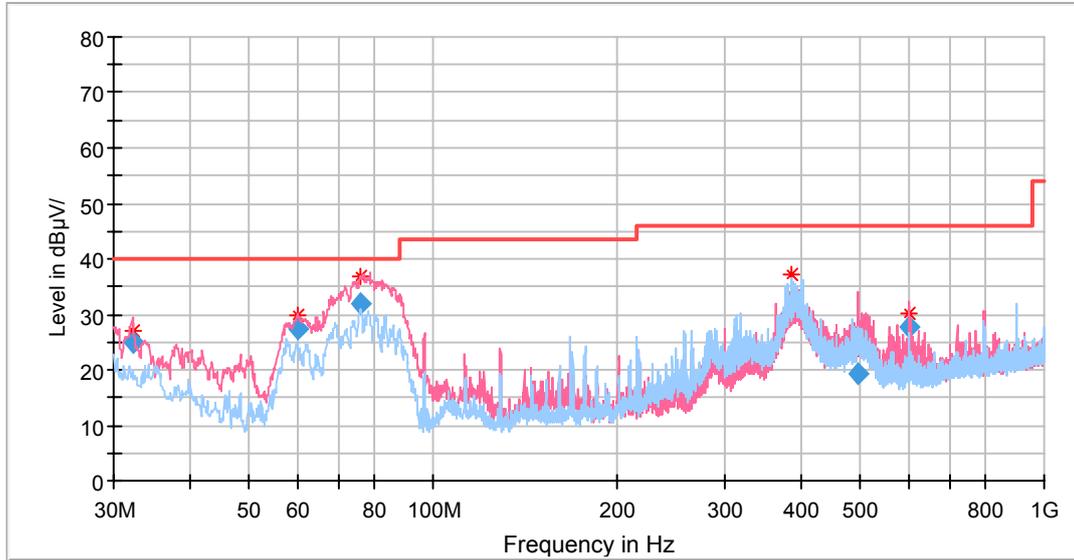
Frequency (MHz)	Corrected Amplitude (dBµV/m)	Detector	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
82.247500	28.04	QuasiPeak	40.00	11.96	101.0	V	145.0	-17.0
125.005950	38.23	QuasiPeak	43.50	5.27	199.0	H	179.0	-14.0
249.982900	34.11	QuasiPeak	46.00	11.89	199.0	H	343.0	-12.0
499.994100	38.79	QuasiPeak	46.00	7.21	101.0	V	160.0	-5.6
625.000150	36.53	QuasiPeak	46.00	9.47	101.0	V	174.0	-4.5
799.791150	31.75	QuasiPeak	46.00	14.25	199.0	H	156.0	-1.7

Above 1GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB /m)
1599.028056	47.52	---	74.00	26.48	100.0	V	121.0	-7.0
1599.028056	---	22.36	54.00	31.64	100.0	V	121.0	-7.0
1964.519038	---	24.16	54.00	29.84	100.0	V	295.0	-5.1
1964.519038	47.05	---	74.00	26.95	100.0	V	295.0	-5.1
2248.767535	53.22	---	74.00	20.78	199.0	V	2.0	-4.0
2248.767535	---	27.72	54.00	26.28	199.0	V	2.0	-4.0
2628.046092	---	24.43	54.00	29.57	100.0	V	116.0	-2.3
2628.046092	44.18	---	74.00	29.82	100.0	V	116.0	-2.3
3198.346694	---	26.06	54.00	27.94	199.0	V	43.0	0.7
3198.346694	47.21	---	74.00	26.79	199.0	V	43.0	0.7
6372.735471	---	34.49	54.00	19.51	199.0	V	103.0	12.4
6372.735471	57.75	---	74.00	16.25	199.0	V	103.0	12.4

Test Model: POE mode

2)30MHz ~ 1GHz



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Detector	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
32.243600	24.74	QuasiPeak	40.00	15.26	101.0	V	169.0	-6.2
59.933650	27.23	QuasiPeak	40.00	12.77	101.0	V	55.0	-16.8
76.260350	31.94	QuasiPeak	40.00	8.06	101.0	V	227.0	-17.1
384.975450	30.44	QuasiPeak	46.00	15.56	101.0	H	297.0	-8.7
495.077100	19.26	QuasiPeak	46.00	26.74	199.0	V	322.0	-5.7
599.983650	27.89	QuasiPeak	46.00	18.11	101.0	V	200.0	-5.2

Above 1GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB /m)
1536.963928	---	47.83	74.00	6.17	149.0	V	6.0	-7.4
1536.963928	52.78	---	54.00	21.22	149.0	V	6.0	-7.4
1752.595190	46.60	---	54.00	27.40	149.0	H	117.0	-6.2
1752.595190	---	24.08	74.00	29.92	149.0	H	117.0	-6.2
1845.400802	59.32	---	74.00	14.68	149.0	H	241.0	-5.7
1845.400802	---	37.95	54.00	16.05	149.0	H	241.0	-5.7
2141.192385	48.57	---	54.00	25.43	149.0	H	173.0	-4.4
2141.192385	---	33.98	74.00	20.02	149.0	H	173.0	-4.4
2440.010020	56.31	---	54.00	17.69	149.0	H	236.0	-3.3
2440.010020	---	43.13	74.00	10.87	149.0	H	236.0	-3.3
6654.939880	50.39	---	54.00	23.61	149.0	H	56.0	13.4
6654.939880	---	36.09	74.00	17.91	149.0	H	56.0	13.4

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