

FCC PART 15.249 TEST REPORT

For

GALAXYWIND Network System Co., Ltd.

GalaxyWind building, No.5 Xinxu road, Shenzhen High-Tech Industry Park, Nanshan, Shenzhen,
China

FCC ID: 2AES6IWULINKM104

Report Type: Original Report	Product Type: Macbee Module
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Report Number: RSH160428051-00	
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Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *GALAXYWIND Network System Co., Ltd.*'s product, model number: iWulink M104-2.0 (FCC ID: 2AES6IWULINKM104) or the "EUT" in this report was a Macbee Module, which was measured approximately: 2.9 cm (L) x 1.4 cm (W) x 0.8 cm (H), rated with DC 3.0V from the operational system.

Note: The main model (iWulink M104-2.0) and the multiple models (iWulink M104-3.0, iWulink M104-2.1) are electrically identical with the PCB design, components and electromagnetic compatibility characteristics. The detailed information can be referred to the declaration letter that stated and guaranteed by the applicant.

**All measurement and test data in this report was gathered from production sample serial number: 1604028 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2016-04-28.*

Objective

This type approval report is prepared on behalf of *GALAXYWIND Network System Co., Ltd.* in accordance with Part 2-Subpart J, and Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

No related submittal(s).

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

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

Measurement uncertainty with radiated emission is 5.81 dB for 30MHz-1GHz.and 4.88 dB for above 1GHz, 1.95dB for conducted measurement.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) 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 October 31, 2013. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.10-2013.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. 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 engineering mode.

EUT Exercise Software

N/A

Equipment Modifications

No modifications were made to the unit tested.

Support Equipment List and Details

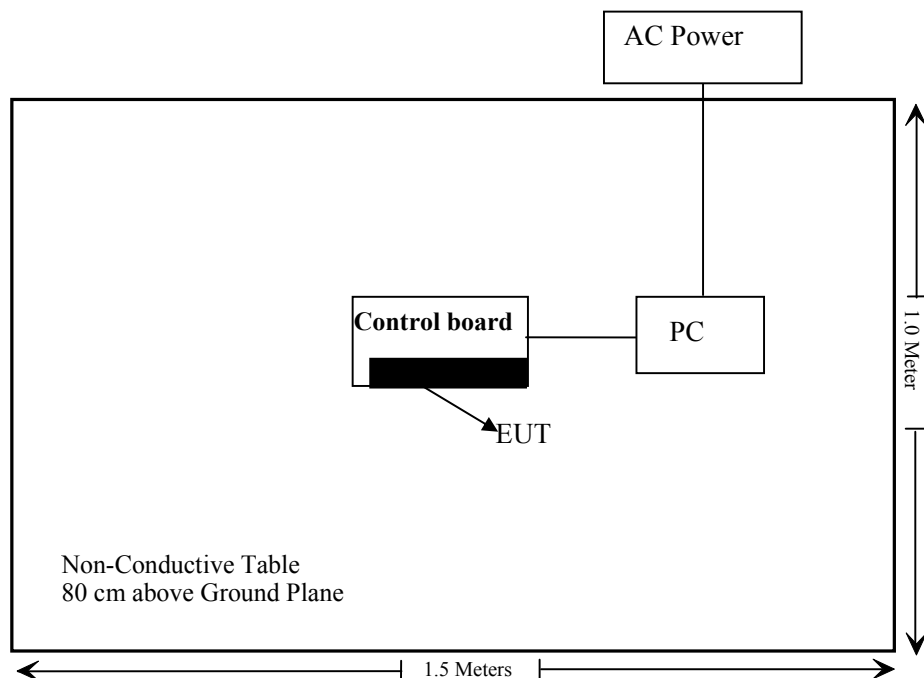
Manufacturer	Description	Model	Serial Number
GALAXYWIND Network System Co., Ltd.	Control board	N/A	N/A
DELL	PC	1#	N/A

Support Cable Descriptions

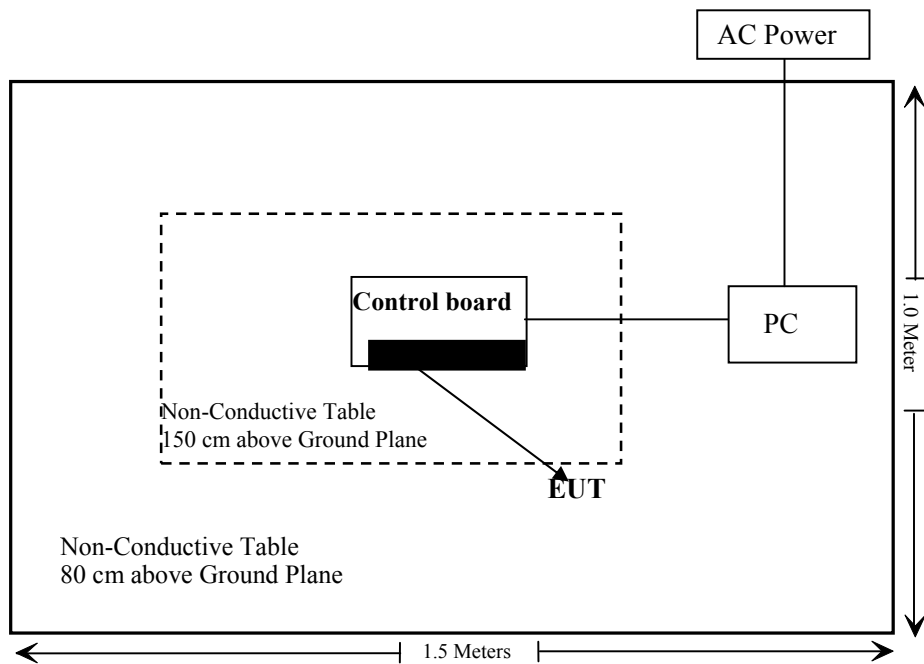
Cable Description	Length (m)	From/Port	To
Un-shielding Detachable USB Cable	1.0	Control board	PC

Block Diagram of Test Setup

For Below 1G:



For Above 1G:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§ 15.203	Antenna Requirement	Compliance
§ 15.207(a)	Conduction Emissions	Compliance
15.205, § 15.209, § 15.249(d)	Radiated Emissions& Outside of Band Emission	Compliance
§ 15.215 (c)	20 dB Bandwidth	Compliance

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

Antenna Connector Construction

For mode iWulink M104-2.0 and iWulink M104-2.1:

An internal PCB antenna arrangement was applied for transmitting, which was permanently attached and the antenna gain is 3.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

For mode iWulink M104-3.0:

An external helical antenna arrangement was applied for transmitting, which was attached through a RP-SMA connector and the antenna gain is 3.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliant.

Applicable Standard

Measurement Uncertainty

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Shenzhen) 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	3.34 dB (k=2, 95% level of confidence)
CAT 3	3.72 dB (k=2, 95% level of confidence)
CAT 5	3.74 dB (k=2, 95% level of confidence)
CAT 6	4.54 dB (k=2, 95% level of confidence)

The diagram illustrates a test setup for a Low Noise Amplifier (LNA). It features a Vertical Reference Ground Plane on the left and a Horizontal Reference Ground Plane at the bottom. The EUT (Equipment Under Test) is a rectangular box mounted on a stand, with a dimension of 40 cm indicated between the vertical ground plane and its left side. Below the EUT, a LISN (Line Impedance Stabilization Network) is also mounted on a stand, with a dimension of 80 cm indicated between the horizontal ground plane and the bottom of the LISN stand. A Test Receiver, depicted as a device with a screen and buttons, is connected to the LISN and the horizontal ground plane. The entire setup is connected to a common ground plane, which is labeled as being bonded to the horizontal reference ground plane.

- 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

During the conducted emission test, the PC 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	100176	2016-06-01	2017-05-31
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2015-12-15	2016-12-14
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2016-05-14	2017-05-14
Rohde & Schwarz	CE Test software	EMC 32	V8.53	NCR	NCR
Ducommun technologies	Conducted Emission Cable	RG-214	CB031	2015-06-15	2016-06-15

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) 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 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 recorded data in following table, the EUT complied with the FCC Part 15.207, the worst margin reading as below:

11.9 dB at 0.205500MHz in the Line 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.

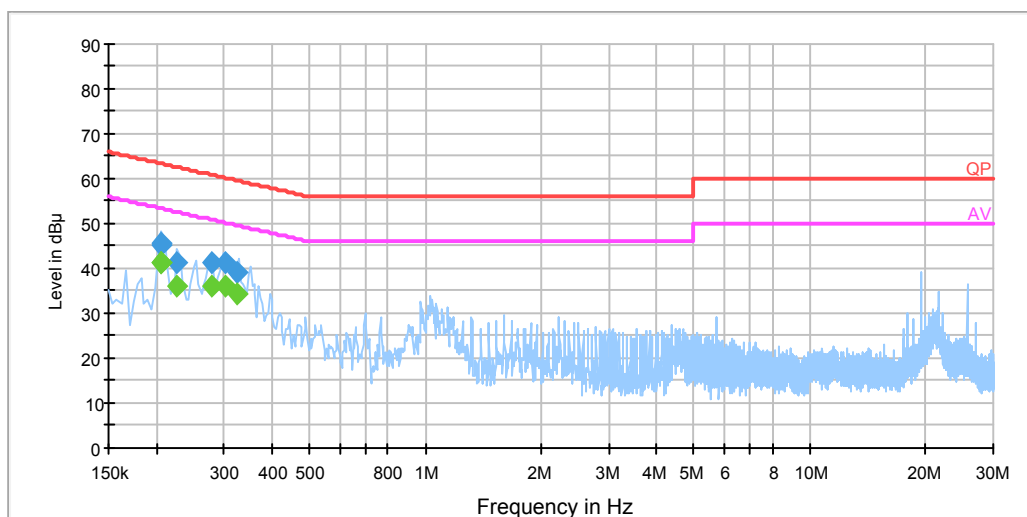
Test Data

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

The testing was performed by Simon Wang on 2016-05-19.

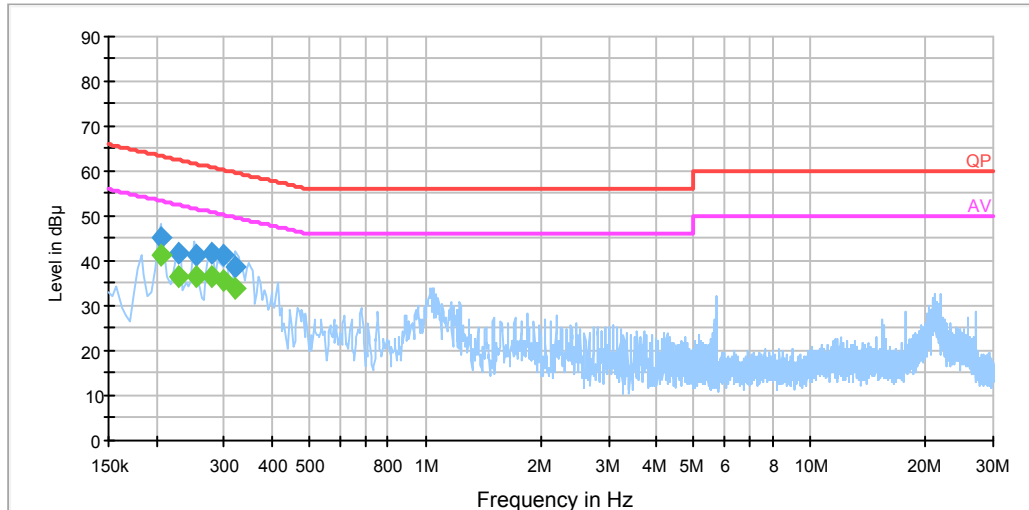
EUT operation mode: Transmitting

AC 120V/60 Hz, Line**EMI Auto Test L**

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.205500	45.4	20.0	63.4	18.0	QP
0.205500	45.5	20.0	63.4	17.9	QP
0.225500	41.2	20.0	62.6	21.4	QP
0.278501	41.2	19.9	60.9	19.7	QP
0.301470	41.4	19.9	60.2	18.8	QP
0.325110	39.3	19.9	59.6	20.3	QP
0.205500	41.5	20.0	53.4	11.9	Ave.
0.205500	41.4	20.0	53.4	12.0	Ave.
0.225500	35.9	20.0	52.6	16.7	Ave.
0.278501	36.3	19.9	50.9	14.6	Ave.
0.301470	36.0	19.9	50.2	14.2	Ave.
0.325110	34.5	19.9	49.6	15.1	Ave.

AC 120V/60 Hz, Neutral

EMI Auto Test N



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.205500	45.4	20.0	63.4	18.0	QP
0.229500	41.9	20.0	62.5	20.6	QP
0.253500	41.5	19.9	61.6	20.1	QP
0.277500	41.8	19.9	60.9	19.1	QP
0.297470	41.3	19.9	60.3	19.0	QP
0.321170	38.8	19.9	59.7	20.9	QP
0.205500	41.2	20.0	53.4	12.2	Ave.
0.229500	36.4	20.0	52.5	16.1	Ave.
0.253500	36.6	19.9	51.6	15.0	Ave.
0.277500	36.7	19.9	50.9	14.2	Ave.
0.297470	35.8	19.9	50.3	14.5	Ave.
0.321170	33.9	19.9	49.7	15.8	Ave.

Note:

- 1) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
- 2) Corrected Amplitude = Reading + Correction Factor
- 3) Margin = Limit – Corrected Amplitude

FCC§15.205, §15.209 & §15.249(d) - RADIATED EMISSIONS& Outside Of Band Emission

Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

As per FCC§15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

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, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is 5.91 dB for 30MHz-1GHz, 4.92 dB for above 1GHz, and it will not be taken into consideration for the test data recorded in the report

Test Equipment Setup

The spectrum analyzer or receiver is set as:

Below 1000MHz:

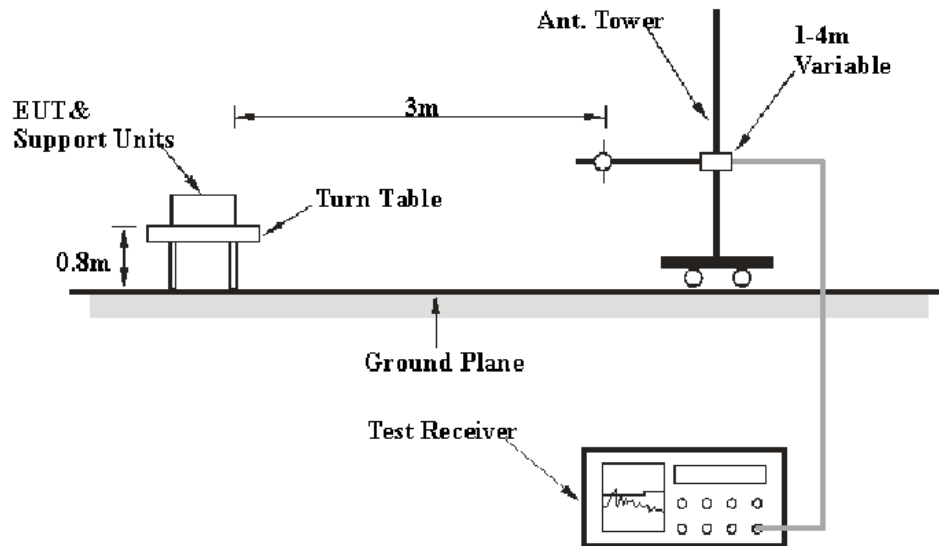
$$\text{RBW} = 100 \text{ kHz} / \text{VBW} = 300 \text{ kHz} / \text{Sweep} = \text{Auto}$$

Above 1000MHz:

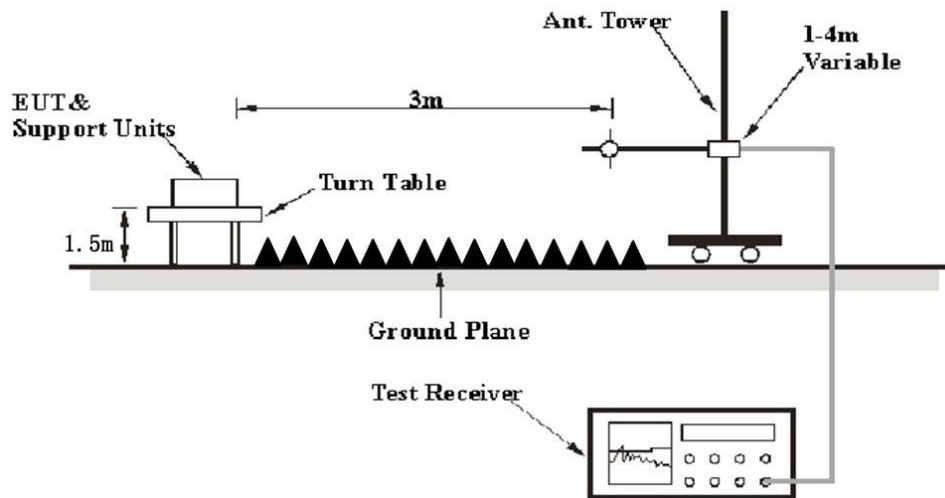
$$\begin{aligned} \text{Peak: RBW} &= 1\text{MHz} / \text{VBW} = 1\text{MHz} / \text{Sweep} = \text{Auto} \\ \text{Average: RBW} &= 1\text{MHz} / \text{VBW} = 10\text{Hz} / \text{Sweep} = \text{Auto} \end{aligned}$$

EUT Setup

Below 1G:



Above 1GHz:



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.

Test Procedure

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

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

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 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447E	1937A01046	2016-05-06	2017-05-06
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2015-12-15	2016-12-14
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-07	2017-12-06
A.H. System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2016-04-14	2017-04-14
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2016-04-23	2017-04-23
DUCOMMUN	Pre-amplifier	ALN-22093530-01	991373-01	2015-12-02	2016-12-02
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2015-06-13	2016-06-13
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2013-10-14	2016-10-13
Rohde & Schwarz	Auto test Software	EMC32	V9.10	NCR	NCR
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369223410-001	2015-06-15	2016-06-15
Ducommun technologies	RF Cable	104PEA	218124002	2016-04-22	2017-04-22
Ducommun technologies	RF Cable	RG-214	1	2015-06-15	2016-06-15
Ducommun technologies	RF Cable	RG-214	2	2015-06-15	2016-06-15

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

Test Results Summary

According to the data in the following table, the worst margin reading as below:

3.12 dB at 2389.99 MHz in the Horizontal polarization for Low Channel in external helical antenna arrangement.

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

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

In BACL, $U_{(L_m)}$ 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:	22 °C
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

The testing was performed by Simon Wang on 2016-05-19.

Test Mode: Transmitting

30 MHz to 25 GHz:**External helical antenna arrangement:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.249&15.209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2403 MHz)									
291.5	43.85	QP	89	1.1	H	-13.7	30.15	46	15.85
2403.00	110.44	PK	106	1.6	H	-6.46	103.98	114	10.02
2403.00	93.75	Ave.	106	1.6	H	-6.46	87.29	94	6.71
2403.00	102.43	PK	303	2.4	V	-6.46	95.97	114	18.03
2403.00	85.41	Ave.	303	2.4	V	-6.46	78.95	94	15.05
2398.42	74.11	PK	162	1.4	H	-6.46	67.65	74	6.35
2398.42	46.24	Ave.	162	1.4	H	-6.46	39.78	54	14.22
2398.42	75.13	PK	133	1.5	V	-6.46	68.67	74	5.33
2398.42	47.21	Ave.	133	1.5	V	-6.46	40.75	54	13.25
2389.35	77.11	PK	264	1.2	H	-6.46	70.65	74	3.35
2389.35	45.24	Ave.	264	1.2	H	-6.46	38.78	54	15.22
2389.99	77.34	PK	59	1.5	H	-6.46	70.88	74	3.12
2389.99	46.85	Ave.	59	1.5	H	-6.46	40.39	54	13.61
4806.00	47.11	PK	123	2.2	H	3.79	50.90	74	23.10
4806.00	30.38	Ave.	123	2.2	H	3.79	34.17	54	19.83
7209.00	53.94	PK	115	1.9	H	9.79	63.73	74	10.27
7209.00	34.88	Ave.	115	1.9	H	9.79	44.67	54	9.33
Middle Channel (2440 MHz)									
291.5	43.96	QP	175	1.1	H	-13.7	30.26	46	15.74
2440.00	109.34	PK	54	2.3	H	-6.46	102.88	114	11.12
2440.00	93.18	Ave.	54	2.3	H	-6.46	86.72	94	7.28
2440.00	101.13	PK	123	2.2	V	-6.46	94.67	114	19.33
2440.00	85.01	Ave.	123	2.2	V	-6.46	78.55	94	15.45
2387.99	63.78	PK	72	1.0	H	-6.46	57.32	74	16.68
2387.99	36.54	Ave.	72	1.0	H	-6.46	30.08	54	23.92
2389.59	64.55	PK	188	1.6	H	-6.46	58.09	74	15.91
2389.59	37.01	Ave.	188	1.6	H	-6.46	30.55	54	23.45
2484.55	63.67	PK	164	1.4	H	-4.74	58.93	74	15.07
2484.55	28.34	Ave.	164	1.4	H	-4.74	23.60	54	30.40
4880.00	46.99	PK	109	2.0	H	3.56	50.55	74	23.45
4880.00	30.68	Ave.	109	2.0	H	3.56	34.24	54	19.76
7320.00	51.92	PK	61	1.5	H	10.11	62.03	74	11.97
7320.00	33.26	Ave.	61	1.5	H	10.11	43.37	54	10.63

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.249&15.209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2480 MHz)									
291.5	43.89	QP	26	1.1	H	-13.7	30.19	46	15.81
2480.00	109.46	PK	16	1.1	H	-4.74	104.72	114	9.28
2480.00	92.25	Ave.	16	1.1	H	-4.74	87.51	94	6.49
2480.00	99.22	PK	348	1.6	V	-4.74	94.48	114	19.52
2480.00	83.15	Ave.	348	1.6	V	-4.74	78.41	94	15.59
2383.98	59.64	PK	239	1.2	H	-6.46	53.18	74	20.82
2383.98	32.56	Ave.	239	1.2	H	-6.46	26.10	54	27.90
2483.51	73.91	PK	130	2.0	H	-4.74	69.17	74	4.83
2483.51	46.28	Ave.	130	2.0	H	-4.74	41.54	54	12.46
2483.92	73.14	PK	68	1.6	V	-4.74	68.40	74	5.60
2483.92	46.12	Ave.	68	1.6	V	-4.74	41.38	54	12.62
4960.00	47.83	PK	127	2.1	H	3.19	51.02	74	22.98
4960.00	31.28	Ave.	127	2.1	H	3.19	34.47	54	19.53
7440.00	49.66	PK	286	1.2	H	8.17	57.83	74	16.17
7440.00	33.27	Ave.	286	1.2	H	8.17	41.44	54	12.56

Internal PCB antenna arrangement:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.249&15.209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2403 MHz)									
285.7	43.92	QP	56	1.1	H	-13.8	30.12	46	15.88
2403.00	104.53	PK	67	1.3	H	-6.46	98.07	114	15.93
2403.00	88.41	Ave.	67	1.3	H	-6.46	81.95	94	12.05
2403.00	105.07	PK	123	1.1	V	-6.46	98.61	114	15.39
2403.00	87.28	Ave.	123	1.1	V	-6.46	80.82	94	13.18
2395.58	70.95	PK	252	2.1	H	-6.46	64.49	74	9.51
2395.58	42.28	Ave.	252	2.1	H	-6.46	34.82	54	19.18
2389.67	71.33	PK	337	2.0	H	-6.46	64.87	74	9.13
2389.67	39.04	Ave.	337	2.0	H	-6.46	32.58	54	21.42
2498.81	54.36	PK	89	2.4	H	-4.74	49.62	74	24.38
2498.81	31.43	Ave.	89	2.4	H	-4.74	26.69	54	27.31
4806.00	42.48	PK	21	2.4	H	3.79	46.27	74	27.73
4806.00	27.03	Ave.	21	2.4	H	3.79	30.82	54	23.18
7209.00	50.96	PK	185	1.9	H	9.79	60.75	74	13.25
7209.00	32.06	Ave.	185	1.9	H	9.79	41.85	54	12.15
Middle Channel (2440 MHz)									
285.7	43.95	QP	16	1.1	H	-13.8	30.15	46	15.85
2440.00	103.26	PK	19	1.2	H	-6.46	96.80	114	17.2
2440.00	86.21	Ave.	19	1.2	H	-6.46	79.75	94	14.25
2440.00	102.51	PK	133	1.1	V	-6.46	96.05	114	17.95
2440.00	85.66	Ave.	133	1.1	V	-6.46	79.20	94	14.8
2384.14	59.38	PK	145	1.7	H	-6.46	52.92	74	21.08
2384.14	33.02	Ave.	145	1.7	H	-6.46	26.56	54	27.44
2389.91	60.13	PK	213	1.5	H	-6.46	53.67	74	20.33
2389.91	33.71	Ave.	213	1.5	H	-6.46	27.25	54	26.75
2483.63	56.44	PK	222	1.3	H	-4.74	51.70	74	22.30
2483.63	28.34	Ave.	222	1.3	H	-4.74	23.60	54	30.40
4880.00	45.73	PK	247	2.0	H	3.56	49.29	74	24.71
4880.00	29.73	Ave.	247	2.0	H	3.56	33.29	54	20.71
7320.00	55.88	PK	132	2.1	H	10.11	65.99	74	8.01
7320.00	36.41	Ave.	132	2.1	H	10.11	46.52	54	7.48

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.249&15.209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2480 MHz)									
285.7	43.86	QP	76	1.2	H	-13.8	30.06	46	15.94
2480.00	102.36	PK	356	1.2	H	-4.74	97.62	114	16.38
2480.00	84.91	Ave.	356	1.2	H	-4.74	80.17	94	13.83
2480.00	102.31	PK	154	2.3	V	-4.74	97.57	114	16.43
2480.00	84.13	Ave.	154	2.3	V	-4.74	79.39	94	14.61
2389.51	55.15	PK	224	2.0	H	-6.46	48.69	74	25.31
2389.51	31.13	Ave.	224	2.0	H	-6.46	24.67	54	29.33
2483.89	74.01	PK	208	1.5	H	-4.74	69.27	74	4.73
2483.89	42.32	Ave.	208	1.5	H	-4.74	37.58	54	16.42
2483.89	73.64	PK	179	1.1	V	-4.74	68.90	74	5.10
2483.89	41.82	Ave.	179	1.1	V	-4.74	37.08	54	16.92
4960.00	47.39	PK	75	2.4	H	3.19	50.58	74	23.42
4960.00	31.54	Ave.	75	2.4	H	3.19	34.73	54	19.27
7440.00	54.88	PK	30	1.0	H	8.17	63.05	74	10.95
7440.00	35.59	Ave.	30	1.0	H	8.17	43.76	54	10.24

Note:

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) +cable loss – amplifier factor

Margin = Limit- Corr. Amplitude

FCC§15.215(c) - 20dB EMISSION BANDWIDTH**Applicable Standard**

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that indicated 20dB bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
A.H. System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-12-11	2016-12-11
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2016-04-23	2017-04-23
Ducommun technologies	RF Cable	RG-214	1	2015-06-15	2016-06-15
Ducommun technologies	RF Cable	RG-214	2	2015-06-15	2016-06-15

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

Test Data**Environmental Conditions**

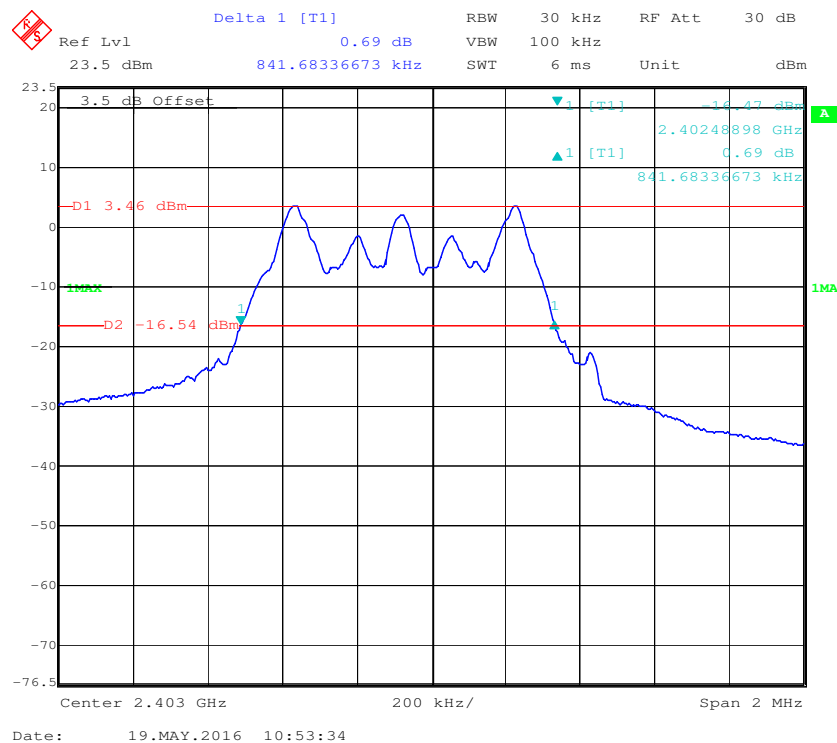
Temperature:	22 °C
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

The testing was performed by Simon Wang on 2016-05-19.

Test Mode: Transmitting

Please refer to the following table and plots.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2403	0.842
Middle	2440	0.850
High	2480	0.850

Low Channel

Delta 1 [T1]

Ref Lvl 0.87 dB

RBW 30 kHz

VBW 100 kHz

RF Att 30 dB

15.5 dBm 849.69939880 kHz SWT 6 ms Unit dBm

3.5 dB Offset

D1 4.1 dBm

D2 -15.9 dBm

1MAX

1 [T1] -16.24 dBm

2.43948497 GHz

0.87 dB

849.69939880 kHz

Center 2.44 GHz

200 kHz/

Span 2 MHz

Date: 19.MAY.2016 14:31:10

Delta 1 [T1]

Ref Lvl 0.50 dB

23.5 dBm 849.69939880 kHz

RBW 30 kHz RF Att 30 dB

VBW 100 kHz

SWT 6 ms Unit dBm

3.5 dB Offset

D1 3.23 dBm

D2 -16.77 dBm

1 [T1] -16.54 dBm

1 [T1] 2.47948898 GHz

1 [T1] 0.50 dB

1 [T1] 849.69939880 kHz

Center 2.48 GHz

200 kHz/

Span 2 MHz

Date: 19.MAY.2016 11:12:38

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