FCC PART 15B, CLASS B

TEST REPORT

For

Autel Robotics Co., Ltd.

9th Floor,Bldg.B1,Zhiyuan,1001 Xueyuan Rd., Xili, Nanshan, Shenzhen, China

FCC ID: 2AGNTRC5809A

Report Type:	**Product Type:**
Original Report	EZ-FLY

Test Engineer:	Simon Wang
Report Number:	RSZ151118003-00A
Report Date:	2015-12-16
Reviewed By:	Candy Li EMC Manager
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Autel Robotics Co., Ltd.*'s product, model number: *EF5A (FCC ID: 2AGNTRC5809A)* or the "EUT" in this report was an *EZ-FLY*, which was measured approximately: 49.3cm (L) x48.5cm (W) x 20.9cm (H), rated with input voltage: DC 3.7 V from battery or DC 16.8V from adapter.The highest operating frequency is 5799MHz.

Adapter information: Switching Adapter
Model: ADF029
Input: 100-240V~50/60 Hz, 1.4A
Output: DC 16.8V, 5.7A.

** All measurement and test data in this report was gathered from production sample serial number: 1507136. (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2015-11-18.*

Objective

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

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

Related Submittal(s)/Grant(s)

FCC Part 15.407 NII submission with FCC ID: 2AGNTRC5809A
FCC Part 15.247 DTS submission with FCC ID: 2AGNTAC5809A
FCC Part 15.407 NII submission with FCC ID: 2AGNTAC5809A

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 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 5.91 dB for 30MHz-1GHz, and 4.92 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 C63.4-2014.

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

Description of Test Configuration

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

EUT Exercise Software

No exercise software was used.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

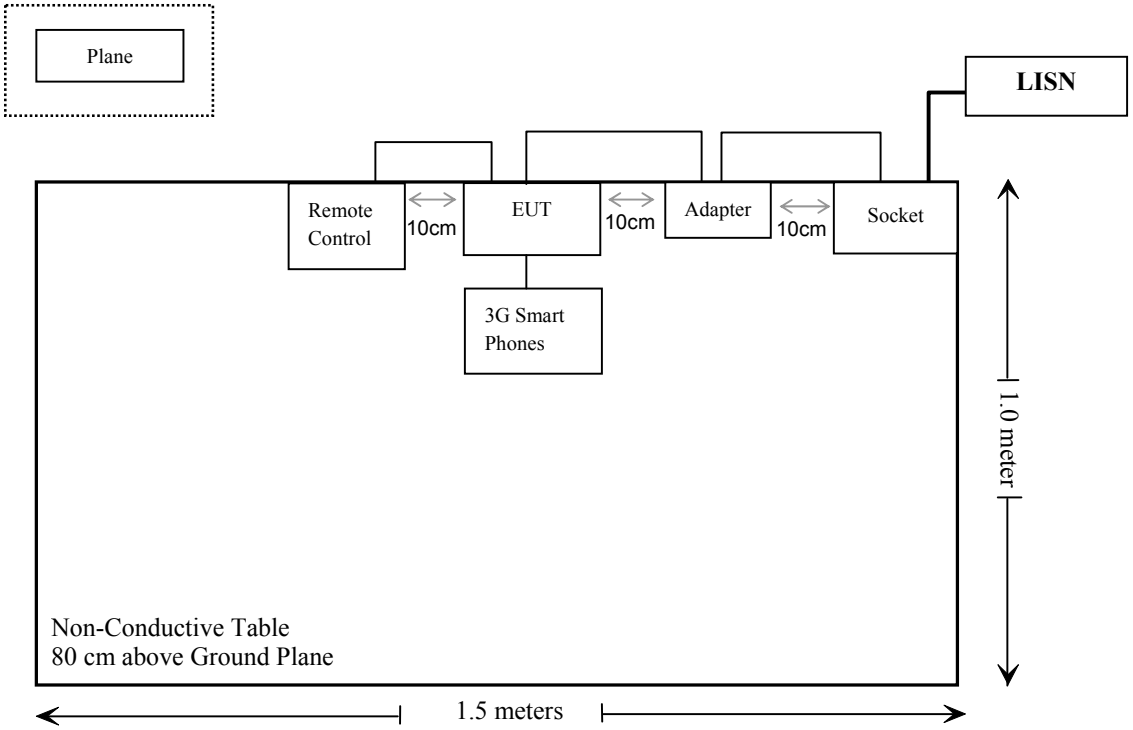
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Conplex International Limited	3G Smart Phone	QUE 5.0	1410258
Autel	Remote Control	EF5A	1507136

External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-shielding Un-detachable AC cable	1.0	Socket	Mains
Un-shielding Un-detachable DC cable	2.4	Adapter	EUT
Un-shielding Detachable AC cable	1.3	Adapter	Socket
Un-shielding Detachable AV cable	1.5	Remote Control	EUT
Un-shielding Detachable USB cable	1.0	3G Smart Phone	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

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

FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

According to FCC §15.107

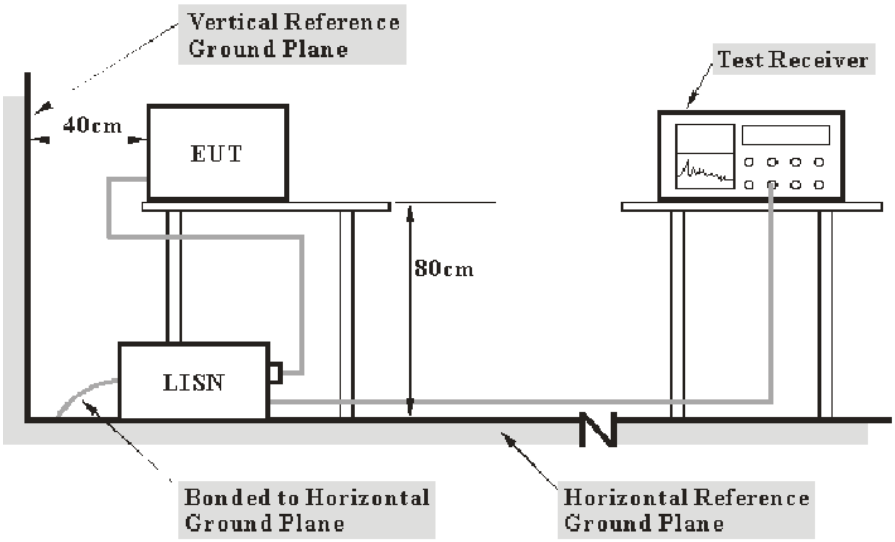
Measurement Uncertainty

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

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	Measurement uncertainty
AC Mains	3.54 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)

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 per ANSI C63.4-2014. The related limit was specified in FCC Part 15.107 Class B.

The spacing between the peripherals was 10 cm.

The Adapter was connected to a 120 VAC/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 adapter was connected to the first LISN and the other relevant equipments were conncected to the second 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	LISN	ENV216	3560.6650.12-101613-Yb	2015-12-01	2016-12-01
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2015-06-03	2016-06-03
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2015-05-14	2016-05-14
Rohde & Schwarz	LISN	ESH3-Z5	100113	NCR	NCR
Rohde & Schwarz	CE Test software	EMC 32	V8.53	NCR	NCR

*** 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/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss + 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:

Margin = Limit – Corrected Amplitude

Test Results Summary

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

18.3 dB at **0.325110 MHz** in the **Line** conducted mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance 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

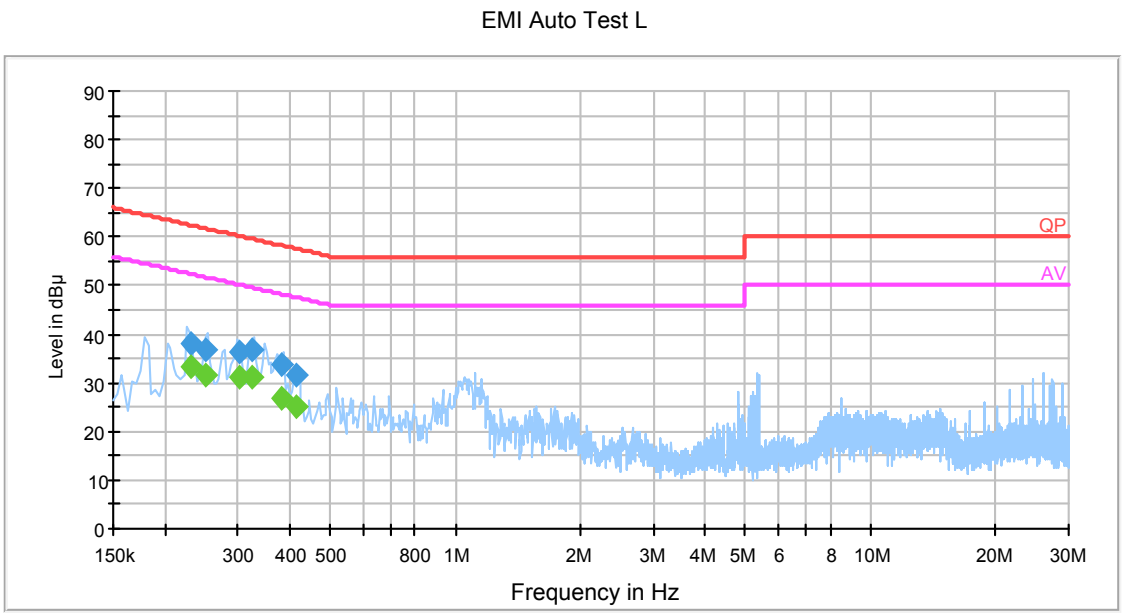
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Simon Wang on 2015-12-02.

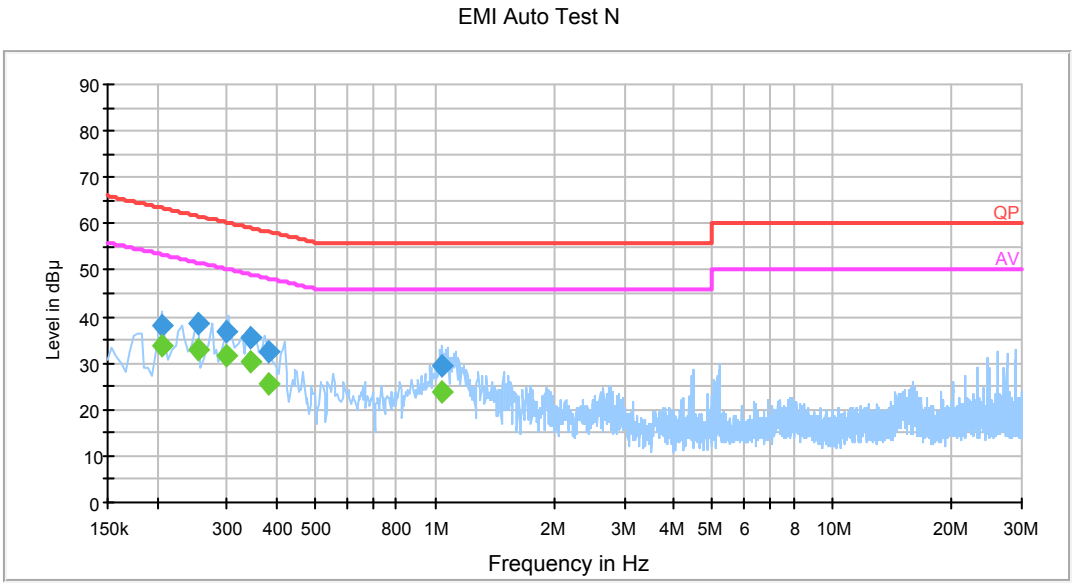
EUT Operation Mode: ***Controlling & Receiver(For 900MHz)***

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Corrected Factor (dB)	Limit (dBµV)	Margin (dB)	Remark (PK/QP/Ave.)
0.230500	37.9	20.0	62.4	24.5	QP
0.230500	33.3	20.0	52.4	19.1	Ave.
0.249500	36.6	20.0	61.8	25.2	QP
0.249500	31.7	20.0	51.8	20.1	Ave.
0.302500	36.3	19.9	60.2	23.9	QP
0.302500	31.3	19.9	50.2	18.9	Ave.
0.325110	36.6	19.9	59.6	23.0	QP
0.325110	31.3	19.9	49.6	**18.3**	Ave.
0.380210	33.7	19.9	58.3	24.6	QP
0.380210	27.0	19.9	48.3	21.3	Ave.
0.415790	31.6	19.9	57.5	25.9	QP
0.415790	25.1	19.9	47.5	22.4	Ave.

AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Corrected Factor (dB)	Limit (dBµV)	Margin (dB)	Remark (PK/QP/Ave.)
0.205500	38.1	20.0	63.4	25.3	QP
0.205500	33.8	20.0	53.4	19.6	Ave.
0.253500	38.4	19.9	61.6	23.2	QP
0.253500	32.9	19.9	51.6	18.7	Ave.
0.297470	36.6	19.9	60.3	23.7	QP
0.297470	31.5	19.9	50.3	18.8	Ave.
0.344810	35.6	19.9	59.1	23.5	QP
0.344810	30.2	19.9	49.1	18.9	Ave.
0.379610	32.4	19.9	58.3	25.9	QP
0.379610	25.7	19.9	48.3	22.6	Ave.
1.042310	29.6	20.0	56.0	26.4	QP
1.042310	23.7	20.0	46.0	22.3	Ave.

Note:

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

FCC §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §15.109

Measurement Uncertainty

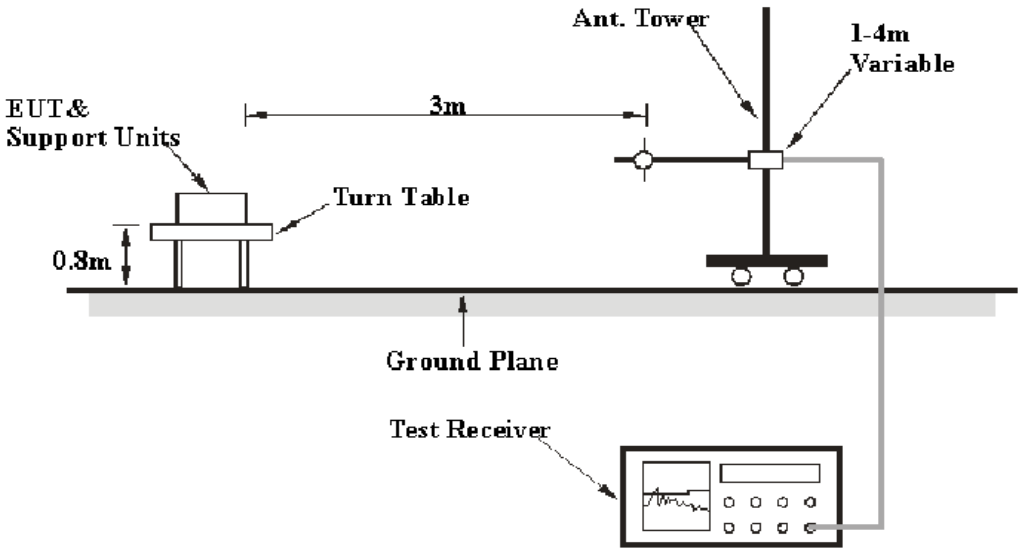
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency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

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

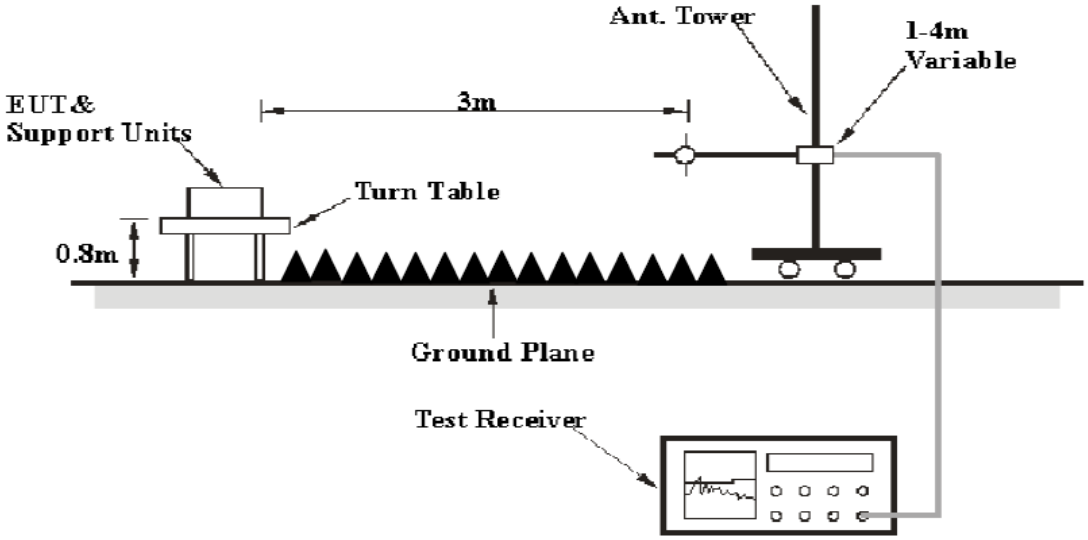
Frequency	Polarity	Measurement uncertainty
30 MHz~200 MHz	Horizontal	4.04dB (k=2, 95% level of confidence)
	Vertical	4.52 dB (k=2, 95% level of confidence)
200 MHz~1 GHz	Horizontal	4.72 dB (k=2, 95% level of confidence)
	Vertical	5.81 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	Horizontal/Vertical	4.64 dB (k=2, 95% level of confidence)
Above 6 GHz	Horizontal/Vertical	4.88 dB (k=2, 95% level of confidence)

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.

The Adapter was connected to a 120 VAC/60 Hz power source.

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
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

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 and PK and average detector modes for frequencies above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447E	1937A01046	2015-05-06	2016-05-06
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2015-11-03	2016-11-03
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-07	2017-12-06
A.H. System	Horn Antenna	SAS-200/571	135	2013-02-10	2016-02-10
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-08-22	2016-08-22
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2015-04-23	2016-04-23
DUCOMMUN	Pre-amplifier	ALN-22093530-01	991373-01	2015-12-02	2016-12-01
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2013-10-14	2016-10-13
TDK	Chamber	Chamber A	2#	2015-10-15	2018-10-15
TDK	Chamber	Chamber B	1#	2015-07-23	2018-07-22
R&S	Auto test Software	EMC32	V9.10	NCR	NCR

*** 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 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:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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:

Margin = Limit – Corrected Amplitude

Test Results Summary

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

3.64 dB at **377.104250 MHz** in the **Horizontal** polarization mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance 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 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Simon Wang on 2015-12-02.

EUT Operation Mode: ***Controlling & Receiver(For 900MHz)***

1 GHz ~ 30 GHz

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15B	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
64.52	38.81	QP	349	1.7	V	-13.8	25.01	40	14.99
102.86	44.54	QP	86	2.8	H	-9.9	34.64	43.5	8.86
235.76	41.92	QP	46	1.3	V	-8.9	33.02	46	12.98
308.58	43.19	QP	109	1.1	H	-6.2	36.99	46	9.01
377.10	47.76	QP	80	1.1	H	-5.4	42.36	46	**3.64**
445.59	39.84	QP	0	1.2	V	-3.8	36.04	46	9.96
1811.6	50.05	PK	110	1.7	H	1.87	51.92	74	22.08
1811.6	28.79	Ave.	110	1.7	H	1.87	30.66	54	23.34
3685.3	40.65	PK	295	1.7	H	12.71	53.36	74	20.64
3685.3	23.15	Ave.	295	1.7	H	12.71	35.86	54	18.14
1811.6	48.14	PK	306	2.2	V	1.87	50.01	74	23.99
1811.6	27.96	Ave.	306	2.2	V	1.87	29.83	54	24.17
3685.3	41.20	PK	283	1.0	V	12.71	53.91	74	20.09
3685.3	24.01	Ave.	283	1.0	V	12.71	36.72	54	17.28

Note:
1) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
2) Corrected Amplitude = Correction Factor + Reading
3) Margin = Limit - Corrected Amplitude

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