



# FCC PART 15C

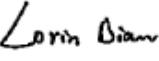
## TEST REPORT

For

### Telepower Communication Co.,Ltd.

5 Bld, Zone A, Hantian Technology Town No.17 ShenHai RD, Nanhai District, Foshan, China

**FCC ID: 2AJ2B-TPS390**

<b>Report Type:</b> Original Report	<b>Product Name:</b> Handheld POS
<b>Test Engineer:</b> <u>Lorin Bian</u> 	
<b>Report Number:</b> <u>RXM160919050E</u>	
<b>Report Date:</b> <u>2016-12-07</u>	
<b>Reviewed By:</b> <u>Henry Ding</u>  EMC Leader	
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## **TABLE OF CONTENTS**

<b>GENERAL INFORMATION .....</b>	<b>3</b>
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	3
OBJECTIVE .....	3
TEST METHODOLOGY .....	4
TEST FACILITY.....	4
<b>SYSTEM TEST CONFIGURATION.....</b>	<b>5</b>
JUSTIFICATION.....	5
EUT EXERCISE SOFTWARE.....	5
EXTERNAL CABLE .....	5
BLOCK DIAGRAM OF TEST SETUP .....	5
<b>SUMMARY OF TEST RESULTS.....</b>	<b>6</b>
<b>FCC§15.203 - ANTENNA REQUIREMENT .....</b>	<b>7</b>
APPLICABLE STANDARD.....	7
ANTENNA CONNECTED CONSTRUCTION .....	7
<b>FCC §15.207 – AC LINE CONDUCTED EMISSION .....</b>	<b>8</b>
MEASUREMENT UNCERTAINTY .....	8
EUT SETUP.....	9
EMI TEST RECEIVER SETUP .....	9
TEST EQUIPMENT LIST AND DETAILS .....	10
TEST PROCEDURE .....	10
CORRECTED AMPLITUDE & MARGIN CALCULATION.....	11
TEST RESULTS SUMMARY .....	11
TEST DATA .....	11
<b>FCC§15.225, §15.205 &amp; §15.209 - RADIATED EMISSIONS TEST .....</b>	<b>14</b>
APPLICABLE STANDARD.....	14
MEASUREMENT UNCERTAINTY .....	14
EUT SETUP.....	15
EMI TEST RECEIVER SETUP .....	15
CORRECTED AMPLITUDE & MARGIN CALCULATION.....	15
TEST EQUIPMENT LIST AND DETAILS .....	15
TEST RESULTS SUMMARY .....	16
TEST DATA .....	16
<b>FCC§15.225(E) - FREQUENCY STABILITY .....</b>	<b>18</b>
APPLICABLE STANDARD.....	18
TEST PROCEDURE .....	18
TEST EQUIPMENT LIST AND DETAILS .....	18
TEST DATA .....	19
<b>FCC §15.215(C) – 20 DB EMISSION BANDWIDTH .....</b>	<b>20</b>
APPLICABLE STANDARD.....	20
TEST PROCEDURE .....	20
TEST EQUIPMENT LIST AND DETAILS .....	20
TEST DATA .....	21

## GENERAL INFORMATION

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### Product Description for Equipment Under Test (EUT)

The **Telepower Communication Co.,Ltd.**'s product, model number: **TPS390 (FCC ID: 2AJ2B-TPS390)** (the "EUT") in this report was a **Handheld POS**, which was measured approximately: 19.6 cm (L) × 8.4 cm (W) × 6.3 cm (H), rated input voltage: DC3.7V rechargeable Li-ion battery or DC5V from adapter.

Adapter information:

Model: SA/12PA/05FUS050200

Input: 100-240V~50/60Hz 0.5A

Output: DC 5.0V, 2.0A

*\*All measurement and test data in this report was gathered from final production sample, serial number: 160919050 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2016-09-27, and EUT conformed to test requirement.*

### Objective

This Type approval report is prepared on behalf of **Telepower Communication Co.,Ltd.** in accordance with Part 2, Subpart J, and Part 15, Subparts A, B and C of the Federal Communications Commission's rules.

The objective is to determine the compliance of the EUT with FCC rules, sec 15.203, 15.205, 15.207, 15.209 and 15.225.

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

The uncertainty of any RF tests which use conducted method measurement is  $\pm 3.17$  dB, the uncertainty of any radiation on emissions measurement is:

30M~200MHz:  $\pm 4.7$  dB;  
200M~1GHz:  $\pm 6.0$  dB;  
1G-6GHz:  $\pm 5.13$  dB;  
6G~25GHz:  $\pm 5.47$  dB;

And the uncertainty will not be taken into consideration for all test data recorded in the report.

## Test Facility

The test site used by BACL to collect test data is located in the 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China

Test site at BACL 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 April 24, 2015. 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.: 560332. 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 test mode

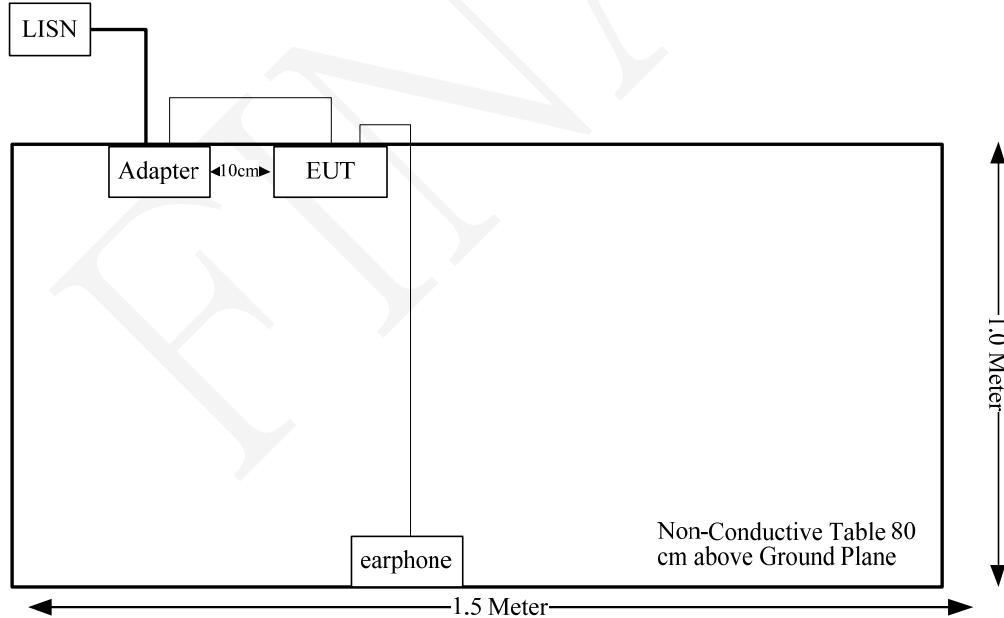
### EUT Exercise Software

No software was performed under test.

### External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	Yes	No	1.0	Adapter	EUT
Earphone	No	No	1.2	EUT	Earphone

### Block Diagram of Test Setup



## **SUMMARY OF TEST RESULTS**

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FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207	AC Line Conducted Emission	Compliance
§15.225 §15.209 §15.205	Radiated Emission Test	Compliance
§15.225(e)	Frequency Stability	Compliance
§15.215(c)	20 dB Emission Bandwidth	Compliance

## **FCC§15.203 - ANTENNA REQUIREMENT**

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### **Applicable Standard**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

### **Antenna Connected Construction**

The EUT has one integral antenna arrangement, which was permanently attached and fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliance.

## FCC §15.207 – AC LINE CONDUCTED EMISSION

### Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner:

If  $U_{\text{lab}}$  is less than or equal to  $U_{\text{cisp}}$  of Table 1, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If  $U_{\text{lab}}$  is greater than  $U_{\text{cisp}}$  of Table 1, then:

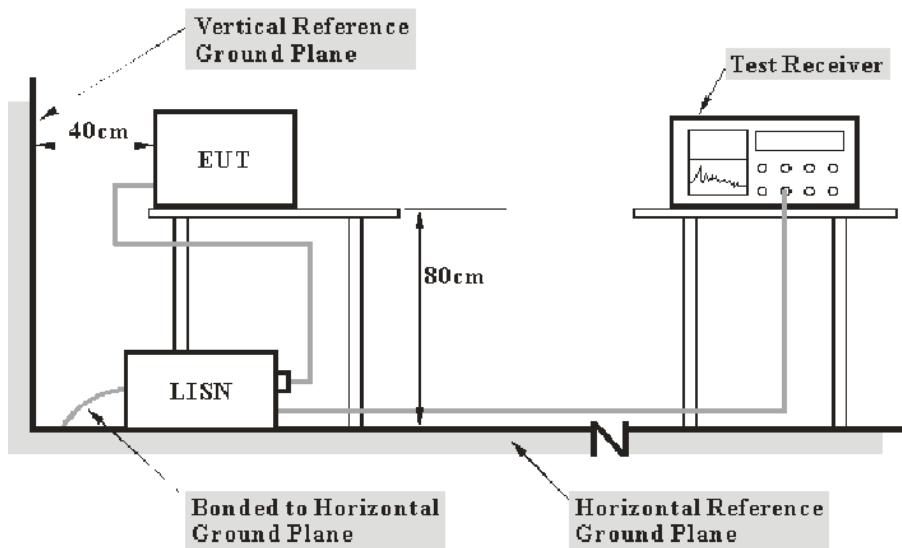
- compliance is deemed to occur if no measured disturbance level, increased by  $(U_{\text{lab}} - U_{\text{cisp}})$ , exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by  $(U_{\text{lab}} - U_{\text{cisp}})$ , exceeds the disturbance limit.

Based on CISPR 16-4-2:2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Chengdu) is  $\pm 3.17$  dB (150 kHz to 30 MHz).

Table 1 – Values of  $U_{\text{cisp}}$

Measurement	$U_{\text{cisp}}$
Conducted disturbance at mains port using AMN (9 kHz to 150 kHz) (150 kHz to 30 MHz)	3.8 dB 3.4 dB
Conducted disturbance at mains port using voltage probe (9 kHz to 30 MHz)	2.9 dB
Conducted disturbance at telecommunication port using AAN (150 kHz to 30 MHz)	5.0 dB
Conducted disturbance at telecommunication port using CVP (150 kHz to 30 MHz)	3.9 dB
Conducted disturbance at telecommunication port using CP (150 kHz to 30 MHz)	2.9 dB

## EUT Setup



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

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207.

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 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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2016-12-02	2017-12-01
Rohde & Schwarz	PULSE LIMITER	ESH3Z2	357.8810.52	2016-10-31	2017-10-30
Rohde & Schwarz	L.I.S.N.	ENV216	3560.6550.06	2016-12-02	2017-12-01
N/A	Conducted Cable	NO.5	N/A	2016-11-10	2017-11-09
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Procedure

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

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

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

According FCC publication number 174176, for a device with a permanent antenna operating at or below 30 MHz, the measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions: (1) perform the AC line conducted tests with the permanent antenna to determine compliance with the Section 15.207 limits outside the transmitter's fundamental emission band; (2) retest with a dummy load in lieu of the permanent antenna to determine compliance with the Section 15.207 limits within the transmitter's fundamental emission band.

## Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_c + VDF$$

Herein,

$V_C$ : corrected voltage amplitude

$V_R$ : reading voltage amplitude

$A_c$ : attenuation caused by cable loss

VDF: voltage division factor of AMN or ISN

The “Margin” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum 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.

## Test Data

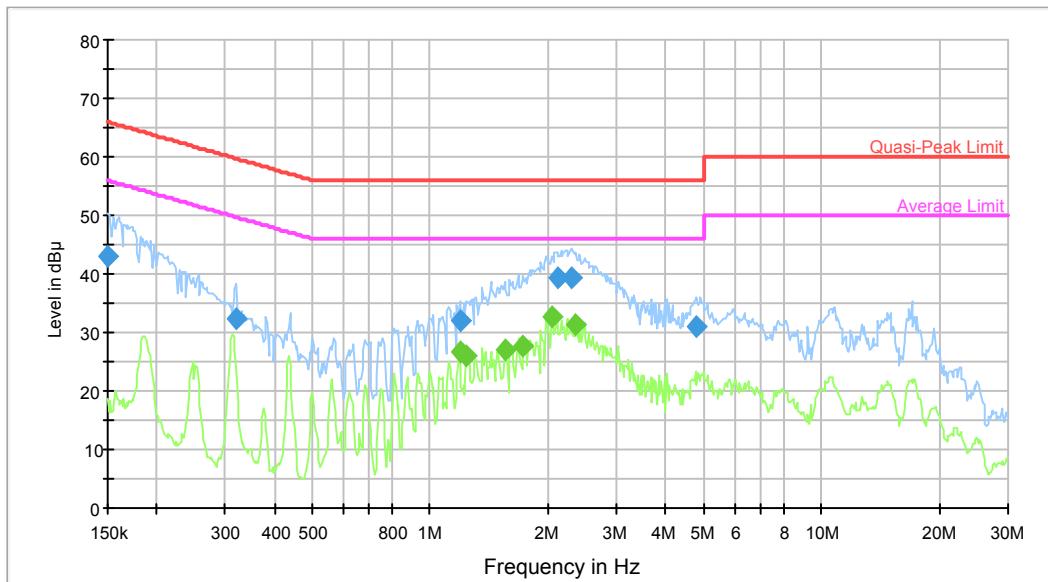
### Environmental Conditions

Temperature:	28.6 °C
Relative Humidity:	60 %
ATM Pressure:	101.1 kPa

*The testing was performed by Lorin Bian on 2016-12-06.*

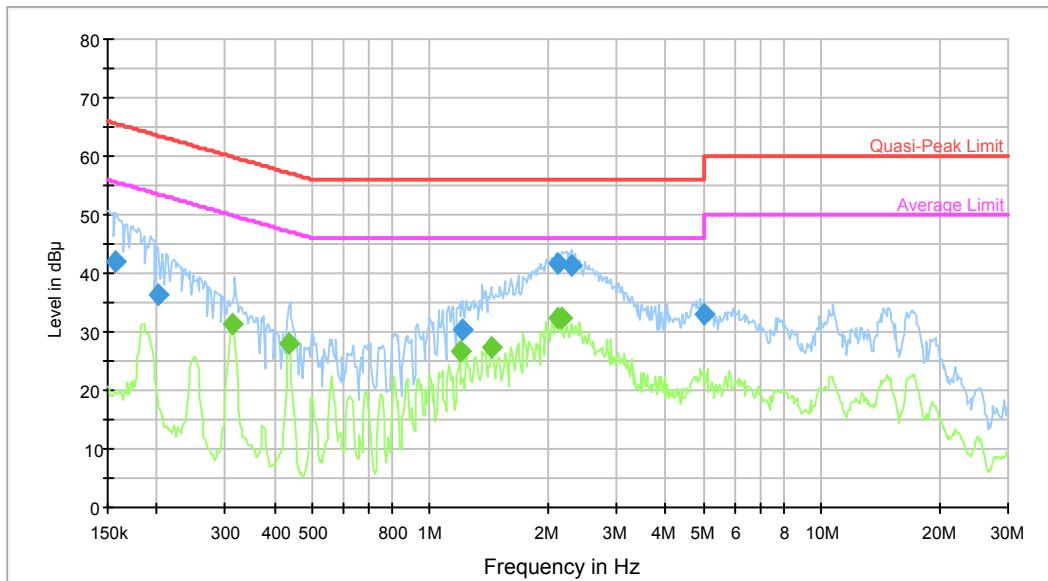
Test Mode: Transmitting

Line:



Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.150000	43.0	9.000	L1	19.74	23.0	66.0	Compliance
0.319773	32.3	9.000	L1	19.73	27.4	59.7	Compliance
1.190776	32.0	9.000	L1	19.71	24.0	56.0	Compliance
2.113432	39.3	9.000	L1	19.77	16.7	56.0	Compliance
2.307034	39.4	9.000	L1	19.72	16.6	56.0	Compliance
4.802010	31.0	9.000	L1	19.74	25.0	56.0	Compliance

Frequency (MHz)	Average (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
1.190776	26.6	9.000	L1	19.71	19.4	46.0	Compliance
1.239175	26.0	9.000	L1	19.71	20.0	46.0	Compliance
1.548915	27.0	9.000	L1	19.7	19.0	46.0	Compliance
1.731709	27.6	9.000	L1	19.74	18.4	46.0	Compliance
2.047133	32.8	9.000	L1	19.79	13.2	46.0	Compliance
2.362847	31.4	9.000	L1	19.71	14.6	46.0	Compliance

**Neutral:**

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.157346	41.9	9.000	N	19.71	23.7	65.6	Compliance
0.201433	36.3	9.000	N	19.59	27.3	63.6	Compliance
1.209904	30.5	9.000	N	19.64	25.5	56.0	Compliance
2.113432	41.8	9.000	N	19.67	14.2	56.0	Compliance
2.307034	41.4	9.000	N	19.68	14.6	56.0	Compliance
4.997188	32.9	9.000	N	19.73	23.1	56.0	Compliance

Frequency (MHz)	Average (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.312220	31.2	9.000	N	19.6	18.7	49.9	Compliance
0.436318	28.0	9.000	N	19.63	19.1	47.1	Compliance
1.190776	26.7	9.000	N	19.64	19.3	46.0	Compliance
1.430284	27.5	9.000	N	19.65	18.5	46.0	Compliance
2.113432	32.2	9.000	N	19.67	13.8	46.0	Compliance
2.164561	32.3	9.000	N	19.67	13.7	46.0	Compliance

## **FCC§15.225, §15.205 & §15.209 - RADIATED EMISSIONS TEST**

### **Applicable Standard**

As per FCC Part 15.225

- (a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

### **Measurement Uncertainty**

Compliance or non- compliance with a disturbance limit shall be determined in the following manner:

If  $U_{\text{lab}}$  is less than or equal to  $U_{\text{cisp}}$  of Table 1, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If  $U_{\text{lab}}$  is greater than  $U_{\text{cisp}}$  of Table 1, then:

- compliance is deemed to occur if no measured disturbance level, increased by  $(U_{\text{lab}} - U_{\text{cisp}})$ , exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by  $(U_{\text{lab}} - U_{\text{cisp}})$ , exceeds the disturbance limit.

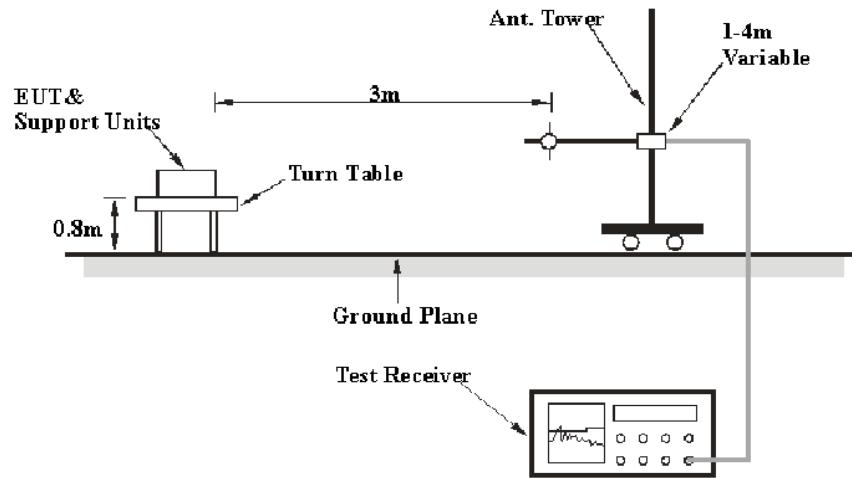
Based on CISPR 16-4-2-2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Chengdu) is:

30M~200MHz:  $\pm 4.7$  dB ;  
200M~1GHz:  $\pm 6.0$  dB ;  
1G-6GHz:  $\pm 5.13$  dB;  
6G~25GHz:  $\pm 5.47$  dB;

Table 1 – Values of  $U_{\text{cisp}}$

<b>Measurement</b>	<b><math>U_{\text{cisp}}</math></b>
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

## EUT Setup



All measurements contained in this report were conducted with ANSI C63.10-2013. The specification used was the FCC Part Subpart C limits.

The spacing between the peripherals was 10 cm.

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

## EMI Test Receiver Setup

The system was investigated from 9 kHz to 1 GHz.

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

Frequency Range	RBW	Video B/W	Detector
9 kHz – 150 kHz	300 Hz	1 kHz	QP
150 kHz – 30 MHz	10 kHz	30 kHz	QP
30 MHz – 1000 MHz	100 kHz	300 kHz	QP

## Corrected Amplitude & Margin Calculation

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

$$\text{Corr. Ampl.} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

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 maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corr. Ampl.}$$

## Test Equipment List and Details

Bay Area Compliance Laboratories Corp. (Chengdu)

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A101808	2016-04-10	2019-04-09
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
The Electro-Mechanics Company	Passive Loop Antenna	6512	9706-1224	2014-11-30	2017-11-29

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209.

## Test Data

### Environmental Conditions

Temperature:	26.1°C
Relative Humidity:	34%
ATM Pressure:	101.5kPa

\* The testing was performed by Lorin Bian on 2016-12-04.

Test mode: Transmitting

1) Fundamental (9 kHz~30 MHz):

Frequency	Receiver		Rx Antenna Factor	Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Detector						
MHz	dB $\mu$ V	PK/QP/AV	dB(1/m)	dB	dB	dB $\mu$ V/m	dB $\mu$ V/m	dB
13.56	33.7	QP	32.08	0.35	21.44	44.69	124.00	79.31
13.53	7.8	QP	32.08	0.35	21.44	18.79	90.47	71.68
13.69	6.9	QP	32.08	0.35	21.44	17.89	90.47	72.58
13.23	10.3	QP	32.06	0.35	21.43	21.28	80.50	59.22
13.72	6.6	QP	32.09	0.35	21.44	17.60	80.50	62.90
3.17	20.4	QP	38.23	0.17	21.50	37.30	69.50	32.20
20.36	14.5	QP	31.46	0.41	21.43	24.94	69.50	44.56

2) Spurious Emissions (30 MHz ~1 GHz):

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Detector	Polar	Factor					
MHz	dB $\mu$ V	PK/QP/AV	H/V	dB(1/m)	dB	dB	dB $\mu$ V/m	dB $\mu$ V/m	dB
47.53	29.76	QP	H	9.71	0.87	21.42	18.92	40.00	21.08
73.18	22.36	QP	H	8.53	1.06	21.41	10.54	40.00	29.46
47.53	35.97	QP	V	9.71	0.87	21.42	25.13	40.00	14.87
73.18	24.82	QP	V	8.53	1.06	21.41	13.00	40.00	27.00

## FCC§15.225(e) - FREQUENCY STABILITY

### Applicable Standard

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from  $85\%$  to  $115\%$  of the rated supply voltage at a temperature of  $20$  degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to one laptop which connected to an external AC power supply and loop antenna was connected to a Spectrum Analyzer.

The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external variable AC power supply Source. The voltage was set to  $115\%$  of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
BACL	High Temperature Test Chamber	BTH-150	30024	2016-12-02	2017-12-01
The Electro-Mechanics Company	Passive Loop Antenna	6512	9706-1224	2014-11-30	2017-11-29
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

Temperature:	25.1°C
Relative Humidity:	36%
ATM Pressure:	101.6kPa

\* The testing was performed by Lorin Bian on 2016-12-04.

Test Mode: Transmitting

Test Result: Pass

$f_o = 13.56 \text{ MHz}$				
Temperature °C	Voltage $V_{DC}$	Measured frequency	Frequency Error (Hz)	Limit(Hz)
		MHz		
-30	3.7	13.560786	-786	$\pm 1356$
-20		13.560673	-673	$\pm 1356$
-10		13.560632	-632	$\pm 1356$
0		13.560804	-804	$\pm 1356$
10		13.560695	-695	$\pm 1356$
20		13.560731	-731	$\pm 1356$
30		13.560633	-633	$\pm 1356$
40		13.560644	-644	$\pm 1356$
50		13.560735	-735	$\pm 1356$
20	4.2	13.560675	-675	$\pm 1356$
20	3.5	13.560789	-789	$\pm 1356$

## FCC §15.215(c) – 20 dB EMISSION BANDWIDTH

### Applicable Standard

Per FCC §15.215 (c) 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. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of band operation.

### 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 were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
The Electro-Mechanics Company	Passive Loop Antenna	6512	9706-1224	2014-11-30	2017-11-29
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

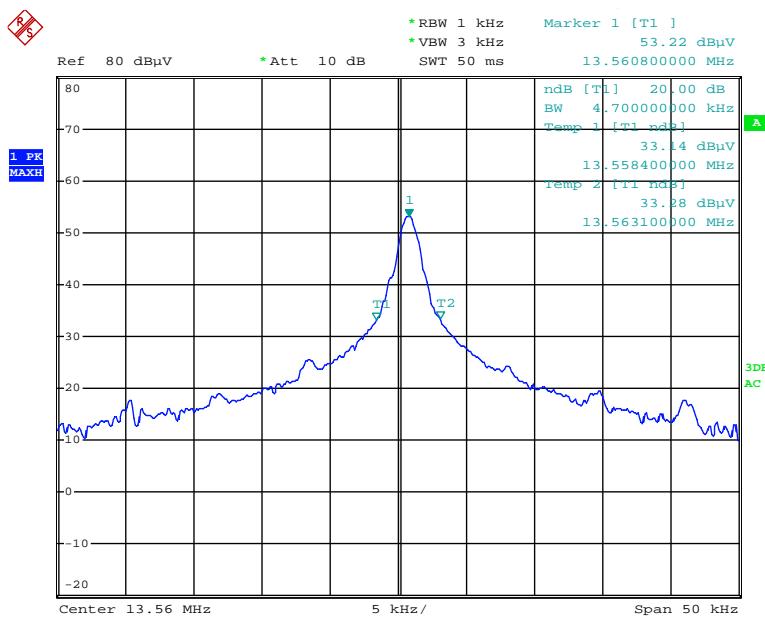
### Environmental Conditions

Temperature:	25.1 °C
Relative Humidity:	36%
ATM Pressure:	101.6kPa

\* The testing was performed by Lorin Bian on 2016-12-04.

Test Mode: Transmitting

### 20 dB Emission Bandwidth



Date: 30.NOV.2016 01:35:53

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