

FCC PART 15.225

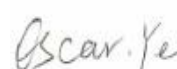
TEST REPORT

For

**Qingdao Hisense Intelligent Commercial System Co.,
Ltd.**

Bldg 3, 151 Zhuzhou Lu, Laoshan, Qingdao, China

FCC ID: GQK-HM618

Report Type: Original Report	Product Type: Tablet POS
Test Engineer: Kyle Xu 	
Report Number: RSHA170823001-00E	
Report Date: 2017-10-13	
Reviewed By: RF Leader	Oscar Ye 
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	

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Qingdao Hisense Intelligent Commercial System Co., Ltd.
Tested Model	HM618
Series Model	HM616
Product Type	Tablet POS
Dimension	Tablet: 282 mm(L)×198 mm(W)×18 mm(H) Dock: 151 mm(L)×121 mm(W)×92 mm(H) Multifunctional dock: 236 mm(L)×218 mm(W)×370 mm(H)
Power Supply	Tablet: DC 3.7V from battery and DC 5.0V charging by adapter Dock: DC5.0V charging by adapter Multifunctional dock: DC24.0V charging by adapter

Adapter-1 Information:

Model: ADS-25SGP-06 05020E

Input: AC100-240V, 50/60Hz, 0.7A

Output: 5.0V, 4.0A

Adapter-2 Information:

Model: FSP060-DAAN2

Input: AC100-240V, 50/60Hz, 0.7A

Output: 24.0V, 2.5A

* Note: The difference between tested model and series model was explained in the declaration letter.

*All measurement and test data in this report was gathered from production sample serial number: 20170823001
(Assigned by the BACL. The EUT supplied by the applicant was received on 2017-08-23)

Objective

This Type approval report is prepared on behalf of Qingdao Hisense Intelligent Commercial System Co., Ltd. in accordance with Part 2- Subpart J, and Part 15-Subparts A and C of the Federal Communication 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.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS, Part 15.247 DTS and Part 15.407 NII submission with FCC ID: GQK-HM618.

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 Lab Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	9kHz~30MHz	6.00dB
	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
Occupied Bandwidth		0.5kHz
Temperature		1.0°C
Humidity		6%

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. 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.: 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).

EUT Exercise Software

No exercise software.

Equipment Modifications

No modification on the EUT.

Support Equipment List and Details

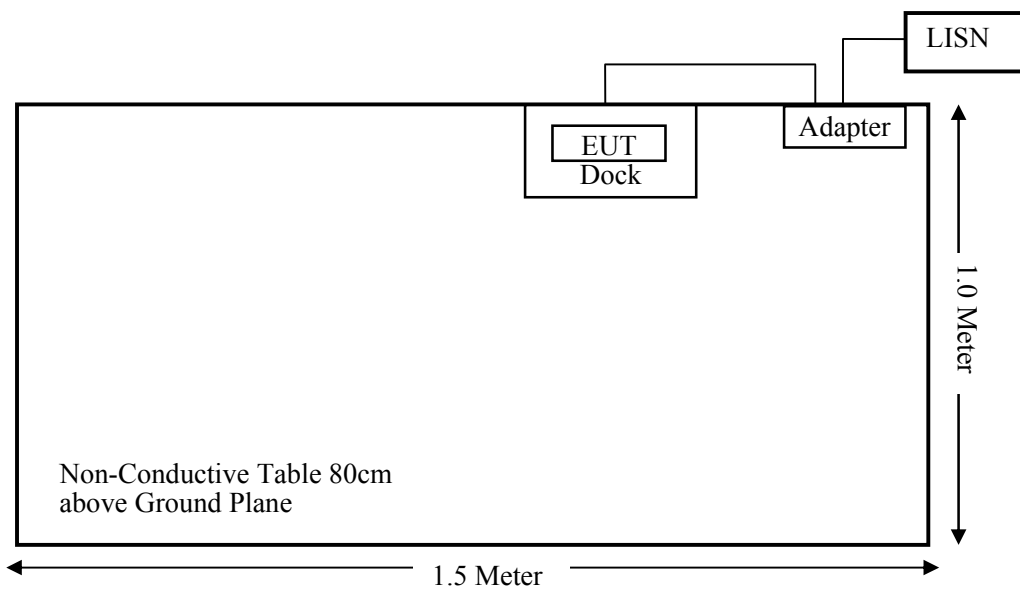
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

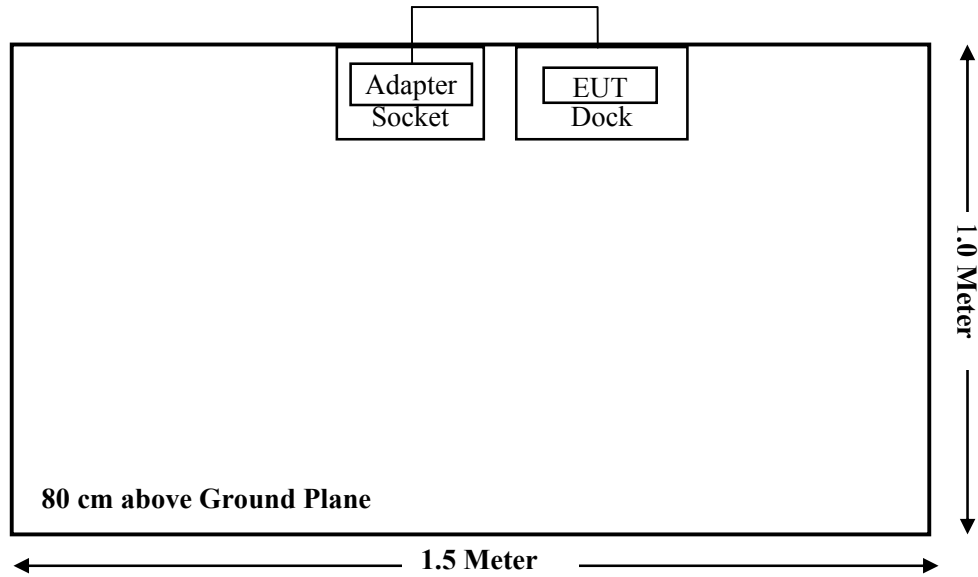
Cable Description	Length (m)	From Port	To
/	/	/	/

Block Diagram of Test Setup

For Conducted Emissions:



For Radiated Emissions(Below & Above 30MHz):



SUMMARY OF TEST RESULTS

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

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber 1#)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
ETS-LINDGREN	PASSIVE LOOP	6512	108100	2016-01-09	2019-01-08
Sonoma Instrument	Pre-amplifier	310N	171205	2017-08-15	2018-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2017-08-15	2018-08-14
Frequency Stability Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
EAST	Regulated DC Power Supply	MCH-303D-II	14070562	/	/
BACL	Temperature & Humidity Chamber	BTH-150	30023	2016-10-10	2017-10-09
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2016-10-10	2017-10-09
Rohde & Schwarz	LISN	ENV216	3560655016	2016-11-25	2017-11-24
BACL	BACL-EMC	V1.0	CE001	/	/
Narda	Attenuator/6dB	10690812-2	26850-6	2017-01-10	2018-01-09
MICRO-COAX	Coaxial Cable	Cable-15	015	2017-08-15	2018-08-14

* **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).

FCC§15.203 - ANTENNA REQUIREMENT

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 a PCB antenna arrangement and antenna gain is 0 dBi, which was permanently attached ,fulfill the requirement of this section, please refer to the EUT photos.

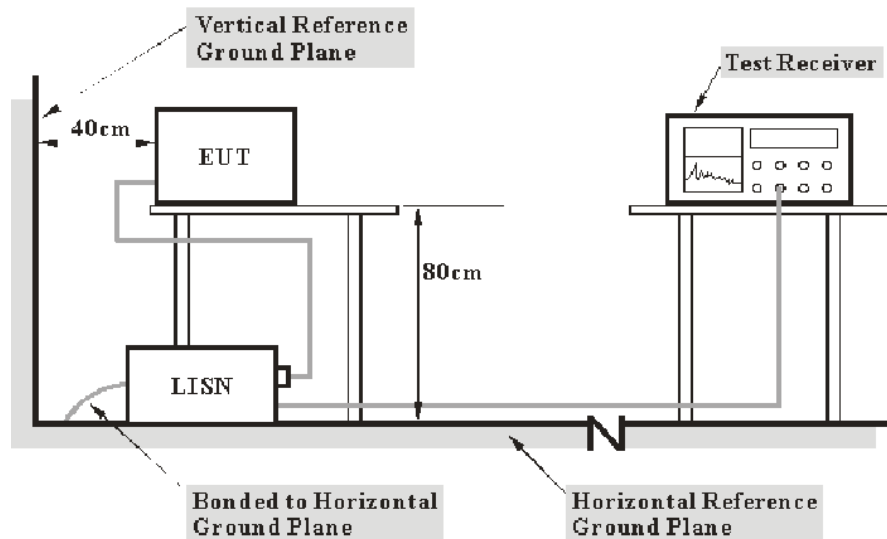
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

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

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 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.

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:

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

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.

Test Data

Environmental Conditions

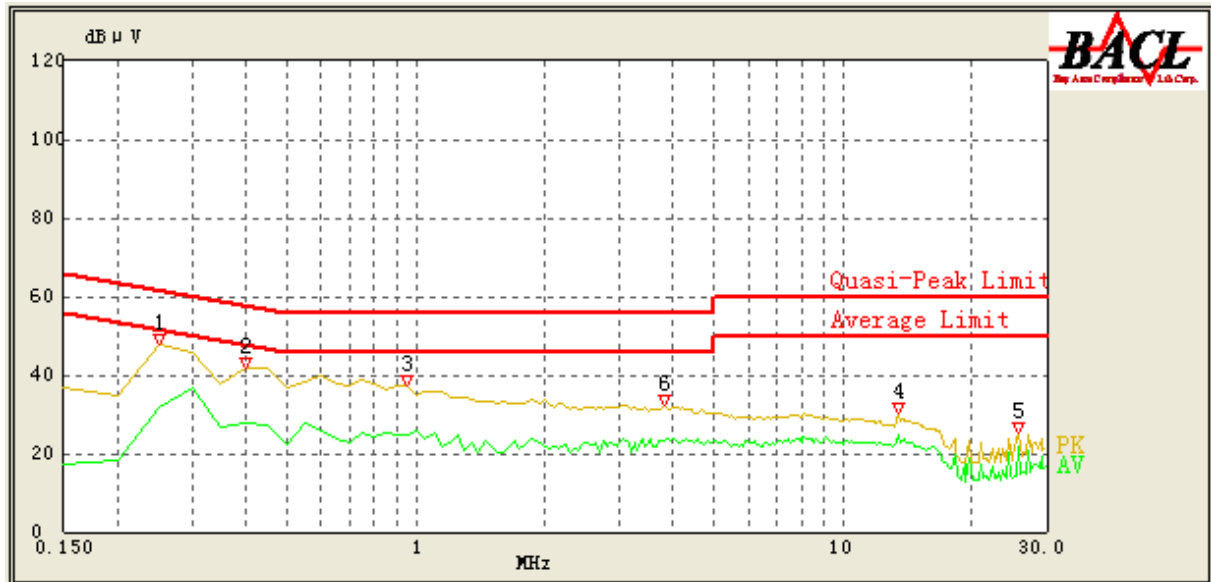
Temperature:	20.2 °C
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

The testing was performed by Kyle Xu on 2017-08-29.

EUT operation mode: Transmitting

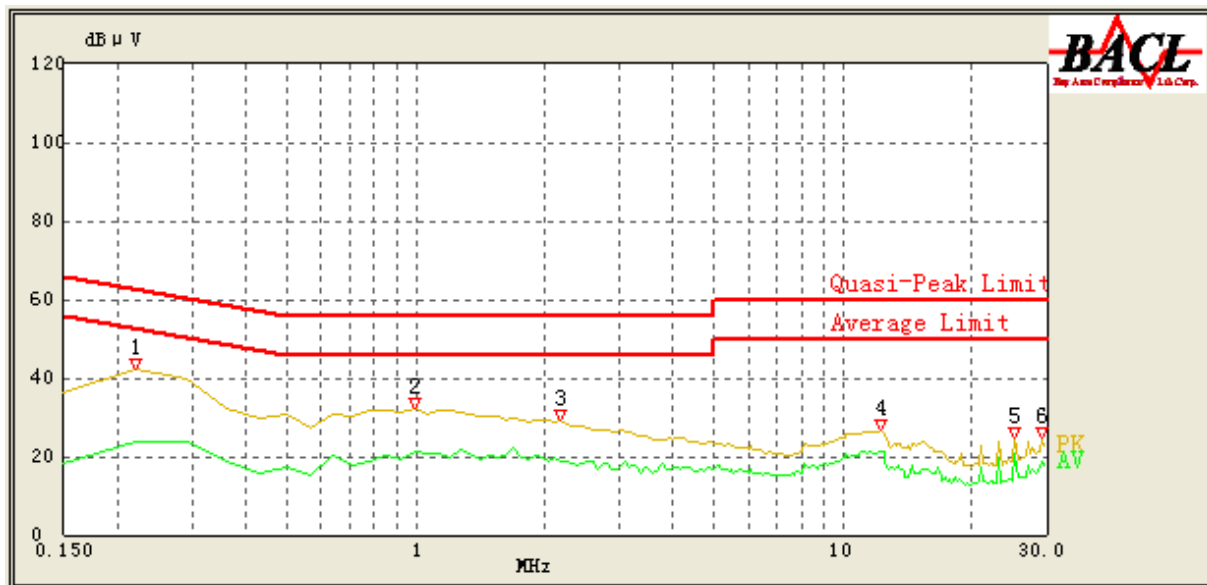
Adapter 1

AC 120V/60 Hz, Line



Frequency (MHz)	Reading (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Correction (dB)	Limit (dBμV)	Margin (dB)	Comment
0.250	47.75	PK	9.000	L1	16.02	63.14	15.39	Compliance
0.250	31.58	AV	9.000	L1	16.02	53.14	21.56	Compliance
0.400	42.00	PK	9.000	L1	16.06	58.86	16.86	Compliance
0.400	27.95	AV	9.000	L1	16.06	48.86	20.91	Compliance
0.950	37.50	PK	9.000	L1	15.89	56.00	18.50	Compliance
0.950	24.64	AV	9.000	L1	15.89	46.00	21.36	Compliance
13.550	30.49	PK	9.000	L1	16.17	60.00	29.51	Compliance
13.550	24.85	AV	9.000	L1	16.17	50.00	25.15	Compliance
25.750	25.27	PK	9.000	L1	16.48	60.00	34.73	Compliance
25.750	21.97	AV	9.000	L1	16.48	50.00	28.03	Compliance
3.800	32.14	PK	9.000	L1	15.85	56.00	23.86	Compliance
3.800	23.10	AV	9.000	L1	15.85	46.00	22.90	Compliance

AC 120V/60 Hz, Neutral



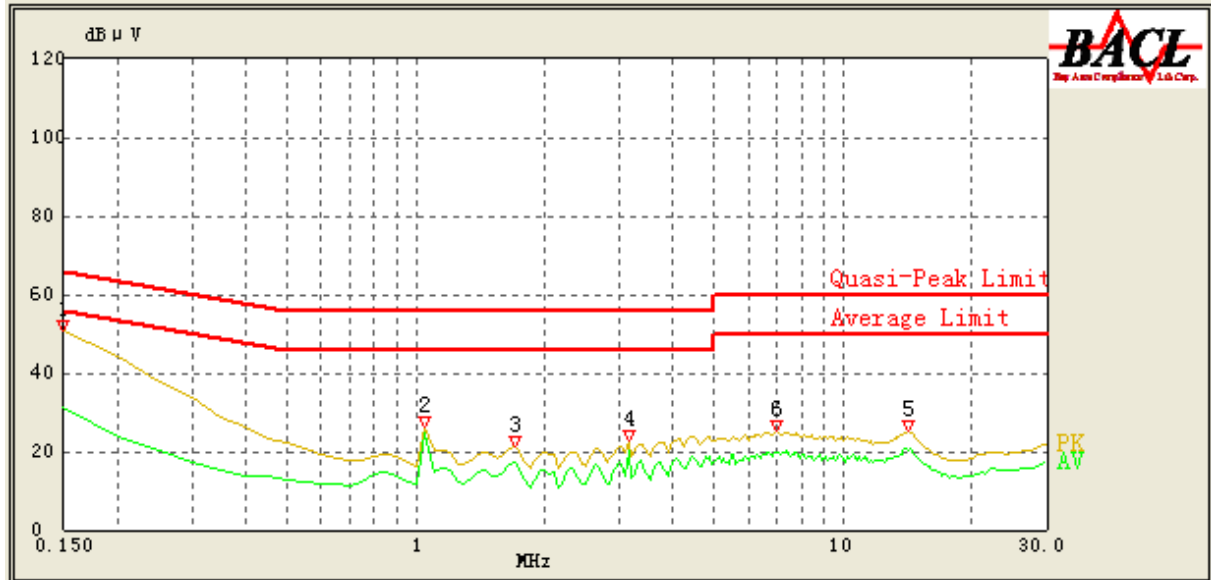
Frequency (MHz)	Reading (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Correction (dB)	Limit (dBμV)	Margin (dB)	Comment
0.220	42.17	PK	9.000	N	16.05	64.00	21.83	Compliance
0.220	23.93	AV	9.000	N	16.05	54.00	30.07	Compliance
0.990	32.34	PK	9.000	N	15.94	56.00	23.66	Compliance
0.990	21.29	AV	9.000	N	15.94	46.00	24.71	Compliance
2.180	29.12	PK	9.000	N	15.91	56.00	26.88	Compliance
2.180	18.96	AV	9.000	N	15.91	46.00	27.04	Compliance
12.190	26.64	PK	9.000	N	16.00	60.00	33.36	Compliance
12.190	21.01	AV	9.000	N	16.00	50.00	28.99	Compliance
25.070	24.63	PK	9.000	N	16.24	60.00	35.37	Compliance
25.070	20.57	AV	9.000	N	16.24	50.00	29.43	Compliance
29.130	24.71	PK	9.000	N	16.32	60.00	35.29	Compliance
29.130	18.72	AV	9.000	N	16.32	50.00	31.28	Compliance

Note:

- 1) Corr.=LISN VDF (Voltage Division Factor) + Cable Loss
- 2) Corrected Amplitude = Reading + Corr.
- 3) Margin = Limit –Corrected Amplitude

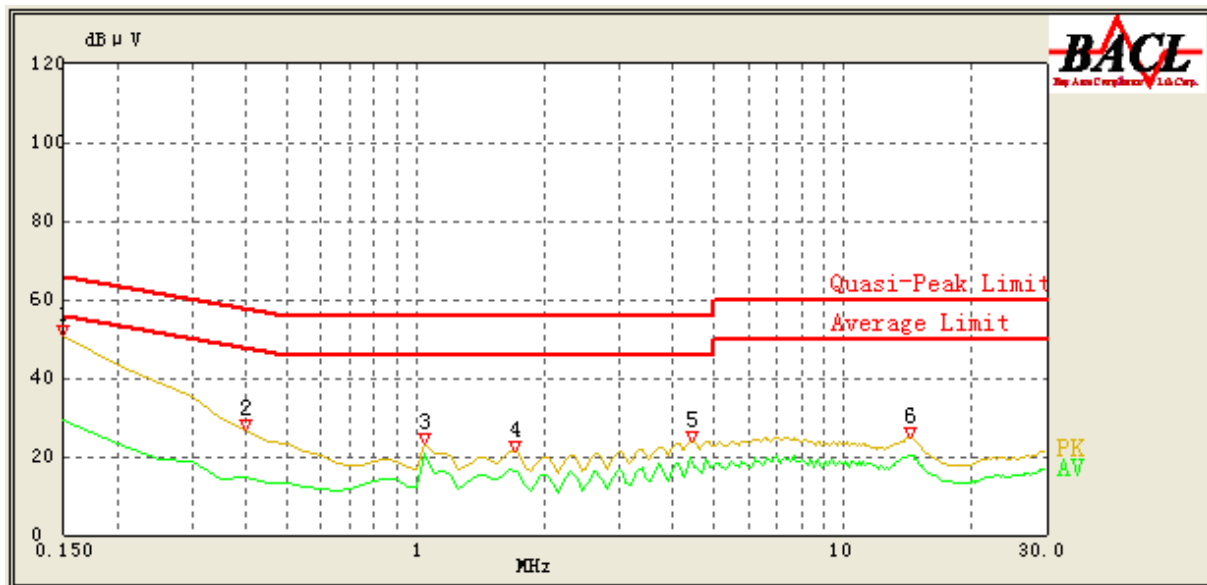
Adapter 2

AC 120V/60 Hz, Line



Frequency (MHz)	Reading (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Correction (dB)	Limit (dBμV)	Margin (dB)	Comment
0.150	50.80	PK	9.000	L1	16.06	66.00	15.20	Compliance
0.150	31.42	AV	9.000	L1	16.06	56.00	24.58	Compliance
1.050	26.11	PK	9.000	L1	15.88	56.00	29.89	Compliance
1.050	24.81	AV	9.000	L1	15.88	46.00	21.19	Compliance
1.700	21.28	PK	9.000	L1	15.86	56.00	34.72	Compliance
1.700	17.06	AV	9.000	L1	15.86	46.00	28.94	Compliance
3.150	22.76	PK	9.000	L1	15.85	56.00	33.24	Compliance
3.150	20.43	AV	9.000	L1	15.85	46.00	25.57	Compliance
14.150	25.04	PK	9.000	L1	16.18	60.00	34.96	Compliance
14.150	20.27	AV	9.000	L1	16.18	50.00	29.73	Compliance
7.000	25.05	PK	9.000	L1	15.98	60.00	34.95	Compliance
7.050	19.52	AV	9.000	L1	15.98	50.00	30.48	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	Reading (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Correction (dB)	Limit (dBμV)	Margin (dB)	Comment
0.150	50.99	PK	9.000	N	16.06	66.00	15.01	Compliance
0.150	29.18	AV	9.000	N	16.06	56.00	26.82	Compliance
0.400	26.82	PK	9.000	N	16.09	58.86	32.04	Compliance
0.400	14.73	AV	9.000	N	16.09	48.86	34.13	Compliance
1.050	23.33	PK	9.000	N	15.94	56.00	32.67	Compliance
1.050	20.72	AV	9.000	N	15.94	46.00	25.28	Compliance
1.700	21.38	PK	9.000	N	15.92	56.00	34.62	Compliance
1.700	16.49	AV	9.000	N	15.92	46.00	29.51	Compliance
4.450	23.97	PK	9.000	N	15.88	56.00	32.03	Compliance
4.450	19.57	AV	9.000	N	15.88	46.00	26.43	Compliance
14.350	24.91	PK	9.000	N	16.01	60.00	35.09	Compliance
14.350	20.25	AV	9.000	N	16.01	50.00	29.75	Compliance

Note:

- 1) Corr.=LISN VDF (Voltage Division Factor) + Cable Loss
- 2) Corrected Amplitude = Reading + Corr.
- 3) Margin = Limit –Corrected Amplitude

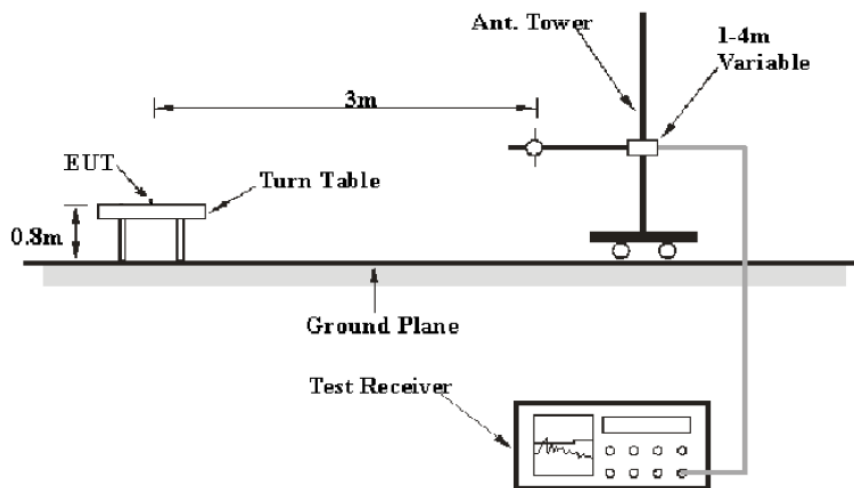
FCC§15.225, §15.205 & §15.209 - RADIATED EMISSIONS TEST

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.

EUT Setup



The radiated emission tests were performed in the 3-meter chamber a test site, using the setup accordance with the ANSI C63.10. The specification used was the FCC Part Subpart C limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

According to FCC Rules, 47 CFR 15.33, the EUT emissions were investigated up to 1000 MHz.

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
9 kHz – 150 kHz	200 Hz	1 kHz	/	QP
150 kHz – 30 MHz	9 kHz	30 kHz	/	QP
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP

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 Factor = Antenna Factor + Cable Loss- Amplifier Gain

Corrected Amplitude = Meter Reading + Corrected Factor

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 Part 15.209.

Test Data

Environmental Conditions

Temperature:	23.2 °C
Relative Humidity:	50 %
ATM Pressure:	101.3 kPa

The testing was performed by Kyle Xu on 2017-09-05.

Test mode: Charging and Transmitting with adapter 2(worst case).

1) Spurious Emissions (9 kHz~30 MHz):

Indicated		Detector PK/QP/Ave.	Correction Factor			Corrected Amplitude (dBμV/m) @3m	FCC Part 15.225\15.209	
Frequency (MHz)	Maximum Reading (dBuV)		Ant. Factor (dB/m)	Cable Loss (dB)	Pre- Amp. Gain (dB)		Limit (dBμV/m) @3m	Margin (dB)
0.560	14.35	QP	51.53	0.32	20.00	46.20	72.64	26.44
13.326	27.35	QP	35.40	0.32	20.00	43.07	80.50	37.43
13.483	28.06	QP	35.40	0.32	20.00	43.78	90.50	46.72
13.667	26.11	QP	35.40	0.32	20.00	41.83	90.50	48.67
13.560	48.09	QP	35.40	0.32	20.00	63.81	124.00	60.19

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

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Detector PK/QP/Ave.	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBμV/m)	Margin (dB)
121.35	35.63	QP	112	V	251	-10.90	43.50	7.87
149.31	34.35	QP	129	V	150	-11.90	43.50	9.15
153.79	36.74	QP	135	H	257	-12.08	43.50	6.76
240.00	37.54	QP	124	H	284	-11.84	46.00	8.46
246.57	38.31	QP	123	V	351	-11.83	46.00	7.69
523.14	35.74	QP	136	V	319	-5.16	46.00	10.26

Note:

Corrected Amplitude = Corrected Factor + Reading

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

Margin = Limit - Corr. Amplitude

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

a) Supply the EUT with a nominal ac voltage or install a new or fully charged battery in the EUT. If possible, a dummy load shall be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, then the EUT shall be placed in the center of the chamber with the antenna adjusted to the shortest length possible. Turn ON the EUT and tune it to one of the number of frequencies shown in 5.6.

b) Couple the unlicensed wireless device output to the measuring instrument by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away), or by connecting a dummy load to the measuring instrument, through an attenuator if necessary.
NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory agency is the recommended measuring instrument.

c) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).

d) Turn the EUT OFF and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.

e) Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.

f) While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

g) Measure the frequency at each of frequencies specified in 5.6.

h) Switch OFF the EUT but do not switch OFF the oscillator heater.

i) Lower the chamber temperature by not more than 10°C , and allow the temperature inside the chamber to stabilize.

j) Repeat step f) through step i) down to the lowest specified temperature.

Test Data**Environmental Conditions**

Temperature:	23.2 °C
Relative Humidity:	50 %
ATM Pressure:	101.3 kPa

The testing was performed by Kyle Xu on 2017-09-05.

Test Mode: Transmitting.

Test Result: Pass

F₀ = 13.56MHz				
Power Supply	Temperature (°C)	Measured Frequency (MHz)	Frequency Error	Part 15.225 Limit
3.7V	-20	13.56119	0.00878%	±0.01%
	-10	13.56120	0.00885%	±0.01%
	0	13.56121	0.00892%	±0.01%
	10	13.56128	0.00944%	±0.01%
	20	13.56132	0.00973%	±0.01%
	30	13.55996	-0.00029%	±0.01%
	40	13.56108	0.00796%	±0.01%
	50	13.55998	-0.00015%	±0.01%
3.5V	20	13.55993	-0.00052%	±0.01%
4.2V	20	13.56112	0.00826%	±0.01%

§15.215(c) - 20dB EMISSION BANDWIDTH TESTING

Requirement

Per 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 Data

Environmental Conditions

Temperature:	23.2 °C
Relative Humidity:	50 %
ATM Pressure:	101.3 kPa

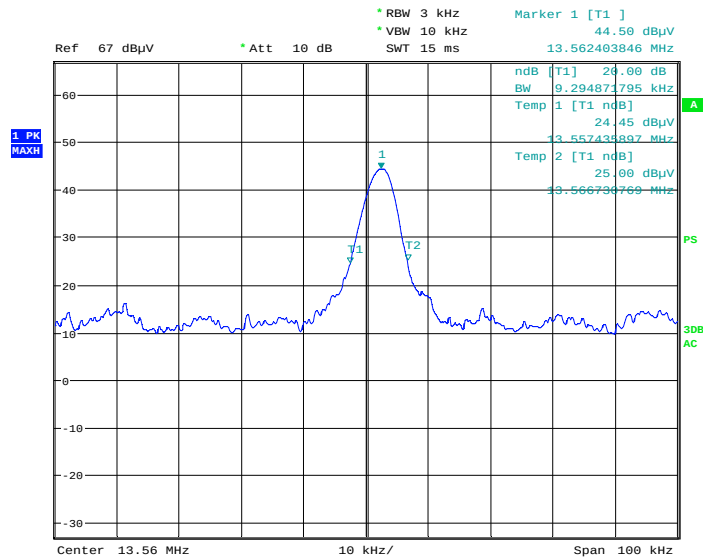
The testing was performed by Kyle Xu on 2017-09-05.

Test Mode: Transmitting

Test Result: Pass

Frequency (MHz)	20 dB Bandwidth (kHz)
13.56	9.29

20 dB Emission Bandwidth



Date: 5.SEP.2017 04:50:00

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