FCC PART 15C
TEST REPORT
No. I16N00547-SRD

for

Easy Home Technology Co.,Ltd.

Door Sensor

Model Name:EH-DS-01

with

Hardware Version: 1.0

Software Version: 1.0

FCC ID: 2AIPTEHDS01

Issued Date: Jun 16th, 2016

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

Test Laboratory:

CTTL, Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0)10-62304633-2512, Fax:+86(0)10-62304633-2504

Email: cttl_terminals@catr.cn, website: www.chinattl.com

REPORT HISTORY

Report Number	Revision	Description	Issue Date
I16N00547-SRD	Rev.0	1st edition	2016-06-16

CONTENTS

1. Test Laboratory

1.1.

Location: CTTL(South Branch)

Address: TCL International E city No. 1001 Zhongshanyuan Road, Nanshan District, Shenzhen; Guangdong, China 518000

1.2. Testing Environment

Normal Temperature:	15-35℃
Extreme Temperature	-10/+85℃
Relative Humidity:	20-75%

1.3. Project Data

Testing Start Date:	2016-04-06
Testing End Date:	2016-06-01

1.4. Signature

Xu Ye

(Prepared this test report)

Tang Weisheng

(Reviewed this test report)

Zhang Bojun

(Approvedthis test report)

2. Client Information

2.1. Applicant Information

Company Name:	Easy Home Technology Co.,Ltd.
Address:	Rm.1609, Shenzhen International Mayor Communication Center,Shennan Road,Nanshan District, Shenzhen,China
City:	Shenzhen
Postal Code:	518000
Country:	China
Telephone:	15217761450
Fax:	/

2.2. Manufacturer Information

Company Name:	Easy Home Technology Co.,Ltd.
Address:	Rm.1609, Shenzhen International Mayor Communication Center,Shennan Road,Nanshan District, Shenzhen,China
City:	Shenzhen
Postal Code:	518000
Country:	China
Telephone:	15217761450
Fax:	/

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Door Sensor
Model Name	EH-DS-01
Market Name	EH-DS-01
Operating Frequency	908.40MHz/908.42MHz/916 MHz
FCC ID	2AIPTEHDS01

*Note: Photographs of EUT are shown in ANNEX A of this test report.

3.2. Internal Identification of EUT Used during the Test

Mobile phone identification

EUT ID*	IMEI	HW Version	SW Version	Receive Date
EUT1	/	1.0	1.0	2016-05-24

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE Used during the Test

AE ID*	Description	SN	Reversion
AE1	/	/	/

*AE ID: is used to identify the test sample in the lab internally.

3.4. General Description

This is a product supporting ZigBee with 908.40/908.42/916 MHz technologies.
Manuals and specifications of the EUT were provided to fulfil the test.
Samples undergoing test were selected by the client.
Manufacturer's declaration: The ZigBee antenna is a spring-load antenna on the PCB. The spring-load antenna has a gain of 2dBi.

4. Reference Documents

4.1. Documents Supplied by the Applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

4.2. Regulations and Standards

The following documents listed in this section are referred for testing.

Reference	Title	Version
CFR 47 Part 15	Part 15 — Radio Frequency Devices. HSubpart C — Intentional RadiatorsH. § 15.35 Measurement detector functions and bandwidths. § 15.207 Conducted limits. § 15.209 Radiated emission limits, general requirements. § 15.231 Periodic operation in the band 40.66–40.70 MHz and above 70 MHz § 15.249 Operation within the bands 902–928 MHz, 2400–2483.5 MHz,5725–5875 MHZ, and 24.0–24.25 GHz.	Nov,2015
ANSI C63.10	American National Standard for Testing Unlicensed Wireless Devices	Jun,2013

5. Test Results

5.1. Summary of Test Results

No	Test cases	Standard Sub-clause	Verdict
0	Antenna Requirement	15.203	**P**
1	Occupied 20dB Bandwidth	15.231	**P**
2	Occupied Bandwidth	15.231	**P**
3	Transmitter Spurious Emission - Radiated	15.209,15.249	**P**

See **ANNEX B and ANNEX C** for details.

5.2. Statements

CTTL has evaluated the test cases requested by the applicant/manufacturer as listed in section 5.1 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2

5.3. Terms used in the result table

Terms used in Verdict column

P	Pass
NA	Not Available
F	Fail

Abbreviations

AC	Alternating Current
AFH	Adaptive Frequency Hopping
BW	Band Width
E.I.R.P.	equivalent isotropical radiated power
ISM	Industrial, Scientific and Medical
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency
Tx	Transmitter

5.4. Laboratory Environment

Semi-anechoic chamber did not exceed following limits along the EMC testing

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω
Normalised site attenuation (NSA)	< ±4dB, 3m/10m distance,from 30 to 1000 MHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

Shielded room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω

Fully-anechoic chamber did not exceed following limits along the EMC testing

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω
Voltage Standing Wave Ratio (VSWR)	≤6dB, from 1 to 18 GHz,3m distance

6. Test Facilities Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Vector Signal Analyzer	FSV40	100903	Rohde & Schwarz	2017-03-21	1 year

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Chamber	FACT5-2.0	4166	ETS-Lindgren	2018-05-13	3 years
2	Test Receiver	ESCI	100701	Rohde & Schwarz	2016-08-10	1 year
3	BiLog Antenna	VULB9163	9163 329	Schwarzbeck	2017-01-20	3 years
4	Horn Antenna	3117	00066585	ETS-Lindgren	2019-03-05	3 years
5	Spectrum Analyser	FSP40	100378	Rohde & Schwarz	2016-12-18	1 year

Anechoic chamber

Fully anechoic chamber by ETS-Lindgren.

ANNEX A: MEASUREMENT RESULTS

A.0 Antenna requirement

Measurement Limit:

Standard	Requirement
FCC CRF Part 15.203	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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, § 15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Conclusion: The Directional gains of antenna used for transmitting is 2.0 dBi.
The RF transmitter uses a spring-load antenna.

A.1 Occupied 20dB Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.231	/

Measurement Result:

Channel	Frequency(MHz)	20dB Bandwidth(kHz)		conclusion
908.4(40kbps)	908.4	Fig.1	82.49	P
908.42(9.6kbps)	908.42	Fig.2	68.31	P
916(100kbps)	916	Fig.3	123.59	P

See ANNEX B for test graphs.

Conclusion: PASS

A.2 Occupied Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.231	/

Measurement Result:

Channel	Frequency(MHz)	Occupied Bandwidth(kHz)		conclusion
908.4(40kbps)	908.4	Fig.4	88.57	P
908.42(9.6kbps)	908.42	Fig.5	89.15	P
916(100kbps)	916	Fig.6	108.83	P

See ANNEX B for test graphs.

Conclusion: PASS

A.3 Radiated Emissions

A.3.1 Transmitter Spurious Emission - Radiated

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.209,249	/

Operation within Operation within the bands902–928 MHz, 2400–2483.5 MHz,5725–5875 MHZ, and 24.0–24.25 GHz

(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 (microvolts/meter)	Field strength of hamonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(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.

Frequency of emission (MHz)	Field strength(μV/m)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Condition

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	120kHz/300kHz	5
1000-4000	1MHz/3MHz	15
4000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

Note:

According to the performance evaluation, the radiated emission margin of EUT is over 20dB in the band below 30MHz. Therefore, the measurement starts from 30MHz to tenth harmonic.

The measurement results include the horizontal polarization and vertical polarization measurements.

Measurement Results:

Mode	Frequency(MHz)	Result	conclusion
908.4(40kbps)	908.4	Fig.7	P
908.42(9.6kbps)	908.42	Fig.8	P
916(100kbps)	916	Fig.9	P

Mode	Frequency (MHz)	Frequency Range	Test Results	Conclusion
908.4(40kbps)	908.4	30 MHz ~1 GHz	Fig.10	P
		1 GHz ~10 GHz	Fig.11	P
908.42(9.6kbps)	908.42	30 MHz ~1 GHz	Fig.12	P
		1 GHz ~10GHz	Fig.13	P
916(100kbps)	916	30 MHz ~1 GHz	Fig.14	P
		1 GHz ~10GHz	Fig.15	P

908.4(40kbps) (1-10GHz)

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
8175.625000	48.9	H	6.7	25.1	74.0
8602.625000	48.5	V	7.1	25.5	74.0
8762.750000	48.4	H	7.2	25.6	74.0
9163.500000	49.4	V	7.7	24.6	74.0
9422.500000	49.0	V	8.0	25.0	74.0
9969.375000	49.4	H	8.6	24.6	74.0

Frequency (MHz)	Average-ClearWrite (dBµV/m)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2725.250000	40.9	V	2.1	13.1	54.0
8175.625000	40.9	H	6.7	13.1	54.0
8663.000000	37.0	H	7.2	17.0	54.0
9271.125000	36.9	H	7.9	17.1	54.0
9425.125000	36.9	H	8.0	17.1	54.0
9993.000000	37.5	V	8.6	16.5	54.0

908.42(9.6kbps) (1-10GHz)

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
8145.000000	48.4	H	6.6	25.6	74.0
8645.500000	49.1	H	7.1	24.9	74.0
8740.875000	48.9	H	7.2	25.1	74.0
9217.750000	49.3	H	7.8	24.7	74.0
9400.625000	49.2	V	8.0	24.8	74.0
9967.625000	49.5	H	8.6	24.5	74.0

Frequency (MHz)	Average-ClearWrite (dBμV/m)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2725.250000	40.0	H	2.1	14.0	54.0
8175.625000	40.3	V	6.7	13.7	54.0
8648.125000	37.1	V	7.1	16.9	54.0
9279.000000	37.5	V	7.9	16.5	54.0
9420.750000	37.1	V	8.0	16.9	54.0
9993.000000	38.1	V	8.6	15.9	54.0

916(100kbps) (1-10GHz)

Frequency (MHz)	MaxPeak-ClearWrite (dBμV/m)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
8175.625000	49.0	V	6.7	25.0	74.0
8656.875000	50.2	V	7.2	23.8	74.0
8768.875000	48.7	V	7.3	25.3	74.0
9303.500000	49.2	V	7.9	24.8	74.0
9419.875000	49.0	H	8.0	25.0	74.0
9769.000000	49.7	V	8.4	24.3	74.0

Frequency (MHz)	Average-ClearWrite (dBμV/m)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2725.250000	38.4	V	2.1	15.6	54.0
8175.625000	41.7	V	6.7	12.3	54.0
8649.875000	37.1	V	7.1	16.9	54.0
9272.000000	37.6	V	7.9	16.4	54.0
9429.500000	37.2	V	8.0	16.8	54.0
9980.750000	38.0	V	8.6	16.0	54.0

See ANNEX B for test graphs.

Conclusion: PASS

Note:

A "reference path loss" is established and the A_{Rpl} is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

P_{Mea} is the field strength recorded from the instrument.

The measurement results are obtained as described below:

Result=P_{Mea}+$A_{Rpl=}$ P_{Mea}+Cable Loss+Antenna Factor

ANNEX B: TEST LAYOUTS

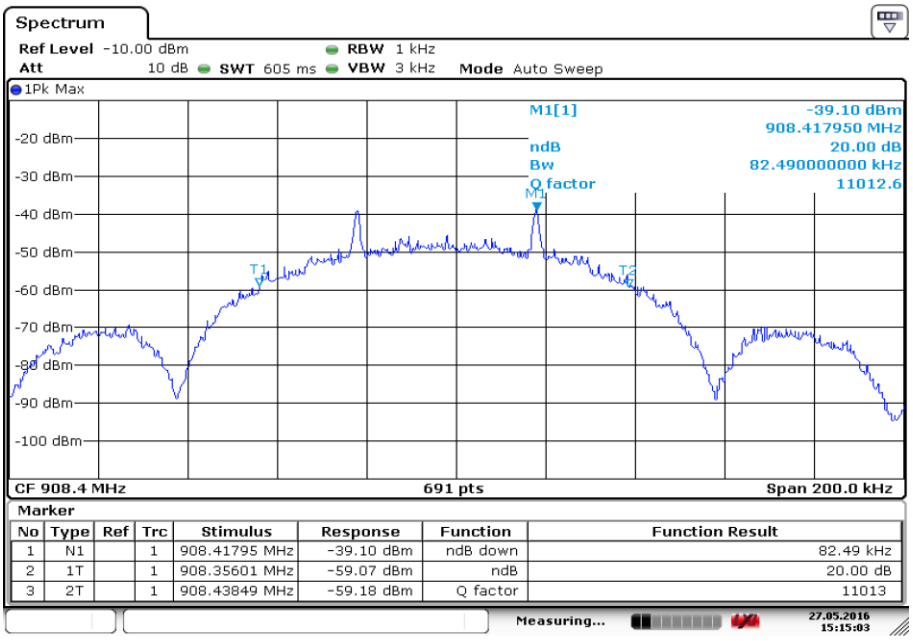


Fig.1 Occupied 20dB Bandwidth (908.4MHz, 40kbps)

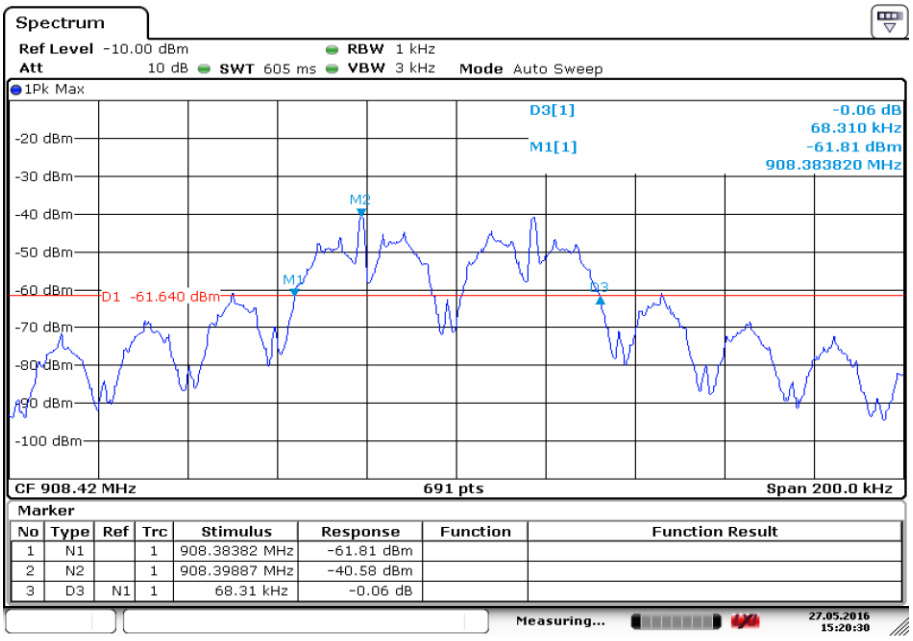


Fig.2 Occupied 20dB Bandwidth (908.42MHz, 9.6kbps)

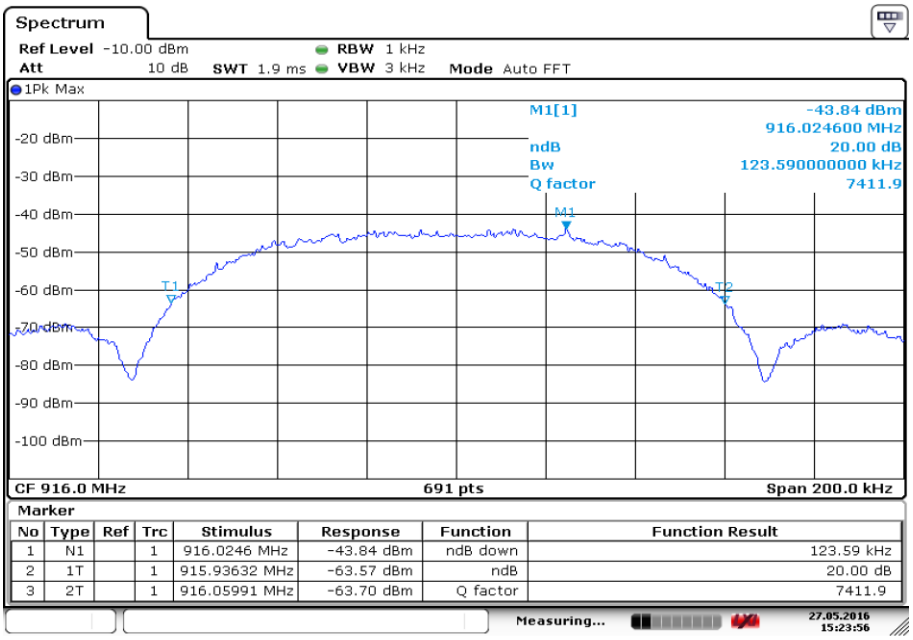


Fig.3 Occupied 20dB Bandwidth (916MHz, 100kbps)

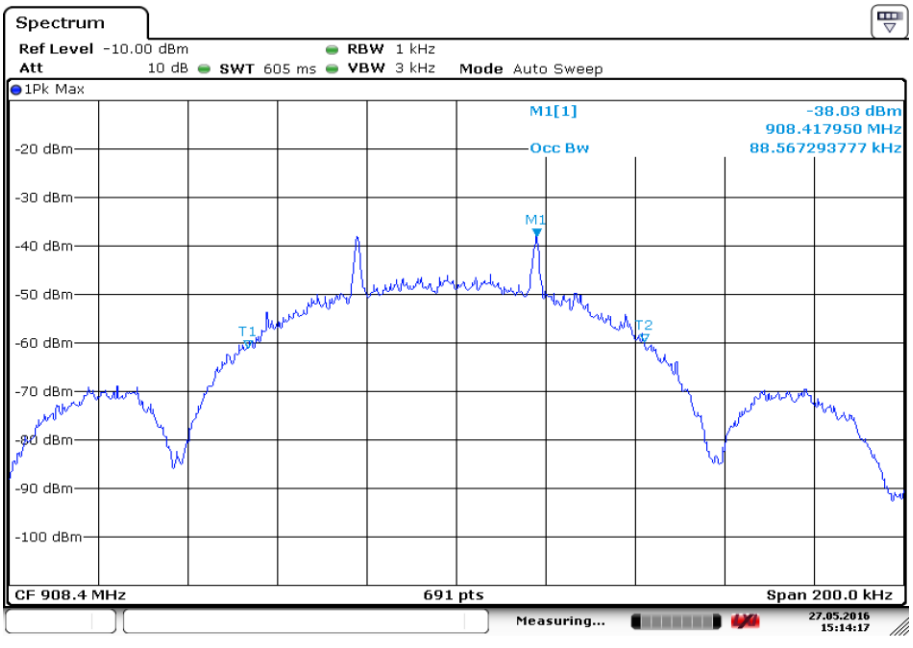
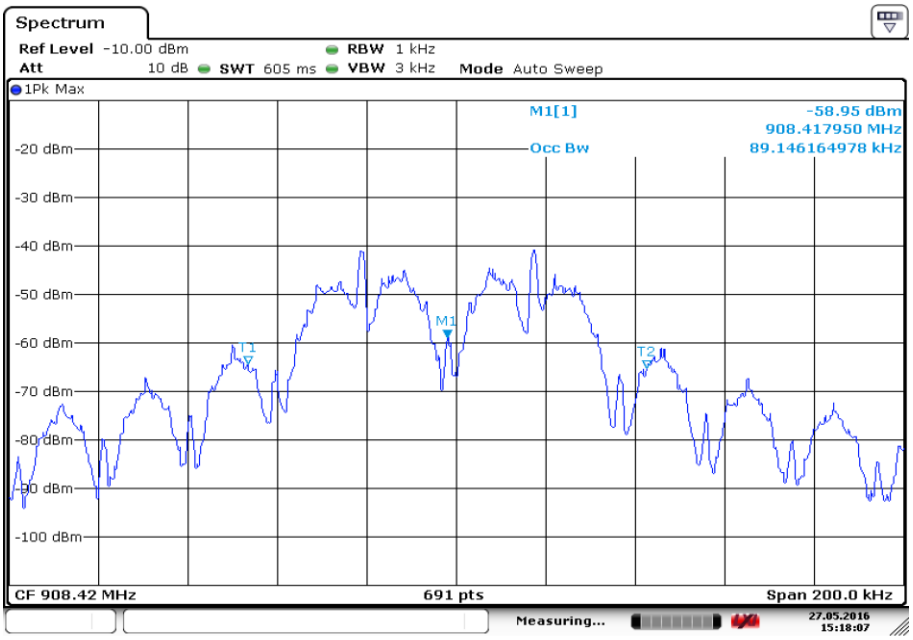
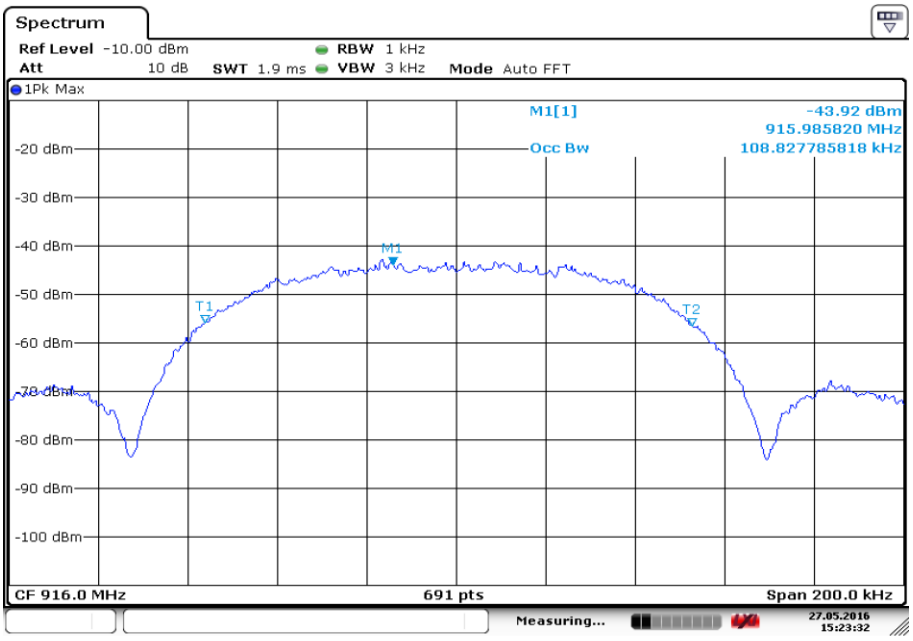


Fig.4 Occupied Bandwidth (908.4MHz, 40kbps)



Date: 27.MAY.2016 15:18:07

Fig.5 Occupied Bandwidth (908.42MHz, 9.6kbps)



Date: 27.MAY.2016 15:23:32

Fig.6 Occupied Bandwidth (916MHz, 100kbps)

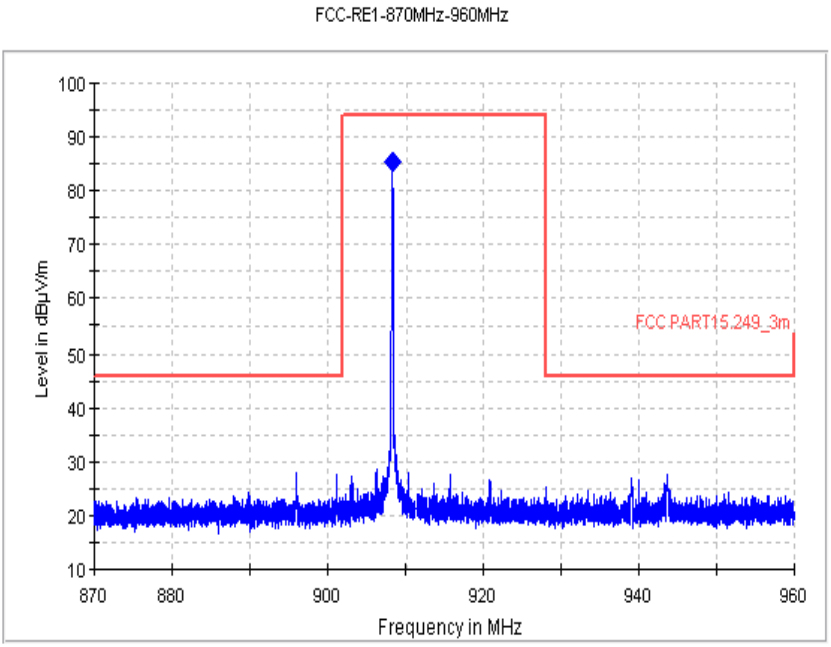


Fig.7 Radiated Emission (908.4MHz, 40kbps)

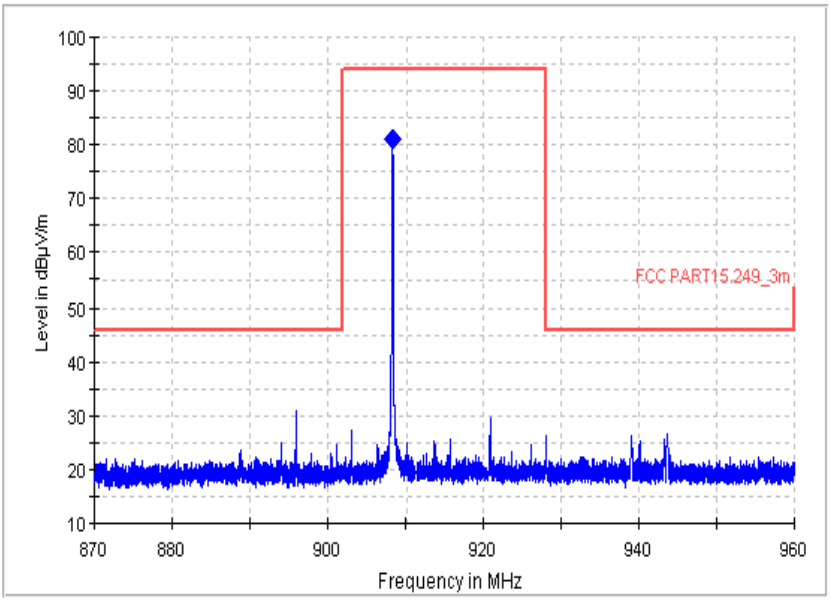


Fig.8 Radiated Emission (908.42MHz, 9.6kbps)

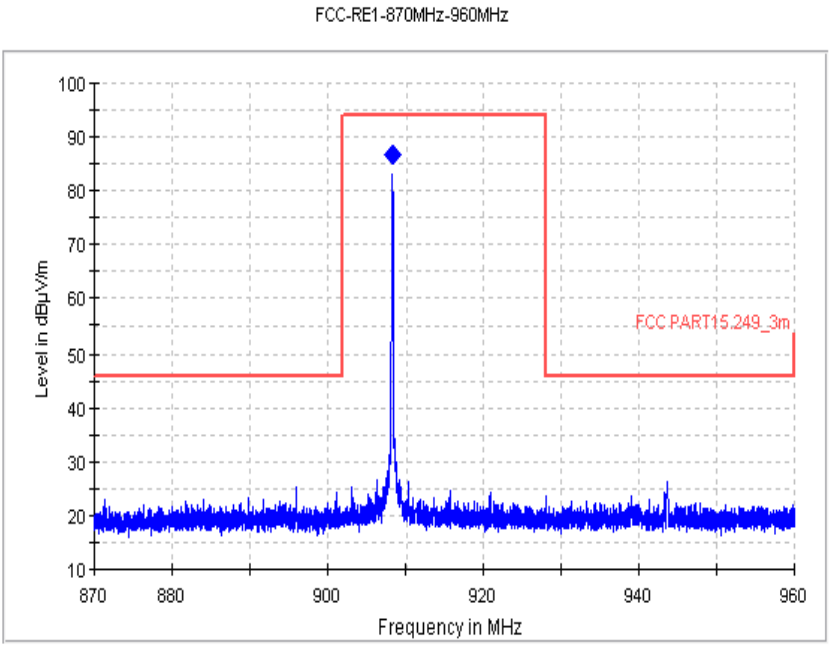


Fig.9 Radiated Emission (916MHz, 100kbps)

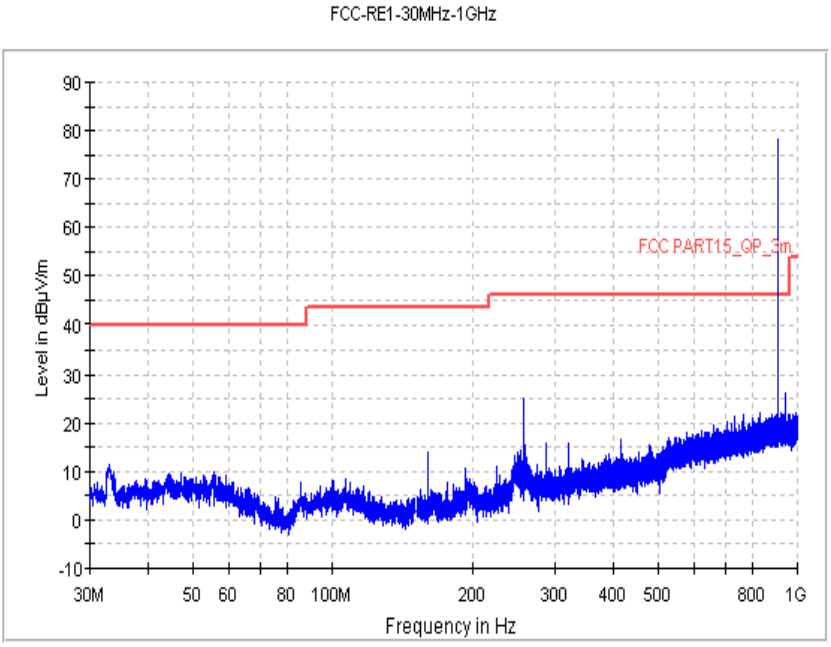


Fig.10 Radiated Spurious Emission (908.4MHz, 40kbps,30MHz-1GHz)

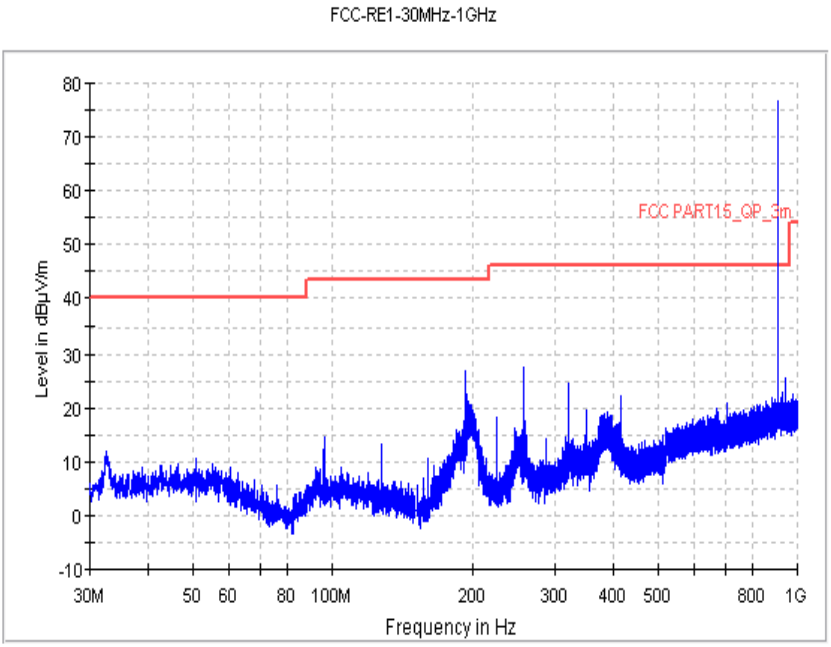


Fig.11 Radiated Spurious Emission (908.42MHz, 9.6kbps,30MHz-1GHz)

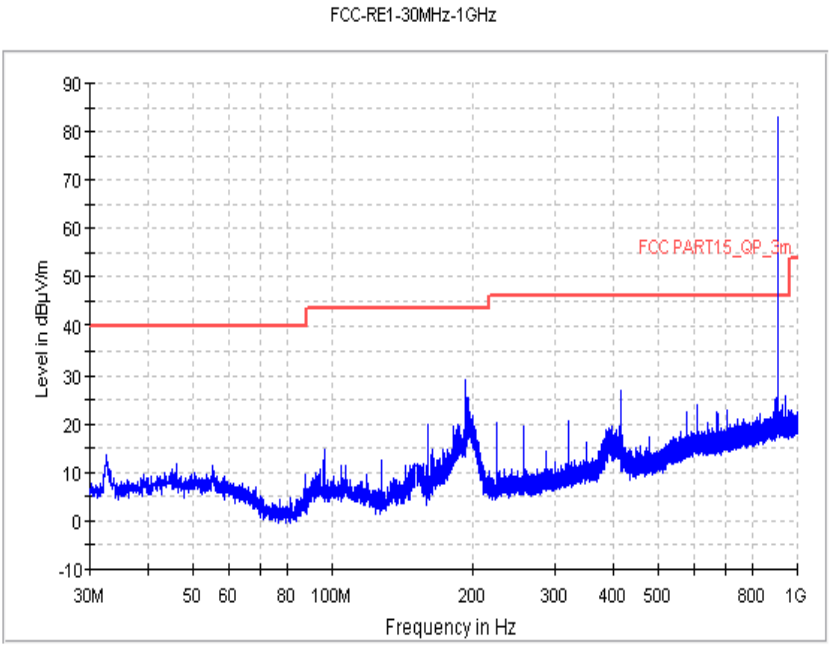


Fig.12 Radiated Spurious Emission (916MHz,100kbps,30MHz-1GHz)

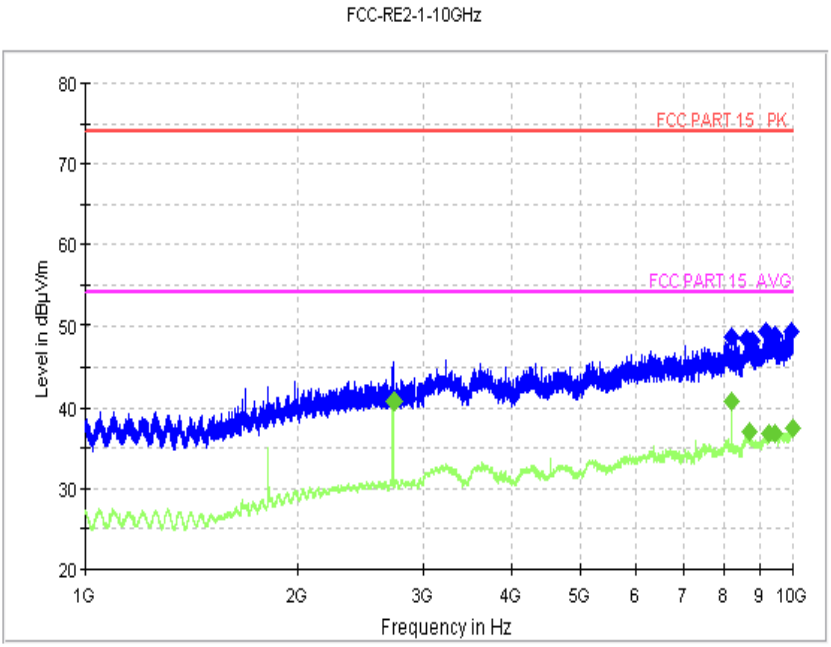


Fig.13 Radiated Spurious Emission (908.4MHz, 40kbps, 1GHz-10GHz)

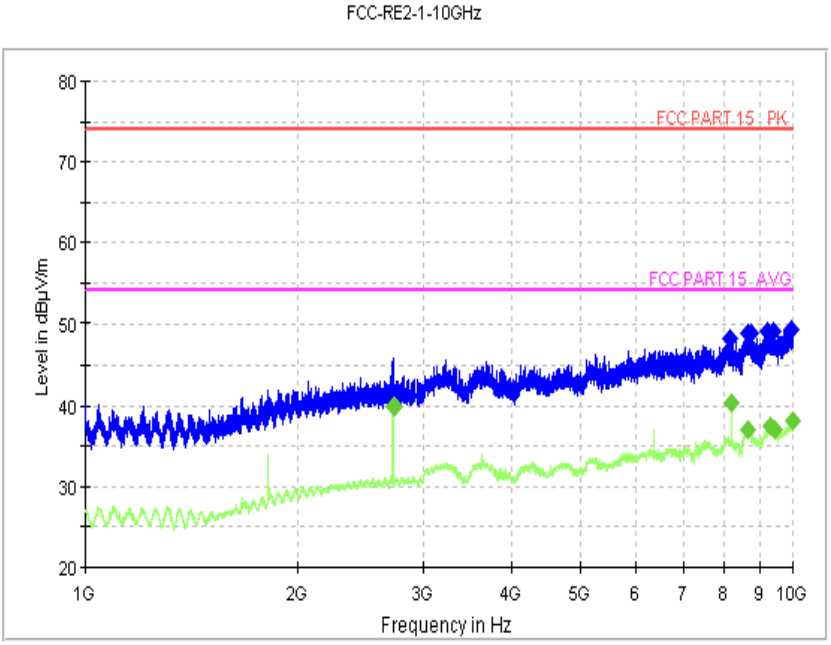


Fig.14 Radiated Spurious Emission (908.42MHz, 9.6kbps, 1GHz-10GHz)

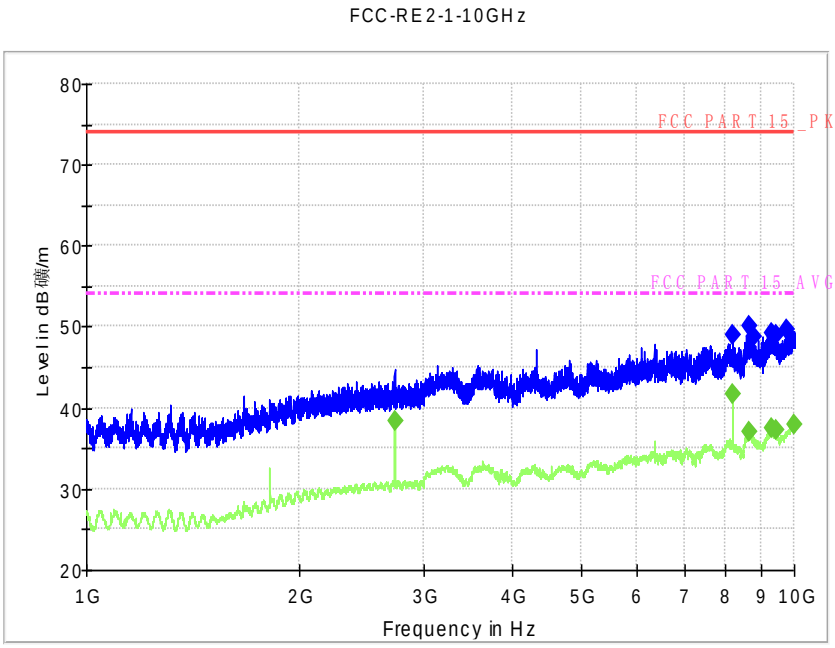


Fig.15 Radiated Spurious Emission (916MHz,100kbps, 1GHz-10GHz)

ANNEX C: Persons involved in this testing

Test Name	Tester
Occupied 20dB Bandwidth	Xu Ye, Tang Weisheng
Maximum Peak Output Power	Xu Ye, Tang Weisheng
Peak Power Spectral Density	Xu Ye, Tang Weisheng
Occupied 6dB Bandwidth	Xu Ye, Tang Weisheng
Band Edges Compliance	Xu Ye, Tang Weisheng
Transmitter Spurious Emission - Conducted	Xu Ye, Tang Weisheng
Transmitter Spurious Emission - Radiated	Xu Ye, Tang Weisheng
AC Powerline Conducted Emission	Xu Ye, Tang Weisheng

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