

FCC TEST REPORT
for
Z-Wave Europe GmbH

Z-Wave USB Interface
Model No.: ZMEUUZB

Prepared for : Z-Wave Europe GmbH
Address : Antonstr. 3, Hohenstein-Ernstthal, 09337, Germany

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited
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Report Number : 011504831I
Date of Test : Apr. 29~ May 19, 2015
Date of Report : May 20, 2015

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TEST REPORT

Applicant : Z-Wave Europe GmbH
Manufacturer : Airline Mechanical Company Ltd.
EUT : Z-Wave USB Interface
Model No. : ZMEUUZB
Serial No. : N/A
Trade Mark : N/A
Rating : DC 5V from USB Port

Measurement Procedure Used:

FCC Part15 Subpart C, Paragraph 15.207, 15.249 & 15.209

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : Apr. 29~ May 19, 2015

Prepared by : Kebo Zhang
(Tested Engineer / Kebo Zhang)

Reviewer : Amy Ding
(Project Manager / Amy Ding)

Approved & Authorized Signer : Tom Chen
(Manager / Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : Z-Wave USB Interface

Model Number : ZMEUUZB

Test Power Supply : DC 5V Via USB Port

Frequency : 908.40MHz

Antenna Specification : Whip Antenna:1 dBi

Applicant Address : Z-Wave Europe GmbH
: Antonstr. 3, Hohenstein-Ernstthal, 09337, Germany

Manufacturer Address : Airline Mechanical Company Ltd.
: 20/F, Kam Man Fung Factory Building, 6 Hong Man Street, Chai Wan, Hongkong

Factory Address : Airline Mechanical Company Ltd.
: 20/F, Kam Man Fung Factory Building, 6 Hong Man Street, Chai Wan, Hongkong

Date of receiver : Apr. 29, 2015

Date of Test : Apr. 29~ May 19, 2015

1.2. Auxiliary Equipment Used during Test

PC

: Manufacturer: DELL
M/N: Optiplex 3020 MT
S/N: CN-079V51-70163-4AD-089K-A00
Input Rating: AC 100-240V, 50-60Hz 5.4A
CE , FCC DOC, CCC

MONITOR

: Manufacturer: DELL
M/N: UZ2215Hf
S/N: CN-035VN6-72872-45A-A3AB
Input Rating: AC 100-240V, 50-60Hz, 1.5A
Output Rating: DC 19.5V, 4.62A
TUV-GS FCC CE KCC VCCI

KEYBOARD

: Manufacturer: DELL
M/N: SK-8120
S/N: CN-0DJ365-71616-49J-0MVR-A00
Input Rating: DC 5V,0.05A
CE FCC VCCI KCC TUV-GS
Cable: 1.8m, unshielded

MOUSE

: Manufacturer: DELL
M/N: MS111-T
S/N: CN-0KW2YH-71616-488-1CBJ
Input Rating: DC 5V,0.1A
Cable: 1.8m, unshielded
CE FCC VCCI KCC TUV-GS

Printer

: Manufacturer:Brother
M/N: MFC-3360C
S/N: N/A
CE, FCC:DOC

1.3. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS - LAB Code: L3503

Shenzhen Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

FCC-Registration No.: 752021

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 752021, July 10, 2013.

IC-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A-1, February 22, 2013.

Test Location

All Emissions tests were performed at

Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

1.4. Measurement Uncertainty

Radiation Uncertainty : Ur = 4.1 dB (Horizontal)
Ur = 4.3 dB (Vertical)

Conduction Uncertainty : Uc = 3.4dB

2. Test Procedure

GENERAL: This report shall NOT be reproduced except in full without the written approval of Shenzhen Anbotek Compliance Laboratory Limited. The EUT was transmitting a test signal during the testing.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.10-2013 using a spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the EUT was 74.3oF with a humidity of 69%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

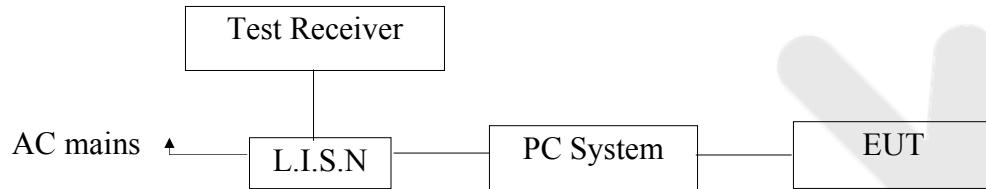
Freq (MHz) METER READING + ACF = FS
20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

ANSI STANDARD C63.10-2013 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

3. Conducted Limits

3.1. Block Diagram of Test Setup

3.1.1. Block diagram of connection between the EUT and simulators



3.2. Power Line Conducted Emission Measurement Limits (15.207)

Frequency MHz	Limits dB(μ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

3.3. Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.4. Operating Condition of EUT

- 3.4.1. Setup the EUT and simulator as shown as Section 3.1.
- 3.4.2. Turn on the power of all equipment.
- 3.4.3. Let the EUT work in test mode (ON) and measure it.

3.5. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.4 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9KHz.

The frequency range from 150KHz to 30MHz is checked.

The test results are reported on Section 3.6.

Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Two-Line V-network	Rohde & Schwarz	ENV216	100055	Apr. 17, 2015	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 17, 2015	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Apr. 17, 2015	1 Year

3.6. Power Line Conducted Emission Measurement Results

PASS.

The frequency range from 150KHz to 30 MHz is investigated.

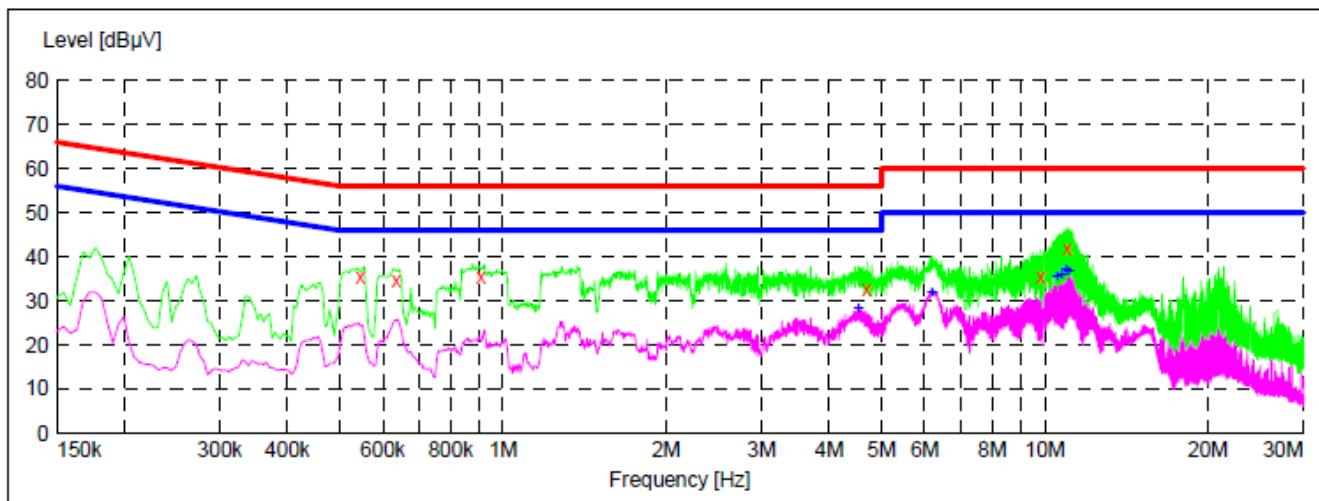
Please refer the following pages.

CONDUCTED EMISSION TEST DATA

Test Site: 1# Shielded Room
 Operating Condition: ON
 Test Specification: DC 5V Via USB Port
 Comment: Live Line
 Tem.:25°C Hum.:50%

SCAN TABLE: "Voltage (150K~30M) FIN"

Short Description: 150K-30M Disturbance Voltages



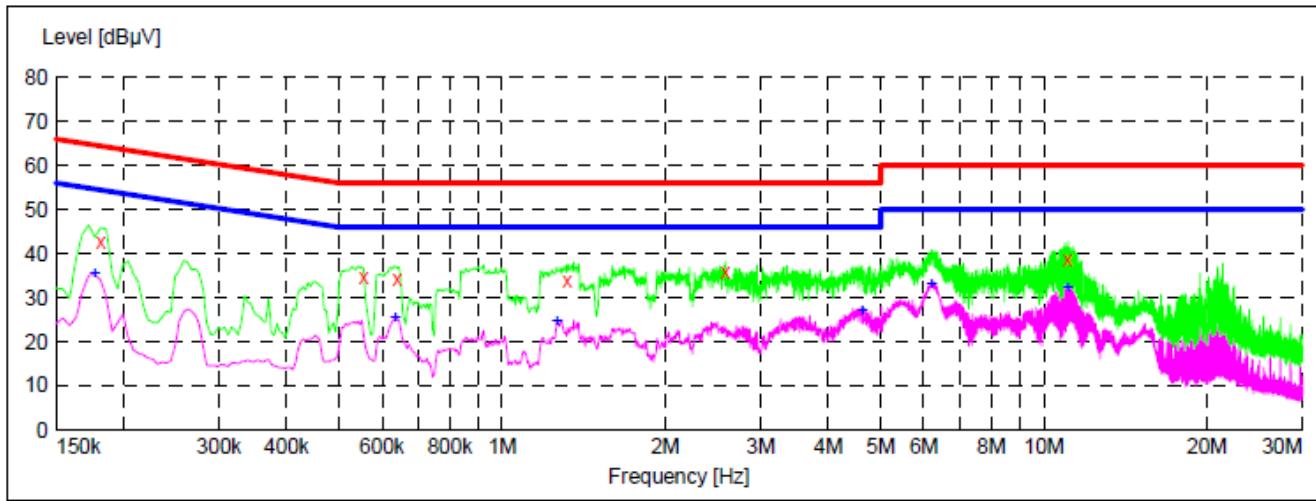
Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.546000	35.50	20.1	56	20.5	QP	L1	GND
0.636000	34.50	20.1	56	21.5	QP	L1	GND
0.910500	35.60	20.1	56	20.4	QP	L1	GND
4.699000	32.70	20.5	56	23.3	QP	L1	GND
9.833500	35.50	20.6	60	24.5	QP	L1	GND
10.990000	42.10	20.6	60	17.9	QP	L1	GND
Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
4.532500	28.50	20.5	46	17.5	AV	L1	GND
6.184000	31.70	20.5	50	18.3	AV	L1	GND
10.544500	35.40	20.6	50	14.6	AV	L1	GND
10.742500	35.90	20.6	50	14.1	AV	L1	GND
10.940500	37.00	20.6	50	13.0	AV	L1	GND
11.075500	36.70	20.6	50	13.3	AV	L1	GND

CONDUCTED EMISSION TEST DATA

Test Site: 1# Shielded Room
 Operating Condition: ON
 Test Specification: DC 5V Via USB Port
 Comment: Neutral Line
 Tem.:25°C Hum.:50%

SCAN TABLE: "Voltage (150K~30M) FIN"

Short Description: 150K-30M Disturbance Voltages



Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
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0.181500	42.70	20.1	64	21.7	QP	N	GND
0.555000	34.60	20.1	56	21.4	QP	N	GND
0.640500	34.30	20.1	56	21.7	QP	N	GND
1.319500	33.90	20.2	56	22.1	QP	N	GND
2.584000	35.70	20.4	56	20.3	QP	N	GND
11.057500	38.60	20.6	60	21.4	QP	N	GND

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
------------------	---------------------	--------------	---------------------	--------------	----------	------	----

0.177000	35.30	20.1	55	19.3	AV	N	GND
0.636000	25.50	20.1	46	20.5	AV	N	GND
1.261000	24.60	20.2	46	21.4	AV	N	GND
4.618000	26.90	20.5	46	19.1	AV	N	GND
6.202000	33.30	20.5	50	16.7	AV	N	GND
11.066500	32.10	20.6	50	17.9	AV	N	GND

4. Radiation Interference

4.1. Requirements (15.249, 15.209):

FIELD STRENGTH of Fundamental: 902-928 MHZ 2.4-2.4835 GHz 94 dB μ V/m @3m	FIELD STRENGTH of Harmonics 54 dB μ V/m @3m	S15.209 30 - 88 MHz 88 - 216 MHz 216 - 960 MHz ABOVE 960 MHz	40 dB μ V/m @3M 43.5 46 54dB μ V/m
---	---	--	---

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.

4.2. Test Procedure

For below 1GHz, the EUT is placed on a turn table which is 0.8 meter high above the ground. For above 1GHz, the EUT is placed on a turn table which is 1.5 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

All readings from 30MHz to 1GHz are quasi-peak values with a resolution bandwidth of 120kHz. All reading are above 1GHz, peak & average values with a resolution bandwidth of 1MHz. The EUT is tested in 9*6*6 Chamber.

The test results are listed in Section 4.3.

Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Apr. 17, 2015	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Apr. 17, 2015	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 17, 2015	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 20, 2015	1 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 20, 2015	1 Year
6.	Pre-amplifier	SONOMA	310N	186860	Apr. 17, 2015	1 Year
7.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

4.3. Test Results

PASS.

Please refer the following pages.

Data: (Frequency=908.40MHz)

Horizontal								
Frequency	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
MHz	dB	dB/m	dB	dB μ V	dB μ V/m	dB μ V/m	dB	
65.49	0.63	8.43	38.79	57.61	27.88	40.00	-12.12	QP
194.69	0.72	10.31	39.40	59.39	31.02	43.50	-12.48	QP
908.40	1.51	29.00	38.52	104.51	96.5	114.0	-17.5	Peak
908.40	1.51	29.00	38.52	93.66	85.65	94.0	-8.35	AV
1,816.80	1.82	28.02	39.21	70.55	61.18	74.0	-12.82	Peak
1,816.80	1.82	28.02	39.21	54.01	44.64	54.0	-9.36	AV
2,725.20	2.28	33.16	35.16	61.35	61.63	74.0	-12.37	Peak
2,725.20	2.28	33.16	35.16	44.87	45.15	54.0	-8.85	AV
3,633.60	2.50	33.31	35.02	51.03	51.82	74.0	-22.18	Peak
3,633.60	2.50	33.31	35.02	39.22	40.01	54.0	-13.99	AV
4,542.00	2.65	34.40	34.77	49.09	51.37	74.0	-22.63	Peak
4,542.00	2.65	34.40	34.77	35.74	38.02	54.0	-15.98	AV
5,450.40	---	---	---	---	---	---	---	---
6,358.80	---	---	---	---	---	---	---	---
7,267.20	---	---	---	---	---	---	---	---

Vertical Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB μ V	Level dB μ V/m	Limit dB μ V/m	Over Limit dB	Remark
184.65	0.68	9.19	39.0	59.61	30.48	43.50	-13.02	QP
447.91	0.74	11.95	40.09	57.58	30.18	46.00	-15.82	QP
908.40	1.51	29.00	38.52	109.12	101.11	114.0	-12.89	Peak
908.40	1.51	29.00	38.52	91.03	83.02	94.0	-10.98	AV
1,816.80	1.82	28.02	39.21	63.58	54.21	74.0	-19.79	Peak
1,816.80	1.82	28.02	39.21	51.79	42.42	54.0	-11.58	AV
2,725.20	2.28	33.16	35.16	58.04	58.32	74.0	-15.68	Peak
2,725.20	2.28	33.16	35.16	44.15	44.43	54.0	-9.57	AV
3,633.60	2.50	33.31	35.02	47.63	48.42	74.0	-25.58	Peak
3,633.60	2.50	33.31	35.02	37.04	37.83	54.0	-16.17	AV
4,542.00	2.65	34.40	34.77	48.39	50.67	74.0	-23.33	Peak
4,542.00	2.65	34.40	34.77	32.94	35.22	54.0	-18.78	AV
5,450.40	---	---	---	---	---	---	---	---
6,358.80	---	---	---	---	---	---	---	---
7,267.20	---	---	---	---	---	---	---	---

NOTE: “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5. Occupied Bandwidth

5.1. Requirements (15.249):

The field strength of any emissions appearing outside the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 50 dB below the level of the carrier or to the general limits of 15.249.

5.2. Test Procedure

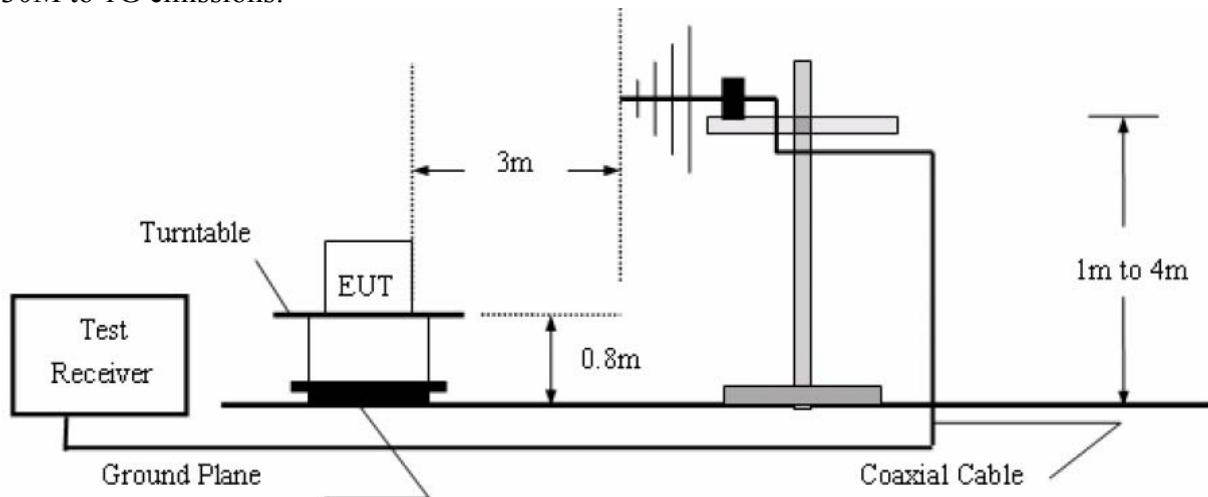
The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

Test Equipment

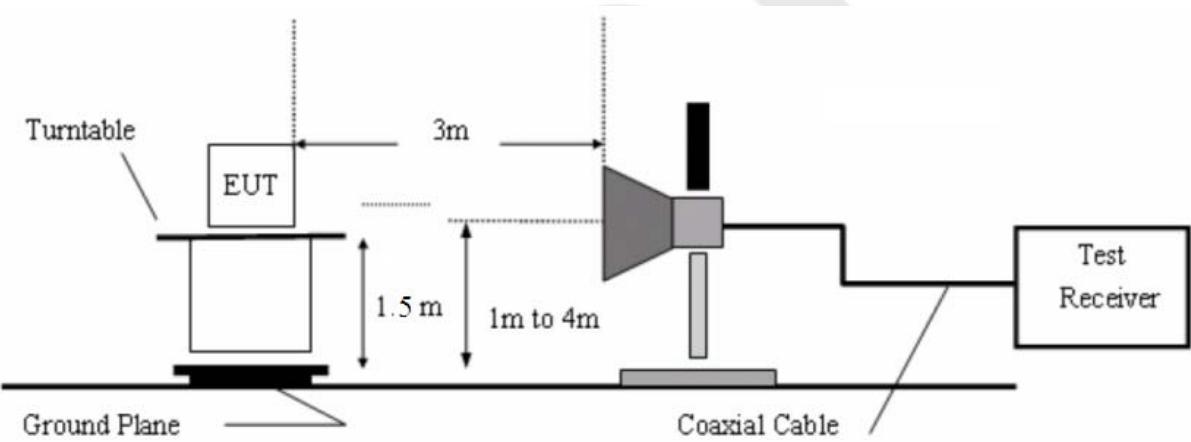
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Apr. 17, 2015	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Apr. 17, 2015	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 17, 2015	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 20, 2015	1 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 20, 2015	1 Year
6.	Pre-amplifier	SONOMA	310N	186860	Apr. 17, 2015	1 Year
7.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

5.3. Test Configuration:

30M to 1G emissions:



1G to 40G emissions:

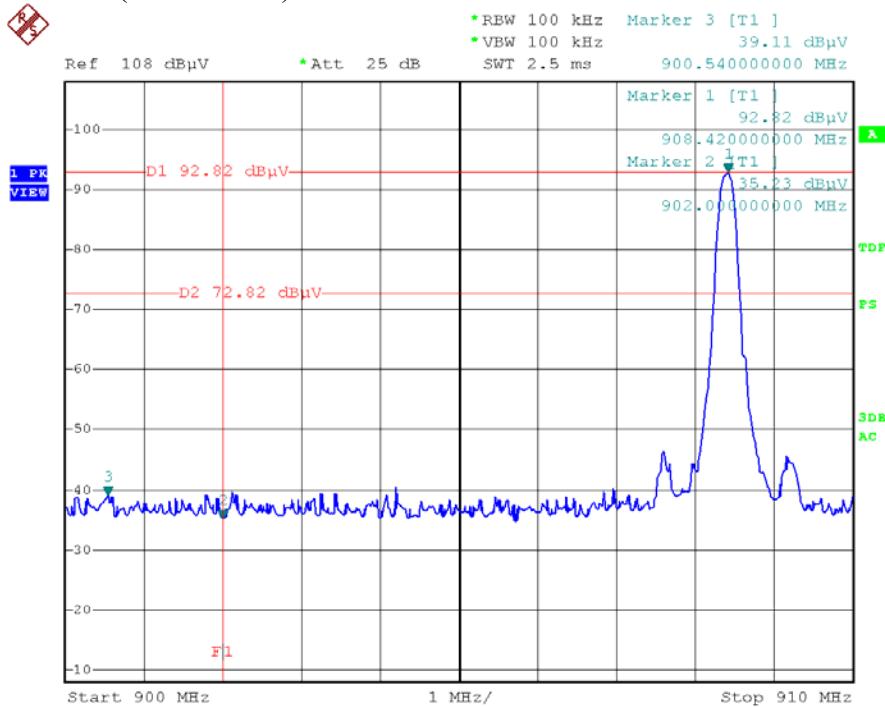


5.4. Test Results

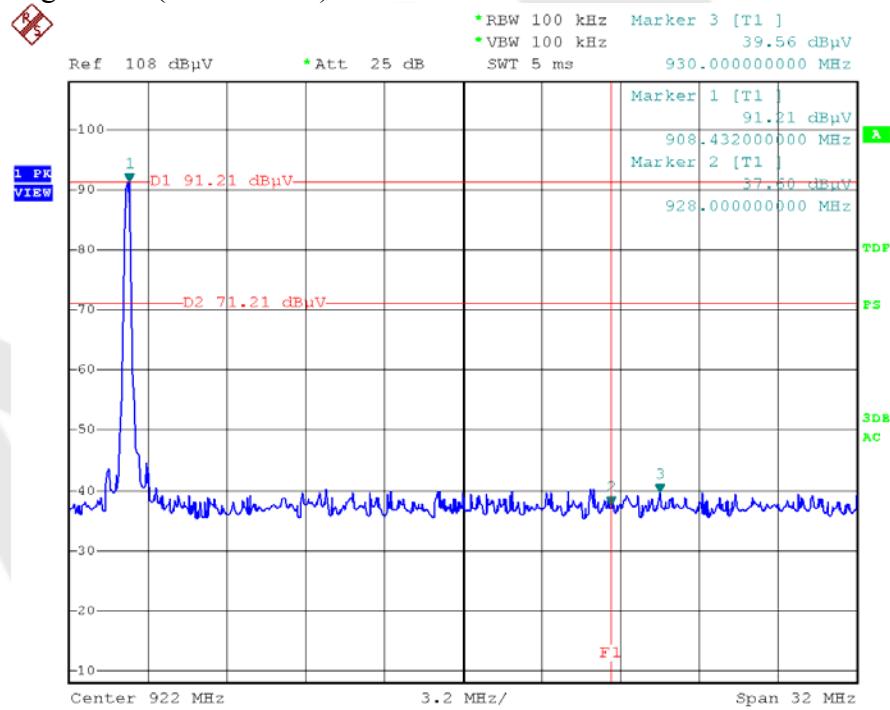
Pass.

Please refer the following plot.

Left Side (908.40MHz)



Right Side (908.40MHz)



6. ANTENNA APPLICATION

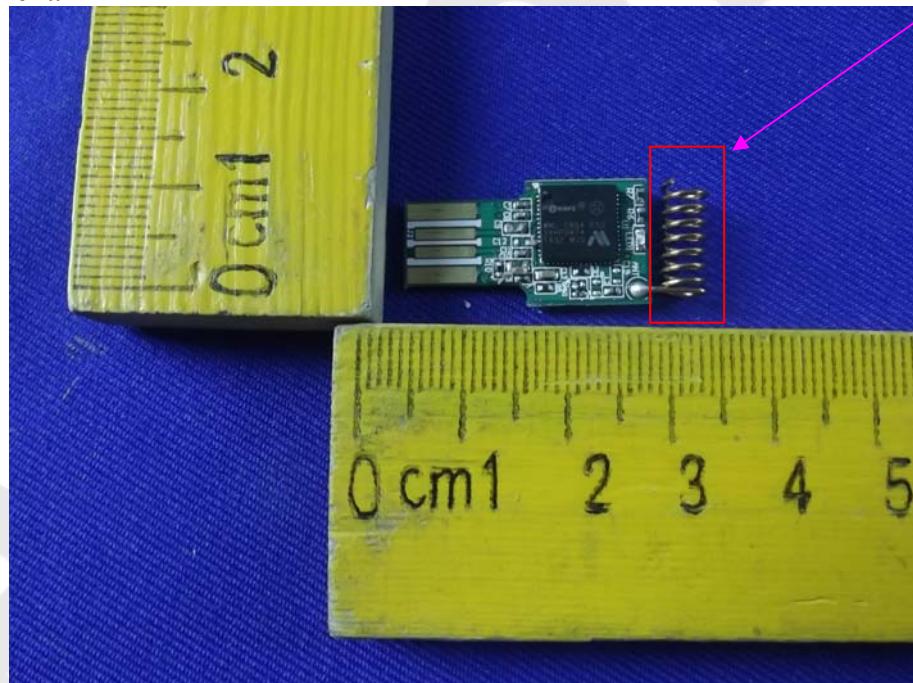
6.1. Antenna requirement

The EUT'S antenna is met the requirement of FCC part 15C section 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.

6.2. Result

The EUT's antenna used a Whip antenna which is permanently attached, The antenna's gain is 1dBi and meets the requirement.



7. PHOTOGRAPH

7.1. Photo of Conducted Emission Test



7.2. Photo of Radiated Emission Test



APPENDIX I (EXTERNAL PHOTOS)

Figure 1
The EUT-Front View

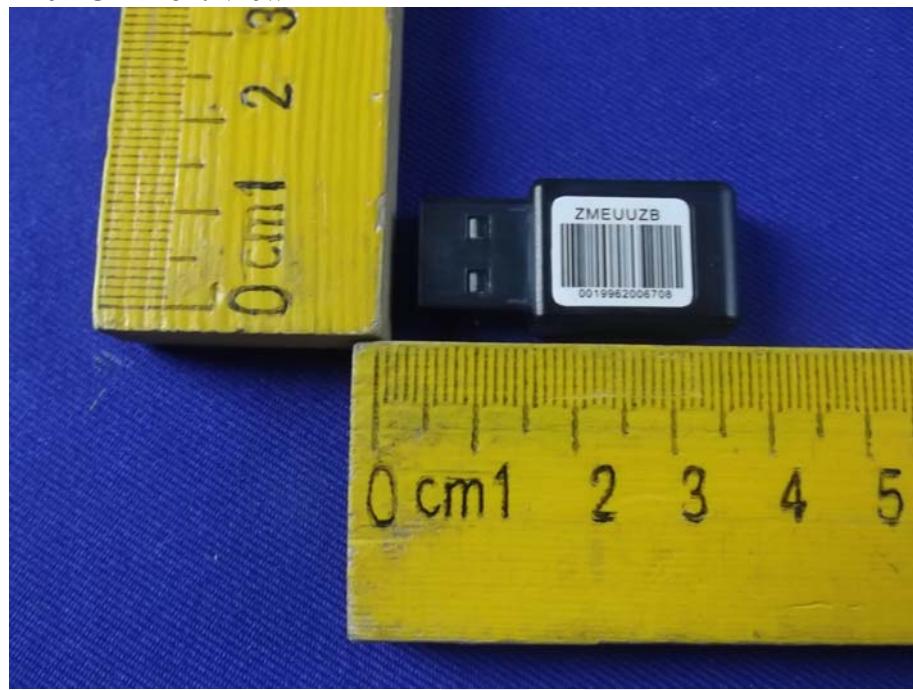


Figure 2
The EUT-Back View

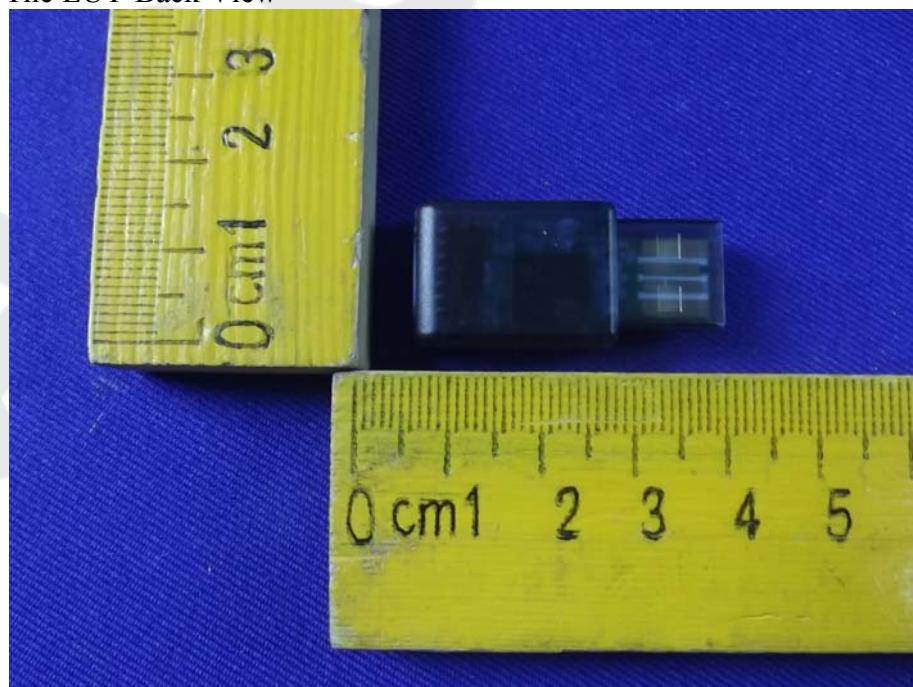


Figure 3
The EUT-Top View



Figure 4
The EUT-Bottom View



Figure 5
The EUT-Left View

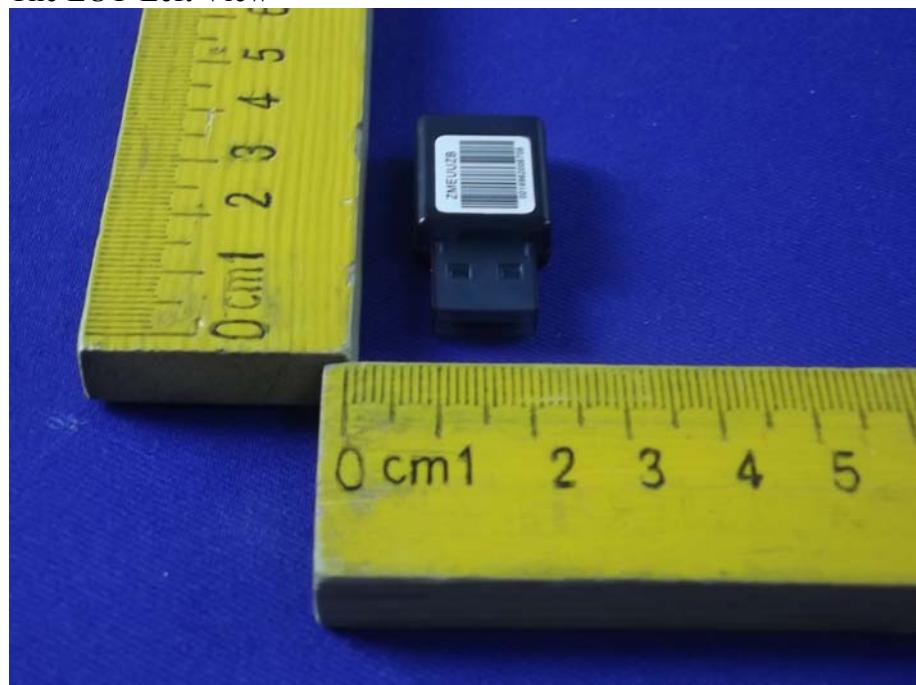


Figure 6
The EUT-Right View



APPENDIX II(INTERNAL PHOTOS)

Figure 7
The EUT-Inside View

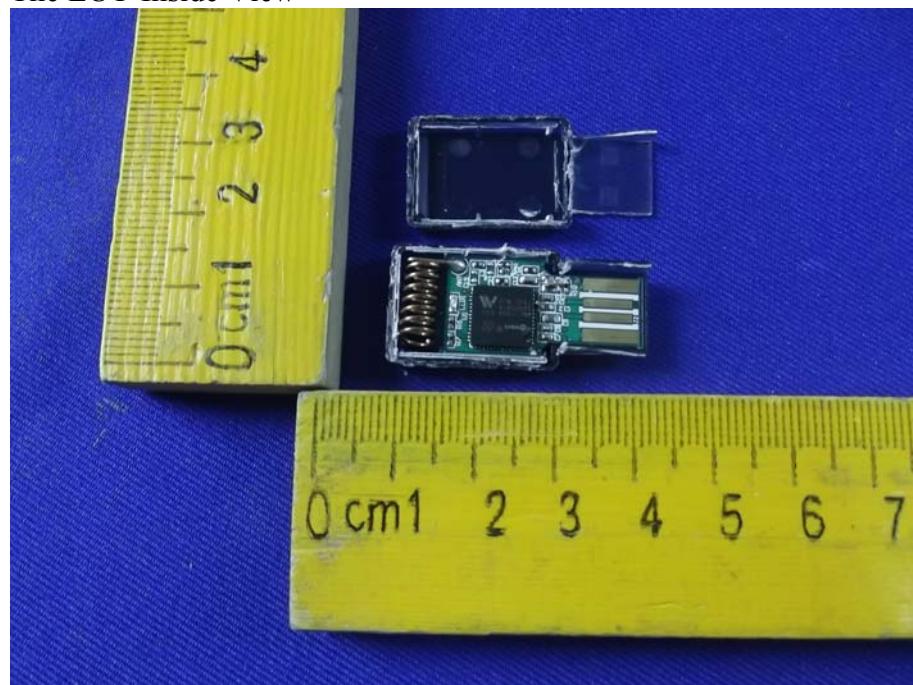


Figure 8
PCB of the EUT-Front View

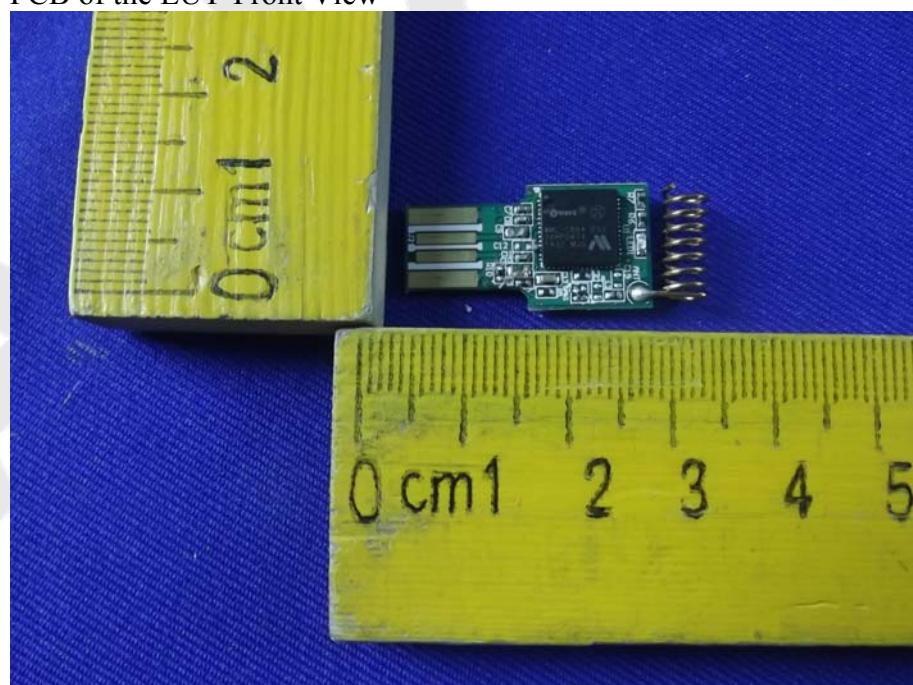


Figure 9
PCB of the EUT-Back View

