



Shenzhen Global Test Service Co.,Ltd.

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

TEST REPORT

47 CFR FCC Part 15 Subpart B (Class B)

Radio Frequency Devices – Unintentional Radiators – Limits and methods of measurement

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

Report Reference No.....: **GTS20190321004-1-6**

Compiled by

(position+printed name+signature)..: File administrators Jimmy Wang

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Approved by

(printed name + signature): Manager Jason Hu

Date of issue.....: May. 17, 2019

Testing Laboratory Name: **Shenzhen Global Test Service Co.,Ltd.**

Address: No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

Applicant's name: **InvizBox Limited**

Address: LINC Centre, IT Blanchardstown, Blanchardstown, Dublin 15, D15 VPT3, Ireland, Republic of

Test specification:

Standard: **47 CFR FCC Part 15 Subpart B (Class B)**
ANSI C63.4: 2014

TRF Originator: Shenzhen Global Test Service Co.,Ltd.

Master TRF.....: Dated 2014-12

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Test item description: Router

Trade Mark: /

Manufacturer.....: **InvizBox Limited**

Model/Type reference.....: InvizBox 2

Listed Models: N/A

Ratings: Input: AC 100-240V~50/60Hz

Result.....: **Pass**



TEST REPORT

Test Report No. :	GTS20190321004-1-6	May.17, 2019
		Date of issue

Equipment under Test	Router
Model /Type	InvizBox 2
Listed Models	N/A
Applicant	InvizBox Limited
Address	LINC Centre, IT Blanchardstown, Blanchardstown, Dublin 15, D15 VPT3, Ireland, Republic of
Manufacturer	InvizBox Limited
Address	LINC Centre, IT Blanchardstown, Blanchardstown, Dublin 15, D15 VPT3, Ireland, Republic of

Test Result	Pass
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. TEST STANDARDS	4
2. SUMMARY	5
2.1. General Remarks	5
2.2. Equipment Under Test	5
2.3. Short description of the Equipment under Test (EUT)	5
2.4. EUT operation mode	5
2.5. EUT configuration	5
3. TEST ENVIRONMENT	6
3.1. Address of the test laboratory	6
3.2. Test Facility	6
3.3. Environmental conditions	6
3.4. Test Description	6
3.5. Statement of the measurement uncertainty	7
3.6. Equipments Used during the Test	7
4. TEST CONDITIONS AND RESULTS	8
4.1. Radiated Emission	8
4.2. Conducted disturbance	11
5. TEST SETUP PHOTOS OF THE EUT	14
6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT	15
6.1. External photos of the EUT	15
6.2. Internal photos of the EUT	16

1. TEST STANDARDS

The tests were performed according to following standards:

[47 CFR FCC Part 15 Subpart B \(Class B\)](#) Radio Frequency Devices – Unintentional Radiators – Limits and methods of measurement
[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.

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Apr. 1, 2017
Testing commenced on	:	May. 17, 2019
Testing concluded on	:	May. 17, 2019

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage	:	☒ 120V / 60 Hz	☐ 230V / 50Hz
		☐ 12 V DC	☐ 24 V DC
		☐ Other (specified in blank below)	

2.3. Short description of the Equipment under Test (EUT)

The EUT is an Router.

2.4. EUT operation mode

Operation mode	
Mode 1	working

2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

☒ - supplied by the manufacturer

☐ - Supplied by the lab

☐	Load	M/N:	5W
		Manufacturer:	N/A

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

3.2. Test Facility

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

CNAS (No. CNAS L8169)

Shenzhen Global Test Service Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2019 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA (Certificate No. 4758.01)

Shenzhen Global Test Service Co., Ltd. has been assessed by the American Association for Laboratory Accreditation (A2LA). Certificate No. 4758.01.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Test Description

Emission Measurement		
Radiated Emission	47 CFR FCC Part 15 Subpart B Class B ANSI C63.4 2014	PASS
Conducted Disturbance	47 CFR FCC Part 15 Subpart B Class B ANSI C63.4 2014	PASS

Remark: N/A means “not applicable”.

The measurement uncertainty is not included in the test result.

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Shenzhen Global Test Service Co.,Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.24dB	(1)
Conducted Disturbance	0.15~30MHz	3.12dB	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

3.6. Equipments Used during the Test

966 Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Amplifier	SCHWARZBECK	BBV 9743	202	09/20/2018	1 year
Amplifier	EMCI	EMC051845SE	980355	09/25/2018	1 year
Test Receiver	R&S	ESCI 7	101102	09/20/2018	1 year
Spectrum Analyzer	R&S	FSV40-N	101800	05/08/2019	1 year
Broadband Antenna	SCHWARZBECK	VULB 9163	00976	09/29/2018	1 year
Double Ridged Horn Antenna	SCHWARZBECK	BBHA 9120D	01622	09/29/2018	1 year
Test Site	XINJU	966	N/A	09/20/2018	1 year

Conducted Emission test site					
Equipment	Equipment	Equipment	Equipment	Equipment	Equipment
Test Receiver	R&S	ESPI	101841	09/20/2018	1 year
Transient Limiter	CYBERTEK	EM5010A	E1950100106	09/20/2018	1 year
LISN	R&S	ESH2-Z5	893606/008	09/20/2018	1 year
LISN	CYBERTEK	EM5040A	E1850400105	05/08/2019	1 year
ISN	SCHWARZBECK	CAT 3	066	08/26/2018	1 year
ISN	SCHWARZBECK	CAT 5	121	08/26/2018	1 year
ISN	SCHWARZBECK	NTFM	102	08/26/2018	1 year
Test Site	XINJU	Conductive Shielding Room	N/A	N.C.R.	-----

The calibration interval was one year

4. TEST CONDITIONS AND RESULTS

4.1. Radiated Emission

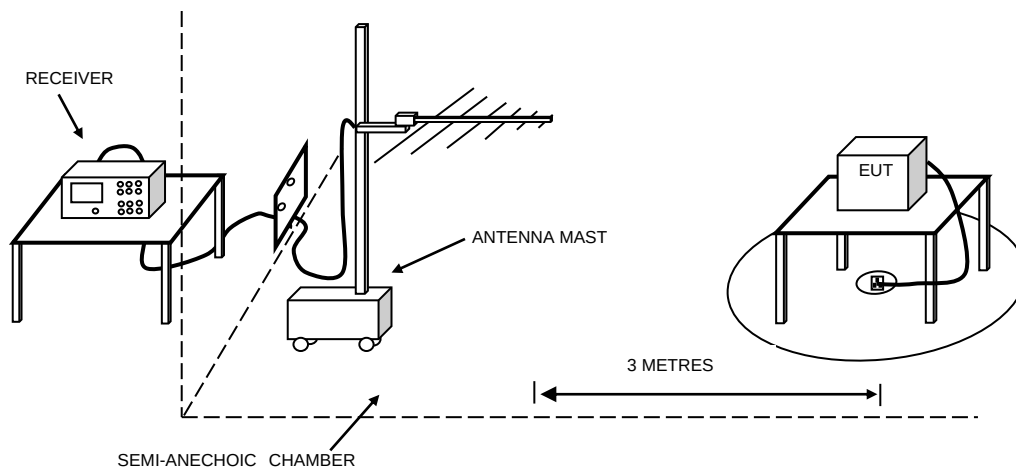
4.1.1. LIMITS OF DISTURBANCE (Class B)

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dB μ V/m)
30 ~ 88	3	40
88~216	3	43.5
216 ~ 960	3	46
Above 960 PK	3	74
Above 960 AV	3	54

Note: (1) The tighter limit shall apply at the edge between two frequency bands.

(2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

4.1.2. TEST CONFIGURATION



4.1.3. TEST PROCEDURE

EUT is tested in Semi-Anechoic Chamber. EUT is placed on a nonmetal table which is 0.8 meter above a grounded turntable. The turntable can rotate 360 degrees to determine the azimuth of the maximum emission level. EUT is set 3 meters away from the center of receiving antenna. The antenna can move up and down from 1 to 4 meter to find out the maximum emission level. Both horizontal and vertical polarizations of the antenna are set on the test.

4.1.4. CLIMATIC CONDITIONS

- ambient temperature : 24 °C
- relative humidity: 48%
- atmospheric pressure: 960 mbar

4.1.5. TEST RESULTS

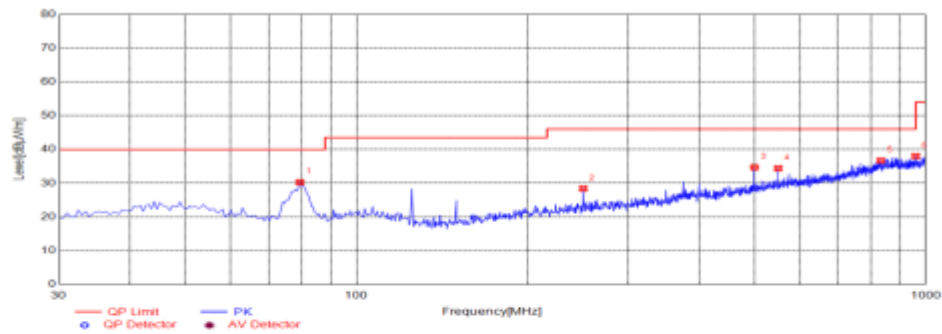
Test mode:

Mode 1

Polarization

Horizontal

Test Graph



Suspected List

NO.	Freq. [MHz]	Polarity	Height [cm]	Angle [°]	Limit [dBμV/m]	Level [dBμV/m]	Factor [dB]	Readin d [dBμV /m]	Margin [dB]
1	79.4700	Horizontal	100	160	40.00	30.24	-20.81	51.05	9.76
2	250.190	Horizontal	100	180	46.00	28.37	-15.12	43.49	17.63
3	499.965	Horizontal	100	270	46.00	34.66	-9.72	44.38	11.34
4	550.405	Horizontal	100	60	46.00	34.38	-8.99	43.37	11.62
5	833.645	Horizontal	100	20	46.00	36.67	-4.22	40.89	9.33
6	960.230	Horizontal	100	310	54.00	37.99	-3.37	41.36	16.01

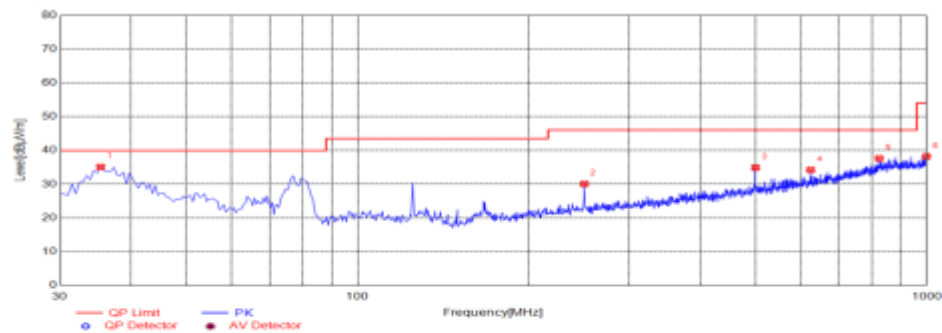
Test mode:

Mode 1

Polarization

Vertical

Test Graph



Suspected List

NO.	Freq. [MHz]	Polarity	Height [cm]	Angle [°]	Limit [dBμV/m]	Level [dBμV/m]	Factor [dB]	Readin d [dBμV /m]	Margin [dB]
1	35.3350	Vertical	100	330	40.00	35.09	-17.01	52.10	4.91
2	250.190	Vertical	100	70	46.00	30.05	-15.12	45.17	15.95
3	499.965	Vertical	100	260	46.00	34.89	-9.72	44.61	11.11
4	625.095	Vertical	100	100	46.00	34.21	-7.60	41.81	11.79
5	824.915	Vertical	100	130	46.00	37.61	-4.37	41.98	8.39
6	999.030	Vertical	100	320	54.00	38.20	-3.10	41.30	15.80

Re above 1G:

NO.	Freq. [MHz]	Factor [dB]	PK Value [dB μ V/m]	PK Limit [dB μ V/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1609.44	1.73	36.09	74.00	37.91	140	20	Vertical
2	1845.96	2.71	37.12	74.00	36.88	140	120	Vertical
3	2062.85	2.04	35.48	74.00	38.52	150	330	Vertical
4	2791.62	6.71	40.42	74.00	33.58	130	150	Vertical
5	2966.96	7.56	41.47	74.00	32.53	120	230	Vertical

NO.	Freq. [MHz]	Factor [dB]	AV Value [dB μ V/m]	AV Limit [dB μ V/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1609.44	1.73	22.25	54.00	31.75	140	20	Vertical
2	1845.96	2.71	23.23	54.00	30.77	140	120	Vertical
3	2062.85	2.04	22.44	54.00	31.56	150	330	Vertical
4	2791.62	6.71	27.14	54.00	26.86	130	150	Vertical
5	2966.96	7.56	27.41	54.00	26.59	120	230	Vertical

NO.	Freq. [MHz]	Factor [dB]	PK Value [dB μ V/m]	PK Limit [dB μ V/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1610.42	1.73	36.01	74.00	37.99	130	160	Horizontal
2	1966.16	2.51	37.20	74.00	36.8	130	60	Horizontal
3	2681.23	5.74	39.69	74.00	34.31	130	120	Horizontal
4	2812.93	6.72	40.62	74.00	33.38	200	290	Horizontal
5	2954.36	7.35	40.72	74.00	33.28	130	120	Horizontal

NO.	Freq. [MHz]	Factor [dB]	AV Value [dB μ V/m]	AV Limit [dB μ V/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1610.42	1.73	22.17	54.00	31.83	130	160	Horizontal
2	1966.16	2.51	23.10	54.00	30.9	130	60	Horizontal
3	2681.23	5.74	25.73	54.00	28.27	130	120	Horizontal
4	2812.93	6.72	26.92	54.00	27.08	200	290	Horizontal
5	2954.36	7.35	27.28	54.00	26.72	130	120	Horizontal

Notes:

Measuring frequencies from 30MHz ~30 GHz.

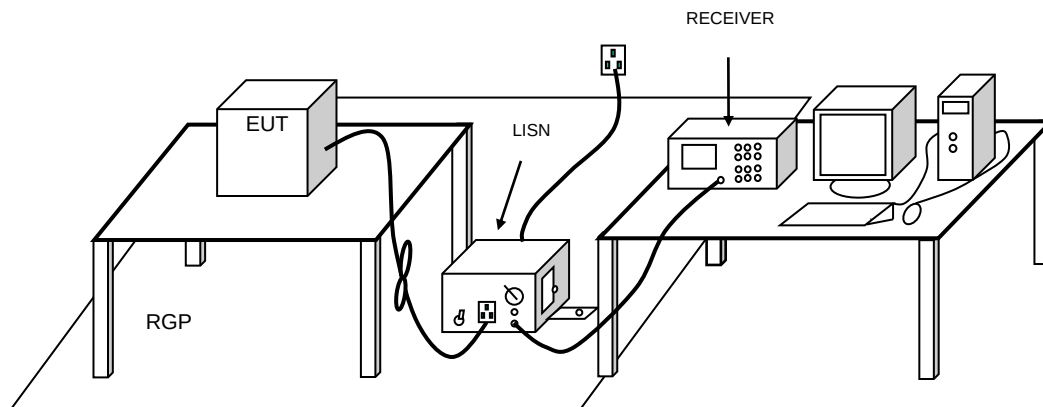
4.2. Conducted disturbance

4.2.1. LIMITS OF DISTURBANCE (Class B)

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150~0.500	66~56	56~46
0.500~5.000	56	46
5.000~30.000	60	50

Note: (1) The tighter limit shall apply at the edge between two frequency bands.

4.2.2. TEST CONFIGURATION



4.2.3. TEST PROCEDURE

EUT is placed on a nonmetal table which is 0.8 meter (or 0.1 meter for floor-stood equipments) above the grounded reference plane. Connect the power line of the EUT to the LISN. Voltage of the power supply is varied over a range of 0.9 to 1.1 times of the rated voltage in order to check whether the level of disturbance varies considerably with the supply voltage at the selected frequency about 160KHz. Perform an initial measurement on each line with peak detector to identify the frequencies where the maximum disturbances may occur. Then measure and record the maximum disturbances with quasi-peak and average detector.

4.2.4. CLIMATIC CONDITIONS

- ambient temperature : 25 °C
- relative humidity: 52%
- atmospheric pressure: 960 mbar

4.2.5. TEST RESULTS

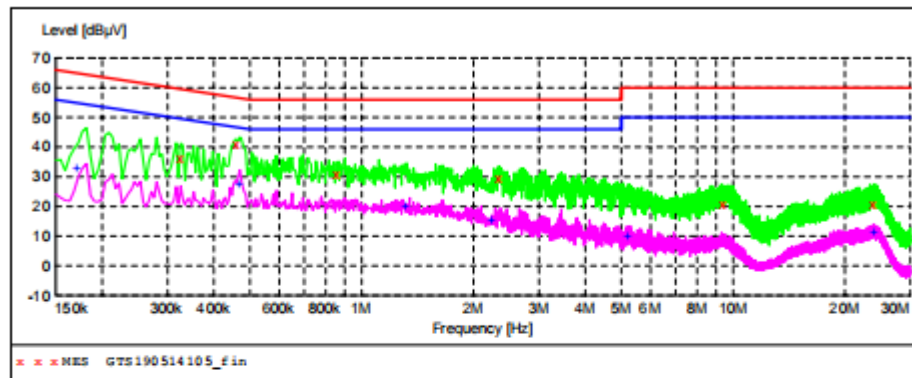
Test mode:

Mode 1

Polarization

L

SCAN TABLE: "Voltage (9K-30M) FIN"
 Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTS190514105_fin"

5/14/2019 10:40AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.325500	36.20	9.9	60	23.4	QP	L1	GND
0.460500	41.10	9.8	57	15.6	QP	L1	GND
0.861000	31.00	9.6	56	25.0	QP	L1	GND
2.355000	29.30	9.5	56	26.7	QP	L1	GND
9.361500	20.90	8.9	60	39.1	QP	L1	GND
23.968500	20.80	7.0	60	39.2	QP	L1	GND

MEASUREMENT RESULT: "GTS190514105_fin2"

5/14/2019 10:40AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.172500	32.80	10.0	55	22.0	AV	L1	GND
0.469500	27.70	9.8	47	18.8	AV	L1	GND
1.311000	20.00	9.6	46	26.0	AV	L1	GND
2.242500	15.40	9.5	46	30.6	AV	L1	GND
5.199000	10.20	9.3	50	39.8	AV	L1	GND
23.991000	11.40	7.0	50	38.6	AV	L1	GND

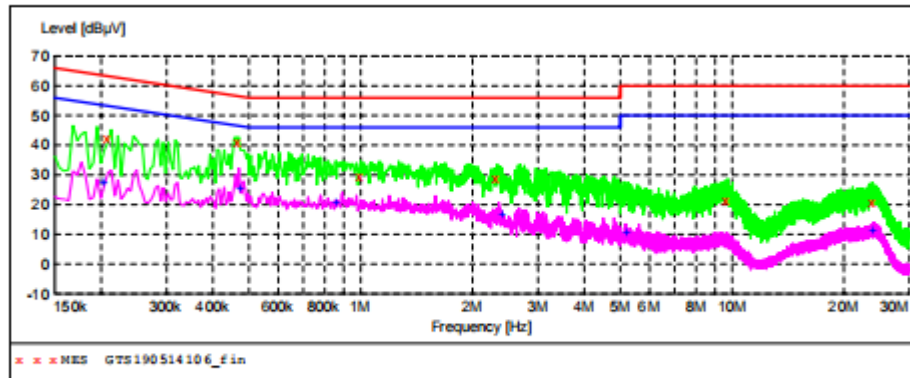
Test mode:

Mode 1

Polarization

N

SCAN TABLE: "Voltage (9K-30M) FIN"
 Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTS190514106_fin"

5/14/2019 10:42AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.208500	42.10	10.0	63	21.2	QP	N	GND
0.469500	40.90	9.8	57	15.6	QP	N	GND
0.991500	29.40	9.6	56	26.6	QP	N	GND
2.323500	28.80	9.5	56	27.2	QP	N	GND
9.703500	21.10	8.9	60	38.9	QP	N	GND
23.851500	20.80	7.0	60	39.2	QP	N	GND

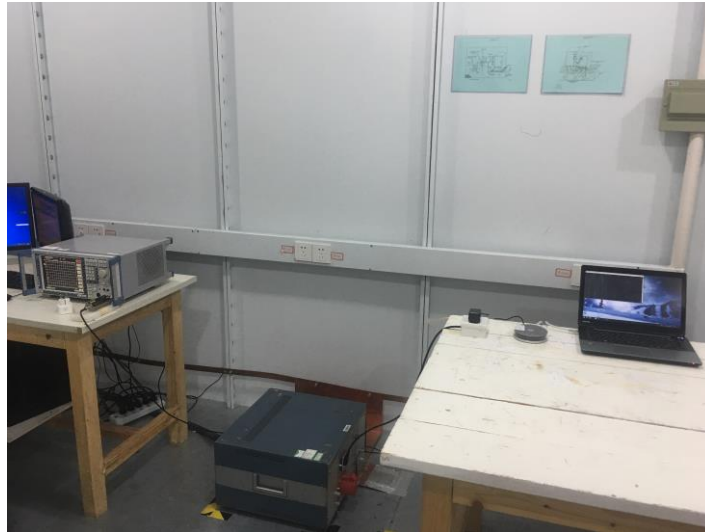
MEASUREMENT RESULT: "GTS190514106_fin2"

5/14/2019 10:42AM

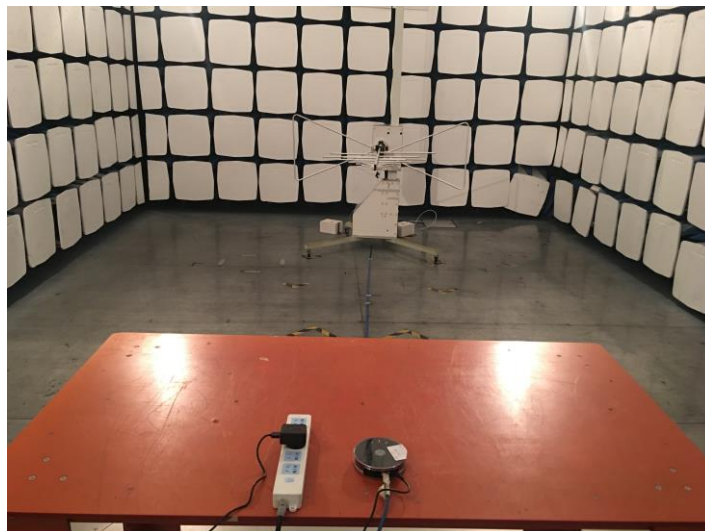
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.204000	27.60	10.0	53	25.8	AV	N	GND
0.474000	25.70	9.8	46	20.7	AV	N	GND
0.856500	21.00	9.6	46	25.0	AV	N	GND
2.400000	16.40	9.5	46	29.6	AV	N	GND
5.185500	10.30	9.3	50	39.7	AV	N	GND
24.063000	11.60	7.0	50	38.4	AV	N	GND

5. Test Setup Photos of the EUT

Conducted Emission

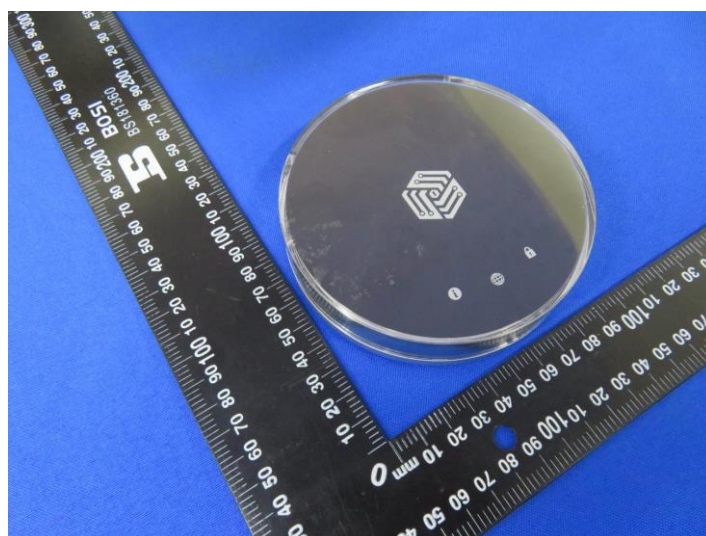


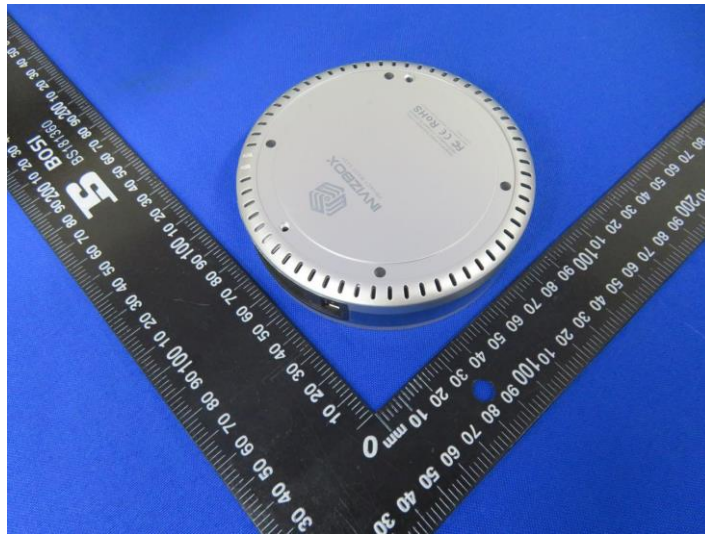
Radiated Emission



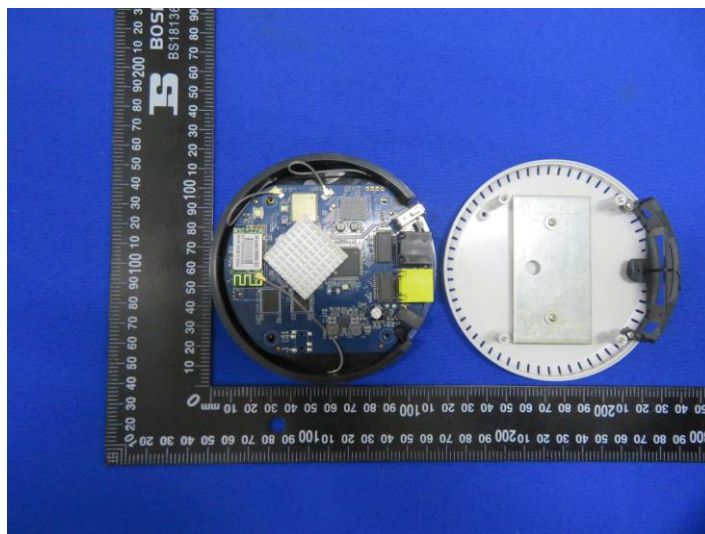
6. External and Internal Photos of the EUT

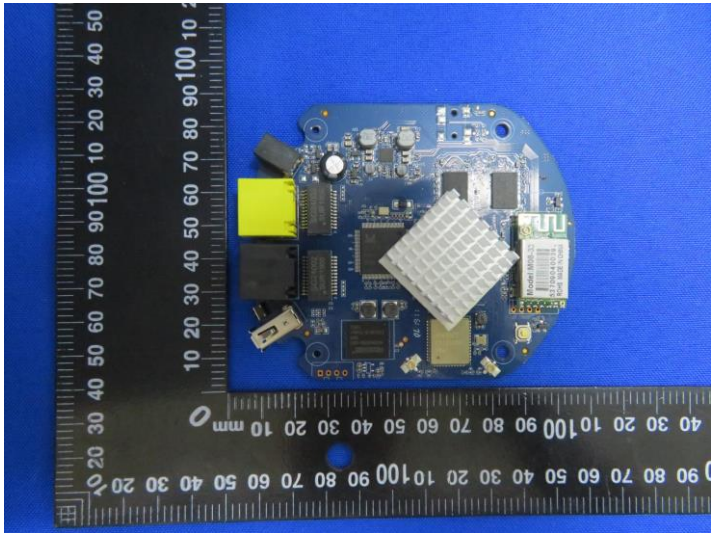
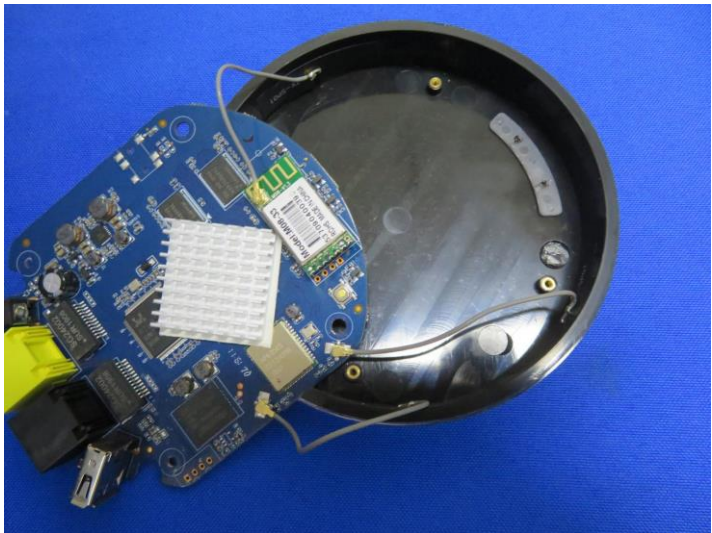
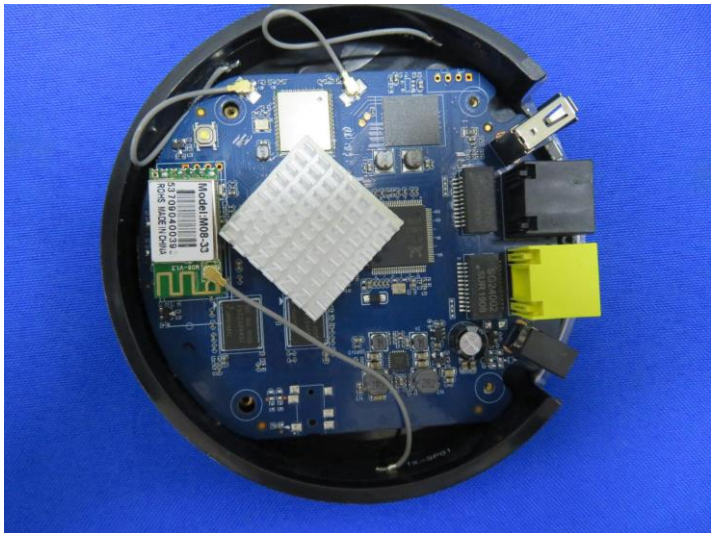
6.1. External photos of the EUT

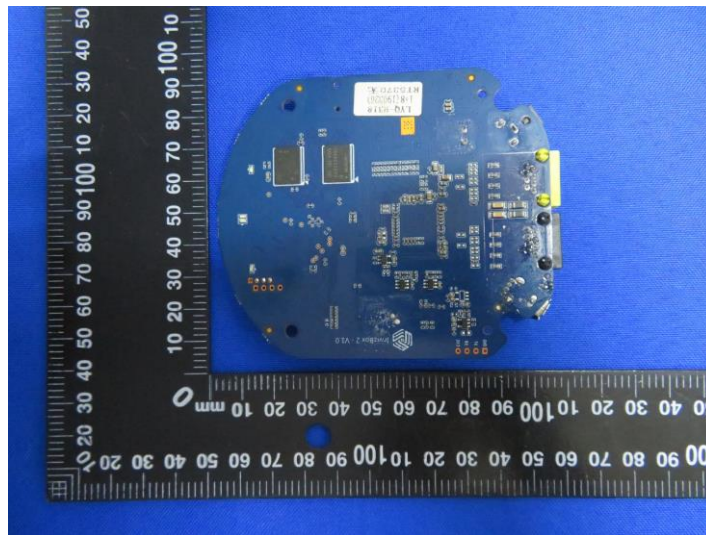




6.2. Internal photos of the EUT







.....End of Report.....