



中国认可
国际互认
检测
TESTING
CNAS L2264

EMC TEST REPORT

Applicant LUXROBO
FCC ID 2AL85-LUX-32
Product Wifi/BT module
Brand LUXROBO
Model LUX-32
Report No. RXA1704-0126EMC01R1
Issue Date July 14, 2017

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC Code CFR47 Part15B (2016)/ ANSI C63.4 (2014)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Wei Liu

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Table of Contents

1	Test Laboratory.....	4
1.1	Notes of the Test Report	4
1.2	Test facility	4
1.3	Testing Location.....	5
2	General Description of Equipment under Test	6
2.1	Client Information	6
2.2	General information.....	6
2.3	Applied Standards	7
2.4	Test Mode.....	8
3	Test Case Results	9
3.1	Radiated Emission	9
3.2	Conducted Emission	15
4	Main Test Instrument	18
	ANNEX A: The EUT Appearance and Test Configuration.....	19
	A.1 EUT Appearance	19
	A.2 Test Setup.....	20
	A.3 Host Product.....	22



Summary of measurement results

Number	Test Case	Clause in FCC Rules	Conclusion
1	Radiated Emission	15.109, ANSI C63.4-2014	PASS
2	Conducted Emission	15.107, ANSI C63.4-2014	PASS
Test Date: May 4, 2017 ~ May 6, 2017			

1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above. This report must not be used by the client to claim product certification, approval, or endorsement by CNAS or any government agencies.

1.2 Test facility

CNAS (accreditation number: L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (recognition number is 428261)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.



1.3 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
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E-mail: xukai@ta-shanghai.com

2 General Description of Equipment under Test

2.1 Client Information

Applicant	LUXROBO
Applicant address	50, 63-ro, Yeoungdeungpo-gu, 63city 4th floor, Seoul, South Korea
Manufacturer	LUXROBO
Manufacturer address	50, 63-ro, Yeoungdeungpo-gu, 63city 4th floor, Seoul, South Korea

2.2 General information

EUT Description			
Device Type:	Portable Device		
Model Number:	LUX-32		
HW Version:	HW V1.0		
SW Version:	SW V1.0		
Antenna Type:	Embedded Antenna		
Frequency:		TX:	RX:
	Bluetooth:	2400MHz to 2483.5MHz	2400MHz to 2483.5MHz
	WIFI:	2400MHz to 2483.5MHz	2400MHz to 2483.5MHz
Modulation:	Bluetooth: GFSK, $\pi/4$ -DQPSK, 8-DPSK Bluetooth v4.2 LE: GFSK WLAN 802.11b: DSSS WLAN 802.11a/g/n: OFDM		
Used Host Product:	PC Manufacturer: lenovo Model: Thinkpad T540p (SN : SL10E37685)		
Test Mode:	Transfer Data Mode		
Remark: The information of the EUT is declared by the manufacturer. Please refer to the specifications or user manual for details.			



2.3 Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards

FCC Code CFR47 Part15B (2016)

ANSI C63.4 (2014)

2.4 Test Mode

Test Mode	
Mode 1:	EUT + USB cable with PC + Idle
Mode 2:	EUT + USB cable with PC + Bluetooth Traffic
Mode 3:	EUT + USB cable with PC + WIFI Traffic

During the test, the preliminary test was performed in all modes with all bands, mode 1, is selected as the worst condition. The test data of the worst-case condition was recorded in this report.

3 Test Case Results

3.1 Radiated Emission

Ambient condition

Temperature	Relative humidity	Pressure
24°C~26°C	45%~50%	102.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The distance between EUT and receive antenna should be 3 meters. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier. During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum of radiated signal level.

The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing. During the test, the EUT is worked at maximum output power.

Set the spectrum analyzer in the following:

Below 1GHz:

RBW=100 kHz / VBW=300 kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO

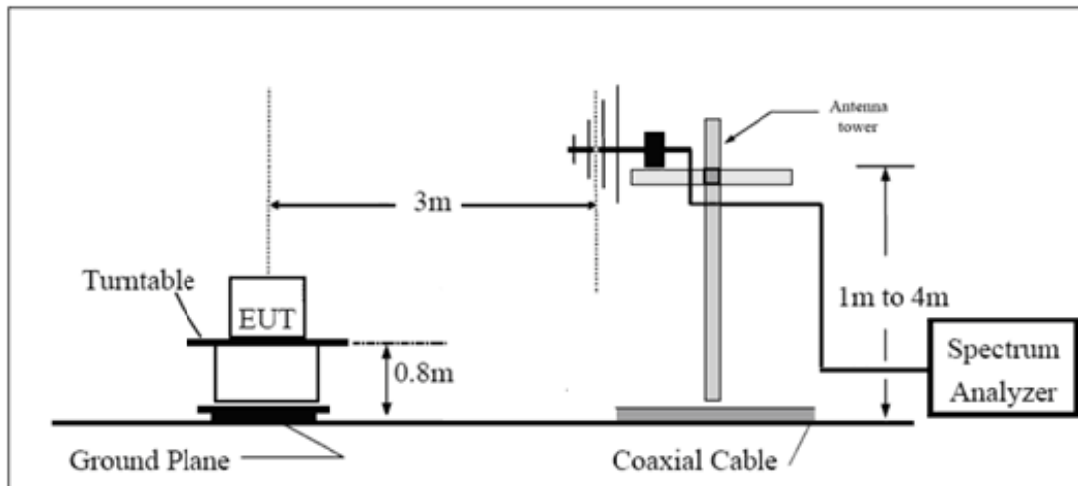
(b) AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded.

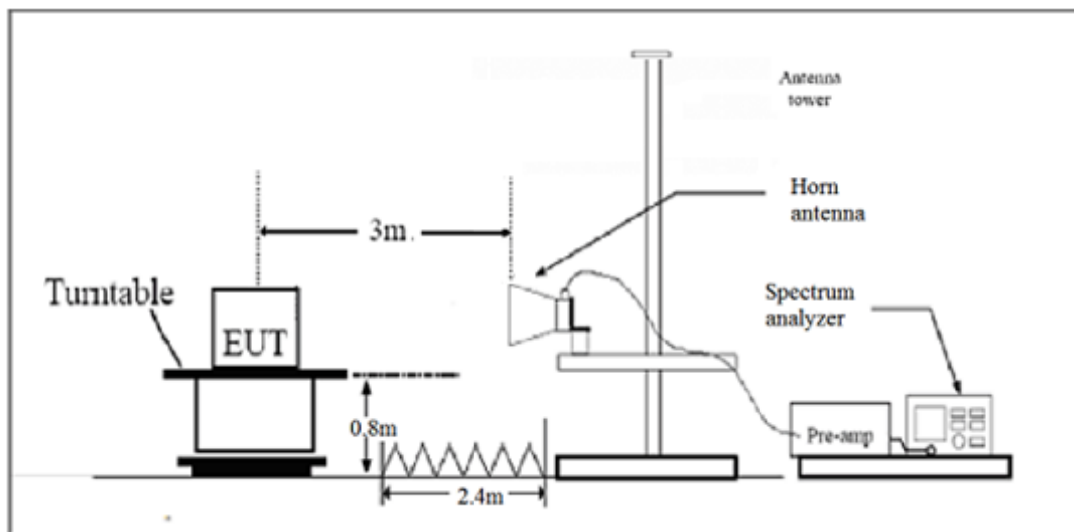
During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC; PC is connected to server via a long LAN cable.

Test Setup

Below 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

Antenna Tower meets ANSI C63.4 requirements for measurements above 1 GHz by keeping the antenna aimed at the EUT during the antenna's ascent/ descent along the antenna mast.

Limits

Frequency (MHz)	Field Strength (dB μ V/m)	Detector
30 -88	40.0	Quasi-peak
88-216	43.5	Quasi-peak
216 – 960	46.0	Quasi-peak
960-1000	54.0	Quasi-peak
1000-5 th harmonic of the highest frequency or 40GHz, which is lower	54 74	Average Peak

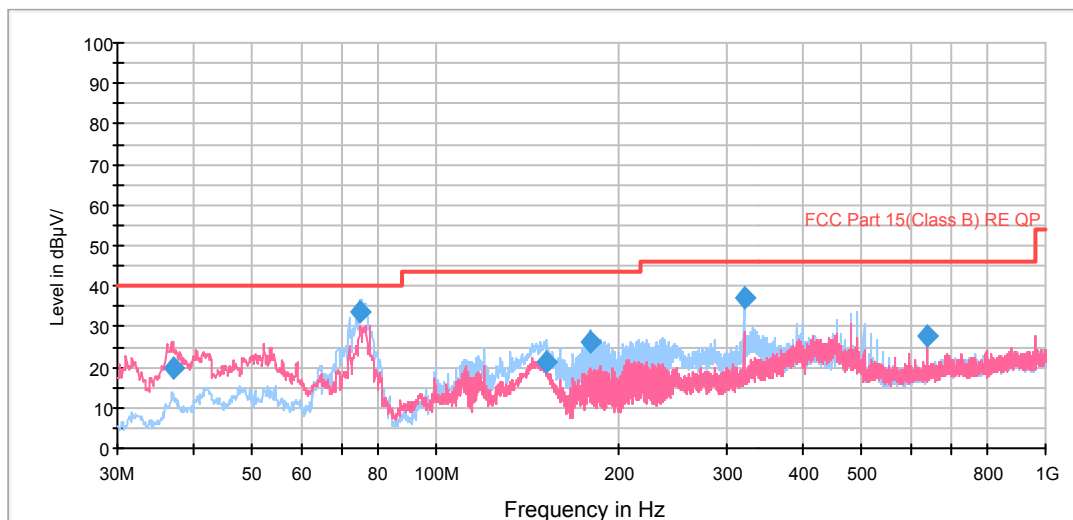
Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U = 3.92$ dB.

Test Results

The following graphs display the maximum values of horizontal and vertical by software.
For above 1GHz, Blue trace uses the peak detection, Green trace uses the average detection.

RE 30M-1GHz QP

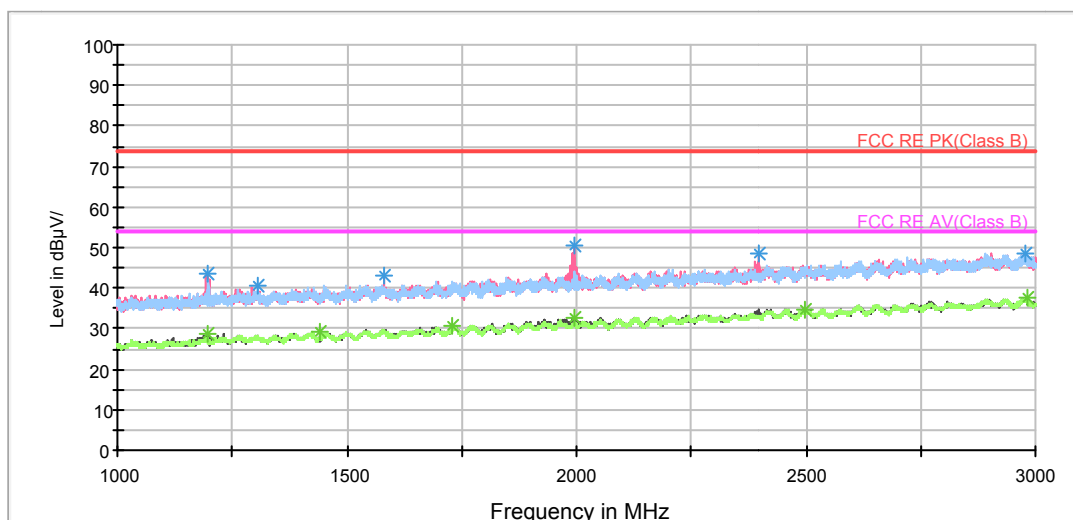


Radiated Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
36.978972	20.0	42.1	101.0	V	15.0	-22.1	20.0	40.0
75.158184	33.9	62.6	125.0	H	320.0	-28.7	6.1	40.0
151.714716	21.1	50.3	125.0	H	0.0	-29.2	22.4	43.5
178.887762	26.1	54.4	125.0	H	15.0	-28.3	17.4	43.5
319.990000	37.3	60.6	100.0	H	253.0	-23.3	8.7	46.0
640.008750	27.8	44.2	101.0	V	117.0	-16.4	18.2	46.0

- Remark: 1. Quasi-Peak = Reading value + Correction factor
2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)
3. Margin = Limit – Quasi-Peak

RE 1G-3GHz PK+AV

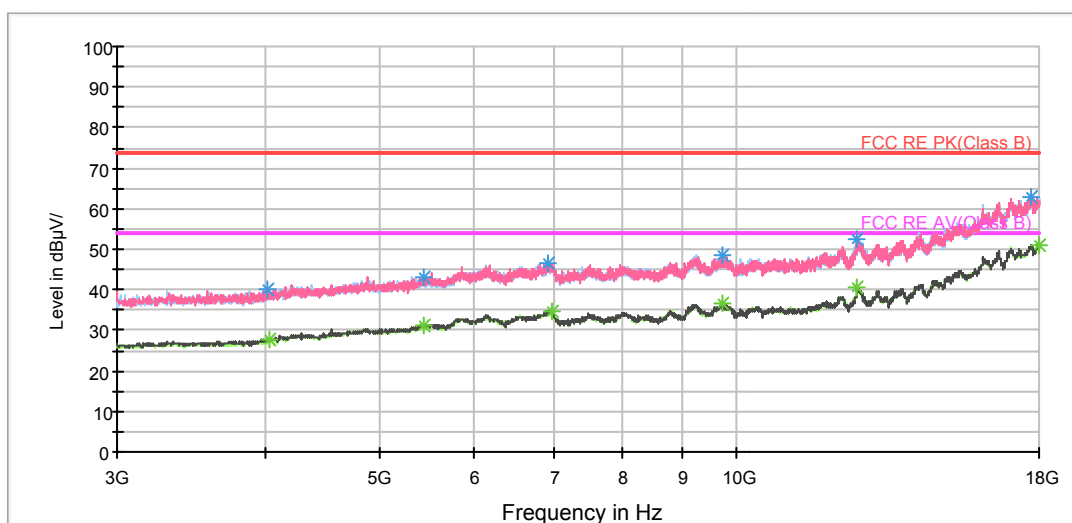


Radiated Emission from 1GHz to 3GHz

Frequency (MHz)	Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1197.750000	43.4	51.6	100.0	V	284.0	-8.2	30.6	74
1305.000000	40.4	48.2	100.0	H	44.0	-7.8	33.6	74
1580.250000	43.2	49.5	100.0	V	284.0	-6.3	30.8	74
1994.000000	50.4	53.6	100.0	V	238.0	-3.2	23.6	74
2396.500000	48.3	49.6	100.0	V	319.0	-1.3	25.7	74
2980.250000	48.7	46.5	100.0	H	104.0	2.2	25.3	74

Frequency (MHz)	Average (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1197.750000	28.7	36.9	100.0	V	284.0	-8.2	25.3	54
1439.750000	29.2	36.1	100.0	H	0.0	-6.9	24.8	54
1730.500000	30.4	35.3	100.0	V	139.0	-4.9	23.6	54
1993.500000	32.8	36.1	100.0	V	256.0	-3.3	21.2	54
2497.000000	34.8	34.8	100.0	H	193.0	0.0	19.2	54
2981.250000	37.5	35.3	100.0	H	78.0	2.2	16.5	54

RE 3-18GHz PK+AV



Radiated Emission from 3GHz to 18GHz

Frequency (MHz)	Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
4023.750000	40.2	41.3	101.0	V	284.0	-1.1	33.8	74
5433.750000	43.3	40.5	101.0	V	154.0	2.8	30.7	74
6920.625000	46.6	40.4	101.0	H	0.0	6.2	27.4	74
9720.000000	48.7	39.2	101.0	H	168.0	9.5	25.3	74
12635.625000	52.7	38.6	101.0	H	242.0	14.1	21.3	74
17720.625000	62.9	38.3	101.0	H	333.0	24.6	11.1	74

Frequency (MHz)	Average (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
4031.250000	27.8	28.9	101.0	V	0.0	-1.1	26.2	54
5439.375000	31.2	28.3	101.0	V	25.0	2.9	22.8	54
6997.500000	34.7	28.2	101.0	V	0.0	6.5	19.3	54
9740.625000	36.4	26.4	101.0	V	246.0	10.0	17.6	54
12641.250000	40.7	26.2	101.0	H	0.0	14.5	13.3	54
18000.000000	51.2	25.7	101.0	V	0.0	25.5	2.8	54

3.2 Conducted Emission

Ambient condition

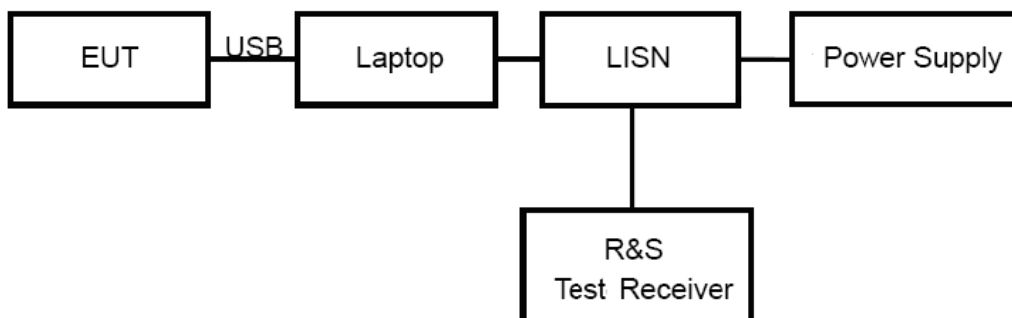
Temperature	Relative humidity	Pressure
24°C ~26°C	50%~55%	102.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC; PC is connected to server via a long LAN cable.

Test Setup



Note: Power Supply is AC Power source and it is used to change the voltage 120V/60Hz.

Limits

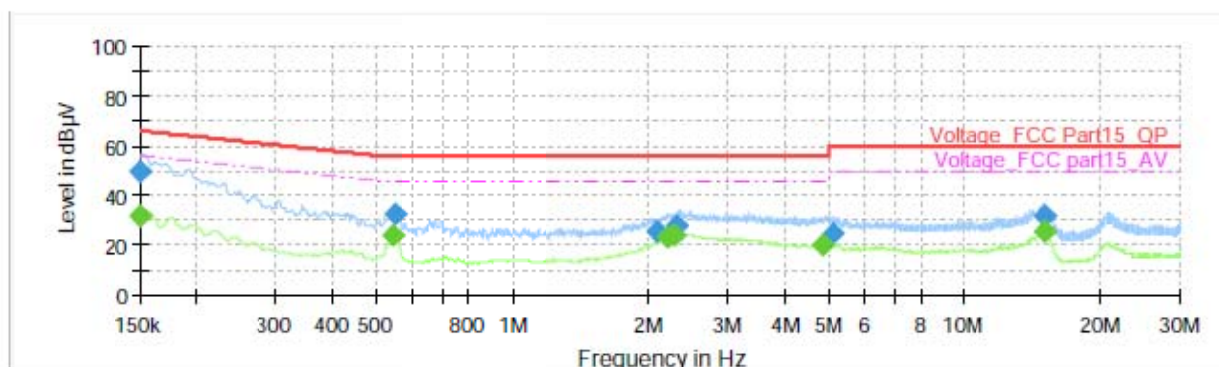
Frequency (MHz)	Conducted Limits(dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46 *
0.5 - 5	56	46
5 - 30	60	50
*: Decreases with the logarithm of the frequency.		

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U = 2.69$ dB.

Test Results

Following plots, Blue trace uses the peak detection; Green trace uses the average detection.

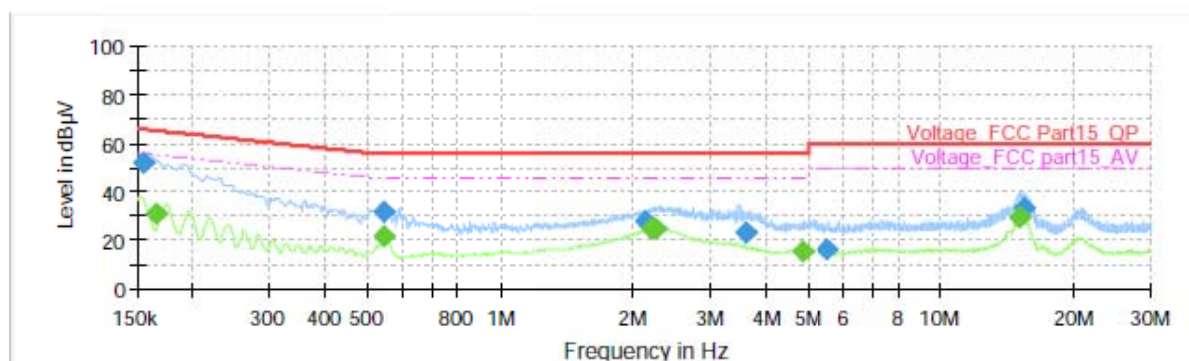


Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.150000	---	31.83	56.00	24.17	1000.0	9.000	L1	ON	19.1
0.150000	50.00	---	66.00	16.00	1000.0	9.000	L1	ON	19.1
0.546000	---	23.72	46.00	22.28	1000.0	9.000	L1	ON	19.2
0.548250	32.87	---	56.00	23.13	1000.0	9.000	L1	ON	19.3
2.094000	25.58	---	56.00	30.42	1000.0	9.000	L1	ON	19.1
2.193000	---	23.03	46.00	22.98	1000.0	9.000	L1	ON	19.1
2.271750	---	24.12	46.00	21.88	1000.0	9.000	L1	ON	19.1
2.314500	28.15	---	56.00	27.85	1000.0	9.000	L1	ON	19.0
4.866000	---	20.47	46.00	25.53	1000.0	9.000	L1	ON	19.1
5.122500	24.89	---	60.00	35.11	1000.0	9.000	L1	ON	19.1
14.993250	---	25.92	50.00	24.08	1000.0	9.000	L1	ON	19.5
15.038250	31.64	---	60.00	28.36	1000.0	9.000	L1	ON	19.5

L line

Conducted Emission from 150 KHz to 30 MHz



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.154500	51.69	---	65.75	14.06	1000.0	9.000	N	ON	19.1
0.165750	---	31.00	55.17	24.17	1000.0	9.000	N	ON	19.2
0.546000	---	22.01	46.00	23.99	1000.0	9.000	N	ON	19.2
0.546000	31.77	---	56.00	24.23	1000.0	9.000	N	ON	19.2
2.134500	28.08	---	56.00	27.92	1000.0	9.000	N	ON	19.1
2.195250	---	24.55	46.00	21.45	1000.0	9.000	N	ON	19.1
2.247000	---	24.91	46.00	21.09	1000.0	9.000	N	ON	19.1
3.585750	23.34	---	56.00	32.66	1000.0	9.000	N	ON	19.1
4.832250	---	15.88	46.00	30.12	1000.0	9.000	N	ON	19.1
5.509500	16.38	---	60.00	43.62	1000.0	9.000	N	ON	19.1
15.033750	---	29.54	50.00	20.46	1000.0	9.000	N	ON	19.5
15.391500	33.60	---	60.00	26.40	1000.0	9.000	N	ON	19.4

N line

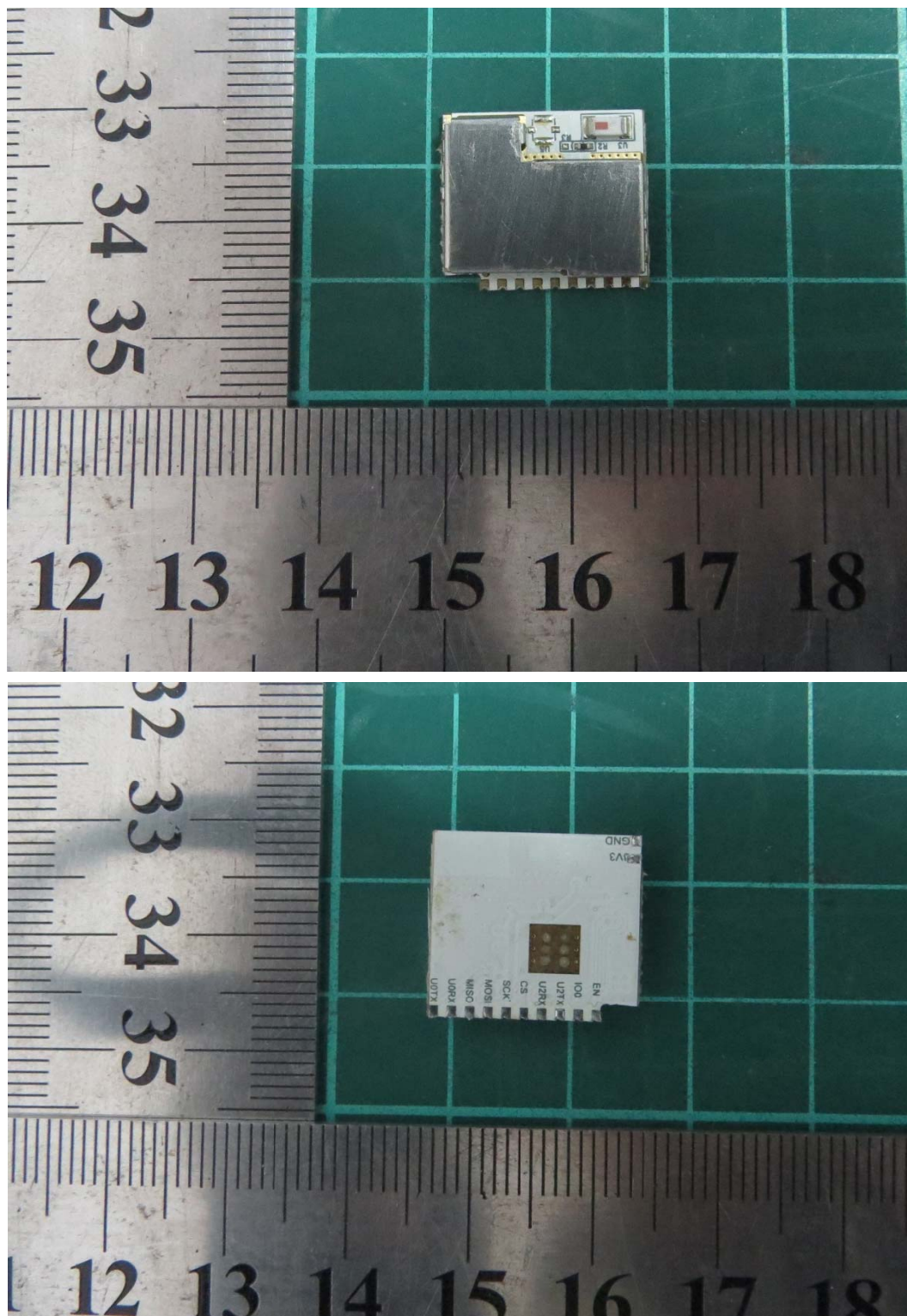
Conducted Emission from 150 KHz to 30 MHz

4 Main Test Instrument

Name	Type	Manufacturer	Serial Number	Last Cal.	Cal. Due Date
EMI Test Receiver	ESCI3	R&S	100948	2016-06-01	2017-05-31
Signal Analyzer	FSV30	R&S	100815	2016-12-16	2017-12-15
Trilog Antenna	VULB 9163	SCHWARZBECK	9163-201	2014-12-06	2017-12-05
Horn Antenna	HF907	R&S	100126	2014-12-06	2017-12-05
Horn Antenna	3160-09	ETS-Lindgren	00102643	2015-01-30	2018-01-29
EMI Test Receiver	ESCS30	R&S	100138	2016-12-16	2017-12-15
LISN	ENV216	R&S	101171	2016-12-16	2019-12-15
Bore Sight Antenna mast	2171B	ETS	00058752	NA	NA

ANNEX A: The EUT Appearance and Test Configuration

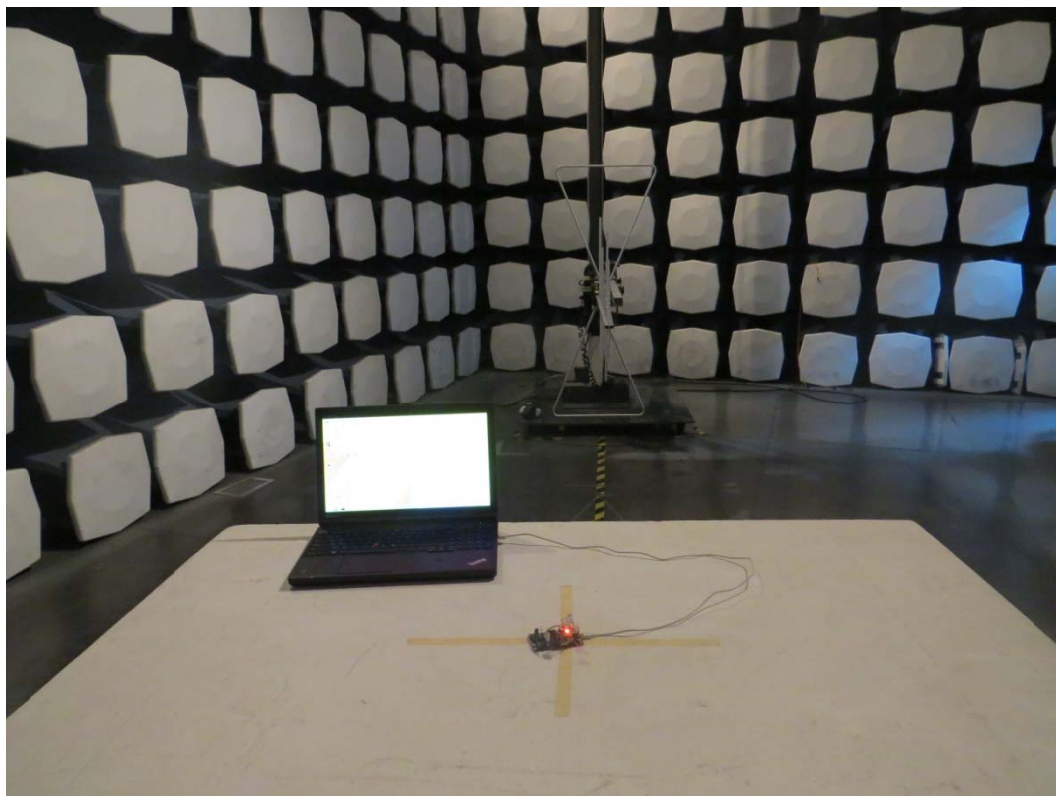
A.1 EUT Appearance



a: EUT

Picture 1 EUT

A.2 Test Setup

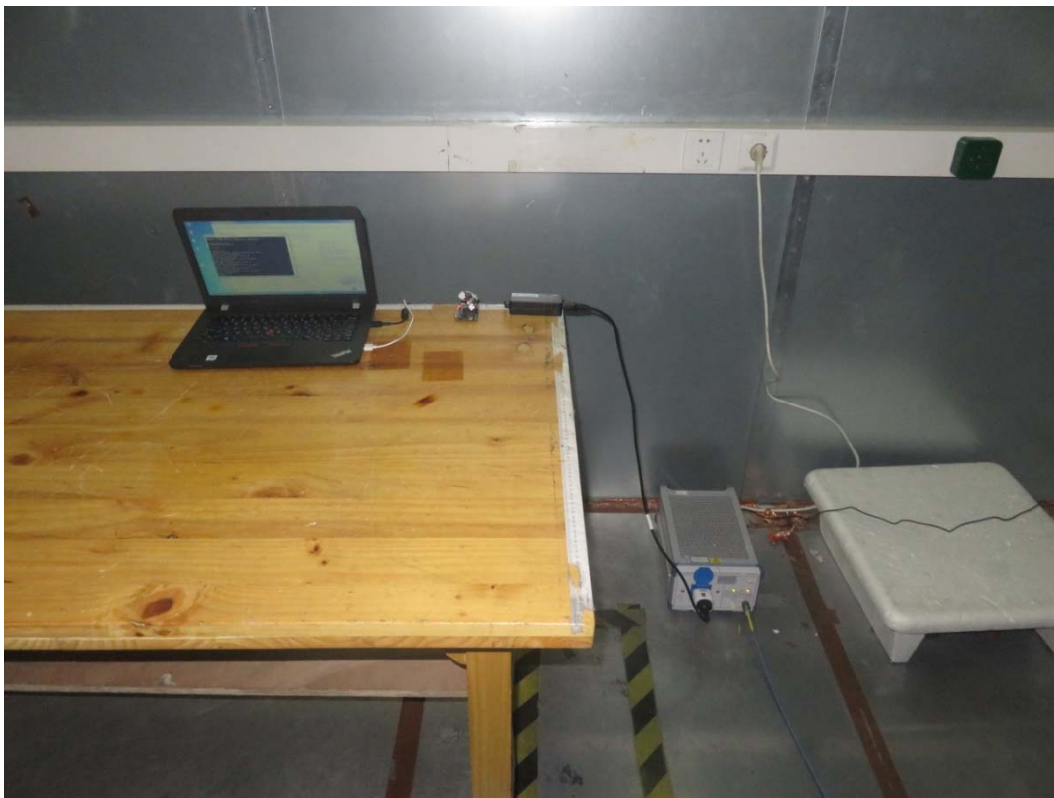


a: Below 1GHz



b: Above 1GHz

Picture 2 Radiated Emission Test Setup



Picture 3 Conducted Emission Test Setup

A.3 Host Product

