EMC TEST REPORT

Applicant	Nokia Shanghai Bell CO., Ltd.
FCC ID	2ADZRG240WE
Product	GPON ONU
Model	G-240W-E
Report No.	Y1804B0029-E1V2
Issue Date	June 11, 2018

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC Code CFR47 Part15B (2017)/ 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

Performed by: Wei Liu/ Manager

Guangchang Fan

Approved by: Guangchang Fan/ Director

TA Technology (Shanghai) Co., Ltd.

No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000

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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: April 4, 2018~ April 18, 2018			

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.

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 (Designation number: CN1179, Test Firm Registration Number: 446626)

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-10766)

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
City:	Shanghai
Post code:	201201
Country:	P. R. China
Contact:	Xu Kai
Telephone:	+86-021-50791141/2/3
Fax:	+86-021-50791141/2/3-8000
Website:	http://www.ta-shanghai.com
E-mail:	xukai@ta-shanghai.com

2 General Description of Equipment under Test

2.1 Client Information

Applicant	Nokia Shanghai Bell CO., Ltd.
Applicant address	388#, Ningqiao Road, China (Shanghai) Pilot Free Trade Zone, Shanghai 201206, China
Manufacturer	Nokia Shanghai Bell CO., Ltd.
Manufacturer address	388#, Ningqiao Road, China (Shanghai) Pilot Free Trade Zone, Shanghai 201206, China

2.2 General information

EUT Description			
Device Type:	Movable Device		
Model Number:	G-240W-E		
IMEI:	/		
HW Version:	Version C		
SW Version:	3FE47344AFIB36		
Antenna Type:	Internal Antenna		
Frequency:		TX:	RX:
	WIFI 2.4G:	2400MHz ~ 2483.5MHz	2400MHz ~ 2483.5MHz
	WIFI 5G(U-NII-1):	5150MHz ~ 5250MHz	5150MHz ~ 5250MHz
	WIFI 5G(U-NII-2A):	5250MHz ~ 5350MHz	5250MHz ~ 5350MHz
	WIFI 5G(U-NII-2C):	5470MHz ~ 5725MHz	5470MHz ~ 5725MHz
Modulation:	WLAN 802.11b: DSSS WLAN 802.11a/g/n/ac: OFDM		
Test Mode:	Transfer Data Mode		
EUT Accessory			
Adapter 1	Manufacturer: Dongguan Shilong Fuhua Electronic Co., Ltd. Model: UES36WA-120300SPAU		
Adapter 2	Manufacturer: RUIDE Model: RD1203000-C55-20MG		
Note: The information of the EUT is declared by the manufacturer.			

EUT Configuration

No.	Name	Model/Code No.	Edition	Serial No. or Quantity
1	G-240W-E	3FE47464AA	PEM 1	PEM 1
2	G-240W-E	3FE47464BA	PEM 1	PEM 1
3	G-240W-E	3FE47464CA	PEM 1	PEM 1
4	Power adapter	UES36WA-120300SPAU	A/0	PEM 1
5	Power adapter	RD1203000-C55-20MG	A/0	PEM 1

	Model	ONU Part number	Kit Part number
US ONU	G-240W-E	3FE47464AA	-
US KIT	G-240W-E	3FE47464AA	3FE47358AA

Auxiliary Equipment

No.	Name	Brand name	Model	ASB code	Valid Until
1	SmartBits 600B	Sprient	DE7853	-	No Cal. Required
2	PC	HP	N.A	-	No Cal. Required
3	PC	DELL	N.A	-	No Cal. Required
4	PC	Thinkpad	N.A	-	No Cal. Required

Description of Ports

No.	Port name	Number	Shielded or unshielded	Cable type (optic, twisted pair, etc.)	Max. Cable length
1	AC port	1	Unshielded	-	-
2	GE	4	Unshielded	-	-
3	Fiber	1	Unshielded	-	-

2.3 Applied Standards

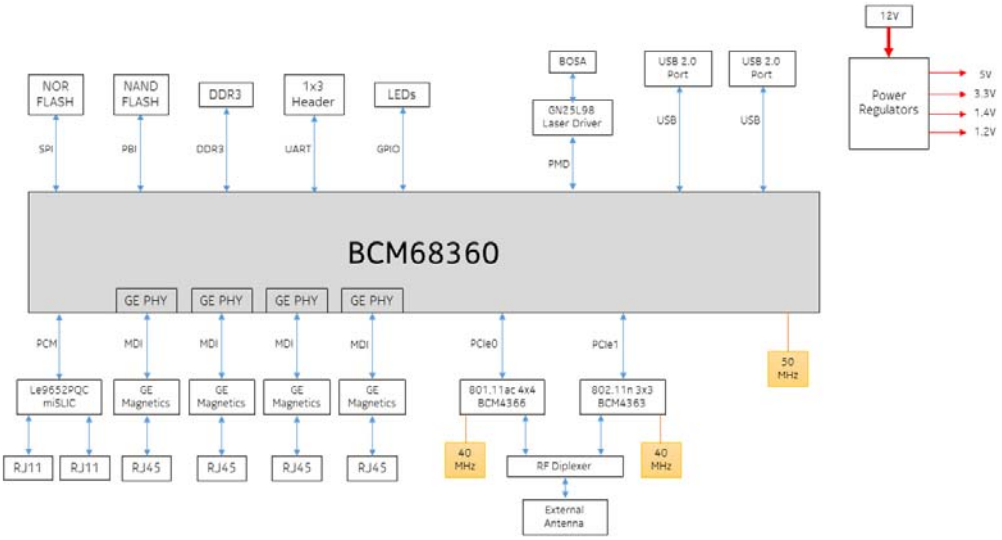
According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards
FCC Code CFR47 Part15B (2017)
ANSI C63.4 (2014)

2.4 Test Configuration

Description: The G-240W-E is a GPON which has 4 GE LAN ports, 2 USB2.0 ports, 2 POTS,3 x 3 2.4G Wi-Fi and 4 x 4 5G Wi-Fi.

The basic functional test in normal room conditions consists of the traffic test and WIFI throughput test. G-240W-E runs 4 traffics on each line with SMB600B, the each upstream of 4 GE is 200 Mbps, and downstream is 800Mbps. Frame loss ratio less than 10e-7. The WIFI keep connecting.



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

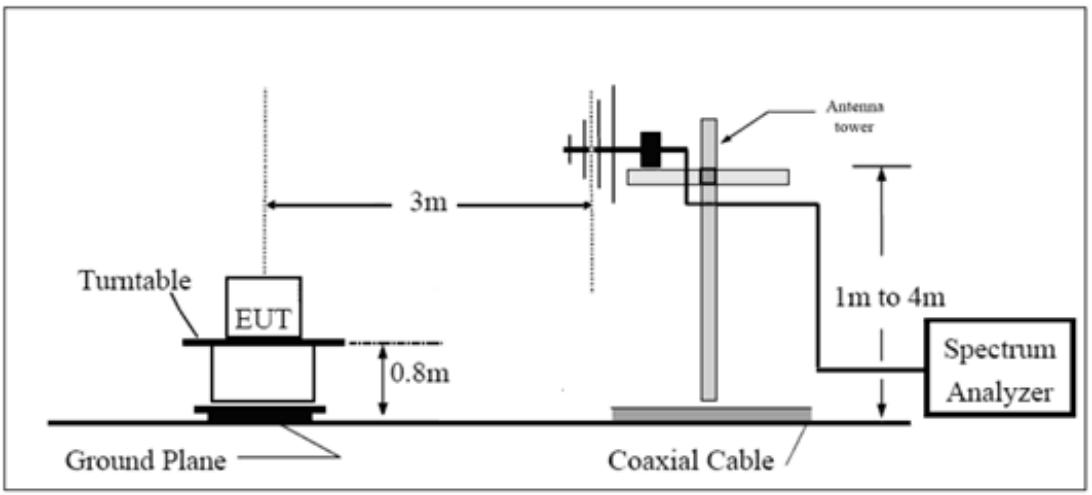
The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The distance between EUT and receive antenna should be 3 meters. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Sweep the whole frequency band 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=1Hz / 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 lie-down position (X axis) and the worst case was recorded.

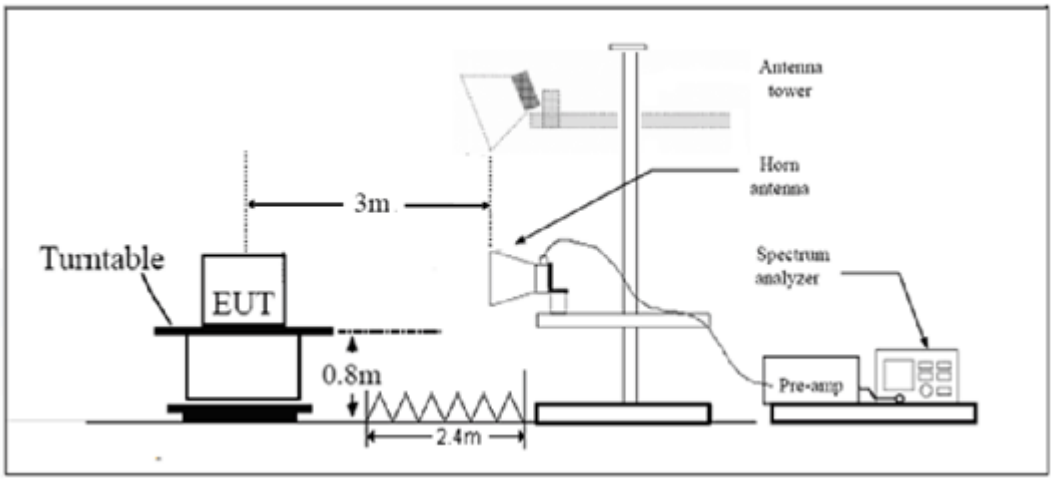
During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC; PC is connected to server via a long LAN cable.

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 (dBμV/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
1000-5th harmonic of the highest frequency or 40GHz,which is lower	54 74	Average Peak

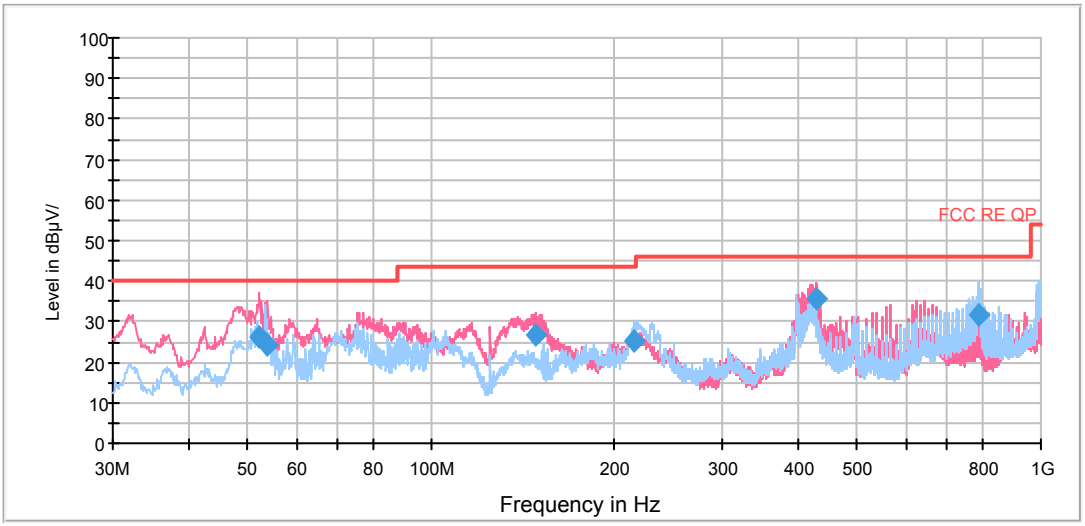
Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor *k* = 1.96. U= 3.704 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

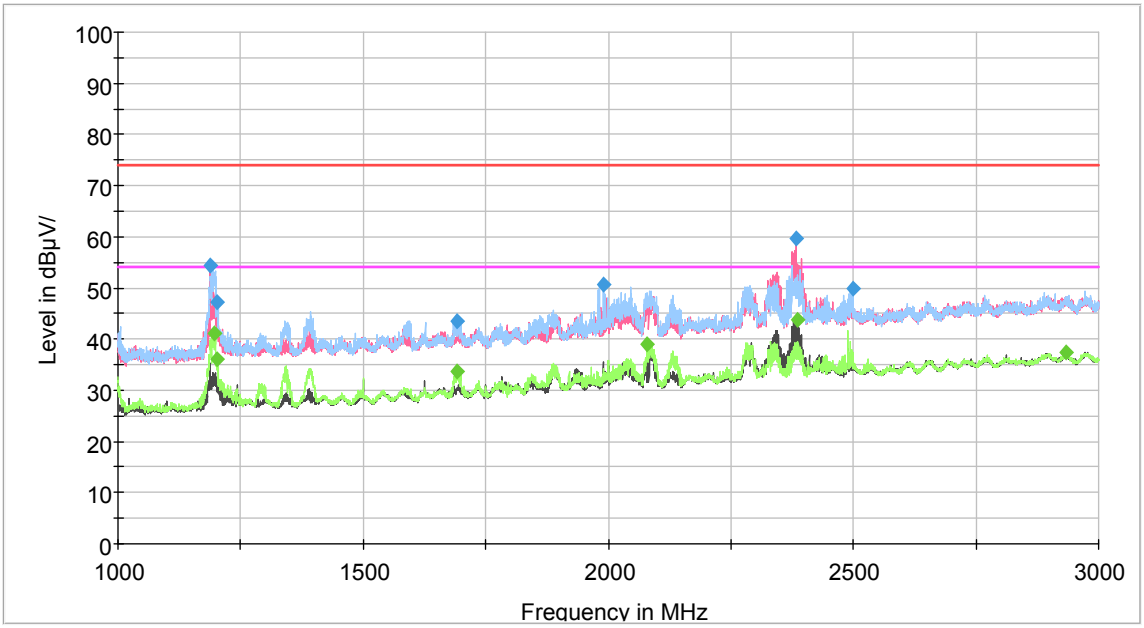
Frequency (MHz)	Quasi-Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
52.188750	26.3	45.3	125.0	V	145.0	-19.0	13.7	40.0
53.886250	24.5	44.3	100.0	V	185.0	-19.8	15.5	40.0
148.461250	26.6	55.0	100.0	V	264.0	-28.4	16.9	43.5
215.270000	25.2	50.9	125.0	H	311.0	-25.7	18.3	43.5
427.942500	35.5	55.7	125.0	V	24.0	-20.2	10.5	46.0
790.358750	31.7	48.3	306.0	H	326.0	-16.6	14.3	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

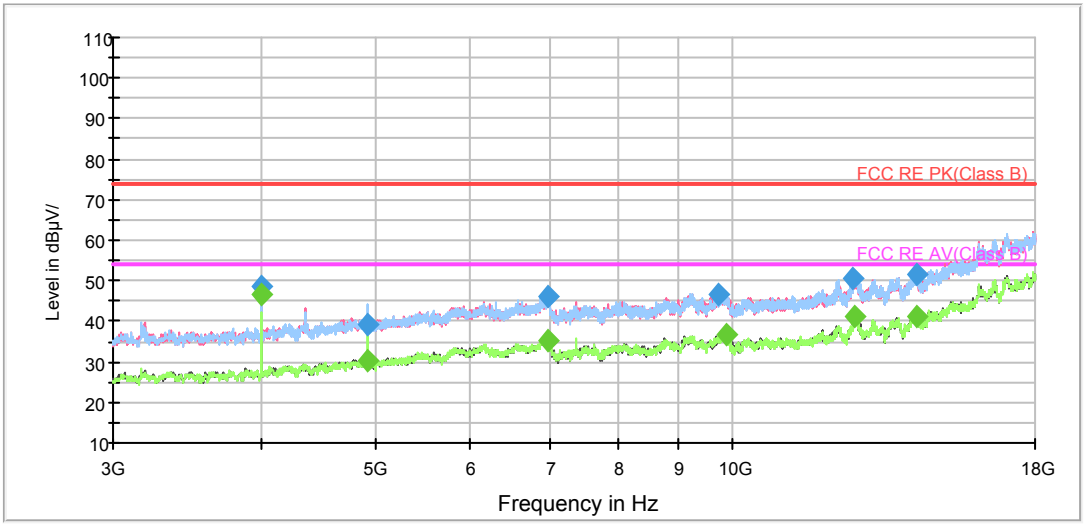


Radiated Emission from 1GHz to 3GHz

Frequency (MHz)	Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1188.500000	54.4	62.6	100.0	H	101.0	-8.2	19.6	74.0
1202.250000	47.1	55.3	100.0	V	145.0	-8.2	26.9	74.0
1690.250000	43.6	48.6	100.0	H	145.0	-5.0	30.4	74.0
1989.500000	50.7	54.1	100.0	H	137.0	-3.4	23.3	74.0
2383.250000	59.6	61.1	100.0	H	281.0	-1.5	14.4	74.0
2500.250000	49.8	50.0	400.0	V	0.0	-0.2	24.2	74.0

Frequency (MHz)	Average (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1195.250000	41.1	49.3	300.0	H	145.0	-8.2	12.9	54.0
1202.250000	36.0	44.2	300.0	V	145.0	-8.2	18.0	54.0
1690.500000	33.7	38.7	100.0	H	145.0	-5.0	20.3	54.0
2080.000000	38.9	41.9	100.0	H	279.0	-3.0	15.1	54.0
2386.250000	43.8	45.2	100.0	H	281.0	-1.4	10.2	54.0
2933.250000	37.5	35.7	400.0	V	41.0	1.8	16.5	54.0

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)
4000.051250	48.8	49.9	200.0	H	225.0	-1.1	25.2	74.0
4922.875000	39.4	37.5	200.0	H	24.0	1.9	34.6	74.0
6986.703750	46.4	40.0	400.0	V	54.0	6.4	27.6	74.0
9735.568750	46.7	36.8	100.0	V	163.0	9.9	27.3	74.0
12641.368750	50.5	36.0	100.0	V	295.0	14.5	23.5	74.0
14328.017500	51.7	35.3	400.0	V	21.0	16.4	22.3	74.0

Frequency (MHz)	Average (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
4000.086250	46.7	47.8	200.0	H	225.0	-1.1	7.3	54.0
4926.536250	30.5	28.6	200.0	H	24.0	1.9	23.5	54.0
6990.140000	35.2	28.7	200.0	H	61.0	6.5	18.8	54.0
9863.451250	36.5	26.1	200.0	H	36.0	10.4	17.5	54.0
12687.566250	41.1	26.9	100.0	H	228.0	14.2	12.9	54.0
14325.856250	41.3	24.9	400.0	H	0.0	16.4	12.7	54.0

3.2 Conducted Emission

Ambient condition

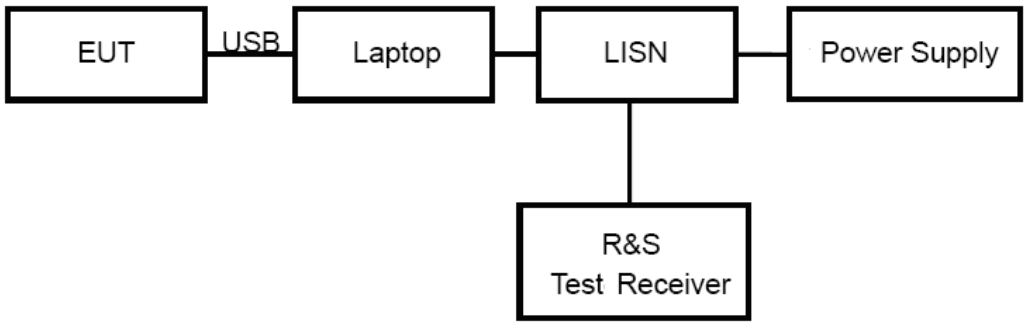
Temperature	Relative humidity	Pressure
24°C ~26°C	50%~55%	102.5kPa

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

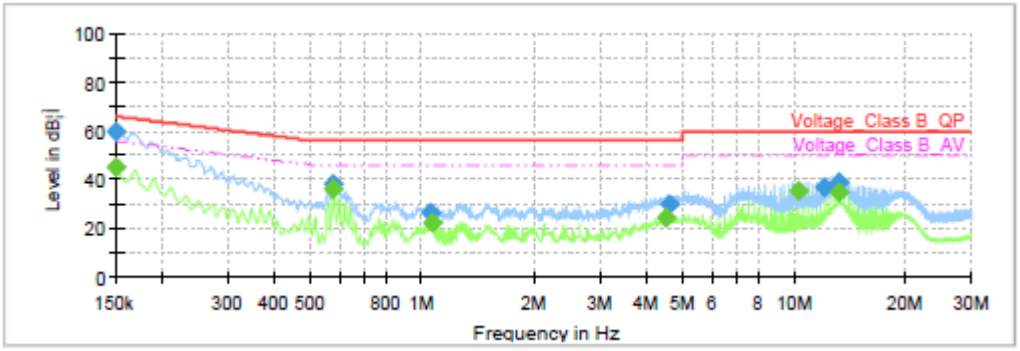
Frequency (MHz)	Conducted Limits(dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46 *
0.5 - 5	56	46
5 - 30	60	50
*: Decreases with the logarithm of the frequency.		

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor *k* = 1.96. U= 2.57 dB.

Test Results

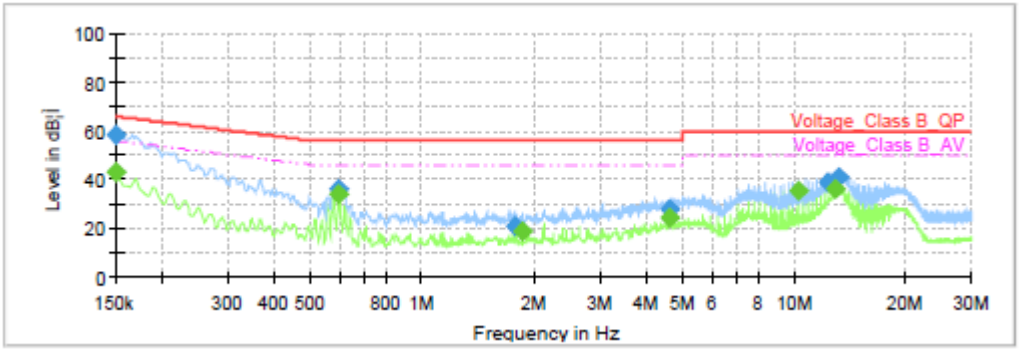
Following plots, Blue trace uses the peak detection; Green trace uses the average detection.



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.150000	---	44.93	56.00	11.07	1000.0	9.000	L1	ON
0.150000	59.39	---	66.00	6.61	1000.0	9.000	L1	ON
0.577500	---	36.03	46.00	9.97	1000.0	9.000	L1	ON
0.577500	38.23	---	56.00	17.77	1000.0	9.000	L1	ON
1.052250	26.45	---	56.00	29.55	1000.0	9.000	L1	ON
1.070250	---	22.10	46.00	23.90	1000.0	9.000	L1	ON
4.515000	---	24.54	46.00	21.46	1000.0	9.000	L1	ON
4.647750	29.65	---	56.00	26.35	1000.0	9.000	L1	ON
10.225500	---	35.62	50.00	14.38	1000.0	9.000	L1	ON
12.086250	36.46	---	60.00	23.54	1000.0	9.000	L1	ON
13.146000	38.83	---	60.00	21.17	1000.0	9.000	L1	ON
13.148250	---	34.73	50.00	15.27	1000.0	9.000	L1	ON

L line

Conducted Emission from 150 KHz to 30 MHz



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.150000	---	43.15	56.00	12.85	1000.0	9.000	N	ON
0.150000	58.60	---	66.00	7.40	1000.0	9.000	N	ON
0.597750	---	34.16	46.00	11.84	1000.0	9.000	N	ON
0.597750	36.03	---	56.00	19.97	1000.0	9.000	N	ON
1.776750	20.96	---	56.00	35.04	1000.0	9.000	N	ON
1.860000	---	18.58	46.00	27.42	1000.0	9.000	N	ON
4.647750	27.72	---	56.00	28.28	1000.0	9.000	N	ON
4.647750	---	24.07	46.00	21.93	1000.0	9.000	N	ON
10.225500	---	35.64	50.00	14.36	1000.0	9.000	N	ON
12.351750	38.97	---	60.00	21.03	1000.0	9.000	N	ON
12.882750	---	36.44	50.00	13.56	1000.0	9.000	N	ON
13.143750	40.97	---	60.00	19.03	1000.0	9.000	N	ON

N line

Conducted Emission from 150 KHz to 30 MHz

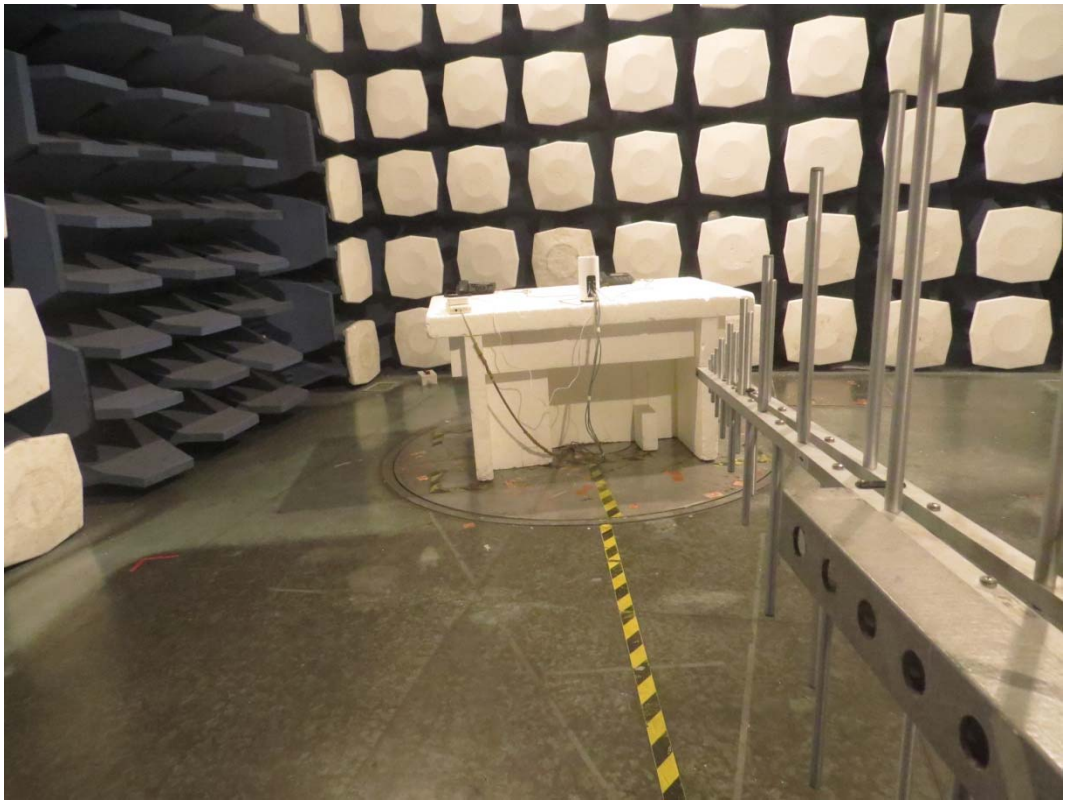
4 Main Test Instrument

Name	Manufacturer	Type	Serial Number	Last Cal.	Cal. Due Date
Signal Analyzer	R&S	FSV30	100815	2017-12-17	2018-12-16
EMI Test Receiver	R&S	ESCI	100948	2017-05-20	2018-05-19
Loop Antenna	SCHWARZBECK	FMZB1519	1519-047	2017-02-18	2019-02-17
Trilog Antenna	SCHWARZBECK	VULB 9163	9163-201	2017-11-18	2020-11-17
Horn Antenna	R&S	HF907	100126	2014-12-06	2019-12-05
Horn Antenna	ETS-Lindgren	3160-09	00102643	2015-01-30	2020-01-29
EMI Test Receiver	R&S	ESR	101667	2017-09-06	2018-09-05
LISN	R&S	ENV216	101171	2016-12-16	2019-12-15
Bore Sight Antenna mast	ETS	2171B	00058752	NA	NA
Test software	EMC32	R&S	V9.26.0	NA	NA

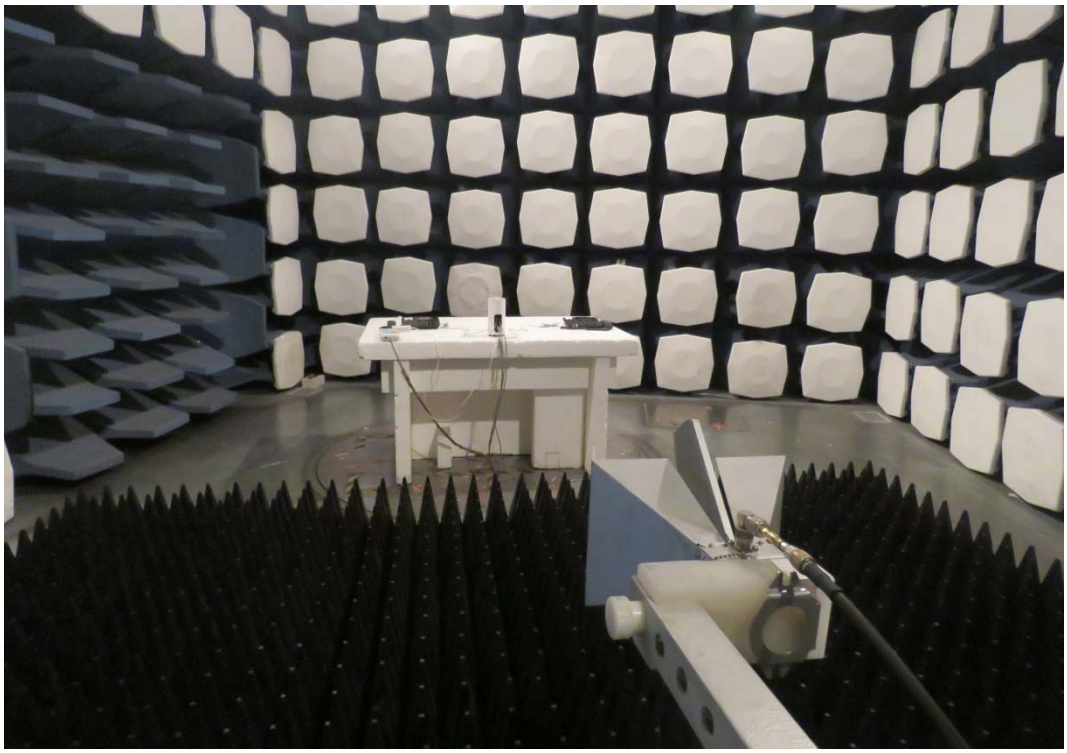
*******END OF REPORT *******

ANNEX A： Test Configuration

A.1 Test Setup

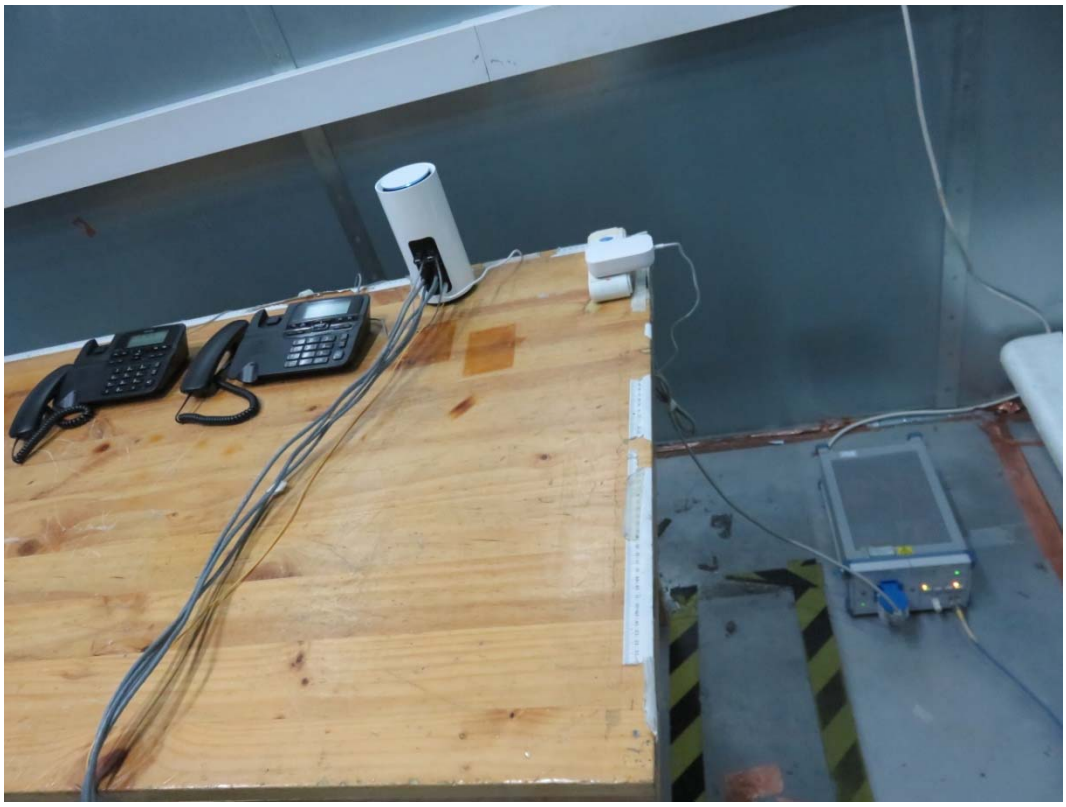


a: Below 1GHz



b: Above 1GHz

Picture 1 Radiated Emission Test Setup



Picture 2 Conducted Emission Test Setup