



EMC TEST REPORT

Applicant Gosuncn Technology Group Co.,Ltd.
FCC ID 2APNR-GW631Q
Product LTE CPE
Model WF831, WF831+, WF831A, GW631
Report No. R1805A0254-E1V1
Issue Date June 6, 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

Guangchang Fan

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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
Date of Testing: November 15, 2017 ~ November 24, 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 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 (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
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E-mail: xukai@ta-shanghai.com

2 General Description of Equipment under Test

2.1 Client Information

Applicant	Gosuncn Technology Group Co.,Ltd.
Applicant address	6F, 2819 KaiChuang Blvd., Science Town, Huangpu District, Guangzhou City, Guangdong, China
Manufacturer	Gosuncn Technology Group Co.,Ltd.
Manufacturer address	6F, 2819 KaiChuang Blvd., Science Town, Huangpu District, Guangzhou City, Guangdong, China

2.2 General information

EUT Description	
Device Type:	Portable Device
Product Name:	LTE CPE
Model Number:	WF831, WF831+, WF831A, GW631
HW Version:	V1.0
SW Version:	ENTEL_PER_WF831_V1.0.0B02
Antenna Type:	External Antenna
Test Mode:	Transfer Data Mode
EUT Accessory	
Adapter	Manufacturer:AQUILSTAR PRECISION INDUSTRIAL(SHENZHEN)CO., LTD Model: ASSA65A-120100
Network cable	Manufacturer: SHANGHAI JINGTU ELECTRONICS LTD. Model: UTP CAT5E
Auxiliary test equipment	
PC	PC Manufacturer: lenovo Model: Thinkpad T540p (SN : SL10E37685)
Note: The information of the EUT is declared by the manufacturer.	

Item	WF831	WF831+	WF831A	GW631
Protocol Stack	The same	The same	The same	The same
MMS/STK	The same	The same	The same	The same
JAVA	The same	The same	The same	The same
Web User Interface page	The same	changes	changes	changes
HARDWARE	The same	The same	The same	The same
MECHANICAL	The same	The same	The same	The same
ACCESSORY	The same	The same	The same	The same
Note: Customer declaration, four models are the same, except for the logo and default parameters in the Web User Interface page, which will not affect the RF characteristic according to Part 2.1043 requirement. This report tested WF831.				



2.3 Applied Standards

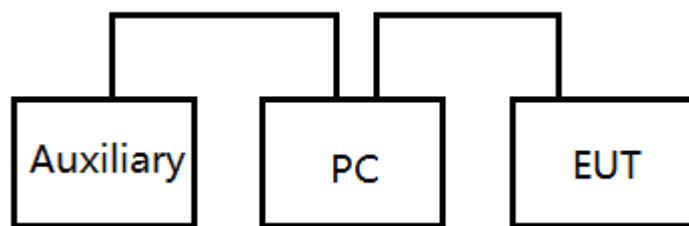
According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards

FCC Code CFR47 Part15B (2017)

ANSI C63.4 (2014)

2.4 Test Configuration



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

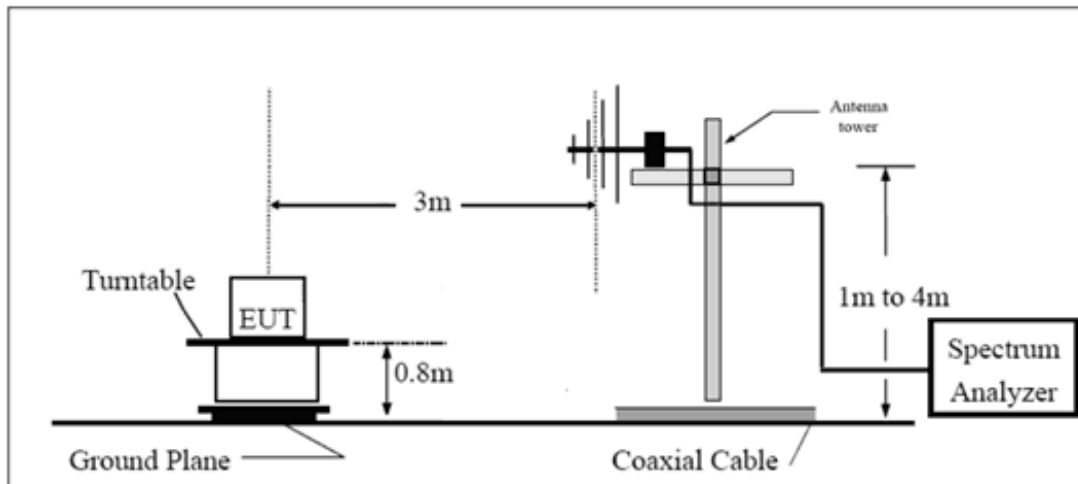
(b) AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO

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.

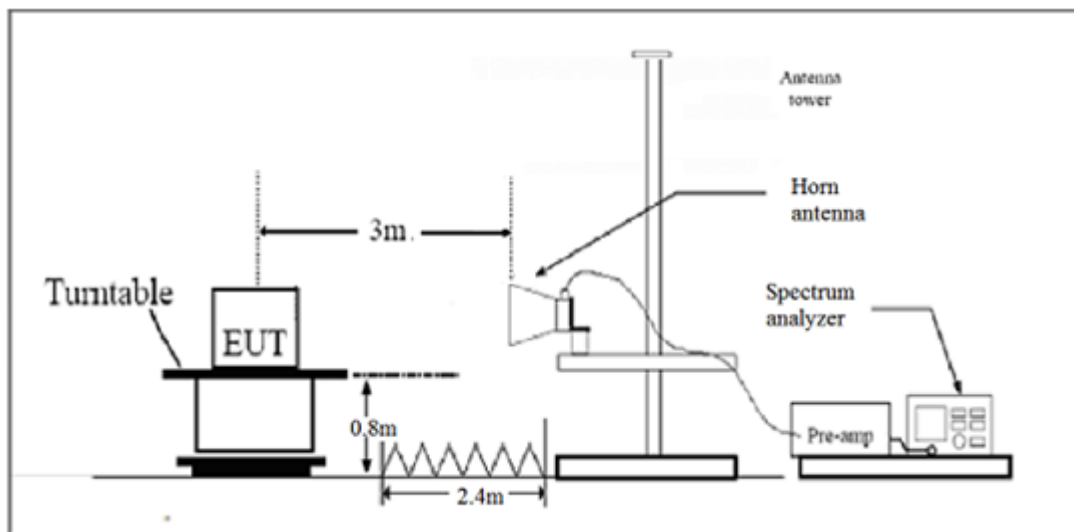
During the test, EUT is connected to a laptop via a Ethernet cable in the case of Transfer Data . The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC.

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

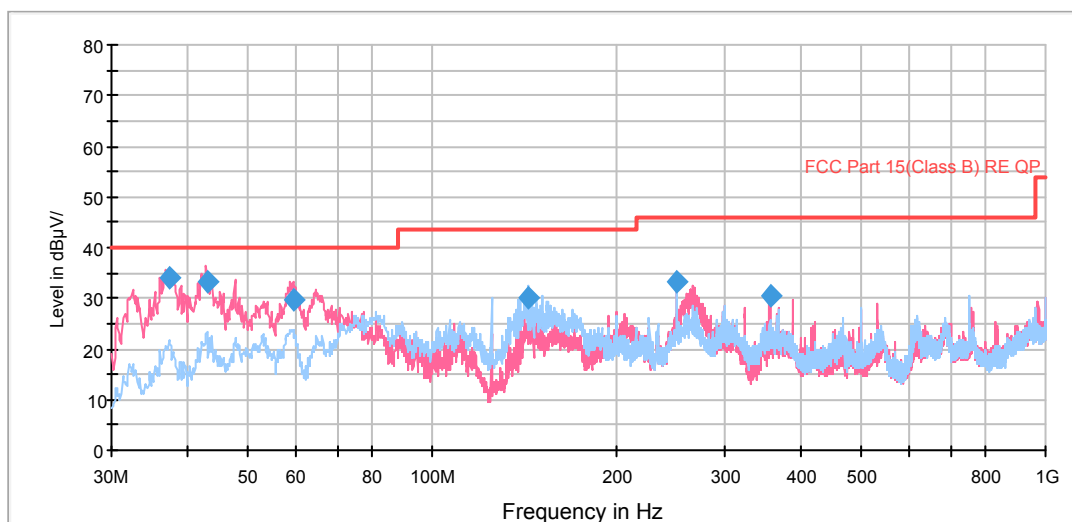
Measurement Uncertainty

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 0.03-1GHz QP Class B

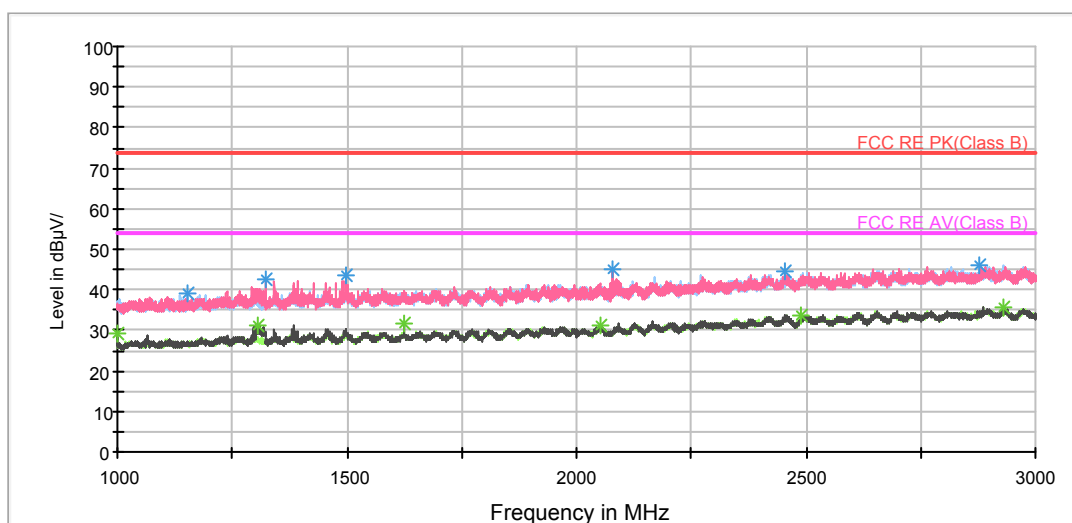


Radiated Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
37.335000	34.1	52.5	100.0	V	249.0	-18.4	5.9	40.0
42.912500	33.1	50.8	100.0	V	232.0	-17.7	6.9	40.0
59.282500	29.6	51.1	100.0	V	126.0	-21.5	10.4	40.0
143.267500	30.0	58.1	125.0	H	323.0	-28.1	13.5	43.5
250.007500	33.3	58.3	125.0	V	293.0	-25.0	12.7	46.0
355.373750	30.5	50.1	100.0	V	272.0	-19.6	15.5	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

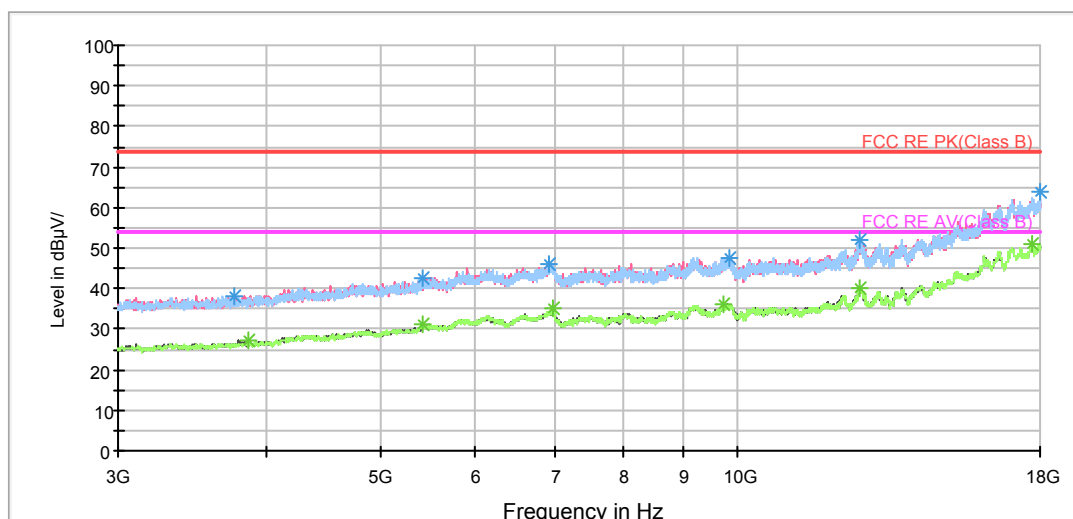


Radiated Emission from 1GHz to 3GHz

Frequency (MHz)	Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1151.500000	38.9	48.0	100.0	H	0.0	-9.1	35.1	74
1321.750000	42.4	50.7	150.0	V	249.0	-8.3	31.6	74
1498.250000	43.5	51.4	150.0	V	148.0	-7.9	30.5	74
2079.500000	45.2	50.4	200.0	V	271.0	-5.2	28.8	74
2453.500000	44.6	47.4	150.0	V	103.0	-2.8	29.4	74
2878.250000	45.8	46.5	100.0	H	0.0	-0.7	28.2	74

Frequency (MHz)	Average (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1000.000000	29.0	38.6	100.0	H	146.0	-9.6	25.0	54
1305.250000	31.3	40.0	150.0	V	249.0	-8.7	22.7	54
1625.500000	31.9	38.1	150.0	V	0.0	-6.2	22.1	54
2050.250000	30.9	36.3	200.0	H	157.0	-5.4	23.1	54
2490.000000	33.8	35.7	150.0	V	181.0	-1.9	20.2	54
2931.750000	35.6	37.0	100.0	H	302.0	-1.4	18.4	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)
3755.625000	38.3	39.9	100.0	H	51.0	-1.6	35.7	74
5426.250000	42.6	39.8	200.0	V	330.0	2.8	31.4	74
6937.500000	45.9	39.8	200.0	V	330.0	6.1	28.1	74
9851.250000	47.8	37.5	100.0	H	5.0	10.3	26.2	74
12673.125000	51.8	37.7	150.0	H	126.0	14.1	22.2	74
17998.125000	64.0	38.6	150.0	H	51.0	25.4	10.0	74

Frequency (MHz)	Average (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
3866.250000	27.0	28.5	100.0	V	31.0	-1.5	27.0	54
5422.500000	31.2	28.5	200.0	V	284.0	2.7	22.8	54
6995.625000	34.9	28.4	200.0	V	0.0	6.5	19.1	54
9740.625000	36.1	26.1	100.0	H	0.0	10.0	17.9	54
12691.875000	40.1	25.9	150.0	V	284.0	14.2	13.9	54
17707.500000	51.1	26.4	150.0	V	208.0	24.7	2.9	54

3.2 Conducted Emission

Ambient condition

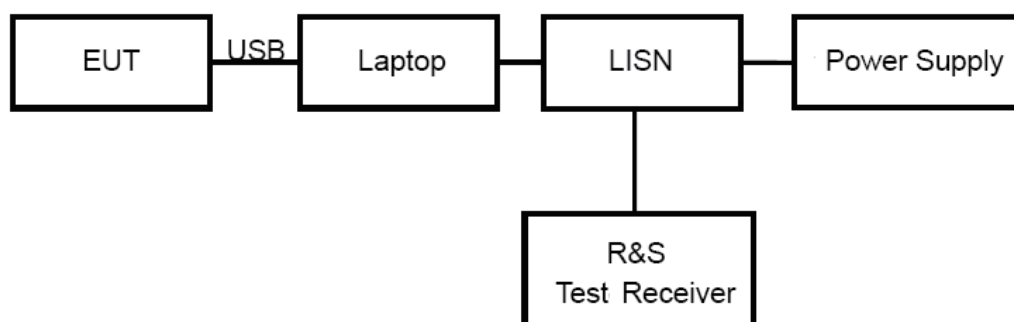
Temperature	Relative humidity	Pressure
24°C ~26°C	50%~55%	102.5kPa

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 Ethernet 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;

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

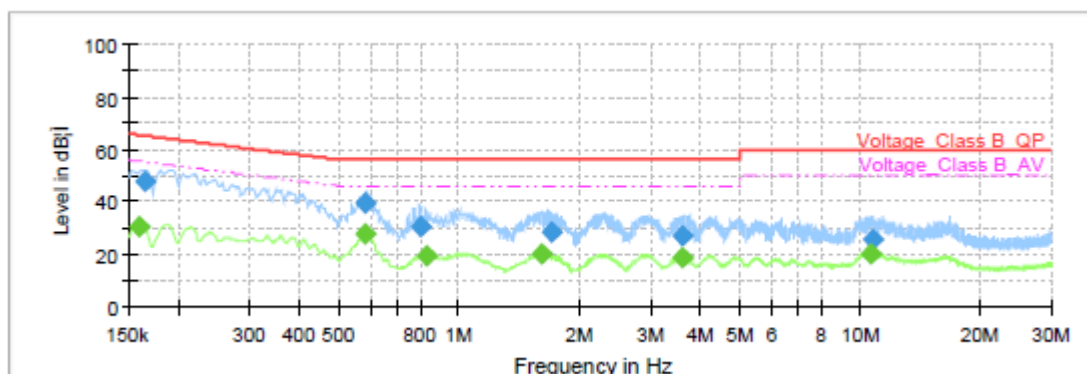
*: Decreases with the logarithm of the frequency.

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

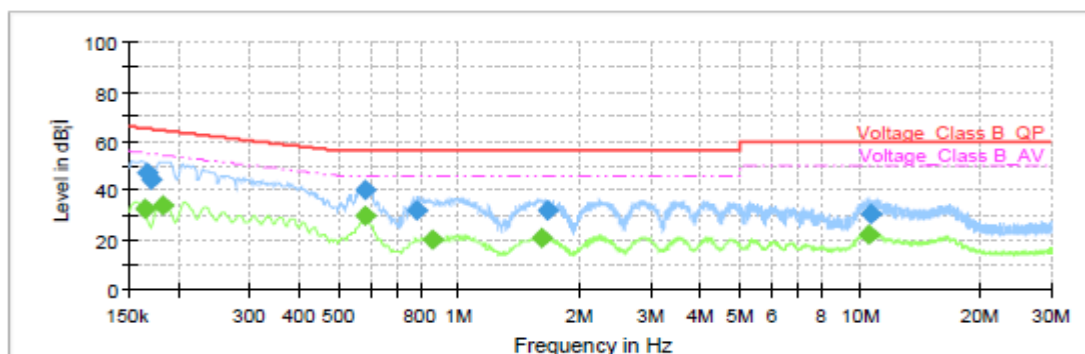
Following plots, Blue trace uses the peak detection; Green trace uses the average detection.



Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.159000	---	30.42	55.52	25.09	1000.0	9.000	L1	ON	19.6
0.163500	47.91	---	65.28	17.38	1000.0	9.000	L1	ON	19.6
0.579750	---	27.98	46.00	18.02	1000.0	9.000	L1	ON	19.6
0.579750	39.52	---	56.00	16.48	1000.0	9.000	L1	ON	19.6
0.798000	30.73	---	56.00	25.27	1000.0	9.000	L1	ON	19.6
0.825000	---	19.42	46.00	26.58	1000.0	9.000	L1	ON	19.6
1.608000	---	20.00	46.00	26.00	1000.0	9.000	L1	ON	19.6
1.691250	28.55	---	56.00	27.45	1000.0	9.000	L1	ON	19.6
3.597000	27.16	---	56.00	28.84	1000.0	9.000	L1	ON	19.6
3.601500	---	18.82	46.00	27.18	1000.0	9.000	L1	ON	19.6
10.677750	---	20.04	50.00	29.96	1000.0	9.000	L1	ON	19.9
10.754250	26.04	---	60.00	33.96	1000.0	9.000	L1	ON	19.9

L line

Conducted Emission from 150 KHz to 30 MHz



Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.163500	---	32.73	55.28	22.55	1000.0	9.000	N	ON	19.7
0.165750	47.52	---	65.17	17.65	1000.0	9.000	N	ON	19.7
0.170250	44.16	---	64.95	20.79	1000.0	9.000	N	ON	19.7
0.181500	---	34.01	54.42	20.41	1000.0	9.000	N	ON	19.7
0.579750	---	29.54	46.00	16.46	1000.0	9.000	N	ON	19.6
0.584250	40.17	---	56.00	15.83	1000.0	9.000	N	ON	19.6
0.784500	31.71	---	56.00	24.29	1000.0	9.000	N	ON	19.6
0.856500	---	20.41	46.00	25.59	1000.0	9.000	N	ON	19.6
1.599000	---	20.71	46.00	25.29	1000.0	9.000	N	ON	19.6
1.657500	31.85	---	56.00	24.15	1000.0	9.000	N	ON	19.6
10.518000	---	22.43	50.00	27.57	1000.0	9.000	N	ON	19.9
10.599000	30.36	---	60.00	29.64	1000.0	9.000	N	ON	19.9

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	2016-12-16	2017-12-15
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	2014-12-06	2017-12-05
Horn Antenna	R&S	HF907	100126	2014-12-06	2017-12-05
Horn Antenna	ETS-Lindgren	3160-09	00102643	2015-01-30	2018-01-29
EMI Test Receiver	R&S	ESCS30	100138	2016-12-16	2017-12-15
LISN	R&S	ENV216	101171	2016-12-16	2019-12-15
Bore Sight Antenna mast	ETS	2171B	00058752	NA	NA
Software (CE)	ROHDE&SCHWARZ	EMC32	9.26.0	/	/
Software (RE)	ROHDE&SCHWARZ	EMC32	8.52.0	/	/

ANNEX A: The EUT Appearance and Test Configuration

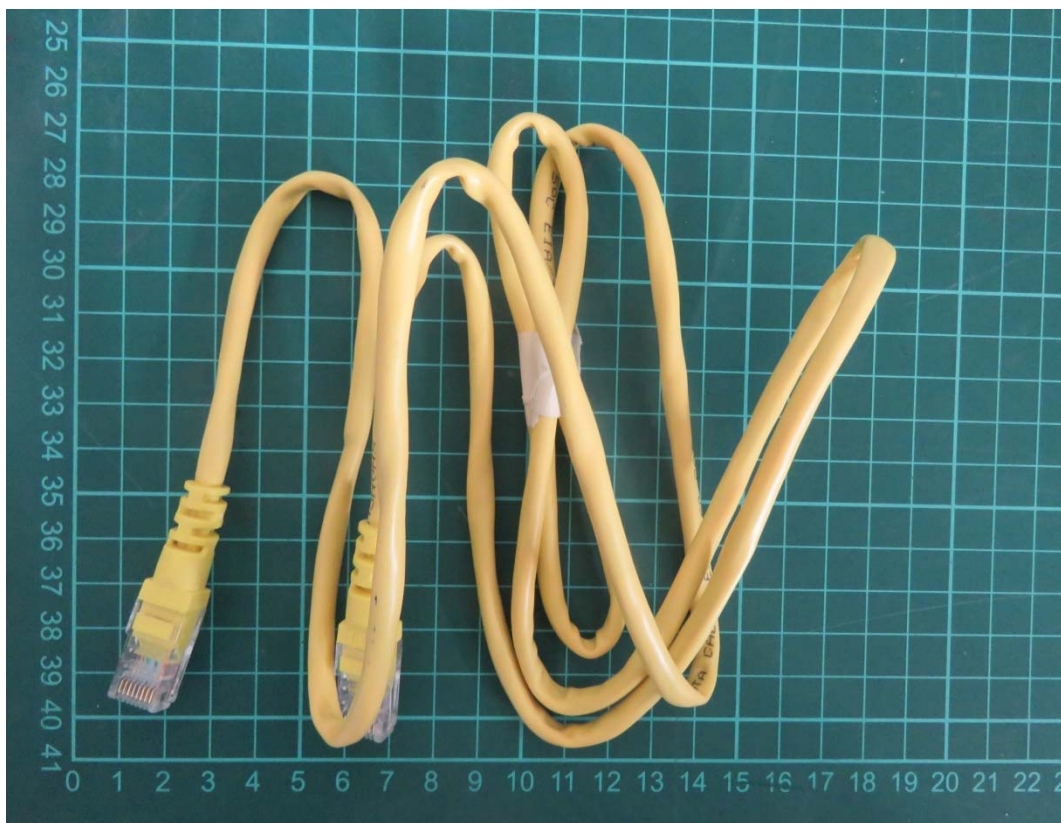
A.1 EUT Appearance



a: EUT



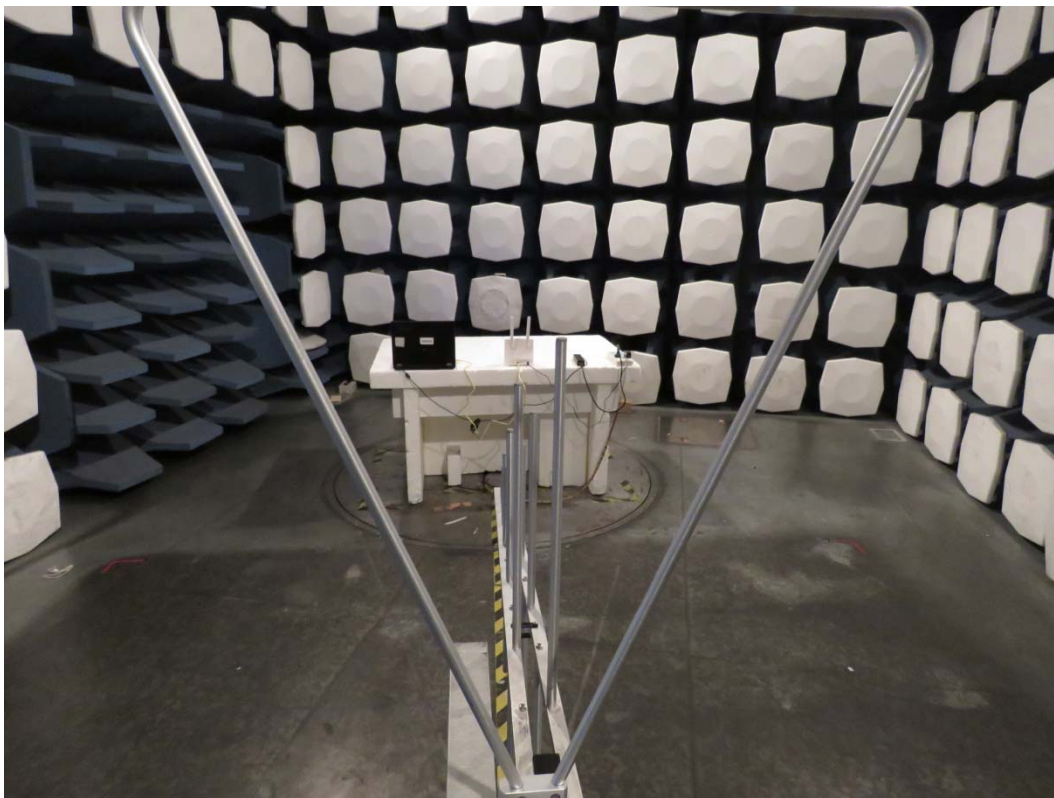
b: Adapter



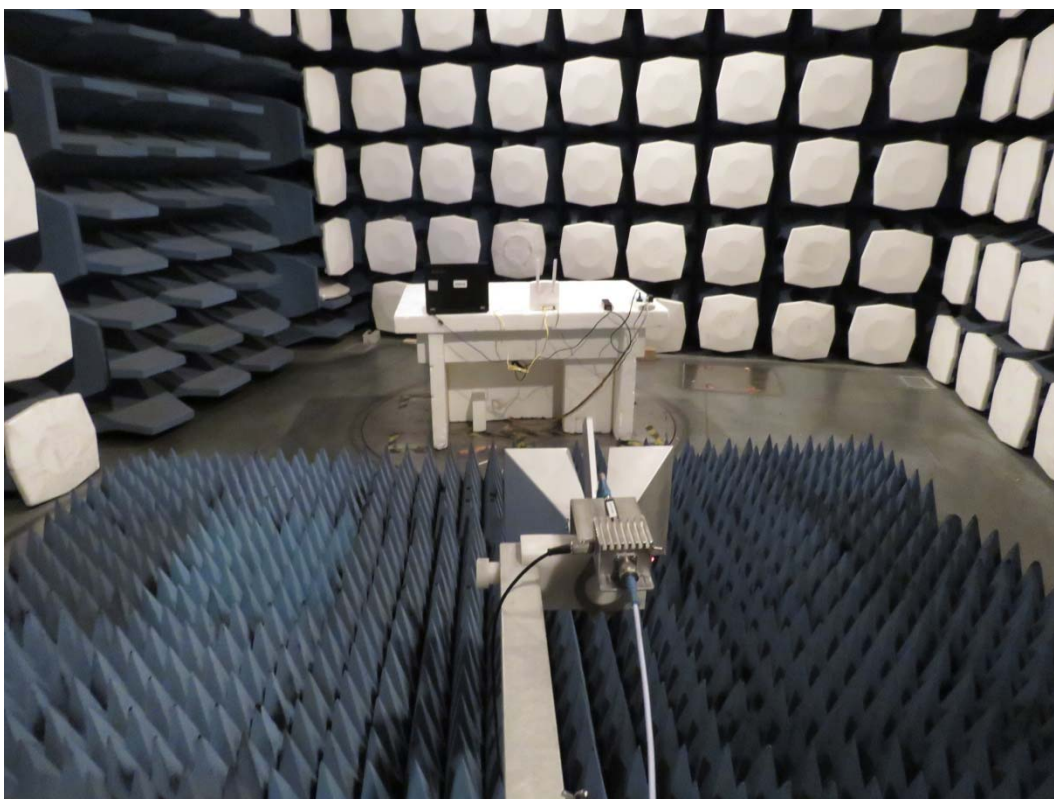
c: Network cable

Picture 1 EUT and Accessory

A.2 Test Setup



a: Below 1GHz



b: Above 1GHz

Picture 2 Radiated Emission Test Setup



Picture 3 Conducted Emission Test Setup

A.3 Auxiliary test equipment

