FCC EMC TEST REPORT

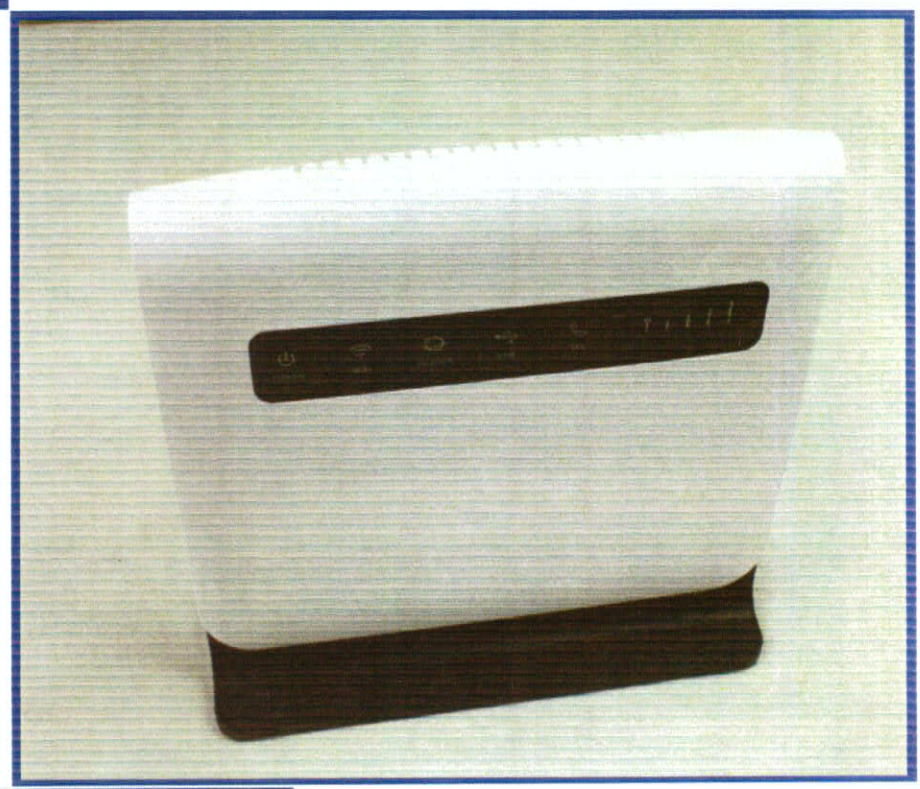
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

4G LTE Cat.4 CPE

ISSUED TO
Observa Telecom

c/ Monte Esquinza, 28 1 Drcha Madrid P.C.28010 SPAIN



Tested by: Zhang Yanqing
Zhang Yanqing
(Engineer)
Date Jan. 18, 2016

Approved by:
Wei Yanquan
(Chief Engineer)
Date Jan. 18, 2016

Report No.:	BL-SZ15B0251-401
EUT Type:	4G LTE Cat.4 CPE
Model Name:	RT880
Brand Name:	Observa Mobile
Test Standard:	47 CFR Part 15 Subpart B
FCC ID:	2AFTXRT880
Test conclusion:	Pass
Test Date:	Nov. 30, 2015 ~ Dec. 7, 2015
Date of Issue:	Jan. 18, 2016

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Revision History

Version	Issue Date	Revisions
Rev. 01	Jan. 18, 2016	Initial Issue

TABLE OF CONTENTS

1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625. The laboratory has met the requirements of the IAS Accreditation Criteria for Testing Laboratories (AC89), has demonstrated compliance with ISO/IEC Standard 17025:2005. The accreditation certificate number is TL-588. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Laboratory Condition

Ambient Temperature	20°C~25°C
Ambient Relative Humidity	45% - 55%
Ambient Pressure	100 kPa - 102 kPa

1.4 Announce

(1) The test report reference to the report template version v1.2.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) The results documented in this report apply only to the tested sample, under the conditions and modes of

operation as described herein.

(5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Observa Telecom
Address	c/ Monte Esquinza, 28 1 Drcha Madrid P.C.28010 SPAIN

2.2 Manufacturer Information

Manufacturer	Observa Telecom
Address	c/ Monte Esquinza, 28 1 Drcha Madrid P.C.28010 SPAIN

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Type	4G LTE Cat.4 CPE
Mode Name Under Test	RT880
Hardware Version	v1.0
Software Version	N/A
Network and Wireless connectivity	2G Network GSM/GPRS/EDGE 850/900/1800/1900 MHz 3G Network WCDMA/HSDPA/HSUPA/HSPA+ Band1/2/5/8 4G Network FDD-LTE Band 2/7/28 WIFI

2.5 Ancillary Equipment

Ancillary Equipment 1	Adapter	
	Brand Name	MINGXIN
	Model No.	MX18W1-0503000V
	Rated Input	100-240 V~, 0.5 A, 50/60 Hz
	Rated Output	5 V⎓, 3 A
Ancillary Equipment 2	RJ11 Cable	
	Length (Approx.)	1.50 m
Ancillary Equipment 3	RJ45 Cable	
	Length (Approx.)	1.84 m

2.6 Technical Information

N/A

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	FCC 47 CFR Part 15 Subpart B (10-1-14 Edition)	Unintentional Radiators
2	ANSI C63.4-2014	American National Standard for 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

3.2 Verdict

No.	Description	FCC Rule	Test Verdict	Result
1	Radiated Emission	15.109	Pass	Annex A .1
2	Conducted Emission	15.107	Pass	Annex A .2

3.3 Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Conducted emissions (9 kHz-30 MHz)	2.79 dB
Radiated emissions (30 MHz-1 GHz)	3.45 dB
Radiated emissions (1 GHz-18 GHz)	3.67 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

Environment Parameter	Selected Values During Tests			
	Temperature	Voltage	Relative Humidity	Ambient Pressure
Normal Temperature, Normal Voltage (NTNV)	23°C~26°C	AC 110 V/60 Hz	50%-55%	100 to 102 kPa

4.2 Test Equipment List

Radiated Emission Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2015.07.14	2016.07.13	☒
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2015.07.22	2017.07.21	☒
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2015.07.22	2017.07.21	☒
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2015.07.22	2017.07.21	☒
Test Antenna-Horn(15-26.5 GHz)	SCHWARZBECK	BBHA 9170	9170-305	2015.07.22	2017.07.21	☐
Anechoic Chamber	RAINFORD	9 m*6 m*6 m	N/A	2015.02.28	2016.02.27	☒

Conducted disturbance Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2015.07.14	2016.07.13	☒
LISN	SCHWARZBECK	NSLK 8127	8127-687	2015.07.14	2016.07.13	☒
AMN	SCHWARZBECK	NNBM8124	8124-509	2015.07.14	2016.07.13	☐
AMN	SCHWARZBECK	NNBM8124	8124-510	2015.07.14	2016.07.13	☐
ISN	TESEQ	ISN T800	34449	2015.07.14	2016.07.13	☐
Shielded Enclosure	ChangNing	CN-130701	130703	N/A	N/A	☒

4.3 Test Enclosure list

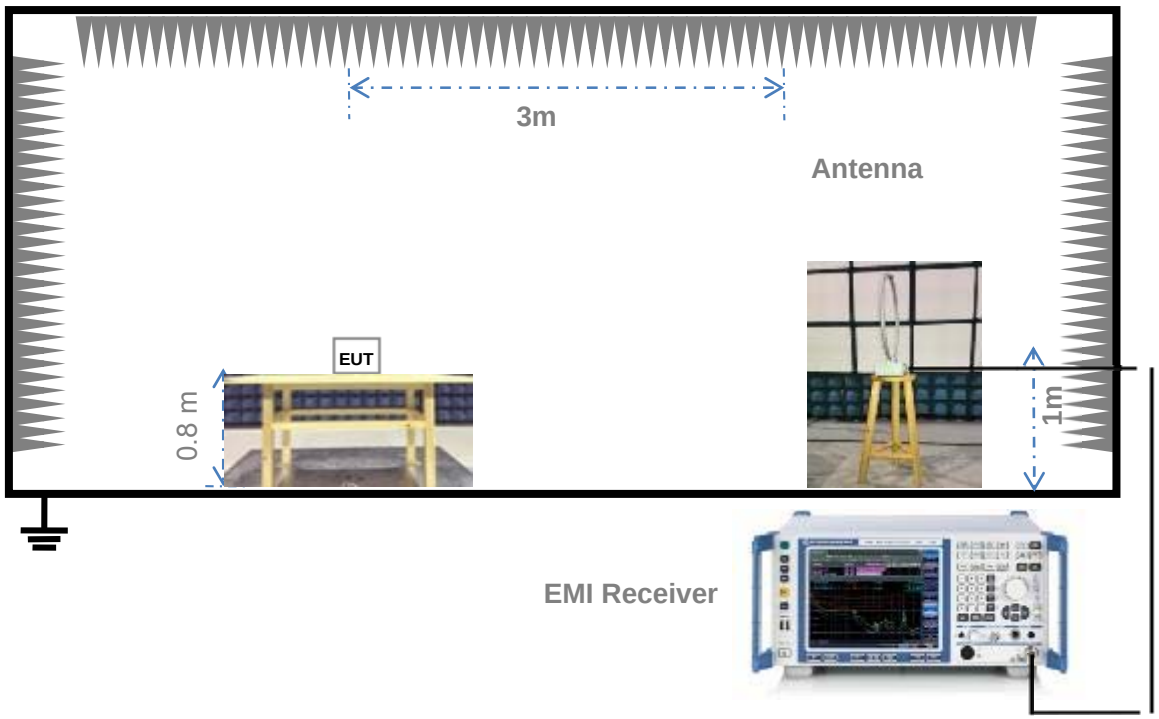
Description	Manufacturer	Model	Serial No.	Length	Description	Use
PC	N/A	N/A	N/A	N/A	Special Handled	☐
Printer	HP	DESKJET 1000	N/A	N/A	N/A	☐
Keyboard	Logitech	Y-BP62a	N/A	N/A	N/A	☐
Mouse	Logitech	M100	N/A	N/A	N/A	☐
USB disk	Kingston	N/A	N/A	N/A	N/A	☒
TF Card	Kingston	N/A	N/A	N/A	N/A	☐
VGA Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
HDMI Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
DVI Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
Coaxial video cable	N/A	N/A	N/A	2.0 m	Shielded with core	☐
iPhone	APPLE	A1387	N/A	N/A	N/A	☐
Laptop	LENOVO	K29	N/A	N/A	N/A	☒
USB Cable	N/A	N/A	N/A	1.0 m	Shielded with core	☐
Artificial load	N/A	N/A	N/A	N/A	2.5 Ω/20 W	☐
Electronic Load	ITECH	IT8511	N/A	N/A	N/A	☐

4.4 Test Configurations

Test Configurations (TC) No.	Description
TC01	The Normal Working Test Mode The EUT configuration of the emission tests is EUT + Laptop + RJ11 Cable + RJ45 Cable + Adapter + USB disk. During the measurement, the EUT was powered by the Adapter. The EUT with a USB disk embedded was connect to public network via RJ45 cable, a communication link is established between the EUT and the laptop. The laptop can access the USB disk via FTP agreement. The EUT was connect to telephone via RJ11 cable, the EUT is working normally.
TC02	The Idle Test Mode The EUT configuration of the emission tests is EUT + Adapter. During the measurement of idle mode, the EUT was powered by the Adapter only.

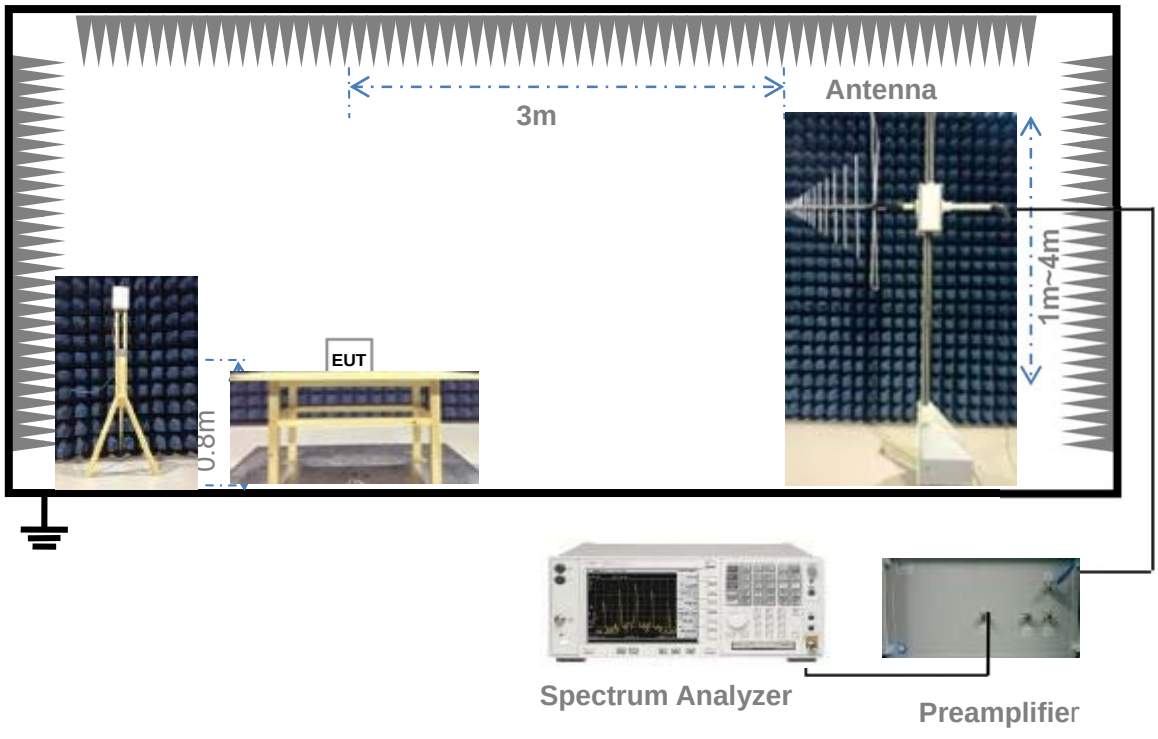
4.5 Test Setups

Test Setup 1



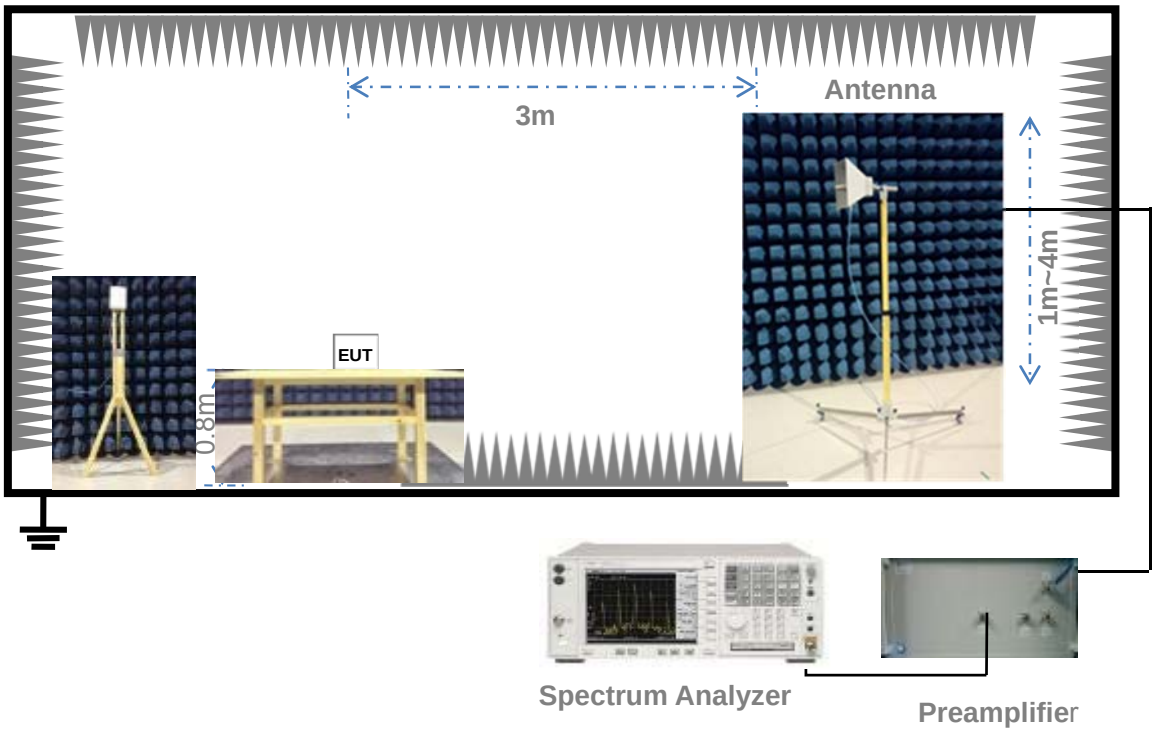
For Radiated Emission Test (Below 30 MHz))

Test Setup 2



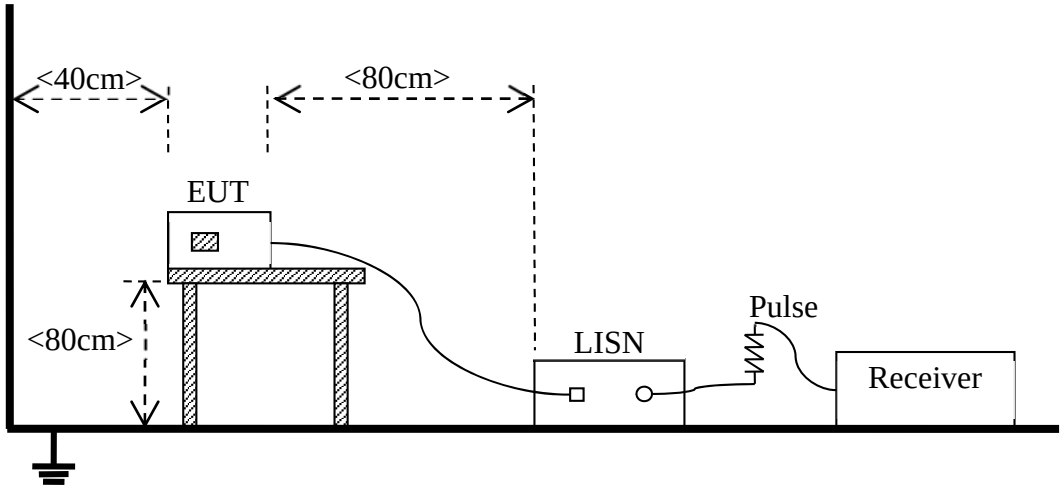
(For Radiated Emission Test (30 MHz-1 GHz))

Test Setup 3



(For Radiated Emission Test (above 1 GHz))

Test Setup 4



(For Conducted Emission, AC Ports Test)

4.6 Test Conditions

Test Case	Test Conditions	
Radiated Emission	Test Env.	NTNV
	Test Setup	Test Setup 1&3
	Test Configuration	TC01~TC02 Note
Conducted Emission	Test Env.	NTNV
	Test Setup	Test Setup 4
	Test Configuration	TC01~TC02 Note

Note: Based on client request, all normal using modes of the normal function were tested but only the worst test data of the worst mode is reported in this report. The Normal Working test mode is the worst test mode in this report.

5 TEST ITEMS

5.1 Emission Tests

5.1.1 Radiated Emission

5.1.1.1 Limit

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

NOTE:

1) Field Strength (dBμV/m) = 20*log [Field Strength (μV/m)].
2) In the emission tables above, the tighter limit applies at the band edges.
3) For above 1000 MHz, limit field strength of harmonics: 54 dBuV/m@3 m (AV) and 74 dBuV/m@3 m (PK)

5.1.1.2 Test Setup

Refer to 4.5 section (test setups1 to test setups3) for radiated emission test, the photo of test setup please refer to ANNEX B.

5.1.1.3 Test Procedure

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

An initial pre-scan was performed in the chamber using the EMI Receiver in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bi-Log antenna with 2 orthogonal polarities.

5.1.1.4 Test Result

Please refer to ANNEX A.1.

5.1.2 Conducted Emission

5.1.2.1 Test Limit

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:

1) The limit is applicable to Class B ITE.
2) The lower limit shall apply at the band edges.
3) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

5.1.2.2 Test Setup

Refer to 4.5 section test (test setup 4) for conducted emission, the photo of test setup please refer to ANNEX B.

5.1.2.3 Test Procedure

The EUT is connected to the power mains through a LISN which provides 50 Ω/50 μH of coupling impedance for the measuring instrument. The test frequency range is from 150 kHz to 30 MHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels that are more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed.

5.1.2.4 Test Result

Please refer to ANNEX A.2.

ANNEX A TEST RESULTS

A.1 Radiated Emission

Note 1: The symbol of "--" in the table which means not application.

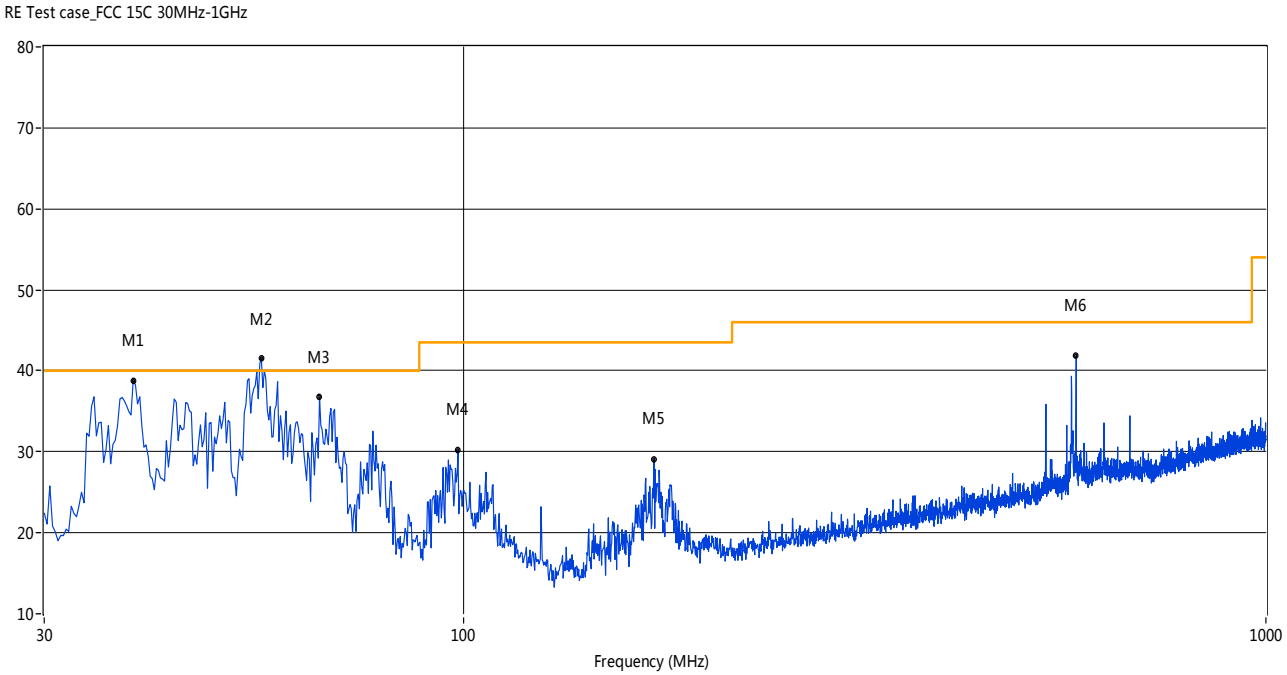
Note 2: For the test data above 1 GHz, According the ANSI C63.4-2014, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Test Data and Plots

The worst test mode: The Normal Working Test mode

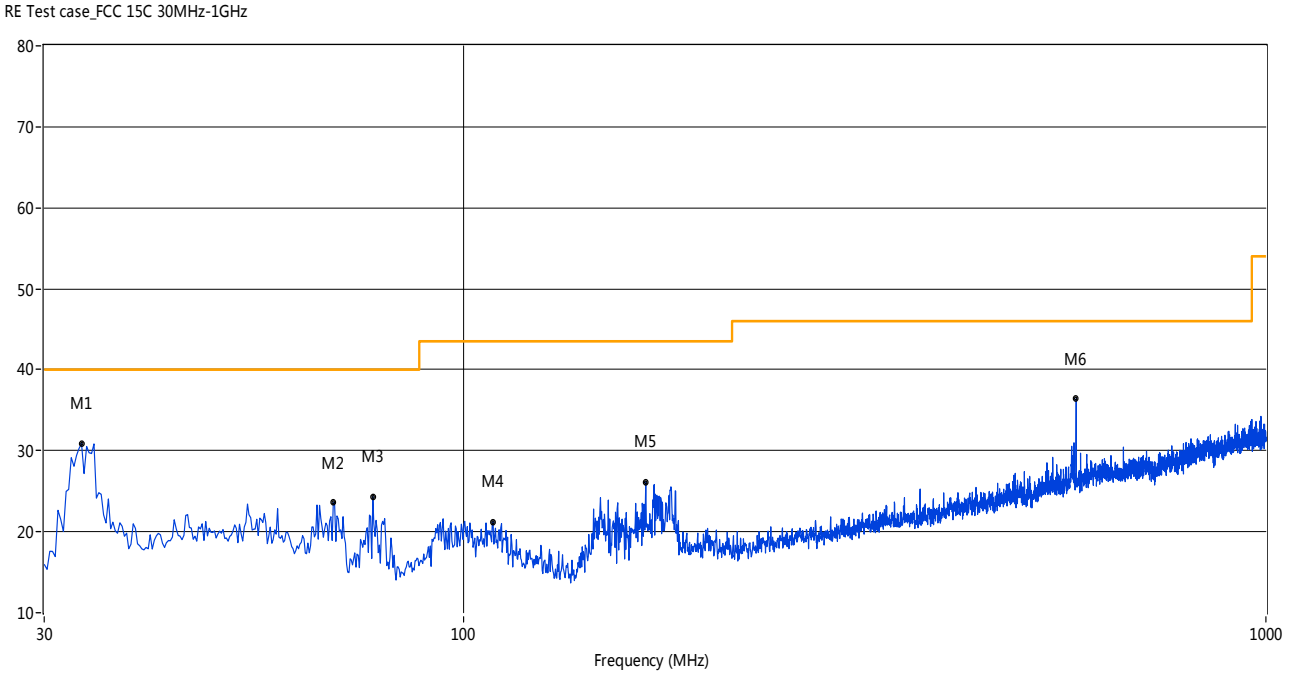
The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31 (o) was not reported.

A.1.1 Test Antenna Vertical, 30 MHz – 1 GHz



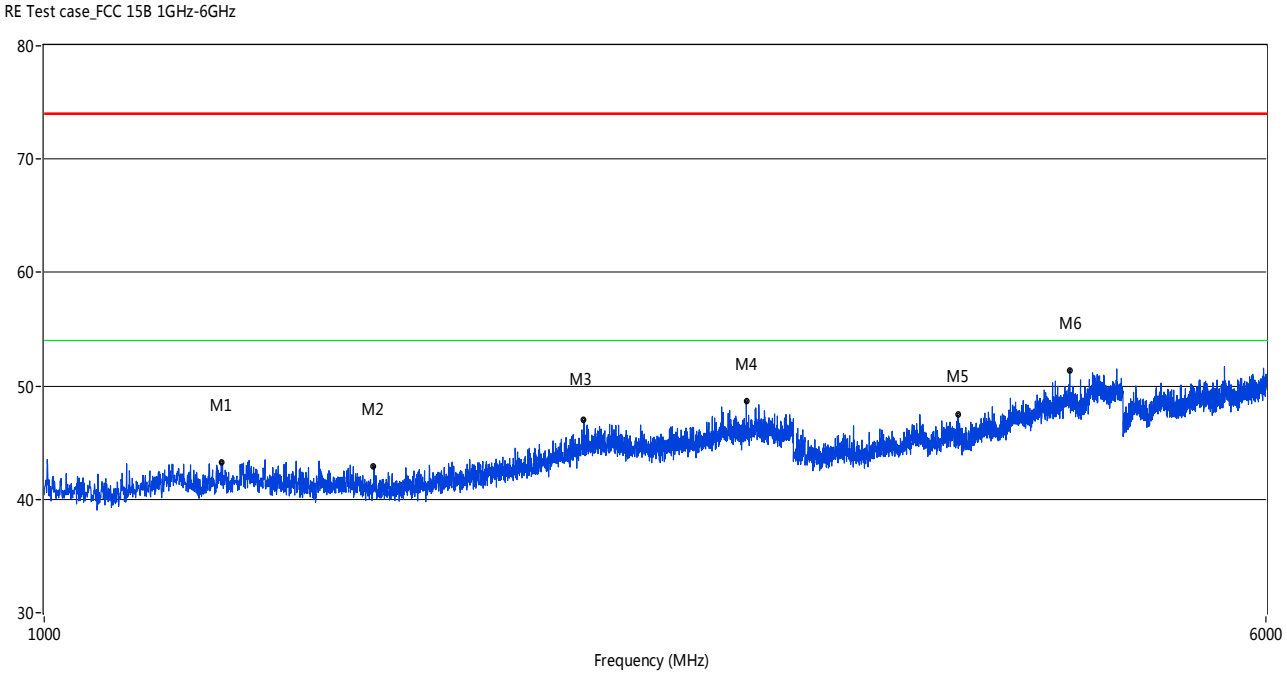
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	38.73	38.79	-20.05	40.0	1.21	Peak	194.90	100	Vertical	Pass
2	56.00	40.91	-19.19	40.0	-0.91	Peak	2.30	100.00	Vertical	N/A
2*	56.00	38.33	-19.19	40.0	1.67	QP	2.30	100.00	Vertical	Pass
3	66.12	36.76	-21.03	40.0	3.24	Peak	149.20	100	Vertical	Pass
4	98.37	30.23	-20.38	43.5	13.27	Peak	61.00	100	Vertical	Pass
5	172.80	29.14	-22.51	43.5	14.36	Peak	25.40	100	Vertical	Pass
6	579.85	41.93	-11.47	46.0	4.07	Peak	169.20	100	Vertical	Pass

A.1.2 Test Antenna Horizontal, 30 MHz – 1 GHz



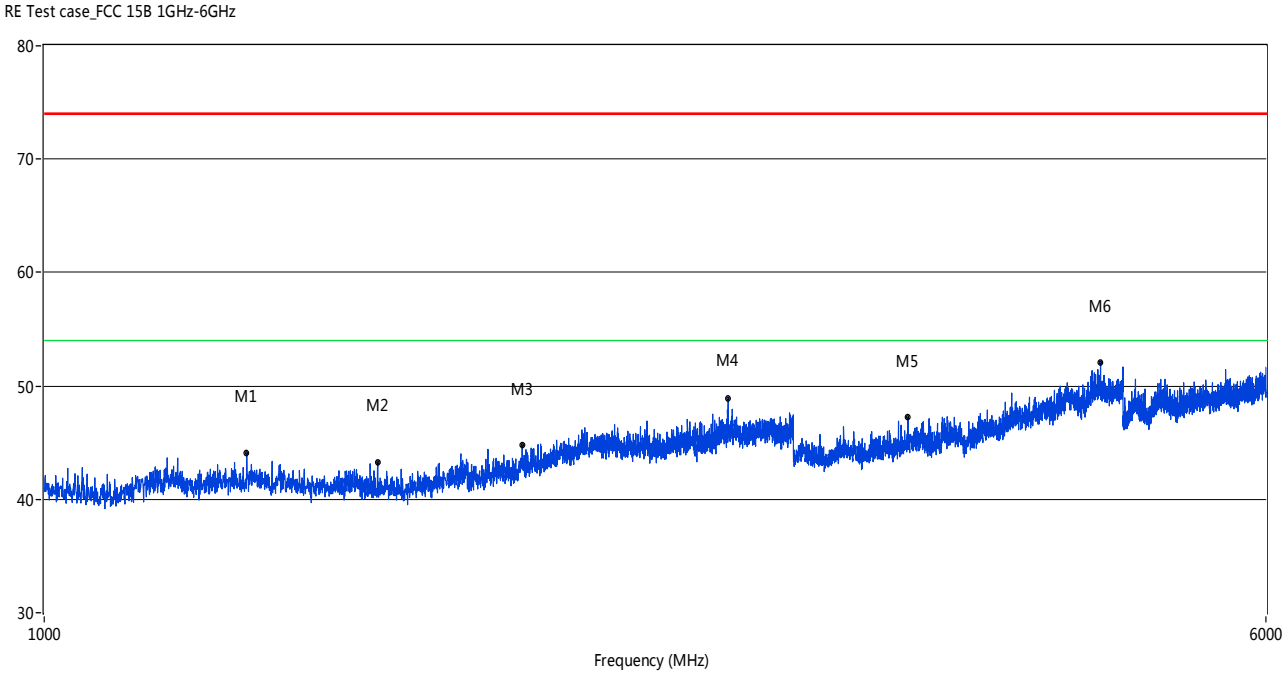
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	33.39	30.89	-21.71	40.0	9.11	Peak	264.30	100	Horizontal	Pass
2	68.79	23.59	-22.21	40.0	16.41	Peak	253.90	100	Horizontal	Pass
3	77.03	24.34	-24.70	40.0	15.66	Peak	198.30	100	Horizontal	Pass
4	108.79	21.25	-20.24	43.5	22.25	Peak	71.50	100	Horizontal	Pass
5	168.68	26.15	-22.76	43.5	17.35	Peak	45.90	100	Horizontal	Pass
6	579.85	36.44	-11.47	46.0	9.56	Peak	31.10	100	Horizontal	Pass

A.1.3 Test Antenna Vertical, 1 GHz – 6 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1296.43	43.21	-4.85	74.0	30.79	Peak	26.20	100	Vertical	Pass
2	1621.34	42.92	-4.29	74.0	31.08	Peak	358.20	100	Vertical	Pass
3	2206.70	46.96	-0.24	74.0	27.04	Peak	32.50	100	Vertical	Pass
4	2800.55	48.62	1.66	74.0	25.38	Peak	359.00	100	Vertical	Pass
5	3818.05	47.43	10.73	74.0	26.57	Peak	20.00	100	Vertical	Pass
6	4498.88	51.34	12.70	74.0	22.66	Peak	172.70	100	Vertical	Pass

A.1.4 Test Antenna Horizontal, 1 GHz – 6 GHz



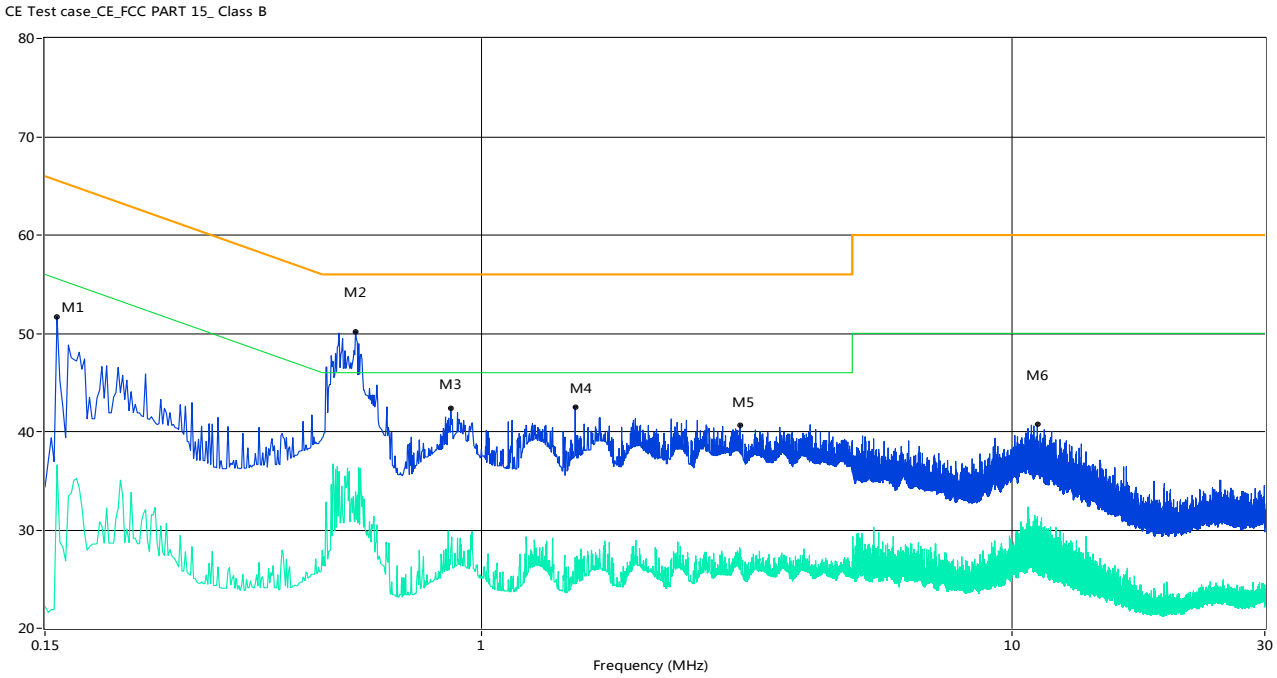
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1345.91	44.10	-4.66	74.0	29.90	Peak	322.00	100	Horizontal	Pass
2	1630.84	43.30	-4.33	74.0	30.70	Peak	233.00	100	Horizontal	Pass
3	2015.75	44.79	-2.14	74.0	29.21	Peak	258.60	100	Horizontal	Pass
4	2726.57	48.90	1.72	74.0	25.10	Peak	169.50	100	Horizontal	Pass
5	3549.61	47.23	9.82	74.0	26.77	Peak	218.30	100	Horizontal	Pass
6	4707.32	52.07	13.34	74.0	21.93	Peak	213.50	100	Horizontal	Pass

A.2 Conducted Emission

Test Data and Plots

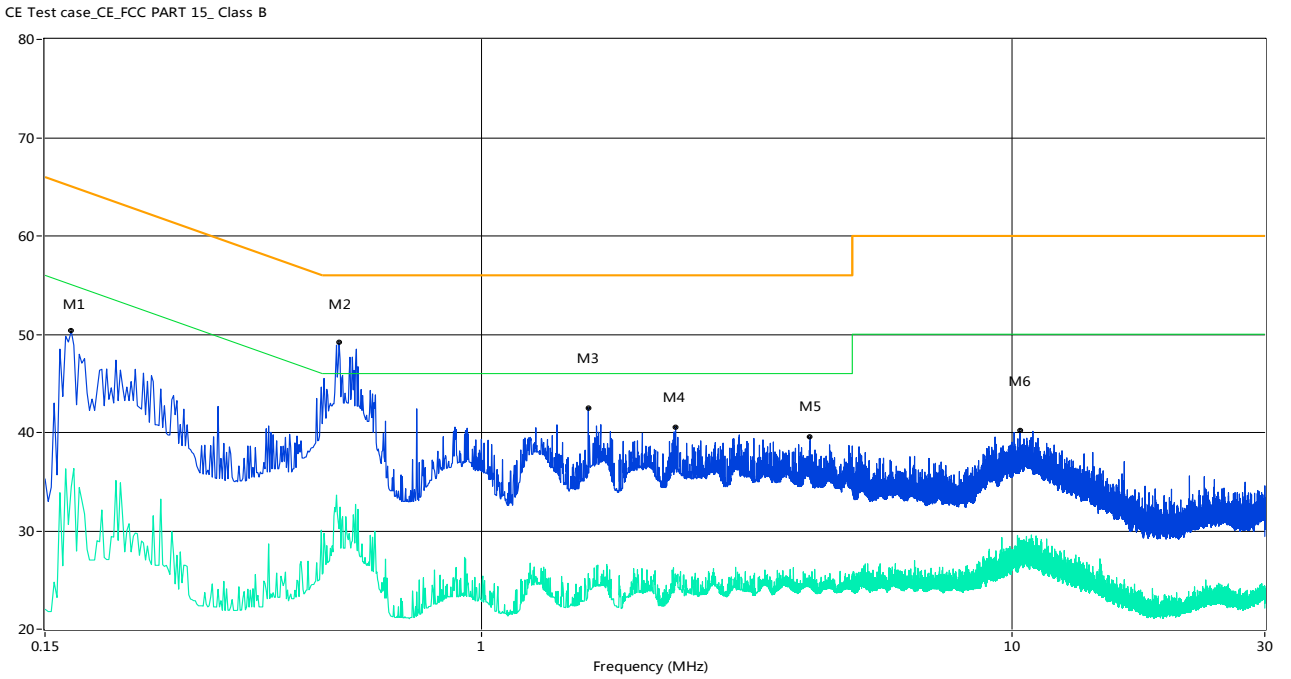
The worst test mode: The Normal Working Test mode

A.2.1 L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.16	51.7	13.00	65.8	14.10	Peak	L Line	Pass
1**	0.16	36.6	13.00	55.8	19.20	AV	L Line	Pass
2	0.58	50.2	13.00	56.0	5.80	Peak	L Line	Pass
2**	0.58	33.9	13.00	46.0	12.10	AV	L Line	Pass
3	0.87	42.4	13.00	56.0	13.60	Peak	L Line	Pass
3**	0.87	28.0	13.00	46.0	18.00	AV	L Line	Pass
4	1.50	42.5	13.00	56.0	13.50	Peak	L Line	Pass
4**	1.50	27.2	13.00	46.0	18.80	AV	L Line	Pass
5	3.07	40.7	13.00	56.0	15.30	Peak	L Line	Pass
5**	3.07	27.4	13.00	46.0	18.60	AV	L Line	Pass
6	11.17	40.7	13.00	60.0	19.30	Peak	L Line	Pass
6**	11.17	31.4	13.00	50.0	18.60	AV	L Line	Pass

A.2.2 N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.17	50.3	13.00	65.5	15.20	Peak	N Line	Pass
1**	0.17	34.5	13.00	55.5	21.00	AV	N Line	Pass
2	0.54	49.2	13.00	56.0	6.80	Peak	N Line	Pass
2**	0.54	30.2	13.00	46.0	15.80	AV	N Line	Pass
3	1.59	42.5	13.00	56.0	13.50	Peak	N Line	Pass
3**	1.59	25.7	13.00	46.0	20.30	AV	N Line	Pass
4	2.32	40.6	13.00	56.0	15.40	Peak	N Line	Pass
4**	2.32	25.2	13.00	46.0	20.80	AV	N Line	Pass
5	4.16	39.6	13.00	56.0	16.40	Peak	N Line	Pass
5**	4.16	25.3	13.00	46.0	20.70	AV	N Line	Pass
6	10.35	40.2	13.00	60.0	19.80	Peak	N Line	Pass
6**	10.35	27.1	13.00	50.0	22.90	AV	N Line	Pass

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ15B0251-AE.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ15B0251-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ15B0251-AI.PDF”.

--END OF REPORT--