

FCC  
RF  
TEST REPORT

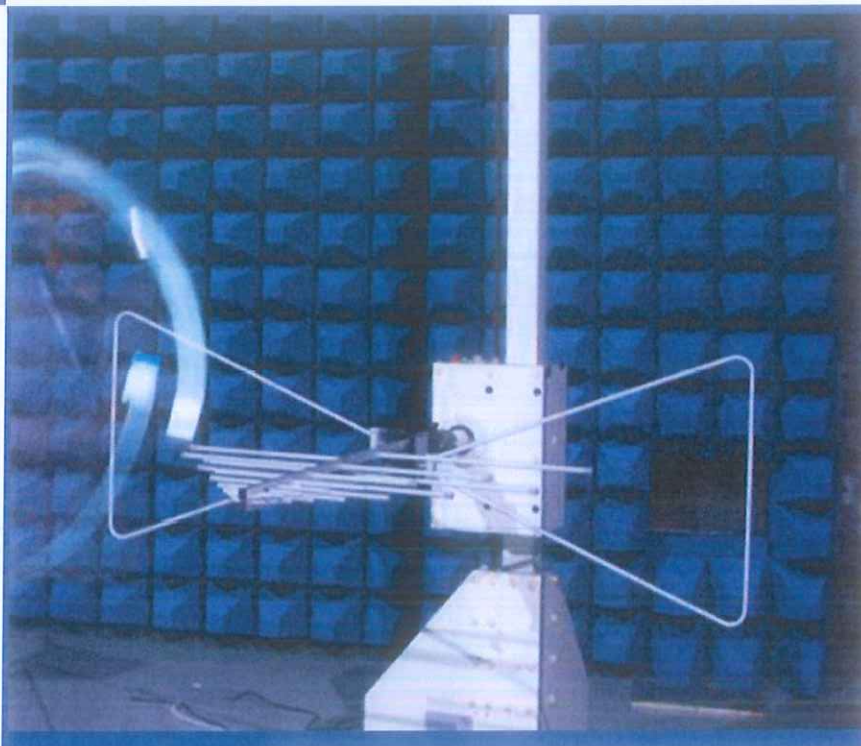
ISSUED BY  
Shenzhen BALUN Technology Co., Ltd.



FOR  
**10W Wireless Fast Charging Station**

ISSUED TO  
TP-Link Technologies Co., Ltd.

Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and  
Technology Park, Shennan Rd, Nanshan, Shenzhen, China



Tested by: Xia Long  
Xia Long  
(Engineer)

Date: Jun. 25, 2018

Approved by: Wei Yanquan  
Wei Yanquan  
(Chief Engineer)

Date: Jun. 25, 2018

Report No.: BL-SZ1830386-402

EUT Name: 10W Wireless Fast Charging Station

Model Name: TL-WCS200

Brand Name: tp-link

Test Standard: 47 CFR Part 15 Subpart C

FCC ID: TE7WCS200

Test Conclusion: Pass

Test Date: Apr. 15, 2018 ~ Apr. 13, 2018

Date of Issue: Jun. 25, 2018

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**Revision History**

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>May 30, 2018</u>	<u>Initial Issue</u>
<u>Rev. 02</u>	<u>Jun. 25, 2018</u>	<u>Update the Frequency Range on page 5</u>

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# 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

## 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	<p>The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1.</p> <p>The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.</p> <p>The laboratory is a testing organization accredited by American Association for Laboratory Accreditation(A2LA) according to ISO/IEC 17025.The accreditation certificate is 4344.01.</p> <p>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.</p>
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 to 25°C
Ambient Relative Humidity	45% to 55%
Ambient Pressure	100 kPa to 102 kPa

## 1.4 Announce

- (1) The test report reference to the report template version v2.5.
- (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	TP-Link Technologies Co., Ltd.
Address	Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China

### 2.2 Manufacturer Information

Manufacturer	TP-Link Technologies Co., Ltd.
Address	Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China

### 2.3 Factory Information

Factory	N/A
Address	N/A

### 2.4 General Description for Equipment under Test (EUT)

EUT Name	10W Wireless Fast Charging Station
Model Name Under Test	TL-WCS200
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

### 2.5 Ancillary Equipment

Note: Not application.

### 2.6 Technical Information

Network and Wireless connectivity	Qi
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The requirement for the following technical information of the EUT was tested in this report:

Frequency Range	110.5kHz~205kHz
Product Type	<input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable <input type="checkbox"/> Fix Location
Antenna Type	Coil Antenna
Antenna Gain	0 dBi
About Product	The EUT support the Qi and PMA technology, and they have the same operating frequency.

### 3 SUMMARY OF TEST RESULTS

#### 3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C (10-1-16 Edition)	Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

#### 3.2 Verdict

No.	Description	FCC Rule	Test Verdict	Result
1	Radiated Emission	15.209,15.215(b)	Pass	Annex A.1
2	Conducted Emission, AC Ports	15.207	Pass	Annex A.2
3	20 dB Bandwidth	15.215(c)	Pass	Annex A.3

#### 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)	3.23 dB
Radiated emissions (30 MHz-1 GHz)	4.30 dB
Radiated emissions (1 GHz-18 GHz)	4.81 dB



## 4 GENERAL TEST CONFIGURATIONS

### 4.1 Test Environments

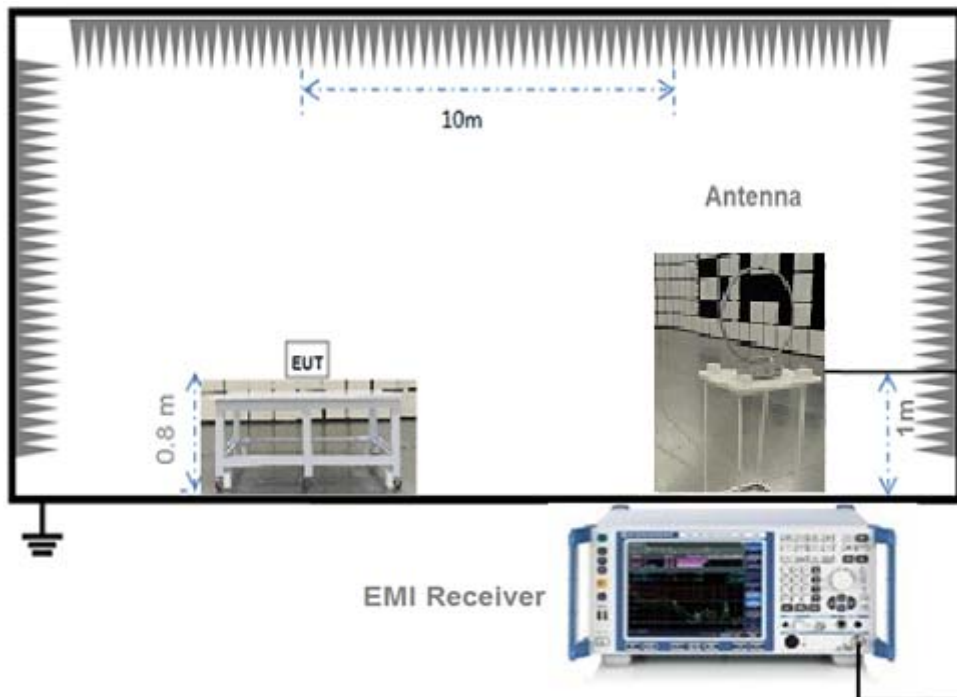
Relative Humidity	45% to 55%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22°C to +25°C
Working Voltage of the EUT	NV (Normal Voltage)	9 V

### 4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2017.06.22	2018.06.21
Test Antenna- Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2017.11.07	2019.11.08
Test Antenna- Rod(9 kHz-30 MHz)	SCHWARZBECK	VAMP 9243	9243-556	2017.07.22	2019.07.21
Test Antenna- Bi-Log(30 MHz- 3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2016.07.12	2018.07.11
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60*7 .35m	N/A	2016.08.09	2018.08.08
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2017.06.22	2018.06.21
LISN	SCHWARZBECK	NSLK 8127	8127-687	2017.06.22	2018.06.21
Shielded Enclosure	ChangNing	CN-130701	130703	N/A	N/A

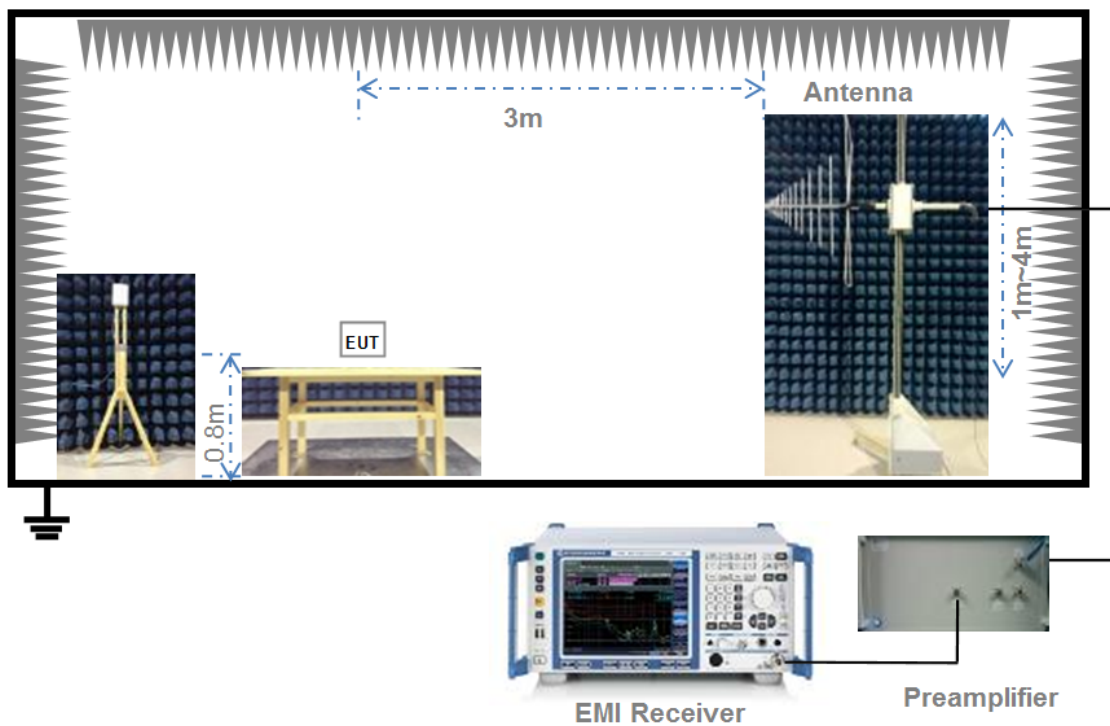
### 4.3 Test Setups

#### Test Setup 1



For Radiated Emission Test (Below 30 MHz))

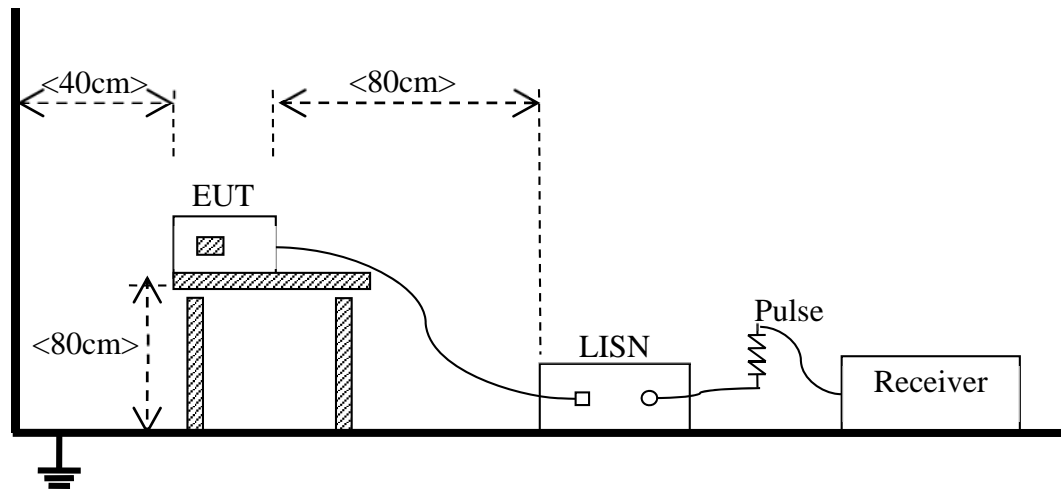
#### Test Setup 2



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



### Test Setup 3



(For Conducted Emission, AC Ports Test)

## 5 TEST ITEMS

### 5.1 Emission Tests

#### 5.1.1 Radiated Emission

##### 5.1.1.1 Limit

Frequency (MHz)	Field Strength ( $\mu\text{V/m}$ )	Measurement Distance (m)
0.009 - 0.490	$2400/F(\text{kHz})$	300
0.490 - 1.705	$24000/F(\text{kHz})$	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 ( $\text{dB}\mu\text{V/m}$ ) =  $20 \cdot \log [\text{Field Strength } (\mu\text{V/m})]$ .
- 2) In the emission tables above, the tighter limit applies at the band edges.
- 3) For above 1000 MHz, limit field strength of harmonics:  $54 \text{ dBuV/m}@3 \text{ m (AV)}$  and  $74 \text{ dBuV/m}@3 \text{ m (PK)}$
- 4) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). For example, at the frequency 9 kHz, limit @10m =  $20 \cdot \log (2400/f) + 40 \log (d_{\text{limit}}/d_{\text{measure}})$  where limit = 300m,  $d_{\text{measure}}=10\text{m}$ . limit @10m =  $20 \cdot \log (2400/9) + 40 \log (300/10) = 107.5 \text{ (dB}\mu\text{V/m)}$ .
- 5) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided, When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements). For example, at the frequency 30 MHz, limit @10m =  $20 \cdot \log (100) + 20 \log (d_{\text{limit}}/d_{\text{measure}})$  where limit = 3m,  $d_{\text{measure}}=10\text{m}$ . limit @10m =  $20 \cdot \log (100) + 20 \log (3/10) = 29.5 \text{ (dB}\mu\text{V/m)}$ .

##### 5.1.1.2 Test Setup

Refer to 4.3 section (test setup 1 to test setup 2) 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 (dB $\mu$ V)	
	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 4.3 section test (test setup 3) 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  $\Omega$ /50  $\mu$ H 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.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

### 5.1.2.4 Test Result

Please refer to ANNEX A.2.

### 5.1.3 20 dB Bandwidth

#### 5.1.3.1 Limit

FCC §15.215(c)

The 20 dB bandwidth is known as the 99% emission bandwidth, or 20 dB bandwidth ( $10 \cdot \log 1\% = 20$  dB) taking the total RF output power.

#### 5.1.3.2 Test Setup

Refer to 4.3 section test (test setup 1) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

#### 5.1.3.3 Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW  $\geq$  1% of the 20 dB bandwidth

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate, Allow the trace to stabilize.

#### 5.1.3.4 Test Result

Please refer to ANNEX A.3.

## ANNEX A TEST RESULTS

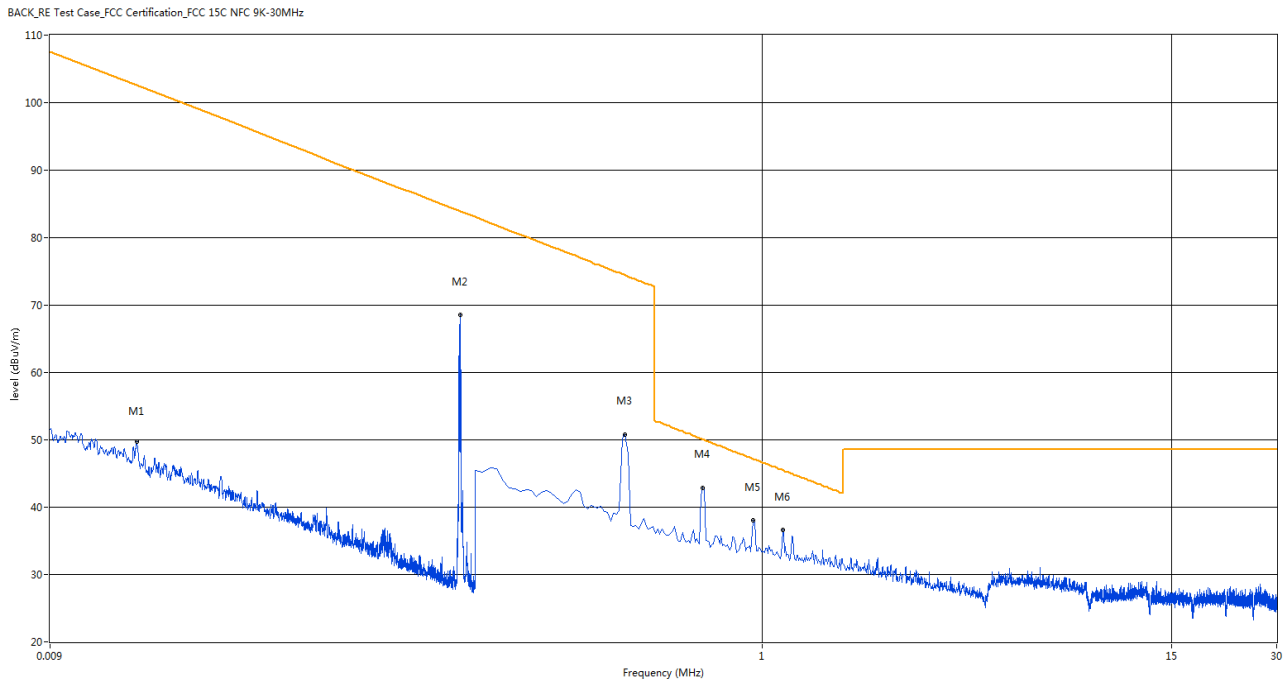
### A.1 Radiated Emission

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.

#### QI Test Data and Plots

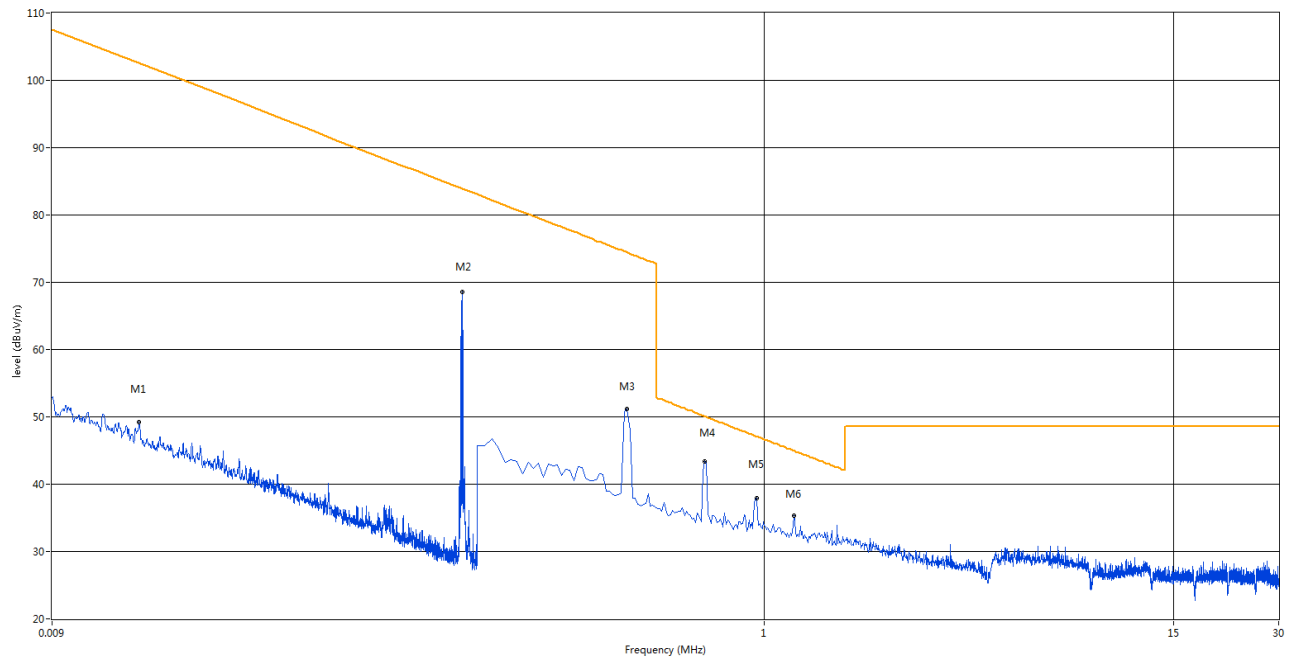
##### A.1.1 Test Antenna Vertical, 9 kHz –30 MHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	0.016	49.65	19.77	102.6	52.95	Peak	209.00	100	Vertical	Pass
2	0.136	68.61	19.79	83.9	15.29	Peak	50.00	100	Vertical	N/A
3	0.404	50.78	19.81	74.5	23.72	Peak	61.00	100	Vertical	Pass
4	0.672	42.87	19.98	50.1	7.23	Peak	53.00	100	Vertical	Pass
5	0.941	38.01	20.09	47.1	9.09	Peak	291.00	100	Vertical	Pass
6	1.143	36.54	20.09	45.5	8.96	Peak	356.00	100	Vertical	Pass

## A.1.2 Test Antenna Horizontal, 9 kHz –30 MHz

BACK\_RE Test Case\_FCC Certification\_FCC 15C NFC 9K-30MHz

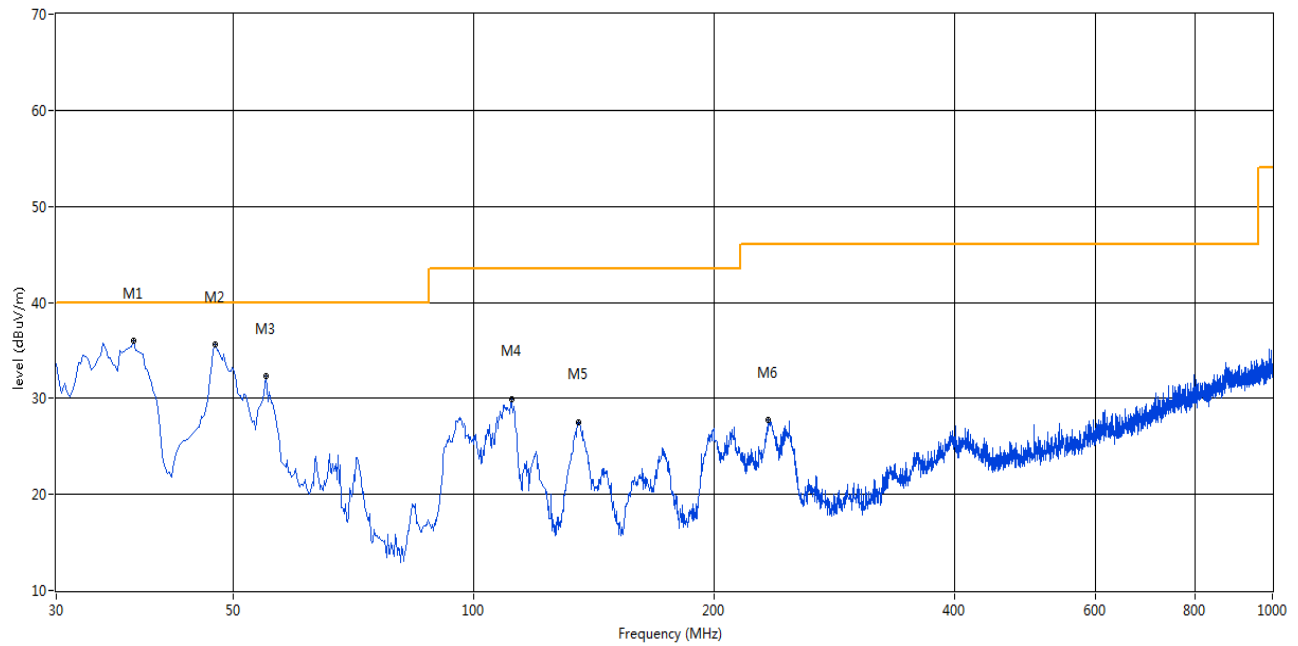


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	0.016	49.14	19.77	102.5	53.36	Peak	9.00	100	Horizontal	Pass
2	0.136	68.62	19.79	83.9	15.28	Peak	43.00	100	Horizontal	N/A
3	0.404	51.17	19.81	74.5	23.33	Peak	61.00	100	Horizontal	Pass
4	0.672	43.38	19.98	50.1	6.72	Peak	79.00	100	Horizontal	Pass
5	0.948	37.96	20.09	47.0	9.04	Peak	53.00	100	Horizontal	Pass
6	1.217	35.35	20.09	44.9	9.55	Peak	61.00	100	Horizontal	Pass



### A.1.3 Test Antenna Horizontal, 30 MHz – 1 GHz

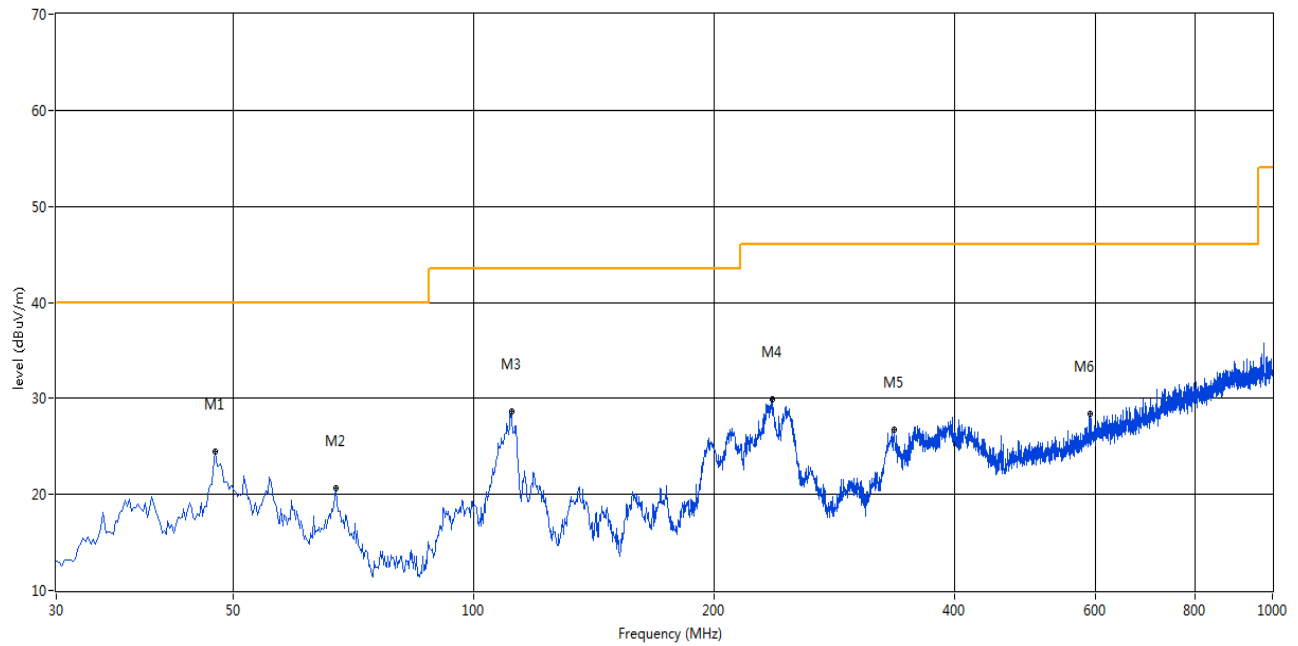
3m RE Test Case\_FCC Certification\_FCC 15B ClassB 30MHz-1GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	37.517	35.96	-25.11	40.0	4.04	Peak	48.00	100	Vertical	Pass
2	47.460	35.61	-23.35	40.0	4.39	Peak	22.00	100	Vertical	Pass
3	54.977	32.31	-23.55	40.0	7.69	Peak	356.00	100	Vertical	Pass
4	111.480	29.97	-24.65	43.5	13.53	Peak	1.00	100	Vertical	Pass
5	135.245	27.56	-27.59	43.5	15.94	Peak	237.00	100	Vertical	Pass
6	233.943	27.73	-22.52	46.0	18.27	Peak	16.00	100	Vertical	Pass

#### A.1.4 Test Antenna Horizontal, 30 MHz – 1 GHz

3m RE Test Case\_FCC Certification\_FCC 15B ClassB 30MHz-1GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	47.460	24.41	-23.35	40.0	15.59	Peak	325.00	100	Horizontal	Pass
2	67.103	20.70	-25.98	40.0	19.30	Peak	338.00	100	Horizontal	Pass
3	111.480	28.65	-24.65	43.5	14.85	Peak	356.00	100	Horizontal	Pass
4	236.367	29.87	-22.65	46.0	16.13	Peak	73.00	100	Horizontal	Pass
5	335.793	26.74	-19.38	46.0	19.26	Peak	92.00	100	Horizontal	Pass
6	592.115	28.35	-13.03	46.0	17.65	Peak	224.00	100	Horizontal	Pass

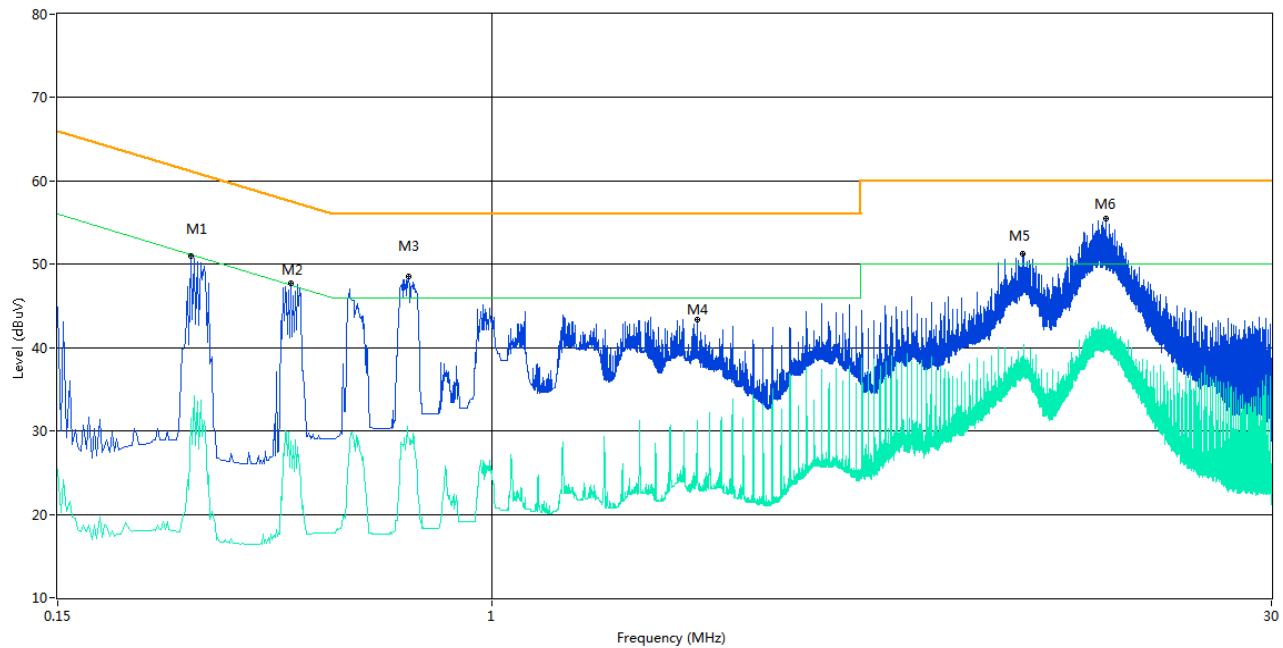
## A.2 Conducted Emission

Note: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration (120 VAC, 60 Hz ) shown here.

### QI Test Data and Plots

#### A.2.1 L Phase

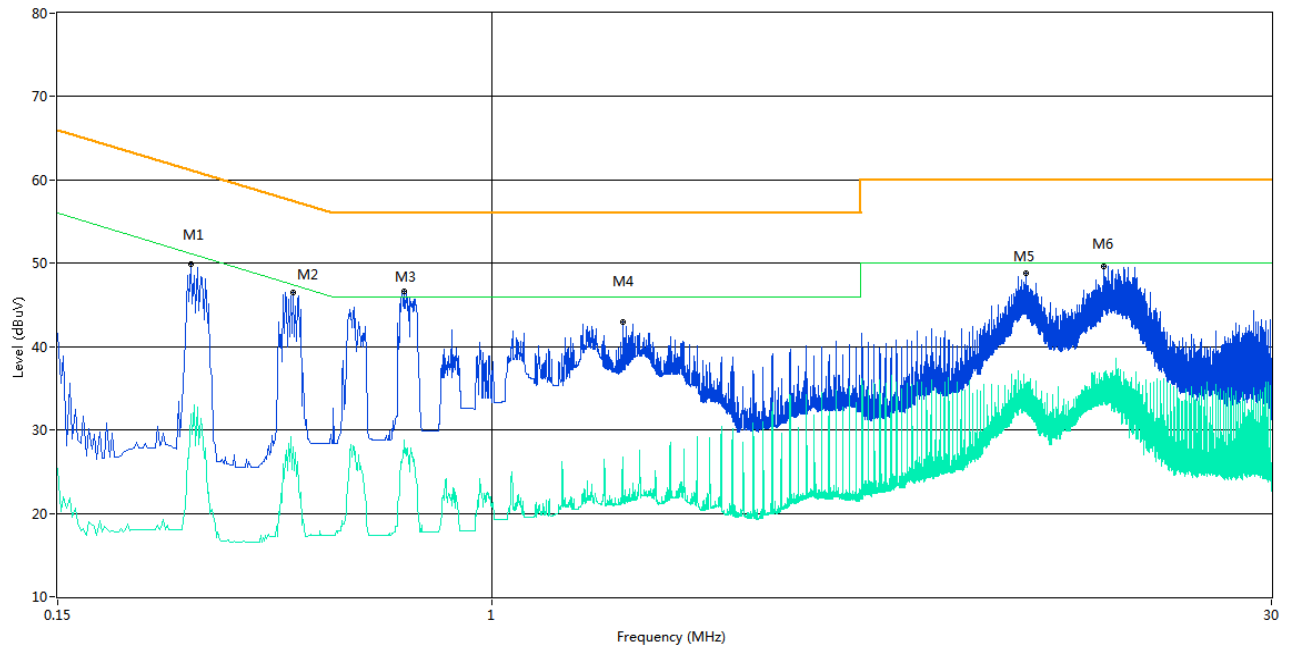
CE Test case\_FCC\_CE\_FCC PART 15B\_Class B



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.268	51.0	10.04	61.2	10.20	Peak	L Line	Pass
1**	0.268	31.5	10.04	51.2	19.70	AV	L Line	Pass
2	0.416	47.7	10.04	57.5	9.80	Peak	L Line	Pass
2**	0.416	28.8	10.04	47.5	18.70	AV	L Line	Pass
3	0.694	48.6	10.05	56.0	7.40	Peak	L Line	Pass
3**	0.694	29.2	10.05	46.0	16.80	AV	L Line	Pass
4	2.444	43.3	10.10	56.0	12.70	Peak	L Line	Pass
4**	2.444	31.2	10.10	46.0	14.80	AV	L Line	Pass
5	10.126	51.2	10.32	60.0	8.80	Peak	L Line	Pass
5**	10.126	39.0	10.32	50.0	11.00	AV	L Line	Pass
6	14.540	55.4	10.44	60.0	4.60	Peak	L Line	Pass
6**	14.540	41.1	10.44	50.0	8.90	AV	L Line	Pass

## A.2.2 N Phase

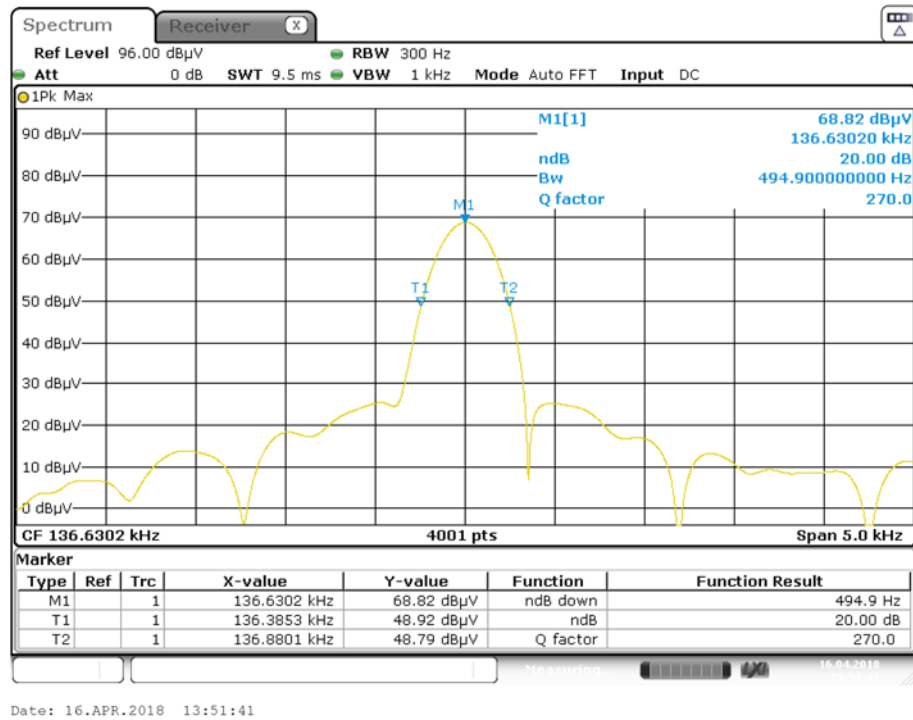
CE Test case\_FCC\_CE\_FCC PART 15B\_Class B



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.268	49.9	10.04	61.2	11.30	Peak	N Line	Pass
1**	0.268	31.9	10.04	51.2	19.30	AV	N Line	Pass
2	0.420	46.5	10.04	57.4	10.90	Peak	N Line	Pass
2**	0.420	28.0	10.04	47.4	19.40	AV	N Line	Pass
3	0.682	46.7	10.05	56.0	9.30	Peak	N Line	Pass
3**	0.682	28.8	10.05	46.0	17.20	AV	N Line	Pass
4	1.768	42.9	10.08	56.0	13.10	Peak	N Line	Pass
4**	1.768	26.8	10.08	46.0	19.20	AV	N Line	Pass
5	10.278	48.9	10.32	60.0	11.10	Peak	N Line	Pass
5**	10.278	33.4	10.32	50.0	16.60	AV	N Line	Pass
6	14.398	49.6	10.44	60.0	10.40	Peak	N Line	Pass
6**	14.398	35.9	10.44	50.0	14.10	AV	N Line	Pass

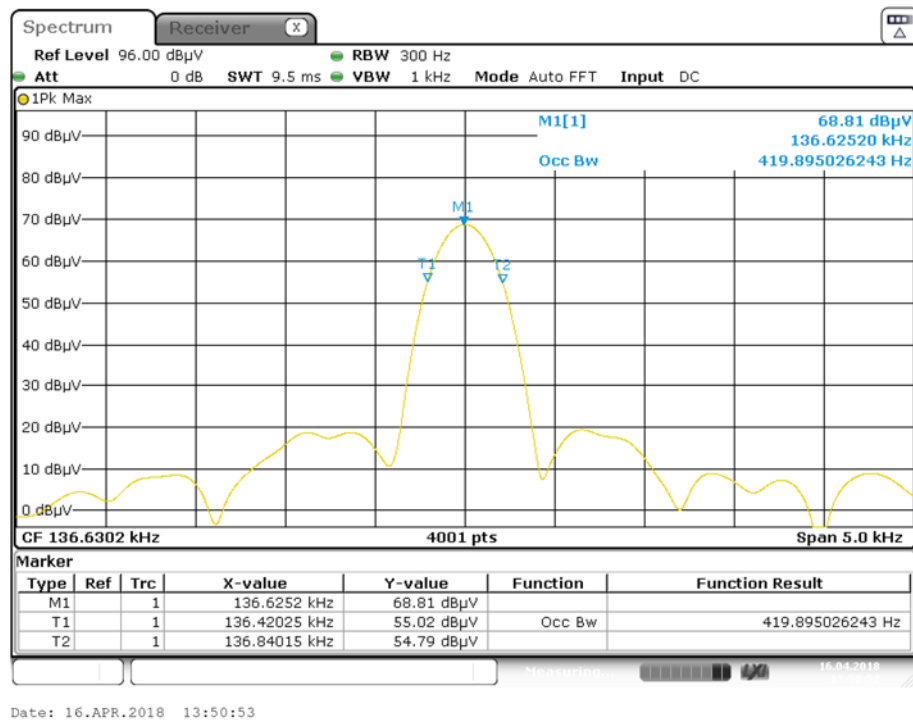
### A.3 20 dB Bandwidth

#### QI Test Data and Plots



### 99% Occupied Bandwidth

#### QI Test Data and Plots



## **ANNEX B TEST SETUP PHOTOS**

Please refer the document “BL-SZ1830386-AE2.PDF”.

## **ANNEX C EUT EXTERNAL PHOTOS**

Please refer the document “BL-SZ1830386-AW.PDF”.

## **ANNEX D EUT INTERNAL PHOTOS**

Please refer the document “BL-SZ1830386-AI.PDF”.

--END OF REPORT--