

# RF

## TEST REPORT

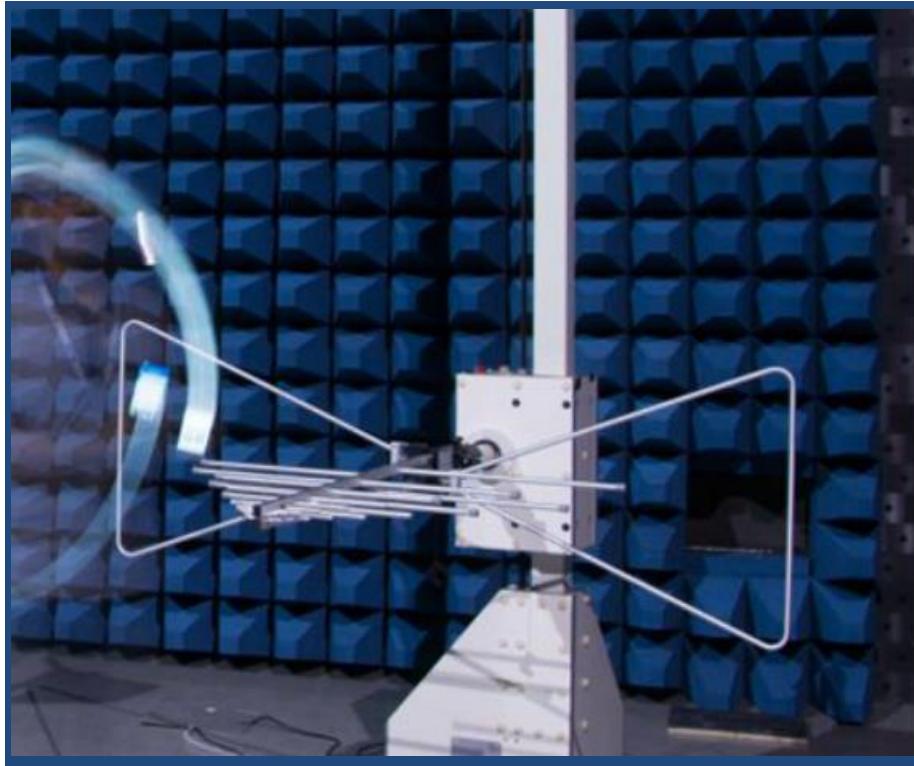
ISSUED BY  
Shenzhen BALUN Technology Co., Ltd.



FOR  
**Mobile Phone**

ISSUED TO  
Guangdong OPPO Mobile Telecommunications Corp., Ltd.

NO.18 Haibin Road, Wusha Village, Chang'an Town, Dongguan City,  
Guangdong, China



Tested by:	<u>Zhang Guoxi</u> Zhang Guoxi	Report No.:	BL-SZ2190589-403
Date	Jan. 21, 2022	EUT Name:	Mobile Phone
Approved by:	<u>Wei Yanquan</u> (Chief Engineer)	Model Name:	CPH2307
Date	Jan. 21, 2022	Brand Name:	OPPO
		Test Standard:	47 CFR Part 15 Subpart C
		FCC ID:	R9C-CPH2307
		Test Conclusion:	Pass
		Test Date:	Jan. 18, 2022 ~ Jan. 20, 2022
		Date of Issue:	Jan. 21, 2022

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### Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Dec. 28, 2021</u>	<u>Initial Issue</u>
<u>Rev. 02</u>	<u>Jan. 21, 2022</u>	<u>Add remarks to chapter 3.2 and update test data in ANNEX A.</u>

## TABLE OF CONTENTS

1	GENERAL INFORMATION .....	4
1.1	Identification of the Testing Laboratory .....	4
1.2	Identification of the Responsible Testing Location .....	4
1.3	Laboratory Condition .....	4
1.4	Announce .....	4
2	PRODUCT INFORMATION .....	5
2.1	Applicant Information .....	5
2.2	Manufacturer Information .....	5
2.3	Factory Information .....	5
2.4	General Description for Equipment under Test (EUT) .....	5
2.5	Ancillary Equipment .....	6
2.6	Technical Information .....	6
3	SUMMARY OF TEST RESULTS .....	7
3.1	Test Standards .....	7
3.2	Verdict .....	7
3.3	Test Uncertainty .....	7
4	GENERAL TEST CONFIGURATIONS .....	8
4.1	Test Environments .....	8
4.2	Test Equipment List .....	8
4.3	Test Setups .....	9
5	TEST ITEMS .....	11
5.1	Emission Tests .....	11
	ANNEX A TEST RESULTS .....	15
A.1	Radiated Emission .....	15
A.2	Conducted Emission .....	19

A.3	20 dB Bandwidth .....	21
ANNEX B	TEST SETUP PHOTOS .....	23
ANNEX C	EUT EXTERNAL PHOTOS .....	23
ANNEX D	EUT INTERNAL PHOTOS .....	23

# 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
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	30% to 60%
Ambient Pressure	100 kPa to 102 kPa

## 1.4 Announce

- (1) The test report reference to the report template version v3.0.
- (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.
- (7) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

## 2 PRODUCT INFORMATION

### 2.1 Applicant Information

Applicant	Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Address	NO.18 Haibin Road, Wusha Village, Chang'an Town, Dongguan City, Guangdong, China

### 2.2 Manufacturer Information

Manufacturer	Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Address	NO.18 Haibin Road, Wusha Village, Chang'an Town, Dongguan City, Guangdong, China

### 2.3 Factory Information

Factory	Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Address	NO.18 Haibin Road, Wusha Village, Chang'an Town, Dongguan City, Guangdong, China

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

EUT Name	Mobile Phone
Model Name Under Test	CPH2307
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	0
Software Version	ColorOS V12.1
Dimensions (Approx.)	160.3*72.6*8.68mm
Weight (Approx.)	196g (with battery)

## 2.5 Ancillary Equipment

Ancillary Equipment 1	Li-Polymer Battery 1	
	Brand Name	OPPO
	Model No.	BLP891
	Serial No.	N/A
	Capacity	Rated: 2340mAh/18.11Wh Typical: 2400mAh/18.57Wh
	Rated Voltage	7.74 V
	Limit Charge Voltage	8.90 V
Ancillary Equipment 2	Power Supply Unit 1	
	Brand Name	OPPO
	Model No.	VCA7JFUH (USA Plug 65W)
	Serial No.	N/A
	Rated Input 1	100-130VAC 50/60Hz 1.8A
	Rated Output 1	5VDC 2A or 10VDC 5A Max
	Rated Input 2	200-240VAC 50/60Hz 1.8A
Ancillary Equipment 3	Power Supply Unit(alternative) 2	
	Brand Name	OPPO
	Model No.	VCB8JAUH (USA Plug 80W)
	Serial No.	N/A
	Rated Input 1	100-130VAC 50/60Hz 2.0A
	Rated Output 1	5VDC 2A or 5.0~10VDC 6.5A Max
	Rated Input 2	200-240VAC 50/60Hz 1.8A
Ancillary Equipment 4	Rated Output 2	
	USB Cable	
	Model No.	DL129
Ancillary Equipment 5	Length (Approx.)	
	Data connector	
	Model No.	N/A
	Length (Approx.)	N/A
Note 1: Letter in () means plug type.		
Note 2: All batteries are tested, only the worst data of VCA7JFUH (USA Plug 65W) shown in this report.		

## 2.6 Technical Information

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

Operating Frequency	110~148.5 kHz
Product Type	<input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable <input type="checkbox"/> Fix Location
Antenna Type	Coil Antenna

## 3 SUMMARY OF TEST RESULTS

### 3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C (10-1-19 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
Note: The test mode is changed to reverse wireless charging mode, so the test data is updated.				

### 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)	2.96 dB
Radiated emissions (30 MHz-1 GHz)	3.67 dB
Radiated emissions (1 GHz-18 GHz)	3.57 dB

## 4 GENERAL TEST CONFIGURATIONS

### 4.1 Test Environments

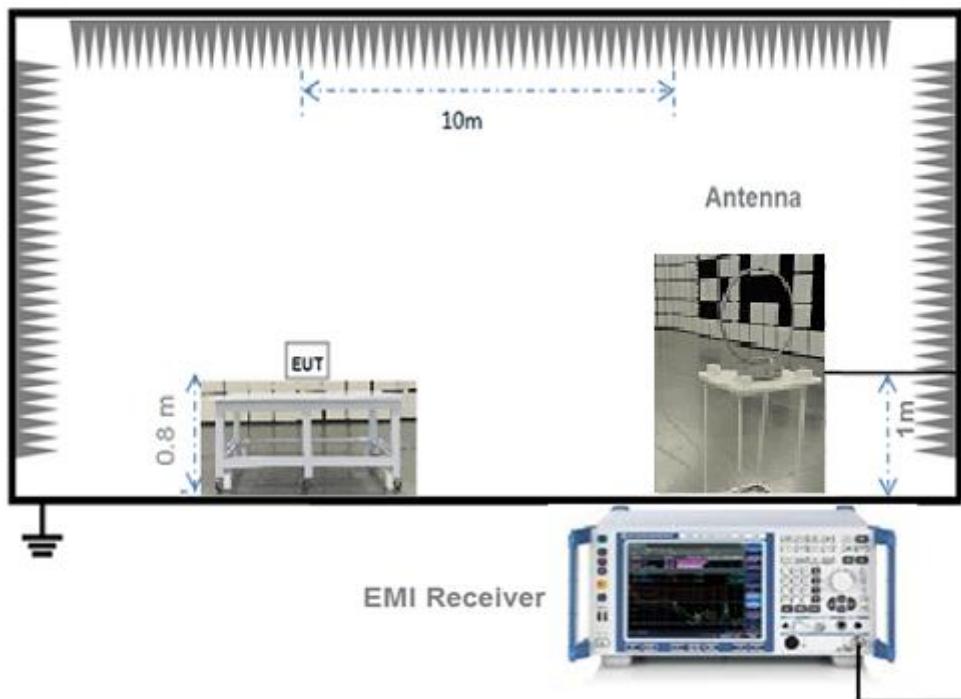
Relative Humidity	30% to 60%		
Atmospheric Pressure	100 kPa to 102 kPa		
Temperature	NT (Normal Temperature)		+22°C to +25°C
Working Voltage of the EUT	NV (Normal Voltage)	7.74 V	

### 4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2021.10.10	2022.10.09
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2021.04.16	2024.04.15
Test Antenna-Bi-Log(30 MHz- 3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2021.08.20	2024.08.19
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60*7 .35m	N/A	2021.08.15	2024.08.14
EMI Receiver	KEYSIGHT	N9010B	MY5711030 9	2021.10.10	2022.10.09
LISN	SCHWARZBECK	NSLK 8127	8127-687	2021.06.08	2022.06.07
Shielded Enclosure	YiHeng Electronic Co., Ltd	3.5m*3.1m*2. 8m	N/A	2019.08.16	2022.08.15
Test Software	BALUN	BL410_E	V19.918	--	--

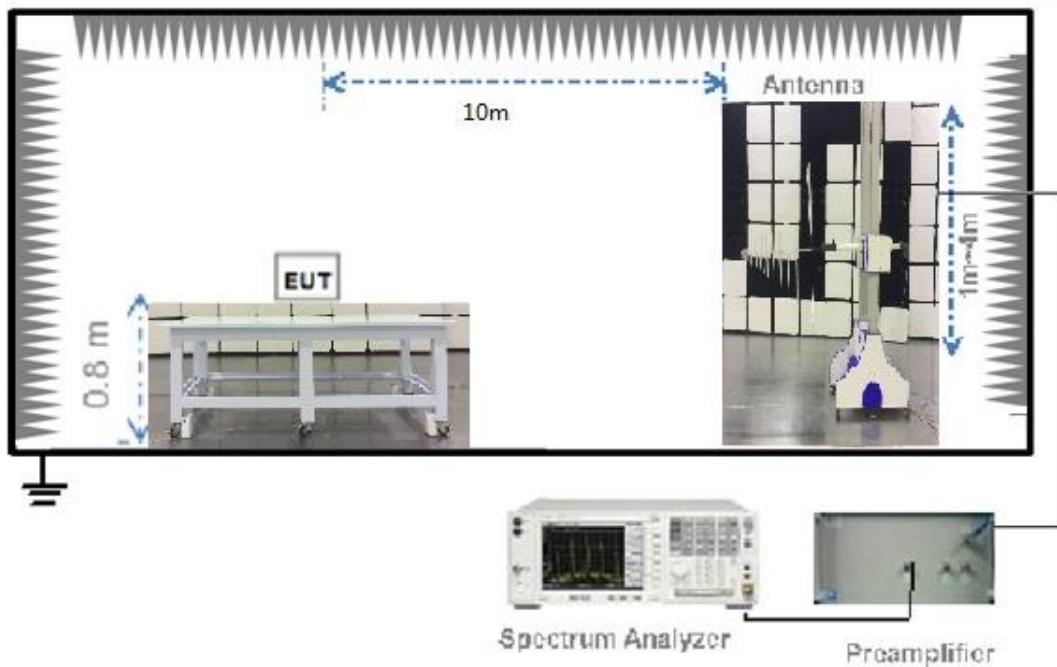
## 4.3 Test Setups

### Test Setup 1

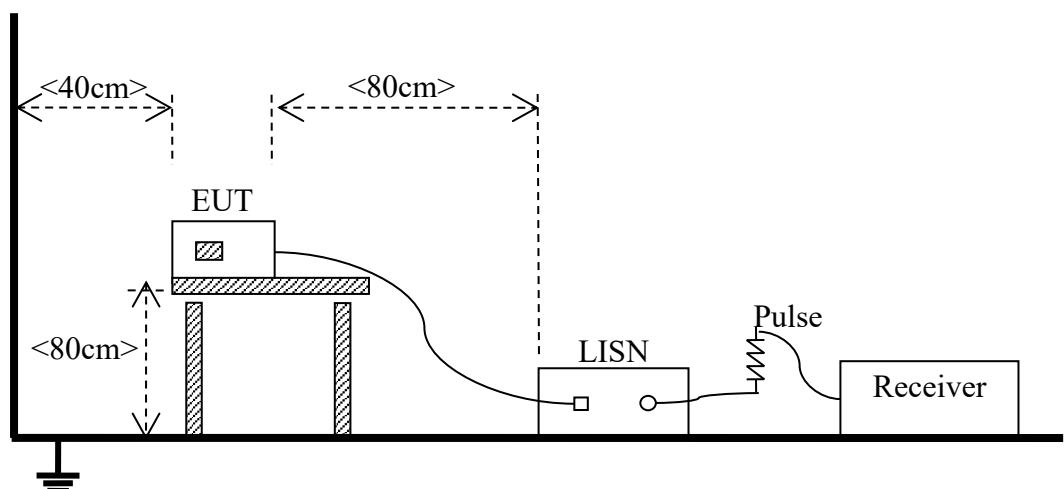


For Radiated Emission Test (Below 30 MHz))

### 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 ( $\mu$ V/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 ( $\text{dB}\mu\text{V}/\text{m}$ ) =  $20 \times \log [\text{Field Strength} (\mu\text{V}/\text{m})]$ .
- 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  $\text{dB}\mu\text{V}/\text{m}$ @3 m (AV) and 74  $\text{dB}\mu\text{V}/\text{m}$ @3 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 =  $20 \times \log (2400/f) + 40 \log (d_{\text{limit}}/d_{\text{measure}})$  where limit = 300m, dmeasure=10m. limit @10m =  $20 \times \log (2400/9) + 40 \log (300/10) = 107.5$  ( $\text{dB}\mu\text{V}/\text{m}$ ).
- 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 =  $20 \times \log (100) + 20 \log (d_{\text{limit}}/d_{\text{measure}})$  where limit = 3m, dmeasure=10m. limit @10m =  $20 \times \log (100) + 20 \log (3/10) = 29.5$  ( $\text{dB}\mu\text{V}/\text{m}$ ).

##### 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.

## NOTE:

1. Results (dBuV/m) = Reading (dBuV/m) + Factor (dB/m)

The reading level is calculated by software which is not shown in the sheet

2. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain (dB)

3. Over limit = Results – Limit.

## 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  $50\ \Omega/50\ \mu\text{H}$  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.

NOTE:

1. Results (dB $\mu$ V) = Reading (dB $\mu$ V) + Factor (dB/m)

The reading level is calculated by software which is not shown in the sheet

2. Factor = Insertion loss + Cable loss

3. Over limit = Results – Limit.

### 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 ( $10 \log 1\% = 20$  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 = between 2 and 5 times the OBW

RBW = 1%~5% of the OBW

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

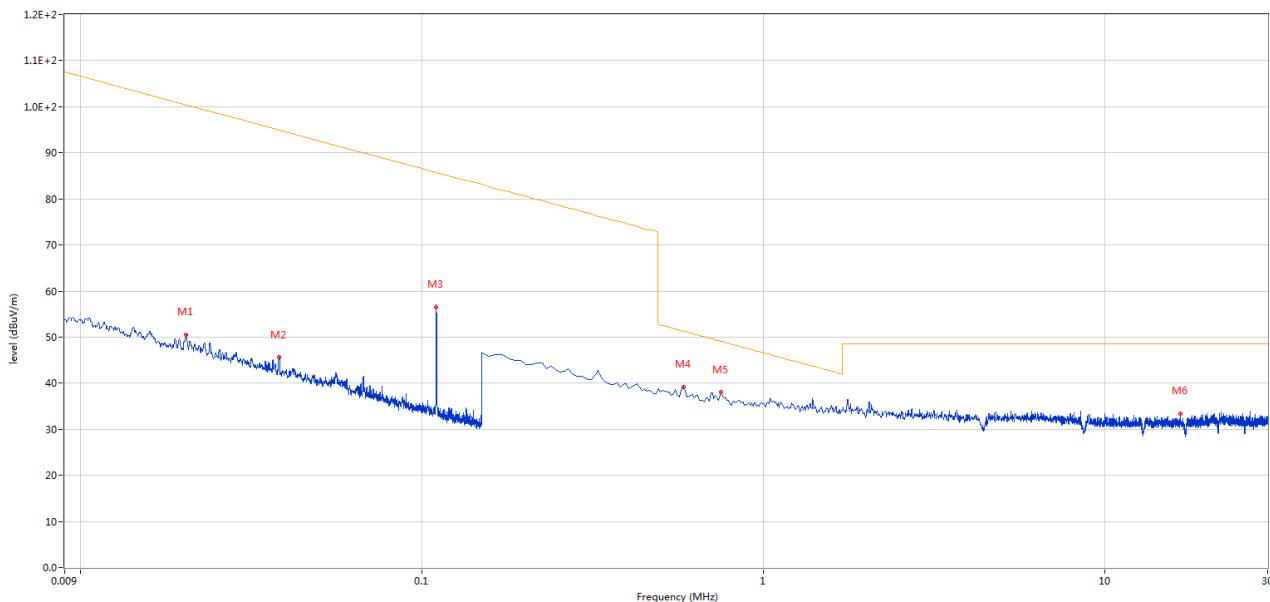
### A.1 Radiated Emission

Note <sup>1</sup>: The symbol of “--” in the table which means not application.

Note <sup>2</sup>: 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.

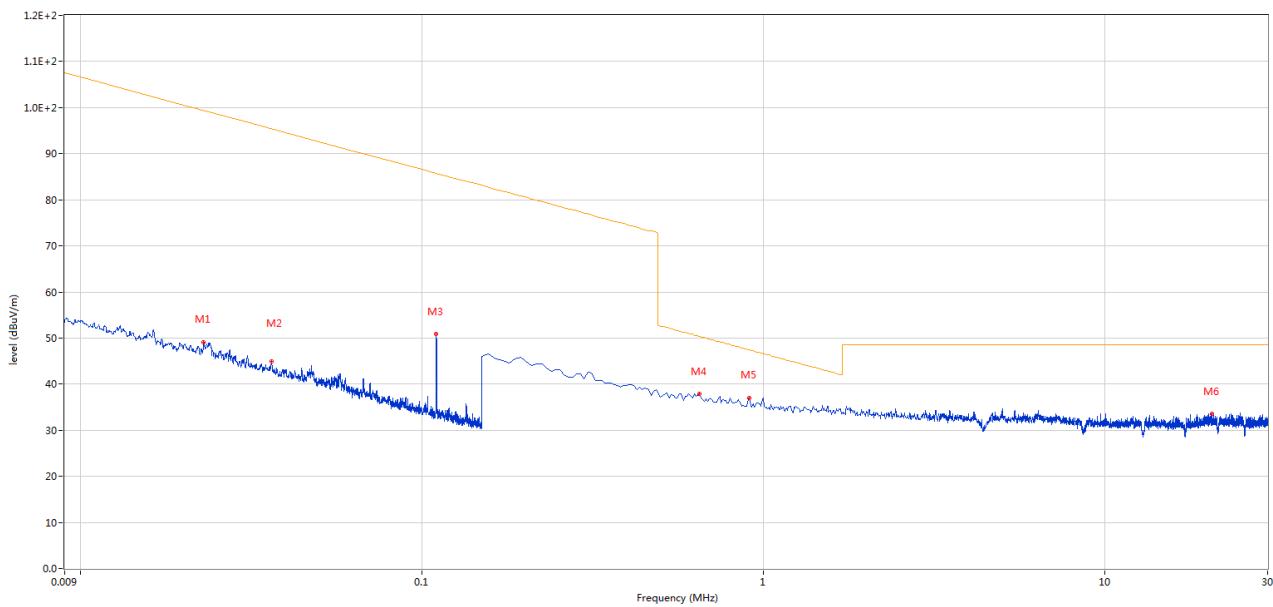
#### Test Data and Plots

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



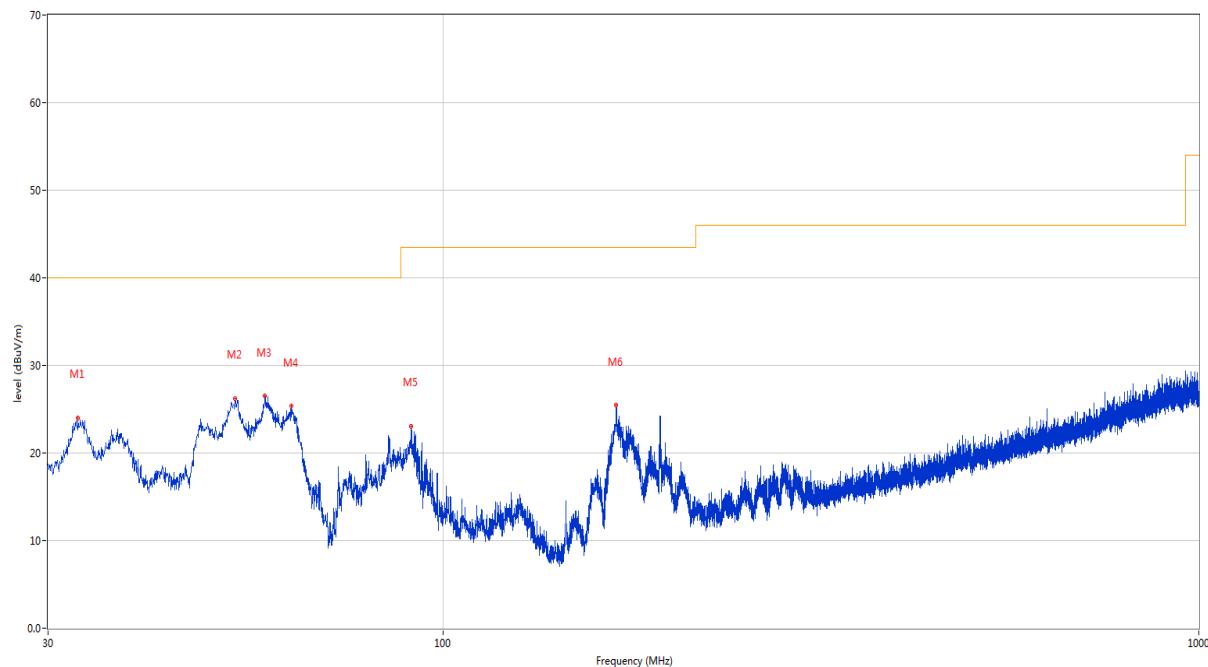
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	0.020	50.30	20.20	100.4	-50.10	Peak	299.00	100	Vertical	Pass
2	0.038	45.51	20.23	95.0	-49.49	Peak	219.00	100	Vertical	Pass
3	0.110	56.96	20.16	85.8	-28.84	Peak	112.00	100	Vertical	N/A
4	0.583	39.18	20.32	51.3	-12.12	Peak	360.00	100	Vertical	Pass
5	0.754	38.03	20.43	49.1	-11.07	Peak	35.00	100	Vertical	Pass
6	16.642	33.39	20.92	48.5	-15.11	Peak	105.00	100	Vertical	Pass

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



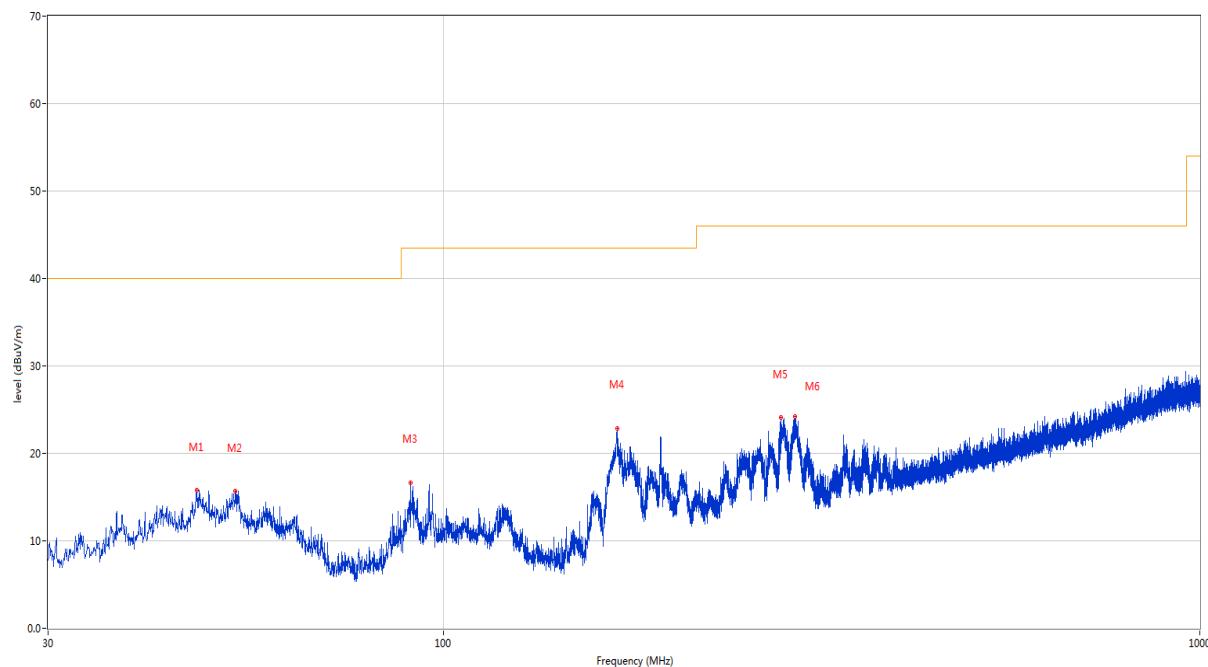
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	0.023	48.80	20.23	99.4	-50.60	Peak	316.00	100	Horizontal	Pass
2	0.036	44.59	20.22	95.4	-50.81	Peak	131.00	100	Horizontal	Pass
3	0.110	50.89	20.16	85.8	-34.91	Peak	219.00	100	Horizontal	N/A
4	0.650	37.81	20.36	50.3	-12.49	Peak	132.00	100	Horizontal	Pass
5	0.911	36.98	20.52	47.4	-10.42	Peak	141.00	100	Horizontal	Pass
6	20.642	33.51	21.17	48.5	-14.99	Peak	35.00	100	Horizontal	Pass

## A.1.3 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	32.861	24.03	-26.43	40.0	-15.97	Peak	319.90	100	Vertical	Pass
2	52.989	26.23	-23.00	40.0	-13.77	Peak	99.30	100	Vertical	Pass
3	58.081	26.50	-24.11	40.0	-13.50	Peak	86.20	100	Vertical	Pass
4	62.931	25.36	-24.76	40.0	-14.64	Peak	94.80	100	Vertical	Pass
5	90.771	23.06	-25.93	43.5	-20.44	Peak	145.30	100	Vertical	Pass
6	169.292	25.44	-26.94	43.5	-18.06	Peak	311.80	100	Vertical	Pass

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



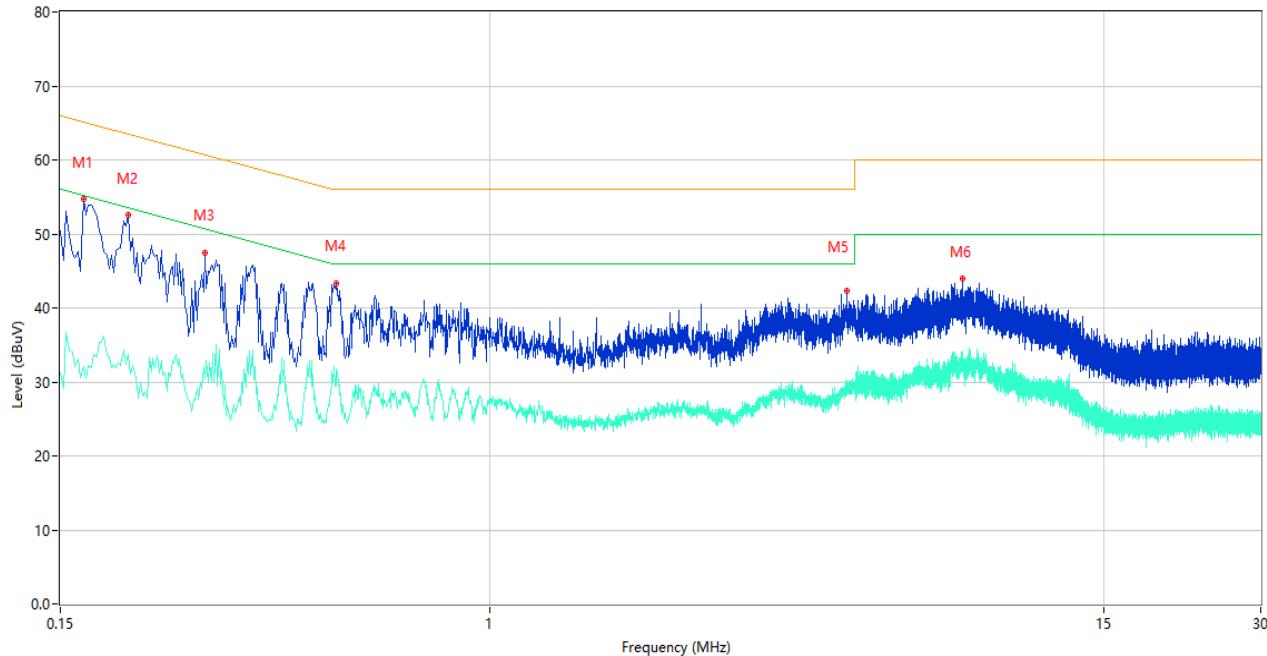
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	47.169	15.77	-22.84	40.0	-24.23	Peak	1.00	200	Horizontal	Pass
2	53.038	15.65	-23.00	40.0	-24.35	Peak	1.00	200	Horizontal	Pass
3	90.479	16.67	-26.00	43.5	-26.83	Peak	153.50	200	Horizontal	Pass
4	169.826	22.87	-26.80	43.5	-20.63	Peak	282.00	200	Horizontal	Pass
5	279.533	24.08	-21.82	46.0	-21.92	Peak	265.10	100	Horizontal	Pass
6	291.560	24.18	-21.56	46.0	-21.82	Peak	92.50	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.

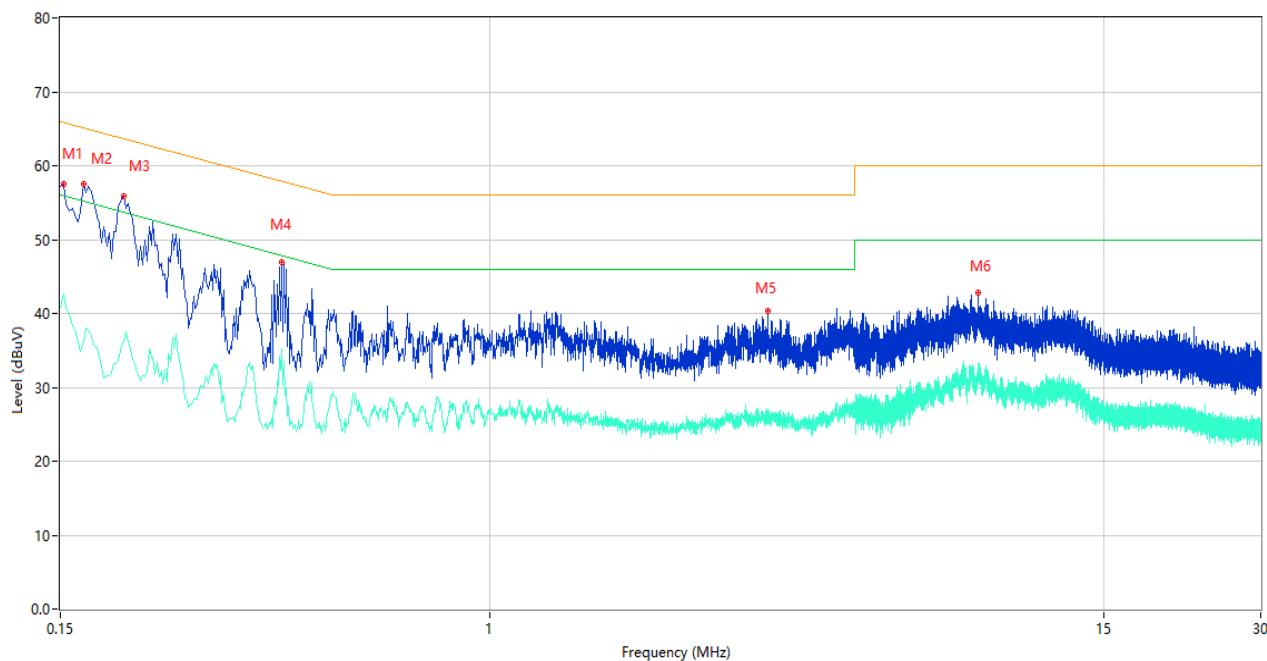
### Test Data and Plots

#### A.2.1 L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.166	54.71	10.40	65.16	-10.45	Peak	L	Pass
1**	0.166	32.13	10.40	55.16	-23.03	AV	L	Pass
2	0.202	52.51	10.38	63.53	-11.02	Peak	L	Pass
2**	0.202	33.73	10.38	53.53	-19.80	AV	L	Pass
3	0.284	47.50	10.34	60.70	-13.20	Peak	L	Pass
3**	0.284	30.49	10.34	50.70	-20.21	AV	L	Pass
4	0.508	43.39	10.30	56.00	-12.61	Peak	L	Pass
4**	0.508	29.40	10.30	46.00	-16.60	AV	L	Pass
5	4.830	42.29	10.31	56.00	-13.71	Peak	L	Pass
5**	4.830	29.60	10.31	46.00	-16.40	AV	L	Pass
6	8.064	43.98	10.36	60.00	-16.02	Peak	L	Pass
6**	8.064	32.48	10.36	50.00	-17.52	AV	L	Pass

## A.2.2 N Phase

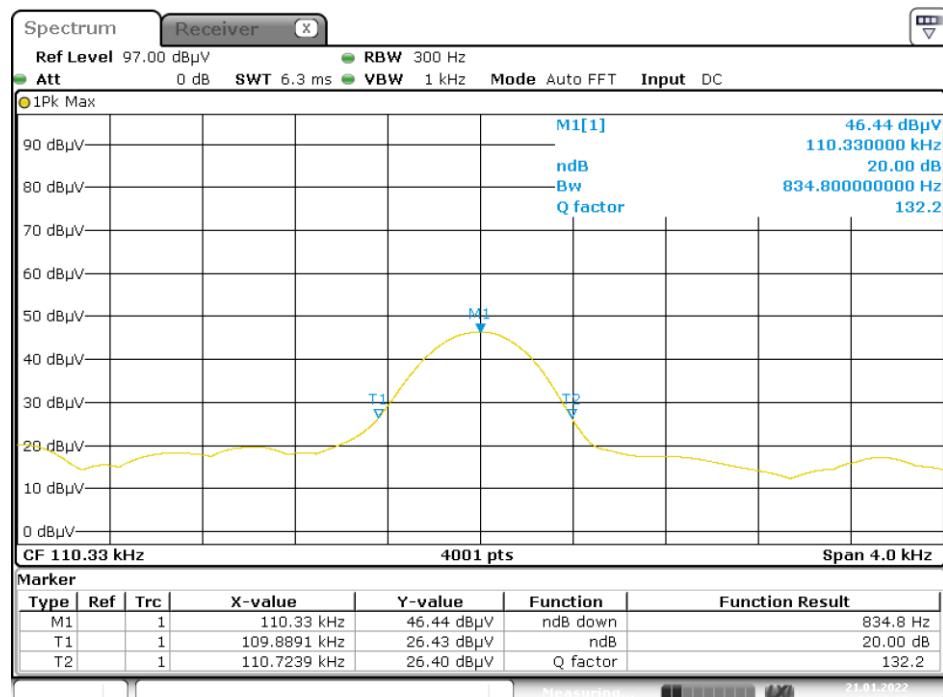


No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.152	57.59	10.41	65.89	-8.30	Peak	N	Pass
1**	0.152	42.70	10.41	55.89	-13.19	AV	N	Pass
2	0.166	57.52	10.40	65.16	-7.64	Peak	N	Pass
2**	0.166	36.18	10.40	55.16	-18.98	AV	N	Pass
3	0.198	55.92	10.38	63.69	-7.77	Peak	N	Pass
3**	0.198	36.30	10.38	53.69	-17.39	AV	N	Pass
4	0.398	46.92	10.31	57.90	-10.98	Peak	N	Pass
4**	0.398	35.16	10.31	47.90	-12.74	AV	N	Pass
5	3.406	40.27	10.27	56.00	-15.73	Peak	N	Pass
5**	3.406	26.41	10.27	46.00	-19.59	AV	N	Pass
6	8.612	42.89	10.36	60.00	-17.11	Peak	N	Pass
6**	8.612	32.40	10.36	50.00	-17.60	AV	N	Pass

### A.3 20 dB Bandwidth

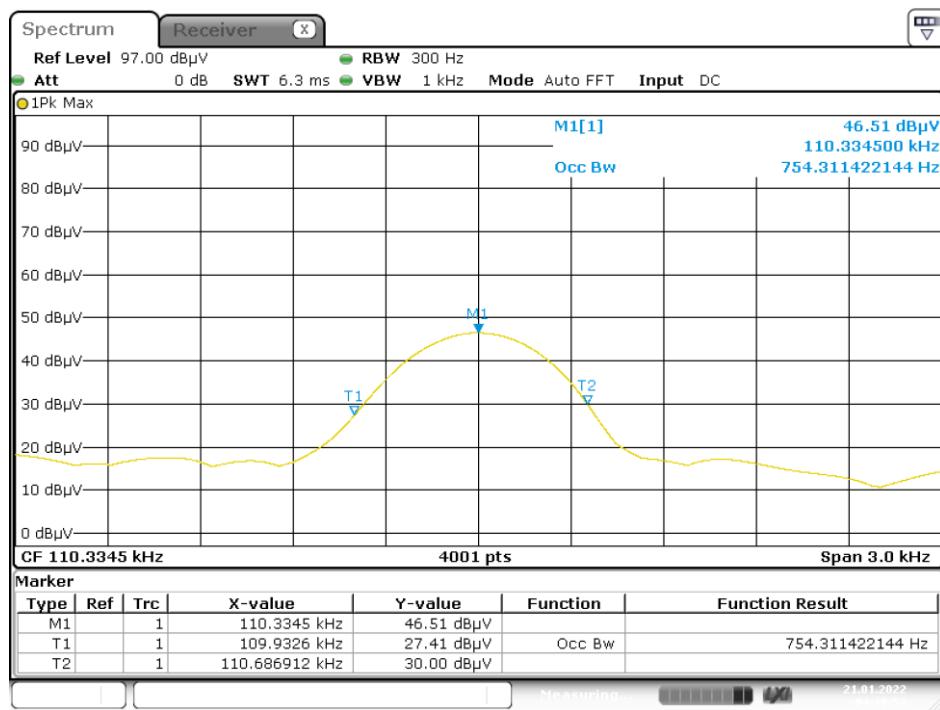
Note: Because the measured signal is CW adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

#### Test Data and Plots



99% Occupied Bandwidth

### Test Data and Plots



Date: 21.JAN.2022 04:10:53

## **ANNEX B TEST SETUP PHOTOS**

Please refer the document "BL-SZ210589-AE-3.PDF".

## **ANNEX C EUT EXTERNAL PHOTOS**

Please refer the document "BL-SZ2190589-AW.PDF".

## **ANNEX D EUT INTERNAL PHOTOS**

Please refer the document "BL-SZ2190589-AI.PDF".

--END OF REPORT--