

FCC - TEST REPORT

Report Number : **68.950.19.3047.01** Date of Issue: **February 14, 2020**

Model : **C301ANA**

Product Type : **OnePlus Warp Charge 30 Wireless Charger**

Brand name : **ONEPLUS**

Applicant : **OnePlus Technology (Shenzhen) Co., Ltd.**

Address : **18C02, 18C03, 18C04 and 18C05, Shum Yip Terra Building, Binhe**
: **Avenue North, Futian District, Shenzhen P.R.China**

Manufacturer : **OnePlus Technology (Shenzhen) Co., Ltd.**

Address : **18C02, 18C03, 18C04 and 18C05, Shum Yip Terra Building, Binhe**
: **Avenue North, Futian District, Shenzhen P.R.China**

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including Appendices : **18**

TÜV SÜD Certification and Testing (China) Co., Ltd. – Shenzhen Branch is a subcontractor to TÜV SÜD Product Service GmbH according to the principles outlined in ISO 17025.

TÜV SÜD Certification and Testing (China) Co., Ltd. – Shenzhen Branch reports apply only to the specific samples tested under stated test conditions. Construction of the actual test samples has been documented. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. The manufacturer/importer is responsible to the Competent Authorities in Europe for any modifications made to the production units which result in non-compliance to the relevant regulations. TÜV SÜD Certification and Testing (China) Co., Ltd. – Shenzhen Branch shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD Certification and Testing (China) Co., Ltd. – Shenzhen Branch issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval

1. Table of Contents

1.	Table of Contents	2
2.	Details about the Test Laboratory	3
3.	Description of the Equipment Under Test	4
4.	Summary of Test Standards.....	5
5.	Summary of Test Results.....	6
6.	General Remarks.....	7
7.	Test Setups	8
8.	Technical Requirement	9
8.1	Conducted Emission Test	9
8.2	Radiated Emission Test for 9KHz-30MHz.....	12
8.3	Radiated Emission Test for 30MHz-1GHz	15
9.	Test Equipment List	17
10.	Measurement System Uncertainty.....	18



2. Details about the Test Laboratory

Details about the Test Laboratory

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

FCC Registration Number: 514049

Telephone: 86 755 8828 6998
Fax: 86 755 8828 5299

3. Description of the Equipment Under Test

Product:	OnePlus Warp Charge 30 Wireless Charger
Model no.:	C301ANA
FCC ID:	2ABZ2-C301ANA
Rating:	Input:100-240V ~ 50/60Hz 1.2A; Output: 30W(max)
RF Transmission Frequency:	110-145KHz
Antenna Type:	Integrated coil antenna
Antenna gain:	0dBi
Description of the EUT:	The Equipment Under Test (EUT) is a wireless charger which operated at 110-145KHz.

4. Summary of Test Standards

Test Standards	
FCC Part 18 10-1-18 Edition	Industrial, Scientific, and Medical equipment

5. Summary of Test Results

Technical Requirements			
FCC Part 18 10-1-18 Edition			
Test Condition		Pages	Test Result
§18.307	Conducted emission AC power port	10	Pass
§18.301	Operating frequencies	--	N/A
§18.305	Field strength	15	Pass
§18.309	Frequency range	See note 2	Pass
§18.303	Prohibited frequency bands	See note 3	Pass

Note 1: N/A=Not Applicable.

Note 2: Because the highest frequency of the internal sources of the EUT is less than 108MHz, so the measurement only is made up to 1GHz.

Note 3: The fundamental frequency of this product is 110-145kHz. Outside the band specified of §18.303, it is considered sufficiently to comply with the provisions of this section.

6. General Remarks

Remarks

This submittal(s) (test report) complies with FCC Part 18.

SUMMARY:

All tests according to the regulations cited on page 5 were

n - Performed

o - **Not** Performed

The Equipment under Test

n - **Fulfills** the general approval requirements.

o - **Does not** fulfill the general approval requirements.

Sample Received Date: December 28, 2019

Testing Start Date: December 28, 2019

Testing End Date: January 20, 2020

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by:



John Zhi
Project Manager

Prepared by:



Moon Xiong
Project Engineer

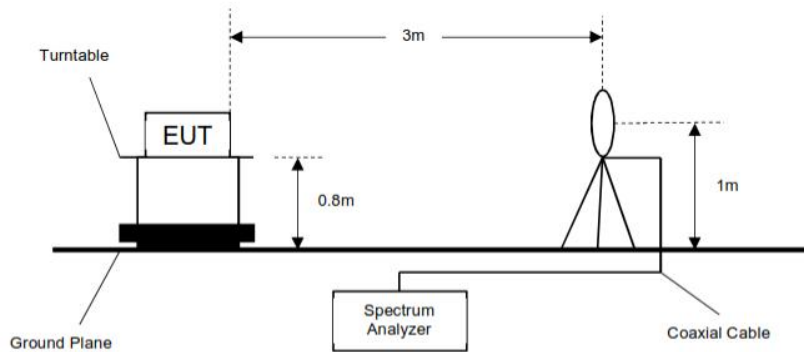
Tested by:



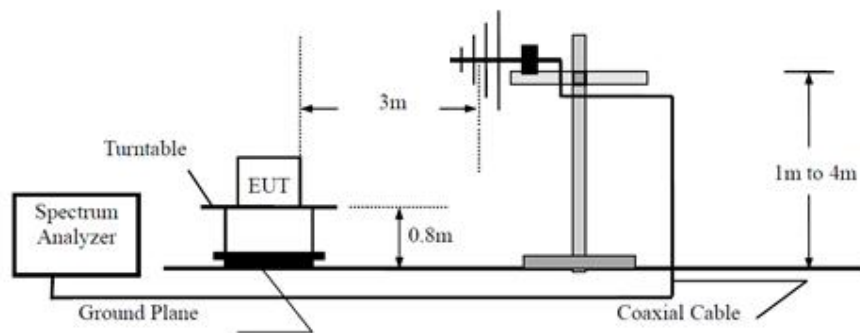
Tree Zhan
Test Engineer

7. Test Setups

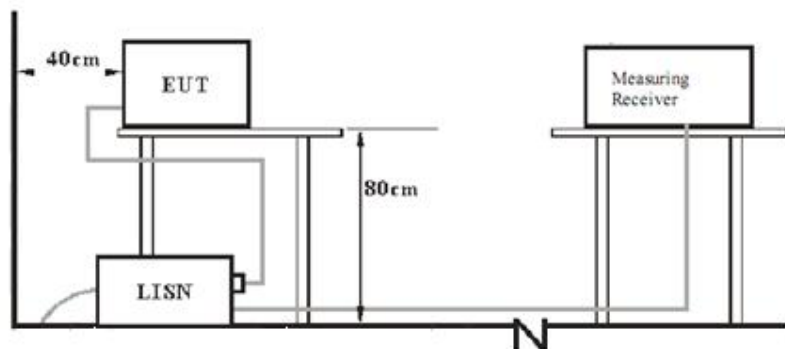
Below 30MHz



30MHz-1GHz



AC Power Line Conducted Emission test setups



8. Technical Requirement

8.1 Conducted Emission Test

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through an Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

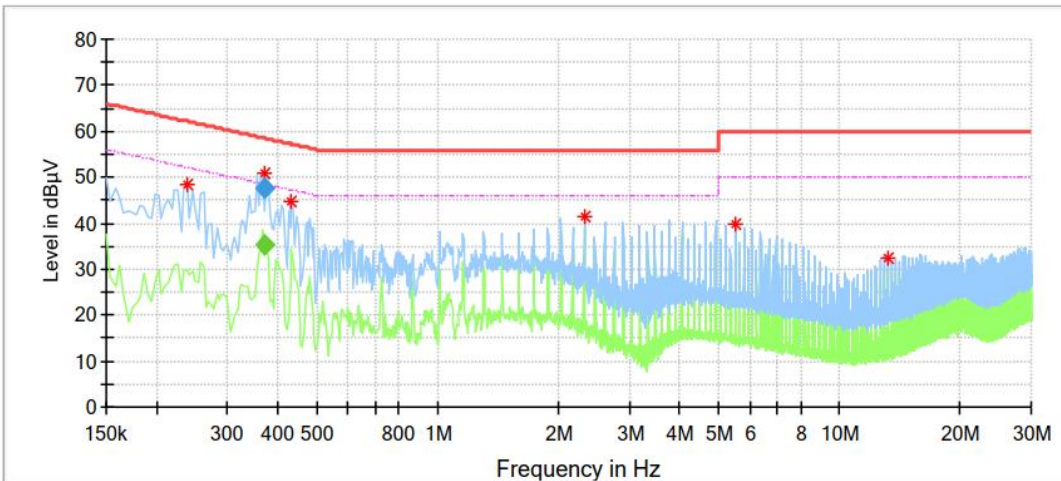
According to §18.307, conducted emissions limit as below:

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreasing linearly with logarithm of the frequency

Conducted Emission

Model: C301ANA
 Test mode: Normal working
 Test Voltage: AC 120V/60Hz
 Project No/Sample ID: 68.950.19.3047.01
 Remark: /



Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.238000	48.23	---	62.17	13.94	L1	9.5
0.369500	50.85	---	58.41	7.56	L1	9.5
0.434000	44.65	---	57.18	12.53	L1	9.5
2.318000	41.52	---	56.00	14.48	L1	9.6
5.506000	39.84	---	60.00	20.16	L1	9.7
13.182000	32.53	---	60.00	27.47	L1	9.7

Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.369500	---	35.45	48.51	13.06	L1	9.5
0.369500	47.40	---	58.51	11.11	L1	9.5

Remark:

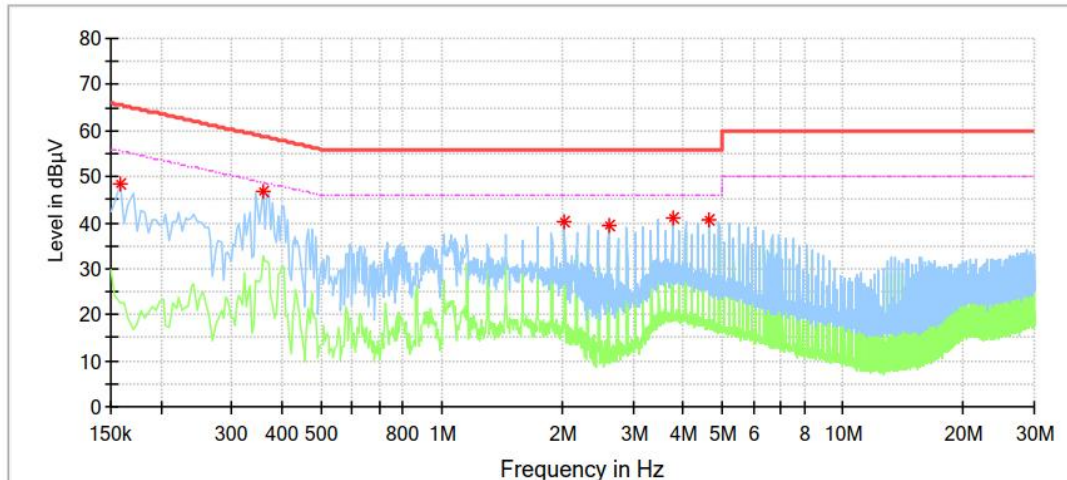
Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

Conducted Emission

Model: C301ANA
 Test mode: Normal working
 Test Voltage: AC 120V/60Hz
 Project No/Sample ID: 68.950.19.3047.01
 Remark: /



Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.158000	48.29	---	65.57	17.28	N	9.5
0.358000	46.81	---	58.78	11.96	N	9.6
2.026000	40.06	---	56.00	15.94	N	9.6
2.606000	39.39	---	56.00	16.61	N	9.6
3.766000	41.09	---	56.00	14.91	N	9.6
4.634000	40.65	---	56.00	15.35	N	9.7

Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
---	---	---	---	---		---

Remark:

Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

8.2 Radiated Emission Test for 9KHz-30MHz

Test Method

1: Field strength measurements are made in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna as specified in ANSI C63.4 clause 4.5.2, positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. This method is applicable for radiated radio-noise measurements from all units, cables, power cords, and interconnect cabling or wiring.

2: For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

Limits

According to §18.305, Field strength limit as below:

Equipment	Operating frequency	RF Power generated by equipment (watts)	Field strength limit (uV/m)	Distance (meters)
Any type unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500 500 or more	25 $25 \times \text{SQRT}(\text{power}/500)$	300 ¹ 300
	Any non-ISM frequency	Below 500 500 or more	15 $15 \times \text{SQRT}(\text{power}/500)$	300 ¹ 300
Industrial heaters and RF stabilized arc welders	On or below 5,725 MHz Above 5,725 MHz	Any Any	10 (²)	1,600 (²)
Medical diathermy	Any ISM frequency Any non-ISM frequency	Any Any	25 15	300 300
Ultrasonic	Below 490 kHz	Below 500 500 or more	$2,400/F(\text{kHz})$ $2,400/F(\text{kHz}) \times \text{SQRT}(\text{power}/500)$	300 ³ 300
	490 to 1,600 kHz Above 1,600 kHz	Any Any	$24,000/F(\text{kHz})$ 15	30 30
Induction cooking ranges	Below 90 kHz	Any	1,500	⁴ 30
	On or above 90 kHz	Any	300	⁴ 30
¹ Field strength may not exceed 10 $\mu\text{V}/\text{m}$ at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts. ² Reduced to the greatest extent possible. ³ Field strength may not exceed 10 $\mu\text{V}/\text{m}$ at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts. ⁴ Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.				

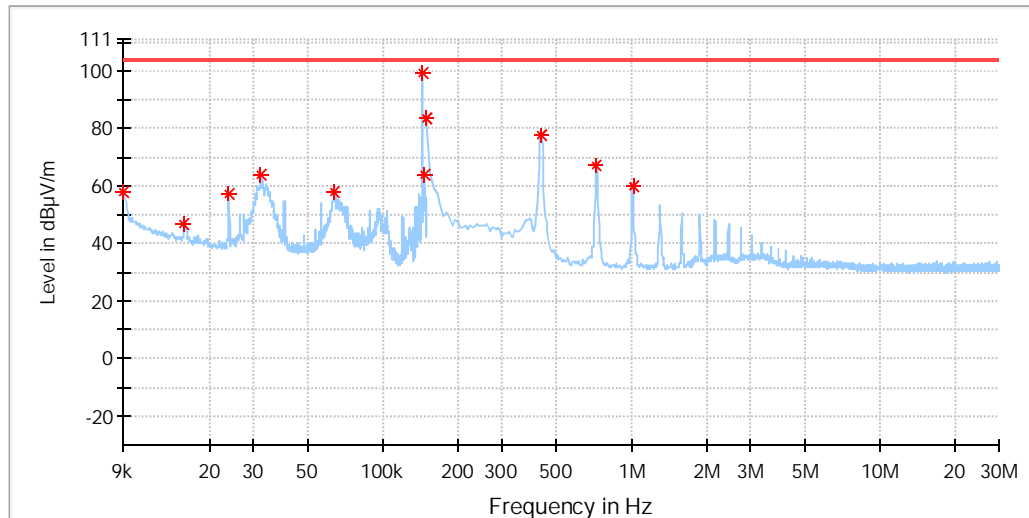
Note 1: Limit $3\text{m}(\text{dB}\mu\text{V}/\text{m}) = \text{Limit } 300\text{m}(\text{dB}\mu\text{V}/\text{m}) + 40\text{Log}(300\text{m}/3\text{m})$ (Below 30MHz)

Note 2: Limit $3\text{m}(\text{dB}\mu\text{V}/\text{m}) = \text{Limit } 300\text{m}(\text{dB}\mu\text{V}/\text{m}) + 20\text{Log}(300\text{m}/3\text{m})$ (Above 30MHz)

Note 3: this product is a wireless charger which operated at 111-148kHz with data transmission. So, it belongs to miscellaneous with non-SIM frequency.

Radiated Emission for 9KHz-30MHz

Model: C301ANA
 Test Mode: Charging
 Test Voltage: AC 120V/60Hz
 Project No./Sample ID: 68.950.19.3047.01
 Remark: /



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)	Corr. (dB/m)
0.009000	57.67	103.50	45.83	H	77.0	21
0.015862	46.96	103.50	56.54	H	328.0	20
0.023993	57.45	103.50	46.05	H	0.0	20
0.032171	63.97	103.50	39.53	H	343.0	20
0.063473	58.12	103.50	45.38	H	359.0	20
0.144877	99.07	103.50	4.43	H	0.0	20
0.146898	63.76	103.50	39.74	H	9.0	20
0.150000	83.32	103.50	20.18	H	2.0	20
0.433575	77.46	103.50	26.04	H	2.0	20
0.722125	67.06	103.50	36.44	H	2.0	20
1.010675	59.69	103.50	43.81	H	0.0	20

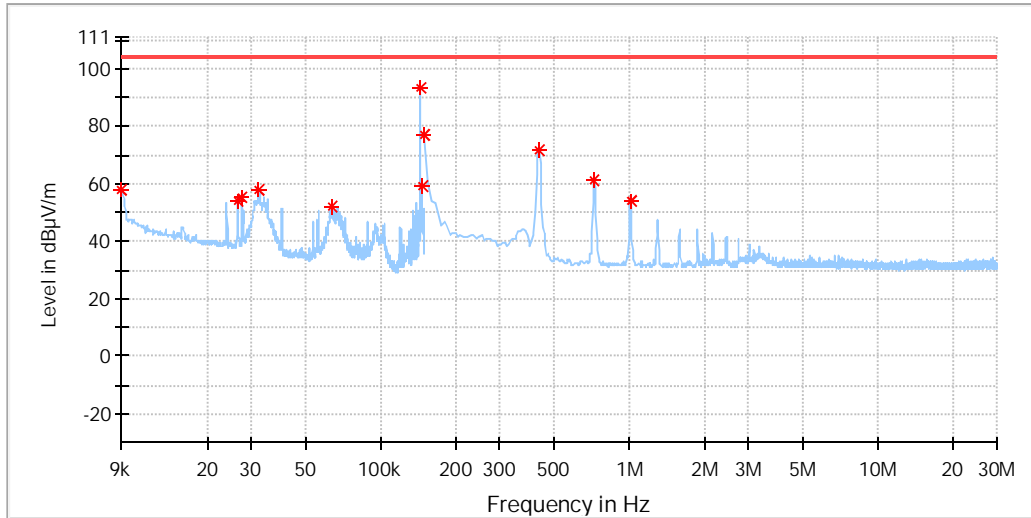
Remark:

Level=Reading Level + Correction Factor

Correction Factor=Antenna Factor + Cable Loss

(The Reading Level is recorded by software which is not shown in the sheet)

Model: C301ANA
 Test Mode: Charging
 Test Voltage: AC 120V/60Hz
 Project No./Sample ID: 68.950.19.3047.01
 Remark: /



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Azimuth (deg)	Corr. (dB/m)
0.009000	57.64	103.50	45.86	V	100.0	21
0.026531	54.07	103.50	49.43	V	278.0	20
0.027612	55.00	103.50	48.50	V	264.0	20
0.032312	57.86	103.50	45.64	V	35.0	20
0.063332	52.29	103.50	51.21	V	285.0	20
0.144736	93.18	103.50	10.32	V	299.0	20
0.146710	59.17	103.50	44.33	V	314.0	20
0.150000	76.97	103.50	26.53	V	316.0	20
0.433575	71.72	103.50	31.78	V	301.0	20
0.722125	61.38	103.50	42.12	V	301.0	20
1.010675	54.13	103.50	49.37	V	301.0	20

Remark:

Level=Reading Level + Correction Factor

Correction Factor=Antenna Factor + Cable Loss

(The Reading Level is recorded by software which is not shown in the sheet)

8.3 Radiated Emission Test for 30MHz-1GHz

Test Method

- 1: The EUT was placed on a turn table which is 0.8m above ground for below 1GHz at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5: Use the following spectrum analyzer settings According to C63.4:
 Span = wide enough to capture the peak level of the in-band emission and all spurious
 RBW = 100 KHz, VBW ≥ RBW for peak measurement, Sweep = auto, Detector function = peak,
 Trace = max hold.

Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.

Limits

According to §18.305, Field strength limit as below:

Equipment	Operating frequency	RF Power generated by equipment (watts)	Field strength limit (μV/m)	Distance (meters)
Any type unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500 500 or more	25 25 × SQRT(power/500)	300 1300
	Any non-ISM frequency	Below 500 500 or more	15 15 × SQRT(power/500)	300 1300
Industrial heaters and RF stabilized arc welders	On or below 5,725 MHz Above 5,725 MHz	Any Any	10 (²)	1,600 (²)
Medical diathermy	Any ISM frequency Any non-ISM frequency	Any Any	25 15	300 300
Ultrasonic	Below 490 kHz	Below 500 500 or more	2,400/F(kHz) 2,400/F(kHz) × SQRT(power/500)	300 ³ 300
	490 to 1,600 kHz Above 1,600 kHz	Any Any	24,000/F(kHz) 15	30 30
Induction cooking ranges	Below 90 kHz	Any	1,500	⁴ 30
	On or above 90 kHz	Any	300	⁴ 30
¹ Field strength may not exceed 10 μV/m at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts. ² Reduced to the greatest extent possible. ³ Field strength may not exceed 10 μV/m at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts. ⁴ Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.				

Note 1: Limit 3m(dBμV/m)=Limit 300m(dBμV/m)+40Log(300m/3m) (Below 30MHz)

Note 2: Limit 3m(dBμV/m)=Limit 300m(dBμV/m)+20Log(300m/3m) (Above 30MHz)

Note 3: this product is a wireless charger which operated at 111-148kHz with data transmission. So, it belongs to miscellaneous with non-SIM frequency.

Radiated Emission

Model: C301ANA
 Test Mode: Charging Mode
 Test Voltage: AC 120V/60Hz
 Project No./Sample ID: 68.950.19.3047.01

Frequency Band	Frequency MHz	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Margin dBμV/m	Correct factor (dB)	Result
30MHz-1000MHz	97.354375	24.63	H	63.52	QP	38.89	16	Pass
	126.515000	27.66	H	63.52	QP	35.86	13	Pass
	186.958125	32.15	H	63.52	QP	31.37	15	Pass
	299.660000	33.09	H	63.52	QP	30.43	19	Pass
	430.428125	28.81	H	63.52	QP	34.71	22	Pass
	641.463750	29.94	H	63.52	QP	33.58	26	Pass
	33.152500	34.62	V	63.52	QP	28.9	14	Pass
	45.701875	33.63	V	63.52	QP	29.89	18	Pass
	97.111875	25.71	V	63.52	QP	37.81	16	Pass
	147.551875	25.55	V	63.52	QP	37.97	12	Pass
	299.599375	30.73	V	63.52	QP	32.79	19	Pass
	620.366250	33.19	V	63.52	QP	30.33	26	Pass

Remark:

- 1) Level=Reading Level + Correction Factor
- 2) Correction Factor=Antenna Factor + Cable Loss
- 3) The Reading Level is recorded by software which is not shown in the sheet
- 4) The worst case data were reported and no other spurious and harmonics emissions were reported greater than listed emission above table.

9. Test Equipment List

Radiated Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	68-4-74-14-002	101269	2020-6-28
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	68-4-80-14-002	707	2020-8-20
Horn Antenna	Rohde & Schwarz	HF907	68-4-80-14-005	102294	2020-6-22
Loop Antenna	Rohde & Schwarz	HFH2-Z2	68-4-80-14-006	100398	2020-7-7
Pre-amplifier	Rohde & Schwarz	SCU 18	68-4-29-14-001	102230	2020-6-28
Signal Generator	Rohde & Schwarz	SMY01	68-4-48-16-001	839369/005	2020-6-28
Attenuator	Agilent	8491A	68-4-81-16-001	MY39264334	2020-6-28
3m Semi-anechoic chamber	TDK	9X6X6	68-4-90-14-001	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	68-4-90-14-001-A10	Version9.15.00	N/A

Conducted Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	68-4-74-14-001	101782	2020-6-28
LISN	Rohde & Schwarz	ENV4200	8-4-87-14-001	100249	2020-6-28
LISN	Rohde & Schwarz	ENV432	68-4-87-16-001	101318	2020-7-19
LISN	Rohde & Schwarz	ENV216	68-4-87-14-002	100326	2020-6-28
ISN	Rohde & Schwarz	ENY81	68-4-87-14-003	100177	2020-6-28
ISN	Rohde & Schwarz	ENY81-CA6	68-4-87-14-004	101664	2020-6-28
High Voltage Probe	Rohde & Schwarz	TK9420(VT9420)	68-4-27-14-001	9420-584	2020-6-24
RF Current Probe	Rohde & Schwarz	EZ-17	68-4-27-14-002	100816	2020-7-2
Attenuator	Shanghai Huaxiang	TS2-26-3	68-4-81-16-003	080928189	2020-6-28
Test software	Rohde & Schwarz	EMC32	68-4-90-14-003-A10	Version9.15.00	N/A

10. Measurement System Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Items	Extended Uncertainty
Uncertainty for Conducted Emission 9kHz-150KHz	3.62dB
Uncertainty for Radiated Emission in 3m chamber 9KHz-30MHz	4.76dB
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 5.12dB; Vertical: 5.10dB;