

EMI TEST REPORT

FCC VERIFICATION

Applicant:

CNA Co., Ltd

160, Hangeyo-ro, Paldal-gu, Suwon-si,
Gyeonggi-do, Republic of Korea**Date of Issue: August 14, 2018****Test Report No. HCT-EM-1807-FC014-R2****Test Site: HCT CO., LTD.****MODEL:****XCAN**

Rule Part(s) / Standard(s): FCC CFR 47 PART 15 Subpart B Class B
ANSI C63.4-2014

EUT Type: Wireless Charger

Manufacturer: EMW

Date of Test: July 06, 2018 to July 09, 2018

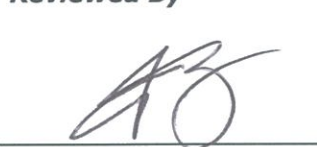
The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2014. (See Test Report if any modifications were made for compliance)

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

HCT certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

Tested By

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REVISION HISTORY

The revision history for this document is shown in table.

Test Report No.	Issue Date	Description
HCT-EM-1807-FC014	July 23, 2018	Initial Release
HCT-EM-1807-FC014-R1	August 01, 2018	Changed the client address
HCT-EM-1807-FC014-R2	August 14, 2018	Removing test setup-photo from test report



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1. GENERAL INFORMATION

1.1 Description of EUT

The EUT is LTE Mobile Router

Model	XCAN
EUT Type	Wireless Charger
Power Rating	DC 5V
Frequency	Min: 110 kHz, Initial: 130 kHz, MAX: 146 kHz
Manufacturer Information	EMW 155 Namdongseo-ro, Namdong-gu, Incheon, Korea

1.2 Related Submittal(s) / Grant(s)

Original submittal only.

1.3 Test Facility

Test site is located at 74, SEOICHEON-RO, 578BEON-GIL, MAJANG-MYEON, ICHEON-SI, GYEONGGI-DO, SOUTH KOREA. Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4-2014. The Normalized site attenuations (30 MHz to 1GHz) and Site validation (1 GHz to 18 GHz) were performed in accordance with the standard in ANSI C63.4-2014

Measurement Facilities	Registration Number
Radiated Field strength measurement facility 3 m Semi Anechoic chamber	90661
Radiated Field strength measurement facility 10 m Semi Anechoic chamber	

1.4 Instrument Calibration

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturers recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2006).



1.5 Tested System Details

All equipment descriptions used in the tested system (including inserted cards) are:

Equipment	Model No.	Serial Number	Manufacturer
EUT	XCAN	-	EMW
Smart Phone	SM-G955N	R39J40H6BHR	SAMSUNG
TA	MCS-01KP	PD77050350	WEIHAI PNTELECOM

1.6 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	DC IN	Y	N/A	1.2

* The marked “(D)” means the data cable and “(P)” means the power cable.

1.7 Noise Suppression Parts on Cable. (I/O Cable)

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	DC IN	N/A	N/A	Y	Both end



2. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014.

All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Emission (0.15 MHz to 30 MHz)	1.82 dB ($k = 2$)
3 m Radiated Emissions (30 MHz to 1 GHz)	5.20 dB ($k = 2$)
3 m Radiated Emissions (1 GHz to 18 GHz)	5.24 dB ($k = 2$)
3 m Radiated Emissions (18 GHz to 40 GHz)	5.40 dB ($k = 2$)



3. DESCRIPTION OF TEST

3.1 Measurement of Conducted Emission

The test procedure was in accordance with ANSI C63.4-2014

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN).
If the EUT is connected to the PC through USB, the AC power-line adapter of the PC is directly connected to a line impedance stabilization network (LISN).
Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both conducted lines are measured in Quasi-Peak and Average mode, including the worst-case data points for each tested configuration.
- c. The frequency range from 150 kHz to 30 MHz was searched.

[Conducted Emission Limit]

Frequency (MHz)	Resolution Bandwidth (kHz)	Class A		Class B	
		Quasi-Peak (dBμV)	Average (dBμV)	Quasi-Peak (dBμV)	Average (dBμV)
0.15 to 0.5	9	79	66	66 to 56*	56 to 46*
0.5 to 5	9	73	60	56	46
5 to 30	9	73	60	60	50

**Decreases with the logarithm of the frequency.*



3.2 Measurement of Radiated Emission

The test procedure was in accordance with ANSI C63.4-2014

- The EUT was placed on the top of a turn table 0.8 meters above the ground at a semi anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from 1 m to 4 m 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.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 m to 4 m and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Quasi-Peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- The test-receiver system was set to Peak and Average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.(1 GHz to 40 GHz)

[Radiated Emission Limits]

Frequency (MHz)	Class A			Class B		
	Antenna Distance (m)	Field Strength ($\mu\text{V/m}$)	Quasi-Peak (dB $\mu\text{V/m}$)	Antenna Distance (m)	Field Strength ($\mu\text{V/m}$)	Quasi-Peak (dB $\mu\text{V/m}$)
30 to 88	10	90	39.0	3	100	40.0
88 to 216	10	150	43.5	3	150	43.5
216 to 960	10	210	46.4	3	200	46.0
Above 960	10	300	49.5	3	500	54.0
Frequency (MHz)	Antenna Distance (m)	Class A		Class B		
		Peak (dB $\mu\text{V/m}$)	Average (dB $\mu\text{V/m}$)	Peak (dB $\mu\text{V/m}$)	Average (dB $\mu\text{V/m}$)	
Above 1 000	3	80	60	74	54	

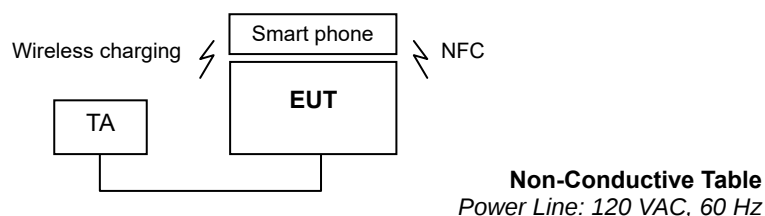


3.2.1 Frequency Range of Radiated Measurements

An unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a Radiated Emission limit is specified, up to the frequency shown in the following table

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705 to 108	1 000
108 to 500	2 000
500 to 1 000	5 000
Above 1 000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

3.3 Configuration of Tested System





4. PRELIMINARY TEST

4.1 Conducted Emission Test

During preliminary tests, the following operating mode was investigated:

Operation Mode: Charging & NFC mode

4.2 Radiated Emission Test

During preliminary tests, the following operating mode was investigated:

Operation Mode: Charging & NFC mode

NOTE.

Since the main clock of this product is less than 108MHz, we only tested for radiated emission below 1 GHz



5. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

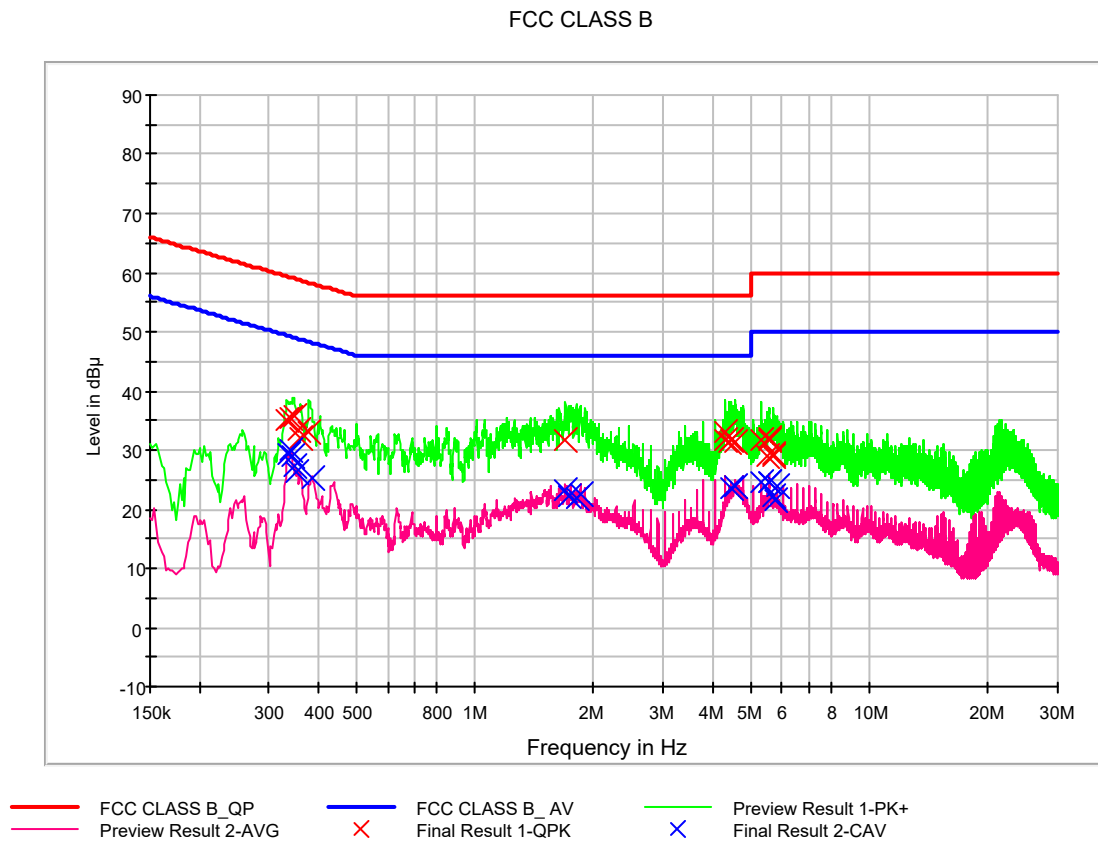
5.1 Conducted Emission Test

The test results of conducted emission at mains ports provide the following information:

Rule Part / Standard	FCC PART 15 Subpart B Class B
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 kHz (6 dB)
Operation Mode	Charging & NFC mode
Kind of Test Site	EMI Shielded Room
Temperature	23.7 °C
Relative Humidity	49.2 %
Test Date	July 06, 2018

- Calculation Formula:

1. Conductor L1 = Hot, Conductor N = Neutral
2. Corr. = LISN Factor + Cable Loss
3. QuasiPeak or CAverage= Receiver Reading + Corr.
4. Margin = Limit – QuasiPeak or CAverage

**Figure 1: Conducted Emission, AC Main Port, Line (L1)**



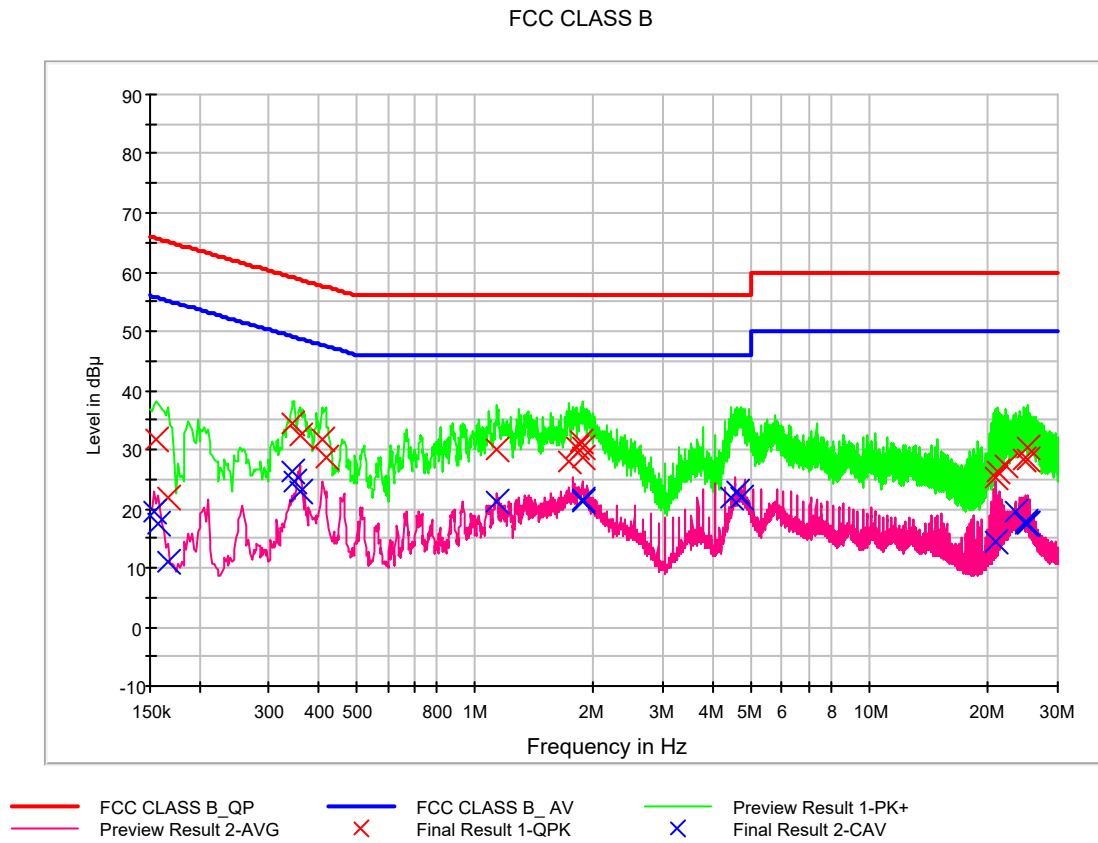
QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.334000	34.9	9.000	L1	9.6	24.4	59.4
0.342000	35.5	9.000	L1	9.6	23.7	59.2
0.348000	35.7	9.000	L1	9.6	23.3	59.0
0.358000	33.5	9.000	L1	9.6	25.2	58.8
0.362000	32.1	9.000	L1	9.6	26.5	58.7
0.380000	33.1	9.000	L1	9.6	25.2	58.3
1.698000	31.8	9.000	L1	9.7	24.2	56.0
4.288000	31.6	9.000	L1	9.8	24.4	56.0
4.292000	33.1	9.000	L1	9.8	22.9	56.0
4.416000	31.3	9.000	L1	9.8	24.7	56.0
4.476000	31.6	9.000	L1	9.8	24.4	56.0
4.574000	31.3	9.000	L1	9.8	24.7	56.0
5.300000	31.6	9.000	L1	9.8	28.4	60.0
5.474000	29.0	9.000	L1	9.8	31.0	60.0
5.552000	32.0	9.000	L1	9.8	28.0	60.0
5.556000	31.6	9.000	L1	9.8	28.4	60.0
5.678000	29.2	9.000	L1	9.9	30.8	60.0
5.694000	29.0	9.000	L1	9.9	31.0	60.0



CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.336000	29.5	9.000	L1	9.6	19.8	49.3
0.340000	30.0	9.000	L1	9.6	19.2	49.2
0.344000	28.8	9.000	L1	9.6	20.3	49.1
0.348000	27.3	9.000	L1	9.6	21.7	49.0
0.352000	26.2	9.000	L1	9.6	22.7	48.9
0.386000	25.1	9.000	L1	9.6	23.0	48.1
1.698000	23.1	9.000	L1	9.7	22.9	46.0
1.738000	22.2	9.000	L1	9.7	23.8	46.0
1.802000	22.0	9.000	L1	9.7	24.0	46.0
1.844000	22.7	9.000	L1	9.7	23.3	46.0
4.470000	23.6	9.000	L1	9.8	22.4	46.0
4.566000	23.7	9.000	L1	9.8	22.3	46.0
5.302000	24.5	9.000	L1	9.8	25.5	50.0
5.552000	24.7	9.000	L1	9.8	25.3	50.0
5.556000	24.5	9.000	L1	9.8	25.5	50.0
5.680000	22.1	9.000	L1	9.9	27.9	50.0
5.748000	21.5	9.000	L1	9.9	28.5	50.0
5.804000	23.8	9.000	L1	9.9	26.2	50.0

**Figure 2: Conducted Emission, AC Main Port, Line (N)**



QuasiPeak Final Result, Line (N)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.156000	31.6	9.000	N	9.6	34.1	65.7
0.166000	21.9	9.000	N	9.6	43.3	65.2
0.346000	34.3	9.000	N	9.6	24.8	59.1
0.360000	32.5	9.000	N	9.6	26.2	58.7
0.408000	31.7	9.000	N	9.6	25.9	57.7
0.418000	28.7	9.000	N	9.6	28.8	57.5
1.136000	30.0	9.000	N	9.7	26.0	56.0
1.732000	27.9	9.000	N	9.7	28.1	56.0
1.802000	30.2	9.000	N	9.7	25.8	56.0
1.854000	31.4	9.000	N	9.7	24.6	56.0
1.866000	30.2	9.000	N	9.7	25.8	56.0
1.884000	28.6	9.000	N	9.7	27.4	56.0
20.988000	25.3	9.000	N	10.2	34.7	60.0
21.244000	26.2	9.000	N	10.2	33.8	60.0
22.008000	27.4	9.000	N	10.2	32.6	60.0
24.520000	28.2	9.000	N	10.2	31.8	60.0
25.026000	28.2	9.000	N	10.3	31.8	60.0
25.030000	30.3	9.000	N	10.3	29.7	60.0



CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154000	19.6	9.000	N	9.6	36.2	55.8
0.158000	17.4	9.000	N	9.6	38.2	55.6
0.166000	10.9	9.000	N	9.6	44.3	55.2
0.344000	26.4	9.000	N	9.6	22.7	49.1
0.348000	24.4	9.000	N	9.6	24.6	49.0
0.360000	22.9	9.000	N	9.6	25.8	48.7
1.136000	21.2	9.000	N	9.7	24.8	46.0
1.868000	21.4	9.000	N	9.7	24.6	46.0
1.884000	21.2	9.000	N	9.7	24.8	46.0
4.482000	21.9	9.000	N	9.8	24.1	46.0
4.630000	22.7	9.000	N	9.8	23.3	46.0
4.732000	21.8	9.000	N	9.8	24.2	46.0
20.988000	14.5	9.000	N	10.2	35.5	50.0
23.510000	19.4	9.000	N	10.2	30.6	50.0
24.774000	17.8	9.000	N	10.3	32.2	50.0
25.016000	17.4	9.000	N	10.3	32.6	50.0
25.026000	17.4	9.000	N	10.3	32.6	50.0
25.030000	17.4	9.000	N	10.3	32.6	50.0



5.2 Radiated Emission Test

The test results of radiated emission provide the following information:

-For Measurement Below 1 GHz

Rule Part / Standard	FCC PART 15 Subpart B Class B
Detector	Quasi-Peak
Bandwidth	120 kHz (6 dB)
Operation Mode	Charging & NFC mode
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.2 °C
Relative Humidity	48.6 %
Test Date	July 09, 2018

Frequency (MHz)	Quasi Peak (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.520800	30.9	99.8	V	317.0	18.7	9.1	40.0
32.263200	31.6	99.7	V	0.0	18.9	8.4	40.0
34.161600	27.9	99.9	V	317.0	19.1	12.1	40.0
51.434400	20.0	117.7	V	200.0	20.2	20.0	40.0
114.554400	21.6	225.1	V	30.0	17.2	21.9	43.5
160.492800	26.7	100.0	V	313.0	20.2	16.8	43.5

Calculation Formula:

1. POL. H: Horizontal, POL. V: Vertical
2. Quasi Peak = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor + Cable Loss
4. Margin = Limit – Quasi Peak



-For Measurement Above 1 GHz

Rule Part / Standard	FCC PART 15 Subpart B Class B
Detector	Peak mode: Peak (RBW: 1 MHz, VBW: 3 MHz) CISPR-Average mode: Peak (RBW: 1 MHz, VBW: 10 Hz)
Highest Operating Frequency	146 kHz
Tested Frequency Range	Not applicable
Operation Mode	Not applicable
Kind of Test Site	3 m semi anechoic chamber
Temperature	- °C
Relative Humidity	- %
Test Date	-

NOTE.

Since the main clock of this product is less than 108 MHz, we only tested for radiated emission below 1 GHz



6. LIST OF TEST EQUIPMENT

<u>Type</u>	<u>Manufacturer</u>	<u>Model Name</u>	<u>Serial Number</u>	<u>Calibration Cycle</u>	<u>CAL Date</u>
<u>Conducted Emission</u>					
☒ EMI Test Receiver	Rohde & Schwarz	ESCI	100584	1 year	06.25.2018
☐ EMI Test Receiver	Rohde & Schwarz	ESCI	100033	1 year	06.27.2017
☐ LISN	Rohde & Schwarz	ENV216	102245	1 year	12.20.2017
☐ LISN	Rohde & Schwarz	ENV216	100073	1 year	05.03.2018
☒ Software	Rohde & Schwarz	EMC32 VER8.54.0	-	-	-
<u>Radiated Emission</u>					
-For measurement below 1 GHz					
☐ EMI Test Receiver	Rohde & Schwarz	ESU40	100361	1 year	10.10.2017
☐ Trilog Antenna	Schwarzbeck	VULB9168	185	2 year	04.19.2017
☒ EMI Test Receiver	Rohde & Schwarz	ESU40	100524	1 year	08.16.2017
☒ Trilog Antenna	Schwarzbeck	VULB 9168	760	2 year	04.06.2017
☒ Antenna Master	INNCO Systems	MA4640-XP-ET	-	N/A	-
☒ Antenna master controller	INNCO Systems	CO 3000	CO3000/870/ 35990515/L	N/A	-
☒ Turn Table	INNCO Systems	1060-2M	-	N/A	-
☒ Turn Table controller	INNCO Systems	CO2000	CO2000/095/ 7590304/L	N/A	-
☐ Low Noise Amplifier	TESTEK	TK-PA01S	160014-L	1 year	01.24.2018
☐ EMI Test Receiver	Rohde & Schwarz	ESU26	100241	1 year	08.16.2017
☐ Antenna master	INNCO Systems	MA4000-EP	MA4000/283	N/A	-
☐ Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
☒ Software	Rohde & Schwarz	EMC32 VER.9.20.00	-	-	-
-For measurement above 1 GHz					
☐ EMI Test Receiver	Rohde & Schwarz	ESU40	100524	1 year	08.16.2017
☐ Antenna master	INNCO Systems	MA4640-XP-ET	-	N/A	-
☐ Antenna master controller	INNCO Systems	CO 3000	CO 3000/870/ 35990515/L	N/A	-
☐ Turn Table	INNCO Systems	-	-	N/A	-
☐ Turn Table controller	INNCO Systems	CO2000	CO2000/095/ 5790304/L	N/A	-
☐ Horn Antenna	Schwarzbeck	BBHA 9120D	296	2 year	10.12.2016
☐ Low Noise Amplifier	TESTEK	TK-PA18H	170034-L	1 year	03.06.2018
☐ Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170#786	2 year	12.05.2017
☐ Power Amplifier	TESTEK	TK-PA1840H	170030-L	1 year	12.20.2017
☐ Antenna master	HD GmbH	MA240	240/520	N/A	-
☐ EMI Test Receiver	Rohde & Schwarz	ESU26	100241	1 year	08.16.2017
☐ Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
☐ Software	Rohde & Schwarz	EMC32 VER8.40.0	-	-	-



7. CONCLUSION

The data collected shows that the **EUT Type: Wireless Charger, Model: XCAN** complies with §15.107 and §15.109 of the FCC rules.



8. APPENDIX A. TEST SETUP PHOTOGRAPHS

Please refer to Appendix A