TEST REPORT

Product Name:

Trademark:

Model Number:

Prepared For:

Address:

Manufacturer:

Address:

Prepared By:	Shenzhen BCTC Testing Co., Ltd.
Address:	BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Sample Received Date:	Jun. 4, 2020
Sample tested Date:	Jun. 4, 2020 to Jun.11, 2020
Issue Date:	Jun.11, 2020
Report No.:	BCTC2006110723-3E
Test Standards	ETSI EN 303 417 V1.1.1
Test Results	(2017-09) PASS

Compiled by:	Reviewed by:	Approved by:
Kelsey Tan	Eric Yang	Zero Zhou/Manager

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TABLE OF CONTENT

(Note: N/A means not applicable)

1. VERSION

Report No.	Issue Date	Description	Approved
BCTC2006110723-3E	Jun.11,2020	Original	Valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No	Results
Transmitter Parameters			
1	Permitted range of operating frequencies	4.3.2	PASS
2	Operating frequency ranges	4.3.3	PASS
3	H-field requirements	4.3.4	PASS
4	Transmitter spurious emissions	4.3.5	PASS
5	Transmitter out of band (OOB) emissions	4.3.6	PASS
6	WPT system unwanted conducted emissions	4.3.7	N/A
Receiver Parameters			
7	Receiver spurious emissions	4.3.2	PASS
8	Receiver Blocking	4.3.2	PASS
Note: N/A is an abbreviation for Not Applicable and means this test intem is not applicable for this device according to the technology characteristic of device.			

3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product 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.

RF frequency	1×10^{-7}
RF power, conducted	1.38 dB
Conducted spurious emission (30MHz-1GHz)	1.28 dB
Conducted spurious emission (1GHz-18GHz)	1.576dB
Radiated Spurious emission (30MHz-1GHz)	4.3dB
Radiated Spurious emission (1GHz-18GHz)	4.5dB
Temperature	0.59℃
Humidity	5.3%

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s):	W2-B
Model Description:	N/A
Wireless Charger:	Support
Hardware Version:	N/A
Software Version:	N/A

Operation Frequency:	110kHz-205kHz
Antenna installation:	Loop coil antenna
Ratings:	DC 5V

4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Data Cable	Power Cord
1.	Adapter	UGreen	CD122	---	---	---

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Channel List

Not applicable

4.5 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Operational Mode	Function of mobile device	Center Frequency
Mode 4:energy transmission	TX and RX	141kHz

4.6 Test Environment

1. Normal Test Conditions:

Humidity(%):	54
Atmospheric Pressure(KPa):	101
Temperature(℃):	26
Test Voltage(DC):	5V

2.Extreme Test Conditions:

Extreme Temperature: -20°C to +55°C;

Extreme Power Source Voltages:

1). Mains voltage

The extreme test voltage for equipment to be connected to an AC mains source shall be the nominal mains voltage±10 %.

2). Lead-acid battery power sources used on vehicles

When radio equipment is intended for operation from the usual type of alternator fed lead-acid battery power source used on vehicles, then extreme test voltage shall be 1,3 and 0,9 times the nominal voltage of the battery (6 V, 12 V, etc.).

3). Power sources using other types of batteries

The Low extreme test voltages for equipment with power sources using the following types of battery shall be:

• for the Leclanché or lithium type battery: 0,85 times the nominal voltage of the battery;

• for the mercury or nickel-cadmium type of battery: 0,9 times the nominal voltage of the battery.

In both cases, the High extreme test voltage shall be 1,15 times the nominal voltage of the battery.

4). Other power sources

For equipment using other power sources, or capable of being operated from a variety of power sources (primary or secondary), the extreme test voltages shall be those stated by the manufacturer and shall be recorded.

The follow condition is applicable

Test Conditions	Normal	LTLV	LTHV	HTHV	HTLV
Temperature (℃)	22	-20	-20	55	55
Voltage (DC)	5	4.5	5.5	5.5	4.5

5. TEST FACILITY AND TEST INSTRUMENT USED

5.1 Test Facility

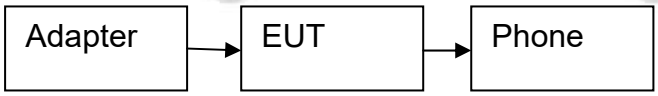
All measurement facilities used to collect the measurement data are located at BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

5.2 Test Instrument Used

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4407B	MY45109572	Jun. 13, 2019	Jun. 12, 2020
2	Test Receiver (9kHz-7GHz)	R&S	ESR7	101154	Jun. 13, 2019	Jun. 12, 2020
3	Bilog Antenna (30MHz-3GHz)	SCHWARZBECK	VULB9163	VULB9163-942	Jun. 22, 2019	Jun. 21, 2020
4	Horn Antenna (1GHz-18GHz)	SCHWARZBECK	BBHA9120D	1541	Jun. 22, 2019	Jun. 21, 2020
5	Horn Antenna (18GHz-40GHz)	SCHWARZBECK	BBHA9170	822	Jun. 22, 2019	Jun. 21, 2020
6	Amplifier (9KHz-6GHz)	SCHWARZBECK	BBV9744	9744-0037	Jun. 25, 2019	Jun. 24, 2020
7	Amplifier (0.5GHz-18GHz)	SCHWARZBECK	BBV9718	9718-309	Jun. 25, 2019	Jun. 24, 2020
8	Amplifier (18GHz-40GHz)	MITEQ	TTA1840-35-HG	2034381	Jun. 17, 2019	Jun. 16, 2020
9	Loop Antenna (9KHz-30MHz)	SCHWARZBECK	FMZB1519B	014	Jul. 02, 2019	Jul. 01, 2020
10	RF cables1 (9kHz-30MHz)	Huber+Suhnar	9kHz-30MHz	B1702988-0008	Jun. 25, 2019	Jun. 24, 2020
11	RF cables2 (30MHz-1GHz)	Huber+Suhnar	30MHz-1GHz	1486150	Jun. 25, 2019	Jun. 24, 2020
12	RF cables3 (1GHz-40GHz)	Huber+Suhnar	1GHz-40GHz	1607106	Jun. 25, 2019	Jun. 24, 2020
13	Power Metter	Keysight	E4419B	\	Jun. 17, 2019	Jun. 16, 2020
14	Power Sensor (AV)	Keysight	E9 300A	\	Jun. 17, 2019	Jun. 16, 2020
15	Signal Analyzer 20kHz-26.5GHz	KEYSIGHT	N9020A	MY49100060	Jun. 13, 2019	Jun. 12, 2020
16	Spectrum Analyzer 9kHz-40GHz	Aglient	FSP40	100363	Jun. 13, 2019	Jun. 12, 2020
17	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
18	Software	Frad	EZ-EMC	FA-03A2 RE	\	\

6. PERMITTED RANGE OF OPERATING FREQUENCIES AND OFR

6.1 Block Diagram Of Test Setup



6.2 Limit

The operating frequency range for emissions shall be within one of the following limits: 19 - 21 kHz, 59 - 61 kHz, 79 - 90 kHz, 100 - 300 kHz, 6 765 - 6 795 kHz.

6.3 Test procedure

1.The occupied bandwidth of the EUT, e.g. the minimum and maximum output frequencies at which the permitted spurious and out-of-band emission levels are exceeded due to intentional emission from the radio transmitter shall be measured using the method shown in below figure.

2.The measuring receiver was a spectrum analyser which was appropriate to perform the intended measurement of the EUT.

3. The 99 % OBW function shall be used to determine the operating frequency range:

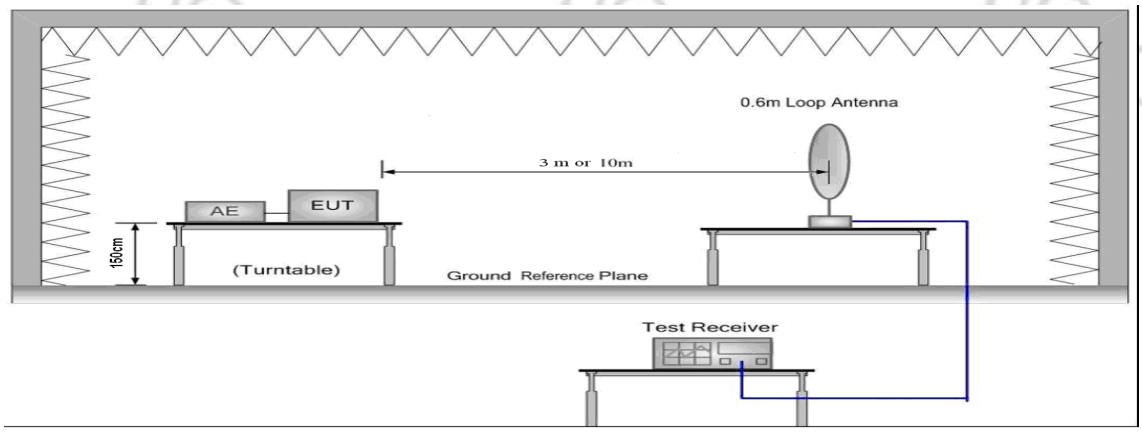
- fH is determined. fH is the frequency of the upper marker resulting from the OFR.
- fL is determined. fL is the frequency of the lower marker resulting from the OFR.
- fc is the centre frequency. $Fc=(f_H+f_L)/2$

6.4 Test Result

Test conditions (Voltage)	Result (kHz)		
	Lower edge	upper edge	OFR
Normal	109.49	170.58	8.61
Lower	110.73	170.49	8.39
Upper	110.35	171.19	8.50
Limit	100-300kHz		

7. H-FIELD REQUIREMENTS

7.1 Block Diagram Of Test Setup



7.2 Limit

Frequency range [MHz]	H-field strength limit [dBµA/m at 10 m]	Comments
0,019 ≤ f < 0,021	72	
0,059 ≤ f < 0,061	69,1 descending 10 dB/dec above 0,059 MHz	See note 1
0,079 ≤ f < 0,090	67,8 descending 10 dB/dec above 0,079 MHz	See note 2
0,100 ≤ f < 0,119	42	
0,119 ≤ f < 0,135	66 descending 10 dB/dec above 0,119 MHz	See note 1
0,135 ≤ f < 0,140	42	
0,140 ≤ f < 0,1485	37,7	
0,1485 ≤ f < 0,30	-5	
6,765 ≤ f < 6,795	42	

NOTE 1: Limit is 42 dBµA/m for the following spot frequencies: 60 kHz ± 250 Hz and 129,1 kHz ± 500 Hz.
NOTE 2: At the time of preparation of the present document the feasibility of increased limits for high power wireless power transmission systems to charge vehicles [i.4] was prepared. New specific requirements for such systems (e.g. higher H-field emission limits in the 79 - 90 kHz band) will be reflected within a future revision of the present document.

7.3 Test procedure

1.The measurements of the transmitter radiated H-field was made on an semi-anechoic chamber. Any measured values were at least 6 dB above the ambient noise level.

2.The H-field produced by the equipment was measured at standard distance of 10 m.

3.The H-field was measured with a shielded loop antenna connected to a measurement receiver. The measuring bandwidth and detector type of the measurement receiver was in accordance with below table.

Frequency: (f)	Detector type	Measurement receiver bandwidth	Spectrum analyser bandwidth
9 kHz ≤ f < 150 kHz	Quasi Peak	200 Hz	300 Hz
150 kHz ≤ f < 30 MHz	Quasi Peak	9 kHz	10 KHz
30 MHz ≤ f ≤ 1 000 MHz	Quasi Peak	120 kHz	100 kHz
NOTE: For the measurement of the ranges 6,765 MHz ≤ f ≤ 6,795 MHz and 13,553 MHz ≤ f ≤ 13,567 MHz, the measurement bandwidth has to be 200 Hz respectively 300 Hz.			

4.The equipment under test operated with normal modulation

5.The measurements were made under normal and extreme conditions.

6.For measuring equipment calibrated in dBμV/m, the reading should be reduced by 51,5 dB to be converted to dBμA/m.

7.4 Test Result

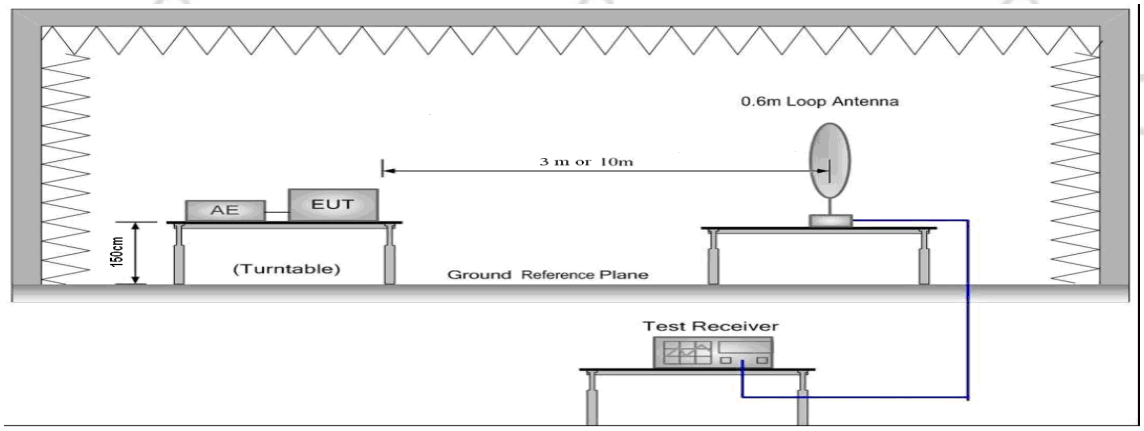
Freq.	Detector	Reading	Corrected Factor	Amplitude E-field	Amplitude H-field	Limit (10m)	Limit (3m)	Margin
kHz	PK/QP	dBμV	dB	dBμV/m	dBμA/m	dBμA/m	dBμA/m	dB
141	QP	74.16	31.08	106.01	54.02	37.8	68.23	-14.79

Remark: H-field= reading + corrected factor

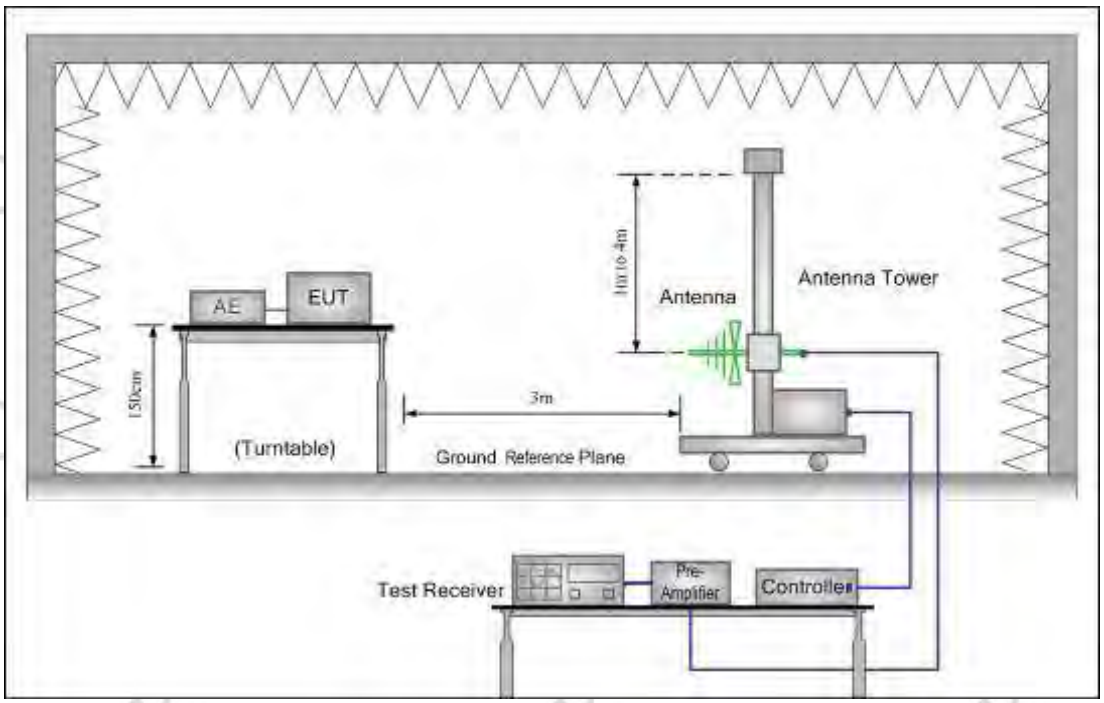
8. TRANSMITTER SPURIOUS EMISSIONS

8.1 Block Diagram Of Test Setup

Below 30MHz



From 30-1000MHz



8.2 Limit

State	Frequency 9 kHz ≤ f < 10 MHz	Frequency 10 MHz ≤ f < 30 MHz
Operating	27 dBμA/m at 9 kHz descending 3 dB/oct	-3,5 dBμA/m
Standby	5,5 dBμA/m at 9 kHz descending 3 dB/oct	-25 dBμA/m

State (see note)	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz	Other frequencies between 30 MHz to 1 000 MHz
Operating	4 nW	250 nW
Standby	2 nW	2 nW
NOTE: "Operating" means mode 2, 3 and 4 according to Table 2; "standby" means mode 1 according to Table 2.		

8.3 Test procedure

Substitution method was performed to determine the actual spurious emission levels of the EUT.

The following test procedure as below:

1) 9 kHz to 30MHz test procedure:

1.The field strength was measured for frequencies below 30 MHz. The equipment under test was measured at a distance of 10 m on a semi-anechoic. The test antenna was a calibrated shielded magnetic field antenna.

2.The equipment under test was switched on with normal modulation. The characteristics of the modulation signal used was stated on the test report. The measuring receiver was tuned over the frequency range 9 kHz to 30 MHz, except for the frequency band on which the transmitter was intended to operate.

3.At each frequency at which a relevant spurious signal was detected the equipment under test and the test antenna was rotated until maximum field strength was indicated on the measuring receiver. This level was noted.

4.The measurements were repeated in the standby mode.

5.For measuring equipment calibrated in dBμV/m, the reading should was reduced by 51,5 dB to be converted to dBμA/m.

2) 30 MHz to 1GHz test procedure:

6.On the test site as test setup graph above, the EUT shall be placed at the 1.5m support on the turntable and in the position closest to normal use as declared by the provider.

7.The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the test frequency of the transmitter. The output of the test antenna shall be connected to the measuring receiver.

8.The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the test frequency of the transmitter under test.

9.The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

10.Repeat step 4 for test frequency with the test antenna polarized horizontally.

11.Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.

12.Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.

13.Repeat step 7 with both antennas horizontally polarized for each test frequency.

14.Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:

ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)

where:

Pg is the generator output power into the substitution antenna.

8.4 Test Result

Below 30MHz

Freq.	Detector	Reading	Corrected Factor	Corrected Amplitude E-field	Corrected Amplitude H-field	Limit (10m)	Limit (3m)	Margin
MHz	QP/AV	dBμV	dB	dBμV/m	dBμA/m	dBμA/m	dBμA/m	dB
5	QP	36.26	28.4	64.66	13.16	14.55	42.95	-29.79
22.7	QP	31.37	16.1	47.47	-4.03	-3.5	12.6	-16.63

Remark: H-field= reading + corrected factor

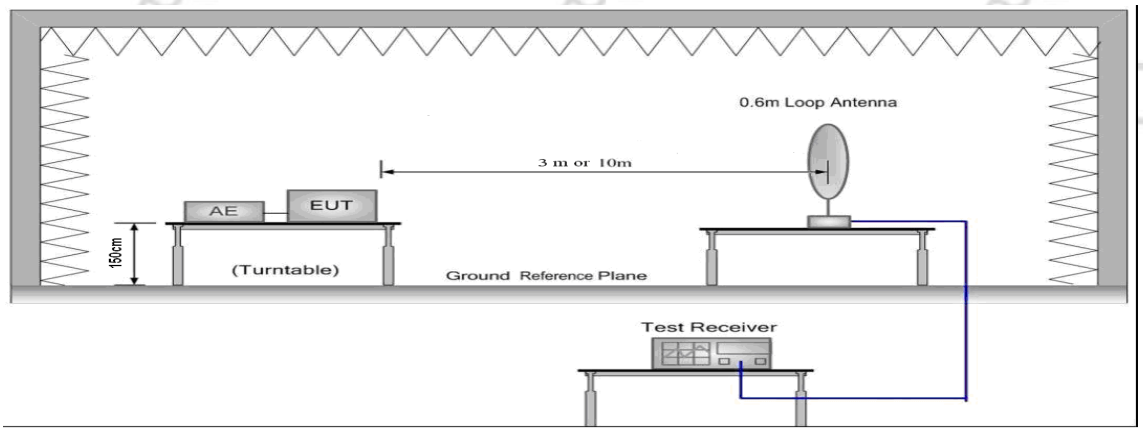
30-1000MHz

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
67.35	31.24	314	1.3	H	-75.76	1.61	12.2	-77.37	-54	-23.37
67.35	30.15	163	1.3	V	-76.85	1.61	12.2	-78.46	-54	-24.46
438.27	63.12	272	1.3	H	-43.88	4.25	15.8	-48.13	-36	-12.13
438.27	64.04	15	1.6	V	-42.96	4.25	15.8	-47.21	-36	-11.21

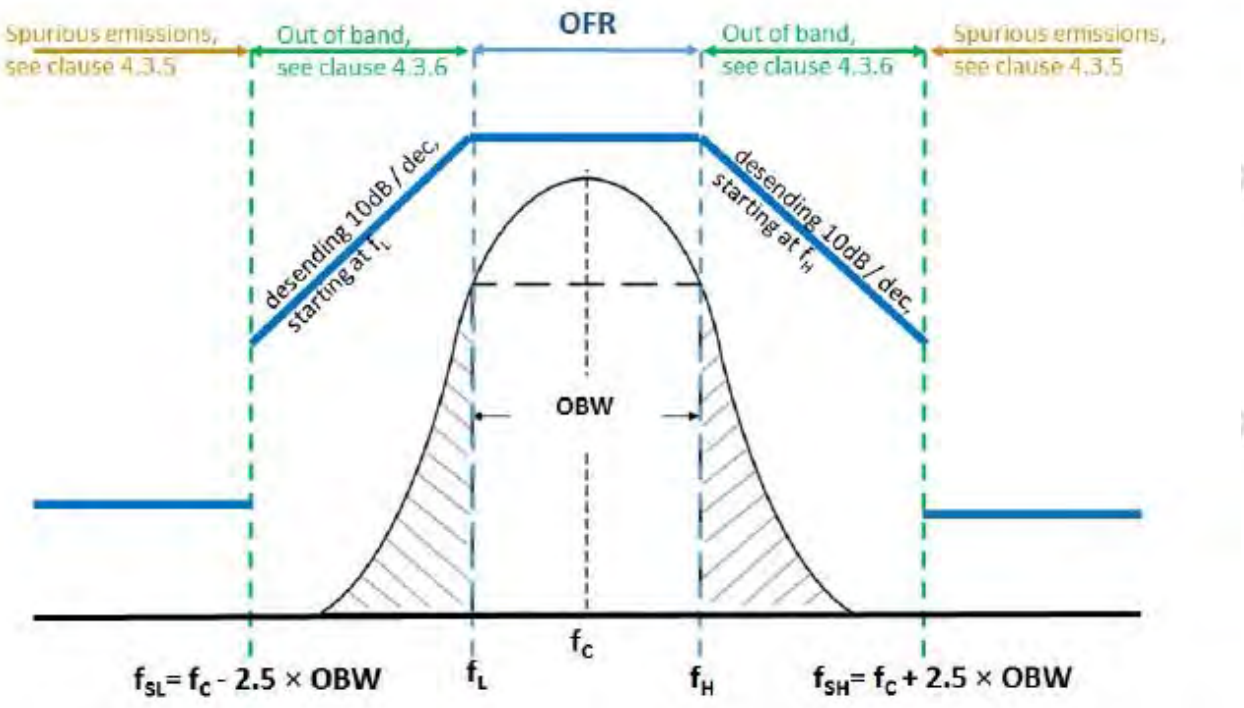
Remark: Absolute level=SG level + cable + antenna gain

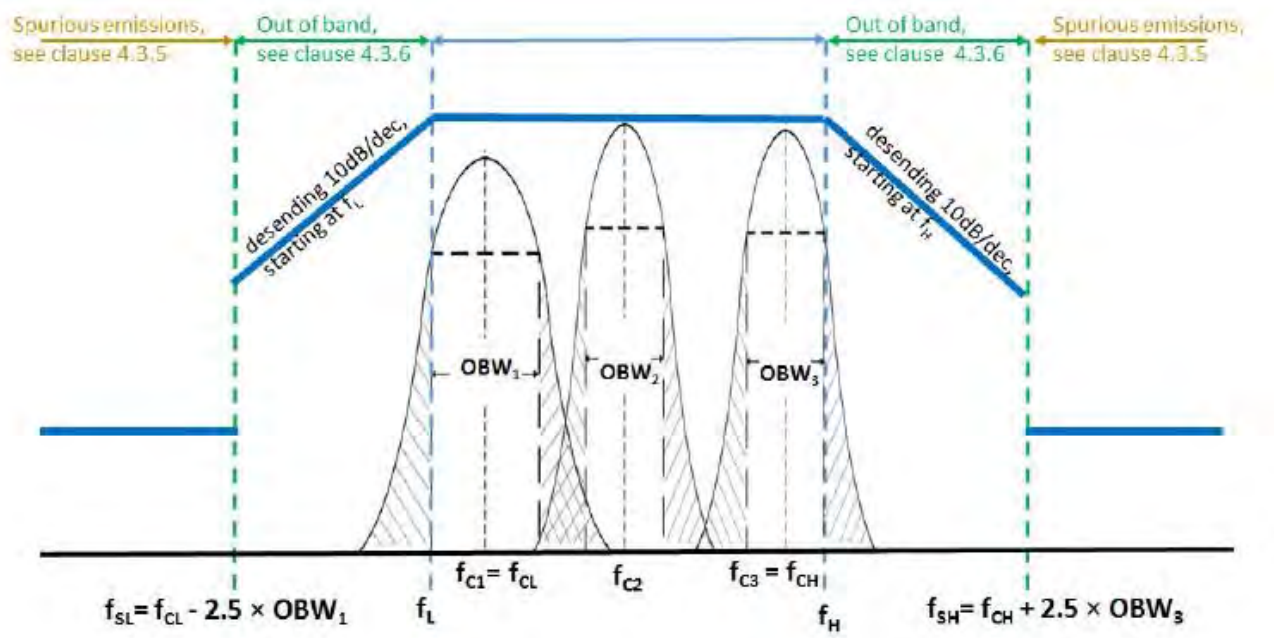
9. TRANSMITTER OUT OF BAND (OOB) EMISSIONS

9.1 Block Diagram Of Test Setup



9.2 Limit





9.3 Test procedure

Methods of measurement (< 30 MHz)

This applies to all Product Classes.

The field strength shall be measured for frequencies below 30 MHz. The equipment under test shall be measured at a distance of 10 m on an outdoor test site. The test antenna shall be a calibrated shielded magnetic field antenna. The equipment under test and test antenna shall be arranged as stated in clause A.1.

For Product Class 3 the transmitter antenna connector of the equipment under test shall be connected to an artificial antenna (see clause 6.2) and the output connector terminated.

The equipment under test shall be switched on with normal modulation. The characteristics of the modulation signal used shall be stated on the test report. The measuring receiver shall be tuned over the frequency range 9 kHz to 30 MHz, except for the frequency band on which the transmitter is intended to operate.

At each frequency at which a relevant spurious signal is detected the equipment under test and the test antenna shall be rotated until maximum field strength is indicated on the measuring receiver. This level shall be noted.

If the transmitter can be operated in the standby mode, then the measurements shall be repeated in the standby mode.

For measuring equipment calibrated in dBµV/m, the reading should be reduced by 51,5 dB to be converted to dBµA/m.

Methods of measurement (≥ 30 MHz)

This method applies to all Product Classes.

On an appropriate test site selected from annex A, the equipment shall be placed at the specified height on a non-conducting support and in the position closest to normal use as declared by the provider.

For Product Class 3 the transmitter antenna connector shall be connected to an artificial antenna (see clause 6.2).

The test antenna shall be oriented for vertical polarization. The output of the test antenna shall be connected to a measuring receiver.

The transmitter shall be switched on with normal modulation, and the measuring receiver shall be tuned over the frequency range 30 MHz to 2 000 MHz.

At each frequency at which a relevant spurious component is detected, the test antenna shall be raised and lowered through the specified range of heights until a maximum signal level is detected on the measuring receiver.

The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

The maximum signal level detected by the measuring receiver shall be noted.

The substitution antenna shall be oriented for vertical polarization and calibrated for the frequency of the spurious component detected.

The frequency of the calibrated signal generator shall be set to the frequency of the spurious component detected. The input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver, if necessary.

The test antenna shall be raised and lowered through the specified range of heights to ensure that the maximum signal is received.

When a test site according to clause A.1.1 is used, there is no need to vary the height of the antenna.

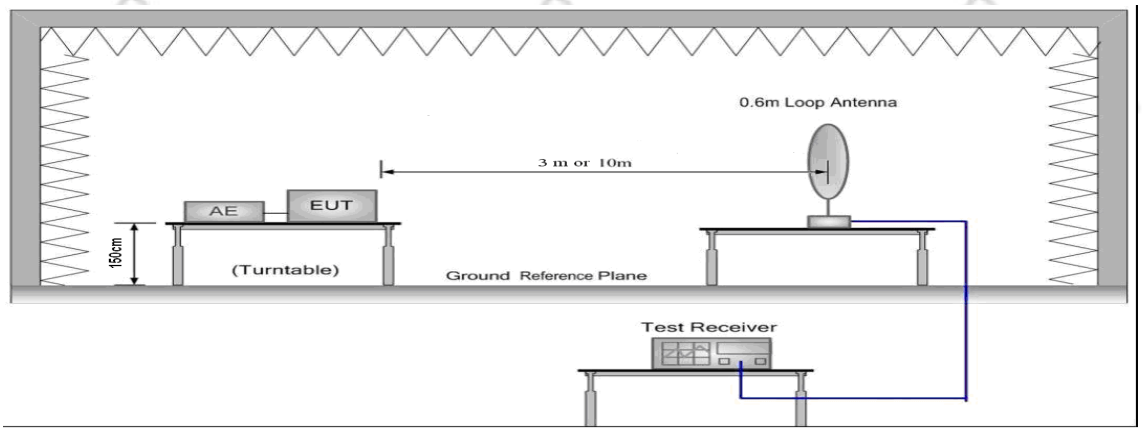
The input signal to the substitution antenna shall be adjusted until an equal or a known related level to that detected from the transmitter is obtained on the measuring receiver.

9.4 Test Result

Pass

10. WPT SYSTEM UNWANTED CONDUCTED EMISSIONS

10.1 Block Diagram Of Test Setup



10.2 Limit

The common mode current (ICM) between 1 MHz and 30 MHz shall not exceed the following limit:

$$ICM = 47 - 8 \times \log(f)\ dB\mu A$$

NOTE: f is the frequency in MHz

10.3 Test procedure

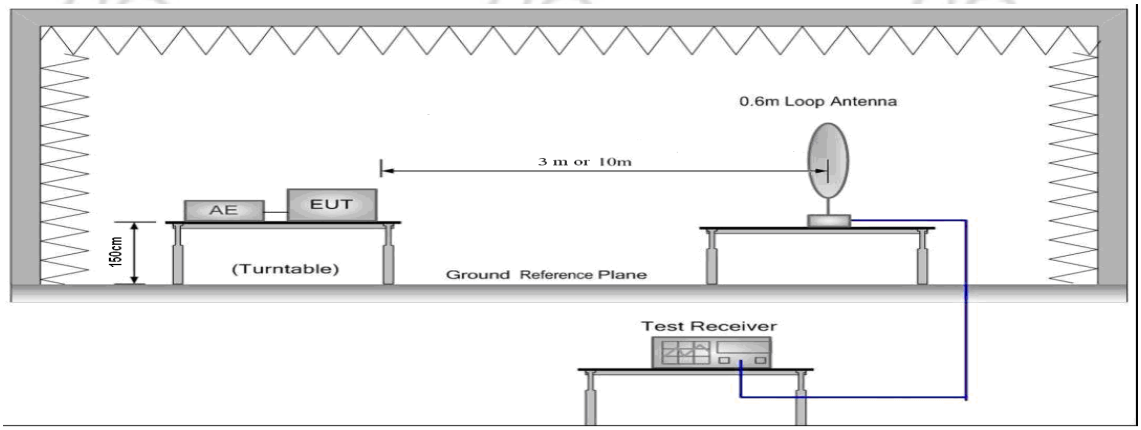
Please see the 8.3 in this report.

10.4 Test Result

N/A

11. RECEIVER BLOCKING

11.1 Block Diagram Of Test Setup



11.2 Limits

	In-band signal	OOB signal	Remote-band signal
Frequency	Centre frequency (f_c) of the WPT system (see clause 4.3.3)	$f = f_c \pm F$ (see note)	$f = f_c \pm 10 \times F$ (see note)
Signal level field strength at the EUT	72 dBμA/m	72 dBμA/m	82 dBμA/m
NOTE: F = OFR see clause 4.3.3.			

11.3 Test Procedure

Please see the 8.3 in this report.

11.4 Test Results

PASS

12. EUT PHOTOGRAPHS

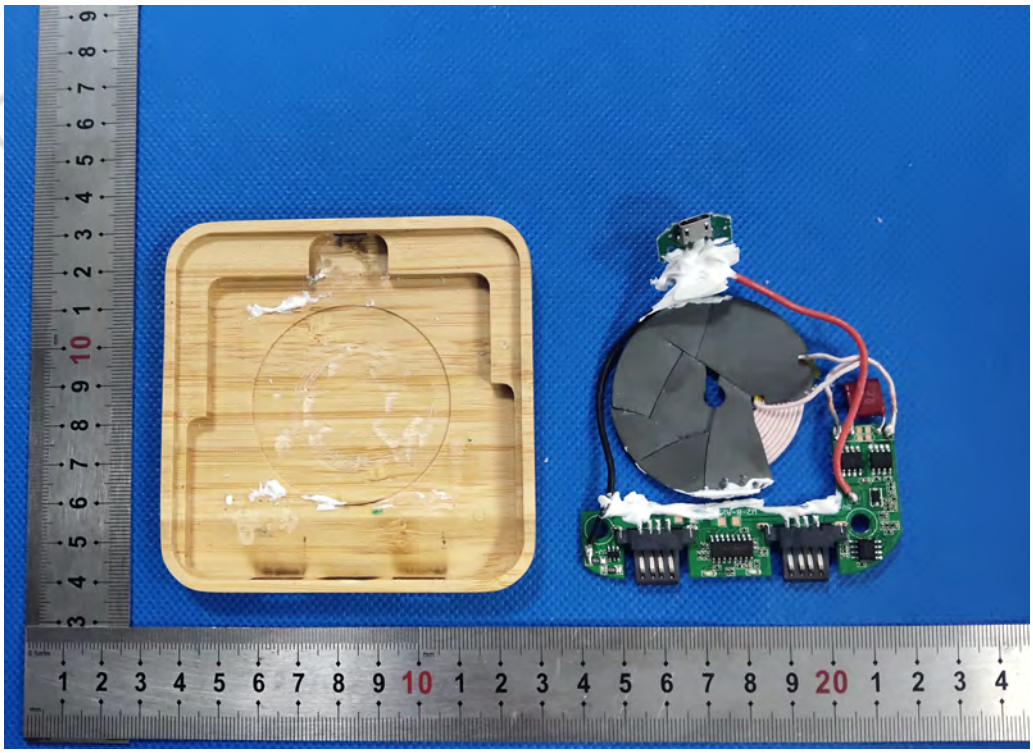
EUT Photo 1

EUT Photo 2

EUT Photo 3

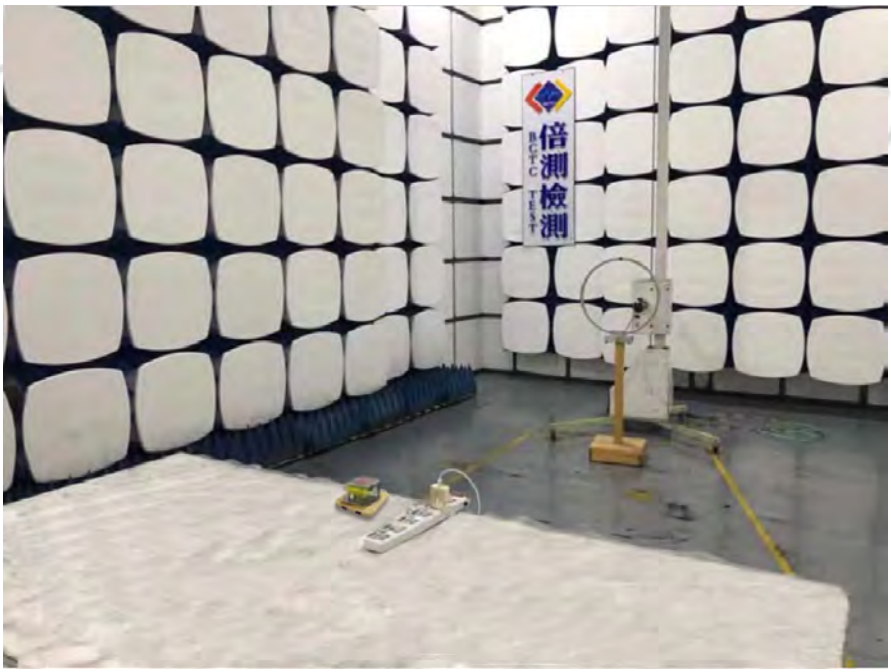
EUT Photo 4

EUT Photo 5



13. EUT TEST SETUP PHOTOGRAPHS

Spurious emissions



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