Microtest
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Test Report

Report No.: MTi19091903-3E2-R1

Date of issue: Oct. 21, 2019

Sample description:	Wheat straw wireless charging speaker
Model(s):	P328.71X
Applicant:	
Address:	
Date of test:	Sept. 24, 2019 – Oct. 11, 2019

Shenzhen Microtest Co., Ltd.
http://www.mtitest.com

This test report is the revision of the test report MTi19091903-3E2, the original report is invalid.
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General information	
Applicant's name:	
Address:	
Manufacture's name:	
Address:	
Product description	
Product name:	Wheat straw wireless charging speaker
Trademark:	N/A
Model name:	P328.71X
Serial model:	N/A
Deference in serial model:	N/A
Standards:	EN 303 417 V1.1.1 (2017-09)

This device described above has been tested by Shenzhen Microtest Co., Ltd. and the test results show that the equipment under test (EUT) is in compliance with the Radio equipment directive requirements. And it is applicable only to the tested sample identified in the report.

Tested by: Demi Mu Oct. 11, 2019

Reviewed by: Blue Zheng Oct. 21, 2019

Approved by: Smith Chen Oct. 21, 2019

1. Summary of Test Result

No.	Description of Test	Reference: Clause No	Result
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*
7	Receiver blocking	4.4.2	Pass
** This applies to all WPT systems where the cable to the primary coil exceeds a length of 3 m and where the cable is not installed in the ground or any metallic structures.			

2. General description

2.1. Feature of equipment under test (EUT)

Product name:	Wheat straw wireless charging speaker
Brand name:	N/A
Model name:	P328.71X
Series model:	N/A
Deference in serial model:	N/A
TX/RX frequency range:	110-205kHz
Radiated H-Field:	-45.545dBuA/m(@10m)
Operational mode:	Wireless charging
Antenna designation:	Coil Antenna
Power source:	DC 5V from adapter AC 230V/50Hz or DC 3.7V from battery
Battery:	DC 3.7V 1200mAh
Adapter information:	N/A
Hardware Version：	V1.6
Software Version：	1.5

2.2. EUT operation mode

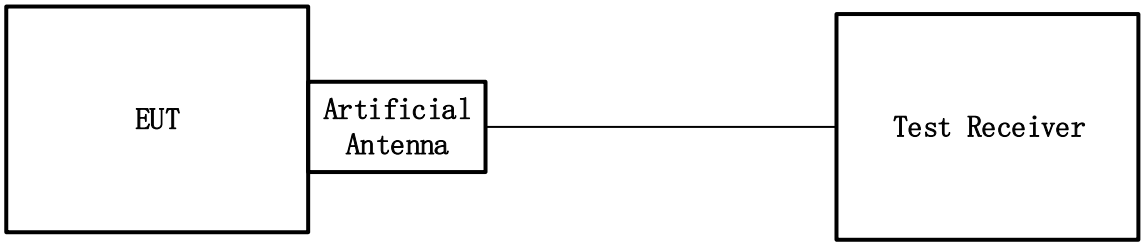
Testing shall be made under normal test conditions, and also, where stated, under extreme test conditions.

Test mode	Description
Mode 1	Stand-by mode
Mode 2	Charging mode
Mode 3	Communication
Mode 4	energy transmission

Note: The product supports the above four modes, and the report only reflects the worst mode, worst mode is Mode 2.

2.3. EUT test setup

For Conducted test:



For Radiated test:

See photographs of the test setup in the report for the actual setup and connections between EUT and support equipment.

2.4. Test conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15ºC~35ºC
- Humidity: 20%~75%
- Atmospheric pressure: 98kPa~101kPa

2.5. Ancillary equipment list

Equipment	Model	S/N	Manufacturer
Adapter	XED-CE050100CU	/	Shenzhen XED Power Supply Co., Ltd.
Load	/	/	/

2.6. Measurement uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in ETSI TR 100 028 [i.14]. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

Parameters	Uncertainty
RF frequency	±1.12 x 10^{-8}
RF power, conducted	± 1 dB
Radiated emission of transmitter	±4.7 dB
Radiated emission of receiver	±4.7 dB
Temperature	±0.5 °C
Humidity	±0.5 %

3. Testing site

Test laboratory:	Shenzhen Microtest Co., Ltd.
Laboratory location:	No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China
CNAS Registration No.:	L5868
Telephone:	(86-755)88850135
Fax:	(86-755)88850136

4. List of test equipment

Software Name: EMI Measurement Software
Manufacturer: Farad
Model: EZ-EMC

Equipment No.	Equipment Name	Manufacturer	Model	Serial No.	Calibration date	Due date
MTI-E004	EMI Test Receiver	Rohde&schwarz	ESPI7	100314	2019/10/09	2020/10/08
MTI-E006	TRILOG Broadband Antenna	schwarabeck	VULB 9163	9163-872	2018/10/15	2019/10/14
MTI-E014	amplifier	Hewlett-Packard	8447D	3113A06150	2019/10/09	2020/10/08
MTI-E036	Single path vehicle AMN(LISN)	Schwarzbeck	NNBM 8124	01175	2019/10/09	2020/10/08
MTI-E038	Low noise active vertical monopole antenna	Schwarzbeck	VAMP 9243	#565	2019/10/16	2020/10/15
MTI-E039	Biconical antenna	Schwarzbeck	BBA 9106	#164	2019/10/15	2020/10/14
MTI-E041	MXG Vector Signal Generator	Agilent	N5182A	MY49060455	2019/04/16	2020/04/15
MTI-E042	ESG Series Analog signal generator	Agilent	E4421B	GB40051240	2019/05/21	2020/05/20
MTI-E044	Thermometer clock humidity monitor	-	HTC-1	/	2019/04/17	2020/04/16
MTI-E062	Log Periodic Antenna	Schwarzbeck	VUSLP 9111B	#312	2018/04/11	2020/04/10
MTI-E063	Log Periodic Dipole Array Antenna	ETS-LINDGREN	3148B	00224524	2018/04/11	2020/04/10
MTI-E065	Amplifier	EMtrace	RP06A	00117	2019/04/29	2020/04/28
MTI-E071	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2018/10/25	2019/10/24
MTI-E076	EMI Test Receiver	Rohde&schwarz	ESIB26	100273	2019/04/16	2020/04/15
MTI-E078	Synthesized Sweeper	Agilent	83752A	3610A01957	2019/04/16	2020/04/15
MTI-E093	Artificial mains network	3ctest	LISN J50	ES3911805	2019/04/16	2020/04/15
MTI-E096	Power amplifier	Space-Dtroniccs	EWLNA0118G-P40	1852001	2019/04/29	2020/04/28
MTI-E097	Current Probe	SOLAR ELECTRONICS CO.	9207-1	220095-1	2019/04/17	2020/04/16
MTI-E098	Loop Sensor	SOLAR ELECTRONICS CO.	7334-1	220095-2	2019/04/21	2020/04/20

Note: the calibration interval of the above test instruments is 12 or 24 months and the calibrations are traceable to international system unit (SI).

5. Transmitter parameters

5.1. Permitted range of operating frequencies

5.1.1. Definition

The permitted range of operating frequencies denotes the frequency ranges set out in Table 1. It likewise denotes the respective frequency range for accommodation of the fundamental WPT frequency of the EUT within its operating frequency range (OFR).

5.1.2. Limits

The permitted range of operating frequency range(s) for intentional emissions shall be within 19 - 21 kHz, 59 - 61 kHz,79 - 90 kHz, 100 - 300 kHz, 6 765 - 6 795 kHz, see Table 2.

Table 2

Operational Mode	Set-up	Function of base station	Function of Mobile device	Test scenario	Conformance and Requirements
Mode 1: base station in stand-by, idle mode	Single device	Transmitter	Not applicable	Single radiation test (TX) with the base station/charging pad. The test set-up as described in clause 6.1.2 shall be used.	• Operating frequency range (clause 4.3.3) • H-Field emission (clause 4.3.4) • TX spurious (clauses 4.3.5, 4.3.6 and 4.3.7) • Performance criteria test (RX test) (clause 4.4)
Mode 2: Communication before charging, adjustment charging mode / position	In combination	TX and RX	TX and RX	Specific test setup, declared by the manufacturer. Manufacturer shall declare the maximal distance between base station and mobile device the WPT system is able to communicate (distance D). The test setup- up shall be performed with the largest communication distance. The test set-up as described in clause 6.1.3 shall be used.	• Operating frequency range (clause 4.3.3) • H-Field emission (clause 4.3.4) • TX spurious (clauses 4.3.5, 4.3.6 and 4.3.7) • Wanted performance criteria test (RX test) (clause 4.4)
Mode 3: Communication	WPT system alignment	TX and RX	TX and RX	Worst case alignment	
Mode 4: energy transmission	WPT system alignment	TX and RX	TX and RX	Both tests can be performed within one set-up, worst-case alignment. The test set-up as described in clause 6.1.4 shall be used.	• Operating frequency range (clause 4.3.3) • H-Field emission (clause 4.3.4) • TX spurious (clauses 4.3.5, 4.3.6 and 4.3.7) • Wanted Performance criteria test (RX test) (clause 4.4)

5.1.3. Test Procedures

Follow the test procedure as described in EN 303 417 V1.1.1 Clause 4.3.3.2 to measure the permitted range of operating frequencies at normal condition.

5.1.4. Test Result

Permitted range of operating frequencies				
F_L (kHz)	F_H(kHz)	Limit (kHz)		Result
110	205	F_L≥100	F_H≤300	Pass

5.2. Operating frequency range(s) (OFR)

5.2.1. Definition

Additional setup for OFR test, see clause 4.3.3.

The OBW function of the spectrum analyser shall be used with a limit of 99 % to determine the operating frequency range:

. f_H is the frequency of the upper marker resulting from the OBW.
. f_L is the frequency of the lower marker resulting from the OBW.

The following values shall be recorded:

. f_H as the frequency of the upper marker resulting from the "OBW"-function of a spectrum analyser, using 99 % of the power (see Figure 1). Alternatively the frequency above the centre frequency fc shall be recorded where the level is 23 dB lower than the maximum;

. f_L as the frequency of the lower marker resulting from the "OBW"-function of a spectrum analyser, using 99 % of the power (see Figure 1). Alternatively the frequency below the centre frequency shall be recorded where the level is 23 dB lower than the maximum;

$$f_C = \frac{f_H + f_L}{2}$$

f_C= is the centre frequency:

OFR= f_H- F_L.

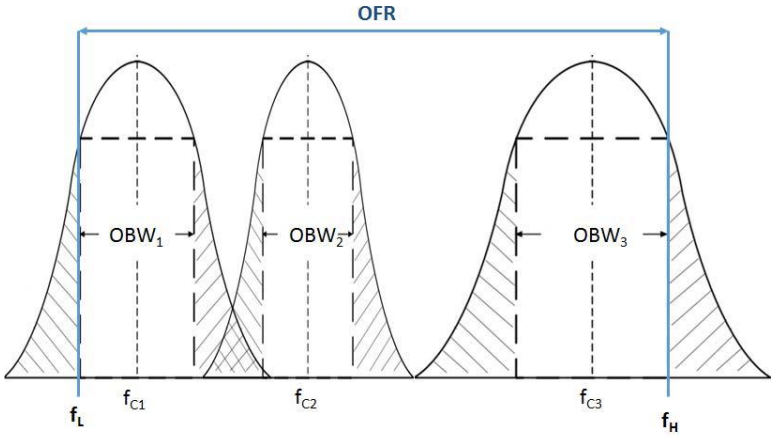


Figure 2: OFR of a multi - frequency WPT system within one frequency range of Table 2 and within one WPT system cycle time

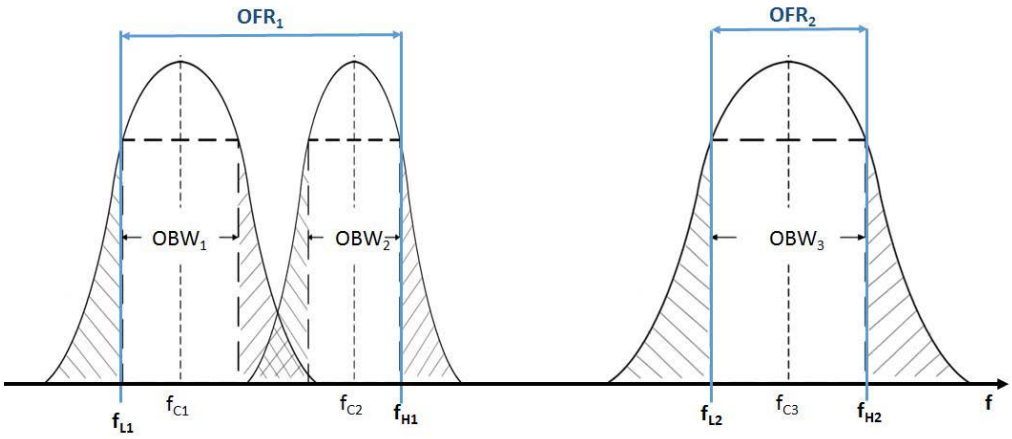


Figure 3: OFR of a multi - frequency WPT system within two frequency ranges of Table 2 and within one WPT system cycle time

5.2.2. Limits

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.

5.2.3. Test Procedures

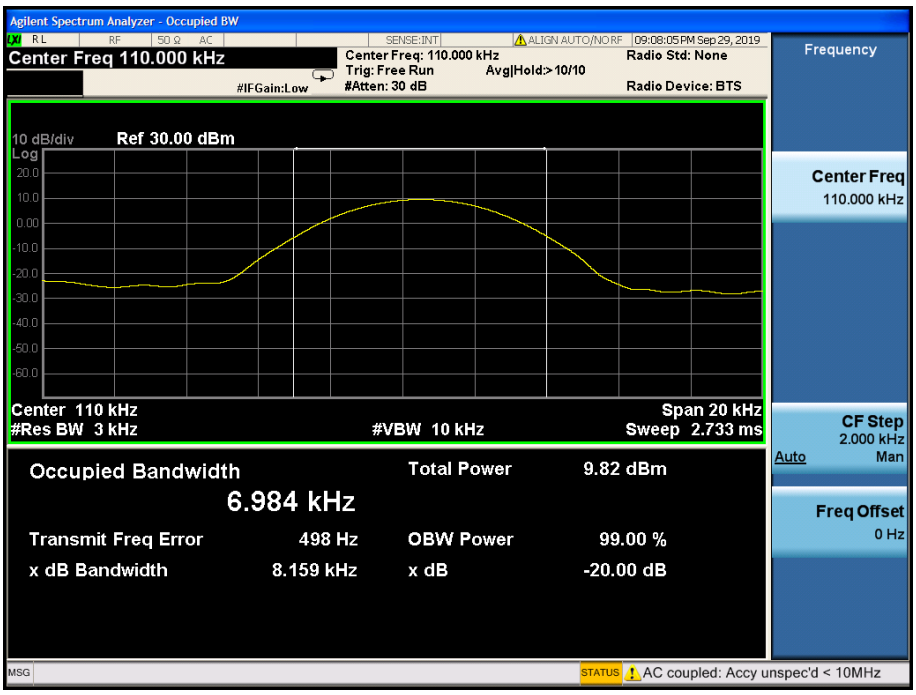
The conformance test suite for operating frequency ranges shall be as defined in clause 6.2.1.
The manufacturer shall declare all necessary information (distance, orientation) which are necessary to set-up the different alignments as defined in clause 6.1.1 for each operational mode as defined in clause 4.2.3, Table 2.

Conformance shall be established under test conditions to be declared by the manufacturer according to clause 4.1. The interpretation of the results for the measurements uncertainty shall be as given in clause 5.11.

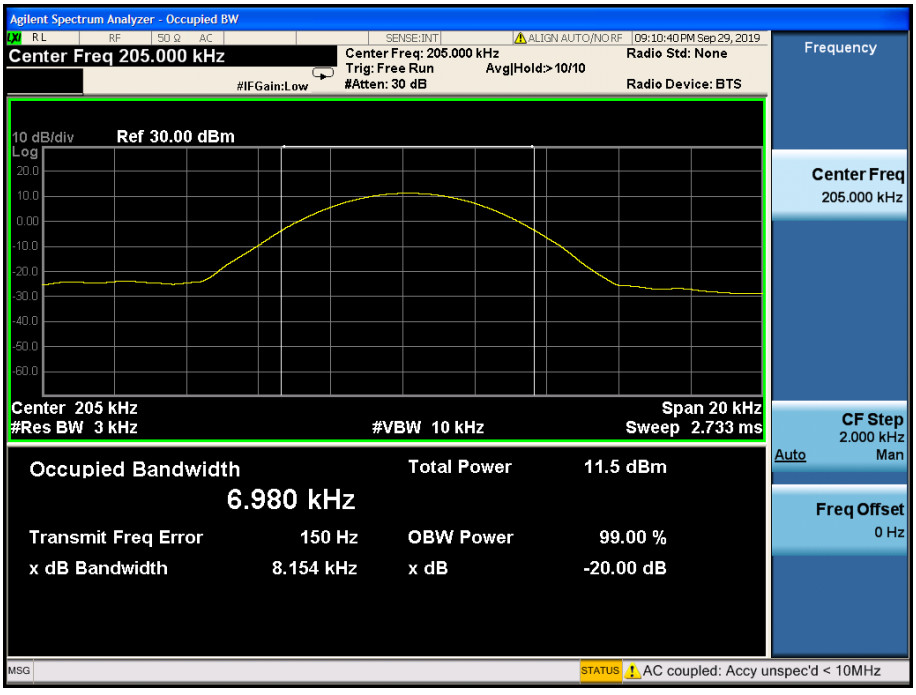
5.2.4. Test Result

Operating frequency range(s) (OFR)				
F_L (kHz)	F_H(kHz)	Limit (kHz)		Result
106.508	208.490	F_L≥100	F_H≤300	Pass
Note: F_L (kHz) = F_{center} – OBW1/2 F_H (kHz) = F_{center} + OBW1/2				

99% OBW



99% OBW



5.3. H-field requirements

5.3.1. Definition

The radiated H-field is defined in the direction of maximum field strength under specified conditions of measurement.

5.3.2. Limits

The H-field limits are provided in Table 3.

Table 3: H-field limits

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	Note 1
0.079 ≤ f < 0.090	67.8 descending 10 dB/dec	Note 2
0.100 ≤ f < 0.119	42	
0.119 ≤ f < 0.135	66 descending 10 dB/dec	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.		

5.3.3. Test Procedures

Follow the test procedure as described in EN 303 417 V1.1.1 Clause 6.2.1 to measure the H-field requirements at normal condition.

5.3.4. Test Result

EUT	Wheat straw wireless charging speaker	Model name:	P328.71X
Pressure:	101kPa	Test mode:	Mode 2
Test voltage:	DC 5V from adapter AC 230V/50Hz		

Frequency (MHz)	Level (dBuA/m)@3m	C_3Factor (dB)	Level (dBuA/m)@10m	Limit (dBuA/m)@10m	Result
0.110	-13.917	31.471	-45.441	42	Pass
0.205	-12.274	31.521	-45.545	-5	Pass

Note:1. $H3_m=H10_m+C_3$ refer to ETSI EN300 330 Annex H.2

Level(dBuA/m)@10m = Level(dBuA/m)@3m - C3

5.4. Transmitter spurious emissions

5.4.1. Definition

The transmitter spurious emissions for a single frequency system are to be considered in frequency ranges defined in Figure 4 ($f < f_{SL}$ and $f > f_{SH}$).

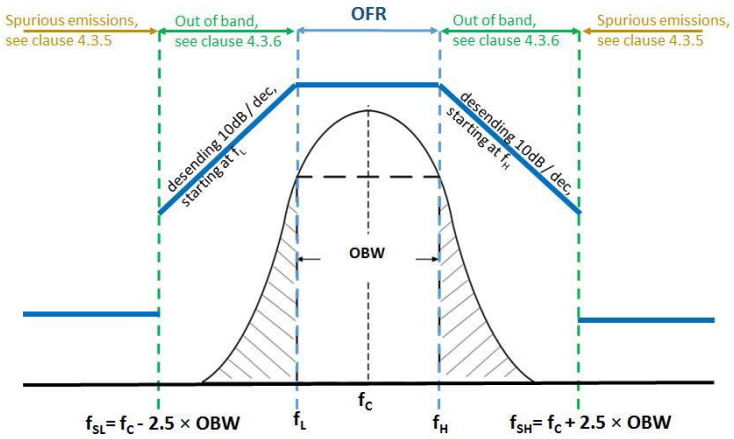


Figure 4: Out of band and spurious domain of a single frequency WPT system

The transmitter spurious emissions for a multi frequency system (within one WPT frequency range from Table 2) are to be considered in frequency ranges defined in Figure 5 ($f < f_{SL}$ and $f > f_{SH}$).

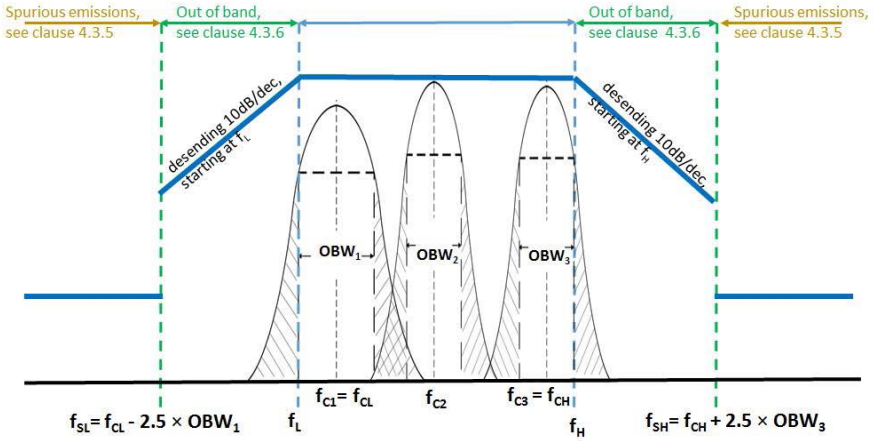


Figure 5: Out of band and spurious domain of a multi - frequency system (during one WPT system cycle time) 4.3.5.3

5.4.2. Limits

The radiated field strength of spurious emissions below 30 MHz shall not exceed the generated H-field given in Table 4.

State (see note)	Frequency 9 kHz ≤ f < 10 MHz	Frequency 10 MHz ≤ f < 30 MHz
Operating	27 dBμA/m at 9 kHz descending	-3.5 dBμA/m
Standby	5.5 dBμA/m at 9 kHz descending	-25 dBμA/m
Note: "Operating" means mode 2, 3 and 4 according to Table 2; "standby" means mode 1 according to Table 2.		

The power of any radiated spurious emission between 30 MHz and 1 GHz shall not exceed the values given in Table 5.

Table 5

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.		

5.4.3. Test Procedures

Follow the test procedure as described in EN 300 330 V2.1.1 Clause 6.2.1. to measure the transmitter spurious emissions at normal condition.

5.4.4. Test Result

9KHz-30MHz:

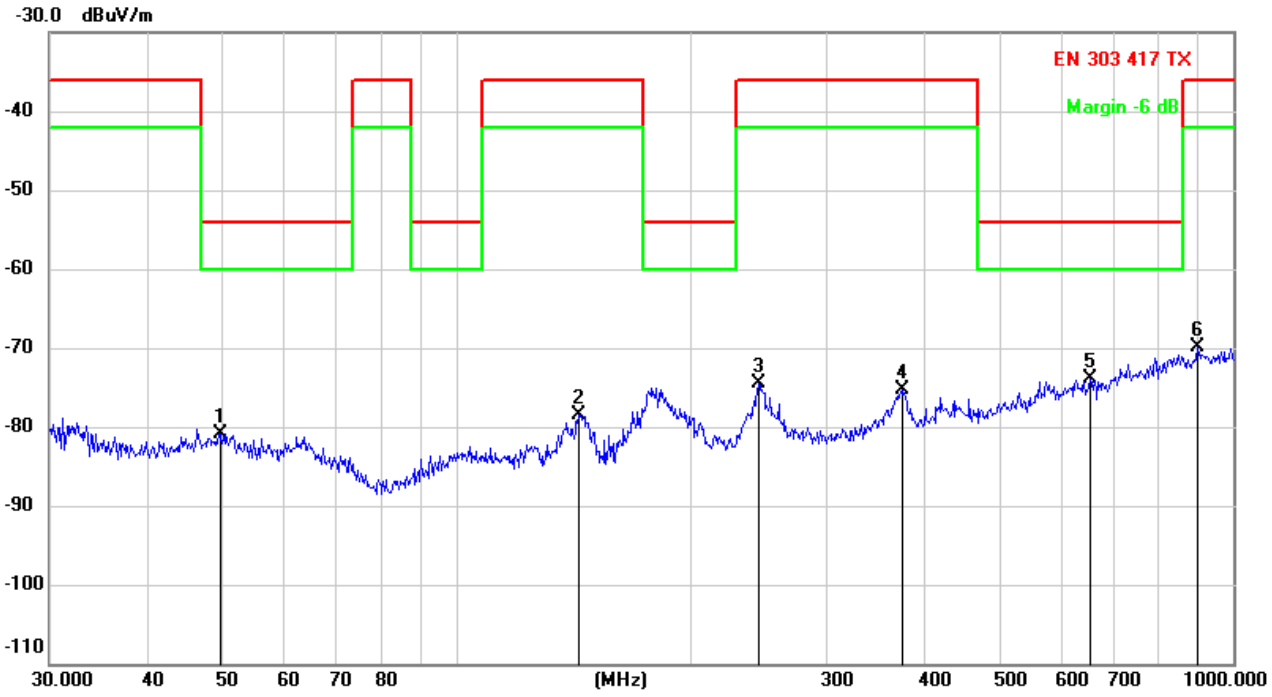
EUT	Wheat straw wireless charging speaker	Model name:	P328.71X
Pressure:	101kPa	Test mode:	Mode 2
Test voltage:	DC 5V from adapter AC 230V/50Hz		

No.	Frequency	Result@3m	C_3	Result @10m	Limit@10m	Margin	Remark
	(MHz)	dBuA/m	(dB)	dBuA/m	dBuA/m	(dB)	
1	16.7328	-25.18	22.45	-47.63	-3.6	-44.03	Peak

Note: $H_{3m}=H_{10m}+C_3$ refer to ETSI EN300 330 Annex H.2
Result @10m= Result@3m - C_3
Margin= Result @10m - Limit@10m

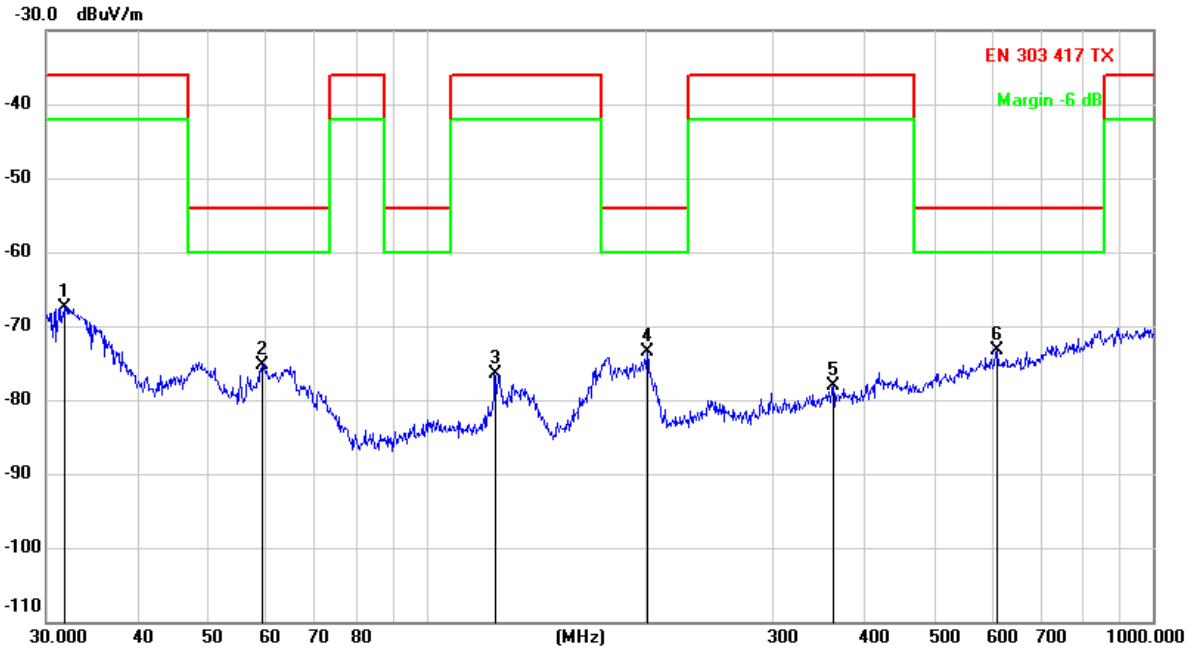
30MHz-1000MHz:

EUT	Wheat straw wireless charging speaker	Model name:	P328.71X
Pressure:	101kPa	Phase:	H
Test voltage:	DC 5V from adapter AC 230V/50Hz	Test mode:	Mode 2



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	Detector
1		49.7068	-74.42	-6.53	-80.95	-54.00	-26.95	peak
2		143.8295	-67.75	-10.65	-78.40	-36.00	-42.40	peak
3		245.0900	-68.62	-5.96	-74.58	-36.00	-38.58	peak
4		375.9385	-71.35	-3.90	-75.25	-36.00	-39.25	peak
5	*	654.2318	-73.53	-0.40	-73.93	-54.00	-19.93	peak
6		900.1474	-73.46	3.64	-69.82	-36.00	-33.82	peak

EUT	Wheat straw wireless charging speaker	Model name:	P328.71X
Pressure:	101kPa	Phase:	V
Test voltage:	DC 5V from adapter AC 230V/50Hz	Test mode:	Mode 2



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	Detector
1		31.8427	-58.64	-8.92	-67.56	-36.00	-31.56	peak
2		59.4405	-67.17	-8.10	-75.27	-54.00	-21.27	peak
3		124.1330	-66.92	-9.66	-76.58	-36.00	-40.58	peak
4		201.3930	-66.51	-7.02	-73.53	-54.00	-19.53	peak
5		362.9844	-74.21	-3.83	-78.04	-36.00	-42.04	peak
6	*	609.9217	-72.77	-0.45	-73.22	-54.00	-19.22	peak

5.5. Transmitter out of band (OOB) emissions

5.5.1. Definition

The WPT system out of band emissions are to be considered in frequency ranges defined in Figure 4 and Figure 5 (between f_{SL} and f_L and between f_H and f_{SH}).

5.5.2. Limits

The OOB limits are visualized in Figures 4 and 5; they are descending from the intentional limits from Table 3 at f_H/f_L with 10 dB/decade.

5.5.3. Test Procedures

Follow the test procedure as described in EN 303 417 V1.1.1 Clause 6.2.1 to measure the transmitter out of band (OOB) emissions at normal condition.

5.5.4. Test Result

EUT	Wheat straw wireless charging speaker	Model name:	P328.71X
Pressure:	101kPa	Test mode:	Mode 2
Test voltage:	DC 5V from adapter AC 230V/50Hz		

No.	Frequency	Result@3 m	C_3	Result @10m	Limit@10m	Margin	Remark
	(MHz)	dBuA/m	(dB)	dBuA/m	dBuA/m	(dB)	
1	FcL-2.5 X OBW_1	-13.17	31.2	-44.37	16.77	61.14	Peak
2	F_L	-6.15	31.2	-37.35	16.64	53.99	Peak
3	F_H	-5.41	31.2	-36.61	16.24	52.85	Peak
4	FcH-2.5 X OBW_2	-8.81	31.2	-40.01	16.08	56.09	Peak

Note: $H_{3m}=H_{10m}+C_3$ refer to ETSI EN300 330 Annex H.2

5.6. WPT system unwanted conducted emissions

5.6.1. Definition

WPT system unwanted conducted emissions are based on the emissions of the unwanted common mode current on the cable between the off board power supply and the primary coil seen as a monopole radiator driven against the power supply.

5.6.2. Limits

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.

5.6.3. Test Procedures

Follow the test procedure as described in EN 303 417 V1.1.1 Clause 6.2.4 to measure the WPT system unwanted conducted emissions.

5.6.4. Test Result

Not application.

5.7. Receiver blocking

5.7.1. Definition

Blocking is a measure of the capability of the receiver to receive a wanted signal without exceeding a given degradation due to the presence of an unwanted input signal at any frequencies other than those of the receiver spurious responses.

The test shall be performed in the relevant operational modes (see clause 4.2.3).

The wanted performance criteria from clause 4.2.2 shall be used as criterion for the receiver blocking tests.

5.7.2. Limits

The receiver blocking limits in Table 6 shall be fulfilled

	In-band signal	OOB signal	Remote-band signal
Frequency	Centre frequency (fc) of the WPT	f = fc ± F (see note)	f = fc ± 10 × 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.			

5.7.3. Test Procedures

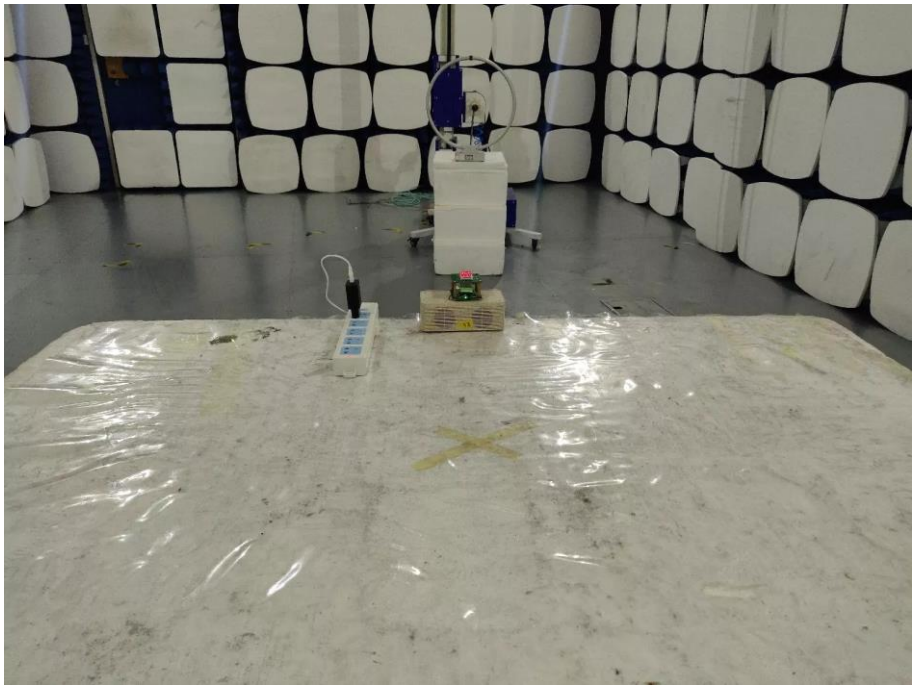
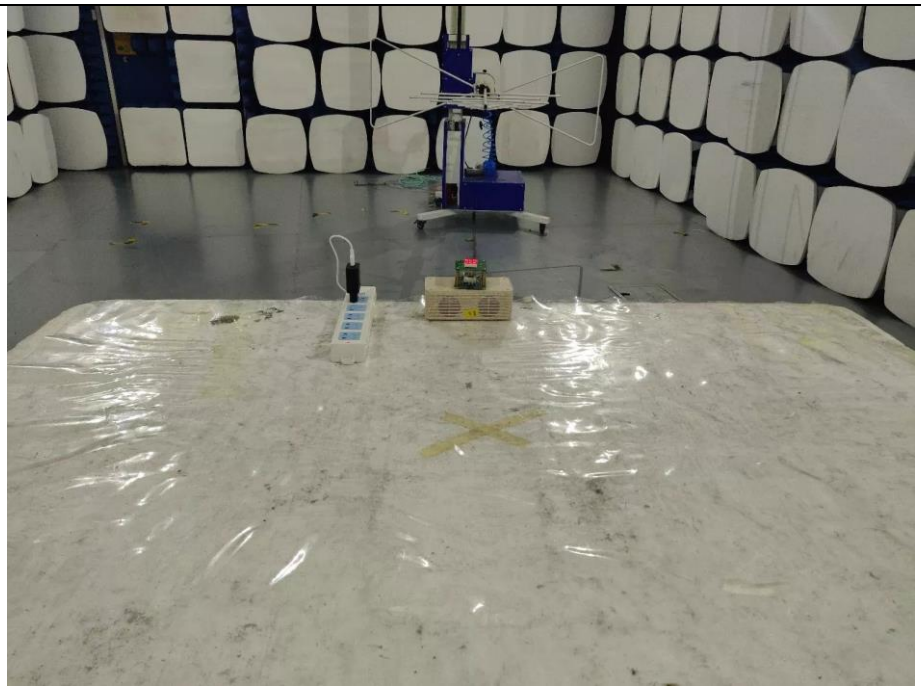
Follow the test procedure as described in EN 303 417 V1.1.1 Clause 6.3.2 to measure Receiver blocking.

5.7.4. Test Result

EUT	Wheat straw wireless charging speaker	Model name:	P328.71X
Pressure:	101kPa	Test mode:	Mode 2
Test voltage:	DC 5V from adapter AC 230V/50Hz		

Test Frequency	Blocking Signal (dBuA/m)	Performance Criterion	Result
Fc-10 X OFR	82	Without degradation of Performance	Pass
Fc-OFR	72	Without degradation of Performance	Pass
Fc	72	Without degradation of Performance	Pass
Fc+ OFR	72	Without degradation of Performance	Pass
Fc+10 X OFR	82	Without degradation of Performance	Pass

Photographs of the Test Setup

Radiated emission below 30MHz

Radiated emission above 30MHz


Photographs of the EUT

See the APPENDIX 1: EUT PHOTO in the report No.: MTi19091903-3E1-R1-1.

----END OF REPORT----