



EMC Measurement and Test Report For

Sipec SpA

Wireless charger

Applicant : Sipec SpA
Address : Via Anna Kuliscioff 16/18, 20152 Milano - Italy
Product Name : Wireless charger
Brand Name : N/A
Model No : 23406
Standards : ETSI EN 303 417 V1.1.1
Report No : MTL22070100503E03
Date of Receipt sample : 2022-07-01
Date of Test : 2022-07-01 to 2022-07-06
Date of Issue : 2022-07-15
Test Result : PASS

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

Shenzhen MTL Testing Technology Co., Ltd.

6th Floor, Building 4, No. 22, Dawangshan Second Industrial Zone, Shajing, Baoan District,

Shenzhen City, Guangdong Province, China.

Tel: +86-0755-23143231 Fax: +86-0755-23143231



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**Report version**

Version No.	Date of issue	Description
Rev.00	Dec.01, 2020	Original
/	/	/



1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

TEST REPORT DECLARATION

Applicant : Sipec SpA
Manufacturer : 012725
EUT Description : Wireless charger

(A) Model No. : 23406
(B) Serial No. : N/A
(C) Power Supply : DC5V (USB PORT)

Test Procedure Used:

ETSI EN 303 417 V1.1.1 (2017-09) The devices described above have been tested by **Shenzhen MTL Testing Technology Co., Ltd** to determine the maximum emission levels emanating from the device, the severe levels that the device can endure and EUT'S performance criterion. The test results are contained in this test report. **Shenzhen MTL Testing Technology Co., Ltd.** is assumed of full responsibility for the accuracy and completeness of these tests.

This report applies to above tested sample only and shall not be reproduced in part without written approval of **Shenzhen MTL Testing Technology Co., Ltd.**

Prepared by:

Kaka fan

Project Engineer

Reviewed by:

Zhan Cui

Project Manager

Approved by:



Technical Director



1.2 Test Standards

The tests were performed according to following standards:

ETSI EN 303 417 V1.1.1 (2017-09): Wireless power transmission systems, using technologies other than radio frequency beam in the 19 - 21 kHz, 59 - 61 kHz, 79 - 90 kHz, 100 - 300 kHz, 6 765 - 6 795 kHz ranges; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the immunity should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ETSI EN 300330,

The equipment under test (EUT) was configured to measure its highest possible emission level. For more detail refer to the Operating Instructions.

The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.



1.4 EUT Setup and Test Mode

The equipment under test (EUT) was configured to measure its highest possible emission/immunity level. The test modes were adapted according to the operation manual for use, the EUT was operated in the engineering mode to fix the Tx/Rx frequency that was for the purpose of the measurements, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Transmitting	DC5V
Note: Only show the worst case in the test report		

Test Conditions	
Temperature:	25 °C
Relative humidity:	53 %.
ATM Pressure:	1019 mbar

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
Type-C Cable	0.8	Shielded	Without Ferrite

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Adapter	/	/	/



1.5 Measurement Uncertainty

Measurement uncertainty		
Parameter	Uncertainty	Note
Radiated H-field	$\pm 3.0\text{dB}$	(1)
Permitted range of operating frequency	10Hz	(1)
Permitted frequency range of the modulation bandwidth	$\pm 10\text{Hz}$	(1)
Radiated spurious emissions	0.9-30MHz $\pm 5.2\text{dB}$	(1)
	30-200MHz $\pm 4.52\text{dB}$	(1)
	0.2-1GHz $\pm 5.56\text{dB}$	(1)
	1-6GHz $\pm 3.84\text{dB}$	(1)
	6-18GHz $\pm 3.92\text{dB}$	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.



1.6 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	E4407B	MY41440400	2021-12-28	2022-12-27
Spectrum Analyzer	Agilent	N9020A	US47140102	2021-12-28	2022-12-27
Signal Generator	Agilent	83752A	3610A01453	2021-12-28	2022-12-27
Power Divider	Weinschel	1506A	PM204	2021-12-28	2022-12-27
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2021-12-28	2022-12-27
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2021-12-28	2022-12-27
Amplifier	Agilent	8447F	3113A06717	2021-12-28	2022-12-27
Amplifier	C&D	PAP-1G18	2002	2021-12-28	2022-12-27
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2021-12-28	2022-12-27
Horn Antenna	ETS	3117	00086197	2021-12-28	2022-12-27
Loop Antenna	SCHWARZBECK	HFRA 5150	5150-9453	2021-12-28	2022-12-27
DC Power Supply	LW	APR-3003	N/A	2021-12-28	2022-12-27

Software List			
Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1

*Remark: indicates software version used in the compliance certification testing



2. SUMMARY OF TEST RESULTS

Standards	Reference	Description of Test Item	Result
ETSI EN 303 417	4.3.2	Permitted range of operating frequencies	Pass
	4.3.3	Operating frequency ranges	Pass
	4.3.4	H-field requirements	Pass
	4.3.5	Transmitter spurious emissions	Pass
	4.3.6	Transmitter out of band (OOB) emissions	Pass
	4.3.7	WPT system unwanted conducted emissions	N/A
	4.4.2	Receiver blocking	N/A
Pass: The EUT complies with the essential requirements in the standard Fail: The EUT does not comply with the essential requirements in the standard N/A: not applicable			



3. PERMITTED RANGE OF OPERATING FREQUENCY

3.1 Standard Applicable

1. This applies to all WPT systems.
2. 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).
3. 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.

3.2 Test Procedure

Please refer to ETSI EN 303 417 subclause 6.2.2

3.3 Summary of Test Results

Permitted range of operating frequencies				
F _L (kHz)	F _H (kHz)	Limit (kHz)		Result
112	190	F _L ≥ 100	F _H ≤ 300	PASS

4. OPERATING FREQUENCY RANGES

4.1 Standard Applicable

The operating frequency range is the frequency range over which the WPT system is intentionally transmitting (all operational modes, see clause 4.2.3, Table 2).

The operating frequency range(s) of the WPT system are determined by the lowest (f_L) and highest frequency (f_H) as occupied by the power envelope.

The WPT system could have more than one operating frequency range.

For a single frequency systems the OFR is equal to the occupied bandwidth (OBW) of the WPT system. For multi-frequency systems the OFR is described in Figures 2 and 3.

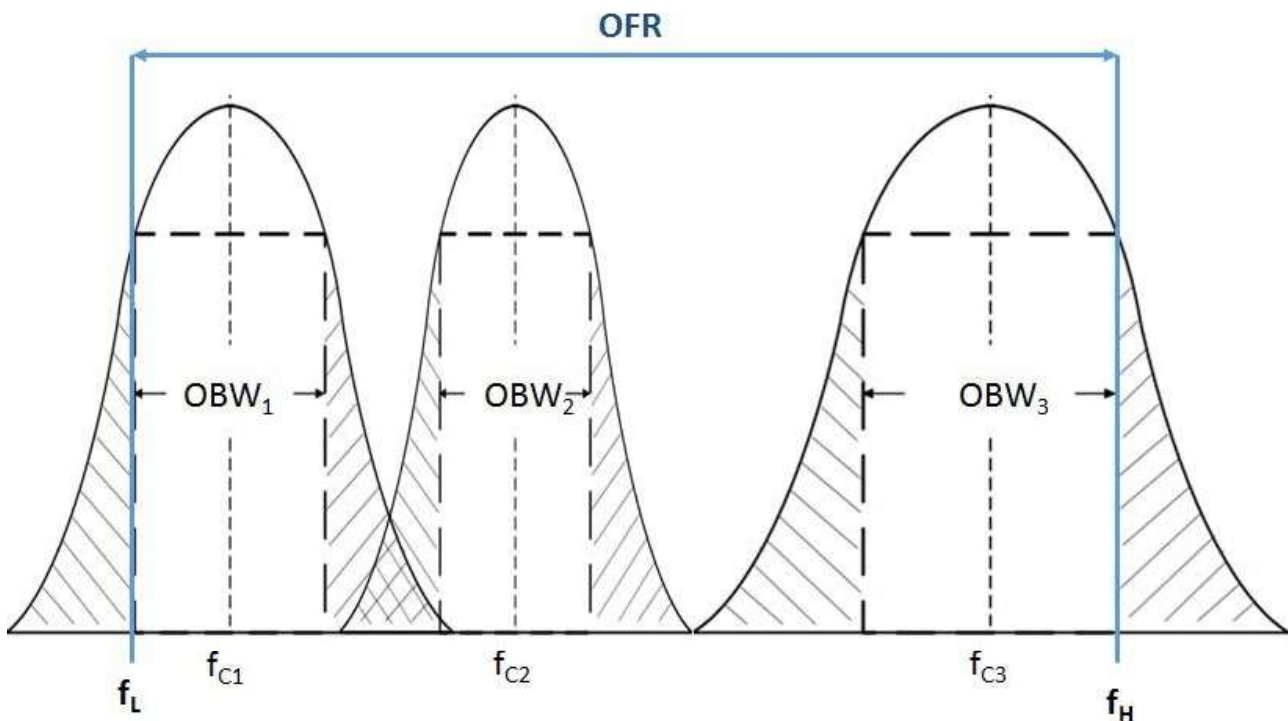


Figure 2: OFR of a multi - frequency WPT system within one frequency range of Table 2 and within one WPT system cycle time

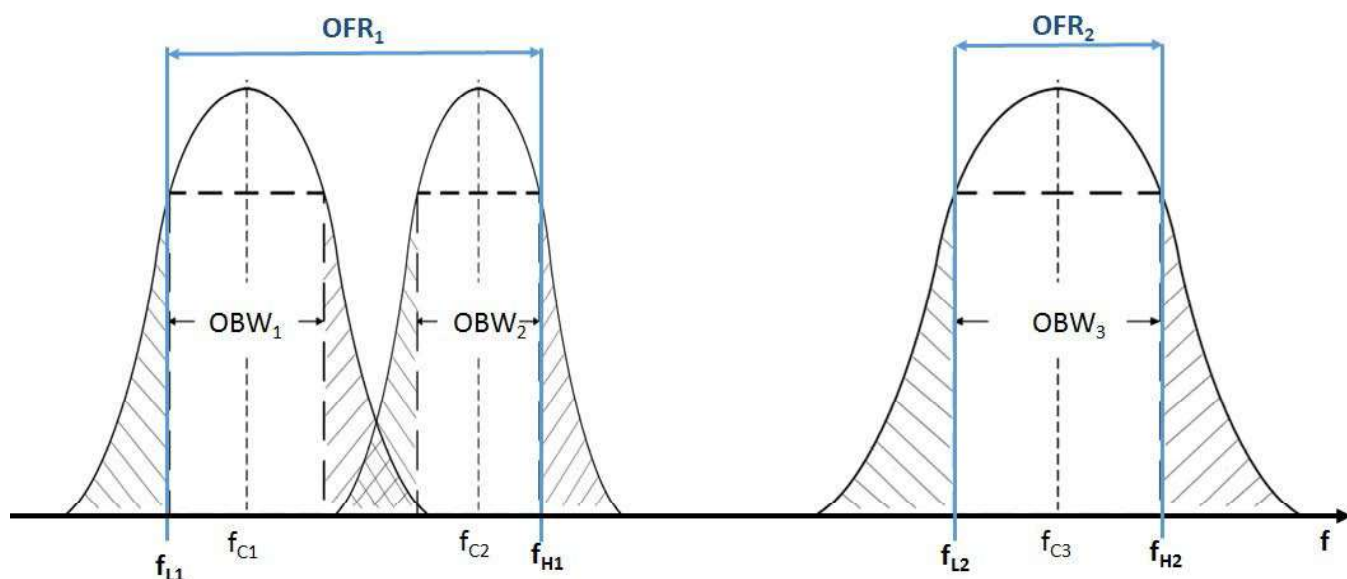


Figure 3: OFR of a multi - frequency WPT system within two frequency ranges of Table 2 and within one WPT system cycle time

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.

4.2 Test Procedure

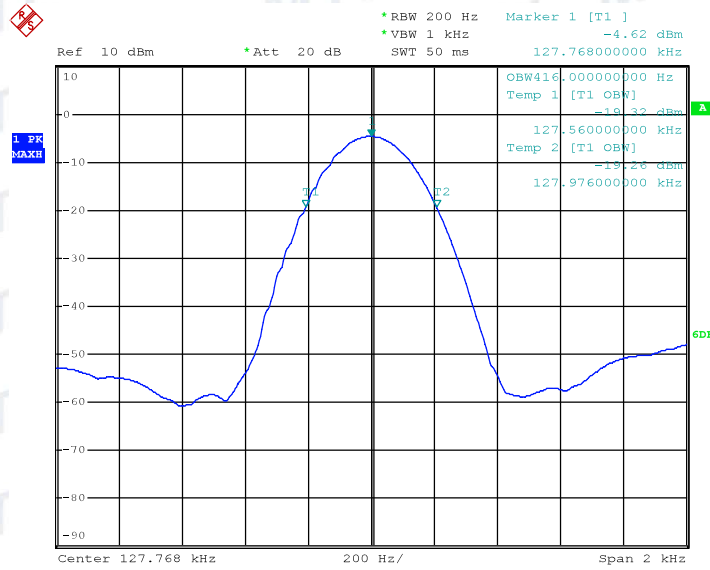
Please refer to ETSI EN 303 417 subclause 6.2.2

4.3 Summary of Test Results/Plots

Operating frequency range(s) (OFR)				
F_L (kHz)	F_H (kHz)	Limit (kHz)		Result
127.560	127.976	$F_L \geq 100$	$F_H \leq 300$	PASS



Operating frequency range(s) (OFR)



Date: 30.NOV.2020 09:16:08



5. Transmitter H-field requirements

5.1 Standard Applicable

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

The H-field limits are provided in Table 3.

They have been specified for control of any radiated emissions within the OFR originating from the WPT system (power transmission and accompanying data communication).

The H-field limits in Table 3 are EU wide harmonised according to EC Decision 2013/752/EU [i.2]. Further information is available in CEPT/ERC/REC 70-03 [i.1].

Table 3: H-field limits

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

5.2 Test Procedure

Please refer to ETSI EN 303 417 subclause 6.2.2

5.3 Summary of Test Results/Plots



- Pre-scan EUT X,Y,Z axis, and find the worst case at X axis.

Frequency (MHz)	Level (dBuA/m)@3m	C ₃ Factor (dB)	Level (dBuA/m)@10m	Limit (dBuA/m)@10m	Result
0.1278	33.84	31.20	2.64	65.69	PASS

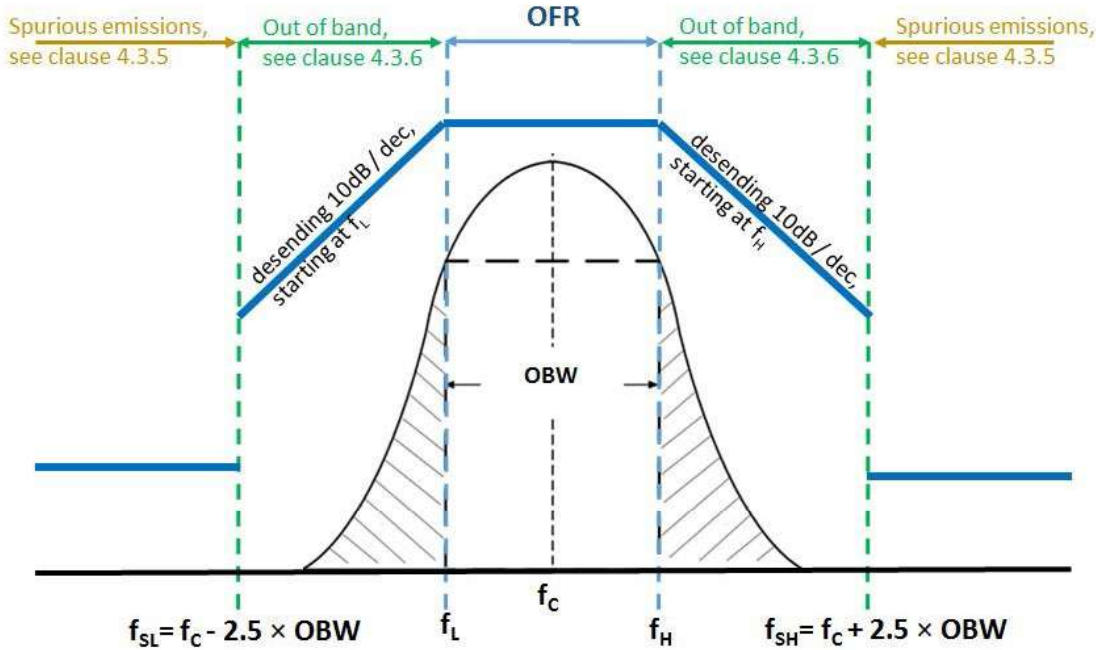
Note 1: $H_{3m} = H_{10m} + C_3$ refer to ETSI EN300 330 Annex H.2

6. Transmitter spurious emissions

6.1 Standard Applicable

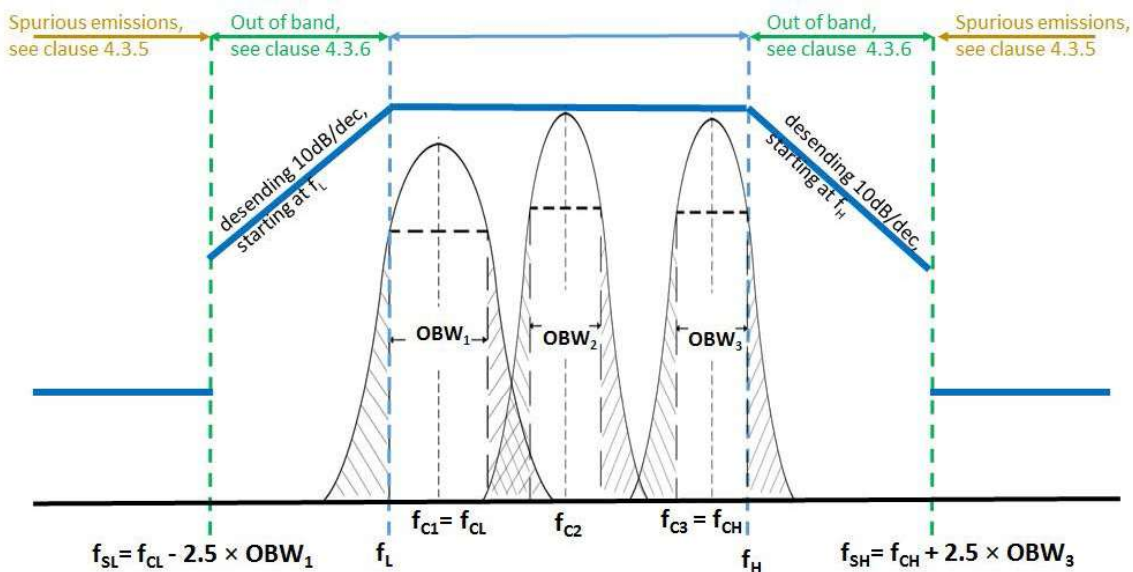
The transmitter spurious emissions for a single frequency system are to be considered in frequency ranges defined in Figure 4 ($f < f_{SL}$ and $f > f_{SH}$).

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).



**Limit**

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 $9 \text{ kHz} \leq f < 10 \text{ MHz}$	Frequency $10 \text{ MHz} \leq f < 30 \text{ MHz}$
Operating	27 dB μ A/m at 9 kHz descending 10 dB/dec	-3,5 dB μ A/m
Standby	5,5 dB μ A/m at 9 kHz descending 10 dB/dec	-25 dB μ A/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.

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.		

6.2 Test Procedure

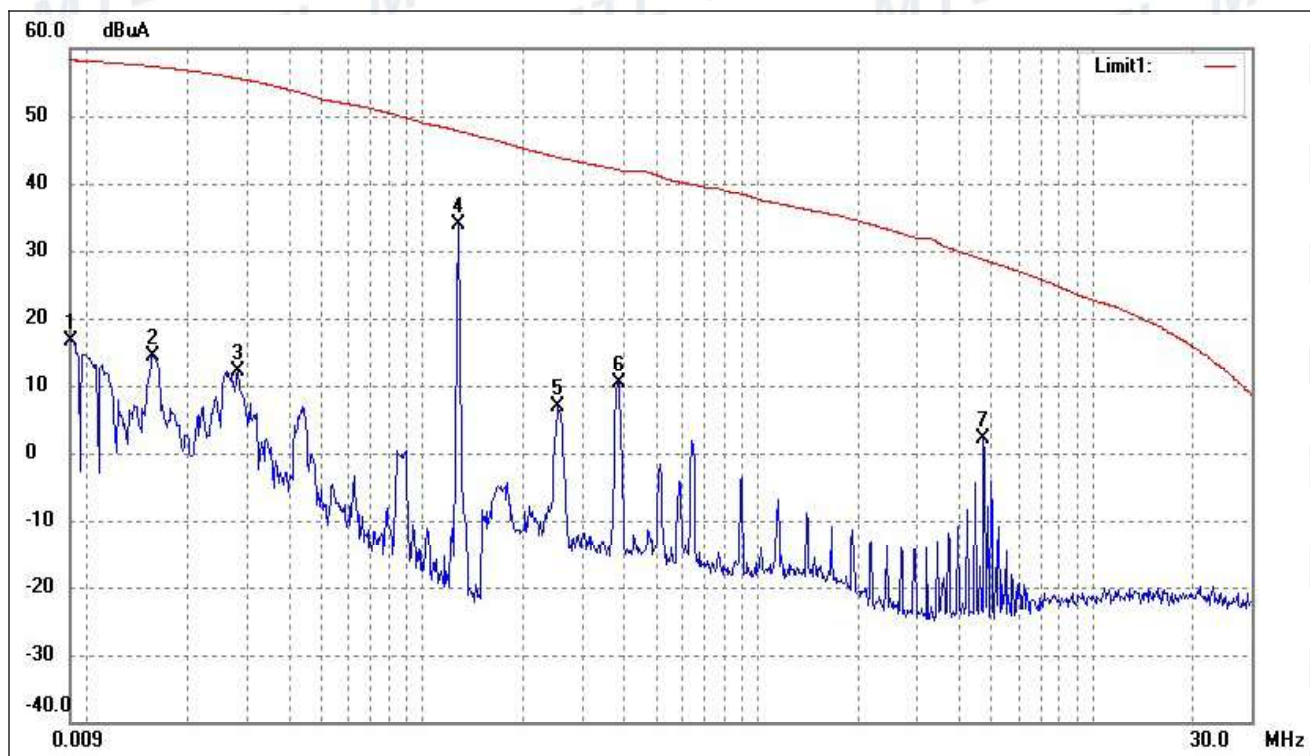
Please refer to ETSI EN 303 417 subclause 6.2.2 and subclause 6.2.3 for the measurement method

6.3 Summary of Test Results/Plots



- Pre-scan EUT X,Y,Z axis,and find the worst case at X axis.
- 9kHz-30MHz Emission @3m

Test Channel:	/	Polarity:	Vertical
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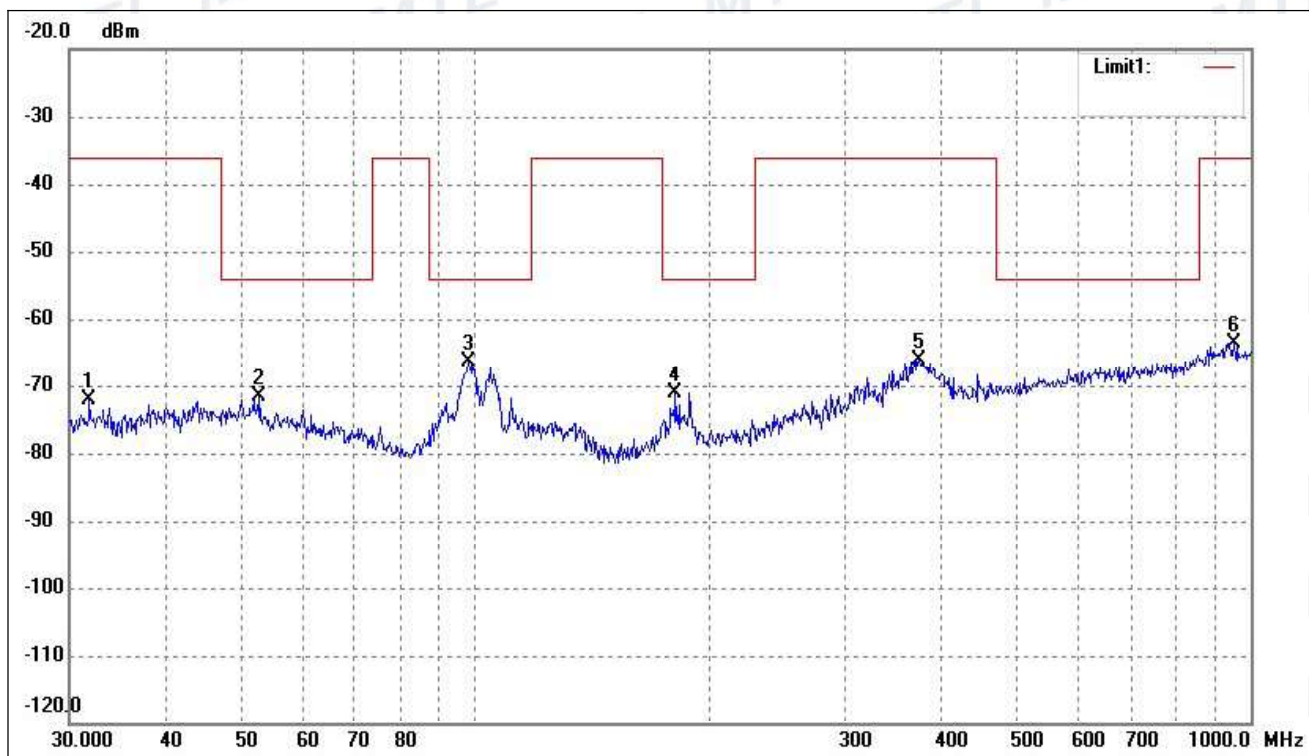
No.	Frequency (MHz)	Reading (dBuA/m)	Correct dB	Result (dBuA/m)	Limit (dBuA/m)	Margin (dB)	Remark
1	0.0090	44.29	-27.58	16.71	58.30	-41.59	ERP
2	0.0157	41.93	-27.49	14.44	57.35	-42.91	ERP
3	0.0282	39.57	-27.33	12.24	55.58	-43.34	ERP
4	0.1278	60.55	-26.71	33.84	Fundamental		
5	0.2548	35.15	-28.33	6.82	43.83	-37.01	ERP
6	0.3832	39.39	-28.89	10.50	42.07	-31.57	ERP
7	4.7213	29.66	-27.41	2.25	28.74	-26.49	ERP

Note 1: $H_{3m}=H_{10m}+C_3$ refer to ETSI EN300 330 Annex H.2



➤ 30MHz-1GHz Emission

Test Channel:	/	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	31.8427	-69.80	-2.25	-72.05	-36.00	-36.05	ERP
2	52.7600	-71.11	-0.51	-71.62	-54.00	-17.62	ERP
3	98.1419	-64.65	-1.82	-66.47	-54.00	-12.47	ERP
4	181.2834	-68.75	-2.36	-71.11	-54.00	-17.11	ERP
5	373.3112	-70.69	4.59	-66.10	-36.00	-30.10	ERP
6	952.0937	-76.83	13.17	-63.66	-36.00	-27.66	ERP

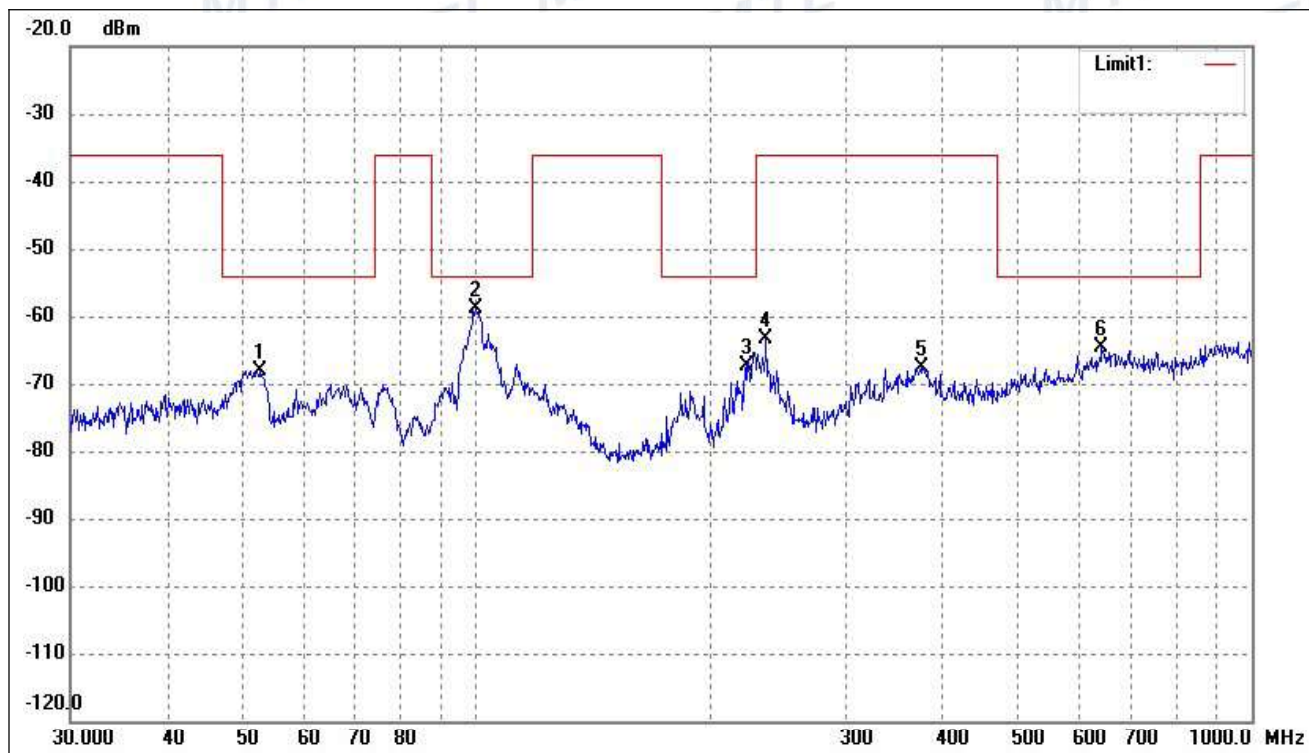


Test Channel:

/

Polarity:

Vertical



No.	Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	52.7600	-67.58	-0.51	-68.09	-54.00	-14.09	ERP
2	99.8777	-57.26	-1.54	-58.80	-54.00	-4.80	ERP
3	223.7334	-67.06	-0.35	-67.41	-54.00	-13.41	ERP
4	236.6447	-63.67	0.22	-63.45	-36.00	-27.45	ERP
5	374.6225	-72.19	4.61	-67.58	-36.00	-31.58	ERP
6	640.6110	-74.15	9.51	-64.64	-54.00	-10.64	ERP

Note1: Standby mode dose not produce any emission, which no emission been detected.



7. Transmitter out of band (OOB) emissions

7.1 Standard Applicable

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}).

Limit

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.

7.2 Test Procedure

Please refer to ETSI EN 303 417 subclause 6.2.2 for the measurement method

7.3 Summary of Test Results/Plots

No.	Frequency	Result@3m	C ₃	Result@10	Limit@10	Margin	Remark
	(MHz)	(dBuA/m)	(dB)	(dBuA/m)	(dBuA/m)	(dB)	
1	$F_{cL}-2.5 \times OBW_1$	33.78	31.20	2.58	65.73	-63.15	peak
2	F_L	33.83	31.20	2.63	65.70	-63.07	peak
3	F_H	33.84	31.20	2.64	65.68	-63.04	peak
4	$F_{cH}+2.5 \times OBW_3$	33.73	31.20	2.53	65.66	-63.13	peak

Note 1: $H_{3m}=H_{10m}+C_3$ refer to ETSI EN300 330 Annex H.2



8. Receiver blocking

8.1 Standard Applicable

This requirement applies to all WPT systems operation in Mode 1, Mode 2 and Mode 3.

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.

Limit

Table 6: Receiver blocking limits

	In-band signal	OOB signal	Remote-band signal
Frequency	Centre frequency (f_c) of the WPT	$f = f_c \pm F$ (see note)	$f = f_c \pm 10 \times F$ (see note)
Signal level field strength at the EUT	72 dB μ A/m	72 dB μ A/m	82 dB μ A/m

NOTE: $F = \text{OFR}$ see clause 4.3.3.

The EUT shall achieve the wanted performance criterion, see clause 4.2.2, in the presence of the blocking signal.

8.2 Test Procedure

Please refer to ETSI EN 303 417 Sub-clause 6.2.3 for the measurement method

8.3 Summary of Test Results/Plots

Not applicable

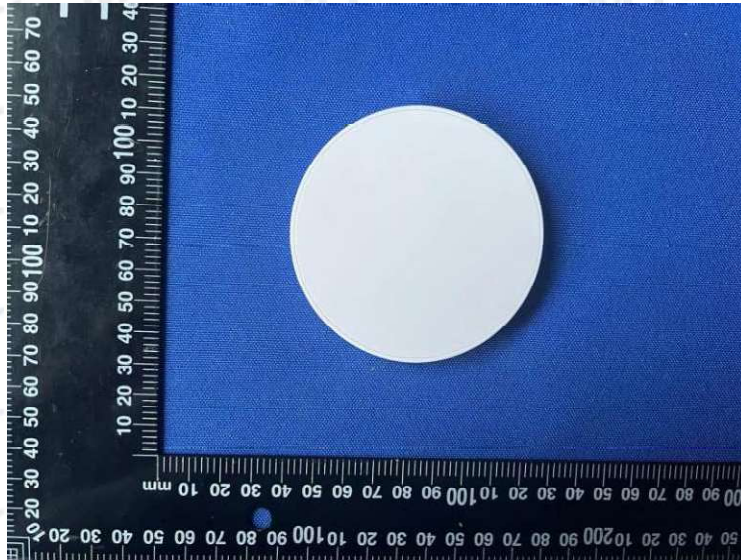


FIGURE 1



FIGURE 2



FIGURE 3

End of Report



EMC
Measurement and Test Report
For
Sipac SpA
Wireless charger

Applicant : Sipac SpA
Address : Via Anna Kuliscioff 16/18, 20152 Milano - Italy
Product Name : Wireless charger
Brand Name : N/A
Model No : 23406
Standards : EN IEC 62311:2020
Report No : MTL22070100503E01
Date of Receipt sample : 2022-07-01
Date of Test : 2022-07-01 to 2022-07-06
Date of Issue : 2022-07-15
Test Result : PASS

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

Shenzhen MTL Testing Technology Co., Ltd.

6th Floor, Building 4, No. 22, Dawangshan Second Industrial Zone, Shajing, Baoan District,
Shenzhen City, Guangdong Province, China.

Tel: +86-0755-23143231 Fax: +86-0755-23143231



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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

TEST REPORT DECLARATION

Applicant : Sipec SpA
Manufacturer : 012725
EUT Description : Wireless charger

(A) Model No. : 23406
(B) Serial No. : N/A
(C) Power Supply : DC5V (USB PORT)

Technical Characteristics of EUT	
Frequency Range:	112-190kHz
Radiated H-Field:	Max: 33.84dBuA/m(@3m)
Type of Antenna:	Coil Antenna

Test Procedure Used:

EN IEC 62311:2020 The devices described above have been tested by **Shenzhen MTL Testing Technology Co., Ltd** to determine the maximum emission levels emanating from the device, the severe levels that the device can endure and EUT'S performance criterion. The test results are contained in this test report. **Shenzhen MTL Testing Technology Co., Ltd.** is assumed of full responsibility for the accuracy and completeness of these tests.

This report applies to above tested sample only and shall not be reproduced in part without written approval of **Shenzhen MTL Testing Technology Co., Ltd.**

Prepared by:

Kaka fan
Project Engineer

Reviewed by:

Zi Jian Cai
Project Manager

Approved by:

Bo yu zh
Technical Director



1.2 Compliance Standards

The tests were performed according to following standards:

EN IEC 62311:2020: Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz to 300 GHz)

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with EN IEC 62311,
The equipment under test (EUT) was configured to measure its highest possible emission level. For more detail refer to the Operating Instructions.



2. RF EXPOSURE BASIC RESTRICTIONS

2.1 Standard Applicable

This International Standard applies to electronic and electrical equipment for which no dedicated product- or product family standard regarding human exposure to electromagnetic fields applies. The frequency range covered is 0 Hz to 300 GHz.

The object of this generic standard is to provide assessment methods and criteria to evaluate such equipment against basic restrictions or reference levels on exposure of the general public related to electric, magnetic and electromagnetic fields and induced and contact current.

Normative reference

EN 62311:2008, Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz).

Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to the electromagnetic fields (0Hz to 300GHz) (Official Journal L 197 of 30 July 1999) .

Directive 2013/35/EU of 26 June 2013, on the minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (electromagnetic fields) . Official Journal L179 of 2013-6-29,p. 1-21

2.2 Reference Levels Limit

According to the EN 62311:2008, the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified 1999/519/EC.

Reference levels of electric, magnetic, and electromagnetic fields
(0MHz to 300GHz, imperturbed rms values)

Frequency range	E-field strength (V/m)	H-field strength (μT)	B-field (nT)	Equivalent plane wave power density S_{Eq} (W/m ²)
0-1Hz	—	3.2×10^4	4×10^4	—
1-8Hz	10000	$3.2 \times 10^4 / f^2$	$4 \times 10^4 / f^2$	—
8-25Hz	10000	$4000 / f$	$5000 / f$	—
0.025-0.8kHz	$250 / f$	$4 / f$	$5 / f$	—
0.8-3kHz	$250 / f$	5	6.25	—
3-150kHz	87	5	6.25	—
0.15-1MHz	87	$0.73 / f$	$0.92 / f$	—
1-10MHz	$87 / f^{1/2}$	$0.73 / f$	$0.92 / f$	—
10-400MHz	28	0.073	0.092	2
400-2000MHz	$1,375 f^{1/2}$	$0.0037 f^{1/2}$	$0.0046 f^{1/2}$	$f / 200$
2-300GHz	61	0.16	0.20	10

**Note:**

1. f as indicated in the frequency range column
2. For frequencies between 100 kHz and 10 GHz, S_{Eq} , E^2 , H^2 , and B^2 are to be averaged over any sixty-minute period.
3. For frequencies exceeding 10GHz, S_{Eq} , E^2 , H^2 , and B^2 are to be averaged over any $68/f^{0.5}$ -minute period (f in GHz).
4. No E-field value is provided for frequencies <1 Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 25 kV/m, Spark discharges causing stress or annoyance should be avoided.

2.3 Evaluation Methods

The antenna of the product, under normal use condition is at least 20 cm away from the body of the user. Warning statement to the user to keeping at least 20 cm separation distance and the prohibition of operating to a person has been printed on the user's manual. So, this product under normal use is located on electromagnetic far field between the human body.

Far Field Calculation Formula

$$E = \eta_0 H = \frac{\sqrt{30 P G(\theta, \phi)}}{r}$$

G=antenna gain relative to an isotropic antenna

θ, ϕ =elevation and azimuth angles to point of investigation

r=distance from observation point to the antenna

η_0 =Characteristic impedance of free space



2.4 Evaluation Results

Maximum Average Output Power

Frequency	Radiated H-Field	Radiated H-Field	Limit	Result
MHz	dBuA/m	A/m	A/m	Pass/Fail
0.1278	33.84	0.00004920	5	Pass

Since average output power at worse case is: 0.00004920 A/m which cannot exceed the exempt condition, 5A/m specified in EN 62311. It is deemed to full fit the requirement of RF exposure basic restriction specified in EC Council Recommendation (1999/519/EC).

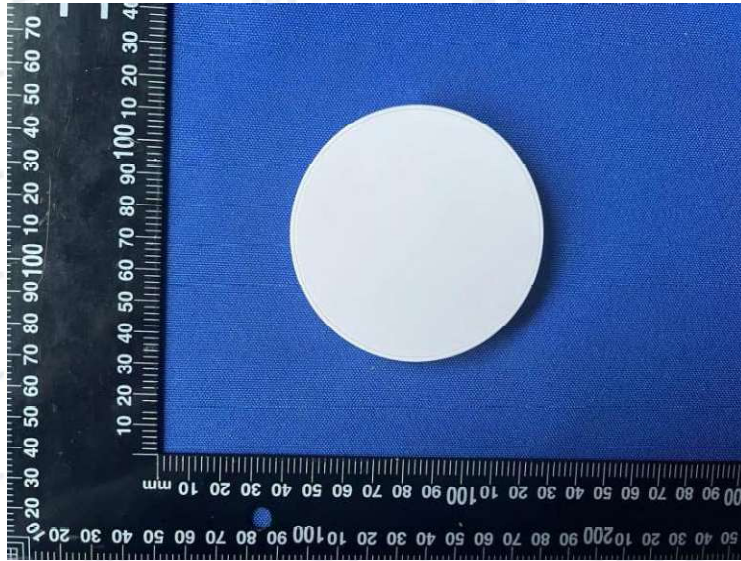


FIGURE 1



FIGURE 2



FIGURE 3

End of Report