Microtest
微测检测

Test Report

Report No.: MTi190702E017

Date of issue: July. 02, 2019

Sample Description:	Wireless charger power bank
Model(s):	
Applicant:	
Address:	
Date of Test:	June. 21, 2019 to July. 02, 2019

Shenzhen Microtest Co., Ltd.
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General information	
Applicant's name:	
Address:	
Manufacture's Name:	
Address:	
Product description	
Product name:	Wireless charger power bank
Trademark:	**N/A**
Model name:	
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 July. 02, 2019

Reviewed by: Smith Chen July. 02, 2019

Approved by: Tom Xue July. 02, 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. ** The EUT only work in mode 4			

2. General description

2.1. Feature of equipment under test (EUT)

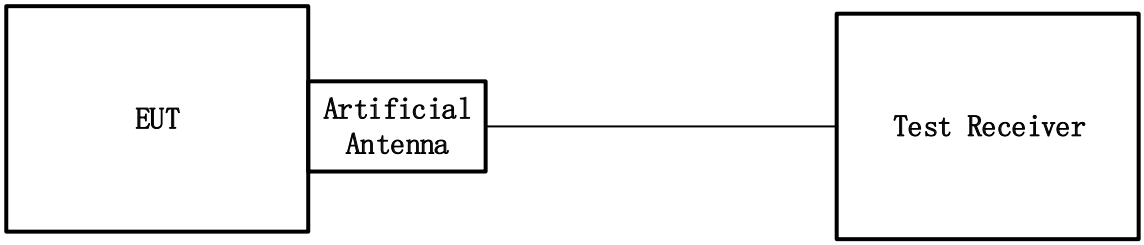
Product name:	Wireless charger power bank
Model name:	DP84Q
TX/RX frequency range:	110-205kHz
Radiated H-Field:	-18.77dBuA/m(@3m)
Operational Mode:	Mode 4(see table 2)
Antenna Designation:	Coil Antenna
Power Source:	DC 5V form AC 230V/50Hz
Battery:	DC 3.7V 8000mAh
Adapter information:	N/A
Note: The is a receiver device only use to energy transmission	

2.2. EUT operation mode

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

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: 20ºC~30ºC

- Humidity: 30%~70%
- Atmospheric pressure: 98kPa~101kPa

2.5. Ancillary equipment list

Equipment	Model	S/N	Manufacturer
/	/	/	/

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 ℃
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

Equipment	Manufacturer	Model	Serial No.	Calibration Due
Spectrum Analyzer	R&S	FSP_40	100129	2019/11/14
Microwave Pre_amplifier	Agilent	8449B	3008A01714	2019/11/14
Pre-Amplifier	Anritsu	MH648A	M09961	2019/11/4
Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9160	3058	2019/11/4
Signal Generator	R&S	SMT 06	832080/007	2019/11/4
Loop antenna	ZHINAN	ZN30900A	120245	2019/11/4

Note: the calibration interval of the above test instruments is 12 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) (kHz)	F_H(kHz)	Limit (KHz)		Result
110	205	$F_L \geq 100$	$F_H \leq 300$	Pass

5.2. Operating frequency range(s) (OFR)

5.2.1. Definition

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 (fL) 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.

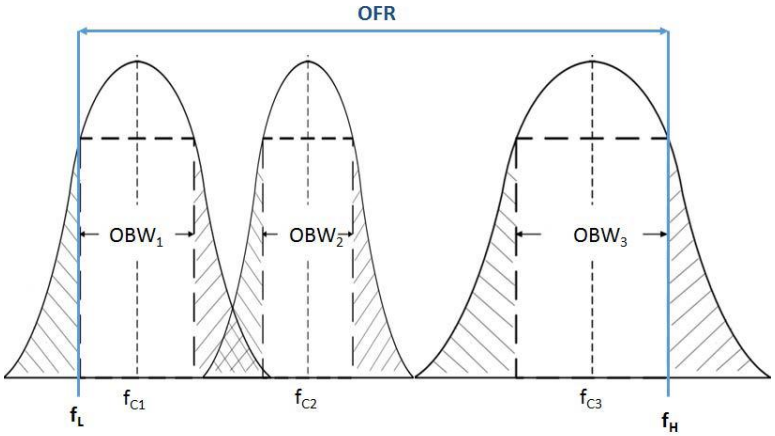


Figure 2: OFR of a multi - frequency WPT system within one frequency range of Table 2 and within one WPT system cycle time

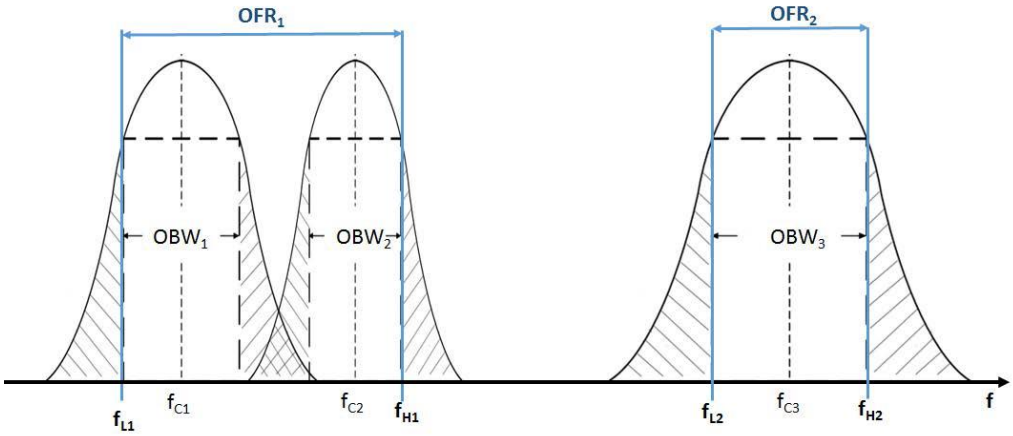


Figure 3: OFR of a multi - frequency WPT system within two frequency ranges of Table 2 and within one WPT system cycle time

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.

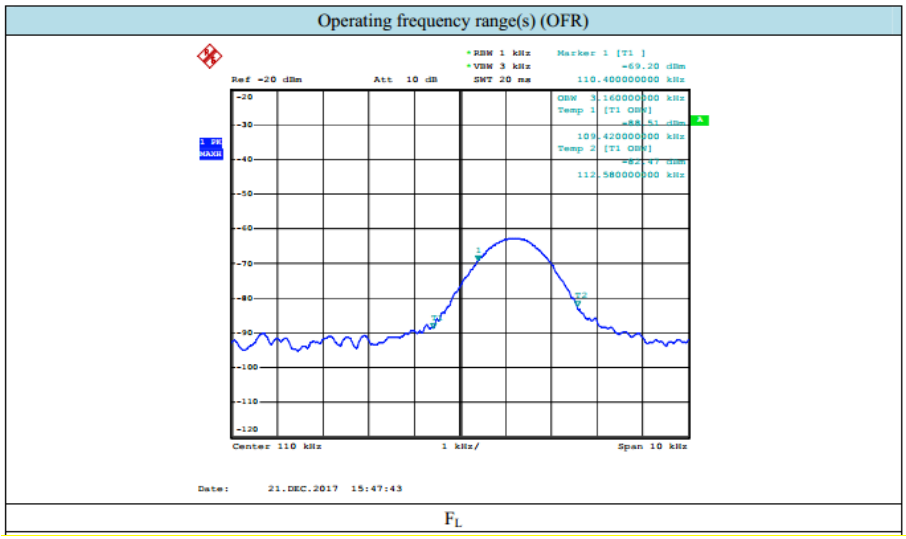
5.2.2. Test Procedures

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.

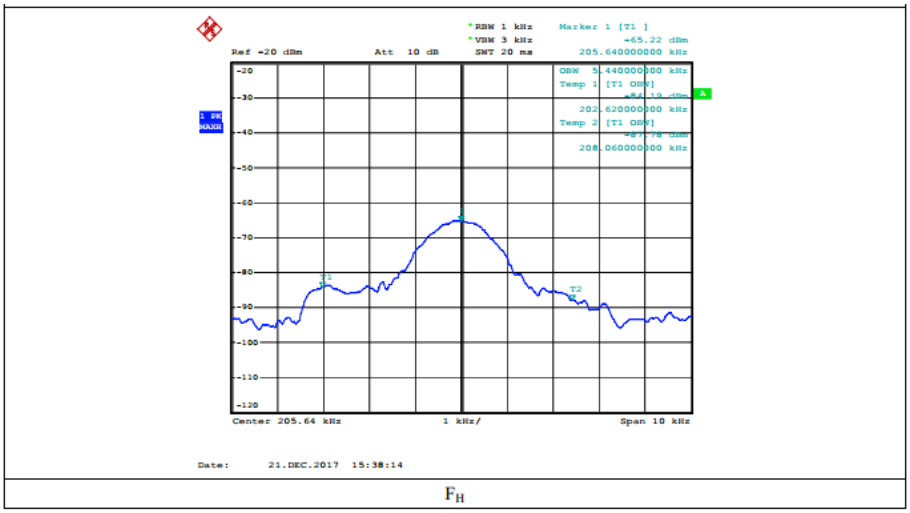
Conformance shall be established under test conditions to be declared by the manufacturer according to clause 4.1. The interpretation of the results for the measurements uncertainty shall be as given in clause 5.11.

5.2.3. Test Result

Operating frequency range(s) (OFR)				
F_L (KHz) (kHz)	F_H(kHz)	Limit (KHz)		Result
109.42	208.06	F_L≥100	F_H≤300	Pass



F_L



F_H

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

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

Frequency (MHz)	Level (dBuA/m)@3m	C_3Factor (dB)	Level (dBuA/m)@10m	Limit (dBuA/m)@10m	Result
0.110	-18.85	31.2	-50.05	42	Pass

Frequency (MHz)	Level (dBuA/m)@3m	C_3Factor (dB)	Level (dBuA/m)@10m	Limit (dBuA/m)@10m	Result
0.205	-19.24	31.2	-50.44	-5	Pass

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

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 $f > f_{SH}$).

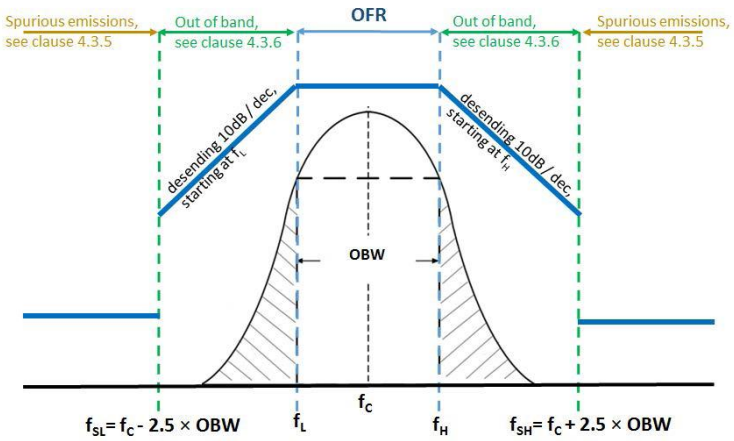


Figure 4: Out of band and spurious domain of a single frequency WPT system

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 $f > f_{SH}$).

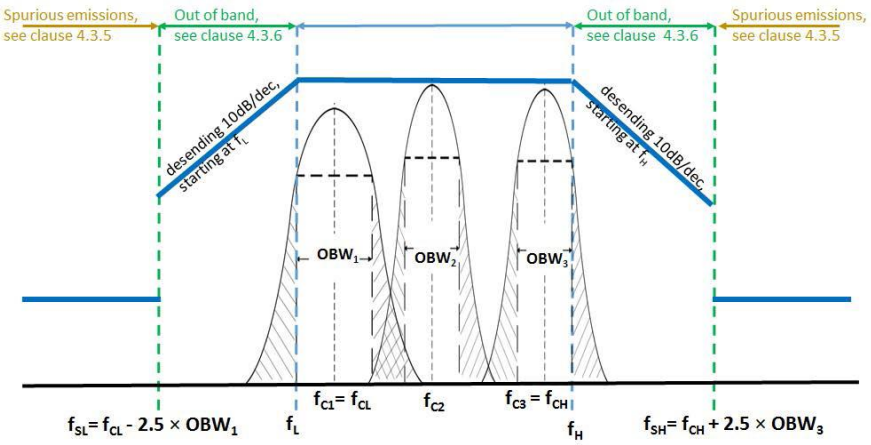


Figure 5: Out of band and spurious domain of a multi - frequency system

(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

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

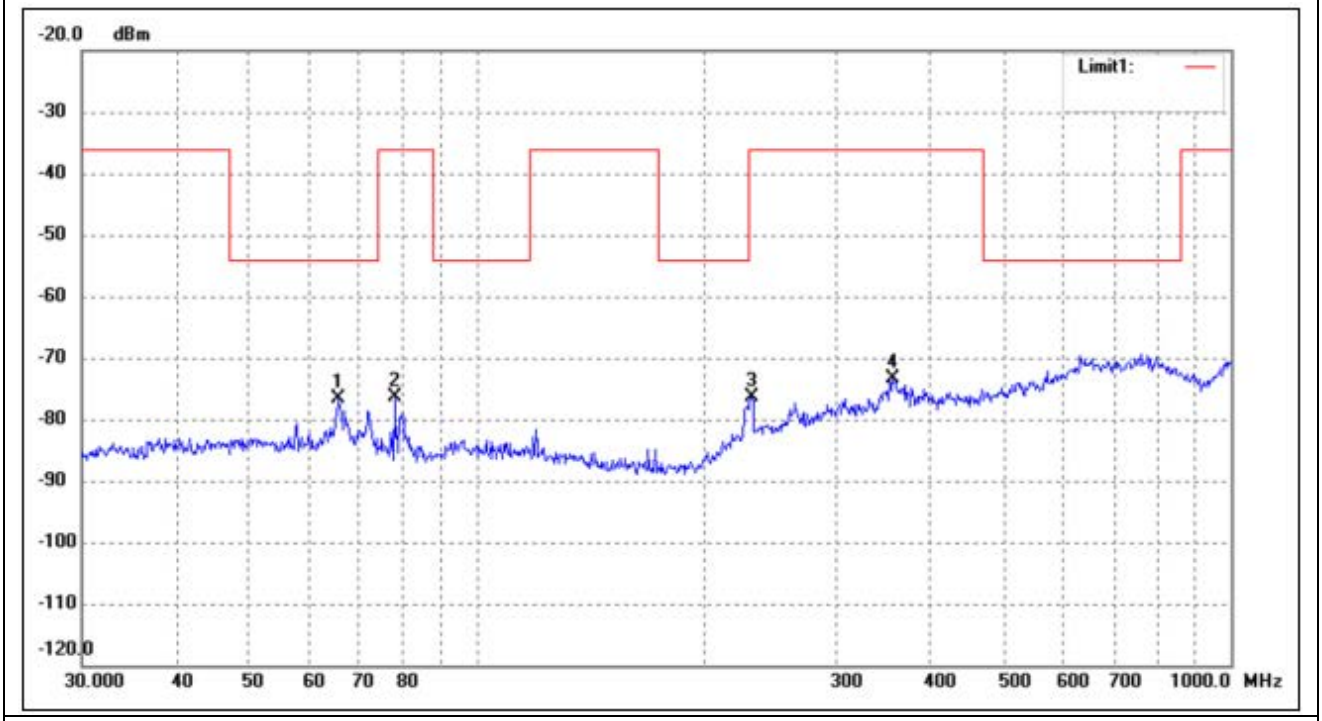
9KHz-30MHz Emission

No.	Frequency	Result@3m	C_3	Result @10m	Limit@10m	Margin	Remark
	(MHz)	dBuA/m	(dB)	dBuA/m	dBuA/m	(dB)	
1	16.5731	-24.49	31.2	-55.69	-3.5	-52.19	Peak

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

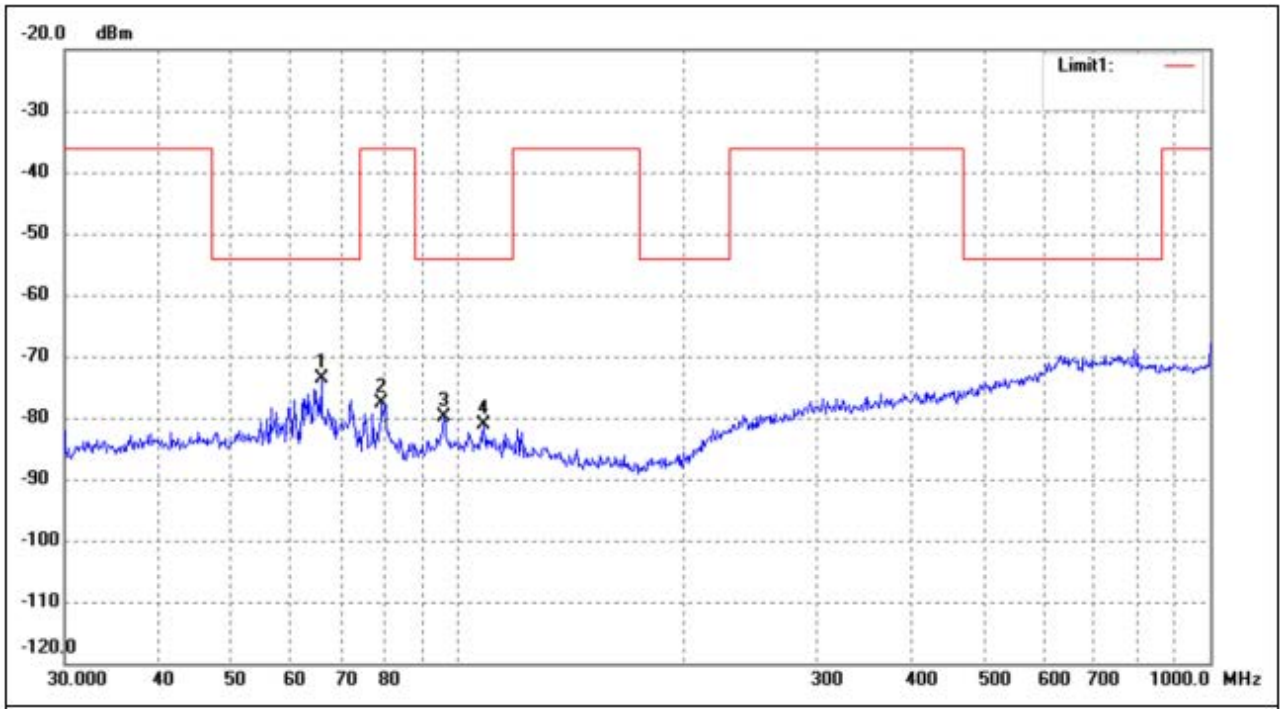
➢ 30MHz-1GHz Emission

Test Channel:	/	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	65.5727	-70.78	-5.92	-76.70	-54.00	-22.70	ERP
2	77.8654	-68.56	-7.78	-76.34	-36.00	-40.34	ERP
3	231.7179	-74.99	-1.29	-76.28	-36.00	-40.28	ERP
4	356.6758	-76.13	2.76	-73.37	-36.00	-37.37	ERP

Test Channel:	/	Polarity:	Vertical



No.	Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	65.8031	-67.70	-5.97	-73.67	-54.00	-19.67	ERP
2	79.2426	-69.79	-7.93	-77.72	-36.00	-41.72	ERP
3	95.7622	-74.47	-5.39	-79.86	-54.00	-25.86	ERP
4	108.2667	-76.36	-4.81	-81.17	-54.00	-27.17	ERP

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

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

No.	Frequency	Result@3m	C_3	Result @10m	Limit@10m	Margin	Remark
	(MHz)	dBuA/m	(dB)	dBuA/m	dBuA/m	(dB)	
1	FcL-2.5×OBW_1	-24.78	31.2	-55.98	41.76	-97.74	Peak
2	F_L	-20.65	31.2	-51.85	42	-93.85	Peak
3	F_H	-20.74	31.2	-51.94	-5	-46.94	Peak
4	FcH-2.5×OBW_3	-26.37	31.2	-57.57	-5.23	-52.34	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.			

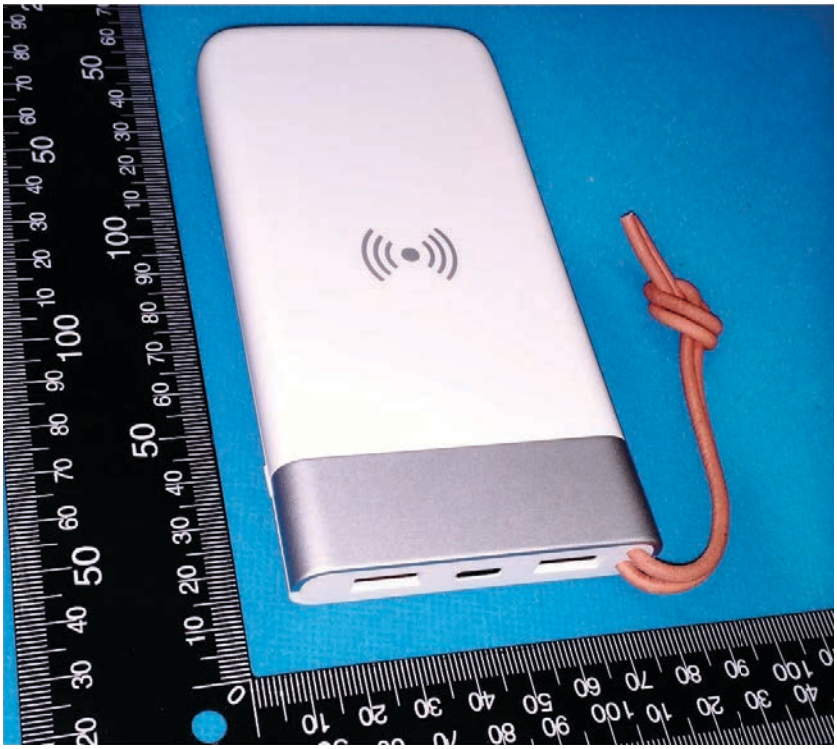
5.7.3. Test Procedures

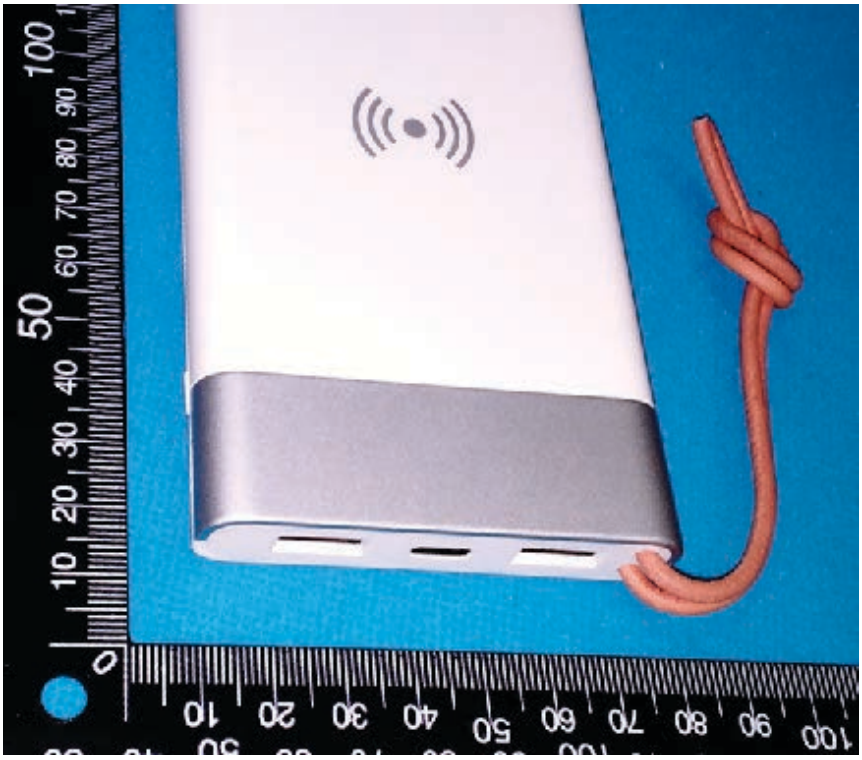
Follow the test procedure as described in EN 303 417 V1.1.1 Clause 6.3.2 to measure Receiver blocking.

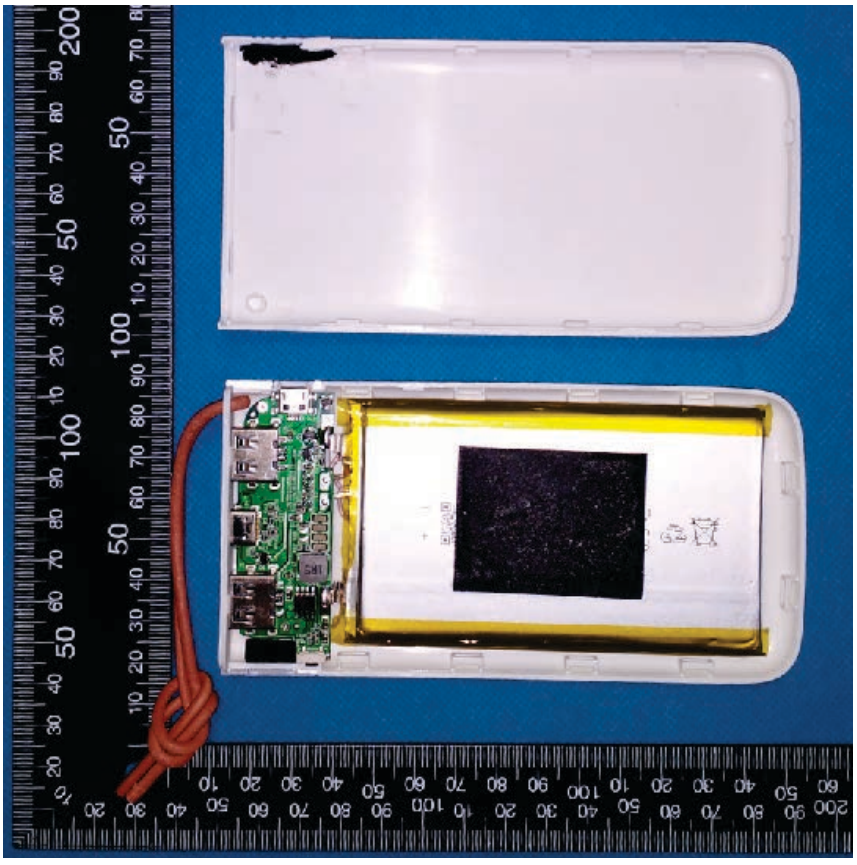
5.7.4. Test Result

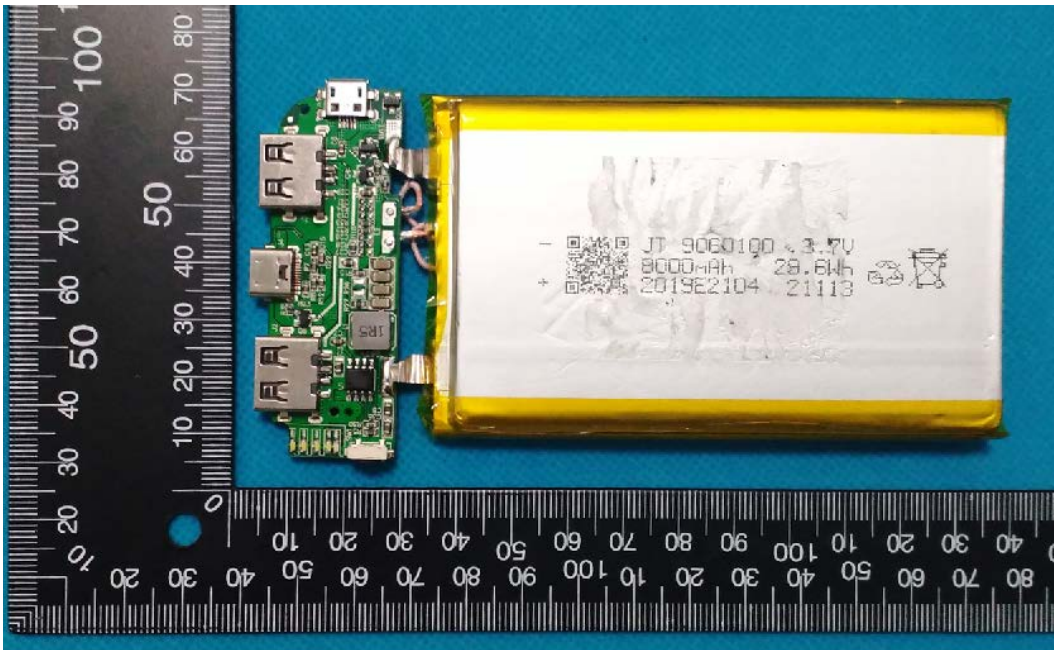
Test Frequency	Blocking Signal (dBuA/m)	Performance Criterion	Result
Fc-10×OFR	82	Without degradation of Performance	Pass
Fc	72	Without degradation of Performance	Pass
Fc+ OFR	72	Without degradation of Performance	Pass
Fc+0×OFR	82	Without degradation of Performance	Pass

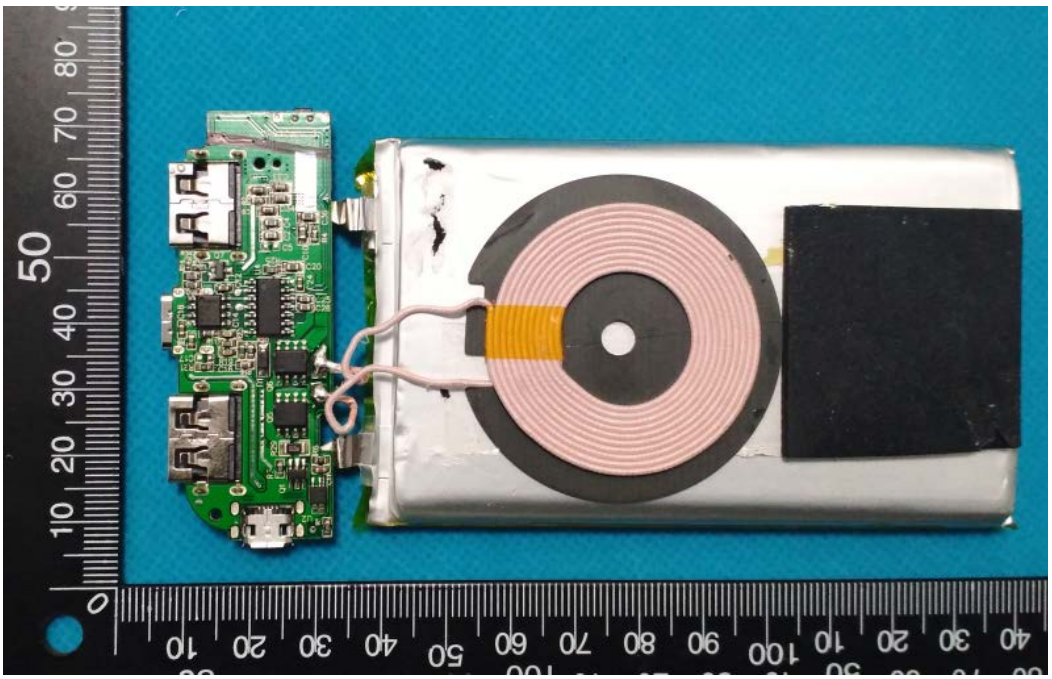
Photographs of the EUT

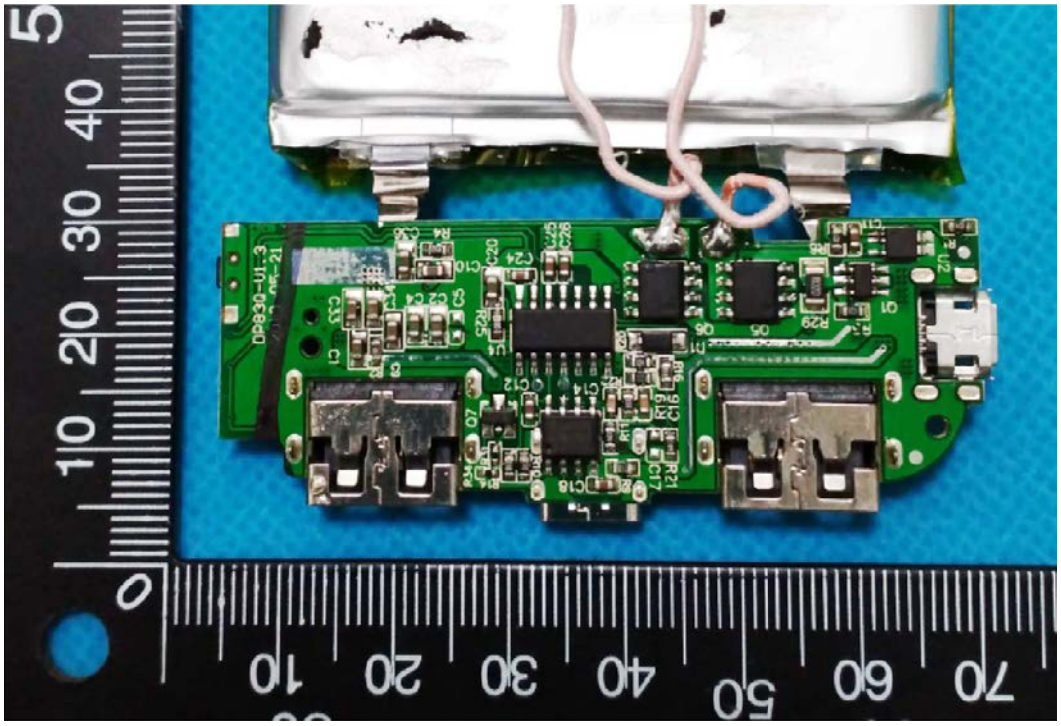


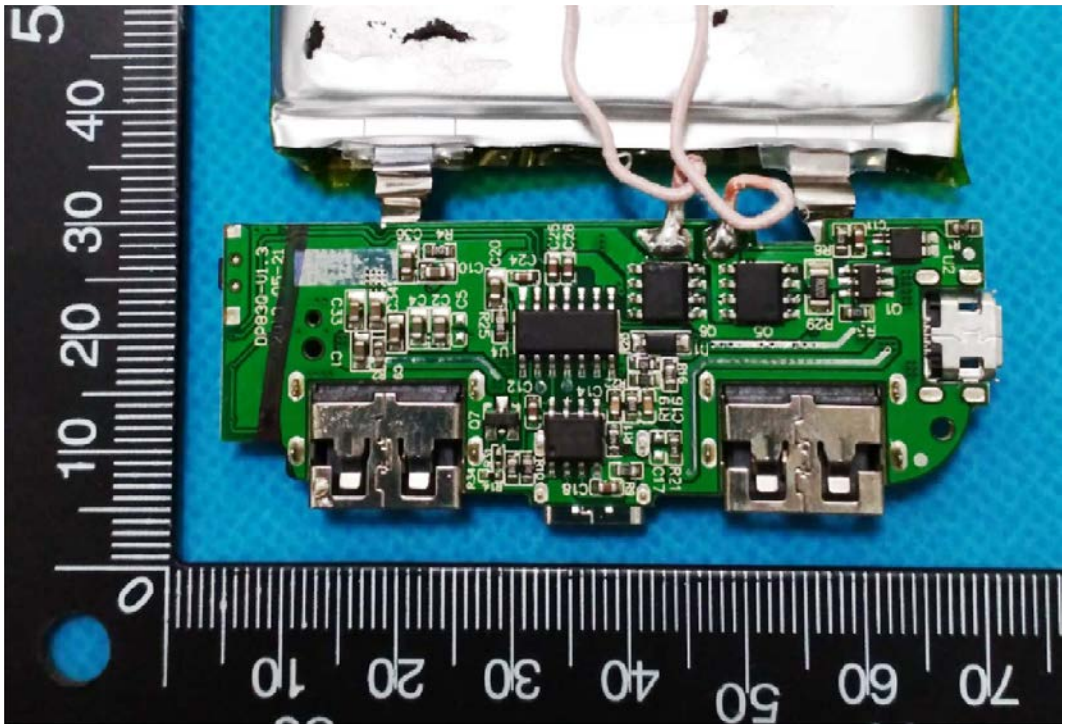












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