



# RADIO TEST REPORT

Prepared For:	
Product Name:	Wireless charger
Trade Mark:	YuRoad
Model:	BM2245, BM2245B
Prepared By:	Shenzhen United Testing Technology Co., Ltd. 2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China
Receipt Date:	Jun.05,2018
Test Date:	Jun.05,2018-Jun.15,2018
Date of Report:	Jun.15,2018
Report No.:	UNIA2018051522-2ER-01



## TABLE OF CONTENTS

### Test Report Declaration

1. GENERAL INFORMATION .....	4
1.1. Description of Device (EUT).....	4
1.2. Test Facility .....	5
1.3. Block Diagram of EUT Configuration .....	6
1.4. Support Equipment List .....	6
1.5. Operating Condition of EUT .....	6
1.6. Test Conditions .....	6
1.7. Modifications .....	6
1.8. Abbreviations.....	6
2. TEST RESULTS SUMMARY .....	7
3. TEST EQUIPMENTS.....	8
4. MEASUREMENT UNCERTAINTY.....	9
5. Permitted range of operating frequencies/Operating frequency ranges .....	10
6. H-field requirements.....	12
7. Transmitter spurious emissions.....	14
8. Transmitter out of band (OOB) emissions.....	16
9. WPT system unwanted conducted emissions.....	19
10. Receiver blocking.....	20
APPENDIX I (Photos of the EUT) .....	22



## TEST REPORT DECLARATION

Applicant	
Address	
Manufacturer	
Address	
EUT Description	Wireless Charger
Model Number	BM2245, BM2245B

### Test Standards:

ETSI EN 303 417 V1.1.1 (2017-09)

The EUT described above is tested by Shenzhen United Testing Technology Co., Ltd. EMC Laboratory to determine the maximum emissions from the EUT and ensure the EUT to be compliance with the immunity requirements of the EUT. Shenzhen United Testing Technology Co., Ltd. Laboratory is assumed full responsibility for the accuracy of the test results. Also, this report shows that the EUT technically complies with the 2014/53/EU directive and its amendment requirements. The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Prepared by:

*Kahn Yang*

Kahn yang/Editor

Reviewer:

*Shenwin Qian*

Shenwin Qian/Supervisor

Approved & Authorized Signer:

*Liuzhe*

Liuzhe/Manager





## 1. GENERAL INFORMATION

### 1.1. Description of Device (EUT)

Description : Wireless Charger

Model Number : BM2245

Applicant :

Manufacturer :

RF Operating Frequency (ies) : 110-205KHz

Date of Test : Jun.05,2018-Jun.15,2018



## 1.2. Test Facility

### Site Description

EMC Lab.

### Name of Firm

: Shenzhen United Testing Technology Co., Ltd.

### Site Location

: 2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19. The testing quality system of our laboratory meets with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

### CNAS-LAB Code: L6494

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of testing Laboratories.

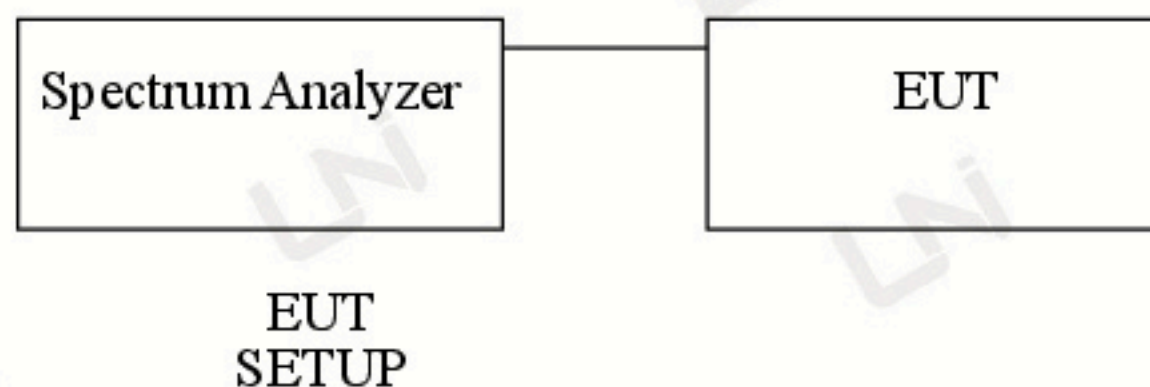
### Designation Number: CN1227

### Test Firm Registration Number: 674885

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files.



### 1.3. Block Diagram of EUT Configuration



### 1.4. Support Equipment List

Table 2 Ancillary Equipment

Name	Model No	S/N	Manufacturer	Used
Mobile phone	G610	--	HUAWEI	No

### 1.6. Test Conditions

Temperature: -20~55°C

Relative Humidity: 50~70 %

### 1.7. Modifications

No modification was made.

### 1.8. Abbreviations

AC	Alternating Current
AMN	Artificial Mains Network
DC	Direct Current
EM	ElectroMagnetic
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
IF	Intermediate Frequency
RF	Radio Frequency
rms	root mean square
EMI	Electromagnetic Interference
EMS	Electromagnetic Susceptibility



## 2. TEST RESULTS SUMMARY

Table 1 Test Results Summary

List of Measurements			
No	Test Items	Clause No.	Results
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
Note: N/A is an abbreviation for Not Applicable and means this test item is not applicable for this device according to the technology characteristic of device.			



### 3. TEST EQUIPMENTS

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Horn Antenna	Sunol	DRH-118	A101415	2018.9.29
2	BicoNILog Antenna	Sunol	JB1 Antenna	A090215	2018.9.29
3	PREAMP	HP	8449B	3008A00160	2018.9.9
4	PREAMP	HP	8447D	2944A07999	2018.9.9
5	EMI TEST RECEIVER	Rohde&Schwarz	ESR3	101891	2018.9.9
6	VECTOR Signal Generator	Rohde&Schwarz	SMU200A	101521	2018.9.28
7	Signal Generator	Agilent	E4421B	MY4335105	2018.9.28
8	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2018.9.28
9	MXA Signal Analyzer	Agilent	N9020A	MY51110104	2018.9.9
10	ANT Tower&Turn table Controller	Champro	EM 1000	60764	2018.9.28
11	Anechoic Chamber	Taihe Maorui	9m*6m*6m	966A0001	2018.9.9
12	Shielding Room	Taihe Maorui	6.4m*4m*3m	643A0001	2018.9.9
13	RF Power sensor	DARE	RPR3006W	15I00041SNO88	2019.3.14
14	RF Power sensor	DARE	RPR3006W	15I00041SNO89	2019.3.14
15	RF power divider	Anritsu	K241B	992289	2018.9.28
16	Wideband radio communication tester	Rohde&Schwarz	CMW500	154987	2018.9.28
17	Biconical antenna	Schwarzbeck	VHA 9103	91032360	2018.9.8
18	Biconical antenna	Schwarzbeck	VHA 9103	91032361	2018.9.8
19	Broadband Hybrid Antennas	Schwarzbeck	VULB9163	VULB9163#958	2018.9.8
20	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2019.1.12
21	Active Receive Loop Antenna	Schwarzbeck	FMZB 1919B	00023	2018.11.02
22	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170651	2019.03.14
23	Microwave Broadband Preamplifier	Schwarzbeck	BBV 9721	100472	2018.10.24



## 4. MEASUREMENT UNCERTAINTY

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

Test Item	Uncertainty
Occupied Channel Bandwidth	$\pm 1\%$
Uncertainty for radio frequency	$1 \times 10^{-9}$
RF Output power, conducted	$\pm 0.6\text{dB}$
Power Spectral Density, Conducted	$\pm 1.2\text{dB}$
Unwanted Emissions, Conducted	$\pm 0.6\text{dB}$
Temperature	$\pm 0.2^\circ\text{C}$
Humidity	$\pm 1\%$
DC and Low frequency voltage	$\pm 0.5\%$
Time	$\pm 1\%$
Duty Cycle	$\pm 1\%$
Uncertainty for Unwanted Emission, Radiated (30MHz-1GHz)	2.12 dB (Polarize: V)
	2.42 dB (Polarize: H)
Uncertainty for Unwanted Emission, Radiated (Above of 1GHz)	2.08dB(Polarize: V)
	2.16dB (Polarize: H)



## 5. Permitted range of operating frequencies/Operating frequency ranges

### 5.1. Standard Requirement:

#### 5.1.1. Test Standard

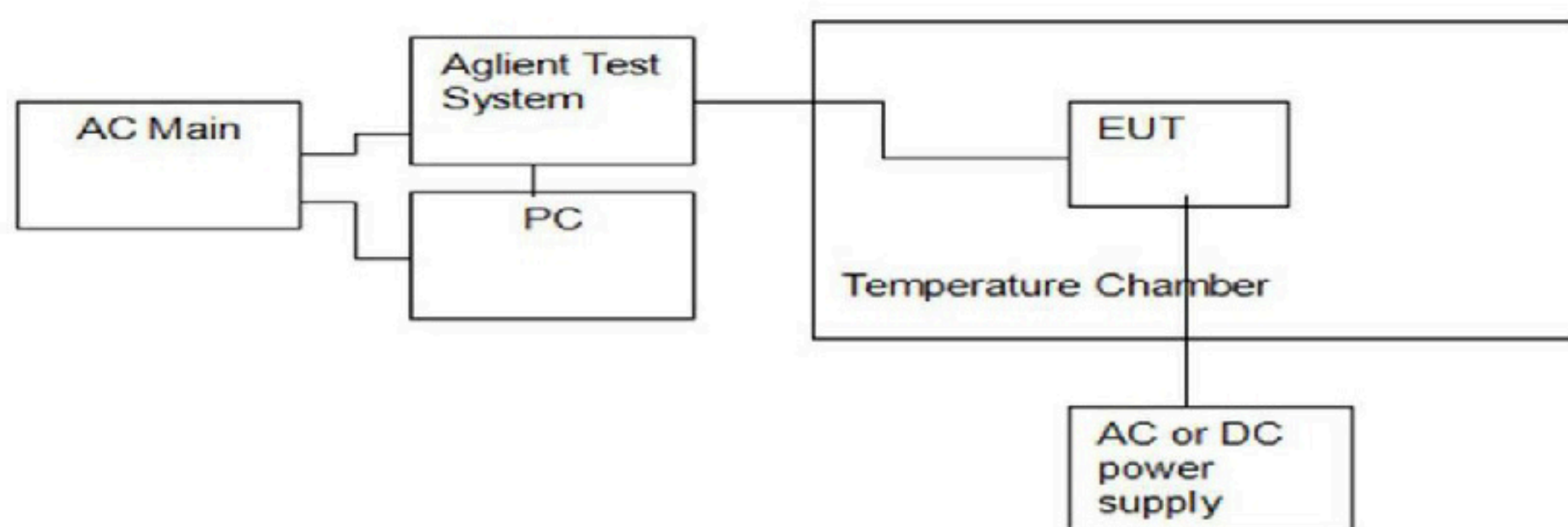
ETSI EN 303 417 V1.1.1 (2017-09)

#### 5.1.2. Test Limit

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, 6765 - 6 795 kHz, see Table below

	WPT frequency range	Frequency Bands	Applications
Transmit and Receive	1	19 kHz to 21 kHz	WPT systems
Transmit and Receive	2	59 kHz to 61 kHz	WPT systems
Transmit and Receive	3	79 kHz to 90 kHz	WPT systems
Transmit and Receive	4	100 kHz to 119 kHz	WPT systems
Transmit and Receive		119 kHz to 140 kHz	WPT systems
Transmit and Receive		140 kHz to 148,5 kHz	WPT systems
Transmit and Receive		148,5 kHz to 300 kHz	WPT systems
Transmit and Receive	5	6 765 kHz to 6 795 kHz	WPT systems

#### 5.1.3. Test Setup



### 5.2. Test Procedure

Refer to chapter 4.3.2 & 4.3.3 of EN 303 417 V1.1.1.



### 5.3. Test Data

Test Condition			Frequency(KHz)	
			Lowest	Highest
Tnom (°C)	+20	AC 230V	110.14	204.52
Tmin (°C)	-10	AC 230V	110.25	204.58
		AC 230V	110.16	204.40
Tmax (°C)	+45	AC 230V	110.18	204.67
		AC 230V	110.21	204.65
Measured frequencies (lowest and highest)			FL = > 110KHz	FH = <205KHz



## 6. H-field requirements

### 6.1. Standard Requirement:

#### 6.1.1. Test Standard

ETSI EN 303 417 V1.1.1 (2017-09)

#### 6.1.2. Test Limit

H – Field Limit refer to the table:

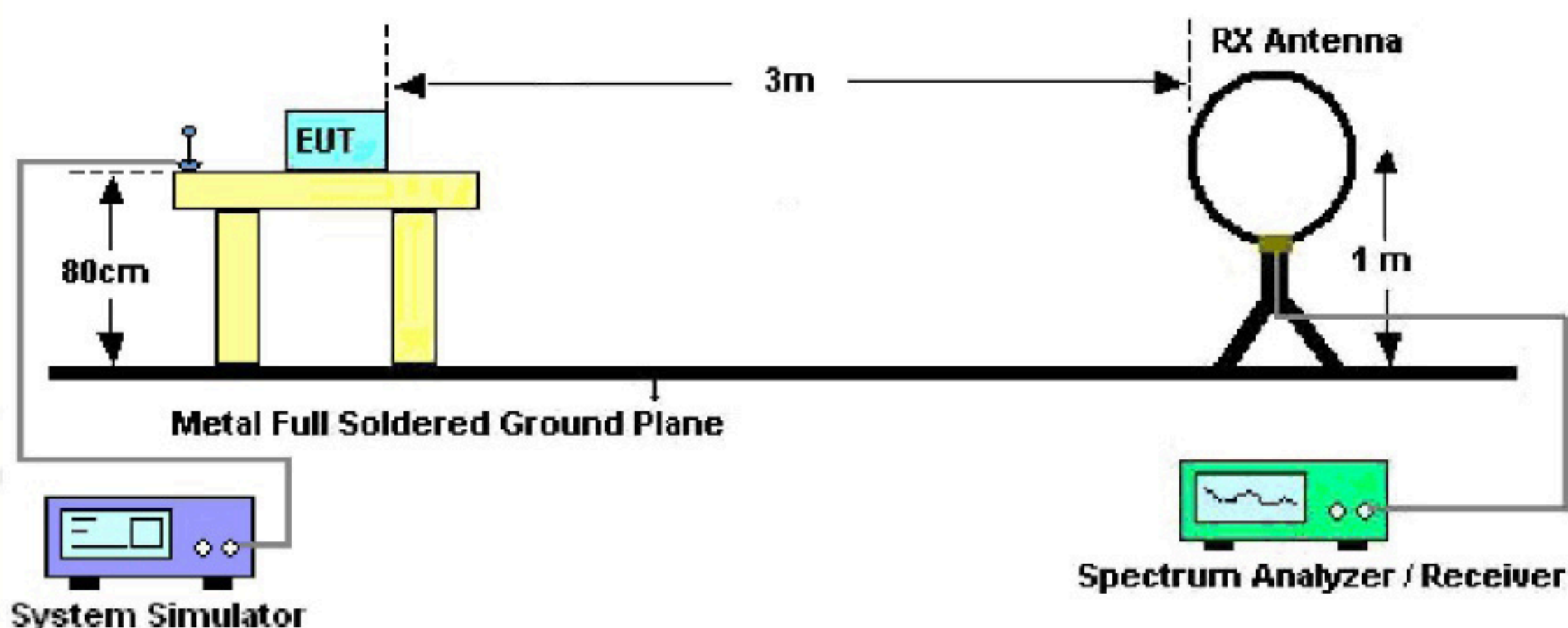
They have been specified for control of any radiated emissions within the OFR originating from the WPT system (Power transmission and accompanying data communication).

**H-field limits**

Frequency range [MHz]	H-field strength limit [dB $\mu$ A/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 dB $\mu$ A/m for the following spot frequencies: 60 kHz  $\pm$  250 Hz and 129,1 kHz  $\pm$  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 [1.4] 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.

#### 6.1.3. Test Setup





## 6.2. Test Procedure

Refer to chapter 4.3.4 of EN 303 417 V1.1.1.

The conformance test suite for H-field requirements shall be as defined in clause 6.2.1.

## 6.3. Test Data

Ambient temperature: 21 °C		Relative humidity: 60%	
Test mode		H-field requirements	
TX		PASS	
Note: No result in this part for margin above 20dB. So didn't show test data in the report.			



## 7. Transmitter spurious emissions

### 7.1. Test Requirements

#### 7.1.1. Test Standard

ETSI EN 303 417 V1.1.1 (2017-09)

#### 7.1.2. Test Limit

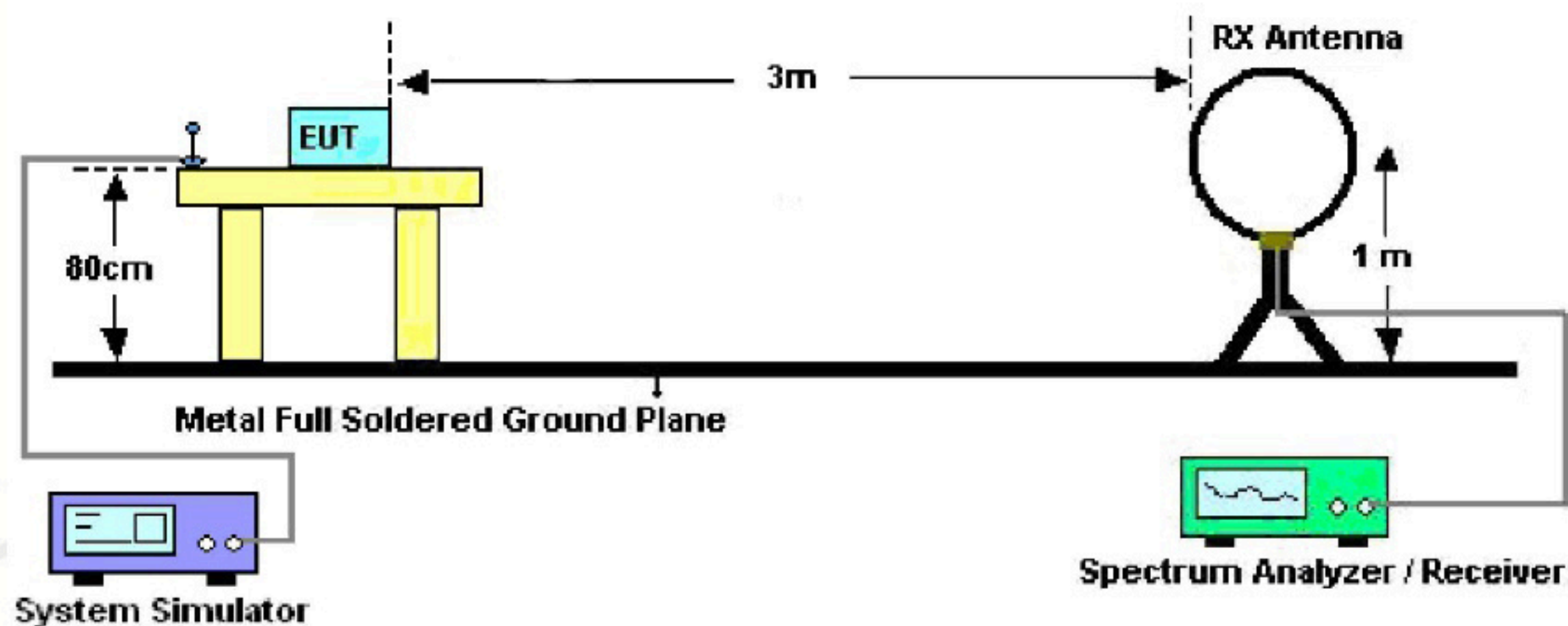
The radiated field strength of spurious emissions below 30 MHz shall not exceed the v generated H-field given in Table below:

State (see note)	Frequency $9 \text{ kHz} \leq f < 10 \text{ MHz}$	Frequency $10 \text{ MHz} \leq f < 30 \text{ MHz}$
Operating	27 dB $\mu$ A/m at 9 kHz descending 10 dB/dec	-3,5 dB $\mu$ A/m
Standby	5,5 dB $\mu$ A/m at 9 kHz descending 10 dB/dec	-25 dB $\mu$ A/m
NOTE: "Operating" means mode 2, 3 and 4 according to Table 2; "standby" means mode 1 according to Table 2.		

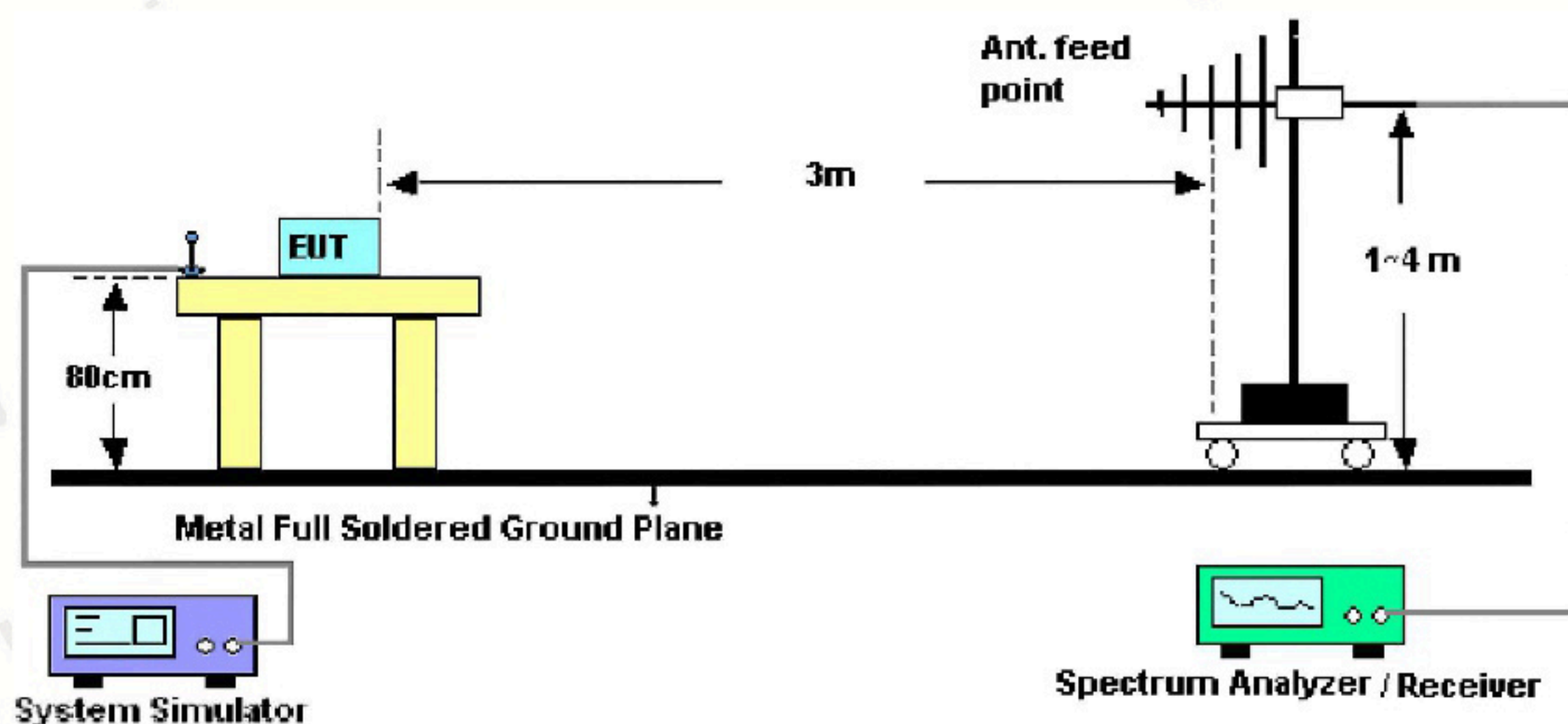
The power of any radiated spurious emission between 30MHz and 1GHz shall not exceed the values given in Table Below:

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.		

#### 7.1.3. Test Setup







## 7.2. Test Procedure

Refer to chapter 4.3.5 of EN 303 417 V1.1.1.

The conformance test suite for unwanted emissions 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.

## 7.3. Test Data

Ambient temperature: 21°C		Relative humidity: 60%	
Test mode		Transmitter spurious emissions	
TX		PASS	



## 8. Transmitter out of band (OOB) emissions

### 8.1. Test Requirements

#### 8.1.1. Test Standard

ETSI EN 303 417 V1.1.1 (2017-09)

#### 8.1.2. Test 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.

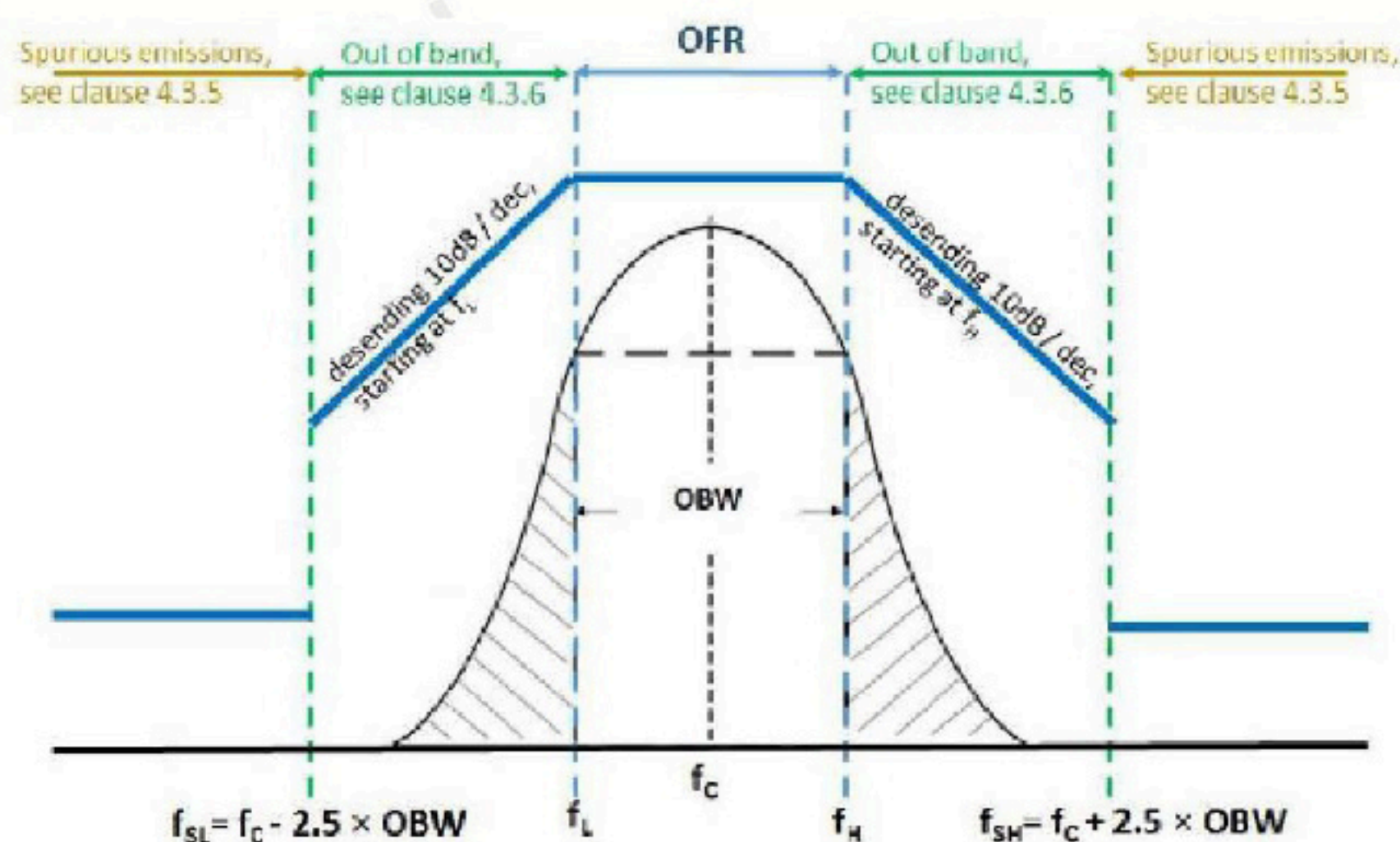
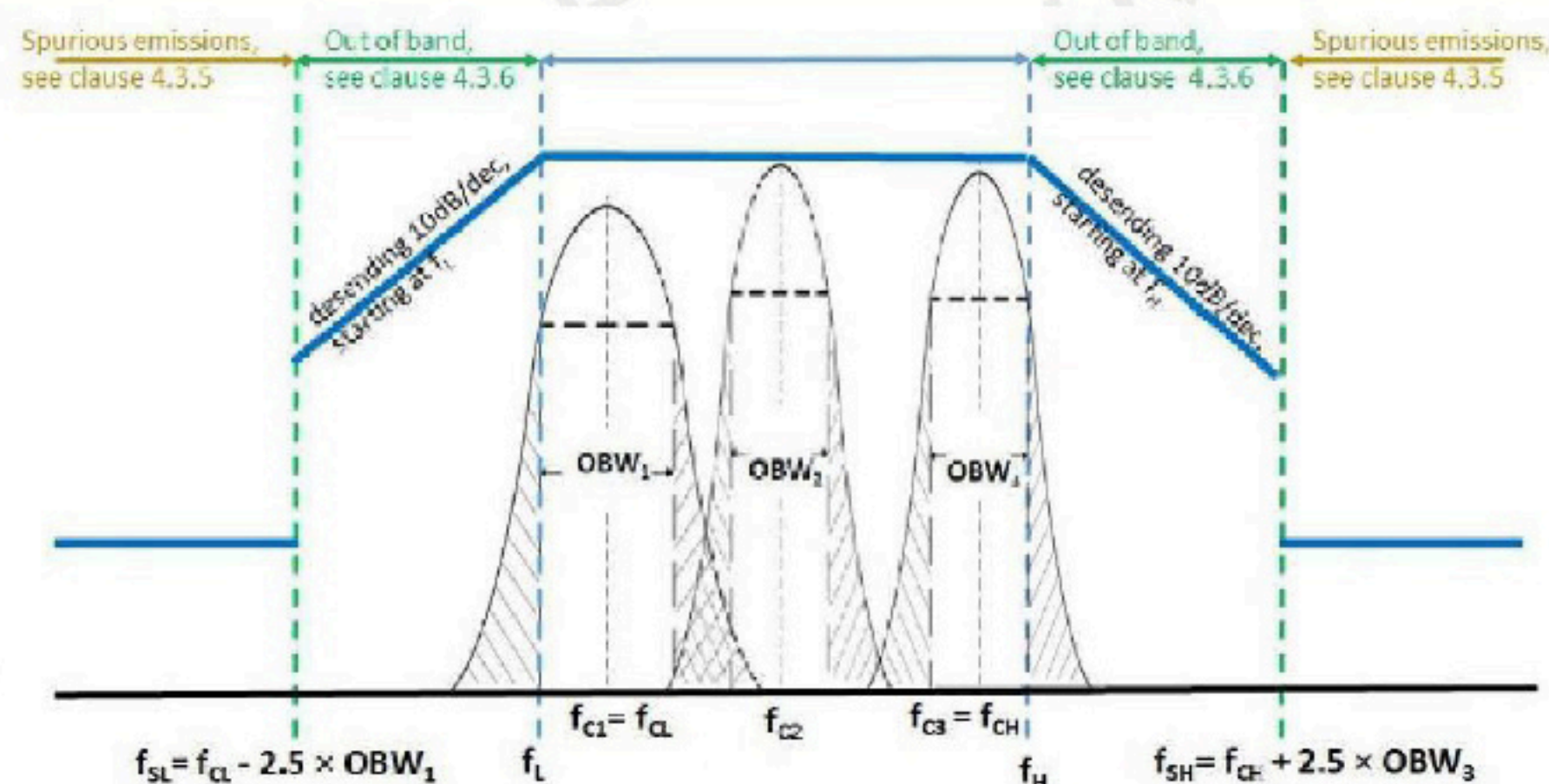


Figure 4: Out of band and spurious domain of a single frequency WPT system

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





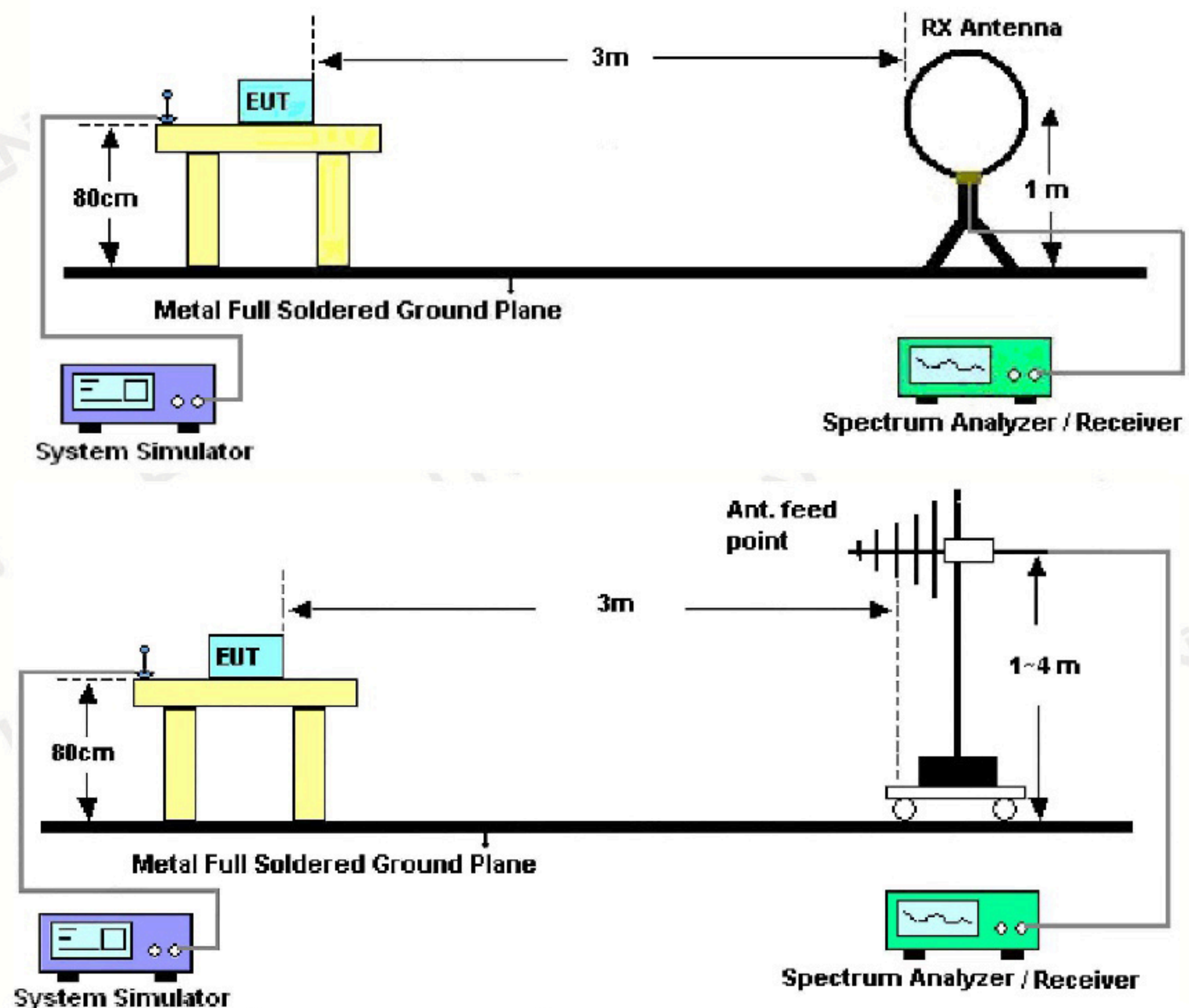
The transmitter spurious emissions for a multi frequency system (within one WPT frequency range from Table 2) are to be considered in frequency ranges defined in Figure 5 ( $f < f_{SL}$  and  $f > f_{SH}$ ).

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  $\pm$  250 Hz and 129,1 kHz  $\pm$  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 [1.4] 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.

### 8.1.3. Test Setup





## 8.2. Test Procedure

Refer to chapter 4.3.6 of EN 303 417 V1.1.1.

The conformance test suite for Transmitter out of band emissions is provided in clause 6.2.1.

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.

## 8.3. Test Data

Ambient temperature: 21 °C		Relative humidity: 60%	
Test mode		Transmitter out of band (OOB) emissions	
TX		PASS	



## 9. WPT system unwanted conducted emissions

### 9.1. Standard Requirement:

#### 9.1.1. Test Standard

ETSI EN 303 417 V1.1.1 (2017-09)

#### 9.1.2. Test Limit

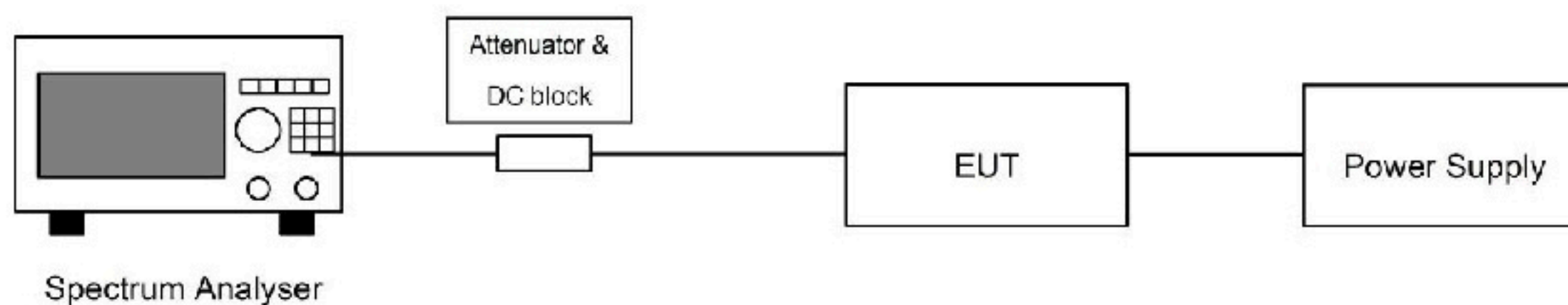
This applies to all WPT systems where the cable to the primary coil exceeds a length of 3 m and where the cable is not installed in the ground or any metallic structures.

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

$$I_{CM} = 47 - 8 \times \log(f) \text{ dB}\mu\text{A}$$

NOTE: f is the frequency in MHz.

#### 9.1.3. Test Setup



### 9.2. Test Procedure

Refer to chapter 4.3.4 of EN 303 417 V1.1.1.

The conformance test suite for common mode current shall be as defined in clause 6.2.4.

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.

### 9.3. Test Data

N/A

The cable to the primary coil is less than 3 m.



## 10. Receiver blocking

### 10.1. Standard Requirement:

#### 10.1.1. Test Standard

ETSI EN 303 417 V1.1.1 (2017-09)

#### 10.1.2. Test Limit

Receiver blocking Limit refer to the table:

**Receiver blocking limits**

	In-band signal	OOB signal	Remote-band signal
Frequency	Centre frequency ( $f_c$ ) of the WPT system (see clause 4.3.3)	$f = f_c + F$ (see note)	$f = f_c + 10 \times F$ (see note)
Signal level field strength at the EUT	72 dB $\mu$ A/m	72 dB $\mu$ A/m	82 dB $\mu$ A/m

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

#### 10.1.3. Test Setup

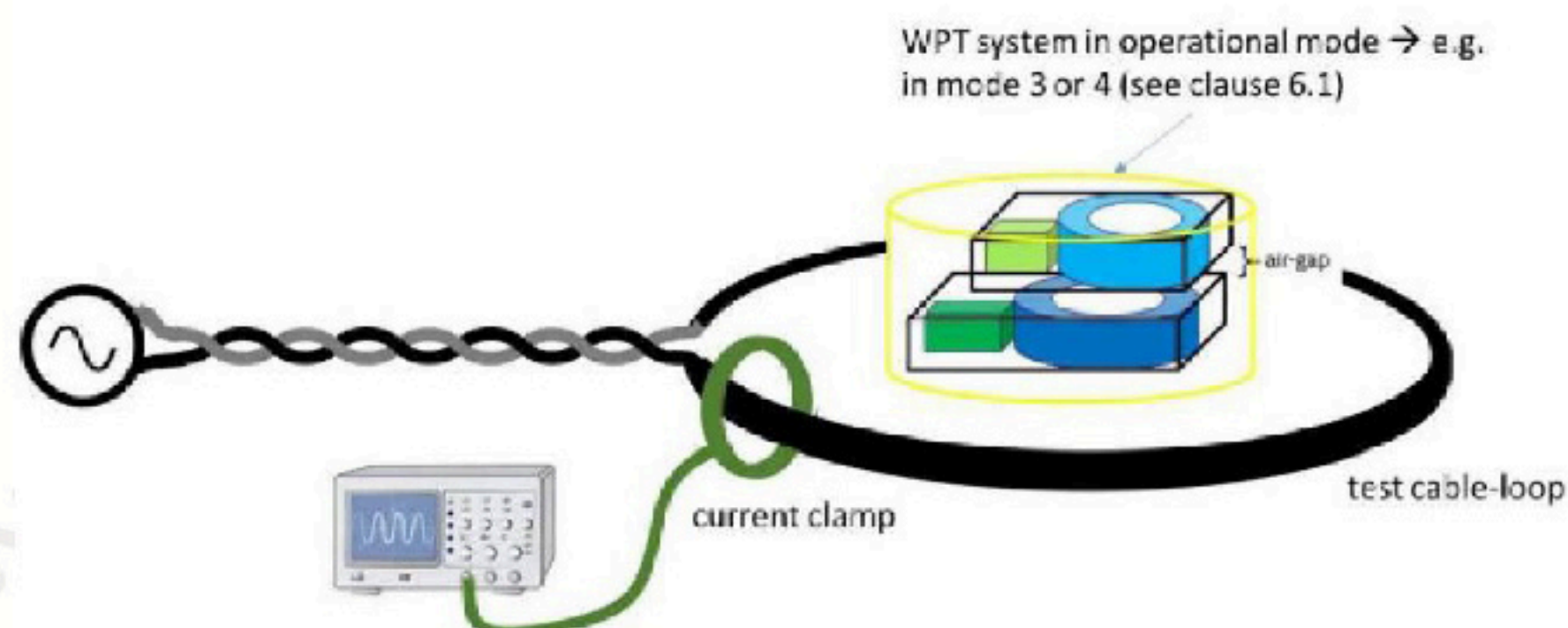


Figure 11: Schematic test set-up for the RX-blocking test

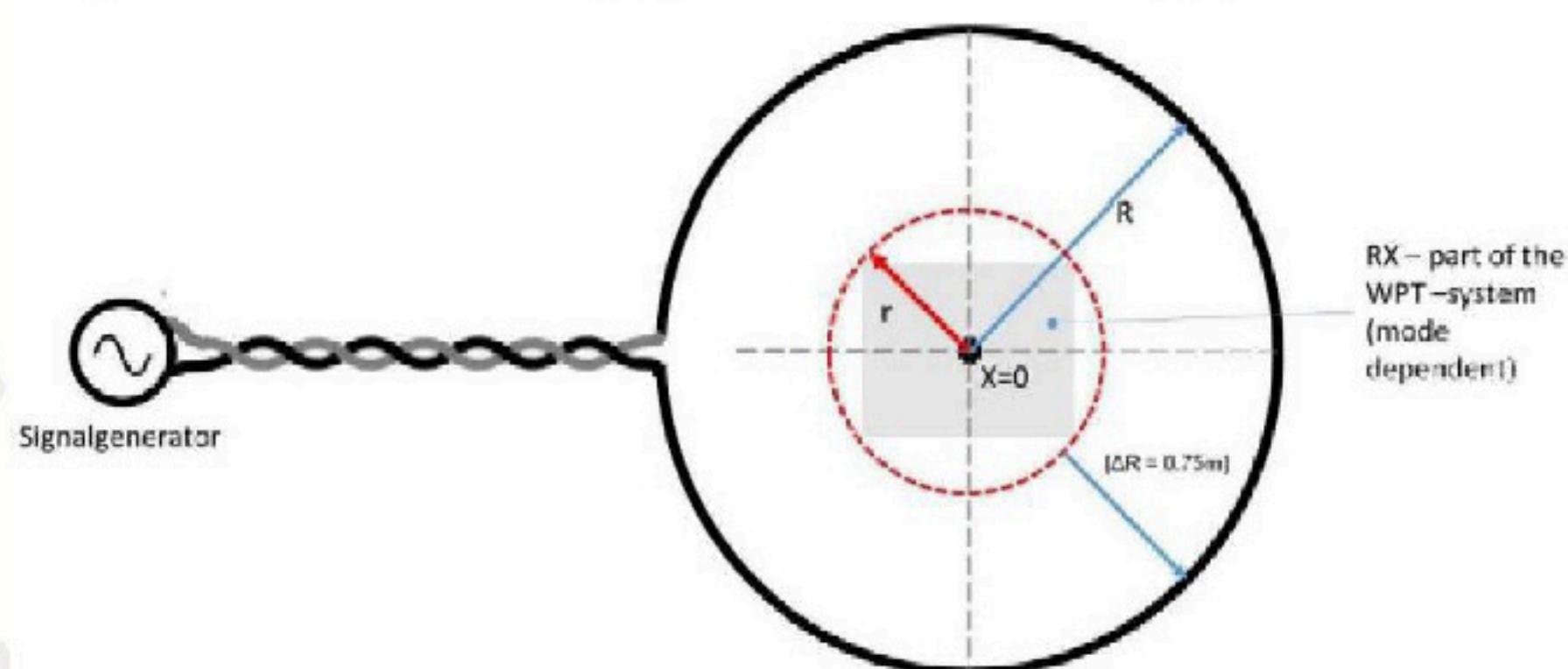


Figure 12: Schematic test set-up for the RX-blocking test



## 10.2. Test Procedure

Refer to chapter 4.3.4 of EN 303 417 V1.1.1.

The conformance test suite for performance criterion test shall be as defined in clause 6.3.2 and within the test-set-ups as defined in clause 6.1.

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.

## 10.3. Test Data

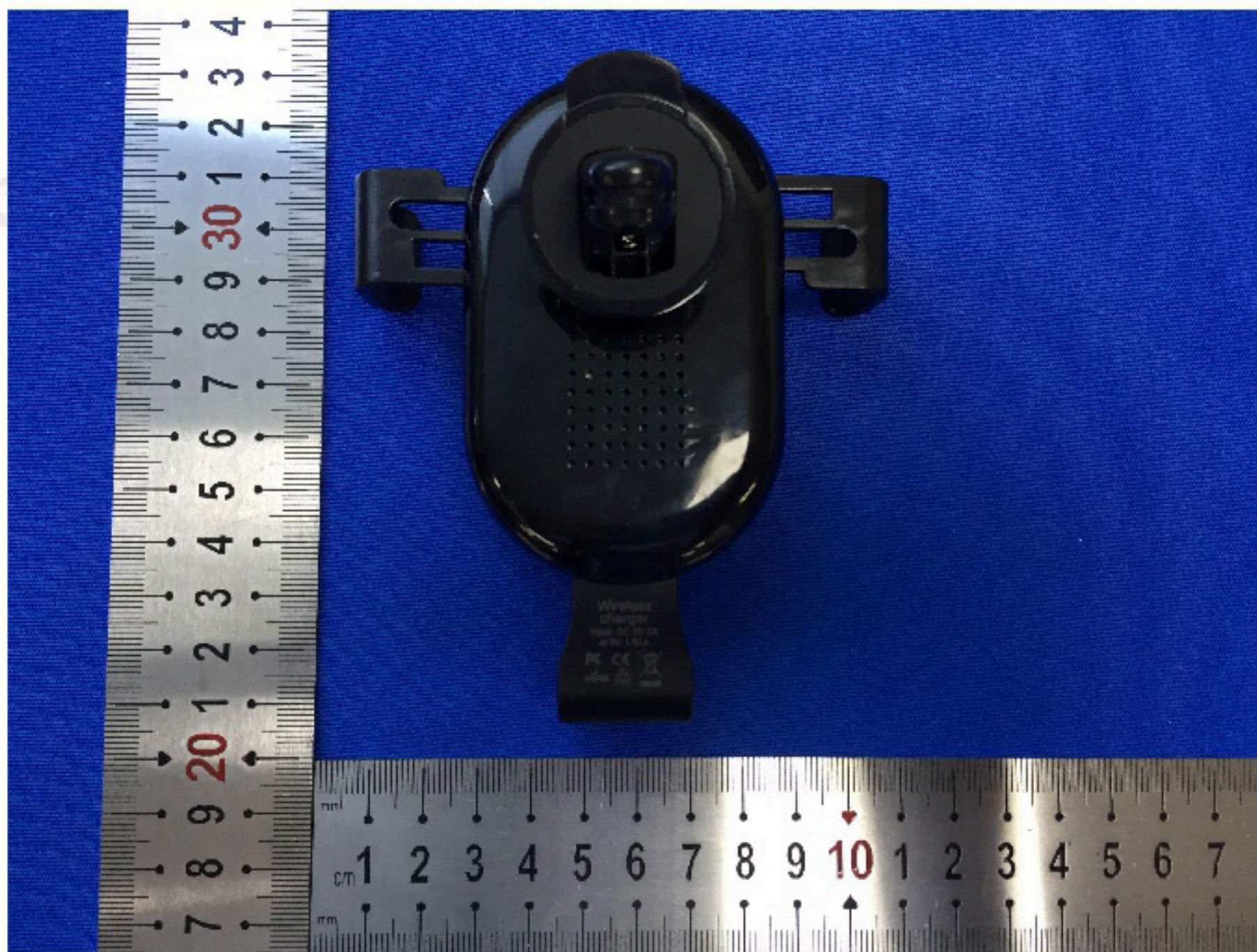
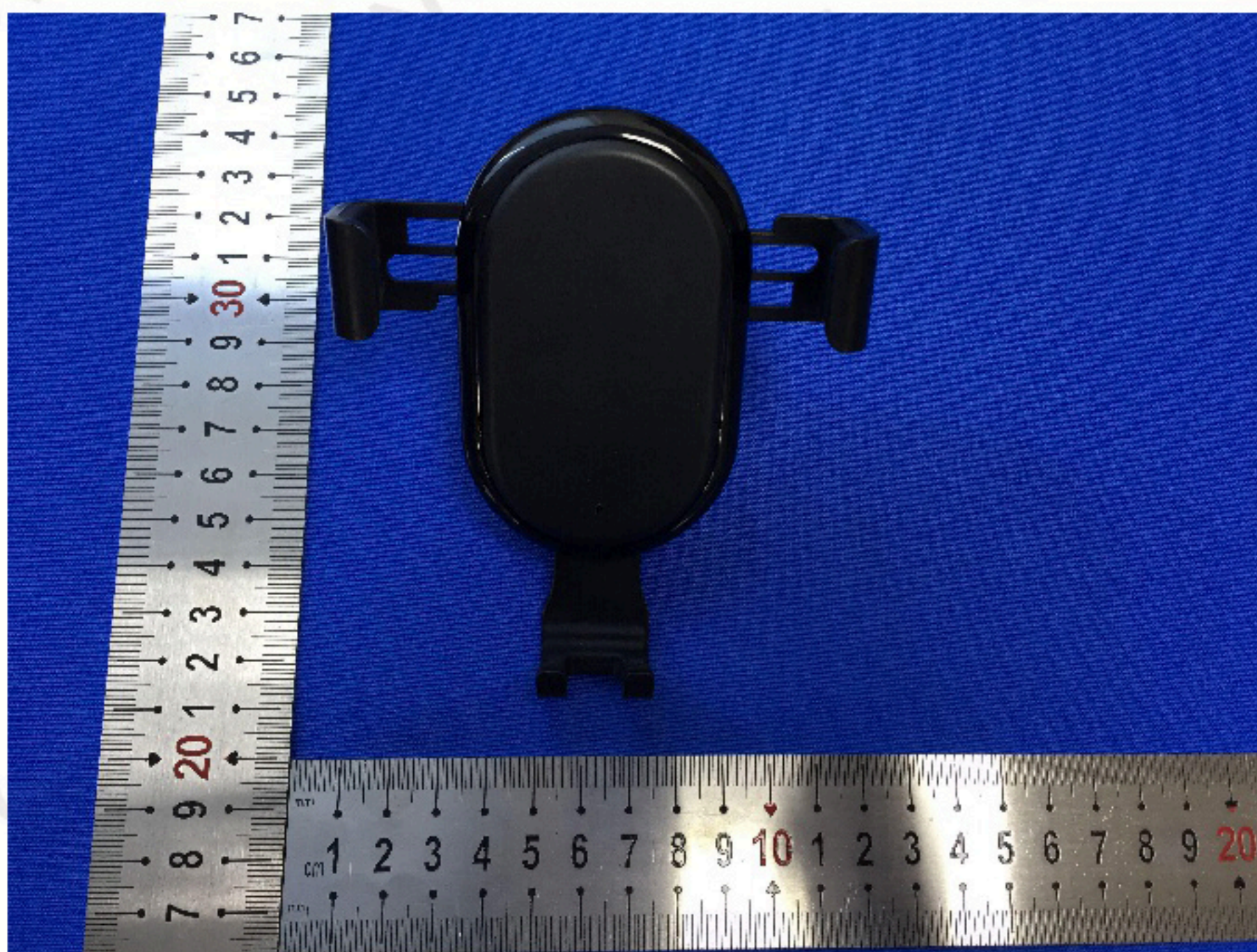
Ambient temperature: 21°C		Relative humidity: 60%	
Test mode		Receiver blocking	
RX		PASS	



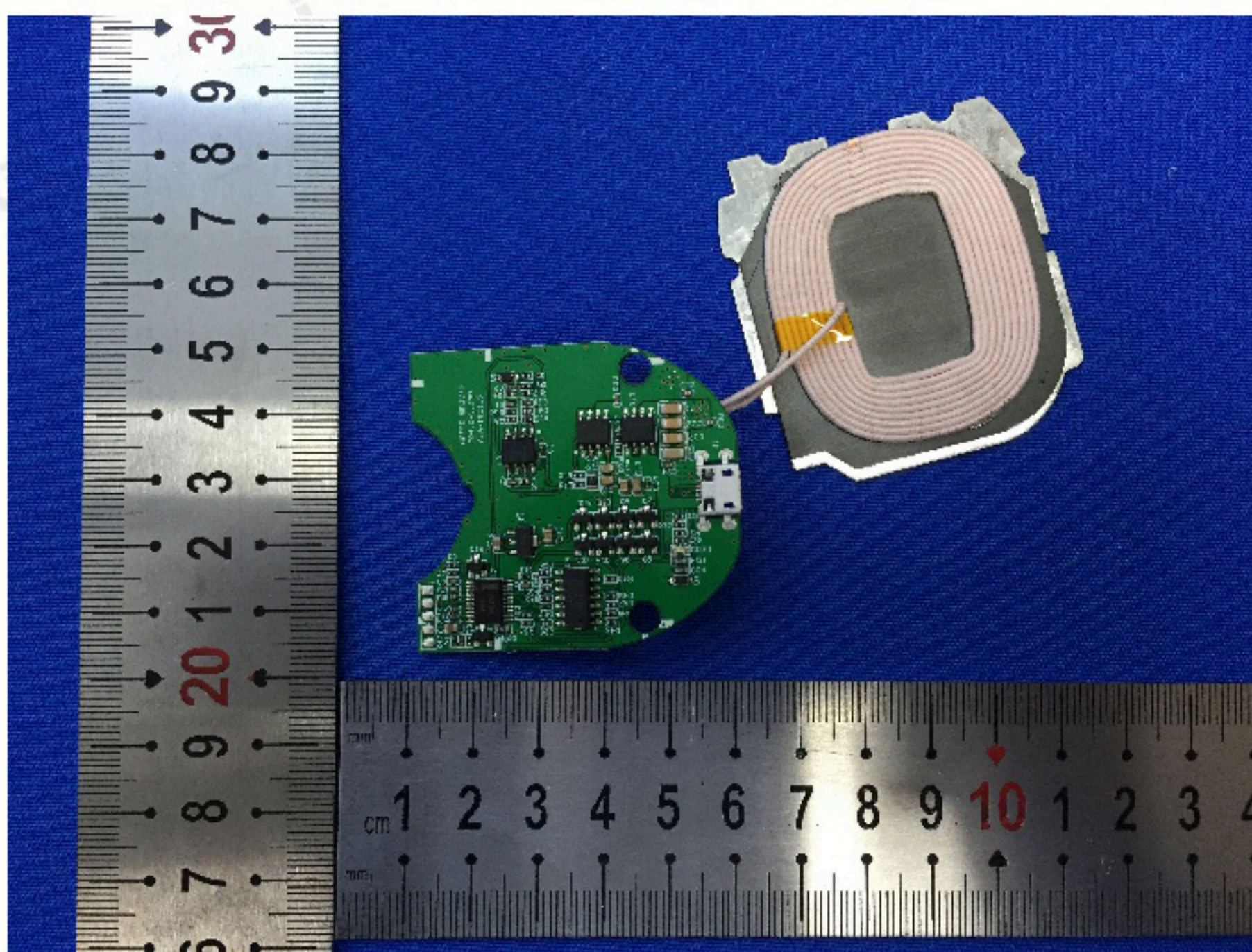
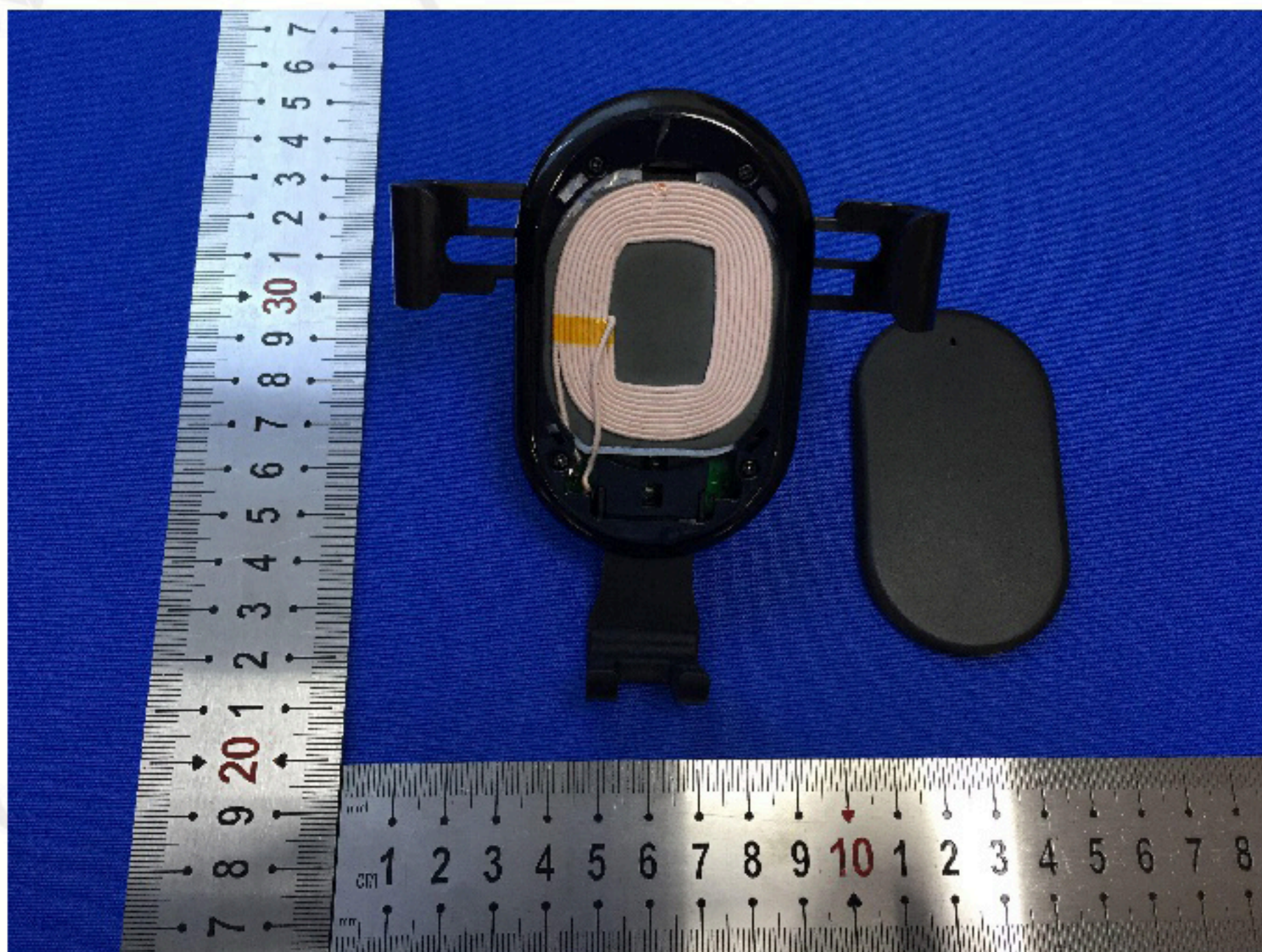


## APPENDIX I

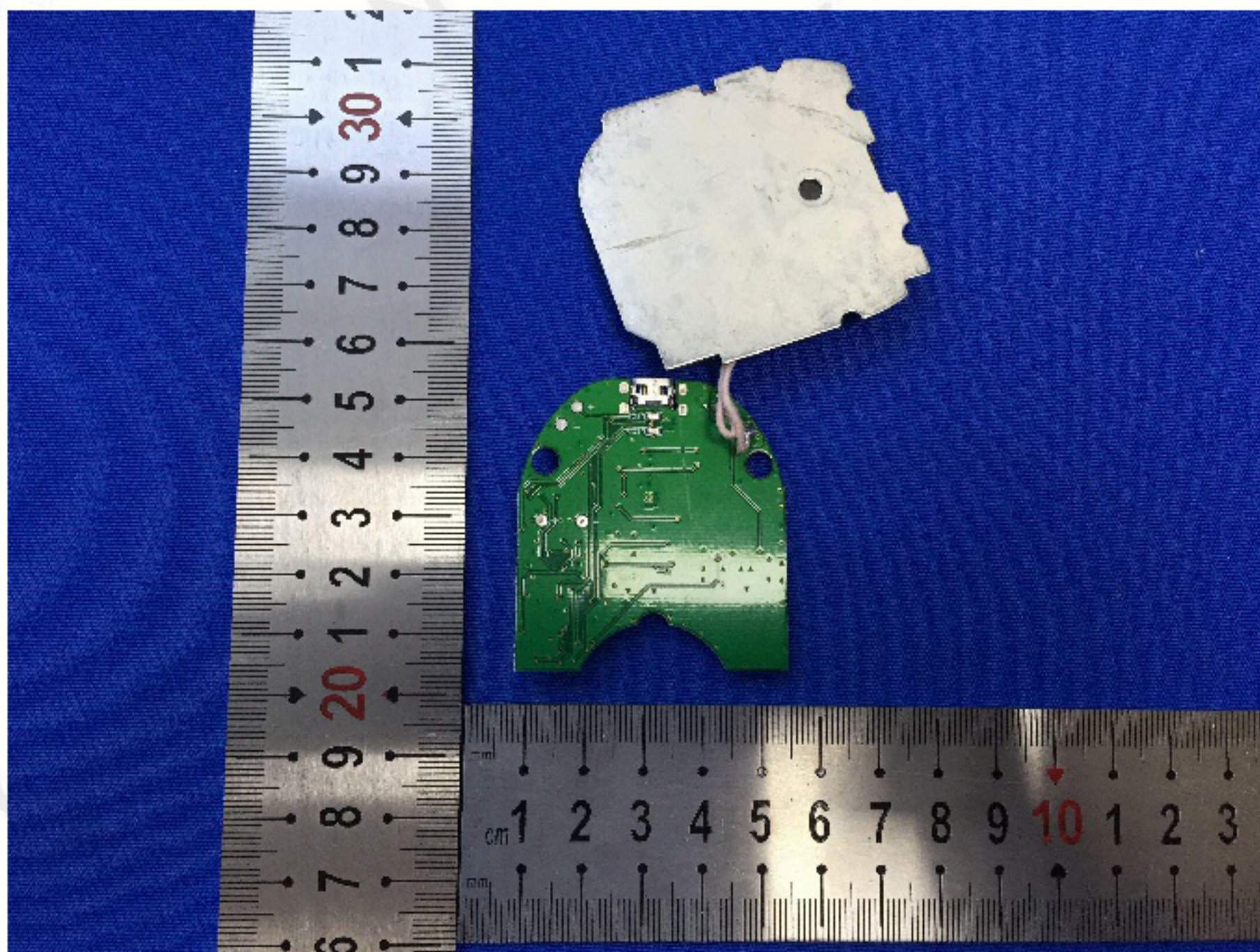












\*\*\*End of Report\*\*\*