

Test Report

Report No.: MTi180612E048

Date of issue: June 14, 2018

Sample Description: Wireless 5W charging pad made from ABS

Model(s): P308.84, P308.841, P308.843, P308.844, P308.845

Applicant:

Address:

Date of Test: June 04, 2018 to June 14, 2018

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



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TEST REPORT

Applicant's name:

Address:

Manufacture's Name:

Address:

Product name: Wireless 5W charging pad made from ABS

Trademark: N/A

Model name: P308.84, P308.841, P308.843, P308.844, P308.845

Standards:

EN 55032:2015
EN 55035:2017
EN 61000-3-2:2014
EN 61000-3-3:2013

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 EMC requirements. And it is applicable only to the tested sample identified in the report.

Tested by:



Archer Liu

June 14, 2018

Reviewed by:



Blue Zheng

June 14, 2018

Approved by:



Smith Chen

June 14, 2018

1 General Description

1.1 Feature of equipment under test (EUT)

Product name:	Wireless 5W charging pad made from ABS
Model name:	P308.84, P308.841, P308.843, P308.844, P308.845
Specification:	Input: DC 5V/1.5A Output: DC 5V/800mA
Model difference:	All the models above are identical in interior structure, electrical circuits and components; just color is different. The model P308.84 has been tested for the worst case.

1.2 Test mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test mode	Description
Mode 1	Normal working

NOTE: The test modes were carried out for all operation modes. The final test mode of the EUT was the worst test mode for EMI, and its test data is showed.

1.3 EUT test setup

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

1.4 Ancillary equipment

Equipment	Model	S/N	Manufacturer
Mobile phone	5S	/	Apple

2 Summary of Test Result

No.	Test Standard	Description of Test	Result	Remark
Emission				
1	EN 55032:2015	Conducted emission	Pass	
2		Radiated emission	Pass	
3	EN 61000-3-2:2014	Harmonic current emission	N/A	
4	EN 61000-3-3:2013	Voltage fluctuations & flicker	Pass	
Immunity				
1	EN 55035:2017	Electrostatic discharges (ESD)	Pass	
2		Radiated electromagnetic field disturbances (RS)	Pass	
3		Conducted disturbances (CS)	Pass	
4		Power frequency magnetic field	N/A	
5		Electrical fast transients/burst (EFT/S)	Pass	
6		Surges	Pass	
7		Voltage dips and interruptions	Pass	
8		Broadband Impulse noise disturbances repetitive	N/A	
9		Broadband Impulse noise disturbances isolated	N/A	

Note1 : N/A mean not applicable.

3 Test Facilities and Accreditations

3.1 Test laboratory

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

Note: The item of radiated electromagnetic field immunity was tested by:

Test Site	WALTEK SERVICES (SHEN ZHEN) CO., LTD.
Test Site Location	1/F,Fukangtai Building,West Baima Rd., Songgang Street,Baoan District, ShenZhen 518105, Guangdong,China.
Telephone:	(86-755)83551033
Fax:	(86-755)83552400
CNAS Registration No.:	CNAS L3110

3.2 Environmental conditions

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

Temperature:	20°C~30°C
Humidity	30%~70%(30%~60% for ESD)
Atmospheric pressure	98kPa~101kPa

3.3 Measurement uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, $U=2 \times U_c(y)$

Conducted emission(150kHz~30MHz)	± 2.5 dB
Radiated emission(30MHz~1GHz)	± 4.2 dB
Radiated emission (above 1GHz)	± 4.3 dB
Temperature	± 1 degree
Humidity	± 5 %

3.4 Test software

Software name	Manufacturer	Model	Version
EMI Measurement Software	Farad	EZ-EMC	V1.1.4.2
Conducted immunity test system	Scholder	EN61000-4-6.exe	V1.3.0
Harmonics and flicker test system	TTI	HA-PC Link	V2.02
Firmware DIPS Test Firmware	Prima	DRP61011AG	V4.1.2
Firmware EFT Test Firmware	HTEC	HCOMPACT	V1.0.1
Firmware Surge Test Firmware	HTEC	HCOMPACT	V1.0.1

4 List of test equipment

Radiation emission							
Item	Equipment name	Equipment No.	Manufacturer	Model	Serial No.	Calibration date	Due date
1	EMI Test Receiver	MTI-E004	Rohde&schwarz	ESPI	1000314	2017/11/04	2018/11/03
2	Broadband antenna	MTI-E006	schwarabeck	VULB9163	872	2017/11/17	2018/11/16
3	Horn antenna	MTI-E007	schwarabeck	BBHA9120D	1201	2017/11/15	2018/11/14
4	amplifier	MTI-E014	America	8447D	3113A06150	2017/11/13	2018/11/12
5	amplifier	MTI-E034	Agilent	8449B	3008A02400	2017/08/22	2018/08/21
6	18-40GHz amplifier	MTI-E052	Chengdu step Micro Technology	ZLNA-18-40G-21	1608001	2017/09/18	2018/09/17
7	spectrum analyzer	MTI-E049	Rohde&schwarz	FSP-38	100019	2017/09/18	2018/09/17
8	15-40G Antenna	MTI-E053	Schwarzbeck	BBHA9170	BBHA9170582	2017/09/18	2018/09/17
9	Active Loop Antenna 9kHz - 30MHz	MTI-E051	Schwarzbeck	FMZB 1519 B	00044	2018/02/26	2019/02/25

Conduction emission							
Item	Equipment name	Equipment No.	Manufacturer	Model	Serial No.	Calibration date	Due date
1	Artificial power network	MTI-E037	Schwarzbeck	NSLK8127	NSLK8127#841	2017/09/26	2018/09/25
2	EMI Test Receiver	MTI-E003	Rohde&schwarz	ESCI	101368	2017/11/13	2018/11/12
3	LISN	MTI-E027	Laplace	LISN-16A	003420	2017/11/04	2018/11/03

Conduction immunity							
Item	Equipment name	Equipment No.	Manufacturer	Model	Serial No.	Calibration date	Due date
1	Conduction Immunity Signal Generator	MTI-E015	Schloder	CDG6000	126A1343/2015	2017/11/13	2018/11/12
2	Coupled decoupling network	MTI-E016	Schloder	CDA M2/M3	A2210332/2015	2017/11/13	2018/11/12

Voltage dips, short interruptions and voltage variations immunity							
Item	Equipment name	Equipment No.	Manufacturer	Model	Serial No.	Calibration date	Due date
1	Drop generator	MTI-E025	Prima/China	DRP61011AG	PR15056303	2017/11/13	2018/11/12

Working frequency magnetic field immunity							
Item	Equipment name	Equipment No.	Manufacturer	Model	Serial No.	Calibration date	Due date
1	power frequency magnetic field generator	MTI-E011	china HTEC	HPFMF 100	153703	2017/11/13	2018/11/12

Electrostatic discharge immunity							
Item	Equipment name	Equipment No.	Manufacturer	Model	Serial No.	Calibration date	Due date
1	ESD Simulator	MTI-E008	Schloder	SESD 30000	509325	2017/11/17	2018/11/16

Surge immunity							
Item	Equipment name	Equipment No.	Manufacturer	Model	Serial No.	Calibration date	Due date
1	Surge Generator	MTI-E010	china HTEC	HCWG 51	153702	2017/11/13	2018/11/12

Harmonic & flicker emissions							
Item	Equipment name	Equipment No.	Manufacturer	Model	Serial No.	Calibration date	Due date
1	AC power source	MTI-E023	shenzhen tongyuan	TY-8205	20150916809	2017/11/13	2018/11/12
2	Harmonic scintillation Analyzer	MTI-E013	Laplace	AC2000A	311216	2017/11/13	2018/11/12

Radiated electromagnetic field immunity					
Equipment	Manufacturer	Model	Serial No.	Calibration date	Due date
Signal Generator	R&S	SMB100A	106148	2017/09/10	2018/09/09
RF Power Amplifier	BONN Elektronik	STLP9128D	128740	2017/09/10	2018/09/09
Gestockte Breitband (S tacked) Log.-per.Antenna	SCHWARZBECK	STLP9128D	043	2017/09/10	2018/09/09
Power Meter	R&S	NRP2	102031	2017/09/10	2018/09/09
Amplifier	NJNT	NTWPAS-2560 025	2560025	2018/04/14	2019/04/13
Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA9120D-667	2018/04/06	2019/04/05

Electrical Fast Transient/Burst immunity							
Item	Equipment name	Equipment No.	Manufacturer	Model	Serial No.	Calibration date	Due date
1	Electrical Fast Transient Generator	MTI-E009	HTEC	HEFT 51	153701	2017/11/13	2018/11/12

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

5 Emission test

5.1 Conducted emission

3.1.1 Limits

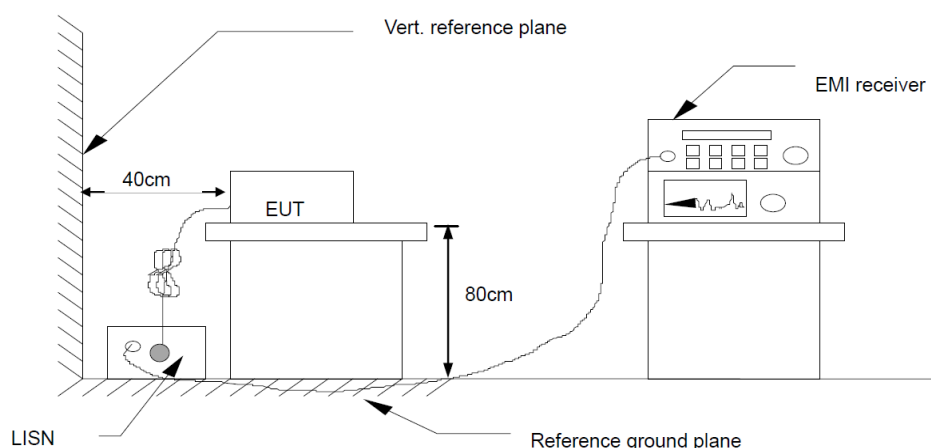
Frequency (MHz)	Class A (dBμV)		Class B (dBμV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79	66	66 - 56 *	56 - 46 *
0.5 -5	73	60	56	46
5 -30	73	60	60	50

Note 1: the tighter limit applies at the band edges.
Note 2: the limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

3.1.2 Test Procedures

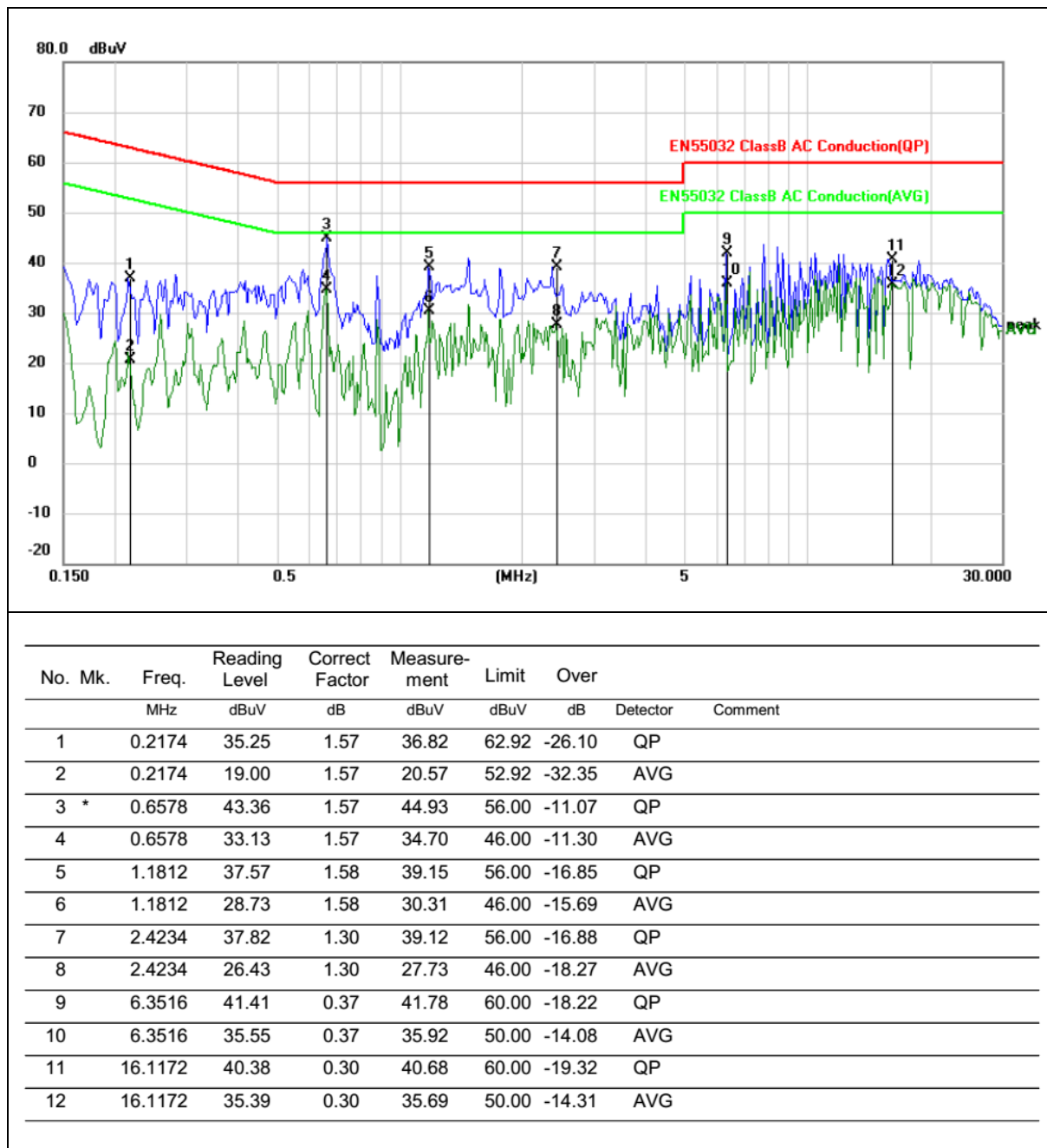
- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN is at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item – photographs of the test setup.

3.1.3 Test setup

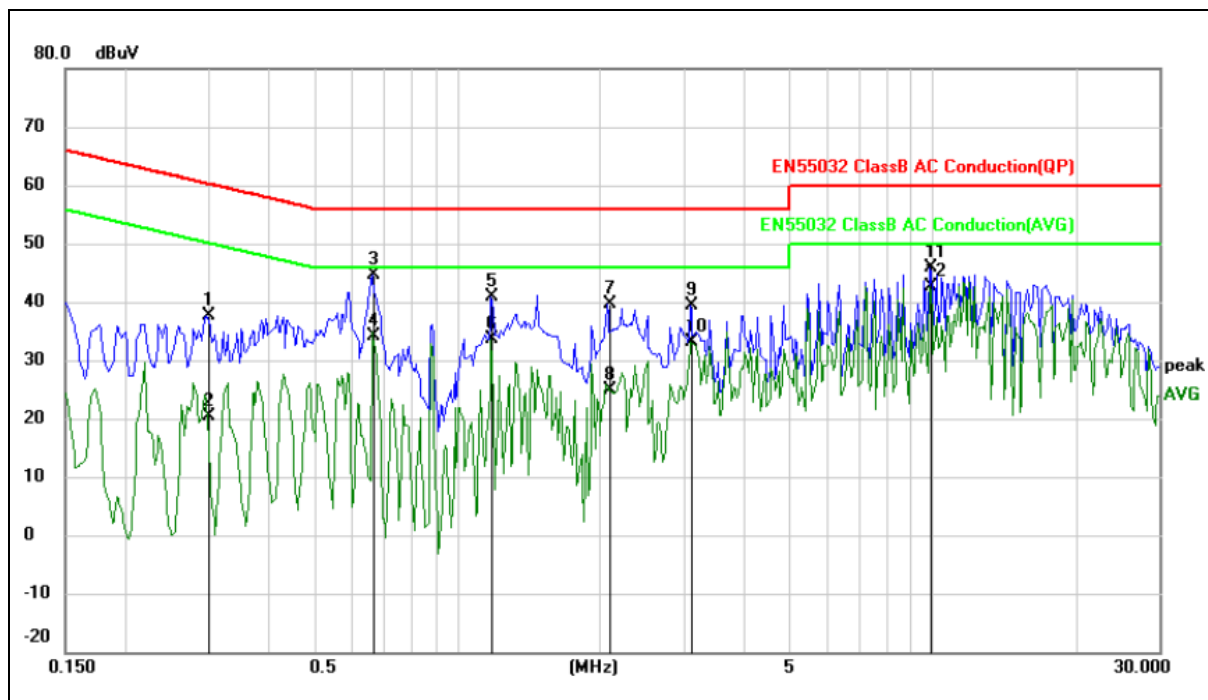


3.1.4 Test Result

Temperature:	27°C	Relative Humidity:	65%
Pressure:	101kPa	Phase:	L
Test voltage:	DC 5V	Test mode:	Mode 1



Temperature:	27°C	Relative Humidity:	65%
Pressure:	101kPa	Phase:	N
Test voltage:	DC 5V	Test mode:	Mode 1



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV	dBuV	dB		
1		0.2987	37.58	0.02	37.60	60.28	-22.68	QP	
2		0.2987	20.48	0.02	20.50	50.28	-29.78	AVG	
3		0.6648	44.58	0.02	44.60	56.00	-11.40	QP	
4		0.6648	34.10	0.02	34.12	46.00	-11.88	AVG	
5		1.1812	40.79	0.02	40.81	56.00	-15.19	QP	
6		1.1812	33.71	0.02	33.73	46.00	-12.27	AVG	
7		2.0953	39.56	0.02	39.58	56.00	-16.42	QP	
8		2.0953	24.82	0.02	24.84	46.00	-21.16	AVG	
9		3.1016	39.27	0.04	39.31	56.00	-16.69	QP	
10		3.1016	32.99	0.04	33.03	46.00	-12.97	AVG	
11		9.9022	45.77	0.10	45.87	60.00	-14.13	QP	
12	*	9.9022	42.64	0.10	42.74	50.00	-7.26	AVG	

3.2 Radiated emission

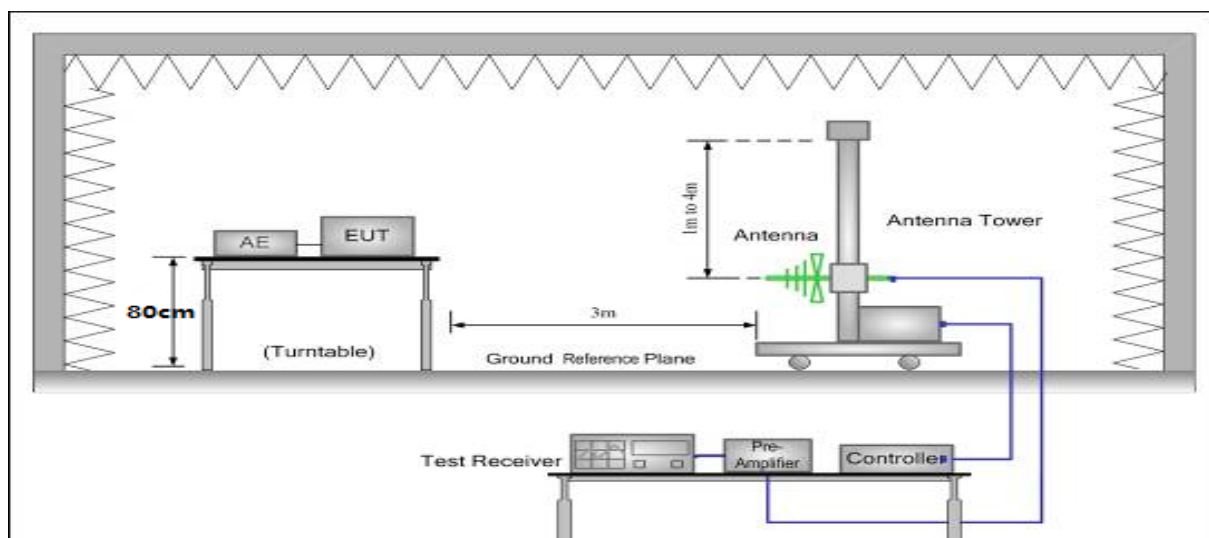
3.2.1 Limits

Frequency (MHz)	Class A (at 3m) dB μ V/m		Class B (at 3m) dB μ V/m	
	Quasi-peak		Quasi-peak	
30-230	50		40	
230-1000	57		47	
/	Peak	Average	Peak	Average
1000-3000	76	56	70	50
3000-6000	80	60	74	54

3.2.2 Test Procedures

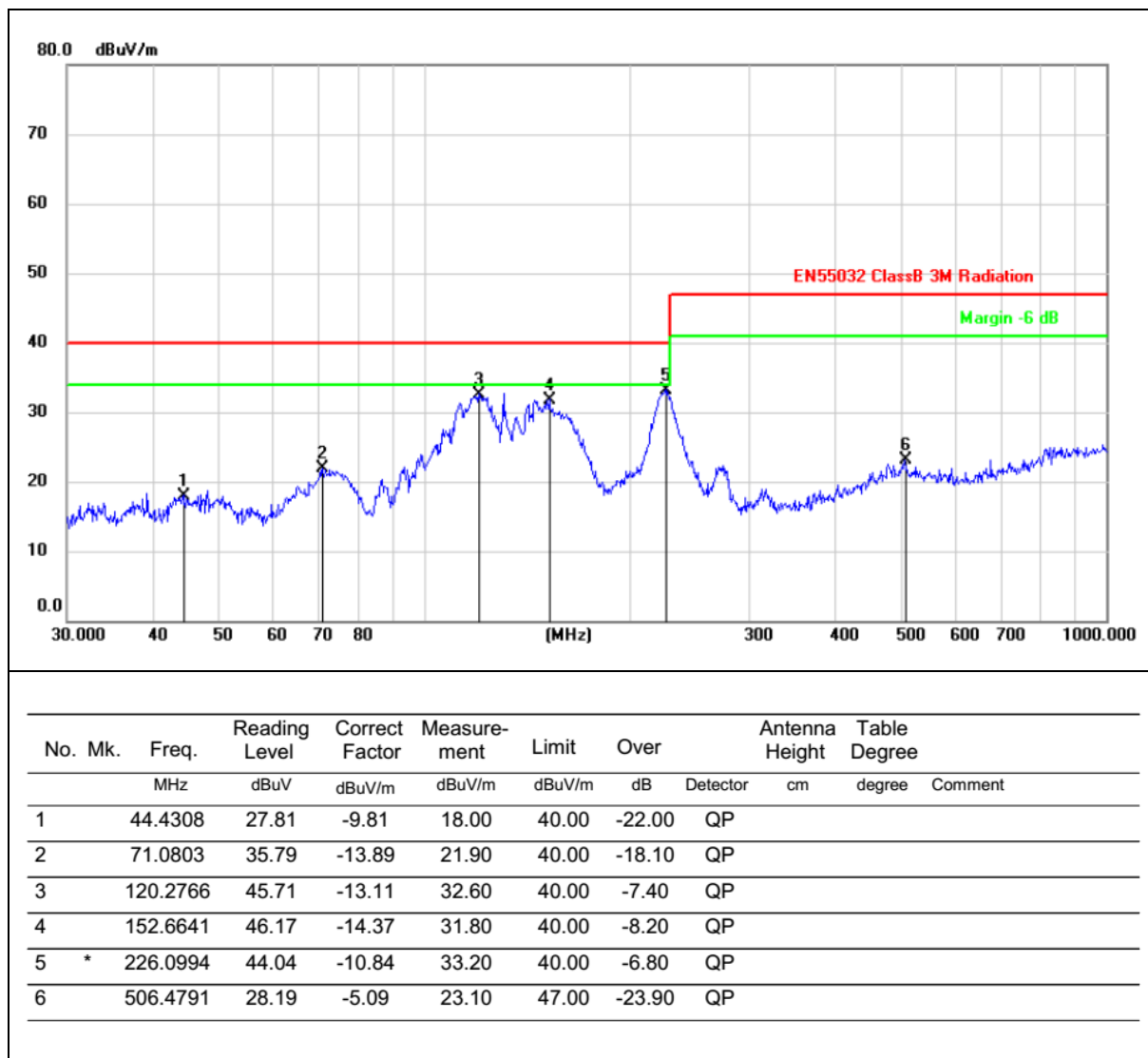
- The radiated emission tests were performed in the 3 meters.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the test antenna shall vary between 1m to 4m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- If the peak mode measured value compliance with and lower than quasi peak mode limit, the EUT shall be deemed to meet QP limits and then no additional QP mode measurement performed.
- If the peak mode measured value compliance with and lower than average mode limit, the EUT shall be deemed to meet average limits and then no additional average mode measurement performed.
- For the actual test configuration, please refer to the related item – EUT test photos.

3.2.3 Test Setup

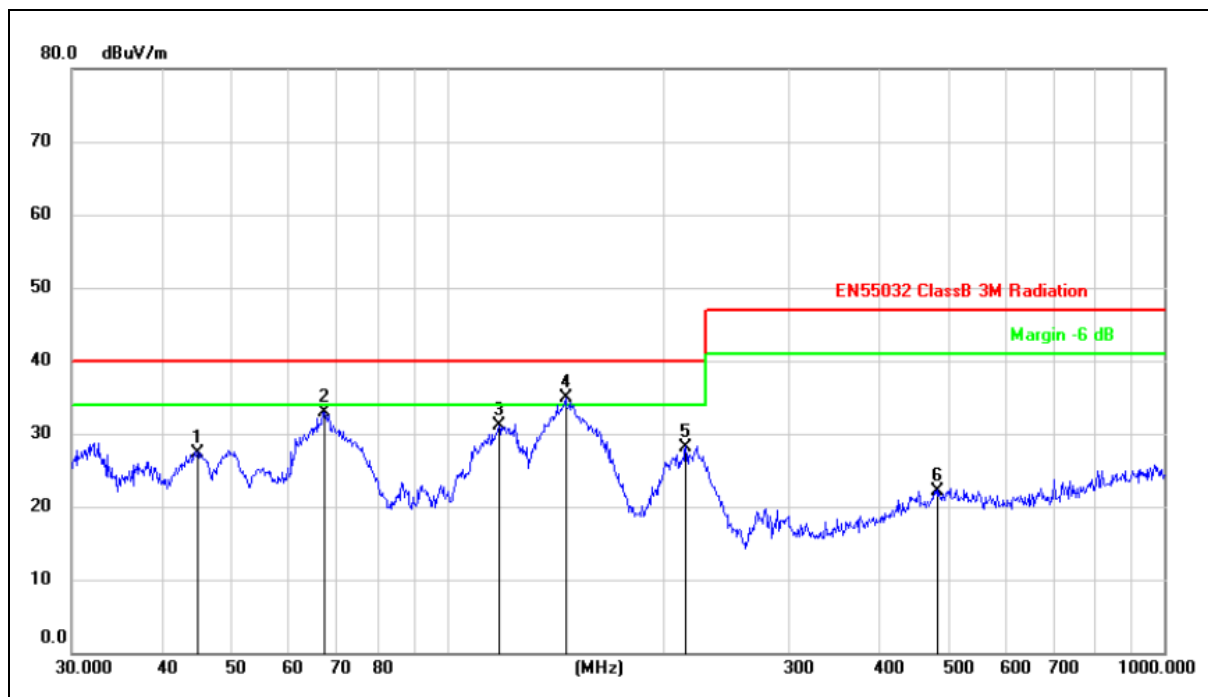


3.2.4 Test Result

Temperature:	25°C	Relative Humidity:	55%
Pressure:	101kPa	Polarization:	Horizontal
Test voltage:	DC 5V	Test mode:	Mode 1



Temperature:	25°C	Relative Humidity:	55%
Pressure:	101kPa	Polarization:	Vertical
Test voltage:	DC 5V	Test mode:	Mode 1



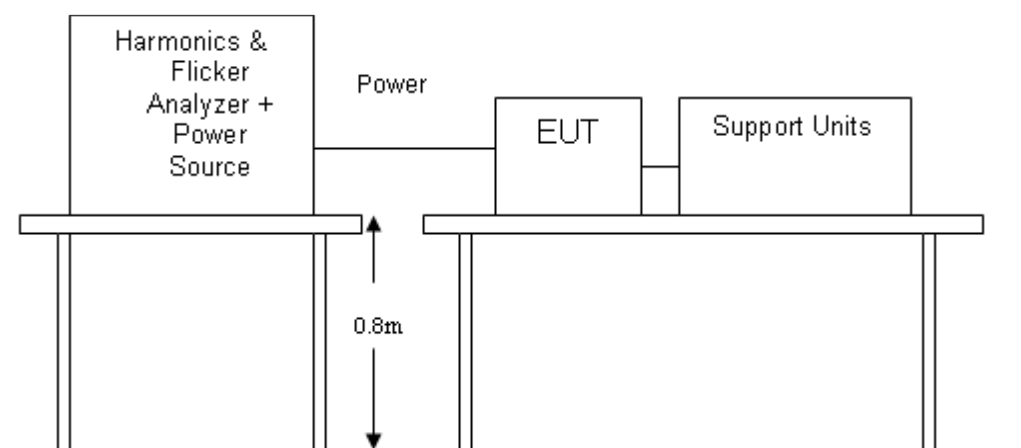
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		44.9006	37.12	-9.72	27.40	40.00	-12.60	QP		
2		67.2022	45.88	-12.98	32.90	40.00	-7.10	QP		
3		118.1862	43.24	-12.14	31.10	40.00	-8.90	QP		
4	*	146.3735	48.52	-13.62	34.90	40.00	-5.10	QP		
5		215.2678	38.40	-10.20	28.20	40.00	-11.80	QP		
6		483.9094	27.52	-5.32	22.20	47.00	-24.80	QP		

3.3 Harmonic current emission / Voltage fluctuations & flicker

5.3.1 Test Procedures

- The EUT was installed and placed on a non-conductive table and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- The correspondent test program of test instrument to measure the current harmonics / voltage fluctuations & flicker emanated from EUT. The measure time shall be not less than the time necessary for the EUT to be exercised.

5.3.2 Test Setup



5.3.3 Test Result

Harmonic current emission:

N/A, the rated power is blew 75W.

Voltage fluctuations & flicker:

Temperature:	24℃	Relative Humidity:	53%
Pressure:	101kPa	Test mode:	Mode 1

	Pst	dc (%)	dmax (%)	d(t) > 3.3% (ms)
Limit	1.000	3.300	4.000	500
Reading	0.10	0.11	0.21	0

6 Immunity test

6.1 Performance criteria

Performance criteria	
Performance criterion	Description
A	During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.
B	<p>After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance.</p> <p>During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.</p> <p>If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.</p>
C	<p>During and after testing, a temporary loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions.</p> <p>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>
<p>Particular performance criteria:</p> <p>The particular performance criteria which are specified in the normative annexes take precedence over the corresponding parts of the general performance criteria. Where particular performance criteria for specific functions are not given, then the general performance criteria shall apply</p>	

Temperature:	25℃	Relative Humidity:	54%
Pressure:	101kPa	Test mode:	Mode 1

Indirect discharge

No.	Test Point	Contact discharge level (kV)	Number and polarity	Criterion met	Criterion Required	Result
1	VCP-Front side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A	B	Compliance
		<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A		
2	VCP-Rear side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A		
		<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A		
3	VCP-Left side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A		
		<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A		
4	VCP-Right side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A		
		<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A		
5	HCP	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A		
		<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A		

Direct discharge

No.	Test Point	Contact discharge level (kV)	Air discharge level (kV)	Number and polarity	Criterion met	Criterion Required	Result
1	Each nonconductive location touchable by hand	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	10 (+)	A	B	Compliance
		<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	<input type="checkbox"/> ..6 <input checked="" type="checkbox"/> ..8	10 (-)	A		
2	Each conductive location touchable by hand	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	10 (+)	N/A		
		<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	N/A		
Note1: Please see the photographs blew about the details of test points.							

Test location:



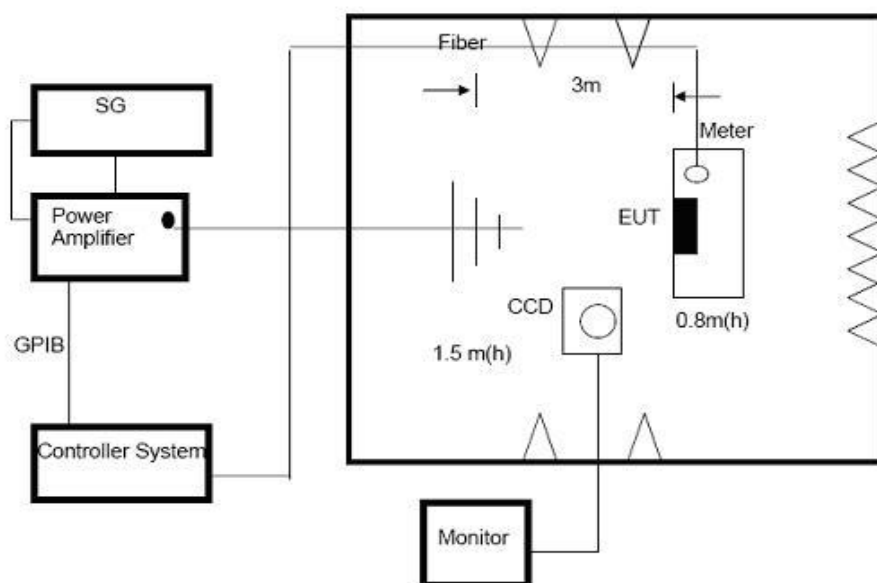
Note: Yellow circle for Air Discharge; Red circle for Contact Discharge.

6.3 Radiated electromagnetic field immunity (RS)

6.3.1. Test Procedures

- a) The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber.
- b) The testing distance from antenna to the EUT was 3 meters.
- c) The other condition as following manner:
 - i. The field strength level was 3V/m.
 - ii. The frequency range is swept from 80 MHz to 1000 MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz with the signal 80% amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
- d) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- e) The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.
- f) For the actual test configuration, please refer to the related Item –EUT Test Photos.

6.3.2. Test setup



6.3.3. Test Result

Temperature:	24.3℃	Relative Humidity:	48.6%
Pressure:	101kPa	Test mode:	Mode 1

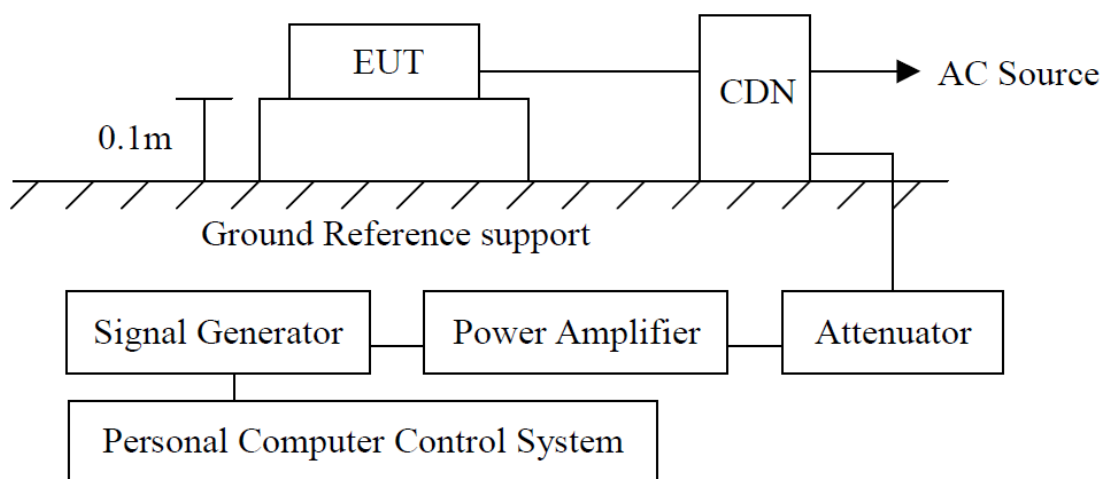
Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Perform. Criteria	Measurement	Result
80 - 1000 1800 2600 3500 5000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	A	A	Compliance
			Rear			
			Left			
			Right			

6.4 Conducted disturbances (CS)

6.4.1. Test Procedures

- The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- The disturbance signal described below is injected to EUT through CDN.
- The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- The frequency range is swept from 0.150MHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave.
- The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally; the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

6.4.2. Test Setup



6.4.3. Test Result

Temperature:	24°C	Relative Humidity:	53%
Pressure:	101kPa	Test mode:	Mode 1

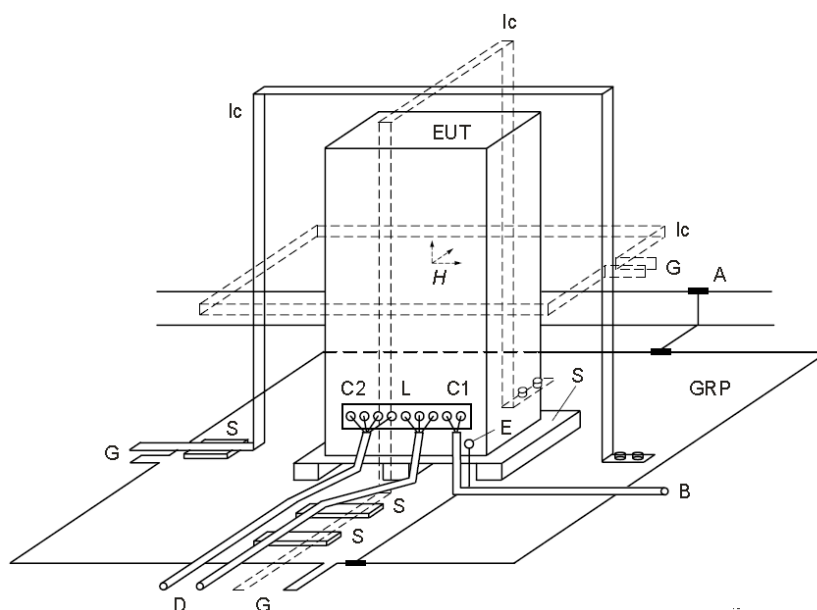
Port Type	Frequency (MHz)	Test Voltage	Criterion met	Criterion Required	Result
AC Mains	0.15 to 10	3 V (rms) AM Modulated 1000Hz, 80%	A	A	Compliance
	10 to 30	3 V to 1V (rms) AM Modulated 1000Hz, 80%	A	A	Compliance
	30 to 80	1 V (rms) AM Modulated 1000Hz, 80%	A	A	Compliance

6.5 Power frequency magnetic field

6.5.1. Test Procedures

- EUT connect the wires according to the typical configuration, and switch on the power supply for 15 minutes.
- Turn on the instrument power switch and wait for the instrument to start.
- When the device is started, click the Setup icon to enter the settings screen
- As shown below, for the settings screen, click the test time position and current position to set the test time and current
- Set the correct test time and test current
- Click Start to begin the test, while observing the status of EUT and recording

6.5.2. Test Setup



Components:

GRP	Ground plane	A	Safety earth
C1	Power supply circuit	C2	Signal circuit
S	Insulating support	L	Communication line
EUT	Equipment under test	B	To power supply source
Ic	Inductive coil	D	To signal source, simulator
E	Earth terminal	G	To the test generator

6.5.3. Test Result

N/A

6.6 Electrical fast transients/burst (EFT/S)

6.6.1. Test Procedures

- a) The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support 0.1m + 0.01m thick. The ground reference plane was 1m*1m metallic sheet with 0.65mm minimum thickness. This reference ground plane was project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.

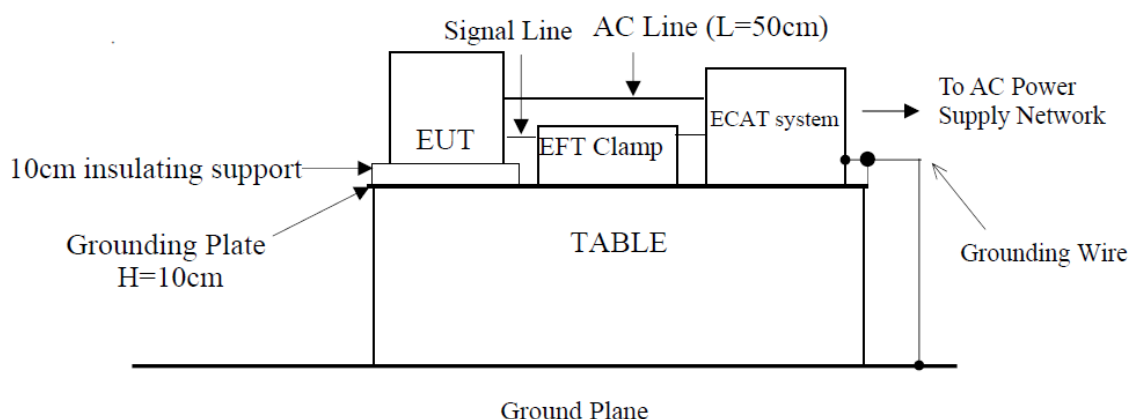
- b) For input and AC power ports:

The EUT was connected to the power mains by using a coupling device that couples the EFT interference signal to AC power lines. Both positive transients and negative transients of test voltage were applied during compliance test and the duration of the test can't less than 1min.

- c) For signal lines and control lines ports:

Ports which are intended to be connected to telecommunication networks (e.g. public switched telecommunication networks, integrated services digital networks, local area networks and similar networks.)

6.6.2. Test Setup



6.6.3. Test Result

Temperature:	24℃	Relative Humidity:	53%
Pressure:	101kPa	Test mode:	Mode1

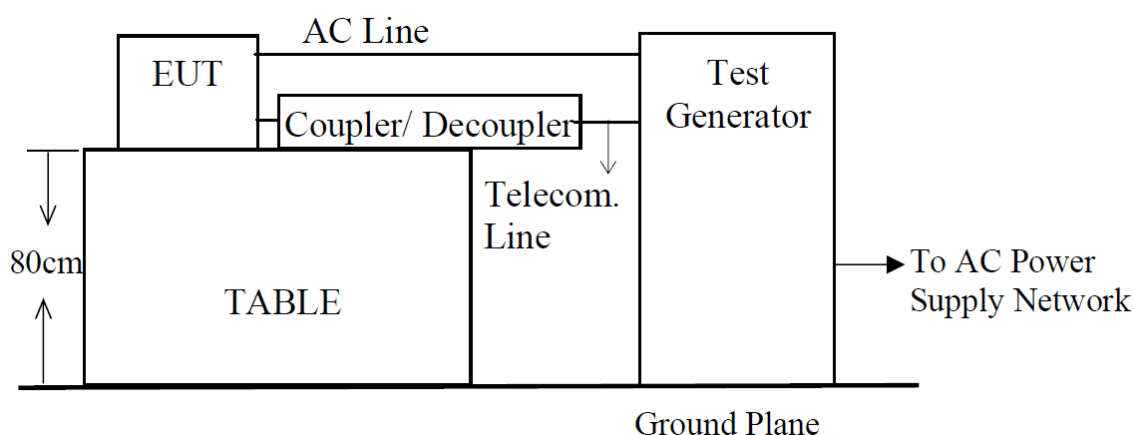
Port Type	Injected Line	Test Voltage	Criterion met	Criterion Required	Result
AC Mains	L–Gnd	±1kV	A	B	Compliance
	N–Gnd	±1kV	A		
	L+N–Gnd	±1kV	A		
	PE–Gnd	±1kV	/		
	L+PE–Gnd	±1kV	/		
	N+PE–Gnd	±1kV	/		
	L+N+PE–Gnd	±1kV	/		
Note: +/- 1KV for AC mains port; +/- 0.5KV for analogue digital data ports and DC network power port.					

6.7 Surges

6.7.1. Test Procedures

- For line-to-line coupling mode, provide a 1kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points, and for active line / neutral lines to ground are same except test level is 2kV.
- At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are applied during test.
- Different phase angles are done individually.
- Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

6.7.2. Test Setup



6.7.3. Test Result

Temperature:	24℃	Relative Humidity:	53%
Pressure:	101kPa	Test mode:	Mode1

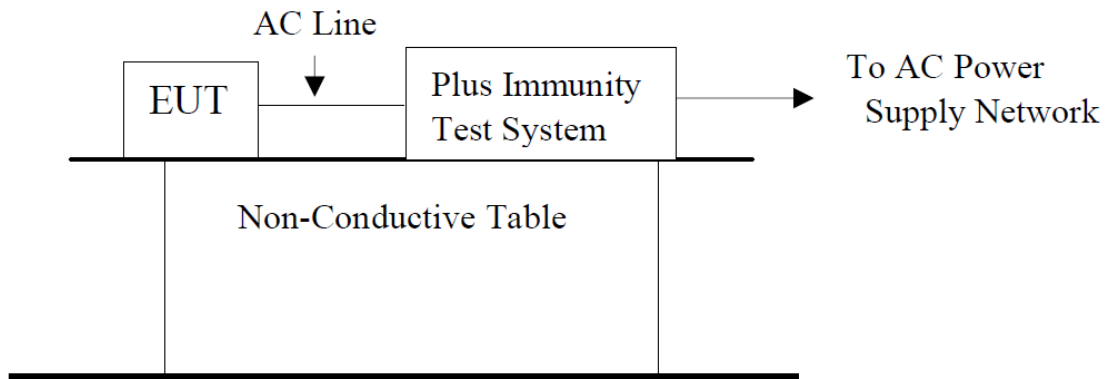
Port Type	Injected Line	Test Voltage	Criterion met	Criterion Required	Result
AC Mains	L – N	±0.5kV, ±1kV	A	A	Compliance
	L – PE	±1kV, ±2kV	/		
	N – PE	±1kV, ±2kV	/		

6.8 Voltage dips and interruptions

6.8.1. Test procedures

- The interruptions are introduced at selected phase angles with specified duration.
- Record any degradation of performance

6.8.2. Test setup



6.8.3. Test result

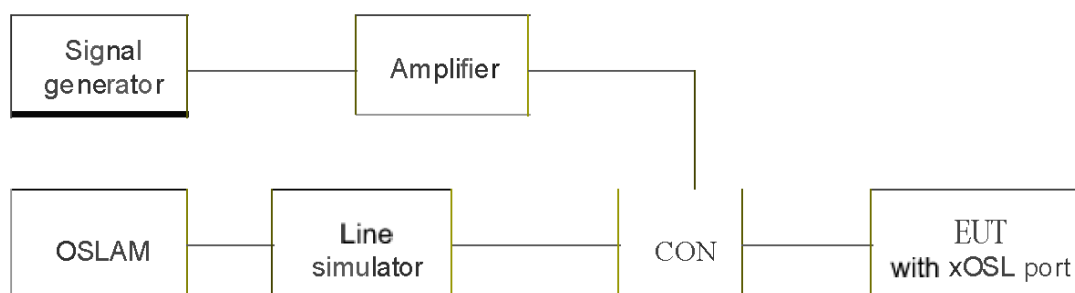
Test Level in %U _T	Period	Criterion	Result	Result
0%	0.5	B	A	Compliance
70%	25	C	B	Compliance
0%	250	C	C	Compliance

6.9 Broadband Impulse noise disturbances repetitive

6.9.1. Test procedures

- The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- The disturbance signal described below is injected to EUT through CDN.
- The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- The xOSL technology or 30 MHz, whichever is the lowest using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 128 kHz sine wave.
- The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally; the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

6.9.2. Test setup



6.9.3. Test result

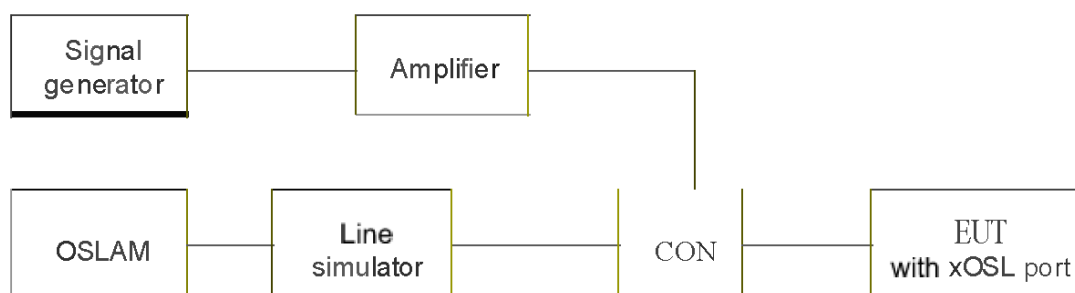
N/A

6.10 Broadband Impulse noise disturbances isolated

6.10.1. Test procedures

- The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- The disturbance signal described below is injected to EUT through CDN.
- The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- The xOSL technology or 30 MHz, whichever is the lowest using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 128 kHz sine wave.
- The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally; the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

6.10.2. Test setup

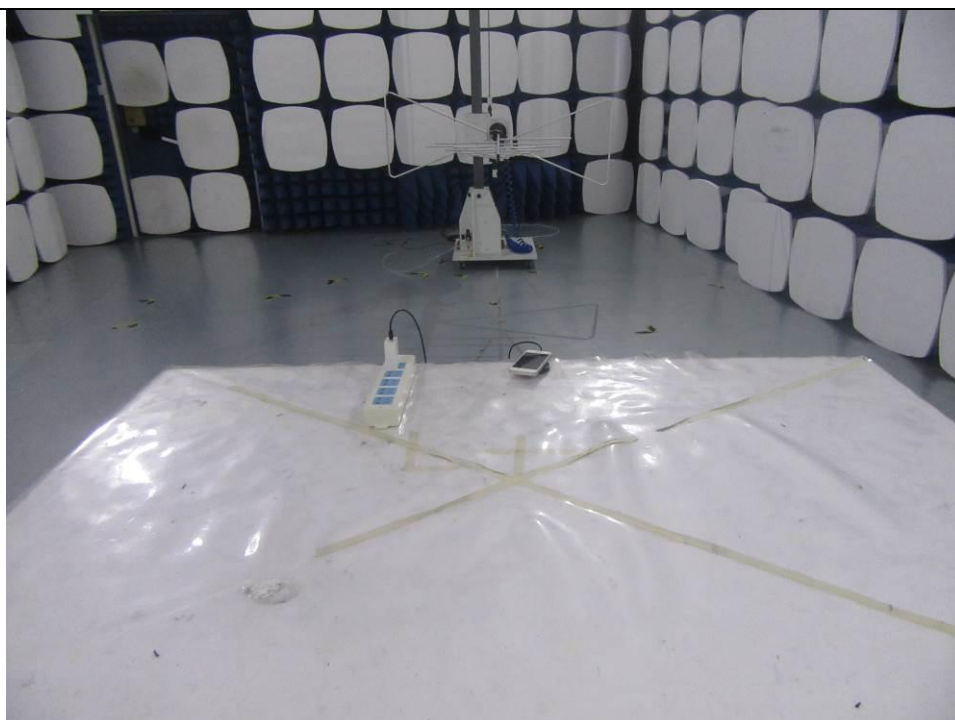


6.10.3. Test result

N/A

Photographs of the Test Setup

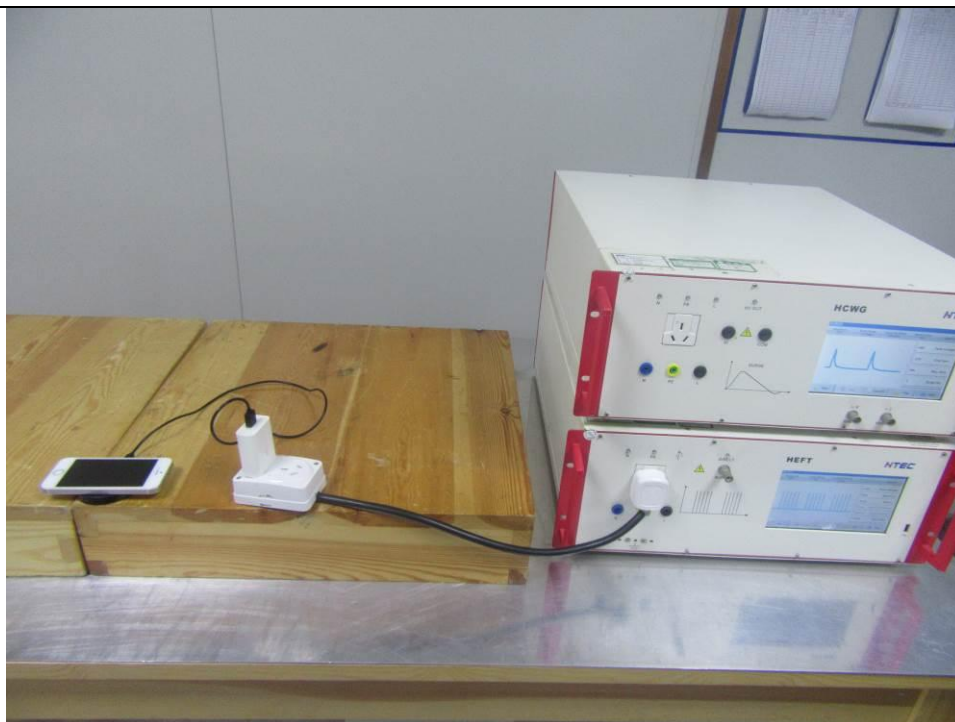
Radiated emission



Conducted emission



EFT



Surges



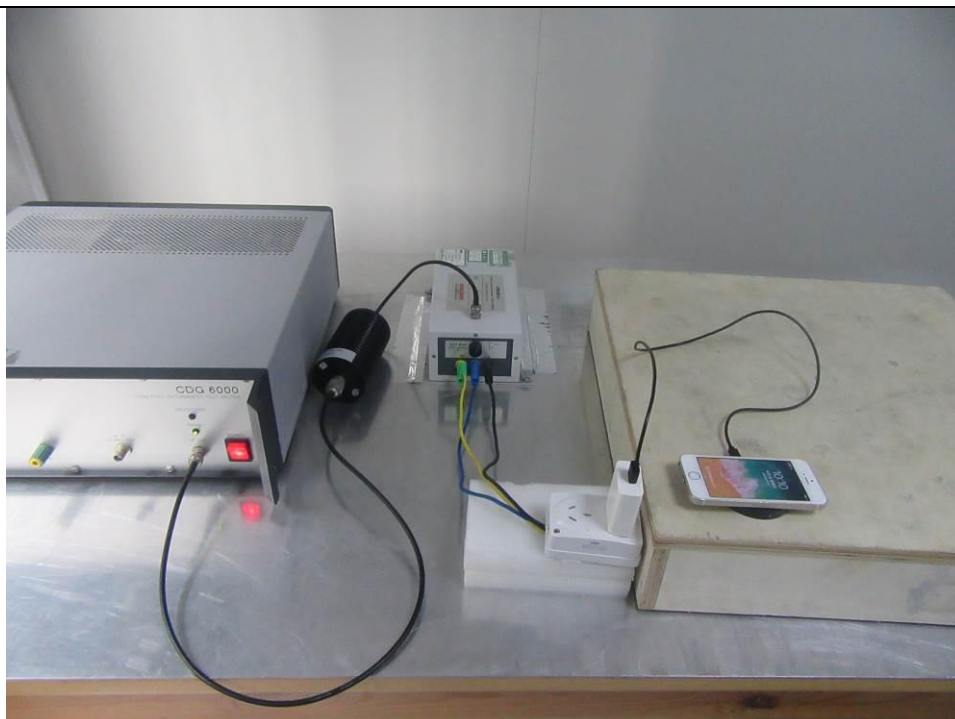
Dips



Harmonic& Flicker

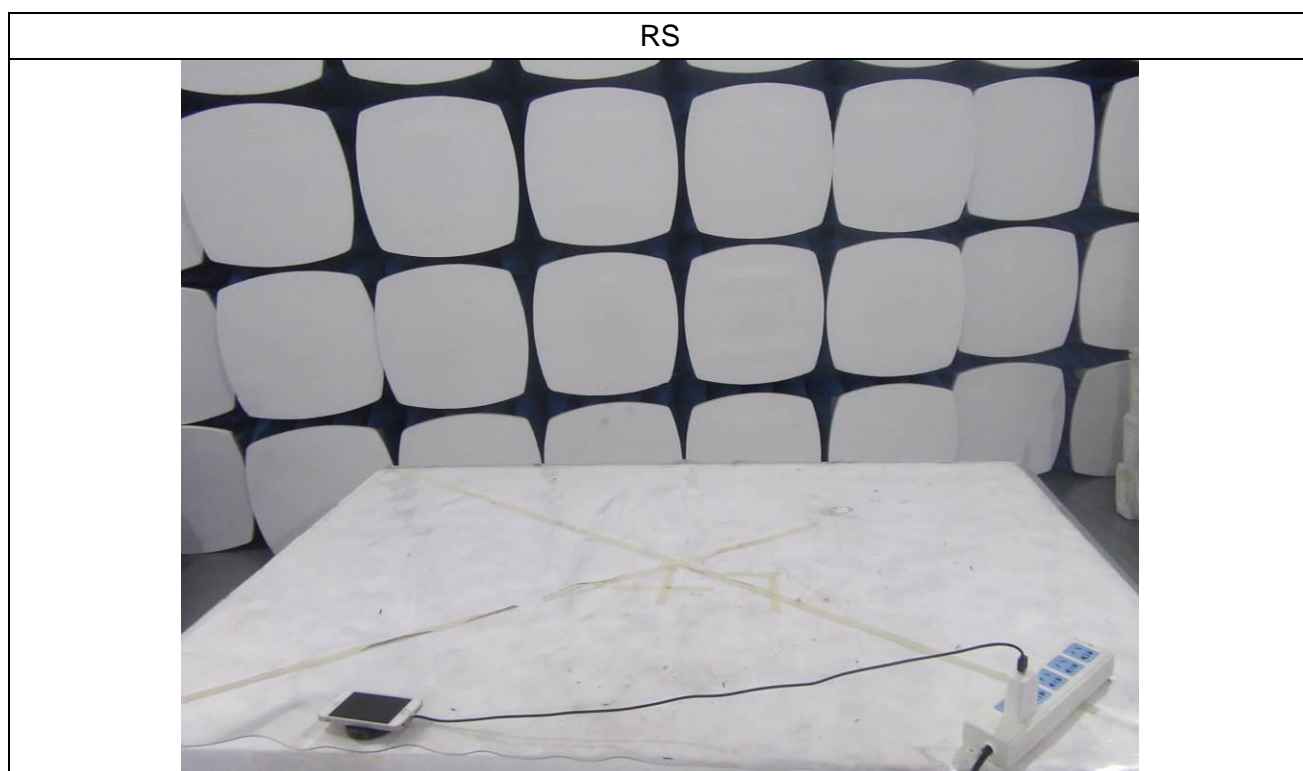


CS

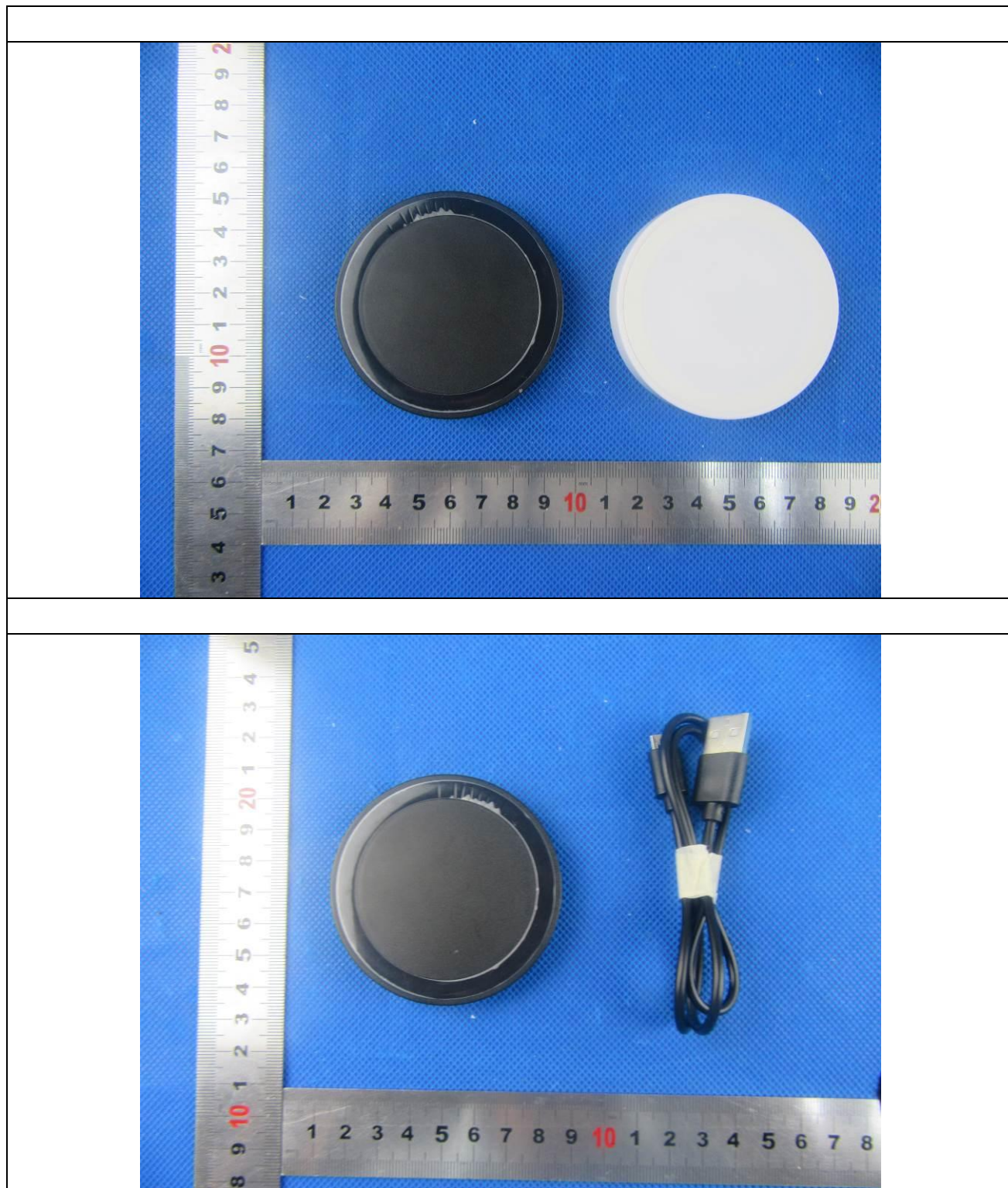


ESD



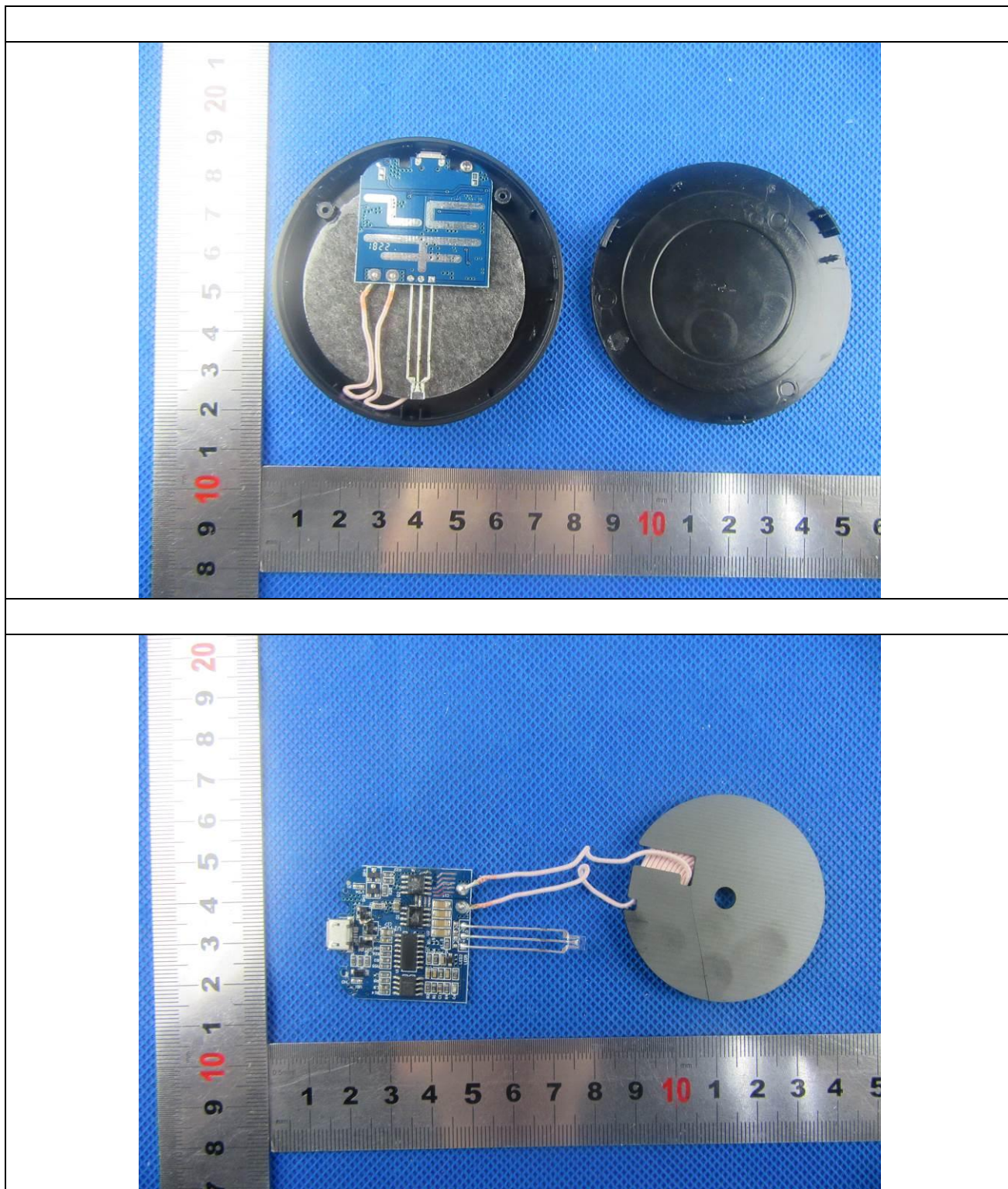


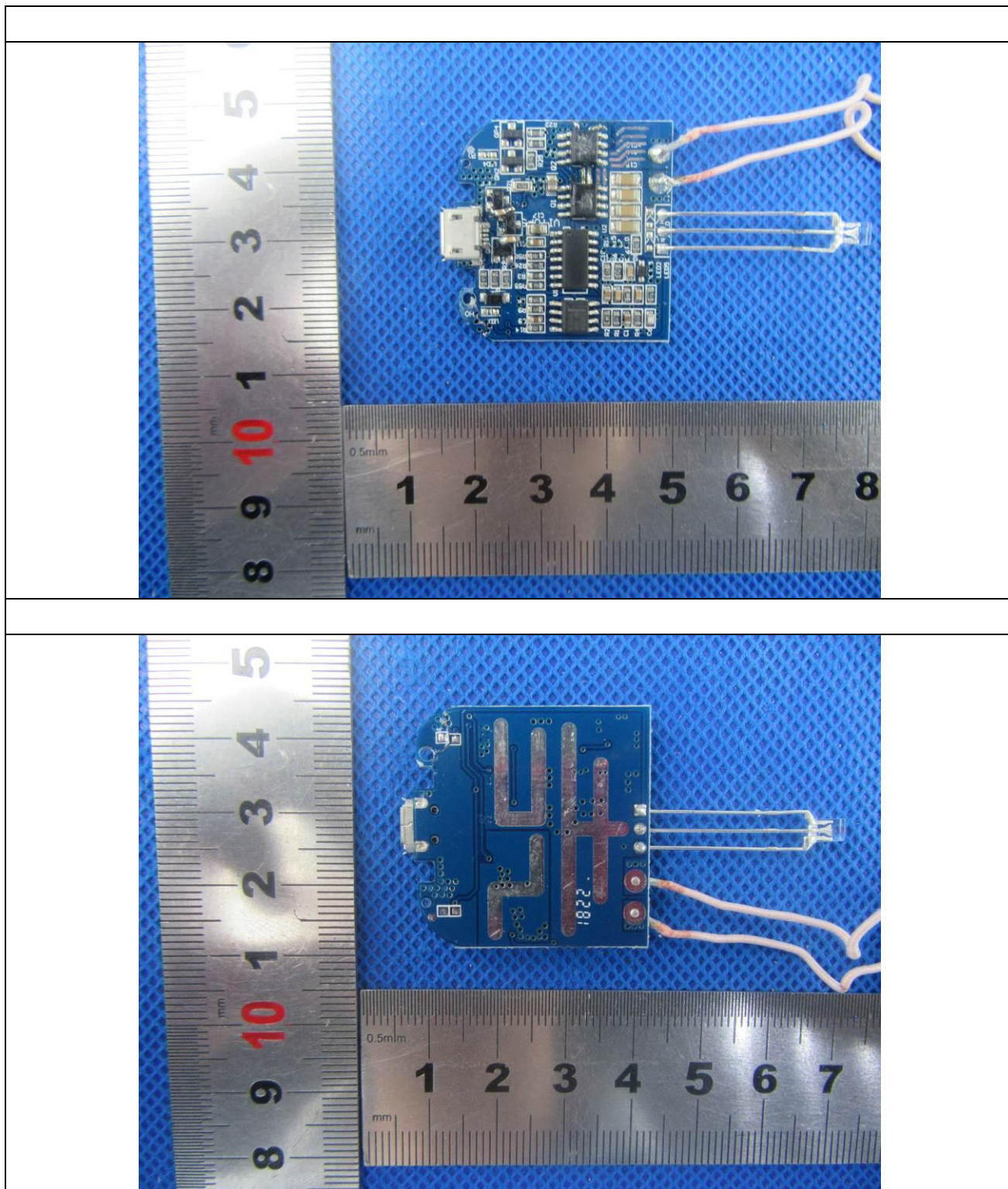
Photographs of the EUT

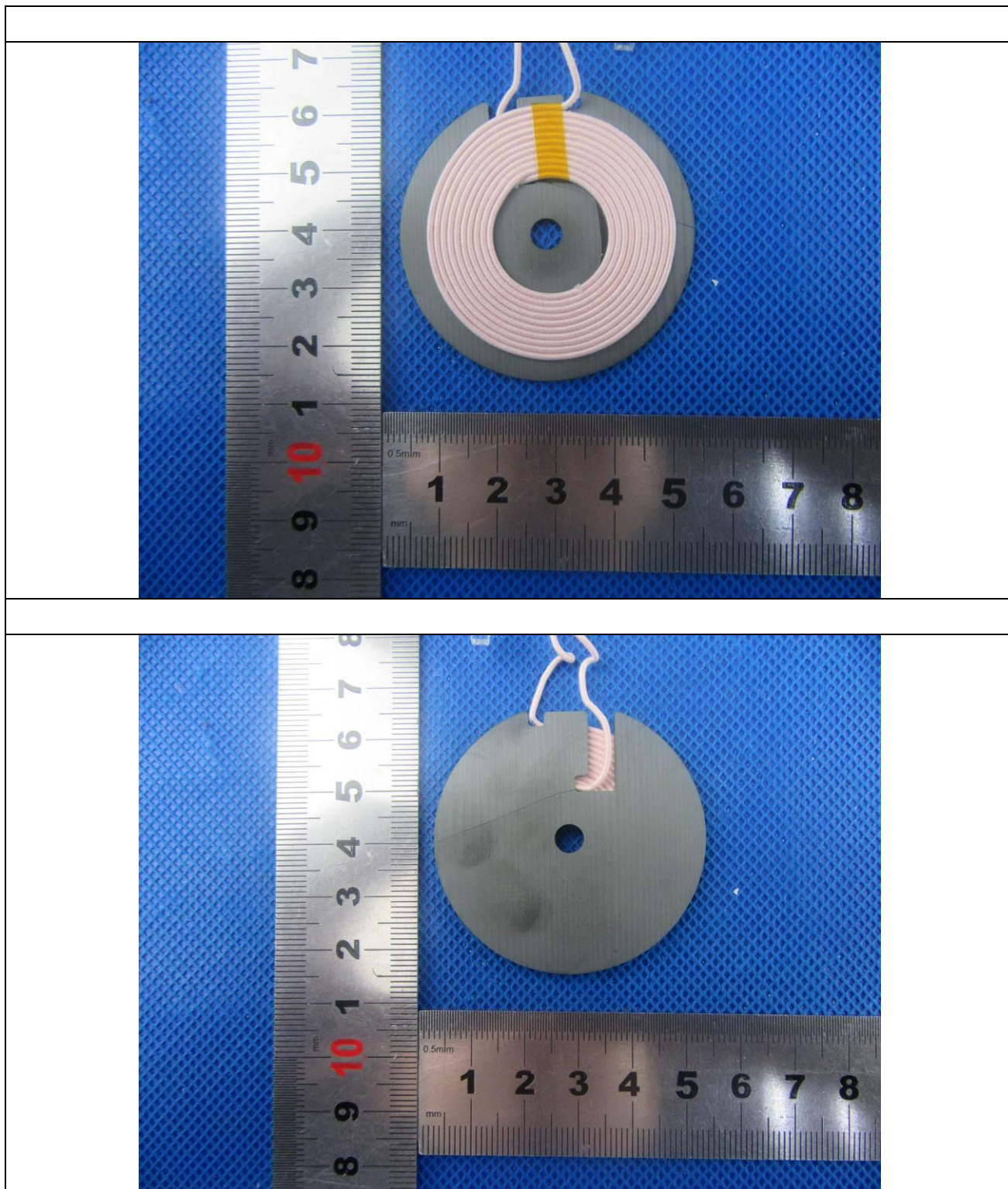












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