



EMC MEASUREMENT REPORT

Applicant: Shenzhen EPS Technology Co. LTD.

Address: 901, Tower 1, Louhu Investment Holding Building,
Qingshuihe 1 Road, Luohu, Shenzhen

Product: USB2.0 contactless connectivity

Model No.: SKL5010A, SKL5010B

Brand Name: EPS

Standards: EN 301 489 - 1 V2.2.3 (2019-11)
EN 301 489 - 3 V2.3.2 (2023-01)

Result: Complies

Received Date: 2023-09-19

Test Date: 2023-09-25 ~ 2023-09-27

Reviewed By:

Jame Yuan

Approved By:

Robin Wu



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2309RSU048-E3	V01	Initial Report	2023-12-01	Valid

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1. General Information

1.1. Applicant

Shenzhen EPS Technology Co. LTD.

901, Tower 1, Louhu Investment Holding Building, Qingshuihe 1 Road, Luohu, Shenzhen

1.2. Manufacturer

Shenzhen EPS Technology Co. LTD.

901, Tower 1, Louhu Investment Holding Building, Qingshuihe 1 Road, Luohu, Shenzhen

1.3. Testing Facility

<input checked="" type="checkbox"/>	Test Site – MRT Suzhou Laboratory
	Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian’edang Rd., Wuzhong Economic Development Zone, Suzhou, China
	Laboratory Location (Suzhou - SIP) 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China
	Laboratory Accreditations
	A2LA: 3628.01 FCC: CN1166 VCCI:
	CNAS: L10551 ISED: CN0001 <div> <input type="checkbox"/>R-20025 <input type="checkbox"/>G-20034 <input type="checkbox"/>C-20020 <input type="checkbox"/>T-20020 </div> <div> <input type="checkbox"/>R-20141 <input type="checkbox"/>G-20134 <input type="checkbox"/>C-20103 <input type="checkbox"/>T-20104 </div>
<input type="checkbox"/>	Test Site – MRT Shenzhen Laboratory
	Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China
	Laboratory Accreditations
	A2LA: 3628.02 FCC: CN1284
CNAS: L10551 ISED: CN0105	
<input type="checkbox"/>	Test Site – MRT Taiwan Laboratory
	Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
	Laboratory Accreditations
	TAF: 3261 FCC: 291082, TW3261
ISED: TW3261	

1.4. Product Information

Product Name	USB2.0 contactless connectivity
Model No.	SKL5010A, SKL5010B
Product Brand Name	EPS
EUT Identification No.	20230920Sample#06(Low Rate) 20230920Sample#02(High Rate)
Software Version	V1.3
Hardware Version	V1.0
Temperature	-20°C ~ +85°C
Notes: <ol style="list-style-type: none">1. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.2. SKL5010A: USB Type-C female connector with MCU, host mode; SKL5010B: USB Type-C male connector without MCU, device mode	

2. Test Configuration

2.1. Test Mode

Test Mode

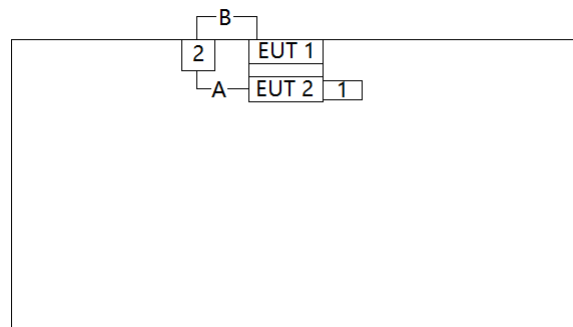
Mode 1: Powered the EUT 1 and EUT 2 by Notebook + Insert USB Disk to the EUT 2 + Transmit or Receive data between EUT 1 and EUT 2 via 60GHz.

Mode 2: Powered the EUT 1 and EUT 2 by Notebook + Using Signal Generator to transmit or receive data between EUT 1 and EUT 2 via 60GHz.

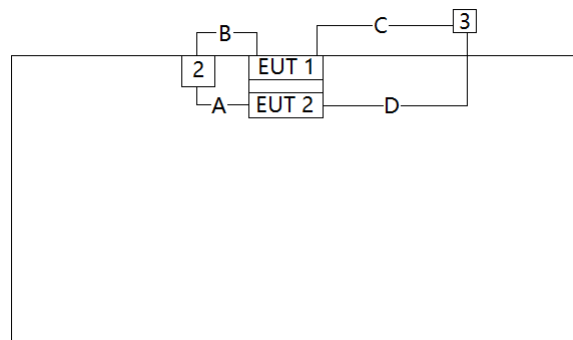
Note: The EUT 1 is SKL5010A and the EUT 2 is SKL5010B.

2.2. Test System Connection Diagram

Mode 1



Mode 2



No.	Cable Type	Cable Spec.	Length
A	USB Cable	Shielding	2.0m
B	USB Cable	Shielding	2.0m
C	Coaxial Cable	Shielding	2.0m
D	Coaxial Cable	Shielding	2.0m

No.	Product	Manufacturer	Model No.
1	USB Disk	Kingston	N/A
2	Notebook	ThinkPad	E495
3	Signal Generator	Keysight	81160A

2.3. Performance Criteria

General Requirements (EN 301489-1):

The performance criteria are used to take a decision on whether radio equipment passes or fails immunity tests.

For the purpose of the present document two categories of performance criteria apply:

- Performance criteria for continuous phenomena.
- Performance criteria for transient phenomena.

Normally, the performance criteria depend upon the type of radio equipment and/or its intended application. Thus, the present document only contains general performance criteria commonly used for the assessment of radio equipment.

Performance criteria for continuous phenomena

During the test, the equipment shall:

- continue to operate as intended;
- not unintentionally transmit;
- not unintentionally change its operating state;
- not unintentionally change critical stored data.

Performance criteria for transient phenomena

For all ports and transient phenomena with the exception described below, the following applies:

- The application of the transient phenomena shall not result in a change of the mode of operation (e.g. unintended transmission) or the loss of critical stored data.
- After application of the transient phenomena, the equipment shall operate as intended.

For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:

- For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be otherwise restored. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.
- For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

General Requirements (EN 301489-3):

The performance criteria are used to make an assessment whether a radio equipment passes or fails immunity tests.

Only the performance criteria specified in ETSI EN 301 489-3 or in ETSI EN 301 489-1 [1] where referenced shall apply.

The provisions of ETSI EN 301 489-1 [1], Clause 6, shall apply together with the following.

Continuous and non-continuous operation

Latency is the time delay between the initiation and the completion of the operation of the EUT. Correct functioning requires completing the relevant operation within the maximum latency time.

Where the maximum latency is specified in the applicable harmonized radio standard (in the wanted performance criterion, or an acknowledge requirement), that value shall be used.

Where this is not the case, then the maximum latency is that required by the intended use of the EUT.

Note:**Operating modes**

Where the EUT has more than one mode of operation (see clause 4.4.1 in ETSI EN 301 489-3), an unplanned transition from one mode to another is considered as an unintentional response. The EUT shall be tested in all modes to confirm there are no such unintentional response.

3. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
Audio Analyzer	Keysight	U8903B	MRTSUE06143	1 year	2024-04-27	SIP-AC4
Log Periodic Antenna	ar	ATR80M6G	MRTSUE06145	N/A	N/A	SIP-AC4
Amplifier	ar	150W1000M1	MRTSUE06146	N/A	N/A	SIP-AC4
Electric Field Probe	ar	FL7006	MRTSUE06149	1 year	2024-05-22	SIP-AC4
Power Meter	Agilent	E4418B	MRTSUE06204	1 year	2024-05-23	SIP-AC4
Power Sensor	Agilent	E9301H	MRTSUE06205	1 year	2024-05-23	SIP-AC4
Amplifier	rflight	NTWPAS-1025100	MRTSUE06363	N/A	N/A	SIP-AC4
Amplifier	rflight	NTWPAS-2560100	MRTSUE06364	N/A	N/A	SIP-AC4
Signal Generator	Agilent	N5181A	MRTSUE06370	1 year	2024-05-23	SIP-AC4
USB Power Sensor	Keysight	U2021XA	MRTSUE06595	1 year	2024-07-31	SIP-AC4
Thermohygrometer	testo	608-H1	MRTSUE06618	1 year	2023-11-27	SIP-AC4
Thermohygrometer	testo	608-H1	MRTSUE06625	1 year	2023-11-27	SIP-AC4
Thermohygrometer	testo	608-H1	MRTSUE06626	1 year	2023-11-01	SIP-AC4
Anechoic Chamber	RIKEN	SIP-AC4	MRTSUE06806	1 year	2024-04-21	SIP-AC4
ESD Simulator	HAEFELY	ONYX 30	MRTSUE06388	1 year	2024-01-02	SIP-SR3
Thermohygrometer	testo	622	MRTSUE06628	1 year	2024-01-03	SIP-SR3
Shielding Room	MIX-BEP	SIP-SR3	MRTSUE06950	N/A	N/A	SIP-SR3

Software	Version	Function
TS+-RS	4.0.0.0	RS Test Software

4. Decision Rules and Measurement Uncertainty

4.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2.

(Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

4.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

Conducted Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 9kHz~150kHz: 3.58dB 150kHz~30MHz: 3.20dB
Radiated Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): Horizontal: 30MHz~200MHz: 3.79dB 200MHz~1GHz: 3.91dB 1GHz~6GHz: 4.99dB Vertical: 30MHz~200MHz: 4.06dB 200MHz~1GHz: 5.21dB 1GHz~6GHz: 4.90dB
Harmonic Current Emissions
The maximum measurement uncertainty is evaluated as 0.5%.
Voltage Fluctuation and Flicker
The maximum measurement uncertainty is evaluated as d_c and d_{max} : 0.095%, P_{st} and P_{lt} : 4.6%, $d_{(t)}$: 1.0%.

5. Test Result

5.1. Summary

Test Item	Reference Standard	Verdict
EN 301 489-1 & EN 301 489-3		
Conducted Emission	EN 55032:2015	N/A
Radiated Emission	EN 55032:2015	N/A
Harmonic Current Emissions	EN 61000-3-2:2014	N/A
Voltage Fluctuations and Flicker	EN 61000-3-3:2013	N/A
Electrostatic Discharge	EN 61000-4-2:2009	Complies
Radio Frequency Electromagnetic Field	EN 61000-4-3:2006+A1:2008+A2:2010	Complies
Fast Transients, Common Mode	EN 61000-4-4:2012	N/A
Surges	EN 61000-4-5:2014+A1:2017	N/A
Radio Frequency Common Mode	EN 61000-4-6:2014	N/A
Voltage Dips and Interruptions	EN 61000-4-11:2004	N/A
Note:		
1. "N/A" means that the test item is not applicable, and the detailed information refers to relevant section.		

5.2. Conducted Emission

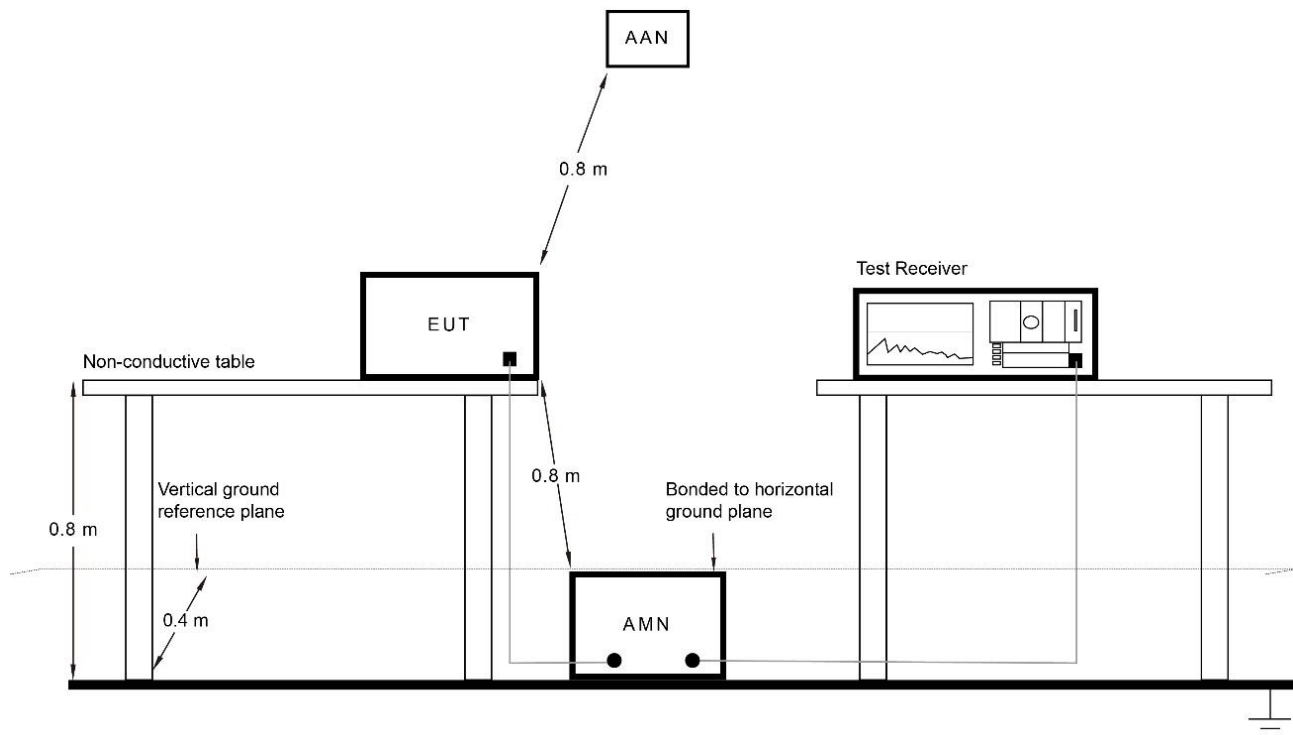
5.2.1. Test Limit

EN 301 489 -1/-3

Limits for AC Mains Power input/output Ports				
Frequency Range (MHz)	Class A Limits		Class B Limits	
	QP dB(μ V)	AV dB(μ V)	QP dB(μ V)	AV dB(μ V)
0.15 ~ 0.5	79	66	66 to 56	56 to 46
0.5 ~ 5	73	60	56	46
5 ~ 30	73	60	60	50

Limits for DC Power input/output Ports for EN 301 489 -1		
Frequency Range (MHz)	Quasi-peak dB(μ V)	Average dB(μ V)
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60

5.2.2. Test Setup



5.2.3. Test Procedure

The receiver or associated equipment under measurement and the artificial mains network are disposed as shown in 5.2.2. Measurements shall be carried out using a selective voltmeter having a quasi-peak detector

for broadband measurements and an average detector for narrow-band measurements in accordance with CISPR 16-1.

The mains lead shall be arranged to follow the shortest possible path between the receiver and artificial mains network on the ground. The mains lead in excess of 0,8 m separating the equipment under test from the artificial mains network shall be folded back and forth parallel to the lead so as to form a bundle with a length of 0,3 m to 0,4 m.

Earthing of the equipment under test if provided with a safety earth connection, shall be made to the earth terminal provided on the artificial mains network with the shortest possible lead.

If the equipment under test has a coaxial RF input connector, tests shall be performed with and without an earth connection made to the outer conductor screen of the coaxial RF input connector. When these tests are being carried out, no other earth connections shall be made to any additional earth terminal whatever.

If the equipment under test has no coaxial RF input connector and if it has an earth terminal, tests shall be performed with this terminal earthed.

5.2.4. Test Result

The EUT is powered by USB, so this item is not applicable.

5.3. Radiated Emission

5.3.1. Test Limit

EN 301 489 -1/-3

Frequency range (MHz)	Class A	Class B
	Quasi-peak limits dB(μ V/m)	Quasi-peak limits dB(μ V/m)
30 to 230	50	40
230 to 1000	57	47

Note 1: The lower limit shall apply at the transition frequency.

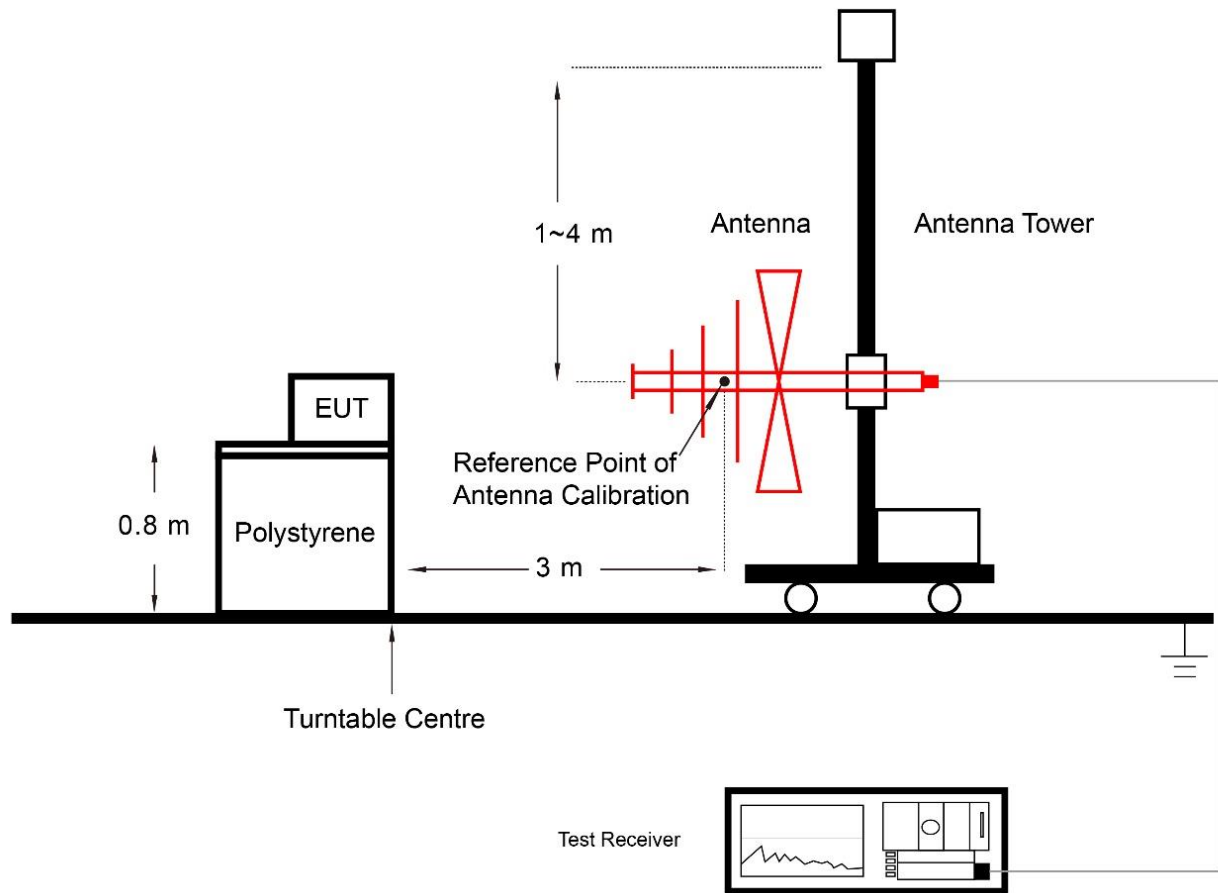
Note 2: Additional provisions may be required for cases where interference occurs.

Frequency range (GHz)	Class A		Class B	
	Average limit dB(μ V/m)	Peak limit dB(μ V/m)	Average limit dB(μ V/m)	Peak limit dB(μ V/m)
1 to 3	56	76	50	70
3 to 6	60	80	54	74

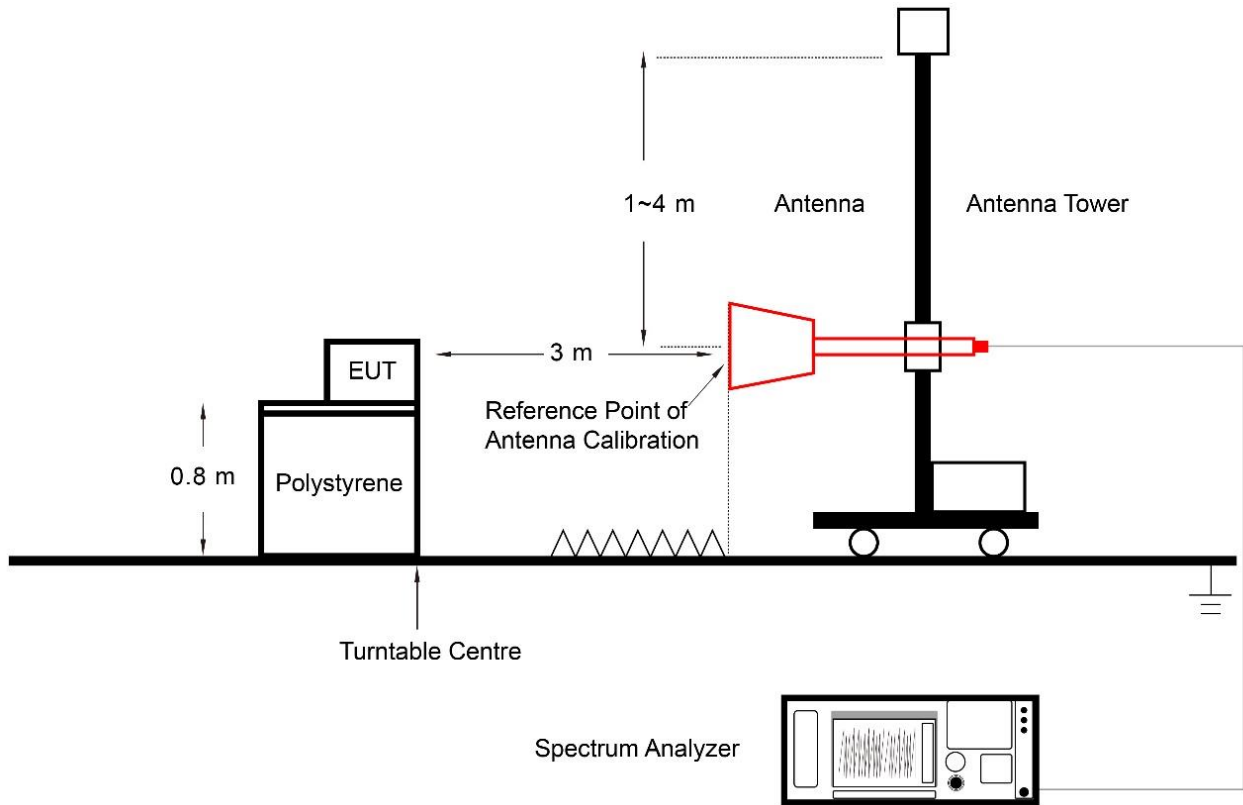
Note: The lower limit applies at the transition frequency.

5.3.2. Test Setup

30 ~ 1000 MHz



1000 ~ 6000 MHz



Note: About the radiated test setup, the EUT and local AE shall be arranged in the most compact practical arrangement within the test volume, while respecting typical spacing and the requirements defined in EN55032 Annex D. The central point of the arrangement shall be positioned at the centre of the turntable. The measurement distance is the shortest horizontal distance between an imaginary circular periphery just encompassing this arrangement and the calibration point of the antenna. See below Figure 1 and Figure 2.

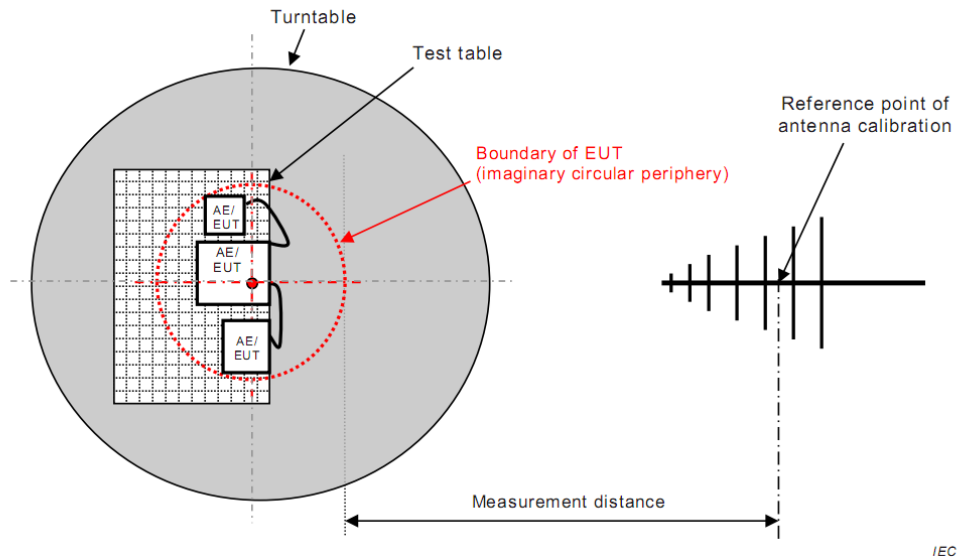


Figure 1

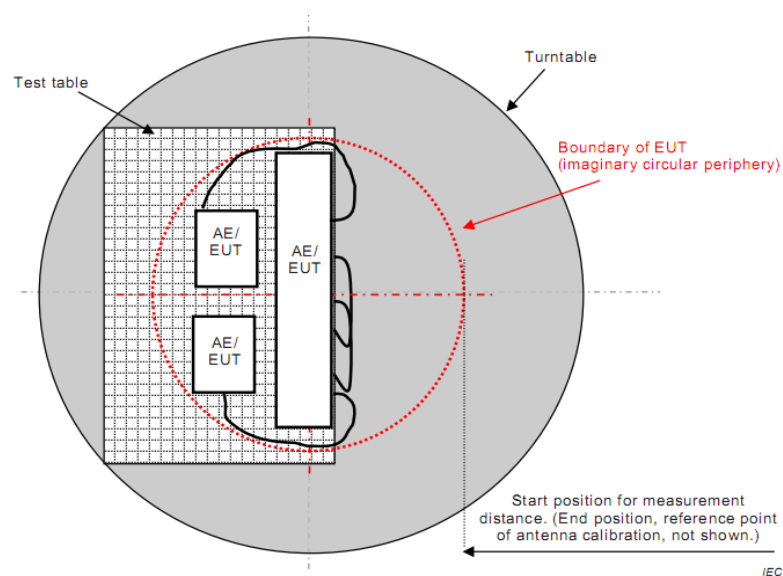


Figure 2

5.3.3. Test Procedure

Starting with the front of the receiver under test facing the measuring antenna, the measuring antenna is adjusted for horizontal polarization measurement and its height varied between 1 m and 4 m until the maximum reading is obtained.

The receiver under test is then rotated about its centre until the maximum meter reading is obtained, after which the measuring antenna height is again varied between 1 m and 4 m and the maximum reading noted.

The procedure is repeated for vertical polarization of the measuring antenna.

The highest value found, following this procedure, is defined as the radiation figure of the receiver.

If at certain frequencies the ambient signal field strength is high at the position of the receiving antenna, one of the following methods may be used to show compliance of the equipment under test.

For small frequency bands with high ambient signals, the disturbance value may be interpolated from the adjacent values. The interpolated value shall lie on the curve describing a continuous function of the disturbance values adjacent to the ambient noise.

5.3.4 Test Result

The product is tested by test fixture, no ancillary equipment, so this item is not applicable.

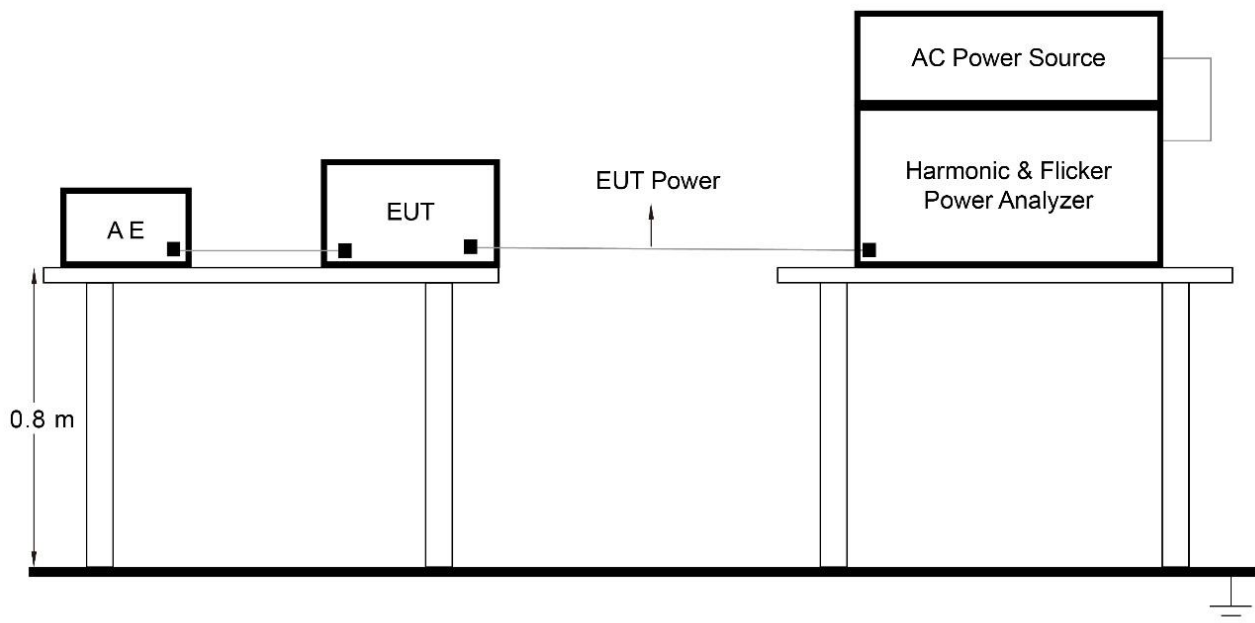
5.4. Harmonic Current Emissions

5.4.1. Test Limit

Limits of Class A Harmonics Currents

Harmonics Order n	Maximum Permissible harmonic current A	Harmonics Order n	Maximum Permissible harmonic current A
Odd harmonics		Even harmonics	
3	2.30	2	1.08
5	1.14	4	0.43
7	0.77	6	0.30
9	0.40	$8 \leq n \leq 40$	$0.23 * 8/n$
11	0.33	--	--
13	0.21	--	--
$15 \leq n \leq 39$	$0.15 * 15/n$	--	--

5.4.2. Test Setup



5.4.3. Test Procedure

The EUT is supplied in series with power analyzer from a power source having the same normal voltage and frequency as the rated supply voltage and the equipment under test. And the rated voltage at the supply voltage of EUT of 0.98 times and 1.02 times shall be performed.

5.4.4 Test Result

The EUT is powered by USB, so this item is not applicable.

5.5. Voltage Fluctuations and Flicker

5.5.1. Test Limit

The following limits apply:

- the value of P_{st} shall not be greater than 1.0;
- the value of P_{it} shall not be greater than 0.65;
- the value of $d_{(t)}$ during a voltage change shall not exceed 3.3% for more than 500ms;
- the relative steady-state voltage change, dc , shall not exceed 3.3%;
- the maximum relative voltage change, d_{max} , shall not exceed;
 - a) 4% without additional conditions;
 - b) 6% for equipment which is:
 - switched manually, or
 - switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

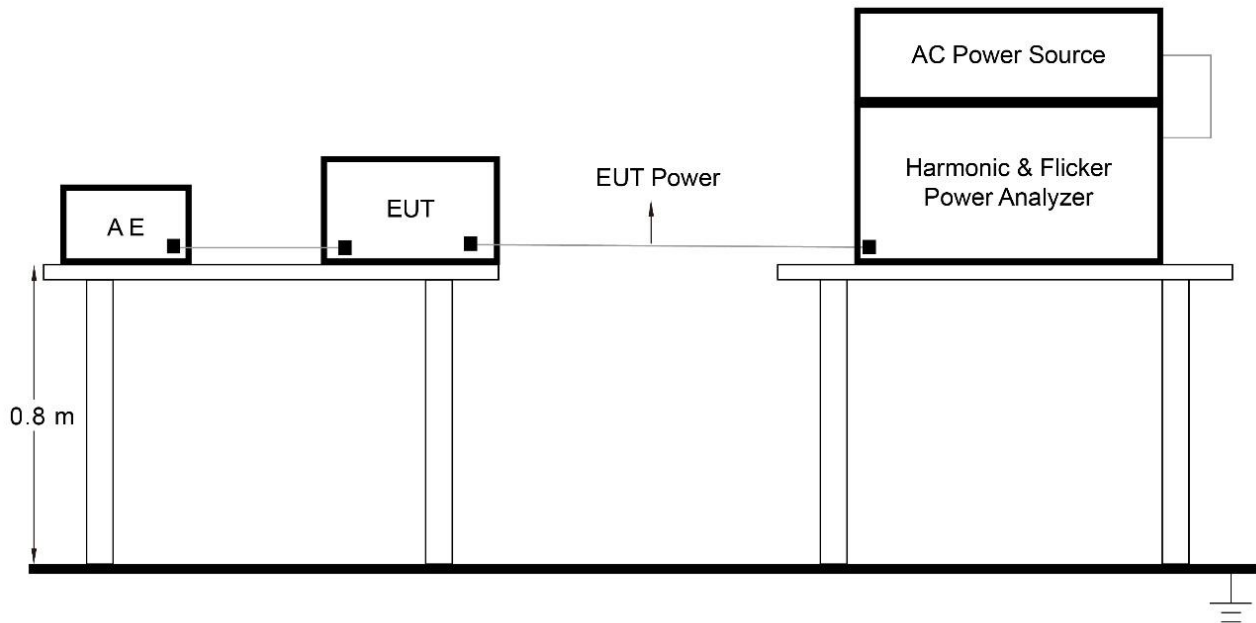
Note: The cycling frequency will be further limited by the P_{st} and P_{it} limit.

For example: a d_{max} of 6% producing a rectangular voltage change characteristic twice per hour will give a P_{it} of about 0.65.

- c) 7% for equipment which is:
 - attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
 - switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

P_{st} and P_{it} requirements shall not be applied to voltage changes caused by manual switching.

5.5.2. Test Setup



5.5.3. Test Procedure

The EUT is supplied in series with power analyzer from a power source having the same normal voltage and frequency as the rated supply voltage and the equipment under test. And the rated voltage at the supply voltage of EUT of 0.98 times and 1.02 times shall be performed.

5.5.4 Test Result

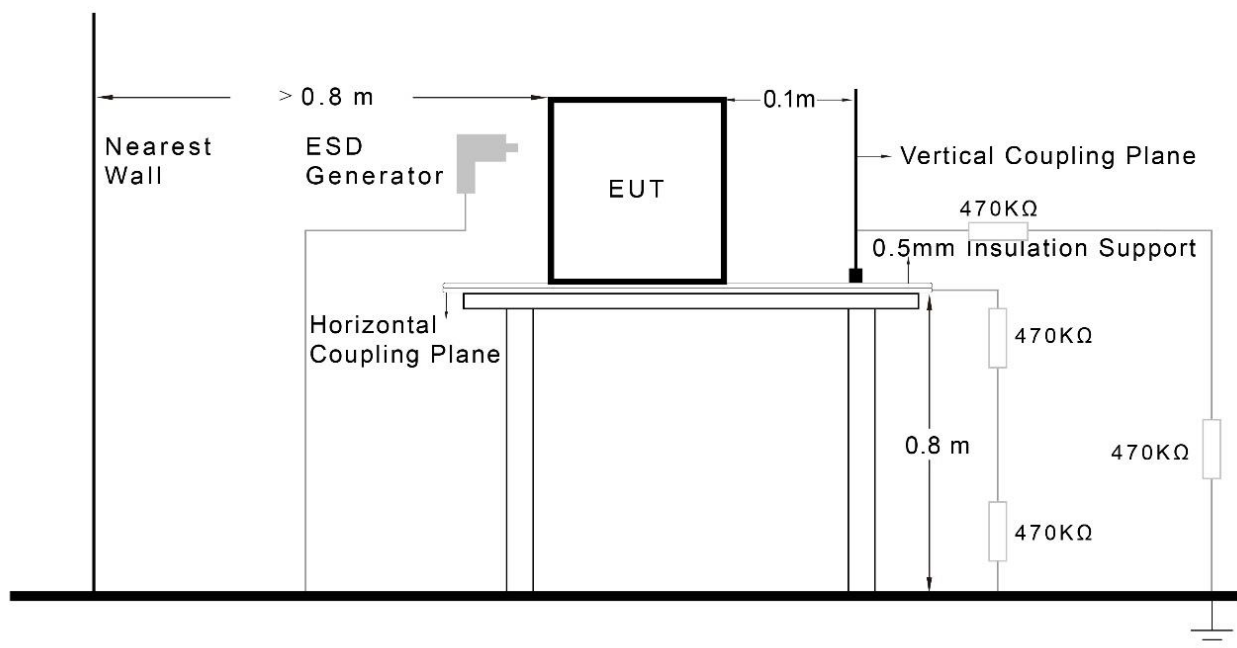
The EUT is powered by USB, so this item is not applicable.

5.6. Electrostatic Discharge

5.6.1. Test Limit

Environmental Phenomenon	Test Specification	Units	Performance Criterion
EN 301 489 -1/-3			
Electrostatic Discharge	± 4 (Contact discharge)	kV (Test voltage)	Transient phenomena
	$\pm 2, \pm 4, \pm 8$ (Air discharge)	kV (Test voltage)	

5.6.2. Test Setup



5.6.3. Test Procedure

Direct Application of Discharges to the EUT:

Contact discharge was applied only to conductive surfaces of the EUT.

Air discharges were applied only to non-conductive surfaces of the EUT.

During the test, it was performed with single discharges. For the single discharge time between successive single discharges will be keep longer 1 second. It was at least ten single discharges with positive and negative at the same selected point.

The selected point, which was performed with electrostatic discharge, was marked on the red label of the EUT.

Indirect Application of Discharges to the EUT:

Vertical Coupling Plane (VCP):

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge. It was at least ten single discharges with positive and negative at the same selected point.

Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge. It was at least ten single discharges with positive and negative at the same selected point.

5.6.4 Test Result

Test Site	SIP-SR3	Temperature/ Humidity	26.3°C/49.6%
Test Engineer	Leo Zhou	Barometric	100.3kPa
Test Mode	Mode 1	Test Date	2023-09-27

Indirect Application		Performance Criterion Result
Test Location	Test Level	Horizontal Coupling
Bottom, Top	±4kV	Complies ^{Note 1}
Test Location	Test Level	Vertical Coupling
Front, Rear Left, Right	±4kV	Complies ^{Note 1}

Note 1: During the test, devices and computers failed to transmit, but the function recovered on its own after the test.

Test Site	SIP-SR3	Temperature/ Humidity	26.3°C/49.6%
Test Engineer	Leo Zhou	Barometric	100.3kPa
Test Mode	Mode 2	Test Date	2023-09-27

Indirect Application		Performance Criterion Result
Test Location	Test Level	Horizontal Coupling
Bottom, Top	±4kV	Complies ^{Note 2}
Test Location	Test Level	Vertical Coupling
Front, Rear Left, Right	±4kV	Complies ^{Note 2}

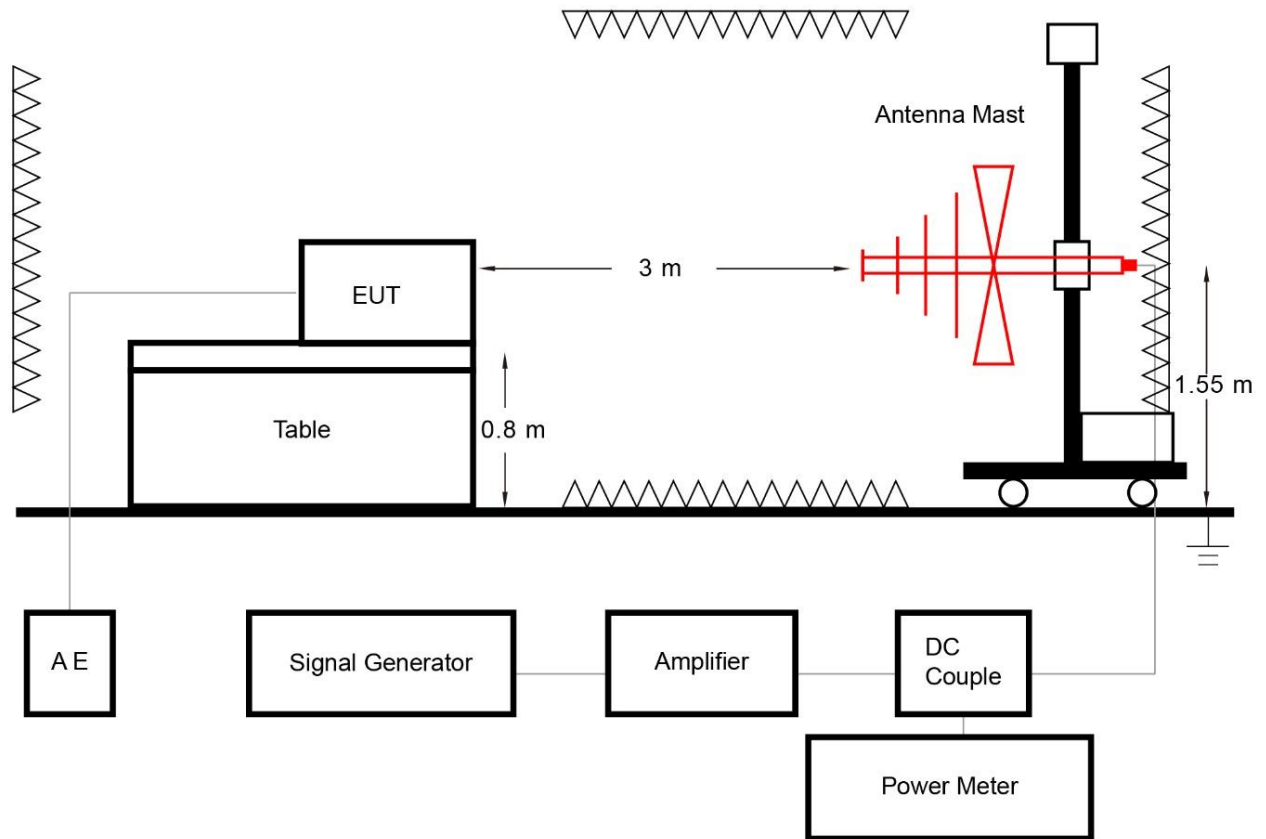
Note 2: During and after the test, the EUT performance complied with performance criteria and there is not any degradation of performance or function.

5.7. Radio Frequency Electromagnetic Field

5.7.1. Test Limit

Environmental Phenomenon	Test Specification	Units	Performance Criterion
EN 301 489 -1 /-3			
Enclosure port			
Radio-Frequency Electromagnetic field	80 - 6000 3 80	MHz V/m (unmodulated, r.m.s) % AM (1kHz)	Continuous phenomena

5.7.2. Test Setup



5.7.3. Test Procedure

The EUT and load, which are placed on a table that is 0.8 meter above ground, are placed with one coincident with the calibration plane such that the distance from antenna to the EUT was 3 meters.

The test shall normally be performed with the generating antenna facing each side of the EUT. When equipment can be used in different orientations (i.e. vertical or horizontal) all sides shall be exposed to the field during the test. When technically justified, some EUTs can be tested by exposing fewer faces to the generating antenna. In other cases, as determined for example by the type and size of EUT or the frequencies of test, more than four azimuths may need to be exposed.

All the scanning conditions are as follows:

	Condition of Test	Remarks
1.	Field Strength	3V/m
2.	RF Signal	AM 80% Modulated with 1kHz
3.	Scanning Frequency	80MHz ~ 6000MHz
5.	Dwell Time	1 Second
6.	Frequency Step Size Δf	1%

5.7.4 Test Result

Test Site	SIP-AC4	Temperature	25.5°C
Test Engineer	Miron Ding	Relative Humidity	52.8%
Test Mode	Mode 1~2	Test Date	2023-09-25

Frequency (MHz)	Polarity	Test Position	Field Strength (V/m)	Performance Criterion Result
80 - 1000	Horizontal/Vertical	Front	3	Complies ^{Note 1}
		Rear		Complies ^{Note 1}
1000 - 6000	Horizontal/Vertical	Front	3	Complies ^{Note 1}
		Rear		Complies ^{Note 1}

Note 1: During and after the test, the EUT performance complied with performance criteria and there was not any degradation of performance or function.

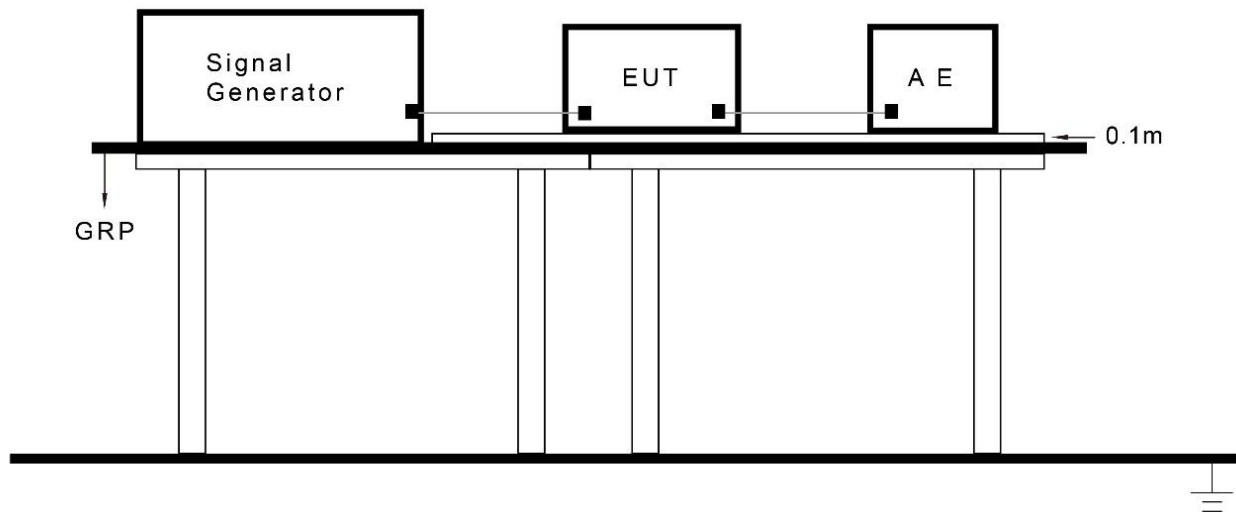
Note 2: The exclusion bands which defined in EN301489 series standards were excluded during the test.

5.8. Fast Transients, Common Mode

5.8.1. Test Limit

Environmental Phenomenon	Test Specification	Units	Performance Criterion
EN 301 489 -1/-3			
Input AC power ports			
Electrical fast transients	±1 5/50 5	kV (open circuit test voltage) Tr/Th (ns) Repetition frequency (kHz)	Transient phenomena
Signal ports, telecommunication ports, and control ports (See Note 1 / 2 / 3)			
Fast transients common mode	±0.5 5/50 5	kV (peak) Tr/Th ns Repetition frequency (kHz)	Transient phenomena
<p>Note 1: This test shall be additionally performed on signal ports, telecommunication ports, control ports, and DC power ports, of radio equipment and associated ancillary equipment, if the cables may be longer than 3m.</p> <p>Note 2: The test level for signal ports, wired network ports (excluding xDSL), and control ports shall be 0.5 kV open circuit voltage at a repetition rate of 5 kHz.</p> <p>Note 3: The test level for xDSL wired network ports shall be 0,5 kV open circuit voltage at a repetition rate of 100 kHz.</p> <p>Note 4: Not applicable to input ports intended for connection to a battery or a rechargeable battery which must be removed or disconnected from the apparatus for recharging. Apparatus with a DC power input port intended for use with an AC - DC power adaptor shall be tested on the AC power input of the AC- DC power adaptor specified by the manufacturer or, where none is so specified, using a typical AC - DC power adaptor. The test is applicable to DC power input ports intended to be connected permanently to cables longer than 3 m.</p> <p>Note 5: Applicable only to ports interfacing with cables whose total length according to the manufacturer's functional specification may exceed 3 m.</p>			

5.8.2. Test Setup



5.8.3. Test Procedure

The EUT is placed on a table that is 0.8 meter height. A ground reference plane is placed on the table, and uses a 0.1m insulation between the EUT and ground reference plane.

The minimum area of the ground reference plane is 1m*1m, and 0.65mm thick min, and projected beyond the EUT by at least 0.1m on all sides.

For Input AC Power Ports:

The EUT is connected to the power mains through a coupling device that directly couples the EFT/B interference signal.

Each of the line conductors is impressed with burst noise for 1 minute.

The length of the power lines between the coupling device and the EUT is 0.5m.

For Signal Ports, Telecommunication Ports, and Control Ports:

The EFT interference signal is through a coupling clamp device couples to the signal of the EUT with burst noise for 1 minute.

The length of the signal lines between the coupling device and the EUT is 0.5m.

5.8.4 Test Result

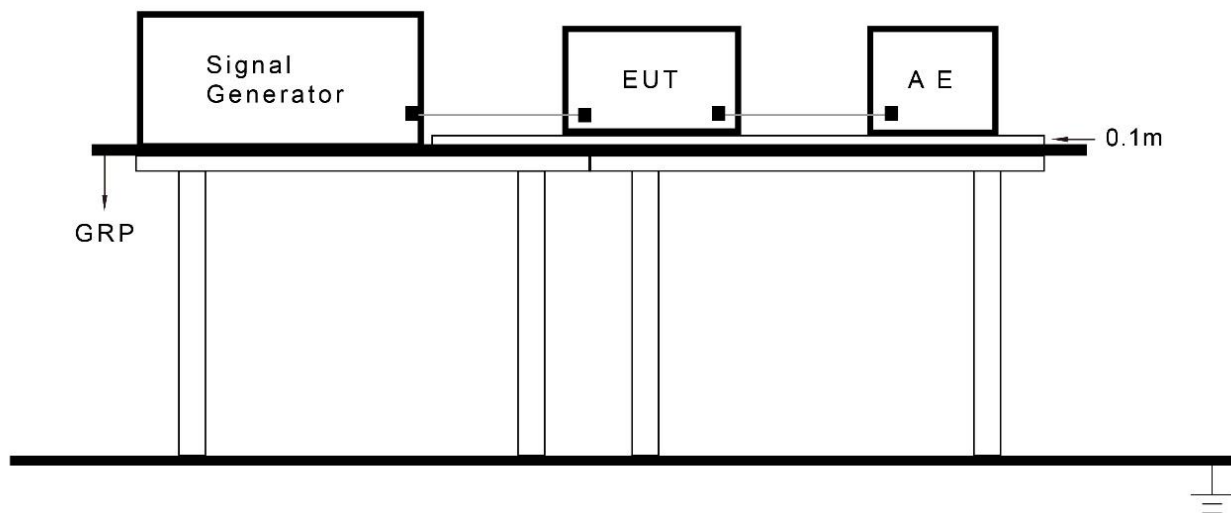
The EUT is powered by USB, so this item is not applicable.

5.9. Surges

5.9.1. Test Limit

Environmental Phenomenon	Test Specification	Units	Performance Criterion
EN 301 489 -1/-3			
AC mains power ports			
Surges	1.2/50 (8/20) ±1 line to line ±2 line to earth	Tr/Th (us) kV (open circuit test voltage) kV (open circuit test voltage)	Transient phenomena
Telecommunication ports directly connected to indoor cables (See Note 1)			
Surges	1.2/50 ±0.5 line to ground	Tr/Th (us) kV (peak)	Transient phenomena
Note:			
1. The test level for wired network ports, intended to be connected to indoor cables (longer than 30 m) shall be 0,5 kV (applied line to ground, or shield to ground)			

5.9.2. Test Setup



5.9.3. Test Procedure

The EUT is placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m minimum and 0.65mm thick minimum and projected beyond the EUT by at least 0.1m on all sides. The length of power cord between the coupling device and the EUT shall be 2m or less.

For Input AC Power Ports:

The EUT is connected to the power mains through a coupling device that directly couples the surge interference signal.

The surge noise shall be applied synchronized to the voltage phase at 0°, 90°, 180°, 270° and the peak value of the AC voltage wave. (Positive and negative)

Each of Line to Earth and Line to Line is impressed with a sequence of five surge voltages with interval of 1 minute.

For Telecommunication Ports:

The signal line of EUT is connected to coupling and decoupling network that directly couples the surge interference signal.

Only Line to ground is impressed with a sequence of five surge voltages with interval of 1 minute.

5.9.4 Test Result

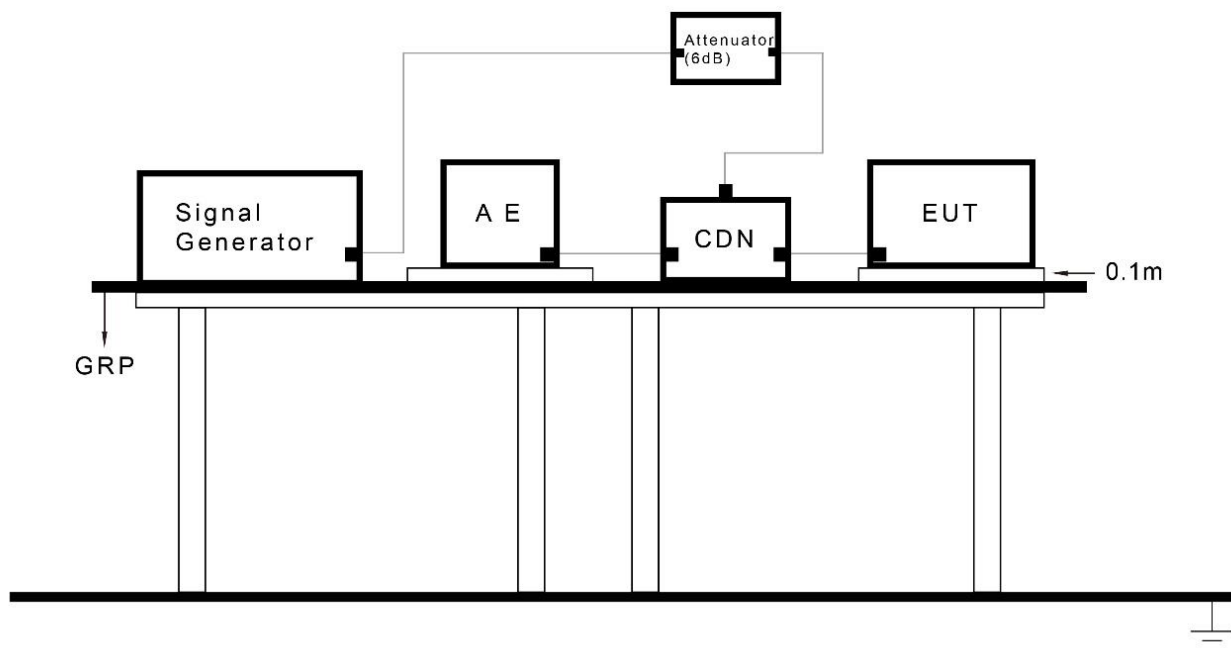
The EUT is powered by USB, so this item is not applicable.

5.10. Radio Frequency Common Mode

5.10.1. Test Limit

Environmental phenomenon	Test specification	Units	Performance criterion
EN 301 489 -1/-3			
Input AC power ports (See Note 1 / 2)			
Radio-frequency common mode	0.15 - 80	MHz	Continuous phenomena
	3	V (unmodulated, r.m.s)	
	80	% AM (1kHz)	
Signal ports, telecommunication ports, and control ports (See Note 1 / 2 / 3)			
Radio frequency common mode	0.15 - 80	MHz	Continuous phenomena
	3	V (unmodulated, r.m.s)	
	80	% AM (1kHz)	
Note 1: If the wanted signal is modulated at 1000Hz, then an audio signal of 400Hz shall be used. Note 2: The test shall be performed over the frequency range 150kHz to 80MHz with the exception of the exclusion band for transmitters, and for receivers and duplex transceivers [see clause 4 of EN 301 489-1. Note 3: This test shall be additionally performed on signal ports, telecommunication ports, control ports, and DC power ports, of radio equipment and associated ancillary equipment, if the cables may be longer than 3m.			

5.10.2. Test Setup



5.10.3. Test Procedure

The EUT is placed on a table that is 0.8 meter height, and a ground reference plane on the table, EUT is placed upon table and use 0.1m insulation between the EUT and ground reference plane.

For Input AC Power Ports:

The EUT is connected to the power mains through a coupling and decoupling networks for power supply lines. And directly couples the disturbances signal into EUT.

For Signal Ports, Telecommunication Ports, and Control Ports:

The disturbance signal is through a coupling and decoupling networks (CDN) or EM-clamp device couples to the signal and telecommunication lines of the EUT.

	Condition of Test	Remarks
1.	Voltage Strength	3V
2.	RF Signal	AM 80% Modulated with 1kHz
3.	Scanning Frequency	0.15MHz - 80MHz
4.	Dwell Time	1 Second
5.	Frequency Step Size Δf	1%

5.10.4. Test Result

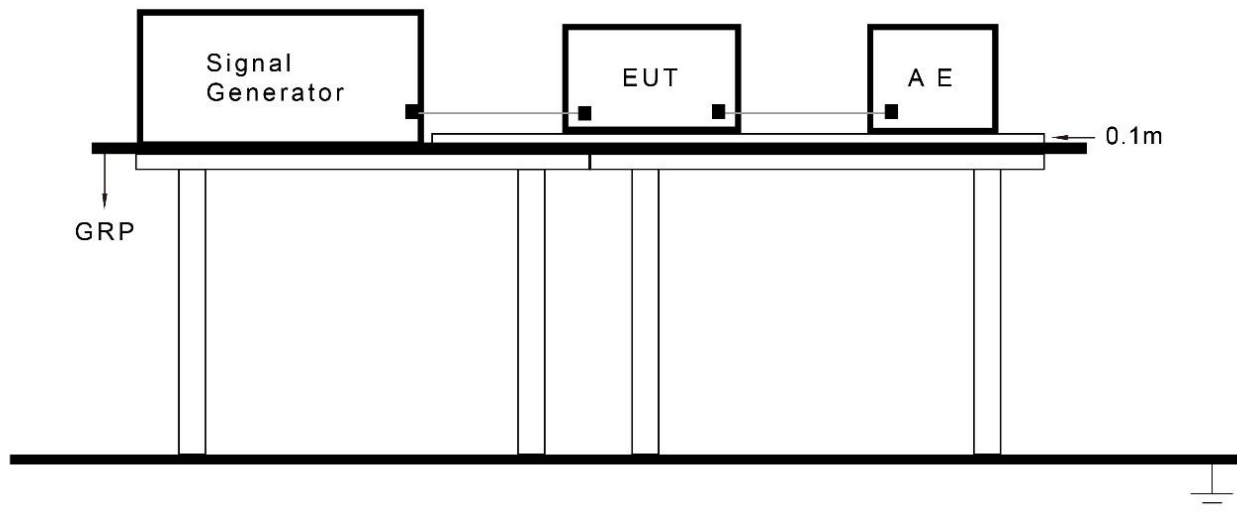
The EUT is powered by USB, so this item is not applicable.

5.11. Voltage Dips and Interruptions

5.11.1. Test Limit

Environmental Phenomenon	Test Specification	Units	Performance Criterion
EN 301 489 -1 / -3			
Input AC power ports (See Note 1)			
Voltage dips	0 0.5	% residual cycle	Transient Phenomena
	0 1	% residual cycle	Transient Phenomena
	70 25 (50Hz)	% residual cycle	Transient Phenomena
Voltage interruptions	0 250 (50Hz)	% residual cycle	Transient Phenomena
Note 1: This test shall be performed on the AC mains power port (if any) of radio equipment and associated ancillary equipment.			

5.11.2. Test Setup



5.11.3. Test Procedure

The EUT is placed on a table which is 0.8 meter above a metal ground plane measured 1m*1m minimum, and 0.65mm thick minimum, and projected beyond the EUT by at least 0.1m on all sides. The power cord shall be used the shortest power cord as specified by the manufacturer.

For Voltage dips and interruptions test:

The selection of test voltage is based on the rated power range. If the operation range is large than 20% of lower power range, both end of specified voltage shall be tested. Otherwise, the typical voltage specification is selected as test voltage.

The EUT is connected to the power mains through a coupling device that directly couples to the voltage dips and interruption generator.

5.12.4 Test Result

The EUT is powered by USB, so this item is not applicable.

Appendix A - Test Setup Photograph

Refer to “2309RSU048-ET” file.

Appendix B - EUT Photograph

Refer to "2309RSU048-EE" file.

_____ The End _____