

# CE EMC TEST REPORT

For  
EV Charging Station

Model No.: WPro-32-3P, WPro-32-3P, WPro-16-3P, WPro-40P,  
WPro-50P, WPro-32S, WPro-32-3S, WPro-16-3S

Applicant : Shanghai Zencar Industry Co., Ltd  
Room 103 Building 1 No 690 Linheng Road Pudong New  
Area Shanghai China

Manufacturer : Shanghai Zencar Industry Co., Ltd  
Room 103 Building 1 No 690 Linheng Road Pudong New  
Area Shanghai China

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Issued Date : May. 16, 2023

Date of Report : May. 16, 2023

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## 1 GENERAL INFORMATION

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### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: Shanghai Zencar Industry Co., Ltd  
Address of applicant: Room 103 Building 1 No 690 Linheng Road Pudong New Area  
Shanghai China  
Manufacturer: Shanghai Zencar Industry Co., Ltd  
Address of manufacturer: Room 103 Building 1 No 690 Linheng Road Pudong New Area  
Shanghai China

#### General Description of E.U.T

EUT Description: EV Charging Station  
EUT-Model No.: WPro-32-3P  
Test Voltage: Input: AC 220-240V / 380-400V, 50/60Hz, 16-50A  
Output: AC 220-240V / 380-400V, 50/60Hz, 16-50A

#### Remark:

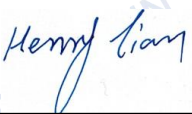
The test data gathered are from the production sample provided by the manufacturer.

### 1.2 Test Standards

The following Declaration of Conformity report of EUT is prepared in accordance with

EN IEC 61851-21-2:2021  
EN IEC 61000-6-1: 2019  
EN IEC 61000-6-2: 2019  
EN IEC 61000-6-3:2021  
EN IEC 61000-6-4: 2019

The objective of the manufacturer is to demonstrate compliance with the described standards above.

Tested By:   
(Henry Tian)

Date: May. 16, 2023

Check By:   
(Kevin Liu)

Date: May. 16, 2023

### 1.3 Test Summary

For the EUT described above. The standards used were EN 61000-6-3 Class B for Emissions & EN 61000-6-1 for Immunity.

Table 1 : Tests Carried Out Under EN IEC 61000-6-3:2019, EN IEC 61000-6-4, EN IEC 61851-21-2:2021 (as amended)

Standard	Test Items	Status
EN IEC 61000-6-3:2021	Disturbance Voltage at The Mains Terminals (150KHz To 30MHz)	√
	Radiated Disturbances (30MHz To 1000MHz)	√
EN IEC 61000-3-2:2019/A1:2021	Harmonic current emissions	√
EN 61000-3-3:2013/A2:2021	Voltage fluctuations & flicker	√

- √ Indicates that the test is applicable
- × Indicates that the test is not applicable

Table 2: Tests Carried Out Under EN IEC 61000-6-1: 2019, EN IEC 61000-6-2 (as amended)

Standard	Test Items	Status
EN61000-4-2:2009	Electrostatic discharge Immunity	√
EN61000-4-3:2006+A2:2020	Radiated Susceptibility (80MHz to 1GHz)	√
EN 61000-4-4:2012	Electrical fast transients/burst immunity test	√
EN 61000-4-5:2014+A1:2017	Surge immunity test	√
EN 61000-4-6:2014+AC:2015	Immunity to conducted disturbances, induced by radio-frequency fields	√
EN 61000-4-8:2010	Power-frequency magnetic field immunity test	√
EN 61000-4-11:2019	Voltage dips, short interruptions and voltage variations immunity tests	√

- √ Indicates that the test is applicable
- × Indicates that the test is not applicable

### 1.4 Test Methodology

All measurements contained in this report were conducted with CISPR 16-1: 2002, radio disturbance and immunity measuring apparatus, and CISPR16-2: 2002, Method of measurement of disturbances and immunity.

### 1.5 Test Facility

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

### 1.6 Test Equipment List and Details

Immunity shielded room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMC PARTNER TRANSIENT 2000	EMC PARTNER	TRA2000	881	04/01/2024
Power-frequency Magnetic field	SCHAFFNER	CCN 1000-1	72046	04/01/2024
Induction Coil Interface	SCHAFFNER	INA2141	6003	04/01/2024
Signal Generator	Marconi	2022D	119246/003	04/01/2024
Power Amplifier	M2S	A00181-1000	9801-112	04/01/2024
CDN	MEB	M3-8016	003683	04/01/2024
Power Amplifier	M2S	AC8113/ 800-250A	9801-179	04/01/2024
Power Antenna	SCHAFFNER	CBL6140A	1204	04/01/2024
ESD 2000	EMC PARTNER	ESD2000	182	04/01/2024
Harmonic & Flicker Tester	California instruments	PACS-3	SB2588/01	04/01/2024
AC Power Source	California instruments	5001iX-CTS-40	SB2588	04/01/2024
EMI Test Receiver	R&S	ESCI	100005	04/01/2024
Spectrum Analyzer	R&S	FSU	100114	04/01/2024
Pre Amplifier	H.P.	HP8447E	2945A02715	04/01/2024
Bilog Antenna	SUNOL Sciences	JB3	A021907	04/01/2024
Cable	TIME MICROWAVE	LMR-400	N-TYPE04	04/01/2024
System-Controller	CCS	N/A	N/A	N.C.R
Turn Table	CCS	N/A	N/A	N.C.R
Antenna Tower	CCS	N/A	N/A	N.C.R
Triple-Loop Antenna	EVERFINE	LLA-2	N/A	04/01/2024
LISN	AFJ	LS16	16010222119	04/01/2024
LISN(EUT)	Mestec	AN3016	04/10040	04/01/2024

## 2 Disturbance Voltage at The Mains Terminals

### 2.1. LIMITS

FREQUENCY (MHz)	Class (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

**NOTE:**

- (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### 2.2. TEST PROCEDURES

#### Procedure of Preliminary Test

The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN55013 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

All I/O cables were positioned to simulate typical actual usage as per EN55013.

The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in Item 3.1 were scanned during the preliminary test.

After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.

The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

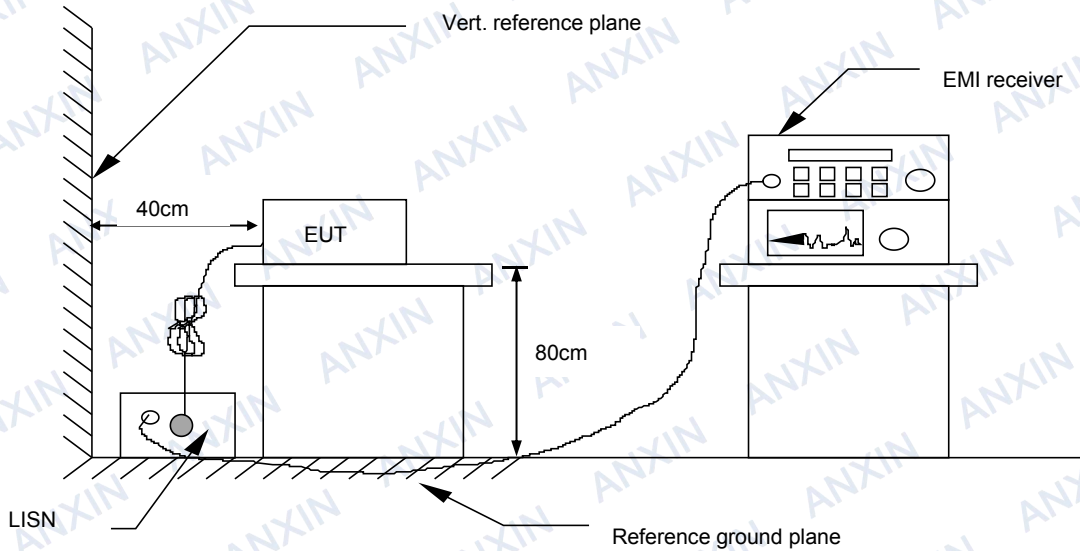
#### Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

### 2.3. TEST SETUP

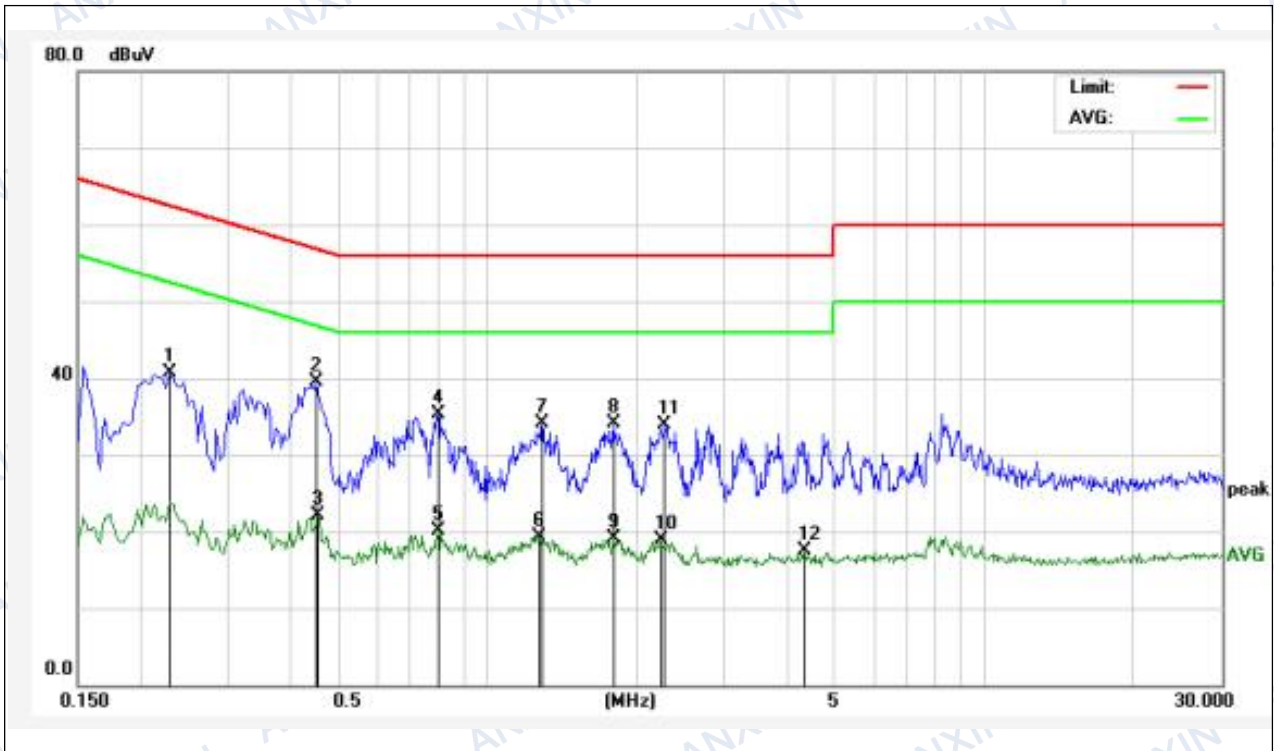


For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 2.4. TEST RESULTS

Temperature ( °C )	22~28
Humidity ( %RH )	50~58
Barometric Pressure ( mbar )	950~1000
EUT	EV Charging Station
M/N	WPro-32-3P
Operating Mode	Normal Operation
Test Results	PASS

EUT:	EV Charging Station	Model Name:	WPro-32-3P
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	May. 14, 2023
Test Mode :	Normal Operating	Polarization :	L
Test Power :	AC 240V, 50Hz		

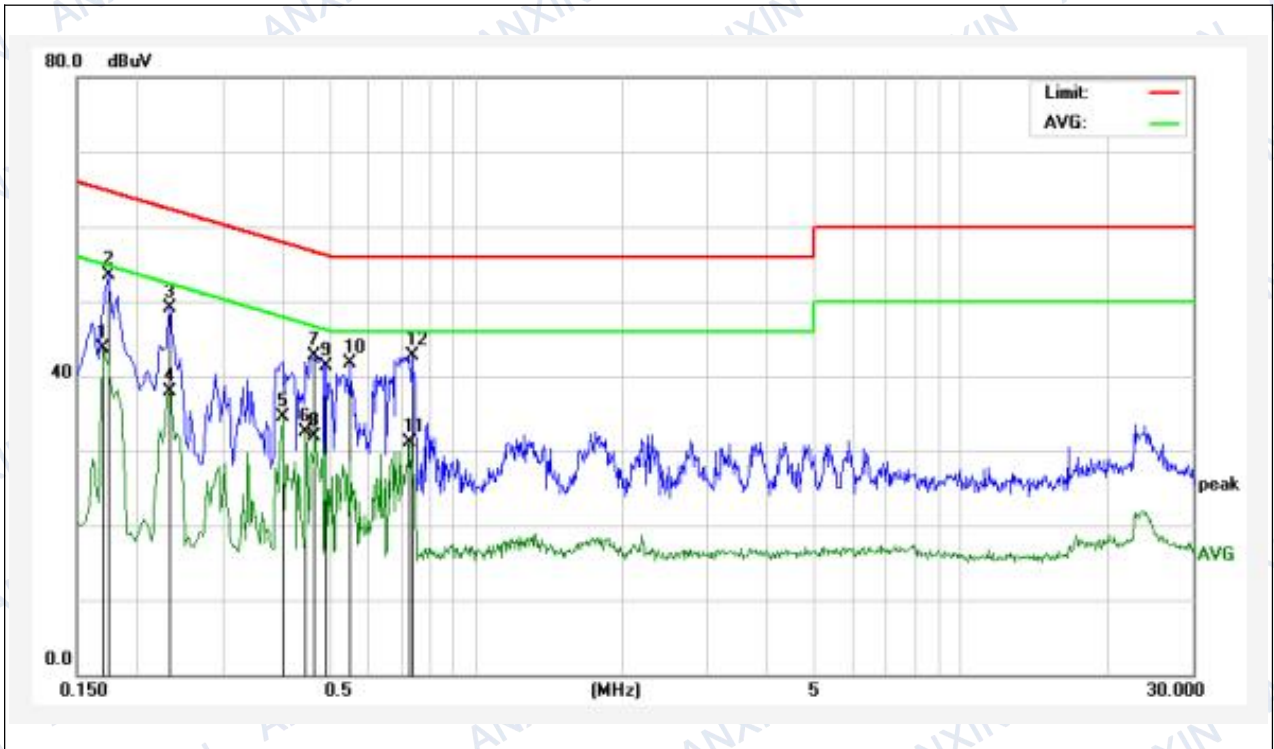


	Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (db)	Detector
1	0.2300	20.82	19.89	40.71	62.45	-21.74	QP
2	0.4540	19.61	19.96	39.57	56.80	-17.23	QP
3	0.4580	2.05	19.96	22.01	46.73	-24.7	AVG
4	0.7980	15.30	20.07	35.37	56.00	-20.63	QP
5	0.7980	0.00	20.07	20.07	46.00	-25.93	AVG
6	1.2700	-0.85	20.13	19.28	46.00	-26.72	AVG
7	1.2940	13.92	20.13	34.05	56.00	-21.95	QP
8	1.7940	13.92	20.14	34.06	56.00	-21.94	QP
9	1.8060	-1.07	20.14	19.07	46.00	-26.93	AVG
10	2.2300	-1.20	20.14	18.94	46.00	27.06	AVG
11	2.2780	13.82	20.15	33.97	56.00	-22.03	QP
12	4.3380	-2.69	20.19	17.50	46.00	-28.50	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit

EUT:	EV Charging Station	Model Name:	WPro-32-3P
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	May. 14, 2023
Test Mode :	Normal Operating	Polarization :	N
Test Power :	AC 240V, 50Hz		



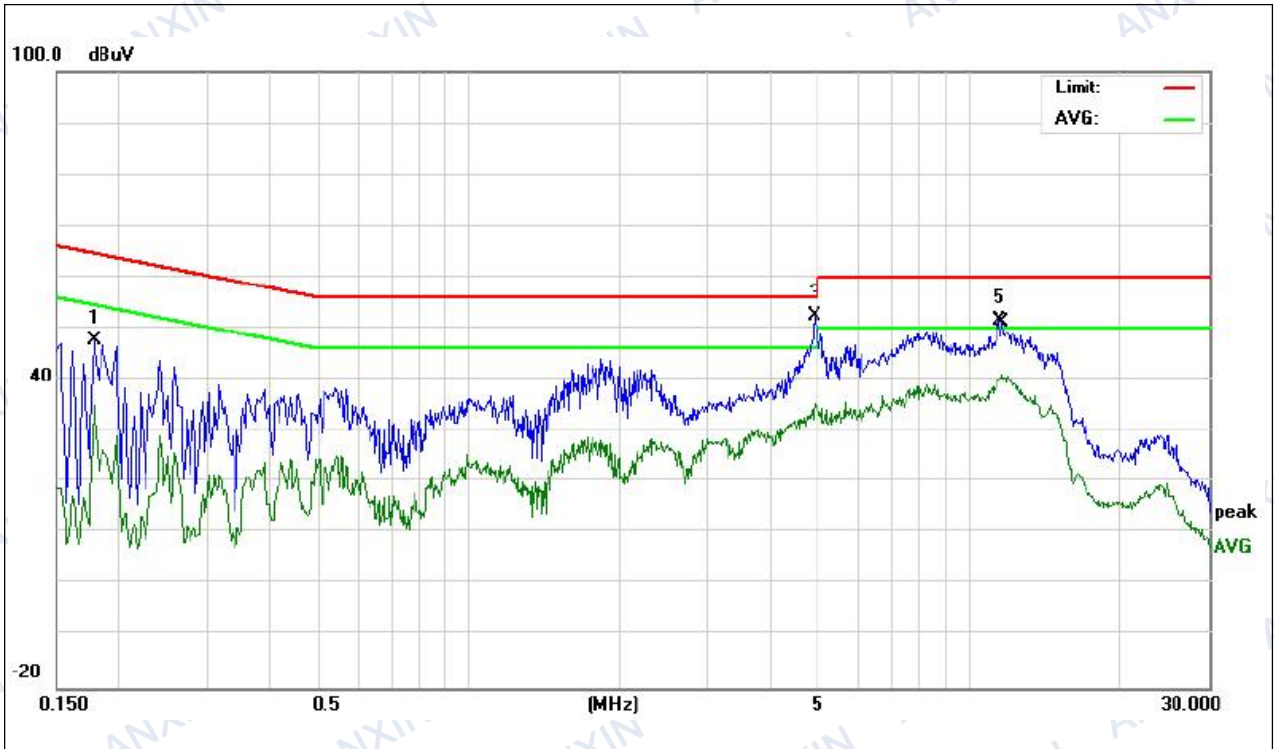
	Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (db)	Detector
1	0.1700	23.72	19.90	43.62	54.96	-11.34	AVG
2	0.1740	33.52	19.90	53.42	64.76	-11.34	QP
3	0.2340	29.25	19.89	49.14	62.30	-13.16	QP
4	0.2340	18.07	19.89	37.96	52.30	-14.34	AVG
5	0.3980	14.60	19.93	34.53	47.89	-13.36	AVG
6	0.4460	12.52	19.96	32.48	46.95	-14.47	AVG
7	0.4660	22.74	19.96	42.70	56.58	-13.88	QP
8	0.4660	11.97	19.96	31.93	46.58	-14.65	AVG
9	0.4900	21.37	19.98	41.35	56.17	-14.82	QP
10	0.5500	21.73	19.99	41.72	56.00	-14.28	QP
11	0.7260	11.12	20.05	31.17	46.00	-14.83	AVG
12	0.7380	22.67	20.05	42.72	56.00	-13.28	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit



EUT:	EV Charging Station	Model Name:	WPro-32-3P
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	May. 14, 2023
Test Mode :	Normal Operating	Polarization :	L1, L2, L3, N
Test Power :	AC 380V, 50Hz		

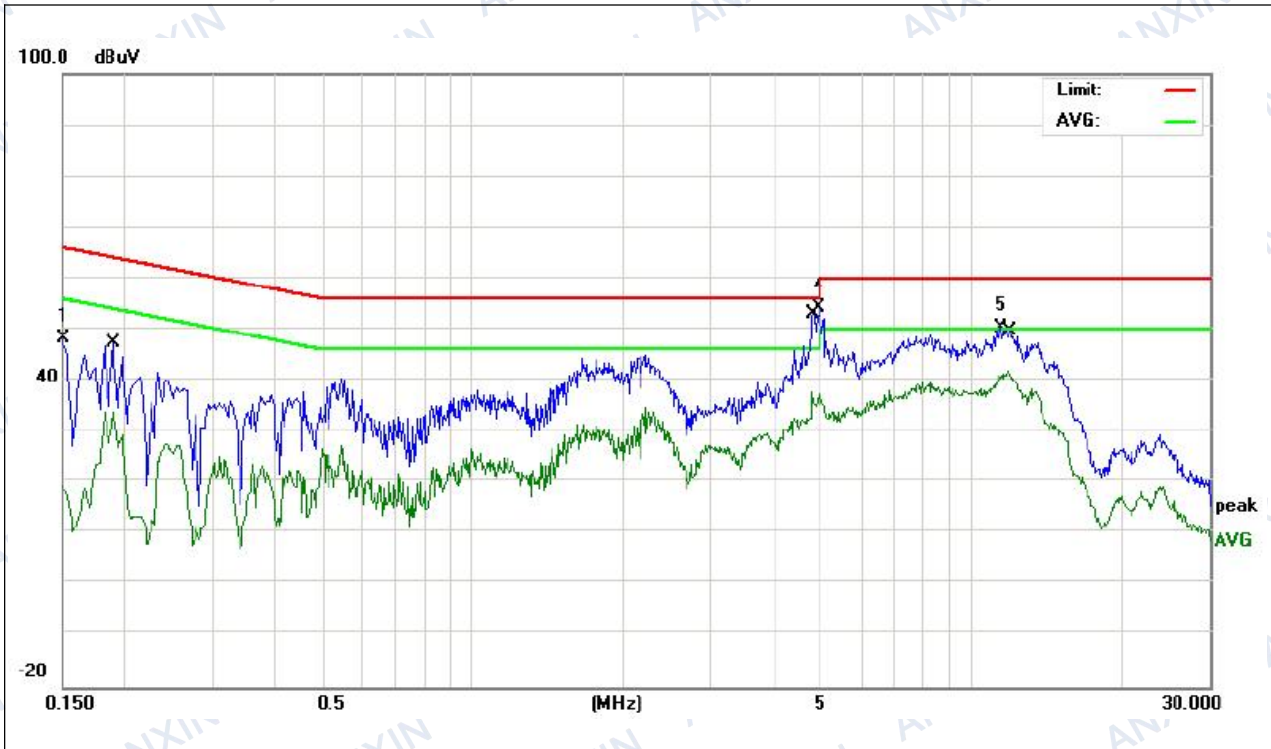


	Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (db)	Detector
1	0.1780	37.35	10.44	47.79	64.57	-16.78	QP
2	0.1780	24.60	10.44	35.04	54.57	-19.53	AV
3	4.9020	41.68	10.64	52.32	56.00	-3.68	QP
4	4.9020	24.63	10.64	35.27	46.00	-10.73	AV
5	11.4620	40.73	10.69	51.42	60.00	-8.58	QP
6	11.4620	30.29	10.69	10.98	50.00	-9.02	AV

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit

EUT:	EV Charging Station	Model Name:	WPro-32-3P
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	May. 14, 2023
Test Mode :	Normal Operating	Polarization :	L1, L2, L3, N
Test Power :	AC 380V, 50Hz		



	Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (db)	Detector
1	0.1500	36.76	11.49	48.25	65.99	-17.74	QP
2	0.1900	23.42	10.40	33.82	54.03	-8.23	AV
3	4.7900	27.10	10.67	37.77	46.00	-20.21	QP
4	4.9400	43.44	10.67	54.11	56.00	-8.23	AV
5	11.4780	39.63	10.71	50.34	60.00	-9.66	QP
6	11.9060	31.28	10.71	41.99	50.00	-8.01	AV

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit

### 3 RADIATED DISTURBANCES

#### 3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is  $\pm 4.0$  dB.

#### 3.2 Limit of Radiated Disturbances (Class B)

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dB $\mu$ V/m)
30 ~ 230	3	40
230 ~ 1000	3	47

Note: (1) The tighter limit shall apply at the edge between two frequency bands.  
(2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

#### 3.3 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the CISPR 16-1: 2002, CISPR16-2: 2002. The specification used was EN 55022 Class B limits.

The EUT was placed on the center of the test table.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

#### 3.4 Test Receiver Setup

According to EN 61000-6-3 rules, the frequency was investigated from 30 to 1000 MHz. During the radiated emission test, the test receiver was set with the following configurations:

Test Receiver Setting:

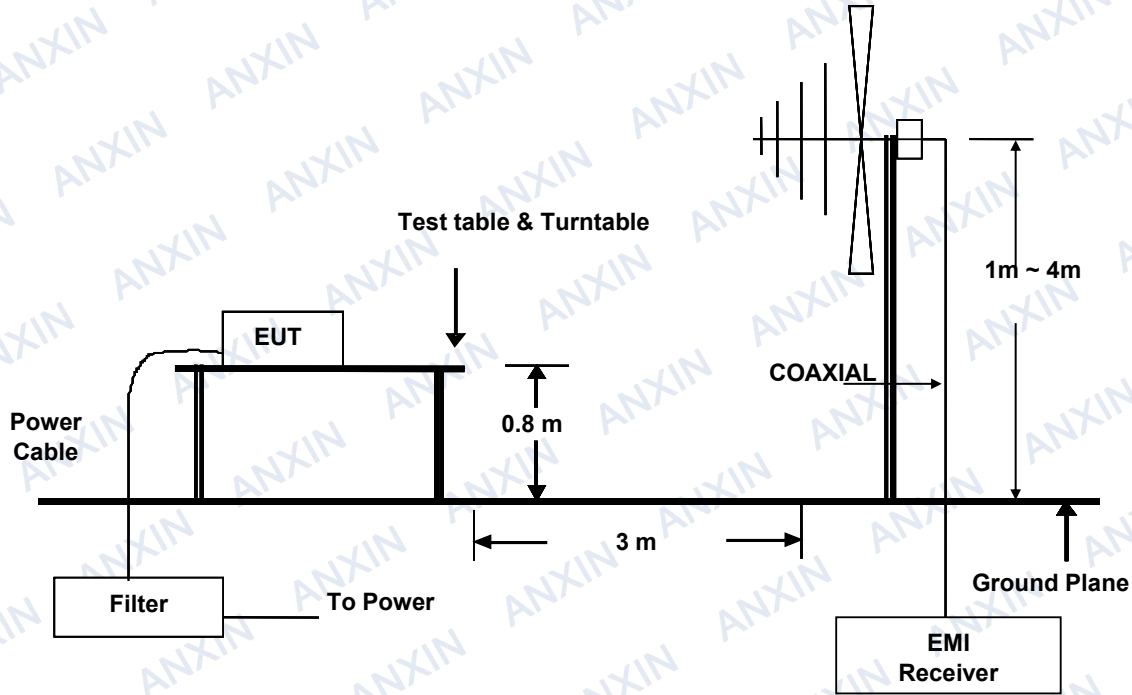
Detector.....Peak & Quasi-Peak  
IF Band Width.....120KHz  
Frequency Range.....30MHz to 1000MHz  
Turntable Rotated.....0 to 360 degrees

Antenna Position:

Height.....1m to 4m  
Polarity.....Horizontal and Vertical

### 3.5 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.



All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within  $-10 \text{ dB}\mu\text{V}$  of specification limits), and are distinguished with a "QP" in the data table.

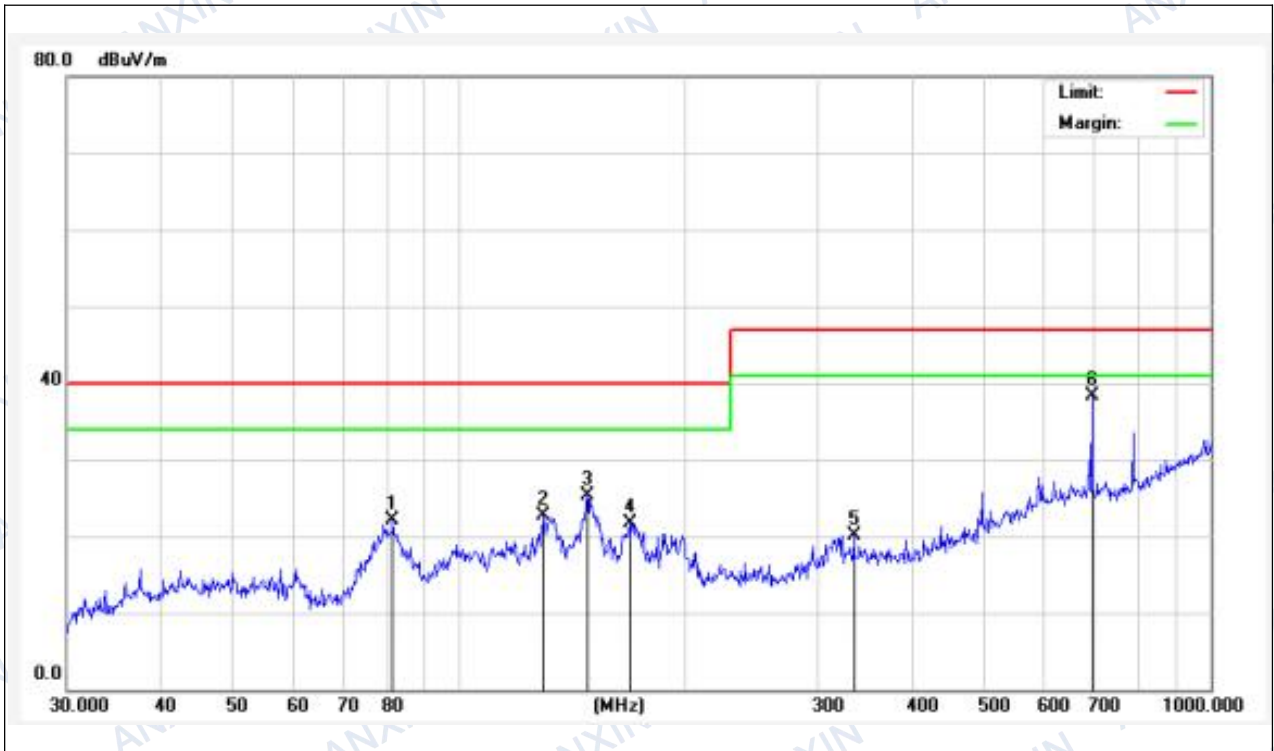
### 3.6 TEST SETUP

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration

### 3.7 Test Result

Temperature ( °C )	22~28
Humidity ( %RH )	50~58
Barometric Pressure ( mbar )	950~1000
EUT	EV Charging Station
M/N	WPro-32-3P
Operating Mode	Normal Operation
Test Results	PASS

EUT:	EV Charging Station	Model Name:	WPro-32-3P
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	May. 14, 2023
Test Mode :	Normal Operating	Polarization :	Vertical
Test Power :	AC 240V, 50Hz		



	Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (db)	Detector
1	81.4970	39.61	-17.43	22.18	40.00	-17.82	QP
2	129.4677	42.10	-19.32	22.78	40.00	-17.22	QP
3	147.9214	45.15	-19.93	25.22	40.00	-14.78	QP
4	168.4138	40.64	-18.94	21.70	40.00	-18.30	QP
5	334.8589	32.55	-12.41	20.14	40.00	-26.86	QP
6	694.4174	44.33	-6.09	38.24	40.00	-8.7	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit

EUT:	EV Charging Station	Model Name:	WPro-32-3P
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	May. 14, 2023
Test Mode :	Normal Operating	Polarization :	Horizontal
Test Power :	AC 240V, 50Hz		

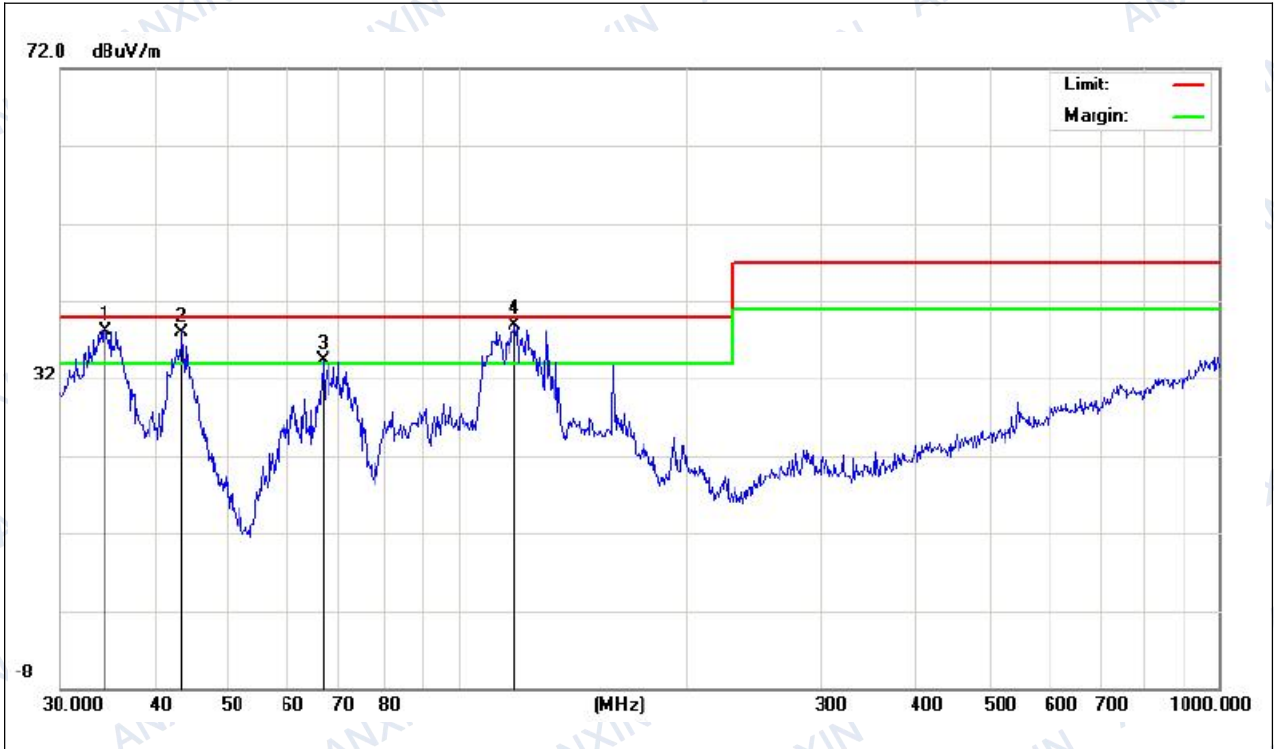


	Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (db)	Detector
1	34.3964	22.14	15.98	38.21	40.00	-1.88	QP
2	43.3534	26.47	11.51	37.98	40.00	-2.02	QP
3	66.4989	28.87	5.47	34.34	40.00	-5.66	QP
4	119.0180	27.06	11.75	38.81	40.00	-1.19	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit

EUT:	EV Charging Station	Model Name:	WPro-32-3P
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	May. 14, 2023
Test Mode :	Normal Operating	Polarization :	Vertical
Test Power :	AC 380V, 50Hz		



	Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (db)	Detector
1	196.5098	46.47	-20.04	26.43	40.00	-13.57	QP
2	295.1469	42.79	-14.75	28.04	40.00	-18.96	QP
3	495.9344	41.40	-10.23	31.17	40.00	-15.83	QP
4	694.4174	44.93	-6.09	38.84	40.00	-8.16	QP
5	787.8513	42.70	-4.42	38.28	40.00	-8.72	QP
6	986.0717	35.38	0.00	35.38	40.00	-11.62	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit

EUT:	EV Charging Station	Model Name:	WPro-32-3P
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	May. 14, 2023
Test Mode :	Normal Operating	Polarization :	Horizontal
Test Power :	AC 380V, 50Hz		



	Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (db)	Detector
1	105.2718	16.27	10.96	27.23	40.00	-12.77	QP
2	160.3456	18.16	10.54	28.80	40.00	-11.20	QP
3	284.9767	11.79	13.60	25.39	47.00	-21.61	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit



## 4 HARMONICS CURRENT MEASUREMENT

### 4.1. LIMITS OF HARMONICS CURRENT MEASUREMENT

Limits for Class A equipment		Limits for Class D equipment		
Harmonics Order n	Max. permissible harmonics current A	Harmonics Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd harmonics		Odd Harmonics only		
3	2.30	3	3.4	2.30
5	1.14	5	1.9	1.14
7	0.77	7	1.0	0.77
9	0.40	9	0.5	0.40
11	0.33	11	0.35	0.33
13	0.21	13	0.30	0.21
15<=n<=39	0.15x15/n	15<=n<=39	3.85/n	0.15x15/n
Even harmonics				
2	1.08			
4	0.43			
6	0.30			
8<=n<=40	0.23x8/n			

NOTE:

1. Class A and Class D are classified according to item 4.4.3.
2. According to section 7 of EN 61000-3-2, the above limits apply for all equipments with a rated power more than 75W, except for lighting equipment.
3. Product Standard: EN 61000-6-2

### 4.2. TEST PROCEDURE

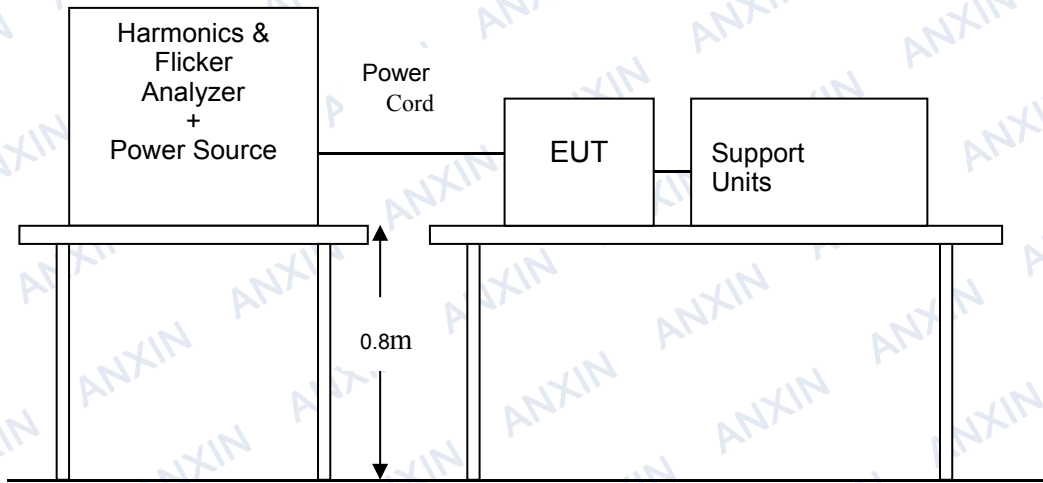
The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under Running operating conditions for each successive harmonic component in turn.

The classification of EUT is according to section 5 of EN 61000-3-2.

The EUT is classified as follows:

- Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.
- Class B: Portable tools; Arc welding equipment which is not professional equipment.
- Class C: Lighting equipment.
- Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors and television receivers.

The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.



### 4.3. TEST RESULTS

N/A

## 5 VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

### 5.1. LIMITS OF VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

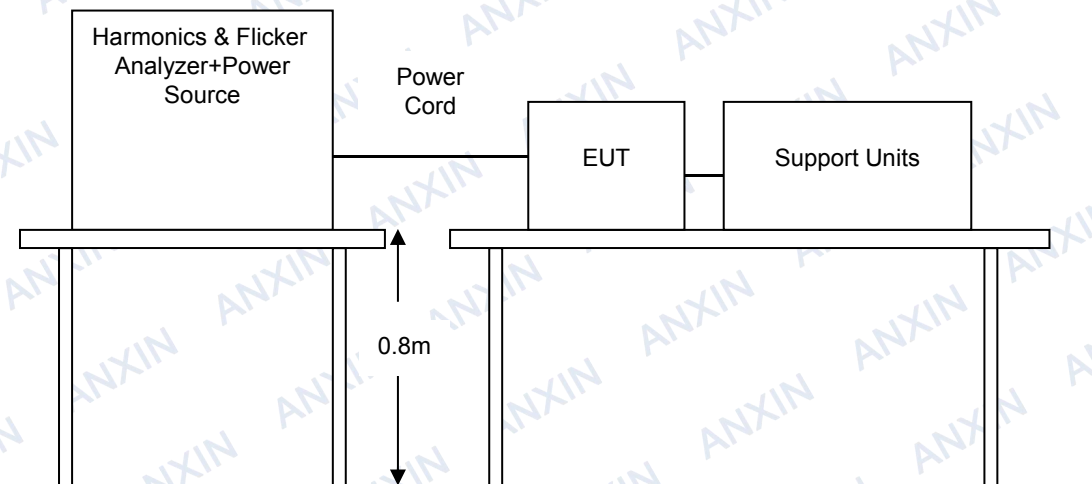
TEST ITEM	LIMIT	REMARK
$P_{st}$	1.0	$P_{st}$ means short-term flicker indicator.
$P_{lt}$	0.65	$P_{lt}$ means long-term flicker indicator.
$T_{dt}$ (ms)	500	$T_{dt}$ means maximum time that dt exceeds 3 %.
$d_{max}$ (%)	4%	$d_{max}$ means maximum relative voltage change.
dc (%)	3.3%	dc means relative steady-state voltage change

### 5.2. TEST PROCEDURE

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under POWER SUPPLY operating conditions.

During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

### 5.3. TEST SETUP



For the actual test configuration, please refer to the related item.

### 5.4. TEST RESULTS

Temperature ( °C )	22~28
Humidity ( %RH )	50~58
Barometric Pressure ( mbar )	950~1000
EUT	EV Charging Station
M/N	WPro-32-3P
Operating Mode	Normal Operation
Test Results	PASS

### results

Parameter	P <sub>st</sub>	P <sub>lt</sub>	T <sub>dt</sub> (ms)	dc (%)	d <sub>max</sub> (%)
Limit	1	0.65	500	3.3	4
WPro-32-3P (>16APhase A worst case)	0.230	0.144	0	0.889	1.860
WPro-32-3P (>16APhase B worst case)	0.183	0.101	0	0.590	0.940

## 6 IMMUNITY TEST

### 6.1. GENERAL DESCRIPTION

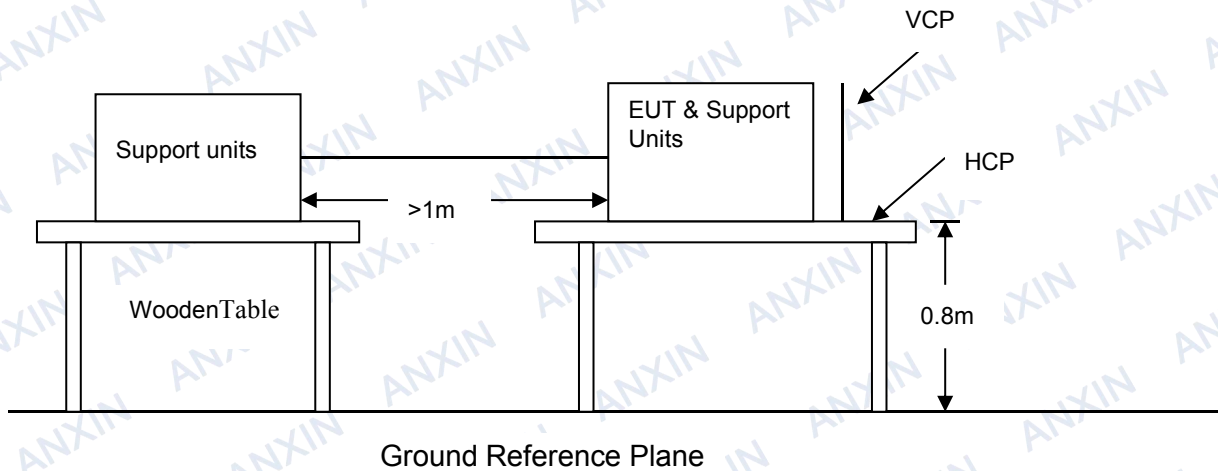
Product Standard	EN IEC 61000-6-1:2019	
	Test Type	Minimum Requirement
Basic Standard, Specification, and Performance Criterion required	EN 61000-4-2	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80 ~1000 MHz, 3V/m, 80% AM(1kHz), Performance Criterion A
	EN 61000-4-4	Electrical Fast Transient/Burst - EFT, Power line: 2kV Performance Criterion B
	EN 61000-4-6	Conducted Radio Frequency Disturbances Test –CS: 0.15 ~ 80 MHz, 3Vrms, 80% AM, 1kHz, Performance Criterion A
	EN 61000-4-8	Power frequency magnetic field immunity test 50 Hz, 1A/m Performance Criterion A
	EN 61000-4-11	Voltage Dips: i) >95% reduction for 0.5 period, Performance Criterion B ii) 30% reduction for 25 period, Performance Criterion C Voltage Interruptions: >95% reduction for 250 period Performance Criterion C

**6.2. GENERAL PERFORMANCE CRITERIA DESCRIPTION**

<b>Criteria A:</b>	The apparatus shell continues to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the manufacturer does not specify the minimum performance level or the permissible performance loss, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
<b>Criteria B:</b>	<p>After test, the apparatus shell continues to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomenon below a performance level specified by the manufacturer, when the apparatus 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 however allowed. However, no change of operating state if stored data is allowed to persist after the test. If the manufacturer does not specify the minimum performance level or the permissible performance loss, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.</p>
<b>Criteria C:</b>	<p>Temporary loss of function is allowed, provided the functions is self-recoverable or can be restored by the operation of controls by the user in accordance with the manufacturer instructions.</p> <p>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

### 6.3. ELECTROSTATIC DISCHARGE (ESD)

#### 6.3.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### **NOTE:**

##### TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of EN 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

##### FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

### 6.3.4. TEST RESULTS

Temperature ( °C )	22~28
Humidity ( %RH )	50~58
Barometric Pressure ( mbar )	950~1000
EUT	EV Charging Station
M/N	WPro-32-3P
Operating Mode	Normal Operation Mode
Test Results	PASS

<i>Air Discharge</i>						
<i>Test locations</i>	<b>Test Levels</b>		<b>Results</b>			
	$\pm 8$ kV	Pass	Fail	Performance Criterion	Observation	
Slot      2Points	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<b>B</b>	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	

<i>Contact Discharge</i>						
<i>Test locations</i>	<b>Test Levels</b>		<b>Results</b>			
	$\pm 4$ kV	Pass	Fail	Performance Criterion	Observation	
HCP      4Points	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<b>B</b>	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	
VCP      4Points	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<b>B</b>	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	

**NOTE:** 1. There was no change compared with initial operation during the test.  
2. The loss of function of the EUT during the test and it was recovered by itself operation after the test.



#### 6.4. RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD (RS)

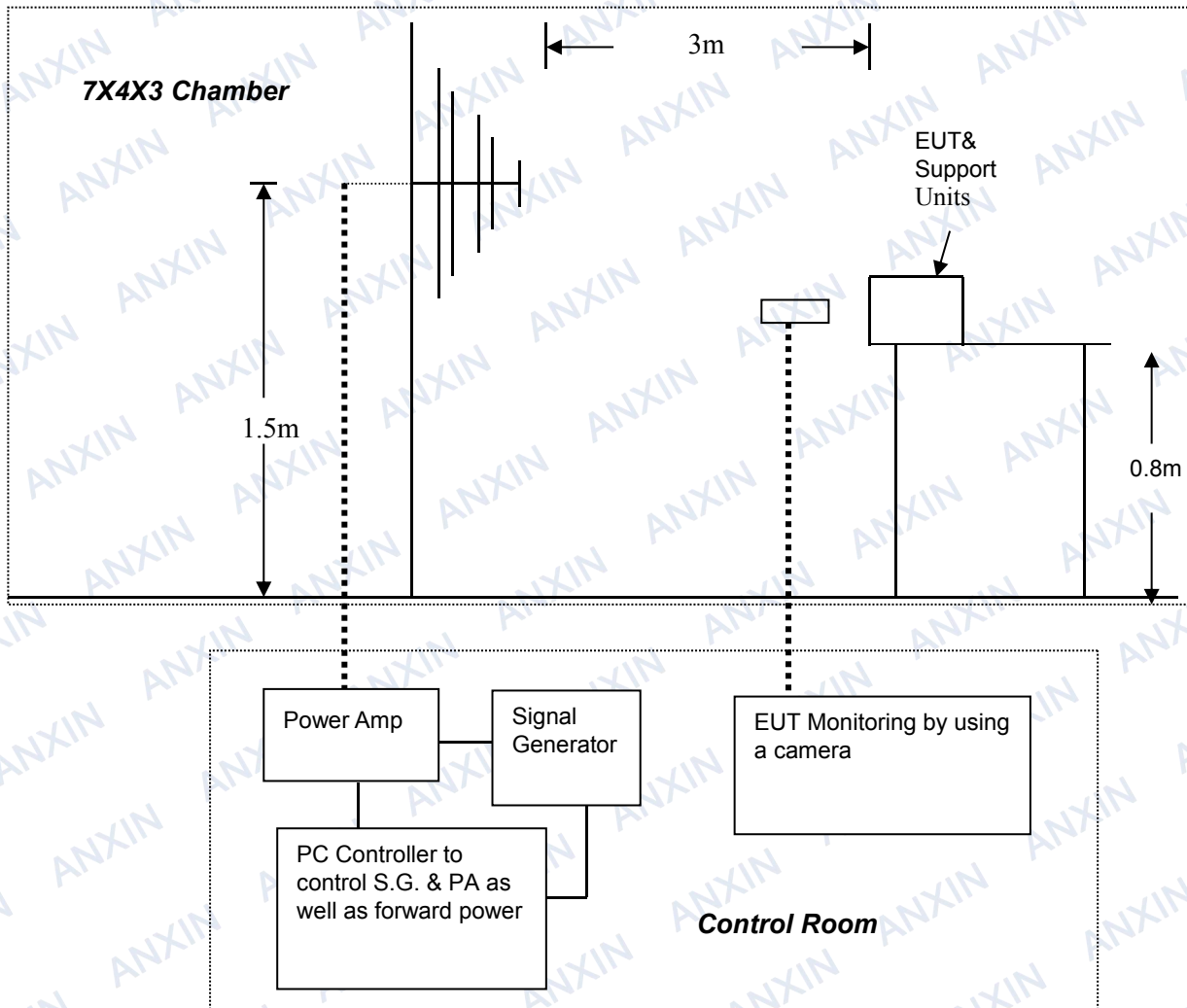
<b>Basic Standard:</b>	EN 61000-4-3
<b>Frequency Range:</b>	80 MHz ~1000 MHz,
<b>Field Strength:</b>	3 V/m
<b>Modulation:</b>	1kHz Sine Wave, 80%, AM Modulation
<b>Frequency Step:</b>	1 % of preceding frequency value
<b>Polarity of Antenna:</b>	Horizontal and Vertical
<b>Test Distance:</b>	3 m
<b>Antenna Height:</b>	1.5m
<b>Performance Criterion:</b>	A

##### 6.4.1. TEST PROCEDURE

The test procedure was in accordance with EN 61000-4-3

- The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz sine-wave. The rate of sweep did not exceed  $1.5 \times 10^{-3}$  decade/s, where the frequency range is swept incrementally, the step size was 1% of preceding frequency value.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

### 6.4.2. TEST SETUP



For the actual test configuration, please refer to the related item .

**NOTE:**

**TABLETOP EQUIPMENT**

The EUT installed in a representative system as described in section 7 of EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

**FLOOR STANDING EQUIPMENT**

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

### 6.4.3. TEST RESULTS

Temperature ( °C )	22~28
Humidity ( %RH )	50~58
Barometric Pressure ( mbar )	950~1000
EUT	EV Charging Station
M/N	WPro-32-3P
Operating Mode	Normal Operation
Test Results	PASS

Frequency (MHz)	Polarity	Position	Field Strength (V/m)	Observation	Result
80 ~ 1000	V&H	Front	3	Note	PASS
80 ~ 1000	V&H	Rear	3	Note	PASS
80 ~ 1000	V&H	Left	3	Note	PASS
80 ~ 1000	V&H	Right	3	Note	PASS

**NOTE:** There was no change compared with the initial operation during the test.

### 6.5. ELECTRICAL FAST TRANSIENT (EFT)

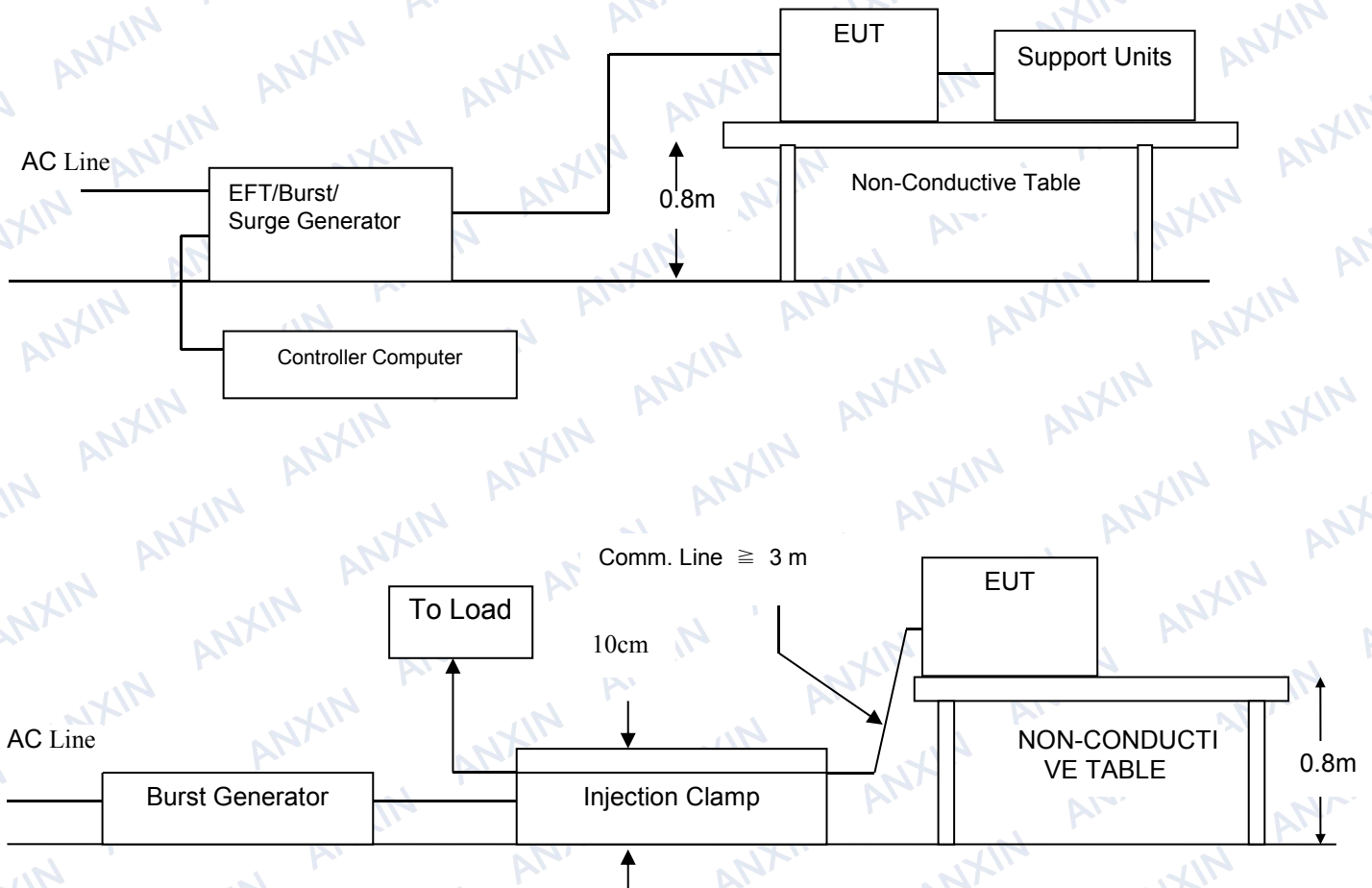
#### 6.5.1. TEST SPECIFICATION

<b>Basic Standard:</b>	EN 61000-4-4
<b>Test Voltage:</b>	Power Line: 2 kV
<b>Polarity:</b>	Positive & Negative
<b>Impulse Frequency:</b>	5 kHz
<b>Impulse Wave-shape:</b>	5/50 ns
<b>Burst Duration:</b>	15 ms
<b>Burst Period:</b>	300ms
<b>Test Duration:</b>	Not less than 1 min.
<b>Performance Criterion:</b>	B

#### 6.5.2. TEST PROCEDURE

- Both positive and negative polarity discharges were applied.
- The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 1 meter.
- The duration time of each test sequential was 1 minute.
- The transient/burst waveform was in accordance with EN 61000-4-4, 5/50ns.

### 6.5.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

**NOTE:**

TABLETOP EQUIPMENT

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

#### 6.5.4. TEST RESULTS

Temperature ( °C )	22~28
Humidity ( %RH )	50~58
Barometric Pressure ( mbar )	950~1000
EUT	EV Charging Station
M/N	WPro-32-3P
Operating Mode	Normal Operation
Test Results	PASS

Test Point	Polarity	Test Level (kV)	Performance Criterion	Observation	Result
The coupling clamp	+/-	2	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	PASS

**NOTE:** 1. There was no change compared with initial operation during the test.

2. The loss of function of the EUT during the test and it was recovered by itself operation after the test.

## 6.7. CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

### 6.7.1. TEST SPECIFICATION

<b>Basic Standard:</b>	EN 61000-4-6
<b>Frequency Range:</b>	0.15 MHz ~ 80 MHz
<b>Field Strength:</b>	3 V
<b>Modulation:</b>	1kHz Sine Wave, 80%, AM Modulation
<b>Frequency Step:</b>	1 % of preceding frequency value
<b>Coupled cable:</b>	Power Mains, Shielded
<b>Coupling device:</b>	CDN-M3/2 (3 wires)
<b>Performance Criterion:</b>	A

### 6.7.2. TEST PROCEDURE

The EUT shall be tested within its intended operating and climatic conditions.

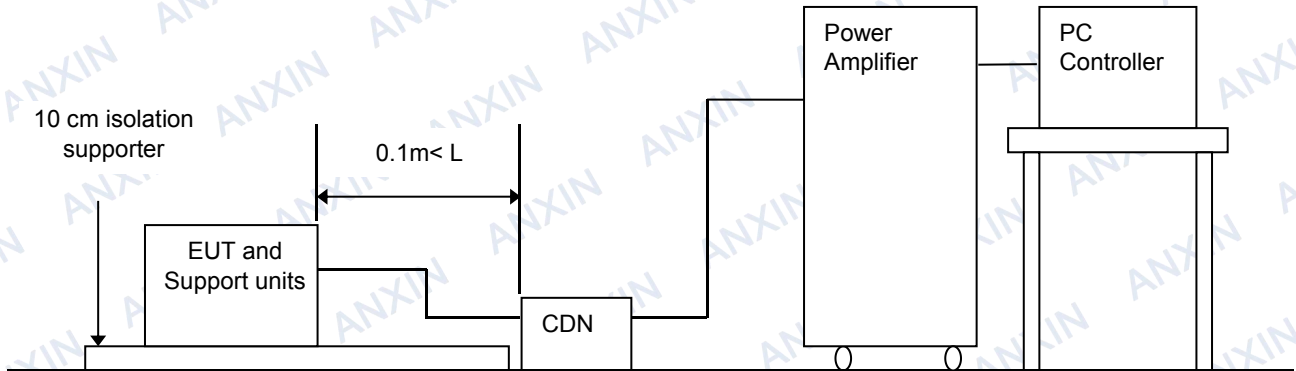
The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

The frequency range was swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal was modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate was  $1.5 \times 10^{-3}$  decades/s. Where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value from 150 kHz to 80 MHz.

The dwell time at each frequency was less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequency(ies) and harmonics or frequencies of dominant interest, was analyzed separately.

Attempts were made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

### 6.7.3. TEST SETUP



**Note:** 1. The EUT is setup 0.1m above Ground Reference Plane

2. The CDNS and / or EM clamp used for real test depends on ports and cables configuration of EUT.

For the actual test configuration, please refer to the related item.

**NOTE:**

**TABLE-TOP AND FLOOR-STANDING EQUIPMENT**

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

### 6.7.4. TEST RESULTS

Temperature ( °C )	22~28
Humidity ( %RH )	50~58
Barometric Pressure ( mbar )	950~1000
EUT	EV Charging Station
M/N	WPro-32-3P
Operating Mode	Normal Operation
Test Results	PASS

Frequency Band (MHz)	Field Strength (Vrms)	Injected Position	Injection Method	Performance Criterion	Observation	Result
0.15 ~ 80	3	AC Mains	CDN-M3	A	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
0.15 ~ 80	3	N/A			Note <input type="checkbox"/> 1 <input type="checkbox"/> 2	N/A

**NOTE:** 1. There was no change compared with initial operation during the test.

2. The loss of function of the EUT during the test and it was recovered by itself operation after the test.

## 6.8. POWER FREQUENCY MAGNETIC FIELD

### 6.8.1. TEST SPECIFICATION

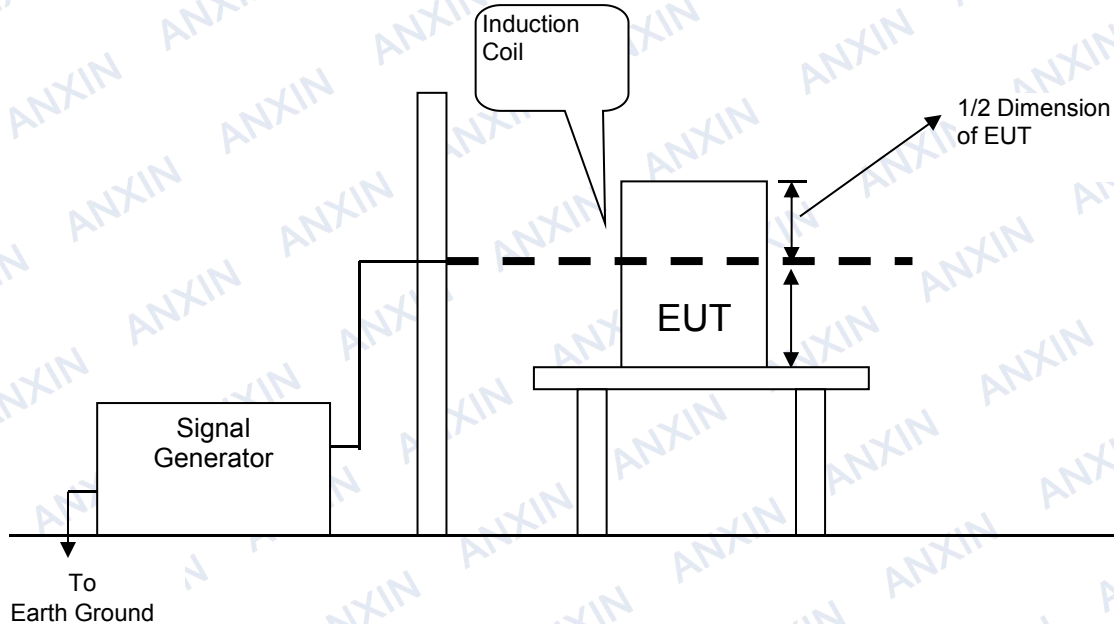
<b>Basic Standard:</b>	EN 61000-4-8
<b>Frequency Range:</b>	50Hz
<b>Field Strength:</b>	3A/m
<b>Observation Time:</b>	5 minutes
<b>Inductance Coil:</b>	Rectangular type, 1mx1m
<b>Performance criterion:</b>	N/A

### 6.8.2. TEST PROCEDURE

- The equipment is configured and connected to satisfy its functional requirements. It shall be placed on the GRP with the interposition of a 0.1m-thick insulating support.
- The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
- The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.



### 6.8.3. TEST SETUP



For the actual test configuration, please refer to the related item .

#### NOTE:

##### TABLETOP EQUIPMENT

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

##### FLOOR-STANDING EQUIPMENT

The equipment shall be subjected to the test magnetic field by using induction coils of suitable dimensions. The test shall be repeated by moving and shifting the induction coils, in order to test the whole volume of the EUT for each orthogonal direction. The test shall be repeated with the coil shifted to different positions along the side of the EUT, in steps corresponding to 50 % of the shortest side of the coil. The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

#### 6.8.4. TEST RESULTS

Temperature ( °C )	22~28
Humidity ( %RH )	50~58
Barometric Pressure ( mbar )	950~1000
EUT	EV Charging Station
M/N	WPro-32-3P
Operating Mode	Normal Operation
Test Results	PASS

DIRECTION	Field Strength (A/m)	Performance Criterion	OBSERVATION	RESULTS
X	3	A	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
Y	3	A	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
Z	3	A	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS

**NOTE:** 1. There was no change compared with initial operation during the test.  
2. The loss of function of the EUT during the test and it was recovered by itself operation after the test.

#### 6.9. VOLTAGE DIP

##### 6.9.1. TEST SPECIFICATION

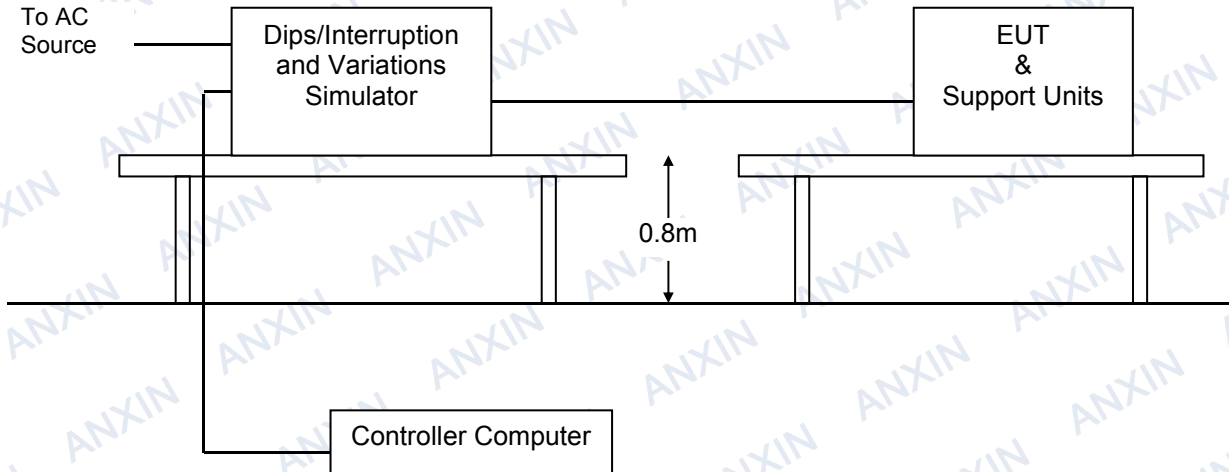
<b>Basic Standard:</b>	EN 61000-4-11
<b>Test Duration Time:</b>	Minimum three test events in sequence
<b>Interval Between Event:</b>	Minimum 10 seconds
<b>Test Cycle:</b>	3 times
<b>Performance Criterion:</b>	B,C

##### 6.9.2. TEST PROCEDURE

1. The EUT and support units were located on a wooden table, 0.8 m away from ground floor.
2. Setting the parameter of tests and then perform the test software of test simulator.
3. Conditions changes to occur at 0 degree crossover point of the voltage waveform.
4. Recording the test result in test record form.

### 6.9.3. TEST SETUP

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



### 6.9.4. TEST RESULTS

Temperature ( °C )	22~28
Humidity ( %RH )	50~58
Barometric Pressure ( mbar )	950~1000
EUT	EV Charging Station
M/N	WPro-32-3P
Operating Mode	Normal Operation
Test Results	PASS

Test Power: 380Vac, 50Hz				
Voltage (% Reduction)	Duration (Period)	Performance Criterion	Observation	Test Result
100	0.5	<input type="checkbox"/> A <input checked="" type="checkbox"/> B <input type="checkbox"/> C	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3	PASS
30	10	<input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3	PASS

- NOTE:** 1. There was no change compared with initial operation during and after the test.  
No unintentional response was found during the test.  
2. The function stopped during the test, but can be recoverable by itself operation after the test.  
3. The function stopped during the test, but can be recoverable manually after the test.

## Appendix A - EUT Photographs

Photo 1

View:

- Front
- Rear
- Right side
- Left side
- Top
- Bottom
- Internal



Photo 2

View:

- Front
- Rear
- Right side
- Left side
- Top
- Bottom
- Internal







Photo 7

View:

- Front
- Rear
- Right side
- Left side
- Top
- Bottom
- Internal



--END--