EMC Test Report

China

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Applicant: Autel New Energy Co., Ltd.
Address: Room 101, Building B2, Zhiyuan, No.1001 Xueyuan Avenue, Changyuan Community, Taoyuan Road, Nanshan District, Shenzhen, 518055,China

Product: MaxiCharger AC Wallbox
Model: see page 3

In accordance with IEC 61851-21-2, EN IEC 61851-21-2, EN 301 489-1, EN 301 489-3, EN 301 489-17, EN 301 489-52

COMMERCIAL-IN-CONFIDENCE

Report Number: 64.713.21.30849.01

RESPONSIBLE FOR	NAME	SIGNATURE	DATE
Prepared by	Matt Zhang		2021-11-05
Approved by	Wendy Ye		2021-11-05

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service control rules.

EXECUTIVE SUMMARY
A sample of this product was tested and found to be in compliance with EN 301 489-1 V2.2.3:2019, EN 301 489-3 V2.1.1:2019, EN 301 489-17 V3.2.4:2020, EN 301 489-52 V2.1.1:2019, IEC 61851-21-2:2018, EN IEC 61851-21-2:2021

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Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2021-11-05

1.2 Introduction

The information contained in this report is intended to show verification of the EMC Qualification Approval Testing of the requirements of the standards for the tests listed in Section 1.3.

Manufacturer	:	Same as applicant
Address	:	Same as applicant
Product Type	:	AC charging equipment
Model	:	Maxi C-SE AC W - XX - YY - ZZ I II III IV V I: Basic model designation: Maxi C-SE AC: Maxi C-SE AC series II: "W" donates for power, "W" can be: W7: 7.4kW W11: 11kW W22: 22kW III: "XX" donates for vehicle connection method, "XX" can be: C5: vehicle connector with 5m cable S: socket-outlet (Not for 11kW models) IV: "YY" donates for wireless function, "YY" can be: 4G: 4G function embedded Blank: Standard type V: "ZZ" donates for colour, "ZZ" can be: B: black WH: white DG: dark grey SV: silver
Date of Receipt of EUT	:	2021-10-11
Start of Test	:	2021-10-11
Finish of Test	:	2021-10-20
Name of Engineer(s)	:	Matt Zhang

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1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with EN 301 489-1, EN 301 489-3, EN 301 489-17 and EN 301 489-52 V2.1.1 is shown below.

Specification	Clause	Test Description	Result	Comments/ Base Standard
EN 301 489-1 V2.2.3 EN 301 489-3 V2.1.1 EN 301 489-17 V3.2.4 EN 301 489-52 V2.1.1	8.3 of EN 301 489-1	Conducted Disturbance at DC input/output port	N/A	---
EN 301 489-1 V2.2.3 EN 301 489-3 V2.1.1 EN 301 489-17 V3.2.4 EN 301 489-52 V2.1.1	8.4 of EN 301 489-1	Conducted Disturbance at AC input/output port	Pass	---
EN 301 489-1 V2.2.3 EN 301 489-3 V2.1.1 EN 301 489-17 V3.2.4 EN 301 489-52 V2.1.1	8.2 of EN 301 489-1	Radiated Disturbance (30MHz to 1GHz, 1GHz to 6GHz)	Pass	---
EN 301 489-1 V2.2.3 EN 301 489-3 V2.1.1 EN 301 489-17 V3.2.4 EN 301 489-52 V2.1.1	8.5 of EN 301 489-1	Harmonic current emission	Pass	--
EN 301 489-1 V2.2.3 EN 301 489-3 V2.1.1 EN 301 489-17 V3.2.4 EN 301 489-52 V2.1.1	8.6 of EN 301 489-1	Voltage fluctuations and flicker	Pass	--
EN 301 489-1 V2.2.3 EN 301 489-3 V2.1.1 EN 301 489-17 V3.2.4 EN 301 489-52 V2.1.1	9.3 of EN 301 489-1	Electrostatic discharge immunity test	Pass	--
EN 301 489-1 V2.2.3 EN 301 489-3 V2.1.1 EN 301 489-17 V3.2.4 EN 301 489-52 V2.1.1	9.4 of EN 301 489-1	Electrical fast transient /burst immunity test	Pass	--
EN 301 489-1 V2.2.3 EN 301 489-3 V2.1.1 EN 301 489-17 V3.2.4 EN 301 489-52 V2.1.1	9.2 of EN 301 489-1	Radiated, radio-frequency, electromagnetic field immunity test	Pass	--
EN 301 489-1 V2.2.3 EN 301 489-3 V2.1.1 EN 301 489-17 V3.2.4 EN 301 489-52 V2.1.1	9.8 of EN 301 489-1	Surge immunity test	Pass	--
EN 301 489-1 V2.2.3 EN 301 489-3 V2.1.1 EN 301 489-17 V3.2.4 EN 301 489-52 V2.1.1	9.7 of EN 301 489-1	Voltage dips, short interruptions and voltage variations immunity tests	Pass	--

Remarks: for communication mode only.

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1.4 Test Conditions

1.4.1 Environmental Conditions

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:		
Temperature	**Humidity**	**Atmospheric pressure**
15 °C – 35 °C	30 % - 60 %	860 hPa – 1060 hPa
If explicitly required in the basic standard or applied product standard the climatic values are recorded and documented separately in this test report.		

1.4.2 Performance Criteria

Clause 6 of EN 301 489-1		
Criteria	**Performance Criteria**	
CT/CR	During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended.	
TT/TR	After the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer, when the apparatus is used as intended.	
Clause 6 of EN 301 489-3 & EN 301 489-17 & EN 301 489-52		
Criteria	**During test**	**After test**
A	Shall operate as intended. Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function No unintentional responses	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of stored data or user programmable functions.

1.5 Product Information and general remarks

1.5.1 Technical Description

	Transmitter and Receiver
Power supply	AC 400V 50Hz
Frequency	880MHz ~ 915MHz,925 MHz~960 MHz (FOR GSM900), 1710MHz ~ 1785MHz,1805 MHz~1880 MHz (FOR DCS1800), 1920MHz ~ 1980MHz,2110 MHz~2170 MHz (FOR WCDMA B1) , 880MHz ~ 915MHz,925 MHz~960 MHz(FOR WCDMA B8) , 1920MHz ~ 1980MHz,2110 MHz~2170 MHz (FOR LTE Band1), 1710 MHz ~ 1785MHz,1805 MHz~1880 MHz (FOR LTE Band3), 2500MHz ~ 2570MHz,2620 MHz~2690 MHz (FOR LTE Band7), 880MHz ~ 915MHz,925 MHz~960 MHz (FOR LTE Band8),

	832MHz ~ 862MHz,791 MHz~821 MHz (FOR LTE Band20), 2570MHz ~ 2620MHz (FOR LTE Band38), 2300MHz ~ 2400MHz (FOR LTE Band40), 2496 MHz~2690MHz (FOR LTE Band41)
Protection class	I
Power wire	Unshielded
Interconnecting wires	NONE
Alternative power levels	NONE
External RF connector	NONE

1.5.2 Modes of Operation

The basic operation modes are:

Mode1	GSM900
Mode2	DCS1800
Mode3	WCDMA Band 1
Mode4	WCDMA Band 8
Mode5	TD-LTE Band 38
Mode6	TD-LTE Band 40
Mode7	TD-LTE Band 41
Mode8	FDD LTE Band 1
Mode9	FDD LTE Band 3
Mode10	FDD LTE Band 7
Mode11	FDD LTE Band 8
Mode12	FDD LTE Band 20
Mode13	GSM900 Idle
Mode14	DCS1800 Idle
Mode15	WCDMA Idle
Mode16	LTE Idle

1.5.3 General remark:

This report is based on report No.: 64.713.21.30159.01
This time a 4G LTE module is added to each model, “-4G” was added to each model name accordingly, so model Maxi EU AC W22-C5-4G-DG was selected for full tests with communication mode only.

1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.7 Test Location

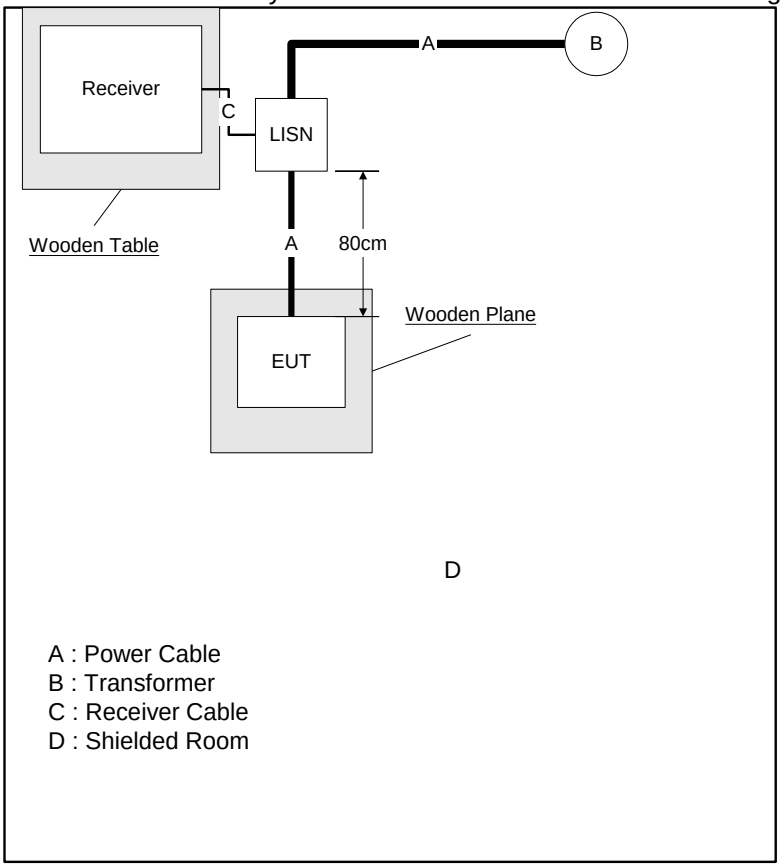
Test Site:
CVC Testing Technology Co., Ltd.
Add.: No.3, Tiantaiyi Road, Kaitai Avenue, Science City, Guangzhou, 510663, P. R. China

2 Test Details

2.1 Conducted Disturbance

2.1.1 Test Method

The EUT was placed on a 0.8 m non-conductive table for table-top equipment and on a 0.12 m insulated support for floor standing equipment above a ground reference plane all within a test laboratory.
All power was connected to the EUT through an Artificial Mains Network (AMN). Conducted disturbance voltage measurements on mains lines were made at the output of the AMN. The AMN was placed 0.8m from the boundary of the EUT and bonded to the reference ground plane.



2.1.2 Specification Limits

For EN 301 489-1, EN 301 489-3, EN 301 489-17 and EN 301 489-52

EN 55032:2015, table A.10 – requirements for conducted emissions from the AC mains power ports of Class B equipment			
Frequency range	Limits dB(μV)[a]		Method
	Quasi-peak	Average	AMN
150kHz to 500kHz	66 to 56	56 to 46	
500kHz to 5MHz	56	46	
5MHz to 30MHz	60	50	

EN 55032:2015, table A.9 – requirements for conducted emissions from the AC mains power ports of Class A equipment			
Frequency range	Limits dB(μV)[a]		Method
	Quasi-peak	Average	AMN
150kHz to 500kHz	79	66	
500kHz to 30MHz	73	60	

Remark for test data:
*Level=Reading Level + Correction Factor
**Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

2.1.3 Test Setup

2.1.4 Test Location

This test was carried out in shielded room.

2.1.5 Test Results

Test Conditions :

Power Supply : 400 V / 50 Hz ;

Operating Mode of the EUT : Mode 1~Mode 12.

Power line L1:

Conducted emission					
Freq. (MHz)	QP Level (dBμV)	QP Limits (dBμV)	Freq. (MHz)	AV Level (dBμV)	AV Limits (dBμV)
0.6788	38.75	56.00	0.4133	30.85	47.58
0.2918	35.45	60.47	0.5843	28.56	46.00
0.1950	44.47	63.82	0.3098	25.27	49.98

Power line L2:

Conducted emission					
Freq. (MHz)	QP Level (dBμV)	QP Limits (dBμV)	Freq. (MHz)	AV Level (dBμV)	AV Limits (dBμV)
0.3165	13.64	59.80	0.5843	8.44	46.00
0.8858	15.61	56.00	2.2245	8.27	46.00
1.8375	13.03	56.00	0.8858	9.74	46.00

Power line L3:

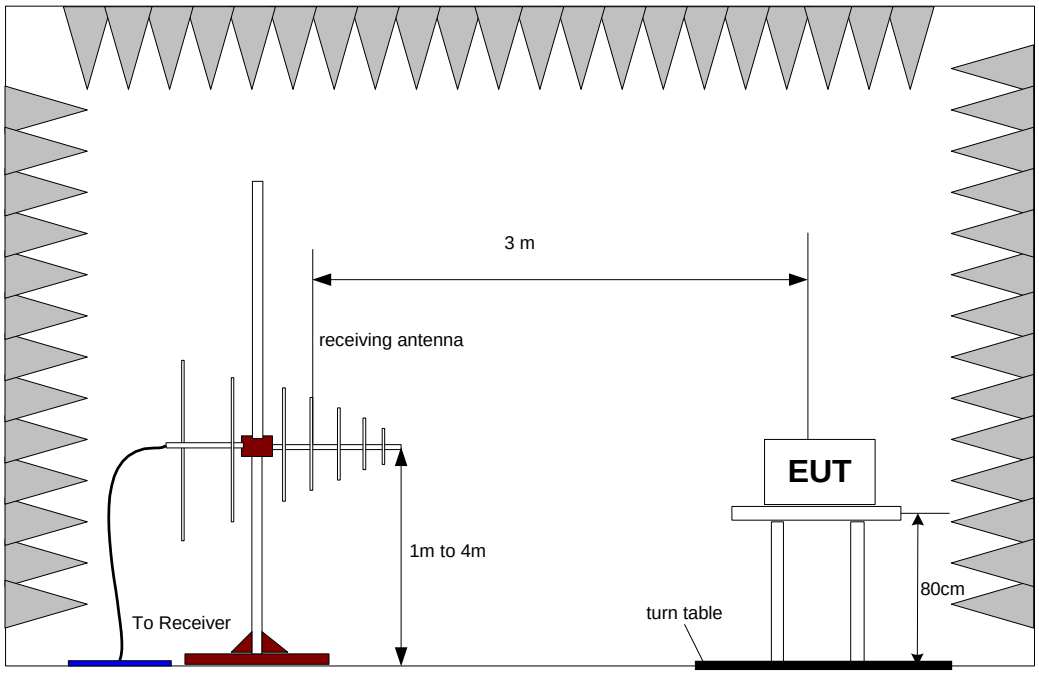
Conducted emission					
Freq. (MHz)	QP Level (dBμV)	QP Limits (dBμV)	Freq. (MHz)	AV Level (dBμV)	AV Limits (dBμV)
0.3165	15.79	59.80	0.9533	13.13	46.00
2.2245	13.78	56.00	6.7628	11.78	50.00
6.7628	20.57	60.00	1.5878	12.62	46.00

Note: Only the worst plots were recorded in this report.

2.2 Radiated Disturbance

2.2.1 Test Method

The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable and placed on a non-conductive. Guidance on how to arrange the EUT during the measurements can be found in 5.3.4.3.
Table-top EUT shall be placed at (0,8 ± 0,05) m above the reference plane of the test site selected for measurement.
Floor standing EUT shall be placed at (0,12 ± 0,04) m above the reference plane of the test site selected for measurement.
Where the EUT comprises multiple parts, these shall be arranged to minimise, as far as it is reasonably practical, the test volume. A minimum distance of 0,1 m shall be maintained between these parts.
A prescan of the EUT emissions profile was made while varying the antenna-to-EUT azimuth and antenna-to-EUT polarization using a peak detector; measurements were taken at a 3m or 10m distance. Using the prescan list of the highest emissions detected, their bearing and associated antenna polarization, the EUT was then formally measured using a Quasi-Peak detector. The readings were maximized by adjusting the antenna height, polarization and turntable azimuth, in accordance with the specification.



2.2.2 Specification Limits

Radiated disturbance limits in the frequency range 30MHz to 1000MHz at a measuring distance of 3 m for Class B		
Frequency range MHz	Quasi-peak limits dB(μV/m)	
30 to 230	40	
230 to 1000	47	
Radiated disturbance limits in the frequency range 1000MHz to 6000MHz at a measuring distance of 3 m for Class B		
Frequency range MHz	Peak limits dB(μV/m)	Average dB(μV/m)
1000 to 3000	70	50
3000 to 6000	74	54

Radiated disturbance limits in the frequency range 30MHz to 1000MHz at a measuring distance of 10 m for Class B		
Frequency range MHz	Quasi-peak limits dB(μV/m)	
30 to 230	30	
230 to 1000	37	
Radiated disturbance limits in the frequency range 1000MHz to 6000MHz at a measuring distance of 3 m for Class B		
Frequency range MHz	Peak limits dB(μV/m)	Average dB(μV/m)
1000 to 3000	60	40
3000 to 6000	64	44

Radiated disturbance limits in the frequency range 30MHz to 1000MHz at a measuring distance of 3 m for Class A		
Frequency range MHz	Quasi-peak limits dB(μV/m)	
30 to 230	50	
230 to 1000	57	
Radiated disturbance limits in the frequency range 1000MHz to 6000MHz at a measuring distance of 3 m for Class A		
Frequency range MHz	Peak limits dB(μV/m)	Average dB(μV/m)
1000 to 3000	76	56
3000 to 6000	80	60

Radiated disturbance limits in the frequency range 30MHz to 1000MHz at a measuring distance of 10 m for Class A	
Frequency range MHz	Quasi-peak limits dB(μV/m)
30 to 230	40

Radiated disturbance limits in the frequency range 30MHz to 1000MHz at a measuring distance of 10 m for Class A	
230 to 1000	47

Radiated disturbance limits in the frequency range 1000MHz to 6000MHz at a measuring distance of 3 m for Class A		
Frequency range MHz	Peak limits dB(μV/m)	Average dB(μV/m)
1000 to 3000	66	46
3000 to 6000	70	50

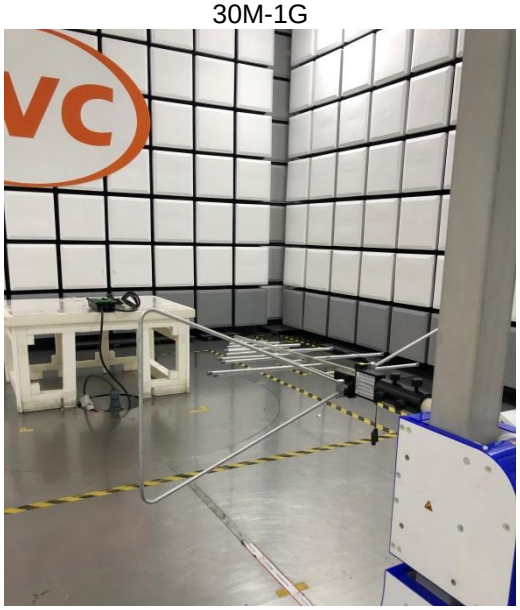
Remark：
Level=Reading Level + Correction Factor
Correction Factor=Antenna Factor + Cable Loss
(The Reading Level is recorded by software which is not shown in the sheet)

Table 15 – Required highest frequency for radiated measurement

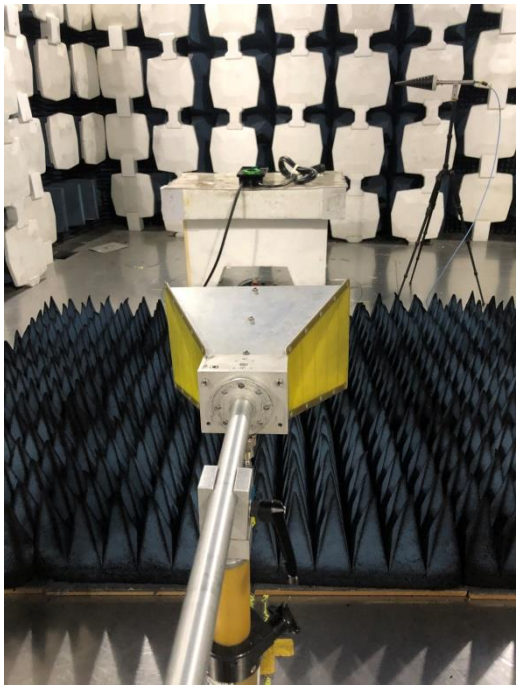
Highest internal frequency (F_x)	Highest measured frequency
$F_x \leq 108$ MHz	1 GHz
108 MHz < $F_x \leq 500$ MHz	2 GHz
500 MHz < $F_x \leq 1$ GHz	5 GHz
$F_x > 1$ GHz	5 x F_x up to a maximum of 6 GHz

2.2.3 Test Setup

30M-1G



1G-6G



2.2.4 Test Location

This test was carried out in 3m SAC Test Location.

2.2.5 Test Results

Test Conditions:
Power Supply : 400V / 50 Hz ;
Operating Mode of the EUT : Mode 1~Mode 12.

30MHz – 1000MHz

Radiated emission			
Freq. (MHz)	Direction of antenna	QP Level (dB μ V/m)	QP Limits (dB μ V/m)
31.0671	H	29.08	40.00
130.3080	H	34.39	40.00
276.2106	H	35.99	47.00
35.8206	V	25.97	40.00
78.7959	V	26.18	40.00
133.4123	V	23.36	40.00

1000MHz – 6000MHz

Radiation emission					
Freq. (MHz)	Antenna Polarity (V/H)	PK Level (dBμV)	PK Limits (dBμV)	AV Level (dBμV)	AV Limits (dBμV)
3191.7192	H	42.29	74.00	/	/
2707.6708	H	46.34	70.00	/	/
1805.0805	H	51.98	70.00	/	/
1805.0805	H	/	/	31.06	50.00
2707.6708	H	/	/	32.44	50.00
2393.1393	H	/	/	26.49	50.00
1804.5805	V	51.45	70.00	/	/
2401.1401	V	40.30	70.00	/	/
2707.1707	V	46.24	70.00	/	/
1805.5806	V	/	/	30.39	50.00
2707.6708	V	/	/	37.53	50.00
2329.6330	V	/	/	26.63	50.00

Note: Only the worst plots were recorded in this report.

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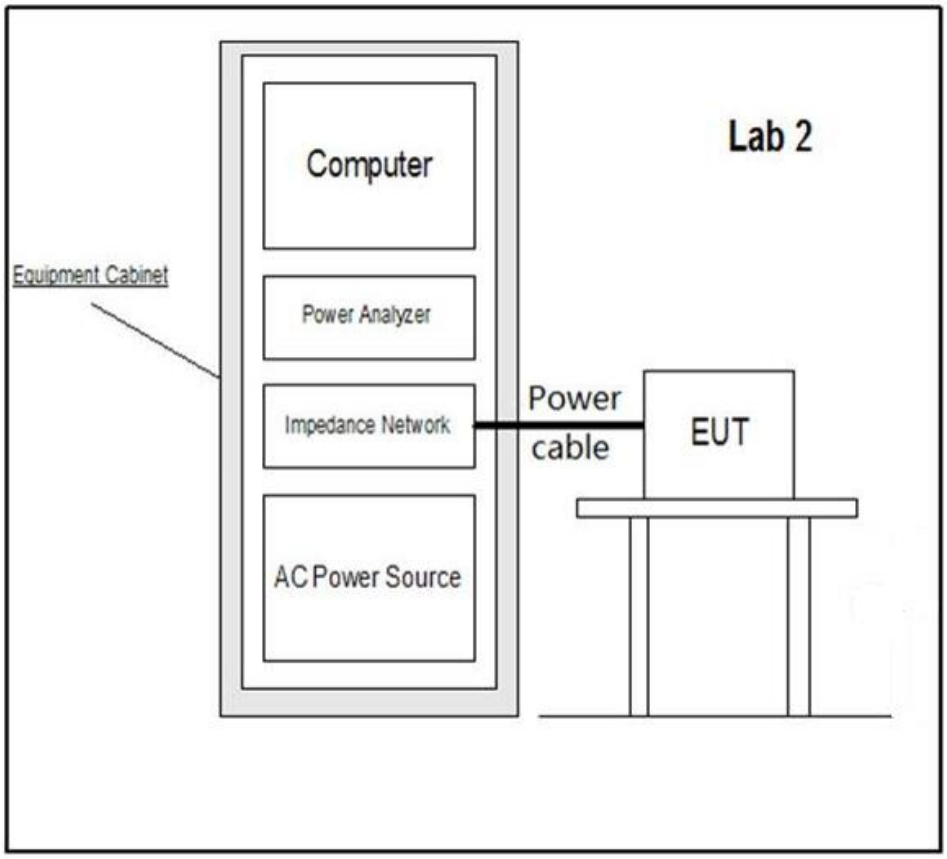
2.3 Harmonic current emission

2.3.1 Test Method

Harmonic current test should be conducted with the user's operation control or automatic programs set to the mode expected to produce the maximum total harmonic current under normal operating conditions.
Specific test conditions for the measurement of harmonic currents associated with some types of equipment are given in test equipment list.



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2.3.2 Specification Limits

Table 2 – Current emission limits for equipment other than balanced three-phase equipment

Minimum R_{sce}	Admissible individual harmonic current I_h/I_{ref} [a] %						Admissible harmonic parameters %	
	I_3	I_5	I_7	I_9	I_{11}	I_{13}	THC/I_{ref}	$PWHC/I_{ref}$
33	21,6	10,7	7,2	3,8	3,1	2	23	23
66	24	13	8	5	4	3	26	26
120	27	15	10	6	5	4	30	30
250	35	20	13	9	8	6	40	40
≥350	41	24	15	12	10	8	47	47
The relative values of even harmonics up to order 12 shall not exceed 16/h %. Even harmonics above order 12 are taken into account in THC and $PWHC$ in the same way as odd order harmonics. Linear interpolation between successive R_{sce} values is permitted.								
[a] I_{ref} = reference current; I_h = harmonic current component.								

2.3.3 Test Setup

N/A

2.3.4 Test Location

This test was carried out in Harmonic Flicker Test area.

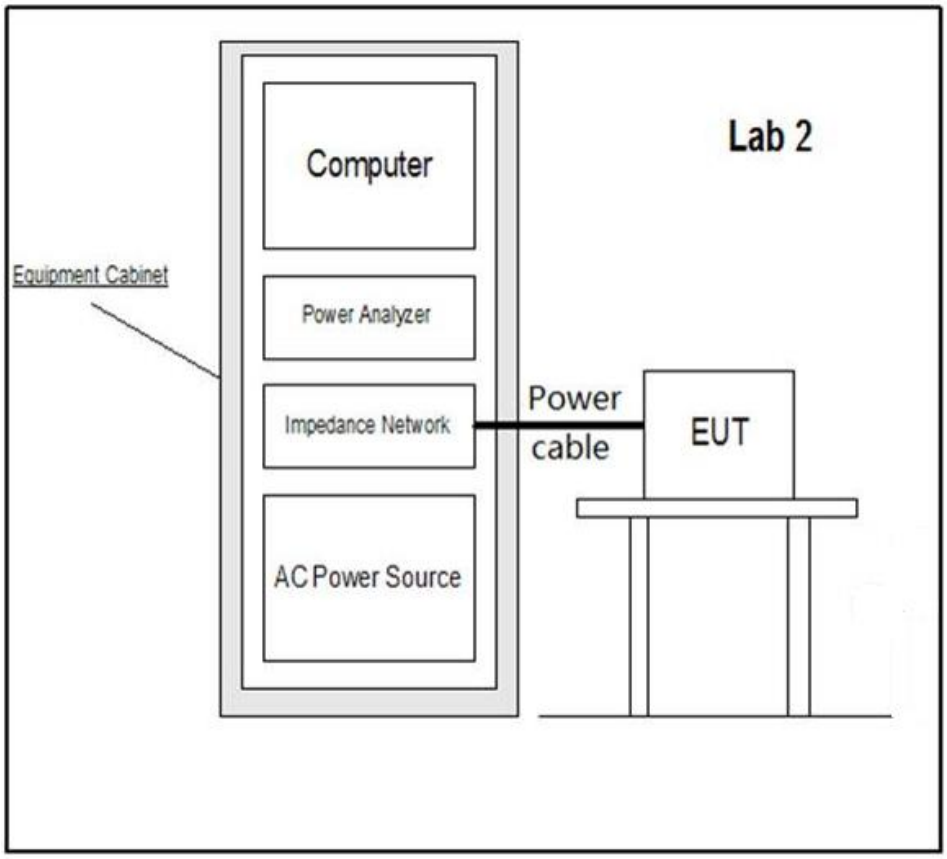
2.3.5 Test Results

N/A (the input power is less than 75W for communication mode)

2.4 Flicker

2.4.1 Test Method

Flicker test should be conducted with the user's operation controls or automatic programs set to the mode expected to produce the most unfavourable sequence of voltage change, using only those combinations of controls and programmes which are mentioned by the manufacturer in the instruction manual, or are otherwise likely to be used.



2.4.2 Specification Limits

The value of *P*st shall not be greater than 1.0
The value of *P*lt shall not be greater than 0.65
*T*max, the accumulated time value of *d*(t) with a deviation exceeding 3.3% during a single voltage change at the EUT terminals, shall not exceed 500ms
The maximum relative steady-state voltage change, *d*c, 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 start, or manual restart, after a power supply interruption

c) 7% for equipment which is:

- Attended whilst in use, 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 or manual restart, after a power supply interruption

2.4.3 Test Setup

N/A

2.4.4 Test Location

This test was carried out in Harmonic Flicker Test area.

2.4.5 Test Results

N/A (it is not likely to produce flicker with communication mode)

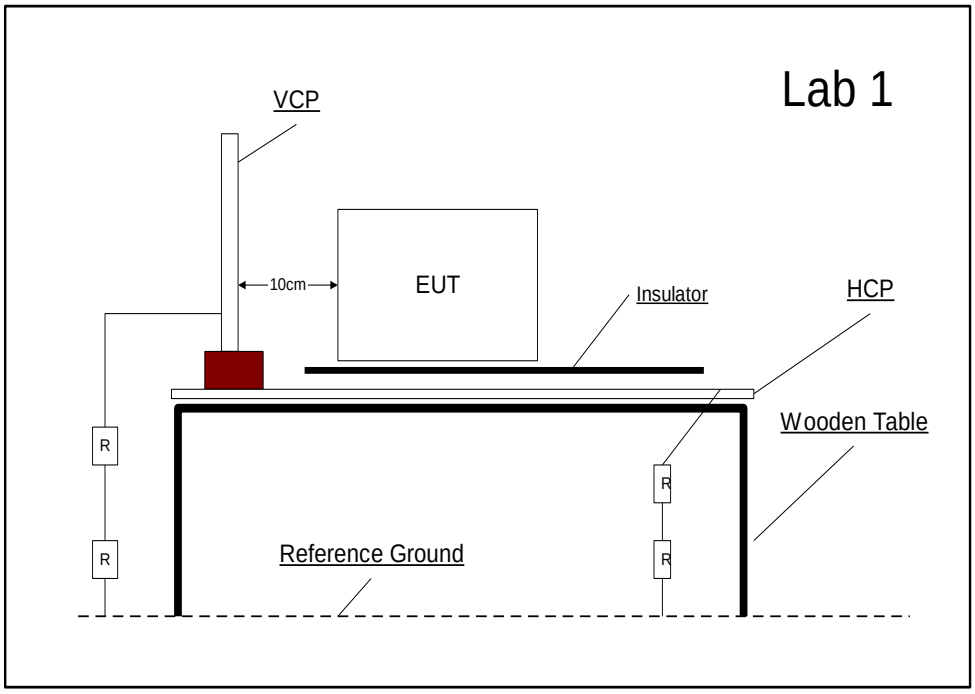
2.5 Electrostatic discharge immunity test

2.5.1 Test Method

The equipment under test including associated cabling was configured on but insulated from, using a 0.5mm isolator, a horizontal coupling plane fitted to the top of a 0.8m non-conductive table for table-top equipment; and on a 0.1m insulated support for floor standing equipment; above a ground reference plane all within a test laboratory.

Using the air discharge method for non-metallic parts, contact discharge method for metallic parts with both vertical and horizontal couple plane discharge methods for the sides of the equipment under test, the required electrostatic discharge voltage levels in both voltage polarities were applied at the detailed pulse repartition rate.

During this testing any anomalies in the equipment under tests performance was recorded.



2.5.2 Specification Limits

Required Test Levels				Performance Criteria
Discharge type	Discharge Level (kV)		Number of discharges per location (each polarity)	
	Positive	Negative		
Air – Direct	8	8	10	B
Contact – Direct	4	4	10	B
Contact – Indirect	4	4	10	B

2.5.3 Test Setup and Teat point

X: Contact Discharge, applied to any accessible metal part, figure for illustrating only
O: Air Dischage, applied to any accesible non-metal part, figure for illustrating only

Test point

2.5.4 Test Location

This test was carried out in ESD room.

2.5.5 Test Results

Results for Configuration and Mode: AC power/Mode 1~16

Performance assessment of the EUT made during this test: Pass

Detailed results are shown below.

Test date: 2021-10-11 to 2021-10-20

Test Point	Discharge	Results: Met Performance Criteria									
		2kV		4kV		6kV		8kV		15kV	
		+	-	+	-	+	-	+	-	+	-
HCP	Contact	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VCP	Contact	N/A	N/A	A	A	N/A	N/A	N/A	N/A	N/A	N/A
Each conductive location touchable by hand	Contact	N/A	N/A	A	A	N/A	N/A	N/A	N/A	N/A	N/A
Each nonconductive location touchable by hand	Air	N/A	N/A	N/A	N/A	N/A	N/A	A	A	N/A	N/A
N/A	Not Appliance										

Remark: The results met the requirement of EN 301 489-1, EN 301 489-3, EN 301 489-17 and EN 301 489-52

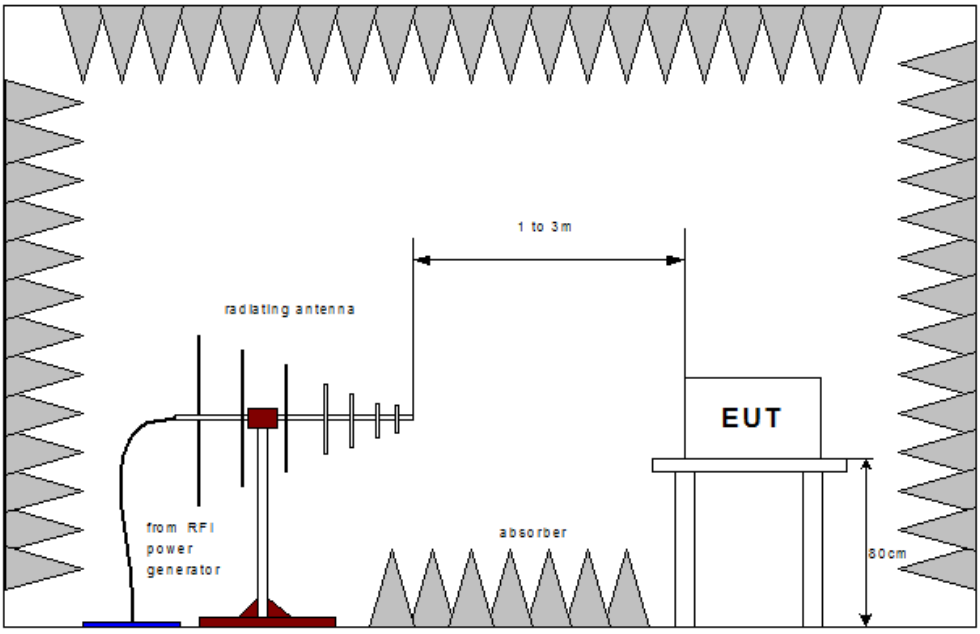
2.6 Radiated, radio-frequency, electromagnetic field immunity test

2.6.1 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.12 m insulated support for floor standing equipment; with a pre-calibrated semi anechoic chamber.

All four side of the equipment under test were subjected to the required RF field strength, modulated as described, swept over the frequency range of test with the antenna positioned in both horizontal and vertical polarizations.

During this testing any anomalies in the equipment under tests performance was recorded.

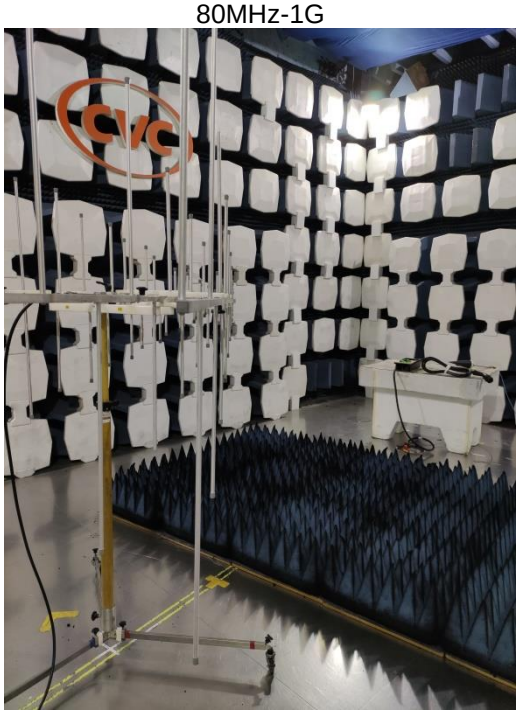


2.6.2 Specification Limits

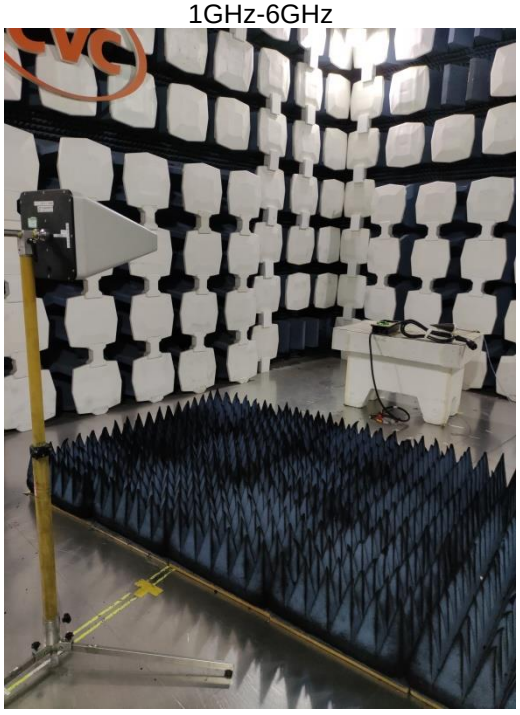
Required Test Levels					Performance Criteria
Frequency Range (MHz)	Level (V/m)	Modulation	Step Size (%)	Dwell (s)	
80 to 6000	3	AM (80 %,1 kHz, sine wave)	1	1	A
Note 1. EUT powered at one of the Nominal input voltages and frequencies					

2.6.3 Test Setup

80MHz-1G



1GHz-6GHz



2.6.4 Test Location

This test was carried out in RS Test Location.

2.6.5 Test Results

Results for Configuration and Mode: AC power/Mode 1~16

Performance assessment of the EUT made during this test: Pass

Detailed results are shown below.

Test date: 2021-10-11 to 2021-10-20

Tabulated Results for RF Electromagnetic Field 80 - 6000 MHz					
Side of the equipment under test	Antenna polarization	Test Level	Dwell Time	Measuring distance	Results
Front, Left, Right, Back sides	Horizontal	3 V/m 80 to 6000MHz	1 s	3 m	A
Front, Left, Right, Back sides	Vertical	3 V/m 80 to 6000MHz	1 s	3 m	A

Remark: The results met the requirement of EN 301 489-1, EN 301 489-3, EN 301 489-17 and EN 301 489-52

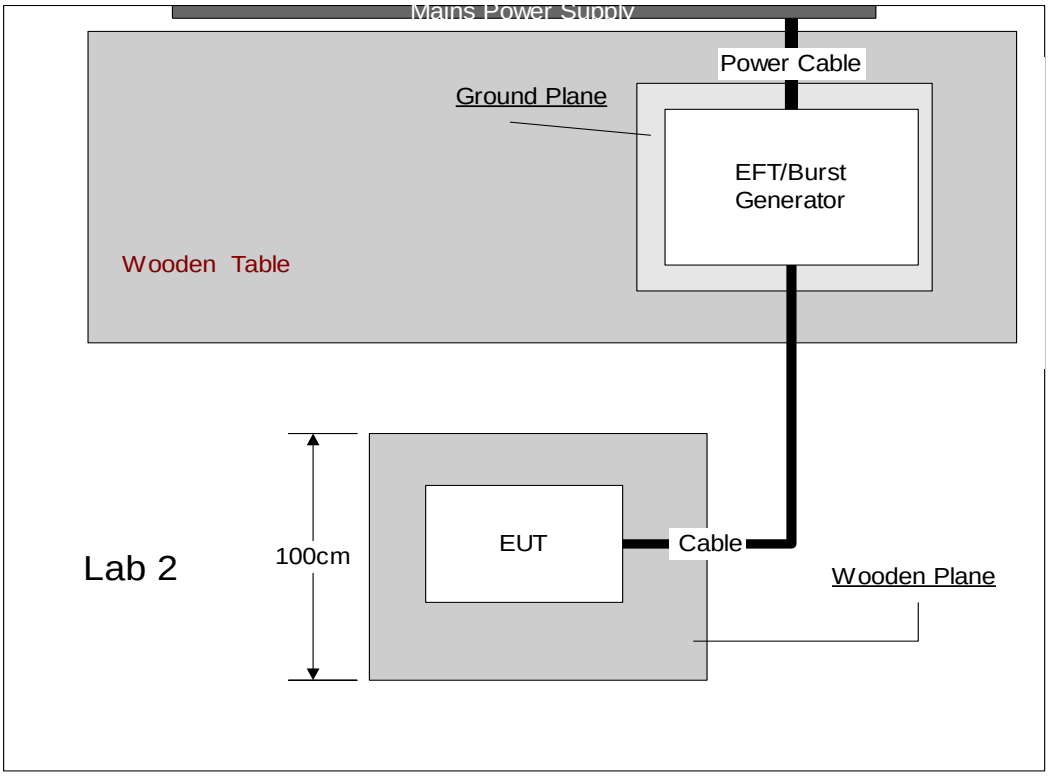
2.7 Electrical fast transient /burst immunity test

2.7.1 Test Method

The equipment under test including associated cabling was configured on but insulated from, using a 0.1 m isolator, a horizontal coupling plane fitted to the top of a 0.8 m non-conductive table for table-top equipment; and on a 0.1 m insulated support for floor standing equipment; above a ground reference plane all within a test laboratory.

Using a CDN for power ports, capacitive coupling clamp for signal and control ports and a 33nF coupling capacitor for earth ports, the required fast transient burst voltage levels in both voltage polarities were applied at the detailed pulse repartition rate and duration of test.

During this testing any anomalies in the equipment under tests performance was recorded.



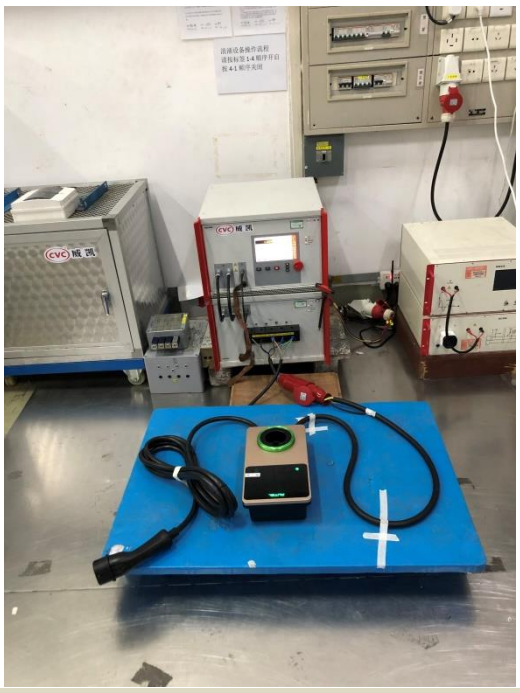
2.7.2 Specification Limits

Required Test Levels Input and output a.c. power ports					
Line Under Test	Level (kV)	Repetition Rate (kHz)	Test Duration	Coupling Method	Performance Criteria
Input and output a.c. power ports	± 2.0	5 kHz	2 min per polarity	Direct	B
For extra low voltage a.c. ports and output a.c. ports, this testing is only applicable to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.					

Required Test Levels ports for CPT					
Line Under Test	Level (kV)	Repetition Rate (kHz)	Test Duration	Coupling Method	Performance Criteria
Signal and control lines	± 2.0	5 kHz	2 min per polarity	CDN	B
Tests are not required if the power input and output are directly connected in charge mode using a mechanical switching device.					

Required Test Levels ports for signal and control lines					
Line Under Test	Level (kV)	Repetition Rate (kHz)	Test Duration	Coupling Method	Performance Criteria
Signal and control lines	± 1.0	5 kHz	2 min per polarity	CDN	B
Applicable only to ports interfacing with cables whose total length can exceed 3m according to the manufacturer’s function specification.					

2.7.3 Test Setup



2.7.4 Test Location

This test was carried out in EMS Test Location.

2.7.5 Test Results

Results for Configuration and Mode: AC power/Mode 1~16

Performance assessment of the EUT made during this test: Pass

Detailed results are shown below.

Test date: 2021-10-11 to 2021-10-20

Tabulated Results for Fast Transient Burst Immunity					
Line under test	Test Level (V/m)	Repetition Rate	Test Duration	Coupling Method	Result
Input a.c. power ports	± 2.0 kV	5 kHz	2 min	Direct	A
CPT	± 2.0 kV	5 kHz	2 min	CDN	A
Signal port	± 1.0 kV	5 kHz	2 min	CDN	A

Remark: The results met the requirement of EN 301 489-1, EN 301 489-3, EN 301 489-17 and EN 301 489-52

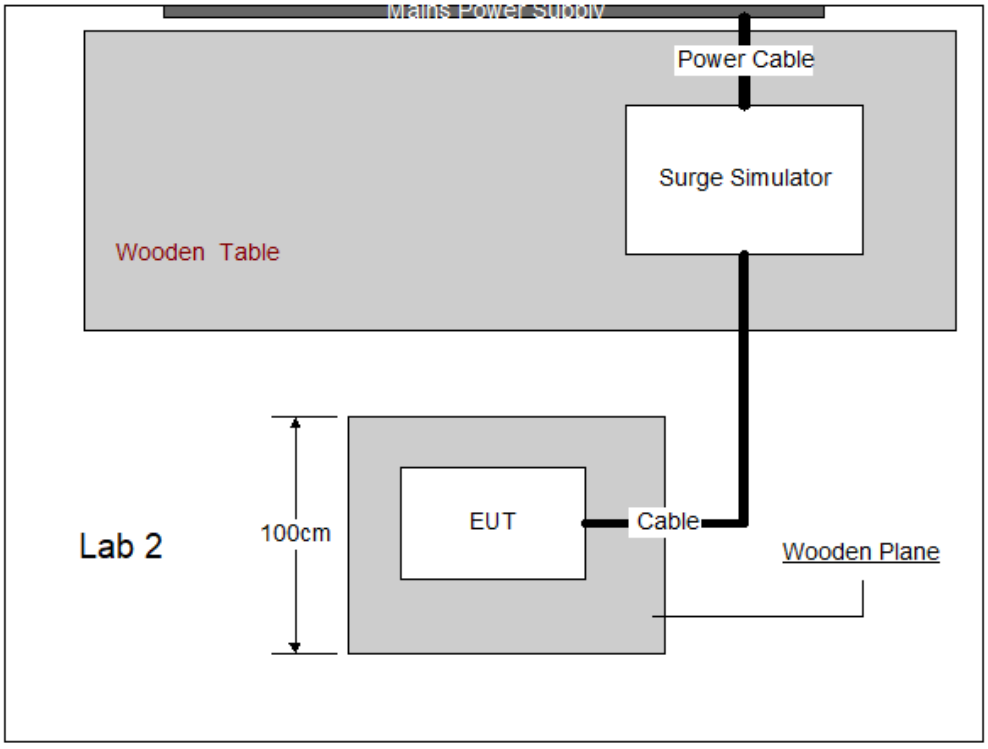
2.8 Surge immunity test

2.8.1 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment above a ground reference plane all within a test laboratory.

Using CDNs for power ports and appropriate coupling methods for applicable signal and control ports, the required number of surges was applied for each surge voltage level using both positive and negative surge voltage polarities. Surges were applied at the power line frequency phase angles and repartition rates detailed.

During this testing any anomalies in the equipment under tests performance was recorded.

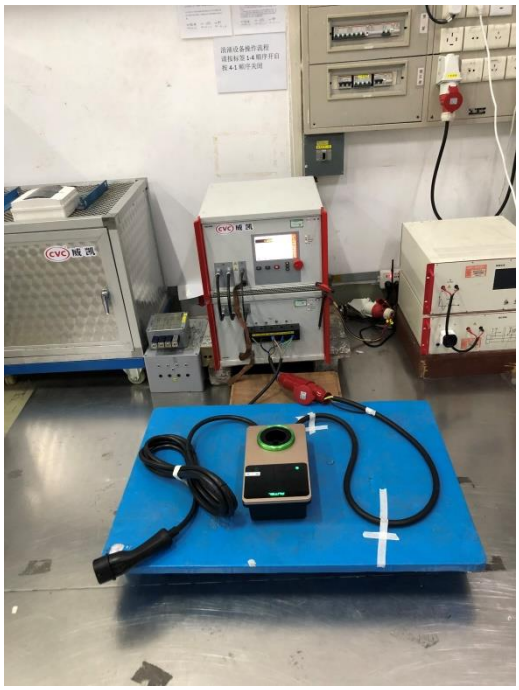


2.8.2 Specification Limits

Required Test Levels a.c.Input and CPT ports			Performance Criteria
Line Under Test	Characteristics	Test Levels	
line to line with line to earth with	Wave-shape data 2Ω impedance 12Ω impedance	1.2/50 μs ± 1.0 kV ±2.0 kV	B
Note in addition to the specified test level, all lower levels as detailed in IEC 61000-4-5 should also be satisfied. For CPT ports: Applicable only to ports interfacing with cables whose total length according to the manufacturer's functional specification is greater than 30 m.			

Required Test Levels Ports for signal lines and control lines			Performance Criteria
Line Under Test	Characteristics	Test Levels	
line to earth with	Wave-shape data 42Ω impedance	1.2/50 μs ± 1.0 kV	B
Applicable only to ports interfacing with long distance lines(>30m). Where the normal functioning cannot be achieved because of the impact of the coupling/decoupling network (CDN) on the EUT, the test shall be done with the reduced functionality. A rationale shall be given in the test report for doing so. After the test and the removal of the CDN, the normal function shall not be affected.			

2.8.3 Test Setup



2.8.4 Test Location

This test was carried out in EMS Test Location.

2.8.5 Test Results

Results for Configuration and Mode: AC power/Mode 1~16

Performance assessment of the EUT made during this test: Pass

Detailed results are shown below.

Test date: 2021-10-11 to 2021-10-20

Tabulated Results for Surge Immunity (a.c.Power Ports)							
Line Name	Coupling	Level	Polarity	Phase Angle	No of Pulses	Repetition Rate	Result
Power line	Live to Neutral	1.0kV	NEGATIVE	0, 90, 180,270	5	60 sec	A
Power line	Live to Neutral	1.0kV	POSITIVE	0, 90, 180,270	5	60 sec	A
Power line	Live to Earth	2.0kV	NEGATIVE	0, 90, 180,270	5	60 sec	A
Power line	Live to Earth	2.0kV	POSITIVE	0, 90, 180,270	5	60 sec	A
Power line	Neutral to Earth	2.0kV	NEGATIVE	0, 90, 180,270	5	60 sec	A
Power line	Neutral to Earth	2.0kV	POSITIVE	0, 90, 180,270	5	60 sec	A

Remark: The results met the requirement of EN 301 489-1, EN 301 489-3, EN 301 489-17 and EN 301 489-52

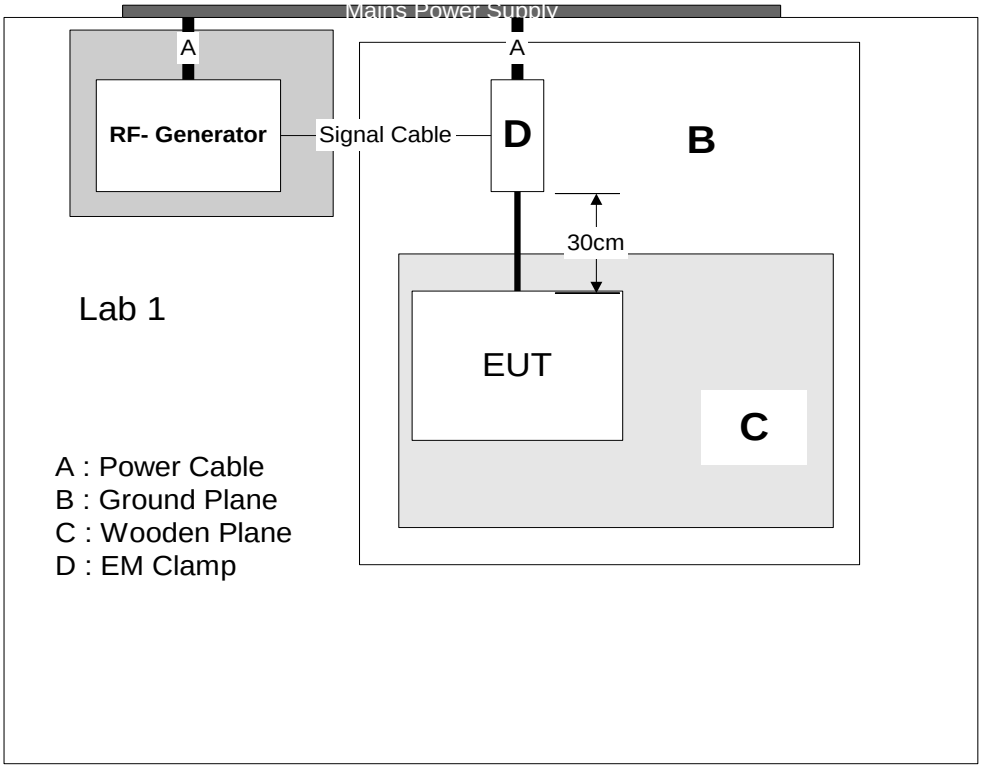
2.9 Immunity to conducted disturbances, induced by radio-frequency fields

2.9.1 Test Method

The equipment under test was configured, on but insulated from, using a 0.1 m isolator, a horizontal coupling plane fitted to the top of a 0.1 m non-conductive table for table-top equipment, above a ground reference plane all within a test laboratory.

All associated cabling was configured, on but insulated from, using a 50 mm isolator, the same horizontal coupling plane as the equipment under test.

Using CDNs, EM Clamps or current clamps as appropriate, the power ports and applicable signal and control ports were subjected to the required, pre calibrated RF injected signal strength, modulated as described, swept over the frequency range of test.
During this testing any anomalies in the equipment under tests performance was recorded.



2.9.2 Specification Limits

Required Test Levels Input and output a.c. power ports						Performance Criteria
Line Under Test	Frequency Range (MHz)	Level (V/m)	Modulation	Step Size (%)	Dwell (s)	
Input and output a.c. power ports	0.15 to 80	3	AM (80 %,1 kHz, sine wave)	1	1	A
For extra low voltage a.c ports and output a.c. ports, this testing is only applicable to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.						

Required Test Levels Ports for CPT						Performance Criteria
Line Under Test	Frequency Range (MHz)	Level (V/m)	Modulation	Step Size (%)	Dwell (s)	
Signal and control port	0.15 to 80	10	AM (80 %,1 kHz, sine wave)	1	1	A
Tested using the EM coupling clamp defined in IEC 61000-4-6:2013; at the CPT port, the clamp shall be over the whole charging cable.						

Required Test Levels Ports for signal lines and control lines						Performance Criteria
Line Under Test	Frequency Range (MHz)	Level (V/m)	Modulation	Step Size (%)	Dwell (s)	
Signal and control port	0.15 to 80	3	AM (80 %,1 kHz, sine wave)	1	1	A
Applicable only to ports interfacing with cables whose total length may exceed 3m according to the manufacturer’s function specification.						

2.9.3 Test Setup

2.9.4 Test Location

This test was carried out in EMS Test Location.

2.9.5 Test Results

Results for Configuration and Mode: AC power/Mode 1~16
Performance assessment of the EUT made during this test: Pass
Detailed results are shown below.
Test date: 2021-10-11 to 2021-10-20

Tabulated Results for Injected current, a.c. power ports						
Line and sensitive frequency under test	Test Level	Step	Dwell Time	Coupling Method	Modulation	Result
Power line	3V	1%	1s	CDN	1kHz, 80%	A

Tabulated Results for Injected current, CPT						
Line and sensitive frequency under test	Test Level	Step	Dwell Time	Coupling Method	Modulation	Result
Power line	10V	1%	1s	CDN	1kHz, 80%	A

Remark: The results met the requirement of EN 301 489-1, EN 301 489-3, EN 301 489-17 and EN 301 489-52

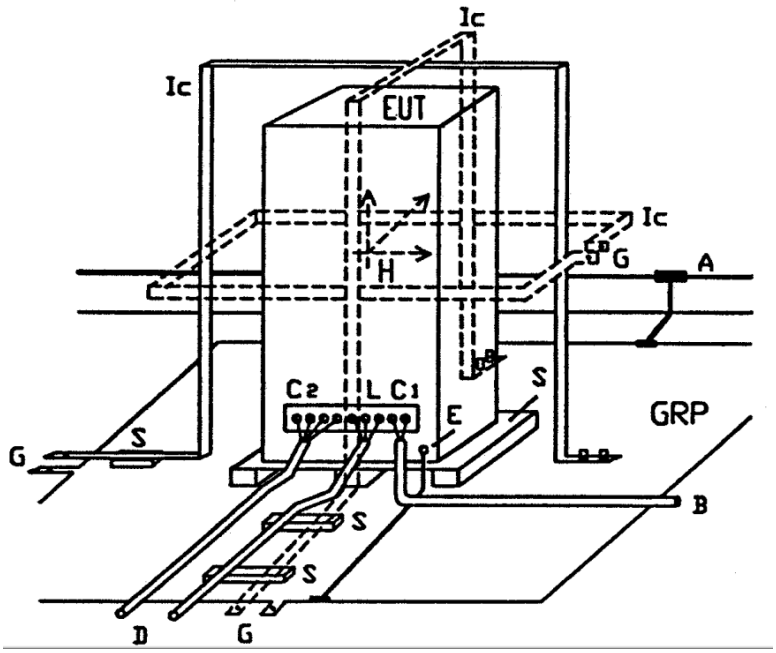
2.10 Power-frequency magnetic field immunity test

2.10.1 Test Method

The equipment under test including associated cabling was configured on a non-conductive support at the volumetric center of the immunity coils. A pre calibrated input level was then applied to magnetic immunity coils at the detailed frequency and level for the required test period.

The EUT was retested with the magnetic field applied in all 3 orthogonal planes of the EUT.

During this testing any anomalies in the equipment under tests performance was recorded.



2.10.2 Specification Limits

Required Test Levels			Performance Criteria
Application	Level (A/m)	Duration	
Continuous Field	30(for systems ≤32A)	dependent on EUT operating cycle	A
Supplementary information: Note 1. EUT powered at one of the Nominal input voltages and frequencies			

2.10.3 Test Setup

N/A

2.10.4 Test Location

This test was carried out in EMS Test Location.

2.10.5 Test Results

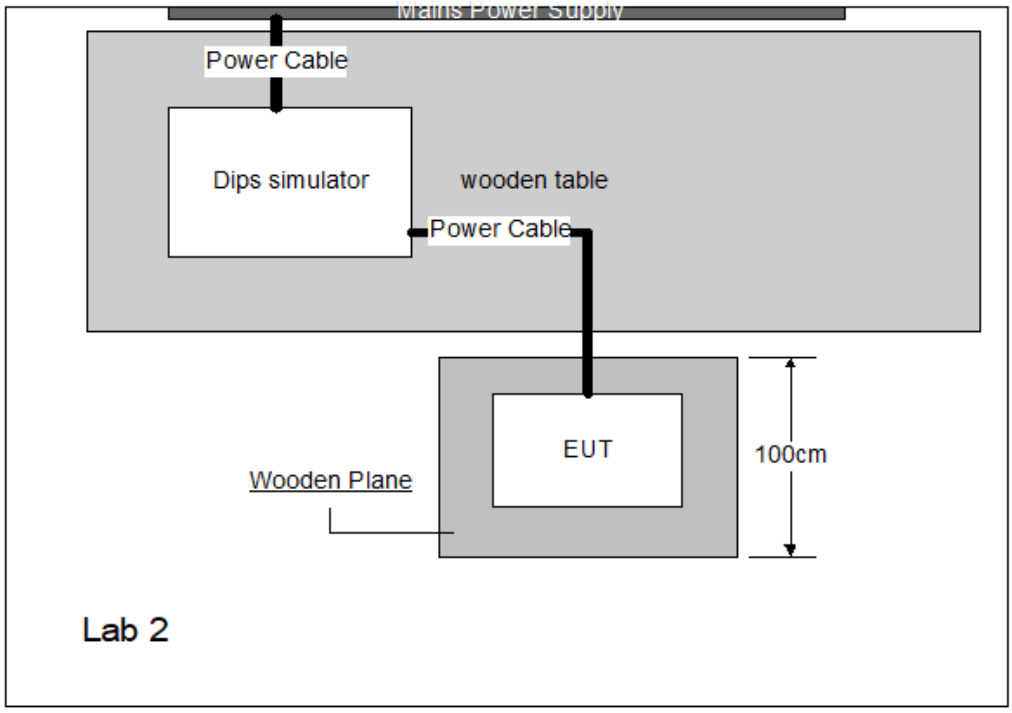
N/A

2.11 Voltage dips, short interruptions and voltage variations immunity tests

2.11.1 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment above a ground reference plane all within a test laboratory.

Using a programmable power supply the equipment under test was subjected to the detailed supply voltage dips and interruptions. The required supply phase synchronization and test repetition rate, detailed, was controlled by the programmable power supply.
During this testing any anomalies in the equipment under tests performance was recorded.



2.11.2 Specification Limits

Voltage Dips and short interruptions				
Voltage Dips in % UT	Test level in % UT	Duration		Performance Criteria
		50Hz	60Hz	
100	0	½ and 1cycle	½ and 1cycle	B
30	70	25 cycles	30 cycles	C
100	0	250 cycles	300 cycles	C
UT is the rated voltage of the Equipment Under Test				

2.11.3 Test Setup

2.11.4 Test Location

This test was carried out in EMS Test Location.

2.11.5 Test Results

Results for Configuration and Mode: AC power/Mode 1~16

Performance assessment of the EUT made during this test: Pass

Detailed results are shown below.

Test date: 2021-10-11 to 2021-10-20

Tabulated Results for Voltage Dip and Short Interruption					
Line under test	Vnom	Operating Frequency	Test Level	Duration	Result
Power line	400 V~	50 Hz	0% of Vnom	1 cycle	A
Power line	400 V~	50 Hz	40% of Vnom	10 cycle	A
Power line	400 V~	50 Hz	70% of Vnom	25 cycles	A
Power line	400 V~	50 Hz	0% of Vnom	250 cycles	C

Remark: During 250 cycles interruption test, the EUT stopped working. After the test, it can return to normal status by operator. The results met the requirement of EN 301 489-1, EN 301 489-3, EN 301 489-17 and EN 301 489-52

3 Test Equipment Information

3.1 General Test Equipment Used

Test Equipment	Type/Mode	SERIAL NO.	Equipment No.	Manufacturer	Cal. Due
Conducted emission					/
EMI Test Receiver	ESCI	100857	WKNB-0081	R&S	2021-12-08
EMI Test Receiver	ESR3	102394	VGDY-0705	R&S	2022-03-05
LISN	NSLK 8127	8127644	VGDY-0150	SCHWARZBECK	2022-09-01
LISN	NSLK 8128	8128-316	VGDY-0149	SCHWARZBECK	2022-09-01
DC LISN	PVDC8301-017	PVDC8301#17	VGDY-0692	SCHWARZBECK	2022-06-07
LISN	NSLK 8129	8129-268	EM-000388	SCHWARZBECK	2022-03-05
Plus Limiter（#1）	VTSD 9561 F-N	00515	VGDY-0808	SCHWARZBECK	2022-03-05
Plus Limiter（#2）	VTSD 9561	9561-F017	VGDY-0152	SCHWARZBECK	2022-09-01
Impedance Stabilization Network	ISN T800	27095	WKNE-0195	TESEQ	2022-09-01
Impedance Stabilization Network	NTFM8158	8158-0092	VGDY-0356	SCHWARZBECK	2022-06-07
ImpedanceStabilizationNetwork	NTFM8131	#184	EM-000498	SCHWARZBECK	2022-06-05
Voltage Probe	TK9420	9420-499	VGDY-0128	SCHWARZBECK	2022-03-05
Power Divider	4901.17.B	22643830	DB-0016	HUBER+SUHNER	2023-09-01
Video Signal Generator	GV-798+	151064920001	VGDS-0215	PROMAX	2022-06-07
AudioSignalGenerator	GAG-810	EK871591	EM-000309	GW	2021-12-11
Shielding Room(#1)	GP1A	002	WKNF-0001	LEINING	2024-08-08
Shielding Room(#2)	GP1A	/	WKNF-0006	LEINING	2024-08-08
Intermittent interference					/
Click Analyzer	DDA55	14041630071	EM-000527	AFJ	2022-06-05
LISN（CLICK）	LS-16C	16011624394	EM-000528	AFJ	2022-06-05
Disturbance power					/
EMI Test Receiver（#1）	ESCI	100857	WKNB-0081	R&S	2021-12-08
Absorbing Clamp	MDS21B	48052	VGDY-0689	TESEQ	2022-04-07
Radiation emission					/
EMI Test Receiver	N9038A-508	MY532290079	EM-000397	Agilent	2022-03-05
EMI Test Receiver	ESR7	102235	VGDY-0956	R&S	2022-03-05
EMI Test Receiver	N9038A-508	MY53290078	EM-000396	Agilent	2022-03-05
Spectrum Analyzer	N9010B	MY57470323	DZ-000174	KEYSIGHT	2022-03-05
Radio Communication Test	CMW500	156686	EM-000623	R&S	2021-12-25
Broadband Antenna(3m)	VULB 9163	9163-530	EM-000342	SCHWARZBECK	2022-06-26
Broadband Antenna(5m)	VULB 9163	9163-676	EM-000382	SCHWARZBECK	2022-05-07
Broadband Antenna(10m)	VULB 9163	9163-675	EM-000381	SCHWARZBECK	2022-07-08
Broadband Antenna(10m)	HL562E	101121	EM-000566	R&S	2022-05-07
Loop Antenna	HLA 6121	540046	EM-000546	TESEQ	2022-06-05
Loop Antenna	FMZB1513	1513-170	EM-000384	SCHWARZBECK	2022-03-05
Monopole antenna	HFH2-Z6E	101317	EM-000613	R&S	2021-12-11
Waveguide Horn Antenna	BBHA9120B	602	EM-000383	SCHWARZBECK	2022-03-05
Waveguide Horn Antenna	HF906	360306/008	WKNA-0024-8	R&S	2022-03-05
Semi-Anechoic Chamber(3m)	FACT-4	ST08035	WKNA-0024	ETS	2024-12-12
Semi-Anechoic Chamber(5m)	SAC-5	SAC-5-2.0	EM-000557	COMTEST	2024-11-02
Semi-Anechoic Chamber(10m)	10m-SAC	P25904	EM-000460	Albatross	2024-06-30
CDN radiation substitution					/
EMI Test Receiver	ESR3	102394	VGDY-0705	R&S	2022-03-05
CDN	CDN M016S	33519	VGDS-0093-2	TESEQ	2022-09-01
CDNE	CDNE M2	CDNE-M2-020	VGDY-0291	SCHWARZBECK	2022-06-07
CDNE	CDNE M3	CDNE-M3-017	VGDY-0292	SCHWARZBECK	2022-03-05

Test Equipment	Type/Mode	SERIAL NO.	Equipment No.	Manufacturer	Cal. Due
Plus Limiter(6dB))	1W6	93459	EM-000499	Aeroflex	2021-12-08
Three loop antenna					/
EMI Test Receiver	ESR3	102394	VGDY-0705	R&S	2022-03-05
Three Loop Antenna	HXYZ9170	9170-232	VGDS-0085	SCHWARZBECK	2022-03-05
Harmonics, voltage flicker, voltage drop test system					/
45kVA Three-phase harmonic ,voltage flicker, drop test system	NSG1007	1404A01259	VGDS-0116	TESEQ	2022-03-24
Single-phase harmonic and voltage flicker test system					/
3KVA single phase harmonic voltage flicker test system	DPA500N/ACS500N3	P2041244476 P2051246302	EM-000615-1 EM-000615-2	EMTEST	2022-01-13
Electrostatic discharge					
ESD Generator	ONYX	182795	VGDY-0587	HAEFELY	2022-06-07
ESD Generator	NSG438	996	NA-0091	TESEQ	2021-12-13
Radio frequency electromagnetic field radiation immunity					/
Signal generator（Below 1G）	E4432B	MY43350242	VGDY-0222	Agilent	2021-12-08
Signal generator（Above 1G）	N5172B	MY53051933	VGDY-0591	Agilent	2021-12-08
Power amplifier（Below 1G）	CBA 9413A	9906	EM-000563	HAFFNER	2022-06-05
Power amplifier（Above 1G）	NTWPA-1060100E	18093197	VGDY-0804	RFLIGHT	2021-12-08
LPDA	STLP 9128E	9128E-052	EM-000561	SCHWARZBECK	2022-06-05
Horn Antenna	STLP 9149	390	EM-000375	SCHWARZBECK	2022-06-05
Power meter	4232A	41001	EM-000033	BOONTON	2021-12-08
Surge and EFT test system					/
Surge and EFT generator	NSG3060	1376	VGDS-0014	TESEQ	2022-03-06
Surge and EFT CDN	CDN3063	1994	VGDS-0014	TESEQ	2022-03-06
Large current stray surge pulse magnetic field testing system	CWS 1500	ES058002820002	EM-00580	3Ctest	2022-05-31
Surge manual coupling/decoupling network	SPN 69100TM15	ES071003620001	EM-00580	3Ctest	2022-05-31
Signal Line coupling network	CDN117	140	DC-0004-2	SCHAFFNER	2021-12-08
Signal Line coupling network	CDN118	192	EM-000530	SCHAFFNER	2021-12-08
Capacitive-coupling	CDN8014	32799	EM-000337-4	TESEQ	2022-09-01
Immunity to conducted disturbances induced by RF fields					/
C/S test generator	N5171B	MY59101555	EM-000614-1	KEYSIGHT	2022-04-25
CDN(singlephase)	M016	26143	EM-000300	TESEQ	2022-06-07
CDN(Threephase)	M532	31829	CGDS-0093-1	TESEQ	2022-03-05
EM Injected Clamp	EM101	3-5339	K-0041-7	LIITNI	2022-03-05
ATT(6dB)	59-6-33	SQ914	EM-000551	Weinschel	2022-03-05
Power Frequency Magnetic Field					/
Power frequency magnetic field generator	EMS61000-8K	11030001	EM-000332	EVERFINE	2022-06-05
Pulsed magnetic field immunity					/
Large current stray surge pulse magnetic field testing system	CWS 1500	ES058002820002	EM-00580	3Ctest	2022-05-31
Pulsed field coil	TCXS111	TCXS19110268	EM-00580	3Ctest	2022-05-31
Transient Immunity					/
Transient Test System	NSG 5500/5600	1232	EM-000164	TESEQ	2021-12-07
Digital Oscilloscope	7104B	MY50340263	EM-000324	Agilent	2021-10-08
Oscilloscope Probe	N2873A	N/A	EM-000594-1	Keysight	2022-07-20
Temperature and humidity data logger	175-H1	44608655	EM-000568-6	Testo	2021-10-07
Comprehensive tester	CMW500	159000	ZD-000240-2	R&S	2022-01-04

4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

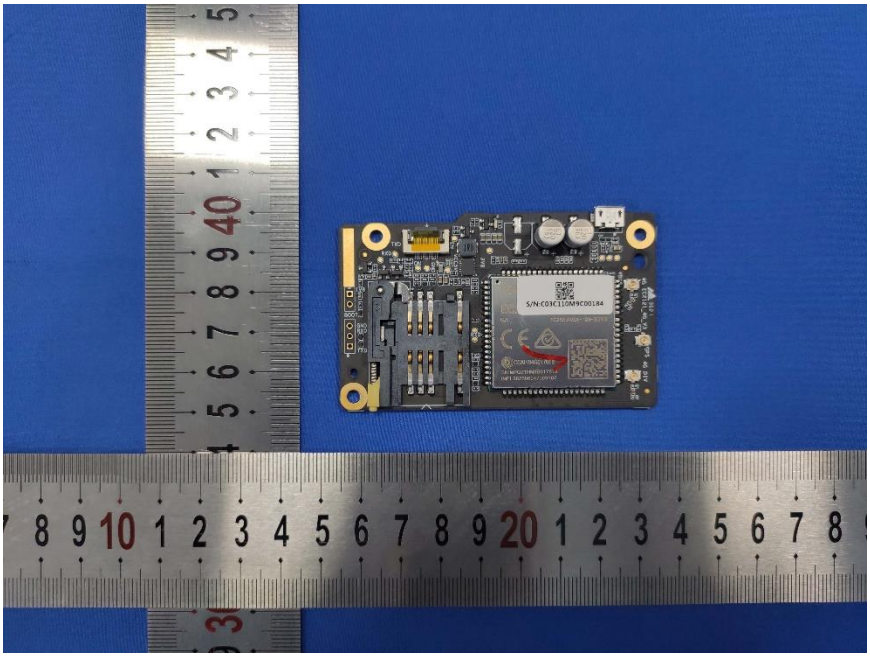
System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Conducted Emission 150kHz-30MHz	3.3dB
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.50dB; Vertical: 4.50dB
Uncertainty for Radiated Emission in 10m chamber 30MHz-1000MHz	Horizontal: 4.50dB; Vertical: 4.50dB
Uncertainty for Harmonic test	3.16%
Uncertainty for Flicker test	4.69%
Uncertainty for RS test	49%, K=2
Uncertainty for CS test	28%(CDN); 45%(EM Clamp) K=2
Uncertainty for ESD test	The immunity measurement system uncertainty is within standard requirement and is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.
Uncertainty for EFT test	
Uncertainty for Surges test	
Uncertainty for PMF test	
Uncertainty for Voltage Dips, Voltage Variations and Short Interruptions Test	

Remark:
Measurement Uncertainty Decision Rule
Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.

5 Photographs

Details of: Outside appearance

Details of: 4G LTE module



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