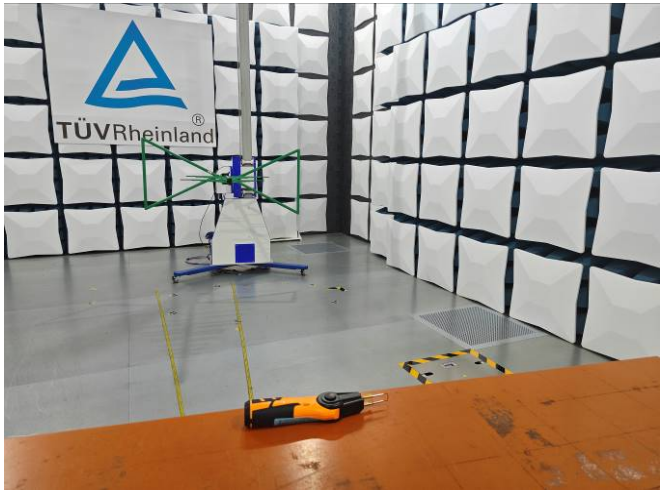




Prüfbericht-Nr.: Test report no.:	CN23LVLO 001	Auftrags-Nr.: Order no.:	180272860	Seite 1 von 19 Page 1 of 19
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2023.10.08	
Auftraggeber: Client:	Ningbo Zhongdi Industry & Trade Co., Ltd. Jishigang Industry Zone Yinzhou District Ningbo 315171 Zhejiang P.R. China			
Prüfgegenstand: Test item:	Plastic Repair Tool with Pivoting Head			
Bezeichnung / Typ-Nr.: Identification / Type no.:	ZD-507L			
Auftrags-Inhalt: Order content:	TÜV Rheinland – EMC Service			
Prüfgrundlage: Test specification:	EN IEC 55014-1:2021 EN IEC 55014-2:2021			
Wareneingangsdatum: Date of sample receipt:	2023.10.08			
Prüfmuster-Nr.: Test sample no.:	A003576402-002			
Prüfzeitraum: Testing period:	2023.10.11-2023.10.19			
Ort der Prüfung: Place of testing:	Refer to section 1.1			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland / CCIC (Ningbo) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:			genehmigt von: authorized by:	
Datum: Date:	2023.11.13		Ausstelldatum: Issue date:	2023.11.13
Stellung / Position:	Bingbing Li/PE		Stellung / Position:	Shey Zheng/Authorizer
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
<p>* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet</p> <p>* Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested</p>				
<p>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</p>				

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Anmerkungen Remarks

1	<p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system.</i></p> <p><i>Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p>
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3	<p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</p> <p><i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report. Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p>
4	<p>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</p> <p><i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i></p>

TEST SUMMARY

5.1.1 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

Result:

N/A

5.1.2 DISCONTINUOUS INTERFERENCE ON AC MAINS

Result:

N/A

5.2.1 RADIATED DISTURBANCE IN THE FREQUENCY RANGE FROM 30MHZ TO 1000MHZ

Result:

Pass

6.1.1 ELECTROSTATIC DISCHARGE

Result:

Pass

6.1.2 RADIO FREQUENCY ELECTROMAGNETIC FIELD

Result:

Pass

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1 Test Sites

1.1 Test Facilities

Laboratory: TÜV Rheinland /CCIC(Ningbo) Co., Ltd.

**1st Floor, Building 11, Scholar Innovation Park, No.1188 Zhongguan Road,
Zhenhai District, Ningbo 315200 P.R. China.**

The used test equipments of Laboratory are in accordance with CISPR 16-1 series standards for measurement of radio interference.

1.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment of Laboratory

No.	Equipment	Model	Serial No.	Cal. due date
1.	EMI test receiver	ESR7	101929	2024.10.29
2.	Bilog Antenna	CBL6112D	49033	2024.03.14
3.	ESD generator	NX30.1	11744	2024.11.01
4.	Signal generator	SMB100A	180488	2024.10.29
5.	Amplifier	BBA150-BC250	102749	2024.10.29
6.	Stacked Log-Per Antenna	STLP 9128 ES	219	N/A

1.3 Measurement Uncertainty

Test Item	Expanded Measurement Uncertainty (k=2)
Conducted Emission (9-150kHz)	3.70dB
Conducted Emission (150k-30MHz)	3.30dB
Disturbance Power	4.27dB
Radiated Emission (30-1000MHz)	4.39dB
Radiated Emission (1-18GHz)	4.67dB
Radiated Emission (CDNE method)	4.05dB

2 General Product Information

2.1 Product Function and Intended Use

The EUT (equipment under test) is an ordinary Plastic Repair Tool with Pivoting Head for household and similar use. For the further information, refer to the user's manual.

2.2 Ratings and System Details

System input : DC 5V
Protection Class : III

Refer to the circuit diagram and user's manual for further information.

2.3 Independent Operation Modes

The basic operation modes are: "On" or "Off."
Refer to the user's manual for further information.

2.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit diagram for further information.

2.5 Submitted Documents

Circuit diagram, PCB, label and user's manual etc.

3 Test Set-up and Operation Modes

3.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.

Immunity: The equipment under test (EUT) was configured to measure its highest susceptibility against the tested phenomena. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.

3.2 Physical Configuration for Testing

Refer to the related paragraph of this report.

3.3 Test Operation and Test Software

Refer to the related paragraph of this report. No software was used.

3.4 Special Accessories and Auxiliary Equipment

None.

3.5 Countermeasures to achieve EMC Compliance

The tested sample contained noise suppression components as described in the circuit diagram. No special measure is employed to achieve the requirement.

4 Conformity Decision Rule

For all EMI tests (when included in this report), as measurement uncertainties are less than the values U_{CISPR} given in CISPR 16-4-2, compliance with the limits is determined by comparing measurement results directly with corresponding limits without taking into consideration of measurement uncertainties. For all EMS tests (when included in this report), measurement uncertainties are not considered as well according to corresponding test standards.

5 Test Results EMISSION

5.1 Emission in the Frequency Range up to 30 MHz

5.1.1 Mains Terminal Continuous Disturbance Voltage

Result:	N/A
----------------	------------

Test procedure : EN IEC 55014-1:2021 and CISPR 16-1 series standards
Frequency range : 0.15 – 30MHz

According to EN IEC 55014-1:2021 “No radio disturbance limits apply to appliances with built-in batteries, which cannot be connected to the mains supply.”

The EUT is powered by built-in batteries, and cannot be connected to the mains supply. Therefore, no disturbance voltage test is performed.

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5.1.2 Discontinuous Interference on AC Mains

Result:

N/A

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5.2 Emission in the Frequency Range above 30 MHz

5.2.1 Radiated Disturbance in the Frequency Range from 30MHz to 1000MHz

Result:

Pass

Date of testing	:	2023.10.19
Test procedure	:	EN IEC 55014-1:2021 & CISPR 16-2-3
Frequency range	:	30-1000MHz
Kind of test site	:	Semi-anechoic Chamber
Measurement Distance	:	3m
Polarization of Antenna	:	Both horizontal and vertical
Limit	:	EN IEC 55014-1:2021 Table 9 Quasi-peak limits (3m test distance): 30-230MHz, 40dB μ V/m; 230-1000MHz, 47dB μ V/m
Ambient Condition	:	Temperature: 21 °C ; Relative Humidity: 63 %

Test Setup

Input voltage	:	DC 5V
Operational mode	:	Normal working

Measuring configuration and description

The radiated disturbance was measured in the frequency range from 30MHz to 1000MHz according to EN IEC 55014-1:2021. The measurement was performed in accordance with the method specified in CISPR 16-2-3.

The radiated disturbance test was performed in a 3m semi-anechoic chamber. The test distance is 3m. The 10m radiated emission limits are converted to 3m radiated emission limits by an inverse proportionality of 20 dB per decade. The normalized site attenuation of the semi-anechoic chamber is regularly calibrated to ensure the radiated disturbance test results are valid. During the test, the EUT was placed on a 0.8m high wooden support above the reference ground plane. The turntable was rotated 360° around and the antenna was varied from 1m to 4m to find the maximum disturbance. The test was performed with the antenna both in its horizontal and vertical polarizations.

Before measurement, a survey was made to determine in which state the maximum disturbance was obtained. And the measurement was made in the state the maximum disturbance was obtained.

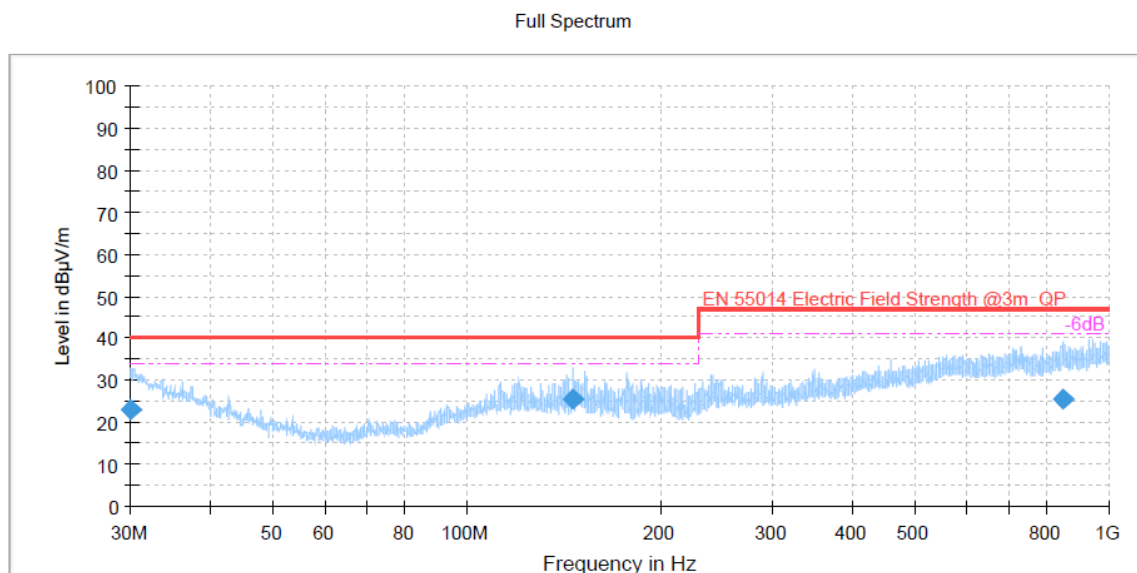
The following figures were those measured and recorded by a test receiver. The curves in the figure were those measured with a Peak detector. The symbol “◆” in the figures are those of QP value which were measured in final measurement. Quasi-peak measurements were only performed at those critical frequencies obtained during the test with Peak Detector.

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Figure 1: Spectral Diagrams, Radiated disturbance, Horizontal

Full Spectrum

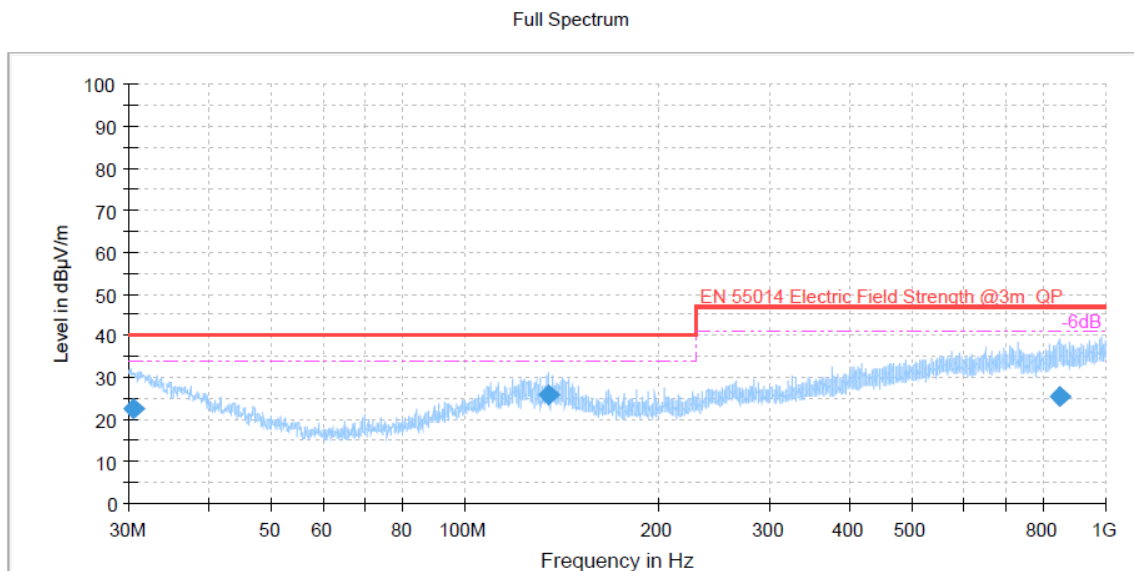


Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.063333	22.99	40.00	17.01	1000.0	120.000	100.0	H	2.0	25.9
146.701667	25.54	40.00	14.46	1000.0	120.000	124.0	H	163.0	18.1
845.951667	25.47	47.00	21.53	1000.0	120.000	216.0	H	221.0	29.3

Figure 2: Spectral Diagrams, Radiated disturbance, Vertical

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.440000	22.80	40.00	17.20	1000.0	120.000	150.0	V	238.0	25.7
135.534444	25.97	40.00	14.03	1000.0	120.000	143.0	V	67.0	18.7
845.035556	25.40	47.00	21.60	1000.0	120.000	107.0	V	306.0	29.4

6 Test Results I M M U N I T Y

According to the electrical characteristics and EN IEC 55014-2:2021, the EUT belongs to category III equipment.

“Category III: battery operated equipment not included in Category I.”

During the immunity tests, the EUT was operated under conditions specified by clause 3.1 of this report.

Performance criterion A: The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed.

Performance criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

Date of testing: 2023.10.11-2023.10.12

Room temperature	:	21°C
Relative Humidity	:	51-62%(51% for ESD test)
Atmospheric pressure	:	102.1 kPa

6.1 Enclosure

6.1.1 Electrostatic Discharge

Result:

Pass

The immunity against electrostatic discharge was tested in accordance with EN IEC 55014-2:2021. Test setup and ESD-Generator are according to EN 61000-4-2 which is specified by EN IEC 55014-2:2021.

The EUT is placed on 0,8m wood table above the ground plane. And the minimum distance between the EUT and all other conductive structures except the ground plane beneath the EUT is more than 0,5m.

The reference ground plane is an aluminium sheet of 0,25mm minimum thickness. The reference ground plane is connected to the protective earth. The size of the ground plane is 2m x 2m.

A horizontal coupling plane (HCP), 1,6m x 0,8m, is placed on the table and isolated the EUT 0,5mm thick. Vertical coupling plane of dimensions 0,5m x 0,5m is placed parallel to and positioned at a distance of 0,1m from the EUT.

Charge voltage : $\pm 4.0\text{kV}$ (Contact Discharge), $\pm 8.0\text{kV}$ (Air Discharge)
Polarity : positive / negative
Number of discharges : ≥ 10
Performance criteria : B

Table 2: ESD, Positive / Negative Polarity

Position	Kind of Discharge	Result	Remarks
Nonmetal Enclosure	Air discharge $\pm 8\text{kV}$	Pass	No disturbance of function
Button	Air discharge $\pm 8\text{kV}$	Pass	No disturbance of function
Metal Enclosure	Contact discharge $\pm 4\text{kV}$	Pass	No disturbance of function
Coupling plane (Both HCP and VCP)	Contact discharge $\pm 4\text{kV}$	Pass	No disturbance of function

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6.1.2 Radio Frequency Electromagnetic Field

Result:

Pass

The immunity against radio-frequency electromagnetic fields in the frequency range between 80MHz and 1000MHz was tested in accordance to IEC 61000-4-3 which is specified by EN IEC 55014-2:2021.

The test was performed inside a 3m modified semi-anechoic chamber. During the test the part of the ground plane between the field generating antenna and the equipment under test was covered by absorbing material. The distance between the tip of the antenna and the side of the system tested is 3m. The field uniformity of the 1.5mx1.5m plane where the surface of the EUT tested coincides with is regularly calibrated to ensure the 0-6 dB field uniformity criterion as specified by IEC 61000-4-3 is met.

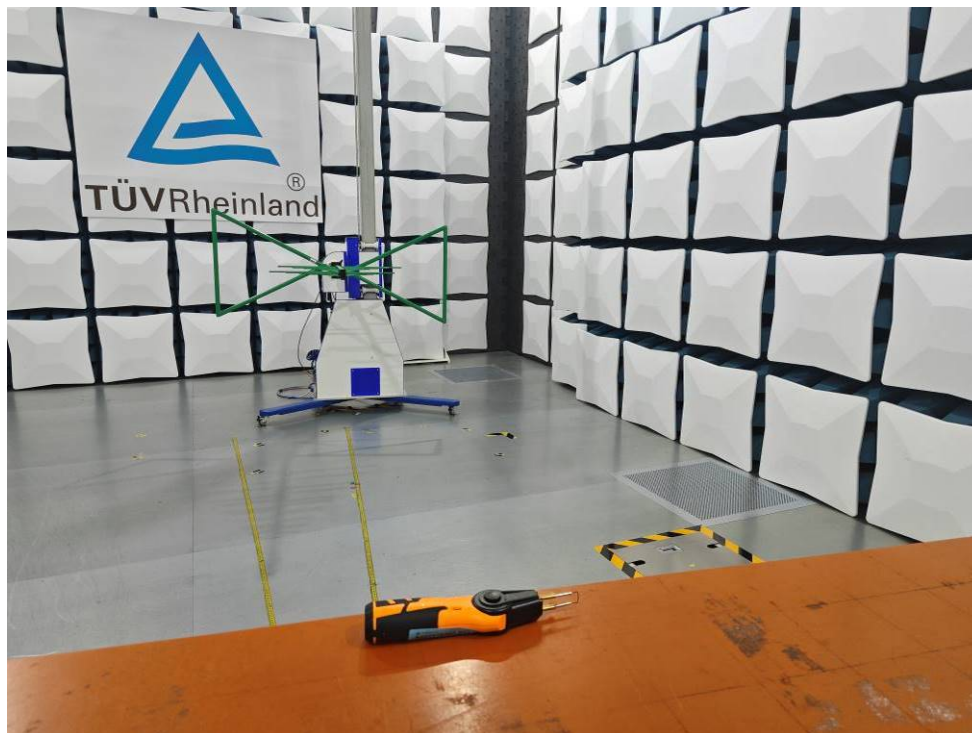
Test Level	: 3V/m
Frequency Range	: 80-1000MHz
Modulation	: 80%AM, 1kHz
Frequency Sweep Speed	: ≤0.005 octave/s (1.5×1E−3 decades/s)
Performance Criteria	: A

Table 3: Radiated Susceptibility, Field Strength 3V/m

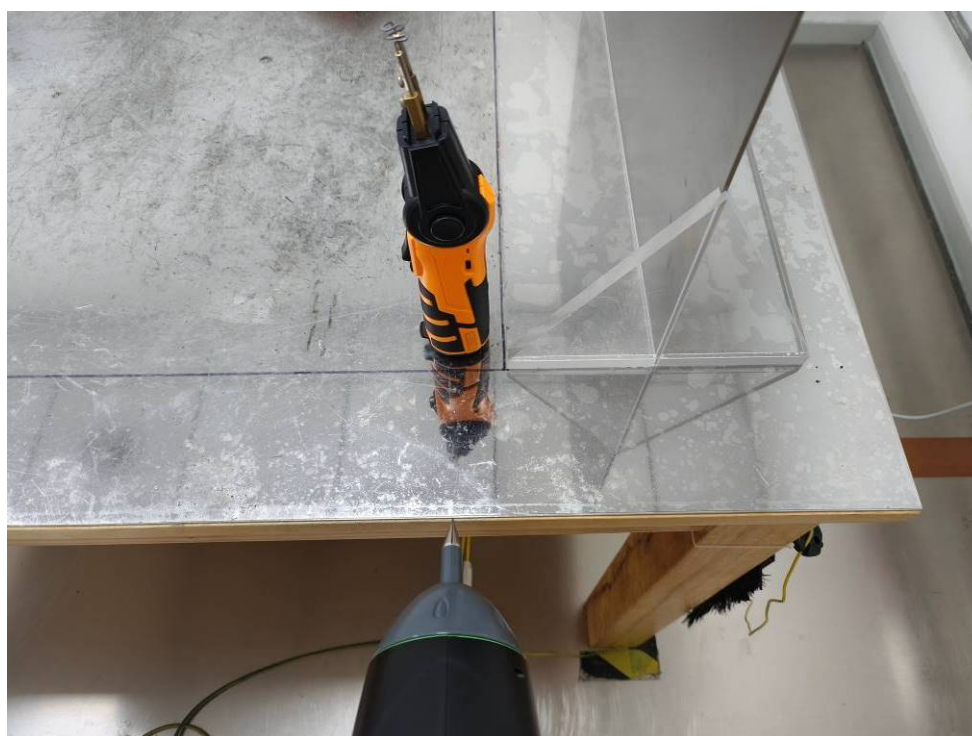
Position	Observation	Result
Antenna in vertical orientation	No disturbance of function	Pass
Antenna in horizontal orientation	No disturbance of function	Pass

7 Photographs of the Test Set-Up

Photograph 1: Set-up for Radiated Emission



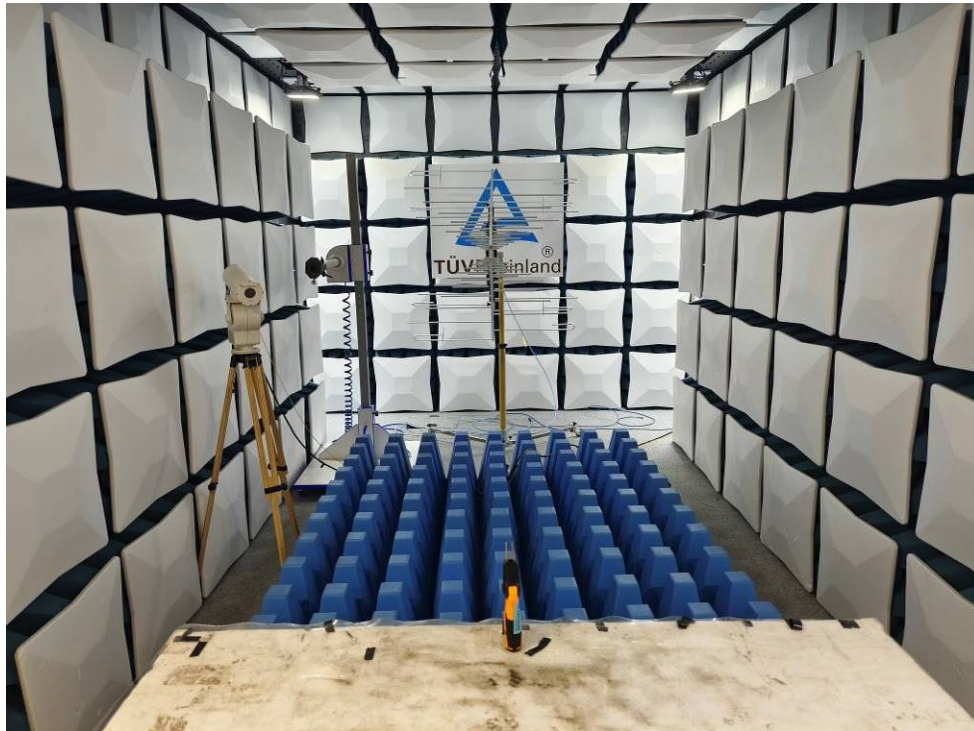
Photograph 2: Set-up for ESD



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Photograph 3: Set-up for RS



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-- The END --