

<b>Prüfbericht-Nr.:</b> <i>Test Report No.:</i>	<b>50192824 001</b>	<b>Auftrags-Nr.:</b> <i>Order No.:</i>	<b>154366586</b>	<b>Seite 1 von 17</b> <i>Page 1 of 17</i>
<b>Kunden-Referenz-Nr.:</b> <i>Client Reference No.:</i>	<b>633276</b>	<b>Auftragsdatum:</b> <i>Order date.:</i>	<b>15.10.2018</b>	
<b>Auftraggeber:</b> <i>Client:</i>	<b>TAIZHOU CITY XIEFENG MACHINERY CO., LTD</b> Shamenyu Industrial Zone, Yuanqiao Town, Huangyan District, Taizhou City, Zhejiang Province, P. R. China			
<b>Prüfgegenstand:</b> <i>Test item:</i>	<b>Battery Sprayer</b>			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type No.:</i>	<b>XF-45MH</b>			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	<b>EMC test</b>			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	<b>EN 55014-1:2006+A1+A2</b> <b>EN 55014-2:2015</b>		<b>EN 55014-1:2017</b>	
<b>Wareneingangsdatum:</b> <i>Date of receipt:</i>	<b>23.10.2018</b>			
<b>Prüfmuster-Nr.:</b> <i>Test sample No.:</i>	<b>A000813142-001</b>			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	<b>Refer to test report</b>			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	<b>EMC laboratory</b>			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	<b>TÜV Rheinland (Shanghai) Co., Ltd.</b>			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	<b>Pass</b>			
<b>geprüft von / tested by:</b>		<b>kontrolliert von / reviewed by:</b>		
				
<b>06.11.2018</b>	<b>Somuns Chen/Project engineer</b>	<b>06.11.2018</b>	<b>Jiayi Zhou/Senior manager</b>	
<b>Datum</b>	<b>Name/Stellung</b>	<b>Unterschrift</b>	<b>Datum</b>	<b>Name/Stellung</b>
<b>Date</b>	<b>Name/Position</b>	<b>Signature</b>	<b>Date</b>	<b>Name/Position</b>
<b>Sonstiges / Other:</b>				
For the product, the requirements of EN 55014-1:2017 can be covered by EN 55014-1: 2006 +A1+A2.				
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>		<b>Prüfmuster vollständig und unbeschädigt</b> <i>Test item complete and undamaged</i>		
* 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				
Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specifications(s) F(ail) = failed a.m. test specifications(s) N/A = not applicable N/T = not tested				
<b>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.</b>				
<i>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.</i>				

## TEST SUMMARY

### 4.1.1 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

Result:

N/A

### 4.1.2 DISCONTINUOUS INTERFERENCE ON AC MAINS

Result:

N/A

### 4.2.1 DISTURBANCE POWER

Result:

N/A

### 4.2.2 RADIATED EMISSION

Result:

Passed

### 5.1.1 ELECTROSTATIC DISCHARGE

Result:

Passed

### 5.1.2 RADIO FREQUENCY ELECTROMAGNETIC FIELD

Result:

Passed

## Contents

<b>1</b>	<b>TEST SITES .....</b>	<b>4</b>
1.1	TEST FACILITIES.....	4
1.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS .....	4
<b>2</b>	<b>GENERAL PRODUCT INFORMATION .....</b>	<b>5</b>
2.1	PRODUCT FUNCTION AND INTENDED USE .....	5
2.2	RATINGS AND SYSTEM DETAILS.....	5
2.3	INDEPENDENT OPERATION MODES.....	5
2.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS.....	5
2.5	SUBMITTED DOCUMENTS .....	5
<b>3</b>	<b>TEST SET-UP AND OPERATION MODES .....</b>	<b>6</b>
3.1	PRINCIPLE OF CONFIGURATION SELECTION.....	6
3.2	PHYSICAL CONFIGURATION FOR TESTING .....	6
3.3	TEST OPERATION AND TEST SOFTWARE.....	6
3.4	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT .....	6
3.5	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE .....	6
<b>4</b>	<b>TEST RESULTS EMISSION .....</b>	<b>7</b>
4.1	EMISSION IN THE FREQUENCY RANGE UP TO 30 MHz .....	7
4.1.1	<i>Mains Terminal Continuous Disturbance Voltage .....</i>	<i>7</i>
4.1.2	<i>Discontinuous Interference on AC Mains .....</i>	<i>7</i>
4.2	EMISSION IN THE FREQUENCY RANGE ABOVE 30 MHz .....	8
4.2.1	<i>Disturbance Power .....</i>	<i>8</i>
4.2.2	<i>Radiated emission .....</i>	<i>9</i>
<b>5</b>	<b>TEST RESULTS IMMUNITY .....</b>	<b>12</b>
5.1	ENCLOSURE.....	13
5.1.1	<i>Electrostatic Discharge .....</i>	<i>13</i>
5.1.2	<i>Radio Frequency Electromagnetic Field .....</i>	<i>14</i>
<b>6</b>	<b>PHOTOGRAPHS OF THE TEST SET-UP.....</b>	<b>15</b>
<b>7</b>	<b>LIST OF TABLES.....</b>	<b>17</b>
<b>8</b>	<b>LIST OF FIGURES.....</b>	<b>17</b>
<b>9</b>	<b>LIST OF PHOTOGRAPHS .....</b>	<b>17</b>

## 1 Test Sites

### 1.1 Test Facilities

**Laboratory: TÜV Rheinland (Shanghai) Co., Ltd.**  
**Address: No.177, 178, Lane 777 West Guangzhong Road, Jing'an District, Shanghai**  
**200072, P. R. China**

The used test equipment is 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**

No.	Equipment/Software	Model	Serial no. /Software version	Cal. due date
1.	3m modified semi-anechoic chamber	SAC3	FJ129002	04.02.2019
2.	EMI test receiver	ESCI	100280	02.11.2018
3.	Bilog antenna	CBL6112D	40530	13.02.2020
4.	EMC measurement software	EMC32	10.01.00	N/A
5.	ESD generator	NSG 435	5506	21.06.2019
6.	Barometer	DYM3	08102717	03.04.2021
7.	Fully anechoic chamber	FAC3plus	FJ139001	24.07.2019
8.	Signal generator	SMR20	101393	02.11.2020
9.	Power amplifier	80RF1000-30	1077138	21.11.2018
10.	Average power sensor	NRP6AN	101102	13.01.2019
11.	Average power sensor	NRP6AN	101103	13.01.2019
12.	Broadband field meter	NBM-520	C-0120	05.07.2019
13.	E-field probe	EF1891	A-0387	05.07.2019
14.	EMS antenna	HL046	100039	N/A

## **2 General Product Information**

### **2.1 Product Function and Intended Use**

The EUT (equipment under test) is an ordinary battery power sprayer for household and similar use. For the further information, refer to the user's manual.

### **2.2 Ratings and System Details**

Rated input voltage : DC 12V  
Protection class : III

### **2.3 Independent Operation Modes**

The basic operation modes are: "on" and "off".

### **2.4 Noise Generating and Noise Suppressing Parts**

Refer to circuit diagram for further information.

### **2.5 Submitted Documents**

Circuit diagram and rating label.

## **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 emission 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 have its highest possible 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**

No special measure is employed to achieve the requirement.

## 4 Test Results EMISSION

### 4.1 Emission in the Frequency Range up to 30 MHz

#### 4.1.1 Mains Terminal Continuous Disturbance Voltage

<b>Result:</b>	N/A
----------------	-----

Test procedure : EN 55014-1:2006+A1+A2  
Frequency range : 0.15 - 30MHz

According to clause 4.1.1.5 of EN 55014-1:2006+A1+A2 "No radio disturbance limits apply to appliances with built-in batteries, which cannot be connected to the mains supply.  
EUT is powered by built-in batteries and cannot be used when charging, therefore no disturbance voltage tests is performed.

#### 4.1.2 Discontinuous Interference on AC Mains

<b>Result:</b>	N/A
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## **4.2 Emission in the Frequency Range above 30 MHz**

### **4.2.1 Disturbance Power**

<b>Result:</b>	<b>N/A</b>
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Test procedure : EN 55014-1:2006+A1+A2

There is no disturbance limits apply for the reason mentioned in clause 4.1.1 in this report.



#### 4.2.2 Radiated emission

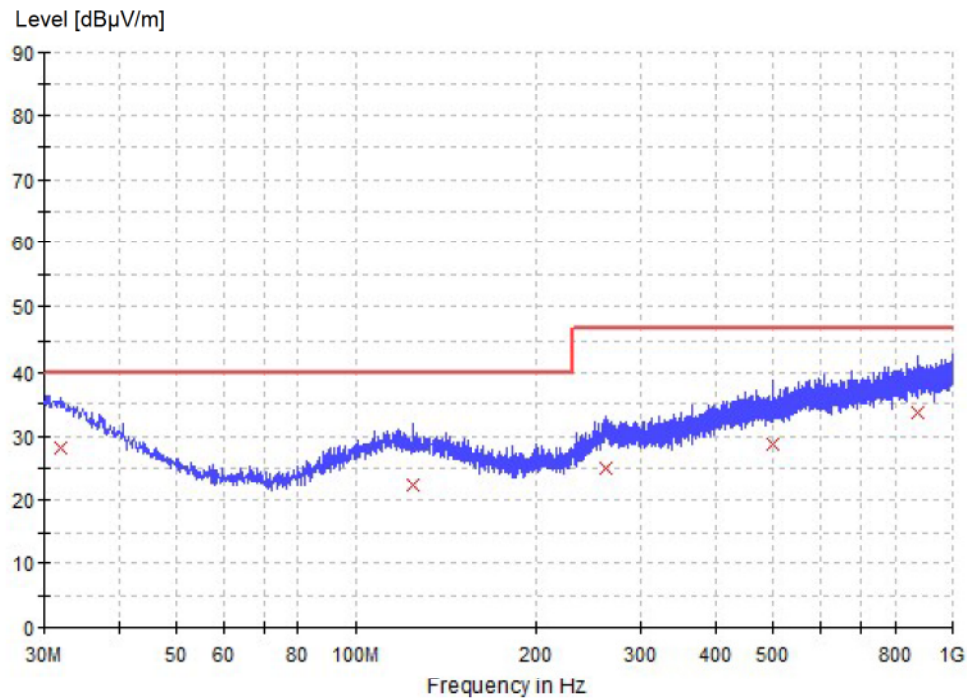
<b>Result:</b>	<b>Passed</b>
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Date of testing	: 26.10.2018
Test procedure	: EN 55014-1:2006+A1+A2 and CISPR 16-2-3
Frequency range	: 30 – 1000MHz
Kind of test site	: Semi-anechoic Chamber
Measurement distance	: 3m
Polarization of antenna	: Both horizontal and vertical
Limit	: Quasi-peak limits (3m test distance): 30-230MHz, 40dB $\mu$ V/m; 230-1000MHz, 47dB $\mu$ V/m;
Test voltage	: DC 18V
Ambient condition	: Temperature: 23.2°C; Relative humidity: 46.0%
Expanded measurement uncertainty ( $k=2$ )	: 5.49 dB

The radiated disturbance was measured in the frequency range from 30MHz to 1000MHz according to EN 55014-1:2006+A1+A2.

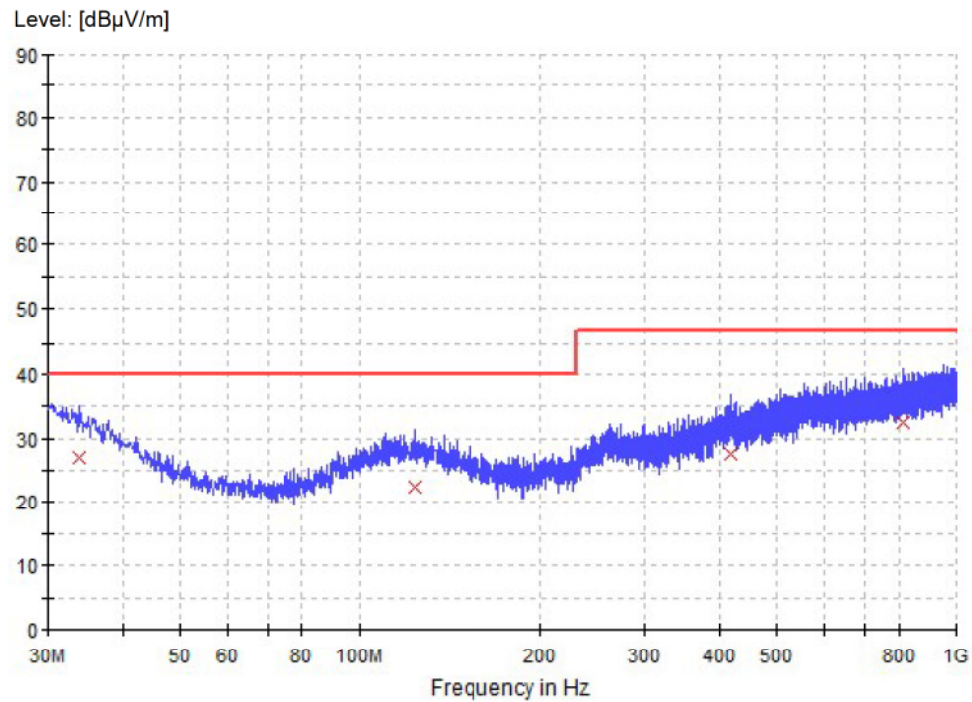
The test setup was made according to EN 55014-1:2006+A1+A2 in a semi-anechoic chamber. The test distance from the receiving antenna to the EUT is 3m. The normalized site attenuation of the semi-anechoic chamber is regularly calibrated to ensure the radiated disturbance test results are valid. During the test, the EUT was placed on a 0.8m high wooden table. The wooden table can be rotated 360° around and the receiving antenna was varied from 1m to 4m to find the maximum disturbance. The test was performed with the antenna both in horizontal and vertical polarizations.

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 “x” in the figures are those of quasi-peak value which were measured in final measurement. Quasi-peak detector measurement was only performed at those critical frequencies obtained during the test with peak detector.

**Figure 1: Spectral Diagrams, Radiated Emission, 30MHz-1000MHz, Horizontal Polarization**


Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
32.061250	28.1	1000.0	120.000	100.0	H	0.0	24.3	11.9	40.0
124.453750	22.4	1000.0	120.000	100.0	H	0.0	19.1	17.6	40.0
261.587500	24.9	1000.0	120.000	100.0	H	0.0	21.4	22.1	47.0
498.146250	28.8	1000.0	120.000	100.0	H	0.0	25.0	18.2	47.0
873.657500	33.7	1000.0	120.000	100.0	H	0.0	28.5	13.3	47.0

**Figure 2: Spectral Diagrams, Radiated Emission, 30MHz-1000MHz, Vertical Polarization**


Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
33.758750	26.9	1000.0	120.000	100.0	V	0.0	23.3	13.1	40.0
123.362500	22.5	1000.0	120.000	100.0	V	90.0	19.2	17.5	40.0
417.636250	27.5	1000.0	120.000	100.0	V	0.0	23.9	19.5	47.0
812.547500	32.5	1000.0	120.000	180.0	V	0.0	28.1	14.5	47.0

## 5 Test Results IMMUNITY

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. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if 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, however no change of actual operating state or stored data is allowed to persist after the test. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

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: 29.10.2018

<b>Room temperature</b>	:	<b>23.0°C</b>
<b>Relative humidity</b>	:	<b>49%</b>
<b>Atmospheric pressure</b>	:	<b>102.3kPa</b>

According to the electrical characteristics and EN 55014-2:2015, the EUT belongs to category III equipment.

## 5.1 Enclosure

### 5.1.1 Electrostatic Discharge

<b>Result:</b>	<b>Passed</b>
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The immunity against electrostatic discharge was tested in accordance with EN 55014-2:2015. Test setup and ESD-Generator are according to EN 61000-4-2 which is specified by.

The EUT is placed on 0.1m wooden support 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, placed on the table and isolate 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.

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

**Table 2: ESD, Positive / Negative Polarity**

Position	Kind of Discharge	Result	Remarks
Switch Enclosure(non-metal)	Air discharge $\pm 8\text{kV}$	Pass	No disturbance of function
Seam	Air discharge $\pm 8\text{kV}$	Pass	No disturbance of function
Enclosurc(mctal)	Contact discharge $\pm 4\text{kV}$	Pass	No disturbance of function
Coupling plane (HCP/VCP)	Contact discharge $\pm 4\text{kV}$	Pass	No disturbance of function

### 5.1.2 Radio Frequency Electromagnetic Field

<b>Result:</b>	<b>Passed</b>
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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 clause 5.5 in EN 55014-2:2015.

The test set-up, the RF signal generator, the power amplifier and the antennas were in accordance with IEC 61000-4-3. The test was performed in an anechoic chamber with a test distance of 3m. The field uniformity of the anechoic chamber is regularly calibrated to meet 0-6dB field uniformity criterion as specified in IEC 61000-4-3.

Test level	: 3V/m
Frequency range	: 80-1000MHz
Modulation	: 80%AM, 1kHz
Frequency sweep speed	: Frequency step: 1%; Dwell time: 3s
Performance criteria	: A

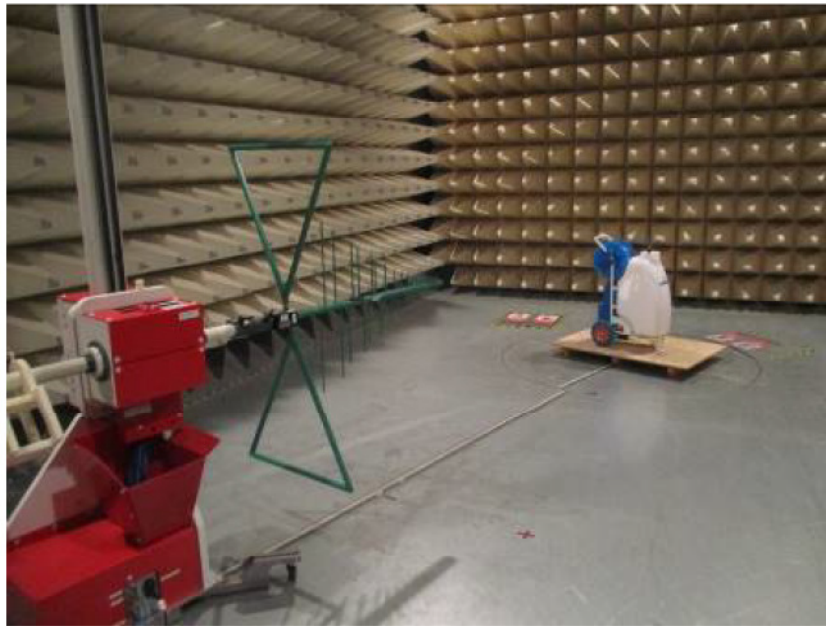
**Table 3: RF electromagnetic field immunity test results**

Polarization	Position	Result	Remarks
Horizontal	Front side	Pass	No disturbance of function
	Rear side		
	Left side		
	Right side		
Vertical	Front side	Pass	No disturbance of function
	Rear side		
	Left side		
	Right side		



## 6 Photographs of the Test Set-Up

**Photograph 1: Set-up for measurement of radiated emission**



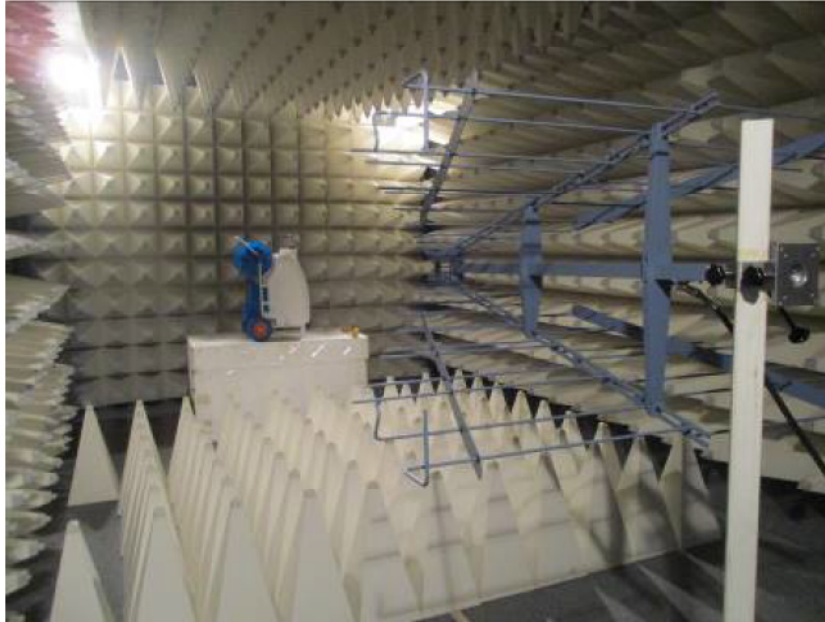
**Photograph 2: Set-up for immunity test of ESD**



**Prüfbericht - Nr.: 50192824 001**  
Test Report No.:

Seite 16 von 17  
Page 16 of 17

**Photograph 3: Set-up for immunity test of RF electromagnetic field**





## 7 List of Tables

Table 1: List of test and measurement equipment.....	4
Table 2: ESD, Positive / Negative Polarity.....	13
Table 3: RF electromagnetic field immunity test results.....	14

## 8 List of Figures

Figure 1: Spectral Diagrams, Radiated Emission, 30MHz-1000MHz, Horizontal Polarization.....	10
Figure 2: Spectral Diagrams, Radiated Emission, 30MHz-1000MHz, Vertical Polarization .....	11

## 9 List of Photographs

Photograph 1: Set-up for measurement of radiated emission.....	15
Photograph 2: Set-up for immunity test of ESD .....	15
Photograph 3: Set-up for immunity test of RF electromagnetic field .....	16