

Prüfbericht - Nr.: 17703453 001 <i>Test Report No.:</i>			Seite 1 von 24 <i>Page 1 of 24</i>														
Auftraggeber: <i>Client:</i>			Yantai Sanxiong Electronics Co., Ltd. No.21, Tongrun Road, APEC Industrial Zone, ZhifuDistrict, Yantai, P.R. China														
Gegenstand der Prüfung: 3D Wheel Alignment <i>Test item:</i>																	
Bezeichnung: <i>Identification:</i>		G6 G7 G8 S750 S760 S770		Serien-Nr.: <i>Serial No.:</i>													
Wareneingangs-Nr.: <i>Receipt No.:</i>		183009856		Eingangsdatum: 24.06.2010 <i>Date of receipt:</i>													
Prüfort: <i>Testing location:</i>			Refer to section 1.1														
Prüfgrundlage: <i>Test specification:</i>			EN 61326-1:2006														
Prüfergebnis: <i>Test Result:</i>			Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>The test item passed the test specification(s).</i>														
Prüflaboratorium: <i>Testing Laboratory:</i>			TÜV Rheinland/CCIC (Qingdao) Co., Ltd.														
geprüft/ tested by: Xie Ying/PE kontrolliert/ reviewed by: Zhao Hongliang/TC																	
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%; text-align: left;">Datum <i>Date</i></th> <th style="width: 25%; text-align: left;">Name/Stellung <i>Name/Position</i></th> <th style="width: 25%; text-align: left;">Unterschrift <i>Signature</i></th> <th style="width: 15%; text-align: left;">Datum <i>Date</i></th> <th style="width: 25%; text-align: left;">Name/Stellung <i>Name/Position</i></th> <th style="width: 25%; text-align: left;">Unterschrift <i>Signature</i></th> </tr> </thead> <tbody> <tr> <td> </td><td> </td><td> </td><td> </td><td> </td><td> </td> </tr> </tbody> </table>						Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>						
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Sonstiges/ Other Aspects: In electrical characteristics, all models mentioned above are similar, the differences among them are the software and model name. Therefore, all EMC tests were performed on the model G8.																	
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> Abkürzungen: P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet </td> <td style="width: 50%; vertical-align: top;"> Abbreviations: P(ass) = Passed F(ail) = failed N/A = not applicable N/T = not tested </td> </tr> </table>						Abkürzungen: P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet	Abbreviations: P(ass) = Passed F(ail) = failed N/A = not applicable N/T = not tested										
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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. <i>This test report 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 safety mark on this or similar products.</i>																	

TEST SUMMARY

4.1.1 HARMONICS ON AC MAINS

Result:

Passed

4.1.2 VOLTAGE FLUCTUATIONS ON AC MAINS

Result:

Passed

4.1.3 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

Result:

Passed

4.2.1 RADIATED DISTURBANCE

Result:

Passed

5.1.1 ELECTROSTATIC DISCHARGE

Result:

Passed

5.1.2 RF RADIATED IMMUNITY

Result:

Passed

5.2.1 FAST TRANSIENTS ON AC POWER LINES

Result:

Passed

5.2.2 INJECTED CURRENT INTO AC POWER PORT

Result:

Passed

5.2.3 SURGES TO AC POWER PORT

Result:

Passed

5.2.4 VOLTAGE DIPS AND INTERRUPTIONS TO AC POWER PORT

Result:

Passed

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1 Test Sites

1.1 Test Facilities

Laboratory: Qingdao Supervision & Testing Center of Product Quality

Address: No. 173 Shenzhen Road, Laoshan District, Qingdao 266061, Shandong

The used test equipment is in accordance with CISPR 16-1 series standards for measurement of radio interference.

The performed tests have been conducted by “Qingdao Supervision & Testing Center of Product Quality”, under supervision of TÜV Rheinland’s engineer.

1.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Type	Serial No.	Calibrated until
EMI Test Receiver	ESCS30	100069	22.03.2011
V-Network	ESH3-Z5	100059	05.06.2011
EMI receiver	ESU40	100159	22.03.2011
Antenna	HL562	100457	22.03.2011
Ultra Compact Generator	UCS500M	0101-46	22.03.2011
ESD Simulator	HF500	100023	30.05.2011
Continuous Wave Simulator	CWS500	0900-13	30.05.2011
CDN	M3	0900-17	06.06.2011
Signal Generator	CGE01KIT05	732	18.09.2011
Antenna	HL046E	100062	30.05.2011

2 General Product Information

2.1 Product Function and Intended Use

The EUTs (equipment under test) are ordinary 3D wheel alignments for aligning wheels of vehicle or similar use. For the further information, refer to the user's manual.

2.2 Ratings and System Details

System input voltage : AC 220-230V for all models
Frequency : 50/60Hz for all models
Rated input power : 20W for all models
Protection class : I

2.3 Independent Operation Modes

The basic operation modes are: "On" or "Off".

2.4 Noise Generating and Noise Suppressing Parts

Refer to the circuit diagram for further information.

2.5 Submitted Documents

Circuit diagrams, PCB layouts, component list, rating label and user's manual.
Photo documentation, construction drawings etc. (Refer to relevant safety report 17703455 001).

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

A software "V3D" was used to for simulated test modes of EUT.

3.4 Special Accessories and Auxiliary Equipment

An "HP" computer was used to control EUT.

3.5 Countermeasures to achieve EMC Compliance

Connection of two pins of "J1" behind light panel of camera is employed to achieve ESD requirement.

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4 Test Results EMISSION

4.1 Emission in the Frequency Range up to 30 MHz

4.1.1 Harmonics on AC Mains

Result:	Passed
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Date of testing : 14.09.2010

Test procedure : IEC 61000-3-2

Test duration : 2.5min

Harmonic order : 2 – 40th

Frequency range : 0 – 2kHz

Ambient : Temperature:20°C, relative humidity: 60%
condition

Following are the measurement results, which were obtained via an automatic measurement system.

Table 2: Harmonic currents measurement result

Equipment category: Class A;

Test voltage: AC 230V, 50Hz

Fundamental current I1: 0.053A; Power factor: 0.358; Active input power: 6.259W.

Harmonic order	Result (avg.) (A)	100% limits (A)	Result (max.) (A)	150% limits (A)	Result
2	2.016E-3	1.08	2.986E-3	1.62	Pass
3	34.893E-3	2.30	35.652E-3	3.45	Pass
4	1.400E-3	430.00E-3	2.150E-3	645.00E-3	Pass
5	32.775E-3	1.14	33.919E-3	1.71	Pass
6	1.552E-3	300.00E-3	2.474E-3	450.00E-3	Pass
7	30.582E-3	770.00E-3	31.833E-3	1194.00E-3	Pass
8	1.212E-3	230.00E-3	1.817E-3	345.00E-3	Pass
9	29.127E-3	400.00E-3	30.623E-3	500.00E-3	Pass
10	1.630E-3	184.00E-3	2.925E-3	276.00E-3	Pass
11	25.287E-3	330.00E-3	26.297E-3	495.00E-3	Pass
12	1.088E-3	153.00E-3	1.654E-3	230.00E-3	Pass
13	20.813E-3	210.00E-3	21.970E-3	315.00E-3	Pass
14	1.013E-3	131.00E-3	1.621E-3	197.00E-3	Pass
15	16.913E-3	150.00E-3	18.935E-3	225.00E-3	Pass
16	966.594E-6	115.00E-3	1.235E-3	173.00E-3	Pass
17	13.275E-3	132.00E-3	14.220E-3	198.00E-3	Pass
18	889.795E-6	102.00E-3	1.360E-3	153.00E-3	Pass
19	9.817E-3	118.00E-3	10.529E-3	177.00E-3	Pass
20	863.384E-6	92.00E-3	1.272E-3	138.00E-3	Pass
21	6.620E-3	107.00E-3	7.288E-3	160.00E-3	Pass
22	835.250E-6	84.00E-3	1.161E-3	126.00E-3	Pass
23	3.681E-3	98.00E-3	4.455E-3	147.00E-3	Pass
24	798.824E-6	77.00E-3	1.002E-3	116.00E-3	Pass
25	1.175E-3	90.00E-3	1.769E-3	135.00E-3	Pass
26	754.108E-6	71.00E-3	948.448E-6	106.00E-3	Pass
27	1.573E-3	83.00E-3	1.966E-3	125.00E-3	Pass
28	720.303E-6	66.00E-3	954.253E-6	99.00E-3	Pass
29	3.129E-3	78.00E-3	3.498E-3	117.00E-3	Pass
30	719.759E-6	61.00E-3	895.979E-6	92.00E-3	Pass
31	4.252E-3	73.00E-3	4.679E-3	110.00E-3	Pass
32	702.352E-6	58.00E-3	878.419E-6	87.00E-3	Pass
33	4.913E-3	68.00E-3	5.324E-3	102.00E-3	Pass
34	703.942E-6	54.00E-3	850.963E-6	81.00E-3	Pass
35	4.965E-3	64.00E-3	5.330E-3	96.00E-3	Pass
36	705.125E-6	51.00E-3	816.927E-6	77.00E-3	Pass
37	4.679E-3	61.00E-3	5.027E-3	92.00E-3	Pass
38	707.267E-6	48.00E-3	831.711E-6	72.00E-3	Pass
39	4.134E-3	58.00E-3	4.361E-3	87.00E-3	Pass
40	798.532E-6	46.00E-3	965.707E-6	69.00E-3	Pass

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4.1.2 Voltage Fluctuations on AC Mains

Result:**Passed**

Test procedure : IEC 61000-3-3

According to the characteristic of the samples (low power), they cannot produce voltage changes, fluctuation and/or flicker exceeding the limits prescribed by IEC 61000-3-3. Therefore, the sample is deemed to meet the requirements of EN 61326-1:2006 without actual testing.

4.1.3 Mains Terminal Continuous Disturbance Voltage

Result:**Passed**

Date of testing : 14.09.2010
Test procedure : EN 61326-1:2006 and CISPR 16-1 series standards
Frequency range : 0.15 - 30MHz
Kind of test site : Shielded room
Ambient conditions : Temperature: 20°C, relative humidity: 60%

Test Setup

Input Voltage : AC 230V, 50Hz
Earthing : Earthed
Operating condition : Test mode: On

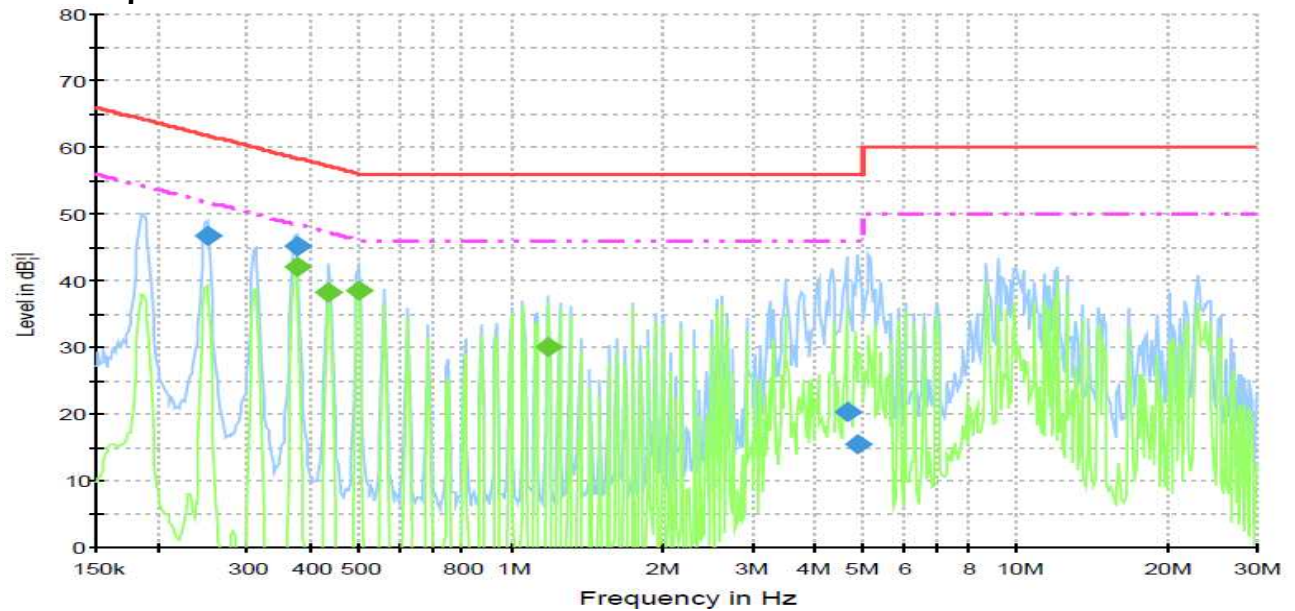
The measurement setup was made according to EN 61326-1:2006 in a shielded room.

The measurement equipment like test receivers, quasi-peak detector and Artificial Mains Network (AMN) are in compliance with CISPR 16-1. Prior to the measurements the test object operated about 15 minutes (warm-up) in order to stabilize its operating conditions and to ensure reliable measurement values.

Furthermore an internal calibration with the test receiver was conducted prior to each measurement. Before measurement, a survey was made while the EUT work in different working mode to determine the maximum disturbance was obtained.

The tested object was settled in a wooden table. The EUT was set 0.8m away from the AMN. (Either the indoor and outdoor unit) The cord longer than necessary to be connected to the AMN was folded forth and back parallel so as to form a bundle with a length between 0.3m and 0.4m.

The following figures and tables were those measured by an automatic measuring system. Both Quasi Peak and Average Value were measured. Quasi-Peak and Average Value were measured and listed respectively where they had a maximum in previous scanning survey.

Figure 1: Spectral Diagrams, Disturbance voltage, 150kHz - 30MHz, L&N
Level dB μ V


Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dB μ V)	Limit (dB μ V)	Margin (dB)
0.249784	46.8	61.8	15.0
0.375018	45.0	58.4	13.4
4.614451	20.3	56.0	35.7
4.840422	15.5	56.0	40.5

Final average measurement results:

Frequency (MHz)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)
0.375018	42.1	48.4	6.3
0.436317	38.2	47.1	8.9
0.499611	38.5	46.0	7.5
1.181324	30.0	46.0	16.0

4.2 Emission in the Frequency Range above 30 MHz

4.2.1 Radiated Disturbance

Result:	Passed
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Date of testing	: 14.09.2010
Port	: Enclosure
Basic Standard	: EN 61326-1:2006
Frequency Range	: 30 – 1000MHz
Limit	: Quasi-peak limits (3m test distance): 30-230MHz, 50dB μ V/m; 230-1000MHz, 57dB μ V/m.
Ambient conditions	: Temperature: 20°C, relative humidity: 60%

Test Setup

Input Voltage	: AC 230V, 50Hz
Operational mode	: Test mode: On

Measuring configuration and description

According to the clause 3.4 of the standard EN 61326-1:2006:

“class A equipment: Equipment suitable for use in establishments other than domestic, and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.”

This EUT is belonged to class A equipment due to this product is used in superclean space and similar industrial location, therefore the limits for class A equipment was used.

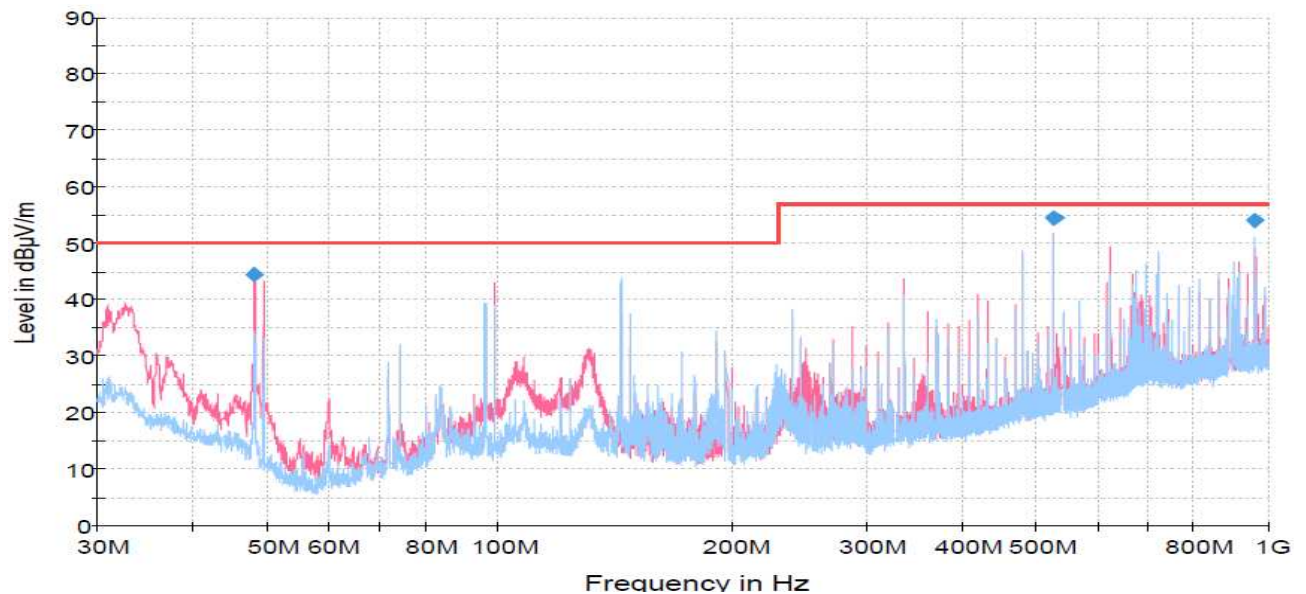
An AC-DC adapter were used when the sample was tested.

The radiated disturbance test was carried out in a semi-anechoic chamber and the distance form the EUT to the antenna is 3 meter.

The EUT was placed on a wooden table that is 0.1m high. During the test, the wooden table was circumvolved 360° around while the antenna was varied from 1m to 4m at the same time to find the maximum disturbance.

The test was performed with the antenna both in its horizontal and vertical polarizations. The figures below were those measured in the operation mode.

Figure 2: Spectrum diagrams and measurement results, 30-1000MHz, Horizontal and Vertical polarization



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarity
48.017333	44.5	50.0	5.5	V
528.192000	54.4	57.0	2.6	V
960.399333	53.9	57.0	3.1	H

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5 Test Results I M M U N I T Y

Result:**Passed**

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

Performance criterion A: During testing normal performance within the specification limits.

Performance criterion B: During testing, temporary degradation, or loss of function or performance which is self-recovering.

Performance criterion C: During testing, temporary degradation, or loss of function or performance which requires operator intervention or system reset occurs.

Performance criterion D: Degradation or loss of function which is not recoverable due to damage to equipment, components, software, or to loss of data.

Testing date: 13.09.2010-14.09.2010

Room temperature: 20°C

Relative Humidity: 60%

5.1 Enclosure

5.1.1 Electrostatic Discharge

Result:	Passed
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The ESD test was carried out according to EN 61326-1:2006. Test setup and all the equipment used are in accordance with the requirements of IEC 61000-4-2.

The EUT is placed on 0.8m wood table above the ground plane. The reference ground plane is connected to the protective earth. The size of the ground plane is more than 2m x 2m.

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 3: ESD, Positive / Negative Polarity

Position	Kind of Discharge	Result	Remarks
Control panel	Air discharge $\pm 8\text{kV}$	Passed	No disturbance of function
Power cord	Air discharge $\pm 8\text{kV}$	Passed	Ditto
Enclosure	Contact discharge $\pm 4\text{kV}$	Passed	Ditto
Screws	Contact discharge $\pm 4\text{kV}$	Passed	Ditto
Coupling plane (VCP)	Contact discharge $\pm 4\text{kV}$	Passed	Ditto

5.1.2 RF Radiated Immunity

Result:	Passed
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The RF radiated immunity test was carried out according to EN 61326-1:2006. Test setup and all the equipment used are in accordance with the requirements of IEC 61000-4-3.

During the test, the sample was in its normal operations and the test was performed both at horizontal and vertical polarizations.

Modulation : 80% 1kHz AM
 Frequency scan speed : Frequency step: 1%; Dwell time: 2s
 Performance criteria : A

Table 4: RF radiated immunity test

Frequency range	Test level	Polarization	Result	Remarks
80-1000MHz	10V/m	Horizontal	Pass	No disturbance of function
		Vertical	Pass	Ditto
1.4-2.0GHz	3V/m	Horizontal	Pass	Ditto
		Vertical	Pass	Ditto
2.0-2.7GHz	1V/m	Horizontal	Pass	Ditto
		Vertical	Pass	Ditto

5.2 Input and Output AC Power Ports

5.2.1 Fast Transients on AC Power Lines

Result:	Passed
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The immunity against fast transients on AC power lines was tested in accordance with EN 61326-1:2006.

Test setup and the fast transient noise generator were in accordance with IEC 61000-4-4 which is specified by EN 61326-1:2006. The EUT was just placed on the reference ground plane of aluminum and was insulated from it by an insulating support 0.1m thick.

Test Voltage	: 2kV
Polarity	: Negative/positive
Repetition frequency	: 5kHz
Test duration	: ≥120sec
Tr/Tn	: 5ns/50ns
Performance criteria	: B

Table 5: Burst, AC Power lines, Positive and Negative Polarity

Line	Result	Remarks
L+N+PE-GRD	±2kV Passed	No disturbance of function

5.2.2 Injected Current into AC Power Port

Result:**Passed**

The immunity against injected current into AC power port was tested according to EN 61326-1:2006 in a shielded room. The Test setup and the test generator was according to IEC 61000-4-6 which is specified by EN 61326-1:2006.

The EUT is placed on a ground reference plane and shall be insulated from it by an insulating support 0.1m thick. And the minimum distance between the EUT and all other conductive structures except the ground plane beneath the EUT is more than 0.5m.

Voltage Level	: 3V(rms)(unmodulated)
Environmental phenomena	: r.f. current, common mode, 1kHz, 80%AM
Source impedance	: 150 Ω
Frequency range	: 0.15 – 80 MHz
Step size/dwell time	: 1%/2s
Performance criteria	: A

Table 6: Injected current, AC Power Port

Line	Result	Remarks
AC Input port	Passed	No disturbance of function

5.2.3 Surges to AC Power Port

Result:	Passed
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The immunity against surges to AC power port was tested in accordance to EN 61326-1:2006. Test setup and the Combination Wave Generator (CWG) were according to IEC 61000-4-5 which is specified by EN 61326-1:2006.

The EUT is placed on a 0.1m wood table above the ground plane.

Open-circuit Test Voltage	: 1kV (phase to neutral) 2kV (phase to PE)
Tr/Tn	: 1.2/50µs (open-circuit voltage) 8/20µs (short-circuit current)
Test numbers	: 5 positive and 5 negative pulses
Repetition rate	: 1 surge/min
Performance criteria	: B

Table 7: Surges to AC Power lines, positive/negative

Line	Result	Remarks
Phase to neutral 1kV	Passed	No disturbance of function
Phase to PE 2kV	Passed	Ditto
Neutral to PE 2kV	Passed	Ditto

5.2.4 Voltage dips and interruptions to AC Power Port

Result:	Passed
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The immunity against voltage dips and interruptions to AC power port was tested in accordance to EN 61326-1:2006. Test setup and the test generator were according to IEC 61000-4-11 which is specified by EN 61326-1:2006. The EUT was placed directly on the table.

Test level	: 100% reduction, 1T; 60% reduction, 10T; 30% reduction, 25T; 100% reduction, 250T.
Performance criteria	: B (100% reduction, 1T) ; C (60% reduction, 10T, 30% reduction, 25T and 100% reduction, 250T)

Table 8: Test condition and Test Result for Voltage dips

Environmental Phenomena	Test level (in % U_T)	Duration (in period of the rated frequency)	Remarks
Interruptions	0	250T	During the test, the EUT was off Manual restart can be achieved
Dips	0	1T	No disturbance of function
Dips	40	10T	No disturbance of function
Dips	70	25T	No disturbance of function

6 Photographs of the Test Set-Up

Photograph 1: Set-up for harmonics current



Photograph 2: Set-up for measurement of disturbance voltage

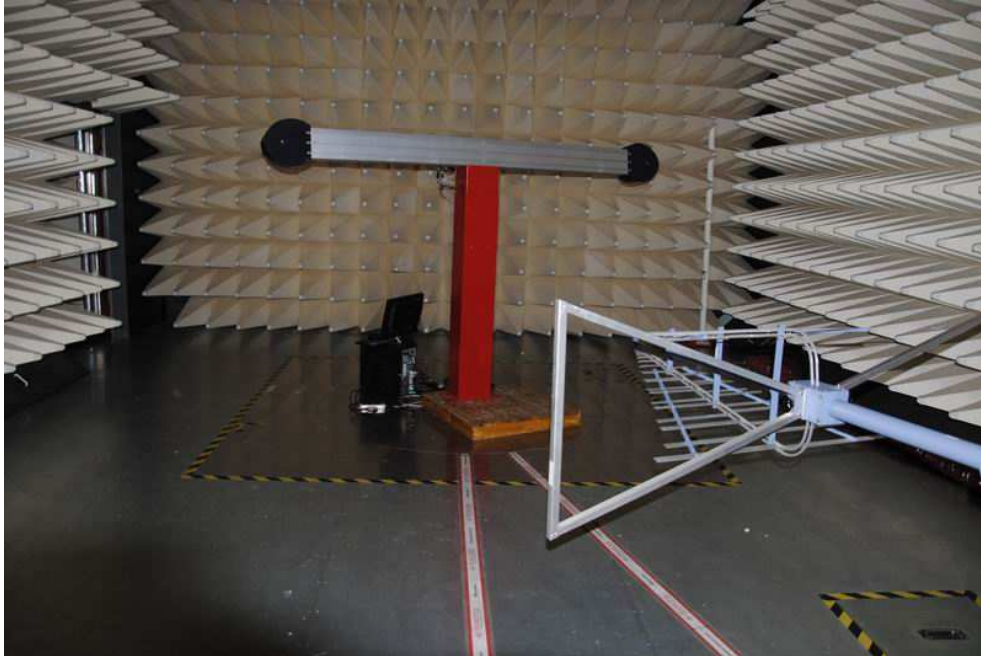


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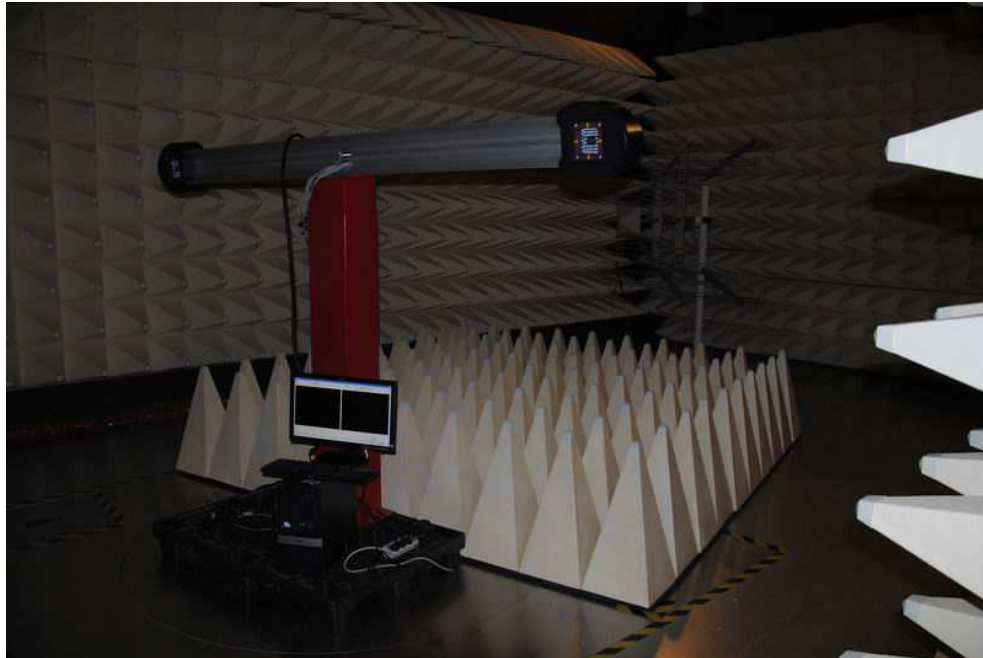
Photograph 3: Set-up for measurement of radiated disturbance**Photograph 4: Set-up for ESD**

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