

Certificate

Issue Date: March 20, 2024
Ref. Report No. ISL-20LE142CE-R2

Product Name: : Hydrogen Generator
Main Model : SE-500
Responsible Party : Hydrogen Breathing Century Intl Co., LTD.
Address : NO. 11,Aly.7,Ln.330,Yanshou St.,Songshan Dist.,Taipei City 105028,Taiwan

We, **International Standards Laboratory Corp.**, hereby certify that:

The device bearing the trade name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in European Council Directive- EMC Directive 2014/30/EU and UK Directive Electromagnetic Compatibility Regulations 2016. And Our laboratories is the accredited laboratories and are approved according to ISO/IEC 17025. The device was passed the test performed according to :



Standards:

CE

EN 55011:2016/A1:2017, CISPR 11:2015/A1:2016: Industrial, scientific and medical equipment Radio frequency disturbance characteristics Limits and methods of measurement.
EN 61326-1:2013: Electrical equipment for measurement, control and laboratory use -EMC requirements - Part 1: General requirements.
EN 61000-4-2:2009/ IEC 61000-4-2:208
EN 61000-4-3:2006+A1:2008 +A2:2010/ IEC 61000-4-3:2006+A1:2007+A2:2010
EN 61000-4-4:2012 and IEC 61000-4-4:2012
EN 61000-4-5: 2014+A1:2017 and IEC 61000-4-5: 2014+A1:2017
EN 61000-4-6:2014+AC:2015 and IEC 61000-4-6:2013
EN 61000-4-8: 2010 and IEC 61000-4-8: 2009
EN 61000-4-11: 2004+A1:2017 and IEC 61000-4-11: 2004+A1:2017
EN 61000-3-2:2014 and IEC 61000-3-2:2014
EN 61000-3-3: 2013 and IEC 61000-3-3: 2013

UK

BS EN 55011:2016+A2:2021
BS EN IEC 61326-1:2021
BS EN IEC 61000-3-2:2019+A1:2021
BS EN 61000-3-3:2013+A2:2021+AC:2022
BS EN 61000-4-2:2009
BS EN IEC 61000-4-3:2020
BS EN 61000-4-4:2012
BS EN 61000-4-5:2014+A1:2017
BS EN 61000-4-6:2014
BS EN 61000-4-8:2010
BS EN IEC 61000-4-11:2020+AC:2022

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

The Laboratory evaluates measurement inaccuracies based on regulatory or standard document specifications and is listed in the report for reference. According to customer agreement, the laboratory issues test reports based on the regulations or standards specifications, the measurement uncertainty is not considered in conformity decision rules.

Benson Chen / Manager

International Standards Laboratory Corp. LT Lab.

TEL: +886-3-263-8888 FAX: +886-3-263-8899

No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan

TEST REPORT

of

EN 55011 / BS EN 55011
EN IEC 61326-1 / BS EN IEC 61326-1
EN IEC 61000-3-2 / BS EN IEC 61000-3-2
EN 61000-3-3 / BS EN 61000-3-3

Product: **Hydrogen Generator**
Main Model: **SE-500**
Applicant: **Hydrogen Breathing Century Intl Co., LTD.**
Address: **NO. 11, Aly.7, Ln.330, Yanshou St., Songshan Dist.,
Taipei City 105028, Taiwan**

Test Performed by:



International Standards Laboratory Corp. LT Lab.

TEL: +886-3-263-8888 FAX: +886-3-263-8899

No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan

Report No.: **ISL-20LE142CE-R2**
Issue Date : **March 20, 2024**



Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein. According to customer agreement, the laboratory issues test reports based on the regulations or standards specifications, the measurement uncertainty is not considered in conformity decision rules. This test report shall not be reproduced except in full, without the written approval of International Standards Laboratory Corp.

Contents of Report

1.	General.....	1
1.1	Certification of Accuracy of Test Data.....	1
1.2	Test Standards.....	2
1.3	Description of EUT	4
1.4	Description of Support Equipment	6
1.5	Software for Controlling Support Unit.....	6
1.6	I/O Cable Condition of EUT and Support Units	6
2.	Power Main Port Conducted Emissions	7
2.1	Test Setup and Procedure	7
2.2	Conduction Test Data: Configuration 1.....	8
2.3	Test Setup Photo.....	10
3.	Radiated Disturbance Emissions.....	12
3.1	Test Setup and Procedure	12
3.2	Radiation Test Data: Configuration 1	14
3.3	Test Setup Photo.....	15
4.	Electrostatic discharge (ESD) immunity	16
4.1	Test Specification	16
4.2	Test Setup	16
4.3	Test Result	16
4.4	Test Point.....	17
4.5	Test Setup Photo.....	19
5.	Radio-Frequency, Electromagnetic Field immunity.....	20
5.1	Test Specification	20
5.2	Test Setup	20
5.3	Test Result	20
5.4	Test Setup Photo.....	21
6.	Electrical Fast transients/burst immunity.....	22
6.1	Test Specification and Setup	22
6.2	Test Setup Photo.....	24
7.	Surge Immunity	25
7.1	Test Specification and Setup	25
7.2	Test Setup Photo.....	26
8.	Immunity to Conductive Disturbance.....	27
8.1	Test Specification and Setup	27
8.2	Test Setup Photo.....	28
9.	Power Frequency Magnetic Field immunity.....	29
9.1	Test Specification and Setup	29
9.2	Test Setup Photo.....	30
10.	Voltage Dips, Short Interruption and Voltage Variation immunity	31
10.1	Test Specification and Setup	31
10.2	Test Setup Photo.....	32

11.	Harmonics	33
11.1	Test Specification and Setup	33
11.2	Test Data	35
11.3	Test Setup Photo.....	37
12.	Voltage Fluctuations	38
12.1	Test Specification and Setup	38
12.2	Test Data	39
12.3	Test Setup Photo.....	40
13.	Appendix.....	41
13.1	Appendix A: Test Equipment.....	41
13.2	Appendix B: Uncertainty of Measurement	44
13.3	Appendix D: Photographs of EUT Please refer to the File of ISL-20LE142P	45

1. General

1.1 Certification of Accuracy of Test Data

Standards: Please refer to 1.2

Equipment Tested: Hydrogen Generator

Model: SE-500

Applicant: Hydrogen Breathing Century Intl Co., LTD.

Sample received Date: January 6, 2020

Final test Date: EMI: refer to the date of test data
EMS: February 10, 2020

Test Site: Chamber 02; Conduction 02; Immunity 02

Test Distance: 10M (EMI test)

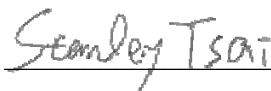
Temperature: refer to each site test data

Humidity: refer to each site test data

Input power: Conduction input power: AC 230 V / 50 Hz
Radiation input power: AC 230 V / 50 Hz
Immunity input power: AC 230 V / 50 Hz

Test Result: PASS

Report Engineer: Cheryl Tung

Test Engineer: 
Stanley Tsai

Approved By: 
Angus Chu / Sr. Manager

1.2 Test Standards

The tests which this report describes were conducted by an independent electromagnetic compatibility consultant, International Standards Laboratory Corp. in accordance with the following standards:

EN 55011:2016/A1:2017, CISPR 11:2015/A1:2016 and BS EN 55011:2016+A2:2021: Industrial, scientific and medical equipment Radio frequency disturbance characteristics Limits and methods of measurement.

EN 61326-1:2013: Electrical equipment for measurement, control and laboratory use -EMC requirements - Part 1: General requirements.

Standard	Description	Results	Criteria
EN 61000-4-2:2009 IEC 61000-4-2:2008 BS EN 61000-4-2:2009	Electrostatic Discharge	Pass	B
EN 61000-4-3:2006+A1:2008 +A2:2010 IEC 61000-4-3:2006+A1:2007+A2:2010 BS EN IEC 61000-4-3:2020	Radio-Frequency, Electromagnetic Field	Pass	A
EN 61000-4-4:2012 IEC 61000-4-4:2012 BS EN 61000-4-4:2012	Electrical Fast Transient/Burst	Pass	B
EN 61000-4-5:2014+A1:2017 IEC 61000-4-5:2014+A1:2017 BS EN 61000-4-5:2014+A1:2017	Surge	Pass	B
EN 61000-4-6:2014+AC:2015 IEC 61000-4-6:2013 BS EN 61000-4-6:2014	Conductive Disturbance	Pass	A
EN 61000-4-8:2010 IEC 61000-4-8:2009 BS EN 61000-4-8:2010	Power Frequency Magnetic Field	Pass	A
EN 61000-4-11:2004+A1:2017 IEC 61000-4-11:2004+A1:2017 BS EN IEC 61000-4-11:2020+AC:2022	Voltage Dips / Short Interruption and Voltage Variation		
	0% in 0.5 period	Pass	B
	0% in 1 period	Pass	B
	30% in 25 period	Pass	C
	0% in 250 period	Pass	C

Standard	Description	Results
EN 61000-3-2:2014 IEC 61000-3-2:2014 BS EN IEC 61000-3-2:2019+A1:2021	Limits for harmonics current emissions	Pass
EN 61000-3-3:2013 IEC 61000-3-3:2013 BS EN 61000-3-3:2013+A2:2021+AC:2022	Limits for voltage fluctuations and flicker in low-voltage supply systems.	Pass

1.2.1 Performance Criteria for Compliance

EN 61326-1 and BS EN IEC 61326-1

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.

ISL
Draft

1.3 Description of EUT

EUT

1. This report is based on the report: 20LE142CE-R1.
2. This report is to add the UK Directive and version of test standards.
3. This report is to change of company name. It will not inflect the original tests, so provide the original data in this report.
4. This report test data using report number 20LE142CE-R1

Description:	Hydrogen Generator
Model:	SE-500
Condition	Pre-Production
Serial Number	N/A
AC Power cable	C13 Type / Manufacturer: CABLE-JACK TECHNOLOGY INC Model: CPOW209582018000
Maximum Operating Frequency	32.768MHz
The radiation test should be tested till	1GHz
Classification of equipment	Class B group 1 equipment
Environment	Basic electromagnetic environmental conditions test

The devices can be installed inside the EUT are listed below:

Components	Vendor	Model Name
Main board	Hydrogenmed Biotechnology Corp.	SE-500 Main Board_R02
Current Control Board	Hydrogenmed Biotechnology Corp.	SE-500 CC Board_R03
LED Panel Board	Hydrogenmed Biotechnology Corp.	SE-500 LED Panel Board_R02
+12V Power Board	Hydrogenmed Biotechnology Corp.	+12V Power_R03
Blue Light Bubble Board	Hydrogenmed Biotechnology Corp.	SE-500 LED Panel Board_R02
PRESSURE SENSOR BOARD	Hydrogenmed Biotechnology Corp.	SE-500 PS Board_R01
USB BOARD	Hydrogenmed Biotechnology Corp.	USB Board
Adapter	Adapter Tech.	Model:ATS250T-P120 Input:100-240V~50-60Hz 3.3A MAX Output:12V/20A

The I/O ports of EUT are listed below:

I/O Port Type	Quantity
DC in Port	1

Test configurations:

Configuration	Adapter
1	Hydrogenmed (Model: ATS250T-P120)

EMI Noise Source:

Please refer to technical document

EMI Solution:

Refer to the photo	Materials	SPEC (L*W*H) (mm)	Manufacturer
EUT-18(Mark 1)	Core	25 * 12 * 15	King Core
EUT-18 (Mark 2)	Core	43 * 22.5 * 22.5	CORE MASTER

1.4 Description of Support Equipment

NA

1.5 Software for Controlling Support Unit

Test programs exercising various part of EUT were used. The programs were executed as follows:

1. Turn on the power of EUT
2. EUT transmits hydrogen to the hydrogen tube through the water bottle
3. Repeat the above steps.

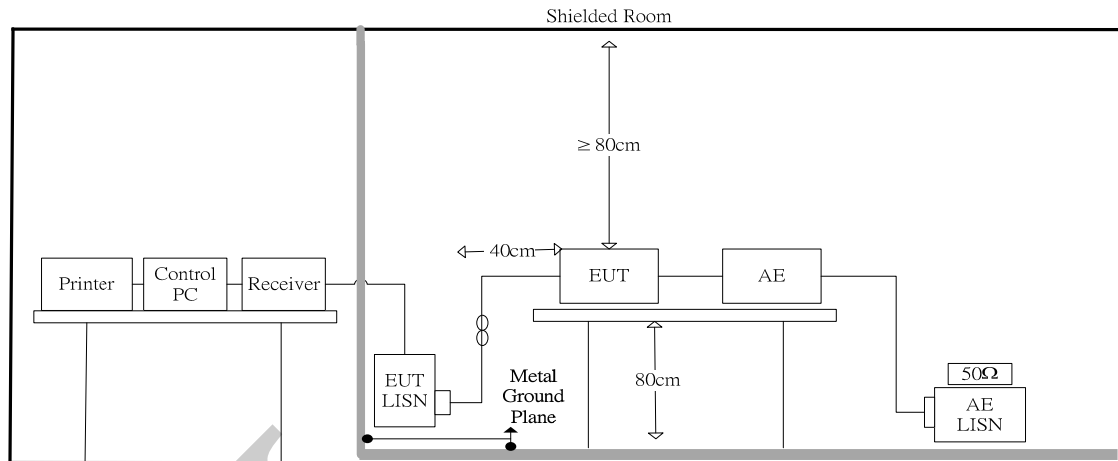
1.6 I/O Cable Condition of EUT and Support Units

Description	Path	Length	Shielding	Core	Remark
AC Power Cable	230V to adapter	1m	No	Yes	
Power Cable	Adapter to EUT	1.2m	No	Yes	

2. Power Main Port Conducted Emissions

2.1 Test Setup and Procedure

2.1.1 Test Setup



2.1.2 Test Procedure

The measurements are performed in a 3.5m x 3.4m x 2.5m shielded room, which referred as Conduction 01 test site, or a 3m x 3m x 2.3m test site, which referred as Conduction 02 test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

Power to the EUT was provided through the LISN which has the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the standard. Power to the LISNs were filtered to eliminate ambient signal interference and these filters were bonded to the ground plane. Peripheral equipment required to provide a functional system (support equipment) for EUT testing was powered from the second LISN through a ganged, metal power outlet box which is bonded to the ground plane at the LISN.

The interconnecting cables were arranged and moved to get the maximum measurement. Both the line of power cord, hot and neutral, were measured.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude. All of the interfaces cables were manipulated according to EN 55011 / BS EN 55011 requirements.

2.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	150kHz--30MHz
Detector Function:	Quasi-Peak / Average Mode
Resolution Bandwidth:	9kHz

2.2 Conduction Test Data: Configuration 1 -Live



No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.150	48.52	32.85	9.69	58.21	66.00	-7.79	42.54	56.00	-13.46
2	0.158	46.91	30.20	9.69	56.60	65.57	-8.97	39.89	55.57	-15.68
3	0.322	34.90	19.55	9.69	44.59	59.66	-15.07	29.24	49.66	-20.42
4	2.010	31.16	16.65	9.75	40.91	56.00	-15.09	26.40	46.00	-19.60
5	16.042	30.28	23.05	9.97	40.25	60.00	-19.75	33.02	50.00	-16.98
6	16.690	36.15	25.03	9.97	46.12	60.00	-13.88	35.00	50.00	-15.00
7	17.746	39.35	28.22	9.97	49.32	60.00	-10.68	38.19	50.00	-11.81
8	18.558	33.48	26.27	9.97	43.45	60.00	-16.55	36.24	50.00	-13.76

Note:

Margin = QP/AVG Emission - Limit

QP/AVG Emission = QP_R/AVG_R + Correct Factor

Correct Factor = LISN Loss + Cable Loss

A margin of -8dB means that the emission is 8dB below the limit

The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.

If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

- Neutral



Address: No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,
Tao Yuan City 325, Taiwan.
Tel: 03-4071718

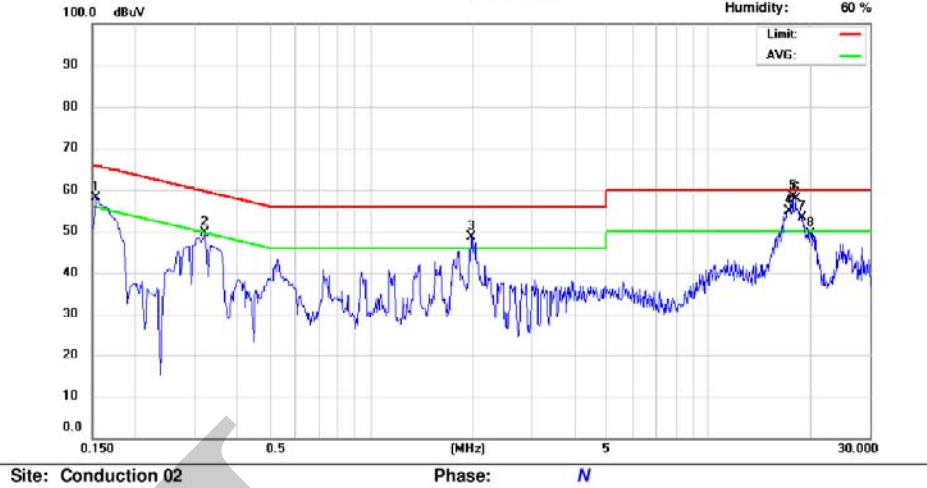
Conducted Emission Measurement

Date: 2020/1/15

operator: Elric Chen

Temperature: 26 °C

Humidity: 60 %



No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.154	46.72	30.83	9.68	56.40	65.78	-9.38	40.51	55.78	-15.27
2	0.322	35.84	23.59	9.68	45.52	59.66	-14.14	33.27	49.66	-16.39
3	1.990	33.47	19.33	9.75	43.22	56.00	-12.78	29.08	46.00	-16.92
4	17.046	36.53	26.82	10.04	46.57	60.00	-13.43	36.86	50.00	-13.14
5	17.706	38.07	29.29	10.06	48.13	60.00	-11.87	39.35	50.00	-10.65
6	18.326	35.61	28.41	10.06	45.67	60.00	-14.33	38.47	50.00	-11.53
7	19.138	31.52	24.65	10.06	41.58	60.00	-18.42	34.71	50.00	-15.29
8	20.038	28.40	21.35	10.08	38.48	60.00	-21.52	31.43	50.00	-18.57

Note:

Margin = QP/AVG Emission - Limit

QP/AVG Emission = QP_R/AVG_R + Correct Factor

Correct Factor = LISN Loss + Cable Loss

A margin of -8dB means that the emission is 8dB below the limit

The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.

If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

2.3 Test Setup Photo

Front View



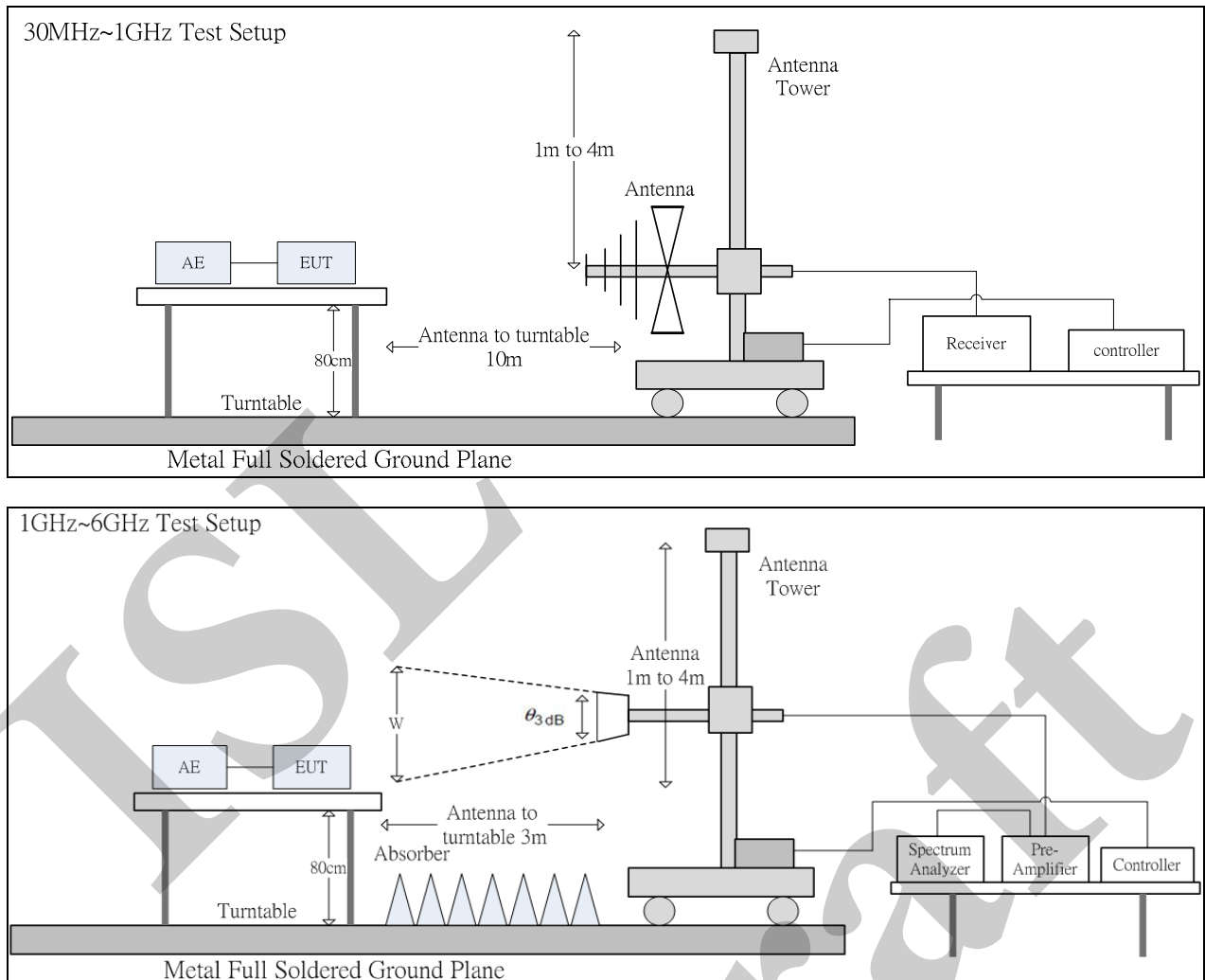
Back View



3. Radiated Disturbance Emissions

3.1 Test Setup and Procedure

3.1.1 Test Setup



The 3dB beam width of the horn antenna used for the test is as shown in the table below.

Frequency (GHz)	E-plane	H-plane	$\theta_{3dB}(\min)$	d= 3 m
				w (m)
1	88°	147°	88°	5.79
2	68°	119°	68°	4.04
3	73°	92°	73°	4.44
4	70°	89°	70°	4.20
5	55°	60°	55°	3.12
6	63°	62°	62°	3.60

3.1.2 Test Procedure

The radiated emissions test will then be repeated on the open site or chamber to measure the amplitudes accurately and without the multiple reflections existing in the shielded room. The EUT and support equipment are set up on the turntable of one of 10 meter open field sites or 10 meter chamber. Desktop EUT are set up on a wooden stand 0.8 meter above the ground or floor-standing arrangement shall be placed on the horizontal ground reference plane. The test volume for a height of up to 30 cm may be obstructed by absorber placed on the ground plane.

For the initial measurements, the receiving antenna is varied from 1-4 meter height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. The highest emissions between 30 MHz to 1000 MHz were analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. The highest emissions between 1 GHz to 6 GHz were analyzed in details by operating the spectrum analyzer in peak and average mode to determine the precise amplitude of the emissions.

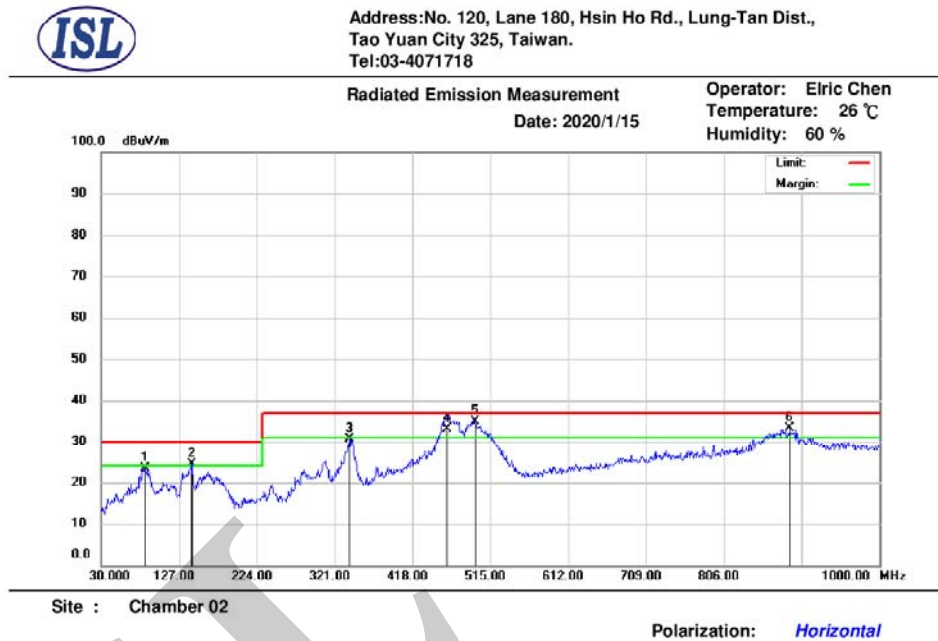
At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum measurement. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings. All of the interfaces cables were manipulated according to EN 55011 / BS EN 55011 requirements.

The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes. If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz. If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.

3.1.3 Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	30MHz--1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth:	120kHz
Frequency Range:	Above 1 GHz to 6 GHz
Detector Function:	Peak/Average Mode
Resolution Bandwidth:	1MHz

3.2 Radiation Test Data: Configuration 1 - Radiated Emissions (Horizontal)



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	85.29	45.64	-22.21	23.43	30.00	-6.57	400	206	peak
2	142.52	40.55	-16.21	24.34	30.00	-5.66	400	294	peak
3	339.43	43.61	-12.86	30.75	37.00	-6.25	250	89	peak
4	461.27	42.40	-9.39	33.01	37.00	-3.99	150	302	QP
5	496.57	43.77	-8.80	34.97	37.00	-2.03	150	218	peak
6	888.45	35.43	-2.14	33.29	37.00	-3.71	100	351	peak

* Note:

Margin = Emission – Limit

Emission = Radiated Amplitude + Correct Factor

Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

Antenna Distance: 10 meters

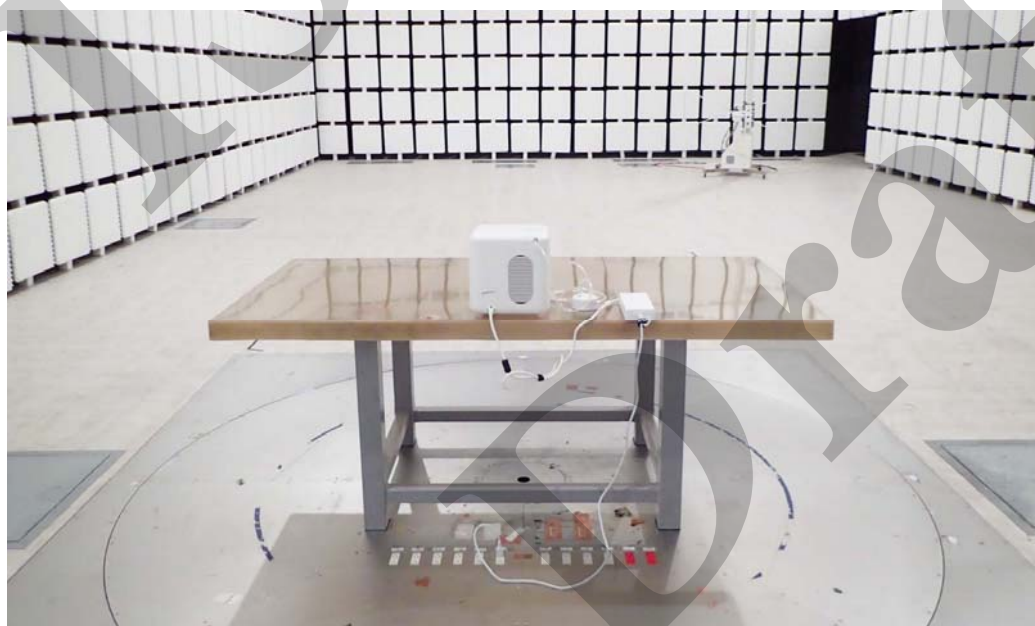
Below 1GHz test, if the peak measured value meets the QP limit, it is unnecessary to perform the QP measurement.

3.3 Test Setup Photo

Front View (30MHz~1GHz)



Back View (30MHz~1GHz)



4. Electrostatic discharge (ESD) immunity

4.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-2 / IEC 61000-4-2 / BS EN 61000-4-2 (details referred to Sec 1.2)
Test Level:	Air +/- 2 kV, +/- 4 kV, +/- 8 kV Contact +/- 2 kV, +/- 4 kV
Criteria:	B
Test Procedure	refer to ISL QA -T4-E-S7
Temperature:	22 °C
Humidity:	40%

Selected Test Point

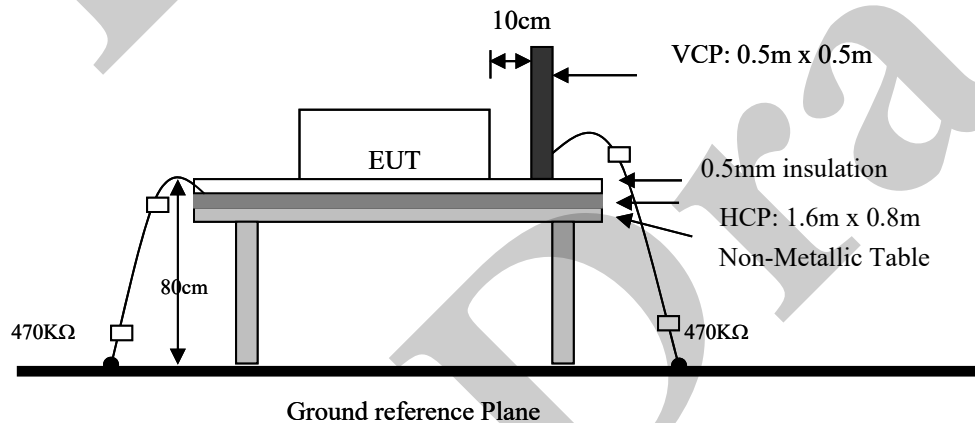
Air: discharges were applied to slots, aperture or insulating surfaces. 10 single air discharges were applied to each selected points.

Contact: Total 200 discharges minimum were to the selected contact points.

Indirect Contact Points: 25 discharges were applied to center of one edge of VCP and each EUT side of HCP with 10 cm away from EUT.

4.2 Test Setup

EUT is 1m from the wall and other metallic structure. When Battery test mode is needed, a cable with one 470K Ω resistor at two rare ends is connected from metallic part of EUT and screwed to HCP.



4.3 Test Result

Performance of EUT complies with the given specification

4.4 Test Point

Red arrow lines indicate the contact points, and blue arrow lines indicate the air points.

Figure 1: Test Point Assignments Discharge:

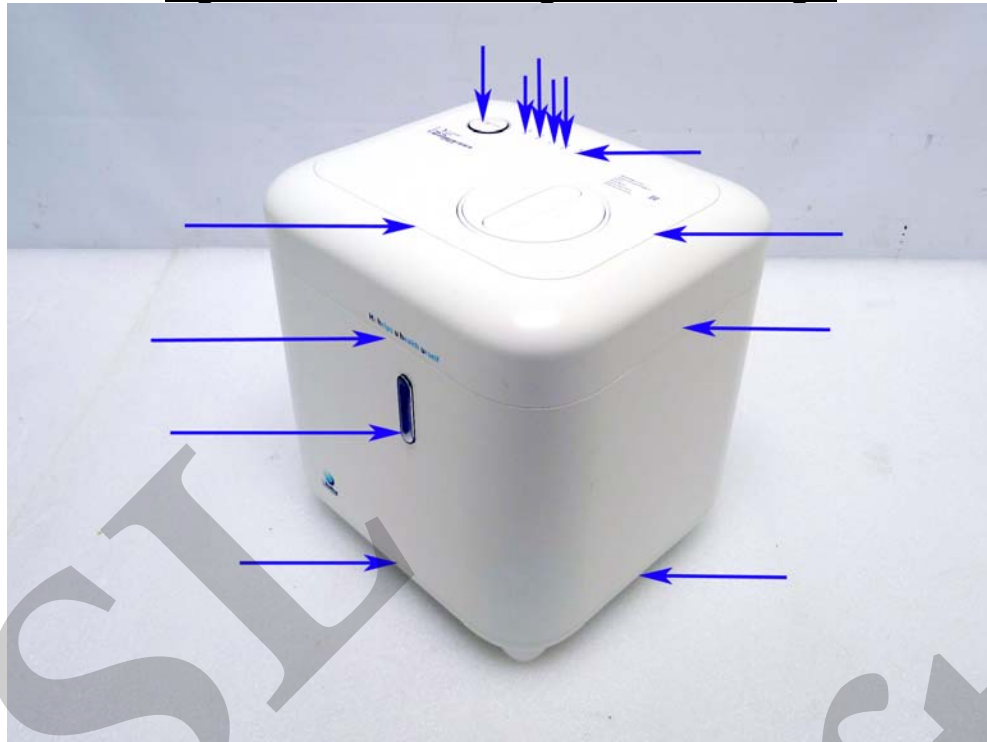


Figure 2: Test Point Assignments Discharge:

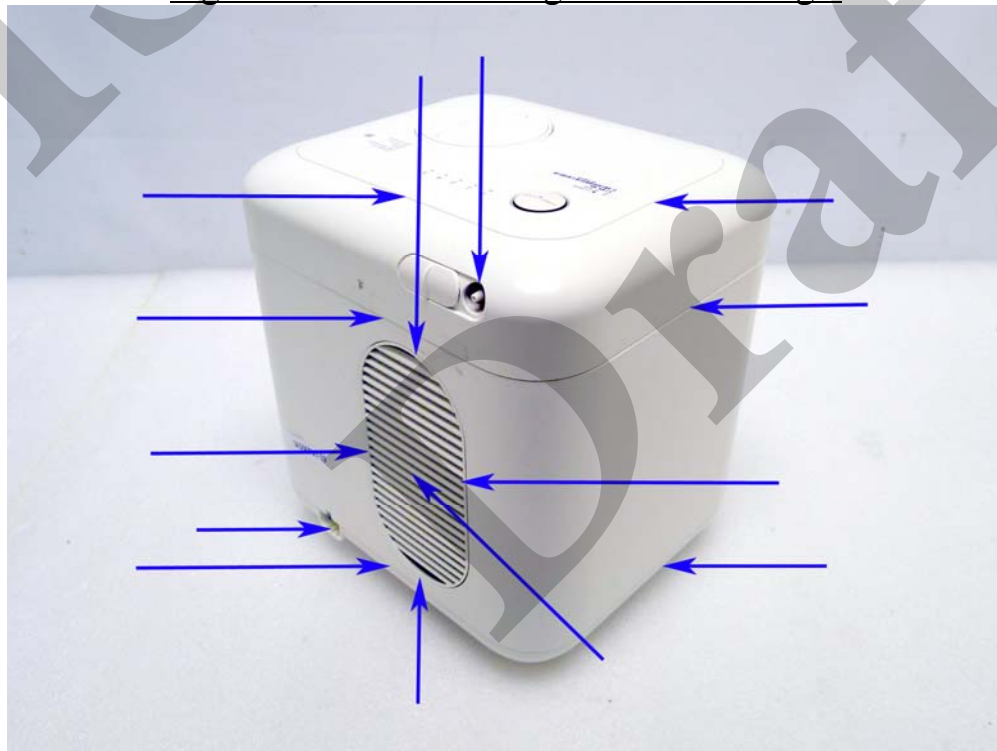


Figure 3: Test Point Assignments Discharge:

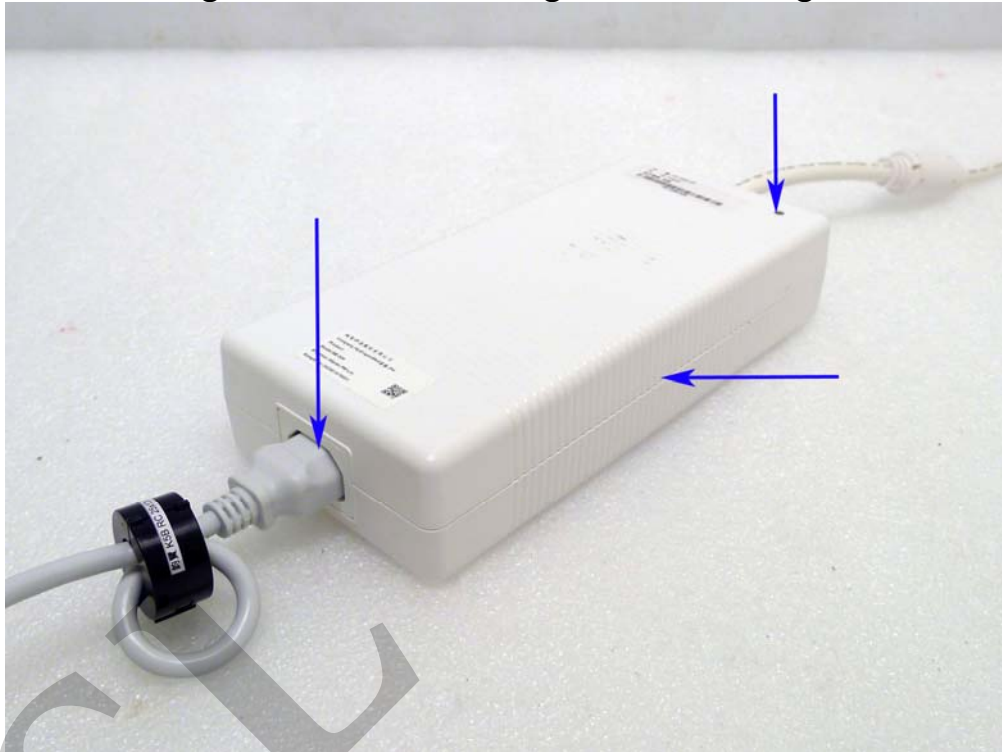


Figure 4: Test Point Assignments Discharge:



4.5 Test Setup Photo



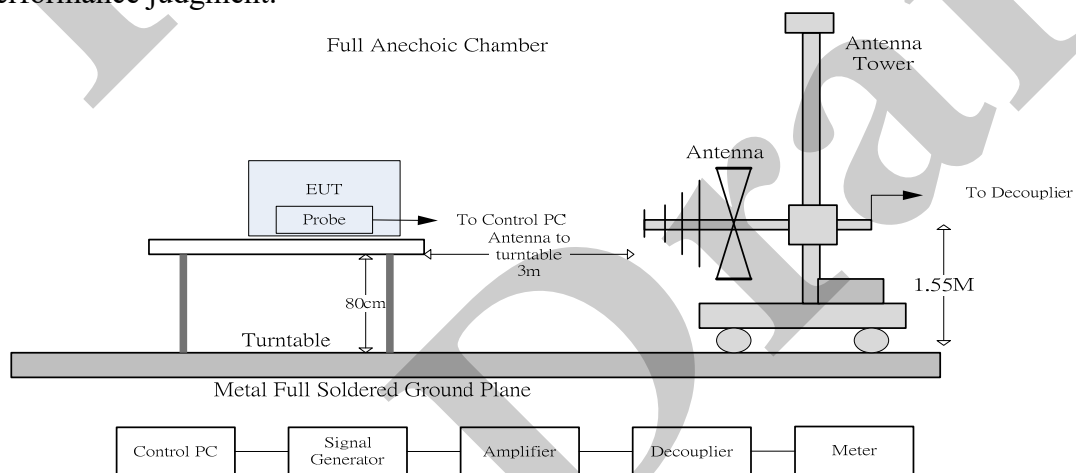
5. Radio-Frequency, Electromagnetic Field immunity

5.1 Test Specification

Port:	Enclosure
Basic Standard:	EN IEC 61000-4-3 / IEC 61000-4-3 / BS EN IEC 61000-4-3 (details referred to Sec 1.2)
Test Level:	3 V/m ,1 V/m
Modulation:	AM 1kHz 80%
Frequency range:	3 V/m (80 MHz to 1 GHz) 3 V/m (1,4 GHz to 2 GHz) 1 V/m (2,0 GHz to 2,7 GHz)
Frequency Step:	1% of last step frequency
Dwell time:	3s
Polarization:	Vertical and Horizontal
EUT Azimuth Angle	☒ 0° ☒ 90° ☒ 180° ☒ 270°
Criteria:	A
Test Procedure	refer to ISL QA -T4-E-S8
Temperature:	24°C
Humidity:	55%

5.2 Test Setup

The field sensor is placed at one calibration grid point to check the intensity of the established fields on both polarizations. EUT is adjusted to have each side of EUT face coincident with the calibration plane. A CCD camera and speakers are used to monitor the condition of EUT for the performance judgment.



5.3 Test Result

Performance of EUT complies with the given specification

5.4 Test Setup Photo



6. Electrical Fast transients/burst immunity

6.1 Test Specification and Setup

6.1.1 Test Specification

Port:	AC mains
Basic Standard:	EN 61000-4-4 / IEC 61000-4-4 / BS EN 61000-4-4 (details referred to Sec 1.2)
Test Level:	AC Power Port: +/- 1 kV
Rise Time:	5ns
Hold Time:	50ns
Burst Period:	300ms
Repetition Frequency:	5kHz
Criteria:	B
Test Procedure	refer to ISL QA -T4-E-S9
Temperature:	25 °C
Humidity:	56%

Test Procedure

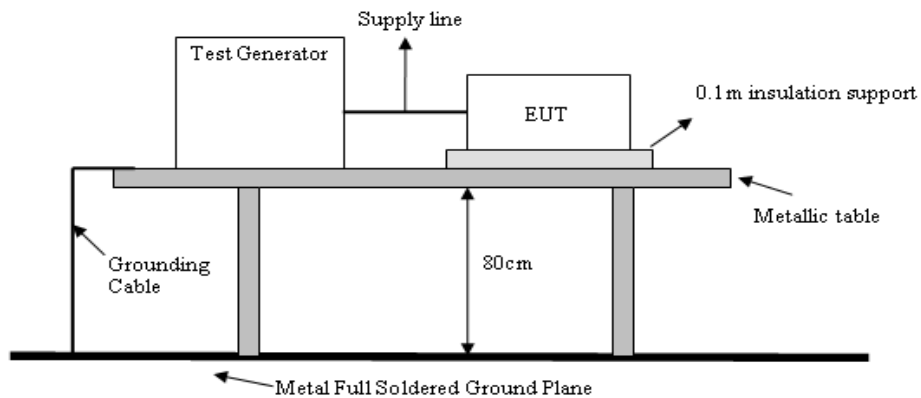
The EUT was setup on a nonconductive table 0.1 m above a reference ground plane.

Test Points	Polarity	Result	Comment
Line	+	N	60 sec
	-	N	60 sec
Neutral	+	N	60 sec
	-	N	60 sec
Ground	+	N	60 sec
	-	N	60 sec
Line to Neutral	+	N	60 sec
	-	N	60 sec
Line to Ground	+	N	60 sec
	-	N	60 sec
Neutral to Ground	+	N	60 sec
	-	N	60 sec
Line to Neutral to Ground	+	N	60 sec
	-	N	60 sec

Note: 'N' means normal, the EUT function is correct during the test.

6.1.2 Test Setup

EUT is at least 50cm from the conductive structure.



6.1.3 Test Result

Performance of EUT complies with the given specification

6.2 Test Setup Photo



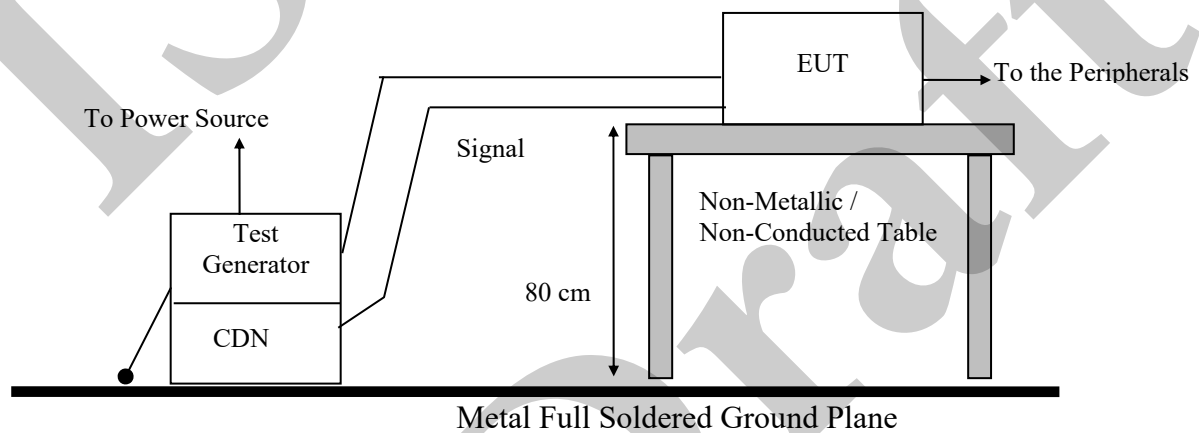
7. Surge Immunity

7.1 Test Specification and Setup

7.1.1 Test Specification

Port:	AC mains
Basic Standard:	EN 61000-4-5 / IEC 61000-4-5 / BS EN 61000-4-5 (details referred to Sec 1.2)
Test Level:	Line to Line: +/- 0.5 kV Line to Earth: +/- 0.5 kV, +/- 1 kV
Rise Time:	1.2us
Hold Time:	50us
Repetition Rate:	30 seconds
Angle:	☒ 0° ☒ 90° ☒ 180° ☒ 270°
Criteria:	B
Test Procedure:	refer to ISL QA -T4-E-S10
Temperature:	25°C
Humidity:	55%

7.1.2 Test Setup



7.1.3 Test Result

Performance of EUT complies with the given specification

7.2 Test Setup Photo



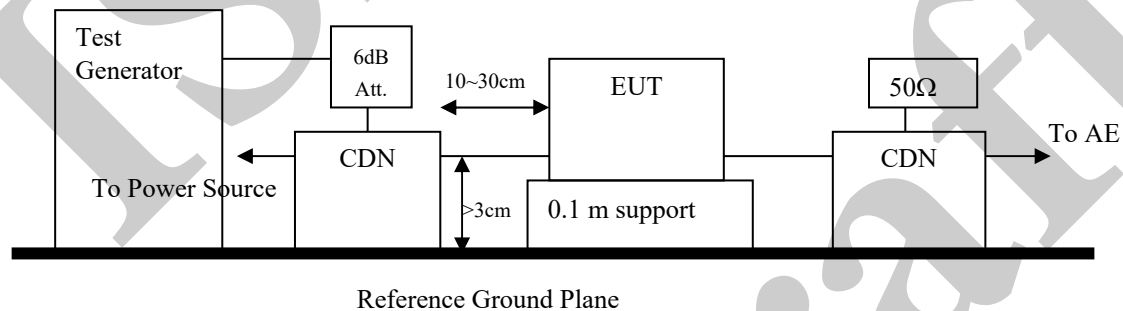
8. Immunity to Conductive Disturbance

8.1 Test Specification and Setup

8.1.1 Test Specification

Port:	AC mains
Basic Standard:	EN 61000-4-6 / IEC 61000-4-6 / BS EN 61000-4-6 (details referred to Sec 1.2)
Test Level:	3 V
Modulation:	AM 1kHz 80%
Frequency range:	0.15 MHz - 80MHz
Frequency Step:	1% of last Frequency
Dwell time:	3s
Criteria:	A
CDN Type:	CDN M2+M3
Test Procedure	refer to ISL QA -T4-E-S11
Temperature:	24°C
Humidity:	56%

8.1.2 Test Setup



8.1.3 Test Result

Performance of EUT complies with the given specification

8.2 Test Setup Photo



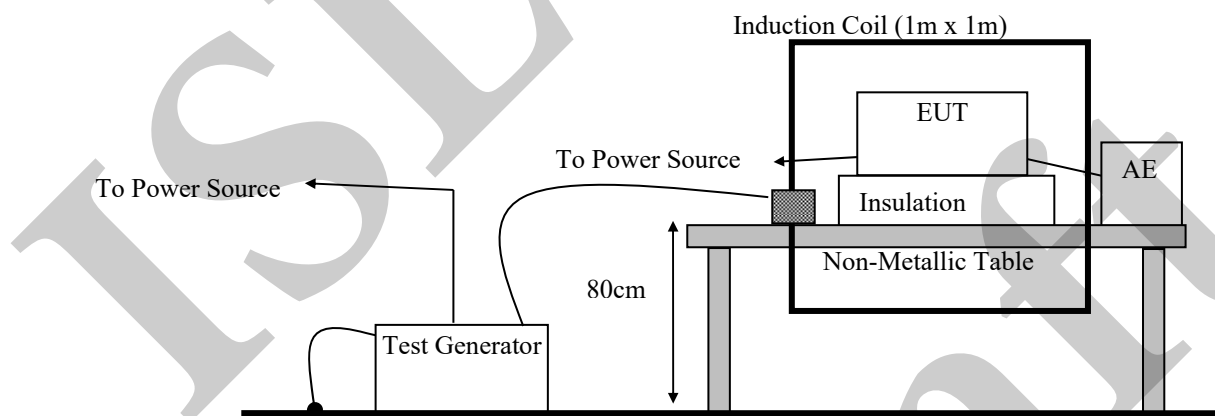
9. Power Frequency Magnetic Field immunity

9.1 Test Specification and Setup

9.1.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-8 / IEC 61000-4-8 / BS EN 61000-4-8 (details referred to Sec 1.2)
Test Level:	3A/m
Polarization:	X, Y, Z
Criteria:	A
Test Procedure	refer to ISL QA -T4-E-S12
Temperature:	24°C
Humidity:	56%

9.1.2 Test Setup



9.1.3 Test Result

Performance of EUT complies with the given specification

9.2 Test Setup Photo



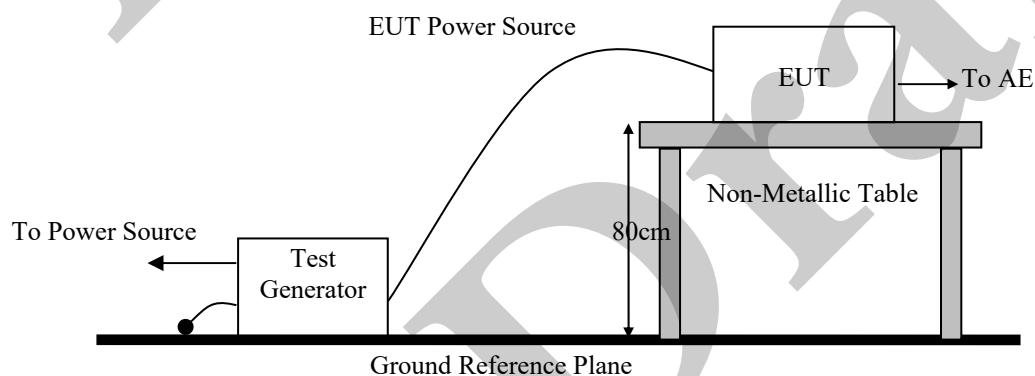
10. Voltage Dips, Short Interruption and Voltage Variation immunity

10.1 Test Specification and Setup

10.1.1 Test Specification

Port:	AC mains
Basic Standard:	EN IEC 61000-4-11 / IEC 61000-4-11 / BS EN IEC 61000-4-11 (details referred to Sec 1.2)
Test Level:	0% in 0.5 period
Criteria:	B
Test Level:	0% in 1 period
Criteria:	B
Test Level:	30% in 25 period
Criteria:	C
Test Level:	0% in 250 period
Criteria:	C
Phase:	0°; 180°
Test intervals:	3 times with 10s each
Test Procedure	refer to ISL QA -T4-E-S13
Temperature:	25°C
Humidity:	55%

10.1.2 Test Setup



10.1.3 Test Result

Performance of EUT complies with the given specification

10.2 Test Setup Photo



11. Harmonics

11.1 Test Specification and Setup

11.1.1 Test Specification

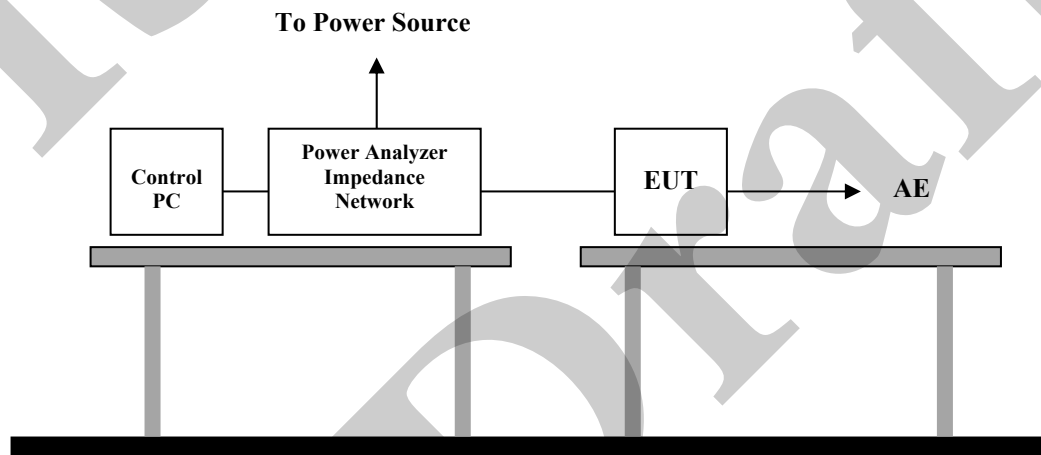
Port:	AC mains
Active Input Power:	>75W
Basic Standard:	EN IEC 61000-3-2 / IEC 61000-3-2 / BS EN IEC 61000-3-2 (details referred to Sec 1.2)
Test Duration:	2.5min
Class:	A
Test Procedure	refer to ISL QA -T4-E-S14
Temperature:	24°C
Humidity:	56%

Test Procedure

The EUT is supplied in series with shunts or current transformers from a source having the same nominal voltage and frequency as the rated supply voltage and frequency of the EUT. The EUT is configured to its rated current with additional resistive load when the testing is performed.

Equipment having more than one rated voltage shall be tested at the rated voltage producing the highest harmonics as compared with the limits.

11.1.2 Test Setup



11.1.3 Limit

Limits of Class A Harmonics Currents

Harmonics Order n	Maximum Permissible harmonic current A	Harmonics Order n	Maximum Permissible harmonic current A
Odd harmonics		Even harmonics	
3	2.30	2	1.08
5	1.14	4	0.43
7	0.77	6	0.30
9	0.40	$8 \leq n \leq 40$	$0.23 * 8/n$
11	0.33		
13	0.21		
$15 \leq n \leq 39$	$0.15 * 15/n$		

11.1.4 Test Result

Performance of EUT complies with the given specification.

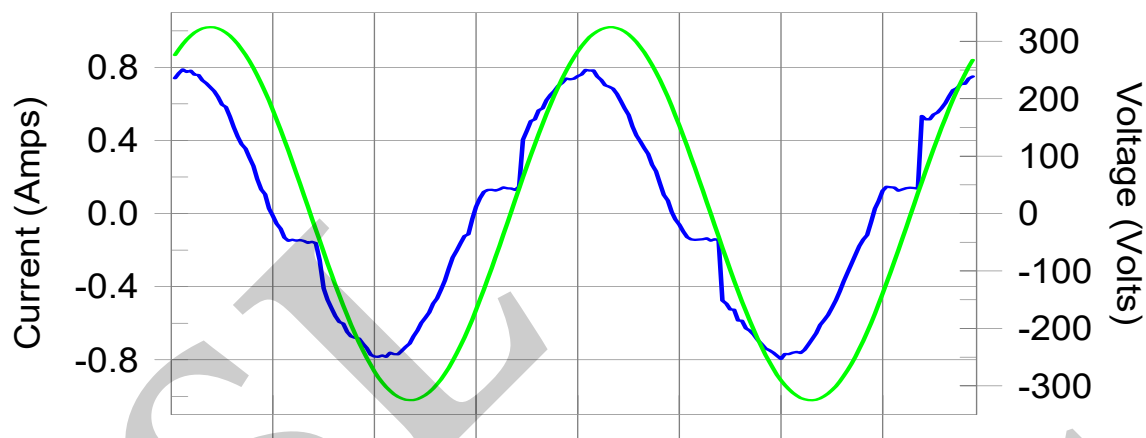
11.2 Test Data

Harmonics – Class-A per Ed. 4.0 (2014)(Run time)

Test category: Class-A per Ed. 4.0 (2014) (European limits) Test Margin: 100
 Test duration (min): 3 Data file name: CTSMXL_H-002038.cts_data

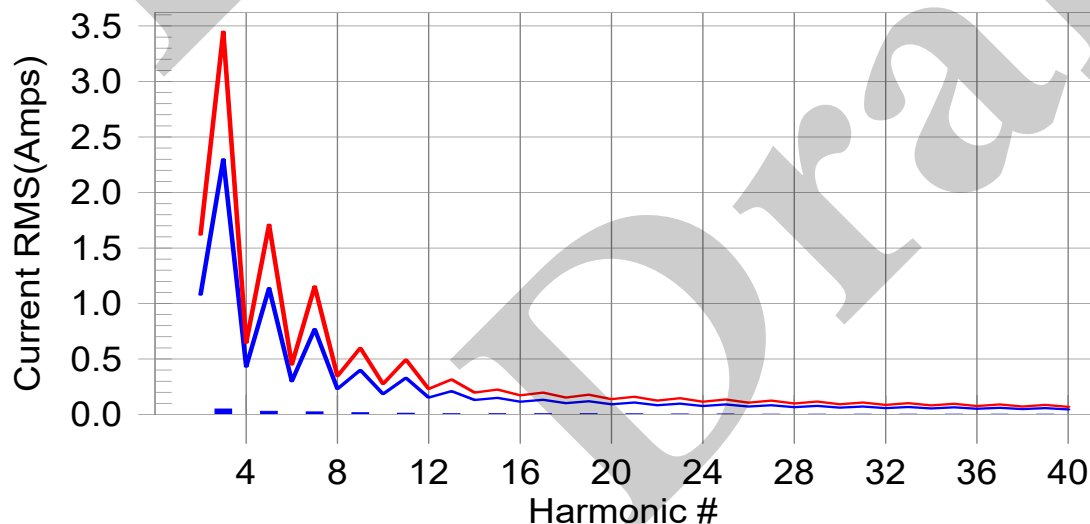
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass Worst harmonics H29-4.8% of 150% limit, H19-6.6% of 100% limit.

Current Test Result Summary (Run time)

Test category: Class-A per Ed. 4.0 (2014) (European limits) Test Margin: 100
 Test duration (min): 3 Data file name: CTSMXL_H-002038.cts_data

Test Result: Pass Source qualification: Normal
 THC(A): 0.071 I-THD(%): 13.6 POHC(A): 0.016 POHC Limit(A): 0.251

Highest parameter values during test:

V_RMS (Volts): 229.740	Frequency(Hz): 50.00
I_Peak (Amps): 0.861	I_RMS (Amps): 0.528
I_Fund (Amps): 0.523	Crest Factor: 1.664
Power (Watts): 108.0	Power Factor: 0.891

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.000	1.080	N/A	0.000	1.620	N/A	Pass
3	0.051	2.300	2.2	0.054	3.450	1.6	Pass
4	0.000	0.430	N/A	0.000	0.645	N/A	Pass
5	0.030	1.140	2.6	0.031	1.710	1.8	Pass
6	0.001	0.300	N/A	0.001	0.450	N/A	Pass
7	0.025	0.770	3.2	0.025	1.155	2.2	Pass
8	0.000	0.230	N/A	0.000	0.345	N/A	Pass
9	0.018	0.400	4.4	0.018	0.600	3.1	Pass
10	0.000	0.184	N/A	0.000	0.276	N/A	Pass
11	0.012	0.330	3.7	0.013	0.495	2.6	Pass
12	0.000	0.153	N/A	0.000	0.230	N/A	Pass
13	0.009	0.210	4.2	0.010	0.315	3.1	Pass
14	0.000	0.131	N/A	0.000	0.197	N/A	Pass
15	0.008	0.150	5.4	0.009	0.225	3.9	Pass
16	0.000	0.115	N/A	0.000	0.173	N/A	Pass
17	0.008	0.132	6.2	0.009	0.198	4.5	Pass
18	0.000	0.102	N/A	0.000	0.153	N/A	Pass
19	0.008	0.118	6.6	0.008	0.178	4.7	Pass
20	0.000	0.092	N/A	0.000	0.138	N/A	Pass
21	0.007	0.107	6.3	0.008	0.161	4.7	Pass
22	0.000	0.084	N/A	0.000	0.125	N/A	Pass
23	0.006	0.098	5.9	0.007	0.147	4.6	Pass
24	0.000	0.077	N/A	0.000	0.115	N/A	Pass
25	0.005	0.090	5.8	0.006	0.135	4.4	Pass
26	0.000	0.071	N/A	0.000	0.107	N/A	Pass
27	0.005	0.083	6.2	0.006	0.125	4.7	Pass
28	0.000	0.066	N/A	0.000	0.099	N/A	Pass
29	0.005	0.078	6.5	0.006	0.116	4.8	Pass
30	0.000	0.061	N/A	0.000	0.092	N/A	Pass
31	0.005	0.073	N/A	0.005	0.109	N/A	Pass
32	0.000	0.058	N/A	0.000	0.086	N/A	Pass
33	0.004	0.068	N/A	0.005	0.102	N/A	Pass
34	0.000	0.054	N/A	0.000	0.081	N/A	Pass
35	0.004	0.064	N/A	0.005	0.096	N/A	Pass
36	0.000	0.051	N/A	0.000	0.077	N/A	Pass
37	0.004	0.061	N/A	0.005	0.091	N/A	Pass
38	0.000	0.048	N/A	0.000	0.073	N/A	Pass
39	0.004	0.058	N/A	0.004	0.087	N/A	Pass
40	0.000	0.046	N/A	0.000	0.069	N/A	Pass

11.3 Test Setup Photo

Refer to the Setup Photo for Voltage Fluctuations

ISL
Draft

12. Voltage Fluctuations

12.1 Test Specification and Setup

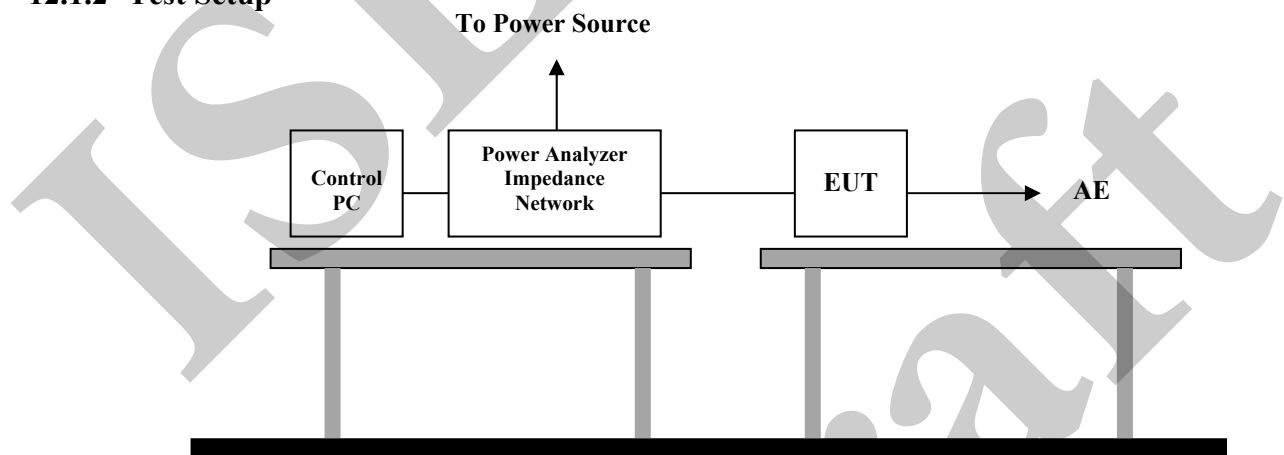
12.1.1 Test Specification

Port:	AC mains
Basic Standard:	EN 61000-3-3 / IEC 61000-3-3 / BS EN 61000-3-3 (details referred to Sec 1.2)
Test Procedure	refer to ISL QA -T4-E-S14
Observation period:	For Pst 10min
	For Plt 2 hours
Temperature:	24°C
Humidity:	56%

Test Procedure

The EUT is supplied in series with reference impedance from a power source with the voltage and frequency as the nominal supply voltage and frequency of the EUT.

12.1.2 Test Setup



12.1.3 Test Result

Performance of EUT complies with the given specification.

12.2 Test Data

Flicker Test Summary per EN/IEC61000-3-3 Ed. 3.0 (2013) (Run time)

Test duration (min): 10

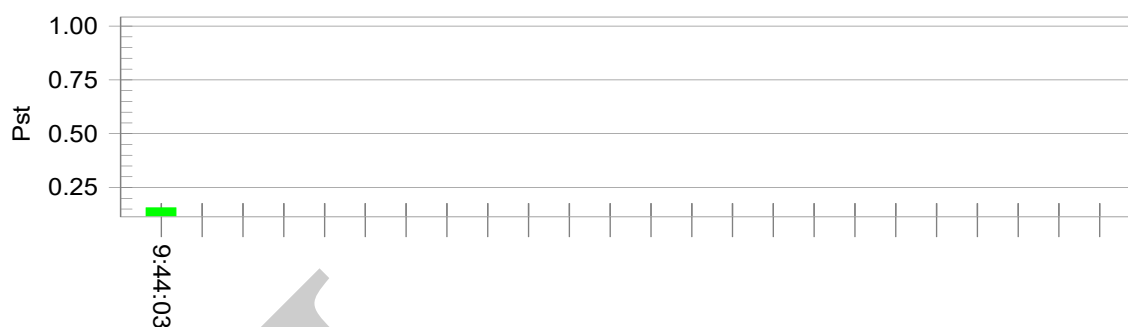
Data file name: CTSMXL_F-001169.cts_data

Test Result: Pass

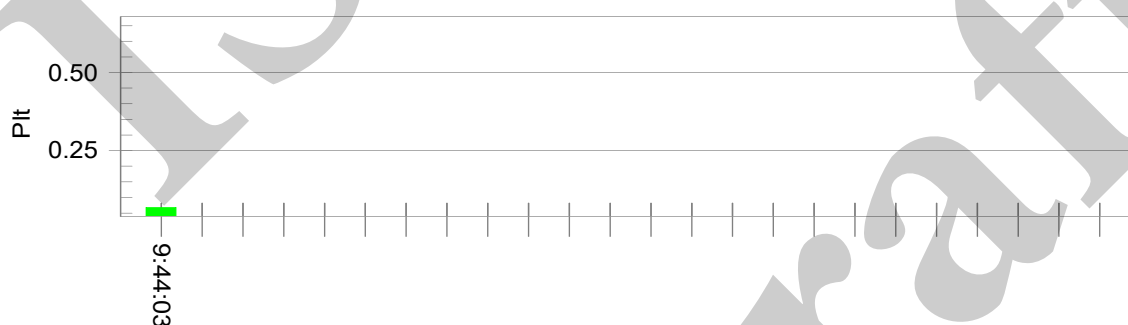
Status: Test Completed

 Pst_i and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 108.83

T-max (mS): 0.0

Highest dc (%): 0.00

Highest dmax (%): 0.19

Highest Pst (10 min. period): 0.156

Highest Plt (2 hr. period): 0.068

Test limit (mS): 500.0 Pass

Test limit (%): 3.30 Pass

Test limit (%): 4.00 Pass

Test limit: 1.000 Pass

Test limit: 0.650 Pass

12.3 Test Setup Photo



13. Appendix

13.1 Appendix A: Test Equipment

13.1.1 Test Equipment List

Location Con02	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 02	LISN 26	R&S	ENV216	102378	11/21/2019	11/21/2020
Conduction 02	LISN 21	R&S	ENV216	101476	07/31/2019	07/31/2020
Conduction 02	Conduction 02-1 Cable	WOKEN	CFD 300-NL	Conduction 02 -1	09/11/2019	09/11/2020
Conduction 02	EMI Receiver 14	ROHDE & SCHWARZ	ESCI	101034	05/31/2019	05/31/2020

Location Chamber02	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation (Chamber02)	BILOG Antenna 17	Schwarzbeck	Schwarzbeck VULB 9168+EMCI-N -6-05	645	03/06/2019	03/06/2020
Radiation (Chamber02)	Preamplifier 25	EMCI	EMC9135	980295	02/27/2019	02/27/2020
Radiation (Chamber02)	Coaxial Cable Chmb 02-10M-02	EMC	RG214U	Chmb 02-10M-02	09/16/2019	09/16/2020
Radiation (Chamber02)	EMI Receiver 12	ROHDE & SCHWARZ	ESCI	100804	08/30/2019	08/30/2020

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
EN61K-4-2	ESD Gun 12	EM TEST	Dito	P1650188689	05/07/2019	05/07/2020
EN61K-4-3	Broadband Log-Periodic Antenna	AR	AT1080	310698	N/A	N/A
EN61K-4-3	Horn Antenna RF-01	AR	ATS700M11 G	0335864	N/A	N/A
EN61K-4-3	Amplifier 80Mz~1GHz 250W	AR	250W1000A	312494	N/A	N/A
EN61K-4-3	Amplifier 800MHz~4.2GHz 50W	AR	50S1G4M1	312762	N/A	N/A
EN61K-4-3	Amplifier 4.0~8.0GHz 35W	AR	35S4G8AM1	0335752	N/A	N/A
EN61K-4-3	Broadband Coupler 80M~1GHz	Amplifier Research	DC6180A	0341805	N/A	N/A
EN61K-4-3	Coaxial Cable	INSULATED	NPS-4806-23 60-NP3	108599.003.01.03	N/A	N/A
EN61K-4-3	Broadband Coupler 0.8G~4.26GHz	AR	DC7144A	0335226	N/A	N/A
EN61K-4-3	Broadband Coupler 4G~8GHz	AR	DC7350A	0335817	N/A	N/A
EN61K-4-3	Signal Generator 07	ROHDE&SCHWARZ	SMB100A	107780	12/04/2019	12/04/2020
EN61K-4-4	EFT and SURGE Test System	EM TEST	UCS-500 M6B	V0728102674	02/14/2019	02/14/2020
EN61K-4-5	CDN-UTP8 ED3	EMC-PARTNER	CDN-UTP8	1509	04/02/2019	04/02/2020
EN61K-4-5	SURGE-TESTER	EMC Partner	MIG0603IN3	523	04/02/2019	04/02/2020
EN61K-4-6	CDN M2+M3 04	TESEQ	CDN M016	43257	09/10/2019	09/10/2020
EN61K-4-6	Coaxial Cable 4-6 02-1			4-6 02-1	N/A	N/A
EN61K-4-6	Conducted Immunity Test System 02	Frankonia	CIT-10-75-D C	126B1301/2014	03/25/2019	03/25/2020
EN61K-4-8	Magnetic Field Immunity Loop	FCC	F-1000-4-8-L-1M	01037	05/27/2019	06/05/2020
EN61K-4-8	Magnetic Field Test Generator	FCC	F-1000-4-8-G-125A	01038	05/27/2019	06/05/2020
EN61K-4-11	Voltage Dip and UP Simulator 01	NoiseKen	VDS-2002	VDS1750439	09/25/2019	09/25/2020
EN61K-3-2/3, EN61K-3-11-1 2	(Harmonic/Flicker) MX Series CTSH Compliance Test System	California Instruments	MX60T04GH 10400	72793	08/05/2019	08/05/2020

PS: N/A => The equipment does not need calibration.

****Software for Controlling Spectrum/Receiver and Calculating Test Data**

Test Item	Filename	Version
EN61000-3-2	California Instruments	CTSMXL V2.19.0
EN61000-3-3	California Instruments	CTSMXL V2.19.0
EN61000-4-2	N/A	2.0
EN61000-4-3	i2	4.130102k
EN61000-4-4	EMC TEST	4.10
EN61000-4-5	EMC Partner	1.69
EN61000-4-6	FRANKONIA CD-LAB	V5.221
EN61000-4-8	N/A	
EN61000-4-11	NOISE KEN	2.0

Site	Filename	Version	Issue Date
Conduction/Radiation	EZ EMC	ISL-03A2	3/6/2013

13.2 Appendix B: Uncertainty of Measurement

The laboratory measurement uncertainty accordance with refers to CISPR 16-4-2. If U_{lab} is less than or equal to U_{cispr} in Table 1, then the test report may either state the value of U_{lab} or state that U_{lab} is less than U_{cispr}.

The coverage factor $k = 2$ yields approximately a 95 % level of confidence.

<Conduction 02>

AMN: $\pm 2.94\text{dB}$

<Chamber 02 (10M)>

Horizontal

30MHz~200MHz: $\pm 4.52\text{dB}$

200MHz~1000MHz: $\pm 4.42\text{dB}$

Vertical

30MHz~200MHz: $\pm 4.51\text{dB}$

200MHz~1000MHz: $\pm 4.70\text{dB}$

<Immunity 02>

Test item	Uncertainty	Test item	Uncertainty
EN 61000-4-2 (ESD)		EN 61000-4-6 (CS)	
Rise time t_r	$\leq 9.81\%$	CDN	$\pm 1.74\text{dB}$
Peak current I_p	$\leq 5.54\%$	EM Clamp	$\pm 3.36\text{dB}$
current at 30 ns	$\leq 5.55\%$	EN 61000-4-8 (Magnetic)	$\pm 6.53\%$
current at 60 ns	$\leq 5.55\%$	EN 61000-4-11 (Dips)	$\pm 2.41\%$
EN 61000-4-3 (RS)	$\pm 1.89\text{dB}$	EN 61000-3-2 (Harmonics)	$\pm 1.29\%$
EN 61000-4-4 (EFT)		EN 61000-3-3 (Fluctuations and Flicker)	$\pm 6.8\%$
voltage rise time (tr)	$\pm 5.1\%$		
peak voltage value (VP)	$\pm 6.39\%$		
voltage pulse width (tw)	$\pm 5.0\%$		
EN 61000-4-5 (Surge)			
open-circuit voltage front time	$\pm 13.5\%$		
open-circuit voltage peak value	$\pm 6.6\%$		
open-circuit voltage duration (Td)	$53.33\mu\text{s}$		

13.3 Appendix D: Photographs of EUT

Please refer to the File of **ISL-20LE142P**

ISL
Draft