

EMC TEST REPORT

Report No. : 68.5.52.13.0519.01

Applicant : Salus Limited

Address : 9/F, Tower One, Lippo Centre, 89 Queensway, HongKong

Manufacturer : Shenzhen Jia Lai Yen Hai Yan Electronics Plastic Plant

Address : Block 3 Dachen Industrial Park, Shang Shui Jing Xia Qi Kuai Road, Buji, Longgang District, Shenzhen, P.R.China

Factory : Shenzhen Jia Lai Yen Hai Yan Electronics Plastic Plant

Address : Block 3 Dachen Industrial Park, Shang Shui Jing Xia Qi Kuai Road, Buji, Longgang District, Shenzhen, P.R.China

Equipment Under Test (EUT) :

Name : Actuator

Model No. : T30NC24, SLG3CA2

Standards : EN 60730-1:2000+A1:2004+A12:2003+A13:2004+A14:2005
+A16:2007+A2:2008
EN 60730-2-8:2002+A1:2003

Date of Test : Nov. 08, 2013 to Nov. 13, 2013

Date of Issue : Nov. 19, 2013

Test Engineer : David Xu

Reviewed By : Mike Liu



Test Result :	PASS *
----------------------	---------------

* The sample detailed above has been tested to the requirements of Council Directives 2004/108/EC (as amended by Directives 92/31/EEC and 93/68/EEC). The test results have been reviewed against the Directives above and found to meet their essential requirement.

Test Summary

Electromagnetic Compatibility (EMC) Part				
Test	Test Requirement	Test Method	Class / Severity	Result
Conducted Emission (150KHz to 30MHz)	EN 60730-1:2000/ A2:2008 EN 60730-2-8:2002+A1:2003	EN 55022:2006/ A1:2007	Class B	PASS
Radiated Emission, 30MHz to 1GHz	EN 60730-1:2000/ A2:2008 EN 60730-2-8:2002+A1:2003	EN 55022:2006/ A1:2007	Class B	PASS
Harmonic Current Emissions	EN 60730-1:2000/ A2:2008 EN 60730-2-8:2002+A1:2003	EN 61000-3-2:2006/ A1 :2009/A2 :2009	Clause 7 of EN 61000-3-2	N/A
Voltage fluctuation and Flicker	EN 60730-1:2000/ A2:2008 EN 60730-2-8:2002+A1:2003	EN 61000-3-3:2008	Clause 5 of EN 61000-3-3	N/A
Electrostatic discharge	EN 60730-1:2000/ A2:2008 EN 60730-2-8:2002+A1:2003	IEC 61000-4-2:2008	±4 kV Contact ±8 kV Air	PASS
RF Electromagnetic Field (80MHz to 2.7GHz)	EN 60730-1:2000/ A2:2008 EN 60730-2-8:2002+A1:2003	IEC 61000-4-3:2006/ A1:2007/A2:2010	3V/m, 80%, 1kHz, Amp. Mod.	PASS
Fast transients common mode	EN 60730-1:2000/ A2:2008 EN 60730-2-8:2002+A1:2003	IEC 61000-4-4:2004/ A1:2010	AC ±1.0kV DC ±0.5kV	PASS
Surges, line to line and line to ground	EN 60730-1:2000/ A2:2008 EN 60730-2-8:2002+A1:2003	IEC 61000-4-5:2005	±1kV D.M.† ±2kV C.M.‡	PASS
RF common mode 0,15 MHz to 80 MHz	EN 60730-1:2000/ A2:2008 EN 60730-2-8:2002+A1:2003	IEC 61000-4-6:2008	3Vrms(emf), 80%, 1kHz Amp. Mod.	PASS
Voltage dips and interruptions	EN 60730-1:2000/ A2:2008 EN 60730-2-8:2002+A1:2003	IEC 61000-4-11:2004	0 % U_T^* for 250per 40 % U_T^* for 5per 70 % U_T^* for 0.5per	PASS

Remark:

A.M.-- Amplitude Modulation.
† D.M. – Differential Mode
UT is the nominal supply voltage
N/A means not applicable

Contents

Page

TEST SUMMARY	2
CONTENTS	3
1 GENERAL INFORMATION	5
1.1 CLIENT INFORMATION	5
1.2 GENERAL DESCRIPTION OF E.U.T.	5
1.3 DETAILS OF E.U.T.	5
1.4 DESCRIPTION OF SUPPORT UNITS	5
1.5 TEST LOCATION	5
1.6 GENERAL PRODUCT INFORMATION:	5
2 EQUIPMENT USED DURING TEST	6
3 EMISSION TEST RESULTS	8
3.1 MAINS TERMINALS DISTURBANCE VOLTAGE, 150KHZ TO 30MHZ	8
3.2 E.U.T. OPERATION	8
3.3 MEASUREMENT DATA	8
3.3.1 <i>Conducted Emissions Test Data</i>	9
3.3.2 <i>Mains Terminal Disturbance Voltage on AC Test Setup Drawing</i>	11
3.4 RADIATED EMISSION: 30MHZ TO 1000MHZ	12
3.4.1 <i>E.U.T. Operation</i>	12
3.4.2 <i>Measurement Data</i>	12
3.4.3 <i>Radiated Emissions Test Data</i>	13
3.4.4 <i>Radiated Power Test Setup Drawing</i>	15
3.5 HARMONICS TEST RESULTS	16
3.6 FLICKER TEST RESULT	16
3.7 HARMONICS AND FLICKER TEST SETUP (DRAWINGS)	17
4 IMMUNITY TEST RESULTS	18
4.1 PERFORMANCE CRITERIA DESCRIPTION	18
4.2 ESD	18
4.2.1 <i>E.U.T. Operation</i>	18
4.2.2 <i>Direct Application Test Results</i>	19
4.2.3 <i>Indirect Application Test Results</i>	19
4.2.4 <i>ESD Test Setup Drawing</i>	20
4.3 RF ELECTROMAGNETIC FIELD.....	21
4.3.1 <i>E.U.T. Operation</i>	21
4.3.2 <i>Test Results</i>	21
4.3.3 <i>Radiated Immunity Test Setup Drawing</i>	22
4.4 FAST TRANSIENTS COMMON MODE	23
4.4.1 <i>E.U.T. Operation</i>	23
4.4.2 <i>Test Results On AC Cable</i>	23
4.4.3 <i>Fast transients common mode Test Setup Drawing</i>	24
4.5 SURGE.....	25
4.5.1 <i>E.U.T. Operation</i>	25
4.5.2 <i>Test Results</i>	25
4.5.3 <i>Surge Test Setup (Drawings)</i>	26
4.6 VOLTAGE DIPS AND INTERRUPTIONSS	27
4.6.1 <i>E.U.T. Operation</i>	27
4.6.2 <i>Measurement Data</i>	27
4.6.3 <i>Voltage Dips and Interruptions Test Setup</i>	28
4.7 RADIO-FREQUENCY COMMON MODE / CONDUCTED SUSCEPTIBILITY (CS).....	29

4.7.1	<i>E.U.T. Operation</i>	29
4.7.2	<i>Test Results AC mains of AC Cable</i>	29
4.7.3	<i>Conducted Immunity Test Setup Drawing</i>	30
5	PHOTOGRAPHS - CONSTRUCTIONAL DETAILS	31
5.1	EUT – GENERAL VIEW	31
5.2	EUT –GENERAL VIEW	31
5.3	INSIDE CONSTRUCTION.....	32
5.4	INSIDE CONSTRUCTION.....	32

1 General Information

1.1 Client Information

See page 1

1.2 General Description of E.U.T.

Name : Actuator

Model No. : T30NC24, SLG3CA2

1.3 Details of E.U.T.

Ratings : 24 Vac,50-60 Hz,2 W

1.4 Description of Support Units

The EUT has been tested as an independent unit.

1.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Add.: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China

1.6 General product information:

Model T30NC24 and SLG3CA2 only model name difference.

2 Equipment Used during Test

Radiated Emission						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)* 6.0(H)	GTS250	Mar. 29 2013	Mar. 28 2014
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	ESU EMI Test Receiver	R&S	ESU26	GTS203	Jul. 07 2013	Jul. 06 2014
4	BiConiLog Antenna	SCHWARZBECK	VULB9163	GTS214	Mar. 09 2013	Mar. 08 2014
5	Double -ridged waveguide horn	SCHWARZBECK	9120D	GTS208	Mar. 09 2013	Mar. 08 2014
6	RF Amplifier	HP	8347A	GTS204	Jul. 07 2013	Jul. 06 2014
7	Preamplifier	HP	8349B	GTS206	Jul. 07 2013	Jul. 06 2014
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial cable	GTS	N/A	GTS210	Jul. 07 2013	Jul. 06 2014
10	Coaxial Cable	GTS	N/A	GTS211	Jul. 07 2013	Jul. 06 2014
11	Thermo meter	N/A	N/A	GTS256	Jul. 06 2013	Jul. 05 2014

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	Sep. 08 2012	Sep. 07 2014
2	EMI Test Receiver	R&S	ESCS30	GTS223	Jul. 07 2013	Jul. 06 2014
3	Pulse Limiter	R&S	ESH3-Z2	GTS224	Jul. 07 2013	Jul. 06 2014
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	Jul. 07 2013	Jul. 06 2014
5	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	Jul. 07 2013	Jul. 06 2014
6	Coaxial Cable	GTS	N/A	GTS227	Jul. 07 2013	Jul. 06 2014
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Thermo meter	KTJ	TA328	GTS233	Jul. 07 2013	Jul. 06 2014

Electrical fast transients/ Surges/ Voltage dips and interruptions						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	EMTEST system	EMTEST	UCS500N	GTS239	Jul. 07 2013	Jul. 06 2014
2	Thermo meter	KTJ	TA328	GTS238	Jul. 07 2013	Jul. 06 2014

Electrostatic discharge						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	ESD Simulator	EMPEK	ESD-2030A	GTS242	Jul. 07 2013	Jul. 06 2014
2	Thermo meter	KTJ	TA328	GTS243	Jul. 06 2013	Jul. 05 2014

Flicker						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Power Analyzer	EMTEST	DPA500	GTS235	Sep. 09 2013	Sep. 08 2014
2	AC Power Source	EMTEST	ACS500	GTS236	Sep. 09 2013	Sep. 08 2014
3	Test software	EMTEST	ACS	N/A	N/A	N/A
4	Thermo meter	KTJ	TA328	GTS256	Jul. 06 2013	Jul. 05 2014

Radio-frequency electromagnetic fields:					
Item	Test Equipment	Manufacturer	Model No.	Serial NO.	Cal.Due Date (mm-dd-yy)
1	Signal Generator	Rohde & Schwarz	SMT03	100059	Jan. 18 2014
2	Power Amplifier	AR	150W1000	300999	Jan. 18 2014
3	Power Amplifier	AR	25S1G4AM1	305993	Jan. 20 2014
4	Power Amplifier	AR	150A220M6	305965	Mar. 07 2014
5	Broadband antenna	CHASE	CBL6111C	2576	Jan. 18 2014
6	Horn Antenna	AR	AT4002A	#N/A	#N/A
7	Anechoic Chamber	Albatross Projects	MCDC	----	Oct. 08 2014

Conducted Immunity:					
Item	Test Equipment	Manufacturer	Model No.	Serial NO.	Cal.Due Date (mm-dd-yy)
1	CW sine Generator	EMTEST	CWS500	0399-11	Jan. 18 2014
2	CDN	EMTEST	CDN-M2	9907105C	Jan. 18 2014
3	CDN	EMTEST	CDN-M3	9905170C	Jan. 18 2014

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
1	Barometer	ChangChun	DYM3	GTS257	July 10 2013	July 09 2014

3 Emission Test Results

3.1 Mains Terminals Disturbance Voltage, 150kHz to 30MHz

Test requirement: EN 60730-1, EN 60730-2-8
Test Method: EN 55022
Test Date: Nov. 08, 2013
Frequency Range: 150kHz to 30MHz
Class/Severity: Class B
Detector: Peak for pre-scan (9kHz Resolution Bandwidth)
Quasi-Peak & Average if maximised peak within 6dB of Average Limit

3.2 E.U.T. Operation

Operating Environment:
Temperature: 23.3 °C
Humidity: 54 % RH
Atmospheric Pressure: 1012 mbar

EUT Operation :

Compliance test was performed in ON mode.

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

3.3 Measurement Data

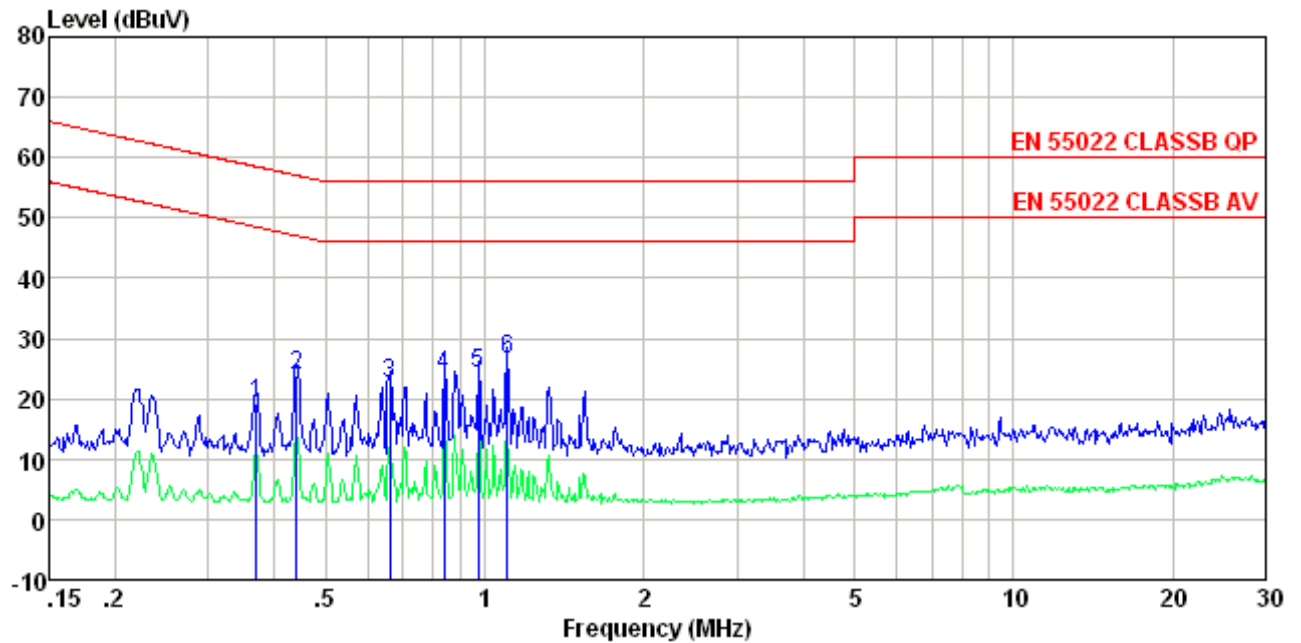
An initial pre-scan was performed on the live and neutral lines.

No further quasi-peak or average measurements were performed if no peak emissions were detected within 10dB line below the average limit.

Please refer to the following peak scan graph for reference.

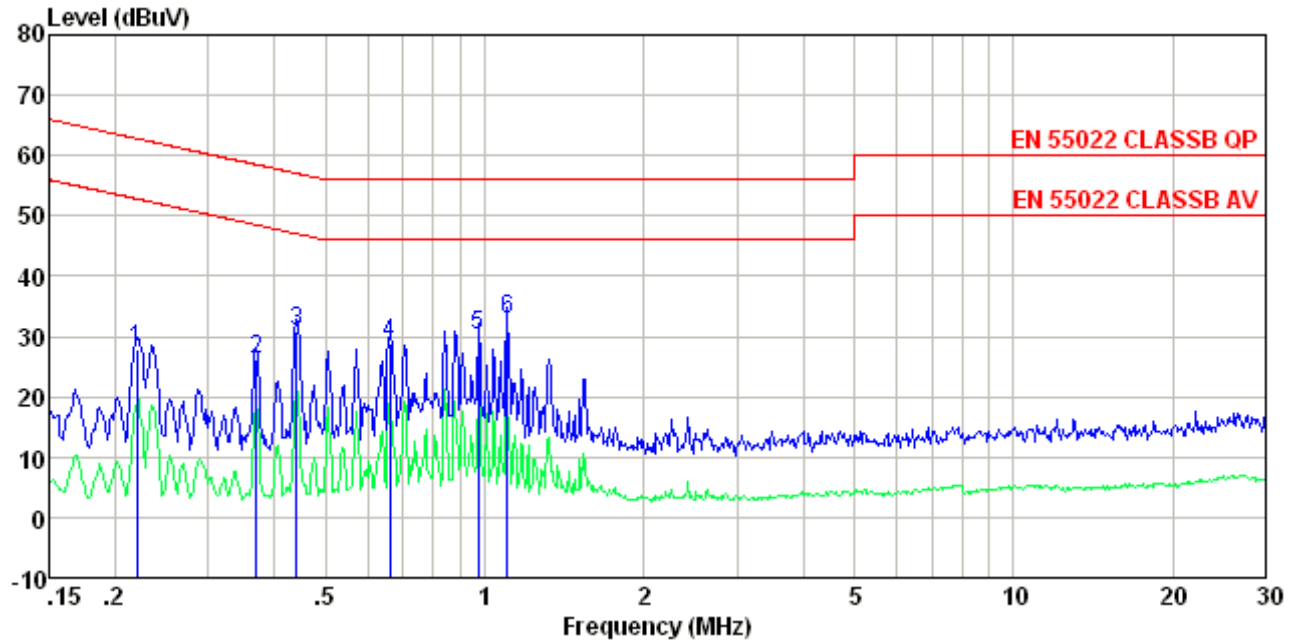
3.3.1 Conducted Emissions Test Data

L Line:



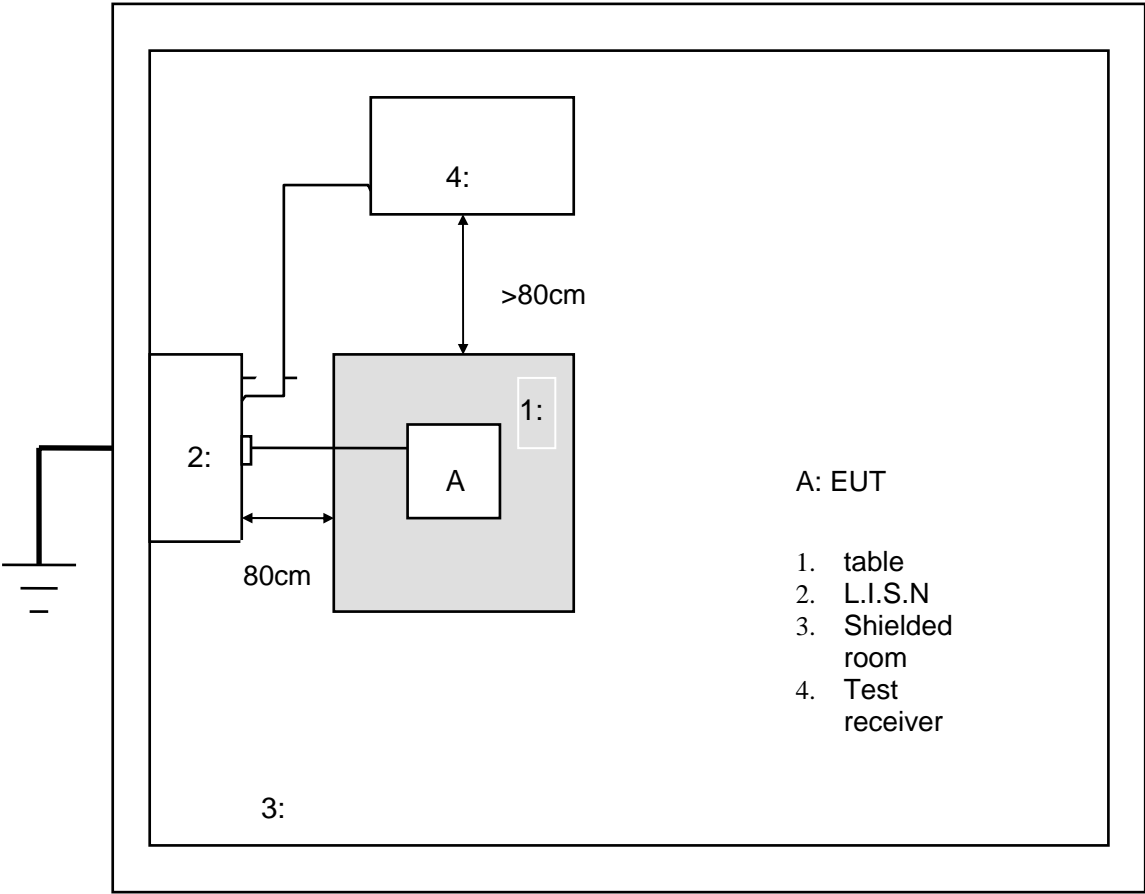
	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.369	19.03	0.11	0.10	19.24	58.52	-39.28	QP
2	0.440	23.76	0.12	0.11	23.99	57.07	-33.08	QP
3	0.661	22.18	0.14	0.13	22.45	56.00	-33.55	QP
4	0.839	23.72	0.14	0.13	23.99	56.00	-32.01	QP
5	0.974	23.93	0.14	0.13	24.20	56.00	-31.80	QP
6	1.106	26.18	0.13	0.13	26.44	56.00	-29.56	QP

N Line:



	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.220	27.66	0.06	0.12	27.84	62.83	-34.99	QP
2	0.369	25.88	0.06	0.10	26.04	58.52	-32.48	QP
3	0.440	30.78	0.06	0.11	30.95	57.07	-26.12	QP
4	0.661	28.76	0.07	0.13	28.96	56.00	-27.04	QP
5	0.974	29.88	0.07	0.13	30.08	56.00	-25.92	QP
6	1.106	32.50	0.08	0.13	32.71	56.00	-23.29	QP

3.3.2 Mains Terminal Disturbance Voltage on AC Test Setup Drawing



Test Setup: Conducted Emission 0.1/0.15 - 30MHz

For reference only

3.4 Radiated Emission: 30MHz to 1000MHz

Test requirement : EN 60730-1, EN 60730-2-8
Test Method: EN 55022
Test Date: Nov. 11, 2013
Frequency Range: 30MHz to 1000MHz
Class/Severity: Class B
Detector: Peak for pre-scan (120kHz resolution bandwidth)
Quasi-Peak & average if pre-scan peak within 15dB of average limit.

3.4.1 E.U.T. Operation

Operating Environment:
Temperature: 23.2 °C
Humidity: 54 % RH
Barometric Pressure: 1012 mbar

EUT Operation:

Compliance test was performed in ON mode.

If any maximised peak emissions are detected within 15dB of the average limit line, then:

- Extend the lead to at least 6.2m (i.e. half wavelength at 30MHz plus twice the length of the absorbing clamp) length or keep the original lead length (if no other lead can is connected to the unit at the end of the lead).
- Maximise all peak emissions by moving clamp along cable.
- Perform Quasi-Peak and Average measurements on all maximised peak emissions within 6dB of the average limit line.

3.4.2 Measurement Data

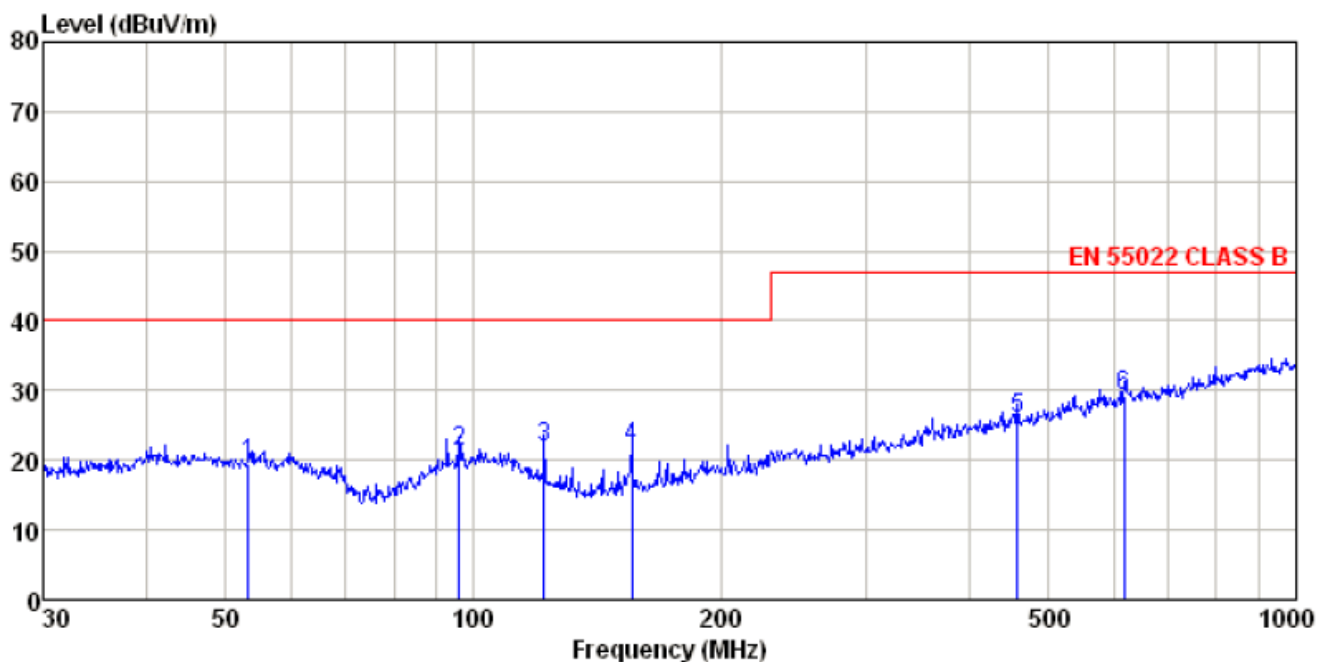
Extending the cable to 6 meters, performed quasi-peak & average measurements since peak emissions from the EUT were detected within 15dB of the limit line. Average measurements were only performed if the quasi-peak measurements were within 15dB of the average limit line.

Please see the below Quasi-peak & Average measurement data for reference.

Remarks: No significant emissions above the equipment noise floor were detected.

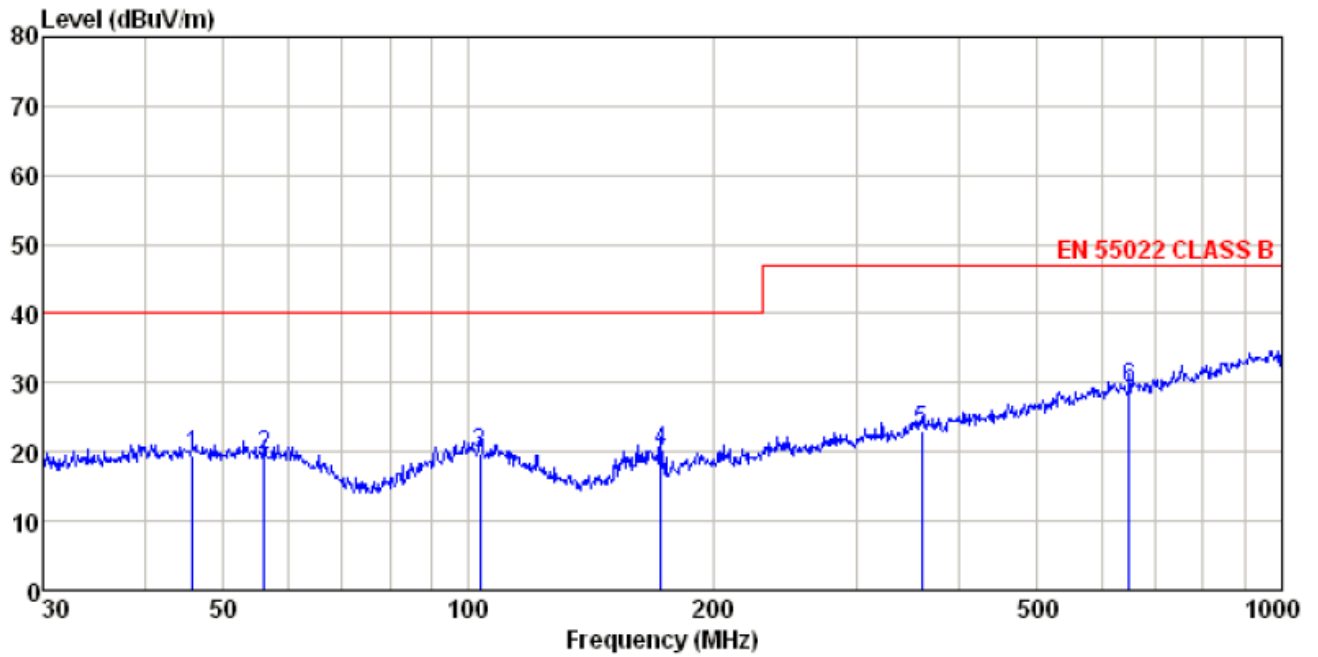
3.4.3 Radiated Emissions Test Data

Vertical:



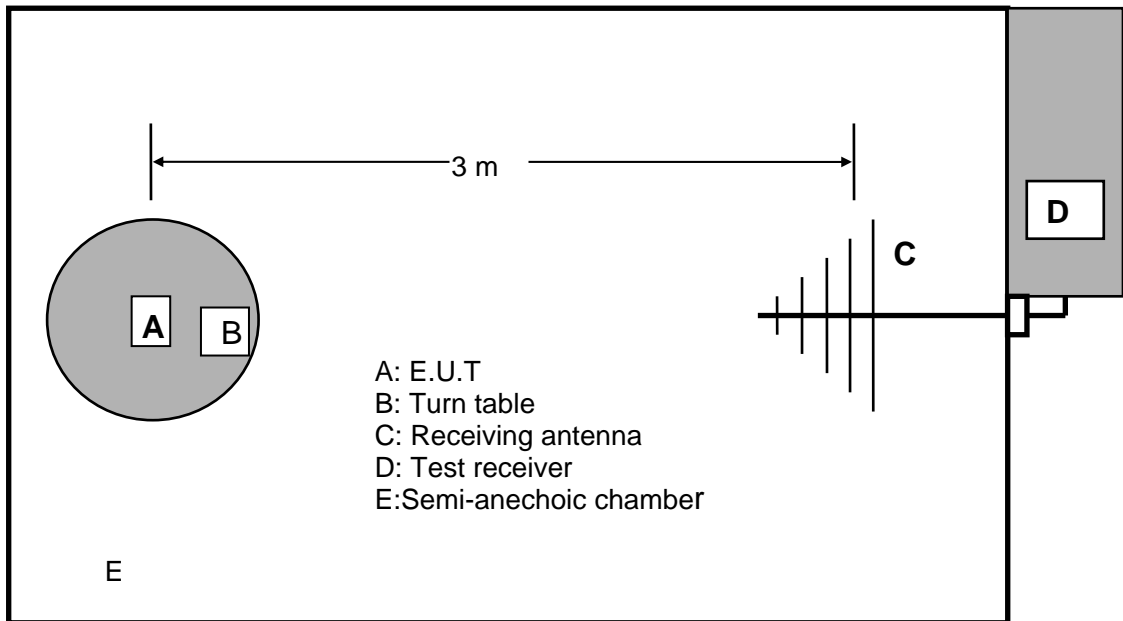
	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over	Remark
	MHz	Level	Factor	Loss	Factor	Line	Limit	
		dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	53.318	35.60	15.10	0.80	31.95	19.55	40.00	-20.45 QP
2	96.099	37.04	14.90	1.16	31.75	21.35	40.00	-18.65 QP
3	121.976	40.05	12.19	1.38	31.87	21.75	40.00	-18.25 QP
4	155.910	41.74	10.51	1.60	32.00	21.85	40.00	-18.15 QP
5	459.114	36.89	17.59	3.13	31.69	25.92	47.00	-21.08 QP
6	618.537	35.97	20.52	3.80	31.07	29.22	47.00	-17.78 QP

Horizontal:



	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	45.855	35.36	15.49	0.73	32.00	19.58	40.00	-20.42	QP
2	56.197	35.66	14.93	0.83	31.95	19.47	40.00	-20.53	QP
3	103.442	35.64	14.82	1.22	31.78	19.90	40.00	-20.10	QP
4	172.599	39.36	11.16	1.70	32.06	20.16	40.00	-19.84	QP
5	360.448	36.03	16.43	2.67	32.00	23.13	47.00	-23.87	QP
6	649.660	35.93	20.64	3.91	31.12	29.36	47.00	-17.64	QP

3.4.4 Radiated Power Test Setup Drawing



Test-setup: Radiated emission 30MHz-1000MHz

For reference only

3.5 Harmonics Test Results

Test requirement: EN 60730-1, EN 60730-2-8
Test Method: EN 61000-3-2
Frequency Range: 100Hz to 2kHz
Test Result: N/A

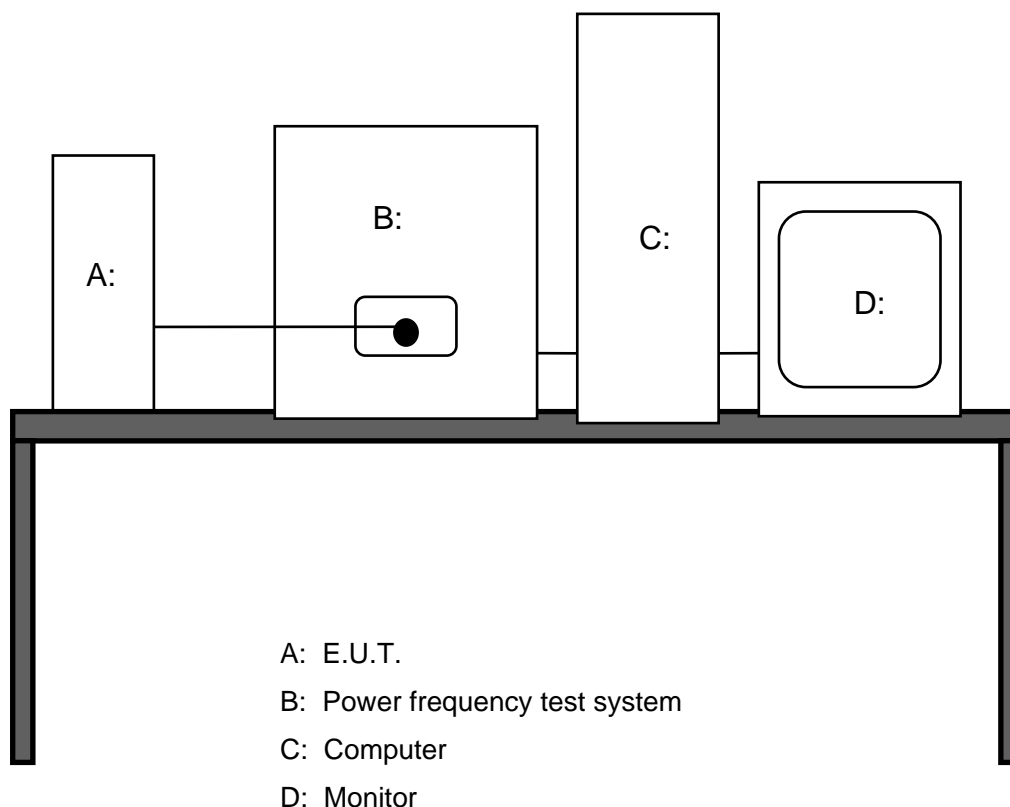
There is no need for Harmonics test to be performed on this product (rated power is less than 75W) in accordance with EN 61000-3-2.

For further details, please refer to Clause 7, Note 1 of EN61000-3-2 which states:
“For the following categories of equipment limits are not specified in this edition of the standard.

3.6 Flicker Test Result

Test requirement: EN 60730-1, EN 60730-2-8
Test Method: EN 61000-3-3
Test Result: N/A

3.7 Harmonics and Flicker Test Setup (Drawings)



Test-setup: Steady State Harmonics Test & Voltage Fluctuations (Flicker Meter Test)

For reference only

4 Immunity Test Results

4.1 Performance Criteria Description

Criterion A: The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

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 specified by the manufacturer, when the apparatus is used as intended.

Criterion C: Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.

4.2 ESD

Test requirement:	EN 60730-1, EN 60730-2-8
Test Method:	IEC 61000-4-2
Test Date:	Nov. 12, 2013
Discharge Impedance:	330 Ω / 150 pF
Discharge Voltage:	Air Discharge: ± 8 kV Contact Discharge: ± 4 kV HCP & VCP: ± 4 kV
Polarity:	Positive & Negative
Number of Discharge:	Minimum 10 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

4.2.1 E.U.T. Operation

Operating Environment:

Temperature :	23.3 $^{\circ}\text{C}$
Humidity :	55 % RH
Barometric Pressure :	1012 mbar

EUT Operation:

Compliance test was performed in ON mode.

4.2.2 Direct Application Test Results

Observations : Test points : 1. All Exposed Surface & Seams;
2. All metallic part

Direct Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
8	+/-	1	N/A	A
4	+/-	2	A	N/A

Results

A: No degradation in the performance of the E.U.T. was observed.

N/A: Not applicable.

4.2.3 Indirect Application Test Results

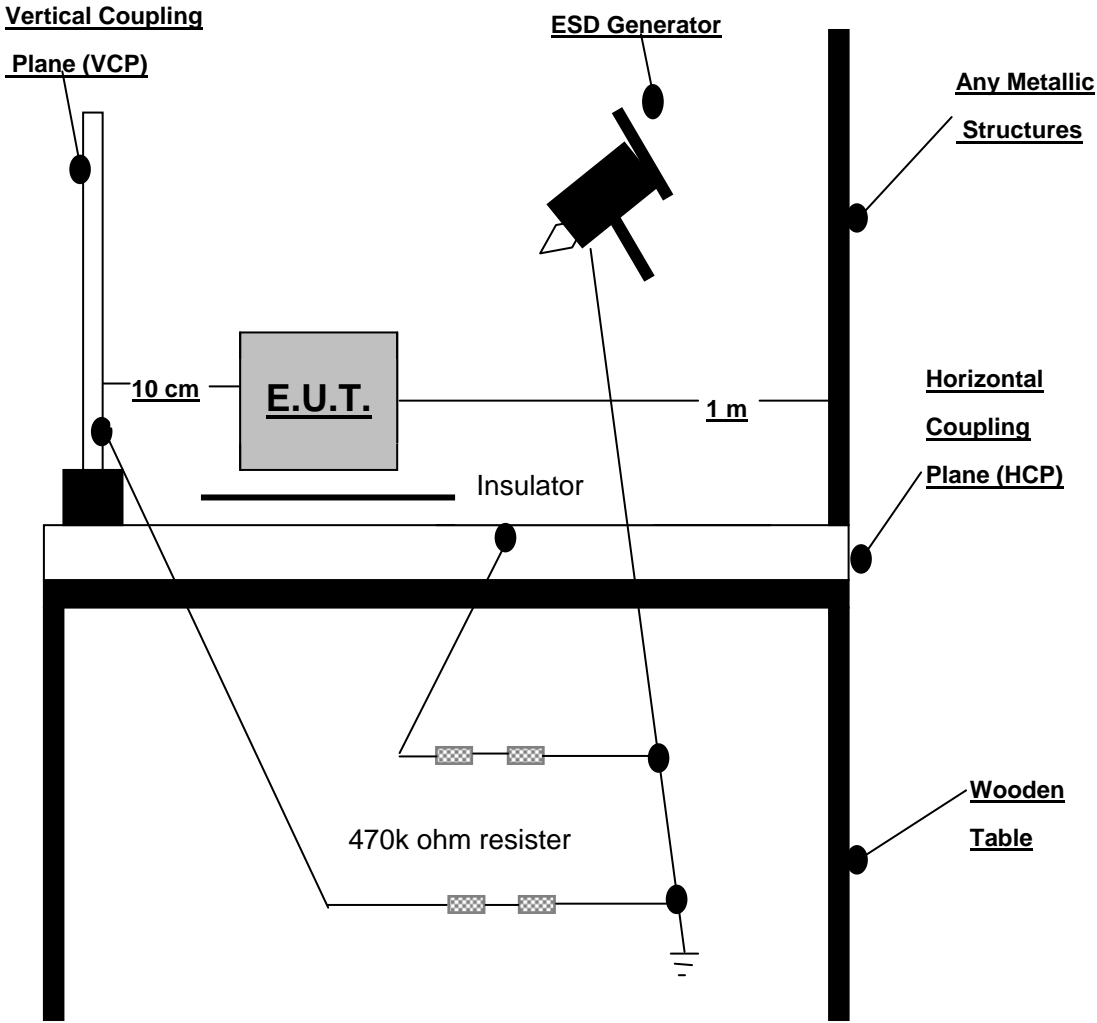
Observations : Test points : 1. All sides.

Indirect Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling	Vertical Coupling
4	+/-	1	A	A

Results

A: No degradation in the performance of the E.U.T. was observed.

4.2.4 ESD Test Setup Drawing



Test Setup: Electrostatic Discharge (ESD)

For reference only

4.3 RF electromagnetic field

Test Requirement: EN 60730-1, EN 60730-2-8
Test Method: IEC 61000-4-3
Criterion required: Performance criteria for CR
Test Date: Nov. 13, 2013
Frequency Range: 80MHz to 1GHz, 1.4G to 2.7GHz
Antenna Polarization: Horizontal & Vertical
Test frequency: Refer to below table.

4.3.1 E.U.T. Operation

Operating Environment:

Temperature : 22.1 °C
Humidity : 52 % RH
Barometric Pressure : 1012 mbar

EUT Operation:

Compliance test was performed in ON mode.

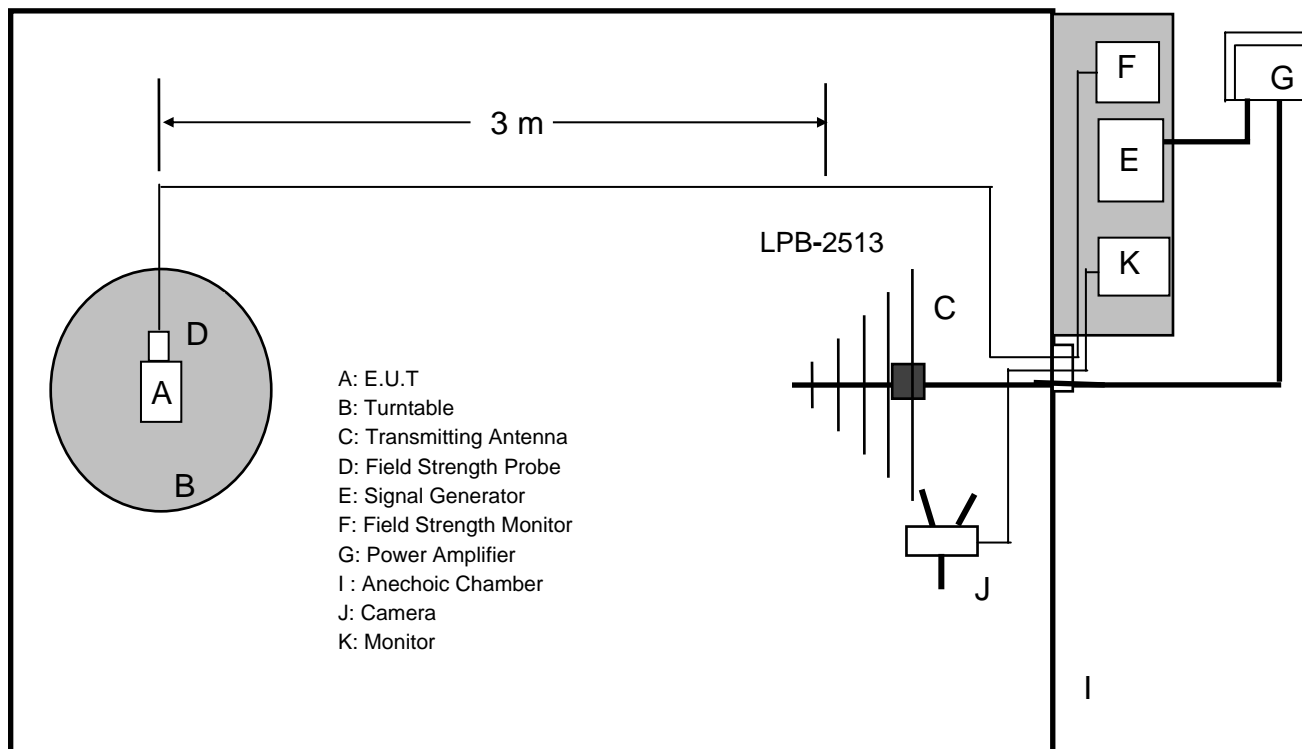
4.3.2 Test Results

Frequency	Level	Modulation	EUT Face	Result / Observations
80MHz-1GHz, 1.4GHz to 2.7G	3V/m	1kHz, 80% Amp. Mod, 10% increment	0°V	A
			0°H	
			90°V	A
			90°H	
			180°V	A
			180°H	
			270°V	A
			270°H	

Remarks:

A: No degradation in the performance of the E.U.T. was observed. No unintentional transmissions were observed.

4.3.3 Radiated Immunity Test Setup Drawing



Test-setup: Radiated Immunity

For reference only

Project number not require

4.4 Fast transients common mode

Test requirement: EN 60730-1, EN 60730-2-8
Test Method: IEC 61000-4-4
Test Date: Nov. 12, 2013
Test Level: 1.0kV on AC and Signal
Polarity: Positive & Negative
Repetition Frequency: 5kHz
Burst Duration: 300ms
Test Duration: 2 minutes per level & polarity

4.4.1 E.U.T. Operation

Operating Environment:
Temperature: 23.7 °C
Humidity: 52 % RH
Barometric Pressure: 1012 mbar

EUT Operation:

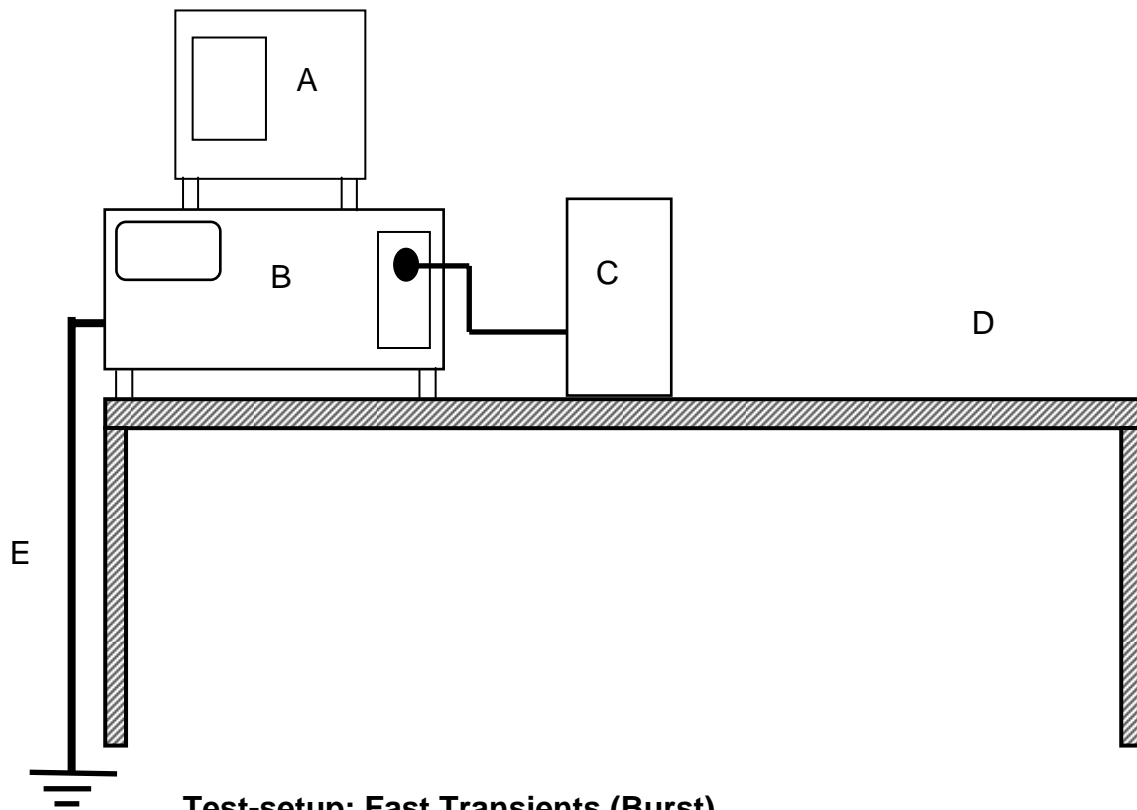
Compliance test was performed in ON mode.

4.4.2 Test Results On AC Cable

Lead under Test	Level (±kV)	Coupling Direct/Clamp	EUT operating mode	Observations (Performance Criterion)
Live	±1.0	Direct	Operation	No loss of function
Neutral	±1.0	Direct	Operation	No loss of function
Live- Neutral	±1.0	Direct	Operation	No loss of function

4.4.3 Fast transients common mode Test Setup Drawing

- A: Digital Oscilloscope
- B: Burst Generator
- C: EUT
- D: Wooden Table
- E: Ground Wire



Test-setup: Fast Transients (Burst)

For reference only

4.5 Surge

Test requirement	: EN 60730-1, EN 60730-2-8
Test Method	: IEC 61000-4-5
Date of testing	: Nov. 12, 2013
Pulsform	: $T_r/T_h=1.2/50\mu s$
Test voltages	: $\pm 1.0KV$
Coupling	: Coupling Network for AC Mains
Coupling phases	: $0, \pi/2, \pi, 3\pi/2$
Number of surges	: 5 (for each combination of parameters)
Repetition rate	: max. 1/min
Performance criterion	: B

4.5.1 E.U.T. Operation

Operating Environment:

Temperature	: 23.5°C
Humidity	: 52%
Barometric Pressure	: 1012 mbar

EUT Operation:

Compliance test was performed in ON mode.

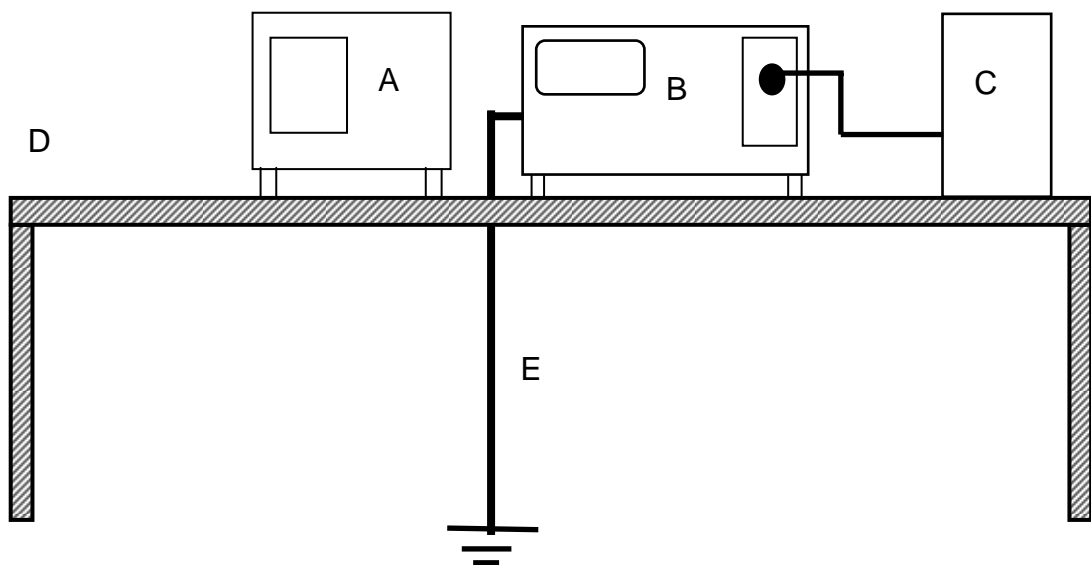
4.5.2 Test Results

Surge Immunity Tests, AC Power Supply

Pulse No	Line-Line	Level (kV)	Surge Interval	Phase (deg)	Observation (Performance Criterion)
1-5	L-N	+1	60s	0°	No loss of performance (A)
6-10	L-N	-1	60s	0°	(A)
11-15	L-N	+1	60s	90°	(A)
16-20	L-N	-1	60s	90°	(A)
21-25	L-N	+1	60s	180°	(A)
26-30	L-N	-1	60s	180°	(A)
31-35	L-N	+1	60s	270°	(A)
36-40	L-N	-1	60s	270°	(A)

4.5.3 Surge Test Setup (Drawings)

- A: Digital Oscilloscope
- B: Surge Generator
- C: EUT
- D: Wooden Table
- E: Ground Wire



Test-setup: Surges tests

For reference only

4.6 Voltage Dips and Interruptions

Test requirement:	EN 60730-1, EN 60730-2-8
Test Method:	IEC 61000-4-11
Test Date:	Nov. 12, 2013
Test Level:	<5% of UT (Supply Voltage) for 250 Periods 40% of UT (Supply Voltage) for 5 Periods 70 % of UT (Supply Voltage) for 0.5 Periods
No. of Dips / Interruptions:	3 per Level at 10s intervals

4.6.1 E.U.T. Operation

Operating Environment:

Temperature:	23.5 °C
Humidity:	52 % RH
Barometric Pressure:	1012 mbar

EUT Operation:

Compliance test was performed in ON mode.

4.6.2 Measurement Data

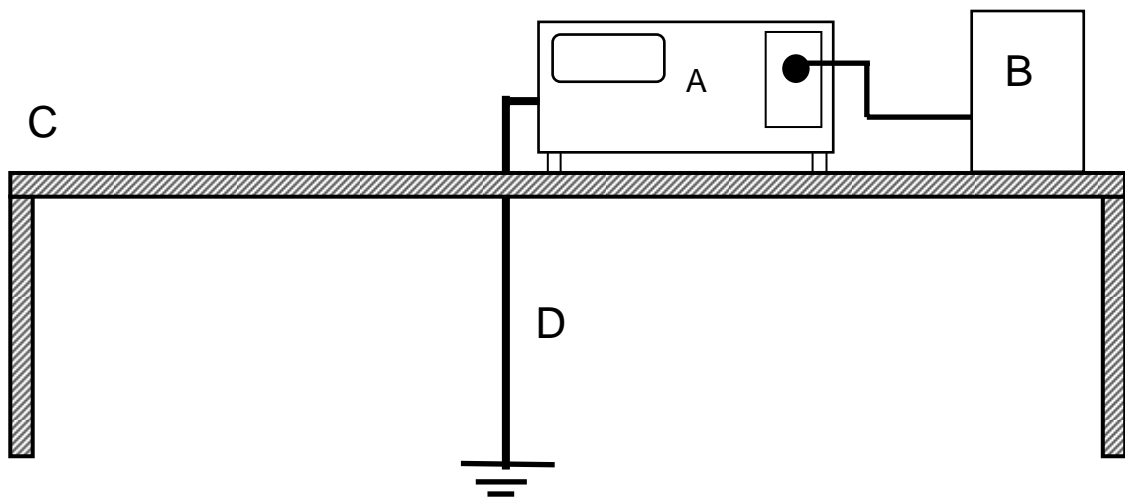
EUT operating mode	Dropout % UT	Phase	Duration of dropout in Periods	No of dropout	Time between dropout	Observations (Performance Criterion)
Normally	70	0°	0.5 (10ms)	3	10s	No Loss of Function (A)
Normally	40	0°	5 (100ms)	3	10s	No Loss of Function (A)
Normally	<5	0°	250 (5000ms)	3	10s	During the test EUT to shut down, after the test it return to normal status by operator(B).

A: No degradation in performance of the E.U.T. was observed.

Performance B is within the acceptable criterion for Voltage Dips and Interruptions test.

4.6.3 Voltage Dips and Interruptions Test Setup

- A: Mains Drop out Simulator
- B: EUT
- C: Wooden Table
- D: Ground Wire



Test-setup: Voltage Dips, Interruptions & Variations

For reference only

4.7 Radio-frequency Common Mode / Conducted Susceptibility (CS)

Test requirement: EN 60730-1, EN 60730-2-8
Test Method: IEC 61000-4-6
Test Date: Nov. 12, 2013
Frequency Range: 0.15MHz to 80MHz
Test level: 3V rms (unmodulated emf into 150 Ω)
Modulation: 80%, 1kHz Amplitude Modulation.

4.7.1 E.U.T. Operation

Operating Environment:
Temperature: 22.1 °C
Humidity: 52 % RH
Barometric Pressure: 1012 mbar

EUT Operation:

Compliance test was performed in ON mode.

4.7.2 Test Results

AC mains of AC Cable

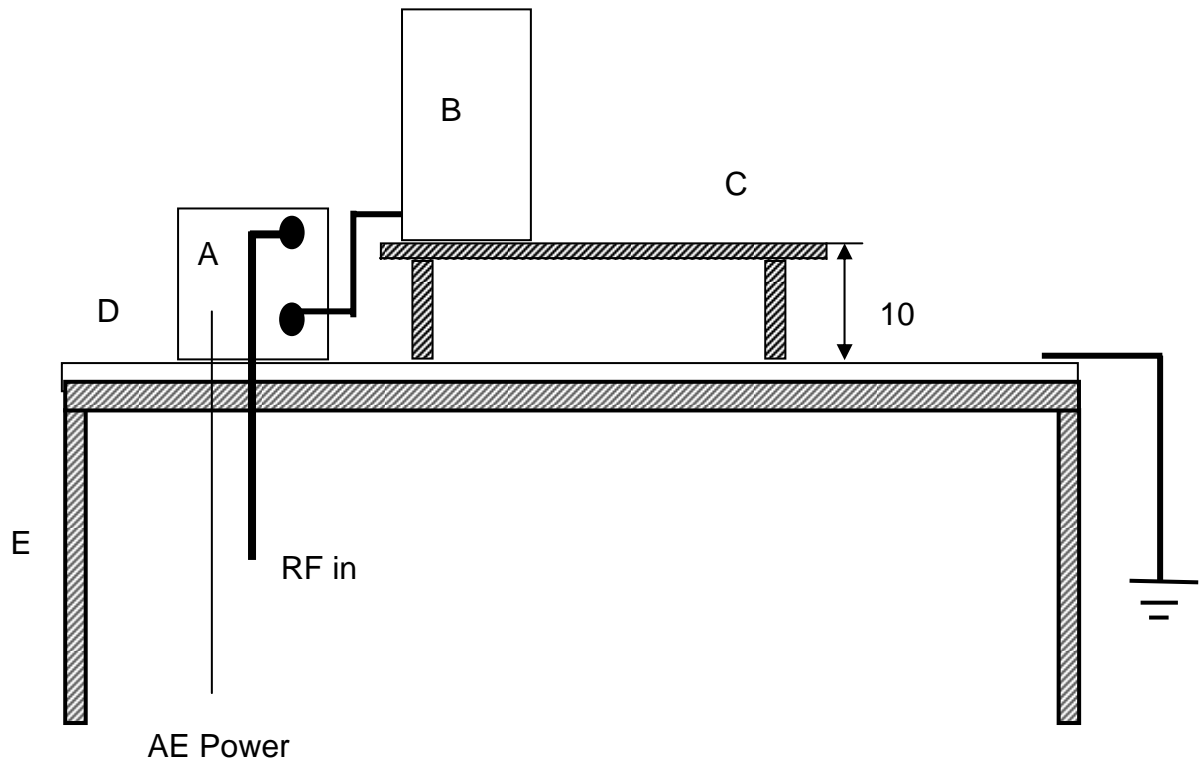
Frequency	Line	Test Level	Modulation	Step Size	Dwell Time	Observation (Performance Criterion)
150kHz to 80MHz	2 Wire AC Supply Cable	3Vrms	80%, 1kHz Amp. Mod.	1%	1s	During test, After test EUT to normal (A).

Results

A: No degradation in the performance of the E.U.T. was observed.

4.7.3 Conducted Immunity Test Setup Drawing

- A: CDN
- B: EUT
- C: Wooden table
- D: Reference Ground Plane
- E: Wooden table
- F: Ground Wire



Test-setup: Conducted Immunity

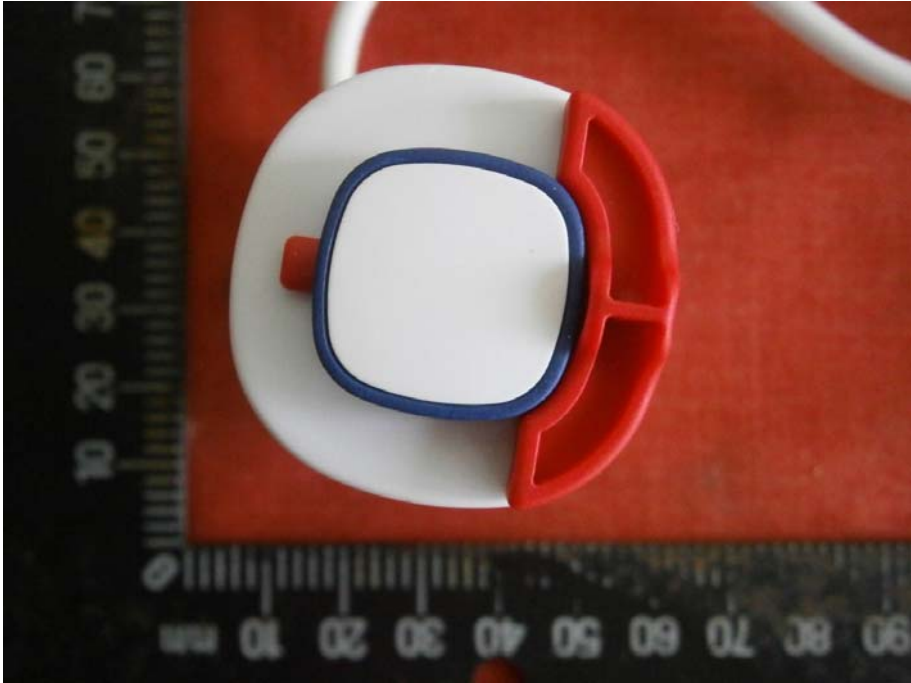
For reference only

5 Photographs - Constructional Details

5.1 EUT – General View



5.2 EUT –General View



5.3 Inside Construction



5.4 Inside Construction



End of the report