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1 TEST RESULTS SUMMARY

Test Item	Standard	Result
Continuous conducted disturbance voltage	EN 55015: 2006+A1:2007	Pass
Radiated electromagnetic disturbance	EN 55015: 2006+A1:2007	Pass
Radiated Electromagnetic Disturbance (30 MHz -300 MHz)	EN 55015: 2006+A1: 2007	Pass
Insertion loss	EN 55015: 2006+A1:2007	N/A
Harmonic of current	EN 61000-3-2: 2006	Pass
Flicker	EN 61000-3-3 : 1995+A1 : 2001 +A2 : 2005	Pass
ESD immunity	EN 61547: 1995+A1: 2000 Reference: IEC 61000-4-2: 1995+A1: 1998+A2: 2000	Pass
Inject current immunity	EN 61547: 1995+A1: 2000 Reference: IEC 61000-4-6: 2003+A1: 2004+A2: 2006	Pass
Surge immunity	EN 61547: 1995+A1: 2000 Reference: IEC 61000-4-5:2005	Pass
EFT immunity	EN 61547: 1995+A1: 2000 Reference: IEC 61000-4-4:2004	Pass
Radiated EM filed immunity	EN 61547: 1995+A1: 2000 Reference: IEC 61000-4-3: 2006	Pass
Voltage dips and interruption immunity	EN 61547: 1995+A1: 2000 Reference: IEC 61000-4-11:2004	Pass
Power frequency magnetic field immunity	EN 61547: 1995+A1: 2000 Reference: IEC 61000-4-8:1993+A1:2000	N/A

Remark: 1. The symbol "N/A" in above table means Not Applicable.
2. When determining the test results, measurement uncertainty of tests has been considered.

2 EMC Results Conclusion
(with Justification)

RE: EMC Testing Pursuant to EMC Directive 2004/108/EC Performed on the LED power supply, Models: ELP06-12LS; ELP09-12LS; ELP12-12LS; ELP18-12LS.

We tested the LED power supply, Model: ELP06-12LS; ELP09-12LS; ELP12-12LS; ELP18-12LS, to determine if they were in compliance with the relevant EN standards as marked on the Test Results Summary. We found that the unit met the requirement of EN 55015, EN 61000-3-2, EN 61000-3-3, EN 61547 (IEC 61000-4-2), EN 61547 (IEC 61000-4-4), EN 61547 (IEC 61000-4-6), EN 61547 (IEC 61000-4-5), EN 61547 (IEC 61000-4-11), & EN 61547 (IEC 61000-4-3) standards when tested as received. The worst case's test data was presented in this test report. Test item Radiated electromagnetic disturbance and Radiated EM filed immunity was subcontracted.

ELP09-12LS; ELP12-12LS and ELP18-12LS have similar circuit diagram; similar mechanical and electrical constructions, except technical data of some components; output wattage are different. ELP18-12LS; ELP09-12LS; ELP12-12LS were selected to do fully test. ELP06-12LS was selected to do fully test because of different PCB layout and circuit diagram.

The production units are required to conform to the initial sample as received when the units are placed on the market.

3 LABORATORY MEASUREMENTS

Configuration Information

Equipment Under Test (EUT):	LED power supply
Model:	ELP06-12LS; ELP09-12LS; ELP12-12LS; ELP18-12LS
Serial No.	Not Labelled
Support Equipment:	Resistance provided by Intertek
Rated Voltage:	220-240 VAC 50/60 Hz
Condition of Environment:	Temperature : 15~25°C Relative Humidity: 35~60% Atmosphere Pressure 86~106kPa

Notes:
1. The EMI measurements had been made in the operating mode produced the largest emission in the frequency band being investigated consistent with normal applications.
An attempt had been made to maximize the emission by varying the configuration of the EUT.

2. The EMS measurements had been made in the frequency bands being investigated, with the EUT in the most susceptible operating mode consistent with normal applications. The configuration of the test sample had been varied to achieve maximum susceptibility.

4 EMI TEST

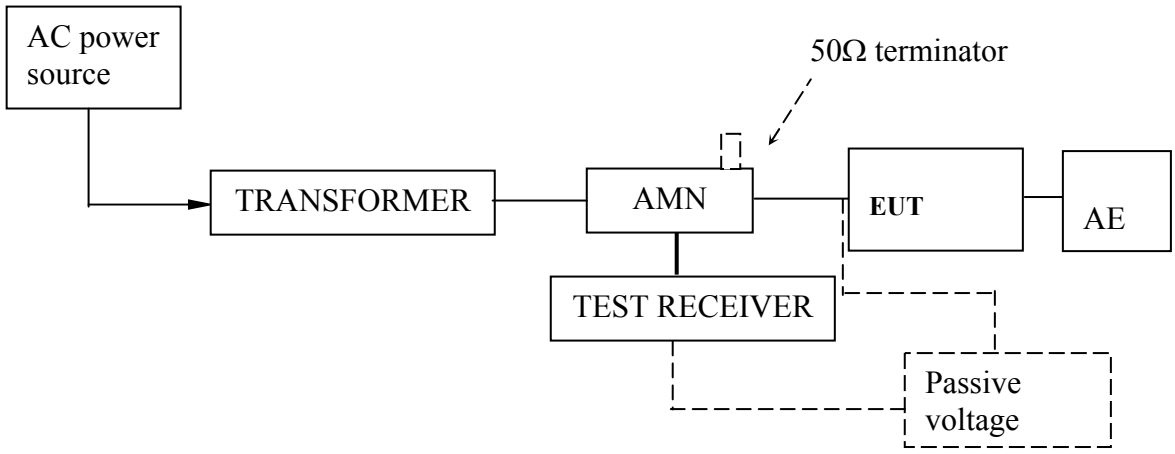
4.1 EN 55015 Continuous Conducted Disturbance Voltage Test

Test Result: Pass

4.1.1 Used Test Equipment

Equipment No.	Equipment	Model	Manufacturer
EM080-05	EMI receiver	ESCI	R&S
EM006-06	LISN	ENV216	R&S
EM004-03	EMC shield Room	8m×4m×3m	Zhongyu

4.1.2 Block Diagram of Test Setup



4.1.3 Test Setup and Procedure

The EUT was set to achieve the maximum emission level. The mains terminal disturbance voltage was measured with the EUT in a shielded room. The EUT was connected to AC power source through an Artificial Mains Network which provide a 50Ω linear impedance Artificial hand is used if appropriate (for handheld apparatus). The load/control terminal disturbance voltage was measured with passive voltage probe if appropriate.

The EUT was placed on a 0.8m high non-metallic table above a metallic plane, and 0.4m from wall of shielded room which is considered as Ground Reference Plane (GRP) (For floor standing EUT, was placed on a 0.1m high non-metallic supported on GRP) The EUT keeps a distance of at least 0.8m from any other of the metallic surface. The Artificial Mains Network is situated at a distance of 0.8m from the EUT.

During the test, mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m.

The bandwidth of test receiver was set at 200Hz in the frequency range from 9kHz to 150KHz, and 9kHz in the frequency range from 150kHz to 30MHz.

4.1.4 Test Data

At main terminal: Pass

Model: ELP06-12LS

Tested Wire: Live **Operation Mode: EUT on**

EDIT PEAK LIST (Final Measurement Results)			
Trace1:	CE1511QP		
Trace2:	CE1511AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	12.84 kHz	59.83 L1	
2 Average	15.32 kHz	44.28 L1	
2 Average	25.64 kHz	51.63 L1	
2 Average	52.44 kHz	44.34 L1	
2 Average	77 kHz	35.44 L1	
1 Quasi Peak	186 kHz	49.03 L1	-15.17
2 Average	186 kHz	35.76 L1	-18.44
1 Quasi Peak	258 kHz	48.68 L1	-12.81
2 Average	266 kHz	31.88 L1	-19.35
1 Quasi Peak	386 kHz	47.17 L1	-10.98
2 Average	390 kHz	32.71 L1	-15.35
2 Average	722 kHz	26.08 L1	-19.91
1 Quasi Peak	794 kHz	39.55 L1	-16.44
1 Quasi Peak	870 kHz	37.40 L1	-18.59
1 Quasi Peak	1.966 MHz	35.35 L1	-20.64
1 Quasi Peak	2.578 MHz	34.68 L1	-21.32
1 Quasi Peak	4.098 MHz	29.06 L1	-26.93

Tested Wire: Neutral **Operation Mode: EUT on**

EDIT PEAK LIST (Final Measurement Results)			
Trace1:	CE1511QP		
Trace2:	CE1511AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	12.84 kHz	76.77 L1	
2 Average	15.32 kHz	46.84 L1	
2 Average	25.56 kHz	49.40 L1	
2 Average	52.52 kHz	43.07 L1	
2 Average	77.16 kHz	35.06 L1	
1 Quasi Peak	182 kHz	48.13 L1	-16.26
2 Average	182 kHz	36.07 L1	-18.31
1 Quasi Peak	258 kHz	49.21 L1	-12.28
2 Average	262 kHz	36.80 L1	-14.56
1 Quasi Peak	390 kHz	49.67 L1	-8.39
2 Average	390 kHz	38.12 L1	-9.93
1 Quasi Peak	718 kHz	42.37 L1	-13.62
2 Average	718 kHz	31.86 L1	-14.13
1 Quasi Peak	1.182 MHz	40.86 L1	-15.13
2 Average	1.33 MHz	28.70 L1	-17.29
1 Quasi Peak	1.706 MHz	39.85 L1	-16.14
2 Average	1.79 MHz	27.73 L1	-18.26
2 Average	2.546 MHz	26.85 L1	-19.15
1 Quasi Peak	3.038 MHz	38.95 L1	-17.05
1 Quasi Peak	4.114 MHz	33.67 L1	-22.32

Model: ELP09-12LS

Tested Wire: Live **Operation Mode: EUT on**

EDIT PEAK LIST (Final Measurement Results)

Trace1:	CE1511QP
Trace2:	CE1511AV
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	12.84 kHz	80.43 L1	
2 Average	15.16 kHz	55.79 L1	
2 Average	38.12 kHz	50.96 L1	
2 Average	65.8 kHz	60.23 L1	
2 Average	68.84 kHz	47.42 L1	
2 Average	130.36 kHz	41.24 L1	
1 Quasi Peak	154 kHz	41.44 L1	-24.34
2 Average	262 kHz	34.59 L1	-16.77
1 Quasi Peak	310 kHz	45.05 L1	-14.92
2 Average	326 kHz	33.85 L1	-15.70
1 Quasi Peak	346 kHz	46.53 L1	-12.52
2 Average	666 kHz	35.01 L1	-10.99
1 Quasi Peak	674 kHz	47.03 L1	-8.96
1 Quasi Peak	1.362 MHz	39.63 L1	-16.36
2 Average	1.41 MHz	30.45 L1	-15.54
2 Average	1.478 MHz	29.85 L1	-16.14
1 Quasi Peak	1.818 MHz	39.18 L1	-16.81
2 Average	3.198 MHz	28.82 L1	-17.17
1 Quasi Peak	3.298 MHz	36.49 L1	-19.50
1 Quasi Peak	6.51 MHz	37.88 L1	-22.12
2 Average	6.538 MHz	31.64 L1	-18.35
1 Quasi Peak	7.614 MHz	42.33 L1	-17.66
2 Average	7.758 MHz	35.04 L1	-14.95
2 Average	11.298 MHz	32.24 L1	-17.75
1 Quasi Peak	11.414 MHz	38.81 L1	-21.18
2 Average	22.978 MHz	32.47 L1	-17.52
1 Quasi Peak	23.17 MHz	43.27 L1	-16.72

Tested Wire: Neutral **Operation Mode: EUT on**

EDIT PEAK LIST (Final Measurement Results)			
Trace1:	CE1511QP		
Trace2:	CE1511AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	12.84 kHz	63.19 L1	
2 Average	16.68 kHz	54.56 L1	
2 Average	38.52 kHz	51.37 L1	
2 Average	65.72 kHz	60.73 L1	
2 Average	73.64 kHz	46.83 L1	
2 Average	130.44 kHz	41.42 L1	
1 Quasi Peak	178 kHz	41.01 L1	-23.56
2 Average	194 kHz	36.27 L1	-17.58
1 Quasi Peak	310 kHz	44.73 L1	-15.23
2 Average	326 kHz	35.37 L1	-14.17
1 Quasi Peak	342 kHz	46.17 L1	-12.98
2 Average	594 kHz	36.46 L1	-9.53
1 Quasi Peak	706 kHz	47.32 L1	-8.67
1 Quasi Peak	910 kHz	42.99 L1	-13.00
2 Average	1.286 MHz	30.70 L1	-15.29
2 Average	1.486 MHz	29.17 L1	-16.82
1 Quasi Peak	1.602 MHz	39.20 L1	-16.79
2 Average	3.082 MHz	30.54 L1	-15.45
1 Quasi Peak	3.106 MHz	39.23 L1	-16.76
1 Quasi Peak	6.522 MHz	38.39 L1	-21.60
2 Average	6.538 MHz	31.44 L1	-18.55
1 Quasi Peak	6.95 MHz	41.49 L1	-18.50
2 Average	7.426 MHz	34.94 L1	-15.05
2 Average	11.39 MHz	31.96 L1	-18.03
1 Quasi Peak	11.574 MHz	38.25 L1	-21.74
1 Quasi Peak	23.038 MHz	43.86 L1	-16.13
2 Average	23.102 MHz	33.26 L1	-16.73

Model: ELP12-12LS

Tested Wire: Live **Operation Mode: EUT on**

EDIT PEAK LIST (Final Measurement Results)

Trace1:	CE1511QP
Trace2:	CE1511AV
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
2 Average	12.84 kHz	80.86	L1	
2 Average	15.64 kHz	57.38	L1	
2 Average	27.64 kHz	55.65	L1	
1 Quasi Peak	53.4 kHz	59.15	L1	-30.24
2 Average	54.28 kHz	56.30	L1	
2 Average	73.32 kHz	47.75	L1	
2 Average	133.24 kHz	38.04	L1	
1 Quasi Peak	162 kHz	42.99	L1	-22.36
2 Average	270 kHz	38.91	L1	-12.20
1 Quasi Peak	310 kHz	44.04	L1	-15.92
1 Quasi Peak	354 kHz	46.50	L1	-12.36
2 Average	402 kHz	34.95	L1	-12.86
1 Quasi Peak	682 kHz	49.14	L1	-6.85
2 Average	682 kHz	38.55	L1	-7.44
1 Quasi Peak	974 kHz	40.13	L1	-15.86
2 Average	1.318 MHz	31.26	L1	-14.73
2 Average	1.458 MHz	31.03	L1	-14.96
1 Quasi Peak	1.598 MHz	39.61	L1	-16.38
1 Quasi Peak	3.178 MHz	39.40	L1	-16.60
2 Average	3.294 MHz	32.12	L1	-13.87
1 Quasi Peak	4.914 MHz	34.39	L1	-21.60
2 Average	4.99 MHz	27.51	L1	-18.49
1 Quasi Peak	9.134 MHz	43.65	L1	-16.34
2 Average	9.238 MHz	36.33	L1	-13.66
2 Average	11.874 MHz	33.10	L1	-16.90
1 Quasi Peak	11.882 MHz	40.21	L1	-19.78
1 Quasi Peak	22.262 MHz	41.61	L1	-18.38
2 Average	22.33 MHz	32.18	L1	-17.81

Tested Wire: Neutral **Operation Mode: EUT on**

EDIT PEAK LIST (Final Measurement Results)

Trace1:	CE1511QP
Trace2:	CE1511AV
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
2 Average	9.16 kHz	67.22	L1	
2 Average	15.8 kHz	58.03	L1	
2 Average	26.52 kHz	55.37	L1	
2 Average	54.28 kHz	55.62	L1	
2 Average	72.04 kHz	53.88	L1	
2 Average	133.24 kHz	40.49	L1	
1 Quasi Peak	166 kHz	41.87	L1	-23.28
2 Average	270 kHz	39.52	L1	-11.59
1 Quasi Peak	306 kHz	44.80	L1	-15.27
2 Average	338 kHz	35.42	L1	-13.82
1 Quasi Peak	342 kHz	47.34	L1	-11.80
2 Average	670 kHz	39.71	L1	-6.28
1 Quasi Peak	678 kHz	49.64	L1	-6.35
2 Average	874 kHz	33.33	L1	-12.66
1 Quasi Peak	1.366 MHz	42.12	L1	-13.88
2 Average	1.798 MHz	31.61	L1	-14.38
1 Quasi Peak	1.918 MHz	41.23	L1	-14.76
1 Quasi Peak	3.27 MHz	38.65	L1	-17.34
2 Average	3.298 MHz	31.41	L1	-14.58
1 Quasi Peak	4.246 MHz	33.11	L1	-22.88
2 Average	8.786 MHz	37.99	L1	-12.00
1 Quasi Peak	9.174 MHz	44.41	L1	-15.58
2 Average	11.478 MHz	34.72	L1	-15.27
1 Quasi Peak	11.606 MHz	41.92	L1	-18.07
2 Average	21.654 MHz	33.24	L1	-16.75
1 Quasi Peak	21.778 MHz	41.99	L1	-18.00

Model: ELP18-12LS

Tested Wire: Live **Operation Mode: EUT on**

EDIT PEAK LIST (Final Measurement Results)			
Trace1:	CE1511QP		
Trace2:	CE1511AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	12.84 kHz	81.58 L1	
2 Average	20.76 kHz	55.51 L1	
2 Average	39.56 kHz	57.03 L1	
2 Average	46.6 kHz	66.91 L1	
1 Quasi Peak	56.76 kHz	60.57 L1	-28.27
2 Average	70.52 kHz	53.91 L1	
2 Average	137.88 kHz	42.30 L1	
1 Quasi Peak	186 kHz	52.36 L1	-11.84
2 Average	274 kHz	40.54 L1	-10.45
1 Quasi Peak	306 kHz	45.84 L1	-14.23
2 Average	334 kHz	38.88 L1	-10.46
1 Quasi Peak	354 kHz	48.46 L1	-10.40
2 Average	686 kHz	40.16 L1	-5.84
1 Quasi Peak	694 kHz	52.23 L1	-3.76
2 Average	1.234 MHz	37.16 L1	-8.83
1 Quasi Peak	1.33 MHz	46.34 L1	-9.65
1 Quasi Peak	1.742 MHz	46.40 L1	-9.59
2 Average	1.814 MHz	37.63 L1	-8.36
1 Quasi Peak	3.214 MHz	45.73 L1	-10.26
2 Average	3.462 MHz	38.60 L1	-7.39
2 Average	6.074 MHz	39.09 L1	-10.90
1 Quasi Peak	6.126 MHz	45.98 L1	-14.01
1 Quasi Peak	7.258 MHz	46.50 L1	-13.49
2 Average	7.334 MHz	39.72 L1	-10.27
1 Quasi Peak	17.906 MHz	43.22 L1	-16.77
2 Average	18.062 MHz	33.83 L1	-16.16
2 Average	20.37 MHz	40.43 L1	-9.56
1 Quasi Peak	20.478 MHz	51.09 L1	-8.90

Tested Wire: Neutral **Operation Mode: EUT on**

EDIT PEAK LIST (Final Measurement Results)

Trace1:	CE1511QP
Trace2:	CE1511AV
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
2 Average	12.84 kHz	64.19	L1	
2 Average	15.8 kHz	56.17	L1	
2 Average	40.68 kHz	61.03	L1	
2 Average	45.8 kHz	67.22	L1	
1 Quasi Peak	53.88 kHz	62.87	L1	-26.44
2 Average	76.44 kHz	46.46	L1	
2 Average	137.32 kHz	42.37	L1	
1 Quasi Peak	186 kHz	48.47	L1	-15.73
2 Average	270 kHz	34.17	L1	-16.94
1 Quasi Peak	310 kHz	44.92	L1	-15.05
1 Quasi Peak	370 kHz	47.52	L1	-10.98
2 Average	410 kHz	31.11	L1	-16.53
2 Average	634 kHz	33.15	L1	-12.84
1 Quasi Peak	638 kHz	42.21	L1	-13.79
2 Average	1.37 MHz	30.91	L1	-15.08
1 Quasi Peak	1.39 MHz	39.89	L1	-16.10
2 Average	1.926 MHz	32.30	L1	-13.69
1 Quasi Peak	2.078 MHz	40.09	L1	-15.90
2 Average	3.646 MHz	33.46	L1	-12.53
1 Quasi Peak	3.678 MHz	41.21	L1	-14.79
1 Quasi Peak	6.506 MHz	40.54	L1	-19.45
2 Average	6.506 MHz	34.19	L1	-15.81
2 Average	6.85 MHz	34.33	L1	-15.67
1 Quasi Peak	7.178 MHz	38.56	L1	-21.43
1 Quasi Peak	17.726 MHz	32.04	L1	-27.95
2 Average	17.998 MHz	26.13	L1	-23.87
2 Average	21.83 MHz	37.25	L1	-12.74
1 Quasi Peak	21.934 MHz	47.04	L1	-12.95

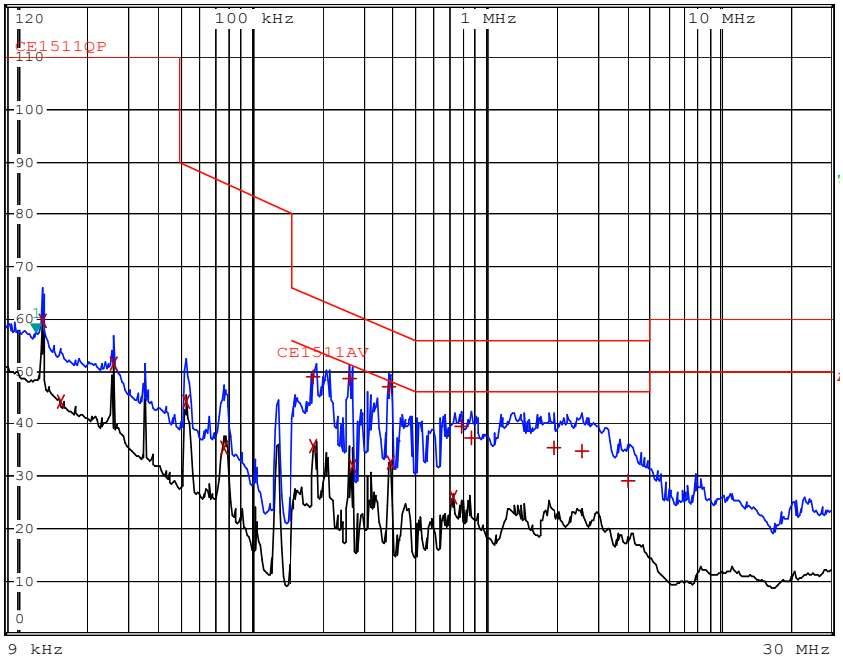
At load/control terminal: Not Applicable

4.1.5 Emission Curve

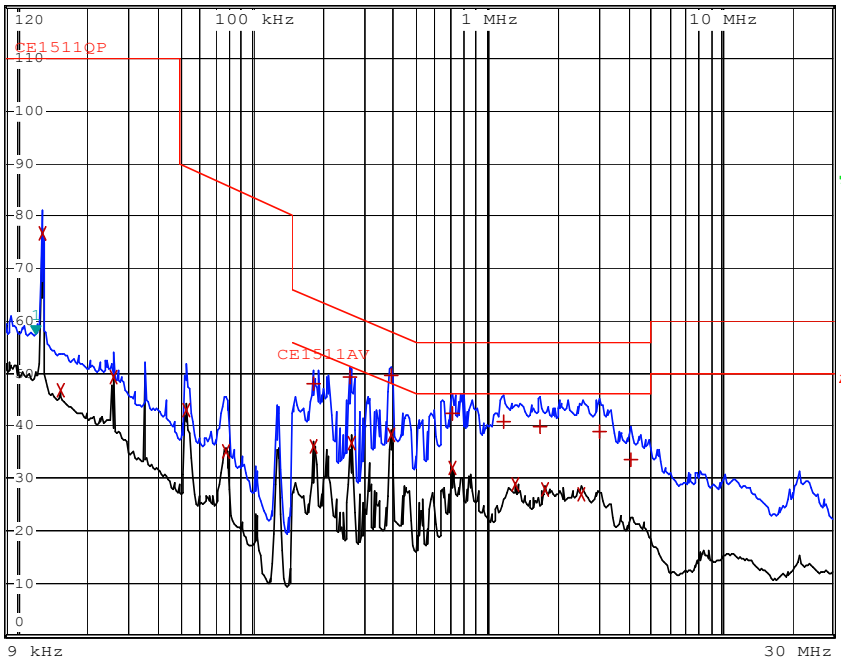
At mains terminal:

Model: ELP06-12LS

Tested Wire: Live

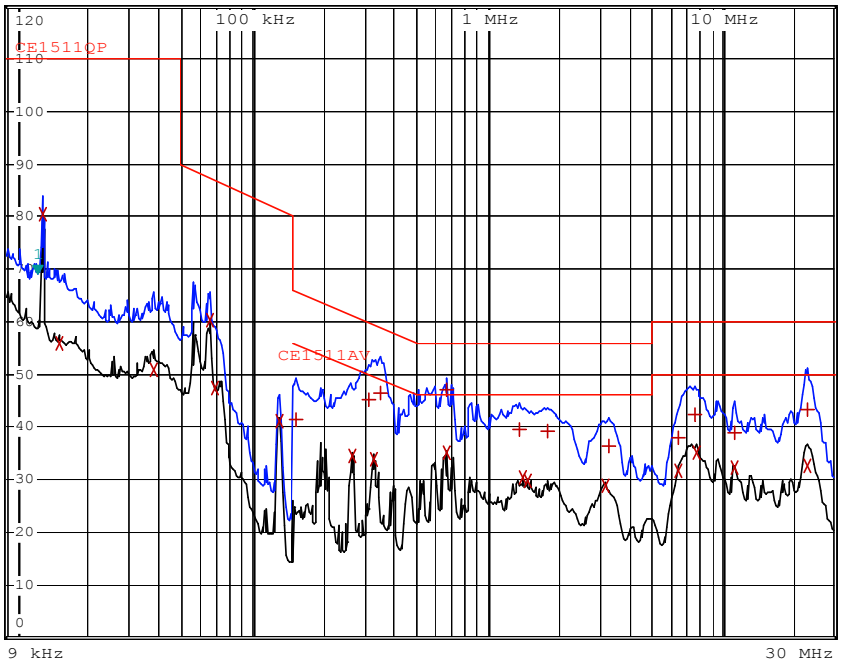


Tested Wire: Neutral

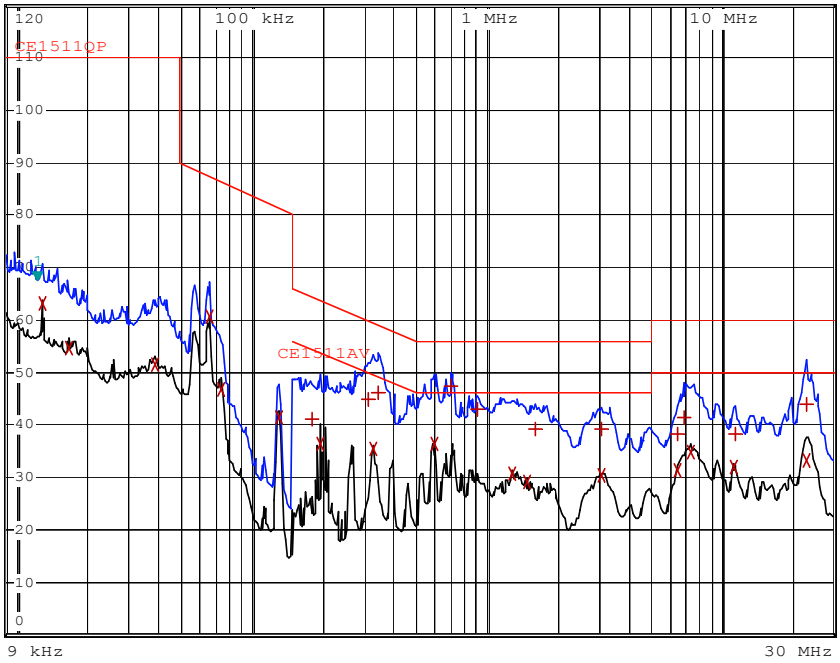


Model: ELP09-12LS

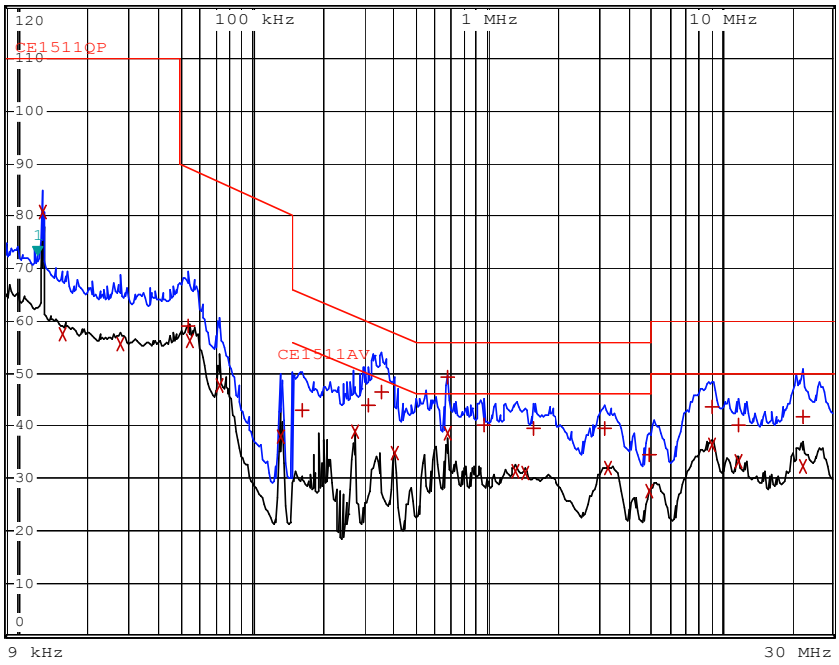
Tested Wire: Live



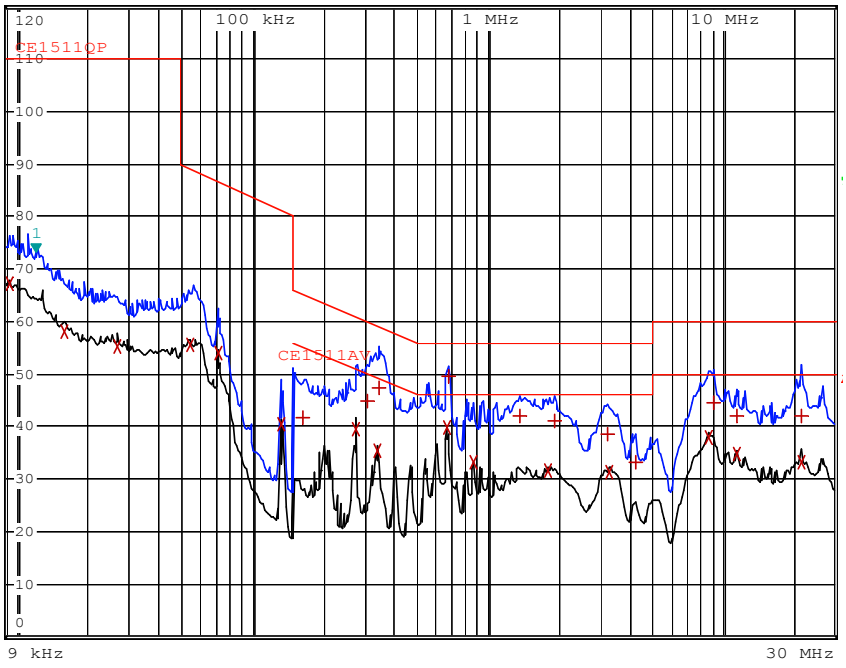
Tested Wire: Neutral



Model: ELP12-12LS
Tested Wire: Live

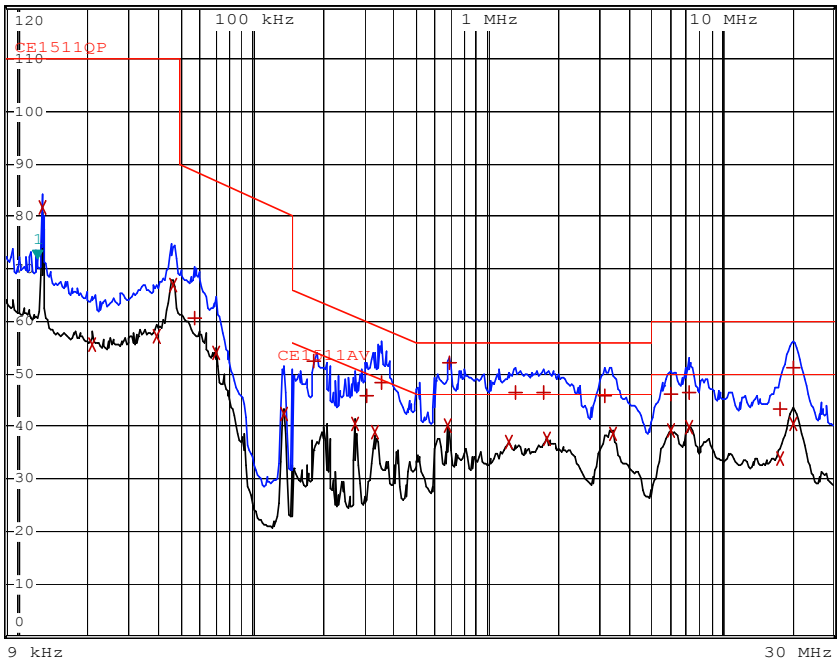


Tested Wire: Neutral

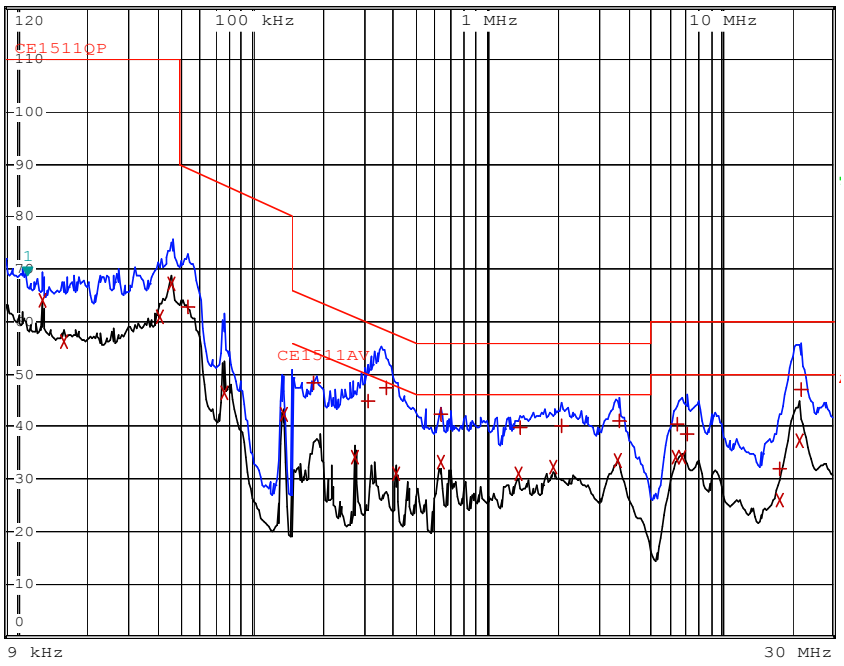


Model: ELP18-12LS

Tested Wire: Live



Tested Wire: Neutral



At load/control terminal:

Not Applicable.

4.1.6 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty is calculated in accordance with CISPR 16-4-2:2003.
Measurement uncertainty of mains terminal disturbance voltage in CISPR band A: 1.8dB.
Measurement uncertainty of mains terminal disturbance voltage in CISPR band B: 2.2dB.
The measurement uncertainty is given with a confidence of 95%, k=2.

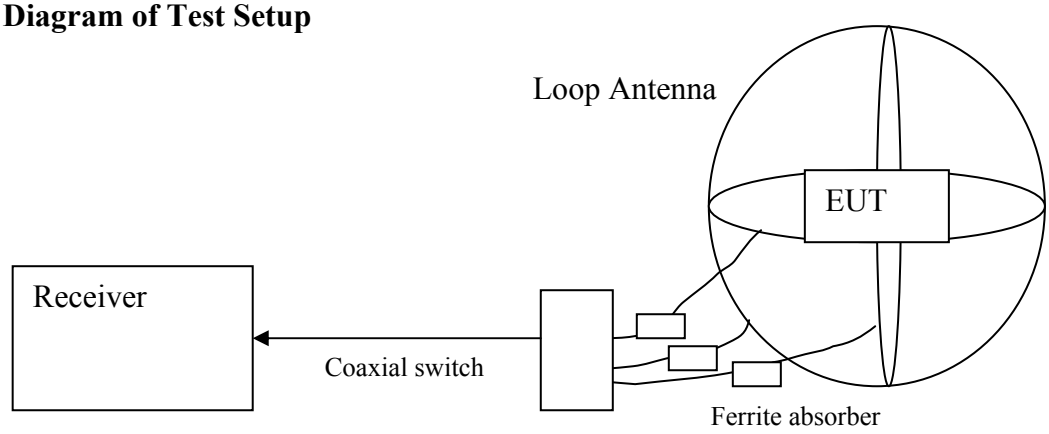
4.2 EN 55015 Radiated Electromagnetic Disturbance (9 kHz – 30MHz)

Test Result: Pass

4.2.1 Used Test Equipment

Equipment No.	Equipment	Model	Manufacturer
EM080-05	EMI receiver	ESCI	R&S
EM061-04	Triple Loop Antenna	HXYZ9170	SCHWARZBECK
EM004-03	EMC shield Room	8m×4m×3m	Zhongyu

4.2.2 Block Diagram of Test Setup



4.2.3 Test Setup and Procedure

The EUT is placed in the centre of the loop antenna system(LAS). The current induced by the magnetic field from the EUT into each of the three large loop antennas of the LAS is measured by connecting the current probe of the large loop antenna to a measuring receiver. During the measurements the EUT remains in a fixed position.
The currents in the three large loop antenna, origination from the three mutually orthogonal magnetic field components, are measured in sequence. Each current level measured shall comply with the emission limit, expressed in dBμA, as specified in table of EN 55015.
The distance between the outer perimeter of the LAS and nearby objects, such as floor and walls, shall be at least 0.5m.

To avoid unwanted capacitive coupling between the EUT and the LAS, the maximum dimensions of the EUT shall allow a distance of at least 0.2m between the EUT and the standardized 2m large loop antenna of the LAS.
The position of the mains lead shall be optimized for maximum current induction. In general, this position will not be critical when the EUT complies with the conducted emission limit.

4.2.4 Test Data

Model: ELP06-12LS

Frequency [MHz]	X axis [dB(μA)]	Y axis [dB(μA)]	Z axis [dB(μA)]	Limit [dB(μA)]
0.009	<78	<78	<78	88.0
0.050	<78	<78	<78	88.0
0.100	<64	<64	<64	74.0
0.160	<47	<47	<47	57.2
0.240	<40	<40	<40	52.4
0.550	<30	<30	<30	42.5
1.000	<25	<25	<25	35.4
1.400	<20	<20	<20	31.4
2.000	<17	<17	<17	27.1
3.500	<12	<12	<12	22.0
6.000	<12	<12	<12	22.0
10.000	<12	<12	<12	22.0
22.000	<12	<12	<12	22.0
30.000	<12	<12	<12	22.0

Model: ELP09-12LS

Frequency [MHz]	X axis [dB(μA)]	Y axis [dB(μA)]	Z axis [dB(μA)]	Limit [dB(μA)]
0.009	<78	<78	<78	88.0
0.050	<78	<78	<78	88.0
0.100	<64	<64	<64	74.0
0.160	<47	<47	<47	57.2
0.240	<40	<40	<40	52.4
0.550	<30	<30	<30	42.5
1.000	<25	<25	<25	35.4
1.400	<20	<20	<20	31.4
2.000	<17	<17	<17	27.1
3.500	<12	<12	<12	22.0
6.000	<12	<12	<12	22.0
10.000	<12	<12	<12	22.0
22.000	<12	<12	<12	22.0
30.000	<12	<12	<12	22.0

Model: ELP12-12LS

Frequency [MHz]	X axis [dB(μA)]	Y axis [dB(μA)]	Z axis [dB(μA)]	Limit [dB(μA)]
0.009	<78	<78	<78	88.0
0.050	<78	<78	<78	88.0
0.100	<64	<64	<64	74.0
0.160	<47	<47	<47	57.2
0.240	<40	<40	<40	52.4
0.550	<30	<30	<30	42.5
1.000	<25	<25	<25	35.4
1.400	<20	<20	<20	31.4
2.000	<17	<17	<17	27.1
3.500	<12	<12	<12	22.0
6.000	<12	<12	<12	22.0
10.000	<12	<12	<12	22.0
22.000	<12	<12	<12	22.0
30.000	<12	<12	<12	22.0

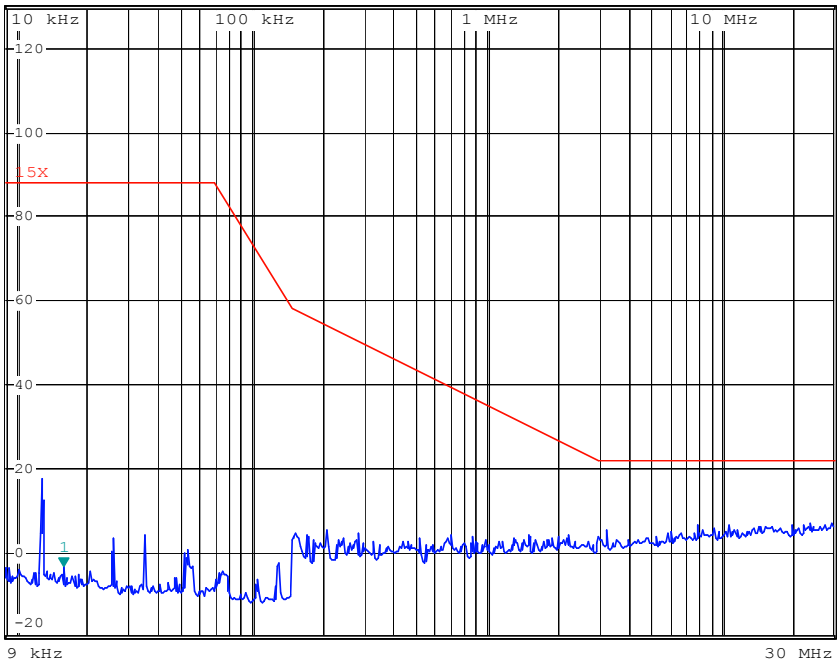
Model: ELP18-12LS

Frequency [MHz]	X axis [dB(μA)]	Y axis [dB(μA)]	Z axis [dB(μA)]	Limit [dB(μA)]
0.009	<78	<78	<78	88.0
0.050	<78	<78	<78	88.0
0.100	<64	<64	<64	74.0
0.160	<47	<47	<47	57.2
0.240	<40	<40	<40	52.4
0.550	<30	<30	<30	42.5
1.000	<25	<25	<25	35.4
1.400	<20	<20	<20	31.4
2.000	<17	<17	<17	27.1
3.500	<12	<12	<12	22.0
6.000	<12	<12	<12	22.0
10.000	<12	<12	<12	22.0
22.000	<12	<12	<12	22.0
30.000	<12	<12	<12	22.0

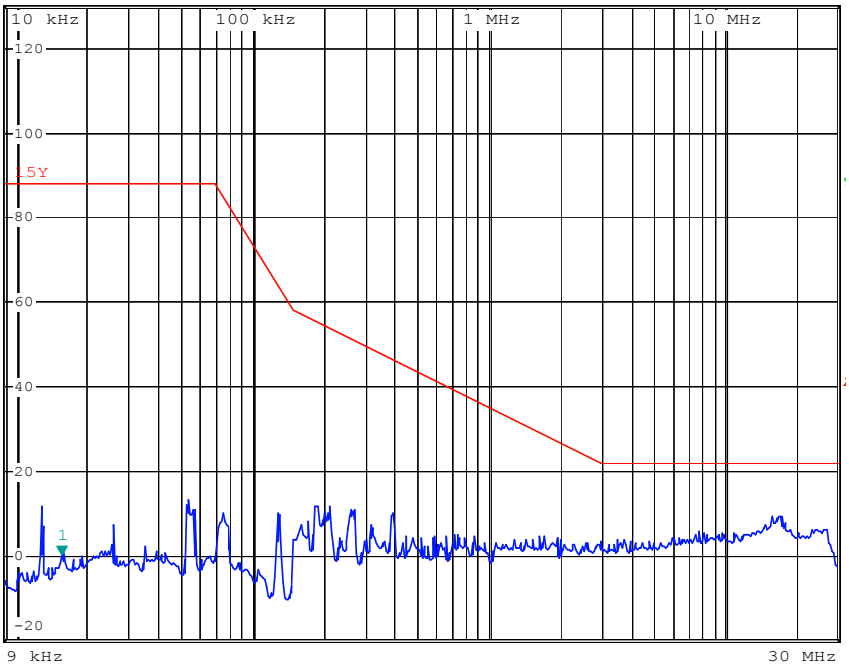
4.2.5 Test Curve

Model: ELP06-12LS

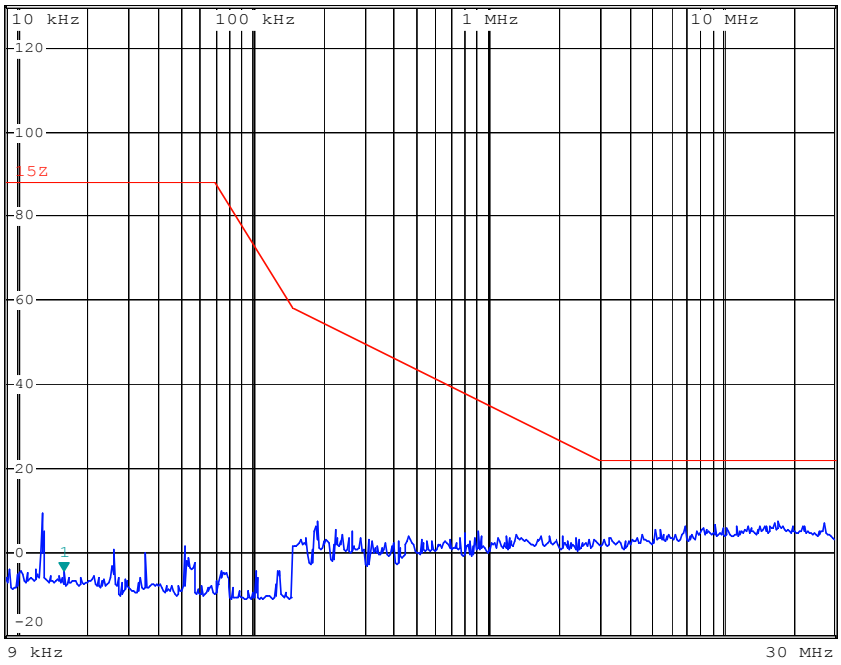
X-axis



Y-axis

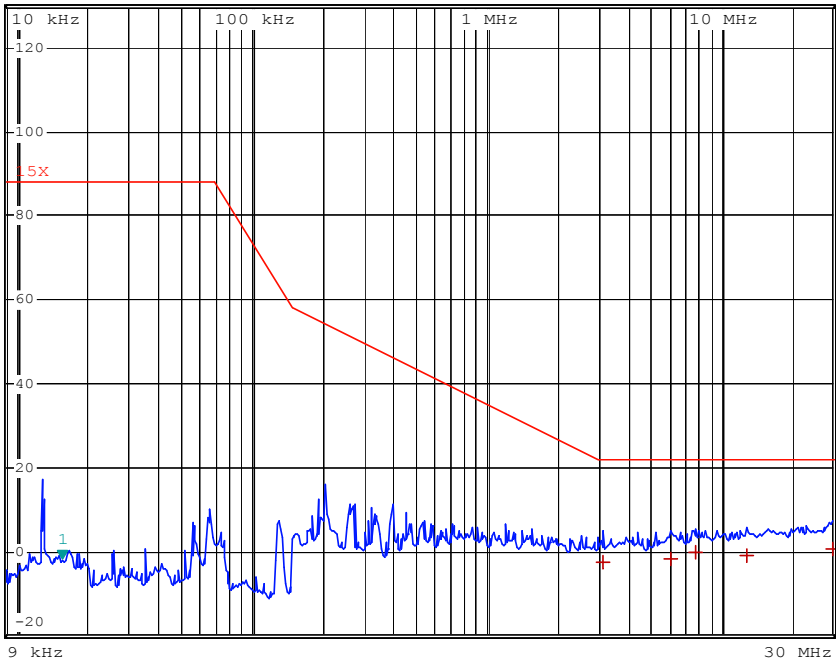


Z-axis

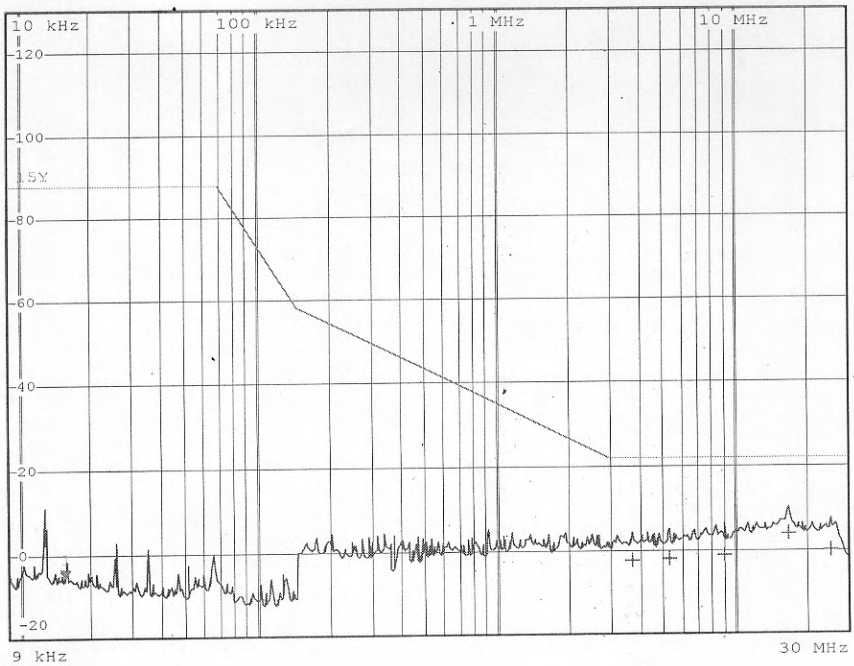


Model: ELP09-12LS

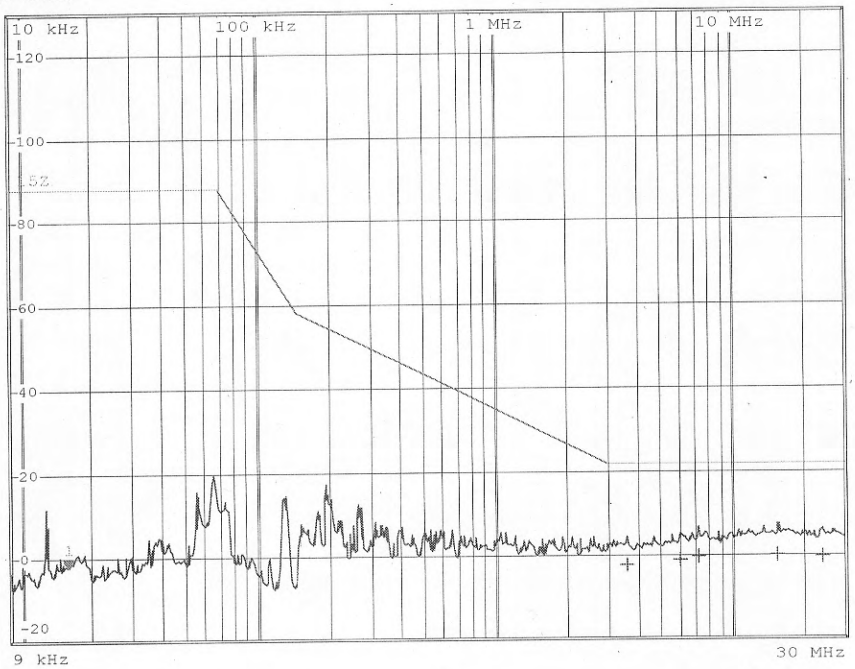
X-axis



Y-axis

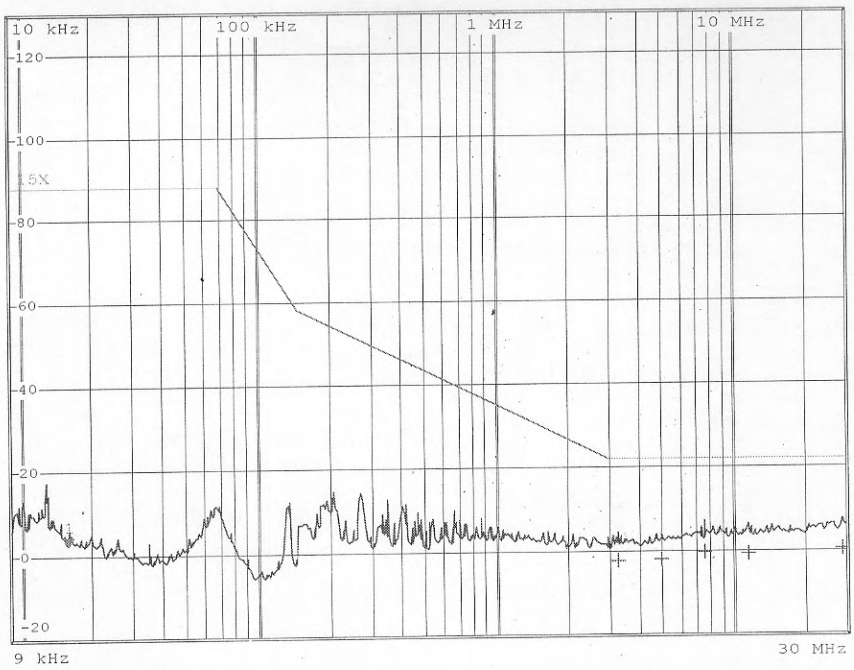

10 kHz
100 kHz
1 MHz
10 MHz
120
100
15Y
80
60
40
20
0
-20
9 kHz
30 MHz

Z-axis

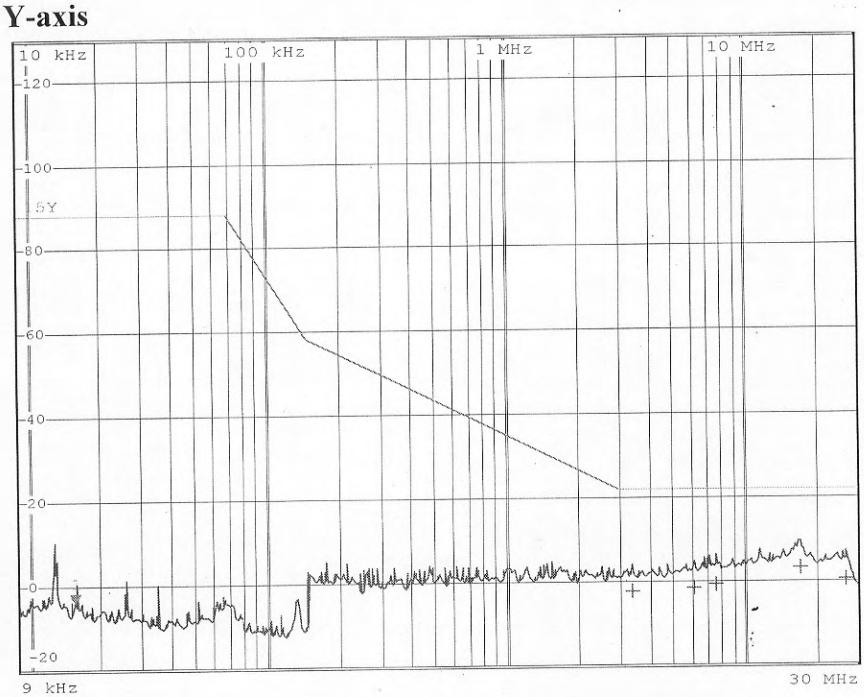

10 kHz
100 kHz
1 MHz
10 MHz
120
100
15Z
80
60
40
20
0
-20
9 kHz
30 MHz

Model: ELP12-12LS

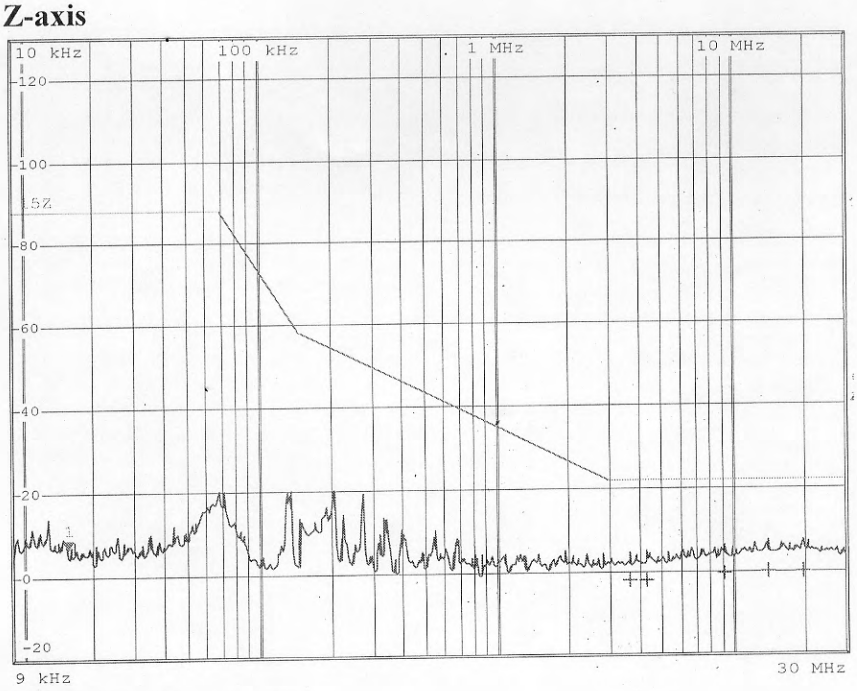
X-axis



Y-axis

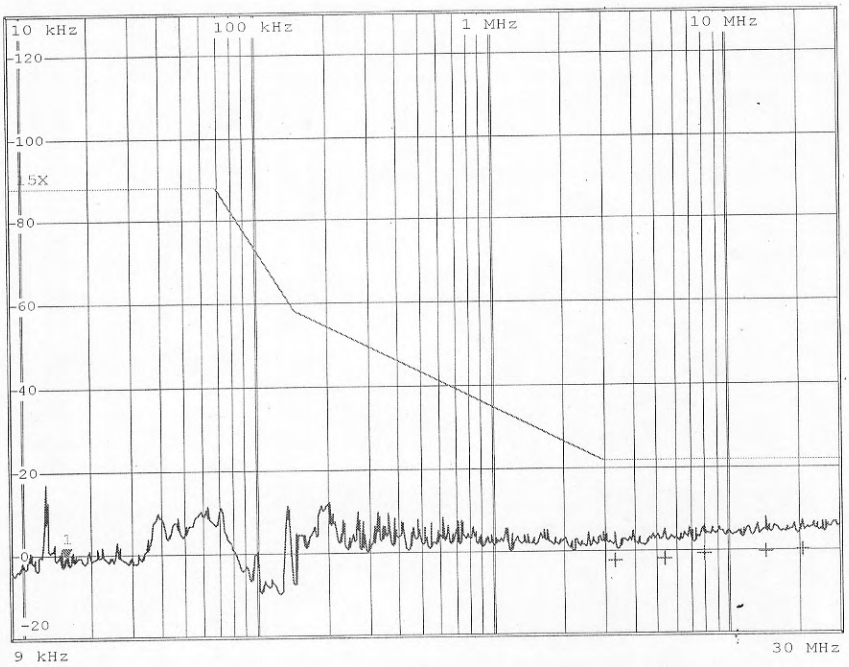


Z-axis

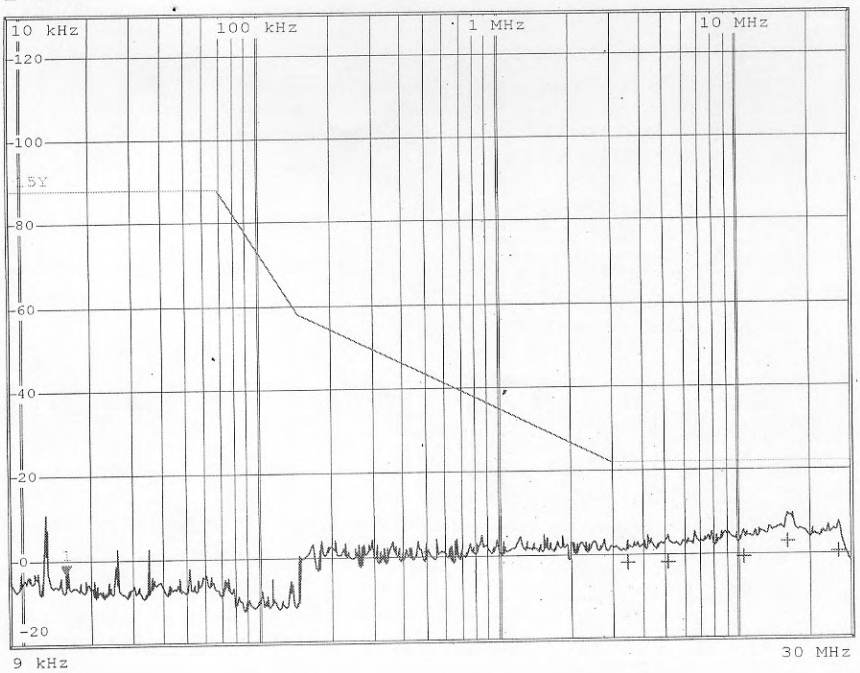


Model: ELP18-12LS

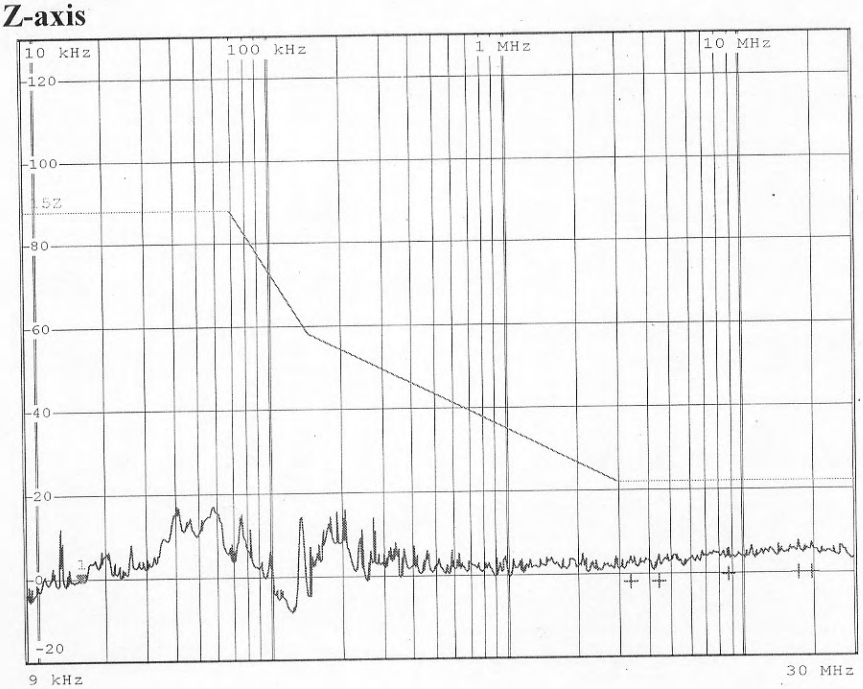
X-axis



Y-axis



Z-axis



4.2.6 Measurement Uncertainty

The measurement uncertainty for induction current is under consideration according to CISPR 16-4-2:2003.

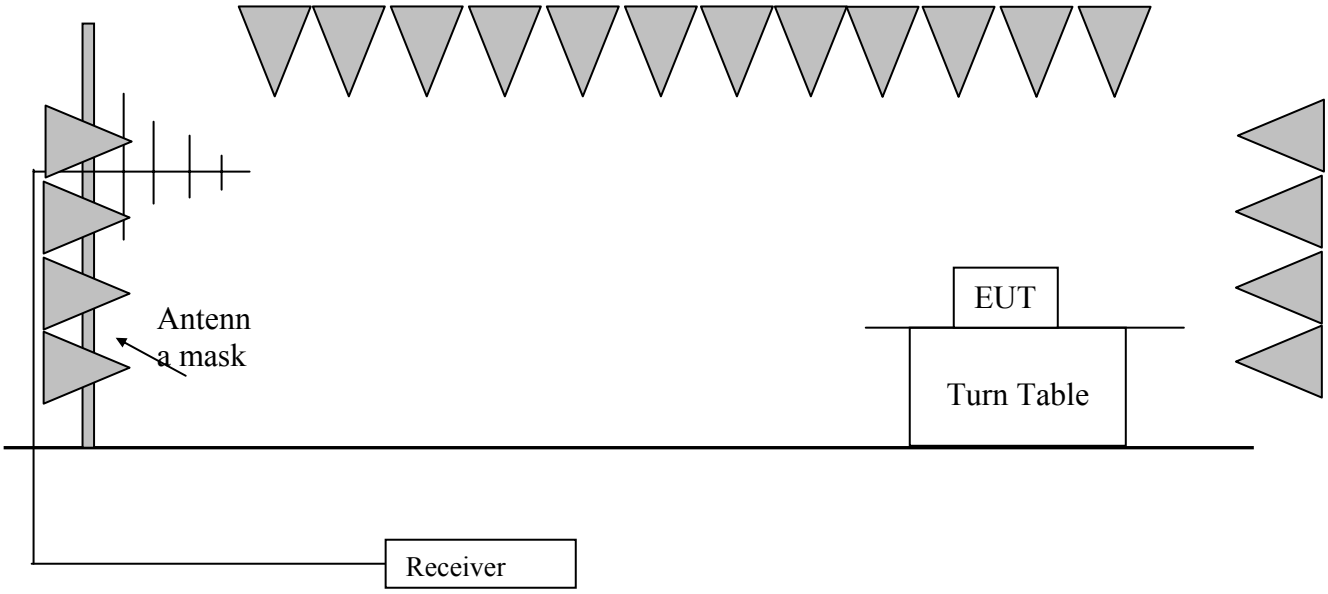
4.3 EN 55015 Radiated Electromagnetic Disturbance (30 MHz -300 MHz)

Test Result: Pass

4.3.1 Used Test Equipment

Equip. No.	Equipment	Model	Manufacturer
SZ185-01	EMI receiver	ESCI	R&S
SZ061-03	BiConiLog Antenna	3142C	ETS
SZ188-01	Anechoic Chamber	RFD-F/A-100	ETS

4.3.2 Block Diagram of Test Setup



4.3.3 Test Setup and Procedure

The measurement was applied in a semi-anechoic chamber. The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mask. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

Broadband antenna was used as receiving antenna. Both horizontal and vertical polarization of the antenna was set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to EN55022 requirement during radiated test.
The bandwidth setting on R&S Test Receiver ESI26 was 120 kHz.
The frequency range from 30MHz to 300MHz was checked

4.3.4 Test Data

Model: ELP06-12LS

Antenna Polarization	Frequency [MHz]	Measured Net at 3m [dB(μV/m)]	Limit at 3m [dB(μV/m)]
Horizontal	100.0	<30	40.0
Horizontal	200.0	<30	40.0
Horizontal	280.0	<37	47.0
Vertical	36.5	33	40.0
Vertical	44.3	33.5	40.0
Vertical	55.0	30.4	40.0

Model: ELP09-12LS

Antenna Polarization	Frequency [MHz]	Measured Net at 3m [dB(μV/m)]	Limit at 3m [dB(μV/m)]
Horizontal	100.0	<30	40.0
Horizontal	200.0	<30	40.0
Horizontal	280.0	37	47.0
Vertical	30.1	38.1	40.0
Vertical	30.4	37.6	40.0
Vertical	31.1	37.3	40.0

Model: ELP12-12LS

Antenna Polarization	Frequency [MHz]	Measured Net at 3m [dB(μV/m)]	Limit at 3m [dB(μV/m)]
Horizontal	100.0	<30	40.0
Horizontal	200.0	<30	40.0
Horizontal	280.0	<37	47.0
Vertical	100.0	<30	40.0
Vertical	200.0	<30	40.0
Vertical	280.0	<37	47.0

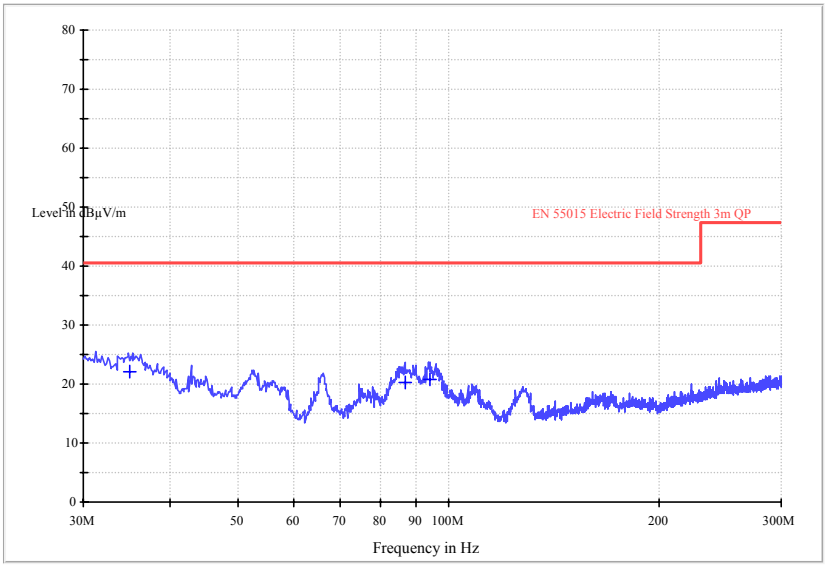
Model: ELP18-12LS

Antenna Polarization	Frequency [MHz]	Measured Net at 3m [dB(μV/m)]	Limit at 3m [dB(μV/m)]
Horizontal	87.6	35.5	40.0
Horizontal	97.8	36.1	40.0
Horizontal	137.3	34.9	40.0
Vertical	40.3	34.5	40.0
Vertical	46.0	36.6	40.0
Vertical	78.7	34.2	40.0

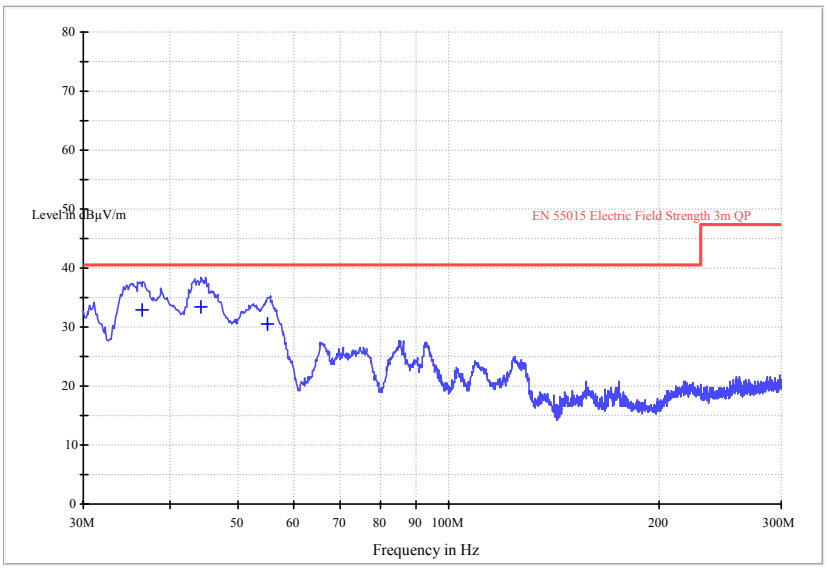
4.3.5 Test Curve

Model: ELP06-12LS

Horizontal

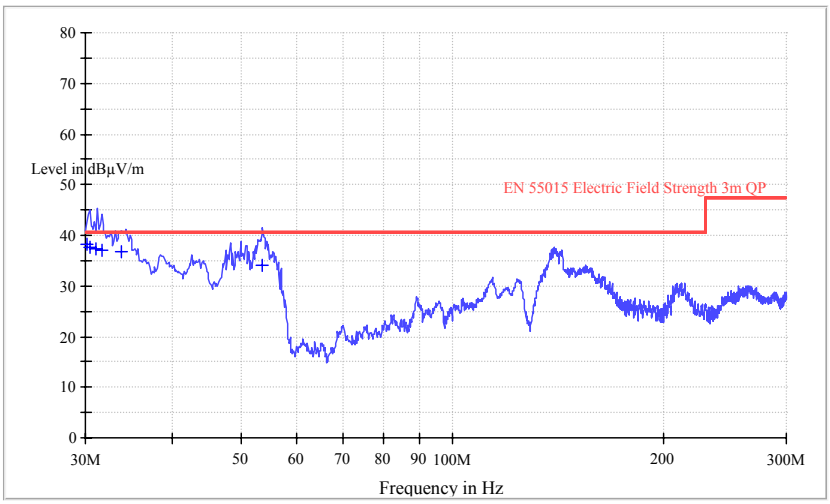


Vertical

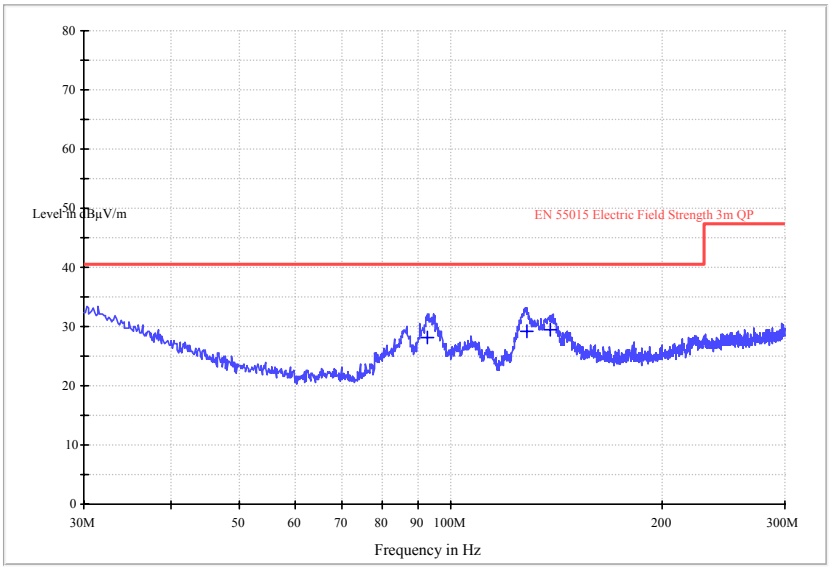


Model: ELP09-12LS
Horizontal

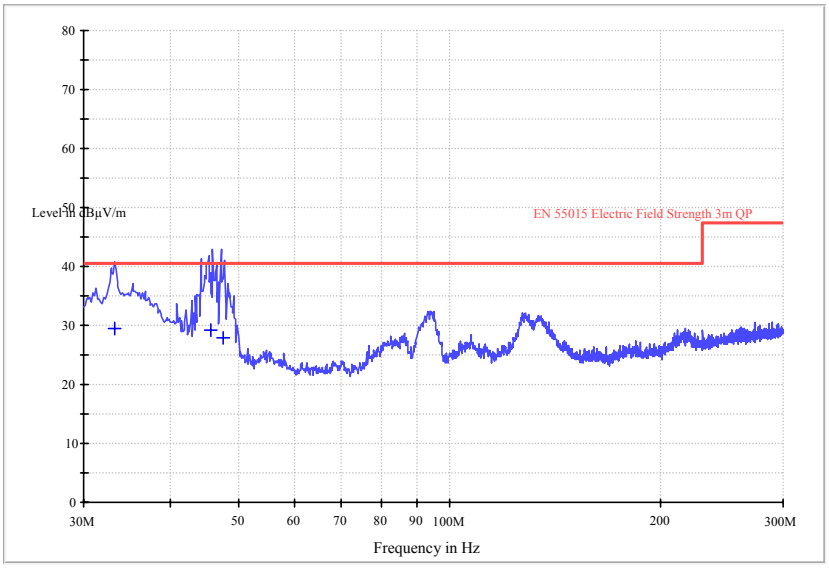
Vertical



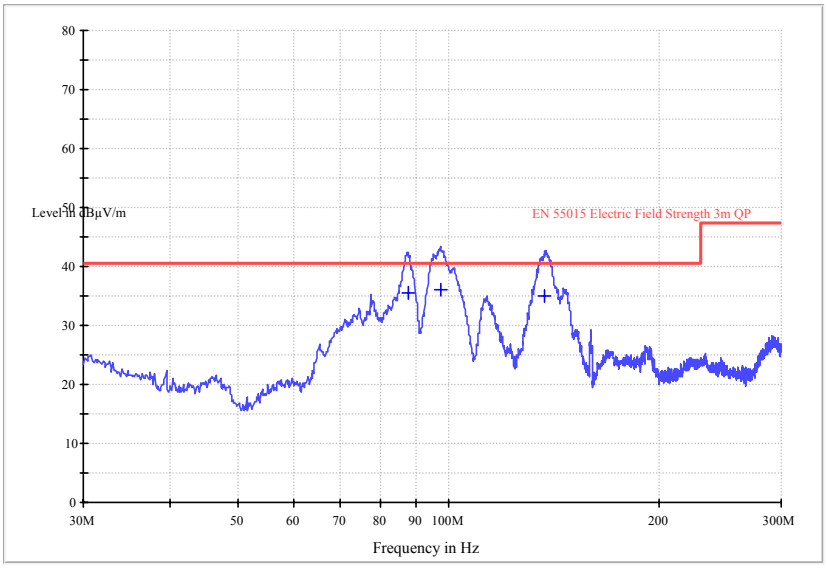
Model: ELP12-12LS
Horizontal



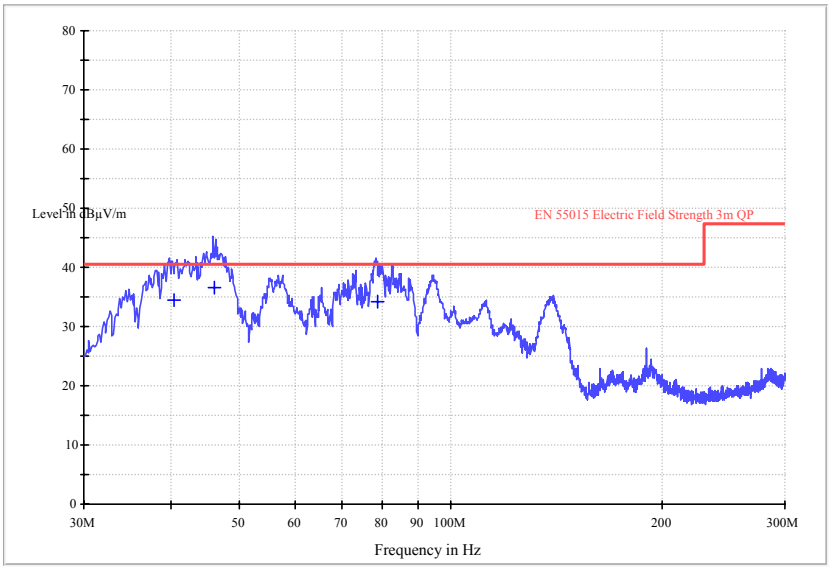
Vertical



Model: ELP18-12LS
Horizontal



Vertical



4.3.6 Measurement uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty is calculated in accordance with CISPR 16-4-2:2003.
Measurement uncertainty of radiated emission: 4.8 dB.
The measurement uncertainty is given with a confidence of 95%, k=2.

4.4 Insertion Loss

Test Result: Not Applicable.
Remark: Not required by standard.

5 Harmonics of current

Test Result: Pass

Remark:

EUT is not discharge lighting, the harmonics currents limits are not specified for the equipment with a rated power smaller than or equal to 25W. Therefore the EUT was deemed fulfill the requirements of relative standard without testing.

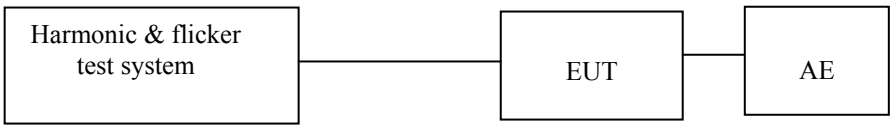
6 Flicker

Test Result: Pass

6.1 Used Test Equipment

Equipment No.	Equipment	Model	Manufacturer
EM001-01	Harmonic & Flicker Test System	CTS 3.0	California Instrument

6.2 Block Diagram of Test Setup



6.3 Test Setup and Procedure

6.3.1 Definition

Flicker:	impression of unsteadiness of visual sensation induced by a lighting stimulus whose luminance or spectral distribution fluctuates with time.
Pst:	Short-term flicker indicator The flicker severity evaluated over a short period (in minutes); Pst=1 is the conventional threshold of irritability
Plt:	long-term flicker indicator; the flicker severity evaluated over a long period (a few hous). Using successive Pst valuse.
dc:	the relative steady-state voltage change
dmax:	the maximum relative voltage change
d(t):	the value during a voltage change

6.3.2 Test condition

The EUT was set to produce the most unfavourable sequence of voltage changes.

6.4 Test Data

Model: ELP06-12LS

Flicker Test Summary (Run time)

Test Result: Pass **Status: Test Completed**

Time is too short for Plt plot

Parameter values recorded during the test:

Vrms at the end of test (Volt):	**230.36**			
Highest dt (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Time(mS) > dt:	**0.0**	**Test limit (mS):**	**500.0**	**Pass**
Highest dc (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Highest dmax (%):	**0.00**	**Test limit (%):**	**4.00**	**Pass**
Highest Pst (10 min. period):	**0.064**	**Test limit:**	**1.000**	**Pass**

Model: ELP09-12LS

Flicker Test Summary (Run time)

Test Result: Pass **Status: Test Completed**

Time is too short for Plt plot

Parameter values recorded during the test:

Vrms at the end of test (Volt):	**230.24**			
Highest dt (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Time(mS) > dt:	**0.0**	**Test limit (mS):**	**500.0**	**Pass**
Highest dc (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Highest dmax (%):	**0.00**	**Test limit (%):**	**4.00**	**Pass**
Highest Pst (10 min. period):	**0.064**	**Test limit:**	**1.000**	**Pass**

Model: ELP12-12LS

Flicker Test Summary (Run time)

Test Result: Pass **Status: Test Completed**

Time is too short for Plt plot

Parameter values recorded during the test:

Vrms at the end of test (Volt):	**230.26**			
Highest dt (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Time(mS) > dt:	**0.0**	**Test limit (mS):**	**500.0**	**Pass**
Highest dc (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Highest dmax (%):	**0.00**	**Test limit (%):**	**4.00**	**Pass**
Highest Pst (10 min. period):	**0.064**	**Test limit:**	**1.000**	**Pass**

Model: ELP18-12LS

Flicker Test Summary (Run time)

Test Result: Pass **Status: Test Completed**

Time is too short for Plt plot

Parameter values recorded during the test:

Vrms at the end of test (Volt):	**230.29**			
Highest dt (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Time(mS) > dt:	**0.0**	**Test limit (mS):**	**500.0**	**Pass**
Highest dc (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Highest dmax (%):	**0.00**	**Test limit (%):**	**4.00**	**Pass**
Highest Pst (10 min. period):	**0.064**	**Test limit:**	**1.000**	**Pass**

6.5 Measurement Uncertainty

Measurement uncertainty for voltage fluctuation and flicker is under consideration according to CISPR 16-4-2:2003.

7 EMS TEST

Performance Criteria:

Criterion A: During the test no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.

Criterion B: During the test the luminous intensity may change to any value. After the test the luminous intensity shall be restored to its initial value within 1 min.

Regulating controls need not function during the test, but after the test the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

Criterion C: During and after the test any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal if necessary by temporary interruption of the mains supply and /or operating the regulating control.

Additional requirement for lighting equipment incorporation a starting device:

After the test the lighting equipment is switched off. After half an hour it is witched on again. The lighting equipment shall start and operate as intended.

Measurement Uncertainty
According to CISPR 16-4-2:2003, measurement uncertainty to immunity test is under consideration.

Note: "N/A" means Not Applicable in below text.

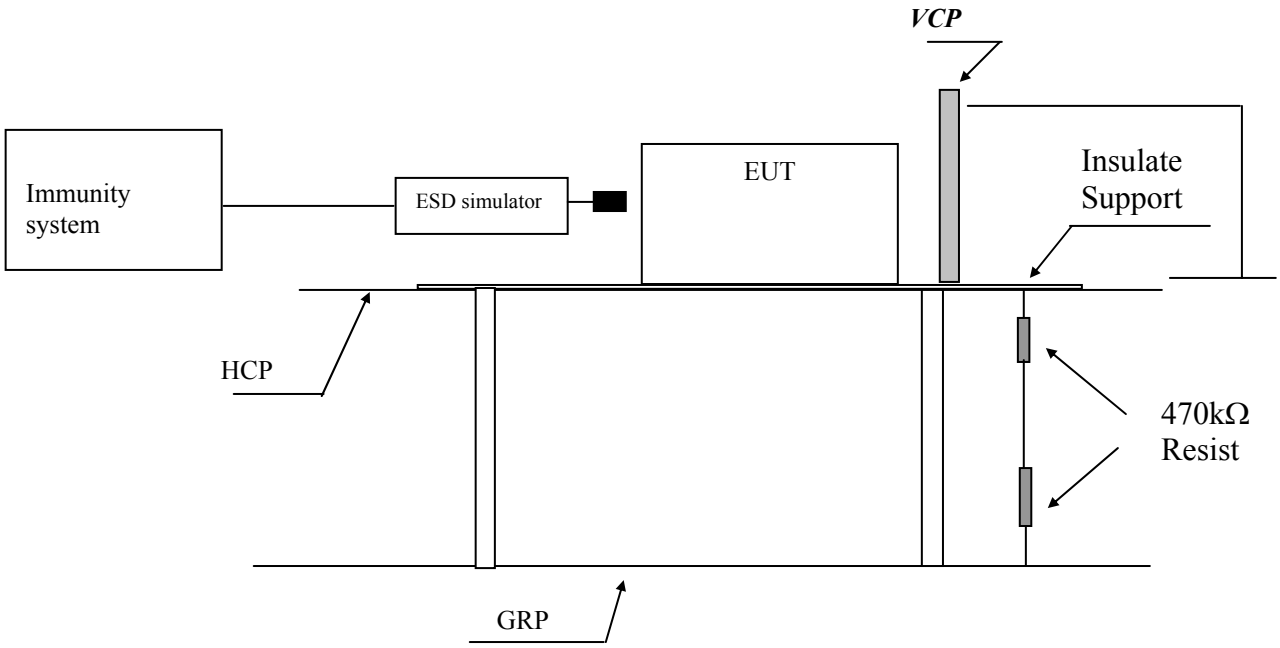
7.1 IEC 61000-4-2(Pursuant to EN 61547) Electrostatic Discharge Immunity

Performance criterion: ☒ B ☐ A(only for luminaire that use for emergency lighting)
Test Result: Pass

7.1.1 Used Test Equipment

Equip. No.	Equipment	Model	Manufacturer
EM077-02	ESD Simulator	NSG435	SCHAFFNER

7.1.2 Block Diagram of Test Setup



Note: HCP means Horizontal Coupling Plane,
VCP means Vertical Coupling Plane
GRP means Ground Reference Plane

7.1.3 Test Setup and Procedure

The EUT was put on a 0.8m high wooden tabel/0.1m high for floor standing equipment standing on the ground reference plane(GRP) 3m by 2m in size, made by iron 1.0 mm thick.

A horizontal coupling plane(HCP) 1.6m by 0.8m in size was placed on the table, and the EUT with its cables were isolated from the HCP by an insulating support with 0.5mm thick. The VCP 0.5m by 0.5m in size & HCP were constructed from the same material type & thinkmess as that of the GRP, and connected to the GRP via a 470kΩ resistor at each end.

The distance between EUT and any of the other metallic surface excepted the GRP, HCP & VCP was greater than 1m.

The EUT was arranged and connected according to its functional requirements.

Direct static electricity discharges was applied only to those points and surface which are accessible to personnel during normal usage, terminals are excluded.

On each preselected points 10 times of each polarity single discharge were applied The time interval between successive single discharges is at least 1s.

The ESD generator was held perpendicular to the surface to which the discharge is applied.

The discharge return cable of the generator was kept at a distance of 0.2m whilst the discharge is being applied. During the contact discharges, the tip of the discharge electrode was touch the EUT before the discharge switch is operated. During the air discharges, the round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT.

Indirect discharge was conducted to objects placed near the EUT, simulated by applying the dischares of the ESD generator to a coupling plane, in the contact discharge mode.

After each discharge, the ESD generator was removed from the EUT, the generator is then retriggered for a new single discharge. For ungrounded product, a grounded carbon fibre brush with bleeder resistors (2×470 kΩ) in the grounding cable was used after each discharge to remove remnant electrostatic voltage.

10 times of each polarity single discharge were applied to HCP and VCP. The detail selected points are listed in the following table.

7.1.4 Test Result

Direct Application of ESD

Direct Contact Discharge

Applied Voltage (kV)	No. of Discharge for each point	Result (Pursuant to EN 61547)	Discharged Points
4	20	N/A	All touchable screws of enclosure, accessible metal parts of the EUT

Direct Air Discharge

Applied Voltage (kV)	No. of Discharge for each point	Result (Pursuant to EN 61547)	Discharged Points
8	20	Pass	Air gap of the switch, button, the air in-taking opening, slots around the EUT

Indirect Application of ESD

Horizontal Coupling Plane under the EUT

Applied Voltage (kV)	No. of Discharge for each point	Result (pursuant to EN 61547)	Discharged Point
4	20	Pass	Edge of centre, corner on HCP

Vertical Coupling Plane beside the EUT

Applied Voltage (kV)	No. of Discharge for each point	Result (pursuant to EN 61547 criterion B)	Discharged Point
4	20	Pass	Edge of centre, corner on VCP

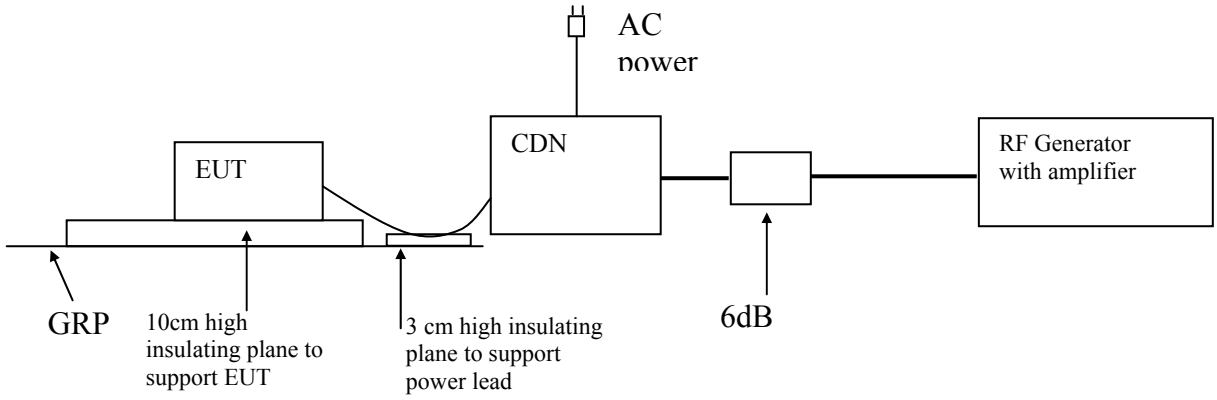
7.2 IEC 61000-4-6(Pursuant to EN 61547) Injected Current (0.15 MHz to 80 MHz)

Performance criterion: ☒ A ☐ B(only for luminaire with electronic ballast for discharge lamps)
Test Result: Pass

7.2.1 Used Test Equipment

Equip. No.	Equipment	Model	Manufacturer
EM003-01	Conducted Disturbance Generator	CDG_1020	Dr.Hubert GmbH

7.2.2 Block Diagram of Test Setup



7.2.3 Test Setup and Procedure

The EUT was placed on an insulating support of 0.1m height above a ground reference Plane, arranged and connected to satisfy its functional requirement.
All relevant cables were provided with the appropriate coupling and decoupling devices at a distance between 0.1m and 0.3m from the projected geometry of the EUT on an insulating support of 0.03m height above the ground reference plane.
Test voltage was verified before each testing though power meter combined in the RF generator with AMP.
Dwell time was set to 3s and step was set as 1% to keep sufficient response time for EUT.
The frequency from 0.15MHz to 80MHz was checked.

7.2.4 Test Result

Port:	Frequency (MHz)	Level (Pursuant to EN 61547)	Result
A.C. Power Lines	0.15 to 80	3V (r.m.s.)	Pass
D.C. Power Lines	0.15 to 80	3V (r.m.s.)	N/A
Signal Lines	0.15 to 80	3V (r.m.s.)	N/A
Control Lines	0.15 to 80	3V (r.m.s.)	N/A

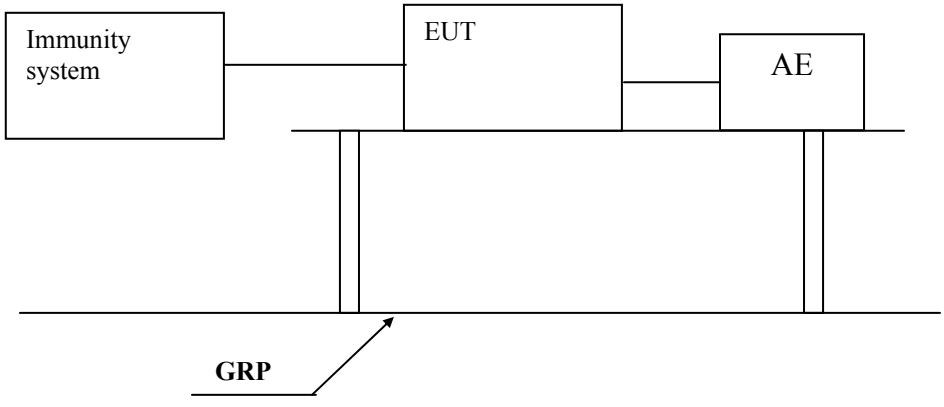
7.3 IEC 61000-4-4(Pursuant to EN 61547) Electrical Fast Transient/Burst

Performance criterion: B
Test Result: Pass

7.3.1 Used Test Equipment

Equipment No.	Equipment	Model	Manufacturer
EM005-07	EMS test system	Ecompact 4	HAEFELY

7.3.2 Block Diagram of Test Setup



7.3.3 Test Setup and Procedure

The EUT was placed on a 0.1m high wooden table, standing on the ground reference plane 3m by 2m in size, made by steel 1mm thick.

The distance between the EUT and any other of the metallic surface except the GRP is greater than 0.5m.

The mains lead excess than 0.5m is folded to avoid a flat coil and situated at a distance of 0.1m above the ground reference plane to insure the distance between the coupling device and the EUT were 0.5m.

The EUT was arranged and connected to satisfy its functional requirement and supplied by the coupling-decoupling network.

7.3.4 Test Result

Level (Pursuant to EN 61547)	Polarity	Input and Output A.C. Power Ports	D.C. Power Ports, Signal and Control Lines
0.5kV	+	N/A	N/A
0.5kV	-	N/A	N/A
1kV	+	Pass	N/A
1kV	-	Pass	N/A

7.4 IEC 61000-4-5(Pursuant to EN 61547) Surge Immunity

Performance criterion: ☒ **C**

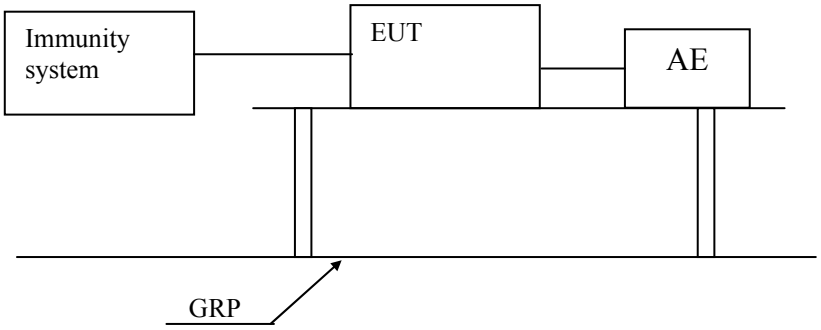
☐ **B** (for regulating device for ballast or converter or lumimaire for emergency lighting)

Test Result: Pass

7.4.1 Used Test Equipment

Equipment No.	Equipment	Model	Manufacturer
EM005-08	Surge Generator	NSG2050	SCHAFFNER

7.4.2 Block Diagram of Test Setup



7.4.3 Test Setup and Procedure

The surge is to be applied to the EUT power supply terminals via the capacitive coupling network.

Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines and to provide sufficient decoupling impedance to the surge wave so that the specified wave may be developed on the lines under test.

The EUT was arranged and connected according to its functional requirements
The EUT was placed on 0.1m high wooden support above the GRP, supplied by the coupling-decoupling network, and arranged and connected to satisfy its functional requirement and the power cord between the EUT and the coupling/decoupling network was less than 2 meters.

Surge is applied to the EUT power supply terminals.

Five positive and five negative pulses shall be applied at the peak value and zero crossing points of the a.c. voltage wave.

7.4.4 Test Result

☒ I. For Self-ballasted lamps and semi-luminaires and independent auxiliaries with input power less or equal to 25 W:

Level (Pursuant to EN 61547)		Result
Between Phase And Phase:	0.5kV	N/A
Between Phase And Neutral:	0.5kV	Pass
Between Phase And Earth:	1.0kV	N/A
Between Neutral And Earth:	1.0kV	N/A

☐II. For luminaires and independent auxiliaries with input power greater than 25 W:

Level (Pursuant to EN 61547)		Result
Between Phase And Phase:	1.0kV	N/A
Between Phase And Neutral:	1.0kV	N/A
Between Phase And Earth:	2.0kV	N/A
Between Neutral And Earth:	2.0kV	N/A

7.5 IEC 61000-4-11(Pursuant to EN 61547) Voltage Dips and Interruptions

Performance criterion:

for table 11 of EN 61547 ------☒ **C**

for table 12 of EN 61547-------☒ **B**

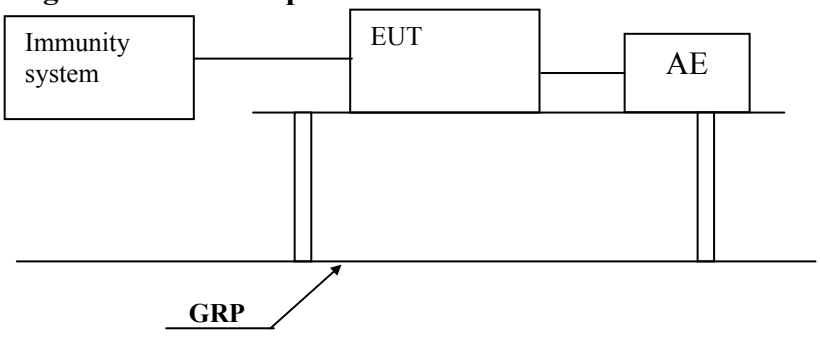
☐ **C**(only for lum. with electronic ballast for discharge lamps)

Test Result: Pass

7.5.1 Used Test Equipment

Equipment No.	Equipment	Model	Manufacturer
EM005-07	EMS test system	Ecompact 4	HAEFELY

7.5.2 Block Diagram of Test Setup



7.5.3 Test Setup and Procedure

The EUT was placed on an insulating support of 0.1m height, standing on a ground reference plane, and arranged and connected to satisfy its functional requirement

The test was performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer.

The EUT was tested for each selected combination of test level and duration with a sequence of three dips/interruptions with intervals of 10 s minimum. Each representative mode of operation was tested.

EUT is tested for voltage reduction of 100%Ut, 0.5 period, 30%Ut, 10 periods,both the positive and negative polarity test was conducted.

Abrupt changes in supply voltage was occur at zero crossings of the voltage and at additional angles considered critical by product committees or individual product specifications preferably selected from 45°, 90°, 135°, 180°, 225°, 270°, 315°.

7.5.4 Test Result

I. According to table 11 of EN 61547

Test condition (Pursuant to EN 61547)		Result
Test Level in $\%U_T$	Duration (in period of the rated frequency)	
70	10	Pass

II. According to table 12 of EN 61547

Test condition (Pursuant to EN 61547)		Result
Test Level in $\%U_T$	Duration (in period of the rated frequency)	
0	0.5	Pass

Remark: U_T is the rated voltage for the equipment.

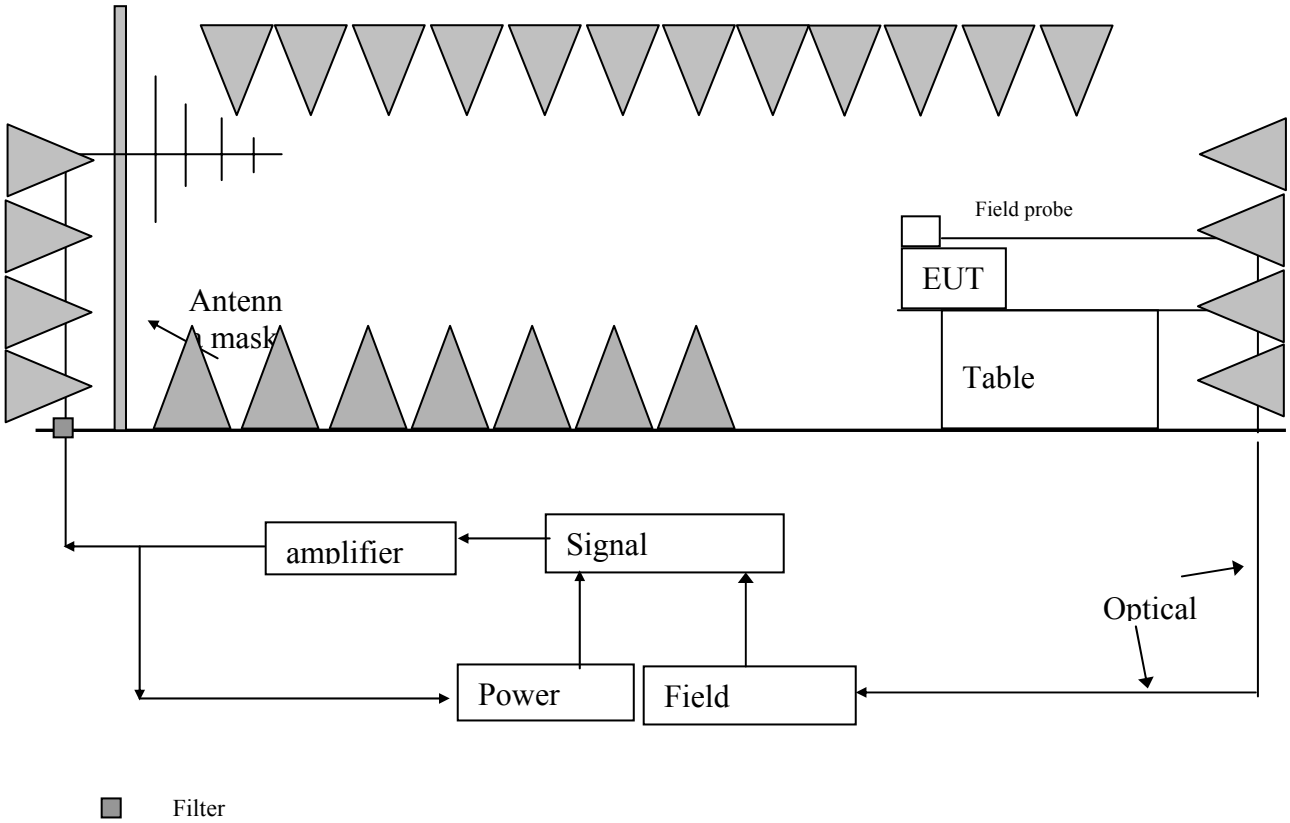
7.6 IEC 61000-4-3(Pursuant to EN 61547) Radiated Electromagnetic Field Immunity

Performance criterion: A
Test Result: Pass

7.6.1 Used Test Equipment

Equipment No.	Equipment	Model	Manufacturer
SZ186-01	Field Probe	ETS	HI-6105
SZ188-02	Anechoic Chamber	ETS	RFD-F/A-100
SZ061-04	BiConiLog Antenna	ETS	3142C
SZ180-01	Signal Generator	R&S	SML03
SZ181-01	Amplifier	PRANA	AP32 MT215
SZ181-02	Power Amplifier	MILMEGA	AS0825-35
SZ182-01	RF Power Meter	BOONTON	4232A

7.6.2 Block Diagram of Test Setup



7.6.3 Test Setup and Procedure

The test was conducted in an fully anechoic chamber to maintain a uniform field of sufficient dimensions with respect to the EUT, and also in order to comply with various national and international laws prohibiting interference to radio communications.

The equipment is placed in the test facility on a non-conducting table 0.8m high (for floor standing EUT, is placed on a non-conducting support 0.1m height).

The EUT was placed on the uniform calibrated plane which is 3V/m EM field.

For all ports connected to EUT, manufacturer specified cable type and length was used, for those cables no specification, unshielded cable applied.

Wire is left exposed to the electromagnetic field for a distance of 1m from the EUT.

The EUT was arranged and connected according to its functional requirements

Before testing, the intensity of the established field strength have been checked by placing the field sensor at a calibration grid point, and with the field generating antenna and cables in the same positions as used for the calibration, the forward power needed to give the calibrated field strength was measured.

Spot checks was made at a number of calibration grid points over the frequency range 80MHz to 1000MHz, both polarizations was checked.

After calibration, the EUT is initially placed with one face coincident with the calibration plane.

The frequency range is swept from 80MHz to 1000MHz, with the signal 80% amplitude modulated with a 1 kHz sinewave, pausing to adjust the r.f. signal level.

The dwell time at each frequency was 3s so as that the EUT to be exercised and be able to respond.

The step size was 1% of the fundamental with linear interpolation between calibrated points. Test was performed with the generating antenna facing each of the four sides of the EUT.

7.6.4 Test Result

Frequency (MHz)	Exposed Side	Field Strength (V/m)	Result
80 to 1000	Front	3V/m (r.m.s.)	Pass
80 to 1000	Left	3V/m (r.m.s.)	Pass
80 to 1000	Rear	3V/m (r.m.s.)	Pass
80 to 1000	Right	3V/m (r.m.s.)	Pass

7.7 IEC 61000-4-8(Pursuant to EN 61547) Power Frequency Magnetic Field Immunity

Performance criterion: A
Test Result: Not Applicable
Remark:
Equipment containing no Hall elements or magnetic field sensors is not susceptible to magnetic field.Hence, this equipment is deemed to fulfil the magnetic field test.

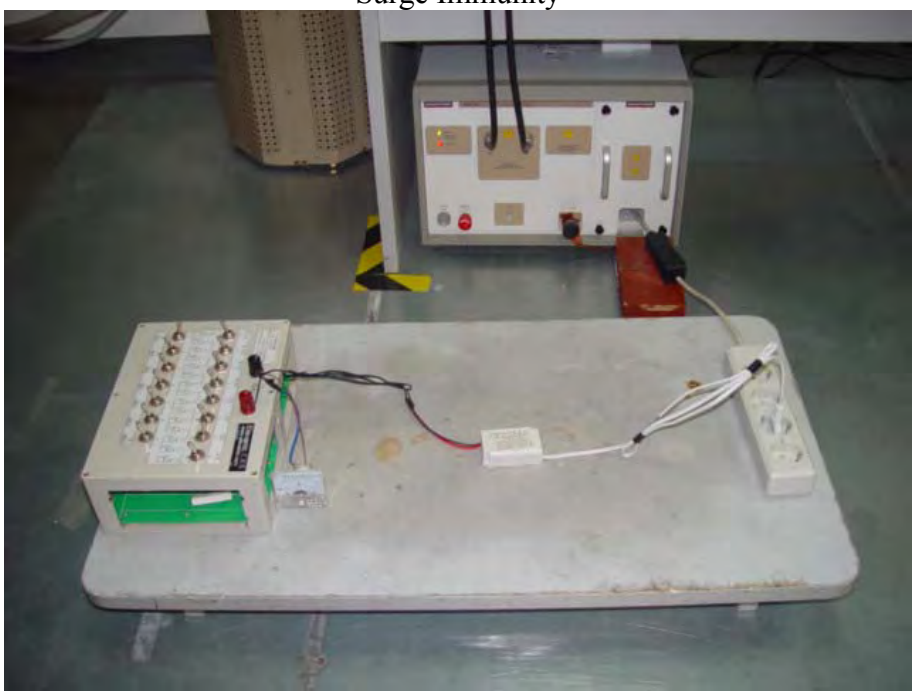
8 Appendix I - Photos of test setup (representative)

Conducted Emission

Radiated Electromagnetic Filed Disturbance (9 KHz – 30MHz)

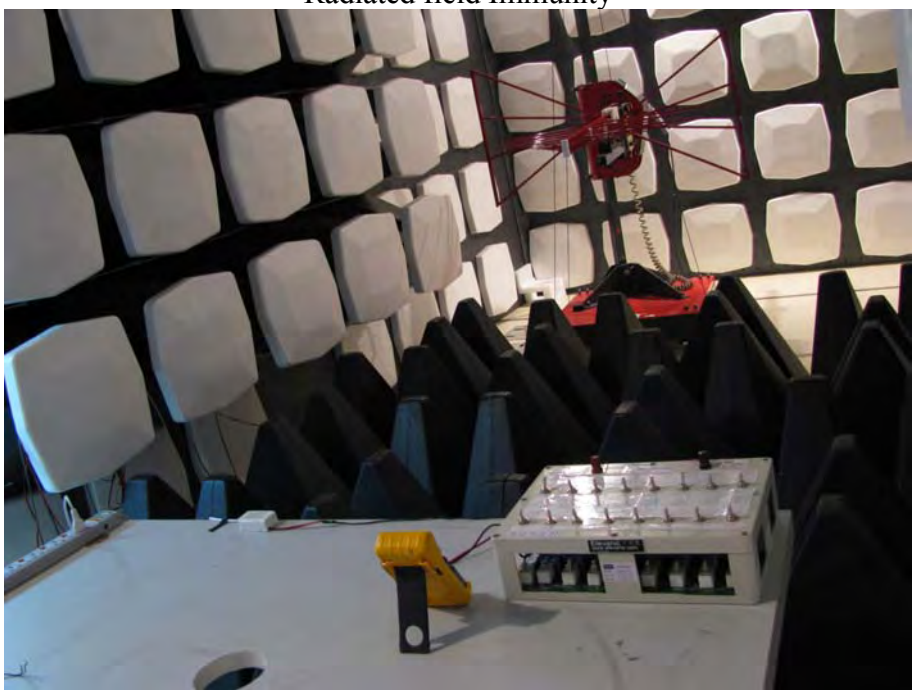
ESD Immunity

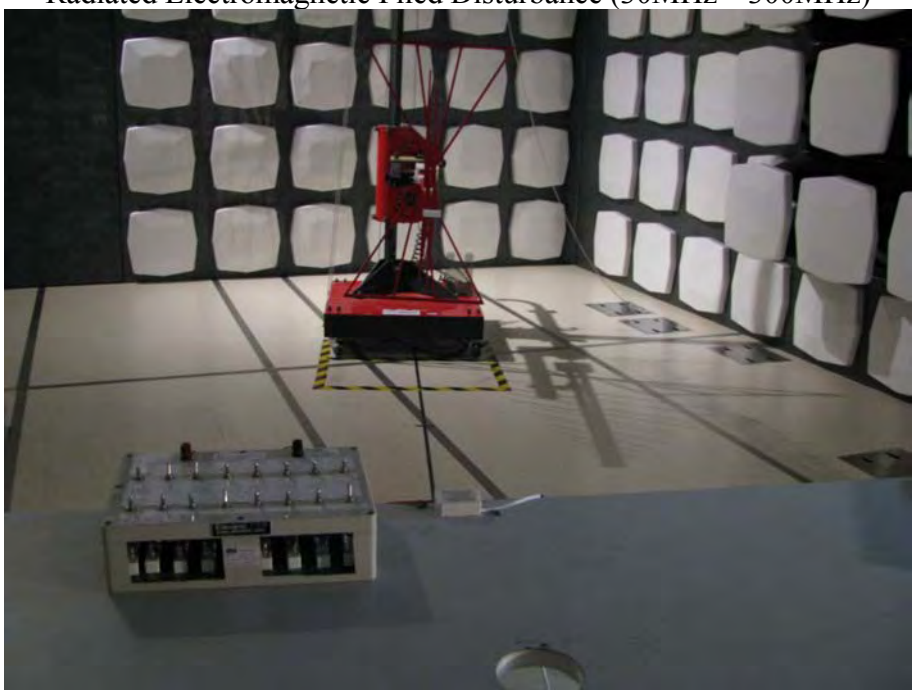
Surge Immunity



Conducted Immunity

Radiated field Immunity



EFT, Dips Immunity

Radiated Electromagnetic Filed Disturbance (30MHz – 300MHz)