

CE/EMC TEST REPORT

for

Shenzhen Aitlen Technology Co. Ltd.

Li-ion Battery Charger

Model Number: LBC0023602

Prepared for : Shenzhen Aitlen Technology Co. Ltd.
Address : Zhuo Yu business building, 4 floor, Guanlan street,
Baoan District, Shenzhen, Guangdong, Chinese

Prepared by : Keyway Testing Technology Co., Ltd.
Address : Baishun Industrial Zone, Zhangmutou Town,
Dongguan, Guangdong, China

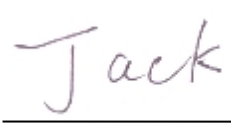


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Report No. : 15KWE092987E
Date of Test : Sept. 08~11, 2015
Date of Report : Sept. 12, 2015

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Keyway Testing Technology Co., Ltd.

Applicant:	Shenzhen Aitlen Technology Co. Ltd.		
Address:	Zhuo Yu business building, 4 floor, Guanlan street, Baoan District, Shenzhen, Guangdong, Chinese		
Manufacturer:	Shenzhen Aitlen Technology Co. Ltd.		
Address:	Zhuo Yu business building, 4 floor, Guanlan street, Baoan District, Shenzhen, Guangdong, Chinese		
E.U.T:	Li-ion Battery Charger		
Model Number:	LBC0023602		
Trade Name:	-----	Serial No.:	-----
Date of Receipt:	Sept. 07, 2015	Date of Test:	Sept. 08~11, 2015
Test Specification :	EN 55014-1:2006+A1:2009+A2:2011 EN 55014-2:1997+A1:2001+A2:2008 EN 61000-3-2:2014 EN 61000-3-3:2013		
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied.		
Issue Date: Sept. 12, 2015			
Tested by:	Reviewed by:	Approved by:	
 <hr/> Jack Bu / Engineer	 <hr/> Andy Gao / Supervisor	 <hr/> Jade Yang / Supervisor	
Other Aspects:			
None.			
Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested			
This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Keyway Testing Technology Co., Ltd.			

1. GENERAL PRODUCT INFORMATION

1.1.Product Function

Refer to Technical Construction Form and User Manual.

1.2.Description of Device (EUT)

Description : Li-ion Battery Charger
Model No. : LBC0023602
Power Input : AC 100-240V, 50/60Hz, 2.2A max
Output : DC 42V/2A
DC Line : Unshielded, Undetachable, 1.0m

1.3.Difference between Model Numbers

None.

1.4.Independent Operation Modes

The basic operation modes are:

1.4.1.Full Load

1.4.2.Half Load

1.4.3.No Load

1.5.Test Supporting System

None.

2. TEST SITES

2.1. Test Facilities

Lab Qualifications : 944 Shielded Room built by ETS-Lindgren, USA
Date of completion: March 28, 2011

966 Chamber built by ETS-Lindgren, USA
Date of completion: March 28, 2011

Certificated by TUV Rheinland, Germany.
Registration No.: UA 50207153
Date of registration: July 13, 2011

Certificated by UL, USA
Registration No.: 100567237
Date of registration: September 5, 2012

Certificated by Intertek
Registration No.: 2011-RTL-L1-31
Date of registration: October 11, 2011

Certificated by Industry Canada
Registration No.: 9868A
Date of registration: December 8, 2011

Certificated by FCC, USA
Registration No.: 370994
Date of registration: February 21, 2012

Certificated by CNAS China
Registration No.: CNAS L5783
Date of registration: August 8, 2012

Name of Firm : Keyway Testing Technology Co., Ltd.

Site Location : Baishun Industrial Zone, Zhangmutou Town,
Dongguan, Guangdong, China

2.2.List of Test and Measurement Instruments

2.2.1.For conducted emission at the mains terminals test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr 27,15	Apr 27,16
Artificial Mains Network	Rohde&Schwarz	ENV216	101315	Apr 27,15	Apr 27,16
Artificial Mains Network (AUX)	Rohde&Schwarz	ENV216	101314	Apr 27,15	Apr 27,16
RF Cable	FUJIKURA	3D-2W	944 Cable	Apr 27,15	Apr 27,16

2.2.2.For disturbance power test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr 27,15	Apr 27,16
Absorbing Clamp	Luthi	MDS-21	4056	Apr 27,15	Apr 27,16
Clamp Attenuation	HUBER+SUHNER	CBL2-NB-9m	100104-22 39000-01	Apr 27,15	Apr 27,16

2.2.3.For harmonic current emissions and voltage fluctuations/flicker test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
5kVA AC Power Source	California Instruments	5001iX-CTS-400	60138	Apr 27,15	Apr 27,16
Harmonic/Flicker Test System	California Instruments	PACS-1	72847	Apr 27,15	Apr 27,16

2.2.4.For electrostatic discharge immunity test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
ESD Generator	TESEQ	NSG437	433	Apr 27,15	Apr 27,16

2.2.5.For electrical fast transient/burst immunity test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EFT Tester	EMtest	EFT500N5	V1105108698	Apr 27,15	Apr 27,16
EFT Coupling Clamp	EMtest	HFK	0211-168	Apr 27,15	Apr 27,16

2.2.6.For surge immunity test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Surge Tester	EMtest	UCS500N7	V1105108699	Apr 27,15	Apr 27,16

2.2.7.For injected currents susceptibility test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
C/S Test System	EMtest	CIT-10	126B1164	Apr 27,15	Apr 27,16
CDN	Luthi	L-801 M2/M3	2789	Apr 27,15	Apr 27,16
Electromagnetic Injection Clamp	Luthi	EM101	36041	Apr 27,15	Apr 27,16

2.2.8.For voltage dips and short interruptions immunity test:

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Dips Tester	EVERFINE	EMS61000-11K	YG100319N11 040005	Apr 27,15	Apr 27,16

3. TEST SET-UP AND OPERATION MODES

3.1.Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

Immunity: The equipment under test (EUT) was configured to the representative operating mode and conditions.

3.2.Block Diagram of Test Setup

System Diagram of Connections between EUT and Simulators



(EUT: Li-ion Battery Charger)

3.3.Test Operation Mode and Test Software

Refer to Test Setup in clause 4 & 5.

3.4.Special Accessories and Auxiliary Equipment

None.

3.5.Countermeasures to Achieve EMC Compliance

None.

4. TEST RESULTS

4.1. Conducted Emission at the Mains Terminals Test

Result : **Pass**
Test Procedure : EN 55014-1:2006+A1:2009+A2:2011
Frequency Range : 0.15 to 30 MHz
Test Site : 944 Shielded Room
Limits : EN 55014-1:2006+A1:2009+A2:2011

Test Setup

M/N : LBC0023602
Test Voltage : AC 264V/50Hz
Operation Mode : Full load /Half load /No load

The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 1 m, the excess was folded back and forth parallel to the cable at the centre so as to form a bundle no longer than 0.4 m.

The EUT was kept 0.4 m from any other earthed conducting surface. Both sides of AC line were checked to find out the maximum conducted emission levels according to the test procedure during the conducted emission test.

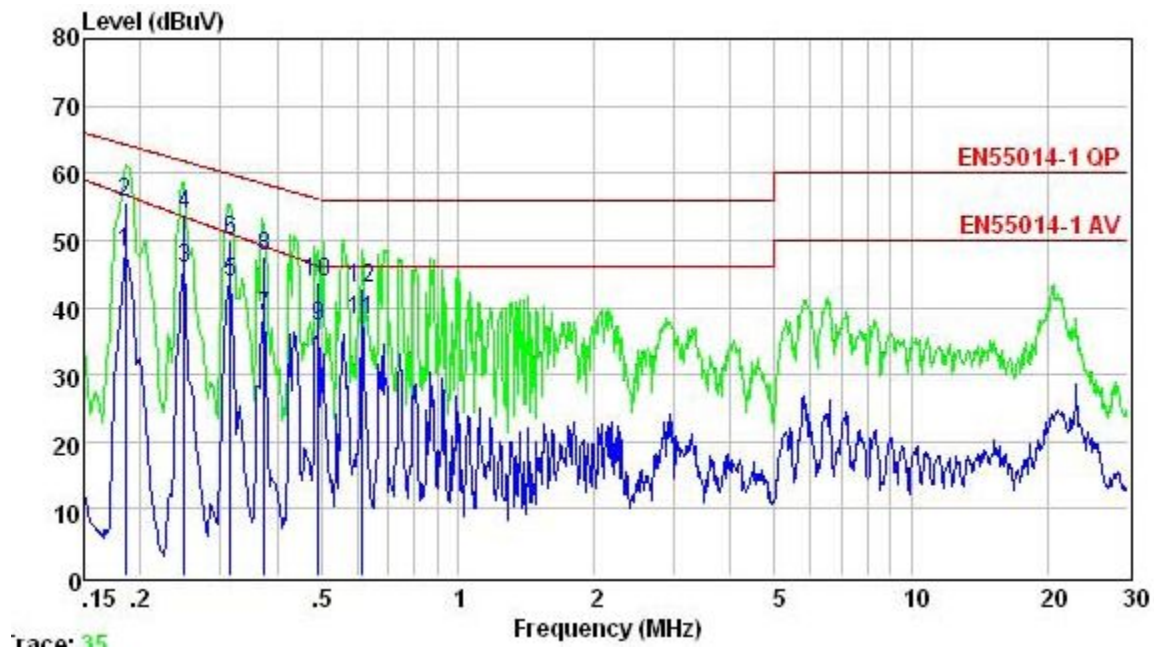
The frequency range from 150 kHz to 30 MHz was investigated.

The bandwidth of the test receiver was set at 9 kHz.

All the test data were reported on the following page.

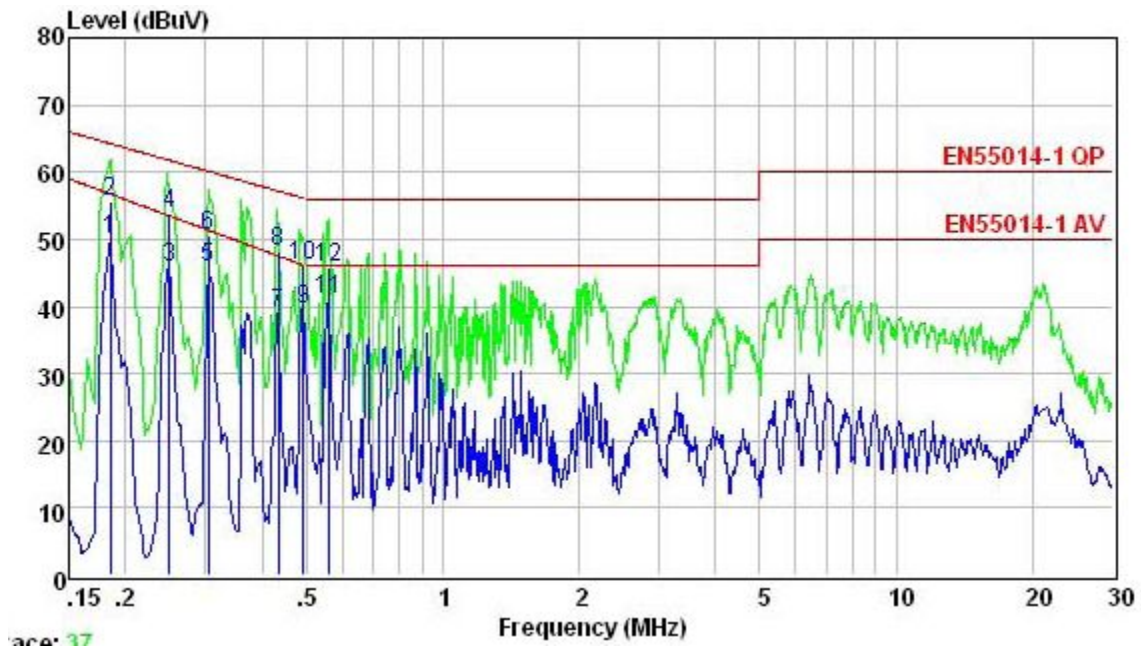
Notes: Measurement Uncertainty: ± 2.6 dB at a level of confidence of 95%.

M/N : LBC0023602
 Operating Condition : Full load
 Test Specification : Power Line; Live
 Comment : AC 264V/50Hz



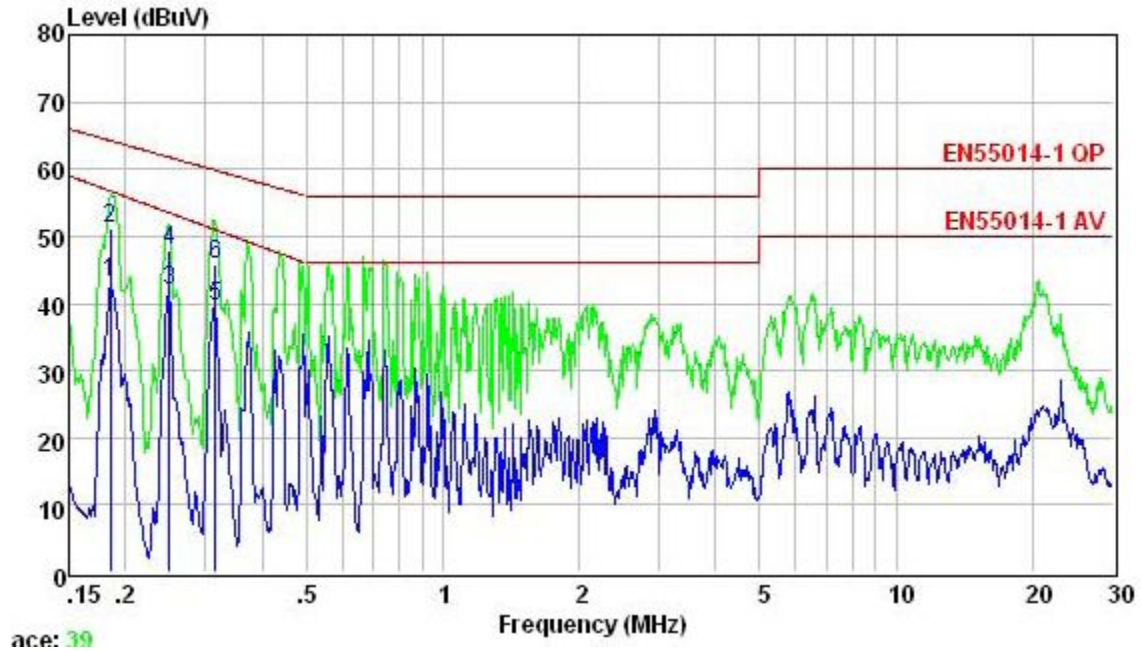
	Freq	Level	Limit	Over	
	MHz	dBuV	Line	Limit	Remark
			dBuV	dB	
1	0.185	48.25	56.71	-8.46	Average
2	0.185	55.60	64.24	-8.64	QP
3	0.249	45.82	53.51	-7.69	Average
4	0.249	53.80	61.78	-7.98	QP
5	0.315	43.68	50.99	-7.31	Average
6	0.315	49.90	59.84	-9.94	QP
7	0.375	38.75	49.10	-10.35	Average
8	0.375	47.50	58.39	-10.89	QP
9	0.494	37.30	46.13	-8.83	Average
10	0.494	43.70	56.10	-12.40	QP
11	0.614	38.19	46.00	-7.81	Average
12	0.614	42.90	56.00	-13.10	QP

M/N : LBC0023602
Operating Condition : Full load
Test Specification : Power Line; Neutral
Comment : AC 264V/50Hz



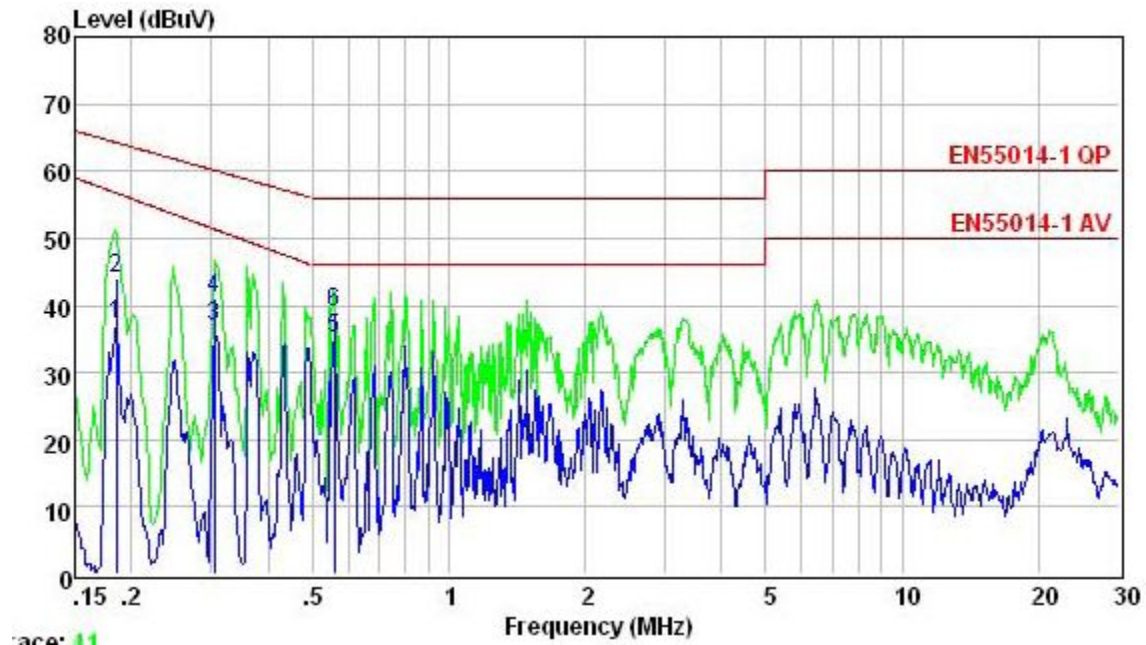
	Freq	Level	Limit	Over	Remark
	MHz	dBuV	dBuV	dB	
1	0.185	50.11	56.71	-6.60	Average
2	0.185	55.60	64.24	-8.64	QP
3	0.249	45.88	53.51	-7.63	Average
4	0.249	53.70	61.78	-8.08	QP
5	0.305	45.85	51.33	-5.48	Average
6	0.305	50.60	60.10	-9.50	QP
7	0.435	39.08	47.50	-8.42	Average
8	0.435	48.20	57.15	-8.95	QP
9	0.494	39.62	46.13	-6.51	Average
10	0.494	46.10	56.10	-10.00	QP
11	0.561	41.04	46.00	-4.96	Average
12	0.561	45.70	56.00	-10.30	QP

M/N : LBC0023602
 Operating Condition : Half load
 Test Specification : Power Line; Live
 Comment : AC 264V/50Hz



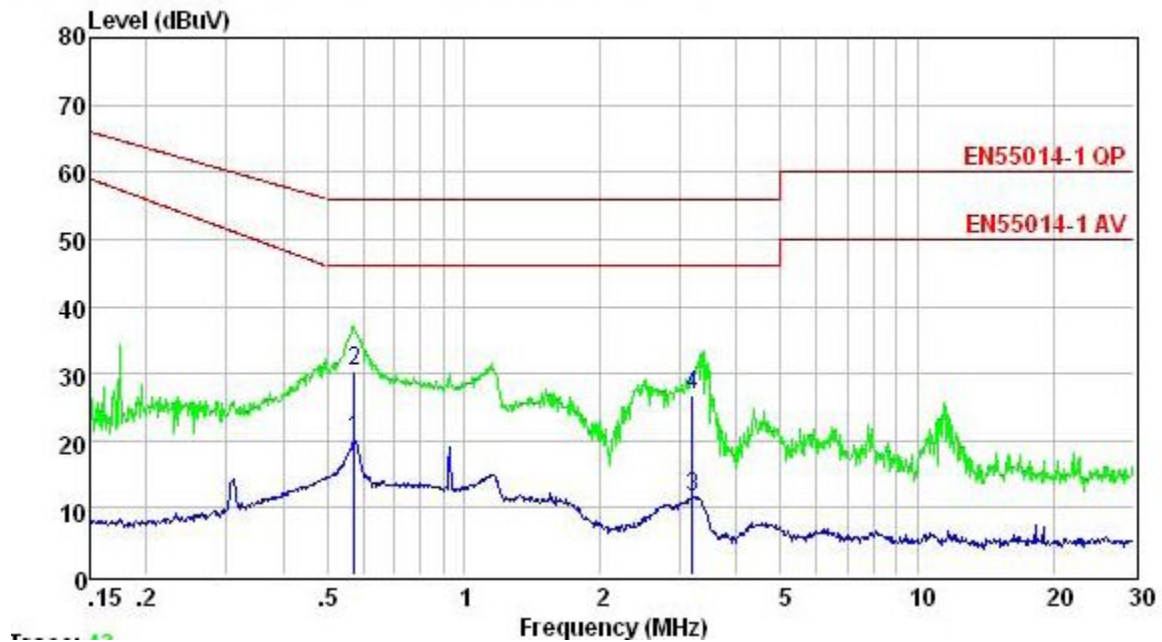
	Freq	Level	Limit	Over	
	MHz	dBuV	Line	Limit	Remark
			dBuV	dB	
1	0.185	43.25	56.71	-13.46	Average
2	0.185	51.30	64.24	-12.94	QP
3	0.249	41.82	53.51	-11.69	Average
4	0.249	47.80	61.78	-13.98	QP
5	0.315	39.68	50.99	-11.31	Average
6	0.315	45.80	59.84	-14.04	QP

M/N : LBC0023602
 Operating Condition : Half load
 Test Specification : Power Line; Neutral
 Comment : AC 264V/50Hz



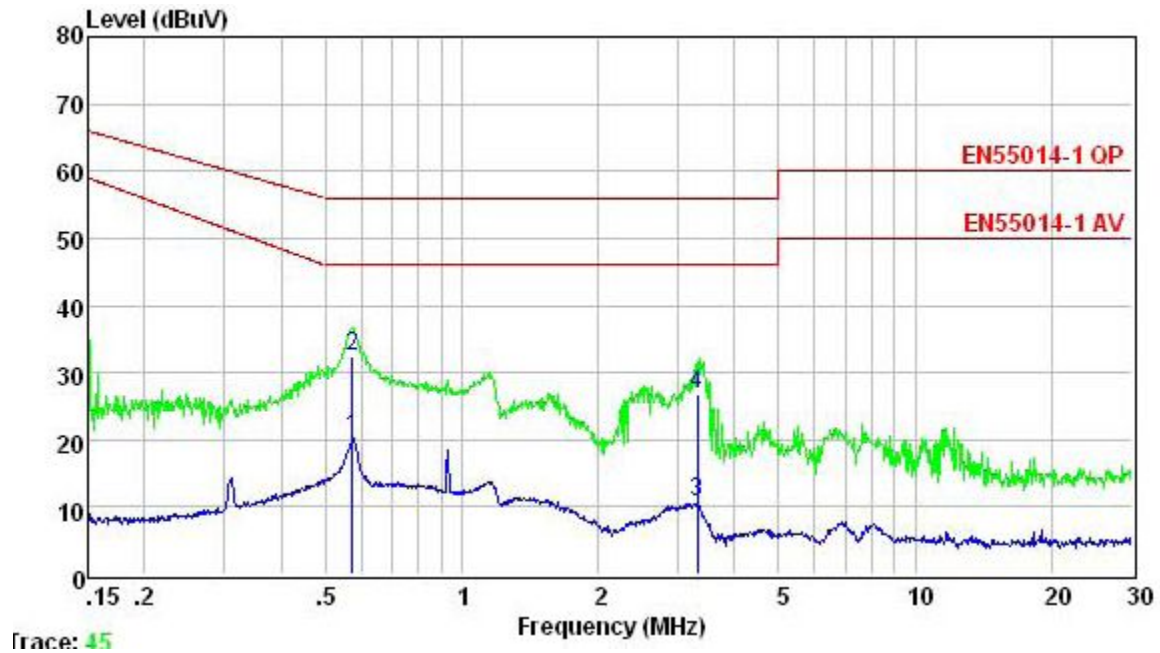
	Freq	Level	Limit	Over	Remark
	MHz	dBuV	dBuV	Limit	
				dB	
1	0.185	37.11	56.71	-19.60	Average
2	0.185	43.90	64.24	-20.34	QP
3	0.305	36.85	51.33	-14.48	Average
4	0.305	41.00	60.10	-19.10	QP
5	0.561	35.04	46.00	-10.96	Average
6	0.561	38.90	56.00	-17.10	QP

M/N : LBC0023602
Operating Condition : No load
Test Specification : Power Line; Live
Comment : AC 264V/50Hz



	Freq	Level	Limit	Over	Remark
	MHz	dBuV	dBuV	dB	
1	0.573	20.17	46.00	-25.83	Average
2	0.573	30.20	56.00	-25.80	QP
3	3.190	11.61	46.00	-34.39	Average
4	3.190	26.90	56.00	-29.10	QP

M/N : LBC0023602
 Operating Condition : No load
 Test Specification : Power Line; Neutral
 Comment : AC 264V/50Hz



	Freq	Level	Limit	Over	
	MHz	dBuV	Line	Limit	Remark
			dBuV	dB	
1	0.573	20.19	46.00	-25.81	Average
2	0.573	32.40	56.00	-23.60	QP
3	3.310	10.59	46.00	-35.41	Average
4	3.310	26.70	56.00	-29.30	QP

4.2.Disturbance Power Test

Result : **Pass**
Test procedure : EN 55014-1:2006+A1:2009+A2:2011
Frequency range : 30 to 300 MHz
Test Site : 944 Shielded Room
Limits : EN 55014-1:2006+A1:2009+A2:2011

Test Setup

M/N : LBC0023602
Input Voltage : AC 264V/50Hz
Operation Mode : Full load /Half load /No load

The EUT was placed on a non-metallic table of 0.8 m of height above the floor and at least 0.4 m from other metallic objects and from any person.

The lead to be measured was stretched in a straight horizontal line for a length sufficient to accommodate the absorbing clamp and to permit the necessary adjustment of its position for tuning. The absorbing clamp was placed around the lead to be measured, with its current transformer towards the EUT, so as to measure a quantity proportional to the disturbance power on the lead.

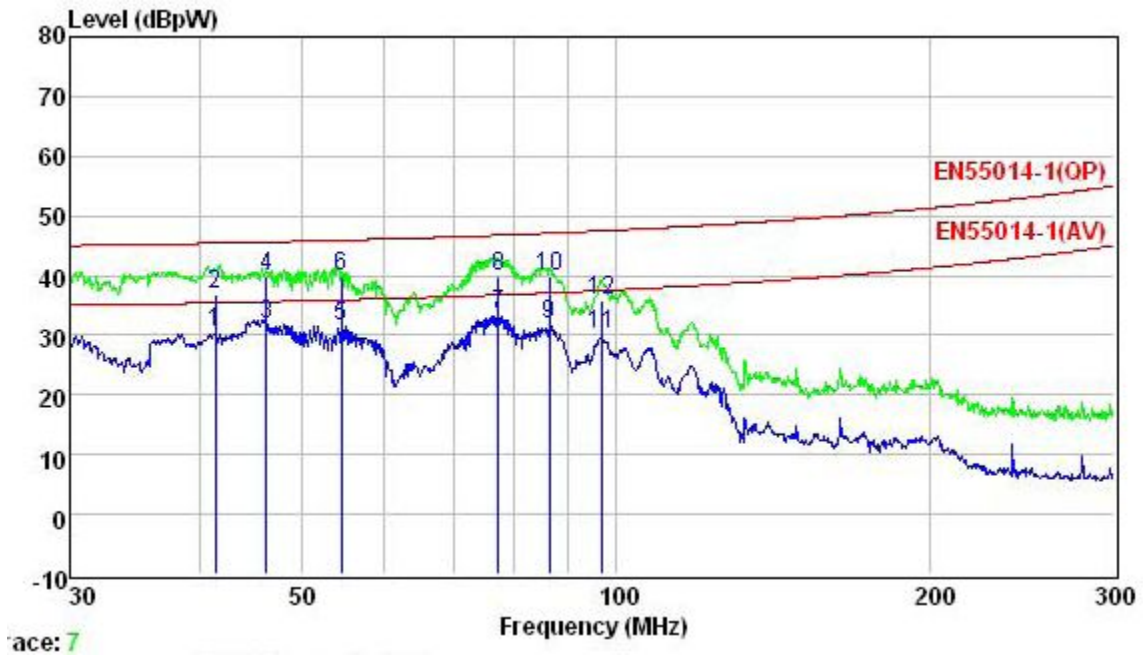
At each test frequency the absorbing clamp was moved along the lead until the maximum value was found between a position adjacent to the EUT and a distance of about a half wavelength from it. The connected leads were extended to have a length of 6 m.

The bandwidth of the test receiver was set at 120 kHz.

All the test data were reported on the following page.

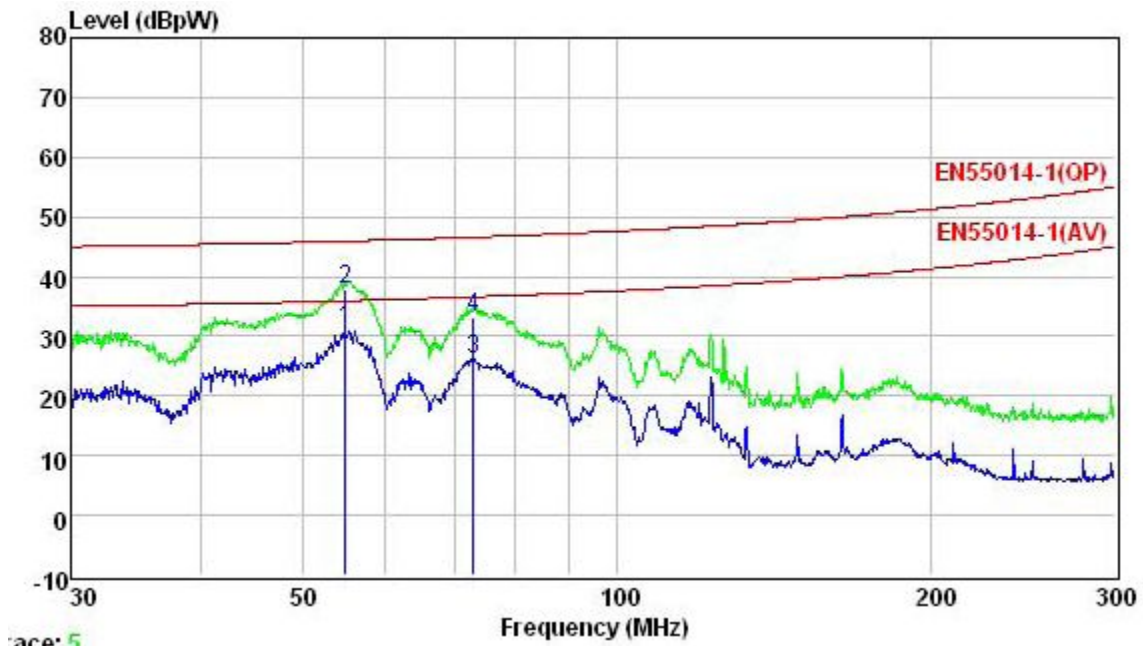
Notes: Measurement Uncertainty: ± 2.3 dB at a level of confidence of 95%.

M/N : LBC0023602
Operating Condition : Full load
Test Specification : AC Line
Comment : AC 264V/50Hz



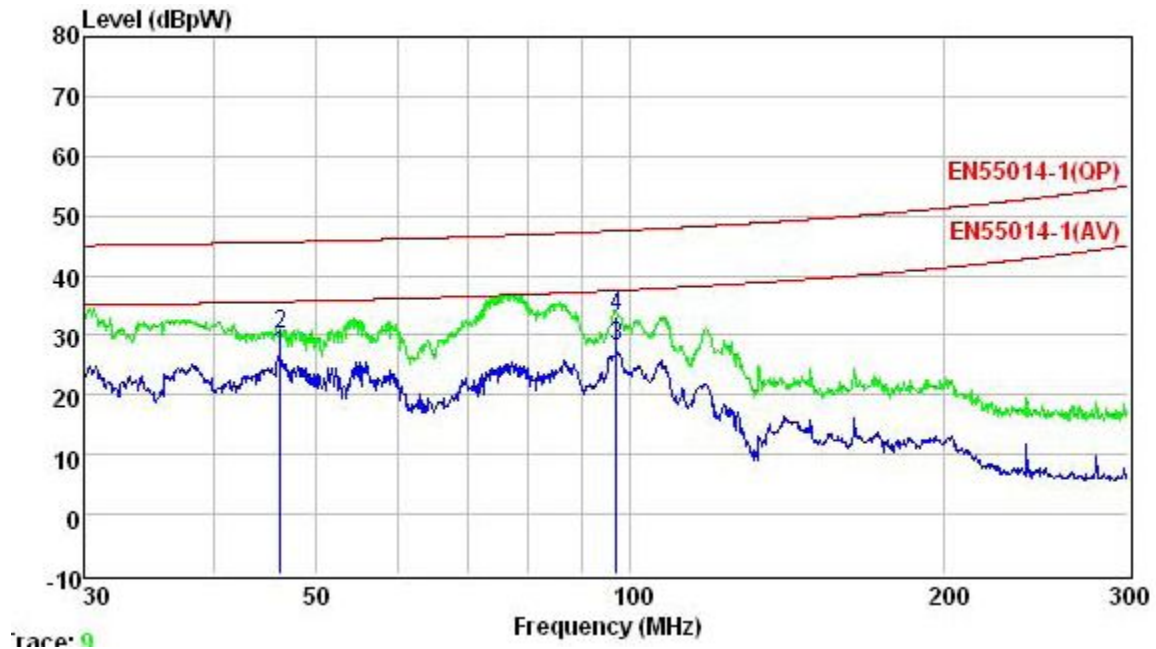
	Freq	Level	Limit	Over	
	MHz	dBpW	Line	Limit	Remark
			dBpW	dB	
1	41.316	30.45	35.43	-4.98	Average
2	41.316	37.00	45.43	-8.43	QP
3	46.251	31.85	35.61	-3.76	Average
4	46.251	40.00	45.61	-5.61	QP
5	54.591	31.49	35.92	-4.43	Average
6	54.591	40.00	45.92	-5.92	QP
7	77.112	33.34	36.76	-3.42	Average
8	77.112	40.00	46.76	-6.76	QP
9	86.322	31.85	37.10	-5.25	Average
10	86.322	40.00	47.10	-7.10	QP
11	97.078	29.99	37.49	-7.50	Average
12	97.078	36.00	47.49	-11.49	QP

M/N : LBC0023602
 Operating Condition : Full load
 Test Line : DC Line
 Comment : AC 264V/50Hz



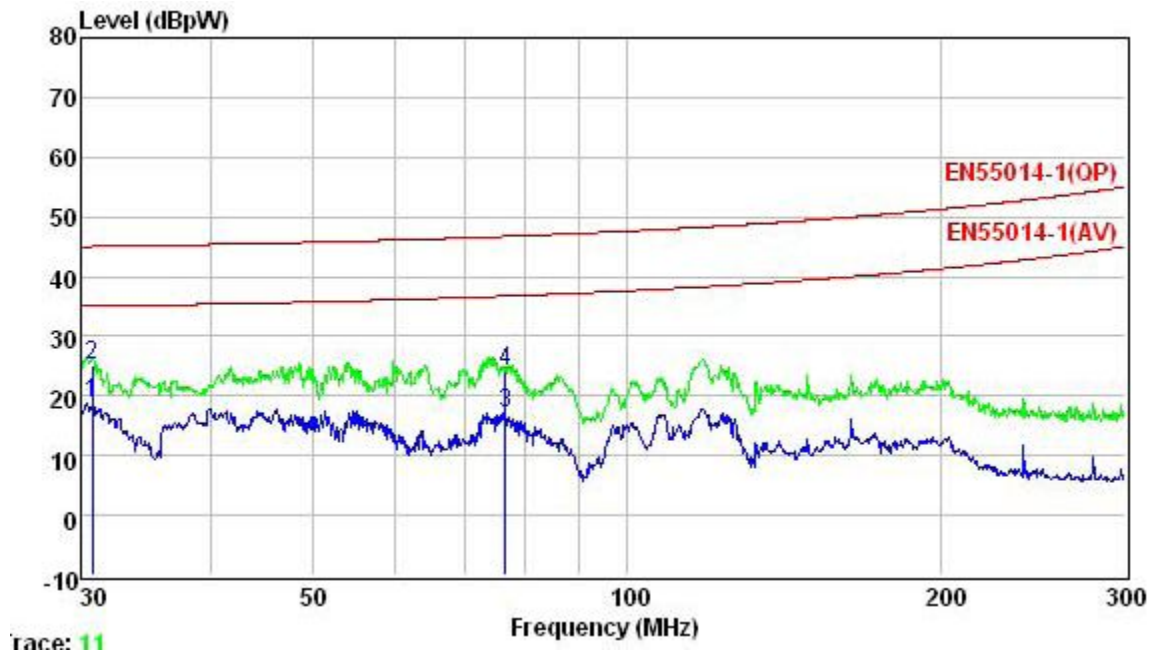
	Freq	Level	Limit	Over	Remark
	MHz	dBpW	Line	Limit	
1	54.969	31.16	35.94	-4.78	Average
2	54.969	38.00	45.94	-7.94	QP
3	72.966	26.20	36.60	-10.40	Average
4	72.966	33.00	46.60	-13.60	QP

M/N : LBC0023602
 Operating Condition : Half load
 Test Line : AC Line
 Comment : AC 264V/50Hz



	Freq	Level	Limit	Over	Remark
	MHz	dBpW	Line	Limit	
				dB	
1	46.251	26.85	35.61	-8.76	Average
2	46.251	30.00	45.61	-15.61	QP
3	97.078	27.99	37.49	-9.50	Average
4	97.078	33.00	47.49	-14.49	QP

M/N : LBC0023602
 Operating Condition : No load
 Test Line : AC Line
 Comment : AC 264V/50Hz



	Freq	Level	Limit	Over	
	MHz	dBpW	Line	Limit	Remark
			dBpW	dB	
1	30.770	18.82	35.04	-16.22	Average
2	30.770	25.00	45.04	-20.04	QP
3	76.581	17.20	36.74	-19.54	Average
4	76.581	24.00	46.74	-22.74	QP

4.3. Harmonic Current Emissions on AC Mains Test

RESULT : **Pass**

Test Procedure : EN 61000-3-2:2014

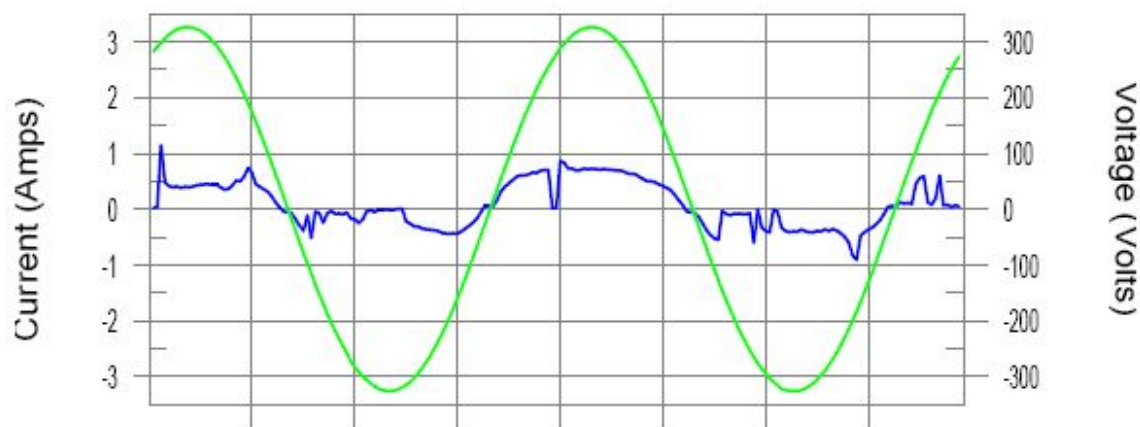
Limits : EN 61000-3-2:2014

Harmonics – Class-A per Ed. 3.2 (2014)(Run time)

EUT: AC/DC Adapter M/N: LBC0023602 Tested by: Andy
Test category: Class-A per Ed. 3.2 (2014) (European limits) Test Margin: 100
Test date: 2015-9-10 Start time: 19:47:16 End time: 19:50:08
Test duration (min): 2.5 Data file name: H-006899.cts_data
Comment: Full Load Temp:24.9°;Humi:56%;Press:101.52kPa
Customer: Aitlen

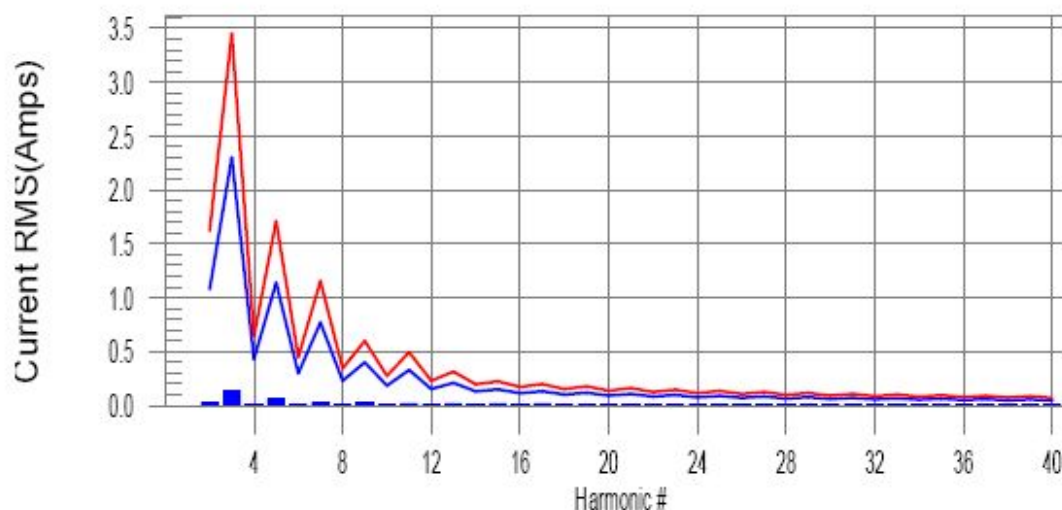
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass Worst harmonic was #17 with 8.29% of the limit.

Current Test Result Summary (Run time)

EUT: AC/DC Adapter M/N: LBC0023602 Tested by: Andy
 Test category: Class-A per Ed. 3.2 (2014) (European limits) Test Margin: 100
 Test date: 2015-9-10 Start time: 19:47:16 End time: 19:50:08
 Test duration (min): 2.5 Data file name: H-006899.cts_data
 Comment: Full Load Temp:24.9°;Humi:56%;Press:101.52kPa
 Customer: Aitlen

Test Result: Pass Source qualification: Normal
 THCA: 0.13 I-THD(%): 36.56 POHC(A): 0.010 POHC Limit(A): 0.268
 Highest parameter values during test:
 V_{RMS} (Volts): 230.96 Frequency(Hz): 50.00
 I_{Peak} (Amps): 2.329 I_{RMS} (Amps): 0.421
 I_{Fund} (Amps): 0.453 Crest Factor: 5.676
 Power (Watts): 80.0 Power Factor: 0.882

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.012	1.080	1.1	0.022	1.620	1.34	Pass
3	0.108	2.300	4.7	0.133	3.450	3.85	Pass
4	0.006	0.430	1.3	0.008	0.645	1.22	Pass
5	0.048	1.140	4.2	0.062	1.710	3.65	Pass
6	0.006	0.300	2.0	0.009	0.450	1.91	Pass
7	0.022	0.770	2.9	0.029	1.155	2.52	Pass
8	0.005	0.230	2.3	0.008	0.345	2.26	Pass
9	0.020	0.400	5.0	0.025	0.600	4.15	Pass
10	0.005	0.184	2.8	0.007	0.276	2.66	Pass
11	0.014	0.330	4.3	0.017	0.495	3.45	Pass
12	0.005	0.153	3.4	0.008	0.230	3.58	Pass
13	0.009	0.210	4.4	0.013	0.315	4.14	Pass
14	0.005	0.131	4.0	0.008	0.197	4.31	Pass
15	0.012	0.150	8.0	0.016	0.225	7.24	Pass
16	0.005	0.115	4.8	0.008	0.173	4.51	Pass
17	0.011	0.132	8.3	0.014	0.199	7.12	Pass
18	0.006	0.102	5.4	0.008	0.153	5.00	Pass
19	0.007	0.118	6.3	0.011	0.178	5.97	Pass
20	0.006	0.092	6.0	0.008	0.138	5.94	Pass
21	0.006	0.107	5.7	0.008	0.161	5.26	Pass
22	0.005	0.084	6.4	0.008	0.125	6.42	Pass
23	0.006	0.098	5.9	0.008	0.147	5.46	Pass
24	0.005	0.077	6.7	0.008	0.115	6.63	Pass
25	0.006	0.090	6.6	0.009	0.135	6.97	Pass
26	0.005	0.071	7.0	0.007	0.106	6.83	Pass
27	0.006	0.083	6.7	0.008	0.125	6.47	Pass
28	0.005	0.066	7.3	0.007	0.099	6.86	Pass
29	0.005	0.078	6.7	0.007	0.116	6.22	Pass
30	0.005	0.061	7.7	0.007	0.092	7.10	Pass
31	0.005	0.073	6.6	0.007	0.109	6.13	Pass
32	0.005	0.058	8.0	0.006	0.086	7.35	Pass
33	0.004	0.068	6.4	0.006	0.102	5.65	Pass
34	0.004	0.054	8.0	0.006	0.081	7.59	Pass
35	0.004	0.064	6.4	0.006	0.096	6.04	Pass
36	0.004	0.051	8.0	0.006	0.077	7.30	Pass
37	0.004	0.061	6.5	0.006	0.091	6.19	Pass
38	0.004	0.048	8.0	0.006	0.073	7.59	Pass
39	0.004	0.058	6.6	0.005	0.087	6.00	Pass
40	0.004	0.046	7.7	0.005	0.069	7.78	Pass

4.4.Voltage Fluctuations and Flicker on AC Mains Test

RESULT : Pass

Test Procedure : EN 61000-3-3:2013

Limits : EN 61000-3-3:2013

The test data of the worst case condition(s) was reported on the page below.

Test Data

Voltage Fluctuation	Limit	Value
Relative Voltage Change Characteristic Tmax (dc>3%)	500 ms	0 ms
Maximum Relative Voltage Change dmax	4%	0.00
	6%	/
	7%	/
Relative Steady-state Voltage Change dc	3.3%	0.00

Flicker	Limit	Value
Short-term Flicker Indicator Pst	1.0	0.064
Long-term Flicker Indicator Plt	0.65	/

5. IMMUNITY TEST RESULTS

5.1. Description of Performance Criteria

Performance criteria A

The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance criteria B

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however, no change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance criteria C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

Classification of the EUT

The product belongs to Category II.

5.2. Electrostatic Discharge Immunity Test

Result : **Pass**

Test Procedure : EN 55014-2:1997+A1:2001+A2:2008

Basic Standard : EN 61000-4-2:2009

Test Specification : ± 4 kV (Contact discharge)
 ± 8 kV (Air discharge)

Number of Discharges : 10 (Air discharge for single polarity discharge)
10 (Contact discharge for single polarity discharge)

Repetition Rate : One discharge per second

Performance Criterion : B

Test Setup

M/N : LBC0023602

Test Voltage : AC 230V/50Hz

Operation Mode : Full Load

Temperature : 24.9°C

Humidity : 55%

Atmospheric Pressure : 101.48kPa

Table 1: Electrostatic Discharge Immunity Test Result

Discharge Location		Type of Discharge	Result
Slot	4 points	Air	Pass
DC Port	1 point	Air	Pass
LED Light	1 point	Air	Pass
HCP	4 points	Contact	Pass
VCP	4 points	Contact	Pass

Remark: 1. No obvious change of function was found after the test.
2. Discharge should be considered on Contact, Air, Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).

5.3. Electrical Fast Transient/Burst Immunity Test

RESULT	: Pass
Test Procedure	: EN 55014-2:1997+A1:2001+A2:2008
Basic Standard	: EN 61000-4-4:2012
Waveshape of the pulse	: Tr/Td = 5/50 ns
Repetition Frequency	: 5 kHz
Burst Duration	: 15 ms
Burst Period	: 300 ms
Test Duration	: 60 s
Performance Criterion	: B

Test Setup

M/N	: LBC0023602
Test Voltage	: AC 230V/50Hz
Operation Mode	: Full Load
Temperature	: 24.9°C
Humidity	: 55%
Atmospheric Pressure	: 101.48kPa

The test generator and the coupling/decoupling network were placed directly on, and bonded to, the ground reference plane. The ground reference plane projected beyond the EUT or/and the coupling clamp by at least 0.1 m on all sides. And the minimum area was 1 m x 1 m. The minimum distance between the EUT and all other conductive structures, except the ground plane was more than 0.5 m.

EUT and its simulators were placed on the insulation support 0.1 m above the ground reference plane. The length of the cables between the coupling device and the EUT was 0.5 m. If it was more than 0.5 m, the excess length of this cable was folded to avoid a flat coil and situated at a distance of 0.1 m above the ground reference plane.

Table 2: Electrical Fast Transient/Burst Immunity Test Result

Coupling Ports		Coupling Voltage	Inject Method	Result
AC Power Ports	L	±1 kV	Direct	Pass
	N	±1 kV		Pass
	L-N	±1 kV		Pass

Remark: No obvious change of function was found after the test.

5.4.Surge Immunity Test

RESULT	: Pass
Test Procedure	: EN 55014-2:1997+A1:2001+A2:2008
Basic Standard	: EN 61000-4-5:2014
Waveform Parameters	: Open-circuit voltage: 1.2/50 μ s Short-circuit current: 8/20 μ s
Repetition Rate	: 60 s
Performance Criterion	: B

Test Setup

M/N	: LBC0023602
Test Voltage	: AC 230V/50Hz
Operation Mode	: Full Load
Temperature	: 24.9°C
Humidity	: 55%
Atmospheric Pressure	: 101.48kPa

The effective output impedance of the generator was 2 Ω for L-N test, and 12 Ω for L-PE and N-PE test.

For d.c. power ports and interconnection lines, the surge pulses were 5 positive and 5 negative. For a.c. power ports, the surge pulses were 5 positive 90° and 5 negative at 270°. The time between successive pulses was 1 minute.

For double-insulated products without PE or external earth connections, the test was done in a similar way as for grounded products but without additional external grounded connections. If there were no other possible connections to earth, line-to-ground tests were omitted. The power cord or/and interconnection line between the EUT and the coupling/decoupling network was less than 2 m in length.

Table 3: Surge Immunity Test Result

Coupling Ports		Coupling Voltage	Coupling Phase / Result			
			0°	90°	180°	270°
AC power ports	L-N	+1 kV	/	Pass	/	/
		-1 kV	/	/	/	Pass

Remark: No obvious change of function was found after the test.

5.5. Injected Currents Susceptibility Test

RESULT : **Pass**

Test Procedure : EN 55014-2:1997+A1:2001+A2:2008

Basic Standard : EN 61000-4-6:2014

Test Voltage : 3 V (r.m.s) unmodulated

Test Signal : 1kHz sine wave, AM 80% modulated

Frequency Range : 150 kHz to 230 MHz

Performance Criterion : A

Test Setup

M/N : LBC0023602

Test Voltage : AC230V/50Hz

Operation Mode : Full Load

Temperature : 24.9°C

Humidity : 55%

Atmospheric Pressure : 101.48kPa

The EUT was placed on an insulating support of 0.1m height above the ground reference plane. All cables exiting the EUT were supported at a height of 30 mm above the ground reference plane. CDN (coupling and decoupling device) was placed on the ground reference plane about 0.3 m from the EUT. The cables between the CDN and EUT were as short as possible (0.1 m to 0.3 m) and were not to be bundled or wrapped. Their height above the ground reference plane was 30 mm.

The frequency range was swept from 150 kHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.

The frequency was swept incrementally, the step size was 1% of the preceding frequency value. The dwell time of the amplitude modulated carrier at each frequency was 1.5 s.

Table 4: Injected Currents Susceptibility Test Result

Coupling ports	Voltage (r.m.s)	Modulation Signal	Freq. Step	Dwell Time	Coupling Method	Result
AC Power Ports	3 V	AM 80%, 1kHz sine	1%	1.5 s	CDN	Pass

Remark: The EUT was operated as intended during and after the test.

5.6.Voltage Dips and Short Interruptions Immunity Test

RESULT : **Pass**
Test Procedure : EN 55014-2:1997+A1:2001+A2:2008
Basic Standard : EN 61000-4-11:2004
Test Specification : 70% U_T / 25 P, Criterion: C
40% U_T / 10 P, Criterion: C
0% U_T / 0.5 P, Criterion: C

Test Setup

M/N : LBC0023602
Test Voltage : AC 230V/50Hz
Operation Mode : Full Load
Temperature : 24.9°C
Humidity : 55%
Atmospheric Pressure : 101.48kPa

The test was performed with the EUT connected to the test generator with the shortest possible length suitable to the application of the EUT.

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 (between each test event). Each representative mode of operation was to be tested.

For voltage dips and short interruptions, changes in supply voltage were to occur at zero crossings of the voltage.

Table 5: Voltage Dips and Short Interruptions Immunity Test Result

Test Level in % U_T	Voltage Dips & Short Interruptions in % U_T	Durations (in Period)	Criterion	Result
70	30	25 P	C	Pass
40	60	10 P	C	Pass
0	100	0.5 P	C	Pass

Remark: No obvious change of function was found after the test.

6. PHOTOGRAPHS OF TEST SET-UP

Conducted Emission at the Mains Terminals Test



Disturbance Power Test



Harmonic Current and Voltage Fluctuations/Flicker Test



Electrostatic Discharge Immunity Test



Electrical Fast Transient/Burst Immunity Test



Surge Immunity Test



Injected Currents Susceptibility Test



Voltage Dips and Short Interruptions Immunity Test



7. PHOTOGRAPHS OF THE EUT



END.