

EMC TEST REPORT

For

EN POWER ELECTRONICS LLC

Flexible led strip

Model No. : See in Annex page at the end of this report

Prepared for : EN POWER ELECTRONICS LLC

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126081, Dubai - UAE

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TEST REPORT DECLARATION

Applicant : EN POWER ELECTRONICS LLC
Manufacturer : EN POWER ELECTRONICS LLC
EUT Description : Flexible led strip
(A) Model No. : See in Annex page at the end of this report
(B) Trademark :



(C) Ratings Supply : DC 24V or DC 12V
(D) Test Voltage : DC 24V From Power

Measurement Standard Used:

EN 55015: 2013+A1:2015

EN 61547: 2009

(IEC61000-4-2:2008; IEC 61000-4-3:2006+A1:2007+A2:2010)

The device described above is tested by Shenzhen Hong Testing technology Co., Ltd to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Shenzhen Hong Testing technology Co., Ltd is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the EN 55015 and EN 61547 requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Hong Testing technology Co., Ltd

Tested by (name + signature).....: Tom Zhu
Test Engineer *Tom Zhu*

Approved by (name + signature)....: Frank Hu
Project Manager *Frank Hu*



Date of issue.....: January 06, 2020

1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION				
Description of Test Item	Standard	Limits	Results	
Conducted disturbance at mains terminals	EN 55015: 2013+A1:2015	Section 4.3 Table 2a	N/A	
Radiated Electromagnetic Disturbance	EN 55015: 2013+A1:2015	Section 4.4.1 Table 3a	PASS	
Radiated disturbance	EN 55015: 2013+A1:2015	Section 4.4.2 Table 3b	PASS	
Harmonic current emissions	EN 61000-3-2: 2014	Class C	N/A	
Voltage fluctuations & flicker	EN 61000-3-3: 2013	Section 5	N/A	
IMMUNITY (EN 61547:2009)				
Description of Test Item	Basic Standard	Performance Criteria	Observation Criteria	Results
Electrostatic discharge (ESD)	IEC 61000-4-2: 2008	B	A	PASS
Radio-frequency, Continuous radiated disturbance	IEC 61000-4-3:2006+A1:2007+A2:2010	A	A	PASS
Electrical fast transient (EFT)	IEC 61000-4-4:2012	B	N/A	N/A
Surge	IEC 61000-4-5: 2014	C	N/A	N/A
Radio-frequency, Continuous conducted disturbance	IEC 61000-4-6: 2013	A	N/A	N/A
Power frequency magnetic field	IEC 61000-4-8: 2009	A	N/A	N/A
Voltage dips, >95% reduction	IEC 61000-4-11:2004	B	N/A	N/A
Voltage dips, 30% reduction		C	N/A	N/A
N/A is an abbreviation for Not Applicable.				

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Description : Flexible led strip
Classification : Class III
Model Number : See in Annex page at the end of this report
Diff : All models are the same, except the power.
Trademark :



Applicant : EN POWER ELECTRONICS LLC
Address : Office#M01, Mezzanine Floor, Al Marri 7 building Besides Dewa Power Station, Manama Street 51 Ras Al Khor Industrial 1, P.o box: 126081, Dubai - UAE
Manufacturer : EN POWER ELECTRONICS LLC
Address : Office#M01, Mezzanine Floor, Al Marri 7 building Besides Dewa Power Station, Manama Street 51 Ras Al Khor Industrial 1, P.o box: 126081, Dubai - UAE
Sample Type : Prototype production

2.2. Block Diagram of connection between EUT and simulators



※ EUT: Flexible led strip

2.3. Test Facility

2.3.1. Laboratory Name:

Shenzhen Hong Testing technology Co., Ltd

2.3.2. Site Location :

3F, JinHai building 2, JinHai road XiXiang street Baoan district ShenZhen , P.R.
China

2.3.3. Test Facility

JAN 01, 2012 File on Federal Communication Commission
Registration Number:177635

September 11, 2011 Certificated by IC
Registration Number: 8513 B

2.4. Measurement Uncertainty

(95% confidence levels, k=2)

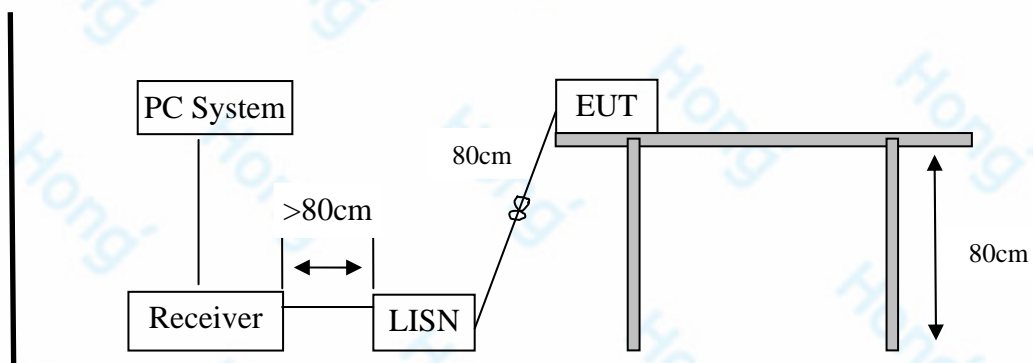
Test Item	Uncertainty	U _{cispr}
Uncertainty for Conduction emission test	2.50dB	3.8 dB
Uncertainty for Radiation Emission test	3.04 dB (Distance: 3m Polarize: V)	5.2 dB
	3.02 dB (Distance: 3m Polarize: H)	
Uncertainty for Flicker test	0.05%	N/A
Uncertainty for Harmonic test	1.8%	N/A

3. CONDUCTED DISTURBANCE AT MAINS TERMINALS TEST

3.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	100843	Sep.19, 19	1 Year
2.	L.I.S.N.	Schwarzbeck	NSLK8126	8126466	Sep.19, 19	1 Year
3.	RF Cable	Schwarzbeck	9111505/200	5995-12-1 61-6890#	Sep.19, 19	1 Year
4.	Coaxial Switch	Schwarzbeck	CX-210	N/A	Sep.19, 19	1 Year
3.2	5. Pulse Limiter	Schwarzbeck	VTSD9516F	9618	Sep.19, 19	1 Year

Block Diagram of Test Setup



3.3. Test Standard

EN 55015: 2013+A1:2015

3.4. Conducted Disturbance at Mains Terminals Limits

Frequency	At mains terminals (dB μ V)	
	Quasi-peak Level	Average Level
9kHz ~ 50kHz	110	--
50kHz ~ 150kHz	90 ~ 80*	--
150kHz ~ 0.5MHz	66 ~ 56*	56 ~ 46*
0.5MHz ~ 5.0MHz	56	46
5.0MHz ~ 30MHz	60	50

Notes: 1. Emission level=Read level+LISN factor-Preamp factor+Cable loss

2. * Decreasing linearly with logarithm of frequency.
3. The lower limit shall apply at the transition frequencies.

3.5. EUT Configuration on Test

The following equipments are installed on Conducted Disturbance at Mains Terminals Test to meet EN 55015 requirement and operating in a manner that tends to maximize its emission characteristics in a normal application.

3.6. Operating Condition of EUT

- 3.6.1. Setup the EUT as shown in Section 3.2.
- 3.6.2. Turned on the power of EUT.
- 3.6.3. Let EUT work in test mode (ON) 15 minutes after taking the test.

3.7. Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. #1). The power line was checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to EN 55015 on Conducted Disturbance at Mains Terminals test.

The bandwidth of test receiver (R & S ESCI) is set: 200Hz at 9kHz to 150kHz, 10kHz at 150kHz to 30MHz.

The frequency range from 9kHz to 30MHz is checked. The test result are reported on Section 3.8.

3.8. Conducted Disturbance at Mains Terminals Test Results

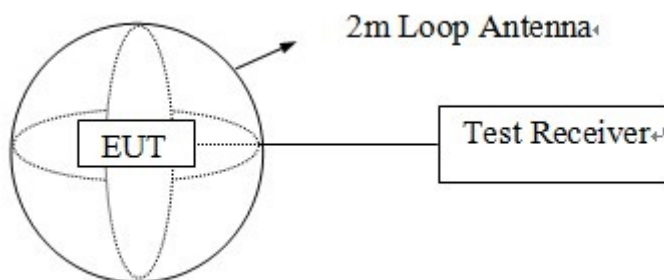
The EUT is supplied by battery or DC Power, so this item does not applicable.

4. RADIATED ELECTROMAGNETIC DISTURBANCE TEST

4.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	100843	Sep.19, 19	1 Year
2.	Triple-loop Antenna	EVERFINE	LLA-2	11050002	Sep.19, 19	1 Year
3.	RF Cable	MIYAZAKI	5D-2W	NO.1	Sep.19, 19	1 Year
4.	Coaxial Switch	Anritsu	MP59B	M55367	Sep.19, 19	1 Year

4.2. Block Diagram of Test Setup



4.3. Test Standard

EN 55015: 2013+A1:2015

4.4. Radiated Electromagnetic Disturbance Limits

Frequency	Limits for loop diameter (dB μ A)
	2m
9kHz ~ 70kHz	88
70kHz ~ 150kHz	88 ~ 58*
150kHz ~ 3.0MHz	58 ~ 22*
3.0MHz ~ 30MHz	22

Notes: 1. * Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

4.5. EUT Configuration on Test

The following equipments are installed on Radiated Electromagnetic Disturbance Test

to meet EN 55015 requirement and operating in a manner that tends to maximize its emission characteristics in a normal application.

4.6. Operating Condition of EUT

4.6.1. Setup the EUT as shown in Section 4.2.

4.6.2. Turned on the power of all equipments.

4.6.3. Let EUT work in test mode (ON) 15 minutes after taking the test.

4.7. Test Procedure

The EUT was placed on a wood table in the center of a loop antenna. The induced current in the loop antenna is measured by means of a current probe and the test receiver. A three-field component was checked by means of a coaxial switch.

The frequency range from 9kHz to 30MHz was checked. The receiver was measured with the quasi-peak detector. For frequency band 9kHz to 150kHz.

The bandwidth of the field strength meter (R&S test receiver ESCI) is set at 200Hz.

For frequency band 150kHz to 30MHz, the bandwidth is set at 10kHz. The test results are reported on Section 4.8.

4.8. Radiated Disturbance Test Results

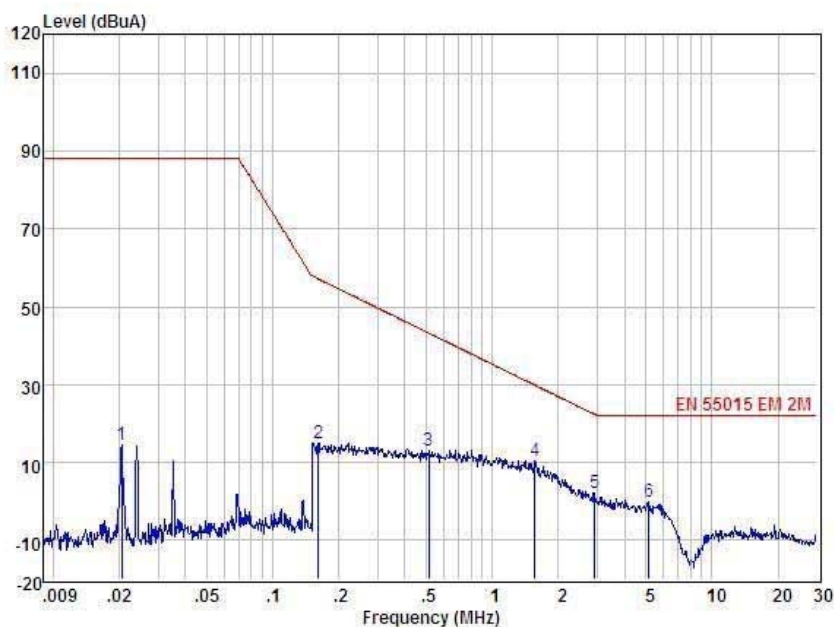
PASS. (All emissions not reported below are too low against the prescribed limits.)

The EUT with the following test mode was tested and read QP values, the test results are listed in next pages.

Temperature: 24.2°C Humidity: 54%

The details of test mode is as follows :

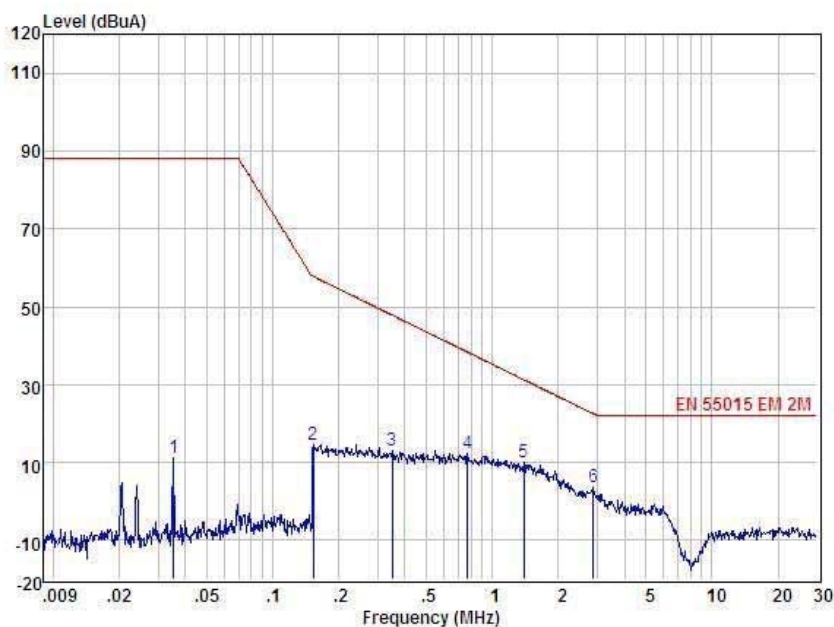
No.	Test Mode
1.	ON



Condition : EN 55015 EM 2M POL: Z Temp:24 °C Hum:56%

Item	Freq MHz	Read dBuA	AUX Factor dB	Cable Loss dB	Level dBuA	Limit dBuA	Margin dBuA	Remark
1	0.021	1.19	13.32	0.08	14.59	88.02	-73.43	QP
2	0.162	-6.39	21.30	0.08	14.99	57.13	-42.14	QP
3	0.515	-8.66	21.74	0.08	13.16	43.19	-30.03	QP
4	1.566	-11.68	21.80	0.10	10.22	29.83	-19.61	QP
5	2.925	-20.11	22.18	0.13	2.20	22.33	-20.13	QP
6	5.160	-23.57	23.19	0.16	-0.22	22.02	-22.24	QP

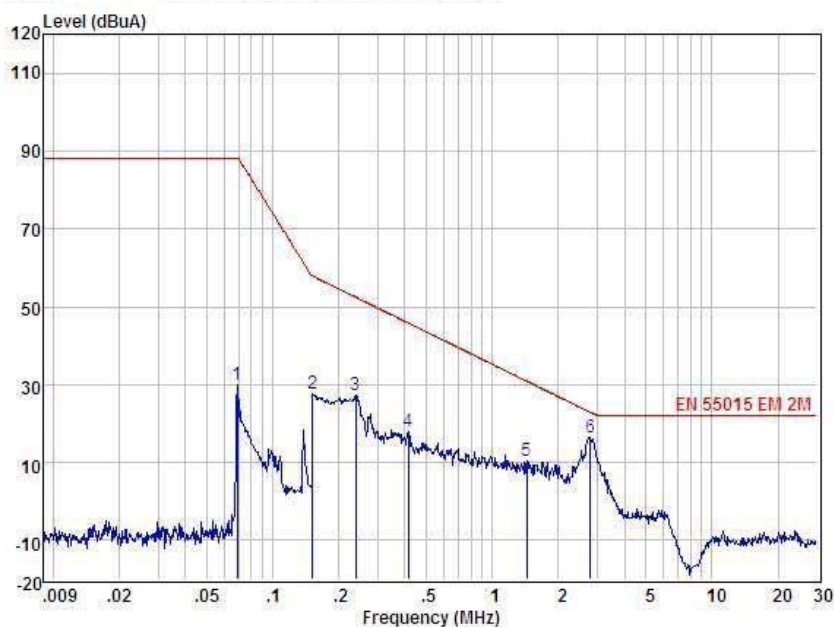
Remarks: Level = Read + AUX Factor + Cable loss



Condition : EN 55015 EM 2M POL: Y Temp:24 °C Hum:56%

Item	Freq MHz	Read dBuA	AUX Factor dB	Cable Loss dB	Level dBuA	Limit dBuA	Margin dBuA	Remark
1	0.035	-6.59	17.58	0.08	11.07	88.02	-76.95	QP
2	0.153	-6.61	21.00	0.08	14.47	57.81	-43.34	QP
3	0.349	-8.39	21.27	0.08	12.96	47.87	-34.91	QP
4	0.773	-9.43	21.50	0.10	12.17	38.31	-26.14	QP
5	1.387	-11.82	21.77	0.10	10.05	31.29	-21.24	QP
6	2.877	-18.54	21.93	0.13	3.52	22.52	-19.00	QP

Remarks: Level = Read + AUX Factor + Cable loss



Condition : CISPR 15 EM 2M POL: X Temp:24 °C Hum:56%

Item	Freq MHz	Read dBuA	AUX Factor dB	Cable Loss dB	Level dBuA	Limit dBuA	Margin dBuA	Remark
1	0.069	10.15	19.52	0.08	29.75	88.02	-58.27	QP
2	0.151	7.81	19.89	0.08	27.78	57.91	-30.13	QP
3	0.238	7.25	19.80	0.08	27.13	52.45	-25.32	QP
4	0.414	-2.56	20.31	0.08	17.83	45.82	-27.99	QP
5	1.432	-9.76	20.16	0.10	10.50	30.90	-20.40	QP
6	2.786	-3.60	20.03	0.12	16.55	22.91	-6.36	QP

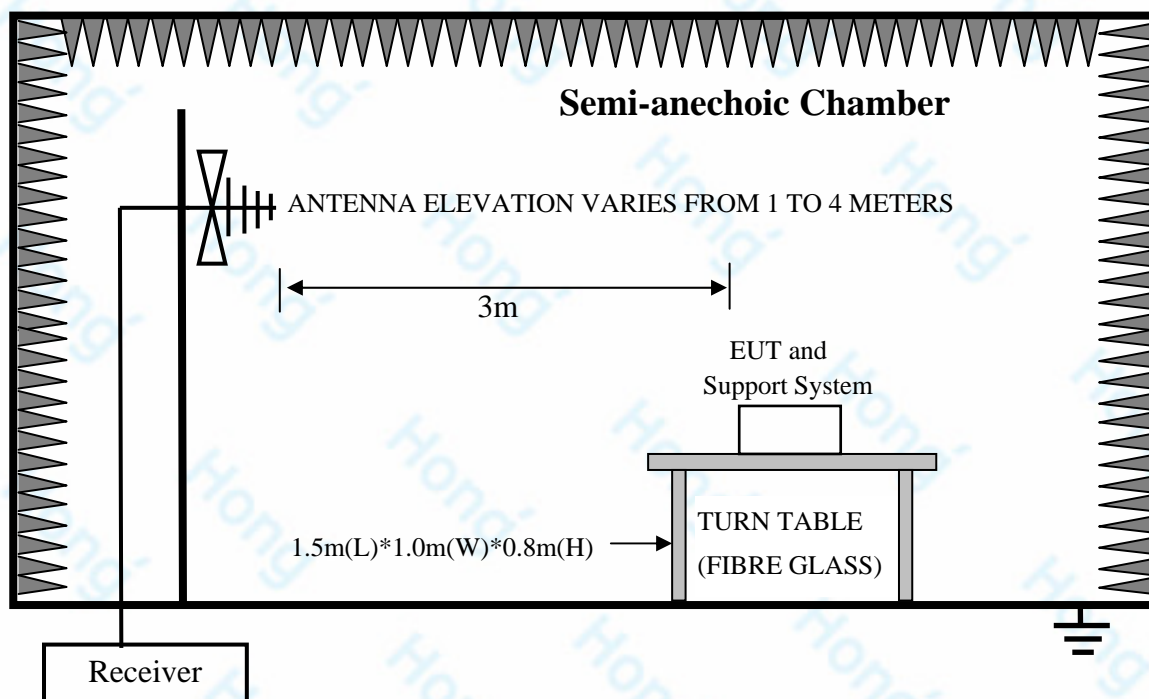
Remarks: Level = Read + AUX Factor + Cable loss

5. RADIATED DISTURBANCE TEST

5.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Test Receiver	Rohde & Schwarz	ESCI	101165	Sep.19, 19	1 Year
2	Amplifier	Schwarzbeck	BBV9743	9743-019	Sep.19, 19	1Year
3	Bilog Antenna	Schwarzbeck	VULB 9168	VULB9168-438	Sep.19, 19	1 Year
4	RF Cable	Schwarzbeck	AK9515E	95891-2m	Sep.19, 19	1 Year
5	RF Cable	Schwarzbeck	AK9515E	95891-11m	Sep.19, 19	1 Year
6	RF Cable	Schwarzbeck	AK9515E	95891-0.5m	Sep.19, 19	1 Year

5.2. Block Diagram of Test Setup



5.3. Test Standard

EN 55015: 2013+A1:2015

5.4. Radiated Disturbance Limit

All emanations from computing devices or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMITS (dB μ V/m)
30 ~ 230	3	40
230 ~ 300	3	47

Note: (1) Emission level = Read level+Antenna Factor-Preamp Factor +Cable Loss

(2) The lower limit shall apply at the transition frequencies.

(3) Distance refers to the distance in meters between the test antenna and the closed point of any part of the EUT.

5.5. EUT Configuration on Test

The EN 55015 regulations test method must be used to find the maximum emission during Radiated Disturbance test. The configuration of EUT is same as used in Conducted Disturbance test. Please refer to Section 3.5.

5.6. Operating Condition of EUT

5.6.1. Setup the EUT and the simulators as shown on Section 5.2.

5.6.2. Turned on the power of all equipments.

5.6.3. Let EUT work in test mode (ON) 15 minutes after taking the test.

5.7. Test Procedure

The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 10m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to EN 55015 on Radiated Disturbance test.

The bandwidth setting on the test receiver (R&S TEST RECEIVER ESCI) is 120 kHz.

The frequency range from 30MHz to 300MHz is checked. The test result are reported on Section 5.8.

5.8. Radiated Disturbance Test Results

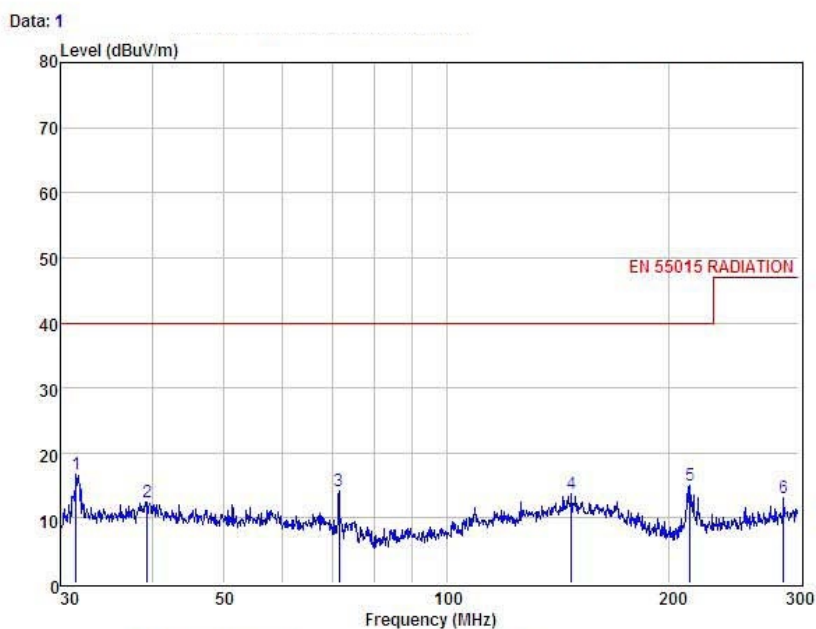
PASS. (All emissions not reported below are too low against the prescribed limits.)

The EUT with the following test mode was tested and read QP values, the test results listed in next pages.

Temperature: 24.2°C Humidity:54%

The details of test mode is as follows:

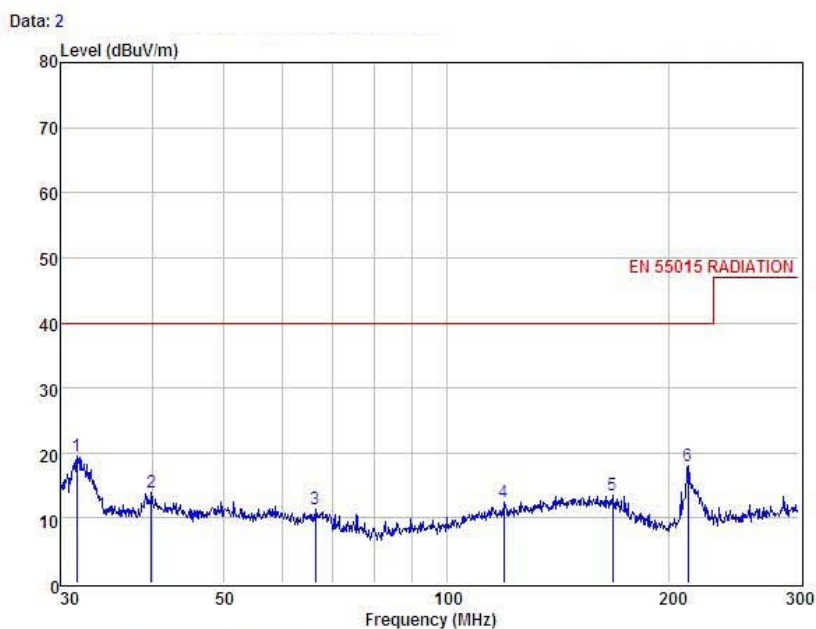
No.	Test Mode
1.	ON



Condition : EN 55015 RADIATION 3m POL: HORIZONTAL

Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	31.49	30.83	13.28	27.51	0.11	16.71	40.00	-23.29	QP
2	39.37	26.00	14.07	27.81	0.17	12.43	40.00	-27.57	QP
3	71.63	30.12	10.51	26.77	0.19	14.05	40.00	-25.95	QP
4	147.61	26.40	13.90	26.91	0.37	13.76	40.00	-26.24	QP
5	213.86	31.26	10.30	27.04	0.53	15.05	40.00	-24.95	QP
6	286.50	27.06	12.54	27.17	0.70	13.13	47.00	-33.87	QP

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



Condition : EN 55015 RADIATION 3m POL: VERTICAL

Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	31.56	33.68	13.28	27.51	0.11	19.56	40.00	-20.44	QP
2	39.82	27.40	14.07	27.81	0.17	13.83	40.00	-26.17	QP
3	66.39	26.65	11.59	27.20	0.28	11.32	40.00	-28.68	QP
4	119.71	26.97	12.06	26.88	0.33	12.48	40.00	-27.52	QP
5	167.93	26.59	13.37	26.92	0.42	13.46	40.00	-26.54	QP
6	212.38	34.24	10.18	27.03	0.57	17.96	40.00	-22.04	QP

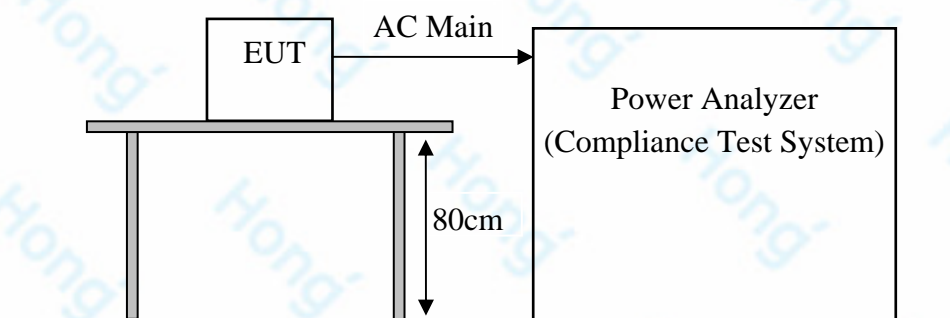
Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

6. HARMONIC CURRENT TEST

6.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Harmonics&Flicker Analyser	Voltech	PM6000	200006700495	Sep.19, 19	1 Year

6.2. Block Diagram of Test Setup



6.3. Test Standard

EN 61000-3-2: 2014, Class C

6.4. Limits of Harmonic Current

Limits for Class C equipment	
Harmonic order	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency
n	%
2	2
3	$30 \cdot \lambda^*$
5	10
7	7
9	5
$11 \leq n \leq 39$ (odd harmonics only)	3

* λ is the circuit power factor

6.5. Operating Condition of EUT

Same as Section 3.5. except the test setup replaced by Section 6.2.

6.6. Test Procedure

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.

6.7. Test Results

The EUT is supplied by battery or DC Power, so this item does not applicable.

7. VOLTAGE FLUCTUATIONS & FLICKER TEST

7.1. Test Equipment

Same as Section 6.1.

7.2. Block Diagram of Test Setup

Same as Section 6.2.

7.3. Test Standard

EN 61000-3-3: 2013

7.4. Limits of Voltage Fluctuation and Flick

Test Item	Limit	Note
P_{st}	1.0	P_{st} means Short-term flicker indicator
P_{lt}	0.65	P_{lt} means long-term flicker indicator
T_{dt}	0.2	T_{dt} means maximum time that dt exceeds 3%
$d_{max}(\%)$	4%	d_{max} means maximum relative voltage change.
$d_c(\%)$	3%	d_c means relative steady-state voltage change.

7.5. Operating Condition of EUT

Same as Section 6.4.

7.6. Test Procedure

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal conditions. During the flick measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

7.7. Test Results

The EUT is supplied by battery or DC Power, so this item does not applicable.

8. IMMUNITY PERFORMANCE CRITERIA DESCRIPTION

Performance Level

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance level by its manufacturer or the requestor of the test, or the agreed between the manufacturer and the purchaser of the product.

Definition related to the performance level:

1. Based on the used product standard
2. Based on the declaration of the manufacturer, requestor or purchaser

Criterion A:

Definition: normal performance within limits specified by the manufacturer, requestor and purchaser.

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:

Definition: temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.

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:

Definition: temporary loss of function or degradation of performance, the correction of which requires operator intervention.

During and after the test any change of the luminous intensity is allowed and the lamps 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 incorporating a starting device: after the test the lighting equipment is switched off. After half an hour it is switched on again. The lighting equipment shall start and operate as intended.

Criterion D:

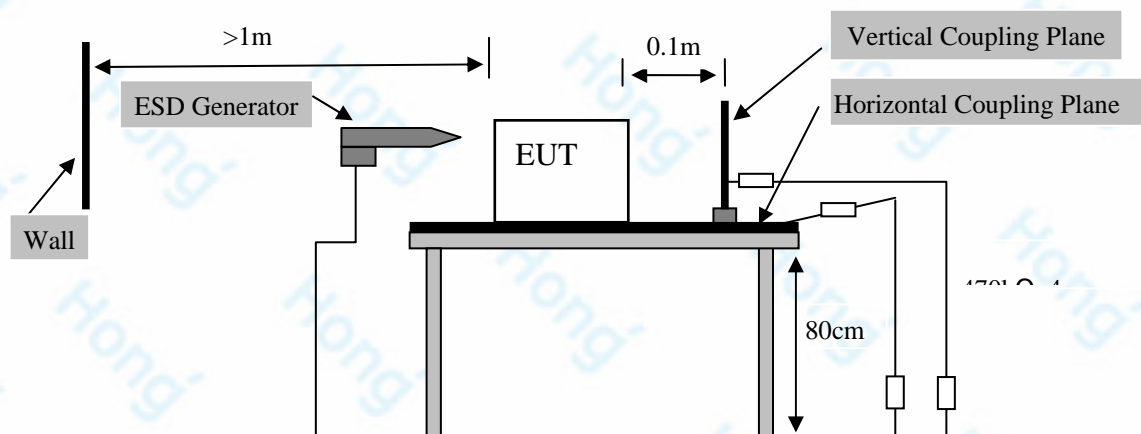
Definition: loss of function or degradation of performance, which is not recoverable, owing to damage to hardware or software, or loss of data.

9. ELECTROSTATIC DISCHARGE TEST

9.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	ESD Tester	HAEFLY	PESD1610	H310546	Sep.19, 19	1 Year

9.2. Block Diagram of Test Setup



9.3. Test Standard

EN 61547: 2009 (IEC 61000-4-2: 2008)

(Severity Level 1 & 2 & 3 for Air Discharge at 2 kV & 4 kV & 8kV,
Severity Level 1 & 2 for Contact Discharge at 2 kV & 4kV)

9.4. Severity Levels and Performance Criterion

9.4.1. Severity level

Level	Test Voltage Contact Discharge (kV)	Test Voltage Air Discharge (kV)
1.	2	2
2.	4	4
3.	6	8
4.	8	15
X.	Special	Special

9.4.2. Performance criterion: **B**

9.5. EUT Configuration on Test

The configuration of EUT are listed in Section 3.5..

9.6. Operating Condition of EUT

Same as Conducted Emission test which is listed in Section 3.6. except the test set up replaced by Section 9.2.

9.7. Test Procedure

9.7.1. Air Discharge:

The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and repeated 20 times for each pre-selected test point. This procedure was repeated until all the air discharge completed

9.7.2. Contact Discharge:

All the procedure was same as Section 9.7.1. except that the generator was re-triggered for a new single discharge for each pre-selected test point. The tip of the discharge electrode was touching the EUT before the discharge switch was operated.

9.7.3. Indirect discharge for horizontal coupling plane

At least 20 single discharges were applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

9.7.4. Indirect discharge for vertical coupling plane

At least 20 single discharge were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

9.8. Test Results

PASS.

Please refer to the following page.

Electrostatic Discharge Test Results

Applicant	EN POWER ELECTRONICS LLC	Test Date	January 04, 2020		
EUT	Flexible led strip	Temperature	24°C		
M/N	BR-F3528xx60-xx-x-Fx-Vx	Humidity	56%		
Test Voltage	DC 24V From Power	Test Mode	ON		
Test Engineer	Tom	Pressure	101.3KPa		
Required Performance	B	Actual Performance	A		
Air Discharge:±8kV:±4kV :±2kV # For Air Discharge each Point Positive 10 times and negative 10 times discharge.					
Contact Discharge:±4kV:±2kV # For Contact Discharge each point positive 10 times and negative 10 times discharge					
For the time interval between successive single discharges an initial value of one second.					
Discharge Voltage (kV)	Type of discharge	Dischargeable Points	Performance		Result (Pass/Fai)
			Required	Observatio	
±4	Contact	1	B	A	Pass
±8	Air	2	B	A	Pass
±4	HCP-Bottom	Edge of the HCP	B	A	Pass
±4	VCP-Front	Center of the VCP	B	A	Pass
±4	VCP-Left	Center of the VCP	B	A	Pass
±4	VCP-Back	Center of the VCP	B	A	Pass
±4	VCP-Right	Center of the VCP	B	A	Pass
Discharge Points Description					
<u>1</u>	Metal		<u>4</u>		
<u>2</u>	Slots		<u>5</u>		
<u>3</u>			<u>6</u>		
Test Equipment: ESD Tester (PESD1610)					
Remark: Class A is no function loss.					

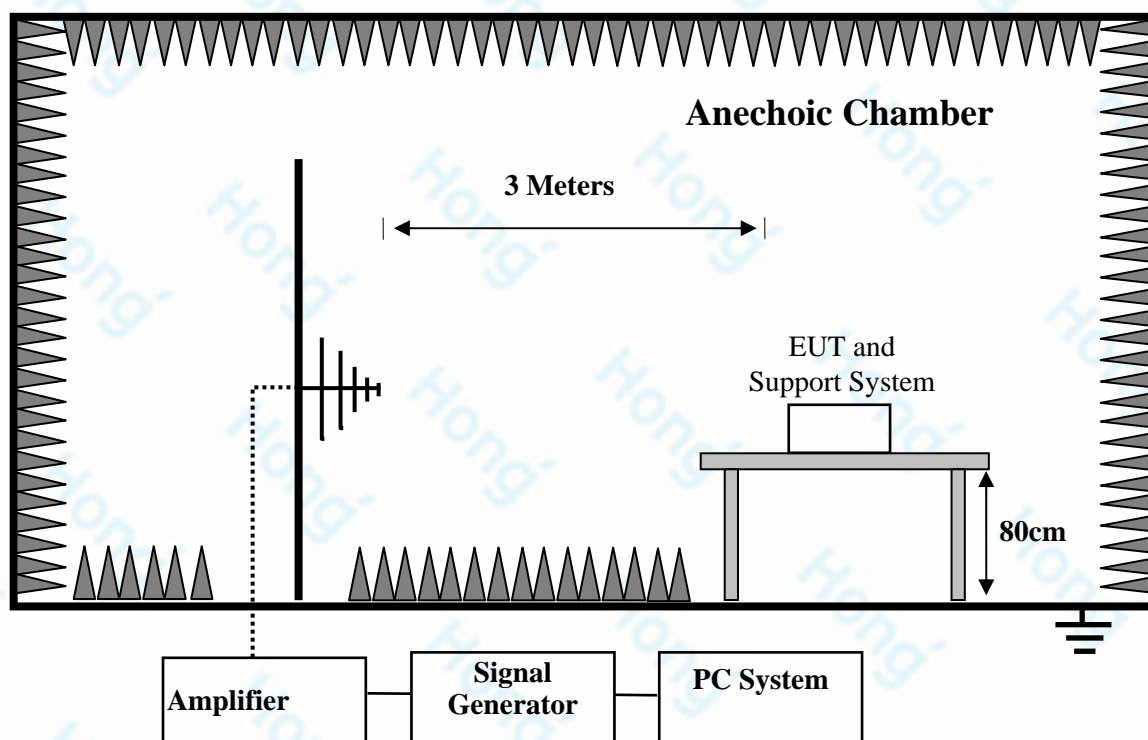
Discharge should be considered on Contact and Air and Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).

10. RF FIELD STRENGTH SUSCEPTIBILITY TEST

10.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	2#Chamber	AUDIX	N/A	N/A	Sep.19, 19	1 Year
2.	Signal Generator	Marconi	2031B	11606/058	Sep.19, 19	1 Year
3.	Amplifier	A&R	100W/1000M 1	17028	N/A	N/A
4.	Isotropic Field Monitor	A&R	FM7004	0325983	N/A	N/A
5.	Isotropic Field Probe	A&R	FL7006	0325736	Sep.19, 19	1 Year
6.	Laser Probe Interface	A&R	FL7000	325430	N/A	N/A
7.	Power Meter	Anritsu	ML2487A	6k000032 62	Sep.19, 19	1Year
8.	Power Sensor	Anritsu	MA2491A	33005	Sep.19, 19	1Year
9.	Log-periodic Antenna	A&R	AT1080	16512	N/A	N/A

10.2. Block Diagram of Test Setup



10.3. Test Standard

EN 61547: 2009 (IEC 61000-4-3:2006+A1:2007+A2:2010)
(Severity Level 2 at 3V / m)

10.4. Severity Levels and Performance Criterion

10.4.1. Severity level

Level	Test Field Strength V/m
1.	1
2.	3
3.	10
X.	Special

10.4.2. Performance criterion: A

10.5. EUT Configuration on Test

The configuration of EUT are listed in Section 3.5..

10.6. Operating Condition of EUT

Same as Conducted Emission test which is listed in Section 3.6. except the test set up replaced by Section 10.2.

10.7. Test Procedure

Testing was performed in a fully anechoic chamber as recommended by IEC 61000-4-3. The EUT was placed on an 80 cm high non-conductive table located in the area of field uniformity. The radiating antenna was placed 3m in front of the EUT, and dwell time of the radiated interference was controlled by an automated computer controlled system. The signal source was stepped through the applicable frequency range at a rate no faster than 1% of the fundamental. The signal was amplitude

modulated 80% over the frequency range 80 MHz to 1GHz at a level of 3 V/m. The dwell time was set at 3.0 s. Field presence was monitored during testing via a field probe placed in close proximity to the EUT. Throughout testing, the EUT was closely monitored for signs of susceptibility. The test was performed with the antennae oriented in both a horizontal and vertical polarization.

All the scanning conditions are as follows:

Condition of Test

Remarks

1. Test Fielded Strength	3 V/m (r.m.s Unmodulated, Severity Level)
2. Amplitude Modulated	80% amplitude modulated with a 1kHz sinewave
3. Scanning Frequency	80 - 1000 MHz
4. Sweeping time of radiated	0.0015 decade/s
5. Dwell Time	3.0 Sec.

10.8. Test Results

PASS.

Please refer to the following page.

RF Field Strength Susceptibility Test Results

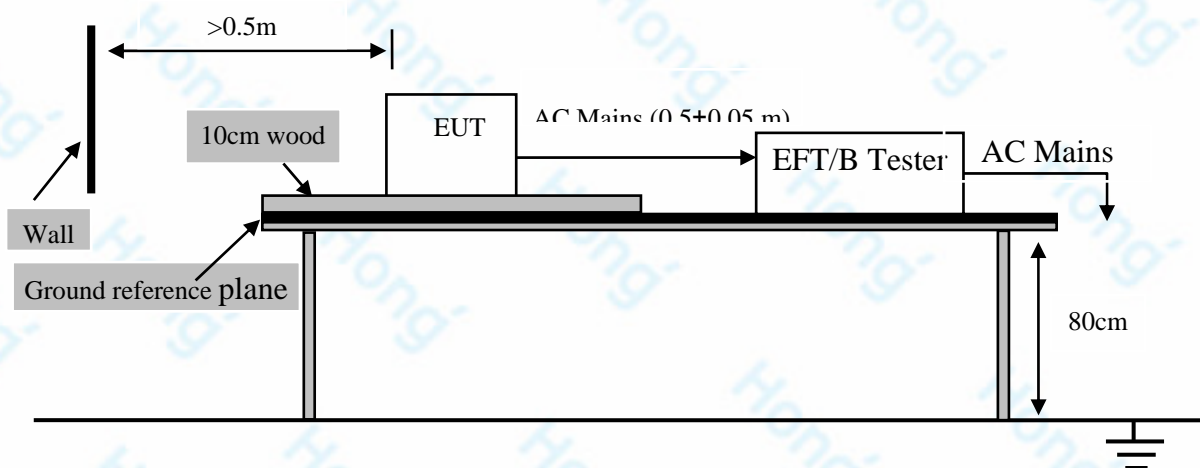
Applicant	:	EN POWER ELECTRONICS LLC	Test Date	:	January 04, 2020
EUT	:	Flexible led strip	Temperature	:	24°C
M/N	:	BR-F3528xx60-xx-x-Fx-Vx	Humidity	:	56%
Test Voltage	:	DC 24V From Power	Pressure	:	101.3KPa
Test Engineer	:	Tom	Test Mode	:	ON
Frequency Range	:	80 MHz -1000MHz	Field Strength	:	3V/m
Required Performance	:	A	Actual Performance	:	A
Modulation: <input checked="" type="checkbox"/> AM <input type="checkbox"/> Pulse <input type="checkbox"/> none 1 kHz 80%					
Frequency Range :80 MHz -1000MHz					
Steps 1%					
	Horizontal		Vertical		Result
	Required	Observation	Required	Observation	(Pass / Fail)
Front	A	A	A	A	Pass
Right	A	A	A	A	Pass
Rear	A	A	A	A	Pass
Left	A	A	A	A	Pass
Test Equipment :					
1. Signal Generator : Marconi 2031B					
2. Power Amplifier : A&R 500A/100;100W/1000M.					
3. Power Antenna : A&R AT-1080.					
4. Field Monitor : A&R FM7004.					
Remark: Class A is no function loss.					

11. ELECTRICAL FAST TRANSIENT/BURST TEST

11.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Burst Tester	3ctest	EFT-4001G	EC0461015	Sep.19, 19	1 Year

11.2. Block Diagram of Test Setup



11.3. Test Standard

EN 61547: 2009 (IEC 61000-4-4: 2012)
 (Severity Level 2 at 1kV for AC power port,
 Severity Level 1 at 0.5kV for other port)

11.4. Severity Levels and Performance Criterion

11.4.1. Severity level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 kV	0.25 kV
2.	1 kV	0.5 kV
3.	2 kV	1 kV
4.	4 kV	2 kV
X	Special	Special

11.4.2.Performance criterion : B

11.5.EUT Configuration on Test

The configuration of EUT are listed in Section 3.5.

11.6.Operating Condition of EUT

Same as Conducted Emission test which is listed in Section 3.6. except the test set up replaced by Section 11.2.

11.7.Test Procedure

The EUT and its simulators were placed on a ground reference plane and were insulated from it by an wood support $0.1\text{m} \pm 0.01\text{m}$ thick. The ground reference plane was $1\text{m} \times 1\text{m}$ metallic sheet with 0.65mm minimum thickness. This reference ground plane was project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.

11.7.1.For input and output AC power ports:

The EUT was connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both positive transients and negative transients of test voltage was applied during compliance test and the duration of the test to 2min.

11.7.2.For signal lines and control lines ports:

No I/O ports. It's unnecessary to test.

11.7.3.For DC output line ports:

It's unnecessary to test.

11.8.Test Results

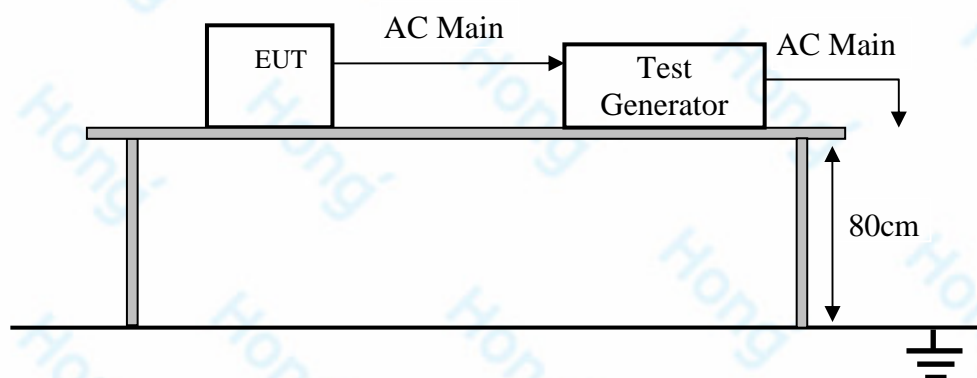
The EUT is supplied by battery or DC Power, so this item does not applicable.

12.SURGE TEST

12.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Surge CDN	3ctest	SGN-5010G	EC5591004	Sep.19, 19	1 Year
2	Surge Generator	3ctest	SG-5006G	EC5581006	Sep.19, 19	1 Year

12.2.Block Diagram of Test Setup



12.3.Test Standard

EN 61547: 2009 (IEC 61000-4-5: 2014)

Characteristics	Test levels			
	Device			
	Self-ballasted lamps and semi-luminaires	Luminaires and independent auxiliaries		
		Input power		
		≤25 W	>25 W	
Wave-shape data	1,2/50 μs	1,2/50 μs	1,2/50 μs	
Test levels	line to line	±0,5 kV	±1,0 kV	
	line to ground	±1,0 kV	±2,0 kV	

NOTE In addition to the specified test level, all lower test levels as detailed in IEC 61000-4-5 should also be satisfied.

12.3.1. Severity level

Severity Level	Open-Circuit Test Voltage kV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

12.3.2. Performance criterion : B

12.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.5.

12.5. Operating Condition of EUT

Same as Conducted Emission test which is listed in Section 3.6. except the test set up replaced by Section 12.2.

12.6. Test Procedure

- 1) Set up the EUT and test generator as shown on Section 12.2.
- 2) For line to line coupling mode, provide a 1.0kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
- 3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 4) Different phase angles are done individually.
- 5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

12.7. Test Results

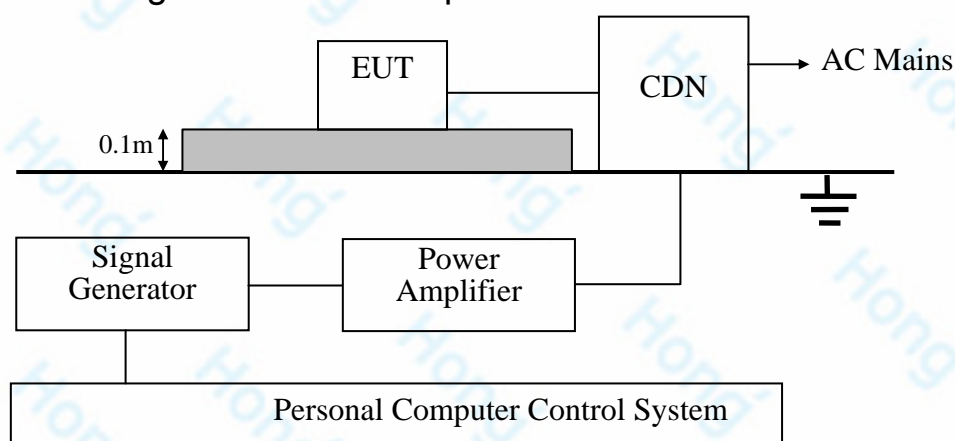
The EUT is supplied by battery or DC Power, so this item does not applicable.

13. INJECTED CURRENTS SUSCEPTIBILITY TEST

13.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Conducted Immunity Test System	Frankonia	CIT-10/75	12681247/2013	Sep.19, 19	1 Year
2.	Fixed Coaxial Attenuator	CD	ATT-0675	120540086	Sep.19, 19	1 Year
3.	coupling-decoupling network (CDN)	CD	CDN M2/M3	2302	Sep.19, 19	1 Year
4.	Electromagnetic Injection Clamp (EMC-Clamp)	CD	EM-Clamp	0513A031201	Sep.19, 19	1 Year

13.2. Block Diagram of Test Setup



13.3. Test Standard

EN 61547: 2009 (IEC 61000-4-6: 2013)

(Severity Level 2 at 3V_{rms} and frequency is from 0.15MHz to 80MHz for AC power port,

Severity Level 2 at 3V_{rms} and frequency is from 0.15MHz to 80MHz for other port)

13.4. Severity Levels and Performance Criterion

13.4.1. Severity level

Level	Voltage Level (e.m.f.) V
1.	1

2.	3
3.	10
X	Special

13.4.2. Performance criterion: A

13.5. EUT Configuration on Test

The configuration of EUT are listed in Section 3.5..

13.6. Operating Condition of EUT

Same as Conducted Emission test which is listed in Section 3.6. except the test set up replaced by Section 13.2.

13.7. Test Procedure

- 1) Set up the EUT, CDN and test generators as shown on Section 13.2.
- 2) Let the EUT work in test mode and test it.
- 3) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 4) The disturbance signal described below is injected to EUT through CDN.
- 5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 6) The frequency range is swept from 150kHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.
- 7) The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

13.8. Test Results

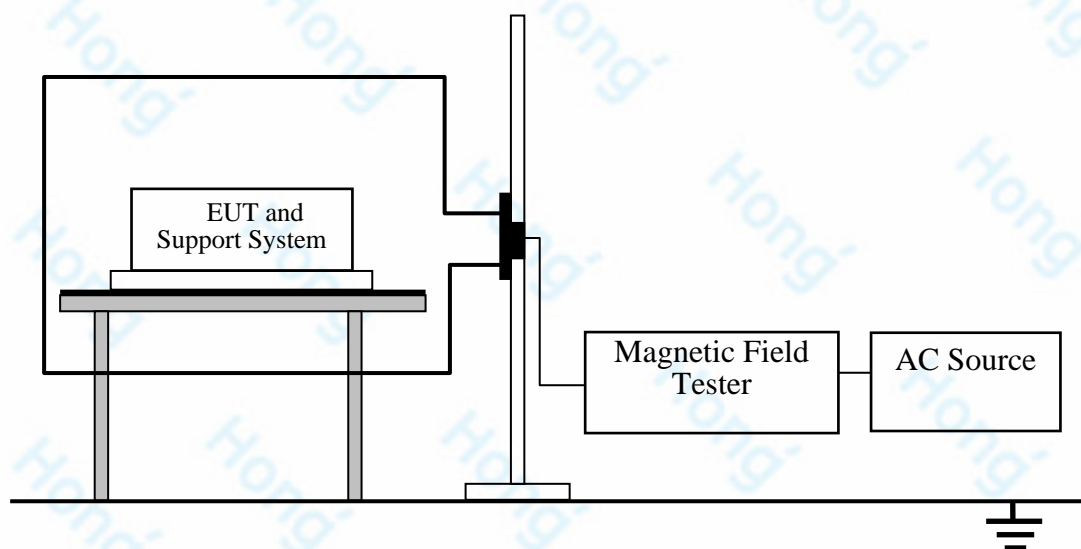
The EUT is supplied by battery or DC Power, so this item does not applicable.

14. MAGNETIC FIELD IMMUNITY TEST

14.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Magnetic Field Tester	HEAFELY	MAG100.1	083858-10	Sep.19, 19	1 Year

14.2. Block Diagram of Test Setup



14.3. Test Standard

EN 61547: 2009 (IEC 61000-4-8: 2009)
(Severity Level 2 at 3A/m)

14.4. Severity Levels and Performance Criterion

14.4.1. Severity level

Level	Magnetic Field Strength A/m
1.	1
1.	3
1.	10
1.	30

1.	100
X.	Special

14.4.2. Performance criterion : A

14.5. EUT Configuration on Test

The configuration of EUT are listed in Section 3.5..

14.6. Operating Condition of EUT

Same as Conducted Emission test which is listed in Section 3.6. except the test set up replaced by Section 14.2.

14.7. Test Procedure

The EUT shall be subjected to the test magnetic field by using the induction coil of standard dimensions (1m*1m) and shown in Section 14.2. The induction coil shall then be rotated by 90 °in order to expose the EUT to the test field with different orientations.

14.8. Test Results

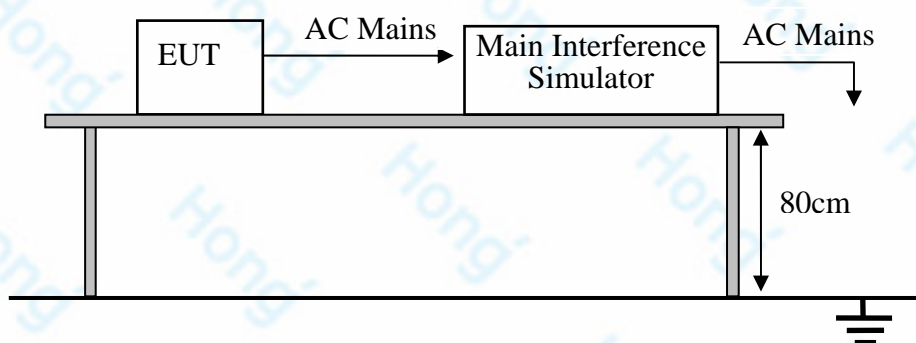
The EUT not containing devices susceptible to magnetic fields, and Power-frequency magnetic field test applicable only to EUT containing devices susceptible to magnetic fields, so the test not applicable.

15. VOLTAGE DIPS AND INTERRUPTIONS TEST

15.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Main Interference Simulator	3ctest	VDG-1105G	EC0171002	Sep.19, 19	1 Year

15.2. Block Diagram of Test Setup



15.3. Test Standard

EN 61547: 2009 (IEC 61000-4-11: 2004)

Test Level $\%U_T$	Voltage dip and short interruptions $\%U_T$	Duration (in period)
0	100	0.5
70	30	10

15.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.5..

15.5. Operating Condition of EUT

Same as Conducted Emission test which is listed in Section 3.6. except the test set up replaced by Section 15.2.

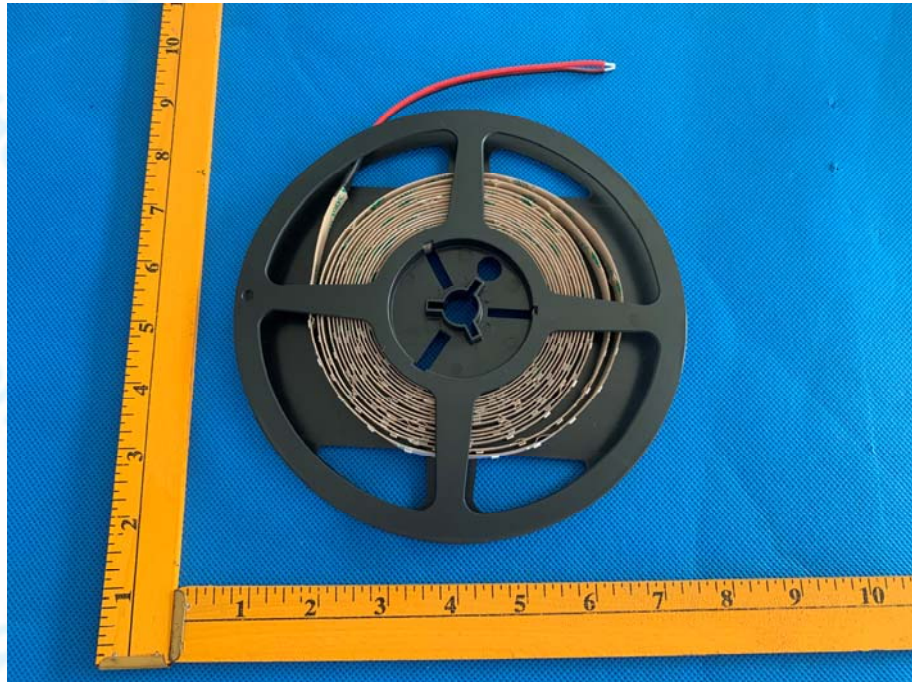
15.6. Test Procedure

- 1) Set up the EUT and test generator as shown on Section 15.2.
- 2) The interruptions were introduced at selected phase angles with specified duration.
- 3) Record any degradation of performance.

15.7. Test Results

The EUT is supplied by battery or DC Power, so this item does not applicable.

16.PHOTOS OF THE EUT



Annex

	Product part numbers
	BR-F3528xx60-xx-x-Fx-Vx
	BR-F3528xx120-xx-x-Fx-Vx
	BR-F3528xx180-xx-x-Fx-Vx
	BR-F3528xx240-xx-x-Fx-Vx
	BR-F3528xx240D-xx-x-Fx-Vx
	BR-F2835xx30-xx-x-Fx-Vx
	BR-F2835xx60-xx-x-Fx-Vx
	BR-2835xx120-xx-x-Fx-Vx
1	BR-F2835xx180-xx-x-Fx-Vx
	BR-F2835xx240-xx-x-Fx-Vx
	BR-F2835xx112-xx-x-Fx-Vx
	BR-F2835xx96-xx-x-Fx-Vx
	BR-F5050xx30-xx-x-Fx-Vx
	BR-F5050xx60-xx-x-Fx-Vx
	BR-F5050xx120D-xx-x-Fx-Vx
	BR-F5630xx126-xx-x-Fx-Vx
	BR-F5050xx96-xx-x-Fx-Vx
	BR-F3014xx70-xx-x-Fx-Vx
	BR-F2216xx120-xx-x-Fx-Vx
2	"BR" in the part number represents the brand " Brio Series", a product serie from the brand"LED RAY".
3	"F" in the part number represents "Flexible LED STRIP".
4	Numbers like "3528", "2835", "5050", "5630", "3014", "2216" represents the size of the LEDs;
5	The first "xx" represents the CCT/Color, such a"WW=Warm White", "NW=Natural White", "CW=Cool White", "B=Blue Color", " G=Green Color", " R=Red Color".
6	Numbers like "60", "120", "180", "240", "112", "126", "96", "30", "70" represents the quantity of LEDs per meter;
7	"D" means "double row";
8	The second "xx" represents the Color Kelvin, such as "22=2200K", "24=2400K", "27=2700K", "30=3000K", "40=4000K", "65=6500K", "Blank = Solid Color like Red, Green, Blue...etc"
9	"x" represents the MacAdam Binning, such as" C= MacAdam 3 Step", "C1=MacAdam 4 Step".
10	"Fx" Represents the waterproof types, such as"F0=IP20", "F1=IP54", "F2=IP65", "F3=IP66", "F4=IP67", "F5=IP68" etc.
11	"Vx" Represents the Voltage, Such as " V1=DC12V", "V2=DC24V" etc.

-----THE END OF REPORT-----