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Subject: **Procedure And/Or Report Material**

The following material resulting from the investigation under the above numbers is enclosed.

**Issue**

<u>Date</u>	<u>Vol</u>	<u>Sec</u>	<u>Pages</u>	<u>Revised Date</u>
	1		Revised Index Page(s) 3	2016/06/08
2014/06/20	1	13	Cert of Compliance	
2014/06/20	1	13	Revised Description Page(s) 1,2,3,4,5,11	2016/06/08
2014/06/20	1	13	New Test Record 6	2016/06/08
2014/06/20	1	13	Revised Test Record 1-1,2,4-1	2016/06/08

Purchase Order: UL Quote#1101189056 (Accept date:19-May-2016)

Inspections at your plant will be conducted under the supervision of LI JIAN, UL INSPECTION CENTER GUANGZHOU, CHINA NAT'L IMPORT & EXP COM INSPCTN CORP, 66 HUA CHENG DA DAO, WEST TOWER, 17TH FL, ZHU JIANG XIN CHENG, GUANGZHOU, GUANGDONG, China, 510623., PHONE: 20-38872860, FAX: 20-3829-0799, EMAIL: ulic316@ccicgd.com

Please file revised pages and illustrations in place of material of like identity. New material should be filed in its proper numerical order.

NOTE: Follow-Up Service Procedure revisions DO NOT include Cover Pages, Test Records and Conclusion Pages. Report revisions DO NOT include Authorization Pages, Indices, Section General Pages and Appendixes.

Please review this material and report any inaccuracies to UL's Customer Service Professionals. Contact information for all of UL's global offices can be found at <http://ul.com/aboutul/locations>.

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BRE File

UL INSPECTION CENTER 316



Models	Section	Report Date
<p>LED Drivers, Models</p> <p>EBR0PPA-XXXX-30-YYY-ZZZ, EBR0PPA-XXXX-24-YYY-ZZZ, EBR0PPA-XXXX-32-YYY-ZZZ, EBR0PPA-XXXX-36-YYY-ZZZ, EBR0PPA-XXXX-37-YYY-ZZZ, EBR0PPA-XXXX-42-YYY-ZZZ, EBR0PPA-XXXX-48-YYY-ZZZ, JWBR010U-XXXX-28-YYY-ZZZ, JWBR0YYU-XXXX-21-YYY-ZZZ, EBR010U-XXXX-28-YYY-ZZZ, EBR0YYU-XXXX-21-YYY-ZZZ, EBR015U-XXXX-18, EBR0PPA-XXXX- 29-YYY-ZZZ</p> <p>Where "PP"=20, If 16W&lt;Pout&lt;21W; "PP"= 15, If 11W&lt;Pout&lt;16W; "PP"=10, If Pout&lt;11W.</p> <p>"A"=U, if AC input is 120VAC; "A"=W, if AC input is 120- 277VAC; "A"=V, if AC input is 277VAC; "A"=E, if AC input is 230VAC.</p> <p>For models EBR0YYU-XXXX-21-YYY-ZZZ and JWBR0YYU-XXXX-21- YYY-ZZZ, "YY"=15, if 11W&lt;Pout&lt;16W; and "YY"=10, if Pout&lt;11W.</p> <p>For suffix "XXXX", where "X" represents 0-9, means regulated output current, which is not greater than max output regulated current within the output voltage range.</p>	12	2013-10-30
<p>LED Drivers, Series <b>ESS0PPA-XXXX-VV-YYYY-ZZZZ</b>, ESS015W- 0350-42-CPLV, ESS040A-XXXX-VV-YYY-ZZZ.</p> <p>Where "PP"- If Pout&lt;11W, "PP"=10; if 11W&lt;Pout&lt;15W, "PP"=15; if 15W&lt;Pout&lt;20W, "PP"=20; if 20W&lt;Pout&lt;30W, "PP"=30; if 30W&lt;Pout&lt;40W, "PP"=40.</p> <p>"A" - Denotes input voltage code. If input rated 120Vac, "A"=U; if input rated 120-277Vac, "A"=W; if input rated 277Vac, "A"=V; if input rated 230Vac, "A"=E.</p> <p>"XXXX" - Denotes regulated output current or could be blank. Regulated output current is not greater than max output regulated current within the output voltage range.</p> <p>"VV" - Denotes maximum output voltage. It may be "21", "23", "24", "26", "27", "30", "32", "34", "36", "42", "56" or "58".</p> <p>"YYYY" - Denotes customer code for market purpose only, where "Y" represents 0-9, A-Z or blank.</p> <p>"ZZZZ" - Denotes customer code for market purpose only, where "Z" represents 0-9, A-Z or blank.</p>	13	2014-06-20

## DESCRIPTION

## PRODUCT COVERED:

USR, CNR- Component LED Driver, Series **ESS0PPA-XXXX-VV-YYYY-ZZZZ**.

Where "PP"- If Pout<11W, "PP"=10; if 11W<Pout<15W, "PP"=15; if 15W<Pout<20W, "PP"=20; if 20W<Pout<30W, "PP"=30; if 30W<Pout<40W, "PP"=40.

"A" - Denotes input voltage code. If input rated 120Vac, "A"=U; if input rated 120-277Vac, "A"=W; if input rated 277Vac, "A"=V; if input rated 230Vac, "A"=E.

"XXXX" - Denotes regulated output current or could be blank. Regulated output current is not greater than max output regulated current within the output voltage range.

"VV" - Denotes maximum output voltage. It may be "21", "23", "24", "26", "27", "30", "32", "34", "36", "42", "56" or "58".

"YYYY" - Denotes customer code for market purpose only, where "Y" represents 0-9, A-Z or blank.

"ZZZZ" - Denotes customer code for market purpose only, where "Z" represents 0-9, A-Z or blank.

## ELECTRICAL RATINGS:

Model No.	Input				Output		
	Voltage (Vac)	Frequency (Hz)	Current (A)	Power Factor (PF)	Max. Voltage (Vdc)	Max. Current (mA)	Max. Power (W)
<b>ESS0PPA-XXXX-VV-YYYY-ZZZZ</b>	120, 120-277, 277, 230	50/60	0.35	>0.9	56	1400	29.4
<b>ESS0PPA-XXXX-58-YYYY-ZZZZ</b>	120, 120-277, 277, 230	50/60	0.35	>0.9	58	690	40.0
ESS015W-0350-42-CPLV	120, 120-277, 277, 230	50/60	0.35	>0.9	42	350	14.7
<b>ESS040A-XXXX-VV-YYYY-ZZZZ</b>	120, 120-277, 277, 230	50/60	0.35	>0.9	42	1400	37.8
<b>ESS015W-0440-25-ROA</b>	<b>120, 120-277, 277, 230</b>	<b>50/60</b>	<b>0.35</b>	<b>&gt;0.9</b>	<b>25</b>	<b>440</b>	<b>11.0</b>
<b>ESS030W-0700-39-ROA</b>	<b>120, 120-277, 277, 230</b>	<b>50/60</b>	<b>0.35</b>	<b>&gt;0.9</b>	<b>39</b>	<b>700</b>	<b>27.3</b>
<b>ESS030W-0900-32-ROA</b>	<b>120, 120-277, 277, 230</b>	<b>50/60</b>	<b>0.35</b>	<b>&gt;0.9</b>	<b>32</b>	<b>900</b>	<b>28.8</b>

## TECHNICAL CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

USR - Indicates investigation to the United States Standards for Light Emitting Diode (LED) Light Equipment for Use in Lighting Products, UL 8750 and CLASS 2 POWER UNITS, UL 1310.

The output has been evaluated as Low voltage Limited energy, Section 8.14

**For ESS0PPA-XXXX-VV-YYYY-ZZZZ series models where "VV" <= 32V only:  
The outputs has been evaluated as Class 2, Clause 7.12.1**

\*CNR - Indicates investigation to the Canadian Standard for:  
Light emitting Diode (LED) Equipment for Lighting Applications, CAN/CSA-C22.2 No. 250.13 and Power Supplies with Extra-low-voltage Class 2 outputs, CAN/CSA C22.2 NO. 223.

The output has been evaluated as LED Class 2, Low voltage Limited energy, Annex A

**For ESS0PPA-XXXX-VV-YYYY-ZZZZ series models where "VV" <= 32V only:  
The outputs have been evaluated as Extra-Low-Voltage Class 2,  
Clause 8.12**

These devices were additionally investigated to UL 2097, Reference Standard for Double Insulation Systems for Use in Electronic Equipment and CSA C22.2 No. 0.1, General Requirements for Double-Insulated Equipment.

These products been evaluated for the following characteristics.

Model No. [x] applies to all models			Product is rated	Type HL (c)	Type TL (d)
<b>ESS0PPA-XXXX-VV- YYYY-ZZZZ series models where "VV" &lt;=&gt; 34V, &lt;=58</b>	Input type-  [x ] Branch Circuit (Mains)	Output type- [x ] CC  Output is [x ] Isolated [x ] LVLE (LED Class 2) (b)	Dry or Damp	No	No
<b>ESS0PPA-XXXX-VV- YYYY-ZZZZ series models where "VV" &lt;=32V</b>		Output type- [x ] CC  Output is [x ] Isolated [x ] Class 2 (a)			

a- As defined in [X] UL 8750, Clause 7.12.1 [X] and CAN/CSA-C22.2 No. 250.13, Clause 8.12

b- As defined in UL 8750, Section 8.14 and CAN/CSA-C22.2 No. 250.13-12, Annex A

c- Evaluated per UL 8750 requirements for Type HL LED drivers

d- Evaluated per UL 8750 requirements for Type TL LED drivers

#### Conditions of Acceptability:

Use - For use only in (or with) complete equipment where the acceptability of the combination is determined by UL LLC.

1. Rated output loading for these products was achieved using resistive loads or electronic loads.

2. The products have been tested in a still oven required the case temperature (Tc) achieve 90°C with rated load. Tc location as shown in ILL. 8. And the oven ambient listed in the table accordingly for information. Acceptable operation at a higher temperature should be determined in end products.

Model No.	Oven ambient (Ta) / °C		Case temperature (Tc) / °C	
	Test	Corrected Value	Test	Corrected to Tc
<b>ESS0PPA-XXXX-21-YYY-ZZZZ</b>	40	45.6	84.4	90
<b>ESS0PPA-XXXX-58-YYYY-ZZZZ</b>	40	44.3	85.7	90
ESS040W-0900-42	40	46.3	83.7	90
ESS040W-1400-27	40	44.9	85.1	90

3. These products utilize a UL Recognized OBJ2 Class B (130) electrical insulation system.

4. These products are intended for building in. Acceptability of the LED driver- with respect to mounting, spacing, casualty, temperature and segregation- is to be determined as part of the end device evaluation.

5. These products are provided with 18 AWG, stranded, leads, rated 105°C, 300 V minimum for input and output connections. Acceptability of the leads relative to strain relief and secureness, is to be determined as part of the end device evaluation.

6. These products are dimmable using a low voltage 0-10 V proprietary interface. This interface is a source, since the product provides the source of supply. The interface circuits (Purple-grey output wires) of the LED drivers have been evaluated for isolation from primary circuit. The need for evaluating the combination of the drivers and the dimming circuits shall be considered in the end product evaluation.

7. These products are intended for use in dry or damp locations. Acceptable use of location should be determined in end products.

8. These products have been evaluated isolated LVLE output. Some models with an output between 42.4Vdc and 60Vdc. The consideration of end-use application will be determined in the end product evaluation.

9. The housings have not been evaluated as enclosures. Acceptability is to be determined as part of the end device evaluation.

10. These products are intended to be operated in a maximum 20 A branch circuit

11. Double insulation only apply on primary and secondary circuit. Further evaluation shall be determined in end-use application.

12. ESS015W-0350-42-CPLV provided with a 5VA flame class enclosure, Type NH7010 under File E121562). RESISTANCE TO IMPACT Test and MOLD STRESS Test were conducted. Acceptability of the LED driver- with respect to mounting, spacing, casualty, temperature and segregation- is to be determined as part of the end device evaluation.

13. **ESS0PPA-XXXX-VV-YYYY-ZZZZ series models where "VV" => 34V and <= 58V only.** Based on maximum voltage restrictions for Class 2 circuits in the Canadian Electrical Code, the output cannot be accessible. The output terminals of the end product should be evaluated to confirm compliance with this accessibility requirement, either based on output terminal design or based on manufacturer specifications for its use in restricted access areas only. The latter option will require markings on the end product as well as the installation manual.



## CONSTRUCTION DETAILS:

Corrosion Protection - Ferrous metal parts are protected against corrosion by plating or painting.

Soldered Connections - All soldered connections are mechanically secured before soldering.

Printed Wiring Boards - Suitable for the solder time and temperature used by the manufacturer.

"CN" indicates the component has been evaluated to Canadian requirements and the component shall have a Canadian UL certification Mark (C-UL) or UL certification Mark and CSA certification Mark when the Applicant's basic product bearing C-UL certification Mark.

## Product markings-

1. Recognized company name or File number
2. Model designation
3. Factory ID, when more than one factory
4. Optional - Date Code
5. Optional - Electrical Ratings- see electrical ratings table
6. Optional - Output Type- see product characteristics table
7. Optional - "Suitable for dry or damp Locations".
8. Optional - Polarity of the Input and Output Connections
9. Optional - Temperature Measurement Point (Tc): 90°C.
10. Optional - "Dimmable".
11. Optional - "DOUBLE INSULATION", "DOUBLE INSULATED" or symbol:



\*12. Optional - LED Class 2 (Per CAN/CSA-C22.2 No. 250.13-12, Annex A).

(ESS0PPA-XXXX-VV-YYYY-ZZZZ series models where "VV" =>34V and <= 58V only.)

13. Optional - "Class 2" (ESS0PPA-XXXX-VV-YYYY-ZZZZ series models where "VV"<=32V

## MODEL DIFFERENCES:

All products covered in this report utilize the same PWB design, circuit diagram, transformer, enclosure constructions and input/ output connection scheme (via supply leads) except model designation, input and output ratings and component ratings. See ILL. 7 for different component ratings.

**Models ESS015W-0440-25-ROA, ESS030W-0700-39-ROA, ESS030W-0900-32-ROA all belong to the ESS0PPA-XXXX-VV-YYYY-ZZZZ series.**

Illustrations - The following illustrations are included in this Report.

ILL. No.	Description
ILL. 1	Dimension drawings of Housing
ILL. 2	PWB Layout
ILL. 3	Line Filter (L5) Specification
ILL. 4	Inductance (L3) Specification
ILL. 5	Inductance (L1) Specification
ILL. 6	Transformer (T1) Specification
ILL. 7	Different component ratings among models
ILL. 8	Drawing for Tc location

Model **ESS040A-XXXX-VV-YYYY-ZZZZ**

General - Similar to Model ESS040W-0690-58-YYY-ZZZ and ESS030W-1400-21-YYY-ZZZ except as described below.

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F) IG (I) LL
1	Resistor (R5)	-	Various	Various	From 5.49 k $\Omega$ to 5.76 k $\Omega$ (1.4 A -0.9 A)	

# CERTIFICATE OF COMPLIANCE

**Certificate Number** 20160609-E343741  
**Report Reference** E343741-20140620  
**Issue Date** 2016-JUNE-09


**Issued to:** ENERGY RECOVERY PRODUCTS (ZHUHAI) CO LTD  
NANPING SCIENTIFIC TEC INDUSTRY PARK  
NO 8 PINGDONG RD 2, ZHUHAI  
GUANGDONG 519060 CHINA

**This is to certify that  
representative samples of** COMPONENT - DRIVERS FOR LIGHT-EMITTING-DIODE  
ARRAYS, MODULES AND CONTROLLERS  
Refer to addendum page for Models

Have been investigated by UL in accordance with the  
Standard(s) indicated on this Certificate.

**Standard(s) for Safety:** Refer to addendum  
**Additional Information:** See the UL Online Certifications Directory at  
[www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's  
Certification and Follow-Up Service.

The UL Recognized Component Mark generally consists of the manufacturer's identification and catalog  
number, model number or other product designation as specified under "Marking" for the particular  
Recognition as published in the appropriate UL Directory. As a supplementary means of identifying products  
that have been produced under UL's Component Recognition Program, UL's Recognized Component Mark:  
, may be used in conjunction with the required Recognized Marks. The Recognized Component Mark is  
required when specified in the UL Directory preceding the recognitions or under "Markings" for the individual  
recognitions.

Recognized components are incomplete in certain constructional features or restricted in performance  
capabilities and are intended for use as components of complete equipment submitted for investigation rather  
than for direct separate installation in the field. The final acceptance of the component is dependent upon its  
installation and use in complete equipment submitted to UL LLC.

Look for the UL Certification Mark on the product.



Bruce Mahrenholz, Director North American Certification Program

UL LLC

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contact a local UL Customer Service Representative at <http://ul.com/aboutul/locations/>



# CERTIFICATE OF COMPLIANCE

**Certificate Number** 20160609-E343741  
**Report Reference** E343741-20140620  
**Issue Date** 2016-JUNE-09

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

USR, CNR- Component LED Driver, Series ESS0PPA-XXXX-VV-YYYY-ZZZZ.

Where "PP" – If  $P_{out} < 11W$ , "PP"=10; if  $11W < P_{out} < 15W$ , "PP"=15; if  $15W < P_{out} < 20W$ , "PP"=20; if  $20W < P_{out} < 30W$ , "PP"=30; if  $30W < P_{out} < 40W$ , "PP"=40.

"A" - Denotes input voltage code. If input rated 120Vac, "A"=U; if input rated 120-277Vac, "A"=W; if input rated 277Vac, "A"=V; if input rated 230Vac, "A"=E.

"XXXX" - Denotes regulated output current or could be blank. Regulated output current is not greater than max output regulated current within the output voltage range.

"VV" - Denotes maximum output voltage. It may be "21", "23", "24", "26", "27", "30", "32", "34", "36", "42", "56" or "58".

"YYYY" - Denotes customer code for market purpose only, where "Y" represents 0-9, A-Z or blank.

"ZZZZ" - Denotes customer code for market purpose only, where "Z" represents 0-9, A-Z or blank.


Standard(s) for Safety:

UL 8750 - Light Emitting Diode (LED) Equipment For Use In Lighting Products.

UL 1310 - Class 2 Power Units

CAN/CSA C22.2 No. 250.13-14- Light Emitting Diode (LED) Equipment For Lighting Applications.

CAN/CSA C22.2 NO. 223 - POWER SUPPLIES WITH EXTRA-LOW-VOLTAGE CLASS 2 OUTPUTS.



Bruce Mahrenholz, Director North American Certification Program

UL LLC

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## DESCRIPTION

## PRODUCT COVERED:

USR, CNR- Component LED Driver, Series **ESS0PPA-XXXX-VV-YYYY-ZZZZ**.

Where "PP"- If Pout<11W, "PP"=10; if 11W<Pout<15W, "PP"=15; if 15W<Pout<20W, "PP"=20; if 20W<Pout<30W, "PP"=30; if 30W<Pout<40W, "PP"=40.

"A" - Denotes input voltage code. If input rated 120Vac, "A"=U; if input rated 120-277Vac, "A"=W; if input rated 277Vac, "A"=V; if input rated 230Vac, "A"=E.

"XXXX" - Denotes regulated output current or could be blank. Regulated output current is not greater than max output regulated current within the output voltage range.

"VV" - Denotes maximum output voltage. It may be "21", "23", "24", "26", "27", "30", "32", "34", "36", "42", "56" or "58".

"YYYY" - Denotes customer code for market purpose only, where "Y" represents 0-9, A-Z or blank.

"ZZZZ" - Denotes customer code for market purpose only, where "Z" represents 0-9, A-Z or blank.

## ELECTRICAL RATINGS:

Model No.	Input				Output		
	Voltage (Vac)	Frequency (Hz)	Current (A)	Power Factor (PF)	Max. Voltage (Vdc)	Max. Current (mA)	Max. Power (W)
<b>ESS0PPA-XXXX-VV-YYYY-ZZZZ</b>	120, 120-277, 277, 230	50/60	0.35	>0.9	56	1400	29.4
<b>ESS0PPA-XXXX-58-YYYY-ZZZZ</b>	120, 120-277, 277, 230	50/60	0.35	>0.9	58	690	40.0
ESS015W-0350-42-CPLV	120, 120-277, 277, 230	50/60	0.35	>0.9	42	350	14.7
<b>ESS040A-XXXX-VV-YYYY-ZZZZ</b>	120, 120-277, 277, 230	50/60	0.35	>0.9	42	1400	37.8
<b>ESS015W-0440-25-ROA</b>	<b>120, 120-277, 277, 230</b>	<b>50/60</b>	<b>0.35</b>	<b>&gt;0.9</b>	<b>25</b>	<b>440</b>	<b>11.0</b>
<b>ESS030W-0700-39-ROA</b>	<b>120, 120-277, 277, 230</b>	<b>50/60</b>	<b>0.35</b>	<b>&gt;0.9</b>	<b>39</b>	<b>700</b>	<b>27.3</b>
<b>ESS030W-0900-32-ROA</b>	<b>120, 120-277, 277, 230</b>	<b>50/60</b>	<b>0.35</b>	<b>&gt;0.9</b>	<b>32</b>	<b>900</b>	<b>28.8</b>

## TECHNICAL CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

USR - Indicates investigation to the United States Standards for Light Emitting Diode (LED) Light Equipment for Use in Lighting Products, UL 8750 and **CLASS 2 POWER UNITS, UL 1310.**

The output has been evaluated as Low voltage Limited energy, Section 8.14

**For ESS0PPA-XXXX-VV-YYYY-ZZZZ series models where "VV" <= 32V only:  
The outputs has been evaluated as Class 2, Clause 7.12.1**

\*CNR - Indicates investigation to the Canadian Standard for:  
Light emitting Diode (LED) Equipment for Lighting Applications, CAN/CSA-C22.2 No. 250.13 and **Power Supplies with Extra-low-voltage Class 2 outputs, CAN/CSA C22.2 NO. 223.**

The output has been evaluated as LED Class 2, Low voltage Limited energy, Annex A

**For ESS0PPA-XXXX-VV-YYYY-ZZZZ series models where "VV" <= 32V only:  
The outputs have been evaluated as Extra-Low-Voltage Class 2,  
Clause 8.12**

These devices were additionally investigated to UL 2097, Reference Standard for Double Insulation Systems for Use in Electronic Equipment and CSA C22.2 No. 0.1, General Requirements for Double-Insulated Equipment.

These products been evaluated for the following characteristics.

Model No. [x] applies to all models			Product is rated	Type HL (c)	Type TL (d)
<b>ESS0PPA-XXXX-VV- YYYY-ZZZZ series models where "VV" &lt;=&gt; 34V, &lt;=58</b>	Input type-  [x ] Branch Circuit (Mains)	Output type- [x ] CC  Output is [x ] Isolated [x ] LVLE (LED Class 2) (b)	Dry or Damp	No	No
<b>ESS0PPA-XXXX-VV- YYYY-ZZZZ series models where "VV" &lt;=32V</b>		Output type- [x ] CC  Output is [x ] Isolated [x ] Class 2 (a)			

a- As defined in [X] UL 8750, Clause 7.12.1 [X] and CAN/CSA-C22.2 No. 250.13, Clause 8.12

b- As defined in UL 8750, Section 8.14 and CAN/CSA-C22.2 No. 250.13-12, Annex A

c- Evaluated per UL 8750 requirements for Type HL LED drivers

d- Evaluated per UL 8750 requirements for Type TL LED drivers

#### Conditions of Acceptability:

Use - For use only in (or with) complete equipment where the acceptability of the combination is determined by UL LLC.

1. Rated output loading for these products was achieved using resistive loads or electronic loads.

2. The products have been tested in a still oven required the case temperature (Tc) achieve 90°C with rated load. Tc location as shown in ILL. 8. And the oven ambient listed in the table accordingly for information. Acceptable operation at a higher temperature should be determined in end products.

Model No.	Oven ambient (Ta) / °C		Case temperature (Tc) / °C	
	Test	Corrected Value	Test	Corrected to Tc
<b>ESS0PPA-XXXX-21-YYY-ZZZZ</b>	40	45.6	84.4	90
<b>ESS0PPA-XXXX-58-YYYY-ZZZZ</b>	40	44.3	85.7	90
ESS040W-0900-42	40	46.3	83.7	90
ESS040W-1400-27	40	44.9	85.1	90

3. These products utilize a UL Recognized OBJ2 Class B (130) electrical insulation system.

4. These products are intended for building in. Acceptability of the LED driver- with respect to mounting, spacing, casualty, temperature and segregation- is to be determined as part of the end device evaluation.

5. These products are provided with 18 AWG, stranded, leads, rated 105°C, 300 V minimum for input and output connections. Acceptability of the leads relative to strain relief and secureness, is to be determined as part of the end device evaluation.

6. These products are dimmable using a low voltage 0-10 V proprietary interface. This interface is a source, since the product provides the source of supply. The interface circuits (Purple-grey output wires) of the LED drivers have been evaluated for isolation from primary circuit. The need for evaluating the combination of the drivers and the dimming circuits shall be considered in the end product evaluation.

7. These products are intended for use in dry or damp locations. Acceptable use of location should be determined in end products.

8. These products have been evaluated isolated LVLE output. Some models with an output between 42.4Vdc and 60Vdc. The consideration of end-use application will be determined in the end product evaluation.

9. The housings have not been evaluated as enclosures. Acceptability is to be determined as part of the end device evaluation.

10. These products are intended to be operated in a maximum 20 A branch circuit

11. Double insulation only apply on primary and secondary circuit. Further evaluation shall be determined in end-use application.

12. ESS015W-0350-42-CPLV provided with a 5VA flame class enclosure, Type NH7010 under File E121562). RESISTANCE TO IMPACT Test and MOLD STRESS Test were conducted. Acceptability of the LED driver- with respect to mounting, spacing, casualty, temperature and segregation- is to be determined as part of the end device evaluation.

13. **ESS0PPA-XXXX-VV-YYYY-ZZZZ series models where "VV" => 34V and <= 58V only.** Based on maximum voltage restrictions for Class 2 circuits in the Canadian Electrical Code, the output cannot be accessible. The output terminals of the end product should be evaluated to confirm compliance with this accessibility requirement, either based on output terminal design or based on manufacturer specifications for its use in restricted access areas only. The latter option will require markings on the end product as well as the installation manual.



## CONSTRUCTION DETAILS:

Corrosion Protection - Ferrous metal parts are protected against corrosion by plating or painting.

Soldered Connections - All soldered connections are mechanically secured before soldering.

Printed Wiring Boards - Suitable for the solder time and temperature used by the manufacturer.

"CN" indicates the component has been evaluated to Canadian requirements and the component shall have a Canadian UL certification Mark (C-UL) or UL certification Mark and CSA certification Mark when the Applicant's basic product bearing C-UL certification Mark.

## Product markings-

1. Recognized company name or File number
2. Model designation
3. Factory ID, when more than one factory
4. Optional - Date Code
5. Optional - Electrical Ratings- see electrical ratings table
6. Optional - Output Type- see product characteristics table
7. Optional - "Suitable for dry or damp Locations".
8. Optional - Polarity of the Input and Output Connections
9. Optional - Temperature Measurement Point (Tc): 90°C.
10. Optional - "Dimmable".
11. Optional - "DOUBLE INSULATION", "DOUBLE INSULATED" or symbol:



\*12. Optional - LED Class 2 (Per CAN/CSA-C22.2 No. 250.13-12, Annex A).

(ESS0PPA-XXXX-VV-YYYY-ZZZZ series models where "VV" =>34V and <= 58V only.)

13. Optional - "Class 2" (ESS0PPA-XXXX-VV-YYYY-ZZZZ series models where "VV"<=32V

## MODEL DIFFERENCES:

All products covered in this report utilize the same PWB design, circuit diagram, transformer, enclosure constructions and input/ output connection scheme (via supply leads) except model designation, input and output ratings and component ratings. See ILL. 7 for different component ratings.

**Models ESS015W-0440-25-ROA, ESS030W-0700-39-ROA, ESS030W-0900-32-ROA all belong to the ESS0PPA-XXXX-VV-YYYY-ZZZZ series.**

Illustrations - The following illustrations are included in this Report.

ILL. No.	Description
ILL. 1	Dimension drawings of Housing
ILL. 2	PWB Layout
ILL. 3	Line Filter (L5) Specification
ILL. 4	Inductance (L3) Specification
ILL. 5	Inductance (L1) Specification
ILL. 6	Transformer (T1) Specification
ILL. 7	Different component ratings among models
ILL. 8	Drawing for Tc location

Model **ESS040A-XXXX-VV-YYYY-ZZZZ**

General - Similar to Model ESS040W-0690-58-YYY-ZZZ and ESS030W-1400-21-YYY-ZZZ except as described below.

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F) IG (I) LL
1	Resistor (R5)	-	Various	Various	From 5.49 k $\Omega$ to 5.76 k $\Omega$ (1.4 A -0.9 A)	

TEST RECORD NO. 1

## SAMPLES:

Samples of the LED Drivers, Series **ESS0PPA-XXXX-VV-YYYY-ZZZZ** as indicated below and constructed as described herein, was submitted by the manufacturer for examination and test.

Full tests conducted on Models **ESS0PPA-XXXX-21-YYYY-ZZZZ** and ESS0PPA-XXXX-58-YYY-ZZZ were considered representative of entire ESS0PPA-XXXX-VV-YYY-ZZZ series.

## GENERAL:

Test results relate only to the items tested.

The following tests were conducted.

Test Name	Standard (CSA Test Name)/ Paragraph
INPUT	UL8750- 8.2 CSA 250.13- 9.2
WORKING VOLTAGE MEASUREMENT	UL 8750- 7.8.3, 8.4.1 CSA 250.13- 8.8.3, 9.4.1
DIELECTRIC VOLTAGE WITHSTAND	UL 8750- 8.4 CSA 250.13- 9.4
BARE PW BOARD DIELECTRIC VOLTAGE WITHSTAND TEST	UL 8750- 8.4 CSA 250.13- 9.4
ABNORMAL COMPONENT FAILURE	UL 8750- 8.5.2 (UL 1310- 39.7) CSA 250.13- 9.5.2 (CSA 223-M91- 6.7)
OUTPUT LOADING TEST	UL 8750- 8.5.3 CSA C22.2 No. 250.13- 9.5.3
LEAKAGE CURRENT TEST	UL 8750- 8.7 CSA 250.13- 9.7
DETERMINATION OF LOW-VOLTAGE, LIMITED-ENERGY CIRCUIT STATUS	UL 8750- 8.14 CSA 250.13- 8.12.2, Annex A
TRANSFORMER INSULATING MATERIALS	UL 8750-7.11 CSA 250.13- 8.11
TEMPERATURE TEST	UL 8750- 8.3 CSA 250.13- 9.3
RESISTANCE TO IMPACT (POLYMERIC ENCLOSURES)	UL 8750- 6.3.2 UL 746C- 56
MOLD STRESS (POLYMERIC ENCLOSURES)	UL 8750- 6.3.2 UL 746C- 29, 31, 61

The test methods and results of the above tests have been reviewed and found in accordance with the Standards for Light Emitting Diode (LED) Equipment For Use In Lighting Products, UL 8750. Light emitting Diode (LED) Equipment for Lighting Applications, CAN/CSA-C22.2 No. 250.13.

TEST RECORD NO. 2

SAMPLES:

Representative sample of the LED Driver, Model **ESS0PPA-XXXX-21-YYYY-ZZZZ** with alternate construction as below were submitted for review.

- Adding Potting Compound alternate;
- Adding Electrical Insulation System alternate, with no change in material;

GENERAL:

Test results relate only to the items tested.

Generic material of alternate compound, type ZS-GF Series (under UL File E329120), and alternate Electrical Insulation System, type ERP-130 are the same as the existing potting material and system, therefore, testing of the device was not considered necessary.

The test methods and results of the above tests have been reviewed and found in accordance with the requirements in the following:

Standard	Title	Edition or Publication Date	Latest Revision Date
CAN/CSA C22.2 No. 250.13-14	Light emitting diode (LED) equipment for lighting applications	2nd	2014-07-01
UL 8750	Light Emitting Diode (LED) Equipment For Use In Lighting Products	1st	2014-05-22

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

Karl Chang  
Engineer

TEST RECORD NO. 4

SAMPLES:

Representative sample of the LED Driver, Model **ESS040W-0900-42-YYYY-ZZZZ** and **ESS040W-1400-27-YYYY-ZZZZ**, as below were submitted for review.

Model No.	Similar to Recognized Model	Component Difference
<b>ESS040W-0900-42-YYYY-ZZZZ</b>	<b>ESS040W-0690-58-YYYY-ZZZZ</b>	R5-5.76 k $\Omega$
<b>ESS040W-1400-27-YYYY-ZZZZ</b>	<b>ESS030W-1400-21-YYYY-ZZZZ</b>	R5-5.49 k $\Omega$

Additional tests were not considered necessary due to tests conducted in Test Record Nos. 1-3.

Tests conducted on the above models were considered representative of entire **ESS040A-XXXX-VV-YYYY-ZZZZ** series.

GENERAL:

Test results relate only to the items tested. The following tests were conducted.

Test Name	Standard (CSA Test Name)/ Paragraph
INPUT	UL8750- 8.2 CSA 250.13- 9.2
DIELECTRIC VOLTAGE WITHSTAND	UL 8750- 8.4 CSA 250.13- 9.4
ABNORMAL COMPONENT FAILURE	UL 8750- 8.5.2 (UL 1310- 39.7) CSA 250.13- 9.5.2 (CSA 223-M91- 6.7)
OUTPUT LOADING TEST	UL 8750- 8.5.3 CSA C22.2 No. 250.13- 9.5.3
LEAKAGE CURRENT TEST	UL 8750- 8.7 CSA 250.13- 9.7
DETERMINATION OF LOW-VOLTAGE, LIMITED-ENERGY CIRCUIT STATUS	UL 8750- 8.14 CSA 250.13- 8.12.2, Annex A
TEMPERATURE TEST	UL 8750- 8.3 CSA 250.13- 9.3

TEST RECORD NO. 6

## SAMPLES

A sample of the component LED Drivers as indicated below and constructed as described herein, was submitted by the manufacturer for examination and test.

Models ESS0PPA-XXXX-21-YYYY-ZZZZ, ESS0PPA-XXXX-32-YYYY-ZZZZ were submitted to evaluate for Class 2 output levels.

These models were used for test purposes and considered representative of the ESS0PPA-XXXX-VV-YYYY-ZZZZ series models where "VV" <= 32V only.

Only limited tests were considered necessary due to tests covered under Test Record Nos. 1-4.

## GENERAL:

The following tests were conducted:

INPUT	UL 8750- 8.2 CSA 250.13- 9.2
DIELECTRIC VOLTAGE WITHSTAND	UL 8750- 8.6 CSA 250.13- 9.4
ABNORMAL COMPONENT FAILURE	UL 8750- 8.7.2 CSA 250.13- 9.5.2
CLASS 2 OUTPUT CIRCUITS- OUTPUT VOLTAGE	UL 8750- 7.12.1 (UL 1310- 28)
CLASS 2 OUTPUT CIRCUITS- OUTPUT CURRENT & POWER	UL 8750- 7.12.1 (UL 1310- 30)

## Test Record Summary:

The results of this investigation, including construction review and testing, indicate that the products evaluated complies with the applicable requirements in the standards noted below and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report. Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

Standard	Title	Edition or Publication Date	Latest Revision Date
UL 8750	Light Emitting Diode (LED) Equipment For Use In Lighting Products	2nd Edition	2015-09-15
UL 1310	Class 2 Power Units	6th Edition	2014-12-12
CAN/CSA C22.2 No. 250.13-14	Light Emitting Diode (LED) Equipment For Lighting Applications	2nd Edition	2014-07-01
CAN/CSA C22.2 NO. 223	POWER SUPPLIES WITH EXTRA-LOW-VOLTAGE CLASS 2 OUTPUTS	3rd Edition	2015-12-01

Test Record by:

ANDREW BUTT  
Senior Project Engineer  
UL International Ltd.

Reviewed by:

MICHAEL HAMILTON  
Project Engineer